# Annual Environmental Management Report Boggabri Coal Pty Limited

March 2008

| | | | |
|---|---|---|---|
| **Name of Mine** | Boggabri Coal Mine | | |
| **Mining Titles/Leases** | CL368 | | |
| **MOP Commencement Date** | 1 January 2006 | **MOP Completion Date** | 15 November 2011 |
| **AEMR Commencement Date** | 1 January 2007 | **AEMR Completion Date** | 31 December 2007 |
| **Name of Leaseholder** | Boggabri Coal Pty Limited | | |
| **Name of Mine Operator** | Downer EDI Mining Pty Ltd | | |
| **Reporting Officer** | Thor Berding | | |
| **Title** | General Manager | | |
| **Signature** | | | |
| **Date** | 26 March 2008 | | |

| | |
|---|---|
| Author: | Joe Rennick |
| Reviewer: | Thor Berding |
| Approved by: | Thor Berding |
| Signed: | ..... |
| Date: | 26 March 2008 |
| Distribution: | 1 x Department of Primary Industries; 1 x Department of Environment and Conservation; 1 x Department of Planning; 1 x Narrabri Shire Council |

# Glossary

| | |
|---|---|
| **Colliery Holding** | A colliery holding registered under the Mining Act, 1992 for coal mining operations. |
| **Contamination of Land** | As defined in the Contaminated Land Management Act (1997) as meaning "the presence in or under the land of a substance at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment. |
| **Disturbed Area** | The surface area disturbed during mining or any mining purpose. It includes all infrastructure facilities, emplacement area, residue disposal area, road and rail access, soil stockpile area, product stockpile area, water diversion and storage structures. |
| **Endangered Flora/Fauna** | Species identified as endangered in the schedules of the Threatened Species Conservation Act (1995) and the Environment Protection and Biodiversity Conservation Act (1999). |
| **Extraction Area** | The area proposed to be mined during the MOP period, including batters and pre-strip areas. |
| **Flood prone land** | Land within 1 in 100 year flood boundaries as shown on regional maps. Where maps are not available other means may be required to assess flood potential. |
| **Inspector of Mines** | Means an officer of the Department of Minerals Resources authorised as an Inspector under the Mining Act, 1992. This includes Department of Minerals Resources Environmental Officers. |
| **Landscape Planning** | The sympathetic integration of the MOP's rehabilitated landforms, revegetation strategies with the environment surrounding the mine to achieve drainages and predetermined environmental outcomes and including land use (flora and fauna habitat and visual amenity) |
| **Limits to Extraction** | The boundary of an area of land from which mineral can not be extracted due to a provision, restriction or condition imposed by a government instrument. |
| **Mine Life** | The expected extent and scope of the mine as approved in the "Development Consent". In most circumstances this will be as described in the Environmental Impact Assessment on which approval and grant of lease were based. |
| **Mining Leases** | Leases granted under the Mining Act 1992 or any previous mining legislation. |
| **Mining Purposes** | The construction, maintenance or use in or in connection with mining operations of buildings, plant, road, emplacement, stock pile and other infrastructure |
| **Pollution** | The Protection of the Environment Operations Act (1997) comprehensively defines water, air and noise pollution. In essence: |
| **Water pollution** | Means introducing anything which makes or is likely to make the water detrimental, undrinkable, poisonous, harmful or unsuitable for use, or changing the condition of the water. |
| **Noise pollution** | Means the emission of an offensive noise |
| **Air pollution** | Means the emission into the air of any impurity including smoke, dust, gases, mists odours or radioactive substances. |
| **Land pollution** | Means the degradation of land because of the disposal of waste. |
| **Processing Wastes** | Tailings from ore beneficiation and processing |
| **Rural Land Capability Classification** | A method of land classification published by the Soil Conservation Service of the Department of Land and Water Conservation. |

| | |
|---|---|
| **Shaped Emplacement Areas** | Mine and processing waste emplacements shaped to final design contours. |
| **Soil Stripping Depth** | The depth from the surface to which soil material which is to be removed in the preparation of land for mining or mining purposes. |
| **Sublease** | An interest registered under Section 161 of the Mining Act, 1992. |
| **Threatened flora/fauna** | Species defined as threatened in the schedules of the Threatened Species Conservation Act (1995) and Environment Protection and Biodiversity and Conservation Act (1999). |
| **Unshaped Emplacement Areas** | Active mine and processing waste emplacements not shaped to the final design contours. |
| **Water - Clean water** | Water from undisturbed vegetated parts of the site. Fit for diversion or direct discharge to receiving streams. |
| **Water - Dirty water** | Water from disturbed but otherwise uncontaminated parts of the site. Fit for discharge, except for suspended solids which may require settling. |
| **Water - Controlled Discharge** | Typically water, saline but otherwise uncontaminated, collected within open cuts or underground mine workings as a result of groundwater seepage. Able to be discharged under certain conditions. For example, saline water which may be discharged under high flow conditions as part of the Hunter River Salinity Trading Scheme. |
| **Water - Contaminated Water** | Water containing potential contaminants or pollutants and not fit for discharge. |

# Abbreviations

| | |
|---|---|
| **AEMR** | Annual Environmental Management Report |
| **AN** | Ammonium Nitrate |
| **ANFO** | Ammonium Nitrate Fuel Oil mix |
| **BC** | Boggabri Coal |
| **BCM** | Boggabri Coal Mine |
| **BCT** | Boggabri Coal Terminal |
| **CL** | Coal Lease |
| **CMA** | Catchment Management Authority |
| **DEC** | Department of Environment and Conservation |
| **DEDIM** | Downer EDI Mining PTY LTD |
| **DMR** | Department of Minerals Resources |
| **EIS** | Environmental Impact Statement |
| **EMP** | Environmental Management Plan |
| **EMS** | Environmental Management Strategy |
| **EPL** | Environmental Protection License |
| **GSC** | Gunnedah Shire Council |
| **IAR** | Idemitsu Australia Resources Group |
| **LOX** | Limit of Oxidation |
| **MIA** | Mine Infrastructure Area |
| **MMU** | Mobile Mixing Unit |
| **MOP** | Mine Operations Plan |
| **MSDS** | Material Safety Data Sheet |
| **Mtpa** | Million tonnes per annum |
| **MW** | Contaminated Water Dam |
| **NSC** | Narrabri Shire Council |
| **ROM** | Run Of Mine |
| **RTA** | Roads and Traffic Authority |
| **SD** | Sediment Dam |
| **tpa** | Tonnes per annum |
| **WCM** | Whitehaven Coal Mining Pty Ltd |

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# 1. EXECUTIVE SUMMARY

The Boggabri Coal Mine (BCM) is located approximately 15km north-east of the township of Boggabri in north-western New South Wales. The mine area contains considerable open cut and potential underground reserves.

The BCM includes development of an open cut coal mine with associated infrastructure including a private haul road, rail loading facility and mine infrastructure area including workshops, administration and coal processing and handling.

Production is based on 1.5 million tonnes of product coal per annum (Mtpa), with potential to progressively increase production to 5 Mtpa.

The Boggabri Coal Mine's Mine Operations Plan (MOP) was approved in January 2006 and construction and mine development activities began forthwith. Topsoil stripping commenced in the southern area of the coal lease area during May 2006. Mining operations are undertaken using hydraulic excavators and trucks and the first coal was delivered to the ROM pad in October 2006. The first six years of mining will concentrate on two separate, progressively developed pits (Merriown Pit and Jeralong Pit) in the south of the coal lease area.

This document describes all environmental management related activities during the second year's operation of the BCM.

| | | | |
|---|---|---|---|
| **Name of Mine** | Boggabri Coal Mine | | |
| **Mining Titles/Leases** | CL368 | | |
| **MOP Commencement Date** | 1 January 2006 | **MOP Completion Date** | 15 November 2011 |
| **Name of Leaseholder** | Boggabri Coal Pty Limited | | |
| **Name of Mine Operator** | Downer EDI Mining PTY LTD | | |
| **Reporting Officer** | Thor Berding | | |
| **Title** | General Manager | | |
| **Signature** | | | |
| **Date** | 26 March 2008 | | |

# 2. INTRODUCTION

In December 1991, Idemitsu Boggabri Coal Pty Limited (IBC) became the sole owner of the Boggabri Coal Mine (BCM). IBC is 100% owned by Idemitsu Kosan Co. Ltd (IKC), a privately owned Japanese resource company whose main business consists of importing crude oil, refining oil and the retail sale of fuel products in Japan.

IKC has been involved in the Australian coal mining industry for 25 years, currently operating the Ensham Mine in central Queensland, Muswellbrook Mine in the Hunter Valley, New South Wales and the Boggabri Coal Mine in the Gunnedah Basin. In January 2007, the Idemitsu Australia Resources Group (IAR) underwent an internal reorganisation. As part of the reorganisation, the assets and undertaking of Idemitsu Boggabri Coal Pty Limited were transferred to Boggabri Coal Pty Limited (BC), a newly constituted wholly owned subsidiary of Idemitsu Australia Resources.

The Boggabri Coal Mine is located approximately 15 km northeast of Boggabri and lies within the Leard State Forest. Access to the site is via the Leard Forest Road (SR12) off the Boggabri-Manilla Road (MR357). The area lies immediately to the north of the Tarrawonga Mine, a joint venture between BC and Whitehaven Coal Mining Pty Limited (WCM).

Development of the project commenced in 1976, and in the early 1980's numerous environmental and engineering studies were prepared. In the mid 1980's these studies were reviewed and in 1988 an Environmental Impact Statement (EIS) was submitted for the project. The project was granted development consent on 25 August 1989. Coal Lease 368 was subsequently granted on 15 November 1990 for a period of 21 years to 15 November 2011.

Between May and July 1979, a box cut pit (approximately 150m long and 35m wide was developed to the Merriown seam in the south west of the lease area near the Merriown seam limit of oxidation (LOX) line. A 100 tonne bulk sample of Merriown seam coal was initially extracted and in November 1981 a further 10 tonne sample was excavated from the box cut. In November 1993 a bulk sample of approximately 2,000 tonnes of Merriown seam was extracted by auguring operations at the box cut.

Consistent with the lease expiry date, the Mine Operations Plan (MOP) was prepared to cover a six year period, from when operations commenced in early 2006 extending to the end of the lease period. It is the intention of BC to seek renewal of CL368 at the end of the current lease period to allow mining operations to continue uninterrupted.

On 11 January 2006, IBC was granted an Environmental Protection Licence (EPL 12407) and the Mine Operations Plan was submitted and approved on 25 January 2006. Subsequent to the granting of the required approvals, construction of the project began.

Constructed items included a 17 km bitumen sealed private coal haul road from the mine to the rail loading facility including a bridge over the Namoi River and Kamilaroi Highway; a Run of Mine (ROM) pad; a coal crusher, conveyor and truck load out facility; a 3 km rail loop and turnout, a product stockpile and precision train loading facility; and the mine infrastructure area including

workshop and offices. These construction activities were completed by early November 2006.

In accordance with the EIS prepared by BHP-AGIP-Idemitsu Joint Venture, current development consent conditions allow development of the BCM at a rate of 5 Mtpa. However, due to limits on rail capacity, initial production has been restricted to approximately 1.5 Mtpa. Provided that market conditions remain favourable, BC intends to expand the operation once rail and port capacity restrictions are resolved. It is possible that this expansion could occur within the first six years of operation.

Forest clearing began in February 2006 and Stage 1 clearing including timber recovery was completed in August 2006. Topsoil stripping activities commenced in May 2006 and the first coal was mined and delivered to the ROM pad in October 2006.

Initially, coal is mined and transported to the run of mine (ROM) crushing facility located in the south western corner of the mine lease, crushed and blended (without further beneficiation) to produce an export quality steaming coal and a product suitable for pulverised coal injection applications.

Product coal is hauled 17km via a bitumen sealed private coal haul road to the Boggabri Coal Terminal (BCT) facility for loading and rail transport to the Port of Newcastle.

The BCM employs approximately 100 mining and maintenance services employees and 20 transport services employees. Local job opportunities have been created as many positions have been filled by local residents. This is outlined in further detail later in this report.

Mining operations are undertaken on a two shift, seven day,10.5 hours per shift basis, with maintenance activities occurring 24 hours per day, 7 days a week.

Mining commenced from the south of the open cut area utilising large hydraulic excavators and rear dump trucks. The first six years of mining will concentrate on two separate, progressively developed pits (the “Merriown“ and “Jeralong” pits).

Rehabilitation of in-pit and ex-pit emplacement areas will be undertaken progressively. The rehabilitation objective will be to achieve a similar structure to existing native forest composition with emphasis on the following commercial native species: Narrow-leaved Ironbark (*Eucalyptus crebra*), White Box (*E. albens*), Pilliga Box (*E. pilligaensis*) and Cypress Pine (*Callitris glaucophylla*). The mine infrastructure area will be rehabilitated to pasture.

Clean water is diverted around the mine site via diversion channels and all dirty water is collected in purpose built sediment dams where sediment is allowed to settle prior to discharge. Potentially contaminated water is collected and utilised within the mine site.

Facilities associated with the BCM are illustrated in Figure 5 which is a plan showing all mine infrastructure.

## 2.1 Consents, Leases and Licences

Table 1 summarises the leases, consents and licenses that have been granted for the BCM.

| Description | Date Granted | Expiry/Duration |
|---|---|---|
| Development Consent 79/1443(z)2 | 22 August 1989 | 15 November 2011 |
| Coal Lease 368 | 15 November 1990 | 21 Years |
| Water Access License No: 2571 | 1 July 2004 | In perpetuity |
| Water Access License No: 2572 | 1 July 2004 | In perpetuity |
| Water Access License No: 2595 | 1 July 2004 | In perpetuity |
| Water Access License No: 2596 | 1 July 2004 | In perpetuity |
| Water License 90BL252849 | 1 November 2006 | 30 October 2010 |
| Water Licence 90BL253854 | 6 July 2007 | 5 July 2012 |
| Mine Operations Plan | 25 January 2006 | 15 November 2011 |
| Environmental Protection Licence 12407 | 11January 2006 | Anniversary<br>11 January 2007 |

**Table 1 BCM Consents Leases and Licences**

## 2.2 Mine Contacts

The principle points of contact at the BCM are:

**General Manager**: **Thor Berding**

Company: Boggabri Coal Pty Limited

Address: 386 Leard Forest Rd, Boggabri, NSW, 2382

Phone: 02 6743 4775

Fax: 02 6743 4496

**Environmental Coordinator**: **Joe Rennick**

Company: Boggabri Coal Pty Limited

Address: 386 Leard Forest Rd, Boggabri, NSW, 2382

Phone: 02 6743 4775

Fax: 02 6743 4496

**Mine Manager**: **Gus Jorquera**

Company: Downer EDI Mining Pty Ltd

Address: 386 Leard Forest Rd, Boggabri, NSW, 2382

Phone: (0427) 460 414

Fax: 0429 987 523

## 2.3 Actions Required at Previous AEMR Review

Actions required at the previous AEMR review were mainly concerning water management onsite, specifically issues with the construction and design of the northern and eastern clear water diversion drains.

Required actions are presented in the table below.

| No | Issue / Observation | Action Required | Where dealt with in this AEMR |
|---|---|---|---|
| 1 | **Plan of Infrastructure** | Provide DPI with a plan detailing location & identification of all infrastructure | **Attachment 2** |
| 2 | **Noise compliance at "The Rock"** | Continue working with the residents of "The Rock" and DECC to ensure noise criteria limits are met. Provide a review of this issue in this AEMR. | **3.6** |
| 3 | **Dust monitoring** | Undertake a review of dust monitoring analysis to identify correct identification of cumulative impacts between Boggabri & Tarrawonga and provide a report to DPI & DECC. | **3.2** |
| 4 | **Water management** | Undertake a review of water management onsite & provide DPI & DECC the following:<br>• A complete site water balance (quantifying inputs, outputs & storage capacities) which is to be reviewed annually in AEMR.<br>• An action plan (or Pollution Reduction Program) that addresses the clean water diversion non compliance which outlines remediation actions to ensure compliance with POEO Act. | **2.10** |
| 5 | **Diversion contours & rock lined channel structures** | Provide DPI a detailed design of the diversion contours & rock lined channel structures prior to construction | **2.10** |
| 6 | **AEMR – Section 6 -** | Section 6 must include more detailed information covering performance, rehabilitation, proposed improvements, programs, key performance indicators etc. | **6.1** |
| 7 | **AEMR Plans** | Provide AEMR Plans as per the DPI guidelines | **Attachments 5 & 6** |

| | | | |
|---|---|---|---|
| **8** | **AEMR** | Section 1.3 should be expanded to provide sufficient detail of the actions required by the DPI following its environmental review of mining operations and a copy of these requirements should be included in the AEMR's appendices.<br>And<br>Section 3.1 should include a map showing the location of air quality monitoring sites (and other environmental monitoring sites), as well as annual averages for deposited dust and PM10 air quality. | **1.3**<br><br><br><br><br><br>**Attachment 3** |

**Table 2 Actions Required**

# 3. OPERATIONS DURING THE REPORTING PERIOD

Boggabri Mine operational mining activities have been confined to areas cleared in 2006 with no new areas being disturbed during the reporting period, 2007.

## 3.1 Exploration

### 3.1.1 Exploration Activity

Exploration drilling was undertaken during 2007 to confirm coal quality, examine possible fault locations and further define Tarrawonga and Templemore seam extents within the identified open cut resource area at Boggabri. The programme comprised the drilling of twelve fully cored HQ drillholes to intersect the Templemore Seam. An additional six partial redrills were required at various sites. Refer to Table 3 and Figure 2 for details and locations of drilling undertaken.

**Figure 1 2007 Exploration Drilling in Leard State forest**

### 3.1.2 Drill Hole Sealing

Boggabri Coal continued its drillhole cement sealing programme in 2007. One deep drillhole sunk by previous project owners, 14 drillholes from previous Boggabri Coal programmes and 12 drillholes from the 2007 programme were sealed. Details of all drillholes sealed in the course of 2007 exploration are provided in Table 3, and their locations are shown in Figure 2.

| Hole_ID | East_MGA | North_MGA | Collar | TD | Drill_Start | Drill_Finish | Hole_Status | Seal_Date |
|---|---|---|---|---|---|---|---|---|
| AB1145 | 226568.81 | 6612164.09 | 344.8 | 266.00 | 11/12/1978 | 22/01/1979 | Sealed IBC | 17-18/7/2007 |
| IBC2120 | 228205.04 | 6610264.20 | 308.4 | 107.90 | 29/10/2005 | 3/11/2005 | Sealed IBC | 12-14/5/07 |
| IBC2121 | 228609.80 | 6610172.12 | 313.1 | 114.10 | 3/11/2005 | 8/11/2005 | Sealed IBC | 14/05/2007 |
| IBC2123A | 228343.71 | 6610748.26 | 302.7 | 123.97 | 10/11/2005 | 2/12/2005 | Sealed IBC | 10/05/2007 |
| IBC2130 | 228786.08 | 6610535.53 | 311.3 | 137.00 | 12/07/2006 | 31/07/2006 | Sealed IBC | 10/05/2007 |
| IBC2131 | 229349.41 | 6610284.16 | 328.1 | 119.84 | 1/08/2006 | 7/08/2006 | Sealed IBC | 11/05/2007 |
| IBC2132 | 229344.34 | 6609783.64 | 315.0 | 65.97 | 8/08/2006 | 10/08/2006 | Sealed IBC | 11/05/2007 |
| IBC2133 | 228891.68 | 6609806.51 | 307.6 | 61.94 | 11/08/2006 | 22/08/2006 | Sealed IBC | 11/05/2007 |
| IBC2134 | 228864.33 | 6610029.08 | 322.7 | 94.00 | 22/08/2006 | 23/08/2006 | Sealed IBC | 14/05/2007 |
| IBC2135 | 228891.83 | 6610281.07 | 319.3 | 120.00 | 23/08/2006 | 23/08/2006 | Sealed IBC | 10/05/2007 |
| IBC2136 | 228429.37 | 6610114.17 | 307.5 | 54.00 | 24/08/2006 | 24/08/2006 | Sealed IBC | 13/05/2007 |
| IBC2137 | 228436.60 | 6610041.48 | 304.8 | 33.00 | 24/08/2006 | 24/08/2006 | Sealed IBC | 13/05/2007 |
| IBC2140 | 228665.69 | 6609410.69 | 302.9 | 68.90 | 1/09/2006 | 14/09/2006 | Sealed IBC | 12/05/2007 |
| IBC2142 | 228886.99 | 6609068.91 | 314.8 | 78.95 | 17/09/2006 | 20/09/2006 | Sealed IBC | 12/05/2007 |
| IBC2144 | 228765.78 | 6608982.50 | 319.3 | 96.50 | 20/09/2006 | 20/09/2006 | Sealed IBC | 12/05/2007 |
| BC2147 | 225667.75 | 6610107.35 | 299.8 | 174.34 | 1/06/2007 | 6/06/2007 | Sealed BC | 18/07/2007 |
| BC2147R | 225670.47 | 6610110.40 | 299.7 | 43.30 | 4/07/2007 | 5/07/2007 | Sealed BC | 17/07/2007 |
| BC2148 | 226968.07 | 6611721.81 | 319.3 | 249.14 | 6/06/2007 | 21/06/2007 | Sealed BC | 21/6-11/10/2007 |
| BC2149 | 226560.34 | 6612161.61 | 345.1 | 257.94 | 21/06/2007 | 1/07/2007 | Sealed BC | 17-18/7/2007 |
| BC2149R | 226565.09 | 6612162.11 | 344.9 | 102.10 | 1/07/2007 | 4/07/2007 | Sealed BC | 17-18/7/2008 |
| BC2150 | 227383.90 | 6612272.05 | 320.0 | 255.15 | 5/07/2007 | 16/07/2007 | Sealed BC | 2/8-10/10/2007 |
| BC2150R | 227383.67 | 6612275.21 | 320.1 | 99.34 | 16/07/2007 | 17/07/2007 | Sealed BC | 10/10/2007 |
| BC2151 | 228038.85 | 6612295.81 | 325.3 | 341.24 | 19/07/2007 | 29/07/2007 | Sealed BC | 10/10/2007 |
| BC2152 | 226337.94 | 6610702.02 | 306.5 | 243.19 | 7/09/2007 | 23/09/2007 | Sealed BC | 11/10/2007 |
| BC2152A | 226338.58 | 6610700.11 | 306.6 | 54.24 | 31/07/2007 | 4/08/2007 | Sealed BC | 4/8-11/10/2007 |
| BC2153 | 228151.64 | 6611271.26 | 303.3 | 310.22 | 8/08/2007 | 5/09/2007 | Sealed BC | 10-11/10/2007 |
| BC2153A | 228151.14 | 6611273.29 | 303.4 | 32.12 | 3/08/2007 | 7/08/2007 | Sealed BC | 10/10/2007 |
| BC2154A | 228853.52 | 6611285.07 | 315.0 | 367.01 | 25/09/2007 | 2/11/2007 | To be sealed | |
| BC2155 | 228711.18 | 6612333.55 | 332.5 | 360.67 | 1/11/2007 | 1/12/2007 | To be sealed | |
| BC2156 | 228860.43 | 6611778.20 | 322.7 | 345.17 | 2/11/2007 | 2/12/2007 | To be sealed | |
| BC2157 | 229654.22 | 6611269.51 | 340.0 | 372.66 | 1/12/2007 | 22/01/2008 | To be sealed | |
| BC2158 | 229615.46 | 6610536.67 | 337.0 | 351.18 | 3/12/2007 | 27/01/2008 | To be sealed | |

**Table 3 Exploration Drill Holes**

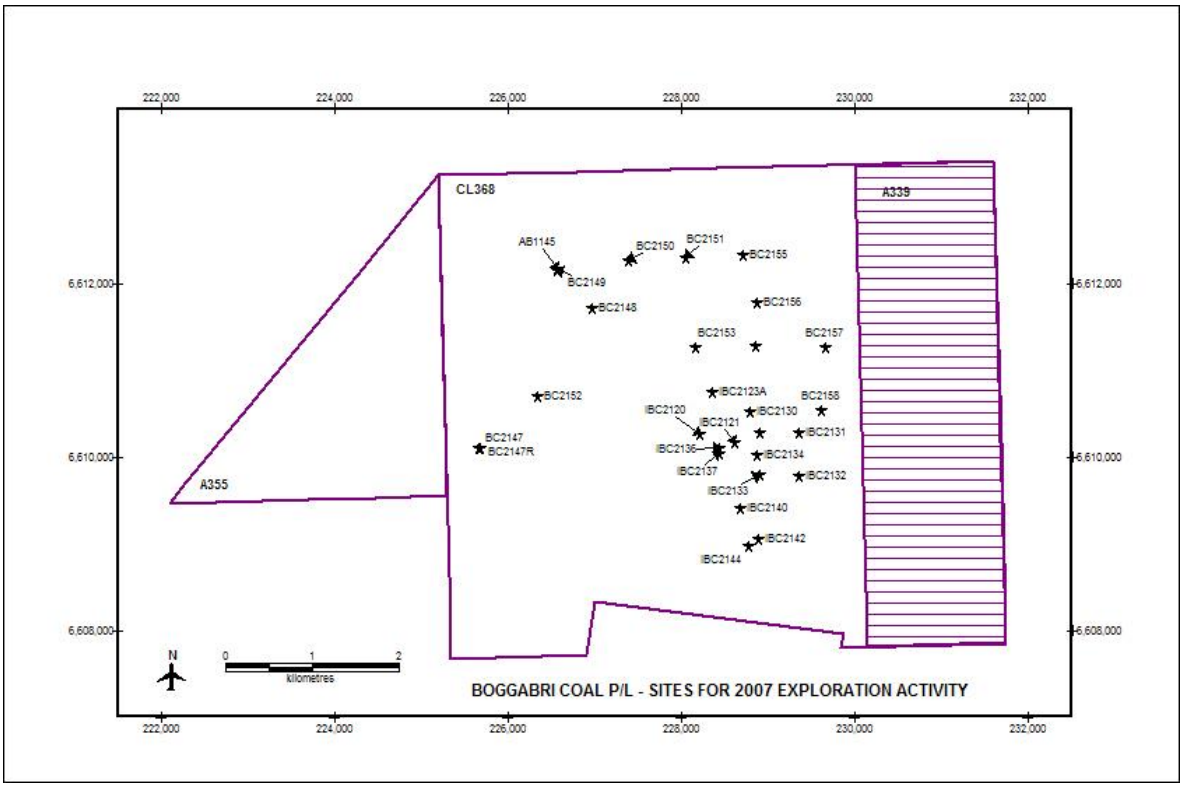


**Figure 2 Exploration Drill Hole Locations**

### 3.1.3 Drill Site Rehabilitation

Rehabilitation programs for 2007 drill sites are continuing. Activities have been completed at sites BC2147 and BC2149. Partial rehabilitation has been undertaken at sites BC2148, BC2150, BC2151 and BC2153. Rehabilitation of the remaining sites will be undertaken once borehole sealing operations are completed in March 2008.

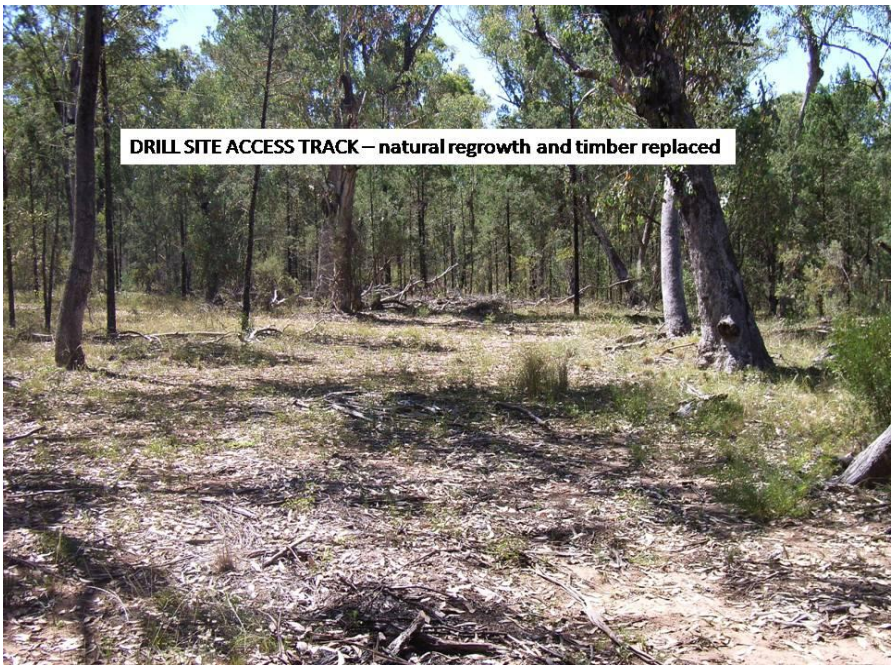


**Figure 3 2007 Rehabilitation of access track drill site TA13**

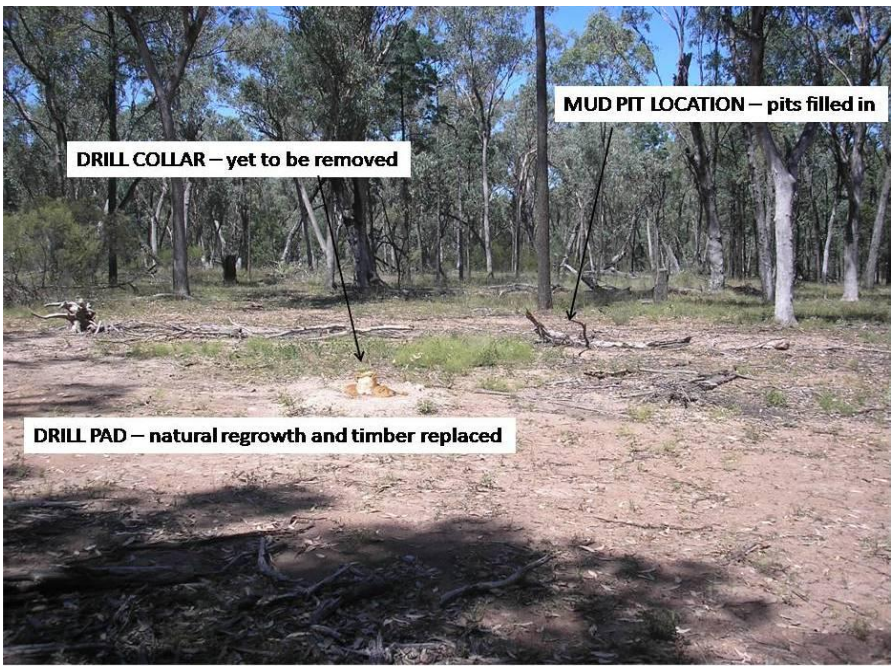


**Figure 4 2007 Rehabilitation of drill site TA13**

## 3.2 Land Preparation

### 3.2.1 Existing Vegetation

Previous mapping of the site (Department of Land and Water Conservation 2002) indicated that the proposed mine infrastructure and development would cover four main vegetation communities.

The four vegetation communities are:

- Black-earth grassland
- Riparian woodland
- River Oak, Black Tea-tree woodland
- White Cypress Pine, Ironbark Forest.

Details of the vegetation types are provided in the Flora and Fauna Assessment.

None of the above communities are listed as Endangered Ecological Communities under either the *NSW Threatened Species Conservation Act 1995* or the *Environment Protection and Biodiversity Conservation Act 1999*.

The dominant canopy species include White Box, Ironbark, Blakely's Red Gum and White Cypress Pine. Recent studies and pre-clearing inspections indicate that the vegetation mapping of the EIS appeared to be relatively accurate.

### 3.2.2 Vegetation Clearing

No vegetation clearing was undertaken in the reporting period. Additional clearing is programmed for mid to late 2008.

### 3.2.3 Soil Types

Most of the soils within the lease area have developed from two major sources of parent material. The parent materials are residuum of weathered sandy conglomerates and alluvium and/or colluvium from weathering of surrounding volcanic or sedimentary outcrops.

The texture of these soils ranges from gravely sandy clay loams to sandy clays.

There are basically three major types of soil groups in the lease area.

Detailed field observations of the soils have qualified soil mapping previously prepared for the EIS. These observations indicate the area to be disturbed during this MOP period can mainly be categorised as duplex soils (mainly Sodosols) or structured loams (Tenosol and Rudosols).

The third soil type Lithsols are typically occupy the steeper sloping terrain and ridge top areas, outside of the area of disturbance expected in this MOP duration.

For most areas of the open cut area the soil profile consists of a sandy loam A horizon developed upon a hard setting B_C Horizon.

Topsoil or A Horizon thickness varies across the area of operations from 50 mm to 150 mm averaging at approximately 100mm.

The third soil type Lithsols are typically occupy the steeper sloping terrain and ridge top areas, outside of the area of disturbance expected in this MOP duration.

### 3.2.4 Soil Characteristics

For most areas of the open cut area the A horizon comprises recognisable A1 and A2 horizons, is non-saline, non sodic and slightly acidic. Compared with other over-interburden material, while not considering the existing seed bank, the A horizons are the most suitable plant growing media available for use in rehabilitation.

Most of the strata are devoid of acid producing pyrites. The siltstone roof over portions of the Braymont seam in the lease area have the potential to develop acid producing conditions however, this type of material is not expected to be encountered during the current MOP duration. If materials having the potential to develop acid are identified they should be buried at a minimum of 2 metres from the reclaimed surface.

As these sodic and potentially acid producing materials make up less than a third of the total thickness of the overburden/interburden to be disturbed during mining, appropriate scheduling of overburden/interburden emplacement will ensure burial of these materials with the remaining non-saline, non-sodic materials.

### 3.2.5 Soil Profile

For most areas of the open cut area the soil profile consists of a sandy loam A horizon developed upon a hard setting B_C Horizon.

Topsoil or A Horizon thickness varies across the proposed varies from 50mm to 150mm.

Overburden material is highly variable. Overburden rock types include sandy conglomerate, sandstone, siltstone, and shale/mudstone.

### 3.2.6 Topsoil stripping

A Cat D11R dozer and Cat 16H grader were used for the stripping of topsoil from the areas of 2007 development operations. Recovered topsoil was loaded into rear dump trucks by an Hitachi EX2500 hydraulic excavator and hauled directly to reshaped areas on the OOPD for spreading to the required 100mm thickness.

Quality control of the topsoil removal and replacement processes was maintained throughout by regular inspections and by the introduction of a formal ‘sign off’ procedure executed by the environmental coordinator and the DEDIM production supervisor.

A total of six hectares of topsoil stripping was undertaken in the 2007 reporting period. A detailed topsoil plan of the Boggabri Mine is presented at the end of this report in Attachment 4.

## 3.3 Construction

### 3.3.1 Mine Infrastructure

Only minor construction activities were undertaken in the reporting period. Additional works included the installation of security fencing around the high explosives magazine compound, the installation of a licensed groundwater bore adjacent to the MIA on “Nagero”, and the installation of a dust suppression system at the ROM crusher complex.

## 3.4 Mining

### 3.4.1 Mine Design and Planning

#### 3.4.1.1 Merriown Pit (Pit 1)

Mining development in the Merriown Pit continued from the initial boxcut in the south, northwards towards the Jeralong Pit utilising 50 metre wide east-west oriented mining strips.

This pit is designed as a single seam operation down to the Merriown seam. To the east, the pit is bounded by a zone of deeper oxidation of the Merriown seam, and to the west by a 10:1 stripping ratio limit.

The Merriown Pit is being progressively backfilled with waste in accordance with the MOP final landform design.

It is proposed that the Merriown Pit continues northward past the development 10:1 stripping ratio limit until it intersects the southern boundary of the Jeralong Pit. The mine water storage dam proposed for the final void of the Merriown Pit is proposed to be relocated to a temporary location north-west of the existing Jeralong Pit.

#### 3.4.1.2 Jeralong Pit (Pit 2)

Concurrent with mining of the Merriown Pit, operations commenced at the western edge of the Jeralong Pit. The Jeralong Pit’s western and southern boundaries have been determined by the Jeralong seam limit of oxidation (LOX) line.

As the Jeralong Pit advances to the east, the northern pit limit has been designed to allow future long term mine development to continue northwards. Coal is mined from three coal seams, from the upper Bollol Creek seam, Jeralong seam to the basal Merriown seam.

The Jeralong Pit will be progressively back filled however a void shall be left on the northern and eastern face to allow continued open cut operations beyond the term of the MOP.

### 3.4.2 Mining Method

#### 3.4.2.1 Overburden Drilling and Blasting

The major consideration with drill and blast design includes managing environmental compliance and ensuring effective fragmentation of the

overburden. The major waste constituent is conglomerate. Drill and blast design focuses on the following objectives:

- control of air blast and ground vibration
- minimise fly rock
- optimise fragmentation
- reduce coal seam damage.

Blasting of mining strips in the Jeralong Pit that fall within 500 metres of the Leard Forest Road, require temporary road closures.

**Figure 5 Drilled interburden, northern extents of the Merriown Pit**

#### 3.4.2.2 Overburden Removal

Overburden/interburden removal is carried out by Hitachi EX3600 and Hitachi EX-2500 hydraulic excavators in backhoe configuration loading Cat 789 and Cat 785 rear dump trucks respectively.

**Figure 6 Interburden Removal by Hitachi EX3600, northern extent of Jeralong Pit**

The waste is hauled to both in-pit and ex-pit emplacements via haul roads maintained within the advancing pit face and emplacement faces.

#### 3.4.2.3 Coal Extraction

Coal is free dug using an Hitachi EX2500 hydraulic excavator and loaded into Cat 785 rear dump trucks for transport to the ROM crusher pad. Coal is stockpiled on the ROM pad for further blending and crushing.

**Figure 7 Coal mining by Hitachi EX2500, Jeralong Pit**

## 3.5 Coal Processing

Coal is recovered from the ROM pad by a Komatsu WA-600 front-end-loader and trammed to a 500 tph crusher for sizing to a 50 mm x 0 mm size specification. Product coal is batch loaded into over-mass B-double coal haulers for transport to the Boggabri Coal Terminal (BCT), via the private haul road. The BCT comprises a product stockpile and dozer push-reclaim system, coal conveyors, train loading bin and 3 km rail loop. Coal is transported via rail to the Port of Newcastle.

**Figure 8 Coal loading for transport to the product stockpile at the rail terminal**

## 3.6 Coal Stockpiles

A 200m x 230 m ROM coal stockpile is located adjacent to crushing facility with a nominal capacity of 100,000 tonnes.

The product coal stockpile at the rail loading facility has a nominal maximum capacity of 90,000 tonne.

ROM coal is processed to a product specification sizing of 50 mm x 0 mm.

The stockpiled coal has a relatively high calorific value and low ash content. The coal is also relatively low in sulphur, chlorine, phosphorous and trace elements.

## 3.7 Waste Management

Waste emplacement areas have been created through the clearing of designated out of pit areas and by in–pit emplacement in mined-out sections of the mine. The main emplacement area is immediately bounded by the Merriown Pit to the east, the Jeralong Pit to the north and the EIS surface mine limit to the west and south.

At the end of the MOP period the emplacement area will be approximately 1,500 m long (north-south) and 1,000m wide (east-west). The majority of the emplacement is designed to an RL of 330 m AHD, approximately 40 metres above the natural ground level (varying with the slope of the landform). Side slopes are designed at a maximum angle of 10 degrees and incorporate 8 metre wide catch benches at 20 metre vertical intervals. Water management from the emplacement areas consists of a system of contour drains installed on the catch benches and drainage flumes that direct water to sediment control dams located on natural surface.

Particular care is taken with the positioning of night lighting sets on the waste dumps adjacent to the Leard Forest Road to avoid any hazard to road users due to fugitive light.

The emplacement is progressively reshaped, spread with topsoil and an 8 ha section has been rehabilitated during 2007 in accordance with the rehabilitation management plan. Another 17 ha section is scheduled for rehabilitation in early 2008.

| | Cumulative Production | | |
|---|---|---|---|
| | **Start of Reporting Period (bcm)** | **At end of Reporting Period (bcm)** | **End of Next Reporting Period (bcm)** |
| **Topsoil Stripped** | 371,896 | 377,886 | 406,168 |
| **Topsoil Replaced** | 5,000 | 13,000 | 30,241 |
| **Waste Rock** | 6,926,891 | 19,561,550 | 29,349,050 |
| **Coal** | 235,193 | 1,561,758 | 2,911,758 |
| **Processing Waste** | 0 | 0 | 0 |
| **Production** | 7,538,980 | 21,511,494 | 32,697,216 |

**Table 4 Production and Waste Summary**

## 3.8 Water Management

### 3.8.1 General

The basic approach to water management is to segregate clean runoff, dirty runoff, and contaminated water.

The original site water balance prepared by Parsons Brinckerhoff indicated that the BCM is likely to produce an excess quantity of groundwater.

The BCM holds a number of existing licenses for surface and ground water on the BC properties “Daisymede”, “Heathcliffe” and Nagero. In the event of an extended dry period, or if the mine does not produce an excess of water, the BCM will utilise these existing water licenses to provide water for dust suppression operations.

During 2007 it was recognised that the current water management plan was not meeting site requirements. Parsons Brinckerhoff was commissioned to conduct a review of the water management plan and to make recommendations for improvement. This review was completed in late 2007. From this review a new water management plan was prepared and submitted for approval in early 2008. A copy of the new water management plan has already been sent to all of the

recipients of this report and therefore has not been included in the attachments to this report.

### 3.8.2 Clean Water Drainage

Clean water drains have been constructed around the perimeter of the development area. These diversion drains are designed to divert “clean water” around the disturbed areas, and to protect the mining pits from water inundation from the ephemeral tributaries of Nagero Creek that cross the mine area. The catchments of these water courses remain undisturbed by mining activities, and the drains ensure that the majority of surface flows emanating from the Leard Forest remain separated from the disturbed mine site.

**Figure 9 Northern Clean Water Diversion Drain November 2006**

**Figure 10 Northern Clean Water Diversion Drain March 2008**

The drains comprise a small earth bund constructed from material excavated from a shallow earth channel excavated upslope. The excavated channel is sized to contain the 2 year average recurrence interval (ARI) flood event, with larger events overflowing the channel and spreading over a wide area upslope. The earth bund is sized to contain the 100 year ARI design flood event with suitable freeboard.

The drains have been topsoiled and grassed to control erosion and preserve downstream water quality. At the downstream ends of the channels, the design flow is spread over a wide area of undisturbed natural ground. The flow will be contained within a pair of low earth bunds to train the flow around sedimentation dam 3 (SD3) before rejoining the natural drainage system downstream.

### 3.8.3 Dirty Water Drainage

Dirty water drains are provided around the perimeter of the emplacement to direct runoff from disturbed areas to sediment dam 3.

The original MOP submission specified that where catchment runoff from disturbed areas is anticipated to be non-saline, it is to be captured in sedimentation dams (SD1 and SD3) sized to contain the total volume of runoff from the 20 year ARI design flood event. However, during construction, it became apparent that existing dam structures in addition to an excavated borrow pit could cater for dirty water management in the Mine Infrastructure area.

The network of dams sees dirty water from the Mine workshop area draining to sediment dam 5 which has a spillway on its eastern side allowing excess water to drain to sediment dam 1 which is located in the approximate position of the originally planned sediment dam 1.

Sediment dam 1 catches the remaining dirty water from the office complex, carpark and Lovton compound and has a spillway on its north eastern side that directs water to Nagero dam. All fuels and lubricants are stored in bunded areas within the MIA to ensure that water entering SD1 does not contain high concentrations of these substances.

Sediment dam 2 (borrow pit) is designed to operated as a dry basin with water being pumped to a standpipe and used for haul road dust suppression. In the event of heavy rainfall that may fill this dam, water exits via a spillway that directs flow into a natural drainage depression that feeds the original “Nagero” farmhouse dam as per the diagram below.

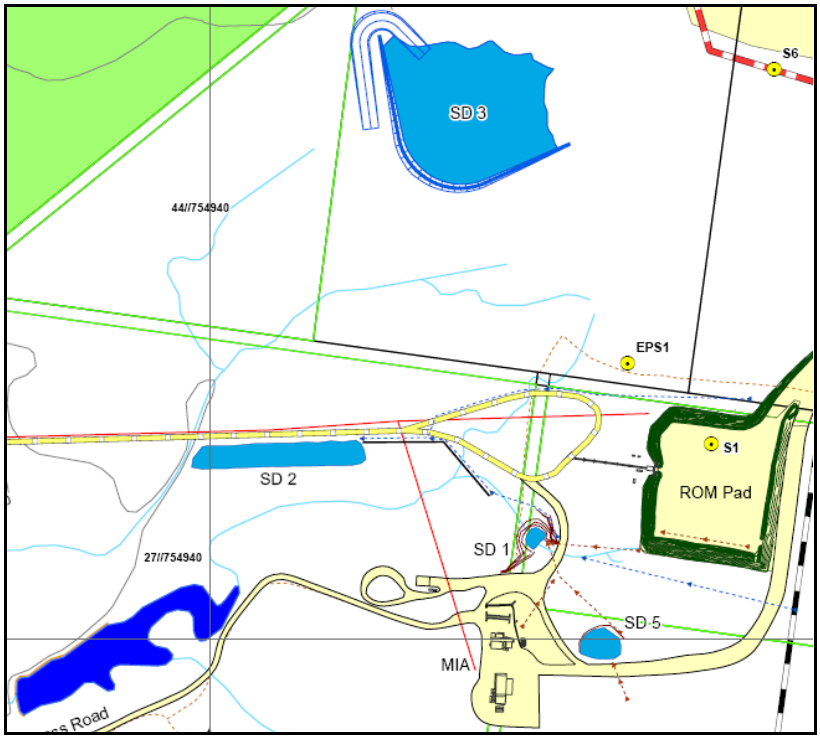


**Figure 11 Plan of MIA Water Management**

Sediment dam 3 is designed to operate as a dry basin; with a (normally closed) low level slow release outlet provided to ensure (water quality permitting) the contents of the dams may be emptied over a 10 day period. This will allow coarse particles in the runoff to settle before leaving the site. Where the catchment potentially contains large quantities of stockpiled coal (SD2 and SD4), sedimentation dams are sized to contain the total volume of run-off from a 100 year ARI 72 hour design storm event. Captured water is preferentially re-used for dust suppression on stockpiles and roads.

There is currently a proposal to move the monitoring point from sediment dams 1 and 5 to the outlet of Nagero Dam as both these dams overflow into this dam. The design sediment dam volumes are summarised in Table 5

| | Location Description | Stored Water | Catchment Area (ha) | Sizing Criteria | Volume (ML) |
|---|---|---|---|---|---|
| **SD1 &**<br>**SD 5** | Mine Infrastructure Area | Dirty runoff from MIA | 19<br>6 | V = 20 year tc plus sediment | 1 &1.5 |
| **SD2** | Coal Processing Area | Dirty runoff from crusher and stockpiles (controlled discharge) | 13 | V = 100 year 72h plus sediment | 20 |
| **SD3** | SW corner of lease area | **Location** | 45 | V = 20 year tc plus sediment | 35 |
| **SD4** | Rail Loop | Dirty runoff from Rail Loop (controlled discharge) | 5 | V = 100 year 72h plus sediment | 8.1 |
| **Nagero Dam** | Mine Infrastructure Area | Clean runoff from Nagero property & emergency dirty runoff | 79 | | 20 |

**Table 5 Sediment Dam Design Volumes**

### 3.8.4 Contaminated Water Collection

During 2007 all contaminated water was retained in dedicated contaminated water dams for use in mine dust suppression operations. Additional storage of accumulated water in excess of the contaminated water dam capacity will be transferred to the Jeralong pit void. A new dam MW2 is scheduled for construction in early 2008 to replace the existing one that will be decommissioned ahead of mining development.

| | Volumes Held | | |
|---|---|---|---|
| | **Start of Reporting Period (cu.m)** | **At end of Reporting Period (cu.m)** | **Storage Capacity (cu.m)** |
| **Clean Water** | 0 | 0 | 0 |
| **Dirty Water** | 0 | 30 | 58.3 |
| **Controlled discharge** | 0 | 30 | 31 |
| **Contaminated Water** | 0 | 75 | 150 |

**Table 6 Stored Water**

| Location | Location Description | Stored Water | Sizing Criteria | Volume (ML) |
|---|---|---|---|---|
| **MW1** | Year 2 Jeralong Pit | Contaminated Water | Maximum accumulated contaminated water volume from wettest year on record according to historical simulation water balance modelling | 92 |
| **Pit 2 Void** | SW corner of site | Contaminated Water | Maximum accumulated contaminated water volume from wettest 6yr period on record according to historical simulation water balance modelling | 800 |
| **MW2** | S of MIA | Contaminated Water | Not yet constructed | 300 |
| **MW3** | N of MW1 | Contaminated Water | Not yet constructed | 150 |

***Table 7 Contaminated Water Storage***

## 3.9 Hazardous Materials

A number of potentially hazardous materials have been, and are being used within the operation of the BCM. These materials include:

- Diesel fuel
- Ammonium nitrate
- ANFO
- High explosives and detonators
- Lubricating oils and greases
- Cleaning agents
- Herbicides

Appropriate licenses, for the storage and handling of these hazardous materials, have been obtained by the mining contractor.

### 3.9.1 Diesel

Diesel fuel is stored in the maintenance workshop area in two double skinned, aboveground tanks plumbed in series as ‘slave and master”, with a total nominal capacity of approximately 110,000 litres. Fuel consumption is approximately 135,000 litres per week.

The transport services contractor also has a 55,000 litre double-skinned fuel storage tank located adjacent to their workshop within the MIA.


**Figure 12 Diesel Fuel Storage Tank**

### 3.9.2 Ammonium Nitrate

Ammonium nitrate is used in the blasting process.

Ammonium nitrate is stored in one tonne bulker bags at the bunded Downer EDI Blasting Services compound in an above ground storage shed. The AN storage shed is fitted with lockable access gates and is subject to daily inspections to safeguard against theft and/or spillages.

### 3.9.3 ANFO

ANFO is used in the blasting process and is delivered as required by mobile mixing units (MMU) to the blast site.

### 3.9.4 Detonators

Detonators and other high explosives are used in the blasting process.

Detonators are stored in purpose built isolated magazines to the west of the DEBS compound and at the toe of the ex-pit emplacement.

### 3.9.5 Hydraulic/Lubricating Oils

Hydraulic/lubricating oils are stored in double skinned above ground tanks near the truck wash down pad next to the maintenance workshop area.

Waste oils are stored in a bulk oil tank, for regular collection by a licensed waste contractor.


**Figure 13 Waste Oil Awaiting Collection**

### 3.9.6 Cleaning Agents

Cleaning agents are used in the equipment wash down facility used for preparing the fleet of mobile equipment such as dozers, water trucks, lighting plant and generators for maintenance.

The cleaning agents are stored in covered stores within the maintenance workshop area, adjacent to the truck wash. All water collected in the sealed and bunded truck wash is collected in a 55,000 litre tank for re-circulation at the facility.

**Figure 14 Cleaning Fluids Stored Beside Wash Bay Area**

### 3.9.7 Herbicides

Herbicides will be used in the rehabilitation process if weed infestation becomes an issue. Herbicides are also used around the site for noxious weed control throughout the mine site. Herbicides are not stored on site but are purchased on an as-needs basis.

### 3.9.8 Material Safety Data Sheets

Material Safety Data Sheets (MSDS's) for all hazardous material stored on site are maintained by BC, Downer EDI and Lovton personnel with copies being provided at appropriate locations throughout the project site such as, maintenance workshops and stores and rail loading facility.

# 4. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

An "Environmental Risk Identification Matrix" was used as a risk assessment tool to identify mine activities, processes and facilities which require control strategies to ensure environmental protection and compliance with conditions of lease, licence and development consent.

Upon completion of the risk assessment process, all aspects relevant to environmental performance were identified and incorporated in subsequent Environmental Management Plans (EMPs). These EMPs are an integral part of the operation's Environmental Management System (EMS).

| Environmental Management Plans | Construction | Operations |
|---|---|---|
| Air Quality Management Plan | X | X |
| Site Water Management Plan (Surface/Ground Water and Erosion and Sedimentation Control) | X | X |
| Flora and Fauna Management Plan | X | X |
| Rehabilitation and Land Management Plan (Rehabilitation, weed and soil) | X | X |
| Noise, Blast and Vibration Management Plan | X | X |
| Hydrocarbon and Contaminated Land Management Plan | X | X |
| Aboriginal Archaeology and Cultural Heritage Management Plan | X | X |
| Waste Management Plan | X | X |
| Public Safety Management Plan – (Traffic, Bushfire, Lighting, Security) | X | X |

**Table 8 Summary of Environmental Management Plans (EMP's)**

Environmental monitoring systems are in place to ensure compliance with the EPL. These include continuous monitoring of weather conditions, dust monitoring, noise and vibration monitoring and water quality testing. The site map presented in Attachment 3 shows the locations of all monitoring sites.

## 4.1 Weather Monitoring

### 4.1.1 General

The Boggabri Coal Mine monitors local weather conditions using an automatic weather station comprised of µSmart series sensors and data logger supplied by Monitor Sensors. Monitoring is recorded at 15 minute intervals for temperature, rainfall, wind speed and direction and solar radiation. The site is labelled W1 on Attachment 3. The data collected is then presented in the Boggabri Mine monthly environmental report.

### 4.1.2 Temperature

Maximum, minimum and average temperatures are recorded and reported in the BCM monthly environmental reports. Figure 15 below shows monthly temperature records for the reporting period

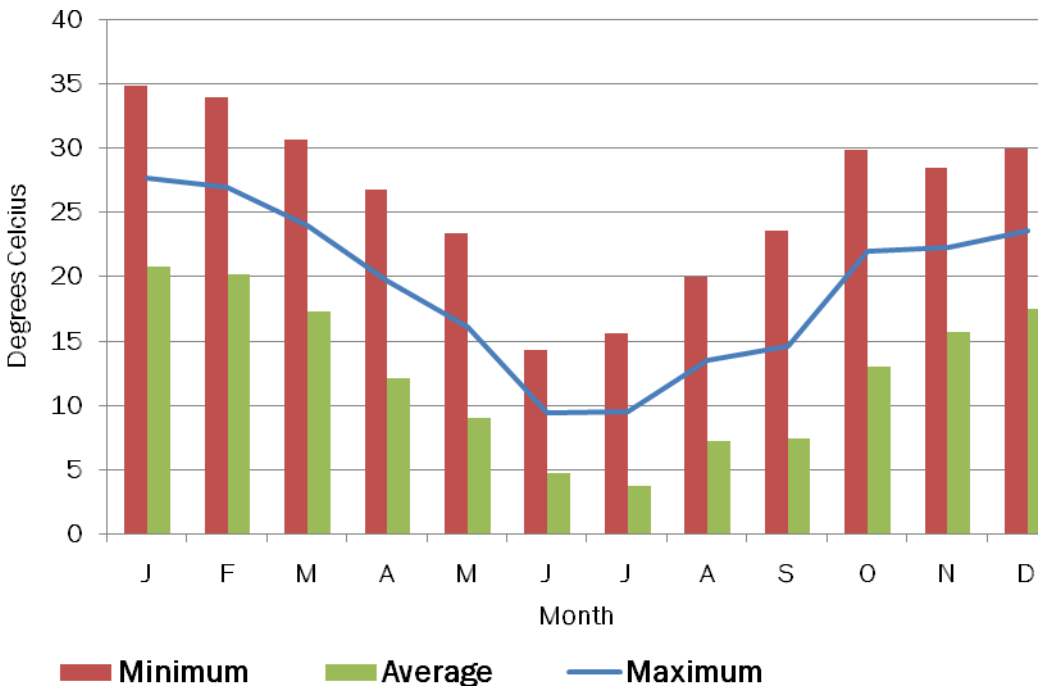


**Figure 15 Temperature 2007**

### 4.1.3 Rainfall

Rainfall is measured using an RG5 type flow through monitor recording every 15 minutes with 24 hours to 9am recorded on a 24 hour basis. Rainfall totals for the reporting period are presented in Figure 16 below.

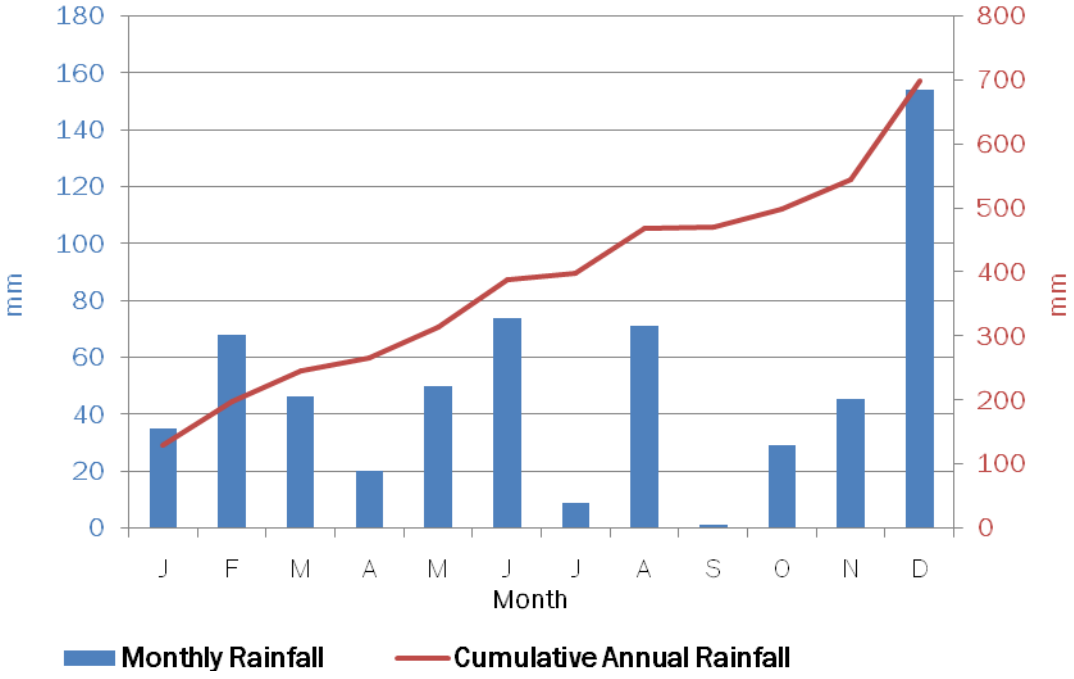


**Figure 16 Rainfall Totals 2007**

### 4.1.4 Wind

2007 wind data is presented in the wind roses below. Wind speed values are shown in kilometres per hour. The wind roses show wind speed and direction on a three monthly basis for the reporting period.

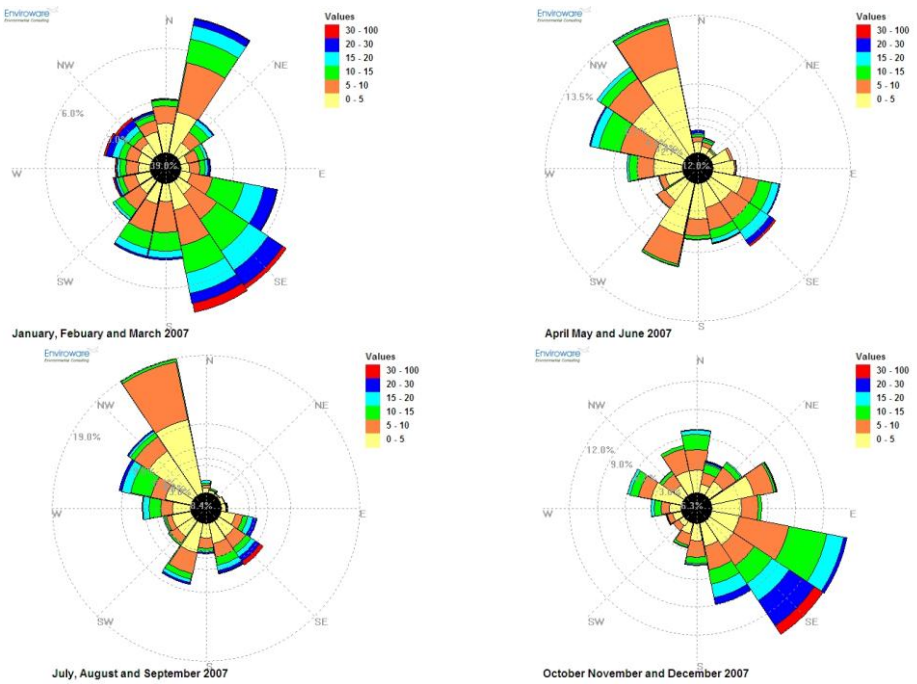


**Figure 17 Wind Summary 2007**

## 4.2 Air Quality Management and Performance

The Boggabri Coal Mine has a network of 14 depositional dust gauges that give results for deposited dust in g/m$^2$/month. A casual field technician undertakes this monitoring program on a monthly basis.

Results for the 14 depositional dust gauges are presented in the figures below. For ease of modelling they have been broken up into four locations. A summary of non-compliances is provided in Table 9 below.

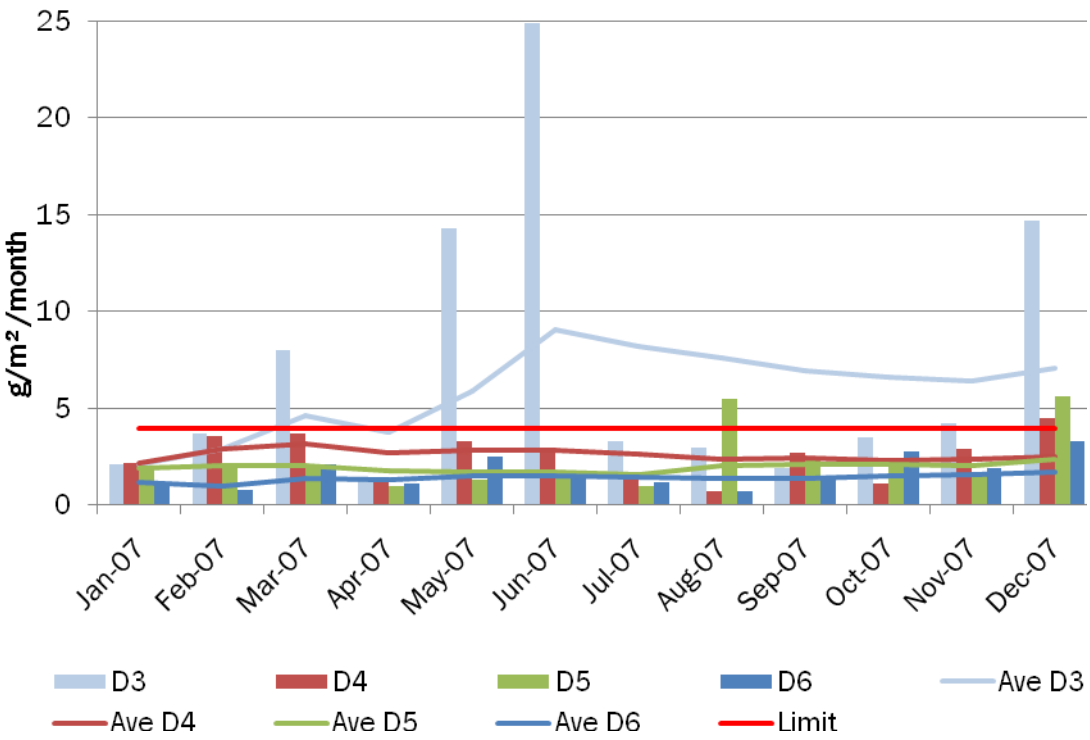


**Figure 18 Dust Monitoring Sites East of the Boggabri Mine**

Notable features of Figure 14 above are the high readings recorded at site D3, located near the start of Goonbri Road; a gravel road that can generate large volumes of dust from normal vehicle traffic. This source cannot be disregarded when assessing dust gauge exceedences as the road is closer than the mine to the D3monitoring site.

An additional dust gauge has been ordered and will be placed between Boggabri Mine's coal ROM pad and Tarrawonga Mine's out-of-pit dump to gather data on the cumulative effect of the two mines.

Another two gauges will be located between the mines and monitoring site D3 to investigate the origin of the dust at site D3, (mine or road traffic). It is possible that these additional gauges could form the platform for a change of location for this monitoring point if it continually has higher readings than the additional gauges.

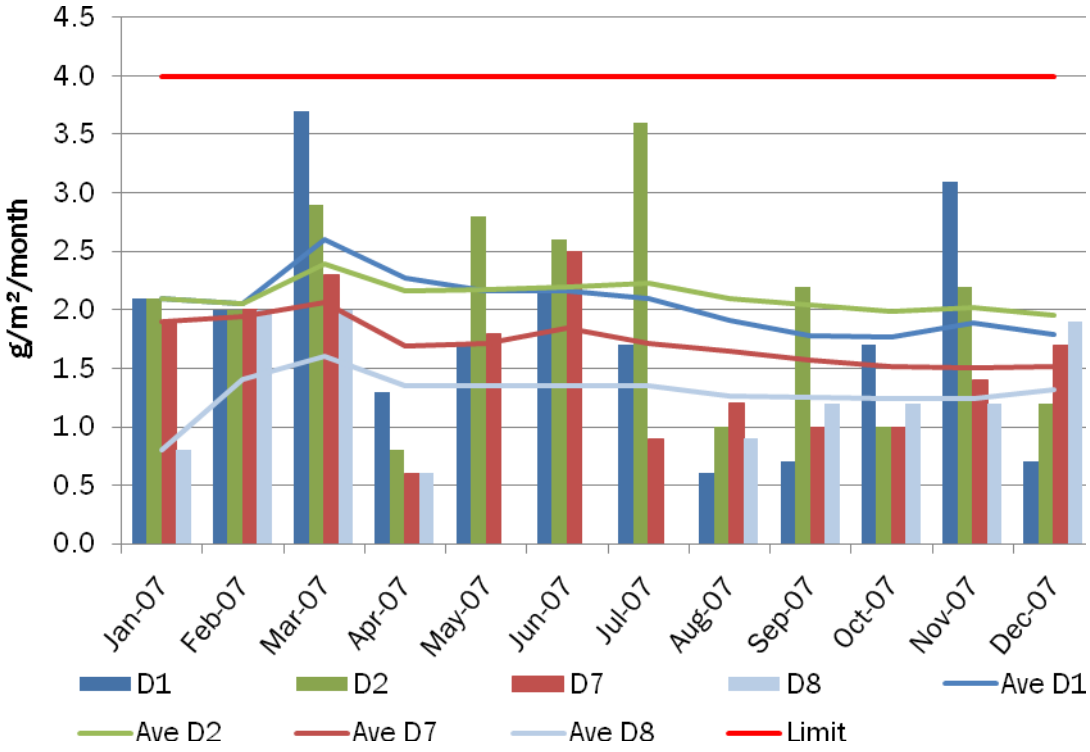


**Figure 19 Dust Monitoring Sites West of the Boggabri Mine**

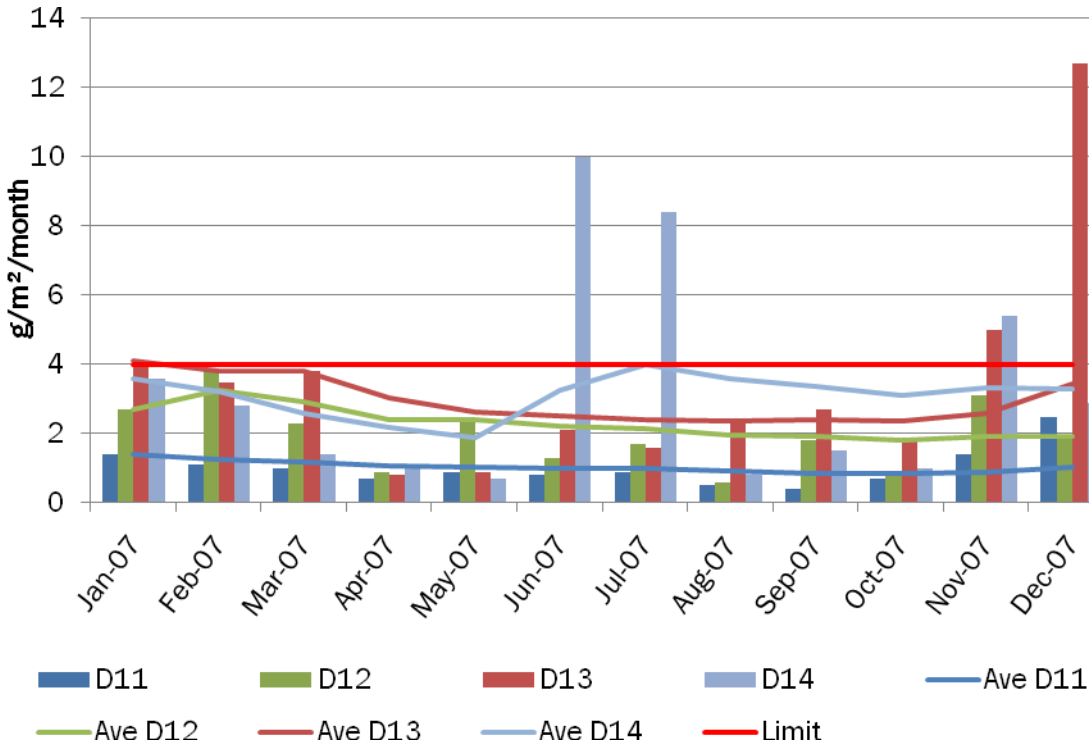


**Figure 20 Dust Monitoring Sites Adjacent to the Coal Terminal**

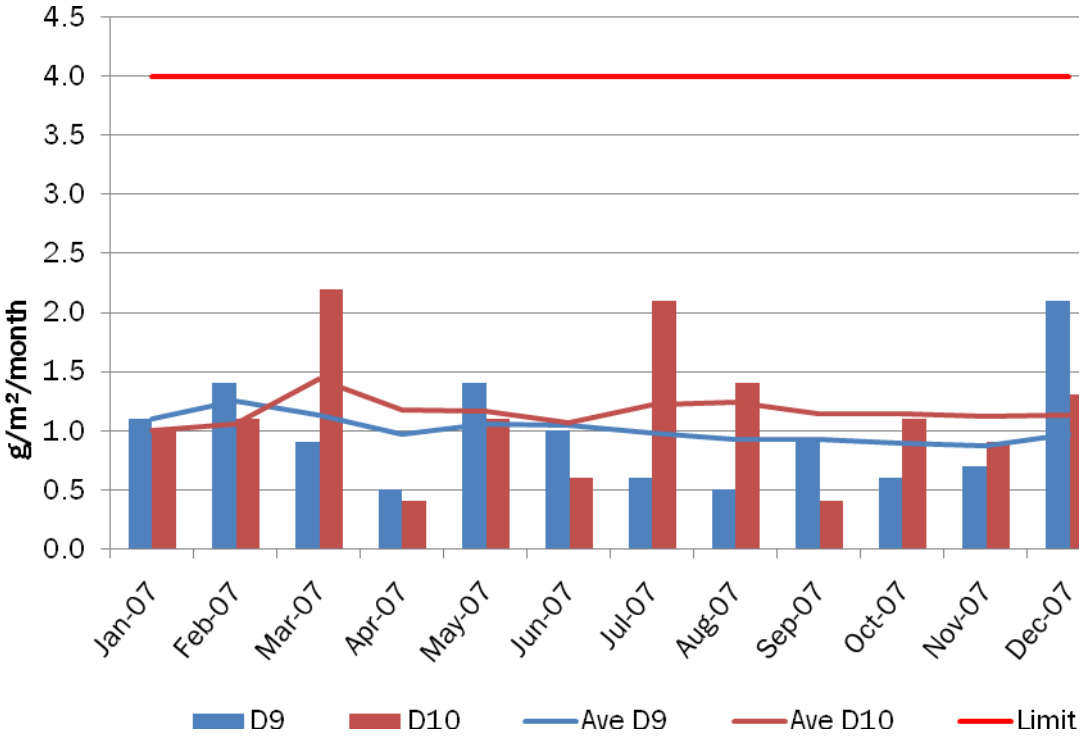


**Figure 21 Dust Monitoring Sites South of the Haul Road**

| Month | Site | Value ($g/m^2$/month) | Possible Explanation |
|---|---|---|---|
| January | D13 | 4.10 | Site located next to a cultivation paddock |
| March | D3 | 8.00 | The proximity of this site to the start of Goonbri road where it has the most local traffic passing by, contributes to the elevated dust readings at this site. |
| May | D3 | 14.30 | As above |
| June | D3<br>D14 | 24.90<br>10.00 | As above<br>This site was cultivated in June prior to sowing |
| July | D14 | 8.40 | The paddock in which D14 is located was sown to feed oats during this month. |
| August | D5 | 5.50 | This site is located in a pasture paddock that is showing signs of over grazing. |
| November | D3<br>D13<br>D14 | 4.20<br>5.00<br>5.40 | The proximity of this site to the start of Goonbri road where it has the most local traffic passing by, contributes to the elevated dust readings at this site.<br>Strong winds and persistent dry weather combined with little ground cover due to overgrazing in adjacent paddocks. |
| December | D3<br>D4<br>D5<br>D13 | 14.70<br>4.50<br>5.60<br>12.70 | D3, D4 and D5 are all close to the Goonbi Road. Average temperatures of close to 30˚ and considerable use of the road by harvest trucks.<br>Pasture paddock where D13 is located was overgrazed and then cultivated |

**Table 9 Summary of non compliant monthly dust observations for the Boggabri Mine**

In addition to the 14 depositional dust gauges, the Boggabri Coal Mine also has a 'Hi Vol' sampler measuring $PM_{10}$, yielding results in µg/m³. A summary of these results is shown in Figure 22 below.

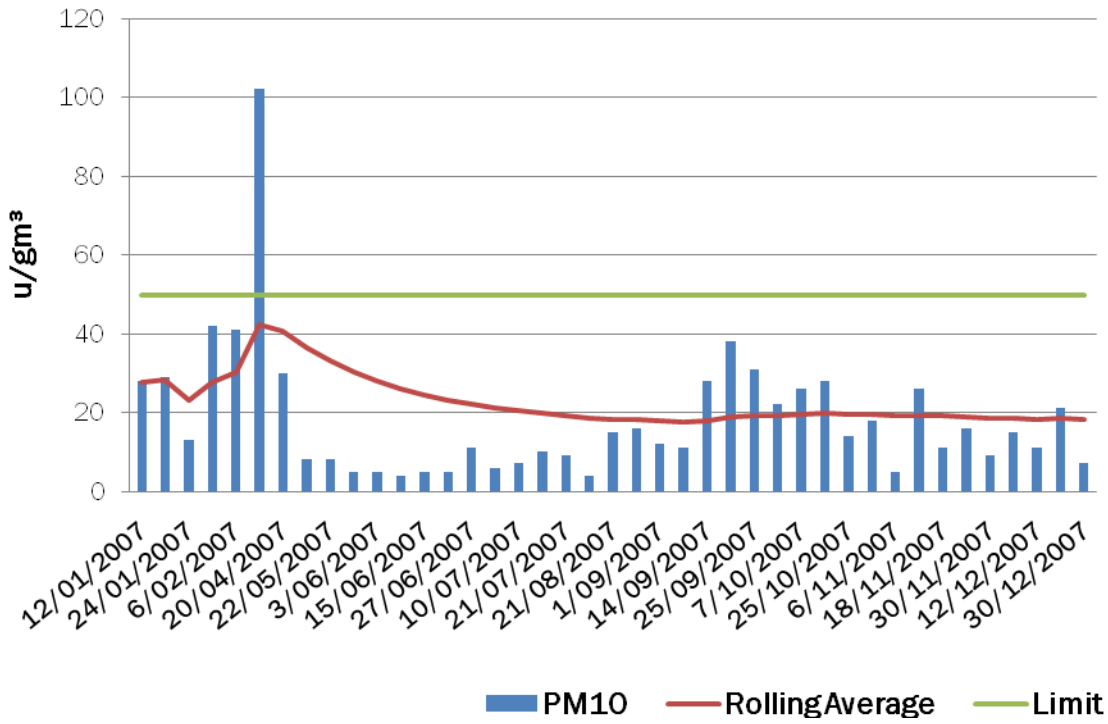


**Figure 22 $PM_{10}$ Results 2007**

The $PM_{10}$ monitor had to be repaired early in 2007. Because of this there were no readings recorded between the 6th February and the 15th of April. Note the high result obtained for the 15th April (102 µg/m³). This was the first reading taken after the site had been repaired and is therefore not considered to be an accurate reading.

## 4.3 Site Water Management and Performance

### 4.3.1 Surface Water

Discharge and monitoring points 1, 2, 3 and 4 (SD1, SD2, SD3 and SD4) are to be sampled at "Special Frequency 1" as detailed in condition M2 of EPL 12407; where Special Frequency 1 means the collection of samples as soon as practicable after a discharge, and in any case not more than twelve hours after a discharge commences.

Discharge and monitoring points 5 and 6 (SW1 and SW2) are to be sampled at "Special Frequency 2" as detailed in condition M2 of EPL 12407; where "Special Frequency 2" is "as soon as practicable after a wet weather discharge from points 1, 2 and 3, and in any case not more than 12 hours after a discharge commences". Monitoring Point 36 was only sampled and analysed once during the 2007 reporting period. The reason for this non-compliance is the ongoing discussions to move this monitoring point to the Nagero Dam.

Monitoring Points 37 and 38 were only sampled and analysed twice during the 2007 reporting period. This was an oversight by Boggabri Mine.

Monitoring Point 39 had not received any water at the specified monitoring times. Consequently there were no samples analysed.

A discharge event occurred in late December 2007. As no staff were on site due to the mine being closed for the Christmas shut down period (19th December – 7th January) this monitoring event was missed.

In order to prevent recurrence of this non-compliance staffing arrangements will be made so that during periods such as these, monitoring activities will be covered either by BC staff or contractors.

### 4.3.2 Groundwater

During the June monitoring event the micro purge equipment failed and had to be returned to the supplier for repairs. The monitoring programme was finished in August 2007, once repairs were carried out.

Monitoring point 18 was missed in August 2007, but was then reported in September. Monitoring data was picked up from the Tarrawonga Mine for the January and June monitoring periods as this monitoring point is analysed by both mines.

#### 4.3.2.1 Groundwater Level

Standing groundwater levels are monitored at twelve piezometers at the Boggabri Coal mine site. The location of these piezometers is illustrated in Attachment 3. These piezometers were installed as part of Boggabri Coal's groundwater monitoring program to monitor coal seam aquifers in the area, in particular in the Merriown seam. Five piezometers monitor the volcanic rock aquifer, at the foot of the hills, where the mine is located.

Monitoring commenced in 2005, however due to staged piezometer installation, it was not possible to monitor all piezometers at that time. Systematic water level monitoring commenced in 2006 and in accordance with the Department of Environment and Climate Change (DECC) approved Environmental Protection License (EPL), Department of Primary Industries – Minerals approved Mining Operations Plan (MOP) and associated Environmental Management Plans (EMP's) occurs quarterly.

The temporal variation in standing water levels in the monitored piezometers are illustrated in Figure 19. The majority of the piezometers show a decreasing trend in groundwater levels. The exceptions are IBC2103, IBC2104 and IBC2105. IBC2103 and IBC2104 are installed in coal seams other than the Merriown seam and the third piezometer is located at a greater distance from the current mine work area. Drawdown has been observed since mid 2006 when mine works began progressing to the north.

The largest fluctuation in standing water level was observed at IBC2138, the closest piezometer to mine workings. This piezometer is located immediately up gradient (northwest) of the mine workings and a fluctuation in standing water levels of 11.1 m was observed. The smallest fluctuations (0.5 m) in standing water levels are observed at GW3115 (approximately 2.5km west of mine workings), which is located away from the ground water flow path.

In piezometers IBC2110 and IBC2111, which are installed in the shallow and deep volcanics, the standing water level declined by about 2 m during the October 2005 to April 2007 period. These bores are located in the vicinity of the “Nagero” bore which is being pumped as a water supply. The standing water levels have since recovered, being close to pre-mining levels.

Between August and October 2007 no further decline in standing water level has occurred.

The interpreted groundwater flow in the aquifer remains in the south-westerly direction, with no significant trends observed.

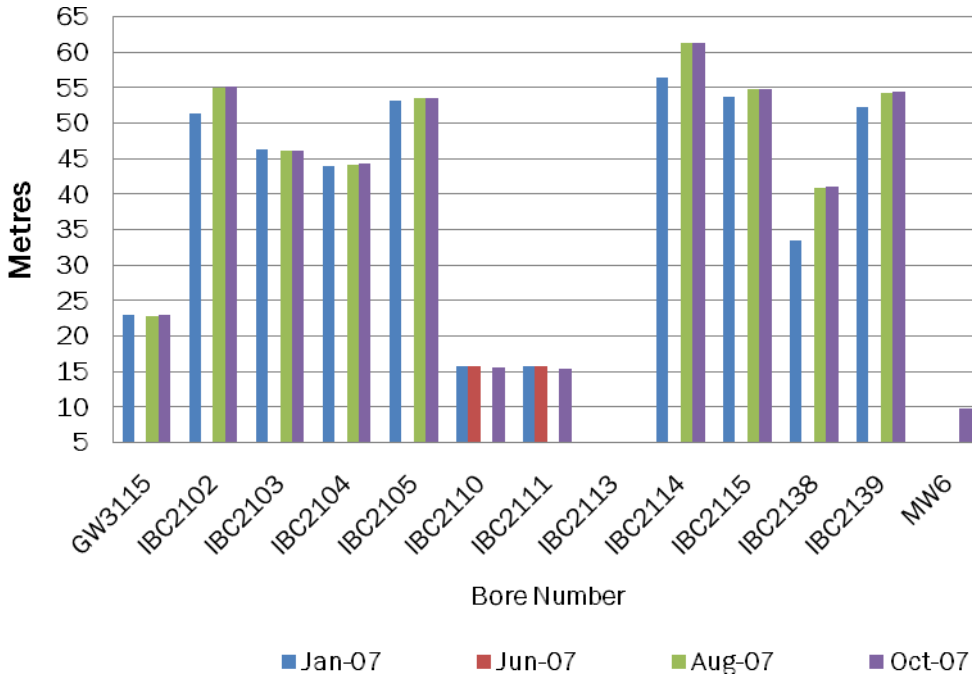


**Figure 23 Bore Hole Standing Water Level**

#### 4.3.2.2 Groundwater pH

The water is in general neutral with pH ranging from 6.5 to 7.5. IBC2110 is slightly more alkaline than the other piezometers. All piezometers show the same fluctuations in pH during the year, with the exception of IBC2110. The standard deviation of pH value for all piezometers is within 5 % of the mean, with no significant trends observed.


**Figure 24 Bore Hole pH**

#### 4.3.2.3 Groundwater Electrical Conductivity

The highest conductivity value (3500 to 4000 uS/cm) was measured in GW3115 (located approximately 2.5km west of mine workings) while the lowest values were recorded in piezometers to the north, which have higher elevations (IBC2102, IBC2103, IBC2104 and IBC2105). The water quality in these piezometers has an EC below 1000 uS/cm, while EC in the remaining piezometers varies from 1500 to 2500 uS/cm.

The standard deviation of measured EC is generally within 20% of the mean, and no significant trends were observed for any of the bores. The monitoring in August 2007 indicates elevated EC comparing to previous monitoring. This is most likely the result of the decline in standing water levels at that time, which has been followed by a decrease in EC and the stabilisation of standing water levels.

In general the electrical conductivity values are below the upper limit guidelines for irrigation and livestock use.

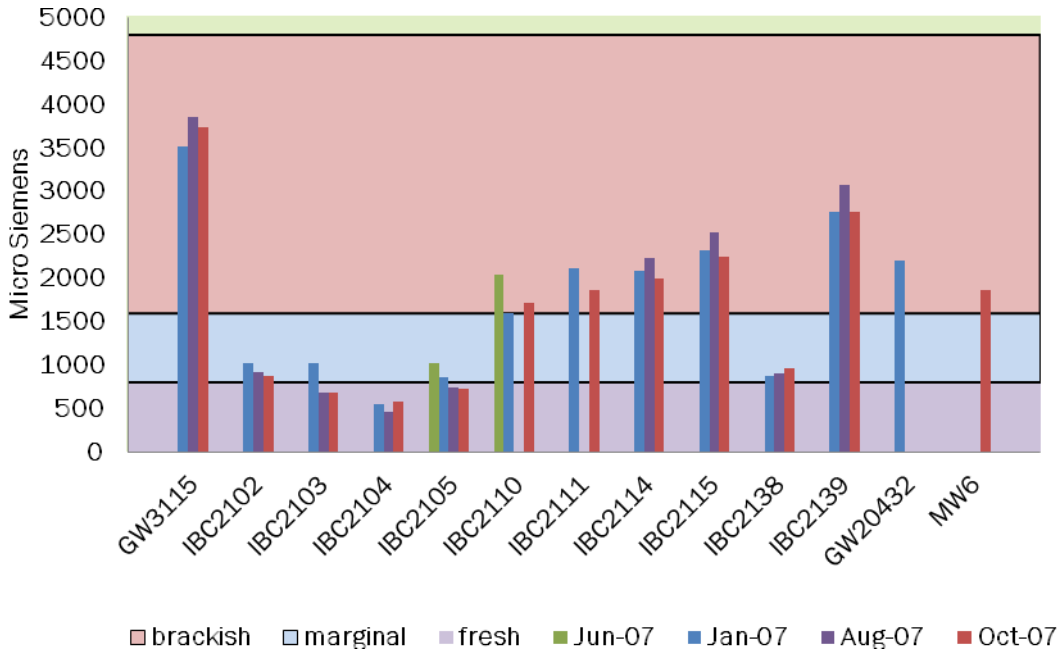


***Figure 25 Bore Hole Electrical Conductivity***

#### 4.3.2.4 Groundwater Temperature

Temperatures are generally between 20 to 22 degrees. Seasonal temperature variations can be observed in all bores. The highest standard deviation occurs in bores located in the north of the mine lease and in shallow volcanics. This may indicate that the groundwater at those locations is in contact with surface water and/or is in the recharge area. Overall, the deviation is within 10 % of the mean value with no significant trends observed.

#### 4.3.2.5 Groundwater Redox

Redox values vary from negative -200 mV to 150 mV. Negative conditions prevail in IBC2110, GW3115 and IBC2105 (-200 mV to -100 mV), while IBC2102, IBC 2103, IBC2104 are positive (0 mV to 100 mV). Fluctuations over time are small in comparison to differences in redox variations between bores. No significant trends were observed.

Standard deviation can be up to 50 % of the mean, however this is considered to be within the normal variation for field measurements of redox potential.

#### 4.3.2.6 Groundwater Major ions

Major ions (calcium, sodium, potassium, magnesium, sulphate, chloride, bicarbonate) were analysed during the half yearly monitoring events. The dominant water types appear to be sodium and bicarbonate based, however, water type is variable between bores and also with sample date. There does not appear to be any trends associated with geology.

#### 4.3.2.7 Groundwater Metals

Groundwater extracted from the piezometers was analysed for the following metals: arsenic, cadmium, chromium, copper, lead, nickel, zinc and iron. Concentrations of metals in most bores were below laboratory detection limits.

Metal concentrations were below guidelines for irrigation and stock for all metals with the exception of iron, as expected for groundwater samples. Iron levels are only marginally above the guideline concentrations (0.3 mg/L for irrigation and 0.2 mg/L for stock) in bores IBC2102, IBC2103, IBC2105, IBC2115, IBC3115 and IBC2111. In bore IBC2111 the pre-mining concentrations of iron were above the ANZECC (2000) guidelines.

No trends were observed in metal concentrations for any of the bores.

#### 4.3.2.8 Groundwater Nutrients

The nutrients (ammonia, nitrite and nitrate) were analysed with nitrate below detection limits and nitrate values were below the guideline values for stock and irrigation in most piezometers. Ammonia was detected at concentrations between 0.5 mg/L and 0.6 mg/L, slightly above the guideline value (0.5 mg/L) at IBC2113, IBC2114, IBC2115, IBC2139 and IBC20432.

No trends in nutrient concentrations were observed.

## 4.4 Flora and Fauna Management and Performance

No new areas were cleared in 2007.

Specialist consultant ecologists from Parsons Brinckerhoff have been engaged to perform regular ecological monitoring. This monitoring relates to the general impacts of mining activities on native vegetation, fauna habitats and biodiversity within Leard State Forest and does not relate to monitoring of the rehabilitation program.

### 4.4.1 Monitoring Results

There was one survey event carried out during 2007 between 29$^{th}$ March and 6$^{th}$ April. No statistical analysis of this data has been undertaken as it was considered to be too short a time period for any meaningful analysis to be undertaken. Statistical analysis of this data will be carried out as part of the scheduled survey event in April 2008. The survey locations are shown in Table 10 and the actual locations of the various monitoring points are shown in the following figures.

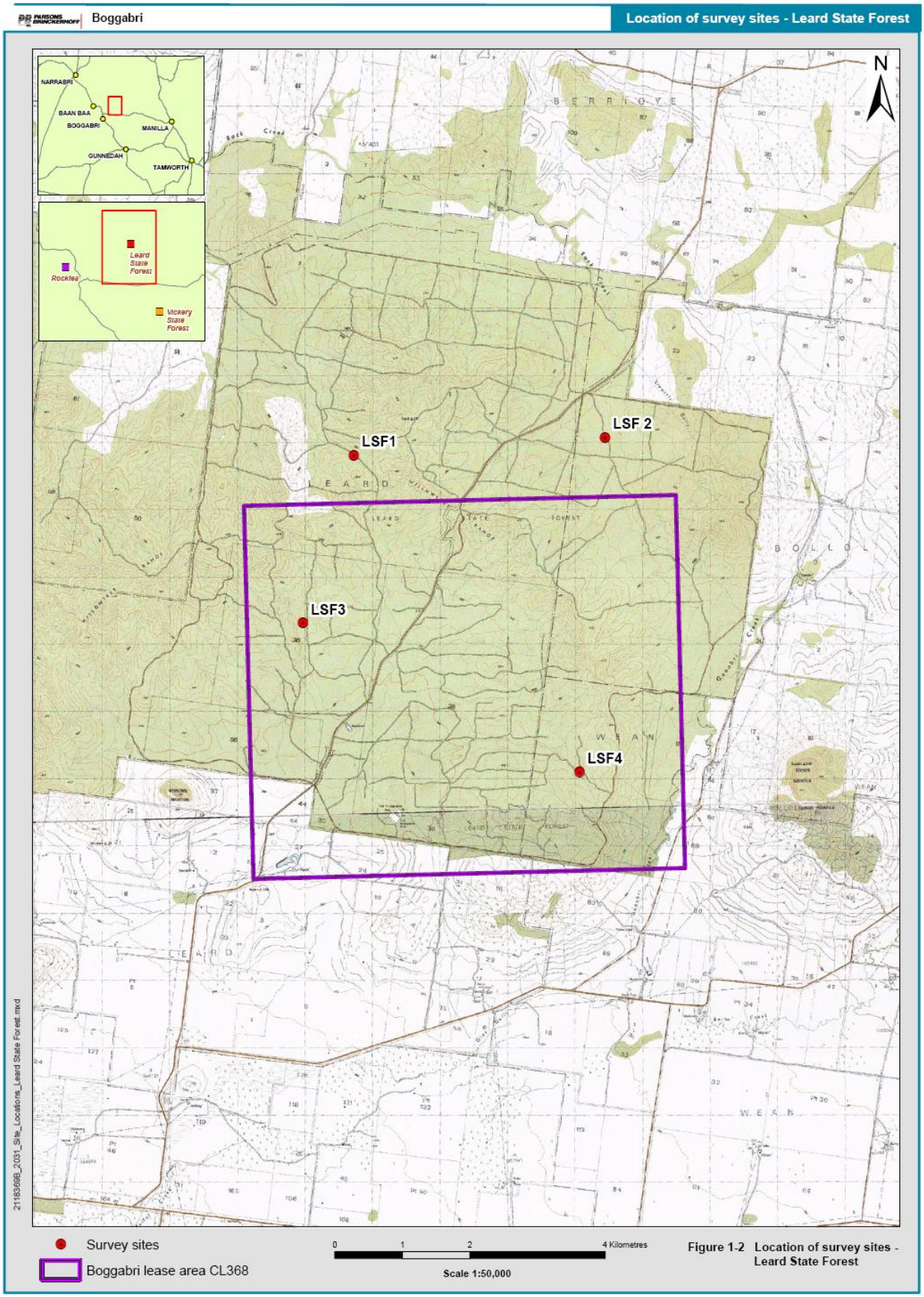


**Figure 26 Ecological Survey Sites in Leard State Forest**

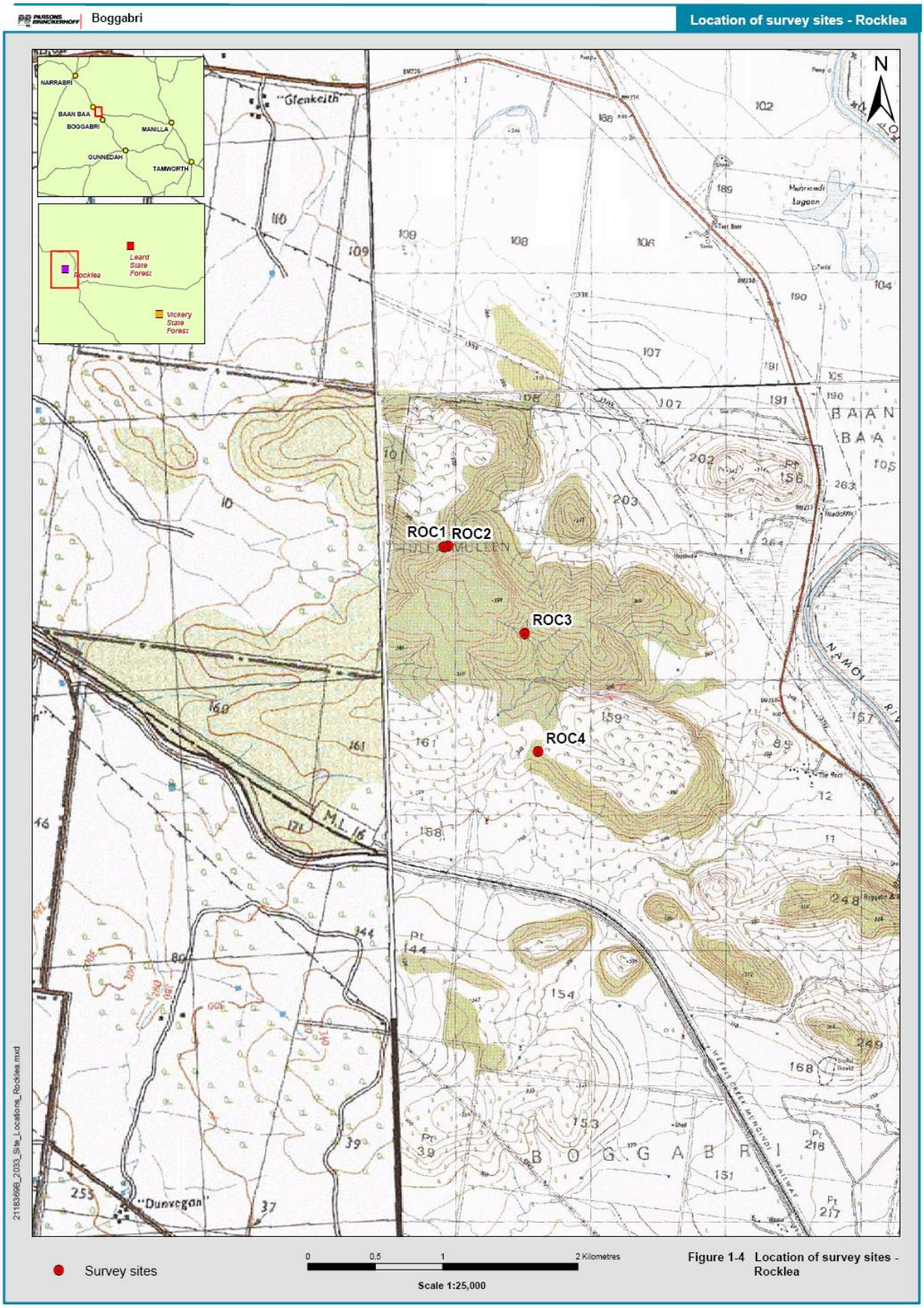


**Figure 27 Ecological Survey Sites at Rocklea**

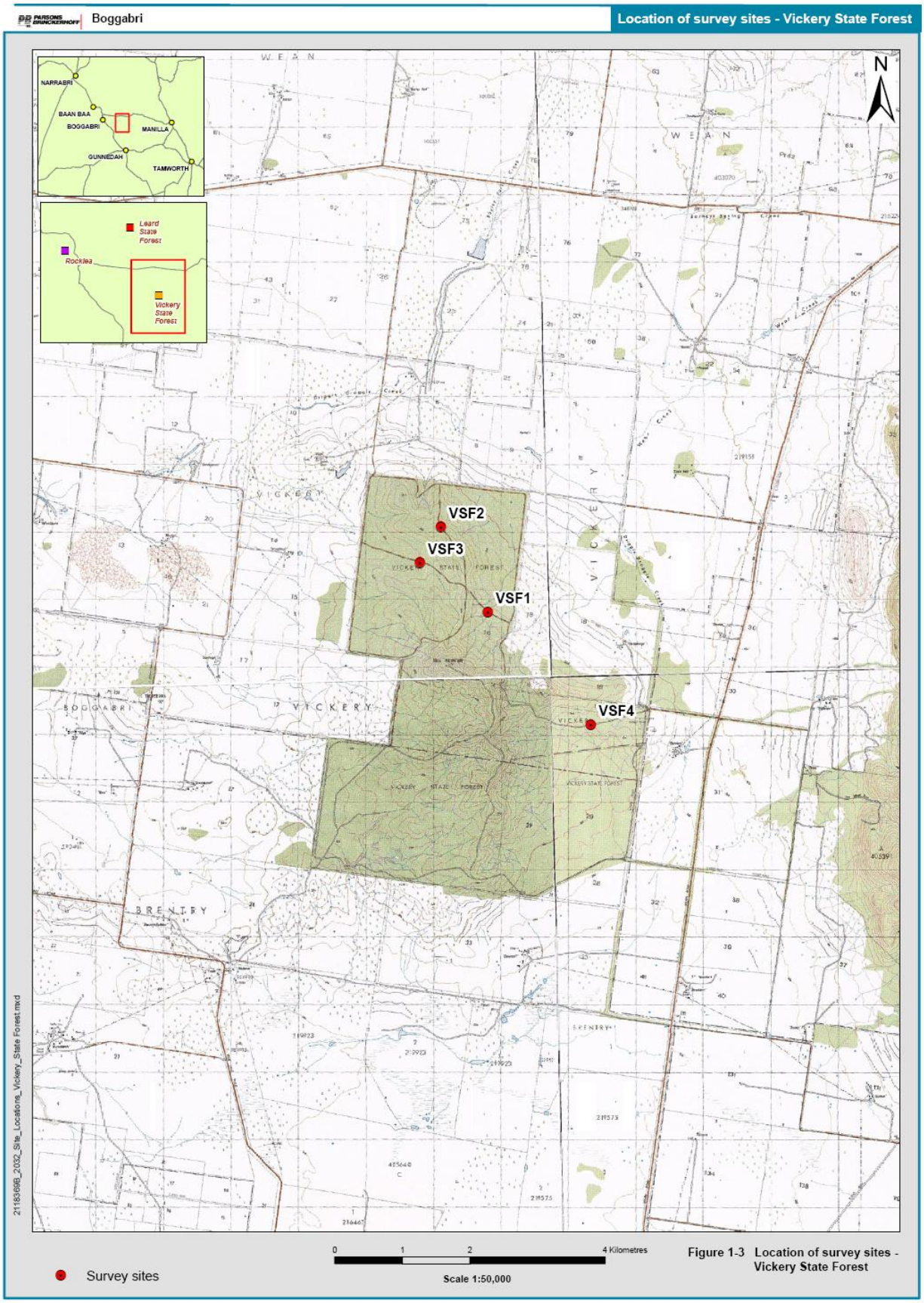


**Figure 28 Ecological Survey Sites in Vickery State Forest**

| Survey Location | Site Reference No: | Location (MGA94 Zone 56) | | Direction of Transects | | Slope of Transects | |
|---|---|---|---|---|---|---|---|
| | | Easting | Northing | A | B | A | B |
| Leard State Forrest | LSF 1 | 226825 | 6614004 | 54 | 250 | 4 | 2 |
| | LSF 2 | 230545 | 6614270 | 17 | 90 | 1 | -1 |
| | LSF3 | 226070 | 6611510 | 225 | 77 | -1 | -2 |
| | LSF4 | 230169 | 6609296 | 219 | 295 | 1 | -2 |
| Vickery State Forrest | VSF 1 | 235906 | 6596010 | 3 | 157 | 2 | 7 |
| | VSF2 | 235212 | 6597274 | 177 | 230 | -3 | 5 |
| | VSF3 | 234902 | 6596744 | 177 | 342 | 2 | -1 |
| | VSF4 | 237432 | 6594345 | 336 | 138 | 2 | -2 |
| "Rocklea" Property | ROC 1 | 2130 | 6607181 | 105 | 195 | 5 | 5 |
| | ROC2 | 213016 | 6607172 | 286 | 169 | 7 | 8 |
| | ROC3 | 213614 | 6606534 | 303 | 13 | 15 | 6 |
| | ROC4 | 213713 | 6605664 | 75 | 108 | 2 | -3 |

**Table 10 Ecological Survey, Site Locations**

## 4.5 Rehabilitation and Land Management and Performance

### 4.5.1 Revegetation

Rehabilitation aspects of this MOP have, and will be progressively developed and implemented through the mine life with consideration given to the "Strategic Framework for Mine Closure" developed by the Australian and New Zealand Minerals and Energy Council.

Topsoil has been salvaged from all stripping areas and stockpiled appropriately in a designated area east of the Merriown Pit. The topsoil stockpile and all other disturbed areas have been seeded with a stabilisation seed mix

In November 2007 the washouts on the batter were repaired using a laser buket. The area was then hilled for tree planting using a savannah plough to make the hills approximately 350mm high and 5m apart. The laser bucket was used to rip in between the hills to a depth of 300mm. The area was then aerially sown with superbrew seed mix comprising Bisset Creeping Blue Grass (10%), Bare Fine-cut Rhodes (70%), Green Panic (10%) and Premier Digitaria (10%). at a rate of 60kg per hectare

**Figure 29 Laser bucket Repairing Washouts on Batter**

**Figure 30 Savannah Plough used to Rip and Mound for Tree Planting**

**Figure 31 Preparation of Final Landform for Aerial Seeding November 2007**


**Figure 32 Forming Hills and Ripping of Batter Prior to Aerial Seeding November 2007**

**Figure 33 Aerial Seeding of Prepared Topsoil 2007**

As at the end of 2007, approximately 13 ha (5 ha in 2006 and 8 ha in 2007) of overburden dump had undergone reshaping to a final landform slope of 10 degrees, with topsoil respread as a 100mm layer. All of this area has been seeded and mounded in preparation for tree planting in March/April 2008.

**Figure 34 Rehabilitation after Aerial Seeding January 2008**

A good germination was achieved over the majority of the area helped by increased rain in the later part of 2007

Rhodes Grass

Self Sown Tree

*Green Panic*

*Creeping Blue Grass*

**Figure 35 Grass Species Aerial Sown in November 2007 (photo March 2008)**

## 4.6 Noise, Blast and Vibration Management and Performance

### 4.6.1 Blast Peak Vibration

Monitoring for blast overpressure and peak vibration has been conducted for every BCM blast initiated to date. Monitoring results indicate that all blasts have complied with the EPL12407 limits for peak vibration as measured at both monitoring locations, “Bollol Creek Station” and “Greenhills”.

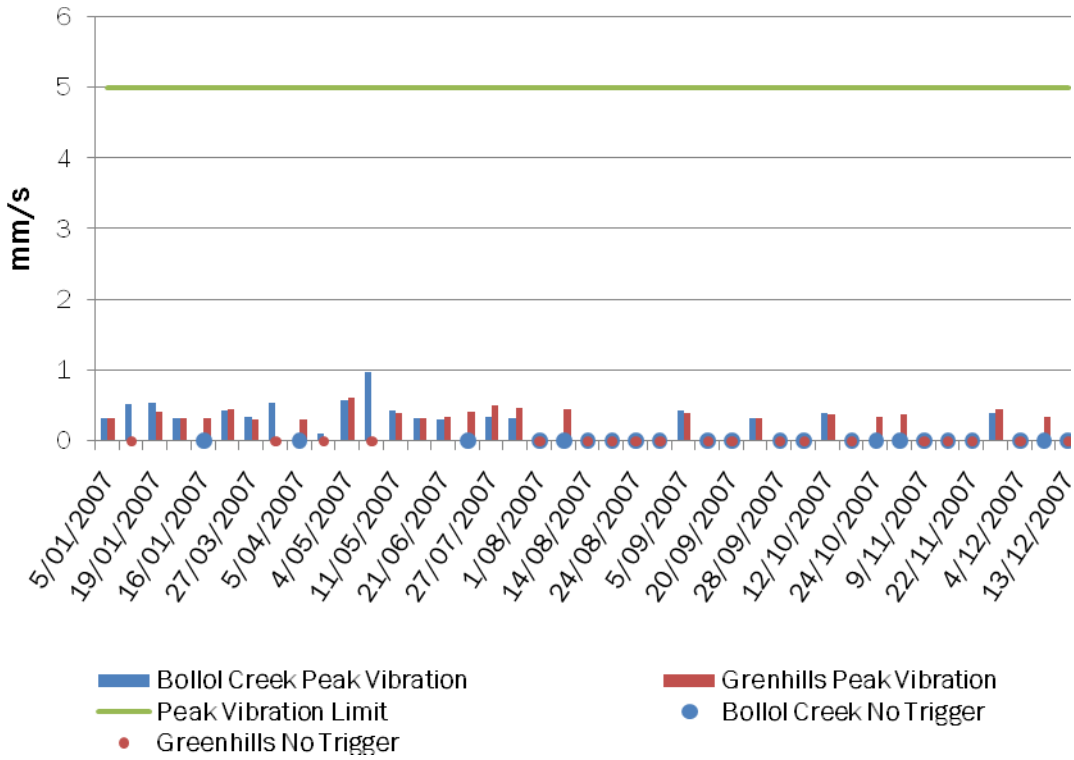


**Figure 36 Peak Vibration Summary**

### 4.6.2 Blast Overpressure

During the reporting period there has been one blast that has exceeded the acceptable limit for peak overpressure of 115dBA. A reading of 116.4 dBA was recorded on 27 July 2007 at “Bollol Creek Station”. This reading is not classed as an exceedence of peak overpressure as overall monitoring results have been well over the 95% acceptance limit.

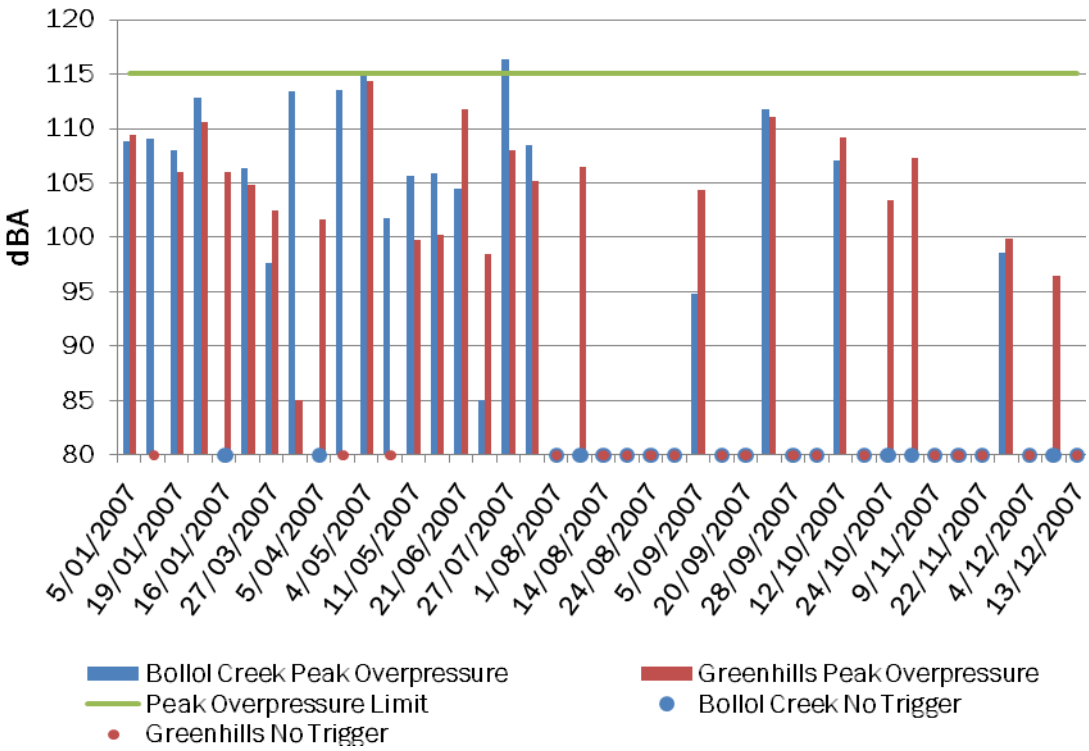


**Figure 37 Peak Overpressure Summary 2007**

### 4.6.3 Noise Monitoring

A specialist consultant (Spectrum Acoustics Pty Ltd) is engaged to monitor BCM noise levels according to the requirements of EPL12407.

Monitoring locations for the operations phase of the mine are presented in Table 11 below and their actual location can be seen in Attachment 3.

| Operational Noise Monitoring Locations | EPA Identification No: | Closest Project Component |
|---|---|---|
| “Templemore” | N4 | Mine |
| “Bollol Creek Station” | N3 | Mine |
| “Goonbri” | N1 | Mine |
| “Greenhills” | N2 | Mine |
| “Tarrawonga” | N6 | Mine |
| “Bellvue” | N5 | Private Coal Haul Road |
| “Cooboobindi” | N7 | Private Coal Haul Road |
| “The Rock” | N8 | Private Coal Haul Road |
| “Hazeldene” | N9 | Rail Loop |

| | | |
|---|---|---|
| “Springfield” | N10 | Rail Loop |
| “Roma” | N11 | Rail Loop |

**Table 11 Noise Monitoring Locations for Boggabri Mine**

Monitoring was conducted during April, July, September and January 2007 with results revealing two non-compliant events with noise criteria as follows:

- April 2007 – 1.6 dBA exceedence at “Bellvue” in the evening. This exceedence has been put down to the influence of temperature inversion conditions being experienced at the time of monitoring. There have been no further exceedence issues at “Bellvue”.
- April 2007 – 4 dBA exceedence of 39dBA at “The Rock” associated with the downhill acceleration of empty coal trucks on the haul road. Since this exceedence a 50km speed limit has been imposed on the trucks and there have been no further exceedence issues at “The Rock”.

Noise monitoring was not conducted at “Hazeldene”, “Springfield” or “Roma” due to a communications break down between Boggabri Coal and their noise consultant; Spectrum Acoustics, who mistakenly believed that this was an “events based” requirement rather than “time based”. Monitoring at these sites is to be carried out in late February 2008 and will continue as part of the normal monitoring program.

Early concerns of haul road noise exceedence at “The Rock” have led to more comprehensive monitoring at this site. This includes a close analysis of individual truck pass-bys on the haul road. The analysis shows the condition of the truck (full or empty) and the time it first became audible, the duration of each passing truck and the average levels for that duration period. This is then averaged into a fifteen minute assessment period.

A night time measurement was taken at the bedroom window at “The Rock” to determine maximum pass-by levels for comparison with the 45 dB(A),$L_{max}$ sleep disturbance criterion. There has also been ongoing correspondence with the residents at “The Rock”.

Noise monitoring results for the reporting period has been presented in Figure30 below.

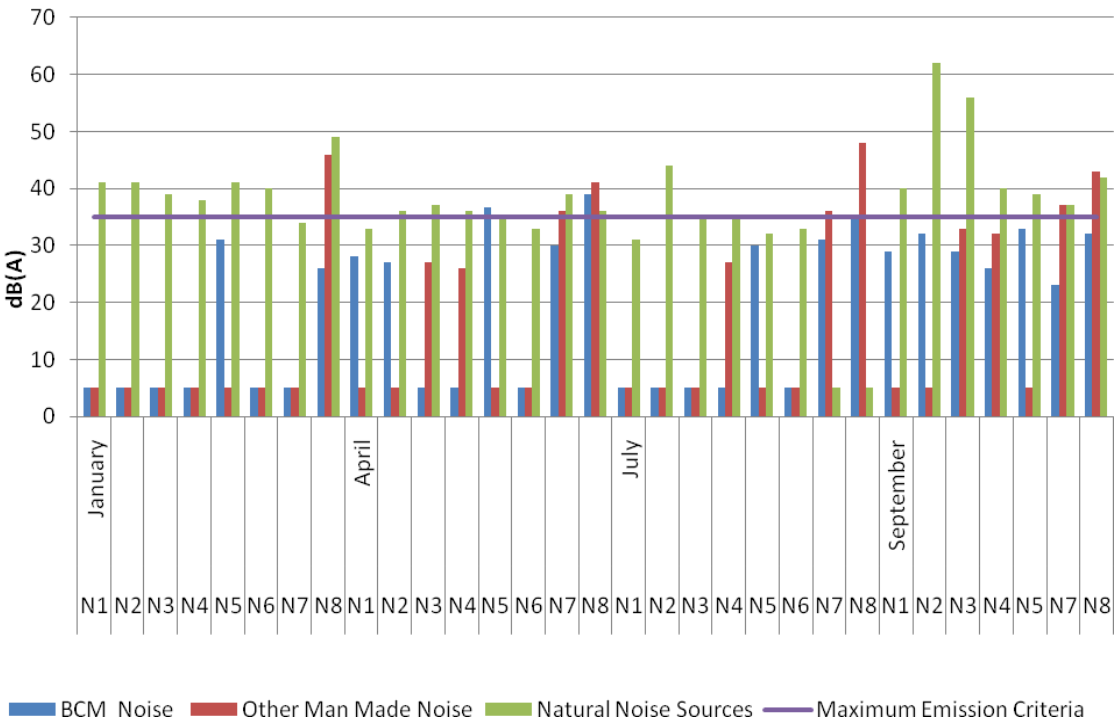


**Figure 38 Noise Monitoring Summary 2007**

## 4.7 Hydrocarbon and Contaminated Land Management and Performance

### 4.7.1 General

All hydrocarbons are stored on site are in double skinned self bunded tanks. No reportable spills of hydrocarbons occurred during the reporting period and all wastes are removed from site by a licensed waste contractor.


**Figure 39 Double Skinned Self Bunded Oil Storage Tanks**

## 4.8 Aboriginal Archaeology and Cultural Heritage Management and Performance

A detailed archaeological survey of the BCM was completed in mid 2006 prior to construction and the commencement of mining. No issues or findings in relation to cultural heritage have occurred as a result of mine development during the reporting period.

Sites of significance identified during the 2006 archaeological survey continue to be maintained and protected.


***Figure 40 Aboriginal Archaelogical Site***

## 4.9 Public Safety Management and Performance

### 4.9.1 Mine Access Roads

The designated access route to the Boggabri Mine is from the Kamilaroi Highway north of Boggabri via the Manilla Road (MR357) and the Leard Forest Road (SR12).. Both of these roads are currently of gravel standard. However Boggabri Coal have entered into negotiations with the Narrabri Shire Council to upgrade and seal the designated access route to improve the level of safety associated with accessing the mine. It is anticipated that the 14 km, $2M upgrade to sealed status will be completed during 2008.

### 4.9.2 Private Coal Haul Road

The ‘at grade crossings’ of Therribri and Leard Forest Roads give right of way to the oversize haul trucks. Electronically operated boom gates restrict access of public vehicles to the haul road and signage plus flashing lights that engage upon the approach of the haul trucks warn motorists on the shire roads of coal trucks approaching the haul road intersections. While no near misses or accidents have been recorded at either intersection since commencement numerous safety

observations have been made by BCM personnel of shire road traffic failing to observe the installed intersection signage.

### 4.9.3 Rural Lands Protection Board

Provision has been made for the safe and efficient movement of stock to the satisfaction of the Narrabri Shire Council and Pastures Protection Board along Travelling Stock Reserve # 83990 which is dissected by the private coal haul road. This included the construction of fenced and locked gate laneways, and secure holding pens located on the both sides of the haul road crossing.

### 4.9.4 Minesite Security

A 4 strand Iowa barb fence has been erected around the perimeter of the Stage 1 mine development area. Access to the Leard State Forest east of the active mine area is via the mine entry and through gates that have been included in the perimeter fence to the east of the active area. These gates allow access to the monitoring sites (piezometers) located in the eastern part of CL 368 and also for the Rural Fire Brigade should such access be required.

### 4.9.5 Fire Management

The lighting of fires on the BCM site is strictly prohibited and daily inspections are conducted by the Open Cut Examiner to ensure that any bush fire hazards are immediately dealt with. All welding on site is performed under the provisions of site issued ‘hot work permits’. All mine vehicles are equipped with fire extinguishers and the two 17 kL water trucks have fire fighting capabilities. These water trucks are always kept full of water when not in use in readiness should fire fighting be required.

### 4.9.6 Site Lighting

Deployment of lighting plants for night work is done with due consideration so as to minimise any stray light leaving the sight and affecting any neighbouring areas beyond CL 368.

# 5. COMMUNITY RELATIONS

## 5.1 Workforce

The Boggabri Mine workforce consists of approximately 125 staff most of whom are engaged on a permanent or sub-contract basis..

Where ever possible local people have been employed at the Boggabri Mine. Figure 33 below shows the results of a recent survey conducted to ascertain where the people in the current workforce are residing. In this instance a town refers to the township itself and surrounding rural areas. Employees who fit into the category of other NW NSW districts come from Wee Waa, Bingara, Tamworth and Quirindi.

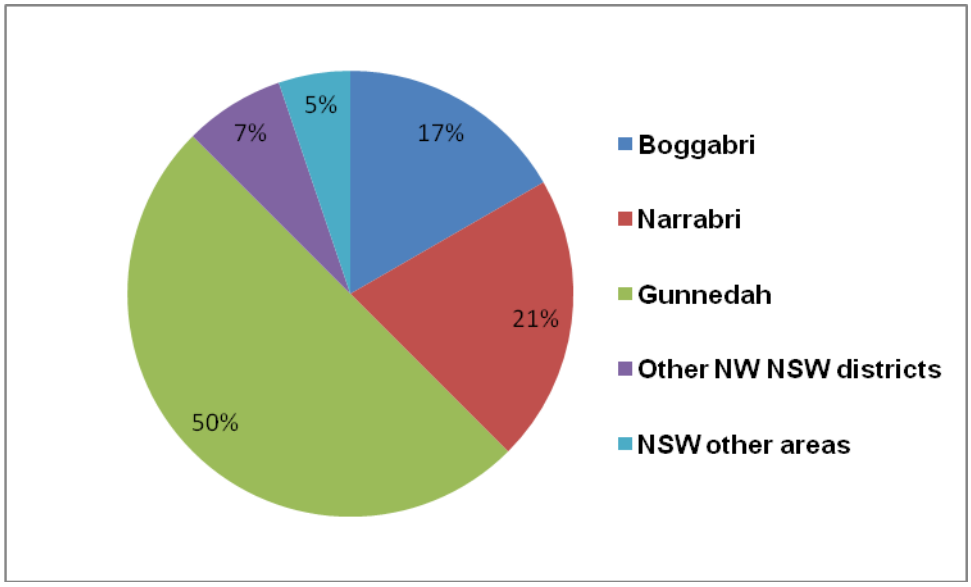


**Figure 41 Workforce Residential Locality Summary 2007**

Figure 34 below shows the origin of employees now working at the Boggabri Mine. This is approximate only but shows that a distinct majority of the workforce originated from the local area. The local area in this report refers to Boggabri, Narrabri and Gunnedah and surrounding rural areas.

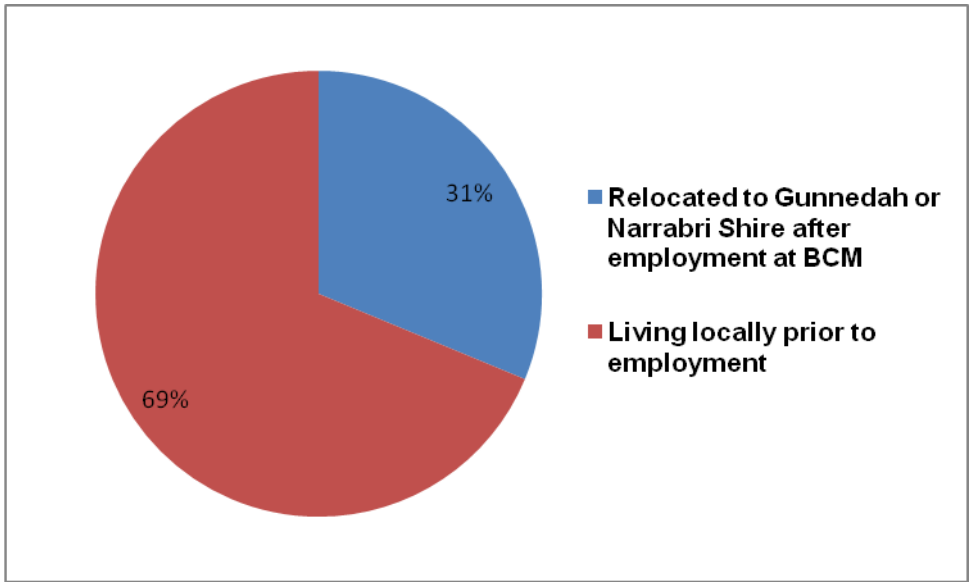


**Figure 42 Workforce Origin**

## 5.2 Community Complaints

A total of two formal community complaints were received by the company during 2007 and these are briefly summarised below.

On 18 June 2007 a complaint was received with respect to BCM blasting operations from a resident that lived 10.5 km lineal distance from the mine. Boggabri Coal communicated with the complainant and offered to once again have the blasts monitored by Downer EDI Mining and Downer EDI Blasting Services. The offer was

refused as the last time BCM monitored at this residence no triggers were recorded. The complainant subsequently withdrew the complaint.

In August 2007 a complaint was received from a local resident after a misunderstanding with regard to blast monitoring on this person's property. Communications with the resident have been re-established with no more complaints resulting.

## 5.3 Community Liaison

Boggabri Coal continues to consult with the public and the following bodies to monitor the impacts of mine operations upon the local community.

- Narrabri Shire Council
- Gunnedah Shire Council
- Federal & State Local Members
- Roads and Traffic Authority NSW
- Rural Lands Protection Board – Narrabri
- Boggabri Business Development Group
- Department of Environment & Conservation Armidale
- Forests NSW Dubbo
- Red Chief Local Aboriginal Land Council
- Gunidah Gunyah CDEP
- Boggabri Service Clubs i.e. Lions, Rotary, HACC, RSL, SES, RFB, NSW Police, NSW Ambulance, Narrabri Tafe, occurred.

# 6. REHABILITATION

## 6.1 Buildings

The existing "Nagero" homestead has now been refurbished and is being used as the Boggabri Coal administration office. The potential exists for the farmhouse/office to be utilised as a rural homestead following cessation of mining. There is no heritage or conservation status relevant to this building.

## 6.2 Rehabilitation of Disturbed Land

At the end of this reporting period (2007) approximately, 13ha of overburden emplacement had undergone treatment to final landform slope of 10 degrees and topsoiled to a depth of 100mm. It is anticipated that a further 9 ha will be available early in 2008 in preparation for tree planting in March/April 2008.

The long term rehabilitation objective is to re-establish native vegetation commensurate with commercial native forestry, while at the same time establishing suitable ecological functioning habitats. Boggabri Coal has initially sown the rehabilitated slope to a vigorously growing pioneer grass mix so as to bind the soil in place and reduce water runoff from the emplacement areas. After the successful

stabilisation by use of the pioneer pasture mix, it is proposed to selectively remove the pasture sward and commence establishment of the native ecosystems as per section 5.6.8 of the MOP.

## 6.3 Other infrastructure

No other rehabilitation works have been carried out at the Boggabri Mine other than those already mentioned in this report.

## 6.4 Rehabilitation Trials and Research

No rehabilitation trials or research has been undertaken at this time.

## 6.5 Further Development of the Final Rehabilitation Plan

Not applicable at this time.

# 7. ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

## 7.1 Activities proposed in 2008

Activities proposed by Boggabri Coal in 2008 include the extensive upgrade and sealing in conjunction with the Narrabri Shire Council of a total of fourteen kilometres of those portions of the Manilla Road (MR357), Leard Forest Road (SR12), SR15, SR23 and SR26 which form the designated mine access road.

The construction of the new mine water dam (MW2) at the tailings dam site.

The establishment of fourteen thousand selected eucalyptus hardwood trees as part of the ongoing mine rehabilitation program.

The construction of water management structures (contour drains, rock-lined flumes) to optimise water management on the emplacement areas, and to control soil erosion in the topsoiled reafforested areas.

Completion of the construction of the southern diversion drain culvert commenced in December 2007. The culvert will divert clean water under the mine haul road and is scheduled for completion in April 2008.

| | **Affected Area/Rehabilitated (hectares)** | | |
|---|---|---|---|
| | **To date** | **Last Report** | **Next Report (estimated)** |
| **A: MINE LEASE AREA** | | | |
| **A1 Mine Lease(s) Area** | 3,547 | | |
| **B: DISTURBED AREAS** | 164 | | 185 |

| | | | |
|---|---|---|---|
| **B1 Infrastructure area** (other disturbed areas to be rehabilitated at closure including facilities, roads) | 10.6 | 10.6 | 10.6 |
| **B2 Active Mining Area** (excluding items B3 – B5 below) | 58.4 | 55.4 | 70 |
| **B3 Waste Emplacements** (active/unshaped/uncapped) | 83 | 42 | 80 |
| **B4 Tailings Emplacements** (active/unshaped/uncapped) | 0 | 0 | 0 |
| **B5 Shaped Waste Emplacement** (awaits final vegetation) | 12 | 0 | 25 |
| **ALL DISTURBED AREAS** | 164 | 107.4 | 185 |

**C: REHABILITATION PROGRESS**

| | | | |
|---|---|---|---|
| **C1 Total Rehabilitated Land** (except for maintenance) | 0 | 0 | 25 |

**D: REHABILITATION ON SLOPES**

| | | | |
|---|---|---|---|
| **D1 10 to 18 degrees** | 12 | 5 | 25 |
| **D2 Greater than 18 degrees** | 0 | 0 | 0 |

**E: SURFACE OF REHABILITATED LAND**

| | | | |
|---|---|---|---|
| **E1 Pasture and Grasses** | 12 | 0 | 25 |
| **E2 Native forest/ecosystems** | 0 | 0 | 25 |
| **E3 Plantations and Crops** | 0 | 0 | |
| **E4 Other** (include non vegetative outcomes) | 0 | 0 | |

**Table 12 Rehabilitation Summary 2007**

| | Area Treated (hectares) | | |
|---|---|---|---|
| **NATURE OF TREATMENT** | **Report Period** | **Next Period** | **Comment/Control strategies/treatment details** |
| **Additional erosion control works** (drains re-contouring, rock protection) | 0 | 0 | |
| **Re-covering** (detail – further topsoil, subsoil sealing, etc) | 0 | 0 | |
| **Soil treatment** (detail – fertiliser, lime, gypsum, etc) | 5.0 | 13.0 | Aerial spreading of DAP fertilizer @ 40kg/ha |
| **Treatment/Management** (detail – grazing, cropping, slashing, etc) | 0 | 0 | |
| **Re-seeding/Replanting** (detail – species density, season, etc) | 5 | 0 | Imprved pasture mix @6kg/ha |
| **Adversely Affected by Weeds** (detail – type and treatment) | 0 | 0 | |
| **Feral animal control** (detail – additional fencing, trapping baiting, etc) | 0 | 0 | |

**Table 13 Maintenance Activities on Rehabilitated Land 2007**