BOGGABRI COAL MINE

DEVELOPMENT CONSENT MODIFICATION ENVIRONMENTAL ASSESSMENT

for

Boggabri Coal Pty Limited

May 2012

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

BOGGABRI COAL MINE

DEVELOPMENT CONSENT MODIFICATION

ENVIRONMENTAL ASSESSMENT

Prepared by:

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SINGLETON NSW 2330

May 2012

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:	James Bailey
Qualifications:	B. Natural Resources, MBA
Address:	Hansen Bailey Pty Limited PO Box 473 SINGLETON NSW 2330
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*; • Meets the form and content of Clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*; • 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:	May 2012

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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 Mine 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 2011, Boggabri Coal Mine produced 2.9 Million tonnes (Mt) of product coal from the Maules Creek Formation down to the Merriown coal seam. Boggabri Coal Mine currently employs 450 full time equivalent employees and production is forecast to achieve 3.5 Mt in 2012.

Boggabri Coal currently operates under Development Consent (DA) 36/88 granted by the (then) Minister for Local Government & Planning under Section 101 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

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 approved 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 (CHPP) 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 and Infrastructure 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 (ML) 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.

A second Modification Application to DA 36/88 (MOD 2) was granted in October 2011 under Section 75W of the EP&A Act to extend the operation of the Boggabri Coal Mine for an additional period of two years (from 14 November 2011 to 14 December 2013) to allow operations to continue whilst the *Continuation of Mining Project Environmental Assessment* (Hansen Bailey 2010) (Boggabri EA) (see **Section 1.2**) was being assessed by Department of Planning & Infrastructure (DP&I). Operations described in DA 36/88 MOD 2 included the following:

- Continuation of the use of existing Boggabri Coal infrastructure and facilities;
- Continuation of mining at up to 3.5 Mtpa product coal;
- Utilising similar equipment, manning and operational parameters to existing operations; 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.

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 (Application Number 09_0182) is supported by the Boggabri EA.

Director General's Requirements (DGRs) were issued on 17 December 2009 by 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 Project Application is provided in **Section 2**. This Application is currently being reviewed for determination by a Planning Assessment Commission (PAC).

The Continuation of Mining Project incorporates increases in areas, scale of operations and rates of mining. It also seeks approval to operate utilising some different parameters including increases in overburden emplacement heights to improve mining efficiencies and environmental outcomes.

1.3 DOCUMENT PURPOSE

This EA document (Modification EA) has been prepared to support an application for the Modification of DA 36/88 under Section 75W of the EP&A Act. The Modification makes provision for changed overburden emplacement arrangements within the existing approved operations.

Operations under this Modification (if approved) would be generally as described in this EA and consistent with the Boggabri EIS and at a reduced scale and extent as described in DA 36/88 (MOD2). These operations would be located entirely within the previously disturbed 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 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

The DA 36/88 MOD 2 approved in October 2011 provided for the continuation of mining at Boggabri for two years until December 2013.

Since the granting of this modification, the Planning Assessment Commission (PAC) merit review of the Boggabri Continuation of Mining Project has concluded that it has merit and could be approved subject to stringent conditions.

Following a report from the PAC being provided to the Minister, the Director-General of the DP&I has written his report and the Continuation of Mining Project has been referred to a second PAC for determination, where a number of matters are being reviewed.

In light of this outcome and the delay in the determination of the Continuation of Mining Project, a further modification is sought to increase the approved overburden emplacement heights to facilitate a more efficient waste dumping profile, consistent with that sought as part of the Continuation of Mining Project. Increasing the approved overburden emplacement height now will facilitate a reduction in future rehandle of waste material and/or sterilisation of coal resources or a reduction in mining until the Continuation of Mining Project is determined.

The approval to increase overburden emplacement heights (as sought by this Modification application) is seen as a temporary measure, pending the outcome of the Continuation of Mining Project application.

Approval of this Modification application is required to facilitate the more efficient handling and placement of overburden in consideration of the reduced scale of mining allowed under Boggabri Coal Mine's current planning approvals platform. This Modification has been designed to avoid additional disturbance of natural ground.

Under the currently approved mine plan (DA 36/88 (MOD 2)), overburden emplacement capacity will be reached in some areas of the Overburden Emplacement Area (OEA) by June 2012. At that time, overburden will have to be temporarily placed in mine voids and later rehandled in order to facilitate the continuation of the mine. Otherwise the scale of mining would have to be reduced to minimise future costs.

The current limitation in the approved height of the OEA will significantly impact on the future operation of Boggabri Coal Mine, if the Continuation of Mining Project has not been determined by June 2012. Increasing the allowable overburden emplacement heights presents an opportunity to improve environmental outcomes at the mine by reducing material rehandling which consequentially brings reduced truck movements, fuel use, and the environmental impacts from those improvements to operations.

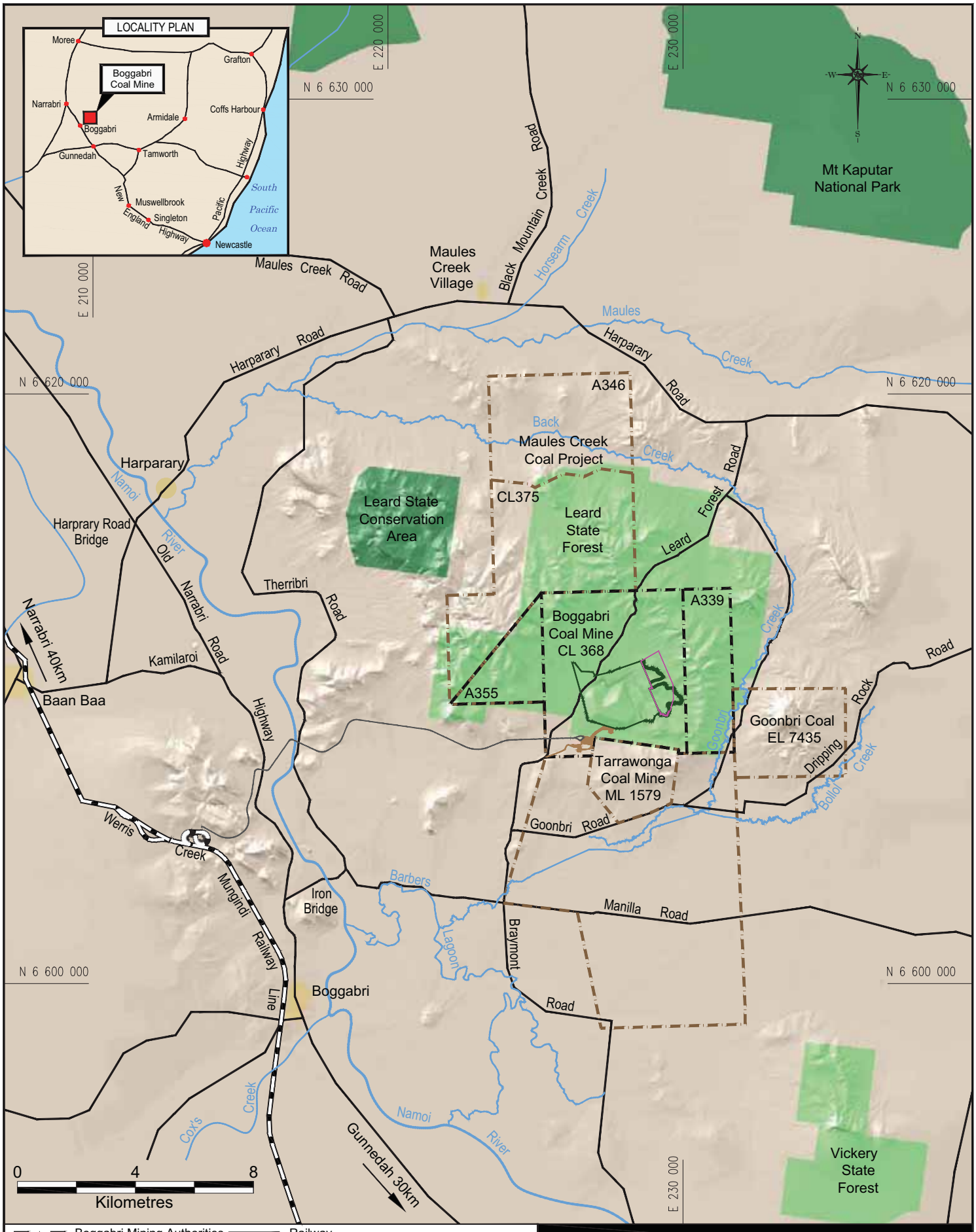
The Modification as proposed would facilitate more efficient overburden handling allowing, the continuation of Boggabri Coal Mine operations with improved environmental outcomes beyond the determination process for the Continuation of Mining Project. As noted in **Section 4**, the increase in the OEA and the associated mine plan proposed for this Modification is entirely consistent with the mine plans proposed under the Continuation of Mining Project Application 09_0182.

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 Continuation of Mining 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 to this EA; and
- **Sections 9** - **11** include abbreviations, references and a summary of the study team for this Modification EA.



BOGGABRI COAL MINE

Regional Locality

Cad File: 08165A.dwg	Date: 12.03.12	Drawn: CP	Figure 1

2 BOGGABRI COAL CONTINUATION OF MINING

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

2.1 OVERVIEW

Boggabri Coal is awaiting 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 the meantime, mining operations continue under DA 36/88 (as modified).

In seeking Project Approval for the Continuation of Mining Project (PA 09_0182), Boggabri Coal also seeks to maximise operational flexibilities at the existing operation 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 coal 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:
    - 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 (prepared as part of PA 09_0182) 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, flooding, groundwater, geochemical, economics, social, waste, soils and land use, rehabilitation and final landform, bushfire, hazard analysis, and traffic and transport.

The components of this relationship between this Modification and the areas and activities assessed in the Boggabri EIS and Boggabri Modification EA are shown in **Figure 2**.

This Modification relates to development within the area assessed within 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 (PA 09_0182) would produce up to 7 Mtpa product coal, with 500 employees utilising a mobile fleet and mining process similar to (but more than) would be the case during the operation of Boggabri Coal Mine as sought by this Modification.

As such, it is considered that utilising the environmental assessments for Year 5 of the Continuation of Mining Project for the purposes of considering and assessing the potential environmental impacts of the activities proposed by this Modification gives a conservative basis to consider the environmental effects of the Boggabri Coal Mine operating under DA 36/88 as proposed to be modified.

2.3 RELATIONSHIP BETWEEN CONTINUATION OF MINING PROJECT AND THIS MODIFICATION

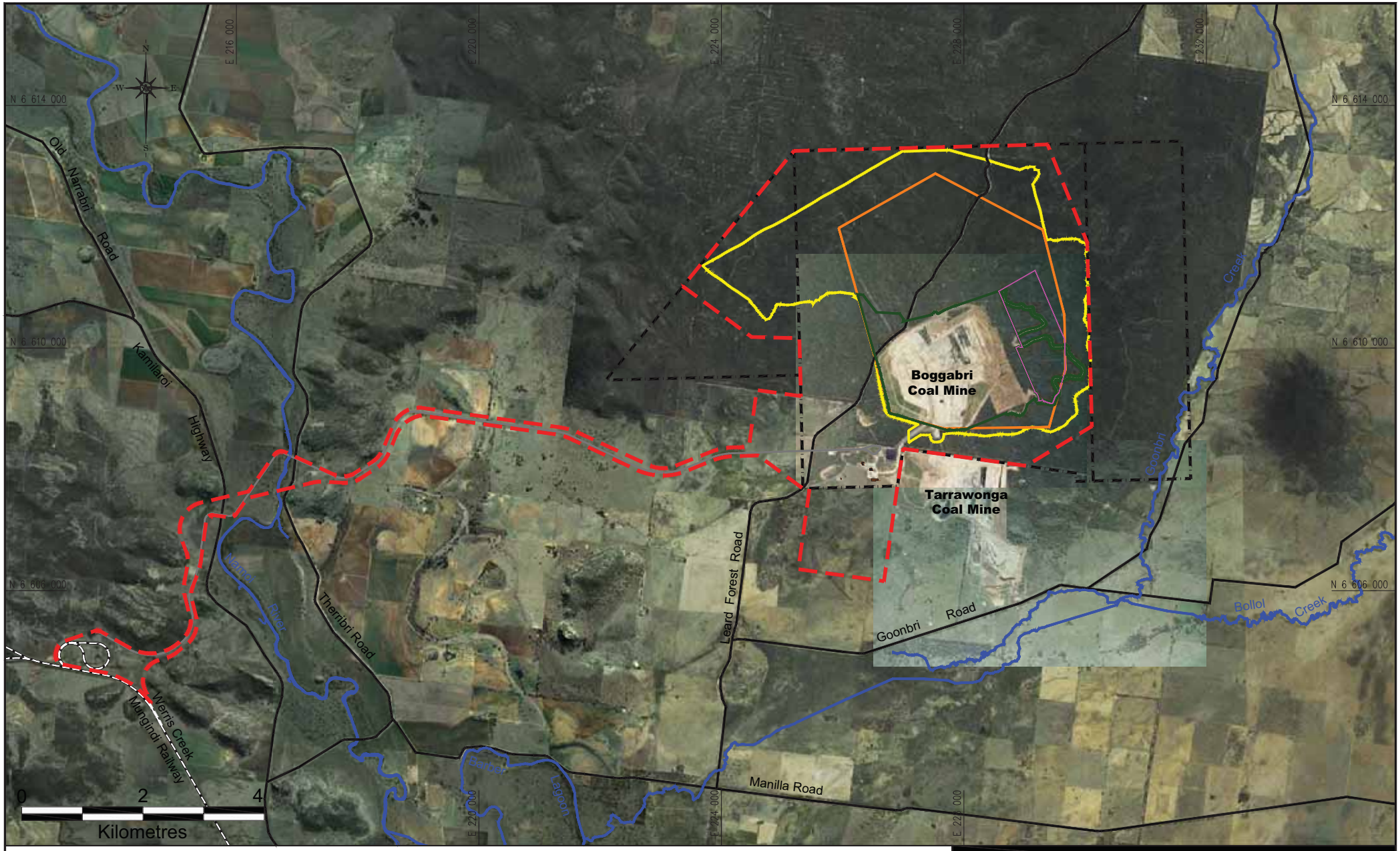
An essential element of the Continuation of Mining Project is the surrender DA 36/88 (as modified), if the Project Approval is approved.

The increased overburden emplacement height for which this Modification is sought is consistent with the development for which Project Approval is sought in the Continuation of Mining Project application.

Given the commitment to surrender DA36/88 upon grant of the Project Approval for the Continuation of Mining Project, this Modification will (if granted) constitute an approval for only a relatively short period.

If the Project Approval for the Continuation of Mining Project is not granted, then DA 36/88 requires the rehabilitation of the mine site upon its expiry in 2013.

Whichever outcome, the increased overburden height modification is a short term approval, the effect of which is to improve environmental outcomes.



- Boggabri EA Project Boundary
- Boggabri EA Mine Disturbance Boundary
- Modification EA Extent of Approved Mining
- Boggabri Mining Authorities
- EIS Limit of Surface Mine
- Mine Disturbance to Nov 2011
- Private Haul Road
- Proposed Infrastructure Area
- Roads
- Railway
- Rivers and Creeks

Hansen Bailey

IDEMITSU BOGGABRI COAL

Co-ordinate System: MGA 94 Zone 56
Source: Google Maps, Whitehaven Coal (2009), Boggabri Coal (2010)

BOGGABRI COAL MINE

Site Plan

Cad File: 08166A.dwg	Date: 12.03.12	Drawn: CP	Figure 2

3 EXISTING OPERATIONS

This section of the 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 (MOD 2) which is supported by the Boggabri EIS, Boggabri SEE and Boggabri Modification EA. Approved activities are described below and shown on **Figure 3**.

3.1.1 Boggabri EIS

The (then) Minister for Local Government and Planning granted DA 36/88 to the BJV on 22 August 1989 under section 101 of the EP&A Act. The application was 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 coal seam is removed by truck and shovel with a dragline potentially required to extract interburden down to the Merriown coal 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:

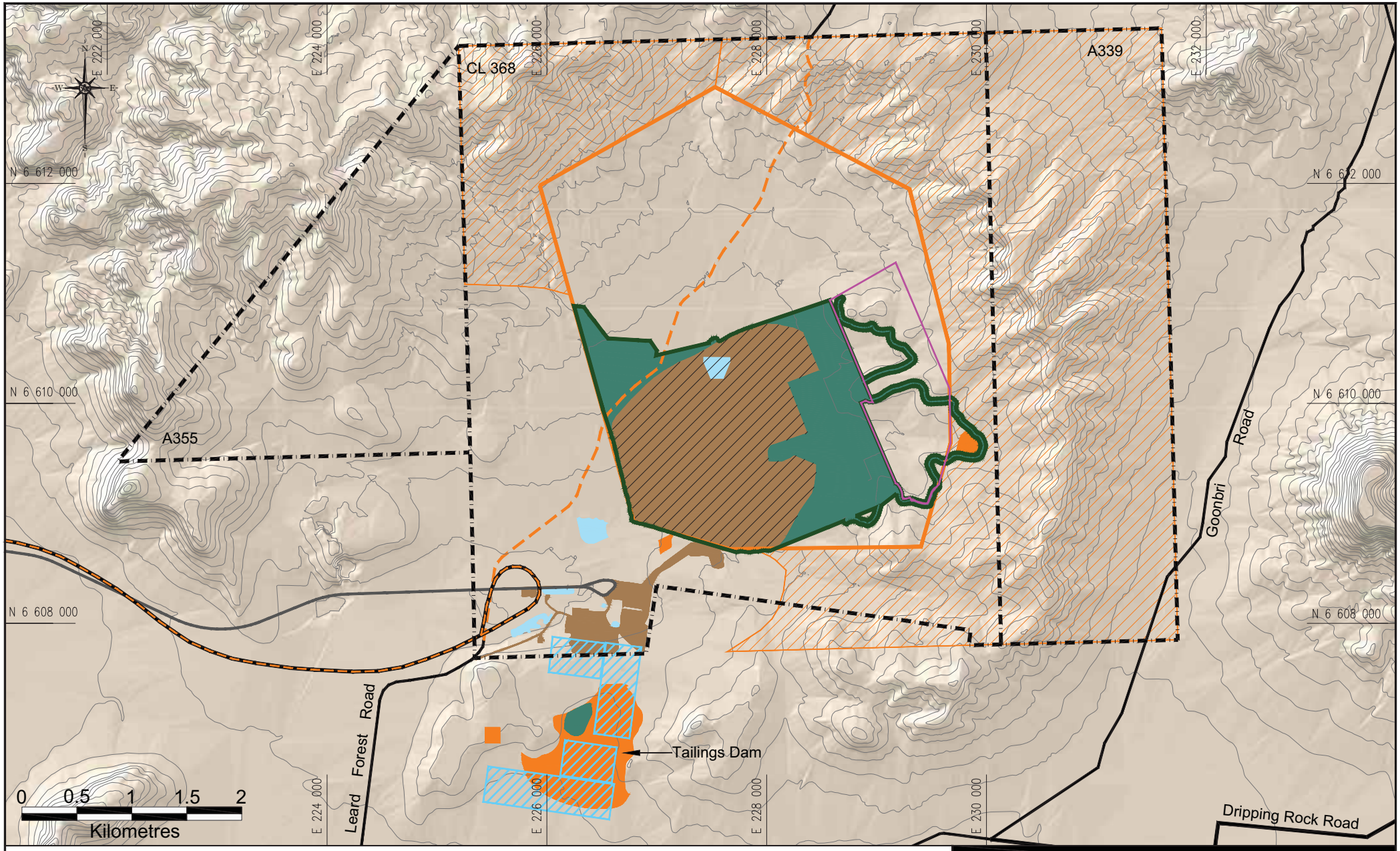
- Offices, workshops, bathhouse, access roads and mine water storage;
- 45,000 tonne (t) raw coal stockpile area;
- Coal crushing and sizing plant which conveys product coal to the product stockpile;
- Two CHPP facilities each with the capacity to process up to 2.5 Mtpa;
- A rail spur and rail loop with 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.



Boggabri Mining Authorities
EIS Limit of Surface Mine
Modification EA Extent of Approved Mining
Mine Disturbance to Nov 2011
Private Haul Road
Water Storage
Irrigation Areas

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

EIS Approved Works not Commenced
Infrastructure
Rail Loop
Underground Mining Area
Leard Forest Road Closure

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

Hansen Bailey

IDEMITSU
BOGGABRI COAL

BOGGABRI COAL MINE

Approved Mining Operations & Modification

Cad File: 08167C.dwg	Date: 24.05.12	Drawn: JD	Figure 3

3.1.2 Boggabri SEE (2009 Modification)

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 ML 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.

3.1.3 Boggabri Modification EA (2011 Modification)

An application under section 75W of the EP&A Act for a second Modification to DA 36/88 was lodged in August 2011 and supported by the Boggabri Modification EA (Hansen Bailey 2011) for approval of the following:

- 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.

The application was granted by the Acting Deputy Director-General Development Assessment and Systems Performance, as a delegate for the Minister for Planning & Infrastructure on 19 October 2011.

3.2 MINING OPERATIONS

The mining process at Boggabri Coal Mine 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 to load rear dump trucks.

In order to minimise coal loss, 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 currently 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 to 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 2011, a total of 2.9 Mt of product coal was railed from Boggabri Coal Terminal to the Port of Newcastle for export. Approximately 3.5 Mt is anticipated to be produced in calendar year 2012 under the current approval.

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 assisted 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 700 tph consists of a:

- Coal Receival hopper of 60 t nominal capacity fitted with a 750 mm grizzly, designed to accommodate a 22 m^3 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 12 hour shifts, seven days per week with maintenance activities occurring 24 hours per day seven days a week. 450 personnel are currently employed at the Boggabri Coal Mine.

3.6 ENVIRONMENTAL MANAGEMENT SYSTEM

Idemitsu Australia Resources Pty Ltd 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 PM_{10};

- 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 owns most of the area to which this Modification applies. Boggabri Coal owns the other residual land to which this Modification applies. The private landholders located nearest 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 Maules Creek Coal 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. Maules Creek Coal Pty Ltd owns the land to the north-west and Whitehaven Coal owns the land to the south of the mining area.

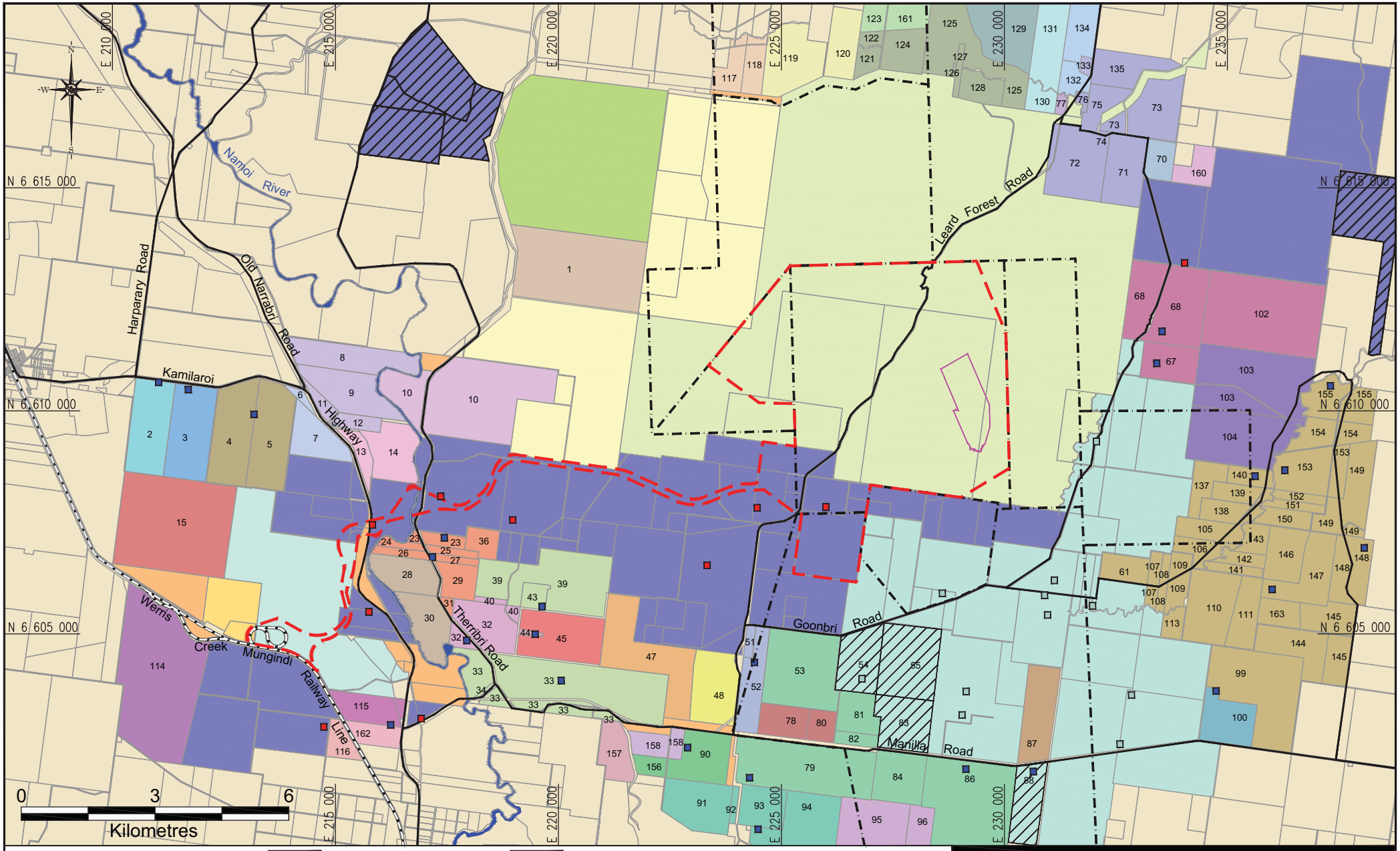
Existing land use within Boggabri Coal's mining authorities and its landholdings include limited agriculture, forestry and recreational activities. Open cut coal mining is a dominant land use in the vicinity of this Modification.

Boggabri Coal Mine has been operating since 2005 with the commencement of construction activities, and the first coal from the operation was produced 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) (Louinville)		Boggabri Coal owned previously owned by KR Druce (Belleview)	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 (Belleview)	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 (Belleview)	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 (Leyetonstone)	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 (Wirrilah)		Boggabri Coal owned previously owned by NF Smith
27	RW & A Grover (Cooboobindi)	70	JD & DJ Duncan (Myal 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 (Belleview)	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		



- Boggabri EA Project Boundary
- Boggabri Mining Authorities
- Modification EA Extent of Approved Mining
- Boggabri Coal
- Whitehaven Coal Mining
- Aston Resources
- Not Searched
- Crown
- Crown - Special Lease
- NSW State Forest
- Leard State Conservation Area
- Mining Joint Ownership
- Under Negotiation
- Private Freehold Receiver
- Boggabri Coal Owned Receiver
- Other Mine Owned Receiver

Hansen Bailey

IDEMITSU BOGGABRI COAL

Land Searches LPI 2009/2010
Co-ordinate System: MGA 94 Zone 56

BOGGABRI COAL MINE

Land Ownership

Cad File: 08168A.dwg	Date: 12.03.12	Drawn: CP	Figure 4

4 THIS MODIFICATION

4.1 NEED

This Modification Application (MOD 3) if approved would improve the future efficiency of overburden emplacement.

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 (noting that the increased overburden height has been assessed in the Boggabri EA and recommended for approval by the PAC as part of the Continuation for Mining Project).

4.2 DESCRIPTION

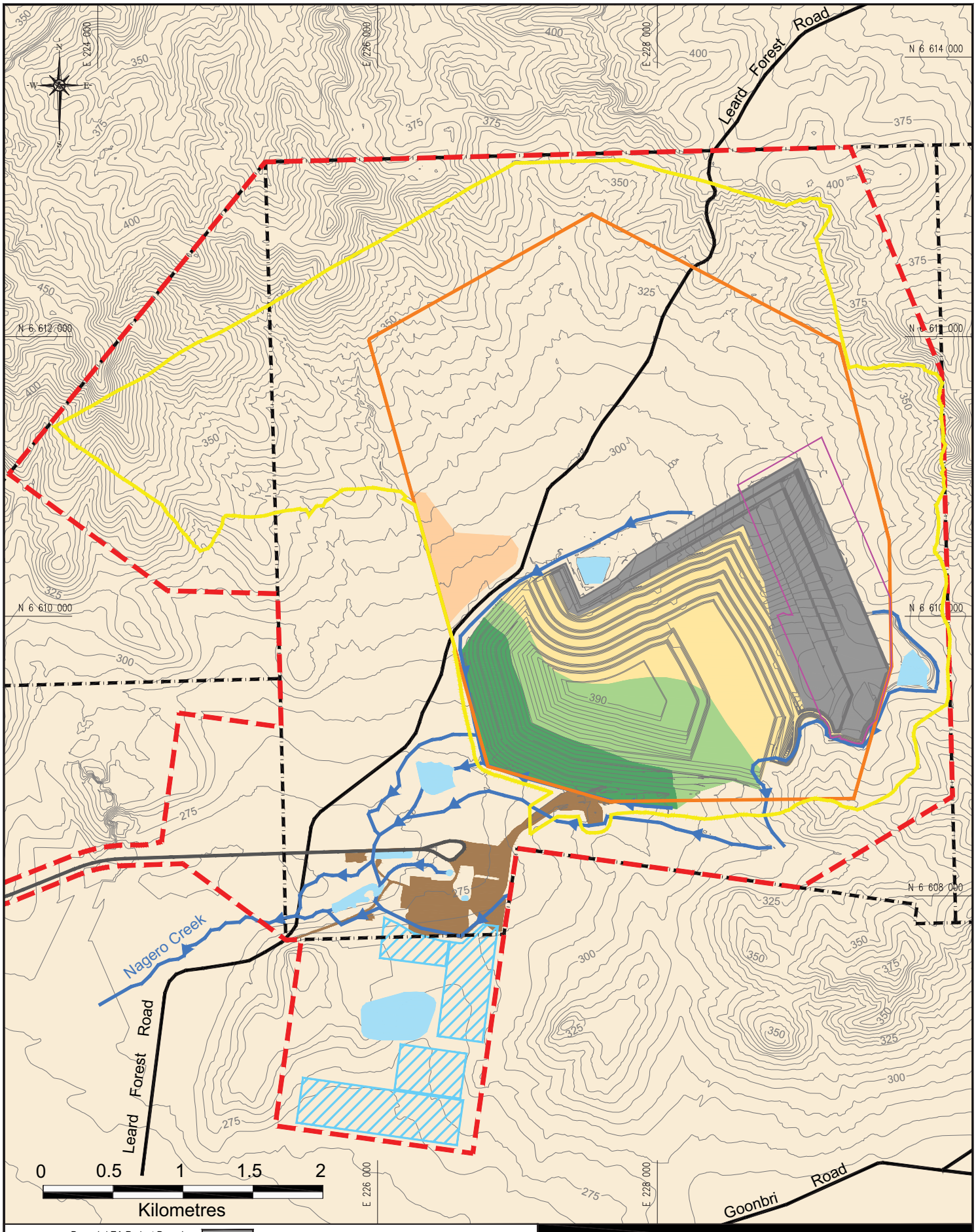
For this Modification, Boggabri Coal is seeking to increase the maximum approved height of the OEA by 55 m from that currently approved (RL 340 m) to RL 395 m. The increase is sought due to Boggabri Coal identifying that overburden emplacement can be undertaken so as to reduce the future need to rehandle overburden.

This Modification does not seek to disturb any additional natural land to that already approved. The positioning of all overburden will be on top of existing disturbed land.

The maximum OEA height proposed for this Modification (see **Figure 5**) is also consistent with the Year 5 Mine Plan as assessed in the Boggabri EA that supports the Boggabri Coal Continuation of Mining Project Application.

The benefits of this Modification would be:

- Reduced energy use due to less overburden rehandling;
- Reduced environmental impacts from more efficient operations;
- More efficient resource recovery (because coal sterilisation is minimised); and
- There would be no increase in environmental impacts from this Modification if it was approved.



Source: Boggabri Coal (2010)

BOGGABRI COAL MINE

Conceptual Year 2 Mine Plan

Cad File: 08081E.dwg	Date: 24.05.12	Drawn: JD	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. DA 36/38 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. Condition 1 of the development consent requires that the development be conducted generally in accordance with the Boggabri EIS 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 3.1.1**) and as discussed in the subsequent Boggabri SEE and Boggabri Modification EA documents (as described in **Section 3.1.2** and **3.1.3**).

A second modification was granted by the delegate of the Minister for Planning and Infrastructure on 19 October 2011 which (amongst other things) authorised continuation of mining for an additional two years (until 14 November 2013).

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

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.

5.1.3 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).

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 as approved by the development consent as modified ("approved") will remain unaltered by this Modification:

- Total tonnes of coal to be extracted, processed or transported will be less than or equal to that currently approved;
- Total annual extraction, processing and transportation of coal will be less than or equal to that currently approved;
- Manning levels will be less than currently approved;
- Methodology of mining, processing and transportation of coal will be no different to that which is approved;
- The surface disturbance limit will not increase from that which is approved; and
- Infrastructure for storage, processing and transport of coal will be no different to what is approved.

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 advised 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*".

This Modification sought will involve activities which are entirely within the Existing Boggabri Project and will not result in the disturbance of any additional natural land surface and as such, it does not require referral or approval under the EPBC Act.

5.3 ENVIRONMENTAL PLANNING INSTRUMENTS

In addition to SEPP Mining, other relevant environmental planning instruments include the following.

5.3.1 SEPP (Mining, Petroleum Production and Extractive Industries 2007

The aims of SEPP Mining include providing for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of the State and to facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources and to establish appropriate planning controls to encourage Ecologically Sustainable Development (ESD) and establishes relevant matters for consideration by a consent authority.

The considerations set out by clauses 12 to 17 of SEPP Mining (which set out matters for consideration in development applications) are examined and reported upon throughout this EA.

In particular, clause 12 of SEPP Mining provides:

'*Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:*

(a) consider:

(i) the existing uses and approved uses of land in the vicinity of the development, and

(ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and

(iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses; and

(b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a)(i) and (ii), and

(c) evaluate any measures proposed by the Proponent to avoid or minimise any incompatibility, as referred to in paragraph (a)(iii).'

This EA undertakes the assessments required by clause 12 of SEPP Mining.

5.3.2 SEPP 33 – Hazardous and Offensive Development

SEPP 33 – Hazardous and Offensive Development (SEPP 33) requires the consent authority to consider the merits of proposed activities including the location of the development and the way in which it is to be carried out.

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

Further, as SEPP 33 applies only to proposals that are potentially hazardous or offensive and the proposed development does not constitute a potentially hazardous or offensive industry under clause 3, SEPP 33 does not apply to this Modification.

5.3.3 SEPP 44 – Koala Habitat Protection

SEPP 44 – Koala Habitat Protection (SEPP 44) encourages the conservation and management of koala habitats, to ensure permanent free living koala populations will be maintained over their present range. The SEPP requires that the consent authority to consider whether land the subject of a development application is '*potential koala habitat*' or *'core koala habitat'*.

There will be no impact caused by this Modification to any koala communities.

5.3.4 SEPP 55 – Remediation of Land

SEPP 55 – Remediation of Land (SEPP 55) was enacted to provide a state-wide approach to the remediation of contaminated land for the purpose of minimising the risk of harm to the health of humans and the environment.

There are no potentially contaminated sites within the area subject of this Modification.

5.3.5 Narrabri Local Environment Plan 1992

The Project Boundary is located within the Narrabri Shire LGA, in which the relevant environmental planning instrument is the Narrabri LEP.

All components of the modification of the development fall within the 1(a) – General Rural Zone of the Narrabri LEP. Agriculture is permissible on land which is within this zone without development consent and therefore under SEPP (Mining), open cut coal mining and facilities for the transportation and processing of minerals extracted from the land or adjoining land is permissible with development consent under the Narrabri LEP.

The objectives of Zone 1(a) are the proper management and utilisation of resources by:

'(*a) protecting, enhancing and conserving:*

(i) agricultural land in a manner which sustains its efficient and effective agricultural production potential,

(ii) soil sustainability by controlling and locating development in accordance with soil capability,

(iii) forests of existing and potential commercial value for timber production,

(iv) valuable deposits of minerals, coal, petroleum and extractive materials by controlling the location of development for other purposes in order to ensure the efficient extraction of those deposits,

(v) trees and other vegetation in environmentally sensitive areas where the conservation of the vegetation is significant to scenic amenity or natural wildlife habitat or is likely to control land degradation,

(vi) water resources for use in the public interest;

(vii) areas of significance for nature conservation, including areas with rare plants, wetlands and significant habitats, and

(viii) places and buildings of archaeological or heritage significance, including the protection of Aboriginal relics and places,

(b) preventing the unjustified development of agricultural land for purposes other than agriculture,

(c) preventing residential development of prime crop and pasture land, except where it is ancillary to agriculture or another use permissible in the zone,

(d) facilitating farm adjustments,

(e) ensuring that any allotment created for an intensive agricultural pursuit is potentially capable of sustaining a range of such purposes or other agricultural purposes,

(f) minimising the cost to the community of:

(i) fragmented and isolated development of rural land; and

(ii) providing, extending and maintaining public amenities and services.'

5.3.6 Permissibility

The land on which the development is located (including the proposed modification) is zoned General Rural 1(a) under the *Narrabri Local Environmental Plan 1992* (Narrabri LEP). Under that zoning, '*agriculture*' is permitted without development consent and mining is permitted with development consent.

Under *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (NSW) (SEPP Mining), mining is permissible with development consent (Project Approval in this case) on land where development for the purposes of agriculture may be carried out or on land that is the subject of a mining authority immediately before the commencement of clause 7 of SEPP Mining.

Accordingly, development for the purposes of coal mining is permissible on the subject land with development consent.

5.4 OTHER REGULATORY REQUIREMENTS

5.4.1 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.

5.4.2 Mining Act 1992

Mining and overburden emplacement is required to be authorised by a mining lease under the *Mining Act 1992* (Mining Act) (granted by the Minister for Resources and Energy). If this modification application is approved, all mining and overburden emplacement will occur entirely within the boundaries of Boggabri Coal's existing Mining Lease CL368.

The principal mining authority is CL 368 which expired 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 (section 65 Mining 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.

Under the conditions of CL 368, a mining operations plan (MOP) approved by the Minister administering the Mining Act or his delegate is required for all mining or mining purposes.

Amendments to the existing approved MOP for Boggabri Coal Mine as required by the conditions of its mining authority will be sought 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.

5.4.3 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 approval to amendments necessary will be sought.

5.4.4 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 Boggabri Coal Mine.

No further water licence under the Water Act would be required as a consequence of this Modification (if approved).

5.4.5 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 approved by the development consent:

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

Boggabri Coal already holds water access licences with appropriate share component attached (and water use approvals thereof) for the development to account for water taken from water sources regulated under the WM Act. This modification will not increase the amount of water taken from any relevant water source. Therefore, no additional share component will be required.

The Water Sharing Plan for the Murray-Darling Basin Porous Rock Groundwater sources has now commenced. The existing licences held by Boggabri Coal for the development under the *Water Act 1912* (NSW) will be converted to Water Access Licences under the WM Act.

5.4.6 National Parks and Wildlife Act 1974 (NPW Act)

Under the NPW Act it is an offence to harm or desecrate an Aboriginal place or object without a permit under section 90 or 87 of the NPW Act.

There are no Aboriginal places or objects which will be impacted by the Modification.

5.4.7 Heritage Act 1977 (Heritage Act)

The Heritage Act provides for controls over the manner in which items of European heritage significance (*relics*) are managed and prohibits their destruction or change without an excavation permit under section 139 of the Heritage Act.

There are no relics which will be impacted by the Modification.

5.4.8 Native Vegetation Act 2003 (NV Act)

Under the NV Act it is an offence to clear native vegetation (as defined) without development consent to do so (subject to certain exemptions).

Under section 25 of the NV Act any clearing authorised under the Mining Act 1992 is exempt from the requirement for a development consent under the NV Act. There will be no clearing required for this Modification.

5.4.9 Draft Strategic Regional Land Use Plan – New England North West (SRLUP)

In March 2012 the draft SRLUP was published for submissions.

Pending its finalisation, the Interim Strategic Agricultural Land Policy for State Significant and Transitional Part 3A Mining and Coal Seam Gas Proposals in the Upper Hunter and New England North West Regions (Interim Policy) has been published.

The Interim Policy arrangements are defined to '*apply to … applications and significant modifications …*'.

This modification is not considered to be a '*significant modification*' in the terms of the Interim Policy.

Further, the modification does not affect any area which is within two kilometres of mapped biophysical strategic agricultural land.

Accordingly, neither the SRLUP nor the Interim Policy apply to this application.

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 completed 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

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).

The greenhouse gas impacts from this Modification were calculated as CO_2-equivalent ($CO_{2\text{-}e}$) 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 and maximum OEA height proposed for this Modification would be consistent with those presented in the Boggabri EA in support of Project Application 09_0182.

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 PM_{10} 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 PM_{10} levels above the criteria of 30 µg/m^3 (with a predicted result of 33 µg/m^3).

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

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

Greenhouse Gas

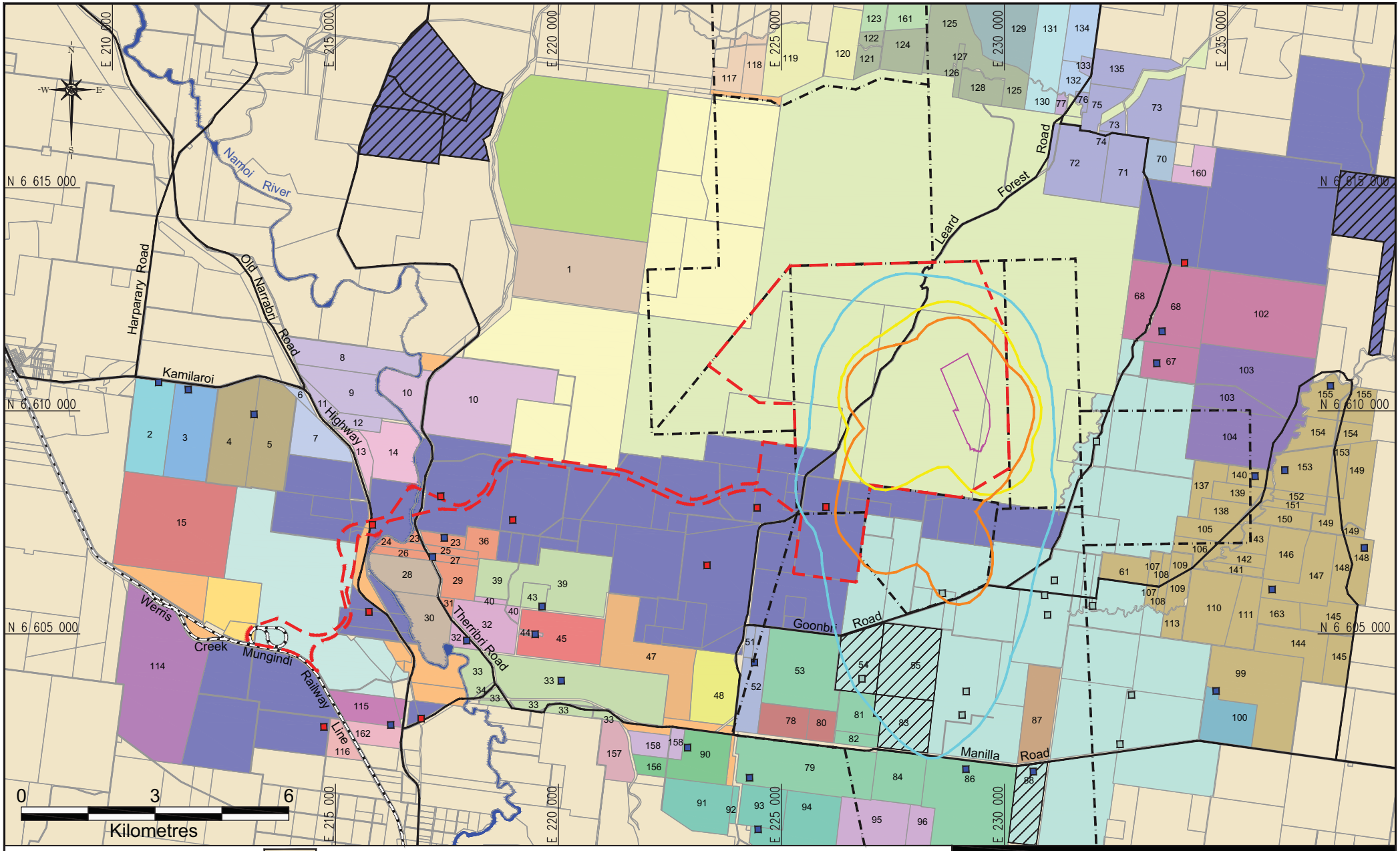
Through the more efficient placement of overburden material, largely in its final resting place (thus reducing rehandle) greenhouse gas emissions from the project will be less than if the Modification is not approved.

6.1.4 Mitigation and Management

Boggabri Coal will revise 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 conveyor systems and installing automatically triggered dust suppression sprays to conveyors;
- Revegetating disturbed areas as soon as practicable including rehabilitation areas and obsolete haul roads; and
- Installing a Tapered Element Oscillating Microbalance (TEOM) air quality monitoring unit to aid real-time dust management and monitor compliance.



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- Whitehaven Coal Mining
- Aston Resources
- Not Searched
- Crown
- Crown - Special Lease
- NSW State Forest
- Leard State Conservation Area
- Mining Joint Ownership
- Under Negotiation
- Private Freehold Receiver
- Boggabri Coal Owned Receiver
- Other Mine Owned Receiver
- TSP OEH Criteria (90 µg/m³)
- PM_{10} OEH Annual Average Criteria (30 µg/m³)
- Dust Deposition OEH Criteria (2g/m²/month)

Hansen Bailey

IDEMITSU BOGGABRI COAL

Land Searches LPI 2009/2010
Co-ordinate System: MGA 94 Zone 56

BOGGABRI COAL MINE

Air Quality Contour Year 2

Cad File: 08169A.dwg	Date: 12.03.12	Drawn: CP	Figure 6

6.2 NOISE

6.2.1 Introduction

A noise 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 impact assessment was undertaken to determine noise impacts associated with this Modification in accordance with current OEH guidelines and policies. Existing noise levels have been reviewed and assessed for the operations proposed for this Modification, including the elevation of the haul road using a comprehensive model developed for the Boggabri Coal Mine site.

The model utilised for this assessment included an appropriate meteorological dataset, all operational noise sources present and the noise 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 by Bridges Acoustics (2010) for the Boggabri EA. This study included an assessment of noise levels at intervals of 1, 5, 10 and 21 years of that operation and the recovery of product coal at a rate of up to 7 Mtpa.

Noise impact levels during the period of 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;
- Noise levels reported for Year 5 in the Boggabri EA were for a proposed production level of 7 Mtpa of product coal, compared to a maximum production level of 3.5 Mtpa of product coal proposed for this Modification. A correction factor of -2.5 dBA was applied to the Boggabri EA results for the assessment to account for the difference in production levels; and
- The maximum OEA height of RL 395 proposed for this Modification is identical to the OEA height in Year 5 assessed in the Boggabri EA.

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 and those proposed for the Maules Creek 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 $L_{Aeq,15\ min}$.

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 $L_{A90,15min}$ which is the lowest background noise level that can be adopted according to the INP.

6.2.3 Impact Assessment

Predicted noise levels for this Modification have been calculated based on the Year 1 and Year 5 mine plan as described in the Boggabri EA and are consistent with those conservatively assessed to support the Boggabri Modification EA (Bridges Acoustics 2011), despite the increase in height of the OEA by RL 55 m. This result is due to the following:

- Receivers located generally east of the active mining area would remain approximately 900m further from the active mining area assessed for the Boggabri EA and would therefore receive less noise than predicted in this assessment, as no distance correction factor was adopted from the Boggabri EA Year 5 mine plan to the mine plan assessed for this Modification;
- Receivers located generally south of the active mining area would receive similar noise levels to the predicted levels, as mining equipment operating within the Boggabri EA Year 5 mine plan and within the current Modification mine plan would be at a similar distance from receivers; and
- There are no receivers located generally west of the active mining area that are likely to be affected by mining noise as a result of this Modification. Receivers generally west of the mining area are potentially affected by product coal trucks on the existing haul road or from proposed train movements on the rail spur, if the spur is constructed, and these sources are not affected by the proposed increase in the maximum height of the OEA.

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 presented in **Figure 7**, with a 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) are predicted to receive a significant impact (of more than 5 dBA over the criterion) 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 consent; and
- Five other properties (23-27, 29, 31, 36 Cooboobindi; 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.

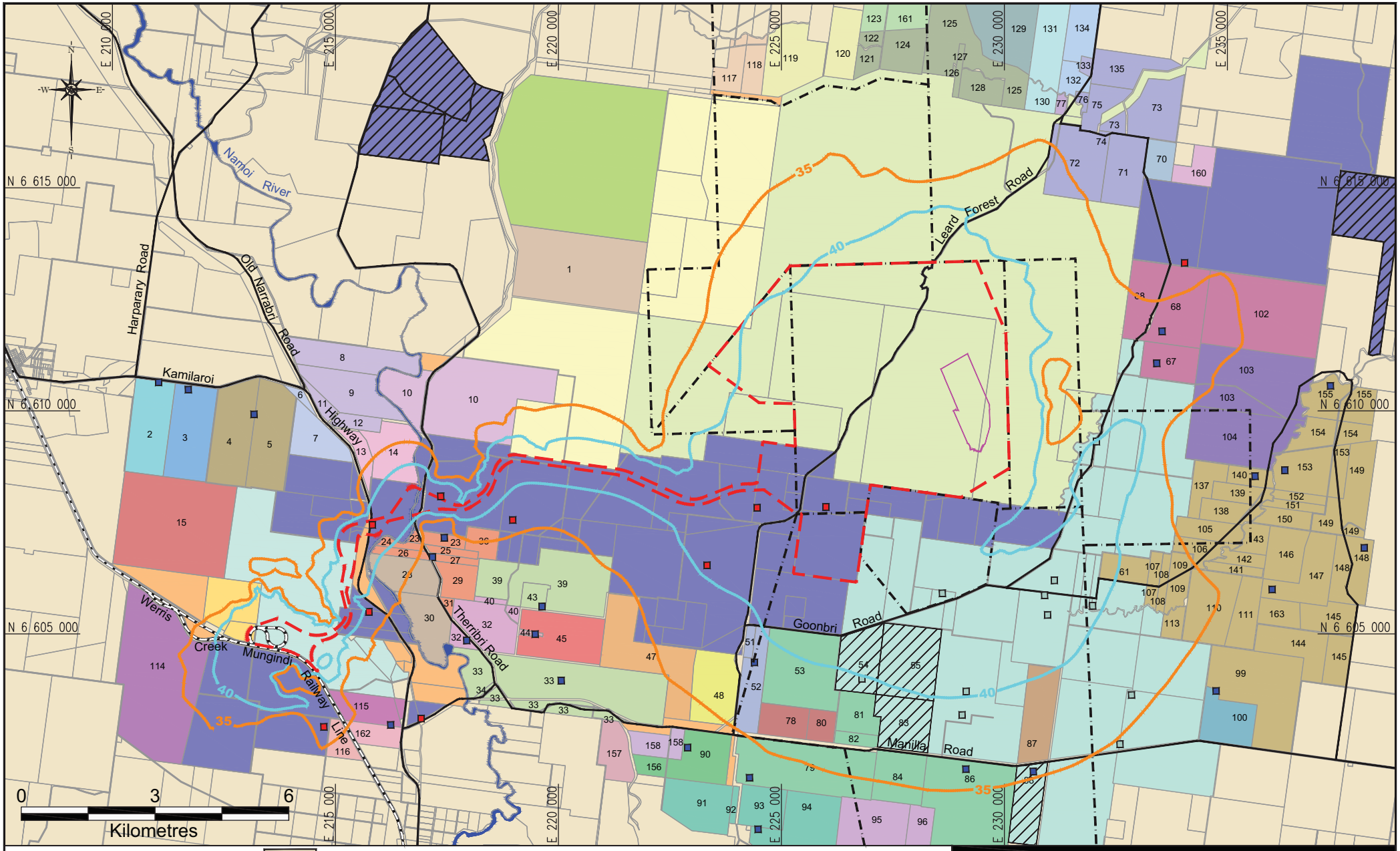
6.2.4 Mitigation and Management

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

Boggabri Coal will 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.



Boggabri EA Project Boundary
Boggabri Mining Authorities
Mining Extension Approved Mining
Boggabri Coal
Whitehaven Coal Mining
Aston Resources

Not Searched
Crown
Crown - Special Lease
NSW State Forest
Leard State Conservation Area
Mining Joint Ownership
Under Negotiation

Private Freehold Receiver
Boggabri Coal Owned Receiver
Other Mine Owned Receiver
35 dBA Noise Contour
40 dBA Noise Contour

Hansen Bailey

IDEMITSU
BOGGABRI COAL

Land Searches LPI 2009/2010
Co-ordinate System: MGA 94 Zone 56

BOGGABRI COAL MINE

Indicative Noise Contours Year 2

Cad File: 08170A.dwg	Date: 12.03.12	Drawn: CP	Figure 7

6.3 VISUAL AND LIGHTING

6.3.1 Introduction

A visual impact assessment for this Modification was undertaken by Visual Planning & Design. This standalone study relies upon the extensive assessment undertaken for the Boggabri EA study "*Visual Impact Assessment 2010*" (Integral 2010) and for the Boggabri Modification EA (Integral 2011) and draws upon the impact assessment and mitigation therein which provides a contemporary and conservative assessment of the impacts from this Modification. This assessment is presented in **Appendix C**.

6.3.2 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 this 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.

6.3.3 Impact Assessment

Visual

The north, east and west viewing sectors surrounding this Modification will continue to be generally screened by the Willow Tree Range. This Modification will therefore have no visual impact for sensitive receivers (private residences) in these sectors.

The south-east and south-west sectors, there are potential limited views of this Modification due to the increased height of the OEA as proposed. However any impacts to receivers in this sector would be reduced as the rehabilitation of the OEA is progressed. Further, the existing OEA approved for Boggabri Coal Mine under DA 38/66 forms a component of views toward the site from some sensitive receiver locations in the south-east sector. As such, this Modification will not result in any additional visual impacts to sensitive receivers in those sectors, including those within the township of Boggabri.

Lighting

The activities proposed for this Modification associated with the increase in OEA height to RL395 m may create additional direct lighting impacts to receivers in the south-east and south-west viewing sectors to those already created by the existing operations approved for Boggabri Coal Mine and the adjacent Tarrawonga Coal Mine.

The activities proposed for the increase in OEA height are also consistent with the Year 5 mine plan as presented in the Boggabri EA Project Application.

6.3.4 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 development and progressive rehabilitation of the OEA, with the following visual treatments to be implemented:

- 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.

Any lighting towers to be used on the top of the OEA will continue to be directed away from receivers to avoid direct lighting impacts. No further management measures for lighting impacts in addition to those already in place at Boggabri Coal Mine are required.

6.4 REHABILITATION AND FINAL LANDFORM

6.4.1 Rehabilitation Objectives

Rehabilitation strategies have been documented and reported on an annual basis to regulators since mining commenced in 2006. While the area assessed for this Modification has been intermittently logged over the past century for its valuable timber resources, the vegetation communities within the Modification areas 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 Boggabri Coal Mine Biodiversity Offset Strategy;
- 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.

6.4.2 Rehabilitation Techniques

Clearance Protocol

The existing broad rehabilitation techniques and criteria will continue to be applied to all rehabilitation areas for the 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, 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 for the Modification areas and for the proposed increase to the OEA, 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 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.

6.4.3 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.

6.4.4 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.

6.5 WASTE

6.5.1 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.

6.5.2 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.

6.5.3 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.

7 STATEMENT OF COMMITMENTS

Boggabri Coal commits to the operational controls as outlined in **Table 2** 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 2
Statement of Commitments

Ref	Description	Section
	Mining Operations	
1.	Should Project Approval 09_0182 be granted then Development Approval 36/88 shall be surrendered in accordance with the Boggabri EA Statement of Commitments.	4
	Environmental Management	
2.	Subsequent approvals under other relevant legislation as described in this EA will be obtained.	**5**
3.	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.	**3.6**
4.	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.	**3.6**
5.	The Environmental Monitoring Program as enhanced and described in this EA will be implemented.	**3.7**
	Environmental Management and Mitigation	
6.	Technologies and initiatives will be implemented as required to achieve the air quality outcomes described in this Environmental Assessment.	**6.1**
7.	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**
8.	Overburden, rejects emplacement and rehabilitation will be managed as described in this Environmental Assessment.	**6.3**, **6.4**

Ref	Description	Section
	Reporting and Consultation	
9.	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**
10.	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**
11.	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 to enable the more efficient relocation of overburden material to December 2013 if the determination of the Continuation of Mining Project under Project Application 09_0182 is further delayed.

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 remain to the end of 2013;
- 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 450 personnel;
- 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; and
- The maximum height of the OEA would be increased by 55 m from that currently approved (from RL 340 m to RL 395 m).

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 Boggabri Coal Mine OEA 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.

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 Project Application 09_0182 and as assessed within 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 and consistency with the proposal to increase the height of the OEA as approved under DA 36/88.

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 are 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 criteria.

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

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

8.5 ENVIRONMENTAL PLANNING AND SOCIAL CONTEXT

Boggabri Coal had 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 in a more efficient manner under DA 36/88 (as modified) until there has been a determination of the Continuation of Mining Project Application. If approved, mining will continue at Boggabri Coal Mine more efficiently 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 Continuation of Mining 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.

Should the approval of the Continuation of Mining Project be delayed after June 2012, and the approval of this Modification was not granted, then these estimates of economic stimulus would be lost along with employment for up to 450 direct employees.

This Modification provides a balanced consideration of all potential environmental, social and economic impacts, consistent with the principles of Ecologically Sustainable Development. Mine planning, engineering investigations and conceptual studies have identified that the recovery of the coal resource within the approval area of DA 36/88 and that sought for this Modification, ensures the advancement of the interests of all the interested communities in accordance with the objects of the EP&A Act by:

- 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:

- Continue 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 450 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
- Enable Idemitsu Australia Resources to invest with confidence in the future development of the Boggabri Coal Mine.

8.6 JUSTIFICATION

The economic and social benefits of the continuation of the Boggabri Coal Project are set out in the Boggabri EA attached to Project Application 09_0182, within DA 36/88 (MOD 2) and under **Section 8.5** of this EA.

This Modification facilitates that continuity of operations until Project Application 09_0182 is finally determined.

The continuity of the Boggabri Mine is consistent with the objects of the EP&A Act, namely '*To encourage the proper management and development and conservation of the natural and artificial resources including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment*'.

The approved Boggabri Mine contains a significant coal resource which is and can continue to be developed in a balanced manner, managing the impacts, for the benefit of local and state and national communities.

This Modification as proposed furthers Ecologically Sustainable Development in the State of NSW. The assessments undertaken have demonstrated that the modification proposed satisfies: the precautionary principle, social and intergenerational equity and improved valuation and pricing of environmental resources.

This Modification proposed also sustains and enables the continuity of the mine without material changes to the impacts and therefore the objects of the EP&A Act as referred to above are satisfied and will be furthered by its approval.

If approved. this Modification provides for:

- Greater efficiency in operation of the mine;
- Improved environmental outcomes;
- Reduced environmental impacts;
- Improved resource recovery;
- No increase in area disturbed; and
- The enhancement of the achievement of the objects of the EP&A Act through the above outcomes.

9 ABBREVIATIONS

Abbreviation	Description
Boggabri CCC	Community Consultative Committee
Boggabri Coal	Boggabri Coal Pty Limited
Boggabri EA	Continuation of Mining Project Environmental Assessment 2010
Boggabri EIS	Boggabri Coal Project Environmental Impact Statement 1987
Boggabri Modification EA	Boggabri Coal Modification Environmental Assessment 2011
Boggabri SEE	Boggabri Coal Project Statement of Environmental Effects 2009
CO_2	Carbon dioxide
$CO_{2\text{-}e}$	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
DP&I	NSW Department of Planning and Infrastructure (Incorporates former DoP, DIPNR, Planning NSW, DUAP)
EA	Environmental Assessment
EC	Electrical conductivity
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Program
EMS	Environmental Management System
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPL	Environmental Protection Licence
ESD	Ecologically Sustainable Development
ha	Hectare
HVAS	High Volume Air Sampler
LEP	Local Environment Plan
LGA	Local Government Area
Mining Act	*Mining Act 1992*
mm	Millimetre
MNES	Matter of National Environmental Significance
MOP	Mining Operations Plan
Mt	Million tonnes
Mtpa	Million tonnes per annum
NPW Act	*National Parks and Wildlife Act 1974*
NSC	Narrabri Shire Council
OEA	Overburden Emplacement Area

Abbreviation	Description
OEH	Office of Environment & Heritage (formerly DECCW)
Planning Approval	Project Approval document
PM_{10}	Particulate Matter <10 microns
POEO Act	*Protection of the Environment Operations Act 1997*
RBL	Rating Background Level
Receiver	Private property adjacent the Modification containing a receiver
SCA	State Conservation Area
SEPP	State Environmental Planning Policy
SoC	Statement of Commitments
TEOM	Tapered Element Oscillating Microbalance
tph	tonnes per hour
TSC Act	*Threatened Species Conservation Act 1995*
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
WAL	Water Access Licence
Water Act	*Water Act 1912*
WM Act	*Water Management Act 2000*

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- 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*.

11 EA STUDY TEAM

Section	Title / EA Component	Team Member and Company	
Project Management			
	General Manager - Development and Technical	Brian Cox	Idemitsu Australia Resources
	Environmental Coordinator	Joe Rennick	Boggabri Coal
EA Management			
	Project Director	James Bailey	Hansen Bailey
	Project Manager	Nathan Cooper	
	Project Coordinator	Dorian Walsh	
EA Sections			
1	Overview	Dianne Munro	Hansen Bailey
2	Continuation of Boggabri Coal Mine	Dorian Walsh	
3	Existing Operations	Dorian Walsh	
4	Modification Description	Dorian Walsh	
5	Regulatory Framework	Dorian Walsh	
7	Impacts, Management and Mitigation	Nathan Cooper, Dorian Walsh	
8	Statement of Commitments	James Bailey	
9	Conclusion	James Bailey	
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	Visual Impact Assessment	John Van Pelt	Visual Planning & Design
Figures provided by Pegasus Technical Legal advice provided by David White at Sparke Helmore			

APPENDIX A

Air Quality and Greenhouse Gas

25 May 2012

Dorian Walsh
Hansen Bailey

Sent via email: dwalsh@hansenbailey.com.au

RE: BOGGABRI COAL MINE MODIFICATION TO DEVELOPMENT CONSENT (MOD3) – AIR QUALITY

Dear Dorian,

1 INTRODUCTION

Boggabri Coal Mine is located 15 kilometres north-east of Boggabri in the North West Region of NSW. In 2010 Boggabri Coal Mine produced 2.3 Million tonnes of product coal from the Maules Creek Formation down to the Merriown coal seam.

Boggabri Coal Mine is operated by Boggabri Coal Pty Limited (Boggabri Coal), a wholly owned subsidiary of Idemitsu Australia Resources Pty Limited. Boggabri Coal Mine currently operates in accordance with Development Consent DA 36/88 under the *Environmental Planning and Assessment Act 1979* (EP&A Act). In 2009, Boggabri Coal applied for a new Project Approval for the operation of the mine which was supported by the *Continuation of Boggabri Coal Mine Environmental Assessment* document dated December 2010 (Boggabri EA). This Project Application (PA 09_0182) is yet to be determined.

Due to the delay in the determination of PA 09_0812 Hansen Bailey Pty Ltd (Hansen Bailey) has been commissioned by Boggabri Coal to prepare an Environmental Assessment (EA) to support a modification to its existing Development Consent under Section 75W(former) of the EP&A Act. This Modification is required as Boggabri Coal has identified that the currently approved mine plan will run out of overburden emplacement capacity by April 2012.

The Modification to the Development Consent is sought to increase the maximum height of the overburden emplacement area to RL395 m from the currently approved height of RL340m. This 55 m increase in the maximum height of the overburden emplacement area and the associated mine plan is entirely consistent with the mine plans proposed under PA 09_0182.

Apart from the extension in overburden emplacement height sought, , operations will continue in accordance with that described in Section 4 of the *Boggabri Coal Mine Development Consent Modification Environmental Assessment* (Hansen Bailey 2011), including:

- Continuing mining operations under the Development Consent until 14 November 2013 or until PA 09_0182 is granted for the Continuation of Mining Operations Project;
- 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 as approved; and

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- 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.

Further details regarding the Modification, including a plan showing the currently approved mining area and the proposed Modification Boundary is included in the main volume of the Boggabri Coal Modification to Development Consent EA.

This report has been commissioned by Hansen Bailey on behalf of Boggabri Coal to assess the air quality impacts of the proposed modification to DA 36/88. This report includes an assessment of air quality impacts associated with the Modification to current NSW Office of Environment and Heritage (OEH) guidelines and policies described below.

2 ASSESSMENT CRITERIA

Table 2-1 summarises the air quality goals for concentrations of particulate matter that are relevant to this study.

Table 2-1: Air quality standards / goals for particulate matter concentrations

Pollutant	Averaging period	Standard / Goal	Agency
Total suspended particulate matter (TSP)	Annual mean	90 μg/m^3	• NHMRC
Particulate matter with an equivalent aerodynamic diameter less than 10 μm (PM_{10})	24-hour maximum	50 μg/m^3	• NSW OEH impact assessment criteria; • NEPM reporting goal, allows five exceedances per year for bushfires and dust storms;
	Annual mean	30 μg/m^3	• NSW OEH impact assessment criteria; • DoP acquisition criteria

Notes: μg/m^3 – micrograms per cubic metre, μm – micrometre.

Table 2-2 shows the maximum acceptable increase in dust deposition over the existing dust levels from an amenity perspective. These criteria for dust fallout levels are set to protect against nuisance impacts (**NSW DEC, 2005**).

Table 2-2: OEH criteria for dust (insoluble solids) fallout

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

3 CURRENT AIR QUALITY

3.1.1 Introduction

Air quality standards and goals refer to pollutant levels that include the contribution from specific projects and existing sources. To fully assess impacts against all the relevant air quality standards and goals it is necessary to have information or estimates on existing dust concentration and deposition levels in the area in which the Modification is likely to contribute to these levels. It is important to note that the existing air quality conditions (that is, background conditions) will be influenced to some degree by the existing mining operations.

The following sections provide a summary of the monitoring results for dust deposition, PM_{10} and TSP in the area surrounding the Modification.

3.1.2 Dust Deposition

Dust deposition is monitored using dust deposition gauges at 15 locations in the vicinity of the Modification. Dust deposition gauges use a simple device consisting of a funnel and bottle to estimate the rate at which dust settles onto the surface over a period of one month. The measured dust fallout levels include the effects of all existing sources of particulate matter including the existing mining operations.

Data collected from the gauges between 2005 and December 2011 are summarised in **Table 3-1**.

The data indicate that deposition levels are generally low and within the OEH's annual average assessment criteria of 4 g/m^2/month for insoluble solids.

Table 3-1: Dust deposition data (insoluble solids) (g/m^2/month)[a]

Dust gauge	2005 average	2006 average	2007 average	2008 average	2009 average	2010 average	2011 average
D1[b]	0.7	0.9	1.8	2.1	1.7	4.0[c]	1.8
D2[b]	0.7	1.5	2.0	2.1	1.5	2.7	1.5
D3	2.1	1.6	2.9	1.8	3.2	0.9	3.4[d]
D4	2.2	1.5	2.3	1.6	1.7	2.4	2.8[e]
D5	1.4	1.3	1.7	1.4	1.7	0.8	0.9
D6	1.5	1.0	1.7	1.6	1.3	0.9	1.2
D7	0.8	1.2	1.5	1.2	1.0	0.8	1.7
D8	1.1	1.1	1.3	1.2	1.1	0.9	1.3
D9	1.1	1.3	1.0	1.3	1.9	1.5	4.2[f]
D10	1.1	0.8	1.1	1.1	0.9	0.4	0.5[g]
D11	1.5	1.2	1.0	1.4	1.1	0.7	0.4[g]
D12	1.1	1.6	1.9	1.7	1.7	2.8	1.8
D13	1.5	1.8	2.2	2.4	1.6	1.6	0.6
D14	0.9	0.9	1.6	1.7	3.7	3.6	1.3
D15	-	-	-	1.1	1.4	1.1	2.1
D16	-	-	-	-	-	-	2.3

[a] Excluding contaminated data;
[b] Monitor located inside Boggabri Mine boundary;
[c] An elevated reading of 11.6 g/m^2/month was recorded in June 2010 at D1. Whilst the field notes do not indicate that the sample was contaminated, the results contains greater than 70% combustible matter, suggesting contribution from sources other mining, for example, bushfires or wood smoke.
[d] This value is the average of just two valid samples (May and July 2011) for D3. All other samples collected at this site during 2011 have been identified in field notes as contaminated with insects.
[e] An elevated reading of 8.9 g/m^2/month was recorded in June 2011 at D4. Whilst the field notes do not indicate that the sample was contaminated, the results contains greater than 75% combustible matter, suggesting contribution from sources other mining, for example, bushfires or wood smoke.
[f] An elevated reading of 13.1 g/m^2/month was recorded in June 2011 at D9. Whilst the field notes do not indicate that the sample was contaminated, the results contains greater than 75% combustible matter, suggesting contribution from sources other mining, for example, bushfires or wood smoke.

[g] These values are the average of just seven valid samples (D10 and D11). No results were recorded for the months August-December 2011.

3.1.3 PM_{10} and TSP concentrations

Particulate matter (PM_{10}) concentrations have been monitored by Boggabri Coal since 2005. 24-hour average concentrations of PM_{10} are collected at site D7 every sixth day using a High Volume Air Sampler (HVAS). An additional HVAS monitor is located to the south of the Modification as a part of the Tarrawonga Mine environmental monitoring system.

The data collected by the Boggabri Coal HVAS is available between August 2005 and December 2011. There have been five elevated concentrations above the OEH 24-hour average goal of 50 $\mu g/m^3$. Two of these events in December 2005 occur when strong northerly winds were reported by Bureau of Meteorology (**Bureau of Meteorology, 2005**). Narrabri, 60 km northwest of Boggabri, recorded winds greater than 115 km/h on the 28th December 2005, as such, it is likely there was significant sources of wind-generated dust, from both mining and agricultural activities in the area. Sampling field notes also indicated there was fire in Pilliga (approximately 115 km north-west of Boggabri) on 30 December 2005 which will have contributed to the elevated concentrations.

There were two other days where the dust levels were recorded to be above the OEH criterion, both of which occurred in November and December of 2009. As with the above, these elevated levels are unlikely to have been caused by operations at Boggabri. The Bureau of Meteorology identifies dust storms and raised dust levels in to the west of the area in both these monitoring periods (**Bureau of Meteorology, 2009**). There have been no recorded concentrations above the criterion since December 2009.

The monitoring data collected at the Tarrawonga HVAS indicates that there have been five elevated recordings above the OEH goal, with four occurring between September and December 2009, a period in which a number of dust storms and strong winds were experienced in New South Wales. The maximum 24-hour average PM_{10} concentration recorded was 97 $\mu g/m^3$ on 8 December 2009, a day when most of the State experienced strong winds and elevated dust levels.

Although the data indicates fewer than the five exceedances per year allowed by the OEH goal, it should be noted that the monitoring is not continuous and so it is not possible to conclude that the area complies with the PM_{10} Air-NEPM standard. However the fact that the exceedances are attributable to periods of severe wind suggests that air quality is satisfactory. **Figure 3.1** shows a graphical representation of the data.

The rolling annual average is below the OEH goal of 30 $\mu g/m^3$. In April 2009, the rolling annual average PM_{10} concentrations were 19 $\mu g/m^3$, and have been as high as 25 $\mu g/m^3$ (April 2007). Overall, the PM_{10} concentrations decreased significantly in June 2008, a slight increase is observed during 2009, with a decrease occurring from March 2010.

There are no TSP data collected, however, experience with monitoring in other mining areas in the State indicates that where mining activities are a significant source of the particulate matter, then on an annual basis, approximately 40% of the TSP will be in the form PM_{10}. This would suggest that the annual average TSP concentrations are in the range 48 $\mu g/m^3$ to 63 $\mu g/m^3$. These concentrations are less than OEH's annual average 90 $\mu g/m^3$ assessment criterion for TSP.

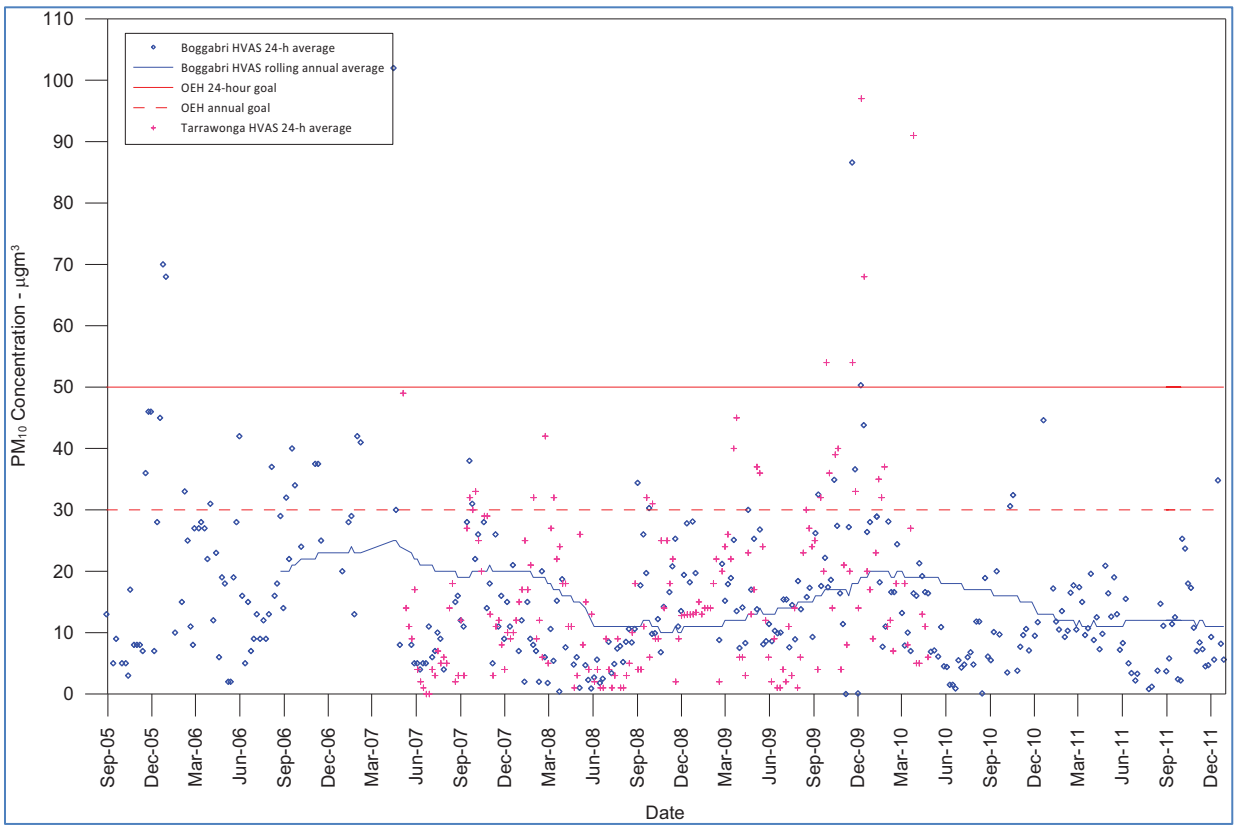

Figure 3.1: Measured PM_{10} concentrations (HVAS)

4 ASSESSMENT METHODOLOGY

4.1 Meteorology

One of the most important factors in determining the transport of dust from emission sources at Boggabri Coal Mine to the surrounding area is the frequency of different wind directions and wind speeds.

Boggabri Coal operates an automatic weather station (AWS) located to the south-west of the Modification Boundary. The meteorological data consist of 15-minute readings of temperature, wind speed, wind direction and sigma-theta (a measure of the fluctuation of the horizontal wind direction). The data from this site were incomplete and did not meet the OEH's requirements of 90% with data missing from 1 November 2008 to 25 December 2008 and 1 September 2009 to 17 September 2009. These data have been replaced with meteorological data from a nearby weather station operated by the Tarrawonga Coal Mine, 2 km southeast of the Boggabri AWS. There were still data missing from the Tarrawonga dataset for the period from the 2 May to 2 June in 2009. However, with the supplemented data from 1st November 2008 to 25 December 2008 and 1 September 2009 to 17 September 2009, the meteorological file is now 90.1% complete and meets the OEH's requirements.

Annual and seasonal windroses compiled from the onsite meteorological data are presented in **Figure 4-1**. The windroses show that on an annual basis, winds are predominantly from the north, west-northwest and southeast. During summer and autumn, winds from the southeast are predominant, with very few winds originating from the north-eastern quadrant. As winter progresses, the wind distribution pattern is predominantly from the north and the northwest. This wind pattern carries through until spring, when winds from the south and south-southeast are

present in more significant proportions. The percentage of calms (when the wind speed is less than 0.5 ms^{-1}) is 14.7%. The annual average wind speed for the 2008/2009 data is 2.3 m/s.

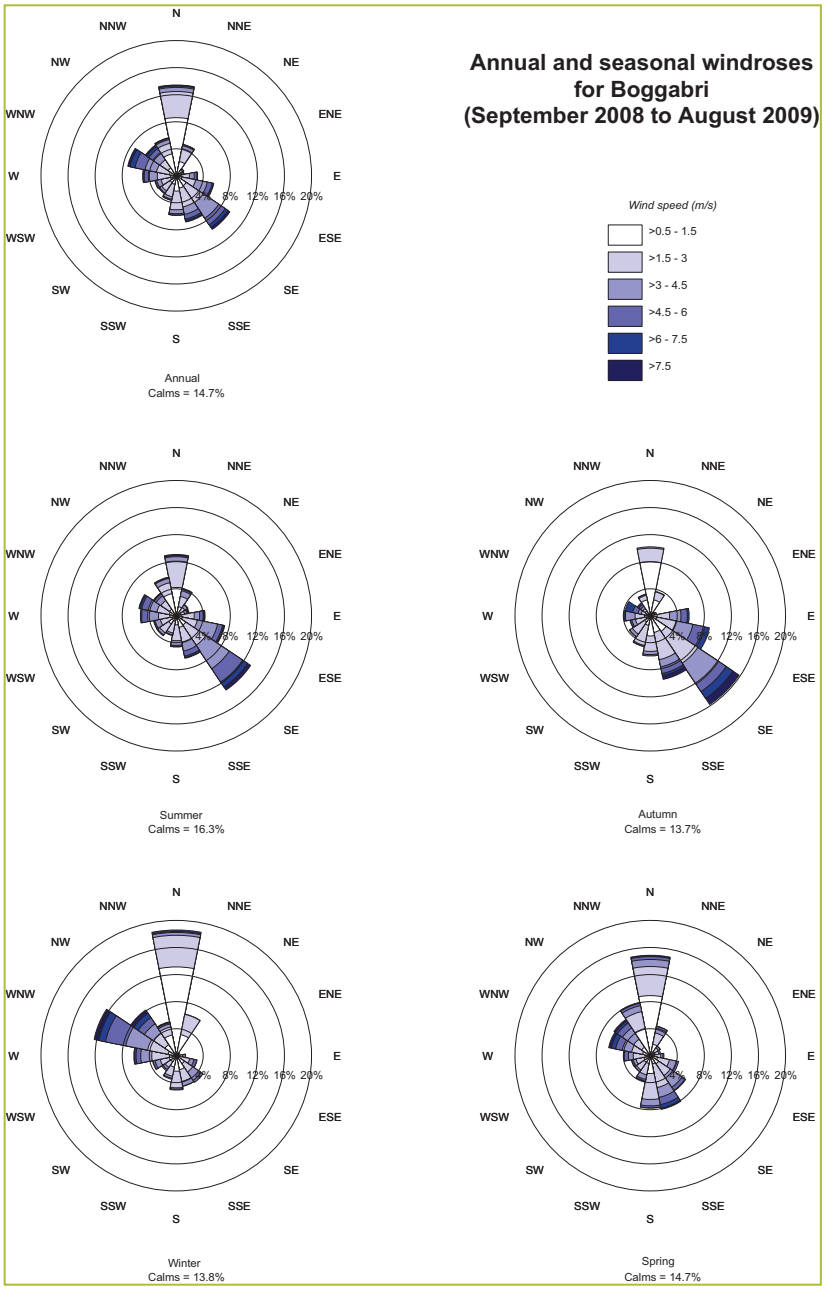

Figure 4-1: Annual and seasonal windroses for Boggabri

4.2 Dispersion Modelling

PAEHolmes completed a detailed air quality impact assessment (**PAEHolmes, 2011**) as input to the Environmental Assessment (EA) prepared for the Continuation of Boggabri Coal Mine (Boggabri EA) which is currently being assessed by NSW Department of Planning and Infrastructure (DP&I).

The model used was a modified version of the US EPA ISCST3 model (ISCMOD). ISCST3 is fully described in the user manual and the accompanying technical description (**US EPA, 1995a** and **US EPA, 1995b**).

As noted in **Section 1**, the proposed increase in the overburden emplacement area and the associated mine plan is entirely consistent with the mine plans proposed under PA 09_0182 as assessed for Year 5.

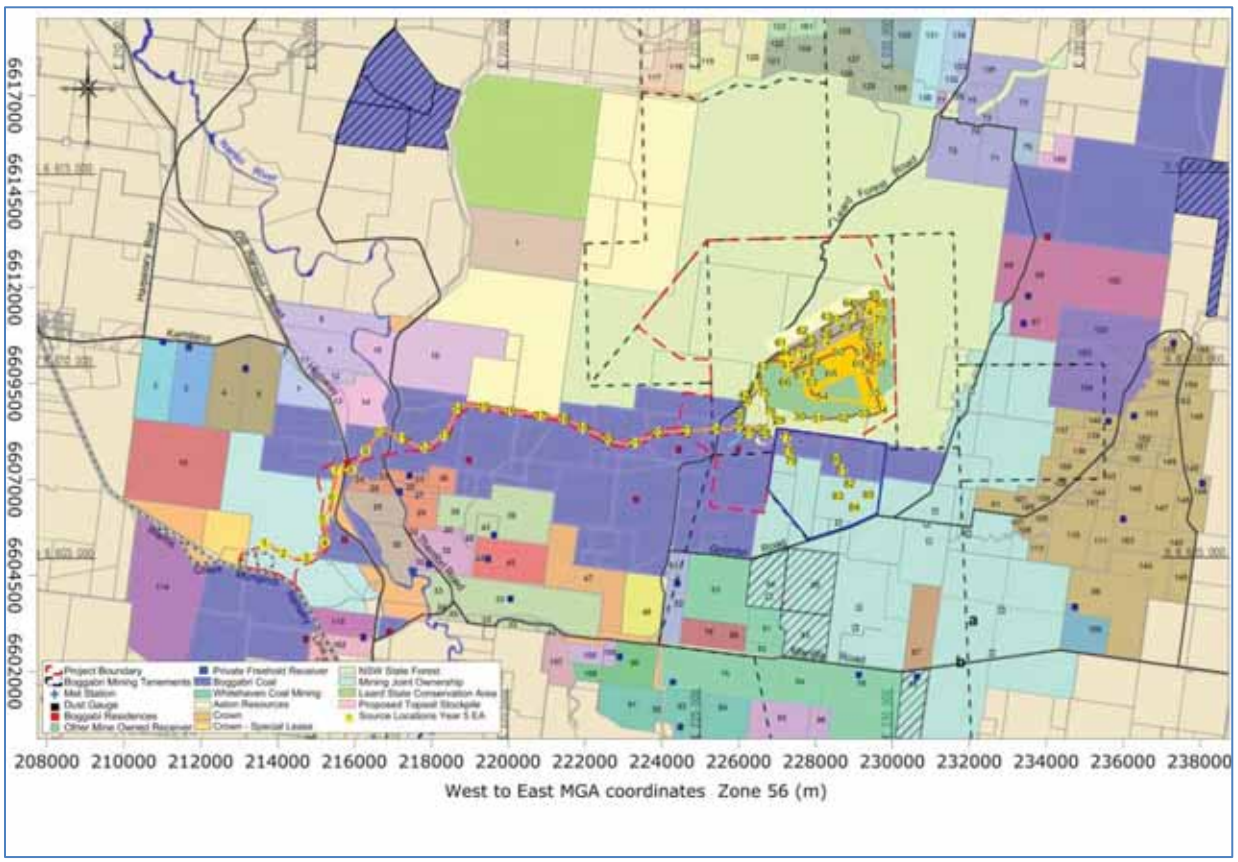

Figure 4-2: Year 5 activity per Boggabri EA

4.3 Estimated Emissions

Table 4-1 shows the calculated emissions from Year 5 of the Boggabri EA, based on a production rate of 6.97 Mtpa. As Boggabri Coal does not intend to produce more than 3.5 Mtpa during the proposed Modification, these emission estimates are considered to be conservative.

Table 4-1: Summary of estimated TSP emissions from the Modification (kg/y)

ACTIVITY	Year 5
Topsoil Removal-Dozers/Excavators stripping topsoil	9,801
Topsoil removal-Sh/Ex/FELs loading topsoil	758
Topsoil removal -Hauling topsoil to emplacement area	50,404
Topsoil removal -Emplacing topsoil at emplacement area	758
OB - Drilling	67,260
OB - Blasting	250,316
OB - Dragline removal of overburden	n/a
OB - Excavator loading OB to haul truck	123,118
OB - Hauling to emplacement area	2,182,006
OB - Emplacing at emplacement area	123,118
OB - Dozers removing OB	219,374
OB - Dozers on OB dumping in emplacement area	219,374
CL - Dozers ripping/pushing/clean-up	806,769
CL - Hauling open pit coal to ROM pad	274,222
CL - Unloading ROM to ROM stockpiles	81,979
CL - Loading ROM directly to hopper to be crushed	327,916
CL – Loading from stockpile to crusher using FELs	81,979
CL - Crushing ROM	23,137
CL - Unloading Product coal from crusher	85,694
CL- Loading coal from hopper for transfer to CHPP (2 Mtpa production rate).	354
CL - Hauling coal from hopper to CHPP	n/a
CL - Unloading to CHPP	531
CL - Handle coal at CHPP	389
CL - Rehandle coal at CHPP	89
CL - Dozers at ROM Pad	9,046
CL - Loading product coal to haul trucks	903
CL - Hauling product coal to rail loop	373,921
CL - Unloading product coal at rail loop	903
CL - Loading product coal to trains	903
CL - Loading rejects to haul trucks	208
CL - Hauling rejects from CHPP	41,010
CL - Unloading rejects	208
WE - OB dump area	902,650
WE - Open pit	507,945
WE - ROM stockpiles	16,118
WE - Product stockpiles	16,493
WE - Topsoil area and stockpiles	372,728
WE - Product stockpiles at Rail loop	19,792
Grading roads	26,957
Tarrawonga Coal Mine	1,600,000
Total	**7,219,260**

4.3.1 Estimated emissions from neighbouring mines

For the purposes of addressing cumulative air quality impacts, the inventories used in the modelling of Year 5 (Boggabri EA) included operations at the site and estimates of emissions from Tarrawonga Coal Mine located to the south of Boggabri Coal Mine.

In the cumulative modelling work, Tarrawonga Coal Mine has been treated as nine volume sources located at the apparent points of major emissions as estimated from the known locations of the pits and/or major dust sources on the mine site.

Sources have been considered in three classes covering all dust emission sources for which there are emission factor equations for open cut mines.

1. Wind erosion sources where emissions vary with the hourly average wind speed according to the cube of the wind speed.
2. Loading and dumping operations where emissions vary with wind speed raised to the power of 1.3.
3. All other sources where emissions are assumed to be independent of wind speed.

For the Tarrawonga Coal Mine, the proportion of emissions in each of these categories has been assumed to be:

- 0.73 for emissions independent of wind speed;
- 0.14 for emissions that depend on wind speed (such as loading and dumping); and
- 0.13 for wind erosion sources.

These factors are based on a detailed analysis of mine dust inventories undertaken as part of the Mount Arthur North EIS (**URS, 2000**) and these factors have been applied to subsequent air quality impact assessments for coal mines.

It is noted that, should approval be granted, the Maules Creek Coal Project located to the north of the Boggabri Coal Mine may be under construction during the two years of the Modification. Due to the terrain that currently exists between the two sites, prevailing wind directions would differ to those identified in the Boggabri EA assessment. In addition, the vegetation and terrain that currently exist between the two sites would largely remain, thus providing a buffer to any dust emissions generated by the Maules Creek Coal Project. It is therefore considered that the potential for the operations at the Maules Creek Coal Project to have any significant impact on those residences south of Boggabri Coal Mine is minimal.

4.3.2 Estimated emissions from other sources

In addition to those sources identified in **Section 4.3.1**, contributions from, for example, small local sources of dust such as dust from vehicles using private unsealed access roads, stock movements and fugitive emissions of coal dust from trains will contribute to $PM_{2.5}$, PM_{10}, TSP concentrations and dust deposition.

An estimate of the background allowance for non-mining sources, as presented in the Boggabri EA, was calculated by comparing the predicted cumulative impact with the monitoring data. This suggests that the annual average quantity of particulate matter contributed to by these more distant sources is 12 $\mu g/m^3$ for annual average PM_{10}, 33 $\mu g/m^3$ for annual average TSP and 0.5 g/m^2/month for annual average deposited dust.

4.4 Predicted impacts

Figure 4-3 shows the predicted annual average PM_{10} and TSP concentrations and dust deposition levels for operations in Year 5 of the Boggabri EA. This also shows the effects the Modification in combination with other sources. For simplification, only the assessment criteria contour has been presented. The contour for maximum predicted 24-hour PM_{10} impacts is the effects of the Modification alone.

Table 4-2 presents the predicted dust concentration results for all private receptors in the vicinity of the Modification and highlights in bold those values above the relevant project specific criteria or cumulative criteria where the Modification is expected to influence air quality.

In summary, the following receptors were identified where criteria are exceeded for the Modification:

- Annual average PM_{10} above 30 $\mu g/m^3$ due to the Modification, other mines and other sources – Tarrawonga (ID 54). It is noted that this property has the right to acquisition under the current Tarrawonga Mine Conditions of Consent.

These predicted impacts are based on a production rate of almost 7 Mtpa modelled for the Boggabri EA, which is double the production rate proposed for the Modification, and as such are considered to be conservative.

Table 4-2: Predicted PM_{10}, TSP and dust deposition for Year 5 (Boggabri EA)

		Modification alone				Modification and other sources (Cumulative)		
		PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/month)	PM_{10} ($\mu g/m^3$)	TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/month)
Averaging Period		24-hour	Annual	Annual	Annual	Annual	Annual	Annual
Owner	ID	*Impact Assessment Criteria*						
		50	*30*	*90*	*2*	*30*	*90*	*4*
FJ Maunder	2	5	1	1	0.0	13	34	0.5
RB & ML Kerr	3	5	1	1	0.0	13	34	0.5
Glek Pty Ltd	4	6	1	1	0.0	13	34	0.5
H & M Bullock[(a)]	18	7	2	2	0.0	14	35	0.5
Cooboobindi	23	14	3	3	0.1	15	36	0.6
Cooboobindi	27	13	3	3	0.1	15	36	0.6
Billabong	32	10	2	2	0.0	14	35	0.5
Brighton	33	13	1	1	0.0	14	35	0.5
Belleview(a)	35	15	3	3	0.1	15	36	0.6
Roma	43	13	2	2	0.0	14	35	0.5
Glenhope	44	12	1	2	0.0	14	35	0.5
Jeralong	51	22	3	3	0.0	16	37	0.6
Tarrawonga[(b)]	54	50	15	15	0.1	**33**	54	0.7
DC & EL Cheeseman[(c)]	59	32	7	7	0.1	21	42	0.8
Bradlock Pty Ltd[(c)]	63	50	8	9	0.5	21	43	1.1
Goonbri	67	31	4	4	0.1	17	38	0.6
Goonbri	68	28	3	4	0.1	16	37	0.6
Wirrilah(a)	69	27	3	3	0.1	15	36	0.6
Northham	79	16	3	4	0.0	16	37	0.5
Kyalla	86	40	10	10	0.1	28	50	0.6
Pine Grove(b)	88	40	7	7	0.1	22	44	0.6
Barbers Lagoon	90	14	2	2	0.0	14	35	0.5
Callandar	94	16	4	4	0.0	17	38	0.5
Flixton	98a	23	4	4	0.1	18	39	0.6
Flixton	98b	19	4	4	0.1	18	39	0.6
Bailey Park	100	15	3	3	0.1	16	37	0.6
Hazeldene	115	7	1	1	0.0	14	35	0.5
JE & RJ Picton	140	19	3	3	0.1	15	37	0.6
JE & RJ Picton	147	20	2	3	0.1	15	36	0.6
JE & RJ Picton	148	15	2	2	0.1	14	35	0.6
JE & RJ Picton	153	16	2	3	0.1	15	36	0.6
JE & RJ Picton	155	14	2	2	0.0	14	35	0.6

(a) Purchased by Boggabri Coal after the air quality assessment was completed.

(b) Right to acquisition under Tarrawonga Coal Mine Conditions of Consent.

(c) Purchased by Tarrawonga Mine after the air quality assessment was completed.

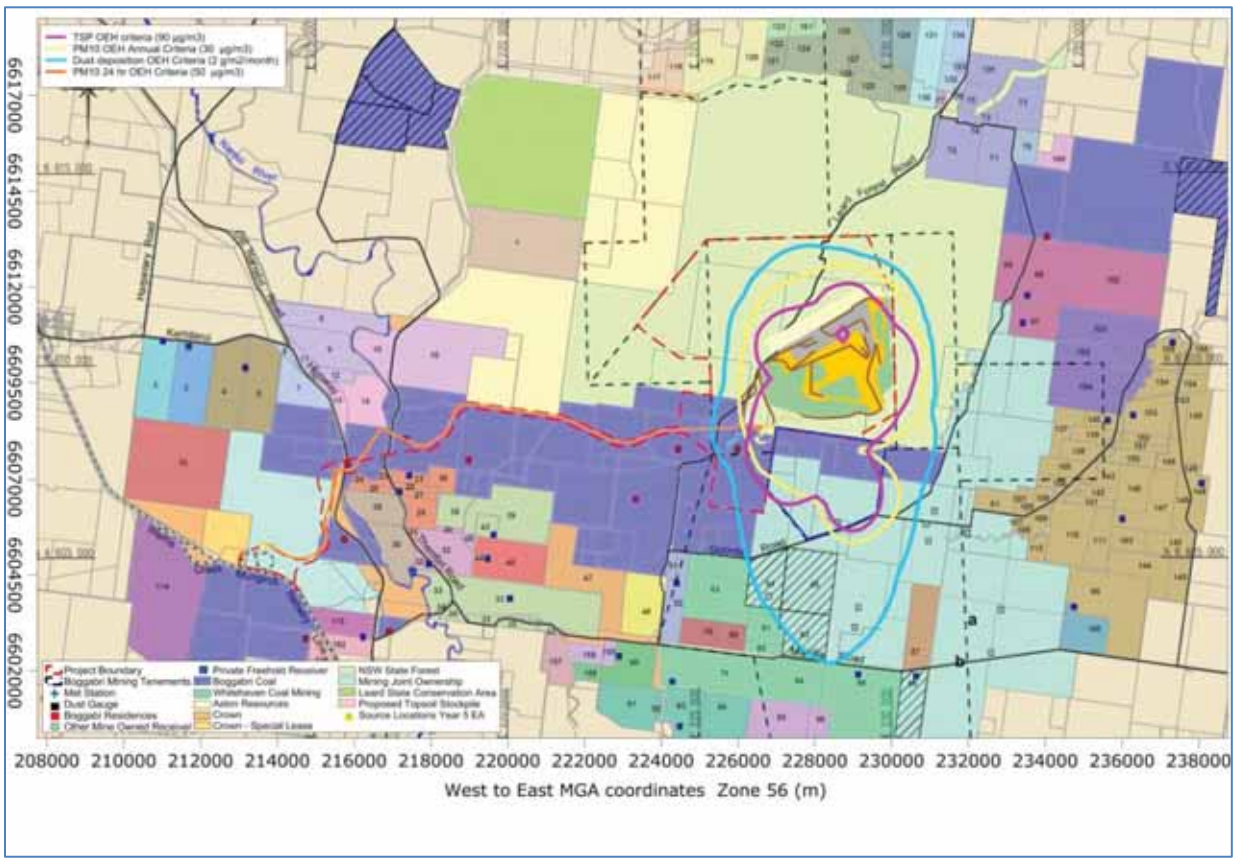

Figure 4-3: Air quality contours (per Boggabri EA in Year 5)

5 MANAGEMENT AND MITIGATION MEASURES

Boggabri Coal will revise the Air Quality Management Plan for the site to incorporate practical management measures to ensure dust emissions are minimised and that regulatory criteria are met at the private receivers. These measures 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 conveyor systems and installing automatically triggered dust suppression sprays to conveyors;
- Revegetating disturbed areas as soon as practicable including rehabilitation areas and obsolete haul roads; and
- Installing a Tapered Element Oscillating Microbalance (TEOM) air quality monitoring unit to aid real-time dust management and monitor compliance.

6 CONCLUSIONS

This letter report has investigated the likely effects on air quality from the proposed Modification.

The Modification is proposed to have a similar (albeit smaller) particulate emission inventory and mine footprint to that described for Year 5 of the Boggabri EA air quality impact assessment (**PAEHolmes, 2011**).

Based on the dispersion modelling completed for Year 5 of the Boggabri EA, the assessment concluded that when considered both in isolation, and cumulatively with other sources, the Modification is unlikely to result in exceedances of the OEH's impact assessment criteria for annual average PM_{10}, TSP or dust deposition at any private properties in the vicinity of the site.

Predicted 24-hour average PM_{10} concentrations due to the Modification were below the assessment criterion of 50 $\mu g/m^3$ at all private residences.

As the proposed operations are not dissimilar to those already occurring at the site, and the current monitoring of 24-hour PM_{10} concentration has been below the assessment criteria since the end of 2009 (see **Section 3**), it is considered that the cumulative 24-hour impacts will be similar during the Modification to those under existing conditions.

In view of the above, it is anticipated that the Modification may be managed to ensure that adverse air quality impacts do not occur at the nearest sensitive receptors to the Modification Boundary.

With respect to GHG emissions, the Modification will contribute less than 0.2% of the total emissions for NSW (based on 2008 emissions).

Please do not hesitate to contact me should you require any further information.

JACox

Judith Cox
Senior Engineer

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"User's Guide for the Industrial Source Complex (ISC3) Dispersion Models - Volume 1 User's Instructions" US Environmental Protection Agency, Office of Air Quality Planning and Standards Emissions, Monitoring and Analysis Division, Research Triangle Park, North Carolina 27711.

US EPA (1995b)
"User's Guide for the Industrial Source Complex (ISC3) Dispersion Models - Volume 2 Description of Model Algorithms" US Environmental Protection Agency, Office of Air Quality Planning and Standards Emissions, Monitoring, and Analysis Division, Research Triangle Park, North Carolina 27711.

APPENDIX B

Acoustic Impact Assessment

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BOGGABRI COAL PTY LIMITED

ACOUSTIC IMPACT ASSESSMENT

BOGGABRI COAL MINE
MODIFICATION
ENVIRONMENTAL ASSESSMENT

REPORT J0130-57-R2
25 MAY 2012

Prepared for:
Hansen Bailey Pty Ltd
P.O. Box 473
SINGLETON NSW 2330

Prepared by:
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Principal Consultant

TABLE OF CONTENTS

1 INTRODUCTION

Boggabri Coal Pty Limited (Boggabri Coal) operates the Boggabri Coal Mine located approximately 15 km north east of Boggabri within the Narrabri Shire Council (NSC) Local Government Area (LGA). Boggabri Coal currently operates under Development Consent 36/88 as modified, which allows mining of up to 3.5 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal to 31 December 2013. In 2010 Boggabri Coal produced approximately 2.3 Mtpa of product coal.

In 2009, Boggabri Coal applied for a new Project Approval for the operation of the mine which was supported by the *Continuation of Boggabri Coal Mine Environmental Assessment* (*Boggabri EA*) (Hansen Bailey, 2010). This Project application (PA 09_0182) is yet to be determined.

Due to the delay in the determination of PA 09_0812, Hansen Bailey Pty Ltd (Hansen Bailey) has been commissioned by Boggabri Coal to prepare an Environmental Assessment (EA) to support a Modification to DA36/88 under Section 75W (former) of the *Environmental Planning & Assessment Act 1979*. This Modification is required as Boggabri Coal has identified that overburden emplacement can be carried out in a more efficient manner, avoiding long haulage distances and any requirement for disturbance of additional land.

1.1 The Modification

The proposed Modification to DA 36/88 is sought to allow an increase in the maximum height of the overburden emplacement area (OEA) by 55 m from that currently approved (RL 340) to RL 395 m.

This report has been commissioned by Hansen Bailey on behalf of Boggabri Coal to assess noise and vibration impacts associated with the Modification to current NSW Office of Environment & Heritage (OEH) guidelines and policies as described below.

1.2 Environmental Noise Policies

OEH has developed or adopted policies and recommended procedures to assess environmental noise levels from various noise source categories. The following policy documents are relevant to this assessment:

- The *NSW Industrial Noise Policy* (INP) (EPA, 2000) is intended to guide noise investigations from existing or proposed industrial developments including coal mines. The INP recommends procedures to determine:
  - background noise levels at receiver properties;
  - existing noise levels from an industrial site;
  - recommended, not mandatory, noise criteria for existing and proposed operations;
  - predicted noise levels from proposed developments; and
  - negotiation options if recommended noise criteria are not or may not be met.
- The *NSW Road Noise Policy* (RNP) (DECCW, 2011) provides recommended noise criteria and assessment procedures for road traffic noise, including Project-related traffic, from public roads but excludes noise produced by vehicle movements on the Project site. The RNP also discusses sleep disturbance effects and the discussion is considered relevant to industrial sources;
- The *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (the Blasting Guideline) (Australian and New Zealand Environment Council (ANZEC), 1990) recommends residential ground vibration and overpressure limits and time restrictions for blasting;

- *Assessing Vibration – a Technical Guide* (DEC, 2006) provides recommended criteria and methods for assessing vibration, primarily from construction activities such as pile driving;
- *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (Interim Rail Noise Guideline) (DECC, 2007) provides criteria and methods to assess noise from train movements on publicly owned rail lines. The *Draft Rail Infrastructure Noise Guideline* (DRING) (OEH, 2012) which is currently available for public comment has also been considered in the assessment.

1.3 Previous Environmental Assessments

Potential environmental impacts, including noise impacts, from Boggabri Coal Mine have been assessed on a number of previous occasions. Significant public documents, and abbreviations used in this assessment, include:

- *Boggabri Coal Project Environmental Impact Statement* (*Boggabri EIS*) (BHP – AGIP – Idemitsu Joint Venture, 1987);
- *Boggabri Coal Project Statement of Environmental Effects* (*Boggabri SEE*) (Parsons Brinckerhoff and Spectrum Acoustics, February 2009);
- *Continuation of Boggabri Coal Mine Environmental Assessment* (*Boggabri EA*) (Hansen Bailey and Bridges Acoustics, 2010); and
- *Boggabri Modification Environmental Assessment* (*2011 Boggabri Modification*) (Hansen Bailey and Bridges Acoustics, 2011).

The Tarrawonga Coal Mine and Maules Creek Project adjoin Boggabri Coal Mine to the south and north, respectively. Significant public documents assessing potential noise impacts from these adjoining developments, and abbreviations used in this assessment, include:

- *East Boggabri Coal Mine Noise and Vibration Assessment* (*2005 Tarrawonga Assessment*) (R. W. Corkery & Co and Spectrum Acoustics, 2005);
- *Tarrawonga Mine Modification Environmental Assessment* (*Tarrawonga EA*) (Resource Strategies and Wilkinson Murray, 2010); and
- *Maules Creek Coal Project Environmental Assessment* (*Maules Creek EA*) (Hansen Bailey and Bridges Acoustics, 2011).

1.4 Receivers

The existing Boggabri Coal Mine operates primarily within the Leard State Forest and adjoins rural and residential receivers on all sides. Properties to the immediate south of the Modification Boundary are owned by Boggabri Coal to provide an environmental buffer around the mine, while further properties are owned by Whitehaven Coal Mining Pty Ltd (Whitehaven Coal). Properties and residences owned by Boggabri Coal or another mining company are not considered to be noise-sensitive receivers and are not specifically assessed in this report.

A land ownership plan is included in each noise contour figure in Appendix A.

2 EXISTING ENVIRONMENT

2.1 Environmental Impact Statement

The *Boggabri EIS* described the results of background noise measurements taken at various locations around the mine in 1979. While the measurement procedures and instrumentation used do not necessarily comply with current standards, the results are considered relevant to this assessment.

Noise measurements at Nagero Homestead, at the site of the current mine facilities, indicated background noise levels in the range 30 to 35 dBA during the day and as low as 23 dBA during the night. The reported levels were LA90 levels measured over an unspecified time period.

Noise measurements at Heathcliff and Cooboobindi Homesteads indicated background levels were approximately 30 dBA during the day and in the range 20 to 25 dBA during the night, while measurements within the town of Boggabri indicated similar background levels during the night and higher levels during the day due to traffic on Wee Waa Street.

2.2 Statement of Environmental Effects

The *Boggabri SEE* adopted noise criteria from DA 36/88. No additional background noise monitoring was conducted for the SEE.

2.3 Recent Noise Monitoring Data

The Tarrawonga Coal Mine lies immediately south of the Modification Boundary. The 2008 AEMR for the Tarrawonga Coal Mine includes detailed noise monitoring results at four receiver locations around the mine, with all receivers located south of the Modification. These results are considered representative of background noise levels at all assessed receivers. Table 1 shows monitoring results reported in the Tarrawonga AEMR.

Table 1: Measured Background Noise Levels, Tarrawonga AEMR 2008, LA90,15min.

Receiver	Measured Background Level, LA90,15min July 07, February 08		
	Day	Evening	Night
54 Tarrawonga *	- , 24	- , 23	- , 21
85 Ambardo *	21, 28	21, 26	21, 24
Templemore *	19, 41 #	18, 42 #	18, 41 #
Bollol Creek Station *	18, 27	16, 33	16, 30

* Properties owned by Whitehaven Coal.

\# Higher background noise levels were due to a pump or similar machine operating near the homestead during the monitoring period.

The most recent 2009-10 Tarrawonga AEMR has also been reviewed, however it does not include background noise monitoring data.

Boggabri Coal commissioned Spectrum Acoustics Pty Ltd (Spectrum) to measure existing mining and background noise levels at a number of representative receiver locations around the Boggabri Coal Mine. Noise measurements were taken by Spectrum in March 2011 and June 2011 using unattended noise monitors installed for periods of 7 days, with results shown in Table 2.

Table 2: Measured Background Noise Levels, Spectrum Acoustics 2011, LA90,15min.

Receiver	Measured Background Level, LA90,15min March, June 2011		
	Day	Evening	Night
Templemore *	39, 28	35, 27	30, 27
Tarrawonga *	34, 28	39, 26	31, 24
The Rock #	22, 42	28, 41	21, 41

* Property owned by Whitehaven Coal.

\# Property owned by Boggabri Coal.

Background noise levels in Table 2 may include some influence from existing Boggabri Coal noise. However, the results indicate background levels regularly drop below 30 LA90,15min which is the lowest background noise level that can be adopted according to the INP.

2.4 Adopted Background Noise Levels

The data above indicates background noise levels below 30 dBA have been measured at various receiver locations around the mine site. While not all measurement results have necessarily been obtained according to currently recommended standards or procedures, it is nevertheless clear that existing background noise levels are on or below 30 LA90,15min during all time periods, at all receiver locations.

As the INP recommends background noise levels below 30 LA90,15min should be considered 30 LA90,15min for the purposes of a noise assessment, a background level of 30 LA90,15min has been adopted for all receivers and time periods.

3 CRITERIA

3.1 Mining Noise

The INP contains two sets of noise criteria for residential receivers. Intrusive criteria are set 5 dBA above the Rating Background Level (RBL) in each time period and are designed to limit the relative audibility of mining or industrial operations. These criteria can be adjusted by one or more 'modifying factors' such as tonality or impulsiveness described in Section 4 of the INP, or alternatively the source noise levels can be adjusted to consider any modifying factors applicable to those sources. As any relevant adjustments have been applied to source noise levels, an intrusive criterion of 35 LAeq,15min is adopted for this assessment for all receivers and time periods.

Amenity limits recommended in the INP depend on existing industrial noise levels, in the absence of existing Boggabri Coal Mine noise, and the nature of the receiver area. The amenity limits are designed to control the total or cumulative level of industrial noise at a sensitive receiver such as a residence. Amenity criteria are set to the amenity limits in cases where limited industrial noise is currently received, or to lower levels to ensure the cumulative impact of existing and proposed noise sources does not exceed the amenity limit for each time period.

3.1.1 Tarrawonga Mine Noise Levels

The only known existing source of potentially audible industrial noise in the area, excluding existing Boggabri Coal Mine operations, is the nearby Tarrawonga Coal Mine previously known as the East Boggabri Coal Mine. Predicted noise levels from Tarrawonga are shown in the *2005 Tarrawonga Assessment* and the *Tarrawonga EA* as shown in Table 3.

The Tarrawonga AEMR 2008 and AEMR 2010 also contain data regarding the noise level contribution from Tarrawonga Coal Mine. Available data are shown in Table 3.

Table 3: Tarrawonga Coal Mine Noise Contribution, LAeq,15min.

Receiver	Day	Evening	Night
	Predicted Noise Level LAeq,15min, Spectrum Acoustics 2005 Initial Mining, End Year 1, Year 3, Year 4, Year 6		
Tarrawonga*	30, 31, 31, 29, 28	30, 31, 31, 29, 28	34, 33, 33, 34, 31
Ambardo*	31, 31, 30, 30, 29	31, 31, 30, 30, 29	33, 31, 30, 32, 31
Templemore *	34, 33, 33, 35, 33	34, 33, 33, 35, 33	34, 33, 33, 35, 33
Bollol Creek Station *	33, 32, 32, 34, 32	33, 32, 32, 34, 32	33, 32, 33, 34, 32
Matong *	28, 28, 28, 28, 28	28, 28, 28, 28, 28	28, 28, 28, 28, 28
	Predicted Noise Level LAeq,15min, Wilkinson Murray 2010 (privately owned properties with noise levels over 35 LAeq,15min)		
Jeralong	36	35	36
Barbers Lagoon	35	35	36
Northam	35	36	36
Kyalla ** #	37	40	40
	Measured Noise Level LAeq,15min, AEMR 2008 July 07, Sept 07, Jan 08, Mar 08		
Tarrawonga*	- , - , - , IA	- , - , - , IA	- , - , - , IA
Ambardo*	31, 35, 36, 28	36, 36, 33, 34	IA, 28, 29, IA
Templemore *	IA, 26, IA, -	IA, 30, IA, -	IA, 32, IA, -
Bollol Creek Station *	IA, 29, IA, 20	IA, 31, IA, 20	IA, 33, IA, 20
	Measured Noise Level LAeq,15min, AEMR 2010 June 09, Sept 09, Dec 09, Mar 10		
Tarrawonga*	IA, 37, IA, <20	<25, IA, 25, 22	<25, IA, IA, <20
Ambardo*	40, 37, 34, 43	40, 34, 30, 37	IA, IA, <20, <20
Bollol Creek Station *	26, 30, 30, 29	33, 35, 18, 29	31, 33, 20, 33
Pine Grove * #	41, 36, 36, 38	- , - , - , -	- , - , - , -
Blair Athol *	IA, 38, - , 20	31, 34, - , 33	30, 31, - , 32
Kyalla ** #	40, - , - , -	- , - , - , -	- , - , - , -

* Properties owned or being acquired by Whitehaven Coal.

** Private Agreement in place regarding Tarrawonga noise levels.

Properties receiving noise from the coal truck haul route only

IA means 'inaudible', a dash ' – ' means no measurement was taken.

Noise measurement results in Table 3 indicate the existing Tarrawonga Coal Mine can produce up to 36 LAeq,15min at closest privately owned residences depending on both mine operating conditions and prevailing weather conditions, excluding noise from coal trucks on the haul route to the Whitehaven CHPP. Noise levels at closer properties owned by or subject to a private agreement with Whitehaven Coal, or at properties near the coal haul route, can be higher than 36 LAeq,15min at times. Therefore, it is reasonable to conclude Tarrawonga Coal Mine would produce 36 LAeq,15min or less at any assessed privately owned residence during all time periods.

Measured and predicted noise levels from Tarrawonga Coal Mine are all expressed as LAeq,15min levels which are average noise levels over a worst case 15 minute period during the day, evening or night. Noise levels during the worst case 15 minute period would occur as a result of combined worst case operating conditions, with mining equipment in relatively exposed areas of the mine, and worst case weather conditions including a north westerly wind during all time periods or a temperature

inversion during the night. Worst case noise levels are unlikely to persist for an entire day, evening or night due to variations in both mine operating conditions and prevailing weather conditions and a nominal correction factor of -3dBA has been applied to adjust predicted or measured LAeq,15min noise levels to LAeq,period noise levels. A maximum level of 33 LAeq,period from Tarrawonga Coal Mine has therefore been adopted at privately owned receivers not subject to an agreement with Whitehaven Coal.

3.1.2 Proposed Maules Creek Mine Noise Levels

The proposed Maules Creek Mine, if approved, is expected to begin construction in 2012 or 2013. The *Maules Creek EA* predicts noise levels below 35 LAeq,15min at all privately owned properties near the Modification, excluding properties near the coal haul road and the proposed Maules Creek Rail Spur. A predicted level below 35 LAeq,15min is equivalent to a level below 32 LAeq,period.

Mining noise levels from the proposed Maules Creek Project would therefore not affect amenity criteria applied to the Modification, while proposed Maules Creek Rail Spur noise levels would not approach the amenity criterion when averaged over an entire day, evening or night period.

3.1.3 Assessment Noise Criteria

In the absence of existing noise from Boggabri Coal Mine, most assessed receivers would be considered 'rural' properties as defined in the INP due to the lack of industrial noise and heavy traffic. Receivers close to Tarrawonga Coal Mine and the Kamilaroi Highway could conceivably be considered 'urban' receivers due to their proximity to dominant traffic or existing industrial sources, although the results in Table 2 indicate existing noise levels from Tarrawonga Coal Mine may not be sufficient to justify this classification. For the purposes of determining appropriate noise amenity criteria, all assessed receivers have conservatively been assigned the 'rural' amenity category.

Amenity criteria are determined by considering the relevant amenity limits for the area and the existing level of industrial noise, excluding noise from existing Boggabri Coal Mine operations. Table 4 shows the intrusive and amenity criteria adopted for this assessment and the method used to determine these criteria.

Table 4: Adopted Boggabri Coal Operational Noise Criteria.

Time Period	Day * 7am – 6pm	Evening 6pm – 10pm	Night 10pm – 7am
Adopted background noise level LA90,15min (Section 2.3)	30	30	30
Intrusive Criteria LAeq,15min (Background + 5 dBA)	35	35	35
Amenity limit LAeq,period (INP, rural category)	50	45	40
Existing industrial noise level LAeq,period	< 33	< 33	< 33
Amenity Criteria LAeq,period (Table 2.2 of INP)	50	45	40
Adopted Noise Criteria LAeq,15min	**35**	**35**	**35**

* Night ends and Day begins at 8am on Sundays and public holidays.

Noise criteria in Table 4 apply to all on-site noise sources including mining and coal processing equipment, coal trucks on the private haul road, train loading equipment and train movements on a private rail loop. The criteria apply within 30m of a residence, or at the receiver property boundary where the boundary is closer than 30m from the residence.

Car and truck traffic on public roads and train movements on public rail lines are subject to alternative noise criteria as described below in Section 3.3.

3.2 Sleep Disturbance

Sleep disturbance can be caused by a short, sharp sound that is noticeably louder than the typical or usual noise level within a bedroom, although further research is required to accurately determine the effects of different types of noise on sleep. Historically, sleep disturbance was assessed to the ENCM which recommended a conservative sleep disturbance criterion of 15 LA1,1min above the night background noise level.

The more recent RNP also discusses sleep disturbance criteria in relation to road traffic noise. Section 5.4 of the RNP suggests:

- A LAnight,outside (approximately equivalent to LAeq,9hr) of 40 dBA;
- Maximum internal noise levels below 50-55 dBA are unlikely to awaken people from sleep; and
- One or two noise events per night, with maximum internal noise levels of 65-70 dBA, are not likely to affect health and wellbeing significantly.

Maximum noise levels produced by the Modification should therefore be assessed to the historical sleep disturbance criterion but would also be compared to the RNP sleep disturbance criterion. The sleep disturbance criteria apply 1 m outside the potentially most affected bedroom window of a residence during the hours 10pm to 7am, or to 8am on Sundays and public holidays.

3.3 Traffic Noise

Relevant traffic noise criteria are listed in Table 3 in the RNP. Residential noise criteria for Situation 6 "Existing residences affected by additional traffic on existing local roads generated by land use developments" are 55 LAeq,1hr during the day and 50 LAeq,1hr during the night and apply to all traffic on the road, including vehicles associated with the Modification.

The LAeq,1hr parameter refers to the average traffic noise level in the loudest 10% of the hours in a day or night. As it is difficult to determine the loudest 10% hour during the day and night, this assessment conservatively considers the loudest hour during a 24 hour period.

Rail noise criteria are sourced from the Interim Rail Noise Guideline which recommends trigger levels of 65 LAeq,15hr during the day, 60 LAeq,9h during the night and 85 LAmax from existing rail lines such as the Mungindi to Werris Creek Railway (MWCR).

Similarly, Condition L6.1 of Environment Protection Licence (EPL) 3142 issued to the Australian Rail Track Corporation (ARTC) specifies noise level objectives of 65 LAeq,15hr day, 60 LAeq,9hr night and 85 LAmax at one metre from the façade of affected residential premises.

3.4 Low Frequency Noise

Section 4 of the INP recommends low frequency noise levels be considered in the normal operational noise criteria by the addition of a 'modifying factor' to either a source sound power level or a received noise level. Any modifying factors that are relevant to the assessment have been applied to the adopted sound power levels for mining and transportation equipment and no further assessment of low frequency noise is required.

3.5 Blast Overpressure and Vibration

Current noise and vibration criteria are recommended in the Blasting Guideline:

- Overpressure 115 dBL; and
- Ground vibration 5mm/s Peak Particle Velocity (PPV).

The Blasting Guideline recognises blast effects cannot always be controlled accurately and allows higher limits of 120 dBL and 10mm/s PPV for up to 5% of the total number of blasts on a site in a 12 month period. Recommended blasting criteria apply during the hours 9am to 5pm Monday to Saturday, excluding public holidays.

4 ASSESSMENT

4.1 Noise Assessment Method

Noise levels from operation of the proposed Modification, including the haul road and rail loading facility, have been assessed using a comprehensive model of the site based on RTA Technology's Environmental Noise Model (ENM) software. ENM is a general purpose noise modelling package that combines terrain and noise source information with other input parameters such as weather conditions to predict noise levels at specific receiver locations or as contours over a specified receiver area. It is recognised in NSW as the most appropriate choice for situations involving complex topography and a large number of individual noise sources and where a detailed assessment of the effects of atmospheric conditions on noise propagation is required.

The standard ENM package includes data input modules to allow terrain and noise source information to be entered and amended, plus an initial setup page containing terrain and source lists and modelled weather conditions for each scenario. All terrain and source files were prepared for this assessment using a combination of AutoCad and Excel based data then automatically converted to ENM format terrain and source files using specially prepared software. All outputs were obtained using ENM's standard sectioning algorithms and equivalents to ENM's standard contouring algorithms and are presented on a landownership plan. Tabulated noise levels at residences, and noise levels over 25% of contiguous properties, have been produced by specially prepared software based on ENM's intermediate calculation files used to produce the noise contours or have been determined by inspection of noise contours in 1 dBA intervals. Noise contour figures are presented in Appendix A while modelled noise source locations are shown in Appendix B.

4.2 Weather Conditions

Atmospheric conditions including temperature, relative humidity, wind speed, wind direction and vertical temperature gradient can all affect noise propagation and received noise levels at some distance from a source. A weather dataset has previously been compiled by PAE Holmes using raw data obtained from weather stations operated by Boggabri Coal and Tarrawonga Coal Mine for the period September 2008 to September 2009. The compiled dataset has been analysed using the *Noise Enhancement Wind Analysis* (NEWA) program (Holmes Air Sciences and OEH, 2009) to determine appropriate atmospheric parameters for this assessment.

The INP recommends noise enhancing winds or temperature inversions that occur for at least 30% of the time in any season or time period should be considered when predicting noise levels. The supplied dataset included stability classes A to F with no occurrence of G class inversions, which would normally indicate strong temperature inversions do not occur in this area. As this result is unexpected, further discussion of this issue is included in Section 4.2.4 below.

4.2.1 Gradient Winds

Results from the wind analysis are shown in Table 5, with entries in bold font highlighting significant winds that occur over 30% of the time in any season or time period.

Table 5: Noise Enhancing Winds, 2008/09.

Wind Direction	Occurrence of Noise Enhancing Winds, % of Season and Time Period											
	Summer			Autumn			Winter			Spring		
	Day	Even.	Night	Day	Even.	Night	Day	Even.	Night	Day	Even.	Night
N	10	20	**32**	9	13	**33**	11	**46**	**53**	12	**34**	**44**
NNE	9	17	**31**	9	12	**32**	8	**42**	**49**	9	**33**	**42**
NE	8	15	27	11	13	29	7	**36**	**44**	7	28	**34**
ENE	7	12	15	10	8	15	4	15	14	7	16	12
E	11	13	15	15	15	17	7	8	5	9	15	10
ESE	15	13	17	23	18	21	13	8	7	15	15	11
SE	19	15	17	28	24	24	21	10	8	23	17	13
SSE	22	14	15	**32**	26	22	25	12	8	27	14	13
S	23	13	14	**32**	29	19	27	9	7	28	12	12
SSW	22	12	9	28	23	12	26	10	6	28	11	10
SW	20	13	7	23	23	9	24	15	6	25	11	8
WSW	18	14	7	18	19	5	20	21	7	20	10	5
W	16	16	8	12	15	6	18	23	11	17	13	7
WNW	14	19	15	9	12	11	17	29	16	16	20	16
NW	14	23	28	11	15	28	17	**50**	**47**	17	**32**	**39**
NNW	12	22	**32**	10	15	**33**	15	**53**	**56**	14	**35**	**44**

Table 5 shows dominant winds can occur from the south during the day, although such winds occur just over 30% of the time and only in autumn. Nevertheless, a 3m/s southerly wind has been included in the assessment for the daytime period.

Wind conditions during the evening and night are very similar and indicate a dominant northerly wind during these time periods, particularly during the colder months of the year. Given the higher occurrence of this wind during the cold months and the location of the weather station near the mine's existing surface facilities, it is clear that this result represents a cold air drainage flow associated with a temperature inversion rather than a gradient wind. Evening and night time periods have been combined in this assessment given the similarities between evening and night weather conditions shown in Table 5.

4.2.2 Drainage Flows

Cold air drainage flows tend to flow downhill and, with significant variations in topography across the site, would change direction depending on the location of the observer. A detailed inspection of topographic features around the Boggabri Coal Mine has indicated the mine itself is located in a depression bounded to the north, east and west by hills, and open to the south. Cold air accumulating in the mining area during the evening and night would therefore tend to run towards the south, and it is this cold air flow that is reflected in the results in Table 5.

Further analysis of topography over the Boggabri Coal Mine indicates the existing train loading facility is located on the southern side of a hill. Drainage flows associated with temperature inversions would therefore also flow from north to south past the train loading facility.

The existing haul road from the mine to the train loading facility crosses the Namoi River floodplain which is different from the terrain near the mine and train loading facility. The Namoi River flows from south to north in this area and cold air drainage flows would therefore also flow along the river valley from south to north.

This assessment therefore considers noise enhancement due to a northerly wind for the mine, rail loading facility and locomotives on the existing rail loop. A southerly wind is considered for the existing haul road on the floodplain. Noise contours and predicted noise levels presented in this report for the night wind scenarios represent the noise enhancing effect of both sets of weather conditions simultaneously.

4.2.3 Adopted Weather Conditions

Table 6 shows adopted atmospheric parameters for this assessment. The adopted weather conditions represent prevailing conditions for receivers in all directions from the site, including those which do not receive a significant occurrence of winds towards them from the site and are therefore assessed under calm wind conditions during the day and temperature inversion conditions during the night.

Table 6: Modelled Weather Conditions.

Atmospheric Parameter	Day		Evening and Night		
	Neutral	Prevailing	Neutral	Inversion No wind	Inversion and Wind
Temperature, °C	20	20	15	10	10
Relative Humidity, %	70	70	80	90	90
Wind Speed, m/s	0	3	0	0	2
Wind Direction	-	South	-	-	North (mine, rail loop) South (haul road)
Temp Gradient, °C/100m	-1	-1	0	3	3

4.2.4 Strong Temperature Inversions

Anecdotal evidence indicates previous noise and atmospheric investigations on other mine sites in the Gunnedah Basin have shown the need to consider stronger temperature inversions that the INP default of 3 °/100m.

Temperature inversions tend to cause increased received noise levels because they refract sound 'rays' down towards the ground. Winds also cause increased noise levels, for receivers down wind, for the same reason. Research indicates the effects of inversions and winds are approximately cumulative and the noise model software adopts this approach by effectively combining inversions and winds into an equivalent inversion strength or, more correctly, to an equivalent radius of curvature for the sound rays. For the 'rural' terrain category in ENM software as used for this assessment, the equivalent inversion strength used for determining the sound ray radius of curvature and received noise levels is calculated by:

Equivalent Inversion °/100m = Inversion °/100m + 2.5 x Wind speed m/s. *Equation 1.*

Table 6 indicates the night scenarios include a combined 3 °/100m inversion plus a 2m/s wind, from the north for the mine and rail loop and from the south for the haul road across the Namoi River floodplain. According to Equation 1, a 2m/s wind is equivalent to a 5 °/100m inversion for receivers downwind of the source. The night scenarios, with a combined wind and inversion, therefore include an equivalent inversion of 8 °/100m for downwind receivers. This equivalent inversion is significantly stronger, and causes greater noise enhancement, than the INP default 3 °/100m inversion strength.

The combined wind and inversion approach adopted in this assessment satisfies the recommendations in the INP while simultaneously assessing strong temperature inversions for closest receivers located generally south of the mine. Noise levels at receivers generally north and east of the mine are

calculated using a 3 °/100, inversion, which remains conservative given the significant ridgeline that exists between the mine and receivers which would prevent a strong inversion forming in this area.

The adopted weather conditions would also result in increased rail loop noise for receivers generally south of the existing rail loop, which is likely to be appropriate given the topography in this area, and for receivers north of the haul road which again is appropriate given the expected southerly drainage flows that would occur in the Namoi River valley.

4.3 Noise Control Measures

The following noise control and mitigation measures have been incorporated into the Modification to minimise noise impacts on receivers and to reduce the area of affectation:

- All mining trucks would be fitted with best practice exhaust silencers to reduce their noise emissions;
- The overburden fleet would be directed to higher, exposed emplacement areas during favourable weather conditions (generally during the day) and to lower, more shielded emplacement areas where possible during noise enhancing weather conditions (generally during the evening and night);
- Product haul trucks would be 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 may operate at the higher speed at any time and under all weather conditions;
- Vehicle reverse alarms and horns, equipment start alarms and other audible warning devices would be selected, installed and adjusted to produce the lowest possible noise level consistent with safe operation; and
- Mobile and coal handling equipment would be maintained in good condition to maximise productivity and, at the same time, minimise any additional or unnecessary noise.

4.4 Operational Noise Sources

Proposed mining operations would rely on a number of items of fixed and mobile equipment to uncover, extract, process and transport coal. Sound power levels for proposed equipment included in the noise model are listed in Table 7 and include the noise reduction measures listed in Section 4.3.

Sound power levels in Table 7 have been derived from on-site noise measurement data obtained by Spectrum Acoustics where such data were available, or from noise measurements taken around similar equipment on other mine sites. Sound power levels for locomotives travelling at slow speed on a loading loop were measured on a loop at another mine in the Muswellbrook area.

Minor items of equipment that are unlikely to be audible at any receiver under any weather conditions, such as pumps located in the pit or conveyor drives within the coal handling area, have been shown by preliminary noise modelling to have no appreciable effect on received noise levels and have been omitted from the assessment. Figures showing noise source locations for the mine and rail loading facility are included in Appendix B.

Table 7: Modelled Noise Sources and Sound Power Levels.

Code, Source	Octave Band Centre Frequency, dBL *								L	A
	63	125	250	500	1k	2k	4k	8k	Total	Total
CHPP and Transportation Sources										
C1, Conveyor 100m	97	96	96	99	99	95	85	75	105.7	102.3
C2, Conveyor 200m	100	99	99	102	102	98	88	78	108.7	105.3
C5, Conveyor 500m	104	103	103	106	106	102	92	82	112.7	109.3
Cpp,Preparation plant	111	112	111	112	112	109	103	94	119.8	115.9
FB, ROM feeder breaker	109	107	107	108	105	100	93	83	115.6	109.3
Sk, Stacker tripper/chute	105	106	102	102	98	97	90	84	111.7	104.0
Tr, Transfer station	111	110	101	101	98	95	87	76	115.9	103.4
B, Truck or train loading bin	107	109	103	99	97	94	92	82	113.4	102.8
Loi, Locomotive (idling)	100	101	97	93	90	89	80	75	106.2	96.2
Haul truck fleet (90km/h)	130	126	123	114	111	108	104	99	133.3	119.2
Haul truck fleet (50km/h)	126	122	118	111	107	103	99	93	130.2	114.7
Mining Sources										
S, Rope Shovel	120	115	118	115	113	110	108	99	125.6	118.2
Dr, Drill	125	115	106	112	111	111	109	96	128.6	116.9
Dz, Dozer	121	121	111	111	110	108	107	101	126.3	115.7
E, Excavator	125	121	116	115	116	113	110	103	129.6	120.2
L, Loader	121	119	114	109	113	111	104	100	126.0	117.0
G, Grader	119	121	119	114	103	104	101	93	126.0	115.2
W, Water cart	121	123	121	116	105	106	103	95	128.0	117.2
Tf, Truck (flat ground)	119	121	119	116	106	107	104	96	126.0	116.8
Tu, Truck (uphill)	111	119	118	117	113	113	106	99	124.5	119.4

* dBL means unweighted, as opposed to A-weighted, noise levels. Total dBL and dBA sound power levels are shown in the last two columns in Table 7.

4.5 Predicted Mining Noise Levels

Noise levels from similar operations to those proposed under the Modification have recently been assessed as described in the *Boggabri EA*. The *Boggabri EA* included an assessment of noise levels at 1, 5, 10 and 21 years with a production rate of up to 7 Mtpa of product coal. Noise levels during the life of this Modification would be similar in many respects to noise levels described for Years 1 and 5 as assessed in the *Boggabri EA*, subject to the following comments:

- Noise levels reported for Year 1 in the *Boggabri EA*, including noise from product haul trucks, would apply directly to this assessment;
- Noise levels reported for Year 5 in the *Boggabri EA* reflected a proposed production level of 6.9 Mtpa, compared to the current maximum production level of 3.5 Mtpa proposed in this Modification. A correction factor of -2.5 dBA has been applied to the Boggabri EA results to account for the production level difference;
- The maximum OEA height of RL 395 proposed for the Modification is identical to the OEA height in Year 5 assessed in the *Boggabri EA*; and
- Compared to the *Boggabri EA* Year 1 mine plan, the Modification mine plan has progressed approximately 800m east while the *Boggabri EA* Year 5 mine plan has progressed a further 900m east. The Modification mine plan therefore lies approximately midway between the *Boggabri*

EA Years 1 and 5 plans. Calculated noise levels based on the *Boggabri EA* Year 5 plan would therefore be conservative for receivers generally east of the Modification.

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*, with a correction factor of -2.5 dBA to consider the proposed maximum production rate of 3.5 Mtpa. This correction factor is identical to that adopted in the *2011 Boggabri Modification*.

Noise contour figures showing predicted noise levels for Years 1 and 2 under neutral and prevailing weather conditions are included in Appendix A while detailed tables of noise levels at potentially affected receiver locations are presented in Table 8.

Table 8: Summary of Predicted Noise Levels, LAeq,15min

Owner ID	Residence							25% of Property Area						
	Resi-dence ID	Day Neutral		Day		Evening/ Night		Property ID	Day Neutral		Day		Evening/ Night	
		Year							Year					
		1	2	1	2	1	2		1	2	1	2	1	2
13	-	-	-	-	-	-	-	13,14	35.3	35.8	37.5	38.0	37.2	37.8
14	23	30.8	30.3	30.8	30.3	32.7	32.6	23-27,29,31,36	34.6	34.1	34.6	34.1	35.3	35.1
	27	33.0	32.5	33.0	32.5	33.9	33.9							
15	-	-	-	-	-	-	-	28,30	34.4	34.9	34.4	33.9	35.1	34.9
21	67	21.5	20.9	33.1	26.3	36.9	37.4	67,68,102	19.2	19.4	32.6	29.2	34.9	36.4
	68	19.5	19.6	33.4	28.2	36.0	37.0							
26	54	27.5	28.0	27.5	28.0	39.9	39.5	54,55,83	26.2	26.2	26.2	26.2	39.6	38.8
	-	-	-	-	-	-	-	95,96	21.3	21.6	21.3	21.6	33.4	33.0
31	-	-	-	-	-	-	-	48	26.5	25.4	26.5	25.4	35.3	36.5
32	52	27.4	26.1	27.4	26.1	37.1	38.0	51,52	28.1	26.8	28.1	26.8	37.5	38.4
33	79	23.4	22.9	23.4	22.9	33.3	34.7	53,79,81,82,84,86	25.5	25.7	25.5	25.7	37.4	37.1
	86	22.3	22.5	22.3	22.5	36.1	35.2							
39	-	-	-	-	-	-	-	78,80	26.2	26.2	26.2	26.2	36.9	37.0
40	-	-	-	-	-	-	-	87	21.3	22.1	21.3	22.1	39.2	37.0
41	88	20.1	20.9	20.1	20.9	35.3	34.1	88	20.1	20.6	20.1	20.6	34.8	33.6
51	-	-	-	-	-	-	-	116	17.6	16.6	17.6	16.6	35.3	33.0
Contour Figure		A1	A4	A2	A5	A3	A6	-	A1	A4	A2	A5	A3	A6
Number of affected residences/ properties		0	0	0	0	0	0	Significant	0	0	0	0	0	0
		0	0	0	0	1	2	Moderate	0	0	1	1	4	3
		0	0	0	0	3	2	Mild	1	1	0	0	5	5

Red – Significant noise impact of more than 5 dBA over the criterion

Blue – Moderate noise impact of up to 5 dBA over the criterion

Green – Mild noise impact of up to 2 dBA over the criterion

Purple – Under negotiation with a mining company

Predicted noise levels in Table 8 include normal mining activity, coal processing, road haulage of coal to the existing rail loading facility, operation of the rail loading facility and three locomotives operating at low speed on the loading loop. The table presents a summary of results to residences and over 25% of contiguous properties, with noise levels shaded based on predicted exceedances of the noise criteria. Residences and properties that are owned by a mining company or are not predicted to be affected by noise from the Modification have been excluded from the table.

Results in Table 8, excluding properties under negotiation with a mining company, indicate:

- Two residences (67 Goonbri and 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 from the Modification. Two moderately affected properties also contain mildly affected residences (68 Goonbri and 86 Kyalla); and
- Five other properties (23-27,29,31,36 Cooboobindi, 28,30 Bullock Paddock, 48 Wilboroi East, 78,80 BJ Cosby and 116 RA & CM Collyer) are predicted to receive mild noise impacts from the Modification.

4.6 Comparison with Previous Modification

Predicted noise levels shown in Table 8 are identical to the noise levels predicted in the *2011 Boggabri Modification*, despite the currently proposed OEA height increase from RL 340 to RL 395. This result is due to the following factors:

- The *2011 Boggabri Modification* assessment compared the *Boggabri EA* Year 5 mine plan with the proposed *2011 Boggabri Modification* mine plan, and adopted a -2.5 dBA correction factor to account for the reduction in annual production. Conservatively, no correction factor was adopted for the reduction in the maximum height of the OEA from RL 395 in *Boggabri EA* Year 5 to RL 340 in the *2011 Boggabri Modification*;
- This assessment has also adopted a correction factor of -2.5 dBA from the *Boggabri EA*, to again account for the reduction in annual production. As the maximum OEA height of RL 395 assessed in the *Boggabri EA* Year 5 mine plan is now proposed as part of this Modification, no additional correction factor is required; and
- The proposed increase from the currently approved OEA height of RL 340 to RL 395 would result in mining equipment on the OEA being slightly more exposed to receivers. The assessment remains appropriate, and in most cases conservative, for all receivers due to the following:
    - Receivers located generally east of the active mining area would remain approximately 900m further from the active mining area and would therefore receive less noise than predicted in this assessment, as no distance correction factor was adopted from the *Boggabri EA* Year 5 mine plan to the current Modification mine plan;
    - Receivers located generally south of the active mining area would receive similar noise levels to the predicted levels, as mining equipment operating within the *Boggabri EA* Year 5 mine plan and within the current Modification mine plan would be a similar distance from receivers; and
    - There are no receivers located generally west of the active mining area that are likely to be affected by mining noise. Receivers generally west of the mining area are potentially affected by product coal trucks on the existing haul road or from proposed train movements on the rail spur, if the spur is constructed, and these sources are not affected by the proposed increase in the maximum height of the OEA.

This discussion indicates the assessment for this Modification remains conservative, although it is a little less conservative for some receivers than the *2011 Boggabri Modification* assessment.

4.7 Existing Measured Noise Levels

Boggabri Coal commissioned Spectrum Acoustics (Spectrum) to measure existing mining noise levels at representative receiver locations around the Modification Boundary. Spectrum completed three noise surveys in March, June and December 2011, with the following results:

- Measured Boggabri Coal Mine noise levels were within the 35 LAeq,15min criterion at all assessed residences in March;
- Measured Boggabri Coal Mine noise levels were within the 35 LAeq,15min criterion at all assessed privately owned residences in June with the exception of 67 Goonbri. A noise level of 38 LAeq,15min was measured at 'Goonbri' during the evening of 23 June 2011 due to mining activity under noise enhancing weather conditions; and
- Measured Boggabri Coal Mine noise levels were within the 35 LAeq,15min criterion at all assessed residences in December.

The measured mining noise level of 38 LAeq,15min at 67 Goonbri is consistent with the predicted noise level of 37 LAeq,15min listed in Table 8.

4.8 Sleep Disturbance

4.8.1 Noise Sources

Coal mining primarily involves a number of diesel powered machines operating to remove overburden and extract coal. Most machines have very little potential to produce noises likely to disturb sleep. Other machines such as shovels and dozers can produce intermittent louder noise depending on working conditions, machine condition and operator actions.

Noise measurements on other mine sites indicate a shovel gate can produce a wide range of noise levels, with a sound power level in the range 125 to 128 dBA representing a typical maximum for this source. The level of noise a dozer can produce in reverse depends on a number of factors including machine type, condition, speed and ground conditions, with a sound power level in the range 125 to 130 dBA representing a typical maximum for this source.

Other sources of potential sleep disturbance include raw coal being dumped from a truck or loader into a steel ROM hopper, vehicle horns and equipment alarms. Noise measurements on other mine sites indicates these sources tend to produce a sound power level in the range 115 to 120 dBA, although the proposed vehicle horns and alarms would be significantly quieter.

This discussion indicates dozer tracks are generally the loudest sources of potential sleep disturbance within the mine, followed by shovel gates. Received noise levels from these sources depend on the location of the source and receiver. Dozer track noise can occur from within the mining area and from within the rail loading facility.

4.8.2 Calculated Noise Levels

Figure A7 in Appendix A shows the 60 LAmax and 45 LAmax contours, which relate to current and historical sleep disturbance criteria, produced by the following sources:

- Dozer track noise within the mining area for all assessed years;
- Dozer track noise within the existing rail loading facility; and
- Maximum passby noise from a truck on the haul road from the mine to the rail loading facility.

Figure A7 shows the previous 45 LA1,1min sleep disturbance criterion may be exceeded at residences 23 and 27 while the more recent 60 LA1,1min criterion would be met at all residences.

Properties 23 and 27 are included in Table 8 and are already identified as being mildly affected by noise from the Modification.

Maximum noise levels from coal truck movements along the haul road would not increase above current levels, as additional truck movements per hour do not increase the maximum passby level. Calculated maximum noise levels are therefore consistent with current approvals.

4.9 Road Traffic Noise

The Modification includes a production rate to 3.5 Mtpa which is below 5 Mtpa as considered in the 1987 EIS. Proposed road traffic noise levels due to the Modification would therefore be consistent with the EIS and would not change from currently approved road traffic noise levels.

4.9.1 Receivers and Traffic Flows

The Mine access route would continue to be from the Kamilaroi Highway via Manilla Road and Leard Forest Road. Closest residences to the access route are Residence 33 approximately 500m north of Manilla Road, Residence 90 approximately 420m south of Manilla Road and Residence 52 approximately 390m east of Leard Forest Road. The Modification is assumed to include employment for up to 400 full time staff and a reasonable worst case traffic noise assessment would assume two thirds of the staff would either enter or leave the site in a period of one hour. An operational traffic noise assessment is therefore based on 270 car movements per hour along the access route, assuming a worst case situation where most staff travel separately to the site. The assessed situation is most likely to occur at shift changeover times which would occur two or three times per day, during the day and night.

A number of truck movements along the Mine access route are also required for delivery of fuel and lubrication products, spare parts, gravel and other civil products. Such deliveries are usually intermittent and occasional, although fuel deliveries would occur on a fairly regular basis. A reasonable worst case assessment would assume two heavy trucks would enter and leave the site in a one-hour period.

4.9.2 Assessment

Based on the assumed 300 car and 4 truck movements per hour, the following traffic noise levels have been calculated.

- Residence 33 41.8 LAeq,1hr;
- Residence 90 42.5 LAeq,1hr; and
- Residence 52 42.8 LAeq,1hr.

As Modification-related traffic flows represent most of the traffic on the Mine access route, non-mine traffic flows would have an insignificant effect on traffic noise levels and do not need to be specifically considered. Calculated traffic noise levels are acceptable compared to the 55 LAeq,1hr day and 50 LAeq,1hr night criteria and therefore no traffic noise control measures are required or recommended.

4.10 Rail Traffic Noise

The Modification includes a production rate of 3.5 Mtpa which was considered in the EIS. While current rail traffic levels are lower than anticipated due to the historically lower production levels, proposed train movements due to the Modification would be consistent with the EIS and current approvals.

The *2009-2018 Hunter Valley Corridor Capacity Strategy – Consultation Document* (ARTC, 2009) includes the following data regarding train movements from Narrabri to Curlewis:

- 12 train movements per day from Narrabri to Boggabri;
- 14 train movements per day from Boggabri to Gunnedah; and
- 20 train movements per day from Gunnedah to Curlewis.

The *2011-2020 Hunter Valley Corridor Capacity Strategy – Consultation Document* (ARTC, 2011) includes the following data regarding background (non-coal) train movements to and from Narrabri:

- Up to 12 background (non-coal) train movements per day from Narrabri to Gunnedah; and
- Up to 14 background (non-coal) train movements per day from Gunnedah to Scone.

The 2011 ARTC document also indicates coal trains in the Werris Creek-Murulla Section currently carry approximately 10 Mtpa of coal, which is equivalent to approximately 5 trains per day assuming a capacity of 5760 tonnes per train. While the data in the two ARTC documents are not directly comparable, the 2011 data are consistent with the 2009 average daily train traffic estimates.

An average of two train movements per day to and from the existing Boggabri Coal Mine is included in the ARTC data. The Modification would require up to two trains per day (an average of 3 additional train movements per worst-case day) to transport up to 3.5 Mtpa of product coal, which represents less than a 10% increase in train movements from Boggabri to Curlewis and an increase in worst case train noise levels of 0.3 LAeq,15hr day and LAeq,9hr night. Maximum passby noise levels would not change as a result of the Modification, assuming all trains produce a similar maximum noise level.

A 0.3 dBA increase in worst case train noise levels at all potentially affected residences near the MWCR represents a very minor noise impact and is therefore considered acceptable.

4.11 Low Frequency Noise

4.11.1 Mining Sources

A modifying factor of 5 dBA has been applied to modelled mining and transportation sources where relevant so no further analysis of low frequency noise levels is required under the INP.

4.12 Blast Overpressure and Vibration

4.12.1 Previous Blast Monitoring

Explosive blasting is currently used at Boggabri Coal Mine to fragment overburden and this practice would continue for the Modification at the currently approved rate. Boggabri Coal currently operates a blast monitoring system using monitors installed at Bollol Creek Station to the south east and Greenhills to the east, with both of these properties owned by Whitehaven Coal. Overpressure and vibration monitoring results reported in the 2010 Boggabri Coal AEMR have been reviewed to determine the mine's recent blasting history.

Section 3.6.1 of the AEMR shows peak vibration levels produced by blasts in 2009-10. The monitored results show a maximum vibration level of 2.0mm/s Peak Particle Velocity (PPV) compared to the 5 mm/s criterion.

Section 3.6.2 of the AEMR similarly presents monitored overpressure levels during 2009-10. The results show maximum overpressure levels of 114 dBL at both Bollol Creek Station and Greenhills compared to the 115 dBL criterion. Bollol Creek Station is located approximately 4.5 km from the 2008 blast sites while Greenhills is approximately 4 km from the blast sites.

Privately owned properties are further from the existing mining area and therefore currently receive lower vibration and overpressure levels. Approximately 110 blast events per year would be required for the currently approved production rate of 3.5 Mtpa, which is an average of just over 2 blast events per week.

4.12.2 Ground Vibration Analysis

Analysis of the AEMR blast results indicates ground vibration levels are consistent with, or a little lower than, expected vibration levels considering typical Maximum Instantaneous Charge (MIC) weights in the range 1500 to 2500 kg as used in open cut coal mine blasts.

Calculations based on Appendix J of Australian Standard 2187.2-1993 indicate ground vibration levels would remain within the 5 mm/s criterion for blasts 1700m from a residence, based on an MIC of 3000 kg and ground coefficients of K=1140 and b=1.6.

With the closest privately owned residence (67 Goonbri) at least 3.9 km from proposed blasts, ground vibration levels are not expected to exceed 2 mm/s PPV which is well within the 5 mm/s criterion and consistent with recent monitoring results. No additional vibration control measures are expected to be required although ongoing blast monitoring is recommended to ensure vibration levels remain acceptable.

4.12.3 Overpressure Analysis

Analysis of the AEMR blast results indicates overpressure levels in 2009-10 reached a maximum level of 114 dBL at monitoring locations approximately 4 km from the blast site. Proposed blasts would be a minimum of 3.9 km from privately owned properties and, assuming the same blast practises continue, would produce a maximum overpressure level of 114.2 dBL and most overpressure levels below 110 dBL. Most residences would remain over 4.8 km from proposed blasts and are expected to receive less than 112 dBL for all blast events and less than 107 dBL for most blast events.

As the predicted worst case overpressure levels would approach the 115 dBL criterion at closest receivers, ongoing blast monitoring is recommended to ensure overpressure levels remain acceptable.

4.12.4 Buildings

Blast noise and vibration criteria are designed to provide an acceptable level of personal comfort for residents and other sensitive receivers. Noise and vibration criteria to minimise the chance of residential building damage are an order of magnitude higher than the criteria and the levels currently experienced by closest receivers. The proposed blasting program therefore offers an extremely low chance of even superficial or cosmetic damage to privately owned residences. This means structural members within each residence absorb the vibration in an elastic manner, without yielding or suffering permanent damage or change, which in turn means the vibration could theoretically continue indefinitely with no noticeable change to the building structure.

Currently approved and proposed blasts would therefore be unlikely to result in any damage to residences or other buildings.

4.12.5 Cumulative Blast Impacts

Potential cumulative impacts from blasting would normally be limited to an increase in the average number of blasts per day noticed by residents, with a very low chance of blast events at two or more mines occurring simultaneously.

Nevertheless, Boggabri Coal should coordinate blasting schedules with other mines within a 10km radius to avoid any potential for simultaneous blast events. All blast events associated with the Modification would also be designed to meet relevant overpressure and ground vibration criteria. 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 so would not result in exceedances of relevant criteria.

4.13 Cumulative Noise Levels

Predicted noise levels for this Modification are identical to the levels calculated for the *2011 Boggabri Modification*. The *2011 Boggabri Modification* considered noise from the existing Tarrawonga Coal Mine to the south and the proposed Maules Creek Mine to the north. In the absence of a change in the status of these adjoining developments, this Modification would not result in any change in cumulative noise levels from the currently approved levels.

Existing noise levels from Tarrawonga Coal Mine have been considered in Section 3.1 when determining Modification noise criteria and no further cumulative assessment of existing Tarrawonga Coal Mine noise levels is required.

The *Maules Creek EA* includes a cumulative noise impact assessment and concluded no cumulative noise impacts with Boggabri Coal Mine were likely to occur. As the Modification would advance generally to the east rather than towards the proposed Mauls Creek Mine during the Modification period, no cumulative noise impacts are likely to occur at any receiver.

5 CONCLUSION

This assessment shows noise levels from the Modification are not expected to cause significant noise impacts at any residence or over any property, however mild and moderate noise impacts are predicted at some privately owned residences, including:

- Two residences (67 Goonbri and 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. Two moderately affected properties also contain mildly affected residences (68 Goonbri and 86 Kyalla); and
- Five other properties (23-27,29,31,36 Cooboobindi, 28,30 Bullock Paddock, 48 Wilboroi East, 78,80 BJ Cosby and 116 RA & CM Collyer) are predicted to receive mild noise impacts from the Modification.

Sleep disturbance from impact sources within the mine such as a shovel gate and dozer tracks is unlikely to occur, considering the large distance from the mine to closest receivers. Truck movements on the existing haul road have the potential to disturb sleep for closest residents according to previous sleep disturbance criteria but these movements would not affect these residents according to current criteria. Maximum noise levels due to truck movements on the haul road would not change from current levels.

Noise from road traffic and rail traffic would be consistent with current approvals and would remain acceptable compared to current noise criteria.

The Modification would not cause an increase in current acceptable levels of low frequency noise.

Blasting associated with the Modification is expected to produce ground vibration and overpressure levels below relevant amenity criteria at all privately owned residences. Blast monitoring at closest residences, or at other representative locations, is proposed to confirm ongoing compliance with blast criteria.

APPENDIX A – NOISE CONTOUR FIGURES

FIGURE	DESCRIPTION
A1	Year 1 Day, neutral weather conditions
A2	Year 1 Day, prevailing weather conditions
A3	Year 1 Evening/Night, prevailing weather conditions
A4	Year 2 Day, neutral weather conditions
A5	Year 2 Day, prevailing weather conditions
A6	Year 2 Evening/Night, prevailing weather conditions
A7	Year 1 & 2 Night, sleep disturbance LAmax, prevailing weather conditions

Figure A1: Year 1 Day, Neutral Weather Conditions

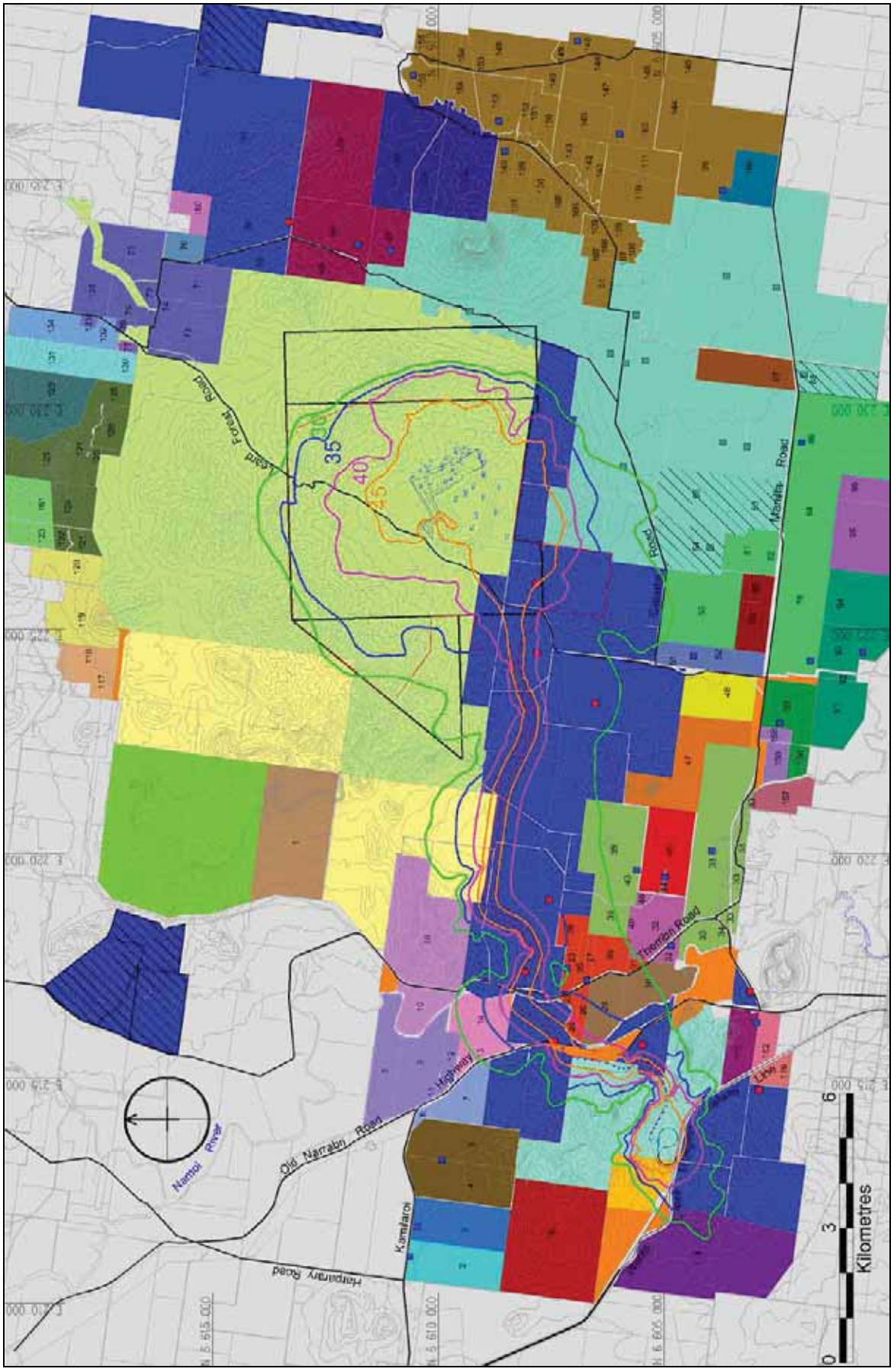


Figure A2: Year 1 Day, Prevailing Weather Conditions

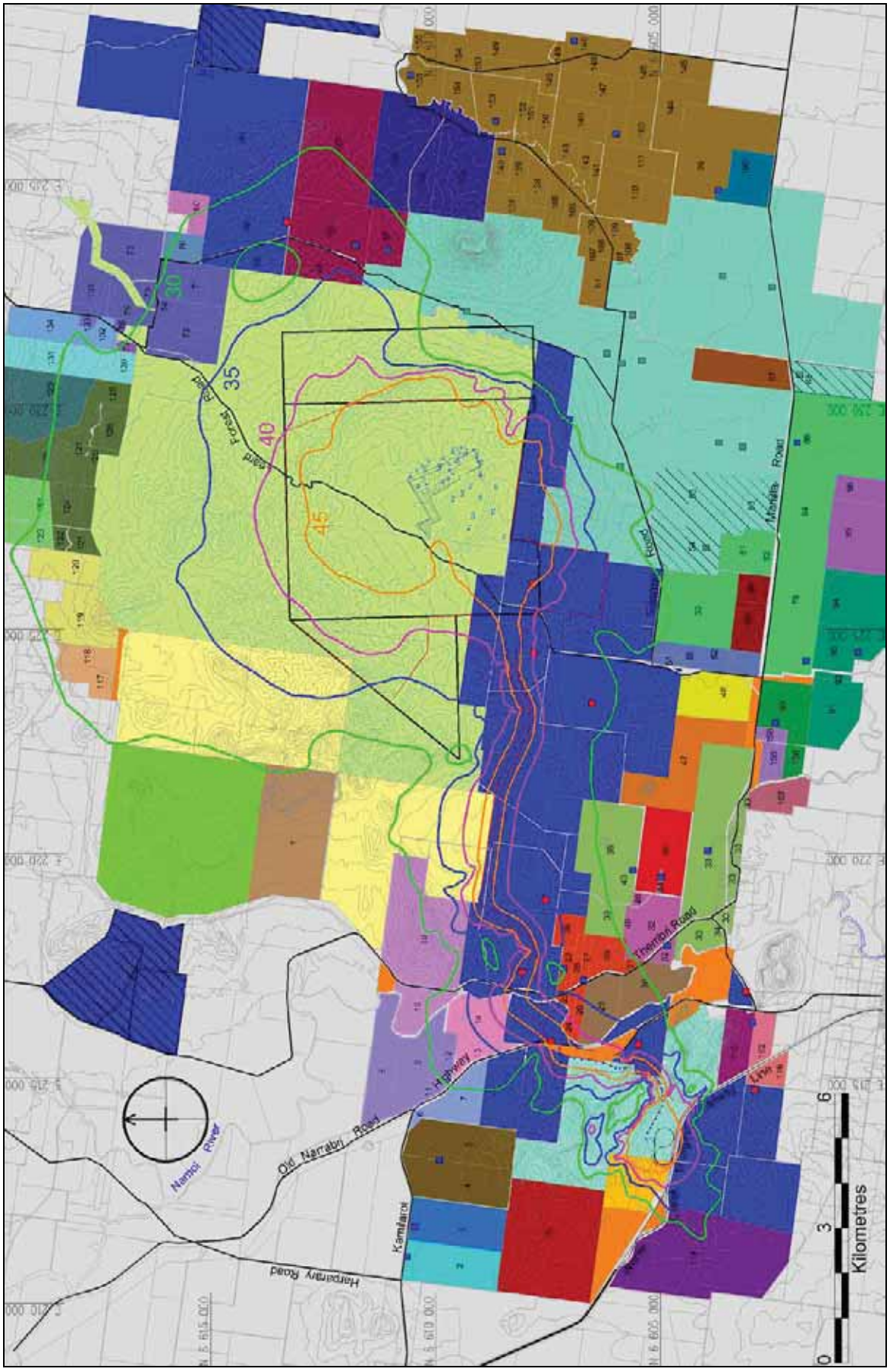


Figure A3: Year 1 Evening/Night, Prevailing Weather Conditions

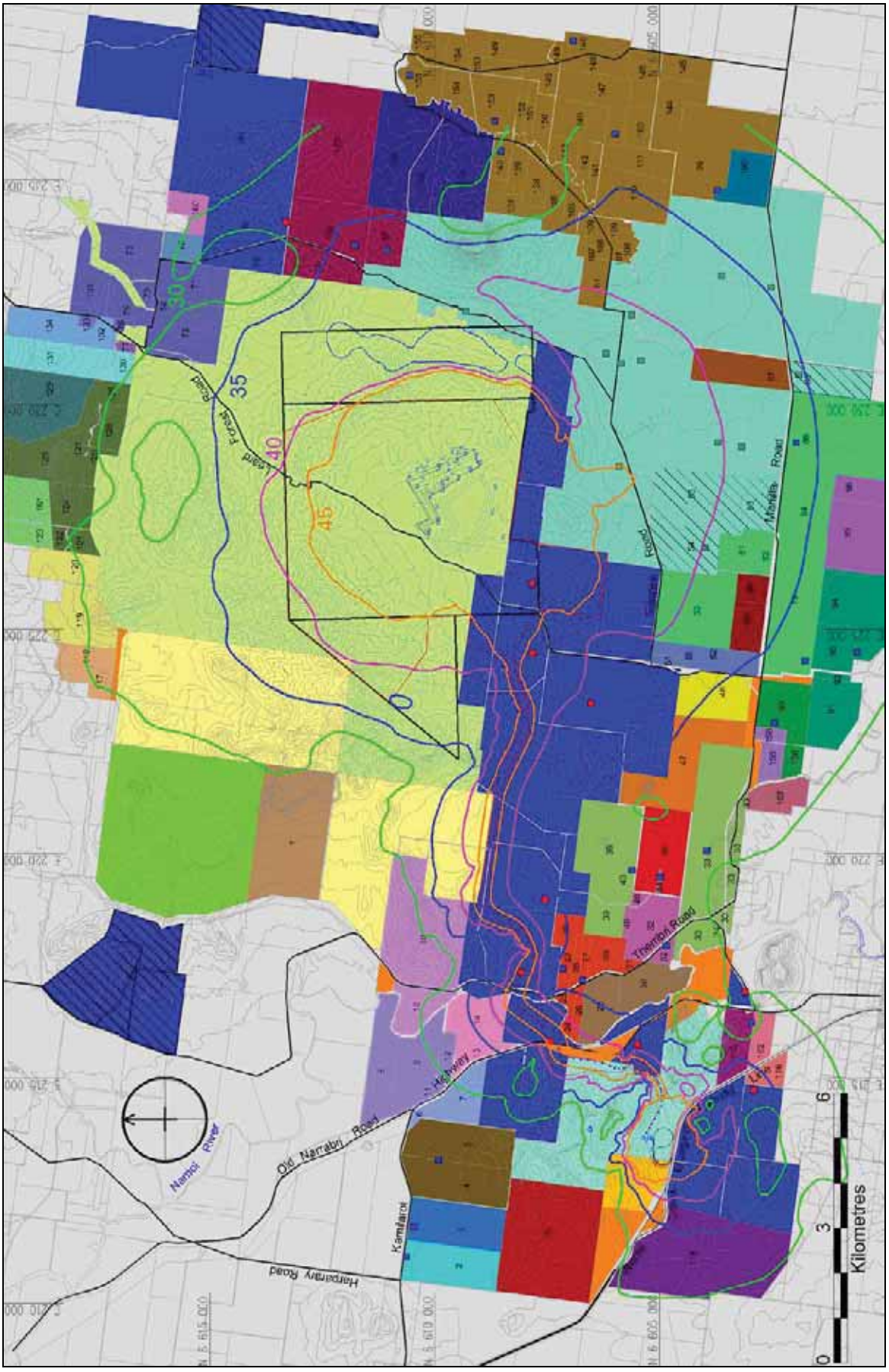


Figure A4: Year 2 Day, Neutral Weather Conditions

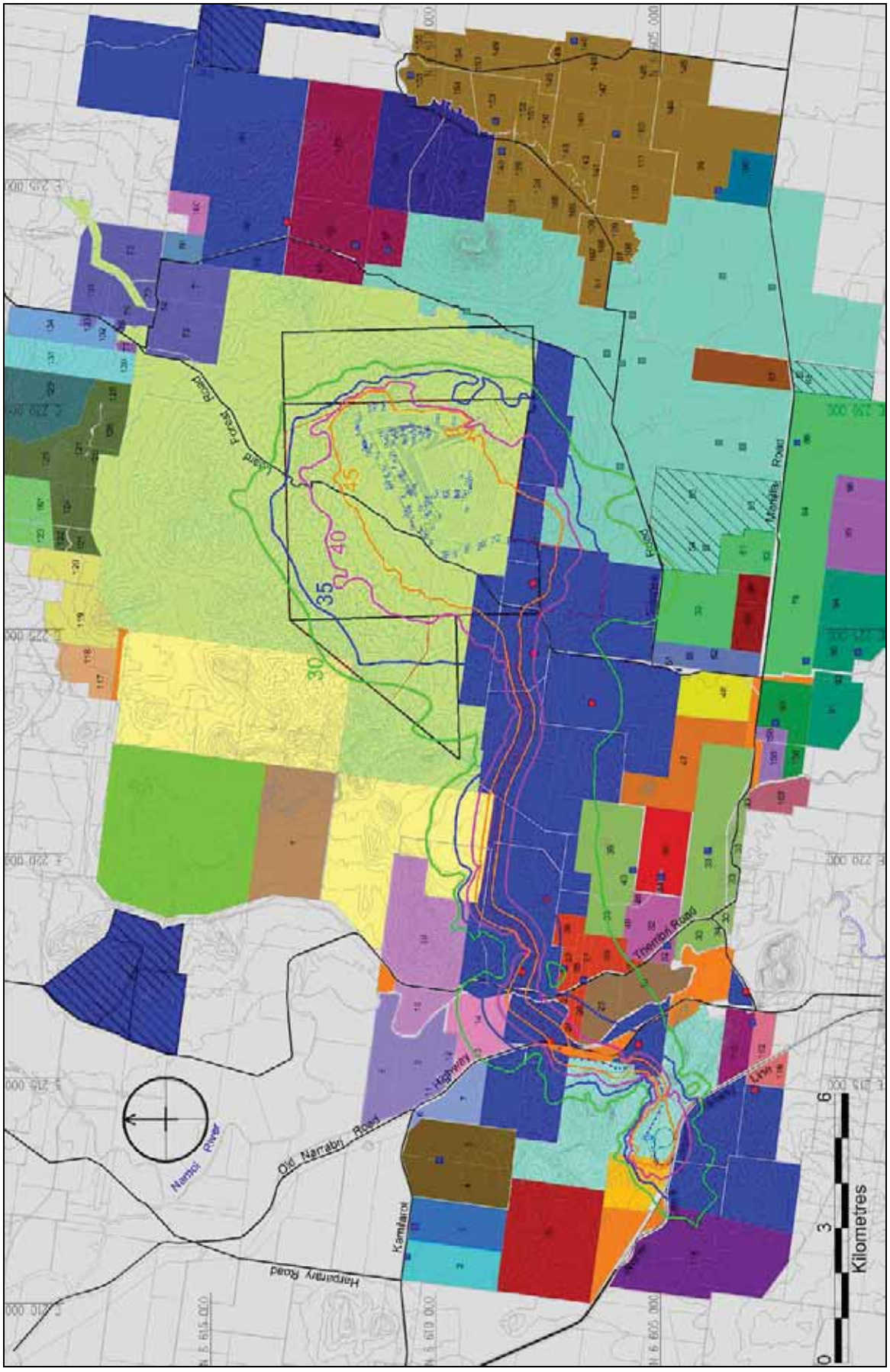


Figure A5: Year 2 Day, Prevailing Weather Conditions

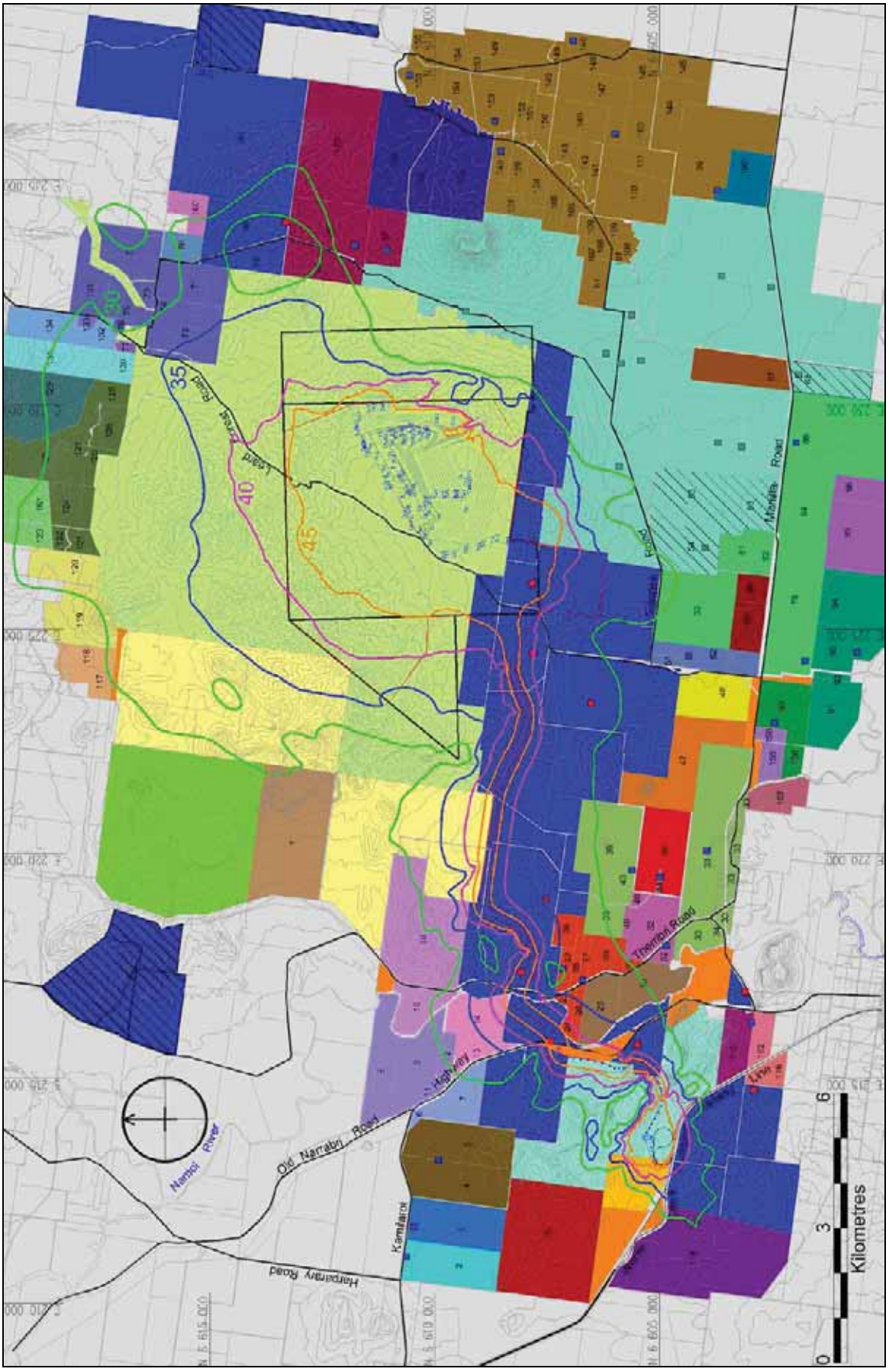


Figure A6: Year 2 Evening/Night, Prevailing Weather Conditions

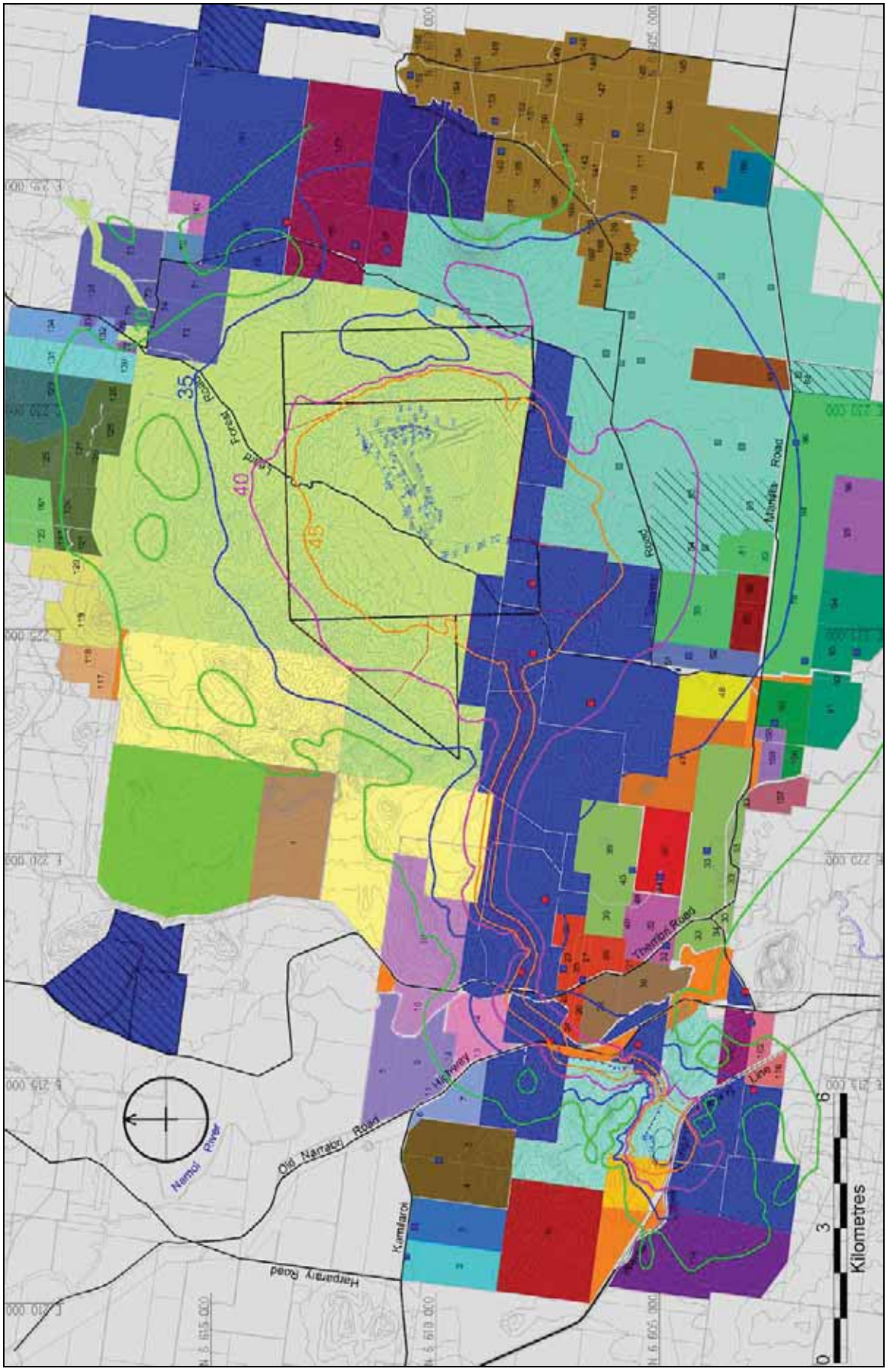
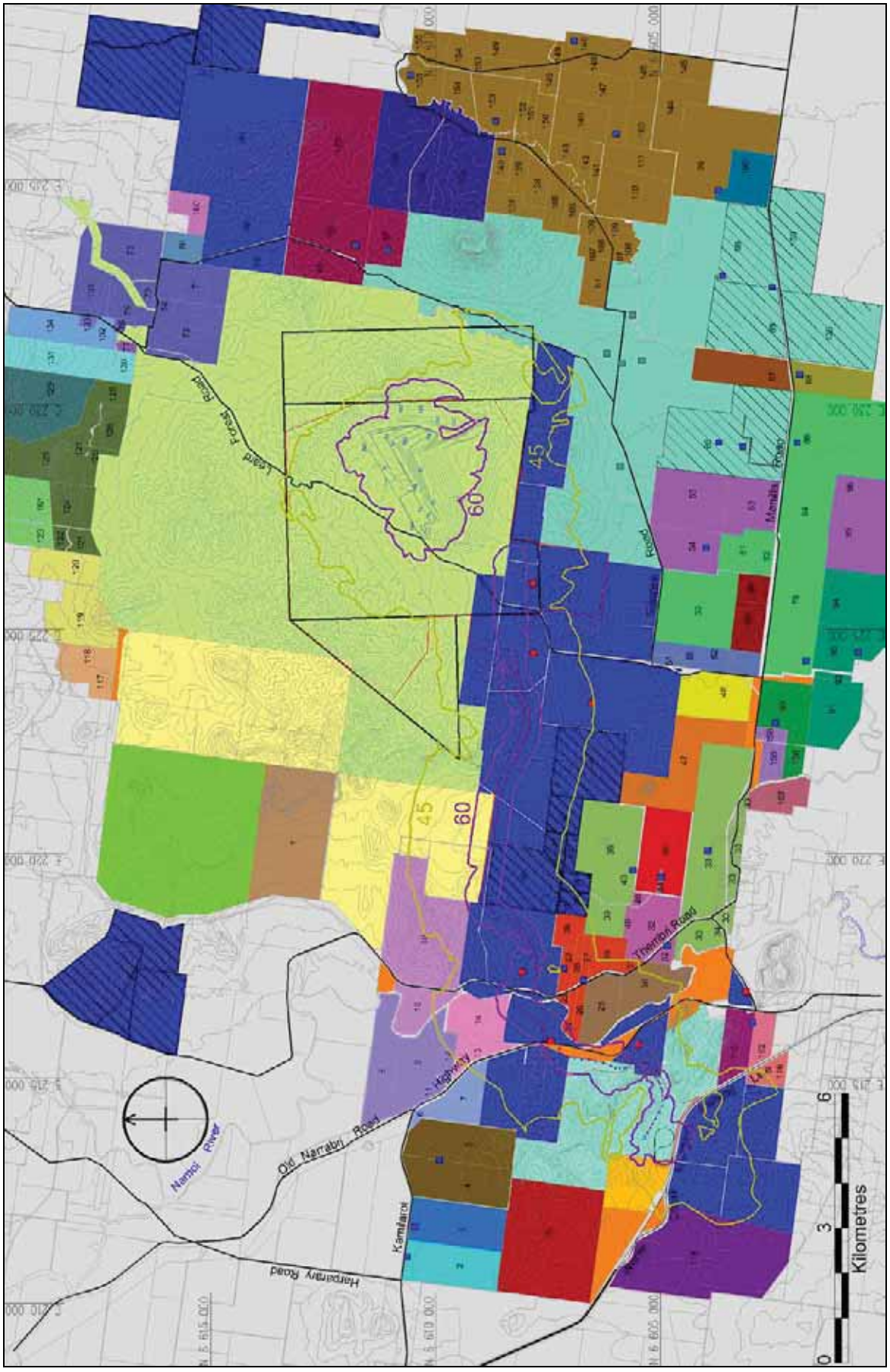


Figure A7: All Years Night, Sleep Disturbance LAmax, Prevailing Weather Conditions



APPENDIX B – NOISE SOURCE LOCATION FIGURES

FIGURE	DESCRIPTION
B1	Year 1 Mine Day noise source locations
B2	Year 1 Mine Evening/Night noise source locations
B3	Year 2 Mine Day noise source locations
B4	Year 2 Mine Evening/Night noise source locations
B5	All Years, Rail Loading Facility noise source locations

Figure B1: Year 1 Mine Day Noise Source Locations

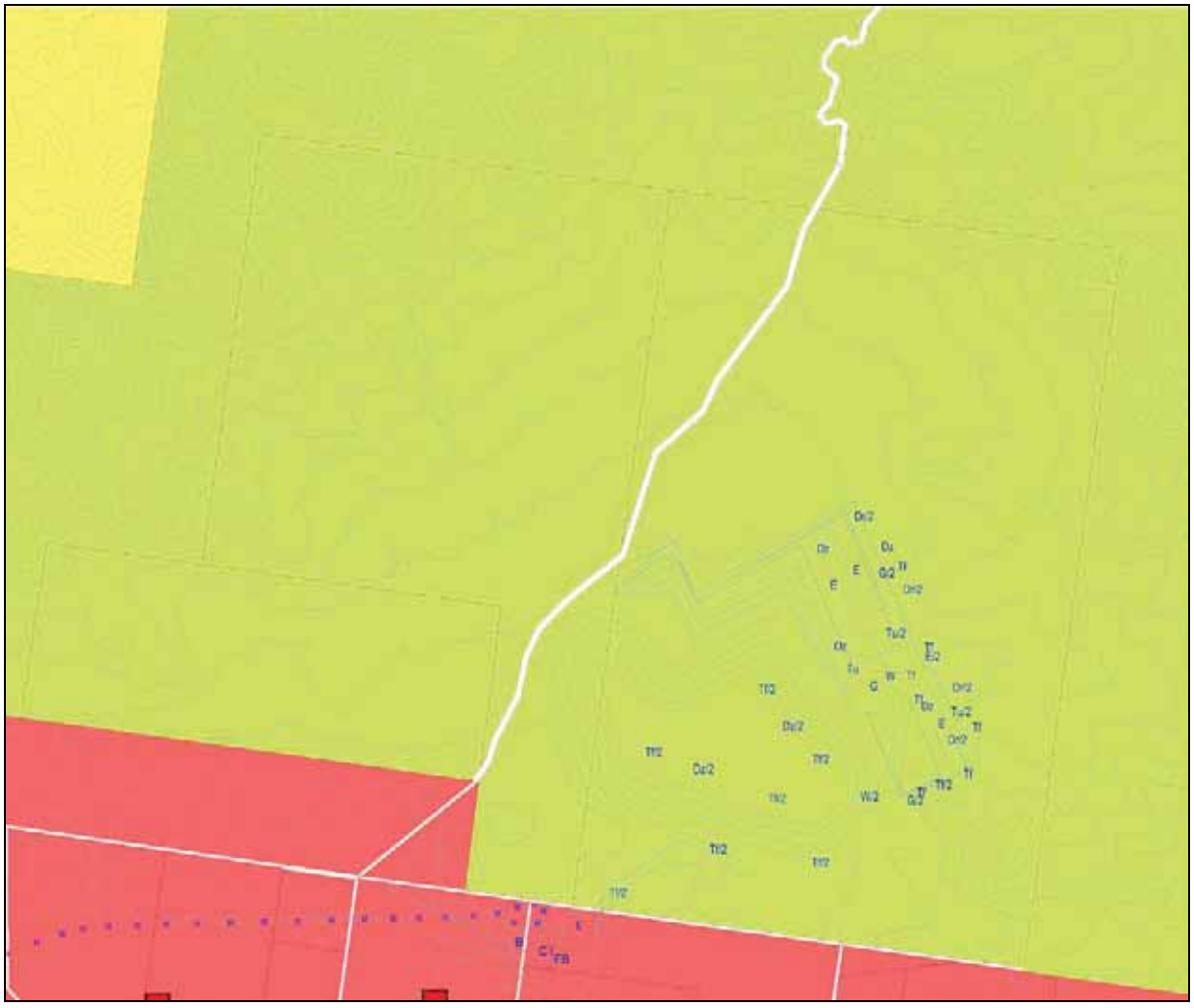


Figure B2: Year 1 Mine Evening/Night Noise Source Locations

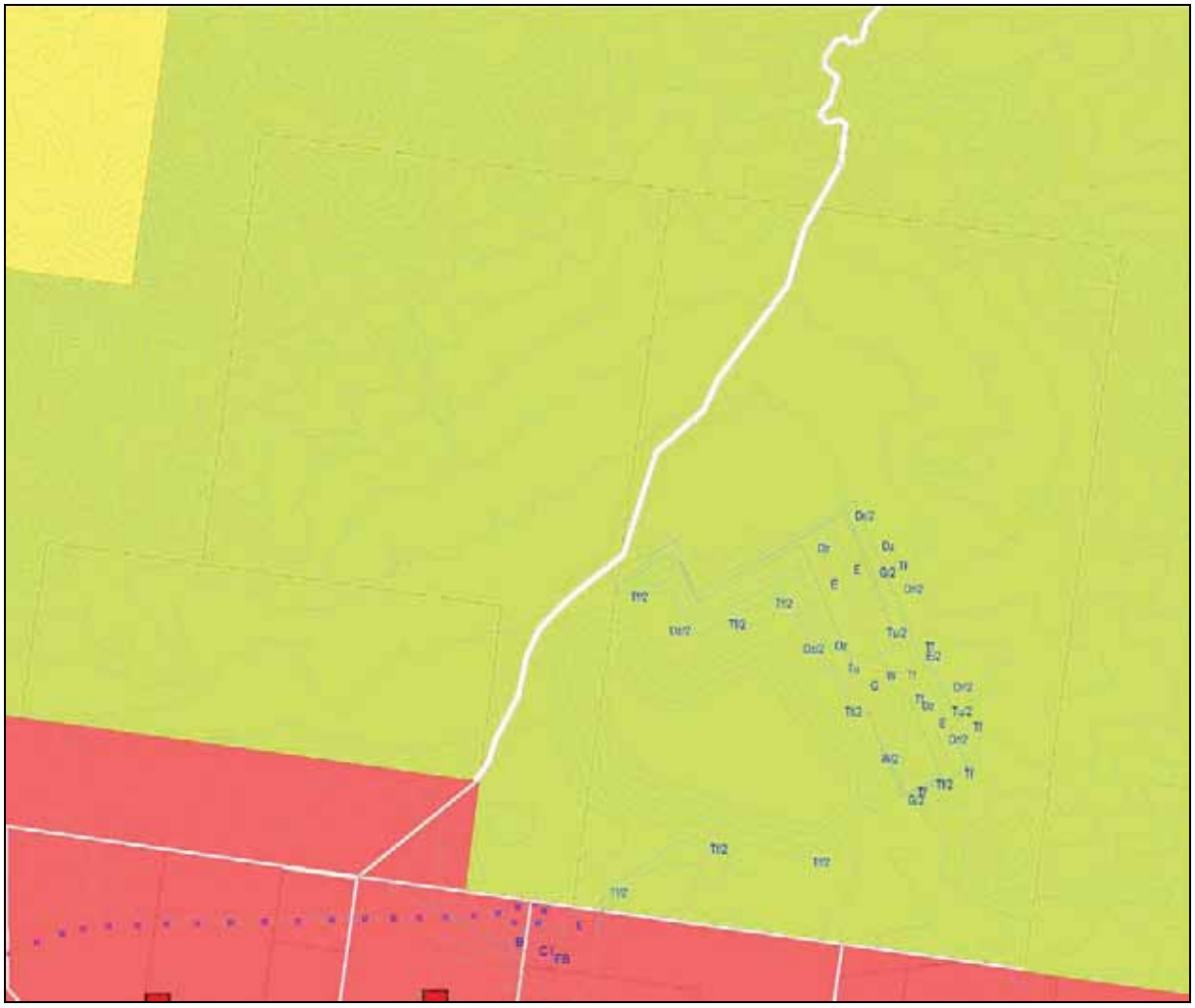


Figure B3: Year 2 Mine Day Noise Source Locations

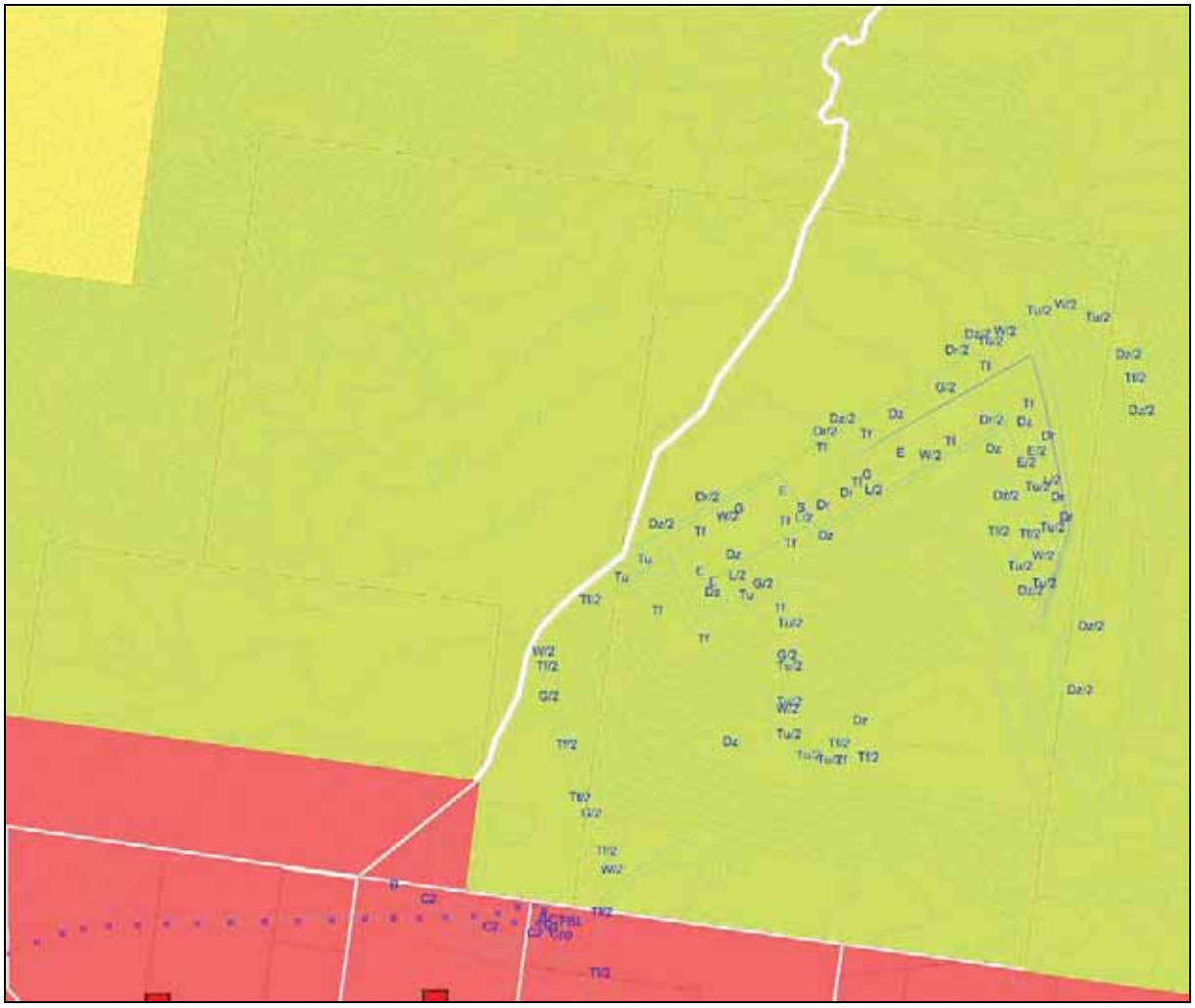


Figure B4: Year 2 Mine Evening/Night Noise Source Locations

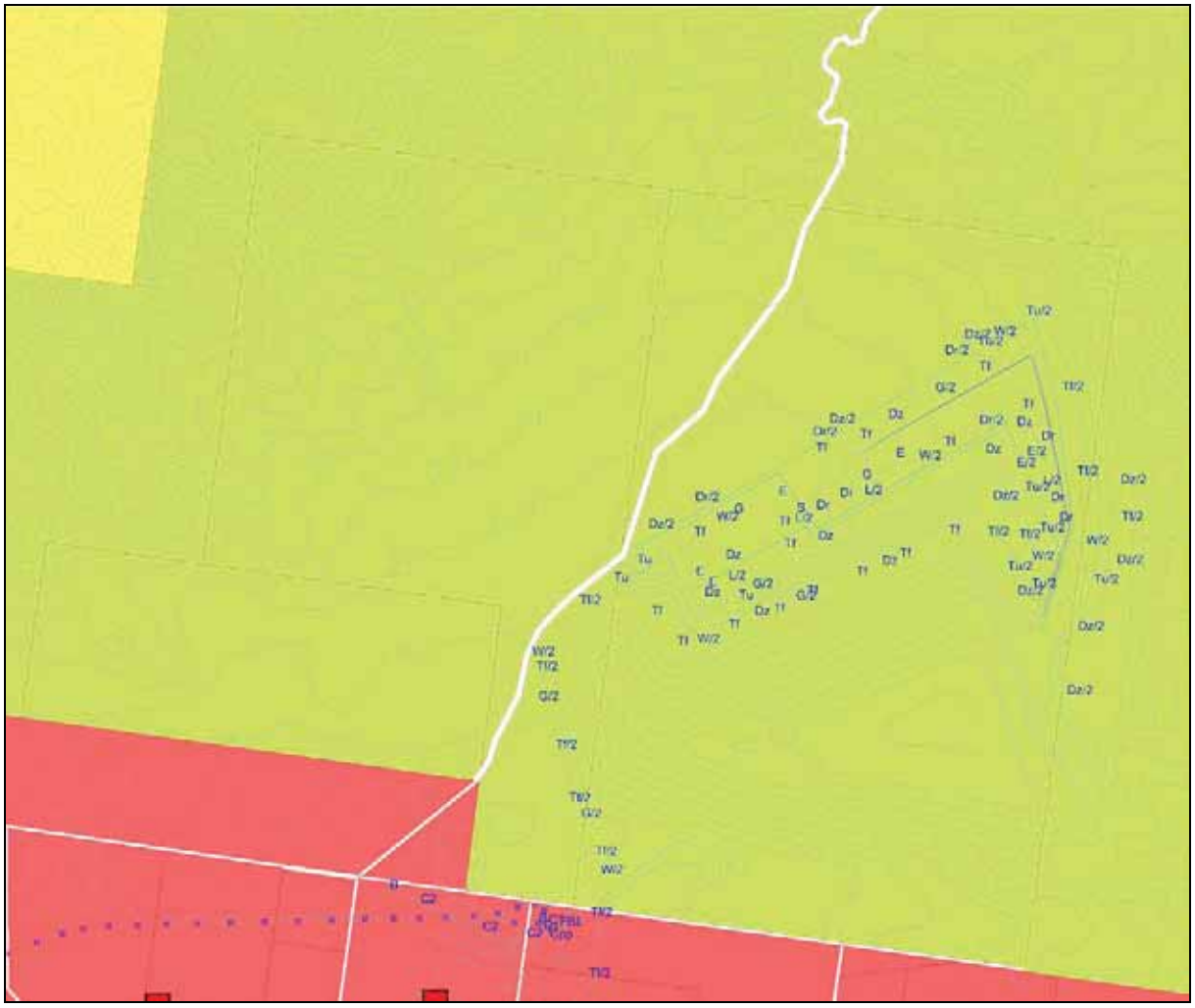


Figure B5: All Years, Rail Loading Facility Noise Source Locations

APPENDIX C

Visual Impact Assessment

Boggabri Coal Mine Development Consent Modification

visual impact assessment

May 2012

a report prepared by

VP&d
visual planning + design

Boggabri Coal Mine
Development Consent Modification

visual impact assessment

May 2012

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Glossary

Areas of Primary Visual Concern	Areas that have potential views to the Modification based on a consideration of topography alone as a screening element
Visual Sensitivity	The degree to which a change to the landscape will be perceived in an adverse way
Visual Effect	A measure of the visual interaction between the Modification and the landscape setting within which it is located
Primary View Zone	This zone is the central most critical part of a view that is seen with the greatest clarity. It is that part of a view that is within an horizontal arc of 30^0 either side of the centre line of a view and a vertical arc of 30^0 above the horizontal
Field of View	This area includes the total view, consisting of the primary view zones above and the secondary or peripheral view zones around the primary view zone, out to about 70^0 either side of the central view line in both vertical and horizontal plain
Visual Impact	A measure of a joint consideration of both visual sensitivity and visual effect that considered together determine the visual impact of a development
Contrast	The degree to which a development component differs visually from its landscape setting
Integration	The degree to which a development component can be blended into the existing landscape without necessarily being screened from view
Screen	The degree to which a development element is unseen due to intervening landscape elements such as topography or vegetation
VCU	Visual Character Unit. Areas of landscape that have similar topographic, vegetation and land use features that create areas of similar visual character

1. INTRODUCTION

1.1 Background

Boggabri Coal Pty Limited (Boggabri Coal), a wholly owned subsidiary of Idemitsu Australia Resources Pty Ltd (IAR), operates the Boggabri Coal Mine. Boggabri Coal Mine is located approximately 15 km north east of Boggabri in the Narrabri Shire Council (NSC) Local Government Area (LGA) in the central north of NSW, see Figure 1.1.

Boggabri Coal currently operates in accordance with Development Consent DA 36/88 (as modified) under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.2 The Modification

This Modification is sought under Section 75W of the EP&A Act to modify DA 36/88 (as modified) to make available additional overburden emplacement capacity that would enable operations at the Boggabri Coal Mine to continue under DA 36/88 (as modified) should the determination of the Continuation of Mining Project be delayed beyond May 2012.

Specifically, the Modification would include the following components:

- Increasing the maximum height of the Overburden Emplacement Area (OEA) by 55 m from that currently approved (from RL 340 m to RL 395 m);
- Creating an additional stockpile area (approximately 60 ha) for topsoil to the north-west of current mining operations;
- Constructing two access roads, with a combined area of approximately 8.5 ha, to the proposed topsoil stockpile area;
- Constructing a mine water storage dam (approximately 3.6 ha in size and 180 ML in capacity) immediately adjacent to the proposed topsoil stockpile area; and
- Installing a temporary 250 mm polyethylene above ground pipeline between Boggabri Coal MW3 and Tarrawonga Coal Mine Water Storage Dam to facilitate water transfer between the two sites. Up to 400 ML/yr is proposed to be transferred via this pipeline, dependent on water availability at Boggabri Coal and demand at Tarrawonga Mine.

1.3 The Boggabri Continuation of Mining Project

The Boggabri Continuation of Mining Project (under Project Application 09_0182) is currently being assessed by the Department of Planning & Infrastructure (DP&I). The Project Application was made under Part 3A of the EP&A Act to gain a single, contemporary planning approval for the continuation of its mining operations at Boggabri Coal Mine. The supporting document for the application is the Boggabri Continuation of Mining Environmental Assessment (Boggabri EA) prepared by Hansen Bailey, which generally seeks approval for 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 (CPP);
    - 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.

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

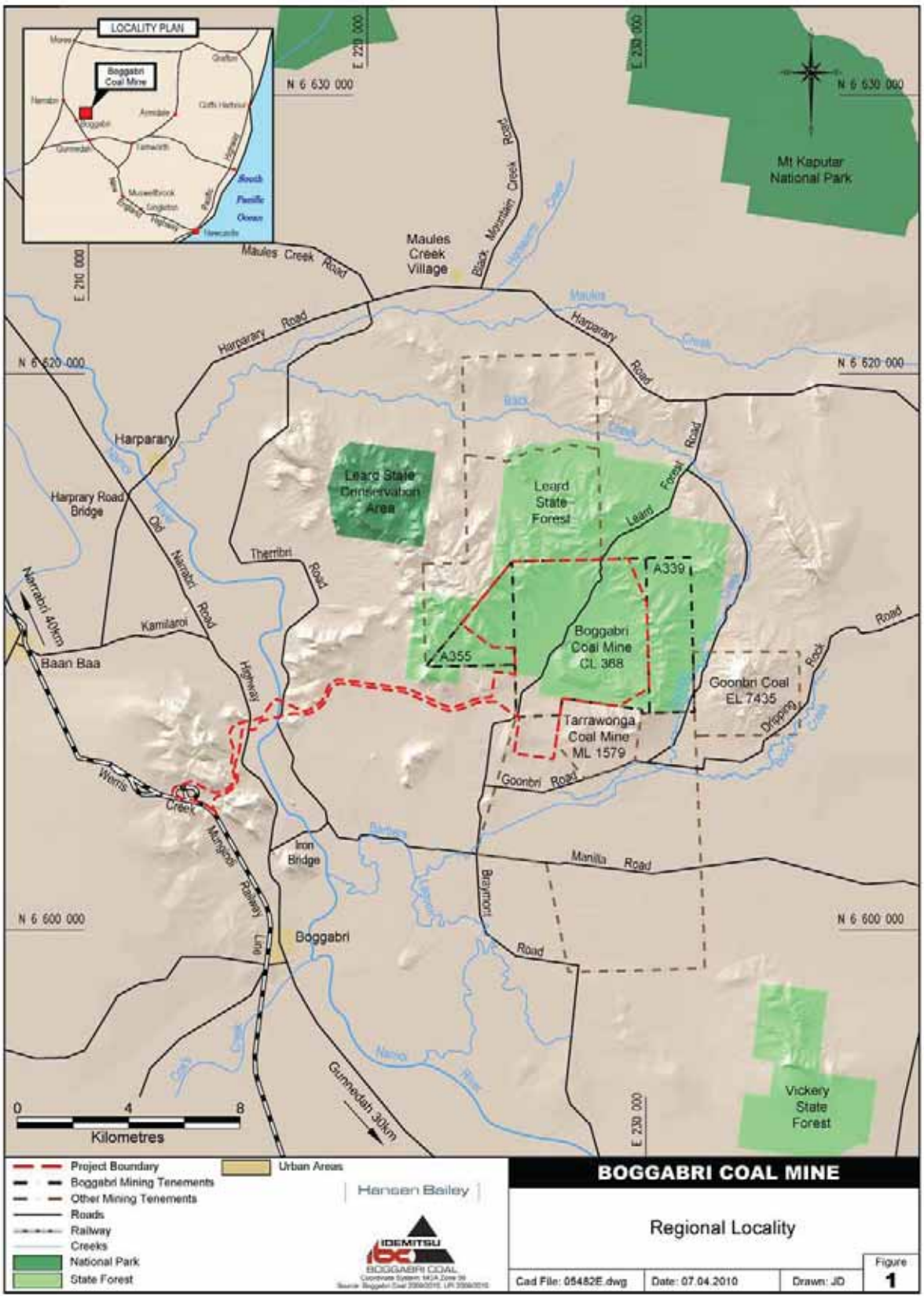

Figure 1.1 | Locality Plan.

1.4 Description of Boggabri Coal Mine and surrounds

Boggabri Coal Mine is predominantly located within the Leard State Forest and is bounded by the Willow Tree Range that reaches approximate heights of 460 m. The ridge encloses the existing Boggabri Coal Mine surface and Leard State Forest. The catchment area includes numerous ephemeral creek lines where water drains towards the Namoi River.

Tarrawonga Mine is located immediately south of the Boggabri Coal Mine site. The nearest residential area is the township of Boggabri, located approximately 15 km south west of the site.

1.5 Visual assessment objectives

This technical report is a visual assessment of the potential impacts of the Modification on the existing landscape and visual values of the area, including existing land uses. The report identifies the visual character of the existing landscape as well as that likely to occur as a consequence of the Modification, which are consistent with those assessed for Year 5 of the conceptual mine plans as presented in the Boggabri EA which is currently under assessment. The visual impact of the Modification, including both short term and long term impacts, has been assessed and visual impact mitigation strategies developed.

2. ASSESSMENT METHODOLOGY

The methodology used to determine the level of visual impact of the Modification of is described below.

In the first instance, the existing visual environment was evaluated. This includes consideration of existing landscape settings, and how they 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 can be determined.

Secondly, the visual effect of the Modification is determined by considering the visual characteristics of the Modification in the context of the landscape within which it is seen.

A combined consideration of both visual sensitivity and visual effect identifies impacts and directs if any mitigation strategies are required.

The evaluation of the existing visual environment consists of the assessment of both the landscape and viewing locations within it. It also includes consideration of the statutory framework within which any development must be considered.

This methodology was used in the May 2010 Visual Impact Assessment Report undertaken for the Boggabri EA.

3. EXISTING ENVIRONMENT

3.1 Introduction

This section of the report establishes the visual character of Boggabri Coal Mine and the surrounding landscapes that make up its visual settings. A range of different landscapes, which vary as a result of topography, vegetation cover and land use types, create the existing visual setting. Based on visual differences created by these landscape elements, five Visual Character Units (VCU) were established.

These VCU were analysed in terms of their visual character within the primary view zone of the mine.

3.2 Primary Visual Catchment

At a regional scale, the Visual Catchment is defined by the ridges of the Willow Tree Range, which surround the Western, Northern and Eastern edges of the Project Boundary. To the south west, ranges associated with Mount Boggabri define the Primary Visual Catchment (PVC) boundary. To the south, distance and tree cover on plains and gentle hills define the boundary while in the south east hills within and around Vickery and Kelvin State Forest, eventually linking to the screening created by the Willow Tree Range.

The PVC represents the area within which the majority of critical views of the Boggabri Coal Mine are located. It is the critical part of the Visual Catchment. The PVC does not enclose all viewpoints, but a consideration of those within the PVC will achieve proper visual assessment of the site. The PVC is illustrated in Figure 3.1.

As with the regional Visual Catchment, the PVC is defined to the north, east and west by the Willow Tree Range. It is defined to the south west by the hills and mountains associated with Mount Boggabri. In the south, the township of Boggabri defines the boundary while also being included in the PVC. To the east of Boggabri township, the PVC boundary follows Braymont Road and then generally heads to the north western boundary of Vickery State Forest and then north to Wean and north west back to the south eastern corner of Leard State Forest.

The Namoi River is the main river system of the valley and along with the isolated geological features such as Robinsons Mount and Barbers Pinnacle creates a diverse landscape of high visual interest.

The PVC for Boggabri Coal Mine and this Modification is defined in Figure 3.1.

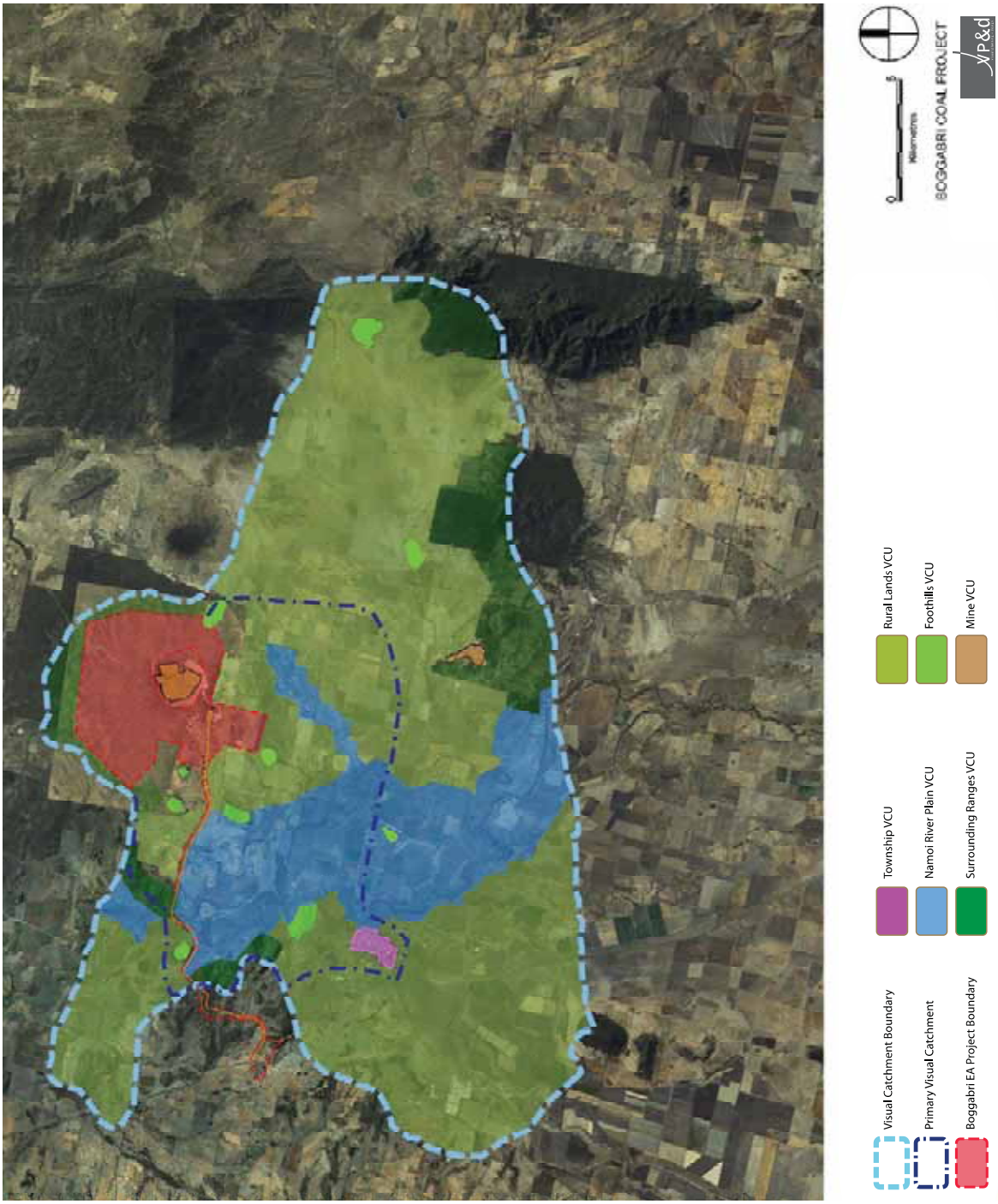

Figure 3.1 | Primary Visual Catchment of the Modification

3.3 Visual Character of the Landscape

The visual character of the regional and local landscape is created by the mosaic of topographic form, vegetation and land cover, hydrological features of the Namoi River and land use patterns. These landscape features combine in various ways to create areas of relative visual uniformity that can be defined as VCUs. The VCUs combine in various vistas that are obtained from viewing locations such as residences and roadways.

Figure 3.1 illustrates the VCUs within the PVC and include the:

- Namoi River Flood plain VCU;
- Lowland Foothills VCU;
- Rural Lands VCU;
- Town Area VCU;
- Surrounding Ranges VCU; and
- Mine and Infrastructure Area VCU.

Each is discussed further below.

3.4 Namoi River Plains VCU

The Namoi River Plain dissects the PVC in a south to north direction of flow; the river itself flows past the Boggabri township. The Goonbri Creek also contributes to this plains VCU, the creek flows from the eastern side of Leard State Forest in a western direction joining the Namoi system in Barbers lagoon approximately 3 km north east of the Boggabri Township. Visually, the VCU is dominated by the expansive river flats that by virtue of soils and irrigation, support cropland, creating vivid rectilinear patterns in the midst of dryland grass and woodlands on adjoining slopes, see Figure 3.2.

The Namoi River Plain VCU creates strong contrast and visual interests to surrounding landscapes, as shown in Figure 3.2. The VCU is relatively flat and the grass / crop cover allows for long views from the cleared rural lands to the surrounding ranges. Also occurring in this VCU are remnant Red Gum woodlands that can restrict long distance views.

There are a number of scattered rural residences within the VCU. However, they are generally limited due to the flood potential within the VCU. They occur at the edges or on slightly elevated areas above the flood plain.

There are a number of roads that pass through this VCU. Generally these roads skirt the flood plain and like the rural Residences, are generally located in the lower part of the Foot Hill VCU for flood avoidance purposes.

The Namoi River Plains Unit supports and provides a connection between the Town Area and Lowland Foothills VCUs.

The significance of the unit in addition to its visual character is the open views it gives to more distant locations.

3.5 Foothills VCU

The lowland foothills provide the connection between the surrounding ranges and the flood plain of the Namoi River and Goonbri Creek, Figure 3.3. The hills vary from slight undulations to rising hills just below the surrounding ranges. Slopes vary between gently sloping elevations to steep slopes leading to the higher elevation ridges and hills. This VCU supports many rural residences in the lower and more gentle sloped areas adjacent to the flood plain and in the more intensively cleared grazing areas.

The lowland foothills VCU occurs throughout the PVC.

To the north, these hills are generally gently sloping, rising to form the ridges of the surrounding ranges. These hills for the greater part have been cleared for grazing purposes and support grasslands with scattered trees or open forest woodlands on steeper areas and along some gully lines.

The southern part of the VCU has a number of foothills that exist in isolation and in most instances are not connected directly to any particular surrounding range in the south. The elevation of the hills in the vicinity of Barbers Pinnacle limits visibility to the Boggabri Coal Mine in a northerly direction, however residences located on the elevated slopes of the foothills have potential views to existing mining operations.

In the east these hills are dominated by more gently sloping low elevation hills, the land cover is a mixture of grasslands, woodlands and open forest. These hills generally continue to the east of the locality of Wean (Figure 3.1), eventually linking with the Vickery State Forest with an average elevation of 320 m. The hills limit views of existing mining operations at Boggabri Coal Mine, however, there are views from the elevated locations in some areas of this VCU.

To the west the foothills are a series of hills to the north west of the Boggabri township, the most prominent being Mount Boggabri. This series of foothills also provide screening for the Boggabri Coal Terminal located on the Werris Creek Mungundi Railway. The lookout at 'Gins Leap' provides views to the north east across the flood plain.

The hills in all sectors create a significant visual block to Boggabri Coal Mine.

3.6 Rural Lands VCU

The rural lands VCU is the most extensive unit covering a range of agricultural land uses, the major use is grazing (see Figure 3.4). The general character of the unit is of gently rolling topography with scattered tree cover and stronger tree belts in some locations along roadways and drainage lines. There are a number of rural residences within this VCU.

3.7 Township VCU

The township of Boggabri is situated on the Kamilaroi Highway between Gunnedah and Narrabri and 15 km to the south west of the Boggabri Coal Mine. The town has a mix of residential, institutional, commercial and industrial land uses and this, along with its open space and streetscape character help create the visual character of the town (see Figure 3.5).

The township is located immediately adjacent to the Namoi River Flood plain and is generally on flat to gently sloping land. The topography tends to limit long distant views out of the town due to foreground screening by adjoining buildings, gardens and street plantings.

3.8 Surrounding Ranges VCU

The surrounding ranges generally consist of steep forested slopes that define the edges of the VCU. The ranges include the Willow Tree Range, Mount Boggabri and associated ridges to the west and the Nandewar Range to the east. The Willow Tree Range encompass the mine site, on the western, northern and eastern side of the mining area and forms an unbroken line that functions as a visual barrier to the mine as seen from those directions (see Figure 3.6).

The visual significance of Surrounding Ranges VCU is that they often create the background to valley views from a full range of view locations and as discussed frequently act as visual barriers to long distant views.

3.9 Mine and Infrastructure VCU

The visual character and scale of the existing Boggabri Coal Mine and adjacent Tarrawonga Coal Mine operations are strong enough to create a VCU based on the visual character of the mines.

The existing Boggabri Coal Mine generally consists of an active mine void, OEA, private haul road, and mine infrastructure facilities. The workshop, offices and truck loading bin is visually evident as you approach the site from the south and west along Leard Forest Road. The site already has a strong industrial visual character.

The OEA has two profiles: the first being the outer edge that is progressively rehabilitated as works are completed and is orientated to the south (Figure 3.7) and the second being the active OEA that is orientated to the north.

The rehabilitated southern side of the OEA quickly integrates with the existing landscape of rolling hills in adjacent landscape areas. This is largely due to the progressive revegetation of the OEA face.

Figure 3.2 | Namoi Plains VCU

The Namoi Plains VCU is dominated by the regular pattern of croplands with strong greens and contrasting random pattern of woodland with more muted colours of the Eucalypts and dry grassland.

Figure 3.3 | Foothills VCU

The Foothills VCU consists of feature elements such as Barbers Pinnacle and Merriown Mountain as well as subtle hills and spurs.

Figure 3.4 I Rural Lands VCU

The Rural Lands VCU is dominated by dryland grass with scattered tree cover. It also supports a limited number of rural residences.

Figure 3.5 | Township VCU

Boggabri is the only town within the Township VCU. It is dominated by buildings and landscapes of streets and gardens.

Figure 3.6 | Surrounding Ranges VCU

The Surrounding Ranges VCU dominates skylines and screen views to areas outside the VCU.

Figure 3.7 I Mines & Infrastructure VCU

The main visual elements of Boggabri & Tarrawonga Coal Mines are their respective OEAs.

4. THE MODIFICATION & VISUAL EFFECT

This section of the report evaluates the various components of the Modification and defines its visual effects in terms of how these elements contrast with the existing landscapes.

4.1 Mine Components

From a visual perspective, the Modification essentially relates to increasing the scale of two major elements: the open cut mining void and OEA. There will be some additional infrastructure required to accommodate an increase in the height of the OEA (see Section 1.2) including the construction of an additional soil stockpile area and water management infrastructure.

The visual effects of the Modification development elements can be divided into major and minor elements. Major elements have the potential for significant visual effect in relation to external view. Minor elements, although not insignificant in horizontal scale, have a less significant visual effect due to lack of vertical scale and visual projection outside of the mine site.

Both the major and minor components already occur within the existing environment because of the existing Boggabri Coal Mine and the neighbouring Tarrawonga Coal Mine.

Modification components that have visual significance include the open cut mining void, OEAs, as well as minor additional infrastructure including water management infrastructure, topsoil stockpile areas and access haul roads.

Major Modification components, shown in Figure 4.2, include:

- Open cut mining void; and
- OEAs.

Minor Modification components include:

- Internal access haul roads and internal light vehicle road network;
- Additional topsoil stockpile area; and
- Additional water management infrastructure.

As stated above, many of these elements are currently in place and to varying degrees create the visual effects of the mine as seen from external areas.

4.2 Mine Voids

Physical Character

Following vegetation removal, topsoil is stockpiled for reapplication on rehabilitated areas post-mining.

Overburden removal then takes place, and will continue from the currently approved areas. This activity is predominately undertaken by conventional truck and excavator operations working the mine void, and in future may be supported by a dragline. The

Modification is largely contained within the basin formed by the natural ridge line of the Willow Tree Range. The ridge line/skyline will not be impacted by the mine void or associated OEA.

The mine voids for the Modification are consistent in physical character and scale with those proposed in the Continuation of Boggabri Coal Mine . They are similar in location and scale to operations that are proximate with Year 5 in the Boggabri EA conceptual mine plans.

Visual Effect

The mine void consists of two significant components. These include the 'highwall' (active mining area) and the 'low wall' which forms part of the OEA. These are the major visual components of the void, however both are generally below natural ground level and are therefore only visible to view points with higher elevations.

The visual effect of the mine void is created by the colour of the raw earth and exposed rock contrasting with the surrounding landscape. The open mining face also creates strong form, shape and line characteristics that differ from the existing landscape. These effects are greatly decreased over distance and by atmospheric conditions such as cloud cover, backlight and heat haze.

The mine voids proposed for the Modification are consistent in physical character with those described in the Boggabri EA.

The location of the void within Leard State Forest, its enclosure by the Willow Tree Range and the OEA eliminates views into the mine void from all locations.

The mine void creates a moderate to high visual effect. This effect cannot be reduced until the final landform is created at the end of all mining activity with only the void left untreated to some degree. However as stated above, these voids are not visible to sensitive receptors in the surrounding landscape so the visual effect has no impact significance.

4.3 Overburden Emplacement Areas

Physical Character

There are two out of pit OEAs, an eastern and southern OEA. The southern OEA will be constructed in the location of the existing OEA, and will develop across the site throughout the life of the Modification.

This OEA is located to the south within the site and will increase in elevation as mining progresses to the north.

The minor eastern out of pit OEA will be positioned to the east of the mine void and adjacent to the Willow Tree Range. The entire mining area will be well shielded in all directions following the completion and rehabilitation of the outer slope of the Southern out of pit OEA.

The Conceptual Modification Mine Plan indicates the proposed OEA height of RL of 395m, an increase of RL 55 m from that currently approved (Figure 4.1). This is consistent with the maximum height as proposed under the conceptual Year 5 mine plan presented in the Boggabri EA.

The modified plan as proposed illustrates that the OEA will be rehabilitated on the western and southern outer faces at the end of 2013, with proposed rehabilitation to the upper limit of the OEA. Progressive rehabilitation on the outer slopes of the OEAs throughout the life of the mine will decrease any visual contrast between the OEA and the surrounding landscape.

Visual Effect

The OEAs will create strong contrasting form in the landscape, and will initially also have strong colour contrasts, Figure 4.3. This contrast and high visual effect will be reduced to moderate/low by landscaping and progressive rehabilitation following mining. The high contrast is somewhat offset by the moderate integration level achieved by the OEA being below the natural forested ridge line of the Willow Tree Range.

Visual effect levels of the Modifications will generally moderate due to the small area of OEA that would be in an un-rehabilitated state at any one time. These effects would reduce to low over five years and very low as tree cover develops and develops foliage colour and texture values.

4.4 Topsoil stockpile area.

The topsoil stockpile as it relates to the Modification is an addition to the existing stockpile area (see Figure 4.1).

Physical Character

Topsoil is stripped and stockpiled before mine voids are created. As illustrated in Figure 4.2, the proposed extension to the topsoil stockpile is over an area of approximately 60 ha. It is positioned on a south facing slope between RL 300m and RL 315m. The height of the stockpile area is restricted to a maximum 3m above ground level at any point to maintain regenerative seed stock.

Visual Effect

The proposed topsoil stockpile area sits within the basin formed by the natural ridge line of the Willow Tree Range. Natural topographic features will limit views to the stockpile area unless from elevated locations.

Visual effects are consistent with those discussed for the voids and OEAs in the Boggabri EA.

4.5 Infrastructure Elements

The additional infrastructure elements such as other buildings, internal haul roads and water management infrastructure will have no significant visual effect, as they will be built in locations where such elements already exist or within the topographic basin where existing Boggabri Coal Mine operations occur.

4.5.1 Access Haul Roads

Physical Character

Two access haul roads will be constructed for the Modification, with a combined area of approximately 8.5 ha. They will service the proposed topsoil stockpile area.

4.5.2 Water Storage Dam

Physical Character

A mine water storage dam with a 180 ML capacity and area of approximately 3.6 ha will be constructed immediately adjacent the proposed topsoil stockpile area.

4.5.3 Above Ground Pipeline

Physical Character

Installation of a temporary 250 mm PE above ground pipeline from Boggabri Coal MW3 and Tarrawonga Coal Mine's Water Storage Dam to facilitate water transfer between the sites at up to 400ML/yr.

Visual Effect

Visual effects of Modifications to both the topsoil stockpile access roads and water management infrastructure are consistent with existing elements and do not change the overall visual effects of existing Boggabri Coal Mine operations.

4.6 Visual Effect Summary

The visual effects of the mine elements vary from high to low. However, most significant high visual effect areas within Boggabri Coal Mine are not visible to external view locations. Only the outer face of the southern OEA is visible to some southern view locations, and the high visual effects of this element are generally quickly reduced by rehabilitation of high visibility outer slopes.

Mine Void

The continued establishment and excavation of the mine void will have a high visual effect throughout the life of the Modification. However, the void will not be visible to external views. The conceptual mine plans for the Modification do not alter this outcome.

OEA

The southern outer face of the southern OEA is the mine element that is most visible to external view. The Modification will result in the OEA reaching a height of RL 395 m, consistent with the conceptual mine plans presented in the Boggabri EA for the proposed Continuation of Mining Project. The rehabilitation of this southern face of the OEA will be progressively undertaken and should be well established by the end of Year 2013 and completed over a following period of approximately the 5 years. During the Modification period, exposed areas of pre-rehabilitated OEA that have high contrast and low integration will generally not exceed 2.5% of a primary view shed and therefore will have a moderate visual effect. If this level is exceeded a high visual effect will temporarily occur until rehabilitation is complete.

The Modifications in Conceptual Year 2013 remain consistent with this outcome.

Other Infrastructure Elements

Although these elements can be large scale, the visual effects are low as they occur adjacent to or replace other elements of similar scale and character.

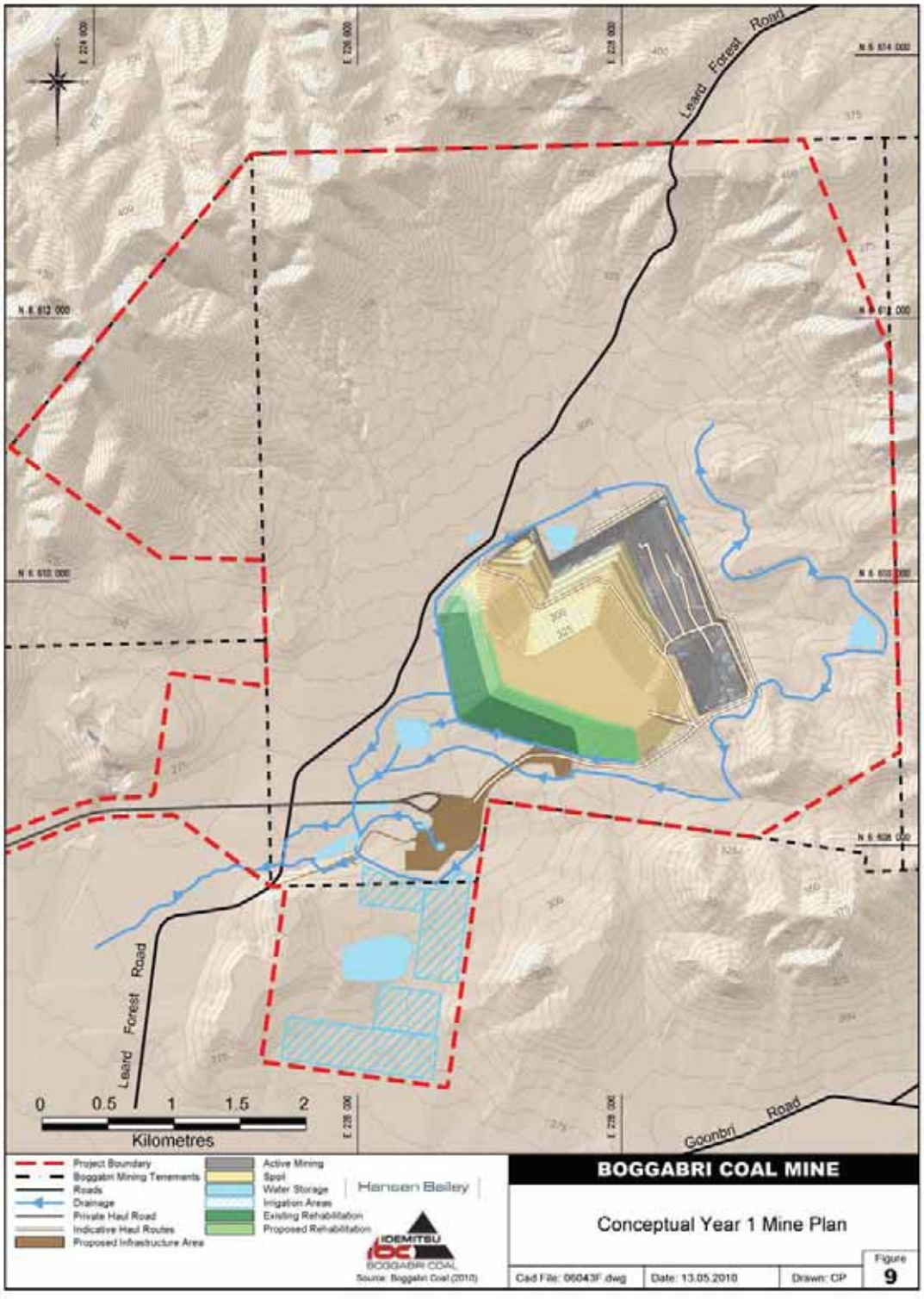

Figure 4.1 | Conceptual Modification Mine Plan

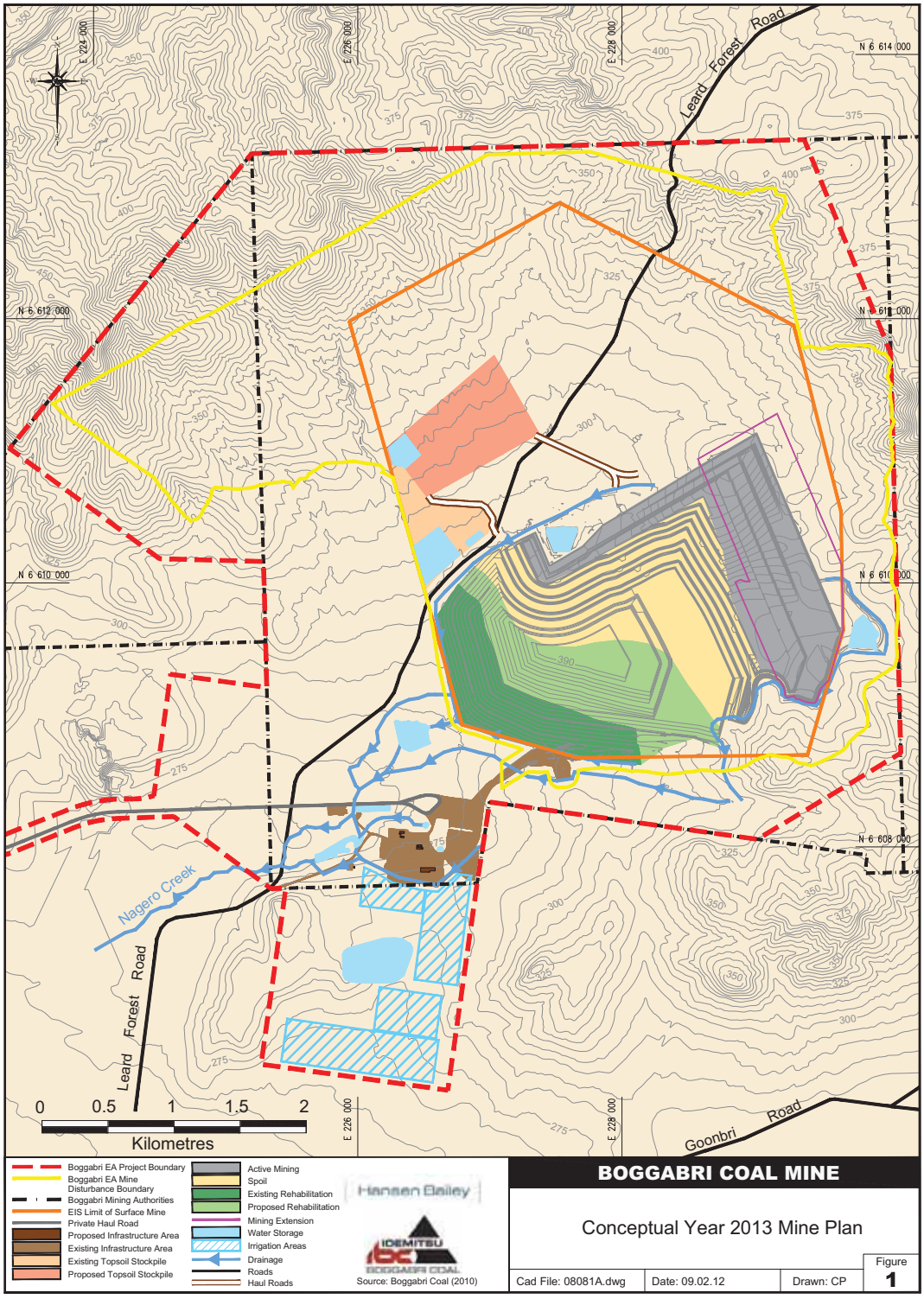

Figure 4.2 | Conceptual Modification Year 2013 Mine Plan

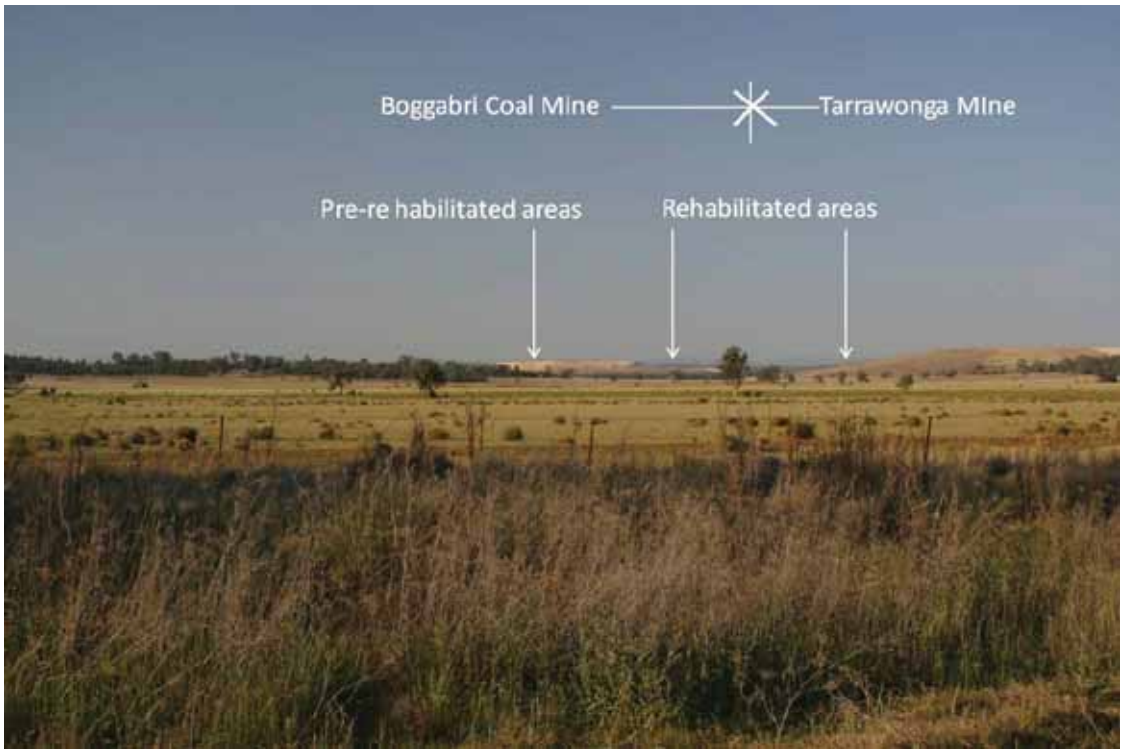

Figure 4.3 | OEA Form

View to Boggabri Coal Mine and Tarrawonga Coal Mine showing OEAs. Rehabilitation can be seen from outside of the site. Rehabilitated OEA slopes have a low visual effect when compared to pre-rehabilitation areas.

5. VISIBILITY AND VISUAL SENSITIVITY

This section of the report evaluates and analyses the visibility of the Modification to external view locations such as homesteads and the Kamilaroi Highway. There has to be visibility to the various mine components for an impact to be incurred.

5.1 Area of primary visual concern within PVC

Figure 5.1 illustrates the view from the existing southern OEA. The area that is seen in this view is the area of visual concern and that has potential views into the mine site and more specifically the OEA as it is built up from its presently approved elevation of RL 340 m to approximately RL 395 m. The general boundaries to the area of visual concern for the Modification are identified below:

As is illustrated in Figure 5.1:

- to the west, the Willow Tree Range;
- to the north, the Willow Tree Range; and
- to the east, the Willow Tree Range.

As is illustrated in Figure 5.2:

- to the south west, Mount Boggabri and associated hills and ranges;
- to the south, the collective of topographic elements such as Robinsons Mount, Barbers Pinnacle and foothills as well as the screening effect of open woodland trees adjacent to and in foreground areas up to 2 km away from potential view locations;
- To the south, based on distance and screening effect of adjoining woodland and foothills, Braymont Road; and
- To the south east, based on distance and intervening tree cover.

5.2 Significant Topographic Features

In addition to the Willow Tree Range (Figure 5.1) and the ranges associated with Mount Boggabri, (Figure 5.2), there are significant topographic features within this area that further limit potential views to the site and creates limited viewing corridors. These topographic features, some dramatic (e.g. Barbers Pinnacle and Robertsons Mount) and some gentle and often not prominent (e.g. foothills to south of site) are important insofar as their influence on the visibility of operations associated with the site (see Figure 5.2). Many of these features will assist in screening various parts of the operations from adjoining areas.

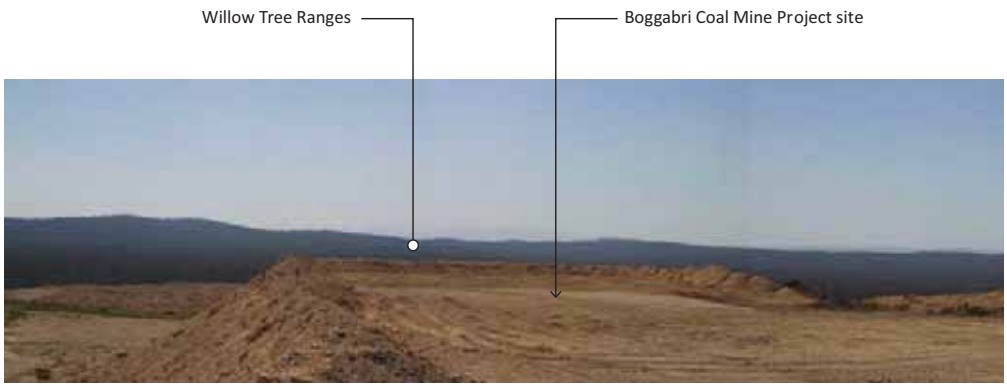

Figure 5.1| Willow Tree Range

The Willow Tree Range surrounds the mine lease to the east, north and west, effectively screening operations from sensitive valley view locations in those directions

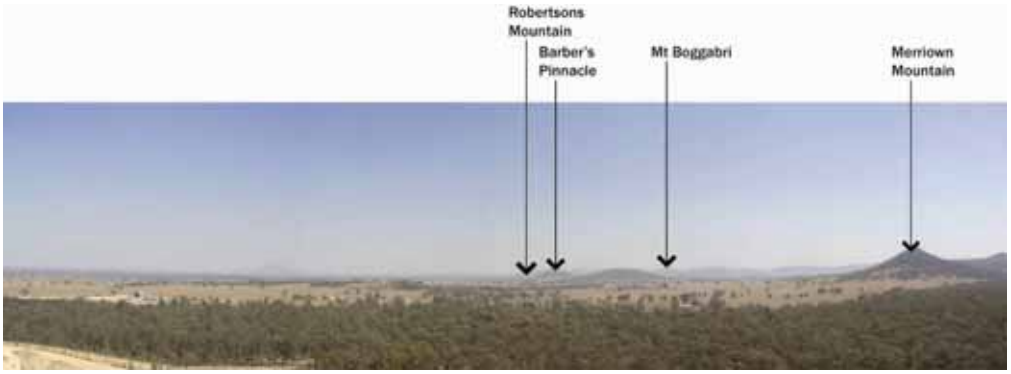

Figure 5.2 | Southern OEA – View to South

A view to the south from the southern OEA illustrates the sensitive visual valley view areas. The screening effect of the scattered foothills to the south of the Boggabri Coal Mine, such as Barbers Pinnacle and Robertsons Mount is evident.

5.3 Significant vegetation areas

Tree cover is important in providing potential screening to the Modification components. It is especially significant when it is close to the viewing locations as shown in Figure 5.3.

In addition to the screening effect of native woodland especially that associated with the eucalypts along the flood plain cultural plantings around rural residences also create screening effects. Cultural plantings and residual tree areas in the foreground or near middle ground can be significant in reducing views to Modification areas. In the same way vegetation around residences or village streets can greatly assist in screening views toward the site.

Figure 5.3 | Manilla Road – View to North

A view from Manilla Road towards Boggabri Coal Mine illustrates the screening potential of trees in the foreground, even if they are not immediately adjacent to the road. It can be seen that even trees in a semi-open woodland configuration can screen mining activity. Gaps in this vegetation pattern illustrate Boggabri Coal Mine's location.

5.4 Distance

The effect of distance, coupled with foreground vegetation, screens views to the site and that of the surrounding forests. For example, based on topography alone, there would be views to the mine site and surrounding forested hills associated with the Willow Tree Range. However given the distance of some 10 km, even Barbers Pinnacle is just visible as are the ridge lines behind the mine site through a small gap in the tree cover as seen from Braymont Road, see Figure 5.4.

5.5 Visibility considerations

There is a range of potentially sensitive viewing locations around the site. These include Boggabri township, rural residences, roads and tourist facilities/recreation areas.

Towns

The only town in the vicinity of Boggabri Coal Mine is the township of Boggabri. The only other village within the vicinity, Baan Baa, is screened by intervening vegetation and topography.

Figure 5.4 | Braymont Road – View to Boggabri Coal Mine

A view from Braymont Road. Distance and foreground trees screen views to the Willow Tree Range and the Boggabri Coal Mine site.

Roads and Railway

The major road in the locality is the Kamilaroi Highway. The other roads within the locality are generally minor roads with the east west Manilla Road being the only regional road; Braymont Road joins the Manilla Road from Boggabri. Therribri Road is located on the western side of the Namoi River and joins the Manilla Road and Harparary Road. Local roads that provide access to the site are the Leard Forest Road and leading off it, the Goonbri Road.

Tourist/Recreation Areas

Tourist activity relates to the Kamilaroi Highway, general travel along it and visitation to Boggabri township. Tourist sites of significance are 'Gins Leap', although not accessible to the general public and the adjacent highway roadside rest area. It is possible to get views of Boggabri Coal Mine from this location.

Leard State Forest, as with all state forests in NSW, is available for forest recreation, especially forest driving, hunting and other recreational activities.

Rural Residences

Rural residences are spread throughout the locality. Significantly, all residences to the north, east and west are unable to view the site due to the Willow Tree Range. Residences in the southern areas are 'potentially' exposed to views of the mining area, especially when the OEA reaches the maximum proposed height of RL 395 m.

Rural Areas

The predominant land use within the visual catchment and the PVC is rural production land, including grazing and cropping and improved pastures in some flood plain areas along the Namoi River. These areas have a low visual sensitivity.

These land uses occur around Boggabri Coal Mine and are evaluated in terms of the north, east southeast, south west and western sector. These sectors are illustrated on Figure 5.5.

Figure 5.5 | View Sectors

5.6 Northern Sector

Immediately to the north of the site are the forested ridges of Willow Tree Range that will screen the Boggabri Coal mining activities from view. The sector as a whole is therefore assigned a low sensitivity.

This is relevant for the Modifications proposed. Proposed additional topsoil stockpile areas will also be screened by the forested ridges to the north.

The view sector is more clearly illustrated in Figure 5.1.

5.7 Eastern Sector

To the east of the site, the Willow Tree Range screens the existing mining operations and those proposed for the Modification from external view, so the sector has low sensitivity.

5.8 South Eastern Sector

Residences

There are a number of rural residences in this sector. There are potential views based on topography so that if there are no foreground trees, there may be some views to the site, especially when the proposed OEA achieves its maximum height of approximately RL 395 m. The Modification may also allow potential views to small sections of the highwall above the currently approved height of RL 340 m. However, if seen, these

views will be to isolated elevated pockets of disturbance contained within the framework of surrounding forest and rehabilitated OEAs.

There are a number of private residences with a 7.5 km radius of the site and these may have a high sensitivity, dependant on visibility and view orientation. Residences beyond this distance would have a moderate sensitivity if they have views of the southern OEA.

Local Roads

The main roads in the south east sector are the Manilla Road and to a lesser extent Goonbri Road. Both roads would have low sensitivity ratings at distances greater than 2.5 km.

5.9 South Western Sector

Boggabri Township

The north eastern corner of the town would have potential views; however the distance of approximately 15 km generally means that even the Willow Tree Range is obscured by foreground and middle ground trees, similarly rendering the mining operations out of view. Also, in terms of distance, sensitivity would be low, even if elements of the Modification could be seen.

Kamilaroi Highway

Views from the highway are restricted by topographic elements such as Robertsons Mount, Barbers Pinnacle, Merriown Mountain, associated ridges and the foothills adjacent to the site.

On leaving Boggabri township, potential views to the south west of Robertsons Mount to the distant hills of the Willow Tree Range are obtained. Similarly, adjacent to 'Gins Leap', fleeting views of the Boggabri Coal Mine are available between Barbers Pinnacle and Merriown Mountain.

At a distance of 10 km from the site, the Kamilaroi Highway would have a low sensitivity to views. Similarly there would be a low sensitivity from the road side rest area due to viewing distance.

Residences

This sector contains a limited number of residences.

Micro-topographic features of the foothills south of the Leard State Forest, in addition to the major features of Merriown Mountain and Barbers Pinnacle, vegetation in the foreground or near middle ground of many residences minimise views of the Modification. In addition, general homestead orientation in directions other than toward the site would also minimise views.

Private residences west of Leard Forest Road are some 8 - 10 km away, creating moderate visual sensitivity to views of mine activity at this distance.

Local Roads

The sector supports a number of local roads including Manilla Road, Therribri Road and Leard Forest Road. The Modification would be visible from parts of Leard Forest Road,

however it is not visible from this road at more distant locations due to roadside forest vegetation cover.

5.10 Western Sector

This sector is totally screened by the Willow Tree Range so no impacts are anticipated.

5.11 Summary

The visibility of the proposed Modification components and ongoing operational area of Boggabri Coal Mine is generally very limited. To the east, north and west, the forest covered Willow Tree Range completely encloses and screens the existing active operations of Boggabri Coal Mine. To the south east and south west, there are a number of topographic elements that also screen the site.

There are some limited views from the Kamilaroi Highway, the roadside rest area at 'Gins Leap', very limited views from rural residences and views from some local roads. Generally the visual sensitivity of these view locations will be moderate to low. The exception would be residences located inside a distance of 7.5 km from the site that have clear views from primary view areas around the homestead to the proposed OEA.

As none of the elements of the Modification are higher in elevation or physically different than those proposed in the Continuation of Mining Project and described in the Boggabri EA, there would be no change to the visibility of mine operations within the site. The one difference is the time at which the OEAs would achieve the maximum height proposed.

6. VISUAL IMPACT AND MITIGATION

The visual effects of the various elements of the Modifications were discussed in Section 4 of this report. The visual sensitivity levels of the Modification were discussed in Section 5 of this report.

This section considers the visual impact of the Modification elements based on visual effect and sensitivity values and outlines strategies to mitigate those impacts. The impact of the development will vary according to the visual effect of the Modification, its visibility, and the visual sensitivity of areas from which it is seen. These three factors are considered together as indicated in Figure 2.5 to determine impact levels. The visual impacts are considered in relation to the various sectors discussed in Section 5.

6.1 North Sector

Residences and roads in this sector are screened from view by the Willow Tree Range and will not experience any visual impacts from the Modification.

6.2 Eastern Sector

There will be no visual impacts from the Modification on residences in the eastern sector as views will also be screened by the Willow Tree Range.

6.3 South Eastern Sector

Rural Residences

There is some potential for views of the Modification from some residences in this sector. However, site and aerial photo evaluation have indicated this would be very limited. Residences in this sector will have a high sensitivity up to 7.5 km with moderate sensitivities past this distance. This, coupled with moderate to low visual effects creates moderate to low visual impacts associated with the proposed OEA height increase.

A high impact would only occur if a high visual effect were experienced due to excessive exposure of pre-rehabilitated OEA. It is considered that areas of the open cut highwall potentially exposed to view from this sector will be limited, small scale and fragmented. Such an impact would reduce to moderate and low following rehabilitation of the exposed OEA faces.

In all, any high to moderate impact would only occur during the active development of the OEA as the ongoing rehabilitation on the outer slopes of the OEA will reduce effects and impact levels to very low and insignificant over time.

Manilla Road

The visual impact on this road would be low, reflecting moderate to low visual effects and a low visual sensitivity. This would reduce to very low and become insignificant and barely perceivable when rehabilitation of the outer face of the OEA is completed.

Goonbri Road

This road has exposure to the outer face of the OEA and the upper parts of the open cut highwall, but visual effects would generally be moderate to low. At this distance (i.e.

greater than 2.5 km) the visual sensitivity is defined as low. Visual impact levels are therefore low and will reduce to very low when rehabilitation is complete.

The increase in OEA height as proposed for the Modification would not alter the visual impact of views from this location due to consistent distance and visual sensitivity.

6.4 South Western Sector

Rural Residences

Private residences located in this sector are more than 8 km away from the Boggabri Coal Mine site. These residences would have a moderate visual sensitivity. Given that visual effects are likely to be low to moderate, low impacts would be experienced in this sector. If high visual effects do occur due to excessive exposure of pre-rehabilitated OEA, a high impact could occur until rehabilitation is established on the OEA.

The Modification may bring forward the timing of exposure of the pre-rehabilitated OEA due to the increase in height currently proposed. However, following that initial high impact, progressive rehabilitation of the OEA proposed for the Modification will reduce the visual effect.

Boggabri Township

Although parts of the site would potentially be visible from Boggabri township to the west of Barbers Pinnacle, foreground screening within the town by houses, buildings and street and garden planting generally eliminates these views.

Further outside the town, the adjoining woodlands along the Namoi River screen views from the edges of town. In keeping with these screening effects, the township has a low sensitivity and there is no visual effect or impact on the town.

The Modifications do not alter the visual effects of the site from Boggabri township.

Kamilaroi Highway

The greatest potential impact on this road occurs north of the township of Boggabri on the journey north for up to 5 km. There may be potential views onto the southern face of the OEA. However the visual effect is limited at this distance and the visual sensitivity is low. There would be a low impact on views from the Kamilaroi highway if any part of the OEA is seen, including the proposed increase in elevation of RL 55 m.

Therribri Road

There are potential views from Therribri road to the OEA. The visual effect of the Modification is that the heightened OEA is likely to be visible by Year 2013. The visual effect at this distance would still be moderate, reducing to low following rehabilitation establishment. At this viewing distance (10 km), visual sensitivity is low, creating a low visual impact level. This would reduce to very low and becoming insignificant and barely perceivable following rehabilitation development. While the Modification proposes to increase the total approved height of the OEA, the visual effect to this sector is unchanged.

Tourist Localities

With the exception of Boggabri township and the Kamilaroi Highway, there are no significant tourist destinations in the PVC, with the possible exception of the roadside

rest area on the highway below Mount Boggabri. The mining area will be over 10 km away from this location.

Visual effects of the OEA before rehabilitation commences will be small in area and will create a moderate to low visual effect at this distance. Also due to the distance, visual sensitivity would be low.

Visual impacts would remain low and would be further reduced and become insignificant following rehabilitation of the OEA.

6.5 Western Sector

There will be no visual impacts from the Modification on residences in this sector as views will be screened by the Willow Tree Range.

6.6 Impact of Night Light

General

The visual effect of lighting surrounding the site will vary. It will be influenced by the locality of operations on site, the relative level at which the viewing location is situated and the presence of any off-site barriers such as topographic features and / or screening vegetation.

As with existing Boggabri Coal Mine operations, there are two types of lighting effects that could be experienced due to the Modification. The first effect is where the light source is directly visible, and will be experienced if there is a direct line of sight between a viewing location and the light source. Light sources would be marginally more elevated due to the proposed increase in elevation of RL 55 m.

The second effect relates to the general night-glow (diffuse light) that results from light of sufficient strength being reflected into the atmosphere. This type of effect will create a strong local focal point and the effect will vary with distance and atmospheric conditions such as fog, low cloud and / or dust particles which all reflect light.

Both of these light effects already exist in the locality of the approved Boggabri Coal Mine and Tarrawonga Coal Mine operations and are discussed further below in relation to the Modification.

Direct Light Effects

Direct light effects are generally restricted to vehicles lights and lighting of active mining areas, as other operational light would be hooded.

Generally, truck and vehicle lighting in active mining areas will be screened by topography, vegetation and eventually by the OEA itself. For the equipment operating at night on exposed faces of the OEA, lighting effects may be projected outside the site. Should this happen, the light effects would be more slightly elevated due to the proposed increase of RL 55 m in elevation of the OEA.

Diffuse Light Effects

Both the existing Boggabri Coal Mine and Tarrawonga Coal Mine operations already contribute diffuse light effects into the night sky. Depending on the proximity of the viewing zone, this glow will not create a significant visual effect. Further, the influence

of surrounding mining operations and associated lighting activities will reduce the visual impact of diffuse light associated with the Modification. The diffuse night lighting effect of the Modification operations would be similar to that which is currently experienced and may increase slightly reflecting the increase in operational intensity.

Night Light Impacts

The visual effect of lighting associated with the Modification would be at a similar level to that currently approved and experienced.

The major mitigation elements against night light effects from Boggabri Coal Mine are topography, vegetation and distance to sensitive receptors. All mitigate light effects to a level that will not create a significant visual impact.

6.7 Visual impact summary

The potential for visual impacts is restricted in many areas surrounding Boggabri Coal Mine due to the visual screening effects of the Willow Tree Range, which effectively eliminates the potential for any impact to the north east and west of the mine site.

The visual impacts associated with the Modification to the south are created for the greater part by the OEA achieving an increased RL of 395 m and being of greater visibility from the southern sectors. The impacts of the infrastructure components of the Modification are insignificant as they are collocated with other elements and are not visible from any sensitive receptor locations.

The visual impacts created by the heightened OEA relates to the outer face before it is progressively rehabilitated. This will limit visual effects to moderate and low, reducing to low following rehabilitation and very low following establishment of tree cover. This will result in low impacts to any sensitive receptors around the site that have views of the OEA.

6.8 Mitigation

Mitigation measures in relation to reducing visual impact relevant to the Modification include:

- On site treatments to reduce visual effects and lighting impacts; and
- At viewer location treatments to reduce visual sensitivity.

On site treatments involve rehabilitation of landforms and land cover, while viewer location treatments could involve a range of treatments to screen views, filter views and or reorientate primary views should this be needed. It should be noted that on site treatments are already being carried out as they relate to OEA establishment and rehabilitation.

The need for Off site treatments at viewer locations is considered unlikely and would only be considered if a high impact is experienced at a residence for a substantial period.

On site treatments to be implemented for the Modification are consistent with those already being implemented by Boggabri Coal and include:

- Additional infrastructure constructed in forest tones (i.e. green, grey, cream) to blend with the surrounding natural environment as far as practical;
- A continuation of existing Boggabri Coal rehabilitation programs;
- Implementation of already completed landform design of the eastern and southern OEAs and associated drainage structures;
- Establishment of visual and ecological forest planting patterns in rehabilitation areas to achieve landscape patterns that emulate existing forest colour and texture continuums in the landscape;
- Where possible and consistent with health and safety requirements, continue to manage light sources so they are hooded or directed away from sensitive receivers to avoid direct light spillage from the site; and
- Keep light sources behind the outer wall of the OEA, constructing the outside wall of the OEA during daylight hours where possible.

7. CONCLUSION

The visual impacts associated with the Modification are anticipated to be minimal on the area surrounding Boggabri Coal Mine. Limited visual impacts will occur due to the increase in the height of the OEA, however the Modification as proposed remains consistent with the conceptual mine plans as presented in the Boggabri EA.

The location of the Boggabri Coal Mine operation within the Leard State Forest limits its visibility from surrounding sensitive receptors. The Willow Tree Range will screen views from the north, east and west, eliminating any possibility of visual impacts in these sectors.

The visual impacts on southern sector viewing locations are also limited by topographic elements and vegetation to only allow glimpses of limited mining activity by way of the outer face of the OEA. This OEA will be constructed and progressively rehabilitated through the life of the Modification, reducing any potential for high to moderate impacts to low. As tree cover becomes more established on the rehabilitated OEA, impacts will be further reduced, to become insignificant.