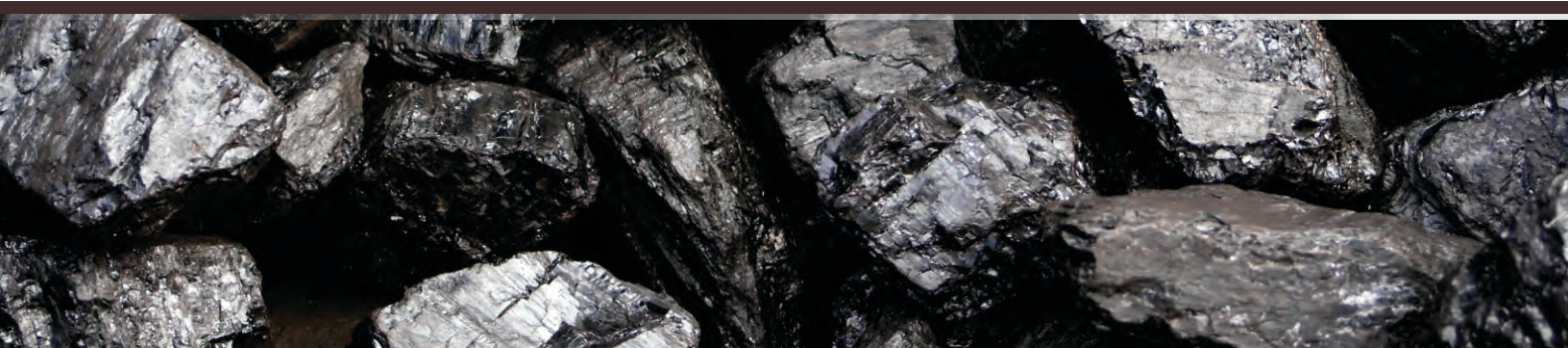


# Terrestrial Flora and Fauna Assessment



**South Galilee Coal Project**

**November 2011**



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#### Document History and Status

Issue	Revision	Issued to	Qty	Date	Reviewed by
1	1(Draft)	Internal	1	8/11/2011	Jessie Keast
2		Internal	1		

MET Serve Project Delivery System

**Printed:** 17 April 2012  
**Last saved:** 17 April 2012  
**File Name:** 00183305-005  
**Project Manager:** Jessie Keast  
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**Name of Organisation:** AMCI  
**Name of Project:** South Galilee Coal Project  
**Name of Document:** Terrestrial Flora and Fauna Assessment for South Galilee Coal Project  
**Document Version:** Version 5  
**Project Number:** AM001

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## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
<b>2</b>	<b>PROJECT DESCRIPTION .....</b>	<b>3</b>
2.1	LOCATION .....	3
2.2	TOPOGRAPHICAL AND WATER FEATURES .....	5
2.3	WORLD HERITAGE AND WETLANDS OF INTERNATIONAL IMPORTANCE .....	7
2.4	EXISTING LAND USE .....	7
2.5	PROPOSED ACTIVITIES.....	7
<b>3</b>	<b>LEGISLATION AND GUIDELINES .....</b>	<b>9</b>
3.1	QUEENSLAND .....	9
3.1.1	<i>Environmental Protection Act 1994</i> .....	9
3.1.2	<i>Nature Conservation Act 1992</i> .....	9
3.1.3	<i>Vegetation Management Act 1999</i> .....	9
3.1.4	<i>Land Protection (Pest and Stock Route Management) Act 2002</i> .....	9
3.1.5	<i>Biodiversity Offset Policy 2011</i> .....	9
3.1.6	<i>Policy for Vegetation Management Offsets 2011</i> .....	9
3.2	COMMONWEALTH .....	9
3.2.1	<i>Environment Protection and Biodiversity Conservation Act 1999</i> .....	9
<b>4</b>	<b>BACKGROUND DATA AND EVALUATION .....</b>	<b>10</b>
4.1	CERTIFIED REGIONAL ECOSYSTEM MAPPING AND ESSENTIAL HABITAT .....	10
4.2	BIODIVERSITY PLANNING ASSESSMENT .....	17
4.3	DATABASE SEARCHES.....	19
4.4	PREVIOUS ECOLOGICAL ASSESSMENTS.....	20
4.5	GAP ANALYSIS .....	20
<b>5</b>	<b>FIELD ASSESSMENT METHODOLOGY.....</b>	<b>22</b>
5.1	VEGETATION COMMUNITIES AND FLORA SPECIES.....	22
5.1.1	Survey Timing and Conditions .....	22
5.1.2	Quaternary Survey Sites .....	22
5.1.3	Secondary Survey Sites.....	25
5.1.4	Vegetation Mapping.....	25
5.1.5	Targeted Surveys .....	25
5.2	TERRESTRIAL VERTEBRATES .....	26
5.2.1	Survey Timing .....	26
5.2.2	Site Selection .....	26
5.2.3	Survey Methods and Effort .....	32
5.2.3.1	<i>Elliott Traps</i> .....	32

5.2.3.2	Pitfall Trap Lines .....	32
5.2.3.3	Funnel Traps.....	32
5.2.3.4	Harp Traps.....	32
5.2.3.5	Bat Call Detection.....	32
5.2.3.6	Diurnal Bird Surveys .....	32
5.2.3.7	Targeted Searches .....	33
5.2.3.8	Nocturnal Surveys .....	33
5.2.3.9	Opportunistic Records.....	33
<b>6</b>	<b>RESULTS.....</b>	<b>35</b>
6.1	FLORA.....	35
6.1.1	Vegetation Communities and RE Classification.....	35
6.1.2	Other Vegetation Communities.....	41
6.1.3	Threatened Ecological Communities.....	41
6.1.4	Flora Species Diversity .....	42
6.1.4.1	Threatened or Near Threatened Flora .....	42
6.1.5	Confirmed Threatened Flora Species.....	46
6.1.5.1	Round-leaved Heath Myrtle ( <i>Micromyrtus rotundifolia</i> ).....	46
6.1.5.2	Large-podded Trefoil ( <i>Desmodium macrocarpum</i> ) .....	47
6.1.5.3	<i>Eleocharis blakeana</i> .....	47
6.1.6	Likely Threatened Flora Species .....	48
6.1.6.1	Western Rosewood ( <i>Acacia spania</i> ) .....	48
6.1.7	Weeds .....	49
6.1.8	Vegetation Communities of Cultural, Commercial or Recreational Significance .....	50
6.2	TERRESTRIAL FAUNA.....	51
6.2.1	Faunal Habitats .....	51
6.2.2	Fauna Diversity .....	56
6.2.3	Conservation Significant Fauna.....	56
6.2.4	Confirmed Threatened and Near Threatened Fauna Species.....	62
6.2.4.1	Square-tailed Kite ( <i>Lophoictinia isura</i> ).....	62
6.2.4.2	Brigalow Scaly-foot ( <i>Paradelma orientalis</i> ) .....	62
6.2.4.3	Little Pied Bat ( <i>Chalinolobus picatus</i> ) .....	62
6.2.4.4	Migratory Species.....	62
6.2.5	Bio-regionally Significant Species.....	63
6.2.5.1	Yellow-spotted Monitor ( <i>Varanus panoptes</i> ) .....	63
6.2.5.2	Black Falcon ( <i>Falco subniger</i> ) .....	64
6.2.5.3	Australian Bustard ( <i>Ardeotis australis</i> ) .....	64



6.2.5.4	Bush Stone-curlew ( <i>Burhinus grallarius</i> ).....	64
6.2.5.5	Barking Owl ( <i>Ninox connivens</i> ).....	64
6.2.5.6	Brown Treecreeper ( <i>Climacteris picumnus</i> ) .....	64
6.2.5.7	White-eared Honeyeater ( <i>Lichenostomus leucotis</i> ) .....	64
6.2.5.8	Hooded Robin ( <i>Melanodryas cucullata</i> ) .....	64
6.2.5.9	Grey-crowned Babbler ( <i>Pomatostomus temporalis</i> ).....	65
6.2.5.10	Narrow-nosed Planigale ( <i>Planigale tenuirostris</i> ) .....	65
6.2.5.11	Common Dunnart ( <i>Sminthopsis murina</i> ) .....	65
6.2.5.12	Koala ( <i>Phascolarctos cinereus</i> ) .....	65
6.2.5.13	Common Brushtail Possum ( <i>Trichosurus vulpecula</i> ) .....	65
6.2.5.14	Rufous Bettong ( <i>Aepyprymnus rufescens</i> ).....	65
6.2.5.15	Spectacled Hare-wallaby ( <i>Lagorchestes conspicillatus</i> ).....	65
6.2.5.16	Black-striped Wallaby ( <i>Macropus dorsalis</i> ).....	65
6.2.5.17	Swamp Wallaby ( <i>Wallabia bicolor</i> ) .....	66
6.2.5.18	Inland Forest Bat ( <i>Vespadelus baverstocki</i> ).....	66
6.2.5.19	Desert Mouse ( <i>Pseudomys desertor</i> ) .....	66
6.2.6	Pest Animals .....	66
<b>7</b>	<b>POTENTIAL IMPACTS .....</b>	<b>68</b>
7.1.1	Vegetation Clearing and Habitat Loss.....	68
7.1.2	Edge Effects and Fragmentation.....	76
7.1.3	Direct Mortality .....	76
7.1.4	Dust .....	77
7.1.5	Subsidence and Hydrological Impacts .....	77
7.1.6	Weeds .....	78
7.1.7	Pest Animals .....	78
7.1.8	Fire .....	78
7.1.9	Release of Contaminants .....	78
7.1.10	Cumulative Impacts.....	79
7.1.11	Impacts on Confirmed Threatened or Near Threatened Flora .....	79
7.1.11.1	Round-leaved Heath Myrtle.....	79
7.1.11.2	Large-podded Trefoil .....	83
7.1.11.3	<i>Eleocharis blakeana</i> .....	83
7.1.12	Impacts on Confirmed Threatened and Near Threatened Fauna Species .....	83
7.1.12.1	Brigalow Scaly-foot ( <i>Paradelma orientalis</i> ) .....	83
7.1.12.2	Square-tailed Kite ( <i>Lophoictinia isura</i> ).....	84
7.1.13	Impacts on Threatened and Near Threatened Species Likely to Occur in SGCP Area .....	84

7.1.13.1	Western Rosewood.....	84
7.1.13.2	Ornamental Snake ( <i>Denisonia maculata</i> ) .....	84
7.1.13.3	Yakka Skink ( <i>Egernia rugosa</i> ).....	85
7.1.13.4	Dunmall's Snake ( <i>Furina dunmalli</i> ).....	85
7.1.13.5	Death Adder ( <i>Acanthophis antarcticus</i> ) .....	85
7.1.13.6	Squatter Pigeon ( <i>Geophaps scripta scripta</i> ).....	85
7.1.13.7	Cotton Pygmy-goose ( <i>Nettapus coromandelianus</i> ).....	85
7.1.13.8	Black-throated Finch ( <i>Poephila cincta cincta</i> ).....	85
7.1.14	Impacts on Migratory Species .....	86
7.1.15	Impacts on Bio-regionally Significant Species .....	86
7.1.15.1	Yellow-spotted Monitor ( <i>Varanus panoptes</i> ) .....	86
7.1.15.2	Black Falcon ( <i>Falco subniger</i> ) .....	86
7.1.15.3	Australian Bustard ( <i>Ardeotis australis</i> ) .....	86
7.1.15.4	Bush Stone-curlew ( <i>Burhinus grallarius</i> ).....	86
7.1.15.5	Barking Owl ( <i>Ninox connivens</i> ).....	87
7.1.15.6	Brown Treecreeper ( <i>Climacteris picumnus</i> ) .....	87
7.1.15.7	White-eared Honeyeater ( <i>Lichenostomus leucotis</i> ) .....	87
7.1.15.8	Hooded Robin ( <i>Melanodryas cucullata</i> ) .....	87
7.1.15.9	Grey-crowned Babbler ( <i>Pomatostomus temporalis</i> ).....	87
7.1.15.10	Narrow-nosed Planigale ( <i>Planigale tenuirostris</i> ) .....	87
7.1.15.11	Common Dunnart ( <i>Sminthopsis murina</i> ) .....	88
7.1.15.12	Koala ( <i>Phascolarctos cinereus</i> ) .....	88
7.1.15.13	Common Brushtail Possum ( <i>Trichosurus vulpecula</i> ) .....	88
7.1.15.14	Rufous Bettong ( <i>Aepyprymnus rufescens</i> ).....	88
7.1.15.15	Spectacled Hare-wallaby ( <i>Lagorchestes conspicillatus</i> ).....	88
7.1.15.16	Black-striped Wallaby ( <i>Macropus dorsalis</i> ).....	89
7.1.15.17	Swamp Wallaby ( <i>Wallabia bicolor</i> ) .....	89
7.1.15.18	Inland Forest Bat ( <i>Vespadelus baverstocki</i> ).....	89
7.1.15.19	Desert Mouse ( <i>Pseudomys desertor</i> ) .....	89
<b>8</b>	<b>MITIGATION MEASURES.....</b>	<b>90</b>
8.1	GENERAL MITIGATION MEASURES .....	90
8.1.1	Rehabilitation and Revegetation .....	90
8.1.2	Weeds and Pest Animals Management Plan.....	90
8.1.3	Direct Mortality .....	91
8.1.4	Fire Regime .....	91
8.2	SPECIFIC MITIGATION MEASURES.....	92

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8.2.1	Threatened Species Management Plan.....	92
8.3	BIODIVERSITY OFFSETS.....	92
<b>9</b>	<b>REFERENCES .....</b>	<b>94</b>

## APPENDICES

Appendix A	BAMM Criteria.....	A1
Appendix B	Fauna Trap Site Descriptions .....	B1
Appendix C	Flora Species List .....	C1
Appendix D	Fauna Species List .....	D1
Appendix E	Anabat Analyses .....	E1
Appendix F	Regional Ecosystem Descriptions .....	F1

## **TABLES**

Table 1	Lot and Plan Numbers for Land Located within or Partly within MLA 70453 and Infrastructure Corridor .....	5
Table 2	REs in Certified Mapping of the SGCP Area.....	12
Table 3	BAMM Results for Remnant Units within the SGCP .....	17
Table 4	Evaluation of Background Sources .....	21
Table 5	Gaps in Existing Ecological Knowledge of the SGCP Area.....	21
Table 6	Fauna Survey Sites .....	29
Table 7	Fauna Survey Methods and Effort .....	33
Table 8	RE Vegetation Communities Recorded within the SGCP Area .....	38
Table 9	Assessment of Potentially Present TECs .....	41
Table 10	Likelihood of Occurrence of Threatened and Near Threatened Flora Species in the SGCP Area .....	43
Table 11	Weeds Recorded in the SGCP Area .....	50
Table 12	Faunal Habitat Types within the SGCP Area .....	52
Table 13	Fauna Diversity within the SGCP Area .....	56
Table 14	Likelihood of Occurrence of Threatened and Near Threatened Fauna Species in the SGCP Area .....	58
Table 15	Migratory Bird Species Present or Potentially Present in the SGCP Area.....	63
Table 16	Pest Animal Species Recorded in the SGCP Area.....	66
Table 17	RE Vegetation Communities Recorded within the SGCP Area .....	70

## **FIGURES**

Figure 1	Regional Location Plan.....	2
Figure 2	Ecological Study Area .....	4
Figure 3	Properties within the SGCP Area .....	6
Figure 4	Bioregional Boundaries .....	11
Figure 5	Certified Regional Ecosystem Mapping, Biodiversity Status and Essential Habitat within the SGCP Area .....	15
Figure 6	Certified Regional Ecosystem Mapping, Biodiversity Status and Essential Habitat within the SGCP Area .....	16
Figure 7	Vegetation Assessment Site Locations .....	23
Figure 8	Vegetation Assessment Site Locations .....	24
Figure 9	Vertebrate Sampling Locations .....	27
Figure 10	Vertebrate Sampling Locations .....	28
Figure 11	Field Verified Regional Ecosystems .....	36
Figure 12	Field Verified Regional Ecosystems .....	37

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Figure 13	Locations of Threatened and Near Threatened Flora.....	45
Figure 14	Locations of Threatened and Near Threatened Fauna .....	57
Figure 15-1	Conceptual Mine Layout – Year 33 .....	81
Figure 15-2	Conceptual Mine Layout – Year 33 .....	82

## **PLATES**

Plate 1	Round-leaved Heath Myrtle in RE 10.7.7, Sapling Property.....	46
Plate 2	Large-podded Trefoil in RE 11.5.3, Saltbush Property .....	47
Plate 3	<i>Eleocharis blakeana</i> Collected from RE 10.3.15i within the Infrastructure Corridor Area.....	48
Plate 4	Western Rosewood West of the SGCP Area .....	49



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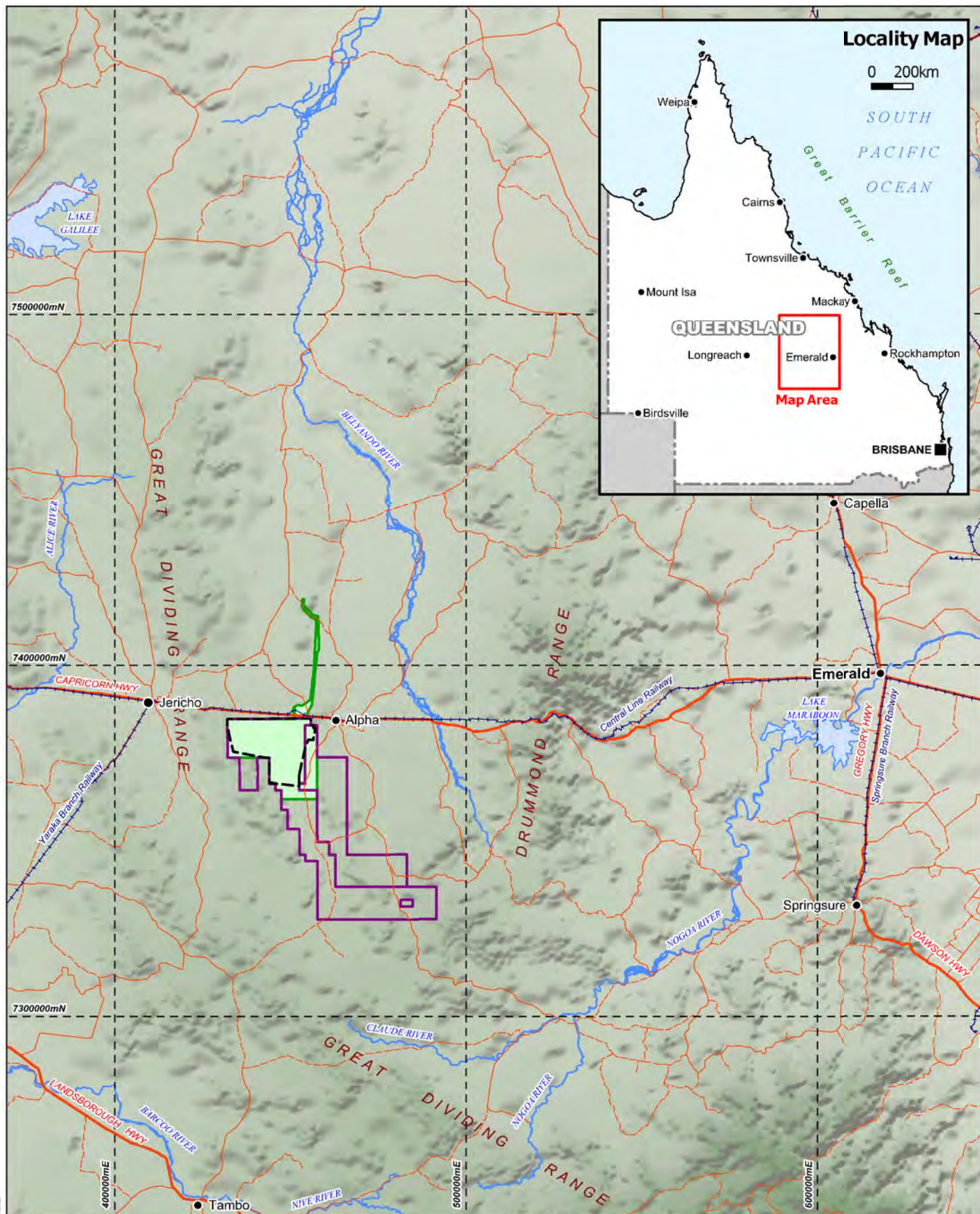
## **1 INTRODUCTION**

AMCI (Alpha) Pty Ltd (AMCI) and Alpha Coal Pty Ltd (a subsidiary of Bandanna Energy) propose to establish a new coal mine near Alpha in Queensland's Galilee Basin (**Figure 1**). The proposed project, referred to as the South Galilee Coal Project (SGCP) is located within Mining Lease Application area (MLA) 70453. In addition, a 40 kilometre (km) long infrastructure corridor is proposed to link MLA 70453 with the proposed common user rail lines to the Abbot Point Coal Terminal. MLA 70453 and the infrastructure corridor are collectively referred to as the SGCP area.

AMCI has commissioned Mining and Energy Technical Services Pty Ltd (MET Serve) to undertake conduct a terrestrial flora and fauna assessment of the proposed SGCP area. This assessment will be included as a technical appendix of the Environmental Impact Statement (EIS).

The aims of the terrestrial flora and fauna assessment were to:

- review existing information on terrestrial flora and fauna values within the SGCP area;
- survey and document ecological values including vegetation communities, faunal habitats and ecological corridors;
- develop an inventory of terrestrial flora and fauna within the SGCP area;
- identify the presence of species of conservation significance under State and Commonwealth regulations;
- identify potential impacts that the proposed activities may have on ecological values; and
- provide mitigation recommendations for potential impacts.



# LEGEND

- MLA70453
- Exploration Tenement
- SGCP Survey Area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream
- Population centre

Data Source:  
Tenement - EEDL Topography (250k) - Geoscience Australia.

## Alpha Coal Pty Ltd South Galilee Coal Project

### Regional Location Plan

0 25 50  
Kilometres

Scale: 1:1,500,000 (A4)

25/11/2011

Datum: GDA94  
Projection: MGA55

FIGURE 1

---

## 2 PROJECT DESCRIPTION

### 2.1 LOCATION

The SGCP area was arbitrarily divided into two areas for this flora and fauna assessment, including the 'mine survey area' and the 'infrastructure corridor survey area' (**Figure 2**). The mine survey area was slightly larger than the MLA 70453 to ensure comprehensive sampling of impacted areas.

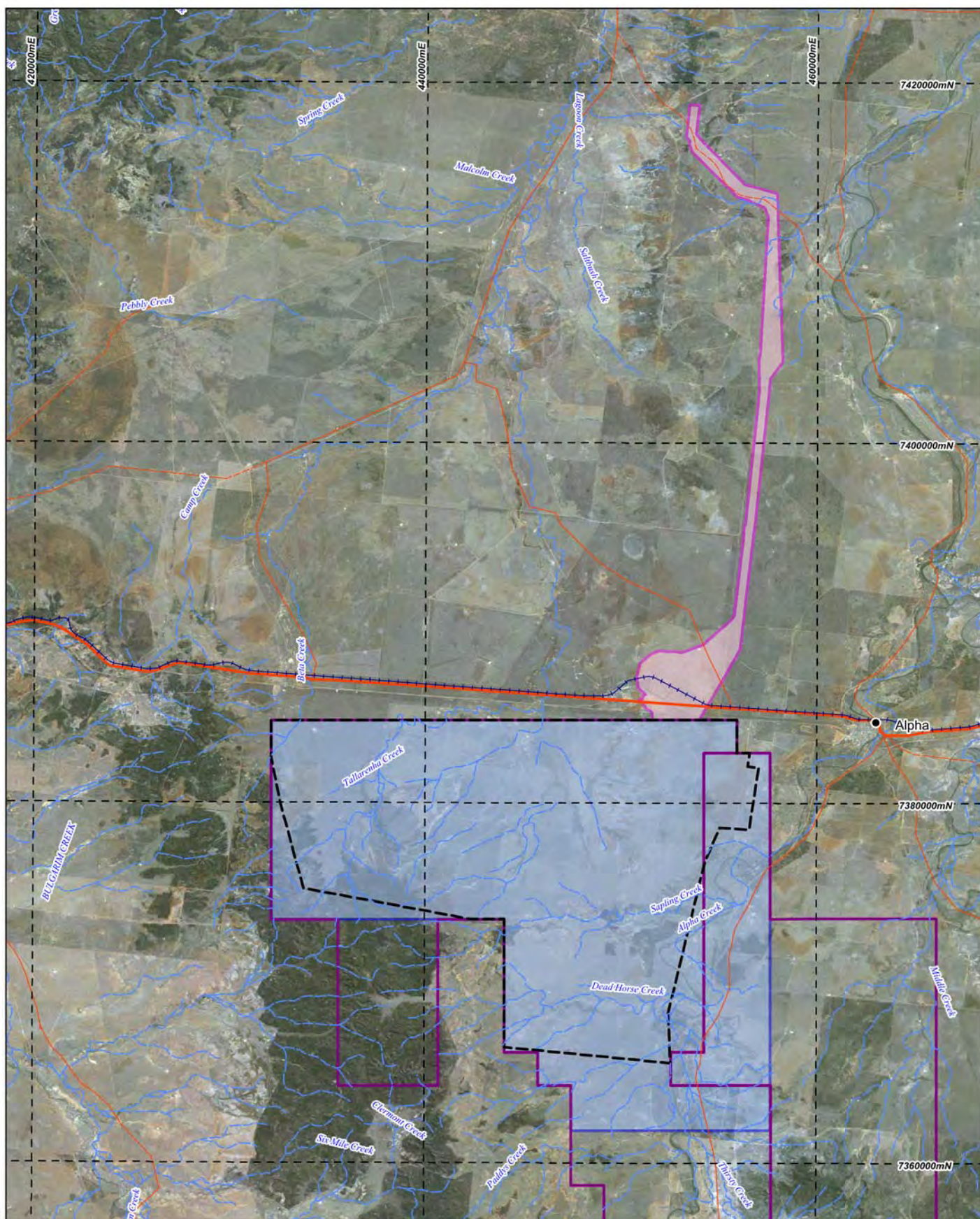
The mine survey area totals approximately 42,792 hectares (ha) and is bounded by the latitudes of  $-3.38^{\circ}$  in the north,  $-23.51^{\circ}$  in the south, and longitudes  $146.44^{\circ}$  in the west and  $146.20^{\circ}$  in the east. The approximate centre of this area occurs at  $-23.7488^{\circ}$ ,  $146.475^{\circ}$ , approximately 20 km south-west of the town of Alpha (**Figure 3**).

The infrastructure corridor will extend north from the mine survey area for approximately 40 km. The infrastructure corridor survey area covers nine properties (**Table 1** and **Figure 3**). Within the infrastructure corridor survey area, a 100 metre (m) wide footprint of vegetation will be cleared to accommodate the rail spur and other infrastructure. The infrastructure corridor survey area was slightly larger than the proposed infrastructure corridor footprint to ensure adequate sampling of flora and fauna, and to allow for minor adjustments to the locations of this infrastructure corridor to minimise ecological impacts.

The Alpha-Tambo road runs through the south-eastern portion of the mine survey area, and the Capricorn Highway and Central Line Railway are to the immediate north. MLA 70453 covers six properties, as identified in (**Table 1** and mapped in **Figure 3**).

Parts of the mine survey area will be subject to direct disturbance from open cut mining as well as the construction of infrastructure.





# LEGEND

- MLA70453
- Exploration tenement
- Mine survey area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream
- Population centre

## Alpha Coal Pty Ltd South Galilee Coal Project

Ecological Study Area



01/11/2011

Datum: GDA94  
Projection: MGA55

FIGURE 2

Data Source:  
Tenement - EEDI, Topography (250k) - Geoscience Australia.



**Table 1 Lot and Plan Numbers for Land Located within or Partly within MLA 70453 and Infrastructure Corridor**

Real Property Description	Property Name	Landholder
<b>MLA 70453</b>		
4315PH720 <sup>1</sup>	'Creek Farm'	Creek Farm Pty Ltd (Jason and Sherri Taylor)
1DM3	'Chesalon'	May Sophia and Richard Hans Hansen
7BF57	'Tallarenha'	Jeffery Alan and Lee Michelle Clews
31BF11	'Betanga'	Cathy Michelle and Russell Hall
1160PH286	'Armagh'	Mexico Grazing Co Pty Ltd
3BF53	'Sapling Creek'	Cyril Thomas and Kathleen Susan Emily and Katrina Ann and Warren Peter Gleeson
<b>Infrastructure Corridor</b>		
5BF5	'Oakleigh'	Paul Anderson
3CP860083	'Tresillian'	Glenn and Keith Sparrow
2SP136836	'Monklands'	Pamela and Reid Bauman
4BF50	'Mentmore'	Bevan and Ernest Everingham
6BF16	'Gadwell'	Bevan and Ernest Everingham
7BF16	'Saltbush'	John White
301SP108315	N/A	Queensland Rail
4315PH720 <sup>1</sup>	'Creek Farm'	Creek Farm Pty Ltd (Jason and Sherri Taylor)
2BF38	Leased Reserve	Creek Farm Pty Ltd (Jason and Sherri Taylor)

Source: AMCI (2011)

<sup>1</sup> 4315PH720 is affected by MLA 70453 as well as the infrastructure corridor

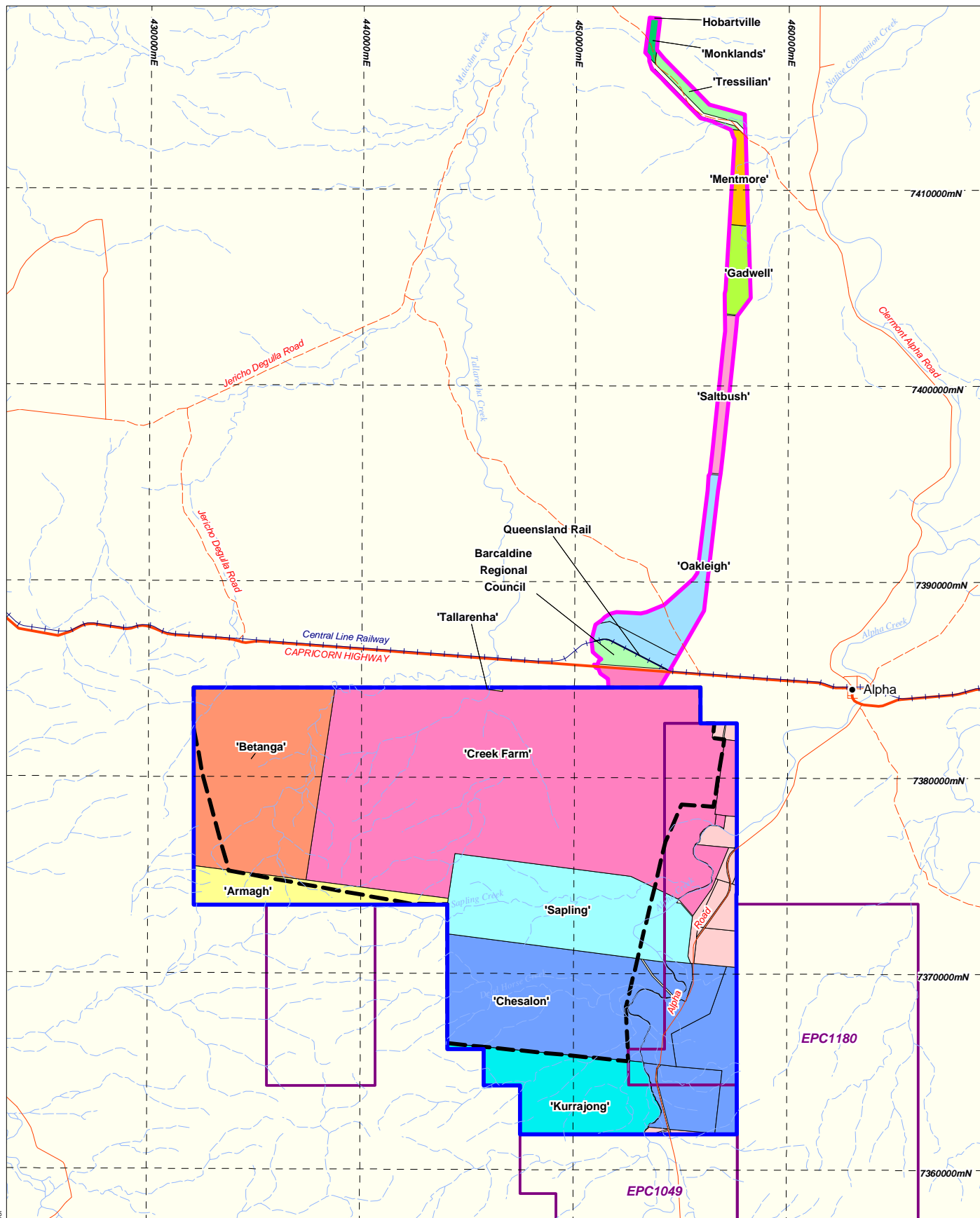
## 2.2 TOPOGRAPHICAL AND WATER FEATURES

The majority of the SGCP area is low-lying, undulating land with shallow relief, ranging from 378 m above sea level to 450 m above sea level, with an average of 422 m. Certified regional ecosystem (RE) maps indicate that the common land zone types in the SGCP area are:

- land zone 3: alluvial plains;
- land zone 4: gently undulating clay;
- land zone 5: uniform sand plains;
- land zone 7: duricrusts and footslopes; and
- land zone 10: course-grained sediments.

The western portion of the mine survey area features a north-south orientated range (542 m above sea level) which is part of the Great Dividing Range. Remnant vegetation along this range is contiguous with vegetation in the Carnarvon Ranges and Carnarvon National Park, approximately 135 km to the south.





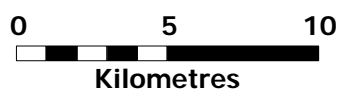
#### LEGEND

- MLA70453
- Exploration tenement
- Mine survey area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream
- Population centre

Data Source:  
Cadastral (Barcaldine May2010) - DERM. EPC Tenement - EEDI. Topography (250k) - Geoscience Australia.

## Alpha Coal Pty Ltd South Galilee Coal Project

Properties within the SGCP Area



Scale: 1:250,000 (A4)

25/11/2011

Datum: GDA94  
Projection: MGA55

FIGURE 3

## **2.3 WORLD HERITAGE AND WETLANDS OF INTERNATIONAL IMPORTANCE**

The SGCP area is not located within or adjacent to any declared World Heritage Areas or wetlands of international importance (e.g. Ramsar wetlands).

## **2.4 EXISTING LAND USE**

The SGCP area and surrounds have been historically used for cattle grazing. As a result, two-thirds of the SGCP area and approximately 50% of the infrastructure corridor survey area has been cleared, with much of these areas being dominated by introduced pasture grasses (especially Buffel Grass [*Cenchrus ciliaris*]) or non-remnant grasslands dominated by native grasses. The remaining remnant vegetation is also utilised for cattle grazing.

## **2.5 PROPOSED ACTIVITIES**

The SGCP will produce up to 17 million tonnes per annum (Mtpa) of low sulphur steaming coal for export to international markets. The SGCP will target thermal coal at depths suitable for both open cut and underground mining. The key elements of the SGCP would include:

- coal mining operations, including:
  - open cut and underground mining within MLA 70453, producing up to 19 Mtpa of run-of-mine coal and 17 Mtpa of product coal for the export market;
  - placement of waste rock and rejects in out-of-pit waste rock emplacements;
  - progressive backfilling of the open pits with waste rock and rejects as mining develops;
- development of a mine water management system including clean water drainage channels, mine affected runoff collection, sediment dams, pit water management process, on-site water reuse procedures and a permanent diversion of Sapling Creek;
- underground services area;
- Mine Industrial Area (containing administration, bath house, storage, vehicle parking, workshops, washdown, refuelling, controls and communication infrastructure);
- Coal Handling and Preparation Plant;
- coal handling infrastructure (including conveyor systems, raw coal and product coal stockpiles);
- development of a Mine Access Road and on-site haul roads and light vehicle roads;
- construction of an on-site rail component (including loading loop, breakdown and fuel sidings);
- construction of a SGCP rail spur component to connect to the common user rail component;
- on-site accommodation village;
- fuel, oil and explosives storage facilities;
- soil stockpiles, laydown areas and a gravel borrow pit;
- raw water supply infrastructure (e.g. pipeline, groundwater bores and Raw Water Dam);
- sewage and waste water treatment infrastructure;
- on-site landfill facility;
- electrical and telecommunications infrastructure;

- 
- ongoing monitoring and rehabilitation;
  - ongoing exploration activities within existing exploration tenements; and
  - other associated minor infrastructure, plant, equipment and activities.

---

### **3 LEGISLATION AND GUIDELINES**

#### **3.1 QUEENSLAND**

##### **3.1.1 *Environmental Protection Act 1994***

The *Environmental Protection Act 1994* (EP Act) regulates environmental management and aims to achieve ecologically sustainable development. The EP Act outlines legal obligations and the duty of care all persons have to the environment and directions for preparing environmental protection policies.

##### **3.1.2 *Nature Conservation Act 1992***

The *Nature Conservation Act 1992* (NC Act) regulates native flora, fauna and habitat conservation within Queensland.

##### **3.1.3 *Vegetation Management Act 1999***

The *Vegetation Management Act 1999* (VM Act) provides a planning framework for the management of native vegetation across Queensland. It regulates clearing of vegetation and aims to conserve Queensland's biodiversity through vegetation management.

##### **3.1.4 *Land Protection (Pest and Stock Route Management) Act 2002***

The *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) imposes a legal responsibility for control of pest plants and animals by all landholders on land under their management.

##### **3.1.5 *Biodiversity Offset Policy 2011***

The *Biodiversity Offset Policy 2011* provides a framework under the EP Act and NC Act to increase the long-term protection and viability of the state's biodiversity values where residual impacts from a development, on an area containing State significant biodiversity values, cannot be avoided.

##### **3.1.6 *Policy for Vegetation Management Offsets 2011***

The *Policy for Vegetation Management Offsets 2011* stipulates the provision of land-based offsets for clearing of vegetation within Queensland that is protected under the VM Act.

#### **3.2 COMMONWEALTH**

##### **3.2.1 *Environment Protection and Biodiversity Conservation Act 1999***

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the identification and management of matters of national environmental significance (MNES) including: threatened flora and fauna species; ecological communities; migratory species protected under international treaties; internationally recognised significant wetlands; and critical habitat areas. Under the EPBC Act, an action will require approval from the Federal Environment Minister for Sustainability, Environment, Water, Population and Communities (SEWPaC) if the action has, will have, or is likely to have a significant impact on MNES.

## 4 BACKGROUND DATA AND EVALUATION

### 4.1 CERTIFIED REGIONAL ECOSYSTEM MAPPING AND ESSENTIAL HABITAT

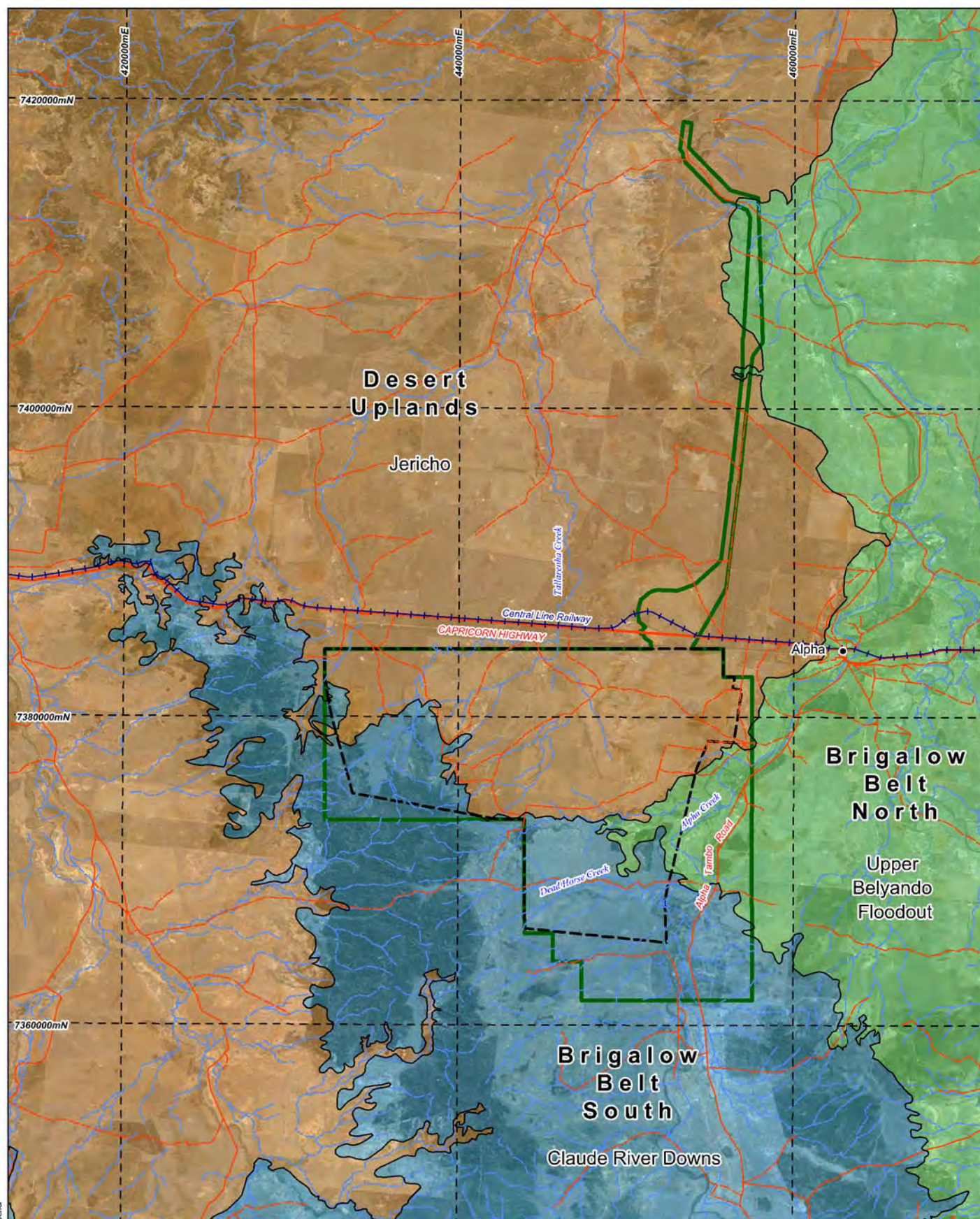
The SGCP area overlaps three national bioregions, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA) system: the Desert Uplands (Subregion 4 - Jericho Plains); Brigalow Belt North (Subregion 8 - Upper Belyando Floodout); and Brigalow Belt South (Subregion 1 - Claude River Downs) (**Figure 4**). Forty-one percent and 61.5% of the REs in the Upper Belyando Floodout and Claude River Downs subregions, respectively, are listed as threatened (DEWHA, 2007). The bioregional boundaries that have been defined for Queensland's RE classification scheme (Sattler and Williams, 1999) largely follow the IBRA system. However, under the RE framework, the Brigalow Belt North and South bioregions are amalgamated into the single Brigalow Belt bioregion.

Twenty-seven distinct REs occur within the mine survey area and 23 distinct REs within the infrastructure corridor area (17 REs are common to both) (**Table 2, Figure 5 and Figure 6**). REs in the SGCP area commonly occur in mosaic vegetation community polygons (i.e. areas that contain more than one RE). A mosaic polygon takes on the conservation status of the constituent RE with the highest conservation significance. Within the SGCP area, the certified RE mapping indicates there are approximately 3,199 ha of vegetation listed as endangered under the VM Act or EPBC Act or have a Department of Environment and Resource Management (DERM) biodiversity status of endangered. The majority of these endangered polygons were mapped as having the endangered RE 11.3.1 or 11.4.8 as subdominant.

Approximately 7,504 ha of the certified remnant vegetation mapped in the SGCP area are listed as 'of concern' under the VM act or has an 'of concern' DERM biodiversity status (**Appendix G**). The majority of threatened REs are from the Desert Uplands bioregion. As biodiversity status incorporates an assessment of the condition of remnant vegetation, it is a more comprehensive assessment than VM Act status.

There is no vegetation mapped as essential habitat within the SGCP area, although two areas in close proximity to the south and west of the mine survey area are mapped as essential habitat for Western Rosewood (*Acacia spania*) and one to the immediate west for Round-leaved Heath Myrtle (*Micromyrtus rotundifolia*) (**Figure 5**).





#### LEGEND

- MLA70453
- Mine survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

#### Bioregional Boundaries

- Desert Uplands (Jericho Subregion)
- Brigalow Belt North (Upper Belyando Floodout Subregion)
- Brigalow Belt South (Claude River Downs Subregion)

### Alpha Coal Pty Ltd South Galilee Coal Project

#### Bioregional Boundaries



18/11/2011

Datum: GDA94  
Projection: MGA55

FIGURE 4



**Table 2 REs in Certified Mapping of the SGCP Area**

RE	Short Description (REDD) *	Status		
		VM Act	Biodiversity Status	EPBC Act
Landzone 3: Alluvial plains				
Dominant or subdominant				
10.3.3b	<i>Acacia harpophylla</i> [Brigalow] low woodland to woodland on alluvium	LC	NOC	–
10.3.27a	<i>Eucalyptus populnea</i> [Poplar Box] open-woodland to woodland on alluvial plains	LC	OC	–
11.3.1	<i>Acacia harpophylla</i> [Brigalow] and/or <i>Casuarina cristata</i> [Belah] open forest on alluvial plains	E	E	E <sup>†</sup>
11.3.2	<i>Eucalyptus populnea</i> [Poplar Box] woodland on alluvial plains	OC	OC	–
11.3.3	<i>Eucalyptus coolabah</i> [Coolabah] woodland on alluvial plains	OC	OC	–
11.3.25	<i>Eucalyptus tereticornis</i> [Forest Red Gum] or <i>E. camaldulensis</i> [River Red Gum] woodland fringing drainage lines	LC	OC	–
Subdominant only				
10.3.12a	<i>Corymbia plena</i> [Large-fruited Bloodwood] ± <i>C. dallachiana</i> [Dallachy's Gum] on sandy alluvial terraces	LC	NOC	–
10.3.14c	Riverine wetland or fringing riverine wetland with mostly bare sand on beds of larger streams with scattered trees and shrubs.	LC	OC	–
10.3.14d	<i>Eucalyptus camaldulensis</i> [River Red Gum] ± <i>Corymbia leichhardtii</i> [Rusty Jacket] riverine wetland or fringing riverine wetland	LC	OC	–
10.3.15g	<i>Eucalyptus camaldulensis</i> [River Red Gum] ± <i>E. brownii</i> [Brown's Box] ± <i>Grevillea striata</i> [Beefwood] palustrine wetland (e.g. vegetated swamp) in closed depressions	LC	OC	–
10.3.28a	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] ± <i>Corymbia dallachiana</i> [Dallachy's Gum] open woodland on sandy alluvial fans	LC	NOC	–
11.3.6	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] woodland on alluvial plains	LC	OC	–
11.3.7	<i>Corymbia</i> spp. woodland on alluvial plains with sandy soils	LC	OC	–

**Table 2 REs in Certified Mapping of the SGCP Area (cont)**

RE	Short Description (REDD)*	Status		
Landzone 4: Gently undulating clay				
Subdominant only				
11.4.8	<i>Eucalyptus cambageana</i> [Dawson Gum] woodland to open forest with <i>Acacia harpophylla</i> [Brigalow] or <i>A. argyrodendron</i> [Blackwood] on Cainozoic clay plains	E	E	E <sup>†</sup>
Landzone 5: Uniform sand plains				
Dominant or subdominant				
10.5.1b	<i>Corymbia brachycarpa</i> [Desert Bloodwood] ± <i>Corymbia dallachiana</i> [Dallachy's Gum] low open woodland to open woodland on sand plains	LC	NOC	–
10.5.5a	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] ± <i>Corymbia plena</i> [Large-fruited Bloodwood] ± <i>C. dallachiana</i> [Dallachy's Gum] open-woodland on sand plains	LC	NOC	–
11.5.3	<i>Eucalyptus populnea</i> [Poplar Box] and/or <i>E. melanophloia</i> [Silver-leaved Ironbark] and/or <i>Corymbia clarksoniana</i> [Clarkson's Bloodwood] on Cainozoic sand plains/remnant surfaces	LC	NOC	–
11.5.5	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark], <i>Callitris glaucophylla</i> [White Cypress Pine] woodland on Cainozoic sand plains/remnant surfaces. Deep red sands	LC	NOC	–
Subdominant only				
10.5.1d	<i>Corymbia setosa</i> [Rough-leaved Bloodwood] open woodland on sandplains	LC	NOC	–
10.5.2a	<i>Corymbia dallachiana</i> [Dallachy's Gum] ± <i>Corymbia plena</i> [Large-fruited Bloodwood] open woodland on sand plains	LC	NOC	–
10.5.10	<i>Corymbia leichhardtii</i> [Rusty Jacket] open woodland on sand plains	LC	NOC	–
10.5.12	<i>Eucalyptus populnea</i> [Poplar Box] open woodland	LC	NOC	–

**Table 2 REs in Certified Mapping of the SGCP Area (cont)**

RE	Short Description (REDD)*	Status		
Landzone 7: Duricrusts and footslopes				
Dominant or subdominant				
11.7.1	<i>Acacia harpophylla</i> [Brigalow] and/or <i>Casuarina cristata</i> [Belah] and <i>Eucalyptus thozetiana</i> [Mountain Yapunyah] or <i>E. microcarpa</i> [Grey Box] woodland on lower scarp slopes on lateritic duricrust	LC	OC	–
11.7.2	<i>Acacia</i> spp. woodland on lateritic duricrust. Scarp retreat zone	LC	NOC	–
10.7.3a	<i>Acacia catenulata</i> [Bendee] ± <i>A. shirleyi</i> [Lancewood] ± <i>Eucalyptus persistens</i> [Mallee Box] ± <i>Corymbia dallachiana</i> [Dallachy's Gum] low woodland on scarps	LC	OC	–
10.7.3b	<i>Acacia shirleyi</i> [Lancewood] woodland on scarps.	LC	OC	–
Subdominant only				
10.7.5	<i>Eucalyptus thozetiana</i> [Mountain Yapunyah] open woodland on scarps and on pediments below scarps	LC	OC	–
Landzone 10: Course-grained sediments				
Dominant or subdominant				
11.10.4	<i>Eucalyptus decorticans</i> [Gum Top Ironbark], <i>Lysicarpus angustifolius</i> [Budgeroo] ± <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp. woodland on coarse-grained sedimentary rocks. Crests and scarps	LC	NOC	–
11.10.7	<i>Eucalyptus crebra</i> [Narrow-leaved Ironbark] woodland on coarse-grained sedimentary rocks	LC	NOC	–
11.10.13b	<i>Corymbia leichhardtii</i> [Rusty Jacket] woodland on scarps and sandstone tablelands	LC	NOC	–
Subdominant only				
11.10.13	<i>Eucalyptus</i> spp. and/or <i>Corymbia</i> spp. open forest on scarps and sandstone tablelands	LC	NOC	–

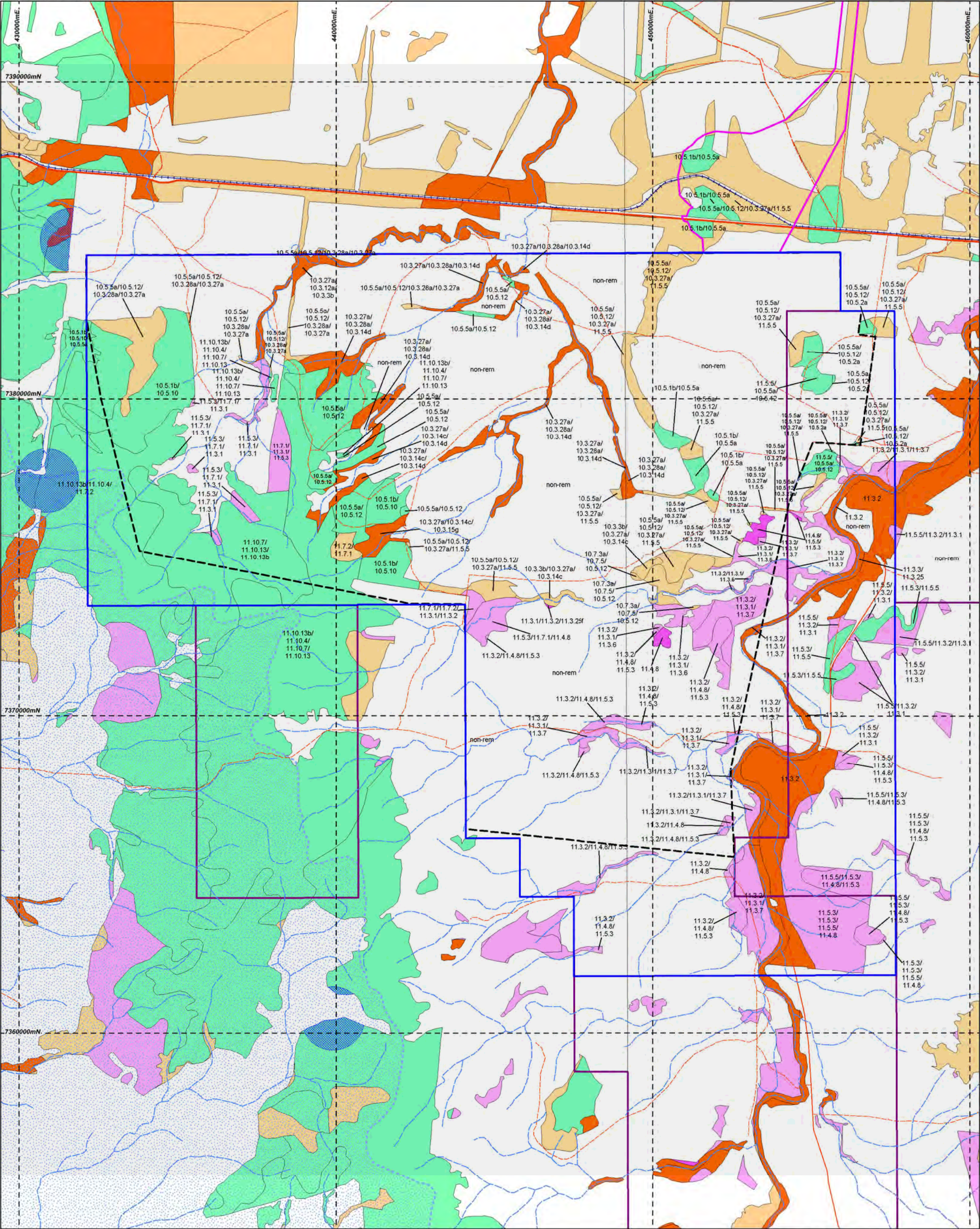
REDD = Regional Ecosystem Description Database

Status—**E** = endangered; **OC** = of concern; **NOC** = not of concern; **LC** = least concern; **–** = not listed

\*Common names have been inserted into the REDD short descriptions for ease of reference by non-specialists

†This RE corresponds to the 'endangered' Brigalow (*Acacia harpophylla* dominant and co-dominant) threatened ecological community (TEC) under the EPBC Act where it is dominated or co-dominated by Brigalow (*Acacia harpophylla*)





Metserve  
Mining & Energy Technical Services

South Galilee

**LEGEND**

- MLA70453
- Mine survey area
- Exploration tenement
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

**BD Status**

- Endangered (dominant)
- Endangered (sub-dominant)
- Of Concern (dominant)
- Of Concern (sub-dominant)
- Not of Concern
- Non-remnant

**VM Act**

- Essential habitat

**Wild River Management Areas**  
(Wild Rivers Act 2005)

- Proposed preservation area

**Alpha Coal Pty Ltd**  
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**Certified RE Mapping, Essential Habitat**  
**and Wild Rivers Management Areas**

0 5  
Kilometres

24/11/2011

Datum: GDA94  
Projection: MGA55

FIGURE 5





## 4.2 BIODIVERSITY PLANNING ASSESSMENT

The DERM developed the Biodiversity Assessment and Mapping Methodology (BAMM) to provide a consistent approach for assessing biodiversity values at the landscape scale in Queensland using vegetation mapping data. BAMM has been used by DERM to generate Biodiversity Planning Assessments (BPAs) for each of Queensland's Bioregions. The BPAs are used by government regulators, local councils and other stakeholders as advice on a range of planning or decision-making processes.

BAMM is used for the identification of areas with various levels of significance for biodiversity reasons. The mapping is based on RE maps generated or approved by the Queensland Herbarium. Accordingly, BPAs should be used as a biodiversity assessment tool to place areas of vegetation and habitat into a regional context. BAMM uses seven diagnostic criteria (**Table 3**) plus three supplementary criteria to determine the biodiversity significance of an area. Each remnant vegetation unit is ranked as 'low', 'medium', 'high' or 'very high' for each of the criteria. Biodiversity significance is calculated by integrating the rankings of the seven diagnostic criteria. As a result, the remnant may be rated as 'State significant', 'regionally significant' or 'locally significant and/or other values'.

The level of significance for each BAMM diagnostic criterion (A–G) and supplementary criterion (H–J) for the SGCP area is outlined in **Table 3**. Relevant maps are provided in **Appendix A**.

**Table 3 BAMM Results for Remnant Units within the SGCP**

BAMM Criterion	Description	Discussion
<b>Diagnostic Criteria</b>		
<b>Criterion A</b> Habitat for endangered, vulnerable and/or rare (EVR) Taxa	This criterion brings together information on EVR taxa using buffering of recorded sites in the absence of Habitat Suitability Maps for species.	Under this criterion, all areas in the SGCP area are mapped as having low value, except areas protruding into the north-western edge of the mine survey area ( <b>Appendix A</b> ).
<b>Criterion B1</b> State Ecosystem Value	This criterion combines a number of elements including the Biodiversity Status of REs, the presence of poorly conserved REs, the presence of significant wetlands, and areas of national importance such as World Heritage Areas and Ramsar Sites.	Under this criterion, scattered patches are mapped as having very high value, generally correlating to areas mapped as Brigalow ( <i>Acacia harpophylla</i> ) dominated communities. Vegetation along Alpha Creek is largely mapped as high value. The bulk of the remaining vegetation in the mine survey area is mapped as having medium value, a small area mapped as very high value occurs in the very north-west. The infrastructure corridor survey area is predominately medium value ecosystems with some small patches of high and very high value ( <b>Appendix A</b> ).
<b>Criterion C</b> Tract Size	This criterion is a measure of the relative size of tracts of vegetation in the landscape.	Under this criterion, most areas of vegetation are mapped as very high value, although some smaller scattered patches and fragments are mapped as high, medium and low value in the mine survey area. A mixture of LOW, very high and medium value tract sizes occur in the infrastructure corridor survey area ( <b>Appendix A</b> ).
<b>Criterion D1</b> State Relative Size of RE	This criterion classifies the relative size of each example of an RE. Patches are compared with all other occurrences of the same RE.	Under this criterion, vegetation along Alpha Creek is generally mapped as low value. However vegetation in the west associated with the range has large areas mapped as low, high and very high value. Smaller fragments mapped as medium value also occur within the mine survey area. The infrastructure corridor survey area is predominantly dominated by medium value REs, with very small patches of low and very high value areas ( <b>Appendix A</b> ).

**Table 3 BAMB Results for Remnant Units within the SGCP (cont)**

BAMB Criterion	Description	Discussion
<b>Diagnostic Criteria</b>		
<b>Criterion E</b> Condition	This criterion represents the quality of remnants judged by the extent to which they resemble their natural condition.	All remnant vegetation is mapped as very high value under this criterion in the mine survey area and infrastructure corridor survey area ( <b>Appendix A</b> ).
<b>Criterion F</b> Ecosystem Diversity	This criterion reflects the degree to which REs are 'packed' within an area. That is, an area with high Ecosystem Diversity will have relatively many REs and ecotones.	Under this criterion most vegetation, particularly large areas of vegetation in the west are mapped as very high value. Vegetation along Alpha Creek is mapped as high or very high value. Small patches of vegetation mapped as medium value are scattered in the mine survey area. There are some scattered areas of high value and a few small patches of very high value in the north of the infrastructure corridor survey area ( <b>Appendix A</b> ).
<b>Criterion G</b> Context and Connection	This criterion represents the extent to which a Remnant Unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems, and the degree to which a Remnant Unit is connected to other vegetation.	Under this criterion, vegetation mapped as low value is scattered and restricted to very small patches throughout the mine survey area. Vegetation mapped as medium value occurs predominantly in the north and east while a large patch of vegetation mapped as high value occurs in the west and on the southern portions of Alpha Creek. Vegetation mapped as very high value is located in the west and south east, generally adjacent to vegetation mapped as high value. The majority of the corridor has a medium value with some areas in the northern half mapped as very high and some small areas in the south mapped as high value ( <b>Appendix A</b> ).
<b>Supplementary Criteria</b>		
<b>Criterion H</b> Essential and General Habitat for Priority Taxa	This criterion can be used to identify Essential and General Habitat for EVR and other Priority Taxa additional to that derived under Diagnostic Criterion A. Information sources include expert and local knowledge, technical reports and papers, and modelled maps of Essential and General Habitat.	No areas of habitat within the SGCP area are mapped as habitat for priority taxa.
<b>Criterion I</b> Special Biodiversity Values	Areas with Special Biodiversity Values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment.	Under this criterion for the Brigalow Belt bioregion, vegetation along the range in the west is mapped as having State significance. A small patch of vegetation mapped as having State significance also occurs along the northern stretches of Alpha Creek, although most vegetation associated with this creekline is mapped as having regional significance. Under this criteria for the desert uplands bioregion, areas of biodiversity significance occur in the centre and western sections of the mine survey area and patchily throughout the ( <b>Appendix A</b> ).



**Table 3 BAMM Results for Remnant Units within the SGCP (cont)**

BAMM Criterion	Description	Discussion
<b>Supplementary Criteria</b>		
<b>Criterion J</b> Corridors	Areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity including regrowth, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".	Under this criterion for the Brigalow Belt bioregion, vegetation along the range in the west is mapped as having State significance along with vegetation immediately fringing Alpha Creek. State significant vegetation also occurs in the north east of the mine survey area. Other vegetation associated with Alpha Creek is mapped as having a regional significance. The infrastructure corridor survey area has small patches of regional significance. The infrastructure corridor survey area contains one listed corridors in the desert upland bioregion ( <b>Appendix A</b> ).
Biodiversity Significance	The overall biodiversity significance of remnant units evaluated by integrating diagnostic criteria (A–G).	Large contiguous vegetation in the west is mapped as having State Biodiversity Significance. Vegetation along Alpha Creek is also considered to be of State Biodiversity Significance; however, it is accompanied by areas mapped as having regional Biodiversity Significance. Fragments with local Biodiversity Significance are largely restricted to the north-east and north-west. Approximately half of the infrastructure corridor survey area is mapped as regional biodiversity significance, with some small patches of state and local significance ( <b>Appendix A</b> ).

#### 4.3 DATABASE SEARCHES

Searches of the following databases were undertaken:

- EPBC Act Protected Matters Search Tool;
- DERM Wildlife Online (Wildnet);
- Birds Australia Atlas; and
- Queensland Museum.

These searches identified a number of threatened plant and animal species that may potentially occur within the SGCP area. Of the species and communities identified by the searches, those that were deemed potentially present, even if unlikely, were assessed. It should be noted that the EPBC Act Protected Matters Search Tool includes predictive records, and may therefore include species that may not be known from the area within the search boundaries.

Based on the habitats present and the inferred distributional range of species retrieved in the searches, each species was assigned a likelihood of presence within the SGCP area. These likelihood designations were defined as follows:

- Unlikely:
  - where there are no local records of the species and the SGCP area contains no suitable habitat.
- Possible:
  - where either suitable habitat or local records were present;
  - where potential habitat was widespread but specific habitat features were absent; or
  - where suitable habitat was present but very limited in extent.
- Likely:
  - where there were both local records and suitable habitat for the species.

Threatened species confirmed to occur in the SGCP area, and the likelihood of occurrence of non-recorded species, are presented in **Table 10** and **Table 14** for flora and fauna, respectively. Threatened or near threatened flora and fauna species that are considered likely or confirmed to occur in the SGCP area are discussed in further detail in **Section 6.1.5**, **Section 6.1.6** and **Section 6.2.4**.

The EPBC Act Protected Matters Search Tool showed three TECs listed under the EPBC Act as potentially present within the SGCP area:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) - endangered;
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin - endangered; and
- Weeping Myall Woodlands - endangered.

The presence/absence of these TECs was determined during vegetation community field assessments and mapping (**Section 6.1**).

The SGCP area is not near any World Heritage region. The SGCP area is within the same catchment as Shoalwater and Corio Bays, which are listed as a Wetland of International Importance (i.e. Ramsar-listed wetland). Groundwater and surface water will be assessed separately as part of the EIS process, with mitigation and management measures proposed as relevant.

#### 4.4 PREVIOUS ECOLOGICAL ASSESSMENTS

Several terrestrial flora and fauna assessments have been conducted in the region as part of EISs prepared for nearby mining proposals. These assessments include the following:

- Alpha Coal Project Flora and Fauna Assessment (AARC, 2010);
- Alpha Rail EIS Terrestrial Ecology (GHD, 2010);
- Kevin's Corner Project Terrestrial Flora and Fauna Assessment (AARC, 2011);
- Report for Alpha Coal Project (Rail) Supplementary Environmental Impact Statement Terrestrial Ecology (GHD, 2011); and
- Waratah Coal China First Project: Mine Site Terrestrial Flora and Fauna Assessment (Unidel, 2011).

The findings of these assessments provided a regional context for this study.

#### 4.5 GAP ANALYSIS

Prior to undertaking detailed field assessments, background data was gathered from a variety of sources including public databases, aerial photos and images, planning documents, RE maps and previous studies. Existing information sources were critically assessed in terms of their contribution to the study. Sources that were reviewed as part of this assessment are indicated in **Table 4**, which includes an evaluation of the relevance and reliability of information sources. It should be noted that the evaluation is provided as a guide only as some studies may be highly reliable and relevant for some ecological values, but low for others. For example, a study may have highly reliable amphibian, reptile and bird records, but poor bat records due to inadequate sampling techniques. These gaps and omissions are presented in **Table 5**.

The field surveys undertaken by MET Serve as part of this study represent the only site-specific data collection to date in the area. No publically available detailed studies that would be suitable for inclusion in an EIS have previously been conducted within the SGCP area.

**Table 4 Evaluation of Background Sources**

Data Source	Search Area	Reliability	Relevance
WildNet (DERM online database)	SGCP area boundaries and immediate surrounds	Moderate/high	Moderate
Birds Australia Atlas (1998–2008)	SGCP area boundaries and immediate surrounds	High	Moderate
EPBC Act Protected Matters Search Tool	SGCP area boundaries and immediate surrounds	Low	Low/moderate
Queensland Museum Database	SGCP area boundaries and immediate surrounds	High	Moderate
DERM RE Maps	SGCP area boundaries and immediate surrounds	Moderate/high	High
BPA: Brigalow Belt (v1.3)	SGCP area boundaries and immediate surrounds	Moderate/high	High

**Table 5 Gaps in Existing Ecological Knowledge of the SGCP Area**

Gap Type	Comments	Action Undertaken
Spatial gap	Database searches are based on a broad area. Results are unlikely to include records directly from the SGCP area, as limited survey work has been undertaken in this exact area.	Detailed ecological work throughout remnant and non-remnant vegetation in the SGCP area was undertaken. Data collection focussed on important habitats or areas likely to be disturbed by proposed activities.
Taxonomic gap	Database records indicate that there are no obvious taxonomic gaps with regard to species groups, with representative species from all major classes having records from within the local area.	Systematic surveys for both flora and vertebrates were undertaken. This included survey methods that sampled for all terrestrial vertebrate groups.
Ecological gaps	With the lack of detailed site-specific data, no habitat or vegetation types have been considered in detail.	Systematic survey work was undertaken and ensured that all identified vegetation types and vertebrate habitat types were sampled.
Topographic gaps	For much of the SGCP area, topographical features are relatively uniform—predominantly undulating plains. However, creek lines dissect these areas and there are also jump-ups and in-filled basins of laterite. Significantly, there is a mountain range dominating the south-western portion of the SGCP area.	Surveys included some sampling within all topographical features, including riparian zones, jump-ups and in-filled basins and mountain ranges.
Temporal and climatic gaps	No previous ecological studies have taken place within the SGCP area.	Five surveys were carried out over three years and included both wet and dry seasons.
Reporting gaps and inconsistencies	No ecological reports have been prepared for the SGCP area.	This report was prepared following the collection of field data and outlines the methods used to gather information as well as the results of the assessment.

## 5 FIELD ASSESSMENT METHODOLOGY

### 5.1 VEGETATION COMMUNITIES AND FLORA SPECIES

Field assessments were conducted using best practice botanical sampling and methodologies (Department of Environment and Conservation [DEC], 2004; Neldner *et al.*, 2005), concomitant with the spatial extent of habitats present. The aim of this approach was to yield data of a high standard—including accurate vegetation mapping—suitable for use as a supporting document for an EIS. Survey techniques encompassed community-level vegetation assessments as well as threatened and near threatened species searches within specific habitats.

#### 5.1.1 Survey Timing and Conditions

Wet and dry season flora surveys were conducted within the mine survey area during 2009. The first survey was conducted towards the end of the wet season from 14 to 20 April 2009. High rainfall events, primarily in February 2009 (148.4 millimetres [mm] total) contributed to considerable vegetation growth, and facilitated the widespread flowering of numerous grass species. Survey activities focused on rapid verification of community types across the mine survey area and on the collection of floristic data for species more readily identifiable during the favorable conditions.

A dry season survey was conducted within the mine survey area from 19 to 25 October 2009. Survey activities focused on the collection of structural data and targeted searches for threatened or 'near threatened' species readily identifiable regardless of prevailing dry season conditions.

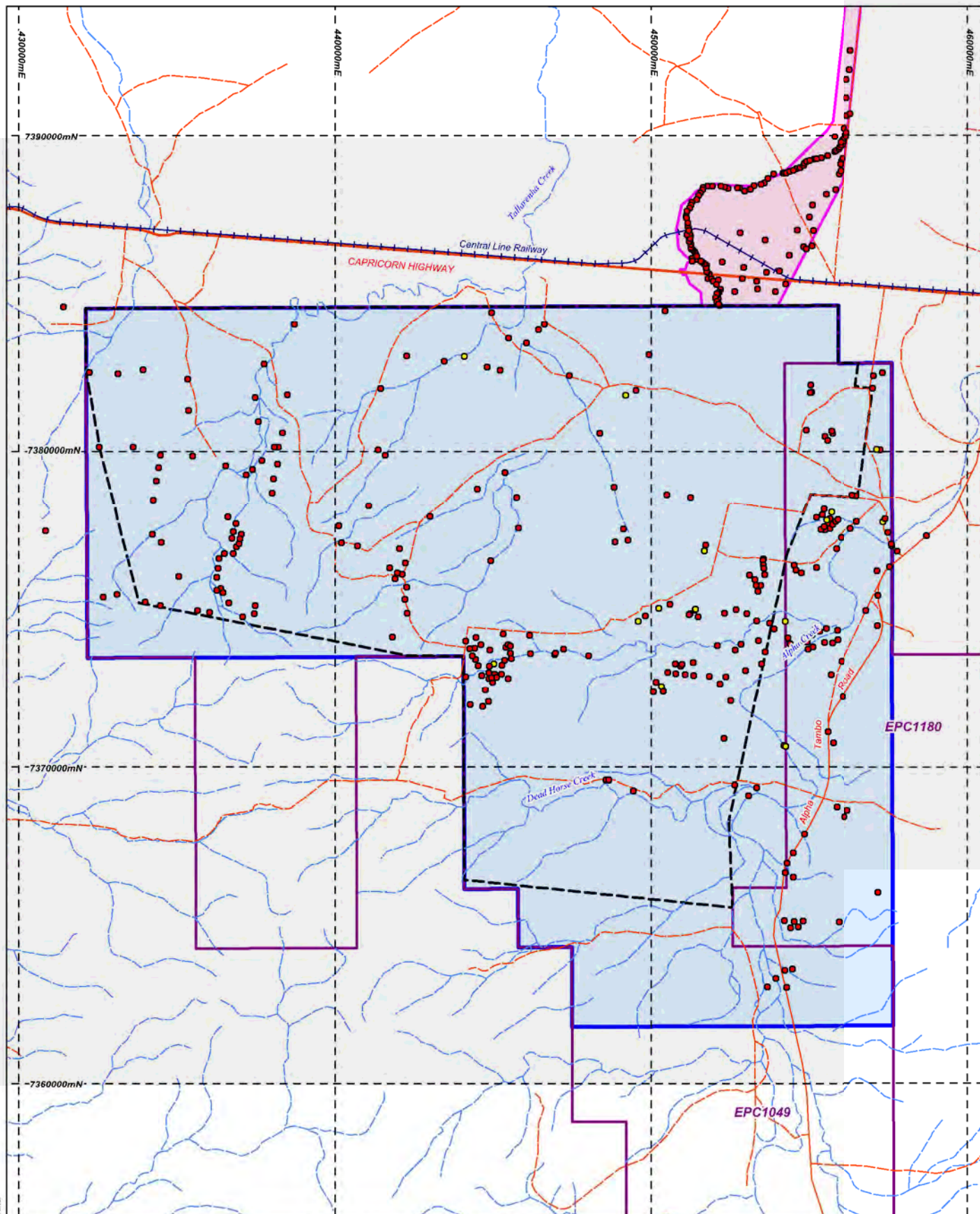
Two additional flora surveys, the first from 18 May to 1 June 2011 and the second from 19 to 23 September 2011, were conducted to assess vegetation in the proposed infrastructure corridor. Despite the surveys being undertaken during the dry season, widespread flooding over the previous January-February ensured most understorey grasses and herbs continued to be in an actively growing state. Furthermore, most species still retained fertile material, allowing for identification.

#### 5.1.2 Quaternary Survey Sites

Quaternary site surveys, using methods specified in Neldner *et al.* (2005), comprised rapid on-ground visual assessments to ground-truth vegetation types and to confirm the location of vegetation map unit boundaries across the SGCP area. These aimed to maximise site coverage, assess the accuracy of RE designations and ascertain the extent of each vegetation unit within the SGCP area. Surveys involved traversing the SGCP area, both by vehicle and on foot. The density of quaternary sites was increased in areas with the highest density of exploratory drill holes, as such locations were considered the most likely to be subject to future vegetation disturbance. Surveys were undertaken at 272 quaternary-level vegetation sites within or adjacent to the mine survey area (**Figure 7**) and 567 quaternary-level vegetation sites within or adjacent to the infrastructure corridor survey area (**Figure 8**). This ensured boundary identifications were accurate and aerial imagery interpretation was effective. Data collected at each quaternary site consisted of:

- site number;
- GPS-derived position;
- general location;
- land unit types present;
- dominant flora in canopy; and
- a qualitative description of the vegetation community structure.





#### LEGEND

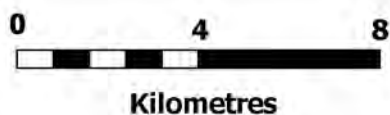
- MLA70453
- Exploration tenement
- Mine survey area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream
- Population centre

#### Vegetation assessment site

- Quaternary
- Secondary

## Alpha Coal Pty Ltd South Galilee Coal Project

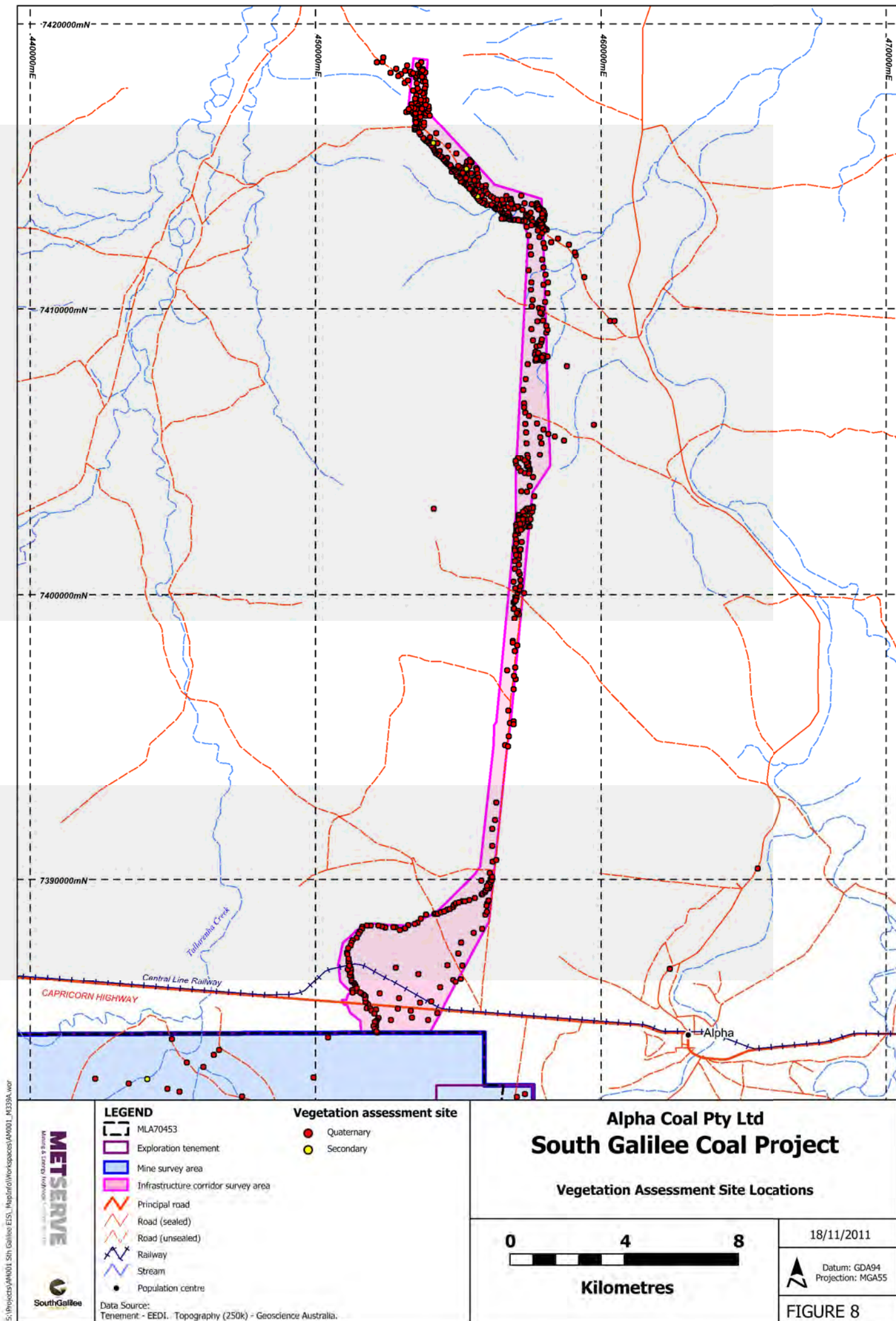
### Vegetation Assessment Site Locations



18/11/2011

Datum: GDA94  
Projection: MGA55

FIGURE 7





### 5.1.3 Secondary Survey Sites

Sixteen secondary sites were assessed within the mine survey area during October 2009, at randomly determined locations within representative vegetation communities identified during the wet season survey (**Figure 7**). In addition, four secondary survey sites were assessed in the infrastructure corridor survey area in May 2011, and two were assessed during September 2011 (**Figure 8**). This data was used as a basis for describing the flora species and vegetation units present within the SGCP area (**Section 6.1**). Surveys focussed on:

- communities likely to be subject to surface disturbance;
- communities of high conservation significance;
- communities poorly described under the RE framework;
- communities whose RE identity was ambiguous;
- areas of vegetation that were not mapped as REs but had the potential to meet the criteria for remnant vegetation; and
- areas of vegetation that were mapped as remnant vegetation but appeared to be regrowth.

A 50 m x 10 m plot was used for the assessment of vegetation communities at each secondary survey site. Within these plots, the following attributes were measured following methodology outlined in Nelder *et al.* (2005): height and percentage cover of each vegetation layer; soil characteristics; species richness; dominant species; stem density and basal area of woody vegetation; amount of litter and woody material on the ground; and level of disturbance. For species not easily identified in the field, specimens were collected, pressed and subsequently examined and identified with the aid of more extensive literature. Specimens with unresolved identities were submitted to the Queensland Herbarium for positive identification.

### 5.1.4 Vegetation Mapping

Results from secondary and quaternary field surveys were used to produce a vegetation map of the SGCP area. Maps were produced using the MapInfo Professional® v10 GIS software package. For each mosaic polygon, a field-verified estimation of the percentage of each RE unit present was recorded. This enabled mosaic polygons to be incorporated into calculations of the total areas covered by each RE within the SGCP area (presented in **Section 7**).

### 5.1.5 Targeted Surveys

Site selection for targeted surveys consisted of a stratified random sampling design for flora consistent with the DEC (2004) methods. Two types of survey were conducted:

- intensive systematic searches along parallel transects of approximately 50 m intervals; and
- targeted searches of potential habitat of flora species.

Surveys were undertaken on foot with survey effort informed by the DEC (2004) guidelines. Searches were conducted at a slow walking pace, examining the vegetation stratum relevant to each target species. The span of the search area varied from 2–5 m width, depending on vegetation structure and visibility.

## 5.2 TERRESTRIAL VERTEBRATES

### 5.2.1 Survey Timing

An initial pilot survey was conducted on 11 - 14 March 2009 to select sites for trapping surveys. Trapping surveys were conducted within the mine area from 14 - 19 October 2009 and 26 April - 3 May 2010. Trapping was conducted within the infrastructure corridor from 18 May - 1 June 2010. Incidental fauna sightings were also recorded during flora surveys.

### 5.2.2 Site Selection

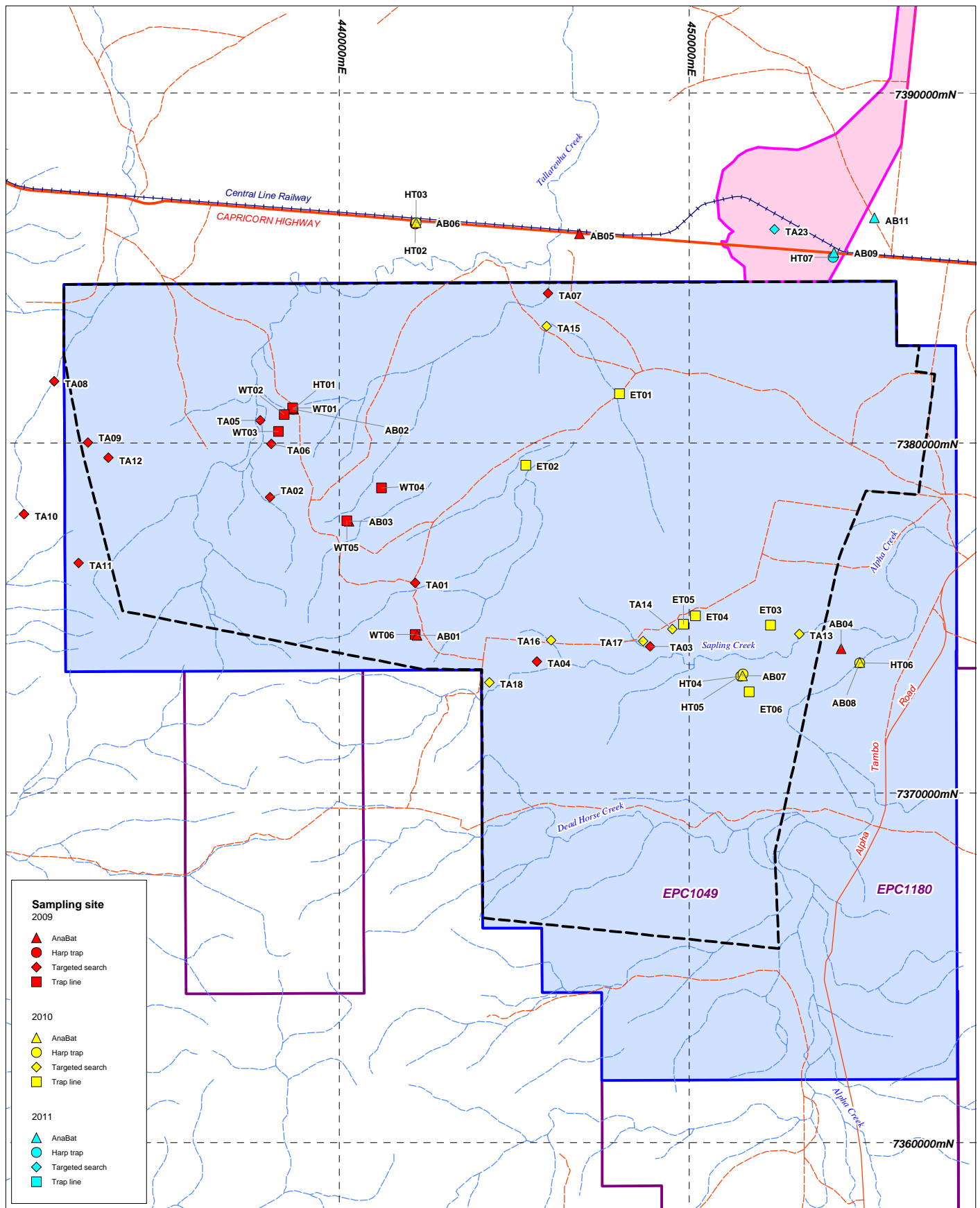
Terrestrial vertebrate survey methods aimed to maximise the number of species identified and locate threatened species. Surveys were conducted over a broad spectrum of habitats present within the SGCP area. Initial field inspection of the SGCP area in March 2009 (Matrixplus, 2009) resulted in the categorisation of landscapes and habitats into the following six types:

- Brigalow woodland on cracking clays;
- Eucalypt woodland with grassy ground cover;
- Eucalypt woodland with a low mixed shrub layer (including *Callitris*);
- Eucalypt woodland with spinifex (*Triodia* spp.) ground cover;
- Lancewood woodland on stony soil; and
- Paperbark woodland.

Twelve sampling sites within the mine survey area and six sampling sites within the infrastructure corridor survey area were selected (**Figure 9** and **Figure 10**). The October 2009 (dry season) survey focused on six sampling sites within the western portion of the mine survey area, called Western 1–6. The April 2010 (wet season) survey focused on six sites in the eastern section of the mine survey area (Eastern 1–6). The May 2011 (dry season) survey within the infrastructure corridor survey area assessed the sites Corridor 1-6.

Trapping sites were supplemented by a number of targeted search sites. Targeted search sites involved visual searches for vertebrates during daylight hours, and while no trapping was carried out, target sites served to increase spatial data and allowed data collection from habitats not included in the above list (e.g. waterbodies). **Table 6** provides a brief description of each survey site, and more detailed descriptions are provided in **Appendix B**.





Sampling site	
2009	
▲	AnaBat
●	Harp trap
◆	Targeted search
■	Trap line
2010	
▲	AnaBat
●	Harp trap
◆	Targeted search
■	Trap line
2011	
▲	AnaBat
●	Harp trap
◆	Targeted search
■	Trap line

#### LEGEND

- MLA70453
- Exploration tenement
- Mine survey area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

Data Source:  
EPC Tenement - EEDI. Topography (250k) - Geoscience Australia.

## Alpha Coal Pty Ltd South Galilee Coal Project

### Vertebrate Sampling Locations

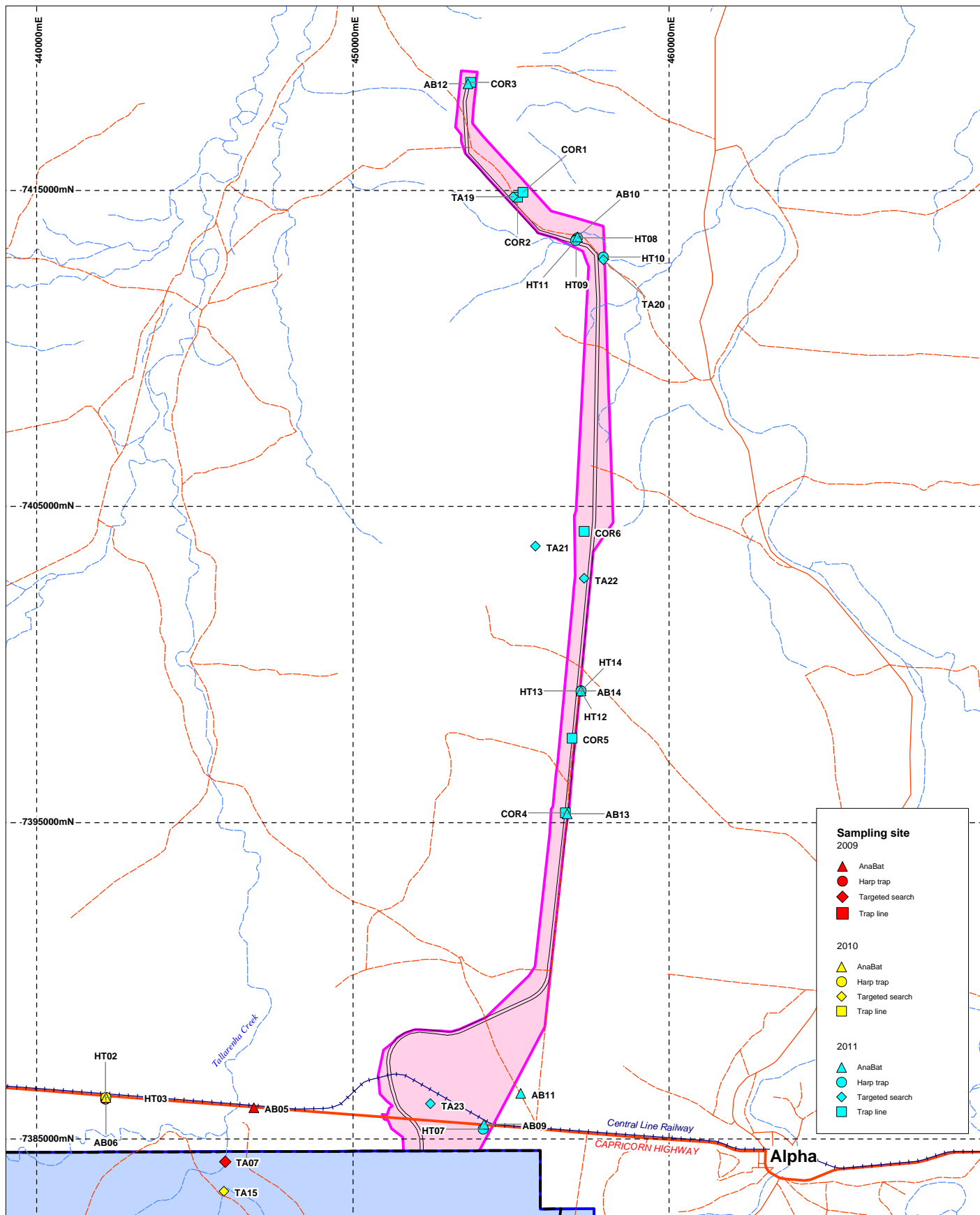


Scale: 1:150,000 (A4)

25/11/2011

Datum: GDA94  
Projection: MGA55

FIGURE 9



**Sampling site**

**2009**

- AnaBat (red triangle)
- Harp trap (red circle)
- Targeted search (red diamond)
- Trap line (red square)

**2010**

- AnaBat (yellow triangle)
- Harp trap (yellow circle)
- Targeted search (yellow diamond)
- Trap line (yellow square)

**2011**

- AnaBat (cyan triangle)
- Harp trap (cyan circle)
- Targeted search (cyan diamond)
- Trap line (cyan square)

**LEGEND**

- MLA70453
- Exploration tenement
- Mine survey area
- SGCP infrastructure corridor
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

Data Source:  
EPC Tenement - EEDI. Topography (250k) - Geoscience Australia.

# Alpha Coal Pty Ltd South Galilee Coal Project

## Vertebrate Sampling Locations



Scale: 1:300,000 (A4)

25/11/2011

Datum: GDA94  
Projection: MGA55

**FIGURE 10**

**Table 6 Fauna Survey Sites**

Site Name	Site Type	Latitude	Longitude	Habitat notes
<b>October 2009 Survey</b>				
Western 1 (WT01)	Trap line	-23.68063	146.39844	Lancewood ( <i>Acacia shirleyi</i> ) with sparse groundcover on stony soil
Western 2 (WT02)	Trap line	-23.68237	146.39613	Open woodland of Silver-leaved Ironbark ( <i>Eucalyptus melanophloia</i> )
Western 3 (WT03)	Trap line	-23.68669	146.39441	Brigalow ( <i>Acacia harpophylla</i> )
Western 4 (WT04)	Trap line	-23.70136	146.42322	Silver-leaved Ironbark with native grass groundcover
Western 5 (WT05)	Trap line	-23.70979	146.41353	Sparse trees with good groundcover
Western 6 (WT06)	Trap line	-23.73921	146.4325	Spinifex ( <i>Triodia</i> spp.) on sand
AB01	AnaBat site	-23.73946	146.43309	Desert Bloodwood ( <i>Corymbia brachycarpa</i> ) shrubby woodland on sand
AB02	AnaBat site	-23.68098	146.39872	Rusty Jacket ( <i>Corymbia leichhardtii</i> ) open woodland at the base of sandstone range
AB03	AnaBat site	-23.70988	146.41407	Silver-leaved Ironbark and mixed <i>Corymbia</i> woodland with native grass groundcover
AB04	AnaBat site	-23.74327	146.55203	Poplar Box ( <i>Eucalyptus populnea</i> ), Silver-leaved Ironbark and White Cypress Pine ( <i>Callitris glaucophylla</i> ) grassy open woodland
AB05	AnaBat site	-23.63597	146.47911	Poplar Box and Silver-leaved Ironbark grassy open woodland without White Cypress Pine
HT01	Harp site	-23.68099	146.39853	Rusty Jacket open woodland at the base of sandstone range
HT02	Harp site	-23.63328	146.43307	Poplar Box and Silver-leaved Ironbark grassy open woodland without White Cypress Pine
Target 1 (TA01)	Target site	-23.72595	146.43257	Poplar Box and Silver-leaved Ironbark grassy open woodland without White Cypress Pine near a farm dam
Target 2 (TA02)	Target site	-23.70365	146.39194	Brigalow shrubby open forest on residual alluvium of clayey sands
Target 3 (TA03)	Target site	-23.74259	146.49846	Poplar Box thinned woodland around a farm dam
Target 4 (TA04)	Target site	-23.74629	146.46662	Mixed Brigalow, Forest Red Gum ( <i>Eucalyptus tereticornis</i> ) and Silver-leaved Ironbark woodland to open forest ecotone
Target 5 (TA05)	Target site	-23.68381	146.38933	Brigalow shrubby open forest on residual alluvium of clayey sands
Target 6 (TA06)	Target site	-23.68982	146.39246	Brigalow shrubby open forest on residual alluvium of clayey sands
Target 7 (TA07)	Target site	-23.65134	146.47015	Silver-leaved Ironbark with native grass groundcover near a farm dam
Target 8 (TA08)	Target site	-23.67346	146.33167	Desert Bloodwood and Silver-leaved Ironbark shrubby to grassy woodland on sand
Target 9 (TA09)	Target site	-23.68932	146.34103	Lancewood low open woodland with sparse understorey
Target 10 (TA10)	Target site	-23.70767	146.32299	Lancewood low open woodland with sparse understorey
Target 11 (TA11)	Target site	-23.72042	146.33818	Gum Top Ironbark ( <i>Eucalyptus decorticans</i> ) tall sparse open woodland on sandstone
Target 12 (TA12)	Target site	-23.69327	146.3467	Desert Bloodwood shrubby woodland on sand

**Table 6 Fauna Survey Sites (cont)**

Site Name	Site Type	Latitude	Longitude	Habitat notes
<b>April 2010 Survey</b>				
Eastern 1 (ET01)	Trap line	-23.67724	146.490067	Small patch of open woodland with heavy infestation of Buffel Grass ( <i>Cenchrum ciliare</i> ) and no midstorey
Eastern 2 (ET02)	Trap line	-23.695599	146.463776	Small patch of open woodland with native grass groundcover and sparse midstorey
Eastern 3 (ET03)	Trap line	-23.73716	146.532227	Brigalow with good groundcover and midstorey
Eastern 4 (ET04)	Trap line	-23.734644	146.5112	Melaleuca swamp
Eastern 5 (ET05)	Trap line	-23.73683	146.507828	Rocky jump-up area with eucalypts, Spinifex and midstorey
Eastern 6 (ET06)	Trap line	-23.754299	146.526138	Stand of White Cypress surrounded by eucalypt woodland. Excellent groundcover and structural diversity
HT03	Harp site	-23.632864	146.433258	Woodland with good groundcover and midstorey
HT04	Harp site	-23.750362	146.523788	Creek in rocky jump-up with white cypress
HT05	Harp site	-23.749765	146.52449	Road in rocky jump-up with white cypress
HT06	Harp site	-23.747002	146.557281	Riparian corridor along Alpha Creek
AB06	AnaBat site	-23.632879	146.433243	Woodland with good groundcover and midstorey
AB07	AnaBat site	-23.750164	146.524338	Road in rocky jump-up with white cypress
AB08	AnaBat site	-23.746807	146.557236	Riparian corridor along Alpha Creek
Target 13 (TA13)	Target site	-23.739473	146.540268	Artificial dam in a small patch of sparse vegetation
Target 14 (TA14)	Target site	-23.738121	146.50473	Brigalow with good groundcover and midstorey
Target 15 (TA15)	Target site	-23.659792	146.469727	Large water body with emergent trees
Target 16 (TA16)	Target site	-23.740805	146.470612	Artificial dam surrounded by paddock with Buffel Grass
Target 17 (TA17)	Target site	-23.74118	146.49646	Water body surrounded by sparse forest
Target 18 (TA18)	Target site	-23.751726	146.453262	Medium-sized patch of vegetation with diverse range of habitats (e.g. Spinifex, forest, Brigalow)
<b>May 2011 Survey</b>				
Corridor 1 (COR1)	Trap line	-23.374621	146.563391	Brigalow with a dense groundcover of Buffel Grass
Corridor 2 (COR2)	Trap line	-23.376014	146.561688	<i>Eucalyptus cambageana</i> -dominated grassy woodland on a low rocky ridge
Corridor 3 (COR3)	Trap line	-23.343187	146.547247	Dense grassland dominated by <i>Themeda triandra</i> and <i>Heteropogon contortus</i> , with scattered <i>Eucalyptus melanophloia</i> , on sandy alluvial flats
Corridor 4 (COR4)	Trap line	-23.551972	146.57591	<i>Eucalyptus populnea</i> -dominated grassy woodland on sandy loam
Corridor 5 (COR5)	Trap line	-23.530712	146.578104	<i>E. melanophloia</i> -dominated grassy woodland on sandy loam, with nearby dam
Corridor 6 (COR6)	Trap line	-23.471574	146.581937	Boundary between <i>E. melanophloia</i> -dominated grassy woodland and a <i>Eucalyptus coolabah</i> -dominated ephemeral wetland



**Table 6 Fauna Survey Sites (cont)**

Site Name	Site Type	Latitude	Longitude	Habitat notes
<b>May 2011 Survey</b>				
HT07	Harp site	-23.642298	146.550106	Track along fence line in <i>E. melanophloia</i> -dominated woodland
HT08	Harp site	-23.387647	146.580138	Sandy creek line with small pools in <i>E. melanophloia</i> -dominated woodland with a dense understorey of <i>Callitris glaucophylla</i>
HT09	Harp site	-23.388224	146.579739	Sandy creek line with small pools in <i>E. melanophloia</i> -dominated woodland with a dense understorey of <i>Callitris glaucophylla</i>
HT10	Harp site	-23.393231	146.5882	Dry, sandy creek line through <i>Eucalyptus camaldulensis</i> -dominated riparian woodland with understorey of <i>C. glaucophylla</i> .
HT11	Harp site	-23.388503	146.579591	Sandy creek line with small pools in <i>E. melanophloia</i> -dominated woodland with a dense understorey of <i>Callitris glaucophylla</i>
HT12	Harp site	-23.517313	146.580894	Track along fence line in <i>E. melanophloia</i> -dominated grassy woodland
HT13	Harp site	-23.517078	146.580804	Track along fence line in <i>E. melanophloia</i> -dominated grassy woodland
HT14	Harp site	-23.517144	146.5809	Track along fence line in <i>E. melanophloia</i> -dominated grassy woodland
AB09	AnaBat site	-23.640934	146.550338	Track along fence line in <i>E. melanophloia</i> -dominated woodland
AB10	AnaBat site	-23.387481	146.580135	Sandy creek line with small pools in <i>E. melanophloia</i> -dominated woodland with a dense understorey of <i>Callitris glaucophylla</i>
AB11	AnaBat site	-23.632053	146.561762	<i>E. melanophloia</i> -dominated open woodland
AB12	AnaBat site	-23.343541	146.54638	Dense grassland dominated by <i>Themeda triandra</i> and <i>Heteropogon contortus</i> , with scattered <i>Eucalyptus melanophloia</i> , on sandy alluvial flats
AB13	AnaBat site	-23.552194	146.576419	<i>Eucalyptus populnea</i> -dominated grassy woodland on sandy loam
AB14	AnaBat site	-23.517144	146.5809	Track along fence line in <i>E. melanophloia</i> -dominated grassy woodland
Target 19 (TA19)	Target site	-23.375898	146.560333	Small dam with grassy edges
Target 20 (TA20)	Target site	-23.393941	146.588198	Dry, sandy creek line through <i>Eucalyptus camaldulensis</i> -dominated riparian woodland with understorey of <i>C. glaucophylla</i>
Target 21 (TA21)	Target site	-23.475734	146.566816	Well-developed stand of Brigalow-Belah on black-cracking clay with gilgais
Target 22 (TA22)	Target site	-23.484999	146.581944	Dense shrub layer dominated by White Cypress Pine and dead finish ( <i>Archidendropsis basaltica</i> ) with some emergent Eucalypt species and dead trees
Target 23 (TA23)	Target site	-23.634971	146.533756	Open woodland dominated by <i>Corymbia</i> spp., <i>Eucalyptus</i> spp. and Budgeroo ( <i>Lysicarpus angustifolius</i> ), with <i>Triodia</i> -dominated understorey

### 5.2.3 Survey Methods and Effort

Systematic vertebrate survey techniques were used (e.g. DEC, 2004). Methods and effort are detailed below and summarised in **Table 7**.

#### 5.2.3.1 *Elliott Traps*

Elliott traps were used to target small terrestrial mammals at each systematic survey site. Between 20 and 25 size A Elliott traps were positioned approximately 10 m apart along each pitfall trap line. Traps were baited with a mixture of peanut butter, rolled oats, honey and vanilla essence. Elliott traps were opened in the late afternoon and checked and closed each morning. This was repeated for four nights at each sampling site. The October 2009 survey involved 625 Elliott trap-nights, the April 2010 survey involved 500 Elliott trap-nights and the May 2011 survey involved 584 Elliott trap-nights.

#### 5.2.3.2 *Pitfall Trap Lines*

Pitfall traps (20 litres) were used to target small terrestrial vertebrates. A drift fence 30 cm high was spread between each pitfall trap and used to direct animals into the traps. In the 2009 and 2010 surveys, five buckets were installed per trap line, and six were installed in 2011, resulting in a total of 480 pitfall trap-nights.

#### 5.2.3.3 *Funnel Traps*

Funnel traps were placed along the pitfall trap drift fence. In the 2009 and 2010 surveys, funnel traps were placed at each end of the drift fence, with one trap on either side of the fence, for a total of four funnel traps per trap line. In 2011, the number of funnel traps was raised to eight per trap line. Funnel traps were checked in the early morning and late afternoon. Funnel trap lines were open for five nights at each sampling site, giving 480 funnel trap-nights across the entire study.

#### 5.2.3.4 *Harp Traps*

Harp traps were used to sample microchiropteran communities and were located in thick vegetation in potential bat flyways such as creeks and roads. Suitable flyways within the SGCP area were rare due to low vegetation density. Trapping was thus restricted to a small number of locations. Harp traps were opened each evening and checked at first light each morning.

#### 5.2.3.5 *Bat Call Detection*

An AnaBat SD1 bat detection unit (AnaBat) was used to capture the echolocation calls of insectivorous bat species active during the survey. At each AnaBat site, the unit was left unattended overnight, thereby ensuring peak activity periods were sampled.

Many insectivorous bat species have similar calls and cannot be identified using current AnaBat technology, thus the results were used to augment harp-trapping data.

#### 5.2.3.6 *Diurnal Bird Surveys*

At each sampling site, surveys of bird species were undertaken during the early morning period (i.e. before 10 am) over at least two days. Bird species were detected by direct observation or by call. Additional bird records were collected during random searches of habitats, while undertaking other trapping/observational methods, and in locations where alternative habitats were present (e.g. waterbodies) or where suitable habitat for cryptic or rare species was located.

#### 5.2.3.7 Targeted Searches

Targeted searches involved intensive investigation of potential shelter sites such as logs, rocks, leaf litter and within rock crevices. High use areas such as tracks, caves, overhangs and around tree bases were also investigated for animal signs (e.g. scats, prints, owl pellets, feeding remains, etc.). Search duration depended on habitat complexity, with areas of abundant fallen timber, rocks and debris searched for longer than simple habitats. Active searching for approximately 30 minutes was undertaken at least once within and around each trap line sampling site. In addition to the trap line sites, targeted searches were also carried out in areas of favourable habitat (i.e. 'target sites' in **Table 6**).

#### 5.2.3.8 Nocturnal Surveys

Nocturnal surveys for frogs, reptiles, bird and mammals were undertaken using a combination of high-powered spotlights and head torches. Spotlights were used either while traversing the SGCP area at night in vehicle, or on foot with the aid of batteries. Head torches were used while on foot and allowed searching of small crevices, tree hollows and similar habitat features. In 2009 and 2010, a nocturnal search of approximately one hour's duration was conducted on foot at each trap line. In 2011, nocturnal surveys were carried out along roads throughout and adjacent to the infrastructure corridor.

#### 5.2.3.9 Opportunistic Records

Throughout the survey, fauna observations were undertaken opportunistically within or adjacent to the SGCP area. These observations were included in the fauna species list.

**Table 7 Fauna Survey Methods and Effort**

Survey Method	Survey Effort					Targeted Species
	March 2009	October 2009	April 2010	May 2011	September 2011	
Elliott traps	–	625 trap-nights	500 trap-nights	584 trap-nights	-	Small terrestrial mammals (e.g. rodents, dasyurid mammals)
Pit-fall trap lines	–	150 trap-nights	150 trap-nights	180 trap-nights	-	Small snakes, skinks, geckos, legless lizards, dragons, frogs, small rodents, dasyurid mammals (e.g. dunnarts, planigales)
Funnel traps	–	120 trap-nights	120 trap-nights	240 trap-nights	-	As per pit-fall buckets, plus larger snakes, goannas and dragons
Harp traps	–	8 trap-nights	8 trap-nights	16 trap-nights	-	Microbats
Anabat detector	–	5 nights	3 nights	6 nights	-	Microbats
Targeted searches	2 days	5 days	5 days	4 days	4 days	Birds, larger mammals (e.g. kangaroos, wallabies), diurnal lizards (e.g. dragons, goannas), large snakes, calling frogs

**Table 7 Fauna Survey Methods and Effort (cont)**

Survey Method	Survey Effort					Targeted Species
	March 2009	October 2009	April 2010	May 2011	September 2011	
Spotlighting	–	45 min x 5 nights	90 min x 5 nights	45 min x 4 nights	45 min x 1 night	Nocturnal reptiles (e.g. snakes, geckos, legless lizards), frogs, arboreal mammals (e.g. gliders, possums), nocturnal birds (e.g. owls, frogmouths, nightjars)
Opportunistic	-	opportunistic	opportunistic	opportunistic	-	All taxa



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## 6 RESULTS

### 6.1 FLORA

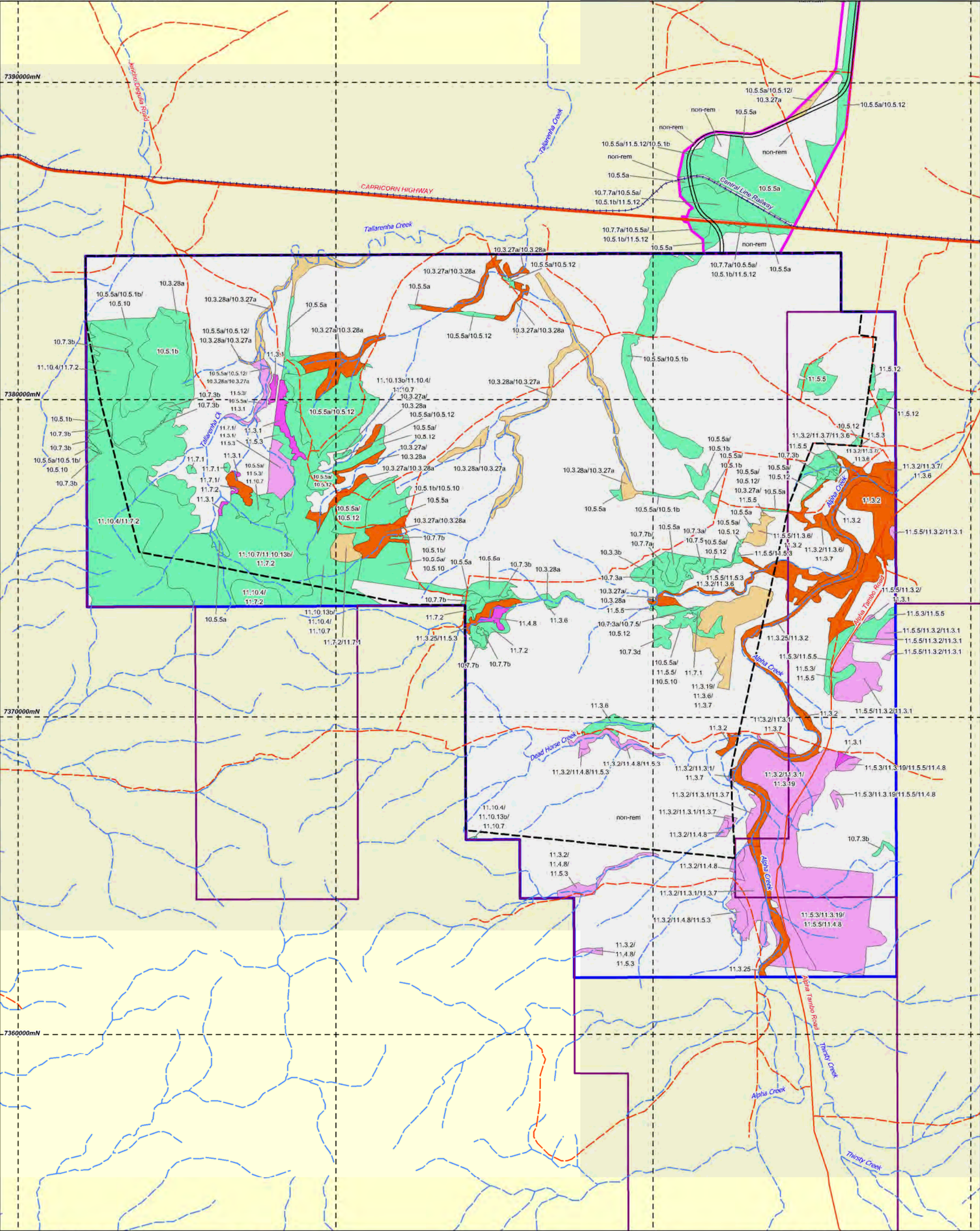
Flora taxonomy within this report follows the Australian Plant Census. Within each section, the first mention of each flora species provides both common and scientific names, thereafter the species is referred to by common name only. A full list of flora species recorded is provided in **Appendix C**.

#### 6.1.1 Vegetation Communities and RE Classification

Field-verified RE mapping found that the SGCP area (**Figure 11, Figure 12, Appendix A**) contains approximately 14,533 ha of remnant vegetation comprised of 33 distinct RE vegetation communities and approximately 32,052 ha non-remnant vegetation (**Table 17**). Field surveys confirmed that the majority of the certified RE mapping was relatively accurate. Refinements to mapping were made as a result of field assessments, including modifications to polygon boundaries and changes to the designations of many communities. Mapping accuracy for the certified dataset was highest for vegetation communities that made up a large percentage of a mosaic RE polygon. Often, those communities constituting a small proportion of a polygon were not observed to be present. Rarely, entire polygons were mislabelled as one RE when they were in fact another. For example, an area incorrectly mapped as Brigalow (*Acacia harpophylla*) (RE 11.3.1) was actually dominated by Bendee (*Acacia catenulata*).

Two REs of the 33 REs present in the SGCP area are listed as endangered under the EPBC Act. These listed communities account for 4% of the total remnant vegetation within the SGCP survey area, with approximately 579 ha proposed to be impacted by the SGCP.





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**LEGEND**

- MLA70453
- Exploration tenement
- SGCP infrastructure rail corridor
- Mine survey area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

Data Source:  
Tenement - EEDl, Topography (250k) - Geoscience Australia, BPA (2003) - DERM.

**Biodiversity Status**

- Endangered (dominant)
- Endangered (sub-dominant)
- Of Concern (dominant)
- Of Concern (sub-dominant)
- Not of Concern
- Non-remnant

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**South Galilee Coal Project**

**Field Verified Remnant Vegetation**  
**Regional Ecosystems and Biodiversity Status**

0 5

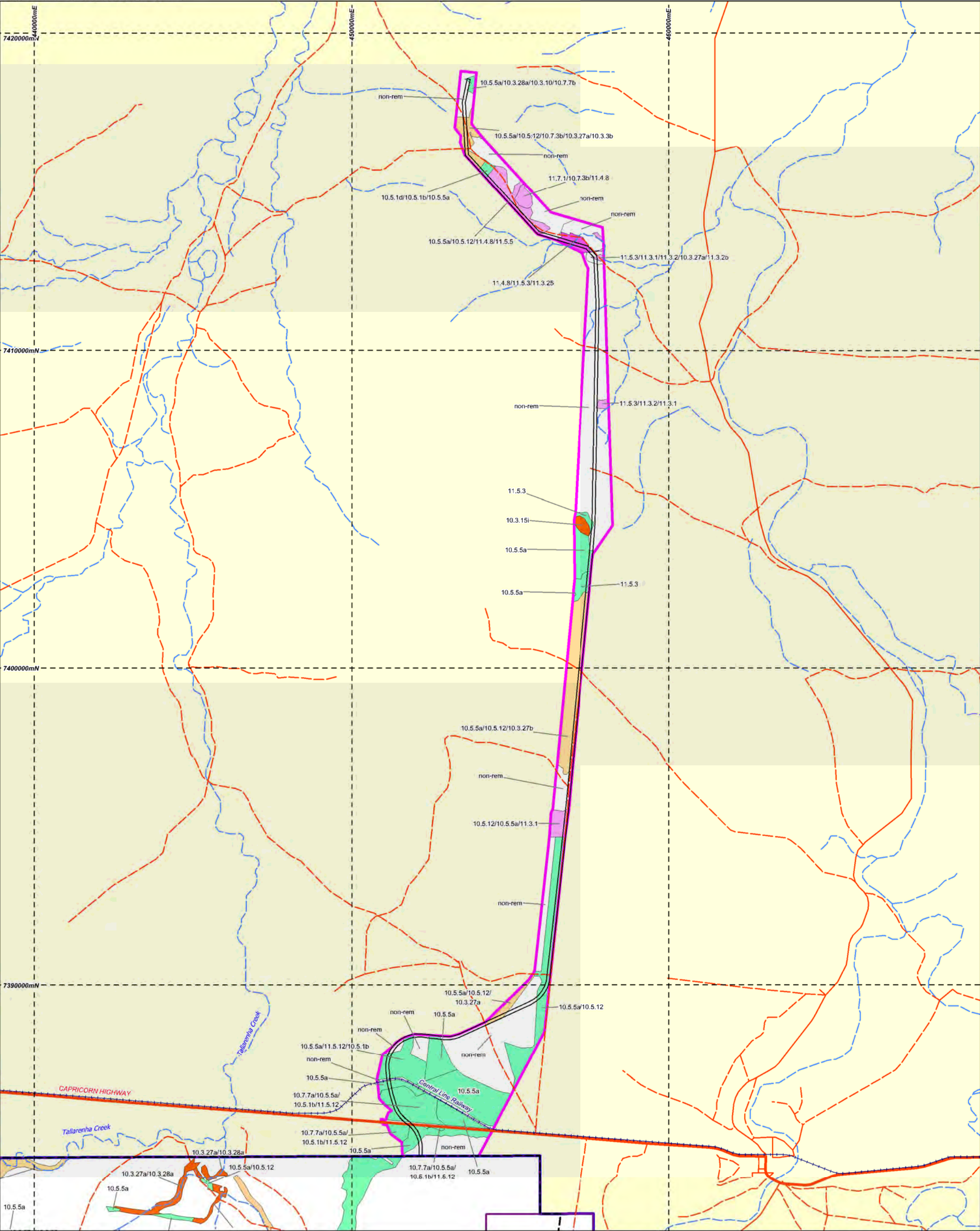
Kilometres

15/11/2011

Datum: GDA94  
Projection: MGA55

**FIGURE 11**







Metserve  
Mining & Energy Technical Services Pty Ltd



SouthGalilee

**LEGEND**

- MLA70453
- Exploration tenement
- SGCP infrastructure rail corridor
- Mine survey area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

Data Source:  
Tenement - EEDI, Topography (250k) - Geoscience Australia, BPA (2003) - DERM.

**Biodiversity Status**

- Endangered (dominant)
- Endangered (sub-dominant)
- Of Concern (dominant)
- Of Concern (sub-dominant)
- Not of Concern
- Non-remnant

**Alpha Coal Pty Ltd**  
**South Galilee Coal Project**

**Field Verified Remnant Vegetation**  
**Regional Ecosystems and Biodiversity Status**

0 5  
Kilometres

15/11/2011

Datum: GDA94  
Projection: MGA55

**FIGURE 12**

**Table 8 RE Vegetation Communities Recorded within the SGCP Area**

RE Vegetation Community	Short Description (REDD)	Extent in Reserves	Status		
			VM Act	Biodiversity Status	EPBC Act
Landzone 3: Alluvial plains					
Dominant or subdominant					
10.3.3b	<i>Acacia harpophylla</i> [Brigalow] low woodland to woodland on alluvium	Low	LC	NOC	–
10.3.15i	<i>Eucalyptus coolabah</i> [Coolibah] dominated Palustrine wetland (e.g. vegetated swamp). Occurs on grey clay soils in closed depressions on Tertiary sandplain or ferricrete	Low	LC	OC	–
10.3.27a	<i>Eucalyptus populnea</i> [Poplar Box] open-woodland to woodland on alluvial plains	Low	LC	OC	–
10.3.28a	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] ± <i>Corymbia dallachiana</i> [Dallachy's Gum] open woodland on sandy alluvial fans	Low	LC	NOC	–
11.3.1	<i>Acacia harpophylla</i> [Brigalow] and/or <i>Casuarina cristata</i> [Belah] open forest on alluvial plains	Low	E	E	E*
11.3.2	<i>Eucalyptus populnea</i> [Poplar Box] woodland on alluvial plains	Low	OC	OC	–
11.3.6	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] woodland on alluvial plains	Low	LC	OC	–
11.3.19	<i>Callitris glaucophylla</i> [White Cypress Pine], <i>Corymbia</i> spp. and/or <i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] woodland on Cainozoic alluvial plains	Low	LC	NOC	–
11.3.25	<i>Eucalyptus tereticornis</i> [Forest Red Gum] or <i>E. camaldulensis</i> [River Red Gum] woodland fringing drainage lines	Low	LC	OC	–
Subdominant only					
10.3.10	<i>Corymbia dallachiana</i> and <i>C. terminalis</i> open woodland on old alluvial plains (western)	Low	LC	NOC	–
10.3.27b	<i>Archidendropsis basaltica</i> [Dead Finish] open-woodland to woodland on alluvial plains	Low	LC	OC	–
11.3.2b	Palustrine wetland (e.g. vegetated swamp). <i>Eucalyptus camaldulensis</i> (sometimes <i>E. populnea</i> and or <i>E. tereticornis</i> ) woodland in drainage depressions. Ground layer of grasses or sedges. Occurs on seasonally inundated drainage depressions	Low	OC	OC	–
11.3.7	<i>Corymbia</i> spp. woodland on alluvial plains	Low	LC	OC	–



**Table 8 RE Vegetation Communities Recorded within the SGCP Area (cont)**

RE Vegetation Community	Short Description (REDD)	Extent in Reserves	Status			
Landzone 4: Gently undulating clay						
Dominant or Subdominant						
11.4.8	<i>Eucalyptus cambageana</i> [Dawson Gum] woodland to open forest with <i>Acacia harpophylla</i> [Brigalow] or <i>A. argyrodendron</i> [Blackwood] on Cainozoic clay plains	Low	E	E	E	E*
Landzone 5: Uniform sand plains						
Dominant or subdominant						
10.5.1b	<i>Corymbia brachycarpa</i> [Desert Bloodwood] ± <i>Corymbia dallachiana</i> [Dallachy's Gum] low open woodland to open woodland on sand plains	Low	LC	NOC		–
10.5.1d	<i>Corymbia setosa</i> dominates the very sparse canopy (6-11 m tall). <i>Grevillea glauca</i> and <i>Petalostigma pubescens</i> are frequently present in the very sparse low trees layer (3-6 m tall). <i>Acacia spp.</i> and <i>Carissa lanceolata</i> dominate the very sparse shrub layer (0.5-2 m tall). The ground layer is usually dominated by <i>Triodia pungens</i> . Occurs on sandplains	Low	LC	NOC		–
10.5.5a	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] ± <i>Corymbia plena</i> [Large-fruited Bloodwood] ± <i>C. dallachiana</i> [Dallachy's Gum] open-woodland on sand plains	Low	LC	NOC		–
10.5.12	<i>Eucalyptus populnea</i> [Poplar Box] open woodland	Low	LC	NOC		–
11.5.3	<i>Eucalyptus populnea</i> [Poplar Box] and/or <i>E. melanophloia</i> [Silver-leaved Ironbark] and/or <i>Corymbia clarksoniana</i> [Clarkson's Bloodwood] on Cainozoic sand plains/remnant surfaces	Low	LC	NOC		–
11.5.5	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark], <i>Callitris glaucophylla</i> [White Cypress Pine] woodland on Cainozoic sand plains/remnant surfaces. Deep red sands	Low	LC	NOC		–
11.5.12	<i>Corymbia clarksoniana</i> [Clarkson's Bloodwood] woodland and other <i>Corymbia</i> spp. and <i>Eucalyptus</i> spp. on Cainozoic sand plains/remnant surfaces	Low	LC	NOC		–
Subdominant only						
10.5.10	<i>Corymbia leichhardtii</i> [Rusty Jacket] open woodland on sand plains	Low	LC	NOC		–

**Table 8 RE Vegetation Communities Recorded within the SGCP Area (cont)**

RE Vegetation Community	Short Description (REDD)	Extent in Reserves	Status			
Landzone 7: Duricrusts and footslopes						
Dominant or subdominant						
10.7.3a	<i>Acacia catenulata</i> [Bendee] ± <i>A. shirleyi</i> [Lancewood], ± <i>Eucalyptus persistens</i> [Mallee Box] ± <i>Corymbia dallachiana</i> [Dallachy's Gum] low woodland on scarps	Medium	LC	NOC	–	
10.7.3b	<i>Acacia shirleyi</i> [Lancewood] ± <i>Eucalyptus exilipes</i> [Fine-leaved Ironbark] low woodland on scarps	Medium	LC	NOC	–	
10.7.3d	<i>Acacia catenulata</i> [Bendee] low woodland on shallow red earths <sup>†</sup>	Medium	LC	NOC	–	
10.7.7a	<i>Melaleuca uncinata</i> [Broom Honey Myrtle] and <i>M. tamariscina</i> [Bushhouse Paperbark] with or without <i>Acacia leptostachya</i> [Slender Wattle] tall open-shrublands on ferricrete	Medium	LC	NOC	–	
10.7.7b	<i>Melaleuca tamariscina</i> [Bushhouse Paperbark] very sparse open-woodland on ferricrete	Medium	LC	NOC	–	
11.7.1	<i>Acacia harpophylla</i> [Brigalow] and/or <i>Casuarina cristata</i> [Belah] and <i>Eucalyptus thozetiana</i> [Mountain Yapunyah] or <i>E. microcarpa</i> [Grey Box] woodland or <i>E. cambageana</i> on lower scarp slopes on lateritic duricrust	Low	LC	OC	–	
11.7.2	<i>Acacia</i> spp. woodland on lateritic duricrust. Scarp retreat zone	Low	LC	NOC	–	
Subdominant only						
10.7.5	<i>Eucalyptus thozetiana</i> [Mountain Yapunyah] open woodland on scarps and on pediments below scarps	Low	LC	NOC	–	
Landzone 10: Coarse-grained sediments						
Dominant or subdominant						
11.10.4	<i>Eucalyptus decorticans</i> [Gum Top Ironbark], <i>Lysicarpus angustifolius</i> [Budgeroo] ± <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp. woodland on coarse-grained sedimentary rocks. Crests and scarps	High	LC	NOC	–	
11.10.7	<i>Eucalyptus crebra</i> [Narrow-leaved Ironbark] woodland on coarse-grained sedimentary rocks	Low	LC	NOC	–	
11.10.13b	<i>Corymbia leichhardtii</i> [Rusty Jacket] woodland on scarps and sandstone tablelands	High	LC	NOC	–	
Total Area (ha)						

**Abbreviations:** MSA = mine survey area, ICSA = infrastructure corridor survey area; Status; **E** = endangered; **OC** = of concern; **NOC** = not of concern; **LC** = Least Concern; **–** = not listed

\*This RE corresponds to the endangered Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC under the EPBC Act as it is dominated by Brigalow (*Acacia harpophylla*).

†This RE subtype is not described in the REDD, but is listed in this report as 10.7.3d as the *Acacia shirleyi* designation is the closest corresponding unit.

### 6.1.2 Other Vegetation Communities

Non-remnant and non-regrowth vegetation communities consisted of grasslands. Extensive areas of the SGCP area were dominated by non-remnant grasslands that were comprised of native species. The most common native species in these areas were Purple Wiregrass, Weeping Mitchell Grass (*Astrebla elymoides*), Redleg Grass, Desert Bluegrass (*Bothriochloa ewartiana*), Silky Oilgrass, Black Spear Grass, and Kangaroo Grass (**Appendix C**). Their condition depended on grazing pressure and varied depending on the amount of recent rain. Extensive areas were also dominated by the invasive exotic perennial Buffel Grass.

### 6.1.3 Threatened Ecological Communities

The EPBC Act Protected Matters Search Tool identified four TECs as being potentially present within the SGCP area. One of these involves species dependent on natural discharge of groundwater from the Great Artesian Basin, and was not considered to be potentially present as the SGCP area lies just outside the Great Artesian Basin.

One of the three potentially present TECs (**Table 9**) - Brigalow (*Acacia harpophylla* dominant and co-dominant)—was confirmed in the SGCP area. This TEC was distributed in units of vegetation within the western, central and southern portions of the mine survey area, as well as being patchily distributed near the central and northern portions of the infrastructure corridor survey area. The infrastructure corridor survey area had one large mosaic polygon with RE 11.4.8 accounting for approximately 21 ha. Other polygons of this TEC including RE 11.3.1 occurred in much smaller mosaic polygons, accounting for <12 ha. Larger discrete areas of the Brigalow TEC occurred as an approximately 28 ha area of RE 11.4.8 in the central portion of the mine survey area and two areas of approximately 67 ha and 17 ha of RE 11.3.1 in the central western portion of the mine survey area. Smaller areas of approximately 5 ha consisting of RE 11.3.1 were present to the south of the aforementioned larger areas. All other instances of the Brigalow TEC within the SGCP area occurred as mosaics with other communities dominated variously by *Eucalyptus*, *Corymbia*, *Acacia* and *Callitris* species. These were particularly extensive in the southern portion of the SGCP area, with some large patches also in the central west of the mine survey area (**Figure 13** and **Figure 14**). RE 11.3.1 and 11.4.8 covered approximately 579 ha of the mine and infrastructure corridor survey areas and a total of approximately 14 ha of this TEC is proposed to be cleared.

**Table 9 Assessment of Potentially Present TECs**

TEC	EPBC Act Status	Present/ Absent	Notes
Brigalow ( <i>Acacia harpophylla</i> dominant and co dominant)	E	<b>Present</b>	Site surveys confirmed the presence of this TEC in both the mine survey area and infrastructure corridor survey area. Within the SGCP area, the TEC consists of REs 11.3.1 and 11.4.8. A third Brigalow-dominated community, RE 10.3.3b is also present. However this RE is not identified as being included within the listed Brigalow ecological community (DEWHA, 2010).
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	E	Absent	Site surveys did not encounter this TEC. All areas of grassland are non-remnant and derived from cleared woodlands.
Weeping Myall Woodlands	E	Absent	Site surveys did not encounter this TEC. While one RE (11.3.2) known to contain this TEC is present within the SGCP area, no areas are dominated by Weeping Myall ( <i>Acacia pendula</i> ).

Abbreviations: E = endangered

#### 6.1.4 Flora Species Diversity

The SGCP area is extensive and contains a large number of REs. As a result, its floristic diversity is relatively high. Three hundred and twelve species from 60 families were recorded. Well-represented families included Poaceae (64 species), Fabaceae (58 species), Asteraceae (28 species), Myrtaceae (27 species) and Cyperaceae (15 species). Genera represented by five or more species included *Acacia* (22 species), *Eucalyptus* (11 species), *Corymbia* (8 species), *Aristida* (8 species), *Cyperus* (7 species), *Eragrostis* (7 species), *Indigofera* (6 species), and *Enneapogon* (5 species). A complete list of all flora species identified in the SGCP area is provided in **Appendix C**.

##### 6.1.4.1 *Threatened or Near Threatened Flora*

Of the ten threatened and near threatened flora species potentially present in the survey area (**Table 14**), three species were recorded within the SGCP area - the Large-podded Trefoil, *Eleocharis blakeana* and Round-leaved Heath Myrtle. A fourth species, Western Rosewood, was found adjacent to but outside the SGCP area (**Figure 13**). No data-deficient species, identified in DERM's *Back on Track: Queensland data deficient plants* list were identified in the SGCP area.



**Table 10 Likelihood of Occurrence of Threatened and Near Threatened Flora Species in the SGCP Area**

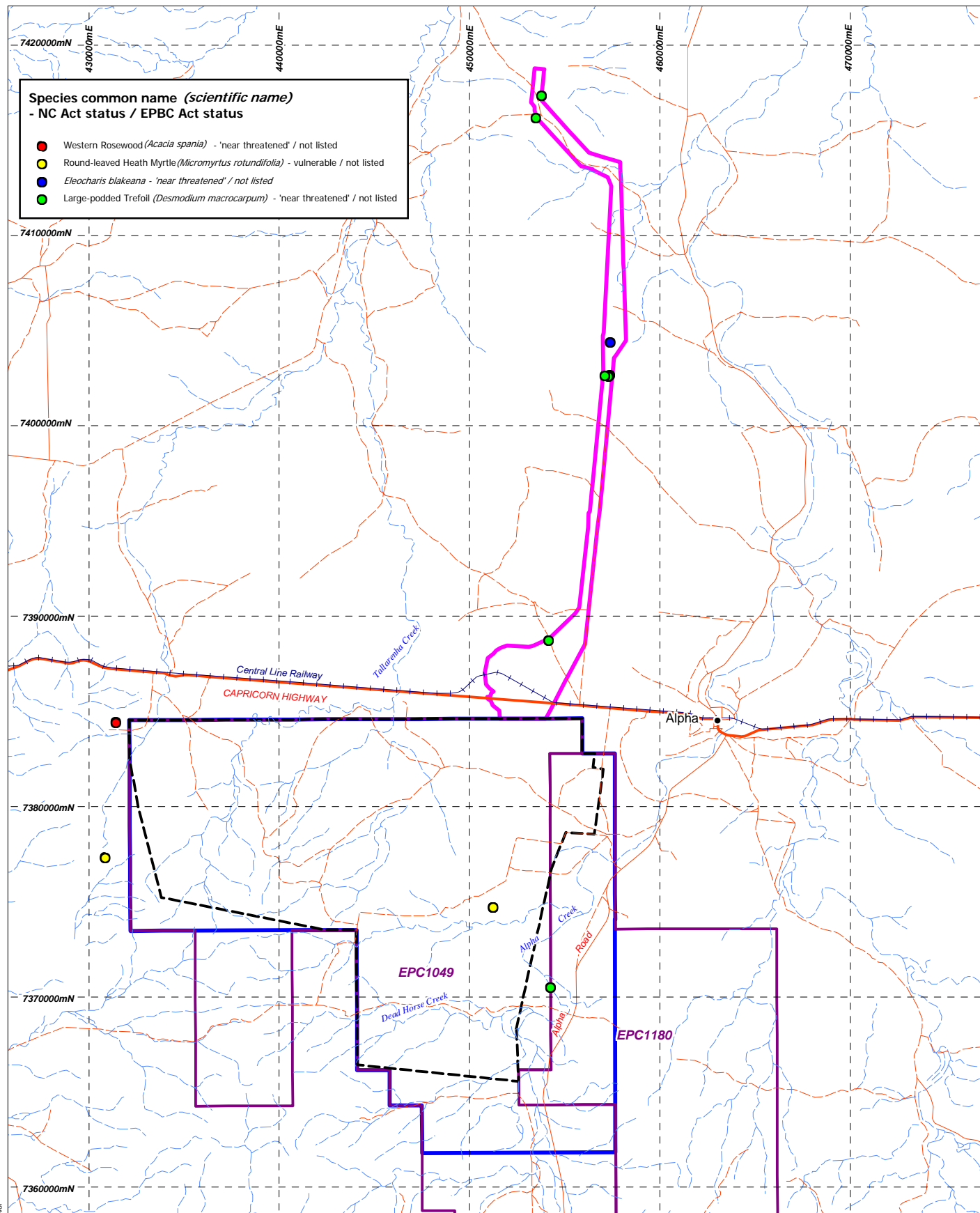
Scientific Name	Common Name	Status		Likelihood of Presence*	Background Information and Results of MET Serve Field Assessments
		EPBC Act	NC Act		
<i>Acacia deuteroneura</i>	Two-nerved Wattle	V	V	Possible	Records of this species were present only within the EPBC Act Protected Matters Search Tool which includes predictive results. No local records from specimen- or observation-backed databases were present.  Known from approximately 70 km south of the SGCP area. It is regarded that the large areas of similar habitat to the north of the known population may contain this species (Pedley, 1979). This habitat includes areas in the west of the SGCP area on weathered sandstone (landzone 10 under DERM RE framework). It is considered possible that this species occurs on landzone 10 regions within the SGCP area.
<i>Acacia ramiflora</i>	Branch-flowered Wattle	V	–	Possible	Records of this species were present only within the EPBC Act Protected Matters Search Tool which includes predictive results. No local records from specimen- or observation-backed databases were present.  The closest record of this species to the SGCP area is approximately 235 km to the north, near Bulliwallah. The species occurs on sandstone hills (DEWHA, 2008), including woodlands dominated by <i>Corymbia leichhardtii</i> (Williams <i>et al.</i> , 2004). While suitable habitat occurs within the SGCP area, there are no local records of this species.
<i>Acacia spania</i>	Western Rosewood	–	NT	<b>Likely</b>	This species has been recorded immediately west of the SGCP area within habitats contiguous with areas within the SGCP area. While survey work within the SGCP did not locate this species, it is considered likely to occur within the large areas of difficult-to-access remnant vegetation in the western portion of the mine survey area. Extensive areas of known habitat for this species (REs 10.5.5, 10.7.3, 11.10.4 and 11.10.13) occur within the SGCP area.
<i>Cadellia pentastylis</i>	Ooline	V	V	Possible	Records of this species were present only within the EPBC Online search which includes predictive results. No local records from specimen- or observation-backed databases were present.  This species usually occurs in dry rainforest and semi-evergreen vine thickets. However, it is known from sclerophyll ecological communities, co-dominating with eucalypt and cypress pine species (DEC, 2005). It is considered possible that the species occurs on sandstone ranges or hills and lowlands on metamorphic rock (Land zone 10 under DERM RE framework) within the SGCP area.
<i>Commersonia argentea</i>	Silver Kurrajong	V	–	Unlikely	Records of this species were present only within the EPBC Online search which includes predictive results. No local records from specimen- or observation-backed databases were present.  There were no records for this species this far north, with all records from the south Brigalow Belt region. This species is not believed to occur or have suitable habitat within the SGCP area.

**Table 10 Likelihood of Occurrence of Threatened and Near Threatened Flora Species in the SGCP Area (cont)**

Scientific Name	Common Name	Status		Likelihood of Presence*	Background Information and Results of MET Serve Field Assessments
		EPBC Act	NC Act		
<i>Desmodium macrocarpum</i>	Large-podded Trefoil	–	NT	Confirmed	Field surveys documented this species within RE 11.5.3 and non-remnant grassland in the central and northern sections of the infrastructure corridor survey area. The closest record of this species to the SGCP area is approximately 30 km to the north, near Hobartville. This species is often associated with the RE 11.5.3 and it is expected to occur in similar locations across the SGCP area.
<i>Dichanthium queenslandicum</i>	King Blue-grass	V	V	Unlikely	Records of this species were present only within the EPBC Online search which includes predictive results. No local records from specimen- or observation-backed databases were present.  This species occurs mostly on black clay soils and could potentially be found in RE 11.4.8 within the SGCP area, although this is unlikely as there are no records this far inland. This species is not believed to occur within the SGCP area.
<i>Eleocharis blakeana</i>	–	–	NT	Confirmed	Field surveys documented this species within the infrastructure corridor survey area in an area of RE 10.3.15i on the Gadwell property. This was the only locality in the entire SGCP area that contained this RE. Due to a lack of suitable habitat elsewhere, it is considered unlikely that this species is more widespread than records suggest.
<i>Marsdenia brevifolia</i>	Short-leaved Milk-vine	V	V	Unlikely	According to the Wildnet database, this species has been recorded north of Bogantungan, approximately 65 km east of Alpha. It occurs in a variety of habitat types but is typically located in dry eucalypt forests with grassy understories on steep rocky slopes or ridges. While dry eucalypt forests are common within the SGCP area, most areas are not rocky. Although this species is not considered likely to occur, there may be possible habitat in the western portion of the SGCP area.
<i>Micromyrtus rotundifolia</i>	Round-leaved Heath Myrtle	–	V	Confirmed	Field surveys documented this species within an area of RE 10.7.7 in the central eastern section of the mine survey area on the Sapling property. This species was also observed and is recorded within the WildNet database from just outside the western boundary of the SGCP area. Habitat in which the species has been recorded is contiguous with habitat within the western portion of the SGCP area. It is expected to occur in similar locations within the western section of the SGCP area, although its presence was not confirmed there. REs that are known habitat for this species (REs 10.7.3 and 11.7.2) are widespread within the SGCP area.

\***Unlikely** = Habitat not present and no local records. **Possible** = Suitable habitat or local records were present; or where potential habitat was widespread but specific habitat features were absent and extensive targeted surveys did not reveal the presence of the species; or where suitable habitat was present but very limited in extent and targeted surveys did not reveal the presence of the species. **Likely** = Species known from area and suitable habitat is present

Status: **E** = endangered; **V** = vulnerable; **NT** = near threatened; **–** = least concern/not listed



**LEGEND**

- MLA70453
- Exploration tenement
- Mine Survey Area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

Data Source:  
Tenement - EED1. Topography (250k) - Geoscience Australia.


Alpha Coal Pty Ltd  
**South Galilee Coal Project**

Locations of Threatened and Near Threatened Flora



Scale: 1:150,000 (A4)

17/11/2011


 Datum: GDA94  
 Projection: MGA55

**FIGURE 13**

### 6.1.5 Confirmed Threatened Flora Species

#### 6.1.5.1 Round-leaved Heath Myrtle (*Micromyrtus rotundifolia*)

Round-leaved Heath Myrtle (**Plate 1**) is listed as vulnerable under the NC Act.

Round-leaved Heath Myrtle was located within the mine survey area. The population occurred within RE 10.7.7 (on the ecotone between vegetation units 10.7.7a and 10.7.7b). The species is likely to be widespread within the SGCP area, both within the RE polygon where it was located, and elsewhere in the project area. A second population was identified 1.3 km west of the central western boundary of the mine survey area. It occupied an area of RE 11.7.2 as well as an adjacent non-remnant area associated with a road verge. It is suspected that this species may also occur in the western portion of the mine survey area, although targeted searches did not confirm its presence.

Round-leaved Heath Myrtle has a restricted distribution, stretching from north of Adavale in the south to north-west of Caledonia in the north, and from south-west of Alpha in the east to east of Dandaraga in the west. It is known from nine geographic locations, mostly in the Desert Uplands bioregion, and with one record each for the Brigalow Belt South and Mulga Lands bioregions. The nearest recorded observation of the species from the population adjacent to the SGCP area is 9 km away to the west, at a location 16 km south-west of Jericho. Round-leaved heath myrtle is known from REs 6.5.16, 10.10.4, 10.7.3, 11.7.2 and 11.10.3. MET Serve recorded the species in RE 10.7.7 in the mine survey area and 11.7.2 just outside the SGCP area.



**Plate 1** Round-leaved Heath Myrtle in RE 10.7.7, Sapling Property



6.1.5.2 *Large-podded Trefoil (Desmodium macrocarpum)*

Large-podded Trefoil (**Plate 2**) is listed as near threatened under the NC Act.

Large-podded Trefoil was located within the infrastructure corridor survey area, on the Saltbush and Tresillian properties. The population within the SGCP area occurred in RE 11.5.3 and non-remnant vegetation. The species is likely to be more widespread within the SGCP area, both within the RE polygon where it was located, and elsewhere in the SGCP area.

The distribution of Large-podded Trefoil stretches from north of Kingaroy in the south to south-west of Cairns in the north, and from the coast to east of Longreach in the west. It has been observed at 25 locations. The nearest recorded observation is from 35 km north-west of the SGCP, approximately 2 km north of Hobartville.



**Plate 2** Large-podded Trefoil in RE 11.5.3, Saltbush Property

6.1.5.3 *Eleocharis blakeana*

*Eleocharis blakeana* (**Plate 3**) is listed as near threatened under the NC Act.

*Eleocharis blakeana* was located in the infrastructure corridor survey area in a Coolibah-dominated wetland (RE 10.3.15i). The species is unlikely to be more widespread within the SGCP area due a lack of similar habitat.

*Eleocharis blakeana* has a distribution that stretches from north of Coonabarabran in the south to north-west of Dingo in the north, and from south-west of Dalby in the east to south-east of Charleville in the west. Publicly available records indicate that it has been observed at 22 locations throughout Queensland and New South Wales. The nearest recorded observation of the species is 280 km east of the SGCP at a location 70 km north of Dingo.



**Plate 3**      *Eleocharis blakeana* Collected from RE 10.3.15i within the Infrastructure Corridor Area

### 6.1.6 Likely Threatened Flora Species

#### 6.1.6.1      *Western Rosewood (Acacia spania)*

Western Rosewood (**Plate 4**) is listed as near threatened under the NC Act.

Western Rosewood was located 700 m to the west of the mine survey area in habitat contiguous with the SGCP area. While field assessments did not verify its presence within the SGCP area, it is considered likely to occur.

Western Rosewood has a scattered distribution, with apparently isolated populations stretching from south of Isisford in the south-west to west of Lillarea in the north-west, and from near Roma in the south-east to near Emerald in the north-east. Publicly available records indicate that it has been observed at 12 locations, mostly in the Brigalow Belt North bioregion and on the border between the Desert Uplands and Brigalow Belt South bioregions. There is a record of the species approximately 5 km south of the SGCP area. The REs 10.5.5, 10.7.3, 11.10.4, and 11.10.13 are known habitats for these species, and all REs occur within the SGCP area.



**Plate 4 Western Rosewood West of the SGCP Area**

#### 6.1.7 Weeds

Twenty-eight weed species were recorded in the SGCP area (**Table 11**). Harrisia Cactus, Prickly Pear (*Opuntia stricta*) and Velvety Tree Pear (*Opuntia tomentosa*) are listed as Class 2 weeds under the LP Act.

Harrisia Cactus is recorded as having a 'localised' distribution and 'occasional' density within the vicinity of the SGCP area according to Biosecurity Queensland's Annual Pest Distribution Survey 2009/2010. Based on climate suitability, the Department of Employment, Economic Development and Innovation (DEEDI) (2011a) indicates that the SGCP area is marginally suitable for the Harrisia Cactus.

Predictive mapping produced by DEEDI (2011a) indicates that based on climate suitability, the SGCP is of marginal suitability for the Prickly Pear and the Velvety Tree Pear.

Predictive mapping produced by DEEDI (2011a) indicates that based on climate suitability, the SGCP area is suitable for Prickly Acacia and of marginal suitability for Hairy Pigweed.

Although not declared under the LP Act, Noogoora Burr (*Xanthium occidentale*) has a priority of 'low 3' under the Barcaldine Pest Management Plan (Barcaldine Regional Council, 2010). It has a 'widespread' distribution and 'common' density in the vicinity of the SGCP area according to Biosecurity Queensland's Annual Pest Distribution Survey 2007. It occurred primarily in riparian areas. No weeds of national significance were identified.

Buffel Grass was widespread in the SGCP area, and although favoured as an improved pasture species in Central Queensland it is a significant environmental weed of native woodland and grassland

ecosystems. This species displaces and suppresses native grassland species (Fairfax and Fensham, 2000) and negatively impacts biodiversity (Kutt and Fisher, 2011). It is unlisted under the LP Act.

**Table 11 Weeds Recorded in the SGCP Area**

Species	Common Name	Status*	Barcaldine Pest Management Plan Priority	Growth Form
<i>Acacia farnesiana</i>	Prickly Acacia	–	–	Shrub
<i>Alternanthera pungens</i>	Khaki Weed	–	–	Herb
<i>Cenchrus ciliaris</i>	Buffel Grass	–	–	Grass
<i>Chloris inflata</i>	Purple-top Rhodes Grass	–	–	Grass
<i>Chloris virgata</i>	Feather-top Rhodes Grass	–	–	Grass
<i>Cirsium vulgare</i>	Bull Thistle	–	–	Herb
<i>Citrullus lanatus</i>	Paddymelon	–	–	Scrambling Vine
<i>Conyza sumatrensis</i>	Sumatran Fleabane	–	–	Herb
<i>Cucumis anguria var anguria</i>	West Indian Gherkin	–	–	Scrambling Vine
<i>Gomphrena celosioides</i>	Gomphrena Weed	–	–	Herb
<i>Harrisia martinii</i>	Harrisia Cactus	Pest - Class 2	–	Succulent
<i>Heliotropium indicum</i>	Indian Heliotrope	–	–	Herb
<i>Indigofera tinctoria</i>	True Indigo	–	–	Shrub
<i>Melinis repens</i>	Natal Grass	–	–	Grass
<i>Opuntia stricta</i>	Prickly Pear	Pest - Class 2	–	Succulent
<i>Opuntia tomentosa</i>	Velvety Tree Pear	Pest - Class 2	–	Succulent
<i>Portulaca pilosa</i>	Hairy Pigweed	–	–	Herb
<i>Salsola australis</i>	Soft Roly-poly	–	–	Herb
<i>Senna occidentalis</i>	Coffee Senna	–	–	Grass
<i>Sida cordifolia</i>	Flannel Weed	–	–	Shrub
<i>Solanum torvum</i>	Devil's Fig	–	–	Shrub
<i>Sonchus oleraceus</i>	Milk Thistle	–	–	Herb
<i>Stapelia gigantea</i>	Carrion Flower	–	–	Succulent
<i>Stylosanthes hamata</i>	Carribean Stylo	–	–	Shrub
<i>Stylosanthes scabra</i>	Shrubby Stylo	–	–	Shrub
<i>Tridax procumbens</i>	Tridax Daisy	–	–	Herb
<i>Verbesina encelioides</i>	Wild Sunflower	–	–	Herb
<i>Xanthium occidentale</i>	Noogoora Burr	–	Low 3	Herb

\*Status under the LP Act

### 6.1.8 Vegetation Communities of Cultural, Commercial or Recreational Significance

No vegetation communities of cultural, commercial or recreational significance were identified during the surveys.



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## 6.2 TERRESTRIAL FAUNA

Within each section, the first mention of each fauna species provides both common and scientific names, thereafter the species is referred to by common name only. A full list of fauna species recorded is provided in **Appendix D**.



### 6.2.1 Faunal Habitats

The remnant vegetation and waterbodies in the SGCP area were categorised into seven faunal habitat types (**Table 12**). Many habitats were structurally diverse, with a native grass understorey, abundant debris and termite mounds. The high quality and diversity of habitats indicated that a careful, detailed survey of fauna species was required. To ensure a robust survey design and suitability for impact assessment, all habitat types were surveyed.

**Table 12 Faunal Habitat Types within the SGCP Area**



Habitat Type and Description	Representative Photograph	Potential Threatened or 'Near Threatened' Taxa
<p><b>Eucalypt woodland with shrubs</b></p> <p>These habitats are dominated by Silver-leaved Ironbark (<i>Eucalyptus melanophloia</i>) and Poplar Box (<i>E. populnea</i>), although in some locations a mix of Eucalypt species (<i>Eucalyptus</i> and <i>Corymbia</i> spp.) occur. The canopy species include abundant hollows of a variety of sizes, providing good habitat opportunities for arboreal species.</p> <p>Midstorey composition consisted of two different types. Some areas were dominated by White Cypress Pine (<i>Callitris glaucophylla</i>), which formed a tall shrub layer or low canopy layer. Regrowth White Cypress Pine was also common. Where this type of understorey was abundant, ground cover grasses were uncommon, or clumped to interspaces where light penetrated to the ground.</p> <p>The understorey at other locations was dominated by a high diversity of low, round shrubs. Generally this layer was lower than those locations dominated by White Cypress Pine, resulting in a slightly different vertical structure. Native grass species were common between shrubs, although Buffel Grass (<i>Cenchrus ciliaris</i>) was common in some areas.</p> <p>Ground debris, particularly fallen timber, was common throughout these habitats. Rock protrusions were present at some locations within the SGCP area but were not common and were only minor in extent. Bare ground was also common, with a mosaic formed of open ground and grass cover, while thick leaf litter occurred beneath bushes or under trees. The soil was typically red sandy loam.</p> <p>Eucalypt woodland with shrubs is the most common faunal habitat type within the SGCP area.</p>		<p>Brigalow Scaly-foot (<i>Paradelma orientalis</i>) – <b>confirmed</b> from this habitat</p> <p>Ornamental Snake (<i>Denisonia maculata</i>)</p> <p>Dunmall's Snake (<i>Furina dunmalli</i>)</p> <p>Yakka Skink (<i>Egernia rugosa</i>)</p> <p>Little Pied Bat (<i>Chalinolobus picatus</i>)</p> <p>Death Adder (<i>Acanthophis antarcticus</i>)</p>

**Table 12 Faunal Habitat Types within the SGCP Area (cont)**

Habitat Type and Description	Representative Photograph	Potential Threatened or 'Near Threatened' Taxa
<p><b>Eucalypt woodland with grassy understorey</b></p> <p>Habitats with a grassy understorey were common. In many locations, the understorey consisted of native grasses, such as <i>Themeda triandra</i> and <i>Heteropogon contortus</i>, while some areas were dominated by Buffel Grass that had formed thick monocultures. Those areas dominated by Buffel Grass hold less habitat value for terrestrial ground species as ground movement is inhibited.</p> <p>The midstorey was open, shrubs were present, but restricted to clumps or isolated individuals. As a result, the vertical density and complexity within this habitat type is considerably less than in Eucalypt woodlands with shrubs.</p> <p>While the canopy density varied, it was typically open and consisted of poplar box and silver-leaved ironbark. Hollow-bearing trees were common.</p>		<p>Brigalow Scaly-foot (<i>Paradelma orientalis</i>)</p> <p>Dunmall's Snake (<i>Furina dunmalli</i>)</p> <p>Ornamental Snake (<i>Denisonia maculata</i>)</p> <p>Yakka Skink (<i>Egernia rugosa</i>)</p> <p>Squatter Pigeon (<i>Geophaps scripta scripta</i>)</p> <p>Little Pied Bat (<i>Chalinolobus picatus</i>)</p> <p>Death Adder (<i>Acanthophis antarcticus</i>)</p>
<p><b>Eucalypt woodland with Spinifex groundcover</b></p> <p>Structurally, Eucalypt woodlands with Spinifex (<i>Triodia</i> spp.) are similar to Eucalypt woodlands with grass. Some of the most diverse terrestrial vertebrate communities within Australia have been linked with the presence of Spinifex (Pianka, 1969; Morton and James, 1988). Several species recorded from the SGCP area are likely to be restricted to areas of Spinifex (e.g. <i>Ctenotus pantherinus</i>), while others are likely to be significantly more abundant in areas of Spinifex (e.g. <i>Ctenotus hebetior</i>). As a result, the vertebrate community in Spinifex woodlands may be different from that found in grassy woodlands. These habitats therefore deserve separate consideration. Bird communities, which may be influenced by vertical complexity (i.e. shrubs), are likely to be similar between the two open vegetation types.</p>		<p>Brigalow Scaly-foot (<i>Paradelma orientalis</i>)</p> <p>Dunmall's Snake (<i>Furina dunmalli</i>)</p> <p>Ornamental Snake (<i>Denisonia maculata</i>)</p> <p>Yakka Skink (<i>Egernia rugosa</i>)</p> <p>Squatter Pigeon (<i>Geophaps scripta scripta</i>)</p> <p>Little Pied Bat (<i>Chalinolobus picatus</i>)</p> <p>Death Adder (<i>Acanthophis antarcticus</i>)</p>





**Table 12 Faunal Habitat Types within the SGCP Area (cont)**

Habitat Type and Description	Representative Photograph	Potential Threatened or 'Near Threatened' Taxa
<p><b>Low open paperbark woodland</b></p> <p>Low open paperbark woodlands were not common within the SGCP area. The canopy, which consisted almost entirely of Bushhouse Paperbark (<i>Melaleuca tamariscina</i>), was very open and low. Little midstorey existed, restricted largely to regrowth canopy species.</p> <p>Few hollow-bearing trees were present within the habitat and arboreal species are not likely to be well represented.</p> <p>The ground layer consisted predominantly of grasses, separated by open areas of ground. Debris, such as fallen timber and leaf litter was present, but was not as abundant or dense as in other habitat types.</p> <p>These areas appeared to retain water, and are likely to provide important frog habitat.</p>		<p>Brigalow Scaly-foot (<i>Paradelma orientalis</i>)</p> <p>Dunmall's Snake (<i>Furina dunmalli</i>)</p> <p>Ornamental Snake (<i>Denisonia maculata</i>)</p> <p>Yakka Skink (<i>Egernia rugosa</i>)</p> <p>Squatter Pigeon (<i>Geophaps scripta scripta</i>)</p> <p>Little Pied Bat (<i>Chalinolobus picatus</i>)</p> <p>Death Adder (<i>Acanthophis antarcticus</i>)</p>
<p><b>Brigalow woodland</b></p> <p>This habitat was distinguished by a tall Brigalow (<i>Acacia harpophylla</i>) canopy. Within the canopy, hollows were rare; however, exfoliating bark was common and provided a different sheltering opportunity. Small arboreal species such as geckos are likely to use these shelter sites.</p> <p>The shrub layer, while present, was less dense than in the eucalypt with shrub habitat, but more dense than grassy Eucalypt woodland habitats. In most cases, the predominant shrub species was Wilga (<i>Geijera parviflora</i>).</p> <p>The ground layer was relatively open. Recent rains sparked low, open grass growth, but typically these habitats had little green ground cover. However, fallen debris such as sticks, logs and leaf litter was often present in high densities. Furthermore, different from other habitats these areas contained cracking soils, which provide excellent sheltering opportunities for ground dwelling species.</p> <p>Brigalow communities observed within the SGCP area showed little evidence of senescence or weed invasion.</p>		<p>Brigalow Scaly-foot (<i>Paradelma orientalis</i>)</p> <p>Dunmall's Snake (<i>Furina dunmalli</i>)</p> <p>Ornamental Snake (<i>Denisonia maculata</i>)</p> <p>Yakka Skink (<i>Egernia rugosa</i>)</p> <p>Little Pied Bat (<i>Chalinolobus picatus</i>)</p> <p>Death Adder (<i>Acanthophis antarcticus</i>)</p>



**Table 12 Faunal Habitat Types within the SGCP Area (cont)**

Habitat Type and Description	Representative Photograph	Potential Threatened or 'Near Threatened' Taxa
<p><b>Bendee woodland</b></p> <p>Bendee woodland consisted of a moderately dense, tall canopy dominated by Bendee (<i>Acacia catenulata</i>). Only a few emergent Eucalypts were present, resulting in few hollows. Shrubs were not common, but where present were typically regrowth of canopy species.</p> <p>The ground stratum was dominated by short native grasses, separated by occasional bare ground. Fallen debris, particularly moderately sized logs, was common. Where Bendee occurred on shallow red earths, termite mounds were abundant.</p> <p>Bendee habitats were restricted to a single location in the mine survey area where they occurred on shallow red earths overlaying ferricrete.</p>		<p>Brigalow Scaly-foot (<i>Paradelma orientalis</i>)</p> <p>Dunmall's Snake (<i>Furina dunmalli</i>)</p> <p>Yakka Skink (<i>Egernia rugosa</i>)</p> <p>Little Pied Bat (<i>Chalinolobus picatus</i>)</p> <p>Death Adder (<i>Acanthophis antarcticus</i>)</p>
<p><b>Artificial and natural waterbodies</b></p> <p>Almost all waterbodies were artificial, and consisted of small to moderate-sized dams used as stock watering points. No observed dams within the SGCP area contained floating or emergent aquatic vegetation. Most dams were surrounded by grasses (native or exotic), rather than emergent macrophytes such as sedges or rushes. The edges of many dams were subject to intense trampling by cattle, and were thus devoid of vegetation.</p> <p>One natural, shallow wetland was located in the infrastructure corridor survey area, and consisted of a dense covering of native sedges with emergent Coolibah (<i>Eucalyptus coolabah</i>).</p>		<p>Cotton Pygmy-goose (<i>Nettapus coromandelianus</i>)</p> <p>Ornamental Snake (<i>Denisonia maculata</i>)</p>

### 6.2.2 Fauna Diversity

Field surveys identified 233 species within the SGCP area (**Appendix D**). A summary of the diversity of the surveyed fauna classes over the course of the five surveys is provided in **Table 13**. The 233 species found in the SGCP area include 81 species that were not recorded in other sources (i.e. DERM Wildlife online [Wildnet], Birds Australia Atlas or Queensland Museum records).

**Table 13 Fauna Diversity within the SGCP Area**

Field Inspection	Amphibians	Reptiles	Birds	Mammals	Total Species
March 2009 – pilot inspection	4	22	79	10	<b>115</b>
October 2009 – dry season survey	1	15	92	25 <sup>1</sup>	<b>133</b>
April 2010 – wet season survey	10	17	100	25 <sup>2</sup>	<b>152</b>
May 2011 – dry season	2	11	92	31 <sup>3</sup>	<b>136</b>
October 2011 - opportunistic	4	3	88	9	<b>104</b>
<b>Total species</b>	<b>10</b>	<b>35</b>	<b>147</b>	<b>41</b>	<b>233</b>

<sup>1</sup> Includes three unconfirmed AnaBat species records (**Appendix E**)

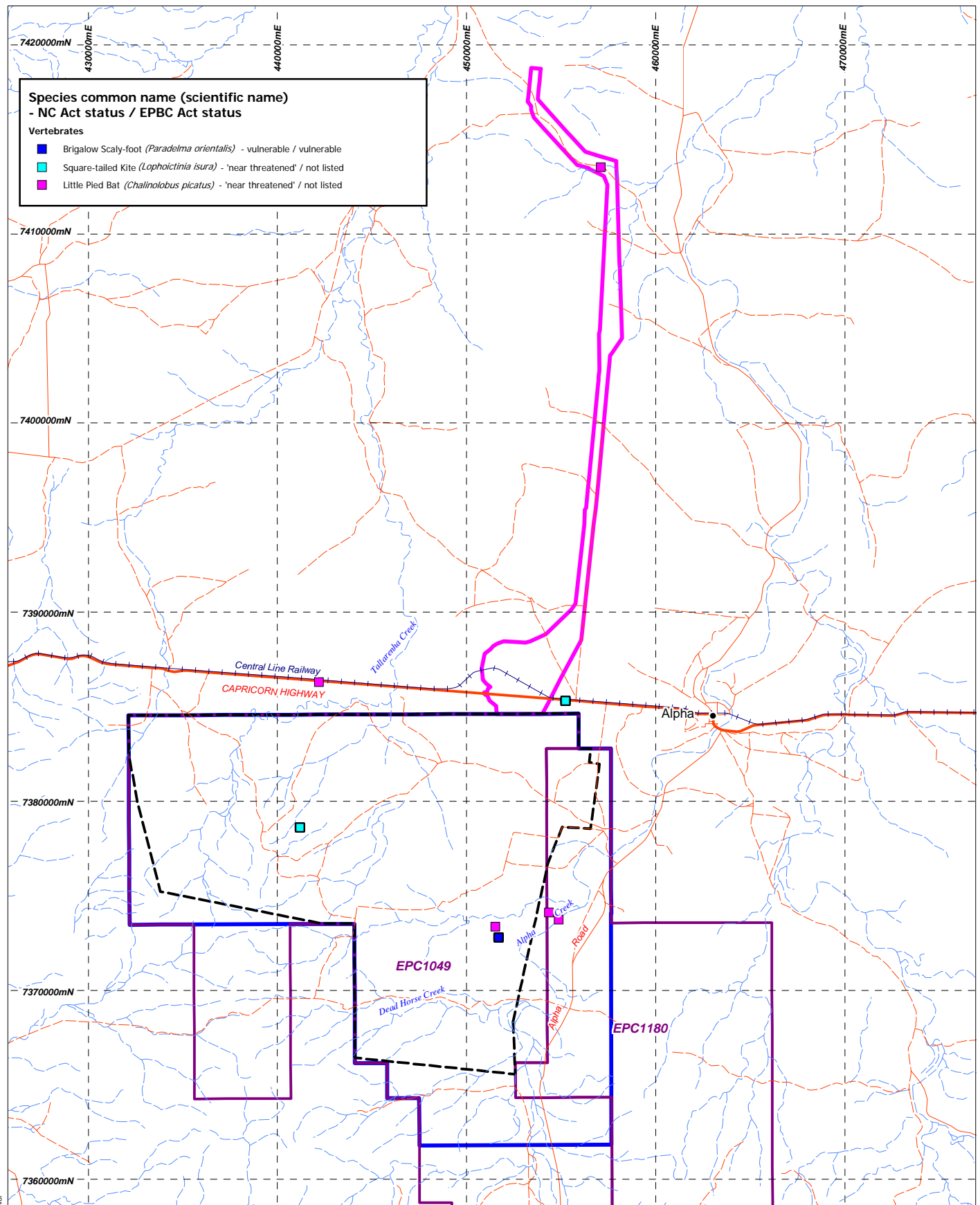
<sup>2</sup> Includes three unconfirmed AnaBat species records (**Appendix E**)

<sup>3</sup> Includes one unconfirmed AnaBat species records (**Appendix E**)

### 6.2.3 Conservation Significant Fauna

The Brigalow Scaly-foot (*Paradelma orientalis*), Little Pied Bat (*Chalinolobus picatus*) and Square-tailed Kite (*Lophoictinia isura*), are listed as threatened or near threatened under the NC Act and/or EPBC Act and are confirmed from the SGCP area (**Figure 11**). Threatened species potentially occurring according to the EPBC Protected Matters search but which were not recorded during ecological surveys were assigned a likelihood of occurrence within the SGCP survey area based on historical records, known geographic range and habitat availability (**Table 8**).

The Brigalow Scaly-foot is the only species recorded in the SGCP area that is listed as a Back on Track species for the Burdekin Natural Resource Management area (containing the SGCP) (DERM, 2011a). The Brigalow Scaly-foot has a North Queensland Dry Tropics priority ranking of 'high' and DERM priority ranking of 'medium'. While the Back on Track framework does not confer additional protection for listed species, it serves as a tool for prioritising species in need of conservation effort. As such, a species' Back on Track status can inform governmental decisions that influence the conservation of listed species.



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**LEGEND**

- MLA70453
- Exploration tenement
- Mine Survey Area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

Data Source:  
 Tenement - EED1. Topography (250k) - Geoscience Australia.

**Alpha Coal Pty Ltd**  
**South Galilee Coal Project**

**Locations of Threatened and  
 Near Threatened Fauna**



Scale: 1:150,000 (A4)

25/11/2011

Datum: GDA94  
 Projection: MGA55

**FIGURE 14**

**Table 14 Likelihood of Occurrence of Threatened and Near Threatened Fauna Species in the SGCP Area**

Scientific Name	Common Name	EPBC Act Status	NC Act Status	Likelihood of Presence*	Background Information and Results of MET Serve Field Assessments
<b>Mammals</b>					
<i>Chalinolobus picatus</i>	Little Pied Bat	–	NT	Confirmed	Calls matching this species were detected among AnaBat recordings taken by MET Serve in the infrastructure corridor in May 2011. In addition, calls that were possibly from this species, but which could not be confirmed, were detected in the October 2009 and April 2010 surveys. Suitable habitat is widespread within the SGCP area.
<i>Dasyurus hallucatus</i>	Northern Quoll	E	–	Possible	The EPBC Protected Matters search (50 km buffer) identified that this species or its habitat may occur within the area. No local records from specimen- or observation-backed databases were present. Suitable habitat is present within the SGCP area and it is therefore possible that this species occurs within the site, despite a lack of local records. The nearest records of this species are from the Carnarvon Range, approximately 120 km south of the SGCP area.
<i>Nyctophilus corbeni</i>	South-eastern Long-eared Bat	V <sup>1</sup>	V <sup>1</sup>	Possible	The EPBC Protected Matters search (50 km buffer) identified that this species or its habitat may occur within the area. No local records from specimen- or observation-backed databases were present. Suitable habitat is present within the SGCP area and it is therefore possible that this species occurs within the site despite a lack of local records. The nearest publically available record of this species is west of Taroom, approximately 320 km away.
<b>Reptiles</b>					
<i>Acanthophis antarcticus</i>	Death Adder	-	NT	Likely	Queensland Museum records show this species occurs within the broader SGCP area. Due to the availability of suitable habitat across the region, it is likely that Death Adders may occur within remnant vegetation in the SGCP area.
<i>Delma torquata</i>	Collared Delma	V	V	Possible	The EPBC Protected Matters search (50 km buffer) identified that this species or its habitat may occur within the area. No local records from specimen- or observation-backed databases were present. Suitable habitat is present within the SGCP area and it is therefore a possibility that it occurs despite a lack of local records. The nearest record of this species is at Blackdown Tableland National Park, more than 250 km east of the SGCP area.
<i>Denisonia maculata</i>	Ornamental Snake	V	V	Likely	The SGCP area is within the known distribution of the Ornamental Snake (SEWPaC, 2011a) and there is high quality habitat within the SGCP area.
<i>Egernia rugosa</i>	Yakka Skink	V	V	Likely	The SGCP area contains likely or known habitat for the Yakka Skink (SEWPaC, 2011a). The nearest record of this species is from Bogantungun, approximately 60 km from the SGCP area.
<i>Furina dunmalli</i>	Dunmall's Snake	V	V	Likely	The EPBC Protected Matters search (50 km buffer) identified that this species or its habitat may occur within the area. Ideal habitat for this species is present within the SGCP area. It is therefore considered likely that the species may occur, despite the lack of local records.



**Table 14 Likelihood of Occurrence of Threatened and Near Threatened Fauna Species in the SGCP Area (cont)**

Scientific Name	Common Name	EPBC Act Status	NC Act Status	Likelihood of Presence*	Background Information and Results of MET Serve Field Assessments
<b>Reptiles (cont)</b>					
<i>Paradelma orientalis</i>	Brigalow Scaly-foot	V	V	Confirmed	The April 2010 survey conducted by MET Serve caught one specimen of this species in a patch of Callitris forest towards the east of the mine survey area. This is the first record of this species within the local area and is outside of the recognised distribution of the species (SEWPac, 2011a).
<i>Rheodytes leukops</i>	Fitzroy River Turtle	V	V	Unlikely	The EPBC Protected Matters search (50 km buffer) identified that this species or its habitat may occur within the area. No local records from specimen- or observation-backed databases were present. Permanent water is absent from Alpha Creek in the SGCP area or nearby and therefore it is considered unlikely this species will occur.
<b>Birds</b>					
<i>Falco hypoleucos</i>	Grey Falcon	–	NT	Possible	The Grey Falcon is widely but sparsely distributed through the arid and semi-arid zone of Australia. Its breeding range is thought to have contracted since the 1950s, now being confined to the arid parts of its range. Grey Falcons are highly mobile animals, and are known to travel over hundreds of kilometres. The SGCP area is within this species' range, but little suitable breeding habitat occurs in the SGCP area.
<i>Geophaps scripta scripta</i>	Squatter Pigeon	V	V	Likely	<p>The EPBC Protected Matters search (50 km buffer) identified that this species or its habitat may occur within the area. No local records from specimen- or observation-backed databases were present.</p> <p>Suitable habitat for the species is widespread throughout both remnant and non-remnant habitats. However, the SGCP area is near the western limit of the species' distribution, and may thus consist of marginal habitat. Given that the species is relatively obvious when present, local populations (if present) are probably small and/or only utilise the SGCP area sporadically.</p> <p>While Squatter Pigeons may not be frequent or resident, this species is likely to occur in the SGCP area in a transient capacity.</p>

**Table 14 Likelihood of Occurrence of Threatened and Near Threatened Fauna Species in the SGCP Area (cont)**

Scientific Name	Common Name	EPBC Act Status	NC Act Status	Likelihood of Presence*	Background Information and Results of MET Serve Field Assessments
<b>Birds (cont)</b>					
<i>Grantiella picta</i>	Painted Honeyeater	–	V	Possible	The SGCP area is within this species' range. Painted Honeyeaters are nomadic, with their movements strongly influenced by the fruiting of mistletoes. The SGCP area in general lacked a high density or diversity of mistletoe, and is unlikely to constitute important habitat. Nevertheless, Painted Honeyeaters are highly mobile and sporadic in occurrence and may utilise any mistletoe in a transient capacity. It is therefore considered possible that Painted Honeyeaters occur in the SGCP area.
<i>Lophoictinia isura</i>	Square-tailed Kite	–	NT	<b>Confirmed</b>	The October 2009 survey conducted by MET Serve recorded two records of this species, most likely representing two observations of the same individual. Given that the species was not recorded in any of the other four surveys, it is unlikely that the SGCP area supports a sizeable population.
<i>Neochmia ruficauda ruficauda</i>	Star Finch (sth)	E	E	Unlikely	The EPBC Protected Matters search (50 km buffer) identified that this species or its habitat may occur within the area. No local records from specimen or observation-backed databases were present and hence the species may not occur within the local area. An inhabitant of open native grasslands and woodlands, particularly those associated with watercourses, the species is extremely uncommon in the local area and rarely detected. Buffel Grass infestations and grazing of wetland edges renders habitat unsuitable. The lack of records from the local area or region, and its general scarcity, strongly suggest the species is unlikely to occur in the SGCP area.
<i>Nettapus coromandelianus</i>	Cotton Pygmy-goose	–	NT	Likely	The SGCP area lies near the western edge of the species' range. Cotton Pygmy-geese breed in wetlands with abundant floating vegetation, and this habitat was lacking within the SGCP area. However, in March 2009 this species was observed approximately 60 km each of the SGCP area, and is likely to utilise artificial waterholes within the SGCP area occasionally and transiently.

**Table 14 Likelihood of Occurrence of Threatened and Near Threatened Fauna Species in the SGCP Area (cont)**

Scientific Name	Common Name	EPBC Act Status	NC Act Status	Likelihood of Presence*	Background Information and Results of MET Serve Field Assessments
<b>Birds (cont)</b>					
<i>Poephila cincta cincta</i>	Black-throated Finch (sth)	E	E	Likely	<p>The EPBC Protected Matters search (50 km buffer) identified this species or its habitat may occur within the area. No local records from specimen or observation-backed databases were present.</p> <p>The Black-throated Finch may have historically occurred in the SGCP area, but has suffered a significant range contraction over the last 50 years, and has largely disappeared from south of Belyando Crossing (180 km north-northwest of the SGCP area). An isolated population at Bimblebox Nature Refuge, 25 km north-west of the infrastructure corridor survey area has been recently identified (Agnew, 2011), indicating that the species may still persist locally.</p> <p>Surveys failed to detect Black-throated Finches within the SGCP area. These surveys were effective at detecting large numbers of other finch species (Zebra Finch, Double-barred Finch, Plum-headed Finch), indicating that surveys methods were likely adequate for detecting the Black-throated Finch, if it was present.</p> <p>Nevertheless, potential habitat for the Black-throated Finch does occur in the SGCP area. The species inhabits a variety of remnant vegetation types with native grassy understories. Black-throated Finches also require nearby permanent water sources, as well as hollow trees for breeding sites. While potential habitat exists and is widespread in the SGCP area, grazing and the invasion of Buffel Grass have meant that most habitat is suboptimal. Nevertheless, given the SGCP's proximity to a known population, it is considered likely that low densities of Black-throated Finch may utilise the site, even if only in a transitory capacity.</p>
<i>Rostratula australis</i>	Australian Painted Snipe	V	V <sup>2</sup>	Possible	<p>The EPBC Protected Matters search (50 km buffer) identified this species or its habitat may occur within the area. No local records from specimen- or observation-backed databases were present.</p> <p>Australian Painted Snipes preferentially inhabit ephemeral and semi-ephemeral wetlands with emergent aquatic and semi-aquatic vegetation. Within the SGCP area, there is little or no suitable habitat for this species in most years. Suitable habitat may occur intermittently in flooded areas during years of extreme rainfall, and at these times Australian Painted Snipe may utilise the SGCP area. However, under such conditions habitat is rarely limiting for the species, and it is unlikely that the SGCP area is significant for the Australian Painted Snipe.</p>

**Notes:**

\* **Unlikely** = Habitat not present and no local records. **Possible** = Suitable habitat or local records were present; or where potential habitat was widespread but specific habitat features were absent and extensive targeted surveys did not reveal the presence of the species; or where suitable habitat was present but very limited in extent and targeted surveys did not reveal the presence of the species. **Likely** = Species known from area and suitable habitat is present

Status—**E** = endangered; **V** = vulnerable; **NT** = near threatened; **—** = least concern/not listed

## 6.2.4 Confirmed Threatened and Near Threatened Fauna Species

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

The Square-tailed Kite is listed as near threatened under the NC Act.

During the October 2009 survey, two Square-tailed Kite sightings were recorded, one within the mine survey area and one just outside the infrastructure corridor survey area (**Figure 14**). It is possible that these records represent two sightings of the same individual.

Square-tailed Kites are widely distributed throughout Australia in coastal and sub-coastal regions. A variety of habitats may be used including heathlands, woodlands, forests, tropical and subtropical rainforests, timbered watercourses, hills and gorges (Pizzey and Knight, 2007). However, most records are from woodlands and forests, particularly those on fertile soils with abundant small birds (Marchant and Higgins, 1993).

### 6.2.4.2 Brigalow Scaly-foot (*Paradelma orientalis*)

The Brigalow Scaly-foot is listed as vulnerable under both the NC Act and the EPBC Act.

During the April 2010 survey, one Brigalow Scaly-foot was captured in a pitfall trap at site ET06 (**Figure 14**).

The Brigalow Scaly-foot is found mainly in the Brigalow Belt bioregion, from Inglewood in the south, north to Emerald, east to Gladstone and west to Blackall (DERM, 2010). The record from the SGCP appears to be the first verified record of the species from the wider Alpha region (Richardson, 2008; SEWPaC, 2011a). The nearest publicly available records are from Idalia National Park located approximately 215 km to the south-west, Buchanan located approximately 205 km to the north-west, Tambo located approximately 130 km to the south, and Emerald located approximately 165 km to the east. Brigalow Scaly-foots occur in a range of forest types throughout the Brigalow Belt bioregion, particularly those with dense ground cover but also in non-remnant disturbed vegetation (Kutt, Hannah and Thurgate, 2003; Tremul, 2000).

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

The Little Pied Bat is listed as near threatened under the NC Act.

Calls of this species were detected at three locations within the mine survey area in 2009 and 2010 and positive identification was confirmed for calls recorded within the infrastructure corridor survey area in 2011 (**Figure 14**).

Little Pied Bats occur north from the Mallee region of South Australia/Victoria to the Tropic of Capricorn and are most common west of the Great Dividing Range in semi-arid regions. However, individuals have also been located in scattered areas closer to the coast (Churchill, 2008).

Little Pied Bats are typically found in dry habitats including open forests, woodland, mulga woodlands, chenopod scrublands, Callitris forest, and Mallee (Churchill, 2008), and have also been detected using notophyll vine forest gullies (Eyre *et al.*, 1997). In drier parts of its range, populations probably heavily depend on riparian areas (Environmental Protection Agency [EPA], 2003).

### 6.2.4.4 Migratory Species

Two migratory species, as listed under the EPBC Act, have been identified within the SGCP area: the Rainbow Bee-eater (*Merops ornatus*) and the Eastern Great Egret (*Ardea alba modesta*).



The Rainbow Bee-eater was commonly observed within remnant vegetation, along tracks and within open grazing pasture. This species was not recorded in the April or May surveys, suggesting that they are summer breeding visitors. Nesting birds were observed in central parts of the mine survey area (e.g. -23.718349°, 146.585464°; -23.715689°, 146.584152°). These two nesting sites are outside the current proposed mine disturbance area. Rainbow Bee-eaters are likely to be common within most areas of the SGCP area and are abundant in the local area.

The Eastern Great Egret was observed on multiple occasions, usually at farm dams. This species is likely to occur wherever similar water bodies are found within the SGCP and local areas. The species is highly dispersive, and often moves towards the coast during the dry season (Marchant and Higgins, 1990). The Eastern Great Egret has been recorded from numerous sites across the SGCP area, and is likely to be relatively common.

Migratory species not expected to occur, but identified in the literature review phase, are briefly discussed in **Table 15**.

**Table 15 Migratory Bird Species Present or Potentially Present in the SGCP Area**

Species name	Likelihood and comments
White-bellied Sea Eagle ( <i>Haliaeetus leucogaster</i> )	Possible. Being primarily restricted to coastlines and large inland waterways, it is unlikely that the SGCP area contains important habitat. May occasionally occur in water-bodies in the SGCP area.
White-throated Needletail ( <i>Hirundapus caudacutus</i> )	Possible. The SGCP area is unlikely to represent important habitat for the species, as it lies at the western edge of its range. The SGCP is unlikely to render local habitat unsuitable for this species.
Rainbow Bee-eater ( <i>Merops ornatus</i> )	<b>Confirmed.</b> Common in local area. Mining will avoid known breeding locations.
Eastern Great Egret ( <i>Ardea alba modesta</i> )	<b>Confirmed.</b> Common in local area.
Cattle Egret ( <i>Ardea ibis</i> )	Possible. The SGCP area lies further west than the Cattle Egret's regular central Queensland distribution, and it is unlikely to represent important habitat for the species.
Cotton Pygmy-goose ( <i>Nettapus coromandelianus albipennis</i> )	Likely. Little suitable habitat occurs in the SGCP area, but the species may occasionally use artificial dams within the SGCP area.
Latham's Snipe ( <i>Gallinago hardwickii</i> )	Possible. Recorded from local area.
Australian Painted Snipe ( <i>Rostratula australis</i> )	Possible. Little suitable habitat occurs in SGCP area, but the species may utilise flooded pasture during years of exceptional rainfall.
Fork-tailed Swift ( <i>Apus pacificus</i> )	Possible. The SGCP area is unlikely to represent important habitat for the species. The SGCP is unlikely to render local habitat unsuitable for this species.
Magpie Goose ( <i>Anseranas semipalmata</i> )	Possible. The SGCP area is unlikely to represent important habitat for the species.

## 6.2.5 Bio-regionally Significant Species

19 species listed as bioregionally significant within the Brigalow Belt (North) and Desert Uplands bioregions were found within the SGCP area. All of these species are listed as priority taxa (EPA 2002).

### 6.2.5.1 Yellow-spotted Monitor (*Varanus panoptes*)

Yellow-spotted Monitors have a broad geographic range across the far north of Australia from the Kimberley to Cape York Peninsula, and southwards through most of Queensland (Wilson and Swan 2010). Yellow-spotted Monitors are a robust terrestrial species that occupy a variety of habitats,

including coastal beaches, floodplains, grasslands and woodlands (DNREA, undated). The most important conservation issue faced by the Yellow-spotted Monitor is its propensity to eat cane toads and to die from the ingested toxins (DNREA, undated). Yellow-spotted Monitors feed on insects and small vertebrates (JCU, 2011).

6.2.5.2 *Black Falcon (Falco subniger)*

The Black Falcon is endemic to Australia and is sparsely distributed in the inland and across northern, eastern, southern and central Australia (Birds Australia, 2006a). Black Falcons are typically found along tree-lined waterways and in isolated woodlands, mainly in arid and semi-arid areas (Birds Australia, 2006a). The species has regular seasonal movements, or is nomadic, depending on seasonal conditions and the availability of food (birds, small mammals, insects and reptiles) (Birds Australia, 2006a).

6.2.5.3 *Australian Bustard (Ardeotis australis)*

Australian Bustards occur in inland and the tropical north of Australia (Birds Australia, 2008a). The species is generally found in small groups or singly. Australian Bustards are typically found on dry plains, grasslands and open woodland (Birds Australia, 2008a). The species is nomadic, and numbers may build up rapidly and disperse, depending on the availability of food. Australian Bustards are omnivorous, with their diet consisting of leaves, buds, seeds, fruit, frogs, lizards and invertebrates (Birds Australia, 2008a).

6.2.5.4 *Bush Stone-curlew (Burhinus grallarius)*

Bush Stone-curlews occur throughout Australia. The Bush Stone-curlew is a nocturnal, ground-dwelling species. During the breeding season, nesting birds will search for food in the vicinity of the nest site, while at other times birds may travel large distances (Birds Australia, 2006b). Bush Stone-curlew numbers have declined through loss of habitat and predation by feral cats (Birds Australia, 2006b).

6.2.5.5 *Barking Owl (Ninox connivens)*

Barking Owls are widely distributed throughout Australia, but are absent from central areas. Barking Owls are typically found in open woodlands and the edges of forests, often adjacent to farmland. They are less likely to use the interior of forested habitat (Birds Australia, 2010). The species prefers woodlands with a high density of large trees with hollow sites (Birds Australia, 2010). The species typically roosts near wetlands or waterways.

6.2.5.6 *Brown Treecreeper (Climacteris picumnus)*

Brown Treecreepers are typically found in dry open forests and woodlands. The species stays in the same area all year round (Birds Australia, 2006c).

6.2.5.7 *White-eared Honeyeater (Lichenostomus leucotis)*

White-eared Honeyeaters occur in mainland eastern and southern Australia (Birds Australia, 2005). White-eared Honeyeaters are typically found in dry Eucalypt forests and woodlands, with well-developed understoreys, but can also be found in a range of heath, shrubland and scrub habitats (Birds Australia, 2005).

6.2.5.8 *Hooded Robin (Melanodryas cucullata)*

Hooded Robins occur all over mainland Australia. Hooded Robins are typically found in lightly timbered woodland, mainly dominated by Acacia and/or Eucalypts (Birds Australia, 2007).

6.2.5.9 *Grey-crowned Babbler (Pomatostomus temporalis)*

The Grey-crowned Babbler is widespread throughout north-western, northern, central and eastern Australia (Birds Australia, 2008b). Grey-crowned Babblers are typically found in open forests and woodlands, favouring inland plains with an open shrub layer, little ground cover and plenty of fallen timber and leaf litter (Birds Australia, 2008b).

6.2.5.10 *Narrow-nosed Planigale (Planigale tenuirostris)*

The Narrow-nosed Planigale is distributed in the eastern interior of Australia (IUCN, undated). Narrow-nosed Planigales are typically found in open grassland, mallee scrub, and bankside vegetation in areas with cracked clay soils (IUCN, undated). This species is nocturnal.

6.2.5.11 *Common Dunnart (Sminthopsis murina)*

Common Dunnart occurs in Queensland and interstate. Common Dunnart are typically found in open forests, woodlands and heathland areas, preferring dry sclerophyll forest and mallee heath (South West Integrated Flora and Fauna Team, undated).

6.2.5.12 *Koala (Phascolarctos cinereus)*

The Koala has a fragmented distribution throughout eastern Australia, from north-east Queensland to the Eyre Peninsula in South Australia (DECC, 2005). Koalas are typically found in Eucalypt woodlands and forests. The species are generally solitary and home ranges vary depending on the quality of the habitat (DECC, 2005).

6.2.5.13 *Common Brushtail Possum (Trichosurus vulpecula)*

Common Brushtail Possums occur in Queensland, New South Wales, Victoria, South Australia, Tasmania, Western Australia and the Northern Territory (Australian Museum, 2010). Common Brushtail Possums are typically found in urban areas, forests, woodlands and heath (Australian Museum, 2010).

6.2.5.14 *Rufous Bettong (Aepyprymnus rufescens)*

Rufous Bettongs are widespread and relatively common in eastern Australia, from near Cooktown to north of Newcastle (Burnett and Winter, 2008). Rufous Bettongs are typically found in wooded areas with a grassy understorey and also occurs in grazing lands (Burnett and Winter, 2008).

6.2.5.15 *Spectacled Hare-wallaby (Lagorchestes conspicillatus)*

Spectacled Hare-wallabies are patchily distributed across the lower latitudes of northern Australia, from eastern Queensland, through the Northern Territory to the Pilbara and Kimberley in Western Australia (Wildlife Australia, undated). Spectacled Hare-wallabies are typically found in open woodlands, shrublands and hummock grasslands (Wildlife Australia, undated).

6.2.5.16 *Black-striped Wallaby (Macropus dorsalis)*

Black-striped Wallabies occur in mid-eastern Australia from Townsville in the north to the Liverpool Plains in northern NSW (NPWS, 1999). Black-striped Wallabies are typically found in open forest with thick regrowth Brigalow or other shrub understorey woodland, closed forest margins and dense wet sclerophyll forests with a viney understorey (NPWS, 1999). Colonies use dense vegetation for shelter during the day and open forest and grassland at night for feeding (NPWS, 1999).

#### 6.2.5.17 Swamp Wallaby (*Wallabia bicolor*)

The range of the Swamp Wallaby extends from Cape York in the north to Victoria and south-eastern South Australia (Menkhorst *et. al.*, 2008). The species is common (Menkhorst *et. al.*, 2008). Swamp Wallabies are typically solitary and found in dense vegetation within various forest, woodland heath and scrub type habitats, although it can also be found grazing in pasture (Menkhorst *et. al.*, 2008).

#### 6.2.5.18 Inland Forest Bat (*Vespadelus baverstocki*)

Inland Forest Bats is common and is found in central Australia. Inland Forest Bats are typically found in a variety of wooded habitats. It roosts in tree hollows and is found in colonies ranging in size from a few individuals to around 50 animals (Lumsden, Reardon and Ellis, 2008).

#### 6.2.5.19 Desert Mouse (*Pseudomys desertor*)

Desert Mice occur widely throughout much of the arid central zone and parts of the semi-arid tropics (Read and Woinarski, 2008). Desert Mice are typically found in a wide range of habitats, including savanna woodland, shrubland, and grassland, mostly within a zone of rainfall of 500-750 mm (Read and Woinarski, 2008). The presence of dense groundcover of grasses, sedges, or shrubs is very important (Read and Woinarski, 2008). The abundance of this species is generally higher after rainfall and lower after fire events (Read and Woinarski, 2008).

### 6.2.6 Pest Animals

Six pest animal species have been recorded from the SGCP area (**Table 16**). These include four species listed as Class 2 declared animals under the LP Act. Under the LP Act, a Class 2 pest 'is one that is established in Queensland and has, or could have, a substantial adverse economic, environmental or social impact'. Management of these pests requires coordination and they are subject to programs led by local government, community or landowners. Landowners must take reasonable steps to keep land free of Class 2 pests (DEEDI, 2009).

Cattle and horses were also found on the SGCP area but these are domestic livestock animals and are not considered to be pests.

**Table 16 Pest Animal Species Recorded in the SGCP Area**

Common Name <i>Scientific Name</i>	LP Act	Potential Biological Impacts
Cane Toad ( <i>Rhinella marina</i> )	–	Highly toxic, and may fatally poison native predators. Preys upon a wide variety of small native animals. Competes for resources with native species. The biological effects, including lethal toxic ingestion, caused by Cane Toads are a key threatening process listed under the EPBC Act.
Dog ( <i>Canis lupus familiaris</i> )	Class 2	Can carry diseases, such as distemper and parvovirus. Competes with native fauna for resources and preys upon a wide variety of native animals. When wild dogs are culled, feral cats may increase in numbers. As such, control measures should target both species concurrently.
Cat ( <i>Felis catus</i> )	Class 2	Preys upon a wide variety of native animals and has been implicated in the extinction of a number of native species (Burbidge and Manly, 2002). Competes for resources with native species. Predation by feral cats is a key threatening process listed under the EPBC Act.
House Mouse ( <i>Mus musculus</i> )	–	May compete for resources with native species especially during drought. May cause economic impacts, especially during plagues.



Table 16 Pest Animal Species Recorded in the SGCP Area (cont)

Common Name <i>Scientific Name</i>	LP Act	Potential Biological Impacts
Rabbit ( <i>Oryctolagus cuniculus</i> )	Class 2	Competes for resources with native species and degrades land through burrowing and grazing. Competition and land degradation by rabbits is a key threatening process listed under the EPBC Act.
Feral Pig ( <i>Sus scrofa</i> )	Class 2	Degrades water-bodies through wallowing and foraging, may spread diseases and weeds, preys on nesting ground birds and competes for resources with native species. Predation, habitat degradation, competition and disease transmission by feral pigs is a key threatening process listed under the EPBC Act.

– denotes a species not listed under the LP Act

Despite predictive climate suitability mapping prepared by DEEDI (2011b) which indicates that the SGCP area is unsuitable for the Cane Toad, the species was recorded on-site. Biological effects including lethal toxic ingestion caused by Cane Toads are listed under the EPBC Act. Any new water bodies, including ponding areas, roadside ditches, flood channels, can increase breeding opportunities for Cane Toads.

Wild Dogs have a priority of 'high 1' under the Barcaldine Regional Council's Pest Management Plan (Barcaldine Regional Council, 2010). Wild Dogs have the potential to affect existing fauna populations. In particular, dispersal and recruitment of medium-sized mammals, such as small wallabies, may be affected. This may reduce a species' ability to recover from adverse stochastic events. Many native species benefit from the control of wild Dogs, but feral Cat numbers must be controlled concurrently to prevent populations of these smaller predators increasing in the absence of wild Dogs.

Feral Cats have a priority of 'medium 2' under the Barcaldine Regional Council's Pest Management Plan (Barcaldine Regional Council, 2010). Predation by feral Cats may pose additional threat to the conservation of biodiversity within the SGCP area. This species is listed as a Class 2 pest under the LP Act and predation by Cats is a Key Threatening Process under the EPBC Act. In addition to their negative impacts on biodiversity, Dogs and Cats may prey upon local stock and may harbour and spread diseases to domestic animals.

Despite mapping prepared by DEEDI (2011b) which indicates that the SGCP is outside the area of potential Rabbit distribution, the species was recorded on-site. Rabbits have a priority of 'medium 2' under the Barcaldine Regional Council's Pest Management Plan (Barcaldine Regional Council, 2010). Under the EPBC Act, competition and land degradation by Rabbits is listed as a key threatening process, although it is unlikely that competition is a significant factor within the SGCP area due to low species density.

Feral Pigs have a priority of 'high 1' under the Barcaldine Regional Council's Pest Management Plan (Barcaldine Regional Council, 2010).

## 7 POTENTIAL IMPACTS

Potential impacts of the construction and operation of the SGCP on terrestrial flora and fauna include:

- vegetation clearing and habitat loss;
- edge effects and fragmentation;
- direct mortality;
- dust;
- subsidence and hydrological impacts;
- weeds;
- pest animals;
- altered fire regime;
- release of contaminants; and
- cumulative impacts.

These impacts are assessed in **Section 7.1.1** to **Section 7.1.10**. Potential impacts for species of conservation significance are described in **Section 7.1.11**.

### 7.1.1 Vegetation Clearing and Habitat Loss

The clearing of vegetation is one of the most significant impacts on biodiversity. Removal of vegetation for the SGCP will impact on local biodiversity through habitat loss and individual mortality. Habitat loss may reduce the viability of an area for a species and remove important features such as hollows in mature vegetation, fallen logs/debris etc. Habitat loss also exacerbates fragmentation and edge effects which impact on species' ability to persist adjacent to cleared areas (described further in **Section 7.1.2**).

Of the 46,584 ha within the SGCP area, approximately 31% (14,533 ha) is remnant vegetation. Of the remnant vegetation, approximately 12% (1,720 ha) will be impacted by SGCP mining activities (**Figure 15-1** and **Figure 15-2**).

Approximately 585 ha of remnant vegetation will be cleared for the open pit mining area and associated infrastructure (approximately 355 ha will be cleared within the mine survey area and 230 ha will be cleared within the infrastructure corridor survey area).

Within the mine survey area, clearing will be primarily associated with the open cut mining area and waste rock emplacements. Smaller areas will be cleared for water management infrastructure, roads, stockpiles and other ancillary infrastructure. All clearing within the infrastructure corridor survey area is associated with the 100 m wide infrastructure corridor.

The REs most impacted by clearing within the mine survey area are 10.3.28a (174.9 ha), 10.3.27a (77.4 ha) and 10.5.5a (54.1 ha) (**Table 17**). The REs most impacted by the infrastructure corridor are 10.5.5a (148.2 ha) and 10.5.12 (37.2 ha) (**Table 17**). All are listed as of least concern under the VM Act and have the biodiversity status 'not of concern', except for 10.3.27a, which has the biodiversity status of 'of concern'. In total, 275 ha of REs with an 'of concern' biodiversity status will be impacted by the proposed activities. The most highly impacted 'of concern' RE is 10.3.27a (approximately 261 ha); the remaining 'of concern' REs impacted on are REs 11.3.2, 11.3.25, 11.3.6 and 11.7.1 (approximately 14 ha). Mitigation measures to address potential impacts are described in **Section 8**.

Small areas of TECs protected under the EPBC Act will be impacted by the proposed activities. Approximately 14 ha of RE 11.4.8 is proposed to be cleared (approximately 8 ha in the infrastructure corridor and 5 ha in the mine survey area). In addition, 0.62 ha of RE 11.3.1 will be cleared in the infrastructure corridor. REs 11.4.8 and 11.3.1 are classified as environmentally sensitive areas (ESAs) under the EP Regulation. As a result, they are protected under the EP Act. These REs correspond to

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the Brigalow TEC under the EPBC Act. This clearing is unavoidable and is considered to have a minor impact on these communities in a bioregional context. Mitigation measures are described in **Section 8**.

**Table 17 RE Vegetation Communities Recorded within the SGCP Area**

RE Vegetation Community	Short Description (REDD)	Extent in Reserves	Status			Total Impacted Area (ha)	Area to be Cleared in the MSA (ha)	Area Overlying Underground Mining Area (ha)	Area to be Cleared in the ICSA (ha)
			VM Act	Biodiversity Status	EPBC Act				
Landzone 3: Alluvial plains									
Dominant or subdominant									
10.3.3b	<i>Acacia harpophylla</i> [Brigalow] low woodland to woodland on alluvium	Low	LC	NOC	–	12.65	11.78	0	0.87
10.3.15i	<i>Eucalyptus coolabah</i> [Coolibah] dominated Palustrine wetland (e.g. vegetated swamp). Occurs on grey clay soils in closed depressions on Tertiary sandplain or ferricrete	Low	LC	OC	–	0	0	0	
10.3.27a	<i>Eucalyptus populnea</i> [Poplar Box] open-woodland to woodland on alluvial plains	Low	LC	OC	–	261.32	77.39	181.77	2.16
10.3.28a	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] ± <i>Corymbia dallachiana</i> [Dallachy's Gum] open woodland on sandy alluvial fans	Low	LC	NOC	–	293.78	174.91	118.68	0.19
11.3.1	<i>Acacia harpophylla</i> [Brigalow] and/or <i>Casuarina cristata</i> [Belah] open forest on alluvial plains	Low	E	E	E*	0.62	0	0	0.62
11.3.2	<i>Eucalyptus populnea</i> [Poplar Box] woodland on alluvial plains	Low	OC	OC	–	0.27	0.0014	0	0.27
11.3.6	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] woodland on alluvial plains	Low	LC	OC	–	2.97	2.97	0	
11.3.19	<i>Callitris glaucophylla</i> [White Cypress Pine], <i>Corymbia</i> spp. and/or <i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] woodland on Cainozoic alluvial plains	Low	LC	NOC	–	0	0	0	
11.3.25	<i>Eucalyptus tereticornis</i> [Forest Red Gum] or <i>E. camaldulensis</i> [River Red Gum] woodland fringing drainage lines	Low	LC	OC	–	4.63	1.39	2.13	1.11



**Table 17 RE Vegetation Communities Recorded within the SGCP Area (cont)**

RE Vegetation Community	Short Description (REDD)	Extent in Reserves	Status			Total Impacted Area (ha)	Area to be Cleared in the MSA (ha)	Area Overlying Underground Mining Area (ha)	Area to be Cleared in the ICSA (ha)
			VM Act	Biodiversity Status	EPBC Act				
Landzone 3: Alluvial plains									
Subdominant only									
10.3.10	<i>Corymbia dallachiana</i> and <i>C. terminalis</i> open woodland on old alluvial plains (western)	Low	LC	NOC	–	0.10	0	0	0.10
10.3.27b	<i>Archidendropsis basaltica</i> [Dead Finish] open-woodland to woodland on alluvial plains	Low	LC	OC	–	2.84	0	0	2.84
11.3.2b	Palustrine wetland (e.g. vegetated swamp). <i>Eucalyptus camaldulensis</i> (sometimes <i>E. populnea</i> and or <i>E. tereticornis</i> ) woodland in drainage depressions. Ground layer of grasses or sedges. Occurs on seasonally inundated drainage depressions	Low	OC	OC	–	0.07	0	0	0.07
11.3.7	<i>Corymbia</i> spp. woodland on alluvial plains	Low	LC	OC	–	0	0	0	0
Landzone 4: Gently undulating clay									
Dominant or Subdominant									
11.4.8	<i>Eucalyptus cambageana</i> [Dawson Gum] woodland to open forest with <i>Acacia harpophylla</i> [Brigalow] or <i>A. argyrodendron</i> [Blackwood] on Cainozoic clay plains	Low	E	E	E*	13.3613.36	4.87	0	8.49

**Table 17 RE Vegetation Communities Recorded within the SGCP Area (cont)**

RE Vegetation Community	Short Description (REDD)	Extent in Reserves	Status			Total Impacted Area (ha)	Area to be Cleared in the MSA (ha)	Area Overlying Underground Mining Area (ha)	Area to be Cleared in the ICSA (ha)
Landzone 5: Uniform sand plains									
Dominant or subdominant									
10.5.1b	<i>Corymbia brachycarpa</i> [Desert Bloodwood] ± <i>Corymbia dallachiana</i> [Dallachy's Gum] low open woodland to open woodland on sand plains	Low	LC	NOC	–	151.15	9.43	137.88	3.84
10.5.1d	<i>Corymbia setosa</i> dominates the very sparse canopy (6-11 m tall). <i>Grevillea glauca</i> and <i>Petalostigma pubescens</i> are frequently present in the very sparse low trees layer (3-6 m tall). <i>Acacia spp.</i> and <i>Carissa lanceolata</i> dominate the very sparse shrub layer (0.5 - 2 m tall). The ground layer is usually dominated by <i>Triodia pungens</i> . Occurs on sandplains	Low	LC	NOC	–	2.16	0	0	2.16
10.5.5a	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark] ± <i>Corymbia plena</i> [Large-fruited Bloodwood] ± <i>C. dallachiana</i> [Dallachy's Gum] open-woodland on sand plains	Low	LC	NOC	–	621.92	54.11	419.65	148.16
10.5.12	<i>Eucalyptus populnea</i> [Poplar Box] open woodland	Low	LC	NOC	–	37.49	0.31	0	37.18
11.5.3	<i>Eucalyptus populnea</i> [Poplar Box] and/or <i>E. melanophloia</i> [Silver-leaved Ironbark] and/or <i>Corymbia clarksoniana</i> [Clarkson's Bloodwood] on Cainozoic sand plains/remnant surfaces	Low	LC	NOC	–	13.08	0.35	0.53	12.20
11.5.5	<i>Eucalyptus melanophloia</i> [Silver-leaved Ironbark], <i>Callitris glaucophylla</i> [White Cypress Pine] woodland on Cainozoic sand plains/remnant surfaces. Deep red sands	Low	LC	NOC	–	1.18	0	0	1.18

**Table 17 RE Vegetation Communities Recorded within the SGCP Area (cont)**

RE Vegetation Community	Short Description (REDD)	Extent in Reserves	Status			Total Impacted Area (ha)	Area to be Cleared in the MSA (ha)	Area Overlying Underground Mining Area (ha)	Area to be Cleared in the ICSA (ha)
Landzone 5: Uniform sand plains									
Dominant or subdominant									
11.5.12	<i>Corymbia clarksoniana</i> [Clarkson's Bloodwood] woodland and other <i>Corymbia</i> spp. and <i>Eucalyptus</i> spp. on Cainozoic sand plains/remnant surfaces	Low	LC	NOC	–	20.22	0	20.22	0
Subdominant only									
10.5.10	<i>Corymbia leichhardtii</i> [Rusty Jacket] open woodland on sand plains	Low	LC	NOC	–	81.44	0	81.44	0
Landzone 7: Duricrusts and footslopes									
Dominant or subdominant									
10.7.3a	<i>Acacia catenulata</i> [Bendee] ± <i>A. shirleyi</i> [Lancewood], ± <i>Eucalyptus persistens</i> [Mallee Box] ± <i>Corymbia dallachiana</i> [Dallachy's Gum] low woodland on scarps	Medium	LC	NOC	–	14.43	14.43	0	0
10.7.3b	<i>Acacia shirleyi</i> [Lancewood] ± <i>Eucalyptus exilipes</i> [Fine-leaved Ironbark] low woodland on scarps	Medium	LC	NOC	–	8.76	0.62	5.53	2.61
10.7.3d	<i>Acacia catenulata</i> [Bendee] low woodland on shallow red earths†	Medium	LC	NOC	–	0	0	0	0

**Table 17 RE Vegetation Communities Recorded within the SGCP Area (cont)**

RE Vegetation Community	Short Description (REDD)	Extent in Reserves	Status			Total Impacted Area (ha)	Area to be Cleared in the MSA (ha)	Area Overlying Underground Mining Area (ha)	Area to be Cleared in the ICSA (ha)
Landzone 7: Duricrusts and footslopes									
Dominant or subdominant									
10.7.7a	<i>Melaleuca uncinata</i> [Broom Honey Myrtle] and <i>M. tamariscina</i> [Bushhouse Paperbark] with or without <i>Acacia leptostachya</i> [Slender Wattle] tall open-shrublands on ferricrete	Medium	LC	NOC	–	5.5	0	0	5.50
10.7.7b	<i>Melaleuca tamariscina</i> [Bushhouse Paperbark] very sparse open-woodland on ferricrete	Medium	LC	NOC	–	33.01	0	32.91	0.10
11.7.1	<i>Acacia harpophylla</i> [Brigalow] and/or <i>Casuarina cristata</i> [Belah] and <i>Eucalyptus thozetiana</i> [Mountain Yapunyah] or <i>E. microcarpa</i> [Grey Box] woodland or <i>E. cambageana</i> on lower scarp slopes on lateritic duricrust	Low	LC	OC	–	5.64	0	5.64	0
11.7.2	<i>Acacia</i> spp. woodland on lateritic duricrust. Scarp retreat zone	Low	LC	NOC	–	45.41	2.49	42.92	0
Subdominant only									
10.7.5	<i>Eucalyptus thozetiana</i> [Mountain Yapunyah] open woodland on scarps and on pediments below scarps	Low	LC	NOC	–	0	0	0	0



**Table 17 RE Vegetation Communities Recorded within the SGCP Area (cont)**

RE Vegetation Community	Short Description (REDD)	Extent in Reserves	Status			Total Impacted Area (ha)	Area to be Cleared in the MSA (ha)	Area Overlying Underground Mining Area (ha)	Area to be Cleared in the ICSA (ha)
Landzone 10: Coarse-grained sediments									
Dominant or subdominant									
11.10.4	<i>Eucalyptus decorticans</i> [Gum Top Ironbark], <i>Lysicarpus angustifolius</i> [Budgeroo] ± <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp. woodland on coarse-grained sedimentary rocks. Crests and scarps	High	LC	NOC	–	25.83	0	25.83	0
11.10.7	<i>Eucalyptus crebra</i> [Narrow-leaved Ironbark] woodland on coarse-grained sedimentary rocks	Low	LC	NOC	–	25.83	0	25.83	0
11.10.13b	<i>Corymbia leichhardtii</i> [Rusty Jacket] woodland on scarps and sandstone tablelands	High	LC	NOC	–	34.44	0	34.44	0
Total Area (ha)						1,720.12	355.07	1,135.4	229.64

**Abbreviations:**

**MSA** = mine survey area, **ICSA** = infrastructure corridor survey area

Status; **E** = endangered; **OC** = of concern; **NOC** = not of concern; **LC** = Least Concern; **–** = not listed

\*This RE corresponds to the endangered Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC under the EPBC Act as it is dominated by Brigalow (*Acacia harpophylla*)

†This RE subtype is not described in the REDD, but is listed in this report as 10.7.3d as the *Acacia shirleyi* designation is the closest corresponding unit

Clearing will result in increased landscape fragmentation. Fragmentation of 'of concern' or 'endangered' REs will result in a reduction of core habitat values of these areas. Fragmentation and associated edge effects can also provide opportunities for the introduction and colonisation of pest animal and weed species during construction and operational phases. The removal of any existing vegetation within the SGCP area may impact locally significant and/or State or Commonwealth-protected species. Vegetation clearing should be undertaken in accordance with the mitigation measures described in **Section 8** to minimise the potential impact.

### **7.1.2 Edge Effects and Fragmentation**

Fragmentation occurs when larger areas of habitat are dissected into smaller remnants dissected by a matrix of dissimilar habitats (Hannah *et al.*, 2007). Fragmentation is a key threat to the persistence of biodiversity (Cox, Dickman and Hunter, 2003; Fletcher, 2005). Even small, linear cleared strips that bisect native vegetation impede the passage of native species and cause fragmentation (Goosem and Marsh, 1997; Carthew, Horner and Jones, 2009). The SGCP will increase fragmentation of remnant vegetation. Remnant vegetation within the SGCP region is already highly fragmented and several mining projects are proposed in the Galilee Basin. In fragmented landscapes, further clearing of vegetation has the potential to exacerbate impacts on ecosystems and species that are already under pressure from existing fragmentation (Souli *et al.*, 2004; McIntyre, McLvor and Heard, 2002).

Although portions of this landscape, particularly in the east, have been subjected to fragmentation as a result of agricultural activities, some areas (most notably in the west of the mine survey area) still maintain significant corridor values. The SGCP is not expected to significantly impact on major corridors.

Edge effects increase the fragmentation of landscapes (Fletcher, 2005) and occur as a result of environmental and ecological changes along the perimeter of a disturbed area of vegetation. Weed infestations are a common edge effect due to the increase in light availability in cleared areas coupled with the lack of competition by native plants. Weeds often establish along edges of cleared areas and then spread into the existing uncleared vegetation. Changes to the microclimate (temperature, soil moisture, humidity) along edges can impede native plant species growth and seed viability (Rowley *et al.*, 1993). Fragmentation is a major threat to Australian vegetation communities and native plants (Burgman *et al.*, 2007).

Edge effects impact on fauna species in terms of changes to microclimates and habitats (Garden *et al.*, 2007). Changes to the thermal environment along edges alter the suite of species that may utilise edge areas, and may increase the susceptibility to predation, further reducing the biodiversity values of a fragmented area (Andren and Anglestam, 1988; May and Norton, 1996; Webb, Shine and Pringle, 2005).

Edge effects are expected to occur as a result of the SGCP where there is clearing of remnant vegetation. However, edge effects will be avoided to a large extent by the positioning of the mine outside of remnant vegetation as much as practicable. The SGCP is to be situated predominantly in non-remnant vegetation and will avoid most REs of conservation significance in the area. The implementation of the measures described in **Section 8.1.2** will mitigate the intrusion of weed species into remnant vegetation due to edge effects.

Vegetation along Alpha Creek in the east of the SGCP area provides important connectivity with larger expanses of remnant vegetation to the west, south and north-east. This vegetation will remain largely intact.

Some patches of remnant vegetation may become isolated during the SGCP development. These patches would be expected to still have ecological value (acting as stepping stones for fauna moving between Alpha Creek and other areas of remnant vegetation) and should be retained where possible.

### **7.1.3 Direct Mortality**

Clearing of vegetation during the development phase of the SGCP presents a risk of direct mortality to threatened flora and fauna. The increased passage of vehicular traffic and machinery both during

construction and operation of the mine has potential to injure fauna species and cause direct mortality. Human-induced mortality is also a risk, particularly to snake species and the Brigalow-scaly Foot which mimics a snake when distressed.

#### **7.1.4 Dust**

Excessive dust associated with clearing, earthworks, vehicle movements, windblown emissions and blasting within the SGCP area will potentially impact on vegetation. Excessive dust reduces photosynthesis and inhibits plant growth (Thompson *et al.*, 1984; Sharifi, Gibson and Rundel, 1997). Pollutants in dust can also impede plant growth (Farmer, 1993; Doley, 2006). It is possible that dust will impact native vegetation within a limited area adjacent to the open pit mining area and haulage routes.

#### **7.1.5 Subsidence and Hydrological Impacts**

Subsidence results in surface effects due to vertical displacement of the landscape above underground mining operations (Singh, 2003). Approximately 1,135 ha of remnant vegetation overlies the proposed longwalls and may be affected by subsidence. No threatened communities will be impacted by subsidence from longwall mining. The REs most impacted by potential subsidence are 10.5.5a (419.65ha), 10.5.1b (137.88ha), 10.3.28 (118.68ha) and 10.3.27a (181.77ha).

Depending on the depth of the coal seam, subsidence and associated cracking of valley floors and creek lines may cause temporary or permanent loss of water flow (Dawkins, 2003; NSW Scientific Committee, 2008). The severity of subsidence varies according to local conditions. A potential impact on surface hydrology in steep terrain is the modification of channel and drainage morphology as a result of subsidence. Such changes could affect riparian habitat through channel erosion, sediment delivery and routing in creeks (Sidle *et al.*, 2000). Steep terrain is rare within the proposed longwall panels of the SGCP area. The SGCP longwall panels will be situated away from major creeks, and only smaller waterways or drainage lines are likely to be impacted by subsidence.

Drainage areas that lie within the west of the SGCP (i.e. Tallarenha Creek headwaters) that will be subject to proposed underground mining areas represent a small area of marginal riparian habitat that has insignificant conservation value.

Any changes to surface hydrology may have indirect effects on vegetation communities through alteration of water availability and flood frequency. For example, altered flows could affect dispersal and replenishment of aquatic species (Dawkins, 2003). Such effects are expected to be minimal in the SGCP area as all drainage systems are ephemeral.

Longwall mining has also been known to lead to gas emissions resulting in localised plant death as anaerobic conditions are created within the soil (Everett *et al.*, 1998). The frequency and intensity of such events is poorly documented. The SGCP Pre-Feasibility Study (AMCI and Bandanna Energy, 2011) indicates that work undertaken on tenements immediately to the north of the SGCP found no economically recoverable reserves of gas therefore methane was not considered to be a likely significant management issue from an operational perspective. Further, no significant indications of gas have been reported during SGCP exploration drilling activities to date (AMCI and Bandanna Energy, 2011).

Subsidence may produce a trough-like depression above the mined-out panel (Booth *et al.*, 1998). This may cause an increase in surface water pooling, or increase soil moisture content in some locations. This could potentially increase weed abundance (particularly Buffel Grass) which alters habitat structure and renders infested areas less suitable for some native plants. Parthenium weed (*Parthenium hysterophorus*) can also increase in abundance with increased soil moisture. This species is currently scarce and patchy within the region (Agriculture & Resource Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers, 2000) and is absent from the local area. An increase in pooled water due to subsidence may provide breeding habitat for cane toad, which have a deleterious impact on native fauna.

The development of open cut mining areas and waste rock emplacements will require the diversion of Sapling Creek and the construction of drainage channels to direct surface runoff around the SGCP area. The diversion of Sapling Creek and construction of drainage channels may negatively impact surrounding vegetation, riparian areas and downstream vegetation as a result of altered local hydrology. However, these small waterbodies are ephemeral and for the majority of time constitute no- to low-flow systems. Sapling Creek is likely to contain pooled water in some sections for much of the year and as a result is likely to be ecologically important in a local context, providing an important water source for fauna during the dry season. Downstream vegetation may be affected by hydrological changes associated with the stream diversion.

The construction of any creek diversion has the potential to disperse weeds into areas of remnant vegetation where weed species do not currently occur. The most likely causes of weed dispersal associated with the proposal would include earthworks, movement of soil and attachment of seeds and other propagules to vehicles and machinery. This may, in turn, reduce the condition of threatened communities and habitat quality for threatened and near threatened species. Threats from weed species are discussed in **Section 7.1.6**.

#### **7.1.6 Weeds**

Twenty-eight weed species were recorded in the SGCP area, including three species listed under the LP Act as class 2 weeds (i.e. Velvety Tree Pear, Prickly Pear and Harrisia Cactus). These three cactus species occurred in low numbers throughout the SGCP area and do not currently pose a significant threat to environmental values.

Although not declared under the LP Act, the Barcaldine Regional Council (2010) recommends that Noogoora Burr (*Xanthium occidentale*) be subject to surveillance and any isolated infestations are controlled. Weed species have the potential to impact on threatened species through broad scale habitat alteration and competition with native plants that provide food and shelter to fauna species.

Soil disturbance, coupled with the introduction of weed seeds from outside the SGCP area via vehicular traffic, has the potential to result in the establishment and spread of new weeds on-site. Mitigation and management measures for weeds are provided in **Section 8.1.2**

#### **7.1.7 Pest Animals**

Six pest animal species were recorded in the SGCP area. Several of these species, including the Pig and Rabbit, have the potential to cause serious environmental harm. Predatory pest species such as feral Cats, Pigs and wild Dogs present a major risk to threatened species. It is not anticipated that the proposed activities of the SGCP will significantly increase the abundance or distribution of pest animals. Mitigation and management measures for pest species are described in **Section 8.1.2**.

#### **7.1.8 Fire**

Fire plays a role in vegetation succession patterns and habitat mosaics in the Desert Uplands bioregion. Periodic, low intensity mosaic burning promotes diversity of habitats (Fensham and Fairfax, 2007; Price, Kutt and McAlpine, 2010). It is not expected that the SGCP project will significantly increase the frequency or intensity of fires within the region. Due to the difficulty of controlling fires during the dry season, it is recommended that fire bans be in place across the SGCP area. Fire is not expected to impact on species or REs of conservation significance unless hot, intense burns are allowed to proliferate.

#### **7.1.9 Release of Contaminants**

Release of contaminated water or other contaminants has the potential to pollute waterways and to impact on vegetation health adjacent to the SGCP area. The design and operation of water management infrastructure, waste rock emplacements and chemical/fuel storage facilities will be undertaken in accordance with relevant legislation and standards, and as such, no additional mitigation measures are proposed.



#### 7.1.10 Cumulative Impacts

Cumulative impacts are the result of multiple developments in an area. An individual development may have negligible impact; however, when coupled with the impacts of other projects, the accumulative changes to the environment over time can lead to more substantial impacts than those associated with any single development. For example, a single project within an area surrounded by areas of biodiversity value will have negligible impacts whilst regional biodiversity is still mostly intact, but when multiple developments occur in the region, despite each having negligible impact in isolation, the sum of individual changes imparts environmental harm.

Cumulative impacts increase exponentially with successive developments and negative impacts on regional biodiversity are likely to occur within a rapid timeframe once development exceeds a threshold level within a given region (Theobald, Miller and Hobbs, 1997; McIntyre, McIvor and Heard, 2002; Fletcher, 2005). The threshold level for these impacts is difficult to quantify and varies depending on the nature of development, the biota impacted on and the landscape in which development occurs (Stakhiv, 1988).

A number of mining projects are currently proposed for the Galilee Basin. The cumulative impact of land clearing and transport infrastructure is likely to result in increased fragmentation, increased edge effects, reduction of biodiversity corridors and removal of large tracts of habitat. These impacts will reduce the likelihood of recolonisation of species into an area, disturb the seasonal movements of species and reduce dispersal between areas of remnant suitable habitat (Theobald, Miller and Hobbs, 1997).

The threatened animal species most likely to be negatively affected by the SGCP is the Brigalow Scaly-foot. The stronghold of this species is in Queensland's Brigalow Belt bioregion, an area that has seen a drastic reduction in its extent of remnant vegetation (Kutt, Hannah and Thurgate, 2003). While the SGCP is unlikely to have significant impacts on the overall population of the species, the cumulative effects of development within the region are likely to be detrimental. To reduce the potentially negative impacts of the SGCP, it is recommended that remaining vegetation be managed for biodiversity conservation purposes and biodiversity corridors are established between remnant habitats (SEWPaC, 2011).

#### 7.1.11 Impacts on Confirmed Threatened or Near Threatened Flora

Three threatened or near threatened flora species were confirmed in the SGCP area (**Figure 13**), and one near threatened flora species (i.e. Western Rosewood) was considered likely to be present despite having not been detected.

##### 7.1.11.1 *Round-leaved Heath Myrtle*

Round-leaved Heath Myrtle was recorded within RE 10.7.7 on a jump-up in the eastern portion of the mine survey area (on the Sapling property). The populations within and in close proximity to the SGCP area appear to be limited in extent.

The core of the identified Round-leaved Heath Myrtle population is not expected to be directly impacted by the SGCP. However, the open pit mining area and waste rock emplacement may result in changes to the surface and groundwater hydrology and chemistry. Acid mine drainage has been known to largely destroy affected areas of vegetation (Bell *et al.*, 2001). Mitigation measures to address acid mine drainage will be proposed in the EIS and include selective placement of potentially acid forming (PAF) within the waste rock emplacements, covering PAF material with non-acid forming material and on-site water management infrastructure.

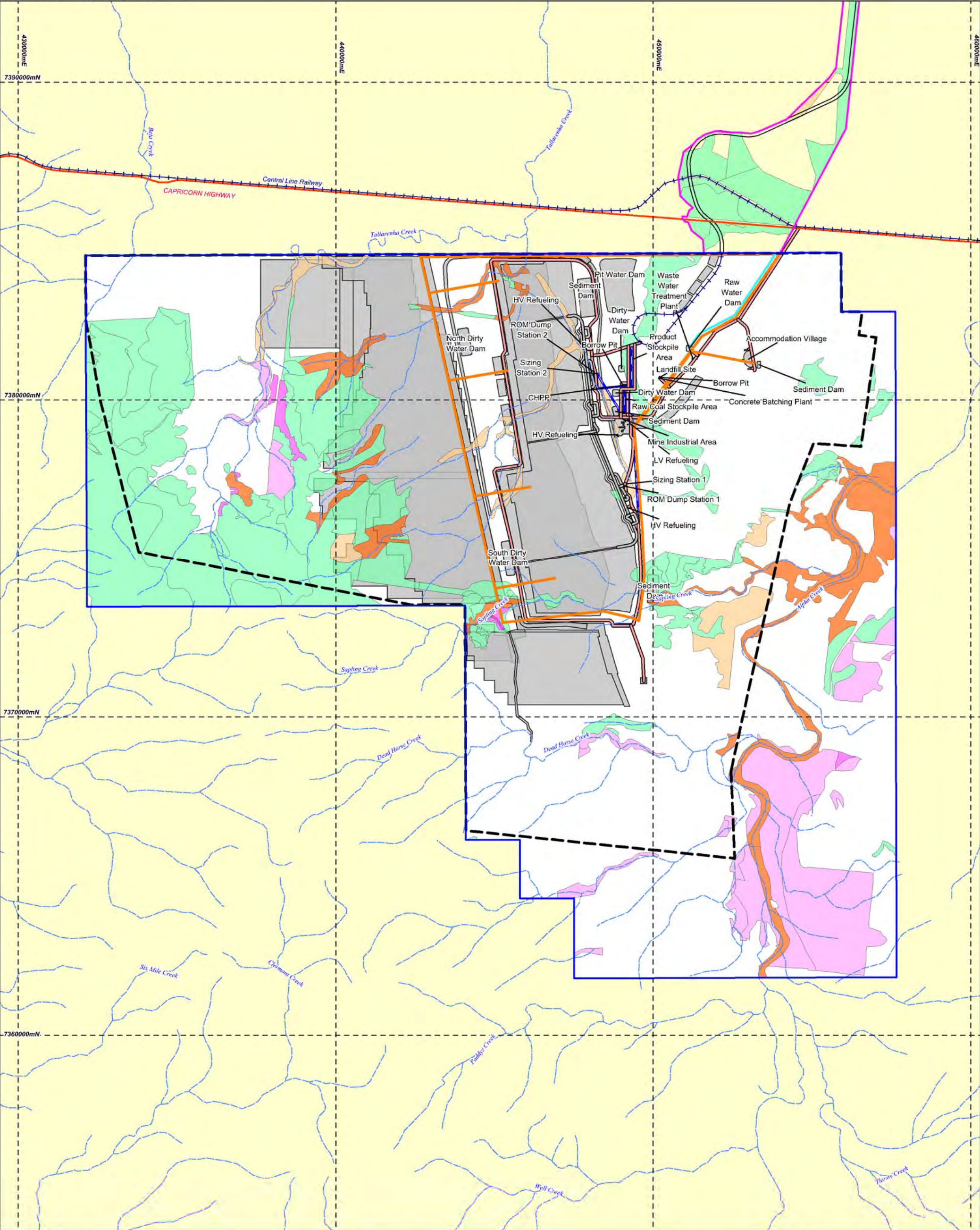
Small populations of plants can sometimes be vulnerable to extinction due to random stochastic events. Loss of connectivity between populations restricts the ability of new dispersal of seed into an area affected by localised threatening processes.

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The Round-leaved Heath Myrtle population to the west of the mine survey area is not expected to be affected by the SGCP, and therefore no specific management or mitigation recommendations are recommended.

In addition to the known population, other populations may exist within the mine survey area and not have been detected. The total area covered by known potential habitat for this species (REs 10.7.3, 11.7.2 and 11.10.3) that will be impacted within the mine survey area is approximately 66 ha (consisting of approximately 18 ha to be cleared and 49 ha to be potentially impacted by subsidence). It is unlikely that the Round-leaved Heath Myrtle occurs in the infrastructure corridor survey area given the intensity of survey effort over a narrow area.





Mining & Energy Technical Services Pty Ltd

**LEGEND**

MLA70453  
Principal road  
Mine survey area  
Infrastructure corridor Survey Area

**Mining Activity**

Mining Activity

**Infrastructure**

Topsoil stockpile  
Facility Area  
Stream diversion  
Drainage channel  
Water Storage Dam  
Heavy vehicle road  
Light vehicle road  
On-site rail component  
Coal & rejects conveyor

**Utilities**

66kV overhead power line  
11kV overhead power line  
Raw water pipeline

**Regional Ecosystem**

Biodiversity status

Endangered (dominant)  
Endangered (sub-dominant)  
Of Concern (dominant)  
Of Concern (sub-dominant)  
Not of Concern  
Non-remnant

**Alpha Coal Pty Ltd**  
**South Galilee Coal Project**

Conceptual Mine Layout Plan - Year 33

2 0 2 4  
Kilometres

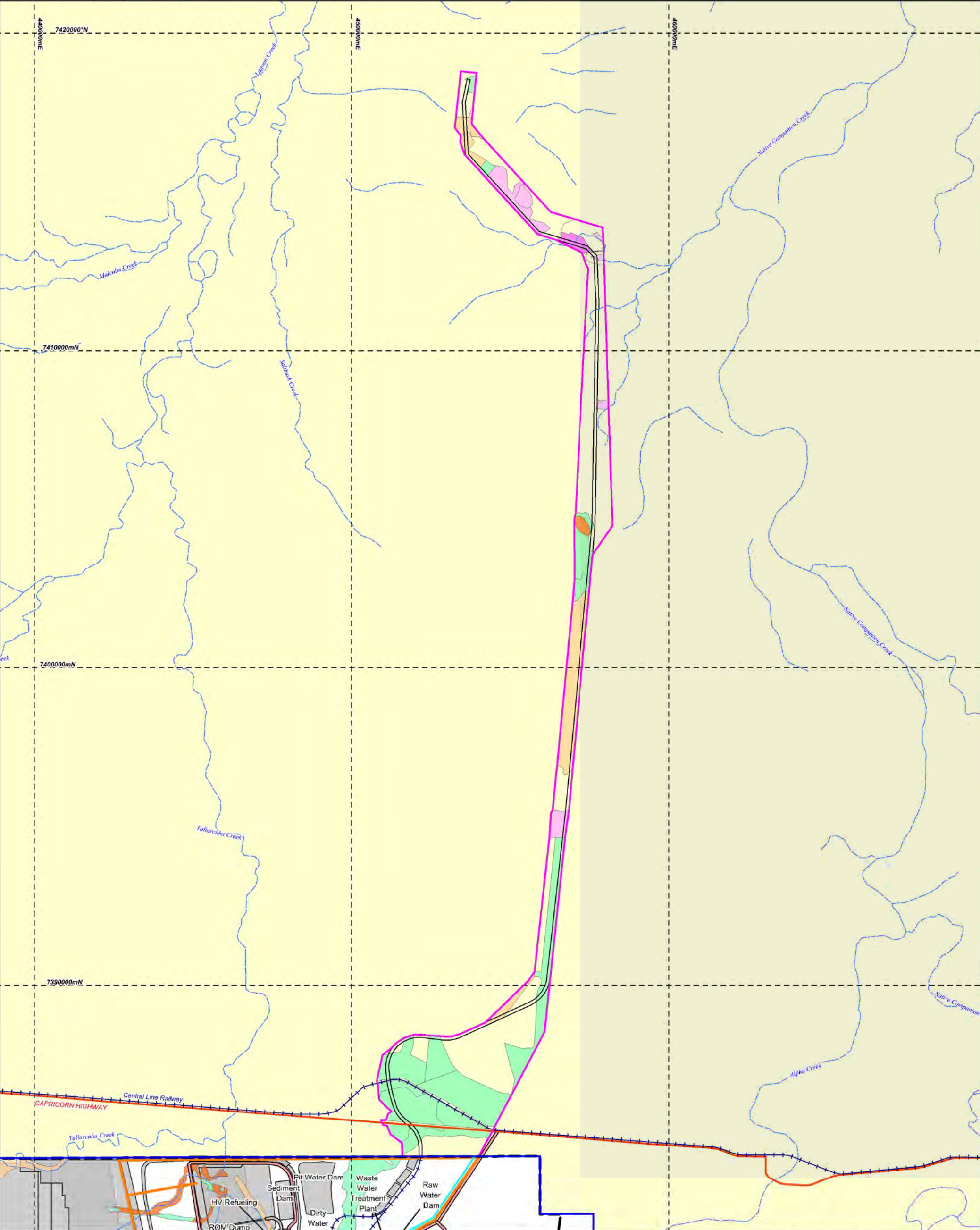
28/11/2011



Datum: GDA94  
Projection: MGA55

**FIGURE 15-1**

Data Source: Contours & DEM (2010 LIDAR) - AAM, Infrastructure - AureconHatch, Mining Activity - Echelon.







SouthGalilee

**LEGEND**

- MLA70453
- Principal road
- Mine survey area
- Infrastructure corridor Survey Area
- Mining Activity**
- Mining Activity

**Infrastructure**

- Topsoil stockpile
- Facility Area
- Stream diversion
- Drainage channel
- Water Storage Dam
- Heavy vehicle road
- Light vehicle road
- On-site rail component
- Coal & rejects conveyor

**Utilities**

- 66kV overhead power line
- 11kV overhead power line
- Raw water pipeline

**Regional Ecosystem**

Biodiversity status

- Endangered (dominant)
- Endangered (sub-dominant)
- Of Concern (dominant)
- Of Concern (sub-dominant)
- Not of Concern
- Non-remnant

**Alpha Coal Pty Ltd**

**South Galilee Coal Project**

**Conceptual Mine Layout Plan - Year 33**

2 0 2 4

**Kilometres**

28/11/2011

Datum: GDA94  
Projection: MGA55

**FIGURE 15-2**



#### 7.1.11.2 *Large-podded Trefoil*

Large-podded Trefoil was recorded within RE 11.5.3 and an area of non-remnant vegetation along the infrastructure corridor survey area, within the properties Saltbush and Tresillian. The population on Saltbush lies 50 m to the west of the proposed infrastructure corridor and the population on the Tresillian lies 100 m to the east of the infrastructure corridor. This herb is likely to be more widespread within the SGCP survey area than the few records suggest.

While the known populations of Large-podded Trefoil will not be impacted by the proposed infrastructure corridor, areas of potential habitat will be removed. Large-podded Trefoil could occur in any remnant or non-remnant vegetation in land zones other than 7 or 10. As such, approximately 4,964 ha of potential habitat will be cleared for the SGCP, while approximately 5,113 ha could be impacted by subsidence.

The Large-podded Trefoil populations within the SGCP area appear to be limited in extent. Small populations of plants can sometimes be vulnerable to extinction due to random stochastic events. However, as this species was recorded within in non-remnant grasslands or other previously cleared areas, clearing of woodland for grazing may not be an important threat.

#### 7.1.11.3 *Eleocharis blakeana*

*Eleocharis blakeana* was observed in a wetland within the infrastructure corridor survey area on the Saltbush property. The proposed alignment of the infrastructure corridor (**Figure 15-2**) bypasses this wetland.

Threats to wetlands in general may include weeds, pollution, altered drainage patterns, draining for agricultural or residential land, or heavy grazing in drier areas. The latter factor is the primary threatening process facing the population of *E. blakeana* in the SGCP area. Grazing is not expected to increase as a result of the SGCP.

Given that most other wetlands within the SGCP were artificial waterbodies with heavily grazed edges, it is unlikely that significant populations of this species occur elsewhere in the survey area. Consequently, impacts of the SGCP on *E. blakeana* are expected to be negligible.

### 7.1.12 Impacts on Confirmed Threatened and Near Threatened Fauna Species

One threatened and two near threatened terrestrial vertebrate species are confirmed from the SGCP area. These are the Brigalow Scaly-foot (*Paradelma orientalis*), Little Pied Bat (*Chalinolobus picatus*) and Square-tailed Kite (*Lophoictinia isura*). The potential impacts of the SGCP on these species are discussed below.

#### 7.1.12.1 *Brigalow Scaly-foot (Paradelma orientalis)*

Loss of habitat is a major threat to the Brigalow Scaly-foot (Richardson, 2008). The remnant vegetation unit in which the Brigalow Scaly-foot was found is on the eastern side of the mine survey area. The current conceptual mine plans show that vegetation in the vicinity of the confirmed Brigalow Scaly-foot record will not be cleared or directly impacted by the SGCP. However, it is likely that the species occurs widely within the SGCP area, and all of the SGCP area (including non-remnant vegetation) is suitable for this species. Approximately 4,990 ha of potential habitat is proposed to be cleared for the SGCP. Approximately 5,235 ha of Brigalow Scaly-foot habitat will be potentially indirectly affected by subsidence associated with longwall mining. During clearing operations there is a threat of direct mortality to Brigalow Scaly-foots from machinery and vehicles. During and after the operational life of the mine, removal of habitat, weed infestation, pest animals and reduced connectivity between high-quality remnant habitat may constitute threats to the species (Tremul, 2000; Kutt, Hannah and Thurgate, 2003; Richardson, 2008).

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

Little Pied Bats are dependent on wooded areas containing suitable hollow trees for roosting, but forage over a wide range of landscapes. Clearing of hollow-bearing trees and too-frequent fires are a threat to the species (SEWPaC, 2011b). Multiple AnaBat recordings from different locations and times of year suggest Little Pied Bats may be widespread and relatively common permanent residents within the SGCP area. Due to the fact that the SGCP area provides mostly non-remnant habitat, the impact of the SGCP on local Little Pied Bat populations is anticipated to be minor. Little Pied Bats may experience direct injury or mortality during clearing, particularly if roost trees are damaged. Removal of roost trees will also impact on the local persistence of Little Pied Bats.

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

Square-tailed Kites favour large tracts of open woodlands (especially along riparian zones). That this large and conspicuous species was only recorded on one of five surveys suggests that the local population is small and/or transitory. Their highly mobile nature means they are unlikely to suffer direct injury from clearing activities. Proposed mining activities will mainly occur within non-remnant habitats, which may be utilised for foraging by the species, but is unsuitable as breeding habitat (Debus, 1998). While approximately 585 ha of remnant vegetation is proposed to be cleared, the nature of the clearing (a long, narrow infrastructure corridor and the removal of small islands of remnant vegetation in the mining area) means that habitat for the species within the local region will probably not be significantly reduced (Garnett and Crowley, 2000).

### 7.1.13 Impacts on Threatened and Near Threatened Species Likely to Occur in SGCP Area

One endangered (EPBC Act and NC Act), four vulnerable (EPBC Act and NC Act) and one near threatened (NC Act) fauna species are likely to occur within the SGCP area but were not detected during fauna surveys. The potential impact of the SGCP on these species is discussed below.

#### 7.1.13.1 *Western Rosewood*

Given the intensity of the survey effort, it is unlikely that this species is present within the infrastructure corridor. However, considering the proximity of the mine survey area to the known population, it is possible that the species occurs in areas to be impacted by mining activities. REs in which the species is known to occur (10.5.5, 10.7.3, 11.10.4 and 11.10.13) will be impacted by proposed clearing (approximately 69 ha) or subsidence (approximately 485 ha). If Western Rosewood is present, it would constitute part of a key source population, along with the confirmed stand of trees adjacent to the SGCP area (**Figure 13**).

#### 7.1.13.2 *Ornamental Snake (Denisonia maculata)*

The SGCP area is within the known distribution of the Ornamental Snake and adjacent to areas mapped as likely habitat (SEWPaC, 2011a). Because of the cryptic nature and seasonal activity of this species, it is difficult to detect. Ornamental Snakes most commonly inhabit cracking soil types particularly where there is gilgai microrelief (Richardson, 2008). Although Ornamental Snakes will disperse widely to move between feeding habitat, connectivity between appropriate habitat types is important (SEWPaC, 2011a). While most of the SGCP area is dominated by sandy soils, small areas of heavy clay are found interspersed with sandy soils (usually associated with Brigalow RE 11.4.8). The Ornamental Snake eats frogs, and therefore impacts on surface hydrology and water quality that affect frog species will potentially indirectly affect the species. Clearing of vegetation will remove approximately 13 ha of high-quality habitat for the Ornamental Snake. Because the Ornamental Snake is known to utilise remnant and non-remnant vegetation (SEWPaC, 2011a; Wilson and Swan, 2005, 2010), much of the mine survey area and infrastructure corridor area, excluding rocky ridges, is potentially suitable habitat.

7.1.13.3 *Yakka Skink (Egernia rugosa)*

The Yakka Skink is a colonial species that lives in family groups using long-term home sites (Richardson, 2008). The Yakka Skink is difficult to detect during surveys and the species was not recorded during the surveys. If sites containing burrow systems of the Yakka Skink are cleared, it is likely to impact on the local population viability. Yakka Skinks utilise a variety of habitats and can be found within landzones 3, 4, 5, 7, 9 and 10 (SEWPaC, 2011a). Clearing of habitat is a major threat to the Yakka Skink (Richardson, 2008). Due to the lack of high quality habitat across much of the SGCP area (i.e. non remnant vegetation), the impacts on Yakka Skinks are likely to be minimal, should they occur on-site.

7.1.13.4 *Dunmall's Snake (Furina dunmalli)*

Dunmall's Snake occurs in very low densities and is also cryptic in habit, making it very difficult to detect during surveys. Clearing vegetation reduces the availability and suitability of habitat, and is a major threat to Dunmall's Snake (Richardson, 2008). Dunmall's Snake potentially utilises all remnant habitats within the SGCP area, particularly open woodland containing adequate ground cover and debris.

7.1.13.5 *Death Adder (Acanthophis antarcticus)*

Death Adders are camouflaged, cryptic snakes that hide in natural ground cover. They are difficult to detect during survey efforts. Clearing of vegetation, cattle grazing and pest animals are major threats to Death Adders. Death Adders potentially occur in all remnant forest types in the SGCP area where there is adequate deep leaf litter and other ground cover.

7.1.13.6 *Squatter Pigeon (Geophaps scripta scripta)*

Squatter Pigeons are highly mobile and move over large areas depending on resource availability (particularly seeding native grasses). Because of their highly mobile nature, they are expected to move away from vegetation clearance activities undertaken for the SGCP. Squatter Pigeons are typically easily detected, and as they were not detected in any surveys, a local population (if present) is likely to be small and/or transitory. The SGCP is unlikely to cause population-level impacts within the region due to the existence of suitable habitat adjacent to the site and the highly mobile nature of the species.

7.1.13.7 *Cotton Pygmy-goose (Nettapus coromandelianus)*

This species has been recorded approximately 60 km east of the SGCP area, in a relatively well-vegetated farm dam. While the species was not recorded at the SGCP area, the SGCP is located within the species' range. Little suitable habitat occurs within the SGCP area, however this species may still use the existing artificial water-bodies in a transient capacity. Due to the lack of habitat, the proposed SGCP is unlikely to impact on this species.

7.1.13.8 *Black-throated Finch (Poephila cincta cincta)*

An isolated population (150 km south of other known populations) of this species has been recorded within the Bimblebox Nature Refuge, 25 km north-west of the infrastructure corridor survey area. This species inhabits remnant wooded habitats in close proximity to permanent water and containing hollow trees for nesting. This species was not detected within the SGCP area during any of the five surveys. However, given the existence of suitable habitat and the close proximity to a known population, it is likely that small numbers of Black-throated Finches may utilise the site at least in a transitory capacity. If present, the Black-throated Finch is most likely to occur in remnant Eucalypt-dominated woodlands within the infrastructure corridor survey area, or in the western and southern portions of the mine survey area. *Acacia*-dominated communities generally lack necessary hollows for breeding. Clearing of remnant Eucalypt woodlands, the removal of permanent water sources, and damage to understorey grasses through overgrazing or weeds may potentially impact the Black-throated Finch. Approximately 543 ha of potential habitat is proposed to be cleared (approximately 217 ha within the infrastructure corridor and 326 ha within the mine survey area).

#### 7.1.14 Impacts on Migratory Species

Two migratory species listed under the EPBC Act are known to occur within the SGCP area, including the Rainbow Bee-eater (*Merops ornatus*) and Eastern Great Egret (*Ardea alba modesta*). Eight other migratory species have the potential to occur within the SGCP area.

The SGCP is not anticipated to significantly impact on recorded or likely migratory species as:

- species are common in the local and regional area (e.g. Rainbow Bee-eater and Eastern Great Egret); and/or
- considerable alternative habitat exists outside of the proposed impact areas (e.g. Rainbow Bee-eater, Eastern Great Egret, Cattle Egret, Fork-tailed Swift, White-throated Needletail); and/or
- no loss of habitat (e.g. Fork-tailed Swift, White-throated Needletail).

Although impacts on migratory species are predicted to be minimal or nil, the presence of two EPBC Act listed species and the potential presence of others within the SGCP area were factors in the SGCP being determined a controlled action by DEWHA (now SEWPAC) under the provisions for listed migratory species (sections 20 and 20A) in the EPBC Act.

Nesting Rainbow Bee-eaters were observed in the central section of the SGCP area, however, the observed nesting sites were located outside of the proposed disturbance footprint. Rainbow Bee-eaters often nest in disturbed areas (e.g. sandy roadside embankments), and the nesting sites observed within the SGCP area were in such a location.

#### 7.1.15 Impacts on Bio-regionally Significant Species

##### 7.1.15.1 *Yellow-spotted Monitor (Varanus panoptes)*

The most important conservation issue faced by the Yellow-spotted Monitor is its propensity to eat cane toads and to die from the ingested toxins (DNREA, undated). Clearing of remnant and nonremnant vegetation for the SGCP will remove habitat for this species. However, given the broad diversity of grassed and wooded habitats occupied, and the abundance of these habitats in the surrounding areas, it is unlikely that the SGCP will have significant impacts on this species' regional population.

##### 7.1.15.2 *Black Falcon (Falco subniger)*

Within the region, Black Falcons hunt primarily over open non-remnant pastures, but require large trees, usually near water, for nesting and roosting. This species was recorded in two out of five surveys (both within the mine survey area), and it is unlikely that the SGCP area supports a large population. Nevertheless, removal of large trees and grasslands to accommodate the mine and infrastructure may reduce the suitability of the SGCP area for the species.

##### 7.1.15.3 *Australian Bustard (Ardeotis australis)*

The Australian Bustard utilised most open to semi-open habitats within the SGCP survey area in low densities, and was recorded in four out of five surveys. The primary threats to the species across its range are altered fire regimes, predation (especially of nests) by dogs and foxes, and overgrazing by cattle (Australian Wildlife Conservancy, undated). It is not anticipated that the SGCP will significantly elevate any of these threats. The primary impact will be through removal of habitat.

##### 7.1.15.4 *Bush Stone-curlew (Burhinus grallarius)*

The Bush Stone-curlew occurred in low densities throughout wooded parts of the SGCP area, and was recorded in three out of five surveys. Primary threats to the species throughout its range include clearing and fragmentation of habitat, removal of fallen logs and other debris, and introduced



predators (Department of Sustainability and Environment, 1997). Removal of remnant wooded habitats constitutes the primary anticipated impact on the species.

*7.1.15.5 Barking Owl (Ninox connivens)*

Habitat loss and degradation is the major threat to the survival of the Barking Owl across its range (Birds Australia, 2010). Loss of hollow-bearing trees impacts on the species by removing nesting sites as well as habitat for hollow-dependent prey such as gliders, possums and parrots (Birds Australia, 2010). Competition with foxes and feral cats, as well as predation by foxes is also thought to be a reason for their decline (Birds Australia, 2010). Habitat removal is the primary impact of the SGCP on the Barking Owl.

*7.1.15.6 Brown Treecreeper (Climacteris picumnus)*

Brown Treecreepers were common residents of most remnant habitats within the SGCP area. They require hollow trees (dead or alive) for nesting, and forage anywhere there are standing and/or fallen trees. The primary threats to their survival pertain primarily to their requirement for ample standing and fallen timber, and include habitat clearing and fragmentation, inappropriate fire regimes and collection of fallen timber (Cooper and Walters, 2002; Cooper *et al.*, 2002; NSW Department of Environment and Conservation, 2005a). The primary impact of the SGCP on Brown Treecreepers is the removal of remnant habitat.

*7.1.15.7 White-eared Honeyeater (Lichenostomus leucotis)*

White-eared Honeyeaters are less common after clearing and bushfire (Birds Australia, 2005), and rarely fly over open spaces, preferring to use corridors with tree cover (Birds Australia, 2005). White-eared Honeyeaters were recorded only in shrubby forests on hills in the southwest of the mine survey area. These areas are unlikely to be impacted by proposed activities.

*7.1.15.8 Hooded Robin (Melanodryas cucullata)*

Hooded Robins have suffered massive declines in the southern half of Australia, caused primarily by widespread clearing of dry woodland habitats. Small habitat fragments and the reduced vegetation complexity that often typifies agricultural landscapes generally leads to local extinction (Garnet and Crowley, 2000; Watson *et al.*, 2003). In Queensland, where woodlands remain widespread and less fragmented, Hooded Robins remain relatively common. They were recorded in four of five surveys of the SGCP area. Habitat clearing is the primary impact of the proposed SGCP. While this single project may not have significant impacts on the species' population, the cumulative impacts of wide-scale clearing for the SGCP and other projects across Queensland may affect the species' long-term conservation.

*7.1.15.9 Grey-crowned Babbler (Pomatostomus temporalis)*

Grey-crowned Babbler populations have declined throughout southern parts of their range as a result of clearing and fragmentation of woodland habitats (Birds Australia, 2008b). Other factors implicated in their decline include fuel-reduction burning, grazing, weed invasions and removal of timber decreasing leaf litter build-up, which then reduces the amount of invertebrate food available (Birds Australia, 2008b). Grey-crowned Babblers often, however, utilise regrowth habitats, in addition to remnant woodlands. They were recorded in four of five surveys of the SGCP area, and were locally common. Cumulative impacts of the SGCP alongside multiple other projects involving vegetation clearing may cause local population declines of this species.

*7.1.15.10 Narrow-nosed Planigale (Planigale tenuirostris)*

There appear to be no major threats to the Narrow-nosed Planigale, apart from localised threats through habitat conversion to agriculture (Ellis *et al.*, 2008). They were recorded from two of the three trapping surveys, and are probably locally common in all remnant and non-remnant habitats on clay soils within the SGCP area. Mining activities will remove some habitat, but given the abundance of

suitable habitat in surrounding areas, overall impacts on the regional population are expected to be minimal.

7.1.15.11 *Common Dunnart (Sminthopsis murina)*

There appear to be no major threats to the Common Dunnart, although it has experienced declines in the southern parts of its range (i.e. Victoria) (Dickman *et al.*, 2008). It was only recorded during a single survey of the SGCP area (in the infrastructure corridor survey area), although during this time it was caught on several occasions. The primary impact of the SGCP is through the removal of woodland habitats.

7.1.15.12 *Koala (Phascolarctos cinereus)*

Threats to the Koala include (DECC, 2005):

- human-induced climate change, especially drought;
- loss, modification and fragmentation of habitat;
- predation by feral and domestic dogs;
- intense fires that scorch or kill the tree canopy; and
- road-kills.

The primary impacts of the SGCP are through the removal of habitat and the potential for vehicular collisions (e.g. within in the proposed infrastructure corridor or due to increased traffic on existing roads). Due to the reliance of Koalas on riparian corridors of River Red Gums (*Eucalyptus camaldulensis*) in semi-arid Queensland, hydrological changes that impact the health of River Red Gums have the potential to impact Koalas indirectly.

7.1.15.13 *Common Brushtail Possum (Trichosurus vulpecula)*

Despite being abundant in urban centres of Australia, the Common Brushtail Possum has undergone drastic declines across central Australia, thought to be due to predation by introduced predators, habitat fragmentation, loss of denning sites and altered fire regimes (Department for Environment and Heritage, 2009; DEWHA, 2009). The Common Brushtail Possum was recorded in only one of five surveys of the SGCP area. Removal of remnant woodland habitat, especially those containing hollow trees, is the primary impact of the SGCP.

7.1.15.14 *Rufous Bettong (Aepyprymnus rufescens)*

Rufous Bettongs inhabit a broad range of woodlands and open areas, as long as they contain a dense grassy understorey. It was locally common within the SGCP area, being recorded on all five surveys. Rufous Bettongs have undergone declines in the south of its range due to intensification of agricultural practices, increases in numbers of foxes, and habitat destruction from introduced rabbits (Burnett and Winter, 2008). While none of these threats are anticipated to increase as a result of the SGCP, other impacts include removal of habitat and increased vehicular traffic.

7.1.15.15 *Spectacled Hare-wallaby (Lagorchestes conspicillatus)*

Spectacled Hare-wallabies inhabit a broad range of wooded and open habitats, but are dependent on large tussock grasses for shelter. In central Queensland, overgrazing coupled with prolonged drought conditions has led to decreases in the quantity and quality of sheltering sites (SEWPaC, 1996). Likewise, hot, extensive and frequent fires that destroy big old grass hummocks remove important shelter (Wildlife Australia, undated). Predation by feral predators following loss of shelter is another serious threat (Wildlife Australia, undated). Spectacled Hare-wallabies will be impacted by vegetation clearance, as well as through collisions resulting from increased vehicular traffic.

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7.1.15.16 *Black-striped Wallaby (Macropus dorsalis)*

Black-striped wallabies are dependent on dense shrubby thickets (e.g. Brigalow, Cypress Pine) adjacent to grassy foraging areas. Loss of these thickets through clearing, inappropriate fire regimes, or via grazing by rabbits, goats, sheep and cattle threatens the species (NPWS, 1999). Predation by introduced predators following loss of shelter is an additional threat. The primary impact of the SGCP will be the removal of remnant woodland habitat.

7.1.15.17 *Swamp Wallaby (Wallabia bicolor)*

Swamp Wallabies are dependent on dense wooded habitats (including regrowth), with a shrubby understorey. The primary impact of the SGCP will be habitat removal.

7.1.15.18 *Inland Forest Bat (Vespertilio baueri)*

The ecology of this species is poorly known, but it is thought to roost primarily in hollow trees, including very small dead stumps (DEC, 2005b). Like other inland bats, it appears to be dependent on riparian corridors, both for roosting sites and for water (DEC, 2005b). As such, any impacts of the SGCP on the hydrology of local creeks may impact this species. Removal of hollow trees along drainage lines may impact this species by reducing available habitat and through direct injury to roosting bats.

7.1.15.19 *Desert Mouse (Pseudomys desertor)*

The Desert Mouse occupies a range of grassland habitats, including pastures produced following the clearing of remnant woodland. It was within these altered landscapes that they were recorded in the SGCP area. The most important habitat requirement is a dense cover of native hummock or tussock grasses, and low pressure from fire and grazing (Kutt *et al.*, 2004). The invasion of introduced grasses like Buffel Grass is a major threat (Read and Woinarski, 2008), along with inappropriate fire regimes and high stocking rates. The SGCP may impact the species by removing grassland habitat.

## 8 MITIGATION MEASURES

### 8.1 GENERAL MITIGATION MEASURES

#### 8.1.1 Rehabilitation and Revegetation

Progressive rehabilitation of disturbance areas will be undertaken throughout the life of the SGCP. Re-establishing vegetation cover should be undertaken with a view to creating self-sustaining ecosystems similar to surrounding ecosystems. The final land use will be a combination of grazing and native bushland. A Mine Rehabilitation and Closure Plan should be prepared to direct land rehabilitation during and after the operational life of the mine.

To rehabilitate disturbed areas to native bushland, only native species should be used, apart from any sterile grass cultivars that are required to ensure soil stability. Locally collected propagules should be used where practicable to preserve local genetic integrity. The use of exotic grass species (e.g. Buffel Grass) in the rehabilitation of native bushland areas is strongly discouraged as such activities may promote the spread of the exotic grass species into otherwise unaffected areas, and restrict the development of the native groundcover vegetation. Where rehabilitation activities involve creating native bushland as a final land use, rehabilitation should involve provision of nest hollows and ground litter.

It is recommended that measures be taken to establish, protect or enhance buffers around areas of remnant vegetation, particularly riparian areas with of concern or endangered VM Act or biodiversity status. Active revegetation around the edges of habitat fragments would further help in maintaining the ecological integrity of remnant vegetation. Such actions can help lessen negative edge effects, for example by protecting vegetation patches from strongly altered conditions in the landscape matrix (Noss and Harris, 1986). In general terms, buffers are particularly important where surrounding land use exerts strongly negative influences on remnant ecosystems (Fischer *et al.*, 2006).

#### 8.1.2 Weeds and Pest Animals Management Plan

Weeds and pest animals pose a threat to biodiversity values of the SGCP area (**Section 7.1.6** and **Section 7.1.7**).

A Weed and Pest Animal Management Plan (WPAMP) should be prepared and implemented over the life of the SGCP. The WPAMP should include a monitoring program and auditable performance measures including reductions in class 1 and 2 pest animals and noxious weeds.

Reasonable measures should be taken to control Velvety Tree Pear, Prickly Pear and Harrisia Cactus in the SGCP area, with particular focus on areas near and within remnant vegetation.

The introduction and/or spread of weed species should be mitigated by:

- restricting light vehicle movement in areas outside of regular activity, particularly on irregularly used tracks;
- restricting vehicle movement during and following rainfall, where practicable;
- strict wash-down procedures for all vehicles (including clearing and construction machinery) entering clearance zones, grazing areas or conservation areas; and
- controlling weeds according to guidelines under the relevant Weed Fact Sheet from DEEDI.

Rehabilitation of disturbed land to native bushland should not include seeding with exotic grasses. Surrounding landholders are legally obliged to take reasonable steps to keep land free of Class 2 LP Act listed weeds, thus reducing the potential of continued weed species dispersal into the SGCP area from surrounding properties. Co-operative weed management programs between properties may increase the effectiveness of these controls.

Domestic animals should not be allowed on-site. Vertebrate pest control activities should be undertaken in conjunction with local authorities and landholders, particularly for pests such as Pigs, wild Dogs and feral Cats, in accordance with the LP Act. Putrescible waste should not be allowed to



accumulate outside designated areas. These designated areas should be animal-proof and the wastes regularly removed or buried.

Where practicable, the SGCP should reduce new Cane Toad breeding opportunities by minimising the creation of additional small water-bodies suitable for Cane Toad breeding (e.g. ponding areas, roadside ditches or flood channels) (Hagman and Shine, 2006).

SGCP employees and contractors will be made aware of environmental obligations and compliance requirements through the site induction program.

### **8.1.3 Direct Mortality**

The SGCP will involve clearing remnant native vegetation and non-remnant vegetation adjacent to remnant vegetation, which will remove habitats for threatened and near threatened species. To minimise negative impacts on fauna in the SGCP area it is recommended that a Threatened Species Management Plan (TSMP) be prepared and implemented prior to the commencement of construction (**Section 8.2.2**).

It is recommended that clearing is undertaken in the presence of an ecologist and/or spotter-catcher. Clearing should occur in one direction through the vegetation, to allow fleeing animals to be 'herded' into adjacent habitat. Strategies for dealing with sick or injured wildlife found during clearing should be detailed within the TSMP and should involve contacting identified local wildlife carers.

Clearing contractors and operators should be made aware of the potential presence of threatened or near threatened vertebrate species and instructed to temporarily cease clearing if any vertebrates are observed, allowing a spotter-catcher to relocate the animal. To minimise potential impacts, clearing may be:

- carried out using a phased approach, initially retaining 'habitat trees' for two to three days before the continuation of clearing, thereby allowing animals to move on themselves; and
- undertaken with a qualified spotter-catcher on hand to immediately relocate affected animals.

Vehicles should use identified light or heavy vehicle roads on-site wherever practicable, and speed limits should be adhered to.

SGCP employees and contractors will be made aware of environmental obligations and compliance requirements through the site induction program.

Field surveys should be undertaken to identify the presence of threatened and near threatened species immediately prior to construction activities. Individual animals should be translocated into adjacent suitable habitat.

Areas which pose a risk to fauna (e.g. construction sites) should be fenced to restrict fauna access, where practicable.

### **8.1.4 Fire Regime**

Groundcover and debris (e.g. leaf litter, fallen logs, low vegetation) is important for Brigalow Belt biodiversity. As inappropriate fire regimes can detrimentally alter the composition of groundcover and debris, care should be taken to avoid too-frequent fires in the SGCP area, especially where Brigalow Scaly-foots are known to, or may potentially, occur. Any fire management activities (e.g. 'cool' burns) should be limited to small areas to retain unburned areas as refugia for fire-intolerant species. Annual burning of any area should be avoided.

A Fire Management Plan should be established for the area in cooperation with regional fire authorities. Appropriate fire fighting equipment and trained personnel should be available on-site to respond to fires.

## 8.2 SPECIFIC MITIGATION MEASURES

### 8.2.1 Threatened Species Management Plan

It is recommended that a TSMP be developed and implemented for the SGCP. The TSMP should include general nature conservation management measures may be undertaken to mitigate impacts from the SGCP. Such measures include:

- remnant vegetation in the SGCP area should be managed for biodiversity values, including implementation of an appropriate fire regime, pest animal and weed management and exclusion of stock;
- revegetating cleared areas that do not form part of the operational mine (e.g. infrastructure corridor edges);
- fire regime management should include precautions such as clearing fire breaks between coal stockpiles to avoid ignition of native vegetation from spontaneous combustion of coal, and restricting cigarette smoking and the dumping of rubbish (particularly glass) in areas of vegetation;
- where practicable, restricting unnecessary vehicle movement during and following rainfall; and
- exclusion of cattle from waterways and remnant vegetation to prevent fouling and habitat degradation.

The TSMP should described the proposed monitoring and reporting timeframes for management of each threatened species impacted on by the SGCP to facilitate auditing of environmental performance measures.

The TSMP should also include specific mitigation and management measures to address predicted impacts on threatened species and communities.

### 8.3 BIODIVERSITY OFFSETS

Biodiversity offsets are measurable conservation outcomes undertaken to counterbalance an impact that causes a loss in biodiversity values, which must achieve an equivalent or better environmental outcome for the biodiversity values impacted (DERM, 2011b). For mining activities in Queensland, offsets are required when there is residual environmental impact following minimisation and avoidance measures by the proponent. Biodiversity offset principles are contained within the *Queensland Biodiversity Offsets Policy 2011*, *Policy for Vegetation Management Offsets 2011* and the *Queensland Government Environmental Offsets Policy 2008* (DERM, 2011b).

Due to impacts on threatened species habitat and threatened REs posed by the SGCP, a biodiversity offsets strategy may need to be implemented. Offset options will be presented in the relevant sections of the SGCP EIS. The EIS will outline measures to ensure that these offsets are managed to maintain and enhance biodiversity values and, where they are in the form of native vegetation, that they are not cleared for any future projects.

Avoidance and mitigation of impacts on the six threatened species listed in **Section 6.1.5** and **Section 6.2.4**, and the threatened REs listed in **Section 6.1.3** must be demonstrated. However, there are likely to be residual impacts from the SGCP. These include impacts on, and removal of, habitat for threatened species and clearing of vegetation within REs of conservation significance listed as of concern and endangered.

Under the *Queensland Biodiversity Offset Policy 2011* guidelines, it is recommended that near threatened plant species be propagated and replanted in appropriate habitat at a ratio of three individuals for every one removed. Land adjacent to the corridor, but away from the edge effects of the proposed infrastructure are likely to be deemed suitable. Offsets for the vulnerable Round-leaved Heath Myrtle are required at a ratio of 1:3.5. Offsets for the Large-podded Trefoil are required at a

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ratio of 1:3. Areas that are suitable for offsets (DERM, 2011b) will require identification by a suitably qualified ecologist.

Offsets for the three threatened fauna species must be areas used by those species, with evidence that the offset area mitigates the direct impacts due to the SGCP on each species and is of ecological equivalence according to the ecological equivalence methodology (DERM, 2011b).

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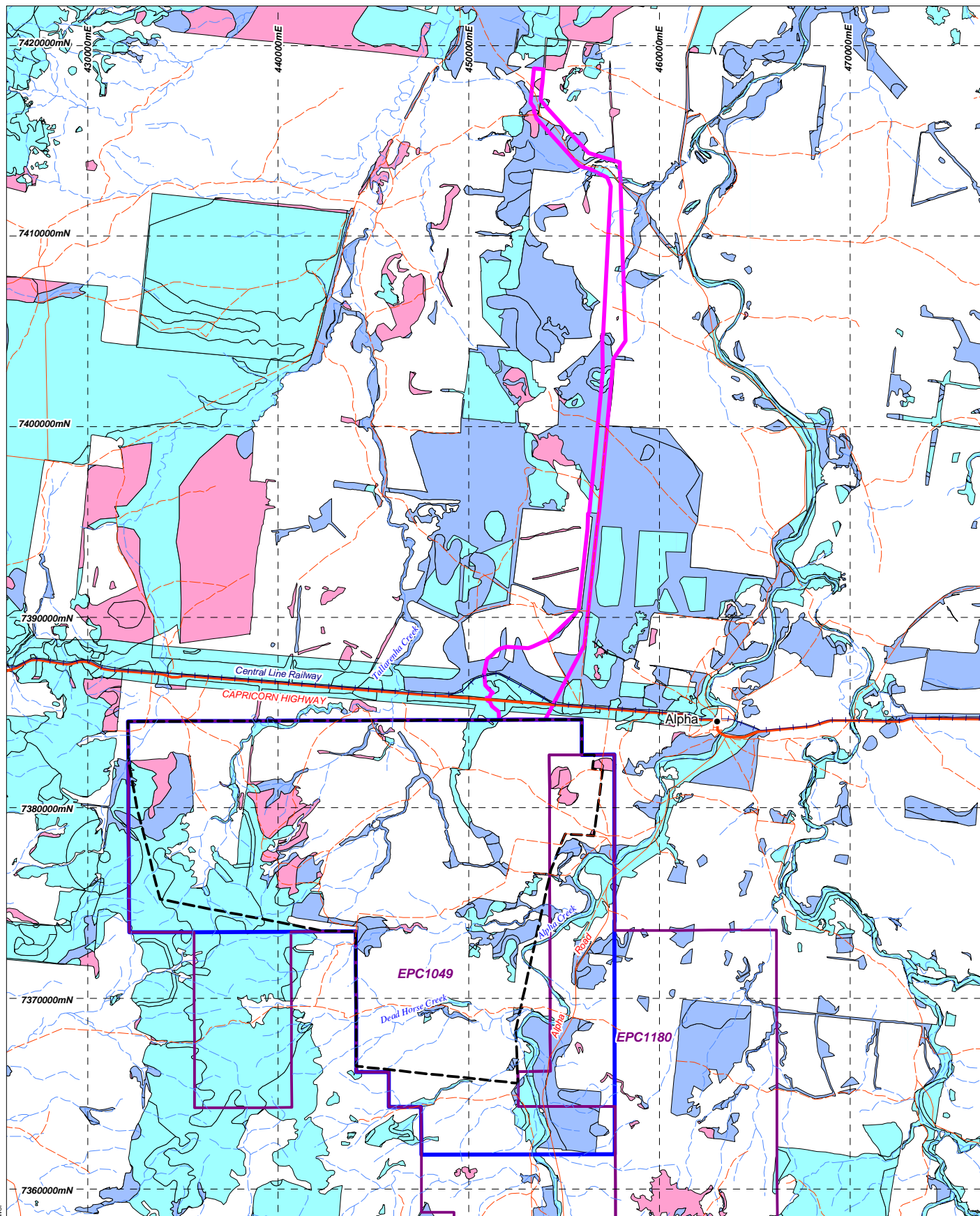


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## **APPENDIX A**

### **BAMM CRITERIA**



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#### LEGEND

- MLA70453
- Exploration tenement
- Mine Survey Area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

#### Biodiversity Significance

- Local or Other Values
- Non Bioregion Ecosystem
- Regional
- State
- State Habitat for EVR taxa

Data Source:  
Tenement - EEDI. Topography (250k) - Geoscience Australia. BPA (2003) - DERM.

## Alpha Coal Pty Ltd South Galilee Coal Project

BAMM - Biodiversity Significance

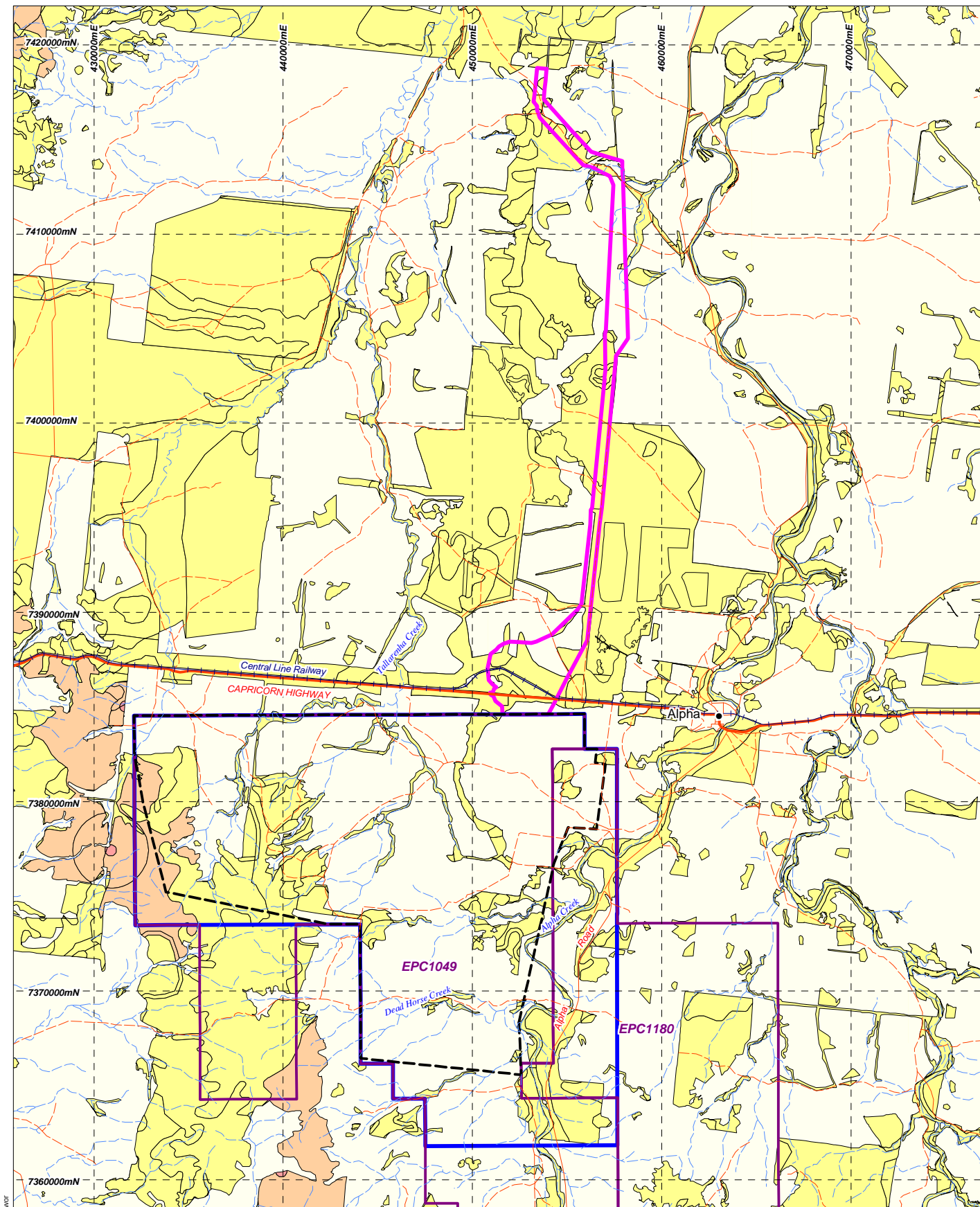
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Kilometres

22/11/2011

Datum: GDA94  
Projection: MGA55

Appendix A1





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#### LEGEND

- MLA70453
- Exploration tenement
- Mine Survey Area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

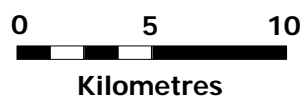
#### Habitat for endangered, vulnerable and/or rare taxa

- Low
- Medium
- High
- Very High

Data Source:  
Tenement - EEDI. Topography (250k) - Geoscience Australia. BPA (2003) - DERM.

## Alpha Coal Pty Ltd South Galilee Coal Project

BAMM - Criteria A



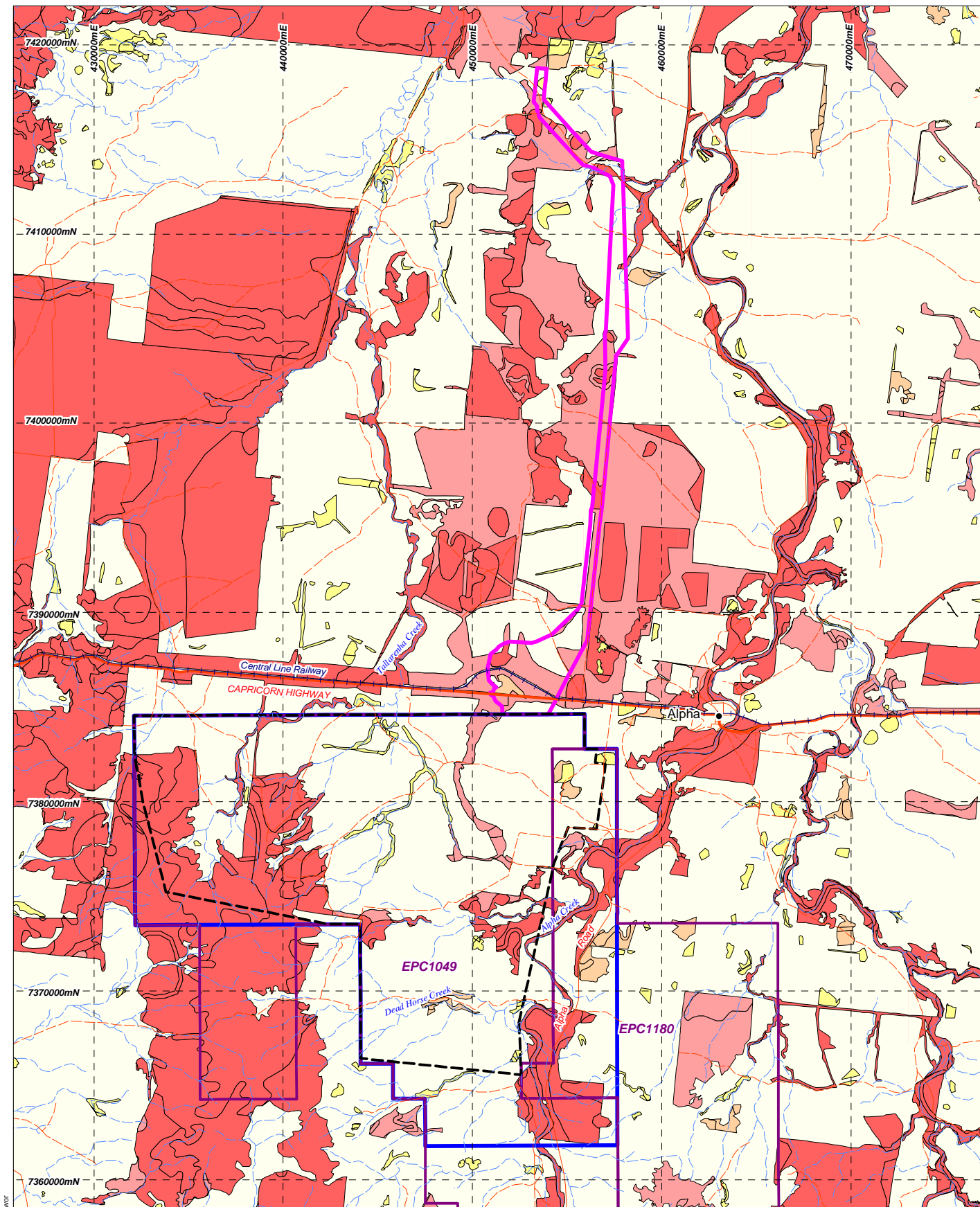
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Datum: GDA94  
Projection: MGA55

Appendix A2







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#### LEGEND

- MLA70453
- Exploration tenement
- Mine Survey Area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- - - Road (unsealed)
- Railway
- ~ Stream

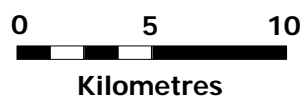
#### Tract Size

- Low
- Medium
- High
- Very High

Data Source:  
Tenement - EEDI. Topography (250k) - Geoscience Australia. BPA (2003) - DERM.

## Alpha Coal Pty Ltd South Galilee Coal Project

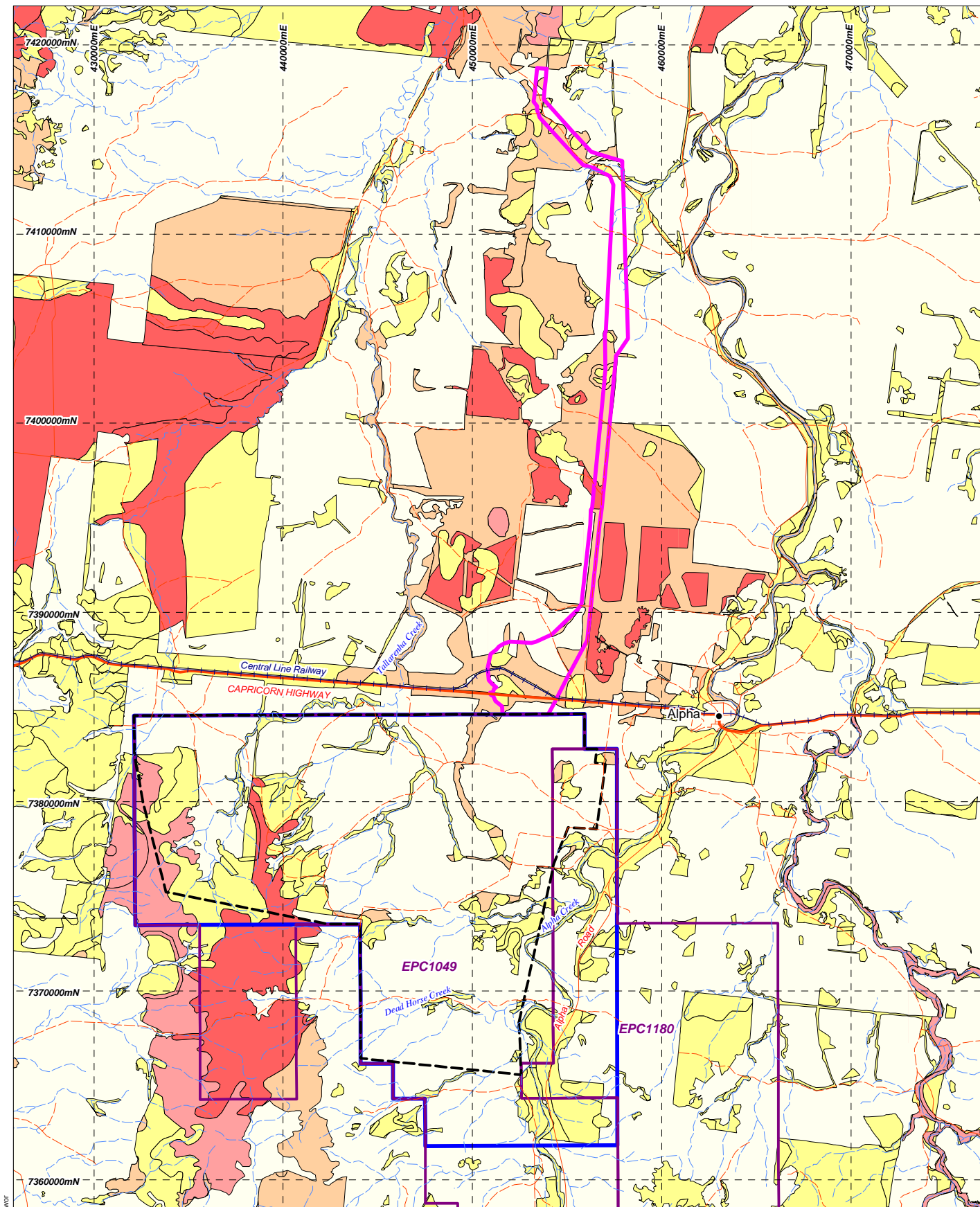
BAMM - Criteria C



22/11/2011

Datum: GDA94  
Projection: MGA55

Appendix A4



#### LEGEND

- MLA70453
- Exploration tenement
- Mine Survey Area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

#### State Relative Size of regional ecosystem (RE)

- Low
- Medium
- High
- Very High

Data Source:  
Tenement - EEDI. Topography (250k) - Geoscience Australia. BPA (2003) - DERM.

## Alpha Coal Pty Ltd South Galilee Coal Project

BAMM - Criteria D1

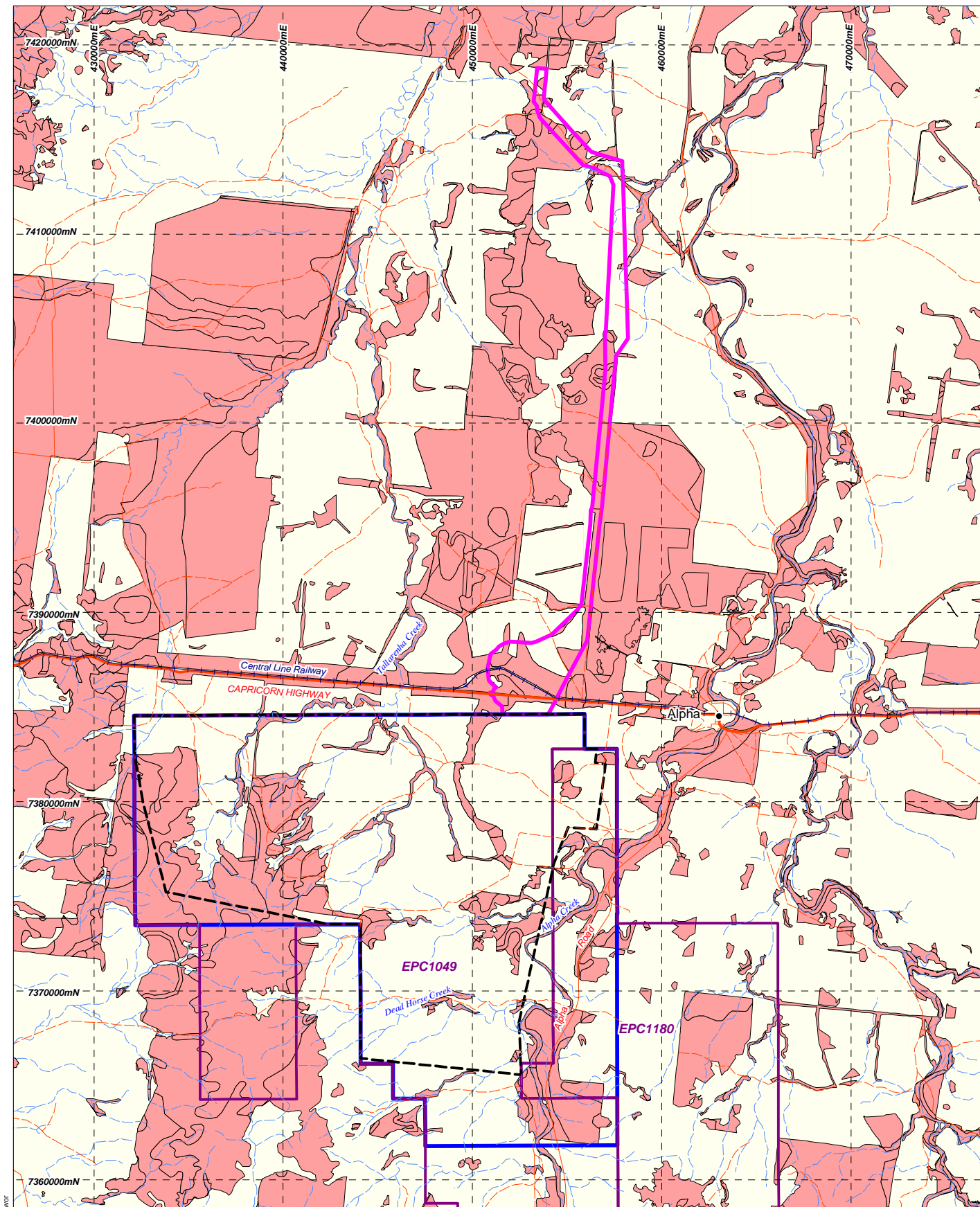
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Datum: GDA94  
Projection: MGA55


Appendix A5









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#### LEGEND

-  MLA70453
-  Exploration tenement
-  Mine Survey Area
-  Infrastructure corridor survey area
-  Principal road
-  Road (sealed)
-  Road (unsealed)
-  Railway
-  Stream

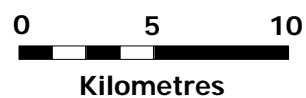
#### Condition

-  Low
-  Medium
-  High
-  Very High

Data Source:  
Tenement - EEDI. Topography (250k) - Geoscience Australia. BPA (2003) - DERM.

## Alpha Coal Pty Ltd South Galilee Coal Project

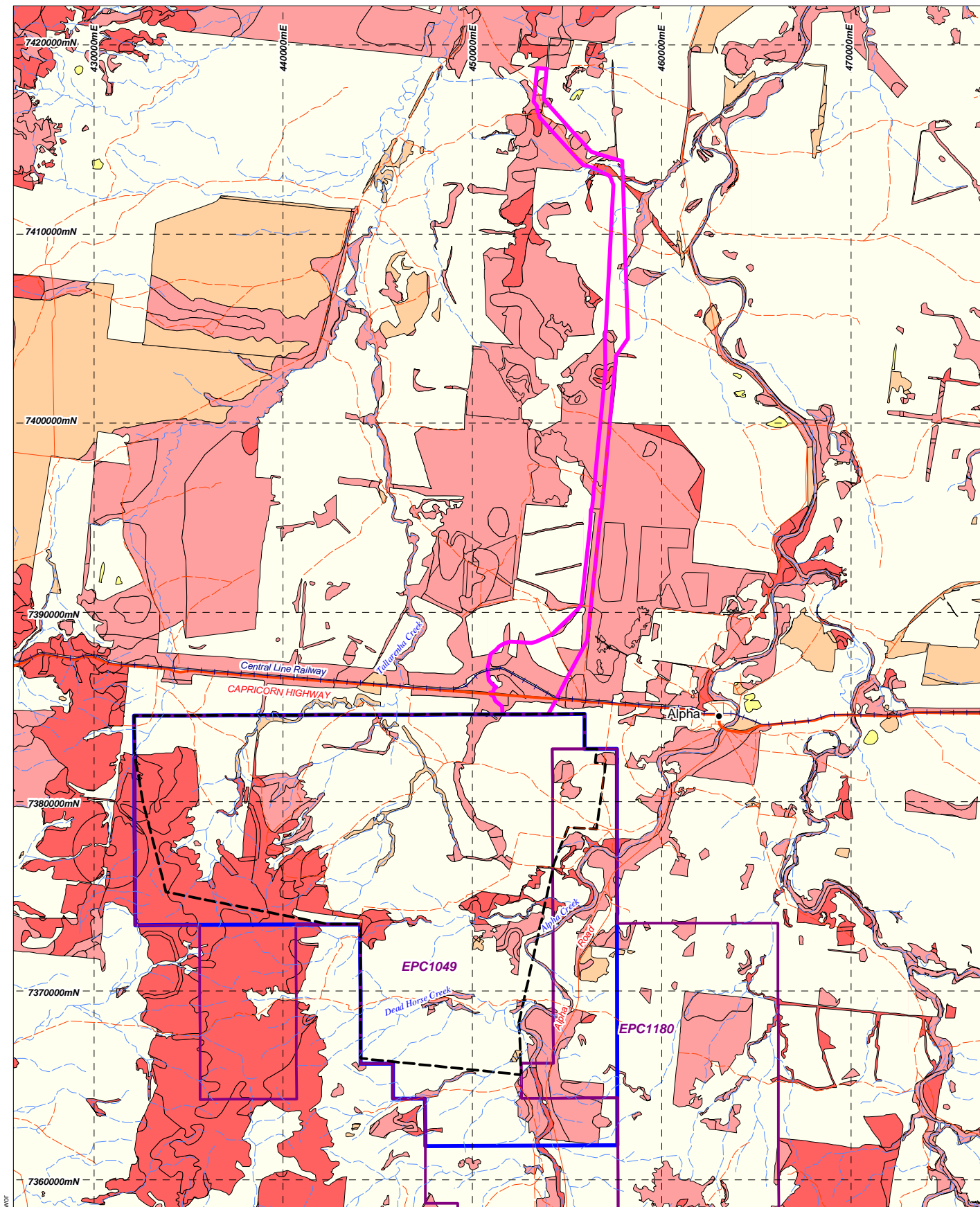
BAMM - Criteria E



22/11/2011

 Datum: GDA94  
Projection: MGA55

Appendix A6



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#### LEGEND

- MLA70453
- Exploration tenement
- Mine Survey Area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- - - Road (unsealed)
- Railway
- ~ Stream

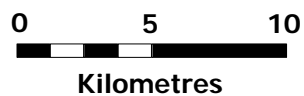
#### Ecosystem Diversity

- Low
- Medium
- High
- Very High

Data Source:  
Tenement - EEDI. Topography (250k) - Geoscience Australia. BPA (2003) - DERM.

## Alpha Coal Pty Ltd South Galilee Coal Project

BAMM - Criteria F

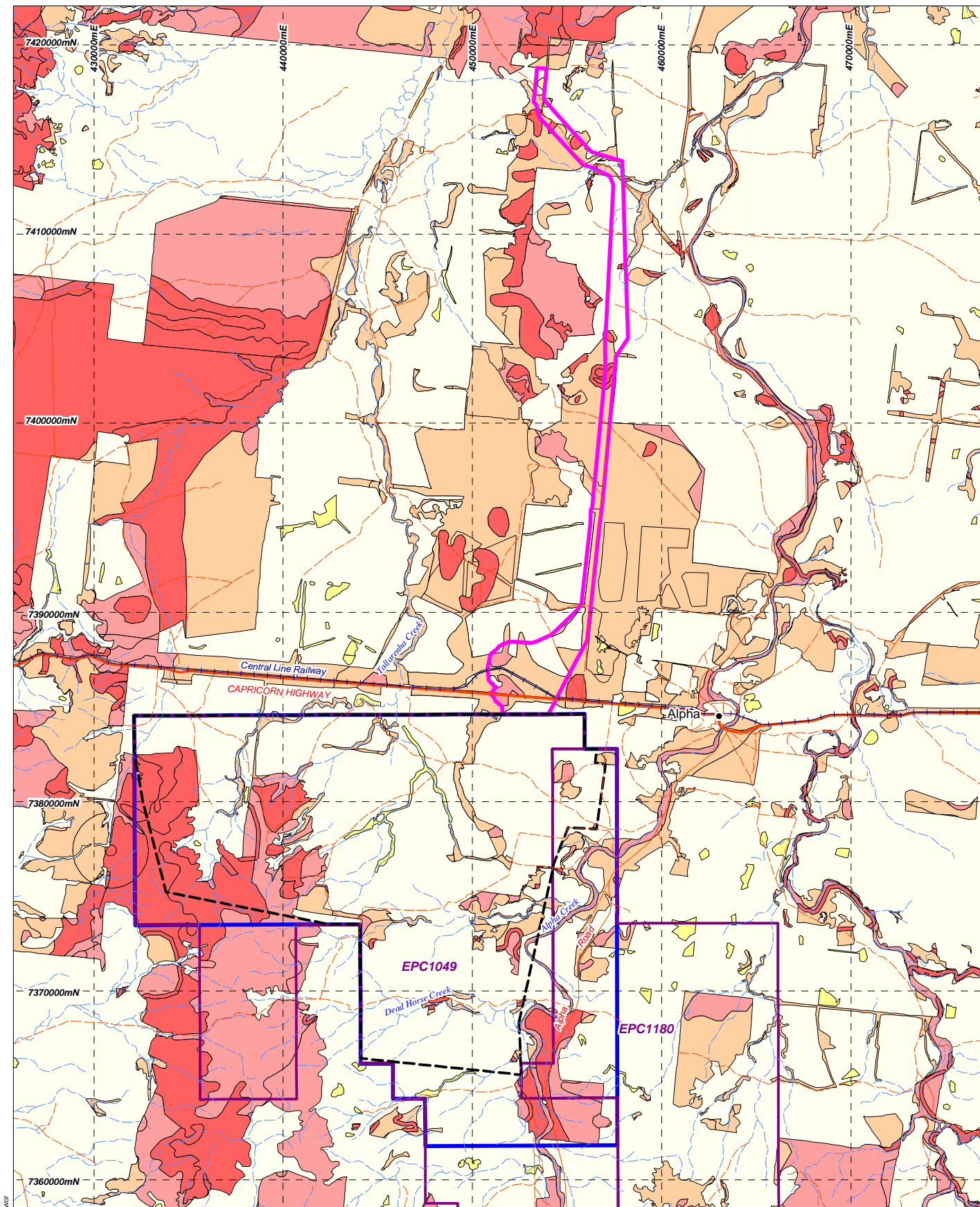


22/11/2011

Datum: GDA94  
Projection: MGA55

Appendix A7





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#### LEGEND

- MLA70453
- Exploration tenement
- Mine Survey Area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- - - Road (unsealed)
- Railway
- ~ Stream

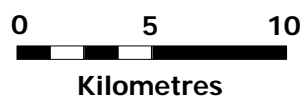
#### Context and Connection

- Low
- Medium
- High
- Very High

Data Source:  
Tenement - EEDI. Topography (250k) - Geoscience Australia. BPA (2003) - DERM.

## Alpha Coal Pty Ltd South Galilee Coal Project

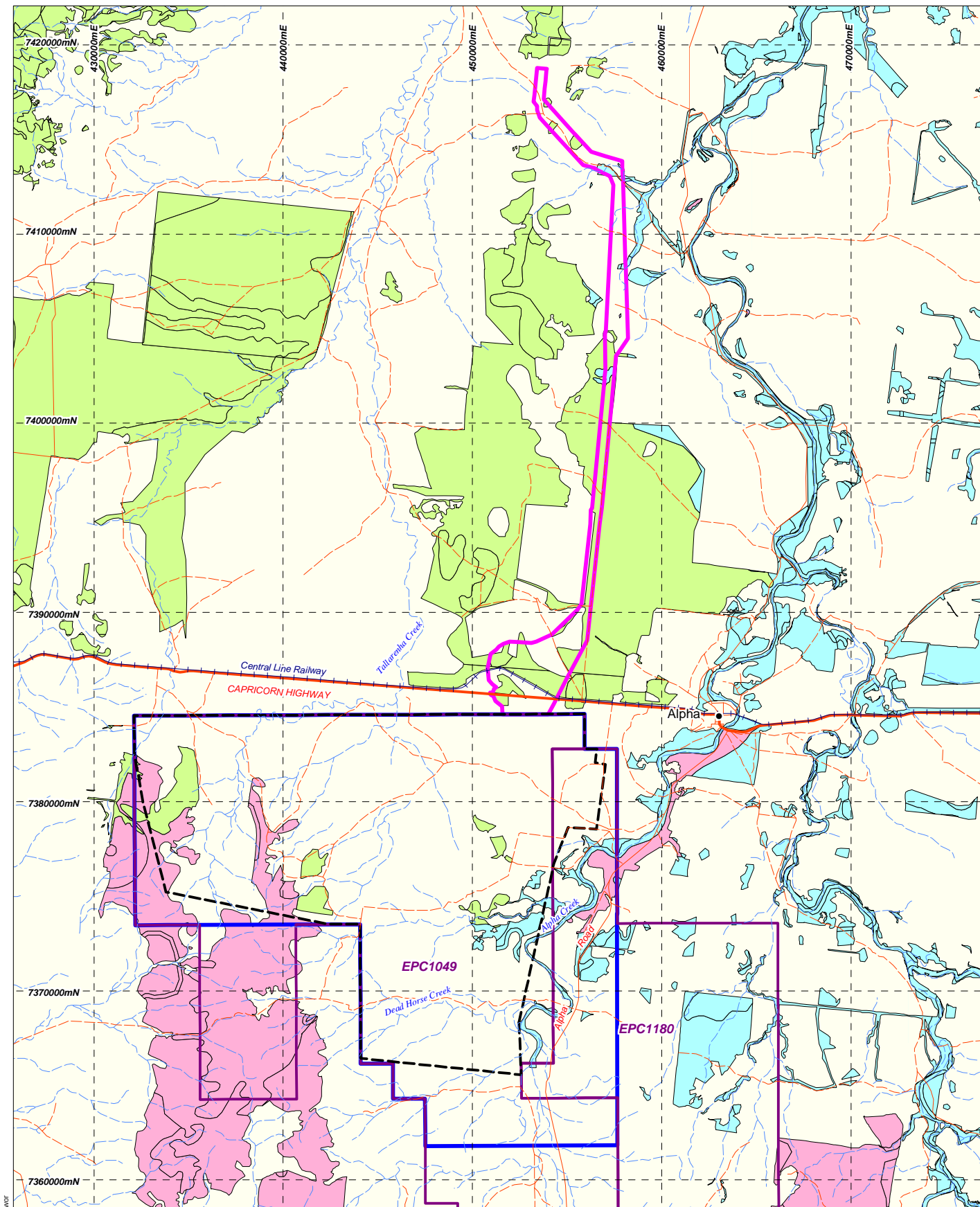
BAMM - Criteria G



22/11/2011

Datum: GDA94  
Projection: MGA55

Appendix A8



#### LEGEND

- MLA70453
- Exploration tenement
- Mine Survey Area
- Infrastructure corridor survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

#### Brigalow Belt Bioregion

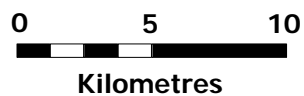
- Local
- Regional
- State

#### Desert Uplands Bioregion

- Listed with special biodiversity value

## Alpha Coal Pty Ltd South Galilee Coal Project

### BAMM - Criteria I



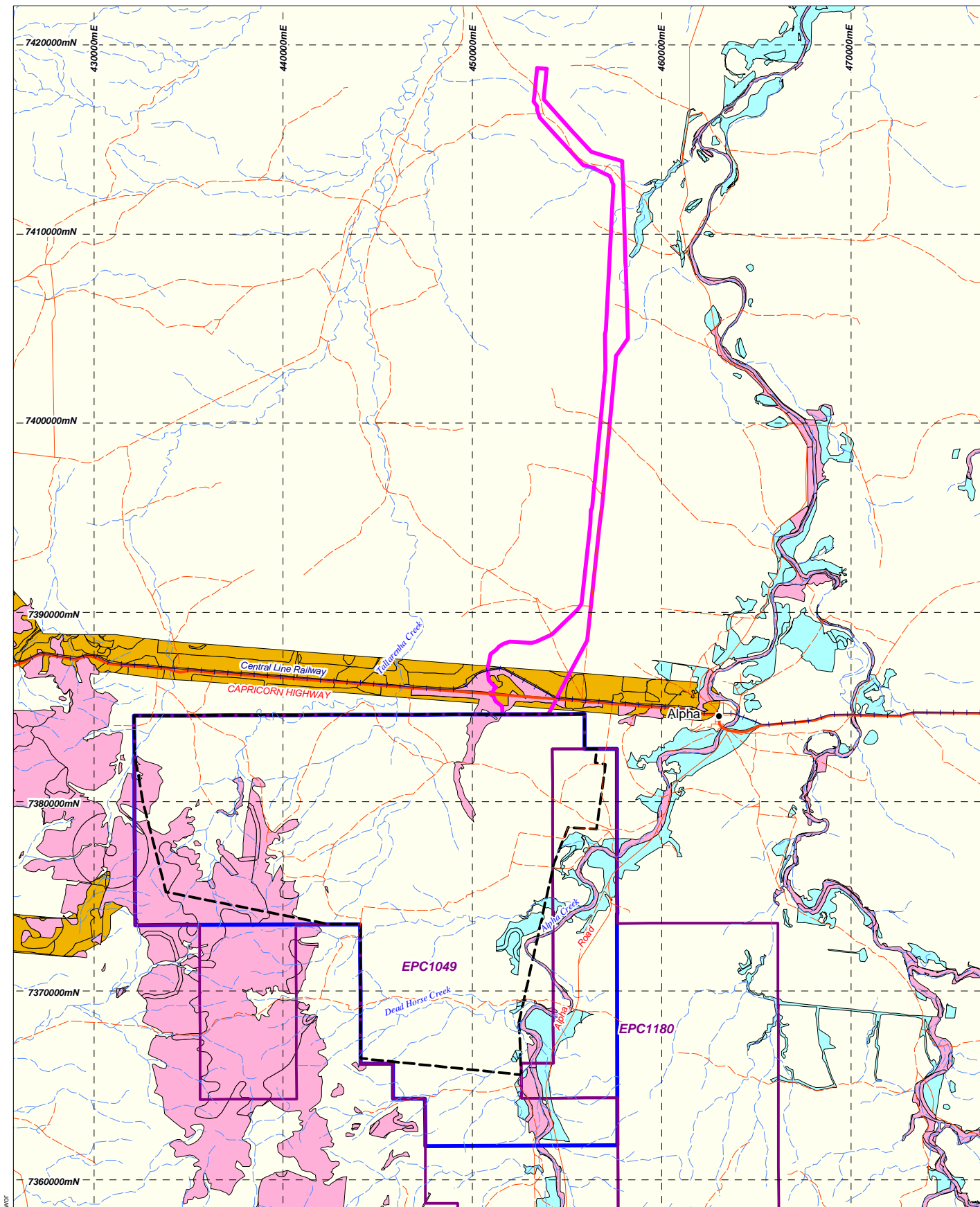
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Datum: GDA94  
Projection: MGA55










Appendix A9

Data Source:  
Tenement - EEDI. Topography (250k) - Geoscience Australia. BPA (2003) - DERM.





#### LEGEND

-  MLA70453
-  Exploration tenement
-  Mine Survey Area
-  Infrastructure corridor survey area
-  Principal road
-  Road (sealed)
-  Road (unsealed)
-  Railway
-  Stream

#### Brigalow Belt Bioregion

-  Regional
-  State

#### Desert Uplands Bioregion

-  High
-  Very High

Data Source:  
Tenement - EEDI. Topography (250k) - Geoscience Australia. BPA (2003) - DERM.

## Alpha Coal Pty Ltd South Galilee Coal Project

BAMM - Criteria J

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Kilometres

22/11/2011



 Datum: GDA94  
Projection: MGA55

Appendix A10



## **APPENDIX B**

### **FAUNA TRAP SITE DESCRIPTIONS**

**Table 1 Fauna Trap Site Descriptions**


Site No.	Location	Habitat Type	Description	Photo
W01	-23.68063° 146.39844°	Lancewood woodland	<p>Minor in extent, this community had a short 8-12 metre (m) canopy of <i>Acacia shirleyi</i> with the occasional emergent <i>Eucalyptus crebra</i>. The midstorey structure was relatively open, punctuated by recruiting canopy species.</p> <p>The ground layer was very open, consisting of sparse grasses and some fallen debris. Bare ground included some minor rocks, but largely pebbles.</p> <p>Hollows were scarce, consisting of occasional fissures and holes in senescing or dead canopy species.</p>	
W02	-23.68237° 146.39613°	Open Eucalypt woodland with shrubs and Spinifex	<p>A very open woodland of <i>E. melanophloia</i> and <i>Corymbia</i> spp. The T2 canopy layer was almost absent, represented only by occasional recruiting canopy species and <i>Grevillea striata</i>.</p> <p>Shrubs, predominantly <i>Carissa spinarum</i>, <i>Senna</i> sp. and <i>Breynia oblongifolia</i>, were clumped, separated by areas of grass including a Spinifex (<i>Triodia pungens</i>), <i>Aristida</i> sp. and <i>Heteropogon contortus</i>.</p> <p>Fallen debris was not common. Hollows were scattered throughout the canopy.</p>	

**Table 1 Fauna Trap Site Descriptions (cont)**



Site No.	Location	Habitat Type	Description	Photo
W03	-23.68669° 146.39441°	Brigalow woodland	<p>A 8-10 m high canopy of predominantly Brigalow (<i>A. harpophylla</i>). Common shrubs included <i>Eremophila mitchelli</i>, <i>Geijera parviflora</i> and <i>C. spinarum</i>.</p> <p>The ground layer was a dense mosaic of <i>C. spinarum</i> and open hard red soils, although occasional grasses (e.g. <i>Aristida</i> sp.) were present. Fallen timber was common, but no large hollow logs occurred.</p> <p>Hollows were scarce, restricted to fissures and isolated hollow branches formed in dead canopy species. Exfoliating bark was abundant.</p>	
W04	-23.70136° 146.42322°	Open grassy woodland	<p>The 10-15 m tall very open canopy was dominated by <i>E. melanophloia</i> with the occasional <i>Corymbia</i> sp. <i>Grevillea striata</i>, <i>B. oblongifolia</i>, <i>Psychodactylus</i> and recruiting canopy species were scattered within the shrub layer, sometimes forming clumps.</p> <p>The ground layer was dominated by native grasses interspersed with occasional clumps of <i>C. spinarum</i>.</p> <p>Fallen timber was not common. Hollows were scattered throughout canopy trees.</p>	



**Table 1 Fauna Trap Site Descriptions (cont)**

Site No.	Location	Habitat Type	Description	Photo
W05	-23.70979° 146.41353°	Open woodland with abundant shrubs	<p>Structurally and floristically diverse, this habitat had an open canopy of <i>E. crebra</i>. The T2 and tall shrub layer, which included <i>Callitris glaucophylla</i>, <i>Acacia</i> and recruiting canopy species, was abundant either as scattered elements or occurring in clumps.</p> <p>The lower shrub layer included several <i>Acacia</i> species, <i>C. glaucophylla</i>, <i>C. spinarum</i>, <i>Senna</i> sp. and <i>B. oblongifolia</i>. These shrubs were scattered or clumped within the community.</p> <p>Ground covers included of a mix of native tussock grasses (<i>H. contortus</i>, <i>Aristida</i> sp.) with patches of Spinifex (<i>Triodia</i> sp.).</p> <p>Fallen timber and leaf litter was common, particularly around larger canopy elements. Hollows were common.</p>	



**Table 1 Fauna Trap Site Descriptions (cont)**

Site No.	Location	Habitat Type	Description	Photo
W06	-23.73921° 146.43250°	Forest and Spinifex habitat mosaic	<p>When present, the dense canopy was dominated by <i>Corymbia brachycarpa</i>, many bearing large and moderate sized hollows. These areas also had a dense midstorey of <i>Acacia melleodora</i>, <i>Persoonia falcata</i>, <i>Alphitonia excelsa</i>, <i>Bursaria incana</i> and <i>Petalostigma pubescens</i>. The ground cover was restricted to occasional clumps of <i>Themeda triandra</i>, <i>Aristida</i> sp., <i>Cymbopogon bombycinus</i> and <i>C. spinarum</i> interspersed with dense leaf litter and abundant fallen debris.</p> <p>Open areas consisted of open tussock grasslands dominated by spinifex (<i>Triodia pungens</i>). These spinifex clumps were interspersed by open bare sandy soils.</p>	
E01	-23.67724° 146.490067	Eucalypt woodland with Buffel Grass	<p>A small patch of open woodland with a heavy infestation of Buffel Grass and very little midstorey. This patch was part of a thin strip of vegetation growing along a drainage line surrounded by cleared pasture.</p>	

**Table 1 Fauna Trap Site Descriptions (cont)**



Site No.	Location	Habitat Type	Description	Photo
E02	-23.695599° 146.463776°	Eucalypt woodland with native grass	A small patch of open woodland with native grass groundcover and a sparse midstorey. This patch was part of a thin strip of vegetation growing along a drainage line surrounded by cleared pasture.	
E03	-23.73716° 146.532227°	Brigalow	Brigalow woodland with good groundcover and midstorey. This area contained cracking clay and gilgais ('melon holes') that would retain water after rain.	

**Table 1 Fauna Trap Site Descriptions (cont)**


Site No.	Location	Habitat Type	Description	Photo
E04	-23.734644° 146.5112°	Paperbark woodland with grass	Melaleuca woodland with grass. This area retains water after rain.	
E05	-23.73683° 146.507828°	Eucalypt woodland with native grass	Rocky jump-up area with Eucalypts, Spinifex and midstorey. The many fallen logs on the ground provide good structural complexity and are likely to provide shelter for a wide variety of terrestrial species.	




**Table 1 Fauna Trap Site Descriptions (cont)**

Site No.	Location	Habitat Type	Description	Photo
E06	-23.754299° 146.526138°	Cypress-pine woodland with dynamic understory	<p>A patch containing Cypress Pine (<i>C. glaucophylla</i>), within a larger patch of varied vegetation. Excellent groundcover and structural diversity. Expected to provide good habitat for a wide variety of species.</p> <p>Threatened species found include Brigalow Scaly-foot (<i>Paradelma orientalis</i>).</p>	
COR1	-23.374621° 146.563391°	Brigalow with a dense groundcover of Buffel Grass	<p>Alluvial flats below a low sandstone ridge. Soil was a hard brown clay. Rocks were absent.</p> <p>The canopy was comprised solely of <i>A. harpophylla</i>, with approximately 50% canopy cover. Approximately 4% of trees were dead. The midstorey was well developed, and dominated by <i>G. parviflora</i> and <i>E. mitchelli</i>. There was 85% ground cover by understorey vegetation, primarily by the exotic buffel grass, <i>Cenchrus ciliaris</i>, but with <i>C. spinarum</i> and native grasses contributing at least 5% cover each. Of the ground not covered by understorey vegetation, 6% was bare earth and 7% had leaf litter. Fallen timber covered 2% of the ground. The entire vegetation community was small and isolated, being surrounded on its southern and western edges by the rocky ridge containing <i>Eucalyptus cambageana</i> woodland, and to the north and east by non-remnant grassland dominated by Buffel Grass.</p>	

**Table 1 Fauna Trap Site Descriptions (cont)**



Site No.	Location	Habitat Type	Description	Photo
COR2	-23.376014° 146.561688°	<i>Eucalyptus cambageana</i> -dominated grassy woodland on a low rocky ridge	<p>Located atop a low, sandstone ridge immediately south of COR1. Soil was a hard, compact yellow-grey clay, containing sandstone rocks. The trap line itself contained no rocks, but there was low sandstone outcropping only 60 m away. The terrain was flat.</p> <p>The canopy was 11 m tall, had approximately 20-30% cover, and was dominated by <i>Eucalyptus cambageana</i>. Five percent of the trees were dead. There was a moderate midstorey layer, dominated by <i>Erythroxylon australe</i> and <i>Flindersia dissosperma</i>. Understorey vegetation covered approximately 50% of the ground, and was dominated by <i>C. spinarum</i> and a diverse community of native and exotic grasses, including <i>T. triandra</i>, <i>Triodia</i> sp, <i>Aristida</i> spp, and <i>Stipa</i> spp. Fallen timber covered approximately 5% of the ground (i.e. was relatively abundant), while leaf litter and bare ground made up 30% and 15% of the ground cover, respectively.</p>	

**Table 1 Fauna Trap Site Descriptions (cont)**

Site No.	Location	Habitat Type	Description	Photo
COR3	-23.343187° 146.547247°	Dense grassland dominated by <i>Themeda triandra</i> and <i>Heteropogon contortus</i> , with scattered <i>Eucalyptus melanophloia</i> , on sandy alluvial flats.	<p>A flat, sandy alluvial plain. There was a substantial amount of water still in the soil, and the area is probably seasonally wet.</p> <p>A dense, non-remnant native grassland, with scattered low trees, dominated by <i>E. melanophloia</i>, with <i>Corymbia dallachiana</i> comprising about 10% of trees. The canopy height was only about 6 m, and greater than 50% of the trees were dead. Canopy cover was only about 5 to 10%. The midstorey was mostly absent, but contained occasional <i>C. glaucophylla</i>, <i>Petalostigma pubescens</i> and <i>Acacia coriacea</i>. The ground cover was dense (95%), and was dominated by the grasses <i>H. contortus</i> and <i>T. triandra</i>. Rocks were absent, and fallen timber was mostly absent.</p>	




**Table 1 Fauna Trap Site Descriptions (cont)**

Site No.	Location	Habitat Type	Description	Photo
COR4	-23.551972° 146.57591°	<i>Eucalyptus populnea</i> -dominated grassy woodland on sandy loam.	<p>A flat plain, with yellow-grey sandy loam soil. Nearby, along the road, were some small marshy areas with sedges.</p> <p>Open woodland, dominated by <i>Eucalyptus populnea</i>. Canopy height was approximately 9 m, and canopy cover was 10-20%. Approximately 2% of trees were dead. There was a moderate midstorey layer, dominated by <i>Acacia excelsa</i> but also with a diversity of other species, including <i>Psydrax oleifolia</i>, <i>Psydrax odoratum</i>, <i>Geijera parviflora</i>, and <i>Archidendropsis basaltica</i>. There was 80% ground cover by understorey species, most of which were native grasses. Fallen timber covered about 1% of the ground, and rocks were absent.</p>	
COR5	-23.530712° 146.578104°	<i>E. melanophloia</i> -dominated grassy woodland on sandy loam, with nearby dam.	<p>A flat plain, with yellow-orange sandy loam soil. Nearby was a small, man-made dam, with heavily grazed edges.</p> <p>Open woodland, dominated by <i>E. melanophloia</i>, with about 5% of the canopy containing <i>Corymbia clarksoniana</i> and <i>C. dallachiana</i>. Canopy height was about 10 m, and canopy cover was 20-30%. Approximately 7% of trees were dead. The midstorey was moderate to open, and was dominated by <i>Bursaria incana</i> and <i>Erythroxylon australe</i>. The understorey was dominated by the grasses <i>Themeda triandra</i>, <i>Heteropogon contortus</i> and <i>Stipa</i> sp, as well as <i>Carissa ovata</i>, which altogether covered approximately 60% of the ground. The remaining ground was 20% bare and 20% leaf litter. There were two large fallen logs, but these constituted less than 1% of the ground cover. Rocks were absent.</p>	



**Table 1 Fauna Trap Site Descriptions (cont)**

Site No.	Location	Habitat Type	Description	Photo
COR6	-23.471574° 146.581937°	Boundary between <i>E. melanophloia</i> -dominated grassy woodland and a <i>Eucalyptus coolabah</i> -dominated ephemeral wetland.	<p>The trap-site was located in dry woodland at the edge of a wooded wetland. The soil was sandy, with large sections of heavy, yellow clay imbedded within it. The entire area was very heavily grazed due to its proximity to a watering source for cattle.</p> <p>The trap-site was positioned on the boundary of two very distinct vegetation types. To the north was a wetland dominated by <i>Eucalyptus populnea</i> and <i>Eucalyptus coolabah</i>. Canopy height was about 9 m, and canopy cover was 20-30%. The midstorey was absent, but the understorey was made up of a dense cover of sedges growing in water.</p> <p>On the southern edge of the trap-site was open woodland dominated by <i>E. melanophloia</i>. <i>C. clarksoniana</i> and <i>E. populnea</i> made up less than 10% of trees. Mean canopy height was 9 m and canopy cover was 20-30%. Approximately 20% of trees were dead. There was a moderate midstorey dominated by <i>Petalostigma pubescens</i>. The understorey was grassy, and was dominated by buffel grass and <i>Heteropogon contortus</i>, producing a ground cover of approximately 60%. Fallen timber was present but sparse (i.e. about 1% cover). Rocks were absent. Despite the relatively high ground cover, much was grazed fairly short.</p>	

## **APPENDIX C**

### **FLORA SPECIES LIST**

**Table 1**      **Flora Species List**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Acanthaceae	<i>Rostellularia adscendens</i>		LC	Y	Y
Alismataceae	<i>Caldesia oligococca</i>		LC		Y
	<i>Damasonium minus</i>	Starfruit	LC		Y
Amaranthaceae	<i>Achyranthes aspera</i>	Chaff Flower	LC		Y
	<i>Alternanthera denticulata</i>	Lesser Joyweed	LC		Y
	<i>Alternanthera pungens</i>	Khaki Weed	I	Y	
	<i>Gomphrena celosioides</i>	Gomphrena Weed	I	Y	Y
	<i>Nyssanthus erecta</i>		LC		Y
	<i>Crinum flaccidum</i>	Darling Lily	LC	Y	
Apocynaceae	<i>Alstonia constricta</i>	Quinine Bush, Bitterbark	LC	Y	Y
	<i>Carissa spinarum</i>	Currant Bush	LC <sup>§</sup>	Y	Y
	<i>Marsdenia micolepis</i>	Northern Milk Vine	LC	Y	
	<i>Parsonsia eucalyptophylla</i>	Gargaloo	LC	Y	Y
	<i>Parsonsia lanceolata</i>	Rough Silkpod	LC		Y
	<i>Sarcostemma viminalis</i> subsp. <i>brunonianum</i>	Caustic Vine	LC	Y	Y
	<i>Stapelia gigantea</i>	Carrion Flower	I	Y	
Asparagaceae	<i>Lomandra confertifolia</i> subsp. <i>pallida</i>	Crowded-leaved Mat-rush	LC	Y	
	<i>Lomandra leucocephala</i> subsp. <i>leucocephala</i>	Woolly Mat-rush	LC	Y	Y
	<i>Lomandra longifolia</i>	Spiny Mat-rush	LC	Y	
	<i>Lomandra spicata</i>	Yellow-fruited Mat-rush	LC	Y	

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Asteraceae	<i>Brachyscome microcarpa</i>	Forest Daisy	LC		Y
	<i>Calotis cuneifolia</i>	Burr-daisy	LC	Y	
	<i>Calotis lappulacea</i>	Yellow Burr-daisy	LC		Y
	<i>Calotis xanthosioidea</i>		LC	Y	Y
	<i>Centipeda minima</i>	Spreading Sneezeweed	LC		Y
	<i>Chrysocephalum apiculatum</i>	Yellow Buttons, Common Everlasting	LC	Y	Y
	<i>Cirsium vulgare</i>	Bull Thistle	I	Y	
	<i>Conyza sumatrensis</i>	Sumatran Fleabane	I	Y	Y
	<i>Coronidium glutinosum</i>	Sticky Everlasting	LC	Y	
	<i>Cyanthillium cinereum</i>	Vernonia	LC	Y	Y
	<i>Epaltes australis</i>	Spreading Nut-heads	LC		Y
	<i>Minuria integerrima</i>	Smooth Minuria	LC		Y
	<i>Olearia xerophila</i>	Desert Daisy Bush	LC		
	<i>Ozothamnus cassinioides</i>		LC		Y
	<i>Peripleura hispidula</i> var. <i>hispidula</i>		LC		Y
	<i>Peripleura obovata</i>	Tall Fuzzweed	LC	Y	
	<i>Podolepis longipedata</i>	Tall Copper-wire Daisy	LC		Y
	<i>Pterocaulon redolens</i>		LC		Y
	<i>Pterocaulon serrulatum</i>		LC		Y
	<i>Rutidosia helichrysoides</i>	Grey Wrinklewort	LC		Y
	<i>Rutidosia leucantha</i>		LC		Y
	<i>Sonchus oleraceus</i>	Milk Thistle	I	Y	
	<i>Tridax procumbens</i>	Tridax Daisy	I	Y	



**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Asteraceae (continued)	<i>Verbesina encelioides</i>	Wild Sunflower	I	Y	
	<i>Vittadinia pustulata</i>		LC		Y
	<i>Wedelia spilanthis</i>		LC		Y
	<i>Xanthium occidentale</i>	Noogoora Burr	I	Y	Y
	<i>Xerochrysum bracteatum</i>	Golden Everlasting, Yellow Paper-daisy	LC		Y
Bignoniaceae	<i>Pandorea pandorana</i>	Wonga Vine	LC		Y
Boraginaceae	<i>Ehretia membranifolia</i>	Peach Bush	LC	Y	
	<i>Heliotropium indicum</i>	Indian Heliotrope	I	Y	
Cactaceae	<i>Harrissia martinii</i>	Harrissia Cactus	I	Y	Y
	<i>Opuntia stricta</i>	Prickly Pear	I		Y
Cactaceae (continued)	<i>Opuntia tomentosa</i>	Velvety Tree Pear	I		Y
Campanulaceae	<i>Wahlenbergia gracilentia</i>	Graceful Bluebell	LC		Y
	<i>Wahlenbergia graniticola</i>	Granite Bluebell, Tufted Bluebell	LC		Y
	<i>Wahlenbergia queenslandica</i>	Queensland Bluebell	LC		Y
Capparaceae	<i>Apophyllum anomalum</i>	Warrior Bush, Currant Bush	LC		Y
	<i>Capparis canescens</i>	Wild Orange	LC		Y
	<i>Capparis lasiantha</i>	Wyjeelah, Nepine, Split Jack	LC		Y
Caryophyllaceae	<i>Polycarpaea corymbosa</i> var. <i>major</i>		LC		Y
Celastraceae	<i>Denhamia oleaster</i>	Stiff Denhamia	LC		Y
	<i>Maytenus cunninghamii</i>	Yellowberry Bush	LC	Y	Y
	<i>Stackhousia viminea</i>		LC		Y

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Chenopodiaceae	<i>Einadia nutans</i> subsp. <i>linifolia</i>	Climbing Saltbush	LC		Y
	<i>Einadia nutans</i> subsp. <i>nutans</i>	Climbing Saltbush	LC		Y
	<i>Enchylaena tomentosa</i>	Ruby Saltbush, Barrier Saltbush	LC		Y
	<i>Salsola australis</i>	Soft Roly-poly	I	Y	Y
	<i>Sclerolaena bicornis</i>	Goathead Burr	LC		Y
	<i>Sclerolaena birchii</i>	Galvinised Burr	LC		Y
	<i>Sclerolaena ramulosa</i>		LC		Y
Convolvulaceae	<i>Evolvulus alsinoides</i>	Tropical Speedwell	LC		Y
	<i>Ipomoea lonchophylla</i>	Cowvine, Peachvine	LC		Y
	<i>Jacquemontia paniculata</i>		LC		Y
	<i>Polymeria ambigua</i>		LC		Y
Cucurbitaceae	<i>Citrullus lanatus</i>	Paddymelon	I	Y	
	<i>Cucumis anguria</i> var. <i>anguria</i>	West Indian Gherkin	I	Y	Y
Cupressaceae	<i>Callitris glaucophylla</i>	White Cypress Pine	LC	Y	Y
Cyperaceae	<i>Cyperus bifax</i>	Western Nutgrass	LC	Y	
	<i>Cyperus concinnus</i>	Trim Flat-sedge	LC		Y
	<i>Cyperus dactylotes</i>		LC		Y
	<i>Cyperus difformis</i>	Variable Flat-sedge	LC		Y
	<i>Cyperus flaccidus</i>	Lax Flat-sedge	LC		Y
	<i>Cyperus fulvus</i>	Sticky Sedge	LC		Y
	<i>Cyperus gracilis</i>	Slender Flat-sedge	LC	Y	
	<i>Cyperus rotundus</i>	Nut Grass	LC	Y	

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Cyperaceae (continued)	<i>Eleocharis atropurpurea</i>		LC		Y
	<i>Eleocharis blakeana</i>		NT		Y
	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge	LC		
	<i>Fuirena incrassata</i>		LC		Y
	<i>Schoenoplectus dissachanthus</i>	Blunt Club-sedge	LC		Y
	<i>Schoenoplectus lateriflorus</i>		LC		Y
	<i>Scleria brownii</i>		LC		Y
Droseraceae	<i>Drosera burmannii</i>	Sundew	LC	Y	Y
	<i>Drosera indica</i>	Sundew	LC	Y	Y
Erythroxylaceae	<i>Erythroxylon australe</i>		LC	Y	Y
Euphorbiaceae	<i>Breynia oblongifolia</i>	Coffee Bush	LC	Y	Y
	<i>Euphorbia alsiniflora</i>		LC <sup>  </sup>		Y
	<i>Euphorbia dallachyana</i>	Caustic Weed	LC		Y
	<i>Euphorbia drummondii</i>	Caustic Weed	LC	Y	
	<i>Euphorbia tannensis</i>		LC		Y
	<i>Petalostigma pubescens</i>	Quinine Free	LC	Y	Y
	<i>Phyllanthus carpentariae</i>		LC		Y
	<i>Phyllanthus fuernrohrii</i>	Sand Spurge	LC		Y
	<i>Phyllanthus virgatus</i> Complex		LC	Y	Y
	<i>Sauropus rigens</i>	Stiff Spurge	LC		Y
Fabaceae	<i>Acacia acradenia</i>	Silky Wattle	LC		Y

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Fabaceae (continued)	<i>Acacia bancroftiorum</i>	Bancroft's Wattle	LC	Y	
	<i>Acacia cambagei</i>	Gidgee	LC	Y	
	<i>Acacia catenulata</i>	Bendee	LC	Y	
	<i>Acacia coriacea</i>	Wirewood, Desert Oak, Dogwood, Wiry Wattle	LC <sup>¶</sup>		Y
	<i>Acacia crassa</i> subsp. <i>crassa</i>	Curracabah	LC	Y	
	<i>Acacia decora</i>	Pretty Wattle	LC	Y	
	<i>Acacia dietrichiana</i>	Dietrich's Wattle	LC		
	<i>Acacia elachantha</i>		LC		Y
	<i>Acacia excelsa</i>	Ironwood, Rosewood	LC	Y	Y
	<i>Acacia farnesiana</i>	Prickly Acacia	I	Y	
	<i>Acacia harpophylla</i>	Brigalow	LC		Y
	<i>Acacia julifera</i> subsp. <i>curvinervia</i>		LC		Y
	<i>Acacia julifera</i> subsp. <i>gilbertensis</i>	Catkin Wattle	LC	Y	Y
	<i>Acacia leiocalyx</i>	Black Wattle	LC	Y	
	<i>Acacia leptostachya</i>	Townsville Wattle	LC	Y	Y
	<i>Acacia melleodora</i>	Waxy Wattle	LC	Y	Y
	<i>Acacia oswaldii</i>		LC		Y
	<i>Acacia pendula</i>	Weeping Myall	LC	Y	
	<i>Acacia salicina</i>	Willow Wattle, Cooba, Doolan	LC	Y	Y
	<i>Acacia shirleyi</i>	Lancewood	LC	Y	Y
	<i>Acacia tenuissima</i>	Narrow-leaved Wattle	LC		Y
	<i>Aeschynomene indica</i>	Budda Pea	LC		Y
	<i>Archidendropsis basaltica</i>	Red Lancewood, Dead Finish	LC	Y	Y



**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Fabaceae (continued)	<i>Bauhinia carronii</i>	Queensland Bean	LC <sup>#</sup>	Y	Y
	<i>Chamaecrista biddulphiana</i>		LC		Y
	<i>Crotalaria brevis</i>		LC		Y
	<i>Crotalaria medicaginea</i>	Trefoil Rattlepod	LC		Y
	<i>Crotalaria montana</i>		LC		Y
	<i>Daviesia filipes</i>	Threaded Bitter Pea	LC	Y	
	<i>Desmodium brachypodium</i>	Large Tick-trefoil	LC		Y
	<i>Desmodium filiforme</i>		LC		Y
	<i>Desmodium macrocarpum</i>	Large-podded Trefoil	LC		Y
	<i>Desmodium varians</i>	Slender Tick-trefoil	LC	Y	
	<i>Erythrina vespertilio</i>	Batwing Coral Tree	LC	Y	
	<i>Galactia tenuiflora</i>		LC		Y
	<i>Gastrolobium grandiflorum</i>	Heart-leaf Poison Bush	LC	Y	
	<i>Glycine microphylla</i>	Small-leaved Glycine	LC		Y
	<i>Glycine</i> sp. (possibly <i>G. latifolia</i> )		LC		Y
	<i>Glycine</i> sp. (Mackay S.B. Andrews+43)		LC		Y
	<i>Glycine tomentella</i>	Woolly Glycine, Rusty Glycine	LC	Y	Y
	<i>Hovea longipes</i>	Brush Hovea	LC	Y	
	<i>Indigofera brevidens</i>		LC		Y
	<i>Indigofera colutea</i>	Sticky Indigo	LC		Y
	<i>Indigofera hirsuta</i>	Hairy Indigo	LC		Y
	<i>Indigofera linifolia</i>		LC		Y
	<i>Indigofera pratensis</i>	Forest Indigo	LC		Y

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Fabaceae (continued)	<i>Indigofera tinctoria</i>	True Indigo	I		Y
	<i>Rhynchosia minima</i>		LC		Y
	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	Silver Cassia	LC		Y
	<i>Senna artemisioides</i> subsp. <i>x coriacea</i>	Desert Cassia	LC	Y	Y
	<i>Senna costata</i>		LC		Y
	<i>Senna occidentalis</i>	Coffee Senna	I	Y	Y
	<i>Stylosanthes hamata</i>	Carribean Stylo	I		Y
	<i>Stylosanthes scabra</i>	Shrubby Stylo	I		Y
	<i>Tephrosia leptoclada</i>		LC		Y
	<i>Zornia areolata</i>		LC		Y
	<i>Zornia muriculata</i>		LC		Y
Goodeniaceae	<i>Brunonia australis</i>	Native Cornflower	LC		Y
	<i>Goodenia cycloptera</i>		LC		Y
	<i>Goodenia glabra</i>		LC		Y
	<i>Goodenia hirsuta</i>		LC		Y
	<i>Goodenia rostulata</i>		LC		Y
	<i>Scaevola spinescens</i>		LC		Y
Haloragaceae	<i>Haloragis heterophylla</i>	Rough Raspwood	LC		Y
Hemerocallidaceae	<i>Dianella longifolia</i>	Flax Lily	LC		Y
	<i>Tricoryne elatior</i>	Yellow Rush-lily, Yellow Autumn-lily	LC		Y
Hydrocharitaceae	<i>Ottelia ovalifolia</i>	Swamp Lily	LC		Y
Hypericaceae	<i>Hypericum gramineum</i>	Small St John's Wort	LC		Y
Juncaceae	<i>Juncus usitatus</i>	Common Rush	LC	Y	

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Lamiaceae	<i>Clerodendrum floribundum</i>	Lolly Bush, Smooth Clerodendrum	LC		Y
	<i>Ocimum tenuiflorum</i>	Native Basil	LC		Y
	<i>Prostanthera leichhardtii</i>	Gaping Mint-bush	LC	Y	
	<i>Prostanthera suborbicularis</i>	Mountain Saltbush	LC	Y	
	<i>Westringia cheelii</i>	Cheel's Rosemary	LC	Y	
Lauraceae	<i>Cassytha pubescens</i>	Devil's Twine	LC	Y	
Linaceae	<i>Linum marginale</i>	Native Flax	LC	Y	
Loranthaceae	<i>Amyema quandang</i>	Grey Mistletoe	LC	Y	Y
	<i>Dendrophthoe glabrescens</i>	Mistletoe	LC		Y
	<i>Lysiana subfalcata</i>	Northern Mistletoe	LC	Y	
Lythraceae	<i>Ammannia multiflora</i>	Jerry-jerry	LC		Y
	<i>Rotala mexicana</i>		LC		Y
Malvaceae	<i>Hibiscus burtonii</i>		LC		Y
	<i>Hibiscus sturtii</i>	Hill Hibiscus	LC	Y	Y
	<i>Sida atherophora</i>		LC		Y
	<i>Sida cordifolia</i>	Flannel Weed	I		Y
	<i>Sida filiformis</i>	Fine Sida	LC	Y	
	<i>Sida subspicata</i>	Spiked Sida	LC**		Y
	<i>Waltheria indica</i>		LC		Y
Marsileaceae	<i>Marsilea</i> sp.	Nadoo, Water Clover			Y
Meliaceae	<i>Melia azedarach</i>	White Cedar	LC	Y	
	<i>Owenia acidula</i>	Emu Apple	LC		Y

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Myoporaceae	<i>Eremophila deserti</i>	Turkey Bush, Dogwood, Poison Bush	LC	Y	Y
	<i>Eremophila longifolia</i>	Emu Bush, Berrigan	LC	Y	Y
	<i>Eremophila mitchellii</i>	False Sandalwood, Budda	LC	Y	Y
Myrtaceae	<i>Calytrix microcoma</i>	Turkey Bush	LC	Y	Y
	<i>Corymbia brachycarpa</i>	Desert Bloodwood	LC	Y	Y
	<i>Corymbia clarksoniana</i>	Clarkson's Bloodwood	LC	Y	Y
	<i>Corymbia dallachiana</i>	Ghost Gum, Dallachy's Gum	LC	Y	Y
	<i>Corymbia erythrophloia</i>	Variable-barked Bloodwood	LC	Y	
	<i>Corymbia lamprophylla</i>	Shiny-leaved Bloodwood	LC	Y	
	<i>Corymbia leichhardtii</i>	Rusty Jacket	LC	Y	
	<i>Corymbia setosa</i>	Rough-leaved Bloodwood	LC		Y
	<i>Corymbia tessellaris</i>	Carbeen, Moreton Bay Ash	LC	Y	Y
	<i>Eucalyptus bakeri</i>	Baker's Mallee	LC	Y	
	<i>Eucalyptus camaldulensis</i>	River Red Gum	LC	Y	Y
	<i>Eucalyptus cambageana</i>	Dawson Gum, Blackbutt	LC	Y	Y
	<i>Eucalyptus coolabah</i>	Coolibah	LC		Y
	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	LC	Y	Y
	<i>Eucalyptus decorticans</i>	Gum Top Ironbark	LC	Y	Y
	<i>Eucalyptus exserta</i>	Bendo	LC	Y	
	<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark	LC	Y	Y
	<i>Eucalyptus populnea</i>	Poplar Box	LC	Y	Y
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	LC	Y	
	<i>Eucalyptus thozetiana</i>	Mountain Yapunyah	LC	Y	
	<i>Lysicarpus angustifolius</i>	Budgeroo, Brown Hazelwood	LC	Y	Y



**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Myrtaceae (continued)	<i>Melaleuca nervosa</i>	Woodland Paperbark	LC	Y	
	<i>Melaleuca tamariscina</i>	Bushhouse Paperbark	LC	Y	
	<i>Melaleuca trichostachya</i>	River Paperbark	LC	Y	
	<i>Melaleuca uncinata</i>	Broom Honey Myrtle	LC	Y	
	<i>Micromyrtus rotundifolia</i>	Round-leaved Heath-myrtle	V	Y	
	<i>Thryptomene parviflora</i>		LC		
Nyctaginaceae	<i>Boerhavia dominii</i>	Tarvine	LC	Y	
Oleaceae	<i>Jasminum didymum</i> subsp. <i>racemosum</i>	Native Jasmine	LC	Y	Y
Orchidaceae	<i>Cymbidium canaliculatum</i>	Black Orchid	LC	Y	Y
Orobanchaceae	<i>Buchnera ramosissima</i>	Black Rod	LC		Y
Oxalidaceae	<i>Oxalis perennans</i>	Grassland Wood-sorrel	LC		Y
Phrymaceae	<i>Mimulus prostratus</i>	Small Monkey-flower	LC		Y
Pittosporaceae	<i>Bursaria incana</i>	Prickly Pine	LC	Y	Y
	<i>Pittosporum angustifolium</i>	Native Apricot	LC	Y	
	<i>Pittosporum spinescens</i>	Large-fruited Orange Tthorn	LC	Y	
Poaceae	<i>Alloteropsis cimicina</i>		LC		Y
	<i>Alloteropsis semialata</i>	Cockatoo Grass	LC	Y	
	<i>Ancistrachne uncinulata</i>	Hooky Grass	LC		Y
	<i>Aristida benthamii</i> var. <i>benthamii</i>	Bentham's Wiregrass	LC		Y
	<i>Aristida calycina</i> var. <i>calycina</i>	Branched Wiregrass, Dark Wiregrass	LC	Y	Y
	<i>Aristida caput-medusae</i>	Many-headed Wiregrass	LC	Y	Y
	<i>Aristida echinata</i>		LC		Y
	<i>Aristida gracilipes</i>	Three-awn Speargrass	LC		Y

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Poaceae (continued)	<i>Aristida holathera</i>	Tall Kerosene Grass	LC		Y
	<i>Aristida ingrata</i>	Feathertop Three-awn	LC	Y	Y
	<i>Aristida ramosa</i>	Purple Top Wiregrass	LC	Y	
	<i>Astrebla elymoides</i>	Weeping Mitchell Grass	LC	Y	
	<i>Austrostipa ramosissima</i>	Bamboo Grass	LC	Y	
	<i>Bothriochloa bladhii</i> subsp. <i>bladhii</i>	Forest Bluegrass	LC		Y
	<i>Bothriochloa decipiens</i> var. <i>decipiens</i>	Redgrass, Pitted Bluegrass	LC	Y	Y
	<i>Bothriochloa ewartiana</i>	Desert Bluegrass	LC	Y	
	<i>Cenchrus ciliaris</i>	Buffel Grass	I	Y	Y
	<i>Chloris divaricata</i>	Slender Chloris	LC	Y	Y
	<i>Chloris inflata</i>	Purpletop Rhodes Grass	I		Y
	<i>Chloris ventricosa</i>	Plump Windmill Grass, Tall Chloris	LC		Y
	<i>Chloris virgata</i>	Feathertop Rhodes Grass	I		Y
	<i>Chrysopogon fallax</i>	Golden Beard Grass	LC	Y	Y
	<i>Cleistochloa subjuncea</i>	Sandstone Panic	LC	Y	
	<i>Cymbopogon bombycinus</i>	Silk Grass	LC	Y	Y
	<i>Cymbopogon refractus</i>	Barb Wire Grass	LC	Y	
	<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	Queensland Blue-grass	LC	Y	Y
	<i>Digitaria ammophila</i>	Silky Umbrella Grass	LC		Y
	<i>Digitaria brownii</i>	Cotton Panic Grass	LC	Y	Y
	<i>Elytrophorus spicatus</i>	Spike Grass	LC		Y
	<i>Enneapogon lindleyanus</i>	Conetop Nineawn	LC		Y
	<i>Enneapogon nigricans</i>	Black Nineawn	LC		Y

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Poaceae (continued)	<i>Enneapogon polyphyllus</i>	Leafy Nineawn	LC		Y
	<i>Enneapogon robustissimus</i>	Tall-stemmed Bottlewasher	LC	Y	
	<i>Enneapogon virens</i>		LC		Y
	<i>Enteropogon ramosus</i>	Curly Windmill Grass	LC	Y	Y
	<i>Eragrostis cumingii</i>	Cuming's Lovegrass	LC		Y
	<i>Eragrostis elongata</i>	Clustered Lovegrass	LC		Y
	<i>Eragrostis lacunaria</i>	Purple Lovegrass	LC	Y	Y
	<i>Eragrostis parviflora</i>	Weeping Lovegrass	LC	Y	Y
	<i>Eragrostis sororia</i>		LC	Y	Y
	<i>Eragrostis speciosa</i>	Hansom Lovegrass	LC		Y
	<i>Eragrostis tenellula</i>	Delicate Lovegrass	LC		Y
	<i>Eriachne aristidea</i>	Three-awn Wanderrie Grass	LC	Y	
	<i>Eriachne mucronata</i>	Mountain Wanderrie Grass	LC	Y	Y
	<i>Eriochloa pseudoacrotricha</i>	Early Spring Grass	LC		Y
	<i>Heteropogon contortus</i>	Black Spear Grass	LC	Y	Y
	<i>Leptochloa decipiens</i> subsp. <i>asthenes</i>		LC		Y
	<i>Leptochloa fusca</i> subsp. <i>fusca</i>	Brown Beetle Grass	LC		Y
	<i>Melinis repens</i>	Red Natal Grass	I	Y	Y
	<i>Panicum decompositum</i>	Native Millet	LC	Y	Y
	<i>Panicum effusum</i>	Hairy Panic	LC	Y	
	<i>Paspalidium criniforme</i>		LC		Y
	<i>Perotis rara</i>	Comet Grass	LC	Y	Y
	<i>Schizachyrium fragile</i>	Firegrass	LC		Y

**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Poaceae (continued)	<i>Sorghum leiocladum</i>	Wild Sorghum	LC <sup>††</sup>		Y
	<i>Sporobolus australasicus</i>	Fairy Grass	LC		Y
	<i>Sporobolus caroli</i>	Fairy Grass, Yakka Grass	LC		Y
	<i>Themeda avenacea</i>	Native Oat Grass, Oat Kangaroo Grass	LC	Y	Y
	<i>Themeda triandra</i>	Kangaroo Grass	LC	Y	Y
	<i>Thyridolepis xerophila</i>	Small Mulga Grass	LC	Y	
	<i>Triodia mitchellii</i>	Buck Spinifex	LC	Y	
	<i>Triodia pungens</i>	Soft Spinifex	LC	Y	Y
	<i>Triraphis mollis</i>	Purple Needlegrass	LC		Y
	<i>Walwhalleya subxerophila</i>	Gilgai Grass	LC		Y
Portulacaceae	<i>Portulaca oleracea</i>	Purslane	LC	Y	
	<i>Portulaca pilosa</i>	Hairy Pigweed	I		Y
Proteaceae	<i>Grevillea parallela</i>	Beefwood, Silver Oak	LC	Y	Y
	<i>Grevillea pteridifolia</i>	Silky Grevillea, Fern-leaved Grevillea	LC	Y	Y
	<i>Grevillea striata</i>	Beefwood, Silver Honeysuckle	LC	Y	Y
	<i>Hakea lorea</i>	Bootlace Oak, Cork Tree	LC	Y	Y
	<i>Persoonia falcata</i>		LC	Y	Y
Pteridaceae	<i>Cheilanthes distans</i>	Bristly Cloak Fern	LC	Y	
	<i>Cheilanthes sieberi</i>	Mulga Fern	LC	Y	Y
Rhamnaceae	<i>Alphitonia excelsa</i>	Red Ash, Soap Bush	LC	Y	Y
	<i>Ventilago viminalis</i>	Supplejack, Vine Tree	LC	Y	Y
Rubiaceae	<i>Psydrax odorata</i> subsp. <i>buxifolia</i>	Stiff Canthium	LC	Y	Y
	<i>Psydrax odorata</i> subsp. <i>odorata</i>	Shiny-leaved Canthium	LC		Y



**Table 1 Flora Species List (cont)**

Family	Species	Common Name	Status*	MSA <sup>†</sup>	ICSA <sup>‡</sup>
Rubiaceae (continued)	<i>Psydrax oleifolia</i>	Wild Lemon, Brush Myrtle	LC	Y	Y
	<i>Spermacoce brachystema</i>		LC		Y
Rutaceae	<i>Citrus glauca</i>	Desert Lime	LC	Y	
	<i>Flindersia dissosperma</i>	Scrub Leopardwood	LC	Y	Y
	<i>Geijera parviflora</i>	Wilga	LC	Y	Y
Santalaceae	<i>Santalum lanceolatum</i>	Desert Quandong, Northern Sandlewood	LC	Y	Y
Sapindaceae	<i>Alectryon oleifolius</i>	Western Rosewood, Boonaree	LC		Y
	<i>Atalaya hemiglauc</i>	Whitewood, Cattlebush	LC	Y	Y
	<i>Dodonaea lanceolata</i>	Hopbush	LC		Y
Sapindaceae (continued)	<i>Dodonaea viscosa</i> subsp. <i>cuneata</i>	Sticky Hopbush	LC	Y	
Solanaceae	<i>Solanum ellipticum</i>	Bush Potato	LC	Y	Y
	<i>Solanum ferocissimum</i>	Spiny Potato Bush	LC	Y	
	<i>Solanum parvifolium</i>	Small-leaved Nightshade	LC	Y	
	<i>Solanum torvum</i> south gai	Devil's Fig	I	Y	
Sterculiaceae	<i>Brachychiton populneus</i>	Kurrajong	LC	Y	Y
	<i>Keraudrenia integrifolia</i>		LC		Y
	<i>Melhania oblongifolia</i>		LC		Y
Stylidiaceae	<i>Stylidium eglanulosum</i>	Trigger Plant	LC		Y
	<i>Stylidium eriorhizum</i>	Trigger Plant	LC		Y
Thymelaeaceae	<i>Pimelea trichostachya</i>		LC		Y
Tiliaceae	<i>Grewia retusifolia</i>	Emu Berry	LC	Y	Y
Violaceae	<i>Hybanthus enneaspermus</i>	Spade Flower	LC		Y

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- \* Status under the *Nature Conservation Act 1992*. No species are listed as threatened or near threatened under the *Environmental Protection and Biodiversity Conservation Act 1999*.
- † Species recorded in the Mine Survey Area.
- ‡ Species recorded in the Infrastructure Corridor Survey Area.
- § Listed under the synonyms *Carissa ovata* and *Carissa lanceolata*.
- || Listed under the synonym *Chamaesyce coghlanii*.
- ¶ Listed under the synonym *Acacia seriophylla*.
- # Listed under the synonym *Lysiphyllum carronii*.
- \*\* Listed under the synonym *Sida hakettiana*.
- †† Listed under the synonym *Sarga leiocladum*.
- Y Denotes species record.

## **APPENDIX D**

### **FAUNA SPECIES LIST**

Table 1 Fauna Species List

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Amphibia (16, with 10 confirmed)												
Bufonidae	<i>Rhinella marina</i>	Cane Toad	I	-		x	x	x	x			x
Hylidae	<i>Cyclorana alboguttata</i>	Green-stripe Frog	-	-	x		x					x
	<i>Cyclorana brevipes</i>	Short-footed Frog	-	-								x
	<i>Cyclorana novaehollandiae</i>	Eastern Snapping Frog	-	-	X		x					x
	<i>Litoria caerulea</i>	Green Tree Frog	-	-	X		x		x			x
	<i>Litoria inermis</i>	Bumpy Rocket Frog	-	-			x					x
	<i>Litoria latopalmata</i>	Broad-palmed Rocket Frog	-	-			x		x			
	<i>Litoria rubella</i>	Desert Tree Frog	-	-			x					x
Limnodynastidae	<i>Limnodynastes peronii</i>	Striped Marsh Frog	-	-								x
	<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog	-	-			x	x	x			
	<i>Limnodynastes terraereginae</i>	Scarlet-sided Pobblebonk	-	-								x
	<i>Neobatrachus sp.</i>		-	-						x		x
	<i>Neobatrachus sudelli</i>	Sudell's Frog	-	-								x
	<i>Notaden bennettii</i>	Holy Cross Frog	-	-								x
	<i>Platyplectrum ornatum</i>	Ornate Burrowing Frog	-	-	X		x					x
Myobatrachidae	<i>Uperoleia rugosa</i>	Chubby Gungan	-	-			x					x
Aves (172, with 145 confirmed)												
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill	-	-		x	x	x	x			x
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	-	-	x	x	x	x	x			x
	<i>Acanthiza nana</i>	Yellow Thornbill	-	-							x	x
	<i>Acanthiza reguloides</i>	Buff-rumped Thornbill	-	-		x						x
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	-	-	x				x			x
	<i>Chthonicola sagittata</i>	Speckled Warbler	-	-	x	x		x	x			x
	<i>Gerygone albogularis</i>	White-throated Gerygone	-	-		x	x	x	x		x	x



Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Aves (172, with 145 confirmed) (continued)												
Acanthizidae (continued)	<i>Gerygone fusca</i>	Western Gerygone	-	-	x			x	x		x	x
	<i>Sericornis frontalis</i>	White-browed Scrubwren	-	-								x
	<i>Smicromis brevirostris</i>	Weebill	-	-	x	x	x	x	x		x	x
Accipitridae	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	-	-			x	x				
	<i>Accipiter fasciatus</i>	Brown Goshawk	Ma	-		x	x		x	x	x	x
	<i>Aquila audax</i>	Wedge-tailed Eagle	-	-	x		x	x	x	x	x	x
	<i>Aviceda subcristata</i>	Pacific Baza	-	-								x
	<i>Circus approximans</i>	Swamp Harrier	-	Ma	x							
	<i>Elanus axillaris</i>	Black-shouldered Kite	-	-		x						x
	<i>Haliastur sphenurus</i>	Whistling Kite	-	Ma	x		x	x	x		x	x
	<i>Hieraaetus morphnoides</i>	Little Eagle	-	-							x	x
	<i>Lophoictinia isura</i>	Square-tailed Kite	NT	-		x						
	<i>Milvus migrans</i>	Black Kite	-	-			x	x				x
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	-	-	x	x	x					x
Alaudidae	<i>Mirafrja javanica</i>	Horsfield's Bushlark	-	-	x	x	x		x			x
Anatidae	<i>Anas gracilis</i>	Grey Teal	-	-	x	x	x	x				x
	<i>Anas rhynchotis</i>	Australasian Shoveler	-	-		x	x					
	<i>Anas superciliosa</i>	Pacific Black Duck	-	-	x	x	x	x	x			
	<i>Aythya australis</i>	Hardhead	-	-		x	x					x
	<i>Chenonetta jubata</i>	Australian Wood Duck	-	-	x	x	x	x	x			x
	<i>Dendrocygna eytoni</i>	Plumed Whistling-Duck	-	-			x					x
	<i>Malacorhynchus membranaceus</i>	Pink-eared Duck	-	-	x	x	x					
Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian Darter	-	-		x	x					

Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Aves (172, with 145 confirmed) (continued)												
Ardeidae	<i>Ardea intermedia</i>	Intermediate Egret	-	Ma		x		x				
	<i>Ardea alba</i>	Eastern Great Egret	Ma	Mig		x		x	x		x	
	<i>Ardea pacifica</i>	White-necked Heron	-	-	x	x	x	x	x			
	<i>Egretta novaehollandiae</i>	White-faced Heron	-	-	x	x		x				
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow	-	-	x	x	x	x	x			x
	<i>Artamus cyanopterus</i>	Dusky Woodswallow	-	-								x
	<i>Artamus leucorhynchus</i>	White-breasted Woodswallow	-	-		x						
	<i>Artamus minor</i>	Little Woodswallow	-	-	x	x	x	x	x			x
	<i>Artamus personatus</i>	Masked Woodswallow	-	-					x			x
	<i>Artamus superciliosus</i>	White-browed Woodswallow	-	-								x
	<i>Cracticus nigrogularis</i>	Pied Butcherbird	-	-	x	x	x	x	x		x	x
	<i>Cracticus tibicen</i>	Australian Magpie	-	-	x	x	x	x	x		x	x
	<i>Cracticus torquatus</i>	Grey Butcherbird	-	-	x	x	x	x	x		x	x
	<i>Strepera graculina</i>	Pied Currawong	-	-	x	x	x	x	x		x	x
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew	-	-	x		x	x				x
Cacatuidae	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	-	-			x	x			x	x
	<i>Calyptorhynchus banksii</i>	Red-tailed Black-Cockatoo	-	-	x							
	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	-	-		x						
	<i>Eolophus roseicapillus</i>	Galah	-	-	x		x	x	x		x	x
	<i>Nymphicus hollandicus</i>	Cockatiel	-	-	x	x	x				x	x

Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Aves (172, with 145 confirmed) (continued)												
Campephagidae	<i>Coracina maxima</i>	Ground Cuckoo-shrike	-	-			x		x			x
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	-	Ma	x	x	x	x	x		x	x
	<i>Coracina papuensis</i>	White-bellied Cuckoo-shrike	-	Ma								x
	<i>Coracina tenuirostris</i>	Cicadabird	-	Ma								x
	<i>Lalage sueurii</i>	White-winged Triller	-	-		x		x				x
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu	-	-	x	x		x	x			x
Charadriidae	<i>Elseyornis melanops</i>	Black-fronted Dotterel	-	-		x	x	x				
	<i>Erythrogonys cinctus</i>	Red-kneed Dotterel	-	-		x						
	<i>Vanellus miles</i>	Masked Lapwing	-	-	x		x	x	x		x	x
	<i>Vanellus tricolor</i>	Banded Lapwing	-	-							x	x
Cisticolidae	<i>Cisticola exilis</i>	Golden-headed Cisticola	-	-			x		x			
Climacteridae	<i>Climacteris picumnus</i>	Brown Treecreeper	-	-	x	x	x	x	x			x
Columbidae	<i>Geopelia cuneata</i>	Diamond Dove	-	-								x
	<i>Geopelia humeralis</i>	Bar-shouldered Dove	-	-	x		x	x	x		x	x
	<i>Geopelia striata</i>	Peaceful Dove	-	-	x	x	x	x	x		x	x
	<i>Ocyphaps lophotes</i>	Crested Pigeon	-	-	x	x	x	x	x		x	x
	<i>Phaps chalcoptera</i>	Common Bronzewing	-	-	x	x	x	x	x			x
Coraciidae	<i>Eurystomus orientalis</i>	Dollarbird	-	Ma	x	x						x
Corcoracidae	<i>Corcorax melanorhamphos</i>	White-winged Chough	-	-		x	x	x				x
	<i>Struthidea cinerea</i>	Apostlebird	-	-	x		x	x	x		x	x
Corvidae	<i>Corvus bennetti</i>	Little Crow	-	-							x	x
	<i>Corvus coronoides</i>	Australian Raven	-	-	x	x	x	x	x		x	x
	<i>Corvus orru</i>	Torresian Crow	-	-	x	x	x	x			x	x

Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Aves (172, with 145 confirmed) (continued)												
Cuculidae	<i>Cacomantis pallidus</i>	Pallid Cuckoo	-	Ma								x
	<i>Cacomantis variolosus</i>	Brush Cuckoo	-	-								x
	<i>Centropus phasianinus</i>	Pheasant Coucal	-	-			x	x				x
	<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo	-	Ma	x							x
	<i>Chalcites lucidus</i>	Shining Bronze-Cuckoo	-	Ma								x
	<i>Chalcites osculans</i>	Black-eared Cuckoo	-	Ma								x
	<i>Eudynamys orientalis</i>	Eastern Koel	-	Ma								x
	<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo	-	Ma					x			x
Estrildidae	<i>Neochmia modesta</i>	Plum-headed Finch	-	-			x	x	x			x
	<i>Taeniopygia bichenovii</i>	Double-barred Finch	-	-	x		x	x	x		x	x
	<i>Taeniopygia guttata</i>	Zebra Finch	-	-	x	x	x	x	x			x
Eurostopodidae	<i>Eurostopodus argus</i>	Spotted Nightjar	-	-			x		x			
Falconidae	<i>Falco berigora</i>	Brown Falcon	-	-	x	x	x	x	x		x	x
	<i>Falco cenchroides</i>	Nankeen Kestrel	-	Ma			x	x	x			x
	<i>Falco longipennis</i>	Australian Hobby	-	-			x					
	<i>Falco peregrinus</i>	Peregrine Falcon	-	-							x	x
	<i>Falco subniger</i>	Black Falcon	-	-	x	x						
Gruidae	<i>Grus rubicunda</i>	Brolga	-	-			x		x		x	x
Halcyonidae	<i>Dacelo leachii</i>	Blue-winged Kookaburra	-	-				x	x		x	x
	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	-	-	x	x	x	x	x		x	x
	<i>Todiramphus macleayii</i>	Forest Kingfisher	-	Ma								x
	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher	-	-	x	x	x	x				x
	<i>Todiramphus sanctus</i>	Sacred Kingfisher	-	Ma	x	x						x



Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Aves (172, with 145 confirmed) (continued)												
Hirundinidae	<i>Cheramoeca leucosterna</i>	White-backed Swallow	-	-		X	X	X			X	X
	<i>Petrochelidon ariel</i>	Fairy Martin	-	-		X					X	X
	<i>Petrochelidon nigricans</i>	Tree Martin	-	-				X	X		X	X
Maluridae	<i>Malurus cyaneus</i>	Superb Fairy-wren	-	-		X						
	<i>Malurus lamberti</i>	Variegated Fairy-wren	-	-	X	X		X	X		X	X
	<i>Malurus leucopterus</i>	White-winged Fairy-wren	-	-	X		X		X		X	X
	<i>Malurus melanocephalus</i>	Red-backed Fairy-wren	-	-	X		X	X	X		X	X
Megaluridae	<i>Cincloramphus cruralis</i>	Brown Songlark	-	-	X							X
	<i>Cincloramphus mathewsi</i>	Rufous Songlark	-	-	X	X	X	X	X			X
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	-	-	X	X	X	X	X			X
	<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater	-	-	X	X		X	X		X	X
	<i>Epthianura tricolor</i>	Crimson Chat	-	-								X
	<i>Lichenostomus fuscus</i>	Fuscous Honeyeater	-	-	X							
	<i>Lichenostomus leucotis</i>	White-eared Honeyeater	-	-	X							
	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	-	-		X	X	X	X		X	X
	<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater	-	-			X	X	X			X
	<i>Lichenostomus virescens</i>	Singing Honeyeater	-	-	X	X	X	X	X			X
	<i>Lichmera indistincta</i>	Brown Honeyeater	-	-	X	X		X	X		X	X
	<i>Manorina flavigula</i>	Yellow-throated Miner	-	-	X	X	X	X	X		X	X
	<i>Manorina melanocephala</i>	Noisy Miner	-	-		X						X
	<i>Melithreptus albogularis</i>	White-throated Honeyeater	-	-	X			X	X			X
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	-	-								X
	<i>Philemon citreogularis</i>	Little Friarbird	-	-	X	X	X		X		X	X

Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Aves (172, with 145 confirmed) (continued)												
Meliphagidae (continued)	<i>Philemon corniculatus</i>	Noisy Friarbird	-	-	x	x	x	x	x		x	x
	<i>Plectorhyncha lanceolata</i>	Striped Honeyeater	-	-	x		x	x	x			
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater	-	Mig	x	x			x		x	x
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark	-	Ma	x	x	x	x	x		x	x
	<i>Myiagra inquieta</i>	Restless Flycatcher	-	-		x	x	x	x		x	x
	<i>Myiagra rubecula</i>	Leaden Flycatcher	-	-		x	x		x			x
Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit	-	-		x	x	x	x			
Nectariniidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird	-	-	x	x	x	x	x			x
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	-	x	x		x	x			x
Odontophoridae	<i>Oriolus sagittatus</i>	Olive-backed Oriole	-	-			x		x			x
	<i>Sphecotheres vieilloti</i>	Australasian Figbird	-	-								x
Otidae	<i>Ardeotis australis</i>	Australian Bustard	-	-		x	x	x	x			x
	<i>Pachycephala rufiventris</i>	Rufous Whistler	-	-	x	x	x	x	x		x	x
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	-	-	x	x	x	x	x		x	x
	<i>Oreica gutturalis</i>	Crested Bellbird	-	-	x	x	x	x	x			x
Pardalotidae	<i>Pardalotus punctatus</i>	Spotted Pardalote	-	-		x						
	<i>Pardalotus rubricatus</i>	Red-browed Pardalote	-	-								x
	<i>Pardalotus striatus</i>	Striated Pardalote	-	-		x	x	x	x		x	x
Passeridae	<i>Passer domesticus</i>	House Sparrow	I	-							x	x
Petroicidae	<i>Eopsaltria australis</i>	Eastern Yellow Robin	-	-			x	x				
	<i>Melanodryas cucullata</i>	Hooded Robin	-	-	x		x	x	x			x
	<i>Microeca fascinans</i>	Jacky Winter	-	-	x	x	x	x	x		x	x
	<i>Petroica goodenovii</i>	Red-capped Robin	-	-				x	x		x	x

Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Aves (172, with 145 confirmed) (continued)												
Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	-	-	x	x	x					
Phasianidae	<i>Coturnix pectoralis</i>	Stubble Quail	-	Ma			x		x			
	<i>Coturnix ypsilophora</i>	Brown Quail	-	-			x	x	x			x
Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth	-	-		x	x	x				x
Podicipedidae	<i>Podiceps cristatus</i>	Great Crested Grebe	-	-			x					
	<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe	-	-			x					
	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	-	-	x	x	x	x				
Pomatostomidae	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	-	-		x	x	x	x		x	x
Psittacidae	<i>Aprosmictus erythropterus</i>	Red-winged Parrot	-	-	x	x	x	x	x		x	x
	<i>Melopsittacus undulatus</i>	Budgerigar	-	-				x				x
	<i>Northiella haematogaster</i>	Blue Bonnet	-	-							x	x
	<i>Platycercus adscitus</i>	Pale-headed Rosella	-	-	x	x	x	x	x		x	x
Psittacidae (continued)	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	-	-	x		x	x	x		x	x
Ptilonorhynchidae	<i>Ptilonorhynchus maculatus</i>	Spotted Bowerbird	-	-	x	x		x	x		x	x
Rallidae	<i>Fulica atra</i>	Eurasian Coot	-	-			x					
	<i>Tribonyx ventralis</i>	Black-tailed Native-hen	-	-		x						
Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt	-	-		x	x					
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail	-	-			x	x	x		x	x
	<i>Rhipidura leucophrys</i>	Willie Wagtail	-	-	x	x	x	x	x		x	x
Scolopacidae	<i>Calidris ruficollis</i>	Red-necked Stint	-	-		x						
Strigidae	<i>Ninox connivens</i>	Barking Owl	-	-			x					
	<i>Ninox novaeseelandiae</i>	Southern Boobook	-	-	x		x		x			x

Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Aves (172, with 145 confirmed) (continued)												
Threskiornithidae	<i>Platalea flavipes</i>	Yellow-billed Spoonbill	-	-		x						
	<i>Platalea regia</i>	Royal Spoonbill	-	-		x						
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	-	-		x		x				
	<i>Threskiornis molucca</i>	Australian white Ibis	-	-				x				
Turnicidae	<i>Turnix maculosus</i>	Red-backed Button-quail	-	-			x					
	<i>Turnix pyrrhotorax</i>	Red-chested Button-quail	-	-								x
	<i>Turnix velox</i>	Little Button-quail	-	-								x
Tytonidae	<i>Tyto javanica</i>	Eastern Barn Owl	-	-			x	x	x			x
Mammalia (48, with 40 confirmed)												
Bovidae	<i>Bos taurus</i>	European Cattle	I	-								x
Canidae	<i>Canis lupus</i>	Dingo, Domestic Dog	I	-	x		x	x				x
Dasyuridae	<i>Planigale tenuirostris</i>	Narrow-nosed Planigale	-	-			x	x				
	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	-	-		x		x				x
	<i>Smithopsis murina</i>	Common Dunnart	-	-				x				
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	-	-	x	x	x	x				x
	<i>Taphozous troughtoni</i>	Troughton's Sheath-tail-bat	-	-		p						
Equidae	<i>Equus caballus</i>	Horse, Brumby	I	-								x
Felidae	<i>Felis catus</i>	Cat	I	-			x	x				x
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit	I	-	x			x	x			x



Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Mammalia (48, with 40 confirmed)												
Macropodidae	<i>Lagorchestes conspicillatus</i>	Spectacled Hare-wallaby	-	-			x					x
	<i>Macropus dorsalis</i>	Black-striped Wallaby	-	-			x	x				
	<i>Macropus giganteus</i>	Eastern Grey Kangaroo	-	-	x	x	x	x	x			x
	<i>Macropus robustus</i>	Common Wallaroo	-	-		x	x	x	x			x
	<i>Macropus rufus</i>	Red Kangaroo	-	-	x	x	x	x	x			x
	<i>Wallabia bicolor</i>	Swamp Wallaby	-	-	x			x	x			
Miniopteridae	<i>Miniopterus shreibersii oceanensis</i>	Eastern Bentwing Bat	-	-				x				
Molossidae	<i>Austronomus australis</i>	White-striped Freetail-bat	-	-				x				
	<i>Chaerephon jobensis</i>	Northern Freetail-bat	-	-		x	x	x				
	<i>Mormopterus beccarii</i>	Beccari's Freetail-bat	-	-		x	p	x				
	<i>Mormopterus eleryi</i>	-	-	-	p		x					
	<i>Mormopterus ridei</i>	Eastern Freetail Bat	-	-				p				
	<i>Mormopterus</i> sp.	-	-	-								x
	<i>Mormopterus</i> sp. 3	Inland Freetail Bat	-	-		x	x					
	<i>Tadarida australis</i>	White-striped Freetail-bat	-	-		x						x
	<i>Taphozous troughtoni</i>	-	-	-			p					
Muridae	<i>Leggadina forresti</i>	Forrest's Mouse	-	-								x
	<i>Mus musculus</i>	House Mouse	l	-	x	x	x	x				x
	<i>Pseudomys delicatulus</i>	Delicate Mouse	-	-		x		x		x		x
	<i>Pseudomys desertor</i>	Desert Mouse	-	-		x		x		x		x
	<i>Rattus tunneyi</i>	Pale Field-rat	-	-								x
Phalangeridae	<i>Trichosurus vulpecula</i>	Common Brushtail Possum	-	-					x			x
Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala	-	-		x						x

Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Mammalia (48, with 40 confirmed)												
Potoroidae	<i>Aepyprymnus rufescens</i>	Rufous Bettong	-	-	x	x	x	x	x			
Pteropodidae	<i>Nyctimene robinsoni</i>	Eastern Tube-nosed Bat	-	-								x
	<i>Pteropus scapulatus</i>	Little Red Flying-fox	-	-	x							
Suidae	<i>Sus scrofa</i>	Pig	I	-				x	x			x
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	-	-	x	x	x	x	x			x
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	-	-		x	x	x				x
Vespertilionidae (continued)	<i>Chalinolobus morio</i>	Chocolate Wattled Bat	-	-		x	x	x				x
	<i>Chalinolobus picatus</i>	Little Pied Bat	NT	-		p	p	x				
	<i>Nyctophilus sp.</i>		-	-		x	x	x				
	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat	-	-		x	x	x		x		x
	<i>Scotorepens greyii</i>	Little Broad-nosed Bat	-	-		x	x	x		x		x
	<i>Scotorepens sanborni</i>	Northern Broad-nosed Bat	-	-						p		
	<i>Vespadelus baverstocki</i>	Inland Forest Bat	-	-		x	x	x				
	<i>Vespadelus troughtoni</i>	Eastern Cave Bat	-	-		x	x					
	<i>Vespadelus vulturnus</i>	Little Forest Bat	-	-			x					x
Reptilia (63, with 35 confirmed)												
Agamidae	<i>Amphibolurus nobbi</i>	Nobbi Dragon	-	-	x	x	x	x	x			x
	<i>Ctenophorus nuchalis</i>	Central Netted Dragon	-	-	x	x	x	x				x
	<i>Diporiphora australis</i>	Tommy Roundhead	-	-	x	x						x
	<i>Pogona barbata</i>	Eastern Bearded Dragon	-	-	x	x				x		x
Boidae	<i>Antaresia maculosa</i>	Spotted Python	-	-	x			x		x		x
	<i>Aspidites melanocephalus</i>	Black-headed Python	-	-	x		x					

Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Reptilia (63, with 35 confirmed)												
Cheluidae	<i>Chelodina longicollis</i>	Eastern Long-necked Turtle	-	-			x					
Colubridae	<i>Boiga irregularis</i>	Brown Tree Snake	-	-								x
	<i>Tropidonophis mairii</i>	Keelback	-	-						x		
Elapidae	<i>Acanthophis antarcticus</i>	Death Adder	NT	-						x		
	<i>Brachyuropsis australis</i>	Australian Coral Snake	-	-								x
	<i>Cryptophis boschmai</i>	Carpentaria Snake	-	-				x				x
	<i>Demansia psammophis</i>	Yellow-faced Whipsnake	-	-						x		x
	<i>Demansia torquata</i>	Collared Whipsnake	-	-						x		
	<i>Demansia vestigiata</i>	Lesser Black Whipsnake	-	-	x							
	<i>Furina diadema</i>	Red-naped Snake	-	-			x					
	<i>Furina ornata</i>	Orange-naped Snake	-	-	x							x
	<i>Hoplocephalus bitorquatus</i>	Pale-headed Snake	-	-						x		x
	<i>Parasuta dwyeri</i>	Dwyer's Snake	-	-								x
Elapidae (continued)	<i>Pseudechis australis</i>	Mulga Snake	-	-						x		
	<i>Pseudonaja nuchalis</i>	Western Brown Snake	-	-						x		
	<i>Pseudonaja textilis</i>	Eastern Brown Snake	-	-			x					
	<i>Suta suta</i>	Curl Snake	-	-	x	x	x	x	x			x
	<i>Vermicella annulata</i>	Bandy-bandy	-	-	x							
Gekkonidae	<i>Diplodactylus conspicillatus</i>	Fat-tailed Gecko	-	-								x
	<i>Gehyra catenata</i>	Chain-backed Dtella	-	-								x
	<i>Gehyra dubia</i>	Dubious Dtella	-	-	x	x	x			x		
	<i>Heteronotia binoei</i>	Bynoe's Gecko	-	-	x		x	x				x
	<i>Lucasium steindachneri</i>	Box-patterned Gecko	-	-	x							x

Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Reptilia (63, with 35 confirmed)												
Gekkonidae (continued)	<i>Nephurus asper</i>	Prickly Knob-tailed Gecko	-	-				x				x
	<i>Oedura monilis</i>	Ocellated Velvet Gecko	-	-								x
	<i>Oedura rhombifer</i>	Zigzag Velvet Gecko	-	-		x				x		x
	<i>Rhynchoedura ornata</i>	Beaked Gecko	-	-								x
	<i>Strophurus williamsi</i>	Eastern Spiny-tailed Gecko	-	-	x	x	x			x		x
Pygopodidae	<i>Delma tincta</i>	Excitable Delma	-	-	x							
	<i>Lialis burtonis</i>	Burton's Legless Lizard	-	-	x			x	x			
	<i>Paradelma orientalis</i>	Brigalow Scaly-foot	V	V			x					
	<i>Pygopus lepidopodus</i>	Common Scaly-foot	-	-								x
	<i>Pygopus schraderi</i>	Eastern Hooded Scaly-foot	-	-	x							
Scincidae	<i>Carlia munda</i>	Shaded-litter Rainbow-skink	-	-		x		x				x
	<i>Carlia pectoralis</i>	Open-litter Rainbow-skink	-	-		x	x					
	<i>Carlia vivax</i>	Lively Rainbow Skink	-	-	x							
	<i>Cryptoblepharus pannosus</i>	Ragged Snake-eyed Skink	-	-		x	x	x				x
	<i>Cryptoblepharus plagiocephalus</i>	Péron's Snake-eyed Skink	-	-						x		
	<i>Cryptoblepharus virgatus sensu lato</i>	Wall Skink	-	-								x
	<i>Ctenotus hebetior</i>	Stout Ctenotus	-	-	x							
	<i>Ctenotus leonhardii</i>	Leonhardi's Ctenotus	-	-								x
	<i>Ctenotus pantherinus</i>	Leopard Ctenotus	-	-	x	x	x	x				x



Table 1 Fauna Species List (cont)

Family	Scientific Name	Common Name	Status		Source							
			NC Act	EPBC Act	Mar-09 Survey	Oct-09 Survey	Apr-10 Survey	May-11 Survey	Oct-11 Survey	QM	BA	WN
Reptilia (63, with 35 confirmed)												
Scincidae (continued)	<i>Ctenotus robustus</i>	Eastern Striped Skink	-	-	x	x	x					x
	<i>Ctenotus strauchii</i>	Eastern Barred Wedgesnout	-	-						x		
	<i>Eremiascincus fasciolatus</i>	Narrow-banded Sand-swimmer	-	-								x
	<i>Eremiascincus richardsonii</i>	Broad-banded Sand-swimmer	-	-								x
	<i>Lerista fragilis</i>	Eastern Mulch-slider	-	-		x						x
	<i>Lerista punctatovittata</i>	Eastern Robust Slider	-	-								x
	<i>Menetia greyii</i>	Common Dwarf Skink	-	-		x	x					x
	<i>Menetia timlowi</i>	Dwarf Litter-skink	-	-						x		
	<i>Morethia boulengeri</i>	South-eastern Morethia Skink	-	-								x
	<i>Morethia taeniopleura</i>	Fire-tailed Skink	-	-								x
	<i>Tiliqua scincoides</i>	Common Blue-tongued Skink	-	-								x
Typhlopidae	<i>Ramphotyphlops ligatus</i>	Robust Blind Snake	-	-								x
	<i>Ramphotyphlops unguirostris</i>	Claw-snouted Blind Snake	-	-						x		x
Varanidae	<i>Varanus panoptes</i>	Yellow-spotted Monitor	-	-	x							
	<i>Varanus tristis</i>	Black-headed Monitor	-	-			x					x
Total: 299 (230 confirmed)												

**Abbreviations:**

**x** = denotes a species recorded from source

**p** = unconfirmed Anabat record of this species

**NCA** = Nature Conservation Act 1992; **EPBCA** = Environment Protection and Biodiversity Conservation Act 1999

**V** = vulnerable; **NT** = 'near threatened'; - = least concern/not listed; **Mig** = Migratory

**QM** = Queensland Museum Database, **BA** = Birds Australia Atlas (1998–2008), **WN** = WildNet (DERM online database), **I** = introduced

## **APPENDIX E**

### **ANABAT ANALYSES**

# Anabat Data Analysis Summary

Client: Matrix+

Contact: Stewart Macdonald

Location: Alpha

Job no.: MAT\_0905

Analysis Date: 15/11/2009

GENUS NAME	SPECIES NAME	Survey Date					Species identity comments
		14-Oct	15-Oct	17-Oct	22-Oct	23-Oct	
<i>Saccolaimus</i>	<i>flaviventris</i>	A	A	A	A	A	calls usually distinctive - uniform curved pulses at c. 18-21kHz; frequency overlaps with <i>C. jobensis</i> but that species distinguished on erratic pulse shape and frequency in overlap zone
<i>Taphozous</i>	<i>troughtoni</i>	C	B			B	pulse shapes similar to <i>S. flaviventris</i> , but usually slightly flatter and at higher frequency (22-24 kHz); several calls looked more like <i>T.roughtoni</i> than <i>S. flaviventris</i> but most calls definitely or highly likely from latter sp.
<i>Chaerephon</i>	<i>jobensis</i>		B	A	A	A	overlaps with <i>S. flaviventris</i> but usually has distinctive pulse characteristics; very few calls attributable to this species but definitely present on last 3 nights
<i>Mormopterus</i>	<i>beccarii</i>	A	A	A	A	A	some frequency overlap with <i>T.roughtoni</i> (23-27kHz) but pulse shape usually diagnostic (longer and with down-curved tail); numerous calls positively identified as <i>M. beccarii</i>
<i>Mormopterus</i>	<i>eleryi</i>		C		C		poorly known but calls apparently similar to those of <i>S. greyii</i> (Reardon <i>et al.</i> 2008); <i>S. greyii</i> definitely present but a few calls showed characteristics more commonly associated with <i>Mormopterus</i> spp. (flat pulses or curved with flat base and slightly down-curved tail)
<i>Mormopterus</i>	species 3				A		possible confusion with <i>C. gouldii</i> but pulse shape in most calls is flatter and lacks frequency alternation; definitely present on 22/10 but no evidence on other nights
<i>Tadarida</i>	<i>australis</i>	A	A	A	A	A	easily recognised - frequency lower than all other species (10-13kHz)
<i>Chalinolobus</i>	<i>gouldii</i>	A	A	A	A	A	positive ID based on steep pulses with alternating frequency; frequency overlaps with <i>S. balstonii</i> (which lacks frequency alternation) and <i>Mormopterus</i> sp3 (which also lacks freq alternation and generally has flatter pulse shape); no doubt about <i>C. gouldii</i> presence
<i>Chalinolobus</i>	<i>morio</i>	B			A	A	frequency similar to <i>V.roughtoni</i> (>50kHz) but has distinctive pulse shape ( <i>C. morio</i> has down-curved tail rather than upturned tail usually evident in <i>V.roughtoni</i> ); several calls on first night could have been from either species but more like <i>C. morio</i>
<i>Chalinolobus</i>	<i>picatus</i>				C		possible confusion with <i>S. greyii</i> but many <i>C. picatus</i> calls have distinctive alternating pulse frequency; not positively identified but a couple of low quality calls on 22/10 had evidence of frequency alternation
<i>Nyctophilus</i>	species		B	A	A		highly distinctive calls unlikely to be mistaken for anything else; species cannot be differentiated but <i>N. geoffroyi</i> most likely the only <i>Nyctophilus</i> species present here
<i>Scotorepens</i>	<i>balstoni</i>	A	A	A	A	A	similar to <i>C. gouldii</i> but lacks frequency alternation; numerous calls recorded every night from this species
<i>Scotorepens</i>	<i>greyii</i>	C	A	A	A	A	frequency overlap with some <i>V. baverstocki</i> calls (around 39-40kHz) and difficult to distinguish; also overlaps with <i>C. picatus</i> but that species usually has alternating pulse frequency; calls of <i>M. eleryi</i> also apparently similar (Reardon <i>et al.</i> 2008)
<i>Vespadelus</i>	<i>baverstocki</i>	B	B	A	A	B	typical <i>Vespadelus</i> pulse shape (steep curve with upturned tail), usually around 43-46kHz but as low as 39kHz (Pennay <i>et al.</i> 2004) where it overlaps with <i>S. greyii</i> and can be difficult to distinguish; most likely present all nights
<i>Vespadelus</i>	<i>troughtoni</i>	C			B	A	calls usually distinctive (frequency 48-53kHz; pulse a steep curve with upturned tail); poor quality calls possible to confuse with <i>Chalinolobus morio</i> but latter sp has downcurved rather than upturned tail; <i>V.roughtoni</i> only positively identified from final night

# Anabat Data Analysis Summary

**Client:** Matrix+

**Contact:** Stewart Macdonald

**Location:** Alpha

**Job no.:** MAT\_0905

**Analysis Date:** 15/11/2009

## Reliability ratings for ID:

A	definite	one or more calls where absolutely no doubt about identification of bat
B	probable	most likely the species named; low probability of confusion with species that use similar calls
C	possible	call is comparable with the listed species, but moderate to high probability of confusion with species with similar calls

## Call identification based on:

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales*. Department of Natural Resources and Mines, Brisbane.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales*. Department of Environment and Conservation, Hurstville.

Reardon, T., Adams, M., McKenzie, N. and Jenkins, P. (2008). A new species of Australian freetail bat *Mormopterus eleryi* sp. nov. (Chiroptera: Molossidae) and a taxonomic reappraisal of *M. norfolkensis* (Gray). *Zootaxa* **1875**: 1-31.

Reference calls collected in south-eastern and central Quensland.

**Note:** the extent of geographic variation in species' call characteristics is poorly understood and reliance on the call key/s mentioned above limits ability to reliably identify some of the calls recorded in this study.

## Other references:

Churchill, S. (2008). *Australian Bats*. Jacana Books, Allen & Unwin; Sydney.

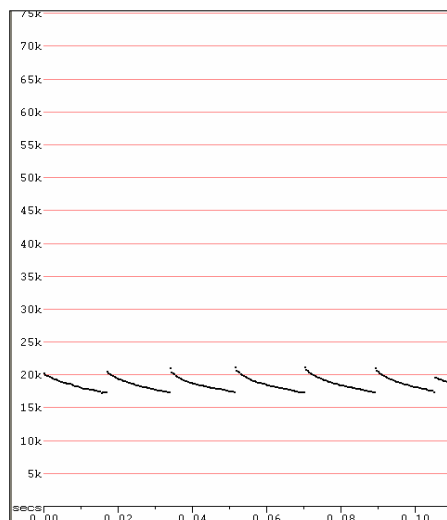
van Dyck, S. and Strahan, R. (ed.) (2008). *The Mammals of Australia* (Third Edition); New Holland; Sydney.



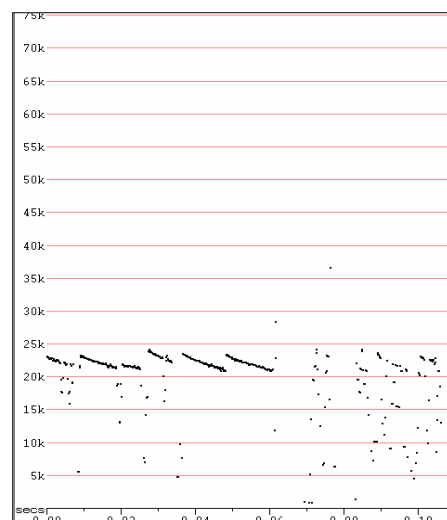
# Anabat Data Analysis Summary

## Sample calls extracted from the Alpha survey data (MatrixPLUS, 14-23 October 2009)

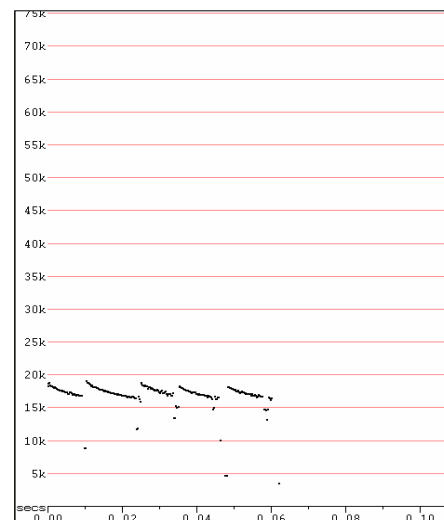
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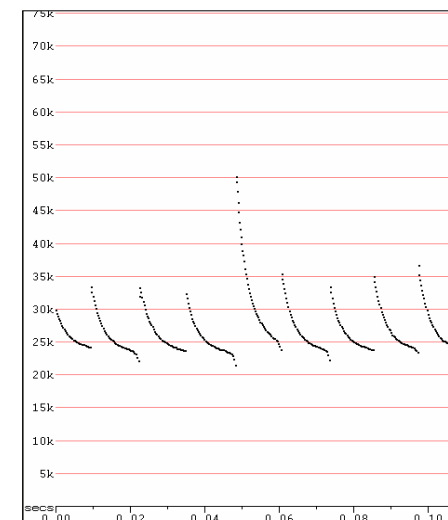
*Saccolaimus flaviventris*



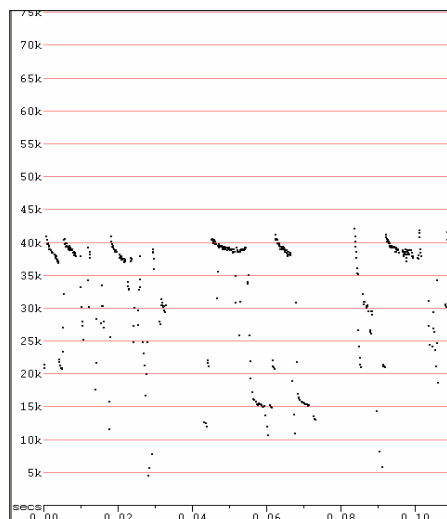
*Probably Taphozous troughtoni*



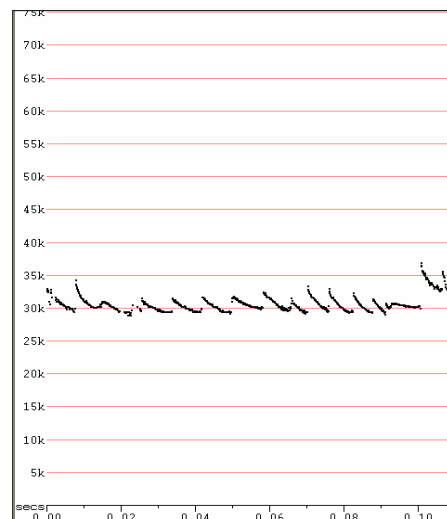
*Chaerephon jobensis*



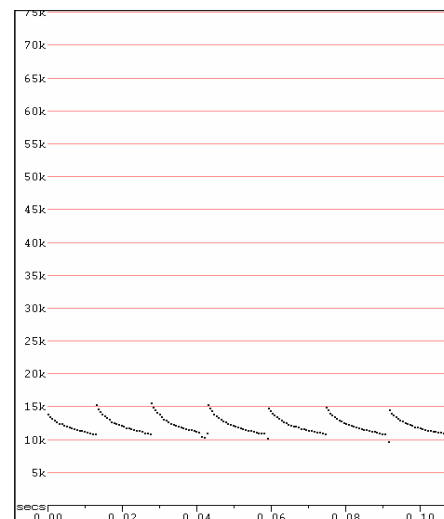
*Mormopterus beccarii*



*Possibly Mormopterus eleryi*



*Mormopterus sp. 3*

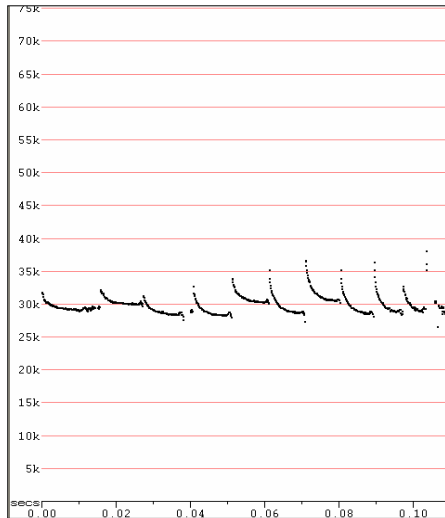


*Tadarida australis*

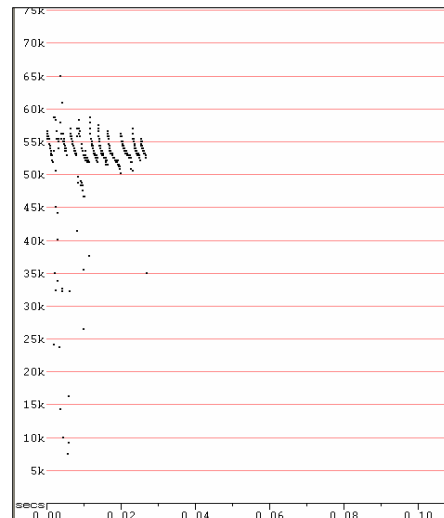
# Anabat Data Analysis Summary

## Sample calls extracted from the Alpha survey data (MatrixPLUS, 14-23 October 2009)

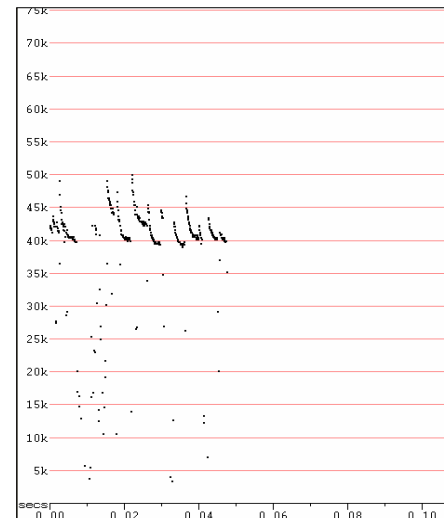
Scale: 10 msec per tick; time between pulses removed (*AnalookW* F7 compressed mode)



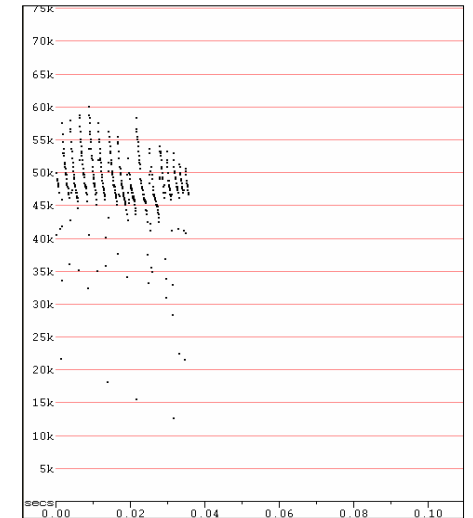
*Chalinolobus gouldii*



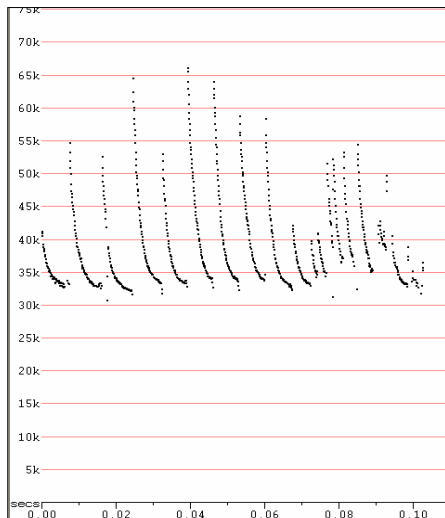
*Chalinolobus morio*



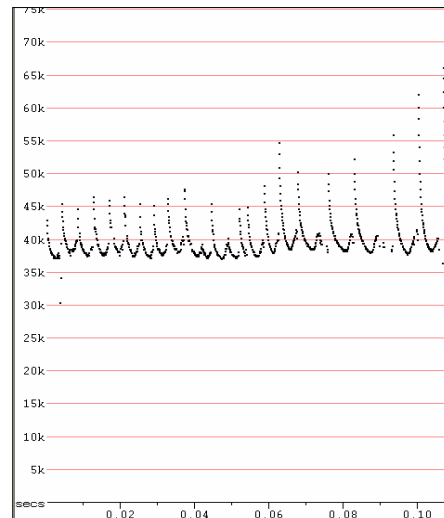
*Possibly Chalinolobus picatus*



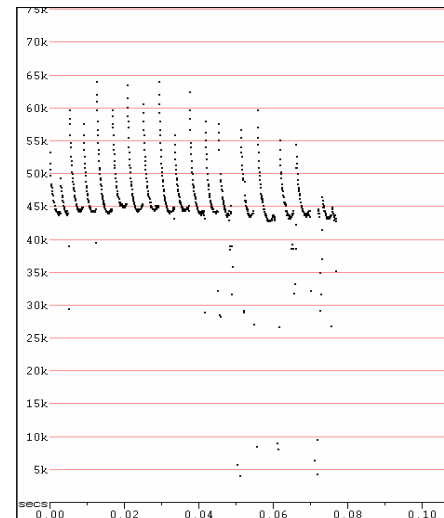
*Nyctophilus* species



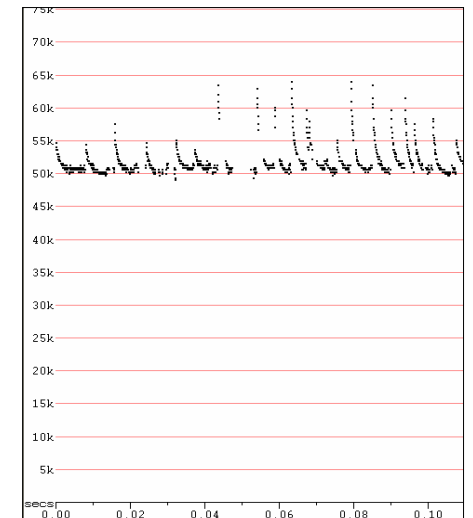
*Scotorepens balstoni*



*Scotorepens greyii*



*Vespadelus baverstocki*



*Vespadelus troughtoni*

# Anabat echolocation data interpretation summary

**Client:** MatrixPLUS Consulting

**Job no.:** MAT-1003

**Analysis Date:** 8/06/2010

**Project name/location:** Alpha Survey (27 April-2 May 2010)

**Job reference:** AMC801

Numbers in columns represent number of calls attributed to each species or species group

Species	Date			Total calls for species
	27-Apr	30-Apr	1-May	
<b>Calls positively identified</b>				
<i>Saccolaimus flaviventris</i>		1	5	6
<i>Chaerephon jobensis</i>			4	4
<i>Mormopterus</i> species 3		11	127	138
<i>Chalinolobus gouldii</i>		5	4	9
<i>Chalinolobus morio</i>		6		6
<i>Nyctophilus</i> species			1	1
<i>Scotorepens balstoni</i>	1	1	7	9
<i>Scotorepens greyii</i>		1		1
<i>Vespadelus baverstocki</i>		4	1	5
<i>Vespadelus troughtoni</i>		2	2	4
<b>Total calls positively identified</b>	<b>1</b>	<b>31</b>	<b>151</b>	<b>183</b>
<b>Calls NOT positively identified</b>				
<i>S. flaviventris</i> / <i>C. jobensis</i>		4	10	14
<i>M. beccarii</i> / <i>Taphozous troughtoni</i>			3	3
<i>Mormopterus</i> sp 3 / <i>C. gouldii</i> / <i>S. balstoni</i>			3	3
<i>C. gouldii</i> / <i>S. balstoni</i>	4	2	2	8
<i>C. picatus</i> / <i>S. greyii</i> / <i>V. baverstocki</i>	1	5	2	8
<i>V. troughtoni</i> / <i>C. morio</i>		8	4	12
unknown	1	2	36	39
<b>Total calls not positively identified</b>	<b>6</b>	<b>21</b>	<b>60</b>	<b>87</b>
<b>Total calls for night</b>	<b>7</b>	<b>53</b>	<b>212</b>	<b>272</b>

\* refer to Notes on following page for discussion of species not positively identified

## Species nomenclature:

Species names used in this summary follow Churchill (2008).

## Call identification & reporting standard:

Call identification was based on published call descriptions for southern Queensland (Reinhold *et al* 2001) and New South Wales (Pennay *et al*. 2004); and on reference calls collected from central-western and southern Qld.

Determination of species' identification was further refined by considering probability of occurrence based on distributional information presented in Churchill (2008) and van Dyck & Strahan (2008).

The format and content of this report complies with nationally accepted standards for the interpretation and reporting of Anabat data (Reardon 2003); latest version available from the Australasian Bat Society on-line at <http://www.ausbats.org.au/>.

# Anabat echolocation data interpretation summary

## Notes to the table - discussion of species/groups with low reliability of identification

### *S. flaviventris* / *C. jobensis*

some frequency overlap around 18-20kHz but most calls fairly easy to differentiate - erratic pulse shape in *C. jobensis* cf. uniform in *S. flaviventris*; a number of calls from this survey were in the frequency overlap zone but were too brief or weak to enable reliable differentiation

### *M. beccarii* / *T. troughtoni*

frequency overlaps around 24-25kHz; *T. georgianus* generally has flat pulses cf. curved pulses in *M. beccarii*; pulse duration also generally longer in *M. beccarii*; a couple of brief calls with intermediate pulse characteristics could have been from either species

### *Mormopterus* sp. 3 / *C. gouldii* / *S. balstoni*

significant frequency overlap in range 30-34kHz; *Mormopterus* pulses flat or gently-curved and uniform but can be erratic with a range of flat and curved pulses within a single sequence; *C. gouldii* pulses generally have steep initial sweep, alternating pulse frequency and abrupt slope change at point of inflexion (i.e. more angular curve); *S. balstoni* pulses similar to *C. gouldii* but smoother curve and lack frequency alternation; a few brief/poor quality calls did not clearly exhibit any of these diagnostic features so could have been from any of these species; a number of other low quality calls were considered not *Mormopterus* sp 3 but potentially either of the other two spp

### *C. picatus* / *S. greyii* / *V. baverstocki*

very similar pulse shapes with frequency overlapping in the range 39-41kHz; good quality *C. picatus* calls usually have alternating pulse frequency but otherwise difficult to differentiate these species when calling within this frequency range; a number of calls were positively attributed to *S. greyii* and *V. baverstocki* based on frequencies outside this range, but several calls recorded that could not be reliably differentiated

### *V. troughtoni* / *C. morio*

significant frequency overlap around 49-53kHz; usually differentiated on different pulse shapes, but brief and low quality calls not reliably differentiated; several such calls recored this survey could have been either species

### Unknown calls

these are calls that were too brief or weak or noisy to enable reliable species identification; they represent species already listed above, not additional species

## References:

Churchill, S. (2008). *Australian Bats*. Jacana Books, Allen & Unwin; Sydney.

Reardon, T. (2003). Standards in bat detector based surveys. *Australasian Bat Society Newsletter* **20**, 41-43.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales*. Department of Environment and Conservation, Hurstville.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales*. Department of Natural Resources and Mines, Brisbane.

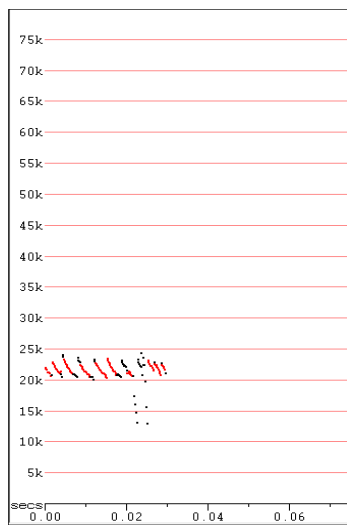
van Dyck, S. and Strahan, R. (ed.) (2008). *The Mammals of Australia* (Third Edition); New Holland; Sydney.

# Anabat Data Analysis Summary

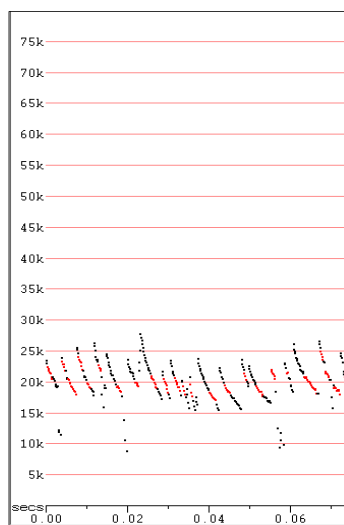
Sample calls extracted from the Alpha survey data (MatrixPLUS Consulting, April-May 2010)

Scale: 10 msec per tick; time between pulses removed (*AnalogW* F7 compressed mode)

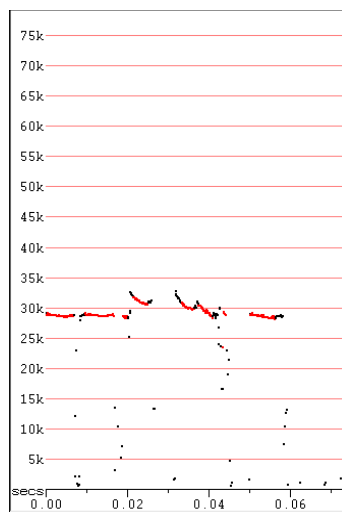
## Species positively identified



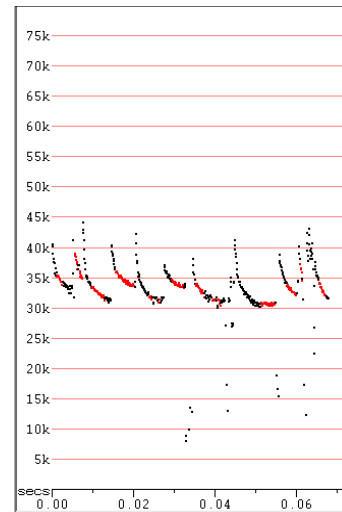
*Saccolaimus flaviventris*



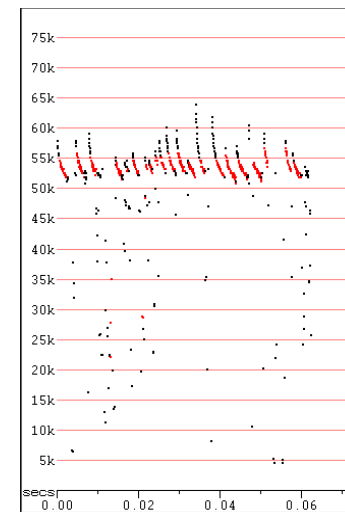
*Chaerephon jobensis*



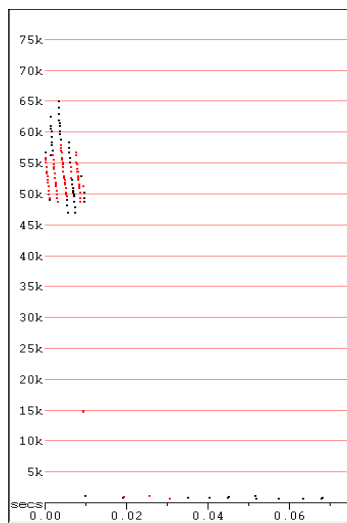
*Mormopterus species 3*



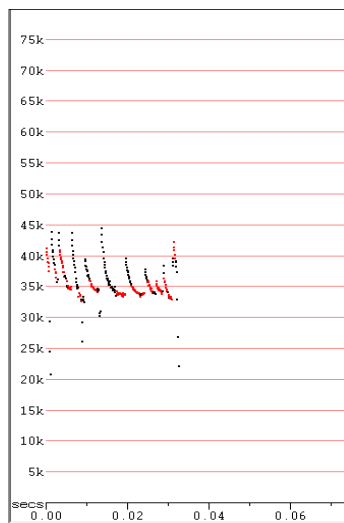
*Chalinolobus gouldii*



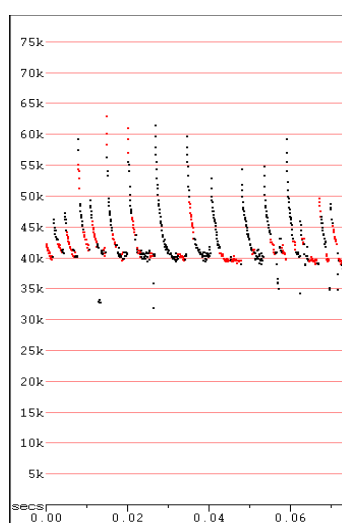
*Chalinolobus morio*



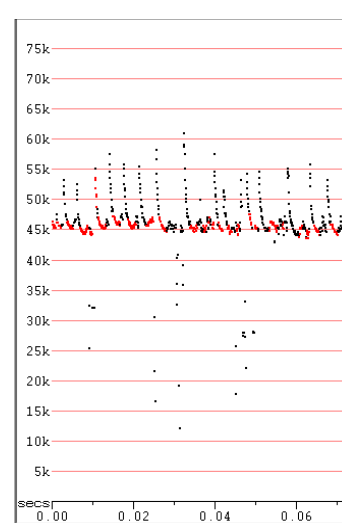
*Nyctophilus species*



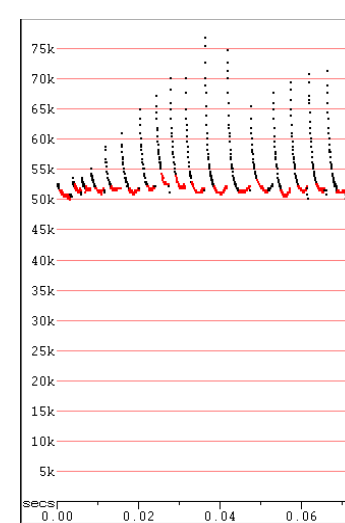
*Scotorepens balstoni*



*Scotorepens greyii*



*Vespadelus baverstocki*



*Vespadelus troughtoni*

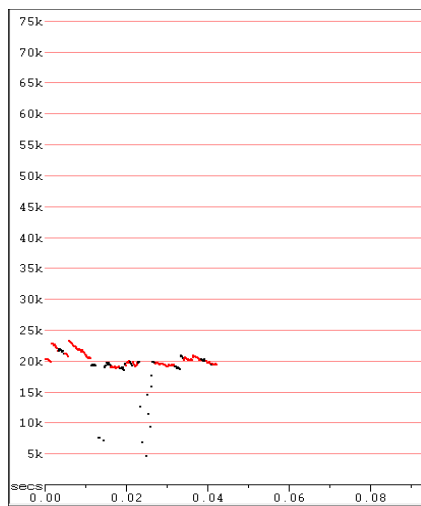


## Anabat Data Analysis Summary

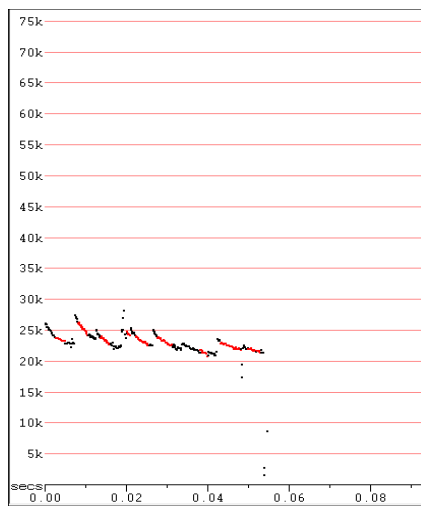
Sample calls extracted from the Alpha survey data (MatrixPLUS Consulting, April-May 2010)

Scale: 10 msec per tick; time between pulses removed (*AnalogW* F7 compressed mode)

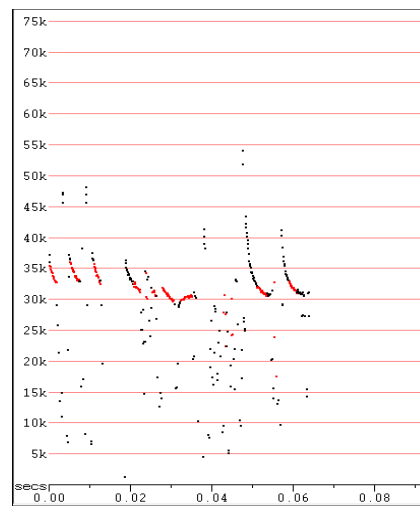
### Calls not positively identified



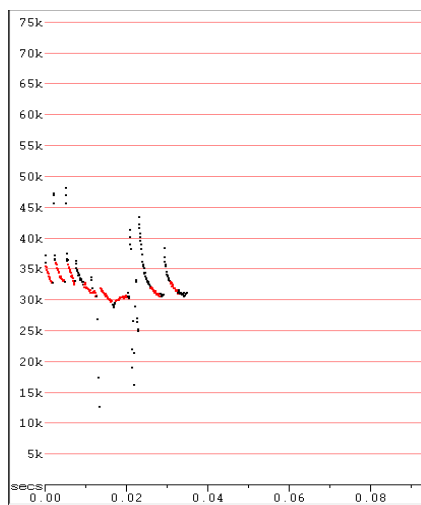
*S. flaviventris* / *C. jobenis*



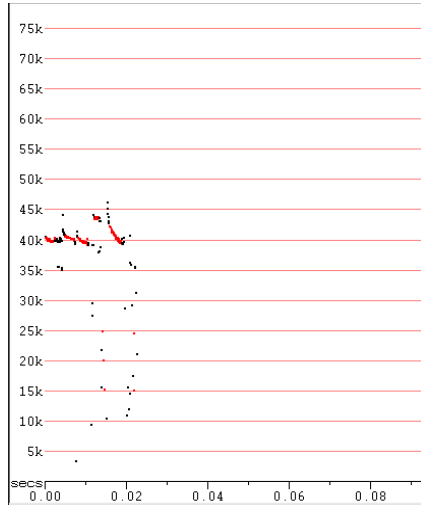
*M. beccarii* / *Taphozous troughtoni*



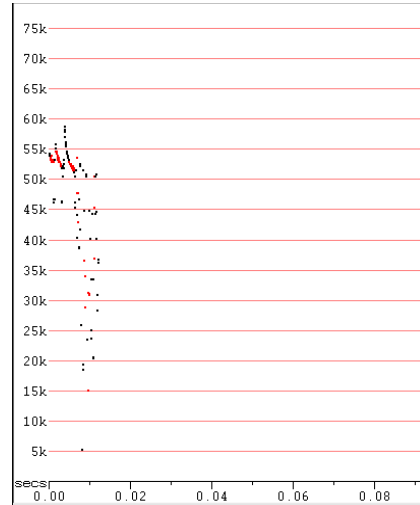
*Mormopterus* sp 3 / *C. gouldii* / *S. balstoni*



*C. gouldii* / *S. balstoni*



*C. picatus* / *S. greyii* / *V. baverstocki*



*V. troughtoni* / *C. morio*

# Anabat Data Analysis Summary

Client: MET Serve

Contact: Stewart McDonald

Job no.: MET-1101

Survey Location & Period: Alpha. May 2011

## Species summary table:

Numbers in columns refer to number of calls attributed to a species for a given night/site. Please note that these **numbers do not imply relative abundance** of the various species recorded. They may, however, be construed to represent relative differences in activity levels between the species.

Date:	22-May	23-May	24-May	26-May	27-May	28-May	30-May
	254	288	8	2	5	16	169
Total Anabat files:							
<b>Species positively identified</b>							
<i>Chalinolobus gouldii</i>	137	116				15	122
<i>Chalinolobus morio</i>	1						1
<i>Chalinolobus picatus</i>		1					
<i>Nyctophilus sp</i>		2					
<i>Scotorepens balstoni</i>		94					1
<i>Scotorepens greyii/S. sanborni</i>	2	11					4
<i>Vespadelus baverstocki</i>	1	6					1
<i>Miniopterus orianae oceanensis</i>	1						
<i>Austronomus australis</i>	2	2					
<i>Chaerephon jobensis</i>	3	1					
<i>Mormopterus beccarii</i>		26					
<i>Saccolaimus flaviventris</i>	8	23					5
<b>Calls NOT positively identified *</b>							
<i>C. gouldii</i> or <i>Mormopterus ridei</i>	72	6	1				7
<i>S. greyii / S. sanborni</i> or <i>C. picatus</i> or <i>Mormopterus eleryi</i>	3	17					2
<i>Vespadelus troughtoni</i> or <i>Chalinolobus morio</i>	5			1		1	
<i>S. flaviventris</i> or <i>M. beccarii</i>	1	3					
Unidentified bat calls	9	7		1			6

\* Species listed in this section but not in the top half of the table should be shown as 'probable occurrence' in all reports based on this analysis. See the "notes" section, below, for an explanation of call identity issues and discussion of likelihood of species presence for those without positive call identification.

## Species nomenclature:

Species names used in this summary follow Churchill (2008), except *Mormopterus eleryi* (after Reardon *et al.* 2008).

## Call identification & reporting standard:

Call identification for this data set was based on call descriptions and keys presented in Reinhold *et al.* (2001) and/or Pennay *et al.* (2004) as well as reference calls collected in eastern Queensland.

Species' identification was further refined by considering probability of occurrence based on distributional information presented in Churchill (2008) and van Dyck & Strahan (2008).

The format and content of this report complies with nationally accepted standards for the interpretation and reporting of Anabat data (Reardon 2003); latest version available from the Australasian Bat Society on-line at <http://www.ausbats.org.au/>.

# Anabat Data Analysis Summary

Client: MET Serve

Contact: Stewart McDonald

Job no.: MET-1101

Survey Location & Period: Alpha. May 2011

Notes - species/calls not reliably identified

## **Nyctophilus species**

The long-eared bats have distinctive calls that are unlike most other bat calls; however, the species within the genus cannot be differentiated. The few *Nyctophilus* calls recorded in this survey are likely to have come from *N. geoffroyi* and/or *N. gouldi*.

## **Scotorepens greyii / S. sanborni**

These species are not distinguishable from their calls. Both potentially occur in the study area, although *S. sanborni* would be near the south-western limit of its geographic range. See also discussion below relating to these species, *C. picatus* and *M. eleryi*.

## **Chalinolobus gouldii or Mormopterus ridei**

*C. gouldii* calls generally have steep, high band-width, curved pulses with almost flat base and which alternate in frequency. *M. ridei* calls at the same frequency usually have flat to gently-curved, low band-width pulses at uniform frequency. In some circumstances, however, both produce calls with intermediate features (i.e. no alternation and uniform curves of varying band-width). Numerous calls were positively attributable to *C. gouldii*, but none could be positively identified as *M. ridei*. A large number of 29-31kHz calls, mostly with less than 5 clear pulses, had intermediate characteristics and could have been from either species.

## **Scotorepens greyii / S. sanborni or C. picatus or Mormopterus eleryi**

*Scotorepens* call pulses (Fc=36-40kHz) typically display as a 'reverse-J' shape, with rounded base and upward-sloping tail. A number of calls with this pulse shape and Fc around 38-39kHz were attributed to these *Scotorepens* spp.

*C. picatus* pulses (Fc=39-43kHz) usually have flatter base with no tail or downward-sloping tail, as well as regular alternating pulse frequency. These diagnostic characters were used to positively attribute one call to *C. picatus* for 23/5.

*M. eleryi* calls are poorly known. Several reasonable-quality 'reference' calls collected from one individual captured during this survey were similar to reference calls collected in central Australia (Reardon 2008). Pulse shape & characteristic frequency (Fc) is similar to and intermediate between the *Scotorepens* spp and *C. picatus*. Pulse characteristics appear to be somewhat erratic within a call sequence (i.e. not uniform like *Scotorepens* and no regular alternation like *C. picatus*), but this feature only serves to confuse identity between this suite of species.

A number of calls from throughout the survey exhibited inconsistent pulse characteristics and could have been from *M. eleryi*; however, it is not possible to be conclusive about this identity and these calls could have come from any of the species in this group.

## **Vespadelus troughtoni or Chalinolobus morio**

These species both produce calls around 48-53kHz, but diagnosis is often straightforward due to differences in pulse shape. Two calls were attributed to *C. morio*, based on the downward sloping body and tail on all pulses (*cf.* usually upturned tail on cup-shaped body in *V. troughtoni*). A number of other calls, however, were too brief to be reliably attributed to either species.

## **S. flaviventris or M. beccarii**

These species were each positively identified from a number of calls with typical frequency differentiation (*S. flaviventris* 18-21kHz *cf.* *M. beccarii* 23-26kHz); however, several calls around 21-23kHz could have been either species.

## **Unidentified bat calls**

These are calls that were too brief and/or weak and/or noisy to be reliably identified. All were within the ranges of species otherwise listed and do not represent additional species.

## **References:**

Churchill, S. (2008). *Australian Bats*. Jacana Books, Allen & Unwin; Sydney.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales*. Department of Environment and Conservation, Hurstville.

Reardon, T. (2003). Standards in bat detector based surveys. *Australasian Bat Society Newsletter* **20**, 41-43.

Reardon, T., Adams, M., McKenzie, N. and Jenkins, P. (2008). A new species of Australian freetail bat *Mormopterus eleryi* sp. nov. (Chiroptera: Molossidae) and a taxonomic reappraisal of *M. norfolkensis* (Gray). *Zootaxa* 1875: 1-31.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales*. Department of Natural Resources and Mines, Brisbane.

van Dyck, S. and Strahan, R. (ed.) (2008). *The Mammals of Australia* (Third Edition); New Holland; Sydney.

# Anabat Data Analysis Summary

Client: MET Serve

Contact: Stewart McDonald

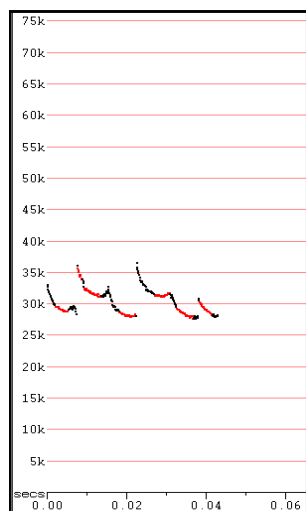
Job no.: MET-1101

Survey Location & Period: Alpha. May 2011

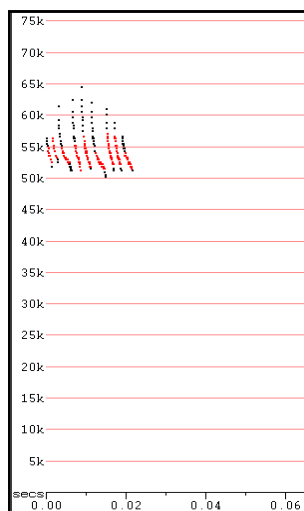
Scale: 10 msec per tick; time between pulses removed (*AnalogW F7* compressed mode)

Sample calls extracted from the survey data

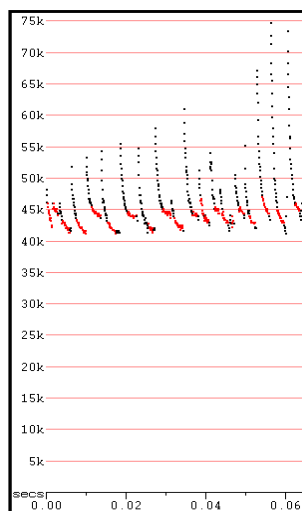
Species positively identified



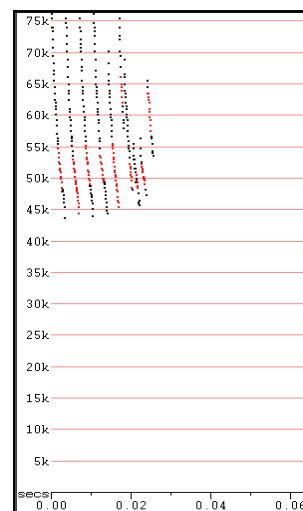
*Chalinolobus gouldii*



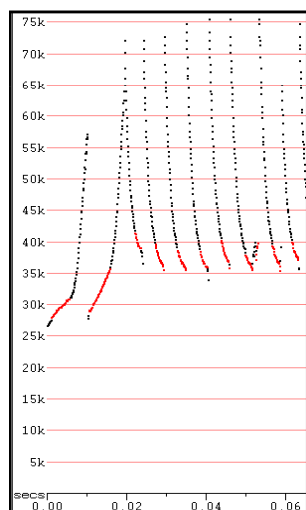
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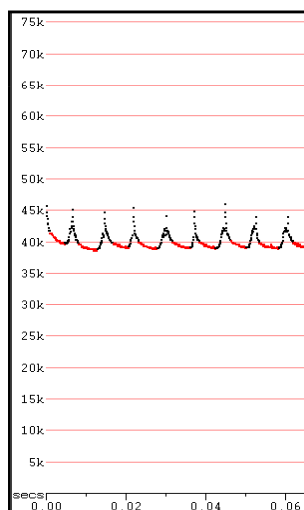
*Chalinolobus picatus*



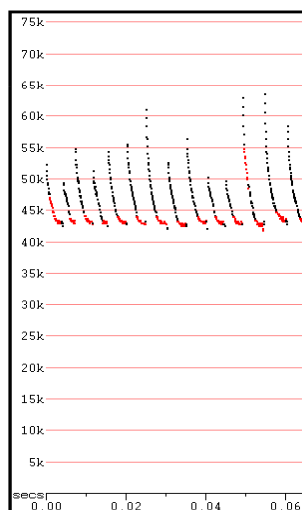
*Nyctophilus sp*



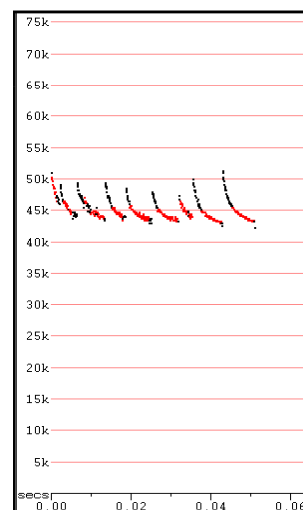
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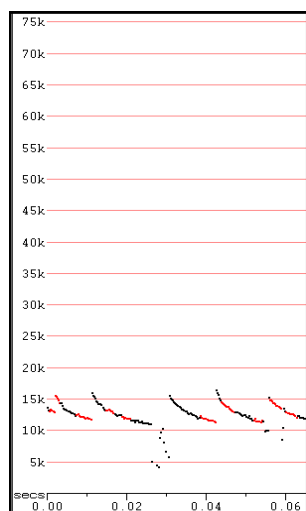
*Scotorepens greyii / S. sanborni*



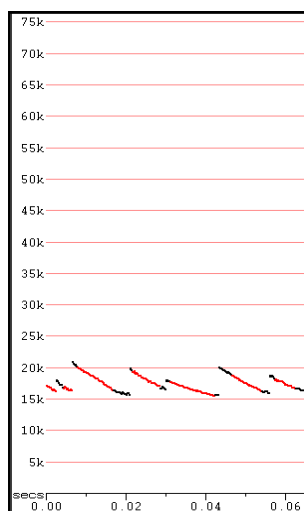
*Vespadelus baverstocki*



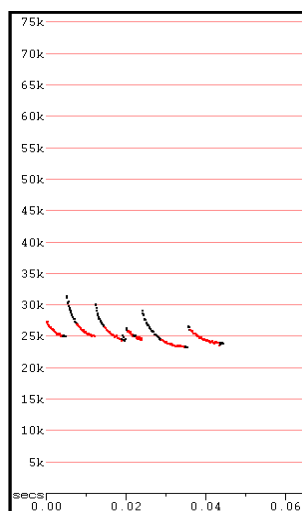
*Miniapterus orianae oceanensis*



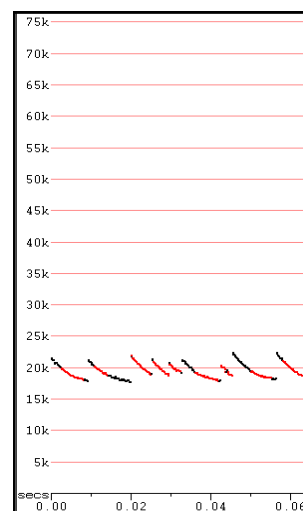
*Austronomus australis*



*Chaerephon jobensis*



*Mormopterus beccarii*



*Saccolaimus flaviventris*

# Anabat Data Analysis Summary

Client: MET Serve

Contact: Stewart McDonald

Job no.: MET-1101

Survey Location & Period: Alpha. May 2011

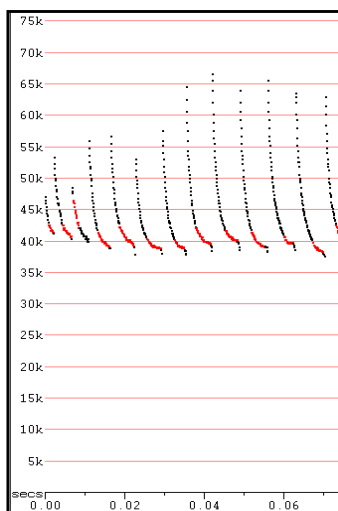
## Sample calls extracted from the survey data

Scale: 10 msec per tick; time between pulses removed (*AnalogW F7* compressed mode)

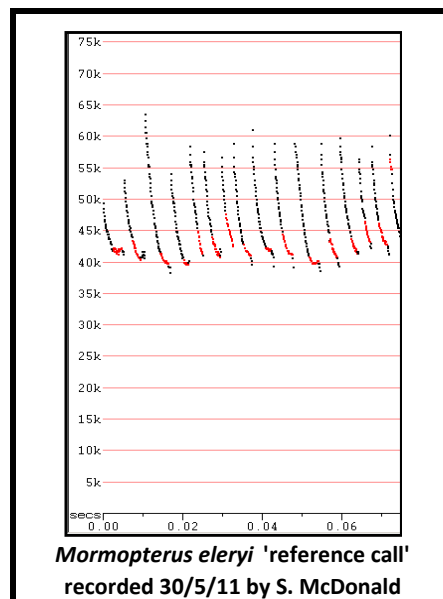
### Calls NOT positively identified



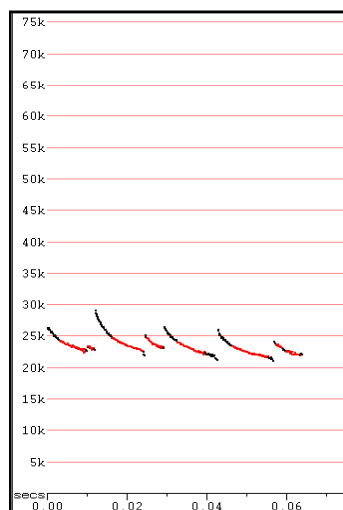
*C. gouldii* or *M. ridei*



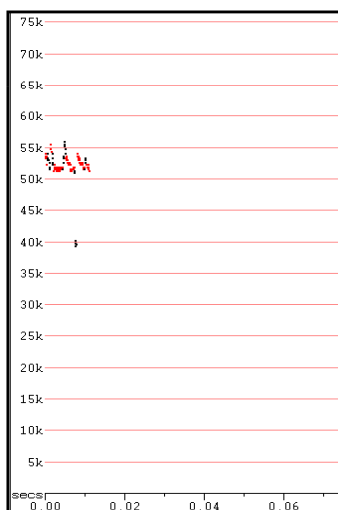
*Scotorepens* sp / *C. picatus* / *M. eleryi*



***Mormopterus eleryi* 'reference call'  
recorded 30/5/11 by S. McDonald**



*S. flaviventris* or *M. beccarii*



*V. troungtoni* or *C. morio*



## **APPENDIX F**

### **REGIONAL ECOSYSTEM DESCRIPTIONS**

## 1.1 REGIONAL ECOSYSTEM DESCRIPTIONS

### 1.1.1 Field Verified Regional Ecosystem Descriptions

#### 1.1.1.1 Land Zone 3

#### 1.1.1.1.1 Regional Ecosystem 10.3.3b

##### Description

An area of Brigalow-dominated vegetation on a gilgai microrelief occurred within the Desert Uplands section of the SGCP area. Brigalow and Dawson Gum (*Eucalyptus cambageana*) dominated the sparse canopy, which was generally lower in height than comparable areas of Regional Ecosystem (RE) 11.3.1. Wilga (*Geijera parviflora*), False Sandalwood (*Eremophila mitchellii*) and Desert Lime (*Citrus glauca*) dominated the mid-dense shrub layer. Other shrubs occasionally present included Ellangowan Poison Bush (*Eremophila deserti*) and Myrtle Tree (*Psydrax oleifolia*). Common ground covers included Native Millet (*Panicum decompositum*) and Tall-stemmed Bottlewasher (*Enneapogon robustissimus*), with Common Fringe-sedge (*Fimbristylis dichotoma*). The soil was a heavy grey clay.

##### Location(s)

There was approximately 26 ha of this RE within the mine survey area and approximately 4 ha within the infrastructure corridor survey area.

##### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This vegetation community was in good condition and free of environmental weeds and over-grazing. While not listed under the *Vegetation Management Act 1999* (VM Act) or *Environment Protection and Biodiversity Act 1999* (EPBC Act), this vegetation is of conservation value due to its proximity to other stands of Brigalow within the Brigalow Belt bioregion (370 m away). Protected areas of this RE occur at Cudmore NP and Cudmore Resources Reserve.

##### Areas within Impact Zones

Approximately 12 ha of this RE within the mining survey area will be impacted by proposed waste rock emplacements and associated roads and batters. Approximately 0.87 ha will be removed for the infrastructure corridor.



**Plate 1** False Sandalwood (*Eremophila mitchellii*—foreground) and Brigalow (*Acacia harpophylla*—background) within RE 10.3.3b on the ‘Sapling’ Property

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1.1.1.1.2      *Regional Ecosystem Vegetation Community 10.3.10*

Description

This RE vegetation community occurred on sandy yellow earth on old alluvial sandplains. The very sparse canopy was dominated by Dallachy's Silver Oak (*Grevillea parallela*) occurred occasionally as a low tree. *Carissa lanceolata*, *Petalostigma pubescens* and *Eremophila mitchellii* occurred in a sparse shrub layer. The ground layer was dominated by Gummy Spinifex. Other common grasses were *Aristida* spp., Mountain Wanderie Grass (*Eriachne mucronata*) and Black Spear Grass.

Location(s)

This RE was present in a mosaic polygon at the northern end of the infrastructure corridor survey area (1.15 ha). This RE did not occur in the mine survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in average ecological condition, with some impacts from grazing and feral pigs. Protected areas of this RE 10.3.10 occur at Moorrinya NP.

Areas within Impact Zones

A 0.10 ha area of RE 10.3.10 in the northern section of the infrastructure corridor is proposed to be cleared.

1.1.1.1.3      *Regional Ecosystem Vegetation Community 10.3.15i*

Description

A Palustrine wetland was observed within the infrastructure corridor survey area. Coolibah (*Eucalyptus coolabah*) dominated the sparse canopy. The very sparse midstorey layer contained juvenile Coolibah. The ground layer was dominated by Nardoo (*Marsilea* sp) and a diverse community of sedges (Cyperaceae).

Number of Instances

There was only one instance of this RE existing as a homogenous polygon surrounded by RE 10.5.5a, RE 10.5.12 and non-remnant grassland.

Locations

This RE was present in one location in the southern section of the Gadwell property in the infrastructure survey corridor area. It occupied an area of 20.77 ha.

Ecological condition, threatened and near threatened species, and ecological significance

This RE was in good condition despite being subject to grazing pressure. *Eleocharis blakeana*, a perennial sedge, listed as near threatened under the NC Act was present in this RE. The weed annual Hairy Pigweed (*Portulaca pilosa*) was present in low densities. Protected areas of this RE occur at White Mountains NP.

Areas within Impact Zones

The proposed rail and road infrastructure corridor is currently positioned to avoid impacts on this RE.



**Plate 2 RE 10.3.15i- Eucalyptus coolabah wetland on the 'Gadwell' Property**

1.1.1.1.4 Regional Ecosystem Vegetation Community 10.3.27a

#### Description

This vegetation community was common on alluvial sediments along minor waterways of the northern portion of the mine survey area and in scattered localities throughout the infrastructure corridor survey area. It was commonly found in association with RE 10.3.28a. Poplar Box (*Eucalyptus populnea*) dominated the moderately sparse canopy. The midstorey to tall shrub layer contained False Sandalwood, Wilga, White Wood (*Atalaya hemiglauca*), Dead Finish (*Archidendropsis basaltica*) and Bootlace Oak (*Hakea lorea*). Blackberry (*Carissa spinarum*) dominated the shrub layer. The ground layer was variable, ranging from very sparse to mid-dense. Desert Bluegrass (*Bothriochloa ewartiana*), Kangaroo Grass (*Themeda triandra*), Black Speargrass (*Heteropogon contortus*) and Dark Wiregrass (*Aristida calycina*) were dominant. The weed Buffel Grass (*Cenchrus ciliaris*) was present in low to moderate densities in some areas.

#### Location(s)

This RE occurred primarily along the minor tributaries that occur in the central northern portion of the mine survey area and throughout the infrastructure corridor survey area. It often occurred within a matrix of non-remnant vegetation. The RE also occurred in minor alluvial areas in association with REs 10.5.1 and 10.5.10 in the west of the mine survey area. In total, 486.48 ha of this RE was contained within the mine survey area and 10.25 ha was contained within the infrastructure corridor survey area.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE primarily occurred in narrow riparian strips, and associated edge effects had decreased the ecological value of the remnants. This RE is susceptible to pasture degradation (Thompson and Sharp, 2003), and this was evident within much of the SGCP area. Protected areas of this RE occur at Cudmore NP and Cudmore RR.

#### Areas within Impact Zones

Approximately 16% of this RE within the mine survey area (77.4 ha) will be cleared to accommodate the mine and infrastructure. An additional 37.4% (181.77 ha) may be affected by subsidence from longwall mining. Approximately 2 ha will be cleared to accommodate the infrastructure corridor.





**Plate 3 RE 10.3.27a—Poplar Box (*Eucalyptus populnea*) over a grassy wet season understorey**

1.1.1.1.5 *Regional ecosystem vegetation community 10.3.27b*

#### Description

Dead Finish dominated the very sparse canopy. The midstorey to tall shrub layer contained False Sandalwood, Wilga, White Wood and Bootlace Oak. Blackberry dominated the shrub layer. The ground layer was variable, ranging from very sparse to mid-dense. Desert Bluegrass, Kangaroo Grass, Black Speargrass and Dark Wiregrass were dominant. The exotic Buffel Grass was present in low to moderate densities.

#### Location(s)

This RE was located in the infrastructure corridor survey area in the central section of the property Saltbush (covering 14.85 ha), despite being absent from certified mapping.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in relatively good condition although susceptible to pasture degradation (Thompson and Sharp, 2003). Protected areas of this RE occur at Cudmore NP and Cudmore RR.

#### Areas within Impact Zones

This RE is proposed to be disturbed by the infrastructure corridor (2.84 ha to be cleared).

1.1.1.1.6 *Regional Ecosystem Vegetation Community 10.3.28a*

#### Description

This RE dominated areas of alluvial sediments along minor waterways in the north of the mining survey area and in the infrastructure corridor survey area. The sparse canopy was dominated by Silver-leaved Ironbark (*Eucalyptus melanophloia*). Dallachy's Gum (*Corymbia dallachiana*) was occasionally present in the canopy. In some instances, Whiteflower Kurrajong (*Brachychiton populneus* subsp. *trilobus*) was emergent. Scattered small trees and shrubs were usually present, consisting of a range of species including Bootlace Oak, Quinine Tree (*Petalostigma pubescens*), Wild Pear (*Persoonia falcata*), Box Thorn (*Bursaria incana*) and occasionally Bushhouse Paperbark (*Melaleuca tamariscina*). A very sparse low shrub layer was sometimes present which included Desert



Lime and Heart-leaf Poison Bush (*Gastrolobium grandiflorum*). The grass layer was dominated or co-dominated by Kangaroo Grass, Black Speargrass (*Heteropogon contortus*) and *Aristida* spp.

#### Location(s)

This RE commonly occurred within mosaic polygons (especially alongside 10.3.27a). It was most widespread along drainage lines in the central parts of the mine survey area (total area of 537.10 ha). Within the infrastructure corridor survey area, this RE was found only in the far northern end (total area of 2.29 ha).

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE generally occurred in narrow riparian strips, and associated edge effects had decreased the ecological value of the remnants. This RE is susceptible to pasture degradation (Thompson and Sharp, 2003), and this was evident within much of the SGCP area. Protected areas of this RE occur at Cudmore NP, Cudmore RR and White Mountains NP.

#### Areas within Impact Zones

Within the mine survey area, 174.92 ha of this RE is proposed to be cleared for mining pits and dumps, and 118.68 ha may be impacted by subsidence from longwall mining. 0.19 ha of this RE is proposed to be cleared to accommodate the infrastructure corridor.



**Plate 4 RE 10.3.28a—Silver-leaved Ironbark (*Eucalyptus melanophloia*) over a grassy wet season understorey, April 2010**

1.1.1.1.7 Regional Ecosystem 11.3.1

#### Description

Brigalow dominated the canopy of this open forest on residual alluvium of clayey sands, although *Bauhinia* (*Bauhinia carronii*) was also present. Colane (*Owenia acidula*) and False Sandalwood were occasional mid-storey species. In many areas the understorey was dominated by Desert Lime and/or Wilga. In the western portion of the mine survey area, the tree height was often higher than the average (11–15 m for this RE).

#### Location(s)

Approximately 353 ha of this RE were present within the mine survey area, mostly along the border of the 'Creek Farm' and 'Betanga' properties. There were additional small areas of this RE in proximity of the Alpha–Tambo Road and within the infrastructure corridor survey area, where it formed a mosaic with REs 11.3.2 and RE 11.3.19.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

The condition of this RE was very good, particularly in the western portion of the mine survey area where the understorey retained high structural complexity. Elsewhere, including in the infrastructure corridor, polygons were small and subject to edge effects and high grazing pressure. This community is endangered under the VM Act and corresponds to the endangered Brigalow community listed under the EPBC Act. Protected areas of this RE occur at Culgoa Floodplain NP, Dipperu NP (S), Canarvon NP, Nairana NP, Taunton NP (S), Epping Forest NP (S), Albinia NP, Narrien Range NP, Niarana NP (Recovery), Junea NP, Mazeppa NP, Mount OConnell NP, Rundle Range RR, Rundle Range NP, Mount Etna Caves NP, Blackwood NP, Lake Broadwater CP and Nuga Nuga NP.

#### Areas within Impact Zones

0.62 ha is proposed to be cleared to accommodate the infrastructure corridor.



**Plate 5**      **False Sandalwood (*Eremophila mitchellii*—midstorey) and Brigalow (*Acacia harpophylla*—upper canopy) within RE 11.3.1**

1.1.1.1.8      *Regional Ecosystem 11.3.2*

#### Description

Areas dominated by this RE were predominantly associated with creek lines. The dominant canopy species was Poplar Box. In addition, silver-leaved ironbark was usually present, and it occasionally dominated over small patches. Dallachy's Gum was occasional. The mid storey was sparse, with clumps of White Cypress Pine (*Callitris glaucophylla*) and occasional specimens of Broom Honey Myrtle (*Melaleuca nervosa*) and False Sandalwood. The ground layer was grassy and generally dominated by species such as Redleg Grass (*Bothriochloa decipiens*) and Kangaroo Grass.



#### Location(s)

RE 11.3.2 was one of the most widespread REs within the SGCP area. It was frequent along Alpha Creek and its tributaries, across the south-east of the mine survey area (total of 1,587.14 ha). 5.41 ha were also present within the infrastructure corridor survey area.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

Although subject to grazing pressure, this RE was in reasonable condition. Grazing impacts were most evident around holding yards and at watering points. Protected areas of this RE occur at Canarvon NP, Expedition (Limited Depth) NP, Dipperu NP (S), Homevale RR, Chesterton Range NP, Homevale NP, Expedition RR, Taunton NP (S), Nuga Nuga NP, Isla Gorge NP, Blackdown Tableland NP, Alton NP, Dawson River CP, Narrien Range NP, Bouldercombe Range RR, Epping Forest NP (S), Lake Murphy CP, Carraba CP, Lake Broadwater CP, Highworth Bend CP and Lake Broadwater RR.

#### Areas within Impact Zones

Less than 0.01 ha of this RE are to be disturbed for the open cut mine.



**Plate 6**      **Poplar Box-dominated RE 11.3.2, with Cypress Pine-dominated mid-storey**

1.1.1.1.9      *Regional Ecosystem Vegetation Community 11.3.2b*

#### Description

This RE vegetation community occurred in a drainage depression on an alluvial plain. The dominant canopy species was Poplar Box, with frequent River Red Gum. A distinct low tree layer was dominated by White Cypress Pine (*Callitris glaucophylla*), but also included False Sandalwood, Queensland Bean (*Bauhinia carronii*), Wilga, *Acacia excelsa*, atalaya hemiglauc and Weeping Myall (*Acacia pendula*). The ground layer was dominated by Buffel Grass, but sedges and native grasses including *Aristida ramosa* and Kangaroo Grass were frequent.

#### Location(s)

One small patch of this RE occurred in a mosaic polygon in the northern portion of the infrastructure corridor survey area (2.61 ha). This RE did not occur in the mine survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

Although subject to grazing pressure, this RE was in reasonable condition. Carnarvon NP, Expedition (Limited Depth) NP, Dipperu NP (S), Homevale RR, Chesterton Range NP, Homevale NP, Expedition RR, Taunton NP (S), Tregole NP, Nuga Nuga NP, Isla Gorge NP, Blackdown Tableland NP, Alton NP, Dawson River CP, Narrien Range NP, Bouldercombe Gorge RR, Lake Murphy CP, Epping Forest NP (S), Carraba CP, Homevale CP, Lake Broadwater CP, [Highworth Bend CP], [Lake Broadwater RR]

Areas within Impact Zones

No areas to be impacted.



**Plate F2-7 RE vegetation community 11.3.2b**

*1.1.1.1.10 Regional Ecosystem 11.3.6*

Description

RE 11.3.6 is the bioregional equivalent of 10.3.28a. Apart from its location within the Brigalow Belt bioregion, it was distinguishable only by the presence of white cypress pine in some instances.

Location(s)

This RE often occurred in association with Alpha Creek and its tributaries, but away from the main channel. It occupied a total area of 193.06 ha within the mine survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE primarily occurred in narrow riparian strips, and associated edge effects had decreased the ecological value of the remnants. This RE is susceptible to pasture degradation (Thompson and Sharp, 2003), and this was evident within much of the SGCP area. The only protected area of this RE occurs at Carnarvon NP.

Areas within Impact Zones

A small area of this RE is proposed to be cleared in the mine survey area for an open pit (1.84 ha).



1.1.1.1.11 Regional Ecosystem 11.3.7

Description

Within the SGCP area, this RE exhibited a sparse canopy and grassy understorey. The dominant tree varied, with Dallachy's Gum, Clarkson's Bloodwood (*Corymbia clarksoniana*) or Carbeen (*Corymbia tessellaris*) dominating over discrete patches. Only some instances of this RE contained a recognisable midstorey. Where present, it was dominated by Breynia (*Breynia oblongifolia*) and Native Apricot (*Pittosporum angustifolium*). The grassy understorey was dominated by Feathertop Threeawn (*Aristida ingrata*) and Black Speargrass. The alluvial soils were sandy. The weed Harrisia Cactus (*Harrisia martinii*) was recorded as present within this RE. In addition the invasive perennial Buffel Grass had invaded portions of this RE.

Location(s)

This RE tended to be subdominant within mosaics. It was present in the mine survey area in the south-eastern portion of the property Creek Farm and in the central portion of the Sapling property, in association with a drainage line. It occupied a total of 90.91 ha.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in relatively good condition although subject to grazing pressure and invasive weeds. It appears particularly sensitive to degradation during drought conditions. Protected areas of this RE occur at Epping Forest NP (S), Nairana NP, Nairana NP (Recovery), Bowling Green Bay NP and Bowling Green Bay CP.

Areas within Impact Zones

This RE is not proposed to be disturbed by the SGCP.



**Plate 8** RE 11.3.7 where Carbeen (*Corymbia tessellaris*) is dominant, Sapling Creek

1.1.1.1.12 Regional Ecosystem 11.3.19

Description

This RE was previously unmapped for the SGCP area. Moderately extensive patches of RE 11.3.19 were situated on sandy alluvial areas, including Pleistocene alluvium, in the SGCP area. The canopy



was dominated by White Cypress Pine, with larger specimens to 18 m in height. There were emergent Carbeen, Clarkson's Bloodwood and occasionally Dallachy's Gum to 22 m. Occasionally, Short Silver-leaved Ironbark were scattered throughout. The midstorey was dominated by small White Cypress Pine with less frequent Dead Finish and Box Thorn individuals. This was the only RE where the scandent shrub Desert Jasmine (*Jasminum didymium*) was observed. The ground layer varied from sparse to dense, depending on the density of White Cypress Pine. In the well shaded understorey, Yellow-fruited Mat-rush (*Lomandra spicata*) was present. More open grassy areas featured Kangaroo Grass, Rock Grass (*Eriachne mucronata*) and Tall-stemmed Bottlewasher. This was one of the few REs in which Comet Grass (*Perotis rara*) and Darling Lilly (*Crinum flaccidum*) were observed.

#### Location(s)

A large patch of this RE occurred in the central portion of the Sapling property. Smaller areas in a mosaic with REs 11.3.2 and 11.3.7 were observed in the eastern portion of the same property. It also occurred within the southeast portion of the mine survey area. It occupied a total of 549.63 ha.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was generally very good condition being largely free of grazing impacts and exhibiting a diverse understorey. The only protected area of this RE is within Carnarvon NP.

#### Areas within Impact Zones

This RE will not be disturbed by the SGCP.



**Plate 9** RE 11.3.19 on an older alluvial surface, illustrating the dominance of White Cypress Pine (*Callitris glaucophylla*)

1.1.1.1.13 Regional Ecosystem 11.3.25

#### Description

This RE was restricted to narrow or wide riparian bands. It was dominated by River Red Gum (*Eucalyptus camaldulensis* var. *obtusa*), with areas of Dallachy's Gum or Carbeen on upper banks. River Paperbark (*Melaleuca trichostachya*) dominated the midstorey along channel edges. Spiny Mat Rush (*Lomandra longifolia*) also often occurred along channel edges in the ground layer. The dominant grass species were variable across localities, but in some areas Kangaroo Grass was dominant.

This RE type included a higher diversity and cover than most others. Weed species present included Sumatran Fleabane (*Conyza sumatrensis*) and Wild Sunflower (*Verbesina encelioides*). Weed cover was up to 30% of the understorey in some disturbed areas.

#### Location

This RE was restricted to the main channel of Alpha Creek and its larger tributaries. Approximately 384 ha were mapped within the mine survey area and 3.88 ha were within the infrastructure corridor survey area.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

Sections of this RE were subject to significant infestation of weeds within the ground layer. Protected areas of this RE occur at Canarvon NP, Expedition (Limited Depth) NP, Palmgrove NP (S), Homevale NP, Bowling Green Bay NP, Expedition RR, Taunton NP (S), Goodedulla NP, Blackdown Tableland NP, Homevale RR, Nairana NP, Eungella NP, Nuga Nuga NP, Albinia NP, Precipice NP, Dipperu NP (S), Lake Murphy CP, Mount Archer NP, Auburn River NP, Narrien Range NP, Cape Upstart NP, Nairana NP (Recovery), Princhester CP, Bell Creek CP, Minerva Hills NP, Cania Gorge NP, Kroombit Tops NP, Rundle Range RR, Mount Hopeful CP, Tooloombah Creek CP, Bouldercombe Gorge RR, Vandyke Creek CP, Shoalwater Bay CP, Rundle Range NP, Tolderodden CP, Dawson River CP, Junee NP, Bowling Green Bay CP, Bukkulla CP, Mount OConnell NP, Mount Jim Crow NP, Highworth Bend CP, Peak Range NP, Bolger Bay CP and Long Island Bend CP.

#### Areas within Impact Zones

Approximately 1 ha of this RE will be cleared for the mine pit and 1.11 ha to accommodate the infrastructure corridor. In addition, 2.13 ha along Sapling Creek lies within a proposed longwall area, and may be impacted by subsidence.



**Plate 10** River Red Gums (*Eucalyptus camaldulensis* var. *obtusa*) on alluvial flats along upper Sapling creek

1.1.1.2 Land Zone 4

1.1.1.2.1 Regional Ecosystem 11.4.8

Description

RE 11.4.8 was dominated by Brigalow. Mountain Yapunyah (*Eucalyptus thozetiana*) was also present. There was a moderately dense mid-storey dominated by Budda and Wilga and occasionally Scrub Leopardwood (*Flindersia dissosperma*). The grass layer included Curly Windmill Grass (*Enteropogon acicularis*).

Location(s)

Approximately 33 ha were present at the northern end of the infrastructure corridor survey area, and 187.55 ha were present in the southern half of the mine survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in good condition as it was protected from edge effects by surrounding vegetation. Protected areas of this RE occur at Dipperu NP (S), Nairana NP (Recovery), Junea NP, Narrien Range NP, Wilanspey CP, Roundstone CP, Nairana NP and Zamia Creek CP.

Areas within Impact Zones

Approximately 8.5 ha of this RE are proposed to be cleared for the infrastructure corridor, and 4.87 ha are to be cleared in the mine survey area.



**Plate 11** Large Brigalow (*Acacia harpophylla*) trees over a moderately dense mid-storey in RE 11.4.8, western Sapling property



1.1.1.3 Land Zone 5

1.1.1.3.1 Regional Ecosystem Vegetation Community 10.5.1b

Description

Desert Bloodwood (*Corymbia brachycarpa*) dominated the very sparse canopy, and in some areas the tree canopy was absent, with a dense shrub canopy of Waxy Wattle (*Acacia melleodora*). Other areas had a more diverse mid-storey comprised of Wild Pear, Soap Bush (*Alphitonia excelsa*), and Quinine tree. The understorey was moderately dense, often dominated by Gummy Spinifex (*Triodia pungens*), or sometimes a mix of grasses such as Feathertop Threeawn, Kangaroo Grass and Silky Oilgrass (*Cymbopogon bombycinus*).

Location(s)

This RE was particularly extensive in unfragmented tracts of remnant vegetation in the western portion of the mine survey area. It also occurred as subdominant RE in a minor tributary in the northwest of the mine survey area. It also occurred within mosaics in the infrastructure corridor survey area. A total of 688.18 ha of this RE was present in the SGCP area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was mostly in very good condition and it was predominantly free of impacts from grazing and edge effects. Protected areas of this RE occur at White Mountains NP, White Mountains RR, Cudmore RR and Cudmore NP.

Areas within Impact Zones

Approximately 13 ha of this RE is to be cleared for the infrastructure corridor and open pits. An additional 137.88 ha may be impacted by subsidence from longwall mining.



**Plate 12** An example of an area where a sparse stand of Desert Bloodwood (*Corymbia brachycarpa*) occurs above a diverse shrub layer which includes Waxy Wattle (*Acacia melleodora*)—RE 10.5.1b, 'Betanga' Property

### *Regional Ecosystem Vegetation Community 10.5.1d*

#### Description

Rough-leaved Bloodwood (*Corymbia setosa*) dominates the sparse canopy of this low open woodland (5-8m tall). *Acacia elachantha*, Quinine tree (*Petalostigma pubescens*), Prickly Pine (*Bursaria incana*) and Bush Myrtle (*Psydrax oleifolia*) occurred as a scattered low tree layer (~2m tall). *Erythroxylon australe* dominates the shrub layer (~1m tall). The diverse ground layer was dominated by Gummy Spinifex, with *Panicum decompositum*, *Aristida* spp., Golden Beard Grass (*Chrysopogon fallax*), Mountain Wanderrrie Grass (*Eriachne mucronata*), Kangaroo Grass and other grasses and herbs frequently present. RE 10.5.1d occurred on sandplains.

#### Location(s)

RE 10.5.1d occurred once, as the dominant RE in a mosaic polygon, at the northern end of the infrastructure corridor survey area (9.24ha). This RE did not occur in the mine survey area.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in good ecological condition, Buffel Grass was occasionally present and there were very few impacts from grazing. Protected areas of this RE 10.5.1d occur at White Mountains NP, White Mountains RR, Cudmore RR, Cudmore NP.



**Plate 13 RE Vegetation Community 10.5.1d**

#### Areas within Impact Zones

An area of 2.16 ha of this RE is proposed to be cleared for the infrastructure corridor.

### *1.1.1.3.2 Regional Ecosystem Vegetation Community 10.5.5a*

#### Description

Silver-leaved Ironbark was usually the only canopy tree, with Poplar Box occasional. The mid-storey often comprised various acacias including Black Wattle (*Acacia leiocalyx*). The shrub layer was dominated by Quinine tree and Wilga. The grass layer was mostly dominated by Purple Wiregrass (*Aristida ramosa*), Kangaroo Grass and Black Spear Grass.



#### Location(s)

Of all REs within the SGCP area, 10.5.5a covered the largest area (2,892.77 ha). It was found on most of land zone 5 within the Desert Uplands bioregion portion of the SGCP area.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in moderate condition, often being subject to heavy grazing pressure and exhibiting erosion in areas. The exotic Buffel Grass and Red Natal Grass (*Melinis rupens*) were present in low to moderate densities in some areas. Instances of this RE outside the SGCP area are known to contain the near threatened tree Western Rosewood (*Acacia spania*). Protected areas of this RE occur at Cudmore RR and Cudmore NP.

#### Areas within Impact Zones

Approximately 148 ha of this RE is proposed to be cleared to accommodate the infrastructure corridor and open pits. An additional 419.65ha area in the west of the mine survey area may be impacted by subsidence from longwall mining.



**Plate 14** RE 10.5.5a dominated by Silver-leaved Ironbark (*Eucalyptus melanophloia*) and with Wilga (*Geijera parviflora*) in the foreground

#### *1.1.1.3.3 Regional Ecosystem 10.5.10*

#### Description

This RE was dominated by Rusty Jacket (*Corymbia leichhardtii*), with Desert Bloodwood usually common or co-dominant. The low tree layers and shrub layers were highly variable. This RE occurred on the lower sections of sandstone scarps. Soap Bush, Quinine tree and Wild Pear were sometimes present as scattered tall shrubs or small trees. Slender Wattle (*Acacia leptostachya*) or Pretty Wattle (*Acacia decora*) often formed a dense tall shrub layer. The grass layer was variable but often dominated by Gummy Spinifex.

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Location(s)

Approximately 390 ha of RE 10.5.10 occurred in the central and western portions of the mine survey area, as a subdominant component of mosaics.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was predominantly unfragmented and in good ecological condition. Protected areas of this RE occur at Cudmore RR, White Mountains RR, Cudmore NP and White Mountains NP.

Areas within impact zones

Approximately 81 ha of this RE may be impacted by subsidence from proposed longwall mining.



**Plate 15** RE 10.5.10 on the 'Betanga' Property

Regional Ecosystem 10.5.12

Description

This RE occurred on gently undulating sand plains and was dominated by poplar box. Other than RE 11.3.1, and its bioregional equivalent RE 11.5.3, this was the only RE in which *Bauhinia* commonly occurred. Other species that occurred in a scattered low tree to tall shrub layer included Cocaine Tree (*Erythroxylum australe*), Budda, Wilga and Bootlace Oak. The main grasses in the ground layer were Kangaroo Grass, Black Spear Grass and *Aristida spp*, with some areas dominated by Soft Spinifex.

Location(s)

This RE was scattered throughout the Desert Uplands bioregion section of the SGCP area, usually as a subdominant component of mosaics. Approximately 80 ha were present in the mine survey area, and 181.16 ha were present in the infrastructure corridor survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was generally in good condition. Buffel Grass had invaded some areas and often dominated the margins. Protected areas of this RE occur at Cudmore NP and Cudmore RR.

### Areas within Impact Zones

Approximately 8 ha of this RE are proposed to be cleared for the establishment of open pits and the infrastructure corridor. In addition, 20.22 ha may be impacted by longwall mining.

#### *1.1.1.3.4 Regional Ecosystem 11.5.3*

### Description

This RE is the bioregional equivalent of RE 10.5.12 and differed from this only in that it usually featured a distinctive low tree layer of White Cypress Pine. Localised areas of this RE, particularly within the infrastructure corridor survey area, were dominated by Narrow-leaved Ironbark (*Eucalyptus crebra*) in association with other occasional canopy species including Silver-leaved Ironbark, Dallachy's Gum and Clarkson's Bloodwood.

### Location(s)

This RE was widespread but scattered throughout the Brigalow Belt bioregion section of the mine survey area. The mine survey area contained 694.99 ha and the infrastructure corridor survey area contained 54.32 ha.

### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was generally in good condition, except where invaded by Buffel Grass. The twining sub-shrub Large-podded Trefoil (*Desmodium macrocarpum*), listed as near threatened under the NC Act, was present in this RE within the infrastructure corridor survey area corridor (Saltbush property). Protected areas of this RE occur at Dipperu NP (S), Narrien Range NP, Wilandspey CP, Carnarvon NP, Nairana NP (Recovery), Junea NP, Mazeppa NP, Albinia NP, and Epping Forest NP (S).

### Areas within Impact Zones

0.35 ha are to be cleared to accommodate the open pits, and 12.20 ha are to be cleared for the infrastructure corridor. Subsidence from underground longwall mining may impact 0.53 ha.



**Plate 16** RE 11.5.3 dominated by Poplar Box (*Eucalyptus populneus*) and showing both Bauhinia (*Bauhinia carronii*) and the distinctive low tree layer of White Cypress Pine (*Callitris glaucophylla*)

#### *1.1.1.3.5 Regional Ecosystem 11.5.5*



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#### Description

This RE was distinguished from the similar 10.5.5a mainly by the presence of White Cypress Pine in the midstorey, which was often dense either throughout or in clumps. Grasses present included wiregrasses (*Aristida* spp.) and Redleg Grass.

#### Location(s)

This RE was widespread across the eastern portions of the mine survey area (559.10 ha), and was also present within a mosaic in the northern end of the infrastructure corridor survey area (4.91 ha).

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was generally in good condition, except where invaded by Buffel Grass. Protected areas of this RE occur at Alton NP, Morven CP and Narrien Range NP.

#### Areas within Impact Zones

Approximately 1 ha within the infrastructure corridor survey area will be cleared. None of this RE will be impacted by proposed activities within the mine survey area.

##### *1.1.1.3.6 Regional Ecosystem 11.5.12*

#### Description

This RE was not contained within certified mapping of the SGCP area. It occurred as two polygons mapped as part of non-remnant vegetation. The nearest occurrence of this RE in the certified mapping layer is 3.5 km west of these polygons, across Alpha Creek. It was dominated by Dallachy's Gum with Clarkson's Gum and occasional Silver-leaved Ironbark. The low tree layer was dominated by Dead Finish, White Cypress Pine and Wilga. The understorey was dominated by patches of Blackberry. Much of the ground layer contained the exotic perennial Buffel Grass, but other common grasses included Kangaroo Grass and Purple Wiregrass.

#### Number of Instances

There were two instances of this RE in the mine survey area, both dominant, and mapped in areas that were designated non-remnant under certified RE mapping. This RE also occurred in a few small patches in the infrastructure corridor, as a subdominant RE in a mosaic polygon.

#### Location(s)

The RE occurred in far central east of the mine survey area (mapped as nonremnant in certified RE mapping), and as a subdominant component of mosaics within the infrastructure corridor. A total of 85.59 ha were contained within the SGCP area.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in moderate to poor ecological condition with Buffel Grass in the ground layer as well as clumps of Harrisia Cactus. Protected areas of this RE occur at Nairana NP (Recovery) and Nairana NP.

#### Areas within Impact Zones

No areas of this RE are proposed to be disturbed.



**Plate 17**      **Dallachy's Gum (*Corymbia dallachiana*) in the foreground of an area of RE 11.5.12, Creek Farm**

1.1.1.4      *Land Zone 7*

1.1.1.4.1      *Regional Ecosystem 10.7.3a*

Description

This RE was dominated by Bendee, forming a low woodland, and sometimes with emergent Mountain Yapunyah. Bitter Bark (*Alstonia constricta*) was occasional. Spiny Potato Bush (*Solanum ferocissimum*) was an occasional shrub. Sandstone Panic (*Cleistochloa subjuncea*) and sometimes Gummy Spinifex were common in the ground layer. Small Mulga Grass (*Thyridolepis xerophila*) was very common in shaded areas.

Location(s)

This vegetation type is associated with a jump up in the central portion of the Sapling property, in the mine survey area. Approximately 66 ha were present.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in good ecological condition, with few impacts from grazing. Instances of this RE outside the SGCP area are known to contain the near threatened tree Western Rosewood and the vulnerable shrub Round-leaved Heath Myrtle (*Micromyrtus rotundifolia*). It is considered likely that this RE within the SGCP area contains Round-leaved Heath Myrtle. Protected areas of this RE occur at White Mountains NP, Cudmore NP, Cudmore RR, White Mountains RR, Dalrymple NP and Moorrinya NP.

Areas within Impact Zones

Approximately 14 ha of this RE is proposed to be cleared in the mine survey area, primarily to accommodate a sediment dam.





**Plate 18**      **The Bendee (*Acacia catenulata*)-dominated 10.7.3a often featured a large amount of woody debris in the ground layer**

*1.1.1.4.2      Regional Ecosystem 10.7.3b*

Description

This vegetation community was dominated by Lancewood (*Acacia shirleyi*) and occasionally featured Shiny-leaved Bloodwood (*Corymbia lamprophylla*). Bitter Bark was occasionally present. Small-leaved Canthium (*Everistia vacciniifolia*) was dominant in the shrub layer, particularly in the western portion of the mine survey area. Cocaine Trees occasionally occurred as a scattered shrub in this layer. Sandstone Panic and occasionally Gummy Spinifex were common in the ground layer. Small Mulga Grass was very common in shaded areas.

Location(s)

This RE was scattered across the Desert Uplands bioregion section of the SGCP area (total of 133.48 ha). Its Brigalow Belt bioregional equivalent (RE 11.7.2), however, was much more widespread, particularly in the west of the mine survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in good ecological condition, with few impacts from grazing. Areas of this RE outside the SGCP area are known to contain the near threatened Western Rosewood and the vulnerable Round-leaved Heath Myrtle. It is likely that within the SGCP this RE contains Round-leaved Heath Myrtle. Protected areas of this RE occur at White Mountains NP, Cudmore NP, Cudmore RR, White Mountains RR, Dalrymple NP and Moorrinya NP.

Areas within Impact Zones

Approximately 3 ha of this RE is proposed to be cleared in the SGCP area to accommodate the mine and infrastructure corridor. An additional 5.53 ha is present above proposed longwall mining.



**Plate 19** Bare areas of lateritic rock sometimes covered with a thin layer of fine clay were sometimes present in the Lancewood (*Acacia shirleyi*)-dominated RE 10.7.3b

1.1.1.4.3 Regional Ecosystem 10.7.3d

Description

This RE was previously unmapped for the SGCP area and occurred in a homogeneous polygon mapped as RE 11.3.1 in the certified RE dataset. The vegetation type occurred on red skeletal soils overlaying ferricrete, on the margins of a Tertiary plateau. The canopy was dominated almost entirely by Bendee, with occasional instances of Poplar Box. Whiteflower Kurrajong, Medicine Bark (*Ventilago viminalis*), Beef Oak (*Grevillea striata*) and Colane were rare canopy species. The mid-storey was very sparse, with scattered individuals of Budda, Whitewood and Breynia. The grassy ground layer was very sparse. The main grasses were Many-headed Wiregrass (*Aristida caput-medusae*), Feathertop Wiregrass (*Aristida latifolia*) and Sandstone Panic. The dominant herb was Hill Hibiscus (*Hibiscus sturtii*). This was the only RE in which the environmental weed Carrion Flower (*Stapelia gigantea*) was observed.

This unit is not described in the REDD, but corresponds most closely to 10.7.3d Lancewood woodland on shallow red earths over ferricrete. No RE designation for this Bendee unit has ever been prescribed, probably because of the difficulty of consistently mapping it from aerial photography. It is more common in the Brigalow Belt South bioregion, where it could be confused with Mulga (*Acacia aneura*) in aerial photography.

Location(s)

There was 34.59 ha of this RE in the central northern portion of the Sapling property.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in moderate condition with heavy grazing and a minor infestation of Carrion Flower. Protected areas of this RE occur at White Mountains NP, Cudmore NP, Cudmore RR, White Mountains RR, Dalrymple NP and Moorrinya NP.

Areas within Impact Zones

This vegetation community is not proposed to be disturbed.





**Plate 20**      **The Bende (Acacia catenulata)-dominated vegetation unit most closely corresponding to RE 10.7.3d.**

*1.1.1.4.4      Regional Ecosystem Vegetation Community 10.7.5*

Description

This RE was dominated by Mountain Yapunyah, forming a distinct but discontinuous canopy. Bende or Lancewood were sometimes frequent. A shrub layer was generally absent, but the ground layer was usually covered in a large amount of fallen logs and debris. Sandstone Panic and sometimes Gummy Spinifex were common in the ground layer. It occurred on scarps of Cainozoic ferricrete.

Location(s)

This vegetation type is associated with a jump up in the central portion of the Sapling property, where 7.02 ha occur.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in good ecological condition, with few impacts from grazing. Protected areas of this RE occur at Cudmore NP, Cudmore RR and Moorrinya NP.

Areas within impact zones

This RE is not proposed to be disturbed.



**Plate 21** Mountain Yapunyah (*Eucalyptus thozetiana*) in the foreground within RE 10.7.5.

*1.1.1.4.5 Regional Ecosystem Vegetation Community 10.7.7a*

Description

This RE was previously unmapped for the SGCP area, with the nearest record being 29 km to the south-west. It was dominated by Broom Honey Myrtle (*Melaleuca uncinata*), and therefore constitutes sub-unit 4 of this RE vegetation unit. Emerging above the dense 1–4 m high Broom Honey Myrtle shrubs were occasional Bendee and Silver-leaved Ironbark (an influence of the dominant species of the adjacent REs 10.7.3a and 10.5.5, respectively). Clumps of Bushhouse Paperbark and Baker's Mallee (*Eucalyptus bakeri*) were occasional. The threatened shrub Round-leaved Heath Myrtle was present, with the densest concentration of the population occurring at the ecotone between this community and the adjacent RE 10.7.7b. The ground layer was moderate to sparse due to the dense shrubs, but was dominated by Gummy Spinifex and Buck Spinifex (*Triodia mitchellii*). Other grasses included Native Millet and Silky Oilgrass. A common herb was Cheel's Rosemary (*Westringia cheelii*). The community occurred on ferricrete.

Location(s)

This RE was most common in the southern end of the infrastructure corridor survey area (89.23 ha). It was also found in one locality in the east of the mine survey area (in the north of the Sapling property) in association with RE 10.7.7b (3.18 ha).

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in excellent ecological condition, but was restricted in size and adjacent to non-remnant vegetation along its northern border. This RE contained Round-leaved Heath Myrtle in the mine survey area, a shrub listed as 'vulnerable' under the NC Act. Based on available knowledge, this RE reaches the south-eastern limit of its distribution within the SGCP area. Protected areas of this RE occur at Cudmore NP, White Mountains NP, Cudmore RR and White Mountains RR.

Areas within Impact Zones

Approximately 6 ha of this RE will be cleared for the infrastructure corridor.





**Plate 22**      **Broom Honey Myrtle (*Melaleuca uncinata*) dominated RE 10.7.7a on the Sapling property.**

*1.1.1.4.6      Regional Ecosystem Vegetation Community 10.7.7b*

Description

This RE was previously unmapped for the SGCP area, with the nearest record being 27 km to the north-west. It was recorded in a number of locations within the SGCP area. It was dominated by Bushhouse Paperbark, forming a tall open shrubland. RE 10.7.7b often occurred in association with 10.5.5a (as it commonly does across its distribution), and Silver-leaved Ironbark was occasionally present within it, often as dead or senescent 'stags' on the margin. RE 10.7.7b within the SGCP area was unusual in having occasional emergent Whiteflower Kurrajong. A low shrub layer was mostly absent but there were occasional Olive-leaved Canthium (*Psydrax oleifolia*) and Shiny-leaved Canthium (*Psydrax odorata*). The ground layer was usually dominated by Buck Spinifex (**Plate 7-20**). The largest polygon, in the east of the mine survey area, is unusual in that it was dominated by Kangaroo Grass. In this area, the herb Common Everlasting (*Chrysocephalum apiculatum*) was also a major component of the ground layer.

All instances of this RE lie close to the boundary between the Desert Uplands and Brigalow Belt bioregions. As most instances of the RE are further north in the Jericho bioregional subregion, it may be that this community has affiliations with RE 11.5.10, a Brigalow Belt RE, which corresponds to the Desert Upland's RE 10.7.7b. Queensland Herbarium's RE review process has not yet resolved this difference. Instances of RE 11.5.10 occur 45 km to the south-west of the SGCP area.

Number of Instances

In the mine survey area there were five instances in of this RE, four homogenous polygons and one within a mosaic containing the 10.7.7a unit. One instance of this RE occurred in the infrastructure corridor area, as a subdominant RE in a mosaic polygon

Location(s)

This RE had a scattered distribution, mostly within the Sapling property. The largest tracts were in the remnants in the central and western parts of the Sapling property in the mine survey area. 108.93 ha was present within the mine survey area, and 1.15 ha was present in the infrastructure corridor survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE contained Round-leaved Heath Myrtle in the mine survey area, a shrub listed as vulnerable under the NC Act. Protected areas of this RE occur at Cudmore NP, White Mountains NP, Cudmore RR and White Mountains RR.

Areas within Impact Zones

0.10 ha of this RE are proposed to be cleared for the infrastructure corridor and 32.91 ha overlies a proposed longwall in the mine survey area.



**Plate 23**      **RE 10.7.7b—Bushhouse Paperbark (*Melaleuca tamariscina*)-dominated tall open shrubland**

*1.1.1.4.7      Regional Ecosystem 11.7.1*

Description

RE 11.7.1 is the bioregional equivalent of RE 10.7.5. Within the mine survey area, this RE was dominated by Mountain Yapunyah, forming a distinct but discontinuous canopy. Bendee or Lancewood was sometimes frequent. A shrub layer was generally absent, but the ground layer was usually covered in a large amount of fallen logs and debris. Sandstone Panic and sometimes Gummy Spinifex were common in the ground layer. It occurred on scarps of Cainozoic ferricrete.

Within the infrastructure corridor survey area (on the property Tressilian), this RE was dominated by Dawson Gum with Brigalow on the deeper soils of the lower slopes. The moderately sparse shrub layer included False Sandalwood and Blackberry. The ground layer was dominated by Kangaroo Grass and Black Spear Grass with occasional Soft Spinifex.

Location(s)

This RE was restricted to the Brigalow Belt portions of the mine survey area (113.97 ha, primarily in the west), with 18.61 ha occurring within the infrastructure corridor survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in good ecological condition, with few impacts from grazing. Protected areas of this RE occur at Juneë NP, Narrien Range NP, Blackwood NP, Blackdown Tableland NP and Chesterton Range NP.

#### Areas within Impact Zones

Approximately 6 ha of this RE will potentially be impacted by underground longwall mining.



**Plate 24**      **RE 11.7.1— Dawson Gum (*Eucalyptus cambageana*) with Brigalow (*Acacia harpophylla*) on the deeper soils of the lower slopes of the scarp**

1.1.1.4.8      *Regional Ecosystem 11.7.2*

#### Description

RE 11.7.2 is the bioregional equivalent of 10.7.3b. This vegetation community was dominated by Lancewood and occasionally featured Shiny-leaved Bloodwood. Bitter Bark was occasionally present. Small-leaved Canthium was dominant in the shrub layer, particularly in the western portion of the SGCP area. Cocaine Trees occasionally occurred as a scattered shrub in this layer. Sandstone Panic and sometimes Gummy Spinifex were common in the ground later. Small Mulga Grass was very common in shaded areas.

#### Location(s)

This RE was widespread in the Brigalow Belt portions of the mine survey area (in the west), where it occupied 594.84 ha. It was absent in the infrastructure corridor survey area.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was in good ecological condition, with few impacts from grazing. Outside the SGCP area this RE supports the near threatened tree Western Rosewood and the vulnerable shrub Round-leaved Heath Myrtle. It is considered likely that these species may occur in this RE within the SGCP area. Protected areas of this RE 11.7.2 occur at Taunton NP (S), Junee NP, Blackdown Tableland NP, Narrien Range NP, Goodedulla NP and Blackwood NP.

#### Areas within Impact Zones

Approximately 2.5 ha of this RE are proposed to be cleared in the mine survey area and 42.92 ha overlie proposed underground longwall panels.





**Plate 25** RE 11.7.2, in which Lancewood (*Acacia shirleyi*) is a frequent low tree, on a bluff overlooking non-remnant vegetation on Betanga

Land Zone 10

1.1.1.4.9 Regional Ecosystem 11.10.4

#### Description

Gum Top Ironbark (*Eucalyptus decorticans*) predominated in this RE, forming pure stands with a discontinuous canopy. Bare, treeless areas were common. Lancewood was a very frequent tall shrub or low tree. Wild Orange (*Capparis canescens*) was infrequent. A low shrub layer was absent. The ground layer was very sparse to open, with large areas of bare rocky ground. *Aristida* spp. occurred in sparse clumps. This RE occurred on crests, scarps and upper slopes of ranges formed from medium to coarse-grained sediments with shallow soils.

#### Location(s)

This RE dominated much of the sandstone hills occurring in the west of the mine survey area. These were connected to continuous tracts of vegetation outside the SGCP area.

#### Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This community's rugged terrain afforded it protection from grazing and fragmentation, and was thus largely undisturbed. Outside the SGCP area, RE 11.10.4 is recorded habitat for the near threatened Western Rosewood. Protected areas of this RE occur at Carnarvon NP, Expedition (Limited Depth) NP, Palmgrove NP (S), Nuga Nuga NP, Chesterton Range NP, Kroombit Tops NP, Minerva Hills NP and MacKenzie Island CP.

#### Areas within Impact Zones

None of this RE is proposed to be impacted by surface disturbance. However, 25.83ha may be impacted by subsidence from longwall mining.





**Plate 26** Gum Top Ironbark (*Eucalyptus decorticans*) above Lancewood (*Acacia shirleyi*), RE 11.10.4, on Betanga's border with Armagh

*1.1.1.4.10 Regional Ecosystem 11.10.7*

Description

This RE was dominated by Narrow-leaved Ironbark, forming a distinct but open canopy. A low tree to tall shrub layer was usually dominated by Pretty Wattle, or a range of species including Golden Parrot Tree (*Grevillea pteridifolia*). A low shrub layer comprised a range of species including threaded Bitter Pea (*Daviesia filipes*). The ground layer was dominated mainly by *Aristida* spp and featured occasional herbs such as Sticky Everlasting (*Coronidium glutinosum*).

Location(s)

The RE occurred on relatively low areas within the sandstone range that dominated the western portion of the mine survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was unfragmented and in good ecological condition. Protected areas of this RE occur at Chesterton Range NP, Precipice NP, Carnarvon NP, Isla Gorge NP, Snake Range NP, Tooloombah Creek NP, Palmgrove NP(S) and Cania Gorge NP.

Areas within Impact Zones

Approximately 26 ha of this vegetation community will be potentially impacted by subsidence caused by longwall mining.



**Plate 27** RE 11.10.7 featuring a knoll of sandstone with Narrow-leaved Ironbark (*Eucalyptus crebra*)

*1.1.1.4.11 Regional Ecosystem Vegetation Community 11.10.13b*

Description

This RE was dominated by Rusty Jacket, with a highly variable low tree and shrub layer. RE 11.10.13b shared similarities with RE 10.5.10 but occurred on coarse-grained sediments rather than sands. It occurred on the lower sections of sandstone scarps.

Location(s)

RE 11.10.7 occurred in the south-west portion of the mine survey area.

Ecological Condition, Threatened and Near Threatened Species and Ecological Significance

This RE was unfragmented and in good ecological condition. Instances of this RE outside the SGCP area are known to contain the near threatened tree western rosewood. Protected areas of this RE occur at Expedition (Limited Depth) NP, Carnarvon NP, Blackdown Tableland NP, Palmgrove NP (S), Precipice NP, Isla Gorge NP, Snake Range NP and Expedition RR.

Areas within impact zones

Approximately 34 ha of this vegetation community may be impacted by subsidence caused by longwall mining.

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## High Value Regrowth Communities

### 1.1.1.5 *Land Zone 3*

#### 1.1.1.5.1 *Regrowth of Regional Ecosystem 11.3.1*

In the western portion of the mine survey area, 18.8 ha of homogenous regrowth RE 11.3.1 occurred. It was dominated by Brigalow (mostly 3–7 m tall) and had scattered shrubs such as Bauhinia and Desert Lime. Part of one of the areas is mapped as High Value Regrowth (HVR) in the official DERM dataset.

#### 1.1.1.5.2 *Regrowth of Regional Ecosystem 11.3.2*

Two areas of regrowth RE 11.3.2 occurred near Dead Horse Creek on the Chesalon property in the mine survey area. They were dominated by thinned Poplar Box trees and some small White Cypress Pine. Both areas are mapped as HVR in the official DERM dataset.

#### 1.1.1.5.3 *Regrowth Mosaics of Regional Ecosystems 11.3.2/11.3.1/11.3.7*

These mosaics occurred in the far south of the mine survey area on the Chesalon property and consisted of both thinned and resprouting open woodland variously dominated by Dallachy's Gum, Poplar Box and Brigalow. These regrowth areas are not mapped as HVR in the official DERM dataset.

### 1.1.1.6 *Land Eone 5*

#### 1.1.1.6.1 *Regrowth of Regional Ecosystem 10.5.1b*

This community occurred on yellow sands either side of the northern road into the Creek Farm property. It contained a mix of species typical of RE 10.5.1b but was clearly regrowth. This area is not mapped as HVR in the official DERM dataset.

#### 1.1.1.6.2 *Regrowth Mosaics of Regional Ecosystems 11.5.3/10.5.5a/11.3.1*

These mosaics occurred in the western portion of the mine survey area, along a creek line. They contained marginal vegetation containing Poplar Box, Silver-leaved Ironbark, and occasionally Brigalow. This area is not mapped as HVR in the official DERM dataset.

#### 1.1.1.6.3 *Regrowth Mosaics of Regional Ecosystems RE 11.5.12/11.5.5*

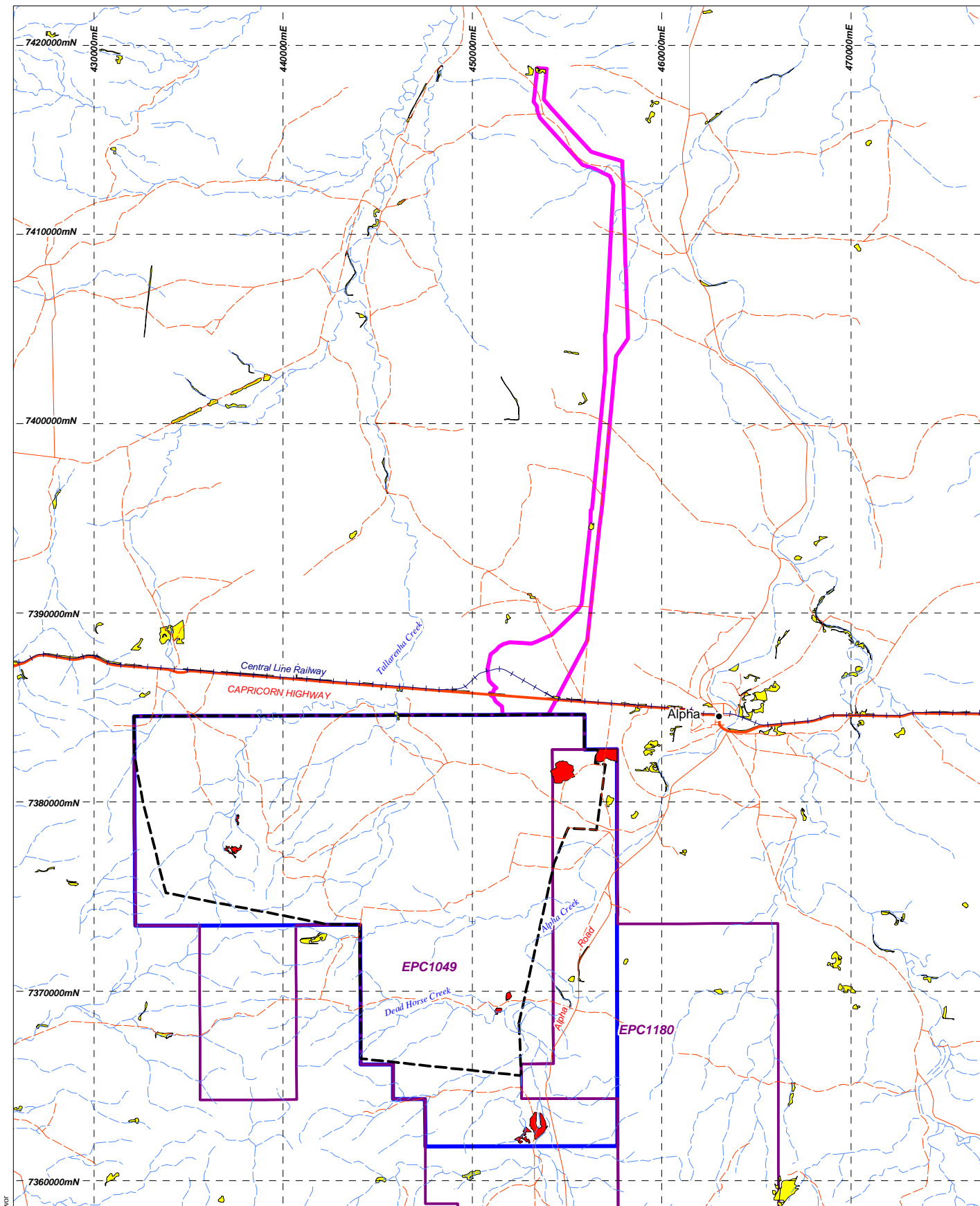
A 105.5 ha area of advanced to moderately advanced regrowth RE 11.5.12/11.5.5 occurred in the Creek Farm property. It consisted mostly of a monospecific stand of Dallachy's Gum and with a grassy understorey of Purple Wiregrass and Weeping Lovegrass (*Eragrostis parviflora*). Areas on the southern margin contained Silver-leaved Ironbark. This area is mapped as remnant vegetation in the official DERM dataset. A structural assessment showed that predominant canopy cover was more than 50% of analogue undisturbed cover, but did not average more than 70% of the vegetation's undisturbed height. As a result, it does not fulfil the DERM criteria of remnant vegetation.




**Plate 28**      **A moderately advanced regrowth area of Dallachy's Gum (*Corymbia dallachiana*) within a regrowth mosaic of REs 11.5.12 and 11.5.5, Creek Farm**

No high value re-growth occurred in the infrastructure corridor survey area, however two very small patches in the south and north of the infrastructure corridor area were previously mapped as occurring in the DERM dataset (**Figure 1**).





 <p><b>METSERVE</b> Mining &amp; Energy Technical Services Pty Ltd</p> <p><b>SouthGalilee</b></p>	<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li>MLA70453</li> <li>Exploration tenement</li> <li>Mine Survey Area</li> <li>Infrastructure corridor survey area</li> <li>Principal road</li> <li>Road (sealed)</li> <li>Road (unsealed)</li> <li>Railway</li> <li>Stream</li> </ul>	<p><b>DERM</b></p> <ul style="list-style-type: none"> <li>High value regrowth</li> </ul> <p><b>FIELD VERIFIED</b></p> <ul style="list-style-type: none"> <li>High value regrowth</li> </ul>	<p><b>Alpha Coal Pty Ltd</b></p> <p><b>South Galilee Coal Project</b></p> <p><b>High Value Regrowth</b></p>		
	<p>Data Source: Tenement - EEDI. Topography (250k) - Geoscience Australia. HVR - DERM.</p>			<p>0 5 10</p> <p><b>Kilometres</b></p>	
				<p>18/11/2011</p> <p>Datum: GDA94 Projection: MGA55</p> <p><b>Figure F-1</b></p>	

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