



BHP Billiton Mitsubishi Alliance

CVM-PLN-0019

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Caval Ridge Mine

Threatened Flora, Fauna and Ecological Communities Management Plan



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Abbreviations

ABBREVIATION	DESCRIPTION
BMA	BM Alliance Coal Operations Pty Ltd
Brigalow EEC	Term used to collectively refer to all vegetation that meets the definition of the Brigalow (Acacia harpophylla dominant and co-dominant) endangered ecological community under the EPBC Act. This definition encompasses a number of Queensland Regional Ecosystems.
CHPP	Coal Handling and Preparation Plant
Caval Ridge Mine	Caval Ridge Mine includes Caval Ridge Mine and the associated accommodation village and services corridor
DEHP	Queensland Department of Environment and Heritage Protection
EA	Environmental Authority, as issued by DEHP
EEC	Endangered Ecological Community, as defined under the EPBC Act
EIS	Environmental Impact Statement
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
MIA	Mining Industrial Area
ML	Mining Lease
Mt/a	Million tonnes per annum
NC Act	Queensland <i>Nature Conservation Act 1992</i>
RE	Regional Ecosystem. REs are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
SDPWO Act	Queensland <i>State Development and Public Works Organisational Act 1997</i>
SEWPAC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities. Now known as the Department of the Environment.
The Plan	Threatened Flora, Fauna and Ecological Communities Management Plan
VM Act	Queensland <i>Vegetation Management Act 1999</i>



1.0 Introduction

BM Alliance Coal Operations Pty Ltd (BMA) Caval Ridge Mine (CVM) is an open cut coal mine situated south-west of Moranbah in the Bowen Basin and approximately 160 km south-west of Mackay, Queensland. The northern most boundary of the mine will be approximately 6 km from Moranbah, while the mine industrial area (MIA) and coal handling and preparation plant (CHPP) will be about 16 km from Moranbah.

The Caval Ridge Mine is approximately 17 km long and 4 km wide (excluding the rail spur and overland conveyor). The mine is located in the northern section of the existing Mining Lease (ML) 1775, with Harrow Creek acting as the southernmost boundary.

Caval Ridge Mine includes a coal mine and coal handling and processing infrastructure to produce 11 Million tonnes per annum (Mtpa) of hard coking coal for the export market over a life of approximately 30 years. The Caval Ridge deposit is north of the Peak Downs coal mine (managed by BMA) and is intersected by the Peak Downs Highway. The location of the mine is shown in Figure 1.

Mining activities will include clearing vegetation, topsoil stripping, removing overburden to in pit and out-of-pit spoil dumps, coal mining and progressive rehabilitation.

Mining and cattle grazing are the predominant land uses within the Bowen Basin region. The northern section of Caval Ridge Mine has been partially cleared for grazing, while the southern section was previously mined. The landscape quality of the Caval Ridge Mine has been significantly altered by agricultural land uses over many years and more recently by open cut mining.

BMA also operate Buffel Park accommodation village, which accommodates up to 1200 people (see Figure 2). The Buffel Park accommodation village is located approximately 20km south of the township of Moranbah, adjacent to Peak Downs Highway. It is situated on approximately 85ha of BMA owned agricultural land. The village will include accommodation buildings and associated shared facilities. The accommodation village will be serviced by an onsite water treatment plant, a sewage treatment plant and a 66/11kV sub-station.

A services corridor associated with the accommodation village is located on BMA properties, both on and off mine lease, adjacent to Peak Down Highway. It spans from the accommodation village and heads in a north-eastern direction towards the intersection of Peak Downs Highway and Winchester Road (see Figure 5).

For the purpose of the Threatened Flora, Fauna and Ecological Communities Management Plan (the Plan) - – Caval Ridge Mine includes Caval Ridge Mine, accommodation village and the associated services corridor.

Caval Ridge Mine has been subject to assessment and approval process under Commonwealth and Queensland legislation.

Commonwealth approval for Caval Ridge Mine, under section 130 (1) and 133 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was granted on 18 March 2011 by the Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) (now the Department of the Environment). The relevant approval conditions are detailed in Section 2.1.1

State approval for Caval Ridge Mine, under section 35 of the *State Development and Public Works Organisational Act 1997* (SDPWO Act) was granted by the Queensland Coordinator General in August 2010. The subsequent approval of a change request for the accommodation villages was approved by the Queensland Coordinator General in February 2011. Relevant conditions of approval are detailed in Section 2.1.2



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aval Ridge Mine – CVM-PLN-0019

Threatened Flora, Fauna and Ecological Communities Management Plan



The Plan has been prepared by BMA to meet the requirements of relevant conditions under both the Commonwealth and Queensland government approvals.



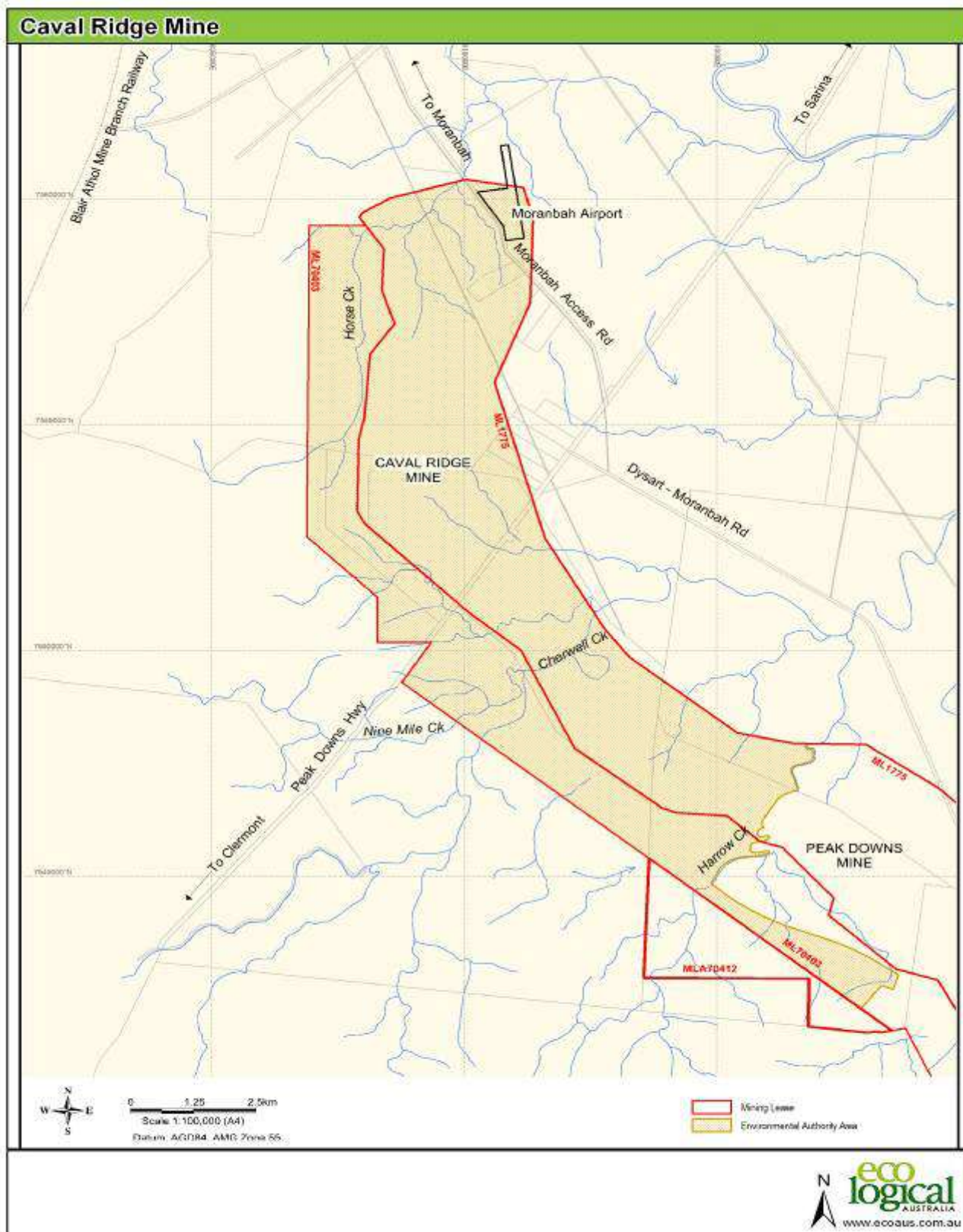


Figure 1: Location of the Caval Ridge Mine

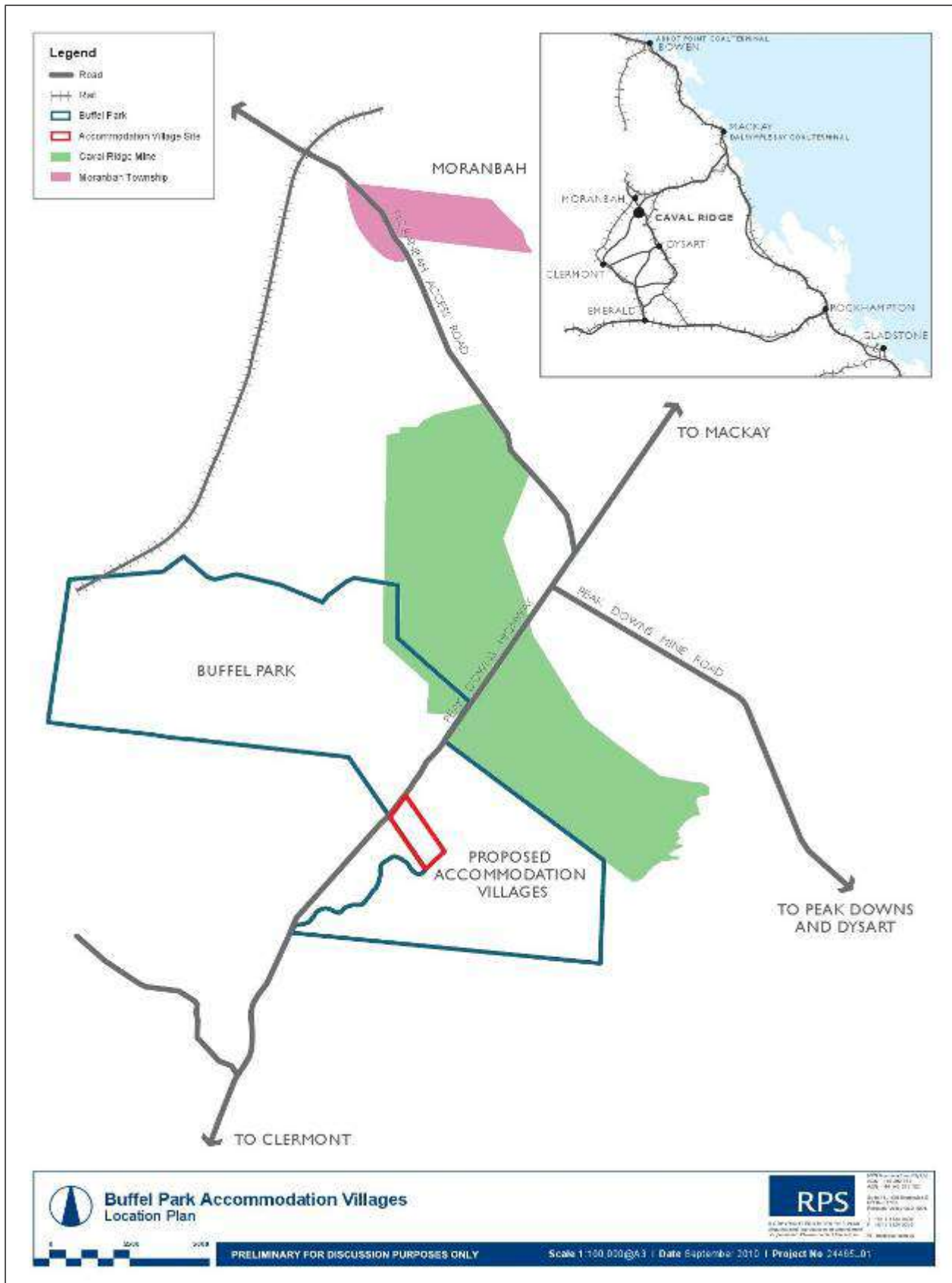


Figure 2: Location of the Buffel Park Accommodation Villages



2.0 Background

This section details the legislative requirements that have shaped this Plan and also provides a brief description of the existing environment at the Caval Ridge Mine, associated accommodation village and service corridor.

Prior to the commencement of mining activities, Caval Ridge Mine site was mainly cleared or disturbed land and cattle grazing was the predominate land-use. Subsequently the area had suffered significant weed infestation, although some patches of remnant vegetation still persisted. Caval Ridge Mine had been degraded by exotic pasture species which had resulted in the suppression and exclusion of native species.

The accommodation village was constructed on land highly modified through historical land-use, which had included extensive vegetation clearing. As a result the area was described as open woodland to shrubland, with minor weed infestation and grazing disturbances.

The services corridor had been modified through historical land-use and was predominately grazing land and open woodland.

2.1 Legislative requirements

Caval Ridge Mine was subject to an assessment and approval process under Commonwealth and Queensland legislation. Approvals were granted under both jurisdictions, and are detailed below.

2.1.1 Commonwealth Government approval conditions

The management principles outlined in this Plan have been designed to meet the requirements of the Commonwealth Government's approval conditions for Caval Ridge Mine. Commonwealth approval for Caval Ridge Mine, under the EPBC Act, was granted by SEWPAC in March 2011. Table 1 details the EPBC Act approval conditions relevant to this Plan.

Table 1: SEWPAC approval conditions relevant to this Plan

Conditions of Approval – Caval Ridge Coal Mine (EPBC 2008/4417)	
Condition 4	<p>Before commencement of operations (excluding early works), the person taking the action must submit to the Minister for approval a "Threatened Flora and Fauna Species and Ecological Communities Management Plan". The Plan must contain, but is not limited to, the following:</p> <ul style="list-style-type: none"> a. Management actions relating to EPBC listed species and ecological communities; and b. Mitigation actions relating to EPBC listed species and ecological communities. <p>The approved Threatened Flora and Fauna and Ecological Communities Management Plan must be implemented. Any changes to the Threatened Flora and Fauna and Ecological Communities Management Plan must be approved by the Minister and approved variations to the Plan must be implemented. This Plan may be made publically available on the internet by the Department.</p>



2.1.2 Queensland Government approval conditions

This Plan has also been designed to meet the requirements of the Queensland Government's approval conditions for Caval Ridge Mine. State approval for Caval Ridge Mine, under the SDPWO Act was granted by the Queensland Coordinator General in August 2010. The subsequent approval of the associated accommodation village was approved by the Queensland Coordinator General in February 2011. The Coordinator General's conditions relating to the Plan are detailed below in Table 2.

Table 2: Coordinator General's Conditions

Conditions of the Coordinator General – Caval Ridge Coal Mine	
Condition	CG Report August 2010
3(b)	<p>The proponent must prepare to the satisfaction of DERM and DEWHA a 'Threatened Flora and Fauna Species and Ecological Management Plan' that:</p> <ol style="list-style-type: none"> ensures the impacts to these species and communities are minimised contributes to the survival of these species in the wild, and achieves conservation benefits for these species and communities where practicable.
3(c)	<p>As a minimum, the plan in (b) should include:</p> <ol style="list-style-type: none"> affected species listed as endangered, vulnerable or rare under the <i>Nature Conservation Act 1994</i> affected species listed by DERM on its 'Back on Track' systems that are identified as in decline and have a good potential for recovery management measures addressing the threatened species listed in the 'controlling provisions' for the CRM under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act). the proponent's commitments to implement management measures to further mitigate the impacts of mining activities on ecological values the additional and on-going management activities to mitigate impacts to native vegetation communities outlined in chapter 8 of the CRM EIS and section 5.4 of the 'EPBC Matters Report' in Appendix C2 of the CRM EIS how the proponent will satisfy the requirements of section 332 of the <i>Nature Conservation (Wildlife Management) Regulation 2006</i> relating to tampering with animal breeding places a commitment to provide information on flora and fauna management actions for significant species for inclusion in DERM's 'Recovery Actions Database' when that framework is finalised and becomes operational.
3(d)	The plan in (b) should be provided to DERM and DEWHA for review at least 28 days prior to commencement of any construction activity, for the CRM project other than early road works.
Condition	CG Change Report 1
Ecology 1	<p>The proponent must submit a threatened flora and fauna species and ecological communities management plan for approval by the Department of Environment and Resource Management prior to the commencement of any works that:</p> <ol style="list-style-type: none"> ensures the impacts to these species and communities are minimised contributes to the survival of these species in the wild achieves conservation benefits for these species and communities where practicable.
Ecology 2	<p>As a minimum, the plan in Ecology Condition 1 should include:</p> <ol style="list-style-type: none"> a list of species listed as endangered, vulnerable or rare under the <i>Nature Conservation Act 1994</i> that may be impacted a KMZ map that identifies GPS positions significant species as listed under the <i>Nature Conservation Act 1994</i> in the clearing footprint and its surrounds affected species listed by the Department of Environment and Resource Management on its 'Back on Track' systems that are identified as in decline and have a good potential for recovery the additional and ongoing management activities to mitigate impacts to native vegetation communities how the proponent will satisfy Section 332 of the <i>Nature Conservation (Wildlife Management) Regulation 2006</i> relating to tampering with animal breeding places management of affected fauna during construction and operation phases a commitment to provide information on the flora and fauna management actions for significant species for inclusion in the Department of Environment and Resource Management's 'Recovery Actions Database' when that framework is finalised and becomes operation a commitment to submit a clearing permit for approval by the Department of Environment and Resource Management should an endangered, vulnerable or near threatened plant listed under the <i>Nature Conservation Act 1994</i> be identified in the clearing footprint.



2.1.3 Environmental Policy

Caval Ridge Mine is committed to the protection and management of the environment and operational activities will be performed in a manner that prevents pollution, promotes sustainability and minimises environmental impacts to native flora, fauna and ecological communities. Caval Ridge Mine has adopted a zero harm policy and will be undertaken in accordance with BHP Billiton's Charter Values.

This commitment is achieved by:

- continual improvement of environmental performance;
- timely and effective responses to non-conformance issues;
- ongoing environmental awareness training for all Caval Ridge Mine employees; and
- regular monitoring, auditing and reviewing of compliance with this Plan, applicable legislation, regulations and environmental authorities.

3.0 Purpose of this Plan

This Plan has been prepared to describe the management actions that will be implemented to mitigate impacts on significant flora, fauna and ecological communities.

The aim of the plan is to ensure that impacts to significant species and/or communities are minimised. In particular, the plan aims to:

- contribute to the survival of the species or community in the wild;
- achieve conservation benefits and maintain the ecological value of a species or community;
- protect and conserve threatened species and communities and the regional biodiversity value;
- describe the responsibilities and actions required during operations to maintain compliance with environmental requirements, commitments, and to address unanticipated discoveries;
- develop management practices for flora and fauna protection and conservation; and
- provide a framework for inspections and monitoring to evaluate compliance with flora and fauna protection requirements.

This Plan relates to the operational activities of Caval Ridge Mine, Buffel Park Accommodation Village and supporting infrastructure and services (eg. roads, powerlines, water and electricity).



4.0 Roles and Responsibilities

The Caval Ridge Mine General Manager is responsible for the implementation of the Plan (Table 3).

Table 3: Roles and Responsibilities

Title	Company	Roles and Responsibilities
General Manager	BMA	Responsible for providing adequate resources for the implementation of the Threatened Flora, Fauna and Ecological Communities Management Plan.
Environmental Representatives	BMA	Responsible for coordinating the day to day implementation of the Threatened Flora, Fauna and Ecological Communities Management Plan in consultation with the relevant Government Departments. Shall ensure that personnel involved in the implementation and monitoring of the values and activities in the Threatened Flora, Fauna and Ecological Communities Management Plan are suitably qualified to perform the task(s).
Ecology specialists (Botanists, Zoologists and Ecologists)	A suitably qualified and experienced person	Responsible for providing expertise in relation to the management and conservation of flora, fauna (including their habitat) and ecological communities.

5.0 Existing environment and impacts

The information provided below is based on the information presented in the EIS, the Supplementary EIS and associated ecological reports for the Caval Ridge Mine, the associated accommodation villages and service corridor.

5.1 Ecological Communities and Regional Ecosystems

A total of 20 Regional Ecosystems (RE's) have been identified as potentially occurring within Caval Ridge Mine. Of these, 14 have been or will be disturbed as a result of Caval Ridge mining activities. These RE's are outlined below in Table 4.

Of the 14 RE's that have been or will be disturbed by Caval Ridge Mine, five are encompassed by endangered ecological communities (EEC) under the EPBC Act. The EECs relevant to Caval Ridge Mine are as follows:

Brigalow (*Acacia harpophylla* dominant and co-dominant)

The Brigalow (*Acacia harpophylla* dominant and co-dominant) 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 as endangered under the EPBC Act and is relevant to Caval Ridge Mine is defined by reference to four REs, 11.4.3, 11.4.9, 11.9.5 and 11.4.8, all of which are listed as Endangered under the Queensland *Vegetation Management Act 1999* (VM Act). The Brigalow EEC is known to occur at various locations across Caval Ridge Mine (see Figures 3 and 4).



Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin

The Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin (Natural Grasslands EEC) 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 RE relevant to Caval Ridge Mine that contains the Natural Grasslands EEC that has been listed as Endangered under the EPBC Act is RE: 11.8.11, which is listed as Of Concern under the VM Act. The Natural Grasslands EEC is known to occur at various locations across Caval Ridge Mine (see Figure 3).

Table 4: Impacts to Significant Vegetation Communities Recorded at Caval Ridge Mine.

RE Code	Vegetation Description (Short)	Vegetation Management Act Status	EPBC Status	Area to be impacted (ha)
11.7.1	<i>Eucalyptus thozetiana</i> Woodland on slopes of rocky residual ranges with Cainozoic lateritic duricrust	Least concern		13.1
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	Least concern		110.2
11.10.3	<i>Acacia catenulate</i> or <i>A. Shirleyi</i> open forest on coarse-grained sedimentary rock. Crests and scarps.	Least concern		7.9
11.4.3	Open-forest dominated by <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i>	Endangered	Endangered	4.6
11.10.4	<i>Eucalyptus crebra</i> , <i>Corymbia aureola</i> , <i>C. Clarksoniana</i> and/or <i>Acacia shireyi</i> woodland. Small areas that occur in conjunction with <i>E. Decorticans</i> woodland.	Least concern		31.3
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	Least concern		225.9
11.8.5	<i>Eucalyptus orgadophila</i> open woodland on Cainozoic igneous rocks	Least concern		27.3
11.8.11	<i>Dichanthium sericeum</i> grassland on Cainozoic igneous rocks	Of concern	Endangered	124.6
11.4.9	<i>Acacia harpophylla</i> shrubby open forest to woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	Endangered	Endangered	17.8
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	Of concern		248.6
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland in Cainozoic clay plains	Least concern		31.5
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest to woodland on fine grained sedimentary rock.	Endangered	Endangered	3.9
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	8.2
11.4.2	<i>Eucalyptus</i> spp. and/or <i>Corymbia</i> spp grassy or shrubby woodland on Cainozoic clay plains	Of concern		4.5

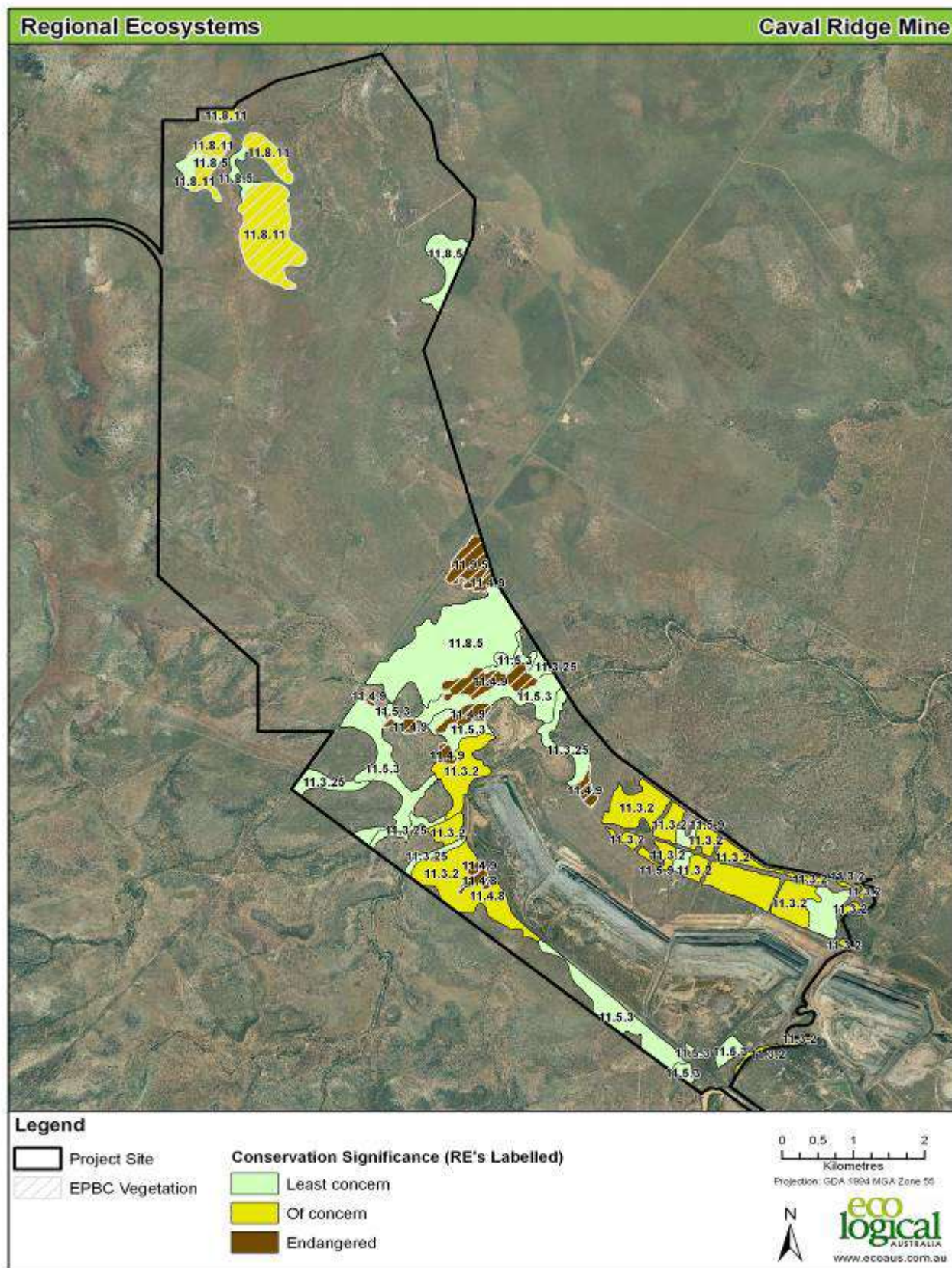


Figure 3: RE's and EEC at the Caval Ridge Mine

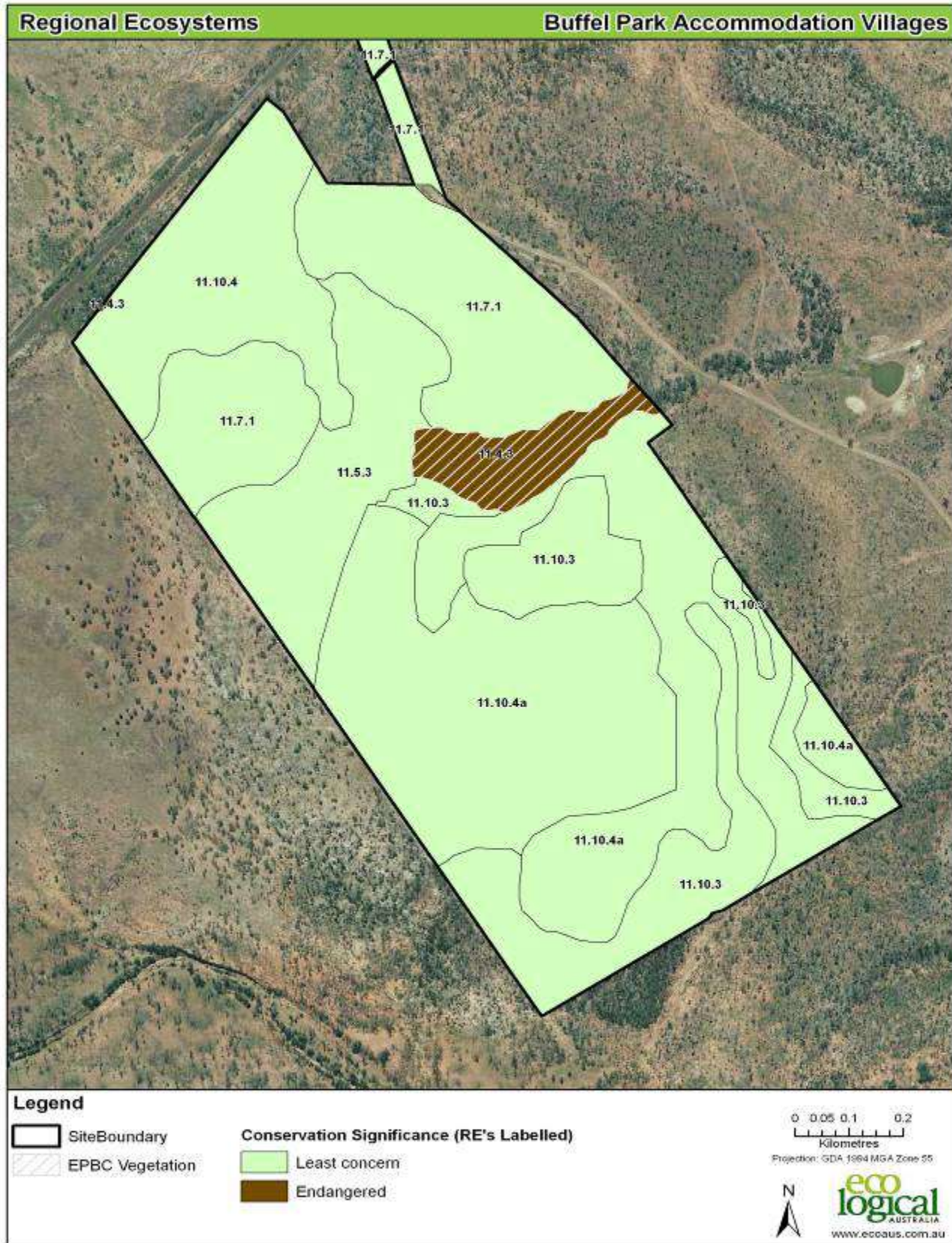


Figure 4: RE's and EEC's within the Buffel Park Accommodation Village



Figure 5: RE's and EEC's within the Services Corridor



5.2 Threatened Flora

No significant flora species listed under the EPBC or NC Acts were recorded within Caval Ridge Mine. However, two species listed under the EPBC and NC Acts were identified as having potential to occur. These species are:

- King Bluegrass (*Dichanthium queenslandicum*) – Vulnerable EPBC Act, Vulnerable NC Act.
- Finger Panic Grass (*Digitaria porrecta*) – Endangered EPBC Act, Rare NC Act.

Although neither species has ever been recorded on site, there is a reasonable probability of occurrence on site in RE 11.8.5 and 11.8.11.

King Bluegrass (*Dichanthium queenslandicum*)

King Blue-grass is listed as Vulnerable under both the EPBC and NC Act. It grows in heavy black soil, open downs or blue grass open downs with scattered Bloodwood on black cracking clay. Although this species was not recorded within Caval Ridge Mine, suitable habitat is known to occur.

Finger Panic Grass (*Digitaria porrecta*)

Finger Panic Grass is listed as Endangered under the EPBC Act and Rare under the NC Act. It occurs in grasslands on extensive basaltic plains and in undulating woodland and open forests. Although this species was not recorded within Caval Ridge Mine, suitable habitat is known to occur.

Given that no flora species listed under the NC Act were recorded within Caval Ridge Mine, it can be concluded that no flora species listed by the Department of Environment and Heritage Protection (DEHP) on its 'Back on Track' systems as a priority species will be affected by operational activities.

5.3 Threatened Fauna

A number of significant fauna species have been identified as having potential to occur or being known to occur at Caval Ridge Mine, including, one species listed as Endangered under both the EPBC and NC Acts, seven species listed as Vulnerable under both the EPBC and NC Acts, 3 species listed as Rare under the NC Act, and one species listed as Endangered under the NC Act (see Table 5).

The significant fauna species relevant to Caval Ridge Mine that are listed under the NC Act also have a priority ranking under the DEHP 'Back on Track' species prioritisation framework (the Framework). The Framework is an initiative that prioritises Queensland's native species (marine, terrestrial and aquatic species of flora and fauna) to guide conservation, management and recovery.

The Framework is designed to prioritise all species, regardless of their current classification under the NC Act or the EPBC Act. The aim is to better reflect the level of management required to conserve Queensland's native wildlife. Species are prioritised using multiple criteria, to allow the identification of species that are in trouble, and those which have the greatest chance of recovery.

The process identifies common threats and actions that affect a range of species, this encourages a multi-species or landscape approach to conservation as well as opportunities for cross regional projects. Species are ranked in order of priority as 'Critical', 'High', 'Medium' or 'Low'. The priority rankings of the species relevant to Caval Ridge Mine are shown in Table 5. Of these species, one species has been ranked as a High priority, eight as Medium priority and 3 as Low priority.



Impacts to a threatened fauna species as a result of Caval Ridge mining activities are not considered likely and it is not expected that those species listed under the Framework as in decline but with a good potential for recovery will be impacted.

Through the implementation of management and mitigation measures (see Section 6) and through the provision of an offset, Caval Ridge Mine will provide conservation benefits for threatened fauna species and therefore increase the chance of recovery for those species listed under the Framework.

Table 5: Significant Fauna Species Relevant to Caval Ridge Mine

Species	NC Act Status	EPBC Act Status	Location	Likelihood of Occurrence
Squatter Pigeon (<i>Geophaps scripta</i>)	Vulnerable (M)	Vulnerable	C / A	Known
Australian Painted Snipe (<i>Rostratula australis</i>)	Vulnerable (M)	Vulnerable	C / A	Potential
Little Pied Bat (<i>Chalinolobus picatus</i>)	Rare (M)		C	Known
Ornamental Snake (<i>Denisonia maculata</i>)	Vulnerable (M)	Vulnerable	C	Known
Brigalow scaly-foot (<i>Paradelma orientalis</i>)	Vulnerable (M)	Vulnerable	C / A	Potential
Allan's Ierista (<i>Erista allanae</i>)	Endangered (H)	Endangered	A	Potential
Yakka skink (<i>Egernia rugosa</i>)	Vulnerable (M)	Vulnerable	C / A	Potential
Cotton Pygmy-Goose (<i>Nettapus coromandelianus albiguttatus</i>)	Rare (L)		C / A	Potential
Black-necked Stork (<i>Ephippiorhynchus asiaticus</i>)	Rare (L)		A	Potential
Troughton's Sheath-tail-bat (<i>Taphozous troughtoni</i>)	Endangered (L)		C	Known
Greater Long-eared Bat (South-eastern) (<i>Nyctophilus timoriensis</i>)	Vulnerable (M)	Vulnerable	C / A	Potential
Dunmall's Snake (<i>Furina dunmali</i>)	Vulnerable (M)	Vulnerable	A	Potential

C = Caval Ridge Coal Mine Site. A = Accommodation Villages

H = Ranked as a high priority under the DEHP 'Back on Track' species prioritisation framework.

M = Ranked as a medium priority under the DEHP 'Back on Track' species prioritisation framework.

L = Ranked as a low priority under the DEHP 'Back on Track' species prioritisation framework.

Although twelve species have been identified as having potential to occur, only four species were recorded within the vicinity of the Caval Ridge Mine Site. No significant species were recorded within the vicinity of the proposed accommodation villages or services corridor.

The four species recorded within the vicinity of the Caval Ridge Mine Site are as follows:

Squatter Pigeon (*Geophaps scripta*)

The Squatter Pigeon is listed as Vulnerable under both the EPBC and NC Acts. The range of the squatter pigeon extends from Cape York Peninsula south through Central Queensland to northern inland NSW. Over 100 records of this species have been made in the Brigalow Belt South Bioregion (DERM 2011).

During the 2008 surveys, squatter pigeons were observed on a number of occasions at the Caval Ridge Mine site, usually as single individuals and never in groups of more than three individuals, though two pairs were recorded in very close proximity (see Figure 6). 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 (Woinarski and Catterall 2004).

Little Pied Bat (*Chalinolobus picatus*)

The Little Pied Bat is listed as Rare under the NC Act. The species is typically found in dry habitats including open forests, woodland, and mulga woodlands. There are numerous anabat survey records from the Brigalow remnant adjacent to the boundary of the Peak Downs Mine with Saraji Mine (Ecoserve and LAMR 2005). Surveys in 2008, also recorded (using anabat surveys) the species from three locations within Caval Ridge Mine (see Figure 6), all in or near woodland with Brigalow. Whilst the species is not expected to regularly use Caval Ridge Mine area, surveys have confirmed that the species may occur within a variety of habitats types that are known to occur within Caval Ridge Mine. Current threats to this species include habitat clearance, fragmentation and loss of potentially important roosting locations such as mine shafts or caves.

Ornamental Snake (*Denisonia maculata*)

The ornamental snake is listed as Vulnerable under both the EPBC and NC Acts. It is found in the Dawson and Fitzroy River drainages of central coastal Queensland (Ehmann 1992).

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.

Two ornamental snakes were recorded on the adjacent Peak Downs Mine during a nocturnal search. The location included known habitat characteristics for this species of inundated gilgaies and Brigalow on deep-cracking clays. Additional targeted searches failed to locate any more individuals (Ecoserve and LAMR 2005) within Caval Ridge Mine area. However, 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.

Troughton's Sheathtail-bat (*Taphozous troughtoni*)

The Troughton's Sheathtail-bat is listed as Endangered under the NC Act. It is known from three locations near Mount Isa and was considered to be restricted to this area. More recently, however, the species has been found to occur throughout much of south-eastern and central Queensland. The Troughton's Sheathtail-bat roosts in caves and abandoned mines and has been recorded from hills with open woodland and Spinifex.

The only records of the species occurring within Caval Ridge Mine are previous anabat records for Cherwell Creek (see Figure 6). Cherwell Creek runs through the Caval Ridge Mine. Although the species has previously been recorded, it is not expected that it would regularly use Caval Ridge Mine.

Although the following species were not recorded, they have been identified as having potential to occur within Caval Ridge Mine:

Australian Painted Snipe (*Rostratula australis*)

The Australian painted snipe is listed as Vulnerable under both the EPBC and NC Acts. It 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.



The species 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.

Although there are no actual database records for or nearby, 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 Caval Ridge Mine 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. Caval Ridge Mine and immediate surrounds are not, however, likely to provide breeding resources and any occurrence is likely to be sporadic at best.

Brigalow scaly-foot (*Paradelma orientalis*)

The Brigalow scaly-foot is listed as Vulnerable under both the EPBC and NC Acts. The majority of records for the species are from the Brigalow Belt North bioregion.

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).

Ecoserve and LAMR (2005) report that Brigalow and Eucalypt communities within the south-eastern area of the adjacent Peak Downs Mine 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. This area is just outside of the area of proposed disturbance. No Brigalow scaly-foot have been recorded within Caval Ridge Mine.

Allan's lerista (*Erista allanae*)

Allan's lerista is listed as Endangered under both the EPBC and NC Acts. The species is found in the root systems of grass tussocks on black soils.

It is known to occur in open grasslands, scattered gums and occasional bottle trees on black and red soil. Although the species has not been recorded within Caval Ridge Mine, a small amount of suitable habitat occurs within the site for the accommodation villages. As such, there is a possibility that the species may occur. However, this is considered unlikely.

Yakka skink (*Egernia rugosa*)

The yakka skink is listed as Vulnerable under both the EPBC and NC Act. It is endemic to Queensland, occurring from Cape York Peninsula to the St. George area in the Southern Brigalow Belt (Drury 2001; Wilson 2005).

Yakka skinks live in colonies, occupying communal burrows, often under dead timber or deep rock crevices. 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.



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 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.

Cotton Pygmy-Goose (*Nettapus coromandelianus albigennis*)

The Cotton Pygmy-Goose is listed as Rare under the NC Act. The species is almost entirely aquatic and prefers freshwater wetlands with abundant floating and submerged aquatic vegetation. The species is known to nest in the hollows of dead trees next to deep swamps. There are previous survey records for this species from a few locations within the vicinity of Caval Ridge Mine. However, the presence of this species in these areas is subject to the presence of aquatic vegetation which can vary seasonally. The species is sensitive to drainage of wetlands and the invasion of weed species. Although it has not been recorded from within Caval Ridge Mine, if conditions are suitable it may utilise some of the dams within Caval Ridge Mine.

Black-necked Stork (*Ephippiorhynchus asiaticus*)

The Black-necked Stork is listed as Rare under the NC Act. It occurs in terrestrial wetlands, estuaries, littoral habitats and, occasionally, grasslands. The species is widespread throughout northern and eastern Australia and occurs through much of Queensland. The Black-necked Stork has the potential to occur occasionally within areas of Caval Ridge Mine, including the shallow margins of wetlands and may utilise small dams scattered throughout the grazing land north of Cherwell Creek. These waterbodies only provide a very limited habitat resource for the species. The major threats to this species include collision with powerlines, loss of nesting trees and wetland habitat.

Greater Long-eared Bat (South-eastern) (*Nyctophilus timoriensis*)

The greater long-eared bat is listed as Vulnerable under both the EPBC and NC Acts. It occurs across southern Australia, including Tasmania, but avoids coastal regions on the south-eastern mainland (NPWS 2003).

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).

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 Caval Ridge Mine. It is therefore unlikely that the greater long-eared bat is present on Caval Ridge Mine. However, sporadic use of the study area by any individuals possibly present in the local area cannot be discounted.

Dunmall's Snake (*Furina dunmalli*)

The Dunmall's Snake is listed as Vulnerable under both the EPBC and NC Acts. The species is known to occur in Brigalow forest and woodland with fallen timber and ground litter present. Although the species has not been recorded within Caval Ridge Mine, a small amount of suitable habitat occurs within the site for the accommodation village. As such, there is a possibility that the species may occur. However, this is considered unlikely given the highly disturbed nature of the site.

As a requirement of Section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006*, a person must not, without a reasonable excuse, tamper with an animal breeding place that is being used by a protected animal. Caval Ridge Mine is not known to contain suitable breeding habitat for any protected animals. As such, it is not likely that a breeding place of a protected species within Caval Ridge Mine will be tampered with. To ensure



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that breeding places immediately outside or adjacent to Caval Ridge Mine are not impacted, a range of mitigation measures such as dust suppression, and fencing will be implemented.



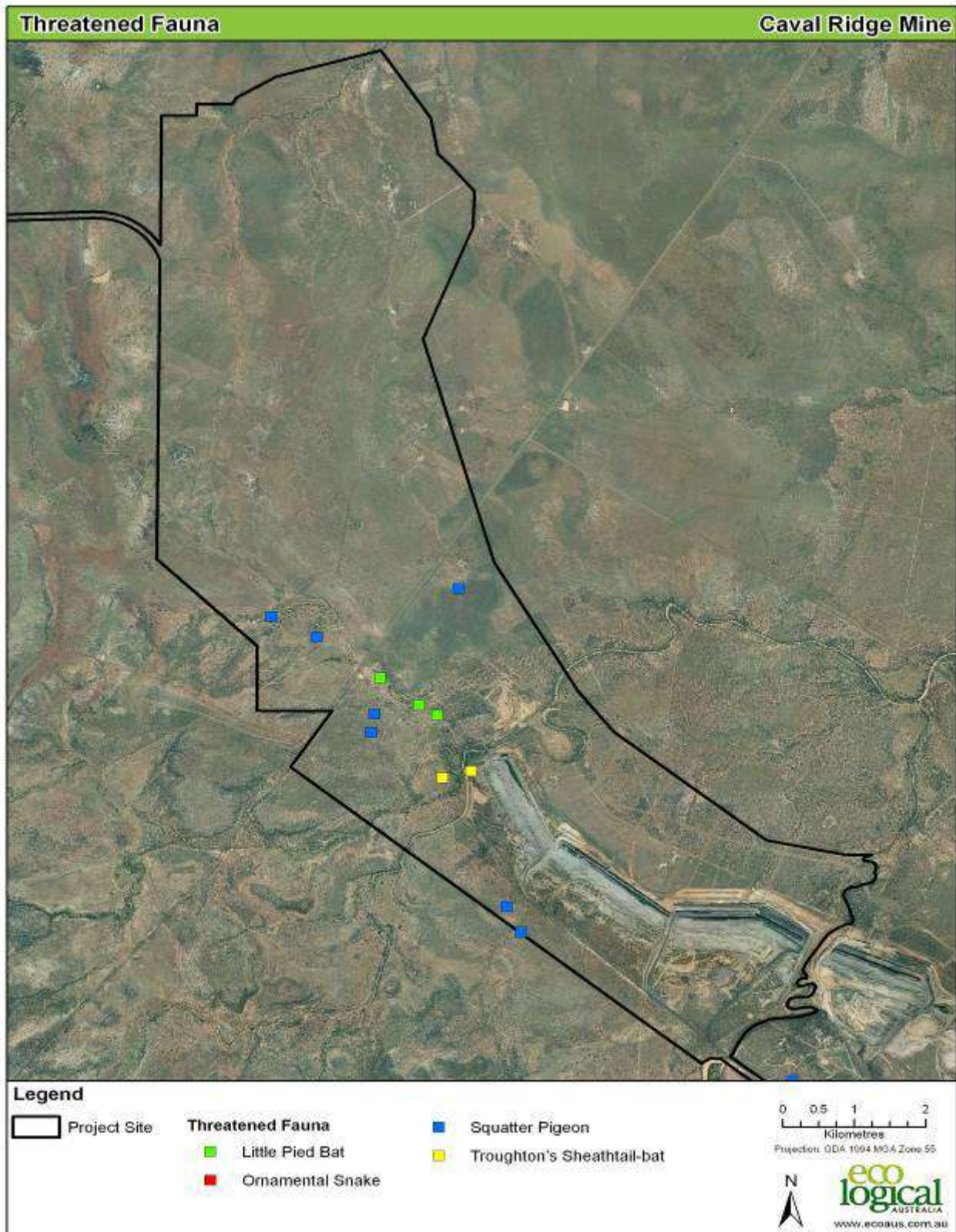


Figure 6: Significant Fauna within the Caval Ridge Mine Site



6.0 Management Actions and Mitigation Measures

The following management actions and mitigation measures have been designed to ensure that potential impacts to native flora, fauna and ecological communities associated with the operation of Caval Ridge Mine are minimised. They aim to contribute to the survival of these species and ecological communities in the wild and provide an overall conservation benefit.

Management actions and mitigation measures have been developed with the DEHP - hierarchy of rehabilitation objectives in mind. This hierarchy, developed specifically for mining projects is listed below in order of decreasing capacity to prevent or minimise environmental harm:

- avoid disturbance that will require rehabilitation;
- reinstate a natural ecosystem as similar as possible to the original ecosystem;
- develop an alternative outcome with a higher economic value than the previous land use;
- reinstate previous land use;
- develop lower value land use;
- leave the site in an unusable condition or with a potential to generate future pollution or adversely affect environmental values; and
- leave the site in an unusable condition or with a potential to generate future pollution or adversely affect environmental values.

As mention above in Section 5, a number of RE's listed under the VM Act and EEC's listed under the EPBC Act have been or will potentially be disturbed as a result of the construction and operation of Caval Ridge Mine. As such, a range of mitigation measures have been developed. These measures will be implemented to ensure that impacts are kept to a minimum and that the Caval Ridge Mine operations do not adversely affect the survival of these communities.

Although a range of mitigation measures and management actions will be implemented as part of operational activities, given the level of unavoidable impacts to some ecological communities, BMA have committed to providing an environmental offset to compensate for the loss of these communities. Detailed information regarding the offset is contained within the Caval Ridge Offset Management Plan. The offset will provide habitat for a number of threatened flora and fauna species and contain a number of RE's and ECC.

In addition to the impacts to ecological communities, a number of threatened flora and fauna species have been recorded within Caval Ridge Mine or as having potential to occur. Although direct impacts to threatened flora or fauna species are not considered likely, given the potential for a number of species to occur within Caval Ridge Mine, a range of mitigation measures and management actions aimed at minimising impacts to threatened species have also been developed.

Mitigation measures will be implemented to ensure that potential impacts are kept to a minimum and that the operational activities do not adversely affect the survival of a threatened species or community. They have also been designed to provide a conservation benefit where possible, through the enhancement of habitat and through the provision of an offset. The offset for Caval Ridge Mine captures areas of vegetation that take into account habitat for significant fauna, flora and ecological communities.

Given the range of management actions and mitigation measures outlined below, it is not expected that the Caval Ridge Mine will have an adverse effect on the ecological value of a threatened species or community.



6.1 Operational Activities

During operational activities at Caval Ridge Mine, BMA will implement the following general mitigation and management measures to reduce impacts on RE's, EEC's and threatened flora and fauna to levels that will not cause permanent harm to significant species or community:

Land and Biodiversity Management Plan (LBMP)

The CVM LBMP has been developed to identify the potential environmental risks from land use and ensure an acceptable level of impact to biodiversity. It covers managing impacts to RE's, EEC's and threatened flora and fauna, including a range of measures aimed at reducing on-going impacts to threatened species and communities that are associated with operational activities.

Vegetation Clearing

Vegetation clearing shall be undertaken in accordance with the CVM Environmental Authority EPML00562013 (EA) and the BMA Permit to Disturb Procedure.

Prior to Clearing Activities

All unnecessary clearing shall be avoided and significant areas of remnant vegetation shall be retained where possible. Prior to the commencement of any disturbance:

- An application for a Permit to Disturb form shall be completed and submitted to the Advisor Environment in accordance with the BMA Permit to Disturb Procedure;
- A Permit to Disturb shall be obtained;
- Location of protected species shall be mapped; and
- Appropriate buffer zones shall be implemented and maintained to conserve and protect riparian vegetation.

Disturbance activities will be limited to reasonable daylight hours and night work will be minimised where practical. This will reduce the potential for impacts to the roosting and breeding patterns of threatened species that may be using the surrounding area.

- The Advisor Environment will field inspect the area and/or use available information, including GIS mapping, to assess the likely impacts to fauna. This assessment will consider the vegetation's RE status, presence of hollow bearing trees or mature trees, and proximity to water.
- No Endangered Regional Ecosystems (ERE) and Of Concern Regional Ecosystems (OCRE) shall be cleared at night time, when practical.

Areas of new disturbance must be captured by quarterly disturbance tracking procedures and reported in the Plan of Operations.

During Clearing

- Clearing of vegetation shall not occur outside of the marked boundaries and will be confined to the smallest practicable area required to safely perform the task.
- Clearing shall be planned and carried out in a manner that causes minimum disturbance to natural drainage patterns.
- Vegetation removal will be carried out using appropriate earthmoving equipment.
- Disturbance of the topsoil will be kept to a minimum.
- Debris from vegetation clearing must not be pushed into gullies, watercourses, other drainage lines or waterlogged areas, cleared vegetation should either be stockpiled for burning, rehabilitation or used as sediment control as appropriate.
- Where practical, salvage and stockpile suitable logs and stumps for use as habitat creation in rehabilitation areas as per the CVM Rehabilitation Management Procedure.

For areas of ERE and OCRE, fauna management requirements are listed below.

Fauna



Protection of Fauna when Clearing Habitat

Where possible, clearing of habitat containing populations of fauna of conservation significance should be avoided. When clearing is being conducted, an Environmental Representative will be made available to rescue, relocate or manage impacted fauna detected during disturbance activity.

Hollow Bearing Trees

Should personnel encounter what may be a hollow bearing tree (HBT) during vegetation clearing, they are to report the occurrence to their supervisor and not disturb the tree until it has been assessed by the Advisor Environment who will determine the process required to manage the HBT.

Recording Animal Sightings

All personnel are required to report sightings of all feral and rare or uncommon native animals to the Advisor Environment.

Endangered & Of Concern Regional Ecosystems

Pre-Clearing

Areas mapped as ERE and OCRE approved for vegetation clearing must have an Environmental Representative undertake a pre-clearance fauna survey to identify wildlife that may potentially inhabit the area.

- Identify and flag all HBTs and potential breeding sites within the clearing area and where possible search hollows for resident fauna.
- Involve a search of likely ground habitats such as rocky areas, fallen logs and woody debris, gullies and waterways and banks (including any artificial habitat sites such as discarded mine or farm equipment, water tanks etc).
- If fauna is present and can be relocated, this shall be undertaken by the Environmental Representative.

During Clearing

The Environmental Representative will be present during clearing of ERE and OCRE to manage fauna impacted by clearing. Works should not commence/continue until the Environmental Representative has given notification that no fauna lies directly in the path of clearing machinery.

All HBTs that require removal will be inspected for resident fauna immediately prior to clearing by an Environmental Representative.

- all reasonable attempts will be made to clear these trees as late in the day as possible to avoid disturbing/dislocating nocturnal fauna in the middle parts of the day and thus exposing them to a greater period of daylight without shelter; and
- the method for clearing HBT that are confirmed habitat trees will involve “tapping” the trees and clearing non-habitat vegetation around this tree. HBT will then be gently felled.

All HBT will be inspected immediately after felling to ensure that no fauna are present in the hollows that were missed by the original pre-clearance survey.

Reporting & Recoding

Event Reporting - Fauna Injury or Death

In the event of injury or death of any significant fauna species (refer to Table 5) *Table 5*, incidents will be recorded and reported to DEHP within 24 hours of the incident occurring. The details for reporting incidents to DEHP are as follows:

- the coordinates of where the incident occurred;
- the checking methods will be outlined i.e. confirmation the pre-clearance surveys were undertaken in accordance with the methodology outlined above;
- confirmation that the Environmental Representative was suitably qualified; and
- suggested mitigation measure to ensure that a similar incident does not occur in the future.

All injuries or death of native fauna during clearing works must be reported and recorded by the Environmental Representative. These records will be kept and made available to DEHP upon request.





Dust Suppression

Dust suppression will be mitigated through the implementation of the Caval Ridge Mine Air Emissions Management Plan. Caval Ridge Mine will utilise a range of dust suppression techniques to reduce dust impacts on areas containing significant ecological communities and/or threatened species habitat.

Dust suppression measures implemented during operational activities will include:

- availability of water trucks to provide dust suppression on haul and light vehicle roads;
- water sprays on stacker/reclaimer units;
- maintaining high moisture content of product coal and reject material as they leave the CHPP; and
- train loadout to incorporate veneering.

Erosion and Sediment Controls

Erosion and sediment control measures will be implemented during operational activities. They will be designed to ensure that impacts associated with erosion and sedimentation to the remaining RE's, EEC's and threatened species are minimised. Detailed erosion and sediment controls will be outlined in the CVM Erosion and Sediment Control Procedure.

Weed Management

Weed management will be on-going and is detailed in the CVM Weed Management Procedure (WMP). Ongoing monitoring and weed surveys 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.

Weed management will include:

- installation of a vehicle wash bay to ensure the removal of all potentially contaminated soil containing seeds;
- avoiding dispersal of weed species from both internal and external sources by implementing control measures, such as ensuring potentially contaminated vehicles are cleaned (i.e. free of contaminants) prior to entering the site;
- ensure all removed weeds; weed-affected materials and rubbish are appropriately disposed of off-site; and
- undertake monitoring of weed growth in disturbed areas on a quarterly basis.

BMA will ensure that environmental weed species will not be used in landscaping.

The WMP provides strategies for the treatment and control of the more problematic weed species. Five flora species listed as declared pests under the provisions of the *Land Protection (Pest and Stock Route Management) Act 2002 (Qld)* (LP Act) were recorded on Caval Ridge Mine during baseline assessments:

- Mother-of-Millions (*Bryophyllum delagoense*) – Class 2;
- Harrisia Cactus (*Eriocereus martini*) – Class 2;
- Lantana (*Lantana camara*) – Class 3;
- Velvet Tree-pear (*Opuntia tomentosa*) – Class 2; and
- Parthenium Weed (*Parthenium hysterophorus*) – Class 2.

Other declared weed species likely to be found in areas of close proximity to Caval Ridge Mine include:

- Rubbervine (*Cryptostegia grandiflora*);
- Giant Rats Tail Grass (*Sporobolus pyramidalis* and *Sporobolus natalensis*); and
- Bellyache Bush (*Jatropha gossypifolia*).

The following management strategies will be implemented:

- management methods for declared weeds within Caval Ridge Mine in accordance with local management practices;



- identification of priority species, target areas and timing of control strategies;
- monitoring of treated areas to assess the success of the eradication of declared pest plants;
- monitoring Caval Ridge Mine to identify any new infestations, including any new occurrences of declared weeds;
- site-wide communication of information on identifying declared pest plants and environmental pest plant issues; and
- details around vehicle access to and movement within areas of remnant vegetation, including vehicle hygiene protocols such as the use of vehicle wash-down facilities for vehicles entering and leaving declared pest plant zones.

The WMP will be reviewed annually. Treatment areas and infestations will be tracked using Geographic Information System (GIS) to ensure effective management is being achieved.

Habitat Rehabilitation and Enhancement

There are a number of opportunities to improve habitat connectivity and quality on Caval Ridge Mine. 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. habitat for threatened flora, fauna and areas of endangered EEC's) that are retained on Caval Ridge Mine are identified in GIS. Disturbance to these habitat areas is managed by the BMA Permit to Disturb Procedure, which involves using GIS to identify and map the habitat areas, and where practical restricting disturbance. . These areas are inspected for weed infestations and as per the WMP are subject to weed controls, such as spraying and weed removal programs.; and
- freshwater sediment basins using during construction will remain on site to provide aquatic habitat for frogs and migratory waterbirds.

Rehabilitation of available threatened species habitat and ecological communities will be undertaken using native species to minimise the net loss of habitat. The CVM Rehabilitation Management Procedure has been developed to guide rehabilitation activities. In particular, the procedure includes:

- rehabilitation planning deliverables and time periods;
- rehabilitation concept designs, including desired fauna habitat and food species;
- rehabilitation and final landform strategies and methods;
- habitat enhancement, such as the introduction of coarse woody debris.
- native tree and shrub species list;

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 operational activities.

Fire Management

A CVM Fire Management Plan and Bush Management Plan – Buffel Park Accommodation Villages has been developed for Caval Ridge Mine and Buffel Park, respectively. The Bush Management Plan includes the following:

- assessment of vegetation communities, including DEHP RE mapping and State Planning Policy 1/103 Guideline;
- assessment of accommodation village site slope, aspect and surrounding land use;
- bushfire hazard assessment; and
- fire management actions, including maintaining fire breaks, maintaining low fuel loads, ensuring access to water supply and development of emergency evacuation plan.

Fauna Mortality on Roads





On-going measures to avoid fauna mortality on internal roads will be implemented. These will include the provision of fauna crossing signs to warn drivers and speed reduction measures, where practical. Focus will be on roads that traverse areas of significant fauna habitat, including creeks and any areas associated with Brigalow Ecological Communities.

Feral Animal Control

The procedure for feral animal management is detailed in the CVM Feral Animal Control Procedure. Control measures include on-going eradication program for foxes, feral pigs, cats, dogs and rabbits as per the requirements of the *Land Protection (Pest and Stock Route Management) Regulation 2002*.

To reduce the pressure on native fauna, especially rare and threatened fauna species such as the Ornamental Snake and Squatter Pigeon, the following strategies will be implemented for the management / control of pest animals:

- conduct an initial survey to identify the pest animals in Caval Ridge Mine. The survey may include analysis of previous survey results and records; and
- feral animal controls procedures include:
 - types of pest animals to be targeted;
 - methods for the eradication and/or control of declared pest animals (i.e. trapping or baiting) in accordance with local management practices and / or DNRW Pest Fact Sheets;
 - timing of control strategies (i.e. implementation and completion); and
 - monitoring and field auditing of pest animal occurrence, particularly declared pest animals, to assess the progress and success of the control measures.

BMA are committed to providing the relevant information on flora and fauna management actions for significant species for inclusion in the DEHP 'Recovery Action Database' when that framework is finalised and becomes operational. This data will be provided in a suitable format agreed by DEHP.





7.0 References

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8.0 Version Management

Version	Details
1.0	Plan submitted to Environmental Assessment Brach of the department in May 2011. Plan approved on 3 June 2014
1.0 Addendum	Plan addendum for the operational phase of the project submitted to the department in September 2014.
1.B Addendum	Plan addendum addressing the department's requirements submitted in November 2014.
2.0	Plan version 2.0 for the operational phase of the project submitted to the department in December 2015.
2A	Track changes removed

