



BOGGABRI COAL MINE

ENVIRONMENTAL ASSESSMENT Modification to Development Consent

for

Boggabri Coal Mine

August 2011

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

BOGGABRI COAL MINE

DEVELOPMENT CONSENT MODIFICATION

ENVIRONMENTAL ASSESSMENT

Prepared by:

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August 2011

for:

BOGGABRI COAL PTY LIMITED
386 Leard Forest Road
BOGGABRI NSW 2382

ENVIRONMENTAL ASSESSMENT STATEMENT

Submission of Environmental Assessment (EA)

Under Section 75W of the *Environmental Planning and Assessment Act 1979*

EA Prepared by

Name:

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In Respect Of:

Boggabri Coal Mine Development Consent Modification EA

Applicant Name:

Boggabri Coal Pty Limited

Applicant Address:

386 Leard Forest Road
BOGGABRI NSW 2382

Proposed modification sought:

Development Consent Modification as described in
Section 4 of this EA.

Environmental Assessment:

An EA for this Modification is attached.

Certification:

I certify that I have prepared the contents of this EA, and to the best of my knowledge:

- It is in accordance with Section 75W of the *Environmental Planning and Assessment Act 1979*;
- It contains all available information that is relevant to the environmental assessment of the activity to which this EA relates; and
- The information contained in this EA is neither false nor misleading.

Signature:



Name:

James Bailey
Director
Hansen Bailey

Date:

August 2011

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1 OVERVIEW

1.1 BACKGROUND

Boggabri Coal Pty Limited (Boggabri Coal) is a wholly owned subsidiary of Idemitsu Australia Resources Pty Limited which operates the Boggabri Coal Mine. Boggabri Coal is located 15 km north-east of Boggabri in the north-west Region of NSW (see Figure 1). Boggabri Coal Mine commenced mining operations in 2006.

In 2010, Boggabri Coal produced 2.3 Million tonnes (Mt) of product coal from the Maules Creek Formation down to the Merriown coal. Boggabri Coal Mine currently employs 320 full time employees and production is forecast to achieve 3.2 Mt in 2011.

Boggabri Coal currently operates under Development Consent (DA) 36/88 granted by the (then) Minister for Planning under Section 101 in Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 22 August 1989 and which expires on 14 November 2011. DA 36/88 is supported by the *Boggabri Coal Project Environmental Impact Statement* (Boggabri EIS) (Boggabri Joint Venture Pty Ltd (BJV) 1987).

DA 36/88 approves the construction and operation of the Boggabri Coal Mine as follows:

- Open cut coal mining of up to 5 Million tonnes per annum (Mtpa) of product coal for a period of 21 years;
- Construction of offices, workshops, bathhouse, access roads and water storage infrastructure;
- Manning up to 495 personnel;
- Combination of dragline and truck / shovel operation;
- Final void and out of pit emplacement area;

- Construction of two coal handling and preparation plants and a 3 million cubic metre tailings dam;
- Private coal haul road and 17 km rail spur and loop; and
- Train loading facility.

A modification to DA 36/88 (MOD 1) supported by the document *Boggabri Coal Project Statement of Environmental Effects* (Boggabri SEE) (Parsons Brinckerhoff 2009) was granted by the (then) Minister for Planning under Section 96 (2) of the EP&A Act on 22 July 2009 authorising:

- Alterations to the final landform;
- Realignment of the diversion dam and associated drainage line design as operations progress;
- The construction of a 100 megalitre water storage facility;
- Establishment of a water treatment and irrigation network covering a total area of 95 ha; and
- The construction of a storage shed.

This Modification Application to DA 36/88 (MOD 2) is sought under section 75W of the EP&A Act due the operation of Clause 8J8 (4) of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) to enable the continuation of the operation of the Boggabri Coal Mine for a two year period should the determination of the Continuation of Mining Project be delayed beyond 14 November 2011.

1.2 CONTINUATION OF MINING PROJECT

Boggabri Coal is seeking a Project Approval as a 'Major Project' under the terms of *State Environmental Planning (Major Development) 2005* (SEPP Major Development) under Part 3A of the EP&A Act for the continuation and extension of its mining operations within its current mining tenements for a further 21 years from 14 November 2011 (the Continuation of Mining Project). The Project Application is supported by the *Continuation of Boggabri Coal Mine Environmental Assessment* (Hansen Bailey 2010) (Boggabri EA).

Director General's Requirements (DGRs) were issued on 17 December 2009 by Department of Planning and Infrastructure (DP&I) with the Boggabri EA placed on public exhibition from 15 December 2010 to 7 February 2011. Community and regulatory submissions were responded to during March and April 2011 with the *Residual Matters Report* (Hansen Bailey 2011) submitted to DP&I on 12 July 2011.

Further detail on the Part 3A Application is provided in Section 2. This Application is currently being assessed for determination.

1.3 DOCUMENT PURPOSE

Should the Continuation of Mining Project be approved prior to 14 November 2011, this Modification sought will not be required. If the Continuation of Mining Project is approved after that date, DA 36/88 (as now sought to be modified) would be surrendered in accordance with the Boggabri EA Statement of Commitments.

This Modification application is supported by this Environmental Assessment (Modification EA).

Boggabri Coal seeks the approval of this Modification to authorise mining and related activities to continue after any expiry of DA 36/88 until (the first of) the expiry of two years from its approval; or until the approval of the Continuation of Mining Project.

Operations under this Modification (if approved) would be generally consistent with the Boggabri EIS and Boggabri SEE but reduced in scale and extent as described in this Modification EA.

The operation of Boggabri Coal Mine (following any approval of this Modification) would be generally as follows:

- The duration of DA 36/88 would be extended by two years;
- Production of coal would be limited to a maximum of 3.5 Mtpa product coal utilising similar equipment and operational parameters to that presently employed and up to 400 personnel; and
- Construction and use of DA 36/88 approved infrastructure including administration, bathhouse and workshop buildings, a heavy vehicle workshop and water management infrastructure in alternate locations.

Any other structures approved by DA 36/88 but not constructed by 14 November 2011 will not be constructed during the two year extended life of DA 36/88 sought.

This development sought (to be authorised by any approval of this Modification application) is located entirely within the area the subject of DA 36/88 as well as the area the subject of the Continuation of Mining Project. Consequently, the environmental impact assessment of the development sought to be approved by this Modification application, adopts and draws from the studies undertaken for the Boggabri EA from Year 1 to Year 5.

The basis for this is that the development sought to be approved by this Modification is consistent with, but of less scope than that proposed and assessed during the contemplated first five years of mining proposed in the Continuation of Mining Project application.

The use of these assessments will result in a materially conservative approach for the assessment of the environmental effects of the proposed mining at Boggabri Coal Mine under this Modification.

1.4 MODIFICATION NEED

Approval of this Modification application is required to secure the continuity of mining at Boggabri Coal Mine.

Application for approval of the Continuation of Mining Project was first sought in September 2009, some two years and two months before the expiry of the life of DA 36/88. Whilst the Continuation of Mining Project has been on public exhibition and determination of it is expected shortly, that cannot be assumed.

Boggabri Coal is concerned that in the context of the time elapsed to date and with changes being in the legal and administrative processes for mining approval that there may be a prospect of the Continuation of Mining Project not being determined by 14 November 2011.

Should this occur, the mining operations at Boggabri Coal would have to cease, pending the determination of the Continuation of Mining Project application or such further application as may be made by Boggabri Coal.

The cessation of mining at Boggabri Coal Mine in such a manner would have material detrimental social, economic and environmental consequences including the loss of 320 direct jobs and revenue flows to local, regional and State recipients as discussed later in this Modification EA.

1.5 DOCUMENT STRUCTURE

This document is structured as follows:

- Section 2 provides a description of the Boggabri Continuation of Mining Project as it pertains to this Modification. In particular, it describes the Project for which Part 3A Approval is sought and technical studies undertaken for the supporting Boggabri EA (which this Modification EA largely relies upon);
- Section 3 provides a description of the existing and approved operations at the Boggabri Coal Mine;
- Section 4 provides a description of this Modification for which approval is sought;
- Section 5 describes the regulatory framework relevant to this Modification;
- Section 6 assesses environmental and social issues and outlines management and mitigation measures proposed in respect of this Modification;
- Section 7 presents Boggabri Coal's Statement of Commitments related to this Modification;
- Section 8 provides a conclusion; and
- Sections 9 - 11 include abbreviations, references and a summary of this Modification EA study team.

2 BOGGABRI COAL CONTINUATION OF MINING

The following section provides a summary of the Continuation of Mining Project as assessed in the Boggabri EA (Hansen Bailey 2010).

2.1 OVERVIEW

Boggabri Coal is seeking a single planning approval for the continuation of its mining operations within its current mining authorities for a further 21 years (application PA 09_0182). In seeking Project Approval for the Continuation of Mining Project, Boggabri Coal also seeks to maximise operational flexibilities through staged additions and upgrades to infrastructure and an increase in approved coal production.

The Continuation of Mining Project comprises the following:

- Continuation of mining operations via open cut methods up to 7 Mtpa product coal to the Merriown seam;
- Open cut mining fleet including excavators and fleet of haul trucks, dozers, graders, water carts and other equipment with the flexibility to introduce a dragline as required utilising up to 500 employees;
- Modifications to existing and continuation of approved (but not yet constructed) infrastructure including:
 - Coal Handling and Preparation Plant (CHPP);
 - Modifications to existing site infrastructure capacities including: Run of Mine (ROM) coal hopper, second crusher, stockpile area, coal loading facilities, water management and irrigation system;

- Rail loop and 17 km rail line across the Namoi River and flood plain including overpasses across the Kamilaroi Highway, Therribri Road and Namoi River;
- Minor widening of the existing coal haul road including overpasses across the Kamilaroi Highway, Therribri Road and Namoi River;
- Upgrading and relocating site facilities including offices, car parking and maintenance sheds as and when required;
- Closing a section of Leard Forest Road; and
- Upgrading the power supply capacity to 132 kilovolt (kV) high voltage lines suitable for dragline operations.

2.2 ENVIRONMENTAL ASSESSMENT TECHNICAL STUDIES

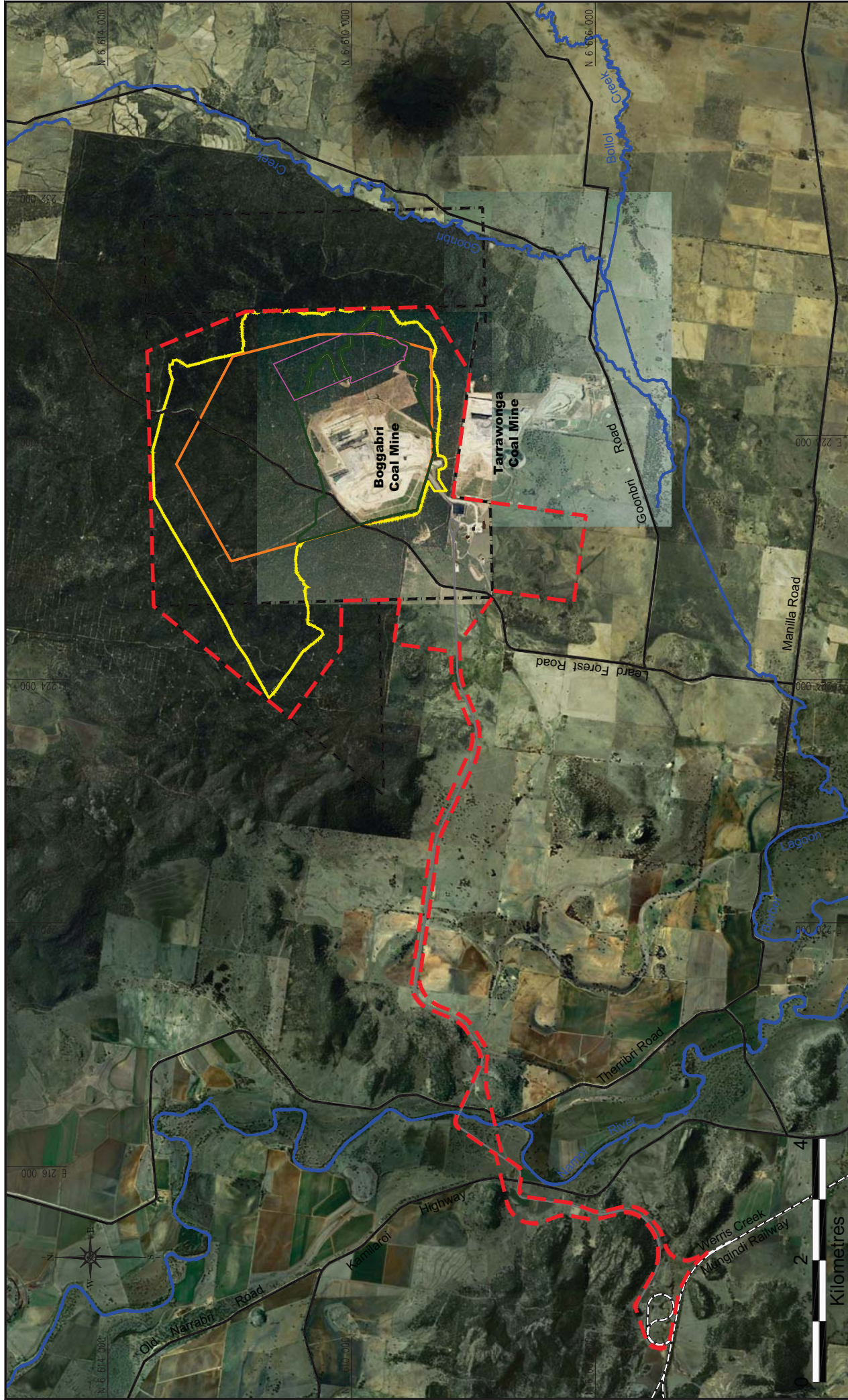
The Boggabri EA includes contemporary assessments for the Continuation of Mining Project for a 21 year period for (at least): air quality and greenhouse gas, acoustics, visual and lighting, ecology, Biodiversity offset strategy, Indigenous archaeology and cultural heritage, non-Indigenous heritage, surface water, flood assessment, groundwater, geochemical, economics, social, waste, soils and land use, rehabilitation and final landform, bushfire, hazard analysis, and traffic and transport.

The relationship between this Modification and the area assessed in the Boggabri EA is shown in Figure 2.

This Modification relates to development within the area assessed in the Boggabri EA for the impacts of the Continuation of Mining Project for its life. In doing so, the Boggabri EA considered the environmental effects of the Continuation of Mining Project at different stages of the progress of the proposed development including the environmental effects at Year 5 of the Continuation of Mining Project.

At Year 5, the Continuation of Mining Project would produce up to 7 Mtpa product coal utilising 500 employees utilising a mobile fleet and mining process similar to (but more than) would be the case during the conduct of the development sought by this Modification.

As such, it is considered that utilising the environmental assessments for Year 5 of the Continuation of Mining Project gives a conservative basis to consider the environmental effects of the Boggabri Coal Mine operating under DA 36/88 as proposed to be modified.



BOGGABRI COAL MINE

Site Plan

Cad File: 07671 C.dwg Date: 09.08.11 Drawn: CP

Figure **2**

Hansen Bailey |

IDEMITSU
BOGGABRI COAL
COAL MINE
Source: Google Maps, Whitehaven Coal (2009),
Boggabri Coal (2010)

- Boggabri EA Project Boundary
- Boggabri EA Mine Disturbance Boundary
- Boggabri Mining Authorities
- EIS Limit of Surface Mine
- Mine Disturbance to Nov 2011
- Private Haul Road
- Proposed Infrastructure Area
- Mining Extension

- Roads
- Railway
- Rivers and Creeks

3 EXISTING OPERATIONS

This section of this Modification EA describes the existing operations at Boggabri Coal Mine. This section also provides contemporary land ownership surrounding Boggabri Coal Mine.

3.1 EXISTING DEVELOPMENT CONSENT

Boggabri Coal Mine operates under DA 36/88 (as modified) which is supported by the Boggabri EIS and Boggabri SEE. Approved activities are described below and shown on Figure 3.

3.1.1 Boggabri EIS

The (then) Minister for Planning granted DA 36/88 to the BJV on 22 August 1989 supported by the Boggabri EIS under Part 4 of the EP&A Act.

DA 36/88 authorised the extraction of coal for a period of 21 years following the grant of Coal Lease (CL) 368 on 15 November 1990 at a maximum product coal production rate of 5 Mtpa.

The approved method of mining includes a combination of shovel and/or dragline operations supported by a truck fleet. Initially, overburden above the Braymont seam is removed by truck and shovel with a dragline potentially required to extract interburden to the Merriown seam. An equipment schedule was developed that states that both equipment sizing and numbers may change according to market conditions.

DA 36/88 also approved the establishment of infrastructure facilities including:

- Offices, workshops, bathhouse, access roads and mine water storage;
- 45,000 tonne (t) raw coal stockpile area;
- Coal crushing and sizing plant which conveys product coal to the product stockpile;

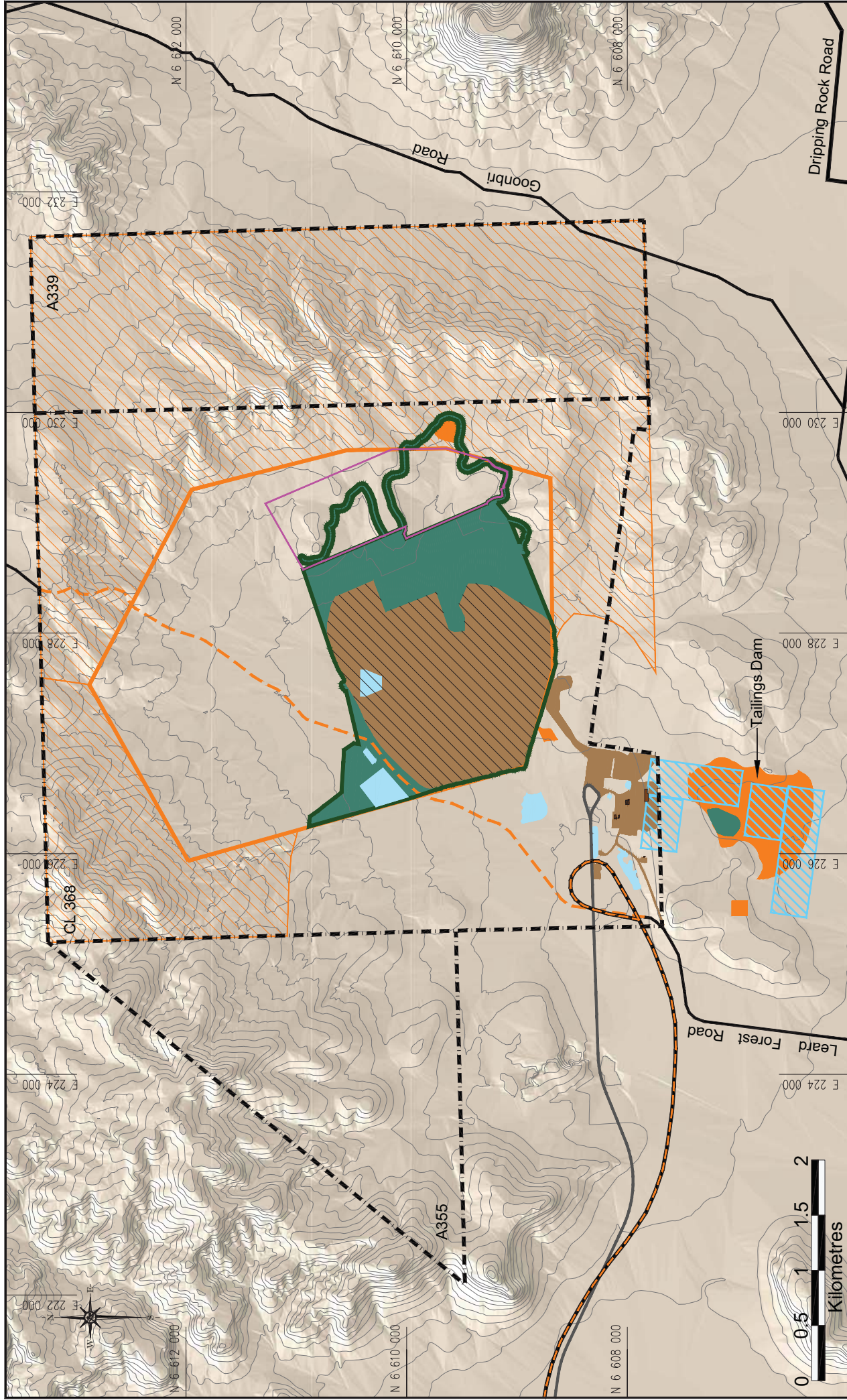
- Two CHPP facilities each with the capacity to process up to 2.5 Mtpa;
- A rail spur and rail loop with a coal load out facility; and
- 3 Million cubic metre capacity tailings dam.

Construction associated with the Boggabri Coal Mine is permitted to be conducted between 7:00 am and 9:00 pm, Monday to Saturday. No construction is to occur on Sunday or public holidays. Mining is permitted to occur 24 hours per day, 7 days a week. Up to 495 personnel were anticipated at full production.

Approval was granted to haul coal by trucks from the Boggabri Coal Mine to the Boggabri Coal Terminal via a 17 km private sealed haul road. At full production, a 17 km rail spur line including a rail loop and bridge crossing over the Namoi River capable of handling a 1 in 100 year Average Recurrence Interval (ARI) rainfall event was also approved.

In addition, a 125,000 t product coal stockpile with the ability for coal to be reclaimed and conveyed into a 1,500 t rail loading bin with a load out capacity of up to 5,000 tonnes per hour (tph) was approved.

Mining activities commenced at Boggabri Coal Mine generally in accordance with DA 36/88 in May 2006. Current operations are being conducted via truck and shovel method of mining. A dragline has not been introduced. Other infrastructure approved but not yet constructed includes the CHPPs, tailings dam, rail spur and loop.







Source: SEE (2009), EIS (1987), Boggabri Coal (2010)

BOGGABRI COAL MINE

Approved Mining Operations & Modification

Cad File: 07685E.dwg

Date: 23.08.11

Drawn: CP

Figure **3**

EIS Approved Works not Commenced

- Infrastructure
- Rail Loop
- Underground Mining Area
- Leard Forest Road Closure

Roads

- Current Operations
- Open Cut
- Additional Works up to Nov 2011
- Existing Infrastructure Area

Boggabri Mining Authorities

- EIS Limit of Surface Mine
- Mine Disturbance to Nov 2011
- Private Haul Road
- Proposed Infrastructure Area
- Mining Extension
- Water Storage
- Irrigation Areas

3.1.2 Boggabri SEE

An application under section 96 (2) of the EP&A Act to modify DA 36/88 was lodged in February 2009 supported by the Boggabri SEE for approval for:

- Alterations to the final landform;
- Realignment of diversion dam and associated drainage line design as operations progress;
- The construction of a 100 megalitre water storage facility;
- Establishment of a water treatment and irrigation network; and
- The construction of a storage shed.

The application was granted by the Director for Major Development Assessment, as a delegate for the Minister for Planning on 22 July 2009.

3.2 MINING OPERATIONS

The mining process involves the salvage of any potentially commercial firewood, removal and mulching of any remnant vegetation, stripping and stockpiling of the topsoil resource, drilling and blasting of overburden, excavation of overburden to expose coal resources, extraction of ROM coal, overburden emplacement followed by progressive rehabilitation.

Clearing and topsoil stripping is undertaken on an annual basis. Prior to clearing, vegetation pre-clearing surveys are undertaken followed by commercial timber harvesting for fire wood. Clearing, seed collection, mulching and removal of large debris are also undertaken. Topsoil and mulched vegetation is removed with the use of dozers and excavators, and where possible placed directly onto reshaped overburden, or alternatively stockpiled for future use.

The removal of overburden and interburden material is conducted with the use of hydraulic excavators in backhoe configuration to load rear dump trucks.

In order to minimise coal damage, a hydraulic excavator is used to remove the final 1 m of overburden or interburden overlying the coal seams. Coal extraction extends down to the base of the Merriown coal seam. Coal is mined from the Braymont, Bollol Creek, Jeralong and Merriown seams. The blended product is a relatively low ash, high volatile, low sulphur thermal and pulverised coal injection coal.

Boggabri Coal presently employs contractors for the mining and transportation of ROM coal from the pit to the ROM coal pad, and also to transport the product coal to the Boggabri Coal Terminal and the load trains. Blasting is generally conducted between the hours 8:00 am and 5:00 pm. Blasting within 500 m of the Leard Forest Road requires temporary road closure.

During 2010, a total of 2.3 Mt of product coal was railed from Boggabri Coal Terminal to the Port of Newcastle for export. Approximately 3.2 Mt is anticipated to be produced in calendar year 2011.

3.3 COAL HANDLING AND TRANSPORT

3.3.1 Handling and Transport

ROM coal from the Boggabri Coal Mine is loaded onto rear dump trucks and transported to the ROM coal pad. Coal is recovered from the ROM coal pad by front end loader and trammed to a crusher for sizing to approximately 50 mm. Crushed coal is conveyed to a 380 tonne truck loading bin where it is batch loaded into B-double trucks for transport to the Boggabri Coal Terminal via a 17 km private haul road.

The private haul road crosses the Leard Forest Road and Therribri Road at grade, has a bridge over the Namoi River and an overpass at the Kamilaroi Highway. The Boggabri Coal Terminal includes a 125,000 t capacity product coal stockpile area, a dozer push stacking and reclaim system, conveyors, train loading bin with a loading capacity up to 5,000 tph and a rail loop. Product coal is transported via the North West and Werris Creek Mungindi Railway Line to the Port of Newcastle for export.

3.3.2 Infrastructure

The existing coal crushing and handling plant has been designed and installed to achieve a nominal throughput rate of 500 tph consists of a:

- Coal Receival hopper of 60 t nominal capacity fitted with a 750 mm grizzly, designed to accommodate a 22 m³ front end loader;
- Crushing system comprising a feeder breaker producing maximum 200 mm top size product and a sizer of 750 tph capacity producing nominal 50 mm product;
- 750 tph load out bin conveyor;
- Truck Loading Bin System comprising a 380 t capacity bin with a bypass chute for emergency stockpiling. The truck load out system is automated and has an instantaneous load out rate of 2,000 tph;
- Product coal stockpile adjacent to rail load out of approximately 125,000 t capacity;
- Train Load out System comprising:
 - Reclaim system with two drawdown hoppers and two low headroom modulating flow control gates;
 - Load out conveyor of up to 5,000 tph capacity; and
 - Automatic train load out system incorporating a precision loading system with 150 t surge bin and 40 t weigh bin capable of loading trains at up to 5,000 tph.

3.4 POWER

Boggabri Coal Mine is supplied electricity via two 66 kV sub-transmission power lines that originate from 132/66 kV substations located at Gunnedah and Narrabri. Several 66/11 kV substations are located in the Boggabri area supplying local distribution feeders, including the 11 kV feeder that supplies the existing mine.

The existing Boggabri Coal Mine is supplied by a single circuit 11 kV 3 - phase overhead radial feeder. There are two 11 kV/415 V substations at the Boggabri Coal Mine supplying the mine facilities.

3.5 OPERATIONAL HOURS AND MANNING

Mining operations are generally conducted on two 10.5 hour shifts, seven days per week with maintenance activities occurring 24 hours per day seven days a week. 320 personnel are currently employed at the Boggabri Coal Mine.

3.6 ENVIRONMENTAL MANAGEMENT SYSTEM

Idemitsu Australia Resources Pty Ltd (IAR) and Boggabri Coal have created and implemented an Environmental Management Policy that provides the framework to facilitate compliance with legal and other requirements (including statutory approval and stakeholder expectations). A component of the Environmental Management Policy is the development and implementation of a number of Environmental Management Plans (EMP) including:

- Water Management;
- Air Quality;
- Flora and Fauna;
- Cultural Heritage;
- Hydrocarbon;
- Noise and Vibration;
- Waste;
- Rehabilitation and Land Management;
- Public Safety; and
- Irrigation Area.

All EMPs are regularly reviewed and communicated to the workforce to ensure a high level of environmental performance is maintained.

3.7 ENVIRONMENTAL MONITORING PROGRAM

Boggabri Coal has implemented an Environmental Monitoring Program which allows effective quantitative measurement and management of its environmental performance.

The existing Boggabri Coal monitoring network comprises:

- A meteorological monitoring station;
- 12 depositional dust gauges;
- A High Volume Air Sampler (HVAS) measuring PM₁₀;
- Ten noise monitoring sites;
- 12 groundwater monitoring bores; and
- Seven surface water sampling points.

Results from the Environmental Monitoring Program measuring Boggabri Coal's environmental performance are published in the Annual Review (formerly Annual Environmental Management Report (AEMR)), and distributed to Government Agencies, employees, the Boggabri Community Consultative Committee (CCC) and other interested stakeholders.

3.8 LAND OWNERSHIP

The land ownership surrounding the area to which this Modification applies is listed in Table 1. Table 1 should be read in conjunction with Figure 4, which provides an overview of the land ownership surrounding Boggabri Coal Mine.

Forests NSW is the primary landowner within the area to which this Modification applies. Boggabri Coal owns the land where the existing and proposed infrastructure is to be constructed. The nearest private landholders to the area to which this Modification applies are located approximately 3.5 km to the north-east.

The majority of infrastructure that has been constructed for the existing Boggabri Coal Mine is located on land owned by Boggabri Coal. The private haul road passes over the Kamilaroi Highway approximately 8 km north of Boggabri, before crossing a small section of declared Crown land.

The Boggabri Coal Terminal is located on land jointly owned by Boggabri Coal and Aston Coal 2 Pty Ltd. The western portion of the rail loop at the Boggabri Coal Terminal is located on Crown land. Boggabri Coal has a special lease over two Crown blocks in this area (see Figure 4). The remaining land is owned by Boggabri Coal.

Several other mining companies own land in the vicinity of this Modification. Aston Coal 2 Pty Ltd owns the land to the north-west and Whitehaven Coal owns the land to the south of the mining area.

Existing land uses within Boggabri Coal's mining authorities and its landholdings include limited agricultural activities, forestry and recreational uses. Open cut coal mining is a dominant land use in the vicinity of this Modification.

Boggabri Coal Mine has been operating since 2005 with the commencement of construction activities, and the production of first coal in 2006. Boggabri Coal Mine is well established within the fabric of the local community and surrounding landscape.

Table 1
Land Ownership

ID	Name	ID	Name	ID	Name
1	MJ & ML Nott (PL) (Louvville)		Boggabri Coal owned previously owned by KR Druce (Bellevue)	80	BJ Crosby
2	FJ Maunder	39	RJ Heiler (Roma)	81	RR & PL Crosby (Northam)
3	RB & ML Kerr	40	RJ & EJ Browning (Billabong)	82	RR & PL Crosby (Northam)
4	Glek Pty Ltd		Boggabri Coal owned previously owned by KR Druce (Bellevue)	83	Under negotiation with Tarrawonga Mine currently owned by RP & RD McGregor (Tarrawonga)
5	Glek Pty Ltd	43	RJ Heiler (Roma)	84	RR & PL Crosby (Northam)
6	PJ Watson	44	DV Gillham (Glenhope)		Purchased by Tarrawonga Mine previously owned by DJ Wellwood (Ambardo)
7	PJ Watson	45	DV & RJ Gillham	86	RR & PL Crosby (Kyalla)
8	PJ Watson & G Parkin (Rosewood)		Boggabri Coal owned previously owned by KR Druce (Bellevue)	87	PL & AC Laird (Templemore)
9	PJ Watson & G Parkin (Rosewood)	47	LE James & KE Woodward (Wilboroi)	88	Under negotiation with Tarrawonga Mine currently owned by MA, CM, JM & SL Bull (Pine Grove)
10	MF, TT, SL Hart & PF Rice (Kelso)	48	KR & KA Pryor (Wilboroi East)		Purchased by Tarrawonga Mine previously owned by JL Alker (Flixton)
11	PJ Watson & G Parkin (Rosewood)		Boggabri Coal owned previously owned by Bradlock Pty Ltd	90	KD Gillham (Barbers Lagoon)
12	PJ Watson & G Parkin (Rosewood)	51	HM Lockwood (Jeralong)	91	RP McGregor (Callandar)
13	LE Christie-Rockliff (Horse Shoe)	52	HM Lockwood (Jeralong)	92	RP McGregor (Callandar)
14	LE Christie-Rockliff (Horse Shoe)	53	RR & PL Crosby (Northam)	93	RP McGregor (Callandar)
15	LJ & KJ Shields (Leyetstone)	54	Under negotiation with Tarrawonga Mine currently owned by RP & RD McGregor (Tarrawonga)	94	RP McGregor (Callandar)
	Boggabri Coal owned from 9/08/10 previously owned by GL Eather	55	Under negotiation with Tarrawonga Mine currently owned by RP & RD McGregor (Tarrawonga)	95	RP & RD McGregor
	Boggabri Coal owned previously owned by H & M Bullock		Properties purchased by Tarrawonga Mine previously owned by GOM Johnson and DC & EL Cheeseman	96	RP & RD McGregor
	Boggabri Coal owned from 3/02/10 previously owned by DE Eather	61	JE & RJ Picton		Purchased by Tarrawonga Mine previously owned by GOM Johnson
23	RW & A Grover (Cooboobindi)		Purchased by Tarrawonga Mine previously owned by Bradlock Pty Ltd		Purchased by Tarrawonga Mine previously owned by JL Alker (Flixton)
24	RW & A Grover (Cooboobindi)	67	VP & SM McAuliffe (Goonbri)	99	JE & RJ Picton
25	RW & A Grover (Cooboobindi)	68	VP & SM McAuliffe (Goonbri)	100	AIM Johnson & TR Hall (Bailey Park)
26	RW & A Grover (Cooboobindi)		Boggabri Coal owned previously owned by Bank of NSW (Wirralah)		Boggabri Coal owned previously owned by NF Smith
27	RW & A Grover (Cooboobindi)	70	JD & DJ Duncan (Myl Plains)	102	VP & SM McAuliffe (Goonbri)
28	GP, LF & WP Clarke (Bullock Paddock)	71	MJ Brennan (Oakleigh)	103	PM & MI Mainey
29	RW & A Grover (Cooboobindi)	72	MJ Brennan (Oakleigh)	104	PM & MI Mainey
30	GP, LF & WP Clarke (Bullock Paddock)	73	MJ Brennan (Oakleigh)	105	JE & RJ Picton
31	RW & A Grover (Cooboobindi)	74	MJ Brennan (Oakleigh)	106	JE & RJ Picton
32	RJ & EJ Browning (Billabong)	75	MJ Brennan (Oakleigh)	107	JE & RJ Picton
33	RJ Heiler (Brighton)	76	MJ Brennan (Oakleigh)	108	JE & RJ Picton
34	RJ Heiler (Brighton)	77	PD & LA Finlay	109	JE & RJ Picton
	Boggabri Coal owned previously owned by KR Druce (Bellevue)	78	BJ Crosby	110	JE & RJ Picton
36	RW & A Grover (Cooboobindi)	79	RR & PL Crosby (Northam)	111	GOM Johnson

ID	Name	ID	Name	ID	Name
	Purchased by Tarrawonga Mine previously owned by GOM Johnson	130	PD & LA Finlay	148	JE & RJ Picton
113	JE & RJ Picton	131	PD & LA Finlay	149	JE & RJ Picton
114	RE & MJ Stoltenberg (Dunvegan)	132	LA & KA & PD Finlay	150	JE & RJ Picton
115	DW & AM Keys (Hazeldene)	133	Narrabri Shire Council (Oakleigh)	151	JE & RJ Picton
116	RA & CM Collyer	134	LA & KA & PD Finlay	152	JE & RJ Picton
117	DJC Watson	135	MJ Brennan (Oakleigh)	153	JE & RJ Picton
118	DJC Watson		Purchased by Tarrawonga Mine previously owned by JL Alker (Flixton)	154	JE & RJ Picton
119	VA & MA Younger	137	JE & RJ Picton	155	JE & RJ Picton
120	VA & MA Younger	138	JE & RJ Picton	156	KD Gillham (Barbers Lagoon)
121	CM & RRF Morse	139	JE & RJ Picton	157	DV Gillham (Hopetoun Park)
122	CM & RRF Morse	140	JE & RJ Picton	158	KL Grover
123	CM Morse	141	JE & RJ Picton		Purchased by Tarrawonga Mine previously owned by JL Alker (Flixton)
124	CM & RRF Morse	142	JE & RJ Picton	160	MJ & KA Brennan (Oakleigh)
125	CM & RRF Morse	143	JE & RJ Picton	161	CM Morse
126	CM & RRF Morse	144	JE & RJ Picton	162	RW & EJ Kemp
127	CM & RRF Morse	145	JE & RJ Picton	163	JE & RJ Picton
128	CM & RRF Morse	146	JE & RJ Picton		
129	Morse Investments Pty Ltd.	147	JE & RJ Picton		

4 THIS MODIFICATION

4.1 NEED

This Modification Application (MOD 2) is required to enable the continuation of the Boggabri Coal Mine for a two year period should the determination of the Continuation of Mining Project be delayed beyond 14 November 2011. This Modification is required to provide continuity and certainty for all the stakeholders at the Boggabri Coal Mine including the mine owners, the workforce, the local and regional community, as well as the economy of the NSW.

Should the Continuation of Mining Project Application be granted, DA 36/88 as sought to be modified will be surrendered in accordance with the Boggabri EA Statement of Commitments.

4.2 DESCRIPTION

The operation of Boggabri Coal Mine (following any approval of this Modification) would be generally as follows:

- Extending the approval period of DA 36/88 by two years from 14 November 2011;
- Continuation of the use of constructed infrastructure and facilities;
- Continuing mining at up to 3.5 Mtpa product coal;
- Utilising similar equipment, manning and operational parameters; and
- Construction and use of DA 36/88 approved infrastructure including administration, bathhouse and workshop buildings, a heavy vehicle workshop and water management infrastructure in alternate locations.

4.2.1 Coal Production of 3.5 Mtpa

Boggabri Coal seeks to continue its mining operations for a further two years, mining at up to 3.5 Mtpa product coal down to the Merriown seam over an area of approximately 133 ha as is presently approved in DA 36/88. The proposed production rate during this period is less than that currently approved under DA 36/88 (5 Mtpa) and as assessed and proposed in the Boggabri EA (7 Mtpa).

This Modification would authorise production of a total of up to 7 Mt of product coal and require the relocation of around 100 Million bank cubic metres of overburden within the two year period. The production schedules ultimately realised will depend on the market drivers over time.

This Modification would authorise for two further years the presently approved use of a shovel and excavator operation supported by a truck fleet to transport coal to onsite coal processing and transport facilities.

A comparison of the existing equipment fleet and proposed total fleet required for this Modification, along with that approved in the Boggabri EIS and proposed in the Boggabri EA is included in Table 2.

Table 2
Mining Equipment Fleet Comparison

Equipment Type	Boggabri EIS	Boggabri EA	Current Fleet (at July 2011)	Modification EA*
Dragline	1	1	0	0
Shovel / Excavator	5	8	7**	8**
Trucks	42	43	22	26
Bulldozer (includes rubber-tyred)	17	20	8	9
Front End Loader	2	2	2	2
B Double Trucks	N/A	8	6	6
Water cart	4	4	2	3
Graders	4	6	3	3
Drill Rigs	7	7	3	3

* operating equipment at 3.5 Mtpa product.

** smaller contractor equipment than ultimately proposed.

4.2.2 Infrastructure Construction and Use

Construction activities for this Modification will include extensions to the existing administration offices and bathhouse.

A heavy vehicle workshop is also proposed to be constructed adjacent to the existing fuel service bay. A small warehouse with a floor area of approximately 200 m² and a workshop with a floor area of approximately 490 m² are proposed to be constructed adjacent existing infrastructure.

The proposed extensions to existing buildings and infrastructure proposed for this Modification are minor additions which are required to accommodate the workforce and maintenance of the mining equipment. These are illustrated in the Boggabri EIS and are proposed in different locations (following detailed design work).

4.2.3 Other Operational Aspects

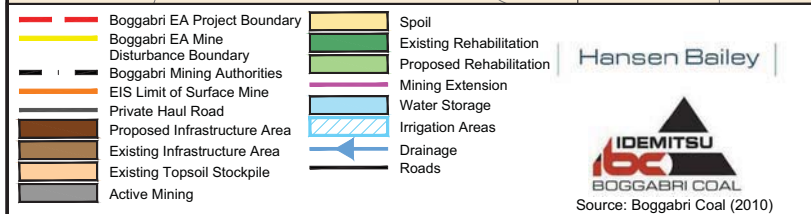
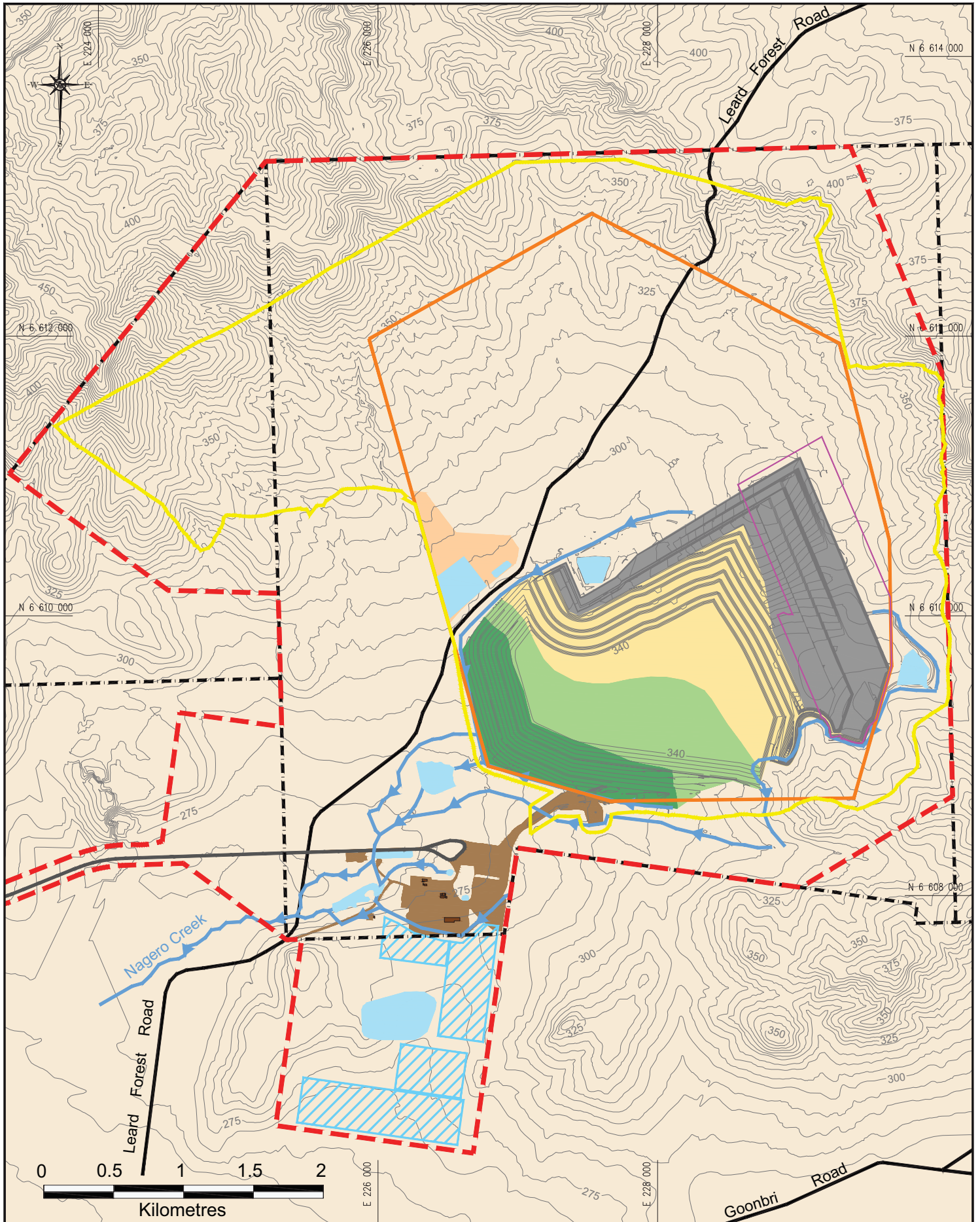
ROM coal will continue to be delivered by haul trucks from the mining area directly to the ROM stockpile for later feeding to the crushing system by front end loader.

The existing coal crushing plant located adjacent the ROM stockpile will continue to be used to facilitate this Modification to crush ROM coal. The existing coal crushing plant and truck loading bin will continue to be utilised for this Modification to load product coal onto haul trucks to be transported to the Boggabri Coal Terminal. Boggabri Coal will continue to utilise product coal handling facilities that currently exist at Boggabri Coal Mine.

Boggabri Coal will continue to utilise all existing buildings and services including workshop, bathhouse and office, fuel farm, vehicle wash bays, potable water, sewage, power supply, communications systems and fire service systems.

The Leard Forest Road will not be closed to enable this Modification.

All other coal mining, coal processing, transport, hours of operation and other operational parameters will remain generally consistent with that described in Section 3 of this Modification EA.



BOGGABRI COAL MINE		
Conceptual Year 2013 Mine Plan		
Cad File: 07733D.dwg	Date: 23.08.11	Drawn: CP
		Figure 5

5 REGULATORY FRAMEWORK

This section of this Modification EA provides a description of the regulatory framework under which Boggabri Coal Mine operates. It discusses the ability of the Minister for Planning and Infrastructure to modify DA 36/88 under Section 75W of the EP&A Act, describes the approvals process, stipulates the consistency with the objects of the EP&A Act and requirements for licences and approvals as a result of this Modification.

5.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

5.1.1 Development Consent

The NSW Minister for Local Government and Minister for Planning (now NSW Minister for Planning and Infrastructure) granted development consent DA 36/88 to the Boggabri Coal Joint Venture on 22 August 1989 under Section 101 in Part 4 of the EP&A Act as it was determined by the Minister at the time that the development was “*state significant development*”. The development was approved on the basis of the assessment of the Boggabri EIS and approved to be conducted generally in accordance with it subject to compliance with the terms of DA 36/88.

The Boggabri EIS authorised the extraction of coal for a period of 21 years following the date of the grant of a coal lease in respect of the development. CL 368 was granted by the Minister for Mineral Resources on 15 November 1990.

A modification to DA 36/88 was granted by the (then) Minister for Planning on 22 July 2009 under Section 96 (2) in Part 4 of the EP&A Act for mine plan alterations as described in Section 3.1.2 and as described in the Boggabri SEE.

5.1.2 Continuation of Mining Project

On 1 August 2005 (SEPP Major Development) came into operation by virtue of which the Continuation of Mining Project was a ‘major project’ to which the provisions of Part 3A of the EP&A Act applied at the time application was made for approval for that development and under which approval was sought by Boggabri Coal as described.

Boggabri Coal’s Continuation of Mining Project application was the subject of Environmental Assessment Requirements issued by the Director-General under section 75F of the EP&A Act on 17 December 2009.

The *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* (Part 3A Repeal Act) was passed on 27 June 2011. Whilst the Part 3A Repeal Act will, when commenced, repeal the whole of Part 3A of the EP&A Act, the Boggabri Continuation of Mining Project will be a “*transitional Part 3A Project*” because it is a project for which environmental assessment requirements were notified before the repeal of Part 3A of the EP&A Act.

As a “*transitional Part 3A Project*”, the Boggabri Continuation of Mining Project will be regulated by the provisions of Schedule 6A which provides that Part 3A of the EP&A Act continues to apply to such projects irrespective of its repeal. Similarly, all SEPPs and declarations, orders, determinations relevant to the Boggabri Continuation of Mining Project continue to apply after the repeal of Part 3A. The regulations relevant to Part 3A (namely Part 1A of the EP&A Regulation made pursuant to the power to make regulations conferred by Part 3A) will also continue to apply to the Boggabri Continuation of Mining Project.

5.1.3 Application of Section 75W to the Boggabri Coal Development Consent

DA 36/88 was granted under Part 4 of the EP&A Act prior to the commencement of the operation of Part 3A of the Act.

Section 157 of the EP&A Act provides that *"The Governor may make regulations, not inconsistent with this Act, for or with respect to any matter that by this Act is required or permitted to be prescribed or that is necessary or convenient to be prescribed for carrying out or giving effect to this Act"*.

Section 75ZA(1) EP&A Act provides *"Development may be declared to be a project to which this Part applies even though action has been taken under Part 4 ... for the purposes of authorising the carrying out of the development"*.

Section 75ZA(2) provides that *"The regulations may make provision for or with respect to the effect of any such action under Part 4 ..."*.

Clause 8J(8) of the EP&A Regulation provides (relevantly):

"(8) For the purposes only of modification, the following development consents are taken to be approvals under Part 3A of the Act and section 75W of the Act applies to any modification of such a consent:

- (a) a development consent granted by the Minister under section 100A or 101 of the Act, The development consent, if so modified, does not become an approval under Part 3A of the Act."*

Under Clauses 8J(8) of the EP&A Regulation, DA 36/88 is taken to be an approval under Part 3A for the purposes only of modification of the Development Consent. Thus this request for Modification is made under Section 75W of the EP&A Act.

5.1.4 Section 75W Power to Modify

Section 75W of the EP&A Act provides for this Modification of planning approvals issued under Part 3A of the EP&A Act as follows:

- "(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.*
- (3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*
- (4) The Minister may modify the approval (with or without conditions) or disapprove of this Modification."*

For the purposes of section 75W, 'modification of approval' means changing the terms of a Minister's approval, including:

- (a) Revoking or varying a condition of the approval or imposing an additional condition of the approval; and*
- (b) Changing the terms of any determination made by the Minister under Division 3 in connection with the approval.*

As mentioned above, under Clause 8J(8) of the EP&A Regulation, DA 36/88 is “*taken to be*” an Approval under Part 3A of the EP&A Act (for the purposes only of modification).

Under Section 75W of the EP&A Act there is express acceptance that the Minister’s approval for a modification of a development consent is “*not required*” where the project as modified will be “*consistent with*” the approved project. The activities described in this Modification are “*consistent with*” the development the subject of DA 36/88 and accordingly this Modification is sought.

The Court has given guidance on the scope of the power to modify. In Barrick Australia Limited v Williams 2009 NSWCA 275 (Williams Case) (at 38) Justice Basten found that Section 75W “*confers on the Minister an implicit obligation to be satisfied that the request falls within the scope of the section*”.

In the Williams Case it was accepted that to engage the power to modify under Section 75W of the EP&A Act, the Minister is called upon to form a view as to whether the proposed changes amount “... to a radical transformation of the terms of the existing development consent”.

In making that finding of the question of jurisdictional fact the relevant comparison is between what is proposed and what is already approved. In making that comparison the Minister will compare what is proposed in this application with “...the approval, with any earlier modifications, as it stood at the time of this Modification request. The relevant comparison ... is with the modified development consent as at the date of this Modification request” (Williams v Minister for Planning 2009 BC 200900319, page 54).

What is proposed under this Modification is not a “*radical transformation*” of what has been already approved under DA 36/88, modified as described in the previous modifications of that DA 36/88.

The following essential elements of Boggabri Coal Mine will remain unaltered by this Modification:

- Total tonnes of coal to be extracted, processed or transported will be less than currently approved;
- Total annual extraction, processing and transportation of coal will be less than currently approved;
- Manning levels will be less than currently approved;
- Methodology of mining, processing and transportation of coal does not change; and
- The disturbance limit will not increase from that which exists.

The Minister for Planning and Infrastructure therefore has the power to modify DA 36/88 under Section 75W of the EP&A Act.

5.2 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

An approval from the Commonwealth Minister for Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) under Part 3 of the EPBC Act is required for actions which are likely to have a significant impact on a Matter of National Environmental Significance (MNES).

For the purposes of the EPBC Act the Boggabri Continuation of Mining Project includes “two components”:

- Actions to be undertaken within the existing Boggabri Coal Mine, and
- Actions to be undertaken within the proposed extension to the existing Boggabri Coal Mine – “*Boggabri Extension*”.

The existing Boggabri Coal Mine (the first component referred to above) was considered under the previous national environmental legislation *Environment Protection (Impact of Proposals) Act 1974* (EPIP Act).

By virtue of the provisions of *Environmental Reform (Consequential Provisions) Act 1999* (ERCP Act) the first component of the Project (Boggabri Existing) – referred to in the first dot point above) is exempt from the requirement for approval under Part 3 of the EPBC Act as it was previously assessed under the EPIP Act.

This is a view shared by the Commonwealth Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC) who has advised the proponent by letter 10 December 2009 that “... *referral and approval of the existing Boggabri coal project is not required under the EPBC Act*”.

That part of the Project which is within the area of Boggabri Continuation of Mining Project is believed to be likely to have a significant impact on some limited areas of listed critically endangered ecological communities and species and accordingly the Boggabri Continuation of Mining Project has been referred to the Minister for the SEWPaC as a proposal under section 68 of the EPBC Act.

This Modification sought will involve activities which are entirely within the Boggabri Existing Project and, as such, it does not require referral or approval under the EPBC Act.

5.3 OTHER REGULATORY REQUIREMENTS

5.3.1 Protection of the Environment Operations Act 1997

The POEO Act provides for licensing of pollution by Office of Environment and Heritage (OEH) which administers the POEO Act.

Boggabri Coal holds Environmental Protection Licence (EPL) 12407 in respect to its currently approved mining operations. A variation to the EPL 12407 may be sought under the POEO Act for this Modification, as required and will be obtained.

5.3.2 Mining Act 1992

The mining of coal in NSW is regulated under the *Mining Act 1992* (Mining Act) administered by the Minister for Resources and Energy. The various components of this Modification lie entirely within the boundaries of Boggabri Coal's existing Mining Authorities CL368, A355 and A339 which have been granted under the provisions of the Mining Act.

The principal mining authority is CL 368 which expires on 14 November 2011. An application has been made to the Minister for its renewal. The Minister may not grant the application until there is an appropriate planning approval under the EP&A Act. Under Section 117 of the Mining Act an authority the subject of a pending renewal application will continue to have effect until the application is finally disposed of.

The Mining Operations Plan (MOP) for Boggabri Coal as required by the conditions of its mining authority will be updated as required to incorporate details of mining operations associated and consistent with this Modification. The MOP will be prepared and submitted to Department of Trade, Investment, Regional Infrastructure and Services – Mineral Resources (DTIRIS – MR) for approval.

5.3.3 Coal Mine Health and Safety Act 2002

Division 3, Section 100 of the *Coal Mine Health and Safety Act 2002* (CMHS Act) states that Ministerial approval must be obtained to establish an emplacement area where reject material is to be deposited or placed.

Boggabri Coal's existing approval under Section 100 of the CMHS Act will be reviewed in respect of this Modification and updated as required.

5.3.4 Water Act 1912

The *Water Act 1912* (Water Act) will apply to those sections of the mine which are outside of a Water Sharing Plan. The area of mining in this Modification is at least partly outside of the Upper and Lower Namoi Groundwater Sources 2003 Water Sharing Plan. Accordingly, a bore licence under Part 5 of the Water Act will be sought as required.

Boggabri Coal holds bore licence 90BL253854 and 90BL255090 issued under Part 5 of the Water Act in respect of the property within the Project.

5.3.5 Water Management Act 2000

Part of the land and water sources within which the activities described in this Modification take place is within the area of the Upper and Lower Namoi Groundwater Sources 2003 Water Sharing Plan. The following approvals and licences under the *Water Management Act 2000* (WM Act) are required for the activities contemplated by this Modification as required:

- An access licence under Part 2 of the WM Act with appropriate share component to authorise the taking of water;
- Sections 89 (Water Use Approvals); and
- Section 90 (Water Management Work Approvals).

These approvals and licences will be subject of a separate application made to NSW Office of Water (NOW) or extension of the existing Water Access Licence in respect of its current operations for which a licence is required.

The proposed activities in this Modification are exempt from the requirement for a Controlled Activity Approval under section 90 by virtue of Clause 39A(2) of the *Water Management (General) Regulation 2004* which exempts from the requirement for an approval for a controlled activity any activity carried out in accordance with any lease under the Mining Act.

6 IMPACTS, MANAGEMENT AND MITIGATION

The potential environmental impacts of this Modification, as identified throughout the planning and assessment process have been assessed as part of this Modification EA. The findings of the relevant environmental assessments that were undertaken for this Modification and a description of the measures that would be implemented to manage and mitigate potential impacts are presented below.

6.1 AIR QUALITY AND GREENHOUSE GAS

6.1.1 Introduction

PAEHolmes has conducted an air quality and greenhouse gas impact assessment for this Modification which is presented in full in Appendix A. This standalone study relies upon the extensive assessment for the Boggabri EA undertaken by PAE in its Air Quality Assessment (PAEHolmes 2010) and draws upon the impact assessment modelling previously undertaken and outlined therein.

6.1.2 Methodology

Air Quality

The report prepared for this Modification included the assessment of:

- Meteorological and climatic conditions and the existing air quality conditions applicable to the proposed two year extension of operations as proposed in this Modification;
- OEH air quality guidelines and assessment criteria as relevant to this Modification;
- Modelling and prediction of dust dispersion patterns due to emissions from this Modification independently and cumulatively; and

- Comparison between the predicted dust concentration and deposition levels with OEH's assessment criteria.

The assessment has been completed using dispersion modelling, following the procedures outlined in the OEH *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC 2005).

Greenhouse Gas

The greenhouse gas impacts from this Modification were calculated as CO₂-equivalent (CO_{2-e}) emissions, which would result from the following:

- Fugitive emissions from the extraction of coal;
- The extraction and processing of the open cut coal due to the combustion of diesel fuel (used in diesel-powered equipment, in blasting and to power the diesel generators);
- The transport of the product coal to the Port of Newcastle and the transport of the product coal overseas; and
- The combustion of the open cut coal in general industry, steelmaking and power generating facilities.

6.1.3 Impact Assessment

Air Quality

To identify the predicted air quality impacts from this Modification, PAEHolmes adopted the results from the modelling undertaken for Year 5 of the Boggabri EA air quality assessment (PAE Holmes 2010). The Year 5 modelling scenario was adopted as it is considered as having the greatest potential for impacts (being at the closest proximity to receivers) and that the mining operations proposed for this Modification would be in a similar location.

Further, as Boggabri Coal will not produce more than 3.5 Mtpa during the two year life of the proposed Modification, the emission estimates are considered to be conservative.

The air quality impact contours showing the predicted annual average Total Suspended Particulates (TSP) concentrations, predicted annual average PM₁₀ concentrations, and the predicted annual average (insoluble solids) dust deposition rates in relation to the locations of private receivers are shown on Figure 6. These contours show the cumulative effects this Modification with other sources, including Tarrawonga Coal Mine located to the south of the Boggabri Coal Mine.

The predicted dispersion pattern of particulate matter due to this Modification, in isolation and combined with other sources, indicate that there is one receiver (Receiver 54) that is predicted to receive annual average PM₁₀ levels above the criteria of 30 µg/m³ (with a predicted result of 33 µg/m³).

All other private receivers are not predicted to experience exceedances of the criteria.

Receiver 54 currently has the right to request acquisition under the existing conditions of development consent for Tarrawonga Coal Mine.

Greenhouse Gas

A summary of the estimated annual average CO_{2-e} emissions for the proposed two year life of this Modification is provided below in Table 3. In comparison to the total Scope 1 and Scope 2 CO_{2-e} emissions for NSW and Australia recorded in 2008, the annual average predicted for this Modification equates to approximately 0.14% and 0.04%, respectively.

Table 3
Estimated Greenhouse Gas Emissions Resulting from this Modification

Year	Product Coal	CO _{2-e} Mining and Extraction (Mt)		CO _{2-e} Transport of product coal (Mt) (Scope 3)	CO _{2-e} Usage of product coal (Mt) (Scope 3)	CO _{2-e} Total (Mt)	
		Scope 1 and 2	Scope 3			Scope 1 and 2	Scope 3
1	3.50	0.23	0.005	0.53	8.47	0.23	9.01
2	3.50	0.23	0.005	0.53	8.47	0.23	9.01
Total	7.00	0.45	0.01	1.07	16.94	0.45	18.01
TOTAL (Scope 1 – 3)							18.47
Annual Average (Scope 1 – 3)							9.43

6.1.4 Mitigation and Management

Boggabri Coal will review the existing Air Quality Management Plan for submission to DP&I within three months of the grant of this Modification to incorporate practical management measures to ensure dust emissions are minimised and regulatory criteria are met at private receivers.

Additional management and mitigation measures will include:

- A review of the existing air quality monitoring program (which has commenced);
- Minimising overburden and ROM coal haul road distances;
- The use of water sprays where practical;
- The use of dust suppressant product (or other comparable effective alternatives) on all active coal and overburden haul roads where necessary;
- Maintaining the bitumen sealed product coal haul road to the Boggabri Coal Terminal;
- Enclosing any new elevated conveyor systems and installing automatically triggered dust suppression sprays to conveyors;
- Revegetating disturbed areas as soon as practicable including rehabilitation areas and obsolete roads; and
- Installing a Tapered Element Oscillating Microbalance (TEOM) air quality monitoring unit to aid real-time dust management and monitor compliance.

6.2 NOISE AND BLASTING

6.2.1 Introduction

A noise and blasting impact assessment was undertaken for this Modification by Bridges Acoustics, which is summarised below. A full copy of the impact assessment report is presented in Appendix B.

This assessment relies upon the noise modelling and assessment results from the Boggabri EA completed by Bridges Acoustics in 2010 in the context of the operations proposed for this Modification.

6.2.2 Methodology

Background

The noise and blasting impact assessment was undertaken to determine noise and vibration impacts associated with this Modification in accordance with current OEH guidelines and policies. Existing noise levels and blast monitoring data have been reviewed and assessed for the operations proposed for this Modification, including the haul road and rail loading facility, have been assessed using a comprehensive model developed for the Boggabri Coal site.

This model included the assessment of an appropriate meteorological dataset, all operational noise sources present and the noise and blasting control measures that would be in place to mitigate impacts resulting from this Modification.

Noise levels from the operations proposed for this Modification were recently described in the modelling undertaken for the Continuation of Mining Project. This study included an assessment of noise levels at intervals of 1, 5, 10 and 21 year intervals and the production of coal at a rate of up to 7 Mtpa.

Noise impact levels during the two year extension proposed for this Modification would be similar to noise levels described for Year 1 to Year 5 in the Boggabri EA report, subject to the following:

- Noise levels reported for Year 1 in the Boggabri EA, including noise from product haul trucks, would apply directly to this Modification assessment; and
- Noise levels reported for Year 5 in the Boggabri EA were for a proposed production level of 7 Mtpa, compared to a maximum production level of 3.5 Mtpa proposed for this Modification.

- A correction factor of -2.5 dBA applied to the Boggabri EA results would therefore be appropriate for this Modification. As this Modification seeks approval for a two year approval period rather than 5 years, the Year 5 results presented in the Boggabri EA would therefore conservatively overstate predicted noise levels during the 2 year Modification at private residences.

Criterion

A review was undertaken for Boggabri Coal Mine to confirm relevant noise impact criteria for Boggabri Coal Mine, considering other known sources of industrial noise in the area. This included a review of the noise monitoring data gathered for the activities of Tarrawonga Coal Mine. Given their locations and the existing noise environment, all assessed receivers have conservatively been assigned the 'rural' amenity category under the NSW *Industrial Noise Policy* (EPA 2000) for the purposes of determining appropriate noise amenity criteria. The noise criteria adopted for all receivers is therefore 35 $L_{Aeq,15\text{ min}}$.

Noise Monitoring Summary

Boggabri Coal commissioned additional weekly unattended noise surveys in March and June 2011 at three representative locations around Boggabri Coal Mine to assess existing mining and background noise levels. During the monitoring periods, it was assessed that background noise levels may include some influences from the existing operations at Boggabri Coal Mine, however the results indicate background levels regularly drop below 30 $L_{A90,15\text{ min}}$ which is the lowest background noise level that can be adopted according to the INP.

Blast Monitoring Summary

The *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (the Blasting Guideline) (ANZEC 1990) recommends residential ground vibration and overpressure limits and time restrictions for blasting.

Noise and vibration criteria are recommended as:

- 115 dBL for overpressure; and
- 5 mm/s Peak Particle Velocity (PPV) for ground vibration.

The Blasting Guideline recognises that blast effects cannot always be controlled accurately and therefore allows higher limits of 120 dBL and 10 mm/s PPV for up to 5% of the total number of blasts on a site in a 12 month period.

A review of recent blast and vibration monitoring data for Boggabri Coal Mine during the 2009 – 2010 period shows that maximum overpressure and ground vibration levels at receiver locations were within the criteria recommended by the Blasting Guideline.

6.2.3 Impact Assessment

Noise

Predicted noise levels for Year 1 have been calculated based on the Year 1 mine plan described in the Boggabri EA. Predicted noise levels for Year 2 have been calculated based on the Year 5 mine plan in the Boggabri EA (assessed at a maximum rate of up to 7 Mtpa product coal), with a correction factor of -2.5 dBA to reflect the maximum coal production rate of 3.5 Mtpa sought for this Modification.

Noise impact contours for this Modification are shown in Figure 7 and further discussion provided below.

Predicted noise impacts from this Modification (under worst case weather conditions) in relation to the relevant criterion include:

- No receivers (additional to those with an existing right to acquisition upon request by a mining company) is predicted to receive a significant impact from this Modification;

- Two residences (Receiver 67 Goonbri and Receiver 52 Jeralong), and three other properties (13-14 Horse Shoe; 53,79,81,82,84,86 Northam/Kyalla; and 87 Templemore) are predicted to receive moderate noise impacts of 3 - 5 dBA over the criterion. Receiver 54 was also predicted to receive moderate noise impacts, however has right to acquisition upon written request under Tarrawonga Coal Mine's development; and
- Five other properties (23-27, 29, 31, 36 Coobooobindi; 28-30 Bullock Paddock; 48 'Wilboroi'; 78-80 Crosby; 116 RA & CM Collyer) are predicted to receive mild noise impacts (of up to 2 dBA over the criterion) from this Modification. Receiver 88 Pine Grove was also predicted to receive mild noise impacts, however has right to acquisition upon written request under Tarrawonga Coal Mine's development consent.

Relevant assessments were also undertaken to determine the potential impacts to receivers associated with Sleep Disturbance, Road Traffic Noise, Rail Traffic Noise, Construction Noise, Low Frequency Noise and Cumulative Noise Impacts. These assessments determined that there would not be any additional impacts from these issues to receivers in addition to those predicted to experience noise impacts as a result of operation of this Modification.

Blasting

To determine potential blasting impacts, recent overpressure and blast monitoring results recorded by Boggabri Coal were reviewed and used to assess impacts that may be associated with this Modification.

Following consideration of the monitoring results and calculation of impacts predicted for this Modification, it was found that:

- Ground vibration levels are not expected to exceed 2 mm/s PPV at the closest receiver locations which is well within the criterion of 5mm/s;
- A maximum overpressure of 114.2 dBL would be produced at the two closest receiver locations, assuming that current blasting practices are maintained. Most residences would remain over 4.8 km from proposed blasts and are expected to receive less than 112 dBL from blast events for this Modification;
- The average number of blast events per week as a result of this Modification would be unlikely to result in any damage to residences or other structures; and
- Potential cumulative impacts, in the form of additional blast events per day from two or more nearby mine sites, would not increase maximum overpressure or ground vibration levels and would therefore not result in exceedances of relevant impact criteria.

6.2.4 Mitigation and Management

Boggabri Coal will ensure that the PSNC are met at all privately owned residences for the duration of this Modification.

Boggabri Coal will also ensure that the blast criteria are met at all privately owned residences for the duration of this Modification by carefully designing all individual blasts where there is a potential for exceedance at any private residence.

Boggabri Coal will review the existing Noise and Vibration EMP for submission to DP&I within three months of the grant of this Modification to incorporate practical management measures to ensure noise emissions are minimised and regulatory criteria are met at private receivers.

The following additional noise control and mitigation measures will be implemented to minimise noise impacts on receivers:

- All mining trucks being fitted with best practice exhaust silencers to reduce their noise emissions;
- The overburden fleet will be directed to higher, exposed emplacement areas during favourable weather conditions (generally during the day) and to lower, more shielded emplacement areas during noise enhancing weather conditions (generally during the evening and night);
- Product haul trucks being operated at a speed of 90 km/hr during the day and during favourable weather conditions and at a speed of 50 km/hr during noise enhancing weather conditions in the evening and night to produce a maximum sound power level of 108 dBA per truck at these times. Trucks that are fitted with additional sound suppression equipment or can otherwise operate within the 108 dBA sound power limit at a higher speed and may operate at the higher speed at any time;

- Vehicle reverse alarms and horns, equipment start alarms and other audible warning devices being selected, installed and adjusted to produce the lowest possible noise level consistent with safe operating procedures; and
- All mobile and coal handling equipment being maintained in good operating condition to maximise productivity and, at the same time, minimise any additional or unnecessary noise impacts.

6.3 SOILS AND LAND CAPABILITY

6.3.1 Introduction

A soils and land capability impact assessment was undertaken for this Modification by GSS Environmental, with the full version of the report provided in Appendix C. This standalone study relies upon the extensive assessment undertaken for the Boggabri EA study GSS Environmental (2010) and draws upon the impact assessment and mitigation therein (as at Year 5) which provides a contemporary and conservative assessment of the impacts from this Modification.

6.3.2 Methodology

The objectives of the soils and land capability assessment for this Modification Boundary were to provide:

- A description of the soils types and highlight areas of unfavourable material which require specific management and handling practices;
- A description of the land capability and agricultural suitability;
- Recommendations for stripping depth for proposed disturbance areas, including any recommendations for handling, stockpiling and amelioration for reuse in rehabilitation; and
- Necessary erosion and sediment control measures to manage in-situ and stockpiled soil resources.

6.3.3 Impact Assessment

Soil Types

Two soil units were identified within the extent of this Modification Boundary, being:

- Grey Brown Gradational Loam (Brown Dermosol), which occur over approximately 99% of the area; and
- Light Brown Uniform Gravelly Sand (Brown Rudosol).

Assuming that only the Brown Dermosol soils will be stripped (to a depth of 15 mm) and that there will be a handling loss of approximately 10%, approximately 158,206 m³ of suitable topdressing will be available for rehabilitation purposes.

Soil Characteristics

The characteristics of the Brown Dermosol to be stripped for this Modification were also assessed. These assessments determined that the upper layers of the soils are non dispersive and non sodic whilst the subsoils trended to moderate dispersion and moderate sodicity with depth.

The potential for acid generation from regolith material (topsoil and subsoil) within this Modification Boundary was assessed as low.

Land Capability

Rural land capability classification was conducted in accordance with the requirements of DTIRIS. This assessment found that this Modification Boundary consists of Class IV land capability overlying the Grey Brown Dermosol soils, whilst Class V exists over the small section of Brown Rudosol soils that is present.

Agricultural Suitability

The assessment of agricultural suitability found that the classifications corresponded to the two soil types present in this Modification Boundary. However, due to the location of this Modification Boundary in the Leard State Forest area which is generally heavily vegetated, the land is currently unsuitable for agricultural activity.

Should this Modification Boundary area be cleared for use in agricultural activities, the majority would be considered to have an agricultural suitability of Class 3. The remaining land (corresponding to the small area of Brown Rudosols) is categorised as Class 4.

6.3.4 Mitigation and Management

The existing mitigation and management measures which will continue to be employed for this Modification are provided below and include:

- Procedures for the correct stripping and handling of topsoil materials;
- Procedures for the correct re-spreading of topsoils; and
- Rehabilitation design, development and management procedures, including measures to promote effective landform design, erosion and sediment control management and seedbank preparation.

6.4 GEOCHEMISTRY

6.4.1 Introduction

An assessment of the geochemical characteristics of the overburden and potential coal rejects materials for this Modification was undertaken by RGS Environmental Pty Ltd (RGS). The area contained within the proposed Modification Boundary was assessed as part of the RGS (2009) study and therefore the potential impacts associated with this Modification are relevant to those described in that report. A standalone study is provided in Appendix D which provides a contemporary and conservative assessment of the impacts from this Modification.

6.4.2 Methodology

This Modification Boundary is a subsection of the larger Project Boundary from the RGS 2009 study. The samples assessed as part of this study are considered representative of the material within this Modification Boundary.

The assessment involved a review of existing geochemical, geological and water quality monitoring data that was available as part of this program of work.

6.4.3 Impact Assessment

This Modification will disturb similar types of overburden and generate similar types of coal reject materials to those described in the 2009 RGS study of overburden and coal reject materials.

The only significant difference is that this Modification covers an area which is significantly smaller than the area likely to be affected and assessed as part of the previous geochemical assessment (see Figure 5). Hence, the amount of overburden and coal reject materials generated by this Modification will be significantly less. Therefore, the magnitude of the potential environmental impacts likely to result from this Modification will be less than those described in the previous RGS geochemical assessment.

The RGS assessment found that:

- Most overburden and coal reject has a high factor of safety with respect to potential acid generation and is classified as Non-Acid Forming (NAF). The exception is immediate roof and floor materials from the Braymont seam (and possibly the Jeralong seam), which are classified as Potentially Acid Forming (PAF);
- The concentration of total metals in overburden and coal reject is low and well below the applied guideline criteria for soils and will not present any environmental issues associated with revegetation and rehabilitation;
- Most overburden and coal reject materials will generate slightly alkaline and relatively low-salinity runoff and seepage following surface exposure.

The exception is potential coal reject material from the Braymont seam (and possibly the Jeralong seam) where PAF materials may generate acidic and more saline runoff and seepage over time;

- The concentration of dissolved metals in initial runoff and seepage from overburden and coal reject materials is unlikely to present any significant environmental issues associated with surface and ground water quality from this Modification; and
- Most overburden and coal reject materials are sodic and may have structural stability problems related to potential dispersion. Some near surface and conglomerate overburden materials are less sodic and may be the most suitable materials for revegetation and rehabilitation activities (as a growth medium). For all other sodic overburden materials, it is likely that treatment would be required if these were to be considered for use as vegetation growth medium.

6.4.4 Mitigation and Management

The ongoing management of overburden will consider the geochemistry of these materials with respect of their potential risk to cause harm to the environment and their suitability for use in construction and revegetation. Boggabri Coal will undertake:

- Pre-stripping topsoil from areas to be mined for use in final rehabilitation activities (surface cover or vegetation growth medium);
- Placement of overburden at the emplacement area in a manner that limits the risk of surface exposure of highly sodic material and subsequent runoff and erosion; and
- Continued monitoring of runoff / seepage from overburden and coal reject emplacement areas for pH, Electrical Conductivity (EC), Total Suspended Solids (TSS) and dissolved metals, as required.

The ongoing management of coal reject material will consider the geochemistry of these materials with respect to their potential risk to cause harm to the environment and suitability for use in construction and revegetation. Boggabri Coal will:

- Ensure placement of reject materials in the open pit and / or co-disposal with overburden;
- Undertake deep (in-pit) burial of Potential Acid Forming (PAF) coal reject materials from the Braymont and Jeralong seams; and
- Ensure placement of Non Acid Forming (NAF) coal reject material is in a manner that limits the risk of surface exposure of highly sodic materials and subsequent runoff and erosion.

6.5 GROUNDWATER

6.5.1 Introduction

A groundwater impact assessment was conducted by Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) which assessed the potential impacts of this Modification as shown in Appendix E. This standalone study relies upon the assessment undertaken for the Boggabri EA Groundwater Assessment (AG&E 2010) and draws upon the impact assessment and mitigation therein (as at Year 5) which provides a contemporary and conservative assessment of the impacts from this Modification.

6.5.2 Methodology

The existing numerical groundwater model prepared by AGE for the Boggabri EA in 2010 was updated to consider the impacts associated with the mining activities proposed for a two year period within this Modification Boundary. This was undertaken to allow the key outcomes of the short-term Modification mine plan to be confirmed.

6.5.3 Impact Assessment

Groundwater Levels

The monitoring undertaken to date indicates depressurisation of the coal seam aquifers surrounding Boggabri Coal Mine occurring due to drainage of groundwater into the existing open-cut mining void. This depressurisation is not unexpected and was predicted by the groundwater model undertaken by AGE (2010). The monitoring has not detected an impact on groundwater levels in the alluvial aquifer which is consistent with predicted modelling results.

The monitoring data indicates groundwater levels in the monitoring bores constructed in the coal seams adjacent to the mining void have fallen about 10 m over the previous two years. A continuing decline in groundwater water levels in the coal seams will likely occur with an additional two years of mining. The depth and rate of mining will determine the magnitude of the decline in water levels in the coal seam monitoring bores. The hydrograph data suggests the rate of decline is starting to stabilise in some bores, but a further decline of groundwater level in the order of magnitude of up to 10 m over the two year extension period is possible.

Water levels in the bores monitoring the alluvial and volcanic basement aquifers were found to have risen in response to recent above average rainfall and do not appear to be impacted by depressurisation of the coal seams. The recharge rate in these areas likely exceeds any drainage associated with mine dewatering, and therefore no material impact on groundwater levels within the alluvial aquifer is expected with the two year extension to the mine life.

Groundwater Quality

The available monitoring data does not indicate any impact on groundwater quality from the current mining operations. The geochemistry assessment undertaken for the Continuation of Boggabri EA indicated the overburden would generate benign slightly alkaline and low salinity runoff (RGS 2009). Therefore, no adverse impact on groundwater quality during the two year extension period is considered likely.

Groundwater Inflows

Modelling predicted groundwater inflows to be about 0.75 megalitres/day (274 megalitres/year) when the pit advances into the two year extension footprint within this Modification Boundary. Although no drawdown has been observed in the alluvium to date, the groundwater model predicts a mining induced loss from the alluvial aquifer in the order of 0.075 megalitres/day (27 megalitres/yr) during the two year extension.

The model assumed some limited connectivity between the alluvial aquifer and the Permian coal seam measures. Therefore, some loss of water from the alluvial aquifer from Boggabri Coal Mine's activities is predicted. This flow of water from the alluvial aquifer cannot be directly measured at Boggabri Coal Mine. However, it can be inferred from recent monitoring results from bores constructed in the alluvial and basement volcanic aquifer that current mining activities are not adversely impacting the alluvial aquifers.

Boggabri Coal Mine currently holds 52 unit shares under licence 90BL252849 for a bore on the Daisymede property. In addition Boggabri Coal has been actively pursuing the acquisition of further water entitlements on the open market over the past 12 months. This has resulted in the purchase of an additional 567ML of alluvial groundwater entitlement as of February 2011. These licences will fully offset any water loss from the alluvial groundwater.

Impacts on Groundwater Users

A review of the zone of influence predicted in the model has confirmed that that no registered private bores should be impacted by the two year extension to the mine life.

Groundwater Dependent Ecosystems

No groundwater dependent ecosystems are known to be present in this Modification Boundary or are anticipated to be connected to the coal seam aquifers.

6.5.4 Mitigation and Management

Boggabri Coal will continue to utilise the Water Management EMP to ensure groundwater is adequately managed. Following a review of recent groundwater monitoring and modelling results for the mine and the scope of the proposed Modification, the additional groundwater management and mitigation measures will be undertaken:

- Installation of three additional nested bores in the alluvial aquifer and underlying bedrock;
- Continuation of monitoring of water levels and water quality in all bores;
- Monitoring of seepage rates to the open cut pit with flow meters on all pumps; and
- Analysis of in-pit seepage samples for key isotopes to enable the proportion of alluvial water (if any) in the pit seepage to be estimated.

6.6 SURFACE WATER AND FLOODING

6.6.1 Introduction

A surface water impact assessment was undertaken by Parsons Brinkerhoff to determine the potential impacts of this Modification on local surface water hydrology and the existing water management system. The surface water impact assessment is presented in Appendix F with a summary provided in the following section.

This assessment relies upon the modelling and assessment undertaken for the Boggabri EA study completed by Parsons Brinckerhoff in 2010 and draws upon the impact assessment and mitigation measures discussed in that report.

WRM Water & Environment also completed an assessment of the impacts of this Modification on Namoi River flood flows, which is also provided in Appendix F.

6.6.2 Methodology

The assessment approach for this Modification predominantly relies upon surface water impact predictions modelled by Parsons Brinckerhoff for the Boggabri EA study. Being a sub-component of the activities assessed under the Boggabri EA, the findings of the existing model were adopted and refined to assess the impacts within this Modification Boundary.

To determine whether any impacts to the Namoi River flood flows would occur as a result of this Modification, the proposed infrastructure changes were considered against the extent of the floodplain.

6.6.3 Impact Assessment

Catchment Hydrology

An assessment of the catchment areas relevant to disturbance proposed for this Modification shows that the catchment draining to the Boggabri Coal Mine 'dirty' and 'contaminated' water management system will increase from existing by approximately 100 ha. The catchment draining to the creek system will reduce by approximately 100 ha, which is equivalent to a 3% reduction for Year 2 of this Modification. This is significantly less than the 22% - 31% reduction for Years 5 to 21 estimated in the Boggabri EA surface water impact study.

Water Balance

The mine site water balance undertaken for the Boggabri EA surface water impact study considered key water demands and inflow for a number of key operational years.

While water balance modelling was not undertaken for the final year of operations proposed for this Modification (Year 2), it is considered that the water balance for Year 2 will be generally similar to Year 1 (Parsons Brinckerhoff 2011).

While a slight increase in water demands for Year 2 operations is expected for this Modification, this would likely be offset by an increase in runoff from disturbed areas being captured in the Boggabri Coal Mine water management system. The approved Boggabri Coal irrigation system would be adequate to dispose of the estimated

208 megalitres/yr surplus for a median year, but not the estimated 545 megalitres/yr surplus for a wet year for the Year 1 and 2 Modification landforms. As such, water would accumulate in mine water dams or in-pit if extended wet weather is experienced. Excessive volumes of water are not expected to accumulate in-pit over the two year duration of this Modification.

Water Quality

Surface water quality in the local catchment is monitored by Boggabri Coal as per the conditions of EPL 12407 at seven sites. These sites include locations at Nagero Creek upstream and downstream of existing mining operations, and within existing sediment and mine water dams onsite. Monitoring is generally undertaken for pH, electrical conductivity, total suspended solids, oil and grease, nitrate, nitrogen (total), phosphorus (total) and reactive phosphorus, with periodic testing for metals, cations, hydrocarbons and volatile organic compounds also carried out at selected sites. The existing procedures Boggabri Coal has established for the monitoring of surface water quality will continue to be undertaken during the two year life of this Modification.

Water Management System

The objectives of the existing water management system will also be followed for this Modification. This system has been designed to segregate clean runoff, dirty runoff and contaminated water generated from rainfall events and mining operations.

The following definitions have been adopted for the various runoff types:

- Clean water: defined as runoff from undisturbed bushland catchments located upslope of Boggabri Coal Mine;
- Dirty water: defined as runoff from disturbed areas within the Boggabri Coal Mine and includes runoff from the Mine Infrastructure Area, spoil dumps and haul roads. This water contains high levels of suspended solids; and
- Contaminated water: is defined as runoff generated from coal stockpiles and the mining void, as well as groundwater inflows to the mining void. This water contains high levels of suspended solids and is mildly saline.

Flooding Impacts

Under the changes to site infrastructure proposed by Boggabri Coal for this Modification (see Section 4), the haul road will remain unchanged from its existing approved condition. On this basis, This Modification will not impact on Namoi River flood flows above existing conditions.

6.6.4 Mitigation and Management

Boggabri Coal will continue to utilise the Water Management EMP and Irrigation Area EMP to ensure surface water and sediment and erosion control is adequately managed.

The surface water impacts of this Modification will be mitigated through the continued use of the Boggabri Coal water management system and the program for the ongoing monitoring of surface water quality. Clean water runoff from undisturbed catchments will be diverted around the mining disturbance areas proposed for this Modification and into Nagero Creek where practical. Where it is not practical to provide diversion drains within the Boggabri Coal Mine, a highwall dam will capture clean runoff to minimise inflows to the mining void. Dirty water runoff will continue to be captured in sediment dams to encourage the settling of suspended solids.

Runoff from large storm events will overtop sediment dams and discharge to Nagero Creek. Captured water will either be released to Nagero Creek or pumped to mine water dams for storage and reuse. This will depend on water quality and the site water balance.

Where there may be some potential for dirty water runoff to exceed relevant water quality criteria, sediment dams will be provided with manually operated valves on the outlet pipes so that discharge to Nagero Creek can be prevented if water quality parameters are not adequate.

No management measures are required for this Modification to mitigate flood flows on the Namoi River.

6.7 VISUAL AND LIGHTING

6.7.1 Introduction

A visual impact assessment for this Modification was undertaken by Integral Landscape Architecture and Visual Planning. This standalone study relies upon the extensive assessment undertaken for the Boggabri EA study "*Visual Impact Assessment 2010*" and draws upon the impact assessment and mitigation therein (as at Year 5) which provides a contemporary and conservative assessment of the impacts from this Modification. This assessment is presented in Appendix G.

6.7.2 Methodology

The following methodology was employed in the preparation of the visual impact assessment for this Modification:

- Evaluation of the existing visual environment and how elements of the landscape are seen from various viewing locations. In this way the visual character of the landscape as well as visual sensitivity of the various viewing locations was determined;

- Determination of the visual effect of the proposed Modification. This was determined by considering the visual characteristics of this Modification in the context of the existing environment;
- Consideration of the visual sensitivity and visibility of this Modification from key viewing location in the surrounding area (including a consideration of lighting impacts); and
- Identification of the overall impacts predicted for this Modification through a combined consideration of both visual sensitivity and visual effect.

6.7.3 Impact Assessment

Visual

The north, east, west and south east viewing sectors surrounding this Modification will continue to be generally screened by the Willow Tree Range. This Modification will therefore have no visual impact on these sectors.

The south west sector offers potential limited views of this Modification, however all receivers in this sector with views oriented toward this Modification Boundary will be screened by existing Boggabri Coal Overburden Emplacement Area (OEA) that has an RL 340 m. As such, this Modification will not result in any additional visual impacts to sensitive receivers (private residences in that sector).

Lighting

The activities proposed for this Modification will not result in any lighting effects in addition to those already experienced by receivers surrounding Boggabri Coal Mine.

6.7.4 Mitigation and Management

Additional visual mitigation strategies to those already in place for existing rehabilitation of OEAs at Boggabri Coal Mine would not be required for this Modification. Continued prioritisation on the shaping and rehabilitation of the outer slopes of the southern OEA will be undertaken (see Figure 5).

Boggabri Coal will continue with current on site management and mitigation measures that relate to the progression of the OEA and rehabilitation of it, with the following visual treatments to be implemented:

- Infrastructure will be constructed in forest tones (i.e. green, grey, cream) to blend with the surrounding natural environment;
- Implementation of already completed landform design of the eastern and southern OEAs and associated drainage structures; and
- Establishment of visual and ecological forest planting patterns to achieve landscape patterns that emulate existing forest colour and texture continuums in the landscape.

Any requirement for offsite treatments at viewer locations as a result of this Modification is considered unlikely.

No additional management measures in relation to lighting impacts are required.

6.8 ECOLOGY

6.8.1 Introduction

An ecological impact assessment for this Modification was undertaken by Parsons Brinckerhoff in order to identify the existing ecological values and to assess any potential impacts that may occur on threatened flora and fauna species and communities within this Modification Boundary. The full assessment can be viewed in Appendix H. This standalone study relies upon the ecological assessment undertaken by Parsons Brinckerhoff (2010) for the Boggabri EA and draws upon the impact assessment and mitigation measures assessed therein to consider the impacts associated with this Modification.

6.8.2 Methodology

A comprehensive ecological assessment and survey program was recently undertaken for Boggabri Coal in 2010. This study included the comprehensive seasonal field assessments of the area within the Modification Boundary.

The relevant findings of the previous studies and desktop searches undertaken were reviewed to determine the likely ecological impacts of this Modification.

6.8.3 Impact Assessment

Vegetation Communities

Four vegetation communities were recorded within this Modification Boundary as shown on Figure 8 and include:

- White Box – White Cypress Pine grassy woodland;
- White Box – Narrow-leaved Ironbark – White Cypress Pine grassy open forest;
- Narrow-leaved Ironbark – White Cypress Pine shrubby open forest; and
- White Box – Narrow-leaved Ironbark – White Cypress Pine shrubby open forest.

Of the vegetation communities present within this Modification Boundary, the White Box – White Cypress Pine grassy woodland and White Box – Narrow-leaved Ironbark – White Cypress Pine grassy open forest are commensurate with the Box Gum Woodland community listed as a threatened ecological community under the EPBC Act and TSC Act. This Modification will result in impacts to approximately 114 ha of native vegetation (within the area proposed to be mined in the Boggabri EIS and Boggabri SEE) of which 45 ha is listed as Endangered Communities under the EPBC Act or TSC Act.

Flora

No threatened flora species have been recorded within this Modification Boundary. Three threatened species: the *Diuris tricolor* (Pine Donkey Orchid); *Pultenaea setulosa* (Stony Bush-pea); and *Pomaderris queenslandica* (Scant Pomaderris) have potential habitat within this Modification Boundary.

Fauna

Four threatened species were recorded in this Modification Boundary including the: *Climacteris picumnus* (Brown Treecreeper); *Glossopsitta pusilla* (Little Lorikeet); *Pyrrholaemus saggitatus* (Speckled Warbler); and *Neophema pulchella* (Turquoise Parrot). A further 20 species have potential habitat located within this Modification Boundary.

6.8.4 Mitigation and Management

To manage the impacts to flora and fauna predicted to occur as a result of this Modification, Boggabri Coal will continue to follow the mitigation and management measures detailed in the approved Flora and Fauna Management EMP (Parsons Brinckerhoff 2009).

In addition to the implementation of existing management measures, a Biodiversity Offset Strategy has been developed that corresponds to the impacts predicted in terms of vegetation disturbance.

The Merriendi Property is proposed to be established as an offset for this Modification and is shown on Figure 9. This property is located adjacent to the western extent of the Leard State Conservation Area and was surveyed in 2010 in accordance with the required methodology of the *Biobanking Operation Manual* (DECC 2009).

The Merriendi Property covers approximately 541 ha and contains five vegetation communities, the majority of which comprise high quality woodland habitat characterised by native grasses, fallen timber, leaf litter and loose rock. Three broad fauna habitat types were recorded on the Merriendi Property:

- 170 ha of Native Grasslands (Photograph 5-1 in Appendix H);
- 197 ha of Grassy Woodland on Fertile Soils; and
- 174 ha of Shrubby Woodlands/Open Forest on Skeletal Soils.

A summary comparing the predicted impacts of this Modification against the proposed offsets provided by the Merriendi Property is provided in Table 4.

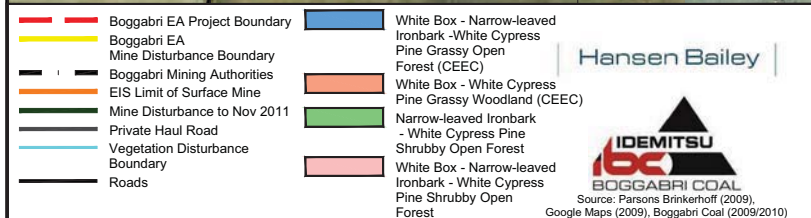
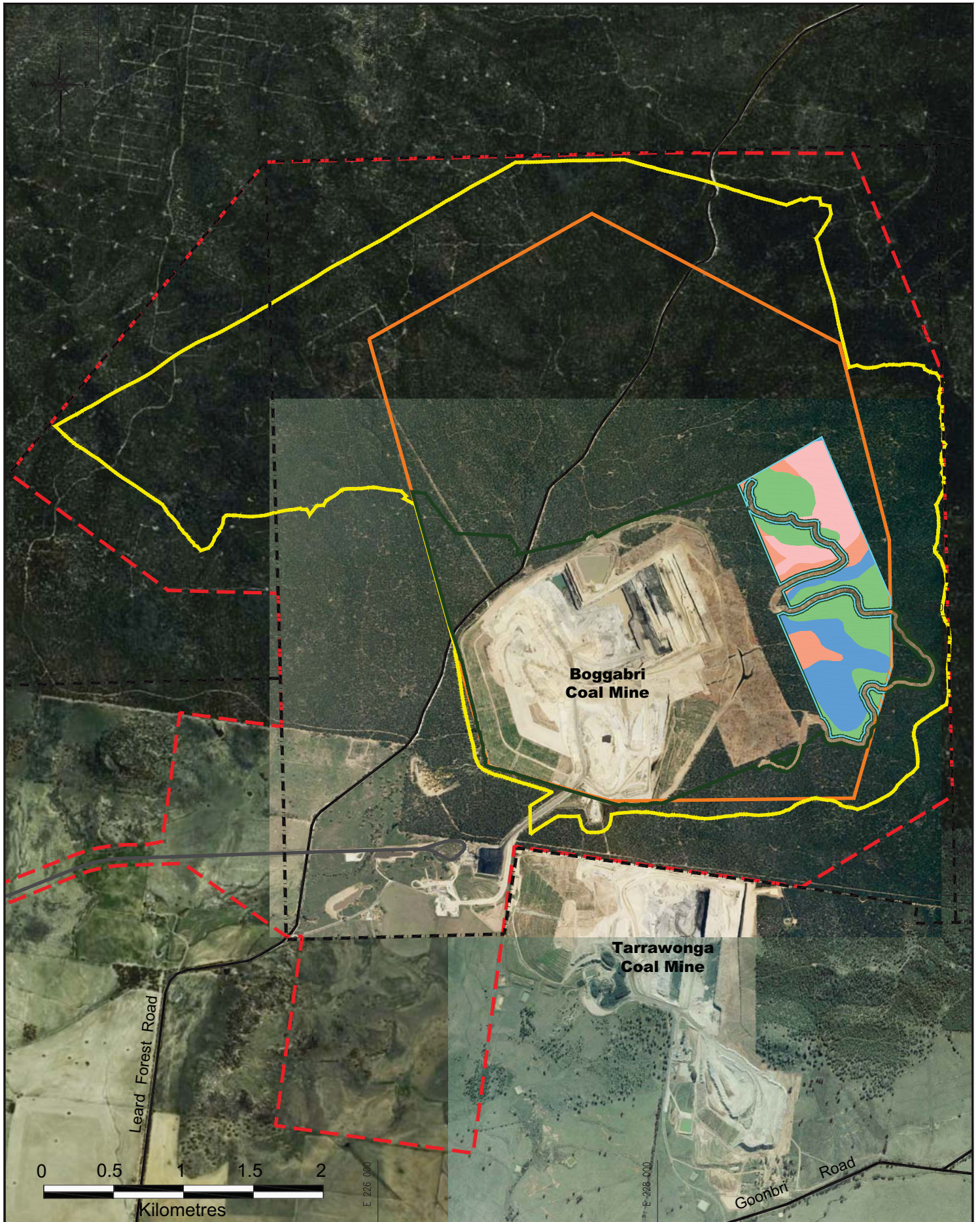


Table 4
Modification Boundary and Merriendi Property Offset Ecological Values

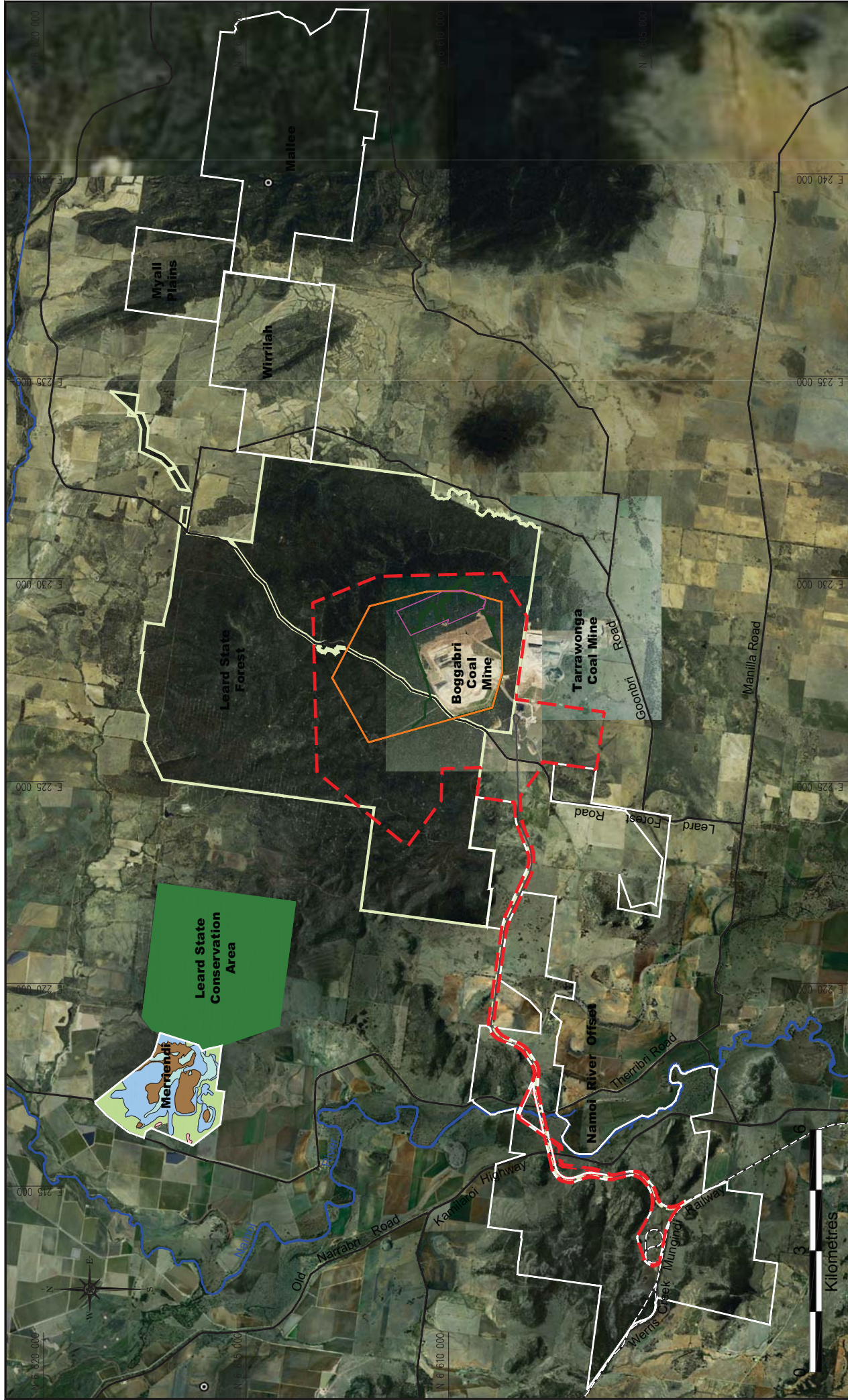
Vegetation Community / Habitat	Modification Boundary (ha)	Merriendi Property (ha)	Offset Ratio
Vegetation Communities			
White Box –White Cypress Pine grassy woodland*	14.9	194	13.0:1
White Box – Narrow-leaved Ironbark –White Cypress Pine grassy open forest*	30	0	0
Narrow-leaved Ironbark – White Cypress Pine shrubby open forest	45.3	62.2	1.4:1
White Box – Narrow-leaved Ironbark –White Cypress Pine shrubby open forest	24.1	0	0
White Box –White Cypress Pine grassy woodland (Derived Native Grassland)*	0	170.1	-
Silver-leaved Ironbark healthy woodland	0	112	0
Weeping Myall Woodland	0	3.1	0
Total Native Vegetation	114.3	541.4	4.7:1
Total Box Gum Woodland (intact)	44.9	194.0	4.3:1
Total Box Gum Woodland (including derived grasslands)	44.9	364.1	8.1:1
Fauna Habitat			
Grassy Woodlands on Fertile Soils	44.9	197.1	4.4:1
Shrubby Woodlands/Open Forest on skeletal soils	69.4	174.2	2.5:1
Grasslands	0.0	170.1	0
Total Fauna Habitat	114.3	541.4	4.7:1

* Commensurate with Box Gum Woodland listed under the TSC and EPBC Act

The 'like for like' threat-listed Box Gum Woodland which is located on the Merriendi property would be offset at a ratio of 4.3:1. The derived native grasslands are considered part of the Threatened ecological community and would be suitable for rehabilitation/revegetation.

The combined 'like for like' Box Gum Woodland and derived native grasslands on the Merriendi Property would provide an overall offset of 8:1. Threatened flora and fauna species recorded within or with potential to occur in this Modification Boundary have either been recorded or have the potential to occur in habitat within proposed Merriendi Property.

To ensure the effective ongoing management of Merriendi as an offset for this Modification, a Biodiversity Management Plan will be prepared for the property, in consultation with the OEH. This document will provide an outline of the proposed management actions, revegetation success criteria and requirements for ongoing monitoring.



Boggabri EA Project Boundary

Boggabri Mining Authorities

EIS Limit of Surface Mine

Mine Disturbance to Nov 2011

Private Haul Road

Mining Extension

Railway

Roads

Rivers and Creeks

Boggabri EA Strategic Corridor Properties

Silver-leaved Ironbark Heathy Woodland

Weeping Myall Woodland (TEC)

White Box - Narrow-leaved Ironbark -

White Cypress Pine Shrubby Open Forest

White Box - White Cypress Pine

Grassy Woodland (Derived Grasslands) (TEC)

White Box - White Cypress

Pine Grassy Woodland (TEC)

Hansen Bailey

IDEMITSU

BOGGABRI COAL

Source: Google Maps; Whitehaven Coal (2009); Boggabri Coal (2010)

BOGGABRI COAL MINE

Biodiversity Offset

Cad File: 07729C.dwg Date: 22.08.11 Drawn: CP

Figure **9**

6.9 INDIGENOUS HERITAGE

6.9.1 Introduction

An Indigenous heritage impact assessment was undertaken for this Modification by Insite Heritage, which is summarised below. A full copy of the impact assessment report is presented in Appendix I. This standalone assessment relies upon the detailed Indigenous Archaeology and Cultural Heritage Assessment undertaken for the recent Boggabri EA by Insite Heritage in 2009 – 2010 in the context of the operations proposed for this Modification.

6.9.2 Methodology

This Indigenous heritage assessment was undertaken to determine potential impacts associated with this Modification in accordance with the relevant findings of previous archaeological and cultural heritage studies undertaken by Boggabri Coal. This included the review of four studies previously undertaken in consultation with the local Aboriginal community and in accordance with relevant regulatory requirements. This Modification Boundary is located entirely within the area studied for the Boggabri EA Indigenous Archaeology and Cultural Heritage Assessment (Insite Heritage 2010).

The archaeological context of the site and the findings of all previous field surveys undertaken were reviewed to determine whether any known items or sites of Indigenous heritage significance were present within this Modification Boundary.

6.9.3 Impact Assessment

The review of existing Indigenous heritage data for Boggabri Coal Mine confirmed that no surface items of significance were located within this Modification Boundary disturbance area as shown on Figure 2.

The locations for development additional infrastructure and water management systems proposed for this Modification would not impact on any known Indigenous heritage sites and that the infrastructure components of this Modification are generally located in the area of the existing Aboriginal Heritage Impact Permit (AHIP) #2369.

While no surface objects have been recorded in the disturbance area proposed for this Modification, previous surveys have found that this Modification Boundary is located within a landform unit which has a high potential for subsurface objects.

6.9.4 Mitigation and Management

Boggabri Coal will continue to manage Indigenous Archaeological and Cultural Heritage generally in accordance with the objectives and procedures outlined in the approved *Cultural Heritage Environmental Management Plan* (Parsons Brinckerhoff, 2009) for the site. This document will be updated and provided to OEH within three months of approval of this Modification, should specific mitigation measures be required for impacts to Indigenous heritage associated with this Modification.

To confirm the presence of Indigenous heritage objects within this Modification Boundary landform unit and whether there would be a need for a salvage program to be undertaken, a testing program for the area will be carried out in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010).

Should the test program confirm the presence of sub-surface objects, an AHIP in accordance with Section 90A of the *National Parks and Wildlife Act 1974* will be prepared prior to the commencement of operations in this Modification Boundary. The preparation of an AHIP will be undertaken in consultation with local Aboriginal stakeholders and to the approval of OEH, should it be required.

6.10 NON-INDIGENOUS HERITAGE

6.10.1 Introduction

A Non-Indigenous heritage impact assessment was undertaken by Archaeology Australia (2011) and assessed the potential impacts of this Modification on Non-indigenous heritage within this Modification Boundary and immediate surrounds.

This standalone study relies upon the extensive assessment undertaken for the Boggabri EA study *Non-Aboriginal Cultural Heritage Assessment* (Archaeology Australia 2009) and draws upon the impact assessment and mitigation therein which provides a contemporary and conservative assessment of the impacts from this Modification. The Non-Indigenous heritage assessment is presented in Appendix J and is summarised below.

6.10.2 Methodology

This Modification assessment involved a review of the Non-Indigenous Cultural Heritage Assessment undertaken by Archaeology Australia for the proposed Boggabri EA in 2009. The 2009 study included desktop searches, physical site inspections and consultation with local residents.

Further to this review, a desktop search of all relevant heritage registers and planning instruments was repeated to ensure no heritage sites had been added since the previous assessment had been completed. The assessment was conducted in accordance with the *Heritage Act 1977* (Heritage Act).

6.10.3 Impact Assessment

The lands relating to this Modification are located within an area that was dedicated as a forest reserve in 1878. It was then known as Back Creek Forest Reserve. Much of that area was part of the original 'Boggabri' run. It was dedicated as Leard State Forest in 1917. The Leard State Forest covers in excess of 90 square kilometres and there is known evidence of Non-Indigenous settlement within the forest area.

During the field surveys undertaken for the Boggabri EA in 2009, physical inspection the Leard State Forest was undertaken by Archaeology Australia. This included the area within this Modification Boundary.

While this survey provided some physical evidence of logging activities, there was no extant material identified that indicated the location of spot mills or logging camps occurred within this Modification Boundary.

Archaeology Australia (2009) did not identify any heritage items within or in close proximity to the area that is the subject of this Modification EA. As such, the impact on the non-Indigenous heritage by mining activities proposed within this Modification Boundary will be negligible.

6.10.4 Mitigation and Management

No heritage items have been identified or are known to occur within or in close proximity to this Modification Boundary. It is possible that previously unidentified sites or relics of heritage significance could be located within this Modification Boundary (e.g. beneath the surface).

The predictive model outlined in Archaeology Australia (2009) highlights the potential of some of those items to occur and this model has been adopted for this Modification. Section 146 of the Heritage Act requires that the discovery of a previously unknown relic be reported to the Heritage Council of NSW within a reasonable time of its discovery.

A pre-clearance survey will be undertaken prior to the commencement of stripping activities for this Modification, which will include an inspection for items of potential Non-Indigenous heritage significance.

Boggabri Coal will ensure that during the development of this Modification, all personnel are made aware of:

- The potential of the existence of previously unknown heritage items;
- The nature of such items;
- Protection afforded these items by the Heritage Act; and
- Appropriate procedures to be followed if any items with potential heritage values are located.

6.11 REHABILITATION AND FINAL LANDFORM

6.11.1 Rehabilitation Objectives

Rehabilitation strategies have been documented and reported on an annual basis to regulators since mining commenced in 2006. The land within this Modification Boundary has been altered from previous forestry activities in the Leard State Forest and the development of a contour bank by Boggabri Coal. While the area assessed has been intermittently logged over the past century for its valuable timber resources, the vegetation communities within this Modification Boundary represent a heavily impacted ecosystem which has maintained some high biodiversity values.

Under agreement with the land manager (Forests NSW), the existing Boggabri Coal rehabilitation strategy has focused on the establishment of commercial timbers for future forestry activities based on best practice research into growth rates of various canopy tree species.

As a consequence of the outcomes from the Boggabri Coal Biodiversity Offsets Strategy Working Group undertaken in 2010, the rehabilitation strategy for Boggabri Coal Mine now focuses on biodiversity values and the establishment of habitat for Threatened species. The strategy will build on the successes from previous rehabilitation trials.

Boggabri Coal's key rehabilitation objective will now be to ensure that all processes undertaken are consistent with SEWPaC *National Recovery Plan for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box Gum Grassy Woodland) (2010).

This will include:

- Implementation of the Offset Strategy described in Section 6.8.4;

- Revegetation of the post mine landscape with native vegetation, comprising a mixture of native grassy woodland, shrubby woodland / open forest, Box Gum Woodland with fauna habitat for Threatened species to encourage the re-establishment of pre-mining biodiversity values;
- Ensuring the sustainability of the post mining ecological values of the landscape; and
- The establishment of a clear set of indicators and completion criteria to be met.

6.11.2 Rehabilitation Techniques

Clearance Protocol

The existing broad rehabilitation techniques and criteria will continue to be applied to all rehabilitation areas for this Modification. Rehabilitation techniques and strategies, with a particular focus on the establishment of the Threatened Box Gum Woodland community using native species common to the region, will be developed during the life of this Modification.

Prior to the clearing of any native vegetation, in particular pre-strip clearing activities in advance of mining, Boggabri Coal will continue to undertake the following activities:

- Undertake pre clearing wildlife surveys and fauna management, incorporating a two stage clearing protocol for all hollow-bearing trees;
- Relocate and store transportable habitat features such as large logs and boulders, for reuse as future potential fauna refuge sites;
- Minimise disturbance of vegetation for each stage of clearing;
- Collect native seed prior to clearing, for use in the revegetation of disturbed areas; and
- Remove and store topsoil.

Rehabilitation

Vegetation and topsoil will be removed prior to mining activities occurring. The topsoil contains a valuable native vegetation seedbank that will enhance the rehabilitation works. Where practical, topsoil will be immediately spread over rehabilitation areas to enhance the rehabilitation outcomes. Where stockpiling is required, measures to protect its quality by retaining soil microbes and maintaining a viable soil seedbank will be implemented.

Topsoil will be spread and contour ploughed to a minimum of 100 mm thickness.

Soil testing will be undertaken on an annual basis to ensure a suitable growth medium exists to meet the objectives of the rehabilitation strategy.

Revegetation

Previous experience has shown that revegetation works are best carried out in spring and autumn, when conditions are optimal. The revegetation works will continue to be implemented with the aim of establishing three broad native vegetation classes representative of the existing vegetation present within this Modification Boundary, including the Threatened Box Gum woodland community.

The management approach in revegetation works proposed for this Modification will consider the performance of existing rehabilitation areas and trials at Boggabri Coal. Habitat material such as fallen hollow logs will be retained and placed throughout the rehabilitation area to provide erosion control, microhabitat and terrestrial fauna habitat.

Final Landform

Boggabri Coal will maximise opportunities for a diverse post-mining landscape and land-use within this Modification Boundary, where possible. It is proposed that the final land use of the rehabilitated site will include those similar to pre-mining forestry land use.

Key rehabilitation domains consistent with those already defined by Boggabri Coal will be identified for this Modification Boundary to guide the implementation of rehabilitation and final landform management strategies appropriate to each.

The final landform will be developed to promote visual characteristics that generally conform to the existing landscape. To ensure long term stability and sustainability the slopes of the final landform within the mine disturbance area will have a maximum slope of 10 degrees. It is expected that the steeper slopes will develop greater biodiversity than the more easily accessible sites.

The conceptual final landform will be free draining and shall also be designed to integrate with the surrounding catchments by channelling water towards natural drainage lines of the Nagero Creek. In addition, the location of Boggabri Coal in the context of other local developments for the adjacent Tarrawonga Coal Mine and the proposed Maules Creek Coal Project will also be considered in the final landform design process.

6.11.3 Rehabilitation Completion Criteria

Completion criteria for mine closure will be developed and agreed in consultation with the relevant government agencies and community. These criteria will continue to be revised and developed to demonstrate that the rehabilitation objectives have been achieved. The achievement of the completion criteria will be monitored and reported both internally and externally to the relevant stakeholders. Boggabri Coal is committed to the achievement of best practice completion criteria, as this will ensure the long-term protection and management of the post mine landscape and its biodiversity conservation values.

The performance of rehabilitation against the agreed criteria and the gradual achievement of these measures will be assessed and discussed within annual rehabilitation monitoring reports. Any improvement in flora and fauna species diversity will also be plotted by year in these reports.

Annual reports will include details of any successes or failures of the criteria and measures taken to address any issues that are identified as being detrimental to rehabilitation performance.

6.11.4 Management and Mitigation

In accordance with existing Rehabilitation and Land Management EMP, all rehabilitation areas will be monitored to ensure that rehabilitation objectives are being met and that sustainable revegetation and long term landform sustainability can be achieved.

Rehabilitation monitoring will continue for this Modification and will include at least annual inspections of rehabilitation areas to assess:

- Structural stability of the rehabilitated landform;
- The effectiveness of erosion and sediment control measures;
- Revegetation success and the establishment of Box Gum Woodland understorey and fauna habitat; and
- The effectiveness of weed and pest management measures.

Maintenance works in rehabilitation areas will be completed as required to address any issues of concern identified during monitoring. These activities may include responses such as:

- Supplementary seeding of vegetated areas;
- Weed and pest control;
- The application of fertiliser;
- De-silting or repairing drainage structures and sedimentation dams; and
- The infill and re-grading of any eroded areas.

Boggabri Coal will continue to undertake rehabilitation maintenance works as required during the life of this Modification.

The results of rehabilitation and landform monitoring and the effectiveness of any maintenance activities required will be assessed and utilised in the continual refinement of rehabilitation techniques and be reported against in the Annual Review.

6.12 ECONOMICS

6.12.1 Introduction

Gillespie Economics undertook an economic assessment for this Modification which is presented in full in Appendix K. This standalone study relies upon the extensive assessment and modelling inputs undertaken for the Boggabri EA *Economic Assessment* (Gillespie Economics 2010) which provides a contemporary assessment of the impacts from this Modification.

6.12.2 Methodology

This report evaluates the following to determine the economic impacts of this Modification:

- Economic costs and benefits of this Modification (using a Benefit Cost Analysis (BCA) framework); and
- Regional economic impacts of this Modification (using an input-output analysis framework).

The BCA draws on cost and revenue data supplied for the Boggabri EA and applies this information to this Modification's proposed production levels. The regional economic impact assessment also applies assumptions consistent with those adopted for the Boggabri EA to determine the direct estimates of output, value-added, income and employment for this Modification.

6.12.3 Impact Assessment

Benefit Cost Analysis

Extending existing mining operations by two years will have a range of economic costs and benefits.

The main economic benefit is the producer surplus (net production benefit) generated by this Modification and the employment benefits it provides, while the main economic costs relate to any residual environmental, social and cultural costs, after mitigation by Boggabri Coal. The BCA estimates that this Modification will have net production benefits of \$108 M (minimum threshold value) that will be distributed between a range of stakeholders, including:

- The local community, in the form of donations and support programs;
- Boggabri Coal and its shareholders;
- The NSW Government, via royalties; and
- The Commonwealth Government, in the form of company taxes.

Regional Economic Impact Assessment

This Modification will enable Boggabri Coal to continue to stimulate the regional and State economy for a period of two years. The level of this economic stimulus to the Narrabri and Gunnedah Local Government Areas (LGAs) economy is estimated at:

- \$371 M per year in direct and indirect regional output or business turnover;
- \$121 M per year in direct and indirect regional value added;
- \$73 M per year in direct and indirect household income; and
- 940 direct and indirect jobs per year.

The stimulus that this Modification will provide to the NSW economy is estimated at:

- \$694 M per year in direct and indirect regional output or business turnover;
- \$231 M per year in direct and indirect regional value added;
- \$192 M per year in direct and indirect household income; and
- 2,944 direct and indirect jobs per year.

In addition, some temporary stimulus will be provided by onsite construction activities of mining infrastructure.

If approval were not granted for this Modification then these estimates of regional and State economic stimulus would be the upper limit of losses from the cessation of Boggabri Coal mining operations.

6.12.4 Conclusion

This Modification will enable the continuation of mining at the Boggabri Coal Mine and will provide substantial ongoing economic stimulus to the Narrabri and Gunnedah LGAs. This Modification will provide estimated net production benefits of \$108 M (present value), including \$42 M (present value) to the NSW Government in the form of royalties.

This Modification will also enable continued economic stimulus to the regional and NSW economy and avoid the impacts of cessation of mining activities that will occur if approval is not obtained.

6.13 SOCIAL

6.13.1 Introduction

A Social Impact Assessment (SIA) was undertaken by Hansen Bailey for the Boggabri EA and assessed the potential impacts of the Boggabri Coal Continuation Project on people including: culture (such as traditions), their way of life (lifestyle, working conditions and interactions between each other) and their community (services and facilities).

This section relies upon the extensive assessment undertaken for the Boggabri EA and draws upon the impact assessment and mitigation therein which provides a contemporary and conservative assessment of the impacts from this Modification. This section provides a summary of the potential social impacts associated with this Modification.

6.13.2 Methodology

The information contained in the SIA has been drawn from a number of sources including studies commissioned by IAR for the Project, published background information and previous social and economic assessments in the region. The information was used to obtain a general understanding of the local setting and potential social impacts to the local area.

An overview of the existing socio-economic characteristics of the Narrabri and Gunnedah LGAs and the key existing socioeconomic issues facing the local community was developed for the Boggabri EA. These included the main townships of Narrabri and Gunnedah and also the smaller townships of Boggabri, Wee Waa and Culewis.

6.13.3 Impact Assessment

The Boggabri EA assessed a workforce of 500 full time equivalent employees. This Modification requires a workforce of up to 400 full time equivalent employees, which is less than that currently assessed in the supporting documentation for DA 36/88 and the Boggabri EA. It is unlikely that any impacts to population, housing, labour pool and skills or community services and facilities will result.

6.13.4 Mitigation and Management

There are no significant impacts likely to occur as a result of this Modification. Boggabri Coal will continue its open, two way communication with the NSC and broader community with regard to its appropriate, ongoing contribution to the local community.

Boggabri Coal will also continue to provide an open forum for community discussions on social and environmental issues as well as prepare an Annual Review of its environmental monitoring and activities.

Boggabri Coal will continue to facilitate the Boggabri Community Consultative Committee and continue to focus hiring strategies in the local area. In particular, Boggabri Coal's local Aboriginal employment program will be further expanded.

6.14 WASTE

6.14.1 Introduction

Boggabri Coal has developed and implemented an effective Waste EMP for the management of all waste produced onsite. The Waste EMP has been developed in accordance with objectives of the *Waste Avoidance and Resource Recovery Act 2001* along with other relevant regulatory requirements.

6.14.2 Waste EMP

Boggabri Coal's Waste EMP utilises an approved, independent waste contractor working within the provisions of the POEO Act to monitor, remove, track and report wastes. Complementing this, the waste segregation component of the Waste EMP ensures each waste stream is segregated in the appropriate receptacles for recycling, reuse and / or disposal. In addition, the Waste EMP outlines measures for the prevention and reduction of waste through the improved efficiency in the use of raw materials.

The Waste EMP also includes procedures for the minimisation, storage, transport, disposal, tracking and reporting of waste generated onsite. To ensure the Waste EMP is working effectively and appropriately for the changing needs of the operation, regular inspections and monitoring is conducted by appropriately qualified personnel.

General Waste

All waste that is no longer considered usable in its present form will be placed in designated recyclable waste bins, which can receive combined recyclable wastes and includes paper, cardboard, glass, recyclable plastics, scrap metal, timber, green waste, bricks and cladding. Recyclable wastes will be transported to an appropriate recycling centre for separation and recovery where practical. Other general waste for disposal to landfill will be collected by a licensed contractor.

Hazardous Waste

The disposal of hazardous waste will be undertaken in accordance with the *NSW Waste Classification Guidelines* (DECCW 2009) and the *Australian Dangerous Goods Code* (NTC 2010). All hazardous wastes will continue to be stored within a bunded facility prior to disposal. Detailed records of the type and quantity of hazardous waste transported and disposed of from site will be maintained.

Boggabri Coal will manage a Bioremediation area for the storage of contaminated material produced at the workshop and wash pad pit. An oil and grease separator will be used to remove any contaminated material from the water with the reclaimed water held in water tanks for dust suppression. Waste grease and bulk waste oil will be held in storage tanks in a bunded area prior to removal from site by a licensed contractor for recycling or disposal.

Any spills that occur within collection areas will be contained within bunds and managed in accordance with procedures of the Waste EMP.

Sewerage Treatment

Boggabri Coal has an onsite treatment facility for the handling of effluent from staff amenities. The treated effluent is removed from site by a licensed contractor for disposal into a licensed waste treatment facility in Gunnedah. Wastewater from the treated effluent will continue to be recycled through the mine water system.

The quality of this water will be monitored on a regular basis under the ongoing water monitoring program. Treated wastewater will be monitored in accordance with the *Environmental Guideline for the utilisation of Treated Effluent* (DEC 1995).

The minimal increase in workforce will not lead to significant additional waste created for this Modification.

6.14.3 Mitigation and Management

The Waste EMP will continue to be utilised for this Modification.

Training will continue to improve efficiency in the minimisation of waste streams, reuse and recycling options and management strategies for each major waste stream relevant to key work areas.

6.15 HAZARD ANALYSIS

6.15.1 Introduction

An assessment has been undertaken in accordance with *SEPP 33 – Hazardous and Offensive Development Application Guidelines* (DUAP 1994) (SEPP 33 Guidelines), and the *Hazardous Industry Planning Advisory Paper No 6 – Guidelines for Hazard Analysis* (Planning NSW 1997) to determine any potential hazards associated with this Modification.

Given that this Modification Boundary is located entirely within the Leard State Forest which is dominated by dry eucalypt woodlands and open forests, potential risks associated with bushfire events have also been considered. Existing management and emergency response procedures for Boggabri Coal Mine have been developed in accordance with the *Rural Fires Act 1999*, the *Coal Mines Health and Safety Act 2002* and in consultation with the NSW Rural Fire Service.

6.15.2 Methodology

Boggabri Coal manages hazardous materials onsite in accordance with site procedures, relevant standards and legislation. All chemicals to be used onsite are verified for their safety and potential environmental effects by the safety and environmental departments. Hazardous material storage facilities are currently located onsite at the workshop and explosives magazine area. These facilities will continue to be used and upgraded for this Modification as required.

A database is utilised by Boggabri Coal to assist in the recording and management of chemicals. This database contains a Material Safety Data Sheet for all chemicals used onsite.

6.15.3 Impact Assessment

Previous risk assessments undertaken for the Boggabri Coal Mine have confirmed that no aspect of the operations is considered to be hazardous or offensive under the relevant guidelines. This Modification will require the continued transport and storage of diesel, materials for explosives and some other goods which may be considered to be potentially hazardous.

The transport of diesel to Boggabri Coal Mine will continue to be undertaken by licensed contractors which will comply with the relevant Occupational Health and Safety (OH&S) standards and procedures.

Boggabri Coal will continue to utilise explosive products (including initiating products, detonators, and emulsion explosives) for blasting activities to facilitate open cut coal mining. These commonly used forms of explosives have successfully been managed in accordance with existing OH&S procedures and legislative requirements.

Boggabri Coal currently has a fully bonded onsite explosives magazine (managed by site personnel) for the storage of detonators and other materials. An independent, licensed contractor is currently utilised to supply emulsion explosives and other initiating products to Boggabri Coal Mine on an as required basis.

Boggabri Coal will continue to implement the management and mitigation measures provided in the approved Public Safety EMP to ensure that bushfire hazards are appropriately managed.

Response procedures to be followed in the event of a bushfire on Boggabri Coal owned lands are included in the Public Safety EMP document.

A review of the additional components of this Modification has confirmed that this Modification is not considered to be Potentially Hazardous or Offensive under the relevant guidelines. As such, a detailed preliminary hazardous analysis is not required.

6.15.4 Mitigation and Management

All potentially hazardous materials or dangerous goods associated with this Modification will continue to be transported by a licensed contractor in accordance with the relevant Australian Standards and legislation.

Boggabri Coal will continue to utilise its EMPs and OH&S procedures to manage the hazards and risks associated with this Modification. These procedures and management plans are regularly reviewed and updated to include any changes that have the potential to result in hazards.

6.16 TRAFFIC AND TRANSPORT

6.16.1 Introduction

A Traffic and Transport impact assessment was undertaken for this Modification by Parsons Brinckerhoff Australia and is presented in Appendix L. This standalone study relies upon the extensive assessment undertaken for the Boggabri EA (Parsons Brinckerhoff 2010) and draws upon the impact assessment and mitigation therein (as at Year 5) which provides a conservative assessment of the impacts from this Modification. The assessment has been completed in accordance with the RTA *Guide to Traffic Generating Developments* (2002).

6.16.2 Methodology

Parsons Brinckerhoff reviewed the assumptions and impact predictions of the Traffic and Transport impact assessment report undertaken for the Boggabri EA against the components proposed for this Modification.

6.16.3 Impact Assessment

The Traffic Impact Assessment for Boggabri EA assumed higher production tonnages (7 Mtpa product coal) and employment levels (500 full time staff and 150 contractors), compared to those proposed for this Modification and concluded that there would be no adverse traffic impact on the capacity or safety of the local road network. The SIDRA modelling indicated that all intersections would continue to operate well below capacity and that only minimal disruption to road traffic due to queuing at railway crossings due to coal train traffic would occur. The findings of the road safety audit completed for the 2010 Boggabri EA report have been adopted as key recommendations to be implemented for this Modification (see Section 6.16.4).

As this Modification is for a more modest level of up to 400 full time staff and 3.5 Mtpa product coal, any associated impacts to the efficient and safe operation of the local road network would therefore be less than the assessment previously undertaken by Parsons Brinckerhoff and could be appropriately managed with the adoption of additional management and mitigation measures.

6.16.4 Mitigation and Management

The following recommendations were made in the Boggabri EA Traffic Impact Assessment (2010) which will also be implemented for this Modification:

- Proper and timely road surface cleaning;
 - Installation of safety barriers on the large culverts;
 - Proper and timely maintenance of drainage facilities;
 - Monitoring and addressing pavements drop-offs;
 - Proper and timely maintenance of the pavement markings; and
 - Proper and timely maintenance and upgrade of the roads signage.
-
- Installation of the speed advisory and curve warning signs on the Kamilaroi Highway, between Narrabri Road and Manilla Road;
 - Proper and timely road pavement maintenance;

7 STATEMENT OF COMMITMENTS

Boggabri Coal commits to the operational controls as outlined in Table 5 for all activities associated with this Modification.

The aim of this Statement of Commitments is to ensure that any potential environmental impacts resulting from this Modification are minimised and managed by implementing relevant environmental management and monitoring strategies.

Table 5
Statement of Commitments

Ref	Description	Section
Mining Operations		
1.	Coal mining at up to 3.5 Mtpa product coal and associated activities will occur generally as described in this Environmental Assessment.	1 & 4
2.	Should PA 09_0182 be granted then Development Approval 36/88 shall be surrendered in accordance with the Boggabri EA Statement of Commitments.	4
Environmental Management		
3.	Subsequent approvals under other relevant legislation as described in this EA will be obtained.	5
4.	Boggabri Coal will continue to operate in accordance with the existing Environmental Management Plans (and review those with an asterisk within three months of the grant of this Modification as indicated in this Environmental Assessment) including: • Water Management*; • Air Quality*; • Flora and Fauna*; • Cultural Heritage*; • Rehabilitation and Land Management*; • Noise and Vibration*; • Hydrocarbon; • Waste; • Public Safety; and • Irrigation Area.	6
5.	Environmental Management Plans will be reviewed as indicated in this Environmental Assessment, communicated to the workforce and audited against for compliance to ensure a high level of environmental performance and legal compliance is maintained.	6
6.	The Environmental Monitoring Program as enhanced and described in this EA will be implemented.	6
Environmental Management and Mitigation		
7.	Technologies and initiatives will be implemented as required to achieve the air quality outcomes described in this Environmental Assessment.	6.1
8.	Noise control and management measures will be undertaken to meet the project specific noise criteria at private receivers described in this Environmental Assessment.	6.2
9.	Soil stripping, overburden, rejects emplacement and rehabilitation will be managed as described in this Environmental Assessment.	6.3, 6.11, 6.4 & 6.7

Ref	Description	Section
10.	The additional groundwater management and mitigation measures identified as part of this Environmental Assessment will be undertaken.	6.5
11.	The Biodiversity Offset Strategy (Merriendi Property) will be established with management measures implemented as described in this Environmental Assessment.	6.8
12.	To identify any presence of Aboriginal heritage objects within this Modification Boundary landform unit, a testing program for the area will be carried out in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW.	6.9
13.	Traffic and transportation mitigation measures will be undertaken in consultation with the Roads and Traffic Authority and the Narrabri Shire Council as required.	6.16
Reporting and Consultation		
14.	A Mining Operations Plan will be prepared to the approval of Department of Trade and Investment, Regional Infrastructure – Mineral Resources prior to the commencement of mining within this Modification Area.	3.2
15.	Boggabri Coal will continue to prepare an Annual Review (which summarises monitoring results and reviews performance) make it publicly available, and distribute it to the relevant regulatory authorities and the Boggabri Coal Community Consultative Committee.	3.7
16.	Boggabri Coal will continue to facilitate the Boggabri Coal Community Consultative Committee.	3.7

8 CONCLUSION

This section provides conclusions with regard to the application and its environmental assessment.

8.1 REASON FOR THE APPLICATION

This Modification to DA 36/88 is required to enable the continuation of the Boggabri Coal Mine for a two year period should the determination of the Continuation of Mining Project be delayed after 14 November 2011.

Should the Continuation of Mining Project be granted and able to be operated under, this Modification application will not be required to be enacted and DA 36/88 shall be surrendered in accordance with the Boggabri EA Statement of Commitments.

8.2 THE APPLICATION

This Modification is supported by this EA and is sought to enable mining and related activities to continue consistent with the Boggabri EIS, Boggabri SEE and this Modification EA.

The operation of Boggabri Coal Mine (following any approval of this Modification) would be generally as follows:

- The duration of DA 36/88 would be extended by two years;
- Production of coal would be limited to a maximum of 3.5 Mtpa product coal utilising similar equipment and operational parameters to that presently employed and up to 400 personnel; and
- Construction and use of DA 36/88 approved infrastructure including administration, bathhouse and workshop buildings, a heavy vehicle workshop and water management infrastructure in alternate locations.

8.3 POWER TO MODIFY

The development sought to be approved by this Modification is located entirely within the area the subject of DA 36/88.

The application is to extend the existing approved mining at Boggabri Coal Mine within the area of the DA 36/88 using infrastructure largely already constructed or approved under DA 36/88 and utilising mining methods, schedules and plant and equipment approved by DA 36/88. A lower rate of production, workforce and plant than authorised by DA 36/88 will also be utilised.

As such, the development sought to be approved by this Modification falls within the term 'modify' in Section 75W of the EP&A Act and there is the power and it is appropriate for the Minister as the approval body to approve the application.

8.4 ENVIRONMENTAL ASSESSMENT

Not only is the development sought to be approved by this Modification application entirely within the area of DA 36/88 but it is also within the assessment area of the Boggabri EA and is generally consistent with what is sought to be approved in the Major Project application and as assessed in the Boggabri EA.

In particular it is materially consistent with, but at a lesser rate and intensity than, the first two years of mining. As such, the environmental assessment of this Modification relies upon the studies undertaken for the Boggabri EA (which was publicly exhibited) as at Year 5 to ensure a conservative assessment approach.

Air quality impacts were predicted to remain within relevant criteria at all private receivers who do not have acquisition rights under an adjacent coal mine's development consent.

No private properties which do not have an existing right to acquisition upon written request were predicted to be affected by significant noise impacts from this Modification. Two additional private residences are predicted (under worst case weather conditions) to receive moderate noise impacts from this Modification. Boggabri Coal will modify its operations to ensure that monitored noise levels at these receivers (whilst private) will remain within relevant noise criteria.

Additional monitoring will be undertaken for noise, air quality and groundwater as described in this EA.

To offset the disturbance 114 ha of total native vegetation including 44.9 ha of Box Gum Woodland within this Modification area, the establishment of a Biodiversity Offset on the Merriendi property will be established.

The Merriendi property allows for a 'like for like' Box Gum Woodland and derived native grasslands on the Merriendi Property would provide an overall offset of 8:1. Threatened flora and fauna species recorded within or with potential to occur in this Modification Boundary have either been recorded or have the potential to occur in habitat within proposed Merriendi Property.

As it has been demonstrated throughout this EA, the likely environmental impacts resulting from this Modification will remain generally consistent with those previously identified, and are significantly less than that presented in the Boggabri EA.

8.5 ENVIRONMENTAL PLANNING AND SOCIAL CONTEXT

Boggabri Coal has approval under the EP&A Act to operate in accordance with DA 36/88 until 14 November 2011.

With this time limit on its planning approval, Boggabri Coal made an application some two years ago for Major Project Approval for the continuation of its mining past November 2011 for a further 21 years.

That application has not been determined and the time for its determination is not certain. The interests of the environment dictate that there be continuity of mining at Boggabri Coal Mine, with any potential for premature and temporary closure presenting not just financial and economic challenges, but also environmental and management risks. The Boggabri Coal Mine is a material employer and contributor to the social and economic fabric of the locality, the region, as well as the State of NSW, assisting with the stability of the respective economies.

The shareholders of Boggabri Coal also have a considerable financial and economic interest in the stable continued operation of mining at Boggabri Coal Mine.

The approval of the application for this Modification will enable Boggabri Coal to continue to operate until there has been a determination of the Continuation of Mining Project Application. If approved, mining will continue at Boggabri Coal Mine which will continue to stimulate the regional and State economy, not just for this Modification approval period of up to two years but forward for the duration of the Project.

If the Project Approval is refused this Modification will allow for an orderly and managed closure of mining at Boggabri Coal Mine where there will be the ability to properly address the complex and important social, economic and environmental challenges of closing down such an operation.

The level of this economic stimulus to the Narrabri and Gunnedah LGA's economy is estimated at:

- \$371 M per year in direct and indirect regional output or business turnover;
- \$121 M per year in direct and indirect regional value added;
- \$73 M per year in direct and indirect household income; and
- 940 direct and indirect jobs per year.

The stimulus that this Modification will provide to the NSW economy is estimated at:

- \$694 M per year in direct and indirect regional output or business turnover;
- \$231 M per year in direct and indirect regional value added;
- \$192 M per year in direct and indirect household income; and
- 2,944 direct and indirect jobs per year.

This Modification would enable the continuation of mining at the Boggabri Coal Mine and would provide substantial ongoing economic stimulus to the Narrabri and Gunnedah LGAs. The approval of this Modification would provide estimated net production benefits of \$108 M (present value), including \$42 M (present value) to the NSW Government in the form of royalties.

Should the approval of the Continuation of Mining Project be delayed after 14 November 2011, and the approval of this Modification was not granted, then these estimates of economic stimulus would be lost along with employment for up to 400 direct employees.

This Modification provides a balanced consideration of all potential environmental, social and economic impacts, consistent with the principles of ESD. Mine planning, engineering investigations and conceptual studies have identified that the recovery of the coal resource within this Modification Boundary, ensures the advancement of the interests of all the interested communities in accordance with the objects of the EP&A Act:

- Enabling the most efficient utilisation of resources to extract the coal;
- Maximising the coal recovery so as to promote the social and economic welfare of the community;

- Enabling a logical transition between a Part 4 approval to a Part 3A approval under the EP&A Act if approved; and
- If not approved ensuring a rational and orderly socially, environmentally and economically transition to mine closure.

This Modification of DA 36/88 will provide Boggabri Coal and the community with certainty and continuity of its current mining activities and will enable Boggabri Coal to:

- Meet its commercial and contractual obligations to its customers, Australian Rail Track Corporation, Port of Newcastle and service providers;
- Maintain continuity of employment for up to 400 employees;
- Provide significant economic stimulus to the Local Narrabri Shire and Gunnedah Shire Councils, NSW State Government and Federal Government of Australia;
- Continue to utilise existing infrastructure; and
- Invest with confidence in the future development of the Boggabri Coal Mine.

9 ABBREVIATIONS

Abbreviation	Description
AHD	Australian Height Datum
ANC	Acid Neutralising Capacity
BCA	Benefit Cost Analysis
Boggabri CCC	Community Consultative Committee
Boggabri Coal	Boggabri Coal Pty Limited
Boggabri EIS	Boggabri Coal Project Environmental Impact Statement 1987
Boggabri SEE	Boggabri Coal Project Statement of Environmental Effects 2009
CCL	Consolidated Coal Lease
CL	Coal Lease
CO ₂	Carbon dioxide
CO _{2-e}	Carbon dioxide equivalent
CHPP	Coal Handling & Preparation Plant
dBA	The peak sound pressure level, expressed as decibels (dB) and scales on the 'A-weighted' scale, which attempts to closely approximate the frequency response of the human ear
DECC Guidelines	Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (2005)
DP&I	NSW Department of Planning and Infrastructure (Incorporates former DoP, DIPNR, Planning NSW, DUAP)
DTIRIS	Department of Trade, Investment, Regional Infrastructure and Services (previously Department of Primary Industries and NSW Industry and Investment)
EA	Environmental Assessment
EARs	Environmental Assessment Requirements
EC	Electrical conductivity
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Program
EMS	Environmental Management System
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
EPI	Environmental Planning Instrument
EPL	Environmental Protection Licence
ESD	Ecologically Sustainable Development
GDE	Groundwater Dependent Ecosystem
ha	Hectare
HVAS	High Volume Air Sampler
IAR	Idemitsu Australia Resources Pty Limited
LEP	Local Environment Plan

Abbreviation	Description
LGA	Local Government Area
Mining Act	<i>Mining Act 1992</i>
mm	Millimetre
MNES	Matter of National Environmental Significance
MOP	Mining Operations Plan
Mt	Million tonnes
Mtpa	Million tonnes per annum
NAF	Non Acid Forming
NOW	NSW Office of Water
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NSC	Narrabri Shire Council
OEA	Overburden Emplacement Area
OEH	Office of Environment & Heritage (formerly DECCW)
PAF	Potentially Acid Forming
Planning Approval	Project Approval document
PM ₁₀	Particulate Matter <10 microns
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
RBL	Rating Background Level
Receiver	Private property adjacent the Modification Boundary containing a receiver
RTA	NSW Roads and Traffic Authority
SCA	State Conservation Area
SEPP	State Environmental Planning Policy
SEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities. Previously known as Department of Environment, Water, Heritage and Arts (DEWHA)
SoC	Statement of Commitments
TEOM	Tapered Element Oscillating Microbalance
tph	tonnes per hour
TSC Act	<i>Threatened Species Conservation Act 1995</i>
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
WAL	Water Access Licence
Water Act	<i>Water Act 1912</i>
WM Act	<i>Water Management Act 2000</i>

10 REFERENCES

- Archaeology Australia (2009) *Non-Aboriginal Cultural Heritage Assessment*.
- AGE (2010) *Continuation of Boggabri Coal Mine; Groundwater Assessment*.
- Boggabri Joint Venture (1987) *Boggabri Coal Project Environmental Impact Statement*.
- Bridges Acoustics (2010) *Acoustic Impact Assessment, Continuation of Boggabri Coal Mine Environmental Assessment*.
- Department of Environment and Conservation (1995) *Environmental Guideline for Utilisation of Treated Effluent*.
- Department of Environment and Conservation (2005) *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*.
- Department of Environment and Climate Change (2009) *Biobanking Operation Manual*.
- Department of Environment, Climate Change and Water (2005) *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*.
- Department of Environment, Climate Change and Water (2010) *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*.
- Department of Environment, Climate Change and Water (2010) *Waste Classification Guidelines*.
- Department of Sustainability, Environment, Water, Population and Communities (2010) *National Recovery Plan for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*.
- Edge Land Planning (2009) *Narrabri Shire Growth Management Strategy*.
- Gillespie Economics (2010) *Continuation of Boggabri Coal Mine; Economic Assessment*.
- GSS (2010) *Continuation of Boggabri Coal Mine Project Environmental Assessment; Soil Survey and Land Resource Impact Assessment Report*.
- Hansen Bailey (2010) *Continuation of Boggabri Coal Mine Environmental Assessment*. Document prepared to accompany Project Application MP 09_0182.
- Hansen Bailey (2011) *Continuation of Boggabri Coal Mine Environmental Assessment; Residual Matters Report*.
- Insite Heritage (2010) *Aboriginal Cultural Heritage Impact Assessment Report for the Continuation of Boggabri Coal Mine*.
- Integral (2010) *Continuation of Boggabri Coal Mine Visual Impact Assessment*.
- NTC (2010) *Australian Dangerous Goods Code*.
- RTA (2002) *Guide to Traffic Generating Developments*.

- PAEHolmes (2010) *Air Quality Assessment; Continuation of Boggabri Coal Mine*.
- Parsons Brinckerhoff (2009) *Boggabri Coal Project Statement of Environmental Effects*.
- Parsons Brinckerhoff (2009) *Air Quality Environmental Management Plan*.
- Parsons Brinckerhoff (2009) *Cultural Heritage Environmental Management Plan*.
- Parsons Brinckerhoff (2009) *Flora and Fauna Environmental Management Plan*.
- Parsons Brinckerhoff (2009) *Irrigation Area Environmental Management Plan*.
- Parsons Brinckerhoff (2009) *Public Safety Environmental Management Plan*.
- Parsons Brinckerhoff (2009) *Waste Environmental Management Plan*.
- Parsons Brinckerhoff (2009) *Water Management Environmental Management Plan*.
- Parsons Brinckerhoff (2010) *Continuation of Boggabri Coal Mine – Biodiversity Impact Assessment*.
- Parsons Brinckerhoff (2010) *Continuation of Boggabri Coal Mine – Surface Water Assessment*.
- Parsons Brinckerhoff (2010) *Continuation of Boggabri Coal Mine; Traffic Impact Assessment*.
- Planning NSW (1997) *Hazardous Industry Planning Advisory Paper No 6 – Guidelines for Hazard Analysis*.
- RGS (2010) *Continuation of Boggabri Coal Mine; Geochemical Assessment*.
- WRM (2009) *Boggabri Coal, Namoi River Flood Impact Assessment*.

11 EA STUDY TEAM

Section	Title / EA Component	Team Member and Company	
Project Management			
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	Executive General Manager	Peter Wilkinson	
	General Manager	Geoff Sharrock	Boggabri Coal
	Environmental Coordinator	Joe Rennick	
EA Management			
	Project Director	James Bailey	Hansen Bailey
	Project Manager	Dianne Munro	
	Project Coordinator	Ben Eastwood	
EA Sections			
1	Overview	Dianne Munro	Hansen Bailey
2	Continuation of Boggabri Coal Mine	Ben Eastwood	
3	Existing Operations	Ben Eastwood	
4	Modification Description	Ben Eastwood	
5	Regulatory Framework	Ben Eastwood	
6	Risk Assessment	Dianne Munro	
7	Impacts, Management and Mitigation	Dorian Walsh, Steve Banks and Ben Eastwood	
8	Statement of Commitments	Dianne Munro	
9	Conclusion	Dianne Munro	
10	Abbreviations		
11	References		
12	EA Study Team		
Appendices			
Appendix A	Air Quality and Greenhouse Gas	Judith Cox	PAEHolmes
Appendix B	Acoustic Impact Assessment	Mark Bridges	Bridges Acoustics
Appendix C	Soil Survey and Land Resource Impact Assessment	Clayton Richards	GSSE Environmental
Appendix D	Geochemical Assessment	Alan Robertson	RGS Environmental Pty Ltd
Appendix E	Groundwater Assessment	James Tomlin	AGE Consultants
Appendix F	Surface Water Assessment	Leigh Doeleman	Parsons Brinckerhoff
	Namoi River Flood Assessment	Greg Roads	WRM Water and Environment
Appendix G	Visual Impact Assessment	John Van Pelt	Integral Landscape Architecture and Visual Planning
Appendix H	Ecological Assessment	Martin Predavec	Parsons Brinckerhoff
Appendix I	Aboriginal Archaeological Assessment	Angela Besant	Insite Heritage
Appendix J	Non-Aboriginal Heritage Impact Assessment	Chris Carter	Archaeology Australia
Appendix K	Economic Analysis	Rob Gillespie	Gillespie Economics
Appendix L	Traffic Impact Assessment	Zoran Bakovic	Parsons Brinckerhoff
Figures provided by Pegasus Technical			
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