BENGALLA Mining Company

Bengalla Mine

August 2017

Biodiversity Management Plan

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

BENGALLA

Bengalla Mining Company Pty Limited

Biodiversity Management Plan

Revision	Date Submitted	Date Approved	Description	Author	Reviewer	Approved
1	12/08/15	-	DP&E Approved Version	D Munro Hansen Bailey	D Munro Hansen Bailey	C White BMC
2	27/07/16	-	Update for SSD-5170 MOD 1 & MOD 2	N Dobbins Hansen Bailey	D Munro Hansen Bailey	C White BMC
3	03/05/17	-	Update for SSD-5170 (as modified) MOD 3	N Dobbins Hansen Bailey	D Munro Hansen Bailey	C White BMC
4	19/06/17	18/08/2017	Update with DoEE Comments and Declaration of Accuracy	N Dobbins Hansen Bailey	D Munro Hansen Bailey	C White BMC

DECLARATION OF ACCURACY

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signature	Cam Halfpenny
Name	Cam Halfpenny
Title	Chief Executive Officer (CEO)
Organisation	Bengalla Mining Company
Date	14.9.17

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1.0 INTRODUCTION

This section provides background information on the Bengalla Mine, describes the mine and its history, and outlines the objectives of this Biodiversity Management Plan.

1.1 Background

Bengalla Mining Company Pty Limited (BMC) operates the Bengalla Mine (Bengalla) which is located approximately 4 km west of Muswellbrook in the Upper Hunter Valley, New South Wales (NSW). Bengalla is bound by Wybong Road to the north, Overton Road to the east, the Muswellbrook-Ulan Rail Line to the south and Roxburgh Road to the west (see **Figure 1**).

BMC was granted Development Consent for State Significant Development (SSD) 5170 on 3 March 2015 by the Secretary of Department of Planning and Environment (DP&E) for the Continuation of Bengalla. SSD-5170 enables BMC to continue open cut coal mining of up to 15 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal until 2039.

On 27 May 2015 BMC was granted *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval 2012/6378 from the Department of the Environment (DoE).

This Biodiversity Management Plan (BMP) has been developed in accordance with the requirements of SSD-5170 (as modified) Schedule 3, Condition 29 (part) and EPBC Act Approval 2012/6378 Condition 2 to provide a framework for the Environmental Management, reporting and auditing of ecological issues across all BMC owned land within the Project Boundary.

A separate Biodiversity Offset Management Plan (BOMP) documents the management of BMC's offset properties, all of which are remote from Bengalla and subject to a different management regime. Both documents combined meet the requirements of Schedule 5, Condition 29 of SSD-5170 (as modified) and Conditions 2 and 3 of EPBC Approval 2012/6378.

1.2 History of Operations

1.2.1 Introduction

BMC was originally granted development consent DA 211/93 in 1996, to construct and operate an open cut coal mine and associated activities in accordance with the supporting document *Bengalla Mine Environmental Impact Statement* (Bengalla EIS). Mining operations at Bengalla commenced in 1998.

HB BENGALLA ANNUAL REVIEW Hb1669 F1 Regional Locality 04 03 2017

BENGALLA MINE

Regional Locality

FIGURE 1

1.2.2 State Significant Development 5170

In September 2013, BMC sought a new development consent under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) to enable mining operations to continue at Bengalla. The application was supported by the '*Continuation of Bengalla Mine Environmental Impact Statement*' (Bengalla EIS) (Hansen Bailey, 2013) as modified by the '*Continuation of Bengalla Mine Response to Submissions*' (RTS) (Hansen Bailey, 2014).

On 3 March 2015 the Secretary of DP&E (as delegate of the Minister for Planning) granted SSD-5170 which permits the following activities at Bengalla:

- Open cut mining towards the west at a rate of up to 15 Mtpa ROM coal until 2039;
- Continued use of the existing dragline, truck fleet and excavators;
- An out of pit Overburden Emplacement Area (OEA) to the west of Dry Creek which may be utilised for excess spoil material until it is intercepted by mining;
- Various upgrades, relocations or additional new infrastructure to support the Project;
- Processing, handling and transportation of coal via the (upgraded) Coal Handling and Preparation Plant (CHPP) and rail loop for export and domestic sale;
- Continued rejects and tailings co-disposal in the Main OEA and temporary in pit reject emplacement;
- Relocation of a 6 km section of Bengalla Link Road at approximately Year 15 near the existing mine access road to facilitate coal extraction;
- The diversion of Dry Creek via dams and pipe work with a later permanent alignment of Dry Creek through rehabilitation areas when emplacement areas are suitably advanced;
- Relocation of water storage infrastructure as mining progresses through existing dams (including the Staged Discharge Dam and Hunter River Raw Water Dam); and
- A workforce of approximately 900 full time equivalent personnel (plus contractors) at peak production.

1.2.3 Bengalla Development Consent – Modification 1

SSD-5170 was modified on 16 December 2015 by the Executive Director – Resource Assessments and Compliance for the DP&E (as delegate of the Minister for Planning) for the activities largely described in the '*Bengalla Mine Development Consent Modification Statement of Environmental Effects*' (Hansen Bailey, 2015a) (MOD 1 SEE).

The MOD 1 SEE provides approval for the following:

- Alterations to various water management infrastructure components including:
    - Utilisation of the Satellite Pit as a temporary mine water catchment dam;
    - Relocation of the Staged Discharge Dam and the Hunter River Salinity Trading Scheme (HRSTS) staged discharge release point;
    - Construction of clean water diversion levees in locations other than those already approved; and
    - Revised locations for the proposed relocation of the Hunter River Raw Water Dam and Washery Dam;
- Additional locations for the siting of the Explosives Storage Facility; and
- Placement of fill from the excavation of the Dry Creek Clean Water Dam (CW1) adjacent to it.

No additional conditions pertaining to Biodiversity management were included in SSD-5170 as a result of the MOD 1 SEE.

1.2.4 Bengalla Development Consent – Modification 2

SSD-5170 was modified on 1 July 2016 by the Director – Resource Assessments for the DP&E as delegate of the Minister for Planning for the activities largely described in the '*Bengalla Mine Development Consent Modification Statement of Environmental Effects*' (Hansen Bailey, 2016) (MOD 2 SEE). The MOD 2 SEE provides approval for the following:

- Alterations to the approved height of the Main OEA to improve visual amenity from primary viewing locations in and surrounding the township of Muswellbrook and Denman Road, in two selected locations (Visual Relief Areas):
    - The Northern Relief Area constructed to a maximum height of Reduced Level (RL) 300; and
    - The Southern Relief Area constructed to a maximum height of RL 290.
- Establishment of a new gravel access road from Wybong Road to the Dry Creek Diversion Project Construction Site Office being a former homestead (Homestead Access).

No additional conditions pertaining to biodiversity management were included in SSD-5170 as a result of the MOD 2 SEE.

The development layout is presented in **Figure 2**.

1.2.5 Bengalla Development Consent – Modification 3

SSD-5170 was modified on 23 December 2016 (MOD 3) by the Director – Resource Assessments for the DP&E as delegate of the Minister for Planning for the activities largely described in the 'Bengalla Mine Development Consent Modification 3 Statement of Environmental Effects'(Hansen Bailey, 2016) (MOD 3 SEE). The MOD 3 SEE provides approval for the repositioning of the following approved activities:

- The construction and operation of an explosives facility and reload facility, which may be relocated to another location(s) within the Approved Disturbance Boundary at a later time;
- The alignment of the Hunter River pipeline; and
- The emplacement and use of temporary topsoil stockpiles during the mining process.

No additional mitigation and management measures to that within SSD-5170 (as modified) are required to manage any potential impacts to biodiversity resulting from MOD 3. As such, no additional conditions pertaining to biodiversity were included in SSD-5170 (as modified) as a result of the MOD 3 SEE.

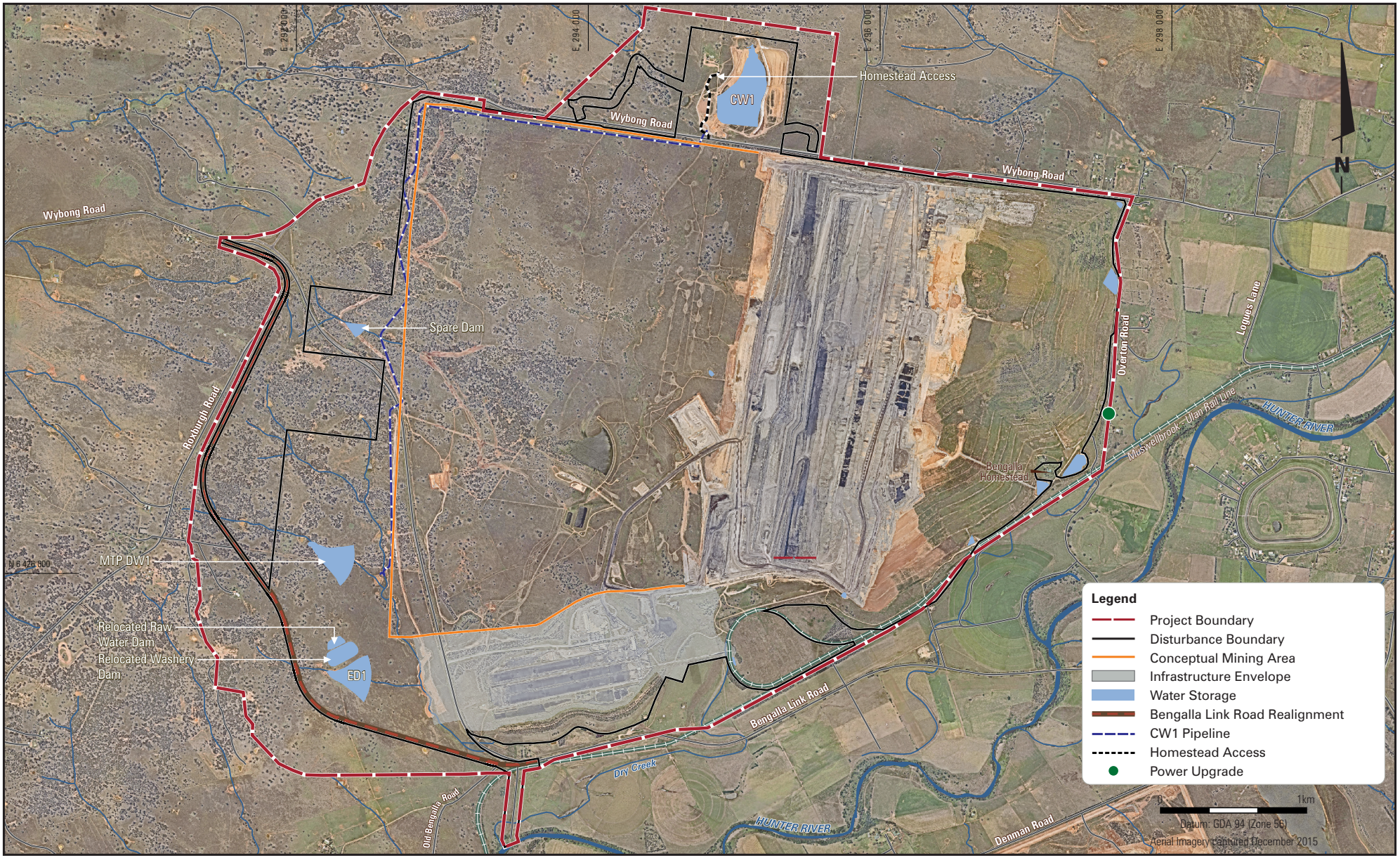
The development layout is presented in **Figure 2**.

1.3 Objectives

This BMP sets out the procedures for biodiversity management, reporting and auditing of ecological issues within the Bengalla Project Boundary (see **Figure 2**). The objective of this BMP is to provide for the management of biodiversity within the Project Boundary that makes provisions for:

- Minimising human disturbance to native flora and fauna;
- Minimising impacts to threatened species and communities;
- Controlling threats to remnant native vegetation at Bengalla;
- Managing the impacts of feral animals and weeds;
- Vegetation disturbance / clearing including a description of the clearance procedure; and
- Monitoring and adaptive management.

This BMP and has been developed in accordance with the requirements of relevant statutory approvals.



HB BENGALLA MOD 3 1639 F2 Development Layout 22 11 2016

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Conceptual Development Layout

FIGURE 2

Table 1 lists all biodiversity-related conditions from SSD-5170 (as modified) and EPBC Approval 2012/6378. It indicates where each requirement is addressed in this BMP or as relevant to the BOMP. Commitments in relation to its supporting document including the *Ecological Impact Assessment* (Cumberland Ecology, 2013) have also been incorporated into this BMP.

Table 1
Biodiversity Requirements and Where Addressed

Requirement	Section
SSD-5170	
Schedule 3 – Environmental Performance Conditions **29. Biodiversity Management Plan**	-
The Applicant must prepare and implement a Biodiversity Management Plan for the development to the satisfaction of the Secretary. The plan must:	This Document
a) be prepared in consultation with OEH, and submitted to the Secretary for approval within 6 months of the date of this consent	**2.0**
b) describe how the implementation of the offset strategy would be integrated with the overall rehabilitation of the site	BOMP
c) Establish baseline data for the existing habitat in the biodiversity offset areas and on the site.	**3.0** and BOMP
d) Include: i) a detailed description of the short, medium and long term measures that would be implemented to:	-
• Implement the biodiversity offset strategy	BOMP
• Manage the remnant vegetation and habitat on the site	**4.0**
ii) Include detailed performance and completion criteria for evaluating the performance of the biodiversity offset strategy and triggering remedial action (if necessary)	BOMP
iii) Include a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:	-
• Enhancing the quality of existing vegetation and fauna habitat in the biodiversity offset areas	BOMP
• Restoring native vegetation and fauna habitat on the biodiversity offset areas and rehabilitation areas through focusing on assisted natural regeneration, targeted vegetation establishment and the introduction of naturally scarce fauna habitat features (where necessary)	BOMP
• Collecting and propagating seed	**4.2.5**
• Protecting vegetation outside the disturbance area	**4.2.1**
• Managing salinity	BOMP
• Undertaking pre-clearance surveys	**4.2**
• Managing impacts on fauna	**4.2**
• Salvaging and reusing material from the site for habitat enhancement	**4.2.3**
• Translocation of threatened flora from the site in accordance with the guidelines for the *Translocation of Threatened Plants in Australia* (Vallee et al., 2004)	**4.0**
• Controlling weeds and feral pests	**4.3 and 4.4**
• Managing grazing and agriculture	BOMP
• Controlling access	BOMP
• Bushfire management	BOMP

Requirement	Section
iv) Include a seasonally-based program to monitor and report on the effectiveness of these measures, and progress against the detailed performance and completion criteria	**5.0**
v) Identify the potential risks to the successful implementation of the biodiversity offset strategy, and include a description of the contingency measures that would be implemented to mitigate these risks	BOMP
vi) Include details of who would be responsible for monitoring, reviewing, and implementing the plan	**7.0**
The Applicant must implement the approved management plan as approved from time to time by the Secretary.	This document
29A. During construction and maintenance of the Northern Diversion Levee, ensure that impacts to native vegetation (particularly EECs) are minimised as far as is reasonable and feasible, to the satisfaction of the Secretary.	**4.5.3**
Schedule 5 **3. Management Plan Requirements**	-
• Detailed baseline data	**3.0** and BOMP
• A description of: i) The relevant statutory requirements (including any relevant approval, licence or lease conditions) ii) Any relevant limits or performance measures/criteria iii) The specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures	**4.0 and 0**
• A description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria	**4.1.1**
• A program to monitor and report on the: i) Impacts and environmental performance of the development ii) Effectiveness of any management measures	**5.0**
• A contingency plan to manage any unpredicted impacts and their consequences	**6.2**
• A program to investigate and implement ways to improve the environmental performance of the development over time	**6.1**
• A protocol for managing and reporting any: i) Incidents ii) Complaints iii) Non-compliances with statutory requirements iv) Exceedances of the impact assessment	**6.0**
• A protocol for periodic review of the plan	**6.3**
EPBC Approval 2012/6378	
2. To mitigate impacts of the action on Box Gum Woodland, the Grey Headed Flying Fox, Large-eared Pied Bat, South-eastern Long-eared Bat, Regent Honeyeater, Swift Parrot and the Spotted-tail Quoll, the approval holder must prepare and submit, prior to the proposed date of commencement of the action, a mine site *Vegetation Clearance Protocol and Landscape Management Plan* (VCPLMP) for the Minister's written approval. The VCPLMP must**:**	This Document
a. Delineate areas to be cleared, describe pre-clearance survey methods, specify actions to minimise fauna impacts and detail vegetation clearance procedures	**3.0** and **4.2**
b. Require collection and stockpiling of habitat features important to threatened fauna species for reinstatement in rehabilitation areas	**4.2.3**
c. Require use of native, locally sourced seed for propagation for rehabilitation areas	**4.2.5**

Requirement	Section
d. Include measures to avoid, supress and control the spread of plant pathogens (such as *Phytophthora cinnamomi*)	**5.4**
e. Specify a two stage clearing protocol where non-habitat trees are cleared 24 hours prior to any habitat trees being cleared, to encourage fauna to move out of an area	**4.2**
The approval holder must not commence the action until the VCPLMP is approved by the Minister. The approved VCPLMP must be implemented.	**2.1.4**
Note: The Biodiversity Management Plan required under NSW approval condition 29 may be used to satisfy this condition if it meets the above content and submission requirements.	This Document
12 By the end of March each year, the approval holder must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of the BOMP and VCPLMP as specified in the conditions. Documentary evidence providing proof of the date of publication must be provided to the Department at the same time the compliance report is published. *Note: The Annual Review required under NSW Approval condition 4 (of Schedule 5) may be used to satisfy this condition if it meets the above content and submission requirements.*	**6.4**

1.4 ENVIRONMENTAL MANAGEMENT

Operations at Bengalla are conducted in accordance with SSD-5170 (as modified), Environment Protection Licence (EPL) 6538 and environmental management plans to ensure that BMC manages its environmental issues, is compliance with regulatory requirements and satisfies the expectations of stakeholders.

This document (and subsequent revisions) will form part of this management regime. BMC will continue to operate during and following mine closure to ensure environmental (including monitoring and management) and social responsibilities are met.

1.5 DOCUMENT STUCTURE

This document is structured as follows:

- **Section 2.0** outlines the stakeholder engagement undertaken in the development of this BMP;
- **Section 3.0** summarises the existing environment and context associated with future disturbance areas at Bengalla;
- **Section 4.0** provides a summary of the management actions associated with biodiversity management;
- **Section 5.0** provides a summary of the monitoring program associated with this BMP;
- **Section 6.0** provides a summary of the reporting, review and training requirements for this BMP;
- **Section 7.0** confirms the responsibilities of key site personnel for actions as identified in this BMP; and
- **Section 8.0** and **Section 9.0** provides a list of abbreviations and references respectively.

2.0 STAKEHOLDER CONSULTATION

This section provides a summary of stakeholder consultation undertaken as part of the development of this BMP.

2.1 2015 BMP

2.1.1 Regulatory Consultation

Schedule 3, Condition 29 of SSD-5170 (as modified) states that the BMP must be prepared in consultation with the Office of Environment and Heritage (OEH) and submitted to the Secretary for approval within 6 months of the date of the Development Consent.

This BMP has also been prepared in accordance with Condition 2 of EPBC Approval 2012/6378 which notes that BMC must prepare a Vegetation Clearance Protocol and Landscape Management Plan (VCPLMP) for submission to the DoE for the Minister's written approval. Condition 2 of EPBC Approval 2012/6378 further notes that the Biodiversity Management Plan required under SSD-5170 (as modified) Schedule 3, Condition 29 may be used to satisfy this condition if it also meets the EPBC requirements.

A discussion in relation to the consultation completed with each agency is provided below. A copy of all regulatory correspondence is provided in **Appendix A**.

2.1.2 Office of Environment and Heritage

On 29 May 2015 a copy of the BMP was provided to OEH for its consideration. In its response dated 4 June 2015, OEH provided several recommendations for consideration (see **Appendix A**). Recommendations were incorporated into the document where required.

2.1.3 Department of Planning and Environment

The BMP was updated to include the comments from the OEH and DoE. The DP&E approved the BMP in correspondence dated 14 August 2015 (see **Appendix A**).

2.1.4 Department of Environment

Condition 2 of EPBC Approval 2012/6378 requires the BMP be submitted prior to commencement of the action for approval by the Minister.

As such, a copy of the BMP was provided to DoE on 29 May 2015 for consideration. In their response received on 16 and 26 June 2015 DoE representatives provided several recommendations to be addressed within the revised BMP (see **Appendix A**). Responses to each comment and where each has been addressed within the BMP is also included in this correspondence.

On 22 July 2015 DoE provided approval for the BMP and indicated that it meets the requirements of Condition 2 of EPBC 2012/6378 (see **Appendix A**).

2.2 2016 BMP

Relevant to this BMP, SSD-5170 (as modified) Schedule 5, Condition 5 states:

> *"5. Within 3 months of submission of:*
>
> *(d) Any modification to the conditions of this consent (unless conditions require otherwise), the applicant shall review, and if necessary revise, the strategies, plans, and programs required under this consent to the satisfaction of the Secretary.*
>
> *Where this review leads to revisions of any such document, then within 4 weeks of the review, unless the Secretary agrees otherwise, the revised document must be submitted to the Secretary for approval."*

Correspondence was provided by DP&E on 24 May 2016 indicating that with consideration of BMC's recent modification application (i.e. MOD 2 SEE provided on 15 April 2016), the Water Management Plan and the Aboriginal Cultural Heritage Management Plan are required to be submitted prior to undertaking disturbance associated with the activities approved under MOD 1, where the activities are not shown in the approved plan. Remaining management plans associated with the update for the Bengalla MOD 1 SEE are required to be submitted "*…to the Department within one month of determination of the current Modification 2 application…".*

The 2016 BMP incorporates minor wording changes relevant to the modification of the consent and contains no changes to the management or monitoring of biodiversity from that previously approved. A copy of the 2016 BMP was provided to DP&E on 28 July 2016 for review and approval. As of 2 May 2017, no correspondence has been received from DP&E with regards to the 2016 document.

A copy of all relevant regulatory correspondence associated with the preparation of this 2016 BMP is provided in **Appendix A**.

2.3 2017 BMP

This review was undertaken to address MOD 3 and updates a minor procedural update in relation to pre-clearing inspections. **Appendix A** includes DP&E correspondence including confirmation of a due date of 12 May 2017. A copy of the 2017 plan was provided to DP&E on 3 May 2017 for review and approval and OEH and DoEE for consultation.

Correspondence was received from OEH on 31 May 2017 which advises they have no further comments in relation to the BMP. Comments were received from DoEE on 8 May 2017 and have been addressed in this version of the BMP.

A copy of all relevant regulatory correspondence associated with the preparation of this BMP is provided in **Appendix A**.

3.0 EXISTING ENVIRONMENT AND BENGALLA MINE IMPACTS

This section describes the existing biodiversity values at Bengalla and outlines the main threats to flora and fauna.

3.1 Ecological Setting

Bengalla is located in the Hunter subregion of the Sydney Basin Bioregion. The Sydney Basin Bioregion extends from Batemans Bay in the south to Nelson Bay in the north and includes parts of the Blue Mountains. The Hunter subregion is principally located in the Hunter Valley and incorporates the Hunter River Catchment.

The most significant river system in the sub-region is the Hunter River, which flows from north east to south west approximately 1 km south of Bengalla. Bengalla is dissected by Dry Creek, a third order ephemeral stream which drains in a general north – south direction to its confluence with the Hunter River. Except during heavy and prolonged rainfall this ephemeral watercourse is generally dry with small stagnant pools of water. Impacts to Dry Creek are discussed in **Section 3.4**.

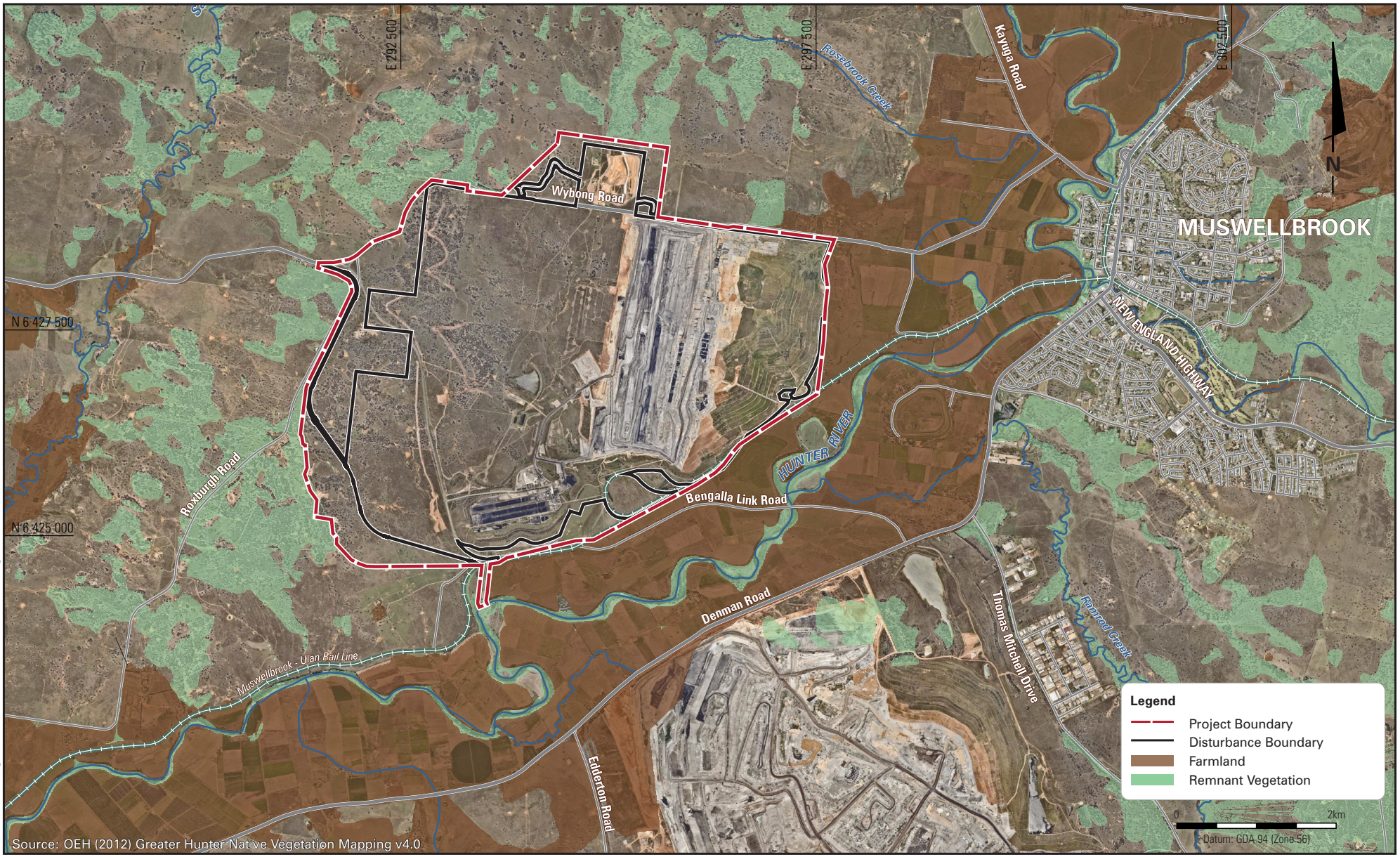
Much of the immediate locality consists of farmland and remnant vegetation as shown in **Figure 3**. As a result, there is little connecting ecological habitat between Bengalla and the wider Hunter Valley.

3.2 Impact Description

Bengalla will impact on approximately 881 hectares (ha) of native vegetation (see **Table 2** and **Figure 4**) and 69 ha of exotic pasture and tree and shrub plantations (totalling 950 ha). Of the 881 ha of native vegetation that is predicted to be impacted: 621 ha is native grassland; and 260 ha is native forest and woodland (see **Figure 4**). Most of the area to be disturbed is within highly modified grassland previously used for agricultural grazing.

Disturbance will occur progressively, as required to facilitate mining and associated operations over the life of Bengalla. This BMP has provisions to protect habitats up until the time of clearance and to salvage key habitat items for future use.

During the life of operations, Bengalla will remove 73 ha of Box Gum Woodland (EPBC listed Critically Endangered Ecological Community (CEEC) and 462 ha Box Gum Woodland Derived Native Grassland CEEC as contained within the Disturbance Boundary presented on **Figure 4**. Bengalla will also remove 9.7 ha of other NSW *Threatened Species Conservation Act 1995* (TSC Act) listed Endangered Ecological Communities (EECs) and 168 ha of non-endangered Narrow-leaved Ironbark Woodland.

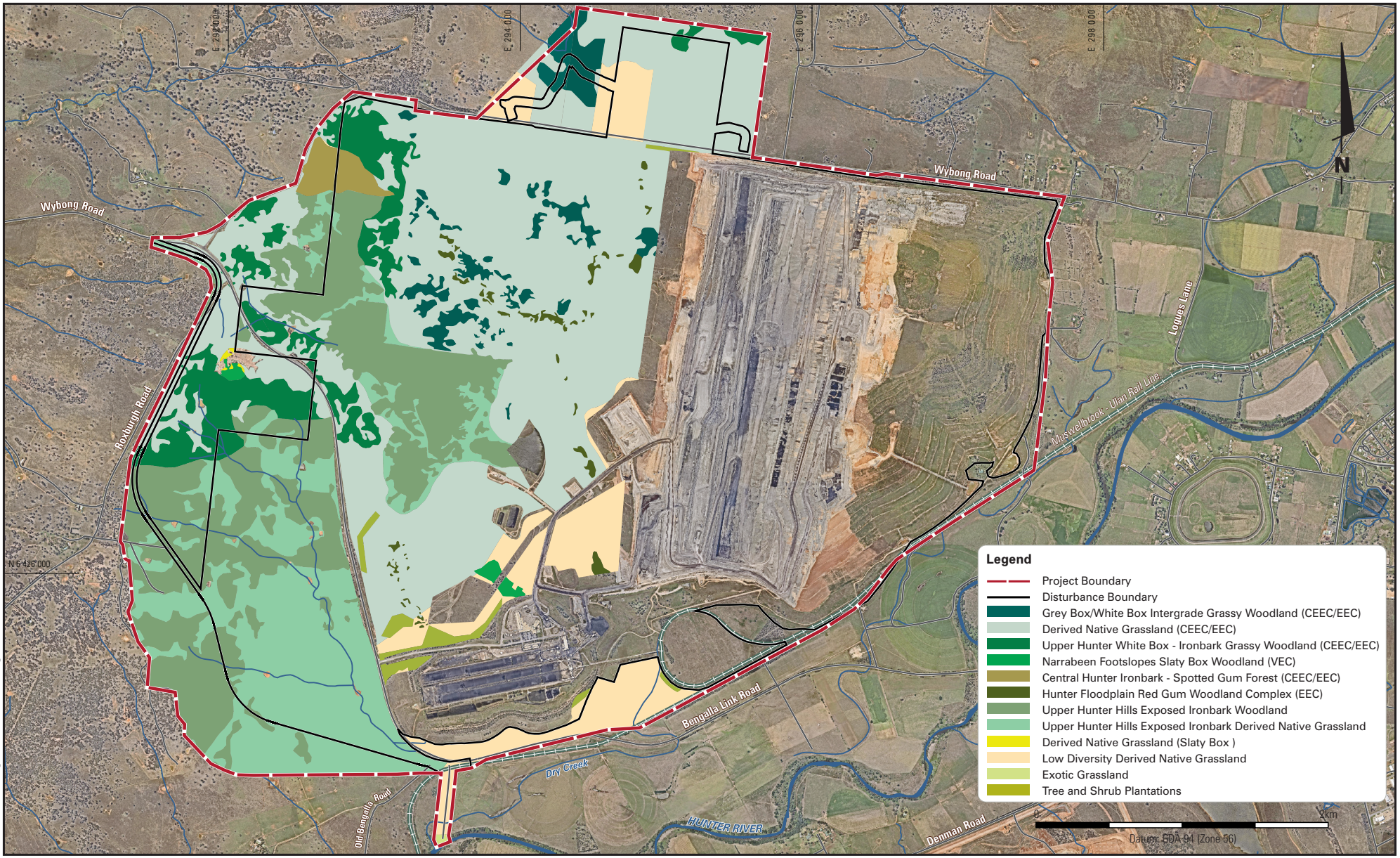


HB BENGALLA Management Plans 1613 F3 Farmland and Remnant Vegetation 28 07 2016

BENGALLA MINE

Farmland and Remnant Vegetation

FIGURE 3



HB BENGALLA Management Plans 1613 F4 Vegetation Communities 28 07 2016

BENGALLA MINE

Vegetation Communities

FIGURE 4

Table 2
Impacted Vegetation at Bengalla Mine

Vegetation Communities	EPBC/TSC Status	Area within Disturbance Boundary (ha)
Grey Box/White Box Intergrade Grassy Woodland (Box Gum Woodland)	C/EEC	27.9
Upper Hunter White Box - Ironbark Grassy Woodland (Box Gum Woodland)	C/EEC	45.3
Derived Native Grassland (Box Gum Woodland)	C/EEC	462.1
Central Hunter Ironbark - Spotted Gum Forest*	C/EEC	6.7
Narrabeen Footslopes Slaty Box Woodland	Vulnerable	2.9
Hunter Floodplain Red Gum Woodland	EEC	9.4
Upper Hunter Hills Exposed Ironbark Woodland	Not Listed	167.9
Derived Native Grassland (Upper Hunter Hills Exposed Ironbark)	Not Listed	159.2
Low Diversity Derived Native Grassland/ Exotic Pasture	Not Listed	57.5
Tree and Shrub Plantation	Not Listed	11.4
Total Area**		**950.3**
Total C/EEC (EPBC Act and TSC Act)		**554.3**

** Central Hunter Ironbark – Spotted Gum Forest corresponds to the Central Hunter Valley eucalypt forest and woodland ecological community listed as 'critically endangered' under the EPBC Act on 7 May 2015*

***The total area contains approximately 19 ha of cleared areas associated with the Bengalla Link Road, farm dams and infrastructure that have been excluded from vegetation calculations.*

3.3 Threatened Flora and Fauna

Most of the land within Bengalla is highly modified grassland areas. Despite the modified condition of the vegetation, it still supports threatened flora and fauna species as well as several ecological communities listed under the TSC Act and/or the EPBC Act. Photographs of threatened fauna are shown in **Appendix B**.

3.3.1 Flora

Ecological Communities

Four ecological communities at Bengalla are listed under either the TSC Act and/or the EPBC Act:

- Box Gum Woodland and Derived Native Grassland C/EEC;
- Central Hunter Ironbark – Spotted Gum Forest C/EEC;
- Narrabeen Footslopes Slaty Box Woodland; and
- Hunter Floodplain Red Gum Woodland.

Threatened Flora Species

Two threatened flora species / populations were originally recorded within the Project Boundary:

- *Bothriochloa biloba* (Lobed Blue Grass) - a grass species originally listed as 'vulnerable' under the EPBC Act; however it was de-listed from the EPBC Act on 14 December 2013. *Bothriochloa biloba* is fairly tolerant of grazing and grows in partially cleared eucalypt forests and grassland derived from the clearing of such forests (NSW Scientific Committee, 2004); and
- *Cymbidium canaliculatum* (Tiger Orchid) - an epiphytic orchid species that grows on trees, predominantly eucalypts. *Cymbidium canaliculatum* in the Hunter Valley is listed under the TSC Act as an 'Endangered Population'. *Cymbidium canaliculatum* plants were detected at three locations at Bengalla, with one record being directly impacted.

3.3.2 Fauna

Fauna Habitat Values

Fauna habitat within the Project Boundary largely comprises Derived Native Grasslands and to a lesser extent, regenerating woodland and open forest that have been partially cleared or thinned in the past. This vegetation contributes to a larger, diffuse patch of forest and woodland that extends south west away from Bengalla.

Native species likely to utilise the habitat are mostly common species and those well-adapted to disturbed woodland and agricultural areas. However, Bengalla also provides habitat for several threatened species including woodland birds, bats and arboreal mammals.

Although the condition and nature of the habitats at Bengalla have been altered by existing and historical land uses, they still retain some value for native fauna. The regrowth areas generally lack many habitat features but areas of more mature habitat are also present that do retain valuable habitat features are present at Bengalla.

Fauna habitat features that will likely be removed by Bengalla include:

- **Understorey vegetation** – loss of shelter and foraging habitat for amphibians, reptiles, small birds and terrestrial mammals;
- **Fallen logs, woody debris and leaf litter** – loss of shelter habitat for amphibians, reptiles and terrestrial mammals, and forage habitat for woodland bird species;
- **Hollow-bearing living trees and stags** – loss of habitat for a range of fauna species which may rely on them for shelter, breeding or roosting. Loss of mature remnant hollow-bearing trees will have important implications for threatened species such as reptiles, birds, arboreal mammals and microbats;
- **Nectar-producing trees and shrubs** – loss of food resources for blossom-dependant birds, arboreal mammals and megachiropteran bats (flying-foxes);
- **Shrubs and grasses** – loss of food for a range of passerine birds and herbivorous mammals;
- **Ecotonal (edge) communities** – loss of foraging habitat for many species, particularly birds such as raptors;
- **Ephemeral drainage lines** – loss of limited foraging, shelter and breeding habitat for amphibians, aquatic reptiles, wetland birds and aquatic mammals; and
- **Constructed farm dams with limited aquatic vegetation** – loss of foraging and breeding habitat for amphibians, aquatic reptiles and wetland birds.

Threatened Fauna Species

A number of threatened fauna species have been recorded at Bengalla and the immediate surrounds, including woodland bird species and microchiropteran bats. These include:

- Brown Treecreeper (*Climacteris picumnus victoriae*);
- Speckled Warbler (*Chthonicola sagittatus*);
- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*);
- Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis*);
- White-throated Needletail (*Hirundapus caudacutus*);
- Fork-tailed Swift (*Apus pacificus*);
- Spotted Harrier (*Circus assimilis*);
- Little Eagle (*Hieraaetus morphnoides*);
- Barking Owl (*Ninox connivens*);
- Rainbow Bee-eater (*Merops ornatus*);

- Squirrel Glider (*Petaurus norfolcensis*);
- Spotted-tailed Quoll (*Dasyurus maculatus*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*);
- Eastern Freetail-bat (*Mormopterus norfolkensis*);
- Large-eared Pied Bat (*Chalinolobus dwyeri*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*);
- Eastern Bent-wing Bat (*Miniopterus orianae*);
- Large-footed Myotis (*Myotis macropus*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*);
- Greater Long-eared Bat (*Nyctophilus corbeni*); and
- Eastern Cave Bat (*Vespadelus troughtoni*).

Other species such as the Superb Parrot (*Polytelis swainsonii*), Swift Parrot (*Lathamus discolor*) and Regent Honeyeater (*Anthochaera phrygia*) have potential to occur in the vicinity of Bengalla and the surrounding area.

3.3.3 Weeds

One of the main threats to vegetation communities and threatened species is weeds, which can result in changes to the structure, species composition, fire frequency and abundance of native communities. Weed species have been recorded including:

- Star Thistle (*Centaurea calcitrapa*);
- African Boxthorn (*Lycium ferocissmum*);
- Tiger Pear (*Opuntia aurantiaca*); and
- Common Prickly Pear (*Opuntia stricta*).

3.3.4 Feral Fauna

Feral fauna can prey upon or compete with native fauna species for food and resources. The European Red Fox (*Vulpes vulpes*) and European Rabbit (*Oryctolagus cuniculus*) have been recorded at Bengalla. Although these species are exotic pests, due to low numbers, they are not considered to be a major threat to the native flora and fauna at Bengalla.

3.4 Dry Creek Impacts

Bengalla will result in the initial diversion and future reinstatement of Dry Creek. Dry Creek is an ephemeral gully that only carries water during and immediately after heavy rain. Dry Creek occasionally holds small pools of water for a few days following rainfall events and drains to the Hunter River approximately 1 km south of Bengalla Mine. It supports limited aquatic habitats and only scattered patches of forest along its length.

The diversion of the Dry Creek will remove a minor amount of aquatic and riparian habitat (i.e. Hunter Floodplain Red Gum Woodland) within a small portion of the catchment of the Hunter River. The impacts to aquatic habitat are predicted to be small and of no significant ecological consequence.

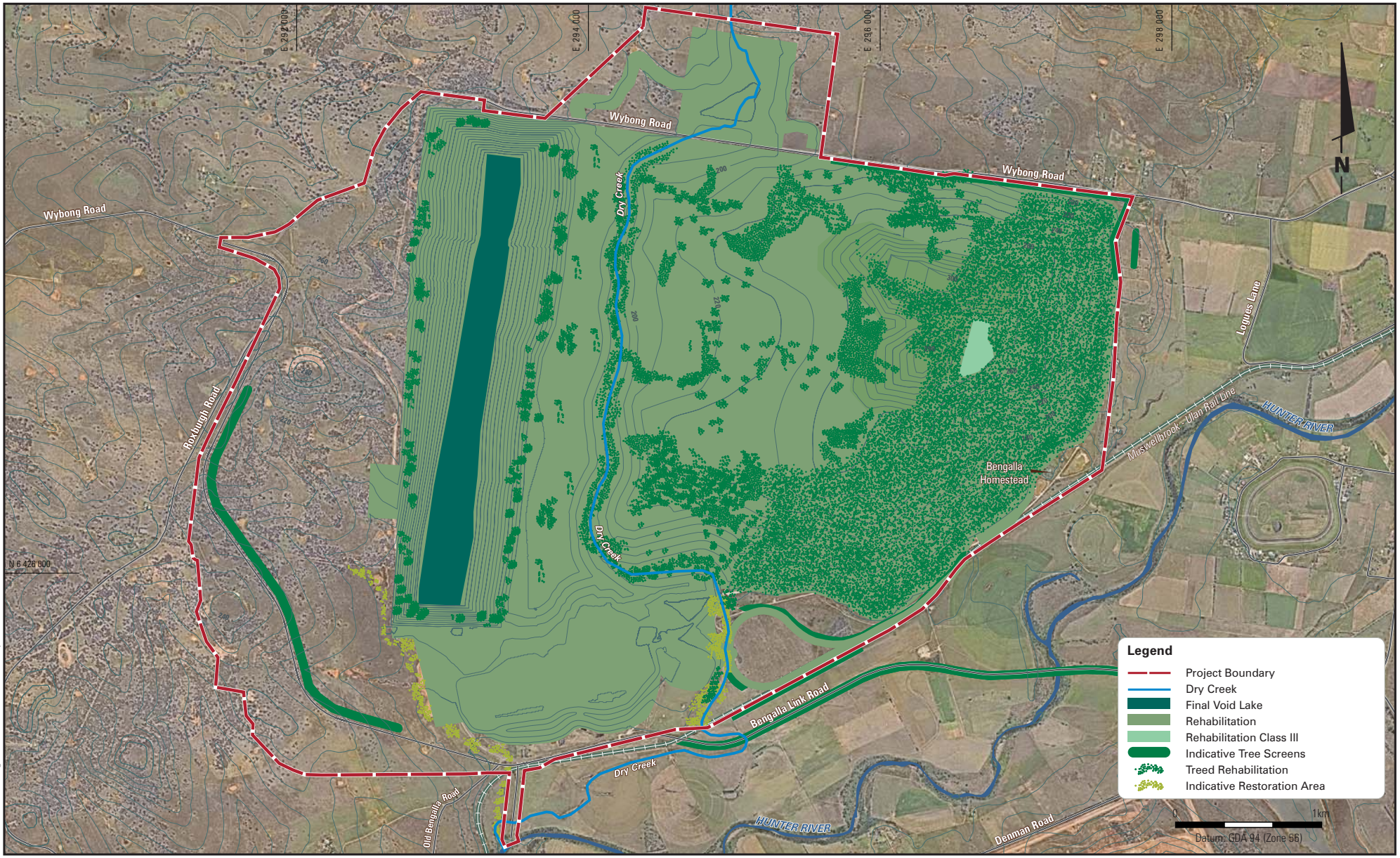
The loss of Hunter Floodplain Red Gum Woodland as riparian habitat will be ameliorated through replanting in the restoration area to the west of the rail loop (see **Figure 5**) and future planting when the Dry Creek frontage is reconstructed towards the end of mining. **Figure 5** presents the indicative approved final landform at Bengalla.

In accordance with SSD-5170 (as modified) Schedule 3, Condition 46, BMC will prepare a plan for the future Reinstatement of Dry Creek. It is anticipated that this plan will be required to be prepared in consultation with the NSW Division of Resources and Energy (DRE) and be approved prior to commencement of any reinstatement activities.

3.5 Biodiversity Offset Strategy

A comprehensive Biodiversity Offset Strategy (BOS) has been developed to compensate for impacts associated with Bengalla. The BOS comprises a total of 6,215 ha of land including broad areas of native forest and woodland, and semi-natural grassland.

In accordance with SSD-5170 (as modified), Schedule 3, Condition 29 and EPBC 2012/6378 Condition 3, a separate BOMP has been developed to provide for the long term security and management of BOS properties.



HB BENGALLA Management Plans 1613 F4 Conceptual Final Landform 19 07 2016

BENGALLA MINE

Approved Final Landform and General Rehabilitation

FIGURE 5

4.0 MANAGEMENT ACTIONS

This section outlines the actions to be taken to minimise the impact of mining and associated activities, weeds and feral animals on biodiversity at Bengalla.

4.1 Ground Disturbance Permit

To minimise the total cumulative impact, vegetation clearance will be staged over the life of the mine with pre-clearance and clearance activities implemented for each stage of clearing. The following section describes the activities to be undertaken prior to clearing.

BMC will continue to utilise its Ground Disturbance Permit (GDP) process prior to clearing or disturbing vegetation (see **Appendix E** for the current version). The GDP process applies to all land owned or managed by BMC that have not previously been disturbed by mining or associated activities.

The Environment Department will conduct an initial inspection of the area to be disturbed to identify constraints to clearing and access issues by equipment, such as steep topography and rocky outcrops. These will be recorded on the GDP. Once completed, the GDP is generally signed by the statutory surveyor, project coordinator, Environmental and Approvals Specialist and Mine Manager. The coordinator of the disturbance activities reviews the completed GDP before clearance works commence to ensure they are aware of any specific requirements.

Disturbance will be documented and reported on in the Annual Review.

4.1.1 Weed Management during Construction

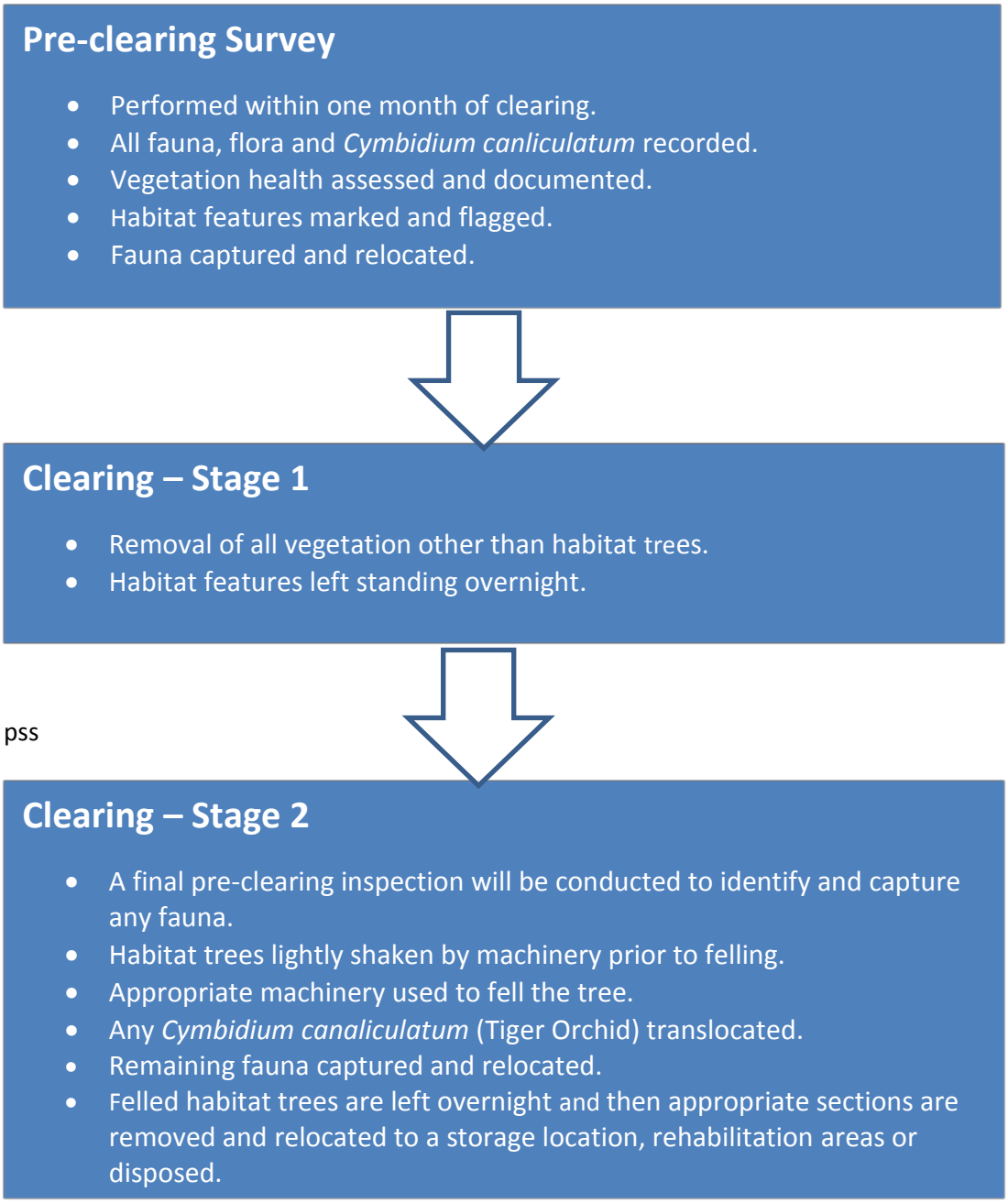
Prior to clearance, significant infestations of Weeds of National Significance (WONS) and noxious weeds will be identified and recorded during the pre-clearing survey. If recommended by BMC's Environment Department or appropriately qualified person, control of weeds will be undertaken prior to clearing. To prevent their spread, weeds removed during weed management programs or land clearing will be disposed of in accordance with relevant legislation associated with individual species. Additional discussion regarding ongoing weed management is provided in **Section 4.3**.

Prior to clearing, all new plant equipment entering the site will be inspected for weed material and may be recommended for wash down in the wash down bay. Where required, machinery involved in clearing or weed management will also be washed down prior to removal from site to prevent weeds from spreading into undisturbed areas and surrounding farmland.

After clearing is complete, a final inspection may be undertaken by an appropriately qualified person to check that weeds have been successfully contained.

4.2 Pre-clearance and Clearance Procedure

As part of the GDP process, ecological pre-clearing and clearing surveys will be carried out by a suitably qualified person. The pre-clearing and clearing survey procedure is presented **Figure 6**.



pss

Figure 6
Clearance Procedure

4.2.1 Pre-clearing Procedure

A pre-clearing survey will be conducted by the suitably qualified person as follows:

- Tree clearing activities must be conducted within one month of the pre-clearing survey;
- Native trees and shrubs will be assessed for their potential as seed sources and, where available, seed will be harvested for storage and/or distribution on rehabilitation areas;
- All occurrences of *Cymbidium canaliculatum* (Tiger Orchid) will be recorded and assessed for relocation;
- Vegetation health will be assessed and documented. If it is suspected that vegetation dieback may be a result of the pathogen *Phytophthora cinnamomi*, plant matter testing will be undertaken to confirm plant pathogens, and, if necessary, quarantine measures will be implemented. Further discussion in regard to monitoring for *P. cinnamomi* is discussed in **Section 5.5**;
- Trees with hollows or other significant habitat features will be identified, recorded and marked with the letter "H" (for habitat) and flagged with fluorescent tape for easy identification;
- Suitable salvage items such as boulders, woody debris or hollow logs will be identified, recorded and marked with the letter "S" (for salvage) and flagged with fluorescent tape (see **Section 3.1.3**);
- Hollows will be observed to see if any arboreal fauna (e.g. gliders, bats) are using them. The ground around each tree will be inspected for scats, and the trees for scratch marks;
- Threatened flora and fauna species along with those likely to occur (see Section 3.3) will be recorded; and
- Fauna utilising the area will be recorded and a suitably qualified person will encourage mobile fauna to leave the area or will capture and relocate the fauna into pre-determined habitat.

4.2.2 Clearance Procedure

Clearance of woodland areas will be avoided during May to November, in order to avoid impacting hibernating bats and important growing or flowering periods for known threatened flora species, generally as shown in **Figure 6**. If clearing is to occur during May to November, a written assessment by a suitably qualified ecologist justifying clearing activities must be recorded and made available to DoEE on request.

Suitable habitat for the release of captured fauna will be identified adjacent to but outside of the Disturbance Boundary. The release area for captured fauna will be determined by the appropriately qualified person and be selected based on the species captured, the species' habitat requirements and

in a similar vegetation community to the one that the fauna was located in. Care will be taken to record where fauna is released in order to avoid over-populating the release areas.

Table 3
Threatened Species Clearance Avoidance Periods

Common Name	Scientific Name	Clearance Avoidance Period
SEPTEMBER TO NOVEMBER		
Tiger Orchid	*Cymbidium canaliculatum*	September to November
Rainbow Bee-eater	*Merops ornatus*	September to November
MAY TO SEPTEMBER		
Barking Owl	*Ninox connivens*	May to September
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	May to September
Eastern Freetail-bat	*Mormopterus norfolkensis*	May to September
Large-eared Pied Bat	*Chalinolobus dwyeri*	May to September
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	May to September
Eastern Bent-wing Bat	*Miniopterus orianae (formerly schreibersii) oceanensis*	May to September
Large-footed Myotis	*Myotis macropus*	May to September
Greater Broad-nosed Bat	*Scoteanax rueppellii*	May to September
Greater Long-eared Bat	*Nyctophilus corbeni* (formerly *N. timoriensis*)	May to September
Eastern Cave Bat	Vespadelus troughtoni	May to September
NO AVOIDANCE PERIOD (COVERED IN THE PRE-CLEARANCE ASSESSMENT)		
Brown Treecreeper	*Climacteris picumnus victoriae*	
Speckled Warbler	*Chthonicola sagittatus*	
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis*	
Spotted Harrier	*Circus assimilis*	
Little Eagle	*Hieraaetus morphnoides*	
Squirrel Glider	*Petaurus norfolcensis*	
Spotted-tailed Quoll	*Dasyurus maculatus*	
Grey-headed Flying-fox	*Pteropus poliocephalus*	
White-throated Needletail	*Hirundapus caudacutus*	
Fork-tailed Swift	*Apus pacificus*	

Clearing will be conducted using a two-stage process:

Stage 1

- All vegetation and salvage items, other than the habitat trees identified in the pre clearance procedure, will be removed; and
- Habitat trees will be will be left to stand overnight to enable any resident fauna to self-relocate upon nightfall, when foraging typically occurs.

Stage 2

- A suitably qualified person will conduct a final pre-clearing inspection to identify and capture any fauna;
- Habitat trees will be lightly shaken by machinery prior to felling to encourage remaining fauna to leave the hollows and move on. Only in limited instances (due to factors such as steep terrain, surface stability, etc.) where it is not possible to be completed safely, will habitat trees not be nudged prior to their removal;
- Appropriate machinery will be used to fell the tree;
- A suitably qualified person will carefully remove any *Cymbidium canaliculatum* (Tiger Orchid) felled with the tree will translocated it to the same species of tree in a nearby area;
- A suitably qualified person will investigate the felled habitat trees for the presence of fauna. Fauna will be captured and relocated into pre-determined habitat;
- The felled habitat tree will be left over night to allow any remaining fauna time to leave the hollow; and
- Branches with hollows and sections of trunk are to be removed and set aside for transfer to a storage area, rehabilitation area or areas of remanent vegetation.

Juvenile animals or animals that are inadvertently injured will be taken to a wildlife carer or veterinary clinic for appropriate treatment. The closest veterinary clinics to Bengalla are listed in **Table 4**.

Table 4
Veterinary Clinics close to Bengalla

Muswellbrook Veterinary Hospital	Pet Medical Denman	Pet Medical Scone
14 Aberdeen Street, Muswellbrook NSW 2333 Telephone: (02) 6543 2000	26 Ogilvie Street, Denman NSW 2328 Telephone: (02) 6547 2222	106 Liverpool Street, Scone NSW 2333 Telephone: (02) 6544 3201

Results and outcomes of pre-clearance and clearance fauna surveys will be documented by the project coordinator or other appropriately qualified person and a summary reported in the Annual Review (see **Section 6.4**).

4.2.3 Salvage of Hollow-Bearing Trees, Hollow-bearing Logs and Rocks

If available, suitable hollow-bearing trees, hollow-bearing logs and rocks will be salvaged for reuse in rehabilitation areas. Such materials vary in quality and quantity among different parts of Bengalla. Whilst some woody materials provide a valuable habitat resource for native fauna, others are not suitable for salvage because they are structurally unsound and/or decayed to the extent that they may not survive felling, translocation and replacement on the recipient site.

The methods described in **Table 5** will be applied to rationalise the salvage of habitat resources to ensure that key habitat resources are retained and utilised in rehabilitation and offset areas (where appropriate).

Table 5
Selection Criteria for Salvage Material

Material Type	Criteria
Hollow bearing trees	• Structural integrity • Number and size of hollows; hollows will include a range of diameter sizes • Ideally, hollows should be trunks or solid living branches to maximise the chance that they would survive the felling process • Trees will be favoured if single stemmed to ensure that they would remain intact during felling • Stags (dead trees) will be selected if they appear solid and have good hollows in the trunk
Woody ground debris	• Selected based on size, structural integrity and presence of good hollows • Larger logs (in both length and girth) will be typically selected • Logs that had been felled previously will be selected rather than old naturally fallen logs because these are typically better preserved (having fallen prior to attack by insects, etc.)
Trees and fallen logs without hollows	• Trees without hollows, or large logs in good condition, will be collected for retention in addition to those marked during pre-clearing.
Large flat or creviced rocks	• Rocks >500 mm width that appear solid enough to survive translocation

4.2.4 Timing of Habitat Features Salvage Activities

Salvage of habitat features will take place during all stages of clearing. The salvaged habitat features will be moved to rehabilitation sites or to an appropriate site for storage until a time that they can be emplaced on areas of rehabilitation or remanent vegetation.

Vegetation that is not salvaged as a habitat feature may be applied to rehabilitation areas to provide additional organic matter or disposed of appropriately.

4.2.5 Seed Collection and Harvest

EPBC 2012/6378 Condition 2(c) requires the use of native, locally sourced seed for propagation on rehabilitation areas. Harvest of native species at Bengalla will be conducted throughout the year to coincide with the seeding period for target species. Harvested seed will be seeded directly, stored or propagated prior to use on rehabilitation and other disturbed areas. Seeds harvested from other locations may be required to supplement those sourced from Bengalla to ensure appropriate floristic diversity of the rehabilitation is achieved or to account for unforeseen environmental factors which may limit the availability of locally harvestable seeds (e.g. fire, drought, available species or quantities harvested).

Additional opportunistic seed harvesting may also occur during vegetation clearing activities. During clearing, collection of seeds from trees and taller shrubs may be undertaken where appropriate. Collection of available seed will take place for shrubs and groundcover species prior to clearing. Seed collection of canopy species will take place after clearing when the canopy seed bank is accessible from the ground. Suitable seed collection techniques are shown in **Table 6** and explained in more detail in **Appendix C**.

Currently accepted best practice, as described in Rawlings et al (2010) for local provenance seed collection includes:

- Collection of seed from several source sites with similar rainfall, soil, altitude, aspect and slope position to the revegetation site to ensure they are most adapted to the landscape and environmental conditions;
- Collection of seed from between 20-50 plants of each species for genetic diversity; and
- Collection of seed from plants spaced approximately three plant-heights (maximum height) apart to prevent collection of too many closely related seeds.

Where possible, seed collection will attempt to focus on all strata including grasses and groundcovers to the canopy species. Indicative seed collection times for native species, with particular focus on species characteristic of the threatened Box Gum Woodland, are shown in **Appendix C (Table C1)**.

When collecting seeds from threatened species or threatened ecological communities. BMC will ensure that relevant and valid collection licences are held by all personnel undertaking seed collection.

Table 6
Selection Criteria & Techniques for Seed Collection

Seed Collection Technique	Suitability of Use
Brush harvesting	Obtains seeds from a diversity of understorey species.
Suction or vacuum harvesting	For grass species with less persistent seed units (e.g. *Microlaena stipoides*).
Hay strewing	Appropriate if a recipient site is ready to receive seed at the time of harvest.

4.3 Weed Management

4.3.1 Objective

The objective of weed management is to control and prevent the spread of weeds with particular attention provided to WONS and Noxious Weeds. Details of common weed management techniques can be found in **Appendix D**.

Noxious weeds known to be present at Bengalla are shown in **Table 7**.

4.3.2 Weed Management Areas

Weed management will focus on weed control at the interface of disturbance areas and the adjacent native vegetation to be retained.

Weed management will also include site inspections in the residual native vegetation areas within Bengalla to identify any outbreaks of WONS or Noxious Weeds, so that appropriate controls can be implemented.

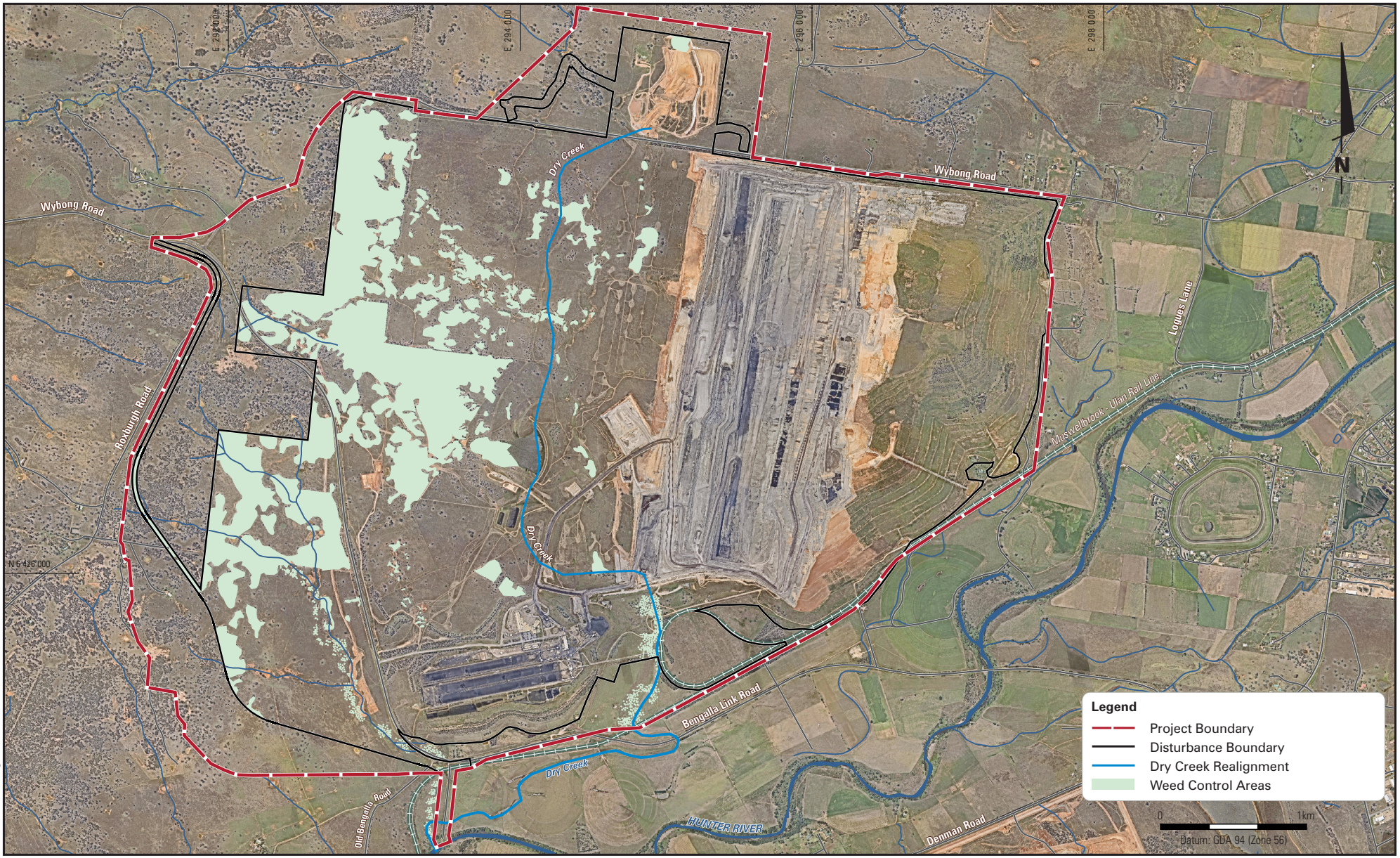
Weed Control Zones shown in **Figure 7** will be used to assist in the implementation of effective weed management. These are:

- Undisturbed areas within Bengalla Mine adjacent to the linear infrastructure (such as the rail line and water pipelines);
- Active disturbance areas including the following:
    - Overburden Emplacement Area;
    - Current mining;
    - Previous mining areas awaiting rehabilitation; and
- Any other residual unmined vegetation within Bengalla. This includes retained vegetation as well as any undisturbed vegetation that will be disturbed in future.

Table 7
Weeds of National Significance and Noxious Weeds Present in Bengalla Mine

Scientific Name	Common Name	WONS	Class (if noxious)*
Centaurea calcitrapa	Star Thistle	No	4
Lycium ferocissmum	African Boxthorn	Yes	4
Opuntia aurantiaca	Tiger Pear	No	4
Opuntia stricta	Common Prickly Pear	No	4
Olea europaea subsp. *cuspidata*	African Olive**	No	4

** Plants declared noxious by NSW Noxious Weed Act 1993 for Muswellbrook Shire Council.*
*** Not recorded within Bengalla Mine but well established in nearby areas.*



HB BENGALLA Management Plans 1613 F7 Weed Control Areas 28 07 2016

BENGALLA MINE

Weed Control Areas

FIGURE 7

4.3.3 Weed Control Strategy

Monitoring

Bengalla will be inspected by a suitably qualified person to develop a weeding plan. Site inspections will be conducted at least annually, preferably during times when weed growth is most common such as Autumn and Spring. Incidental observations as part of daily activities (from the BMC Environmental Team) will be the primary mechanism for the identification of annual weed growth.

The weeding plan will include identification of key weeding areas and weed species to target, identification of sensitive areas to avoid, as well as recommendations regarding appropriate weeding techniques to implement.

Maintenance Weeding

Maintenance weeding will continue to be undertaken for the life of Bengalla. Land within Bengalla will require maintenance weeding, as weed seeds and vegetative propagules make their way on site from the soil stored seed bank, and via wind and bird droppings. The amount of weeding required will decrease once initial infestations are controlled and areas become more resistant to disturbance and weed colonisation.

Adaptive management/restoration practices will be adopted if weed species increase counter to these expectations.

4.3.4 Best Management Practice

Weed removal will have regard to the following, to minimise impacts upon existing vegetation and habitats:

- Avoid over-clearing and remove only targeted species;
- Limit spread of weeds from disturbance areas or off-site areas to weed control areas by washing down vehicles and machinery as required prior to moving them out of designated disturbance / clearance areas;
- Employ minimal disturbance techniques to avoid soil and surrounding vegetation disturbance, and replacement of disturbed mulch/leaf-litter;
- Remove fruiting/seeding parts of weeds carefully, to minimise spread of plant propagules;
- Use of chemicals and sprays only during suitable weather conditions (i.e. not during wet or windy conditions), and only during appropriate seasons; and
- Avoid disturbance of native fauna or nesting/breeding sites.

4.3.5 Timing

Weed management will be undertaken in the areas of vegetation to be cleared. Weed control is independent of clearing activities (i.e. in rehabilitation areas and remnant vegetation) and will be undertaken at the appropriate time for the target species. Weed control will be reported in the Annual Review.

4.3.6 Performance Indicators

Performance indicators for weed control include the following:

- Decline in weed density and distribution;
- Decline in weed diversity; and
- Minimal recruitment of new weed species.

4.3.7 Potential Corrective Actions

If weed densities either increase or spike to due to seasonal factors, the potential corrective actions that will be implemented include:

- Increase frequency of control actions; and
- Additional efforts to control target species or methods extended to cover newly occurring weed species.

4.3.8 Documentation

The Environment Department will maintain a database of weed management activities and will document the results and outcomes of weed management in the Annual Review. This will include documentation of areas subject to weeding, weeding techniques used, target species, new species identified (if any) and chemicals used. Management actions will be summarised on maps of the relevant management areas.

BMC will ensure that relevant and valid licences are held by all personnel undertaking weed management at Bengalla.

4.4 Feral Animal Management Plan

4.4.1 Objective

Feral animal management will focus on the main feral animals recorded from within the Project Boundary; the European Red Fox and the European Rabbit. The goal of feral fauna management will be to ensure that impacts to native species and native vegetation caused by feral fauna are not increased.

4.4.2 Feral Animal Control Strategy

Ongoing management is necessary for protecting the residual habitat within Bengalla from competition or predation by feral fauna. The areas of focus for feral management will be in the Weed Control Zones (see **Figure 7**). Control measures will be implemented by mine staff or by an appropriate Pest Control Contractor(s) if required.

The management of feral fauna is intended to be adaptive and will be informed based on the findings and recommendations of the monitoring program. A feral animal monitoring strategy is presented in **Section 5**.

4.4.3 Control Methods

European Red Fox Control Measures

A range of control measures can be utilised to control the European Red Fox (if required). Government agencies mostly recommend the use of poisons such as strychnine or 1080 (*monosodium fluoroacetate)* to reduce fox populations. Poisons are typically placed into meat baits, or carcasses, then strategically placed for subsequent consumption by the fox.

Other control measures include the following:

- Shooting;
- Electric fencing;
- Trapping;
- Fumigation; and
- Fertility control / biological control.

At Bengalla the most effective control technique for the European Red Fox is baiting with "1080". Baiting with 1080 is regulated in NSW by the *Pesticides Act 1999* and if required, would be carried out under the conditions specified in the *Pest Control (1080 Liquid Concentrate and Bait Products) Order 2010* (PCO, 2010). In NSW, pest control baits are available for purchase through NSW Rural Lands Protection Boards or equivalent. It is recommended that the baits targeting foxes are buried 10-15 cm in the ground to protect native fauna that dig for food.

After baiting is complete, all untaken baits will be removed from baiting locations. All collected and unused baits will be buried in a disposal pit under at least five hundred (500) mm of soil, in accordance with Condition 4.8 of Schedule 2 of the PCO 2010. The disposal pit will be well clear of waterways (permanent or ephemeral) so as to not cause pollution of water.

European Rabbit Control Measures

It is not expected that control will be required for the European Rabbit as part of this plan. However, in rehabilitation and restoration areas, rabbits have the potential to cause a problem by ringbarking

trees and browsing on young shoots. Tree guards may be utilised on tube stock plantings to reduce rabbit access, if required.

Rabbits can be controlled through a combination of activities such as warren ripping, fumigation, fencing, poisoning and shooting. If rabbits cause a significant problem in rehabilitation or restoration areas, then it may be feasible to fence these areas with rabbit-proof wire. If required, these fences would generally be at least one metre high, buried at least 20 cm deep and extend for approximately 30 cm at right angles to prevent rabbits from burrowing underneath.

The most efficient rabbit control method for use at Bengalla is poisoning. The two most common poisons are 1080 and oats coated with Pindone (marketed as RABBAIT®). Usually a trail of poisoned grain is created away from warrens (as rabbits do not usually eat near the warren). It is advantageous to disturb the soil nearby, as rabbits are known to investigate disturbed soil.

Monitoring will be conducted and further follow-up control will be undertaken as required based on the results of the monitoring program.

4.4.4 Timing

Feral animal control activities will be conducted as indicated by the results of the monitoring program (see **Section 5**).

4.4.5 Performance Indicators

- Measurable decline in feral fauna abundance;
- Measurable decline in feral fauna diversity;
- Observable reduction in decline of native fauna populations due either to predation by feral fauna, habitat degradation caused by feral fauna or competition with feral fauna; and
- Minimal recruitment of new feral species.

4.4.6 Potential Corrective Actions

- Increase frequency of control;
- Implement feral fauna controls when threatened species of concern are breeding or migrating/ moving to minimise the damage; and
- Additional efforts to control target species or methods extended to cover new feral species.

4.4.7 Documentation

The results and outcomes of feral management will be documented for each year in the Annual Review. This will generally include the techniques used for each feral species, the quantity of bait material purchased and deployed, the areas subject to control, estimates of the numbers of animals

culled, new species identified (if any) and any other chemicals used. Where necessary, management actions will be summarised on maps of the relevant management areas.

All personnel involved in feral management will hold, where appropriate, relevant and valid licences / permits, including any relevant chemical licences for pesticide use or a firearms licence for shooting.

4.5 Other Management Strategies

In addition to the specific management strategies outlined previously, a range of general measures will be implemented to manage flora and fauna at Bengalla and in adjacent areas. These are described in subsections below.

4.5.1 Inductions and Staff Education

Staff, contractors and visitors to Bengalla will undertake site inductions which outline their environmental roles and responsibilities. Additional training will be provided for contract and operational staff directly involved in clearing (see **Section 4.1**).

4.5.2 Vehicle Operation Policies and Signage

Vehicle operation policies will continue to be implemented including speed restrictions to minimise the risk of vehicle fauna collisions fauna.

4.5.3 Construction and Maintenance of the Northern Diversion Levee

The Bengalla EIS identified that diversion levees would be required north of Wybong Road to divert clean water and isolate the catchment area to the south. The MOD 1 SEE identifies two diversion levees north of Wybong Road (collectively referred to as the Northern Clean Water Diversion Levee) which will be constructed as shown on Figure 5 of the MOD1 SEE.

In accordance with SSD-5170 (as modified) Schedule 3, Condition 29A, BMC will ensure impacts to native vegetation (particularly EECs) are minimised as far as is reasonable and feasible during construction and maintenance of the Northern Diversion Levee.

As outlined in **Section 4.1** and **Section 4.2**, prior to the clearing of any native vegetation for the construction of the levee, BMC will utilise a GDP procedure, including pre-clearance and clearance surveys. Following construction, disturbed areas will be rehabilitated in accordance with the BMC Mine Operations Plan (MOP) and GDP requirements. Maintenance activities, including weed and feral animal management will be undertaken as outlined in **Section 4.3** and **Section 4.4**.

5.0 ECOLOGICAL MONITORING AND INSPECTIONS

5.1 Ecological Monitoring

Schedule 3, Condition 29 of SSD-5170 (as modified) requires the implementation of a program to monitor and report on the effectiveness of mitigation measures, and progress against the detailed performance and completion criteria on the site.

The purpose of the Bengalla ecological monitoring program is primarily to monitor the risks posed by plant pathogens, exotic weeds and feral animals in biodiversity offsets, residual vegetation and rehabilitation areas and to indicate when management actions are required.

The BMC biodiversity offsets will be subject to ongoing monitoring and maintenance actions to ensure that these areas progress towards meeting the objectives and criteria in a timely manner. Monitoring requirements for the offsets are detailed in the BOMP.

The condition of residual vegetation (analogue sites) at Bengalla will be monitored to identify any deterioration or improvement in habitat quality during the life of the mine as well as to provide a comparison when assessing the performance of rehabilitation sites. Monitoring of residual vegetation (analogue sites) and rehabilitation areas is described in the MOP.

5.2 Weed Inspections

Weeds are a threat to the integrity of forest and woodland within Bengalla. Weed distribution and abundance at Bengalla may change due to seasonal changes and human activities associated with mining.

The Environmental Department will undertake regular inspections of residual vegetation, rehabilitation areas and the biodiversity offsets to identify new weed infestations. If significant weed infestations are discovered details regarding the species and the density of the infestation will be recorded. BMC will target all weed species at Bengalla with particular focus on listed noxious weeds or important environmental weeds. Control will be implemented if and when needed.

Records and mapping of weed management areas will enable comparisons to be made over time and identify the efficacy of control measures.

The outcomes of the weed management program will be document in the Annual Review (see **Section 6**).

5.3 Feral Animal Monitoring

Due to the limited number of feral animals present at Bengalla, routine field observations will be relied upon in order to determine whether feral animal numbers are increasing. Observations will focus on direct sightings and on ground evidence (i.e. scats, diggings, burrows, etc.). Further monitoring of feral animals may also be undertaken using permanent camera monitoring points, when required.

The target fauna species are the major feral animal species recorded within the Project Boundary, namely the European Red Fox and the European rabbit. If levels of feral animals are considered to present a threat, then it may be necessary to implement control measures. Further monitoring will be undertaken before and after the implementation of control measures. Monitoring before the implementation of control measures will establish a benchmark of feral animal abundance will allow objectives and performance indicators to be determined. Monitoring after the management program will determine if the management program objectives have been achieved.

Results from feral animal monitoring/observations will be discussed within the Annual Review.

5.4 Plant Pathogen Monitoring

Phytophthora cinnamomi (Cinnamon Fungus) has the potential to cause dieback in some native plants. Families that are particularly susceptible to invasion by Phytophthora include Myrtaceae, Proteaceae, Fabaceae, Epacridaceae and Dilleniaceae. The root damage caused by Phytophthora renders plants vulnerable to disturbance, drought stress, dieback and death. Infection of native plants by Phytophthora is listed as a Key Threatening Process under the TSC Act and EPBC Act.

Ironbarks and Box eucalypts, grasses and other herbaceous plants are relatively resistant to this pathogen. Therefore, the dominant native vegetation that currently exists at Bengalla, which is grassy woodland, grassy open forest and grassland, is not considered to be at significant risk from this pathogen. No dieback, that can be attributable to a plant pathogen, has been observed on site to date.

For these reasons stated above, no immediate management actions are required for the management of plant pathogens at Bengalla. However, signs of pathogens outbreaks may require measures to be taken in the future.

As part of the ecological monitoring program, vegetation health will be assessed and if dieback is detected, the symptoms will be examined and if necessary, additional measures will be developed and implemented to address the risk.

Should *P. cinnamomi* be identified on BMC land, procedures recommended in the *'Threat Abatement Plan for Disease in Natural Ecosystems cause by Phytophthora cinnamomi'* (Commonwealth of Australia, 2014) will be used to mitigate the impact of the pathogen. Mitigation methods may include:

- Use of Phosphite for spraying and stem injection of infected plants;
- Vegetation (host) destruction;
- Fungicide and fumigant treatments; and
- Containment barriers to protect threatened vegetation.

6.0 REPORTING, REVIEW AND CONTINUOUS IMPROVEMENT

This section describes BMC's continuous improvement techniques, review of plans and reporting requirements.

6.1 Continual Improvement

BMC strives to improve Bengalla's environmental performance by applying the principles of best practice through its environmental management plans. Reasonable and feasible new best practice technologies will be investigated and adopted where relevant and progress will continue to be monitored using the methodologies detailed in this BMP.

6.2 Contingency Plan

Appendix F presents a risk assessment and plans for managing unpredicted impacts biodiversity.

6.3 Management Plan Revision

In accordance with SSD-5170 (as modified) Schedule 5, Condition 4, BMC shall review and if necessary, revise the BMP, to the satisfaction of the Secretary. Where the review leads to a revision of the BMP, then within four weeks of the review the revised document must be submitted to the Secretary for approval, unless otherwise agreed with the Secretary. If no changes to this BMP are as a result of the above then BMC will review and, if necessary, revise (in consultation with relevant government agencies and landholders) on at least a three yearly basis (or as otherwise directed by DP&E).

6.4 Annual Review

By the end of March each calendar year, BMC will provide an Annual Review to the Secretary, which will review the environmental performance of the Bengalla for the previous year and present:

- Results and outcomes of pre-clearance and clearance surveys including;
    - Species and numbers of individuals recorded (including any species not previously identified);
    - Incidence of sick or injured animals and the actions taken to care for the fauna;
    - The species and numbers of individuals that were relocated and where each species was released; and
    - The type and number of habitat features salvaged and their destination.
- EPBC Annual Compliance Report;
- Biodiversity monitoring results;
- Any management actions implemented over the reporting period;
- Complaints; and
- Measures that should be implemented to improve performance for the following year.

The Annual Review will be made publicly available through placement on BMC's website, and will be provided to the Bengalla Community Consultative Committee.

6.5 Auditing

Within one year of the commencement of development under this consent (i.e. 1 October 2016) and every 3 years thereafter, unless the Secretary directs otherwise, BMC will commission and pay the full cost of an Independent Environmental Audit of the Project. This audit will include a review of commitments, actions and responsibilities stipulated in this BMP.

7.0 SUMMARY OF ACTIONS AND RESPONSIBILITIES

The implementation of this BMP will be the responsibility of the BMC Environmental Specialist (or delegate). A summary of all commitments in this BMP including actions, responsibilities, frequency of monitoring and reporting requirements is provided in **Table 8**.

Table 8
Summary of BMP Actions and Responsibilities

Control / Action	Timing / Trigger	Responsibility	Monitoring	Reporting	Section
Marking limits of clearing	Prior to clearing	Surveyors	Inspection to be undertaken throughout duration of clearing.	Documented and signed off in the GDP.	**4.1**
Identification of suitable fauna relocation sites	Prior to clearing	Environmental Specialist / Suitably qualified person	N/A	Documented and signed off in the pre-clearing and clearing reports.	**4.2**
Pre-clearing surveys	Within one month prior to clearing	Suitably qualified person	Monitoring of fauna and flora (including Tiger Orchid, pest and weed species), habitat features and plant pathogens.	Documented and signed off in the pre-clearing report. Results to be reported in Annual Review. OEH notified if new threatened species identified.	**4.2**
Clearing surveys	Within one month of the pre-clearing survey	Suitably qualified person	Inspection (including Tiger Orchid, fauna) to be undertaken throughout duration of clearing.	Documented and signed off in the clearing report. Results to be reported in Annual Review. OEH notified if threatened species identified.	**4.2**
Pre-clearing weed management	Prior to clearing	Suitably qualified person	Inspection to be undertaken prior to clearing.	Documented and signed off in the GDP. Results to be reported in Annual Review.	**4.3**

Control / Action	Timing / Trigger	Responsibility	Monitoring	Reporting	Section
Relocation habitat features to rehabilitation areas, adjacent vegetation or storage location.	During and/or after clearing	Environmental Specialist	N/A	To be documented in GDP form and signed off. Results to be reported in Annual Review.	**4.2.3**
Inductions and staff education	Ongoing as part of the existing induction procedure or as part of toolbox talks prior to commencement of a task	Environmental Specialist/ Safety Specialist	N/A	As per Induction procedure	**4.1**
Vehicle Operation Policy and Signage	Ongoing or when wildlife crossing areas are identified	Mining Manager / Environmental Specialist	N/A	N/A	**4.2**
Seed collection	Targeted throughout year; and opportunistically before and immediately after clearing	Environmental Specialist / Suitably qualified person	Observations to be made throughout year to check flowering / seeding development of key species. Ensure correct licences are held by any contractors.	To be documented and reported in the Annual Review.	**0**
Weed control	Ongoing over life of mine	Environmental Specialist	Routine field observations in Weed Control Zones including rehabilitation areas.	Results to be reported in Annual Review.	**4.3**
Feral control	Ongoing over life of mine	Environmental Specialist	Routine field observations in Weed Control Zones including rehabilitation areas.	Results to be reported in Annual Review.	**4.4**
Ecological Monitoring Program	Ongoing over life of mine	Suitably qualified person	N/A	Results to be reported in Annual Review	**5.0**

8.0 REFERENCES

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9.0 ABBREVIATIONS

Abbreviation	Meaning
Annual Review	Formerly Annual Environmental Management Report
Bengalla	Bengalla Mine
Bengalla EIS	Bengalla Mine Environmental Impact Statement
BMC	Bengalla Mining Company Pty Limited
BMP	Biodiversity Management Plan
BOMP	Biodiversity Offset Management Plan
BOS	Biodiversity Offset Strategy
CEEC	Critically Endangered Ecological Community
CHPP	Coal Handling and Preparation Plant
CW1	Clean Water 1 Dam
DA	Development Application
DoE	Department of the Environment
DP&E	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
GDP	Ground Disturbance Permit
Ha	Hectares
HRSTS	Hunter River Salinity Trading Scheme
ICMM	International Council for Mining and Metals
Mtpa	Mega tonnes per annum
NSW	New South Wales
OEA	Overburden Emplacement Area
OEH	NSW Office of Environment and Heritage
RL	Reduced Level
ROM	Run of Mine
RTS	Response to Submissions'

Abbreviation	Meaning
SEE	Statement of Environmental Effects
SSD	State Significant Development
TSC Act	*Threatened Species Conservation Act 1995*
VCPLMP	Vegetation Clearance Protocol and Landscape Management Plan
WONS	Weeds of National Significance

APPENDIX A

REGULATORY CORRESPONDENCE

Australian Government
Department of the Environment and Energy

Mr Craig White
Approvals and Environmental Specialist
Bengalla Mining Company Pty Limited
Bengalla Road
MUSWELLBROOK NSW 2333

Dear Mr White

Continuation of Bengalla Mine, Upper Hunter Valley, NSW (EPBC 2012/6378)

I refer to the email dated 15 September 2017, from Hansen Bailey, to the Department, seeking approval of the revised Vegetation Clearance Protocol and Landscape Management Plan (VCPLMP), specified under condition 2 of approval for EPBC 2012/6378.

The VCPLMP is part of a Biodiversity Management Plan prepared to meet the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and NSW State approvals. The Biodiversity Management Plan, and therefore the VCPLMP, was approved by a delegate of the Minister on 22 July 2015, in accordance with condition 2 of approval for EPBC 2012/6378.

Officers of this Department have advised me on the revised VCPLMP and on the requirements of Condition 2 of approval for EPBC 2012/6378. On this basis, and as a delegate of the Minister for the Environment and Energy, I have decided to approve the *Bengalla Mine Biodiversity Management Plan* (Revision 4), dated 18 August 2017 in accordance with Condition 2 of approval for EPBC 2012/6378. This plan must now be implemented.

In accordance with Condition 15 of EPBC 2012/6378 approval, if Bengalla Mining Company, as the approval holder, wishes to carry out any activity other than in accordance with the approved plan, Bengalla Mining Company must submit to the Department for the Minister's written approval a revised version of the plan. Bengalla Mining Company must not commence the varied activity until the Minister has approved in writing the revised plan.

Should you require any further information please contact Tim Kaminskas on 02 6275 9516 or by email (post.approvals@environment.gov.au).

Yours sincerely

James Barker
Assistant Secretary
Assessments & Governance Branch
Environment Standards Division

20 September 2017

Cc: Dianne Munroe, Hansen Bailey

Planning Services
Resource Assessments
Contact: Jessie Evans
Phone: 9274 6419
Email: jessie.evans@planning.nsw.gov.au

Craig White
Environment and Approval Specialist
Bengalla Mining Company
Locked Bag 5
Muswellbrook NSW 2333

Dear Mr White

Bengalla Coal Mine (SSD 5170)
Management Plans

I refer to Dianne Munro's correspondence from late April and early May 2017 submitting various revised management plans for Bengalla Coal Mine (SSD 5170). I note that the Department recently approved these plans on 3 March 2016. However, Bengalla Mining Company has since revised the plans to address the new activities and requirements approved under modifications 2 and 3, the recommendations from the 2016 Independent Environmental Audit and further adjustments to account for its interactions with Mount Pleasant Coal Mine. Bengalla Mining Company is now seeking the Secretary's approval of the revised plans.

The Department has reviewed the following plans and is satisfied that they meet the relevant requirements under SSD 5170:

- Noise Management Plan version 4 (condition 7 of Schedule 3);
- Blast Management Plan version 5 (condition 15 of Schedule 3);
- Air Quality Management Plan version 4 (condition 20 of Schedule 3);
- Water Management Plan version 6 (condition 25 of Schedule 3);
- Biodiversity Management Plan version 3 and Biodiversity Offset Management Plan version 6 (condition 29 of Schedule 3);
- Aboriginal Cultural Heritage Management Plan version 7 (condition 31 of Schedule 3);
- Historic Heritage Management Plan version 7 (condition 32 of Schedule 3); and
- Rehabilitation Management Plan version 4 (condition 46 of Schedule 3).

Consequently, I wish to advise that the Secretary approves the above plans. Please provide final (untracked) versions of these plans to the Department at your earliest convenience and place a copy of them on your website.

Should you have any questions in relation to this matter, please contact Jessie Evans on the above details.

Yours sincerely

18/08/2017

Matthew Sprott
A/Director Resource Assessments
as nominee of the Secretary

DoEE Comments May 2017

BMP Document Reference	DoEE Comment	BMC Response
Section 4.1.1	Please change to "Prior to clearance, significant infestations of Weeds of National Significance (WONS) and noxious weeds will be identified and recorded in the GDP"	**Section 4.1.1**
	Please justify change to pre-clearing survey from "within one week of clearing" to "within one month of clearing"	Alex Cockerill (National Manager, Ecology WSP Parsons Brinckerhoff) has provided the following justification: *Within reason, the timing of pre-clearing protocols, does not diminish the duty of care for threatened flora and fauna, as tree-clearing procedures require that a qualified person be present at the time of tree-clearing to ensure detected flora and fauna are adequately cared for during the clearing process.* *The proposed extension in the timing of pre-clearance surveys from one week to one month is not considered to be detrimental to the welfare of threatened flora and fauna. This increase will more easily accommodate variations in the timing of clearing if transitory fauna use, such as nesting birds and bat are identified. Pre-clearing surveys involve the identification of habitat features (eg hollow trees) and threatened plants (Cymbidium canaliculatum) which are unlikely to change within the revised timeframe. Surveys undertaken at the time of clearing will detect potential new fauna occurrences, which may arise during the intervening period, and which will be managed by the duty of care that the BMP currently makes provision for in the Biodiversity Management Plan.*
Section 4.2.1	Please change to "Clearance of woodland areas will be avoided during May to November, in order to avoid impacting hibernating bats and important growing or flowering periods for known threatened flora species, generally as shown in Figure 6. If clearing is to occur during May	**Section 4.2.1**

BMP Document Reference	DoEE Comment	BMC Response
	to November, a written assessment by a suitably qualified ecologist justifying clearing activities must be recorded and made available to DoEE on request."	
	Please change to "Fauna utilising the area will be recorded and a suitably qualified person will encourage mobile fauna to leave the area or will capture and relocate the fauna into pre-determined habitat	**Section 4.2.1**
Section 4.2	Please retain these important commitments: "Results and outcomes of pre-clearance and clearance fauna surveys will be documented by the project coordinator or other appropriate person and a summary reported in the Annual Review. This will include: • Species and numbers of individuals recorded (including any species not previously identified); • Incidence of sick or injured animals and the actions taken to care for the fauna; • The species and numbers of individuals that were relocated and where each species was released; and • The type and number of habitat features salvaged and their destination"	**Section 4.2 and Section 6.4**

Section 4.3 and Section 5.1	Please reinstate commitments to monitor permanent vegetation plots/transects.	The meaning with regards to this comment by DoEE is unclear. The Biodiversity Management Plan (BMP) still commits the Bengalla Mining Company Pty Ltd (BMC) to monitoring permanent vegetation plots/transects as per the following extract from the submitted BMP: *The condition of residual vegetation (analogue sites) at Bengalla will be monitored to identify any deterioration or improvement in habitat quality during the life of the mine as well as to provide a comparison when assessing the performance of rehabilitation sites. Monitoring of residual vegetation (analogue sites) and rehabilitation areas is described in the MOP.* With regards to the removal of the commitment to establish vegetation plots/transects in weed infestations, advice has been sought from Dee Murdoch, a land management specialist from AECOM. Ms Murdoch has provided the following advice: *The monitoring of weeds species via the use of a quadrat and transect based approach may have limited success in determining the actual density, diversity and distribution of weed species in the pre-mine areas. This is in part due to the reproductive cycles and distribution techniques of many weed species that are known to occur across the Mining Lease. An example of this can be seen in the African Boxthorn, the seed of which are spread by birds and in doing so this plant species can form dense thickets under the canopy of mature trees. If quadrats and transects were located in these areas and the resultant data extrapolated over the entire site a false representation of the density and distribution of this species would be created. The use of regular visual inspections by site personal collects information that can be immediately passed onto weed control contractors and in doing so ensures timely and prompt control programs are implemented.*

BMP Document Reference	DoEE Comment	BMC Response
	Please ensure performance indicators are quantitative, specific and time bound. Current performance indicators: "Decline in weed density and distribution"; "Decline in weed diversity"; and "Minimal recruitment of new weed species", are inadequate. Please reinstate completion criteria commitments (see Table 8 below). Please ensure that completion criteria are quantitative, specific and time bound.	Condition 29 of SSD-5170 requires BMC to prepare a BMP for Bengalla Mine (Bengalla) which includes "…*detailed performance and completion criteria for evaluating the performance of the biodiversity offset strategy and triggering remedial action (if necessary)*". As identified in Table 1 of the BMP, the performance and completion criteria for evaluating the performance of the biodiversity offset strategy are outlined in the Bengalla Biodiversity Offset Management Plan. Additionally, performance and completion criteria for rehabilitation areas are detailed in the Bengalla Rehabilitation Management Plan and/or Mine Operation Plan. BMC proposes that no additional criteria are required for areas that are approved for disturbance under SSD-5170.
Section 4.4.3	Please change to "After baiting is complete, all untaken baits will be removed from baiting locations".	**Section 4.4.3**
Section 4.5.3	Please explain if, or to what extent, EPBC listed species/ecological communities will be impacted by the levees.	The construction of the clean water diversion levees is outlined in the 'Bengalla Development Consent Modification Statement of Environmental Effects' (Hansen Bailey, 2015). Section 3.4.3 of the 'Response to Submissions' (RTS) (Hansen Bailey, 2015), details that an Ecological Impact Assessment was completed by Cumberland Ecology for the Modification, which concluded that providing that the recommended mitigation measures are implemented, the Modification was not considered to result in a significant impact to Box Gum Woodland and Derived Native Grassland. Construction of the levees was completed in 2016. An EPBC Compliance report is completed annually by BMC and included as an Appendix in the Annual Review (refer to Section

APPENDIX B

THREATENED SPECIES REFERENCE PHOTOGRAPHS

Photo 1 - Brown Treecreeper *(Climacteris picumnus victoriae*)
Source: David Kleinert Photography 20110523, http://www.davidkphotography.com/?showimage=1137

Photo 2 - Speckled Warbler (*Chthonicola sagittatus*)
Source: Ian Colley 20110423, http://ibc.lynxeds.com/photo/speckled-warbler-chthonicola-sagittatus/bird-branch

Photo 3 - Grey-crowned Babbler (*Pomatostomus temporalis temporalis*)
Source: 2005-2015 Graeme Chapman, http://www.graemechapman.com.au/library/viewphotos.php?c=4&pg=3

Photo 4 - Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis*)
Source: Ted Shimba, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10523

Photo 5 - White-throated Needletail (*Hirundapus caudacutus*)
Source: Mat Gilfedder, http://www.birdfellow.com/birds/white-throated-needletail-hirundapus-caudacutus/photos/identification

Photo 6 - Fork-tailed Swift (*Apus pacificus*)
Source: 2003, Oriental Bird Club, http://orientalbirdimages.org/search.php?Bird_ID=545&Bird_Image_ID=30326&p=29

Photo 7 - Spotted Harrier (*Circus assimilis*)
Source: 2015 Planet of Birds, http://www.planetofbirds.com/accipitriformes-accipitridae-spotted-harrier-circus-assimilis

Photo 8 - Little Eagle (Hieraaetus morphnoides)
Source: World Wildlife Images 2011,
http://www.worldwildlifeimages.com/birds/v/KitesHawksAndEagles/Hieraaetus/Hieraaetus+morphnoides+morphnoides+_Little+Eagle_+In+flight_3645+_c_+Andy+and+Gill+Swash+_WorldWildlifeImages_com_.jpg.html

Photo 9 - Barking Owl (*Ninox connivens*)
Source: Birdlife Australia, http://birdlife.org.au/bird-profile/barking-owl

Photo 10 - Rainbow Bee-eater (*Merops ornatus*)
Source: Birdlife Australia, http://birdlife.org.au/bird-profile/rainbow-bee-eater

Photo 11 - Squirrel Glider (*Petaurus norfolcensis*)
Source: Queensland Museum 2010-2015, http://www.qm.qld.gov.au/Find+out+about/Animals+of+Queensland/Mammals/Common+mammals+of+south-east+Queensland/Marsupials/Squirrel+Glider#.VNKgiJ2UdNM

Photo 12 - Spotted-tailed Quoll (*Dasyurus maculatus*)
Source: Gary Lewis, http://www.biodiversitysnapshots.net.au/bdrs-core/public/speciesInfo.htm?spid=470&mode=fieldguide

Photo 13 - Grey-headed Flying-fox (Pteropus poliocephalus)
Source: Shane Ruming, http://www.environment.nsw.gov.au/animals/GreyheadedFlyingfox.htm

Photo 14 - Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)
Source: The State of Queensland (Department of Environment and Heritage Protection) 2014,
http://wetlandinfo.ehp.qld.gov.au/wetlands/ecology/components/species/?saccolaimus-flaviventris

Photo 15 - Eastern Freetail-bat (*Mormopterus norfolkensis*)
Source: GB Baker © Australian Museum, http://australianmuseum.net.au/eastern-freetail-bat

Photo 16 - Large-eared Pied Bat (*Chalinolobus dwyeri*)
Source: The State of Queensland (Department of Environment and Heritage Protection) 2014, Ian Gynther, https://www.ehp.qld.gov.au/wildlife/animals-az/bats.html

Photo 17 - Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
Source: Lindy Lumsden, Museum Victoria Australia, http://museumvictoria.com.au/bioinformatics/mammals/images/tasmliv3.htm

Photo 18 - Eastern Bent-wing Bat (*Miniopterus orianae*)
Source: https://faunaandfloraresearchcollective.files.wordpress.com/2013/06/eastern-bent-wing-bats-01.jpg?w=899

Photo 19 - Large-footed Myotis (*Myotis macropus*)
Source: Australian Museum, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10549

Photo 20 - Greater Broad-nosed Bat (*Scoteanax rueppellii*)
Source: http://images.smh.com.au/2010/09/12/1921844/Bats4-420x0.jpg

Photo 21 - Greater Long-eared Bat (*Nyctophilus corbeni*)
Source: https://www.pinterest.com/lannanm324/life-bats/

Photo 22 - Eastern Cave Bat (*Vespadelus troughtoni*)
Source: Michael Pennay, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10829

Photo 23 - Superb Parrot (*Polytelis swainsonii*)
Source: David and Glynis Ingram, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10645

Photo 24 - Swift Parrot (*Lathamus discolor*)
Source: Neville Lazarus, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10455

Photo 25 - Regent Honeyeater (*Anthochaera phrygia*)
Source: Chris Tzaros, Melbourne Museum,
http://museumvictoria.com.au/melbournemuseum/discoverycentre/wild/victorian-environments/dry-forest/regent-honeyeater/

APPENDIX C

SELECTION OF REVEGETATION STOCK AND SEED COLLECTION TECHNIQUES

APPENDIX C – SELECTION OF REVEGETATION STOCK AND SEED COLLECTION TECHNIQUES

SEED COLLECTION METHODS

Currently accepted best practice, as described in Rawlings *et al* (2010) for local provenance seed collection includes:

- Collection of seed from several source sites with similar rainfall, soil, altitude, aspect and slope position to the revegetation site to ensure they are most adapted to the landscape and environmental conditions;
- Collection of seed from between 20-50 plants of each species for genetic diversity; and
- Collection of seed from plants spaced approximately three plant-heights apart to prevent collection of too many closely related seeds.

It is advised that seed from vegetation to be cleared by the Project, particularly canopy trees, be collected and propagated to be used for revegetation and rehabilitation, as they are most adapted to local conditions.

For direct seeding, it is recommended that seed collection allows for approximately 200-500 grams of viable seed per kilometre sown (or, for wattle-rich mixes, 400g/km) (Rawlings, Freudenberger et al. 2010). In higher rainfall areas, this can be reduced to 150-300 grams, while in low rainfall Mallee type sites, a rate of 300-500 grams per kilometre may be necessary (Purnell, Higgins et al. 1999; Bonney 2000; O'Shea 2001).

SEED COLLECTION TIMES

The indicative seed collection times for many of the species relevant to the Project are summarised in **Table C1** below (Greening Australia 2011).

Further details, including flowering times, collection methods, germination and cultivation tips and additional species can be found at the following website: http://www.florabank.org.au/. Florabank is an online resource for native seed and is funded by Greening Australia. Florabank is an initiative of the Australian Government, Greening Australia and CSIRO.

Table C1 - Indicative Seed Collection Times for Flora Species Relevant to Bengalla

Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TREES AND SHRUBS													
Acacia acinacea	Gold Dust Wattle								x	x	x		
Acacia dealbata	Early Black Wattle	x	x										x
Acacia decora	Western Silver Wattle				x	x	x	x	x	x	x		
Acacia implexa	Lightwood	x	x	x									
Acacia melanoxylon	Blackwood Wattle	x	x	x									x
Acacia paradoxa	Kangaroo Thorn						x	x					
Acacia rubida	Red-Stemmed Wattle	x	x										x
Allocasuarina leuhmanii	Buloke	x											x
Brachychiton populneus	Kurrajong	x	x	x	x	x							x
Bursaria spinosa	Blackthorn	x	x	x	x								
Callitris endlicheri	Black Cypress Pine	x	x	x	x	x	x	x	x	x	x	x	x
Callitris glaucophylla	White Cypress Pine	x	x	x	x	x	x	x	x	x	x	x	x
Cassinia arcuata	Drooping Cassinia	x	x	x	x						x	x	x
Casuarina cunninghamiana	River Oak	x	x	x	x	x	x	x	x	x	x	x	x
Daviesia genistifolia	Broom Bitter Pea	x											x

Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daviesia latifolia	Broad-leaved Bitter-pea											x	x
Daviesia mimosoides	-	x									x	x	x
Dilwynia sericea	Showy Parrot-pea	x	x										x
Dodonea viscosa	Hop Bush									x	x	x	
Eucalyptus melanophloia	Silverleaf Ironbark	x	x	x	x							x	x
Eucalyptus albens	White Box	x	x	x	x							x	x
Eucalyptus blakelyi	Blakeylis Red Gum	x	x	x	x							x	x
Eucalyptus bridgesiana	Apple Box	x	x	x	x	x	x	x	x	x	x	x	x
Eucalyptus camaldulensis	River Red Gum	x	x	x	x	x	x	x	x	x	x	x	x
Eucalyptus melliodora	Yellow Box	x	x	x	x							x	x
Eucalyptus microcarpa	Inland Greybox	x	x	x	x							x	x
Hibbertia obtusifolia	Grey Guinea Flower	x	x	x								x	x
Indigofera aedesmifolia	Tick Indigo	x	x									x	x
Indigofera australis	Austral Indigo	x	x									x	x
Pimelea glauca	Smooth Rice-flower	x	x								x	x	x
HERBS AND GRASSES													
Austrodanthonia caespitosa	Wallaby Grass	x											x

Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Austrodanthonia setacea	Wallaby Grass	x											x
Austrostipa scabra	Spear Grass	x	x							x	x	x	x
Bothriochloa macra	Red-leg Grass	x	x	x							x	x	x
Bulbine bulbosa	Bulbine Lily	x	x									x	x
Burchardia umbellata	Milkmaids												
Calocephalus citreus	Lemon Beauty-heads	x	x	x									
Calotis lappulacea	Yellow Burr-Daisy	x	x	x								x	x
Chrysocephalum apiculatum	Golden Buttons	x	x	x							x	x	x
Chrysocephalum semipapposum	Clustered Everlasting	x	x	x							x	x	x
Clematis microphylla	Old Man's Beard								x	x	x	x	x
Convolvulus angustissimus	Australian Bindweed								x	x	x	x	
Cymbopogon refractus	Barbed Wire Grass	x	x	x	x					x	x	x	x
Desmodium varians	Slender Tick-trefoil	x	x							x	x	x	x
Dianella longifolia	Smooth Flax Lily	x									x	x	x
Dianella revoluta	Blueberry Lily	x											x
Einatia nutans	Nodding Saltbush	x	x									x	x

Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Eremophila debilis	Winter Apple	x	x	x									
Geranium solanderi	Austral Cranesbill								x	x	x	x	x
Glycine clandestina	Twining Glycine	x	x								x	x	x
Glycine tabacina	Variable Glycine	x	x	x	x	x	x				x	x	x
Hardenbergia violaceae	False Sarsparilla	x	x										x
Linum marginale	Native Flax	x	x	x	x							x	x
Lomandra filiformis	Wattle Matt-rush	x	x										
Lomandra longifolia	Spiny-headed Mat-rush	x	x										x
Lomandra multiflorus	Many-flowered Matt-rush	x	x										
Lotus australis	Australian Trefoil	x	x										x
Microlaena stipoides	Weeping Grass	x	x							x	x	x	x
Microseris lanceolata	Murnong	x	x	x								x	x
Poa labillardieri	Tussock Grass	x	x							x	x	x	x
Sorghum leiocladum	Wild Sorghum	x	x	x								x	x
Themeda australis	Kangaroo Grass	x	x									x	x
Tricoryne elatior	Yellow Rush-lily	x	x	x							x	x	x
Vittadinia cuneata	Burr Daisy	x	x	x							x	x	x
Vittadinia gracilus	Woolly New Holland Daisy	x	x									x	x

Species	Common Name	Summer		Autumn			Winter			Spring			Summer
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Vittadinia muelleri	Narrow-leaf New Holland Daisy	x	x								x	x	x
Wahlenbergia gracilis	Sprawling Bluebell								x	x	x	x	
Wurmbea dioica	Early Nancy							x	x	x	x		
Xerochrysum viscosum	Sticky Everlasting										x	x	x

APPENDIX D

WEED MANAGEMENT TECHNIQUES

APPENDIX D – WEED MANAGEMENT TECHNIQUES

A control program comprising mechanical, herbicide, fire, and if possible, grazing is recommended (SEWPaC 2007). The following weed control options have been taken from NRRBS (2011), Rawlings et al (2010) and the Weeds Australia website.

These are general techniques; site and species-specific techniques would be applied depending on the chemicals used, site conditions, accessibility and environmental conditions. Treatment options depend on the size of the control area, time frame of activities and resourcing and equipment availability.

Where practical, weeds can be controlled by hand weeding or manual removal (particular in sensitive areas of native vegetation) over herbicide application.

Where such areas are available, strategic grazing would also be undertaken before herbicide application to minimise risks to native vegetation.

No high disturbance manual removal of woody weeds would be undertaken near native trees, for instance, deep ripping techniques.

Where herbicides are required to be used, **Table D1** details recommended application times for popular herbicides used for common weed species. Available methods in relation the application of herbicides is included below.

Table D1 – Recommended Application Times for Herbicides

Herbicide	Weed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Access	Deciduous plants												
	Non-deciduous plants												
Graslan	Brigalow Regrowth												
Grazon DS	Blackberry												
	St John's Wort												
	Sweet Briar												
	Gorse												
	Lantana and Associated weeds												
	Eucalypts / Acacias												
Starane 200	Lantana												
	Acacias												

** Please note this table has been adapted from the RBS website.*
Further information can be found at http://www.nrrbs.com.au/chemicalwoodyweedcontrol.htm

Key:

Best time to spray/treat
Spray/treat only if conditions are suitable
Do not spray/treat

STEM INJECTION / DRILL AND FILL

- Suitable for woody weeds and trees;
- Drill or cut through bark into live sapwood;
- Where low branches are encountered place a cut immediately below the branch;
- Immediately apply herbicide (within 15 seconds) for active uptake by plant;
- Remove plant once dead; and
- Do not treat trees with poor sap flow that occurs when plants are stressed.

CUT STUMP APPLICATION

- Suitable for woody weeds, saplings and trees;
- Put plant off completely at base (no higher than 15cm from ground);
- Use a chainsaw, axe, brush cutter or machete depending on the thickness of the stem/trunk;
- Apply herbicide using knapsack, paint brush, drench gun or a hand-spray bottle;
- Spray or paint herbicide immediately onto the exposed surface of the cut stump (within 15 seconds for water-based herbicides and 1 minute for diesel-soluble herbicides); and
- For trees with large circumferences, it is only necessary to place the solution around the edge of the stump in the living tissue. The stump circumference should be bruised with the back of an axe and each successive blow treated with herbicide.

CUT AND SWAB

- Suitable for vines and multi-stemmed shrubs;
- Similar to cut stump method;
- Herbicide applied via spray or brush; and
- In the case of vines with aerial tubers, both ends of the cut stems must be treated with herbicide. Hold both 'bunches' of cut stems in a container of herbicide for 15 seconds after cutting, so that maximum translocation occurs to both ground and aerial tubers.

STEM SCRAPE

- Suitable for plants and vines with aerial tubers;
- Sharp knife used to scrape a very thin layer of bark from a 10 cm section of stem; and
- Herbicide immediately applied to the exposed soft underlying green tissue.

BASAL BARK APPLICATION

- Suitable for thin-barked woody weeds, saplings, regrowth and multi-stemmed shrubs and trees;
- Mix an oil soluble herbicide with diesel;
- Spray (saturate) the full circumference of the trunk or stem of the plant from ground level to 30 cm height; and
- Best undertaken by contractors.

FOLIAR SPRAY APPLICATION

- Suitable for shrubs, grasses and dense vines less than 6 m tall and perennial weeds with a small roost system and simple stem;
- Herbicide is diluted with water or diesel at a specific rate, and sprayed over the foliage to point of runoff (until every leaf is wetted, but not dripping); and
- Techniques differs depending on size of weed plant or infestation.

PELLET OR GRANULAR SOIL APPLICATION

- Suitable for woody weeds with extensive fine stems and root-suckering plants to 3m in height; and
- Apply herbicide pellets evenly to root area (soil under canopy from root crown or stems to 30 cm beyond dripline) prior to spring or summer rains.

SPECIES-SPECIFIC WEED CONTROL METHODS

Appendix D provides the recommended weed control methods for pasture weeds and other agricultural weeds published by various Government Departments.

APPENDIX E

GROUND DISTURBANCE PERMIT

GROUND DISTURBANCE PERMIT

This Permit is an environmental and land management checklist which applies to all ground disturbance at Bengalla Mine.

Section 1 – Ground Disturbance Permit Application

GDP Number		
Project Coordinator		
Name		
Role		
Company		
Phone		
Email		
Project Details		
Title		
Location	*a) General description:*	
	b) Project within approved Project Boundary: Yes ☐ No ☐ Details:	
	Approved by:	
	Name:	Signature:
Description of Activities	*a) Describe the nature and type of activity:* *b) Describe the equipment to be used (include any chemicals required):* *c) Provide details of disturbance (including size, access, drilling and clearing requirements etc.):*	
Duration	Start date:	End date:
Project Layout	*a) Figure illustrating Project ground disturbance boundary and associated works attached:* Yes ☐ No ☐	

Permits and Safeguards *(Attach copy where applicable)*		
BMC Multi Work Permit	Yes ☐ No ☐ a) Reference number: b) Details:	
Dial Before You Dig	Yes ☐ No ☐ a) Reference number: b) Details:	
Other	Yes ☐ No ☐ a) Reference number: b) Details:	
Survey		
Project Ground Disturbance Boundary	*a) Ground Disturbance Permit boundary surveyed pegged:* Yes ☐ No ☐ Details:	
	Approved by:	
	Name:	Signature:
Access	*a) Roadway access and parking surveyed:* Yes ☐ No ☐ Details: *b) Roadway access and parking appropriately demarcated:* Yes ☐ No ☐ Details: *c) MapInfo Tab file (or equivalent) of access provided to the Environment Department:* Yes ☐ No ☐ Details:	
Environmental Mitigation and Management		
Flora and Fauna	*a) Described pre-clearance field protocol for fauna:* *b) Describe management of cleared vegetation (i.e. felled timber):*	

Aboriginal Heritage	*a) Are there aboriginal heritage sites located within the ground disturbance permit boundary?* Yes ☐ No ☐ Details: *b) Describe management measures for aboriginal heritage:*
Topsoil	*a) Describe management of stripped topsoil, including handling, exposure prior to stockpiling and stockpile location:* *b) Describe the current capacity of the stockpile location. Confirm if the capacity is sufficient to cater for the Project:* *c) Describe opportunities for stripped topsoil to be placed directly onto active rehabilitation areas:*
Erosion and Sediment	Erosion and sediment controls are to be implemented in accordance with: • Managing Urban Stormwater, Soils and Construction, Volume 1, 2004 ('Blue Book') • Managing Urban Stormwater, Soils and Construction, Volume 2E Mines and quarries 2008 *a) Describe erosion and sediment controls to be implemented (e.g. sediment fences, sediment dams, sumps, etc.):*
Water	*a) Describe water sources to be utilised:* *b) Describe any sensitive watercourses within the vicinity of the Project:* *c) Describe measures undertaken for activities within 40 m of identified sensitive watercourses (where applicable):*
Fire	*a) Describe fire controls to be implemented:*
Geotechnical Stability	*a) Geotechnical stability of area within disturbance boundary assessed prior to the Project commencing:* Yes ☐ No ☐ *b) Condition of the area within the disturbance boundary will be consistent for the duration of the Project:*

	Yes ☐ No ☐ Details:	
	Approved by:	
	Name:	Signature:
Rehabilitation	*a) Describe rehabilitation measures to be implemented:*	
Date Application Submitted		

Section 2 – Environmental Desktop Assessment

Desktop Assessment	Checklist
General	
1. Is the Project within Development Consent Project boundary?	Yes ☐ No ☐ N/A ☐
2. Is the Project inside the approved disturbance limit?	Yes ☐ No ☐ N/A ☐
3. Is the Project consistent with the conditions of relevant authorisations?	Yes ☐ No ☐ N/A ☐
Land Stewardship	
4. Is the Project on land owned by Bengalla Mining Company?	Yes ☐ No ☐ N/A ☐
5. Have relevant lessees been notified of the Project?	Yes ☐ No ☐ N/A ☐
Aboriginal Archaeology	
6. Has an internal Aboriginal archaeology desktop due diligence been undertaken in relation to the Project? Brief report and figure to be attached.	Yes ☐ No ☐ N/A ☐
7. Has an Aboriginal archaeology survey and salvage been undertaken at relevant sites?	Yes ☐ No ☐ N/A ☐
8. Is an Aboriginal archaeology survey and salvage required?	Yes ☐ No ☐ N/A ☐
Flora and Fauna	
9. Has an internal ecology desktop due diligence been undertaken in relation to the Project? Brief report and figure to be attached.	Yes ☐ No ☐ N/A ☐
10. Has a pre clearing survey been conducted?	Yes ☐ No ☐ N/A ☐
Other Environmental Aspects	
11. Is there opportunity for direct placement of stripped topsoil on active rehabilitation areas?	Yes ☐ No ☐ N/A ☐
12. Is the topsoil stockpile location ready for use and does it have enough capacity?	Yes ☐ No ☐ N/A ☐
13. Are proposed environmental mitigation measures adequate for the Project?	Yes ☐ No ☐ N/A ☐
14. Have nearby environmental monitoring sites (e.g. groundwater bores, dust and noise monitors) been considered and controls implemented if required? Figure to be attached.	Yes ☐ No ☐ N/A ☐
Comments	

Section 3 – Environmental Pre-Approval Field Inspection

Position	Name	Signature	Date
Environmental Specialist / Advisor:			

Section 4 – Ground Disturbance Permit Approval

Position	Name	Signature	Date
Project Coordinator:			
Environmental Specialist / Advisor:			
Statutory Manager:			
Conditions of Approval:			

Section 5 – Completion of Works

Position	Name	Signature	Date
Final Inspection for Completion of Works and Rehabilitation			
1. Environmental Advisor:			
Comments:			
GDP Project Completed			
Project Coordinator:			
Environmental Advisor:			

Please return a signed copy of the completed GDP to the Environment Department within one month of completion.

Supporting Documentation

Appendix x Title
Appendix x Title
Appendix x Title

APPENDIX F

ECOLOGICAL RISK ASSESSMENT

APPENDIX F – ECOLOGICAL RISK ASSESSMENT

An ecological hazard and risk assessment is provided in **Table E1** and has been completed for Bengalla Mine.

The risk matrix presented in **Figure E1** and the associated descriptors were utilised to determine the consequence and likelihood of each hazard.

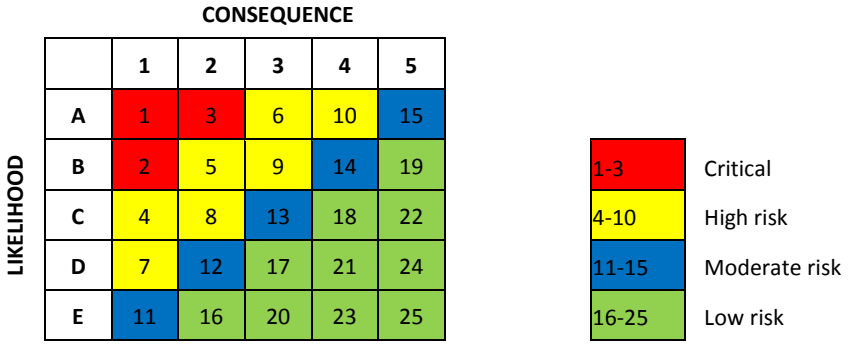

Figure E1 – Risk Matrix

Consequence	Descriptor	Description
1	Severe	Loss of species, populations or communities in an area
2	Major	Major damage/reduction of species, populations or communities in an area
3	Moderate	Moderate damage to species, populations or communities in an area
4	Minor	Minor damage to individuals/small area
5	Insignificant	Unlikely to affect species, populations or communities

Likelihood	Descriptor	Description
A	Almost certain	Almost certain to happen
B	Likely	Likely to happen at some time
C	Possible	Could potentially happen
D	Unlikely	Not likely to happen
E	Rare	Practically impossible

Table F1 – Ecological Risk Assessment

Risk Factor (Hazard)	Impact (Risk)	Likelihood without controls	Consequence	Risk Level	Method of Detection	Action/Control/Risk Mitigation Measure	Residual Likelihood	Residual Risk Level
Drought	Dieback of plant species	B	3	9	Vegetation monitoring plots.	No controls recommended.	B	9
	Increase severity of bushfire	C	2	8	Surveillance of monitoring plots, mapping and reporting of bushfires.	Reduce fuel loads	D	12
	Erosion post-drought	C	2	8	Vegetation monitoring plots.	Control numbers of rabbits to reduce net grazing pressure; Maintain ground cover of native vegetation.	D	12
Bushfire	Loss of tree hollows	B	3	9	Surveillance of property generally and monitoring plots, mapping and reporting of bushfires.	Reduce fuel loads as required.	C	13
	Plant mortality	B	2	5	Surveillance of property generally and monitoring plots, mapping and reporting of bushfires.	Reduce fuel loads as required.	C	8
	Fauna mortality	B	2	5	Surveillance of property generally and monitoring plots, mapping and reporting of bushfires.	Reduce fuel loads as required.	C	8

Risk Factor (Hazard)	Impact (Risk)	Likelihood without controls	Consequence	Risk Level	Method of Detection	Action/Control/Risk Mitigation Measure	Residual Likelihood	Residual Risk Level
Flood/major rainfall	Major erosion	C	2	8	Vegetation monitoring plots.	Control numbers of rabbits to reduce net grazing pressure; Maintain ground cover of native vegetation.	D	12
	Loss or decline of plant species	C	3	13	Vegetation monitoring plots.	No controls required.	C	13
Existing environmental weeds	Loss or decline of native plant species	C	2	8	Surveillance of monitoring plots.	Implement weed controls.	D	12
	Loss of fauna habitat	C	2	8	Surveillance of monitoring plots.	Implement weed controls.	D	12
New environmental weeds	Loss or decline of native plant species	C	2	8	Surveillance of monitoring plots.	Implement weed controls.	D	12
	Loss of fauna habitat	C	2	8	Surveillance of monitoring plots.	Implement weed controls.	D	12
Edge effects	Elevated soil nutrients	B	2	5	Visual inspection; Monitoring plots.	Limit use of fertilisers in commercial areas. Apply in areas with low potential for run-off and away from Monitoring Plots.	C	8
	Weed invasion	B	2	5	Visual inspection; Monitoring plots.	Control weeds in commercial areas	D	12