







BHP Billiton Mitsubishi Alliance

# Caval Ridge Coal Mine Project

## EPBC Report





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# 1 Executive Summary

The Proponent, BHP Billiton Mitsubishi Alliance Coal Operations Pty Ltd (BMA), propose to develop a multi-seam open cut coal mine at Caval Ridge, located approximately 6 km south-west of Moranbah and approximately 160 km south-west of Mackay in Central Queensland. The Caval Ridge Coal Mine Project (the project) includes a new coal mine and coal handling and processing infrastructure to produce 8 million tonnes per annum (Mtpa) of hard coking coal for the export market over a life of approximately 30 years.

The project is the second element of the BMA Bowen Basin Coal Growth Project (BMA BBCGP) which involves the expansion and development of BMA's coal mining operations in the northern section of the Bowen Basin, near Moranbah in Central Queensland.

The Terms of Reference (ToR) for the Environmental Impact Statement (EIS) for the project requires a stand-alone report addressing the potential impact of the project on matters of national environmental significance (NES) as identified in the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and regulations. The report is required to exclusively and fully address the issues relevant to the controlling provisions in the EPBC Act. This report has been prepared to satisfy this requirement.

The Decision on Referral, issued by the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) on 22 September 2008 states that the action (i.e. the project) is likely to have a significant impact on matters of NES because it will involve the clearing of the EPBC-listed Brigalow and Natural Grassland Ecological Communities.

A desktop analysis and field surveys were completed to determine the known and likely suite of EPBC listed species and communities across the study area. The desktop analysis involved the collection and review of relevant database records, surveys and ecological literature with relevance to the study area. Field surveys were also completed in 2008 to supplement the results of previous surveys undertaken in the area.

The desktop analysis and field surveys found that no EPBC-listed plant species were recorded from the study area. Two Endangered Ecological Communities were confirmed as occurring in the study area: the Brigalow Ecological Community; and the Natural Grassland Ecological Community. Two fauna species of National NES have been recorded in the study area: the Southern Squatter Pigeon; and the Ornamental Snake. Four fauna species of NES have been identified as likely to occur in the project area: Australian painted snipe; greater long-eared bat; yakka skink; and brigalow scaly-foot.

The current status of the Brigalow and Natural Grassland Ecological Communities and the six fauna species of NES have been assessed with reference to potential impacts of the project.

The project has adopted the hierarchical approach of avoiding impacts on remnant vegetation in the first instance, minimising impacts on remnant vegetation where clearing is unavoidable and rehabilitating areas of remnant vegetation. It is considered that neither the Brigalow or Natural Grassland Ecological Communities, nor any of the six fauna species of NES are likely to suffer significant adverse impacts as a result of the proposed action.

## 2 Introduction

### 2.1 Background

The Proponent, BHP Billiton Mitsubishi Alliance Coal Operations Pty Ltd (BMA) propose to develop a multi-seam open cut coal mine at Caval Ridge, located approximately 6 km south-west of Moranbah and approximately 160 km south-west of Mackay in Central Queensland. The Caval Ridge Coal Mine Project (the project) includes the development and operation of a new coal mine and coal handling and processing infrastructure to produce 8 million tonnes per annum (Mtpa) of hard coking coal for the export market over a life of approximately 30 years. The project is the second element of the BMA Bowen Basin Coal Growth Project (BMA BBCGP) which involves the expansion and development of BMA's coal mining operations in the northern section of the Bowen Basin, near Moranbah in Central Queensland.

### 2.2 Statutory Context

On 4 July 2008, the Coordinator-General (CG) declared the project a 'significant project', for which an Environmental Impact Statement (EIS) is required pursuant to section 26(1)(a) of the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

The project was referred to the Commonwealth Minister for Department of Environment, Water, Heritage, and the Arts (DEWHA) in July 2008. BMA nominated the project as a "controlled action" under sections 18 and 18A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on the basis of its potential impact on matters of national environmental significance (NES), namely listed species and communities. On 22 September 2008, the DEWHA determined the project to be a controlled action.

The Terms of Reference (ToR) for an EIS under part (4) of the SDPWO Act specifically requires a stand-alone report addressing potential impacts of the project on matters of NES. This report has been prepared to satisfy this requirement.

### 2.3 Information Required

A specific information request was not issued by the DEWHA prior to the preparation of this report. However, this report seeks to provide information recently requested from DEWHA in relation to other EIS projects in Queensland:

- A description of the Affected Environment Relevant to the Matters Protected. It is important that the current status of the matters protected under the EPBC Act be described in sufficient detail, to inform the analysis of the project's impact on these matters (refer Section 3).
- Assessment of Relevant Impacts and Mitigation Measures. In this section, the impacts and potential impacts on the matters protected should be described, and the possible mitigation measures for each impact need to be analysed. If alternative ways of taking the action have been identified, the relative impacts of these alternatives should also be considered. When effective mitigation measures are not available, the discussion should be broadened to include compensatory measures to offset unavoidable impacts (refer Section 4).
- Potential Significant Impacts on Matters of National Environmental Significance (refer Section 2.3 and Section 4).



## 3 Description of the Existing Environment

The project is situated predominantly on granted Mining Lease (ML) 1775 at Peak Downs. Out of pit spoil dumps will be created to the west of the mining area on an area subject to a Mining Lease Application (MLA 70403). These areas are collectively referred to as the project site. The “Study Area” for the desktop and field surveys included the project site and its vicinity.

### 3.1 Methodology

#### 3.1.1 Desktop Analysis

A desktop analysis was completed to determine the known and likely suite of EPBC- listed threatened species and ecological communities occurring across the study area. The data sources used in this review included:

- Results of previous flora and fauna surveys undertaken in the vicinity of the study area by Ecoserve (2005a and b, 2006a to h), Emmerton and Elsol (2007), GHD (2004), and WBM (1996, 1998 and 1999);
- The Queensland Environmental Protection Agency (EPA) and Queensland Parks and Wildlife Service (QPWS) for details concerning regional ecosystems (RE's), and flora and fauna of conservation significance;
- Records published in scientific journals, reports and general flora and fauna distribution texts;
- Results of local environmental studies, including studies prepared by consultants, government authorities, biological organisations, universities and other sources; and
- Other relevant databases including the Queensland Herbarium and Birds Australia Atlas of Australian Birds.

#### 3.1.2 Field Surveys

It should be noted that the areas associated with this project, to be cleared on ML 1775 would be cleared as the Peak Downs Mine continues its operation at its current rate. The Caval Ridge Mine brings this clearing forward in clearing and disturbance.

The clearing, disturbance and mining activities proposed as part of the Caval Ridge Mine would occur under normal mining associated with the Peak Downs Mine, albeit deferred for a period of time.

Furthermore the clearing will occur on the land subject to an existing mining lease (ML 1775), on which all but small areas have the necessary Surface Area Approvals under the Mineral Resources Act 1989. Finally, ML 1775 in its entirety is the subject of an Environmental Authority granted pursuant to the Environmental Protection Act 1994 for the carrying out of mining activities.

Despite these approvals being in place, a full assessment of the environmental impacts on flora and fauna values of the site has been completed.

### Terrestrial Flora

Several field surveys have been conducted on, or in the vicinity of the study area and the results are presented and discussed in this report. Ecoserve conducted two surveys in 2005 and 2006, and a further survey in 2007. Emmerton and Elsol also conducted a survey in 2007. Results of these surveys provide useful background information on the flora and fauna assemblages present in the locality of the study area.

## Terrestrial Fauna

Several fauna surveys have been undertaken by Ecoserve in the vicinity of the study area. Two surveys were conducted in 2005, seven conducted in 2006, and one in 2007. GHD completed a survey in 2004, and WBM undertook surveys in 1996 and 1998. Results from these surveys have been considered in describing the existing fauna values of the study area.

## 3.2 Results

### 3.2.1 Terrestrial Flora

Desktop analysis identified the potential occurrence of two EPBC-listed flora species in the study area:

- *Dichanthium queenslandicum* (king blue-grass), identified as Vulnerable under the EPBC Act; and
- *Digitaria porrecta* (finger panic grass), identified as Endangered under the EPBC Act.

A previous ecological assessment undertaken for the Peak Downs mining lease (including southern sections of the current study area) by Ecoserve and LAMR in 2005 also indicated that, although not recorded during surveys, king blue-grass and Queensland blue-grass (*Dichanthium setosum*, identified as Vulnerable under the EPBC Act) both have a “reasonable probability of occurrence on the site in either Regional Ecosystems 11.8.5 or 11.8.11.”

Field surveys failed to locate any significant flora species on or within the vicinity of the study area.

The field surveys identified that the occurrence of vegetation communities in the study area differed from the current Queensland Department of Natural Resources and Water (DNRW) certified RE mapping for the area. Of particular note was the absence of RE 11.4.9 (south of Cherwell Creek) and RE 11.9.5 from the RE mapping. Table 3.1 lists the observed REs on the study area and highlights those REs which were found to be absent. Mapped REs are presented on Figure 3.1.

**Table 3.1 Observed Regional Ecosystems on the Study Area**

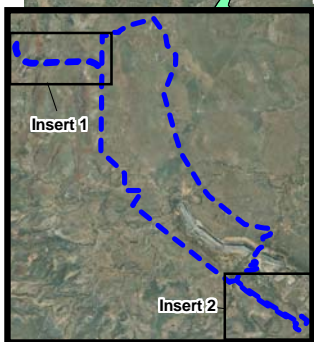
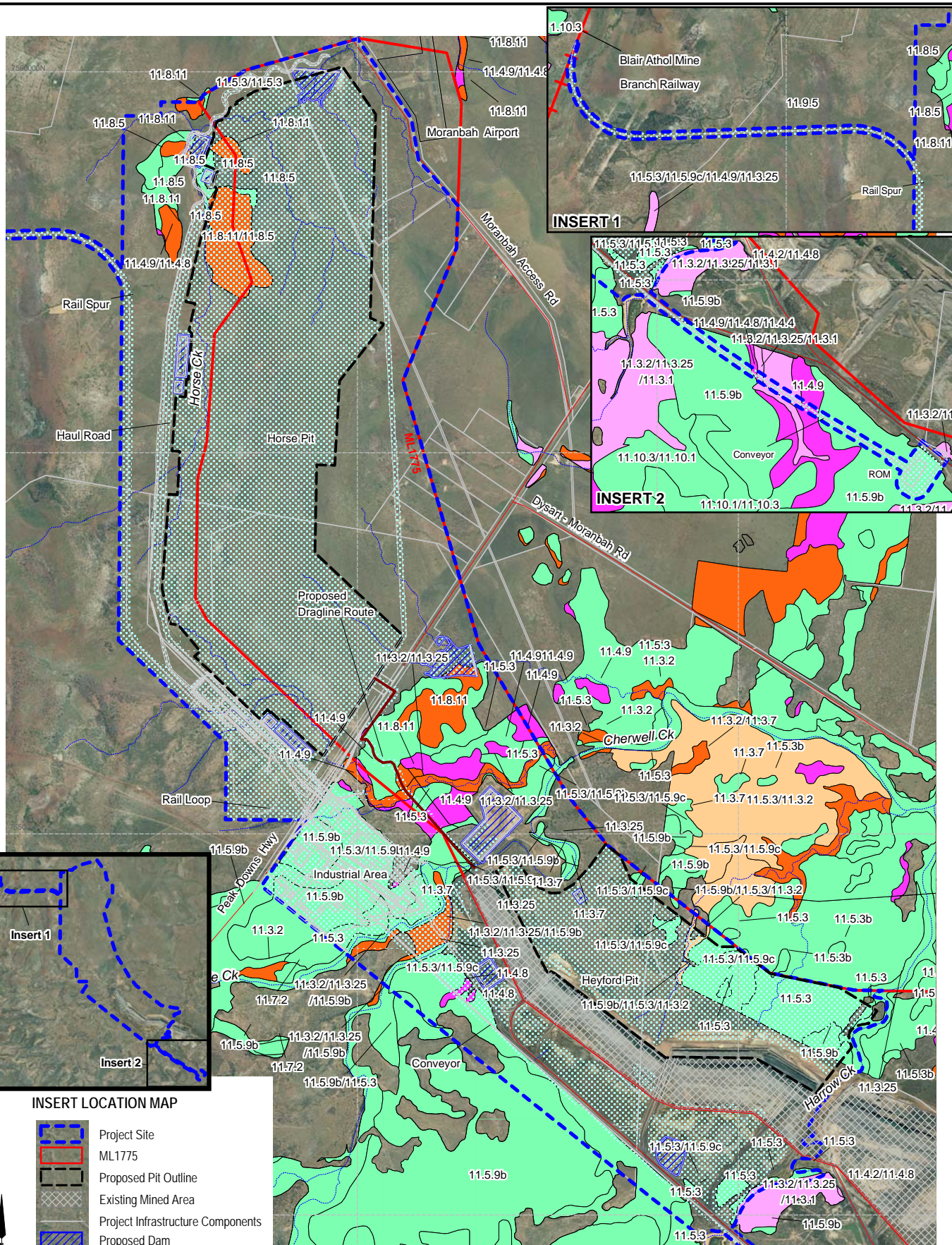
RE Code	Description	VM Act <sup>1</sup> status	EPBC Act <sup>2</sup> Status	Occurrence in Study Area
11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> on alluvial plains	Endangered	Endangered	Absent
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains.	Of Concern	N/A	Present
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	Not Of Concern	N/A	Present
11.3.7	<i>Corymbia</i> spp. woodland on alluvial plains sandy soils	Not Of Concern	N/A	Absent
11.4.2	<i>Eucalyptus</i> spp. and/or <i>Corymbia</i> spp. grassy or shrubby woodland on Cainozoic clay plains	Of Concern	N/A	Present
11.4.4	<i>Dichanthium</i> spp., <i>Astrelba</i> spp. grassland on Cainozoic clay plains	Not of Concern	Endangered	Absent
11.4.8	<i>Eucalyptus cambageana</i> woodland to open forest with <i>Acacia harpophylla</i> or <i>A. argyrodendron</i> on Cainozoic clay plains	Endangered	Endangered	Present
11.4.9	<i>Acacia harpophylla</i> shrubby open forest to woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	Endangered	Endangered	Present
11.5.3	<i>Eucalyptus populnea</i> and/or <i>E. melanophloia</i> and/or <i>Corymbia clarksoniana</i> on Cainozoic sand plains/remnant surfaces	Not Of Concern	N/A	Present
11.5.9	<i>Eucalyptus crebra</i> and other <i>Eucalyptus</i> spp. and <i>Corymbia</i> spp. woodland on Cainozoic sand plains/remnant surfaces	Not Of Concern	N/A	Present
11.8.5	<i>Eucalyptus orgadophila</i> open woodland on Cainozoic igneous rocks	Not of Concern	N/A	Present
11.8.11	<i>Dichanthium sericeum</i> grassland on Cainozoic igneous rocks	Of Concern	Endangered	Present
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest to woodland on fine grained sedimentary rock.	Endangered	Endangered	Present

<sup>1</sup> Vegetation Management Act 1999

<sup>2</sup> Environment Protection and Biodiversity Conservation Act 1999

N/A – Not applicable





INSERT LOCATION MAP

- Project Site
- ML1775
- Proposed Pit Outline
- Existing Mined Area
- Project Infrastructure Components
- Proposed Dam



0 1 2km  
Scale

Datum: AGD84, AMG Zone 55

Source: Qld. Herbarium, EPA - Pre-clearing Vegetation Communities Ecosystems Queensland, Version 5.0 (Dec 2005, amended Aug. 2008); BAAM, Sept 2008

- RE Dominant - "Not of Concern"
- RE Subdominant - "Of Concern"
- RE Dominant - "Of Concern"
- RE Subdominant - "Endangered"
- RE Dominant - "Endangered"

Client



Project

CAVAL RIDGE PROJECT  
EPBC MATTERS REPORT

Title

CURRENT NRW CERTIFIED  
REGIONAL ECOSYSTEM MAP  
FOR THE PROJECT SITE

Drawn: VH

Approved: CB

Date: 31-03-2009

Job No: 4262 6158

File No: 42626158-g-494.wor

Figure: 3.1

Rev:A

A4

### 3.2.2 Terrestrial Fauna

A total of 289 native fauna species have been recorded from the locality of the project during field surveys in 2008 and previous surveys undertaken on the adjacent Peak Downs mining lease (including southern sections of the current study area). The ground survey by BAAM in 2008 recorded a total of 153 terrestrial vertebrate species from the study area or nearby, including 20 species of mammal, 113 birds, 10 reptiles and 10 amphibians. An additional 136 terrestrial vertebrate species were also identified in previous surveys, resulting in an overall total of 289 terrestrial vertebrate species for the study area and surrounds.

Two nationally threatened terrestrial fauna species were recorded within the vicinity of the study area during the current and previous surveys:

- *Denisonia maculata* (ornamental snake), identified as Vulnerable under the EPBC Act; and
- *Geophaps scripta scripta* (the southern subspecies of the Squatter Pigeon), identified as Vulnerable under the EPBC Act.

Two ornamental snakes were recorded on the adjacent Peak Downs Mine during a nocturnal search as part of a previous fauna survey. The location included known habitat characteristics for this species of inundated gilgais and Brigalow on deep-cracking clays. Targeted searches failed to locate any more individuals or suitable habitat (Ecoserve and LAMR 2005). An area of Brigalow possibly suitable for this species based on substrate and proximity to a creekline was identified during the winter 2008 survey (BAAM 2008). This area is outside of that proposed to be disturbed and, as only part of the patch has substrate suitable for ornamental snake, may be insufficient in size to maintain a population.

During the recent 2008 surveys squatter pigeons were observed on a number of occasions, usually as single individuals and never more than three individuals, though two pairs were recorded in very close proximity. Most observations were at the same location, near a creek, and may have been of the same individual. All individuals were observed in areas of active grazing and substantial habitat degradation and their occurrence may reflect the nearby presence of water rather than food resources, or be simply a result of increased visibility improving the likelihood of detection.

### 3.3 Occurrence of Matters of National Environmental Significance

#### 3.3.1 Relevant Controlling Provisions

The potential impact of the project on matters of NES (as defined in the EPBC Act and regulations) is assessed by the Commonwealth Government under the Bilateral Agreement and in accordance with the Queensland environmental impact assessment process. The seven matters of NES as they relate to the project and its location are described in Table 3.2.

**Table 3.2 Matters of National Environmental Significance as Relating to the Project**

Matter of NES	Relevance to the Project
World Heritage Properties	There are no World Heritage Properties within the study area.
National Heritage Places	There are no National Heritage places within the study area.
Wetlands of International Importance (Ramsar wetlands)	There are no listed Ramsar wetlands located within close proximity to the study area.
Threatened Ecological Communities	Two listed Threatened Ecological Communities are found within the study area: Brigalow ( <i>Acacia harpophylla</i> ) dominated and co-dominated community (REs 11.4.8, 11.4.9 and 11.9.5); and Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin (RE 11.8.11).

Matter of NES	Relevance to the Project
Listed Threatened Species	No EPBC-listed threatened flora species have been identified in the study area. Two EPBC-listed threatened fauna species (southern squatter pigeon and ornamental snake) have been identified in the vicinity of the study area.
Migratory Species	Fourteen listed migratory species have been identified on the study area including (but not restricted to) the great egret ( <i>Ardea alba</i> ), rainbow bee-eater ( <i>Merops ornatus</i> ), caspian tern ( <i>Sterna caspia</i> ) and the Australian reed-warbler ( <i>Acrocephalus australis</i> ). These species are relatively common and widespread across the regional landscape.
Commonwealth Marine Areas	There are no Commonwealth Marine Areas located in the vicinity of the study area.
Commonwealth Lands and Heritage Places	There are no Commonwealth lands or heritage places located within the study area.
Places on the Register of the National Estate (RNE)	There are no places listed on the RNE located within the study area.
State and Territory Reserves	There are no State or Territory Reserves within the study area.
Nuclear Action	The project does not involve any nuclear actions.

### 3.3.2 Threatened Ecological Communities

Three RE's mapped within the study area represent the Brigalow Ecological Community, listed as an Endangered Ecological Community (EEC) under the EPBC Act. The RE's are:

- RE 11.4.8 - Brigalow (*Acacia harpophylla* Dominant and Co-dominant) Community;
- RE 11.4.9 – Brigalow (*Acacia harpophylla*) and Yellowwood (*Terminalia oblongata*) woodland; and
- RE 11.9.5 - Brigalow (*Acacia harpophylla* Dominant and Co-dominant) Community.

As discussed previously, REs 11.3.1 and 11.4.4 were not observed to occur on the study area.

The Brigalow EEC occurs within the study area in several locations although they are generally clustered within the central portion of the site, south of the Peak Downs Highway, and at two locations traversed by the proposed conveyor along the southern boundary (Figure 3.1). This EEC is represented by areas mapped as REs 11.4.8, 11.4.9 and 11.9.5 (Figure 3.1). Stands of Brigalow within the study area are generally in poor condition, with evidence of dieback and a high level of invasion by buffel grass (*Cenchrus ciliaris*). Recruitment of native species has generally been suppressed in the mid and ground strata by the high abundance of buffel grass.

The Natural Grassland Ecological Community, listed as an EEC under the EPBC Act, is mapped within the study area as RE 11.8.11 – Bluegrass (*Dichanthium sericeum*) grassland on Cainozoic igneous rocks. This EEC occurs within the far northern portion of the study area (Figure 3.1). *Dichanthium spp.* grasslands within the study area are generally in poor condition and have been invaded by exotic species such as buffel grass (*Pennisetum ciliare*) and parthenium (*Parthenium hysterophorus*) which have suppressed recruitment of native grass and forb species. As discussed previously, RE 11.4.4 was not observed to occur on the study area.

### 3.3.3 Threatened Flora

Literature review, database searches and field surveys failed to locate any significant flora species on or near to the study area.



### 3.3.4 Threatened Fauna

The EPBC Act Protected Matters Search Tool indicates that nine threatened fauna species potentially occur in the study area. The assessment of the likely occurrence of each species is based on a comparison of the species preferred habitat against the habitat present within the study area and whether the species has been recorded in the area. The likelihood of occurrence of these species is discussed in Table 3.3 below.

**Table 3.3 Likelihood of Occurrence Fauna of National Environmental Significance**

Species Name	Common Name	Status <sup>1</sup>	Habitat	Likelihood of Occurrence
<b>Birds</b>				
<i>Erythrorhynchus radiatus</i>	Red goshawk	E(Q) V(A)	Red Goshawks occupy a range of habitats, often at ecotones, including coastal and sub-coastal tall open forest, tropical savannahs crossed by wooded or forested watercourses, woodlands, the edges of rainforest and gallery forests along watercourses, and wetlands that include Melaleuca and Casuarina species (EPA 2006a)	<b>Unlikely.</b> Depends on extensive tracts of productive forest and woodland.
<i>Geophaps scripta scripta</i>	Southern squatter pigeon	V(A) V(Q)	The squatter pigeon occurs mainly in grassy woodlands and open forests that are dominated by <i>Eucalyptus</i> spp.. It has also been recorded in sown grasslands with scattered remnant trees, disturbed habitats (Longmore 1976), in scrub (Baldwin 1975) and Acacia growth.	<b>Confirmed.</b> During the most recent ground survey, squatter pigeons were observed on a number of occasions, most near a creek. Also recorded during previous surveys on the study area and adjacent Peak Downs Mine.
<i>Neochmia ruficauda ruficauda</i>	Star finch (eastern)	E(A) E(Q)	The star finch inhabits tall grass and reed beds associated with swamps and watercourses. It may also be found in grassy woodlands, open forests and mangroves (EPA 2006b).	<b>Unlikely.</b> Habitat compromised by buffel grass. Species is thought to be locally extinct.
<i>Rostratula australis</i>	Australian painted snipe	V(A) R(Q)	Inhabits shallow vegetated wetlands, either freshwater or brackish, that are either permanently or temporarily filled in coastal or inland areas.	<b>May occur</b> on the study area at times, possibly years apart, including at One North Dam to the south of the study area.
<b>Mammals</b>				
<i>Nyctophilus timoriensis</i>	Eastern long-eared bat (south-eastern form)	V(A)	The species is found in the mallee, open savanna and Black box woodland. This species prefers semi-arid areas (Churchill 1998).	<b>May occur.</b> Sporadic use of the site by individuals possibly present in the local area cannot be discounted.
<b>Reptiles</b>				
<i>Egernia rugosa</i>	Yakka skink	V(A) V(Q)	Usually found in open dry sclerophyll forest or woodland (Cogger 2000). Occurs near the coast and in the sub-humid to semi-arid eastern interior of Qld, from the St. George area in the south to Cape York Peninsula (Cogger 2000).	<b>May occur.</b> Potential occurrence within small areas.

Species Name	Common Name	Status <sup>1</sup>	Habitat	Likelihood of Occurrence
<i>Erista allanae</i>	Allan's lerista, retro slider	E(A) E(Q)	This species is known from only three localities in Central Queensland: Clermont, 55 km north-east of Clermont and 30 km north-west of Capella (Covacevich et al. 1996b). Specimens were found below the soil surface in black soil under grass tussocks on farmland with the following broad habitat types: open grasslands, scattered gums, moderately heavy groves of Tea Trees and occasional Bottle Trees (Covacevich et al. 1996a). The species was not seen between 1967 and 1992 despite searches by hand and pit fall trapping (Couper and Ingram 1992) and is thought to be extinct (Wilson and Swan 2008).	<b>Unlikely.</b> Suitable habitat absent from the study area. Species thought to be extinct.
<i>Paradelma orientalis</i>	Brigalow scaly-foot	V(A) V(Q)	This species occurs in the area known as the Brigalow Belt, east of the Great Dividing Range in south-central Qld (Cogger et al. 1993).	<b>May occur.</b> Potential occurrence within a patch of Brigalow on a variety of substrates that retains areas of leaf litter and coarse woody debris.
<i>Rheodytes leukops</i>	Fitzroy tortoise	V(A)	This species is found only in the drainage system of the Fitzroy River, Qld (Cogger et al. 1993). This tortoise is found in rivers with large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles.	<b>Unlikely.</b> Suitable habitat absent from the study area.
<i>Denisonia maculata</i>	Ornamental snake	V(A) V(Q)	The species is found in woodlands and shrublands, such as Brigalow, and in riverine habitats, and lives in soil cracks and under fallen timber (Ehmann 1992; Wilson 2005; Wilson and Swan 2008).	<b>May occur.</b> Previously recorded on the adjacent Peak Downs Mine. Potential occurrence within an area of Brigalow.

<sup>1</sup> (A)- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: E = Endangered, V = Vulnerable, M = Migratory Species.

(Q)- Queensland's *Nature Conservation Act 1992*: E = Endangered, V = Vulnerable, R = Rare, S = Special Least Concern (Migratory), CS = Least Concern (Culturally Significant), C = Least Concern wildlife.

### 3.3.5 Migratory Species

The EPBC Act Protected Matters Search Tool listed 12 migratory bird species that may be found in the vicinity of the study area (refer Table 3.4). Many of these species migrate between the northern and southern hemispheres, to breed, over winter or complete other phases of their lifecycles. Six of these species were observed during field investigations. One further species is expected to occur over time.

**Table 3.4 Occurrence of Listed migratory species**

Species	Recorded on Study Area		Identified from MNES search	Not expected (habitat unsuitable)
	Previous Survey Records <sup>1</sup>	BAAM 2008		
(Australian) Cotton pygmy-goose ( <i>Nettapus coromandelianus albipennis</i> )	√		√	
Great egret ( <i>Ardea alba</i> )	√		√	
White-bellied sea-eagle ( <i>Haliaeetus leucogaster</i> )	√	√	√	
Marsh sandpiper ( <i>Tringa stagnatilis</i> )	√			
Common sandpiper ( <i>Actitis hypoleucos</i> )	√			
Red-necked stint ( <i>Calidris ruficollis</i> )	√			
Sharp-tailed sandpiper ( <i>Calidris acuminata</i> )	√			
Caspian tern ( <i>Sterna caspia</i> )	√			
White-throated needletail ( <i>Hirundapus caudacutus</i> )	√		√	
Fork-tailed swift ( <i>Apus pacificus</i> )	√		√	
Rainbow bee-eater ( <i>Merops ornatus</i> )	√	√	√	
Rufous fantail ( <i>Rhipidura rufifrons</i> )	√			
Satin flycatcher ( <i>Myiagra cyanoleuca</i> )	√		√	
Australian reed-warbler ( <i>Acrocephalus australis</i> )	√	√		
Black-faced Monarch ( <i>Monarcha melanopsis</i> )			√	√
Cattle Egret ( <i>Ardea ibis</i> )			√	√
Latham's Snipe ( <i>Gallinago hardwickii</i> )			√	√
Little Curlew ( <i>Numenius minutus</i> )			√	√
Painted Snipe ( <i>Rostratula benghalensis s. lat.</i> )			√	

<sup>1</sup> WBM (1998), GHD (2004), Ecoserve and LAMR (2005), Ecoserve (2006a, b, c) and Ecoserve and Ecoteam (2006)



## 4 Description of the Affected Environment

### 4.1 Introduction

This section details the current status of the matters of NES protected under the EPBC Act in detail. For the listed threatened species and communities known to occur in the study area, the description of the affected environment includes the following:

- A discussion of the current distribution of the species/ecological community;
- Relevant information about the ecology of the species (habitat, feeding and breeding behaviour etc);
- Information about any populations of the species or habitat for the species in the area affected by the project;
- A discussion of current pressures on the species, especially those in the area to be affected by the project; and
- A discussion of relevant controls or planning regimes already in place.

### 4.2 Status of Listed Threatened Species/Communities Known from the Study Area

#### 4.2.1 Southern Squatter Pigeon

##### Current Distribution

The range of the squatter pigeon extends from Cape York Peninsula south through Central Queensland to northern inland New South Wales (NSW). The southern subspecies is found south of Proserpine and the Burdekin River (Higgins and Davies 1996; Schodde and Tideman 1997). Over 100 records of this species have been made in the Brigalow Belt South Bioregion (Queensland Department of Natural Resources 2001). Queensland remains an important stronghold for this species as it has declined markedly in many parts of its range since 1905 (Storr 1973; Garnett 1992a; Ayers 1996).

##### Ecology

The squatter pigeon forages on the ground in pairs or small flocks on a wide range of seeds, including grasses, legumes, trees and shrubs; also occasionally takes insects (Crome 1976; Frith 1982). This species loafs during the day on the ground and at night roosts on low branches. It constructs a shallow scrape lined with grass in sheltered locations on the ground, such as beneath grass tussocks, bushes or fallen logs (Crome 1976; Higgins and Davies 1996). The movements of this pigeon are poorly understood, with some evidence that it is locally nomadic (Blakers et al. 1984; Higgins and Davies 1996).

##### Populations within the Study Area

During the recent 2008 surveys, squatter pigeons were observed on a number of occasions, usually as single individuals and never in groups of more than three individuals, though two pairs were recorded in very close proximity. Most observations were at the same location and may have been of the same individual. All individuals were observed in areas of active grazing and substantial habitat degradation, and their occurrence may reflect the nearby presence of water rather than food resources, or be simply a result of increased visibility improving the likelihood of detection.

Earlier surveys of the study area and adjacent Peak Downs Mine recorded squatter pigeons in groups of up to seven individuals (Ecoserve and LAMR 2005). Habitat details are not available for most of these records, though the report states that the species is likely to occur anywhere within the area that has grassland. The squatter pigeon, despite substantial declines and even local extinctions in the southernmost parts of its

range, remains common locally, even in areas heavily degraded by cattle. The species has been known to recover from declines driven by drought and then increase in abundance on active grazing properties (e.g. Woinarski and Catterall 2004).

### **Current Pressures**

Known pressures on the Southern squatter pigeon include the following:

- Habitat loss: destruction and fragmentation of habitat due to the clearing of woodland for cropping lands and improved pastureland, which removes foraging and breeding habitat (Garnett 1992a; Park and Borsboom 1995);
- Habitat degradation: degradation of remaining habitat due to over-grazing by livestock and rabbits (Garnett 1992a; Higgins and Davies 1996). For example, cattle grazing combined with drought in 1902 apparently caused a population decline in the Dawson River valley (Campbell and Barnard 1917; Barnard and Barnard 1925); and
- Grazing: reduces or eliminates vegetative cover used by the species for cover and breeding purposes, reduces the availability of perennial grasses and herbaceous plants (important dietary source), and nests are vulnerable to trampling (Blakers et al 1984; Garnett 1992a; Ayers 1996).

Suspected pressures on the Southern squatter pigeon include the following:

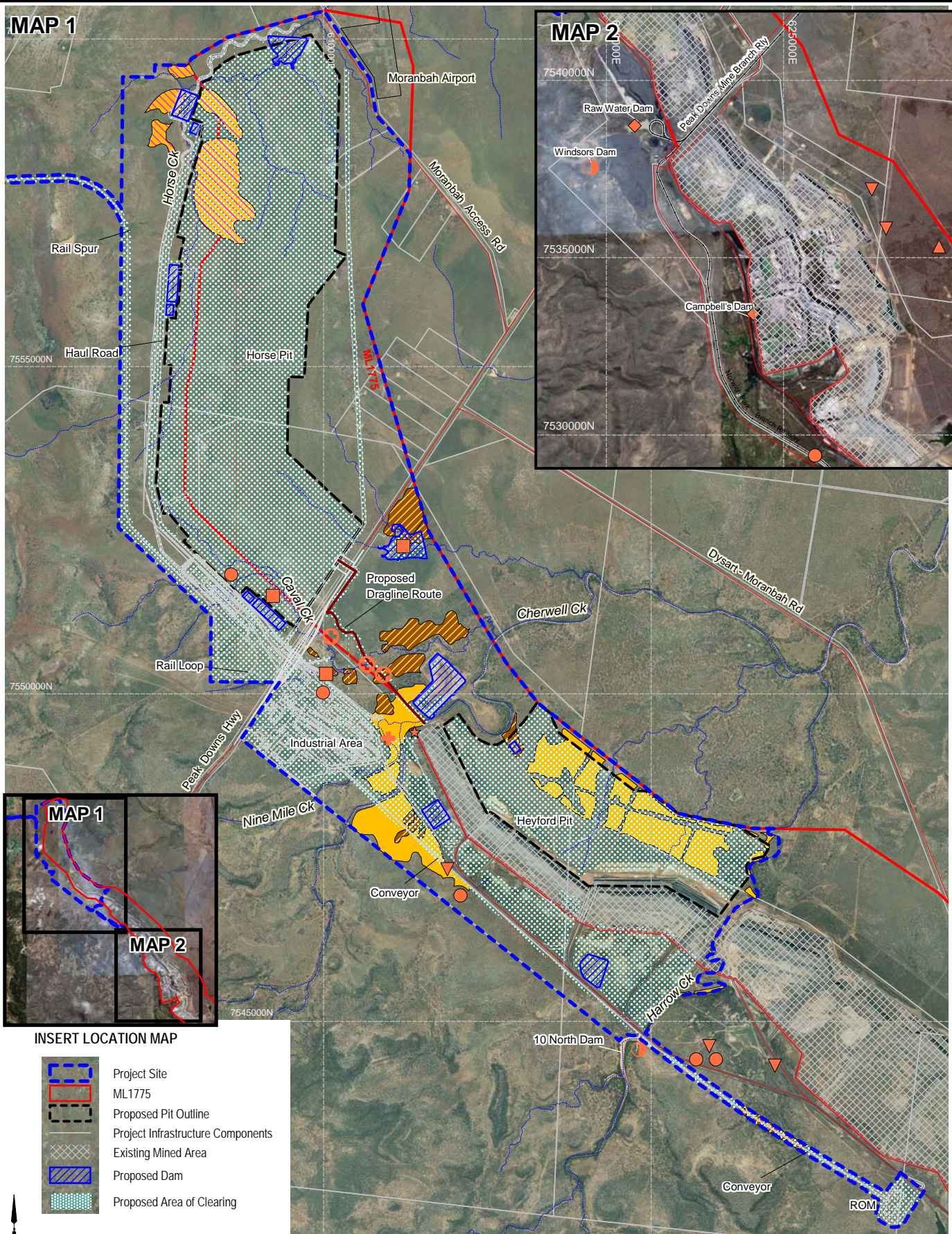
- Feral animals: predation by foxes and cats (Blakers et al 1984);
- Fire: inappropriate fire regimes, particularly during the breeding season (Park and Borsboom 1995);
- Weeds: proliferation of exotic grasses (e.g. buffel grass) may reduce the dietary diversity, particularly the availability of perennial grasses and herbaceous plants; and
- Other factors: the species may still be vulnerable to illegal hunting in certain localities (Crome 1976), as well as trapping for the bird trade (Garnett 1992b). Mortality may also occur due to ingestion of poisoned grain in aerially broadcast strychnine baits for house mice (Brown and Lundie-Jenkins 1999).

### **Existing Controls and Planning Regimes**

Currently no management plan is in place that promotes the protection of this species or its habitat.



MAP 1



MAP 2



INSERT LOCATION MAP



0 1 2km  
Scale 1:80,000 (A4)  
Datum: AGD84, AMG Zone 55

Of Concern (VM Act)

Endangered (VM Act)

Endangered Brigalow (EPBC Act)

Endangered Natural Grassland (EPBC Act)

Ornamental Snake (E & LAMR,05)

Squatter Pigeon (BAAM,08)

Squatter Pigeon (E & LAMR,05)

Squatter Pigeon (E & LAMR,06)

Cotton Pygmy-goose (WBM,1998)

Troughton's Sheathrat-bat (E & LAMR,05)

Troughton's Sheathrat-bat (E & LAMR,06)

Little Pied Bat (BAAM,08)

Little Pied Bat (E & LAMR,05)

Source: Client Supplied Data; BAAM Sept 2008

Client



Project

CAVAL RIDGE PROJECT  
EPBC MATTERS REPORT

Title

LOCATION OF SIGNIFICANT  
COMMUNITIES AND EVR SPECIES  
WITHIN AND AROUND THE  
PROJECT SITE

Drawn: VH

Approved: CB

Date: 31-03-2009

Job No: 4262 6158

File No: 42626158-g-495b.wor

Figure: 4.1

Rev:B

A4



#### **4.2.2 Australian Painted Snipe**

##### **Current Distribution**

The Australian painted snipe is patchily distributed throughout Australia, with most records being in the south-east of the country. Records are unpredictable, the species being absent from areas in some years and common in others.

##### **Ecology**

The Australian painted snipe is a secretive, cryptic, crepuscular species that occurs in terrestrial shallow wetlands, both ephemeral and permanent, usually freshwater but occasionally brackish. They also use inundated grasslands, saltmarsh, dams, rice crops, sewage farms and bore drains. The species feeds on vegetation, seeds and invertebrates including crustaceans and molluscs (Marchant and Higgins 1993).

##### **Populations within the Study Area**

Although there are no actual database records for the study area or nearby (the EPBC Act Online Protected Matters Search Tool is a predictive database), the erratic nature of its movements and its willingness to use artificial waterbodies means that the species may occur on the study area at times. Any such occurrences could be years apart and could easily be overlooked due to the secretive nature of the species.

One North Dam to the south of the study area is one location that may provide suitable resources, though this will be dependent on water levels being such that the water's edge is near fringing vegetation. The study area and immediate surrounds are not, however, likely to provide breeding resources and any occurrence is likely to be sporadic at best.

##### **Current Pressures**

The Australian painted snipe is threatened by drainage of wetlands, diversion of water from rivers, clearance of wetland vegetation, and overgrazing (Garnett and Crowley 2000).

##### **Existing Controls and Planning Regimes**

Currently no management plan is in place that promotes the protection of this species or its habitat.

#### **4.2.3 Greater Long-eared Bat**

##### **Current Distribution**

The greater long-eared bat occurs across southern Australia, including Tasmania, but avoids coastal regions on the south-eastern mainland (NPWS 2003). Mating occurs in autumn and a single litter is produced each year (Churchill 1998).

##### **Ecology**

The greater long-eared bat occurs in dry forest and woodland, mallee, Brigalow/Belah and other arid and semi-arid habitats. The species is most common in box/ironbark/cypress pine woodland on sandy soils (Turbill et al. 2008). It roosts in tree hollows or under bark (NPWS 2003). It is a little known species that is rarely caught (Churchill 1998).

### **Populations within the Study Area**

The genus *Nyctophilus* is readily identifiable by Anabat call analysis, though there are major difficulties in further resolution to species level. However, there are no Anabat records for any species of *Nyctophilus* for the study area. It is therefore unlikely that the greater long-eared bat is present on the study area, however sporadic use of the study area by any individuals possibly present in the local area cannot be discounted.

### **Current Pressures**

The greater long-eared bat is threatened by loss and fragmentation of habitat, loss of mature hollow-bearing trees, and the use of pesticides (NPWS 2003).

### **Existing Controls and Planning Regimes**

Currently no management plan is in place that promotes the protection of this species or its habitat.

#### **4.2.4 Yakka Skink**

##### **Current Distribution**

The yakka skink is endemic to Queensland, occurring from Cape York Peninsula to the St. George area in the Southern Brigalow Belt (Drury 2001; Wilson 2005). The species lives in colonies (Ehmann 1992) but no breeding information is available.

##### **Ecology**

Yakka skinks live in colonies, occupying communal burrows, often under dead timber or deep rock crevices. They eat invertebrates and soft plant material, particularly fruit. They are found in a variety of drier forests, woodlands and shrublands (usually on well drained, coarse gritty soils) including poplar box on alluvial soils, low ridges, cypress on sands, belah, mulga and *Eucalyptus intertexta* (Ehmann 1992; Cogger 2000; Drury 2001; Wilson 2005). They can also occur in highly degraded sites and where there are log piles and rabbit warrens. It has been suggested the species may be more common than previously thought (EPA 2003a).

### **Populations within the Study Area**

The species was targeted in earlier surveys south of Cherwell Creek (Ecoserve and LAMR 2005) but was not located nor was it reported as likely to occur. During the winter 2008 habitat assessment small areas of potentially suitable habitat were identified very close to Site V16 (refer Figure 4.2), just outside of the area of proposed disturbance. The very small areas of apparently suitable habitat mean that its occurrence is questionable but cannot be discounted.

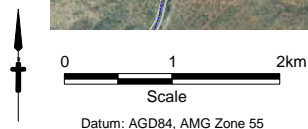
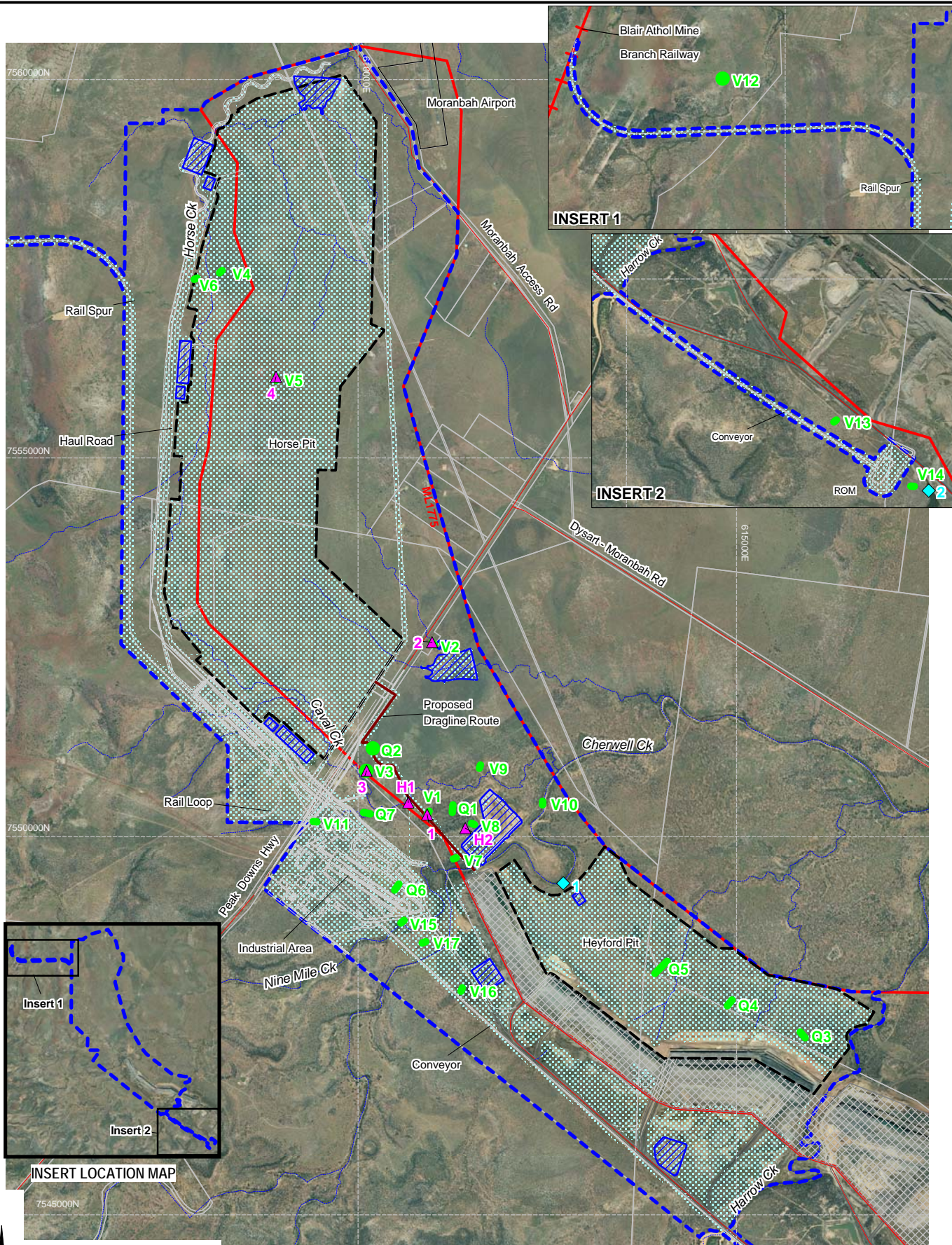
### **Current Pressures**

The yakka skink is threatened by loss of habitat, loss of shelter sites through agricultural practices, inappropriate fire regimes, trampling of burrows by livestock, and predation by foxes and cats (Drury 2001).

### **Existing Controls and Planning Regimes**

There is a draft national Recovery Plan in preparation for the yakka skink and other reptiles of the Brigalow Belt Bioregion (TSN 2008).





Source: BAAM, Sept 2008

- Project Site
- ML1775
- Proposed Dam

- Existing Mined Area
- Project Infrastructure Components
- Proposed Area of Clearing

- Flora Transect Locations
- ▲ Terrestrial Vertebrate Sample Location
- ◆ Aquatic Sampling Location

Client



Project

CAVAL RIDGE PROJECT  
EPBC MATTERS REPORT

Title

LOCATION OF ECOLOGICAL  
GROUND SURVEY SITES

Drawn: VH

Approved: CB

Date: 31-03-2009

Job No: 4262 6158

File No: 42626158-g-496.wor

Figure: 4.2

Rev:A

A4



#### **4.2.5 Brigalow Scaly-foot**

##### **Current Distribution**

The majority of records for the Brigalow scaly foot are from the Brigalow Belt North bioregion. However, records occur from 200 km south-west of Charters Towers south to Bendidee National Park and Eena State Forest (35 km north-west of Goondiwindi) (Schulz and Eyre 1997; Kutt et al. 2003). The species occurs east to Gladstone (Boyne Island) and west to around Morven (Eyre et al. 1997; Schulz and Eyre 1997; Tremul 2000). Breeding occurs in spring and summer (Tremul 2000).

##### **Ecology**

The Brigalow scaly-foot was once thought to be confined to remnant Brigalow or sparse tussock grass vegetation on grey cracking soils (Shea 1987). More recent studies however, have found the species in additional habitats including broad-leaved hickory (*Acacia falciformis*) woodland, gidgee (*A. cambagei*) woodland, poplar box open woodland, sandstone rises in dry sclerophyll forests, spotted gum (*Corymbia citriodora*) and narrow-leaved ironbark dominated forest and mixed open woodland with buck spinifex (*Triodia mitchelli*) (Schulz and Eyre 1997; Kutt et al. 2003).

Most records are from relatively undisturbed habitats but the species does also occur in young regrowth (two to three years old) and heavily grazed areas (Kutt et al. 2003). However, it is also suggested that the species needs litter on the ground and therefore rarely occurs in disturbed habitats (EPA 2003a). Fragments of invertebrates such as spiders and crickets have been recorded from scats. However, sap, particularly from *Acacia* species, constitutes a significant proportion of this species' diet (Tremul 2000).

##### **Populations within the Study Area**

Ecoserve and LAMR (2005) report that Brigalow and Eucalypt communities within the south-eastern area of the adjacent Peak Downs mining lease are most likely to provide suitable resources for Brigalow scaly-foot. The 2008 surveys indicate that there is only limited habitat north of Cherwell Creek, all of which is south of the Peak Downs Highway. South of Cherwell Creek is a patch of Brigalow on a variety of substrates and, although some of the patch is infested with buffel grass, it retains areas of leaf litter and coarse woody debris and appears suitable for Brigalow scaly-foot (refer Figure 3.1). This area is just outside of the area of proposed disturbance.

##### **Current Pressures**

The Brigalow scaly-foot is threatened by clearing and habitat fragmentation for agriculture and pastoral purposes. In addition, uncleared areas can be deleteriously altered by stock grazing and inappropriate fire regimes. Both these activities reduce horizontal ground layer complexity.

##### **Existing Controls and Planning Regimes**

Currently no management plan is in place that promotes the protection of this species or its habitat.

#### **4.2.6 Ornamental Snake**

##### **Current Distribution**

The ornamental snake is found in the Dawson and Fitzroy River drainages of central coastal Queensland (Ehmann 1992).

## Ecology

The ornamental snake occurs in low-lying areas with deep-cracking clay soils that are subject to seasonal flooding, and in adjacent areas of clay and sandy loams. The species is found in woodlands and shrublands, such as Brigalow, and in riverine habitats, and lives in soil cracks and under fallen timber. It is a secretive and nocturnal species and feeds almost entirely on frogs, though lizards may very occasionally be eaten (Ehmann 1992; Wilson 2005; Wilson and Swan 2008).

## Populations within the Study Area

Two ornamental snakes were recorded on the adjacent Peak Downs Mine during a nocturnal search as part of a previous fauna survey. The location included known habitat characteristics for this species of inundated gilgais and Brigalow on deep-cracking clays.

Targeted searches failed to locate any more individuals or suitable habitat (Ecoserve and LAMR 2005). An area of Brigalow possibly suitable for this species based on substrate and proximity to a creekline was identified during the winter 2008 survey. This area is outside of the area of proposed disturbance and, as only part of the patch has substrate suitable for Ornamental Snake, may be insufficient in size to maintain a population (refer Figure 3.1).

## Current Pressures

Threats to this species are uncertain. It is likely to be susceptible to habitat destruction, habitat degradation through overgrazing and inappropriate fire regimes, poisoning by attempted predation on cane toads, predation by feral predators, and a decline in prey abundance (McFarland et al. 1999).

## Existing Controls and Planning Regimes

Currently no management plan is in place that promotes the protection of this species or its habitat.

### 4.2.7 Brigalow Ecological Community

#### Current Distribution

The Brigalow EEC occurs on the north-western slopes and plains and Darling River plains in NSW, and is characteristic of the southern Brigalow Belt Bioregion in Queensland. Queensland's southern Brigalow Belt stretches from Rockhampton in Queensland to the border of NSW. The region encompasses much of the country that receives 500 to 750 millimetres (mm) of rainfall per year.

In Queensland, the Brigalow EEC that has been listed under the EPBC Act is defined by reference to 16 REs, (i.e. 6.4.2, 11.3.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 11.9.5, 11.9.6, 11.11.14, 11.12.21, 12.8.23, 12.9-10.6 and 12.12.26), all of which are listed as Endangered under the Queensland *Vegetation Management Act 1999* (VM Act).

## Ecology

The floristic composition of the Brigalow EEC is relatively well documented. In the southern Brigalow Belt, Brigalow is commonly found with Belah, however, sometimes monotypic stands are present (Johnson 1984). Common understorey species include wilga (*Geijera parviflora*), sandalwood (*Eremophila mitchelli*), boonaree (*Heterodendrum diversifolium*), lime bush (*Eremocitrus glauca*), Ellangowan poison bush (*Myoporum deserti*) and black tea tree (*Melaleuca bracteata*) (Johnson 1984).

In mature stands, the grass/herbaceous layer is sparse and ephemeral. Where present, the ground layer is characterised by genera such as *Atriplex*, *Bassia*, *Chloris*, *Leptochloa*, *Paspalidium* and *Sporobolus*, which tend to be more prominent in years where rainfall exceeds the mean (Isbell 1962). Brigalow tend to have short, dense tree and shrub layers, with understorey dominated by edge species. In contrast, wider stands display more open tree and shrub layers, as well as spatial variation in species and structure (West et al. 1999). Five broad soil groups support Brigalow dominated vegetation (Isbell 1962):

- deep gilgaied clay soils;
- sedentary clay soils;
- alluvial clay soils;
- miscellaneous deep clay soils; and
- light-textured red soils.

The two main clay groups (deep gilgaied clays and sedentary clays) cover approximately 86% of the Brigalow Belt (Bradley 2006). The phrase 'gilgaied soil' is used to refer to soils with alternating mounds and depressions, which result in an irregular, undulating land surface (Brown and Green 2001).

Brigalow vegetation has a recognised tendency to develop extensive horizontal root systems, typical of trees in environments where there is no access the groundwater table (West et al. 1999, van Noordwijk et al. 1996). Johnson (1964) observed lateral roots in the upper 90 cm of the soil profile; being well developed in the top 30 cm. Tunstall and Connor (1981) completed a hydrological study of a mature Brigalow community and found that most of the soil water fluctuations underneath Brigalow trees occurred in the top 1 m section of the soil.

A distinctive feature of Brigalow vegetation is its capacity to sucker freely from an extensive system of shallow, lateral roots. Suckering is initiated when there is damage to aerial parts of the vegetation or to lateral roots (Nix 1994). Brigalow communities are particularly susceptible to fire, with hot fires being able to burn mature vegetation (Butler and Fairfax 2003). Under most circumstances the practice of burning tends to induce suckering from lateral Brigalow roots (Johnson 1964). If no further management is applied to a burnt Brigalow community, it is likely to revert to its original condition. If an area has been cultivated for a number of consecutive years Brigalow suckering is likely to be negligible. In terms of regrowth development, the average growth rate of Brigalow suckers has been measured at approximately 30 centimetres (cm) in height each year over the first 5 to 10 years, with growth being particularly rapid in the early stages (Johnson 1964). The growth rate of Brigalow tends to slow down after 10 to 15 years, being extremely slow from 20 years onwards.

### **Populations within the Study Area**

The Brigalow EEC occurs within the study area in several locations, most of which are generally within the central portion of the site, south of the Peak Downs Highway, however some of which are along the southern boundary (refer Figure 3.1). All Brigalow stands are generally in poor condition with evidence of dieback and a high level of buffel grass invasion within the understorey. Native flora species are sparsely distributed within the mid and low strata of the stands present on site. Approximately 134 ha of the Brigalow EEC is present within the study area, 30 ha of which will be cleared as part of the project. Four main areas are proposed for disturbance due to the creation of Catchment Dam South (approximately 7 ha to be cleared), the extension of Heyford Pit (approximately 6 ha to be cleared), the construction of the industrial area and



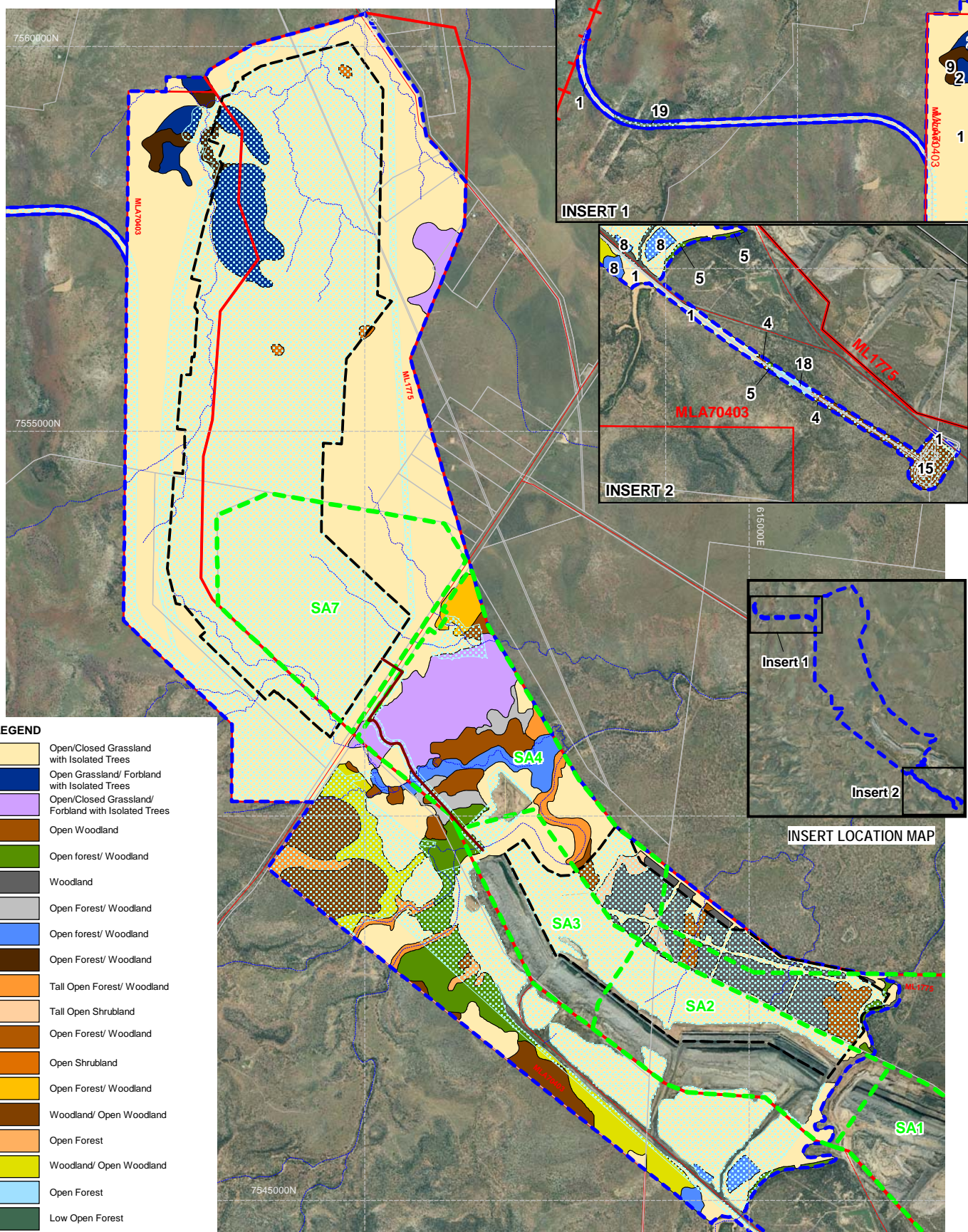
conveyor (approximately 16 ha to be cleared) and the creation of the dragline transport route (approximately 1 ha to be cleared) (refer Figure 4.3).

### **Current Pressures**

The Brigalow EEC once occupied approximately 7 million hectares (ha) in Queensland. This area has been reduced to approximately 660 000 ha, primarily as a result of land clearing for agricultural development (Bradley 2006). The southern Brigalow Belt has been extensively cleared over the last 200 years. In fact, more than 13 million hectares (60%) of the original vegetation has been cleared (Accad et al 2001). As a result, vegetation communities, flora and fauna, including several species of reptiles, have become threatened. Many of these reptiles are endemic.

### **Existing Controls and Planning Regimes**

Clearing of the Brigalow EEC is strongly regulated, with all 16 of the REs which characterise the community in Queensland being listed as Endangered under the VM Act.



#### LEGEND

- Open/Closed Grassland with Isolated Trees
- Open Grassland/ Forbland with Isolated Trees
- Open/Closed Grassland/ Forbland with Isolated Trees
- Open Woodland
- Open forest/ Woodland
- Woodland
- Open Forest/ Woodland
- Open Forest/ Woodland
- Open Forest/ Woodland
- Open Forest/ Woodland
- Tall Open Forest/ Woodland
- Tall Open Shrubland
- Open Forest/ Woodland
- Open Shrubland
- Open Forest/ Woodland
- Woodland/ Open Woodland
- Open Forest
- Woodland/ Open Woodland
- Open Forest
- Low Open Forest

0 1 2km  
Scale  
Datum: AGD84, AMG Zone 55

Study Area  
Lease Area

Proposed Pit Outline  
Pre2001 Surface Area Applications

Proposed Area of Clearing  
Proposed Dam

Source: Client Supplied Data, BAAM, Sept 2008

Client

**BMA**  
BHP Billiton Mitsubishi Alliance

**URS**

Project

CAVAL RIDGE PROJECT  
EPBC MATTERS REPORT

Title

**GROUND-TRUTHED VEGETATION MAP  
OF THE STUDY AREA  
(INCLUDING EXISTING pre2001  
SURFACE AREA APPLICATIONS)**

Drawn: VH

Approved: CB

Date: 31-03-2009

Job No: 4262 6158

File No: 42626158-g-497.wor

Figure: 4.3

Rev:A

A4



#### 4.2.8 Natural Grasslands Ecological Community

##### Current Distribution

The Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin occurs within the Queensland Brigalow Belt which stretches from Rockhampton in Queensland to the border of NSW. The region encompasses much of the country that receives 500 to 750 mm of rainfall per year.

In Queensland, the Natural grasslands EEC that has been listed under the EPBC Act is defined by reference to the following Res: REs 11.3.21, 11.4.4, 11.4.11, 11.8.11, , 11.9.3, 11.9.12, and 11.11.17. Under the provisions of the VM Act two of these REs (i.e. 11.3.21 and 11.9.12) are listed as Endangered, two (i.e. 11.8.11 and 11.11.17) are listed as Of concern.

##### Ecology

The floristic composition of the Natural Grassland EEC has been relatively well documented (Fensham, 1999 and Butler, 2007). typically include a number of native and exotic grass and forb species. A number of perennial native grasses are used as typical indicator species including *Dichanthium* spp., *Aristida* spp., *Astrebla* spp. *Panicum* spp., *Eriochloa* spp.. Canopy trees may be present including *Eucalyptus organophila*, *E. melanophloia*, and *Corymbia erythrophloia*, although, if present, these species are sporadically distributed as scattered individuals (Beeton, 2007).

The Natural Grasslands EEC may be found growing on a variety of landforms, including quaternary alluvial systems, clay plains not currently associated with current alluvium, plains and hills on Cainozoic flood basalts, and undulating landscapes on more or less horizontally bedded fine grained sedimentary rocks (Sattler and Williams 1999).

##### Populations within the Study Area

The Natural Grasslands EEC occurs entirely within the far northern portion of the study area as five distinct polygons (refer Figure 3.1). These areas are comprised primarily of native species including *Dichanthium sericeum* and scattered trees including *Eucalyptus organophila* and *Corymbia erythrophloia*, although intrusion of parthenium weed and buffel grass is apparent and have suppressed recruitment of native grass and forb species. Approximately 153 ha of the Natural Grasslands EEC is present within the study area.

##### Current Pressures

The primary threats identified for the Natural Grasslands of the Queensland Central Highlands include: Grazing, cropping, pasture improvement; weed invasion pest animals; mining activities; construction of roads and other infrastructure (Beeton, 2007).

Of the major threats ongoing conversion from native pastures to cropping systems is identified as a primary concern (DEWHA, 2007). In addition, when overgrazed, this EEC is susceptible to invasion by exotic flora species such as parthenium, which subsequently lowers its value for grazing purposes.

Grazing is considered the predominant land use to which remaining patches of the grasslands are subject. Persistent heavy grazing can degrade grasslands and increases the risk of weed invasion. It leads to the elimination of palatable species reducing habitat quality. (Tremont, 1994; Fensham *et al.*, 1999; Dorrough *et al.*, 2004).



## Existing Controls and Planning Regimes

Clearing of the Natural Grassland EEC is strongly regulated under federal legislation (EPBC Act). However, within Queensland, clearing of only four of the seven REs which constitute this EEC (i.e. REs 11.3.21, 11.8.11, 11.9.12 and 11.11.17) is regulated under the provisions of the VM Act.

### 4.3 Status of Migratory Species Known from the Study Area

A total of 14 Migratory species have been identified within the study area and immediate surrounds. For the convenience of this report, Migratory bird species have been assigned to one of two groups: those that occur in terrestrial habitats; and those that are associated with wetland/aquatic habitats.

#### 4.3.1 Migratory Species- Terrestrial

Migratory bird species identified as potentially occurring in terrestrial habitat in the study area comprise:

- Fork-tailed swift (*Apus pacificus*);
- White-throated needletail (*Hirundapus caudacutus*);
- Rainbow bee-eater (*Merops ornatus*);
- Rufous fantail (*Rhipidura rufifrons*) and
- Satin flycatcher (*Myiagra cyanoleuca*).

#### Fork-tailed Swift and White-throated Needletail

Fork-tailed swift and white-throated needletail are species that may at times fly over the study area. They are non-breeding summer visitors and forage over a wide variety of habitats, including highly modified areas such as pasture and those dominated by human infrastructure. These two species are susceptible to collisions with infrastructure such as overhead wires, windows and lighthouses (Higgins 1999).

#### Rainbow Bee-eater

Rainbow bee-eater is a common, widespread species that occurs in a wide variety of habitats, including highly modified land such as pasture. The majority of the survey records from the study area are from wooded or rehabilitated habitats (WBM 1998; Ecoserve/LAMR 2005, 2006a, b) but the species is likely to utilise almost any habitat present, particularly during migration. Potential breeding habitat is present on the exposed banks of Cherwell Creek though breeding was not recorded during any surveys. The species was present during winter 2008 and is likely to be present year-round. Such individuals are either migrants from southern Australia or over-wintering birds. Threats are minimal, although cane toads have been found to prey on the eggs and nestlings of rainbow bee-eaters (Boland 2004).

#### Rufous Fantail and Satin Flycatcher

Rufous fantail and satin flycatcher are both species largely restricted to wetter, more dense habitats, particularly riparian vegetation. Although a number of fauna surveys have been conducted in the study area, there has been only one survey record of each species, both in 1996 (WBM 1998). Neither species is likely to be a regular visitor to the area, even on passage, due to a lack of suitable habitat in the local landscape. These species are sensitive to loss and fragmentation of moist forest breeding habitat and of migration corridors (Higgins et al. 2006a).

#### 4.3.2 Migratory Species- Wetland

Migratory bird species identified as potentially occurring in wetland habitat in the study area comprise:

- (Australian) Cotton pygmy-goose (*Nettapus coromandelianus albipennis*);
- Great egret (*Ardea alba*);
- White-bellied sea-eagle (*Haliaeetus leucogaster*);
- Marsh sandpiper (*Tringa stagnatilis*);
- Common sandpiper (*Actitis hypoleucos*);
- Red-necked stint (*Calidris ruficollis*);
- Sharp-tailed sandpiper (*Calidris acuminata*);
- Caspian tern (*Sterna caspia*); and
- Australian reed-warbler (*Acrocephalus australis*).

### **Cotton Pygmy-goose**

The cotton pygmy-goose is almost entirely aquatic, spending much less time out of the water than most other Australian duck species, and prefers freshwater wetlands with abundant floating and submerged aquatic vegetation, interspersed with patches of open water. It feeds almost entirely on aquatic vegetation, including flowers and seeds. Breeding is little known in Australia but all known nests have been in hollows in dead trees in or next to deep swamps (Marchant and Higgins 1990) and suitable artificial waterbodies (Beruldsen 2006).

There are survey records for this species for Campbell's and Raw Water Dams and it is also likely to occur under suitable conditions on Boomerang Dam, the wetlands adjacent to 7 South fill point (south of Peak Down MIA) and Windsor's Dam (Ecoserve and LAMR 2005). Waterbodies such as 4 North Dam (just south of the Southern ROM) have suitable trees with hollows for breeding but the species does require aquatic vegetation, which was not present during the winter 2008 survey. The species is sensitive to drainage of wetlands; invasion of wetlands by weeds (especially water hyacinth *Eichhornia crassipes* and ponded-pasture species); grazing of wetlands by livestock; removal of standing dead trees; and the use of herbicides and insecticides near wetlands (Garnett and Crowley 2000; NPWS 2003).

### **Great Egrets**

Great egrets (also known as Eastern great egret *Ardea modesta*) utilise modified habitats including pasture, and are common and widespread. Those previous survey records of the species on the study area for which habitat details are available (six of eight records) are all from artificial waterbodies (WBM 1998). The species was also recorded in winter 2008 on Four North Dam. Great egret is threatened by destruction and modification of freshwater habitats by drainage, grazing, clearing, burning, increased salinity, groundwater extraction and weed invasions (Marchant and Higgins 1990).

### **White-bellied Sea-Eagle**

White-bellied sea-eagles are mainly found in maritime habitats, terrestrial wetlands and coastal areas and offshore islands. The species does also range inland over large rivers and wetlands and forages over freshwater swamps, lakes, reservoirs and billabongs.

There is one survey record for the general study area of a breeding pair from nearby One Mile Dam at Saraji Mine, which is south of Peak Downs Mine (Ecoserve/LAMR 2006b). The species remains fairly common throughout its range and has undergone some localised increases in population numbers due to the creation of artificial waterbodies and the introduction of fish (Olsen 1998). Localised decreases in numbers are likely

to be due to clearing of forests and the consequent loss of optimal breeding sites (Marchant and Higgins 1993; Olsen 1998).

### **Marsh, Common and Sharp-tailed Sandpipers and Red-necked Stint**

The four sandpiper species recorded for the study area (marsh, common and sharp-tailed sandpipers, and red-necked stint), are species all regularly recorded at freshwater habitats. They will all forage on artificial waterbodies but prefer those with shallow water margins. Only limited suitable habitat is present in the study area for sandpipers, though groups of up to eight individuals were observed for both red-necked stints and sharp-tailed sandpipers at Boomerang Dam 21 on Peak Downs Mine (Ecoserve and LAMR 2005). Sandpipers are susceptible to loss of wetlands through drainage and reclamation, loss of inflows to floodplains due to damming of rivers and water extraction, loss of high tide roosts, destruction of mangroves, pollution, harvesting of prey items such as yabbies (*Trypaea australiensis*), disturbance such as recreational use of habitat including beaches and foredunes, and global warming (Geering et al. 2007).

### **Caspian Tern**

Caspian terns mostly occur in coastal habitats but also on inland wetlands, especially lakes, reservoirs and rivers. The species usually forages on open water, preferring shallow water near margins. There are two survey records of Caspian tern from the study area, one observation being from Raw Water Dam on Peak Downs Mine (WBM 1998). Caspian terns are susceptible to loss of eggs by trampling by cattle and chick predation by cats. Occasionally they are entangled in fishing nets (Higgins and Davies 1996).

### **Australian Reed-Warbler**

The Australian reed-warbler was, until recently, considered conspecific with clamorous reed-warbler (*Acrocephalus stentoreus*) and is as such listed as a Migratory species under the EPBC Act. Now regarded as a separate species, the Australian reed-warbler is most likely restricted to Australia. Possible extralimital breeding populations in Wallacea and New Guinea are most likely a subspecies of clamorous reed-warbler and are resident in any case (Higgins et al. 2006b). Nonetheless, the species will be treated as a Migratory species under the EPBC Act when discussing potential project impacts in Section 5.

There are three survey records of Australian reed-warbler for the study area, from both a Peak Downs Mine rehabilitation area and Peak Downs Mine Dam 1 North (WBM 1998). The species was also present at Dam 1 North in winter 2008. The species is likely to occur in any patch of suitable habitat, such as dense, low, aquatic or riparian vegetation including reeds, rushes and sedges. It regularly occurs on artificial waterbodies should they have suitable fringing vegetation and may breed in the study area. The major threat to Australian reed-warblers is loss of habitat due to coastal development in natural habitat areas (Higgins et al. 2006b).

## 5 Assessment of Relevant Impacts and Mitigation Measures

### 5.1 Introduction

This section describes the potential impacts of the project on matters of NES assessed against criteria in the EPBC Act (Environment Australia 2000), and the mitigation measures available for each impact. When effective mitigation measures are not available, compensatory measures to offset unavoidable impacts have been proposed and discussed further in Section 4.4.

### 5.2 Assessment of Impacts

Six nationally threatened species were recorded either within the vicinity of the study area or have the potential to occur within the vicinity of the study area, namely:

- Southern squatter pigeon;
- Australian painted snipe;
- Greater long-eared bat;
- Yakka skink;
- Brigalow scaly-foot; and
- Ornamental snake.

#### 5.2.1 Southern Squatter Pigeon

This species is listed as Vulnerable under the EPBC Act. An assessment of the significance of impacts on this species under the assessment guidelines of the EPBC Act (Environment Australia 2000) is provided in Table 5.1. The assessment indicates that due to the restriction of the mine footprint to existing cleared, modified and degraded lands, and the limited disturbance to suitable habitat from development of infrastructure, the impacts of the project on the squatter pigeon will be negligible.

**Table 5.1 Assessment of Significance of Impact on Listed Threatened Species - Squatter Pigeon**

EPBC Act Criteria	Assessment of Significance
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	<p>Squatter Pigeon (southern subspecies) <i>Geophaps scripta scripta</i></p> <p>During the recent BAAM 2008 survey, squatter pigeons were observed on a number of occasions, usually as single individuals, although two pairs were recorded in very close proximity. Most observations were at the same location and may have been of the same individual. All individuals were observed in areas of active grazing and substantial habitat degradation and their occurrence may reflect the nearby presence of water rather than food resources, or be simply a result of increased visibility. Earlier surveys of the study area recorded Squatter Pigeons in groups of up to seven individuals. Habitat details are not available for most of these records though the reports state that the species is likely to occur anywhere within the area that has grassland (Ecoserve and LAMR 2005). The squatter pigeon, despite substantial declines and even local extinctions in the southernmost parts of its range, remains common locally even in areas degraded by cattle. Squatter pigeons are terrestrial, foraging and breeding on the ground. The species occurs in open dry sclerophyll woodland with grassy understorey, nearly always near permanent water. Birds may occasionally feed in sown grasslands and pastures. Squatter pigeons eat mainly seeds, including those of exotic pasture plants, and some insects (Crome and Shields 1992; Higgins and Davies 1996).</p>

EPBC Act Criteria	Assessment of Significance
Lead to a long-term decrease in the size of an important population of a species.	Any impacts on any local population would be minor and temporary.
Reduce the area of occupancy of an important population.	The actual area of occupancy of the species would be unaffected by the proposed action in the long-term.
Fragment an existing important population into two or more populations.	No important population of this mobile species would be fragmented due to the proposed action.
Adversely affect habitat critical to the survival of a species.	No habitat considered critical to the survival of the species is present in the study area.
Disrupt the breeding cycle of an important population.	Population scale movement would be unaffected in the long-term and no known breeding sites would be lost. As such, significant disruptions to breeding cycles as a result of the proposed action are unlikely.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	No habitat to be modified, destroyed, removed, isolated or decreased by the project would result in species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Any impacts on any local populations or individuals would be minor and temporary, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species as a result of the project.
Introduce disease that may cause the species to decline.	The implementation of a pest and weed management plan, as required under State legislation, will help control and prevent the establishment of invasive species (and associated diseases) as a result of the project.
Interfere with the recovery of the species.	Population scale movement would be unaffected in the long-term and significant disruptions to breeding cycles and interference to species recovery as a result of the proposed action are therefore unlikely.

### 5.2.2 Australian Painted Snipe

This species is listed as Vulnerable under the EPBC Act. An assessment of the significance of impacts on this species under the assessment guidelines of the EPBC Act (Environment Australia 2000) is provided in Table 5.2. The Australian painted snipe is relatively common and widespread across the regional landscape, and the project is not considered to have a significant impact on this species, its habitat or breeding and feeding resources.

**Table 5.2 Assessment of Significance of Impact on Listed Threatened Species – Australian Painted Snipe**

EPBC Act Criteria	Assessment of Significance
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	<p>Australian Painted Snipe <i>Rostratula australis</i></p> <p>The Australian painted snipe is a secretive, cryptic, crepuscular species that occurs in terrestrial shallow wetlands, both ephemeral and permanent, usually freshwater but occasionally brackish. They also use inundated grasslands, saltmarsh, dams, rice crops, sewage farms and bore drains (Marchant and Higgins 1993). The species is patchily distributed throughout Australia, with most records being in the south-east. Records are erratic, the species being absent from areas in some years and common in others. There are no records for the study area and the species would only be expected to occur occasionally at best. Artificial waterbodies possibly suitable for this species are not within the area of proposed disturbance.</p>
Lead to a long-term decrease in the size of an important population of a species.	Any impacts on any local population will be minor and temporary. The creation of additional water storages on site could result in a net increase in available habitat.
Reduce the area of occupancy of an important population.	The actual area of occupancy of the species will be unaffected in the long-term. The creation of additional water storages on site could result in a net increase in available habitat.
Fragment an existing important population into two or more populations.	No population of this highly mobile species will be fragmented due to the proposed action.
Adversely affect habitat critical to the survival of a species.	No habitat considered critical to the survival of the species is present in the study area.
Disrupt the breeding cycle of an important population.	It is expected that any disruption to any possible local population of the species would be minor and temporary.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	No habitat to be modified, destroyed, removed, isolated or decreased by the project would result in the species decline. The creation of additional water storages on site could result in a net increase in available habitat.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Any impacts on any local populations or individuals would be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species as a result of the project.
Introduce disease that may cause the species to decline.	The implementation of a pest and weed management plan as required under State legislation will help control and prevent the establishment of invasive species (and associated diseases) as a result of the project.
Interfere with the recovery of the species.	Population scale movement would be unaffected in the long-term and significant disruptions to breeding cycles and interference to species recovery is therefore unlikely. The creation of additional water storages on site could result in a net increase in available habitat.

### 5.2.3 Greater Long-eared Bat

This species is listed as Vulnerable under the EPBC Act. An assessment of the significance of impacts on this species under the assessment guidelines of the EPBC Act (Environment Australia 2000) is provided in Table 5.3. The greater long-eared bat is relatively common and widespread across the regional landscape,

and the project is not considered to have a significant impact on this species, its habitat or breeding and feeding resources.

**Table 5.3 Assessment of Significance of Impact on Listed Threatened Species – Greater Long-eared Bat**

EPBC Act Criteria	Assessment of Significance
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	Greater Long-eared Bat (south-eastern form) <i>Nyctophilus timoriensis</i> The greater long-eared bat is a medium-sized insectivorous bat species that occurs in dry forest and woodland, mallee, and other arid and semi-arid habitats. It roosts in tree hollows or under bark (NPWS 2003). It is a little known species that is rarely caught (Churchill 1998). This species occurs across southern Australia, including Tasmania, but avoids coastal regions on the south-eastern mainland (NPWS 2003). Mating occurs in autumn and a single litter is produced each year (Churchill 1998). The Greater Long-eared Bat is threatened by loss and fragmentation of habitat, loss of mature hollow-bearing trees, and the use of pesticides (NPWS 2003). The genus <i>Nyctophilus</i> is readily identifiable by Anabat call analysis, though there are major difficulties in further resolution to species level. However, there are no Anabat records for any species of <i>Nyctophilus</i> for the study area. It is therefore unlikely that the Greater Long-eared Bat is present in the study area; however sporadic use of the site by any individuals possibly present in the local area cannot be discounted.
Lead to a long-term decrease in the size of an important population of a species.	Any impacts on any local population would be minor and temporary.
Reduce the area of occupancy of an important population.	The actual area of occupancy of the species would be unaffected by the proposed action in the long-term.
Fragment an existing important population into two or more populations.	No population of this highly mobile species would be fragmented due to the proposed action.
Adversely affect habitat critical to the survival of a species.	No habitat critical to the survival of the species is present in the study area.
Disrupt the breeding cycle of an important population.	Overall, population scale movement would be unaffected in the long-term and significant disruptions to breeding cycles as a result of the proposed action are therefore unlikely.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	No habitat to be modified, destroyed, removed, isolated or decreased by the project would result in the species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	Any impacts on any local populations or individuals would be minor and short-term, particularly following the implementation of a pest and weed management plan, as is required under State legislation to control and prevent the establishment of invasive species as a result of the project.
Introduce disease that may cause the species to decline.	The implementation of a pest and weed management plan as required under State legislation will help control and prevent the establishment of invasive species (and associated diseases) as a result of the project.
Interfere with the recovery of the species.	Population scale movement will be unaffected in the long-term and significant disruptions to breeding cycles and interference to species recovery as a result of the proposed action are therefore unlikely.



#### 5.2.4 Yakka Skink

This species is listed as Vulnerable under the EPBC Act. An assessment of the significance of impacts on this species under the assessment guidelines of the EPBC Act (Environment Australia 2000) is provided in Table 5.4. Yakka skink is relatively common and widespread across the regional landscape, and the project is not considered to have a significant impact on this species, its habitat or breeding and feeding resources.

**Table 5.4 Assessment of Significance of Impact on Listed Threatened Species – Yakka Skink**

EPBC Act Criteria	Assessment of Significance
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	Yakka Skink <i>Egernia rugosa</i> Yakka skinks live in colonies, occupying communal burrows, often under dead timber or deep rock crevices. They are found in dry open forests and woodlands, usually on coarse gritty soils that are well drained (Ehmann 1992; Cogger 2000; Drury 2001; Wilson 2005). The species is threatened by loss of habitat, loss of shelter sites through agricultural practices, too-frequent fire, trampling of burrows by livestock and predation by foxes and cats (Drury 2001). Based on soil type it is considered unlikely that Yakka Skink occurs north of Cherwell Creek on the study area. The species was targeted in earlier surveys south of Cherwell Creek (Ecoserve and LAMR 2005) but was not located nor was it reported as likely to occur. There are no database or survey records of this species for the study area.
Lead to a long-term decrease in the size of an important population of a species.	It is expected that any possible decrease in any possible local population of the species would be minor and temporary.
Reduce the area of occupancy of an important population.	It is expected that any reduction in the area of occupancy of any possible local population of the species would be minor and temporary.
Fragment an existing important population into two or more populations.	If this species is present, any population is unlikely to be of a sufficient size for fragmentation to occur.
Adversely affect habitat critical to the survival of a species.	A lack of historical records and study records indicates that there is no habitat present that is critical to the survival of the species.
Disrupt the breeding cycle of an important population.	It is expected that any disruption to any possible local population of the species would be minor and short-term.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	The study area is not considered to contain habitat important enough for the species such that its modification, destruction, removal or isolation, or a decrease in its availability or quality would result in overall species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	The implementation of a pest and weed management plan as required under State legislation will help control and prevent the establishment of invasive species (and associated diseases) as a result of the project..
Introduce disease that may cause the species to decline.	The implementation of a pest and weed management plan as required under State legislation will help control and prevent the establishment of invasive species (and associated diseases) as a result of the project.
Interfere with the recovery of the species.	The species is not known to occur in the study area, however, habitat rehabilitation and restoration activities using seed or seedlings of local provenance and placement of log piles for habitat are likely to assist, rather than interfere, with the recovery of the species in the local area.

### 5.2.5 Brigalow Scaly-foot

This species is listed as Vulnerable under the EPBC Act. An assessment of the significance of impacts on this species under the assessment guidelines of the EPBC Act (Environment Australia 2000) is provided in Table 5.5. The Brigalow scaly-foot is relatively common and widespread across the regional landscape, and the project is not considered to have a significant impact on this species, its habitat or breeding/feeding resources.

**Table 5.5 Assessment of Significance of Impact on Listed Threatened Species –Brigalow Scaly-foot**

EPBC Act Criteria	Assessment of Significance
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	Brigalow Scaly-foot <i>Paradelma orientalis</i> The Brigalow Scaly-foot was once thought to be confined to remnant Brigalow ( <i>Acacia harpophylla</i> ) or sparse tussock grass vegetation on grey cracking soils (Shea 1987). Recent records, however, have found the species in additional habitats including <i>Acacia falciformis</i> woodland, Gidgee ( <i>A. cambagei</i> ) woodland, Poplar Box <i>Eucalyptus populnea</i> open woodland, sandstone rises in dry sclerophyll forests, <i>Corymbia maculata</i> and <i>E. crebra</i> dominated forest and mixed open woodland with <i>Triodia mitchelli</i> (Schulz and Eyre 1997; Kutt et al. 2003). Most records are from relatively undisturbed habitats but the species does also occur in young regrowth (two-three years old) and heavily grazed areas (Kutt et al. 2003). Fragments of invertebrates such as spiders and crickets have been recorded from scats. However, sap, particularly from <i>Acacia</i> species, constitutes a significant proportion of this species diet (Tremul 2000).
Lead to a long-term decrease in the size of an important population of a species.	A portion of habitat for this species could potentially be lost as a result of the proposed action. With mitigation through offsetting, the result of the proposed action would not significantly reduce the local extent of these habitats. It is expected that any possible decrease in any local population would be minor and temporary. See Section 5.4.4 for detail on offsetting.
Reduce the area of occupancy of an important population.	It is expected that any reduction in the area of occupancy of any possible local population of the species would be minor and temporary.
Fragment an existing important population into two or more populations.	If this species is present, any population is unlikely to be of a sufficient size for fragmentation to occur.
Adversely affect habitat critical to the survival of a species.	A lack of historical records and study records indicates that there is no habitat present that is critical to the survival of the species.
Disrupt the breeding cycle of an important population.	It is expected that any disruption to any possible local population of the species would be minor and temporary.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	The study area is not considered to contain habitat important enough for the species such that its modification, destruction, removal or isolation, or a decrease in its availability or quality would result in overall species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	The implementation of a pest and weed management plan as required under State legislation will help control and prevent the establishment of invasive species (and associated diseases) as a result of the project.
Introduce disease that may cause the species to decline.	The implementation of a pest and weed management plan as required under State legislation will help control and prevent the establishment of invasive species (and associated diseases) as a result of the project.
Interfere with the recovery of the species.	The species is not known to occur in the study area, however, habitat rehabilitation and restoration activities using seed or seedlings of local provenance and placement of log piles are likely to assist, rather than interfere, with the recovery of the species in the local area.

### 5.2.6 Ornamental Snake

The ornamental snake is listed as Vulnerable under the EPBC Act. An assessment of the significance of impacts on this species under the assessment guidelines of the EPBC Act (Environment Australia 2000) is provided in Table 5.6. This species is relatively common and widespread across the regional landscape, and the project is not considered to have a significant impact on this species, its habitat or breeding/feeding resources.

**Table 5.6 Assessment of Significance of Impact on Listed Threatened Species – Ornamental Snake**

EPBC Act Criteria	Assessment of Significance
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	Ornamental Snake <i>Denisonia maculata</i> Ornamental Snake was recorded for the study area during a previous fauna survey on Peak Downs Mine. Two individuals were found during a nocturnal search. The location included known habitat characteristics for this species of inundated gilgais and Brigalow on deep-cracking clays. Targeted searches failed to locate any more individuals or suitable habitat (Ecoserve and LAMR 2005). The Ornamental Snake occurs in low-lying areas with deep-cracking clay soils that are subject to seasonal flooding, and in adjacent areas of clay and sandy loams. The species is found in woodlands and shrublands, such as Brigalow, and in riverine habitats, and lives in soil cracks and under fallen timber (Ehmann 1992; Wilson 2005; Wilson and Swan 2008). There are no database records for the study area. The location described above is almost 12 km south-east of the southern edge of the study area and no suitable habitat is found within the disturbance footprint. Therefore the potential impact on this species will be negligible.
Lead to a long-term decrease in the size of an important population of a species.	It is expected that any possible decrease in any possible local population of the species would be minor and temporary.
Reduce the area of occupancy of an important population.	It is expected that any reduction in the area of occupancy of any possible local population of the species would be minor and temporary.
Fragment an existing important population into two or more populations.	If this species is present, any population is unlikely to be of a sufficient size for fragmentation to occur.
Adversely affect habitat critical to the survival of a species.	A lack of historical records and study records indicates that there is no habitat present that is critical to the survival of the species.
Disrupt the breeding cycle of an important population.	It is expected that any disruption to any possible local population of the species would be minor and temporary.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	The study area is not considered to contain habitat important enough for the species such that its modification, destruction, removal or isolation, or a decrease in its availability or quality would result in overall species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	The implementation of a pest and weed management plan as required under State legislation will help control and prevent the establishment of invasive species (and associated diseases) as a result of the project.
Introduce disease that may cause the species to decline.	The implementation of a pest and weed management plan as required under State legislation will help control and prevent the establishment of invasive species (and associated diseases) as a result of the project.
Interfere with the recovery of the species.	The species is not known to occur in the area of proposed disturbance, however habitat rehabilitation and restoration activities using seed or seedlings of local provenance and replacement of habitat such as logs are likely to assist, rather than interfere, with the recovery of the species in the local area.

### 5.2.7 Brigalow EEC

An assessment of the potential significance of impacts on the Brigalow EEC under the assessment guidelines of the EPBC Act (Environment Australia 2000) is provided in Table 5.7. This community will be impacted upon by the project and will be offset by the protection and management of an area of Brigalow regrowth. In addition, BMA will implement trials to establish Brigalow in areas proposed for rehabilitation. If successful, this would further serve to offset the loss of Brigalow associated with the open pit and conveyor infrastructure.

**Table 5.7 Assessment of Significance of Impact on Endangered Ecological Communities– Brigalow EEC**

EPBC Act Criteria	Assessment of Significance
An action is likely to have a significant impact on an endangered ecological community if there is a real chance or possibility that it will:	Brigalow ( <i>Acacia harpophylla</i> dominant and co-dominant) communities This community is analogous to areas mapped as RE s 6.4.2, 11.3.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 11.9.5, 11.9.6, 11.11.14, 11.12.21, 12.8.23, 12.9-10.6 and 12.12.26 under the provisions of the Queensland <i>Vegetation Management Act 1999</i> . Four vegetation communities contained within the study area (i.e. Communities 4, 14, 16 and 18) have been identified as being analogous to REs 11.4.8, 11.4.9 and 11.9.5 (refer Figure 4.3).
Reduce the extent of an ecological community.	Within the relevant Local Government Area (former Belyando Shire), approximately 0.03% of the remaining extent of RE 11.4.8, 0.04% of the remaining extent of RE 11.4.9 and 0.79% of the remaining extent of RE 11.9.5 would be affected by the proposed action. Within the relevant bioregion (Brigalow Belt North), this equates to a losses of approximately 0.01%, 0.02% and 0.003%, respectively, for each RE of their remaining extent. As this represents very small portions of the existing extent of the analogous communities, with mitigation through offsetting, the result of the proposed action would not significantly reduce the extent of this ecological community.*
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	Relatively small areas of REs 11.4.8, 11.4.9 and 11.9.5 within the project area would be removed as a result of the proposed action. With mitigation through offsetting and the control of buffel grass within offset areas, the result of the proposed action would not significantly contribute to the local fragmentation of this already highly fragmented ecological community.
Adversely affect habitat critical to the survival of an ecological community.	Within the relevant Local Government Area (former Belyando Shire), approximately 0.03% of the remaining extent of RE 11.4.8, 0.04% of the remaining extent of RE 11.4.9 and 0.79% of the remaining extent of RE 11.9.5 would be affected by the proposed action. Within the relevant bioregion (Brigalow Belt North), this equates to a losses of approximately 0.01%, 0.02% and 0.003%, respectively, for each RE of their remaining extent. As this represents very small portions of the existing extent of the analogous communities, with mitigation through offsetting and the control of Buffel Grass on site and within offset areas the result of the proposed action would not significantly adversely affect habitat critical to the survival of this ecological community.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	The proliferation of buffel grass has contributed to the Endangered status of Brigalow as this species invades the understorey, outcompetes and suppresses Brigalow species recruitment, and increases fire frequency and intensity in Brigalow communities. Control of this species on site and as part of the management program for offsets may well establish healthier examples of this RE type than are currently present within the areas proposed for disturbance.  The vegetation species and regional soil/geology types suggest that the level of groundwater dependence is likely to be relatively low and vegetation is likely to be able to satisfy plant water requirements using retained soil moisture.  Modification or destruction of abiotic factors to the extent that the community's survival is compromised outside of these areas is highly unlikely.

EPBC Act Criteria	Assessment of Significance
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.	While the proposed action would remove a portion of the Brigalow communities on site, the remaining area would be managed to exclude buffel grass and other weed species. With the application of fire management aimed at reducing the frequency and intensity of fires in these areas, it is likely that there will be an increase in the number of functionally important species within the Brigalow communities.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: – assisting invasive species, that are harmful to the listed ecological community, to become established; or – causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.	While the proposed action would remove a portion of the Brigalow communities on site, which have been assessed as being in poor ecological condition, those areas that remain would be managed to exclude Buffel Grass and too frequent fire, thereby possibly affecting an increase in the quality of the woodland.
Interfere with the recovery of an ecological community.	It is proposed that areas of the Brigalow communities that are retained on site will be managed to control exotic species in accordance with the pest and weed management plan as required under State legislation. With mitigation through offsetting and the control of Buffel Grass and too-frequent fire on site and within offset areas, the loss of areas of Brigalow through the proposed action would not interfere with the recovery of this ecological community.

\* Based on a 1:1 offset scenario, excluding those areas subject to existing onsite clearing approval.

### 5.2.8 Natural Grassland EEC

An assessment of the potential significance of impacts on the Natural Grassland EEC under the assessment guidelines of the EPBC Act (Environment Australia 2000) is provided in Table 5.8. This community will be impacted upon by the proposed activities and will be offset by the protection and management of an area of corresponding suitable habitat. In addition, areas currently supporting RE 11.8.11 will be managed to control the extent of exotic species (e.g. *Parthenium*) to ensure the continued persistence of this community within the study area.



**Table 5.8 Assessment of Significance of Impact on Endangered Ecological Communities– Natural Grassland EEC**

EPBC Act Criteria	Assessment of Significance
An action is likely to have a significant impact on an endangered ecological community if there is a real chance or possibility that it will:	<p><b>Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin</b></p> <p>This community is analogous to areas mapped as RE s 11.3.21, 11.4.4, 11.4.11, 11.8.11, 11.9.9, 11.9.12 and 11.11.17 under the provisions of the Queensland <i>Vegetation Management Act 1999</i>. One vegetation community recorded within the Study Area (i.e. Community 2) is analogous to RE 11.8.11 (refer Figure 4.3).</p>
Reduce the extent of an ecological community.	<p>Polygons that are mapped as part of the current study as RE 11.8.11 (i.e. vegetation community 2) will be subject to removal and/or disturbance within the northern portion of the study area. The total area that is affected is more than 100 ha. Within the relevant Local Government Area (former Belyando Shire), the area that is affected equates to a loss of approximately 0.33% of its remaining extent. Within the relevant bioregion (Brigalow Belt North), it equates to a loss of approximately 0.07% of its remaining extent. With mitigation through offsetting, the result of the proposed action would not significantly reduce the extent of this ecological community.*</p>
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	<p>A significant area of RE 11.8.11 within the study area would be removed as a result of the proposed action. With mitigation through offsetting and the control of buffel grass and parthenium on site and within offset areas, the result of the proposed action would not contribute to the regional fragmentation of this already highly fragmented ecological community.</p>
Adversely affect habitat critical to the survival of an ecological community.	<p>Polygons that are mapped as part of the current study as RE 11.8.11 (i.e. vegetation community 2) will be subject to removal and/or disturbance within the northern portion of the study area. The total area that is affected is more than 100 ha. Within the relevant Local Government Area (former Belyando Shire), the area that is affected equates to a loss of approximately 0.33% of its remaining extent. Within the relevant bioregion (Brigalow Belt North), this equates to a loss of approximately 0.07% of its remaining extent. As this represents a small portion of the existing extent of this community, with mitigation through offsetting and the control of buffel grass and parthenium on site and within offset areas, the result of the proposed action would not significantly adversely affect habitat critical to the survival of this ecological community.</p>
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	<p>The community occurs on Cainozoic igneous rocks, particularly fresh basalt, and is generally associated with undulating to gently undulating rises. It usually occurs on the crests and middle and upper slopes (slopes 2–6%), although in places is occasionally present on lower slopes and flat areas (slopes 0–2%). Associated soils are moderately shallow to deep cracking clay soils with gravel, stone or linear gilgai sometimes present. The occurrence of this community in association with specific landforms, soil types and inferred drainage requirements indicates that a narrow range of conditions are required for its establishment. The proposed action will remove these features, thus reducing potential areas for the distribution of this community. The presence of buffel grass and parthenium has contributed to the Endangered status of RE 11.8.11 as both species outcompete and suppress native grasslands in the region. Control of these species on site and as part of the management program for offsets will minimise further impacts on the remaining community within the study area.</p>
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.	<p>While the proposed action would remove the majority of the Natural Grasslands on site, those areas that remain would be managed to exclude buffel grass and parthenium, thereby possibly affecting an increase in the number of functionally important species within the grassland.</p>

EPBC Act Criteria	Assessment of Significance
<p>Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:</p> <ul style="list-style-type: none"> <li>– assisting invasive species, that are harmful to the listed ecological community, to become established; or</li> <li>– causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.</li> </ul>	<p>While the proposed action would remove the majority of the Natural Grasslands on site, which have been assessed as being in poor ecological condition, those areas that remain would be managed to exclude buffel grass and parthenium, thereby possibly affecting an increase in the quality of the grassland.</p>
<p>Interfere with the recovery of an ecological community.</p>	<p>It is proposed that areas of the community retained on site will be managed to control exotic species in accordance with the pest and weed management plan as required under State legislation. With mitigation through offsetting and the control of buffel grass and parthenium on site and within offset areas, the loss of Natural Grasslands through the proposed action would not interfere with the recovery of this ecological community.</p>

\* Based on a 1:1 offset scenario, excluding those areas subject to existing onsite clearing approval.

### 5.3 Assessment of Impacts on Migratory Species

#### 5.3.1 Introduction

The ToR for the EIS do not contain prescriptions which specifically relate to impacts on migratory species. As such, this assessment has referred to the EPBC Act Policy Statement 1.1 - Significant Impact Guidelines (Matters of National Significance). This section lists the significant impact criteria against which the project is to be assessed, and reviews the occurrence of important habitat and ecological significance of populations across the study area.

#### 5.3.2 Significant Impact Criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

### **5.3.3 Occurrence of Important Habitat in the Study Area**

An area of 'important habitat' for a migratory species is defined as (Environment Australia 2000):

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
- Habitat that is of critical importance to the species at particular life-cycle stages; and/or
- Habitat utilised by a migratory species which is at the limit of the species range; and/or
- Habitat within an area where the species is declining.

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with each species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (e.g. site fidelity and dispersal rates). 'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.

### **5.3.4 Impact Assessment**

There is no evidence to suggest that the study area provides an area of important habitat for, or supports an ecologically significant proportion of a population of, any of the 14 identified migratory birds.

Most are wetland species and the study area is surrounded by properties containing many small dams. These, including the dams and other large waterbodies on the study area, form a multitude of isolated waterbodies that comprise a large, regional 'wetland' resource for mobile species. A number of small artificial waterbodies in the study area will be lost due to the project, however, these species will be moving throughout this larger 'wetland' and not just reliant on the waterbodies in the study area.

In the context of regional resources, including nearby farm dams and water storage areas associated with the existing Peak Downs Mine, the loss of the habitat is very unlikely to be significant. Most of the birds are using artificial waterbodies in the area and of the larger region of which the study area is a part and no long-term impacts on local populations of the observed migratory species are expected as a result of the project. Overall, the creation of additional water storages within the study area may provide a net increase in habitat for these species.

In terms of non-wetland migratory species, only rainbow bee-eater is likely to suffer any substantial loss of habitat. However, this species is not dependent specifically on habitat occurring on the project site and utilises highly modified lands as well as remnant vegetation. Overall, the proposed action is not expected to have a significant impact on any migratory species. An assessment of the level of impact of the project on the 14 migratory species identified is provided in Table 5.9.

**Table 5.9 Assessment of Significance of Impact on Migratory Species**

EPBC Act Criteria	Assessment of Significance
<p>An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:</p>	<p>The 19 migratory species identified as potentially using the study area comprise:</p> <ul style="list-style-type: none"> <li>• Australian cotton pygmy-goose <i>Nettapus coromandelianus albipennis</i>;</li> <li>• Great egret <i>Ardea alba</i> (also known as Eastern Great Egret <i>Ardea modesta</i>);</li> <li>• Cattle egret <i>Bubulcus ibis</i> (also known as <i>Ardea ibis</i>);</li> <li>• White-bellied sea-eagle <i>Haliaeetus leucogaster</i>;</li> <li>• Australian painted snipe <i>Rostratula australis</i>;</li> <li>• Latham's snipe <i>Gallinago hardwickii</i>;</li> <li>• Little curlew <i>Numenius minutus</i>;</li> <li>• Marsh sandpiper <i>Tringa stagnatilis</i>;</li> <li>• Common sandpiper <i>Actitis hypoleucos</i>;</li> <li>• Red-necked stint <i>Calidris ruficollis</i>;</li> <li>• Sharp-tailed sandpiper <i>Calidris acuminata</i>;</li> <li>• Caspian tern <i>Sterna caspia</i> (also known as <i>Hydroprogne caspia</i>)</li> <li>• White-throated needletail <i>Hirundapus caudacutus</i>;</li> <li>• Fork-tailed swift <i>Apus pacificus</i>;</li> <li>• Rainbow bee-eater <i>Merops ornatus</i>;</li> <li>• Black-faced monarch <i>Monarcha melanopsis</i>;</li> <li>• Rufous fantail <i>Rhipidura rufifrons</i>;</li> <li>• Satin flycatcher <i>Myiagra cyanoleuca</i>; and</li> <li>• Australian reed-warbler <i>Acrocephalus australis</i> (also known as <i>Acrocephalus stentoreus</i>).</li> </ul>
<p>Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of <i>important habitat</i> for a migratory species.</p>	<p>There is little evidence to suggest that the study area supports 'important habitat' for migratory species. Given their migratory habits, the ephemeral nature of food and habitat resources, and the extent of habitat across their range, it is likely that the existing resources within the study area would be utilised infrequently and on a transitory basis only.</p> <p>Within the study area migratory wetland species are restricted to artificial waterbodies such as dams rather than natural systems such as Cherwell Creek and a variety of ephemeral gullies which do not provide suitable resources. While some smaller artificial water storages will be lost, the creation of additional water storages on site could result in a net increase in available habitat for many of these species. The larger and more suitable waterbodies are not within the area of proposed disturbance. Given their artificial nature, their size and the highly modified landscape within which they are set these waterbodies are not regarded as important habitat. The creation of additional water storages on site could result in a net increase in available habitat for many of these species.</p> <p>Those remaining wetland species for which specific potential impacts need to be considered are discussed separately below, along with those migratory species that do not inhabit wetland areas.</p> <ul style="list-style-type: none"> <li>• <b>Australian cotton pygmy-goose <i>Nettapus coromandelianus albipennis</i></b> This species has previously been recorded within the study area, although not during the BAAM 2008 field survey. There is no potential for a direct impact associated with the removal of existing wetland habitat for the proposed mine. The proposed action would have minimal effects on any local population of this species.</li> <li>• <b>Great egret <i>Ardea alba</i> and cattle egret <i>Bubulcus ibis</i></b> These species are predicted to occur, within or nearby to the study area. Great egret was recorded during the BAAM 2008 survey and has been recorded in previous surveys. There are no records of cattle egret and it is considered unlikely to occur on the study area. There is potential for a direct impact associated with the removal of existing wetland habitat during mine construction. Any such impacts involving habitat would be minor and may be mitigated by the habitat creation and enhancement activities noted above for other wetland species. The proposed action would have minimal effects on any local population of these species.</li> <li>• <b>White-bellied sea-eagle <i>Haliaeetus leucogaster</i></b> This species has been recorded in previous surveys and is predicted to occur in the study area. There is potential for a direct impact associated with the removal of large trees during mine construction. Any such impacts involving habitat would be minor and may be mitigated by the retention of large trees (both live and dead), where</li> </ul>

EPBC Act Criteria	Assessment of Significance
	<p>practical.</p> <ul style="list-style-type: none"> <li> <p><b>Australian painted snipe <i>Rostratula australis</i> and Latham's snipe <i>Gallinago hardwickii</i></b>  These species may occur within or nearby to the study area, although neither have been recorded previously. As little suitable wetland vegetation occurs in the study area these species would only be expected to occur on the study site occasionally, at best. There is no potential for a direct impact associated through the removal of existing wetland habitat during mine construction. The proposed action is not expected to have any effect on these species.</p> </li> <li> <p><b>Little curlew <i>Numenius minutus</i></b>  This species may occur within or nearby to the study area, but has not been recorded previously. It is expected to occur in the study area occasionally, at best. There is potential for a direct impact associated with the removal of existing wetland and grassland habitat during mine construction. Any such impacts involving habitat would be minor. The proposed action is not expected to have any significant effect on this species.</p> </li> <li> <p><b>Marsh sandpiper <i>Tringa stagnatilis</i>, common sandpiper <i>Actitis hypoleucos</i>, red-necked stint <i>Calidris ruficollis</i> and sharp-tailed sandpiper <i>Calidris acuminata</i></b>  These species have been recorded previously within or near the study area. There is potential for a direct impact associated with the removal of existing wetland habitat during mine construction. However, habitat considered suitable for these species (although not considered 'important' habitat) will not be impacted by the proposed works.</p> </li> <li> <p><b>Caspian tern <i>Sterna caspia</i></b>  This species has been recorded within or nearby to the study area in previous surveys. It is considered to be a sporadic visitor to the area. There is no potential for a direct impact associated with the removal of existing wetland habitat during mine construction. The proposed action is not expected to have any effect on this species.</p> </li> <li> <p><b>Fork-tailed swift <i>Apus pacificus</i> and white-throated needletail <i>Hirundapus caudacutus</i></b>  These species have been recorded within or nearby to the study area in previous surveys, and are predicted to occur. The study area does not represent 'important habitat' and no impacts are expected due to mine construction or operation as these species forage over a wide variety of land uses, including human infrastructure and large waterbodies.</p> </li> <li> <p><b>Rainbow bee-eater <i>Merops ornatus</i></b>  Rainbow bee-eater was regularly recorded across the study area and is a very common, widespread species. Consequently, the study area does not represent important habitat for the bird and any potential impacts during mine construction, such as loss of breeding sites and loss of prey species due to clearing and inundation, would be negligible. Some suitable nesting areas will be lost with the realignment of a section of Cherwell Creek but this loss would be minor.</p> </li> <li> <p><b>Black-faced monarch <i>Monarcha melanopsis</i>, Rufous fantail <i>Rhipidura rufifrons</i> and Satin flycatcher <i>Myiagra cyanoleuca</i></b>  These species were not recorded within or nearby the study area during the BAAM 2008 field survey, but are predicted to occur. The Rufous Fantail and Satin Flycatcher have been recorded in previous surveys. These species would only be expected to occur on the study site occasionally, at best. If present, they have the potential to be directly impacted by the loss of riparian habitat suitable for foraging, resting during migration and/or breeding. However, only a very small area of marginally suitable habitat in the study area, situated on Cherwell Creek, would be subjected to impact by the proposed action.</p> </li> <li> <p><b>Australian reed-warbler <i>Acrocephalus australis</i></b>  This species was recorded within the study area during the BAAM 2008 field survey and has also been recorded within or nearby in previous surveys. There is potential for a direct impact associated with the removal of existing wetland habitat during mine</p> </li> </ul>

EPBC Act Criteria	Assessment of Significance
	<p>construction, although the most suitable habitat identified for this species lies outside the footprint of the proposed works. Any such impacts involving habitat loss would be minor. The proposed action will have minimal effects on any local population of this species.</p>
<p>Result in invasive species that are harmful to the migratory species becoming established in an area of <i>important habitat</i> for the migratory species.</p>	<p>As noted above, the study area is not considered to be an area of 'important habitat' for migratory birds, whether they are wetland or terrestrial species. The local area has a history of forest clearing and habitat modification, which has benefited a number of feral and invasive flora and fauna species. BMA proposes the implementation of a weed and feral animal control program for the project in accordance with its own and with local and/or State government pest or weed management plans. This program will contribute to the overall enhancement of habitat for migratory species.</p>
<p>Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an <i>ecologically significant proportion</i> of the population of a migratory species.</p>	<p>There is no evidence to suggest that the study area supports an 'ecologically significant proportion of a population' of any of the migratory birds known or considered likely to occur. While some smaller artificial water storages will be lost, the creation of additional water storages on site could result in a net increase in available habitat for many of these species. Those wetland species for which specific potential impacts need to be considered are discussed below, along with those migratory species that do not inhabit wetland areas.</p> <ul style="list-style-type: none"> <li> <p><b>Australian cotton pygmy-goose <i>Nettapus coromandelianus albigennis</i></b> This species was not recorded within or nearby the study area, but is predicted to occur sporadically in low numbers. It breeds from late spring to mid autumn, nesting high in hollow trees near water and, if present, there is potential for a direct impact associated with the removal of existing wetland habitat and associated large dead trees suitable for nesting during mine construction. There is potential for breeding by this species within the study area but none of the possible areas is within the area of proposed disturbance. Any possible impacts on other aspects of lifecycle would be minor.</p> </li> <li> <p><b>Great egret <i>Ardea alba</i> and cattle egret <i>Bubulcus ibis</i></b> Great egret was recorded during the BAAM survey and has been recorded in previous surveys of the study area. There are no records of Cattle Egret and it is considered unlikely to occur on the study area. There is potential for a direct impact associated with the removal of existing wetland habitat during mine construction. Any such impacts involving habitat would be minor. The proposed action would have minimal effects on any local population of this species.</p> </li> <li> <p><b>White-bellied sea-eagle <i>Haliaeetus leucogaster</i></b> This species has been recorded in previous surveys and is predicted to occur in the study area. There is potential for a direct impact associated with the removal of large trees during mine construction. Any such impacts involving habitat would be minor and may be mitigated by the retention of large trees (both live and dead), where possible. Any possible impacts on lifecycle as a result of the proposed action would be minor.</p> </li> <li> <p><b>Australian painted snipe <i>Rostratula australis</i> and Latham's snipe <i>Gallinago hardwickii</i></b> These species may occur within or nearby to the study area, although neither have been recorded previously. As little suitable wetland vegetation occurs in the study area these species would only be expected to occur on the study site occasionally, at best. Latham's snipe breeds in the northern hemisphere. There is no potential for a direct impact associated with the removal of existing suitable wetland habitat during mine construction. Any such impacts involving habitat would be minor. The proposed action is not expected to have any effect on these species.</p> </li> <li> <p><b>Little curlew <i>Numenius minutus</i></b> This species may occur within or nearby to the study area, but has not been recorded previously. It breeds in the northern hemisphere and is expected to occur in the study area occasionally, at best. There is potential for a direct impact associated with the removal of existing wetland and grassland habitat during mine construction. Any such impacts involving habitat would be minor. The proposed action is not expected to have any significant effect on this species.</p> </li> </ul>

EPBC Act Criteria	Assessment of Significance
	<ul style="list-style-type: none"> <li> <b>Marsh sandpiper <i>Tringa stagnatilis</i>, common sandpiper <i>Actitis hypoleucos</i>, red-necked stint <i>Calidris ruficollis</i> and sharp-tailed sandpiper <i>Calidris acuminata</i></b>            These species have been recorded within or near the study area in previous surveys. All of these species breed in the northern hemisphere. Habitat considered suitable for these species would not be impacted by the proposed action.         </li> <li> <b>Caspian tern <i>Sterna caspia</i></b>            This species has been recorded within or nearby to the study area in previously surveys. It is considered to be a sporadic visitor and is not expected to breed within the study area. There is no potential for a direct impact associated with the removal of existing suitable wetland habitat during mine construction. Any such impacts involving habitat would be minor. The proposed action is not expected to have any significant effect on this species.         </li> <li> <b>Fork-tailed swift <i>Apus pacificus</i> and white-throated needletail <i>Hirundapus caudacutus</i></b>            These species have been previously recorded within or nearby the study area, and are predicted to occur outside of their breeding seasons (they do not breed in Australia). Both are common, widespread species for which the study area does not support an 'ecologically significant proportion of a population'. No impacts are expected due to mine construction or operation.         </li> <li> <b>Rainbow bee-eater <i>Merops ornatus</i></b>            Rainbow bee-eater was regularly recorded across the study area and is a very common, widespread species in Queensland. Consequently, the study area is unlikely to support an 'ecologically significant proportion of a population' and any potential impacts during mine construction, such as loss of breeding substrate and loss of prey species due to clearing and inundation, would be negligible.         </li> <li> <b>Black-faced monarch <i>Monarcha melanopsis</i>, rufous fantail <i>Rhipidura rufifrons</i> and satin flycatcher <i>Myiagra cyanoleuca</i></b>            These species are predicted to occur within or nearby the study area. The rufous fantail and satin flycatcher have been recorded in previous surveys. These species would only be expected to occur on the study site occasionally, at best. If present, they have the potential to be directly impacted by the loss of riparian habitat suitable for foraging, resting during migration and/or breeding. However, most suitable habitat for these species lies outside of the area for proposed works and therefore any potential impact is predicted to be insignificant.         </li> <li> <b>Australian reed-warbler <i>Acrocephalus australis</i></b>            This species was recorded within the study area during the BAAM 2008 field survey and has also been recorded within or nearby in previous surveys. Where present, it has the potential to be directly impacted by the removal of existing wetland habitat during mine construction, although the most suitable habitat identified for this species lies outside the footprint of the proposed works. Any associated impacts on the life cycles of a local population as a result of the proposed action would be minor.         </li> </ul>

## 5.4 Proposed Mitigation

### 5.4.1 Weed Management

Surveys indicate that a number of weed species are present on the study area. It is desirable that there is no net increase in weed abundance as a result of the project. A contractors construction environmental management plan and site environmental management plan including weed management requirements will be developed, consistent with any local authority plans and Queensland legislation. Ongoing monitoring as part of the management plan will determine if weed species are spreading into riparian buffer areas and rehabilitated areas, and effective response to weed infestation will be implemented as required.



#### **5.4.2 Pest Species Management**

Ongoing control of feral predators (i.e. particularly red foxes and cats, but also dingo/dogs and pigs) as required will ensure population numbers are kept low and thereby minimise potential impacts on the breeding and recovery of the Southern Squatter Pigeon in the area.

#### **5.4.3 Fauna Mortality on Roads**

Measures to avoid fauna mortality on internal and external roads connecting to the project site will be implemented. These will include the maintenance of road side vegetation, the provision of fauna crossing signs to warn drivers and speed reduction measures, where practical on internal roads. Focus will be on roads that traverse areas of significant fauna habitat, including the haul road crossing of drainage lines (e.g. Cherwell, Nine Mile, Harrow and Horse Creeks) and any areas associated with Brigalow Ecological Communities.

#### **5.4.4 Offsets**

##### **5.4.4.1 Biodiversity Offset Management Plan**

An offset management plan will be developed and implemented to manage the offsetting of cleared significant vegetation communities. The plan will be developed in keeping with the objectives of the current Commonwealth and State legislation for the offsetting of significant vegetation communities. The plan will also be in keeping with the principles of relevant policies and guidelines such as:

- Draft policy statement 'Use of environmental offsets under the EPBC Act 1999' (DEWHA, 2007)
- Queensland Policy for Vegetation Management Offsets (DNRW, 2007)
- Queensland Government Environmental Offset Policy.

The offset management plan will include criteria for offset suitability which where practicable, would include:

- The acquisition of a remnant/regrowth community that is equal to, or greater in area than that which will be impacted by the project.
- Support a comparable suite of plant species contained in RE types impacted by the project;
- Consider maximising biodiversity gains through site selection, (e.g. habitat requirements for migratory species that will be impacted by loss of foraging trees and water sources).
- Offset locations which are preferentially closer (at least within the locality) to communities impacted by the project.
- Offset sites which are preferentially larger contiguous stands of vegetation with connectivity to other habitat types to increase viability of ecological processes.
- Place potential offset(s) parcels under a secure protection such as a conservation covenant to ensure that protection runs with title.
- Management measures to ensure offset areas remain viable in the long term. Such measures may include the management of supplementary planting, weed, fire, feral animal, livestock management and restriction on access.
- Monitoring and maintenance activities to measure success and viability of the offset activities to measure success and viability of the offset.

Specific components of the offset management plan will include:

- A map detailing the location and extent of the proposed offset(s), the associated vegetation types and any infrastructure (e.g. fencing, vehicle access networks);
- Measures for the long-term management and protection of existing areas of the endangered ecological communities
  - Brigalow (*Acacia harpophylla* dominant and co-dominant) and
  - Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy basin native grasslands;
- Measures to survey and monitor the occurrence of flora and fauna species including but not limited to squatter pigeon (*Geophaps scripta*) and brigalow scaly-foot (*Paradelma orientalis*);
- Where appropriate, measures for weed and feral animal control, supplementary fire management, erosion & sediment control, access restriction and livestock exclusion;
- The development of a process to review and report on the effectiveness of the performance of the management plan and on any unplanned events which may impact on the offset.

#### **5.4.4.2 Endangered Regional Ecosystems and Threatened Ecological Communities**

EREs proposed to be cleared on the Mining Lease Application area or area with Mining Lease and Surface Area post 2000 and not subject to an existing clearing approval will be offset. Vegetation loss will be offset by habitat restoration and enhancement of a comparable ecosystem in the local area.

Clearings associated with Horse Pit and Horse Creek diversion/dam and Horse Pit and Catchment Dam South may be offset by confining clearing to the pit and creek diversion/dam footprint areas. Vegetation loss may be offset with habitat restoration and enhancement of a comparable ecosystem in the local area.

#### **5.4.4.3 Other remnant vegetation**

Environmental offsets that ensure minimal loss of remnant vegetation types resulting from clearing associated with the Heyford Pit, The CHPP Mine Water Cam 12 North and the dragline, include confining all clearing to the pit, infrastructure, dam and dragline transport route footprint areas. Habitat restoration and enhancement of a comparable ecosystem of remnant vegetation where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetations undisturbed canopy, in the local area, is recommended to achieve no net loss of biodiversity values.

#### **5.4.4.4 Adjacent Vegetation**

Minimising the extent of disturbance caused through the direct damage during construction or alteration of environmental flows and water quality affecting riparian and instream ecosystem integrity for all remnant and non-remnant vegetation types, including riparian vegetation adjacent to the disturbance areas will be achieved through the inclusion of appropriate vegetation and water management measures within the site through the development of an Environmental Management Plan. Restoration of naturally occurring riparian vegetation will offset disturbance to vegetation.

#### **5.4.4.5 Fauna**

Impacts to the Brigalow Scaly-foot (*Paradelma orientalis*), the Yakka Skink (*Egernia rugosa*), the Ornamental Snake (*Denisonia maculata*) will be mitigated through the employment of a spotter/catcher during clearing. Where practical, the retention of log piles will be maintained to provide suitable habitat for the Yakka Skink.

Rehabilitation or restoration/enhancement of comparable habitat in the local area, including the exclusion of livestock will be employed as measures to mitigate impacts from disturbance resulting from construction of the pits and associated infrastructure. Appropriate speed limits for vehicles will be implemented within the site and awareness of wildlife matters will be incorporated in the site induction.

The rehabilitation or restoration/enhancement of suitable woodland with a native grassy understory is recommended for the Australian Painted Snipe (*Rostratula australis*) and the Squatter Pigeon (*Geophaps scripta scripta*) (southern subspecies). The suppression of dust through measures implemented in the EMP will minimise impacts from dust to these species.

The retention of hollow-bearing trees where possible will offset any potential impacts to the Greater Long-eared bat (*Nyctophilus timoriensis*) although this species was not recorded during field studies and there is a low possibility that it is present.

Impacts to the Koala (*Phascolarctos cinereus*) will be mitigated through the employment of a fauna spotter/catcher during clearing where occurrences of koala are likely. Appropriate pest animal management measures will be developed for the site in an Environmental Management Plan, including appropriate speed limits for vehicles within the site and awareness of wildlife matters incorporated in the site induction. BMA will liaise with local Wildlife Carers to ensure that appropriate treatment occurs for injured animals, including young animals rescued from adults, that may have been killed or injured by vehicles or other activities associated with the Project. Dust suppression measures by watering roads and other potential sources within the site will be employed.

#### **5.4.4.6 Feral Species**

The feral cat (*Felis catus*), dingo (*Canis lupus*), red fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*), wild pig (*Sus scrofa*) and feral goat (*Capra hircus*) will be managed through the development of appropriate pest animal management measures in an Environmental Management Plan.

Other feral species such as the Cane Toad (*Bufo marinus*), House Sparrow (*Passer domesticus*), House Mouse (*Mus musculus*), Black Rat (*Rattus rattus*), Brown Hare (*Lepus capensis*), and Donkey (*Equus asinus*) will be managed through the development of appropriate pest animal management measures in an Environmental Management Plan.

#### **5.4.5 Dust management**

Dust suppression measures primarily include the application of water to control dust emissions. This will be implemented through the EM Plan, and will reduce impacts on the following species: Little Pied Bat (*Chalinolobus picatus*); Great Egret (*Ardea alba*); Cattle Egret (*Bubulcus ibis*); White-bellied Sea-eagle (*Haliaeetus leucogaster*); Painted Snipe (*Rostratula benghalensis* s. lat. ) and Latham's Snipe (*Gallinago hardwickii*); Little Curlew (*Numenius minutus*); Marsh Sandpiper (*Tringa stagnatilis*); Common Sandpiper (*Actitis hypoleucos*); Red-necked Stint (*Calidris ruficollis*) and Sharp-tailed Sandpiper (*Calidris acuminata*); White-throated Needletail (*Hirundapus caudacutus*); Fork-tailed Swift (*Apus pacificus*); Rainbow Bee-eater (*Merops ornatus*); Rufous Fantail (*Rhipidura rufifrons*); Black-faced Monarch (*Monarcha melanopsis*); Satin Flycatcher (*Myiagra cyanoleuca*); and the Australian Reed-Warbler (*Acrocephalus australis*).

Dust suppression measures will include:

- Watering of haul roads to best-practice level of more than 2 litres/m<sup>2</sup>/hour of water applied.
- Watering of ROM stockpiles using water sprays and water cannons that are operated on timers. The use of timers avoids the potential for missing a scheduled watering operation. The timers can also be operated manually in particularly hot or windy conditions.
- Fogging system on outlets from transfer points and sizing stations.
- Water sprays on stacker/reclaimer units.
- High moisture content of product coal and reject material as they leave the CHPP which avoids the need for supplementary watering. Immediately after the coal is dewatered in the CHPP, the coal will be above the dust extinction moisture limit (the lower limit at which dust-prone materials will no longer create dust) and so will not be a source of dust.
- Train loadout to incorporate chemical reagent to be sprayed onto the surface of each loaded wagon. This will form a barrier that binds small dust particles together and prevents dust generation from the coal trains as they are transported from Caval Ridge Mine to the port.

In the event that adverse conditions are encountered during operation of Caval Ridge, additional dust suppression measures will have to be implemented. The circumstances where this might be required include pre-strip and overburden dumping operations in the north of Horse Pit and during construction of the CHPP and associated infrastructure.

#### **5.4.6 Aquatic Habitat water storages**

Any freshwater sediment basins constructed on the project site will be developed with the aim of providing aquatic habitat for frogs and migratory waterbirds. Where practicable, the water storages will be designed with shallow perimeters, and rocks or logs placed near the edges to provide basking areas. Where practicable, these basins should be fringed by native grasses and herbs, improving habitat quality for the Squatter pigeon.

#### **5.4.7 Retention of Large Trees**

Where practical, large trees (particularly when bearing hollows) will be retained during construction of the MIA and supporting infrastructure.

#### **5.4.8 Habitat Rehabilitation**

There are a number of opportunities to improve habitat connectivity and quality on the project site as a compensation for the loss of habitat resulting from the project. Available disturbed areas will be strategically rehabilitated to minimise the net loss of vegetative cover, such that:

- Areas of vegetation that are considered significant (i.e. 'endangered' or 'of concern' RE's) and are to be retained on the project site will be identified and have protective fencing and/or signage erected, to restrict access to these areas. These areas will also be maintained and regenerated by way of a weed removal program and a contractors construction environmental management plan and site environmental management plan including specific revegetation plan, which will include methods to ensure long-term viability of these areas; and

- Any freshwater sediment basins constructed on the project site will be developed with the aim of providing aquatic habitat for frogs and migratory waterbirds. Where practicable, the water storages will be designed with shallow perimeters, and rocks or logs placed near the edges to provide basking areas. Where practicable, these basins should be fringed by native grasses and herbs, improving habitat quality for the Squatter pigeon.

#### **5.4.9 Ongoing Monitoring of Flora and Fauna**

Given the presence of flora and fauna of conservation significance within and surrounding the study area, a contractors construction environmental management plan and site environmental management plan including will be developed, including a flora and fauna monitoring program. The monitoring program will include:

- Monitoring the protection of Endangered and Of concern REs. Pre-clearing checks will be undertaken and the vegetation to be retained will be fenced off to avoid construction impacts;
- Monitoring the revegetation of Endangered and Of concern REs;
- Seasonal monitoring of birds, in particular the extent and distribution of the southern squatter pigeon population on-site and monitoring the use of the mining lease and surrounding areas by migratory species; and
- Weed and pest monitoring.

BMA has developed and provided to the DEWHA a database for recording observations of the southern squatter pigeon. Monitoring data collected by or on behalf of BMA is provided to DEWHA annually to allow the database to be updated.

## 6 Conclusion

The following matters of national environmental significance were identified for the Caval Ridge Coal Mine:

- RE 11.4.8 - Brigalow (*Acacia harpophylla* Dominant and Co-dominant) Community
- RE 11.4.9 – Brigalow (*Acacia harpophylla*) and Yellowwood (*Terminalia oblongata*) woodland
- RE 11.8.11 – Bluegrass (*Dichanthium sericeum*) grassland on Cainozoic igneous rocks
- RE 11.9.5 - Brigalow (*Acacia harpophylla* Dominant and Co-dominant) Community
- Southern Squatter Pigeon
- Australian Painted Snipe
- Greater Long-eared Bat
- Yakkay Skink
- Brigalow Scaly-foot
- Ornamental Snake
- 19 migratory species potentially using the study area

The combined strategies put forward in this report, which include offsetting of cleared EECs and associated habitat (through the restoration and enhancement of a comparable ecosystem in the local area), management of threatening processes within retained habitats, control of pest vertebrates and weeds, assisted natural regeneration and active rehabilitation, and ongoing flora and fauna monitoring are considered adequate to mitigate the adverse impacts of the proposed action on matters of national environmental significance.

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