Tasman Extension Project

Environmental Impact Statement

APPENDIX G

TERRESTRIAL FAUNA ASSESSMENT

Resource Strategies

DONALDSON COAL

Part of Gloucester Coal

TASMAN EXTENSION PROJECT

TERRESTRIAL FAUNA ASSESSMENT

PREPARED BY
Dr Arthur White
Biosphere Environmental Consultants Pty Ltd

JUNE 2012
Project No. DCL-09-01
Document No. 00455392

TABLE OF CONTENTS

Section			Page
1	INTRODUCTION		1
	1.1	SURVEY OBJECTIVES	1
	1.2	BIOGEOGRAPHIC AND ZOOGEOGRAPHIC REGIONAL SETTING	3
		1.2.1 Hunter Valley Bioregion	3
		1.2.2 Zoogeographic Region	3
	1.3	PREVIOUS FAUNA SURVEYS	3
	1.4	DESCRIPTION OF THE PROJECT AREA	3
		1.4.1 General	3
		1.4.2 Climate	5
		1.4.3 Hydrology and Topography	5
		1.4.4 Vegetation Communities and Habitat Types	5
		1.4.5 Possible Occurrence of Threatened Species	8
		1.4.6 Threatened and Endangered Ecological Communities	9
2	SURVEY METHODS		11
	2.1	SURVEY TIMING AND CONDITIONS	11
		2.1.1 Timing	11
		2.1.2 Conditions	11
	2.2	FAUNA SURVEY SITES	12
		2.2.1 Systematic Survey Sites	12
		2.2.2 Targeted Survey Sites	14
		2.2.3 Opportunistic Sightings	15
	2.3	FAUNA SURVEY TECHNIQUES	17
		2.3.1 Ground and Arboreal Mammals (excluding Bats)	17
		2.3.2 Bats	18
		2.3.3 Diurnal Birds	18
		2.3.4 Owls	18
		2.3.5 Reptiles	19
		2.3.6 Frogs	19
	2.4	HABITAT ASSESSMENT	19
	2.5	RELATIVE ABUNDANCE	20
3	SURVEY RESULTS		21
	3.1	MAJOR FAUNA HABITAT TYPES	21
	3.2	FAUNA SPECIES DIVERSITY AND ABUNDANCE	22
		3.2.1 Species Diversity across Project Area	22
		3.2.1 Amphibians	24
		3.2.2 Reptiles	25
		3.2.3 Birds	25
		3.2.4 Mammals	25
		3.2.5 Introduced Fauna	25
	3.3	THREATENED FAUNA SPECIES	32
4	EVALUATION OF POTENTIAL IMPACTS		37
	4.1	POTENTIAL IMPACTS OF PROJECT SURFACE ACTIVITIES ON FAUNA AND THEIR HABITAT	37
	4.2	POTENTIAL IMPACTS OF SUBSIDENCE EFFECTS ON FAUNA AND THEIR HABITAT	38

TABLE OF CONTENTS (continued)

4.3 OTHER DIRECT OR INDIRECT POTENTIAL IMPACTS ON FAUNA AND THEIR HABITAT 38
4.4 SEPP 44 – KOALA HABITAT ASSESSMENT 40
5 IMPACT AVOIDANCE AND MITIGATION MEASURES 43
5.1 SUBSIDENCE PERFORMANCE MEASURES AND SUBSIDENCE CONTROL ZONES 43
5.2 LAND CLEARING STRATEGIES 46
5.3 MISCELLANEOUS PROGRAMMES 47
5.4 REHABILITATION OF SURFACE DISTURBANCE AREA 48
6 THREATENED FAUNA IMPACT ASSESSMENT 49
6.1 ASSESSMENT APPROACH 49
6.2 THREATENED SPECIES RECORDED DURING PROJECT SURVEYS 50
6.2.1 Glossy Black-cockatoo 50
6.2.2 Little Lorikeet 54
6.2.3 Yellow-bellied Glider 58
6.2.4 Grey-headed Flying-fox 61
6.2.5 Large-eared Pied Bat 65
6.2.6 Eastern False Pipistrelle 68
6.3 THREATENED SPECIES CONSIDERED POSSIBLE OCCURRENCES IN PROJECT AREA BUT NOT RECORDED DURING PROJECT SURVEYS 72
6.3.1 Amphibians 72
6.3.2 Reptiles 76
6.3.3 Woodland Birds 79
6.3.4 Mammals 82
7 CONCLUSION 90
8 REFERENCES 91

LIST OF TABLES

Table 1 Threatened Fauna Species Considered Possible Occurrences in the Project Area and Surrounds
Table 2 Vegetation Communities Recorded across Proposed Pit Top Area
Table 3 Weather Conditions during Fauna Surveys
Table 4 Systematic Survey Sites
Table 5 Targeted Survey Sites
Table 6 Location of Opportunistic Fauna Sightings
Table 7 Distribution of Fauna Species across and Surrounding the Proposed Pit Top Area
Table 8 Distribution of Fauna Species across Systematic and Targeted Survey Sites
Table 9 Distribution of Fauna Species Observed Opportunistically across and Surrounding the Project Area
Table 10 Relative Abundance in Fauna Groupings
Table 11 Fauna Species Recorded during Project Surveys
Table 12 Threatened Fauna Species Recorded during Project Surveys
Table 13 Relevant Subsidence Performance Measures for Significant Surface Features

TABLE OF CONTENTS (continued)

LIST OF FIGURES

Figure 1	Regional Location
Figure 2	Project General Arrangement
Figure 3	Surface Features of the Project Area and Surrounds
Figure 4	Vegetation Communities
Figure 5	Fauna Survey Sites
Figure 6a and 6b	Threatened Fauna Species Recorded During Project Surveys
Figure 7	Subsidence Control Zones

LIST OF ATTACHMENTS

Attachment A	Threatened Fauna Species Database Search Results
Attachment B	Survey Effort
Attachment C-A	Fauna Species Recorded during the Project Surveys at Systematic Survey Sites S1 to S12
Attachment C-B	Fauna Species Recorded during the Project Surveys at Targeted Survey Sites T1 to T26
Attachment D	Threatened Fauna Species Distribution/Habitat Requirements in Relation to the Project Area
Attachment E-A1	Threatened Fauna Species – Mammals
Attachment E-A2	Threatened Fauna Species – Mammals
Attachment E-B1	Threatened Fauna Species – Birds
Attachment E-B2	Threatened Fauna Species – Birds
Attachment E-C	Threatened Fauna Species – Amphibians and Reptiles

1 INTRODUCTION

A comprehensive fauna survey of the Tasman Extension Project (the Project) area located in the lower Hunter Valley in New South Wales (NSW) (Figure 1) was carried out in three stages: in April 2011, October 2011 and December 2011. The initial fauna survey was conducted from 6 to 10 April 2011 inclusive. The second and third stages of the fauna survey were conducted during 12 to 16 October 2011 and 5 to 9 December 2011.

This report lists the fauna records compiled from relevant database searches and field surveys and assesses any potential impacts that might arise from the proposed Project on relevant fauna species and their habitat.

The fauna surveys involved a variety of survey methods conducted at systematic and targeted survey sites located within and surrounding the Project area.

The existing Tasman Underground Mine was declared under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 2000* (EPBC Act) "Not a Controlled Action" on 9 May 2002 (2001/253).

The Project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) under the EPBC Act on 5 December 2011.

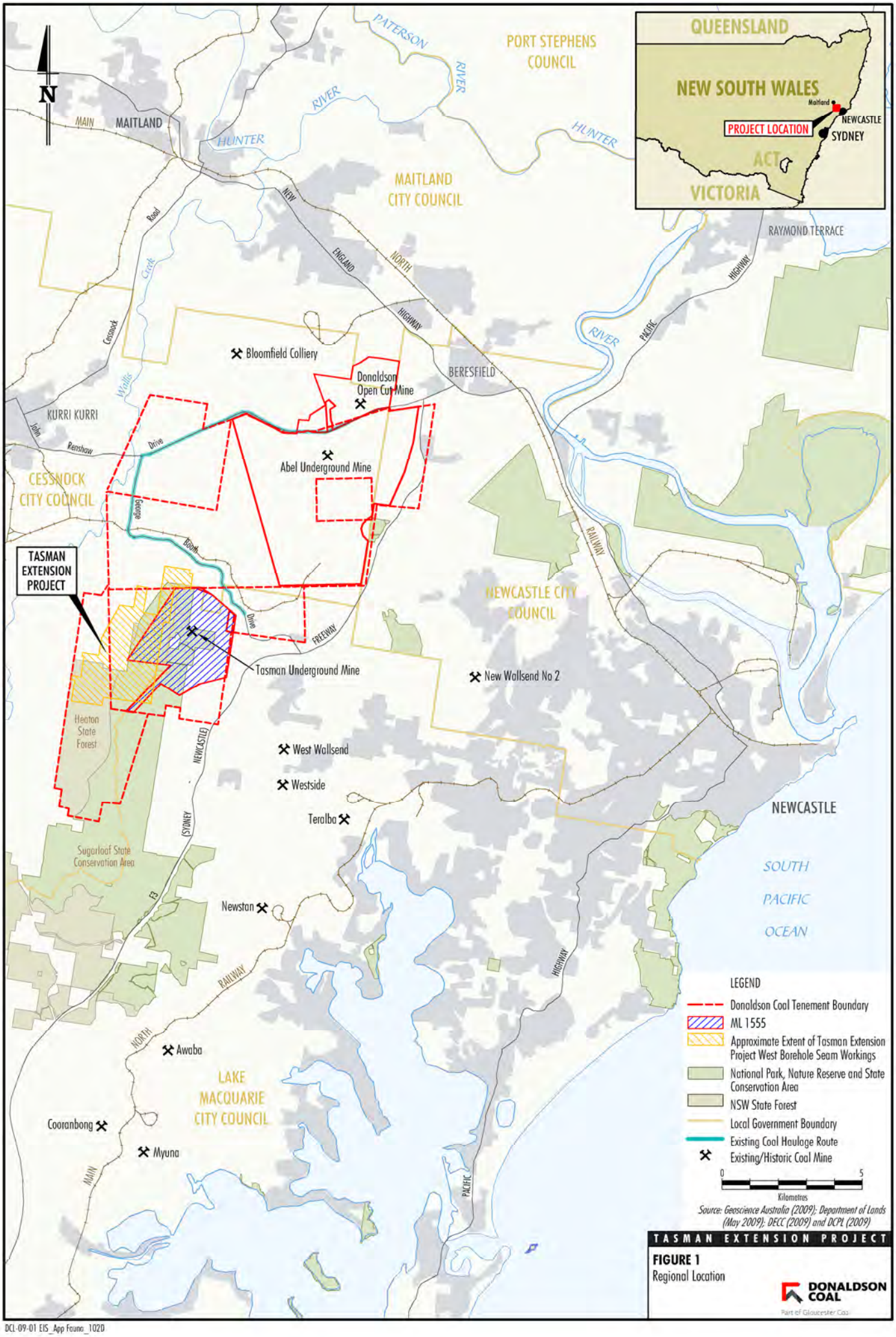
On 10 January 2012, a delegate of the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities declared the Project was "Not a Controlled Action" (2011/6211). Therefore the Project does not require assessment and approval under the EPBC Act.

1.1 SURVEY OBJECTIVES

The objectives of the fauna surveys were to:

- Conduct fauna surveys within the Project area and its surrounds utilising recognised fauna survey techniques.
- Assess fauna species diversity (native and introduced) and their relative abundance.
- Conduct database searches for threatened fauna species within the Project area or surrounds and map the location of the threatened species records.
- Report on the findings of the Project fauna surveys.

This Terrestrial Fauna Assessment has been prepared in accordance with the Director-General's Requirements for the Project, the *Threatened Species Survey and Assessment: Guidelines for Developments and Activities* (NSW Department of Environment and Conservation [DEC], 2004) and in consideration of the requirements under Part 3A of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act).



TASMAN EXTENSION PROJECT

FIGURE 1
Regional Location

DONALDSON COAL
Part of Gloucester Coal

DCL-09-01 EIS_App Fauna_102D

1.2 BIOGEOGRAPHIC AND ZOOGEOGRAPHIC REGIONAL SETTING

1.2.1 Hunter Valley Bioregion

The Project area and surrounds lie within the Sydney Basin Interim Biogeographic Regionalisation of Australia (IBRA) bioregion on the central east coast of NSW. The bioregion extends from just north of Batemans Bay to Nelson Bay on the central coast, and almost as far west as Mudgee. The bioregion is bordered to the north by the North Coast and Brigalow Belt South Bioregions, to the south by the South East Corner Bioregion and to the west by the South Eastern Highlands and South Western Slopes Bioregions (SEWPaC, 2012a).

1.2.2 Zoogeographic Region

The study area and surrounds are also located within the Bassian zoogeographic region proposed by Spencer (1896) and modified by Schodde (1994) (cited in Date *et al*. [2000]). The Bassian zoogeographic region (coastal zone) is a coarse but more useful predictor of faunal assemblages than the Sydney Basin IBRA bioregion. While IBRA bioregions have helped to rationalise our understanding of landscape patterns, fauna species tend to respond more to vegetation structure (i.e. grassland, woodland and forest) rather than to particular vegetation communities *per se*.

1.3 PREVIOUS FAUNA SURVEYS

Several fauna studies by various specialists (including the former NSW Department of Environment and Climate Change [DECC]) have been undertaken in the Project area.

These studies include:

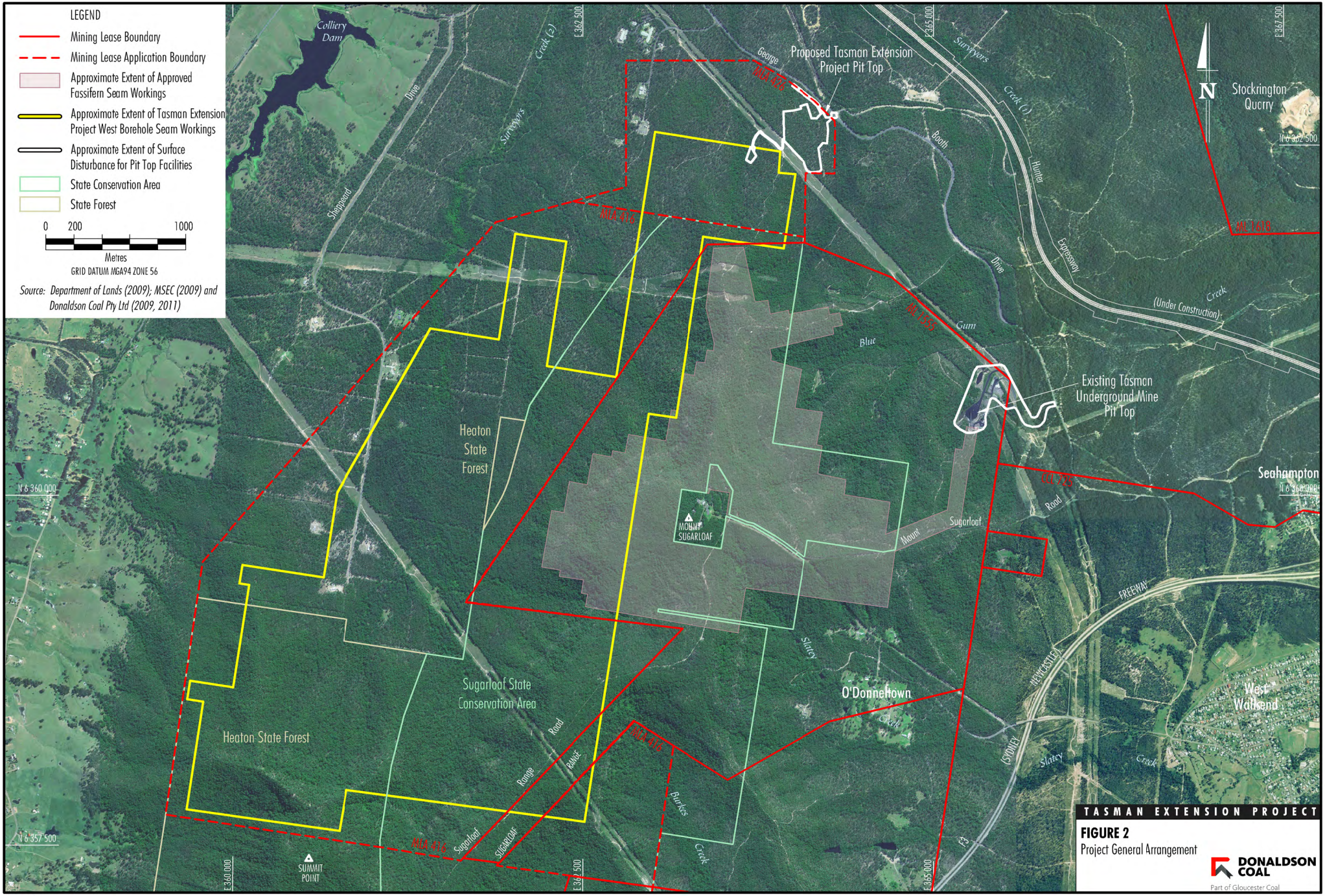
- Gunninah Environmental Consultants (2002) *Tasman Project Proposed Underground Coal Mine Flora and Fauna Assessment*.
- Ecobiological (2007a) *Ecology Assessment for Tasman Mine Panels 10-15 Subsidence Management Plan Application*.
- Ecobiological (2008a) *2008 Annual Flora and Fauna Monitoring Report: Tasman Underground Coalmine Disturbance Area, Mt Sugarloaf, NSW*.
- Ecobiological (2008b) *2008 Annual Flora and Fauna Monitoring Report: Tasman Underground Coalmine Compensatory Habitat Area, Sugarloaf, NSW*.
- DECC (2008a) *The Vertebrate Fauna of the Sugarloaf State Conservation Area*.

1.4 DESCRIPTION OF THE PROJECT AREA

1.4.1 General

The Project is located approximately 20 kilometres (km) west of the Port of Newcastle in NSW within the Newcastle Coalfield (Figure 1).

The Project area includes the extent of the proposed underground workings and extent of the proposed surface disturbance associated with the Project (Figure 2).



DCL-09-01 EIS_App Fauna_103D

1.4.2 Climate

The study area experiences a wet temperate climate. A description of the weather conditions experienced during the Project fauna surveys is provided in Section 2.1.2.

1.4.3 Hydrology and Topography

The majority of the Project area is within the headwaters of the Wallis Creek catchment, which flows into the Hunter River near Maitland (Figure 1). Other portions of the Project area are located in the ephemeral headwaters of Blue Gum Creek that flow to Hexham Swamp approximately 8 km east, and within the headwaters of the Cockle Creek catchment which flows into the northern end of Lake Macquarie. The majority of streams within the Project area are smaller first and second order tributaries to the third order Surveyors Creek, a tributary of Wallis Creek, with flows across the underground mining area of the Project.

The Project area is characterised by undulating to steep terrain comprising the prominent Sugarloaf Range ridgeline spur and several natural drainage gullies (Figures 2 and 3).

1.4.4 Vegetation Communities and Habitat Types

Nine vegetation communities have been mapped within the Project area and surrounds (Hunter Eco, 2012). The vegetation communities are listed below and shown on Figure 4:

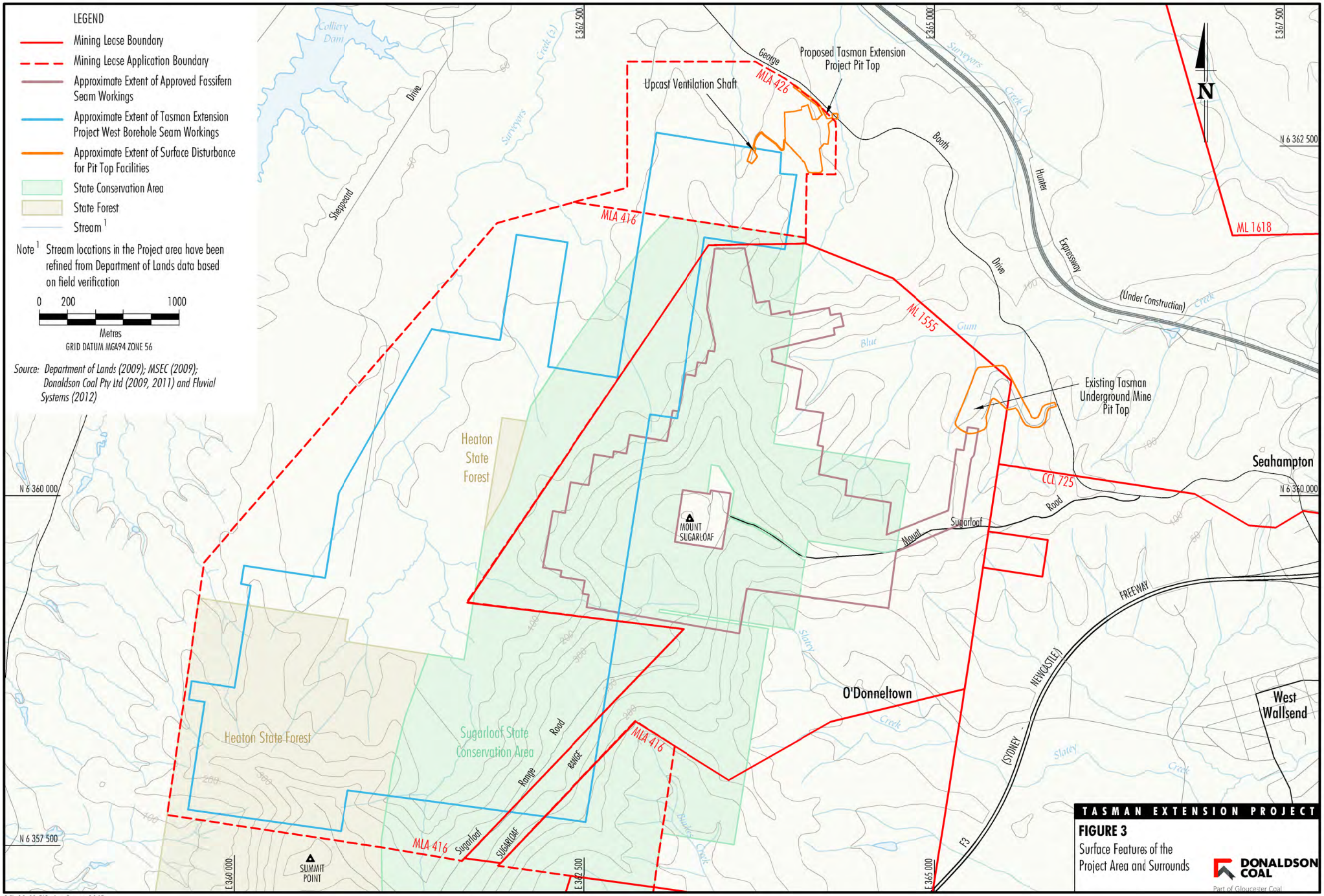
- Hunter Valley Moist Forest.
- Coastal Foothills Spotted Gum – Ironbark Forest.
- Sugarloaf Uplands Paperback Thicket.
- Lower Hunter Spotted Gum – Ironbark Forest.
- Lower Hunter Spotted Gum – Ironbark Forest Honey Myrtle Scrub variant.
- Hunter Lowlands Redgum Forest.
- Warm Temperate Rainforest.
- Coastal Plains Smooth-barked Apple Woodland.
- Alluvial Tall Moist Forest.

Two vegetation communities were mapped within the proposed pit top disturbance area, one of which is listed as an endangered ecological community (EEC) under the NSW *Threatened Species Conservation Act, 1995* (TSC Act) (Section 1.4.6). Cleared powerline easements also intersect the Project area, including an easement between the proposed pit top area and proposed ventilation shaft (Figure 2).

The fauna habitats identified within the Project area can be broadly categorised into four habitat types, *viz*.:

- Moist Forest.
- Dry Forest/Woodland.
- Water (creeks and dams) and associated riparian habitat.
- Cleared land (associated with electricity transmission line easements).

A detailed description of the habitat types is provided in Section 3.1.



TASMAN EXTENSION PROJECT

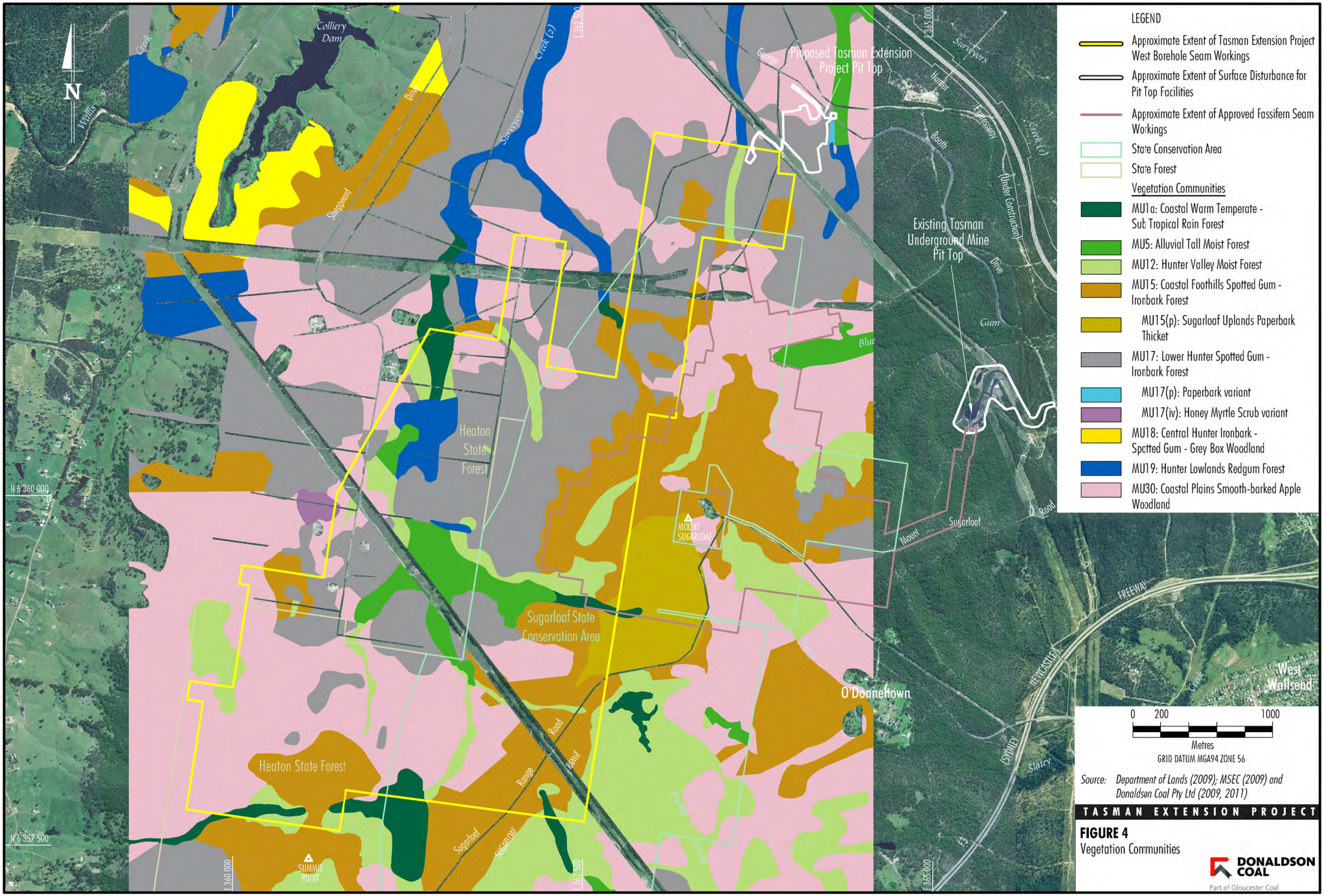
FIGURE 3

Surface Features of the Project Area and Surrounds

DONALDSON COAL

Part of Gloucester Coal

DCL-09-01 EIS_App Fauna_104E



LEGEND

- Approximate Extent of Tasman Extension Project West Borehole Seam Workings
- Approximate Extent of Surface Disturbance for Pit Top Facilities
- Approximate Extent of Approved Fassifern Seam Workings
- State Conservation Area
- State Forest

Vegetation Communities

- MU1a: Coastal Warm Temperate - Sub Tropical Rain Forest
- MU5: Alluvial Tall Moist Forest
- MU12: Hunter Valley Moist Forest
- MU15: Coastal Foothills Spotted Gum - Ironbark Forest
- MU15(p): Sugarloaf Uplands Paperbark Thicket
- MU17: Lower Hunter Spotted Gum - Ironbark Forest
- MU17(p): Paperbark variant
- MU17(iv): Honey Myrtle Scrub variant
- MU18: Central Hunter Ironbark - Spotted Gum - Grey Box Woodland
- MU19: Hunter Lowlands Redgum Forest
- MU30: Coastal Plains Smooth-barked Apple Woodland

0 200 1000

Metres

GRID DATUM MGA94 ZONE 56

Source: Department of Lands (2009); MSEC (2009) and Donaldson Coal Pty Ltd (2009, 2011)

TASMAN EXTENSION PROJECT

FIGURE 4

Vegetation Communities

DONALDSON COAL

Part of Gloucester Coal

DCL-09-01 EIS_App Fauna_105F

1.4.5 Possible Occurrence of Threatened Species

A number of database searches and previous fauna survey records were used to identify threatened species which may occur in a search area of approximately 50 km x 50 km covering the Project area, including:

- OEH BioNet/Atlas of NSW Wildlife (OEH, 2012a);
- EPBC Act Protected Matters Search (SEWPaC, 2012b);
- Birds Australia (2012) database records;
- Australian Museum (2012) database records; and
- previous fauna surveys conducted by other various specialists (Section 1.3).

Based on the results of the database searches and previous surveys, a list of threatened fauna species considered possible occurrences within the Project area or immediate surrounds are provided in Table 1. The threatened species database search results are presented in full in Attachment A. Table 1 is relevant to threatened species with known distribution or potential habitats available within the Project area.

Table 1
Threatened Fauna Species Considered Possible Occurrences in the Project Area and Surrounds

Scientific Name	Common Name	Conservation Status[1]	
		TSC Act	EPBC Act
Amphibians			
Crinia tinnula	Wallum Froglet	V	-
Mixophyes balbus	Stuttering Frog	E	V
Mixophyes iteratus	Giant Barred Frog	E	E
Litoria aurea	Green and Golden Bell Frog	E	V
Litoria brevipalmata	Green-thighed Frog	V	-
Reptiles			
Hoplocephalus stephensii	Stephens' Banded Snake	V	-
Birds			
Lophoictinia isura	Square-tailed Kite	V	-
Hamirostra melanosternon	Black-breasted Buzzard	V	-
Hieraaetus morphnoides	Little Eagle	V	-
Ptilinopus magnificus	Wompoo Fruit-Dove	V	-
Calyptorhynchus lathami	*Glossy Black-cockatoo	V	-
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-
Glossopsitta pusilla	*Little Lorikeet	V	-
Lathamus discolor	Swift Parrot	E	E
Neophema pulchella	Turquoise Parrot	V	-
Tyto tenebricosa	Sooty Owl	V	-
Tyto novaehollandiae	Masked Owl	V	-
Ninox strenua	Powerful Owl	V	-
Ninox connivens	Barking Owl	V	-
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-
Pyrrholaemus saggitatus	Speckled Warbler	V	-

Table 1 (Continued)
Threatened Fauna Species Considered Possible Occurrences in the Project Area and Surrounds

Scientific Name	Common Name	Conservation Status[1]	
		TSC Act	EPBC Act
Birds (Continued)			
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-
Anthochaera phrygia	Regent Honeyeater	CE	E
Epthianura albifrons	White-fronted Chat	V	-
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-
Petroica phoenicea	Flame Robin	V	-
Petroica boodang	Scarlet Robin	V	-
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-
Daphoenositta chrysoptera	Varied Sittella	V	-
Mammals			
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	V	E
Phascolarctos cinereus	Koala	V	-
Petaurus australis	*Yellow-bellied Glider	V	-
Petaurus norfolcensis	Squirrel Glider	V	-
Potorous tridactylus tridactylus	Long-nosed Potoroo (SE mainland)	V	V
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V
Pteropus poliocephalus	*Grey-headed Flying-fox	V	V
Saccolaimus flaviventris	Yellow-bellied Sheathtailed-bat	V	-
Mormopterus norfolkensis	Eastern Freetail-bat	V	-
Kerivoula papuensis	Golden-tipped Bat	V	-
Miniopterus australis	Little Bentwing-bat	V	-
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-
Chalinolobus dwyeri	*Large-eared Pied Bat	V	V
Falsistrellus tasmaniensis	*Eastern False Pipistrelle	V	-
Myotis macropus	Large-footed Myotis	V	-
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-
Vespadelus troughtoni	Eastern Cave Bat	V	-
Pseudomys novaehollandiae	New Holland Mouse	-	V

* Known to occur within the Project area.

[1] Threatened species status under the TSC Act and/or EPBC Act (current as at 22 March 2012).
V = Vulnerable, E = Endangered, CE = Critically Endangered.

1.4.6 Threatened and Endangered Ecological Communities

No threatened ecological communities listed under the EPBC Act have been recorded in the Project area or immediate surrounds by previous flora surveys (Hunter Eco, 2012; Ecobiological, 2007a, 2008a, 2008b; Gunninah Environmental Consultants, 2002).

The following EECs listed under the TSC Act have been recorded in the Project area and surrounds (Hunter Eco, 2012; Ecobiological, 2007a, 2008a, 2008b; Gunninah Environmental Consultants, 2002):

- *Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion*;
- *Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions*;
- *Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions*; and
- *Riverflat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions*.

The proposed pit top area includes a portion of an EEC listed under the TSC Act *viz*.: *Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion.* Directly adjacent to the proposed pit top area is the Hunter Lowlands Redgum Forest (EEC), which the pit top was designed to avoid (Figure 4). The proportion of the vegetation communities recorded is outlined in Table 2 and shown on Figure 4.

Table 2
Vegetation Communities Recorded across Proposed Pit Top Area

Vegetation Community	Area (ha)	% Cover of Pit Top Area
MU17 Lower Hunter Spotted Gum - Ironbark Forest (EEC)	8.9	79.4
MU30 Coastal Plains Smooth-barked Apple Woodland	2.3	20.5

Source: Hunter Eco (2012).

ha = hectares.

% = percentage.

2 SURVEY METHODS

This section describes the methodology used during the Project fauna surveys including the survey timing and conditions (Section 2.1), selection of fauna survey sites (Section 2.2), fauna survey techniques (Section 2.3), habitat assessment methodology (Section 2.4) and criteria used for determining species relative abundance (Section 2.5).

2.1 SURVEY TIMING AND CONDITIONS

2.1.1 Timing

The initial stage of the fauna survey was conducted from 6 to 10 April 2011 inclusive. The second stage of the fauna survey was conducted from 12 to 16 October 2011 and the third stage of the survey was conducted during the 5 to 9 December 2011.

2.1.2 Conditions

Unsettled weather conditions prevailed for the first half of the survey period. The lower Hunter Valley received approximately 50 millimetres (mm) of rain on 5 April 2011 and occasional showers persisted for the next three days. Daytime temperatures were relatively mild during the initial survey.

The conditions experienced during the October and December 2011 surveys were also mild with approximately 60 mm of rainfall recorded during the survey periods. A summary of the approximate minimum and maximum temperature and rainfall recorded during the survey periods is provided in Table 3.

Table 3
Weather Conditions during Fauna Surveys

Date	Approximate Maximum Temperature (^{o}C)	Approximate Minimum Temperature (^{o}C)	Approximate Rainfall (mm)
6 April 2011	23	15	22.5
7 April 2011	24	16	8.9
8 April 2011	23	14	8.5
9 April 2011	26	13	0.0
10 April 2011	29	15	9.6
12 October 2011	23	14	0.0
13 October 2011	21	12	0.0
14 October 2011	18	12	6.6
14 October 2011	19	13	20.1
16 October 2011	19	12	0.0
5 December 2011	19	13	5.5
6 December 2011	19	14	0.0
7 December 2011	20	12	25.4
8 December 2011	22	15	2.5
9 December 2011	23	15	0.0

^{o}C = degrees Celsius.

2.2 FAUNA SURVEY SITES

2.2.1 Systematic Survey Sites

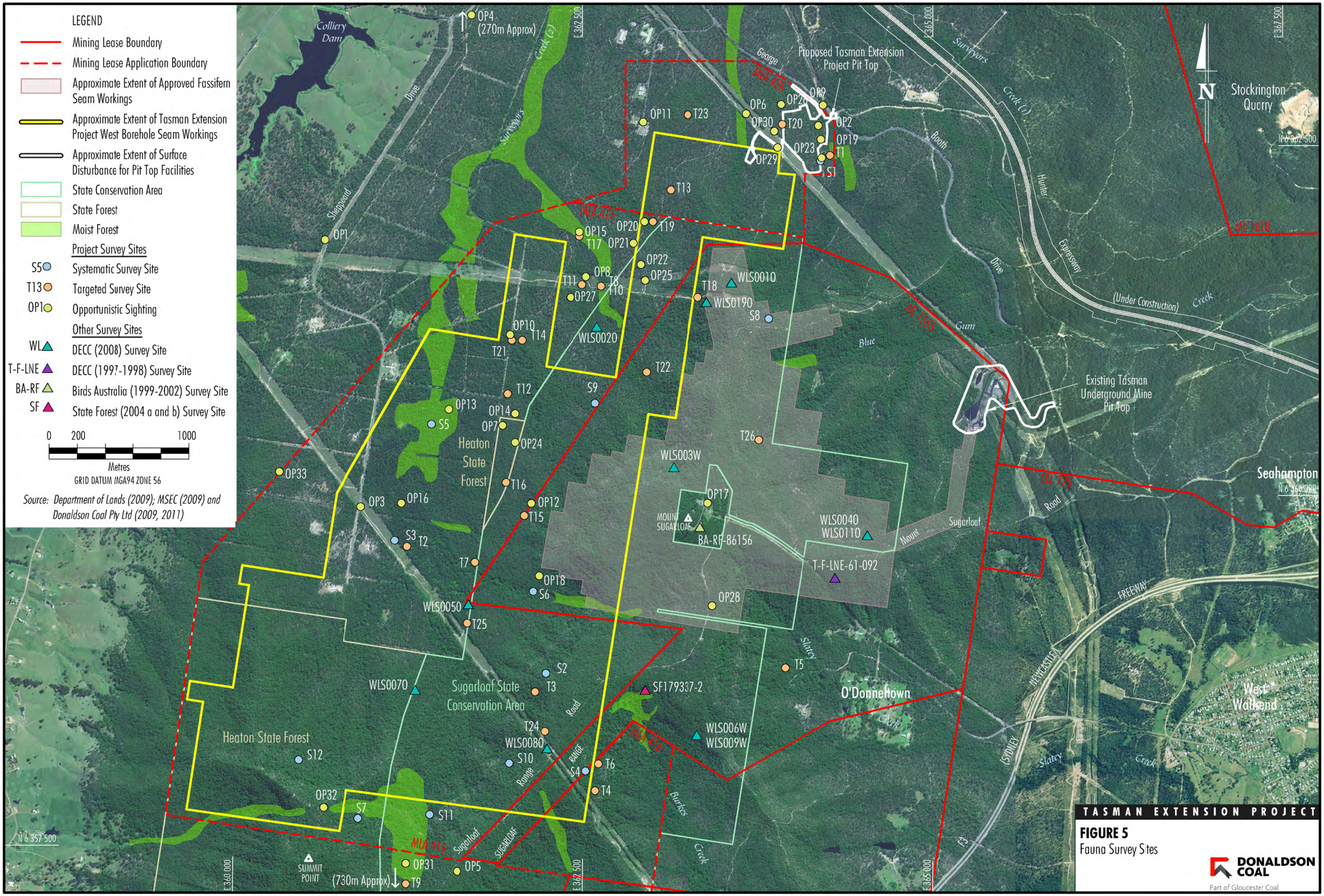
Systematic survey sites were established consecutively over the three survey stages within and surrounding the Project area. Four systematic survey sites were surveyed in April 2011 (i.e. sites S1 to S4). Sites S5 to S8 were surveyed during October 2011 and sites S9 to S12 were surveyed in December 2011.

A description of the location of the systematic survey sites and the survey completed at the site is provided in Table 4. The location of the sites is shown on Figure 5.

The results of the surveys conducted at the systematic sites are provided in Section 3. Details of the survey effort undertaken at each site are further described in Attachment B.

Table 4
Systematic Survey Sites

Site No.	**Location** (refer to Figure 5)	**Approximate Co-ordinates** (Easting [E]; Northing [N])	**Survey Completed**	**Survey Date**
S1	Pit Top Area George Booth Drive Opposite Quarry Access Road	E 364197 N 6362391	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	6-10.4.2011
S2	Sugarloaf Range Road Tower Side Road	E 362234 N 6358729	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	6-10.4.2011
S3	Silly Buggas, Sheppeard Drive, near Powerline Easement Western portion of Sugarloaf State Conservation Area (SCA)	E 361153 N 6359680	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	6-10.4.2011
S4	South-east of Sugarloaf Range Road, near Powerline Easement	E 362520 N 6358031	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	6-10.4.2011
S5	Starr's Property (within Moist Forest)	E 361414 N 6360510	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	12-16.10.2011
S6	Western Creekline Sugarloaf Range	E 362143 N 6359315	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	12-16.10.2011
S7	The Summit Open Woodland	E 360891 N 6357693	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	12-16.10.2011
S8	Northern Woodland Sugarloaf SCA	E 363825 N 6361264	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	12-16.10.2011
S9	West Sugarloaf Range	E 362588 N 6360660	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	5-9.12.2011
S10	Sugarloaf Range Road Middle Slope	E 361972 N 6358087	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	5-9.12.2011
S11	Sugarloaf Range, Gully Summit Junction	E 361401 N 6357720	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	5-9.12.2011
S12	Summit Western Slope	E 360467 N 6358112	Elliotts, Cages, Birds, Anabat, Nocturnal, Herp	5-9.12.2011



DCL-09-01 EIS_App Fauna_101F

2.2.2 Targeted Survey Sites

Targeted survey sites were also established within and surrounding the Project area. These sites were selected as they contained habitat for threatened species that potentially could occur in the area, or were located at sites where particular fauna had previously been observed or detected during other surveys. In accordance with the *Threatened Species Survey and Assessment: Guidelines for Developments and Activities* (DEC, 2004), the targeted survey sites were located in the various fauna habitat types across the Project area.

Survey techniques undertaken at the targeted survey sites were selected based on habitat type present or fauna previously observed. The locations of the targeted survey sites are shown on Figure 5 and described in Table 5. The results of the targeted surveys are described in Section 3.

Table 5
Targeted Survey Sites

Site No.	Location (refer to Figure 5)	Approximate Co-ordinates (E; N)	Survey Date
T1	Pit Top Area George Booth Drive Bush Track near Site S1	E 364264 N 6362431	8-9.4.2011
T2	Silly Buggas Sheppeard Drive Bush Track near Site S3	E 361240 N 6359636	8-9.4.2011
T3	Sugarloaf Range near Site S2	E 362157 N 6358597	6-7.4.2011
T4	Sugarloaf Range Powerline Easement near Site S4	E 362588 N 6357890	6-7.4.2011
T5	Dam east of Sugarloaf Range Road	E 363944 N 6358768	7.4.2011
T6	Dam, south-east of Sugarloaf Range Road Approximately 200 metres (m) north of Powerline Easement	E 362612 N 6358082	8.4.2011
T7	Silly Buggas Eastern Property Line	E 361727 N 6359523	9.4.2011
T8	Pond/Watercourse 330 kilovolt (kV) Powerline Easement	E 362631 N 6361496	12.10.2011
T9	Pond, Sugarloaf Range Road, 0.5 km past Summit Turnoff	E 361231 N 6356493	12-14.10.2011
T10	Pond/channel, 330 kV Powerline Easement	E 362631 N 6361496	12-13.10.2011
T11	Pond/Watercourse 330 kV Powerline Easement	E 362495 N 6361507	12-13.10.2011
T12	Track, west of Starr's Property	E 361961 N 6360727	12-14.10.2011
T13	North side of 330 kV Powerline Easement	E 363127 N 6362184	13.10.2011
T14	Sugarloaf SCA, north-east of Starr's Property	E 362065 N 6361110	14.10.2011

Table 5 (Continued)
Targeted Survey Sites

Site No.	Location (refer to Figure 5)	Approximate Co-ordinates (E; N)	Survey Date
T15	Hill Creek, gully north of Site S6	E 362081 N 6359859	14-15.10.2011
T16	Lower Hill creek, gully north of Site S6	E 361949 N 6360094	14-15.10.2011
T17	Washout area, north of 330 kV Powerline Easement	E 362477 N 6361853	14-15.10.2011
T18	Ridge, 330 kV Powerline Easement	E 363321 N 6361416	14-16.10.2011
T19	Gully, between 132 kV and 330 kV Powerline Easements	E 362999 N 6361957	15.10.2011
T20	Knoll, drill rig track leading down to Pit Top Area.	E 363921 N 6362653	15-16.10.2011
T21	Creekline, north-east of Starr's Property	E 361991 N 6361110	14.10.2011
T22	Woodland near Site S8	E 362955 N 6360882	14.10.2011
T23	Ridge between two powerline easements Near new compound area	E 363249 N 6362721	5-6.12.2011
T24	Near intersection of Sugarloaf Range Road and Powerline Easement	E 362227 N 6358314	5-6.12.2011
T25	Powerline Easement, south-east of Silly Buggas	E 361673 N 6359088	7-8.12.2011
T26	Mount Sugarloaf, northern fire trail	E 363755 N 6360397	7-8.12.2011

2.2.3 Opportunistic Sightings

In addition to the systematic and targeted survey sites, the sites where fauna were observed opportunistically within and surrounding the Project area were also recorded. The location of these opportunistic sightings is described in Table 6 and shown on Figure 5.

Table 6
Location of Opportunistic Fauna Sightings

Site No.	Location (refer to Figure 5)	Approximate Co-ordinates (E; N)	Date Surveyed
OP1	Sheppeard Drive Powerline Easement Crossing	E 360655 N 6361828	8.4.2011
OP2	Pit Top Area Entrance Road	E 364182 N 6362644	8.4.2011
OP3	Sheppeard Drive	E 360911 N 6359920	8.4.2011
OP4	Richmond Vale Road	E 361703 N 6363677	8.4.2011
OP5	Sugarloaf Range Road	E 361597 N 6357314	9.4.2011
OP6	Swampy area, Powerline Easement	E 363665 N 6362729	12.10.2011
OP7	Track, western side Sugarloaf Range	E 361925 N 6360501	13.10.2011
OP8	Swampy area, Powerline Easement	E 362523 N 6361564	13.10.2011
OP9	George Booth Drive, immediately north of Pit Top Area	E 364215 N 6362790	13.10.2011
OP10	Track east of Starr's Property	E 361979 N 6361150	13.10.2011
OP11	North side of 330 kV Powerline Easement. West of Sugarloaf SCA	E 362930 N 6362670	14.10.2011
OP12	Gully west of Sugarloaf SCA	E 362130 N 6359944	14.10.2011
OP13	Near Starr's Property, within Moist Forest Habitat	E 361537 N 6360617	14.10.2011
OP14	Near Starr's Property, east of Site OP13 in Dry Forest Habitat	E 362014 N 6360586	14.10.2011
OP15	Northern woodland in Sugarloaf SCA	E 362477 N 6361853	14.10.2011
OP16	Woodland between Powerline Easements	E 361200 N 6359945	14.10.2011
OP17	Mount Sugarloaf Lookout	E 363391 N 6359945	14.10.2011
OP18	Western side of Sugarloaf SCA	E 362186 N 6359426	14.10.2011
OP19	Northern track in Powerline Easement	E 364200 N 6362546	14.10.2011
OP20	330 kV Powerline Easement West of Sugarloaf SCA	E 362939 N 6361957	15.10.2011
OP21	Area between Powerline Easements, West of Sugarloaf SCA	E 362860 N 6361803	15.10.2011
OP22	Area between Powerline Easements, West of Sugarloaf SCA	E 362914 N 6361651	15.10.2011

Table 6 (Continued)
Location of Opportunistic Fauna Sightings

Site No.	Location (refer to Figure 5)	Approximate Co-ordinates (E; N)	Date Surveyed
OP23	Pit Top Area	E 364206 N 6362413	15.10.2011
OP24	Track near Crowhurst Property	E 362015 N 6360379	15.10.2011
OP25	Near 330 kV Powerline Easement	E 362944 N 6361538	15.10.2011
OP26	Woodland near 132 kV Powerline Easement	E 363914 N 6362795	15.10.2011
OP27	Track near Washout site	E 362413 N 6361416	16.10.2011
OP28	Sugarloaf Range Road	E 363423 N 6359212	6.12.2011
OP29	132 kV Powerline Easement, adjacent to Pit Top Area	E 363888 N 6362487	6.12.2011
OP30	132 kV Powerline Easement, adjacent to Pit Top Area	E 363865 N 6362604	6.12.2011
OP31	Sugarloaf Range Road, south of Site S11	E 361231 N 6357371	7.12.2011
OP32	Summit Picnic Area	E 360645 N 6357771	9.12.2011
OP33	End of Sheppeard Drive	E 360331 N 6360171	9.12.2011

2.3 FAUNA SURVEY TECHNIQUES

2.3.1 Ground and Arboreal Mammals (excluding Bats)

Twenty-five small and 10 large Elliott traps were set out in 200 m long trapping lines at each survey site. The traps were checked each morning and closed during the day and were reset each afternoon. In addition, six arboreal Elliot traps were set along each of the trap lines, in appropriate habitat, and checked as for ground traps. All Elliot traps were in place at each survey site over four consecutive nights.

Ten large and 10 small hair tubes were set out in pairs at each survey site, as well as 10 arboreal hair tubes were left in place for at least four days and four nights.

Five cage traps were also located at each survey site over four consecutive nights.

Pitfall traps were not used because of the unsuitability of the ground.

Indirect evidence of mammals was searched for a minimum of 30 minutes at each survey site. Methods included searching for tracks, burrows, potential roost hollows (30 minutes before sunrise and 60 minutes following sunset), fur and bone, scats, and examination of trees for scratch marks, bite notches and drays. Scats of targeted mammals and predators were collected. If scat samples contained bone or hair samples they were forwarded to Dr Barbara Triggs in Mallacoota for analysis (along with hair tube samples).

Mammals were also surveyed by spotlighting at night. Spotlighting on foot and by vehicle took place over two nights at each survey site and were combined with other nocturnal survey activities. Thirty minutes were spent spotlighting on foot and 30 minutes were spent spotlighting by vehicle (where vehicle access was possible) by two people each night. In addition, playback calls for Koalas, Squirrel Gliders and Yellow-bellied Gliders were played twice on separate nights, in areas where potential habitat existed for these species.

2.3.2 Bats

Flying foxes were detected by spotlighting at night (as described above) and during the daytime as part of other daytime searches. Insectivorous bats were detected using ultra-sonic bat recorders (ANABAT^{TM}). These recorders were set to record over potential bat flyways and left in location to record opportunistically from dusk to dawn. Each site was sampled for two consecutive nights. Recorded bat calls were later analysed using ANABAT 5.0 software.

In addition, harp traps were set up in locations where bat flyways were accessible from the ground. The harp traps remained at each location for two consecutive nights.

2.3.3 Diurnal Birds

Bird surveys were carried out on two sunny mornings and/or late afternoons in the survey areas. Transects were established in each survey area and all birds seen or heard were recorded. The surveys were conducted along a 200 m transect through the survey area (for 30 minutes).

Birds were also detected by spotlighting at night. Spotlighting took place over two nights at each survey site and was combined with other nocturnal survey activities. Thirty minutes were spent spotlighting by two people each night.

2.3.4 Owls

Owl surveys were conducted at night using a small portable amplifier. Owl calls were broadcast over two nights at each survey site for the: Southern Boobook (*Ninox novaeseelandiae*), Powerful Owl (*Ninox strenua*), Sooty Owl (*Tyto tenebricosa*), Barking Owl (*Ninox connivens*), Masked Owl (*Tyto novaehollandiae*), and Barn Owl (*Tyto alba*). Calls were played after a two minute initial listening period. The calls of each species are about two minutes in duration and were followed by a further five minutes listening period before the next set of calls was broadcast.

2.3.5 Reptiles

Reptiles were searched for on foot. Searches were conducted during sunny mornings on two separate days. The survey area was walked by two surveyors and all potential reptile shelter sites were examined. If possible, the reptiles were caught, identified and immediately released. The search also involved looking for burrows, shed skin and droppings. Potential habitat of threatened species known from the local area was noted. A minimum of one person per hour was spent at each systematic or targeted site.

Gecko surveys were carried out at night using spotlights.

2.3.6 Frogs

Frog surveys were carried out at night under suitable (wet) weather conditions. Calling frogs were identified and non-calling frogs were caught, identified and released. Night-time habitat searches of suitable sites were undertaken on two nights for a minimum of 30 minutes.

Playback recordings of frog species, including threatened frog species considered possible occurrences within the survey area or wider surrounds, were broadcast at each site. After the calling sessions were completed, the surrounding area was searched by surveyors using headlamps to locate non-calling or sheltering frogs. Call playback was undertaken on two separate nights.

Daytime searches were also conducted for amphibians, and hand-netting was carried out to search for tadpoles. All tadpoles caught were transferred to a clear plastic bag and identified using Anstis (2002). Tadpoles were returned to the water once identified.

Hygiene Protocols for the Control of Disease in Frogs (DECC, 2008b) were considered throughout the survey.

A summary of the survey effort is provided in Attachment B.

2.4 HABITAT ASSESSMENT

A habitat assessment was conducted at each survey site based on visual observations. The habitat characteristics and parameters that were assessed included:

- aspect/slope;
- habitat layers and heights (e.g. litter, logs, grass-herb layer, understoreys and canopy);
- percent cover including vegetation components, bare soil and rock;
- rock formation, tree hollows;
- fire history;
- successional stage;
- tree/shrub density;
- habitat connectivity;
- presence of water;
- habitat condition and trends;
- dominant vegetation species, and
- disturbance characteristics (weed invasion, erosion and loss of functional integrity).

This information was recorded in a database and used to categorise and describe the broad fauna habitat types within the Project area (Section 3.1).

2.5 RELATIVE ABUNDANCE

The relative abundance of each species recorded was estimated as follows:

1	One sighting of the species, or at least one trace found.
U	Uncommon, two to five observations of the species, as well as an assessment of how widespread and persistent the species was.
C	Common, six to 30 observations of the species, as well as an assessment of how widespread and persistent the species was.

Relative abundance was based on empirical data as well as being a value judgment made by an experienced surveyor.

3 SURVEY RESULTS

3.1 MAJOR FAUNA HABITAT TYPES

The habitats identified within the Project area can be broadly categorised into two major fauna habitat types, as listed below.

- Dry Forest/Woodland; and
- Moist Forest.

Water (including creeklines and dams) and associated riparian habitat and areas of cleared land, associated with electricity transmission line easements, are also located within the Project area.

A description of these habitat types is provided below.

Dry Forest/Woodland

The majority of the Project area is vegetated by dry forest/woodland including various vegetation communities (Section 1.4.4) (Figure 4). The Hunter Valley Moist Forest and Alluvial Tall Moist Forest vegetation communities also transition into dry forest/woodland on the more open and drier slopes of the Project area.

These dry forest/woodland areas provide a variety of refuge and foraging resources for native fauna including mature or dead hollow-bearing trees. Peeling bark and trunk crevices may also provide refuge habitat for arboreal reptiles and tree dwelling microchiropteran bats. The overstorey, midstorey and understorey vegetation (particularly within the Sugarloaf SCA) is consistent as the area has not been recently logged or burnt in approximately two decades.

Whilst groundcover vegetation is sometimes sparse, ground debris is abundant in many areas with fallen trees and tree limbs scattered amongst a thick dry layer of leaf litter.

Scattered rock outcrops occur particularly in the western portion of the Project area. Exposed sandstone rock faces in the western portion contain small crevices and caves that may be utilised by a variety of herpetofauna and potentially microchiropteran bat species.

Moist Forest

Portions of the Project area include areas of Moist Forest (Figure 4). These areas include the Hunter Lowlands Redgum Forest which includes open Eucalypt forest with a consistent layer of grasses and herbs. Logs and fallen branches and the low grass and herb cover provide refuge and foraging resources for small terrestrial fauna. The Warm Temperate Rainforest areas have a distinct closed rainforest canopy and typically surround gullies and creeklines. These waterbodies are utilised by a variety of herpetofauna. No areas of Moist Forest have been mapped within the proposed pit top area.

Water and Associated Riparian Habitat

The headwaters of several creeks traverse the Project area and typically include gullies and channels in the upper reaches, and swampy and small pools in the lower reaches.

The upper reaches of the creeklines have a sandy substrate with scattered sandstone boulders forming small pools. The small pools and fringing fern, sedge and rush species provide breeding and foraging habitat for amphibians as well as foraging resources for birds, small mammals and reptiles.

Some of the lower reaches of the creeklines are degraded from being traversed by a network of frequently used tracks and electricity transmission line easements. These reaches have reduced flow of water and contain a variety of emergent and submergent vegetation, which provide a foraging resource for birds, reptiles, amphibians and mammals.

There a several small farm dams scattered throughout the Project area and some Rural Fire Service fire dams located in the Sugarloaf SCA. These dams may provide some breeding habitat for some forest-dwelling amphibians, however the limited vegetation surrounding the margins of the dams restricts shelter and foraging habitat.

Cleared Land

The electricity transmission line easements which intersect the Project area have been cleared, removing all trees and understorey vegetation. The easements typically consist of cleared grassy areas with some regenerating vegetation. As a result, the easements provide some foraging resources for macropods, birds and reptiles. However, the absence of ground shelter resources means these areas are of limited habitat value for most small terrestrial fauna species.

Access roads associated with the electricity transmission line easements limit fauna usage of these areas.

3.2 FAUNA SPECIES DIVERSITY AND ABUNDANCE

3.2.1 Species Diversity across Project Area

Species diversity for amphibians, reptiles, birds, mammals and introduced mammals recorded across and immediately surrounding the proposed pit top area is provided in Table 7. No introduced amphibians, reptiles or birds were recorded.

Table 7
Distribution of Fauna Species across and Surrounding the Proposed Pit Top Area

	Relevant Survey and Opportunistic Sites										
	S1	**T2**	**T20**	**OP2**	**OP6**	**OP9**	**OP19**	**OP26**	**OP28**	**OP29**	**OP30**
No. Native Amphibians	2	0	0	0	0	0	0	0	0	0	0
No. Native Reptiles	3	0	4	0	0	0	0	0	0	0	1
No. Native Birds	0	0	7	0	1	1	3	1	0	0	0
No. Native Mammals	7	2	0	1	0	0	0	0	1	1	0
No. Introduced Mammals	2	0	0	0	0	0	0	0	0	0	0
Total Native Species	12	2	11	1	1	1	3	1	1	1	1

A summary of the species diversity for amphibians, reptiles, birds, mammals and introduced mammals recorded across all systematic and targeted survey sites (i.e. across and surrounding the entire Project area) is provided in Table 8. The full list of fauna species recorded during the Project surveys at the systematic and targeted survey sites is provided in Attachment C-A and C-B, respectively. Species diversity of fauna observed opportunistically across and surrounding the Project area is provided in Table 9.

Table 8
Distribution of Fauna Species across Systematic and Targeted Survey Sites

	Systematic Survey Sites												Targeted Survey Sites						
	S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**	**S10**	**S11**	**S12**	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**
No. Native Amphibians	2	0	2	2	4	2	0	4	3	2	3	0	0	0	0	0	5	4	3
No. Native Reptiles	3	1	3	3	3	1	2	3	1	2	3	3	0	0	0	0	0	0	0
No. Native Birds	0	0	0	0	12	15	8	11	16	15	17	13	0	0	0	0	0	0	0
No. Native Mammals	7	7	7	6	8	6	5	7	9	4	7	6	2	2	3	1	2	3	3
No. Introduced Mammals	2	2	5	2	3	0	2	1	0	2	0	2	0	0	0	0	0	0	0
Total Native Species	12	8	12	11	27	24	15	25	29	23	30	24	2	2	3	1	7	7	6

	Targeted Survey Sites																		
	T8	**T9**	**T10**	**T11**	**T12**	**T13**	**T14**	**T15**	**T16**	**T17**	**T18**	**T19**	**T20**	**T21**	**T22**	**T23**	**T24**	**T25**	**T26**
No. Native Amphibians	9	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
No. Native Reptiles	0	0	0	0	0	0	0	0	0	0	3	2	4	0	0	0	0	0	0
No. Native Birds	0	1	0	1	7	1	8	10	0	10	0	6	7	12	11	0	0	0	0
No. Native Mammals	0	4	2	3	2	1	0	3	1	4	2	0	0	0	0	1	0	1	1
No. Introduced Mammals	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Total Native Species	9	6	2	4	9	3	8	13	1	15	5	8	11	12	11	1	0	1	1

Table 9
Distribution of Fauna Species Observed Opportunistically across and Surrounding the Project Area

	Opportunistic Sites
	OP1 to OP33
No. Native Amphibians	0
No. Native Reptiles	6
No. Native Birds	19
No. Native Mammals	14
No. Introduced Mammals	0
Total Native Species	39

Native species diversity varied between zero and 30 species per site (Tables 8 and 9). Amphibian surveys were conducted at systematic and targeted survey sites across all habitat types (including near creeklines and waterbodies).

Amphibian diversity per site ranged from zero to nine species, reptile diversity ranged from zero to four species, bird diversity ranged from zero to 17 species, native mammal diversity ranged from zero to nine species and introduced mammal diversity ranged between zero and five species (Tables 7 and 8).

During the survey, a total of 119 species were identified across and surrounding the Project area (including 112 native and seven introduced species). A total of 15 amphibians, 14 reptiles, 62 birds and 28 mammals (21 native and seven introduced) were recorded in the Project area and its surrounds. A summary of the species recorded and their abundance is provided in Attachment C.

The number of fauna species in each of the three abundance groupings is illustrated in Table 10. Eighteen species were located based on one observation or trace, 50 species were assessed as uncommon and 50 species were assessed as common (Table 10; Attachment C).

Table 10
Relative Abundance in Fauna Groupings

Fauna Group	One Sighting/Trace	Uncommon (2 to 5 observations)	Common (6 to 30 observations)
Amphibians	0	6	9
Reptiles	3	6	5
Birds	12	29	21
Native Mammals	3	5	13
Introduced Mammals	0	5	2

3.2.1 Amphibians

Fifteen native amphibian species were located during the surveys (Attachment C). The frog records were made across each of the various habitat types (i.e. dry forest/woodland, moist forest, water and within the cleared electricity transmission line easements). Rain fell on nine of the 15 days the surveys were undertaken, making conditions highly suitable for frog surveys. The number of species located at each of the sampling sites varied between zero and nine species (Tables 7 and 8). Eight Myobatrachidae and seven Hylidae were observed (Attachment C). The frog species most widely distributed across the Project area was the Common Eastern Froglet (*Crinia signifera*) (Attachment C).

3.2.2 Reptiles

Fourteen native reptile species were located during the surveys (Attachment C). The number of species located at each of the sampling sites varied between zero and four species (Tables 7 and 8). Eight Scincidae, one Gekkonidae, one Agamidae, one Typhlopidae and three Elapidae were located (Attachment C).

3.2.3 Birds

Sixty-two native bird species were identified during the surveys. No non-native species were recorded (Attachment C). The number of native bird species located at all sampling sites varied between zero and 17 species (Tables 7 and 8).

Overall, native bird families recorded comprised one Anatidae, one Ardeidae, one Falconidae, two Accipitridae, one Turnicidae, four Columbidae, five Psittacidae, four Cuculidae, one Tytonidae, one Strigidae, one Podargidae, one Caprimulgidae, one Aegothelidae, two Alcedinidae, one Meropidae, one Climacteridae, one Maluridae, two Pardalotidae, three Acanthizidae, nine Meliphagidae, one Petroicidae, two Eupetidae, three Pachycephalidae, four Dicruridae, three Artamidae, one Campephagidae, one Oriolidae, one Corvidae, one Corcoracidae, one Ptilonorhynchidea and one Hirundinidae (Attachment C).

Birds most widely distributed across the Project area included the Spotted Pardalote (*Pardalotus punctatus*), Yellow-faced Honeyeater (*Lichenostomus chysops*), White-throated Treecreeper (*Cormobates leucophaeus*), Rufous Whistler (*Pachycephala rufiventris*), Olive-backed Oriole (*Oriolus sagittatus*), Noisy Friarbird (*Philemon comiculatus*) and Brown Thornbill (*Acanthiza pusilla*) (Attachment C).

This data indicates that bird diversity is relatively high across the entire Project area and its surrounds.

3.2.4 Mammals

Twenty-eight mammal species were located during the surveys, 21 of which were native (Attachment C). The number of native mammal species located at each of the sampling sites varied between zero and nine species (Tables 7 and 8).

The native mammal families included one Tachyglossidae, two Dasyuridae, one Peramelidae, one Vombatidae, two Petauridae, one Pseudocheiridae, one Phalangeridae, four Macropodidae, one Pteropodidae, six Vespertilionidae and one Muridae (Attachment C).

The most common native mammals were the Brown Antechinus (*Antechinus stuarti*), Bush Rat (*Rattus fuscipes*) and Swamp Wallaby (*Wallabia bicolor*) (Attachment C).

These data indicate that native mammal diversity is relatively high across the entire Project area and its surrounds.

3.2.5 Introduced Fauna

Seven introduced mammal species were located during the surveys (Attachment C). The number of introduced species located at each of the sample sites varied between zero and five species (Tables 7 and 8).

The species included the House Mouse (*Mus musculus*), Black Rat (*Rattus rattus*), Red Fox (*Vulpes vulpes*), Brown Hare (*Lepus capensis*), Rabbit (*Oryctolagus cuniculus*), Pig (*Sus scrofa*) and Goat (*Capra hircus*) (Attachment C).

Table 11 provides a list of fauna recorded at the systematic and targeted survey sites and opportunistic sites (Section 2.2) during the three survey periods (April, October and December 2011). Table 11 identifies the conservation status of the recorded species under the TSC Act and Commonwealth EPBC Act and the relative abundance of the species (Section 1.4.5).

Table 11
Fauna Species Recorded during Project Surveys

Common Name	Scientific Name	Conservation Status[1]		Survey Sites[2]	Relative Abundance[3]
		TSC Act	EPBC Act		
Amphibians					
MYOBATRACHIDAE					
Common Eastern Froglet	*Crinia signifera*	-	-	S1, S3, S4, S5, S8, S9, S10, S11, T5, T6, T7, T8	C
Brown-striped Frog	*Limnodynastes peronii*	-	-	S5, T5, T8	C
Spotted Grass Frog	*Limnodynastes tasmaniensis*	-	-	T7, T8	C
Ornate Burrowing Frog	*Platyplectrum ornatum*	-	-	T8	U
Brown Toadlet	*Pseudophryne bibronii*	-	-	S1, S3, S4, T5, T6, T7	C
Red-backed Toadlet	*Pseudophryne coriacea*	-	-	S6, S8, S11, T13, T17	C
Dusky Toadlet	*Uperoleia fusca*	-	-	T8	C
Smooth Toadlet	*Uperoleia laevigata*	-	-	T5, T6	C
HYLIDAE					
Bleating Tree Frog	*Litoria dentata*	-	-	S5, S8, S9, S10	C
Eastern Dwarf Tree Frog	*Litoria fallax*	-	-	S8, S9, T8	C
Broad-palmed Frog	*Litoria latopalmata*	-	-	T5, T8	U
Peron's Tree Frog	*Litoria peronii*	-	-	S5, T8	U
Tyler's Tree Frog	*Litoria tyleri*	-	-	T8	U
Verreaux's Tree Frog	*Litoria verreauxii*	-	-	T9	U
Stoney Creek Frog	*Litoria wilcoxi*	-	-	S6, S11, T6	U
Reptiles					
SCINCIDAE					
Cream-striped Shinning-skink	*Cryptoblepharus virgatus*	-	-	S1, S4, S7, S11, T20	C
Copper-tailed Skink	*Ctenotus taeniolatus*	-	-	T18	U
Dark-flecked Garden Skink	*Lampropholis delicata*	-	-	S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, T20	C
Pale-flecked Garden Skink	*Lampropholis guichenoti*	-	-	S1, S8, S12, T20	C
Eastern Water-skink	*Eulamprus quoyii*	-	-	S3, S4, S5, T19	C
Weasel Skink	*Saproscincus mustelinus*	-	-	T20	U
Red-throated Skink	*Acritoscincus platynotum*	-	-	S10	U
Barred-sided Skink	*Eulamprus tenuis*	-	-	S12	1

Table 11 (Continued)
Fauna Species Recorded during Project Surveys

Common Name	Scientific Name	Conservation Status[1]		Survey Sites[2]	Relative Abundance[3]
		TSC Act	EPBC Act		
Reptiles (Continued)					
GEKKONIDAE					
Lesueur's Velvet Gecko	*Oedura lesueurii*	-	-	S11	1
AGAMIDAE					
Jacky Lizard	*Amphibolurus muricatus*	-	-	S8, T18, T19, OP23, OP27	C
TYPHLOPIDAE					
Blackish Blind Snake	*Ramphotyphlops nigrescens*	-	-	T18	1
ELAPIDAE					
Red-naped Snake	*Furina diadema*	-	-	S3, OP33	U
Black-bellied Swamp Snake	*Hemiaspis signata*	-	-	S5, OP13	U
Red-bellied Black Snake	*Pseudechis porphyriacus*	-	-	OP21, OP30	U
Birds					
ANATIDAE					
Pacific Black Duck	*Anas superciliosa*	-	-	OP8	U
ARDEIDAE					
White-necked Heron	*Ardea pacifica*	-	-	OP8	1
FALCONIDAE					
Australian Kestrel	*Falco cenchroides*	-	-	OP4	1
ACCIPITRIDAE					
White-bellied Sea-eagle	*Haliaeetus leucogaster*	-	-	OP19	1
Brown Goshawk	*Accipiter fasciatus*	-	-	S6	1
TURNICIDAE					
Painted Button-quail	*Turnix varia*	-	-	T21	U
COLUMBIDAE					
Brown Cuckoo-dove	*Macropygia amboinensis*	-	-	S8, T19, T22	U
Wonga Pigeon	*Leucosarcia melanoleuca*	-	-	S11, T22	U
Peaceful Dove	*Geopelia placida*	-	-	T22	U
Common Bronzewing	*Chaps chalcoptera*	-	-	S11	1
PSITTACIDAE					
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V	-	S10	U
Long-billed Corella	*Cacatua tenuirostris*	-	-	OP4	C
Little Lorikeet	*Glossopsitta pusilla*	V	-	T21, OP18	U
Crimson Rosella	*Platycercus elegans*	-	-	S11	U
Australian King Parrot	*Alisterus scapularis*	-	-	S7, T17	U
CUCULIDAE					
Pallid Cuckoo	*Cuculus pallidus*	-	-	S6, S12	U
Fan-tailed Cuckoo	*Cuculus flabelliformis*	-	-	S6, S7, S8, S9, T21	U
Shining Bronze Cuckoo	*Chrysococcyx lucidus*	-	-	S6, T12, T21	U
Channel-billed Cuckoo	*Scythrops novaehollandiae*	-	-	S8, T12, T15, T17	U

Table 11 (Continued)
Fauna Species Recorded during Project Surveys

Common Name	Scientific Name	Conservation Status[1]		Survey Sites[2]	Relative Abundance[3]
		TSC Act	EPBC Act		
Birds (Continued)					
TYTONIDAE					
Barn Owl	*Tyto alba*	-	-	OP9	1
STRIGIDAE					
Southern Boobook	*Ninox novaehollandiae*	-	-	S9, S10, T9, T13, OP16	U
PODARGIDAE					
Tawny Frogmouth	*Podargus strigoides*	-	-	S10, T22	U
CAPRIMULGIDAE					
White-throated Nightjar	*Eurostopodus mystacalis*	-	-	S9, S10, T17, T22	U
AEGOTHELIDAE					
Australian Owlet-nightjar	Aegotheles cristatus	-	-	OP10	1
ALCEDINIDAE					
Laughing Kookaburra	*Dacelo novaeguineae*	-	-	S5, S10, S11, S12, T14, T20	C
Sacred Kingfisher	*Todirampus sanctus*	-	-	T22	1
MEROPIDAE					
Rainbow Bee-eater	*Merops ornatus*	-	-	OP19	C
CLIMACTERIDAE					
White-throated Treecreeper	*Cormobates leucophaeus*	-	-	S6, S7, S8, S9, S10, S11, S12, T15, T17, T19	C
MALURIDAE					
Variegated Fairy-wren	*Malurus lamberti*	-	-	S5, S11, T12, T17	C
PARDALOTIDAE					
Spotted Pardalote	*Pardalotus punctatus*	-	-	S5, S6, S7, S8, S9, S10, S11, S12, T15, T19, T20, T21	C
Striated Pardalote	*Pardalotus striatus*	-	-	S10	1
ACANTHIZIDAE					
Chestnut-rumped Heathwren	*Hylacola pyrrhopygia*	-	-	OP6	U
White-browed Scrub-wren	*Sericornis frontalis*	-	-	S5, T14	U
Brown Thornbill	*Acanthiza pusilla*	-	-	S6, S8, S9, S10, S11, S12, T14, T15	C
MELIPHAGIDAE					
Yellow-faced Honeyeater	*Lichenostomus chrysops*	-	-	S5, S6, S7, S9, S10, S11, S12, T14, T15, T19, T20, T21	C
Yellow-tufted Honeyeater	*Lichenostomus melanops*	-	-	OP18, OP25	C
Lewin's Honeyeater	*Meliphaga lewinii*	-	-	S5, S10	U

Table 11 (Continued)
Fauna Species Recorded during Project Surveys

Common Name	Scientific Name	Conservation Status[1]		Survey Sites[2]	Relative Abundance[3]
		TSC Act	EPBC Act		
Birds (Continued)					
Bell Miner	*Manorina melanophrys*	-	-	S9	C
Noisy Miner	*Manorina melanocephala*	-	-	S6, T14, T22	C
Noisy Friarbird	*Philemon corniculatus*	-	-	S5, S7, S9, S10, S11, S12, T15, T21	C
Little Wattlebird	*Anthochaera chrysoptera*	-	-	OP16	1
Eastern Spinebill	*Acanthorhynchus tenuirostris*	-	-	T22	U
Scarlet Honeyeater	*Myzomela sanguinolenta*	-	-	S5, S6, S9, S10, T12, T15, T17, T21	C
PETROICIDAE					
Eastern Yellow Robin	*Eopsaltria australis*	-	-	S5, S6, S8, S9, T11, T14,T17	C
EUPETIDAE					
Eastern Whipbird	*Psophodes olivaceus*	-	-	S5, S8, S9, T12, T17, T19, T21	C
Spotted Quail-thrush	*Cinclosoma punctatum*	-	-	OP5, S11, S12	U
PACHYCEPHALIDAE					
Golden Whistler	*Pachycephala pectoralis*	-	-	OP15	1
Rufous Whistler	*Pachycephala rufiventris*	-	-	S5, S6, S8, S9, S10, S11, T12, T14, T15, T20, T21	C
Grey Shrike-thrush	*Colluricincla harmonica*	-	-	S12, T20	U
DICRURIDAE					
New Zealand Fantail	*Rhipidura fuliginosa*	-	-	S6, S8, S9, S11, T12, T15	C
Willy Wagtail	*Rhipidura leucophrys*	-	-	T22	1
Black-faced Monarch	*Monarcha melanopsis*	-	-	S5, S8	C
Leaden Flycatcher	*Myiagra rubecula*	-	-	S6, S11, S12	C
ARTAMIDAE					
Australian Magpie	*Gymnorhina tibicen*	-	-	T22	U
Pied Currawong	*Strepera graculina*	-	-	S7, S12, T15	U
Dusky Woodswallow	*Artamus cyanopterus*	-	-	OP19	U
CAMPEPHAGIDAE					
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	-	-	S7, S11, T20	U
ORIOLIDAE					
Olive-backed Oriole	*Oriolus sagittatus*	-	-	S6, S9, S10, S11, S12, T14, T17, T19, T20, T21	C
CORVIDAE					
Australian Raven	*Corvus coronoides*	-	-	S12, T17, T21	U
CORCORACIDAE					
White-winged Chough	*Corcorax melanorhamphos*	-	-	OP26, S11	C

Table 11 (Continued)
Fauna Species Recorded during Project Surveys

Common Name	Scientific Name	Conservation Status[1]		Survey Sites[2]	Relative Abundance[3]
		TSC Act	EPBC Act		
Birds (Continued)					
PTILONORHYNCHIDAE					
Satin Bowerbird	*Ptilonorhynchus violaceus*	-	-	S9, T22	U
HIRUNDINIDAE					
Welcome Swallow	*Hirundo neoxena*	-	-	OP17	U
Mammals					
TACHYGLOSSIDAE					
Short-beaked Echidna	*Tachyglossus aculeatus*	-	-	OP 2, OP12, OP31	U
DASYURIDAE					
Brown Antechinus	*Antechinus stuartii*	-	-	S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12	C
Common Dunnart	*Sminthopsis murina*	-	-	S1	1
PERAMELIDAE					
Long-nosed Bandicoot	*Perameles nasuta*	-	-	OP24	1
VOMBATIDAE					
Common Wombat	*Vombatus ursinus*	-	-	S3	1
PETAURIDAE					
Yellow-bellied Glider	*Petaurus australis*	V	-	S1, S2, S5, S6, S8, S9, OP11, OP14, OP22	C
Sugar Glider	*Petaurus breviceps*	-	-	S1, S2, S3, S4, S5, S6, S7, S8, S9, S11, S12, T7, T17	C
PSEUDOCHEIRIDAE					
Common Ringtail Possum	*Pseudocheirus peregrinus*	-	-	S5, S11, S12, T7	U
PHALANGERIDAE					
Common Brushtail Possum	*Trichosurus vulpecula*	-	-	S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S12, T9, T17	C
MACROPODIDAE					
Eastern Grey Kangaroo	*Macropus giganteus*	-	-	T13, OP1	C
Red-necked Wallaby	*Macropus rufogriseus*	-	-	S2, S3, S4, S5, S8, T7, OP7	C
Swamp Wallaby	*Wallabia bicolour*	-	-	S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, OP3, OP20, OP28, OP32	C
Eastern Wallaroo	*Macropus robustus robustus*	-	-	OP29	U

Table 11 (Continued)
Fauna Species Recorded during Project Surveys

Common Name	Scientific Name	Conservation Status[1]		Survey Sites[2]	Relative Abundance[3]
		TSC Act	EPBC Act		
Mammals (Continued)					
PTEROPODIDAE					
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	T17	U
VESPERTILIONIDAE					
Lesser Long-eared Bat	*Nyctophilus geoffroyi*	-	-	S9#, T3, T9#, T15#, T16	U
Gould's Long-eared Bat	*Nyctophilus gouldii*	-	-	S9#, T3, T5, T6, T9#, T15#	C
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	T10, T11, T18, T25	C
Chocolate Wattle Bat	*Chalinolobus morio*	-	-	S11, T1, T2, T4, T6, T9, T11, T12	C
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	-	T18	C
Little Forest Bat	*Vespadalus vulturnus*	-	-	S9, S11, S12, T1, T2, T3, T5, T6, T10, T11, T12, T15, T17, T23, T26	C
MURIDAE					
House Mouse*	*Mus musculus*	-	-	S1, S2, S3, S4, S5	C
Bush Rat	*Rattus fuscipes*	-	-	S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12	C
Black Rat*	*Rattus rattus*	-	-	S1, S2, S3, S4, S5, S7	C
CANIDAE					
Red Fox*	*Vulpes vulpes*	-	-	S3, S5, S8, S10, T8, T15	U
LEPORIDAE					
Brown Hare*	*Lepus capensis*	-	-	S3	U
Rabbit*	*Oryctolagus cuniculus*	-	-	S3	U
SUIDAE					
Pig*	*Sus scrofa*	-	-	S7, S12	U
BOVIDAE					
Goat*	*Capra hircus*	-	-	S10, S12	U

[1] Threatened species status under the TSC Act and/or EPBC Act (current as at 22 March 2012).
V = Vulnerable

[2] Refer to Figure 5.

[3] Relative abundance presented for surveys:
1 = one sighting of a species.
U = uncommon (2 to 5 individuals).
C = common (6 to 30 individuals).

* Introduced species.

\# ANABAT 5.0 software unable to differentiate bat call of Lesser Long-eared Bat or Gould's Long-eared Bat due to incomplete/disrupted bat call.

3.3 THREATENED FAUNA SPECIES

Six threatened species listed under the TSC Act and/or the EPBC Act were recorded across the Project area or its surrounds during the Project surveys (Figures 6a and 6b). These species, together with their survey sites, respective location co-ordinates and number of individuals observed, are outlined in Table 12.

Table 12
Threatened Fauna Species Recorded during Project Surveys

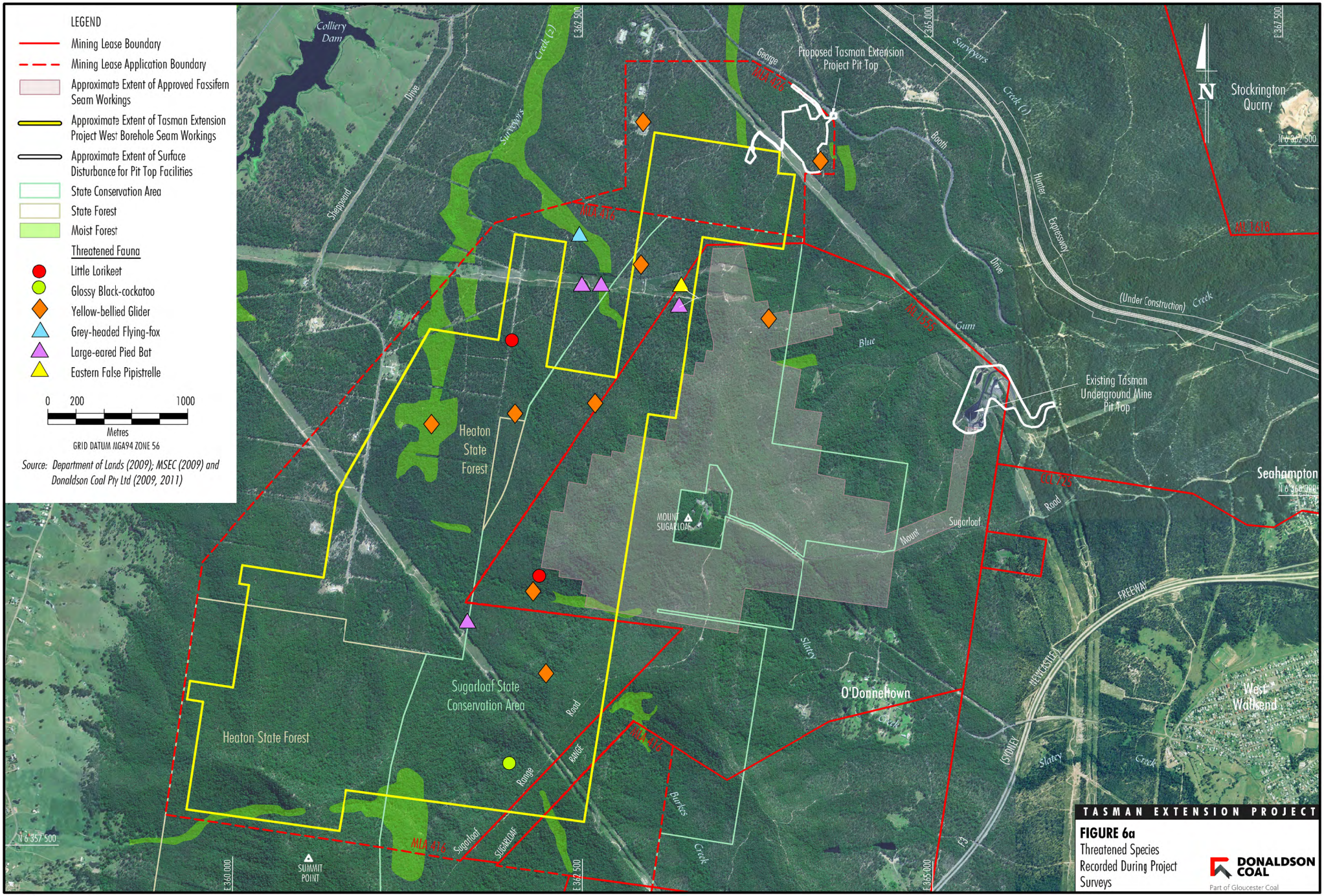
Common Name	Scientific Name	Conservation Status[1]		Survey Sites[2]	Location of Record (AMG)		Number of Individuals
		TSC Act	EPBC Act		Easting	Northing	
Birds							
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V	-	S10	361972	6358087	3
Little Lorikeet	*Glossopsitta pusilla*	V	-	T21	361991	6361110	5
				OP18	362186	6359426	8
Mammals							
Yellow-bellied Glider	*Petaurus australis*	V	-	S1	364197	6362391	1
				S2	362234	6358729	1
				S5	361414	6360510	2
				S6	362143	6359315	1
				S8	363825	6361264	2
				S9	362588	6360660	1
				OP11	362930	6362670	1
				OP14	362014	6360586	1
				OP22	362914	6361651	1
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	T17	362477	6361853	5
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	T10	362631	6361496	*
				T11	362495	6361507	1
				T18	363321	6361416	*
				T25	361673	6359088	2
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	-	T18	363321	6361416	*

[1] Threatened species status under the TSC Act and/or EPBC Act (current as at 22 March 2012).
V = Vulnerable

[2] Refer to Figure 5.

* Species identified using ANABAT^{TM} detectors and number of individuals unknown.

The Yellow-bellied Glider (*Petaurus australis*) is the only threatened fauna species that was recorded in the vicinity of the proposed pit top area. The Yellow-bellied Glider was recorded at other locations across the Project area by the Project survey (Figure 6a and discussion below).



DCL-09-01 EIS_App Fauna_107D

TASMAN EXTENSION PROJECT

FIGURE 6b
Threatened Species Recorded During Project Surveys

DONALDSON COAL

DCL-09-01 EIS_App Fauna_108C

Other threatened fauna species recorded during the surveys at sites located outside of the extent of surface disturbance but within the proposed underground mining area or immediate surrounds include the: Little Lorikeet (*Glossopsitta pusilla*), Glossy Black Cockatoo (*Calyptorhynchus lathami*), Grey-headed Flying-fox (*Pteropus poliocephalus*), Large-eared Pied Bat (*Chalinolobus dwyeri*) and Eastern False Pipistrelle (*Falsistrellus tasmaniensis*). The locations of where the threatened fauna species were recorded are shown on Figure 6a and 6b and described below.

Glossy Black-cockatoo

Three Glossy Black-Cockatoos were recorded on one occasion at one systematic survey site in the Project area (S10) (Figure 6a). The Glossy Black-cockatoos were recorded in the far south of the underground mining portion of the Project area within dry forest/woodland habitat near Sugarloaf Range Road (approximately 200 m west of the electricity transmission line easement running south-east to north-west through the Project area) (Figure 6a).

The occurrence of the above species in the lower Hunter Valley region is discussed in detail in Section 6.2.1.

Little Lorikeet

Two groups of the Little Lorikeet were recorded within the proposed underground mining portion of the Project area. Five individuals were recorded at targeted survey site T21 to the central east of the Project area (Figure 6a; Table 12). Eight individuals were observed opportunistically at site OP18 to the south of the Project area (near systematic site S6) (Figure 6a; Table 12). The species was recorded in dry forest/woodland habitat generally near creeklines.

The occurrence of the above species in the lower Hunter Valley region is discussed in detail in Section 6.2.2.

Yellow-bellied Glider

The Yellow-bellied Glider was recorded at numerous systematic survey sites and observed opportunistically within and outside the Project area during the survey periods. The species was observed in various habitats across the Project area (e.g. in Moist Forest [at systematic site S5], at several sites/locations in dry forest/woodland and opportunistically near the electricity line easement located to the north of the Project area) (Table 12) (Figure 6a). Eleven individuals of the species were recorded during the Project surveys (Table 12).

A search of the proposed pit top area and the surrounding dry/forest woodland habitat on either side of George Booth Drive was conducted for Yellow-bellied Glider habitat resources (i.e. hollow-bearing trees) or evidence of Yellow-bellied Glider use of the habitat. A Yellow-bellied Glider roost (i.e. hollow-bearing tree) was identified in the vicinity of the proposed pit top area. As a result, the design of the proposed pit top area has been modified to avoid and protect this tree from disturbance.

The occurrence of the above species in the lower Hunter Valley region is discussed in detail in Section 6.2.3.

Grey-headed Flying-fox

A group of five Grey-headed Flying-foxes were seen at targeted survey site T17 located outside the Project area (Figure 6a; Table 12). The group was recorded within Moist Forest habitat near a severely eroded section of a creekline (approximately 250 m north of the electricity transmission line easement running generally east to west across the Project area) (Figure 6a). The Grey-headed Flying-fox has been recorded within and surrounding the Project area during previous fauna surveys, including surveys undertaken by DECC (2008a).

The occurrence of the above species in the lower Hunter Valley region is discussed in detail in Section 6.2.4.

Large-eared Pied Bat

The Large-eared Pied Bat was recorded at four targeted survey sites located both within and outside the Project area (sites T10, T11, T18 and T25) (Figure 6a). All of the targeted survey sites where the Large-eared Pied Bats were recorded were located either within or immediately adjacent to electricity transmission line easements. These targeted survey sites included each of the habitat types of the Project area (Section 2.2.2). Site T10 is immediately adjacent to Moist Forest habitat, and sites T11, T18 and T25 are surrounded by dry forest/woodland habitat (Figure 5). Sites T10 and T11 are also located near ponds/channels of water within the electricity transmission line easement. The bats were confirmed by both direct sightings and signature calls recorded by ANABAT detectors.

The occurrence of the above species in the lower Hunter Valley region is discussed in detail in Section 6.2.5.

Eastern False Pipistrelle

The Eastern False Pipistrelle was detected by an ANABAT recorder located at targeted survey site T18 (Figure 6a). This site is located within the electricity transmission line easement running east to west across the Project area on a ridge of the Sugarloaf Range.

The occurrence of the above species in the lower Hunter Valley region is discussed in detail in Section 6.2.6. Section 6 also includes an assessment of the significance of potential impacts to these species as a result of the Project.

4 EVALUATION OF POTENTIAL IMPACTS

4.1 POTENTIAL IMPACTS OF PROJECT SURFACE ACTIVITIES ON FAUNA AND THEIR HABITAT

Vegetation Clearance

The Project would involve the removal of approximately 11.2 ha of dry forest/woodland for construction of the pit top and associated surface facilities (including the ventilation shaft). The vegetation clearance would comprise the following vegetation types (Figure 4):

- Coastal Plains Smooth-barked Apple Woodland – approximately 2.3 ha.
- Lower Hunter Spotted Gum – Ironbark Forest – approximately 8.9 ha.

Some vegetation disturbance would also be associated with monitoring, exploration and subsidence remediation activities conducted within the Project area. These activities would be sited, where practicable, to minimise the amount of vegetation clearance required.

The extent of surface disturbance for the pit top was substantially modified to avoid a population of the threatened flora species Black-eyed Susan (*Tetratheca juncea*). The proposed pit top disturbance area has also been modified to avoid an area of Hunter Lowlands Redgum Forest EEC and a habitat tree for the Yellow-bellied Glider.

Animals can use native vegetation for foraging, roosting, movement, shelter and breeding. *Clearing of native vegetation* is recognised as a key threatening process listed under the TSC Act and *Land clearance* is a related key threatening process listed under the EPBC Act.

Surface disturbance activities for the Project may include habitat clearance impacts such as loss of hollow-bearing trees, removal of dead wood and dead trees and loss of habitat connectivity.

Loss of hollow-bearing trees and *Removal of dead wood and dead trees* are also key threatening processes listed under the TSC Act. Tree hollows are likely to occur predominantly within the dry forest/woodland habitat. Dead trees can provide tree hollows for a range of fauna hollow-nesting birds, bats and arboreal mammals recorded within the Project area. Fallen wood can provide habitat resources for fauna (e.g. lizards and nesting birds).

The main impact on fauna associated with the Project is considered to be habitat loss due to vegetation clearance. Vegetation clearance is a small component of the Project (11.2 ha). The potential impacts associated with the Project are comparable to other land uses in the vicinity of the Project which have resulted in small scale vegetation clearance and associated indirect impacts (e.g. the introduction of pest species). Much of the area in the vicinity of the Project has been reserved (i.e. Sugarloaf SCA) and will not be impacted by vegetation clearance from the Project.

Water Quality

The Project has been designed to avoid the release of mine water from the pit top area. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. A description of the surface water management measures that would be implemented to minimise this impact is provided in Section 5.3.

4.2 POTENTIAL IMPACTS OF SUBSIDENCE EFFECTS ON FAUNA AND THEIR HABITAT

Potential impacts of underground mining as part of the Project may include mine subsidence effects on the surface of the Project area. Mine subsidence surface effects may include:

- Potential surface cracking of soils or slope instability, including erosion and sedimentation effects.
- Potential to impact on streams including changes to stream flow regimes and availability of water.
- Potential to increase the natural rate of erosion and rock falls with localised impacts on vegetation and minor impacts, if any, on potential shelter, retreat or roosting sites for fauna species.

A detailed description of the performance measures Donaldson Coal would implement to mitigate the potential impacts associated with the underground mining as part of the Project is provided in Section 5.1.

4.3 OTHER DIRECT OR INDIRECT POTENTIAL IMPACTS ON FAUNA AND THEIR HABITAT

Fauna and Artificial Lighting

Project lighting has the potential to affect behavioural patterns of some fauna species. Some bird and bat species, for example, are attracted to insects around lights. As a consequence of this, they could become vulnerable to predation by larger predators (e.g. owls) which may lead to changes in population structure and community composition. Night-lighting of the Project surface facilities would be kept to a practicable minimum.

Vehicular Traffic Movements

Vehicular traffic movements associated with exploration, construction and operation of the Project have the potential to increase the incidence of fauna mortality via vehicular strike. Traffic movements are expected to increase along existing public roads as a result of the Project. There is limited vehicle access in the underground mining area and therefore the Project is not expected to increase the risk of vehicle-fauna collisions in this area.

Bush Fire Risk

High frequency fire resulting in the disruption of lifecycle processes in plants and animals, and loss of vegetation structure is listed as a key threatening process under the TSC Act. The potential for bushfires to occur may be increased due to various activities associated with the Project (e.g. vehicles traversing tracks in dense vegetation). A range of management measures would be implemented for the Project to minimise the potential for bushfire (Section 5.3).

Introduced Fauna

Seven introduced fauna species were located during the surveys including the House Mouse (*Mus musculus*), Black Rat (*Rattus rattus*), Red Fox (*Vulpes vulpes*), Brown Hare (*Lepus capensis*), Rabbit (*Oryctolagus cuniculus*), Pig (*Sus scrofa*) and Goat (*Capra hircus*) (Section 3.2.5).

The provision of refuge or scavenging areas (e.g. discarded food scraps and other rubbish) has the potential to increase populations of introduced fauna species in or around the Project area. Management measures would be implemented to maintain clean, rubbish-free environment maintained in order to discourage scavenging and reduce the potential for colonisation of these areas by non-endemic fauna.

Fauna and Noise

Numerous studies have been undertaken on the effects of noise on wildlife (e.g. Algers *et al.*, 1978, Allaire, 1978; Ames, 1978; Busnel, 1978; Lynch and Speake, 1978; Shaw, 1978; Streeter *et al.*, 1979; Poole, 1982). The studies indicate that many species are well adapted to human activities and noise.

Noise associated with the construction and operation of the surface facilities has the potential to disrupt the routine activities of vertebrate fauna. Noise mitigation and management measures would be implemented at the surface facilities in accordance with the NSW *Industrial Noise Policy* (NSW Environment Protection Authority [EPA], 2000). The potential for noise generation in the proposed underground mining area and surrounds is expected to be low.

Human-Caused Climate Change

Human-caused climate change is listed as a key threatening process under the TSC Act. An assessment of this potential impact is outside the scope of this report and is instead addressed in the main report of the Project Environmental Impact Statement.

Chytrid Fungus

Infection of frogs by amphibian chytrid causing the disease Chytridiomycosis is listed as a key threatening process under the TSC Act.

A water-borne fungal pathogen *Batrachochytrium dendrobatidis*, commonly known as the amphibian or frog chytrid fungus, is responsible for the disease Chytridiomycosis (Berger *et al.*, 1999). Infection occurs through water-borne zoospores released from an infected amphibian in water (DECC, 2008b). Collection and handling of frogs and inadvertent transport of infected material between frog habitats may also promote the disease's spread (NSW Scientific Committee, 2003).

To reduce the likelihood of spreading infection, personnel conducting amphibian surveys or surface water sampling would observe appropriate hygiene protocols in accordance with the DECC (2008b) *Hygiene Protocols for the Control of Disease in Frogs.*

Myrtle Rust

The introduction and establishment of exotic disease causing rusts on the plants of the Myrtaceae family is listed as a key threatening process under the TSC Act.

The exotic rust, *Uredo rangelii*, commonly referred to as Myrtle Rust attacks the young growing leaves and shoots of the host plant causing them to become stunted and necrotic. Spores of Myrtle Rust are dispersed by wind, water-splash on plant material including seed, and on people and their clothing and equipment (NSW Industry and Investment, 2010). Myrtle Rust is present within Heaton State Forest.

Donaldson Coal contractors would undertake standard procedures to prevent the spread of Myrtle Rust in the Project area. Standard control procedures include washing vehicles, clothing, footwear and tools and not removing infected plant material from sites with Myrtle Rust.

Koala Habitat

The Koala has been previously recorded within the underground mining area. An assessment of Koala habitat in relation to the *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44) is provided in Section 4.4.

Cumulative Impacts

A cumulative impact assessment considers the impacts of the Project added to other existing impacts, as well as potential impacts from proposed (but not yet approved) developments in the local area.

There are currently a number of underground coal mines operating in the vicinity of the Project. These include the existing Tasman Underground Mine, Abel Underground Mine and West Wallsend Colliery.

The proposed pit top area was previously used for illegal dumping (e.g. rubbish and car bodies) and therefore had existing disturbance. Remediating this disturbance is part of Donaldson Coal's management measures.

An assessment of the cumulative subsidence impacts of the Project and the existing Tasman Underground Mine is provided in Appendix A of the Project Environmental Impact Statement (Ditton Geotechnical Services, 2012). The impacts assessment presented in this report is based on the findings of the cumulative subsidence assessment.

In addition, a number of other land uses exist in the vicinity of the Project. These include:

- a reserve system (e.g. Sugarloaf SCA and Heaton State Forest);
- infrastructure (e.g. public roads, electricity transmission lines, communication towers and fibre optic cables);
- industrial developments (existing, approved and proposed), including an ammonium nitrate emulsion production, research and testing facility;
- residential developments; and
- private landholdings.

These other land uses (excluding the reserve system) have resulted in the removal and modification to substantial areas of fauna habitat in the region. Considering the nature and scale of the potential impact of the Project (Section 4) and the mitigation and rehabilitation measures proposed (Section 5), the Project would be unlikely to substantially contribute to regional cumulative impacts.

4.4 SEPP 44 – KOALA HABITAT ASSESSMENT

In response to a state-wide decline of Koala populations, the Department of Urban Affairs and Planning (now Department of Planning and Infrastructure) gazetted the SEPP 44 in January 2005.

The policy aims to *encourage the conservation and proper management of areas of natural vegetation that provide habitat for Koalas, to ensure permanent free-living populations over their present range and to reverse the current trend of population decline*.

As the Sugarloaf SCA is reserved under the *National Parks and Wildlife Act, 1974*, SEPP 44 does not apply to this reserved land. Therefore an assessment of the Project under the provisions of SEPP 44 is only relevant to the Project area located outside the Sugarloaf SCA.

In accordance with SEPP 44, the impact of the Project on core and potential Koala habitat is to be assessed. Core and potential Koala habitat are defined by SEPP 44 as:

> ***core koala habitat*** *means an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population)*; and
>
> ***potential koala habitat*** *means areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component*.

An assessment of whether either core or potential Koala habitat is located with the Project area outside the Sugarloaf SCA is provided below.

Koala Records Within and Surrounding the Project Area

Koala records within the Project area are scant. There are a total of eight sightings collected over a period of 20 years. Most of the sightings were made on the middle and upper slopes of the Sugarloaf Ranges in areas of mixed open woodland.

OEH BioNet database records (OEH, 2012a) indicate two Koala records within the Project area and some in the greater surrounds (Attachment E-A). The highest concentrations of Koala records by far are in vegetation surrounding Grahamstown Lake approximately 20 km north-east of the Project area (Attachment E-A).

Results of Project Fauna Surveys for Koalas

Despite earlier records, no Koalas were seen or heard during the Project fauna surveys which covered almost the entire site. No Koalas responded to Koala playback calls and although scratches were found on a tree near Sugarloaf Range Road to the far south of the Project area that could possibly have been made by a Koala, none of the marks were distinctive enough to be sure of the identification. Many of the smooth barked trees in the area are scratched by possums, gliders and goannas but definite Koala scratches were not found. Additionally, no Koala droppings were observed.

Prevalence of Koala Food Trees

The Koala is associated with favoured Eucalyptus species for food sources. These species are listed in Schedule 2 (Feed Tree Species) of SEPP 44. A number of these Eucalyptus species are predicted to occur in most vegetation communities in the Project area, including those in the proposed surface disturbance area, underground mining area and in the Project surrounds.

Koala Feed Tree Species were found to occur in the Project area, the most common and widely dispersed of which are Grey Gums (*Eucalyptus punctata*). Grey Gums are present on the alluvial flats to the west of the Sugarloaf Range as well as on the flanks of the ranges. In some areas they are the dominant trees in the woodland, including an area along the eastern margin of the pit top site (and continuing offsite northwards across George Booth Drive). The Grey Gums are also heavily used by the Yellow-bellied Gliders in the area and gliders scratches and chew marks were relatively common on these trees across the site. In contrast, no definite scratch marks from Koalas could be found during Project surveys.

Other food trees in the area include Forest Red Gum (*Eucalyptus tereticornis*), Scribbly Gum (*E. signata* and *E. haemastoma*) and Swamp Mahogany (*E. robusta*). Forest Red Gums are confined to main drainage lines. Scribbly Gums are relatively uncommon with only some found on eastern footslopes well away from the pit top area. Swamp Mahogany were very scarce and only a few trees were found in the alluvial flats on the western side of the Sugarloaf Range.

Potential Koala Habitat

Potential Koala habitat is defined as an area of native vegetation where Koala food trees constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

The only areas where potential Koala habitat was present was in the Grey Gum dominated areas flanking the eastern margin of the pit top area and extending northwards across George Booth Drive and where Forest Red Gums occur in sufficient concentrations within the Hunter Lowlands Red Gum Forest. Over the remainder of the site, potential food trees were widely interspaced and do not meet this criterion.

Core Koala Habitat

Core Koala habitat refers to an area of land with a resident population of Koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population. No recent sightings are known from the Project area and there do not appear to be any resident Koalas in the immediate vicinity of the Project area. On this basis, core Koala habitat is considered to be absent from the site.

Potential Impacts

An assessment of the potential impacts of the Project on the Koala is presented in Section 6.3.4.

5 IMPACT AVOIDANCE AND MITIGATION MEASURES

The measures that would be taken to avoid and/or mitigate the impacts described in Section 4, include the strategies and measures addressed under the following categories:

- subsidence performance measures and subsidence control zones (Section 5.1);
- land clearing strategies (i.e. timing of land clearance, pre-clearance surveys and salvage of habitat features) (Section 5.2);
- miscellaneous programmes (i.e. site water management, weed and animal pest management and fire management) (Section 5.3); and
- rehabilitation of surface disturbance area (Section 5.4).

These avoidance and mitigation strategies are described in the sections below.

5.1 SUBSIDENCE PERFORMANCE MEASURES AND SUBSIDENCE CONTROL ZONES

Prior to the commencement of mining and periodically during the life of the Project, Extraction Plans would be developed in consultation with the relevant authorities. The Extraction Plans would detail the mine layout required to meet defined subsidence performance measures and document the monitoring and management measures for potential subsidence effects on key surface features.

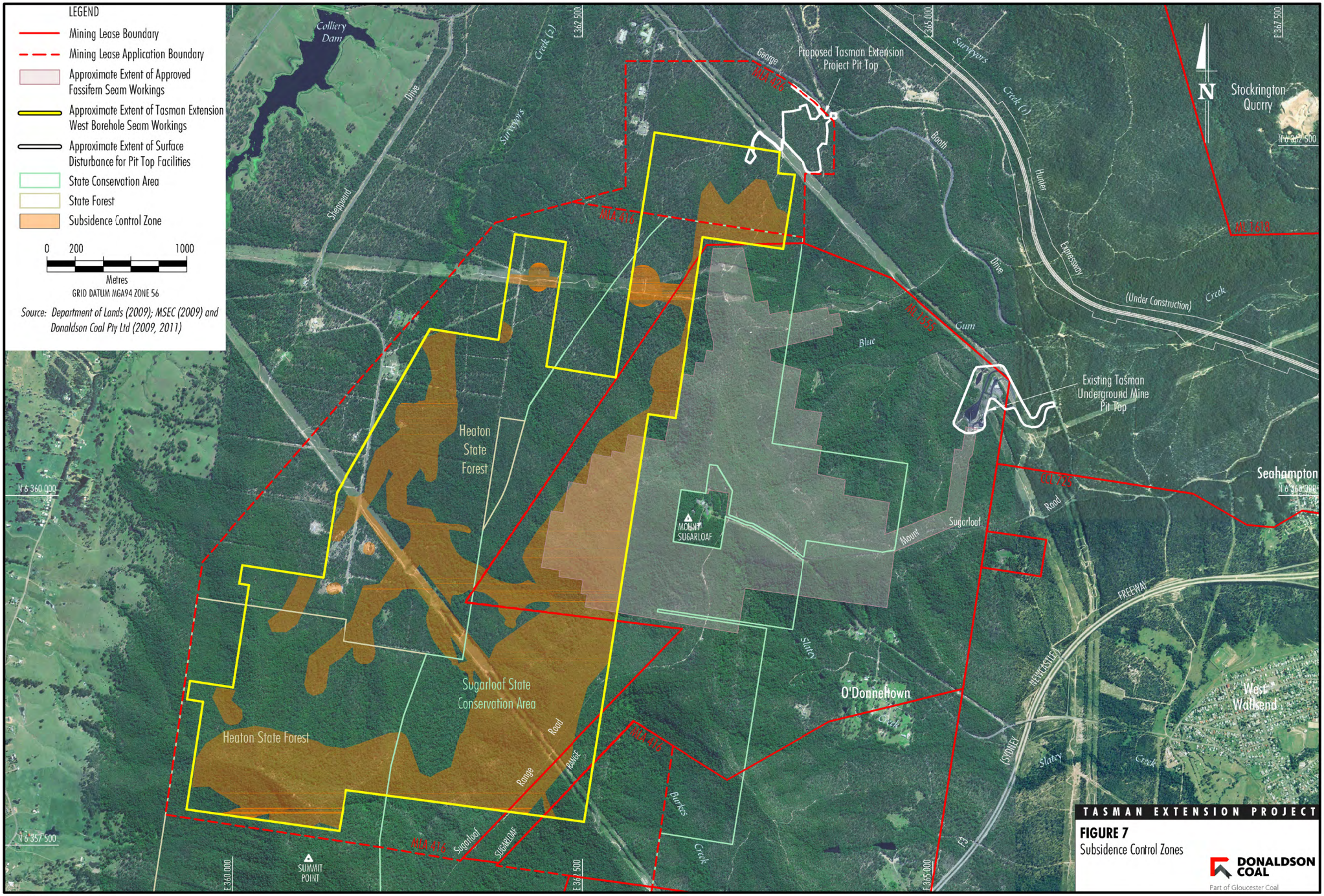
As a component of the Project, Donaldson Coal would implement performance measures for significant surface features (Table 13). These subsidence performance measures would be achieved by implementing subsidence control zones to manage subsidence effects on the surface feature and achieve the performance measure. Indicative subsidence control zones for the Project are shown on Figure 7. The subsidence control zones may involve partial extraction or limiting extraction to first workings (i.e. no secondary extraction) in some areas. The mine design will be such that the subsidence performance measures are achieved.

Table 13
Relevant Subsidence Performance Measures for Significant Surface Features

Surface Feature	Performance Measure
Cliff Lines	Minor impact resulting in negligible environmental consequence. No additional risk to public safety.
Steep Slopes	Minor impact resulting in negligible environmental consequence. No additional risk to public safety.
3rd Order Streams[1] or above	Negligible environmental consequences (i.e. negligible diversion of flows and negligible change in the natural drainage behaviour of pools). Negligible connective cracking to underground workings.
1st and 2nd Order[1] Steams	Not more than minor environmental consequences. Negligible connective cracking to underground workings.
Warm Temperate Rainforest and Alluvial Tall Moist Forest (Groundwater Dependent Ecosystems) and Hunter Lowlands Red Gum Forest on 3rd Order Streams[1]	Negligible environmental consequence.

[1] In accordance with the Strahler stream order system.

Note: Cliff Lines - a continuous rock face with minimum height of 10 m and a minimum slope of 2 to 1.
Steep Slopes - an area of land having gradient between 1 in 3 and 2 in 1.
Minor - Relatively small in quantity, size and degree given the relative context.
Negligible - Small and unimportant, such as to be not worth considering.



DCL-09-01 EIS_App Fauna_106D

Donaldson Coal would implement an adaptive management approach to ensure the subsidence performance measures are achieved for the Project. Adaptive management would involve the monitoring and periodic evaluation of environmental consequences against the performance measures, and adjustment (if necessary) of the subsidence control zones (i.e. mine design and extent) to achieve the adopted performance measures.

Numerous assessments and monitoring programmes of the environmental consequence of mine subsidence have been conducted at the existing Tasman Underground Mine, Abel Underground Mine, other mines in the Newcastle Coalfield and also in the Southern Coalfield. Donaldson Coal has a subsidence monitoring programme for the existing Tasman Underground Mine which includes visual inspections and photographic monitoring focusing on surface features such as cliffs. No evidence of subsidence related environmental consequences have been observed at the existing Tasman Underground Mine to date (Newcastle Coal Company Pty Ltd, 2011).

In consideration of the finding of the above and based on Donaldson Coal's commitment to performance measures (Table 13), the following presents potential impacts associated with underground mining as part of the Project:

- Potential to impact on streams - with the implementation of the subsidence performance measures outlined in Table 13 (through designing the mine to minimise subsidence proximal to sensitive features), there would be negligible environmental consequence for groundwater dependent ecosystems, and the availability of water in streams would not be impacted to an extent that would significantly affect the availability of habitat resources for fauna species.
- Potential to precipitate rock falls - this is particularly the case where the rocks are marginally stable. Rock falls also occur as part of the natural weathering processes. Given the implementation of the subsidence performance measures and the predicted low incidence of rock falls, it is considered that rock falls resulting from mine subsidence would likely have only localised impacts on vegetation and minor impacts, if any, on potential shelter, retreat or roosting sites for threatened fauna species.
- Potential to cause cracking on slopes and ridgetops, including surface tension cracking near the tops of slopes - the magnitude of expected surface cracking is considered too small to influence the hydrological processes in the slope and ridgetop areas and is unlikely to have any biologically significant effect on the soil moisture regime that sustains the existing vegetation. The author is not aware of any reported observations of significant impacts to slope or ridgetop vegetation that have been attributed to mine subsidence in Australia.
- Potential to result in localised impacts to stream baseflow through subsidence impacts - due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow (RPS Aquaterra, 2012).
- Potential to result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients - due to the implementation of the subsidence performance measures, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependent ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012; Evans and Peck, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring.

- Potential to increase erosion (particularly in steep areas), resulting in increased sediment loads within streams - based on the implementation of the subsidence control zones (particularly those relating to steep slopes, cliff lines, 3rd Order streams and 1st and 2nd Order streams in areas with less than 80 m depth of cover) the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

Prior to the commencement of mining and periodically during the life of the Project, Extraction Plans would be developed in consultation with the relevant authorities. The Extraction Plans would detail the mine layout required to meet the subsidence performance measures (Table 13) and document the monitoring and management measures for potential subsidence effects on key surface features.

5.2 LAND CLEARING STRATEGIES

Donaldson Coal currently implements a Flora and Fauna Management Plan (Ecobiological, 2007b) at the existing Tasman Underground Mine, which would be reviewed and revised to incorporate the Project. This plan includes measures for pre-clearing surveys and revegetation of disturbed areas that would not be in use following construction. The Flora and Fauna Management Plan includes a Vegetation Clearance Protocol to minimise and ameliorate any impact on flora and fauna, in particular threatened species, during the revegetation clearing activities.

Minimisation and Avoidance

Vegetation clearance associated with minor surface disturbance activities (i.e. monitoring and exploration activities and access tracks) would be sited, where practicable, to avoid or minimise the amount of vegetation clearance required (i.e. positioning sites to avoid the removal of trees).

Timing of Land Clearance

Clearing of remnant tree and shrub vegetation would, where practicable, be restricted to late summer and autumn in order to avoid the spring breeding season for nesting birds and winter when bats are hibernating, and early to mid-summer when bats are bearing young. As a result, the impact to fauna less likely to be able to escape from felled habitat trees would be minimised.

Pre-clearance Surveys

Pre-clearance surveys would be conducted by a suitably qualified and experienced fauna expert. Surveys would involve the inspection of trees requiring removal (concentrating on those trees with a diameter at breast height greater than 20 centimetres (cm) and those with tree hollows) and would specifically target Koalas or hollowing-dependant fauna (e.g. microchiropteran bats and arboreal mammals). A search of groundcover (i.e. logs and rocks) would also be undertaken to detect smaller terrestrial fauna such as small mammals, reptiles and amphibians.

Fauna detected during the pre-clearance surveys would be captured and released into areas of adjacent habitat that would not be cleared. Nocturnal fauna would be released at dusk. Although unlikely, if a Koala is detected in a tree it would be left to move away on its own accord.

Salvage of Habitat Features

Habitat features (e.g. trunks, logs, branches, small stumps and roots) would be salvaged during vegetation clearance activities and relocated to areas undergoing rehabilitation. The ground layer vegetation and low shrubs would be incorporated into the topsoil when it is stripped. This would increase the mulch cover for the soil and enhance the soil seed bank, and importantly provide habitat for a range of species in the rehabilitated areas.

Tree hollows and logs would be selectively chosen for placement in areas where habitat enhancement is required. These features may be fixed to mature trees or placed on the ground.

5.3 MISCELLANEOUS PROGRAMMES

Site Water Management Measures (including Erosion and Sediment Control)

Donaldson Coal currently implements a Site Water Management Plan for the existing Tasman Underground Mine, which would be reviewed and revised to include the Project. The Site Water Management Plan includes erosion and sediment control measures, surface and groundwater monitoring and a surface water and groundwater response plan.

As described in Section 4.1, limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. The Project has been designed to avoid the release of mine water from the pit top area.

Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the OEH.

Regular monitoring of water quality upstream and downstream of the pit top area would be undertaken throughout the life of the Project.

Measures to Avoid or Reduce Impacts of Weeds

Donaldson Coal would implement weed control measures to minimise seed transport, including inspection of vehicles and mechanical equipment.

Weed management measures for the pit top area would include identification of weeds via regular site inspections, mechanical removal of identified weeds and/or the application of approved herbicides and follow-up site inspections to determine the effectiveness of the eradication programmes.

Measures to Avoid or Reduce Impacts of Animal Pests

Waste management measures would be implemented to maintain a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation of these areas by non-endemic fauna. In addition, surface lighting will be confined to the area around the pit tops and the ventilation shaft.

Measures to Avoid or Reduce Impacts of Bushfire

Donaldson Coal implements a Bushfire Management Plan approved by the Rural Fire Service for the existing Tasman Underground Mine, which would be reviewed and revised as required for the Project.

Management measures to reduce the risk of bushfire and bushfire protection measures would include the maintenance of fire breaks to slow the progress of bushfires, implementation of housekeeping activities such as keeping the site tidy and removing fire hazards where relevant, and having fire fighting equipment and spill kits located on-site.

5.4 REHABILITATION OF SURFACE DISTURBANCE AREA

The rehabilitation programme for the Project would include the rehabilitation of surface disturbance areas remaining at the cessation of the Project (i.e. the pit top and ventilation shaft sites and any areas disturbed by monitoring and exploration activities). Rehabilitation would be subject to regulatory authority agreement and approval as part of the Mining, Rehabilitation and Environmental Management Process administered by the NSW Trade and Investment – Division of Resources and Energy. The final land use for the rehabilitated pit top and ventilation shaft sites would be bushland conservation.

Monitoring of rehabilitation areas would be conducted on a regular basis to confirm that the rehabilitation objectives are being achieved and to identify the need for any maintenance and/or contingency measures. Remediation of minor surface disturbance areas (associated with monitoring and exploration activities) and mine subsidence surface effects (e.g. surface cracking and minor erosion identified as part of the subsidence monitoring programme) would occur progressively.

A Mine Closure Plan would be developed for the Project, and would address the long-term land use for the pit top area, which would be bushland conservation. The plan would document the final mine closure process, final rehabilitation works and post-closure maintenance and monitoring requirements appropriate to established completion criteria.

6 THREATENED FAUNA IMPACT ASSESSMENT

6.1 ASSESSMENT APPROACH

Forty-seven threatened species (Table 1 and Attachment D) have been identified as possible occurrences in the Project area at some time or another (Section 1.4.5).

Assessments of the significance of the potential impacts of the Project on these threatened fauna species or their habitat have been undertaken in accordance with Section 5A of the EP&A Act and the *Threatened Species Assessment Guidelines: The Assessment of Significance* (DECC, 2007).

The likelihood of the Project significantly affecting threatened species, populations or their habitats listed under the TSC Act has been assessed by addressing the following factors:

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle[1] of the species such that a viable[2] local population[3] of the species is likely to be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the lifecycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- *(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or*
- *(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.*

(d) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

(e) In relation to the habitat of a threatened species, population or ecological community:

- *(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;*
- *(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and*
- *(iii) the importance[4] of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.*

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

(g) Whether the action proposed constitutes or is part of a key threatening process[5] or is likely to result in the operation of, or increase the impact of, a key threatening process.

---

1 **Lifecycle**: the series or stages of reproduction, growth, development, ageing and death of an organism (DECC, 2007).

2 **Viable**: the capacity to successfully complete each stage of the lifecycle under normal conditions (DECC, 2007).

3 **Local population**: the local population may be extended to include individuals beyond the study area if it can be clearly demonstrated that contiguous or interconnecting parts of the population continue beyond the study area, according to the following definitions (DECC, 2007).

- The *local population* of *resident fauna* species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area.
- The *local population* of *migratory or nomadic fauna* species comprises those individuals that are likely to occur in the study area from time to time.

4 **Importance**: related to the stages of the species' lifecycles and how reproductive success may be affected.

5 This factor refers only to those key threatening processes listed in Schedule 3 of the TSC Act and Schedule 6 of the NSW *Fisheries Management Act, 1994*.

Questions (b), (c) and (d) are not relevant to the threatened fauna species assessments provided in this section because they relate to endangered populations, EECs or critical EECs and critical habitat, respectively. No endangered populations or critical habitat occur within the Project area or its surrounds. Assessments relevant to the EECs associated with Project area are addressed within Hunter Eco (2012) (Appendix F of the Project Environmental Impact Statement).

An assessment has been prepared for each individual threatened species recorded during the Project surveys. These assessments are provided in Sections 6.2.1 to 6.2.6. Assessments have also been prepared for threatened fauna species which are considered possible occurrences in the Project based on results of other surveys or database search results, but were not recorded during Project surveys. The assessments for these species have been prepared in the following fauna groupings *viz*., amphibians, reptiles, woodland birds and mammals. These assessments are provided in Sections 6.3.1 to 6.3.5. Regional records (based on OEH BioNet/Atlas of NSW Wildlife database records [OEH, 2012a]) for these fauna groupings are provided in Attachments E-A to E-C.

6.2 THREATENED SPECIES RECORDED DURING PROJECT SURVEYS

6.2.1 Glossy Black-cockatoo

Introduction

The Glossy Black-cockatoo (*Calyptorhynchus lathami*) has a patchy distribution along the eastern seaboard, south from Paluma in northern Queensland to the Gippsland area of Victoria and inland to south-central Queensland and the Central Western Plains and Riverina of NSW (Thomas *et al.,* 2011; Glossy Black Conservancy, 2010). The Project is not at the limit of this species known distribution, though the species occurs predominantly in the east of the region. This species has been recorded at multiple locations in the wider area, with a concentration of numbers in the forested areas to the west of the Project (Attachment E-B). Figure 6a shows the location of where this species was recorded during the Project surveys.

The Glossy Black-cockatoo inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1,000 m in which stands of Sheoak species, particularly Black Sheoak (*Allocasuarina littoralis*), Forest Oak (*A. torulosa*), Bulloak (*Allocasuarina luehmannii*) or Drooping Sheoak (*A. verticillata*) occur (OEH, 2012b). Not all apparently suitable habitat provides adequate food value to support the cockatoos (Crowley and Garnett, in press, in Garnett and Crowley, 2000; Crowley *et al*., 1999; Clout, 1989). This species is dependent on large hollow-bearing Eucalypts for nest sites (OEH, 2012b). One or two eggs are laid between March and August (OEH, 2012b).

The Glossy Black-cockatoo forages on Allocasuarina or Casuarina seeds and requires foraging habitats that contain abundant Allocasuarina or Casuarina trees (Morcombe, 2004; Simpson and Day, 1999). Preferred food sources include Black Sheoak (*Allocasuarina littoralis*), Forest Oak (*A. torulosa*) and Drooping Sheoak (*A. verticillata*). Even given a stable source of seeds, their high nutritional content and abundance, intake rates are low and cannot be accelerated if food supply is short (Garnett *et al.,* 2011). Individuals may spend up to 88% of each day foraging and are rarely found foraging on species other than Allocasuarina or Casuarina species (Glossy Black Conservancy, 2010). This species generally forages in areas that have a high vegetation cover of Allocasuarina species and generally avoids open sites (Glossy Black Conservancy, 2010).

This species is considered sedentary, resident or nomadic, either partially or locally (Glossy Black Conservancy, 2010). However, some Glossy Black-cockatoos have been known to undertake movements over long distances (Glossy Black Conservancy, 2010).

The Glossy Black-cockatoo lives in groups, commonly up to 10 birds, which spend the majority of the day feeding in the foliage of Casuarina trees (Morcombe, 2004). This species abundance is also dependent on hollow availability (Cameron, 2006).

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Glossy Black-cockatoo could potentially use components of the Dry Woodland/Forest (Figure 4) broad habitat type in the Project area for roosting, feeding and breeding. Limited feeding resources are available for this species within the Project area and surrounds (e.g. Bulloak [*Allocasuarina luehmannii*] and Belah [*Casuarina cristata*]). However, preferred food sources, Black Sheoak (*Allocasuarina littoralis*) may occur in the Coastal Plains Smooth-barked Apple Woodland vegetation community and Forest Sheoak (*A. torulosa*) may potentially occur in vegetation communities Hunter Valley Moist Forest and Coastal Foothills Spotted Gum – Ironbark Forest. A portion of Coastal Plains Smooth-barked Apple Woodland is present in the proposed surface disturbance area (Figure 4). However, Forest Sheoak is expected to occur in a number of vegetation communities surrounding the Project area. Large tree hollows suitable for breeding are present in the Project area.

The Glossy Black-cockatoo population is widespread in suitable habitat throughout the Hunter/Central Rivers Catchment Management Authority (CMA) region and the species is known to occur in the following CMA sub-regions within the Hunter/Central Rivers CMA, a number of which have protected areas: Barrington, Comboyne Plateau, Ellerston, Hunter, Karuah Manning, Kerrabee, Liverpool Range, Macleay Hastings, Mummel Escarpment, Pilliga, Tomalla, Upper Hunter, Walcha Plateau, Wollemi (Part A, B and C), Wyong and Yengo (OEH, 2012b).

During the Project surveys, three individuals of the Glossy Black-cockatoo (*Calyptorhynchus lathami*) were recorded within the Project area at site S10 (Figures 5 and 6a). Previous surveys within and surrounding the Project area have also recorded the Glossy Black-cockatoo. The local population is likely to be continuous due to large areas of connected vegetation throughout Sugarloaf SCA, Heaton State Forest and further south (Attachment E-B).

Based on the above, the Project is unlikely to have an adverse impact on the lifecycle of the Glossy Black-cockatoo such that a viable population of the species is likely to be placed at risk of extinction.

Questions (b), (c) and (d) are not relevant to this species.

(e) In relation to the habitat of a threatened species, population or ecological community:

- ***(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;***
- ***(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and***
- ***(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.***

In order for the Project to significantly affect the Glossy Black-cockatoo from habitat removal or modification, habitat fragmentation or isolation, the Project would have to undergo substantially larger clearing than planned and in such a way as to fragment or isolate vegetation. Disruption of existing habitat connectivity for existing populations would be possible following events such as significant habitat clearing, or extensive rock falls that created a barrier to movement, or the complete and permanent drying of streams that separated existing meta-populations.

The Project would disturb approximately 11.2 ha (comprising approximately 2.3 ha of Coastal Plains Smooth-barked Apple Woodland and 8.9 ha of Lower Hunter Spotted Gum - Ironbark Forest), all of which is classified as Dry Forest/Woodland broad habitat type (Figure 4). Substantial areas of this habitat is available in the remaining Project area (underground mining area) (Figure 4) plus significantly more in the Project surrounds. All vegetation communities and broad habitat types that occur in the proposed surface disturbance area (pit top and ventilation shaft areas) occur in other areas of the Project and surrounds (Figure 4).

The Project would not result in an area of habitat suitable for this species becoming fragmented or isolated from other areas of habitat for this species. Potential movement pathways across the Project area are not expected to be disrupted by the proposed surface disturbance. The Project area represents a small area of vegetation within a large area of connected remnant vegetation through the Sugarloaf SCA, Heaton State Forest and surrounding vegetation (Figure 1).

The species is likely to continue to use the habitat resources that would remain within the locality, including within the protected areas listed above in Question (a) where this species has been recorded.

Any vegetation communities or habitat features relevant to this species outside of the proposed surface disturbance area (i.e. in the underground mining area) is expected to receive negligible impact from the Project due to the implementation of subsidence performance measures and associated subsidence control zones (Section 5.1).

Given the expected limited nature of vegetation clearance, hydrological changes and other potential Project impacts, the Project is unlikely to significantly reduce the quality or availability of suitable habitat for this species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There are no listed priority actions for the Glossy Black-cockatoo (OEH, 2012b). Recovery actions include: reducing impact of burning to understorey species, protecting hollow-bearing trees, protecting Sheoak containing vegetation, establishing forested corridors to link remnant habitat and reporting illegal bird trapping and egg-collecting to OEH (OEH, 2012b).

Threats to this species relevant to the Project include loss of tree hollows, reduction of habitat and excessively frequent fires (OEH, 2012b).

Donaldson Coal would implement bushfire management procedures in order to minimise disturbance caused by fire (Section 5.3). Black Sheoak (*Allocasuarina littoralis*) may occur in the Coastal Plains Smooth-barked Apple Woodland vegetation community and Forest Sheoak (*A. torulosa*) may potentially occur in vegetation communities Hunter Valley Moist Forest and Coastal Foothills Spotted Gum – Ironbark Forest. A portion of Coastal Plains Smooth-barked Apple Woodland is present in the proposed surface disturbance area (Figure 4). The Forest Sheoak (*A. torulosa*) may possibly occur in the surface disturbance area, however it is expected to occur in a number of vegetation communities in the remaining Project area and surrounds. The Project is not expected to fragment suitable habitat for the species. Donaldson Coal and its contractors would report illegal activity as part of its standard operating procedures.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to this species include clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

The Project would result in clearing of native vegetation which is a key threatening process applicable to the Glossy Black-cockatoo. Notwithstanding, the Project is not expected to significantly affect the Glossy Black-cockatoo due to the small area of estimated proposed surface disturbance (11.2 ha) and given no vegetation community in the proposed surface disturbance area is limited to that area (Figure 4).

Threats from pests would be managed using the mitigation measures outlined in Section 5.3. As a result, the Project would not result in an increase of pest species.

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012). However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

Various management plans for impact avoidance and management of possible effects would be developed and implemented as part of the Project (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). Collectively, these would ensure that the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

6.2.2 Little Lorikeet

Introduction

The Little Lorikeet (*Glossopsitta pusilla*) is distributed widely across the coastal and Great Dividing Range regions of eastern Australia and is generally found along the eastern seaboard north to Cairns (Thomas *et al.*, 2011). In NSW, Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri (Barrett *et al*., 2003). The Project is near the eastern limit of this species known distribution. The sites where the Little Lorikeet was recorded within the Project area during the Project surveys are shown on Figure 6a.

Little Lorikeet nests are typically situated close to foraging areas and are found in hollows in the limbs or trunks of mature and old-growth stands of smooth-barked Eucalypts (Courtney and Debus, 2006). These nests are usually high above the ground (2 to 15 m) and are often used repeatedly for decades (Courtney and Debus, 2006). The nesting season of the Little Lorikeet extends from May to September and during years when flowering is prolific, pairs can breed twice, producing 3 to 4 young per attempt (OEH, 2012b). This species is heavily dependent on White Box (*Eucalyptus albens*) and Yellow Box (*E. melliodora*) for successful breeding (Courtney and Debus, 2006).

This species forages on nectar, pollen, fruits, berries and seeds (Morcombe, 2004). Foraging habitat often occurs in tree canopies where nectar and pollen is taken from Eucalypts as well as *Angophora* spp., *Melaleuca* spp. and native fruits such as Mistletoe (OEH, 2012b). Key food trees of the Little Lorikeet includes flowering White Box (*E. albens*) and Yellow Box (*E. melliodora*) (Courtney and Debus, 2006).

The Little Lorikeet is nomadic and nomadic movements are generally influenced by season and food availability, although some areas contain residents for most of the year (Morcombe, 2004; OEH, 2012b). The Little Lorikeet is gregarious and travels and feeds in small flocks (<10), often with other lorikeets (OEH, 2012b). This species is occasionally seen in larger flocks of approximately 100 birds (OEH, 2012b).

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Dry Forest/Woodland broad habitat type may provide potential habitat for this species. White Box (*Eucalyptus albens*) and other plants that provide nectar, pollen, fruits, berries and seeds provide potential forage resources for this bird. White Box (*Eucalyptus albens*) is not considered likely to occur in any vegetation communities present in the Project area. However Eucalyptus species were present in every vegetation community in the Project area except for Sugarloaf Uplands Paperbark Thicket in the underground mining area and a variant of Lower Hunter Spotted Gum – Ironbark Forest in the underground mining area (Figure 4). This indicates that although feed trees may be present in the proposed surface disturbance area, they are certainly not limited there.

Tree hollows are present in the Project area and it is possible that the species could use them for breeding. Habitat features such as hollows and feed trees are unlikely to be affected in the underground mining area (Section 5.1).

Despite a possible impact on hollow-bearing trees and feeding trees, the Project is not likely to adversely impact the Little Lorikeet such that the population is placed at risk of extinction given:

- the Little Lorikeet is nomadic and the local population is not likely to be confined to the Project area;
- habitat features such as feed trees and hollow-bearing trees within the underground mining area would have negligible to no disturbance (Section 5.1); and
- the species is known to occur within a range of areas in the Hunter/Central Rivers CMA region, a number of which are protected: Barrington, Comboyne Plateau, Ellerston, Kerrabee, Liverpool Range, Macleay Hastings, Mummel Escarpment, Pilliga, Tomalla, Upper Hunter, Walcha Plateau, Wollemi (Part A, B and C), Wyong and Yengo (OEH, 2012b).

Questions (b), (c) and (d) are not relevant to this species.

(e) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

In order for the Project to significantly affect the Little Lorikeet from habitat removal or modification, habitat fragmentation or isolation, the Project would have to undergo substantially larger clearing than planned and in such a way as to fragment or isolate vegetation. Disruption of existing habitat connectivity for existing populations would be possible following events such as significant habitat clearing, or extensive rock falls that created a barrier to movement, or the complete and permanent drying of streams that separated existing meta-populations.

As described above, the Little Lorikeet could potentially use the Dry Forest/Woodland broad habitat type that would be cleared for the Project area. However, this broad habitat type is not limited to the surface disturbance area (Figure 4) as substantial Dry Forest/Woodland is located in the immediate surrounds and outside the Project area.

Given the limited area of proposed vegetation clearance (i.e. 11.2 ha), the Project would not result in an area of habitat suitable for this species becoming fragmented or isolated from other areas of habitat for this species. Movement across the Project and surrounding forested areas is not expected to be disrupted by the Project. Potential movement pathways across the surface disturbance area are likely to be restored across the revegetation areas (Section 5.4). Large areas or remnant connected vegetation remains throughout Sugarloaf SCA, Heaton State Forest and surrounds (Figure 1).

If the potential habitat in the Project area is removed, the species is very likely to continue to use the habitat resources that would remain within the locality, including those within the protected areas listed above where this species has been recorded (OEH, 2012b). The Little Lorikeet has been recorded within the Project area at sites T21 and OP18, including 13 individuals in total (Figure 6a). Previous surveys within and surrounding the Project area have also recorded the Little Lorikeet. This species has also been recorded at numerous locations in the wider area (Attachment E-B) (OEH, 2012a). The Project is less likely to impact any potentially breeding Little Lorikeets as clearing of remnant tree and shrub vegetation would, where relevant, be restricted to late summer and autumn in order to avoid the spring breeding season (Section 5.2).

Any vegetation communities or habitat features relevant to this species outside of the proposed surface disturbance area (i.e. in the underground mining area) is expected to receive negligible impact from the Project due to the implementation of subsidence control zones to achieve the stated subsidence performance measures (Section 5.1). Surface features relevant to this species include water resources (i.e. streams).

Given the expected limited nature of vegetation clearance, hydrological changes and other potential Project impacts, the Project is unlikely to significantly reduce the quality or availability of suitable habitat for this species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At this stage, no priority actions have been identified for the Little Lorikeet (OEH, 2012b). However recovery actions include (OEH, 2012a):

- Retain large old trees, especially those that are hollow-bearing.
- Ensure recruitment of trees into the mature age class so that there is not a lag period of decades between the death of old trees and hollow formation in younger trees.
- Protect large flowering Eucalyptus trees throughout the habitats frequented by this species. Manage remnant woodlands and forest for recovery of old-growth characteristics.
- Where natural tree recruitment is inadequate, replant local species to maintain foraging habitat and breeding sites.
- Reduce the abundance of feral Honeybees and limit the exploitation of nectar by domestic bees where resources are spatially or temporally sparse (e.g. in years of drought).
- Document nest sites and ensure their protection.

These recovery actions were developed from threats relevant to the Little Lorikeet including loss of feed trees (old, fertile Eucalypts), loss of hollows and competition with the introduced Honeybee (OEH, 2012b).

The Project would be consistent with the recovery actions for this species (OEH, 2012b). Hollow-bearing trees within the underground mining are expected to receive negligible impact from the Project and the proposed area to be cleared, approximately 11.2 ha, is not considered significant given no vegetation communities are exclusive to the proposed surface disturbance area (Figure 4).

The Project would implement a feral animal and weed control programme (Section 5.3) to alert personnel to the presence of feral Honeybees, a Vegetation Clearance Protocol (Section 5.2) to document and manage habitat features and implement subsidence control zones (Section 5.1) to minimise potential effects on potential habitat and habitat features.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to this species includes clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012). However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012).

In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

Threats from pests would be managed using the mitigation measures outlined in Section 5.3. As a result, the Project would not result in an increase of pest species.

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

The Project would result in clearing of some native vegetation which is a key threatening process applicable to the Little Lorikeet. Clearing large old Eucalyptus trees on fertile soils that produce more nectar is a recognised threat to this species as it decreases food availability (OEH, 2012b). The Project would possibly result in removal of dead wood and dead trees.

The Project would implement management plans for impact avoidance and management of possible effects (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). Collectively, these would ensure that the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

6.2.3 Yellow-bellied Glider

Introduction

The Yellow-bellied Glider (*Petaurus australis*) is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria (OEH, 2012b). Within its range, the Yellow-bellied Glider is restricted to tall, mature forests in regions of high rainfall (NSW National Parks and Wildlife Service [NPWS], 1999a). This species favours productive, tall open sclerophyll forests with mature trees, which provide shelter and nesting hollows and year round forage resources (NPWS, 1999a; 2002). Essential elements of habitat include sap-site trees, winter flowering Eucalypts, mature trees suitable for den sites and a mosaic of forest types (Tanton, 1994). Winter flowering Eucalypts includes: Blue-leaved Stringybark (*Eucalyptus agglomerata*), Narrow-leaved Ironbark (*E. crebra*), Tumbledown Red Gum (*E. dealbata*), Mugga Ironbark (*E. sideroxylon*), Swamp Mahogany (*E. robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*) and White Box (*E. albens*).

The Yellow-bellied Glider lives in small family groups of two to six individuals and is nocturnal (OEH, 2012b). Family groups live in dens in hollows of large trees and often occur in tall, mature eucalypt forests generally in areas with high rainfall and nutrient rich soils (OEH, 2012b). Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south (OEH, 2012b). This species prefers tall open sclerophyll forests where mature trees provide shelter and nesting hollows and year-round food resources are available from a mixture of eucalypt species (NPWS, 1999a).

This species is agile and very active, travelling for over 2 km from the den to forage (NPWS, 1999a). This species has a very large home range of between 30 and 65 ha and usually occurs in densities of 0.05 to 0.14 individuals per hectare (NPWS, 1999a).

A total of 11 individuals of this species were recorded within and surrounding the Project area during Project surveys at sites S1, S2, S5, S6, S8, S9, OP11, OP14 and OP22 (Figures 5 and 6). Previous surveys within and surrounding the Project area have also recorded the Yellow-bellied Glider.

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Some vegetation communities that would be cleared by the Project provide potential foraging habitat resources for the Yellow-bellied Glider (i.e. winter flowering Eucalypts) (refer to Eucalypts described above). Potential foraging resources for this species occur across most vegetation communities in the Project area including: Hunter Valley Moist Forest, Coastal Foothills Spotted Gum – Ironbark Forest, Sugarloaf Uplands Paperbark Thicket, Coastal Plains Smooth-barked Apple Woodland, Lower Hunter Spotted Gum – Ironbark Forest and Hunter Lowlands Redgum Forest (Figure 4). Of these the Coastal Plains Smooth-barked Apple Woodland and Lower Hunter Spotted Gum – Ironbark Forest are present in the proposed surface disturbance area, therefore the Project may remove potential feed trees for this species. However, neither of these vegetation communities are limited to the proposed surface disturbance area (Figure 4).

The Project is not likely to adversely impact the Yellow-bellied Glider such that the population is placed at risk of extinction given:

- trees with hollows would be identified and avoided as far as practical;
- the species has been recorded at various locations throughout the region;
- habitat within the underground mining area would have negligible to no disturbance due to implementation of subsidence performance measures (Section 5.1);
- no vegetation communities present in the proposed surface disturbance area are limited to that area; and
- the potential foraging habitat proposed to be removed is a small component of the species potential foraging habitat in the region for this species.

Questions (b), (c) and (d) are not relevant to this species.

(e) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

In order for the Project to significantly affect the Yellow-bellied Glider from habitat removal or modification, habitat fragmentation or isolation, the Project would have to undergo substantially larger clearing than planned and in such a way as to fragment or isolate vegetation. Disruption of existing habitat connectivity for existing populations would be possible following events such as significant habitat clearing, extensive rock falls or major surface cracking that created a barrier to movement, or the complete and permanent drying of streams that separated existing meta-populations. These types of disturbances are not likely to result from the proposed works.

The Dry Forest/Woodland broad habitat type present in the proposed surface disturbance area that would be cleared by the Project provides potential foraging habitat resources, winter flowering Eucalypts, for the species listed. The Yellow-bellied Glider was recorded in both Dry Forest/Woodland and Moist Forest broad habitat types (Figures 6a and 6b), and these forest types continue offsite and are well represented in the immediate surrounding areas. There is no Moist Forest broad habitat type within the proposed surface disturbance area.

Given the limited area of proposed vegetation clearance, the Project would not result in an area of habitat suitable for this species becoming fragmented or isolated from other areas of habitat for this species.

This species has been located in the Project area and potential foraging habitat does exist. However, its removal is likely to have a limited impact on this species, if at all, as the species is very mobile and significant areas of other potential or actual habitat would be available in the uncleared areas in the Project area and surrounds. A description of the distribution of this species is provided in Attachment D and shown on Attachment E-A.

Any vegetation communities or habitat features relevant to this species outside of the proposed surface disturbance area, (i.e. in the underground mining area) is expected to receive negligible impact from the Project (Section 5.1). Subsidence control zones would manage subsidence effects on a surface feature (e.g. cliffs) to achieve performance measures that would minimise potential impacts. The subsidence control zones may involve partial extraction or limiting extraction to first workings (i.e. no secondary extraction) in some areas.

Given the limited scale of vegetation clearance, hydrological changes and other potential Project impacts, the Project is unlikely to significantly reduce the quality or availability of habitat for this species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There are no priority actions identified for the Yellow-bellied Glider (OEH, 2012b). Recovery actions have been developed and are as follows (OEH, 2012b):

- Retain den trees and recruitment trees (future hollow-bearing trees).
- Retain food resources, particularly sap-feeding trees.
- Retain and protect areas of habitat, particularly mature or old growth forest containing hollow-bearing trees and sap-feeding trees.
- Maintain connectivity between habitat patches.
- In urban and rural areas retain and rehabilitate habitat to maintain or increase the total area of habitat available, reduce edge effects, minimise foraging distances and increase the types of resources available.

Threats to this species include loss and fragmentation of habitat, loss of hollow-bearing trees and loss of feed trees. The Project would not fragment habitat as the area of proposed surface would be limited (approximately 11.2 ha) and no vegetation communities or broad habitat types are exclusive to the proposed surface disturbance area (Figure 4). As such, habitat resources such as den trees, recruitment trees, sap-feeding trees and old growth forest will be minimally affected, and available in the vast remaining vegetation in and surrounding the Project area. As described in Section 3.3 the design of the pit top was adjusted to avoid a roosting tree and to maintain canopy connectivity.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to this species includes clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012).

However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

The Project would result in *clearing of native vegetation* which is a key threatening process applicable to the Yellow-bellied Glider. Notwithstanding, the area of vegetation clearance (approximately 11.2 ha) is not considered significant given the vast areas of native vegetation in the remaining Project area and surrounds.

Threat from pests and fires would be managed using the mitigation measures outlined in Section 5.3. As a result, the Project would not exacerbate these threats.

The Project would implement management plans for impact avoidance and management of possible affects (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). Collectively, the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

6.2.4 Grey-headed Flying-fox

Introduction

The Grey-headed Flying-fox (*Pteropus poliocephalus*) occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria (SEWPaC, 2012b). In winter, this species congregates in coastal lowlands north of the Hunter Valley and is occasionally found on the south coast of NSW (associated with flowering Spotted Gum [*Corymbia maculata*]) and on the north-west slopes (generally associated with flowering White Box [*Eucalyptus albens*] or Mugga Ironbark [*E. sideroxylon*]) (SEWPaC, 2012b).

The Grey-headed Flying-fox feeds on blossoms, fruits and leaves of a wide range of plants (Van Dyck and Strahan, 2008). This species is a canopy feeder of rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands (NSW Scientific Committee, 2001).

This species selectively forages where food is available (SEWPaC, 2012b). The Grey-headed Flying-fox forages at night, primarily on eucalypt blossom within 50 km of day roosts and usually in dense, riparian vegetation (Tidemann and Nelson, 2004). It is suggested that 75% of foraging forays are within 20 km of the camp but this may be up to 50 km (Van Dyck and Strahan, 2008).

The national Grey-headed Flying-fox population is spatially structured into colonies, however, there are no separate or distinct populations due to genetic exchange and movement between camps which indicates that there is one single interbreeding population (SEWPaC, 2012b). The nearest known Grey-headed Flying-fox roost is approximately 4.5 km north-east of the Project area (OEH, 2012a). Roosts are commonly found in gullies, close to water (OEH, 2012b).

Five individuals of this species were recorded at site T17 (Figures 5 and 6a) during the Project surveys. Previous surveys within and surrounding the Project area have recorded the Grey-headed Flying-fox.

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The vegetation communities: Lower Hunter Spotted Gum – Ironbark Forest, Hunter Lowlands Redgum Forest and Coastal Foothills Spotted Gum – Ironbark Forest (Figure 4) have the potential to contain Spotted Gum (*Corymbia maculata*), a known Grey-headed Flying-fox feed tree. Lower Hunter Spotted Gum – Ironbark Forest is within the proposed surface disturbance area, however it is not restricted to this area and is present throughout the Project area and surrounds (Figure 4). Hunter Lowlands Redgum Forest and Coastal Foothills Spotted Gum – Ironbark Forest are not within the proposed surface disturbance area (Figure 4). Other characteristic feed tree species (White Box [*Eucalyptus* albens] and Mugga Ironbark [*E. sideroxylon*]) are not expected to occur in vegetation communities in the Project area, but a range of other Eucalyptus species are present in all vegetation communities except for the Lower Hunter Spotted Gum Ironbark Forest variant community (Figure 4). For this reason there is scope for other feed tree species to be removed by the Project, especially as they are plentiful throughout the rest of the Project area and surrounds.

The Project is not likely to adversely impact the Grey-headed Flying-fox such that the population is placed at risk of extinction given:

- no ideal roost habitat (gullies, close to water) would be significantly impacted by the Project;
- the species has been recorded within the underground mining area, but not within the proposed extent of surface disturbance;
- habitat within the underground mining area would have negligible to no disturbance due to implementation of subsidence performance measures (Section 5.1); and
- the potential foraging habitat proposed to be removed is a small component of the species potential foraging habitat in the region for this species.

Questions (b), (c) and (d) are not relevant to this species.

(e) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

In order for the Project to significantly affect the Grey-headed Flying-fox from habitat removal or modification, habitat fragmentation or isolation, the Project would have to undergo substantially larger clearing than planned and in such a way as to fragment or isolate vegetation. Disruption of existing habitat connectivity for existing populations would be possible following events such as significant habitat clearing, extensive rock falls or major surface cracking that created a barrier to movement, or the complete and permanent drying of streams that separated existing meta-populations.

The vegetation communities in the proposed surface disturbance area have the potential to contain habitat resources for this species (Figure 4). The potential habitat resource may occur within the area of proposed surface disturbance (comprising approximately 2.3 ha of Coastal Plains Smooth-barked Apple Woodland and 8.9 ha of Lower Hunter Spotted Gum - Ironbark Forest). However, only a small portion of the Coastal Plains Smooth-barked Apple Woodland is present within the proposed surface disturbance area. Furthermore, the site at which the Grey-headed Flying-fox was recorded (T17 – Figures 5 and 6a) is within the Moist Forest broad habitat type, including the Hunter Lowlands Redgum Forest vegetation community, which is not present within the proposed surface disturbance area.

The Project would not result in an area of habitat suitable for this species becoming fragmented or isolated from other areas of habitat for this species as the species is very mobile.

This species has been located in the Project area and potential foraging habitat does exist. However, its removal is likely to have a limited impact on this species, if at all, as the species if very mobile and significant areas of other potential or actual habitat would be available in the uncleared areas in the Project area and surrounds. A description of the landscape distribution of this species is provided in Attachment D and shown on Attachment E-A.

Any vegetation communities or habitat features relevant to this species outside of the proposed surface disturbance area, (i.e. in the underground mining area) is expected to receive negligible impact from the Project (Section 5.1). Subsidence control zones would manage subsidence effects on a surface feature (e.g. cliffs) to achieve performance measures that would minimise potential impacts. The subsidence control zones may involve partial extraction or limiting extraction to first workings (i.e. no secondary extraction) in some areas.

Given the limited scale of vegetation clearance, hydrological changes and other potential Project impacts, the Project is unlikely to significantly reduce the quality or availability of habitat for this species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

No priority actions have been identified for the Grey-headed Flying-fox (OEH, 2012b). Recovery actions have, however, been identified and include:

- Protect roost sites, particularly avoid disturbance September through November.
- Identify and protect key foraging areas.
- Manage and enforce licensed shooting.
- Investigate and promote alternative non-lethal crop protection mechanisms.
- Identify powerline blackspots and implement measures to reduce deaths.

Threats to this species include loss of foraging habitat, disturbance of roosting sites, unregulated shooting and electrocution on powerlines. Eucalyptus species occur in the proposed surface disturbance area, however this clearance is not considered significant given the abundance of vegetation in the remaining Project area and surrounds that are likely to contain Eucalyptus species. With the implementation of the subsidence control zones, the Project would unlikely significantly impact any known roost sites and potential roost sites, such as sandstone escarpments. Any illegal activity will be reported as part of Donaldson Coal standard operating procedures. As such the Project is consistent with recovery actions, where relevant to this species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to this species includes clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

The Project would result in *clearing of native vegetation* which is a key threatening process applicable to the Grey-headed Flying-fox. The proposed area of vegetation clearance (approximately 11.2 ha) is not considered significant given the vast areas of native vegetation in the remaining Project area and surrounds.

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012). However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

Threat from pests and fires would be managed using the mitigation measures outlined in Section 5.3. As a result, the Project would not exacerbate these threats.

The Project would implement management plans for impact avoidance and management of possible affects (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). Collectively, the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

6.2.5 Large-eared Pied Bat

Introduction

The Large-eared Pied Bat (*Chalinolobus dwyeri*) is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands (OEH, 2012b). This species is endemic to Australia (Churchill, 2008). It is generally rare with very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes (OEH, 2012b). The largest numbers of records are from sandstone escarpment country in the Sydney basin and Hunter Valley regions of central NSW (Van Dyck and Strahan, 2008).

This species mainly roosts in caves, although some were located during this study in culverts. The females give birth to one or two young during late November and early December and are suckled until late January (Van Dyck and Strahan, 2008). The young are typically independent by late February (Churchill, 2008). It is not known whether mating occurs in the autumn or spring (Churchill, 2008). Females have been recorded raising young in maternity roosts (c. 20 to 40 females) from November through to January in roof domes in sandstone caves. They remain loyal to the same cave over many years (OEH, 2012b).

This species probably forages for small, flying insects below the forest canopy (OEH, 2012b). Colony numbers are typically fewer than 10 individuals, although up to 80 have been recorded at some roosts (Van Dyck and Strahan, 2008).

The Large-eared Pied Bat was recorded during Project surveys at sites T10, T11, T18 and T25 (Figures 5 and 6a). At least three individuals were counted, however the exact total number was not able to be determined as some were recorded by ANABAT detectors. Previous surveys within and surrounding the Project area have recorded the Large-eared Pied Bat.

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The broad fauna habitat type that would be cleared by the Project (Dry Forest/Woodland) may provide potential foraging habitat resources for the Large-eared Pied Bat (moths and possibly other flying invertebrates). The potential habitat resources within the proposed surface disturbance area may occur within approximately 2.3 ha of Coastal Plains Smooth-barked Apple Woodland and 8.9 ha of Lower Hunter Spotted Gum - Ironbark Forest. Denser components of vegetation are less likely to be used by this species due to limited accessibility by this species.

This species typically roosts in caves (or similar subterranean habitats) which occur in some portions of the Project area. These habitat features are not present in the proposed surface disturbance area.

The Project is not likely to adversely impact the Large-eared Pied Bat such that the population is placed at risk of extinction given:

- breeding habitat (caves or similar subterranean habitats) would unlikely be significantly impacted by the Project;
- the species has been recorded within the Project area (underground mining area), but not within the proposed extent of surface disturbance;
- habitat within the underground mining area would likely have negligible to no disturbance due to implementation of subsidence control zones (Section 5.1); and
- the potential foraging habitat proposed to be removed is a small component of the species potential foraging habitat in the region for this species.

Questions (b), (c) and (d) are not relevant to this species.

(e) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

In order for the Project to significantly affect the Large-eared Pied Bat from habitat removal or modification, habitat fragmentation or isolation, the Project would have to undergo substantially larger clearing than planned and in such a way as to fragment or isolate vegetation. Disruption of existing habitat connectivity for existing populations would be possible following events such as significant habitat clearing, extensive rock falls or major surface cracking that created a barrier to movement, or the complete and permanent drying of streams that separated existing meta-populations.

Although the proposed surface disturbance area has the potential to contain habitat features the Large-eared Pied Bat may use, this broad habitat type is not limited to this area. The survey sites this species was recorded at were located in cleared land near the electricity transmission easement (sites T10, T11 and T18) or on the border between cleared land and the Dry Forest/Woodland broad habitat type, specifically vegetation community Lower Hunter Spotted Gum – Ironbark Forest (Figures 5 and 6a). Both the Dry Forest/Woodland broad habitat type and Lower Hunter Spotted Gum – Ironbark Forest vegetation community occurs within the proposed surface disturbance area; however they are not limited to this area (Figure 4).

Given the limited area of proposed vegetation clearance, the Project would not result in an area of habitat suitable for this species becoming fragmented or isolated from other areas of habitat for this species.

This species has been located in the Project area and potential foraging habitat does exist. However, its removal is likely to have a limited impact on this species, if at all, as the species is very mobile and significant areas of other potential or actual habitat would be available in the uncleared areas in the Project area and surrounds. A description of the distribution of this species is provided in Attachment D and shown on Attachment E-A.

Any vegetation communities or habitat features relevant to this species outside of the proposed surface disturbance area, (i.e. in the underground mining area) is expected to receive negligible impact from the Project (Section 5.1). Subsidence control zones would manage subsidence effects on a surface feature (e.g. cliffs) to achieve performance measures that would minimise potential impacts. The subsidence control zones may involve partial extraction or limiting extraction to first workings (i.e. no secondary extraction) in some areas.

Given the limited scale of vegetation clearance, hydrological changes and other potential Project impacts, the Project is unlikely to significantly reduce the quality or availability of habitat for this species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At this stage, no priority actions have been identified for this animal (OEH, 2012b). However, recovery actions have been identified and include:

- Protect known and potential habitat from burning at too-frequent intervals.
- Avoid damage to known roosting and maternity sites from mining activities, and from recreational caving by contacting the DEC prior to activities.
- Reduce the use of pesticides and consider alternatives where available.
- Protect known and potential forest and woodland habitat around cliffs, rock overhangs and old mine workings from clearing and isolation.

Threats to this species include clearing of woodland and forest near potential roosting sites, loss of foraging habitat near potential roosting sites, damage to roosting and maternity sites and use of pesticides (OEH, 2012b).

The Project mitigation measures are considered consistent with the listed recovery actions for this species. The proposed surface disturbance area does not contained known or potential roosting or maternity sites and as such, clearing, too-frequent burning and damage would not occur. Pesticides are not expected to be used as part of the Project, however if they are, they will be used sparingly.

Impact to surface features such as cliffs, escarpments, etc, in the underground mining area would be minimal due to implementation of subsidence performance measures and associated subsidence control zones (Section 5.1).

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to this species includes clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012).

However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

Threat from pests and fires would be managed using the mitigation measures outlined in Section 5.3. As a result, the Project would not exacerbate these threats.

The Project would implement management plans for impact avoidance and management of possible affects (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). Collectively, the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

6.2.6 Eastern False Pipistrelle

Introduction

The Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania (OEH, 2012b). In NSW their distribution occurs along the eastern coast over the Great Dividing Range (Churchill, 2008). The Project is not at the limit of this species known distribution.

The Eastern False Pipistrelle inhabits wet sclerophyll and coastal Mallee (Churchill, 2008). This species prefers tall and wet forests where trees are larger than 20 m high and the understorey is dense (Churchill, 2008). At lower altitudes this species inhabits open forests (Churchill, 2008).

The Eastern False Pipistrelle predominantly roosts in tree hollows, as well as abandoned buildings (Parnaby, 1983), and there is also one record from the Jenolan Caves (Churchill, 2008). Breeding occurs in late spring and early summer and one young is born in December (Churchill, 2008). Maternity colonies range from three to 80 individuals and are usually almost entirely male or female groups, although mixed colonies have previously occurred (Churchill, 2008).

This species forages within or just below the tree canopy and targets the largest available prey items (Churchill, 2008). The diet of the Eastern False Pipistrelle consists of moths, beetles, weevils, bugs, flies and ants (Menkhorst and Lumsden, 1995).

The Eastern False Pipistrelle has been recorded travelling 12 km from foraging areas to roosting sites (Van Dyck and Strahan, 2008). Given the size and shape of the wings of this species, it is likely that Eastern False Pipistrelles are highly mobile (Van Dyck and Strahan, 2008). This species is often solitary (Churchill, 2008) and during winter, some populations of the Eastern False Pipistrelle may migrate from highland to coastal areas, while others may hibernate (Parnaby, 1983).

The Eastern False Pipistrelle was recorded by an ANABAT detector at site T18 (Figures 5 and 6a), however the exact number of individuals was not able to be distinguished by this method. Previous surveys within and surrounding the Project area have recorded the Eastern False Pipistrelle.

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The vegetation that would be cleared by the Project could potentially provide foraging habitat resources for the Eastern False Pipistrelle (moths and other flying insects) (Figure 4). This species may use tree hollows in the Project area for roosting.

The Project is not likely to adversely impact the Eastern False Pipistrelle such that the population is placed at risk of extinction given:

- the species was not recorded within proposed extent of surface disturbance;
- habitat within the underground mining area would have negligible to no disturbance due to implementation of subsidence control zones (Section 5.1); and
- the potential foraging habitat proposed to be removed (approximately 11.2 ha) is a small component of the species potential foraging habitat in the region for this species.

Questions (b), (c) and (d) are not relevant to this species.

(e) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

In order for the Project to significantly affect the Eastern False Pipistrelle from habitat removal or modification, habitat fragmentation or isolation, the Project would have to undergo substantially larger clearing than planned and in such a way as to fragment or isolate vegetation. Disruption of existing habitat connectivity for existing populations would be possible following events such as significant habitat clearing, extensive rock falls or major surface cracking that created a barrier to movement, or the complete and permanent drying of streams that separated existing meta-populations.

The broad fauna habitat type that would be cleared by the Project, Dry Forest/Woodland, provide potential habitat resources for this species to a small degree. The potential habitat resources within the proposed surface disturbance area may occur over within approximately 2.3 ha of Coastal Plains Smooth-barked Apple Woodland and 8.9 ha of Lower Hunter Spotted Gum - Ironbark Forest.

Although this species was recorded outside of the proposed disturbance area (T18 – Figures 5 and 6a), this site is within the Dry Forest/Woodland broad habitat type which occurs in the proposed surface disturbance area. However removal of a portion of this broad fauna habitat type is unlikely to limited impact this species, if at all, as significant areas of other potential or actual habitat would be available in the uncleared areas surrounding the Project area, and within the Project area itself. The distribution of the species is described in Attachment D and shown on Attachment E-A.

Given the limited area of proposed vegetation clearance, the Project would not result in an area of habitat suitable for this species becoming fragmented or isolated from other areas of habitat for this species.

This species has been located in the Project area and potential foraging habitat does exist. However, its removal is likely to have a limited impact on this species, if at all, as the species is very mobile and significant areas of other potential or actual habitat would be available in the uncleared areas in the Project area and surrounds. A description of the distribution of this species is provided in Attachment D and shown on Attachment E-A.

Any vegetation communities or habitat features relevant to this species outside of the proposed surface disturbance area, (i.e. in the underground mining area) is expected to receive negligible impact from the Project due to the implementation of subsidence control zones (Section 5.1). Subsidence control zones would manage subsidence effects on a surface feature (e.g. cliffs) to achieve performance measures that would minimise potential impacts. The subsidence control zones may involve partial extraction or limiting extraction to first workings (i.e. no secondary extraction) in some areas.

Given the limited scale of vegetation clearance, hydrological changes and other potential Project impacts, the Project is unlikely to significantly reduce the quality or availability of habitat for this species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

At this stage, no priority actions have been identified for the Eastern False Pipistrelle (OEH, 2012b). However recovery actions include retaining diverse native vegetation, minimising pesticide use and protecting roost sites (OEH, 2012b).

Threats relevant to this species include disturbance to winter roosting and breeding sites, loss of trees for foraging and hollow-bearing trees for roosting and application of pesticides in or adjacent to foraging areas (OEH, 2012b).

The Project may potentially remove hollow-bearing trees if they occur within the proposed surface disturbance area and would remove native vegetation. Notwithstanding, this is not likely to have a significant effect on the Eastern False Pipistrelle considering the large amounts of remnant vegetation within the Project and surrounds that would not be disturbed. There are no known roost sites within the Project area, however, there are sandstone escarpments within the underground mining area. Due to the implementation of subsidence control zones and associated performance measures (Table 13), this surface feature will unlikely to significantly impacted. Pesticides are not expected to be used as part of the Project, however if they are, they will be used sparingly.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to this species includes clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012). However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

Threat from pests and fires would be managed using the mitigation measures outlined in Section 5.3. As a result, the Project would not exacerbate these threats.

The Project would implement management plans for impact avoidance and management of possible effects (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). Collectively, the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

6.3 THREATENED SPECIES CONSIDERED POSSIBLE OCCURRENCES IN PROJECT AREA BUT NOT RECORDED DURING PROJECT SURVEYS

6.3.1 Amphibians

Wallum Froglet
Giant Burrowing Frog
Stuttering Frog
Littlejohn's Tree Frog
Giant Barred Frog
Green and Golden Bell Frog
Green-thighed Frog

Introduction

Although the Giant Burrowing Frog and Littlejohn's Tree Frog are not considered possible occurrences in the Project area (Attachment D), in accordance with the Director-General's Requirements for the Project, assessments for these species are also provided in this section. The Wallum Froglet is the only threatened amphibian recorded proximal to the Project area (DECC, 2008a). As such, an assessment has been provided for this species.

The Wallum Froglet is known to exclusively inhabit acid paperbark swamps and sedge swamps of coastal 'wallum' habitat (OEH, 2012b). The Wallum Froglet is distributed along the coast from south-eastern Queensland to north-eastern NSW and breeds in moist microhabitats in swamps, or wet or dry heaths, or sedge grasslands or swamps (OEH, 2012b).

The Giant Burrowing Frog is found in sites from the Watagan Mountain (to the south of the Project area) south as far as north-eastern Victoria. Their distribution within this range is discontinuous and patchy. Although this species has not been recorded in the Sugarloaf Range, this range connects to the northern end of the Watagan Mountain block and apparently suitable sandstone habitats occur in the Sugarloaf Ranges.

The Giant Barred Frog, Green and Golden Bell Frog, Stuttering Frog and the Green-thighed Frog were identified as possible occurrences in the Project area and surrounds (Attachment D). As a result, an assessment of the potential impact to these species has been prepared for these species. This species is known from sites in the nearby Watagan Mountains and from private land near Quorrobolong.

The Stuttering Frog occurs along the east coast of Australia however has undergone considerable range contraction in south-east NSW (OEH, 2012b). It is found in rainforest and wet, tall open forests, breeds in streams and feeds on insects and smaller frogs (OEH, 2012b). This species is known from several locations to the south-east of the Project area, especially in the Awaba State Forest.

The Giant Barred Frog occurs in coast and ranges from south-eastern Queensland to the Hawkesbury River in NSW (OEH, 2012b). The frog forages and lives amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forests (OEH, 2012b). They breed around shallow, flowing rocky streams and feed primarily on large insects and spiders (OEH, 2012b).

Littlejohn's Tree Frog is a forest-dwelling species that prefers wet sclerophyll forest or rainforest ecotones. The northern distributional limit for this species is the Watagan Mountains, a close-by mountain block that is connected to the Sugarloaf Range. Wet sclerophyll forest occurs in pockets on the western side of the Sugarloaf Range but to date no Littlejohn's Tree Frogs have been found there.

Green and Golden Bell frogs were once widespread across the lower Hunter Valley (OEH 2012a). The species has been greatly reduced in range and abundance and only a few extant sites remain near Maitland in the lower Hunter Valley. In view of the historic wide distribution of this species, targeted searches for this species were conducted during the Project fauna surveys. The Green and Golden Bell Frog has been recorded at approximately 50 locations in NSW since 1990, most of which are small, coastal, or near coastal populations (OEH, 2012b). It can be regarded as a 'colonising'/'pioneering' species as it is a habitat generalist, disperses widely and matures early (Hamer, 1998; Hamer *et al.,* 2002). It inhabits marshes, dams and stream sides (OEH, 2012b). These characteristics are an adaptation to living in an unpredictable environment (Begon *et al.*, 1990).

None of the above threatened amphibian species were recorded during targeted fauna surveys conducted under optimal conditions for this assessment. The regional distribution of these species is shown on Attachment A-C.

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Potential habitat for frogs in the Project area is largely in the form of ephemeral streams, mine water dams, pools, and their associated terrestrial surrounds. Surveyors Creek occurs within the underground mining area (Figure 2).

Several fauna studies by various specialists have been undertaken in the Project area (Gunninah Environmental Consultants, 2002; Ecobiological, 2007a, 2008a, 2008b; and DECC, 2008a) including the surveys undertaken in April, October and December 2011 relevant to this assessment. During the surveys conducted, only one threatened amphibian species (Wallum Froglet) has been recorded in the vicinity of the Project area by DECC (2008a).

Given no acid paperbark swamps or sedge habitat is located within the proposed surface disturbance area associated with the pit top area and no individuals or local population of the species was recorded during the Project surveys, it is considered that no viable local population of the Wallum Froglet is present within the Project area. Therefore the Project is unlikely to have an adverse effect on the lifecycle of the species or place the species at risk of extinction.

With respect to other threatened amphibian species considered possible occurrences in the Project area. No individuals or populations of the threatened amphibians were identified during the targeted amphibian surveys conducted at potential amphibian habitats located throughout the Project area under optimal survey conditions. Although the Project area contains some potential habitat for amphibian species, given the lack of breeding habitat (i.e. permanent streams) and the absence of records, it is considered that no viable local populations of these species are present within the Project area. Therefore the Project is unlikely to have an adverse effect on the lifecycle of these species or place these species at risk of extinction.

Questions (b, (c) and (d) are not relevant to these threatened amphibian species.

(e) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

As described above, potential habitat for frogs in the Project area is largely in the form of ephemeral streams, mine water dams, pools, and their associated terrestrial surrounds. Given there are no streams or moist forest habitat located within the extent of proposed surface disturbance, surface disturbance activities associated with the Project would not remove, fragment or isolate potential habitat for these threatened amphibian species.

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012). However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the OEH (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

As a result, it is considered unlikely an area of habitat suitable for these species would become fragmented or isolated from other areas of habitat for these species.

As these species have not been located in the Project area (although some potential habitat does exist) and no suitable habitat would be removed and any effects to suitable habitat are expected to be minor, it is considered the Project is not likely to impact the long-term survival of these species.

Given the above, there is unlikely to be a net impact on these amphibian species in the region over the medium to long-term since:

- the extent of surface disturbance is limited and no potential amphibian habitat would be removed during clearance activities; and
- progressive rehabilitation of areas of surface disturbance (e.g. from conducting monitoring activities) and rehabilitation of surface disturbance areas remaining at the cessation of the Project (i.e. the pit top and ventilation shaft site) would be undertaken.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

The national recovery plans and threat abatement plan relevant to these threatened amphibian species include:

- *National recovery plan for the wallum sedge frog and other wallum-dependent frog species* (DEC, 2006);
- *National recovery plan for Stream Frogs of South-east Queensland 2001-2005* (relevant to the Giant Barred Frog) (EPA, 2002); and
- *Threat Abatement Plan - Infection of amphibians with chytrid fungus resulting in chytridiomycosis* (Commonwealth Department of Environment and Heritage, 2006).

Donaldson Coal implements a Flora and Fauna Management Plan (Ecobiological, 2007b) at the existing Tasman Underground Mine, which would be reviewed and revised to incorporate the Project. The Flora and Fauna Management Plan includes a Vegetation Clearance Protocol and Fauna Protection Protocols to minimise and ameliorate any impact on fauna and flora, in particular threatened species, during the clearing process. The key components of the Vegetation Clearance Protocol include delineation of areas to be cleared of native remnant vegetation, pre-clearance surveys, fauna management measures and vegetation clearance supervision. The Flora and Fauna Management Plan also includes a flora and fauna monitoring programme to monitor the effectiveness of conservation measures.

The Project would be consistent with the objectives and/or actions of these plans given the Project would involve progressive rehabilitation of minor surface disturbance areas (e.g. associated with monitoring activities) and the rehabilitation of surface disturbance areas remaining at the cessation of the Project (i.e. the pit top and ventilation shaft sites). A Mine Closure Plan would be developed to address the long-term land use for the pit top area, which would be bushland conservation. Monitoring of rehabilitation areas would be conducted on a regular basis to identify the need for any maintenance and/or contingency measures.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The Project would result in *clearing of native vegetation* or *land clearance* which are key threatening processes listed under the TSC Act and the EPBC Act. Reduction of suitable habitat through clearing is a recognised threat to each of these threatened amphibian species (OEH, 2011). Another key threatening process listed under the EPBC Act and TSC Act relevant to amphibian species is the *Infection of amphibians with chytrid fungus resulting in chytridiomycosis.* The Giant Burrowing Frog, Giant Barred Frog and the Green and Golden Bell Frog are species known to have infected populations (SEWPaC, 2012b).

As described earlier in this section, no streams or moist forest habitat (considered potential amphibian fauna habitat) are located within the extent of proposed surface disturbance. Notwithstanding, as a creekline of Surveyors Creek is located to the east of the proposed pit top area, Donaldson Coal's Flora and Fauna Management Plan and Vegetation Clearance Protocol would be implemented to restrict vegetation clearance to only the extent necessary.

The DECC's (2008b) *Hygiene protocol for the control of disease in frogs* will be considered during Project activities conducted in areas of potential frog habitat within the Project area, particularly during monitoring activities.

6.3.2 Reptiles

Stephen's Banded Snake

Introduction

The Stephens' Banded Snake (*Hoplocephalus stephensii*) has a distribution generally along the coast and ranges from Southern Queensland to Gosford in NSW (OEH, 2012b). The regional distribution of this species is shown on Attachment E-C. This species is found in rainforest and eucalypt forests and rocky areas up to 950 m in altitude (OEH, 2012b). This species is nocturnal and shelters between loose bark and tree trunks, rock crevices or under slabs during the day (OEH, 2012b). At night it hunts frogs, lizards, birds and small mammals (OEH, 2012b).

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

This species is known to utilise rock features, which are present in the Project area. However, due to subsidence control zones and associated performance measures that would be implemented by the Project (Section 5.1), these features will receive no or negligible impacts as a result of subsidence.

An increase in fire frequency also has the potential to impact on the lifecycle of this species. Given a range of management protocols proposed to be in place (Section 5) to manage the behaviour of people in the Project area, it is unlikely that there would be an increase in fire frequency resulting from the Project.

It is estimated that the Project would disturb approximately 11.2 ha of vegetation in the proposed surface disturbance area. This is unlikely to have a significant effect given substantial areas of the same broad fauna habitat type, Dry Forest/Woodland, is available in the remaining Project area, and more is known in the surrounds. No vegetation community present in the proposed surface disturbance area is unique to this area (Figure 4). Additionally, natural regeneration would be encouraged or active revegetation undertaken in areas disturbed by the Project (Section 5.4).

It is unlikely that the Project would adversely impact on the lifecycle of this reptile species to the extent that a local population would be placed at risk of extinction.

Questions (b, (c) and (d) are not relevant to these threatened amphibian species.

(e) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

Mine subsidence can potentially result in local effects on water sources and rock features however, as detailed above, these effects are unlikely to be significant. Section 4.2 evaluates potential impacts of subsidence on fauna and their habitats and Section 5.1 further explains Donaldson Coal's effort to minimise impact of subsidence through subsidence control zones.

Minimal vegetation clearance for the proposed pit top area would be required, (i.e. approximately 11.2 ha). However this is unlikely to influence any water resource, and there is substantial Dry Forest/Woodland habitat, throughout the remaining Project area and surrounds.

Clearing of potential habitat for this species would occur unlikely significantly impact habitat connectivity for this species considering the limited scale of disturbance proposed.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

No recovery Plan exists for the Broad-headed Snake but the species is considered in the Action Plan for Australian reptiles (Cogger *et al*., 1993). Several actions were recognised as important conservation aims for this species:

- Protection of known habitat areas from bush rock collecting and reptile collecting.
- Restoration of habitat with rocky pavers.
- Cutting of overhanging braches and clearing of understorey weeds in areas deemed important for the species.

The Project will not damage or interfere with potential habitat areas for this species and may provide greater protection to rocky habitats and prevent the illegal collection of reptiles because of the presence of the mine and mine staff. No habitat enhancement measures are proposed.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to this species includes clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow.

Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012). However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

The Project would result in *clearing of native vegetation* which is a key threatening process applicable to the Stephen's Banded Snake. Notwithstanding, the area of vegetation clearance (approximately 11.2 ha) is not considered significant given the vast areas of native vegetation in the remaining Project area and surrounds.

Threat from pests and fires would be managed using the mitigation measures outlined in Section 5.3. As a result, the Project would not exacerbate these threats.

The Project would implement management plans for impact avoidance and management of possible affects (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). Collectively, the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

6.3.3 Woodland Birds

The Woodland birds considered possible occurrences in the Project area or surrounds includes the species listed below.

Square-tailed Kite
Black-breasted Buzzard
Little Eagle
Wompoo Fruit-Dove
Gang-gang Cockatoo
Swift Parrot
Turquoise Parrot
Sooty Owl
Masked Owl
Powerful Owl
Barking Owl
Brown Treecreeper (eastern subspecies)
Speckled Warbler
Black-chinned Honeyeater
Regent Honeyeater
White-fronted Chat
Hooded Robin (south-eastern form)
Flame Robin
Scarlet Robin
Grey-crowned Babbler (eastern subspecies)
Varied Sittella

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

These bird species would potentially utilise vegetation and habitat features (e.g. cliffs, hollow-bearing trees, streams) within the Project area. It is estimated that the Project would disturb approximately 11.2 ha of vegetation in the proposed surface disturbance area. This is unlikely to have a significant effect given substantial areas of the same broad fauna habitat type, Dry Forest/Woodland, is available in the remaining Project area, and more is known in the surrounds. No vegetation community present in the proposed surface disturbance area is unique to this area (Figure 4). Additionally, natural regeneration would be encouraged or active revegetation undertaken in areas disturbed by the Project (Section 5.4).

An increase in fire frequency also has the potential to impact on the lifecycle of this species. Given a range of management protocols proposed to be in place (Section 5) to manage the behaviour of people in the Project area, it is unlikely that there would be an increase in fire frequency resulting from the Project.

Notwithstanding, given the limited nature of vegetation clearance proposed and with the implementation of subsidence control zones, the habitat features relevant to these species would unlikely to significantly impact and any viable local population would unlikely be placed at risk of extinction. It is unlikely that the Project would adversely impact on the lifecycle of these bird species to the extent that a local population would be placed at risk of extinction.

Questions (b), (c) and (d) are not relevant to this species.

(e) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

Mine subsidence can potentially result in local impacts on water sources however, as detailed above, these effects are unlikely to be significant. Section 4.2 evaluates potential impacts of subsidence on fauna and their habitats and Section 5.1 further explains the measures Donaldson Coal would implement to minimise the impact of subsidence (i.e. subsidence control zones). Section 5.1 details the performance measures that would be put in place to minimise potential impacts to surface features.

Minimal vegetation clearance for the proposed pit top area would be required (i.e. approximately 11.2 ha). However this is unlikely to influence any water resource, and there is substantial Dry Forest/Woodland habitat throughout the remaining Project area and surrounds.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There are no listed priority actions for these bird species (OEH, 2012b). Recovery actions for Australian Woodland bird species include: retaining suitable woodland habitats, particularly those with unimproved pasture and an intact native ground plant layer and to increase the size and connectivity of existing remnants, planting trees and establishing buffer zones of unimproved uncultivated pasture around woodland remnants (OEH, 2012b).

Threats to these bird species include clearing of remnant open forest and woodland habitat; poor regeneration of open forest and woodland habitats because of intense grazing; and being excluded from smaller remnants by aggressive species such as the Noisy Miner (*Manorina melanocephala*) (OEH, 2012b).

The Project would involve clearing of woodland habitat, however, as outlined in Question (e), this is not considered significant (i.e. clearance would be limited to approximately 11.2 ha of Dry Woodland/Forest habitat and clearing associated with minor surface disturbance activities such as monitoring and exploration activities). Furthermore, the Project would unlikely fragment suitable habitat for these species given the mobility of these species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to these bird species include clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

The Project would result in clearing of native vegetation which is a key threatening process applicable to these species. However, due to the small area of estimated proposed surface disturbance (11.2 ha) and given no vegetation community in the proposed surface disturbance area is limited to that area, this process is not expected to significantly affect these species.

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012). However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

Threats from pests would be managed using the mitigation measures outlined in Section 5.3. As a result, the Project would not exacerbate these threats.

Various management plans for impact avoidance and management of possible affects would be developed and implemented as part of the Project (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). As a result, it is considered the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

6.3.4 Mammals

Koala

Introduction

The Koala (*Phascolarctos cinereus*) occurs in certain Eucalypt forest and woodland depending on a number of factors including the size and species of trees, soil nutrients, climate, rainfall and amount of past disturbance (NPSW, 1999b). The Koala is nocturnal, rests in tree forks during the day and breeds in summer (Martin and Handasyde, 1998).

Tree species preferred by Koalas in NSW as their principal food source include Grey Gum (*Eucalyptus punctata*), Forest Red Gum (*E. tereticornis*), Swamp Mahogany (*E. robusta*), Tallowwood (*E. microcorys*), Ribbon Gum (*E. viminalis*), River Gum (*E. camaldulensis*), Scribbly Gum (*E. haemastoma* and *E. signata*), White Box (*E. albens*) and Brimble Box (*E. populnea*) (SEPP, 1995). Koalas have however been observed to feed on the leaves of approximately 70 species of Eucalypt and 20 non-Eucalypt species (Philips, 1990). A field study by Matthews *et al*. (2007) found that Koalas preferred trees of larger diameter (i.e. greater than 30 cm) and used significantly taller trees during summer.

The Koala is regarded as a solitary species that spends most of its time in defined home ranges (Martin and Handasyde, 1998; Ayers *et al.,* 1996) although individuals have overlapping home range areas (Martin and Handasyde, 1998). Dispersal distances generally range from 1 to 11 km, although movements in excess of 50 km have been recorded (NPWS, 1999b).

Resource depletion from intense wildfire is likely to be short-term for Koalas because they have been observed to use burnt trees (presenting epicormic growth) within months of the fire for both food and shelter (Matthews *et al.,* 2007).

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Koala is associated with favoured Eucalyptus species for food sources, listed above. A number of these Eucalyptus species are predicted to occur in most vegetation communities in the Project area, including those in the proposed surface disturbance area.

Clearance of the proposed surface disturbance area is not considered to have a significant effect on the Koala given the relatively small area of clearance (i.e. approximately 11.2 ha of Dry Forest/Woodland) and the substantial areas of the same habitat available within the remaining Project area and its surrounds. Furthermore, these tree species are likely present in the uncleared underground mining area, and Project surrounds.

Feeding resources are unlikely to be impacted in the underground mining area by subsidence (Section 5.1). Any impact on water resources will likely be unrelated to this species, given it obtains most of its water from eucalyptus leaves (OEH, 2012b).

The Hunter/Central Rivers Catchment Management Region has a number of known Koala populations including within CMA subregions: Barrington, Comboyne Plateau, Ellerston, Hunter, Karuah Manning, Kerrabee, Liverpool Range, Macleay Hastings, Mummel Escarpment, Pilliga, Tomalla, Upper Hunter, Walcha Plateau, Wollemi (Part A, B and C), Wyong and Yengo (OEH, 2012b). The local Koala population is likely to remain connected throughout Sugarloaf SCA, Heaton State Forest and further south based on regional database records (Attachment D, Attachment E-A).

Given the above, the Project is unlikely to have an adverse impact on the lifecycle of the Koala such that a viable population of the species is likely to be placed at risk of extinction.

Questions (b), (c) and (d) are not relevant to this species.

(e) In relation to the habitat of a threatened species, population or ecological community:

- ***(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;***
- ***(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and***
- ***(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.***

In order for the Project to significantly affect the Koala from habitat removal or modification, habitat fragmentation or isolation, substantially larger clearing than planned for the Project would have to occur. Only minor disruption, if any, would occur as a result of the Project.

In NSW this species is mainly associated with their primary eucalyptus food sources. The broad fauna habitat type mapped in the Project area, Dry Woodland/Forest, is considered to potentially contain a number of these species. Should the Koala utilise the Dry Woodland/Forest habitat within the proposed surface disturbance area, clearance of this vegetation is unlikely to significantly impact food sources for this species. All vegetation communities and broad habitat types that occur in the proposed surface disturbance area (pit top area) occur in other areas of the Project and surrounds (Figure 4).

Given the limited scale of clearance proposed, the Project would unlikely result in an area of habitat suitable for this species becoming fragmented or isolated from other areas of habitat for this species. Potential movement pathways across the Project area are not expected to be disrupted by the proposed surface disturbance. The Project area represents a small area of vegetation within a large area of connected remnant vegetation through Sugarloaf SCA, Heaton State Forest and surrounding vegetation (Figure 1).

The species is likely to continue to use the habitat resources that would remain within the locality, including within the protected areas listed above in Question (a) where this species has been recorded.

Any vegetation communities or habitat features relevant to this species outside of the proposed surface disturbance area (i.e. in the underground mining area) is expected to receive negligible impact from the Project (Section 5.1).

Given the limited scale of vegetation clearance, hydrological changes and other potential Project impacts, the Project is unlikely to significantly reduce the quality or availability of habitat for this species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There are no listed priority actions for the Koala (OEH, 2012b). Recovery actions include (OEH, 2012b):

- Undertake feral predator control.
- Apply low intensity, mosaic pattern fuel reduction burns in or adjacent to Koala habitat.
- Retain suitable habitat, especially areas dominated by preferred feed-tree species.
- Protect populations close to urban areas from attacks by domestic dogs.
- Identify road-kill blackspots and erect warning signs, reduce speed limits or provide safe crossing points to reduce Koala fatalities.
- Revegetate with suitable feed tree species and develop habitat corridors between populations.

A number of management strategies and documents have been developed including the *Far South Coast Koala Management Framework* (Ecological Australia, 2006), *National Koala Conservation and Management Strategy 2009-2014 and the approved Recovery Plan for the Koala* (*Phascolarctos cinereus*) (DECC, 2008c). Collectively these provide a framework for managing threats such as human-induced climate change; loss, modification and fragmentation of habitat; predation by feral and domestic dogs; intense fires that scorch or kill the tree canopy and road-kills (OEH, 2012b).

As described above, the Project area represents a small area of vegetation within a large area of connected remnant vegetation through Sugarloaf SCA, Heaton State Forest and surrounding vegetation (Figure 1). Furthermore, the Project would unlikely fragment suitable habitat for the Koala given the mobility of the species.

Donaldson Coal would implement bushfire management, feral animal, traffic and revegetation strategies that would mitigate or avoid affects on the Koala (Section 5). As such, the Project is unlikely to contribute significantly to known threats to this species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to this species include clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

The Project would result in clearing of native vegetation which is a key threatening process applicable to the Koala. Notwithstanding, this is not expected to significantly affect this species due to the small area of estimated proposed surface disturbance (11.2 ha) and given no vegetation community in the proposed surface disturbance area is limited to that area (Figure 4).

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012).

However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

The Project would implement management plans for impact avoidance and management of possible affects (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). Collectively, with the implementation of these measures the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

Other Mammals

Spotted-tailed Quoll
Squirrel Glider
Long-nosed Potoroo (south-east mainland)
Brush-tailed Rock-wallaby
Yellow-bellied Sheathtailed-bat
Eastern Freetail-bat
Golden-tipped Bat
Little Bentwing-bat
Eastern Bentwing-bat
Large-footed Myotis
Greater Broad-nosed Bat
Eastern Cave Bat
New Holland Mouse

Assessment of Significance

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

These mammal species may potentially utilise vegetation and habitat features (e.g. cliffs, hollow-bearing trees, streams and rocks) within the Project area. However, in order for the Project to significantly affect the lifecycle of these species or populations, a substantially larger area of surface disturbance would have to occur.

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012). However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

Similarly, some species, including the Brush-tailed Rock-wallaby may utilise rocky escarpments and cliffs present in the Project area. However, with the implementation of subsidence control zones and associated subsidence performance measures, these habitat features are unlikely to be significantly affected by the Project.

Although an increase in fire frequency also has the potential to impact on the lifecycle of these species, a range of management protocols would be implemented (Section 5) to manage the behaviour of people in the Project area. Therefore, it is considered unlikely there would be an increase in fire frequency resulting from the Project.

It is estimated that the Project would disturb approximately 11.2 ha of vegetation in the proposed surface disturbance area. No vegetation community present in the proposed surface disturbance area is limited to this area (Figure 4). Additionally, natural regeneration and active revegetation would be undertaken in areas disturbed by the Project at the completion of mining (Section 5.4).

Given the above, it is unlikely that the Project would adversely impact on the lifecycle of these mammal species to the extent that a local population would be placed at risk of extinction.

Questions (b), (c) and (d) are not relevant to this species.

(e) In relation to the habitat of a threatened species, population or ecological community:

- ***(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed;***
- ***(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and***
- ***(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.***

Mine subsidence can potentially result in local impacts on water sources however, as detailed above, these effects are unlikely to be significant. Section 4.2 evaluates potential impacts of subsidence on fauna and their habitats and Section 5.1 further explains the measures Donaldson Coal would implement to minimise the impact of subsidence.

Minimal vegetation clearance for the proposed pit top area would be required (i.e. approximately 11.2 ha). However this is unlikely to influence any water resource, and there is substantial Dry Forest/Woodland throughout the remaining Project area and surrounds.

Habitat features for the Brush-tailed Rock-wallaby include rocky escarpments, outcrops and cliffs and browses on vegetation adjacent to these habitat features (OEH, 2012b). These habitat features are present in the Project area, though not in the proposed surface disturbance area. As such, these habitat features will not be cleared but will be present in the underground mining area. The subsidence control zones and performance measures (Section 5.1) would be implemented to minimise effects on these surface features. As a result, it is unlikely Brush-tailed Rock-wallaby habitat would be substantially modified as a result of the Project, nor would the long-term survival of the species be significantly impacted.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A draft national recovery plan for the Spotted-tailed Quoll has been prepared (Long and Nelson, 2010). In NSW, the Threatened Species Priorities Action Statement (DECC, 2007b) lists recovery actions for all threatened species. Thirty-three recovery actions are listed for the Spotted-tailed Quoll (OEH, 2012c). These actions focus on addressing current knowledge gaps and managing the threats to Spotted-tailed Quoll populations as identified through scientific research.

A Recovery Plan (Environment Australia, 2000) is present for the Long-nosed Potoroo which focuses on preventing habitat loss and isolation of populations.

The various bat species are covered by the Action Plan for Australian Bats (Environment Australia, 1999). Recovery actions highlight the need to conserve roosting sites, protect foraging areas from light pollution and to fill gaps in our knowledge and understanding of each species.

The New Holland Mouse does not have a Recovery Plan but the reasons for listing of this species identify habitat protection and feral predator control as the main recovery strategies required (Environment Australia, 2010).

The Project will not adversely impact on the habitats of these animals and will not isolate populations.

The Project is considered consistent with the objectives of the various recovery or threat abatement plans.

The Brush-tailed Rock-wallaby has two recovery plans; the *Recovery plan for the brush-tailed rock-wallaby (Petrogale penicillata)* (OEH, 2008) and the *Warrumbungle Brush-tailed Rock-wallaby Endangered Population Recovery Plan* (NPWS, 2003). Both identify boulders, cliffs and rocks to be key habitat.

The *Warrumbungle Brush-tailed Rock-wallaby Endangered Population Recovery Plan* identifies the following recovery plan objectives (NPWS, 2003):

1. Increase recruitment at priority sites.
2. Decrease the rate of decline in range and abundance.
3. Prevent the decline of the species to a level at which it would risk becoming extinct in the wild.
4. Increase knowledge to enable more effective management of the species.

Similarly, the *Recovery plan for the brush-tailed rock-wallaby (Petrogale penicillata)* (OEH, 2008) aims:

1. To improve and maintain threat-abatement programmes that provide strategic year-round protection to rock-wallaby colonies.
2. To determine and monitor population levels at all extant colonies, and increase overall population size and distribution.
3. To promote community awareness and participation in rock-wallaby conservation.
4. To research ecological issues critical to the recovery effort.
5. To prepare and implement contingency plans if colony sizes are determined to be nonviable.

The mitigation measures proposed to be implemented for the Project are considered consistent with the objectives of these recovery plans.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to these species include clearing of native vegetation, ecological consequences of high frequency fires, predation by feral cats, European Red Fox and alteration to the natural flow regimes of rivers, streams, floodplains and wetlands and alteration of habitat following subsidence due to longwall mining (OEH, 2011).

The Project would result in clearing of native vegetation which is a key threatening process applicable to these collective species. This is not expected to significantly affect these species due to the small area of estimated proposed surface disturbance (11.2 ha) and given no vegetation community in the proposed surface disturbance area is limited to that area (Figure 4).

Mine subsidence can potentially result in localised impacts to stream baseflow through subsidence impacts (Ditton Geotechnical Services, 2012). As described by RPS Aquaterra (2012), due to the implementation of the subsidence control zones, the Project would not result in any more than negligible impacts to stream baseflow. Similarly mine subsidence can potentially result in localised increases in levels of ponding, flooding or scouring in locations where subsidence induced tilts are greater than the natural stream gradients (Ditton Geotechnical Services, 2012). However, due to the implementation of the subsidence control zones, no more than negligible changes to stream flow regimes are expected within 3rd Order streams or within 1st or 2nd Order streams associated with groundwater dependant ecosystems, steep slopes or cliff lines (Ditton Geotechnical Services, 2012). In the limited reaches of 1st and 2nd Order streams outside these areas, the predicted tilts are considered small when compared to the existing natural grades and are unlikely to results in any significant increases in ponding, flooding or scouring. In terms of water quality, the predicted change in stream sediment loads due to increased erosion is expected to be negligible when compared to background levels and erosion processes (Ditton Geotechnical Services, 2012; Evans and Peck, 2012).

The Project has been designed to avoid the release of mine water from the pit top. Limited quantities of stormwater runoff (e.g. from the administration and car park areas) would drain from the pit top area. Where this water comes from areas where it has the potential to contain sediment or traces of oils or grease, this water would be captured and stored in sediment dams to reduce sediment loads. Oil and grease separators would be installed where required to avoid downstream water quality effects. Water would only be released subject to compliance with relevant Environment Protection Licences to the satisfaction of the EPA (Evans and Peck, 2012).

Regular monitoring of water quality upstream and downstream of the pit top would be undertaken throughout the life of the Project (Evans and Peck, 2012).

Threats from pests would be managed using the mitigation measures outlined in Section 5.3. As a result, the Project would not exacerbate these threats.

The Project would implement management plans for impact avoidance and management of possible affects (Section 5). These include subsidence performance measures (Section 5.1), land clearing strategies (Section 5.2) and rehabilitation of the surface disturbance area (Section 5.4). Collectively, with the implementation of these measures the Project is not likely to significantly contribute to, or increase the effect of, a key threatening process.

7 CONCLUSION

Potential impacts on fauna and their habitats have been evaluated within this report. Specific measures have been proposed to address the potential impacts resulting from the Project.

Given the limited extent of surface disturbance proposed, it is considered the impact to fauna and their habitat is likely to be minimal. Potential impacts are most likely to be associated with loss of habitat. However, there is unlikely to be a net impact on threatened fauna species in the region over the medium to long-term when taking into consideration the measures proposed to mitigate impacts including the implementation of subsidence performance measures.

8 REFERENCES

Algers, B., Ekesbo, I. and Stromberg, S. (1978) *The Impact of Continuous Noise on Animal Health*. Acta Scandinavica, Suppl. 67.

Allaire, P.N. (1978) *Effects on Avian Populations Adjacent to an Active Strip Mine*. Symposium on Surface Mining and Fish/Wildlife Needs in Eastern United States, West Virginia.

Ames, D.R. (1978) *Physiological Responses to Auditory Stimuli*. In Fletcher, J.L and Busnel, R.G. (1978) (Eds.) *Effects of Noise on Wildlife.*

Anstis, M. (2002) *Tadpoles of south-eastern Australia: a guide with keys*, Reed New Holland, Sydney.

Australian Museum (2012) *Database Records for the Search Area: -32.8260, 151.4473; -32.8279, 151.6075; -32.9613, 151.4449; -32.9632, 151.6054.* Date Received: 19 January 2012.

Ayers, D., Nash. S., and Baggett, K. (1996) *Threatened Species of Western New South Wales.* NSW National Parks and Wildlife Service, Hurstville.

Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulte, R. (2003) *The New Atlas of Australian Birds.* Birds Australia, Melbourne.

Begon, M., Harper, J.L. and Townsend, C.R. (1990) *Ecology – Individuals, Populations and Communities.* Blackwell Scientific Publication, London, UK, 2nd edition.

Berger, L., Speares, R. and Hyatt, A. (1999) *Chytrid fungus and amphibian declines: Overview, implications and future directions.* In Campbell, A. (1999) (Ed.) *Declines and Disappearances of Australian Frogs.* Environment Australia, Canberra.

Birds Australia (2012) *Database Records for the Search Area: -32.8260, 151.4473; -32.8279, 151.6075; -32.9613, 151.4449; -32.9632, 151.6054. Date Received: 5 January 2012*.

Busnel, R.G. (1978) *Introduction*. In Fletcher, J.L. and Busnel, R.G. (1978) (Eds.) *Effects of Noise on Wildlife*.

Cameron, M. (2006) Nesting Habitat of the Glossy Black-Cockatoo in Central New South Wales. *Biological Conservation*, 127, 402-410.

Churchill, S. (2008) *Australian Bats*. Second Edition. Allen & Unwin, Crows Nest, NSW, Australia.

Clout, M.N. (1989) Foraging Behaviour of Glossy Black-cockatoos. *Australian Wildlife Research* 16: 467-473.

Cogger, H.G., E.E. Cameron, R.A. Sadlier and P. Eggler (1993) *The Action Plan for Australian Reptiles*. Canberra, ACT: Australian Nature Conservation Agency.

Courtney, J. and Debus, S.J.S. (2006) Breeding habits and conservation status of the Musk Lorikeet *Glossopsitta concinna* and Little Lorikeet *G. pusilla* in Northern New South Wales. *Australian Field Ornithology* 23, 109-124.

Crowley, G. M. and Garnett, S. T. (in press) Food value and tree selection by Glossy Black-Cockatoos *Calyptorhynchus lathami. Austral Ecol.*In Garnett, S.T. and Crowley, G.M. (2000) *The Action Plan for Australian Birds.* Environment Australia, Australia.

Crowley, G.M., Garnett, S.T. and Pedler, L.P. (1999) *Assessment of the Role of Captive Breeding and Translocation in the Recovery of the South Australian Sub-species of the Glossy Black-cockatoo Calyptorhynchus lathami halmaturinus.* Birds Australia Report No. 5. Birds Australia, Melbourne.

Department of Environment and Climate Change (2007a) *Threatened Species Assessment Guidelines: The Assessment of Significance.*

Department of Environment and Climate Change (2007b) *NSW Threatened Species Priorities Action Statement*.

Department of Environment and Climate Change (2008a) *The Vertebrate Fauna of the Sugarloaf State Conservation Area.*

Department of Environment and Climate Change (2008b) *Hygiene Protocol for the Control of Disease in Frogs.*

Department of Environment and Climate Change (2008c) *National Koala Conservation and Management Strategy 2009-2014 and the approved recovery plan Recovery plan for the koala (Phascolarctos cinereus).*

Department of Environment and Conservation (2004) *Threatened Species Survey and Assessment: Guidelines for Developments and Activities*.

Department of Environment and Conservation (2006) *National recovery plan for the wallum sedgefrog and other wallum-dependent frog species.*

Department of Environment and Heritage (2006) *Threat Abatement Plan - Infection of amphibians with chytrid fungus resulting in chytridiomycosis.*

Department of Sustainability, Environment, Water, Population and Communities (2012a) *Maps: Australia's Bioregions (IBRA) Website.*
Website: http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/index.html
Date Retrieved: March 2012.

Department of Sustainability, Environment, Water, Population and Communities (2012b) *EPBC Act Protected Matters Report for Search Area -32.8260, 151.4473; -32.8279, 151.6075; -32.9613, 151.4449; -32.9632, 151.6094, -32.826, 151.4473.*
Date Received: 3 January 2012.

Ditton Geotechnical Services (2012) *Subsidence Predictions and General Impact Assessment for the Tasman Extension Project.* Report prepared for Donaldson Coal.

Ecobiological (2007a) *Ecology Assessment for Tasman Mine Panels 10-15 Subsidence Management Plan Application*.

Ecobiological (2007b) *Donaldson Coal Fauna and Flora Management Plan.*

Ecobiological (2008a) *2008 Annual Flora and Fauna Monitoring Report: Tasman Underground Coalmine Disturbance Area, Mt Sugarloaf, NSW*.

Ecobiological (2008b) *2008 Annual Flora and Fauna Monitoring Report: Tasman Underground Coalmine Compensatory Habitat Area, Sugarloaf, NSW*.

Ecological Australia (2006) *Far South Coast Koala Management Framework.*

Environment Australia (1999) *Action Plan for Australian Bats*. Canberra.

Environment Australia (2000) *Recovery Plan for the Long-nosed Potoroo*. Canberra.

Environment Australia (2010) *Commonwealth Conservation Advice on Pseudomys novaehollandiae* (New Holland Mouse) (Threatened Species Scientific Committee [TSSC], 2010).

Environment Protection Authority (2000) *NSW Industrial Noise Policy.*

Environmental Protection Agency (2002) *Recovery Plan for Stream Frogs of South-east Queensland 2001-2005.*

Evans and Peck (2012) *Characteristics of Creeks in the Tasman Extension Project Area.* Report prepared for Donaldson Coal.

Garnett, S.T. and Crowley, G.M. (2000) *The Action Plan for Australian Birds.* Environment Australia, Australia.

Garnett, S.T., Szabo, J.K. and Dutson, G. (2011) *The Action Plan for Australian Birds 2010*. CSIRO Publishing, Australia.

Glossy Black Conservancy (2010) *Glossy Black-Cockatoo Conservation Guidelines for South-Eastern Queensland and Far North-Eastern New South Wales.*

Gunninah Environmental Consultants (2002) *Tasman Project Proposed Underground Coal Mine Flora and Fauna Assessment Report*.

Hamer, A. (1998) *Aspects of the ecology of the Green and Golden Bell Frog (Litoria aurea) on Kooragang Island, New South Wales, Australia.* Major Project Report, M. Env. Studies, University of Newcastle.

Hamer, A.J., Lane, S.J. and Mahony, M.J. (2002) Management of freshwater wetlands for the endangered green and golden bell frog (*Litoria aurea*): roles of habitat determinants and space. *Biological Conservation* 106(3): 413-424.

Hunter Eco (2012) *Tasman Underground Coalmine Extension Project Mining Area Surface Vegetation Ecology and Impact Assessment*. Report prepared for Donaldson Coal.

Long, K. and Nelson, J. (2010) *Draft National Recovery Plan for the Spotted-tailed Quoll Dasyurus maculatus*.

Lynch, T.E. and Speake, D.W. (1978) *Eastern Wild Turkey Behavioural Responses Induced by Sonic Boom*. In Fletcher, J.L. and Busnel, R.G. (1978) (Eds.) *Effects of Noise on Wildlife*. Academic Press, New York.

Martin, R.W. and Handasyde, K.A. (1998) *Koala*. In Strahan, R. (1998) (ed.) *The Mammals of Australia*. New Holland Publishers, Sydney.

Matthews, A., Lunney, D., Gresser, S. and Maitz, W. (2007) Tree use by koalas (*Phascolarctos cinereus*) after fire in remnant coastal forest. *Wildlife Research* 34: 84-93.

Menkhorst, P.W. and Lumsden, L.F. (1995) Eastern False Pipistrelle *Falsistrellus tasmaniensis.* In Menkhorst, P.W. (Ed.) (1995) *Mammals of Victoria- Distribution, Ecology and Conservation*. Oxford University Press, Melbourne.

Morcombe, M. (2004) *Field Guide to Australian Birds.* Steve Parish Publishing Pty Ltd, Archerfield, QLD.

National Parks and Wildlife Service (1999a) *Threatened Species Information – Yellow-bellied Glider.*

National Parks and Wildlife Service (1999b) *Threatened Species Information – Koala (Phascolarctos cinereus).*

National Parks and Wildlife Service (1999c) *Threatened Species Information – Squirrel Glider (Petaurus norfolensis).*

National Parks and Wildlife Service (2002) *Recovery Plan for the Yellow-bellied Glider (Petaurus australis).*

National Parks and Wildlife Service (2003) *Warrumbungle Brush-tailed Rock-wallaby Endangered Population Recovery Plan.*

Newcastle Coal Company Pty Ltd (2011) *Tasman Extension Project Referral of Proposed Action.*

New South Wales Industry and Investment (2010) *Preventing the Spread of Myrtle Rust in Bushland.*

NSW Scientific Committee (2001) *Final Determination – Grey-headed Flying-fox vulnerable species listing.*

NSW Scientific Committee (2003) *Infection of frogs by amphibian chytrid causing the disease chytridiomycosis - key threatening process listing.*
Website: http://www.environment.nsw.gov.au/animals/AmphibianChytridKTPListing.htm
Date Retrieved: February 2012

NSW Scientific Committee (2010) *Wompoo Fruit-dove Ptilinopus magnificus. Review of Current Information in NSW.*
Website:http://environment.nsw.gov.au/resources/nature/schedules/WompooFD.pdf
Date Retrieved: February 2012.

Oceanic Coal Australia Limited (2010) *Ecological Assessment West Wallsend Colliery Continued Operations Project*. Prepared by Umwelt Environmental Consultants.

Office of Environment and Heritage (2008) *Recovery plan for the brush-tailed rock-wallaby (Petrogale penicillata).*
Website: http://mapdata.environment.nsw.gov.au/DDWA/
Date Retrieved: February 2012.

Office of Environment and Heritage (2011) *Key Threatening Process Website*.
Website: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_threats.aspx
Date Retrieved: February 2012.

Office of Environment and Heritage (2012a) *BioNet – NSW Atlas of Wildlife*.
Website: http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx
Date Retrieved: February 2012.

Office of Environment and Heritage (2012b) *Threatened Species Website*.
Website: http://www.threatenedspecies.environment.nsw.gov.au/threatenedspecies/index.htm
Date Retrieved: February 2012.

Office of Environment and Heritage (2012c) *Recovery Planning for the Spotted-tailed Quoll Website*.
Website: http://www.environment.nsw.gov.au/equollogy/DecSeminarQuollsPrice.htm
Date Retrieved: March 2012.

Parnaby, H.A. (1983) *Great Pipistrelle.* In Ayers, D., Nash. S., and Baggett, K. (1996) *Threatened Species of Western New South Wales.* NSW National Parks and Wildlife Service, Hurstville.

Phillips, B. (1990) *Koalas: the Little Australian we'd hate to lose.* Australian National Parks and Wildlife Service, Canberra. In National Parks and Wildlife Service (1999) *Threatened Species Information – Koala (Phascolarctos cinereus).*

Poole, G. (1982) *Sound Advice Poultry Notes*. NSW Department of Agriculture and Fisheries.

RPS Aquaterra (2012) *Groundwater Assessment for the Tasman Extension Project.* Report prepared for Donaldson Coal.

Schodde, R. (1994) *The Bird Fauna of Western New South Wales: Geography and Status.* Pages 107-21 in Date, E.M., Goldney, D.C., Bauer, J. and Paull, D. (2000) *The distribution and abundance of endangered vertebrate fauna in NSW White Cypress woodlands: implications of state forest management*. In D. Saunders, N. Mitchell and J. Craig (Eds.) *Conservation in Production Environments: Managing the Matrix*. Taupo, New Zealand. Surrey Beatty and Sons, Norton Chipping.

Shaw, E.A. (1978) *Symposium of the Effects of Noise on Wildlife*. In Fletcher, J.L. and Busnel, R.G. (1978) (Eds.) *Effects of Noise on Wildlife.*

Simpson, K. and Day, N. (1999) *Field Guide to the Birds of Australia*. Sixth Edition, Penguin Books Australia Ltd, Camberwell, Victoria.

State Environment Planning Policy No.44 (1995) *Koala Habitat Protection. Environmental Planning and Assessment Act, 1979.*

Streeter, I.P., Moore, R.T., Skinner, J.J., Martin, S.G., Terrel, T.L., Klimstra, W.D., Tate, J. Jnr and Nolde, M.J. (1979) *Energy Impacts and Wildlife Management: Which Way to Turn?* Proceedings of the 44th North American Wildlife Conference.

Tanton, M.T.T. (1994) *Fauna Impact Statement. Proposed Forestry Operations in the Eden Management Area. Environmental Impact Statement.* Vol B: Appendix 1. State Forests of NSW, Sydney. In National Parks and Wildlife Service (1999) *Threatened Species Information – Yellow-bellied Glider.*

Thomas, R., Thomas, S., Andrew, D. and McBride, A. (2011) *The Complete Guide to Finding the Birds of Australia.* Second Edition. CSIRO Publishing, Collingwood, Australia.

Tidemann, C.R. and Nelson, J.E. (2004) Long-distance movements of the grey-headed flying fox (*Pteropus poliocephalus*). *Journal of Zoology* 263: 141-146.

Van Dyck, S. and Strahan, R. (2008) *The Mammals of Australia (Third Edition)*. Reed New Holland Publishers Pty Ltd, Sydney.

White, A. (2000). *The status of the Barred River Frogs Mixophyes balbus and Mixophyes iteratus in the Sydney Basin Region of New South Wales 1999-2000*. Report for NSW National Parks and Wildlife Service.

ATTACHMENT A

THREATENED FAUNA DATABASE SEARCH RESULTS

Attachment A
Threatened Fauna Species - Database Search Results

Scientific Name	Common Name	Conservation Status[1]		EPBC Act Protected Matters Search[2]	Species Records			Previous Survey Records[6]
		TSC Act	EPBC Act		OEH Atlas of NSW Wildlife[3]	Australian Museum[4]	Birds Australia[5]	
Amphibians								
MYOBATRACHIDAE								
Crinia tinnula	Wallum Froglet	V	-	-	-	-	-	E
Heleioporus australiacus	Giant Burrowing Frog	V	V	●	-	-	-	-
Mixophyes balbus	Stuttering Frog	E	V	●	●	-	-	A^+
Mixophyes iterates	Giant Barred Frog	E	E	●	●	-	-	A^+
HYLIDAE								
Litoria aurea	Green and Golden Bell Frog	E	V	●	●	-	-	-
Litoria brevipalmata	Green-thighed Frog	V	-	-	●	-	-	-
Litoria littlejohni	Littlejohn's Tree Frog	V	V	●	-	-	-	-
Reptiles								
CHELONIIDAE								
Caretta caretta	Loggerhead Turtle	E	E	●	-	-	-	-
Chelonia mydas	Green Turtle	V	V	●	-	-	-	-
Eretmochelys imbricate	Hawksbill Turtle	-	V	●	-	-	-	-
DERMOCHELYIDAE								
Dermochelys coriacea	Leathery Turtle	E	E	●	-	-	-	-
ELAPIDAE								
Hoplocephalus bitorquatus	Pale-headed Snake	V	-	-	-		-	A^+
Hoplocephalus bungaroides	Broad-headed Snake	E	V	●	-	-	-	-
Hoplocephalus stephensii	Stephens' Banded Snake	V	-	-	●	-	-	E, G

Attachment A (Continued)
Threatened Fauna Species - Database Search Results

Scientific Name	Common Name	Conservation Status[1]		EPBC Act Protected Matters Search[2]	Species Records			Previous Survey Records[6]
		TSC Act	EPBC Act		OEH Atlas of NSW Wildlife[3]	Australian Museum[4]	Birds Australia[5]	
Birds								
ANSERANATIDAE								
Anseranas semipalmata	Magpie Goose	V	-	-	●	-	-	
CICONIIDAE								
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	-	●	-	●	E
ARDEIDAE								
Botaurus poiciloptilus	Australasian Bittern	E	E	●	-	-	-	-
Ixobrychus flavicollis	Black Bittern	V	-	-	●	-	●	-
ACCIPITRIDAE								
Lophoictinia isura	Square-tailed Kite	V	-	-	●	-	●	-
Hamirostra melanosternon	Black-breasted Buzzard	V	-	-	●	-	-	-
Hieraaetus morphnoides	Little Eagle	V	-	-	●	-	●	A^+, E^+, F
HAEMATOPODIDAE								
Haematopus longirostris	Pied Oystercatcher	E	-	-	●	-	-	-
CHARADRIIDAE								
Charadrius mongolus	Lesser Sand Plover	V	-	-	●	-	-	-
ROSTRATULIDAE								
Rostratula benghalensis australis	Australian Painted Snipe	E	V	●	●	-	●	-
JACANIDAE								
Irediparra gallinacean	Comb-crested Jacana	V	-	-	●	-	●	E
SCOLOPACIDAE								
Limosa limosa	Black-tailed Godwit	V	-	-	-	-	●	-
COLUMBIDAE								
Ptilinopus magnificus	Wompoo Fruit-Dove	V	-	-	●	-	●	-

Attachment A (Continued)
Threatened Fauna Species - Database Search Results

Scientific Name	Common Name	Conservation Status[1]		EPBC Act Protected Matters Search[2]	Species Records			Previous Survey Records[6]
		TSC Act	EPBC Act		OEH Atlas of NSW Wildlife[3]	Australian Museum[4]	Birds Australia[5]	
PSITTACIDAE								
Calyptorhynchus lathami	Glossy Black-cockatoo	V	-	-	●	-	-	A+, B, D+, E, G
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	-	●	-	●	A+, E
Glossopsitta pusilla	Little Lorikeet	V	-	-	●	-	●	A+, B+, C^, D^, E+, F
Neophema pulchella	Turquoise Parrot	V	-	-	●	-	-	-
Lathamus discolour	Swift Parrot	E	E	●	●	-	●	E
TYTONIDAE								
Tyto tenebricosa	Sooty Owl	V	-	-	●	-	-	B, C^, D, D^, E, F, G
Tyto novaehollandiae	Masked Owl	V	-	-	●	●	●	A, A+, E, F, G
STRIGIDAE								
Ninox strenua	Powerful Owl	V	-	-	●	-	●	A+, B, C+, D+, D^, E, G
Ninox connivens	Barking Owl	V	-	-	●	-	-	A+
CLIMACTERIDAE								
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	-	●	-	●	A+, E, G
ACANTHIZIDAE								
Dasyornis brachypterus	Eastern Bristlebird	E	E	●	-	-	-	-
Pyrrholaemus saggitatus	Speckled Warbler	V	-	-	-	-	-	E, F, G

Attachment A (Continued)
Threatened Fauna Species - Database Search Results

Scientific Name	Common Name	Conservation Status[1]		EPBC Act Protected Matters Search[2]	Species Records			Previous Survey Records[6]
		TSC Act	EPBC Act		OEH Atlas of NSW Wildlife[3]	Australian Museum[4]	Birds Australia[5]	
MELIPHAGIDAE								
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	-	●	-	●	B, D^+, E
Anthochaera Phrygia	Regent Honeyeater	CE	E	●	●	-	●	-
Epthianura albifrons	White-fronted Chat	V	-	-	●	-	●	-
PETROICIDAE								
Melanodryas cucullata	Hooded Robin (south eastern form)	V	-		●			
Petroica phoenicea	Flame Robin	V	-	-	-	-	-	F
Petroica boodang	Scarlet Robin	V	-	-	●	-	●	A^+, E^+, G
POMATOSTOMIDAE								
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	-	●	-	●	A^+, E, F
NEOSITTIDAE								
Daphoenositta chrysoptera	Varied Sittella	V	-	-	●	-	●	A, A^+, B^+, E^+, F, G
PACHYCEPHALIDAE								
Pachycephala olivacea	Olive Whistler	V	-	-	-	-	-	F
Mammals								
DASYURIDAE								
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	V	E	●	●	-	-	E, G
Planigale maculate	Common Planigale	V	-	-	-	-	-	E, G

Attachment A (Continued)
Threatened Fauna Species - Database Search Results

Scientific Name	Common Name	Conservation Status[1]		EPBC Act Protected Matters Search[2]	Species Records			Previous Survey Records[6]
		TSC Act	EPBC Act		OEH Atlas of NSW Wildlife[3]	Australian Museum[4]	Birds Australia[5]	
PHASCOLARCTIDAE								
Phascolarctos cinereus	Koala	V	-	-	●	-	-	A^+, E, G
PETAURIDE								
Petaurus australis	Yellow-bellied Glider	V	-	-	●	-	-	B, D, D^+, E, G
Petaurus norfolcensis	Squirrel Glider	V	-	-	●	-	-	A^+, E, F
POTOROIDAE								
Potorous tridactylus tridactylus	Long-nosed Potoroo (SE mainland)	V	V	●	-	-	-	-
MACROPODIDAE								
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	●	●	-	-	A^+
PTEROPODIDAE								
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	●	●	-	-	A, A^+, B, D^+, E, G
EMBALLONURIDAE								
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	-	●	-	-	A^+
MOLOSSIDAE								
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	-	●	-	-	A, C, C^+, $C^\wedge$, $D^\wedge$, E, G
VESPERTILIONIDAE								
Kerivoula papuensis	Golden-tipped Bat	V	-	-	-	-	-	A^+
Miniopterus australis	Little Bentwing-bat	V	-	-	●	-	-	A, A^+, C, C^+, $C^\wedge$, D, D^+, $D^\wedge$, E, G
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	-	●	-	-	A, A^+, B, C, C^+, $C^\wedge$, D, $D^\wedge$, E, G

Attachment A (Continued)
Threatened Fauna Species - Database Search Results

Scientific Name	Common Name	Conservation Status[1]		EPBC Act Protected Matters Search[2]	Species Records			Previous Survey Records[6]
		TSC Act	EPBC Act		OEH Atlas of NSW Wildlife[3]	Australian Museum[4]	Birds Australia[5]	
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	●	●	-	-	E, G
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	-	●	-	-	A+, E, G
Myotis macropus	Large-footed Myotis	V	-	-	●	-	-	A+, D, D^, G
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	-	●	-	-	A+, C, C+, C^, D^, E, G
Vespadelus troughtoni	Eastern Cave Bat	V	-	-	●	-	-	-
MURIDAE								
Pseudomys novaehollandiae	New Holland Mouse	-	V	●	-	-	-	-

1 Conservation Status under the NSW *Threatened Species Conservation Act, 1995* and/or Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (current as at 22 March 2012)
E = Endangered, V = Vulnerable, CE = Critically Endangered.

2 Department of Sustainability, Environment, Water, Population and Communities (2012a) *EPBC Act Protected Matters Report for Search Area: -32.8260, 151.4473; -32.8279, 151.6075; -32.9613, 151.4449; -32.9632, 151.6054, -32.826, 151.4473.* Date Received: 3 January 2012.

3 Office of Environment and Heritage (2012) *BioNet/Atlas of NSW Wildlife Records for the Search Area: N: -32.83, S: -32.96, W: 151.44, E: 151.6.* Date Received: 17 January 2012.

4 Australian Museum (2012) *Database Records for the Search Area: -32.8260, 151.4473; -32.8279, 151.6075; -32.9613, 151.4449; -32.9632, 151.6054.* Date Received: 19 January 2012.

5 Birds Australia (2012) *Database Records for the Search Area: -32.8260, 151.4473; -32.8279, 151.6075; -32.9613, 151.4449; -32.9632, 151.6054. Date Received: 5 January 2012*.

6 Previous survey results have been sourced from the following:

A Gunninah Environmental Consultants (2002) *Tasman Project Proposed Underground Coal Mine Flora and Fauna Assessment Report*.

A+ Species recorded during previous investigations in the locality listed in Appendix D of Gunninah Environmental Consultants (2002).

B Threatened species previously recorded by Ecobiological (2005, 2006, 2007) during monitoring listed in Table 2 of Ecobiological (2007a) *Ecology Assessment for Tasman Mine Panels 10-15 Subsidence Management Plan Application*.

B+ Species expected to occur listed in Appendix 2 of Ecobiological (2007a).

C Ecobiological (2008a) *2008 Annual Flora and Fauna Monitoring Report: Tasman Underground Coalmine Disturbance Area, Mt Sugarloaf, NSW*.

C+ Species previously recorded during the 2006 monitoring listed in Ecobiological (2008a).

C^ Species previously recorded during the 2007 monitoring listed in Ecobiological (2008a).

D Ecobiological (2008b) *2008 Annual Flora and Fauna Monitoring Report: Tasman Underground Coalmine Compensatory Habitat Area, Sugarloaf, NSW*.

D+ Species previously recorded during the May 2007 baseline surveys listed in Ecobiological (2008b).

D^ Species previously recorded during the November 2007 survey listed in Ecobiological (2008b).

E Species recorded within and surrounding (7.5 km radius from centre of Project) the Project area in DECC (2008a) *The Vertebrate Fauna of the Sugarloaf State Conservation Area*.

E+ Species that were recorded in Appendix B of DECC (2008a) that were not listed as threatened during the time of the surveys. The location of where these species were recorded is unknown.

F Biosis Research (2005) *F3 Freeway to Branxton Link – Updated Additional Flora and Fauna Assessment.* The location of where these species were recorded is unknown.

G Species that were recorded in Oceanic Coal Australia Limited (2010) *Ecological Assessment West Wallsend Colliery Continued Operations Project.*

ATTACHMENT B

SURVEY EFFORT

Survey Effort

Fauna Group	Method	Effort and Frequency
Bats	ANABAT^{TM} detectors	1 ANABAT^{TM} detector for two consecutive nights.
	Harp traps	One harp trap for two consecutive nights.
	Spotlighting	Two people each night on foot and by vehicle for minimum 30 minutes.
Amphibians	Diurnal herpetological searches	Hand-netting for tadpoles.
	Nocturnal amphibian searches	Call payback and night-time habitat searches over two consecutive nights for minimum 30 minutes.
Reptiles	Hand searches	Searches of survey area was conducted by hand by two people on sunny mornings on two separate days.
	Spotlighting	Spotlighting was conducted at night for Geckos.
Diurnal Birds	Bird surveys	Thirty minutes on sunny mornings and/or afternoons over two days along 200 metres (m) long transects in survey area.
	Spotlighting	Thirty minutes over two consecutive nights by two people.
Owls	Call playback	Two consecutive nights including two minute playback period and five minute listening period.
Mammals	Elliott A traps	Twenty-five Elliott A traps along 200 m long trapping lines for four nights.
	Elliott B traps	Ten Elliott B traps along 200 m long trapping lines for four nights.
	Arboreal Elliott traps	Six arboreal Elliott traps for four nights.
	Hair tubes (large)	10 large hair tubes for at least four days and nights.
	Hair tubes (small)	10 small hair tubes for at least four days and nights.
	Arboreal hair tubes	10 arboreal hair tubes for at least four days and nights.
	Standard cage traps	Five traps for four nights.
	Opportunistic observations	*Ad lib* across the Project area and surrounds.
	Tracks and traces	*Ad lib* or when engaged in other activities above.
	Call playback	Twice per night for a minimum of 30 minutes on separate nights.

ATTACHMENT C

FAUNA SPECIES RECORDED DURING THE PROJECT SURVEYS

Attachment C-A
Fauna Species Recorded during the Project Surveys at Systematic Survey Sites S1 to S12

Scientific Name	Common Name	Conservation Status[1]		Survey Transects												Relative Abundance[2]
		TSC Act	EPBC Act	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	
Amphibians																
MYOBATRACHIDAE																
Crinia signifera	Common Eastern Froglet	-	-	✓	-	✓	✓	✓	-	-	✓	✓	✓	✓	-	C
Limnodynastes peronii	Brown-striped Frog	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	C
Pseudophyrne bibronii	Brown Toadlet	-	-	✓	-	✓	✓	-	-	-	-	-	-	-	-	C
Pseudophyrne coriacea	Red-backed Toadlet	-	-	-	-	-	-	-	✓	-	✓	-	-	✓	-	C
HYLIDAE																
Litoria dentata	Bleating Tree Frog	-	-	-	-	-	-	✓	-	-	✓	✓	✓	-	-	C
Litoria fallax	Eastern Dwarf Tree Frog	-	-	-	-	-	-	-	-	-	✓	✓	-	-	-	C
Litoria peronii	Peron's Tree Frog	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	U
Litoria wilcoxii	Stoney Creek Frog	-	-	-	-	-	-	-	✓	-	-	-	-	✓	-	U
Reptiles																
SCINCIDAE																
Cryptoblepharus virgatus	Cream-striped Shinning-skink	-	-	✓	-	-	✓	-	-	✓	-	-	-	✓	-	C
Lampropholis delicata	Dark-flecked Garden Skink	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	C
Lampropholis guichenoti	Pale-flecked Garden Skink	-	-	✓	-	-	-	-	-	-	✓	-	-	-	✓	C
Eulamprus quoyii	Eastern Water-skink	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	C
Acritoscincus platynotum	Red-throated Skink	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	U
Eulamprus tenuis	Barred-sided Skink	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	1
GEKKONIDAE																
Oedura lesueurii	Lesueur's Velvet Gecko	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	1
AGAMIDAE																
Amphibolurus muricatus	Jacky Lizard	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	C
ELAPIDAE																
Furina diadema	Red-naped Snake	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	U
Hemiaspis signata	Black-bellied Swamp Snake	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	U

Attachment C-A (Continued)
Fauna Species Recorded during the Project Surveys at Systematic Survey Sites S1 to S12

Scientific Name	Common Name	Conservation Status[1]		Survey Transects												Relative Abundance[2]
		TSC Act	EPBC Act	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	
Birds																
ACCIPITRIDAE																
Accipiter fasciatus	Brown Goshawk	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	1
COLUMBIDAE																
Macropygia amboinensis	Brown Cuckoo-dove	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	U
Leucosarcia melanoleuca	Wonga Pigeon	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	U
Chaps chalcoptera	Common Bronzewing	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	1
PSITTACIDAE																
Alisterus scapolaris	Australian King Parrot	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	U
Platycercus elegans	Crimson Rosella	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	U
Calyptorhynchus lathami	Glossy Black Cockatoo	V	-	-	-	-	-	-	-	-	-	-	✓	-	-	U
CUCULIDAE																
Cuculus pallidus	Pallid Cuckoo	-	-	-	-	-	-	-	✓	-	-	-	-	-	✓	U
Cuculus flabelliformis	Fan-tailed Cuckoo	-	-	-	-	-	-	-	✓	✓	✓	✓	-	-	-	U
Chrysococcyx lucidus	Shining Bronze Cuckoo	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	U
Scythrops novaehollandiae	Channel-billed Cuckoo	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	U
STRIGIDAE																
Ninox boobook	Southern Boobook	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	U
PODARGIDAE																U
Podargus strigoides	Tawny Frogmouth	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	U
CAPRIMULGIDAE																
Eurostopodus mystacalis	White-throated Nightjar	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	U
ALCEDINIDAE																
Dacelo novaeguineae	Laughing Kookaburra	-	-	-	-	-	-	✓	-	-	-	-	✓	✓	✓	C
CLIMACTERIDAE																
Cormobates leucophaea	White-throated Treecreeper	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	C

Attachment C-A (Continued)
Fauna Species Recorded during the Project Surveys at Systematic Survey Sites S1 to S12

Scientific Name	Common Name	Conservation Status[1]		Survey Transects												Relative Abundance[2]
		TSC Act	EPBC Act	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	
Birds (Continued)																
MALURIDAE																
Malurus lamberti	Variegated Fairy-wren	-	-	-	-	-	-	✓	-	-	-	-		✓	-	C
PARDALOTIDAE																
Pardalotus puctatus	Spotted Pardalote	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	C
Pardalotus striatus	Striated Pardalote	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	1
ACANTHIZIDAE																
Sericornis frontalis	White-browed Scrubwren	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	U
Acanthiza pusilla	Brown Thornbill	-	-	-	-	-	-	-	✓	-	✓	✓	✓	✓	✓	C
MELIPHAGIDAE																
Lichenostomus chrysops	Yellow-faced Honeyeater	-	-	-	-	-	-	✓	✓	✓	-	✓	✓	✓	✓	C
Meliphaga lewinii	Lewin's Honeyeater	-	-	-	-	-	-	✓	-	-	-	-	✓	-	-	U
Manorina melanophrys	Bell Minor	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	C
Manorina melanocephala	Noisy Minor	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	C
Philemon corniculatus	Noisy Friarbird	-	-	-	-	-	-	✓	-	✓	-	✓	✓	✓	✓	C
Myzomela sanguinolenta	Scarlet Honeyeater	-	-	-	-	-	-	✓	✓	-	-	✓	✓	-	-	C
PETROICIDAE																
Eopsaltria australis	Eastern Yellow Robin	-	-	-	-	-	-	✓	✓	-	✓	✓	-	-	-	C
EUPETIDAE																
Psophodes olivaceus	Eastern Whipbird	-	-	-	-	-	-	✓	-	-	✓	✓	-	-	-	C
Cinclosoma punctatum	Spotted Quail-thrush	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	U
PACHYCEPHALIDAE																
Pachycephala rufiventris	Rufous Whistler	-	-	-	-	-	-	✓	✓	-	✓	✓	✓	✓	-	C
Colluricincla harmonica	Grey Shrike-thrush	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	U
DICRURIDAE																
Rhipidura fuliginosa	New Zealand Fantail	-	-	-	-	-	-	-	✓	-	✓	✓	-	✓	-	C
Monarcha melanopsis	Black-faced Monarch	-	-	-	-	-	-	✓	-	-	✓	-	-	-	-	C
Myiagra rubecula	Leaden Flycatcher	-	-	-	-	-	-	-	✓	-	-	-	-	✓	✓	C

Attachment C-A (Continued)
Fauna Species Recorded during the Project Surveys at Systematic Survey Sites S1 to S12

Scientific Name	Common Name	Conservation Status[1]		Survey Transects												Relative Abundance[2]
		TSC Act	EPBC Act	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	
Birds (Continued)																
ARTAMIDAE																
Strepera graculina	Pied Currawong	-	-	-	-	-	-	-	-	✓	-	-	-	-	✓	U
CAMPEPHAGIDAE																
Coracina novaehollandiae	Black-faced Cuckoo-shrike	-	-	-	-	-	-	-	-	✓	-	-	-	✓	-	U
ORIOLIDAE																
Oriolus sagittatus	Olive-backed Oriole	-	-	-	-	-	-	-	✓	-	-	✓	✓	✓	✓	C
CORVIDAE																
Corvus coronoides	Australian Raven	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	U
CORCORACIDAE																
Corcorax melanorhamphos	White-winged Chough	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	C
PTILONORHYNCHIDAE																
Ptilonorhynchus violaceus	Satin Bowerbird	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	U
Mammals																
DASYURIDAE																
Antechinus stuartii	Brown Antechinus	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	C
Sminthopsis murina	Common Dunnart	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	1
VOMBATIDAE																
Vombatus ursinus	Common Wombat	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	1
PETAURIDAE																
Petaurus australis	Yellow-bellied Glider	V	-	✓	✓	-	-	✓	✓	-	✓	✓	-	-	-	C
Petaurus breviceps	Sugar Glider	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	C
PSUEDOCHEIRIDAE																
Pseudocheirus peregrinus	Common Ringtail Possum	-	-	-	-	-	-	✓	-	-	-	-	-	✓	✓	U
PHALANGERIDAE																
Trichosurus vulpecula	Common Brushtail Possum	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	C

Attachment C-A (Continued)
Fauna Species Recorded during the Project Surveys at Systematic Survey Sites S1 to S12

Scientific Name	Common Name	Conservation Status[1]		Survey Transects												Relative Abundance[2]
		TSC Act	EPBC Act	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	
Mammals (Continued)																
MACROPODIDAE																
Macropus rufogriseus	Red-necked Wallaby	-	-	-	✓	✓	✓	✓	-	-	✓	-	-	-	-	C
Wallabia bicolor	Swamp Wallaby	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	C
VESPERTILIONIDAE																
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	U
Nyctophilus gouldi	Gould's Long-eared Bat	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	U
Chalinolobus morio	Chocolate Wattled Bat	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	C
Vespadelus vulturnus	Little Forest Bat	-	-	-	-	-	-	-	-	-	-	✓	-	✓	✓	C
MURIDAE																
*Mus musculus**	House Mouse*	-	-	✓	✓	✓	✓	✓	-	-	-	-	-	-	-	C
Rattus fuscipes	Bush Rat	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	C
*Rattus rattus**	Black Rat*	-	-	✓	✓	✓	✓	✓	-	✓	-	-	-	-	-	C
CANIDAE																
*Vulpes vulpes**	Red Fox*	-	-	-	-	✓	-	✓	-	-	✓	-	✓	-	-	U
LEPORIDAE																
*Lepus capensis**	Brown Hare*	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	U
*Oryctolagus cuniculus**	Rabbit*	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	U
SUIDAE																
Sus scrofa	Pig*	-	-	-	-	-	-	-	-	✓	-	-	-	-	✓	U
BOVIDAE																
Caprahircus	Goat*	-	-	-	-	-	-	-	-	-	-	-	✓	-	✓	U

Notes:

* Introduced species.

[1] Threatened species status under the NSW *Threatened Species Conservation Act, 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) (current as at 22 March 2012).

V = Vulnerable.

[2] Relative Abundance: 1 = one sighting of a species, U = Uncommon (2 to 5 individuals), C = Common (6 to 30 individuals).

Attachment C-B
Fauna Species Recorded during the Project Surveys at Targeted Survey Sites T1 to T26

Scientific Name	Common Name	Conservation Status[1]		Survey Transects													Relative Abundance[2]
		TSC Act	EPBC Act	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	
Amphibians																	
MYOBATRACHIDAE																	
Crinia signifera	Common Eastern Froglet	-	-	-	-	-	-	✓	✓	✓	✓	-	-	-	-	-	C
Limnodynastes peronii	Brown-striped Frog	-	-	-	-	-	-	✓	-	-	✓	-	-	-	-	-	C
Limnodynastes tasmaniensis	Spotted Grass Frog	-	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-	C
Platyplectrum ornatum	Ornate Burrowing Frog	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	U
Pseudophyrne bibronii	Brown Toadlet	-	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	C
Pseudophyrne coriacea	Red-backed Toadlet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	C
Uperoleia fusca	Dusky Toadlet	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	C
Uperoleia laevigata	Smooth Toadlet	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-	C
HYLIDAE																	
Litoria fallax	Eastern Dwarf Tree Frog	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	C
Litoria latopalmata	Broad-palmed Frog	-	-	-	-	-	-	✓	-	-	✓	-	-	-	-	-	U
Litoria peronii	Peron's Tree Frog	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	U
Litoria tyleri	Tyler's Tree Frog	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	U
Litoria verreauxii	Verreaux's Tree Frog	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	U
Litoria wilcoxii	Stoney Creek Frog	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	U
Birds																	
CUCULIDAE																	
Chrysococcyx lucidus	Shining Bronze Cuckoo	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	U
Scythrops novaehollandiae	Channel-billed Cuckoo	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	U
STRIGIDAE																	
Ninox boobook	Southern Boobook	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	✓	U
MALURIDAE																	
Malurus lamberti	Variegated Fairy-wren	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	C
MELIPHAGIDAE																	
Myzomela sanguinolenta	Scarlet Honeyeater	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	C

Attachment C-B (Continued)
Fauna Species Recorded during the Project Surveys at Targeted Survey Sites T1 to T26

Scientific Name	Common Name	Conservation Status[1]		Survey Transects													Relative Abundance[2]
		TSC Act	EPBC Act	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	
Birds (Continued)																	
PETROICIDAE																	
Eopsaltria australis	Eastern Yellow Robin	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	C
EUPETIDAE																	
Psophodes olivaceus	Eastern Whipbird	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	C
PACHYCEPHALIDAE																	
Pachycephala rufiventris	Rufous Whistler	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	C
DICRURIDAE																	
Rhipidura fuliginosa	New Zealand Fantail	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	C
Mammals																	
PETAURIDAE																	
Petaurus breviceps	Sugar Glider	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	C
PSUEDOCHEIRIDAE																	
Pseudocheirus peregrinus	Common Ringtail Possum	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	U
PHALANGERIDAE																	
Trichosurus vulpecula	Common Brushtail Possum	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	C
MACROPODIDAE																	
Macropus giganteus	Eastern Grey Kangaroo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	C
Macropus rufogriseus	Red-necked Wallaby	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	C
VESPERTILIONIDAE																	
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-	U
Nyctophilus gouldi	Gould's Long-eared Bat	-	-	-	-	✓	-	✓	✓	-	-	✓	-	-	-	-	C
Chalinolobus dwyeri	Large-eared Pied Bat	V	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	C
Chalinolobus morio	Chocolate Wattled Bat	-	-	✓	✓	-	✓	-	✓	-	-	✓	-	✓	✓	-	C
Vespadelus vulturnus	Little Forest Bat	-	-	✓	✓	✓	-	✓	✓	-	-	-	✓	✓	✓	-	C
CANIDAE																	
*Vulpes vulpes**	Red Fox*	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	U

Attachment C-B (Continued)
Fauna Species Recorded during the Project Surveys at Targeted Survey Sites T1 to T26

Scientific Name	Common Name	Conservation Status[1]		Survey Transects													Relative Abundance[2]
		TSC Act	EPBC Act	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23	T24	T25	T26	
Amphibians																	
MYOBATRACHIDAE																	
Pseudophyrne coriacea	Red-backed Toadlet	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	C
Reptiles																	
SCINCIDAE																	
Cryptoblepharus virgatus	Cream-striped Shinning-skink	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	C
Ctenotus taeniolatus	Copper-tailed Skink	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	U
Lampropholis delicata	Dark-flecked Garden Skink	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	C
Lampropholis guichenoti	Pale-flecked Garden Skink	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	C
Eulamprus quoyii	Eastern Water-skink	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	C
Saproscincus mustelinus	Weasel Skink	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	U
AGAMIDAE																	
Amphibolurus muricatus	Jacky Lizard	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-	C
TYPHLOPIDAE																	
Ramphotyphlops nigrescens	Blackish Blind Snake	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	1
Birds																	
TURNICIDAE																	
Turnix varius	Painted Button-quail	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	U
COLUMBIDAE																	
Macropygia amboinensis	Brown Cuckoo-dove	-	-	-	-	-	-	-	✓	-	-	✓	-	-	-	-	U
Leucosarcia melanoleuca	Wonga Pigeon	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	U
Geopelia striata	Peaceful Dove	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	U
PSITTACIDAE																	
Glossopsitta pusilla	Little Lorikeet	V	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	U
Alisterus scapularis	Australian King Parrot	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	U

Attachment C-B (Continued)
Fauna Species Recorded during the Project Surveys at Targeted Survey Sites T1 to T26

Scientific Name	Common Name	Conservation Status[1]		Survey Transects												Relative Abundance[2]
		TSC Act	EPBC Act	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23	T24	T25	T26	
Birds (Continued)																	
CUCULIDAE																	
Cuculus flabelliformis	Fan-tailed Cuckoo	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	U
Chrysococcyx lucidus	Shining Bronze Cuckoo	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	U
Scythrops novaehollandiae	Channel-billed Cuckoo	-	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-	U
PODARGIDAE																	
Podargus strigoides	Tawny Frogmouth	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	U
CAPRIMULGIDAE																	
Eurostopodus mystacalis	White-throated Nightjar	-	-	-	-	-	✓	-	-	-	-	✓	-	-	-	-	U
ALCEDINIDAE																	
Dacelo novaeguineae	Laughing Kookaburra	-	-	✓	-	-	-	-	-	✓	-	-	-	-	-	-	C
Todiramphus sanctus	Sacred Kingfisher	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	1
CLIMACTERIDAE																	
Cormobates leucophaea	White-throated Treecreeper	-	-	-	✓	-	✓	-	✓	-	-	-	-	-	-	-	C
MALURIDAE																	
Malurus lamberti	Variegated Fairy-wren	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	C
PARDALOTIDAE																	
Pardalotus puctatus	Spotted Pardalote	-	-	-	✓	-	-	-	✓	✓	✓	-	-	-	-	-	C
ACANTHIZIDAE																	
Sericornis frontalis	White-browed Scrubwren	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	U
Acanthiza pusilla	Brown Thornbill	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-	C
MELIPHAGIDAE																	
Lichenostomus chrysops	Yellow-faced Honeyeater	-	-	✓	✓	-	-	-	✓	✓	✓	-	-	-	-	-	C
Manorina melanocephala	Noisy Minor	-	-	✓	-	-	-	-	-	-	-	✓	-	-	-	-	C
Philemon corniculatus	Noisy Friarbird	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-	-	C

Attachment C-B (Continued)
Fauna Species Recorded during the Project Surveys at Targeted Survey Sites T1 to T26

Scientific Name	Common Name	Conservation Status[1]		Survey Transects													Relative Abundance[2]
		TSC Act	EPBC Act	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23	T24	T25	T26	
Birds (Continued)																	
Acanthorhynchus tenuirostris	Eastern Spinebill	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	U
Myzomela sanguinolenta	Scarlet Honeyeater	-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-	-	C
PETROICIDAE																	
Eopsaltria australis	Eastern Yellow Robin	-	-	✓	-	-	✓	-	-	-	-	-	-	-	-	-	C
EUPETIDAE																	
Psophodes olivaceus	Eastern Whipbird	-	-	-	-	-	✓	-	✓	-	✓	-	-	-	-	-	C
PACHYCEPHALIDAE																	
Pachycephala rufiventris	Rufous Whistler	-	-	✓	✓	-	-	-	-	✓	✓	-	-	-	-	-	C
Colluricincla harmonica	Grey Shrike-thrush	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	U
DICRURIDAE																	
Rhipidura fuliginosa	New Zealand Fantail	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	C
Rhipidura leucophrys	Willy Wagtail	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	1
ARTAMIDAE																	
Gymnorhina tibicen	Australian Magpie	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	U
Strepera graculina	Pied Currawong	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	U
CAMPEPHAGIDAE																	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	U
ORIOLIDAE																	
Oriolus sagittatus	Olive-backed Oriole	-	-	✓	-	-	✓	-	✓	✓	✓	-	-	-	-	-	C
CORVIDAE																	
Corvus coronoides	Australian Raven	-	-	-	-	-	✓	-	-	-	✓	-	-	-	-	-	U
PTILONORHYNCHIDAE																	
Ptilonorhynchus violaceus	Satin Bowerbird	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	U

Attachment C-B (Continued)
Fauna Species Recorded during the Project Surveys at Targeted Survey Sites T1 to T26

Scientific Name	Common Name	Conservation Status[1]		Survey Transects													Relative Abundance[2]
		TSC Act	EPBC Act	T14	T15	T16	T17	T18	T19	T20	T21	T22	T23	T24	T25	T26	
Mammals																	
PETAURIDAE																	
Petaurus breviceps	Sugar Glider	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	C
PHALANGERIDAE																	
Trichosurus vulpecula	Common Brushtail Possum	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	C
PTEROPODIDAE																	
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	-	-	-	✓	-	-	-	-	-	-	-	-	-	U
VESPERTILIONIDAE																	
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	U
Nyctophilus gouldi	Gould's Long-eared Bat	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	U
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	-	-	-	-	✓	-	-	-	-	-	-	✓	-	C
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	C
Vespadelus vulturnus	Little Forest Bat	-	-	-	✓	-	✓	-	-	-	-	-	✓	-	-	✓	C
CANIDAE																	
*Vulpes vulpes**	Red Fox*	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	U

Notes:

* Introduced species.

[1] Threatened species status under the TSC Act and/or the EPBC Act (current as at 22 March 2012).
V = Vulnerable.

[2] Relative Abundance: 1 = one sighting of a species, U = Uncommon (2 to 5 individuals), C = Common (6 to 30 individuals).

ATTACHMENT D

THREATENED FAUNA SPECIES DISTRIBUTION/HABITAT REQUIREMENTS IN RELATION TO THE PROJECT AREA

Attachment D
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Crinia tinnula	Wallum Froglet	• The Wallum Froglet is known to exclusively inhabit acid paperbark swamps and sedge swamps of coastal 'wallum' habitat (New South Wales [NSW] Office of Environment and Heritage [OEH], 2012b). The Wallum Froglet is distributed along the coast from south-eastern Queensland to north-eastern NSW and breeds in moist microhabitats in swamps, wet or dry heaths, sedge grasslands or swamps (OEH, 2012b). The Project area is considered to represent the distributional limit for this species. • NSW Department of Environment and Climate Change (DECC) (2008) have previously recorded this species approximately within 1 kilometre (km) of the far north-eastern boundary of Sugarloaf State Conservation Area (SCA), proximal to the electricity transmission line easement. Targeted amphibian surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. No other specialist surveys have recorded this species within or proximal to the Project area. Notwithstanding, the species has conservatively been considered a possible occurrence in the Project area. • Although the Project area includes potential habitat for this species, no acid paperbark swamps and sedge swamp habitat is located within the extent of proposed surface disturbance for the Project. Therefore, it is considered unlikely this species would occur within the extent of surface disturbance for the Project.	Possible
Heleioporus australiacus	Giant Burrowing Frog	• The northern populations of the Giant Burrowing Frog are largely confined to sandstone ridgetop habitat and broader upland valleys, where the species is associated with small headwater creek lines and slow flowing to intermittent creek lines in undisturbed areas (DECC, 2008). The vegetation in these areas is typically woodland, open woodland and heath, with riparian components in and along the sides of early order streams. The species may also utilise upland swamps as a component of the range of habitats it is able to exploit (DECC, 2007). • Targeted amphibian surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. No other specialist surveys conducted in the locality have recorded this species within or proximal to the Project area. • Given the absence of records for this species within the Project area or its surrounds, it is considered unlikely viable populations of this species would occur in the Project area.	No
Mixophyes balbus	Stuttering Frog	• This species is found in rainforest and wet, tall open forest within permanent streams in the foothills and escarpments on the eastern side of the Great Dividing Range (Commonwealth Department of Sustainability, Environment, Water, Population and Communities [SEWPaC], 2012b). OEH (2012a) maps the closest record within a stream in Heaton State Forest, approximately 6 km south of the Project area (Attachment E-C). • Targeted amphibian surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. No other specialist surveys conducted in the locality have recorded this species within or proximal to the Project area. • Given the lack of suitable habitat (i.e. permanent streams) and absence of records within and near the Project, it is considered unlikely the species would occur in the Project area.	Possible

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Mixophyes iteratus	Giant Barred Frog	• The Giant Barred Frog occurs in uplands and lowlands in rainforest and wet sclerophyll forest, including farmland (SEWPaC, 2012b). In the mid-east of NSW, the species is currently only known from five populations in the Watagan Mountain area (White, 2000). Small pools within the Project area can represent suitable habitat for this species, however, this species has not been recorded in the Project area or immediate surrounds with the closest record located within a stream in Heaton State Forest, approximately 6 km south-west of the Project area (OEH, 2012a) (Attachment E-C). • The Project area contains wet sclerophyll and rainforest which is potential habitat for this species. However, no wet sclerophyll and rainforest habitat is located within the extent of proposed surface disturbance for the Project. The Project area also lacks breeding habitat (i.e. permanent streams) for this species. • Targeted amphibian surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. No other specialist surveys conducted in the locality have recorded this species within or proximal to the Project area.	Possible
Litoria aurea	Green and Golden Bell Frog	• The middle Hunter Green and Golden Bell Frog key population is located approximately 30 km north-west of the Newcastle CBD, between the settlements of Maitland and Kurri Kurri (DECC, 2007). The key population is found in or around the Wentworth Swamp area (DECC, 2007). Another population is also located in the vicinity of Ellalong Lagoon to the south of Cessnock (DECC, 2007). • This species mainly occurs on the coast but it can occur further inland, associated with various types of water bodies and associated terrestrial habitats (SEWPaC, 2012b). The species typically inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.) (OEH, 2012b). • Small pools within the Project area can represent suitable habitat for this species, however, this species has not been recorded in the Project area or immediate surrounds with the closest record located in Minmi Creek approximately 6 km north-east of the Project area (OEH, 2012a) (Attachment E-C). • Based on the absence of records for this species within and near the Project and the lack of breeding habitat (e.g. permanent streams), it is considered unlikely the species would occur in the Project area.	Possible
Litoria brevipalmata	Green-thighed Frog	• The Green-thighed Frog occurs in isolated localities along the NSW coast and ranges from just north of Wollongong to south-east Queensland (OEH, 2012b). The species occurs in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain (OEH, 2012b). • Targeted amphibian surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. Based on BioNet/NSW Atlas of Wildlife records, the closest record is approximately 6 km north-west of the Project. No other specialist surveys conducted in the locality have recorded this species within or proximal to the Project area.	Possible

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Litoria littlejohni	Littlejohn's Tree Frog	• The Littlejohn's Tree Frog occurs in scattered locations between the Watagan Mountains, NSW, to Buchan in Victoria (SEWPaC, 2012b). This species inhabits forest, coastal woodland and heath from 100 to 950 metres (m) above sea level and breeding habitat occurs as permanent rocky streams and semi-permanent ponds (SEWPaC, 2012b). • Targeted amphibian surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. No other specialist surveys conducted in the locality have recorded this species within or proximal to the Project area. • The Project area contains forest and heath which is potential habitat for this species however, based on the absence of records for this species within and near the Project and the lack of breeding habitat (e.g. permanent streams), it is considered unlikely the species would occur in the Project area.	No
Reptiles			
Caretta caretta	Loggerhead Turtle	• The Project area is not located within a marine environment. Therefore these species would not occur within the Project area.	No
Chelonia mydas	Green Turtle		
Eretmochelys imbricata	Hawksbill Turtle		
Dermochelys coriacea	Leathery Turtle		
Hoplocephalus bitorquatus	Pale-headed Snake	• The Pale-headed Snake has patchy distribution from north-east Queensland to north-east NSW (OEH, 2012b). In NSW it occurs from the coast to the western side of the Great Divide as far south as Tuggerah (OEH, 2012b). It is found mainly in dry eucalypt forests and woodlands, cypress woodland and occasionally in rainforest or moist eucalypt forest and favours streamside areas, particularly in drier habitats (OEH, 2012b). • Targeted surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. Based on BioNet/NSW Atlas of Wildlife records, the closest record is near Paterson outside a 50 km x 50 km search area surrounding the Project. • Based on the absence of records for this species within and near the Project it is considered unlikely the species would occur in the Project area.	No

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Hoplocephalus bungaroides	Broad-headed Snake	• The Broad-headed Snake is often found in rocky outcrops and adjacent sclerophyll forest and woodland (SEWPaC, 2012b). The most suitable sites occur in sandstone ridgetops (SEWPaC, 2012b). The closest record is approximately 20 km south-east of the Project area (OEH, 2012a). • Targeted surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. No other specialist surveys conducted in the locality have recorded this species within or proximal to the Project area.	No
Hoplocephalus stephensii	Stephens' Banded Snake	• This species occurs along the NSW Coast and ranges from Southern Queensland to Gosford in NSW (OEH, 2012b). It typically inhabits rainforest and eucalypt forests and rocky areas up to 950 m in altitude (OEH, 2012b). The closest record occurs in Heaton State Forest approximately 3 km south-west of the southern boundary of the Project area (Attachment E-C). • Targeted surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species.	Possible
Birds			
Anseranas semipalmata	Magpie Goose	• Since the 1980s there have been an increasing number of records for this species in central and northern NSW (OEH, 2012b). The species is mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges (OEH, 2012b). • The closest records for this species occur to the north of the Project area near Wentworth Swamp and Hexam Swamp based on the BioNet/NSW Atlas of Wildlife records (OEH, 2012a). • Targeted surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. The Project area lacks suitable habitat for this species.	No
Ephippiorhynchus asiaticus	Black-necked Stork	• This species is widespread in coastal and subcoastal northern and eastern Australia (OEH, 2012b). The Black-necked Stork is mainly found on shallow, permanent, freshwater terrestrial wetlands (OEH, 2012b). • Based on the BioNet/NSW Atlas of Wildlife records, the closest record for this species occurs approximately 3 km north of the Project area (OEH, 2012a). • Targeted surveys conducted under optimal conditions in the Project area and its surrounds did not identify any records for this species. The Project area lacks habitat suitable for this species (i.e. freshwater, wetlands, estuaries or tidal wetlands) and Project surveys have not recorded this species within the Project area and surrounds.	No
Botaurus poiciloptilus	Australasian Bittern	• The Australasian Bittern occurs from south-east Queensland to south-east South Australia, Tasmania and in the south-west of Western Australia (SEWPaC, 2012b). • In NSW it occurs along the coast and frequently in the Murray-Darling (SEWPaC, 2012b). The closest record for this species occurs approximately 10 km north-east of the Project area, (OEH, 2012a). • The Project area lacks habitat suitable for this species (i.e. freshwater, wetlands, estuaries or tidal wetlands) and Project surveys have not recorded this species within the Project area and surrounds.	No

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Ixobrychus flavicollis	Black Bittern	• The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region (OEH, 2012b). In NSW, records are mainly scattered along the east coast (OEH, 2012b). • This species inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation (OEH, 2012b). • Based on the BioNet/NSW Atlas of Wildlife records, the closest known record of this species is approximately 5 km to the east of the Project area (OEH, 2012a). Notwithstanding, the Project area lacks suitable habitat for this species. Project fauna surveys have not recorded this species within the Project area and surrounds.	No
Lophoictinia isura	Square-tailed Kite	• The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria (OEH, 2012b). • There are scattered records throughout NSW as this species is found in a variety of timbered habitats, including dry woodlands and open forests (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known records for this species are approximately 5 km west of the Project area, near Werakata National Park (OEH, 2012a) (Attachment E-B).	Possible
Hamirostra melanosternon	Black-breasted Buzzard	• The Black-breasted Buzzard is found from north-western NSW and north-eastern South Australia to the east coast then across northern Australia in areas of less than 500 millimetres (mm) of rainfall (OEH, 2012b). • This species occurs in inland habitats, especially along timbered watercourses (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known records for this species are approximately 9 km north-west of the Project area (OEH, 2012a) (Attachment E-B).	Possible
Hieraaetus morphnoides	Little Eagle	• The Little Eagle is found throughout mainland Australia, except the densely forested parts of the Dividing Range (OEH, 2012b). This species occurs as a single population throughout NSW and occupies open eucalypt forest, woodland or open woodland, sheoak or acacia woodlands and riparian woodlands (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known records for this species are approximately 2.5 km west of the Project area (OEH, 2012a) (Attachment E-B).	Possible
Haematopus longirostris	Pied Oystercatcher	• The Pied Oystercatcher is distributed around the entire Australian coastline (OEH, 2012b). In NSW, there are scattered records along the entire coast with fewer than 200 breeding pairs estimated to occur in the state (OEH, 2012b). • This species favours intertidal flats of inlets and bays, open beaches and sandbanks (OEH, 2012b). • Based on BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 2.5 km to the north-east of the Project area (OEH, 2012a). The Project lacks suitable habitat for this species and fauna surveys associated with the Project have not recorded this species within the Project or its surrounds.	No

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Charadrius mongolus	Lesser Sand Plover	• The Lesser Sand Plover is found around the entire coast but is most common in the Gulf of Carpentaria and along the east coast of Queensland and northern NSW (OEH, 2012b). Distribution in NSW is almost entirely coastal favouring the beaches of sheltered bays (OEH, 2012b). • The Project area lacks suitable habitat for this species. Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 8 km east of the Project area (OEH, 2012a).	No
Rostratula australis	Australian Painted Snipe	• The Australian Painted Snipe has been recorded in wetlands in all states of Australia (SEWPaC, 2012b). In NSW, this species has been recorded at the Paroo wetlands, Lake Cowal, Macquarie Marshes and Hexham Swamp (OEH, 2012b). • This species generally inhabits shallow terrestrial freshwater wetlands, including temporary and permanent lakes, swamps and claypans (SEWPaC, 2012b). • The Project area lacks suitable habitat for this species. Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 6 km east of the Project (OEH, 2012a).	No
Irediparra gallinacea	Comb-crested Jacana	• The Comb-crested Jacana occurs on freshwater wetlands in northern and eastern Australia, mainly in coastal and subcoastal regions (OEH, 2012b). In NSW, this species occurs along the coast to the Hunter region, with stragglers recorded in south-eastern NSW (OEH, 2012b). • This species is dispersive, moving in response to the condition of wetlands (OEH, 2012b). It inhabits permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation (OEH, 2012b). • The Project area lacks suitable habitat for this species. Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 2 km to the west, in Mulbring (OEH, 2012a).	No
Limosa limosa	Black-tailed Godwit	• The Black-tailed Godwit breeds in Mongolia and Eastern Siberia and flies to Australia for summer (OEH, 2012b). In NSW it is most frequently recorded at Kooragang Island with occasional records elsewhere along the north and south coast and inland (OEH, 2012b). • This is primarily a coastal species, usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats (OEH, 2012b). • The Project area lacks suitable habitat for this species. Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 15 km to the north-east of the Project area, in the Hunter Wetlands National Park (OEH, 2012a).	No

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Ptilinopus magnificus	Wompoo Fruit-Dove	• The Wompoo Fruit-Dove occurs along the coast and coastal ranges from the Hunter River in NSW to Cape York Peninsula (OEH, 2012b). Currently in NSW, the species is distributed along the eastern slopes of the Great Dividing Range from the Queensland border south to the Hunter River (OEH, 2012b). • This species occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 2.5 km north-east of the Project area (OEH, 2012a) (Attachment E-B).	Possible
Calyptorhynchus lathami	*Glossy Black-cockatoo	• The Glossy Black-cockatoo is widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina (OEH, 2012b). • This species inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of sheoak species occur (OEH, 2012b). • This species was recorded within the Project area during the Project fauna survey. There are scattered records for the species in state and national parks, forests and surrounding the Project (OEH, 2012a).	Yes
Callocephalon fimbriatum	Gang-gang Cockatoo	• The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern NSW (OEH, 2012b). In NSW, this species is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes (OEH, 2012b). • This species is found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests in summer, and at lower altitudes and drier vegetation types in winter (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 1 km north of the Project area (OEH, 2012a) (Attachment E-B).	Possible
Glossopsitta pusilla	*Little Lorikeet	• The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia (OEH, 2012b). NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury (OEH, 2012b). • This species is nomadic with food availability, feeding mostly on nectar and pollen (OEH, 2012b). • This species was recorded within the Project area during the Project fauna survey. Based on the BioNet/NSW Atlas of Wildlife records, there are numerous records within Sugarloaf SCA and surrounds, such as Werakata National Park (OEH, 2012a) (Attachment E-B).	Yes

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Neophema pulchella	Turquoise Parrot	• The Turquoise Parrot is found from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range (OEH, 2012b). The Turquoise Parrot occurs mainly on the western side of the tablelands, inland slopes and adjoining plains in the eastern half of NSW (OEH, 2012b). • This species lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record for this species is approximately 5 km north-east of the Project area (OEH, 2012a) (Attachment E-B).	Possible
Lathamus discolour	Swift Parrot	• This species migrates to mainland Australia to feed and is endemic to south-eastern Australia (SEWPaC, 2012b). This species does not breed in NSW, only Tasmania (SEWPaC, 2012b). • The Project is in the migratory distribution of this species and it is possible that the Swift Parrot could forage on winter flowering Eucalypts in the Project area and surrounds, though this species has only been recorded outside of the Project area by DECC (2008). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 2 km west of the Project area, in Mulbring (OEH, 2012a) (Attachment E-B).	Possible
Tyto tenebricosa	Sooty Owl	• The Sooty Owl occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands (OEH, 2012b). This species occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, there are currently 5 known records within Sugarloaf SCA (OEH, 2012a) (Attachment E-B).	Possible
Tyto novaehollandiae	Masked Owl	• The Masked Owl distribution extends from the coast, where it is most abundant, to the western plains (OEH, 2012b). This species falls within approximately 90 percent (%) of NSW, excluding the most arid north-western corner (OEH, 2012b). • This species lives in dry eucalypt forests and woodlands and will hunt along the edges (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, there is one record in Heaton State Forest and another in Sugarloaf SCA (OEH, 2012a) (Attachment E-B).	Possible

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Ninox strenua	Powerful Owl	• The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria (OEH, 2012b). In NSW, it is widely distributed throughout the eastern forests (OEH, 2012b). • This species inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, there is one record of this species within the Project area and numerous records in the region (OEH, 2012a) (Attachment E-B).	Possible
Ninox connivens	Barking Owl	• The Barking Owl is found throughout continental Australia except for the central arid regions (OEH, 2012b). It occurs in a wide but sparse distribution throughout NSW with core populations on the western slopes and plains (especially the Pilliga) (OEH, 2012b). • This species inhabits woodland and open forest, including fragmented remnants and partly cleared farmland (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 7 km south-east of the Project area (OEH, 2012a) (Attachment E-B).	Possible
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	• The Brown Treecreeper (eastern subspecies) is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 1 km north of the Project area (OEH, 2012a) (Attachment E-B).	Possible
Dasyornis brachypterus	Eastern Bristlebird	• The Eastern Bristlebird occurs in south-eastern Queensland, north-eastern NSW, on the central coast of NSW, in south-eastern NSW and eastern Victoria (SEWPaC, 2012b). • This species inhabits low dense vegetation in a broad range of habitat types including sedgeland, heathland, swampland, shrubland, sclerophyll forest and woodland, and rainforest (SEWPaC, 2012b). • The Project area lacks suitable habitat for this species. Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, there are no known records within approximately 100 km of the Project area (OEH, 2012a).	No

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Pyrrholaemus saggitatus	Speckled Warbler	• The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria (OEH, 2012b). This species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the Coast (OEH, 2012b). • The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understory, often on rocky ridges or in gullies (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 1 km north of the Project, along George Booth Drive (OEH, 2012a) (Attachment E-B).	Possible
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	• The Black-chinned Honeyeater (eastern subspecies) extends south from central Queensland, through NSW, Victoria into south eastern South Australia (OEH, 2012b). • This species inhabits dry eucalypt woodland, particularly associations with ironbark and box species. Occurs along the eastern slopes of the Great Dividing Range extending to the coast between Sydney and Newcastle (Garnett & Crowley, 2000). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, there is one record within Sugarloaf SCA, with numerous records west of the Project near the Werakata National Park (OEH, 2012a) (Attachment E-B).	Possible
Anthochaera phrygia	Regent Honeyeater	• The Regent Honeyeater is endemic to south-eastern Australia, where it is widespread but very sparsely scattered, mostly on the inland slopes of the Great Dividing Range (SEWPaC, 2012b). In NSW, most records are scattered on and around the Great Dividing Range, mainly on the North-West Plains, North-West Slopes and adjacent Northern Tablelands (SEWPaC, 2012b). • This species occurs mostly in dry box-ironbark eucalypt woodland and dry sclerophyll forest associations, wherein they prefer the most fertile sites available (SEWPaC, 2012b). • As the Project area contains dry box-ironbark forests and woodlands there is the potential for this species to occur in the area. However, recent fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 2.5 km west of the Project (OEH, 2012a) (Attachment E-B).	Possible
Epthianura albifrons	White-fronted Chat	• The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon (OEH, 2012b). In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 9 km south-east of the Project area (OEH, 2012a) (Attachment E-B).	Possible

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	• The Hooded Robin (south-eastern form) is widespread, found across Australia, except for the driest deserts and the wetter coastal areas (northern and eastern coastal Queensland and Tasmania) (OEH, 2012b). This species is found throughout much of inland NSW (OEH, 2012b). • This species prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 8 km to the east of the Project area (OEH, 2012a) (Attachment E-B).	Possible
Petroica phoenicea	Flame Robin	• The Flame Robin is endemic to south-east Australia and ranges from near the Queensland border to south-east South Australia and also Tasmania (OEH, 2012b). In NSW, this species breeds in upland areas and in winter, many birds move to the inland slope and plains (OEH, 2012b). • This species breeds in areas of tall moist eucalypt forests and woodlands, and occasionally occurs in temperate rainforest (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 10 km to the north-west of the Project area, north of Weston (OEH, 2012a) (Attachment E-B).	Possible
Petroica boodang	Scarlet Robin	• The Scarlet Robin is found from south-east Queensland to south-east South Australia and also in Tasmania and south-west Western Australia (OEH, 2012b). In NSW, it occurs from the coast to the inland slopes (OEH, 2012b). • This species lives in dry eucalypt forests and woodlands, the understorey usually being open and grassy with few scattered shrubs (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 1 km north-west of the Project area (OEH, 2012a) (Attachment E-B).	Possible
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	• The Grey-crowned Babbler (eastern subspecies) occurs from Cape York south through Queensland, NSW and Victoria and formerly to the south-east of South Australia (OEH, 2012b). In NSW, it occurs on the western slopes of the Great Dividing Range and on the western plains, as well as in woodlands in the Hunter Valley (OEH, 2012b). • This species inhabits open Box-Gum Woodlands on the slopes and Box-Cypress Pine and open Box Woodlands on alluvial plains (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record is approximately 2.5 km north-west of the Project area (OEH, 2012a) (Attachment E-B).	Possible

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Daphoenositta chrysoptera	Varied Sittella	• The Varied Sittella occurs most of mainland Australia, except the treeless deserts and open grasslands (OEH, 2012b). In NSW, this species occurs in a nearly continuous distribution from the coast to the far west (OEH, 2012b). • This species inhabits eucalypt forest and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, there are numerous database records within the Project area and surrounds (OEH, 2012a) (Attachment E-B).	Possible
Pachycephala olivacea	Olive Whistler	• The Olive Whistler inhabits wet forests on the ranges of the east coast, with a disjunct distribution in NSW, chiefly occupying the beech forests around Barrington Tops and MacPherson Ranges in the north and west forests from Illawarra south to Victoria (OEH, 2012b). • This species inhabits wet forests above approximately 500 m, moving lower in altitude during the winter months (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, no records for this species occur within a 50 km x 50 km search area surrounding the Project area (OEH, 2012a). Therefore this species is considered unlikely to occur in the Project area.	No
Mammals			
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	• The Spotted-tailed Quoll was previously distributed from south-east Queensland, eastern NSW, Victoria, south-east South Australia and Tasmania. However it is believed that this range has reduced by 50 to 90% (SEWPaC, 2012b). In NSW it is generally confined to within 200 km of the coast and range from the Queensland border to Kosciuszko National Park (SEWPaC, 2012b). • This species has a preference for mature wet forest habitat, unlogged forest or forest that has been less disturbed by timber harvesting (SEWPaC, 2012b). • This species may potentially use habitat resources within the Project area. However, recent fauna surveys within the Project area and surrounds have not recorded this species. There are no records of this species within and surrounding the Project area, however several records occur south of the Project and scattered throughout surrounding national parks and state forests (OEH, 2012a) (Attachment E-A).	Possible
Planigale maculata	Common Planigale	• The Common Planigale is distributed along the coast in NSW and east Queensland (OEH, 2012b). Its southern distribution limit is on the NSW lower north coast (OEH, 2012b). • This species inhabits rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, usually close to water (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, no records for this species occur within a 50 km x 50 km search area surrounding the Project area (OEH, 2012a). However, this species was recorded during a survey relevant to the West Wallsend Colliery Continued Operations Project (Oceanic Coal Australia Limited, 2010). Notwithstanding, this species is considered unlikely to occur in the Project area.	No

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Phascolarctos cinereus	Koala	• The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia (OEH, 2012b). In NSW, it mainly occurs on the central and north coasts though some populations have been recorded west of the Great Dividing Range (OEH, 2012b). • This species inhabits eucalypt woodlands and forests (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, there are numerous records of this species approximately 20 km north-east of the Project area (OEH, 2012a) (Attachment E-A).	Possible
Petaurus australis	*Yellow-bellied Glider	• The Yellow-bellied Glider occurs along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria (OEH, 2012b). • This species is found in tall mature eucalypt forest, generally in areas with high rainfall and nutrient rich soils (OEH, 2012b). • This species was recorded within the Project area during the Project fauna survey. Database records indicate that there have been a number of sightings in the Project area and surrounds, particularly within the Werakata National Park to the north-west and Heaton State Forest to the south (OEH, 2012a) (Attachment E-A).	Yes
Petaurus norfolcensis	Squirrel Glider	• The Squirrel Glider is widely and sparsely distributed in eastern Australia, from northern Queensland to western Victoria (OEH, 2012b). This species has been found inland in the Coonabarabran areas of NSW (NSW National Parks and Wildlife Service, 1999c). • This species inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife, the closest known record is approximately 2 km east of the Project (OEH, 2012a) (Attachment E-A).	Possible
Potorous tridactylus tridactylus	Long-nosed Potoroo (SE mainland)	• The Long-nosed Potoroo (SE mainland) is distributed along the coast from south-east Queensland, to the south-eastern most point of South Australia (SEWPaC, 2012b). This species is sparsely distributed along the coast and Great Dividing Range through NSW, however, there is no consistent pattern to the habitat of the Long-nosed Potoroo (SE mainland) (SEWPaC, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife, the closest known record is in Heaton State Forest approximately 8 km south-west of the Project area (OEH, 2012a) (Attachment E-A).	Possible

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Petrogale penicillata	Brush-tailed Rock-wallaby	• The Brush-tailed Rock-wallaby was once widespread and abundant in south-eastern Australia, however this has reduced, especially in southern NSW (SEWPaC, 2012b). There are scattered colonies of this species throughout NSW; central, southern and western areas, with the most populous of areas in the Macleay Gorges system (SEWPaC, 2012b). • This species occurs in rocky habitats such as cliffs, rocky outcrops and loose bounder piles (SEWPaC, 2012b). • These habitat features occur in the Project area and it is possible this species may utilise the Project area. However, recent surveys associated with the Project area have not recorded this species within the Project area and surrounds. Fauna database records indicate no sightings of this species in the Project area, though some records are present in Heaton State Forest and Watagans National Park to the south of the Project (OEH, 2012a) (Attachmen E-A).	Possible
Pteropus poliocephalus	*Grey-headed Flying-fox	• The Grey-headed Flying-fox is found in a coastal belt from Rockhampton in central Queensland to Melbourne in Victoria (SEWPaC, 2012b). • This species requires foraging resources and roosting sites, including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands (SEWPaC, 2012b). • This species was recorded within the Project area during the Project fauna survey. Database records indicate numerous individuals within the Project area, surrounds and the local area (OEH, 2012a) (Attachment E-A).	Yes
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	• The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia (OEH, 2012b). NSW represents the most southerly part of its range where it is a scarce visitor in late summer and autumn (OEH, 2012b). • This species utilises tree hollows and buildings as roosts and forages in most habitats, with and without trees (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, there are only two known records for the species within a 50 km x 50 km search area surrounding the Project area (OEH, 2012a) (Attachment E-A).	Possible
Mormopterus norfolkensis	Eastern Freetail-bat	• The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW (OEH, 2012b). • This species occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range, with roosts mainly in tree hollows (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife, the closest known record is approximately 1 km south of the Project area (OEH, 2012a) (Attachment E-A).	Possible

Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Kerivoula papuensis	Golden-tipped Bat	• The Golden-tipped Bat is distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to south of Eden in southern NSW (OEH, 2012b). • This species is found in rainforest and adjacent wet and dry sclerophyll forest up to 1,000 m, also tall open forest, Casuarina dominated riparian forest and coastal Melaleuca forests (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife, the closest known records are approximately 8 km of the Project area, south in Heaton State Forest (OEH, 2012a) (Attachment E-A).	Possible
Miniopterus australis	Little Bentwing-bat	• The Little Bentwing-bat is distributed along the east coast and ranges of Australia, from Cape York in Queensland to Wollongong in NSW (OEH, 2012b). • This species roosts in caves, tunnels, hollows and other man-made structures and inhabits moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. A database record falls within the Project area, with numerous records in surrounding national parks and state forests (OEH, 2012a) (Attachment E-A).	Possible
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	• The Eastern Bentwing-bat occurs along the east and north-west coasts of Australia (OEH, 2012b). • This species' primary roosting habitat is caves but also use derelict mines, storm-water tunnels, buildings and other man-made structures (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife records, the closest known record for this species occurs approximately 2 km east of the Project area (OEH, 2012a) (Attachment E-A).	Possible
Chalinolobus dwyeri	*Large-eared Pied Bat	• The Large-eared Pied Bat current distribution is poorly known, though there are records north of Rockhampton, Queensland, through to the vicinity of Ulladulla, NSW in the south (OEH, 2012b). Much of the known distribution is within NSW, with the largest concentrations in the sandstone escarpments of the Sydney basin and the north-west slopes (OEH, 2012b). • This species roosts in sandstone cliffs and fertile woodland valley habitat and has been recorded from a large range of vegetation types including: dry and wet sclerophyll forest, Cyprus Pine dominated forest, tall open eucalypt forest with rainforest sub-canopy, sub-alpine woodland and sandstone outcrop country (OEH, 2012b). • This species was recorded within the Project area during the Project fauna survey. Database records indicate a number of individuals within Sugarloaf SCA and surrounds (OEH, 2012a) (Attachment E-A).	Yes

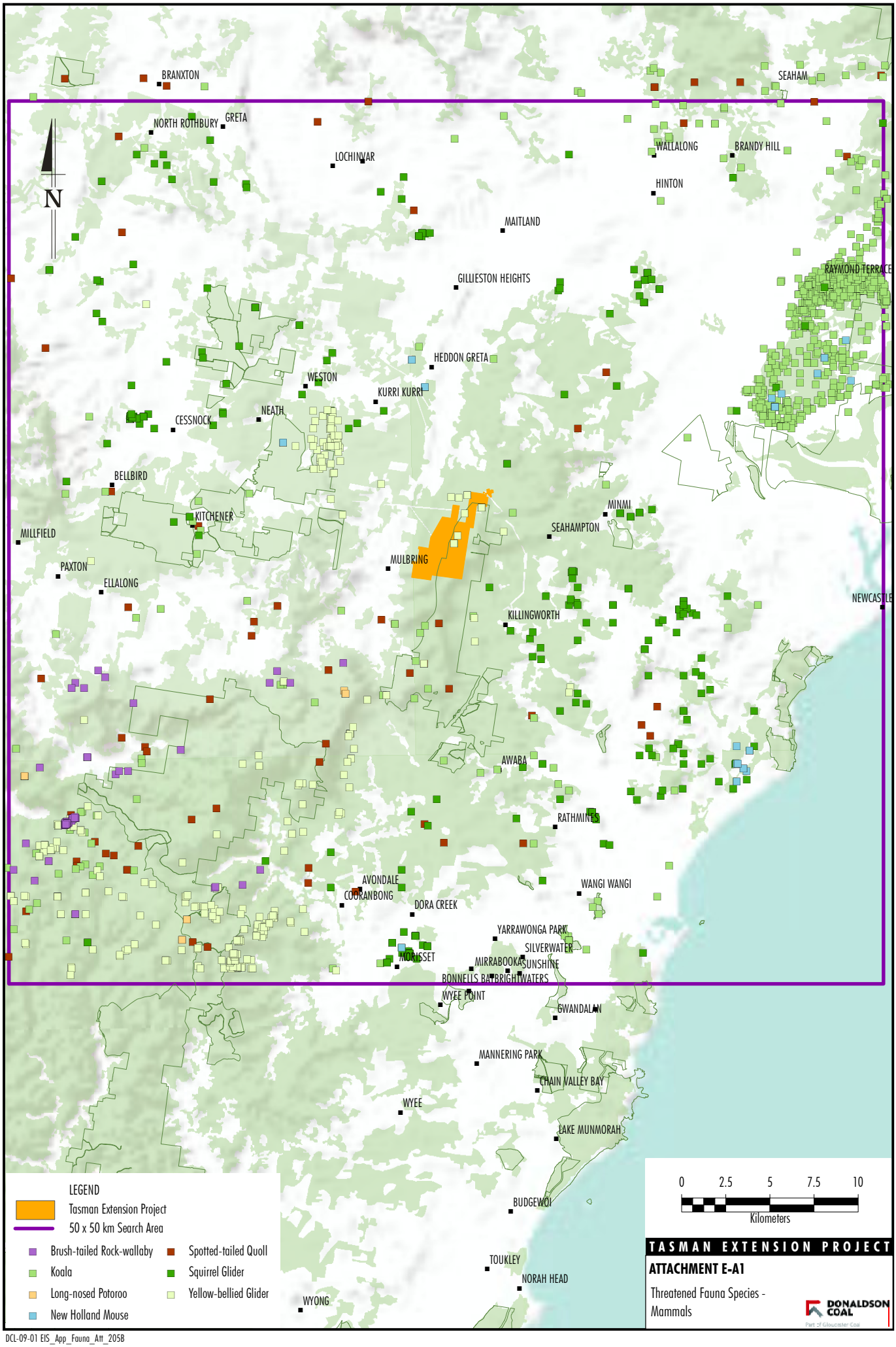
Attachment D (Continued)
Threatened Species Distribution/Habitat Requirements in relation to the Project Area

Scientific Name	Common Name	Distribution/Habitat Requirements in relation to the Project Area	Considered Possible Occurrence in Project Area
Falsistrellus tasmaniensis	*Eastern False Pipistrelle	• The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania (OEH, 2012b). • This species generally roosts in eucalypt hollows but has been found under loose bark, and prefers moist habitats with trees taller than 20 m (OEH, 2012b). • This species was recorded within the Project area during the Project fauna survey. Database searches indicate a record within the Project area, and numerous more in surrounds (OEH, 2012a) (Attachment E-A).	Yes
Myotis macropus	Large-footed Myotis	• The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria (OEH, 2012b). It is rarely found more than 100 km inland, except along major rivers (OEH, 2012b). • This species generally roosts in caves, mine shafts, hollow-bearing trees and storm water channels (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife, the closest known records are approximately 1 km north of the Project area (OEH, 2012a) (Attachment E-A).	Possible
Scoteanax rueppellii	Greater Broad-nosed Bat	• The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland (OEH, 2012b). In NSW it is widespread on the New England Tablelands, however it does not occur at altitudes above 500 m (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife, the closest known records are approximately 2 km east of the Project area (OEH, 2012a) (Attachment E-A).	Possible
Vespadelus troughtoni	Eastern Cave Bat	• The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW (OEH, 2012b). • This is a cave roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhands and in disused mine workings (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife, the closest known records are approximately 5 km to the east of the Project (OEH, 2012a) (Attachment E-A).	Possible
Pseudomys novaehollandiae	New Holland Mouse	• The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, NSW and Queensland (OEH, 2012b). In NSW, this species is known from Royal National Park and the Kangaroo Valley; Kuringai Chase National Park and Port Stephens to Evans Head near the Queensland border (OEH, 2012b). • Fauna surveys associated with the Project have not recorded this species within the Project area and surrounds. Based on the BioNet/NSW Atlas of Wildlife, the closest known records are approximately 10 km north of the Project area (OEH, 2012a) (Attachment E-A).	Possible

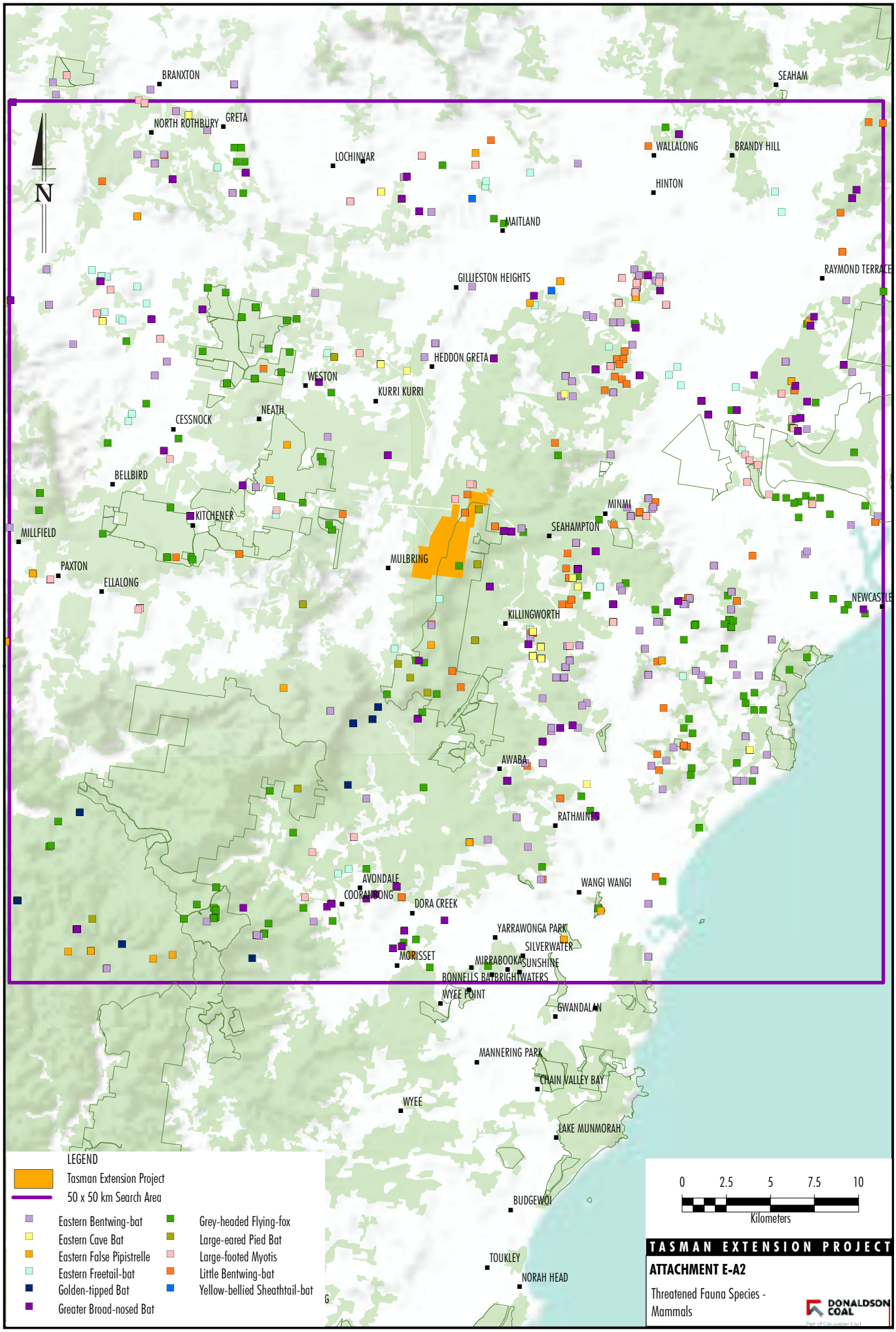
* Recorded by Biosphere Environmental Consultants (2012) *Tasman Extension Project Fauna Assessment.*

ATTACHMENTS E-A to E-C

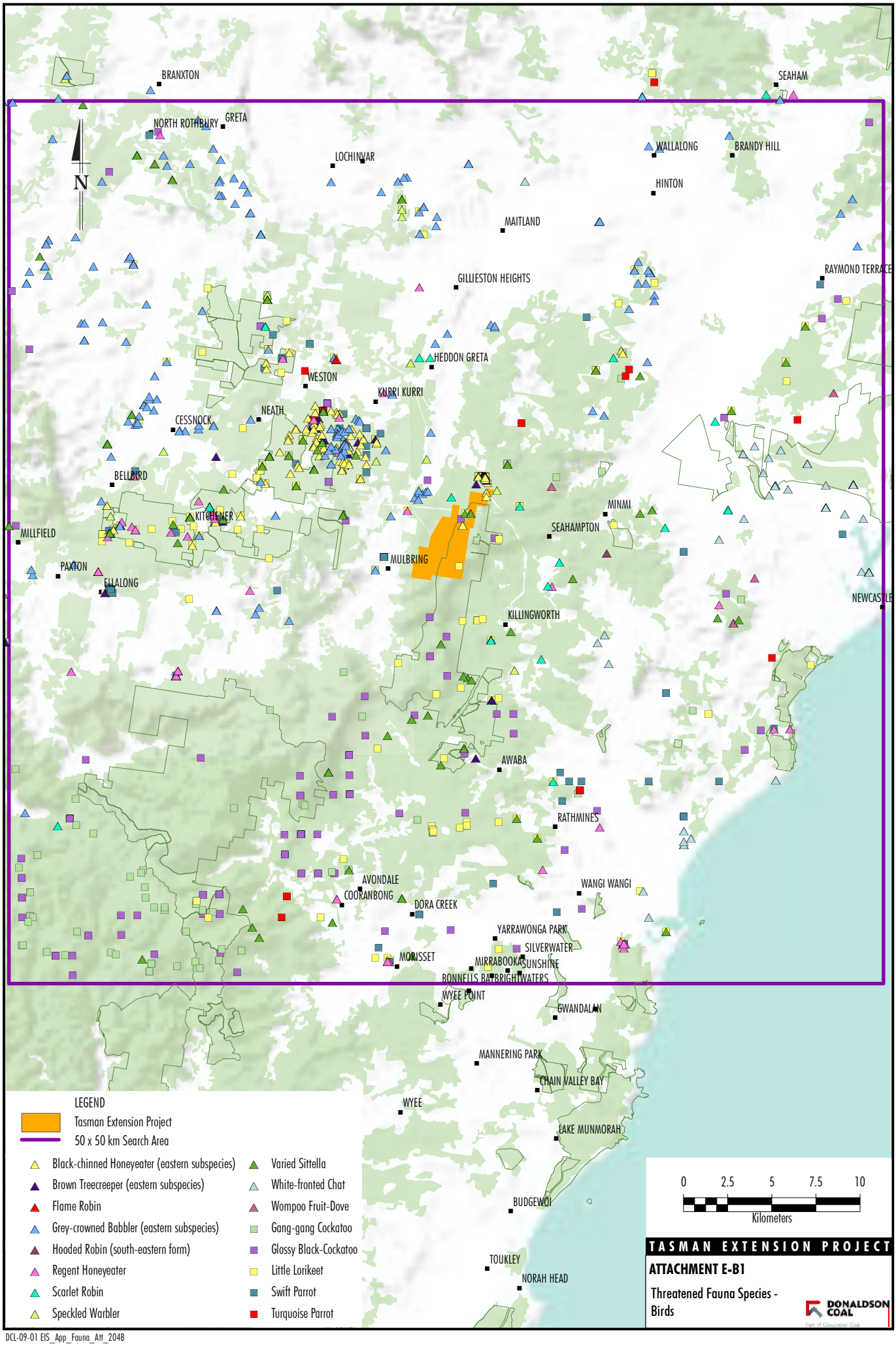
THREATENED FAUNA SPECIES



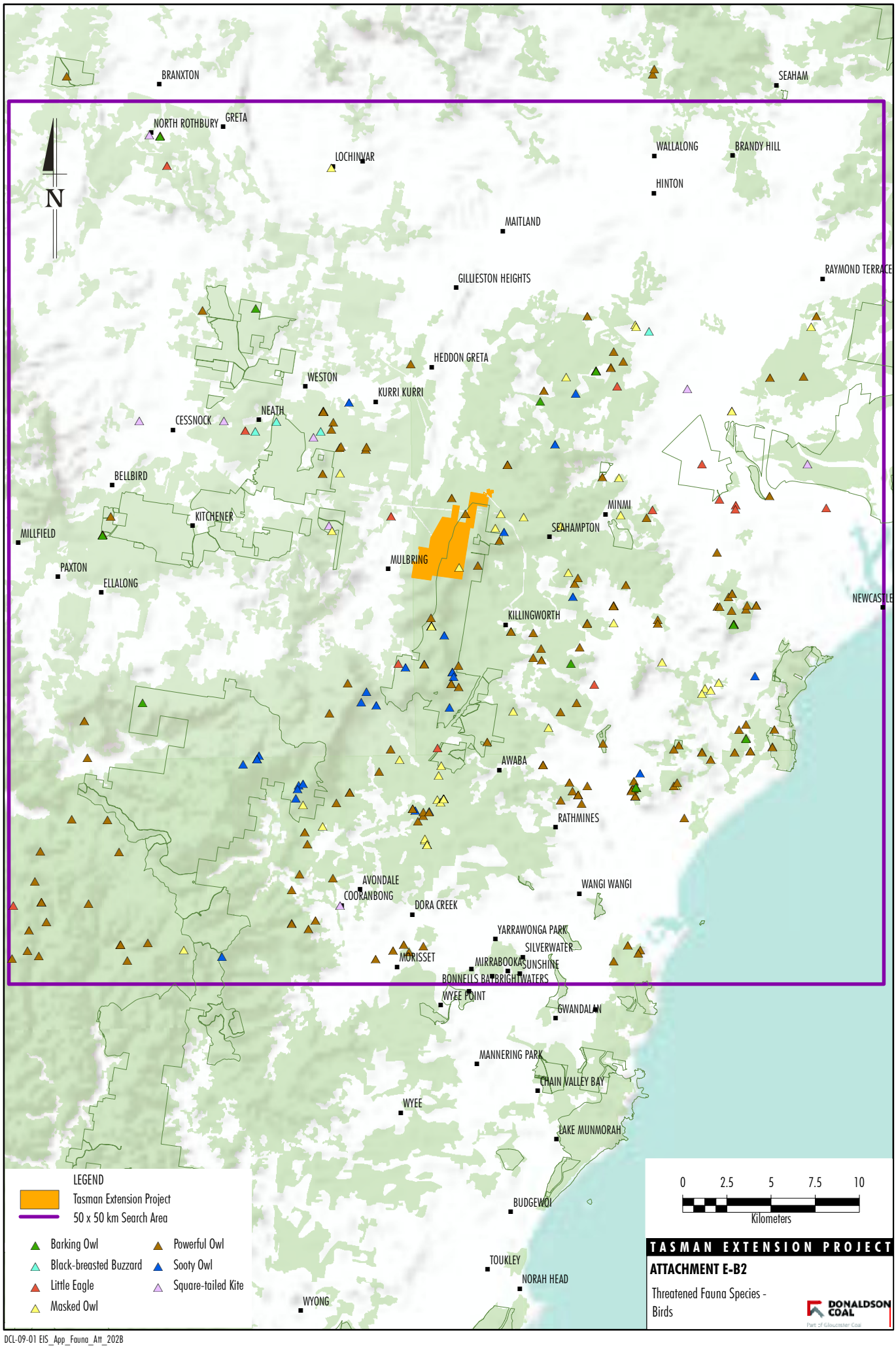
DCL-09-01 EIS_App_Fauna_Att_205B

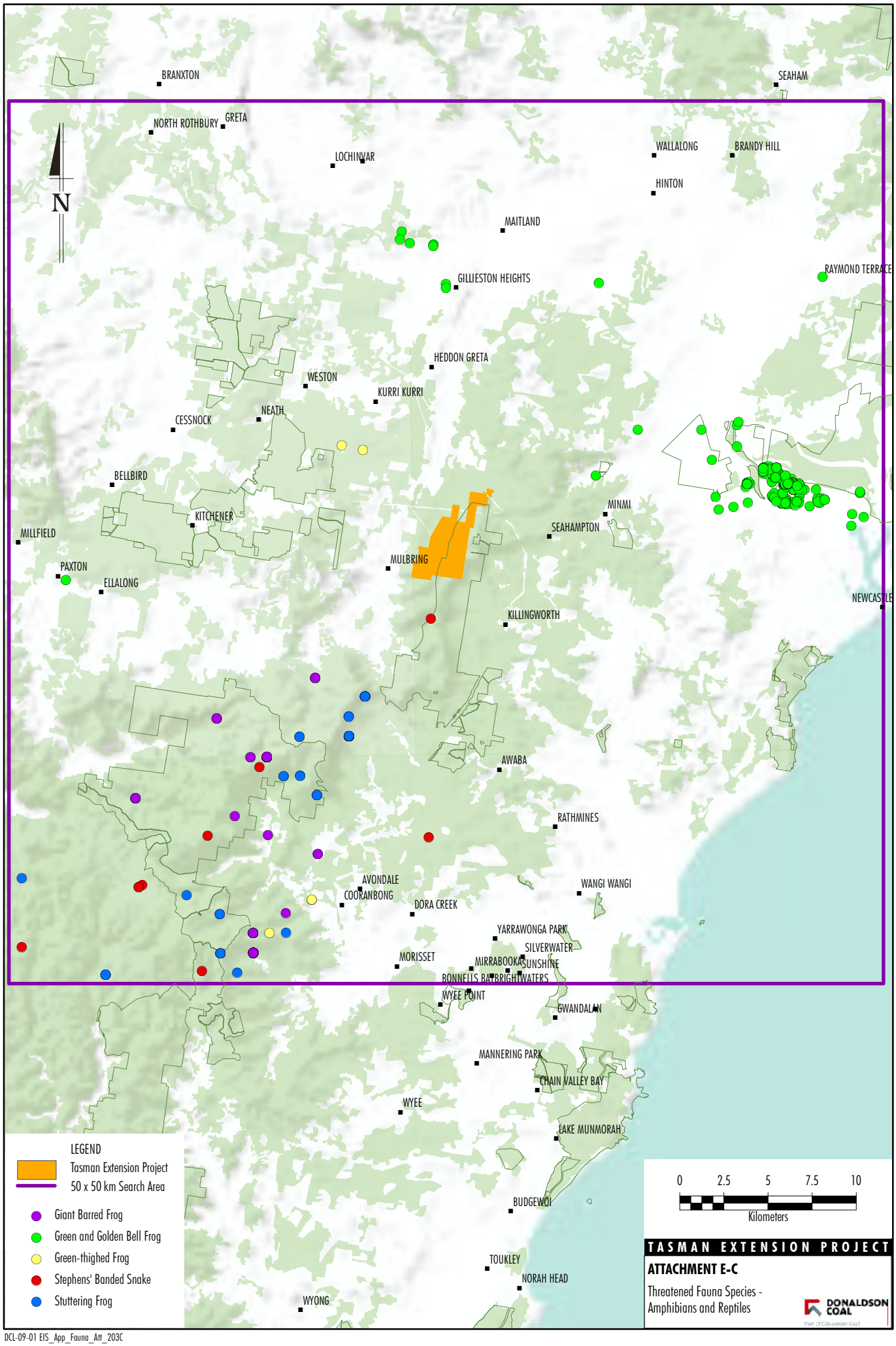


DCL-09-01 EIS_App_Fauna_Att_201C



DCL-09-01 EIS_App_Fauna_Att_204B


BRANXTON
SEAHAM
NORTH ROTHBURY
GRETA
LOCHINVAR
WALLALONG
BRANDY HILL
HINTON
N
MAITLAND
GILLIESTON HEIGHTS
RAYMOND TERRACE
HEDDON GRETA
WESTON
KURRI KURRI
NEATH
CESSNOCK
BELLBIRD
KITCHENER
MINMI
SEAHAMPTON
MILLFIELD
MULBRING
PAXTON
ELLALONG
NEWCASTLE
KILLINGWORTH
AWABA
RATHMINES
AVONDALE
COORANBONG
WANGI WANGI
DORA CREEK
YARRAWONGA PARK
SILVERWATER
MORISSET
MIRRABOOKA
SUNSHINE
BONNELLS BAY
BRIGHTWATERS
WYEE POINT
GWANDALAN
MANNERING PARK
CHAIN VALLEY BAY
WYEE
LAKE MUNMORAH
BUDGEWOI
TOUKLEY
NORAH HEAD
WYONG
LEGEND
Tasman Extension Project
50 x 50 km Search Area
Barking Owl
Black-breasted Buzzard
Little Eagle
Masted Owl
Powerful Owl
Sooty Owl
Square-tailed Kite
0
2.5
5
7.5
10
Kilometers
TASMAN EXTENSION PROJECT
ATTACHMENT E-B2
Threatened Fauna Species - Birds
DONALDSON COAL
Part of Gloucester Coal


BRANXTON
SEAHAM
NORTH ROTHBURY
GRETA
LOCHINVAR
WALLALONG
BRANDY HILL
HINTON
MAITLAND
GILLIESTON HEIGHTS
RAYMOND TERRACE
HEDDON GRETA
WESTON
KURRI KURRI
NEATH
CESSNOCK
BELLBIRD
KITCHENER
MILLFIELD
PAXTON
ELLALONG
MULBRING
MINMI
SEAHAMPTON
NEWCASTLE
KILLINGWORTH
AWABA
RATHMINES
AVONDALE
COORANBONG
DORA CREEK
WANGI WANGI
YARRAWONGA PARK
SILVERWATER
MORISSET
MIRRABOOKA
SUNSHINE
BONNELLS BAY
BRIGHTWATERS
WYEE POINT
GWANDALAN
MANNERING PARK
CHAIN VALLEY BAY
WYEE
LAKE MUNMORAH
BUDGEWOI
TOUKLEY
NORAH HEAD
WYONG
N
LEGEND
Tasman Extension Project
50 x 50 km Search Area
Giant Barred Frog
Green and Golden Bell Frog
Green-thighed Frog
Stephens' Banded Snake
Stuttering Frog
0
2.5
5
7.5
10
Kilometers
TASMAN EXTENSION PROJECT
ATTACHMENT E-C
Threatened Fauna Species - Amphibians and Reptiles
DONALDSON COAL