



BENGALLA MINING COMPANY

CONTINUATION OF BENGALLA MINE
BACKGROUND DOCUMENT

February 2012



Hansen Bailey
ENVIRONMENTAL CONSULTANTS

BENGALLA

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BACKGROUND DOCUMENT

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February 2012

for:

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CONTINUATION OF BENGALLA MINE BACKGROUND DOCUMENT

for

Bengalla Mining Company Pty Limited

1 INTRODUCTION

1.1 OVERVIEW

Bengalla Mining Company Pty Limited (BMC) operates the Bengalla Mine (Bengalla) in the Upper Hunter Valley of NSW, approximately 130 km north-west of Newcastle and 4 km west of Muswellbrook (see **Figure 1**). BMC is managed by Coal & Allied (CNA) Bengalla Pty Limited.

BMC has successfully operated Bengalla since 1999. As part of BMC's ongoing commitment to future operations at Bengalla, and its commitment to long term investment in the Upper Hunter Region, BMC has completed detailed scoping and feasibility studies to enable its continuation of mining west of its current operations.

BMC is seeking a Development Consent under Part 4 Division 4.1 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) to enable mining to continue directly west largely within current Mining Leases (ML) for a 24 year period at a rate of up to 15 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal (the Project).

This Background Document has been prepared by Hansen Bailey Environmental Consultants (Hansen Bailey) and supports BMC's request for Director-General's environmental impact assessment requirements (DGRs) for the Project.

An Environmental Impact Statement (EIS), prepared in accordance with the DGRs (when received) and relevant guidelines, will investigate and report on the social, environmental and economic impacts of the Project in accordance with the objectives of the EP&A Act. If approved, the Project will provide employment for an estimated 900 full time equivalent personnel (plus contractors) and will generate significant revenue for the local, state and Federal Governments.

1.2 BACKGROUND

BMC was granted Development Consent (DA 211/93) by the then Minister for Urban Affairs and Planning on 7 August 1995 for the construction and operation of a surface coal mine, coal preparation plant, rail loop, loading facilities and associated facilities. The supporting document to the Development Consent is the *Environmental Impact Statement for Bengalla Coal Mine* dated November 1993 (Bengalla EIS) (Envirosciences 1993).

Bengalla was originally approved to operate for a 21 year period from 1996 and to produce up to 8.7 Mtpa of ROM coal. The Bengalla EIS acknowledged that significant coal reserves continued west beyond the 21 year mining extent and stated:

'The coal reserves continue to the west of the limit of excavation, and beyond the edge of the Authorisation area. It is anticipated that these reserves will be mined by open cut methods in the future, subject to appropriate approvals' (Bengalla EIS).



- Bengalla Mine
- National Park / State Forest
- Major Roads
- Railways
- Major Waterways

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BENGALLA MINE

Locality Plan

Filename: 0984 (F01) Bengalla Mine Locality

Date: 21.09.11

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Figure
1

Since the granting of DA 211/93, there have been four approved modifications to ensure ongoing operations at Bengalla, which presently has approval to produce up to 10.7 Mtpa ROM coal. A description of Bengalla's approval history is provided in **Section 2.1**.

The Project will largely rely upon the currently approved and constructed mine site infrastructure including (but not limited to) the Coal Handling and Preparation Plant (CHPP), rail loop and load out facility and workshop / administrative buildings. Some of this infrastructure will be required to be relocated or upgraded to facilitate the proposed increased production during the life of the Project.

The Project is largely situated within BMC's ML1397, ML1450, ML1469 and Assessment Lease (AL) 13 (the Mining Titles). BMC's Mining Titles and the Project Development Application Boundary (Project Boundary) are shown on **Figure 2**.

The continuation of mining operations at Bengalla will intersect the natural alignment of an ephemeral creek known as Dry Creek. As such the Project will require the diversion of a section of Dry Creek and its reinstatement at an alternative location.

1.3 PROPONENT

The Bengalla Joint Venturers (BJV) are the holders of the MLs and the proponent for the Project. The BJVs are:

- CNA Bengalla Investments Pty Limited (a wholly owned subsidiary of CNA Industries Limited, a Rio Tinto Group Company) 40%;
- Wesfarmers Bengalla Limited (a wholly owned subsidiary of Wesfarmers Limited) 40%;
- Taipower Bengalla Pty Limited (a wholly owned subsidiary of Taiwan Power Company) 10%; and
- Mitsui Bengalla Investment Pty Limited (a wholly owned subsidiary of Mitsui Coal Holdings Pty Limited) 10%.

The contact details for BMC are:

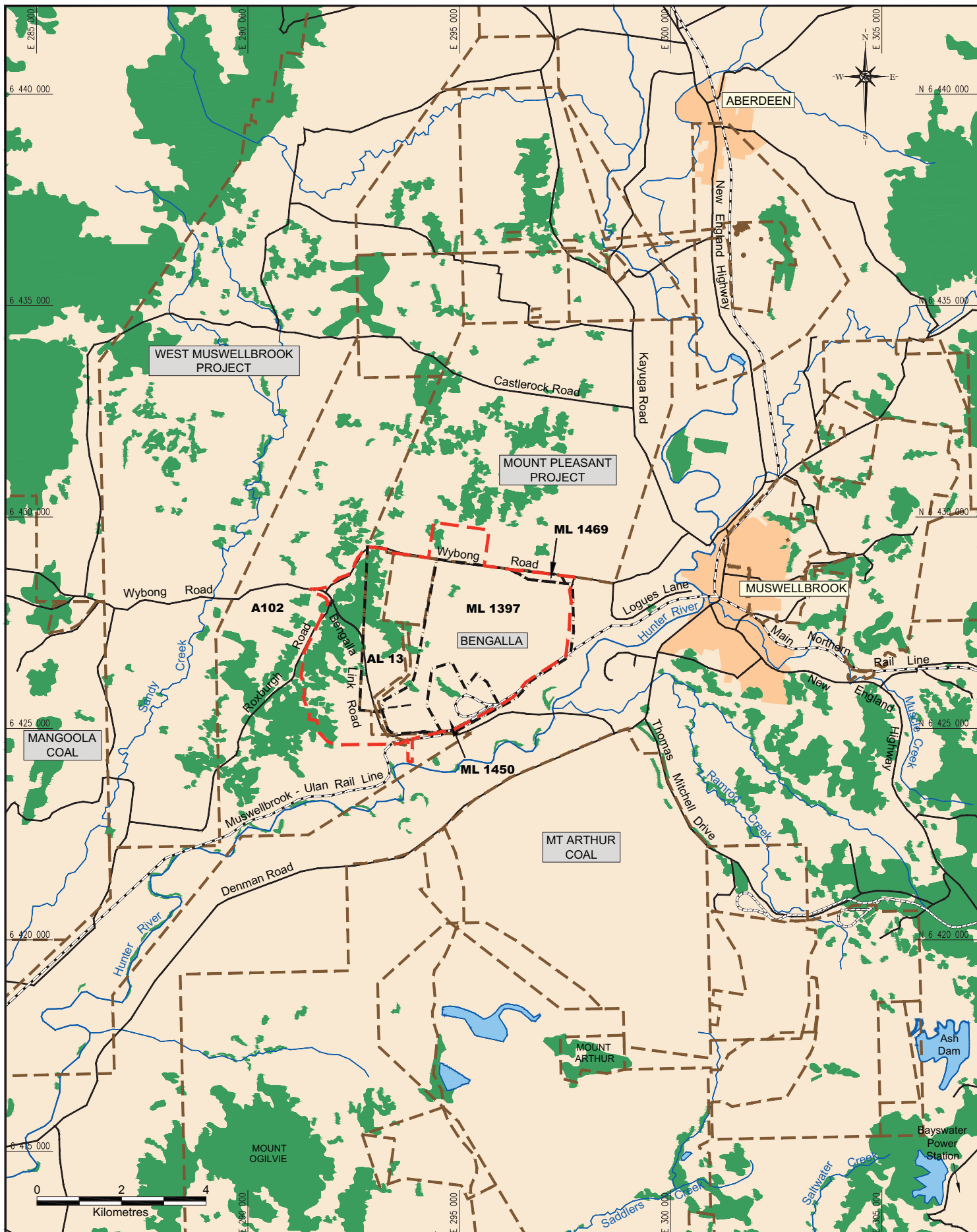
Bengalla Mining Company Pty Limited

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- Project Boundary
- Bengalla Mining Tenement Boundary
- Other Mining Tenements
- Rivers and Creeks
- Roads
- Natural Woodland
- Urban Areas

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BENGALLA MINE

Regional Locality

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Date: 10.02.12

Drawn: CP

Figure
2

1.4 PROJECT OVERVIEW

BMC proposes to make an application for Development Consent under Part 4 Division 4.1 of the EP&A Act to facilitate the continuation of open cut coal largely within current MLs for a further 24 years.

The Project consists of the following features:

- Open cut coal mining at up to 15 Mtpa ROM for 24 years continuing to utilising a dragline and truck / excavator fleet;
- Continue mining to the west of current operations;
- An additional Overburden Emplacement Area (OEA) to the west of Dry Creek which may be utilised for excess spoil material until it is intercepted by mining;
- Processing, handling and transportation of coal via the existing CHPP (to be upgraded) and rail loop for export and domestic sale;
- An additional CHPP coal stockpile and ROM coal stockpile;
- Continued use, expansion and upgrades to existing site infrastructure;
- The construction of a radio tower;
- Relocation of the Explosives Magazine and Reload Facility;
- Relocation of a section of Bengalla Link Road near the existing mine access road to enable coal extraction;
- The re-diversion of Dry Creek via dams and pipe work with a later permanent realignment of Dry Creek through rehabilitation areas once stability is established;
- Re-location of water storage infrastructure as mining progresses through existing dams (including the staged discharge dam);
- The construction of raw water dams and a clean water dam;
- A workforce of approximately 900 full time equivalent personnel (plus contractors) at peak production; and
- Supporting power reticulation infrastructure.

The Project Description is discussed further in **Section 4**.

1.5 DOCUMENT PURPOSE AND STRUCTURE

This Background Document has been prepared by Hansen Bailey on behalf of BMC and supports BMC's request for DGRs for the Project in accordance with the requirements in Part 2 in Schedule 2 to the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). In addition, the supporting document requirements outlined in Section 8 of the form to be used to request DGRs for State Significant Development (SSD) have also been considered in the preparation of this report. **Table 1** lists these requirements and where each is addressed in the Background Document.

Table 1
Supporting Documentation Requirements

Information Requirement	Where Addressed
(1) <u>Site details</u> : Provide high-quality aerial photographs, maps or figures that clearly depict the following:	
The local and regional context of the proposal;	Figure 1 & Figure 2
Surrounding development and any potentially affected properties; and	Figure 8
The location of key infrastructure and environmental features.	Figure 9 & Figure 10
(2) <u>Development description</u> : Provide a clear and concise summary of the proposal that describes the types of activities that will be undertaken during each stage of the development.	Section 4
(3) <u>Permissibility and Strategic Planning</u> : Identify the strategic planning documents, environmental planning instruments and key development standards applying to the development, including any development standards not being met.	Section 5
(4) <u>Preliminary environmental impact assessment</u> : Identify and prioritise the expected environmental impacts (positive and negative) associated with the development, based on a preliminary risk assessment. Briefly outline any strategies to address the impacts identified.	Section 8 & Appendix A
(5) <u>Justification</u> : Explain why the site was chosen for the proposal and briefly discuss the alternatives considered. Outline the strategic context for the proposal, including the benefits to the region and/or State.	Section 9
(6) <u>Consultation</u> : Outline any consultation (with the community, local councils, other Government agencies) already undertaken and proposed to be carried out for the proposal.	Section 6
(7) <u>Capital investment value</u> : Provide an accurate estimate of the cost of carrying out the proposal.	Section 8.8

This Background Document is structured as follows:

- **Section 2** provides an overview of the history of Bengalla's approvals and a description of existing operations;
- **Section 3** provides an overview of the existing environment;
- **Section 4** provides a detailed description of the Project;
- **Section 5** identifies the regulatory framework relevant to the Project;
- **Section 6** describes the stakeholder engagement program conducted to date and proposed to be undertaken to ensure all stakeholders continue to be consulted regarding the Project;
- **Section 7** summarises a contemporary environmental risk assessment conducted for the Project and is provided in full in **Appendix A**;
- **Section 8** describes the potential environmental, social and economic impacts and proposed assessment methodology for key environmental issues identified in the preliminary risk assessment for the Project;
- **Section 9** provides a preliminary justification for the Project; and
- **Section 10** and **Section 11** list all relevant abbreviations and references utilised in this document.

2 EXISTING OPERATIONS

This section provides a brief discussion on the history of the approved operations, a description of current mining operations, coal handling and preparation processes and the environmental management system in place at Bengalla to manage potential environmental impacts.

2.1 PLANNING APPROVALS

2.1.1 Bengalla as Originally Approved

Operations at Bengalla are conducted in accordance with DA 211/93 and its supporting documents: the Bengalla EIS, the *Statement of Environmental Effects Modification to Mining Operations* (Bengalla SEE) (Hansen Consulting 2006), the *Wantana Extension Statement of Environmental Effects* (Wantana Extension SEE) (Hansen Bailey 2007), *BMC Development Consent Modification Environmental Assessment* (Bengalla EA 2008) (Hansen Bailey 2008) and the recent *BMC Development Consent Modification Environmental Assessment* (Bengalla EA 2010) (Hansen Bailey 2010). A brief description of each is provided below.

BMC was granted DA 211/93 under the EP&A Act for the 'Construction and operation of a surface coal mine, coal preparation plant, rail loop, loading facilities and associated facilities' on 7 August 1995. The supporting document to the Development Consent is the Bengalla EIS.

Bengalla as originally approved in DA 211/93 had the following features:

- Extraction of coal within the 21 year coal extraction limit of approximately 565 ha;
- Maximum ROM coal production of 8.7 Mtpa;
- Maximum reserve of 147 Million tonnes (Mt) of ROM coal;
- Mining until 2017;
- Coal mined utilising dragline, excavator and shovel mining methods and truck fleet;
- Open-cut strip mining progressing from the east to the west;
- Maximum OEA height to RL 240 m Australian Height Datum (AHD);
- Construction workforce of approximately 510 and 300 permanent employees; and
- Construction and operation of the CHPP and associated facilities, administration and bath house, rail loop and loading facilities, and other coal mining related facilities.

2.1.2 Bengalla as Modified

Modification 1

DA 211/93 (M1) dated 9 November 2006 approved the following modifications to Bengalla as originally approved:

- Increase the final landform height from a maximum of RL 240 m to RL 270 m;
- The relocation of the overland conveyor, ROM Hopper and associated emergency coal stockpile;
- Modifications to the CHPP to facilitate two-stage washing and an extension of the ROM and product coal stockpiles;

- The construction of two permanent tailings drying areas for the placement of tailings on a temporary basis; and
- Increasing the maximum allowable annual production levels from 8.7 to 10.7 Mtpa ROM coal.

The supporting document to DA 211/93 (M1) is the Bengalla SEE.

Modification 2

DA 211/93 (M2) dated 6 December 2007 approved the following modifications to Bengalla as originally approved:

- Wantana Extension:
 - Extension of coal mining operations to the south of Bengalla open-cut over an additional coal extraction area of 32 ha within the current MLs and existing Project Boundary; and
 - Construction of associated water management infrastructure.
- Infrastructure Modifications:
 - Minor extensions to the administration, bath house and workshop buildings;
 - Extension to car parking facilities; and
 - Relocation of existing facilities within the workshop hardstand area.
- In-pit Facilities:
 - Relocation and upgrade of an in-pit refuelling facility;
 - Construction of a laydown area and associated infrastructure; and
 - Relocation of existing in-pit infrastructure which will be consumed by future mining operations.

The supporting document to DA 211/93 (M2) is the Wantana Extension SEE.

Modification 3

DA 211/93 (M3) dated 22 July 2008 approved the following modifications to Bengalla as originally approved:

- Construction of the Bengalla Link Road Stage 2 on an alternative alignment to that originally approved; and
- Deferral of the relocation of the ROM Hopper and associated facilities from its existing location to a site adjacent to the CHPP.

The supporting document to DA 211/93 (M3) is the Bengalla EA 2008.

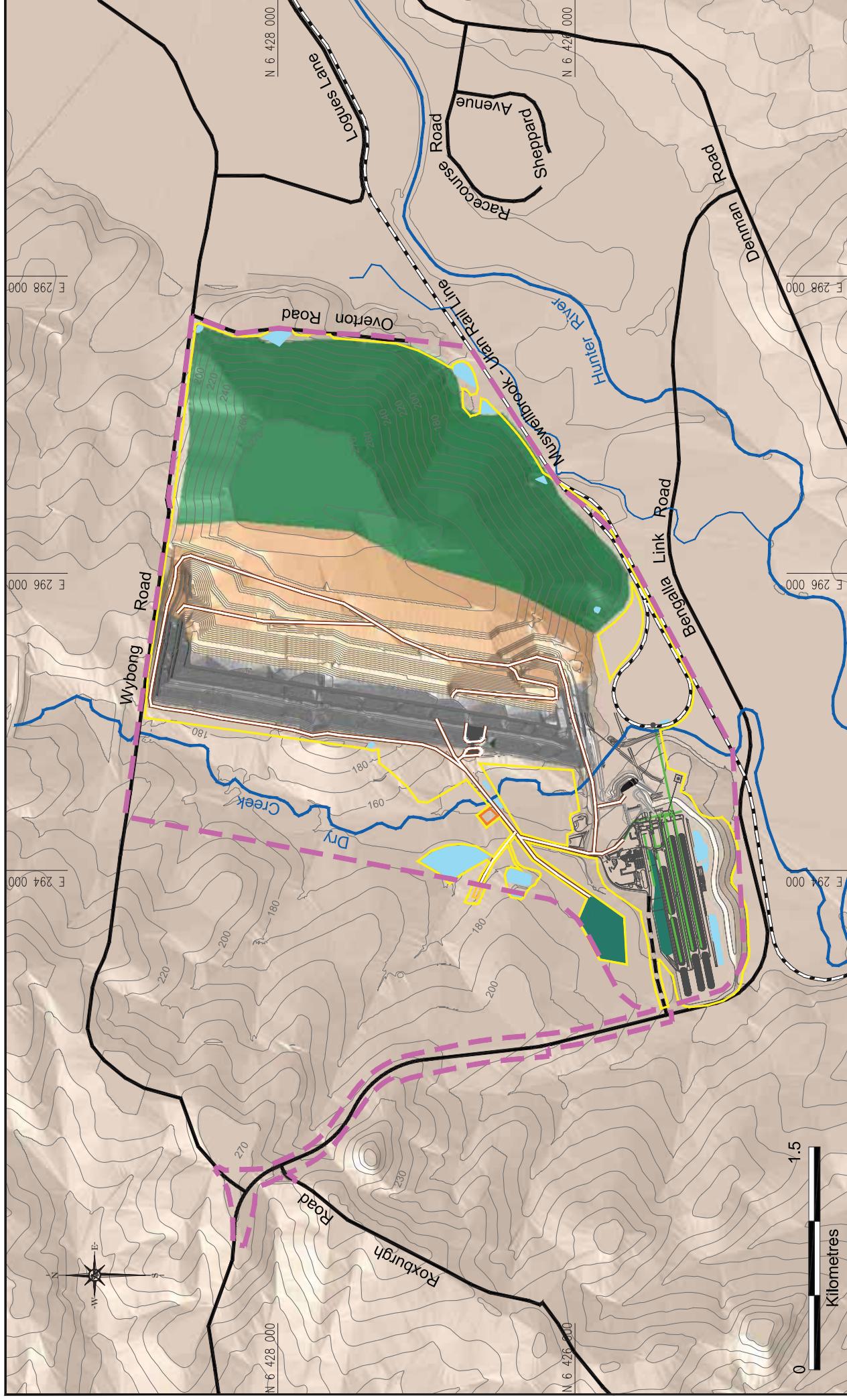
Modification 4

Modification DA 211/93 (M4) dated 7 October 2011 facilitated the following modifications to Bengalla as originally approved:

- Acceleration of mining operations within the Wantana Extension to align these with existing operations; and
- Implementation of an overburden emplacement strategy at Bengalla to resolve the overburden emplacement capacity issues.

The supporting document to DA 211/93 (M4) is the Bengalla EA 2010.

The approved site layout at Bengalla is presented on **Figure 3**.



BENGALLA MINE

Approved Site Layout

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BENGALLA

Source: ERM Mitchell McCotter (1997),
ENGA Mitchell McCotter (2000),
Geomatics Systems (UGA) 1996

Legend

	Existing DA Boundary		Tailings Drying Areas
	Approved Disturbance Limit		Explosives Magazine
	Haul Roads		Storage Facility
	Access Road		
	Mining Area		
	Overburden Emplacement		
	Rehabilitated Area		
	Water Storages		

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Date: 13.02.12

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Figure **3**

2.2 EXISTING OPERATIONS

2.2.1 Mining Operations

Bengalla is an open cut strip coal mining operation where mining advances to the west based on dragline strips approximately 60 m in width. Mining operations are conducted 24 hours a day, seven days a week by approximately 400 full time permanent employees.

The Bengalla mobile equipment fleet consists of modern mining equipment, which incorporates some of the latest mining technology. The main mining equipment used at Bengalla consists of a dragline, loader, hydraulic excavators, haul trucks and dozers. Mining operations extract coal from eight defined seams from the Warkworth to the Edderton coal seam.

All Bengalla owned mining equipment has been modified to meet stringent noise requirements to ensure Bengalla continues to meet consented noise limit criteria at private residences. To minimise noise generation, the fitting and maintenance of specifically designed noise attenuation equipment has ensured quieter operating equipment, most notably the P&H model 9020 dragline and haul truck fleet.

Haul trucks are utilised to transport the coal from the active mining face to the ROM hopper where it is then conveyed to the CHPP for processing.

2.2.2 Coal Processing

The first stage of coal processing involves crushing ROM coal to less than 250 mm in size. The crushed coal is then transported along a 300 m conveyor to a secondary crushing station where it is reduced to less than 50 mm. Where practical, all conveyors are enclosed to reduce both noise and dust emissions. After crushing, coal can be bypassed to product, direct fed into the CHPP or transported and stockpiled on the raw coal stockpile. All stockpiles utilise dust suppression and process strategies to minimise dust emissions.

Bengalla's CHPP has three coal stockpiles in the handling and preparation process. The ROM coal stockpile has a capacity of 200,000 t and the two product stockpiles hold a combined volume of 500,000 t. The CHPP and stockpiles are surrounded by earth bunds to reduce the visual and noise impacts on surrounding areas. Dust from stockpile areas is managed by an automatic sequential spray system that becomes activated when the wind speed exceeds 5.6 metres per second (m/s).

The CHPP utilises dense medium cyclones (-50 mm +1.4 mm) and single stage spirals (-1.4 mm +0.125 mm) to process coal to meet customers' product specifications. This also allows maximum resource recovery of the ROM coal. The CHPP houses two washery modules, each with a capacity of 850 tonnes per hour (tph). Each module contains a dense medium cyclone and spirals used to separate mineral contaminants. After processing, the product coal is centrifuged for the purpose of moisture reduction and then stacked onto one of the two product coal stockpiles.

2.2.3 Product Transport

After processing is complete, product coal is reclaimed via twin boom portal type reclaimers and conveyed to the rail load out facility, which is a fully automated system averaging approximately 3,500 tph annually into trains. The rail load out facility is located immediately to the south of the lease and is automated from the CHPP control room in the main administration complex.

Product coal is transported to the Port Waratah Coal Loader at Newcastle for export with lesser amounts railed directly to local Macquarie Generation power stations.

2.2.4 Reject Disposal

Unlike conventional CHPP processing plants, Bengalla has no tailings dam. Ultrafine material (less than 0.125 mm) is thickened, dewatered on belt press filters and then combined with other reject streams for final disposal back into the spoil for co-disposal. Reject material is stored in a reject bin prior to being hauled back to the pit area where it is dried in cells before being buried within the spoil area and capped with a minimum of five metres of inert overburden material.

The CHPP is a conventional spirals and dense medium cyclone plant. The dense medium cyclone treats the coarse (-50 mm +1.4 mm) material before passing the reject material through the reject screen. Fine material is treated by the spirals and produces the fine (-1.4 mm +0.125 mm) coal and reject material. The extra fine -0.125 mm material is not beneficiated and is treated as reject material.

2.2.5 Office and Workshop

The main office and adjacent workshop area is the primary planning and administration sector for Bengalla. In-house training and inductions are provided in two training rooms at the office area. The administration building is also the entrance for visitors to the mine. The workshop area is the maintenance base for mobile plant and equipment on site where major repairs on machinery are conducted, as well as houses materials and parts in the supply area.

2.2.6 Site Access

All access to the Bengalla administration area is via the Bengalla Access Road and the Bengalla Link Road.

2.2.7 Mine Water Management System

BMC's water management system was designed to minimise the use of fresh water from the Hunter River. This is achieved through maximising the recycling of CHPP process water by dewatering rejects and utilising secondary quality water where possible across the site. Wherever possible, saline mine water and treated sewage water are used for coal processing and dust suppression.

BMC manages a complex and detailed water balance through the development of the operation's Real Time Environmental Management Systems (RTEMS). The RTEMS is a framework used to monitor Bengalla's fully automated water management system. It provides employees with real time information on water movement and usage across the site. The RTEMS also has a range of alarms and safeguards in place to detect any potential discharges, leaks or water related incidents. Routine inspections of water and sedimentation dams are also conducted as an added safeguard to this system.

The design of dams, pipelines and associated drainage structures allows for catchment of water from undisturbed areas to be diverted, where possible, away from disturbed and sediment laden mine water. Controls are implemented to ensure stormwater and groundwater from mining areas is diverted to either mine water dams or the pit void to prevent discharge of this water offsite. The existing water management system at Bengalla is illustrated on **Figure 4**.

During periods of high rainfall, excess water from Bengalla can also be discharged into the Hunter River under the Hunter River Salinity Trading Scheme (HRSTS) during periods of 'high' or 'flood' flows. Discharges are conducted strictly in accordance with BMC's Environment Protection Licence (EPL) 6538. All discharges are released from the main Bengalla water storage (Staged Discharge Dam) and additional surface water monitoring is also undertaken during any such discharge event. However, Bengalla generally operates with a net water deficit and rarely discharges mine water under the HRSTS. The HRSTS was introduced by the NSW Government to reduce salinity levels in the Hunter River and allows controlled water discharges into the Hunter River. The HRSTS operates under the *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002*.

2.2.8 Existing Licences and Approvals

Table 2 outlines the status of BMC's mining authorities, licences and approvals and other environmental mining related approvals. In addition to these licences and approvals, BMC has an extensive groundwater monitoring network consisting of 41 groundwater bores as outlined in **Section 8.11**.

Table 2
Consents, Leases and Licences

Approval	Tenement / Licence	Authority	Dates
Development Consent (as modified)	DA 211/93	Department of Planning & Infrastructure (DP&I)	07/08/1995 – 07/08/2017
Development Consent – Explosives Facility	DA 273/2006	MSC	06/09/2006 – Perpetuity
Assessment Lease	AL13	DRE	20/12/2006 – 19/12/2011
ML	1397	DRE	27/06/1996 – 27/06/2017
ML	1469	DRE	05/06/2000 – 05/06/2021
ML	1450	DRE	11/06/1999 – 11/06/2020
ML	1592	DRE	19/04/2007 – 19/04/2028
Bengalla Mining Operations Plan (MOP)	C 98/2152	DRE	13/01/2009 – 17/12/2012
Exploration Licence	A438	DRE	18/08/2009 – 07/05/2014
Bengalla EPL	6538	OEH	27/11/2009 – 19/08/2014 (Review Date)
Hunter River Water Access Licence (1,449 units)	WAL001106 (previously 20SL060388)	NOW	01/08/2004 – 18/03/2018
Groundwater Extraction Licence	20BL169798	NOW	Expiry Date: 31/10/2015
Hunter River Pump	20PE001354	NOW	01/05/1997 – Annual
Licence to Store	07-100151-001	WorkCover NSW	Expiry Date: 10/01/2013
Licence to Sell / Possess	27484	OEH	Expiry Date: 18/12/2013
Radiation Licence	1320	OEH	Expiry Date: 09/04/2013
Radiation Licence	1321	OEH	Expiry Date: 09/04/2013
Radiation Licence	1322	OEH	Expiry Date: 09/04/2013
Radiation Licence	7285	OEH	Expiry Date: 21/01/2012*
Radiation Licence	7286	OEH	Expiry Date: 21/01/2012*

* Renewal pending.

2.3 ENVIRONMENTAL MANAGEMENT

2.3.1 Environmental Management System

Bengalla operates in accordance with the CNA Environmental Management System (EMS), accredited to the International Standards Organisation (ISO) 14001. The EMS relies upon an environmental policy, a series of regulatory required management plans, a monitoring program and environmental standards and procedures as detailed in **Table 3** and **Table 4** and described further in **Section 2.3.2**. The Environmental Policy directs planning which in turn affects implementation and operation, management measures and a continuous review and improvement process.

The CNA EMS is designed so that BMC can effectively manage its environmental issues, ensure compliance with regulatory requirements, continually improve its environmental performance and satisfy the expectations of stakeholders.

As part of the EMS, Bengalla also has in place a robust Aspects and Impacts Register, which systematically identifies all activities related to the mine that could cause environmental harm and applies a risk ranking of these aspects. Those aspects which are subsequently identified with a critical or high level of risk are prioritised within Departmental Environmental Action Plans so that they are appropriately managed.

To drive the operation's performance, each department has in place a documented Health, Safety and Environmental Action Plan, which outlines projects that will aid in achieving the mine's environmental objectives and targets.

In addition, the EMS describes objectives and performance outcomes for rehabilitation, flora and fauna, spontaneous combustion, acid rock drainage and contaminated sites. The EMS also describes measures involved in auditing, reviews, reporting, calibration, maintenance and accountabilities.

Table 3
BMC Management Plans

Management Plan	Consent Condition
Noise Management Plan	DA 211/93 (M4) Schedule 3, Condition 8
Blast Management Plan	DA 211/93 (M4) Schedule 3, Condition 16
Air Quality and Greenhouse Gas Management Plan	DA 211/93 (M4) Schedule 3, Condition 23
Water Management Plan	DA 211/93 (M4) Schedule 3, Condition 28
Heritage Management Plan	DA 211/93 (M4) Schedule 3, Condition 29
Landscape Management Plan	DA 211/93 (M4) Schedule 3, Condition 35
Rehabilitation Management Plan	DA 211/93 (M4) Schedule 3, Condition 41
Environmental Management Strategy	DA 211/93 (M4) Schedule 5, Condition 1

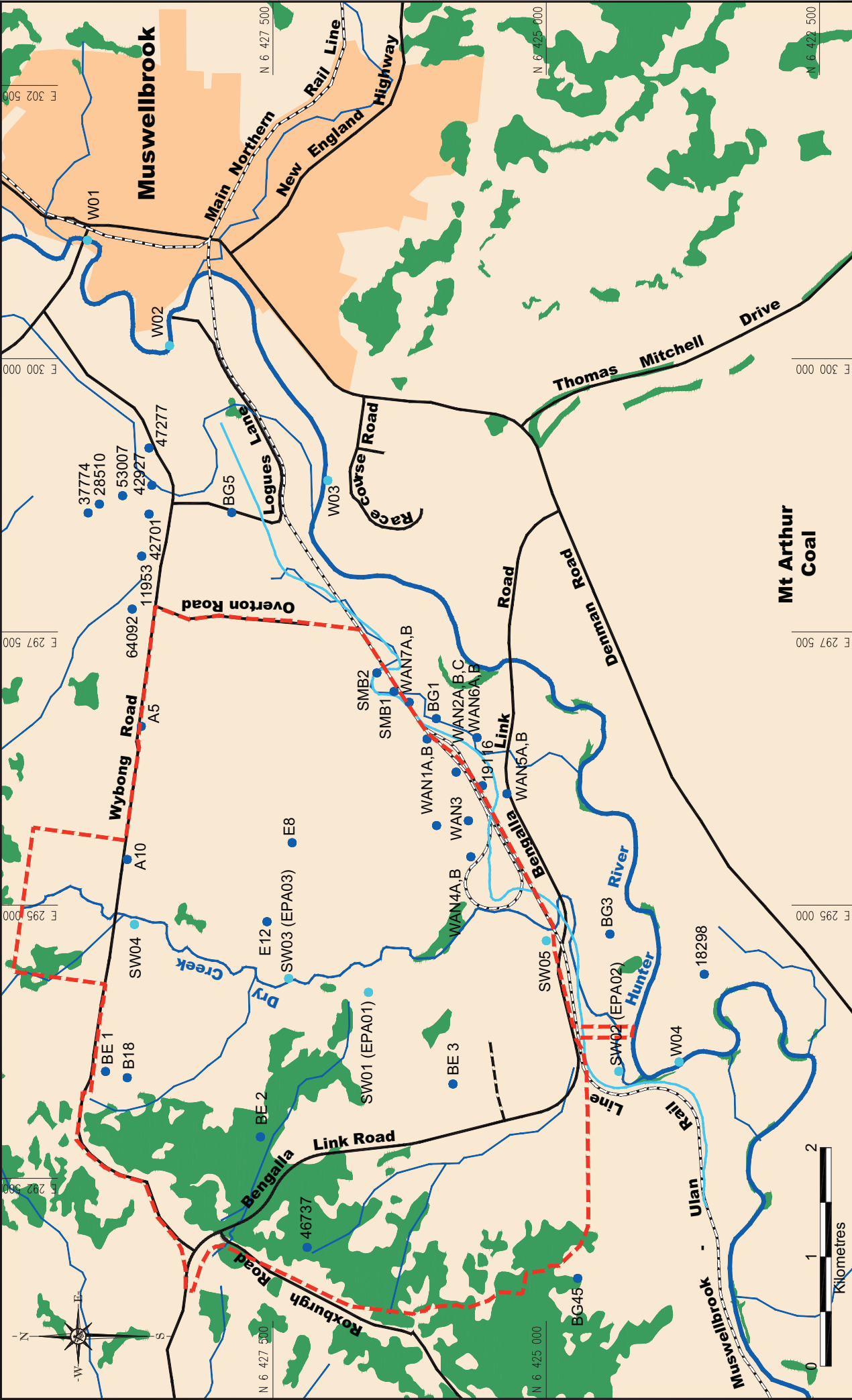
Table 4
EMS Management Systems, Standards and Procedures

RTCA HSEQ System – Management Standards		Current CNA EMS Procedures	
1	Policy	1.1	Aspects and Impacts
2	Legal and Other	1.2	Objectives and Targets
3	Hazard Identification and Risk	1.3	Risk Assessment
4	HSEQ Management Improvement Planning	1.4	Environmental Audits, Inspections and Non-conformance Management
5	Organisation, Accountability and Responsibility	1.5	Environmental Legislative Compliance
6	Training, Competency and Awareness	1.6	Environmental Training
7	Contractor Management	1.7	Environmental Training
8	Document Control	1.8	Incident Reporting
9	Communication and Consultation	1.9	Communications (includes community and complaints management)
10	Operational Control	1.10	Monitoring and Management
11	Management of Change	1.11	Annual Management Reviews of the EMS
12	Disaster Management and Recovery	1.12	Document Control
13	Measuring and Monitoring	2.1	Cultural Heritage Management
14	Non-conformance Incident and Action Management	3.1	Property Transactions Guidelines (Rio Tinto)
15	Data and Records Management	4.1	Closure Planning Guidelines
16	Performance Assessment and Auditing	5.1	Rehabilitation
17	Management Review	6.1	Waste Management
Rio Tinto Environmental Performance Standards		6.2	Coarse Rejects and Tailings Disposal
E1	Environmental Management System	7.1	Water Management
E2	Air Quality Control	7.2	Waste Discharge
E3	Acid Rock Drainage Prediction and Control	8.1	Dust Management CPP
E4	Greenhouse Gas Emission	8.2	Air Quality – Mobile Equipment
E5	Hazardous Materials and Contamination Control	8.3	Air Quality – Spontaneous Combustion
E6	Noise and Vibration Control	9.1	Noise
E7	Non Mineral Waste Management	9.2	Blasting (includes air quality and vibration)
E8	Mineral Waste Management	10.1	Visual Management (includes infrastructure design and lighting management)
E10	Water Use and Quality Control	10.2	Flora and Fauna
STCLO_D4 Closure Standard		10.3	Ground Disturbance Permit
		12.1	Acid Mine Drainage Prevention and Control
		13.1	Site Contamination Prevention and Control

2.3.2 Environmental Monitoring Program

A key component of the EMS is the Bengalla Environmental Monitoring Program (EMP). The EMP contains procedures to allow BMC to effectively monitor its environmental performance via the use of a comprehensive monitoring program.

The existing Bengalla monitoring locations are presented on **Figure 5** and **Figure 6** and outlined in **Table 5**. Existing practices in relation to amenity issues of noise, blasting and air quality are discussed further below.





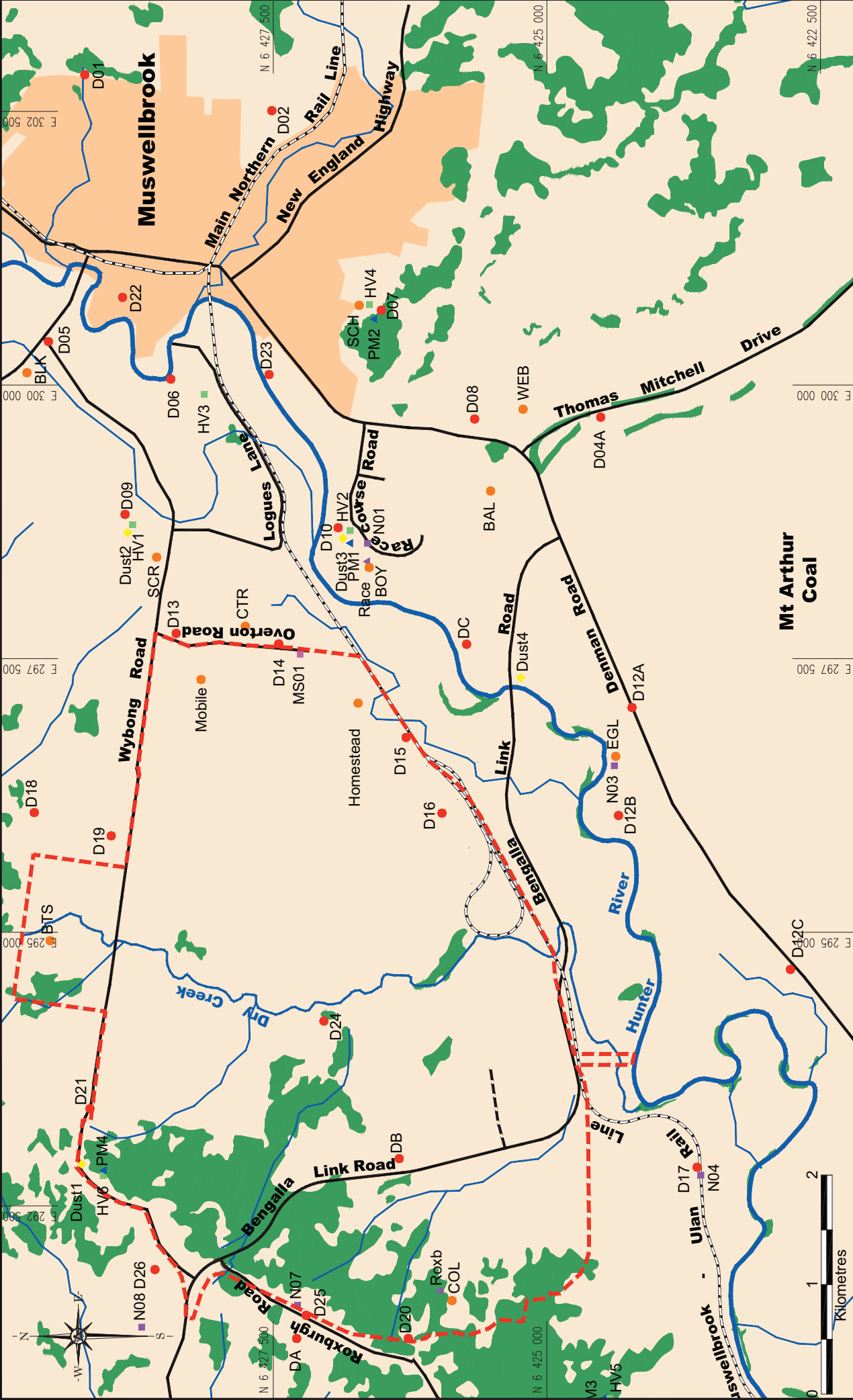
Co-ordinate System: MGA Zone 56

BENGALLA MINE

Surface Water & Groundwater
Monitoring Network

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Figure **5**





Co-ordinate System: MGA Zone 56

BENGALLA MINE

Air Quality, Noise & Meteorological Monitoring Network

Project Boundary
Access Road
Blast Monitor
Real Time Noise Monitor
Quarterly Noise Monitoring Site
Real Time PM₁₀ Grimm Monitor
HVAS -TSP Monitor

HVAS-PM₁₀ Monitor
Dust Deposition Monitor
Meteorological Station

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Figure
6

Table 5
Environmental Monitoring Program

Category	Parameter	Monitoring Program
Air Quality	Total Suspended Particulates	5 High Volume Air Samplers (HVAS)
	PM ₁₀	4 HVAS
	Dust Deposition	29 Depositional Dust Gauges
	Real Time Air Quality Monitors	4 Locations
Meteorological Monitoring	Meteorological Station	1 Location
	Temperature Inversion Tower	1 Location
Noise Monitoring	Attended Noise Monitoring	5 Locations
Blast Monitoring	Fixed Blast Monitor	11 Locations
Water Quality	Surface Water	8 Locations
	Groundwater	41 Locations

Dust Monitoring

Dust monitoring at Bengalla consists of a range of technology to ensure accurate and reliable monitoring of air quality impacts on the surrounding environment. A combination of data collected and the use of real time dust monitors ensure Bengalla is able to proactively manage dust and effectively implement operational controls to reduce or minimise dust.

Bengalla's network of four real time dust monitors is linked to the RTEMS. The site utilises E-Bam model monitors for the real time monitoring. E-Bam monitors utilise new technology and are considered one of the best real time dust monitors currently available.

Real time data from the monitors located strategically upwind and downwind of Bengalla are combined with wind speed and direction data from the meteorological station to ascertain environmental impacts that may be caused by the operation. This allows air quality to be regularly assessed and operations to be modified or ceased if impacts are deemed significant. These monitors perform a key role in enabling the activities of the mine to be continually monitored and to minimise impacts on the surrounding environment.

Noise Monitoring

BMC has also implemented industry leading practices to control and minimise noise levels across the site, including:

- Construction of noise and visual bunds surrounding the active mining operation;
- Development of tree screens;
- Stringent sound power level requirements placed upon supplier's items of plant and equipment;
- Noise attenuation fitted to mobile equipment and some fixed plant including pumps and lighting sets;
- Regular preventative maintenance of all mobile equipment;
- Noise attenuation fitted to the ROM hopper;

- Rigorous mine planning for the scheduling and siting of active emplacement areas and haul roads away from Muswellbrook during night time operations;
- Regular independent noise monitoring surveys undertaken on all pieces of plant and mobile equipment;
- Daily night-time operator attended surveys undertaken around the site after 10:00 pm to ensure compliance with noise conditions;
- Independent fortnightly surveys occurring throughout winter, when the operation is prone to temperature inversions and the subsequent enhancement of noise levels;
- Interrogation of the Real Time Environmental Noise Monitoring System which is available to all employees; and
- Ongoing noise awareness training provided to all relevant employees.

Blasting

Prior to each blast being undertaken at Bengalla, the RTEMS system is accessed and data from Bengalla's meteorological station is used to determine the potential effects of blasting at the scheduled blast time.

Wind speed, wind direction and temperature inversion are all taken into account when determining suitability of blast time. The location of the blast in the pit and size of the area being blasted are also considered to ensure that impacts from blasting are minimised. The scheduled blast will be postponed if wind speed, wind direction or temperature inversion changes do not meet the specified Bengalla blasting criteria.

Reporting

Results from BMC's EMP are published annually in the Annual Review (formerly Annual Environmental Management Report (AEMR)) which is distributed to Government Agencies, employees, and the Bengalla Coal Mine Community Consultative Committee (CCC). It is also made publicly available, on the Bengalla website and the local Muswellbrook library and Muswellbrook Shire Council (MSC) office.

3 EXISTING ENVIRONMENT

This section provides a brief description of the relevant components of the existing environment including regional setting, topography, climate, geology and land use.

3.1 REGIONAL SETTING

Bengalla is located in the Upper Hunter Valley of NSW, approximately 130 km north-west of Newcastle and 4 km west of Muswellbrook within the MSC Local Government Area (LGA). Bengalla is generally bound by Wybong Road to the north, Overton Road to the east, the Muswellbrook to Ulan Rail Line and the Hunter River Floodplain to the south and Roxburgh Road to the west (see **Figure 2**).

3.2 TOPOGRAPHY

The land on which Bengalla is located is generally undulating and generally slopes southward towards the Hunter River. Within the eastern and southern margins of the Project Boundary are the Hunter River alluvial flats.

In the eastern part of the Project Boundary, the Overton Ridge is situated and reaches 188 m AHD. South of the Overton Ridge are lower hillslopes of the Hunter Valley which rise from 134 m AHD at the Hunter River to 250 m AHD (Envirosciences 1993).

Land within the Project Boundary is dominated by slopes of less than 5 degrees, with the gullies in the lower reaches of ephemeral streams draining into the Hunter River along with the ridge tops generally sloping at no more than 2.5 degrees.

The Hunter River alluvial floodplain generally slopes at no more than 1 degree (Envirosciences 1993).

3.3 CLIMATE

As shown in **Table 6**, temperatures range from an average maximum of 31.1°C in summer to an average minimum of 4.7°C in the winter months. Meteorological monitoring has confirmed that temperature inversions are common in winter months, forming in the late afternoon and reaching maximum resistance at dawn. Temperature inversions are also known to occur particularly in winter months, during the night and early morning periods.

For the majority of the year, winds predominantly occur from the south-east, except during the winter months when winds from the north-west prevail.

The long term average annual rainfall for the area is approximately 644 mm.

Table 6
Average Climatic Conditions 1950 to 2010

Month	Mean Daily Temperature (°C)		Mean Monthly Rainfall (mm)	Mean Monthly Rain Days
	Scone SCS		Scone SCS	Scone SCS
	Min	Max		
January	16.9	31.1	82.9	8.2
February	16.9	29.8	77.7	7.6
March	14.6	27.9	51.2	6.8
April	11.4	24.5	40.0	6.6
May	8.2	20.1	46.9	7.5
June	6.0	16.9	44.6	9.3
July	4.7	16.3	35.8	7.8
August	5.5	18.3	39.0	7.6
September	7.9	21.4	38.9	7.1
October	10.9	24.9	59.4	8.7
November	13.3	27.7	59.5	8.3
December	15.7	30.3	68.2	8.5
TOTAL	11.0	24.1	644.1	94.0

Source: Bureau of Meteorology 2010

3.4 GEOLOGY

Bengalla is located in the north-west of the Hunter Coalfield, an administrative subdivision of the Sydney Basin. Within the deposit area, coal seams subcrop along the western flank of the north-south trending Muswellbrook Anticline. Coal seams present within the Project Boundary generally dip westwards at around 5 degrees (Hansen Bailey 2007).

Faulting and igneous intrusion are not significant influences on Bengalla's design, although they do have localised impacts on scheduling, wall stability, groundwater and coal quality. Most faulting is high angle normal faults trending in a westerly to north-westerly direction. Two narrow, north-north westerly trending dykes have been encountered previously (MOP 2003).

The stratigraphic sequence across the site comprises two distinct units including the Permian coal seam sequence and Quaternary alluvial deposits. The Permian coal seam sequence is comprised of overburden and interburden layers of lithic sandstone, interbedded with siltstone, tuffaceous claystone and mudstone. The Permian sediments are unconformably overlain by thin Quaternary alluvial deposits. Quaternary alluvial deposits consist of sand and gravel along the creek valleys within the Project Boundary, and in the alluvial floodplain of the Hunter River to the south (Hansen Bailey 2007).

3.5 COAL RESOURCE

Coal seams at Bengalla comprise those of the lower Jerrys Plains and Vane Subgroups of the Late Permian Wittingham Coal Measures. Seams from the Bowfield (uppermost) to the Ramrod Creek are represented. The sequence of interest at Bengalla comprises eight economically viable seams from the Warkworth to Edderton seams forming part of the Wittingham Coal Measures as shown in **Figure 7**. The Wittingham Coal measures are up to 800 m thick and consist of sandstone, siltstone, claystone, conglomerate and tuff within which intermittent coal seams lie (Envirosciences 1993).

The Permian rocks form a regular layered sedimentary sequence consisting of the Wittingham Coal Measures that contain the economic coal seams and underlie the whole of the Project Boundary to a depth of about 500 m. Coal seams of the Jerrys Plains and Vane Subgroups (part of the Wittingham Coal Measures) will continue to be mined by the Project.

3.6 LAND USE

The Upper Hunter region has a long history of rural land use for a variety of agricultural and industrial activities, predominantly grazing and coal mining. The current dominant land uses within and adjacent to the Project Boundary include open cut coal mining and industrial activities, agriculture, rural residential and residential areas. The Hunter River is located approximately 1 km south of the Project Boundary and plays an important role in the region's mining, power generation and agricultural enterprises.

Each of the key surrounding land uses are discussed further below as relevant to the Project.

3.6.1 Agriculture

The Project is located within lands that have been largely disturbed by previous agricultural activities, particularly cultivation and grazing. Agriculture has played an important role in the area since the Muswellbrook region was first inhabited by European settlers in 1824, resulting largely in grassland interspersed with small woodland remnants.

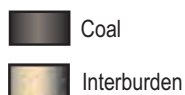
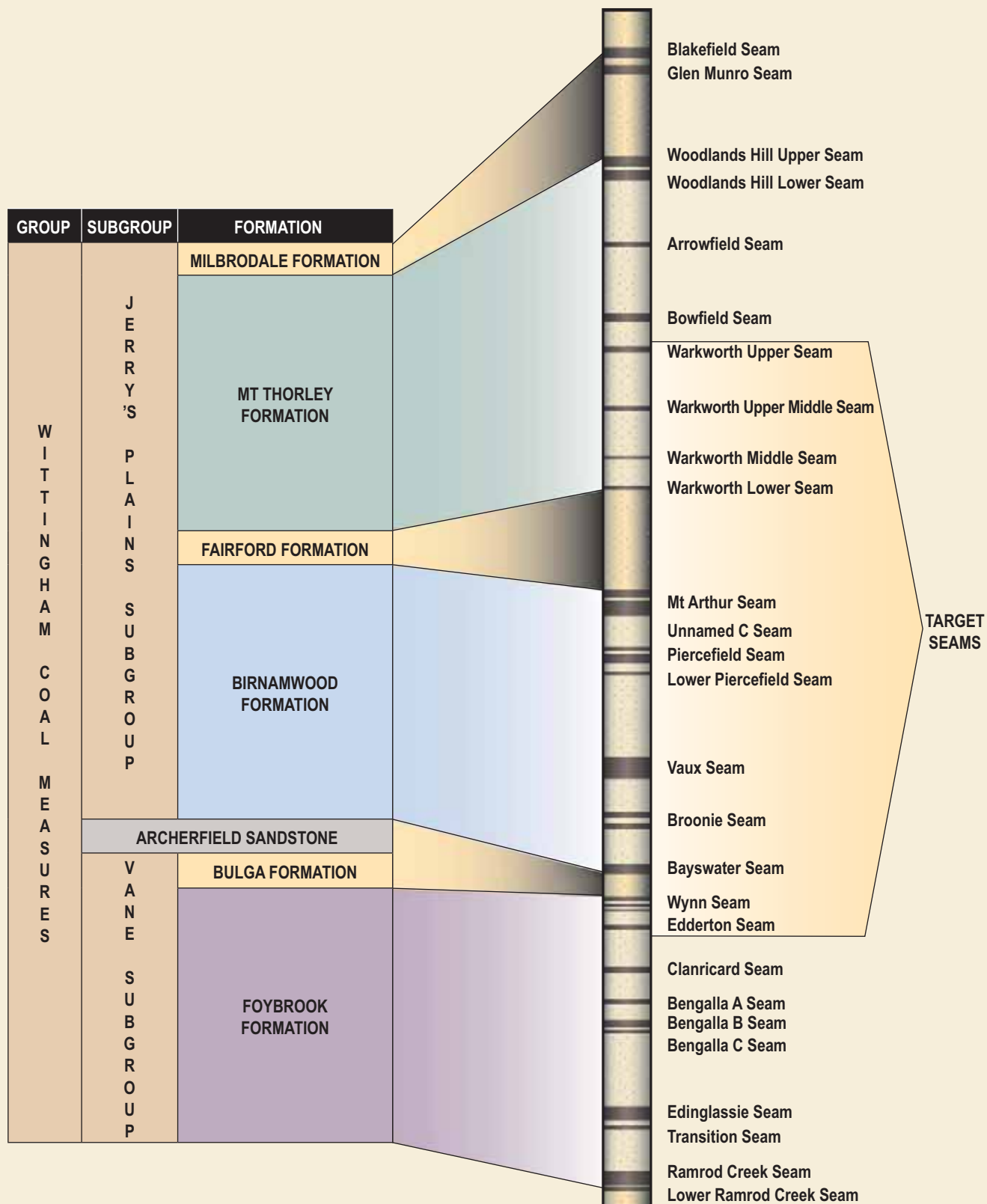
The Hunter River is located to the immediate south of Bengalla and plays an important role in the region's agricultural enterprises, meandering south from Glenbawn Dam (east of Scone) to Muswellbrook before heading east towards Newcastle. The Hunter River and its alluvial floodplain support an array of agricultural enterprises including viticulture, grazing, dairying, Lucerne hay production, horse studs and olive groves.

As shown in **Figure 5**, the BJV owns approximately 1,800 ha of agricultural land surrounding the mine which is managed through individual licensing arrangements with private stakeholders and is primarily used for grazing, dairying and cultivation. The BJV has made a commitment to maintain the agricultural productivity of its land holdings which it has done since 1995. To demonstrate this, the BJV has established lease agreements with private stakeholders for the management of three dairy farms and the Bengalla Horse Stud.

3.6.2 Rural and Residential

The township of Muswellbrook is located approximately 4 km east of the Project Boundary. Muswellbrook is situated on the New England Highway approximately 25 km south of Scone and 50 km north-west of Singleton.

The rural township of Denman is located approximately 16 km to the south-west. In addition, there are private freehold lands to the east of Bengalla. Small private rural and rural-residential properties are also located to the west of Bengalla.



Hansen Bailey



BENGALLA MINE

Indicative Stratigraphic Column

3.6.3 Power Generation and Industrial

The Muswellbrook Industrial Estate is located on Thomas Mitchell Drive located to the south-east of Bengalla, which houses a variety of businesses predominantly providing supporting services to the mining industry.

Macquarie Generation's Bayswater and Liddell Power Stations are located to the south-east of Bengalla.

3.6.4 Coal Mining

Figure 2 shows BMC's Mining Tenements along with tenements owned by other companies. **Table 7** lists the existing and proposed mining Projects at various stages of development in the surrounding area with immediately adjacent projects with potential interactions discussed further below. Each will be included as relevant in the Bengalla EIS cumulative assessment.

Table 7
Surrounding Industry

Mine / Project	Proximity to the Project	Approval Period	Current Approval Summary
Mount Pleasant Project	1 km north	22/12/2020	Open cut coal mine to extract approximately 197 Mt of ROM coal over a period of 21 years at a maximum rate of up to 10.5 Mtpa. Development commenced in 2004 with the construction of Environmental Dam 1.
Mangoola Coal Mine	6 km west	20/11/2029	Open cut coal mine extracting and processing up to 10.5 Mtpa of ROM coal for a period of 21 years.
Mt Arthur Coal Mine	2 km south	Open cut until 2022. Underground until 2030.	Open cut and underground coal mine to extract from Mt Arthur Coal Complex up to 36 Mtpa ROM coal.
Drayton Coal Mine	8 km south-east	2017	Open cut coal mine extracting and processing up to 8 Mtpa of ROM coal.
Muswellbrook Coal Mine	6 km east	2015	Open cut coal mine extracting and processing up to 2 Mtpa of ROM coal.
Dartbrook Underground	9 km north-east	-	In care and maintenance since 2007.
Drayton South Coal Project	13 km south	-	Continuation of mining at Drayton Mine for an additional 26 years by the development of open cut and highwall mining operations extracting up to 7 Mtpa of ROM coal within the Drayton South area while continuing to utilise the existing infrastructure and equipment from Drayton Mine. DGRs have been issued.
West Muswellbrook Project	AL19 located 4 km west	-	Explorations activities currently ongoing within AL19 granted 09/09/09 – 09/09/14.

Mount Pleasant Project

The Mount Pleasant Project is wholly owned by Rio Tinto Coal Australia (RTCA). It is located to the immediate north of the Project Boundary. The Mount Pleasant Project holds DA 92/97 which is supported by the *Mount Pleasant Mine Environmental Impact Statement* (Mount Pleasant EIS) (ERM Mitchell McCotter 1997). The Mount Pleasant Project is approved for the construction and operation of an open cut coal mine, coal preparation plant, transport and rail loading facilities and associated facilities at a production rate of up to 10.5 Mtpa ROM coal. The Mount Pleasant Project physically commenced in 2004 with the construction of Environmental Dam 1 (ED1), however no additional construction or coal mining has occurred at the Mount Pleasant Project.

A modification has recently been granted to DA 92/97, supported by *Mount Pleasant Project Modification Environmental Assessment Report* (EMGA Mitchell McLennan 2010), permitting an infrastructure envelope for siting mine infrastructure, in place of the specific locations presented in the EIS and the provision of an optional conveyor / service corridor between the Mount Pleasant Project area and Bengalla as an alternative to the approved rail facilities.

Key potential interaction between the Project and Mount Pleasant Project include:

- Future Project mining operations will require the relocation of the Mount Pleasant Project approved conveyor / rail corridor (if constructed);
- Upgrades associated with the Project to the existing Bengalla infrastructure area to facilitate Mount Pleasant Project coal; and
- Project water management infrastructure relocation in proximity of the conveyor / rail loop corridor.

RTCA and BMC have an Agreement in place that will facilitate open cut coal mining by BMC in the Mount Pleasant Project surface lease (ML1645) to the west of Bengalla.

Mangoola Coal Mine

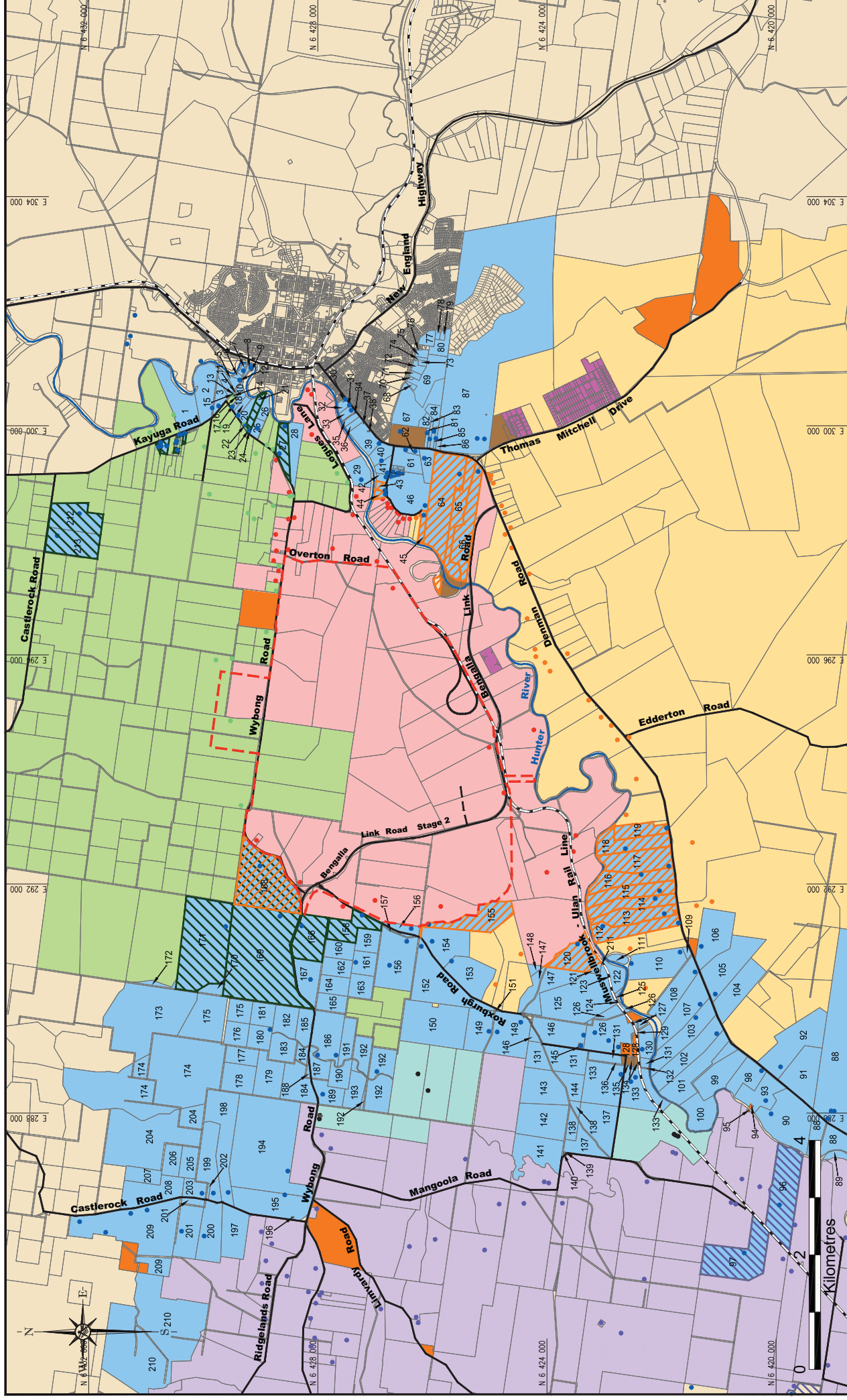
Access to Mangoola Coal Mine (Mangoola) is primarily via the Bengalla Link Road and Wybong Road. Any changes to the Bengalla Link Road alignment associated with the Project will consider currently approved traffic levels at Mangoola.

3.7 LAND OWNERSHIP

Land ownership within the Project Boundary and surrounds is shown on **Figure 8**. All of the land within the Project Boundary is owned by BMC or Mount Pleasant Project. Mount Pleasant Project is the largest landholder to the north of Bengalla, while BHP's Mt Arthur Coal Complex and associated landholdings are located south of Bengalla.

Mangoola Pty Limited owns a significant portion of land to the west of the Project Boundary. Areas of privately owned land are located to the west of Bengalla between the Project Boundary and Mangoola Coal. Other private landholdings occur to the east of Bengalla in the vicinity of the Muswellbrook Racecourse.

The Bengalla Link Road has now been fully constructed and dedicated as a public road, as required under the Development Consent, and is now under the care, custody and control of the MSC.



BENGALLA MINE

Land Ownership

Hansen Bailey

BENGALLA

Co-ordinate System: MGA Zone 56
Source: LPI (2010)

Legend

Project Boundary

- Access Road
- Private Freehold
- Bengalla Mining Company
- Mt Arthur Coal
- Mount Pleasant Project
- Mangoola Coal
- Muswellbrook Coal
- Industrial Freehold
- Crown

Utilities/Government Owned

- Not Searched
- Private Freehold Residence
- Bengalla Mining Company Residence
- Mt Arthur Coal Residence
- Mount Pleasant Project Residence
- Mangoola Coal Residence
- Muswellbrook Coal Residence
- Properties entitled to Acquisition by Mount Pleasant Project

Properties entitled to Acquisition

- Properties entitled to Acquisition by Mangoola Coal
- Properties entitled to Acquisition by Mt Arthur Coal

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Figure **8**

4 PROJECT DESCRIPTION

This section provides a detailed description of the Project and a discussion of the key alternatives that were considered during its development.

4.1 INTRODUCTION

The Project includes the continuation of mining at Bengalla beyond the currently approved extraction limit for a further 24 years at up to 15 Mtpa, the ongoing use of existing infrastructure, the continuation of coal processing and handling and the re-diversion of Dry Creek.

The Project has the potential to recover at least an additional 305 Mt of ROM coal from the Wittingham Coal Measures for export and limited domestic sale.

The Project will generally be consistent with the existing Bengalla Mine (as modified) with contemporary mining methods and practices to continue to be implemented enabling the extraction of the coal reserves within the Project Boundary. The conceptual mine plan layout for the Project at Year 4 and Year 24 of operations is presented on **Figure 9** and **Figure 10** respectively.

4.2 MINING OPERATIONS

As illustrated in **Figure 9** and **Figure 10**, mining will continue west based on dragline strips approximately 60 m in width. The mine plan will progress in a general westerly direction through AL13 towards the western edge of the Project Boundary.

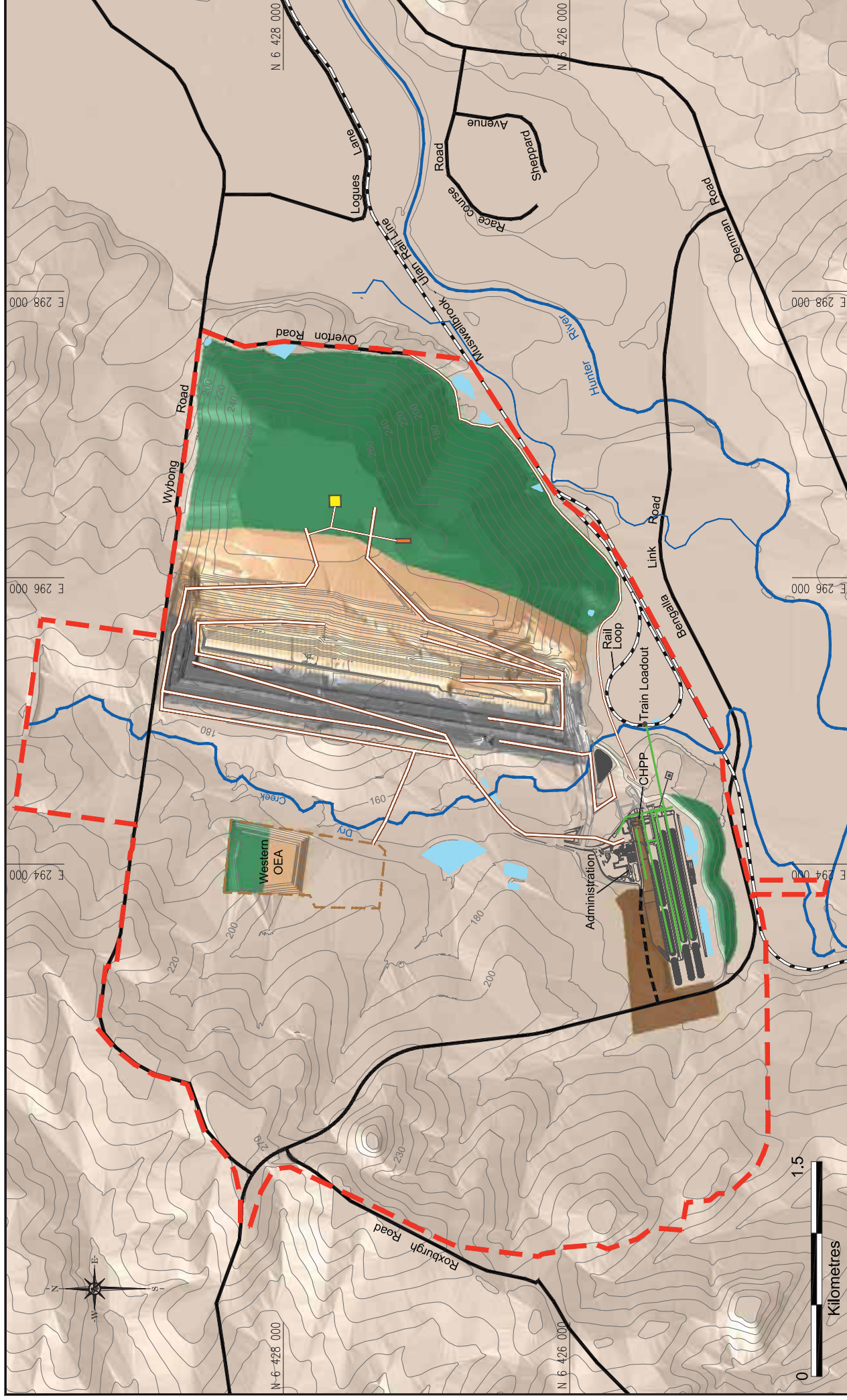
Overburden will be emplaced within the existing OEA located east of active mining operations at up to RL 270 m which will descend towards the west. Overburden may also be placed within an additional OEA to the west of Dry Creek until this area is mined. The location of this additional OEA area and the additional ROM stockpile is shown in **Figure 9**.

The establishment of a satellite pit (i.e. individual mining area in advance of the main Bengalla pit) may be required during up to Year 4 of the Project to assist with coal quality management. If required, this pit would be within the footprint of the proposed dragline strip area and will be mined through with the westerly progression of the mine plan. An assessment of the impacts associated with the alternate satellite pit option will be discussed and assessed in the EIS.

The increase in ROM coal production will utilise an additional ROM coal stockpile which will have a capacity of 350,000 t and an average height of 6 m. As illustrated on **Figure 9** and **Figure 10**, progressive rehabilitation will be conducted as soon as practicable following mining operations.

Final rehabilitation of the OEAs would cover the required mine water infrastructure areas and internal haulage roads that are expected to be required during and beyond the 24 Year mine plan.

Section 8.14 describes a conceptual final landform should the approval for the continuation of mining beyond the 24 year mine plan not be sought and subsequently granted. The final landform for the Project will be designed in consideration of neighbouring approved mining operations as far as practical to ensure favourable outcomes for the community.



BENGALLA MINE

Conceptual Year 4 Mine Plan

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Figure **9**

Hansen Bailey

BENGALLA

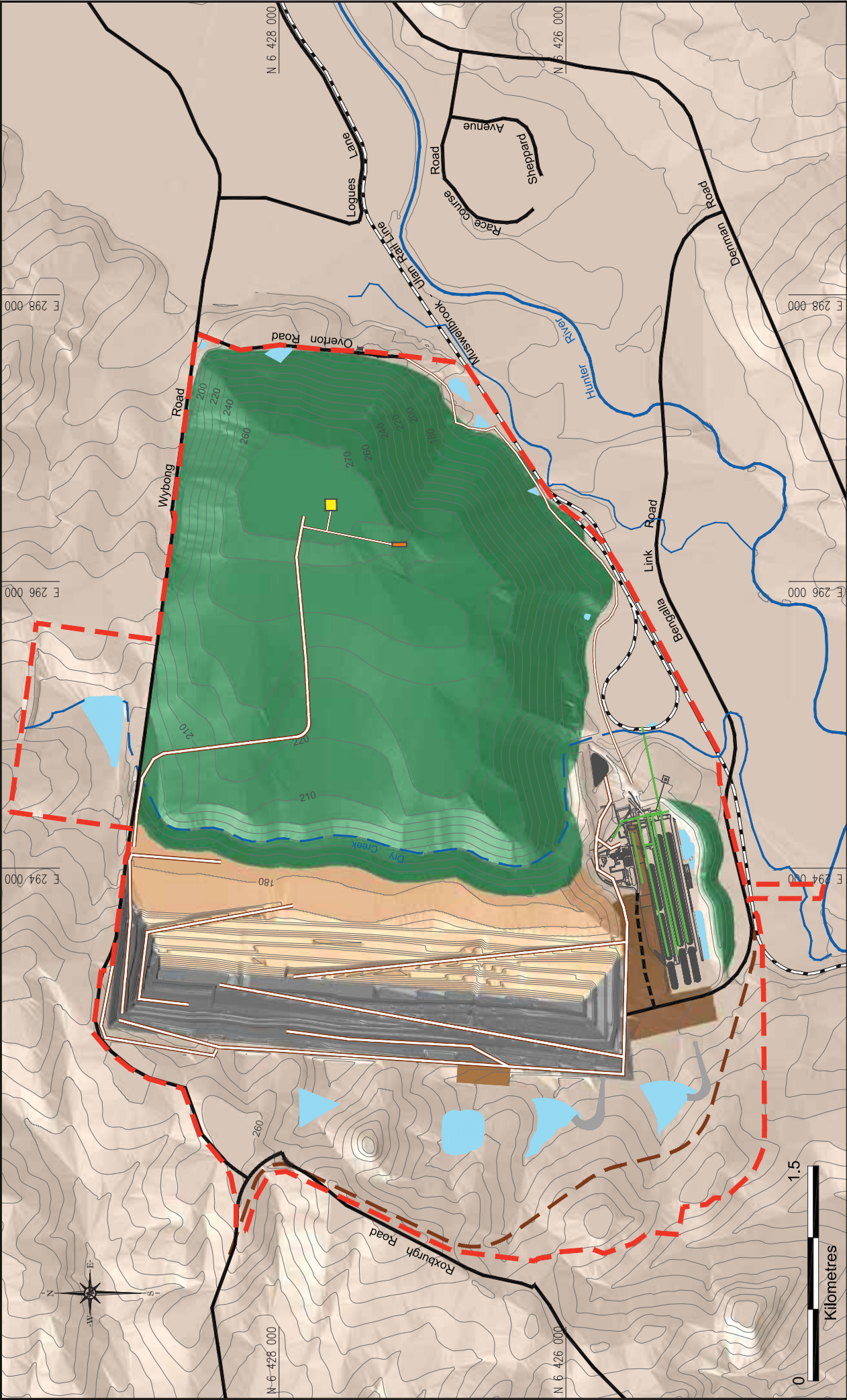
Co-ordinate System: MGA Zone 56

Legend

- Project Boundary
- Western Emergency OEA (Year 1 - 15)
- Conceptual Haul Roads
- Access Road
- Mining Area
- Overburden Emplacement
- Rehabilitated Area
- Water Storages

Legend

- Infrastructure Extension Area
- Coal Stockpiles
- Explosive Magazines
- Reload Facility





Co-ordinate System: MGA Zone 56

BENGALLA MINE

Conceptual Year 24 Mine Plan

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Date: 10.02.12

Drawn: CP

Figure **10**

- 

Project Boundary
Haul Roads
Access Road
Bengalla Link Road Realignment
Dry Creek Realignment
Active Mining Area
Overburden Emplacement Area
Rehabilitated Area
- 

Infrastructure Extension Area
Water Storages
Coal Stockpiles
Explosive Magazines
Reload Facility
Discharge Drains

In order to achieve a logical staged increase to existing mining operations at Bengalla, ROM coal production at Year 1 will remain at 10.7 Mt, consistent with existing approved limits. Production rates are scheduled to increase to the full production of 15 Mtpa by Year 4. Years 1, 4, 8, 15 and 24 will be illustrated in the EIS to indicate mining progression and utilised for modelling as indicative worst-case scenarios

There are considerable resources present beyond the 24 year mining limit and in the future, BMC may (depending upon market factors) seek the relevant approvals for the extraction of further coal resources.

4.3 MINE INFRASTRUCTURE

The Project will utilise the existing Bengalla infrastructure described in **Section 2**. Key items that may need to be upgraded as part of the Project (but not limited to) include:

- CHPP and infrastructure;
- Rail loop and associated coal handling infrastructure;
- Workshops, administration and bath house (including sewage and potable water); and
- Water management infrastructure.

Various other items of infrastructure will require re-location over the life of the Project including (but not limited to): a section of the Bengalla Link Road, Staged Discharge Dams, CHPP and Hunter River (HR) Dams, explosive storage and reload facilities, in-pit facilities, core sheds, powerlines, laydown areas, water fill point, fuel farm, hot tyre park up areas, bioremediation areas, crib locations, fencing and boreholes.

The Project will also require the construction of an additional ROM coal stockpile, a radio tower, a water management dam in the north-west of the Project Boundary, a clean water dam and raw water dam.

4.3.1 Coal Handling and Preparation Plant

The Project will include the upgrading of the Bengalla Mine CHPP to accommodate a nominal rate of 2,200 tph and a maximum rate of 2,400 tph. The CHPP currently contains two coarse modules that work in parallel and a common coarse second stage that operates in series to both modules. All fine coal is processed through a common fines module.

The Project will include an additional coarse module similar to those in operation currently and an upgrade to the common fines circuit. An additional CHPP stockpile will also form part of the upgrade and will have a capacity increase of approximately 250,000 t. Detailed engineering and maximum rates will determine the requirement for a second tailings thickener.

Water infrastructure upgrades will include the relocation and expansion of the CHPP and HR Dam as depicted in **Figure 9**. To support water needs for the CHPP upgrade, an additional water licence has been procured for an additional 449 ML from the Hunter River, as described in **Section 4.5.1**. Power infrastructure will be upgraded to meet the demands associated with the CHPP upgrades.

4.3.2 Product Transport

The Project will involve the transport of product coal by rail to the Port of Newcastle for sale to the export market with lesser amounts supplied for use in local power stations. Product coal will continue to be conveyed from the product stockpiles to the Bengalla Rail Loop and associated train load out facility, which is a fully automated system. The following upgrades will also be required as part of the Project:

- Installation of a reclaiming system, designed to operate at the Project rates required; and
- Upgrades to the existing train load out conveyors to a capacity of 5,000 tph.

The rail loop has sufficient capacity for the Project's planned increase in coal production. BMC also notes that the Australian Rail Track Corporation (ARTC) has completed its works on the rail passing lane in the vicinity of the Project Boundary and accordingly these works will not require further consultation between BMC and ARTC.

Mount Pleasant recently received approval for a modification from the DP&I which describes a rail line, loop and rail loadout conveyor within the BMC Project Boundary, located largely on BMC owned land. Mount Pleasant also holds surface lease ML1645 over this corridor as depicted in **Figure 1**. BMC will continue to consult with Mount Pleasant in relation to its infrastructure needs, as relevant to the Project.

4.3.3 Rejects Disposal

BMC has successfully operated without the requirement for a tailings dam. This fundamental assumption will be carried into all detailed engineering and future work. Reject material will continue to be loaded into a single 700 t reject bin prior to being hauled back to the OEA to designated drying cells before being emplaced within the spoil and capped with a minimum of 5 m of inert material.

Early analysis indicates that existing reject infrastructure will be sufficient and that increased consumable costs will allow increased production. However, all installed equipment will be operating at maximum capacity and therefore the risk associated with this will be managed with other infrastructure. If required, additional thickener capacity and filters will be installed to further reduce any processing congestions.

4.3.4 Mine Site Facilities

As the Project is intended to continue mining operations at Bengalla, minimal changes are required to the existing surface facilities.

The existing administration office, bath house and workshops will continue to be utilised for the Project with the following extensions to the Bengalla infrastructure required:

- Additional parking for heavy and light vehicles;
- A vehicle maintenance workshop with supporting services;
- Administration, training, crib and amenities building;
- Light and heavy vehicle wash station incorporating a catch dam, sediment control dam and oil separator;
- Raw and fire water tanks; and
- Tyre laydown area.

The Project will also include the relocation of the existing helipad, the in-pit shut down and erection pads.

4.4 SITE ACCESS

All access to the Project will remain via the existing Bengalla Access Road off the Bengalla Link Road. An alternative access road may be designed following infrastructure modifications if required and presented and assessed in the EIS. The access road will be utilised for emergency entry and exit.

To facilitate mining related activities in the south-western corner of the Project Boundary, a 6 km section of the Bengalla Link Road will need to be realigned.

The realigned section of road will be designed in accordance with the Road and Traffic Authority's (RTA) Road Design Guide for a typical two-lane, two-way rural road with a nominal speed limit of 100 km/h, consistent with the current design. The design includes an 80 km/h speed curve section at the tie-in with the existing Bengalla Link Road to minimise any potential conflict with major topographical features.

4.5 WATER MANAGEMENT

4.5.1 Mine Water Management System

Amendments to the Bengalla water management system required for the Project will be integrated with the existing water management system to enable optimal collection, use, recovery and recycling of water within the Project Boundary.

BMC currently holds Water Access Licence (WAL) WAL001106 (previously 20SL060388) which provides a water allocation from the Hunter River of up to 1,449 units. This water allocation will be required to supplement existing site water for use in the CHPP and for dust suppression. A pump and associated water pipeline will continue to be required to transfer water from the Hunter River for use in the water management system. BMC holds various other water licences which are detailed in **Section 2.2.8**.

The initial catchment areas above the mining area will require a system of catch dams, bunds, piped transfers and diversion drains to ensure that the water upstream does not inundate the mining area during large rainfall events. The storage locations will evolve as the Project develops, and the catchment areas shift from pre-existing ground surface to rehabilitated OEAs. Key existing water management infrastructure is shown on **Figure 9** and **Figure 10**.

4.5.2 Dry Creek Diversion

Dry Creek is an ephemeral creek that generally only flows following periods of intense rainfall due to its relatively small catchment area. Dry Creek only occasionally holds small pools of water for a few days following rainfall events. Dry Creek drains to the Hunter River approximately 1 km south of the Project Boundary.

As mining progresses to the west, it is anticipated that Dry Creek will be intercepted at approximately Year 5 of operations. As such, the construction of a water storage dam and temporary diversion of Dry Creek will be required to divert clean water around mining operations through the use of a pipe network. Prior to the completion of mining in Year 24, a permanent re-alignment of Dry Creek will be constructed using best practice initiatives to ensure its successful stabilisation.

Several detailed options and alternatives have been investigated for the final alignment of Dry Creek in order to obtain the best possible environmental outcome with considerations of mining practicalities. BMC will continue to consult with the NSW Office of Water (NOW) regarding the most suitable alternative to be developed.

Alternatives considered included:

1. Establishment of a storage dam located in the northern portion of the existing Project Boundary along with a creek alignment that would marry into a diversion created halfway along the spoil. This option would result in the sterilisation of an estimated 30 Mt of ROM coal necessary to create stable batters and suitable buffers from the storage dam and would shorten dragline strips and affect access into the lower sections of the pit. In addition, approximately 115 Million bank cubic metres (Mbcm) of overburden capacity would be lost;
2. Reinstatement of Dry Creek along its natural alignment complete with 10 degree slopes through the OEAs once mining has progressed sufficiently. This option would not require an increase to the approved maximum height of the OEA. However, this would result in an unnatural stream configuration;
3. Re-instate Dry Creek to flow into the final void which would allow equilibrium to be achieved in a shorter timeframe. This option would prevent runoff to infiltrate into the Hunter River during rainfall events and may potentially degrade the quality of the water;
4. Re-instate Dry Creek to flow to the east around the OEA to connect with the Hunter River (e.g. at a point where the Hunter River moves in close proximity to the Muswellbrook to Ulan Rail Line east of the OEA). This option would increase Dry Creek's natural length by several hundred metres and requires a large amount of material movement;
5. Re-instate Dry Creek by installing a tunnel which would transport runoff underneath the OEA. This would restrict any riparian vegetation from being established along the Dry Creek Diversion and is not a long term solution;
6. Reinstall Dry Creek to flow along its original alignment with banks at steep angles. This would create an unnatural bank structure and associated riparian corridor. This option would also encourage erosion and sedimentation issues;
7. Retain Dry Creek in present location. This would sterilise a large amount of the coal which the Project would otherwise mine. This would also create major obstacles of instability to overcome if mining continued around Dry Creek; and
8. The preferred option is presented on **Figure 10** whereby the establishment of a storage dam north of the Project Boundary along with a creek alignment that would meander south in the area between the pit and the spoil before heading east around the northern part of the CHPP area before heading south again towards the Hunter River. This option would create the most natural meandering flow consistent with existing conditions necessary to ensure the design grade parameters between 0.5% and 1.5% without the sterilisation of coal reserves or reduced overburden capacity.

4.6 MOBILE EQUIPMENT

An indicative equipment fleet to accommodate maximum production levels for the Project is shown in **Table 8** and excludes equipment in maintenance or not scheduled.

All equipment required for the Project will be mobilised onsite on a progressive basis consistent with the scheduled mining production levels. Various ancillary and other items of equipment will be required during the construction process.

Table 8
Indicative Project Equipment List

Equipment	Number
P&H 9020 Dragline	1
Excavators: • Hitachi EX5500 • Hitachi EX3600 • LeTourneau 1800 Loader	9
Haul Trucks: • Komatsu 830 E AC • Hitachi EH4500	47
Dozers: • Caterpillar D11 • Cat 854G (Rubber Tyred Dozer)	11
Drill (SK50)	6
Watercarts (Euclid R 90)	3
Graders: • Cat 16 M • Cat 24 M	3

4.7 WORKFORCE AND HOURS OF OPERATION

The Project will require approximately 900 full time equivalent personnel (plus contractors). Maintenance activities, deliveries, coal processing, coal transport and mining operations will be conducted 24 hours a day, seven days a week. Additional contractors and construction personnel will also be required.

The Project will require up to 12 blast events per week from Monday to Saturday between the hours of 7:00 am to 5:00 pm. No blasting is proposed to occur on Sundays without prior approval from the Office of Environment and Heritage (OEH).

4.8 PROJECT ALTERNATIVES

A number of options were developed and analysed with the primary objective of the studies was to develop a mine plan with consideration of the principles of Ecologically Sustainable Development (ESD) whilst providing the best possible environmental, social, physical and economic outcomes for the Project.

Each of the alternatives investigated were refined according to the environmental impacts, the approvals required, operational practicality, timing and economic limitations. The various Project alternatives that were considered during this process are described below and will be described in detail in the EIS.

4.8.1 Option 1 – Do Nothing

Under Option 1, Bengalla Mine would cease operations in 2017 if no further Development Consent is granted. This would result locally in the loss of approximately 400 jobs and associated future employment opportunities.

It would also lead to the loss of local socio-economic benefits created by Bengalla Mine in addition to the loss of ongoing benefits and royalties and other payments to both the Federal and NSW State Government.

4.8.2 Option 2 – Continuation of Mining Retaining the Existing Bengalla Link Road

Development of a viable mine plan that does not impact on the Bengalla Link Road would result in the sterilisation of approximately 8 Mt of coal reserves and would impede the efficiency of the dragline strip operation.

4.8.3 Option 3 – Underground Operation

RTCA, as manager of Bengalla on behalf of the BJV has undertaken an Order of Magnitude study into the potential development of an underground operation at Bengalla.

The study declared that the Edinglassie seam is the only seam currently capable of supporting a large scale longwall operation. The seam is not currently mined by the existing open cut operation nor proposed to be mined for the Project, and lies underneath the open cut pit shell. The resource is contained within the existing tenements including ML1397, ML1450 and ML1469.

The result of the study concluded that the Edinglassie seam could not support a standalone underground operation at Bengalla.

4.8.4 Option 4 – 24 Years at production of 10.7 Mtpa

Option 4 includes continuation of mining for a further 24 years at a maximum ROM coal production rate of up to 10.7 Mtpa.

This would result in no additional increase in employment numbers and hence reduced economic and social flow on effects when compared to the 15 Mtpa option.

4.8.5 Option 5 – The Project

Option 5 represents the preferred Project for which Development Consent is sought, which includes the continuation of mining directly to the west for a period of 24 years at a maximum ROM coal production rate of 15 Mtpa achieved from Year 4 onwards.

Coal mining extraction is constrained by Wybong Road and Mount Pleasant Mine to the north, Roxburgh Road to the west and alluvium associated with the Hunter River to the south.

The Project proposes to utilise largely established infrastructure, personnel and equipment currently employed at Bengalla Mine. The Project is mostly within existing mining authorities held by and land owned by BMC.

4.9 COMPARISON OF THE EXISTING OPERATIONS TO THE PROJECT

Table 9 provides a summary of key Project components and comparison with the approved Bengalla.

Table 9
Key Project Components and Comparison with Existing Bengalla

Component	Bengalla Existing	Project
Planning Approval	- Development Consent DA 211/93 (as modified) - DA 273/2006	New Development Consent
Supporting Documents	- Bengalla EIS - Bengalla SEE - Bengalla Explosives Storage Facility SEE (Hansen Consulting 2006) - Wantana Extension SEE - Bengalla EA 2008 - Bengalla EA 2010	The Project EIS
Life of Mine Approval	27 June 2017	24 years from grant of Development Consent
Resource	178.5 Mt ROM coal within the currently approved coal extraction limit	305 Mt ROM coal within the Project footprint as described in Section 4
Mining Type	Open Cut	No Change
Production	Up to 10.7 Mtpa	Up to 15 Mtpa
Operational Hours	- Mining operations and coal processing 24 hours per day, seven days a week - Blasting between 7:00 am and 5:00 pm Monday to Saturday, inclusive	No Change
Workforce	Up to 400 full time personnel, plus contractors	Up to 900 full time equivalent personnel (plus additional contract personnel)
Mining Method	Dragline operating in conjunction with truck / shovel	No Change
General Infrastructure	- Site Infrastructure (Administration and training buildings, crib and amenities building, vehicle maintenance workshop with support services, heavy and light vehicle car parking and wash down bays, workshop, bath house, in-pit facilities, helipad, tyre laydown area, explosive storage facility, reload facility and core shed) - Haul roads - Water Management Infrastructure	Continued use of existing (upgraded) infrastructure (but not limited to): - Site Infrastructure (Administration and training buildings, crib and amenities building, vehicle maintenance workshop with support services, heavy and light vehicle car parking and wash down bays, workshop and bath house) - Relocation of a portion of Bengalla Link Road - Diversion of a portion of Dry Creek - Water management infrastructure - Radio tower

Component	Bengalla Existing	Project
		Continued use of existing (relocated) infrastructure (but not limited to): • In-pit facilities • Helipad • Tyre laydown area • Explosives storage facility • Reload facility • Core shed
Coal Processing Infrastructure	• CHPP processing rates up to 1,700 tph • 500,000 t capacity product coal stockpiles • 200,000 t ROM coal stockpile • Reclaiming system	• Upgrade of the CHPP to processing rates of up to 2,400 tph • Additional 250,000 t product coal stockpile • Additional 350,000 t ROM coal stockpile • Additional reclaimers
Rejects Management	• Reject material is stored in a 700 t reject bin before being dried in cells and buried within the spoil area and capped with a minimum of five metres of inert overburden material	No Change
Transport	• 3,500 tph rail load out facility • All product coal by rail (no road transport) • Product coal to Port Waratah Coal Loader • Small amounts of product coal to Macquarie Generation power stations	• 5,000 tph rail load out facility • No change to product coal destinations or methods
Rehabilitation and Closure	Maximum 270 RL development of OEA	No change

5 REGULATORY FRAMEWORK

This section sets out the planning and environmental regulatory framework applicable to the Project, including the identification of relevant strategic planning documents, environmental planning instruments and key development standards. Both NSW and Commonwealth legislation are identified.

5.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

5.1.1 Application of Division 4.1 in Part 4 of the EP&A Act

Upon the repeal of Part 3A of the EP&A Act on 1 October 2011, the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* inserted a new Division 4.1 into Part 4 of the EP&A Act. This Division provides for a new planning assessment and determination regime for SSD.

Under section 89C of the EP&A Act, development will be SSD if it is declared to be such by the new *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP). Clause 8(1) of the SRD SEPP provides:

“8 Declaration of State significant development: section 89C

- (1) Development is declared to be State significant development for the purposes of the Act if:
- (a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and
 - (b) the development is specified in Schedule 1 or 2.”

The Project is SSD as it meets each of the two limbs in clause 8(1) of the SRD SEPP – that is:

- The Project is permissible with Development Consent on the land on which the Project will be carried out; and
- The Project is development that is specified in Schedule 1 to the SRD SEPP.

Each is briefly discussed below.

5.1.2 Permissibility of the Project

Clause 7(1) of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP) provides:

“7 Development Permissible with Consent

(1) Mining

Development for any of the following purposes may be carried out only with development consent:

- *On land where development for the purposes of agriculture or industry may be carried out (with or without development consent); or*
- *On land that is, immediately before the commencement of this clause, the subject of a mining lease under the Mining Act 1992 (Mining Act).*

The Mining SEPP applies to the whole of NSW and pursuant to clause 5(3) of the Mining SEPP, prevails over any other environmental planning instrument to the extent of any inconsistency. The practical effect of clause 5(3) is that if there is any inconsistency between the provisions in the Mining SEPP and those contained any other environmental planning instrument, including relevantly the *Muswellbrook Local Environmental Plan 2009* (Muswellbrook LEP), the provisions of the Mining SEPP will prevail.

"Mining" is defined for the purposes of the Mining SEPP as follows:

"mining means the winning or removal of materials by methods such as excavating, dredging, or tunnelling for the purpose of obtaining minerals, and includes:

- (a) the construction, operation and decommissioning of associated works, and*
- (b) the stockpiling, processing, treatment and transportation of materials extracted, and*
- (c) the rehabilitation of land affected by mining."*

Accordingly, as the Project in its entirety can be characterised as development for the purpose of "mining", the Project is permissible with Development Consent on all of the land on which the Project will be carried out.

5.1.3 The Project is development specified in Schedule 1 to the SRD SEPP

The Project is development specified in Schedule 1 to the SRD SEPP.

Clause 5(1) (a) in Schedule 1 to the SRD SEPP specifies the following development:

"5 Mining

- (1) Development for the purpose of mining that:*
 - (a) is coal ... mining, or ..."*

Given that the Project in its entirety is development for the purpose of coal mining, the Project is development specified in Schedule 1 to the SRD SEPP.

5.1.4 The Project is State Significant Development

As the Project is within each of the two limbs in clause 8(1) of the SRD SEPP (see **Section 5.1.2** and **Section 5.1.3**), the Project is (by virtue of SRD SEPP) declared to be SSD. As a consequence of this declaration, the Minister for Planning and Infrastructure (Minister) is the consent authority for the Project (EP&A Act Section 89D (1)).

The Minister has delegated his consent authority function for certain SSD, namely to:

- NSW Planning Assessment Commission (PAC) – for development applications made by private proponents for SSD; and
- Officers of DP&I – for development applications that have attracted less than 25 public submissions objecting to the development and where the local council (MSC) has not objected and where there has been no political disclosure made. That delegation has not been revoked as at the date of this Background Document.

5.1.5 The Need for an EIS

Section 78A (8A) EP&A Act provides that a development application for SSD is to be accompanied by an EIS in the form prescribed by the EP&A Regulation.

Schedule 2 of EP&A Regulation sets out the requirements for inclusion in an EIS.

Clause 3 of Schedule 2 of the EP&A Regulation provides that before preparing an EIS, the applicant must make a written application to the Director-General of DP&I for DGRs with respect to the proposed statement.

In preparing the DGRs, the Director General is required to consult with relevant public authorities and have regard to key issues raised by those public authorities during those consultations (clause 3(4)).

The form of an EIS is set out in Schedule 2 to the EP&A Regulation.

5.1.6 Landowner Consent

The effect of clause 49 of the EP&A Regulation is that the consent of the owner of land to which an application relates is not required where the application relates to a mining project provided that notice is given to the landowner(s) or an advertisement is published in a newspaper circulating in the locality of the application within 14 days after the application is made.

5.1.7 Application of Other Provisions of the EP&A Act

The other applicable provisions of the EP&A Act are described below.

Section 5 – Objects of the EP&A Act

The EIS to be completed for the Project will address the objects of the EP&A Act. This relevantly includes:

- The encouragement of the proper management of natural resources, including minerals, for the purpose of promoting the social and economic welfare of the community; and
- The encouragement of ESD.

Divisions 6 and 6A

Divisions 6 and 6A of the EP&A Act relate to contributions and affordable housing provisions.

Section 89J

Section 89J of the EP&A Act provides that the following authorisations (as relevant to the Project) are not required for the Project if it is approved SSD:

- An approval under Part 4, or an excavation permit under section 139 of the *Heritage Act 1977* (Heritage Act);
- An Aboriginal heritage impact permit under the *National Parks and Wildlife Act 1974* (NPW Act);
- An authorisation under section 12 of the *Native Vegetation Act 2003*;
- A bushfire safety authority under section 100B of the *Rural Fires Act 1997*; and
- A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000* (WM Act).

Section 89K

Section 89K of the EP&A Act provides that the following authorisations cannot be refused if they are necessary for the carrying out of the Project if it is approved SSD and that the authorisations granted must be substantially consistent with the Project's SSD Development Consent:

- A mining lease under the Mining Act;
- An EPL under the *Protection of the Environment Operations Act 1997* (POEO Act); and
- A consent under section 138 of the *Roads Act 1993* (Roads Act).

5.2 NSW ENVIRONMENTAL PLANNING POLICIES

5.2.1 State Environmental Planning Policies

A number of State Environmental Planning Policies could apply to the Project - they are identified below.

SRD SEPP

The application of the SRD SEPP to the Project has already been discussed in **Section 5.1.3** above.

Mining SEPP

The application of the Mining SEPP to the Project is discussed in **Section 5.1.2** above. Further, clauses 12, 13, 14, 15, 16 and 17 of the Mining SEPP set out matters that the Minister must consider before determining the development application for the Project. These matters will be considered in the EIS.

State Environmental Planning Policy No 33 (Hazardous and Offensive Development)

For development that is a "potentially hazardous industry", clause 12 of the *State Environmental Planning Policy No 33 (Hazardous and Offensive Development)* (Hazardous SEPP) requires the preparation of a Preliminary Hazard Analysis. Further, for development that is a "potentially hazardous industry" or "potentially offensive industry", clause 13 of the Hazardous SEPP sets out matters that the Minister must consider in determining the development application for the Project.

If required, a Preliminary Hazard Analysis will be carried out in relation to the Project for inclusion in the EIS and the matters in clause 13 of the Hazardous SEPP will be considered in the EIS.

State Environmental Planning Policy No 44 - Koala Habitat Protection

State Environmental Planning Policy No 44 - Koala Habitat Protection (Koala SEPP) applies within the Shire of Muswellbrook. The Koala SEPP provides that before a planning approval can be granted for any development, the consent authority must satisfy itself as to whether the land on which the development is to be carried out is "potential koala habitat", and if so, where it is "core koala habitat". None of the land within the area affected by this Project has been identified as potential koala habitat.

State Environmental Planning Policy No 55 (Remediation of Land)

State Environmental Planning Policy No 55 (Remediation of Land) (Contamination SEPP) provides that the Minister must not consent to the carrying out of the Project unless it has considered certain matters relating to whether or not the Project land is contaminated.

The relevant provisions of the Contamination SEPP will be addressed in the EIS.

5.2.2 Local Environmental Plans

Hunter Regional Environmental Plan 1989 (Heritage)

The *Hunter Regional Environmental Plan 1989 (Heritage)* (Hunter REP) applies to this Project. Clause 13 of the Hunter REP deals with development in the vicinity of heritage items and requires an assessment of the effects the development will have on the heritage significance.

Section 8.15 describes the non-indigenous heritage impact assessment undertaken as part of this Project. The assessment confirms that this Project should not significantly alter the heritage significance of this building.

This Project for which consent is sought will meet the objectives of the Hunter REP.

Muswellbrook Local Environmental Plan 2009

This Project is located largely on land zoned under the Muswellbrook LEP as Zone RU1 (Primary Production). Approximately 34% of the Project Boundary (to the west) is within Zone E3 (Environmental Management).

Zone RU1 (Primary Production)

The majority of the Project occurs within the RU1 zoning. On land in this zoning:

- "Open Cut Mining" is permitted with development consent; and
- The objectives of the zone are as follows:
 - "To encourage sustainable primary industry production by maintaining and enhancing the natural resource base;
 - To encourage diversity in primary industry enterprises and systems appropriate for the area;
 - To minimise the fragmentation and alienation of resource lands;
 - To minimise conflict between land uses within the zone and land uses within adjoining zones;
 - To protect the agricultural potential of rural land not identified for alternative land use, and to minimise the cost to the community of providing, extending and maintaining public amenities and services;
 - To maintain the rural landscape character of the land in the long term;
 - To ensure that development for the purpose of extractive industries, underground mines (other than surface works associated with underground mines) or open cut mines (other than open cut mines from the surface of the floodplain), will not:
 - (a) Destroy or impair the agricultural production potential of the land or, in the case of underground mining, unreasonably restrict or otherwise affect any other development on the surface, or
 - (b) Detrimentially affect in any way the quantity, flow and quality of water in either subterranean or surface water systems, or
 - (c) Visually intrude into its surroundings, except by way of suitable screening.
 - To protect or conserve (or both):
 - (a) Soil stability by controlling development in accordance with land capability, and
 - (b) Trees and other vegetation, and
 - (c) Water resources, water quality and wetland areas, and their catchments and buffer areas, and
 - (d) Valuable deposits of minerals and extractive materials by restricting development that would compromise the efficient extraction of those deposits."

Zone E3 (Environment Protection)

Part (34% by area) of the Project is located on land classified as Zone E3 (Environmental Protection).

Within this zoning “*Extensive agriculture*” is permitted without development consent. Mining (including open cut mining) on land within this zoning is permissible, pursuant to Clause 7 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)* (SEPP Mining) (which overrides the Muswellbrook LEP) with development consent as “*agriculture*” is permissible.

5.3 OTHER LEGISLATION POTENTIALLY APPLICABLE TO THE PROJECT

The Project may require approvals under one or more of the following items of NSW legislation:

- *Contaminated Land Management Act 1997*;
- *Crown Lands Act 1989*;
- *Dams Safety Act 1978*;
- *Dangerous Goods (Road and Rail Transport) Act 2008*;
- Mining Act;
- *Petroleum (Onshore) Act 1991*;
- *Noxious Weeds Act 1993*;
- Roads Act;
- POEO Act; and
- WM Act.

The likely application of the key legislation, including the Mining Act, POEO Act and WM Act are briefly described below.

5.3.1 Mining Act

Applications will be lodged with the Division of Resources and Energy (DRE) (within the Department of Trade and Investment, Regional Infrastructure and Services) to facilitate coal mining activities within AL13 and A102.

5.3.2 POEO Act

A variation to the existing EPL will be sought for the Project under the POEO Act.

5.3.3 Water Management Act 2000

The WM Act regulates access and management of water resources under its licensing and approvals conditions. The *Water Sharing Plan for the Hunter Regulated River Water Source 2003* as established under the WM Act applies to Bengalla.

This Water Sharing Plan outlines water sharing rules for the allocation of water from the Hunter River and requires that Water Access Licences are obtained by all water users.

The Water Sharing Plan for the *Hunter Unregulated and Alluvial Water Sources 2009* was gazetted on 24 July 2009. The introduction of this resulted in various water licences held within the Hunter River alluvial floodplain under the *Water Act 1912* (Water Act) are converted to WALs and Water Supply Works and Use Approvals under the WM Act.

BMC will continue to consult with NOW over matters related to the WM Act. As discussed in **Section 5.1.5**, if the Project is granted Development Consent, by the operation of section 89J of the EP&A Act, it will not require water use approvals under section 89 of the WM Act, water management approvals under section 90 of the WM Act or a controlled activity approval under section 91 of the WM Act.

WALs are required for the Project for all water taken from water sources subject to the WM Act. A Water Act bore licence will be required for the open cut pit for the water taken from porous rocks (which is excluded from the Hunter Water Share Plans).

Additionally, it is expected that an aquifer interference approval will be required for the Project (the provisions of the WM Act and the *Water Management Regulation 2004* for aquifer interference approvals are expected to commence shortly).

These licences and approvals will be applied for or secured to the extent that they are not already held by BMC.

5.4 COMMONWEALTH LEGISLATION

5.4.1 Environment Protection & Biodiversity Conservation Act 1999

The *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas of national significance. It also provides a mechanism for national environment protection and biodiversity conservation.

The EPBC Act is administered by Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC) and provides protection for listed Matters of National Environmental Significance (MNES) including:

- Listed species and communities (e.g. listed Threatened species and ecological communities and migratory species);
- Protected areas (e.g. World heritage properties, Ramsar wetlands of international significance, conservation zones); and
- National, Commonwealth and Indigenous Heritage.

Species and communities listed under the EPBC Act that are present or are likely to be present in the vicinity of the Project must be identified. A referral including a supporting assessment of significance for each species will be made to SEWPaC for a decision as to whether or not those parts of the Project which are new constitute a "Controlled Action". The Project will be referred to SEWPaC for a decision under Section 68.

If then the Minister decides that the referred parts of the Project are a controlled action (under section 75 EPBC Act) then the Minister for SEWPaC has the power to accredit the EP&A Act to meet the requirements of the EPBC Act. Consultation will be undertaken with SEWPaC to confirm that the Project's assessment under Division 4.1 in Part 4 of the EP&A Act can be accredited to fulfil the assessment requirements of the EPBC Act.

5.5 LICENCES AND APPROVALS REQUIRED

Table 10 provides a summary of the key licences, leases and approvals which will be required under NSW and Commonwealth legislation to enable the construction and the operation of the Project.

Table 10
Anticipated Leases, Licences and Approvals for the Project

Approval	Legislation	Authority	Note
Development Consent for the construction and operation of the Project	Section 89D of Division 4.1 of the EP&A Act provides the Minister for DP&I the power to grant a Development Consent	Minister for Planning & Infrastructure (DP&I)	N/A
Mining lease	Section 63 of the Mining Act	Minister for Resources and Energy	Section 89K of the EP&A Act provides that a mining lease cannot be refused and when granted must be substantially consistent with the development consent
MOP	Condition of a Mining Lease issued under the Mining Act	DRE	
Approval for the carrying out of a "Controlled Action"	EPBC Act	Minister for the Environment (Commonwealth)	Section 87 of the EPBC Act
EPL	Chapter 3 of the POEO Act	OEH	Section 89K of the EP&A Act provides that an EPL cannot be refused and when granted must be substantially consistent with the development consent
Licence Under Threatened Species Act	NPW Act	OEH	Separate Approval
Water Access Licence(s)	Parts 2 and 3 of Chapter 3 of the WM Act	NOW	Separate Approval
Consent to carry out a work in, on or over a public road	Section 138 of the Roads Act	RTA or MSC	Section 89K of the EP&A Act provides that a consent cannot be refused and when granted must be substantially consistent with the development consent
Construction Certificates	EP&A Act	MSC	Separate Approval
Approval for works over Crown land	Crown Lands Act	Crown Lands Division	Separate Approval
Notification of Dangerous Goods	Occupational Health and Safety Regulation 2001	WorkCover	Separate Approval
Approval for Emplacement Area	CMH&S Act	DRE	Separate Approval
Radiation Licences	<i>Radiation Control Act 1990</i>	OEH	Separate Approval
Environment Management Plans	Conditions of Development Consent	DP&I	Separate Approval

6 STAKEHOLDER ENGAGEMENT

This section includes a description of the stakeholder engagement undertaken by BMC for the Project to date and a summary of the key consultation activities proposed for the EIS.

6.1 INTRODUCTION

BMC is strongly committed to undertaking best-practice social assessment and ongoing stakeholder engagement activities with communities in which they operate. Further, BMC has identified key community, regulatory and industry stakeholders relevant to the Project to achieve these goals and will constantly endeavour to build strong and effective relationships, consistent with their policies and values.

6.2 EXISTING COMPANY ENGAGEMENT

Comprehensive stakeholder consultation has previously been undertaken by BMC in relation to Bengalla's current operations and previous modifications sought to DA 211/93. This has enabled BMC to keep its neighbours informed on current stakeholders' issues.

A comprehensive list of stakeholders will be developed for the Project from records of previous consultations.

6.3 PROJECT ENGAGEMENT

A structured consultation engagement program has also now commenced in line with the EIS process. This involves the following key phases:

- Phase 1 - Interim Stakeholder Engagement;
- Phase 2 - Stakeholder Identification;
- Phase 3 - Issue Scoping;
- Phase 4 - Issue Response and Feedback; and
- Phase 5 - Ongoing Stakeholder Engagement.

The Project has completed Phases 1 and 2 and has now commenced Phase 3.

The objectives of the stakeholder engagement program for the Project include:

- Identification of potential stakeholders and the scoping of key issues;
- Identification of major areas of concern and an appropriate level of engagement required for each stakeholder and assessment in the EIS;
- To establish open communication channels with the community; and
- Integration of the stakeholder engagement for the Project with the management of ongoing community engagement as undertaken by BMC.

Relationships have been established and will continue to be developed with key stakeholders during the preparation of the EIS. BMC will facilitate stakeholder feedback on the Project to ensure that stakeholder issues are adequately addressed through the Social Impact Assessment (SIA) and EIS.

Different communication methods have been developed to ensure that a comprehensive list of issues raised by relevant stakeholders for the Project is formulated. The methods used for stakeholder engagement and communication may include:

- The distribution of newsletters;
- Personal briefings;
- Meetings;
- Presentations; and
- Media releases and information sheets.

In addition to the above, Project updates and other relevant information will be placed on the Bengalla Mine website at www.coalandallied.com.au/.

Relationships will continue to be established and developed with key stakeholders during preparation of the EIS. Bengalla will facilitate stakeholder feedback on the Project in order to ensure that stakeholder issues are adequately addressed through the social impact assessment and EIS.

6.3.1 Regulatory Engagement

Face-to-face briefings and group presentations to State and Local Government agencies will take place throughout the development of the Project. These presentations will be designed to provide Government stakeholders with an initial overview of the Project, and to identify issues that will require assessment in the EIS.

6.3.2 Community Engagement

Engagement with the local community will be undertaken for the Project during preparation of the EIS, with all relevant issues raised to be addressed, as required. Information gathered during community engagement regarding the Project will assist in informing Project planning and developing appropriate management and mitigation strategies to address issues of concern and relevance to the local community.

Initial briefings will be offered to near neighbours to discuss the Project via a Newsletter, where information will be provided to collate issues of concern to the community. Where required, further consultation meetings will be offered to provide feedback on the EIS and to obtain additional community input.

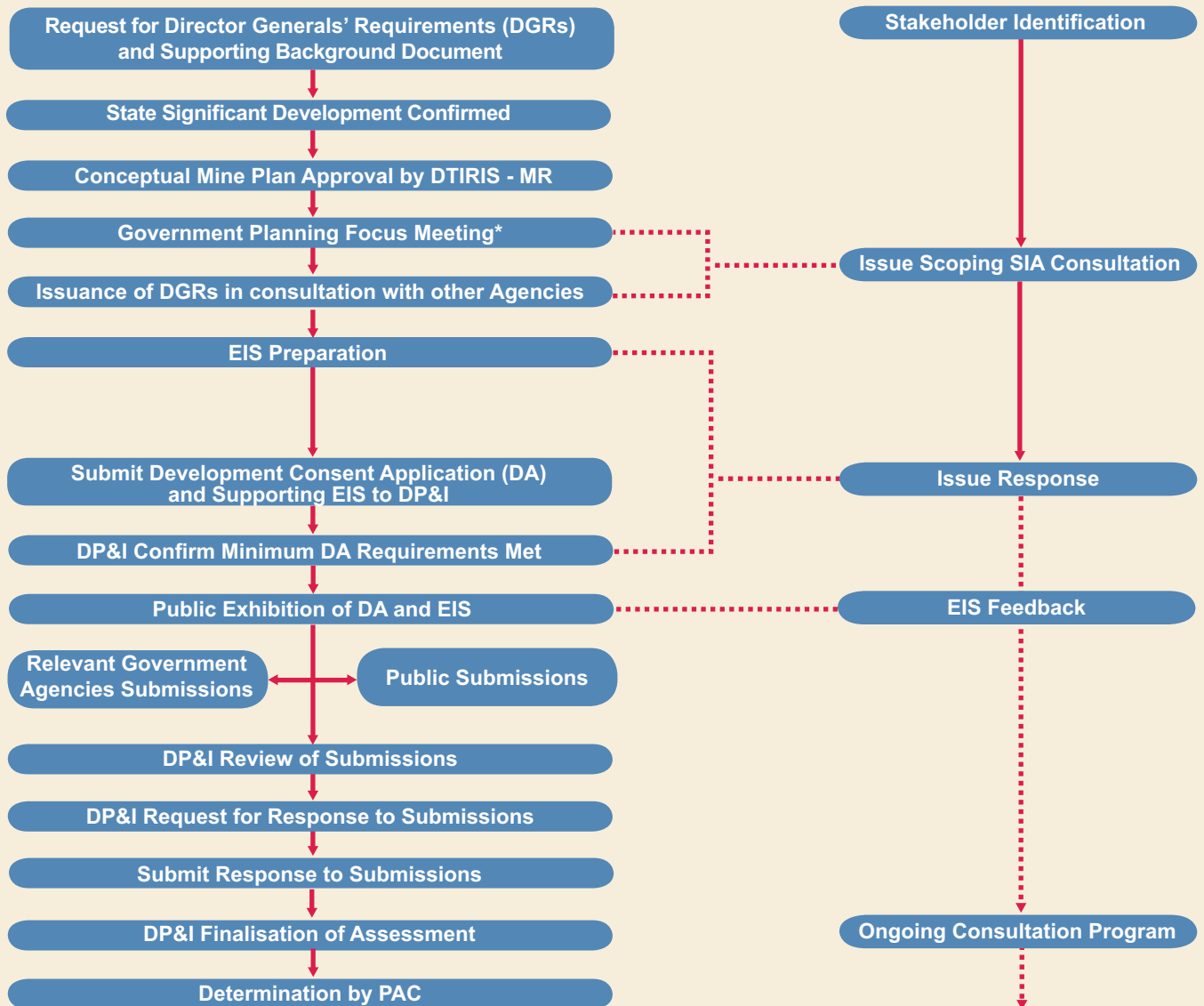
Project newsletters will be regularly distributed to key community stakeholders to complement the engagement program and provide regular updates on the Project.

CNA has established shopfronts in both Muswellbrook and Singleton where community members can drop in at any time to make inquiries or receive an update on the Project.

A flowchart showing the planning approvals and consultation process relevant to the Project is shown in **Figure 11**.

Division 4.1 in Part 4 (EIS Process)

Consultation Process



* Avenue(s) available to the Minister

Hansen Bailey



BENGALLA MINE

EIS Process and Consultation

Filename: BengallaPfig9_ind

Date: 7.11.11

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Figure
11

7 PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

To assist in identifying the key environmental and social issues for the Project, a preliminary environmental risk assessment was completed utilising the Bengalla Risk Assessment Tools. This risk assessment is presented in **Appendix A**.

Each of the potential environmental issues were ranked in accordance with the Rio Tinto Health, Safety, Environment and Quality (HSEQ) Risk Classification Matrix as either being of low, moderate, high or critical risk. The initial findings of the risk assessment were used to prioritise and focus the required environmental assessments for the Project to ensure that each of the environmental issues was addressed to the extent relevant and that appropriate management and mitigation options are developed. The resulting scope of assessment to be included in the EIS is discussed in further detail in **Section 8**.

As shown in **Appendix A** and **Table 11**, the majority of activities are rated as low or moderate level risks, in the absence of controls, with several high risks and no critical risks. It is anticipated that with the completion of detailed assessment as outlined in **Section 8**, any high risks will be reduced to medium or low, due to the identification and implementation of appropriate controls and mitigation measures.

Table 11
Summary of Preliminary Environment Risk Assessment

Category	Issues
Critical	None
High	Ecology, Aboriginal Archaeology and Cultural Heritage, Air Quality and Greenhouse, Noise and Blasting, Agricultural Productivity, Economics, Visual and lighting, Cumulative Impact
Moderate	Surface Water, Groundwater, Social, Soils and Land Capability, Waste, Rehabilitation and Final Landform, Non-Indigenous Heritage, Geochemical and Acid Rock Drainage, Community Concern
Low	Spontaneous Combustion, Traffic and Transport, Flooding, Bushfire, Hazardous Materials

8 KEY ENVIRONMENTAL AND COMMUNITY ISSUES

8.1 ECOLOGY

8.1.1 Background

Historically the land within the Project Boundary includes land that has been impacted by agriculture associated with grazing and land clearing. The 1993 Bengalla EIS addressed the impact on vegetation and faunal species associated with an open cut coal mine. It was determined that no rare or endangered flora or fauna species would be impacted by the Project. Due to the passing of time and changes to policy, legislation and species listings, this is no longer considered contemporary.

Since the completion of the Bengalla EIS, a number of ecological impact assessments have been conducted to determine any potential impacts on threatened flora and fauna that may have arisen following legislative changes.

A recent Ecological Assessment compiled by Cumberland Ecology (Cumberland Ecology 2010) for the Mount Pleasant EA has completed detailed vegetation mapping and fauna identification as part of the proposed conveyor and service corridor. In addition, the Bengalla EA 2010 assessed the location of the proposed Western Overburden Emplacement Area (Western OEA) for threatened or endangered ecology.

Cumberland Ecology identified the presence of Derived Native Grassland, White Box / Grey Box Hybrid Grassy Woodland and Upper Hunter White / Grey Box Hybrid – Ironbark Grassy Woodland (Box Gum Woodland) are listed as Endangered Ecological Communities (EEC's) under the *Threatened Species Conservation Act 1995* (TSC Act) and as Critically Endangered Ecological Communities (CEEC's) under the EPBC Act. Scattered individuals of the grass species *Cymbidium canaliculatum* (Tiger Orchid) and *Bothriochloa biloba* (Lobed Blue Grass), listed as Vulnerable under the EPBC Act, were also identified within or having the potential to occur within the Project Boundary.

Threatened fauna known to occur in the vicinity of the Project Boundary include the Brown Treecreeper, Speckled Warbler, Grey-crowned Babbler, Squirrel Glider, Yellow-bellied Sheathtail Bat, Eastern Bent-wing Bat and Eastern Cave Bat. All of these species are listed as 'Vulnerable' under the TSC Act.

In February 2011, Cumberland Ecology undertook a gap analysis of the flora and fauna assessments conducted to date, and those potentially required for the completion of the ecological assessment of the Project. The analysis indicated that a number of fauna species listed under the EPBC Act and TSC Act are known to have the potential to occur within the Project Boundary and will be assessed in the ecological impact assessment as part of the Project EIS. Preliminary vegetation mapping for the Project has commenced and is provided on **Figure 12**.

Areas previously assessed within the Project Boundary will be reassessed to determine any potential impacts to threatened ecological communities, flora and fauna. The Ecological Impact Assessment for the EIS will include all areas not previously approved to be disturbed within the Project Boundary.

8.1.3 Potential Impacts

The Project Boundary mainly contains land that has been impacted by previous agricultural pursuits associated with grazing and land clearing. Specific flora and fauna impacts identified in the preliminary environmental risk assessment (see **Appendix A**) include:

- Clearance of vegetation within the proposed mining and infrastructure areas; and
- The displacement of faunal communities and therefore increased competition for habitat in the surrounding environment.

8.1.4 Assessment Methodology

An Ecological Impact Assessment will be completed for the Project by Cumberland Ecology in accordance the *OEH Draft Guidelines for Threatened Species Assessment* (DEC 2005b) and in accordance with SEWPaC's guidelines for identifying the EPBC Act listed CEEC Box Gum Woodland (DEH 2006).

A preliminary indication of the ecological values of land within the Project Boundary was prepared by Cumberland Ecology in 2010 and 2011. Further detailed flora and fauna surveys will be completed within the Project Boundary.

The scope of the Ecological Impact Assessment will include:

- A desktop review of relevant databases and extensive available relevant literature to identify flora and fauna species and communities potentially found within the study area;
- Seasonal surveys to comply with OEH's recommendations for survey;
- Mapping the distribution of vegetation communities in the Project Boundary by ground survey and air photo interpretation;
- Listing of flora species and descriptions of vegetation communities within the Project Boundary;
- Targeted searches for threatened flora species, threatened ecological communities and critical habitat (as listed under the schedules to the TSC Act and EPBC Act) that may potentially occur in the Project Boundary;
- Habitat assessment of the Project Boundary;
- Assessment of impacts on listed vegetation communities and threatened flora and fauna species; and
- Identification of any suitable impact mitigation measures necessary for the Project (including a comprehensive Biodiversity Offset Strategy).

As noted in **Section 5.4.1**, an EPBC Referral will be submitted to SEWPaC for determination.

8.2 ABORIGINAL ARCHAEOLOGY AND CULTURAL HERITAGE

8.2.1 Background

A number of Aboriginal Archaeology and Cultural Heritage assessments have been completed at Bengalla. The Bengalla EIS identified 39 Aboriginal Sites and 17 isolated finds across the site. A Consent to Destroy Permit (SZ133) granted under Section 90 of the NPW Act was initiated to salvage all sites within the EIS disturbance footprint.

The Bengalla SEE conducted an Aboriginal Cultural Heritage Assessment, revealing a further 21 isolated artefacts. These sites were salvaged as part of Consent to Destroy SZ110. In addition, the Bengalla EA 2008 identified an additional five artefact scatters and four isolated finds. These items were salvaged following the approval of the Bengalla Aboriginal and Cultural Heritage Management Plan 2008.

A number of identified Aboriginal archaeological sites recorded as part of the Bengalla EIS and the Mount Pleasant EA remain in situ and are located outside the approved disturbance limit.

All previously identified Aboriginal archaeological sites located within the Project Boundary will be re-located and assessed as part of the EIS.

8.2.2 Potential Impacts

Potential impacts on Aboriginal archaeology and cultural heritage identified in the preliminary environmental risk assessment include impacts to archaeological sites and items within the proposed disturbance areas (see **Appendix A**).

This will include any archaeological sites previously identified in the Bengalla EIS and Mount Pleasant EA along with any sites which may be identified during further proposed surveys for the Project.

8.2.3 Assessment Methodology

The Aboriginal Archaeology and Cultural Heritage Impact Assessment for the Project will be conducted by AECOM Australia Pty Ltd (AECOM). Consultation will be undertaken in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011a), the *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (OEH 2011b) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010).

The proposed scope of the Aboriginal Archaeological and Cultural Heritage Impact Assessment includes:

- Desktop review, including Aboriginal Heritage Information Management System (AHIMS) database search, Native Title Search, and a review of previously completed studies conducted in the area to assist in the development of a predictive model;
- A field-based Archaeological and Aboriginal Cultural Heritage archaeological survey with members of the local Aboriginal community. The fieldwork will focus on identifying any additional sites of Aboriginal cultural heritage within the disturbance area and revisiting all existing sites within the Project Boundary;
- Preparation of an Aboriginal archaeology and Cultural Heritage Impact Assessment to meet the OEH requirements and the expectations of the local Aboriginal community. This will include an assessment of any additional Aboriginal cultural heritage issues or places identified during the site visit;
- Aboriginal stakeholder consultation in accordance with the OEHs *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*; and
- Development of appropriate management and mitigation strategies (including the establishment of a keeping place in consultation with the Aboriginal community) for any Aboriginal heritage sites that are identified to be disturbed.

8.3 AIR QUALITY

8.3.1 Background

The Project is situated in an area with various land uses which include open cut mining (located to the south and west), Muswellbrook township to the east, as well as various agricultural uses associated with the Hunter River floodplain from the south-west to the north-east of the Project Boundary. These land use activities surrounding the Project influence the background air quality environment upon which further assessments for the Project will be assessed as required.

As part of the existing EMP, BMC monitors concentrations for dust deposition, Total Suspended Particulates (TSP) and PM₁₀ in the area surrounding the Project Boundary (see **Figure 6**).

8.3.2 Potential Impacts

Potential air quality and greenhouse gas impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Dust generation from land disturbance (vegetation clearing and topsoil stripping);
- Dust generation from open cut mining activities (blasting, loading and movement of haul trucks, overburden emplacement and in-pit activities); and
- Short term dust impacts associated with construction activities.

8.3.3 Assessment Methodology

An air quality impact assessment will be conducted for the Project by Todoroski Air Sciences (TAS) in accordance with OEH's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC 2005a).

The scope of assessment will include:

- Review of air quality monitoring data to confirm background levels;
- Assessment of site meteorology and background air quality levels to determine likely criteria for the Project;
- Assessment of construction and operational air quality impacts;
- Assessment of the air quality impacts from the Project in isolation and a cumulative assessment with other approved industry point sources;
- Assessment of cumulative impacts as indicated in **Table 7**; and
- The development of suitable mitigation and management measures.

Bengalla is committed to continuing to incorporate best-practice air quality measures into its construction and operational activities. Best-practice operational controls, as outlined in *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and / or Minimise Emissions of Particulate Matter from Coal Mining* (Kates Environmental 2010), will be included in the Project.

The following mitigation measures as recommended by Katestone Environmental will continue to be applied to the Project:

- Using chemical dust suppressants on haul roads and regular water carts across the mine site;
- Minimising disturbance ahead of active mining and utilising temporary rehabilitation where required;
- Ensuring progressive rehabilitation of mining areas occurs and accelerating rehabilitation where possible;
- Implementing dust suppression sprays on all stockpiles;
- Establishing cover crops on topsoil and subsoil stockpiles that are not going to be used in within six months;
- Minimising the dump height of overburden material;
- Minimise the dragline drop height;
- Minimise drop height when loading trucks;
- Minimise drop height when unloading to stockpiles;
- Minimising the area blasted and restricting blasting to suitable weather conditions only;
- Modifying work practices in extreme unfavourable weather conditions;
- Fittings drills with dust suppressant measures such as curtains, water sprays or extractive filters; and
- Enclosing the primary crushing station and application of dust sprays.

8.4 GREENHOUSE GAS

8.4.1 Background

RTCA has implemented a Climate Change Action Plan aimed at investigating ways to reduce the effects of climate change. The plan is focused around four main areas which include:

- Researching and promoting clean coal technologies;
- Improving energy use;
- Designing projects to recognise climate change risks and opportunities; and
- Raising awareness amongst key stakeholders groups.

Bengalla has adopted the principles of the above strategies and has progressed with several greenhouse reduction projects such as:

- Improving the accuracy of the data and the electricity reporting and monitoring systems in place, to ensure a robust and usable data set;
- Installing tailgates on trucks to reduce diesel usage per tonne of material moved; and
- Increase the efficiency of dragline use (and therefore decrease fuel used by truck and shovel methods).

Bengalla will continue to progress with the greenhouse and business improvement projects and with the RTCA strategy for addressing climate change.

8.4.2 Potential Impacts

Potential greenhouse gas impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Greenhouse gas emissions (Scope 1 and 2) as a result of the direct and indirect emissions generated onsite for the actual mining operations and the associated use of energy by mining equipment and coal processing infrastructure; and
- Greenhouse gas emissions (Scope 3) as a result of emissions generated as a consequence of the mine operating, such as the transport of product coal to its end use.

8.4.3 Assessment Methodology

A greenhouse gas impact assessment will be conducted for the Project by TAS in accordance with the *National Greenhouse Accounts Factors* (NGA 2011).

The scope of assessment will include:

- Determination of scope 1, 2 and 3 greenhouse gas emissions for the Project as required by latest, best practice methodology; and
- The development of suitable mitigation and management measures.

8.5 NOISE

8.5.1 Background

The Project is situated in an area with various land uses. These include open cut mining (located south and west), Muswellbrook township to the east along with various agricultural uses associated with the Hunter River floodplain from the south west to the north east of the Project Boundary. These land use activities surrounding the Project influence the background noise environment upon which further assessments for the Project will be based.

As part of the existing EMP, BMC monitors noise levels in the area surrounding the Project Boundary (see **Figure 6**).

In addition, BMC currently utilises two Real Time noise monitors which are linked to the RTEMS and provide continuous measurement and relay of noise levels surrounding the operation for onsite operational management purposes.

8.5.2 Potential Impacts

Potential noise impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Noise generated by construction and operational activities associated with open cut mining;
- Noise associated with the transport of coal along the existing rail spur and rail loop and proposed ARTC passing lane;
- Traffic noise associated with the transport of construction materials, personnel, consumables, and waste materials to and from the site;
- Noise generation associated with short term construction activities; and
- Cumulative noise impacts with surrounding industry.

8.5.3 Assessment Methodology

A Noise Impact Assessment will be conducted for the Project by Bridges Acoustics. The scope of assessment will include:

- Noise generation from construction and operational activities associated with open cut mining (land preparation, drilling, blasting, loading and movement of haul trucks, shovel operation, overburden emplacement, CHPP and ancillary activities);
- Noise associated with the transport of coal along the rail spur and rail loop;
- Predictive noise modelling of the Project and infrastructure in accordance with the *Industrial Noise Policy 2000* (INP) for both construction and operational activities, including sleep disturbance impacts;
- Assessment of road traffic noise in accordance with the *Environmental Criteria for Road Traffic Noise 1999* (ECRTN);
- Traffic noise associated with the transport of construction materials, personnel, consumables, and waste materials to and from the site;
- Noise generation associated with short term construction activities; and
- Assessment of cumulative impacts as indicated in **Table 7**.

Bengalla will continue to utilise all reasonable and feasible noise mitigation measures for the Project.

8.6 BLASTING

8.6.1 Background

Prior to each blast being undertaken at Bengalla, the RTEMS system is accessed and data from Bengalla's meteorological station is used to determine the potential effects at the scheduled blast time.

Wind speed, wind direction and temperature inversion are all taken into account when determining suitability of blast time. The location in the pit and size of the area being blasted are also considered to ensure minimal blasting impacts occur. The scheduled blast will be postponed if wind speed, wind direction or temperature inversion changes do not meet the specified Bengalla blasting criteria (Bengalla Meteorological Restrictions for Blasting).

As part of the existing EMP, BMC monitors blasts at 11 fixed locations (see **Figure 6**) surrounding Bengalla. The blast monitoring system operates in real time, relaying blast results to a website that is accessible 24 hours a day by Bengalla staff to ensure that all blasts are carefully monitored to maintain compliance.

8.6.2 Potential Impacts

Potential blasting impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include blasting vibration and overpressure impacts at near neighbours or other sensitive receptors (see **Figure 8** for identified private receivers).

8.6.3 Assessment Methodology

A Blasting Impact Assessment will be conducted for the Project by Bridges Acoustics. The scope of assessment will include:

- Blasting vibration and overpressure impacts at sensitive receptors;
- Assessment of cumulative impacts as indicated in **Table 7**; and
- The development of suitable mitigation and management measures including any required modifications to existing monitoring networks.

8.7 AGRICULTURAL PRODUCTIVITY AND LANDUSE

8.7.1 Background

As described in **Section 3.6**, the Project Boundary mainly contains land that has been impacted by previous agricultural pursuits involving land clearing. The land surrounding Bengalla is owned by BMC and is currently leased for limited cattle grazing and cropping.

As part of the NSW Government's Strategic Regional Land Use Policy, all new coal applications must be accompanied by an Agricultural Impact Statement. DP&I have released the *Draft Strategic Regional Land Use Policy Guideline for Agricultural Impact Statement* guidelines (DP&I 2011) in this regard.

8.7.2 Potential Impacts

The specific impacts on agricultural productivity identified in the preliminary environmental risk assessment (see **Appendix A**) include:

- Loss of agricultural land within the Project Boundary to be impacted; and
- Loss of agricultural land associated with the Biodiversity Offset Strategy.

8.7.3 Assessment Methodology

An Agriculture Impact Statement will be completed for the Project by Scott Barnett & Associates in accordance with *Draft Strategic Regional Land Use Policy Guideline for Agricultural Impact Statement* guidelines (DP&I 2011). The scope of assessment includes:

- A review of any relevant assessment reports completed for the Project including Soils and Land Capability, Surface and Groundwater along with other sources of information;
- Identification of the agricultural domains situated within the Project Boundary along with any properties identified in the Biodiversity Offset Strategy prepared for the Project and quantify the areas of each domain;
- Assessment of the agricultural production of each domain and the potential highest agricultural value land use that could be support by each domain, the likely yields that could be produced sustainably per year, the gross and net dollar value of such yields as well as any likely constraints;
- Identification of the agricultural resources and current agricultural enterprises within the surrounding locality of the Project Boundary;
- Identification and assessment of the impacts of the Project on agricultural resources and industries (including cumulative impacts);

- Potential regional, state and national impacts of the loss of the agricultural productivity of this land as a result of the Project for the next 24 years;
- Account for any physical movement of water away from agriculture;
- Assessment of socio-economic impacts;
- Identification of options for minimising adverse impacts on agricultural resources, including agricultural land, enterprises and infrastructure at the local and regional level; and
- Consultation with adjoining land users and Government departments.

8.8 ECONOMICS

8.8.1 Background

The Project will also involve significant capital investment, ongoing operational expenditure and the continued employment of the existing Bengalla workforce. The Project will contribute to flow on economic effects such as the creation of indirect employment opportunities and significant expenditure at a local and State level.

8.8.2 Potential Impacts

The Project will have a range of economic costs and benefits. Net production benefits that will accrue to Australia will include company tax, royalties and payments to the local community. The Project will require an estimated workforce of 900 full time equivalent personnel (plus contractors). As a result, the Project will further strengthen the local economy.

The Project will also result in additional and ongoing demands on community infrastructure and services (such as skill levels, trade, health and educational opportunities and population demographics) and impacts to the immediate environment.

8.8.3 Assessment Methodology

The Economics Impact Assessment will be completed for the Project by Gillespie Economics in accordance with DP&Is 'Guideline for economic effects and evaluation in EIA' (2002).

The scope of assessment will include:

- A benefit cost analysis (threshold value analysis) of the Project that quantifies the economic costs and benefits;
- A regional economic impact assessment of construction and operation of the Project; and
- Any necessary mitigation measures, as required.

8.9 VISUAL AND LIGHTING

8.9.1 Background

The topography within the Project Boundary consists of moderate undulating foothills over wooded and open paddock grazing land. The topographic elevation ranges from approximately RL 100 m near the Hunter River, up to RL 270 m where a ridgeline consisting of a number of knolls forms part of the western portion of the Project Boundary. The natural land surface within is a combination of wooded areas and cleared, open-paddock grazing land, with minimal tree cover and good grass cover.

Several private freehold residences are located to the west and east of the Project Boundary with the closest residences situated along Roxburgh Road to the west and Wybong Road to the north-west. As discussed in **Section 3.6.4** a number of operational and future coal mines are situated to the north, west and south of Bengalla.

The key viewing locations within the Project's Primary Visual Catchment will be identified as part of the Visual Impact Assessment to be conducted for the Project. Preliminary identification of key viewing locations includes:

- Hunter River Floodplain;
- Foothills;
- Mine and Industrial Uses;
- Town Areas; and
- Surrounding Ranges.

8.9.2 Potential Impacts

The Project mine plan has been designed to minimise the potential views of the operations whilst creating a stable and natural landform. Mining will continue to be conducted in a generally westerly direction away from sensitive receivers in Muswellbrook and the Racecourse Area. In addition, the height of the OEA has reached its approved levels (under previous assessments) of RL 270 m AHD with the Project mine plans designed to slope down from RL 270 m continuing to shield the Project from receivers in the east. Receivers to the west are likely to continue to have views of the Project.

8.9.3 Assessment Methodology

A Visual Impact Assessment will be completed for the Project by Integral Visual Planning and Design and Greenpond. The scope of assessment will include:

- Characterisation of the existing visual environment and landforms, including existing mines taking into consideration existing approvals;
- Identification of sensitive receptors and view sheds (including nearby residences);
- Assessment of the visual sensitive receptors and view sheds;
- Review of the mine plan to recommend any suggested additional 'engineering required' mitigation measures in mine plan finalisation;
- Assessment of potential impacts due to night lighting;
- Development of a 3-D digital terrain model incorporating visual simulations and photomontages and cross sections at relevant locations;
- Assessment of the degree of visual landscape alteration / impact that the Project would have on sensitive view sheds, including the use of visual simulations, where appropriate;
- Assessment of cumulative impacts as indicated in **Table 7**; and
- Identification of any impact mitigation measures necessary for the Project.

8.10 SURFACE WATER

8.10.1 Background

Catchment

The Project lies within the catchment of the Hunter River which flows in a general south westerly direction, immediately to the south of the Project Boundary. The Hunter River begins in the Liverpool Ranges and extends for over 300 km until it discharges into the Pacific Ocean at Newcastle. It has a total catchment area of approximately 22,000 km². The major tributaries of the Hunter River include the Pages River, Goulburn River, Wollombi Brook, Black Creek, Paterson River and the Williams River (OEI 2011).

The Hunter River catchment upstream of Bengalla includes Glenbawn Dam, which commands a catchment area of about 1,300 km², approximately one-third of the total river catchment to Bengalla. Glenbawn Dam was originally commissioned in 1957 with a storage capacity of 300,000 ML with its main purpose being flood mitigation. The lake was raised in 1987 to a total capacity of about 750,000 ML.

The largest recorded flood event for the Hunter River adjacent to Bengalla occurred in February 1955. Based on the available survey information, the 1955 Hunter River flood level in this area is approximately RL 138 to RL 139 m as shown on **Figure 5**. This flood had a peak discharge of 3,964 m³/s recorded at Muswellbrook Bridge and caused widespread inundation and damage.

The construction of Glenbawn Dam in 1957 including a 120,000 ML reserve capacity for flood storage and its subsequent raising in 1987 would have reduced the potential magnitude and frequency of flood discharges in the Hunter River adjacent to Bengalla (WRM 2011).

Glenbawn Dam not only provides for flood mitigation it also provides town water supply for Scone and Muswellbrook along with both high and general security water licences for numerous industrial and domestic requirements including irrigated agriculture, mining, power generation, viticulture and dairy farming.

Within the Project Boundary, natural surface water flows south along several minor tributaries and unnamed drainage lines south towards the Hunter River. Dry Creek, while still being an ephemeral creek, is the most significant watercourse within the Project Boundary. Dry Creek commences north of Wybong Road within the Mount Pleasant Project lease and flows south through the central portion of the Project Boundary through paddocks and farmland which have been largely modified by previous agricultural activities (and owned by BMC). For the vast majority of the year, Dry Creek remains dry and only occasionally hold small pools of water for a few days following significant rainfall events.

Onsite Water Management

BMC manages a complex and detailed water balance through the development of the operation's RTEMS to monitor Bengalla's fully automated water management system. A detailed description of the water management system at Bengalla is described in **Section 2.2.7**.

Water Sources

BMC is permitted under Water Supply Works Approval 20WA201594 and associated WAL 001106 (previously 20SL060388) to withdraw a maximum of 1,449 units (1,449 ML for years of 100% allocation) of fresh water each year from the Hunter River. This Hunter River water source is administered under the *Hunter Regulated River Water Source Water Sharing Plan 2003* and the WM Act. The volume of Hunter River water withdrawn is required to balance water demands and supplement water deficits.

Discharge

As discussed in **Section 2.2.7** Bengalla can discharge water into the Hunter River under the HRSTS during periods of 'high' or 'flood' flows, in accordance with EPL 6538. All discharges are released from the Staged Discharge Dam and additional surface water monitoring is also undertaken during any discharge event. However, Bengalla generally operates with a net water deficit and has rarely had to discharge mine water under the HRSTS.

8.10.2 Potential Impacts

Potential surface water impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Potential for increased turbidity and sedimentation impacting upon downstream water quality;
- Potential for discharge of surplus water and / or additional demands on existing water sources;
- Diversion and relocation of Dry Creek and impacts to its catchment;
- Additional and relocated storage requirements for the Project;
- Changes to the catchment area local drainage network with consequent impacts on catchment yields and drainage downstream of the site; and
- Post-mining surface water impacts on catchment yields, water quality and drainage.

8.10.3 Assessment Methodology

A surface water impact assessment (including mine water management and sediment and erosion control) will be conducted for the Project by WRM Water and Environment, the scope of which will include:

- A review of any existing surface water assessment reports, including mine water balances;
- Identification of surface water resources or usage in the vicinity of the site which could be impacted by the Project;
- Assessment and description of the existing surface water hydrology, including drainage, surface water quality and downstream water usage;
- Assessment of the potential for any other surface water impacts both on and offsite resulting from the Project;
- The establishment of appropriate surface water management strategies for all types of water generated by the Project (including the existing Bengalla) including mine pit water, process water and runoff from disturbed and undisturbed areas;
- The development of a site water balance model to simulate management of water on the site over the life of the Project;
- A relevant flood assessment for the Project. This will include identification of relevant mitigation measures if required;
- A brief assessment of post-mine surface water impacts such as drainage, rainfall runoff and a description of the predicted final void water levels as determined by the specialist groundwater consultant in their final void predictive modelling; and
- Identification of any surface water impact mitigation measures necessary for the Project.

8.11 GROUNDWATER

8.11.1 Background

A number of recent hydrogeological assessments for Bengalla have been undertaken by Australasian Groundwater and Environmental Consultants (AGE) which provide a detailed understanding of the existing groundwater regime within and surrounding Bengalla.

The groundwater regime at Bengalla (which is located on the northern side of the Hunter River alluvial floodplain), consists of two prime aquifer systems:

- An alluvial aquifer associated with the Hunter River floodplain which is up to 14 m thick and consists of an upper silty clay layer and a basal gravel; and
- A Permian aquifer system of which the coal seams are the prime groundwater bearing strata.
- To ascertain potential impacts upon groundwater from mining activities, Bengalla has an established groundwater monitoring network surrounding its operations, with 41 bores and monitoring data dating back to 1992. The existing monitoring network is designed to target three aquifers; an unconsolidated alluvial aquifer, a shallow hard rock aquifer and a deep hard rock aquifer. The 41 groundwater monitoring locations surrounding Bengalla are shown on **Figure 5**.

In 2010, two additional bores (SMB1 and SMB2) were installed adjacent to the alluvial land to the south-east of the mine. These bores were installed as part of the Bengalla EA 2010 to enhance the coverage of the existing monitoring network. There are now 21 bores located adjacent to the Wantana mining area, these bores provide a better understanding of groundwater quality background data. In addition, three additional bores (BE1, BE2 and BE3) have been installed in 2011 to the west of the Project to the base of the Edderton Seam (see **Figure 5**).

Groundwater monitoring across Bengalla consists of a six month and annual sampling regime and a monthly standing water level for the Wantana bores. Parameters recorded include sampling water level, pH, Electrical Conductivity (EC), and Total Dissolved Solids (TDS). A full chemical analysis is also undertaken at a number of monitoring bores on an annual basis. In addition, three bores (BG1, BG3 and BG5) are fitted with data loggers to continually measure water depth and temperature (BMC 2010a).

The Hunter River Alluvial Aquifer is considered to be an important groundwater resource that is widely used by the agricultural industry in the area for stock watering and irrigation. Recent hydrological studies completed at Bengalla indicate that the Hunter River Alluvial Aquifer is currently recharged by the hydraulic gradient of the Hunter River (AGE 2010).

A review of the existing groundwater quality within the alluvial aquifer shows that electrical conductivity (EC) in the area of Bengalla ranges between 930 – 1,190 $\mu\text{S}/\text{cm}$ and SMB1 and SMB2 indicate levels between 1,950 – 2,190 $\mu\text{S}/\text{cm}$. In general, pH of the alluvial groundwater is almost neutral, ranging from 7.1 – 7.2 (Hansen Bailey 2010).

8.11.2 Potential Impacts

Potential groundwater impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Groundwater drawdown effects, changes to groundwater flow directions and changes to groundwater quality;
- Potential for depressurisation of aquifer systems in the area through mine void dewatering;
- Increased groundwater inflows to the pits;

- Loss of groundwater yield at existing bore locations; and
- Long term changes (post mine closure) to groundwater levels, groundwater quality and flow direction.

8.11.3 Assessment Methodology

A groundwater impact assessment will be conducted for the Project by AGE. The scope of assessment will include:

- Identification of groundwater resources (including the location of all privately owned groundwater bores) in the vicinity of the site which could be impacted by the Project;
- Assessment of the potential for any groundwater impacts resulting from the Project, including modelling the cumulative groundwater impacts of the Project with existing industry or approved mining Projects (including groundwater impacts on each identified privately owned bore);
- Establishment of a MODFLOW SURFACT Groundwater Model for the Project which also incorporates the completion of mining at Bengalla and all relevant adjacent proposed mining activity;
- An assessment of the potential for contamination from co-disposed materials to enter and impact on the local and regional groundwater system;
- Assessment of post-mine groundwater impacts including predicted final void water levels;
- Confirmation of alluvium limits and extent of mining impacts;
- The development of groundwater management strategies; and
- Identification of any groundwater impact mitigation measures necessary for the Project.

8.12 SOCIAL

8.12.1 Background

The Muswellbrook LGA covers an area of approximately 3,403 km² in the Upper Hunter Valley. The area is supported by numerous enterprises and is known for its agriculture, viticulture, equine industry, power generation and coal mining. Muswellbrook Shire consists of two larger towns including Muswellbrook and Denman, as well as a number of outlying rural communities including Sandy Hollow, Wybong, Baerami, Martindale, McCullys Gap, Widden and Muscle Creek.

According to the 2006 Census, the Muswellbrook LGA had a population of approximately 15,200 persons. A diverse range of sporting, cultural and recreational activities (including wineries and horse studs) are located within the Muswellbrook LGA. A number of establishments provide accommodation within the MSC LGA.

Mining is the highest employment-generating industry within the Muswellbrook LGA with 16.3% of the total labour force employed in this sector in 2006. Other major industry sectors include: retail (9.8%); agriculture, forestry and fishing (5.0%); manufacturing (7.1%); and accommodation and food service providers employing 6.4% of the total labour force. The Muswellbrook LGA had an unemployment rate of 5.4% in 2006.

8.12.2 Potential Impacts

The Project has the potential to have significant positive impacts on the local and regional economy as a result of the capital costs of the Project, contractor and employee salaries, associated local spending and contributions to community enhancement programs.

There is the potential for new large mining projects to dominate the existing local economy and employment within the region.

The estimated population growth in the region during the operation phase of the Project is expected to provide additional economic impetus to improve the regional prosperity of the Muswellbrook LGA. There are potential social impacts as a result of additional ongoing demand for housing, community services and social infrastructure.

The Project will require a workforce of approximately 900 full time equivalent personnel (plus contractors) at full production. The assessment of the social impacts of this population change and development of appropriate mitigation and management strategies will be a key component of the SIA.

8.12.3 Assessment Methodology

Hansen Bailey will complete a SIA for the Project, which will include:

- A detailed description of the social and economic profile of the Muswellbrook LGA and relevant smaller areas within the LGA, including changes over time;
- A description of the current range of social, educational, health, recreational, cultural, emergency and public transport services within the LGA and an identification of current issues regarding their levels or quality of provision;
- A description of the local housing stock, housing market and land supply;
- Analysis and summation of social and economic planning documents produced by MSC;
- A description of the workforce scenarios to be assessed including construction and operational workforces;
- A description of workforce accommodation needs and identification of potential impacts of the Project on the local housing market and strategies to address those impacts;
- Identification of potential impacts of the Project on the provision of social infrastructure and services to the local and regional community; and
- Recommendation of mitigation and management measures as relevant.

8.13 SOILS AND LAND CAPABILITY

8.13.1 Background

Bengalla is located in the Central Lowlands topographic zone within the Sydney Basin geological province. Three soil landscape units underpin the area within the Project Boundary. These are the Hunter, Bayswater and Roxburgh (occurring west of Dry Creek) soil landscape units as delineated by the Soil Landscapes of the Singleton 1:250,000 Sheet (Kovac & Lawrie 1991).

The Hunter unit describes soils formed from the deposition of Hunter River alluvium and its tributaries. The main soils formed from these alluvial deposits relate to their position in time and space relative to the fluvial channels. Soils developed on: (i) prior stream channels and on tributary flats are typically brown and black clays (Brown / Black Vertosols); (ii) levees and flats adjacent to the present river are typically alluvial soils (Rudosols), specifically uniform loams and uniform sands; and (iii) old terraced areas have typically developed red podzolic soils and lateritic podzolic soils (Red Chromosols) (Hansen Bailey 2010).

The Bayswater unit describes soils that have formed from the underlying Permian Singleton Coal Measures. These measures are composed of sandstone, shale, mudstone, conglomerate and coal parent have been derived from ancient marine sediments. Due to the sediments origin, salt levels are usually high and soils are often dispersive and highly erodible with sheet and gully erosion common landscape features.

Soils are primarily yellow solodic soils (Yellow Sodosols) on slopes, with red, yellow and brown podzolic soils (Chromosols) also common across the Project Boundary (Hansen Bailey 2010).

Land required to be disturbed at Bengalla is to be rehabilitated to a stable, self-sustaining condition. At a minimum, rehabilitation plans to achieve the same classification as prior to the commencement of mining. In order to achieve this, effective conservation and management of the existing topsoil and sub-soil resources are facilitated so as to ensure its effectiveness as a rehabilitation medium.

8.13.2 Potential Environmental Impacts

Many of the soil types within the Project Boundary include soil horizons with a slight to high potential for dispersion. Consequently such soils are likely to be subject to sheet, rill and gully erosion if left unprotected during mining operations.

Potential impacts on soil structure, integrity and fertility may occur as a consequence of extended periods of topsoil storage. This would potentially affect rehabilitation success and the long term sustainability of rehabilitated areas.

The post mining land capability of the Project will be modified from its original condition and will need to be addressed as part of the assessment. The land capability will be largely influenced by the mine plan, post mining land use plans and the final landform design. The presence of final voids or water storage areas will also influence the final land use potential and capability.

The Project will not directly impact any soils associated with the Hunter River alluvium.

8.13.3 Assessment Methodology

A Soils and Land Capability Impact Assessment will be completed for the Project by GSS Environmental. The scope of assessment includes:

- A review of any previous assessment reports and other relevant sources of information;
- Completion of soil test pit excavations and other site investigations to determine soil types, nominal depths, agricultural suitability and land capability classifications;
- Mapping of soil types within the proposed mining areas in accordance with DRE and NOW guidelines including a description of their physical and chemical characteristics;
- Pre and post mining land capability and classes assessment in accordance with DTIRIS and NOW guidelines;
- Pre and post mining agricultural suitability assessment in accordance with DTIRIS agriculture guidelines;
- Assessment of the suitability and availability of topsoil resources for mining and infrastructure area rehabilitation, management and mitigation measures; and
- Identification of any impact mitigation measures necessary.

8.14 REHABILITATION AND FINAL LANDFORM

8.14.1 Background

As discussed in **Section 3**, the current dominant land uses within and adjacent to the Project Boundary include open cut coal mining and associated support industries, agriculture and rural properties.

Rehabilitation planning at Bengalla is undertaken progressively to ensure the total area of disturbance at any one time is minimised to reduce the potential for wind-blown dust, visual impacts and increased sediment-laden runoff.

Rehabilitation is designed to be compatible with the surrounding landform (with a consideration of the progression of neighbouring mining operations), stable and able to support final land use(s). To ensure a stable final landform, the majority of the overburden emplacement slopes will be shaped to 10 degrees or less; consistent with existing rehabilitation and current industry standards.

BMC restores land disturbed by mining to a condition similar to that which existed prior to mining. It is anticipated that with good land management practices, final rehabilitation of the Project will include native vegetation communities in excess of its original coverage.

Rehabilitated land from the Project will be comprised of a mixture of native grasses and native trees representing habitat consistent with the existing grassland and woodland values. Revegetation undertaken will be consistent with the surrounding landscape aiming to link remnant native vegetation communities with re-established habitat areas where possible. The rehabilitation strategy for the Project will focus on biodiversity and the establishment of habitat for threatened species.

8.14.2 Potential Impacts

Throughout its operation, the Project will require the disturbance of areas of grassland and some small patches of open woodland. As such the requirement for progressive and expedient rehabilitation across the Project Boundary will continue to be employed throughout the life of the Project. In this regard and as discussed in **Section 4**, the mine plan has been specifically designed to obtain the maximum area of rehabilitation available throughout the life of the Project.

An existing long term rehabilitation strategy will be expanded to ensure that the disturbed land is returned to as close as possible to its original state once mining operations have ceased.

8.14.3 Assessment Methodology

The proposed mine plan and 24 year landform for the Project maintains the development of an undulating, free-draining and stable landform consistent with the existing landform and surrounding environment. Further planning and detail will be provided in the EIS with regard to the establishment of vegetation communities and final landform.

It should be noted that additional coal resources exist beyond the proposed 24 year mining limit for the Project should BMC be successful in receiving future appropriate approvals and suitable markets exist.

The final landform will be developed via progressive rehabilitation with a focus of developing a stable and undulating, free-draining landform utilising native tree species and shrubs representative of the surrounding landscape habitat as far as practical.

The EIS will include a detailed description of the proposed rehabilitation strategy for the Project Boundary, having regard to the key principles in the 'Strategic Framework for Mine Closure' (ANZMEC-MCA). Detailed descriptions of the following will be included in the EIS:

- Rehabilitation objectives, methodology and proposed completion criteria; and
- Potential final land uses, having regard to any strategic land use planning or resource management plans or policies.

The potential for integrating this strategy with any other offset strategies in the region.

8.15 NON-INDIGENOUS HERITAGE

8.15.1 Background

Previous assessments (including the Bengalla EIS) have identified sites of heritage significance in the vicinity of Bengalla, but not all located within the Project Boundary. Sites of heritage significance are those listed in the NSW Heritage Inventory, Hunter Regional Plan Heritage schedule and the National Trust Register. These included several historic homesteads including Bengalla Homestead, Overdene Homestead, Edinglassie Homestead, Balmoral Homestead, Rous Lench Homestead, Skelletar Homestead and the Keys Family Private Cemetery.

8.15.2 Potential Impacts

The original Bengalla EIS addressed the impacts on local non-Indigenous heritage items associated with the open cut coal mine. Further assessment will be completed for inclusion in the EIS to determine the impacts of the Project upon non-Indigenous heritage.

8.15.3 Assessment Methodology

A non-Indigenous Heritage Impact Assessment will be completed by AECOM for the Project in accordance with relevant guidelines, Heritage Act, and other legislation (in particular the standards of the NSW Heritage Council). The scope of assessment will include:

- A review of any relevant existing heritage assessment reports and other sources of information containing information on heritage items in the region;
- A field survey of the area within the Project Boundary with an emphasis on sites identified during preliminary research and areas with archaeological potential and the recording of any items located;
- Assessment of the heritage significance of identified items within the proposed disturbance areas;
- Preparation of a heritage impact assessment for the Project which considers the potential for impact on any significant adjacent heritage items; and
- Identification of any necessary impact mitigation measures.

8.16 GEOCHEMISTRY AND ACID ROCK DRAINAGE

8.16.1 Background

A number of geochemical assessments of overburden and potential coal reject materials have previously been conducted at Bengalla. The Bengalla EIS indicated that overburden consisted of sandstone, siltstone and claystone with minor amounts of tuff, conglomerate and poor quality coal. The geochemical characteristics were assessed and it was concluded that:

- All strata between the Wynn and Bayswater seams (the Archerfield Sandstone (ASS)) are saline and potentially acid forming (PAF);
- The weathered Bayswater seam is very saline and sodic; and
- All other strata are Non-Acid Forming (NAF), and are not saline or sodic.

The adopted management strategy for overburden materials was to place material from the Archerfield-Bulga Formation and weathered Bayswater seam at least 5 m away from final overburden dump surfaces to avoid potential erosion and revegetation problems.

Acid rock drainage (ARD) is managed in accordance with the CNA procedures and the Bengalla Acid Mine Drainage Management and Mineral Waste Management Plan to monitor, control, report and prevent outbreaks of ARD.

Bengalla employs best practice procedures that minimise the likelihood of ARD occurring within the constraints of the overall mining method. Known reactive materials are covered with thick layers of inert waste material. The maintenance of inert material over potentially reactive waste significantly reduces the risk of spontaneous combustion and ARD occurring at Bengalla.

The Bengalla Acid Mine Drainage Management and Mineral Waste Management Plan will continue to be implemented for the Project.

8.16.2 Potential Impacts

Results from the recent geochemical assessment associated with the Bengalla EA 2010 indicated that:

- All overburden materials (except ASS) are likely to have negligible (<0.1%) total sulphur content and are classified as NAF. Overburden also has significant excess Acid Neutralising Capacity (ANC);
- All overburden materials (except ASS) are likely to have a high factor of safety with respect to potential acid generation;
- The concentration of trace metals and sulphate in run-off and seepage from overburden is likely to be very low;
- The concentration of total metals in overburden materials is well below applied guideline criteria for soils and should not present any environmental issues associated with revegetation and rehabilitation; and
- Some overburden material may be sodic, have structural stability problems related to potential dispersion and erosion.

Further detailed assessment of overburden / interburden and coal reject materials will be completed for inclusion in the EIS to determine any potential geochemical issues associated with the Project.

8.16.3 Assessment Methodology

Further geochemical assessment will be completed for the Project by RGS Environmental Pty Ltd. The scope of assessment includes:

- A review of any additional data from exploration drilling programs and an updated sampling and geochemical testing specification including sampling locations, methodology and proposed geochemical testing;
- A site visit providing additional rigour to the geochemical assessment and to ensure that final conclusions are robust and based on a sound sampling and testing methodology;
- A geochemical test program designed to assess the degree of risk from oxidation of pyrite, acid generation and leaching of soluble metals and salts. The assessment will include characterisation of standard soil parameters including salinity, cation exchange capacity, potential nutrients and major metal compositions; and
- Identification of any impact mitigation measures as necessary.

8.17 SPONTANEOUS COMBUSTION

8.17.1 Background

Spontaneous combustion is managed in accordance with the CNA procedures and the Bengalla Acid Mine Drainage Management and Mineral Waste Management Plan to monitor, control, report and prevent outbreaks of spontaneous combustion.

Bengalla employs best practice procedures that minimise the likelihood of spontaneous combustion occurring within the constraints of the overall mining method. Known reactive materials are covered with thick layers of inert waste material. The maintenance of inert material over potentially reactive waste significantly reduces the risk of spontaneous combustion occurring at Bengalla.

8.17.2 Potential Impacts

Potential spontaneous combustion impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include the emissions of odorous gases associated with spontaneous combustion.

8.17.3 Assessment Methodology

The potential impacts arising from spontaneous combustion will be addressed for the Project by TAS in accordance with OEH's Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC 2005a).

The scope of assessment will include:

- An assessment of spontaneous combustion impacts and emissions; and
- The development of suitable mitigation and management measures.

8.18 TRAFFIC AND TRANSPORT

8.18.1 Background

The principal road network adjacent to the Project Boundary is shown on **Figure 5** and includes:

- Denman Road (situated south of the Project Boundary) is a rural main road that carries vehicular traffic travelling from the Upper Hunter to Denman and beyond to the Central West Region of NSW;
- Bengalla Link Road (intersects Denman Road approximately 4.5 km south of Muswellbrook and connects Denman Road in the south to Wybong Road in the north) transects the western portion of the Project Boundary;
- Bengalla Mine Access Road (a private road intersecting Bengalla Link Road approximately 6.5 km from Denman Road);
- Wybong Road (an east-west rural road connecting North Muswellbrook and Sandy Hollow, which runs along the northern portion of the Project Boundary);
- Roxburgh Road (a north-east to south-west aligned road that connects to the Bengalla Link Road approximately 500 m south of Wybong Road) enters the north-western portion of the Project Boundary;
- Thomas Mitchell Drive (south-east of Bengalla linking the New England Highway to Denman Road and providing access to Drayton Mine, the Mount Arthur Coal complex, the Muswellbrook Industrial Estate, and smaller local roads and private properties); and

- New England Highway (south-east of Bengalla intersecting Thomas Mitchell Drive with a T junction configuration).

Consistent with BMC's construction of the Bengalla Link Road in July 2009 the proposed realignment of the Bengalla Link Road will be undertaken in consultation with MSC. All design and construction work associated with the realignment will be undertaken in accordance with applicable design guidelines and standards.

8.18.2 Potential Impacts

Specific traffic and transport impacts identified in the preliminary environmental risk assessment include a minor increase in local traffic flows (primarily noticeable during shift change times) along Thomas Mitchell Drive, Denman Road and Bengalla Link Road during the construction and ongoing operational phases of the Project. The proposed realignment of the Bengalla Link Road will also require the management of traffic around the road works.

Bengalla Link Road enables access from Denman Road to Mangoola Coal Mine and the Mount Pleasant Project and beyond to Sandy Hollow. On this basis, the proposed realignment will be designed to consider stakeholder requirements (such as Mangoola, private residents and also MSC) and constructed so as not to reduce the existing access.

8.18.3 Assessment Methodology

A Traffic and Transport Impact Assessment will be completed for the Project by DC Traffic Engineering generally in accordance with the *Guide to Traffic Generating Developments* (RTA 2002). The scope of assessment will include:

- Review of any previous traffic impact assessments undertaken for the surrounding area;
- Assessment of site traffic and transport levels to determine likely criteria for the Project;
- Assessment of traffic movements on existing road networks adjacent to the Project;
- Design of traffic counts program and its implementation;
- Assessment of existing, construction and operational traffic impacts (including cumulative) and the performance of the key intersections;
- Relevant assessment in relation to realignment of Bengalla Link Road including quantification of impacts on road users; and
- Mitigation and management measures including any required modifications to existing traffic networks.

9 PRELIMINARY PROJECT JUSTIFICATION

Bengalla's history as a project goes back to 1990, when the NSW Government called for expressions of interest from mining companies to develop the coal resource. Development Consent was granted for Bengalla in 1995 and the site commenced production in 1999. Since the commencement of operations, Bengalla has a demonstrated track record in maintaining high standards of environmental performance which consistently meet and often exceed internal corporate commitments, regulatory requirements and external stakeholder expectations. BMC has implemented a leading practice monitoring program and has confirmed that the environmental impacts from mining activities have remained within those predicted and the criteria set by the NSW Government.

Bengalla has a proven history of best practice environmental management, which will continue to be applied to the Project. In 1997, Bengalla became the first NSW coal mine to develop and maintain an EMS certified to the ISO14001 standards. The EMS relies upon an environmental policy, a series of regulatory required management plans, a monitoring program and environmental standards and procedures. The EMS was last formally reviewed in December 2010 by the Bengalla senior management team for its continuing appropriateness and applicability. Regular internal and regulatory environmental compliance audits indicate that BMC successfully implements all facets of the EMS to ensure that a high level of environmental management is achieved.

The Project will provide BMC with a new Development Consent that will ensure the continuation of operations for Bengalla. This will secure employment for the existing Bengalla workforce and ensure that the local, State and Federal socio-economic benefits created by Bengalla will continue by enabling the recovery of a valuable coal resource from an area that has long been set aside for mining by the NSW Government.

The Project Boundary contains a well sought after, high quality and accessible coal deposit. Bengalla currently achieves an overburden to coal stripping ratio of approximately 3.4:1 bank cubic meters (bcm) of overburden to each tonne of ROM coal extracted. The Project lies within the undulating areas associated with BMC's mining tenements, and is distant from the alluvial floodplain located along the Hunter River to the south.

The original Bengalla EIS acknowledged that significant coal reserves continued west beyond the mining extent, and further to the edge of the Authorisation area and stated:

'The coal reserves continue to the west of the limit of excavation, and beyond the edge of the Authorisation area. It is anticipated that these reserves will be mined by open cut methods in the future, subject to appropriate approvals' (Bengalla EIS).

The development of Bengalla is a logical continuation of a known resource and to secure the future of existing mining operations at Bengalla primarily utilising existing infrastructure and equipment fleet within its land holdings.

The existing dragline strip operation will continue to progress west from its current position directly away from the township of Muswellbrook. Due to the mine plan design and topography within the Project Boundary, there will be no increase in height to the approved final landform. In addition, as mining progresses west the maximum height of the OEA will decrease which will effectively shield mining operations at Bengalla from sensitive receivers in the east.

Bengalla is situated within an area containing large quantities of coal resources. Evidence of this includes the large number of currently operating and approved open cut and underground coal mines located adjacent to Bengalla including Mt Arthur, Mangoola, Dartbrook and the Mount Pleasant Project.

Society is greatly reliant on coal to meet basic energy needs and steel production. With the continuing increase in population and the fact that there are a number of countries that currently do not benefit from extensive electricity distribution networks, it is expected that the demand for thermal coal for energy production will continue to rise.

To ensure that all impacts associated with the Project are qualified, a detailed cumulative impact assessment will be conducted. The cumulative impact assessment will address the Project's impacts associated with air quality, noise and blasting, traffic and transport, social and groundwater, with consideration of adjacent mining operations.

The Project will enable Bengalla to continue to provide substantial economic benefits to the local community, State and Federal governments by utilising an expanded workforce of approximately 900 full time equivalent personnel (plus contractors).

With a reserve of 305 Mt to be mined over 24 years and the additional coal reserves beyond this, the Project will also result in a significant increase in royalty payments to the State of NSW and export earnings for Australia. The Project will provide a significant net production benefit to society.

An EIS conducted in accordance with the DGRs will investigate and report on the social, environmental and economic impacts of the Project in accordance with the objectives of the EP&A Act.

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for

HANSEN BAILEY



Jason Martin
Environmental Scientist



Dianne Munro
Principal

10 ABBREVIATIONS

Abbreviation	Description
AGO	Australian Greenhouse Office
AHIMS	Aboriginal Heritage Information Management System
AL	Assessment Lease
Approved Method	OEH ' <i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> '
ARTC	Australian Rail Track Corporation
bcm	bank cubic metres
Bengalla	Bengalla Mine
BJV	Bengalla Joint Venture
BMC	Bengalla Mining Company Pty Limited
BoM	Bureau of Meteorology
CAP	Catchment Action Plan for the Hunter-Central Rivers Catchment Management Authority
CEECs	Critically Endangered Ecological Community
CHPP	Coal Handling and Preparation Plant
CMHS Act	<i>Coal Mine Health and Safety Act 2002</i>
CNA	Coal & Allied
Dams Safety Act	<i>Dams Safety Act 1978</i>
DGRs	Director-General's environmental impact assessment requirements
DP&I	Department of Planning and Infrastructure
DRE	Division of Resources and Energy within the Department of Trade, Industry, Regional Investment and Services
EA	Environmental Assessment
ECRTN	<i>Environmental Criteria for Road Traffic Noise 1999</i>
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Program
EMS	Environmental Management System
EP&A ACT	<i>Environmental Planning & Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPBC Act	<i>Environment Protection & Biodiversity Conservation Act 1999</i>
EPL	Bengalla's Environmental Protection Licence 6538
ESD	Ecologically Sustainable Development
HRSTS	Hunter River Salinity Trading Scheme
HSEQ	Health, Safety, Environment and Quality
INP	<i>Industrial Noise Policy 2000</i>
LGA	Local Government Area

Abbreviation	Description
ML	Mining Lease
MNES	Matters of National Environmental Significance
MSC	Muswellbrook Shire Council
Mt	Million tonnes
Mtpa	Million tonnes per annum
LEP	Local Environmental Plan
NOW	NSW Office of Water
NPW Act	<i>National Parks and Wildlife Act 1974</i>
OEH	Office of Environment & Heritage
PAC	Planning Assessment Commission
PM ₁₀	Particulate Matter of 10 micrometres or less
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
Project Boundary	Development Application Boundary as illustrated on Figure 2
Roads Act	<i>Roads Act 1993</i>
ROM	Run of Mine
RTA	Roads and Traffic Authority
RTCA	Rio Tinto Coal Australia
RTEMS	Real Time Environmental Management Systems
SDD	State Significant Development
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy
SEWPaC	Federal Department of Sustainability, Environment, Water, Populations and Communities
SIA	Social Impact Assessment
The Project	Project as described in Section 4 of this Background Document
tph	tonnes per hour
TSC Act	<i>Threatened Species Conservation Act 1995</i>
TSP	Total Suspended Particles
VPA	Voluntary Planning Agreement
WAL	Water Access Licence
WM Act	<i>Water Management Act 2000</i>

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APPENDIX A

Preliminary Environmental Risk Assessment

CONTINUATION OF BENGALLA MINE
PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT
for
Bengalla Mining Company Pty Limited

Issue	Aspect	Impact	Preliminary Risk Assessment			Environmental Impact Statement Scope
			C	L	R	
Ecology	Vegetation clearing, drilling, blasting and topsoil stripping	Loss of biodiversity and disruption to threatened flora and fauna or likely habitats	2	A	High	An Ecological Impact Assessment will be completed for the Project in accordance with (at least) the DECCW Draft Guidelines for Threatened Species Assessment and SEWPaC's guidelines for identifying the EPBC Act listed CEEC Boxgum Woodland (DEH 2006). A referral will be compiled to fulfil requirements of the <i>Environment Protection and Biodiversity Conservation Act 1999</i> . Database analysis, literature review and field surveys will identify threatened flora and fauna which may be impacted by the Project. Mitigation measures will be determined as necessary for the Project including the development of a comprehensive biodiversity offset strategy.
		Disturbance to State and Federally listed species, communities or habitat	2	A	High	
Aboriginal Archaeology and Cultural Heritage	Vegetation clearing, drilling, blasting and topsoil stripping	Disturbance of Aboriginal artefacts, sites or places of cultural heritage significance	2	A	High	An Aboriginal Archaeological and Cultural Heritage Impact Assessment for the Project will be undertaken in accordance with <i>National Parks & Wildlife Act 1974: Part 6 Approvals Interim Community Consultation Requirements for Applicants (ICCRs)</i> and <i>DECCWs Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i> . The Assessment will include a desktop review, database, literature search of previously recorded Cultural Heritage information. In addition, a field survey will be conducted with members of the Aboriginal community. Mitigation and management strategies will be developed as required.

Issue	Aspect	Impact	Preliminary Risk Assessment			Environmental Impact Statement Scope
			C	L	R	
Air Quality	Vegetation clearing, drilling and topsoil stripping	Wind blown dust and machinery exhaust fumes contributing to elevated dust levels	2	A	High	An Air Quality Impact Assessment will be conducted for the Project in accordance with the 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales' (DEC 2005). The Assessment will include confirmation of background levels, determination of site criteria, construction and operation of air quality impacts, determination of greenhouse emissions, cumulative impacts and a literature review. The Assessment will also develop any suitable mitigation and management measures needed as outlined in NSW Coal Mining Benchmarking Study: <i>International Best Practice Measures to Prevent and / or Minimise Emissions of Particulate Matter from Coal Mining</i> (Katestone Environmental 2010).
	Overburden Emplacement		2	A	High	
	Uncovering of Coal		2	A	High	
	Coal, overburden and reject haulage		2	A	High	
	Coal stockpiles		3	B	High	
	Coal processing and transport		3	B	High	
	Combustion of diesel		2	A	High	
Greenhouse Gas	Electricity Use	Greenhouse gas emissions	1	A	Moderate	The Air Quality Impact Assessment will include an assessment of greenhouse gas Scope 1, 2 and 3 emissions in accordance with the Australian Greenhouse Office's (AGO) 'Factors and Methods Workbook' (AGO, 2005) as part of the Air Quality and Greenhouse Gas Impact Assessment described above. The Assessment will also develop any suitable mitigation and management measures as needed.
	Emissions from burning coal		2	A	High	
	Coal, overburden and reject haulage		2	A	High	
Noise	Machinery operating in-pit and	Excessive noise generation at sensitive receivers	2	A	High	A Noise Impact Assessment will be conducted for the Project in accordance with (at least) the <i>Industrial Noise Policy 2000</i> . The Assessment will determine likely criteria for the Project and include an assessment of operational and construction noise impacts, a blasting
			2	A	High	

Issue	Aspect	Impact	Preliminary Risk Assessment			Environmental Impact Statement Scope
			C	L	R	
	on overburden emplacement areas					assessment; assessment of train movements, low frequency vibration and cumulative noise impacts with approved industry. The Noise Impact Assessment will also develop appropriate mitigation and management measures.
	CHPP operation and stockpiles		2	A	High	
	Coal loading at rail loop		2	A	High	
	Train movements on the rail loop and spur		2	B	High	
	Increased traffic movements		1	A	Moderate	
Blasting	Coal and overburden blasting	Overpressure and ground vibration impacts at sensitive receivers	2	B	High	A Blasting Impact Assessment will be conducted for the Project as part of the Noise Impact Assessment as described above. Mitigation measures will be developed for blasting adjacent to sensitive receivers and heritage properties, as required.
Agricultural Productivity & Land Use	Vegetation clearing and topsoil stripping	Loss of agricultural land	2	B	High	An Agriculture Impact Statement will be completed for the Project in accordance with DP&I's <i>Draft Strategic Regional Land Use Policy Guideline for Agricultural Impact Statement</i> Guidelines (DP&I 2011). The assessment will determine the existing agricultural domains associated with the project along with an assessment of the highest potential agricultural value and the impact the Project may have on agricultural resources or industries. The Assessment will also develop any suitable mitigation and management measures as necessary.

Issue	Aspect	Impact	Preliminary Risk Assessment			Environmental Impact Statement Scope
			C	L	R	
Economics	Increased employees residing in the local area	Demands on local infrastructure and services	2	B	High	An Economics Impact Assessment will be completed for the Project in accordance with DP&I's 'Guideline for economic effects and evaluation in EIA' (2002).
Visual and Lighting	Overburden emplacement areas	Visual impact to surrounding receivers	2	B	High	A Visual Impact Assessment will be completed for the Project to assess the visual impacts of the Project and identify mitigation and management measures, as appropriate. The Assessment will include analysis of the existing visual setting, definition of preliminary visual impacts and comment on potential cumulative impacts.
	Exposed earthworks		2	B	High	
	Lighting from fixed and mobile equipment		2	C	Moderate	
Surface Water	Topsoil stripping, haul roads, un-rehabilitated spoil	Dirty water runoff entering local waterways	2	C	Moderate	A Surface Water Impact Assessment will be conducted for the Project. This Assessment will include a review of existing surface water assessment reports, the identification of surface water resources, assessment of existing surface water hydrology, assessment of potential surface water impacts on and offsite, assessment of post-mine surface water impacts and predicted final void water levels. The Surface Water Impact Assessment will also include the development of surface water management strategies, mitigation measures and development of a water balance model for the life of the Project.
	Coal processing and production	Water demand for dust suppression and coal washing	2	A	Moderate	
	Water discharges into local waterways	Surface water contamination	2	C	Moderate	
		Contaminated water from wash down bays, etc	2	C	Moderate	
	Flooding	Flooding impact on mining operations	2	D	Low	

Issue	Aspect	Impact	Preliminary Risk Assessment			Environmental Impact Statement Scope
			C	L	R	
Groundwater	Coal extraction and overburden removal	Groundwater inflow into pit	1	A	Moderate	The Groundwater Impact Assessment will be conducted for the Project and will consider <i>The Water Sharing Plan for the Hunter Regulated River Water Source 2003</i> . The assessment will include a finite 3D, numerical simulation package (SURFACT MODFLOW), which will be utilised to simulate the likely impacts of the Project on groundwater (including groundwater impacts on each identified privately owned bore), an analysis of cumulative assessment of adjacent mining impacts, contaminant potential from co-disposed materials, assessment of post-mine groundwater impacts, confirmation of alluvium impacts and extent of mining impacts, as relevant. The Groundwater Impact Assessment will also propose groundwater mitigation and management strategies as required.
Social	Employees residing in local region	Social Impacts	1	A	Moderate	Hansen Bailey will prepare a social assessment for the Project considering the stakeholder engagement program and impacts predicted for the Project. Mitigation measures will be determined as required.
Soils and Land Capability	Topsoil stripping and land preparation	Loss of productive topsoil	2	C	Moderate	A Soils and Land Capability Impact Assessment will be completed for the Project and will include a review of previous relevant assessments, soil test pit excavations, soils assessments of areas to be disturbed, pre and post mining land capability and classes assessment, pre and post mining agricultural suitability assessment, assessment of available topsoil resources, a description of the proposed mine rehabilitation process and an assessment of suitable post-mining land uses. The assessment will also suggest any required impact mitigation measures.
		Deterioration of land capability	2	C	Moderate	

Issue	Aspect	Impact	Preliminary Risk Assessment			Environmental Impact Statement Scope
			C	L	R	
Rehabilitation and Final Landform	Rehabilitation	Erosion	2	C	Moderate	The proposed mine plan and ultimate final landform for the Project is planned to maintain an undulating, free-draining and stable landform consistent with the surrounding environment, as practical. Rehabilitation will be undertaken progressively to ensure the total area of disturbance at any one time is minimised to reduce the potential for wind-blown dust, visual impacts and increased sediment-laden runoff. Final rehabilitation objectives and quality will also be assessed in the EIS.
		Weed invasion	1	C	Low	
		Feral animal invasion	1	C	Low	
	Final Landform	Unstable landform	3	D	Moderate	
		Poor drainage	3	D	Moderate	
Non Indigenous Heritage	Vegetation clearing, drilling, blasting and topsoil stripping	Erosion	2	C	Moderate	A Non-Indigenous Heritage Assessment will be conducted for the Project in accordance with the standards required by the Heritage Office of NSW. The Assessment will include a review of existing heritage assessment reports and a field survey of the Project area. Heritage significance will be assessed. Mitigation measures will be identified as appropriate.
		Disturbance of non-indigenous heritage sites	2	C	Moderate	
Geochemistry	Overburden emplacement	Potentially acid forming materials affecting soil and water resources	2	C	Moderate	A Geochemical Impact Assessment on the potential for PAF and NAF from overburden and rejects materials of the Project. Management and mitigation measures will be determined as required.
		Acid Rock Drainage	2	D	Low	
Spontaneous Combustion	Spontaneous combustion	Release of harmful emissions	2	D	Low	The potential impacts arising from spontaneous combustion will be addressed in the air quality assessment, although has not occurred at

Issue	Aspect	Impact	Preliminary Risk Assessment			Environmental Impact Statement Scope
			C	L	R	
						Bengalla to date. Mitigation measures will be identified as appropriate for potential impacts.
Traffic and Transport	Increased vehicle movements from employees, deliveries and train loading	Increased traffic movements	2	D	Low	A Traffic and Transport Impact Assessment will be completed for the Project in accordance with (at least) the 'Guide to Traffic Generating Developments' (RTA 2002). The Assessment will include a review of previous traffic impact assessments undertaken for the surrounding area, determination of likely criteria for the Project, design of a traffic counts program, assessment of existing, construction and operational traffic impacts and assessment of traffic movements on existing road networks. Mitigation measures will be identified as appropriate for potential impacts.
	Road Upgrades	Public Perception	1	D	Low	
Waste Management	Generation of General waste	Land contamination	1	D	Low	A relevant waste assessment will be undertaken for the Project and Waste Management System described which shall provide management procedures to ensure the environmentally responsible disposal, tracking and reporting of all relevant waste generated at Bengalla.
	Generation of Sewage	Water contamination	2	D	Low	
	Rejects Management		2	C	Moderate	
Hazardous materials	Storage and Handling	Soil and water contamination	2	D	Low	A relevant level of hazard assessment in accordance with SEPP 33 will be undertaken for the Project, although it is not anticipated that large quantities of hazardous materials will be required for the Project.
	Bushfire	Fire Hazard	2	D	Low	A relevant bushfire hazard assessment will be undertaken for the Project with relevant mitigation defined as required.

CONTINUATION OF BENGALLA MINE

Risk Assessment Tools

HSEQ Matrix for Determining Level of Risk

Likelihood	Consequence				
	1 – Minor	2 - Medium	3 - Serious	4 - Major	5 - Catastrophic
A – Almost Certain	Moderate	High	Critical	Critical	Critical
B - Likely	Moderate	High	High	Critical	Critical
C - Possible	Low	Moderate	High	Critical	Critical
D – Unlikely	Low	Low	Moderate	High	Critical
E - Rare	Low	Low	Moderate	High	High

Likelihood Classification Used for the HSEQ Risk Framework

Likelihood	Likelihood Description	Frequency	Substance Exposure
Almost Certain	Recurring event during the life-time of an operation / project	Occurs more than twice per year	Frequent (daily) exposure at > 10 x OEL
Likely	Event that may occur frequently during the life-time of an operation / project	Typically occurs once or twice per year	Frequent (daily) exposure at > OEL
Possible	Event that may occur during the life-time of an operation / project	Typically occurs in 1-10 years	Frequent (daily) exposure at > 50% of OEL Infrequent exposure at > OEL
Unlikely	Event that is unlikely to occur during the life-time of an operation / project	Typically occurs in 10-100 years	Frequent (daily) exposure at > 10% of OEL Infrequent exposure at > 50% of OEL
Rare	Event that is very unlikely to occur during the life-time of an operation / project	Greater than 100 year event	Frequent (daily) exposure at < 10% of OEL Infrequent exposure at > 10% of OEL



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