

Bluff PCI Management

**Bluff Coal Project – Carabella
Resources**

Koala Management Plan (KMP)
23 September 2019



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Declaration of Accuracy

I declare that to the best of my knowledge, all the information contained in, or accompanying this document is complete, current and correct. I am duly authorised to sign this declaration on behalf of the proponent/approval holder. I am aware that:

- a) section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.
- b) section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cwth) where the person knows the information or document is false or misleading.
- c) the above offences are punishable on conviction by imprisonment, a fine or both.

Signed:



Full name: **Michael Gray**, (Project Director)

Organisation: **Carabella Resources Pty Ltd**

EPBC Referral Number: EPBC 2013/7064

Name of Action Management Plan this document and declaration refers to: *Koala Management Plan*

Date: 04 October 2019

1 The Project

The Bluff Coal Mine Project is located immediately south of the township of Bluff, approximately 20 km east of Blackwater in Central Queensland. The Project comprises an open cut mine producing 1.2 Mtpa of ultra low volatile pulverized coal injection (PCI) coal. Four main seams are expected to be mined at Bluff, with the shallowest seam being intersected at 35 m and the deepest at 300 m. The resource at Bluff is estimated to be at least 18.2 Mt. The Project involves a 1,116 ha mining lease (ML) area (ML 80194), referred to as the Project area. The total disturbance footprint is approximately 526 ha (Figure 1).

The Project will utilise truck and excavator terrace mining supplemented by auger mining from final endwalls and highwalls, with a mine life of between 10 and 20 years. Drilling and blasting will be undertaken at the mine. An out-of-pit dump is required to service the overburden removal operation until in-pit dumping can be established. This will be located close to the dig areas.

At a minimum, the total surface area of the planned pit area is 135 ha with a length of about 1,500 m and typical width of 800 m. The ROM coal will be hauled to Cook Colliery CHPP for processing and then transported by rail to RG Tanna.

The Run of Mine (ROM) will be located at the crest of the main coaling ramp to minimise haul distances. It is estimated the Project will involve a fleet of 350 t excavators in conjunction with 190 t trucks for overburden removal and a small excavator to recover coal. Water trucks, service trucks, graders, dozers and conventional vehicles will also form part of the mining fleet.

Mine infrastructure is likely to consist of the following:

- Gravel road access to Capricorn Highway;
- Heavy vehicle haul roads;
- Light vehicle access roads;
- Communications infrastructure including towers and cabling;
- Water pipeline;
- Office and administration facilities;
- Ablutions and crib room facilities;
- A water management system;
- Wastewater treatment facilities;
- Fuel and oil storage facilities;
- Generators;
- Maintenance workshop, offices and associated amenities;
- Coal handling facility;
- Run of mine (ROM); and
- Mine infrastructure area (MIA).

Figure 1 Project area

From Offsets Strat Stg 1

2 Background

The Bluff Coal Project underwent assessment five years ago in 2013, with the intent of the Project commencing works on the ground in late-2014. The ML and Environmental Authority applications for the Project were lodged in February 2013, with MLA accepted in early 2014 and Environmental Authority (EPML02090614) originally approved on 24 April 2014. The approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was granted (with conditions) on 31 July 2014. Due to changing circumstances, the Project was put on hold and no further work was undertaken after about July 2014 until the Environmental Authority was renewed with the Queensland Government on 29 May 2017 and more recently 15 February 2019. The Mining lease for the project was granted on 22 September 2016.

The history of the Bluff Coal Project environmental approvals and relevant events affecting Carabella Resources and the ML on-the-ground are presented in Table 1 to assist DES in understanding the Project and the context in which the proponent is working.

Table 1 Timeline of environmental approvals and events affecting Bluff Coal Project

Date	Event	Details
October 2013	Bluff Terrestrial Flora and Fauna Impact Assessment	Detailed seasonal ecological surveys undertaken over the Project area during 2013.
25 November 2013	Project referred to DotE under the EPBC Act.	Referral documentation submitted, including detailed specialist reports. Documentation accepted as Preliminary Information.
20 December 2013	DotE determine the Project to be a controlled action.	DotE consider that the project has the potential to have a significant impact to threatened species and communities, specifically the Koala (<i>Phascolarctos cinereus</i>). The Project will be assessed on Preliminary Information.
14 February 2014	Bluff Koala Assessment and Management Plan submitted to DotE.	In response to DotE requests, targeted koala surveys conducted on site to determine the use of the Project area by koalas and the value of the habitat. The report identifies 47 ha of high value potential habitat.
7 March 2014	DotE issue a request for further information in relation to the Koala Assessment and Management Plan.	It appears the DotE did not accept the methodology used for the koala habitat assessment. DotE does not agree with the 47 ha of high value habitat.
25 March 2014	EPBC Act Approval Application Additional Information	Itemised response to the Information Request submitted, showing peer review of Koala Assessment and acceptance of methodology in review.
25 March 2014	Bluff Project Koala Offset Strategy	Koala Offset Strategy submitted to identify offset requirements under the EPBC Act and an offset property.

Date	Event	Details
24 April 2014	DEHP issues Environmental Authority (EPML02090614).	Conditions include provision of offsets in accordance with the Queensland Biodiversity Offset Policy.
31 July 2014	DotE issues Approval with conditions of Bluff open cut coal mine.	Conditions include provision of a Koala Management Plan (within 6 months of commencement of the action) and a Biodiversity Offset Management Plan (within 18 months of the commencement of the action). Offset requirements include 250 ha of critical koala habitat, indicating previous koala targeted surveys and habitat mapping were not accepted.
22 September 2016	Mining Lease 80194 granted	
29 May 2017	DEHP re-issues Environmental Authority (EPML02090614).	Same as original approval.
September 2018	New management comes in at Carabella Resources	New management taking Bluff Coal Project forward.
15 February 2019	DEHP re-issues Environmental Authority (EPML02090614)	Updated for legislative changes and staged offsets.

3 Purpose of the document

The approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was granted (with conditions) on 31 July 2014. Condition 6 of the approval states that:

“Within 6 months of the commencement of the action, the person taking the action must prepare and submit a Koala Management Plan to the Minister for written approval. The Koala Management Plan must provide for Koala management and protection on the project area during commencement of the action, construction and operation, including:

- a) Control of animal pest and weed species currently found on the project site. This should include commitments to reduce the overall occurrence, abundance and diversity of pest animal and weed species;*
- b) Management of bushfires within the project site;*
- c) Details of road design and road operation procedures to minimise the risk of koala strike including the implementation of appropriate vehicle speed limits;*
- d) Details of the management, monitoring and reporting actions to be undertaken to ensure that the quality of retained vegetation of the project site is either maintained or improved. This must include clear objectives and performance indicators for the measures referred to in the Koala Management Plan;*
- e) Include specific and measurable trigger levels that will result in corrective actions being implemented to prevent the objectives referred to in the Koala Management Plan being compromised; and*
- f) Include corrective actions to be taken should the trigger levels established in Koala Management Plan be exceeded. These must be clear, measurable, auditable and time bound.”*

This document aims to satisfy Condition 6 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval granted on 31 July 2014 for Bluff Coal Project.

3.1 Scope of Work

The scope of work for this document is to prepare a Koala Management Plan (KMP) to be implemented by the Bluff Coal Project during the construction and operational phases of the Project. The KMP will include:

- Project description;
- Relevant legislative background;
- Purpose of the document;
- Description of ecological values pertaining to the koala on the Project site;
- Description of potential impacts to koala due to the Project;
- Objectives for management;
- Mitigation measures; and
- Monitoring.

It is noted that whilst the KMP does include some discussion of offsets to mitigate the impacts of the Project on koala habitat, it is not intended to be used to satisfy the requirements of a Biodiversity Offset Management Plan (BOMP) under Condition 7 of the approval.

4 Koala values within the Project area

In 2013 terrestrial ecology investigations were undertaken in the Project area by Ecological Survey and Management (EcoSM). Fauna investigations were undertaken over one week in Autumn (7-14 April 2013) and one week in Spring (8 – 17 September 2013) and included spot-lighting, infrared cameras, active diurnal searches and koala transects. During surveys koala scats were detected at four locations (Figure 2), but no individuals were recorded (EcoSM 2013). As a result, all remnant and regrowth eucalypt dominated communities and wattle scrubs, are considered to provide potential habitat for koalas (EcoSm 2013).

However, due to the low number of records (despite substantial survey effort) and the mode of detection (i.e. old scats), the study concluded that it is unlikely that the Project site supports a large or permanent population of koala (EcoSM 2013).

4.1 Koala distribution

The koala is currently widespread in coastal and inland areas, with a range that extends over 22° of latitude and 18° of longitude, or about one million square kilometres (DEE 2019b). The occurrence of animals throughout this distribution is not continuous and is defined by environmental variables, such as altitude (generally limited to <800 m above sea level), temperature and, at the western and northern ends of the range, leaf moisture (DEE 2019b). In the semi-arid regions in the western and northern parts of the species' range, koala distribution and abundance is strongly influenced by the availability of water in soils from which food trees draw water. This is also evident in the targeted koala surveys conducted in the Project area, where signs of the species were observed along drainage lines, (EcoSM 2013, EcoSM 2014), particularly Walton Creek and Bone Creek where they were associated with scattered blue gums (*Eucalyptus tereticornis*).

While the Project area is not at this species' limit of distribution, it is only known to occur in pockets of habitat in the Emerald region and these pockets become smaller and increasingly sparse heading west into central Queensland (DEE 2019b). Wildlife Online records indicate the Koala is known from the region surrounding the Project area and specifically from Taunton National Park, approximately 7 Km to the north-east (Figure 3). Large tracts of native vegetation suitable for the species within the surrounding area, such as Blackdown Tableland National Park, Arthurs Bluff State Forest, Walton State Forest and Taunton National Park have the capacity to support a koala population. Due to the lack of observations of individuals, an estimate of population density is not able to be made (EcoSM 2014). The limited evidence of koala activity indicates that there is a low use of the habitat in the Project area and that any koalas that do use the site are likely to form a small part of a larger population that is distributed, albeit at low densities, across the vegetation in the surrounding area (EcoSM 2014).

4.2 Koala habitat

In accordance with the DEE's SPRAT database (DEE 2019d), koala habitat includes a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by Eucalyptus species. Koala habitat relevant to the Project area can be broadly defined as:

- any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees;
- with suitable land elevation, annual temperature and rainfall patterns, soil types and the resultant soil moisture availability and fertility (preferred food and shelter trees are naturally abundant on fertile clay soils); and
- in the dry, subtropical to semi-arid environments in the western parts of the species' range, koalas inhabit Eucalyptus-dominated forests and woodlands, particularly in the vicinity of riparian environments, and Acacia-dominated forests, woodlands and shrublands.

Koala habitat is described in Table 1 of the EPBC Act Referral Guidelines for the vulnerable koala (DotE 2014b) as having the following attributes:

- woodlands and forests (where koala food trees have reliable access to soil moisture);
- box gum or red gum woodlands on heavier soils in remnant or regrowth vegetation patches, particularly riparian zones; and
- small, patchy and sparsely distributed woodlands, shrublands and forest in highly modified, agricultural-grazing landscapes or in and around rural towns (although there are some large, connected areas of habitat also).

The DotE (2014b) guideline defines koala habitat as “any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. This can include remnant and non-remnant vegetation in natural, agricultural, urban and peri-urban environments. Koala habitat is defined by the vegetation community present and the vegetation structure; the koala does not necessarily have to be present”. The Koala Referral Guideline (DotE 2014) indicates shelter habitat is likely to be ‘riparian environments and other areas with reliable soil moisture and fertility’.

The EPBC Act approval documentation for the Project defines ‘critical koala habitat’ as areas of vegetation found on the Project site containing trees species known to be utilised for food or shelter and which are consistent with the following REs:

- RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines;
- RE 11.5.3 *E. populnea*, *E. melanophloia*, *Corymbia clarksoniana* on Cainozoic sand plains and/or remnant surfaces;
- RE 11.5.2 *E. crebra*, *Corymbia spp.*, with *E. moluccana* on lower slopes of Cainozoic sand plains and/or remnant surfaces; and
- RE 11.5.2a *Allocasuarina leuhmannii* low tree layer with or without emergent woodland.

4.3 Habitat quality

Koalas are known to move across varied landscapes, including agricultural and urban areas. However, better quality habitat is associated with an abundance of food and shelter trees. Koala food trees can generally be considered to be those of the genus *Angophora*, *Corymbia*, *Eucalyptus*, *Lophostemon* and *Melaleuca* (DEE 2019b). There are limited studies in Central Queensland that have investigated the dietary preferences of koalas. However, a study near Clermont (which is located in the same bio-region as the Study Area) found Poplar Box (*Eucalyptus populnea*) (58.9 ± 21.9%) to be the clearly favoured food tree for the species in this area. Other preferred Koala food trees identified in this study included Narrow-leaved Ironbark (*E. crebra*) (10.6 ± 20.1%), Queensland Blue Gum (*E. tereticornis*) (7.3 ± 8.9%) others (6.5 ± 9.0) and Dawson Gum (*E. cambageana*) (2.6 ± 3.8%) (Ellis et. al. 2002). Research in south-western Queensland found that River Red Gum (*E. camaldulensis*) contributed the greatest percent of leaf fragments in faecal pellets at 31.89%. Other koala food trees identified in this study included Napunyah (*E. thozetiana*) 28.98%, Coolibah (*E. coolabah*) 17.98% and Poplar Box (11.02%) with all other species contributing less than 5% of faecal pellet fragments (Sullivan et. al. 2003). The Australian Koala Foundation (AKF) has also identified particular species of *Eucalyptus* as preferred koala food trees in the Central Highlands Local Government Area (in which the Project area is located). These include:

- Brown’s Box *Eucalyptus brownii*;
- River Red Gum *Eucalyptus camaldulensis* (primary food tree);
- Dawson’s Gum *Eucalyptus cambageana*;
- Coolibah *Eucalyptus coolabah*;

- Queensland Peppermint *Eucalyptus exserta*;
- Yapunyah *Eucalyptus ochrophloia*; and
- Mountain Coolibah *Eucalyptus orgadophila*.

Of these trees considered preferred koala food trees, *E. populnea*, *E. camaldulensis*, *E. crebra*, *E. exserta* and *E. tereticornis* are found in the Project area.

During the 2013 field studies (EcoSM 2014), the quality (or biocondition) of the vegetation in the Project area and its value as koala habitat was assessed in accordance with the recommended methodology at the time of survey as well as communication with the Department of Environment (David Way pers. comm. 5 September 2013), as follows:

- Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Neldner et al. 2012);
- Biocondition: A terrestrial Condition Assessment Tool for Biodiversity in Queensland. Field Assessment Manual Version 1.6 (Eyre et al. 2008);
- Ecological Equivalence Methodology (EEM) Version 1 in the Queensland Biodiversity Offset Policy (DERM 2011); and
- Interim Koala Referral Advice for Proponents (SEWPaC 2012).

The baseline vegetation assessment results are provided in Appendix A. The quality (biocondition) of the various vegetation communities (represented by Regional Ecosystems (RE)) is provided as a score out of 10 and where relevant a Fauna Habitat Quality Score (out of 10) has also been provided with reference to koala habitat. A summary of these results appears in Table 2.

Table 2 Vegetation quality assessment results

Regional Ecosystem	Biocondition Score	Koala Habitat quality Score
11.3.25 <i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	7.4	7.3
11.5.2 <i>Eucalyptus crebra</i> , <i>Corymbia</i> spp., with <i>E. moluccana</i> woodland on lower slopes of Cainozoic sand plains and/or remnant surfaces	8	7.5
11.5.2a <i>Allocasuarina luehmannii</i> low tree layer with or without emergent woodland.	8.2	6.7
11.5.3 <i>Eucalyptus populnea</i> +/- <i>E. melanophloia</i> +/- <i>Corymbia clarksoniana</i> woodland on Cainozoic sand plains and/or remnant surfaces	6.3	6.3
11.7.2 <i>Acacia</i> spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone	8.4	n/a

As well as the baseline vegetation quality assessments, transects were undertaken to determine an estimate of koala habitat trees (defined as a tree of the genus of *Eucalyptus*, *Angophora*, *Corymbia*, *Melaleuca* and *Lophostemon* with a diameter at breast height of 100 mm or a height of greater than 4 m) within each RE. The number of koala habitat trees were counted by one observer within the first 100 m of each koala transect. This equates to a search area of 0.25 ha. The investigation indicated that the highest densities of koala habitat trees occur in RE 11.3.25 and RE 11.5.3. The densities of Koala habitat trees in these RE's was more than double the density found in the remaining RE's in the Project area. These RE's were therefore considered to provide the highest quality koala habitat in the Project area. The lowest density of preferred koala food trees was found to occur in RE 11.7.2. Due to the substantially lower density of koala habitat trees, RE 11.7.2 is not considered to provide koala habitat in the Project area (which is also in accordance with the EPBC Act approval documentation). The RE 11.5.2 and RE 11.5.2a contained a mid-dense number of food trees and are associated with a moderate habitat quality. Figure 2 shows the location of areas of high quality koala habitat within the Project area, as well as other areas of remnant or regrowth vegetation.

4.4 Koala habitat connectivity

The Project area supports large areas of remnant and high value regrowth vegetation, particularly in the west and although all areas have been subjected to historical and current disturbance in the form of timber harvesting and fire, a portion of the Project area is located adjacent to a large ecological corridor. This corridor is recognised through the Biodiversity Planning Assessment Mapping and links important flora and fauna refuges of the Arthurs Bluff State Forest, Walton State Forest, Blackdown Tableland National Park and Taunton National Park (Figure 3). The vegetation along Rufus and Walton Creeks, parts of which flow through the Project area, reinforce this connectivity. Although the condition of vegetation along these waterways is reduced by weed invasion, the corridors of vegetation along these waterways are still likely to play a role in maintaining landscape connectivity particularly into Taunton National Park through Duckworth Creek, which is immediately downstream and to the north of Rufus Creek. Duckworth Creek is recognised as a state ecologically significant corridor.

The koala is considered to be a highly mobile species with large home ranges recorded between 8 and 135 ha depending on the location and the environment. The species is known to disperse up to 16 km in certain landscapes and several kilometres within largely cleared landscapes (DEE 2019b). The mobility of this species within the Project area is variable and influenced by the extent of clearing and thinning and factors that may restrict movement on ground between shelter and food trees, e.g. fallen timber, steep sided banks along watercourses, dense grass cover and/or a very low shrubby understorey.

Figure 2 Koala habitat in the Project area

Figure 3 Landscape connectivity

5 Potential impacts to koala by Project

The main threats to the koala are ongoing habitat loss and habitat fragmentation, vehicle strike and predation by the domestic or feral Dogs (*Canis lupus familiaris*) (DEE 2019b). Drought and incidences of extreme heat (which will be more frequent as the climate changes) are also known to cause very significant mortality, and post-drought recovery may be substantially impaired by the range of other threatening factors (DEE 2019b). Disease is also recognised as a threatening process to the species but is more common in South-East Queensland where the density of the species is higher and the stressors more numerous (DEE 2019b).

The Project presents the following threats to the koalas within the Project area:

- Vegetation clearing for mine infrastructure, resulting in habitat loss and fragmentation;
- Operation of the mine resulting in changes in noise levels, bushfire regime and weed incursion;
- Increased risk of predation, particularly just after clearing activities; and
- Vehicle strike, particularly by haul trucks that cannot slow or brake quickly.

These are discussed briefly in the following sections.

5.1 Habitat loss

Land clearing has been a significant cause of koala mortality across Australia, however the effect on local koala numbers is a function of the management regime (DEE 2019b). For example, while clear-felling will completely remove habitat and koala populations, the species may persist in selectively-logged forests, revegetated Eucalyptus-dominated woodlands and eucalypt monoculture plantations (DEE 2019b).

The Project will result in the removal of 250 ha (including 185 ha remnant and 65 ha regrowth) koala habitat (Figure 4) within a broader area containing a reasonably large amount of potential habitat for the species (i.e. in adjacent conservation areas such as Taunton National Park, Walton State Forest, Arthurs Bluff State Forest and Blackdown Tableland National Park). This impact has already been assessed as significant by the Department of Environment (DotE) in their approval dated July 2014. The significant residual impact of koala habitat loss caused by the Project will be offset in accordance with the *EPBC Act Environmental Offsets Policy* (DSEWPC 2012). Offsets are not discussed in detail within this KMP and will be subject to a separate Biodiversity Offset Management Plan (BOMP) as outline in Condition 7 of the EPBC Act approval.

5.2 Fragmentation

The Project area is located adjacent to a large ecological corridor. This corridor is recognised through the Biodiversity Planning Assessment Mapping and links important flora and fauna refuges of the Arthurs Bluff State Forest, Walton State Forest, Blackdown Tableland National Park and Taunton National Park (Figure 3). The vegetation along Rufus and Walton Creeks, parts of which flow through the Project area, reinforce this connectivity.

Local extinctions of koala sub-populations have occurred in the past and have highlighted the need for recognition of koala sub-population structure, and the need for facilitating movements of individuals between smaller areas (DEE 2019b). There is increasing evidence of genetic variability between apparently adjacent koala sub-populations, with the differentiation interpreted to be recent: as a function of isolation due to barriers to dispersal (DEE 2019b). For example, koalas in the Brisbane Metropolitan Area have been shown through the analysis of mitochondrial DNA to be distinct from koalas in adjacent regions (Lee et al. 2009). The impact of habitat fragmentation and isolation is also influenced by the relative hostility of the intervening habitat matrix (DEE 2019b). Agricultural activities, rural towns, mining and petroleum exploration activities occurs throughout the region. These activities generally involve broadscale clearing, road and track construction, rail construction and infrastructure which ultimately result in the removal of habitat and increased fragmentation. The location and management of these disturbances will ultimately influence the severity of the fragmentation.

5.3 Reduced habitat quality

5.3.1 Noise

The available published literature indicates that man-made noise sources, such as traffic and industry, may have impacts on fauna species. These impacts may relate to stress or avoidance, interference with communication, and masking the sounds of predators and prey. In the case of exposure to extreme levels of noise, temporary or permanent hearing damage may also be possible. Research has demonstrated that habituation to man-made noise may occur. Whilst an initial response to an unfamiliar sound may be a startle effect, subsequently familiarisation may occur and the sound may be ignored, as the sound is not biologically of significance to the species (Larkin, Pater, & Tazik, 1996). In a literature review on the effects of noise and light from urban development on biodiversity, the distance at which various bird species were affected by man-made noise was restricted to less than 1 km from the noise source, except in one study where bird presence and breeding was identified as being reduced at a distance of up to 1.2 km from a major road (> 30,000 vehicles per day) (Newport, Shorthouse, & Manning, 2014).

The northern portion of the Project area is already exposed to noise sources, in the form of the Gladstone Railway Line and Capricorn Highway which run adjacent the northern boundary of the Project area and the ongoing coal seam gas exploration activities occurring throughout the area. Adaption to these noise sources would already be occurring by fauna (including koalas) within approximately a 1 km radius, incorporating the Project area. When mining commences on the Project area temporary or intermittent noise and vibration emissions will occur. It is anticipated that koalas would generally exhibit a high degree of adaptability to these noise impacts (given the level of disturbance already in the area), but in some cases noise from mining may interfere with the interactions between animals and cause some behavioural modification (such as avoiding the use of habitat within the noise disturbance zone).

5.3.2 Bushfire

Bushfires represent a threat to koalas both directly and indirectly. Bushfires can cause the direct mortality of koalas or result in injury that ultimately leads to death. Too frequent or too hot bushfires will negatively impact on important koala resources, mainly food and shelter trees – reducing successful recruitment of koala feed trees by killing juvenile trees, killing mature trees and burning foliage (resulting in a temporary shortage of food resources).

A fire starting in the Project area may be caused by sparks originating from machinery, or an accident (such as a collision), scheduled burns getting out of control, hot works, spontaneous combustion of chemicals or explosives, which may then cause fires that expand into the surrounding area.

5.3.3 Weeds

The current assessment (EcoSM 2013) has recorded the presence of a variety of exotic flora within the Project area, including six restricted species (Qld *Biosecurity Act 2014*) and four Weeds of National Significance (WONS) species as follows:

- Mother of Millions (*Bryophyllum delagoense*) – Restricted matter;
- Harrisia cactus (*Eriocereus martinii*) – Restricted matter;
- Prickly pear (*Opuntia stricta*, *O. streptacantha*, *O. tomentosa*) – WONS & Restricted matter; and
- Parthenium weed (*Parthenium hysterophorus*) – WONS & Restricted matter.

The most commonly encountered exotic flora species was *Indian Bluegrass (*Bothriochloa pertusa*), which dominated the majority of the cleared paddocks and some areas of regrowth and remnant woodland, REs 11.5.2 and 11.3.25 in particular. Species such as *Noogoora Burr (*Xanthium pungens*), *Couch (*Cynodon dactylon*), *Star Burr (*Acanthospermum hispidum*) and *Awnless Barnyard Grass (*Echinochloa colonum*) were frequently recorded in Rufus Creek (RE 11.3.25). Species such as *Red Natal Grass (*Melinis repens*), *Milk Thistle (*Sonchus oleraceus*), *Sabi Grass (*Urochloa mosambicensis*), *Shrubby Stylo (*Stylosanthes scabra*) and *Thickhead (*Crassocephalum crepidioides*) were recorded infrequently throughout the Project area.

Exotic flora species are concentrated in areas suffering some form of disturbance, mostly clearing for cattle grazing. Weeds threaten populations of native flora and fauna by competing with native flora and eventually changing the habitat, which is then no longer suitable for native fauna species. For example, weeds may smother or out-compete juvenile koala feed trees. The EPBC Act lists weed invasion as a 'key threatening process' to biodiversity due to the impact on wildlife and the landscape (Threatened Species Scientific Committee (TSSC), 2009).

The spread of weed species is facilitated by disturbance. During construction there would be the potential for disturbing weeds in the Project area resulting in the movement of weeds within and outside of the Project area. This could increase the level of infestation in the Study area and potentially facilitate the spread of weeds to the other adjacent areas. Weed seed can be transported in the mud on machinery or in the machinery itself.

5.4 Increased predation

Dog attacks reportedly cause a significant number of koala deaths each year, particularly in South-East Queensland where urbanisation has led to a high number of dogs in a comparatively small area (DEE 2019b). This risk is transferrable to rural areas, where there can be unchecked populations of wild dogs. The impact of foxes and cats on koalas is less documented, but recent evidence suggests that foxes will climb trees to access prey in Australia (Mella et al. 2017).

Predators such as the Fox (*Vulpes vulpes*) and Wild Dog (*Canis lupus*) are present in the landscape, but there is no evidence to suggest they are high in numbers or putting considerable pressure on the koala (EcoSM 2014). Predatory species are likely to be drawn to areas of disturbance to prey upon animals that are moving away from the disturbance area, therefore, the risk of predation is greatest during and shortly after clearing activities.

5.5 Vehicle strike

Vehicle movements and road haulage has the potential to result in koala mortality through vehicle strike. This has been identified as a particularly notable threat to the koala (DEE 2019b). Road mortality has been implicated in the decline of koala populations, mainly in South-East Queensland (Dique et al. 2004), but is transferrable as a risk to rural areas, particularly where the number of vehicle movements is elevated by activities such as mining. There is a moderate level of threat on the Project area already from the Capricorn Highway and the Central Line railway. Current mining and petroleum exploration activities in the region also result in increasing vehicle movements in the local area and a higher likelihood of vehicle strike resulting in the death of native fauna.

In general, the construction of access roads and site roads through koala habitat as part of the Project may further impact the koala through increased vehicle strike, leading to injury and mortality. The Project will potentially exacerbate an existing threat (i.e. vehicle strike) within the local area.

Figure 4 Koala habitat and Project Impacts

6 Koala Management Plan (KMP)

The Bluff Coal Mine Project is required to have an Operational Environmental Management Plan (EMP) under the State's legislation (Queensland *Environmental Protection Act 1994*). The primary purpose of an Operational EMP is to formalise the actions to be taken and strategies to be implemented that, combined, will manage impacts to the environment to acceptable and sustainable limits over both the short and long-term. The Operational EMP has several sub-plans relating to the management of various issues, including:

- Air and Dust Management Plan;
- Erosion and Sediment Control Plan;
- Clearing/Topsoil Management procedure;
- Noise Management Plan;
- Surface Water Management Plan;
- Waste Management Plan;
- Fire/Bushfire Management Plan;
- Pest Management Plan
- Progressive Rehabilitation and Closure Plan
- Health and Safety Plan

These sub-plans will consolidate information regarding the management of specific issues during the operation of the mine and provide for ongoing reference over the life of the mine. These management sub-plans will be kept on site for continual reference. The KMP will form part of the Operational EMP for the Project and is considered to be a working document. It will be updated following formal assessment by the DEE, and by review following monitoring and reporting periods.

The Koala Management Plan (KMP) has been developed to provide a clear and concise outline of the actions and methods required to mitigate likely impacts on koalas, including:

1. Procedures to be adopted during vegetation clearing, including wildlife rescue procedures;
2. Measures to manage retained vegetation;
3. Reduce impacts of fragmentation;
4. Mitigation of increased noise levels;
5. Prevention of inappropriate bushfire regime;
6. Management of weed invasion;
7. Control of threatening predators; and
8. Road design and management to reduce the incidence of vehicle strike.

These impacts and management actions are outlined in the following sections.

6.1 Responsibilities

The Koala Management Plan (KMP) will be a primary operational document for the Environmental Management Team (EMT) that will operate on site at Bluff Coal Mine. The EMT will be guided by a Team Leader and have at least 1-2 staff members. Having an EMT on site will ensure there is an appropriately qualified Environmental representative available at all times. A key responsibility of the EMT will be to ensure the implementation of the KMP, particularly through:

- monitoring activities;
- being a point of contact for construction personnel to address environmental issues and respond appropriately to trigger events; and
- undertaking annual audits and reporting.

6.2 Management program

Overall Management Goal

To provide for Koala management and protection on the Project area during commencement of the action, construction and operation.

Structure of the Management Plan

For each of the eight (8) actions listed in Section 6 of the Koala Management Plan an Objective has been developed. These objectives relate to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval condition 6 (31 July 2014). Management Measures have been designed to facilitate the realisation of the objectives in the Project area and ensure compliance with approval conditions. The progress of these objectives will be monitored through Monitoring Activities. The aim of the Monitoring Activities is to assess the success of Management Measures (outlined in the table below) in achieving the Objectives. The results of the monitoring program are collated so to support annual auditing of the KMP. The results of the annual audit are published for use by the Environmental Management Team (EMT) as outlined in Section 6.1. The Monitoring Activities are also associated with Triggers for Intervention, which if exceeded will result in the implementation of a time-bound Corrective Action. If a Corrective Action is triggered, it is an indication that the Objective is not being met by the Management Measures and a review of these measures will be necessary to avoid a recurrent need for Corrective Actions. Table 3 contains the detailed management program for the conservation of koalas in the Project area during the construction and operation of the Bluff Coal Project.

Table 3 Koala Management Program for Bluff Coal Project

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
1. Koala habitat removal associated with clearing for mine and infrastructure				
To minimise clearing of koala habitat to only that which is necessary for the construction and operation of the Project.	<ul style="list-style-type: none"> Vegetation clearing / excavation to be subject to internal permitting system managed by the EMT. Clearing is only permitted in areas that are pre-approved for clearing. Vehicle access routes and haul routes will only be on existing tracks. Demarcate exclusion zones to protect areas of vegetation to be retained prior to clearing. Use of clearing machinery to suit site conditions and reduce damage to adjoining areas of retained vegetation. Implementation of Erosion and Sediment Control Plan (ESCP). Retain mature trees (>50cm DBH) or habitat trees where possible, for 	<p>Clearing in excess of the defined annual clearing limits and approved/authorised clearing limits.</p> <p>Clearing outside permitted clearing zones/areas.</p>	<p>An Environmental representative will inspect all areas post-clearing to ensure that the area cleared is in-line with that permitted. Cleared areas will be mapped using DGPS (Digital Global Positioning System) equipment accurate to within 1m. Any areas that have been cleared outside of the permitted area will be recorded (including the following details: vegetation community (RE), area (ha), location, purpose of clearing, personnel and date) in a central clearing database. The clearing</p>	<p>All areas cleared outside of defined boundaries (in the one year reporting period) have commenced rehabilitation or are scheduled to commence rehabilitation within that reporting period.</p> <p>Additional offsets are planned and reported in accordance with the EPBC Act approval, and Queensland Governments requirements under the Environmental Authority (EA) (Condition K4), which require reporting on the balance of clearing and offsetting after the completion of each stage of the Project.</p>

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	<p>example within the mine infrastructure area or adjacent to access tracks where minor alterations in design are possible</p> <ul style="list-style-type: none"> Progressive rehabilitation of temporary impact areas during the operation of the Project. Clearing debris to be collected with a stick rake, stockpiled in the clearing-permitted area and mulched for use in rehabilitation. 		<p>database will be maintained by the EMT, who will instigate the corrective action (i.e. rehabilitation) for over-clearing (within the approved disturbance limit). Areas of over-clearing will be reported in the Annual Koala Report, together with the corrective actions implemented.</p>	
<p>2. Avoidance of koala kills during construction and operational activities</p>				
<p>To prevent koala deaths as a result of the Project</p>	<ul style="list-style-type: none"> Pre-clearing procedures including Site Operator awareness program, which involves inspecting site for any present koalas prior to the commencement of clearing. If any Koalas are identified, the tree in which the Koala is located is to be clearly flagged and it and other trees with touching canopies are to remain standing. The Koala will typically move of its own accord overnight. If the koala does not move within 24 hours, it will be relocated by a licensed spotter catcher. Clearing will be undertaken in a direction that enables koalas to move to undisturbed areas, i.e. commencing adjacent to disturbed areas and moving towards undisturbed areas. Clearing will be staged in areas of less than 10 ha, with sequential clearing techniques employed to 	<p>One koala is injured or killed within the Project area.</p> <p>A koala is detected in or adjacent to construction and/or operational activities</p>	<p>The EMT will be made aware of any koala within the construction / operation area. A representative of the Environmental Management Team will track the movements of the koala (via 3 hourly observation) to ensure the koala is not at risk until it moves off site or is relocated.</p> <p>The EMT will maintain a register of locations where specialised koala management infrastructure has been implemented (i.e. exclusion fencing, escape ropes (or poles etc.) in dams, trenches or pits and directional lighting) and conduct monthly inspections</p>	<p>Any koala death is investigated by the Environmental Adviser within 24 hours and changes made to relevant procedures or dangerous areas addressed within five business days. Injured koalas are taken to the nearest vet/animal hospital as soon as possible.</p> <p>Koalas that have been given at least 24 hours to move from construction or operational zones, but do not relocate of their own accord will be relocated by a licensed spotter-catcher. The offset area is an appropriate location for release.</p>

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	<p>ensure appropriate links to treed areas are maintained to allow koalas to move off the Project site into adjacent habitat areas.</p> <ul style="list-style-type: none"> • Implement koala exclusion fencing around dangerous areas (i.e. contaminated water sources, laydown/stockpiling areas). • Avoid steep sided sediment dams (where possible) to prevent drowning (i.e. use gradual or beach slope) OR add an escape rope (i.e. thick (10cm diameter) rope anchored to dam edge and with flotation device on the end to facilitate escape). • Measures to prevent fauna entrapment in trenches or pits (e.g. escape poles). • The effectiveness of all injury and death mitigations will be monitored by the Land Manager’s (Bluff PCI) appointed Environmental Officers (Nitro Solutions). • A survey of “at risk” areas will be documented for the purpose of frequent inspections. 		<p>to ensure it is in working order. The EMT will request repairs where necessary.</p> <p>All personnel are responsible for reporting any wildlife injuries or fatalities to the Environmental Management Team. The EMT will conduct regular monitoring excursions to track population numbers and locations. A total number of reported injuries and fatalities will be presented in the Annual Koala Report.</p>	
3. Management of retained vegetation				
<p>Ensure that the quality of retained vegetation on the Project site is either maintained or improved.</p>	<ul style="list-style-type: none"> • Harvesting of timber from areas of retained vegetation outside of the Project disturbance footprint is prohibited. • Bushfire management as outlined in item 6 below. • Weed management as outlined in item 7 below. • Stock are excluded from retained 	<p>The Site Condition score (out of 10) of a particular area/polygon of Regional Ecosystem (RE) falls by 1.5 or more points below the reported Biocondition benchmark assessment scores (outlined in Table 2).</p> <p>The retained vegetation is impacted by bushfire. See Corrective Actions</p>	<p>Annual vegetation condition assessments (using the methodology outlined in the <i>Guide to Determining Terrestrial Habitat Quality</i> (DEHP 2017) – which is the updated Biocondition assessment methodology). This will be reported in the</p>	<p>Analysis of Site Condition assessment for the area in question to ascertain appropriate management measures to improve the Biocondition score. For example, the assessment may indicate higher weed cover and therefore weed management</p>

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	vegetation. <ul style="list-style-type: none"> Progressive rehabilitation (with locally endemic species) of areas of retained vegetation outside of the Project disturbance footprint that have been disturbed by Project activities. 	in item 6. Stock are detected in the retained vegetation	Annual Koala Report.	would be implemented in the area. Commencement of additional management measures occurs as soon as practicable (having regard for weather and availability of contractors), and with 6 months of the results being reported in the Annual Koala Report. Continue to implement corrective actions until site condition has attained or exceeded baseline condition. Removal of stock from retained vegetation.
4. Fragmentation of koala habitat associated with the mine and infrastructure				
To allow for continued koala movement around the mine footprint.	<ul style="list-style-type: none"> Management of habitat clearing as outlined in Item 1 above. Sensitive design and siting of tracks and haul road to minimise clearing and fragmentation of retained habitat areas, as outlined in item 9 below. Operate only one haul route between the open pit and the spoil dump operational at anytime. As the open pit and spoil dump (west) expand into new areas the haul route will change location (as required) and the previous haul route will be decommissioned and rehabilitated. Avoid clearing in 100m buffer area 	Koala observed attempting to move through the active mine area, as opposed to areas of retained vegetation around mine site.	All personnel are responsible for reporting any koalas sited within the active mine area to their Supervisor and the Environmental Management Team.	Works will cease immediately (within the affected sector) if a koala is located in the active mine area. An exclusion zone of 100m will be implemented around the koala. Works will not recommence until the koala has moved or been relocated. Any koala within the active mine area is reported to the Environmental Management Team immediately and a wildlife handler assigned to relocate the animal within 4 hours. Injured koalas are taken to the nearest vet/animal hospital as soon as possible.

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	<p>(Figure 1), where possible.</p> <ul style="list-style-type: none"> Do not disturb Walton Creek and surrounding vegetation. Use of fauna friendly fencing around offset property perimeter. Prevent fencing within retained vegetation (Figure 4), where fencing is necessary in these areas ensure that it is koala friendly (i.e. providing a 30 cm gap underneath). Ensure Columba Creek corridor is progressively rehabilitated to represent the original pre-clearing vegetation community (i.e. RE11.3.25 or RE11.5.2)) and provide connectivity to areas to the south. 			
<p>5. Reduced koala habitat quality associated with the mine noise and excess light spillage</p>				
<p>To minimise disturbance to native fauna due to construction and operational noise and light pollution.</p>	<ul style="list-style-type: none"> Machinery use is limited to approved cleared areas and noise is monitored and managed as per Noise Management Plan and EA conditions. Design and siting of tracks and haul road to minimise vehicle movements through and adjacent to areas of retained vegetation, and avoid creation of additional or unplanned tracks. Blasting will only be undertaken during the middle of the day when fauna movement is generally at its lowest. Maintain machinery to ensure optimal operation and minimal noise. 	<p>Ongoing exceedances of low frequency criteria for ambient noise (i.e. not associated with single blasting events).</p> <p>Lighting is found (during inspections) to be penetrating areas of adjoining retained vegetation by > 20m and at a level likely to disturb nocturnal wildlife.</p>	<p>A monitoring program is described in the Noise Management Plan and includes continual noise monitoring at three permanent stations on and around the Project area and a complaints register. Noise monitoring data will be collected in accordance with the requirements of the Environmental Authority and <i>Environmental Protection (Noise) Policy 2008</i> (EPP Noise).</p> <p>The EMT will maintain a register of locations where specialised koala management</p>	<p>Upon receiving a complaint or report of noise exceedances from permanent monitoring stations, the source of excessive noise is to be investigated and remedied in accordance with the Noise Management Plan.</p>

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	<ul style="list-style-type: none"> Minimise the use of truck exhaust brakes adjacent to areas of retained koala habitat. Implement noise control strategies in accordance with the Noise Management Plan. Where lighting is required, use directional lighting to reduce light spill into surrounding areas. 		<p>infrastructure has been implemented (i.e. exclusion fencing, escape ropes (or poles etc.) in dams, trenches or pits and directional lighting) and conduct monthly inspections to ensure it is in working order. The EMT will request repairs where necessary.</p>	
6. Reduced koala habitat quality associated with increased bushfire				
<p>To prevent the Project from causing the ignition of a bushfire and damage to retained vegetation and surrounding koala habitat.</p>	<ul style="list-style-type: none"> Provide 100m buffer between the Project area and surrounding bushland and manage vegetation within the buffer areas to maintain safe fuel loads (in accordance with the Fire/Bushfire Management Plan). Manage vegetation within the buffer areas to maintain safe fuel loads (in accordance with the Fire/Bushfire Management Plan). Access tracks are designed and maintained to convey fire-fighting vehicles. Implement a Safety Management System and associated frameworks to record and monitor fire including: <ul style="list-style-type: none"> Incident Management Framework Hazard / near miss reporting process Incident notification Crisis management and evacuation framework If burning for management of fuel loads is prescribed within retained vegetation by a Fire/Bushfire 	<p>Bushfire event recorded within the Project area (including the whole mining lease area) or immediate surrounds.</p> <p>Fuel loads reported to be high or above critical levels during monitoring program (as per Fire/Bushfire Management Plan).</p>	<p>All personnel are responsible for reporting any incidences of bushfires (within and surrounding the Project area) to the appropriate mine Health and Safety Officers and local authorities immediately.</p> <p>A bushfire monitoring program is described in the Fire / Bushfire Management Plan) and includes: monitoring of fuel loads, GPS mapping of the fire scar, description of the fire intensity and behaviour (if known) and reporting of the cause of the bushfire (where possible).</p>	<p>Once the fire is extinguished, the source of ignition of the fire will be investigated within five business days. If the source of ignition is a result of the Project then any safety issues will be rectified/actions implemented within 10 business days of the finding to ensure ongoing safety.</p> <p>Fuel reduction burns undertaken as described in the Fire/Bushfire Management Plan.</p>

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	<p>Management Plan or the local fire authority, it does not occur when female Koalas are likely to be carrying dependent young (generally Autumn), burning is carried out during appropriate weather conditions (i.e. low temperature, low wind), burns are low intensity and not intended to affect tree canopy and a pre-burn survey is undertaken to ensure no koalas are present at the time. If a koala is located it will be given 24 hours to move of it's own accord, otherwise it will be relocated by a licensed spotter catcher.</p> <ul style="list-style-type: none"> • Burning off of stockpiles can take place at any time provided the necessary precautions listed in the Fire Management Plan are undertaken. • Implement Fire / Bushfire Management Plan. 			
7. Increase of weeds within Project area				
To reduce the overall occurrence, abundance and diversity of weed species within the Project area.	<ul style="list-style-type: none"> • Employees and contractors will be required to participate in an environmental induction program. The program will provide information on employee environmental responsibilities as well as General Biosecurity Obligations (GBO's) under the Qld <i>Biosecurity Act 2014</i>. • Development of a weed map and GIS database to locate, identify and monitor weed infestations (i.e. > 5 individuals or 10m²) for management within the mine 	The identification of a weed infestation within the Project area that is not recorded in the weed map / GIS database.	Annual vegetation condition assessments will include weed monitoring. The Site Condition assessments will incorporate measurements for weed diversity and abundance within various vegetation communities in the Project area. The weed management program will be deemed to be successful if the Site Condition assessments show an improvement in bio-condition	<p>New infestations will be added to the weed map / GIS database.</p> <p>Weed management procedures undertaken for sites identified on the weed map/GIS database are implemented within 3 months of data entry.</p>

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	<p>footprint and retained vegetation.</p> <ul style="list-style-type: none"> • Implement weed management program as per Pest Management Plan. • Weed removal or treatment regimes will be site and species specific and will include one or more of the following: manual removal, herbicide application or controlled burns. Treatment implemented at each site will be recorded in the weeds map / GIS database. • Appropriate disposal of weed material to prevent further spread. • Ongoing vegetation condition assessment in areas of retained vegetation to monitor known weed infestations and locate any new ones. • Inspect topsoil stockpiles annually to check for evidence of weed infestations, record infestations in the weeds map / GIS database and reinspect and treat weeds in accordance with the weed management program. • Equipment hygiene program to minimise the risk of introduction or spread of weeds or soil borne diseases to the Project area, i.e. Weed Certificates. • Construction and use of on-site wash down bay, (until one is built – all vehicles must comply with appropriate site weed hygiene procedures). Progressive rehabilitation of impacted areas within Project area. 		<p>scores, particularly the component related to weed occurrence.</p> <p>The results of the vegetation condition assessments will be reported in the Annual Koala Report. The results of the vegetation condition assessments will be used by the EMT to update the weed treatment program.</p>	

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
8. Increase of animal pests within Project area				
<p>To reduce the overall occurrence of pest animal species (particularly cats, dogs and foxes) within the Project area.</p>	<ul style="list-style-type: none"> • Employees and contractors will be required to participate in an environmental induction program. The program will provide information on employee environmental responsibilities as well as General Biosecurity Obligations (GBO's) under the Qld <i>Biosecurity Act 2014</i>. • Develop and apply a pest animal map and GIS database to locate, identify and monitor locations (including dens, trails, access points, nests etc) of pests for management within the mine footprint and retained vegetation. • Implement pest management program as per Pest Management Plan. • Pest animal management to focus on those species identified as being a specific risk to koalas, i.e. feral dogs, cats and foxes. • Pest animal management to be undertaken by trained and qualified personnel. • The pest animal removal or treatment program will be conducted annually. It will be species specific and will include one or more of the following: baiting, trapping or shooting. Treatment implemented and the location will be recorded in the pest animal GIS database. • The pest animal removal or treatment program is responsive, with treatment (additional to the annual control program) conducted 	<p>The identification of a pest animal breeding site (i.e. den, burrow, nest etc..) within the Project area that is recorded in the pest animal map / GIS database.</p>	<p>All personnel are responsible for reporting any pest animals sited within the active mine area to their Supervisor and the EMT.</p> <p>Pest monitoring in areas of retained vegetation will be conducted on an annual basis, as outlined in Section 6.3.4. The pest management program will be deemed to be successful if there is a reduction in the occurrence of breeding sites or pest sightings reported by the monitoring program.</p> <p>The results of the Pest Monitoring Program will be reported in the Annual Koala Report and will be used by the EMT to update the pest management program.</p>	<p>Pest management procedures undertaken for breeding sites identified on the pest animal map/GIS database are implemented within 1 month of data entry.</p>

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	<p>on observed breeding areas within 1 month of observation (as per the Corrective Action).</p> <ul style="list-style-type: none"> • Consultation and coordination with neighbouring property owners during the annual treatment program regarding pest animal management techniques and effort. This will be conducted at the beginning of the program and continued periodically to assess prominent pest species population and distribution. Land owner will be contacted for approval. There may be potential to extend the pest animal control effort into adjoining areas. • Ensure site waste management measures reduce the potential to attract vermin and other fauna, including: <ul style="list-style-type: none"> - design of waste storage facilities, - avoid feeding of wildlife, - clean-up procedures, - design of food storage. 			

9. Vehicle strike associated with the mine construction and operation

<p>To avoid fatal harm to koalas as a result of vehicle strike caused by construction and operation of the mine within the Project area.</p>	<ul style="list-style-type: none"> • Truck movements on site will be restricted to the areas between the open pit and the spoil dumps (west and east) and from the open pit to the main access point. • The transit route between the open pit to the spoil dump (west) will go across the Columba Creek corridor (where koalas are likely to move). There will be one haul route between the open pit and the spoil 	<p>An incident involving a vehicle and koala occurs, whereby the koala is killed or injured or there is a near miss.</p>	<p>All personnel are responsible for reporting any koala injuries or fatalities or near misses to the EMT. A total number of reported injuries and fatalities will be presented in the Annual Koala Report.</p>	<p>Koala injuries, deaths or near misses within the Project area relating to vehicle strike are recorded and any safety issues are rectified (or are being rectified) within 30 days of the incident. Rectification may include: signage, slow points, aerial crossings, refuge poles or exclusion fencing.</p>
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Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	<p>dump (west) operational at anytime and it will be speed limited to 20 km/hr. As the open pit and spoil dump (west) expand into new areas the haul route will change location (as required) and the previous haul route will be decommissioned and rehabilitated.</p> <ul style="list-style-type: none"> • Road design to be considered within the Project site (particularly in areas adjacent to retained koala habitat, e.g. Columba Creek and northern section) will include: <ul style="list-style-type: none"> - Clearance of vegetation on road shoulders to improve visibility - Signage (koalas crossing) - Slow points on long straights - Speed limits of 20km/hr within and immediately adjacent to the creek crossing • Speed limits throughout the Project Site will be a maximum of 40 km/hour and will be enforced. • Inductions for all staff, contractors and other visitors to the Project Site include a koala awareness component. This will include a description of the location of habitat areas in the project site, an explanation of specific controls in place (e.g. exclusion fencing, speed limits, sequential clearing, koala register). • Koala Register will be established and maintained to record the time and location of Koala sightings (including incidents). • Injured koalas will be transported to 			

Objective	Management Measures (Construction & Operation)	Triggers for Intervention	Monitoring Activities	Corrective Actions
	the nearest vet			

6.3 Monitoring Programs

6.3.1 Vegetation monitoring

Within the areas of retained vegetation in the Project area, annual vegetation condition monitoring will be conducted post wet season. The methodology employed will be in accordance with the following relevant survey guidelines:

- Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland Version 4.0 (Neldner et al. 2017); and
- Guide to Determining Terrestrial Habitat Quality (DEHP 2017).

A number of permanent terrestrial habitat quality assessments plots will be set up within the retained vegetation within the Project area. Each remaining RE polygon on the Project site will contain one monitoring plot, which will be set up (pegged on site) and mapped during the first year of monitoring.

The *Guide to Determining Terrestrial Habitat Quality* (DEHP 2017) forms the basis of the methodology for sampling of terrestrial habitat quality across the Project area and should be referenced for a detailed description of the methodology. Habitat quality is assessed through a strategic combination of indicators that measure the overall viability of the site and its capacity to support a prescribed environmental matter. The three key indicators for determining habitat quality are:

1. site condition: a general condition assessment of vegetation compared to a benchmark (Biocondition assessment as per DSITIA 2015);
2. site context: an analysis of the site in relation to the surrounding environment; and
3. species habitat index: the ability of the site to support a species.

Each of the three indicators are scored, then summed and translated to a final score out of 10.

Site Condition

The methodology employed at each of the terrestrial habitat quality assessment sites involved the collection of the following data within a 100 m x 50 m transect:

- recruitment of woody perennial species in the ecologically dominant layer;
- native plant species richness for trees, shrubs, grasses and forbs;
- tree canopy height;
- tree canopy cover;
- shrub canopy cover;
- native perennial grass cover;
- organic litter;
- large trees;
- coarse woody debris; and
- non-native plant cover.

Each survey site's data was scored individually against a BioCondition benchmark relevant to the RE represented and compared against a set of maximum scores (adding to 80) defined in the *Guide to Determining Terrestrial Habitat Quality* (DEHP 2017). This is converted to a score out of 10.

6.3.2 Weed monitoring

The non-native plant cover and plant species data in the site condition assessment will be used to monitor weed diversity and abundance within the retained vegetation. Opportunistic observations for weeds will also be made during the vegetation monitoring program. The location and size of the infestation will be measured using DGPS (Digital Global Positioning System) equipment accurate to within 1m. New infestations will be recorded in the weed map / GIS database to add to the management program.

6.3.3 Koala monitoring

The Environmental Management Team will undertake a koala survey on an annual basis with opportunistic sightings to be recorded on a continual basis. Annual surveys will be conducted in accordance with *EPBC Act referral guidelines for the vulnerable koala* (DoE 2014) and *Survey guidelines for Australia's threatened mammals* (DSEWPC 2011).

Surveys for koalas will include direct and indirect observation (scats, scratches etc.) and will be centred on riparian areas, upper/mid-slope areas and other dry-period refugia in order to maximise detectability. Surveys should be undertaken between August and January, when koala activity is generally at a peak, and resident breeding females with back-young are most easily observed. The koala survey methods employed will be:

- Koala transects (day time surveys) – undertaken during the day time with two ecologists walking a distance of 25 m apart for a length of 500 m on one side of a centreline and then returning along the other side of the 500 m centreline also remaining a distance of 25 m apart, while searching each tree along this transect for Koalas. Incidental observations of scratch marks and scats are also made while searching trees for Koalas along each transect.
- Nocturnal spotlighting – undertaken during the night time using a spot light to detect eye shine of koalas on a timed random meander (30 minutes to 1 hour) within an area of potential habitat. Spotlight surveys should be repeated on two separate nights.
- Call Playback – undertaken during the nocturnal spotlighting and involves playing the mating call of a male koala through a loud speaker and recording any responses heard subsequently in the following 10 minutes. After 10 minutes inspect the immediate vicinity with a spotlight to see if non-vocalising fauna have been attracted to the call (10 minutes).
- SAT (Spot Assessment Technique) survey - The SAT involves a radial assessment of koala “activity” within the immediate area surrounding a tree of any species that is known to have been utilised by the species, or otherwise considered to be of some importance for koala conservation and/or management purposes. In the field the technique is applied as follows:
 1. Locate and uniquely mark with flagging tape a tree (the centre tree) that meets one or more of the following selection criteria:
 - a) a tree of any species beneath which one or more koala faecal pellets have been observed and/or
 - b) a tree in which a koala has been observed and/or
 - c) any other tree known or considered to be potentially important for koala, or of interest for other assessment purposes.
 2. identify and uniquely mark the 29 nearest trees to the centre tree,
 3. undertake a search for koala faecal pellets beneath each of the 30 marked trees based on a cursory inspection of the undisturbed ground surface within a distance of 100 centimetres around the base of each tree, followed (if no faecal pellets are initially detected) by a more thorough inspection involving disturbance of the leaf litter and ground cover within the prescribed search area.

Any koala records will note the location (using hand held GPS (Global Positioning System) equipment), number of koalas and condition of the koalas. This data will be compiled and retained within a working GIS database that is updated every year following surveys.

6.3.4 Pest animal monitoring

The Environmental Management Team will undertake a pest animal survey (for dogs, cats and foxes) on an annual basis with opportunistic sightings to be recorded on a continual basis. Annual surveys will be conducted in accordance with the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland v3.0* (DES 2018c). Surveys for pest animals will include direct and indirect observation (scats, signs and dens etc.) and will be centred on riparian areas, upper/mid-slope areas and other dry-period refugia in order to maximise detectability. Surveys should be undertaken in Spring, when pest animal activity is generally at a peak. The pest animal survey methods employed will be:

- Diurnal observation – undertaken during the day time, where two ecologists undertake a random meander (30 minutes to 1 hour) within riparian areas, upper/mid-slope areas and other dry period refugia to detect pests and record species, number of pests and location on a GPS. Data to be entered into the GIS database. Diurnal surveys should be repeated on two separate days. The two searches should be conducted on different days, separated by 48 hours.
- Breeding site survey - undertaken during the day time, where two ecologists undertake a random meander within riparian areas, upper/mid-slope areas and other dry period refugia to detect pests breeding sites (e.g. dens). Suspected dens will be recorded on a GPS unit, with data entered in to the GIS database.
- Nocturnal spotlighting – undertaken during the night time using a spot light to detect eye shine of animals on a timed random meander (30 minutes to 1 hour) within an area of potential habitat. Spotlight surveys should be repeated on two separate nights. The two searches should be conducted on different nights, separated by 48 hours.
- Camera traps – set for day time and night time activity in riparian areas, upper/mid-slope areas, near suspected breeding sites and along tracks/trails for a period of 10 days. Traps should be baited with meat (to attract target animals). Commercially available pheromones can also be sprayed near the bait to lure in feral animals such as foxes; these are a recommended addition.

Any pest animal records will note the location (using hand held GPS (Global Positioning System) equipment), number of specimens and condition of the pest animals (particularly if pregnant or lactating). This data will be compiled and retained within a working GIS database that is updated every year following surveys.

6.4 Reporting requirements

The KMP will be audited annually and the results of the audit will be reported to the Environmental Management Team (EMT). Reporting will specifically include:

- Objectives and assessment of whether they were met (results of monitoring programs);
- Incidents where trigger levels were exceeded; and
- Corrective actions implemented.

The EMT will then review the Annual Koala Report and make recommendations for further corrective actions, as necessary. The EMT will also review the KMP and make any necessary changes to ensure Performance Indicators are met in future years.

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Appendix A

**Baseline vegetation
quality assessments**