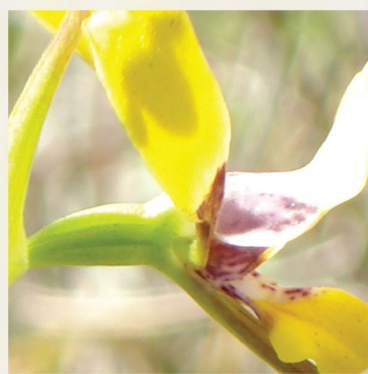


MT ARTHUR COAL CONSOLIDATION PROJECT

Preliminary Environmental Assessment

MARCH 2009



MT ARTHUR COAL CONSOLIDATION PROJECT

PRELIMINARY ENVIRONMENTAL ASSESSMENT

Prepared by:

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**MT ARTHUR COAL
PRELIMINARY ENVIRONMENTAL ASSESSMENT**

for
Hunter Valley Energy Coal Pty Ltd

1 INTRODUCTION

1.1 PROPONENT

Mt Arthur Coal Pty Ltd, a wholly owned subsidiary of BHP Billiton Hunter Valley Energy Coal (HVEC), operates the Mt Arthur Mine Complex (Mt Arthur Coal). Mt Arthur Coal includes the combined operations of the Mt Arthur North Mine, the Bayswater No. 2 Mine, Bayswater No.3 Mine, South Pit Extension and the Mt Arthur Underground project. Mt Arthur Coal is located south west of Muswellbrook in the Upper Hunter Valley in New South Wales (**Figure 1**).

The contact details for HVEC are:

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Phone: 02 6542 4800

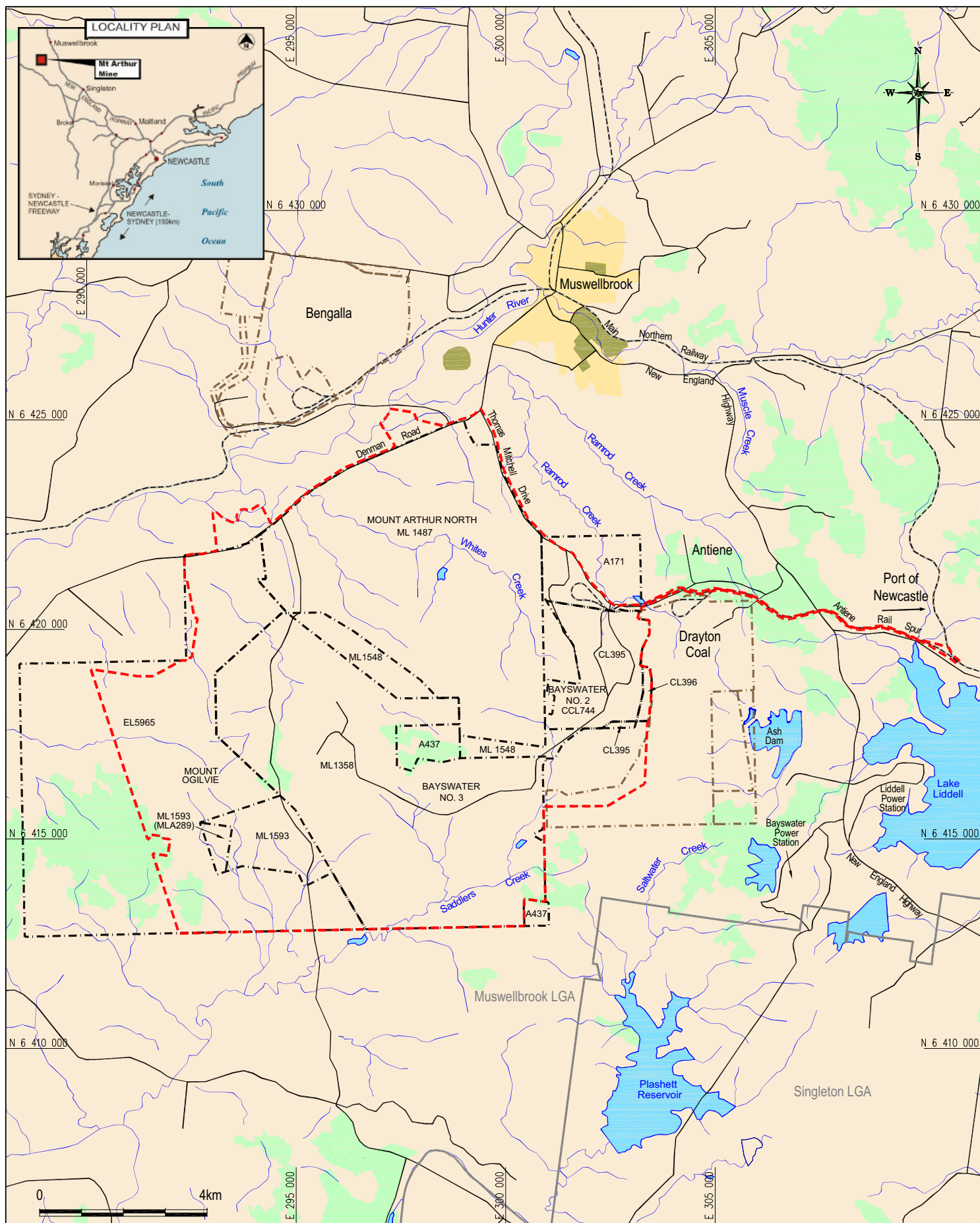
Fax: 02 6542 4801

Mt Arthur Coal currently has approval to produce up to 28 Million tonnes per annum (Mtpa) from the combined complex of which 8 Mtpa is from underground mining methods.

Mt Arthur Coal is committed to maintaining high standards of environmental performance to meet and where feasible, exceed internal corporate commitments, regulatory requirements and external stakeholder expectations. In some instances, this commitment extends to global leading practice to minimise impacts on the environment and community. Since commencement of operations, Mt Arthur Coal has continued to meet its environmental monitoring predictions and criteria in all areas.

Recent upgrades to the site's industry-leading Real Time Environmental Monitoring System to increase the sensitivity of the blast monitoring capture system and air quality monitoring system, waste reduction programs, and ongoing investigations into reducing energy use and greenhouse gas emissions (including the use of biodiesel trials) provide examples of Mt Arthur Coal's ongoing commitment to best practice and continual improvement.

Mt Arthur Coal is committed to implementing leading environmental practice on site and investigating innovative community and environmental management measures throughout the development of the Project.



- EA Boundary
- Mt Arthur Mining Leases
- Other Mining Leases
- Roads
- Railways
- Creeks
- Local Government Boundary

Hansen Bailey



Co-ordinate System: MGA Zone 56

MT ARTHUR COAL

Regional Location

Cad File: 03335D.dwg

Date: 27.01.09

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Figure
1

1.2 PROJECT OVERVIEW

Mt Arthur Coal is proposing to apply for a new Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to gain a single, contemporary planning approval for its open cut operations and the mining of an additional area within Mt Arthur Coal's current Mining Leases (ML) (the Project). The Project Application Boundary (EA Boundary) is shown on **Figure 1** and is consistent with the Project Approval area for the Mt Arthur Underground (MAU).

Specifically, the Project comprises the following:

- An extension of the mine footprint to uncover additional coal reserves within the current MLs;
- Increase the Mt Arthur Coal complex approved production levels by 8 Mtpa up to 36 Mtpa ROM coal. This will be achieved by;
 - Increasing open cut coal production by up to 8 Mtpa; and
 - Having the flexibility to increase either open cut or underground production by an additional 4mtpa if the maximum production from either underground or open cut methods is not being met.
- Relocation of a section of Edderton Road in approximately 2019;
- Upgrade of the existing Mt Arthur Coal Handling and Preparation Plant (CHPP) to wash up to 36 Mtpa of ROM coal and allow the inclusion of an ultra-fine coal circuit to re-process fines and facilitate increased resource recovery and reduced water demand;
- An increase in the approved rail haulage capacity in line with the increased ROM coal production from 19 Mtpa to 27 Mtpa, with the construction of a second rail load out facility and associated conveyor system;
- Modifications to existing infrastructure (such as workshop and bath house), construction of additional ROM coal hoppers and the extension of ROM and product coal stockpiles; and
- A total workforce of approximately 2,600 at peak production, which represents an increase of approximately 1,610 from current staffing levels and an estimated additional 720 positions directly attributable to the Mount Arthur Coal Consolidation Project.

1.3 DOCUMENT PURPOSE

This Preliminary Environmental Assessment (PEA) has been prepared by Hansen Bailey Environmental Consultants Pty Limited (Hansen Bailey) on behalf of Mt Arthur Coal. The document aims to provide a description of the Project and determine key assessment issues identified via a detailed risk assessment process for further review in an Environmental Assessment (EA). This document has been prepared in support of a Project Application under Part 3A of the EP&A Act and *Environmental Planning & Assessment Regulations 2000* (EP&A Regulations) for the Project.

This PEA describes the key social and environmental issues associated with the Project and its proposed assessment methodology for consideration by the Department of Planning (DoP) and other relevant Government Regulators at a Planning Focus Meeting (PFM) held in February 2009.

The Environmental Assessment Requirements (EARs) for the Project will be sought from DoP following the PFM and discussions with key Government stakeholders.

1.4 DOCUMENT STRUCTURE

This PEA is structured as follows:

- **Section 2** provides an overview of Mt Arthur Coal's existing mining operations and the surrounding environment;
- **Section 3** provides a detailed description of the Project, including the proposed mining areas, duration, production rate, infrastructure requirements, additional equipment and employment levels;
- **Section 4** introduces the planning legislation relevant to the Project and describes the current approval framework under which Mt Arthur Coal currently operates;
- **Section 5** describes the stakeholder engagement program to be undertaken for the Project, to ensure all interested parties are consulted over the Project;
- **Section 6** provides an overview of the findings of the preliminary environmental risk assessment conducted under BHP Billiton's risk assessment matrix. The preliminary environmental risk assessment is presented in full in **Appendix A**; and
- **Section 7** discusses the identified impacts and proposed assessment methodology for all key social and environmental issues identified in the preliminary environmental risk assessment for the Project.

2 BACKGROUND

2.1 EXISTING MT ARTHUR COAL MINING OPERATIONS

2.1.1 History

As noted in **Section 1**, Mt Arthur Coal includes the combined operations of the Mt Arthur North Mine, the Bayswater No. 2 Mine, Bayswater No.3 Mine, South Pit Extension and the Mt Arthur Underground project. Each of these operations are described briefly below and illustrated on **Figure 2**.

Bayswater No 2 & 3

Open cut mining at Mt Arthur Coal commenced in the early 1960s, with the development of Bayswater No. 2. Coal production at Mt Arthur Coal progressively increased and approval to mine at Bayswater No 3 at a rate equivalent to 5 Mtpa ROM coal was granted in 1994. To support the expanding development at Bayswater No 3 and cease coal transport by public road, approval was obtained in November 2000 for the construction and operation of the Bayswater rail loading facility and spur line. This connects to the Main Northern Railway to allow export coal to be transported directly to Newcastle.

Mt Arthur North Mine

The Mt Arthur North (MAN) mine located immediately west of Bayswater No 2, was granted approval in May 2001 to produce up to 15 million tonnes of ROM coal per annum. New facilities to accommodate the increase in operations formed part of this approval. Construction in this area commenced in late 2001 and coal production began in 2002. Coal production from the MAN mining area has been the focus of Mt Arthur Coal's operations since 2002.

Exploration Adit

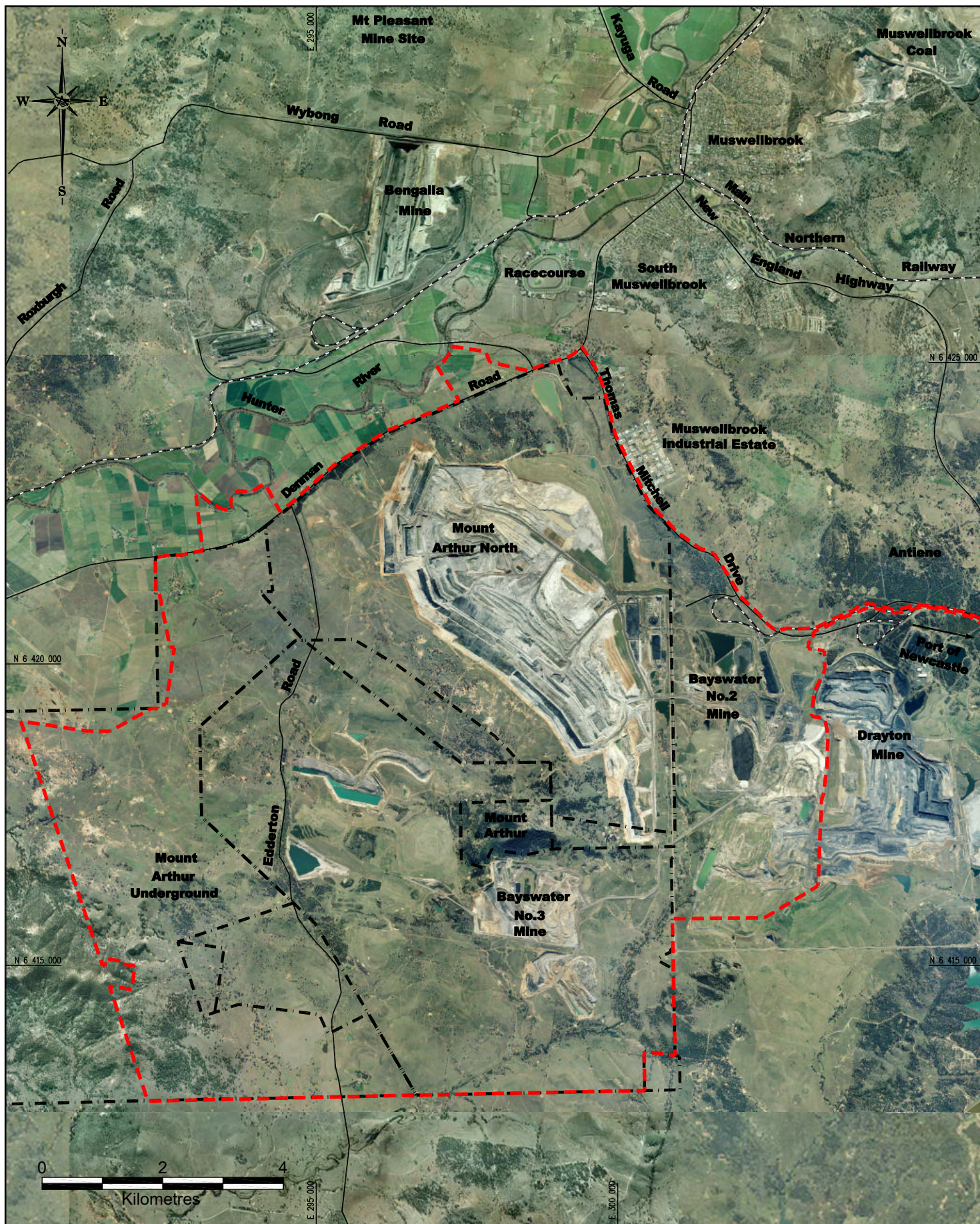
In 2006, Mt Arthur Coal was granted approval to construct an exploration adit to extract a bulk sample of underground coal for quality testing purposes. The adit is located at Bayswater No 3, accessing underground coal seams from the highwall of existing open cut mining areas.

South Pit Extension

In 2008, Mt Arthur Coal was granted approval for the South Pit Extension to extend the approved MAN mining area further south to recover additional coal resources. The South Pit Extension facilitates the placement of overburden in the former Bayswater No. 2 mining area and the adjacent Drayton West Pit.

Mt Arthur Underground

Mt Arthur Coal was granted approval for the MAU in December 2008. This Project facilitates the extraction of up to 8 Mtpa of coal from underground operations, resulting in a total production of 28 Mtpa ROM coal at Mt Arthur Coal. The MAU approval also allows an increase in capacity and throughput of the CHPP to 28 Mtpa and increases the transport of coal via the Bayswater Rail Loading Facility to up to 19 Mtpa.



- EA Boundary
- Mt Arthur Mining Leases
- Roads
- Railways

Hansen Bailey



Co-ordinate System: MGA Zone 56

MT ARTHUR COAL

Site Layout

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Figure
2

2.1.2 Current Operations

Open Cut coal mining is conducted via shovel and excavator. In 2008, coal was mined from the Woodlands Hill seam to the Ramrod Creek seam within the Whittingham coal measures. Open cut mining methods at Mt Arthur Coal allow the full recovery of all coal down to the Ramrod Coal seam.

Underground coal is currently extracted from the Woodlands Hill seam via the exploration adit. The purpose of the exploration adit is to assess underground mining conditions and geology to assist in determining the optimum mine plan for the MAU.

Coal preparation, handling and loading is undertaken at the centralised Mt Arthur Coal CHPP, which are strategically located in a valley to minimise environmental and social impacts. Export coal is loaded onto trains via the Bayswater Rail Loading Facility whilst domestic coal is transported via conveyor directly to Macquarie Generation's Bayswater Power Station.

2.1.3 Environmental Management System

Mt Arthur Coal has developed and implemented a comprehensive Environmental Management System (EMS) that provides a framework to manage compliance with legal and other requirements, including statutory approvals, BHP Billiton requirements and stakeholder expectations. The EMS is certified against ISO14001, which is the benchmark International Standard for the development, implementation and continual review and improvement of an environmental management system.

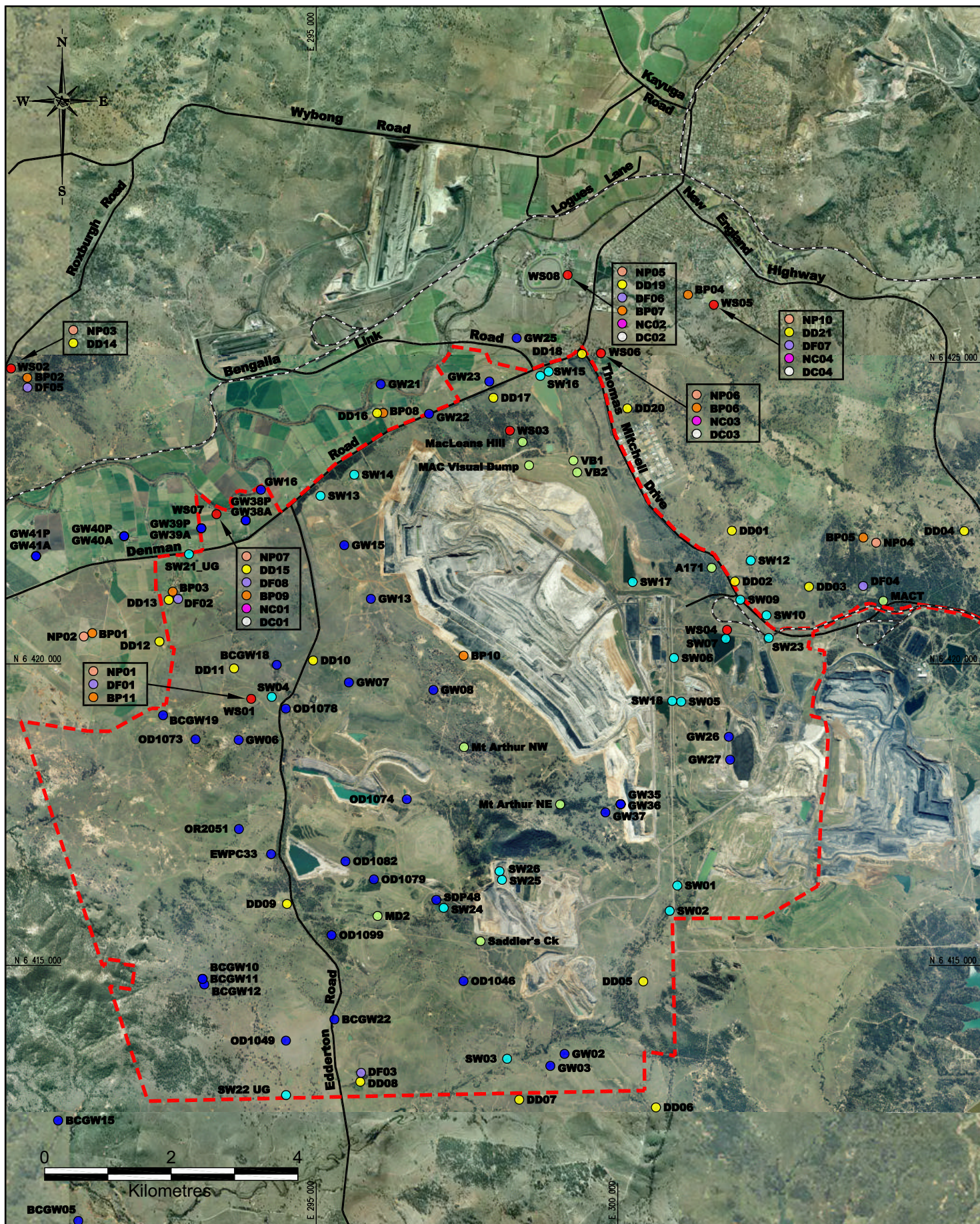
The EMS encourages continual improvement in performance at Mt Arthur Coal and is based upon a suite of management plans and procedures prepared for key activities that have the potential to generate environmental and social impacts. These plans and procedures are continually reviewed, communicated to the workforce and audited for compliance and performance.

2.1.4 Environmental Monitoring Program

A key component of the EMS is the Mt Arthur Coal Environmental Monitoring Program (EMP). The EMP allows Mt Arthur Coal to effectively manage and measure their environmental performance via the use of a comprehensive monitoring system. This allows for the identification and management of environmental risks.

The existing Mt Arthur Coal monitoring locations are illustrated on **Figure 3** and include: three meteorological stations; eight High Volume PM₁₀ Air Samplers; four real-time continuous dust monitors; 21 depositional dust gauges; four continuous noise monitors; 19 groundwater monitoring locations and 18 surface water sampling points.

The existing Mt Arthur Coal EMP would be enhanced and revised as required for the Project to ensure pro-active and ongoing environmental monitoring and management.



- EA Boundary
- Meteorological Station
- Ground Water Monitor
- Surface Water Monitor
- Flora & Fauna Monitor
- Blast Monitor
- Depositional Dust Monitor
- Real-time Dust Monitor
- HVAS PM10 Monitor
- Periodic Noise Monitor
- Real-time Noise Monitor

Hansen Bailey



Co-ordinate System: MGA Zone 56

MT ARTHUR COAL

Environmental Monitoring System

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Date: 18.03.09

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Figure
3

Mt Arthur Coal's environmental monitoring results are published annually in the Annual Environmental Management Report (AEMR) which is distributed to Government Agencies, employees, Community Consultative Committees and is available to view at the local library and local Council.

2.2 COAL RESOURCE

Coal seams at Mt Arthur Coal are contained within the Whittingham Coal Measures, which are separated by a thick, non-coal bearing band known as the Maitland Group. The Whittingham Coal Measures and Maitland Group outcrop in the eastern part of ML 1487 and ML 1358.

Mt Arthur Coal is located to the west of the Muswellbrook Anticline, with coal seams generally dipping to the west-southwest toward the Calool Syncline. An east-west trending Graben faulting structure is located in the central part of MAN which varies in width from 750 to 1000 metres, with the displacement of coal seams ranging up to 110 metres. North of the Graben, the seam dip varies between 2° and 10° with an average dip of approximately 8°. South of the Graben, the seam dip varies between 2° and 20° with the steeper dipping areas occurring in the south eastern and western areas.

Igneous intrusions within Mt Arthur Coal occur mainly as dykes, which selectively intrude coal seams in localised areas, although dykes have a relatively minor impact on mining at Mt Arthur Coal. One minor sill intrusion also occurs within the sequence of coal seams in the MAN area.

2.3 EXISTING ENVIRONMENT

2.3.1 Introduction

The dominant land uses within and adjacent to Mt Arthur Coal include open cut coal mining operations, freehold grazing and cropping land, viticulture, olives and horse studs (including on Mt Arthur Coal owned land).

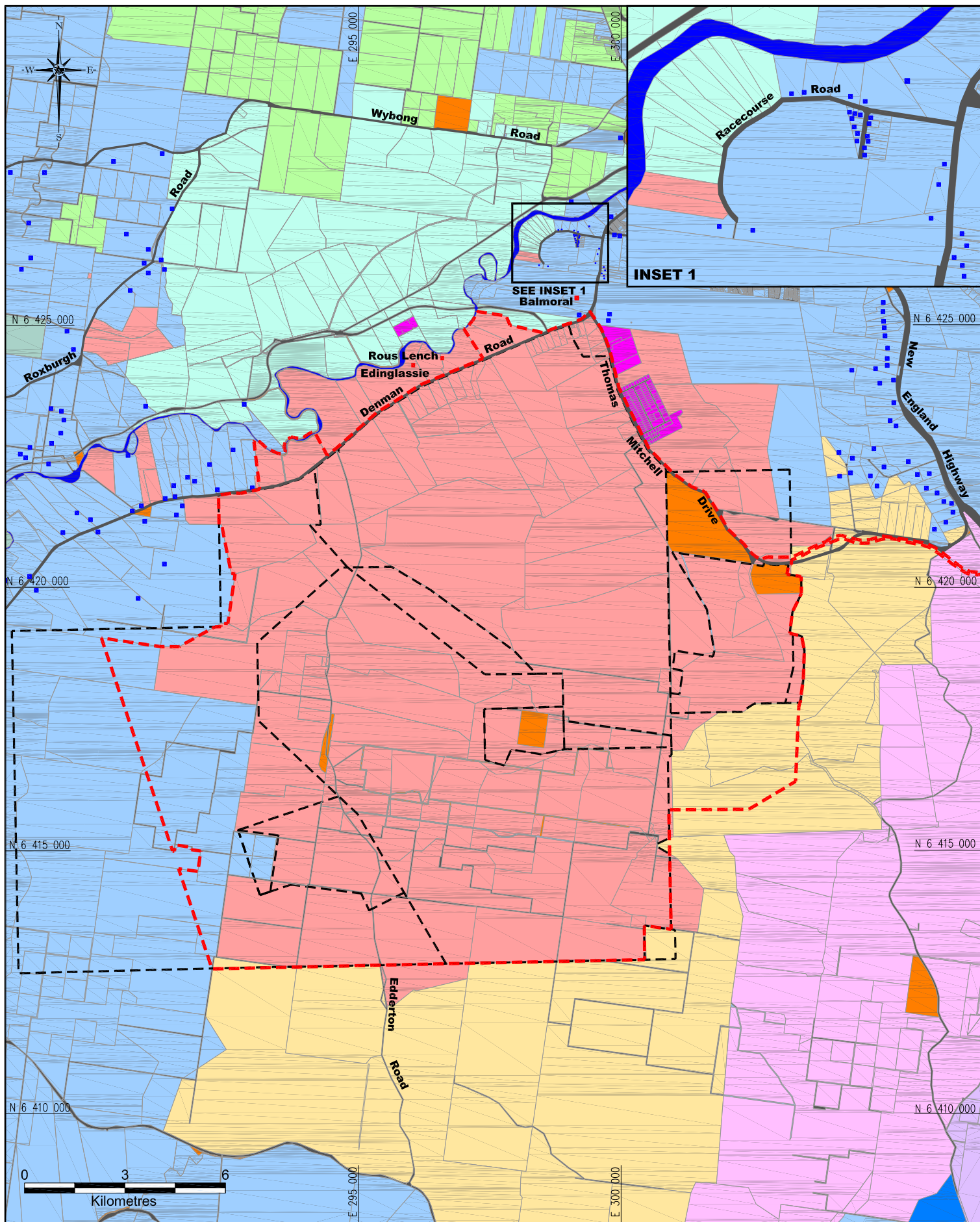
Anglo Coal (Drayton Management) Pty Ltd operates the Drayton open cut mine immediately adjacent to the east of Mt Arthur Coal. Land to the south is grazed and owned by Anglo Coal Pty Ltd who holds an exploration lease over the area. Land to the south-east is Macquarie Generation buffer land. Coal and Allied's Bengalla Mine is located approximately 4 km to the north of Mt Arthur Coal.

There are several residential and rural-residential areas surrounding Mt Arthur Coal, including: the Antiene estate to the east; South Muswellbrook and Racecourse areas to the north; Denman Road to the west; and Roxburgh Road to the north west. The Muswellbrook Industrial Estate is located off Thomas Mitchell Drive immediately to the east of Mt Arthur Coal, which houses a variety of businesses predominantly providing services to the mining industry. The township of Muswellbrook is located approximately 5 km to the north east of Mt Arthur Coal.

The productive alluvial lands of the Hunter River are located to the north of Mt Arthur Coal and are utilised for crop production, thoroughbred breeding and dairying. Pukara Olive Grove Estate and Roxburgh Vineyard are also located to the west of Mt Arthur Coal.

2.3.2 Land Ownership

Land ownership within the EA Boundary and surrounds is shown on **Figure 4**. All of the land within the proposed mining area is owned by HVEC with the exception of an area owned by Drayton. Operations to be undertaken on Anglo Coal (Drayton Management) Pty Ltd land have been agreed under the Anglo Sub-Lease Agreement. Anglo Coal Pty Ltd is the largest landowner to the east and south of the EA Boundary, whilst private landowners occupy land to the north east and west. Bengalla Mine also owns a considerable amount of land to the north of Mt Arthur Coal. Macquarie Generation is the largest landowner to the south east.



- EA Boundary
- Mining Leases
- Private Freehold
- Crown
- HVEC Mt Arthur
- Bengalla
- Mt Pleasant
- Anglo Coal Drayton
- Xstrata Mangoola
- Industrial Freehold
- Macquarie Generation
- Novacoal Australia
- Coal and Allied Residents Locations
- Heritage - Listed Properties

Hansen Bailey



Co-ordinate System: MGA Zone 56

MT ARTHUR COAL

Land Ownership

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Figure
4

3 PROJECT DESCRIPTION

3.1 MINING OPERATIONS

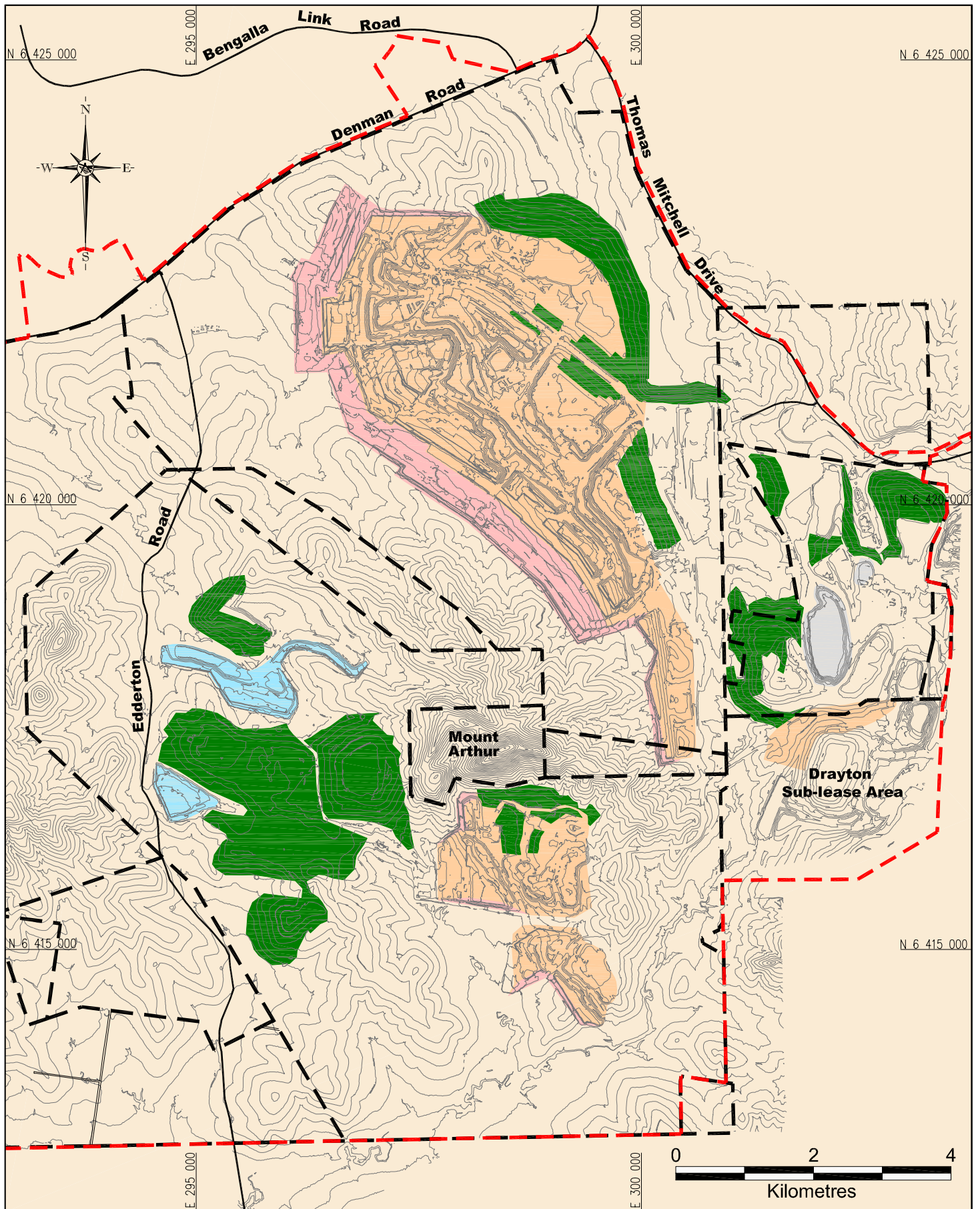
The Project seeks to extend the open cut mining footprint at Mt Arthur Coal to uncover an additional 100 Mt of thermal coal from Mt Arthur Coal's current MLs. The Project will continue to extract coal resources via a truck and shovel operation until (at least) 2022 (consistent with the MAN Development Approval). The Project is a logical progression of mining of the available and identified coal resource within Mt Arthur Coal's mining leases.

The existing approved 2008 mine plan at Mt Arthur Coal is shown on **Figure 5**. The conceptual mine plan layout for the Project is shown on **Figure 6**, **Figure 7** and **Figure 8** for years 2011, 2016 and 2022 respectively. The modelled mine plan years correspond to years 10, 15 and 21 from the MAN Environmental Impact Statement (EIS). The additional open cut disturbance area for the Project in relation to Mt Arthur Coal's existing approved disturbance areas is shown on **Figure 9**.

As indicated in the above figures, mining operations predominantly continue in the north of the operation and the South Pit extension mining areas as currently approved. The Project extends coal extraction to the north into the Macleans Hill area and further west impacting upon Edderton Road. Coal extraction continues in the Saddler's Pit area, in the southern half of the operation, whilst an out-of-pit overburden emplacement area is to be established in the south west of the operation. The Belmont Pit mining area to the west of Edderton Road (as approved in the Bayswater 3 Development Consent) will be maintained to allow access to the Glen Munro Seam as described in the MAU Project Approval. The existing overburden emplacement area will be increased to a maximum height of RL 360 m.

The Project includes an increase in the total approved ROM coal production levels from the Mt Arthur complex by 8 Mtpa up to 36 Mtpa ROM coal. This will be achieved by:

- Increasing open cut coal production by up to 8 Mtpa; and
- Having the flexibility to increase either open cut or underground production by an additional 4 Mtpa if the maximum production from either underground or open cut methods is not being met.



- Mine Lease Boundary
- EA Boundary
- Active Mining
- Spoil
- Tailings
- Existing Rehabilitation
- Water Storage

Hansen Bailey



Co-ordinate System: MGA Zone 56

MT ARTHUR COAL

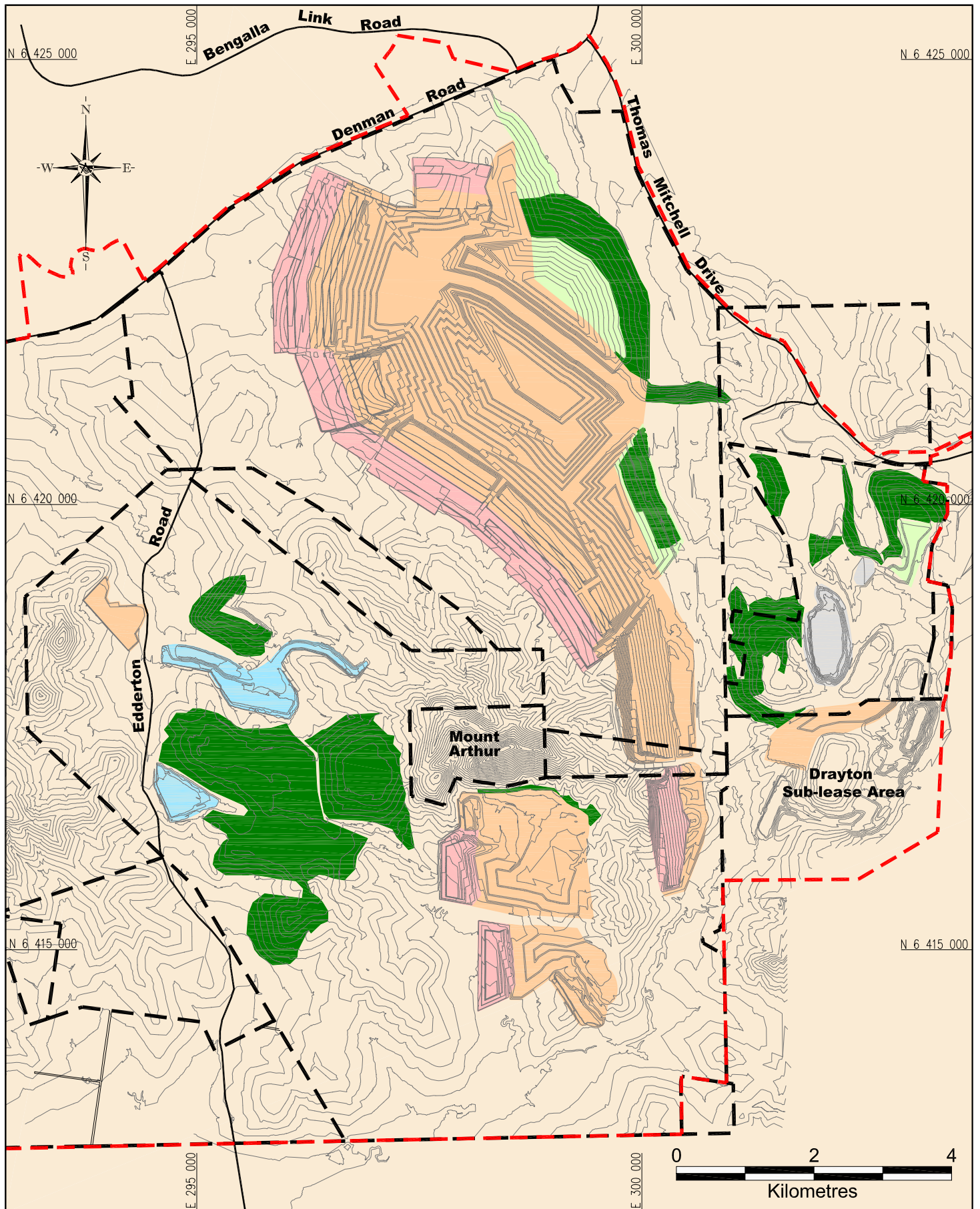
Approved 2008 Mine Plan

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Date: 18.03.09

Drawn: JD

Figure
5



- Mine Lease Boundary
- - - EA Boundary
- Active Mining
- Spoil
- Tailings
- Existing Rehabilitation
- Proposed Rehabilitation
- Water Storage

Hansen Bailey



Co-ordinate System: MGA Zone 56

MT ARTHUR COAL

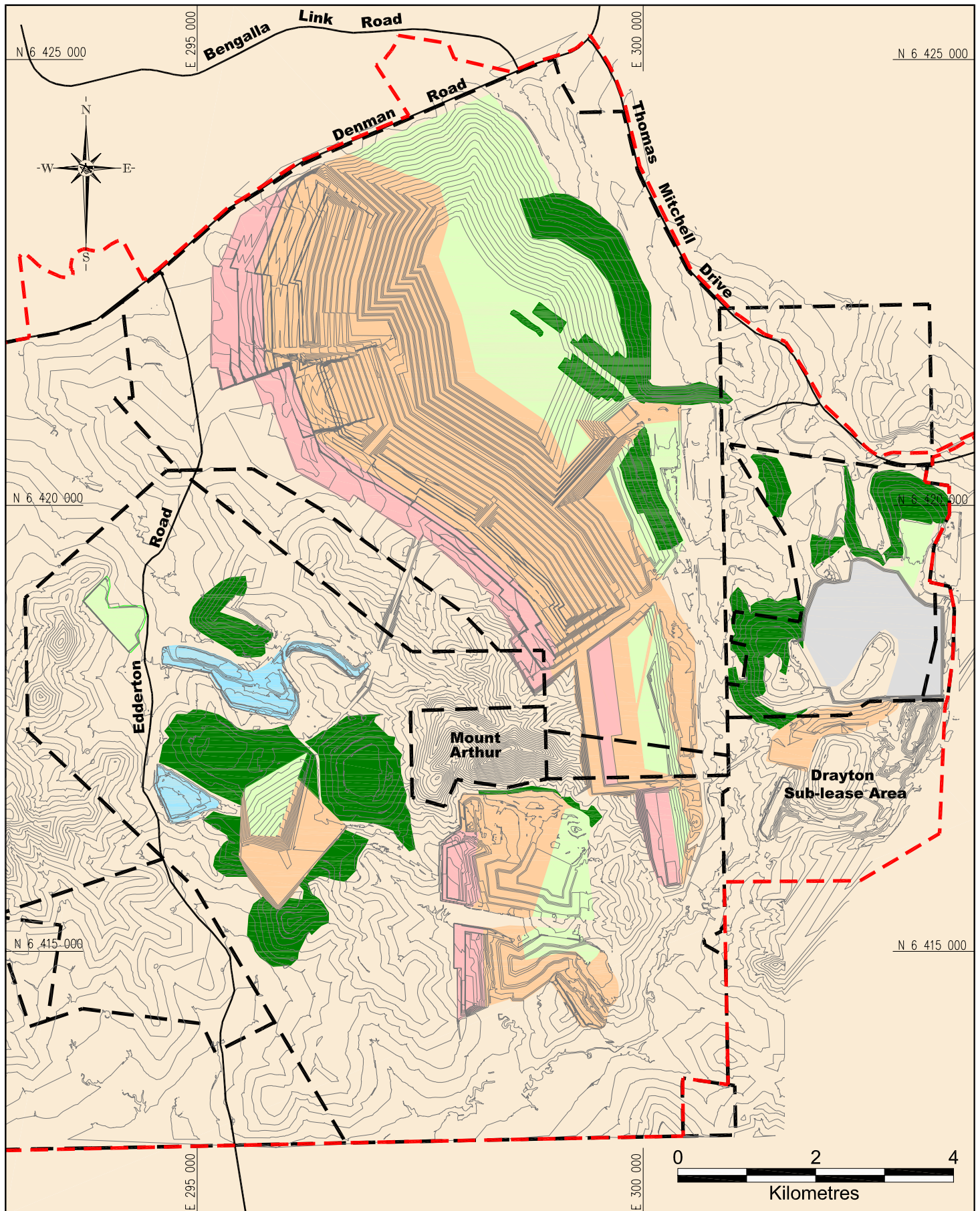
Conceptual 2011 Mine Plan

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Date: 18.03.09

Drawn: TB

Figure
6



- Mine Lease Boundary
- EA Boundary
- Active Mining
- Spoil
- Tailings
- Existing Rehabilitation
- Proposed Rehabilitation
- Water Storage

Hansen Bailey



Co-ordinate System: MGA Zone 56

MT ARTHUR COAL

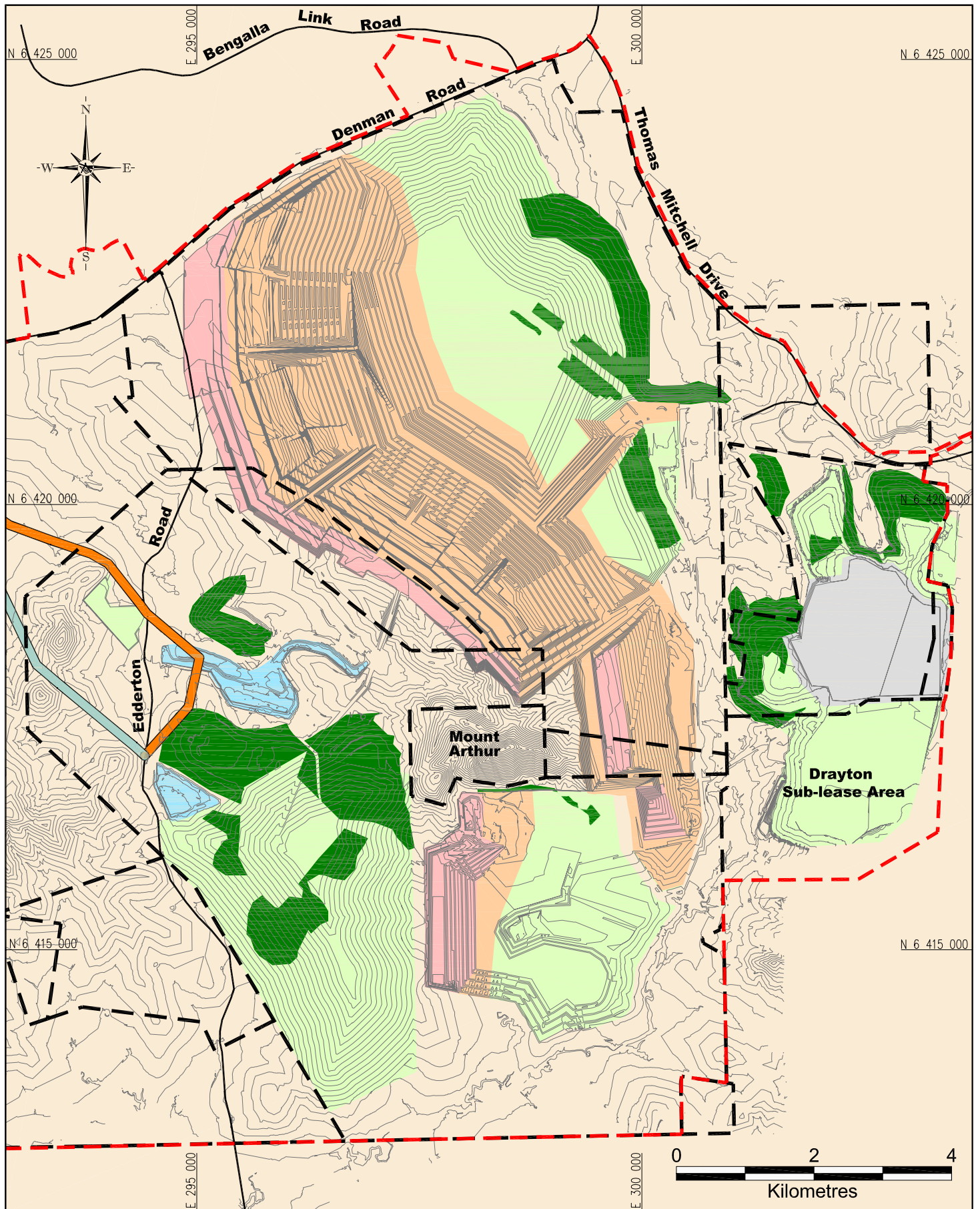
Conceptual 2016 Mine Plan

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Date: 18.03.09

Drawn: JD

Figure
7



- Mine Lease Boundary
- - - EA Boundary
- Active Mining
- Spoil
- Tailings
- Edderton Road Realignment Option 1
- Edderton Road Realignment Option 2
- Proposed Rehabilitation
- Existing Rehabilitation
- Water Storage

Hansen Bailey



Co-ordinate System: MGA Zone 56

MT ARTHUR COAL

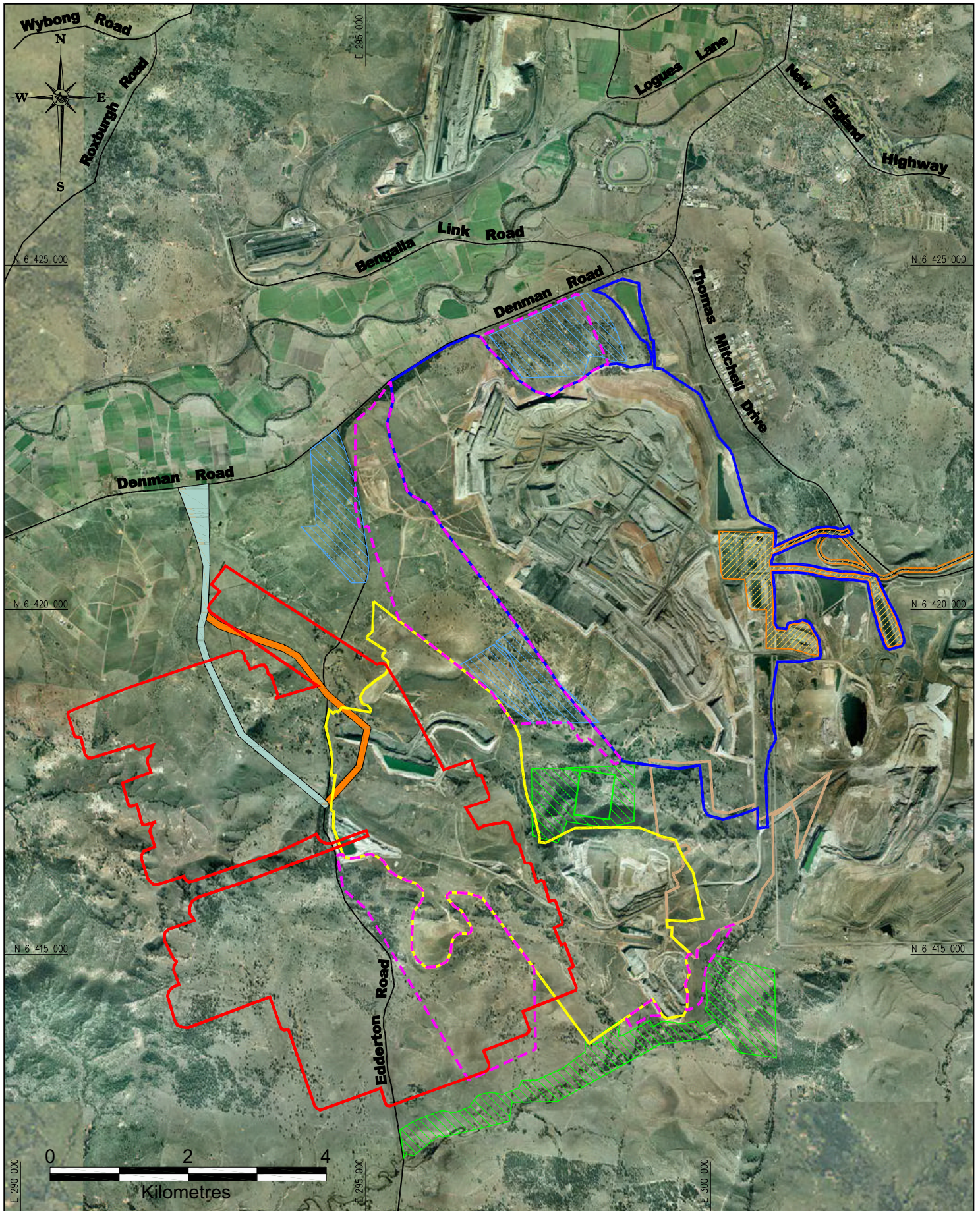
Conceptual 2022 Mine Plan

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Date: 18.03.09

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Figure
8



- MAN 21 Year Disturbance Limit
- Bayswater 3 Mining Area (MAU EA)
- MAC Consolidation Coal Extension Area
- MAU Disturbance Area
- South Pit Disturbance Footprint
- Current Infrastructure
- Edderton Road Realignment Option 1
- Edderton Road Realignment Option 2
- ▨ MAN Heritage Management Zones
- ▨ Voluntary Conservation Areas

Hansen Bailey



Co-ordinate System: MGA Zone 56
Sources: Umwelt (2007, 2008) and Moore (2001)

MT ARTHUR COAL

Additional Open Cut Disturbance

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Date: 11.03.09

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Figure

9

3.2 MINE INFRASTRUCTURE

3.2.1 Coal Handling and Preparation Plant

The Project will include an upgrade of the existing Mt Arthur Coal CHPP to process up to 36 Mtpa of ROM coal from the open cut and underground mining operations and allow the inclusion of an ultra-fine coal circuit to re-process fines and facilitate increased resource recovery, and reduced water demands and waste production. This will involve the installation of coal processing modules and extension of the ROM and product coal stockpiles to handle the additional coal throughput. Additional ROM coal hoppers will also be constructed to feed coal to the CHPP. An additional conveyor system will be constructed to facilitate the development of a second rail load out facility.

3.2.2 Surface Facilities

The Project will require the modification of the existing approved surface facilities at Mt Arthur Coal in addition to the establishment of some new surface facilities. These works have been designed to be located generally within the existing infrastructure footprint and therefore, minimal additional surface disturbance will be necessary.

In summary, the Project proposes the following surface facility modifications and additions:

- Extension of existing car parking facilities;
- Extension or duplication of the existing bathhouse, workshop and warehousing areas;
- Extension or duplication of the Administration building;
- Heavy vehicle wash-down bays, drive-through service and repair bays;
- Bulk oil storages and fuel tanks;
- Relocation of helipad;
- Modifications to power and water reticulation systems;
- New intersection for heavy vehicle entry to the mine; and
- Water storage and sediment retention basins.

3.2.3 Infrastructure and Services

The Project proposes to realign the upper part of Edderton Road in approximately 2019 to allow Mt Arthur Coal to utilise additional land to reduce the currently approved highwall slope to a safer and more workable level if required (as shown on **Figure 8**). The road realignment will also allow the maximisation of recovery of future additional coal reserves within Mt Arthur Coal's existing MLs. Two potential realignment options as shown on **Figure 9** will be assessed as part of the EA.

An additional 18 Ha buffer area to the east of the road alignments will also be surveyed for flora and fauna, soils, Aboriginal archaeology and Non-Aboriginal archaeology to allow for any changes in the road alignment following detailed design.

The realignment of Edderton Road will be designed as a dual-lane carriage bitumen sealed road with a speed limit of 100 km per hour, thereby resulting in an improved transport route potentially reducing travel times along the road for those who access the Golden Highway from Denman Road and visa versa. The proposed realignment of Edderton Road will be undertaken in consultation with the NSW Roads and Traffic Authority (RTA) and Muswellbrook Shire Council (MSC) who have maintenance responsibilities for the road.

The southern end of Edderton Road has previously been approved to be realigned as part of the Bayswater No. 3 EIS. Although this realignment has not been constructed to date, the MAU approval enables the realignment prior to the commencement of mining in the Glen Munro seam. This proposed road alignment will be designed consistent with and to compliment the already approved relocation of Edderton Road.

3.3 COAL TRANSPORT

The Project will require an increase in the approved rate of coal loading and transportation from Mt Arthur Coal. Up to 27 Mtpa of export product coal will be transported via the Bayswater Rail Loading Facility under the Project along the Antiene Rail Spur and Main Northern Railway to the Port of Newcastle.

To facilitate the increased transportation of coal from Mt Arthur Coal, a second rail load out facility and associated conveyor system is proposed to be established as part of the Project.

The existing overland conveyor from Mt Arthur Coal to Macquarie Generation's Bayswater Power Station will continue to be utilised throughout the Project to transport domestic coal to this destination as required.

3.4 MOBILE EQUIPMENT

The Project will require additional items of mobile equipment to the currently approved equipment fleet to accommodate an increased rate of production. An indicative equipment fleet for the Project is shown in **Table 1**.

Table 1
Indicative Project Equipment List

Equipment	Total Mobile Equipment Fleet		
	2011	2016	2022
Electric Face Shovels	3	5	4
Excavators	13	18	16
Trucks	71	107	94
Graders	8	11	9
Bulldozers	19	28	24

Equipment	Total Mobile Equipment Fleet		
	2011	2016	2022
Rubber Tyre Bulldozers	6	8	7
Watercarts	4	8	7
Drills	6	8	7

3.5 REJECT AND TAILINGS DISPOSAL

All tailings produced from the CHPP as a result of the Project will continue to be disposed of in the tailings emplacement area as shown on **Figure 6**, **Figure 7** and **Figure 8**. All tailings areas will be rehabilitated in accordance with regulatory requirements.

All coarse reject produced from the CHPP as a result of the Project will continue to be co-disposed within overburden emplacement areas as currently approved, or utilised in the construction of the tailings dams.

The proposed coarse reject and tailings disposal strategy provides adequate disposal options and capacity for all coal waste produced as a result of the Project.

The installation of the ultra-fines plant as part of the CHPP upgrade for the Project (discussed in **Section 3.2.1**) will facilitate the re-processing of fines to further minimise the coarse rejects, tailings produced and associated water requirements.

3.6 WORKFORCE AND HOURS OF OPERATION

The Project will require approximately an additional 1,610 full time equivalent employees at full production, increasing the total approved workforce to 2,600 employees and an estimated additional 720 positions directly attributable to the Mount Arthur Coal Consolidation Project.

Mining operations will continue to be undertaken 24 hours per day, seven days a week.

3.7 JUSTIFICATION AND ALTERNATIVES

3.7.1 Project Justification

Mt Arthur Coal Environmental and Social Performance

Mt Arthur Coal is an existing operation currently employing over 1,000 full time equivalents. Mt Arthur Coal is a world class operation with comprehensive and effective management and monitoring systems in place.

Mt Arthur Coal has a proven history of best-practice environment management which will continue to be applied to the Project. The existing ISO14001 certified EMS will be revised to include the Project to ensure environmental and social impacts are carefully monitored, mitigated and managed. Mt Arthur Coal has continued to meet its environmental monitoring predictions and criteria in all areas.

Mt Arthur Coal runs a Trainee Operator Program designed to encourage a broad range of local candidates from the Hunter Valley to participate in the program and achieve a nationally recognised qualification and industry relevant skills, increasing the skilled labour pool for Mt Arthur Coal, the mining industry and local employers. The program enables women to gain nationally recognised skills in a non-traditional role and to access future employment opportunities. Mt Arthur Coal was recently awarded by the Australian Government's Equal Opportunity for Women in the Workplace Agency (EOWA) for "Outstanding EEO Practice for the Advancement of Women in a Non-Traditional Area/Role".

Mt Arthur Coal contributes to and supports rigorous, industry-based research projects such as the Upper Hunter River Rehabilitation Initiative (UHRRI) and the Australian Coal Association Research Program (ACARP).

UHRRI is one of the world's largest integrated river rehabilitation and research projects, and the largest project of its kind ever undertaken in Australia. UHRRI aims to create an ecologically self-sustainable riparian forest dominated by indigenous species on the margins of the Hunter River so that river health is improved, a model is provided for future riparian efforts, and the river becomes a valued community resource.

The Australian Coal Association Research Program (ACARP) assists the coal industry to develop and adopt world-leading sustainable mining practices and, through collaboration, to ensure a sustainable position for the global use of coal. In consultation with Mt Arthur Coal and other local mines, ACARP has just completed a study on the cumulative impact of mining with Muswellbrook being used as its case study.

Mt Arthur Coal is committed to implementing leading environmental practice on site and investigating innovative community and environmental management measures throughout the development of the Project.

The Project

The Project will see the continuation of the operation with increased flexibility to respond to uncertain and changing economic circumstances while maintaining effective management of impacts. It is likely that international economic pressures will continue to influence the demand for steaming coal resulting in the need for producers to be able to respond quickly to any market opportunities which may develop. Paralleling this, technical innovations are causing demands for differing coal quality products. This will necessitate Mt Arthur Coal to have the ability to blend various coal seams from open cut and underground operations which have different coal qualities to meet future market demands.

The Project aims to maximise the recovery of additional coal reserves within Mt Arthur Coal's existing MLs, whilst minimising environmental and social impacts as a result of its operations. The Project will also facilitate the consolidation of planning approvals for the open cut mining operations at Mt Arthur Coal, incorporating the MAN, Bayswater No. 3, Rail Loading Facility and South Pit Extension development approvals into a single, contemporary Project Approval.

The consolidation of open cut development consents at Mt Arthur Coal will ensure consistent environmental monitoring and management is implemented and achieved across the mining operation.

Further to this, the Project seeks to consolidate administrative, reporting and monitoring conditions from the MAU approval into the consolidated approval for the open cut mining operations. This will facilitate the removal of duplicative consent conditions and further enhance efficiency and consistency across Mt Arthur Coal.

The Project will provide substantial economic benefits to the local community, State and Federal government through a total workforce of approximately 2,600 employees. Of this 2,600, there will be an estimated 1,610 additional positions, 720 positions directly attributable to the additional 8 Mtpa of the Mount Arthur Coal Consolidation Project.

The recovery of an additional 100 Million tonnes of export coal will also result in a significant increase in royalty payments to the State of NSW and export earnings for Australia.

3.7.2 Project Alternatives

Through past planning, assessment and operational experience, Mt Arthur Coal has developed a thorough understanding of the environmental and social constraints to mining. Prior to the commencement of mine planning, Mt Arthur Coal reviewed these constraints and then developed the mine plan with these constraints in mind. The constraints included minimisation of disturbance, minimising the amount of equipment operating in areas of the operation close to residential areas, location of sensitive environments such as the Hunter River and areas of significant ecological and Aboriginal heritage value.

Mt Arthur Coal has undertaken detailed pre-feasibility studies into the Project, which included the consideration of numerous mine plan and operational alternatives. The primary objective of the detailed pre-feasibility studies was to minimise environmental and social impacts, whilst maximising resource recovery and operational efficiency.

Four Environmental Constraint Analyses were undertaken over a six month period during the development of the mine plan presented in this PEA. These analyses included detailed assessments of potential air quality, noise & blasting and visual impacts associated with the concept mine plan. All recommendations resulting from each Environmental Constraint Analysis were then incorporated by Mt Arthur into further mine plan revisions to minimise environmental and social impacts.

Some of the recommendations which were considered to provide a reduced environmental impact on the local community included:

1. Variations to the mine plan sequencing;
2. Variations to the mine plan layout;
3. Variations to mining intensity in sensitive areas;

4. Increasing available rehabilitation areas and reducing exposed area;
5. Modifying the slope of highwall and low walls;
6. Modifying the locations of haul roads and increasing haul road shielding;
7. Ensuring quiet equipment is located in any exposed areas;
8. The implementation of best-practice noise and air quality mitigation measures; and
9. Investigation into the use of an overburden spreader to reduce air quality impacts.

The location of the proposed mining areas is dictated by the location of the coal resource. Detailed mine planning and engineering have identified that the proposed coal resource can only feasibly be extracted via open cut mining methods to meet government expectations and to maximise coal resource recovery. The economic feasibility of mining the adjacent underground nominated resource is currently being investigated. The project proposes to utilise and enhance existing infrastructure so as to minimise land disturbance where possible.

The 'Do-nothing' approach in regard to the Project would result in the sterilisation of 266 Mt of ROM coal, approximately 720 additional employment opportunities, and the significant socio-economic benefits and royalties to both the Federal and New South Wales governments not being realised.

4 REGULATORY FRAMEWORK

4.1 EXISTING APPROVALS

4.1.1 Mining Leases

Table 2 outlines the status of Mt Arthur Coal's current leases and other mining tenements issued under the *Mining Act 1992*, as illustrated on **Figure 1**.

Table 2
Mining Lease Status

Ref	Approval No	Approval title	Approval Term	Approval Authority
1	A171	Authorisation 171 for Bayswater No 2.	27/10/04 – 25/11/10	DPI-MR
2	CCL 774	Consolidated Coal Lease 774 for Bayswater No 2.	03/07/89 – 21/01/28	DPI-MR
3	MPL 263	Mining Purposes Lease 263 for Bayswater No 2.	17/10/90 – 17/10/11	DPI-MR
4	CL 396	Coal Lease 396 for Bayswater No 2.	03/05/03 – 03/02/24	DPI-MR
5	A437	Authorisation 437 for Bayswater No 3.	04/03/91 – 04/03/10	DPI-MR
6	ML 1358	Mining Lease 1358 for Bayswater No 3.	21/09/94 – 20/09/15	DPI-MR
7	EL 5965	Exploration Licence 5965 for Bayswater No 3.	15/07/02 – 15/07/12	DPI-MR
8	ML 1593	Mining Lease 1593 for Bayswater No 3.	30/04/07 – 29/04/28	DPI-MR
9	ML 1487	Mining Lease 1487 for Mt Arthur North.	16/06/01 – 12/06/22	DPI-MR
10	ML 1548	Mining Lease 1548 for Mt Arthur North.	31/05/04 – 30/05/25	DPI-MR

The extension of mining proposed under the Project is entirely within ML1358, ML1487 and ML1548. It has always been recognised that these mining tenements contained additional valuable coal resources. Resource definition drilling programs and subsequent mine feasibility studies have now confirmed the viability of extending mining into these areas.

4.1.2 Development Approvals

As noted in **Section 3.7**, an integral component of the Project will be gaining a single Project Approval for Mt Arthur Coal's open cut mining operations, thereby enabling the relinquishment of all existing open cut mining Development Consents and associated impact assessments, where practical. Further to this, the Project seeks to consolidate administrative, reporting and monitoring conditions from the MAU approval into the consolidated approval for the open cut mining operations, as practical. This will facilitate the removal of duplicate consent conditions and further enhance efficiency and consistency across the mining operation.

The current status of all of Mt Arthur Coal's Development Consents is shown in **Table 3**.

Table 3
Development Approvals' Status

Ref	DA No	Approval title	Date Granted	Approval Authority	Status
1	210/93	Bayswater No.3 Mine	12/09/94	DoP	Current (To be Surrendered)
2	105-04-00	Construction and operation of the Bayswater Rail loading Facility and Rail Loop	02/11/00	DoP	Current (To be Surrendered)
3	114-05-2000	Development of Mt Arthur North open coal cut mine and construction and operation of associated surface facilities	1/05/01	DoP	Current (To be Surrendered)
4	06_0108	Mt Arthur Coal Mine - South Pit Extension Project	9/01/08	DoP	Current (To be Surrendered)
5	06_0040	Mt Arthur Coal Exploration Adit	20/09/06	DoP	Current
6	06_0091	Mt Arthur Underground Project	02/12/08	DoP	Current

4.2 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

4.2.1 Introduction

Mt Arthur Coal will seek Project Approval under Part 3A of the EP&A Act from the Department of Planning (DoP) as the Project is a class of development listed in Schedule 1 of *State Environmental Planning Policy Major Projects 2005* (SEPP Major Projects). Under Part 3A of the EP&A Act, the Project is deemed to be a Major Project of Significance to the State and as such will be determined by the Minister for Planning.

In addition to gaining Project Approval the Project may also require ancillary approvals under a number of additional Acts and/or applicable SEPPs as discussed in **Sections 4.4**.

4.2.2 NSW State Environmental Planning Policies

SEPP (Major Projects)

This SEPP defines certain developments which are classified as major Projects under Part 3A of the EP&A Act for determination by the Minister for Planning. In accordance with Schedule 1 of the SEPP (Major Projects) this Project is required to be assessed under Part 3A of the EP&A Act.

SEPP (Mining, Petroleum Production and Extractive Industries)

SEPP (Mining, Petroleum Production and Extractive Industries) (SEPP Mining) was gazetted on 16 February 2007. Under SEPP (Mining) open cut mining on any land is permissible with Development Consent where:

- Development zoning under a Local Environment Plan (LEP) is for the purpose of agriculture or industry to be carried out; or
- The land is the subject of a Mining Lease (ML) immediately prior to commencement of SEPP (Mining).

Facilities for the processing or transportation of minerals are permissible with or without Development Consent on land on which mining may be carried out if the minerals were mined from that land or adjoining land.

SEPP No 33 - Hazardous and Offensive Development

SEPP 33 requires the consent authority to consider whether an industrial Project is a potentially hazardous industry or a potentially offensive industry. As the Project is an extension of current operations and existing land uses, a hazardous assessment is not considered necessary for inclusion in the EA.

SEPP No 44 - Koala Habitat Protection

SEPP 44 encourages the conservation and management of natural vegetation areas that provide habitat for koalas to ensure there is ongoing protection of koalas and their habitat. An assessment of koala habitat in the EA Boundary will be conducted as part of the ecological assessment in the EA.

4.2.3 Muswellbrook Local Environment Plan 1985

The EA Boundary is located within the Muswellbrook Local Government Area (LGA), in which the relevant Environmental Planning Instrument (EPI) is the *Muswellbrook Local Environmental Plan 1985* (LEP). It is noted that a new Muswellbrook LEP is currently being drafted however the 1985 Muswellbrook LEP has been utilised for the Project.

The Project is located within Zone 1(a) – Rural ‘A’ and Zone 7(L1) – Environment Protection General (L1) (Alluvial Areas).

Zone 1(a) aims to encourage continued growth in the Shire’s rural economic base and enable mining to occur in an environmentally acceptable manner. Mining is permissible with development consent in this zone.

Zone 7(L1) – Environment Protection General (L1) (Alluvial Areas) aims to ensure that prime alluvial and irrigable land is preserved for agricultural use and to ensure that any development of non-agricultural nature is located and designed in such a way that the reduction of productive land is minimised. The Muswellbrook LEP permits mining in Zone 7(L1) – Environment Protection General (L1) (Alluvial Areas) with development consent where the consent authority is satisfied that:

- “(a) for the purposes of an extractive industry or for underground mining (other than surface works associated therewith)... [the] development will not:*
- “ (i) 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,*
- (ii) detrimentally affect in any way the quantity and quality of water in either subterranean or surface water systems, or*
- (iii) in the case of an extractive industry, visually intrude into its surroundings, except by way of suitable screening, or*
- (b) a purpose permissible in an adjoining rural or environmental protection zone, where it is satisfied that the land is not physically part of the alluvial plain and the development will not have the effects referred to in paragraph (a) (i), (ii) and (iii)”.*

Mining is therefore not permissible within Zone 7(L1). However, due to the power afforded to the Minister by SEPP (Mining) (see **Section 4.2.2**), open cut mining on any land is permissible with Development Consent where the land is the subject of a Mining Lease (ML) immediately prior to commencement of SEPP (Mining), as is the case at Mt Arthur Coal.

4.2.4 Muswellbrook Draft Local Environment Plan 2008

Muswellbrook Shire Council is currently in the process of finalising a new Local Environment Plan (Draft 2008 Muswellbrook LEP) for the Muswellbrook LGA which is awaiting gazettal from the Minister. The Project is located within draft Zone RU1 – Primary Production and draft Zone E3 – Environmental Management.

Draft Zone RU1 aims to encourage sustainable primary industry production by maintaining and enhancing the natural resource base and ensuring that development for the purpose of open cut mines will not:

- “ (a) Destroy or impair the agricultural production potential of the land;*
- (b) Detrimentally 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.”*

Mining is permissible with development consent in this draft zone.

Draft Zone E3 – Environmental Management aims to protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values. Draft Zone E3 also aims to limit development that is visually intrusive and ensure compatibility with the existing landscape character.

Mining is not permissible with development consent within Draft Zone E3, however due to the power afforded to the Minister by SEPP (Mining), open cut mining on any land is permissible with Development Consent where the land is the subject of a Mining Lease (ML) immediately prior to commencement of SEPP (Mining), as is the case at Mt Arthur Coal.

4.3 ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The *Environmental Protection and 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 is administered by the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) and provides protection for listed Matters of National Environmental Significance (NES) 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 or communities listed under the EPBC Act which are present or are likely to be present in the vicinity of a Project must be identified. A Referral including a supporting assessment of significance for each species or listed community must be made to DEWHA to obtain confirmation of whether or not a Project constitutes a Controlled Action. A determination on a Controlled Action is made by DEWHA following the review of the referral documentation in relation to whether or not an action will, or is likely to have a significant impact on a matter of NES.

An EPBC Referral has been prepared to support the Project and is currently awaiting determination by DEWHA.

4.4 OTHER RELEVANT NSW LEGISLATION

4.4.1 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) defines and lists endangered species, populations, communities and critical habitat within NSW, key threatening processes and provides a framework for their protection. It also provides a methodology for the assessment of the effects of development on threatened species which would be relied upon in the EA.

4.4.2 Water Management Act 2000

Mt Arthur Coal falls within the *Water Sharing Plan for the Hunter Regulated River Water Source* (Water Sharing Plan) as established under the Water Management Act 2000 (WM Act). The Water Sharing Plan outlines water sharing rules for the allocation of water and requires that Water Access Licences are obtained by all water users. Accordingly, Mt Arthur Coal will obtain the relevant licences for the Project as required under Section 31 of the WM Act.

4.4.3 Other Authorisations

As part of the Project, a variation to Mt Arthur Coal's Environmental Protection Licences (EPL) 113 and 11457 may be required under the *Protection of the Environment Operations Act 1997*.

Further, Mt Arthur Coal's Mining Operations Plan (MOP) will be required to be revised to incorporate the Project in accordance with the *Mining Act 1992*, should Project Approval be granted.

5 STAKEHOLDER ENGAGEMENT

5.1 INTRODUCTION

As part of the original Mt Arthur North mine development consent in 2001 and subsequent consolidation and extension programs, Mt Arthur Coal presents a strong commitment to undertaking best practice social assessment and stakeholder engagement. The company was one of the first operations in the Hunter Valley to employ a dedicated Community Relations resource to manage community relations activities relating to its operations.

As part of the historical Bayswater No.3 operation and following the development of the Mt Arthur North project in 2001, Mt Arthur Coal has continued to build strong and effective relationships with its local community and key stakeholders, consistent with BHP Billiton policies and values.

The Project will continue this tradition in building upon the comprehensive social assessment and community engagement framework established by the Mt Arthur Coal at the operational level.

5.2 EXISTING COMPANY ENGAGEMENT

Mt Arthur Coal has actively participated in formal engagement activities utilising Community Consultative Committees (CCC) since 1995. Since the development of the Mt Arthur Coal open cut operation in 2001 and during the development of the EA for the MAU, the company has further expanded its community engagement processes through the development of a comprehensive stakeholder database of neighbouring landholders and key stakeholders. Ongoing engagement and social impact monitoring activities in conjunction with an established community partnership and contributions program, aim at enhancing the potential benefits associated with the operation at the local and regional level. Examples of ongoing community relations and involvement initiatives are provided in **Table 4**.

Table 4
Existing Mt Arthur Coal Community Programs and Activities

Activity	Details
Community Engagement and Communications	- Community Consultative Committees (Bayswater, Mount Arthur North, and a joint rail loading CCC with Drayton) and associated community members. - Community Matters newsletter (twice a year) - State and Local Government briefings and meetings - Community Information Evenings - Community Group Presentations - Employee briefings - Website updates
Complaint Management	- Community Response Line - Near neighbour engagement/activities - Reporting of complaints to CCC's and in the Annual Environmental Management Report (AEMR)

Activity	Details
Community Support	- Financial sponsorship provided to a number of local sporting clubs, cultural, health, and special interest groups via the Community Fund - Matched Giving Program where employee donations to eligible groups are matched - Partnerships Program
Monitoring	- Annually publishing of monitoring results through the AEMR - Evaluation forms

5.3 PROJECT ENGAGEMENT

The objectives of the engagement program for the Project include:

- To provide stakeholders with information on the project to facilitate meaningful participation;
- To identify potential impacts associated with the project to inform the Social Impact Assessment (SIA) and broader EA program; and
- To identify potential strategies for impact management, mitigation and enhancement.

Given the history of the company in the community, the program will build upon existing relationships with key stakeholders; will facilitate stakeholder feedback on the project; and will ensure that stakeholder issues are adequately addressed through the SIA and EA.

Relevant engagement methods will be utilised for different stakeholder groups as summarised in **Table 5**.

Table 5
Stakeholder Engagement Methods

Stakeholders	Method
Department of Planning	Briefings, PFM,
Department of Environment, Water, Heritage and the Arts)	Briefing, PFM,
Department of Primary Industries	Briefing, PFM,
Department of Water and Energy	Briefing, PFM,
Department of Environment and Climate Change	Briefing, PFM,
Roads and Traffic Authority (RTA)	Briefing, PFM,
Muswellbrook Shire Council (MSC) Mayor, Councillors & Officers	Personal meetings and briefings, PFM, CCC
Relevant State & Federal MPs	Personal meetings and briefings,
MAC Community Consultative Committee	Briefings, Newsletters
Aboriginal Community	Personal meetings
Landholders/near neighbours	Personal meetings
Relevant Neighbouring mines and industry	Briefing
MAC Employees	Toolbox Talk / Workforce Communication Sessions

Stakeholders	Method
Local Service Providers	Personal meetings
Local business and industry associations	Personal meetings
Community and Non-Government Organisations	Personal meetings (as required)
Special interest groups	Briefings
Media	Briefings, Press Releases

Communication materials in the form of Project Information sheets will also be utilised to complement the engagement program and provide stakeholders with information on the project and the assessment program.

5.3.1 Regulatory Engagement

Face-to-face briefings and group presentations to State and Local Government agencies will continue 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 associated which will require assessment in the EA. The meetings will also present Government stakeholders the opportunity to provide feedback to Mt Arthur Coal on its existing operations.

5.3.2 Community Engagement

Engagement with the community will be integrated as part of SIA (see **Section 7.10**). Past and existing company mechanisms will be utilised to maximise community involvement in the assessment program. Such information will assist in informing project planning and developing strategies to address issues of concern and relevance to the community.

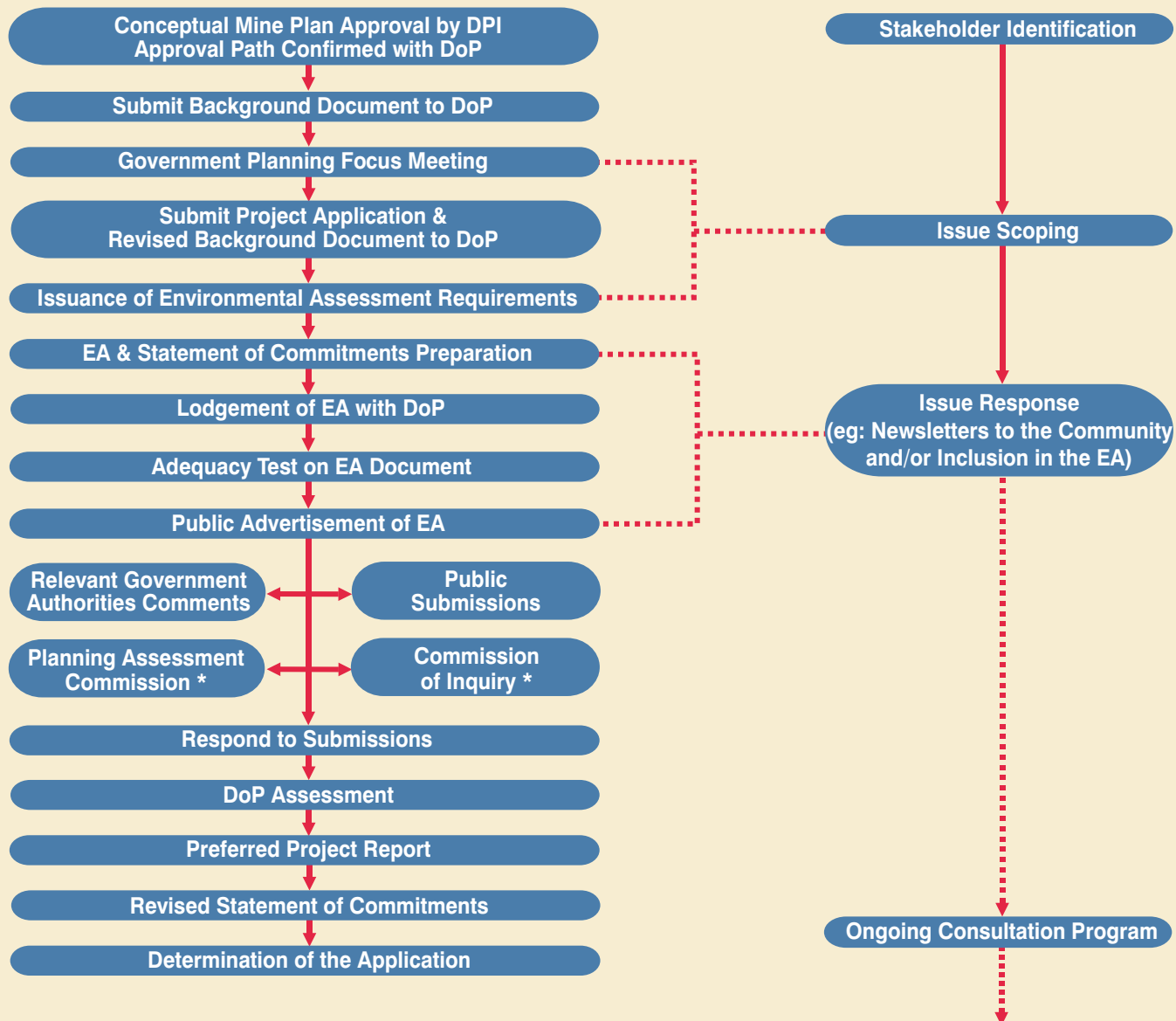
In line with the SIA program, two rounds of engagement are proposed – Round 1 to present the project to the community and gauge community issues; and Round 2 to provide feedback on how information has been used to inform project planning and obtain further community input on the management/mitigation/enhancement of impacts. Community engagement will commence in February 2009 with an invited round of personal meetings with key community stakeholders (as identified in **Table 5**).

The analysis of issues and responses, through the SIA and the broader EA program is essential in ensuring that relevant issues are identified and evaluated in the assessment program and that appropriate strategies are developed to minimise negative impacts and/or enhance the positive impacts associated with the project.

A flowchart showing the planning approvals and consultation process relevant to the Project is shown in **Figure 10**.

Part 3A (EA Process)

Consultation Process



*Avenues available to the Minister

Hansen Bailey



MT ARTHUR COAL

Planning Approvals & Consultation

Cad File: Process Flow

Date: 13.03.2009

Drawn: JD

Figure
10

6 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 BHP Billiton risk matrix. This risk assessment is presented in **Appendix A**.

Each of the potential environmental issues were ranked in accordance with the BHP Billiton risk matrix as either being of Extreme, High, Moderate or Low 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 were addressed to a relevant extent and that appropriate management and mitigation options are developed. The resulting scope of assessment to be included in the EA is discussed in further detail in **Section 7**.

As shown in **Appendix A** and **Table 6**, the majority of activities are rated as low or moderate level risks, with several high risks and no extreme risks. It is anticipated that with the completion of detailed assessment as outlined in **Section 7**, any high risks will be reduced to medium or low, due to the identification and implementation of appropriate controls and mitigation measures.

Table 6
Summary of Preliminary Environment Risk Assessment

Category	Issues
Extreme	None
High	Air quality, Visual, Blasting, Ecology, Aboriginal Archaeology and Cultural Heritage, and Greenhouse Gas emissions
Moderate	Noise, Water Management, Rehabilitation, and Traffic and Transport
Low	Spontaneous Combustion, Waste and Hazardous Materials, European Heritage

7 KEY ENVIRONMENTAL AND COMMUNITY ISSUES

7.1 AIR QUALITY

7.1.1 Background

Dust

Dust management at Mt Arthur Coal involves the integration of operational procedures, alarming systems and an extensive monitoring network. Mt Arthur Coal has implemented a dust management plan that provides a framework to monitor, assess and mitigate dust impacts.

Mt Arthur Coal has an extensive dust monitoring network in place to measure depositional dust and airborne dust (PM₁₀) concentrations surrounding their current operations. The monitoring network consists of: two meteorological stations, eight High Volume Air Samplers (HVAS), four real time monitors and 21 dust depositional gauges. The dust monitoring network is currently being reviewed based on the location of current and future operations. The monitoring network was originally implemented in 1999 with Mt Arthur Coal holding over eight years of historical data for some of its monitors.

Mt Arthur Coal relies upon a Modular GPS equipment tracking system to track mining equipment locations and cross reference these with real-time meteorological data to assist in the management of dust generation. Other operational controls which may be utilised include:

- Minimising disturbance ahead of active mining;
- Deploying up to five water carts across the mine site;
- Using dust suppressant on haul roads;
- Accelerating rehabilitation of mining areas;
- Maintaining an alarming system for strong wind;
- Dumping in less exposed areas during strong winds;
- Avoiding tipping into strong headwinds where possible;
- Restricting blasting to suitable weather conditions;
- Maintaining auto-start for stockpile sprays in windy conditions; and
- Maintaining enclosed coal loading and transfer areas and associated sprays.

These operational and monitoring strategies will continue to be applied to the Project to manage air quality impacts.

Greenhouse Gas

Mt Arthur Coal has implemented a Greenhouse Gas / Energy Savings Strategy to meet BHP Billiton and legislative requirements. The strategy ensures the continual monitoring of fuel and electricity consumption at Mt Arthur Coal and facilitates the identification of ways in which Mt Arthur Coal can reduce its greenhouse emissions and further improved energy management and efficiency. This strategy will continue to be implemented throughout the Project.

Spontaneous Combustion

Spontaneous combustion is predominantly confined at Mt Arthur Coal to former mining areas at Bayswater No 2. This is due to the coal seams mined in the Greta measures at Bayswater No 2 containing higher levels of carbon and sulphuric material than those currently mined in the Whittingham measures. The increased presence of carbon and sulphuric material increases the likelihood of the coal seam self-heating and combustion.

Mt Arthur Coal has implemented a Spontaneous Combustion Management Plan to monitor, control, report and prevent outbreaks of spontaneous combustion. Areas potentially affected by spontaneous combustion are monitored on a regular basis, normally as part of other weekly inspections. The outbreaks are recorded on monthly plans for management and reporting purposes. The management plan and spontaneous combustion management strategies will continue to be implemented for the Project.

7.1.2 Potential Impacts

Potential air quality, spontaneous combustion 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 inpit activities);
- Short term dust impacts associated with construction activities;
- Greenhouse gas emissions (Scope 1 and 2) as result of the actual mining operations and the associated use of energy by mining equipment and coal processing infrastructure;
- Greenhouse gas emissions (Scope 3) as a result of non-mining activities at the site and in the combustion of product coal in the energy generation process; and
- Emissions of odorous gasses from spontaneous combustion.

7.1.3 Assessment Methodology

An air quality, spontaneous combustion and greenhouse gas impact assessment will be conducted for the Project by Holmes Air Sciences in accordance with the NSW Department of Environment and Climate Changes' (DECC) *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2001) and the Australian Greenhouse Office's (AGO) *Factors and Methods Workbook* (AGO, 2005).

The scope of assessment will include:

- A review of local meteorology data, including wind speed and direction, temperature, humidity, rainfall and evaporation (see further detail below);
- A review of background ambient air quality monitoring data to identify representative values for existing background dust deposition, Particulate Matter less than 10 microns in diameter (PM₁₀), and Total Suspended Particulate (TSP) concentrations for relevant averaging periods;
- Development of a predictive air quality model to assess air quality impacts associated with the Project (and cumulatively with other approved and proposed developments) at 2011, 2016 and 2022 against regulatory criteria;
- An assessment of the potential for dust generation associated with construction activities;
- An assessment of cumulative air quality impacts with surrounding mining operations and industry;
- An assessment of spontaneous combustion impacts and emissions;
- An assessment of potential Scope 1, 2 and 3 greenhouse gas emissions; and
- The identification of appropriate management and mitigation measures;

As part of the preliminary air quality assessment undertaken for the EA, Holmes Air Sciences completed an extensive review of the air quality monitoring data collected by Mt Arthur Coal over the last eight years. The monitoring data was comprehensively analysed to identify the background air quality levels around Muswellbrook, in the absence of Mt Arthur Coal's operations.

Further to this, a detailed model simulation of the current ambient air quality environment is being conducted to confirm the background air quality levels in the absence of Mt Arthur Coal operations.

7.2 NOISE & BLASTING

7.2.1 Background

Mt Arthur Coal has implemented a comprehensive noise management plan which provides a framework to monitor, assess and mitigate noise impacts on the local community. Management controls include a range of mine planning, operational and engineering measures and real-time monitoring and alarming systems, all of which will continue to be applied to the Project.

Mt Arthur Coal has a continuous improvement program in place which is designed to model, monitor and mitigate the potential for noise and blasting impacts on sensitive receptors adjacent the mine.

This program includes an extensive noise monitoring system comprised of four continuous noise monitors (Barn Owl) located at; South Muswellbrook, Denman Road West, Thomas Mitchell Drive and the Racecourse and a mobile monitoring unit. In addition to continuous monitoring, periodic noise monitoring is conducted on a quarterly basis at six locations.

This extensive range of monitoring data has been utilised to determine ambient background noise levels for use in the noise impact assessment.

Blast monitoring for overpressure and ground vibration is undertaken at five representative monitoring sites in the area surrounding Mt Arthur Coal and are located up to 8 km from the approved mining areas where blasting occurs.

7.2.2 Potential Impacts

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

- Noise generation from activities associated with land disturbance (vegetation clearing and topsoil stripping);
- Noise generation from open cut mining activities (drilling, blasting, loading and movement of haul trucks, shovel operation, overburden emplacement, CHPP and ancillary activities);
- Additional rail noise associated with the increased transport of coal along the Antiene Rail Spur;
- Additional traffic noise associated with the transport of construction materials, personnel, consumables, and waste materials to and from the site;
- Additional noise generation associated with short term construction activities;
- Cumulative noise impacts with surrounding industry and mining operations; and
- Blasting vibration and overpressure impacts at near neighbours and heritage properties.

7.2.3 Assessment Methodology

A noise and blasting impact assessment will be conducted for the Project by Wilkinson Murray. The scope of assessment will include:

- A review of noise monitoring data and previous assessments undertaken at Mt Arthur Coal (see further detail below);
- Background noise surveys at sensitive receptors in the vicinity of Mt Arthur Coal;
- Predictive noise modelling of the Project and infrastructure at 2011, 2016 and 2022 in accordance with DECC's *Industrial Noise Policy 2000* (INP);
- An assessment of sleep disturbance and low frequency noise as a result of the Project;
- An assessment of traffic noise in accordance with the *Environmental Noise Control Manual 1985* (ENCM);
- An assessment of the potential noise associated with construction activities;

- An assessment of rail traffic noise;
- An assessment of vibration and overpressure blasting impacts at near neighbours and European heritage properties;
- An assessment of cumulative noise and blasting impacts; and
- The identification of noise and blasting mitigation and management measures.

As part of the preliminary noise assessment undertaken for the EA, Wilkinson Murray completed an extensive review of the noise monitoring data collected by Mt Arthur Coal over the last eight years. The monitoring data was comprehensively analysed to identify the background noise levels around Muswellbrook, in the absence of Mt Arthur Coal's operations.

Further to this, additional background monitoring was conducted in October 2008 at three locations along Denman Road and one location in South Muswellbrook. This monitoring data will be analysed in conjunction with existing monitoring data to confirm the background acoustic environment.

7.3 GROUNDWATER

7.3.1 Background

The EA Boundary contains the following three groundwater aquifer systems: Regolith (soils and weathered rock) aquifers, Alluvial Land aquifers and the Coal Measure aquifers. The Regolith aquifer is located just below the surface and is replenished by extended periods of high rainfall. Alluvial Land aquifers are generally shallow storage areas connected to surface drainages (e.g. the Hunter River and Saddlers Creek) whilst the coal measure aquifers capture water permeating from the surrounding parent rock.

These three aquifer systems can act in isolation or be interconnected. The shallow regolith aquifer captures and stores surface water (rainfall) which percolates downwards through the strata cracking to the more confined coal measure aquifers. The unconfined Alluvial Land aquifers including the Hunter River and Saddlers Creek comprise unconsolidated silts, sands and fine gravel that act as drainage sinks.

Groundwater is managed at Mt Arthur Coal in accordance with a comprehensive Water Management Plan. The management plan requires that groundwater is monitored on a periodic basis from 19 sites around Mt Arthur Coal's operations. Groundwater samples are analysed for pH, electrical conductivity (EC), total suspended solids (TSS), total dissolved solids (TDS) and filtered iron. Groundwater quality within the coal measures and Alluvial Land aquifers is generally brackish to saline, while water quality varies from fresh to saline within the regolith aquifer. The groundwater quality within the EA Boundary is consistent with regional groundwater qualities.

7.3.2 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;
- Alluvial aquifer depressurisation through pit dewatering forming a cone of depression extending from the pit that reduces standing water levels in the vicinity of the mine;
- 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.

7.3.3 Assessment Methodology

A groundwater impact assessment will be conducted for the Project by Australasian Groundwater and Environmental Consultants (AGE). The scope of assessment will include:

- An assessment of the potential for mine groundwater impacts (including impacts on alluvial aquifers and neighbouring landowners boreholes) (utilising a minimum of two years baseline data) via predictive numerical modelling in the finite-element simulation package FEFLOW (Diersch, 2005);
- Estimation of mine groundwater inflow rates suitable for input into the water balance for the Project;
- An assessment of any groundwater impacts of infrastructure;
- An assessment of cumulative groundwater impacts incorporating surrounding mining and other activities;
- An assessment of post-mine groundwater impacts; and
- Identification of any groundwater impact mitigation measures necessary for the Project.

Previously conducted core test results and in-situ boreholes will be utilised to determine seam and interburden permeability's in conjunction with past studies. Exploration and survey data will be used to assign geographic and geological parameters like seam depths, special geological anomalies and river bed heights etc. Coal seam geometry, other smaller drainages, alluvial lands and adjacent mining operations will also be considered in the model.

The Mt Arthur North EIS presented an alluvium boundary which was based on approximately 200 observation locations (test pit and drill holes). Further hydro-geological assessments of the alluvial boundary are currently being undertaken as part of the Project to complement these previous works to confirm that the proposed mining area does not encroach on the Hunter River Alluvials and that an appropriate impermeable buffer zone remains between mining and the Hunter River Alluvials, consistent with DWE guidelines.

7.4 SURFACE WATER & SEDIMENT / EROSION CONTROL

7.4.1 Background

Several creeks traverse the EA Boundary including: Whites Creek; Fairford Creek; Saddlers Creek; Quarry Creek; and some smaller un-named creeks. The southern portion of Whites Creek was previously diverted in accordance with the MAN development consent. The creeks all flow in a northerly direction towards the Hunter River.

Mt Arthur Coal has implemented a Water Management Plan which prescribes the system to effectively source, capture, divert, store, monitor, utilise and reticulate water on site. Mt Arthur Coal's water management system comprises of raw water imported to site from the Hunter River, mine water collected from runoff, groundwater seepage and recycling from the CHPP, treated effluent from MSC and fresh water from the potable water supply system.

Mt Arthur Coal has an extensive on-site water storage capacity of more than 6,040 Mega Litres (ML). A system of water storage and diversion structures is used to manage water in such a way as to minimise the site's reliance on clean water use and maximise reuse of recycled mine water.

Key objectives of the site water management plan, which will be applied to the Project include:

- Diverting runoff from undisturbed areas around areas disturbed by mining activities and allow them to drain from the site, where possible;
- Provide water storages to ensure sufficient capacity for mine site usage;
- Collect runoff from all active mining areas, overburden emplacement areas and establishing rehabilitation areas in catch drains and direct it to sediment traps and settling dams to remove suspended sediment, prior to utilisation or drainage from site; and
- Provide an adequate level of flood protection for mining operations.

Mt Arthur Coal monitors surface water quality from a network of 18 surface water sampling points, which includes creeks and dams surrounding the mining operations. Surface water is analysed for pH, EC, TSS, TDS and filtered iron. Additional testing of sulphates, nitrates and oil and grease is also conducted as required.

7.4.2 Potential Impacts

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

- Increased turbidity and sedimentation impacting on downstream water quality;
- Potential for discharge of surplus water makes or demand from existing sources for any operational water deficits;
- Changes to the catchment area, with consequent impacts on catchment yields and drainage downstream of the site;

- Additional controlled discharge to the Hunter River, with consequent potential impacts on downstream water quality and drainage; and
- Post-mining surface water impacts on catchment yields water quality and drainage.

7.4.3 Assessment Methodology

A surface water impact assessment will be conducted for the Project by Gilberts & Associates. The scope of assessment will include:

- Assessment of the existing surface water environment including major flow paths, drainage, water storage locations, water quality and downstream water usage;
- Preparation of a water balance and identification of water demands and management requirements for the Project;
- Review of the existing Mt Arthur Coal mine water management system model including a consideration of a range of water management scenarios during the life of the Project;
- Assessment of impacts on downstream catchment yields and drainage systems;
- Assessment of post-mining surface water impacts; and
- Identification of any impact mitigation measures necessary for the Project.

7.5 ECOLOGY

7.5.1 Background

The EA Boundary area has been largely cleared of woodland for agricultural related purposes and previous mining activities, with small isolated patches of remnant vegetation remaining. The biodiversity present is representative of similar disturbed woodlands and grasslands occurring extensively across the Upper Hunter Valley.

Extensive ecological surveys have been completed over the EA Boundary during the last 15 years, including comprehensive field studies undertaken for the Bayswater No. 3 EIS (Resource Planning, 1993), MAN Coal Project EIS (URS 2000), South Pit Extension EA (Umwelt, 2006) and the MAU EA (Umwelt, 2008), in addition to an annual ecological monitoring program. These surveys and assessments provide extensive background information for the ecological assessment for the Project.

Previous assessments and surveys at Mt Arthur Coal has identified several threatened flora and fauna species which are known to occur or have the potential to occur within the Project area of disturbance, as indicated in **Table 7**.

Table 7
Threatened Flora and Fauna Relevant to the Project Area

Species	EPBC Act Listing	TSC Act Listing
Flora		
<i>Bothriochloa biloba</i>	Vulnerable	Not listed
<i>Diuris tricolor</i>	Vulnerable	Vulnerable
Fauna		
Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>)	Vulnerable	Not listed
Speckled Warbler (<i>Pyrholaemus saggitata</i>)	Not Listed	Vulnerable
Grey-crowned Babbler (<i>Pomatostomus temporalis temporalis</i>)	Not Listed	Vulnerable
Squirrel Glider (<i>Petaurus norfolcensis</i>)	Not Listed	Vulnerable
Eastern bentwing-bat (<i>Miniopterus schreibersii oceanensis</i>)	Not Listed	Vulnerable
Large footed myotis (<i>Myotis adversus</i>)	Not Listed	Vulnerable
Greater broad-nosed bat (<i>Scoteanax rueppellii</i>)	Not Listed	Vulnerable
Eastern freetail-bat (<i>Mormopterus nfolkensis</i>)	Not Listed	Vulnerable
Eastern cave bat (<i>Vespadelus throughtoni</i>)	Not Listed	Vulnerable
Hooded Robin (<i>Melanodryas cucullata cucullata</i>)	Not Listed	Vulnerable
Diamond Firetail (<i>Stagonopleura guttata</i>)	Not Listed	Vulnerable
Yellow-bellied sheath-tail-bat (<i>Neophema pulchella</i>)	Not Listed	Vulnerable

25 migratory avian species listed under the EPBC Act have also previously been identified or have the potential to occur at Mt Arthur Coal.

Further vegetation mapping has already been undertaken by Cumberland Ecology as part of the Project to enhance the existing data, cumulating in the comprehensive identification and mapping of the following vegetation communities:

- Upper Hunter White Box – Ironbark Grassy Woodland;
- Spotted Gum Forest;
- Central Hunter Box – Ironbark Woodland;
- Mt Arthur Forest Complex;
- Narrabeen Foothills Slaty Box Woodland;
- Hunter Floodplain Red Gum Woodland;

- Central Hunter Bulloak Forest Regeneration;
- Upper Hunter Hills Exposed Ironbark Woodland;
- Derived Grassland; and
- Planted vegetation.

The 'White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland' (Box Gum Woodland and Derived Grassland) which is listed as a Critically Endangered Ecological Community (CEEC) under the EPBC Act has also been identified at Mt Arthur Coal from preliminary surveys, however the area which contains this community will not be disturbed by the Project.

The 'Hunter Valley Weeping Myall Woodland' which is an Endangered Ecological Community (EEC) listed under the TSC Act has also been previously recorded at Saddlers Creek, again outside of the proposed mining area.

As noted in **Section 4.3**, an EPBC Referral has been prepared to support the Project. The Referral is currently awaiting determination from DEWHA.

Mt Arthur Coal has two conservation areas, the Mount Arthur Conservation Area and the Saddlers Creek Conservation Area (**Figure 9**) which total approximately 395 ha. Their purpose is to offset the impacts of mining development on flora and fauna and archaeological values. The offsets contain high quality vegetation including threatened species and are strategically located to provide a corridor for wildlife to move throughout the mining area and access other landscapes in the vicinity (**Figure 9**).

The MAU EA also committed to the enhancement of approximately 154 ha west of Edderton Road to improve its ecological corridor values. None of these conservation initiatives will be disturbed by the Project.

7.5.2 Potential Impacts

Most of the woodland vegetation that once covered the EA Boundary has been cleared for agriculture, however approximately 1,600 Ha of remnant vegetation remains. Some of these remnants occur within the proposed mining area for the Project and will be directly impacted.

Specific flora and fauna impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Additional clearance of vegetation within the proposed mine extension areas; and
- The displacement of faunal communities and therefore increased competition for habitat in the surrounding environment.

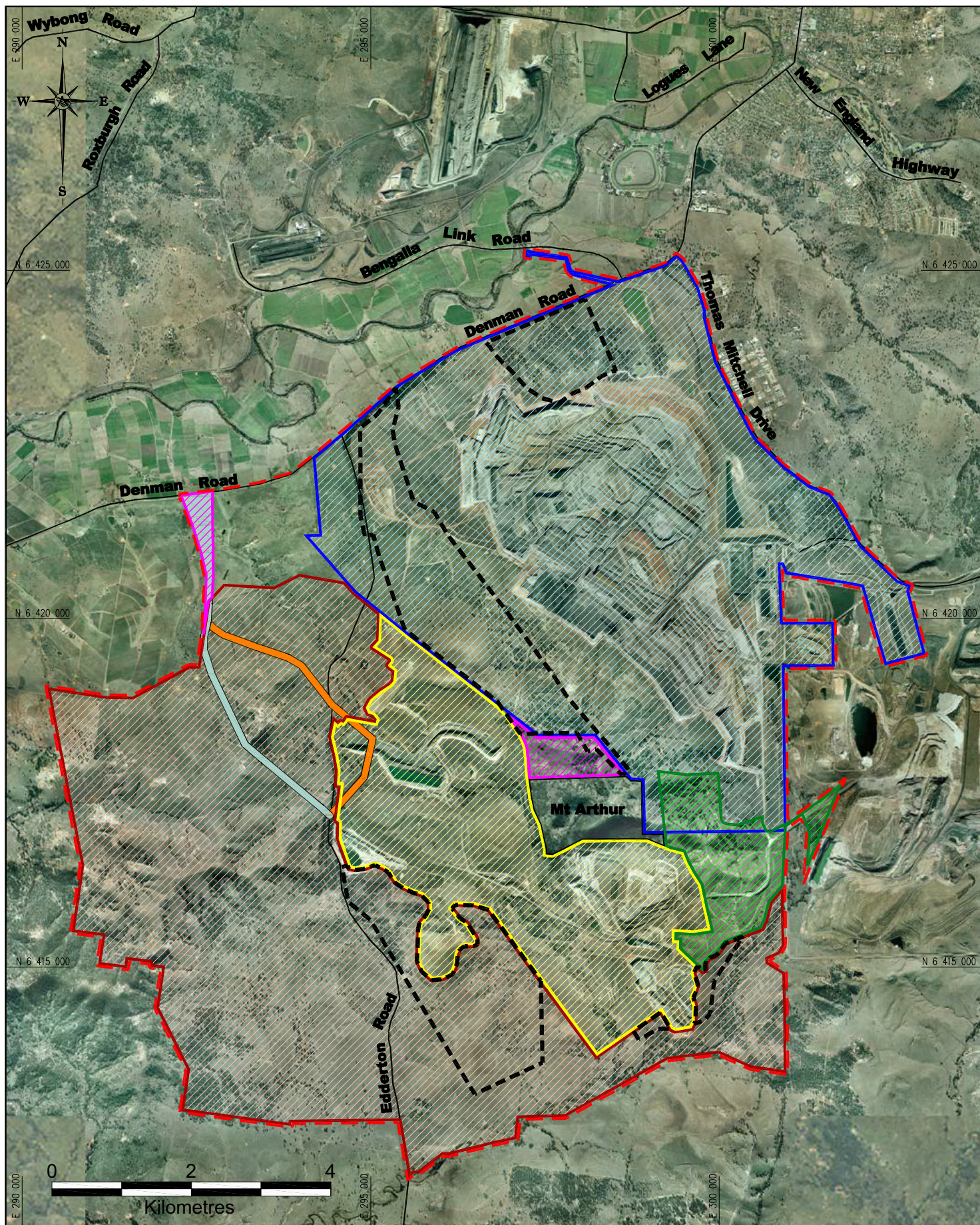
7.5.3 Assessment Methodology

A Flora and Fauna Impact Assessment will be completed for the Project by Cumberland Ecology in accordance the *DECC Draft Guidelines for Threatened Species Assessment* (DEC, 2005b).

As described above and shown on **Figure 11**, numerous previous flora and fauna impact assessments have been conducted at Mt Arthur Coal, covering the majority of areas proposed to be affected by the Project. As such, detailed flora and fauna surveys will concentrate on the two remaining areas which have not already been surveyed.

The scope of the Flora and Fauna 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;
- Mapping the distribution of vegetation communities in the EA Boundary by ground survey and air photo interpretation;
- Listing of flora species and descriptions of vegetation communities within the EA Boundary;
- Targeted searches for threatened flora species, threatened ecological communities and critical habitat (as listed under the schedules of the TSC Act and EPBC Act) that may potentially occur in the EA Boundary;
- Habitat assessment of the EA Boundary;
- Assessment of impacts on listed vegetation communities and threatened flora and fauna species;
- Identification of any impact mitigation measures necessary for the Project; and
- Development of a Mt Arthur Coal Complex habitat management strategy.



- MAC Consolidation Coal Extension Area
- Mt Arthur North Survey Area (2001)
- MAC South Pit Survey Area (2007)
- Mt Arthur Underground Survey Area (2008)
- Bayswater 3 Mining Area (1993)
- MAC Consolidation EA Survey Boundary
- Areas To Be Surveyed
- Edderton Road Realignment Option 1
- Edderton Road Realignment Option 2

Hansen Bailey



Co-ordinate System: MGA Zone 56

Sources: Umwelt (2007 & 2008), Dames & Moore (2001)

MT ARTHUR COAL

MAC Consolidation EA Survey Area

Cad File: 03441G.dwg

Date: 11.03.09

Drawn: TB

Figure
11

7.6 VISUAL

7.6.1 Background

The EA Boundary area has been largely cleared of woodland for agricultural related purposes and previous mining activities with only small isolated patches of remnant vegetation remaining. The EA Boundary contains two main elevated ridges – Mt Arthur (480 m) located centrally within the Project boundary and Macleans Hill (230 m) to the north east. The EA Boundary is screened in part by existing trees planted by Mt Arthur Coal adjacent to Denman and Edderton Roads.

The visual character of lands within and adjacent to Mt Arthur Coal are generally defined by mining and grazing operations. The EA Boundary area is dominated by open cut mining areas, overburden emplacement areas, CHPP and associated buildings which are visible from some locations surrounding the EA Boundary. The key viewing locations within the Projects Primary Visual Catchment include:

- South Muswellbrook;
- Denman;
- Racecourse Area;
- Residences on Roxburgh Road;
- Roxburgh Vineyard;
- Rural Residences along the Hunter River to the north and north west of the site;
- Denman Road;
- Golden Highway; and
- New England Highway.

As part of its approved operations, Mt Arthur Coal constructed a visual bund to screen views of the mining operation from South Muswellbrook. This visual bund will be maintained and extended for the Project. Mt Arthur Coal has also implemented management plans for lighting and landscaping that specify the control measures to reduce the visibility of the operation off-site, which will continue for the Project.

7.6.2 Potential Impacts

The extended open cut mining area, mining into Macleans Hill and increase in overburden emplacement area height will all be key visual impacts resulting from the Project. These visual impacts will modify the existing viewing environment at viewing locations, including (but not limited to): Racecourse Road; Denman Road; Skelletar Stock Route and Roxburgh Road. The mining into Macleans Hill, which currently provides a barrier to a number of neighbouring residences, is also expected to result in further visual impacts for some additional areas to the north and west of Mt Arthur Coal; however the extension of the visual bund will assist in mitigating the visual impact.

7.6.3 Assessment Methodology

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

- Characterisation of the existing visual environment and landforms taking into consideration existing approvals;
- Identification of sensitive view sheds (including nearby residences);
- Assessment of the visual sensitivity of these view sheds;
- Assessment of potential impacts due to night lighting;
- Development of a 3-D digital terrain model incorporating visual simulations and photomontages at relevant locations;
- Assessment of the degree of visual landscape alteration that the Project would have on sensitive view sheds, including the use of visual simulations, where appropriate; and
- Identification of any impact mitigation measures necessary for the Project.

7.7 ABORIGINAL ARCHAEOLOGY & CULTURAL HERITAGE

7.7.1 Background

The entire EA Boundary area has been subject to some of the most detailed Aboriginal heritage assessments and archaeological salvage projects ever conducted in NSW. The extensive level of Aboriginal archaeological investigation and research conducted to date at Mt Arthur Coal has provided a comprehensive record of Aboriginal heritage sites across the entire EA Boundary.

The following is a chronological list of all surveys and assessments that have been completed at Mt Arthur Coal:

- Dyll (1980) - Mount Arthur North Coal Lease survey;
- Dyll (1981) - Mount Arthur South Coal Lease survey;
- Koettig and Hughes (1985) – Mount Arthur North and Mount Arthur South coal lease areas;
- Bayswater Archaeological Research Project (1993 – 2005), which was a collaboration with the University of New England, including several reports by Davidson, James and Fife (1993), ERM Resource Planning (1995), Appleton (1995), Fife (1995), Wilson (1995), MacDonald (1996) and MacDonald and Davidson (1998 and 2005);
- Umwelt (Australia) Pty Limited (1997) – Bayswater Coal Project Modifications to CHPP and Transportation systems;
- South East Archaeology (Kuskie (1999)) – MAN EIS Aboriginal Archaeological assessment;
- South East Archaeology (Kuskie (2001)) – MAN Coal Mine: Excavation Permit Application and Research Design;

- Kuskie and Clarke (2004) – Aboriginal archaeological salvage of MAN;
- ERM (2004) – Review of archaeology in the Upper Hunter Valley on behalf of the Upper Hunter Aboriginal Heritage Trust;
- Umwelt (2005) – Surface Collection, Mt Arthur Coal;
- Umwelt (2006) – South Pit Extension Project;
- Umwelt (2006) – Archaeological Assessment for Downcast Ventilation Shaft and Associated Infrastructure, Proposed Exploration Adit; and
- Umwelt (2007) – Mt Arthur Underground Project, Aboriginal Archaeological Assessment.

The most significant of the above archaeological assessments relevant to the Project are discussed further below.

Mt Arthur North EIS (Kuskie, 1999)

The archaeological assessment undertaken for the MAN EIS included the survey and study of the entire MAN DA boundary. The survey, undertaken by South East Archaeology (Kuskie, 1999) and the Wonnarua Tribal Council between December 1998 and September 1999, was conducted over a period of 5 weeks involving a total of 220 person-days.

The MAN EIS study area was subdivided into 520 survey areas, all of which were sampled. All representative environmental contexts were sampled, including a range of landform elements, classes of slope, archaeological terrain units (specific combinations of landform element and slope), geological formations and soil units.

The MAN EIS Aboriginal archaeological assessment resulted in the identification of 305 Aboriginal heritage sites within the overall study area, consisting predominantly of open artefact scatters and one set of axe grinding grooves. The scientific value of evidence identified was assessed as ranging from low to high within a local context and low to moderate within a regional context. The majority of identified Aboriginal heritage sites (with the exception of the grinding grooves) were disturbed by the MAN project, as Kuskie (1999) notes:

“10 sites lie outside of the mining lease application area in Authorisation A171 ... 295 sites occupying 81% of the mining lease application area may be impacted by the proposal”.

To mitigate the proposed disturbance of Aboriginal heritage sites, Kuskie (1999) proposed *“the establishment of a 122 ha conservation zone west of Edderton Road”*. However, Kuskie also recognised that *“due to the nature and extent of the proposed open cut mining operations within the mining lease, conservation of most areas would not be feasible without sterilising a significant proportion of the coal reserves”*.

Approval for the MAN Project was subsequently granted in 2001. As part of the approval, Mt Arthur Coal was required to establish three Heritage Management Zones (HMZ) and a VCA (see **Figure 9**).

This specific requirement is outlined in the MAN Development Consent Condition 3.3 – *Heritage Assessment, Management and Monitoring*, which states:

“The Applicant shall prior to the commencement of Mining Operations:

(a)(i) Identify of all areas of conservation within the DA area. The establishment of a VCA at Mount Arthur and Heritage Management Zones 1 (west of Edderton Road), 2 (south-east of Edderton Road), 3 (Macleans Hill), as shown on Schedule A...

(d) No s90 permits will be granted for the Aboriginal sites contained within the three (3) heritage management zones...”

Aboriginal Archaeological Salvage of MAN (Kuskie and Clarke, 2004)

Kuskie and Clarke (2004) completed Aboriginal archaeological salvage excavations and surface collections for numerous sites located within the MAN Mining Lease (ML) area, in accordance with an Excavation Permit and Section 90 Consent and Permit to Salvage artefacts. Kuskie and Clarke (2004) excavated a total area of 779 m² by hand, with an additional 38 hectares excavated by surface scrapes. Kuskie and Clarke’s (2004) archaeological salvage investigations thoroughly tested all archaeological terrain units throughout the MAN ML area and adjoining land.

South Pit Extension Project (Umwelt, 2006)

Umwelt completed an Aboriginal archaeological assessment as part of the MAN South Pit Project Environmental Assessment (EA) during 2006. The MAN South Pit Extension Project proposed to extend the approved MAN South Pit further south into the Bayswater No. 3 Mining Lease.

The survey area utilised as part of this Aboriginal archaeological assessment was limited as Umwelt (2006) noted that *“the northern section of the South Pit Extension Area was previously comprehensively surveyed by Kuskie (1999) as part of the MAN EIS. Therefore, the survey for this Project was limited to the area not previously surveyed by Kuskie (1999)”*.

The South Pit assessment identified eight sites consisting of 42 site loci, of which 30 loci in six sites were proposed to be impacted by the South Pit extension project. Five of the six sites to be impacted were assessed as having low to moderate archaeological significance, whilst one site was assessed as having moderate to high archaeological significance on a local and regional scale.

Umwelt (2006) recommended the surface collection of identified Aboriginal heritage proposed to be disturbed as part of the South Pit extension, further noting that *“subsurface salvage was not warranted due to the lack of site integrity...and in recognition of the comprehensive archaeological investigations undertaken of similar terrain units across the MAN ML as part of Kuskie and Clarke’s (2004) subsurface investigations.”*

Mt Arthur Underground Project (Umwelt, 2007)

Umwelt conducted an Aboriginal archaeological assessment in consultation with relevant Aboriginal stakeholder groups during 2007 for the MAU. The assessment covered a survey area of approximately 3,800 hectares and covered all areas of proposed disturbance and subsidence affectation, which had not previously been assessed or salvaged.

A total of 77 sites were identified within the survey area, including one scarred tree, 46 artefact scatters and 30 isolated finds. Three sites within the survey area were assessed as having high archaeological significance; two were assessed as having a moderate to high archaeological significance; three sites as having moderate archaeological significance; four sites as having low to moderate archaeological significance; and 65 sites as having low archaeological significance.

Umwelt (2007) recommended that *“to offset the impacts of the Underground Project on Aboriginal cultural heritage, MAC will set aside the Saddlers Creek Conservation Area, to be preserved in perpetuity, to offset the loss of cultural heritage values”*. MAC also proposed to provide the following additional cultural heritage management measures as part of the overall offset strategy for the Underground Project:

- *“MAC will fund and construct a Keeping Place within the Proposed Saddlers Creek Conservation Area as part of the Aboriginal cultural heritage offset strategy. The Keeping Place will have a storage room for artefacts and display centre for teaching/education purposes. The Keeping Place will be staffed for 50 days per annum by appropriately trained Aboriginal community representatives;*
- *MAC will fund the training of five representatives from the registered stakeholder groups to undertake ‘Collections Training’ at the Australian Museum for staffing of the proposed Keeping Place;*
- *MAC will construct ... a facility suitable for use by the Aboriginal community when using the area for teaching purposes; and*
- *MAC will provide training for up to one member of the registered Aboriginal stakeholder groups ... in relation to site recording and artefact recording and basic analysis.”*

7.7.2 Potential Impacts

Potential impacts on Aboriginal archaeology and cultural heritage resulting from the Project include the removal of archaeological sites and items within the proposed disturbance area. This will include archaeological sites previously identified in the MAN EIS by Kuskie (1999) and newly identified sites not yet surveyed. The set of axe grinding grooves identified by Kuskie (1999) in the MAN EIS are not proposed to be impacted by Project, similarly with Aboriginal heritage sites identified by Umwelt (2007) as part of the MAU EA. Any Aboriginal sites identified by Umwelt (2006) as part of the South Pit EA have recently been salvaged and hence will not be impacted by the Project.

The Project may also impact on non-archaeological Aboriginal cultural heritage values of the area. Therefore, a relevant Aboriginal Cultural Heritage assessment will be undertaken and included in the EA (see **Section 7.7.3**).

Interaction with Heritage Management Zones

The proposed disturbance area for the Project incorporates three Heritage Management Zones (HMZ) – west of Edderton Road HMZ, Macleans Hill HMZ and south-east of Edderton Road HMZ (see **Figure 9**) which were established as part of the MAN Project. All archaeological sites and items within these proposed disturbance areas are proposed to be collected with members of the local Aboriginal community, in consultation with DECC.

7.7.3 Assessment Methodology

The Aboriginal Archaeology and Cultural Heritage Impact Assessment for the Project will be conducted by ENSR Australia in accordance with the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DECC, 2005a).

As described above and shown on **Figure 11**, numerous Aboriginal archaeology impact assessments have been conducted at Mt Arthur Coal, covering the majority of areas proposed to be affected by the Project. As such, a field-based assessment with members of the local Aboriginal community will be concentrated in the two remaining areas which have not already been surveyed. The proposed scope of the Aboriginal archaeological and cultural heritage assessment includes:

- Desktop review, including Aboriginal Heritage Information Management System (AHIMS) database search, Native Title Search and a review of the substantive, previously compiled studies conducted in the area;
- A field-based Archaeological and Aboriginal Cultural Heritage impact assessment with members of the local Aboriginal community. The fieldwork will focus on reviewing the proposed disturbance area and identifying additional sites of Aboriginal cultural heritage within the proposed disturbance area further to that identified in the MAN EIS by Kuskie (1999);
- Preparation of an Aboriginal Archaeology and Cultural Heritage Impact Assessment Report to meet the DECC guidelines 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 and a re-evaluation of the significance of Aboriginal sites identified by Kuskie (1999) which are proposed to be disturbed;
- Aboriginal stakeholder consultation in accordance with the “*Interim Community Consultation Requirements for Applicants*” (DECC, 2004); and
- Development of an appropriate management strategy for any Aboriginal heritage sites and HMZs that are identified to be disturbed, including the possible development of a Mt Arthur Coal Complex archaeological offsets strategy, in consultation with local members of the Aboriginal community and DECC.

7.8 TRAFFIC & TRANSPORT

7.8.1 Background

The principal road network adjacent to Mt Arthur Coal is shown on **Figure 1** and includes:

- The New England Highway (to the east of the EA Boundary);
- Denman Road (adjacent to the north of the EA Boundary);
- Thomas Mitchell Drive (adjacent to the west of the EA Boundary);
- Edderton Road (to the west of the EA Boundary); and
- The Mt Arthur Coal Access Road.

Excluding the Mt Arthur Coal Access Road, all the roads are under the control of the NSW Roads and Traffic Authority (RTA) or Muswellbrook Shire Council (MSC). These roads provide significant transport corridors within the local area.

Mt Arthur Coal has undertaken significant upgrade works on the existing road network for previously approved projects, including the upgrade of the intersections of Thomas Mitchell Drive with Denman Road and with the New England Highway.

As discussed in **Section 2.1.2**, product coal from Mt Arthur Coal is transported via the Bayswater Rail Loading facility onto the Antiene Rail Spur and ultimately onto the Main Northern Railway Line to the Port of Newcastle. Domestic coal is transported via an overland conveyor from Mt Arthur Coal to Macquarie Generation's Bayswater Power Station. Coal is only transported by road in an emergency situation and with approval by the Director General of DoP.

7.8.2 Potential Impacts

The project will increase light vehicle movements associated with employees and contractors, and increased heavy vehicle movements associated with delivery of materials to the site. An increase in local traffic flows will occur during the construction and ongoing operational phases of the Project and during the realignment of Edderton Road. In particular increased traffic flows immediately before and after shift changes is a common period of increased traffic movements.

The proposed realignment of a section of Edderton road may result in slightly greater travel distances and times for road users during construction, however the realigned section will be designed as a dual-lane carriage bitumen sealed road with a speed limit of 100 km per hour, thereby resulting in an improved transport route potentially reducing travel times.

Coal will be transported by rail from the site using the existing approved Bayswater rail loading facility. The increase in production and export coal transportation will require additional infrastructure and increased rail movements associated with delivery of product coal to the Port of Newcastle.

7.8.3 Assessment Methodology

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

- Evaluation of the existing road transport environment (e.g. road hierarchy, road conditions, traffic conditions and safety);
- Review and analysis of background traffic counts and intersection analysis;
- Assessment of the capacity of the affected road network to cater for differing traffic volumes due to the proposed change in traffic flows. This will necessarily involve assessment of the capacity of affected public roads and intersections in accordance with *Austroad* guidelines;
- Identification of impacts of the Project relating to works on the public road network;
- Quantification of predicted increases in traffic during the construction and operational phases (considering potential future traffic flows);
- Assessment of potential impacts on traffic conditions, levels of service and intersection operation during peak periods;
- An assessment of any impacts in relation to the relocation of a section of Edderton Road; Assessment of cumulative traffic impacts; and
- Identification of any impact mitigation measures necessary.

Background traffic counts were completed by Northern Transport and Engineering between 31 October and 6 November 2008 at several locations surrounding the EA Boundary including:

- T1 – Denman Road before the Thomas Mitchell Drive intersection;
- T2 – Thomas Mitchell Drive before the Denman Road intersection;
- T3 – Denman Road between the Bengalla Link Road and Thomas Mitchell Drive intersection; and
- T4 – Denman Road before the Edderton Road intersection;
- T5 – Denman Road after the Edderton Road intersection;
- T6 – Edderton Road after the Denman Road intersection;
- T7 – Mt Arthur Coal Access Road; and
- T8 – Thomas Mitchell Drive.

Metrocount traffic flow counters were installed and maintained at the locations for a period of 8 days with the direction at each traffic count location (i.e. westbound and eastbound traffic) recorded. Vehicles were classified into Austroads classes 1 to 12. An intersection count was also conducted at Edderton Road / Denman Road to provide further background data for the EA. This background data will be utilised in the Traffic and Transport Impact Assessment for the Project.

7.9 NON-ABORIGINAL HERITAGE

7.9.1 Background

The Hunter Region is rich in European heritage, with settlements in the region dating back to 1801. The majority of the EA Boundary area comprises the original Edinglassie Station, established in 1824 by George Forbes. The property was used for pastoral activities and increasingly subdivided.

The MAN EIS identified seven heritage sites of local significance within the EA Boundary area. The MAU EA identified a further eight additional heritage sites within the revised EA Boundary, also of local significance. No Heritage items listed in Schedule 2 of the *Hunter Regional Environmental Plan 1989 (Heritage)* (REP) or the *Heritage Act 1977* were identified within the current EA Boundary.

Three homesteads of Regional Heritage Significance (as listed in schedule 2 of the REP) are located to the north of the EA Boundary along Denman Road. These are shown on **Figure 2** and listed in **Table 8** with Edinglassie Homestead and Rous-lench Homestead owned by Mt Arthur Coal.

Table 8
European Heritage

Site Name	Heritage Listing(s)
Edinglassie Homestead (circa 1800)	• State Heritage Register • Hunter REP • Muswellbrook LEP • National Trust Register
Rous-lench Homestead (circa 1985)	• Register of the National Estate • State Heritage Register • Hunter REP • Muswellbrook LEP • National Trust Register
Balmoral Homestead (circa 1857)	• Register of the National Estate • Hunter REP • Muswellbrook LEP • National Trust Register

Further to the previous assessments, preliminary surveys conducted as part of this EA have identified two additional heritage sites of limited local significance, which are not listed under any statute.

7.9.2 Potential Impacts

The Project is not anticipated to disturb any heritage items, including the newly identified sites from preliminary EA assessments. The three regionally significant and listed homesteads located within 500 m of the EA Boundary (Edinglassie, Balmoral and Rous-lench) may potentially experience impacts as a result of blasting activities.

7.9.3 Assessment Methodology

A European Heritage Impact Assessment will be completed for the Project by Archaeology Australia in accordance with relevant guidelines and legislation. 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 brief field survey focusing on any areas not previously surveyed (see **Figure 11**);
- Assessment of the heritage significance of identified items with proposed disturbance areas;
- Identification of potential impacts to sites of heritage significance; and
- Identification of any impact mitigation measures necessary.

The Noise and Blasting Impact Assessment (discussed in **Section 7.2**) will assess the impact of blasting on heritage items (including Balmoral, Edinglassie and Rous-lench homesteads) and will identify mitigation and management measures, as required.

7.10 SOCIAL IMPACT ASSESSMENT

7.10.1 Background

As discussed in **Section 5.0**, a comprehensive SIA will be developed and integrated with the EA, which has been a defining approach of Mt Arthur Coal's assessment and approval programs since 2001 (e.g. MAN, South Pit Extension Project, Underground Project). Mt Arthur Coal also has ongoing community involvement activities covering four key program areas including:

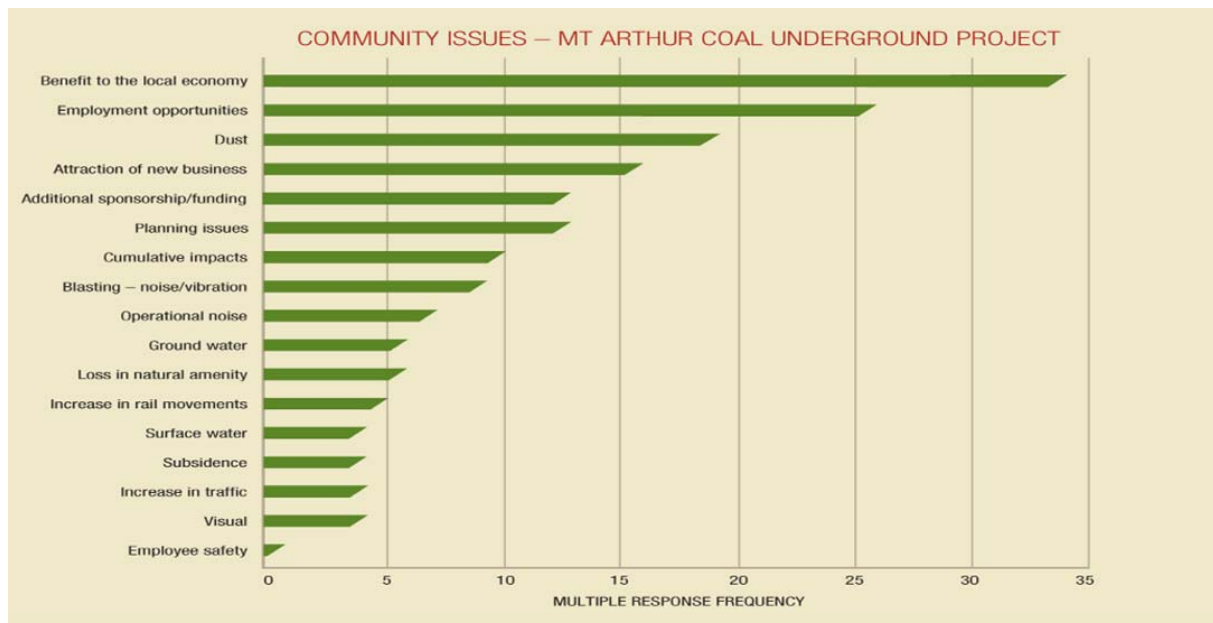
- Community Engagement and Communications;
- Complaint Management;
- Community Support, and
- Monitoring.

Since 2001, a comprehensive database of stakeholders and their issues (over 100 stakeholders have been identified) has been developed. The current assessment will build on existing relationships with these stakeholders and will further inform a historical and future assessment of stakeholder issues in relation to the project.

7.10.2 Potential Impacts

The recent SIA undertaken for the MAU project highlighted that an increase in dust levels; the potential for cumulative impacts with other mines; blasting - noise/vibration; noise from operations and the potential loss of the area's natural features were key concerns of the community (**Table 9**). Based upon a consideration of these issues, it is likely, that increased dust and noise impacts may be of greater concern to local stakeholders for the Project.

Table 9
Mt Arthur Underground Community Issues



Source: Coakes Consulting, 2006

The key benefits of the Project (as also highlighted in the MAU SIA) include significant economic benefit to the state and region associated with job creation, capital expenditure, ongoing operational expenditure, and contributions to community enhancement programs.

As highlighted in the MAU SIA, it is also likely that community concerns in relation to the increased pressures of additional mine developments and their associated workforces, on community infrastructure and service provision within the locality may also be of concern to local stakeholders in relation to the Project.

The Project will require a total workforce of approximately 2,600 at peak production, which represents an increase of 1,610 from current staffing levels and an estimated additional 720 positions directly attributable to the Mount Arthur Coal Consolidation Project. Therefore, the assessment of the social impacts of this population change and the development of appropriate management and mitigation strategies to accommodate such change will be a core component of the assessment.

7.10.3 Assessment Methodology

SIA is an approach used to predict the future effects of a particular proposal on people, that is their way of life (how they live, work and interact with each other); their culture (norms and traditions); and their community (institutions and structures).

SIA involves understanding impacts from the perspectives of those involved in a personal, community, social or cultural sense, to ensure that such issues/perceived impacts are fully assessed and integrated as part of project planning and design. Social impacts may include issues/impacts associated with local employment, procurement and population change, planning, social and cultural resources, personal and property rights, public health and community wellbeing, recreation and tourism, visual aesthetics etc.

The SIA program has the following key objectives:

- To assess the direct and indirect effect of the proposal on communities within the area, particularly those communities within the Shire of Muswellbrook, and beyond as required;
- To assess the compatibility of the proposal with community values and existing land uses;
- To identify the primary and higher order social impacts associated with the proposal; and
- To assess the impacts of the proposal on services, facilities and infrastructure provision in the locality.

Furthermore, as highlighted in **Section 5.0**, the assessment has the following process objectives:

- To initiate and maintain open communication/engagement with key stakeholders and the community on all aspects of the Project;
- To identify and document stakeholder/community issues and concerns in relation to the Project; and
- To proactively respond to and work with key stakeholders, the community and other interested parties to develop appropriate solutions and strategies to minimise negative impacts and enhance the positive impacts associated with the Project.

The methodology for the SIA will be based primarily on information drawn from secondary data review, community involvement and survey research. **Table 10** lists potential activities/mechanisms to be employed in relation to each of the SIA phases described above.

Table 10
Social Impact Assessment Phases, Task & Description

	Objective	Mechanism	Description
Phase 1	To better understand the community and obtain baseline information	Secondary Data Review Media Analysis Social Indicators Analysis	Development of a profile of the social context in which the MAC Consolidation project is based.
Phase 2	To obtain an appreciation of community issues and concerns in relation to the project and more broadly within the locality, and to identify possible strategies/solutions for addressing the issues raised to inform project design and planning.	Community Information Sheet 1 "Outline of the proposal" A range of communication and engagement mechanisms may be employed to inform the assessment including: - Personal interviews (Landowners within and immediately adjacent to the project area) - Focus Groups (combining stakeholders across identified community sectors) - Presentations and briefings to MSC, the CCC's and broader community groups Planning Focus Meeting (involving key government and agency stakeholder)	Engagement with key stakeholders across the following stakeholder group categories is on-going and may include: • Landholders/Near Neighbours • MAC Community Consultative Committee • Bayswater Community Consultative Committee • Community Groups/Organisations and Special interest Groups • Local Government • Indigenous Groups • Service Providers: - Health - Education - Childcare/Early Childhood • Local Businesses and Industry Associations • Employees and Contractors • Mine Suppliers
Phase 3	To assess impact significance to the community and / or particular groups	Community Information Sheet 2 "Issues Feedback" Issue Assessment and Evaluation	Internal assessment of issues, impact evaluation and prediction which will include: • <i>Impact Significance</i> – assessment of impacts associated with MAC Consolidation activities and flow on effects to the township and region. • <i>Population Impact Modelling</i> - prediction of population change across key service sectors.

	Objective	Mechanism	Description
Phase 4	To develop appropriate strategies to address the issues raised	Impact Strategy Development	Involvement of relevant stakeholders in strategy development
	To ensure that the community is informed of assessment outcomes and has the opportunity for further feedback	Community Feedback, including Community Information Sheet 3 - Strategies	Feedback and validation of social and environmental assessment outcomes through a variety of mechanisms
Phase 5	To ensure that the social assessment program and outcomes are documented for consideration in the planning process	Final Reporting	Development of a SIA report for inclusion in the Environmental Approvals documentation.
Phase 6	To determine whether our predictions were correct through monitoring social impacts of the project over time	Monitoring and Management	Development of recommendations for a comprehensive social monitoring program and provision of recommendations for ongoing community relations planning.

Source: Coakes Consulting, 2009

Given the ongoing nature of Mt Arthur Coal's social impact monitoring and engagement activities, where relevant, appropriate data will be sourced from previous assessment and operational engagement activities to inform both a historic and current assessment of social issues and impacts.

7.11 ECONOMICS

7.11.1 Background

The Muswellbrook Shire covers an area of approximately 3,400 km² in the Upper Hunter Valley. The area is supported by mining, agriculture, commerce and industry which creates a stable and successful economic blend. The shire has a population of approximately 16,000 people, the majority of which reside in the township of Muswellbrook with smaller numbers in rural areas and Denman.

The development of Mt Arthur Coal has involved significant initial capital investment, ongoing operational expenditure and the direct employment of over 1000 full time equivalent employees. Operations at Mt Arthur Coal have also resulted in flow-on economic effects such as the creation of indirect employment opportunities and significant expenditure at a local and State level.

7.11.2 Potential Impacts

The Project will require a total proposed workforce at Mt Arthur Coal of approximately 2,600 employees (as discussed in **Section 3.6**). The Project will provide revenue to the State government through the payment of royalties and taxes contributing to the NSW economy. The Project will also maintain employment, further strengthen the local economy and create significant revenue at a state and federal level. However, the Project will also result in additional and ongoing demands on community infrastructure and services, such as skill levels, trade and educational opportunities and population demographics.

7.11.3 Assessment Methodology

The required Economics Impact Assessment will be completed for the Project by Gillespie Economics in accordance with DoP's '*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;
- A regional economic impact assessment of construction and operation of the Project;
- Quantification of the economic cost, benefits and impacts of the Project; and
- Any necessary mitigation measures, as required.

The economic analysis will assess the potential incremental economic costs and benefits of the Project to the community (i.e. consideration of economic efficiency). This will not only include a consideration of the regional economic impact or economic activity generated by the Project but also any incremental costs and benefits to the environment.

7.12 SOILS & LAND CAPABILITY

7.12.1 Background

An extensive soil survey of the EA Boundary has been completed as part of the MAN EIS. The MAN EIS identified eight broad soil classes based on texture and soil profile morphological characteristics across the EA Boundary. The soils are moderately alkaline to moderately acidic and are susceptible to sheet and gully erosion. The predominant soil classes present across the EA Boundary are Class 6 (Red Duplex Soils), Class 7 (Brown Duplex Soils) and Class 8 (Uniform or gradational yellow, red or dark clays).

Agricultural suitability assessments were conducted in the MAN EIS in accordance with the five class system (Riddler, 1996) which allows for assessment and categorisation of land based on suitability for agricultural purposes. Agricultural suitability in the EA Boundary area is predominantly comprised of:

- Class 3 lands – Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with pasture; and

- Class 4 lands – Land suitable for grazing but not cultivation.

Rural Land Capability was also assessed in the MAN EIS in accordance with the standard NSW eight class system (Emery, 1985). The eight class system is based on assessment of biophysical features and categorises the land in terms of general limitations such as erosion hazard, climate and slope. The Rural Land Capability for the EA Boundary was assessed as predominately comprising:

- Class IV lands – Suitable for Grazing and occasional cultivation with simple practices such as stock control and fertiliser application; and
- Class V lands – Suitable for Grazing and occasional cultivation with intensive soil conservation measures required such as contour ripping and banks.

The MAN EIS noted that due to the relative level of the soil deposits and the geomorphological setting of the EA Boundary, the soils are not conducive to the formation of acid sulphate soils.

7.12.2 Potential Environmental Impacts

Many of the soil types within the EA Boundary include soil horizons with a slight to high potential for dispersion and consequently are likely to be subject to sheet, rill and gully erosion if left unprotected during construction or 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 and post mining land use plans and the final landform design. The presence of final voids will also influence the final land use potential and capability.

7.12.3 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 relevant assessment reports and other sources of information;
- A brief field survey focusing on any areas not previously surveyed (see **Figure 11**);
- Mapping of soil types within the proposed mining areas and a description of their physical and chemical characteristics;
- Identification of any soil materials with potentially adverse quality (e.g. acid sulphate generating);
- Identification of the suitability of topsoils for use as topdressing material and potential soil amelioration measures for stabilising soils;

- Pre and post mining land capability and class assessment in accordance with Department of Water and Energy (DWE) guidelines;
- Pre and post mining agricultural suitability assessment in accordance with Department of Primary Industries - Agriculture guidelines; and
- Identification of any impact mitigation measures necessary.

7.13 REHABILITATION, LAND USE & FINAL LANDFORM

7.13.1 Background

Rehabilitation of disturbed areas is an integral and progressive feature of mining operations at Mt Arthur Coal and is conducted in accordance with the MOP and approved Mt Arthur Coal Landscape and Revegetation Management Plan. Rehabilitation planning at Mt Arthur Coal aims 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 run-off.

Rehabilitation at Mt Arthur Coal is designed to be compatible with the surrounding landform, stable and able to support final land use(s). To ensure a stable final landform, the majority of final overburden emplacement slopes are shaped to 10 degrees or less.

Mt Arthur Coal aims to restore land to a condition equivalent to or better than what existed prior to mining. It is anticipated that with good land management practices, final rehabilitation at Mt Arthur Coal is likely to improve to sustain more intensive land-use(s) comparable with Class V or Class IV lands.

Rehabilitated land at Mt Arthur Coal is predominantly re-topsoiled and comprises of a mixture of improved pasture and grasses and native trees and shrubs representing habitat and to a lesser extent forestry values. Reafforestation has been undertaken at Mt Arthur Coal consistent with the Department of Primary Industries – Mineral Resources (DPI) Synoptic Plan for Integrated Mining Landscapes linking remnant native vegetation communities with re-established habitat areas.

7.13.2 Potential Impacts

The extension of mining operations as a result of the Project will require additional disturbance areas and thus, an increased requirement for additional and expedient rehabilitation across Mt Arthur Coal.

As discussed in **Section 3.7**, the mine plan has been specifically revised and designed to obtain the maximum area of rehabilitation available throughout the life of the Project. Increased and expedient rehabilitation will further assist to reduce the potential for wind-blown dust, visual impacts and sediment-laden run-off.

The long-term rehabilitation strategy will be required to be revised to incorporate the Project. The development of biodiversity corridors and contributions to the Synoptic Plan will also be revised as a result of the Project.

7.13.3 Assessment Methodology

The mine plan for the Project has been specifically designed to maximise the available areas of rehabilitation throughout the Project. The proposed rehabilitation areas are indicated on **Figure 6, Figure 7 and Figure 8.**

The proposed mine plan for the Project maintains the development of an undulating, free-draining and stable landform consistent with the surrounding environment. Further planning and detail will be provided in the EA in regard to the revision of biodiversity corridors and final landform.

Progressive rehabilitation at Mt Arthur Coal will continue to be undertaken in accordance with the approved Landscape and Revegetation Management Plan, focusing on utilising a mixture of improved pasture and grasses and native trees and shrubs representing habitat.

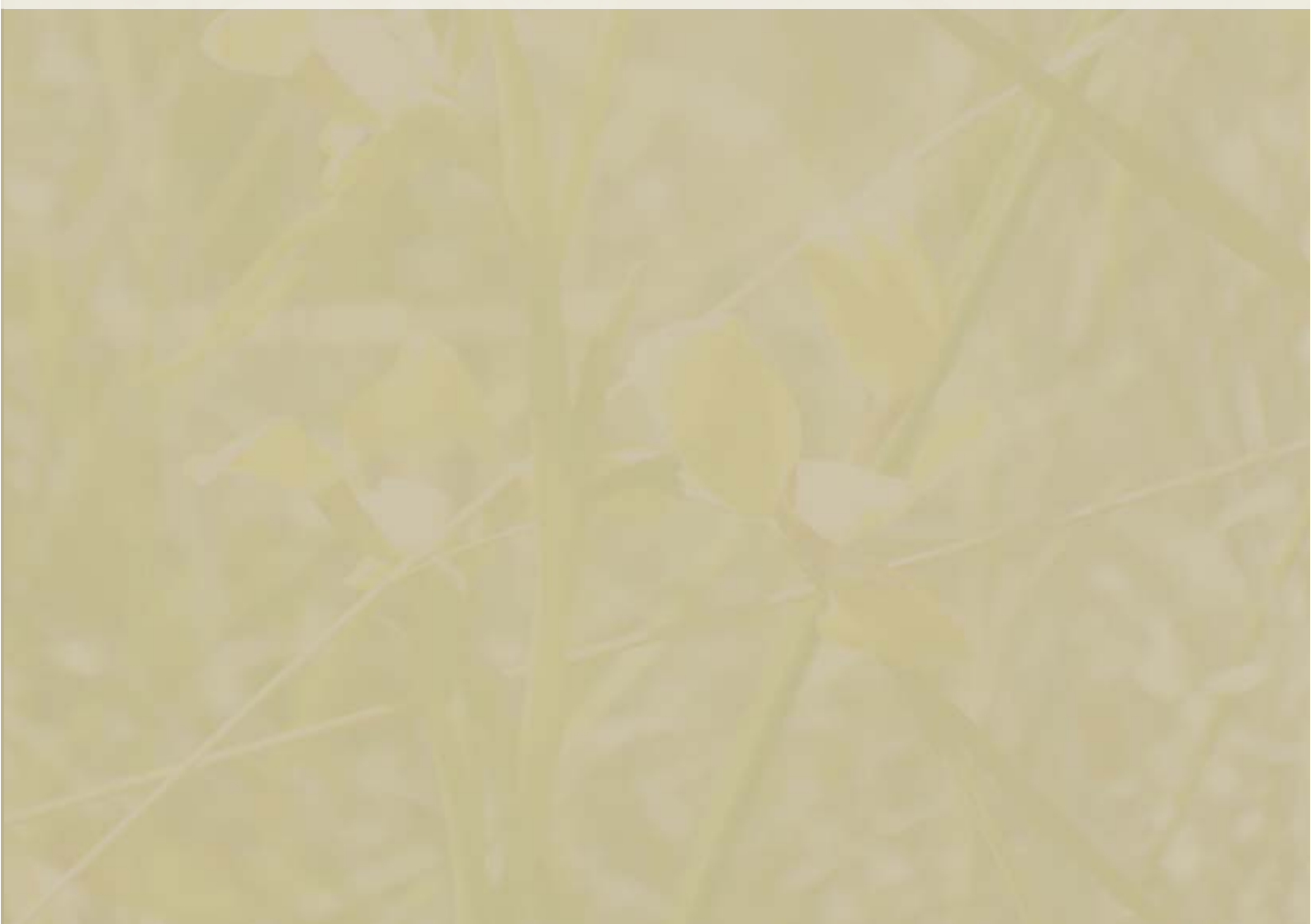
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APPENDIX A

Preliminary Environmental Risk Assessment



**MT ARTHUR COAL
PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT**

*for
Hunter Valley Energy Coal Pty Ltd*

Issue	Aspect	Impact	Initial Risk Assessment			Proposed Control Measures
			C	L	R	
Air Quality	Vegetation clearing, drilling and topsoil stripping	Wind blown dust and machinery exhaust fumes contributing to elevated dust levels	3	C	H	An air quality impact assessment (including dust, spontaneous combustion and greenhouse gas) will be conducted for the Project by Holmes Air Sciences in accordance with the NSW Department of Environment and Climate Changes' (DECC's) <i>'Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales'</i> (DEC, 2001). Dust control measures will continue to be implemented in accordance with the existing MAC Dust Management Plan. Dust management at MAC involves the integration of operational procedures, alarming systems and an extensive monitoring network. Additional operational commitments in relation to dust control will be required to be applied to the Project to ensure monitored levels at adjacent private property remain within acceptable criteria.
	Overburden emplacement		3	C	H	
	Uncovering of coal		2	E	H	
	Coal, rejects and overburden haulage		3	C	H	
	Coal processing and transport		3	C	H	
	CHPP operation and stockpiles		3	C	H	
	Combustion of diesel fuel	Greenhouse gas emissions	2	E	H	The air quality impact assessment will assess greenhouse gas Scope 1, 2 and 3 emissions in accordance with the Australian Greenhouse Office's (AGO) <i>'Factors and Methods Workbook'</i> (AGO, 2005).
	Electricity use		2	E	H	

Issue	Aspect	Impact	Initial Risk Assessment			Proposed Control Measures
			C	L	R	
	Downstream Impacts from the Burning of Coal		2	E	H	MAC will continue to manage and minimise Greenhouse Gas emissions where possible, in accordance with the MAC Greenhouse Gas management plan and will also continue to support, through the Coal21 Project and other industry and Government initiatives, the development of clean coal technologies
	Spontaneous combustion	Heating, vegetation scalding, emissions to air, odours	2	B	L	The air quality impact assessment will include a spontaneous combustion impact assessment. Spontaneous combustion will be managed in accordance with the approved Management Plan. Regular monitoring of areas subject to spontaneous combustion will continue to be undertaken.
	Blasting	Greenhouse gas emissions, fume and dust Generation	3	C	H	Appropriate blasting controls will continue to be applied to the Project, such as restricting blast events in unfavourable weather conditions to minimise impacts.
Acoustics	Coal, rejects and overburden haulage	Excessive Noise generation	2	C	M	An acoustical impact assessment (incorporating noise and blasting) will be conducted for the Project by Wilkinson Murray in accordance with DECC's Industrial Noise Policy 2000 (INP). The assessment will identify the potential noise impacts of the Project, infrastructure, traffic noise and rail noise. The EA will also consider the cumulative noise impacts of the Project with surrounding mining operations and industry. The EA will identify and recommend the implementation of all reasonable and feasible mitigation measures.
	Plant and equipment working in-pit and on overburden dumps		2	C	M	
	Train movements on rail loop and spur		2	C	M	

Issue	Aspect	Impact	Initial Risk Assessment			Proposed Control Measures
			C	L	R	
	CHPP operation and stockpiles		2	C	M	The approved Noise Management Plan will continue to be applied to the Project. Management controls include a range of mine planning, operational and engineering measures, real-time monitoring and alarming systems, which will continue to be applied to the Project.
	Coal loading at rail loop		2	C	M	
	Increased traffic movements		1	D	M	
	Blasting	Overpressure and ground vibration impacts at near neighbours and heritage properties	2	D	H	An acoustical impact assessment (including noise and blasting) will be conducted for the Project by Wilkinson Murray. Blasting will continue to be conducted and managed in accordance with the approved Blasting Management Plan and EMS. Additional mitigation measures will be developed for blasting adjacent sensitive receivers and heritage properties, as required.
Change in landscape	Overburden stockpile dumps	Visual	2	E	H	A Visual Impact Assessment will be completed for the Project by Integral Architecture and Planning, which will assess the visual impacts of the Project and identify mitigation and management measures, as appropriate. MAC will maintain the visual bund constructed to screen views of the mining operation from South Muswellbrook. Management plans for lighting and landscaping that specify the control measures to reduce the visibility of the operation off-site will also continue to be applied to the Project.
	Exposed earthworks		2	E	H	
	Lighting from mobile and fixed equipment		2	C	M	

Issue	Aspect	Impact	Initial Risk Assessment			Proposed Control Measures
			C	L	R	
Ecology	Vegetation clearing, drilling and topsoil stripping	Loss of biodiversity and disruption to threatened flora and fauna or habitats	2	E	H	A Flora and Fauna Impact Assessment will be completed by Cumberland Ecology in accordance the DECC Draft Guidelines for Threatened Species Assessment (DEC, 2005b). The assessment will identify the impacts of the Project on flora and fauna (including listed threatened species and vegetation communities). Mitigation measures will be identified, where necessary.
Cultural Heritage	Vegetation clearing, drilling and topsoil stripping	Disturbance of Aboriginal artefacts, sites or places of cultural significance	2	E	H	The Aboriginal Archaeology and Cultural Heritage Impact Assessment for the Project will be conducted by ENSR Australia in accordance with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DECC, 2005a).
Water Management	Topsoil stripping, haul roads, un-rehabilitated spoil	Dirty water runoff entering local waterways	2	C	M	
	Coal Extraction and overburden removal	Additional groundwater inflow into pit	2	C	M	A Groundwater Impact Assessment will be conducted for the Project by Australasian Groundwater and Environmental Consultants (AGE) utilising the finite-element simulation package (FEFLOW) to identify the impacts of the Project on groundwater (including alluvial aquifers and any surrounding private boreholes). Groundwater will continue to be monitored and is managed at MAC in accordance with the approved Water Management Plan.
		Drawdown of aquifers on surrounding water users	2	C	M	
		Cumulative impacts with surrounding users	2	B	L	

Issue	Aspect	Impact	Initial Risk Assessment			Proposed Control Measures
			C	L	R	
	Increase in production, coal processing and intensification of operations	Additional water demand for dust suppression and coal washing	1	D	M	A surface water impact assessment will be conducted for the Project by Gilberts & Associates. The assessment will include the preparation of a water balance and identification of water demands and management requirements for the Project. MAC will continue to manage surface water in accordance with the approved Water Management Plan which prescribes the system to effectively source, capture, divert, store, monitor, utilise and reticulate water on site.
	Water discharges into local waterways	Surface water contamination	1	C	L	
		Contaminated water from wash down bays, etc	1	B	L	
Mine Rehabilitation	Topsoil Stripping and land preparation	Loss of productive topsoil	3	C	H	A Soils and Land Capability Impact Assessment will be completed for the Project by GSS Environmental. The assessment will map the soil types within the proposed mining areas, identify any soil materials with potentially adverse quality (e.g., acid sulphate generating) and identify the suitability of topsoils for use as topdressing material. Where necessary, the assessment will identify mitigation and management measures for the Project.
		Deterioration of land capability	3	C	H	
	Rehabilitation	Erosion	2	D	H	The proposed mine plan for the Project will allow the development of an undulating, free-draining and stable landform generally consistent with the surrounding environment. Further planning and detail will be provided in the EA in regard to the revision of biodiversity corridors and final landform. Rehabilitation at MAC is designed to be compatible with the surrounding landform, stable and able to support final land use(s).
		Invasion of weed species	1	B	L	
		Invasion of feral animals	1	B	L	
	Final Landform	Acid Rock Drainage	2	A	L	

Issue	Aspect	Impact	Initial Risk Assessment			Proposed Control Measures
			C	L	R	
		Unstable landform	2	B	L	To ensure a stable final landform, the majority of overburden emplacement slopes are shaped to 10 degrees or less. Progressive rehabilitation at MAC will continue to be undertaken in accordance with the approved Landscape and Revegetation Management Plan, focusing on utilising a mixture of improved pasture and grasses and native trees and shrubs. The long-term rehabilitation strategy will be revised for the Project. The development of biodiversity corridors and contributions to the Synoptic Plan will be revised for the Project.
		Poor drainage	2	B	L	
		Erosion	2	C	M	
Traffic and Transport	Increased vehicle movements from employees, deliveries and train loading	Increased traffic movements	1	C	M	A Traffic and Transport Impact Assessment will be completed for the Project by Hansen Bailey in accordance with the RTA's Guide to Traffic Generating Developments (RTA, 2002). The assessment will review the capacity of the affected road network to cater for differing traffic volumes due to the proposed change in traffic flows. Road enhancements and mitigation measures will be identified as required. Noise impacts from traffic will be assessed in the acoustical impact assessment described above.
	Road Resolution	Socio-Economic	3	C	H	
Waste	General waste management	Land contamination	1	B	L	Mt Arthur Coal's Total Waste Management (TWM) system provides detailed procedures to ensure the environmentally responsible disposal, tracking and reporting of all waste generated on site. The TWM system will continue to be applied to the Project and will be enhanced as required.
	Rejects management	Water contamination	2	C	M	
	Sewage management	Water contamination	2	B	L	

Issue	Aspect	Impact	Initial Risk Assessment			Proposed Control Measures
			C	L	R	
Hazardous materials	Storage and Handling	Soil and water contamination	2	B	L	All hazardous materials will continue to be managed in accordance with the ISO14001 Environmental Management System (EMS). It is not anticipated that large and additional quantities of hazardous materials will be required for the Project.

BHP Billiton HSEC Risk Assessment Tools

Quantitative Risk Assessment Matrix

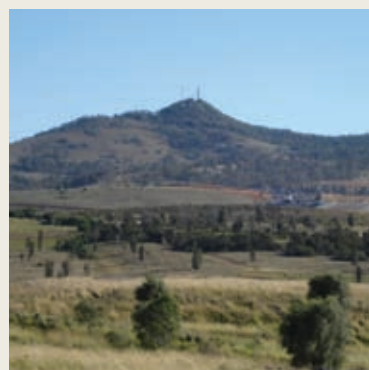
Likelihood or Frequency	Consequence Severity				
	Low (1)	Minor (2)	Moderate (3)	Major (4)	Critical (5)
E – Almost Certain	High	High	Extreme	Extreme	Extreme
D – Likely	Moderate	High	High	Extreme	Extreme
C – Possible	Low	Moderate	High	Extreme	Extreme
B – Unlikely	Low	Low	Moderate	High	Extreme
A – Rare	Low	Low	Moderate	High	High

Consequence Table

Severity Level	Natural Environment	Social/Cultural Heritage	Community/Govt/ Reputation/Media
1	Limited damage to minimal area of low significance.	Low-level repairable damage to commonplace structures.	Public concern restricted to local complaints.
2	Minor effects on biological or physical environment.	Minor medium-term social impacts on local population. Minor damage to structures/ items of some significance. Mostly repairable.	Minor, adverse local public or media attention and complaints.
3	Moderate, short-term effects but not affecting ecosystem functions.	Ongoing social issues. Permanent damage to items of cultural significance.	Attention from media and/or heightened concern by local community. Criticism by NGOs.
4	Serious medium term environmental effects.	On-going serious social issues. Significant damage to structures/items of cultural significance.	Significant adverse national media/public/NGO attention.
5	Very serious, long term environmental impairment of ecosystem function.	Very serious, widespread social impacts. Irreparable damage to highly valued items.	Serious public or media outcry (international coverage).

Likelihood Table

A - Almost Certain	Occurs 1 or more times a year
B - Likely	Occurs once every 1-10 years
C - Possible	Occurs once every 10-100 years
D - Unlikely	Occurs once every 100-1000 years
E - Rare	Occurs once every 1000-10000 years



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