



**WHITEHAVEN COAL**

**Narrabri Coal Operations Pty Ltd**

ABN: 15 129 850 139

# **Annual Environmental Management Report (ML 1609) and Annual Review (PA 08\_0144 MOD 2)**

**for the**

## **Narrabri Mine**

**1 April 2013 – 31 March 2014**



**Narrabri Coal Operations Pty Ltd****Annual Environmental Management Report (ML 1609) and  
Annual Review (PA 08\_0144 MOD 2) for the Narrabri Mine**

Stage 2 MOP Commencement Date 08.08.2011 – MOP Completion 31.12.2017

AEMR/Annual Review Commencement Date 01.04.2013 –

AEMR/Annual Review Completion Date 31.03.2014

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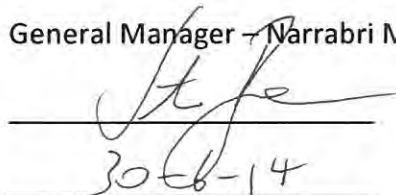
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**Date:**

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- Department of Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy
- Department of Trade and Investment, Regional Infrastructure and Services – Agriculture NSW
- NSW Environment Protection Authority
- Department of Trade and Investment, Regional Infrastructure and Services – NSW Office of Water
- Narrabri Shire Council
- Narrabri Mine Community Consultative Committee

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Appendix 4	Dust Monitoring Results
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**ACRONYMS USED THROUGHOUT THIS DOCUMENT**

AR	- Annual Review
ACHMP	- Aboriginal Cultural Heritage Management Plan
AQMP	- Air Quality Management Plan
CHPP	- Coal Handling and Preparation Plant
DP&E	- Department of Planning and Environment
DRE	- Division of Resources and Energy
DoE	- Commonwealth Department of the Environment
EA	- Environmental Assessment
EMS	- Environmental Management Strategy
EPA	- Environment Protection Authority
EPL	- Environment Protection Licence
ESAP	- Energy Savings Action Plan
LMP	- Landscape Management Plan
mbgl	- Metres below ground level
Mtpa	- Million tonnes per annum
MCP	- Mine Closure Plan
ML	- Mine Lease
NCOPL	- Narrabri Coal Operations Pty Ltd

NM	- Narrabri Mine
NOW	- NSW Office of Water
NSC	- Narrabri Shire Council
NMP	- Noise Management Plan
OEH	- Office of Environment and Heritage
PA	- Project Approval
RMP	- Rehabilitation Management Plan
WMP	- Water Management Plan
WHC	- Whitehaven Coal Limited

## **1 INTRODUCTION AND OBJECTIVES**

### **1.1 Scope**

#### **1.1.1 Introduction and Period of Reporting**

This Annual Environmental Management Report (AEMR) is the sixth for the Narrabri Mine and has been prepared in accordance with Condition 4 of Mining Lease (ML) 1609. This report also forms the Annual Review, required by Schedule 6, Condition 6 of the Narrabri Mine Stage 2 Project Approval (PA) 08\_0144 MOD 2.

As the existing Mining Operations Plan (MOP) for the Narrabri Mine was prepared under the “*Guidelines to the Mining, Rehabilitation and Environmental Management Process*” Version 3, dated January 2006 (‘the 2006 Guidelines’), the format of the AEMR has been prepared in accordance with the requirements of the 2006 Guidelines.

Though primarily covering the period from 1 April 2013 to 31 March 2014 (the reporting period), where relevant the AEMR and Annual Review provides information on historical aspects of the operations, longer term trends in environmental monitoring results, comparisons with predictions in the Environmental Assessment and provides relevant information on activities to be undertaken during the ensuing period, i.e. from 1 April 2014 to 31 March 2015, or beyond.

The Narrabri Mine is located within the Narrabri Local Government Area (LGA), approximately 30 km south-southeast of Narrabri, and 10 km north-northwest of Baan Baa (Figure 1).



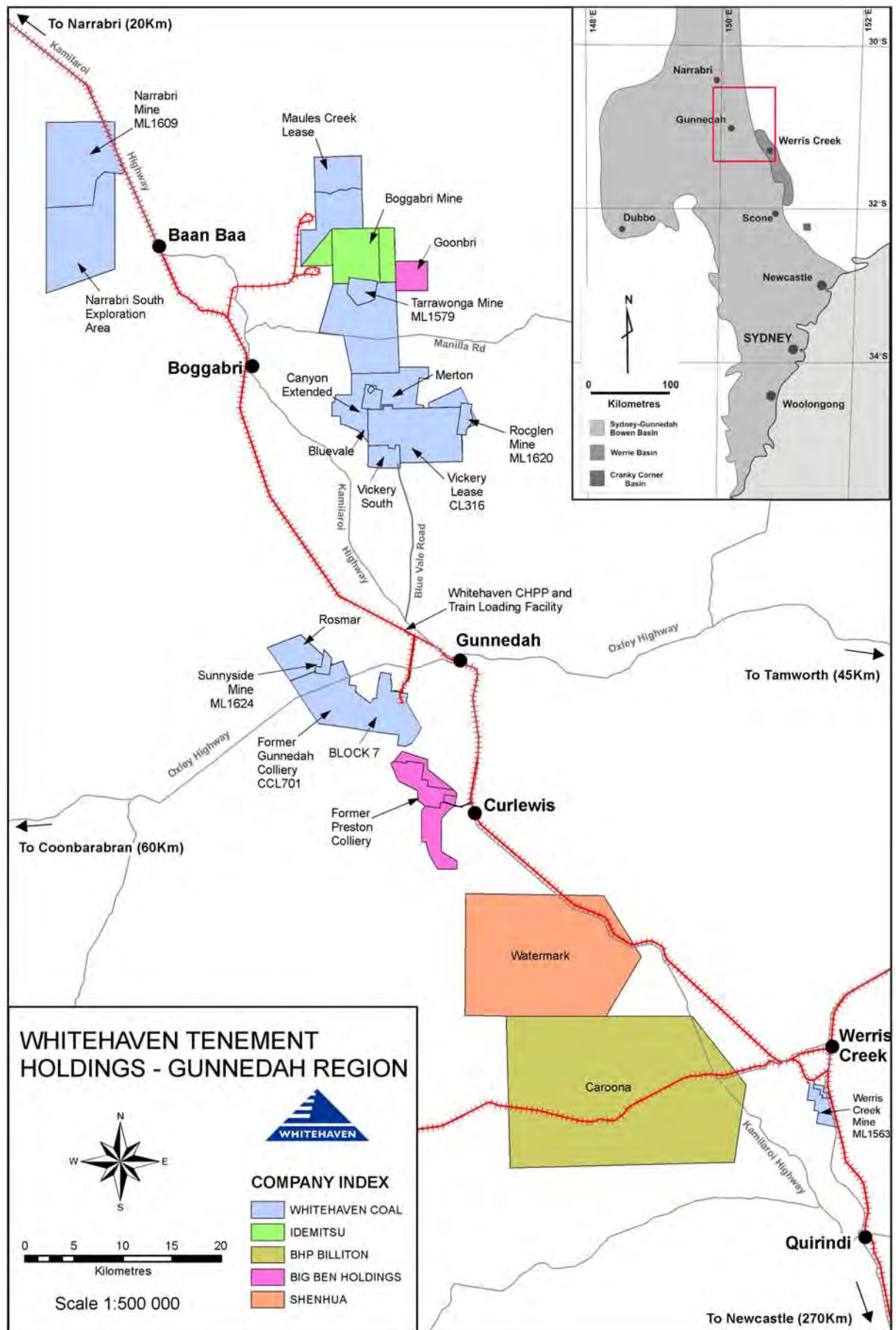


Figure 1 – Project Locality

### 1.1.2 The Company

The operating company for the Narrabri Mine is Narrabri Coal Operations Pty Ltd (NCOPL). The Narrabri Mine is a joint venture between Narrabri Coal Pty Ltd (NCPL) (70%), Upper Horn Investments Limited (7.5%), Electronic Power Development Co. Ltd (7.5%), EDF Trading (7.5%) and Daewoo International Corporation & Korea Resources Corporation (7.5%). NCPL is a 100% owned subsidiary company of Whitehaven Coal Limited (WHC), a publicly listed Company (ASX:WHC) with several mining interests in the Gunnedah-Narrabri region of NSW.

WHC owns and operates a number of open cut coal projects in the Gunnedah basin. The WHC operations comprise the Whitehaven Rail Siding and CHPP approximately 6 km west of Gunnedah, the Rocglen Open Cut Coal Mine, the Canyon (formerly Whitehaven) Open Cut Coal Mine (mining ceased mid 2009), the former Gunnedah Colliery and Sunnyside Open Cut Coal Mine, the Tarrawonga Open Cut Coal Mine (a joint venture between WHC (70%) and Idemitsu Australian Resources Pty Ltd (30%)) and Werris Creek Open Cut Coal Mine (through subsidiary company Werris Creek Coal Pty Ltd).

WHC is in the process of gaining the necessary State and Federal Government approvals to develop the Vickery Project. The Vickery Project is 100% owned by WHC. WHC is also in the process of constructing a new coal mine in the Gunnedah Basin known as the Maules Creek Coal Project. The Maules Creek Coal Project is a joint venture between WHC (75%), J-Power (10%) and ITOCHU (15%).

### 1.1.3 Background and History of the Narrabri Mine

The Narrabri Mine was developed after substantial investigations were undertaken under Exploration Licence (EL) 6243, granted in May 2004. This exploration program comprised an extensive drilling campaign of 160 rotary, fully and partly cored drill holes, totalling in excess of 6000m. Following completion of relevant assessments and feasibility studies, and the determined *in-situ* coal resource of 229M tonnes, it was determined that the proposal proceed to an application under the *Environmental Planning and Assessment Act 1979* (EP&A Act). An Environmental Assessment (EA) was prepared and submitted to the Department of Planning in March 2007. Project Approval (PA) 05\_0102 was subsequently granted for the Project on 13 November 2007. On approval, Mining Lease (ML) 1609 was granted on 18 January 2008 and Environment Protection Licence (EPL) 12789 (refer to Appendix 1) was granted on 20 February 2008.

PA 05\_0102 provided for the extraction of no more than 2.5 million tonnes of ROM coal per year and required all coal to be transported from the site via rail.

Since commencing Stage 1, continued geological exploration and a range of related technical studies were completed to evaluate the feasibility of converting the Stage 1 continuous mining operation to a longwall mining operation. An application for Project Approval, accompanied by an EA for the Narrabri Mine Stage 2 Longwall Project ("Stage 2 EA") was issued for public exhibition in November 2009.

In recognition of the expected approval timeframes and the long lead times for selected Stage 2 construction activities, NCOPL sought approval to undertake some Stage 2 works via a modification to the Stage 1 Project Approval under Section 75W of the EP&A Act while the Stage 2 EA was being assessed.

PA 05\_0102 MOD 1 was granted on the 26<sup>th</sup> March 2010 for activities including the construction and use of the West Mains Ventilation Shaft and gas pre-drainage infrastructure and the construction but not use of a Coal Handling and Preparation Plant (CHPP). Stage 2 operations were subsequently approved by the Minister for Planning on the 26<sup>th</sup> July 2010, via PA 08\_0144, which provides for the extraction of up to 8 Mtpa of run-of-mine (ROM) coal utilising longwall mining methods.

Minor modifications to PA 08\_0144 were approved by the Minister for Planning in March 2011 (an administrative modification in relation to the Extraction Plan – PA 08\_0144 MOD 1) and December 2011 (in relation to a one off transport of coal by road for an approximate 600 tonne bulk sample – PA 08\_0144 MOD 2) (refer to Appendix 2).

Over the life of the approved mine, the total area of native woodland vegetation that may be affected by surface disturbance for construction and operation of mine surface facilities will equate to approximately 210ha. ML 1609 covers a total area of 5,298ha.

#### **1.1.4 Products and Markets**

Coal within the Narrabri Mine coal deposit can be described as being relatively free of major structural disturbance. The basal 4-4.2m of the seam generally averages 8 to 10 % raw ash. The product for Stage 1 operations did not require a CHPP but required general crushing and screening facilities for processing prior to despatch. Coal produced from the Stage 2 longwall operation requires processing through a CHPP which has been constructed and is now fully operational. Coal produced at the mine is sold to the export market.

### **1.1.5 Operational and Environmental Management**

#### **1.1.5.1 Contacts**

The management personnel responsible for operational and environmental performance at the Narrabri Mine and their relevant contact details are as follows:

- Steve Bow – General Manager, retains overall responsibility for all activities and performance at the mine. Contact: (02) 6794 4755.
- Dean Lawrence – Commercial Manager. Contact: (02) 6794 4755.
- Gerald Linde – Mine Manager, retains statutory and mine management responsibility for all operational activities and safety performance at the mine. Contact: (02) 6794 4755.
- Owen Salisbury – Technical Services Manager, retains responsibility for technical aspects of the operation. Contact (02) 6794 4755.
- Steve Farrar – Environmental Officer, oversees day to day environmental performance across the site. Contact: (02) 6794 755.

Mining operations will be undertaken by Narrabri Mine personnel with the assistance of contractors providing underground support, where required. Contractors are currently used to provide outbye services, e.g. conveyors, secondary support and ventilation, underground and to undertake surface civil works onsite at the direction of Narrabri Mine personnel.

#### **1.1.5.2 Support Personnel**

In addition to the personnel identified in Section 1.1.5.1, Narrabri Mine utilise specialist assistance as and when required. Specialist environmentally-based or related companies or consultants involved in activities at the mine during the reporting period included:

- ALS Environmental Gunnedah;
- Eco Logical Australia Pty Ltd;
- Advitech Pty Limited;
- Novecom Pty Limited;
- WRM Water and Environment; and
- Spectrum Acoustics.

All mining and environmental management activities are undertaken generally in accordance with the Mining Operations Plan (MOP), management plans and

procedures prepared in satisfaction of Narrabri Mines' ML 1609, Environment Protection Licence (EPL) 12789, Project Approval's and the relevant legislation.

#### **1.1.6 Corporate Environmental Policy**

WHC has a documented Health, Safety and Environment policy which states:

*Whitehaven Coal intends to conduct business in a way that maintains a safe and healthy workplace for its employees, contractors, visitors and the surrounding community and will protect the environment in all stages of exploration, mining, processing and train loading.*

*Whitehaven Coal aims to:*

- *Achieve zero injuries and occupational illnesses.*
- *Achieve zero equipment damage.*
- *Achieve zero environmental incidents.*

*Whitehaven Coal will strive to achieve these goals by:*

- *Considering health, safety, welfare and environmental matters when planning and completing work activities.*
- *Consulting and communicating in a fair and effective manner regarding health, safety, welfare and environment matters.*
- *Having in place processes for identifying hazards and eliminating or minimising health, safety, welfare and environmental risks and impacts.*
- *Having in place processes for receiving and considering information regarding incidents, hazards, and risks and impacts, and responding to that information in a timely way, including learning's applied and shared.*
- *Working to improve safety and environmental performance through continuous improvement.*
- *Providing an effective injury management and return to work program for employees.*
- *Complying with applicable health, safety and environmental legal and other requirements.*
- *Providing workers with necessary health, safety, welfare and environment information, instruction, training and supervision to allow for the safe performance of their work.*
- *Making available for use, and using, health, safety, welfare and environment resources and processes to implement and maintain the requirements of this Policy and associated health, safety, welfare and environment management systems.*
- *Verifying the availability and use of health, safety and welfare resources and processes.*

Responsibilities of Workers:

- Workers have a responsibility to comply with the applicable legislation, this policy and associated health, safety and environment management systems. No work is to be undertaken without a clear understanding of a safe method that minimises the risk of injury or illness, plant or equipment damage and environmental harm.
- Workers must take reasonable care for their own health and safety and have an obligation to take reasonable care that their acts or omissions don't adversely affect themselves or the health and safety of others at the operation.
- Workers must also comply with any reasonable instruction given by Whitehaven Coal and cooperate with any reasonable policy or procedure relating to health or safety notified to them.

This policy applies to all sites managed by Whitehaven Coal and its subsidiaries, and to all workers, visitors and clients of Whitehaven Coal.

## 1.2 Approval Status

### 1.2.1 Leases, Licences, Approvals and Management Plans

Table 1 identifies the leases, licences and approvals in place for the Narrabri Mine at the end of the reporting period, the issuing / responsible Authority, dates of issue, duration (where limited) and relevant comments. The list is presented chronologically according to the date of issue.

Reviews of compliance/performance with the conditions identified in PA 08\_0144 MOD 2, EPL 12789, and ML 1609, are presented in Appendix 3, Tables A3-1, A3-2 and A3-3 respectively.

**Table 1 – Tenements, Licences and Approvals**

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Division of Resources and Energy (DRE)	Exploration Licence EL 6243	21 May 2004	20 May 2014	Approval for exploration. Renewal application has been submitted
Minister for Planning	Project Approval (PA 05_0102)	13 November 2007	18 January 2029	Project Approval for Stage 1. Surrender of the Stage 1 Project Approval approved on 2 August 2011
DRE	Mining Lease (ML 1609)	18 January 2008	18 January 2029	Approval for mining
Environment Protection Authority (EPA)	Environment Protection Licence 12789	20 February 2008	Nil – Anniversary date: 20 February	For mining operation >5,000,000 T (handled and produced)
Narrabri Shire Council (NSC)	Construction Certificate DP 816020 Inspection Report/Permit to Occupy No 2413	17 October 2008  6 August 2009	N/A	Stage 1 Mine Surface Facilities
NSW Office of Water (NOW)	90CA811347 / WAL15922  90WA812891 / WAL20131 90AL807276 / WAL12833  90CA802130 / WAL6762 90CA802130 / WAL2671 90CA802130 / WAL2728	Various	Various	GAB – Water supply (248ML)  GW – Water supply (150ML) GW – Water supply (67ML)  River – High Security (20ML) River (48ML) River (10ML)



Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
	90CA802130 / WAL20152 90BL254679 / WA822539 90WA822539 / WA822539 90BL254481 - 90BL254487 90BL254660 - 90BL254663 90BL254658 90BL254659 90BL254701 90BL254958 - 90BL254967 90BL255167 - 90BL255173 90BL255216 - 90BL255218 90BL255769 - 90BL255772 90BL256060 - 90BL256063			River (600ML) Mining (Low Security) (818ML) Mine De-gassing/De-Watering Groundwater Monitoring Purposes
Minister for Planning	Project Approval (PA 05_0102 MOD 1)	26 March 2010	18 January 2029	Notice of modification under Section 75W of the EP&A Act. PA surrendered, refer above.
Minister for Planning	Project Approval (PA 08_0144)	26 July 2010	26 July 2031	Project Approval for Stage 2
WorkCover NSW	Notification for explosives use and storage	5 August 2010	20 July 2015	Licence to store – 07-100215-001 Licence to handle – various
Narrabri Shire Council (NSC)	Construction Certificate DP 816020	23 September 2010	N/A	Stage 2 Mine Surface Facilities
Minister for Planning	Project Approval (PA 08_0144 MOD 1)	30 March 2011	26 July 2031	Notice of modification under Section 75W of the EP&A Act
	Project Approval (PA 08_0144 MOD 2)	21 December 2011	26 July 2031	Notice of modification under Section 75W of the EP&A Act

Table 2 identifies the management plans, strategies and programs in place for the Narrabri Mine at the end of the reporting period and their current status.

**Table 2 – Management Plans, Strategies and Programs**

Title	Status	Project Approval Condition (PA 08_0144 MOD 2)
Extraction Plan (for all second workings in the project area), including a: <ul style="list-style-type: none"> <li>Coal Resource Recovery Plan;</li> <li>Subsidence Predictions;</li> <li>Subsidence Monitoring Program;</li> <li>Built Features Management Plan;</li> <li>Public Safety Management Plan;</li> <li>Landscape Management Plan;</li> <li>Water Management Plan;</li> <li>Biodiversity Management Plan;</li> <li>Land Management Plan; and</li> <li>Heritage Management Plan.</li> </ul>	Longwall panels (LW) 101 to 105 approved by the DP&I on 27 <sup>th</sup> March 2012 and DRE on 5 <sup>th</sup> June 2012.	Schedule 3, Condition 3
Noise Management Plan	Stage 2 plan approved 6 <sup>th</sup> December 2011	Schedule 4, Condition 4
Air Quality Monitoring Program	Stage 2 plan approved 6 <sup>th</sup> December 2011	Schedule 4, Condition 7
Water Management Plan, including a: <ul style="list-style-type: none"> <li>site water balance;</li> <li>erosion and sediment control plan;</li> <li>surface water monitoring plan;</li> <li>raffinate discharge and transfer control and monitoring plan;</li> <li>groundwater monitoring program; and</li> <li>surface and groundwater response plan.</li> </ul>	Stage 2 plan approved 5 <sup>th</sup> April 2013	Schedule 4, Condition 13

Title	Status	Project Approval Condition (PA 08_0144 MOD 2)
Aboriginal Cultural Heritage Management Plan	Stage 2 plan approved 6 <sup>th</sup> December 2011	Schedule 4, Condition 23
Energy Savings Action Plan	Stage 2 plan approved 6 <sup>th</sup> December 2011	Schedule 4, Condition 30
Greenhouse Gas Minimisation Plan	Stage 2 plan approved 12 <sup>th</sup> June 2012	Schedule 4, Condition 32
Waste Management Plan	Stage 2 plan approved 6 <sup>th</sup> December 2011	Schedule 4, Condition 33
Landscape Management Plan	Plan approved 27 <sup>th</sup> March 2012, updated as part of the Extraction Plan	Schedule 5, Condition 3
Environmental Management Strategy	Stage 2 plan approved 6 <sup>th</sup> December 2011	Schedule 6, Condition 1
Pollution Incident Response Management Plan	Submitted August 2012	EPL12789
Major Hazard Management Plans incorporating: 1. Surface Transport Management Plan 2. Underground Transport Management Plan 3. Airborne Dust Management Plan 4. Explosives Handling Management Plan 5. Slope Stability Management Plan 6. Fire and Explosion Management Plan 7. Strata Failure Management Plan 8. Inrush Management Plan 9. Dust Explosion Management Plan 10. Outburst Management Plan 11. Spontaneous Combustion Management Plan	All plans currently managed and implemented by Narrabri Mine	<i>Coal Mine Health and Safety Act 2002</i>

### 1.2.2 Amendments to Leases, Licences and Approvals

No modifications of PA 08\_0144 MOD 2 occurred during the 2013/2014 AEMR period. Narrabri Mine is currently collating data and reviewing technical details to assess the viability of introducing Longwall Top Coal Caving (LTCC) and/or face widening to the operation. Should this be considered an option Narrabri Mine will consult with the relevant Government agencies at that time.

The Mining Operations Plan (MOP) for the Narrabri Mine was not amended during the reporting period. The Subsidence Monitoring Program, approved as part of the Extraction Plan for LW101 to LW105, was amended during the reporting period. The amendment removed a subsidence monitoring line initially included to monitor subsidence impacts to a dam wall however this dam is proposed to be backfilled.

### 1.3 Actions Requested at Previous AEMR Review

An AEMR inspection was undertaken by representatives from the Division of Resources and Energy (DRE), the NSW Environment Protection Authority (EPA) and the Department of Planning and Environment (DP&E) on 18 February 2014. In correspondence dated 6 March 2014, the DRE reviewed the Narrabri Mine AEMR/Annual Review for the 2012-2013 period and found that the report was acceptable for the reporting period. In correspondence dated 4 March 2014, the EPA reiterated issues identified while undertaking the inspection. Table 3 outlines the actions identified by the DRE and EPA.

**Table 3 – Actions from 2012/2013 AEMR/Annual Review Site Inspection**

Department	Action/Statement	Progress
DRE	Tree death above Longwall Panels 101 and 102 – Provide DRE with a copy of the report to be given to NSW Department of Planning & Infrastructure (DP&I) regarding impacts upon vegetation above Longwall Panels 101 and 102.	Report provided to the DP&I was provided to DRE on 17 March 2014.
	Weeds present within topsoiled areas & topsoil stockpiles – Ensure weed control is ongoing.	Weed control is ongoing at the site, also refer to Section 3.8.
EPA	It was noted that a heavy vehicle (i.e. crane) was generating dust traveling along an internal road. Speed appeared to be a contributing factor to this dust generation. A water cart was later observed onsite.	Advice provided to the EPA on 9 May 2014 stating that Narrabri Mine had developed a Toolbox Talk for all surface personnel reminding them of their obligations for managing dust emissions. The toolbox talk reinforces a range of dust management options that can be utilised for a range of activities onsite. The Toolbox Talk makes reference to the Katestone Environmental Pty Ltd 2011 report <i>“NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining”</i> .
	Maintenance to the internal lining of the CHPP walls is required.	Advice provide to the EPA on 9 May 2014 stating that Narrabri Mine will undertake an audit of the internal lining of the CHPP during May 2014 to determine the extent of the damage and to arrange repairs. This audit has been completed and maintenance of the acoustic lining has been added to the corrective maintenance and defect reporting schedules for the CHPP.

## **2 SUMMARY OF OPERATIONS**

### **2.1 Exploration, Resources / Reserves and Mine Life**

#### **2.1.1 Exploration**

Over 300 exploratory drill holes totalling approximately 52,000 m of drilling have been completed to date. The drilling has included cored, partly cored and open hole drilling. However, during the 2013/2014 reporting period no exploration activities were undertaken onsite.

#### **2.1.2 Resources and Reserves**

The coal resource of the Narrabri Mine is contained within the Hoskissons Coal Seam. The seam is between 8-10m thick over the western half of ML 1609. The seam strikes generally north-south, and dips gently to the west.

The Hoskissons coal seam has been modelled as a series of plies. The basal 6m section of the seam contains low ash coal suitable for thermal applications. The lower 4.0-4.3m of the seam will form the targeted working section for mining. The upper section of the seam is separated by a tuffaceous band from the basal section and contains higher ash coal that will remain in the roof where seam thickness exceeds 4.3m.

It has been estimated that approximately 230 million tonnes of coal occurs within the targeted working section, with up to 170 million tonnes recoverable by longwall mining methods.

#### **2.1.3 Estimated Mine Life**

The Stage 2 EA estimates a mine life of approximately 30 years based on 170Mt of coal recovered from 26 longwall panels and associated development roadways, at an annual production rate of up to 8.0Mt.

### **2.2 Land Preparation**

Land preparation activities undertaken during the reporting period were conducted in accordance with commitments identified in Section 3 of the MOP and included:

- Minor clearing of previously grazed/cultivated agricultural areas for exploration and gas drainage activities; and
- Limited clearing of woodland areas in consultation with a qualified ecologist and as per the Stage 2 Environmental Assessment.

Table 4, the “Cumulative Production and Waste Summary”, shows that at the end of the reporting period a total of 570,986 m<sup>3</sup> of subsoil and topsoil had been stripped over the life of the mine, with 199,799 m<sup>3</sup> respread across re-profiled areas. A further 371,187 m<sup>3</sup> of topsoil and subsoil remains stockpiled on site for future rehabilitation purposes.

**Table 4 – Cumulative Production and Waste Summary**

	Cumulative Production (cubic metres)			
	Start of Reporting Period	During Reporting Period	Cumulative Total at End of Reporting Period	Cumulative Total at End of next Reporting Period (estimated)
Soil Stripped (m <sup>3</sup> )	536,308	34,678	570,986	762,907
Soil Used/spread (m <sup>3</sup> )	198,228	1,571	199,799	235,541
Waste Rock (m <sup>3</sup> )	657,000	0	657,000	657,000
ROM Coal (t)*	3,495,659	4,754,293	8,249,952	14,249,952
Processing Waste (t)	140,810	172,195	313,005	530,318
Product (t)	3,069,990	4,853,562	7,923,552	13,706,239

\* - ROM Coal is total production at the mine site. The difference between ROM Coal and final product is related to changes in stockpile volumes at the mine.

Soil removal activities were undertaken specific to the footprint of required surface infrastructure.

## 2.3 Construction

Construction activities during the reporting period included:

- Gas drainage infrastructure (Photo 1); and
- Construction and commissioning completed during May/June 2013 on the bypass crusher (Stage 1 crusher has had a screen added and has been enclosed) (Photo 2).



**Photo 1 – Gas Drainage Infrastructure**



**Photo 2 – Bypass Crusher**



## **2.4 Mining**

### **2.4.1 Mining Method**

Continuous miners supported by shuttle cars and feeder breakers continue to develop the underground roadways including ventilation overcasts and belt chambers. During the reporting period development extended into the maingate of LW105 (up to 4c/t) with the roadways being developed for longwall panel LW104 (up to 29 c/t). Development had also extended to 39 c/t in the mains, or the 100 panel. The longwall unit had previously extracted LW101 and LW102 and had just commenced extraction in LW103 during the reporting period.

The underground-in-seam (UIS) drilling program continues using contractors to undertake this work. There are currently two drill rigs operating. The gas from the drill holes is reticulated via underground pipework connected to vertical wells that are connected to the gas drainage plant on the surface.

During the reporting period the longwall and development units produced 4,754,293 t of ROM coal. Of this the longwall unit accounted for 4,319,001 t and at the end of the reporting period the longwall had retreated 204 m along LW103 which has a total length of 2,197 m.

### **2.4.2 Mining Constraints**

Economic factors will ultimately determine the continued viability of the operation over the proposed life of mine. Mining activities are also constrained by reducing seam thickness at the subcrop in the North East of the lease. In addition, the first three longwall panels are truncated by a large North-West trending fault at their Northern ends.

Exploration data obtained to date has identified a number of northwest, northeast and more locally north-northwest trending structural zones in the eastern portion of the mine site however these are not expected to pose any significant operational issues with regard to productivity or mine roof instability.

There have been no major igneous intrusions identified as intersecting within the Hoskissons Coal Seam to date.

The occurrence of three massive strata units, being the Garrawilla volcanics, a Basalt Sill, and the Digby Formation have been considered in the mine plan layout. This layout has been optimised for Stage 2 longwall operations. The occurrence of this strata is therefore not expected to impact on mine operations.

Groundwater inflow predictions were made for Stage 1 operations, with adequate contingencies in place for the storage and treatment of groundwater on the surface.

Predictions for Stage 2 operations, as identified in the Environmental Assessment, suggest additional groundwater intersection as a consequence of longwall operations. The groundwater model will be recalibrated against actual inflows in accordance with the requirements of the consent conditions.

### 2.4.3 Mining Equipment

Table 5 presents a list of mining equipment in use at the mine at the end of the reporting period together with its principal function(s).

**Table 5 – Mining Equipment**

Item	Number in operation	Function
Longwall Unit	1	Longwall mining
Personnel Transport Units	10	Transport of personnel underground
Underground Loader	11	Transport of equipment and materials underground, loaders can also be fitted with attachments to undertake bolting, winching operations etc
Continuous Miner	4	Coal roadway development, each continuous miner serves as a bolting platform fitted with bolting rigs to support the roof and rib of underground roadways
Shuttle Car	8	Coal roadway development
Feeder Breaker	4	Sizing and loading coal onto a conveyor belt
Underground drill rig	2	U/G pre-drainage
Dozers	4	Coal handling – Komatsu 375 & 475, 2 x Caterpillar D11
Water Carts	2	Dust Suppression and drilling operations
Drill Rigs	4	Drilling operations (pre-drainage, gas compliance and SIS drilling)
14H Grader	1	Road maintenance, access tracks and drill pad construction
Excavators	2	Civil works and gas drainage infrastructure
Rollers	1	Civil works, access tracks and drill pad construction
Vacuum truck	1	Drilling operations
Road Registered Tipper	2	Civil works
Posi Trac Loader	1	Civil works

### 2.4.4 Hours of Operations

The approved hours of operation are provided in Table 6.

**Table 6 – Hours of Operation**

Activity	Hours / Days
<b>Surface Facilities Construction</b>	
Vegetation clearing / soil removal	7:00am to 10:00pm / 7 days
Surface infrastructure construction	7:00am to 10:00pm / 7 days
Reject emplacement area development	7:00am to 10:00pm / 7 days
Raw materials / supply delivery	7:00am to 10:00pm / 7 days
Ventilation shaft construction	24 hours / 7 days <sup>1</sup>
Gas drainage bore construction	24 hours / 7 days
<b>Mining Operations</b>	
Pit Bottom Area development	24 hours / 7 days
Underground mining	24 hours / 7 days
Gas drainage	24 hours / 7 days
Ventilation fan operation	24 hours / 7 days
Coal processing and handling	24 hours / 7 days
Rail loading and transportation	24 hours / 7 days
Surface maintenance	24 hours / 7 days

Activity	Hours / Days
CHPP reject disposal	24 hours / 7 days <sup>2</sup>
Raw materials / supply delivery	7:00am to 10:00pm / 7 days
Note 1: Operations initially for 4 months then at approximately 5 year intervals 2: Reject disposal activities will generally be restricted to 7:00am to 10:00pm, 7 days per week. However, it is possible that the proportion of reject material generated by the CHPP may exceed the predicted average 5% level for short periods. To account for these periods of elevated reject production, contingent hours of operation will be 24 hours / 7 days (when inversion conditions do not prevail).	

## 2.5 Processing

### 2.5.1 Outline

Transportation of the mined coal to the ROM coal stockpile occurs via the conveyor drift from the Pit Bottom Area to the Pit Top Area. The ROM coal is then drawn from the ROM coal stockpiles via one of two reclaim valves and tunnels from where it is fed to a rotary breaker for size reduction and waste/stone removal. The broken coal is then transferred to a dry screen with the <20mm coal fraction transferred directly to the thermal product coal stockpile area and the remainder transferred to the CHPP where the coal is washed. The fine and ultra-fine coal is dewatered via a belt press and added to the thermal product stockpile. The washed coal is transferred to the product coal stockpile area as either a thermal coal or Pulverised Coal Injection (PCI) grade product.

The Stage 1 bypass crusher was upgraded and commissioned during the report period. The bypass crusher is fed by dozer from the ROM stockpile. The coal is then conveyed over a screen to remove waste material. The coal is then crushed to ≤50 mm and fed by conveyor on the product stockpile as a thermal coal product.

The coal preparation process currently removes approximately 3.5% of the total ROM feed as reject, which is predominantly rock from the floor of the mine workings. The rejects are stockpiled adjacent to the CHPP. From the reject stockpile, the consolidated reject is transferred to a Reject Emplacement Area (REA) on the north-facing side of a low ridge immediately to the west of the box cut.

### 2.5.2 Changes or Additions to the Process or Facilities

As mentioned above, the Stage 1 crusher has been upgraded, i.e. enclosed with a screen added, to provide additional through put at the mine. The bypass crusher was commissioned during May/June 2013.

Narrabri Mine is also investigating options for the expansion of the ROM and product coal stockpiles. This investigation is in the early stages. Should a preferred option be identified Narrabri Mine will liaise with the relevant Government agencies at that time.

### **2.5.3 Introduction**

Wastes produced from the Narrabri Mine during the reporting period remain unchanged from those identified in the EA and MOP and comprised:

- General domestic-type wastes from onsite buildings and routine maintenance consumables;
- General underground waste;
- Recyclable (steel and paper/cardboard);
- Oil and grease; and
- Sewage.

The following sub-sections identify the management procedures adopted for each of these wastes throughout the reporting period. Management procedures, as identified in the Waste Management Plan, remain unchanged from those previously identified and will be continued for the ensuing reporting period.

### **2.5.4 Domestic Type Wastes**

All general wastes originating from the surface facilities area have been disposed of in mobile garbage bins located adjacent to the various buildings. These bins are collected and disposed of offsite by a licenced waste contractor on a regular basis. Approximately 720 tonnes of general waste was transferred offsite during the reporting period (approximately half is transported to Namoi Waste Corp's transfer facility where it is segregated further to maximise recycling). This amount is consistent with the previous reporting period indicating the level of waste produced when at full production at the mine.

### **2.5.5 Oil Containment and Disposal**

The bunded permanent waste oil storage area adjacent to the washbay has three bunded 1,000L Intermediate Bulk Containers (IBC). The waste oil area also includes bunded containers for waste oil drum storage. A drum crusher is also used onsite. A self bunded 4,000L waste oil tank is also located at the workshop. An oil-water separator is located at the washbay and another oil-water separator is located at the workshop. During the reporting period approximately 23,000 litres of waste oil was collected by the waste contractor, Northern Lubequip, for recycling.

### **2.5.6 Recycling**

Approximately 151 tonnes of scrap metal has been collected for offsite recycling during the reporting period, which has significantly increased when compared to the

previous reporting period. This is a result of underground infrastructure being scrapped during November 2013.

Narrabri Mine also collects waste paper, ink cartridges and cardboard for recycling. Approximately 7.3 tonnes of cardboard was recycled during the reporting period.

#### **2.5.7 Sewage Treatment and Disposal**

Effluent from the sewage and ablutions facilities at the mine is managed through a Sewage Treatment Plant (STP) with a Continuous Extended Aeration Process. The plant is made up of a series of industrial plastic tanks. Each tank provides a separate function in order to treat the sewage for the required quality and quantity. The system has a maximum capacity of 45,000L per day.

#### **2.5.8 Mine Equipment Tyres**

Any tyres requiring disposal during the reporting period were transported offsite for disposal at licensed facilities.

#### **2.5.9 Overburden and Interburden**

No overburden or interburden material was developed during the reporting period as the box cut and drifts are all complete. Any remaining material obtained during drift development has been stockpiled in the north-western corner of the Pit Top Area.

### **2.6 Stockpile Capacity**

The ROM coal stockpile has a capacity of approx. 300,000 t and the product stockpile is approx. 200,000 t with dozer push. Both were developed as per the specifications in the Mining Operations Plan (MOP).

### **2.7 Water Management**

#### **2.7.1 Objectives**

The Narrabri Mine lies within the catchment of the Namoi River. Locally, and within proximity of the mine site, Kurrajong Creek and Pine Creek provide flows to the Namoi River during runoff events. The design of sediment detention basins within the disturbed area of the Pit Top Area limits the opportunity of discharge of runoff from mine-disturbed areas, i.e. after appropriate detention time to satisfy licensed discharge criteria. Three discharge points (Storage Dams SD2, SD4 & SD5) (Plan 4B) have been nominated in EPL 12789, together with upstream and downstream monitoring locations within the adjacent creek systems.

The management of water at the mine is undertaken as per the Site Water Management Plan (SWMP). The Stage 2 Water Management Plan (WMP) was approved by the Department of Planning and Infrastructure on 5 April 2013. The SWMP has the following objectives:

- To ensure sufficient quantities of water can be obtained to meet the requirements for dust suppression across the site;
- To ensure segregation of “contaminated” and “dirty” water from “clean” water with “contaminated” water directed to sediment basins and “dirty” water directed to storage dams;
- To maximise the use of “contaminated” and “dirty” water for dust suppression purposes;
- To minimise the volume of water discharged from the mine site, and ensure in the event of discharge that there has been sufficient settlement time such that suspended sediment levels meet concentration limits specified in the EPL;
- To minimise erosion and sedimentation from all construction/operational activities;
- To eliminate or minimise the risk of off-site discharge of saline water;
- To monitor the effectiveness of surface water controls and ensure all relevant surface water quality criteria are met;
- To minimise cumulative impacts on water sources and dependant ecosystems; and
- To minimise impacts on the availability of surface water to surrounding residents and landholders.

### **2.7.2 Surface Water Management**

Water within ML 1609 is nominally classified either as “clean”, “dirty or saline water”, or “contaminated” depending on the source of the flow and its potential for physical or chemical contamination.

**“Clean”** – surface runoff from the mine site areas where water quality is unaffected by mining operations. Clean water includes runoff from undisturbed areas and any fully rehabilitated areas.

Clean water flowing from upstream Kurrajong Creek Tributaries is separated from the pit top working areas by a buffer and flow is maintained within the natural watercourse.



The use of drains/contours to divert flows from working areas to treatment dams ensures separation of clean water from dirty or contaminated water. Clean water catchment areas above any area of disturbance that could generate dirty or contaminated water are directed around these areas and delivered to the natural water course.

**“Dirty or Saline water”** – comprises surface runoff from areas disturbed by construction or activities such as soil, overburden and coal stockpiling, and rehabilitation (until stabilised), all of which could contribute suspended solids to the surface water.

The storage dams (SD1-6) have a dual function: during the construction phase acting as sedimentation control dams for disturbed ground and, harvesting of surface water for use in mine operations and capture and containment of any potentially contaminated water. During the operations phase storage dams SD1, SD2, SD3, SD4, SD5 and SD6 collect water from around the disturbed or potentially contaminated areas.

A series of evaporation ponds have been constructed within the rail loop as a depository for saline water. This may be mine water pumped out from the underground operations or potentially contaminated runoff from the stockpiling and crushing/sizing area collected via SB1. During the early years of operation, when the groundwater inflows are expected to be low, the pumped out mine water would be used on site for dust suppression or processed through the Water Treatment Plant.

**“Contaminated Water Management”** – two 68,000 L self bunded diesel fuel tanks are located adjacent to the workshop and washbay facility. An additional concrete bund has been established adjacent to the fuel tank to house other oils and lubricants in a safe and efficient manner. Any associated spills within the bund then report to an oil-water separating unit for disposal by an appropriately licensed contractor. Waters potentially contaminated with hydrocarbons from the workshop area are also diverted to another oil-water separator, with clean water reporting to SB1 for later use across the site. Spill kits are maintained within the workshop area and at the waste oil area. The likelihood of localised spills of fuel or oil external to self bunded tanks or bunded areas is kept to a minimum. In the event that localised spills do occur, immediate action would be taken to ensure appropriate clean-up and minimisation of harm. A lined cell has been established to house any contaminated soil for land-farming before it can be disposed of offsite or re-used onsite.

A 30,000L self bunded tank is located at the main ventilation fan site, which has not been used during this reporting period. Spill kits are available at these two sites for use in the unlikely event of a spill from the self bunded tank and any contaminated

soil will be relocated to the land-farming area, thereby limiting potential environmental impacts.

### **2.7.3 Discharges**

During the reporting period, one wet weather discharge occurred from licensed discharge points SD2 and SD5. The results are included in Appendix 3 and each event is discussed further in Section 3.3.2.1.

### **2.7.4 Water Sources, Demand and Use**

Within the ML 1609 area and immediate vicinity of Narrabri Mine, surface water resources are limited to a number of ephemeral drainage lines which flow for a short period after substantial rainfall, farm dams, other newly constructed water storage dams, and groundwater sources.

Water is required on the mine site primarily for dust suppression purposes, operational requirements (e.g. CHPP and longwall) and potable and toilet ablutions purposes. Where practicable, water collected on-site is retained or reused, with water for dust suppression sourced from a combination of onsite water harvesting and mine dewatering. The potable water circuit of the Water Treatment Plant (WTP) provides all potable water used on the mine site. Water pumped from the Namoi River under licence is transferred to Dam D, which is the potable water supply for the WTP. Water from Dam D can also be filtered for use by the mine to supplement supply when mine dewatering does not produce the required amount of water for operations. The water captured in storage dams SD1-SD5 is also transferred to Dam D, where required.

During the reporting period, a total of approximately 80 ML was used for mine site dust suppression purposes on the surface. Water used for underground purposes is recycled through Pond A1 (originating from mine dewatering and SB1 and SB2). Pond A1 feeds the WTP. The processed water from the WTP is pumped to tanks at the box cut and then gravity fed underground, therefore resulting in relatively minor water use.

During the reporting period:

- Potable water was generated onsite utilising the mine's WTP; and
- Surface water was also collected in onsite storages during surface water flow events and transferred to Dam D. From Dam D it can be used to produce permeate or potable water through the WTP.

### 2.7.5 Stored Water

Table 7 presents an estimate of the volume of stored water at the beginning and end of the reporting period.

**Table 7 – Stored Water**

	Volumes Held (m <sup>3</sup> )		Available Storage Capacity at the end of the Reporting Period (m <sup>3</sup> )
	Start of Reporting Period	At end of Reporting Period	
Clean Water (in Storage Dams)	41,710	103,760	14,040
Dirty Water (in Sediment Basins)	8,860	22,722	39,078
Controlled Discharge Water (salinity trading schemes)	N/A	N/A	N/A
Evaporation Ponds*	360,125	289,012	418,788
* = Additional 46ML of storage in containment bund in rail loop.			
N/A = Not applicable for the Narrabri Mine			
Note: 1m <sup>3</sup> = 1,000L			

### 2.7.6 Groundwater Management

Inflows into the box cut are irregular and result from a combination of:

- Direct rainfall over the box cut and entrance; and
- Underground mine dewatering.

The water from the box cut is pumped directly into Pond A1 which is the raw water feed for the WTP. The filtered water resulting from this process is primarily used to supply the underground operation, including the longwall unit. Vertical Production Wells (VPW) are located over the longwall panels and they are used for pre-drainage of gas and water from the underground workings. All water removed using the VPW's is transferred to the ponds in the rail loop.

Contamination of groundwater is controlled by the management of chemical, oil and grease spills and storage, with:

- Vehicle maintenance carried out in designated areas;
- The use of non-toxic and biodegradable drilling fluids and sealing boreholes as required by DRE;
- Any spills being cleaned up; and
- Fuels, oil and greases being stored within a bunded area, constructed in accordance with AS 1940-2004 and/or OEH requirements, whichever are the more stringent.

Groundwater from surrounding bores is monitored on a regular basis to detect and assess any changes in groundwater quality or level that may be attributable to the mine (see Section 3.4.2).

## **2.8 Hazardous and Explosive Material Management**

Two small explosives magazines (within the same compound) are currently located on the mine site to separately store explosives and detonators used for underground shot firing. Narrabri Mine also holds a WorkCover dangerous goods licence in relation to diesel stored onsite.

Safety Data Sheets (SDS) are retained onsite for all hazardous materials, independent of the quantity. Additionally, all contractors are required to supply SDS documents for any hazardous goods they may bring onto the site.

## **2.9 Infrastructure Management**

Management of infrastructure (i.e. buildings, roads, generators, pumps etc) and other facilities not specified elsewhere within this AEMR, is undertaken on an as-needs basis or in accordance with Statutory requirements in order to maintain them in an operationally efficient, safe, neat and tidy condition, and one which does not result in the direct or indirect generation of unacceptable environmental impacts.

### **3 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE**

The following sub-sections document the implementation and effectiveness of the various control strategies adopted at the mine, together with monitoring data for the reporting period. Existing monitoring locations are shown in Figure 2. A risk identification matrix and the relevant Environmental Management procedures are identified in the Mine's MOP and as required by PA 08\_0144 MOD 2.



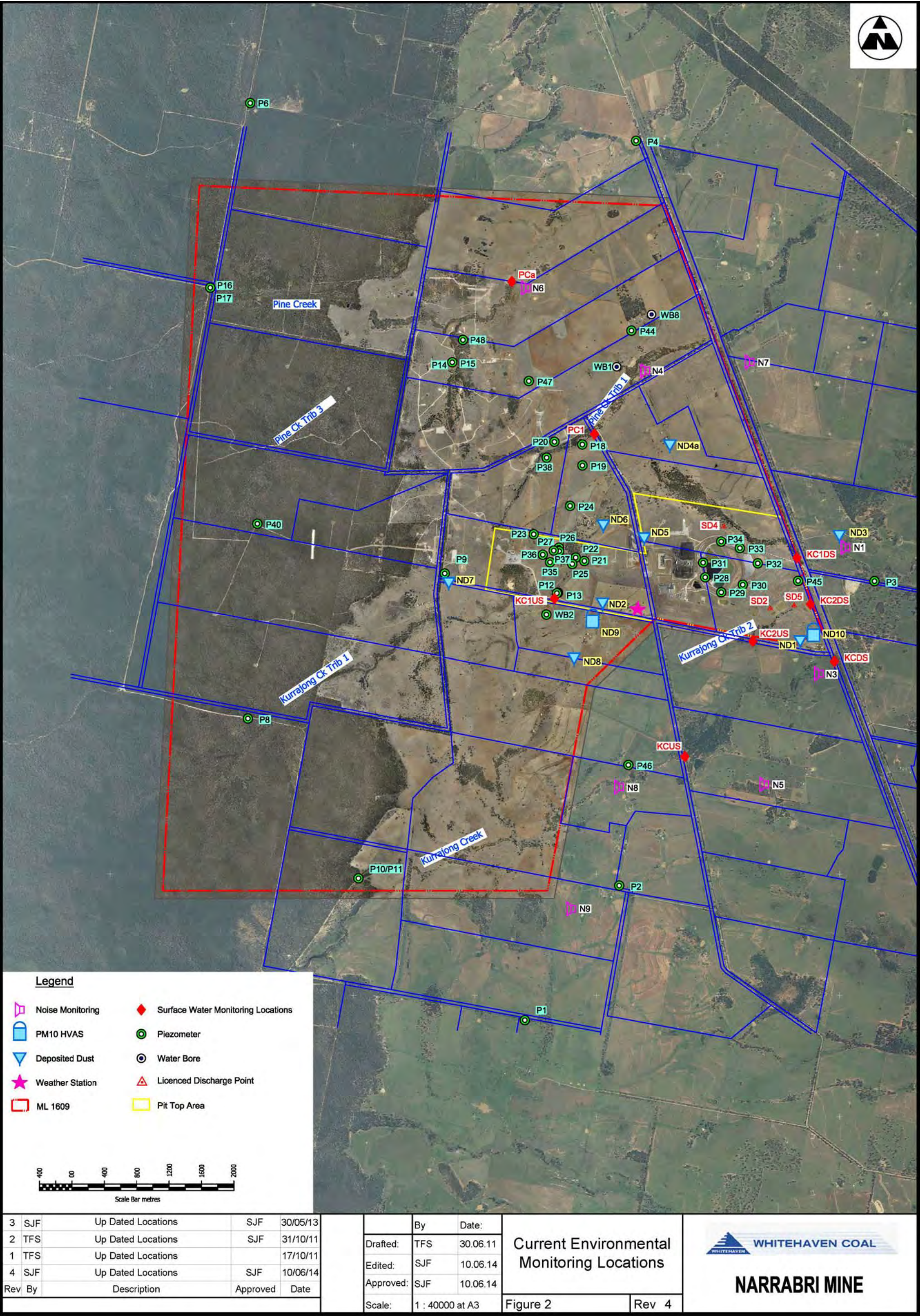


Figure 2 – Current Environmental Monitoring Locations



### 3.1 Air Pollution

#### 3.1.1 Criteria

The air quality criteria applicable to the mine are specified in Schedule 4, Tables 4, 5 and 6 of PA 08\_0144 MOD 2 and summarised below.

- Acceptable mean annual increase in deposited dust of  $2\text{g/m}^2/\text{month}$ .
- Mean annual dust deposition (all sources) of  $4\text{g/m}^2/\text{month}$ .
- Mean annual TSP (all sources) concentration of  $90\text{ }\mu\text{g/m}^3$ .
- Mean annual  $\text{PM}_{10}$  particulate level of  $30\text{ }\mu\text{g/m}^3$ .
- 24 hour average  $\text{PM}_{10}$  particulate level of  $50\text{ }\mu\text{g/m}^3$ .

Additionally, exhaust gases on earthmoving / mining equipment should not be visible for more than 10 seconds continuously.

Notwithstanding the diversity of the criteria identified above, routine air quality monitoring at the mine is required for deposited dust and  $\text{PM}_{10}$  particulates. Monitoring of deposited dust is undertaken on a monthly basis whilst  $\text{PM}_{10}$  levels are monitored every 6 days. The Department of Planning and Environment (DP&E) have advised the mine that determining Total Suspended Particulates (TSP) concentration can be determined by multiplying the  $\text{PM}_{10}$  concentrations by a factor of 2.

#### 3.1.2 Control Procedures

In order to satisfy the criteria identified above, Narrabri Mine employs a range of air pollution control measures including:

- No burning of materials on site. Any vegetation removal for surface infrastructure works is retained for subsequent replacement on the rehabilitated landscape;
- Limiting groundcover removal to areas required for immediate operational requirements;
- Groundcover removal as part of the topsoil removal activities;
- Where practicable, limiting soil stripping activities to periods when there is sufficient soil moisture to prevent significant dust lift-off and avoiding periods of high winds;
- Application of water to exposed surfaces, with emphasis on those areas subject to frequent vehicle / equipment movements which may cause dust generation and dispersal;

- Use of water injection on drill rigs;
- Progressive shaping and rehabilitation;
- Speed limit restrictions on all vehicles and equipment on the mine site; and
- Equipment exhaust positioning to avoid exhausts directed down towards the ground and causing dust lift-off.

### 3.1.3 Dust Monitoring

The Air Quality Monitoring Program (AQMP), as required by Schedule 4, Condition 7 of PA 08\_0144 MOD 2 summarises the air quality monitoring requirements.

Table 8 presents a summary of the deposited dust monitoring data for the reporting period while Appendix 4 presents the results of all dust monitoring over the life of the mine to date. ND4 (Matoppo) was replaced with ND4a, which is in closer proximity to mining operations.

A graphical representation of the total insoluble solids and ash content data for each of the sites monitored during the reporting period is also included in Appendix 4.

Figure 2 identifies the locations of the various deposited dust gauges maintained during the reporting period. All dust gauges are located on properties owned by the mine with the exception of ND3 (Bow Hills).

**Table 8 – Deposited Dust Monitoring Data**

Site (see Figure 2)	Property	Total Insoluble Solids g/m <sup>2</sup> /month		Ash Content g/m <sup>2</sup> /month	
		Mean	Standard Deviation	Mean	Standard Deviation
ND1	Turrabaa	2.4	2.0	1.0	0.6
ND2	Claremont	1.6	0.9	1.1	0.7
ND3	Bow Hills	1.2	0.6	0.7	0.3
ND4a	Matoppo	1.0	0.6	0.6	0.3
ND5	Claremont	4.0	1.7	2.4	1.5
ND6	Willarah	0.7	0.6	0.5	0.4
ND7	Claremont	1.6	1.2	1.2	0.8
ND8	Claremont	0.7	0.3	0.5	0.3

A review of Table 8 and Appendix 4 shows that:

- The mean annual total insoluble solids (deposited dust) criterion was satisfied during the reporting period at all monitoring locations.
- The result for ND5, equal to the annual average criteria, is not unexpected as the monitor is adjacent to an unsealed road that is frequently used as well as the Reject Emplacement Area. The ash content analysis, which indicates mineral type contamination, was below the relevant criteria indicating that



the results are affected by organic matter, which is not attributable to site operations.

- Long term trends show that deposited dust levels have remained relatively consistent since monitoring commenced. The exception to this is ND5, which is located on the project-related “Claremont” property in close proximity to site works.

Narrabri Mine also has two High Volume Air Samplers (HVAS) (PM<sub>10</sub>) located on the project-related properties “Claremont” and “Turrabaa” located to the south-east and south-west of the Pit Top Area. The samplers run for 24 hours every 6 days, with filter papers sent to an accredited laboratory for analysis.

Results during the reporting period indicate compliance with the 24-hour criteria and annual average criteria (Figure 3 and Figure 4). The annual average at both HVAS locations remained well below the annual average criteria (30 µg/m<sup>3</sup>) throughout the reporting period. At the end of the reporting period the annual average was 11.88 µg/m<sup>3</sup> at “Claremont” and 11.24 µg/m<sup>3</sup> at “Turrabaa”.

The full data set for PM<sub>10</sub> monitoring is contained within Appendix 4.

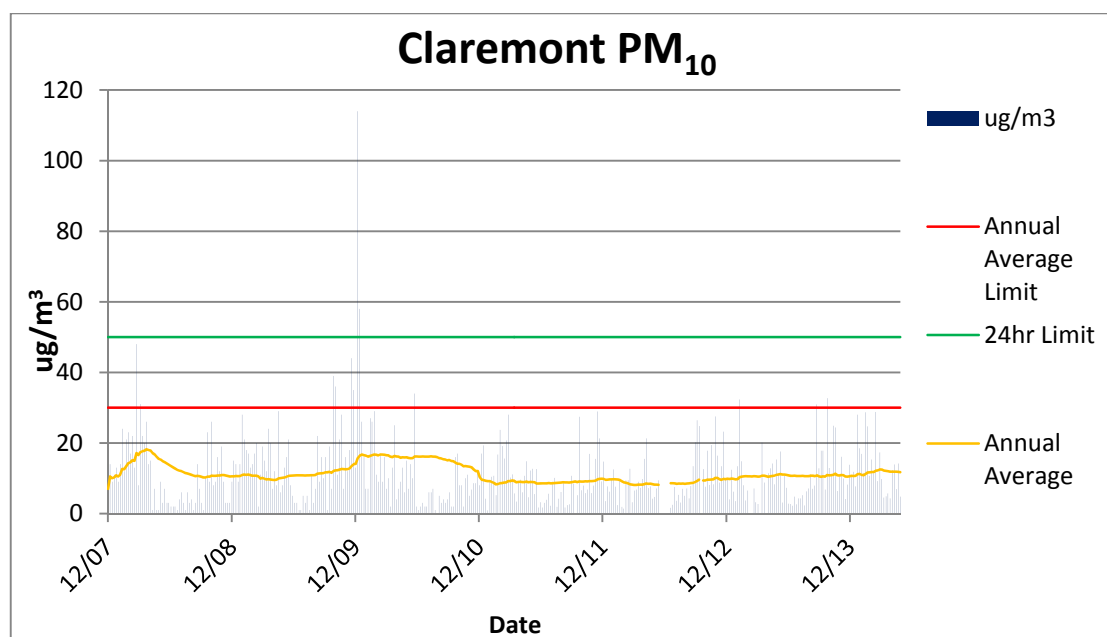


Figure 3 – HVAS PM<sub>10</sub> Data – Claremont

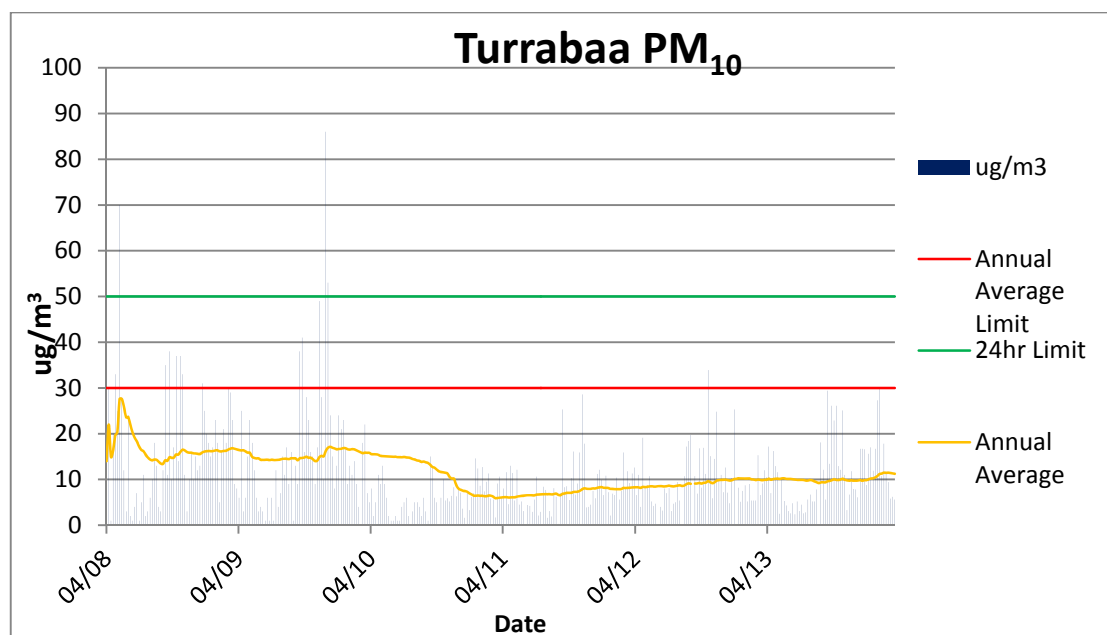


Figure 4 – HVAS PM<sub>10</sub> Data – Turrabaa

The results for the PM<sub>10</sub> monitoring also confirm that the TSP criteria for the mine are well within the compliance limits. The annual average TSP concentrations of 23.76  $\mu\text{g}/\text{m}^3$  at “Turrabaa” and 22.47  $\mu\text{g}/\text{m}^3$  at “Claremont” are both below the 90  $\mu\text{g}/\text{m}^3$  annual average criteria.

### 3.1.4 Comparisons with EA Predictions

The Air Quality Assessment (AQA) undertaken as part of the Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 2, Part 7, November 2009*) predicted the air quality impacts associated with two scenarios: Scenario 1 involved construction activities; and Scenario 2 involved operational activities. The predicted levels and comparisons with actual monitoring data are included below for dust deposition, PM<sub>10</sub> and TSP.

#### 3.1.4.1 Dust Deposition

As most of the properties surrounding the site are now mine owned, only “Bow Hills” is included for both offsite impacts in the AQA and current monitoring, as outlined in Narrabri Mine’s AQMP. The predicted dust levels as outlined in the AQA under both scenarios has dust levels at “Bow Hills” increasing by 0.1  $\text{g}/\text{m}^2/\text{month}$  above the background level of 1.6  $\text{g}/\text{m}^2/\text{month}$ . The reporting period average for “Bow Hills” is 1.2  $\text{g}/\text{m}^2/\text{month}$  and the long-term average is 1.7  $\text{g}/\text{m}^2/\text{month}$ . The results indicate that the dust deposition levels for this reporting period are below the predicted levels and the long term average level is as predicted. It should also be noted that a quarry

is in operation on the “Bow Hills” property which may contribute to deposited dust on the site.

#### 3.1.4.2 PM<sub>10</sub>

Although PM<sub>10</sub> is not monitored at the properties modelled in the AQA but on properties closer to mining operations as outlined in the Narrabri Mine AQMP, the lowest predicted annual average under both scenarios in the AQA is 15.9 µg/m<sup>3</sup>. The highest annual average results for the Narrabri Mine monitoring program is 11.88 µg/m<sup>3</sup>. In addition, the highest 24-hour concentration recorded during the reporting period was 32.7 µg/m<sup>3</sup>. The highest predicted 24-hour level in the AQA for residences further away from the mine than the monitored locations was 69.7 µg/m<sup>3</sup>. No exceedances of the 24-hour criteria (i.e. 50 µg/m<sup>3</sup>) occurred during the reporting period.

#### 3.1.4.3 Visible Dust

During the latter half of 2013, numerous complaints were made to the mine, refer to Section 4.1, in relation to visible dust being generated from the coal processing area. While dust was visible from the site the air quality monitoring network surrounding the mine recorded dust levels below the relevant criteria. The dust issue was a result of old coal being stockpiled for longer than usual and the weather conditions at the time, i.e. hot, dry and windy.

Narrabri Mine has developed and implemented a Trigger Action Response Plan (TARP) for dust generation from the coal processing area which outlines appropriate actions to be undertaken to reduce visible dust generation that is based on wind speed or dozer operations. In addition, the mine is investigating and implementing a range of measures aimed at minimising dust generation from the coal processing area which includes but is not limited to:

- Converting D10 dozers to D11 dozers on stockpiles which should result in less dozer movements;
- Removing ‘fine dust’ from toe of stockpiles and dozer transfer road;
- Engaging a consultant to design a fully automated sprinkler system for ROM/Product Stockpiles;
- Installing coal discharge chutes on the Product Skyline Belt; and
- Requesting CHPP supervisors engage operators on awareness when working in the coal processing area, i.e. need to be responsive.

In addition, the NSW EPA has included additional Pollution Reduction Program (PRP) requirements on the site's EPL. Narrabri Mine will continue to investigate options for management at the site and implement as required.

## **3.2 Erosion and Sedimentation**

### **3.2.1 Management**

Methods for the management of erosion and sediment control at the mine are presented in the MOP and the Site Water Management Plan (SWMP) prepared in accordance with PA 08\_0144 MOD 2.

Control of erosion and sediment generation is achieved on the mine site primarily through the implementation of water management controls such as sedimentation fence, and water usage for dust suppression which ensures adequate storage capacity is available within the various water containment structures to receive inflows. Additional measures which assist in the control of erosion and sedimentation include:

- Minimising the extent of disturbance consistent with operational and construction requirements;
- Revegetation of long-term subsoil and topsoil stockpiles, and establishment of cover crops across areas of disturbance post construction activity; and
- Undertaking soil management activities generally in accordance with the recommendations from Geoff Cunningham Natural Resource Consultants.

Soil stockpiles have been placed in gently sloping or near flat areas surrounded by grassland which effectively reduces the runoff velocity, and hence erosive potential, from any run-on waters. However, Narrabri Mine is cognizant of the potential for stockpile erosion and has adopted stockpile protective procedures to minimise impacts as required over the remaining life of the mine. Establishment of cover crops and pasture grasses across rehabilitated areas will be monitored over the life of the mine and additional works undertaken as required to ensure appropriate cover at all times.

### **3.2.2 Performance**

The effectiveness of the procedures for erosion and sedimentation management are assessed visually as part of routine mine operations and supervision undertaken by Narrabri Mine, with any ameliorative works initiated as and when required.

During the reporting period, all necessary controls were in place and operating as per design. The well-established cover in the Pit Top Area (including along drainage

lines, on the banks of water management structures and on soil stockpiles) has resulted in only isolated, minor occurrences of erosion.

Erosion in the subsidence area is monitored annually as required by the Land Management Plan, developed as part of the Extraction Plan for LW101 to LW105. Transects of the ephemeral creeks within the subsidence area are monitored and visual observations made. Areas identified as requiring attention are then noted and reported to the mine.

### **3.2.3 Comparisons with EA Measures**

The Soils and Land Capability Assessment undertaken as part of the Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 2, Parts 9a and 9b, November 2009*) outlined the measures recommended to be implemented onsite to minimise impacts to soils in the ML 1609 area. As outlined in the assessment: topsoil stockpiles are limited to a maximum of 2 m in height and subsoil stockpiles are limited to 3 m in height; material is also handled as little as possible to minimise compaction and destruction of relatively weak structured soils as exist at the site; and hay bales/sediment fences are used to contain sediment-laden runoff.

The possible effects of longwall mining subsidence on the mine site soils, as outlined in the assessment, has been considered in the Extraction Plan developed for Narrabri Mine which has been approved by DP&I and DRE. The assessment outlined potential impacts associated with longwall mining as outlined below with management measures included:

- *Water ponding and erosion associated with increased bed gradient:* Water ponding has been observed in LW101 and LW102 within two ephemeral tributaries of Pine Creek (Photo 3). The amount of ponding in LW101 was more than what was predicted in the Stage 2 Surface Water Assessment. The assessment did note that this area would be subject to the greatest level of ponding onsite. An expert has provided advice that ponded water should not add to erosion potential downstream. Narrabri Mine currently pumps water downstream from the ponding area in order to manage the ponding water. Samples are collected of the ponded water to determine if key parameters, e.g. salinity, are increasing above baseline levels. If this is found to be the case the mine will investigate options for further management of the ponded water which may include a diversion drain to keep ponded water to a minimum. To date the sandy nature of the creek bed has meant that any

flows are assisting in filling cracks within the creek bed and no significant erosion has been identified to date (Photo 4).

Ponding in LW102 has been as predicted and is generally limited to be within the banks of the creeks. Expert advice states that the system will naturally re-adjust to changes as a result of subsidence to reach a dynamic equilibrium.

- *Subsidence cracks draining an unknown amount of water from the drainage line to the sub-surface area, which are expected to fill and seal over:* The observations of water flows to date indicate that while runoff water is ponding in LW101 and LW102 as identified above the flows within the creek are generally consistent with surrounding creeks indicating no significant losses of water from the drainage lines. The water that initially ponded in LW101, prior to pumping downstream, maintained a consistent level indicating no, or very little water, was being lost to the sub-surface area.
- *Possible impacts on trees and shrubs by disturbing their root systems:* The larger trees within LW101 and LW102 adjacent to Greylands Road and the tributaries of Pine Creek have been affected by subsidence and many of the larger trees have subsequently died (Photo 5). The less mature regrowth and smaller trees remain relatively unaffected by subsidence as predicted. A review of the known impacts to trees as a result of longwall subsidence is presented in Table 9. Given only the larger trees were impacted and the impact was relatively rapid, the likely cause of the tree death is considered to be associated with root ball disturbance.

**Table 9 – Likely Consequences of Longwall Mine Subsidence on Trees**

Impact	Consequence	Site specific likelihood
Mechanical shaking during active subsidence	Disturbance of tree/shrub root ball, root shearing	Likely, can lead to rapid tree death and/or tree fall
Soil fractures	Local soil desiccation	Unlikely, time scale of impact on vegetation is likely longer than reported impact
	Increase in soil macropores, increased water availability, exposure to air	Unlikely, impact is also likely to affect other vegetation forms
	Erosion nick points and increased erosion (gully and piping)	Unlikely, no obvious increased erosion in survey area
Soil/bedrock rupture and tilt	Disturbance of tree/shrub root ball	Likely, can lead to rapid tree death and/or tree fall
	Rain-wash erosion initiation points	Unlikely, no obvious increased erosion in survey area
Topographic change ~1 m over shallow groundwater	Reduced vegetation-available groundwater	Unlikely, no reported shallow groundwater table in area
Soil structure decline	Change in hydraulic conductivity	Unlikely, time scale of impact on vegetation is likely longer than reported impact and impact is also likely to affect other vegetation forms

Impact	Consequence	Site specific likelihood
	Soil compaction	Unlikely, time scale of impact on vegetation is likely longer than reported impact and impact is also likely to affect other vegetation forms
Ponding	Reversal in drainage direction	Unlikely, time scale of impact on vegetation is likely longer than reported impact and impact is also likely to affect other vegetation forms
	Low seed germination (particularly on poorly-drained, low permeability soils)	Unlikely, time scale of impact on vegetation is likely longer than reported impact and impact is also likely to affect other vegetation forms
Gas emissions	Surface vegetation dieback	Unlikely, time scale of impact on vegetation is likely longer than reported impact and impact is also likely to affect other vegetation forms
Shallow water table change	Moisture stress or saturation	Unlikely as the woodland communities not known to be groundwater dependent, and no evidence of tree mortality adjacent to the panel during a sequence of relatively wet seasons
Change in water quality (soil moisture)	Liberation of associated metals	Unlikely, time scale of impact on vegetation is likely longer than reported impact and impact is also likely to affect other vegetation forms

Note: Orange shaded cells considered the likely cause of tree mortality based on known subsidence impacts and site observations.

In late October 2013, a Senior Botanist supervised the excavation of two recently dead trees along Greylands Road within LW101; a Grey Box approximately 12 m tall (dbh 30 cm) and White Cypress Pine (*Callitris glaucophylla*, approximately 5 m tall). Both trees were surrounded by healthy wilga trees and other pines (all less than 5 m in height). Due to the size of the excavator, tree roots could only be exposed to a depth of around 1.5 m. The intent was to identify possible sheared or broken roots which may have been caused by subsidence; however, the exposed broken roots observed were likely to have been caused by the excavation. Broken roots were observed in surface cracking in the soil nearby but could not be observed at depth.

Investigations undertaken to date into these tree deaths do not provide any conclusive explanation for the mortality of these larger trees. Additional excavation and assessment of the root ball (using suitability sized equipment) will be undertaken during the next reporting period. Better understanding of local water tables and soil moisture conditions may facilitate understanding of the role of soil shear strength and moisture conditions in future subsidence areas. The release of methane gas to the sub-surface (and therefore only reaching the deeper roots of the older trees) should also be considered further. Soils units will also be investigated to assess the potential impacts to trees in different woodland communities that occur across the site.

Narrabri Mine has provided advice to both the Department of Planning and Environment (DP&E) and the Division of Resources and Energy (DRE) outlining

that the above investigations will be undertaken during the next reporting period.

- *Possible impact on native pasture species growth by disturbing their root systems and drying out of the upper soil:* The area subject to subsidence during this reporting period consisted of previously farmed paddocks with little or no native pasture species. Cracking in the centre of the longwall panels generally closes up once the longwall unit has retreated and areas along the goaf edge of LW101 have been ploughed to aid in filling cracks and to retain soil moisture. LW102 was not ploughed and seeded as was undertaken in LW101 during its extraction as very little rainfall and hot conditions over the summer period meant very little soil moisture was available for seed propagation. Ploughing and seeding will be undertaken above LW102 when conditions improve.
- *Possible impacts on grain crops and forage growth by disturbing their root systems and drying out of the upper soil:* The area subject to subsidence impacts is not currently farmed so no crops are grown. Cracking in the centre of the longwall panels generally closes up once the longwall unit has retreated and areas along the goaf edge of LW101 have been ploughed to aid in filling cracks and to retain soil moisture.
- *Possible impacts on sown pasture growth by disturbing their root systems and drying out of the upper soil:* As above, areas subject to subsidence have not been farmed so no pastures have been sown. Cracking in the centre of the longwall panels generally closes up once the longwall unit has retreated and areas along the goaf edge of LW101 have been ploughed to aid in filling cracks and to retain soil moisture.
- *Impact to soil erosion by changes in slope gradient and moderate to highly erodible soils forming subsidence cracks:* Significant soil erosion within the subsidence area has not been observed to date. Cracking in the centre of the longwall panels generally closes up once the longwall unit has retreated and areas along the goaf edge have been ploughed to aid in filling cracks and reducing the potential for erosion.
- *Impact to stream banks and waterways with subsidence cracks making the system ineffective:* To date, the impact to stream banks has been relatively minor and the system, while ponding water, remains effective at draining water from the catchment.
- *Possible impacts to soil salinity:* Any impacts to soil salinity will be identified in subsequent surveys undertaken as required by the approved Extraction Plan.



Should any salinity issues be identified in subsequent monitoring then the management actions outlined in the Extraction Plan will be implemented. Water samples are collected from the ponding areas and are tested for a range of parameters including salinity. The results are monitored to ensure parameters are not increasing above the baseline levels in the ponded water as this may affect the soils in the area. The results indicate water quality parameters are within the range of background levels for the mining area. Baseline information was also collected for soils in the ponding area of LW101 as part of the monitoring requirements outlined in the Extraction Plan. This includes electrical conductivity and soil moisture distribution mapping using EM31/38 sensors. Should the ponding of water impact the soils the mine will investigate additional options for management which may include a diversion drain to minimise the level of ponding.

- *Possible impacts to farms dams:* Four small farm dams were undermined in LW102. Rain in late March 2014 refilled these dams and the dams are now full and holding water. Subsidence has not impacted on the function of the dams.
- *Possible impacts to roads and tracks:* All roads and access tracks were inspected and any necessary remedial actions undertaken. Narrabri Mine developed and implemented a management plan for the Narrabri Shire Council (NSC) owned Greylands Road, which required the mine to remediate any impacts associated with subsidence. Remediation activities have been undertaken on Greylands Road following the extraction of LW102 however this road remains closed to the public. The mine has applied to the Crown Lands division of NSW Trade and Investment to purchase the road and the application is currently pending.

It is also important to note that the majority of land purchased for the Narrabri Mine is being farmed by the original owners or others under lease agreements to secure the long-term viability of farming land.



**Photo 3 – Ponding in LW102**



**Photo 4 – Tributary of Pine Creek Downstream of LW101**





Photo 5 – Impacted Trees and Remediated Greylands Road, LW102

### **3.3 Surface Water Pollution**

#### **3.3.1 Management**

The prevention of surface water pollution is achieved through the management of surface water as presented in Section 2.7.2.

#### **3.3.2 Performance**

##### **3.3.2.1 Wet Weather Discharges**

Surface water management controls have operated effectively throughout the reporting period, with water management controls operating in accordance with the SWMP.

Above average rainfall was received during June 2013 and March 2014. One discharge event occurred from the EPL discharge points SD2 and SD5 during the reporting period and the surrounding creeks were sampled during this same event in March 2014. The discharge was sampled in accordance with the requirements of EPL 12879, with the results provided in Appendix 5. Rainfall records are shown in Appendix 8.

**21 and 25-28 March 2014**

As a result of rainfall in March 2014, licenced discharge points SD2, SD5 and the surrounding creeks were sampled as required by the Narrabri Mine SWMP. The results are included in Appendix 5. The results for the licenced discharge points reported concentrations parameters below the criteria identified in EPL 12789. The results for TSS ranged from 8 mg/L to 503 mg/L in the upstream samples, and between 5 mg/L to 302 mg/L in the downstream samples. The highest result in the downstream sample was collected at the Pine Creek downstream sample (PCa). No upstream samples are collected for Pine Creek however the level reported in the upstream sample for Kurrajong Creek (KCUS) of 503 mg/L gives an indication as to the variability of TSS concentrations in the creeks around the mine.

**3.3.2.2 Surface Water Storages**

In addition to monitoring the surface water discharge events, Narrabri Mine undertakes sampling of surface waters, with samples during the reporting period collected and analysed by Australian Laboratory Services (ALS).

Whilst there are no criteria or concentration limits specified for the surface water samples, the results do provide an indication as to the quality of waters on-site. Samples taken during the reporting period indicate water quality similar to that recorded since monitoring commenced, which includes slightly alkaline pH, elevated electrical conductivity (EC) in a number of dams and elevated TSS levels usually associated with water sampled that originated in the coal seam.

**3.3.3 Comparisons with EA Predictions**

The Surface Water Assessment undertaken as part of the Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 1, Part 3, November 2009*) outlines management strategies and the predicted water volumes to be stored onsite. The general surface water management strategies are also outlined in the SWMP. The Surface Water Assessment management strategies include the following: runoff from potentially contaminated areas to be contained onsite; runoff from the dirty water catchment to be contained in sediment dams sized for the 95%ile five day storm event; saline water to be contained onsite; and brine to be stored onsite.

Narrabri Mine's intention is to have the runoff from potentially contaminated areas and saline water contained onsite. However, as outlined in the approved SWMP, under certain conditions there may be a requirement for SB1 and SB2 to overflow. As such the water management system has been designed so that if these two dams

overflow, the water will mix with dirty water and enter SD1, overflowing to SD2 before being discharged offsite at this licensed point.

The performance against the surface water management strategy as outlined in the Stage 2 Longwall Project Surface Water Assessment (*Narrabri Coal Mine Environmental Assessment, Specialist Consultant Studies Compendium, Volume 1, Part 3, November 2009*) can be summarised as follows:

***Pit Top Surface Water Management Strategy***

- *Runoff from potentially contaminated catchments would be collected in storage basins and not released off-site. Water collected in the storage basins would be pumped to Dam A1 for processing in the water conditioning plant: All runoff that falls within the Pit Top Area, which includes the workshop/administration building/fuel bay/coal processing area, is collected in Dam SB1 and transferred to Dam A1 to be reused onsite. Runoff from the Reject Emplacement Area is transferred from Dam SB3 to Dam A1 via Dam SB1.*
- *Runoff from the potentially dirty catchments would be collected in the existing sediment dams. The sediment dams would be sized to achieve required stormwater quality for storms greater than the 95%ile five day storm event. Water collected in the sediment dams would be used during the construction phase of the Longwall Project, as well as to augment shortfalls in supplies expected in the first few years of mining. After this time, the water collected in the dams would be released to the downstream receiving water within 5 days of a runoff event: All runoff from the previously disturbed area of the Pit Top Area is directed to Dams SD1 to SD5 which is then transferred to Dam D for reuse onsite. Dam SD6 currently contains the runoff from the main ventilation shaft site.*
- *All saline water dewatered from the underground workings would be contained within water storages of the Pit Top Area without releasing it to the natural watercourses. The saline water would be treated through a water conditioning plant for use in coal processing and underground dust suppression. Treated water in excess of Mine Site requirements would be piped to the Namoi River at the adopted water quality compliance criteria: Mine dewatering is undertaken via the box cut where it is transferred to Dam A1 for reuse onsite or processing through the WTP. All pre-drainage water is transferred from the Vertical Production Wells (VPW's) in the field to Dam A1 for reuse onsite via a dedicated pipeline.*

- *The concentrated brine by-product of the water conditioning plant would be stored and evaporated in brine storage ponds without releasing it to the environment. Concentrated brine solution retained within the brine storage ponds at the completion of the Longwall Project would be re-injected back into the underground void when longwall mining is completed: The brine produced by the WTP is currently being stored in the HDPE lined Dam C.*

### **Mine Subsidence Management Strategy**

- *Visible cracks in the bed of the creek would be filled in where necessary: The creek bed in LW101 and LW102 is sandy and when cracks appear they generally heal themselves when the creek is flowing.*
- *Contour banks that cross chain pillars would be removed. An assessment on the need to replace the contour banks would be made. Given that the Proponent owns the majority of the land over the mine subsidence zone, lower stocking rates and higher vegetation covers are expected: Six contour banks, or parts thereof, were undermined during the extraction of LW101 and LW102. The subsidence impacts to the contour banks did not affect their functionality. However, should remediation works be required, Narrabri Mine will either reinstate the contour banks or remove a section to avoid water ponding.*
- *Estimates of the extent of over bank ponding would be made:*
  - *If little vegetation of significance is impacted and minimal salt producing soils are evident, the ponding would be left as is: No vegetation of significance has been impacted to date by ponding as the Stage 2 EA Ecological Assessment indicates the vegetation in the creek is riparian vegetation which does not comprise an Endangered Ecological Community. Salt loading will be determined in subsequent monitoring rounds. As outlined above, the ponded water is analysed to allow comparisons against background levels for parameters such as salinity and baseline soil moisture and EC works have been undertaken.*
  - *If vegetation of significance is to be impacted or salt producing soils are evident within the ponded area, the channel across the chain pillars may be excavated to reduce the extent of ponding. Care would be taken to ensure that Aboriginal sites or significant vegetation is not impacted by the excavation: See above.*
- *The creek channels draining into the mine subsidence zone and on the downstream side of the chain pillars would be monitored for erosion following*

*each runoff-producing storm event. Any erosion would be repaired and remedial measures, such as check dams or drop structures, would be constructed if necessary:* Visual inspections are undertaken following flow events and annual monitoring is undertaken as required by the approved Extraction Plan.

The Stage 2 Surface Water Assessment also outlined in the Base Case Annual Water Balance that during the initial years there would be insufficient water generated from the underground. Although the groundwater outflow is less than predicted, see below, the amount of water pumped from the Namoi River during the reporting period was 221 ML and most of this water is being held in storage in Dam D which at the end of the reporting period was holding 62 ML. The increased volume of water required is mainly due to the below average rainfall received across the site during the reporting period which resulted in less harvesting of water from the mine's sediment dams.

### **3.4 Groundwater Pollution**

#### **3.4.1 Management**

With the exception of fuels and oils, no materials occur or are retained on the mine site which is likely to be a source of groundwater pollution.

The methods for management of potential pollutants are summarised in Section 2.7.6. Ongoing monitoring to assess trends in groundwater chemistry will enable assessment of potential contaminants to groundwater.

#### **3.4.2 Performance**

Narrabri Mine's performance with respect to groundwater management, the prevention of pollution and the assessment of impacts on groundwater availability to other surrounding users has been assessed through groundwater level and chemistry monitoring undertaken at a series of operating and monitoring bores within the mining lease area, on properties adjacent to the mining lease and in the alluvial system adjacent to the Namoi River. The frequency of monitoring and the parameters monitored, as defined in the SWMP, are identified in Table 10.

Appendix 6 presents the results of the groundwater monitoring undertaken since commencement of the mine. Monitoring sites are shown on Figure 2.

**Table 10 – Groundwater Monitoring Schedule**

Location	Parameters	Frequency
All Standpipes P1,P2, P3, P4, P5, P6,P7,P8, P9, P10, P11,P12, P13, P14, P15, P16,P17,P18, P19, P20, P28, P29, P30, P31, P32, P33, P34, P47, WB1, WB2, WB3a, WB3b, WB4, WB5a, WB5b, WB6a, WB6b, WB7 and WB8	Water level EC pH TDS Metals Anions and Cations	Quarterly (water level, pH and EC)  Bi-annually (full water quality)
Vibrating Wire Piezometers  P21,P22, P25 ,P26, P27 and P48	Water Level	Daily (Data Logger)
Multi-Level Vibrating Wire Piezometers  P23, P24, P35, P36, P37, P38, P40, P44, P45 and P46	Water Level	Daily (Data Logger)
Mine water pumped into and out of the mine	EC pH TDS Metals Anion and Cations Discharge Rate	Daily (flow rate)  Monthly (full water quality)

A review of the groundwater monitoring results presented in Appendix 6 shows that standing water levels (SWL) have remained relatively consistent in the monitored bores throughout the reporting period. Bore P11 has shown a slight recharge during the reporting period. Bores P12 and P13 have shown a decrease in water levels over the reporting period. Bore P12 is 90 m deep and targets the Napperby Formation. Slight decrease in water level may be due to seasonal variations. This bore lies approximately 350 m to the south of the mains development for the underground mine.

In the area of P13, pre-drainage of water and gas commenced in February 2011 and was completed during November 2013. It is considered likely that any impacts to the standing water level would have been identified during 2011. Bore P13 is 30 m deep and targets the Garrawilla Volcanics. A production bore, WB2, is approximately 300 m to the south and targets the same aquifer. Given the extended hot, dry period experienced over the second half of 2013 the drop in water level in P13 is likely associated with increased production from WB2.

The NSW EPA questioned the decrease in water level in P18 during the AEMR inspection undertaken in February 2014. The decrease in water level is not unexpected as this well is installed into the coal seam targeted for mining and is close to the workings. The life-of-mine monitoring wells, outlined below, will give a better indication of impacts to aquifers in close proximity to the mine and will also allow for comparisons to be made between modelled predictions and actual impacts.

The groundwater monitoring network has been expanded in accordance with discussions held with the NSW Office of Water during the development of the Stage 2 SWMP (refer to Figure 2). Five life-of-mine groundwater monitoring bores have been installed: P40, P44, P45, P46 and P47. P40, P44, P45 and P46 are nested



vibrating wire piezometers and P47 is a standpipe piezometer. The locations of these bores are based on the drawdown contours as presented in the Stage 2 Hydrogeological Assessment. A review of the groundwater monitoring results presented in Appendix 6 shows that standing water levels (SWL) in the expanded monitoring network have remained relatively consistent throughout the reporting period.

A review of the data presented in Appendix 6 indicates that groundwater quality has remained relatively consistent throughout the reporting period. At the end of the reporting period nine groundwater wells recorded concentrations of parameters above the ANZECC Water Quality Guidelines for Stock Drinking Water (*Australian and New Zealand Environment and Conservation Council (ANZECC), Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000*).

Lead concentrations were recorded above the ANZECC criteria in well P16 which has recorded lead concentrations above the ANZECC criteria intermittently since September 2008. As such the lead concentrations in this well indicate the natural variability of dissolved metals in the groundwater surrounding the site. It should be noted that P16 is located 3.5 km from the active mining area and the results in water quality are unlikely to be attributable to mining activities.

Total dissolved solids (TDS) concentrations were recorded above the ANZECC criteria in wells P2, P3, P4, P5, P9, P10, P29 and P31. These wells are installed into either Napperby or Purlawaugh Formations and have consistently exceeded the ANZECC criteria since monitoring commenced, i.e. since 2008, indicating the natural variability of TDS in the groundwater surrounding the site. It should also be noted that well P5 is located 5.75 km from the active mining area and the results in water quality are unlikely to be attributable to mining activities.

Sulphate concentrations were recorded above the ANZECC criteria in wells P3, P4 and P9. These wells are installed into either Napperby or Purlawaugh Formations and have consistently exceeded the ANZECC criteria since monitoring commenced, i.e. since 2008, indicating the natural variability of Sulphate in the groundwater surrounding the site. It should also be noted that well P3 is located 4 km from the active mining area and the results in water quality are unlikely to be attributable to mining activities.

As outlined in the Trigger Action Response Plan (TARP) included in the approved Stage 2 SWMP, if the water quality is impacted by operations an investigation will be undertaken. However, as the exceedances outlined above are occurring in monitoring bores away from active mining areas and are considered indicative of natural variability in the groundwater quality surrounding the site, Narrabri Mine will

continue to monitor the levels and review following subsequent sampling events and report through the AEMR/Annual Review as required by the TARP. The results will also be considered in future reviews of the groundwater model and calibration works. It is also noteworthy that there has been no suggestion from local landowners that Narrabri Mine's activities are adversely affecting groundwater availability or quality.

Three of the seven bores installed around the rail loop water storages have recorded water levels ranging from 7.78 mbgl (P29) to 15.49 mbgl (P32). Narrabri Mine engaged groundwater experts, Dr Noel Merrick and Andy Fulton, to determine the source of the water and any remedial actions that may be required. They compared major ions present in the groundwater wells and the dams in the rail loop to determine their ionic ratios which can aid in determining groundwater sources. The results of this investigation are described below.

The comparisons of major ion chemistry to identify sources were used to assess the potential interaction of the rail loop water storages with groundwater. Groundwater data was presented as Piper Diagrams showing that there is a clear trend for shallow groundwater chemistry from across the monitoring network. A mixing trend can be recognised with end members including older sodium chloride dominated water to that enriched in magnesium and bicarbonate indicating a greater recharge component. Water sampled from the evaporation ponds however, appear as a distinct population disproportionally enriched in bicarbonate and separate to the linear trend from the wider monitoring network. While the rail loop water storages are high in bicarbonate ions, this is not typical of a groundwater recharge signature and is thought to correlate with known bicarbonate anomalies found within deeper groundwater of the Gunnedah basin. As such, this geochemical signature is indicative of water from deeper Permian stratigraphy currently being extracted from the underground mine.

Additional review of ionic chemistry in the form of comparative ratios, i.e. Sodium vs Chloride, Bicarbonate vs Chloride and Magnesium/Calcium vs Bicarbonate, also provide evidence that the groundwater quality in monitoring bores surrounding the rail loop water storages are distinct from the water quality signatures of stored water within the rail loop. It indicates that groundwater in bores surrounding the rail loop water storages are not being impacted on by water stored within the rail loop. The only exception being that there is suggestion that P32 may be influenced by the containment bund stored water which is being fed by rainfall. However, the EC decline indicates this is a positive impact if it is occurring.

### 3.4.3 Comparisons with EA Predictions

The Hydrogeological Assessment undertaken as part of the Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 1, Part 2, November 2009*) outlines the potential impacts on water sources as a result of the longwall mining operation.

The Stage 2 assessment outlines that the groundwater outflows are expected to vary from 0.22ML/day in the first year to approx. 3.83 ML/day in year 18. The outflow rate encountered during the reporting period as a result of underground development and longwall mining has been calculated to be 0.998 ML/day (comprising on average 0.972 ML/day of mine dewatering and 0.026 ML/day of pre-drainage water). It should be noted that although 0.972 ML/day is removed from the mine the operation consumes on average 0.797 ML/day of permeate.

The Stage 2 Groundwater Assessment predicted drawdowns in the Hoskissons Coal Seam of over 100 m restricted to within 1 to 2 km of the underground workings after 15 years but recovering to within the mining lease boundary after 29 years. While some wells have shown reductions in water levels in close proximity to the underground workings, water levels have not declined significantly in the surrounding monitoring wells as illustrated in Appendix 6. The assessment also predicted that the groundwater inflows should gradually increase to a peak rate of 3.89 ML/day in about year 18. As outlined above the current amount of water pumped from the underground workings equates to 0.972 ML/day during the reporting period. Coupled with the pre-drainage of gas and water at the surface, the total outflows from the underground workings for the reporting period equates to 0.998 ML/day.

### 3.5 Contaminated or Polluted Land

Prior to mining, the area was a green-fields site, utilised for grazing and agriculture. Discussion with landowners during the preparation of the Environmental Assessment revealed that no environmentally harmful products had been used on their landholding nor had there been any disposal of contaminated material. This situation has remained unchanged throughout surface construction activities and operations. Consequently there is no reason to expect that contaminated lands would be present within the site.

### 3.6 Threatened Flora

During specialist studies undertaken by Ecotone Ecological Consultants Pty Ltd in 2009 as part of the Stage 2 EA, a total of seven vegetation communities were identified within the mine site and along the route of the water pipeline to the Namoi River, six of which are native vegetation communities.

No threatened or rare flora species were detected within the mine site. However, one species, *Bertya opposens*, was assessed as having a high likelihood of occurring. Its occurrence on site and adjacent to site was confirmed during additional flora survey work conducted to develop an appropriate biodiversity offset strategy. A second species, *Cadellia pentastylis*, was assessed as having a moderate likelihood of occurring and a third species, *Lepidium aschersonii*, a low to moderate likelihood of occurring. *Lepidium aschersonii* was observed during the spring survey undertaken over LW101 to LW105, as required by the Extraction Plan.

All activities onsite have been undertaken to minimise the impact on flora species. This has been achieved by limiting areas of surface disturbance to those areas specifically required, as approved by the Environmental Officer through the Narrabri Mine 'Permit to Disturb' process. As the majority of activities to date have occurred in areas comprising predominantly open pasture and previously cultivated areas, only isolated timber removal occurred during the period. This clearing was only undertaken following pre-disturbance inspections by a qualified ecologist. Any large trees, particularly hollow bearing trees, were avoided where possible. If avoidance was not possible, the trees were inspected for habitation by fauna, felled as instructed by the ecologist and inspected for fauna following felling.

In addition to pre-clearance surveys undertaken by suitably qualified ecologists, spring flora surveys were undertaken during the reporting period as required by the Extraction Plan. The spring survey will be used to determine the effectiveness of management measures when compared to the results of the baseline surveys and future annual spring surveys. Any flora management conducted on site will be reported in future AEMRs/Annual Reviews. The *Lepidium aschersonii* identified onsite has been managed by creating an exclusion zone for surface works in the area they are located. As grinding grooves sites were also discovered in the same stand of trees this exclusion zone serves a dual purpose.

The Biodiversity Offset Strategy was submitted to the Department of Planning and Infrastructure (DP&I), Office of Environment and Heritage (OEH) and the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPoC) in accordance with the requirements of the Project Approval. Subsequent revisions were made to the Offset Strategy following

comments received from these agencies. Narrabri Mine are currently investigating mechanisms for securing the offsets based on comments received by DP&I. Baseline spring surveys of the offset areas was undertaken during the reporting period to assist in managing the offset areas when final approval has been granted and the associated management plans are implemented.

### **3.6.1 Comparisons with EA Predictions**

The Ecological Assessment undertaken as part of the Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 1, Part 2, November 2009*) outlines the disturbance areas that have been assessed as part of the EA. The disturbance is broken down into the different vegetation communities present on the site. During the reporting period Narrabri Mine disturbed approximately 8.7 ha, the majority was in previously cleared farm paddocks, associated with surface activities including: gas drainage infrastructure works; drilling operations; access tracks and existing road maintenance across LW101 to LW105. With the disturbance reported in the previous reporting period over LW101 to LW105, this totals approx. 56.2 ha. The Stage 2 EA has a total area of disturbance of approximately 76 ha for LW101 to LW105. The disturbance areas for these panels have been used as the gas drainage infrastructure has been installed over the first five longwall panels.

## **3.7 Threatened Fauna**

During specialist studies undertaken by Ecotone Ecological Consultants Pty Ltd in 2009 as part of the Stage 2 EA, sixteen threatened fauna species were recorded with potentially suitable habitat present for a further 20 threatened or migratory species that were not identified during field surveys.

Based on the proposed mine design, the Narrabri Mine estimates that up to approximately 210ha of native woodland vegetation could be disturbed, which will be offset by an identified Biodiversity Offset Area, with management measures specified in a Biodiversity Offset Management Plan being developed as part of the over-arching offset strategy. As discussed above, the completion of the management plan is still pending.

Other operational safeguards to minimise impacts to fauna include undertaking pre-clearing surveys (as detailed in Section 3.6), relocating and re-erecting (where practicable) felled hollow bearing trees and control of feral animals.

In addition to pre-clearance surveys undertaken by suitably qualified ecologists, spring fauna surveys were undertaken during the reporting period as required by the

Extraction Plan and spring surveys of the offset areas, although not finalised, was also undertaken. The spring surveys will be used to determine the effectiveness of management measures when compared to the results of the baseline survey and future annual spring surveys. Any fauna management conducted on site will be reported in future AEMRs/Annual Reviews. Except for feral pig trapping on leased land and wild dog baiting on neighbouring properties, no fauna management activities were required to be undertaken onsite during the reporting period.

### **3.8 Weeds**

#### **3.8.1 Management**

Weed management within ML 1609 involves regular inspections by a Narrabri Mine employee who has Chemcert accreditation for weed control via chemical applications. The Stage 2 Landscape Management Plan, approved by the Director-General in December 2011, specifies weed management measurements undertaken on the mine site.

#### **3.8.2 Performance**

During the reporting period, weed control measures continued to focus on the control of Thistles, African Boxthorn and Galvanised Burr. The Thistles and Galvanised Burr are generally located within previously disturbed areas and in LW101 where ploughing had been undertaken. Other weed control comprised spot spraying of Mother-of-Millions, Noogoora Burr and Prickly Pear, as required.

In addition, Cochineal Beetles have been harvested from infested Prickly Pear plants and re-distributed to non-infested plants. This management measure has proved successful in assisting with the control of Prickly Pear across the site.

During the reporting period, approximately 19 ha above the northern portion of LW101 was spot sprayed for Thistles, approximately 6 ha was spot sprayed for Galvanised Burr and approximately 1 ha outside the mining area within an old sheep/cattle yard area was spot sprayed for African Boxthorn. A representative from the Narrabri Shire Council also undertook an inspection of the mine site focusing on noxious local weeds such as Alligator Weed which was not detected onsite.

### **3.9 Blasting**

As there has not been any surface or near-surface blasting at the site during the reporting period, no blast monitoring has been required or conducted.

## 3.10 Operational Noise

### 3.10.1 Criteria

#### 3.10.1.1 EPA Criteria

The EPA-nominated noise emission criteria, identified in EPL 12789 as applicable to the mine, are as follows.

*L3.1 Noise generated at the premises must not exceed the noise limits below:*

*35dB(A) $L_{Aeq}$ (15 minute) during the day, evening and night.*

*45dB(A) $L_{Aeq}$ (1 minute) during the night.*

*L3.2 For the purpose of L3.1:*

- a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;*
- b) Evening is defined as the period from 6pm to 10pm;*
- c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.*

*L3.3 Determining Compliance*

*To determine compliance:*

- a) with the  $L_{eq}$ (15 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located:*
  - i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or*
  - ii) within 30 metres of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable*
  - iii) within approximately 50 metres of the boundary of a National Park or a Nature Reserve.*
- b) with the  $LA1$ (1 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located within 1 metre of a dwelling façade.*
- c) with the noise limits in the Noise Limits table, the noise measurement equipment must be located:*
  - i) at the most affected point at a location where there is no dwelling at the location; or*
  - ii) at the most affected point within an area at a location prescribed by part (a) or part (b) of this condition.*

*L3.4 The noise limits set out in the Noise Limits table apply under all meteorological conditions except for the following:*

- a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or*
- b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or*
- c) Stability category G temperature inversion conditions.*

*For the purposes of this condition:*

- a) Data recorded by the meteorological station identified as EPA Identification Point(s) W1 must be used to determine meteorological conditions; and*
- b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.*

*L3.5 For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.*

*M7.1 To assess compliance with the noise limits presented in the Noise Limits table, attended noise monitoring must be undertaken in accordance with the condition titled Determining Compliance, outlined above, and:*

- a) at each one of the locations listed in the Noise Limits table;*
- b) occur quarterly in a reporting period;*
- c) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy for a minimum of:*
  - i) 1.5 hours during the day;*
  - ii 30 minutes during the evening; and*
  - iii 1 hour during the night.*
- d) occur for three consecutive operating days.*

### 3.10.1.2 Consent Criteria

Noise impact assessment criteria nominated in PA 08\_0144 MOD 2 (Schedule 4, Conditions 1 to 3) are as follows:

#### *Impact Assessment Criteria*

- 1. The Proponent shall ensure that the noise generated by the project does not exceed the levels set out in Table 1 at any privately-owned residence.*



Table 1: Impact Assessment Criteria dB(A)

Location	Day $L_{Aeq}(15 \text{ minute})$	Evening $L_{Aeq}(15 \text{ minute})$	Night	
			$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
All privately-owned residences	35	35	35	45

**Notes:**

- To determine compliance with the  $L_{Aeq}(15 \text{ minute})$  limit, noise from the project is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECCW may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.
- These noise limits apply to applicable receivers under all meteorological conditions except for any one of the following:
  - wind speeds greater than 3 metres/second at 10 metres above ground level; or
  - temperature inversions of  $1.5 - 4^{\circ}\text{C}/100 \text{ metres}$  and a source-to-receiver wind speed greater than 2 metres/second at 10 metres above ground level; or
  - temperature inversions of greater than  $4^{\circ}\text{C}/100 \text{ metres}$ .
- The meteorological data to be used for determining meteorological conditions are the data recorded by the meteorological weather station to be determined in consultation with the DECCW.
- To determine compliance with the  $L_{A1}(1 \text{ minute})$  noise limits, noise from the project is to be measured at 1 metre from the dwelling façade. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECCW may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy).
- These limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

**Noise Acquisition Criteria**

2. If the noise generated by the project exceeds the criteria in Table 2 at any residence on privately- owned land, or on more than 25% of any privately-owned land, then the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 5-7 of schedule 7.

Table 2: Noise acquisition criteria dB(A)

Location	Day $L_{Aeq}(15 \text{ minute})$	Evening $L_{Aeq}(15 \text{ minute})$	Night $L_{Aeq}(15 \text{ minute})$
All privately-owned residences	40	40	40

*Note: Noise generated by the project is to be measured in accordance with the notes presented below Table 1. For this condition to apply, the exceedances of the criteria must be systemic.*

*Additional Noise Mitigation Measures*

3. *If the noise generated by the project is equal to or exceeds the criteria in Table 3 at any residence on privately-owned land, then the Proponent shall, upon receiving a written request from the landowner, implement reasonable and feasible noise mitigation measures (such as double-glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner. If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.*

*Table 3: Additional noise mitigation criteria*

Location	Day $L_{Aeq}(15 \text{ minute})$	Evening $L_{Aeq}(15 \text{ minute})$	Night $L_{Aeq}(15 \text{ minute})$
All privately-owned residences	38	38	38

*Note: Noise generated by the project is to be measured in accordance with the notes presented below Table 1. For this condition to apply, the exceedances of the criteria must be systemic.*

### 3.10.2 Control Procedures

Under certain meteorological conditions, it is acknowledged that some activities may generate noise levels above the noise impact assessment criteria. In order to minimise this potential for exceedance, the following controls are adopted:

- Prior to being brought onto site, or upon commissioning, all additional plant and equipment is required to exhibit sound power levels consistent with those levels specified in the Noise Management Plan (NMP);
- High frequency reversing alarms are not permitted on any equipment brought onto site. Rather, all reversing alarms should be of the broadband frequency type;
- Ensure specific noise attenuation is provided to surface drills when operating over LW1 to LW3 and LW124 to LW126 to achieve a sound power level of 109dB(A);
- The approved hours of operation are adhered to;
- Site personnel are required to pay due attention to site weather conditions and modify or stand down from operational activities if directed by mine management; and

- Monitoring of emitted noise levels is undertaken during mining operations to verify compliance with noise criteria and to assess the need, if any, for additional noise attenuation measures.

Transport and other noise controls, as specified in the NMP, comprise:

- Regular maintenance of the sealed site access road;
- Strict adherence to the approved hours of operation for transport activities will be enforced by mine management;
- All project employees and contractors will be instructed to enter and exit the mine site in a courteous manner and without undue traffic noise;
- All access roads will be signposted and speed limited to minimise transport noise;
- Equipment with lower sound power levels will be used in preference to more noisy equipment;
- All equipment used on site will be regularly serviced to ensure the sound power levels remain at or below the levels used in the modelling to assess generated noise levels and compliance with the criteria; and
- The on-site road network will be well maintained to limit body noise from empty trucks travelling on internal roads.

Narrabri Mine also regularly liaises with the majority of surrounding neighbours to seek feedback on the mining activities. It is noted that over the life of the mine to-date, i.e. since March 2008, operational noise has only been raised as an issue of concern by four landholders.

Schedule 4, Condition 5 of PA 08\_0144 MOD 2 requires Narrabri Mine to investigate ways to reduce the noise generated by the mine, including off-site road and rail noise and maximum noise levels which may result in sleep disturbance. The condition also requires Narrabri Mine to report on these investigations and the implementation and effectiveness of these measures in AEMRs/Annual Reviews. As exceedances were recorded during the reporting period the mine undertook a validation of the noise model developed for the Stage 2 operation. This is discussed further in Section 3.10.4.1.

### **3.10.3 Operational Noise Monitoring**

#### **3.10.3.1 Introduction**

The Stage 2 NMP details the requirements for attended and real-time noise monitoring. Attended noise monitoring sites are identified on Figure 2.

The following sub-sections present a summary of the outcomes of each monitoring event conducted by Spectrum Acoustics. During the reporting period the noise monitoring requirements for privately owned residences were increased as required by a variation to Narrabri Mine's EPL.

Copies of all monitoring reports are presented in Appendix 7.

### 3.10.3.2 Attended Noise Monitoring

#### May 2013

On the 21<sup>st</sup> May 2013, Spectrum Acoustics conducted attended noise monitoring at the "Bow Hills" (N1), "Naroo" (N3), "Greylands" (N4), "Oakleigh" (N5), "New Haven" (N6), and "Belah Park" (N7) properties as required by the approved Stage 2 Noise Management Plan (NMP). The results indicated that noise emissions from the site exceeded the criterion of 35 dB(A),  $L_{eq(15min)}$  at the "Naroo" property during the evening period. The noise attributed to the mine was mainly from dozer(s) working on the coal stockpiles. The land owner and relevant Government agencies were notified of the exceedance. The mine then continued to monitor the noise levels as exceedances at "Naroo" have been recorded sporadically in the past however, these were generally recorded under non-compliant weather conditions.

During the night time measurement circuit the  $L_{1(1 min)}$  noise from mine did not exceed 45 dB(A) at any monitoring location.

#### June 2013

On the 23<sup>rd</sup> to 25<sup>th</sup> June 2013, Spectrum Acoustics conducted attended noise monitoring at the "Bow Hills" (N1), "Naroo" (N3), "Greylands" (N4), "Oakleigh" (N5), "New Haven" (N6), and "Belah Park" (N7) properties as required by the Stage 2 PA 08\_0144 MOD 2, the approved Stage 2 Noise Management Plan and the site's EPL. The results indicated that noise emissions from the site were recorded above the relevant criteria at "Bow Hills" on the 24<sup>th</sup> June 2013 at 11:42 pm. The audible mining noise sources during this measurement were a constant mid-frequency hum described as conveyor noise at 34 dB(A) and dozer track noise at 36 dB(A). At the time of measurement, the temperature inversion strength was +4.9°C/100m which is greater than the upper limit of +4°C/100m under which the noise criteria are applicable. The event, therefore, does not constitute a formal exceedance of the noise criterion.

During the night time measurement circuit the  $L_{1(1 min)}$  noise from mine did not exceed 45 dB(A) at any monitoring location.

### July 2013

On the 22<sup>nd</sup> and 23<sup>rd</sup> July 2013, Spectrum Acoustics conducted attended noise monitoring at the “Bow Hills” (N1), “Naroo” (N3), “Greylands” (N4), “Oakleigh” (N5), “New Haven” (N6), and “Belah Park” (N7) properties as required by the approved Stage 2 NMP. The results indicated that noise emissions from the site did not exceed the criterion of 35 dB(A), $L_{eq(15min)}$  at any receivers.

During the night time measurement circuit the  $L_{1(1\ min)}$  noise from mine did not exceed 45 dB(A) at any monitoring location.

### August 2013

On the 27<sup>th</sup> August 2013, Spectrum Acoustics conducted attended noise monitoring at the “Bow Hills” (N1), “Naroo” (N3), “Greylands” (N4), “Oakleigh” (N5), “New Haven” (N6), and “Belah Park” (N7) properties as required by the approved Stage 2 NMP. The results indicated that noise emissions from the site did not exceed the criterion of 35 dB(A), $L_{eq(15min)}$  at any receivers.

During the night time measurement circuit the  $L_{1(1\ min)}$  noise from mine did not exceed 45 dB(A) at any monitoring location.

### September 2013

On the 22<sup>nd</sup> to 24<sup>th</sup> September 2013, Spectrum Acoustics conducted attended noise monitoring at the “Bow Hills” (N1), “Naroo” (N3), “Greylands” (N4), “Oakleigh” (N5), “New Haven” (N6), and “Belah Park” (N7) properties as required by the Stage 2 PA 08\_0144 MOD 2, the approved Stage 2 NMP and the site’s EPL. The results indicated that noise emissions from the site were recorded above the relevant criteria at the “Naroo” and “Bow Hills” monitoring locations during the evening/night monitoring periods on 22/23 September 2013. The audible mining noise sources during each of these measurements were related to dozers working on the coal stockpiles (both engine and track noise). Although the weather conditions at the time were relatively calm and cool, indicators for moderate to strong temperature inversion conditions, a battery failure at one of the temperature loggers meant that the presence or strength of inversion conditions could not be determined. The Narrabri Mine weather station did indicate an atmospheric stability class of E during the “Bow Hills” exceedance and F during the “Naroo” exceedance, although the wind speed recorded at 10m during the “Naroo” exceedance was less than 2m/s.

During the night time measurement circuit the  $L_{1(1\ min)}$  noise from mine exceeded the 45 dB(A) criteria at the “Bow Hills” and “Naroo” monitoring locations on 22/23 September.

As a result of the exceedances Narrabri Mine undertook a validation of the noise model developed for the Stage 2 Environmental Assessment. The validation report indicated that under temperature inversion conditions of 6°C/100m and dozers operating in second gear reverse, i.e. worst case impacts, noise exceedances are predicted to occur at the “Bow Hills” and “Naroo” properties exceeding the noise acquisition criteria as outlined in Condition 2, Schedule 4 of PA 08\_0144 MOD 2. Narrabri Mine has previously investigated the limiting of reverse speeds on the dozers but this was discounted as an option for noise management. Narrabri Mine has commenced acquisition negotiations with the owner of the “Naroo” property and the results of the noise model validation have been provided to the owner of the “Bow Hills” property. Following a meeting with the landowner the mine will undertake mitigation works to the residence as requested by the landowner.

The noise model validation report also indicates that under the conditions described above two properties are predicted to have increases in noise levels above the 35dB(A) impact assessment criteria set in PA 08\_0144 MOD 2. One of these properties, “Ardmona”, is also predicted to be above the 38dB(A) criteria listed as noise levels requiring additional mitigation measures in PA 08\_0144 MOD 2. The other property, “Haylin Views”, is predicted to be above the 35dB(A) criteria but below the 38dB(A) criteria requiring additional noise mitigation measures. Narrabri Mine has provided a copy of the noise model validation report to the mentioned properties. These two properties were included in the noise monitoring program for the mine during March 2014, refer below.

#### December 2013

On the 10<sup>th</sup> to 12<sup>th</sup> December 2013, Spectrum Acoustics conducted attended noise monitoring at the “Bow Hills” (N1), “Naroo” (N3), “Greylands” (N4), “Oakleigh” (N5), “New Haven” (N6), and “Belah Park” (N7) properties as required by the Stage 2 PA 08\_0144 MOD 2, the approved Stage 2 Noise Management Plan and the site’s EPL. The results indicated that noise emissions from the site were recorded above the relevant criteria at “Bow Hills” on the 12<sup>th</sup> December and “Naroo” on the 11<sup>th</sup> and 12<sup>th</sup> December 2013. The audible mining noise sources during each of these measurements were related to dozers working on the coal stockpiles (both engine and track noise).

The site’s EPL conditions indicate that compliance with noise emission criteria is not applicable under atmospheric conditions where wind speeds are higher than 3m/s or temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level or temperature inversions of greater than 4°C/100 metres.

Data from the mine operated weather station indicated that all of the elevated noise levels were measured whilst there were winds at 3 and 3.7 m/s. The elevated noise levels were, therefore, measured under non-compliant meteorological conditions.

During the night time measurement circuit the  $L_{1(1 \text{ min})}$  noise from mine exceeded the 45 dB(A) criteria at the “Naroo” monitoring location on 12 December. As noted above, this measurement was recorded under non-compliant meteorological conditions.

#### March 2014

On the 17<sup>th</sup> to 19<sup>th</sup> March 2014, Spectrum Acoustics conducted attended noise monitoring at the “Bow Hills” (N1), “Naroo” (N3), “Greylands” (N4), “Oakleigh” (N5), “New Haven” (N6), and “Belah Park” (N7) properties as required by the Stage 2 PA 08\_0144 MOD 2, the approved Stage 2 Noise Management Plan and the site’s EPL. The results indicated that noise emissions from the site were recorded above the relevant criteria at “Bow Hills” on the 18<sup>th</sup> March and “New Haven” on the 17<sup>th</sup> and 19<sup>th</sup> March 2014. The audible mining noise sources during this measurement at the “Bow Hills” property were related to dozers working on the coal stockpiles (both engine and track noise). Noise sources at the “New Haven” property were related to noise from a temporary ventilation fan and drill rig.

The mine’s EPL conditions indicate that compliance with noise emission criteria is not applicable under atmospheric conditions where winds speeds are higher than 3 m/s or temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level or temperature inversions of greater than 4°C/100 metres.

The elevated noise levels were, therefore, measured under non-compliant meteorological conditions as temperature inversions of 6.8°C/100 metres or wind speeds >3 m/s were measured at the time the exceedances were recorded.

Narrabri Mine commenced a noise reduction strategy to mitigate the potential for adverse noise impacts at “New Haven” regarding the temporary ventilation fan. A shed was erected around the fan which is due to be decommissioned during June 2014. Spectrum Acoustics considered a shed may provide at least a 10 dB noise reduction in noise levels from the temporary fan when the shed is erected.

During the night time measurement circuit the  $L_{1(1 \text{ min})}$  noise from mine did not exceed 45 dB(A) at any monitoring location.

During March 2014, attended monitoring was undertaken at the “Matilda” and “Ardmona” properties as outlined above. The results indicated that noise emissions from the site did not exceed the criterion of 35 dB(A),  $L_{eq(15 \text{ min})}$  at the two receivers.

During the night time measurement circuit the  $L_{1(1 \text{ min})}$  noise from mine did not exceed 45 dB(A) at the two monitoring locations.

#### 3.10.3.3 Unattended Noise Monitoring

No unattended noise monitoring was conducted during the reporting period.

#### 3.10.3.4 Real-Time Noise Monitoring

The approved Stage 2 NMP, developed in accordance with the Stage 2 PA 08\_0144 MOD 2, includes the requirement for real-time noise monitoring as well as reactive noise control measures to manage noise impacts for sensitive receptors.

Following a noise complaint from the resident at “Matilda”, further south of the Narrabri Mine, the monitor was relocated to this property in September 2011. The monitor was relocated to the “Turrabaa” property during August 2013, which is adjacent to the “Naroo” property to assess mine related noise following the levels detected during May 2013 at the “Naroo” property. The monitor was then relocated to the “Merriman” property during December 2013 following noise complaints received from the resident. The monitor produces daily reports analysed by Narrabri Mine personnel. The monitor graphs low frequency and total noise, as well as records audio files to indicate if low frequency noise generated by the mine is within the compliance limit of 35 dB(A),  $L_{eq(15\text{min})}$ . Since January 2014 the mine has developed monthly reports based on the results from the mobile noise unit. A copy of the report is sent to the resident to give an overview of the noise impacts detected by the monitor over the course of the month.

As the real-time monitoring unit is mobile, the mine has the ability to relocate the monitor to areas where elevated noise levels are expected or where noise related complaints are received. All indications from monitoring with this unit to date confirms compliance with noise criteria.

#### 3.10.4 Comparisons with EA Predictions

The Noise and Vibration Impact Assessment undertaken as part of the Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 2, Part 6, November 2009*) outlines the potential noise and vibration impacts on surrounding landowners. The report also identified four recommendations for operations to assist in reducing noise impacts offsite. These were:

- *No more than two scrapers are to be used during the earthworks stage under temperature inversion conditions* – No scrapers are currently onsite. If



scrapers were to be used in the future then this recommendation will be implemented.

- *Use of a bulldozer on the Reject Emplacement Area will be suspended under inversion conditions* – The REA was utilised during the reporting period however operations are generally limited to daylight hours and dozers are not usually utilised on the REA.
- *Only one truck per 15 minute period will transport reject to the Reject Emplacement Area under inversion conditions* – The REA was utilised during the reporting period however operations are generally limited to daylight hours commencing from approximately 7 am. The trucks used for transport are also 12 t road registered trucks and not the 50 t articulated haul trucks described in the Noise and Vibration Impact Assessment report.
- *Drills operating at the northern ends of LW1 to LW3 or at the southern ends of LW24 to LW26 must have temporary noise screens positioned so as to achieve a sound power level of 109 dB(A) in the direction of the nearest residences, if these drills are to operate under inversion conditions* – The majority of drilling activities in LW101 to LW103 have been completed. Screens comprising hay bales were used when in the northern end of the longwall panels closest to the “New Haven” property. It should also be noted that geological structures have shortened panels LW101 to LW103 so works were not undertaken as close to the boundary as outlined in the impact assessment. The requirement to screen LW124 to LW126 will be implemented when drilling occurs in this area.

The Noise and Vibration Impact Assessment also predicted residual criterion exceedances at four residences: “Bow Hills”, “Naroo”, “Greylands” and “Kurrajong”. Both the “Greylands” and “Kurrajong” properties have been purchased since the assessment was undertaken. Narrabri Mine is currently in negotiations for the purchase of the “Naroo” property and discussions with the owner of “Bow Hills” has resulted in Narrabri Mine investigating mitigation options for the property as requested by the resident.

#### 3.10.4.1 Noise Model Validation

As a result of the noise exceedances measured at the “Bow Hills” and “Naroo” properties during September 2013 Narrabri Mine undertook a validation of the noise model developed for the Stage 2 EA in 2009.

The validation report indicates that under temperature inversion conditions of 6°C/100m and dozers operating in second gear reverse, i.e. worst case impacts, noise

exceedances are predicted to occur at the “Bow Hills” and “Naroo” properties exceeding the noise acquisition criteria as outlined in Condition 2, Schedule 4 of PA 08\_0144 MOD 2. Narrabri Mine investigated the limiting of reverse speeds of dozers on the stockpile however this is considered impractical due to requirement for efficient coal movement to maintain storage capacity on the stockpiles. This requires that the dozers are operated using higher reversing gears. During the reporting period Narrabri Mine commenced acquisition negotiations with the owner of the “Naroo” property and the results of the noise model validation have been provided to the owner of the “Bow Hills”. This property will be subject to noise mitigation works as requested by the owner. This will be investigated further during the next reporting period.

The noise model validation report also indicates that under the conditions described above two properties are predicted to have increases in noise levels above the 35dB(A) impact assessment criteria set in PA 08\_0144 MOD 2. One of these properties, “Ardmona”, is also predicted to be above the 38 dB(A) criteria listed as noise levels requiring additional mitigation measures in PA 08\_0144 MOD 2. The other property, “Haylin Views”, is predicted to be above the 35 dB(A) criteria but below the 38dB(A) criteria requiring additional noise mitigation measures. Narrabri Mine has provided the noise model validation report to the mentioned properties and these two properties are now included in the attended noise monitoring programme for the mine to assess whether the noise criterion is being achieved.

### **3.11 Visual and Lighting**

#### **3.11.1 Management**

The Narrabri Mine is positioned to the west of, and upslope of, the Kamilaroi Highway, and is thereby visible to passing motorists and to adjacent property holders to the east. The constructed amenity bund on the southern and western boundary of the site obscures views of the development site from the south and west, whilst vegetation associated with Kurrajong Creek obscures views to the site from the north. Narrabri Mine has undertaken strategic tree planting across the site to further enhance visual screening from adjacent areas.

Lights from the mine site are visible during the night, however, it is not considered a significant detrimental impact given the distance from adjacent non-project related residences and the presence of the amenity bund for the adjacent “Naroo” residence. All lighting is designed to comply with *Australian Standard 4282 – 1997: Control of the Obtrusive Effects of Outdoor Lighting*.

The initial ventilation shaft and associated fans have been constructed in an area already shielded from residences to the south and southeast by topography and existing vegetation. Narrabri Mine has also purchased all of the land in the southern portion of the mining lease except for one property in the south-west. Each additional ventilation shaft will be surrounded by a bund wall, which will be grassed to reduce visual contrast.

Gas drainage drilling activities are temporary in nature, and similar visually to the exploration drilling activities which have been ongoing over the mine site for a number of years. Beyond a distance of a few hundred metres, the activities will be virtually imperceptible with dust suppression activities undertaken to reduce dust generation, likely to be the most noticeable aspect of these operations. Once completed, the gas drainage and drilling sites will be rehabilitated to establish the pre-existing vegetation.

The site is maintained in a clean and tidy condition at all times, with areas of disturbance reshaped and rehabilitated as soon as practicable.

### **3.11.2 Performance**

The now completed surface construction phase of the development was the most visual aspect of the entire development. Given the level of construction activity that has occurred since commencement, the site has responded well to reshaping and revegetation programs which have reduced the overall visual impact of the mine. With the exception of those areas that require ongoing disturbance (i.e. site roads), the area in and around the surface infrastructure has excellent groundcover. The visual amenity will further improve as tree establishment progresses.

Complaints have been received at the mine in relation to rubbish accumulating at the front of the mine site. As the mine is a no smoking site personnel do park out the front of the mine for a cigarette before and following work. Narrabri Mine organised for a contractor to collect rubbish from this area as well as in front of the mine on the Kamilaroi Highway. Approximately 16 m<sup>3</sup> of rubbish was collected but it should be noted that not all of this rubbish originated from mining related personnel. An onsite smoking area is being investigated where suitable rubbish bins can be provided and maintained.

One complaint was received due to lighting impacts at the mine. The source of the light was a lighting tower located on the northern side of the ROM coal stockpile to illuminate the back of the stockpile for dozer operators. When the stockpile height was reduced the lighting tower was not lowered at the same time resulting in the complaint. Following the complaint the lights on the tower were directed down and not pointing above the horizontal.

### 3.11.3 Comparisons with EA Measures

The Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, November 2009*) outlines the potential visual impacts on surrounding landowners. The report identified four recommendations for operations to assist in reducing visual impacts offsite. The recommendations and current performance against these are as follows:

- *The 3m high perimeter amenity bund (see Figure 2.2) provides a barrier for views to the facilities within the Pit Top Area, particularly from Kurrajong Creek Road and the closest residences ("Naroo", "Ardmona" and Bow Hills"). A cover of grass is being established over the bund itself to limit its visual contrast, and it would be planted with a range of trees and shrubs to create a long term screen and fauna movement corridor* – the perimeter amenity bund has been vegetated with grasses and trees have been planted and are established on the majority of the bund.
- *All areas not required for site operations, particularly following site establishment, would be revegetated to ensure the maximum area of grassed paddock is present* – active rehabilitation is undertaken across the site and forms part of drilling operations to have drill sites and access roads rehabbed upon the completion of drilling and drill hole logging works.
- *The load-out bin above the rail load-out area and site buildings would be painted in a grey/green hue to limit their overall visibility* – the rail load-out bin, CHPP, rotary breaker enclosure and conveyor covers are all either painted in a green hue or are manufactured from green Colorbond® type sheeting.
- *A high standard of housekeeping would be adopted to maintain a tidy site* – a high standard of housekeeping is required by mine management for both employees and contractors. Designated areas are used for contractors and types of materials across the site. As mentioned above complaints have been received in relation to rubbish accumulation in front of the site and this is being addressed.

## 3.12 Aboriginal Heritage Management

### 3.12.1 Sites Management and Performance

Two assessments of Aboriginal cultural heritage at the mine site have been undertaken. The first assessment was undertaken in March 2007 for the Stage 1 project and encompassed the Pit Top Area of the mine site. The second assessment was undertaken in November 2009 for the Stage 2 project and consisted of a

detailed survey of the surface area associated with Longwall Panels 1 to 7, the Brine Storage Pond Area and the Namoi River Water Pipeline. As part of the Stage 2 work, a reconnaissance survey was also undertaken of LW109 to LW126 to substantiate the representativeness of the results of surveys for LW101 to LW107, and to provide a larger basis on which to assess the cumulative impacts associated with site salvage.

As required by PA 08\_0144 MOD 2 a detailed cultural heritage survey was undertaken for longwall panels 8 to 13 during the previous reporting period. This survey is required prior to surface disturbance works occurring in this area. The report was pending at the time of preparing this AEMR/Annual Review however the report and any associated revisions to the ACHMP will be forwarded to the relevant Government agencies when available.

In addition to the assessments outlined above, a further two surveys of LW101 to LW107 have been undertaken to define the spatial parameters of the sites identified in the November 2009 assessment.

All assessments and surveys were undertaken in consultation with representatives of the local Aboriginal community.

Aboriginal heritage management during the reporting period was based on avoidance. Any planned surface disturbance work has to go through the "Permit to Disturb" process where the Environmental Officer is required to sign off on any disturbance prior to it occurring.

During the reporting period Narrabri Mine organised for Aboriginal site monitors to be present for pre-strip and soil stripping activities occurring across the site in culturally sensitive areas. These monitors are utilised to inform operations of any potential cultural heritage limitations on proposed works.

### **3.12.2 Consultation**

Narrabri Mine maintains contact with the representative Aboriginal groups in order to ensure appropriate engagement with the Aboriginal community prior to surface disturbance activity. This will continue throughout the life of the operation.

The revision to the Aboriginal Cultural Heritage Management Plan, required by PA 08\_0144 MOD 2, was approved by the Department of Planning and Infrastructure in December 2011. A Heritage Management Plan was also developed and approved as part of the Extraction Plan for LW101 to LW105. Both of these plans were developed in consultation with the local Aboriginal representatives.

Once the report for the survey of LW108 to LW113 is received and revisions to the site's ACHMP are made these reports will be forwarded to the Aboriginal groups for review.

During cultural heritage surveys onsite Aboriginal monitors raised the potential for temporary salvage of artefacts from areas of higher significance as identified in the Stage 2 cultural heritage assessment. The mine sought advice from OEH and DP&E in relation to the temporary salvage the approvals that may be required. No response from the OEH and DP&E was received during the reporting period.

### 3.12.3 Comparisons with EA Measures

The Aboriginal Heritage Assessment undertaken as part of the Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 2, Part 5, November 2009*) outlines the investigation of the project area and the potential impacts to items and sites of archaeological significance and cultural heritage significance, as provided by the registered stakeholder groups. The report identified five recommendations in relation to cultural heritage management. These are summarised below with the performance against each to date:

- *...it is recommended that NCOPL, subject to the constraints imposed by mine safety considerations, consider relocating surface disturbing activities to avoid the archaeological sites* – during the reporting period all surface disturbance activities were located at least 10 m from fenced cultural heritage areas as identified in PA 08\_0144 MOD 2. Any works proposed in proximity to identified cultural heritage sites were relocated to avoid disturbance in these areas.
- *It is further recommended that in the event that they can be avoided, that Sites 10, 19, 38 and 39 should be fenced off with fluorescent para-webbing to protect them from inadvertent or accidental damage from vehicular traffic, until such time as the ground surface work to install the goaf drainage boreholes and their access roads has been completed. At that time, the fencing should be removed to allow the cattle to continue to graze the site areas, and thereby provide a measure of weed control and potential grass-fire hazard reduction that would otherwise not occur if the fencing was to remain* – sites 10, 19, 38 and 39, as well as all other sites identified in the Pit Top Area and overlying LW101 to LW105 are fenced with a top wire which has orange tags along the length of the wire.
- *The fenced-off areas should be described as 'Environmental Protection Zones' to avoid damage to the sites that might otherwise occur if they were described as Indigenous or Culturally Sensitive Areas* – sites 10, 19, 38 and 39 all have

signs attached to the wire identifying them as an “Environmental Protection Zone”.

- *With regard to other sites that were recorded but which are not specified above, it is recommended that they should be avoided wherever possible, but where it is not possible, that the archaeological material in the affected sites should be salvaged by the archaeologist assisted by Sites Officers representing Narrabri LALC and Narrabri Gomeroi Traditional Owner Group – no salvage of identified sites has been required during the reporting period as any potential disturbance is relocated to avoid these areas.*
- *The owners, and their employees, earthmoving contractors, subcontractors, machine operators and their representatives, whether working in the survey area or elsewhere, should be instructed that in the event of any bone being unearthed during earthmoving, work should cease immediately in the area of the find – the induction undertaken by all Narrabri Mine staff and contractors includes information on what to do if cultural heritage sites are identified during works in their respective work areas.*

### **3.13 Natural Heritage**

There are no features of Natural Heritage within the mining area and hence, no specific management procedures are required.

### **3.14 Spontaneous Combustion**

#### **3.14.1 Management**

Coal at the mine is from the Hoskissons Coal Seam which has been identified as having a high intrinsic spontaneous combustion propensity. As a consequence, a Spontaneous Combustion Major Hazard Management Plan (SCMHMP) and a Stockpile Management Plan have been developed for the site as part of the Narrabri Mine Health and Safety Management System. The SCMHMP and Stockpile Management Plan were developed to give Narrabri Mine a structured system of work to allow the mine to manage and control spontaneous combustion. The plans define how to establish and maintain a safe working environment for mine personnel and the mine itself.

#### **3.14.2 Performance**

There have been no reportable spontaneous combustion incidents during the reporting period.

### 3.14.3 Comparisons with EA Measures

The Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, November 2009*) outlines the measures to be adopted to minimise the potential for spontaneous combustion. As outlined above, the mine has developed and implemented a SCMHP to manage spontaneous combustion onsite. The performances against the measures outlined in the EA are as follows:

- *The mine design which employs a low resistance ventilation system achieved through a seven heading mains trunk and two heading gate roads* – the mine plan has seven heading mains and two heading gate roads with the exception of the tailgate of LW103 and LW104. Between the install road of LW102 and the LW103, a distance of approximately 400 m, only one gate road has been developed. This has been repeated between 31 cut-through in the tailgate of LW104 and install road of LW104, a distance of approximately 300 m, where only one gate road has been developed. Two heading gate roads are currently planned for future longwall panels LW105 to LW113.
- *Small diameter ventilation shafts to be installed at the rear of every third gate road panel for ventilation of the gate road in-by of the active longwall face thus negating the need for a bleed system skirting the perimeter of the goaf* – Small diameter ventilation shafts are being considered at the rear of the gate road panels for ventilation of the gate road inbye of the active longwall face. This system will support the discontinuation of a perimeter roadway that otherwise results in a pressure differential across goaves and therefore reduce potential for spontaneous combustion.
- *Pre- and post- (goaf) gas drainage systems are to be implemented for gas management purposes thereby minimising ventilation pressures that would result if the ventilation system only were used to maintain gas concentration to acceptable levels* – Pre- and Post- gas drainage systems are utilised across the site.
- *Planned installation of high standard ventilation control devices* – mine has installed stoppings, regulators and overcasts through the underground mining area to control ventilation.
- *Installation, operation and maintenance of a dual ventilation monitoring system (telemetric and tube bundle)* – the mine currently has installed both telemetric and tube bundle monitoring systems.



- *On-site gas chromatograph* – gas chromatograph is located onsite and used to provide real time gas monitoring data.
- *On-site inertisation capability:*
  - *Pipework and valves fitted to all goaf seals to allow the injection of inert gas* – this has been incorporated into the mine design.
  - *Potential utilisation of in-seam drainage ranges* – can be reticulated through gas plant and back into goaf using the existing boreholes.
  - *Access to Thomlinson Boiler and PSA Nitrogen gas generators, if required* – A ‘Floxa’ nitrogen generating plant has been secured through Air Liquide. This equipment is located onsite adjacent to the ventilation shaft and reticulated underground via a dedicated pipeline. Access to a Thomlinson Boiler could be arranged if required.
- *Implementation of Ventilation and Monitoring Arrangements and the related spontaneous combustion procedures and action response plans* – Ventilation Arrangements Management Plan, Monitoring Arrangements Management Plan and Spontaneous Combustion Major Hazard Management Plan together with associated Trigger Action Response Plans (TARPs) have been developed and implemented at the site.
- *Implementation of a Gas Drainage and Outburst Management Plan which would:*
  - *Define acceptable negative pressures at the collars of in-seam boreholes* – The mine does not define negative pressures at the collars of individual boreholes however, the gas drainage plant monitors both pressure and gas concentrations in the goaf gas stream. The plant also has alarms set for gas pressures and concentrations to ensure the effective management of the goaf gas stream.
  - *Establish methods of intersecting and management of in-seam boreholes* – methods for intersecting and management of in-seam boreholes is managed through the borehole intersection procedure and the Borehole Intersection Notices (BIN) developed for each in-seam borehole to be intersected.

### **3.15 Bushfire Management**

#### **3.15.1 Management**

Narrabri Mine is equipped to attend to emergency fire situations with appropriate machinery and personnel. Any involvement in such situations would be at the discretion of the local Rural Fire Service (Baan Baa). A fire break was installed around the northern section of longwall panels during the previous reporting period. This fire break will assist emergency vehicles requiring access to the western portion of the mining lease.

#### **3.15.2 Performance**

There were no bushfire incidents on or adjacent to the mine site during the reporting period.

#### **3.15.3 Comparisons with EA Measures**

The Project Approval (PA) 08\_0144 MOD 2 requires the development of a Rehabilitation Management Plan, see Schedule 5, Condition 4(e), that includes the measures that will be used onsite to manage bushfires. Narrabri Mine has permanent firefighting hydrants located around the coal processing area and workshop areas. Mobile firefighting equipment is also available or use where required. Existing tracks on the western portion of the site are maintained as required. As mentioned above, a fire break has been installed around the perimeter of the mine to the west. Tenants on mine-owned land are required to manage their respective parcels of land, which includes measures to manage bushfire potential, as most are currently operating farms.

### **3.16 Mine Subsidence**

The Stage 2 subsidence assessment for longwall operations undertaken by Ditton Geotechnical Services Pty Ltd (DGS) in 2009 (provided as Part 1 of *Specialist Consultant Studies Compendium* for the Stage 2 EA) predicted a maximum subsidence level of 2.44 m which is based on 58% of the mining height of 4.2 m.

The ground surface will tend to subside more towards the centre of the longwall panel (i.e. away from the chain pillars between the longwall panels). As a consequence of this differential subsidence, DGS (2009) has predicted the following possible impacts:

- Surface cracking of between 20 mm (in the west) and 190 mm (in the east);
- Altered surface gradients of up to 6 % (3°) along creeks;

- Potential ponding depths of 0.5 m to 1.5 m within the watercourses in the flatter areas of the site;
- Possible interaction between discontinuous sub-surface fracturing and surface cracks (where cover depths are <215 m) leading to possible flow re-routing; and
- Possible impacts on subsurface aquifers within 110 m to 180 m above the proposed panels as a result of direct hydraulic connections to the workings.

Based on the above summary of potential subsidence, the impacts are likely to be largely limited to the mining area, the majority of which is owned by Narrabri Mine. The potential impacts include:

- Impacts on groundwater;
- Surface cracking;
- Drainage line ponding;
- Erosion and slope stability;
- Impacts on Aboriginal sites/artefacts; and
- Impacts on local residences.

Management measures for subsidence related impacts are described in the approved Extraction Plan.

### **3.16.1 Longwall Mining during the Reporting Period**

The longwall unit completed the extraction of LW101 during June 2013. LW102 extraction commenced in July 2013 and was completed during January 2014. LW103 extraction commenced during March 2014 and at the end of the reporting period the longwall unit had retreated 204 m in LW103 which is 2,197 m in length. Mining height in LW101 and LW102 was 4.2 m. The mining height for LW103 has been increased to 4.3 m following some trials which indicated extracting coal to this height was practical. The target mining height focuses on the bottom section of the Hoskissons Coal seam. The overburden thickness above LW103 is 220 m. The final extraction void is 305 m which includes the gate roads. Chain pillar dimensions are a minimum of 35 m rib-to-rib at a maximum of 100 m cut-through centres.

### **3.16.2 Performance**

#### **3.16.2.1 Monitoring**

Narrabri Mine has monitored the subsidence movement across the surface of LW101 to LW103 in accordance with the approved Extraction Plan. The subsidence

monitoring survey lines are illustrated on Figure 5. Table 10 outlines the maximum subsidence parameters recorded as part of the subsidence monitoring program and a comparison with the maximum predicted subsidence parameters as outlined in the Extraction Plan.

Monitoring has been undertaken on the 11kv power line that traverses the southern end of LW101 to LW103. Monitoring results are included in Table 11.

**Table 11 – Subsidence Parameters**

<b>LW101, LW102 and Part of LW103</b>		
	Maximum Predicted Extraction Plan	Maximum Measured
<b>Line 101 – Centre of LW101</b>		
Subsidence (m)	2.44	2.628
Tilt (mm/m)	47	29.1 – 46.3
Tensile Strain (mm/m)	11 – 22^	8.7 – 20.7
Compressive Strain (mm/m)	14 – 28^	7.5 – 26.6
Angle of Draw (°, Degrees)	22.5 – 26.5	20.2
<b>Line 102 – Centre of LW102</b>		
Subsidence (m)	2.44	2.665
Tilt (mm/m)	41	43.7
Tensile Strain (mm/m)	10 – 20^	20.5
Compressive Strain (mm/m)	12 – 24^	46.7
Angle of Draw (°, Degrees)	22.5 – 26.5	20.8
<b>Line 103 North – Centre of LW103 Northern End</b>		
Subsidence (m)	2.44	2.589*
Tilt (mm/m)	35	40.2*
Tensile Strain (mm/m)	8 – 16^	18.8*
Compressive Strain (mm/m)	10 – 20^	16.2*
Angle of Draw (°, Degrees)	22.5 – 26.5	18.1*
<b>Line A – Cross Panel Survey Line</b>		
Subsidence (m)	2.44	2.558*
Tilt (mm/m)	47	56.3*
Tensile Strain (mm/m)	11 – 22^	17.1*
Compressive Strain (mm/m)	14 – 28^	26.7*
Angle of Draw (°, Degrees)	22.5 – 26.5	25.7*
<b>Line B – Pine Creek Tributary 1</b>		
Subsidence (m)	2.44	2.557*
Tilt (mm/m)	47	54.8*
Tensile Strain (mm/m)	11 – 22^	13.1*
Compressive Strain (mm/m)	14 – 28^	11.0*
Gradient Change (%)	Up to 6	5.47*
<b>Line E – Pine Creek Tributary 1 Crossline 1</b>		
Subsidence (m)	2.44	0.952*
Tilt (mm/m)	47	26.9*

<b>LW101, LW102 and Part of LW103</b>		
Tensile Strain (mm/m)	11 – 22^	9.2*
Compressive Strain (mm/m)	14 – 28^	2.9*
<b>Line F – Pine Creek Tributary 1 Crossline 2</b>		
Subsidence (m)	2.44	2.514*
Tilt (mm/m)	41	53.5*
Tensile Strain (mm/m)	10 – 20^	6.6*
Compressive Strain (mm/m)	12 – 24^	11.9*
<b>Line G – Pine Creek Tributary 1 Crossline 3</b>		
Subsidence (m)	2.44	0.089*
Tilt (mm/m)	47	2.8*
Tensile Strain (mm/m)	11 – 22^	1.8*
Compressive Strain (mm/m)	14 – 28^	1.5*
<b>Electricity Transmission Lines – 11kV Power Lines</b>		
<i>Pole 2</i>		
Subsidence (m)	0	0.046
Dynamic Tilt (mm/m)	0	8.38
Final Tilt (mm/m)	0	7.21
Conductor length change between poles 2-3 (m)	0.13	0.56
Conductor Clearance Loss (m)	0.77	+0.20
<i>Pole 3</i>		
Subsidence (m)	2.18	2.085
Dynamic Tilt (mm/m)	30	66.3
Final Tilt (mm/m)	12	52.47
Conductor length change between poles 3 - 4 (m)	0.28	-0.81
Conductor Clearance Loss (m)	1.10	0.91
<i>Pole 4</i>		
Subsidence (m)	2.11	2.010
Dynamic Tilt (mm/m)	25	74.22
Final Tilt (mm/m)	15	43.49
Conductor length change between poles 4 - 5 (m)	0.13	0.48
Conductor Clearance Loss (m)	0.07	+0.21
<i>Pole 5</i>		
Subsidence (m)	0.31	0.047
Dynamic Tilt (mm/m)	2	16.32
Final Tilt (mm/m)	2	16.32
Conductor length change between poles 5 - 6 (m)	0.024	-0.12
Conductor Clearance Loss (m)	0.30	0.08
<i>Pole 6</i>		
Subsidence (m)	0.01	0.008
Dynamic Tilt (mm/m)	1	3.5
Final Tilt (mm/m)	1	1.65

\* - subsidence development incomplete.

^ - values for 'smooth' and 'discontinuous' (i.e. crack affected) subsidence profiles.



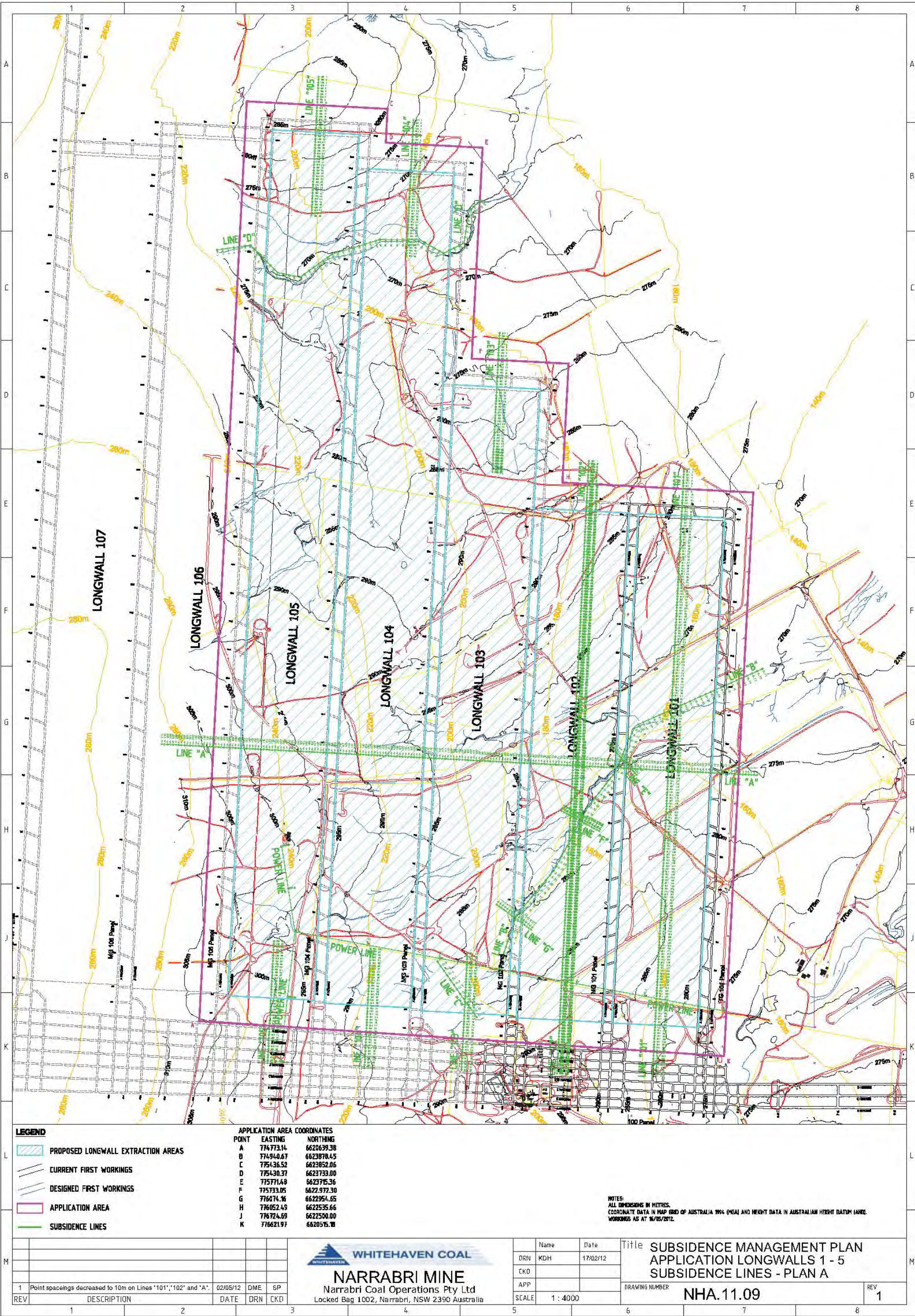


Figure 5 – Subsidence Monitoring Plan



### 3.16.2.2 Impacts

#### Natural Features

##### *Land Management*

Surface cracks generally developed along goaf edges and in the longwall panels themselves. Ploughing and seeding of LW101 has been completed to fill in surface cracks. LW102 and LW103 have not been ploughed and seeded as was undertaken in LW101 as very little rainfall and hot conditions over the summer period meant very little soil moisture was available for seed propagation. Ploughing and seeding will be undertaken above LW102 and LW103 when conditions improve.

##### *Pine Creek and Tributaries*

Water ponding has been observed in LW102 in two tributaries of Pine Creek immediately upstream of the ponding area reported for LW101. The ponding in the tributaries of Pine Creek was predicted to occur in the Stage 2 Longwall Project Environmental Assessment for the Narrabri Mine.

For the ponding of water in the tributaries in LW102 it is expected that the system will naturally re-adjust to changes as a result of subsidence to reach a dynamic equilibrium. Maximum gradient change measured along the reach between LW101 and LW102 is 5.47%. Small reaches of the creek have increased or decreased in gradient at the upstream and downstream extent of ponding but the channel bed appears stable (as relative to the natural system). Monitoring required by the Land Management Plan, developed as part of the Extraction Plan, noted that no remediation works are recommended for the area of ponding within LW101.

The mine is currently developing a management procedure for the ponding area to formalise the current process of pumping water downstream from the ponding area. Water quality samples are collected monthly from the ponded water. The results are monitored to ensure parameters are not increasing above the baseline levels in the ponded water as this may affect the soils in the area. The results indicate water quality parameters, including pH, EC, TSS, Oil & Grease, and turbidity, are within the range of background levels for the mining area. Baseline information was collected for soils in the ponding area of LW101 as part of the monitoring requirements outlined in the Extraction Plan. This includes electrical conductivity and soil moisture distribution mapping using EM31/38 sensors. Should the ponding of water impact the soils the mine will investigate additional options for management which may include a diversion drain to minimise the level of ponding.

### *Natural Vegetation*

As reported previously, large trees have been impacted by subsidence above LW101 and LW102. Although to a lesser extent in LW102 given the trees are smaller than those that occur above LW101. In late October 2013, a Senior Botanist supervised the excavation of two recently dead trees along Greylands Road within LW101; a Grey Box approximately 12 m tall (dbh 30 cm) and White Cypress Pine (*Callitris glaucophylla*, approximately 5 m tall). Both trees were surrounded by healthy wilga trees and other pines (all less than 5 m in height). Due to the size of the excavator, tree roots could only be exposed to a depth of around 1.5 m. The intent was to identify possible sheared or broken roots which may have been caused by subsidence; however, the exposed broken roots observed were likely to have been caused by the excavation. Broken roots were observed in surface cracking in the soil nearby but could not be observed at depth.

Investigations undertaken to date into these tree deaths do not provide any conclusive explanation for the mortality of these larger trees. If possible, additional excavation and assessment of the root ball (using suitability sized equipment) should be undertaken. Better understanding of local water tables and soil moisture conditions may facilitate understanding of the role of soil shear strength and moisture conditions in future subsidence areas. The release of methane gas to the sub-surface (and therefore only reaching the deeper roots of the older trees) should also be considered further. Soils units will also be investigated to assess the potential impacts to trees in different woodland communities that occur across the site.

Narrabri Mine has since provided advice to both the Department of Planning and Infrastructure (DP&I) and the Division of Resources and Energy (DRE) outlining that the above investigations will be undertaken during the next reporting period.

### Public Utilities

#### *Public Roads*

Greylands Road was closed during active subsidence. Following mining, Narrabri Mine undertook remediation works in the form of stabilising the surface of the road with gravel. The road remains closed to the general public. As outlined in the Greylands Road Management Plan (GRMP), developed in consultation with Narrabri Shire Council, the mine intends to purchase the road as part of its long-term management strategy. The mine has applied to the Crown Lands division of NSW Trade and Investment to purchase the road and the application is currently pending.



### *Electricity Transmission Lines*

Narrabri Mine developed a management plan, known as the Essential Energy Management Plan (EEMP), to manage subsidence impacts to the 11kV power line that traverses LW101 to LW105. The EEMP was agreed to by Essential Energy on 4 February 2013 and approved by DRE as satisfying the requirements of SMP 10/9000 Condition 14 on 12 March 2013. Narrabri Mine implemented the EEMP on 19 and 21 March 2013 by installing sheaves/rollers on the 11kV power line. The line remains disconnected where it tee's off from the main line.

This power line was undermined during December 2013 when extracting LW102. The lessee of the mine owned "West Haven" property has been provided with an alternative power supply as outlined in the EEMP. Survey monitoring of the power poles and conductor clearances was undertaken as required by the Subsidence Monitoring Program, refer to Table 11.

### Farm Land and Facilities

#### *Agricultural Utilisation or Agricultural Suitability of Farm Land*

No ploughing of the land overlying LW102 has been undertaken during the reporting period due to the hot, dry weather experienced over the summer/autumn period. Ploughing and seeding of LW102 will be undertaken in the next reporting period. The only area affected by subsidence where agricultural suitability is impacted is where water ponds at the ephemeral creek. The ponded water is currently pumped downstream when required. The ephemeral nature of the creek system is such that any ponding that does occur will be for relatively short periods only, and on this basis will have negligible effect on agricultural utilisation or agricultural suitability. Water samples are collected in the ponding area to ensure parameters do not increase beyond the baseline levels which may affect the soils in the area.

#### *Farm Buildings or Sheds*

No farm buildings or sheds were undermined during the reporting period.

#### *Fences*

Fences and gates were undermined during the reporting period. Narrabri Mine has excluded all stock from the active mining area by erecting a fence outside of the subsidence zone to the east of LW101. Any fences/gates required post-mining will be reinstated.

### *Farm Dams*

Four small farm dams were undermined during the reporting period. Rain in late March 2014 refilled these dams and the dams are now full and holding water. Subsidence has not impacted on the function of the dams.

### *Soil Conservation Works*

Five contour banks, or parts thereof, were undermined during the reporting period. The subsidence impacts to the contour banks did not affect their functionality. However, should remediation works be required, Narrabri Mine will either reinstate the contour banks or remove a section to avoid water ponding

### **3.16.3 Comparisons with EA Predictions**

The Mine Subsidence Predictions and Impact Assessment undertaken as part of the Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 1, Part 1, November 2009*) outlines the range of subsidence predicted to occur as a result of longwall mining operations as well as potential impacts and the recommended monitoring program.

Based on Table 11, subsidence predictions and exceedances for LW101, LW102 and LW103 are as follows:

- The maximum subsidence measurements were 2.665 m in LW102 however, this is within +/- 10% of the predicted value of 2.44 m;
- The maximum tilt measurements were within the predicted ranges for the centrelines of LW101, LW102 and LW103;
- The maximum tensile strain measurements were generally within the predicted range of the values of 11 mm/m (smooth profile) and 22 mm/m (discontinuous or crack affected profiles); and
- The maximum compressive strain measurements were generally within the range of the predicted values of 14 mm/m (smooth profile) and 28 mm/m (discontinuous or crack affected profiles) with the exception of LW102 which recorded a maximum compressive strain of 46.7 mm/m.

The centreline subsidence results for LW101, LW102 and LW103 indicate that the Garrawilla Volcanics and Basalt Sill have not reduced subsidence through spanning behaviour. The maximum subsidence is also considered to be closer to 63% of the average mining height of 4.2m.

All subsidence monitoring results are forwarded to the relevant Government agencies.

### 3.17 Hydrocarbon Contamination

#### 3.17.1 Management

It is Narrabri Mine's objective that:

- All bulk hydrocarbons, i.e. fuel, oils, grease etc (both new and waste) retained at the Narrabri Mine be contained within bunded areas within the contained water management system as described in Section 2.7.2;
- All fixed or portable equipment incorporate self-contained bunding;
- Hydrocarbon contaminated materials be disposed of appropriately; and
- Minor spillages, if occurring, are cleaned up and the contaminated soil either bio-remediated or transferred offsite to an appropriately licensed waste disposal area.

Major spillages, if occurring, would be treated in accordance with a three-phase system of containment, collection and remediation.

#### 3.17.2 Performance

Narrabri Mine's procedures for hydrocarbon management have been effective throughout the reporting period with:

- No surface or groundwater contamination evident or reported by landowners; and
- No requirement for off-site disposal of contaminated materials.

In addition, a bio-remediation area has been established onsite for minor spills to treat impacted soil. A Hydrocarbon Management Plan is also being developed which will be implemented during the next reporting period and will be used to supplement the existing Whitehaven Group's procedure for 'Chemical and Hydrocarbon Spill Response'.

#### 3.17.3 Comparisons with EA Measures

The Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Section 4B.3.4.2.5 – Contaminated Water Management, November 2009*) outlines the range of management measures to be implemented at the site to manage hydrocarbons spills, identified as a potential main source of water contamination. These measures include:

*These areas would be managed as follows:*

- *Runoff would be drained to a triple interceptor (or similar) to reduce hydrocarbon concentration to acceptable levels before draining to SB1. The oily fraction would enter a containment system for removal as necessary –* Two oil-water separators are located at the wash down/refuelling bay and the workshop which are inspected monthly. The treated outflow is directed to SB1 via open drains
- *All oil, grease, fuel and hydrocarbon products would be securely stored on an impermeable surface within a bund capable of containing 110% of the largest tank's capacity –* oils are stored in a bunded container onsite. Waste oil is stored in self bunded tanks or in Intermediate Bulk Containers (IBCs) on bunded pallets. All fuel tanks are self-bunded trans-tanks or similar.
- *Refuelling, oiling and greasing would be restricted to designated areas, away from drainage and where spill kits are readily available –* Refuelling in the field is undertaken by a trained and competent person with a fully operational service truck, which has a spill kit available. Spill kits are also available at the fuel farm, waste oil area, workshop and other areas as required.

*In the event of a major hydrocarbon spill, the following actions would be undertaken:*

- *The contaminated soil at the site of the spill would be collected and transported to an approved waste depot or remediated safely on the Mine Site –* Narrabri Mine has established a plastic lined cell to house hydrocarbon contaminated soil for bio-remediation. The soil will be tested and treated to an acceptable level before being transported to a licenced facility or used onsite pending the results of the analysis. No contamination requiring bio-remediation occurred during the reporting period.
- *Pits would be constructed around the spill with sufficient hydraulic gradient to capture seepage water and contaminated material, enabling the pits to be pumped out –* no hydrocarbon contamination events occurred during the reporting period.
- *The local groundwater would be monitored for signs of further contamination –* Narrabri Mine has implemented a comprehensive groundwater monitoring network around the site, refer to Section 3.4.

In addition to the actions outlined above the Narrabri Mine has developed and implemented a Pollution Incident Response Management Plan (PIRMP) as required for holders of an EPL by Part 5.7A of *Protection of the Environment Operations Act 1997* and Part 3A of the *Protection of the Environment Operations (General)*

*Regulation 2009*. The PIRMP has been developed and implemented to manage pollution events at the Narrabri Mine.

### 3.18 Methane Drainage and Ventilation

#### 3.18.1 Greenhouse Gas Emissions

Narrabri Mine remains committed to minimising greenhouse gas emission levels as much as possible throughout the life of the development. During the reporting period greenhouse gas emissions have been predominantly associated with ventilation of the mine, gas drainage and electricity use onsite. Due to the production levels during the reporting period being closer to those considered to be full production at the mine the electricity supply has increased during the reporting period but this is expected to be relatively consistent during the next reporting period.

Ventilation air was monitored during the reporting period with approximately 10,839 Mm<sup>3</sup> of air vented from the mine with an average composition of 0.04 % methane (CH<sub>4</sub>) and 0.29 % CO<sub>2</sub>.

During the reporting period, a total of 3,679,695 litres of diesel was used at the site by both Narrabri Mine and associated contractors. Assuming an energy content for Automotive Diesel Oil of 38.6 GJ/kL and using Table 3 of the *National Greenhouse Accounts (NGA) Factors – July 2012*, the estimated direct – Scope 1 Greenhouse Gas emissions including all CO<sub>2</sub> and non CO<sub>2</sub> gasses are shown in Table 12.

Electricity consumption totalled approximately 58,820,256 kWh, which is an approximate 138% increase from the previous year. This is a direct result of the increase to full production levels. Table 12 shows the estimated CO<sub>2</sub>-e emissions which are based on the NGERS NSW and ACT emission factor for consumption of electricity purchased from a grid.

**Table 12 – Greenhouse Gas Emissions**

	Usage	Emission Factor	CO <sub>2</sub> Equivalent Tonnes
Diesel (kL)	3,679,695	69.2 t CO <sub>2</sub> -e/GJ	9,872
Electricity (kWh)	58,820,256	0.88 kg CO <sub>2</sub> -e/kWh	51,762

Diesel consumption has increased slightly when compared to the previous reporting period due to the increase in dozer hours associated with full production. In addition increases in gas-drainage and associated works occurring at the surface would also add to the amount of diesel consumed. Diesel generators are also installed at the gas-drainage wells over longwall panels one to five, where required. The volume of

diesel used during the reporting period is considered indicative of the long-term annual usage that could be expected at the Narrabri Mine.

The Narrabri operation forms part of the wider Whitehaven group which has reported for the last three years via the National Greenhouse and Energy Reporting Scheme (NGERS).

The site continues to operate with an Energy Savings Action Plan (ESAP) as required by PA 08\_0144 MOD 2. The *Guidelines for Energy Savings Action Plans (DEUS, 2005)* require an Annual Progress Report of Outcomes to be submitted following implementation of an ESAP. After experiencing difficulty interpreting how the progress report should be completed, Narrabri Mine contacted an ESAP representative at the Office of Environment and Heritage (OEH) who advised that ESAP reporting has progressed substantially since the initial *Guidelines* were developed and reporting is now completed via an online system of which Narrabri Mine cannot access because it is only available to those companies that OEH require to report. As Narrabri Mine did not trigger OEH's requirements the company was not permitted access to the online reporting system and OEH advised that they did not wish to receive annual progress reports from Whitehaven sites. When asked how to complete the original progress report in the 2005 *Guidelines*, OEH were unable to provide sufficient information to allow for a meaningful progress report to be completed. OEH also advised that the ESAP process was not designed for new sites, thereby further complicating the reporting process.

On this basis, Narrabri Mine requested consideration from DP&E to exclude the requirement of the Guidelines to complete annual progress reports. DP&I subsequently advised that they did not expect the company to provide annual progress reports to OEH, however they expect greenhouse gas monitoring and management measures to be reported in AEMRs/Annual Reviews.

A revised ESAP was submitted to DP&E for approval during March 2014. The revised document included the results of a Level 3 Energy Audit undertaken at the site. PA 08\_0144 MOD 2 also requires the mine to submit a Greenhouse Gas Minimisation Plan prior to carrying out longwall operations. The Greenhouse Gas Minimisation Plan was subsequently approved by DP&E on 12 June 2012.

#### 3.18.1.1 Comparisons with EA Predictions

The Greenhouse Gas Assessment (GHGA) undertaken as part of the Environmental Assessment for the Stage 2 longwall operation (*Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 2, Part 8, November 2009*) outlines the predicted greenhouse gas emissions associated with the longwall operation. Comparisons are made with

the Stage 2 assessment as it more closely reflects the operations onsite now that the site is in full production. A comparison of predictions in the Stage 2 GHGA and the actual amounts are provided below:

- *Diesel usage was estimated at 2,022 kL/year (years 2-20) – Narrabri Mine used a total of 3,680 kL during the reporting period;*
- *Electricity use during Year 1 in the GHGA is predicted to be 11,429 MWh with a worst case consumption of 49,283 MWh – Narrabri Mine used 52,820 MWh during the reporting period which is slightly higher than predicted but is considered to indicate electricity consumption at full production levels;*
- *Predicted gas-drainage volumes and composition annualised for a 30 year mine life (GHGA, Table 2) were 50.77 Mm<sup>3</sup> of CO<sub>2</sub> (73 % of total gas-drainage composition) and 17.93 Mm<sup>3</sup> of CH<sub>4</sub> (27 % total gas-drainage composition) – Narrabri Mine has produced 27.6 Mm<sup>3</sup> of CO<sub>2</sub> (46 % of total gas-drainage composition) and 3.1 Mm<sup>3</sup> of CH<sub>4</sub> (6 % of total gas-drainage composition) during the reporting period. The remaining gas composition is made up of 9 % O<sub>2</sub>, 36 % N<sub>2</sub> and other gases;*
- *Predicted ventilation gas volumes for longwall panel 1 was 9.8 Mm<sup>3</sup> of CO<sub>2</sub> and 4.6 Mm<sup>3</sup> of CH<sub>4</sub> – Narrabri Mine has produced 31.4 Mm<sup>3</sup> of CO<sub>2</sub> (0.29 % of total ventilation gas composition) and 4.1 Mm<sup>3</sup> of CH<sub>4</sub> (0.04 % of total ventilation gas composition) during the reporting period; and*
- *Predicted CO<sub>2</sub>-e emissions annualised for a 30 year mine life (GHGA, Table 2) were 0.35 Mt – Narrabri Mine has calculated the emissions for the reporting period were 0.32 Mt of CO<sub>2</sub>-e.*

### **3.18.2 Gas Drainage / Ventilation**

Since February 2012 the three main fans provide all of the ventilation for the active areas of the mine with pre-drainage works undertaken 3-4 longwall panels in advance of the workings. The pre-drainage Surface to Inseam (SIS) works recommenced during the reporting period in LW105 and will continue in the next reporting period in LW106.

There are currently 22 active Vertical Production Wells (VPW's) and 34 that have now been decommissioned. The decommissioning process incorporates grouting the holes and rehabilitation of the immediate areas. Gas drainage drilling and construction works included the use of a SIS lateral rig drilling out to approximately 2,000 meters, standard drill rigs for vertical boreholes, and poly welding of pipe for the interconnection of the wells with the gas plant. Rehabilitation of areas disturbed

by drilling activities has continued during the period however unfavourable weather conditions have limited rehabilitation works onsite.

For comparisons between predicted gas make at the mine and actual gas make refer to Section 3.18.1.

### **3.19 Public Safety**

#### **3.19.1 Management**

The Narrabri Mine Pit Top Area and drilling operations are all located wholly on mine owned land and is appropriately signed allowing authorised access only. The site is visible from the Kamilaroi Highway and accessible via an access road from the Highway across the main northern railway line. Narrabri Mine has applied to close Greylands road, the only other access road in the northern portion of the site. Once the mine takes possession of Greylands Road it will be closed and all access will be directed through the Pit Top Area. Visitors to the mine are required to report to the mine office and unauthorised personnel are not permitted to move around the mine area unaccompanied.

As required by the Extraction Plan (PA 08\_0144 MOD 2, 3(4)) for second workings (i.e. longwall mining), Narrabri Mine has developed a Public Safety Management Plan that outlines the management of subsidence on public infrastructure overlying LW101 to LW105. As required by this plan and the Subsidence Management Plan approval received from DRE, Narrabri Mine developed and implemented two management plans.

One plan outlined the management measures that have been undertaken to reduce the risk to public safety in relation to Greylands Road, known as the Greylands Road Management Plan (GRMP). This plan was developed in consultation with the Narrabri Shire Council and allowed Narrabri Mine to close the road during periods of active subsidence and while remediation activities are being undertaken, refer to Section 3.16.2.2.

The other plan was developed in consultation with Essential Energy, known as the Essential Energy Management Plan (EEMP), and outlines the management measures that have been implemented for the 11kV power line that traverses LW101 to LW105, refer to Section 3.16.2.2.

No other public infrastructure exists within LW101 to LW105, i.e. the approved Extraction Plan area.



### 3.19.2 Performance

The control measures outlined in the Public Safety Management Plan and what has been undertaken onsite are outlined below for Greylands Road and the 11kV power line:

#### ***Greylands Road***

- *Erection of warning signage and communication with leaseholders, owners, staff and contractors:* Signs are erected on Greylands Road at the mining area boundary and as outlined in the Traffic Control Plan that accompanies the GRMP. Lease holders have been notified however no leaseholders access their leased areas from Greylands Road. Safety briefs have been issued to staff and contractors working onsite.
- *Traffic control, and consider closing road to general traffic:* Road closure implemented in consultation with Narrabri Shire Council.
- *Inspection and survey monitoring of roads:* Daily inspections undertaken during periods of active subsidence.
- *Twice-daily inspection and implement repairs in response to observed impacts:* Daily inspections undertaken during periods of active subsidence.

#### ***Power Line***

- *Pre and post mining survey of asset condition / line clearances and remediation if required:* Survey monitoring has been undertaken as outlined in the Subsidence Management Plan for LW101 to LW105, refer to Section 3.16.2.
- *De-energise affected transmission line for period of undermining until inspection and repairs are completed to Essential Energy's satisfaction:* The power line is currently de-energised and will remain de-energised until any remediation works are undertaken, if required, and Essential Energy are satisfied as required by the EEMP.
- *Provided alternative power supply to dwellings as required:* Diesel generators are currently located at the "West Haven" and "Barton Hedge" properties as an alternative power supply.

### 3.20 Other Issues and Risks

#### 3.20.1 Feral Animal Control

Feral animals are not a significant land management issue at the Narrabri Mine and are generally limited to isolated occurrences of foxes, hares, rabbits and pigs. In view of the low frequency of occurrence, and in the absence of an extensive programme by all surrounding landowners, no broad scale feral animal control programme was considered warranted during this reporting period. It should be noted however that pig trapping has been occurring on mine-owned land as well as on neighbouring properties and feral dog baiting has been undertaken by surrounding land owners during the reporting period.

Narrabri Mine will continue to monitor feral animal occurrences and implement necessary control programmes if and when necessary, as outlined in the Landscape Management Plan and in consultation with the local branch of the Local Land Services (LLS) and surrounding land owners.

#### 3.20.2 Land Capability

##### 3.20.2.1 Management

The majority of land currently disturbed by mining activities, including drilling operations and subsidence, is classified as Land Capability Class III. On completion of all mining activities, the successful rehabilitation of areas of disturbance and the relinquishment of the mining leases, the land affected by mining within the project area will, in the main, be returned to a classification similar to that prior to mining. As a consequence, the area disturbed for mining operations will be returned to a Class III land capability. Rehabilitation works such as reshaping and seeding of previously disturbed areas has been undertaken ensuring the visual impact of the development was kept to a minimum and that the soil resources of the area is appropriately managed for future land use requirements.

##### 3.20.2.2 Performance

The Land Management Plan prepared for the Extraction Plan outlined the performance measures and criteria for impacts associated with longwall mining. The *2013 LW101-103 Land Management – 2013 Monitoring Report* (prepared by Eco Logical Australia) noted the following:

- *Surface Cracking – Permanent cracks (which do not self-close within one month of longwall face passing) are remediated as soon as practicably possible (and safe to do so). Surface cracking is remediated to prevent erosion*

*and slope instability issues within 6 months of each longwall pass: Surface cracking remediated and Greylands Road trafficable.*

- *Topographic form (LiDAR):*
  - *Landscape morphology – Subsidence across landscape does not exceed subsidence predictions for LW 101-105: Not assessed during the reporting period (required every 3 years in accordance with Land Management Plan). While LiDAR data was not recorded the measured subsidence onsite is slightly greater than predicted but no significant impacts as a result of the increased subsidence have been observed.*
  - *Creek lines – No identifiable change to overall drainage pattern: Not assessed during the reporting period (required every 3 years in accordance with Land Management Plan).*
- *Soil moisture and nutrient distribution (EM mapping) – Identified areas of EM mapping change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change. Site specific management report prepared and recommendations implemented where necessary: Not assessed during the reporting period (required every 3 years in accordance with Land Management Plan).*
- *Groundcover (multi-spectral images – erosion and pasture cover ) - Identified areas of NDVI change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change. Site specific management report prepared and recommendations implemented where necessary: Areas of change attributed to land management, surface disturbance works and re-establishment of groundcover.*
- *Pasture:*
  - *Pasture biomass - Less than 20% reduction in pasture biomass in impact zones in comparison to control zones: No significant difference was determined between any zones during the reporting period.*
  - *Weed species Weed species identified and managed according to the weed management measures provided in the Rehabilitation MP: No noxious weeds recorded.*
  - *Weed cover Less than 10% increase in weed cover in impact zones in comparison to the control zone: No statistical difference calculated for weed cover onsite.*

- *Soil nutrient status:*
  - *pH - pH remains within +/- 0.5 pH unit of baseline pH. If soil amelioration is undertaken, pH is to remain within recommended pH range for pasture (5.2-8.0):* Not assessed during the reporting period (required every 3 years in accordance with Land Management Plan).
  - *EC - Less than 20% increase in EC in comparison to baseline values:* Not assessed during the reporting period (required every 3 years in accordance with Land Management Plan).
  - *Organic matter - Less than 20% reduction in organic matter in comparison to baseline values:* Not assessed during the reporting period (required every 3 years in accordance with Land Management Plan).
  - *Nitrogen - Less than 20% reduction in total nitrogen in comparison to baseline values:* Not assessed during the reporting period (required every 3 years in accordance with Land Management Plan).
  - *Phosphorus - Less than 20% reduction in phosphorus in comparison to baseline values:* Not assessed during the reporting period (required every 3 years in accordance with Land Management Plan).
- *Field survey of creek stability and condition - Less than 20% increase in creek erosion (bank and bed) in comparison to control Less than 20% increase in cross sectional area in comparison to control cross sectional area (unless stabilisation works have been undertaken):* One area of significant erosion (bed and bank) identified. The mine will organise the required remediation works during the next reporting period.

### **3.20.3 Meteorological Monitoring**

#### **3.20.3.1 Introduction**

In June 2006, a meteorological station was commissioned on the "Claremont" property. The station has been operating since that time recording 15 minute wind speed, wind direction, temperatures, humidity and rainfall. The station was upgraded on 31 January 2012. Daily meteorological data for the reporting period is presented in Appendix 8.

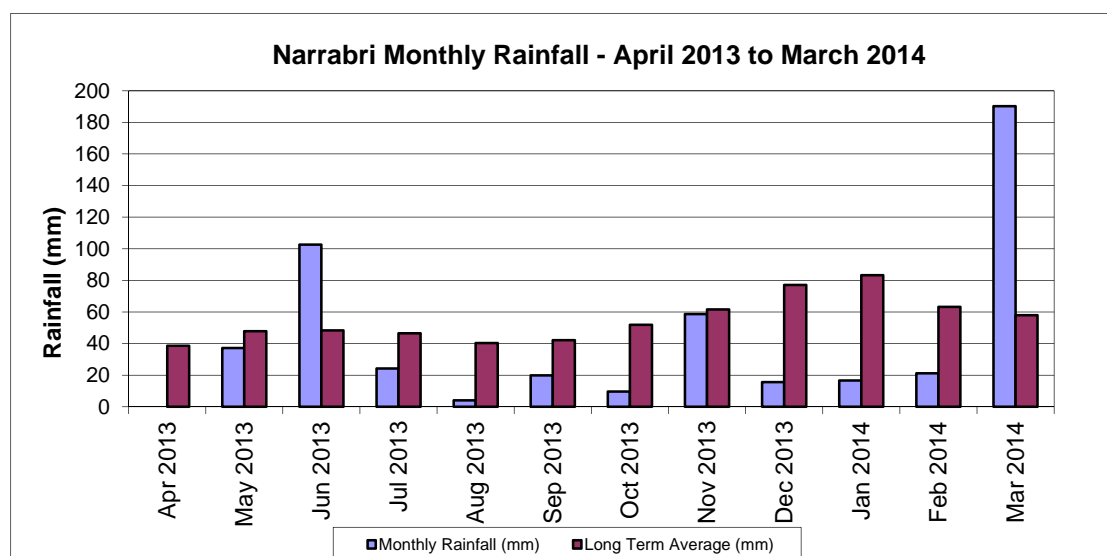
#### **3.20.3.2 Rainfall**

Rainfall data for the reporting period is presented in Table 13.

**Table 13 – Rainfall Data**

Month	Monthly Rainfall (mm)	Cumulative Rainfall (mm)	Long Term Average* (mm)	Number of Rain Days**	Long Term Average Rain Days
Apr 2013	0.0	0.0	38.6	0	2.3
May 2013	37.2	37.2	47.8	5	2.6
Jun 2013	102.6	139.8	48.3	8	3.3
Jul 2013	24.2	164.0	46.5	4	3.1
Aug 2013	4.0	168.0	40.3	1	3.0
Sep 2013	19.8	187.8	42.1	1	3.0
Oct 2013	9.6	197.4	51.9	2	3.5
Nov 2013	58.6	256.0	61.6	3	3.9
Dec 2013	15.6	271.6	77.1	2	4.1
Jan 2014	16.6	288.2	83.3	2	3.7
Feb 2014	21.2	309.4	63.2	5	3.1
Mar 2014	190.2	499.6	57.9	8	2.8
Total	499.6	499.6	658.6	41	38.4

\* – Narrabri West Post Office averages from 1891-2014. \*\* – >1mm.

**Figure 6 – Monthly Rainfall Data**

A review of Table 13 and Figure 6 shows that the total rainfall at the mine site during the reporting period was 499.6 mm, which is 159 mm below the long term average for Narrabri West Post Office and 148 mm less than the site total during the previous reporting period.

Below average rainfall was experienced for 10 of the 12 months during the reporting period. The rainfall totals illustrate the dry weather experienced at the mine during the reporting.

Total rain days during the reporting period was more than the long term average but less than that recorded during the previous reporting period. The only significant rainfall event during the reporting period occurred from 23 March to 27 March 2014 when the mine received 156 mm of rain over a 5-day period. This rainfall event

included the highest daily rainfall total recorded for the reporting period on 27 March 2014 of 57.6 mm.

### 3.20.3.3 Temperature

Average maximum and minimum temperatures for the reporting period are presented in Table 14 together with long-term monthly averages for Narrabri West Post Office (Bureau of Meteorology Station 053030).

**Table 14 – Average Maximum and Minimum Temperatures**

Month	Average Daily Temperature			
	Reporting Period (°C)		Station 053030 (°C)	
	Min	Max	Min	Max
Apr 2013	10.8	26.2	11.9	27.3
May 2013	8.3	21.3	8.3	22.5
Jun 2013	7.1	16.7	5.2	18.7
Jul 2013	5.3	18.2	3.7	18
Aug 2013	4.2	20.7	4.6	19.8
Sep 2013	9.0	26.9	7.6	23.4
Oct 2013	11.7	29.1	11.7	27.1
Nov 2013	14.0	30.5	14.8	30.1
Dec 2013	17.5	34.3	17.7	33.0
Jan 2014	20.1	35.9	19.3	33.8
Feb 2014	20.0	34.5	19.1	33.2
Mar 2014	17.5	29.7	16.4	31.2

Table 14 shows that average minimum temperatures at the mine site were similar to the long term average minimum temperatures from the Narrabri West Post Office Station. The average maximum temperatures at the mine site were generally higher than, or similar to, the long term averages. September 2013 was 3.5 degrees above the long term average and above average temperatures were recorded from July 2013 to February 2014 indicating a hotter than average period experienced at the mine.

### 3.20.3.4 Wind Speed and Direction

Fifteen minute average wind speed and direction data is collected from the Narrabri Mine meteorological station as it, together with operational records and environmental monitoring results, can be used to assess the environmental effects or consequences of specific activities undertaken at the mine or in surrounding areas.

Monthly wind roses are included in Appendix 8. The wind roses show that the predominant wind directions during the reporting period were from the south-east and north-west. Recorded wind speeds were often over 5m/sec, particularly during the period from August 2013 to February 2014.

### 3.20.3.5 Inversions

The Noise Management Plan (NMP) provides details more specific to inversion monitoring requirements. During the winter months of 2013 temperature inversion conditions were monitored during the monthly noise monitoring undertaken as outlined in the NMP and in accordance with PA 08\_0144 MOD 2. Inversion monitoring conducted during the noise monitoring program did identify some instances where noise propagation through temperature inversion conditions was present. The association between inversions and noise impacts will also be assessed through the use of the real-time noise monitor, as discussed in Section 3.10.3.4.

Current inversion monitoring is undertaken by placing temperature sensors on the “Kurrajong” and “Turrabaa” properties to allow for the minimum 50 m separation required to determine inversion strength (refer to Appendix 7). Narrabri Mine’s meteorological station also monitors stability class for temperature inversion conditions. As outlined in the site’s EPL, stability category “F” with wind speeds >2 m/s and stability category “G” are meteorological conditions under which the noise limits do not apply. As an indication of the occurrence of the EPL inversion conditions, during July and August 2013, the EPL meteorological inversion conditions were present for 2.2% (July 2013) and 5.9% (August 2013) of the evening and night time periods, i.e. from 6 pm to 7 am.

## 4 COMMUNITY RELATIONS

### 4.1 Complaints

Narrabri Mine maintains a designated complaints line, with messages checked on a daily basis by site personnel. In the event of a complaint, details pertaining to the complainant, complaint and action taken are recorded on a “Complaints Form”.

During the reporting period, 41 complaints were made to the mine. Two of these complaints were received via the designated complaints line. The nature of the complaint, details and response are presented in Table 15.

**Table 15 – Complaints Summary 2013/2014 Reporting Period**

Method	Date/Time of Complaint	Nature of Complaint	Investigation	Action Taken / Follow-up
Phone call to CRO	7/04/2013 4:40pm	Too much dust at the product stockpile and tripper. Water sprays were not activated at the time of the complaint.	CRO notified the CHPP control room and sprays were in the process of being activated at the time of the complaint as required by the Dust TARP. The Dust TARP resulted in 20 level 1 wind warnings and 5 level 2 wind warnings on Sunday	Complainant rang back at ~5:00pm as the sprays that were activated were not located near the product tripper. CRO notified the CHPP control room again and all sprays were activated. Complainant also rang the EO on Tuesday 9th April to discuss the issues on Sunday. EO reiterated that the Dust TARP has now been implemented and has worked well to date.
Phone call to CRO	16/04/2013 5:45pm	Dust being generated at the coal stockpiles.	CRO investigated dust levels but could not identify dust being generated from the coal stockpiles at the time of the complaint. CRO also noted at this time it was approaching dusk and hard to see anything. TARP notifications indicate that at 3:56pm there was a level 2 wind warning and corrective actions were taken at this time.	No additional action taken as no dust generation was identified at the time of the complaint and controls were in place.
Phone call to site	19/04/2013 6:00pm	Complaint related to a “1/4 mile” of dust being generated at the coal processing area.	Phone call taken by Training and Safety Coordinator who advised the complainant that the complaint info would be passed on to the relevant people. After ending the phone call the Training and Safety Coordinator took photos of the ‘dust’ being generated, which indicated no dust was leaving the coal processing area and that the gantry sprays were active at the time of the complaint.	No additional actions have been undertaken as dust generation was investigated and no dust was being generated at the time and the gantry sprays were active.
Phone call to CRO	26/04/2013 5:13pm	Dust being generated from PCI stockpile.	CRO notified the CHPP control room and additional sprays were activated (some already running). The Dust TARP resulted in 14 level 1 wind warnings and 2 level 2 wind warnings. The dust notifications resulting from the TARP indicated that dust suppression sprays were on the feed belts and the skyline and dust was contained to the product stockpile area.	No follow up action taken as dust managed at the time of the complaint and site reporting indicates that the dust was not leaving the coal stockpile area.
Phone call to EO	31/07/2013 12:00pm	Sprays not activated on product gantry. Wind gusts blowing dust off stockpile.	EO contacted CHPP. CHPP advised that sprays were activated earlier in the day but had stopped for some reason.	Sprays reactivated. No follow up action as complainants request actioned.
Phone call to EO	22/08/2013 9:00am & 10:38am	Dust generated in coal processing area and gantry sprays not activated	Dust from coal processing area was from dozer moving between stockpiles. Gantry sprays not activated.	Options are being considered for watering transfer road between stockpiles including using water carts and installing a permanent spray system. Gantry sprays activated.



Phone call to complaints hotline	24/08/2013 8:15am & 9:00am	Noise in the morning relating to dozer reversing beeps and tracks. Also woke complainant up on Friday morning at ~6am but no complaint made at this time. Complainant called the complaints hotline on Saturday morning at 8:15am but no message left, then called again at 9:00am and left a message.	EO returned call on Monday (26/08/2013) morning at 8:50am. Wind was blowing on the direction of the complainant's residence although only a slight breeze. Weather data also indicates presence of a temperature inversion at the time of the complaint. Dozers were operating on the ROM pad and the product pad as a train was being loaded.	EO phoned complainant back at 4:15pm on 26/08/2013 and explained that excessive noise likely due to temperature inversion conditions. EO also noted that noise monitoring, which includes the complainant's residence, is to be undertaken during August and September. EO also stated that Narrabri Mine will revisit the noise model for the site. Complainant stated that they will contact EO for any future instances.
Phone call to EO	26/08/2013 3:52pm	Dust being generated at product stockpile by dozers.	Dust was being generated by dozers working on the product stockpile, no sprays activated as wind was calm.	EO notified CHPP CRO and sprays activated where dozers were working. EO phoned complainant back at 4:18pm on 26/08/2013 and informed complainant that sprays were activated, complainant still not happy with dust controls in place. CHPP have since installed a sprinkler at the base of the ROM stockpile and 6 more have been ordered for the ROM pad and transfer road.
Phone call to EO	28/08/2013 12:39pm	Dust being generated at product stockpile by dozers.	Dust was being generated by dozers working on the product stockpile, no sprays activated as wind was calm.	EO notified CHPP CRO and sprays activated where dozers were working.
Phone call to EO	12/09/2013 12:17pm	Dust being generated at ROM stockpile by dozer loading the bypass crusher. Complainant rang back as more dust being generated.	3 dozers working on the ROM pad. The dozer loading the bypass crusher was creating dust. Dozer was tracking to product pad from ROM pad.	CHPP notified and a sprinkler was to be relocated to the bypass crusher loading area. Additional sprinklers are to be purchased for the transfer road between stockpiles.
Phone call to EM	16/09/2013 10:35am	Noticed significant additional noise from site when attending local property which is not occupied constantly. Not sure of noise source but constant throughout night.	Advised complainant that noise model is being revisited for the site.	Narrabri Mine will include the residence in the next round of monitoring to better understand noise impacts.
Phone call to complaints hotline	19/09/2013 2:39pm	Constant humming noise and dozer tracks at approx. 7am and 8:30pm. Dust also visible from Greylands Road at approx. 8am.	EO returned phone call at 7:58am on Friday 20th September. EO investigated wind direction strength and dozer movements at the time of the complaint. Wind direction was blowing towards complainant's property but was not particularly strong. Weather data also indicates the presence of a temperature inversion at that time. Dozer movements were in relation to stockpile operations.	EO reiterated to the complainant that the noise model is being revisited. Monitoring is also due again this month at the complainant's residence. Complainant said they would notify the mine for any future instances.
Phone call to complaints hotline	22/09/2013 7:32am	Constant drone from mine can heard inside the house, especially the eastern end	EO investigated operations at the time. Dozers working on ROM pad but not product pad. Weather data indicates temperature inversion. Subsequent investigations highlighted the goaf plant being used over Longwall panel 102 could have been the source of the noise and this has since been rectified.	EO phoned complainant back on 23 September and advised of strong temperature inversions over the weekend. Noise monitoring is also due this and it is the 3-day round which should identify any impacts.
Phone call to EO	30/09/2013 2:02pm	Dust being generated at the mine particularly from dozers.	Dozer working on ROM pad feeding bypass crusher was recovering coal at the extent of the stockpile where it was drier.	EO contacted CHPP and they had already added additional sprinklers. Next steps if dust continued were to swap Komatsu dozer for a Caterpillar dozer and if dust continued then to stop dozer movements. EO phoned back complainant and informed him of the measures above.
Phone call to EO	6/10/2013 6:51am	Noise and dust being generated on the previous day.	Dust on ROM pad from dozer feeding the bypass crusher. Also windy on Saturday afternoon. Noise on Saturday night related mainly to trains but also some from dozers.	Complaint made the following day. Additional water can be added to the ROM pad if required. EO to contact train company and inform them of the complaint. Noise model being revisited to validate the predicted levels.
Phone call to EO	10/10/2013 2:32pm	Dust being generated at the coal processing area	Bypass crusher on and dozer loading train.	Bypass crusher stopped after adding additional water did not achieve required dust suppression. Sprays were already activated on gantry.

Phone call to complaints hotline	12/10/2013 7:23am	Noise relating to dozer tracks and engine hum	Weather conditions indicate southerly winds at ~2m/s towards the complainant's house. No trains being loaded and no production as Longwall on maintenance.	EO advised complainant that noise model being validated. EO provided copy of the monitoring report for September 2013 on 21 October 2013.
Phone call to EO	24/10/2013 12:48pm	Dust being generated at the coal processing area	Train being loaded at the time.	EO contacted CHPP and gantry sprays activated above where dozers were working.
Phone call to complaints hotline	28/10/2013 12:07pm	Dozer noise on Saturday morning and afternoon / evening. Dust also visible. Bad smell on Saturday night.	Dozers undertaking normal operations on Saturday. Wind direction towards complainant's residence. Dust likely from coal processing area. Bad smell in relation to a spontaneous combustion event on the coal stockpiles on Saturday evening.	Latest noise monitoring report provided to complainant. Enquired as to monitoring at adjacent property but EO's understanding is that they are amalgamated with property with residence (part of the noise monitoring network). Spontaneous combustion event managed as per site management plans and extinguished. EO explained that dust may be visible however monitoring network reports results within compliance limits.
Phone call to EO	15/11/2013 12:22pm	Dust being generated at the coal processing area	Dust coming from tripper, reject stockpile operations and dozer loading a train on the product stockpile. Sprays on the conveyors were already activated at the time of the complaint.	Sprays on gantry activated. Reject stockpile operations ceased.
Phone call to complaints hotline	19/11/2013 5:59pm	Dozer noise, tracks and engine hum, on Friday morning and Tuesday afternoon. Loud enough to wake children	ROM coal stockpile close to capacity due to rail outage meaning dozers working higher than usual.	EO to provide noise model validation results when available. Should model indicate compliant levels at complainant's residence then the mobile noise unit will be relocated to their property to gain a better understanding of noise sources/levels.
Phone call to EO	10/12/2013 10:30am	Dust being generated at the coal processing area from the bypass crusher is excessive.	Bypass crusher operating and dozer loading coal on the PCI stockpile.	EO contacted CHPP. Sprays on bypass crusher in the process of being activated. Sprays on gantry for stockpile. Sprays cannot be activated above working dozers due to safety concerns.
Phone call to CRO	9/01/2014 5:11pm	Too dusty. Only been home two days and very dusty.	CRO talked with CHPP in relation to sprays.	CRO advised EO of complaint. EO followed up with complainant the following week.
Phone call to CRO	11/01/2014 4:10pm	Complaint relating to dust from the product tripper.	CRO checked with CHPP to ensure sprays were functioning properly.	CRO notified EO. EO followed with complainant the following week.
Phone call to Complaints Hotline	12/01/2014 8:03am	Light from the mine shining in the front yard and very dusty the previous week.	Only light in addition to normal operations is a lighting tower on the ROM pad. EO advised CHPP that the lights should not shine above the horizontal and this should be rectified if non-compliant.	EO rang complainant back on 13 January at 8:54am and left a message. EO tried again on 17 January at 3:14pm and talked with complainant. EO again contacted the CHPP on 20 January to check on status of lighting tower. Visual observation on 21 January had lighting plant pointing down on ROM stockpile.
Phone call to Complaints Hotline	14/01/2014 6:23pm	Complaint relating to excessive dust being generated from the site.	Dust being generated by dozer and tripper operations.	EO rang complainant on 15 January and advised of sprays on gantry and EPL requirements for dust management due to be implemented and reported to the EPA by 28 February.
Phone call to Complaints Hotline	15/01/2014 8:55am	Complainant concerned about dust and noise levels (dozer tracks) from the mine. Concerned about breathing the dust in and about it settling on their roof.	Complaint in relation to general issues with no specific time.	EO returned phone call at on 15 January at 2:05pm. EO outlined EPA dust mitigation measures being implemented as well as monitoring network around the mine. EO also talked about the sprays in place and the dust TARP. EO to organise meeting with resident in the near future.
Phone call to EO	15/01/2014 1:47pm	Dust generated from the skyline tripper and sprays not on.	Product tripper creating dust when loading onto stockpiles.	EO contacted CHPP at 1:53pm. Sprinklers activated on the upwind side of the coal unloading point, conveyor sprays were on at the time of complaint. CHPP also changed feed point from ROM stockpile to take fresher coal which should have a higher moisture content.

Phone call to Complaints Hotline	16/01/2014 7:25am	Complainant wanted to bring to the attention of the mine the level of dust being generated. Dust coming across Baan Baa and coal dust on the complainant's roof. Also about the smell relating it to Singleton/Muswellbrook.	Bypass crusher used in the morning of the complaint which processes a drier product with the potential to make dust. Spontaneous combustion also occurring onsite.	EO phoned complainant back at 8:03am and explained dust mitigation measures. Complainant stated that info has also been forwarded to the EPA. EO to arrange a meeting with complainant.
Phone call to EO	16/01/2014 1:20pm	Dust being generated onsite. Sprays on gantry not on.	EO contacted CHPP at 1:19pm, CHPP advised that conveyor sprays were on.	EO requested gantry sprays be activated as well. CHPP activated gantry sprays.
Phone call to EO	17/01/2014 3:35pm	Dust being generated from site.	Dust being generated from dozers loading a train and working the ROM stockpile. CHPP had been wetting the area for most of the day with the gantry sprays.	EO contacted CHPP at 3:53pm. CHPP explained they could relocate the dozer to load the train from a different position which may limit the dust being generated.
Phone call to Complaints Hotline	19/01/2014 4:30pm	Dust generation all day from site	Hot and dry day. General operations with sprays activated.	CRO contacted CHPP and made them aware of the complaint. CRO requested CHPP check the sprays that are on and activate more sprays. EO rang complainant back at 9am on 20 January as requested. Complainant stated the dust is a problem for the community. EO stated that EPL measures are being addressed. Complainant stated that more needs to be done.
Phone call to Complaints Hotline	19/01/2014 5:37pm	Coal dust been blown over house	Storm bringing high winds went through at this time. General dust from the coal processing area was blown away in the 55km/hr gusts. Some gantry sprays on at the time.	Rang complainant back on 20 January. Coal dust on roof, in washing and in their pool. Photos taken and EPA notified. EO acknowledged that the storm created strong winds which were the cause for the dust.
Phone call to site	20/01/2014 12:41pm	Cloud of dust from site	The cause was a dozer trafficking between stockpiles. EO had already contacted CHPP at 12:26pm in relation to dust management.	EO rang complainant back at 12:43pm. Dust cloud gone by the time EO returned call. EO advised CHPP of complaint and to ensure areas that have sprinklers are wet.
Phone call to Complaints Hotline	27/01/2014 9:53am	Plume of dust over complainants house	EO reviewed video footage at time of the complaint. One dozer working on ROM stockpile and one dozer working on reject stockpile.	EO phoned complainant back at 8:45am on Tuesday morning. Complainant requested a dust deposition monitor be installed. EO phoned complainant back at 8:55am to advise that a dust deposition gauge would be installed with the next round of sampling, ~13 February 2014.
Phone call to EO	30/01/2014 3:19pm	Dust from dozers, dusty last three days	Train was not being loaded at the time. Dust being generated from dozer on the ROM stockpile.	EO contacted CHPP at 3:32pm. One Komatsu and one Cat dozer being used on the ROM stockpile. At 3:40pm CHPP Supervisor instructed operator to only push 'half blades of coal' on the Komatsu to limit dust generation.
Email to EO received from CCC Rep.	31/01/2014 1:09pm	Dust being generated at the mine. Dust in the house and in the hot water system.	Complaint related to a 3 month period with no specific date/time.	EO contacted complainant on 31 January. EO arranged for a meeting the following week to talk about dust management at the mine and to assess the dust levels at the residence.
Phone call to Complaints Hotline	19/02/2014 7:40am	Dozer noise this morning	Dozer working on reject stockpile from 7am.	EO reviewed noise monitoring information. Dozer noise hard to identify over general road noise. EO requested CHPP start reject stockpile operations after 8am. CHPP acknowledged this would be done. EO advised complainant. Complainant to continue to provide feedback if noise seems excessive.
Phone call to site	19/02/2014 ~3:00pm	Dusty conditions at the mine particularly late last year.	Complaint in relation to dust over a period of months, no specific date/time.	Complainant raised concerns in relation to health impacts, why issue is ongoing and what has been done. EO explained the volume of the coal on the surface and the dry/hot weather resulted in dustier than usual conditions. EPL for the mine requires measures to be implemented two of which have been reported with a further two to be reported by end of February 2014. Additional measures are also been investigated to minimise visible dust at the mine.

Phone call to Complaints Hotline	4/03/2014 10:02pm	Hard to breathe	EO contacted CHPP which advised no instances of spontaneous combustion in the coal processing area. All coal is now fresh coal with old stocks depleted. Wind direction also meant the complainants residence was not down wind at the time of the complaint.	EO contacted complainant on 5th March and advised no spontaneous combustion issues noted at the coal processing area and also noted wind direction. Complainant advised that it was a smell similar to what had been detected in the past and thought they would check with the mine.
Phone call to site	19/03/2014 10:50am	Noise from a new installation and black material in water tank and on water filter	EO was aware of a temporary fan being installed at the end of longwall panel 103. Prior to installation EO investigated noise levels and compared to sound levels predicted in the EA which showed similar levels were modelled. Noise source is the temporary fan.	EO requested earthen bund be installed around the fan. EO was then informed that the fan will have a shed installed around it as it is not weather proof. EO sought additional detail from the acoustic consultant and then provided this information, for the modification of the shed to maximize noise reduction, to the site civil supervisor. The earthen bund was deemed not practical due to access and heights so a temporary installation, including temporary fencing and brattice sheeting, was installed on 21 March as a noise barrier until the shed can be erected and modified. Shed is due to be erected on 3 April. EO rang complainant back at 5pm on 19 March 2014. Complainant rang back at 10am on 20 March 2014. EO informed complainant that the temporary fan will be in place until June 2014. Plan is to have them approx. every 3rd longwall panel which will progressively move west away from the residence. EO explained the noise barrier measures being implemented and associated timeframes which should alleviate noise at the residence. EO advised complainant to drop off a water sample and water filter and the mine would have it analysed. Samples have since been forwarded to the lab.

EO – Environmental Officer, TSM – Technical Services Manager, GM – General Manager, EM – Environmental Manager, CHPP – Coal Handling and Preparation Plant, CRO – Control Room Operator, TBT – Tool Box Talk

The number of complaints during the reporting period increased significantly when compared to the previous reporting period when ten complaints were received. Generally complaints related to dust from the mine. The dusty conditions were related to the hot, dry and windy period experienced during the second half of 2013. Measures are being implemented at the mine to minimise dust which includes additional Pollution Reduction Program (PRP) added to the site's EPL.

Any complaints that are made are reported to the Community Consultative Committee and documented in this AEMR/Annual Review.

## **4.2 Employment Status, Demography and Socio-Economic Contributions**

### **4.2.1 Employment Status and Demography**

At the end of the reporting period, the mine had approximately 254 employees and approximately 74 long term contractors (not all onsite at the one time). Of the mine employees, 74% reside in the local area.

Narrabri Mine has a preference for sourcing personnel from the local area however certain activities requiring specialist knowledge and experience had to be sourced from other locations.

### **4.2.2 Social and Economic Contributions**

In addition to the community funding required by PA 08\_0144 MOD 2, direct and indirect employment, and the purchase of goods and services from local suppliers, during the reporting period Narrabri Mine also contributed over \$8,500 to the local community, including a donation of \$5,000 to the 'Nosh on the Namoi'. The Narrabri Mine is also a proud supporter of the 2013 Narrabri BEST Business Awards and the Couriers 'Live and Learn Locally' promotion. During financial year 2013 Whitehaven's total sponsorships, including Narrabri and its other mines were well over \$130,000, and a further \$26 million was committed under Voluntary Planning Agreements.

As members of the Gunnedah/Narrabri area community, mine-related employees also contribute socially and economically through their involvement in community sporting, educational and social organisations and expenditure of a component of their disposable income.

## **4.3 Community Liaison**

In accordance with Condition 9 of Schedule 6 of PA 08\_0144 MOD 2 a Community Consultative Committee (CCC) was formed within 3 months of the Project Approval. The committee comprises representatives of Narrabri Shire Council, Narrabri Mine and the community. The CCC is chaired by an Independent Chairperson, Mr Terry Miller.

Since its inception, the CCC has met on a regular basis, meeting 4 times per year in accordance with the condition of consent. During the reporting period meetings were held on 17 April 2013, 17 July 2013, 11 December 2013 and 12 March 2014.

Narrabri Mine representatives continue to maintain contact with neighbours in the vicinity of the mine site. These contacts not only provide a means of information

dissemination, but also enable Narrabri Mine to ascertain and address any potential issues which may arise from time to time.

#### **4.3.1 Narrabri Mine Community Newsletter**

During February 2014 a Community Newsletter was published by the mine as an update on the project. The newsletter was posted to local residents and made available in the local bakery, the Narrabri West Post Office, Narrabri Shire Council's administration building, the Boggabri Post Office and the Narrabri Shire Visitors Information Centre. The newsletter is also available at the mine site as well as being published on the Whitehaven Coal website.

The newsletter included a general overview of operations and production information, an update on sponsorships and information relating to subsidence at the mine. Narrabri Mine aims to distribute a newsletter annually ensure the local area is up to date with the operation.

## 5 REHABILITATION

### 5.1 Buildings

No buildings have been removed during the reporting period.

### 5.2 Rehabilitation of Disturbed Land

#### 5.2.1 Objectives

Narrabri Mine's rehabilitation / land use objectives for the Project Area (i.e. the area within the boundary of ML 1609) are as follows:

##### Areas affected by mining – short term

- To minimise clearing / vegetation disturbance consistent with operational requirements;
- To rehabilitate areas of disturbance no longer required for mining related operations in accordance with the approved Rehabilitation Management Plan;
- To apply soil (top soil / sub-soil) to the final landform based on material availability and post-mining land use;
- To stabilise all earthworks, drainage lines and disturbed areas required for mine-related activities to minimise erosion and sedimentation;
- To control vermin, feral animals and noxious weeds; and
- Reduce the visibility of the activities from adjacent properties and the local road network.

##### Areas affected by mining – long term

- To control vermin, feral animals and noxious weeds. Continuation and/or restoration of biodiversity and ecological integrity of areas affected by mining or agriculture within the mining lease;
- To establish a low maintenance, geotechnically stable, safe and vegetated landform which blends in with the surrounding natural landscape;
- To backfill the box cut and blend the final landform with the surrounding topography such that the visual impact of the post-mining landform is minimised;
- To provide habitat for fauna and corridors for fauna movement within the final landform;

- To monitor rehabilitation success in terms of physical and biological parameters;
- To decommission and remove all project-related infrastructure not required for the future use of the site;
- To remediate any land contaminated by accumulated salts or hydrocarbon spills/leaks; and
- The re-establishment of agricultural land of comparable land capability to that of the pre-disturbance environment (i.e. Class III).

### Completion Criteria

The completion criteria for rehabilitation at the mine, as outlined in the Landscape Management Plan, are presented in Table 16:

**Table 16 – Rehabilitation Completion Criteria**

Rehabilitation Action	Completion Criteria	Corrective Action
Landscaping	<ul style="list-style-type: none"> <li>• Geotechnically stable, and safe landform</li> <li>• Blends with surrounding landscape</li> </ul>	Develop and agree on new objectives with I&I and DP&E
Weed Management	<ul style="list-style-type: none"> <li>• Weed management procedures have been implemented to control noxious weeds</li> <li>• Target weed species are reduced from initial levels</li> <li>• Appropriate steps have been taken to minimise the introduction of new weeds from machinery, topsoil and seed mix</li> <li>• The site is of comparable land capability to that of pre-disturbance environment</li> </ul>	Liaise with local pest authority to discuss alternative/new weed control actions
Contouring	<ul style="list-style-type: none"> <li>• Slopes have been contoured to pre-determined or equivalent to pre-mining topography</li> <li>• Top soil has been replaced over areas of disturbance in the appropriate order i.e. 15 cm for top soil and 25 cm for sub-soil</li> <li>• Topsoil has been ripped to a depth of 300mm at 1 m spacing's</li> </ul>	Operations will be undertaken a second time if required
Landform Stability	<ul style="list-style-type: none"> <li>• Minimal evidence of rilling &gt;5 mm deep and &gt;0.5 mm wide</li> </ul>	Reform landscapes if significant rilling occurs
Soil Suitability	<ul style="list-style-type: none"> <li>• EC values are sufficiently low to allow survival and growth of preferred plant species</li> <li>• Visual inspections show that no crusting of soil or excessive compaction exists</li> </ul>	<p>Determine the cause of any problems identified and identify what corrective actions can be implemented</p> <p>Implement corrective actions</p>
Land Capability	<ul style="list-style-type: none"> <li>• Area of land rehabilitated to Class III with Class VII lands confined to Kurrajong Creek</li> </ul>	
Monitoring and Maintenance	<ul style="list-style-type: none"> <li>• A monitoring programme has been implemented that addresses completion criteria and influences site management</li> </ul>	



Following the completion of rehabilitation as outlined above the following steps are then required for rehabilitation sign off:

- Engage suitably qualified and experienced consultants to complete a final rehabilitation assessment and record findings to ensure all objectives have been met;
- Collate all AEMR/Annual Review for reporting to DRE as part of the Lease Relinquishment Report (LRR), which will be prepared by the Group Environment Manager;
- The Group Environment Manager is to arrange for a meeting with DRE to discuss the outcomes of the LRR and address any outstanding issues that may potentially exist; and
- Arrange for a meeting with relevant Government agencies to obtain consensus that the necessary requirements have been fulfilled and that no further work is required

### **5.2.2 Achievements during the Reporting Period**

Table 17 presents a Rehabilitation Summary while Table 18 presents a listing of maintenance activities undertaken during the reporting period. As the majority of cover crop establishment occurred during the previous reporting period in LW101 (Photo 6) and weather conditions were unfavourable to seed cover crops over LW102, rehabilitation during this reporting period was limited to minor cover crop maintenance (Photo 7). The sowing of pasture species above LW101 where agricultural activities have been undertaken is outlined in the Landscape Management Plan as an effective way to protect disturbed areas from topsoil erosion and is compatible with the final land use in this area.

Approximately 2,050 tube stock have been planted since the commencement of construction with an estimated success rate of approximately 90% (Photo 8). Tube stock species planted around the site include Kurrajong, River Bottlebush, White Box, Hop Bush, Grey Box and Poplar Box. No tube stock was planted during the reporting period as the majority of the area disturbed was in previously cultivated/cleared paddocks.

For comparisons between disturbance described in the Stage 2 EA and actual disturbance refer to Section 3.6.1.



**Photo 6 – Cover Crop Established over LW101**



**Photo 7 – Rehabilitated Drill Site**



**Photo 8 – Tube Stock Plantings on Amenity Bund**

Table 17 – Rehabilitation Summary

		Area Affected (hectares)		
		This Report Period (as of 31.03.14)	Last Report Period (up to 31.03.13)	Next Report Period (estimated)
A: MINE LEASE AREA				
A1	Mine Lease(s) Area	5298ha (454.2ha surface area)		
B: DISTURBED AREAS				
B1	Infrastructure area (other disturbed areas to be rehabilitated at closure including facilities, roads)	41.2	41.2	46.2
B2:	Active Mining Area (excluding items B3 - B5 below)	60.4	51.7	108.4
B3	Waste emplacements, (active/unshaped/in or out-of-pit)	5.5	5.5	5.5
B4	Tailings emplacements, (active/unshaped/uncapped)	N/A	N/A	N/A
B5	Shaped waste emplacement (awaits final vegetation)	15.5	15.5	15.5
ALL DISTURBED AREAS		122.6	113.9	175.6
C REHABILITATION PROGRESS*				
C1	Total Rehabilitated area (except for maintenance)	74.8	74.4	83.7
D: REHABILITATION ON SLOPES				
D1	10 to 18 degrees	18.9	18.9	18.9
D2	Greater than 18 degrees	18.4	18.4	18.4
D3	Less than 10 degrees	37.5	37.1	46.4
E: SURFACE OF REHABILITATED LAND				
E1	Pasture and grasses	73.3	72.9	80.2
E2	Native forest/ecosystems	1.5	1.5	3.5
E3	Plantations and crops	0	0	0
E4	Other (include non-vegetative outcomes)	0	0	0

\* Note – rehabilitation estimates are based on the current acceptable level of rehabilitation for an operating mine (i.e. cover crop establishment on amenity bund) and includes areas where rehabilitation is in progress, i.e. the completion criteria is not yet met. Final rehabilitation (i.e. infill of box cut, removal of amenity bund etc) will be calculated closer to mine closure.

**Table 18 – Maintenance Activities on Rehabilitated Land**

NATURE OF TREATMENT	Area Treated (ha)		Comment/control strategies/ treatment detail
	Reporting period	Next period	
<b>Additional erosion control works</b> (drains re-contouring, rock protection)	5	5	Establishment of sediment controls along access roads and construction of spoon drains.
<b>Re-covering</b> (detail – further topsoil, subsoil sealing etc)	Nil	Nil	
<b>Soil treatment</b> (detail – fertilizer, lime, gypsum etc)	Nil	Nil	
<b>Treatment/Management</b> (detail – grazing, cropping, slashing etc)	Nil	Nil	
<b>Re-seeding/Replanting</b> (detail – species density, season etc)	7	Nil	Cumulative total for life-of-mine.
<b>Adversely Affected by Weeds</b> (detail – type and treatment)	38	20	Cumulative total for life-of-mine. See Section 3.8. Weed control undertaken during the reporting period generally consisted of spot spraying areas for the target species.
<b>Feral animal control</b> (detail – additional fencing, trapping, baiting etc)	Nil*	Nil*	* See Section 3.20.1

### 5.2.3 Rehabilitation Monitoring and Performance

Internal rehabilitation/revegetation monitoring undertaken to date has primarily been limited to monthly inspections of roads/creeks impacted by subsidence, water management structures, soil stockpiles and seeded areas for evidence of instability/erosion or poor germination and borehole sealing. This process will continue over the life of the mine, with the extent and nature of activities undertaken being consistent with the relevant MOP, Extraction Plan, Landscape Management Plan and other relevant management plans prepared in satisfaction of Narrabri Mine's Project Approval. Refer to Section 3.8 for more information in relation to weed management undertaken onsite during the reporting period.

Rehabilitation resulting from the impacts of subsidence has been restricted to ploughing affected areas on the surface. Management measures for water ponding and the large trees that have been impacted by subsidence are being investigated as described in Section 3.16.2.2. Additional information will be provided in the next AEMR/Annual Review.

### 5.3 Other Infrastructure

The only other infrastructure decommissioned during the reporting period is gas drainage infrastructure which is then reused, where possible, in other areas of the mine. This involves the decommissioning of vertical production wells and associated pipelines.



## **5.4 Rehabilitation Trials and Research**

No rehabilitation trials or research were undertaken during the reporting period and none are planned for the next reporting period.

## **6 ACTIVITIES PROPOSED IN THE NEXT AEMR/ANNUAL REVIEW PERIOD**

### **6.1 CONTINUOUS IMPROVEMENT AND TARGET INITIATIVES**

#### **6.1.1 Objectives**

Narrabri Mine has an ongoing commitment to environmental management and aims to minimise any adverse impacts on the physical, biological, cultural and socio-economic environment in the immediate and surrounding areas.

Activities at site to date have been on the basis of minimising the extent of disturbance to the minimum extent possible, and rehabilitating those areas as soon as practicable.

#### **6.1.2 Achievements to Date**

Achievements at the mine in its sixth year have included:

- The continued implementation of a working environmental management program and the establishment of culture of environmental awareness / responsibility within all levels of the workforce;
- Routine implementation of all relevant aspects of the approved management plans;
- The ongoing establishment and maintenance of an open and honest relationship with the neighbours, community in general, regulatory authorities, Local Government and other groups such as the local Aboriginal community. Narrabri Mine recognises that it is part of the community and that its activities have the potential to create benefits which extend beyond the life of the mine. The isolated nature of complaints received to date is indicative of the success of this approach;
- Establishment of a Biodiversity Offset Strategy with implementation to commence in the following reporting period;
- Ongoing real-time monitoring in areas with the potential of increased impact. Three neighbouring properties monitored during the reporting period; and
- Effective rehabilitation of areas of disturbance.

## **6.2 Targets and Goals for 2014/2015**

Targets and goals for the 2014/2015 reporting period include:

- Maintenance of established groundcover and rehabilitation across areas of disturbance, i.e. 8.9 ha of rehabilitation as outlined on Plan 5 and ploughing/seeding of LW102;
- Continued improvement in noise management and amenity, including real time noise assessment;
- Continued community liaison, support and involvement / education in the mine's activities;
- Compliance with all relevant conditions of all leases, licences and consents;
- Update the relevant site management plans that are due for their 3-yearly review;
- Investigate and implement management measures for the impacts to large trees that have resulted from subsidence and review implications of this additional disturbance in reference to both the MOP and PA 08\_0144 MOD 2; and
- Implementation of the Biodiversity Offset Strategy and Management Plan that meets the requirements of DP&E, OEH and DoE.



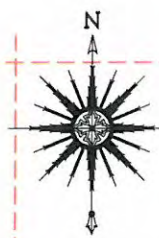
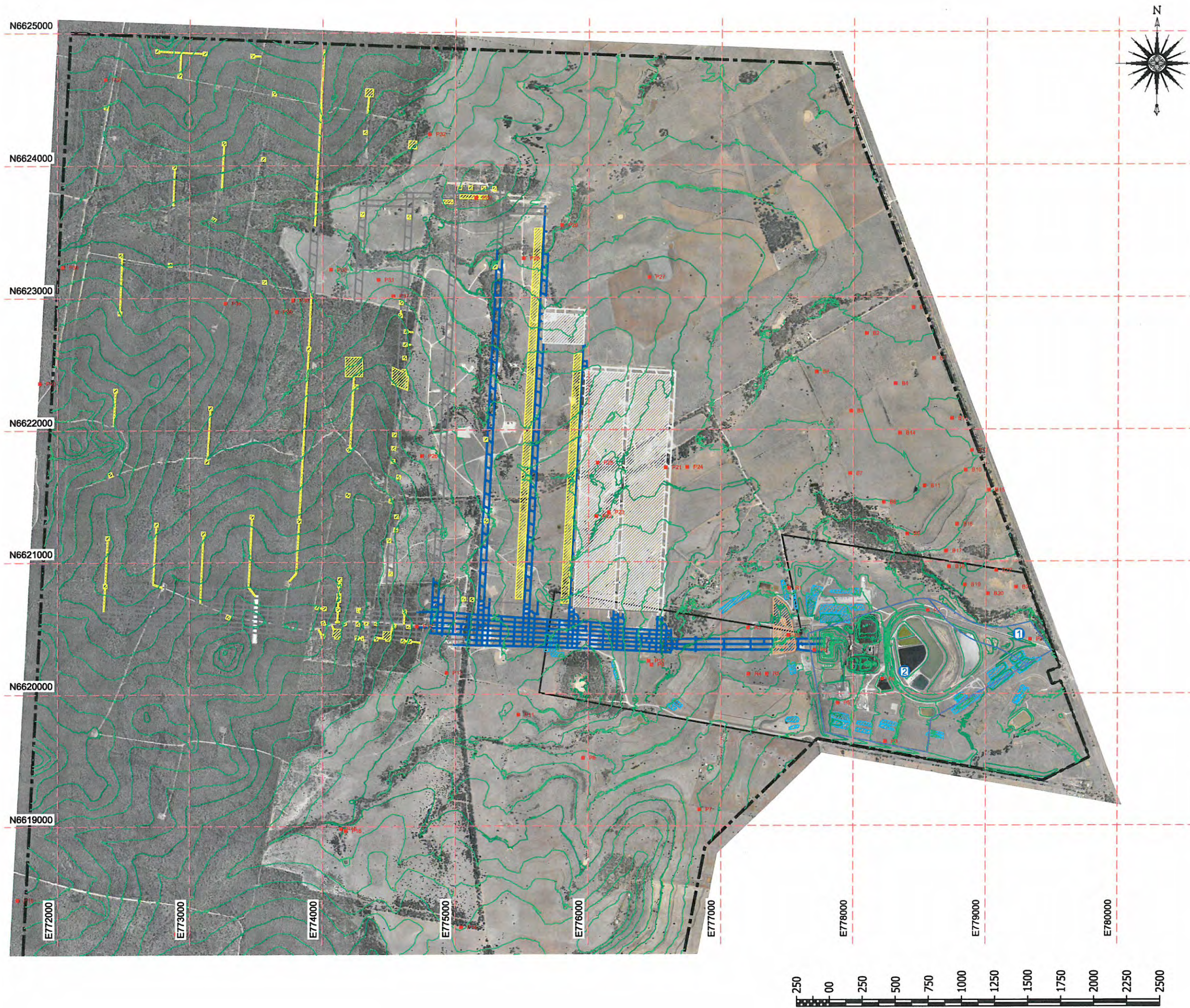
## Plans

AEMR Plan 3: Land Preparation Narrabri  
Mine

AEMR Plan 4: Mining and Rehabilitation  
Narrabri Mine

AEMR Plan 5: Proposed Rehabilitation  
Narrabri Mine





# NARRABRI MINE



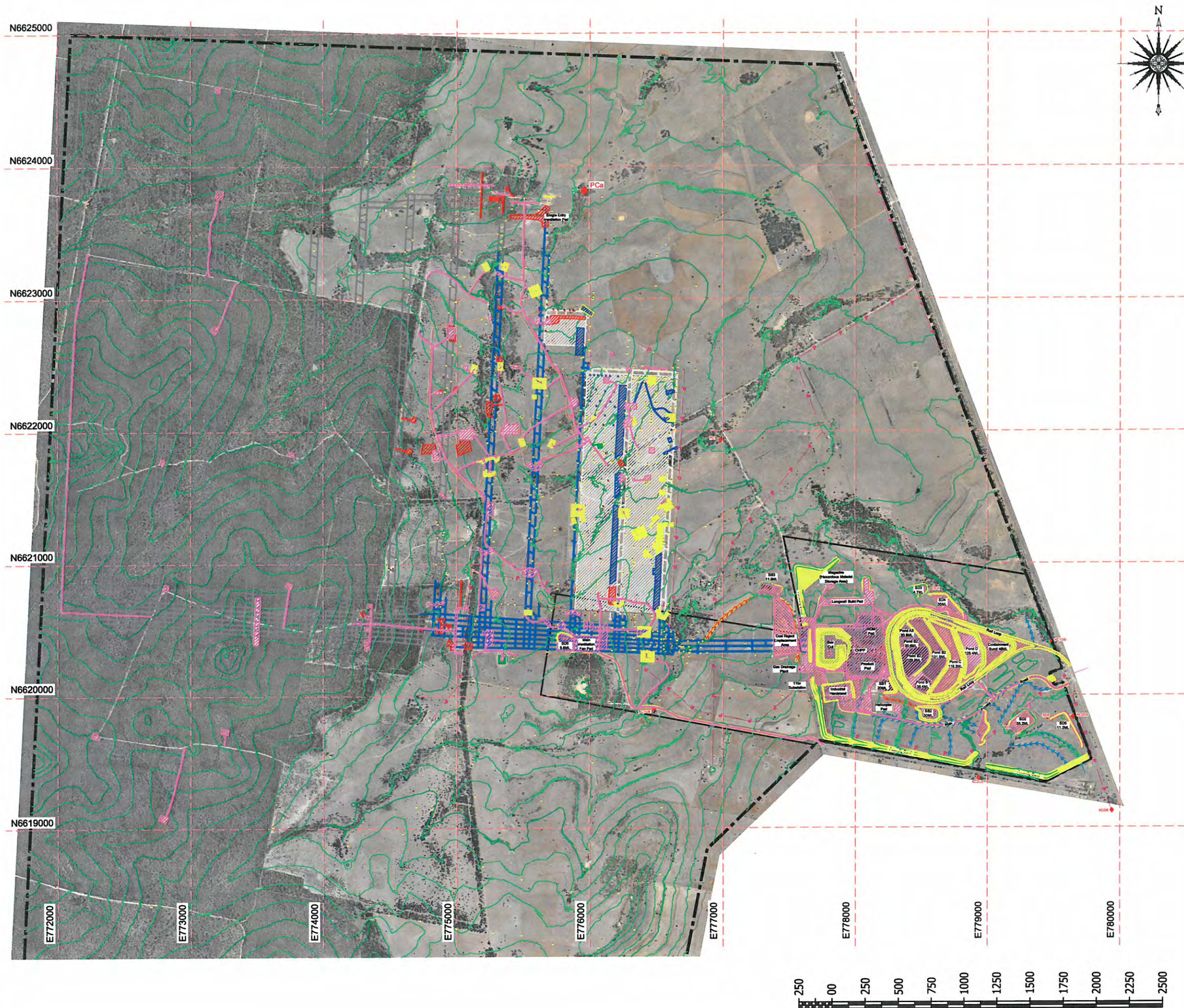
## LEGEND

- Soil Stripping Area Next AEMR Period
- Subsoil Stockpile
- Subsoil Stockpile
- Emplacement Area To Be Shaped
- Mining Lease Boundary & Colliery Holding Boundary
- Mining Surface Lease
- Soil Test Pit Site
- Soil Mapping Unit
- Soil Mapping Unit Boundary
- Minor Contour
- Major Contour
- As Mined Rib
- Goaf
- 15cm Topsoil Stripping Depth
- 25cm Subsoil Stripping Depth

## AEMR PLAN 3 PROPOSED LAND PREPARATION NARRABRI MINE

File Ref:	NC_AEMR(2013-14) - Plan 3
Surveyor:	David Ellwood
Signature:	
Date:	04/06/2014





# NARRABRI MINE

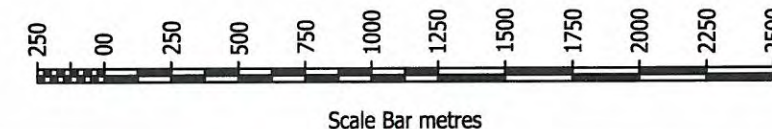


## LEGEND

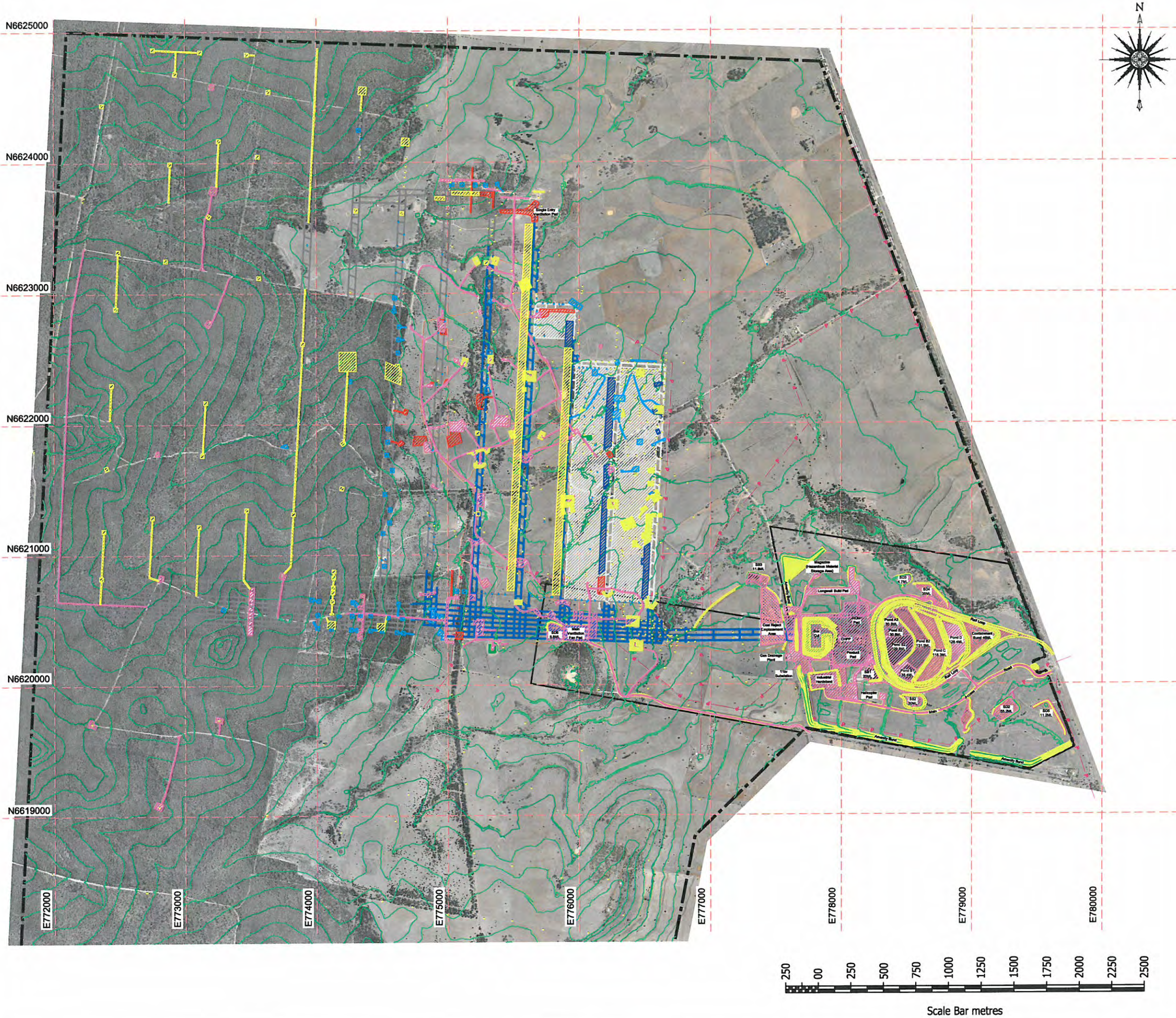
- Soil Stripping Area Prior to this AEMR
- Soil Stripping Area (2013/2014 AEMR)
- Rehab Area Prior to this AEMR. Less than 10 deg slope
- Rehab Area Prior to this AEMR. 10 to 18 deg slope
- Rehab Area Prior to this AEMR. Greater than 18 deg slope
- Rehab Area (2013/2014 AEMR) Less than 10 deg slope
- Rehab Area (2013/2014 AEMR) 10 to 18 deg slope
- Rehab in progress area (2013/2014 AEMR)
- Mining Lease Boundary & Colliery Holding Boundary
- Mining Surface Lease
- Sediment Water Pathway
- Dirty Water Pathway
- Sediment Water Containment
- Dirty Water Containment
- Power Line
- Gas Drainage Pipeline
- Water Monitoring Point
- Sediment Dam Runoff Monitoring
- Minor Contour
- Major Contour
- As Mined Rib
- Goaf

## AEMR PLAN 4 PROPOSED MINING ACTIVITIES NARRABRI MINE

File Ref:	NC_AEMR(2013-14) - Plan 4
Surveyor:	David Ellwood
Signature:	<i>D. Ellwood</i>
Date:	10/06/2014







# NARRABRI MINE



## LEGEND

- Soil Stripping Area Prior to this AEMR
- Soil Stripping Area (2013/2014 AEMR)
- Rehab Area Prior to this AEMR. Less then 10 deg slope
- Rehab Area Prior to this AEMR. 10 to 18 deg slope
- Rehab Area Prior to this AEMR. Greater then 18 deg slope
- Rehab Area (2013/2014 AEMR) Less the 10 deg slope
- Rehab Area (2013/2014 AEMR) 10 to 18 deg slope
- Rehab in progress area (2013/2014 AEMR)
- Area To Be Stripped Next AEMR Period
- Area To Be Rehabbed Next AEMR Period
- Mining Lease Boundary & Colliery Holding Boundary
- Mining Surface Lease
- Power Line
- Gas Drainage Pipeline
- Minor Contour
- Major Contour
- As Mined Rib
- Goaf

## AEMR PLAN 5 PROPOSED REHABILITATION NARRABRI MINE

File Ref:	NC_AEMR(2013-14) - Plan 5
Surveyor:	David Ellwood
Signature:	<i>D. Ellwood</i>
Date:	12/06/2014



## Appendix 1

ENVIRONMENT PROTECTION LICENCE  
12789

# Environment Protection Licence

Licence - 12789

## Licence Details

Number:	12789
Anniversary Date:	20-February

## Licensee

NARRABRI COAL OPERATIONS PTY LTD

LOCKED BAG 1002

NARRABRI NSW 2390

## Premises

NARRABRI COAL OPERATIONS

10 KURRAJONG CREEK ROAD

BAAN BAA NSW 2390

## Scheduled Activity

Coal Works

Mining for Coal

## Fee Based Activity

## Scale

Coal works	> 5000000 T handled
Mining for coal	> 5000000 T produced

## Region

North - Armidale

Ground Floor, NSW Govt Offices, 85 Faulkner Street

ARMIDALE NSW 2350

Phone: (02) 6773 7000

Fax: (02) 6772 2336

PO Box 494 ARMIDALE

NSW 2350

# Environment Protection Licence

Licence - 12789



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# Environment Protection Licence

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Licence - 12789



## Information about this licence

### Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

### Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

### Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

### Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

### Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

### Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

# Environment Protection Licence

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The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

### Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

### Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

### This licence is issued to:

NARRABRI COAL OPERATIONS PTY LTD
LOCKED BAG 1002
NARRABRI NSW 2390

subject to the conditions which follow.

# Environment Protection Licence

Licence - 12789



## 1 Administrative Conditions

### A1 What the licence authorises and regulates

- A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Coal Works	Coal works	> 5000000 T handled
Mining for Coal	Mining for coal	> 5000000 T produced

### A2 Premises or plant to which this licence applies

- A2.1 The licence applies to the following premises:

Premises Details
NARRABRI COAL OPERATIONS
10 KURRAJONG CREEK ROAD
BAAN BAA
NSW 2390
THE LAND APPROVED UNDER PROJECT APPROVAL 08_0144- INDICATED IN APPENDIX 1- SCHEDULE OF PROJECT LAND OF PROJECT APPROVAL 08_0144, DATED 26 JULY 2010 (DOC13/91155).

### A3 Information supplied to the EPA

- A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

- the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
- the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

# Environment Protection Licence

Licence - 12789



## 2 Discharges to Air and Water and Applications to Land

### P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

<i>Air</i>			
EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
3	Ambient Air Quality Monitoring		Monitoring point located at "Bow Hills" and labelled ND3 as shown on map titled "Current Non- Project Related Monitoring Locations- Narrabri Mine" dated 23 November 2011 sent to EPA on 24 November 2011 (DOC11/56033).
23		Gas Drainage Network	Pre- drainage and Goaf gas drainage network associated with the underground mining operations.

P1.2 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

P1.3 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

<i>Water and land</i>			
EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
11	Wet weather discharge Discharge water quality monitoring	Wet weather discharge Discharge water quality monitoring	Discharge point on northern side of mine boundary labelled as "SD4" on Figure titled "Wet Weather Discharge Monitoring Locations" provided with licence variation application dated 10 February 2009.
12	Wet weather discharge Discharge water quality monitoring	Wet weather discharge Discharge water quality monitoring	Discharge point on eastern side of mine boundary labelled as "SD5" on Figure titled "Wet Weather Discharge Monitoring Locations" provided with licence variation application dated 10 February 2009.
13	Wet weather discharge Discharge water quality monitoring	Wet weather discharge Discharge water quality monitoring	Discharge point on south eastern side of mine boundary labelled as "SD2" on Figure titled "Wet Weather Discharge Monitoring Locations" provided with licence variation application dated 10 February 2009.

# Environment Protection Licence

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14	Ambient Water Quality Monitoring		Upstream of mine discharge point on Kurrajong Creek Tributary 1 labelled as "KC1US" on Figure titled "Wet Weather Discharge Monitoring Locations" provided with licence variation application dated 10 February 2009.
15	Ambient Water Quality Monitoring		Downstream of mine discharge point on Kurrajong Creek Tributary 1 labelled as "KC1DS" on Figure titled "Wet Weather Discharge Monitoring Locations" provided with licence variation application dated 10 February 2009.
16	Ambient Water Quality Monitoring		Upstream of mine discharge point on Kurrajong Creek Tributary 2 labelled as "KC2US" on Figure titled "Wet Weather Discharge Monitoring Locations" provided with licence variation application dated 10 February 2009.
17	Ambient Water Quality Monitoring		Downstream of mine discharge point on Kurrajong Creek Tributary 2 labelled as "KC2DS" on Figure titled "Wet Weather Discharge Monitoring Locations" provided with licence variation application dated 10 February 2009.
18	Wet weather discharge Discharge water quality monitoring	Wet weather discharge Discharge water quality monitoring	Discharge point on western side of mine boundary labelled as "SD7" on figure titled "Figure 3- Discharge Location SD7" provided with licence variation application dated 2 September 2011 (DOC11/41455).
19	Ambient Water Quality Monitoring		Upstream location of Kurrajong Creek labelled as "KCUS" on figure titled "Figure 1: Surface Water Monitoring Locations" provided with licence variation application dated 2 September 2011 (DOC11/41455).
20	Ambient Water Quality Monitoring		Upstream location of Kurrajong Creek labelled as "KCDS" on figure titled "Figure 1: Surface Water Monitoring Locations" provided with licence variation application dated 2 September 2011 (DOC11/41455).
21	Ambient Water Quality Monitoring		Northern portion of mining area in Pine Creek labelled as "PCa" on figure titled "Current Environmental Monitoring Locations" provided by licence via email dated 20 October 2011 (DOC11/48204).

# Environment Protection Licence

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22	Ambient Water Quality Monitoring	Monitoring point in Pine Creek Tributary 1 labelled as "PC1" on figure titled "Figure 1: Surface Water Monitoring Locations" provided with licence variation application dated 2 September 2011 (DOC11/41455).
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- P1.4 The following point(s) in the table are identified in this licence for the purpose of the monitoring of weather parameters at the point.

EPA identification number	Type of Monitoring Point	Description of Location
W1	Weather analysis	Weather station identified as "Meteorological station" on map titled "Figure B Environmental Monitoring" submitted with the Final Statement of Commitments, dated June 2007.

## 3 Limit Conditions

### L1 Pollution of waters

- L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

### L2 Concentration limits

- L2.1 For each monitoring/discharge point or utilisation area specified in the table\>s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.
- L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.
- L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\>s.
- L2.4 Water and/or Land Concentration Limits

#### POINT 12,13,11,18

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
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# Environment Protection Licence

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Oil and Grease	milligrams per litre	-	-	-	10
pH	pH	-	-	-	6.5-8.5
Total suspended solids	milligrams per litre	-	-	-	50

L2.5 The Total Suspended Solids concentration limits specified for Points 11, 12, 13 and 18 may be exceeded for water discharged provided that:

- (a) the discharge occurs solely as a result of rainfall measured at the premises that exceeds 38.4 millimetres over any consecutive 5 day period immediately prior to the discharge occurring; and
- (b) all practical measures have been implemented to dewater all sediment dams within 5 days of rainfall such that they have sufficient capacity to store run off from a 38.4 millimetre, 5 day rainfall event.

Note: 38.4 mm equates to the 5 day 90%ile rainfall depth for Gunnedah sourced from Table 6.3a Managing Urban Stormwater: Soils and Construction Volume 1: 4th edition, March 2004.

## L3 Noise limits

L3.1 Noise generated at the premises must not exceed the noise limits in the table below.

Locality and Location	Day- LAeq (15 minute)	Evening- LAeq (15 minute)	Night- LAeq (15 minute)	Night- LA1 (1 minute)
All privately-owned residences	35	35	35	45

L3.2 For the purpose of the table above:

- a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- b) Evening is defined as the period from 6pm to 10pm;
- c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

## L3.3 Determining Compliance

To determine compliance:

- a) with the Leq(15 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located:
  - i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
  - ii) within 30 metres of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
  - iii) within approximately 50 metres of the boundary of a National Park or a Nature Reserve.

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- b) with the LA1(1 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located within 1 metre of a dwelling façade.
- c) with the noise limits in the Noise Limits table, the noise measurement equipment must be located:
  - i) at the most affected point at a location where there is no dwelling at the location; or
  - ii) at the most affected point within an area at a location prescribed by part (a) or part (b) of this condition.

- L3.4 The noise limits set out in the Noise Limits table apply under all meteorological conditions except for the following:
- a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
  - b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
  - c) Stability category G temperature inversion conditions.

For the purposes of this condition:

- a) Data recorded by the meteorological station identified as EPA Identification Point(s) W1 must be used to determine meteorological conditions; and
- b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

- L3.5 For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

## L4 Blasting

- L4.1 The overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L4.2 The overpressure level from blasting operations at the premises must not exceed 120dB (Lin Peak) at any time. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L4.3 The airblast overpressure level from blasting operations listed in Conditions L7.1 and L7.2 must not be exceeded at any point within 30 metres of any non-project related residential building or other noise sensitive location.
- L4.4 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5mm/sec for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L4.5 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10mm/sec at any time. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L4.6 The ground vibration peak particle velocity limits listed in Conditions L7.3 and L7.4 must not be exceeded at any point within 3.5 metres of any non-project related residential building or other noise sensitive



# Environment Protection Licence

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location.

L4.7 Blasting operations at the premises may only take place between 10:00am-4:00pm Monday to Friday. (Where compelling safety reasons exist, the Authority may permit a blast to occur outside the abovementioned hours. Prior written (or facsimile) notification of any such blast must be made to the Authority).

L4.8 Blasting at the premises is limited to:

- a) A maximum of two (2) blasts per day;
- b) Five (5) blasts a week, averaged over a twelve month period;

on each day on which blasting is permitted.

## 4 Operating Conditions

### O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

### O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

- a) must be maintained in a proper and efficient condition; and
- b) must be operated in a proper and efficient manner.

### O3 Dust

O3.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

## 5 Monitoring and Recording Conditions

### M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:

# Environment Protection Licence

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- a) in a legible form, or in a form that can readily be reduced to a legible form;
- b) kept for at least 4 years after the monitoring or event to which they relate took place; and
- c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:

- a) the date(s) on which the sample was taken;
- b) the time(s) at which the sample was collected;
- c) the point at which the sample was taken; and
- d) the name of the person who collected the sample.

## M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

### M2.2 Air Monitoring Requirements

#### POINT 3

Pollutant	Units of measure	Frequency	Sampling Method
Particulates - Deposited Matter	grams per square metre per month	Once a month (min. of 4 weeks)	AM-19

### M2.3 Water and/ or Land Monitoring Requirements

#### POINT 12,13,11,18

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Special Frequency 1	In situ
Oil and Grease	milligrams per litre	Special Frequency 1	Grab sample
pH	pH	Special Frequency 1	In situ
Total organic carbon	milligrams per litre	Special Frequency 1	Grab sample
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

#### POINT 14,17,16,15,19,20,21,22

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Special Frequency 2	In situ

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Oil and Grease	milligrams per litre	Special Frequency 2	Grab sample
pH	pH	Special Frequency 2	In situ
Total organic carbon	milligrams per litre	Special Frequency 2	Grab sample
Total suspended solids	milligrams per litre	Special Frequency 2	Grab sample

- M2.4 For the purposes of the table(s) above Special Frequency 1 means the collection of samples as soon as practicable after each discharge commences and in any case not more than 12 hours after each discharge commences.
- M2.5 For the purposes of the table(s) above Special Frequency 2 means the collection of samples quarterly (in the event of flow during the quarter) at a time when there is flow and as soon as practicable after each wet weather discharge from points 11, 12, 13 or 18 commences and in any case not more than 12 hours after each discharge commences.
- M2.6 Note: Groundwater monitoring has not been formally included in the licence. However, the licensee is required to undertake groundwater monitoring in accordance with the Department of Planning and Infrastructure approved "Stage 2 Water Management Plan" required under Schedule 4, condition 18 of the Project Approval (08\_0144) for the Stage 2 project. The results of this monitoring are required to be reported in the Annual Environmental Management Report (AEMR).

## M3 Testing methods - concentration limits

- M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
- any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
  - if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
  - if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.
- M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.
- Note: The *Protection of the Environment Operations (Clean Air) Regulation 2010* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".
- M3.3 *Clause 18 (1), (1A) and (2) of the Protection of the Environment Operations (General) Regulation 2009* requires that monitoring of actual loads of assessable pollutants listed in L2.2 must be carried out in accordance with the testing method set out in the relevant load calculation protocol for the fee-based activity classification listed in condition A1.1.

## M3.4 Noise Monitoring

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For each monitoring points specified below, the Licensee must monitor the noise parameter specified in Column 1. The Licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns.

POINTS: N1, N3, N5, N6, N7, and N8

Parameter	Units of measure	Frequency	Sampling Method
Ambient Noise	LAeq (15 minute) LAmax LA1 LA10 LA90 LAmin	Quarterly frequency of monitoring as detailed in the most recently approved "Noise Management Plan" for the premises.	As detailed in the most recently approved "Noise Management Plan" for the premises.

## M3.5 POINT: N10

Parameter	Units of Measure	Frequency	Sampling Method
Ambient noise	LAeq (15 minute) LAmax LA1 LA10 LA90 LAmin	Continuous real time noise monitoring as detailed in the most recently approved "Noise Management Plan" for the premises.	As detailed in the most recently approved "Noise Management Plan" for the premises.

## M3.6 For the purpose of this condition, the noise monitoring locations are described as:

EPA Identification No.	Description of Location
N1	Within 30m of the residence on property "Bow Hills"
N3	Within 30m of the residence on property "Naroo"
N5	Within 30m of the residence on property "Oakleigh"
N6	Within 30m of the residence on property "Newhaven"
N7	Within 30m of the residence on property "Belah Park"
N8	Within 30m of the residence on property "Haylin View"
N10	Portable monitor

M3.7 Note: Monitoring at N8 to commence when surface activities approach the eastern end of the southern longwall panels.

M3.8 Note: N10 is a portable monitor enabling the monitor to be relocated to areas of potential greatest impact. The licensee is responsible to ensure that it is located at the most suitable location.

## M4 Weather monitoring

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## M4.1 Requirement to monitor weather

For each monitoring point specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the parameter specified in Column 1. The licensee must use the sampling method, units of measure, averaging period and sample at the frequency, specified opposite in the other columns:

### POINT W1

Parameter	Units of Measure	Frequency	Averaging Period	Sampling Method
Rainfall	mm	Continuous	1 hour	AM-4
Wind speed @ 10 metres	m/s	Continuous	15 minute	AM-2 & AM-4
Wind direction @ 10 metres	°	Continuous	15 minute	AM-2 & AM-4
Temperature @ 2 metres	°C	Continuous	15 minute	AM-4
Temperature @ 10 metres	°C	Continuous	15 minute	AM-4
Sigma theta @ 10 metres	°	Continuous	15 minute	AM-2 & AM-4
Solar radiation	W/m2	Continuous	15 minute	AM-4
Additional requirements - siting - measurement				AM-1 & AM-4 AM-2 & AM-4

## M5 Recording of pollution complaints

M5.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M5.2 The record must include details of the following:

- the date and time of the complaint;
- the method by which the complaint was made;
- any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- the nature of the complaint;
- the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
- if no action was taken by the licensee, the reasons why no action was taken.

M5.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M5.4 The record must be produced to any authorised officer of the EPA who asks to see them.

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## **M6 Telephone complaints line**

- M6.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.
- M6.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.
- M6.3 The preceding two conditions do not apply until 3 months after:
- a) the date of the issue of this licence or
  - b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

## **M7 Other monitoring and recording conditions**

- M7.1 To assess compliance with the noise limits presented in the Noise Limits table, attended noise monitoring must be undertaken in accordance with the condition titled Determining Compliance, outlined above, and:
- a) at each one of the locations listed in the Noise Limits table;
  - b) occur quarterly in a reporting period;
  - c) occur during each day, evening and night period as defined in the NSW Industrial Noise Policy for a minimum of:
    - i) 1.5 hours during the day;
    - ii) 30 minutes during the evening; and
    - iii) 1 hour during the night.
  - d) occur for three consecutive operating days.

## **6 Reporting Conditions**

### **R1 Annual return documents**

- R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
- a) a Statement of Compliance; and
  - b) a Monitoring and Complaints Summary.
- At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.
- R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.
- R1.3 Where this licence is transferred from the licensee to a new licensee:
- a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
  - b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

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- R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
- a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
  - b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.
- R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').
- R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.
- R1.7 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
- a) the licence holder; or
  - b) by a person approved in writing by the EPA to sign on behalf of the licence holder.
- R1.8 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

## R2 Notification of environmental harm

- R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.
- R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

## R3 Written report

- R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
- a) where this licence applies to premises, an event has occurred at the premises; or
  - b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
- and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written

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report of the event.

- R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.
- R3.3 The request may require a report which includes any or all of the following information:
- a) the cause, time and duration of the event;
  - b) the type, volume and concentration of every pollutant discharged as a result of the event;
  - c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
  - d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
  - e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
  - f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
  - g) any other relevant matters.
- R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

## **R4 Other reporting conditions**

- R4.1 A noise compliance assessment report must be submitted to the EPA within thirty (30) days of the completion of the quarterly noise monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:
- a) an assessment of compliance with noise limits detailed in the limit conditions of this licence; and
  - b) an outline of any management actions taken within the monitoring period to address any exceedences of the limits detailed in the limit conditions of this licence.

## **7 General Conditions**

### **G1 Copy of licence kept at the premises or plant**

- G1.1 A copy of this licence must be kept at the premises to which the licence applies.
- G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.
- G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

## **8 Pollution Studies and Reduction Programs**



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## U1 Implementation of Practical BMP

U1.1 The licensee must investigate the following options for dust mitigation and report on their effectiveness by the due date in the Table below:

Dust Mitigation Measure	Due Date
Install shrouding around Radiator Fan and Blade on Dozers on Stockpiles.	31 December 2013
Install Water Sprays on Dozer Trafficking Areas around ROM and Product Stockpiles.	31 December 2013
Trial of variable Coal flow options to minimise thermal coal exposure to wind.	28 February 2014
Review of chute shape and cover, and application of spray ring at discharge point.	28 February 2014

## U2 Development and Implementation of Air Quality Control Protocols for use during Adverse Weather conditions

U2.1 The licensee must develop and implement an Air Quality Control Protocol (AQCP) to reduce coal dust emissions from coal stockpiles during adverse weather conditions. The AQCP must include reactive/predictive tools that can be used to determine appropriate site operational management procedures applicable to coal stockpiles, designed to minimise dust emissions during adverse weather conditions.

U2.2 The AQCP must include a monitoring program that provides detail on the following:

- The parameters to be monitored
- The methods to be used to monitor each parameter
- The location and frequency at which each parameter will be monitored
- A means of documenting and maintaining monitoring data
- Justification for each parameter selected and the development of key performance indicators to demonstrate the level of control efficiency achieved in respect of the best management practice measures documented in the Katestone (June 2011) report.

As a guide the EPA expects that the monitoring program would include the following parameters:

- Wind speed and direction.
- Temperature
- Evaporation rates
- Solar radiation
- Ambient air quality monitoring of TSP and PM10
- ROM and product coal moisture levels
- Water spray cycling time
- Water spray operation, including modified spray cycles to manage winds from different directions.
- Water spray application rates
- Stockpile shape, height and orientation
- Visual cues

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**Note:** Other parameters may be nominated and the licensee should select those parameters which adequately support its nominated key performance indicators.

U2.3 The AQCP must determine appropriate response mechanisms to minimise dust emissions based on monitoring data such as:

- cessation or modification of mobile plant operating on coal stockpiles;
- trigger levels for activation of fixed and/or mobile water spray systems;
- trigger levels for increased frequency of wetting cycles and/or increased water application rates;
- trigger levels for application of chemical dust suppressants where feasible and practical.

U2.4 The AQCP must be submitted by the licensee to the Environment Protection Authority, Regional Manager Armidale by 29 November 2013.

**Note:** The EPA intends to require the licensee to implement the Monitoring Program.

## 9 Special Conditions

### E1 Quality assurance and verification report

E1.1 Prior to the commissioning of the Brine Storage Ponds (approved per Stage 2 Development Consent 08\_0144), the licensee must provide the EPA Armidale office with an "as constructed" report, produced by an experienced and qualified engineer. The report must include detailed design plans for the ponds and illustrate the use of low permeability layers to manage mine waters generated by the project. The report also must include a detailed Quality Assurance/Quality Control program that was used throughout the construction of the ponds.

### E2 Noise Impacts

E2.1 Noise impacts where wind speed exceeds 3 metres per second at 10 metres above the ground must be addressed by:

- a) documenting noise complaints received to identify any higher level of impacts or wind patterns;

where levels of noise complaints indicated a higher level of impact then actions to quantify and ameliorate any enhanced impacts where wind speed exceeds 3 metres per second at 10 metres above the ground should be developed and implemented.

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## Dictionary

### General Dictionary

<b>3DGM [in relation to a concentration limit]</b>	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
<b>Act</b>	Means the Protection of the Environment Operations Act 1997
<b>activity</b>	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
<b>actual load</b>	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
<b>AM</b>	Together with a number, means an ambient air monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
<b>AMG</b>	Australian Map Grid
<b>anniversary date</b>	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
<b>annual return</b>	Is defined in R1.1
<b>Approved Methods Publication</b>	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
<b>assessable pollutants</b>	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
<b>BOD</b>	Means biochemical oxygen demand
<b>CEM</b>	Together with a number, means a continuous emission monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
<b>COD</b>	Means chemical oxygen demand
<b>composite sample</b>	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
<b>cond.</b>	Means conductivity
<b>environment</b>	Has the same meaning as in the Protection of the Environment Operations Act 1997
<b>environment protection legislation</b>	Has the same meaning as in the Protection of the Environment Administration Act 1991
<b>EPA</b>	Means Environment Protection Authority of New South Wales.
<b>fee-based activity classification</b>	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
<b>general solid waste (non-putrescible)</b>	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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<b>flow weighted composite sample</b>	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
<b>general solid waste (putrescible)</b>	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
<b>grab sample</b>	Means a single sample taken at a point at a single time
<b>hazardous waste</b>	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
<b>licensee</b>	Means the licence holder described at the front of this licence
<b>load calculation protocol</b>	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
<b>local authority</b>	Has the same meaning as in the Protection of the Environment Operations Act 1997
<b>material harm</b>	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
<b>MBAS</b>	Means methylene blue active substances
<b>Minister</b>	Means the Minister administering the Protection of the Environment Operations Act 1997
<b>mobile plant</b>	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
<b>motor vehicle</b>	Has the same meaning as in the Protection of the Environment Operations Act 1997
<b>O&amp;G</b>	Means oil and grease
<b>percentile [in relation to a concentration limit of a sample]</b>	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
<b>plant</b>	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
<b>pollution of waters [or water pollution]</b>	Has the same meaning as in the Protection of the Environment Operations Act 1997
<b>premises</b>	Means the premises described in condition A2.1
<b>public authority</b>	Has the same meaning as in the Protection of the Environment Operations Act 1997
<b>regional office</b>	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
<b>reporting period</b>	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
<b>restricted solid waste</b>	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
<b>scheduled activity</b>	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
<b>special waste</b>	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
<b>TM</b>	Together with a number, means a test method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .

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<b>TSP</b>	Means total suspended particles
<b>TSS</b>	Means total suspended solids
<b>Type 1 substance</b>	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
<b>Type 2 substance</b>	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
<b>utilisation area</b>	Means any area shown as a utilisation area on a map submitted with the application for this licence
<b>waste</b>	Has the same meaning as in the Protection of the Environment Operations Act 1997
<b>waste type</b>	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non - putrescible), special waste or hazardous waste

Mr Robert O'Hern

Environment Protection Authority

(By Delegation)

Date of this edition: 20-February-2008

## End Notes

- 1 Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
- 2 Licence varied by notice 1100826, issued on 18-Aug-2009, which came into effect on 18-Aug-2009.
- 3 Licence varied by notice 1126956, issued on 13-Jul-2011, which came into effect on 13-Jul-2011.
- 4 Licence varied by notice 1502129 issued on 20-Dec-2011
- 5 Licence transferred through application 1506423 approved on 29-May-2012 , which came into effect on 31-May-2012
- 6 Licence varied by notice 1506890 issued on 19-Jun-2012
- 7 Licence varied by notice 1516738 issued on 03-Oct-2013
- 8 Licence varied by notice 1518352 issued on 05-Feb-2014

## Appendix 2

PA 08\_0144 MOD 2

# Project Approval

## Section 75J of the *Environmental Planning and Assessment Act 1979*

I approve the project referred to in schedule 1, subject to the conditions in schedules 2 to 7.

These conditions are required to:

- prevent, minimise and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.

Richard Pearson  
**Deputy Director-General, DASP**  
**as delegate for the Minister for Planning**

Sydney

2010

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### SCHEDULE 1

<b>Application No:</b>	08_0144
<b>Proponent:</b>	Narrabri Coal Operations Pty Limited
<b>Approval Authority:</b>	Minister for Planning
<b>Land:</b>	See Appendix 1
<b>Project:</b>	Narrabri Coal Project – Stage 2

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March 2011 modification in blue text  
December 2011 modification in red text



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## DEFINITIONS

<a href="#">Annual Review</a>	<a href="#">The review required by Condition 6 of Schedule 6</a>
Approved mine plan	The mine plan depicted in Figures 1 and 3 of Appendix 2
BCA	Building Code of Australia
Brine	Very salty water
Built features	Includes any building or work erected or constructed on land, and includes dwellings and infrastructure such as any formed road, any pipeline, water sewer, telephone, gas or other service main and communication towers
CCC	Community Consultative Committee
CMA	Catchment Management Authority
Conditions of this approval	Conditions contained in schedules 2 to 7 inclusive
Construction	The demolition of buildings or works, carrying out of works and erection of buildings covered by this approval
CPI	Consumer Price Index, as published by the Australian Bureau of Statistics
Day	The period from 7 am to 6 pm on Monday to Saturday, and 8 am to 6 pm on Sundays and Public Holidays
DECCW	Department of Environment, Climate Change and Water
Department	Department of Planning
Director-General	Director-General of the Department, or delegate
Dispute resolution process	The independent dispute resolution process as described in Appendix 5
EA	Environmental Assessment prepared for Narrabri Coal Pty Limited entitled <i>Stage 2 Narrabri Coal Project Environmental Assessment and Specialist Consultant Studies Compendium</i> , Volumes 1&2 (October 2009), including the <i>Response to Public and Government Agency Submissions</i> (May 2010)
Environmental consequences	The environmental consequences of subsidence impacts, including: damage to built features; loss of surface flows to the subsurface; loss of standing pools; adverse water quality impacts; development of iron bacterial mats; cliff falls; rock falls; damage to Aboriginal heritage sites; impacts to aquatic ecology; ponding
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPL	Environment Protection Licence issued under the POEO Act
Evening	The period from 6 pm to 10 pm
Feasible	Feasible relates to engineering considerations and what is practical to build
First workings	Development of the main headings and gate roads to establish access to the coal in the mining area
GSC	Gunnedah Shire Council
I&I NSW	Industry and Investment NSW
Incident	A set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits of performance measures/criteria in this approval
km	Kilometre
Land	In general, the definition of land is consistent with the definition in the EP&A Act. However, in relation to the noise and air quality conditions in Schedule 4 it means the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval
Material harm to the environment	Harm to the environment is material if it involves actual or potential harm to the health or safety of human beings or ecosystems that is not trivial
<a href="#">MSB</a>	<a href="#">Mine Subsidence Board</a>
Mining area	The area outlined by a dashed purple line on the figures in Appendix 2
Mining operations	The extraction, processing and transportation of coal on the site, including the formation of mine access drifts and associated surface infrastructure such as gas and water drainage facilities
Minister	Minister for Planning, or delegate
Mitigation	Activities associated with reducing the impacts of the project
Mtpa	Million tonnes per annum
Negligible	Small and unimportant, such as not worth considering
Night	The period from 10 pm to 7 am on Monday to Saturday, and 10 pm to 8 am on Sundays and Public Holidays
NOW	DECCW's NSW Office of Water

NSC	Narrabri Shire Council
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
Privately-owned land	Land that is not owned by a public agency, or a mining company (or its subsidiary)
Project	The Stage 2 Narrabri Coal Project described in the EA
Proponent	Narrabri Coal Operations Pty Limited or any other person or persons who rely on this approval to carry out the project that is subject to this approval
Raffinate	Good quality water produced by a water conditioning plant, lower in salinity than the water fed to the plant. The "waste" produced by the plant is brine.
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Reasonable costs	The costs agreed between the Department and the Proponent for obtaining independent experts to review the adequacy of any aspects of the extraction plan, or where such costs cannot be agreed, the costs determined by the Dispute Resolution Process
Rehabilitation	The treatment or management of land disturbed by the project for the purpose of establishing a safe, stable and non-polluting environment <a href="#">including the remediation of impacts</a>
Remediation	Activities associated with partially or fully repairing or rehabilitating the impacts of the project or controlling the environmental consequences of this impact
ROM	Run-of-mine
RTA	Roads and Traffic Authority
Second workings	Extraction of coal from longwall panels, mini-wall panels or pillar extraction
Site	All the land to which the project application applies, comprising the mining area and surface facilities area, as listed in Appendix 1 and shown in Appendix 2
<a href="#">Safe, serviceable &amp; repairable</a>	<a href="#">Safe means no danger to users who are present, serviceable means available for its intended use, and repairable means damaged components can be repaired economically</a>
Stage 1 Approval	The project approval granted by the Minister Planning for the Narrabri Coal Project, dated 14 November 2007
Stage 2 Approval	This project approval, for Stage 2 of the Narrabri Coal Project which includes the introduction of longwall mining operations and increasing ROM coal production to 8.0 Mtpa
Statement of Commitments	The Proponent's revised commitments in Appendix 3, dated May 2010
Steep slopes	An area of land having a natural gradient of between 33° and 66°
Subsidence	The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts
Subsidence effects	Deformation of the ground mass due to mining, including all mining-induced ground movements, <a href="#">such as</a> vertical and horizontal displacement, tilt, strain and curvature
Subsidence impacts	Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised buckling of strata caused by valley closure and upsidence and surface depressions or troughs

## SCHEDULE 2 ADMINISTRATIVE CONDITIONS

### OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. The Proponent shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.

### TERMS OF APPROVAL

2. The Proponent shall carry out the project generally in accordance with the:
  - (a) EA;
  - (b) statement of commitments (see Appendix 3);
  - (c) the modification application 08\_0144 MOD 1 and accompanying letter prepared by Narrabri Coal Operations Pty Limited;
  - (d) the modification application 08\_0144 MOD 2 and accompanying letter prepared by Narrabri Coal Operations Pty Limited; and
  - (e) conditions of this approval.

*Note: The general layout of the project is shown in Figures 1 to 3 of Appendix 2.*

3. If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.
4. The Proponent shall comply with any reasonable and feasible requirements of the Director-General arising from the Department's assessment of:
  - (a) any reports, plans, programs, strategies or correspondence that are submitted in accordance with the conditions of this approval; and
  - (b) the implementation of any actions or measures contained in these reports, plans, programs, strategies or correspondence.

### LIMITS ON APPROVAL

5. The Proponent may undertake mining operations on the site for 21 years from the date of this approval.

*Note: Under this Approval, the Proponent is required to rehabilitate the site and to perform additional undertakings to the satisfaction of the Director-General. Consequently, this approval will continue to apply in all other respects other than the right to conduct mining operations until the site has been rehabilitated to a satisfactory standard.*

6. The Proponent shall not extract more than 8.0 million tonnes of ROM coal from the site per calendar year.
7. The Proponent shall transport all coal from the site by rail.
- 7A The Proponent may undertake a one off transport of coal by road of an approximate 600 tonne bulk sample of coal in accordance with the procedures, vehicle traffic route and transport operating hours as specified in the modification application 08\_0144 MOD 2 and accompanying letter dated 12 December 2011 from Whitehaven Coal Mining Limited.
8. The Proponent shall not transport any coal reject from the site.

### PLANNING AGREEMENTS

9. Within 6 months of this approval, the Proponent shall enter into planning agreements with Narrabri Shire Council (NSC), Gunnedah Shire Council (GSC) and the Minister in accordance with:
  - (a) Division 6 of Part 4 of the EP&A Act; and
  - (b) the terms of the Proponent's offers accepted at NSC's meeting of 16 February 2010, and GSC's meeting of 16 February 2010, which includes the matters set out in Appendix 4.

If there is any dispute between the Proponent and either NSC or GSC during the formal drafting of the planning agreements, then any of the parties involved may refer the matter to the Director-General for resolution.

## **SURRENDER OF STAGE 1 APPROVAL**

10. Within 12 months of the date of this approval, the Proponent shall surrender its previous project approval for the Narrabri Coal Mine to the satisfaction of the Director-General, in accordance with section 75YA of the EP&A Act. Prior to the surrender of the Stage 1 approval, if there is any inconsistency between the Stage 1 and Stage 2 approvals, the conditions of the Stage 2 approval shall prevail to the extent of any inconsistency.

## **MANAGEMENT PLANS / MONITORING PROGRAMS**

11. With the approval of the Director-General, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis.

*Note: The conditions of this approval require certain strategies, plans, and programs to be prepared for the project. They also require these documents to be reviewed and audited on a regular basis to ensure they remain effective. However, in some instances, it will not be necessary or practicable to prepare these documents for the whole project at any one time, particularly as these documents are intended to be dynamic and improved over time. Consequently, the documents may be prepared and implemented on a progressive basis, subject to the conditions of this approval. In doing this however, the Proponent will need to demonstrate that it has suitable documents in place to manage the existing operations of the project.*

12. Stage 1 strategies, plans or programs continue to have effect until replaced by an equivalent approved strategy, plan or program prepared and approved under this approval.

## **STRUCTURAL ADEQUACY**

13. The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

*Notes:*

- *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works.*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*

## **DEMOLITION**

14. The Proponent shall ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

## **OPERATION OF PLANT AND EQUIPMENT**

15. The Proponent shall ensure that all plant and equipment used on site is:
  - (a) maintained in a proper and efficient condition; and
  - (b) operated in a proper and efficient manner.

### SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS – MINING AREA

*Note: These conditions should be read in conjunction with section 5 of the revised Statement of Commitments.*

#### SUBSIDENCE IMPACT PERFORMANCE MEASURES

- The Proponent shall ensure that mine subsidence does not cause any exceedances of the performance measures in Table 1.

*Table 1: Subsidence Impact Performance Measures*

<b>Water Resources</b>	
Great Artesian Basin	The Proponent shall ensure that, within 5 years of the date of this approval, any loss of water flow into the Great Artesian Basin aquifers (equal to the maximum predicted impact, or the measured impact of the project, whichever is the greater), is managed, licensed or offset (including the possibility of injection of raffinate) to the satisfaction of NOW.
<b>Biodiversity</b>	
Flora and Fauna	The Proponent shall ensure that clearing and disturbance of vegetation above the mining area is minimised, to the satisfaction of the Director-General.

*Note: The Proponent may be required to define other performance measures and performance indicators in management plans required under this approval (see eg condition 3 below).*

#### Performance Measures – Built Features

- The Proponent shall ensure that the project does not cause any exceedances of the performance measures in Table 2, to the satisfaction of the Director-General of I&I NSW.

*Table 2: Subsidence Impact Performance Measures*

<b>Built Features</b>	
All built features	Always safe. Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.
<b>Public Safety</b>	
Public Safety	No additional risk

**Notes:**

- The Proponent will be required to define more detailed performance indicators for each of these performance measures in Built Features Management Plans or Public Safety Management Plan (see condition 4 below).
  - Requirements regarding safety or serviceability do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.
  - Compensation required under this condition includes any compensation payable under the Mine Subsidence Compensation Act 1961 and/or the Mining Act 1992.
- Any dispute between the Proponent and the owner of any built feature over the interpretation, application or implementation of the performance measures in Table 2 is to be settled by the Director-General of I&I NSW. The Director-General of I&I NSW may seek the advice of the MSB on the matter. Any decision by the Director-General of I&I NSW shall be final and not subject to further dispute resolution under this approval.

#### Extraction Plan

- The Proponent shall prepare and implement Extraction Plans for any second workings to be mined to the satisfaction of the Director-General. Each Extraction Plan must:
  - be prepared by a team of suitably qualified and experienced persons whose appointment has been endorsed by the Director-General;

- (b) be approved by the Director-General before the Proponent carries out any of the second workings covered by the plan;
- (c) include detailed plans of the proposed first and second workings and any associated surface development;
- (d) include detailed performance indicators for each of the performance measures in Tables 1 and 2;
- (e) provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this approval;
- (f) describe the measures that would be implemented to ensure compliance with the performance measures in Tables 1 and 2, and manage or remediate any impacts and/or environmental consequences;
- (g) include the following to the satisfaction of I&I NSW:
  - a Coal Resource Recovery Plan that demonstrates effective recovery of the available resource;
  - a Subsidence Monitoring Program to:
    - provide data to assist with the management of the risks associated with subsidence;
    - validate the subsidence predictions; and
    - analyse the relationship between the subsidence effects and impacts under the plan and any ensuing environmental consequences;
  - a Built Features Management Plan to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which:
    - addresses in appropriate detail all items of public infrastructure and all classes of other built features; and
    - has been prepared following appropriate consultation with the owner/s of potentially affected feature/s;
  - a Public Safety Management Plan to ensure public safety in the mining area; and
  - appropriate revisions to the Landscape Management Plan required under condition 3 of Schedule 5; and
- (h) include a:
  - Water Management Plan, which has been prepared in consultation with DECCW and NOW, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on surface water resources, groundwater resources and flooding, and which includes:
    - surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality;
    - a program to monitor and report groundwater inflows to underground workings; and
    - a program to manage and monitor impacts on groundwater bores on privately-owned land;
  - Biodiversity Management Plan, which has been prepared in consultation with DECCW and I&I NSW, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on flora and fauna;
  - Land Management Plan, which has been prepared in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general;
  - Heritage Management Plan, which has been prepared in consultation with DECCW and relevant stakeholders for Aboriginal heritage, to manage the potential environmental consequences of the proposed second workings on heritage sites or values; and
- (i) include a program to collect sufficient baseline data for future Extraction Plans.

*Notes:*

*Management plans prepared under condition 4(h) should address all potential impacts of proposed underground coal extraction on the relevant features. Other similar management plans required under this approval (eg under conditions 13 and 23 of schedule 4 or condition 3 of schedule 5) are not required to duplicate these plans or to otherwise address the impacts associated with underground coal extraction.*

5. The Proponent shall ensure that the management plans required under condition 4(h) above include:
  - (a) an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval;
  - (b) a detailed description of the measures that would be implemented to remediate predicted impacts; and
  - (c) a contingency plan that expressly provides for adaptive management.



### **First Workings**

6. The Proponent may carry out first workings within the underground mining area, other than in accordance with an approved extraction plan, provided that I&I NSW is satisfied that the first workings are designed to remain stable and non-subsiding in the long-term, except insofar as they may be impacted by approved second workings.

*Note: The intent of this condition is not to require an additional approval for first workings, but to ensure that first workings are built to geotechnical and engineering standards sufficient to ensure long- term stability, with negligible resulting direct subsidence impacts.*

### **Payment of Reasonable Costs**

7. The Proponent shall pay all reasonable costs incurred by the Department to engage independent experts to review the adequacy of any aspect of an Extraction Plan.

## SCHEDULE 4

### SPECIFIC ENVIRONMENTAL CONDITIONS – SURFACE FACILITIES AREA AND GENERAL

#### NOISE

*Note: These conditions should be read in conjunction with section 10 of the revised Statement of Commitments.*

#### Impact Assessment Criteria

- The Proponent shall ensure that the noise generated by the project does not exceed the levels set out in Table 1 at any privately-owned residence.

*Table 1: Impact assessment criteria dB(A)*

Location	Day $L_{Aeq}(15 \text{ minute})$	Evening $L_{Aeq}(15 \text{ minute})$	Night	
			$L_{Aeq}(15 \text{ minute})$	$L_{A1}(1 \text{ minute})$
All privately-owned residences	35	35	35	45

**Notes:**

- To determine compliance with the  $L_{Aeq}(15 \text{ minute})$  limit, noise from the project is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECCW may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.
- These noise limits apply to applicable receivers under all meteorological conditions except for any one of the following:
  - wind speeds greater than 3 metres/second at 10 metres above ground level; or
  - temperature inversions of 1.5 - 4°C/100 metres and a source-to-receiver wind speed greater than 2 metres/second at 10 metres above ground level; or
  - temperature inversions of greater than 4°C/100 metres.
- The meteorological data to be used for determining meteorological conditions are the data recorded by the meteorological weather station to be determined in consultation with the DECCW.
- To determine compliance with the  $L_{A1}(1 \text{ minute})$  noise limits, noise from the project is to be measured at 1 metre from the dwelling façade. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECCW may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy).
- These limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

#### Noise Acquisition Criteria

- If the noise generated by the project exceeds the criteria in Table 2 at any residence on privately-owned land, or on more than 25% of any privately-owned land, then the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 5-7 of schedule 7.

*Table 2: Noise acquisition criteria dB(A)*

Location	Day $L_{Aeq}(15 \text{ minute})$	Evening $L_{Aeq}(15 \text{ minute})$	Night $L_{Aeq}(15 \text{ minute})$
All privately-owned residences	40	40	40

*Note: Noise generated by the project is to be measured in accordance with the notes presented below Table 1. For this condition to apply, the exceedances of the criteria must be systemic.*

### Additional Noise Mitigation Measures

3. If the noise generated by the project is equal to or exceeds the criteria in Table 3 at any residence on privately-owned land, then the Proponent shall, upon receiving a written request from the landowner, implement reasonable and feasible noise mitigation measures (such as double-glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner. If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

Table 3: Additional noise mitigation criteria

Location	Day L <sub>Aeq</sub> (15 minute)	Evening L <sub>Aeq</sub> (15 minute)	Night L <sub>Aeq</sub> (15 minute)
All privately-owned residences	38	38	38

Note: Noise generated by the project is to be measured in accordance with the notes presented below Table 1. For this condition to apply, the exceedances of the criteria must be systemic.

### Noise Management Plan

4. The Proponent shall revise the Noise Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with noise management (Stages 1 and 2) and subsequently implement this revised version of the Noise Management Plan to the satisfaction of the Director-General. This Plan shall:
- (a) be prepared in consultation with DECCW by a suitably qualified expert whose appointment has been approved by the Director-General;
  - (b) be submitted to the Director-General for approval by 30 June 2011;
  - (c) include a Noise Monitoring Program incorporating:
    - real-time noise and temperature inversion monitoring; and
    - attended noise monitoringto monitor the performance of the project;
  - (d) include reactive noise control measures to manage noise impacts for sensitive receivers; and
  - (e) include a protocol to establish whether the project is complying with the noise impact assessment criteria in Table 1.

### Continuous Improvement

5. The Proponent shall:
- (a) implement all reasonable and feasible best practice noise mitigation measures;
  - (b) investigate ways to reduce the noise generated by the project, including off-site road and rail noise and maximum noise levels which may result in sleep disturbance; and
  - (c) report on these investigations and the implementation and effectiveness of these measures in the [Annual Review](#), to the satisfaction of the Director-General.

### AIR QUALITY

Note: These conditions should be read in conjunction with section 11 of the revised Statement of Commitments.

### Impact Assessment Criteria

6. The Proponent shall ensure that dust emissions generated by the project do not cause additional exceedances of the criteria listed in Tables 4 to 6 at any residence on privately-owned land, or on more than 25 percent of any privately-owned land.

Table 4: Long term impact assessment criteria for particulate matter

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m <sup>3</sup>
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	30 µg/m <sup>3</sup>

Table 5: Short term impact assessment criteria for particulate matter

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	50 µg/m <sup>3</sup>

Table 6: Long term impact assessment criteria for deposited dust

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

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1-2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

### Air Quality Monitoring

7. The Proponent shall revise the Air Quality Monitoring Program for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with air quality (Stages 1 and 2) and subsequently implement this revised version of the Air Quality Monitoring Program to the satisfaction of the Director-General. This program must:
  - (a) be submitted to the Director-General for approval prior to 30 June 2011;
  - (b) be prepared in consultation with DECCW; and
  - (c) use a combination of high volume samplers and dust deposition gauges to monitor the performance of the project.

### METEOROLOGICAL MONITORING

8. During the project, the Proponent shall ensure there is a suitable meteorological station on site that complies with the requirements in *Approved Methods for Sampling of Air Pollutants in New South Wales* (DECC, 2007), or its latest version.

### WATER MANAGEMENT

Note: These conditions should be read in conjunction with sections 6 and 7 of the revised Statement of Commitments.

#### Groundwater Model

9. Within 2 years of the commencement of longwall coal extraction, and every 5 years thereafter, the Proponent shall undertake a transient calibration of the groundwater model presented in the EA, in consultation with NOW, and to the satisfaction of the Director-General. This re-calibration of the groundwater model must include forward impact predictions of brine re-injection to the mine's goaf at the conclusion of mining operations.

#### Discharges

10. Except as may be expressly provided for by an EPL, the Proponent shall not discharge any waters from the disturbed areas of the site. However, raffinate from the water conditioning plant may be transferred to water users in accordance with an approved Water Management Plan (see below).

11. Any raffinate from the water conditioning plant discharged to the Namoi River must be discharged in accordance with the conditions of an EPL and meet the following criteria:
  - (a) 50 percentile of all samples (volume based) are below 250 mg/l of Total Dissolved Solids;
  - (b) 100 percentile of all samples (volume based) are below 350 mg/l of Total Dissolved Solids; and
  - (c) pH values of all sampled water to be between 6.5 and 8.5.
12. Within 3 years of the date of this approval, or otherwise agreed by the Director-General, the Proponent must commission the water conditioning plant identified in the EA, to the satisfaction of the Director-General.

### **Water Management Plan**

13. Prior to 30 June 2011, the Proponent shall revise the Water Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with water management (Stages 1 and 2) and subsequently implement this revised version of the Water Management Plan to the satisfaction of the Director-General. This revised plan must be produced in consultation with DECCW and NOW by suitably qualified expert/s whose appointment/s have been approved by the Director-General and include a:
  - (a) Site Water Balance;
  - (b) Erosion and Sediment Control Plan;
  - (c) Surface Water Monitoring Plan;
  - (d) Raffinate Discharge and Transfer Control and Monitoring Plan;
  - (e) Groundwater Monitoring Program; and
  - (f) Surface and Groundwater Response Plan, setting out the procedures for:
    - investigating, and if necessary mitigating, any exceedances of the surface or groundwater assessment criteria (see conditions 16(b) and 18(c)); and
    - responding to any unforeseen impacts of the project.

*Note: The Raffinate Discharge and Transfer Control and Monitoring Plan does not need to be produced and approved until 3 months prior to the planned discharge or transfer of raffinate from the site.*

### **Site Water Balance**

14. The Site Water Balance must:
  - (a) include details of:
    - sources and security of water supply;
    - underground water make;
    - water use on site;
    - water management on site;
    - off-site water transfers;
    - reporting procedures;
  - (b) describe measures to minimise water use by the project; and
  - (c) be reviewed and recalculated each year in the light of the most recent water monitoring data.

### **Erosion and Sediment Control**

15. The Erosion and Sediment Control Plan must:
  - (a) be consistent with the requirements of *Managing Urban Stormwater: Soils and Construction* manual (Landcom, 2004), or its latest version;
  - (b) identify activities that could cause soil erosion and generate sediment;
  - (c) describe measures to minimise soil erosion and the potential for transport of sediment to downstream waters;
  - (d) describe the location, function, and capacity of erosion and sediment control structures; and
  - (e) describe what measures would be implemented to monitor and maintain the structures over time.

### **Surface Water Monitoring Program**

16. The Surface Water Monitoring Plan must include:
  - (a) detailed baseline data on surface water flows and quality in creeks and other water bodies that could be affected by the project;
  - (b) surface water impact assessment criteria;
  - (c) a program to monitor the impact of the project on surface water flows and quality;
  - (d) procedures for reporting the results of this monitoring.

### **Raffinate Discharge and Transfer Control and Monitoring Plan**

17. The Raffinate Discharge Control and Monitoring Plan must:
- (a) be approved by the Director-General prior to any raffinate discharge to the Namoi River;
  - (b) include measures for the continuous monitoring and recording of volumes of water discharged to the Namoi River;
  - (c) contain an ambient water quality monitoring program upstream and downstream of the discharge point; and
  - (d) contain a water quality monitoring program for discharged waters.

### **Groundwater Monitoring Program**

18. The Groundwater Monitoring Program must include:
- (a) further development of the regional and local groundwater model;
  - (b) detailed baseline data to benchmark the natural variation in groundwater levels, yield and quality (including at any privately owned bores in the vicinity of the site);
  - (c) groundwater impact assessment criteria;
  - (d) a program to monitor the impact of the project on groundwater levels, yield and quality;
  - (e) a program to monitor any impacts of the project on the Namoi River Alluvium;
  - (f) a program to monitor (by the use of shallow piezometers/lysimeters), detect, and quantify any leakage/leachate from the site's evaporation/storage ponds, brine storage area or coal reject emplacement area; and
  - (g) procedures for reporting the results of this monitoring.

### **Evaporation/Storage Ponds**

19. The Proponent shall ensure that the integrity of the low permeability layers lining the evaporation/storage ponds is maintained and achieves a permeability of less than  $1 \times 10^{-14}$  m/s whenever these ponds are in use for the storage of saline waters and less than  $1 \times 10^{-9}$  m/s when being used to store raffinate or captured surface waters.

### **Brine Storage Ponds**

20. The Proponent shall ensure that the integrity of the low permeability layers lining the brine storage ponds is maintained and achieves a permeability of less than  $1 \times 10^{-14}$  m/s whenever these storage ponds are in use.

### **Review of Brine Management and Beneficial Use of Water and Brine**

21. Within 2 years of commissioning the water conditioning plant, and every 5 years thereafter, unless otherwise directed by the Director-General, the Proponent shall engage suitably qualified experts approved by the Director-General to review brine management and beneficial use options for raffinate, brine and minewater produced by the project. The Proponent shall implement all reasonable and feasible recommendations of these reviews, to the satisfaction of the Director-General.

## **HERITAGE**

*Note: These conditions should be read in conjunction with section 9 of the revised Statement of Commitments.*

### **Aboriginal Cultural Heritage Management Plan**

22. The Proponent shall not destroy damage or deface any known Aboriginal objects (as defined in the *National Parks and Wildlife Act 1974*) without the written approval of the Director-General.
23. The Proponent shall revise the Aboriginal Cultural Heritage Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with Aboriginal cultural heritage management for the site (Stages 1 and 2) and subsequently implement this revised version of the Aboriginal Cultural Heritage Management Plan to the satisfaction of the Director-General. This plan must:
- (a) be submitted the Director-General by 30 June 2011;
  - (b) be prepared in consultation with the DECCW, the Narrabri Local Aboriginal Land Council and the Narrabri Gooneroi Aboriginal Corporation;
  - (c) include a protocol for the ongoing consultation and involvement of Aboriginal communities in the conservation and management of Aboriginal heritage on site; and

- (d) describe the measures that would be implemented to protect Aboriginal sites on the mine site, (in particular all known Aboriginal sites on lands overlying Longwalls 1-3 and sites 10b, 38, 39 and 106-112), or any new Aboriginal objects or skeletal remains that are identified during the project.
24. Prior to undertaking any activities involving surface disturbance or vegetation removal for the lands overlying Longwalls 8-26, the Proponent shall undertake a detailed Aboriginal cultural heritage survey in consultation with the local Aboriginal community and DECCW, and to the satisfaction of the Director-General. The Director-General may approve this survey being undertaken in several stages, as mining progresses.

## **TRANSPORT**

*Note: These conditions should be read in conjunction with section 13 of the revised Statement of Commitments.*

### **Mine Access Road Intersection**

25. The Proponent shall maintain the Mine Access Road Intersection with Kurrajong Creek Road and the Kamilaroi Highway in consultation with NSC and to the satisfaction of RTA.

### **Greylands and Scratch Roads**

26. Prior to using Greylands and Scratch Roads to construct mine-related infrastructure, the Proponent shall enter into an agreement with NSC to:
- (a) construct watercourse crossings (either culverts or concrete causeways) on those sections of these roads that it uses in a manner that does not restrict fish passage, in consultation with I&I NSW (Fisheries) and to the satisfaction of NSC; and
  - (b) fund the maintenance of those sections of these roads that it uses to an all-weather unsealed road standard.

### **Gunnedah Traffic Management Study**

27. The Proponent shall contribute, on an equitable basis with other coal project rail users, to the costs of an independent Traffic Management Study analysing the impacts of increased rail traffic on road safety and congestion due to increased closure of rail level crossings within Gunnedah, prepared to the satisfaction of GSC.

*Note: This study should examine funding mechanisms to implement any recommendations to improve road safety and reduce traffic congestion associated with rail level crossings and be completed by 30 June 2011.*

## **VISUAL**

*Note: These conditions should be read in conjunction with section 14 of the Statement of Commitments.*

### **Visual Amenity**

28. The Proponent shall minimise the visual impacts of the project to the satisfaction of the Director-General.

### **Lighting Emissions**

29. The Proponent shall ensure that:
- (a) no outdoor lights shine above the horizontal; and
  - (b) all external lighting associated with the project complies with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*.

## **ENERGY EFFICIENCY AND GREENHOUSE GAS**

*Note: These conditions should be read in conjunction with section 11 of the revised Statement of Commitments.*

### **Energy Savings Action Plan**

30. The Proponent shall revise the Energy Savings Action Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with energy management for the site (Stages 1



and 2) and subsequently implement this revised version of the Energy Savings Action Plan to the satisfaction of the Director-General. This plan must:

- (a) be prepared in consultation with DECCW;
- (b) be prepared in accordance with the *Guidelines for Energy Savings Action Plans* (DEUS, 2005), or its latest version;
- (c) be submitted to the Director-General for approval prior to 30 June 2011; and
- (d) include a program to monitor the effectiveness of measures to reduce energy use on site.

### **Gas Drainage**

- 31. The Proponent shall implement all reasonable and feasible measures to minimise the greenhouse gas emissions from the underground mining operations to the satisfaction of the Director-General.
- 32. Prior to carrying out longwall coal mining operations, the Proponent shall submit a Greenhouse Gas Minimisation Plan for the approval of the Director-General. This plan must:
  - (a) be prepared in consultation with DECCW;
  - (b) identify options for minimising greenhouse gas emissions from underground mining operations, with a particular focus on capturing and/or using these emissions;
  - (c) investigate the feasibility of implementing each option;
  - (d) propose the measures that would be implemented in the short to medium term on site; and
  - (e) include a research program to inform the continuous improvement of the greenhouse gas minimisation measures on site.

### **WASTE**

*Note: These conditions should be read in conjunction with section 3 of the revised Statement of Commitments.*

#### **Waste Minimisation**

- 33. The Proponent shall revise the Waste Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with waste management for the site (Stages 1 and 2) and subsequently implement this revised version of the Waste Management Plan to the satisfaction of the Director-General. This plan must:
  - (a) be submitted to the Director-General for approval prior to 30 June 2011;
  - (b) identify the various waste streams of the project;
  - (c) describe what measures would be implemented to reuse, recycle, or minimise the waste generated by the project;
  - (d) ensure irrigation of treated wastewater is undertaken in accordance with *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004), or its latest version; and
  - (e) include a program to monitor the effectiveness of these measures.

## SCHEDULE 5 REHABILITATION AND OFFSETS

### REHABILITATION

*Note: These conditions should be read in conjunction with sections 4, 8 and 12 of the revised Statement of Commitments and condition 3(c) of schedule 3.*

#### Rehabilitation Objectives

1. The Proponent shall rehabilitate the site to the satisfaction of the Director-General and I&I NSW in accordance with the rehabilitation objectives in Table 1.

*Table 1: Rehabilitation Objectives*

<b>Domain</b>	<b>Rehabilitation objective</b>
Surface Facilities Area	Set through condition 4 below
Other land affected by the project	Restore ecosystem function, including maintaining or establishing self-sustaining native ecosystems: <ul style="list-style-type: none"><li>• comprised of local native plant species; with</li><li>• a landform consistent with the surrounding environment</li></ul>
Built features	Repair/restore to pre-mining condition or equivalent
Community	Minimise the adverse socio-economic effects associated with mine closure including the reduction in local and regional employment
	Ensure public safety

*Note: The Proponent may be required to define other rehabilitation objectives in management plans or strategy required under this schedule.*

#### Progressive Rehabilitation

2. To the extent that mining operations permit, the Proponent shall carry out rehabilitation progressively, that is, as soon as reasonably practicable following the disturbance.

#### Landscape Management Plan

3. The Proponent shall revise the Landscape Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with landscape management for the site (Stages 1 and 2) and subsequently implement this revised version of the Landscape Management Plan to the satisfaction of the Director-General and I&I NSW. This plan must:
  - (a) be submitted to the Director-General for approval by 30 June 2011;
  - (b) be prepared by suitably qualified expert/s whose appointment/s have been endorsed by the Director-General;
  - (c) be prepared in consultation with NOW, DECCW and NSC; and
  - (d) include a:
    - Rehabilitation Management Plan; and
    - Mine Closure Plan.

#### Rehabilitation Management Plan

4. The Rehabilitation Management Plan must include:
  - (a) the rehabilitation objectives for the site;
  - (b) a strategic description of how the rehabilitation of the site would be integrated with surrounding land use;
  - (c) a general description of the short and long term measures that would be implemented to rehabilitate the site;
  - (d) a detailed description of the measures that would be implemented to remediate predicted subsidence impacts under individual Extraction Plans;
  - (e) a detailed description of the measures that would be implemented to minimise environmental impacts of mining operations and to rehabilitate the site, including measures to be implemented for:
    - managing remnant vegetation and habitat on site;
    - minimising impacts on fauna;
    - minimising visual impacts;
    - conserving and reusing topsoil;

- controlling weeds, feral pests, and access;
  - managing bushfires; and
  - managing any potential conflicts between rehabilitation works and Aboriginal cultural heritage.
- (f) detailed performance and completion criteria for the rehabilitation of the site;
- (g) a detailed description of how the performance of the rehabilitation works would be monitored over time to achieve the stated objectives and against the relevant performance and completion criteria; and
- (h) details of who is responsible for monitoring, reviewing and implementing the plan.

*Note: In accordance with condition 11 of schedule 2, the preparation and implementation of Rehabilitation Management Plans is likely to be staged, with each plan covering a defined area (or domain) for rehabilitation. In addition, while mining operations are being carried out, some of the proposed remediation or rehabilitation measures may be included in the detailed management plans that form part of the Extraction Plan. If this is the case, however, then the Proponent will be required to ensure that there is good cross-referencing between the various management plans.*

## **Mine Closure Plan**

5. The Mine Closure Plan must:
- (a) define the objectives and criteria for mine closure;
  - (b) investigate options for the future use of the site;
  - (c) provide a detailed methodology for decommissioning the site's evaporation/storage ponds and the treatment of any accumulated salt within or around those ponds;
  - (d) investigate ways to minimise the adverse socio-economic effects associated with mine closure, including reduction in local and regional employment levels;
  - (e) describe the measures that would be implemented to minimise or manage the on-going environmental effects of the project; and
  - (f) describe how the performance of these measures would be monitored over time.

## **OFFSETS**

### **Biodiversity Offset Strategy**

6. The Proponent shall provide a suitable biodiversity offset strategy to compensate for the impacts of Stages 1 and 2 of the project. This offset strategy must:
- (a) be prepared in consultation with DECCW;
  - (b) be submitted to the Director-General for approval by 31 December 2010, or as otherwise agreed by the Director-General;
  - (c) provide a detailed assessment of offset proposal/s involving the property/ies (agreed to by DECCW) adjoining Mt Kaputar National Park to confirm the ability of either of these property/ies to meet "like for like or better" and "maintain or improve" conservation outcomes;
  - (d) include and assess proposals to offset impacts to the Inland Grey Box EEC, *Bertya opposens*, and foraging habitat for the Superb Parrot;
  - (e) include proposals on offsetting both direct and indirect impacts (ie edge effects) of the project; and
  - (f) determine the best overall combination of lands to provide a suitable offset.
7. The Proponent shall make suitable arrangements to provide appropriate long-term security for the offset areas by 31 December 2011, or other date agreed by the Director-General, to the satisfaction of the Director-General.

## **SCHEDULE 6**

### **ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING AND REPORTING**

*Note: This schedule should be read in conjunction with sections 15, 16 and 17 of the revised Statement of Commitments.*

#### **ENVIRONMENTAL MANAGEMENT**

##### **Environmental Management Strategy**

1. The Proponent shall revise the Environmental Management Strategy for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with environmental management for the site (Stages 1 and 2) and subsequently implement this revised version of the Environmental Management Strategy to the satisfaction of the Director-General. This strategy must:
  - (a) be submitted to the Director-General for approval prior to 30 June 2011;
  - (b) provide the strategic context for environmental management of the project;
  - (c) identify the statutory requirements that apply to the project;
  - (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project
  - (e) describe the procedures that would be implemented to:
    - keep the local community and relevant agencies informed about the operation and environmental performance of the project;
    - receive, handle, respond to, and record complaints;
    - resolve any disputes that may arise during the course of the project;
    - respond to any non-compliance; and
    - respond to emergencies; and
  - (f) include a clear plan depicting all the monitoring currently being carried out in the project area.

##### **Management Plan Requirements**

2. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:
  - (a) detailed baseline data;
  - (b) a description of:
    - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
    - any relevant limits or performance measures/criteria;
    - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;
  - (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
  - (d) a program to monitor and report on the:
    - impacts and environmental performance of the project;
    - effectiveness of any management measures (see (c) above);
  - (e) a contingency plan to manage any unpredicted impacts and their consequences;
  - (f) a program to investigate and implement ways to improve the environmental performance of the project over time;
  - (g) a protocol for managing and reporting any:
    - incidents;
    - complaints;
    - non-compliances with statutory requirements; and
    - exceedances of the impact assessment criteria and/or performance criteria; and
  - (h) a protocol for periodic review of the plan.

##### **Revision of Strategies, Plans and Programs**

3. Within 3 months of the submission of an:
  - (a) audit under condition 7 of schedule 6;
  - (b) incident report under condition 4 of schedule 6; and
  - (c) annual review under condition 5 of schedule 6; and
  - (d) [any modification to the conditions of this approval \(unless the conditions require otherwise\)](#),the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Director-General.

*Note: This is to ensure that the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project*

## **REPORTING**

### **Incident**

4. The Proponent shall notify the Director-General and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Director-General and any relevant agencies with a detailed report on the incident.

### **Regular**

5. The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval, and to the satisfaction of the Director-General.

### **Annual Review**

6. Within 12 months of this approval, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:
  - (a) describe the works that were carried out in the past year, and the works that are proposed to be carried out over the next year;
  - (b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against the
    - the relevant statutory requirements, limits or performance measures/criteria;
    - the monitoring results of previous years; and
    - the relevant predictions in the EA and Extraction Plan;
  - (c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
  - (d) identify any trends in the monitoring data over the life of the project;
  - (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
  - (f) describe what measure will be implemented over the next year to improve the environmental performance of the project.

## **INDEPENDENT ENVIRONMENTAL AUDIT**

7. Prior to 13 September 2010, and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project (Stages 1 and 2). This audit must:
  - (a) be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General;
  - (b) include consultation with the relevant agencies
  - (c) assess the environmental performance of the project and assess whether it is complying with the relevant requirements of this approval and any relevant mining lease or EPL (including any strategy, plan or program required under these approvals);
  - (d) review the adequacy of strategies, plans or programs required under these approvals; and, if appropriate,
  - (e) recommend measures or actions to improve the environmental performance of the project, and/or any strategy, plan or program required under these approvals.

*Note: This audit team must be led by a suitably qualified auditor and include experts in the fields of subsidence, water and noise management (other than for the 2010 audit which is not required to include a subsidence expert in the audit team).*

8. Within 6 weeks of the completing of this audit, or as otherwise agreed by the Director-General, the Proponent shall submit a copy of the audit report to the Director-General, together with its response to any recommendations contained in the audit report.

## COMMUNITY CONSULTATIVE COMMITTEE

9. The Proponent shall maintain a Community Consultative Committee (CCC) for the project to the satisfaction of the Director-General, in general accordance with the *Guideline for Establishing and Operating Community Consultative Committees for Mining Projects (Department of Planning, 2007)*, or its latest version.

*Note: The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval.*

## ACCESS TO INFORMATION

10. The Proponent shall:
- (a) make copies of the following publicly available on its website:
    - the documents referred to in Condition 2 of Schedule 2;
    - all current statutory approvals for the project;
    - all approved strategies, plans and programs required under the conditions of this approval;
    - a comprehensive summary of the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs;
    - a complaints register, updated on a monthly basis;
    - minutes of CCC meetings;
    - the annual reviews of the project;
    - any independent environmental audit of the project, and the Proponent's response to the recommendations in any audit;
    - any other matter required by the Director-General; and
  - (b) keep this information up-to-date, to the satisfaction of the Director-General.

## **SCHEDULE 7**

### **ADDITIONAL PROCEDURES FOR AIR QUALITY AND NOISE MANAGEMENT**

#### **NOTIFICATION OF LANDOWNERS**

1. If the results of the monitoring required in schedule 4 identify that impacts generated by the project are greater than the relevant impact assessment criteria, except where a negotiated agreement has been entered into in relation to that impact, then the Proponent shall, within 2 weeks of obtaining the monitoring results, notify the Director-General, the affected landowners and tenants (including tenants of mine-owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the project is complying with the criteria in schedule 4.
2. If the results of monitoring required in schedule 4 identify that impacts generated by the project are greater than the relevant air quality impact assessment criteria in schedule 4, then the Proponent shall send the relevant landowners and tenants (including tenants of mine-owned properties) a copy of the NSW Health fact sheet entitled "Mine Dust and You" (and associated updates) in conjunction with the notification required in condition 1.

#### **INDEPENDENT REVIEW**

3. If a landowner considers the project to be exceeding the impact assessment criteria in schedule 4, then he/she may ask the Director-General in writing for an independent review of the impacts of the project on his/her land.

If the Director-General is satisfied that an independent review is warranted, the Proponent shall within 2 months of the Director-General's decision:

- (a) consult with the landowner to determine his/her concerns;
  - (b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to conduct monitoring on the land, to:
    - determine whether the project is complying with the relevant impact assessment criteria in schedule 4; and
    - identify the source(s) and scale of any impact on the land, and the project's contribution to this impact; and
  - (c) give the Director-General and landowner a copy of the independent review.
4. If the independent review determines that the project is complying with the relevant impact assessment criteria in schedule 4, then the Proponent may discontinue the independent review with the approval of the Director-General.

If the independent review determines that the project is not complying with the relevant impact assessment criteria in schedule 4, and that the project is primarily responsible for this non-compliance, then the Proponent shall:

- (a) take all reasonable and feasible measures, in consultation with the landowner, to ensure that the project complies with the relevant criteria and conduct further monitoring to determine whether these measures ensure compliance; or
- (b) secure a written agreement with the landowner to allow exceedances of the relevant criteria, to the satisfaction of the Director-General.

If further monitoring under paragraph (a) determines that the project is complying with the relevant criteria, then the Proponent may discontinue the independent review with the approval of the Director-General.

If the independent review determines that the project is not complying with the relevant land acquisition criteria in schedule 4, then the Proponent shall offer to acquire all or part of the landowner's land in accordance with the procedures in conditions 5-7 below, to the satisfaction of the Director-General.

#### **LAND ACQUISITION**

5. Within 3 months of receiving a written request from a landowner with acquisition rights, the Proponent shall make a binding written offer to the landowner based on:
  - (a) the current market value of the landowner's interest in the property at the date of this written request, as if the property was unaffected by the project the subject of the project application, having regard to the:
    - existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and



- presence of improvements on the property and/or any approved building or structure which has been physically commenced at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of 'reasonable and feasible measures' under schedule 4 or condition 4(a) of this schedule;
- (b) the reasonable costs associated with:
  - relocating within the Narrabri or Gunnedah local government areas, or to any other local government area determined by the Director-General;
  - obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired; and
- (c) reasonable compensation for any disturbance caused by the land acquisition process.

However, if following this period, the Proponent and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired, then either party may refer the matter to the Director-General for resolution.

Upon receiving such a request, the Director-General shall request the President of the NSW Division of the Australian Property Institute (the API) to appoint a qualified independent valuer to:

- (a) consider submissions from both parties;
- (b) determine a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;
- (c) prepare a detailed report setting out the reasons for any determination; and
- (d) provide a copy of the report to both parties and the Director-General.

Within 14 days of receiving the independent valuer's report, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.

However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the Director-General for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the Director-General shall determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in paragraphs (a)-(c) above and the independent valuer's report. Within 14 days of this determination, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the Director-General's determination.

If the landowner refuses to accept the Proponent's binding written offer under this condition within 6 months of the offer being made, then the Proponent's obligations to acquire the land shall cease, unless the Director-General determines otherwise.

6. The Proponent shall pay all reasonable costs associated with the land acquisition process described in condition 5 above.
7. If the Proponent and landowner agree that only part of the land shall be acquired, then the Proponent shall also pay all reasonable costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of the plan at the Office of the Registrar-General.

**APPENDIX 1  
SCHEDULE OF PROJECT LAND**

<b>Area</b>	<b>Land Title Reference</b>
<i>Pit Top Area</i>	<i>Lot 60 DP 757124, Part Lot 115 DP757124</i> <i>Lot 152 DP816020, Part Lots 151 &amp; 152 DP816020</i> <i>Lots 381 &amp; 382 DP1028753</i> <i>Various Crown and Council roads.</i>
<i>Underground Mining Area</i>	<i>Lot 7 DP 757104, Part Lots 3, 7, 8, 10, 25, 67 &amp; 68 DP757104</i> <i>Part Lots 57, 58, 63 to 65 DP757114</i> <i>Lot 61 DP 757124, Part Lots 81 &amp; 83 DP757124</i> <i>Lot 2 DP 811171, Part Lot 1 DP811171</i> <i>Lot 1 DP254253</i> <i>Lot 1 DP659899</i> <i>Part Lot 152 DP 816020</i> <i>Part Lot 3 DP1005608</i> <i>Part Lot 2 DP1124652</i> <i>Part Lot 842 DP1134385</i> <i>Part Jacks Creek State Forest (Part Lot 58 DP 757114)</i> <i>Part Pilliga East State Forest</i> <i>Various Crown and Council roads.</i>
<i>Remainder of Mine Site</i>	<i>Lot 1 DP1124652, Part Lot 2 DP1124652</i> <i>Lot 841 DP1134385, Part Lot 842 DP1134385</i> <i>Part Lots 3, 8, 10, 25, 67 &amp; 68 DP 757104</i> <i>Part Lots 57, 63 to 65 DP 757114</i> <i>Part Lots 81 &amp; 83 DP 757124</i> <i>Part Lot 1 DP798487</i> <i>Part Lot 1 DP811171</i> <i>Part Lots 151 &amp; 152 DP816020</i> <i>Part Lot 3 DP1005608</i> <i>Part Jacks Creek State Forest (Part Lot 58 DP 757114 &amp; Part Lot 60 DP757114)</i> <i>Part Pilliga East State Forest (undefined)</i> <i>Various Crown and Council roads.</i>
<i>Water Pipeline Route</i>	<i>Lots 60 &amp; 89 DP757124</i> <i>Lot 151 DP816020</i> <i>Lots 381 &amp; 382 DP1028753</i> <i>Lot 1 DP1124652</i> <i>Various Crown and Council roads.</i>

## APPENDIX 2 PROJECT MAPS

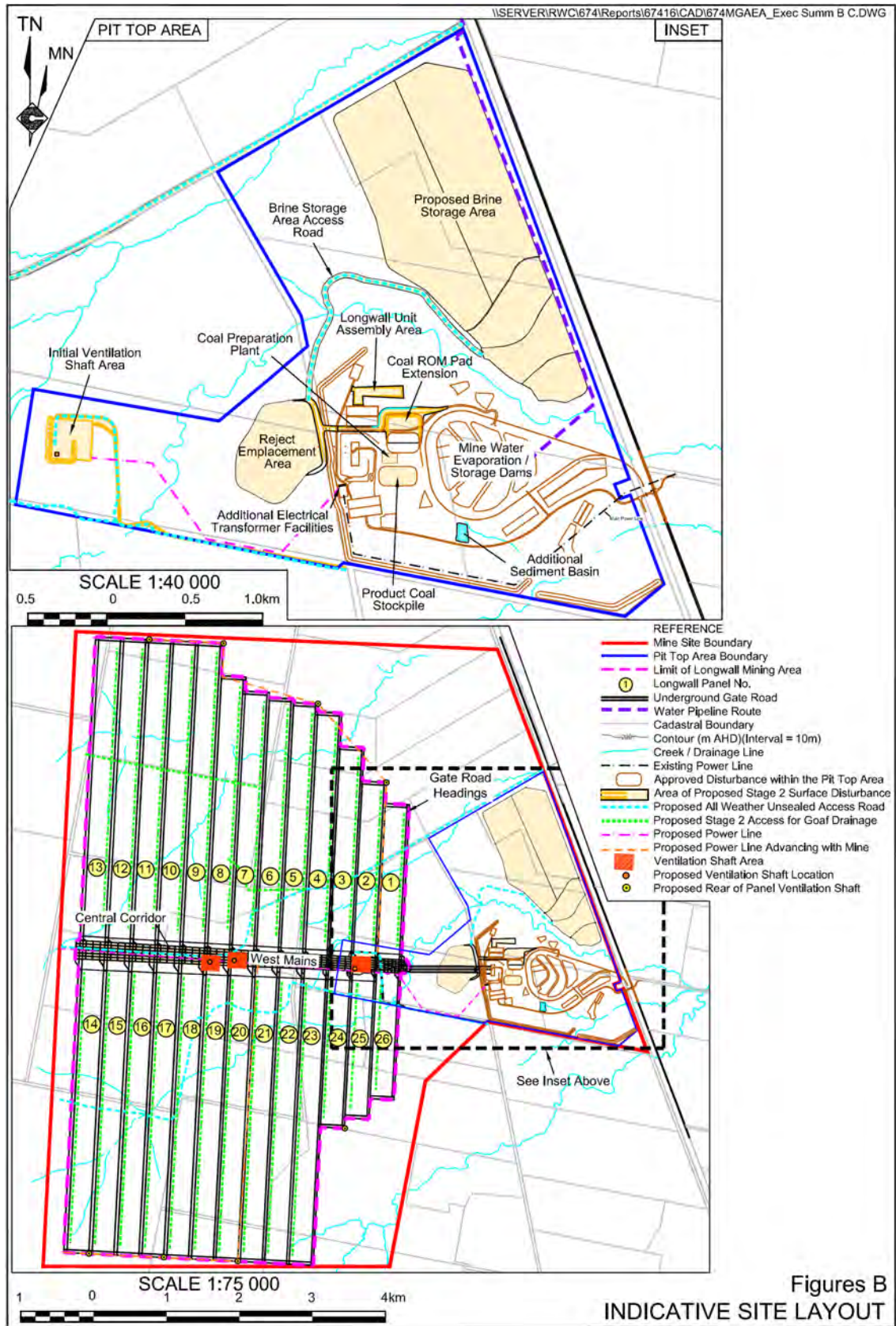
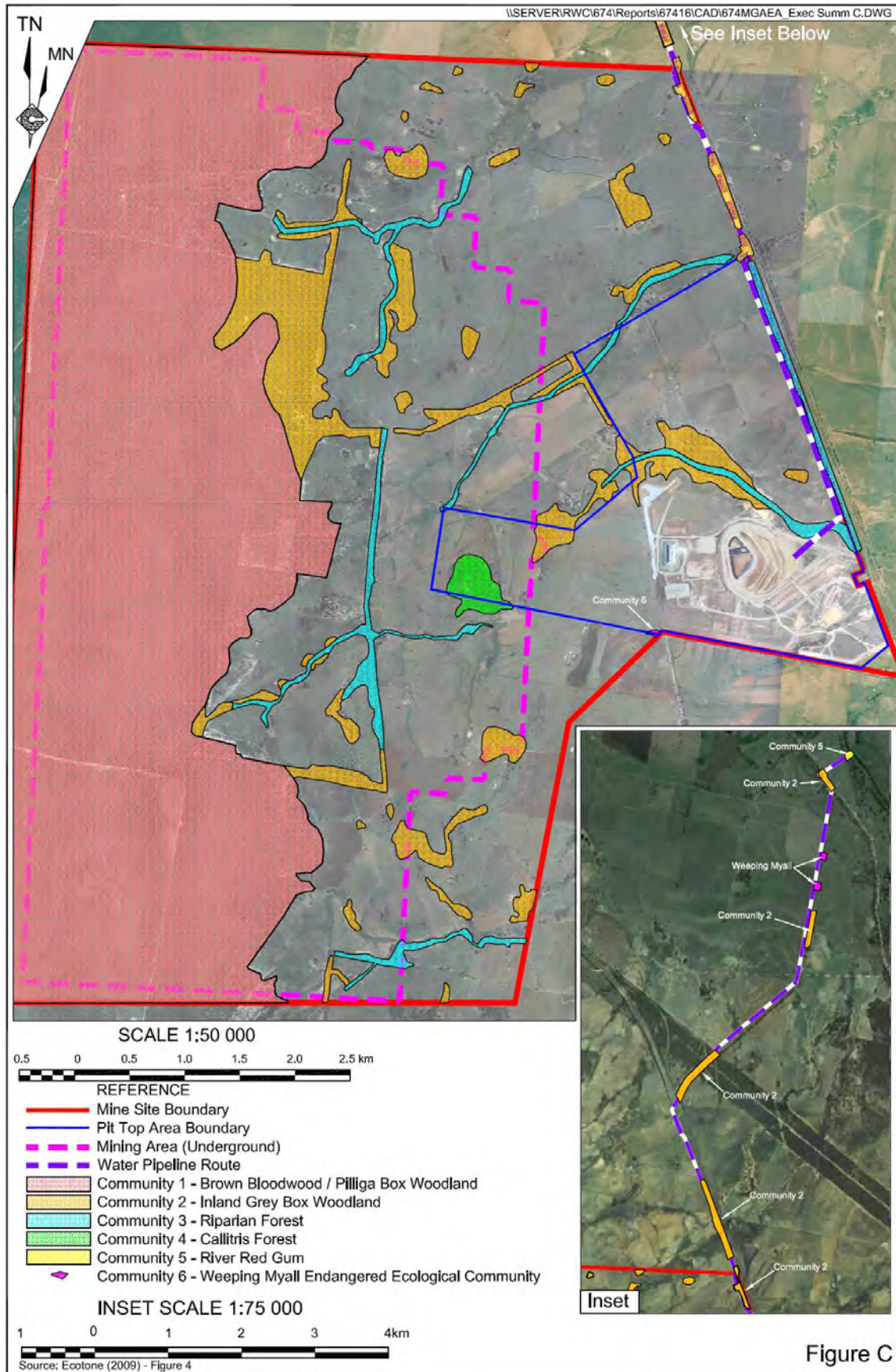


Figure 1: Project Layout





**Figure 2:** Vegetation communities and pipeline route





Figure 4B.29  
INDICATIVE SURFACE DISTURBANCE  
FOR THE LONGWALL PROJECT

## APPENDIX 4 GENERAL TERMS OF PLANNING AGREEMENTS

### Continuation of Stage 1 Planning Agreements

Funding Area	Minimum Proponent Contribution	Funding Time Frame
<u>Narrabri Shire</u> Upgrade and seal Kurrajong Creek Road, adjacent to the Project site	7.0 kilometres length of Kurrajong Creek Road to be upgraded and sealed.	Works to be completed within 12 months of Stage 1 project approval (17 November 2007).
<u>Narrabri Shire</u> Monetary Contribution – Provision of bush fire services	\$7,000	One instalment to be paid within 12 months of Stage 1 project approval (17 November 2007).
<u>Narrabri Shire</u> Community Infrastructure Contribution	\$93,000	An initial instalment of \$13,000 to be paid within 12 months of Stage 1 project approval (17 November 2007) with \$20,000 to be paid for a period of four years on the anniversary of the initial payment.
<u>Gunnedah Shire</u> Monetary Contribution – Gunnedah Urban Riverine Scheme	\$100,000	\$20,000 each year for a period of 5 years with the first instalment to be paid within 12 months of Stage 1 project approval (17 November 2007).

Notes:

- The Gunnedah Urban Riverine Scheme Contributions must be reviewed and adjusted to take into account any increase in the CPI over time, in accordance with the Planning Agreement between the Proponent and Gunnedah Shire Council required under this approval.
- The Community Infrastructure Contribution must be reviewed and adjusted to take into account any increase in the CPI over time, in accordance with the Planning Agreement and Narrabri Shire Council required under this approval.

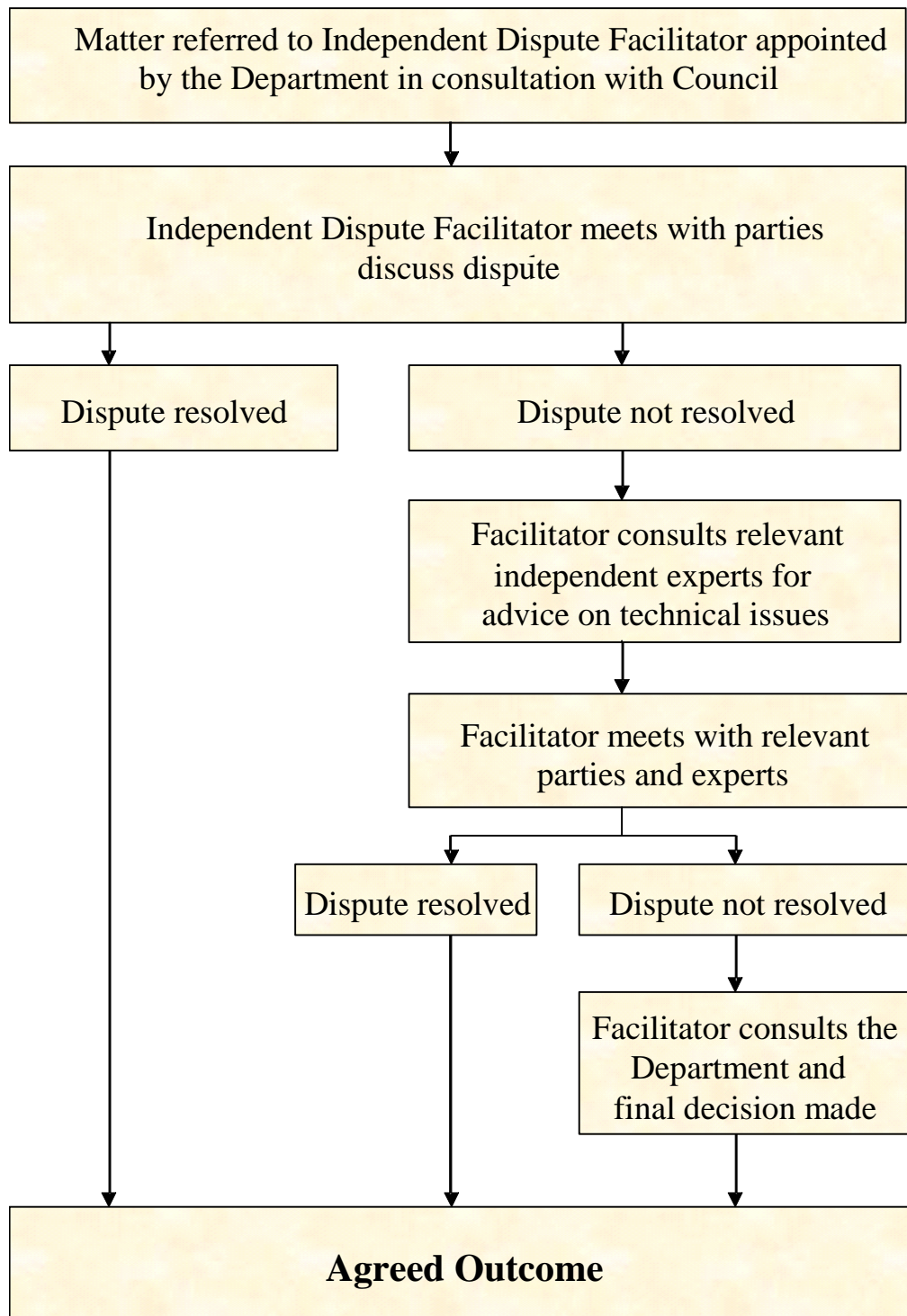
### Stage 2 Planning Agreements

Funding Area	Minimum Proponent Contribution	Funding Time Frame
<u>Narrabri Shire</u> Narrabri Swimming Complex	\$1,500,000	First contribution of \$750,000 to be made in conjunction with the 2010 Stage 1 community enhancement contribution.  Second contribution of \$750,000 to be paid in conjunction with the 2011 Stage 1 community enhancement contribution.
<u>Gunnedah Shire</u> Monetary Contribution	\$100,000	\$20,000 each year for a period of 5 years with the first instalment to be paid in conjunction with the 2010 Stage 1 community enhancement contribution.

Notes: The notes for Stage 1 Community Enhancement Program contributions apply to Stage 2 Community Enhancement contributions.

**APPENDIX 5  
INDEPENDENT DISPUTE RESOLUTION PROCEDURE**

**Independent Dispute Resolution Process  
(Indicative only)**





## Appendix 3

### COMPLIANCE REVIEW

PA 08\_0144 MOD 2 (Table A3-1)

EPL 12789 (Table A3-2)

ML 1609 (Table A3-3)

TABLE A3-1

## Compliance Review – Project Approval 08\_0144 MOD 2

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
<b>Schedule 2: Administrative Conditions</b>			
1	The Proponent shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.	Yes	As per condition.
2	The Proponent shall carry out the project generally in accordance with the: (a) EA; (b) statement of commitments (see Appendix 3); (c) the modification application 08_0144 MOD 1 and accompanying letter prepared by Narrabri Coal Operations Pty Ltd; (d) the modification application 08_01 44 MOD 2 and accompanying letter dated 12 December 2011, prepared by Whitehaven Coal Mining Limited; and (e) conditions of this approval.	Yes	As per condition.
3	If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.	Yes	As per condition.
4	The Proponent shall comply with any reasonable and feasible requirements of the Director-General arising from the Department's assessment of: (a) any reports, plans, programs, strategies or correspondence that are submitted in accordance with the conditions of this approval; and (b) the implementation of any actions or measures outlined in these reports, plans, programs, strategies or correspondence.	Yes	As per condition.
5	The Proponent may undertake mining operations on the site for 21 years from the date of this approval.	Yes	As per condition.
6	The Proponent shall not extract more than 8.0 million tonnes of ROM coal from the site per calendar year.	Yes	Coal extracted for the reporting period was 2,986,527t.
7	The Proponent shall transport all coal from the site by rail.	Yes	As per condition.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
7A	The Proponent may undertake a one off transport of coal by road of an approximate 600 tonne bulk sample of coal in accordance with the procedures, vehicle traffic route and transport operating hours as specified in the modification application 08_0144 MOD 2 and accompanying letter dated 12 December 2011 from Whitehaven Coal Mining Limited.	Yes	As per condition.
8	The Proponent shall not transport any coal reject from the site.	Yes	As per condition.
9	Within 6 months of this approval, the Proponent shall enter into planning agreements with Narrabri Shire Council (NSC), Gunnedah Shire Council (GSC) and the Minister in accordance with....	Yes	As per condition.
10	Within 12 months of the date of this approval, the Proponent shall surrender its previous project approval for the Narrabri Coal Mine to the satisfaction of the Director-General, in accordance with section 75YA of the EP&A Act. Prior to the surrender of the Stage 1 approval, if there is any inconsistency between the Stage 1 and Stage 2 approvals, the conditions of the Stage 2 approval shall prevail to the extent of any inconsistency.	Yes	Stage 1 relinquishment approved August 2011.
11	With the approval of the Director-General, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis.	Yes	As per condition.
12	Stage 1 strategies, plans or programs continue to have effect until replaced by an equivalent approved strategy, plan or program prepared and approved under this approval.	Yes	As per condition.
13	The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.	Yes	As per condition.
14	The Proponent shall ensure that all demolition work is carried out in accordance with <i>Australian Standard AS 2601-2001: The Demolition of Structures</i> , or its latest version.	N/A	No demolition works required.
15	The Proponent shall ensure that all plant and equipment used on site is: (a) maintained in a proper and efficient condition; and (b) operated in a proper and efficient manner.	Yes	As per condition.
<b>Schedule 3: Specific Environmental Conditions - Mining Area</b>			

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
1	The Proponent shall ensure that mine subsidence does not cause any exceedances of the performance measures in Table 1, in relation to the Great Artesian Basin and Flora and Fauna.	No	Tree death has occurred above LW101 and LW102. Narrabri Mine is investigating the cause of the tree death and will implement any remedial actions as required.
2	The Proponent shall ensure that the project does not cause any exceedances of the performance measures in Table 2, to the satisfaction of the Director-General of I&I NSW.	Yes	As per condition.
3	Any dispute between the Proponent and the owner of any built feature over the interpretation, application or implementation of the performance measures is to be settled by the Director-General of I&I NSW.	Yes	As per condition.
4	The Proponent shall prepare and implement Extraction Plans for any second workings to the satisfaction of the Director-General. Each Extraction Plan must....	Yes	As per condition. Extraction Plan for longwall panels 101 to 105 approved by DP&I on 27 March 2012 and DRE on 5 June 2012.
5	The Proponent shall ensure the management plans required by condition 4(h) include....	Yes	As per condition.
6	The Proponent may carry out first workings within the underground mining area, other than in accordance with an approved extraction plan, provided that I&I NSW is satisfied that the workings are designed to remain stable and non-subsiding in the long-term	Yes	As per condition.
7	The Proponent shall pay all reasonable cost incurred by the Department to engage independent experts to review the adequacy of any aspect of the Extraction Plan.	Yes	As per condition.
<b>Schedule 4: Specific Environmental Conditions - Surface Facilities Area and General</b>			
1	The Proponent shall ensure that the noise generated by the project does not exceed the levels set out in Table 1 at any privately-owned residence.	No	Noise exceedances were recorded during the reporting period, refer to Section 3.10 of the 2013/2014 AEMR/Annual Review.
2	If the noise generated by the project exceeds the criteria in Table 2 at any residence on privately-owned land, or on more than 25% of any privately-owned land, then the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 5-7 of schedule 7.	N/A	No written requests received.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
3	If the noise generated by the project is equal to or exceeds the criteria in Table 3 at any residence on privately-owned land, then the Proponent shall, upon receiving a written request from the landowner, implement reasonable and feasible noise mitigation measures (such as double-glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner.....	Yes	No written requests received.
4	The Proponent shall revise the Noise Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with noise management (Stages 1 and 2) and subsequently implement this revised version of the Noise Management Plan to the satisfaction of the Director-General. This Plan shall: (a) be prepared in consultation with DECCW by a suitably qualified expert whose appointment has been approved by the Director-General; (b) be submitted to the Director-General for approval by 30 June 2011; (c) include a Noise Monitoring Program incorporating: - real-time noise and temperature inversion monitoring; and - attended noise monitoring to monitor the performance of the project; (d) include reactive noise control measures to manage noise impacts for sensitive receivers; and (e) include a protocol to establish whether the project is complying with the noise impact assessment criteria in Table 1.	Yes	The revised Noise Management Plan was submitted to the Department on 24 June 2011 and approved on 6 December 2011.
5	The Proponent shall: (a) implement all reasonable and feasible best practice noise mitigation measures; (b) investigate ways to reduce the noise generated by the project, including off-site road and rail noise and maximum noise levels which may result in sleep disturbance. (c) report on these investigations and the implementation and effectiveness of these measures in the Annual Review; to the satisfaction of the Director-General.	Yes	As per condition.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
6	The Proponent shall ensure that dust emissions generated by the project do not cause additional exceedances of the criteria listed in Tables 4 to 6 at any residence on privately owned land, or on more than 25 percent of any privately-owned land.	Yes	As per condition. Visible dust was generated at the mine during the reporting period however the criteria listed in Tables 4 to 6 were met. The NSW EPA has included additional PRP requirements on the site's EPL.
7	The Proponent shall revise the Air Quality Monitoring Program for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with air quality (Stages 1 and 2) and subsequently implement this revised version of the Air Quality Monitoring Program to the satisfaction of the Director-General. This program must: (a) be submitted to the Director-General for approval prior to 30 June 2011; (b) be prepared in consultation with DECCW; and (c) use a combination of high volume samplers and dust deposition gauges to monitor the performance of the project.	Yes	The revised Air Quality Monitoring Program was submitted to the Department on 30 June 2011 and approved on 6 December 2011.
8	During the project, the Proponent shall ensure there is a suitable meteorological station on site that complies with the requirements in <i>Approved Methods for Sampling of Air Pollutants in New South Wales</i> (DECC, 2007), or its latest version.	Yes	As per condition.
9	Within 2 years of the commencement of longwall coal extraction, and every 5 years thereafter, the Proponent shall undertake a transient calibration of the groundwater model presented in the EA, in consultation with NOW, and to the satisfaction of the Director-General.....	N/A	Not triggered
10	Except as may be expressly provided for by an EPL, the Proponent shall not discharge any waters from the disturbed areas of the site. However, raffinate from the water conditioning plant may be transferred to water users in accordance with an approved Water Management Plan (see below).	Yes	As per condition.
11	Any raffinate from the water conditioning plant discharged to the Namoi River must be discharged in accordance with the conditions of an EPL and meet the following criteria: (a) 50 percentile of all samples (volume based) are below 250mg/l of Total Dissolved Solids; (b) 100 percentile of all samples (volume based) are below 350mg/l of Total Dissolved Solids; and (c) pH values of all sampled water to be between 6.5 and 8.5.	N/A	Not triggered.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
12	Within 3 years of the date of this approval, or otherwise agreed by the Director-General, the Proponent must commission the water conditioning plant identified in the EA, to the satisfaction of the Director-General.	Yes	Water Treatment Plant operational during the reporting period.
13	Prior to 30 June 2011, the Proponent shall revise the Water Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with water management (Stages 1 and 2) and subsequently implement this revised version of the Water Management Plan to the satisfaction of the Director-General. This revised plan must be produced in consultation with DECCW and NOW by suitably qualified expert/s whose appointments have been approved by the Director-General and include a: (a) Site Water Balance; (b) Erosion and Sediment Control Plan; (c) Surface Water Monitoring Plan; (d) Raffinate Discharge and Transfer Control and Monitoring Plan; (e) Groundwater Monitoring Program; and (f) Surface and Groundwater Response Plan, setting out the procedures for: - investigating, and if necessary mitigating, any exceedances of the surface or groundwater assessment criteria (see conditions 16(b) and 18(c) ; and - responding to any unforeseen impacts of the project.	Yes	The revised Water Management Plan was submitted to the Department on 30 June 2011. NOW approved the plan on 24 April 2012 and DP&I approved the plan on 5 April 2013.
14	The Site Water Balance must.....	Yes	As per condition.
15	The Erosion and Sediment Control Plan must....	Yes	As per condition.
16	The Surface Water Monitoring Plan must include....	Yes	As per condition.
17	The Raffinate Discharge Control and Monitoring Plan must....	Yes	As per condition.
18	The Groundwater Monitoring Program must include....	Yes	As per condition.
19	The Proponent shall ensure that the integrity of the low permeability layers lining the evaporation/storage ponds is maintained and achieves a permeability of less than $1 \times 10^{-14}$ m/s whenever these ponds are in use for the storage of saline waters and less than $1 \times 10^{-9}$ m/s when being used to store raffinate or captured surface waters.	Yes	As per condition.
20	The Proponent shall ensure that the integrity of the low permeability layers lining the brine storage ponds is maintained and achieves a permeability of less than $1 \times 10^{-14}$ m/s whenever these storage ponds are in use.	N/A	Brine storage ponds not constructed.



Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
21	Within 2 years of commissioning the water conditioning plant, and every 5 years thereafter, unless otherwise directed by the Director-General, the Proponent shall engage suitably qualified experts approved by the Director-General to review brine management and beneficial use options for raffinate, brine and minewater produced by the project....	N/A	Not triggered.
22	The Proponent shall not destroy damage or deface any known Aboriginal objects (as defined in the <i>National Parks and Wildlife Act 1974</i> ) without the written approval of the Director-General.	Yes	As per condition.
23	The Proponent shall revise the Aboriginal Cultural Heritage Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with Aboriginal cultural heritage management for the site (Stages 1 and 2) and subsequently implement this revised version of the Aboriginal Cultural Heritage Management Plan to the satisfaction of the Director-General. This plan must: (a) be submitted to the Director-General by 30 June 2011; (b) be prepared in consultation with the DECCW, the Narrabri Local Aboriginal Land Council and the Narrabri Goomerai Aboriginal Corporation; (c) include a protocol for the ongoing consultation and involvement of Aboriginal communities in the conservation and management of Aboriginal heritage on site; and (d) describe the measures that would be implemented to protect Aboriginal sites on the mine site, (in particular all known Aboriginal sites on lands overlying Longwalls 1-3 and sites 10b, 38, 39 and 106-112, or any new Aboriginal objects or skeletal remains that are identified during the project.	Yes	The revised Aboriginal Cultural Heritage Management Plan was submitted to the Department on 27 June 2011 and approved on 6 December 2011.
24	Prior to undertaking any activities involving surface disturbance or vegetation removal for the lands overlying Longwalls 8-26, the Proponent shall undertake a detailed Aboriginal cultural heritage survey in consultation with the local Aboriginal community and DECCW, and to the satisfaction of the Director-General. The Director-General may approve this survey being undertaken in several stages, as mining progresses.	Yes	As per condition.
25	The Proponent shall maintain the Mine Access Road Intersection with Kurrajong Creek Road and the Kamilaroi Highway in consultation with NSC and to the satisfaction of RTA.	Yes	As per condition.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
26	Prior to using Greylands and Scratch Roads to construct mine-related infrastructure, the Proponent shall enter into an agreement with NSC to: (a) construct watercourse crossings (either culverts or concrete causeways) on those sections of these roads that it uses in a manner that does not restrict fish passage, in consultation with I&I NSW (Fisheries) and to the satisfaction of NSC; and (b) fund the maintenance of those sections of these roads that it uses to an all-weather unsealed road standard.	Yes	Narrabri Mine has applied to NSW Crown Lands to purchase the portion of Greylands Road that traverses the mine lease. A management plan has been developed and implemented to manage the subsidence impacts to Greylands Road in consultation with NSC. Scratch Road has not been utilised to date except for environmental monitoring purposes.
27	The Proponent shall contribute, on an equitable basis with other coal project rail users, to the costs of an independent Traffic Management Study analysing the impacts of increased rail traffic on road safety and congestion due to increased closure of rail level crossings within Gunnedah, prepared to the satisfaction of GSC.	Yes	As per condition.
28	The Proponent shall minimise visual impacts of the project to the satisfaction of the Director-General.	Yes	As per condition.
29	The Proponent shall ensure that:(a) no outdoor lights shine above the horizontal; and(b) all external lighting associated with the project complies with <i>Australian Standard AS4282 (INT) 1995 - Control of Obtrusive Effects of Outdoor Lighting</i> .	Yes	As per condition.
30	The Proponent shall revise the Energy Savings Action Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with energy management for the site (Stages 1 and 2) and subsequently implement this revised version of the Energy Savings Action Plan to the satisfaction of the Director-General. This plan must: (a) be prepared in consultation with DECCW; (b) be prepared in accordance with the Guidelines for Energy Savings Action Plans (DEUS, 2005), or its latest version; (c) be submitted to the Director-General for approval prior to 30 June 2011; and (d) include a program to monitor the effectiveness of measures to reduce energy use on site.	No	The revised Energy Savings Action Plan was submitted late to the Department on 11 August 2011 but was subsequently approved on 6 December 2011.
31	The Proponent shall implement all reasonable and feasible measures to minimise the greenhouse gas emissions from the underground mining operations to the satisfaction of the Director-General.	Yes	As per condition.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
32	<p>Prior to carrying out longwall coal mining operations, the Proponent shall submit a Greenhouse Gas Minimisation Plan for the approval of the Director-General. This plan must:</p> <ul style="list-style-type: none"> <li>(a) be prepared in consultation with DECCW;</li> <li>(b) identify options for minimising greenhouse gas emissions from underground mining operations, with a particular focus on capturing and/or using these emissions;</li> <li>(c) investigate the feasibility of implementing each option;</li> <li>(d) propose the measures that would be implemented in the short to medium term on site; and</li> <li>(e) include a research program to inform the continuous improvement of the greenhouse gas minimisation measures on site.</li> </ul>	Yes	As per condition. Approved by DP&I on 12 June 2012.
33	<p>The Proponent shall revise the Waste Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with waste management for the site (Stages 1 and 2) and subsequently implement this revised version of the Waste Management Plan to the satisfaction of the Director-General. This plan must be:</p> <ul style="list-style-type: none"> <li>(a) be submitted to the Director-General for approval prior to 30 June 2011;</li> <li>(b) identify the various waste streams of the project;</li> <li>(c) describe what measures would be implemented to reuse, recycle, or minimise the waste generated by the project;</li> <li>(d) ensure irrigation of treated wastewater is undertaken in accordance with Environmental Guidelines: Use of Effluent by Irrigation (DEC, 2004), or its latest version; and</li> <li>(e) include a program to monitor the effectiveness of these measures.</li> </ul>	Yes	The revised Waste Management Plan was submitted to the Department on 27 June 2011 and was approved on 6 December 2011.
<b>Schedule 5: Rehabilitation and Offsets</b>			
1	The Proponent shall rehabilitate the site to the satisfaction of the Director-General and I&I NSW.	Yes	As per condition.
2	To the extent that mining operations permit, the Proponent shall carry out rehabilitation progressively, that is, as soon as reasonably practicable following the disturbance.	Yes	As per condition.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
3	The Proponent shall revise the Landscape Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with landscape management for the site (Stages 1 and 2) and subsequently implement this revised version of the Landscape Management Plan to the satisfaction of the Director-General and I&I NSW. This plan must: (a) be submitted to the Director-General for approval by 30 June 2011; (b) be prepared by suitably qualified expert/s whose appointment/s have been endorsed by the Director-General; (c) be prepared in consultation with NOW, DECCW and NSC and (d) include a:- Rehabilitation Management Plan; and- Mine Closure Plan.	Yes	The revised Landscape Management Plan, including the Rehabilitation Management Plan and Mine Closure Plan, was submitted to the Department on 27 June 2011 and was subsequently approved on 6 December 2011. A revision to the Landscape Management Plan, required by the Extraction Plan, this submitted to the Department during November 2012, re-submitted during February 2013 and was subsequently approved on 27 March 2013.
4	The Rehabilitation Management Plan must include....	Yes	Refer to 3 above.
5	The Mine Closure Plan must....	Yes	Refer to 3 above.
6	The Proponent shall provide a suitable biodiversity offset strategy to compensate for the impacts of Stages 1 and 2 of the project. This offset strategy must: (a) be prepared in consultation with DECCW; (b) be submitted to the Director-General for approval by 31 December 2010, or as otherwise agreed by the Director-General; (c) provide a detailed assessment of offset proposal/s involving the property/ies (agreed to by DECCW) adjoining Mt Kaputar National Park to confirm the ability of either of these property/ies to meet "like for like or better" and "maintain or improve" conservation outcomes; (d) include and assess proposals to offset impacts to the Inland Grey Box EEC, <i>Bertya opposens</i> , and foraging habitat for the Superb Parrot; (e) include proposals on offsetting both direct and indirect impacts (ie. edge effects) of the project; and (f) determine the best overall combination of lands to provide a suitable offset.	No	Revised Biodiversity Offset Strategy submitted 13 <sup>th</sup> September 2013 after the Department authorised an extension. Approval of the strategy and management plans was pending at the end of the reporting period.
7	The Proponent shall make suitable arrangements to provide appropriate long-term security for the offset areas by 31 December 2011, or other date agreed by the Director-General, to the satisfaction of the Director-General.	No	Once strategy has been finalised arrangements will be made for long term security of the offset areas. Narrabri Mine is currently waiting on the DP&E to issue a policy in relation to the preferred mechanism for securing offset areas, which will be implemented once released.
<b>Schedule 6: Environmental Management, Monitoring, Auditing and Reporting</b>			

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
1	<p>The Proponent shall revise the Environmental Management Strategy for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with environmental management for the site (Stages 1 and 2) and subsequently implement this revised version of the Environmental Management Strategy to the satisfaction of the Director-General. This strategy must:</p> <ul style="list-style-type: none"> <li>(a) be submitted to the Director-General for approval prior to 30 June 2011;</li> <li>(b) provide the strategic context for environmental management of the project;</li> <li>(c) identify the statutory requirements that apply to the project;</li> <li>(d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project</li> <li>(e) describe the procedures that would be implemented to: <ul style="list-style-type: none"> <li>- keep the local community and relevant agencies informed about the operation and environmental performance of the project;</li> <li>- receive, handle, respond to, and record complaints;</li> <li>- resolve any disputes that may arise during the course of the project;</li> <li>- respond to any non-compliance; and</li> <li>- respond to emergencies; and</li> </ul> </li> <li>(f) include a clear plan depicting all the monitoring currently being carried out in the project area.</li> </ul>	Yes	The revised Environmental Management Strategy was submitted to the Department on 30 June 2011 and was approved on 6 December 2011.
2	The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include.....	Yes	As per condition.
3	Within 3 months of the submission of an audit, incident report, annual review or any modification to the approval the proponent shall review, and if necessary, revise the strategies, plans, and programs required under this condition...	Yes	As per condition.
4	The Proponent shall notify the Director-General and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Director-General and any relevant agencies with a detailed report on the incident.	Yes	As per condition.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
5	The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval, and to the satisfaction of the Director-General.	Yes	As per condition.
6	<p>Within 12 months of this approval, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:</p> <p>(a) describe the works that were carried out in the past year, and the works that are proposed to be carried out over the next year;</p> <p>(b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against:</p> <p>the relevant statutory requirements, limits or performance measures/criteria;</p> <p>the monitoring results of previous years; and</p> <p>the relevant predictions in the EA and Extraction Plan;</p> <p>(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;</p> <p>(d) identify any trends in the monitoring data over the life of the project;</p> <p>(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and</p> <p>(f) describe what measure will be implemented over the next year to improve the environmental performance of the project.</p>	Yes	As per condition.
7	Prior to 13 September 2010, and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project (Stages 1 and 2).	Yes	Independent Audit reported during April 2011.
8	Within 6 weeks of the completing of this audit....	No	Submitted late during July 2011.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
9	The Proponent shall maintain a Community Consultative Committee (CCC) for the project to the satisfaction of the Director-General, in general accordance with the <i>Guideline for Establishing and Operating Community Consultative Committees for Mining Projects (Department of Planning, 2007)</i> , or its latest version.	Yes	CCC established and operating as per guidelines.
10	The Proponent shall make the following information publicly available on its website:.....	No	Narrabri Mine will add to the website a copy of the Subsidence Management Plan approval as well as documentation in relation to modifications 1 and 2.
<b>Schedule 7: Additional Procedures for Air Quality and Noise Management</b>			
1	If the results of the monitoring required in schedule 4 identify that impacts generated by the project are greater than the relevant impact assessment criteria, except where a negotiated agreement has been entered into in relation to that impact, then the Proponent shall, within 2 weeks of obtaining the monitoring results, notify the Director-General, the affected landowners and tenants (including tenants of mine-owned properties) accordingly, and provide quarterly monitoring results to each of those parties until the results show that the project is complying with the criteria in schedule 4.	Yes	Exceedances were noted during the reporting period and the required reporting was undertaken by the mine.
2	If the results of monitoring required in schedule 4 identify that impacts generated by the project are greater than the relevant air quality impact assessment criteria in schedule 4, then the Proponent shall send the relevant landowners and tenants (including tenants of mine-owned properties) a copy of the NSW Health fact sheet entitled "Mine Dust and You" (and associated updates) in conjunction with the notification required in condition 1.	N/A	No exceedances of the air quality criteria were identified during the reporting period.
3	If a landowner considers the project to be exceeding the impact assessment criteria in schedule 4, then he/she may ask the Director-General in writing for an independent review of the impacts of the project on his/her land.  If the Director-General is satisfied that an independent review is warranted, the Proponent shall within 2 months of the Director-General's decision...	N/A	No reviews requested.



Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
4	<p>If the independent review determines that the project is complying with the relevant impact assessment criteria in schedule 4, then the Proponent may discontinue the independent review with the approval of the Director-General.</p> <p>If the independent review determines that the project is not complying with the relevant impact assessment criteria in schedule 4, and that the project is primarily responsible for this non-compliance, then the Proponent shall...</p>	N/A	No reviews requested.
5	Within 3 months of receiving a written request from a landowner with acquisition rights, the Proponent shall make a binding written offer to the landowner based on...	N/A	No written requests received.
6	The Proponent shall pay all reasonable costs associated with the land acquisition process described in condition 5 above.	N/A	No written requests received.
7	If the Proponent and landowner agree that only part of the land shall be acquired, then the Proponent shall pay all reasonable costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of the plan at the Office of the Registrar-General.	N/A	No written requests received.

TABLE A3-2

## Compliance Review – Environment Protection License (EPL) 12789

Condition	EPL 12789 – Conditional Requirement	Compliance	Comments
A1.1	Carry out Coal Mining > 5,000,000t (handled and produced)	Yes	Coal production during the reporting period – 4,754,293 t.
A3.1	Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.	Yes	As per condition.
P1.3-P1.4	Comply with monitoring/discharge points and areas. Setting of limits for the emission of pollutants.	Yes	As per condition. Refer to Section 3.3 of the 2013/2014 AEMR/Annual Review.
L1.1	Comply with Section 120 of the POEO Act 1997 (re water quality)	Yes	As per condition.
L2.1-L2.5	Discharge water quality must not exceed the parameters specified.	Yes	As per condition. Refer to Section 3.3 of the 2013/2014 AEMR/Annual Review.
L3.1	Ensure noise compliance: 35 dB(A) $L_{Aeq}$ (15 minute) during the day (7am to 6pm), evening (6pm to 10pm) and night (10pm to 7am).	No	Noise exceedances were recorded during the reporting period, refer to Section 3.1 of the 2013/2014 AEMR/Annual Review.
L3.3	To determine compliance, measure noise within 30m of noise sensitive residences or receptors.	Yes	As per condition.
O1.1	Carry out licensed activities in a competent manner, i.e. (a) Processing, handling, movement and storage of materials and substances; & (b) Treatment, storage, processing, reprocessing, transport and disposal of generated waste.	Yes	As per condition.
O2.1	Maintain and operate all plant and equipment at premises in proper and efficient condition.	Yes	As per condition.
O3.1	Minimise or prevent emission of dust	No	While air quality criteria at the site are being met visible dust has been recorded at the site, particularly during the latter half of 2013. Refer to Section 3.1.4.3 of the 2013/2014 AEMR/Annual Review.
M1.1	Record and retain monitoring results required as per this licence.	Yes	As per condition.
M1.2	Keep all monitoring records associated with this licence: (a) In a legible form; (b) For at least 4 years; and	Yes	As per condition.

Condition	EPL 12789 – Conditional Requirement	Compliance	Comments
	(c) for production to any EPA authorised officer.		
M1.3	The following records must be kept in respect of any samples collected as required by this licence: (a) sampling date; (b) Sampling time; (c) Sampling location; and (d) Sample collectors name.	Yes	As per condition.
M2.1	Monitor each monitoring point for pollutants as specified in licence	Yes	As per condition.
M3.1	Monitor air pollutants in accordance with the Approved Methods publication or as approved by EPA.	Yes	As per condition.
M3.4	Monitor specified noise parameters at nominated properties	Yes	As per condition.
M4.1	Monitor weather parameters specified	Yes	As per condition.
M5.1	Keep a legible record of all complaints re pollution arising from licenced activity.	Yes	As per condition.
M5.2	Keep the following records of complaint. (a) Date and time of complaint; (b) Method complaint made; (c) Any personal details of complaint; (d) Nature of complaint; (e) Licensee's action in response, any follow up contact; and (f) If no action-reason why.	Yes	As per condition. Refer to Section 4.1 of the 2013/2014 AEMR/Annual Review.
M5.3	Keep records of complaints for 4 years	Yes	As per condition.
M5.4	Present records to EPA on request	Yes	As per condition.
M6.1	Operate telephone complaints line for receipt of complaints from the public	Yes	As per condition.
M6.2	Notify the public of the complaints telephone line	Yes	As per condition.

Condition	EPL 12789 – Conditional Requirement	Compliance	Comments
M7.1	To determine compliance with Noise Limits table, monitoring must be undertaken as follows: (a) At each one of the locations listed in the Noise Limits table; (b) Occur quarterly in a reporting period; (c) Occur during each day, evening and night period as defined in the NSW Industrial Noise Policy for a minimum of: i) 1.5 hours during the day; ii) 30 minutes during the evening; and iii) 1 hour during the night. (d) Occur for three consecutive operating days.	Yes	As per condition.
R1.1	Complete and supply Annual Return to EPA comprising: (a) Statement of Compliance; and (b) Monitoring & Complaints Summary.	Yes	As per condition.
R1.5	Provide EPA with Annual Return no later than 60 days after end each reporting period.	Yes	As per condition.
R1.6	Retain copy of Annual Return for 4 years.	Yes	As per condition.
R1.7	Certify the Statement of Compliance within the Annual Return and sign the Monitoring and Complaints Summary by: (a) Licence holder; or (b) Approved person.	Yes	As per condition.
R2.1	Notify EPA of threatening or harmful incidents as soon as practicable by phoning EPA's Pollution Line Service	Yes	As per condition.
R2.2	Provide written details of the incident to EPA within 7 days of incident	Yes	As per condition.
R3.1	Upon an EPA officer suspecting that an event is causing or likely to cause environmental harm: (a) At the premises; or (b) In connection with vehicles or plant associated with the licenced activities. A request may be made for a written report of the event.	Yes	As per condition.
R3.2	The licensee must make all reasonable inquiries in relation to the event and	Yes	As per condition.

Condition	EPL 12789 – Conditional Requirement	Compliance	Comments
	supply the report to the EPA within the time specified		
R3.3	<p>The report may be required to include:</p> <ul style="list-style-type: none"> <li>(a) Event cause, time and duration;</li> <li>(b) Type, volume and concentration of every pollutant discharged;</li> <li>(c) Contact details of employees or agents of licensee who witnessed event;</li> <li>(d) Contact details of any other persons witnessing the event;</li> <li>(e) The action taken and follow-up action with complainants in relation to event;</li> <li>(f) Mitigation measures proposed to prevent recurrence; and</li> <li>(g) Any other relevant matters.</li> </ul>	Yes	As per condition.
R3.4	EPA may request further details-must be supplied within specified time	Yes	As per condition.
R4.1	<p>Noise compliance assessment report to be submitted within 30 days of the completion of quarterly noise monitoring. The assessment must be prepared by a suitably qualified noise consultant and include:</p> <ul style="list-style-type: none"> <li>(a) An assessment of compliance with noise limits; and</li> <li>(b) An outline of any management actions taken within the monitoring period to address any exceedances.</li> </ul>	Yes	As per condition.
G1.1	Retain a copy of this licence at premises to which the licence applies	Yes	As per condition.
G1.2	Produce licence to EPA officer on request	Yes	As per condition.
G1.3	The licence must be available for inspection by any employee or agent of the licensee working at the premises.	Yes	As per condition.
U1.1	Licensee must conduct a site specific Best Management Practice (BMP) determination to identify practical means to reduce particle emissions	Yes	As per condition.
U1.2	<p>The Licensee must prepare a report which includes, but is not necessarily limited to, the following:</p> <ul style="list-style-type: none"> <li>- identification, quantification and justification of existing measures that are being used to minimise particle emissions;</li> <li>- identification, quantification and justification of best practice measures that could be used to minimise particle emissions;</li> <li>- evaluation of the practicability of implementing these best practice</li> </ul>	Yes	As per condition.

Condition	EPL 12789 – Conditional Requirement	Compliance	Comments
	measures; and - a proposed timeframe for implementing all practicable best practice measures. In preparing the report, the Licensee must utilise the document entitled Coal Mine Particulate Matter Control Best Practice – Site Specific Determination Guideline - November 2011.		
U1.4	Must be submitted to the EPA by 29 June 2012	Yes	As per condition.
U1.5	Must be made available on the Licensee's website by 6 July 2012	Yes	As per condition.
E1.1	Prior to the commissioning of the evaporation and storage ponds, the licensee must provide the EPA Armidale office with an "as constructed" report	No	Report supplied but not prior to commissioning.
E2.1	Noise impacts where wind speed exceeds 3 meters per second at 10 meters above the ground must be addressed by: (a) Documenting noise complaints received to identify any higher level of impacts or wind patterns where levels of noise complaints indicated a higher level of impact then actions to quantify and ameliorate any enhanced impacts where wind speed exceeds 3 meters per second at 10 meters above the ground should be developed and implemented.	Yes	As per condition.

TABLE A3-3

## Compliance Review – Mining Lease (ML) 1609

Condition	ML 1609 – Conditional Requirement	Compliance	Comments
1	Within a period of three months from the date of grant/renewal of the lease a notice in writing must be served on each landholder.	Yes	As per condition.
2	All practicable measures to prevent and/or minimise any harm to the environment.	Yes	As per condition.
3	Conduct mining operations in accordance with a MOP.	Yes	As per condition.
4	EMR to be lodged with the DG annually.	Yes	EMR supplied annually.
7	Disturbed land must be rehabilitated to a sustainable/agreed end land use to the satisfaction of the DG.	Yes	Areas disturbed have been rehabilitated to the extent practicable.
8(a)	Prepare a Subsidence Management Plan prior to commencing any underground mining operations.	Yes	Subsidence Management Plan approval received from the Department on 5 June 2012. Submitted as part of the Extraction Plan for LW101 to LW105.
9(a)	Ensure that at least 212 competent people are efficiently employed on the lease area on each week day except Sunday or Public Holiday; or	Yes	As per condition.
9(b)	Expend on operations carried out in the course of prospecting or mining the lease area, an amount of not less than \$3,710,000 per annum whilst the lease is in force.	Yes	As per condition.
11	Exploration Report to be submitted to the DG each year within 28 days of the anniversary.	Yes	Submitted annually.
15(a)	Monitor ground vibration generated by any blasting that it does not exceed 10mm/second in more than 5% of the total blasts over a period of 12 months.	N/A	No blasting undertaken during reporting period
15(b)	Overpressure noise level generated by any blast is not to exceed 120 dB (linear) and 115 dB (linear) in more than 5% of the total blasts over a period of 12 months.	N/A	No blasting undertaken during reporting period
16	Ensure the safety of persons or stock.	Yes	Safety measures a priority onsite.



Condition	ML 1609 – Conditional Requirement	Compliance	Comments
17(2)	Exploratory drill holes must satisfy the DG: (a) Cored holes surveyed; (b) Cored Holes sealed to prevent collapse; (c) Drill holes permanently sealed with cement plugs; (d) If drill hole meets natural or noxious gases it is plugged or sealed; (e) If drill hole meets an artesian or sub-artesian flow it is effectively sealed. (f) Unused drill holes are to be sealed in accordance with Department guidelines. (g) Once any drill hole ceases to be used the land and its immediate vicinity is left in a clean, tidy and stable condition.	Yes	As per condition.
18	Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution or soil contamination or erosion.	Yes	As per condition.
19	Transmission line, communication line, pipeline or any other utility must not be interfered with without permission from DG.	Yes	As per condition.
20	Fences must not be damaged or interfered with. Gates must be closed or left open in accordance with the requirements of the landholder.	Yes	As per condition.
21(a)	Operations must not affect any road.	Yes	No roads affected, unless in consultation with NSC.
21(b)	The cost incurred in fixing any damage to roads must be paid to the designated authority.	Yes	As per condition.
22	Access tracks must be kept to a minimum.	Yes	As per condition.
23(a)	The lease holder must not fell trees, strip bark or cut timber on the lease without the consent of the landholder.	Yes	As per condition.
23(b)	The lease holder must not cut, destroy, ringbark or remove any timber or other vegetative cover on the lease area except such as directly obstructs or prevents the carrying on of operations.	Yes	As per condition.
23(c)	The lease holder must obtain all necessary approvals or licences before using timber from any Crown land within the lease area.	N/A	No timber removed from Crown land.

Condition	ML 1609 – Conditional Requirement	Compliance	Comments
27(a)	A security of \$100,000 must be given and maintained with the Minister by the lease holder for the purpose of ensuring the fulfillment by the lease holder of obligations under this lease.	Yes	Security paid.
27(b)	Security: Cash or Security Certificate	Yes	Security Certificate in place.
28	A person must not remove, damage, destroy, displace, obliterate or deface any marks in connection with any trigonometrical station, permanent mark or survey mark.	Yes	As per condition.

## Appendix 4

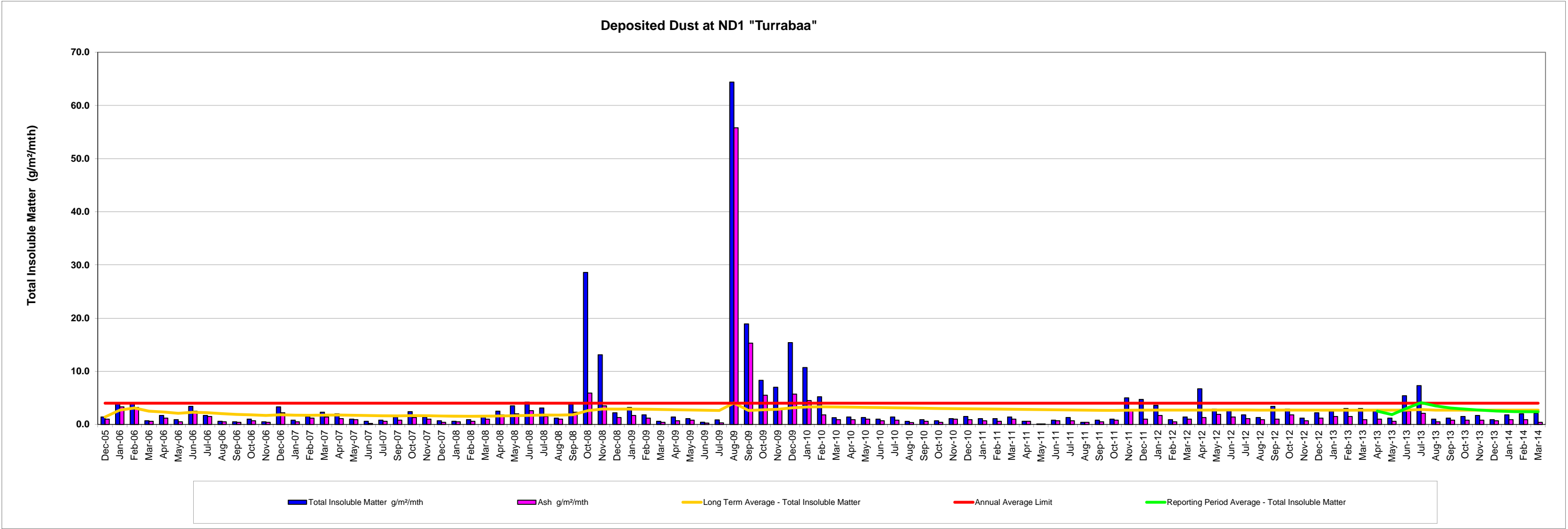
### DUST MONITORING RESULTS

Deposited Dust - ND1 "Turrabaa"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
21959.01	ND1	05-Jan-06	Dec-05	Client	1045	2710	1.4		1.4	4.0	1.0	
22569.01	ND1	03-Feb-06	Jan-06	Client	1045	205	4.0		2.7	4.0	3.3	
22720.01	ND1	09-Mar-06	Feb-06	Client	1310	1135	3.9		3.1	4.0	3.2	
23204.01	ND1	03-Apr-06	Mar-06	Client	1035	135	0.7		2.5	4.0	0.6	
23295.01	ND1	02-May-06	Apr-06	Client	0905	650	1.7		2.3	4.0	1.2	
23630.01	ND1	02-Jun-06	May-06	Client	0825	<10	0.9		2.1	4.0	0.5	
23882.01	ND1	28-Jun-06	Jun-06	Client	1641	660	3.4		2.3	4.0	2.5	
24078.01	ND1	31-Jul-06	Jul-06	Client	0920	1600	1.7		2.2	4.0	1.5	
24412.01	ND1	30-Aug-06	Aug-06	Client	1357	40	0.6		2.0	4.0	0.5	
24689.01	ND1	03-Oct-06	Sep-06	Client	1410	550	0.5		1.9	4.0	0.4	
24973.01	ND1	02-Nov-06	Oct-06	Client	1344	375	1.0		1.8	4.0	0.7	
25439.01	ND1	04-Dec-06	Nov-06	Client	1340	375	0.5		1.7	4.0	0.4	
25536.01	ND1	02-Jan-07	Dec-06	Client	1145	510	3.3		1.8	4.0	2.2	
25839.01	ND1	02-Feb-07	Jan-07	Client	1215	380	0.8		1.7	4.0	0.5	
26116.01	ND1	05-Mar-07	Feb-07	Client	1445	940	1.5		1.7	4.0	1.2	
26423.01	ND1	03-Apr-07	Mar-07	Client	1200	<50	2.3		1.8	4.0	1.4	
26626.01	ND1	02-May-07	Apr-07	Client	1200	395	2.0		1.8	4.0	1.1	
26955.01	ND1	05-Jun-07	May-07	Client	1245	1250	1.0		1.7	4.0	0.9	
27229.01	ND1	02-Jul-07	Jun-07	Client	1205	1350	0.6		1.7	4.0	0.2	
27526.01	ND1	03-Aug-07	Jul-07	Client	0815	155	0.8		1.6	4.0	0.6	
28113.01	ND1	04-Oct-07	Sep-07	Client	1245	70	1.4		1.6	4.0	0.8	
28392.01	ND1	05-Nov-07	Oct-07	Client	1445	680	2.4		1.7	4.0	1.3	
28656.01	ND1	04-Dec-07	Nov-07	Client	1120	1380	1.4		1.6	4.0	1.0	
28917.01	ND1	03-Jan-08	Dec-07	Client	1430	1770	0.7		1.6	4.0	0.4	
29219.01	ND1	04-Feb-08	Jan-08	Client	1315	1480	0.6		1.6	4.0	0.5	
29519.01	ND1	03-Mar-08	Feb-08	Client	1035	2485	0.9		1.5	4.0	0.6	
29767.01	ND1	02-Apr-08	Mar-08	Client	1155	140	1.6		1.5	4.0	1.0	
30049.01	ND1	09-May-08	Apr-08	Client	0945	530	2.5		1.6	4.0	1.8	
30380.01	ND1	02-Jun-08	May-08	Client	1342	320	3.5		1.6	4.0	2.0	
30654.01	ND1	01-Jul-08	Jun-08	Client	1330	1115	4.2		1.7	4.0	2.6	
30896.01	ND1	04-Aug-08	Jul-08	Client	1000	640	3.1		1.8	4.0	1.5	
31204.01	ND1	01-Sep-08	Aug-08	Client	1030	890	1.2		1.8	4.0	1.0	
31522.01	ND1	02-Oct-08	Sep-08	Client	0830	1925	3.8		1.8	4.0	2.3	
31769.01	ND1	03-Nov-08	Oct-08	Client	1049	1365	28.6		2.6	4.0	5.9	
32017.01	ND1	03-Dec-08	Nov-08	Client	1115	1525	13.1		2.9	4.0	3.5	
32512.01	ND1	05-Jan-09	Dec-08	Client	0935	2770	2.2		2.9	4.0	1.3	
32240.01	ND1	02-Feb-09	Jan-09	Client	0930	595	3.2		2.9	4.0	1.7	
32857.01	ND1	02-Mar-09	Feb-09	Client	0815	2600	1.8		2.9	4.0	1.2	
2600 1003-00	ND1	01-Apr-09	Mar-09	ALS		15	0.6		2.8	4.0	0.4	Insects, Bird droppings
2600 1021-00	ND1	01-May-09	Apr-09	ALS		1000	1.4		2.8	4.0	0.7	Bird droppings
2600 1031-01	ND1	01-Jun-09	May-09	ALS		900	1.1		2.7	4.0	0.8	
2600 1041-01	ND1	06-Jul-09	Jun-09	ALS		350	0.4		2.7	4.0	0.3	Insects
2600 1053-01	ND1	03-Aug-09	Jul-09	ALS	0915	600	0.9		2.6	4.0	0.3	Insects, Bird Droppings, Plant Material
2600 1065-00	ND1	31-Aug-09	Aug-09	ALS	0925	100	64.4		4.0	4.0	55.8	Insects, Bird Droppings, Plant Material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
2600 1065-00	ND1	28-Sep-09	Sep-09	ALS	0925	800	18.9		2.6	4.0	15.3	Insects, Bird Droppings, Plant Material
2600 1125-00	ND1	03-Nov-09	Oct-09	ALS	1007	900	8.3		2.8	4.0	5.5	Insects, Bird Droppings, Plant Material
2600 1204-115	ND1	01-Dec-09	Nov-09	ALS	0950	100	7.0		2.9	4.0	2.9	Insects, Bird droppings
2600 1222-00	ND1	31-Dec-09	Dec-09	ALS	0955	2200	15.4		3.1	4.0	5.7	Insects, Plant Material
2600 1234-00	ND1	01-Feb-10	Jan-10	ALS	1120	2200	10.7		3.3	4.0	4.5	Insects, Bird Droppings, Plant Material
2600 1247-00	ND1	03-Mar-10	Feb-10	ALS	1030	1100	5.2		3.3	4.0	1.8	Insects, Bird Droppings, Plant Material
2600 1260	ND1	31-Mar-10	Mar-10	ALS	0945	500	1.3		3.3	4.0	0.9	Insects, Plant Material
2600 1268	ND1	28-Apr-10	Apr-10	ALS	0920	200	1.4		3.2	4.0	0.9	Insects, Plant Material
26001277	ND1	26-May-10	May-10	ALS	0905	300	1.3		3.2	4.0	1.0	Insects, Bird Droppings, Plant Material
2600-1288	ND1	23-Jun-10	Jun-10	ALS	1115	300	1.0		3.2	4.0	0.7	Insects, Bird Droppings, Plant Material
26001298	ND1	21-Jul-10	Jul-10	ALS	0940	800	1.4		3.1	4.0	0.8	Insects, Bird Droppings,Plant Material
26001309915	ND1	20-Aug-10	Aug-10	ALS	1355	2300	0.6		3.1	4.0	0.4	Insects, Plant material
26001319	ND1	20-Sep-10	Sep-10	ALS	1205	1200	0.9		3.0	4.0	0.6	Insects, Plant material
2600-1340-18	ND1	20-Oct-10	Oct-10	ALS	1135	800	0.7		3.0	4.0	0.4	
EN1002881-001	ND1	19-Nov-10	Nov-10	ALS	1208	1800	1.1		3.0	4.0	1.0	
EN1003078-001	ND1	21-Dec-10	Dec-10	ALS	0900	2000	1.5		2.9	4.0	0.9	
EN1100178-001	ND1	20-Jan-11	Jan-11	ALS	0945	750	1.1		2.9	4.0	0.7	
EN1100432-001	ND1	21-Feb-11	Feb-11	ALS	0915	200	1.1		2.9	4.0	0.6	
EN1100689-001	ND1	23-Mar-11	Mar-11	ALS	0930	600	1.4		2.9	4.0	1.0	
EN1100923-001	ND1	20-Apr-11	Apr-11	ALS	9:50	800	0.6		2.8	4.0	0.6	
EN1101164-001	ND1	19-May-11	May-11	ALS	9:40	0	0.1		2.8	4.0	0.1	Bird Droppings/Dry
EN1101450-001	ND1	17-Jun-11	Jun-11	ALS	9:40	1100	0.8		2.8	4.0	0.7	Plant material
EN1101813-001	ND1	18-Jul-11	Jul-11	ALS	9:45	80	1.3		2.7	4.0	0.7	Bird droppings
EN1102302-001	ND1	17-Aug-11	Aug-11	ALS	11:00	300	0.4		2.7	4.0	0.4	Insects, plant material
EN1102771-001	ND1	16-Sep-11	Sep-11	ALS	10:46	800	0.8		2.7	4.0	0.5	Insects, plant material
EN1103120-001	ND1	17-Oct-11	Oct-11	ALS	10:50	1100	1.0		2.6	4.0	0.8	Insects, plant material
EN1103469-001	ND1	15-Nov-11	Nov-11	ALS	9:45	900	5.0		2.7	4.0	2.8	Insects, bird droppings, plan material
EN1104231-001	ND1	15-Dec-11	Dec-11	ALS	10:00	2500	4.7		2.7	4.0	1.0	Insects, bird droppings, plan material
EN1200254-001	ND1	16-Jan-12	Jan-12	ALS	9:50	1200	3.6		2.7	4.0	1.7	Insects, plant material
EN1200646-001	ND1	15-Feb-12	Feb-12	ALS	9:50	2500	0.9		2.7	4.0	0.5	Insects, plant material
EN1201072-001	ND1	16-Mar-12	Mar-12	ALS	11:00	800	1.4		2.7	4.0	1.0	Insects, plant material
EN1201470-001	ND1	17-Apr-12	Apr-12	ALS	11:10	200	6.7		2.7	4.0	1.3	Insects, bird droppings, plan material
EN1201863-001	ND1	17-May-12	May-12	ALS	12:20	600	2.9		2.7	4.0	1.9	Insects, plant material
EN1202257-001	ND1	18-Jun-12	Jun-12	ALS	11:00	900	2.7		2.7	4.0	1.4	Insects, plant material
EN1202680-001	ND1	18-Jul-12	Jul-12	ALS	12:30	1100	1.8		2.7	4.0	1.1	Insects, plant material
EN1203132-001	ND1	17-Aug-12	Aug-12	ALS	10:50	100	1.3		2.7	4.0	0.9	Insects, bird droppings, plan material
EN1203603-001	ND1	18-Sep-12	Sep-12	ALS	13:40	100	3.4		2.7	4.0	1.0	Insects, plant material
EN1203994-001	ND1	18-Oct-12	Oct-12	ALS	12:30	500	2.9		2.7	4.0	1.8	Insects, plant material
EN1204421-001	ND1	19-Nov-12	Nov-12	ALS	13:20	250	1.2		2.7	4.0	0.7	Insects, plant material
EN1204843-001	ND1	19-Dec-12	Dec-12	ALS	12:00	100	2.2		2.7	4.0	1.2	Insects, bird droppings, plant material
EN1300222-001	ND1	17-Jan-13	Jan-13	ALS	14:15	400	2.5		2.7	4.0	1.5	Insects, bird droppings, plant material
EN1300661-001	ND1	15-Feb-13	Feb-13	ALS	11:30	1900	3.0		2.7	4.0	1.5	Insects, plant material
EN1301080-001	ND1	15-Mar-13	Mar-13	ALS	14:00	1500	3.0		2.7	4.0	0.9	Insects, plant material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
EN1301429-001	ND1	15-Apr-13	Apr-13	ALS	12:25	250	2.5	2.5	2.7	4.0	1.0	Insects, plant material
EN1301803-001	ND1	15-May-13	May-13	ALS	11:45	300	1.2	1.9	2.7	4.0	0.6	Insects, plant material
EN1302214-001	ND1	14-Jun-13	Jun-13	ALS	11:30	900	5.4	3.0	2.7	4.0	2.5	Insects, plant material
EN1302597-001	ND1	15-Jul-13	Jul-13	ALS	9:40	500	7.3	4.1	2.8	4.0	2.1	Insects, bird droppings, plant material
EN1303005-003	ND1	14-Aug-13	Aug-13	ALS	11:25	350	1.0	3.5	2.7	4.0	0.5	Insects, bird droppings, plant material
EN1303432-003	ND1	13-Sep-13	Sep-13	ALS	12:50	100	1.2	3.1	2.7	4.0	0.8	Insects, plant material
EN1303774-003	ND1	14-Oct-13	Oct-13	ALS	11:40	350	1.5	2.9	2.7	4.0	0.8	Insects, plant material
EN1304181-001	ND1	13-Nov-13	Nov-13	ALS	12:30	200	1.7	2.7	2.7	4.0	0.8	Insects, plant material, Smokey 18/10/2013, 27/10/2013, 4&6/11/2013
EN1304646-001	ND1	13-Dec-13	Dec-13	ALS	11:15	650	0.9	2.5	2.7	4.0	0.7	Insects, bird droppings, plant material
EN1400142-001	ND1	13-Jan-14	Jan-14	ALS	10:40	100	1.8	2.5	2.7	4.0	0.9	Insects, bird droppings, plant material
26001877-001	ND1	12-Feb-14	Feb-14	ALS	11:00	150	2.0	2.4	2.7	4.0	0.9	Insects, bird droppings, plant material
26001889-001	ND1	13-Mar-14	Mar-14	ALS	9:05	750	2.1	2.4	2.7	4.0	0.4	Plant material



Deposited Dust - ND2 "Claremont"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
21959.02	ND2	05-Jan-06	Dec-05	Client	1105	2750	1.1		1.1	4.0	0.8	
22569.02	ND2	03-Feb-06	Jan-06	Client	1355	475	1.6		1.4	4.0	1.0	
22720.02	ND2	09-Mar-06	Feb-06	Client	1245	1175	1.5		1.4	4.0	1.2	
23204.02	ND2	03-Apr-06	Mar-06	Client	1055	225	4.4		2.2	4.0	2.0	
23295.02	ND2	02-May-06	Apr-06	Client	0900	775	1.1		1.9	4.0	0.6	
23630.02	ND2	02-Jun-06	May-06	Client	0840	<10	1.1		1.8	4.0	0.6	
23882.02	ND2	28-Jun-06	Jun-06	Client	1650	800	1.9		1.8	4.0	1.5	
24078.02	ND2	31-Jul-06	Jul-06	Client	0923	1700	0.7		1.7	4.0	0.6	
24412.02	ND2	30-Aug-06	Aug-06	Client	1407	40	2.8		1.8	4.0	1.9	
24689.02	ND2	03-Oct-06	Sep-06	Client	1422	750	1.7		1.8	4.0	0.8	
24973.02	ND2	02-Nov-06	Oct-06	Client	1341	450	1.4		1.8	4.0	1.0	
25439.02	ND2	04-Dec-06	Nov-06	Client	1310	950	8.8		2.3	4.0	6.7	
25536.02	ND2	02-Jan-07	Dec-06	Client	1155	750	4.0		2.5	4.0	2.3	
25839.02	ND2	02-Feb-07	Jan-07	Client	1220	320	1.1		2.4	4.0	0.7	
26116.02	ND2	05-Mar-07	Feb-07	Client	1345	1080	5.0		2.5	4.0	3.9	
26423.02	ND2	03-Apr-07	Mar-07	Client	0955	200	0.9		2.4	4.0	0.5	
26626.02	ND2	02-May-07	Apr-07	Client	1100	400	1.1		2.4	4.0	0.7	
26955.02	ND2	05-Jun-07	May-07	Client	1145	1350	1.0		2.3	4.0	0.9	
27229.02	ND2	02-Jul-07	Jun-07	Client	1215	1565	0.2		2.2	4.0	0.2	
27526.02	ND2	03-Aug-07	Jul-07	Client	0835	210	0.4		2.1	4.0	0.3	
28113.02	ND2	04-Oct-07	Sep-07	Client	1140	50	0.5		2.0	4.0	0.3	
28392.02	ND2	05-Nov-07	Oct-07	Client	1500	635	1.1		2.0	4.0	0.7	
28656.02	ND2	04-Dec-07	Nov-07	Client	1130	1140	0.9		1.9	4.0	0.6	
28917.02	ND2	03-Jan-08	Dec-07	Client	1440	1800	1.0		1.9	4.0	0.6	
29219.02	ND2	04-Feb-08	Jan-08	Client	1325	1410	0.5		1.8	4.0	0.4	
29219.02	ND2	03-Mar-08	Feb-08	Client	1045	2065	0.8		1.8	4.0	0.4	
29767.02	ND2	02-Apr-08	Mar-08	Client	1110	85	3.7		1.9	4.0	1.2	
30049.02	ND2	09-May-08	Apr-08	Client	0855	480	1.1		1.8	4.0	0.8	
30380.02	ND2	02-Jun-08	May-08	Client	1230	175	2.6		1.9	4.0	2.0	
30654.02	ND2	01-Jul-08	Jun-08	Client	1225	1075	1.7		1.9	4.0	1.4	
30896.02	ND2	04-Aug-08	Jul-08	Client	1010	625	0.6		1.8	4.0	0.5	
31204.02	ND2	01-Sep-08	Aug-08	Client	1040	980	0.5		1.8	4.0	0.4	
31522.02	ND2	02-Oct-08	Sep-08	Client	0840	1815	1.4		1.8	4.0	0.8	
31769.02	ND2	03-Nov-08	Oct-08	Client	1106	1080	0.8		1.7	4.0	0.8	
32017.02	ND2	03-Dec-08	Nov-08	Client	1200	1675	1.6		1.7	4.0	1.0	
32512.02	ND2	05-Jan-09	Dec-08	Client	0943	2765	1.3		1.7	4.0	1.0	
32240.02	ND2	02-Feb-09	Jan-09	Client	0950	635	2.3		1.7	4.0	1.9	
32857.02	ND2	02-Mar-09	Feb-09	Client	0845	2580	1.9		1.7	4.0	1.4	
2600 1003-00	ND2	01-Apr-09	Mar-09	ALS		15	13.8		2.0	4.0	6.6	Insects, Bird droppings
2600 1021-00	ND2	01-May-09	Apr-09	ALS		1000	0.6		2.0	4.0	0.4	Insects, Bird droppings
2600 1031-01	ND2	01-Jun-09	May-09	ALS		900	0.8		2.0	4.0	0.6	
2601 1041-01	ND2	06-Jul-09	Jun-09	ALS		400	0.5		1.9	4.0	0.3	Insects
2601 1053-01	ND2	03-Aug-09	Jul-09	ALS	0920	550	0.4		1.9	4.0	0.3	Insects, Bird Droppings, Plant Material
2600 1065-00	ND2	31-Aug-09	Aug-09	ALS	0935	100	2.2		1.9	4.0	1.7	Insects, Plant Material

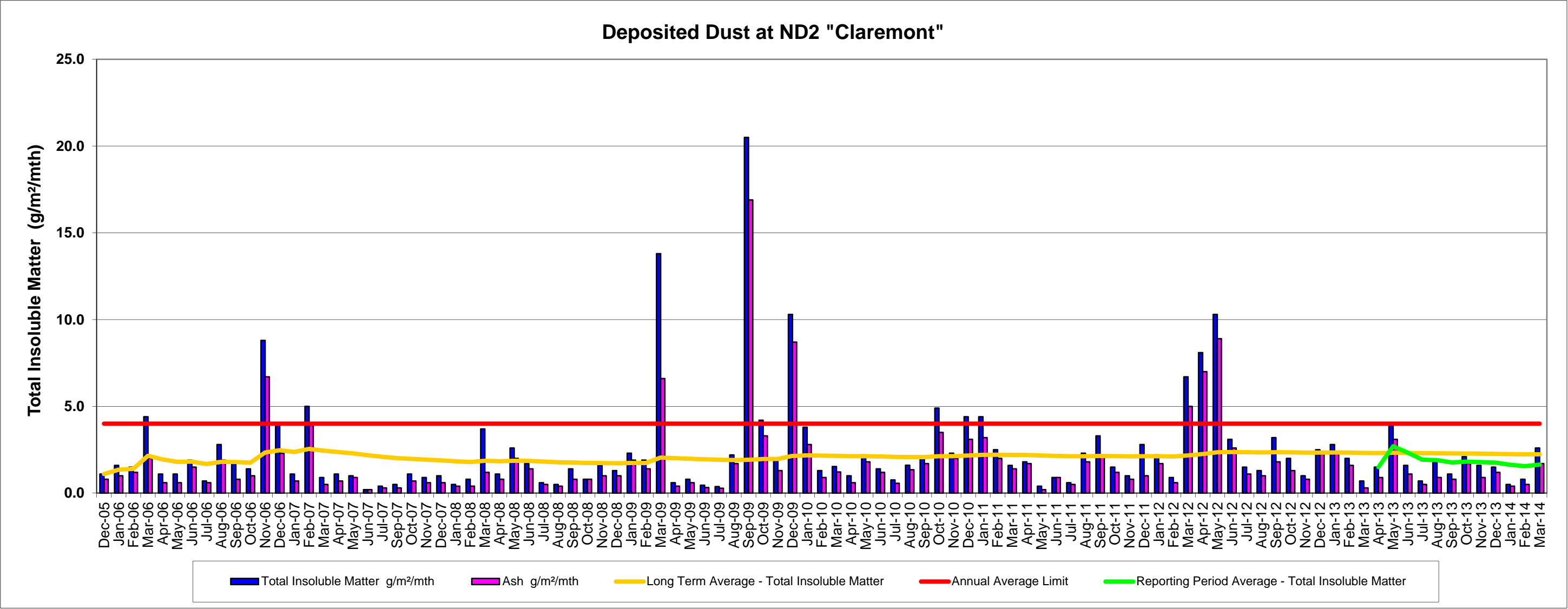


**AEMR/Annual Review 2013/2014**  
*Appendix 4*

**Narrabri Coal Operations Pty Ltd**  
*Deposited Dust Results*

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
2600 1065-00	ND2	28-Sep-09	Sep-09	ALS	1300	1000	20.5		1.9	4.0	16.9	Insects, Plant Material
2600 1125-00	ND2	03-Nov-09	Oct-09	ALS	1012	900	4.2		2.0	4.0	3.3	Insects, Bird Droppings
2600 1204-115	ND2	01-Dec-09	Nov-09	ALS	0956	100	1.9		2.0	4.0	1.3	Insects
2600 1222-00	ND2	31-Dec-09	Dec-09	ALS	1030	2400	10.3		2.1	4.0	8.7	Insects
2600 1234-00	ND2	01-Feb-10	Jan-10	ALS	1125	2200	3.8		2.2	4.0	2.8	Insects, Plant Material
2600 1247-00	ND2	03-Mar-10	Feb-10	ALS	1035	1100	1.3		2.2	4.0	0.9	Insects, Plant Material
2600 1260	ND2	31-Mar-10	Mar-10	ALS	0955	600	1.5		2.1	4.0	1.2	Insects, Plant Material
2600 1268	ND2	28-Apr-10	Apr-10	ALS	0925	150	1.0		2.1	4.0	0.6	Insects, Plant Material
26001277	ND2	26-May-10	May-10	ALS	0920	300	2.2		2.1	4.0	1.8	Insects
2600-1288	ND2	23-Jun-10	Jun-10	ALS	1110	300	1.4		2.1	4.0	1.2	Plant Material
26001298	ND2	21-Jul-10	Jul-10	ALS	0945	800	0.8		2.1	4.0	0.6	Insects,Plant Material
26001309915	ND2	20-Aug-10	Aug-10	ALS	1405	2300	1.6		2.1	4.0	1.3	Insects, Plant material
26001319	ND2	20-Sep-10	Sep-10	ALS	1220	1400	2.0		2.1	4.0	1.7	Insects, Plant material
2600-1340-18	ND2	20-Oct-10	Oct-10	ALS	1150	800	4.9		2.1	4.0	3.5	
EN1002881-002	ND2	19-Nov-10	Nov-10	ALS	1215	1800	2.3		2.1	4.0	2.0	
EN1003078-002	ND2	21-Dec-10	Dec-10	ALS	0910	2000	4.4		2.2	4.0	3.1	
EN1100178-002	ND2	20-Jan-11	Jan-11	ALS	0955	500	4.4		2.2	4.0	3.2	
EN1100432-002	ND2	21-Feb-11	Feb-11	ALS	0920	300	2.5		2.2	4.0	2.0	
EN1100689-002	ND2	23-Mar-11	Mar-11	ALS	1020	400	1.6		2.2	4.0	1.4	
EN1100923-002	ND2	20-Apr-11	Apr-11	ALS	10:00	600	1.8		2.2	4.0	1.7	
EN1101164-002	ND2	19-May-11	May-11	ALS	9:55	0	0.4		2.2	4.0	0.2	Dry
EN1101450-002	ND2	17-Jun-11	Jun-11	ALS	10:00	1100	0.9		2.1	4.0	0.9	Insects, plant material
EN1101813-002	ND2	18-Jul-11	Jul-11	ALS	10:20	50	0.6		2.1	4.0	0.5	Insects, plant material
EN1102302-002	ND2	17-Aug-11	Aug-11	ALS	11:20	300	2.3		2.1	4.0	1.8	Insects, bird droppings, plant material
EN1102771-002	ND2	16-Sep-11	Sep-11	ALS	10:54	800	3.3		2.1	4.0	2.2	Insects, plant material
EN1103120-002	ND2	17-Oct-11	Oct-11	ALS	11:00	1300	1.5		2.1	4.0	1.2	Insects, plant material
EN1103469-002	ND2	15-Nov-11	Nov-11	ALS	9:55	900	1.0		2.1	4.0	0.8	Insects, plant material
EN1104231-002	ND2	15-Dec-11	Dec-11	ALS	10:10	2500	2.8		2.1	4.0	1.0	Insects, bird droppings, plan material
EN1200254-002	ND2	16-Jan-12	Jan-12	ALS	10:10	1200	2.2		2.1	4.0	1.7	Insects, plant material
EN1200646-002	ND2	15-Feb-12	Feb-12	ALS	10:10	2500	0.9		2.1	4.0	0.6	Insects, plant material
EN1201072-002	ND2	16-Mar-12	Mar-12	ALS	11:10	800	6.7		2.2	4.0	5.0	Insects, plant material
EN1201470-002	ND2	17-Apr-12	Apr-12	ALS	11:20	200	8.1		2.3	4.0	7	Insects, plant material
EN1201863-002	ND2	17-May-12	May-12	ALS	11:35	600	10.3		2.4	4.0	8.9	Insects, plant material
EN1202257-002	ND2	18-Jun-12	Jun-12	ALS	11:10	900	3.1		2.4	4.0	2.6	Insects, plant material
EN1202680-002	ND2	18-Jul-12	Jul-12	ALS	12:45	1100	1.5		2.4	4.0	1.1	Insects, plant material
EN1203132-002	ND2	17-Aug-12	Aug-12	ALS	11:00	100	1.3		2.3	4.0	1.0	Insects, plant material
EN1203603-002	ND2	18-Sep-12	Sep-12	ALS	13:20	100	3.2		2.4	4.0	1.8	Insects, plant material
EN1203994-002	ND2	18-Oct-12	Oct-12	ALS	12:00	500	2.0		2.3	4.0	1.3	Insects, plant material
EN1204421-002	ND2	19-Nov-12	Nov-12	ALS	12:50	250	1.0		2.3	4.0	0.8	Insects, plant material
EN1204843-002	ND2	19-Dec-12	Dec-12	ALS	11:40	200	2.5		2.3	4.0	2.3	Insects, plant material
EN1300222-002	ND2	17-Jan-13	Jan-13	ALS		400	2.8		2.3	4.0	2.3	Insects, plant material
EN1300661-002	ND2	15-Feb-13	Feb-13	ALS	12:20	2000	2.0		2.3	4.0	1.6	Insects, plant material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
EN1301080-002	ND2	15-Mar-13	Mar-13	ALS	13:50	1600	0.7		2.3	4.0	0.3	Insects, plant material
EN1301429-002	ND2	15-Apr-13	Apr-13	ALS	12:35	250	1.5	1.5	2.3	4.0	0.9	Insects, plant material
EN1301803-002	ND2	15-May-13	May-13	ALS	11:15	300	3.9	2.7	2.3	4.0	3.1	Insects, bird droppings, plan material
EN1302214-002	ND2	14-Jun-13	Jun-13	ALS	11:00	1050	1.6	2.3	2.3	4.0	1.1	Insects, bird droppings, plan material
EN1302597-002	ND2	15-Jul-13	Jul-13	ALS	9:50	500	0.7	1.9	2.3	4.0	0.5	Insects, plant material
EN1303005-001	ND2	14-Aug-13	Aug-13	ALS	10:45	350	1.8	1.9	2.3	4.0	0.9	Insects, plant material
EN1303432-001	ND2	13-Sep-13	Sep-13	ALS	12:15	100	1.1	1.8	2.3	4.0	0.8	Insects, plant material
EN1303774-001	ND2	14-Oct-13	Oct-13	ALS	11:15	350	2.1	1.8	2.3	4.0	1.7	Insects, plant material
EN1304181-002	ND2	13-Nov-13	Nov-13	ALS	12:15	200	1.6	1.8	2.3	4.0	0.9	Insects, plant material
EN1304646-002	ND2	13-Dec-13	Dec-13	ALS	11:30	650	1.5	1.8	2.3	4.0	1.2	Insects, plant material
EN1400142-002	ND2	14-Jan-14	Jan-14	ALS	10:25	100	0.5	1.6	2.2	4.0	0.4	Insects, plant material
26001877-002	ND2	12-Feb-14	Feb-14	ALS	10:45	100	0.8	1.6	2.2	4.0	0.5	Insects, plant material
26001889-002	ND2	13-Mar-14	Mar-14	ALS	9:35	750	2.6	1.6	2.2	4.0	1.7	Insects, plant material

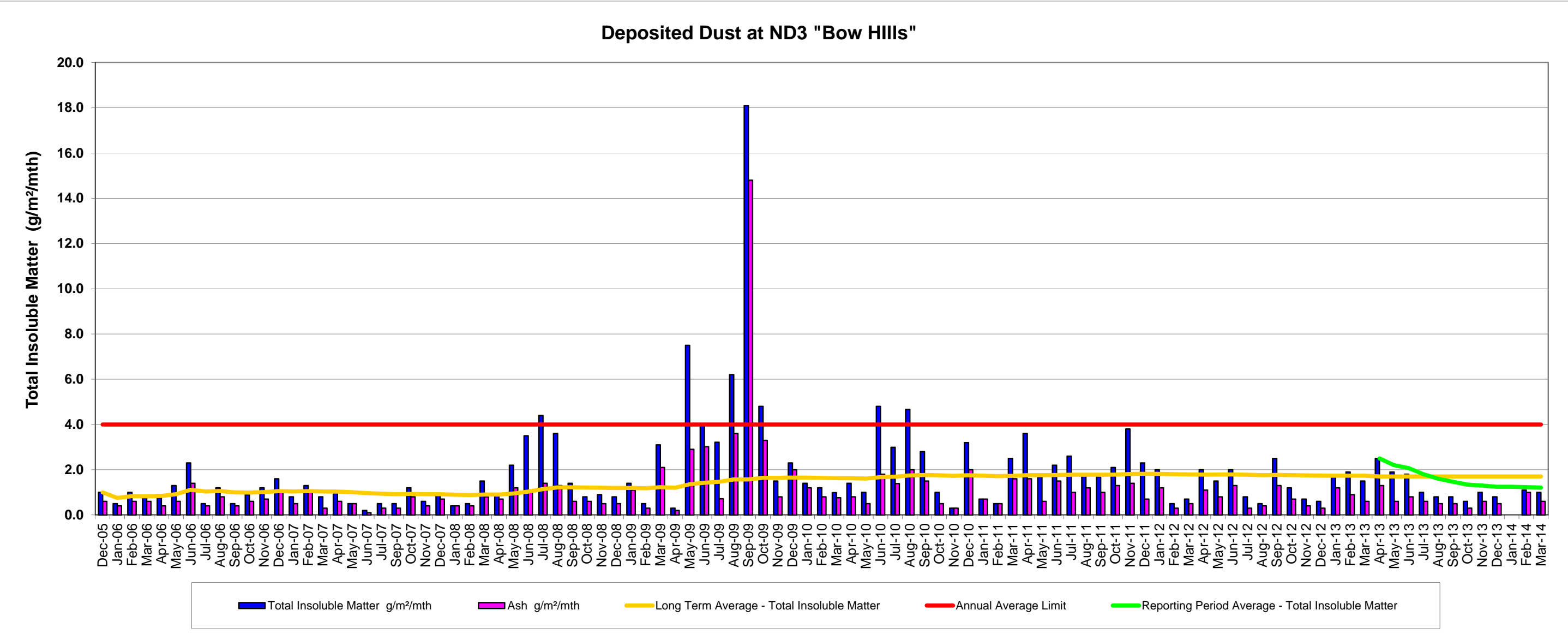


Deposited Dust - ND3 "Bow Hills"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
21959.03	ND3	05-Jan-06	Dec-05	Client	1040	2550	1.0		1.0	4.0	0.6	
22569.03	ND3	03-Feb-06	Jan-06	Client	1340	475	0.5		0.8	4.0	0.4	
22720.03	ND3	09-Mar-06	Feb-06	Client	1235	1285	1.0		0.8	4.0	0.6	
23204.03	ND3	03-Apr-06	Mar-06	Client	1100	350	0.8		0.8	4.0	0.6	
23295.03	ND3	02-May-06	Apr-06	Client	0845	700	0.9		0.8	4.0	0.4	
23630.03	ND3	02-Jun-06	May-06	Client	0815	<10	1.3		0.9	4.0	0.6	
23882.03	ND3	28-Jun-06	Jun-06	Client	1630	660	2.3		1.1	4.0	1.4	
24078.03	ND3	31-Jul-06	Jul-06	Client	0930	1550	0.5		1.0	4.0	0.4	
24412.03	ND3	30-Aug-06	Aug-06	Client	1502	75	1.2		1.1	4.0	0.8	
24689.03	ND3	03-Oct-06	Sep-06	Client	1059	700	0.5		1.0	4.0	0.4	
24973.03	ND3	02-Nov-06	Oct-06	Client	1352	365	0.9		1.0	4.0	0.6	
25439.03	ND3	04-Dec-06	Nov-06	Client	1215	770	1.2		1.0	4.0	0.7	
25536.03	ND3	02-Jan-07	Dec-06	Client	1130	600	1.6		1.1	4.0	1.1	
25839.03	ND3	02-Feb-07	Jan-07	Client	1115	560	0.8		1.0	4.0	0.5	
26116.03	ND3	05-Mar-07	Feb-07	Client	1255	890	1.3		1.1	4.0	1.0	
26423.03	ND3	03-Apr-07	Mar-07	Client	0900	220	0.8		1.0	4.0	0.3	
26626.03	ND3	02-May-07	Apr-07	Client	1050	500	1.0		1.0	4.0	0.6	
26955.03	ND3	05-Jun-07	May-07	Client	1100	1285	0.5		1.0	4.0	0.5	
27229.03	ND3	02-Jul-07	Jun-07	Client	1405	1350	0.2		1.0	4.0	0.1	
27526.03	ND3	03-Aug-07	Jul-07	Client	0950	265	0.5		0.9	4.0	0.3	
28113.03	ND3	04-Oct-07	Sep-07	Client	1250	25	0.5		0.9	4.0	0.3	
28392.03	ND3	05-Nov-07	Oct-07	Client	1545	785	1.2		0.9	4.0	0.8	
28656.03	ND3	04-Dec-07	Nov-07	Client	1255	1370	0.6		0.9	4.0	0.4	
28917.03	ND3	03-Jan-08	Dec-07	Client	1545	1560	0.9		0.9	4.0	0.7	
29219.03	ND3	04-Feb-08	Jan-08	Client	1400	1365	0.4		0.9	4.0	0.4	
29219.03	ND3	03-Mar-08	Feb-08	Client	1630	1885	0.5		0.9	4.0	0.4	
29767.03	ND3	02-Apr-08	Mar-08	Client	1210	130	1.5		0.9	4.0	0.8	
30049.03	ND3	09-May-08	Apr-08	Client	1005	405	0.9		0.9	4.0	0.7	
30380.03	ND3	02-Jun-08	May-08	Client	1400	220	2.2		0.9	4.0	1.2	
30654.03	ND3	01-Jul-08	Jun-08	Client	1350	1060	3.5		1.0	4.0	1.0	
30896.03	ND3	04-Aug-08	Jul-08	Client	1055	685	4.4		1.1	4.0	1.4	
31204.03	ND3	01-Sep-08	Aug-08	Client	1147	945	3.6		1.2	4.0	1.3	
31522.03	ND3	02-Oct-08	Sep-08	Client	1000	1645	1.4		1.2	4.0	0.6	
31769.03	ND3	03-Nov-08	Oct-08	Client	1222	1395	0.8		1.2	4.0	0.6	
32017.03	ND3	03-Dec-08	Nov-08	Client	1106	1710	0.9		1.2	4.0	0.5	
32512.03	ND3	05-Jan-09	Dec-08	Client	1108	2760	0.8		1.2	4.0	0.5	
32240.03	ND3	02-Feb-09	Jan-09	Client	1145	465	1.4		1.2	4.0	1.1	
32857.03	ND3	02-Mar-09	Feb-09	Client	1118	2420	0.5		1.2	4.0	0.3	
2600 1003-00	ND3	01-Apr-09	Mar-09	ALS		100	3.1		1.2	4.0	2.1	Insects
2600 1021-00	ND3	01-May-09	Apr-09	ALS		800	0.3		1.2	4.0	0.2	
2600 1031-01	ND3	01-Jun-09	May-09	ALS		800	7.5		1.4	4.0	2.9	Bird droppings, plant material
2602 1041-01	ND3	06-Jul-09	Jun-09	ALS		350	4.0		1.4	4.0	3.0	Bird Droppings, Insects
2602 1053-01	ND3	03-Aug-09	Jul-09	ALS	1100	450	3.2		1.5	4.0	0.7	Insects, Bird Droppings, Plant Material
2600 1065-00	ND3	31-Aug-09	Aug-09	ALS	1155	100	6.2		1.6	4.0	3.6	Insects, Bird Droppings, Plant Material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
2600 1065-00	ND3	28-Sep-09	Sep-09	ALS	1451	600	18.1		1.6	4.0	14.8	Insects, Bird Droppings
2600 1125-00	ND3	03-Nov-09	Oct-09	ALS	1111	700	4.8		1.6	4.0	3.3	Insects, Plant Material
2600 1204-115	ND3	01-Dec-09	Nov-09	ALS	1155	100	1.5		1.6	4.0	0.8	Bird droppings, Plant Material
2600 1222-00	ND3	31-Dec-09	Dec-09	ALS	1142	2300	2.3		1.7	4.0	2.0	Insects
2600 1234-00	ND3	01-Feb-10	Jan-10	ALS	1220	2200	1.4		1.6	4.0	1.2	Insects
2600 1247-00	ND3	03-Mar-10	Feb-10	ALS	1240	1200	1.2		1.6	4.0	0.8	Insects, Plant Material
2600 1260	ND3	31-Mar-10	Mar-10	ALS	1230	500	1.0		1.6	4.0	0.8	Insects, Plant Material
2600 1268	ND3	28-Apr-10	Apr-10	ALS	1140	150	1.4		1.6	4.0	0.8	Insects, Plant Material
26001277	ND3	26-May-10	May-10	ALS	1155	300	1.0		1.6	4.0	0.5	Insects
2600-1288	ND3	23-Jun-10	Jun-10	ALS	0935	500	4.8		1.7	4.0	1.8	Insects, Bird Droppings, Plant Material
26001298	ND3	21-Jul-10	Jul-10	ALS	1215	750	3.0		1.7	4.0	1.4	Bird Droppings
26001309915	ND3	20-Aug-10	Aug-10	ALS	1510	2000	4.7		1.7	4.0	2.0	Insects, Plant material
26001319	ND3	20-Sep-10	Sep-10	ALS	1340	1300	2.8		1.8	4.0	1.5	Insects, Plant material
2600-1340-18	ND3	20-Oct-10	Oct-10	ALS	1340	800	1.0		1.8	4.0	0.5	
EN1002881-003	ND3	19-Nov-10	Nov-10	ALS	1300	1500	0.3		1.7	4.0	0.3	
EN1003078-003	ND3	21-Dec-10	Dec-10	ALS	1025	2000	3.2		1.8	4.0	2.0	
EN1100178-003	ND3	20-Jan-11	Jan-11	ALS	1100	1000	0.7		1.7	4.0	0.7	
EN1100432-003	ND3	21-Feb-11	Feb-11	ALS	1050	400	0.5		1.7	4.0	0.5	
EN1100689-003	ND3	23-Mar-11	Mar-11	ALS	1135	350	2.5		1.7	4.0	1.6	
EN1100923-003	ND3	20-Apr-11	Apr-11	ALS	11:00	800	3.6		1.8	4.0	1.6	Bird Droppings on funnel
EN1101164-003	ND3	19-May-11	May-11	ALS	11:00	50	1.8		1.8	4.0	0.6	Bird Droppings/Plant matter
EN1101450-003	ND3	17-Jun-11	Jun-11	ALS	12:00	1000	2.2		1.8	4.0	1.5	Bird droppings, plant material
EN1101813-003	ND3	18-Jul-11	Jul-11	ALS	12:00	80	2.6		1.8	4.0	1.0	Bird droppings
EN1102302-003	ND3	17-Aug-11	Aug-11	ALS	13:20	300	1.8		1.8	4.0	1.2	Insects, bird droppings, plant material
EN1102771-003	ND3	16-Sep-11	Sep-11	ALS	11:49	800	1.7		1.8	4.0	1.0	Insects, bird droppings, plant material
EN1103120-003	ND3	17-Oct-11	Oct-11	ALS	12:10	1100	2.1		1.8	4.0	1.3	Insects, plant material
EN1103469-003	ND3	15-Nov-11	Nov-11	ALS	10:50	900	3.8		1.8	4.0	1.4	Insects, bird droppings, plan material
EN1104231-003	ND3	15-Dec-11	Dec-11	ALS	11:10	2500	2.3		1.8	4.0	0.7	Insects, plant material
EN1200254-003	ND3	16-Jan-12	Jan-12	ALS	11:45	900	2.0		1.8	4.0	1.2	Insects, plant material
EN1200646-003	ND3	15-Feb-12	Feb-12	ALS	11:35	2500	0.5		1.8	4.0	0.3	Insects, plant material
EN1201072-003	ND3	16-Mar-12	Mar-12	ALS	12:05	800	0.7		1.8	4.0	0.5	Insects, plant material
EN1201470-003	ND3	17-Apr-12	Apr-12	ALS	12:15	200	2		1.8	4.0	1.1	Insects, plant material
EN1201863-003	ND3	17-May-12	May-12	ALS	10:35	600	1.5		1.8	4.0	0.8	Insects, plant material
EN1202257-003	ND3	18-Jun-12	Jun-12	ALS	12:30	900	2		1.8	4.0	1.3	Insects, plant material
EN1202680-003	ND3	18-Jul-12	Jul-12	ALS	14:10	1100	0.8		1.8	4.0	0.3	Insects, bird droppings, plan material
EN1203132-003	ND3	17-Aug-12	Aug-12	ALS	11:10	100	0.5		1.8	4.0	0.4	Insects, bird droppings, plan material
EN1203603-003	ND3	18-Sep-12	Sep-12	ALS	12:10	100	2.5		1.8	4.0	1.3	Insects, bird droppings, plan material
EN1203994-003	ND3	18-Oct-12	Oct-12	ALS	11:30	500	1.2		1.8	4.0	0.7	Insects, plant material
EN1204421-003	ND3	19-Nov-12	Nov-12	ALS	11:50	400	0.7		1.7	4.0	0.4	Insects, bird droppings blocked funnel, plant material
EN1204843-003	ND3	19-Dec-12	Dec-12	ALS	10:45	100	0.6		1.7	4.0	0.3	Insects, bird droppings, plant material
EN1300222-003	ND3	17-Jan-13	Jan-13	ALS	12:45	400	1.7		1.7	4.0	1.2	Insects, plant material
EN1300661-003	ND3	15-Feb-13	Feb-13	ALS	10:50	1950	1.9		1.7	4.0	0.9	Insects, plant material

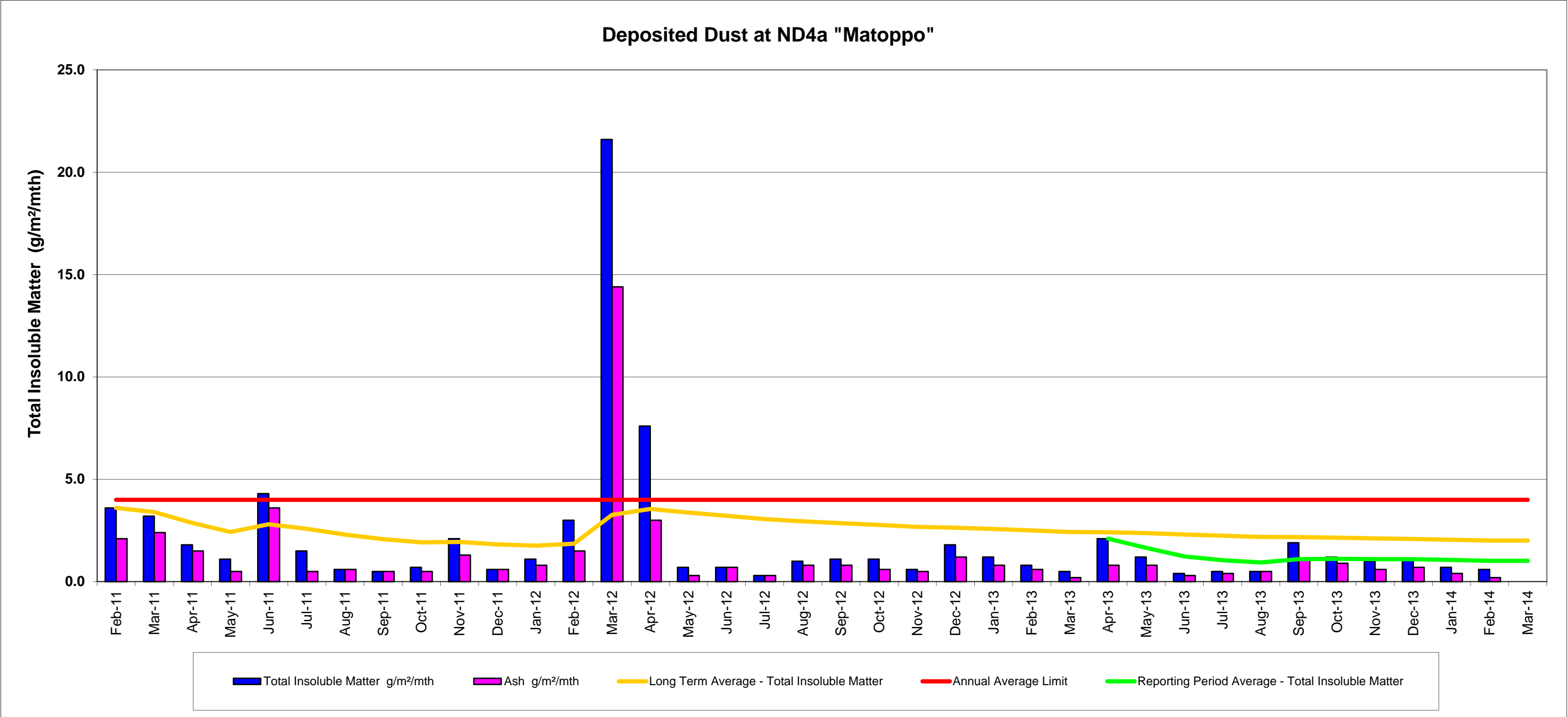
Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
EN1301080-003	ND3	15-Mar-13	Mar-13	ALS	12:40	900	1.5		1.7	4.0	0.6	Insects, plant material
EN1301429-003	ND3	15-Apr-13	Apr-13	ALS	13:40	250	2.5	2.5	1.7	4.0	1.3	Insects, plant material
EN1301803-003	ND3	15-May-13	May-13	ALS	10:00	250	1.9	2.2	1.7	4.0	0.6	Insects, bird droppings, plant material
EN1302214-003	ND3	14-Jun-13	Jun-13	ALS	9:35	800	1.8	2.1	1.7	4.0	0.8	Insects, bird droppings, plant material
EN1302597-003	ND3	15-Jul-13	Jul-13	ALS	11:30	450	1.0	1.8	1.7	4.0	0.6	Insects, plant material
EN1303005-006	ND3	14-Aug-13	Aug-13	ALS	9:10	350	0.8	1.6	1.7	4.0	0.5	Insects, bird droppings, plant material
EN1303432-006	ND3	13-Sep-13	Sep-13	ALS	11:00	150	0.8	1.5	1.7	4.0	0.5	Insects, bird droppings, plant material
EN1303774-006	ND3	14-Oct-13	Oct-13	ALS	9:55	350	0.6	1.3	1.7	4.0	0.3	Insects, bird droppings, plant material
EN1304181-003	ND3	13-Nov-13	Nov-13	ALS	9:45	250	1.0	1.3	1.7	4.0	0.6	Insects, plant material
EN1304646-003	ND3	13-Dec-13	Dec-13	ALS	9:50	650	0.8	1.2	1.7	4.0	0.5	Insects, plant material
EN1400142-003	ND3	13-Jan-14	Jan-14	ALS	8:55	150		1.2	1.7	4.0		Insects, plant material, broken bottle in funnel
26001877-003	ND3	12-Feb-14	Feb-14	ALS	9:10	100	1.1	1.2	1.7	4.0	1.0	Insects, plant material
26001889-003	ND3	13-Mar-14	Mar-14	ALS	11:00	750	1.0	1.2	1.7	4.0	0.6	Insects, plant material



Deposited Dust - ND4a "Matoppo"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
EN1100432-009	ND4a	21-Feb-11	Feb-11	ALS	10:30	600	3.6		3.6	4.0	2.1	
EN1100689-009	ND4a	23-Mar-11	Mar-11	ALS	11:00	200	3.2		3.4	4.0	2.4	
EN1100923-009	ND4a	20-Apr-11	Apr-11	ALS	10:50	200	1.8		2.9	4.0	1.5	
EN1101164-009	ND4a	19-May-11	May-11	ALS	10:40	0	1.1		2.4	4.0	0.5	Dry
EN1101450-009	ND4a	17-Jun-11	Jun-11	ALS	11:40	1000	4.3		2.8	4.0	3.6	Plant material
EN1101813-009	ND4a	18-Jul-11	Jul-11	ALS	11:50	50	1.5		2.6	4.0	0.5	Insects, bird droppings
EN1102302-009	ND4a	17-Aug-11	Aug-11	ALS	12:35	300	0.6		2.3	4.0	0.6	Insects, plant material
EN1102771-009	ND4a	16-Sep-11	Sep-11	ALS	11:35	800	0.5		2.1	4.0	0.5	Insects, plant material
EN1103120-009	ND4a	17-Oct-11	Oct-11	ALS	11:50	900	0.7		1.9	4.0	0.5	Insects, plant material
EN1103469-009	ND4a	15-Nov-11	Nov-11	ALS	10:40	900	2.1		1.9	4.0	1.3	Insects, plant material
EN1104231-009	ND4a	15-Dec-11	Dec-11	ALS	11:03	2500	0.6		1.8	4.0	0.6	Insects, bird droppings, plan material
EN1200254-009	ND4a	16-Jan-12	Jan-12	ALS	11:30	700	1.1		1.8	4.0	0.8	Insects, plant material
EN1200646-009	ND4a	15-Feb-12	Feb-12	ALS	11:25	2500	3.0		1.9	4.0	1.5	Insects, plant material
EN1201072-008	ND4a	16-Mar-12	Mar-12	ALS	12:00	600	21.6		3.3	4.0	14.4	Insects, plant material
EN1201470-008	ND4a	17-Apr-12	Apr-12	ALS	12:10	100	7.6		3.6	4.0	3	Insects, bird droppings, plant material, dead frog in bottle
EN1201863-008	ND4a	17-May-12	May-12	ALS	10:50	600	0.7		3.4	4.0	0.3	Insects, plant material
EN1202257-008	ND4a	18-Jun-12	Jun-12	ALS	12:15	800	0.7		3.2	4.0	0.7	Insects, plant material
EN1202680-007	ND4a	18-Jul-12	Jul-12	ALS	13:50	1100	0.3		3.1	4.0	0.3	Insects, plant material
EN1203132-008	ND4a	17-Aug-12	Aug-12	ALS	11:55	100	1.0		2.9	4.0	0.8	Insects, plant material, broken funnel in bottle
EN1203603-008	ND4a	18-Sep-12	Sep-12	ALS	12:20	100	1.1		2.9	4.0	0.8	Insects, plant material
EN1203994-008	ND4a	18-Oct-12	Oct-12	ALS	11:37	500	1.1		2.8	4.0	0.6	Insects, plant material
EN1204421-008	ND4a	19-Nov-12	Nov-12	ALS	12:10	350	0.6		2.7	4.0	0.5	Insects, plant material
EN1204843-004	ND4a	19-Dec-12	Dec-12	ALS	11:20	100	1.8		2.6	4.0	1.2	Insects, plant material
EN1300222-004	ND4a	17-Jan-13	Jan-13	ALS	13:00	400	1.2		2.6	4.0	0.8	Insects, plant material
EN1300661-004	ND4a	15-Feb-13	Feb-13	ALS	11:10	2000	0.8		2.5	4.0	0.6	Insects, plant material
EN1301080-004	ND4a	15-Mar-13	Mar-13	ALS	13:00	900	0.5		2.4	4.0	0.2	Insects, plant material
EN1301429-004	ND4a	15-Apr-13	Apr-13	ALS	13:30	250	2.1	2.1	2.4	4.0	0.8	Insects, plant material, dead frog in bottle
EN1301803-004	ND4a	15-May-13	May-13	ALS	10:20	250	1.2	1.7	2.4	4.0	0.8	Insects, plant material
EN1302214-004	ND4a	14-Jun-13	Jun-13	ALS	9:50	800	0.4	1.2	2.3	4.0	0.3	Insects, plant material
EN1302597-004	ND4a	15-Jul-13	Jul-13	ALS	11:15	450	0.5	1.1	2.2	4.0	0.4	Insects, plant material
EN1303005-008	ND4a	14-Aug-13	Aug-13	ALS	9:30	350	0.5	0.9	2.2	4.0	0.5	Insects, plant material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
EN1303432-008	ND4a	13-Sep-13	Sep-13	ALS	11:15	150	1.9	1.1	2.2	4.0	1.1	Insects, plant material
EN1303774-008	ND4a	14-Oct-13	Oct-13	ALS	10:10	350	1.2	1.1	2.1	4.0	0.9	Insects, plant material
EN1304181-004	ND4a	13-Nov-13	Nov-13	ALS	12:45	200	1.0	1.1	2.1	4.0	0.6	Insects, plant material
EN1304646-004	ND4a	13-Dec-13	Dec-13	ALS	10:05	700	1.1	1.1	2.1	4.0	0.7	Insects, plant material
EN1400142-004	ND4a	13-Jan-14	Jan-14	ALS	9:15	150	0.7	1.1	2.0	4.0	0.4	Insects, plant material
26001877-004	ND4a	12-Feb-14	Feb-14	ALS	9:30	200	0.6	1.0	2.0	4.0	0.2	Insects, plant material
26001889-004	ND4a	13-Mar-14	Mar-14	ALS	10:30	750	<1	1.0	2.0	4.0	<0.1	Insects





Deposited Dust - ND5 "Claremont"

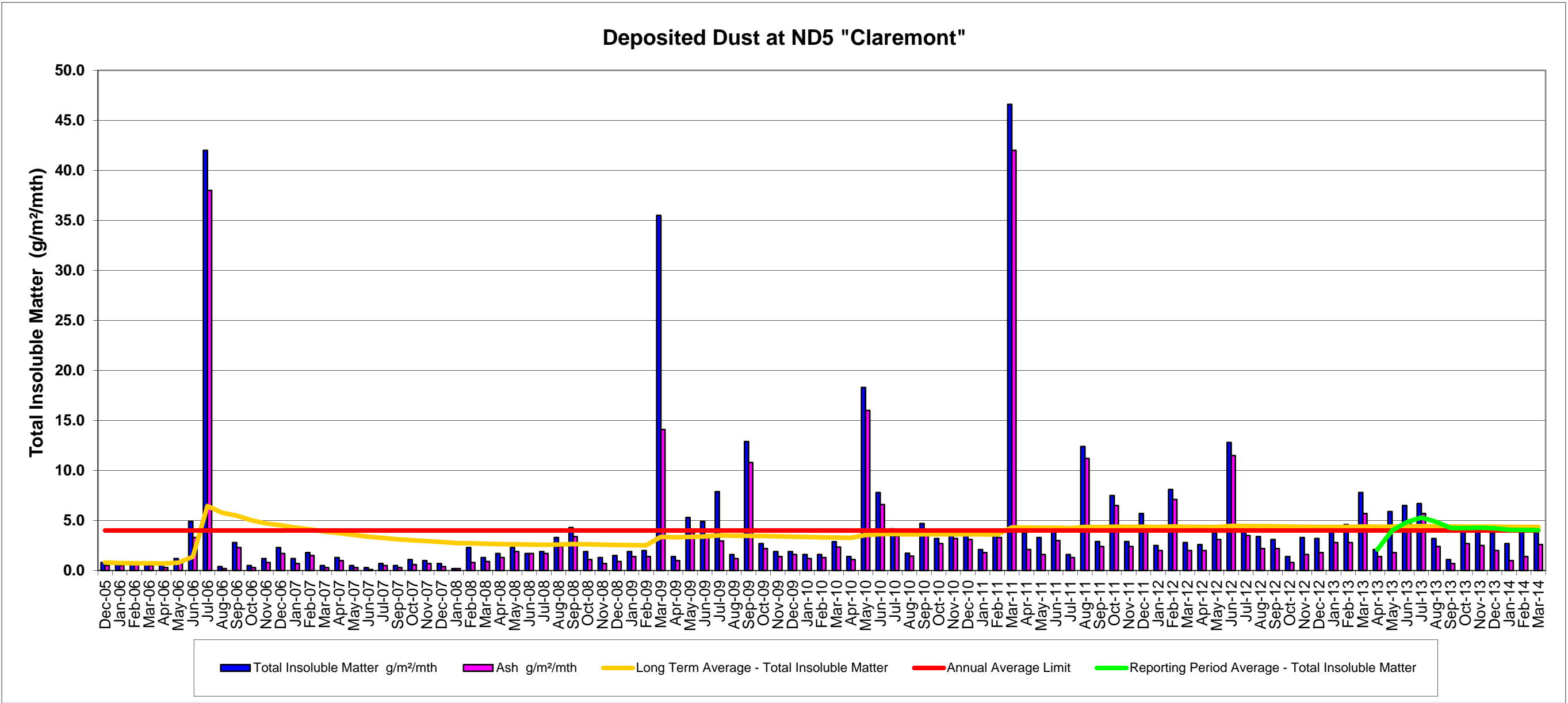
Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
21959.05	ND5	05-Jan-06	Dec-05	Client	1050	1360	0.8		0.8	4.0	0.5	
22569.05	ND5	03-Feb-06	Jan-06	Client	1405	125	0.7		0.8	4.0	0.5	
22720.05	ND5	09-Mar-06	Feb-06	Client	1310	950	0.7		0.7	4.0	0.6	
23204.05	ND5	03-Apr-06	Mar-06	Client	1045	125	0.7		0.7	4.0	0.5	
23295.05	ND5	02-May-06	Apr-06	Client	0910	500	0.6		0.7	4.0	0.3	
23630.05	ND5	02-Jun-06	May-06	Client	0830	<10	1.2		0.8	4.0	0.7	
23882.05	ND5	28-Jun-06	Jun-06	Client	1732	610	4.9		1.4	4.0	3.3	
24078.05	ND5	31-Jul-06	Jul-06	Client	0810	1430	42.0		6.5	4.0	38.0	
24412.05	ND5	30-Aug-06	Aug-06	Client	1446	30	0.4		5.8	4.0	0.2	
25689.05	ND5	03-Oct-06	Sep-06	Client	1120	700	2.8		5.5	4.0	2.3	
24973.05	ND5	02-Nov-06	Oct-06	Client	1313	345	0.5		5.0	4.0	0.3	
25439.05	ND5	04-Dec-06	Nov-06	Client	1235	620	1.2		4.7	4.0	0.8	
25536.05	ND5	02-Jan-07	Dec-06	Client	1340	620	2.3		4.5	4.0	1.7	
25839.05	ND5	02-Feb-07	Jan-07	Client	1155	260	1.2		4.3	4.0	0.7	
26114.05	ND5	05-Mar-07	Feb-07	Client	1320	880	1.8		4.1	4.0	1.5	
26423.05	ND5	03-Apr-07	Mar-07	Client	0925	170	0.5		3.9	4.0	0.3	
26626.05	ND5	02-May-07	Apr-07	Client	1030	380	1.3		3.7	4.0	1.0	
26955.05	ND5	05-Jun-07	May-07	Client	1120	1150	0.5		3.6	4.0	0.3	
27229.05	ND5	02-Jul-07	Jun-07	Client	1345	1310	0.3		3.4	4.0	0.1	
27526.05	ND5	03-Aug-07	Jul-07	Client	1015	185	0.7		3.3	4.0	0.5	
28113.05	ND5	04-Oct-07	Sep-07	Client	1310	45	0.5		3.1	4.0	0.3	
28392.05	ND5	05-Nov-07	Oct-07	Client	1610	625	1.1		3.0	4.0	0.6	
28656.05	ND5	04-Dec-07	Nov-07	Client	1235	1210	1.0		2.9	4.0	0.7	
28917.05	ND5	03-Jan-08	Dec-07	Client	1605	1335	0.7		2.9	4.0	0.4	
29219.05	ND5	04-Feb-08	Jan-08	Client	1425	1235	0.2		2.7	4.0	0.2	
29219.05	ND5	03-Mar-08	Feb-08	Client	1545	1985	2.3		2.7	4.0	0.8	
29767.05	ND5	02-Apr-08	Mar-08	Client	1245	100	1.3		2.7	4.0	0.9	
30049.05	ND5	09-May-08	Apr-08	Client	1050	425	1.7		2.6	4.0	1.3	
30380.05	ND5	02-Jun-08	May-08	Client	1440	190	2.3		2.6	4.0	1.9	
30654.05	ND5	01-Jul-08	Jun-08	Client	1425	870	1.7		2.6	4.0	1.7	
30896.05	ND5	04-Aug-08	Jul-08	Client	1115	510	1.9		2.6	4.0	1.7	
31204.05	ND5	01-Sep-08	Aug-08	Client	1210	840	3.3		2.6	4.0	2.4	
31522.05	ND5	02-Oct-08	Sep-08	Client	0935	1495	4.3		2.6	4.0	3.4	
31769.05	ND5	03-Nov-08	Oct-08	Client	1250	1220	1.9		2.6	4.0	1.1	
32017.05	ND5	03-Dec-08	Nov-08	Client	1250	1440	1.3		2.6	4.0	0.7	
32512.05	ND5	05-Jan-09	Dec-08	Client	1030	2760	1.5		2.6	4.0	0.9	
32240.05	ND5	02-Feb-09	Jan-09	Client	1115	450	1.9		2.5	4.0	1.4	
32857.05	ND5	02-Mar-09	Feb-09	Client	1000	2300	2.0		2.5	4.0	1.4	
2600 1003-00	ND5	01-Apr-09	Mar-09	ALS		100	35.5		3.4	4.0	14.1	Insects, Bird droppings
2600 1021-00	ND5	01-May-09	Apr-09	ALS		800	1.4		3.3	4.0	1.0	Bird droppings
2600 1031-01	ND5	01-Jun-09	May-09	ALS		750	5.3		3.4	4.0	3.8	Plant material
2604 1041-01	ND5	06-Jul-09	Jun-09	ALS		400	4.9		3.4	4.0	3.5	Insects, Plant Material
2604 1053-01	ND5	03-Aug-09	Jul-09	ALS	1035	450	7.9		3.5	4.0	3.0	Insects, Bird Droppings
2600 1065-00	ND5	31-Aug-09	Aug-09	ALS	1113	100	1.6		3.5	4.0	1.2	Insects, Plant Material

**AEMR/Annual Review 2013/2014**  
**Appendix 4**

**Narrabri Coal Operations Pty Ltd**  
**Deposited Dust Results**

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
2600 1065-00	ND5	28-Sep-09	Sep-09	ALS	1428	700	12.9		3.5	4.0	10.8	Insects, Plant Material
2600 1125-00	ND5	03-Nov-09	Oct-09	ALS	1050	800	2.7		3.5	4.0	2.2	Insects, Bird Droppings
2600 1204-115	ND5	01-Dec-09	Nov-09	ALS	1116	100	1.9		3.4	4.0	1.4	Insects, Plant Material
2600 1222-00	ND5	31-Dec-09	Dec-09	ALS	1115	2400	1.9		3.4	4.0	1.6	
2600 1234-00	ND5	01-Feb-10	Jan-10	ALS	1205	1800	1.6		3.3	4.0	1.2	Insects, Plant Material
2600 1247-00	ND5	03-Mar-10	Feb-10	ALS	1210	1000	1.6		3.3	4.0	1.3	Insects
2600 1260	ND5	31-Mar-10	Mar-10	ALS	1150	600	2.9		3.3	4.0	2.3	Insects, Plant Material
2600 1268	ND5	28-Apr-10	Apr-10	ALS	1110	150	1.4		3.3	4.0	1.1	Insects, Plant Material
26001277	ND5	26-May-10	May-10	ALS	1110	300	18.3		3.6	4.0	16.0	Insects
2600-1288	ND5	23-Jun-10	Jun-10	ALS	0955	400	7.8		3.6	4.0	6.6	Insects, Plant Material
26001298	ND5	21-Jul-10	Jul-10	ALS	1130	650	4.2		3.6	4.0	3.4	Insects, Plant Material
26001309915	ND5	20-Aug-10	Aug-10	ALS	1450	2300	1.7		3.6	4.0	1.4	Insects, Plant material
26001319	ND5	20-Sep-10	Sep-10	ALS	1300	1300	4.7		3.6	4.0	3.8	Insects, Plant material
2600-1340-18	ND5	20-Oct-10	Oct-10	ALS	1230	600	3.2		3.6	4.0	2.7	
EN1002881-005	ND5	19-Nov-10	Nov-10	ALS	1240	1500	3.6		3.6	4.0	3.2	
EN1003078-005	ND5	21-Dec-10	Dec-10	ALS	0940	2000	4.1		3.6	4.0	3.1	
EN1100178-005	ND5	20-Jan-11	Jan-11	ALS	1035	400	2.1		3.6	4.0	1.8	
EN1100432-005	ND5	21-Feb-11	Feb-11	ALS	1015	700	4.0		3.6	4.0	3.3	
EN1100689-005	ND5	23-Mar-11	Mar-11	ALS	1120	300	46.6		4.3	4.0	42.0	Amenity bund construction and frequent use of adjacent unsealed road
EN1100923-005	ND5	20-Apr-11	Apr-11	ALS	10:40	400	3.8		4.3	4.0	2.1	
EN1101164-005	ND5	19-May-11	May-11	ALS	10:30	0	3.3		4.3	4.0	1.6	Bird Droppings/Dry
EN1101450-005	ND5	17-Jun-11	Jun-11	ALS	11:15	1000	4.0		4.3	4.0	3.0	Insects, bird droppings, plant material
EN1101813-005	ND5	18-Jul-11	Jul-11	ALS	11:30	50	1.6		4.2	4.0	1.3	Plant material, road work adjacent
EN1102302-005	ND5	17-Aug-11	Aug-11	ALS	12:20	300	12.4		4.4	4.0	11.2	Insects, plant material
EN1102771-005	ND5	16-Sep-11	Sep-11	ALS	11:28	800	2.9		4.3	4.0	2.4	Insects, plant material
EN1103120-005	ND5	17-Oct-11	Oct-11	ALS	11:30	900	7.5		4.4	4.0	6.5	Insects, plant material, large strands of grass in bottle
EN1103469-005	ND5	15-Nov-11	Nov-11	ALS	10:25	900	2.9		4.4	4.0	2.4	Insects, plant material
EN1104231-005	ND5	15-Dec-11	Dec-11	ALS	10:50	2500	5.7		4.4	4.0	4.5	Insects, plant material
EN1200254-005	ND5	16-Jan-12	Jan-12	ALS	11:10	900	2.5		4.4	4.0	2.0	Insects, plant material
EN1200646-005	ND5	15-Feb-12	Feb-12	ALS	11:10	2500	8.1		4.4	4.0	7.1	Insects, plant material
EN1201072-004	ND5	16-Mar-12	Mar-12	ALS	11:40	800	2.8		4.4	4.0	2.0	Insects, plant material
EN1201470-004	ND5	17-Apr-12	Apr-12	ALS	12:00	200	2.6		4.4	4.0	2	Insects, plant material
EN1201863-004	ND5	17-May-12	May-12	ALS	11:00	600	3.8		4.4	4.0	3.1	Insects, plant material
EN1202257-004	ND5	18-Jun-12	Jun-12	ALS	12:00	800	12.8		4.5	4.0	11.5	Insects, plant material
EN1202680-004	ND5	18-Jul-12	Jul-12	ALS	13:40	1100	4.0		4.5	4.0	3.5	Insects, plant material
EN1203132-004	ND5	17-Aug-12	Aug-12	ALS	11:45	150	3.4		4.4	4.0	2.2	Insects, bird droppings, plant material
EN1203603-004	ND5	18-Sep-12	Sep-12	ALS	12:30	100	3.1		4.4	4.0	2.2	Insects, bird droppings, plant material
EN1203994-004	ND5	18-Oct-12	Oct-12	ALS	11:48	500	1.4		4.4	4.0	0.8	Insects, plant material
EN1204421-004	ND5	19-Nov-12	Nov-12	ALS	12:20	250	3.3		4.4	4.0	1.6	Insects, plant material, new road constructed 50 metres away
EN1204843-005	ND5	19-Dec-12	Dec-12	ALS	11:10	100	3.2		4.4	4.0	1.8	Insects, plant material, large amount of insects
EN1300222-005	ND5	17-Jan-13	Jan-13	ALS	13:10	400	4.2		4.4	4.0	2.8	Insects, plant material
EN1300661-005	ND5	15-Feb-13	Feb-13	ALS	11:20	2000	4.6		4.4	4.0	2.8	Insects, plant material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
EN1301080-005	ND5	15-Mar-13	Mar-13	ALS	13:15	900	7.8		4.4	4.0	5.7	Insects, plant material
EN1301429-005	ND5	15-Apr-13	Apr-13	ALS	13:05	250	2.1	2.1	4.4	4.0	1.4	Insects, plant material
EN1301803-005	ND5	15-May-13	May-13	ALS	10:40	250	5.9	4.0	4.4	4.0	1.8	Insects, bird droppings, plant material
EN1302214-005	ND5	14-Jun-13	Jun-13	ALS	10:10	800	6.5	4.8	4.4	4.0	4.8	Insects, plant material
EN1302597-005	ND5	15-Jul-13	Jul-13	ALS	10:45	400	6.7	5.3	4.4	4.0	5.7	Insects, plant material
EN1303005-007	ND5	14-Aug-13	Aug-13	ALS	9:50	350	3.2	4.9	4.4	4.0	2.4	Insects, plant material
EN1303432-007	ND5	13-Sep-13	Sep-13	ALS	11:45	100	1.1	4.3	4.4	4.0	0.7	Insects, plant material
EN1303774-007	ND5	14-Oct-13	Oct-13	ALS	10:45	300	4.2	4.2	4.4	4.0	2.7	Insects, plant material
EN1304181-005	ND5	13-Nov-13	Nov-13	ALS	11:05	200	4.5	4.3	4.4	4.0	2.5	Insects, plant material
EN1304646-005	ND5	13-Dec-13	Dec-13	ALS	10:45	650	3.8	4.2	4.4	4.0	2.0	Insects, plant material
EN1400142-005	ND5	13-Jan-14	Jan-14	ALS	9:25	100	2.7	4.1	4.4	4.0	1.0	Insects, plant material
26001877-005	ND5	12-Feb-14	Feb-14	ALS	9:45	100	3.9	4.1	4.4	4.0	1.4	Insects, plant material
26001889-005	ND5	13-Mar-14	Mar-14	ALS	10:15	500	3.8	4.0	4.4	4.0	2.6	Insects, plant material

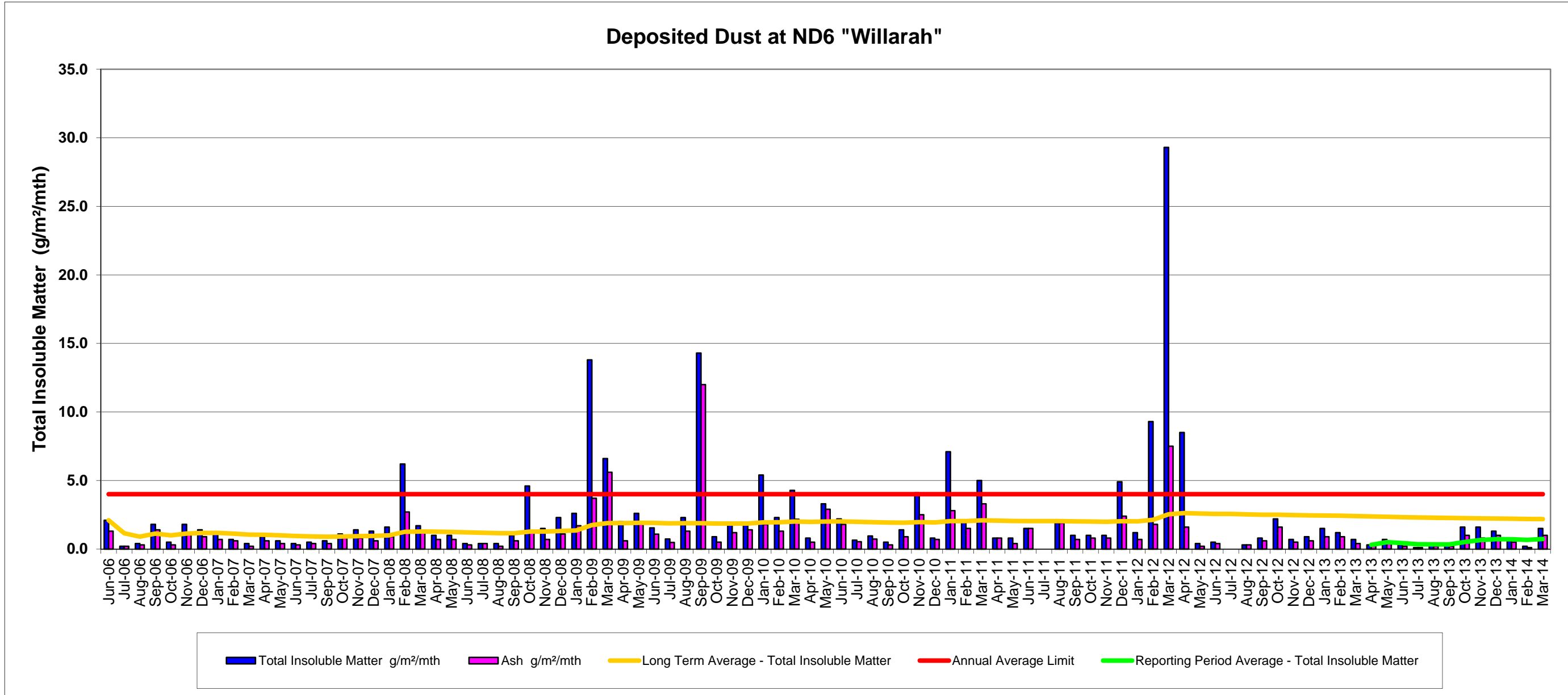


Deposited Dust - ND6 "Willarah"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
23882.06	ND6	28-Jun-06	Jun-06	Client	1720	60	2.1		2.1	4.0	1.3	
24078.06	ND6	31-Jul-06	Jul-06	Client	0830	1280	0.2		1.2	4.0	0.2	
24412.06	ND6	30-Aug-06	Aug-06	Client	1438	30	0.4		0.9	4.0	0.3	
25689.06	ND6	03-Oct-06	Sep-06	Client	1131	400	1.8		1.1	4.0	1.4	
24973.06	ND6	02-Nov-06	Oct-06	Client	1318	255	0.5		1.0	4.0	0.3	
25439.06	ND6	04-Dec-06	Nov-06	Client	1245	560	1.8		1.1	4.0	1.1	
25536.06	ND6	02-Jan-07	Dec-06	Client	1350	280	1.4		1.2	4.0	0.9	
25839.06	ND6	02-Feb-07	Jan-07	Client	1145	60	1.2		1.2	4.0	0.7	
26114.06	ND6	05-Mar-07	Feb-07	Client	1330	890	0.7		1.1	4.0	0.6	
26423.06	ND6	03-Apr-07	Mar-07	Client	0930	<50	0.4		1.1	4.0	0.2	
26626.06	ND6	02-May-07	Apr-07	Client	1035	435	0.9		1.0	4.0	0.6	
26955.06	ND6	05-Jun-07	May-07	Client	1127	1105	0.6		1.0	4.0	0.4	
27229.06	ND6	02-Jul-07	Jun-07	Client	1350	1305	0.4		1.0	4.0	0.3	
27526.06	ND6	03-Aug-07	Jul-07	Client	1025	105	0.5		0.9	4.0	0.4	
28113.06	ND6	04-Oct-07	Sep-07	Client	1325	75	0.6		0.9	4.0	0.4	
28392.06	ND6	05-Nov-07	Oct-07	Client	1620	595	1.1		0.9	4.0	0.8	
28656.06	ND6	04-Dec-07	Nov-07	Client	1245	880	1.4		0.9	4.0	0.8	
28917.06	ND6	03-Jan-08	Dec-07	Client	1615	1445	1.3		1.0	4.0	0.6	
29219.06	ND6	04-Feb-08	Jan-08	Client	1440	925	1.6		1.0	4.0	0.9	
29219.06	ND6	03-Mar-08	Feb-08	Client	1600	1750	6.2		1.3	4.0	2.7	
29767.06	ND6	02-Apr-08	Mar-08	Client	1255	160	1.7		1.3	4.0	1.3	
30049.06	ND6	09-May-08	Apr-08	Client	1055	345	1.0		1.3	4.0	0.7	
30380.06	ND6	02-Jun-08	May-08	Client	1450	190	1.0		1.3	4.0	0.7	
30654.06	ND6	01-Jul-08	Jun-08	Client	1435	885	0.4		1.2	4.0	0.3	
30896.06	ND6	04-Aug-08	Jul-08	Client	1120	595	0.4		1.2	4.0	0.4	
31204.06	ND6	01-Sep-08	Aug-08	Client	1215	695	0.4		1.2	4.0	0.2	
31522.06	ND6	02-Oct-08	Sep-08	Client	0920	1465	1.0		1.1	4.0	0.6	
31769.06	ND6	03-Nov-08	Oct-08	Client	1300	1295	4.6		1.3	4.0	1.2	
32017.06	ND6	03-Dec-08	Nov-08	Client	1300	1505	1.5		1.3	4.0	0.7	
32512.06	ND6	05-Jan-09	Dec-08	Client	1022	2750	2.3		1.3	4.0	1.1	
32240.06	ND6	02-Feb-09	Jan-09	Client	1103	480	2.6		1.4	4.0	1.7	
32857.06	ND6	02-Mar-09	Feb-09	Client	0950	1900	13.8		1.7	4.0	3.7	
2600 1003-00	ND6	01-Apr-09	Mar-09	ALS		100	6.6		1.9	4.0	5.6	Insects, frogs
2600 1021-00	ND6	01-May-09	Apr-09	ALS		600	2.0		1.9	4.0	0.6	Insects, Bird droppings
2600 1031-01	ND6	01-Jun-09	May-09	ALS		750	2.6		1.9	4.0	2.0	
2605 1041-01	ND6	06-Jul-09	Jun-09	ALS		400	1.5		1.9	4.0	1.1	Insects
2605 1053-01	ND6	03-Aug-09	Jul-09	ALS	1030	500	0.7		1.9	4.0	0.5	Insects, Plant Material
2600 1065-00	ND6	31-Aug-09	Aug-09	ALS	1105	100	2.3		1.9	4.0	1.3	Insects, Plant Material
2600 1065-00	ND6	28-Sep-09	Sep-09	ALS	1420	700	14.3		1.9	4.0	12.0	Insects, Plant Material
2600 1125-00	ND6	03-Nov-09	Oct-09	ALS	1045	800	0.9		1.9	4.0	0.5	Bird Droppings, Plant Material
2600 1204-115	ND6	01-Dec-09	Nov-09	ALS	1110	50	1.9		1.9	4.0	1.2	Insects, Plant Material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
2600 1222-00	ND6	31-Dec-09	Dec-09	ALS	1125	2400	1.9		1.9	4.0	1.4	Bird Droppings
2600 1234-00	ND6	01-Feb-10	Jan-10	ALS	1200	1800	5.4		1.9	4.0	1.8	Insects, Plant Material
2600 1247-00	ND6	03-Mar-10	Feb-10	ALS	1215	900	2.3		2.0	4.0	1.3	Insects, Bird Droppings
2600 1260	ND6	31-Mar-10	Mar-10	ALS	1200	500	4.3		2.0	4.0	2.2	Insects, Plant Material
2600 1268	ND6	28-Apr-10	Apr-10	ALS	1120	150	0.8		2.0	4.0	0.5	Insects, Plant Material
26001277	ND6	26-May-10	May-10	ALS	1120	300	3.3		2.0	4.0	2.9	Insects, Plant Material
2600-1288	ND6	23-Jun-10	Jun-10	ALS	1005	200	2.2		2.0	4.0	1.8	Insects, Plant Material
26001298	ND6	21-Jul-10	Jul-10	ALS	1140	600	0.6		2.0	4.0	0.5	Insects
26001309915	ND6	20-Aug-10	Aug-10	ALS	1445	2300	1.0		2.0	4.0	0.7	Insects, Plant material
26001319	ND6	20-Sep-10	Sep-10	ALS	1310	1100	0.5		1.9	4.0	0.3	Insects, Plant material
2600-1340-18	ND6	20-Oct-10	Oct-10	ALS	1240	600	1.4		1.9	4.0	0.9	
EN1002881-006	ND6	19-Nov-10	Nov-10	ALS	1245	1500	4.1		2.0	4.0	2.5	
EN1003078-006	ND6	21-Dec-10	Dec-10	ALS	0950	2000	0.8		1.9	4.0	0.7	
EN1100178-006	ND6	20-Jan-11	Jan-11	ALS	1025	300	7.1		2.0	4.0	2.8	Dead frog in bottle
EN1100432-006	ND6	21-Feb-11	Feb-11	ALS	1000	500	2.1		2.0	4.0	1.5	
EN1100689-006	ND6	23-Mar-11	Mar-11	ALS	1115	250	5.0		2.1	4.0	3.3	Dead praying mantis in bottle
EN1100923-006	ND6	20-Apr-11	Apr-11	ALS	10:35	450	0.8		2.1	4.0	0.8	
EN1101164-006	ND6	19-May-11	May-11	ALS	10:20	0	0.8		2.0	4.0	0.4	Plant Matter/Dry
EN1101450-006	ND6	17-Jun-11	Jun-11	ALS	11:00	1000	1.5		2.0	4.0	1.5	Plant material
	ND6	18-Jul-11	Jul-11	ALS	11:20	50			2.0	4.0		Bottle broken in transit
EN1102302-006	ND6	17-Aug-11	Aug-11	ALS	12:05	300	1.9		2.0	4.0	1.9	Insects, plant material
EN1102771-006	ND6	16-Sep-11	Sep-11	ALS	11:23	800	1.0		2.0	4.0	0.7	Insects, plant material
EN1103120-006	ND6	17-Oct-11	Oct-11	ALS	11:40	900	1.0		2.0	4.0	0.8	Insects, plant material
EN1103469-006	ND6	15-Nov-11	Nov-11	ALS	10:15	900	1.0		2.0	4.0	0.8	Insects, plant material
EN1104231-006	ND6	15-Dec-11	Dec-11	ALS	10:40	2500	4.9		2.0	4.0	2.4	Insects, bird droppings, plan material
EN1200254-006	ND6	16-Jan-12	Jan-12	ALS	11:00	900	1.2		2.0	4.0	0.7	Insects, plant material
EN1200646-006	ND6	15-Feb-12	Feb-12	ALS	11:00	2500	9.3		2.1	4.0	1.8	Insects, bird droppings, plan material, dead frog in bottle
EN1201072-005	ND6	16-Mar-12	Mar-12	ALS	11:30	800	29.3		2.5	4.0	7.5	Insects, bird droppings, plan material, dead frog in bottle
EN1201470-005	ND6	17-Apr-12	Apr-12	ALS	11:50	200	8.5		2.6	4.0	1.6	Insects, bird droppings, plant material
EN1201863-005	ND6	17-May-12	May-12	ALS	11:10	500	0.4		2.6	4.0	0.2	Insects, plant material
EN1202257-005	ND6	18-Jun-12	Jun-12	ALS	11:45	800	0.5		2.6	4.0	0.4	Insects, plant material
	ND6	18-Jul-12	Jul-12	ALS	13:30				2.6	4.0		Bottle broken in transit
EN1203132-005	ND6	17-Aug-12	Aug-12	ALS	11:30	150	0.3		2.5	4.0	0.3	Insects, plant material
EN1203603-005	ND6	18-Sep-12	Sep-12	ALS	12:40	100	0.8		2.5	4.0	0.6	Insects, plant material
EN1203994-005	ND6	18-Oct-12	Oct-12	ALS	11:45	500	2.2		2.5	4.0	1.6	Insects, plant material
EN1204421-005	ND6	19-Nov-12	Nov-12	ALS	12:30	250	0.7		2.5	4.0	0.5	Insects, plant material, lime green object in bottom of bottle
EN1204843-006	ND6	19-Dec-12	Dec-12	ALS	11:30	300	0.9		2.5	4.0	0.6	Insects, plant material
EN1300222-006	ND6	17-Jan-13	Jan-13	ALS	13:20	400	1.5		2.4	4.0	0.9	Insects, plant material
EN1300661-006	ND6	15-Feb-13	Feb-13	ALS	11:30	2000	1.2		2.4	4.0	0.9	Insects, plant material

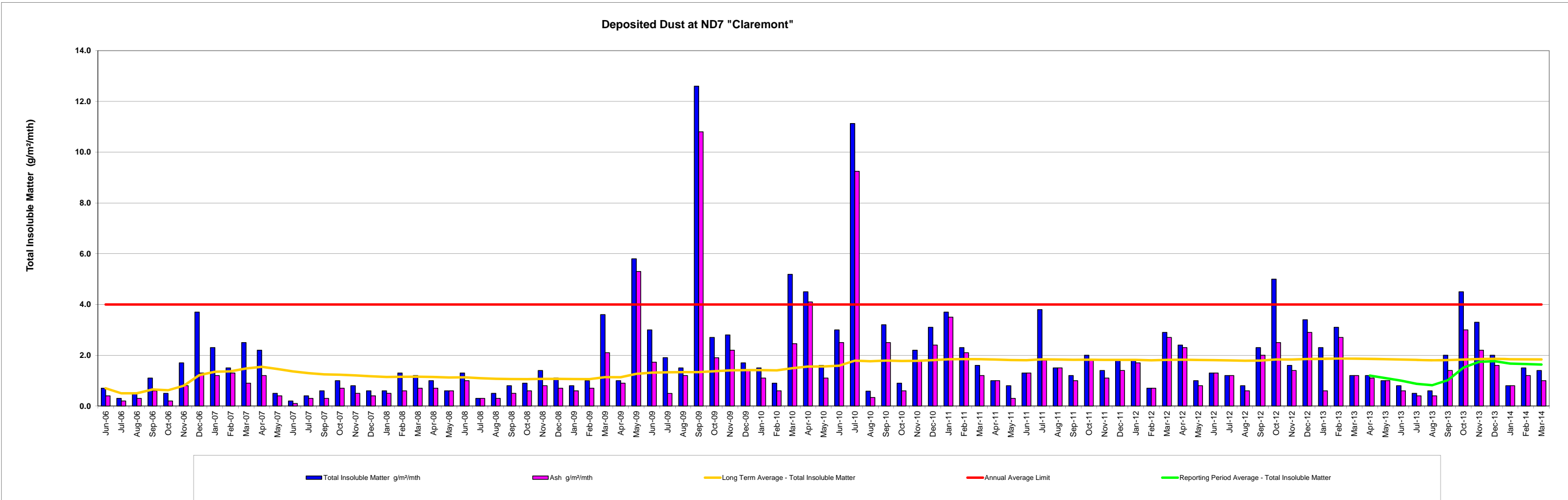
Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
EN1301080-006	ND6	15-Mar-13	Mar-13	ALS	13:30	1000	0.7		2.4	4.0	0.4	Insects, plant material
EN1301429-006	ND6	15-Apr-13	Apr-13	ALS	13:15	250	0.3	0.3	2.4	4.0	0.3	Insects, plant material
EN1301803-006	ND6	15-May-13	May-13	ALS	10:50	250	0.7	0.5	2.4	4.0	0.5	Insects, plant material
EN1302214-006	ND6	14-Jun-13	Jun-13	ALS	10:30	800	0.3	0.4	2.3	4.0	0.2	Insects, plant material
EN1302597-006	ND6	15-Jul-13	Jul-13	ALS	11:00	400	0.1	0.4	2.3	4.0	0.1	Insects, plant material
EN1303005-004	ND6	14-Aug-13	Aug-13	ALS	10:05	350	0.3	0.3	2.3	4.0	0.2	Insects, plant material
EN1303432-004	ND6	13-Sep-13	Sep-13	ALS	11:30	150	0.3	0.3	2.3	4.0	0.2	Insects, plant material
EN1303774-004	ND6	14-Oct-13	Oct-13	ALS	10:30	300	1.6	0.5	2.2	4.0	1.0	Insects, plant material
EN1304181-006	ND6	13-Nov-13	Nov-13	ALS	11:20	200	1.6	0.7	2.2	4.0	0.8	Insects, plant material
EN1304646-006	ND6	13-Dec-13	Dec-13	ALS	10:35	650	1.3	0.7	2.2	4.0	1.0	Insects, plant material
EN1400142-006	ND6	13-Jan-14	Jan-14	ALS	9:40	100	0.6	0.7	2.2	4.0	0.5	Insects, plant material
26001877-006	ND6	12-Feb-14	Feb-14	ALS	10:00	100	0.2	0.7	2.2	4.0	0.1	Insects, plant material
26001889-006	ND6	13-Mar-14	Mar-14	ALS	10:05	600	1.5	0.7	2.2	4.0	1.0	Insects, plant material



Deposited Dust - ND7 "Claremont"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
23882.07	ND7	28-Jun-06	Jun-06	Client	1709	90	0.7		0.7	4.0	0.4	
24078.07	ND7	31-Jul-06	Jul-06	Client	0845	1375	0.3		0.5	4.0	0.2	
24412.07	ND7	30-Aug-06	Aug-06	Client	1426	35	0.5		0.5	4.0	0.3	
25689.07	ND7	03-Oct-06	Sep-06	Client	1440	600	1.1		0.7	4.0	0.6	
24973.07	ND7	02-Nov-06	Oct-06	Client	1328	340	0.5		0.6	4.0	0.2	
25439.07	ND7	04-Dec-06	Nov-06	Client	1255	780	1.7		0.8	4.0	0.8	
25536.07	ND7	02-Jan-07	Dec-06	Client	1205	700	3.7		1.2	4.0	1.3	
25839.07	ND7	02-Feb-07	Jan-07	Client	1230	140	2.3		1.4	4.0	1.2	
26114.07	ND7	05-Mar-07	Feb-07	Client	1355	925	1.5		1.4	4.0	1.3	
26423.07	ND7	03-Apr-07	Mar-07	Client	1000	205	2.5		1.5	4.0	0.9	
26626.07	ND7	02-May-07	Apr-07	Client	1120	290	2.2		1.5	4.0	1.2	
26955.07	ND7	05-Jun-07	May-07	Client	1150	1025	0.5		1.5	4.0	0.4	
27299.07	ND7	02-Jul-07	Jun-07	Client	1225	1270	0.2		1.4	4.0	0.1	
27526.07	ND7	03-Aug-07	Jul-07	Client	0845	205	0.4		1.3	4.0	0.3	
28113.07	ND7	04-Oct-07	Sep-07	Client	1150	60	0.6		1.2	4.0	0.3	
28392.07	ND7	05-Nov-07	Oct-07	Client	1505	630	1.0		1.2	4.0	0.7	
28656.07	ND7	04-Dec-07	Nov-07	Client	1140	1050	0.8		1.2	4.0	0.5	
28917.07	ND7	03-Jan-08	Dec-07	Client	1510	1610	0.6		1.2	4.0	0.4	
29219.07	ND7	04-Feb-08	Jan-08	Client	1335	1580	0.6		1.1	4.0	0.5	
29219.07	ND7	03-Mar-08	Feb-08	Client	1000	1565	1.3		1.2	4.0	0.6	
29767.07	ND7	02-Apr-08	Mar-08	Client	1130	105	1.2		1.2	4.0	0.7	
30049.07	ND7	09-May-08	Apr-08	Client	0920	355	1.0		1.1	4.0	0.7	
30380.07	ND7	02-Jun-08	May-08	Client	1255	170	0.6		1.1	4.0	0.6	
30654.07	ND7	01-Jul-08	Jun-08	Client	1250	985	1.3		1.1	4.0	1.0	
30896.07	ND7	04-Aug-08	Jul-08	Client	1040	475	0.3		1.1	4.0	0.3	
31204.07	ND7	01-Sep-08	Aug-08	Client	1115	695	0.5		1.1	4.0	0.3	
31522.07	ND7	02-Oct-08	Sep-08	Client	0910	1340	0.8		1.1	4.0	0.5	
31769.07	ND7	03-Nov-08	Oct-08	Client	1140	1290	0.9		1.1	4.0	0.6	
32017.07	ND7	03-Dec-08	Nov-08	Client	1220	1345	1.4		1.1	4.0	0.8	
32512.07	ND7	05-Jan-09	Dec-08	Client	1009	2495	1.1		1.1	4.0	0.7	
32240.07	ND7	02-Feb-09	Jan-09	Client	1027	695	0.8		1.1	4.0	0.6	
32857.07	ND7	02-Mar-09	Feb-09	Client	0926	1950	1.0		1.1	4.0	0.7	
2600 1003-00	ND7	01-Apr-09	Mar-09	ALS		100	3.6		1.1	4.0	2.1	Insects, Bird droppings
2600 1021-00	ND7	01-May-09	Apr-09	ALS		800	1.0		1.1	4.0	0.9	Insects
2600 1031-01	ND7	01-Jun-09	May-09	ALS		750	5.8		1.3	4.0	5.3	Plant material
2606 1041-01	ND7	06-Jul-09	Jun-09	ALS		450	3.0		1.3	4.0	1.7	Insects, Plant Material
2606 1053-01	ND7	03-Aug-09	Jul-09	ALS	1015	400	1.9		1.3	4.0	0.5	Insects, Bird Droppings, Plant Material
2600 1065-00	ND7	31-Aug-09	Aug-09	ALS	1050	75	1.5		1.3	4.0	1.2	Insects, Plant Material
2600 1065-00	ND7	28-Sep-09	Sep-09	ALS	1410	600	12.6		1.3	4.0	10.8	Insects
2600 1125-00	ND7	03-Nov-09	Oct-09	ALS	1034	850	2.7		1.4	4.0	1.9	Insects, Plant Material
2600 1204-115	ND7	01-Dec-09	Nov-09	ALS	1100	100	2.8		1.4	4.0	2.2	Insects, Plant Material
2600 1222-00	ND7	04-Jan-10	Dec-09	ALS	1230	2500	1.7		1.4	4.0	1.4	Insects, Plant Material
2600 1234-00	ND7	01-Feb-10	Jan-10	ALS	1140	400	1.5		1.4	4.0	1.1	Insects, Plant Material
2600 1247-00	ND7	03-Mar-10	Feb-10	ALS	1150	800	0.9		1.4	4.0	0.6	Insects
2600 1260	ND7	31-Mar-10	Mar-10	ALS	1130	600	5.2		1.5	4.0	2.5	Insects, Plant Material
2600 1268	ND7	28-Apr-10	Apr-10	ALS	1050	150	4.5		1.6	4.0	4.1	Insects, Plant Material
26001277	ND7	26-May-10	May-10	ALS	1050	250	1.6		1.6	4.0	1.1	Insects, Plant Material
2600-1288	ND7	23-Jun-10	Jun-10	ALS	1100	200	3.0		1.6	4.0	2.5	Insects, Plant Material
26001298	ND7	21-Jul-10	Jul-10	ALS	1120	700	11.1		1.8	4.0	9.2	Insects,Bird Droppings, Plant Material
26001309915	ND7	20-Aug-10	Aug-10	ALS	1430	2300	0.6		1.8	4.0	0.3	Insects, Plant material
26001319	ND7	20-Sep-10	Sep-10	ALS	1245	1200	3.2		1.8	4.0	2.5	Insects, Plant material
2600 1340-18	ND7	20-Oct-10	Oct-10	ALS	1215	600	0.9		1.8	4.0	0.6	
EN1002881-007	ND7	19-Nov-10	Nov-10	ALS	1230	1500	2.2		1.8	4.0	1.8	
EN1003078-007	ND7	21-Dec-10	Dec-10	ALS	0925	2000	3.1		1.8	4.0	2.4	

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m²/mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m²/mth	Comment
EN1100178-007	ND7	20-Jan-11	Jan-11	ALS	1015	300	3.7		1.8	4.0	3.5	
EN1100432-007	ND7	21-Feb-11	Feb-11	ALS	0945	400	2.3		1.8	4.0	2.1	
EN1100689-007	ND7	23-Mar-11	Mar-11	ALS	1035	200	1.6		1.8	4.0	1.2	
EN1100923-007	ND7	20-Apr-11	Apr-11	ALS	10:25	600	1.0		1.8	4.0	1.0	
EN1101164-007	ND7	19-May-11	May-11	ALS	10:10	0	0.8		1.8	4.0	0.3	Plant Matter/Dry
EN1101450-007	ND7	17-Jun-11	Jun-11	ALS	10:40	1000	1.3		1.8	4.0	1.3	Insects, plant material
EN1101813-007	ND7	18-Jul-11	Jul-11	ALS	11:00	80	3.8		1.8	4.0	1.8	Bird droppings
EN1102302-007	ND7	17-Aug-11	Aug-11	ALS	11:50	300	1.5		1.8	4.0	1.5	Insects, plant material
EN1102771-007	ND7	16-Sep-11	Sep-11	ALS	11:14	800	1.2		1.8	4.0	1.0	Insects, plant material
EN1103120-007	ND7	17-Oct-11	Oct-11	ALS	11:15	900	2.0		1.8	4.0	1.8	Insects, plant material
EN1103469-007	ND7	15-Nov-11	Nov-11	ALS	10:10	900	1.4		1.8	4.0	1.1	Insects, plant material
EN1104231-007	ND7	15-Dec-11	Dec-11	ALS	10:23	2500	1.8		1.8	4.0	1.4	Insects, plant material
EN1200254-007	ND7	16-Jan-12	Jan-12	ALS	10:45	1200	1.8		1.8	4.0	1.7	Insects, plant material
EN1200646-007	ND7	15-Feb-12	Feb-12	ALS	10:45	2500	0.7		1.8	4.0	0.7	Insects, plant material
EN1201072-006	ND7	16-Mar-12	Mar-12	ALS	11:25	800	2.9		1.8	4.0	2.7	Insects, plant material
EN1201470-006	ND7	17-Apr-12	Apr-12	ALS	11:40	200	2.4		1.8	4.0	2.3	Insects, plant material
EN1201863-006	ND7	17-May-12	May-12	ALS	11:20	600	1		1.8	4.0	0.8	Insects, plant material
EN1202257-006	ND7	18-Jun-12	Jun-12	ALS	11:30	800	1.3		1.8	4.0	1.3	Insects, plant material
EN1202680-005	ND7	18-Jul-12	Jul-12	ALS	13:15	1100	1.2		1.8	4.0	1.2	Insects, plant material
EN1203132-006	ND7	17-Aug-12	Aug-12	ALS	11:10	100	0.8		1.8	4.0	0.6	Insects, plant material
EN1203603-006	ND7	18-Sep-12	Sep-12	ALS	12:50	100	2.3		1.8	4.0	2.0	Insects, plant material
EN1203994-006	ND7	18-Oct-12	Oct-12	ALS	11:57	500	5.0		1.8	4.0	2.5	Insects, plant material
EN1204421-006	ND7	19-Nov-12	Nov-12	ALS	12:40	300	1.6		1.8	4.0	1.4	Insects, plant material
EN1204843-007	ND7	19-Dec-12	Dec-12	ALS	11:55	200	3.4		1.9	4.0	2.9	Insects, plant material
EN1300222-007	ND7	17-Jan-13	Jan-13	ALS	13:30	400	2.3		1.9	4.0	0.6	Insects, plant material
EN1300661-007	ND7	15-Feb-13	Feb-13	ALS	11:40	1900	3.1		1.9	4.0	2.7	Insects, plant material
EN1301080-007	ND7	15-Mar-13	Mar-13	ALS	13:40	1000	1.2		1.9	4.0	1.2	Insects, plant material
EN1301429-007	ND7	15-Apr-13	Apr-13	ALS	12:55	250	1.2	1.2	1.9	4.0	1.1	Insects, plant material
EN1301803-007	ND7	15-May-13	May-13	ALS	11:00	300	1.0	1.1	1.8	4.0	1.0	Insects, plant material
EN1302214-007	ND7	14-Jun-13	Jun-13	ALS	10:45	800	0.8	1.0	1.8	4.0	0.6	Insects, plant material
EN1302597-007	ND7	15-Jul-13	Jul-13	ALS	10:30	400	0.5	0.9	1.8	4.0	0.4	Insects, plant material
EN1303005-005	ND7	14-Aug-13	Aug-13	ALS	11:10	350	0.6	0.8	1.8	4.0	0.4	Insects, plant material
EN1303432-005	ND7	13-Sep-13	Sep-13	ALS	12:00	100	2.0	1.0	1.8	4.0	1.4	Insects, plant material
EN1303774-005	ND7	14-Oct-13	Oct-13	ALS	11:00	350	4.5	1.5	1.8	4.0	3.0	Insects, plant material
EN1304181-007	ND7	13-Nov-13	Nov-13	ALS	11:40	200	3.3	1.7	1.9	4.0	2.2	Insects, plant material
EN1304646-007	ND7	13-Dec-13	Dec-13	ALS	10:20	550	2.0	1.8	1.9	4.0	1.6	Insects, plant material
EN1400142-007	ND7	13-Jan-14	Jan-14	ALS	9:55	100	0.8	1.7	1.8	4.0	0.8	Insects, plant material
26001877-007	ND7	12-Feb-14	Feb-14	ALS	10:15	200	1.5	1.7	1.8	4.0	1.2	Insects, plant material
26001889-007	ND7	13-Mar-14	Mar-14	ALS	9:50	750	1.4	1.6	1.8	4.0	1.0	Insects

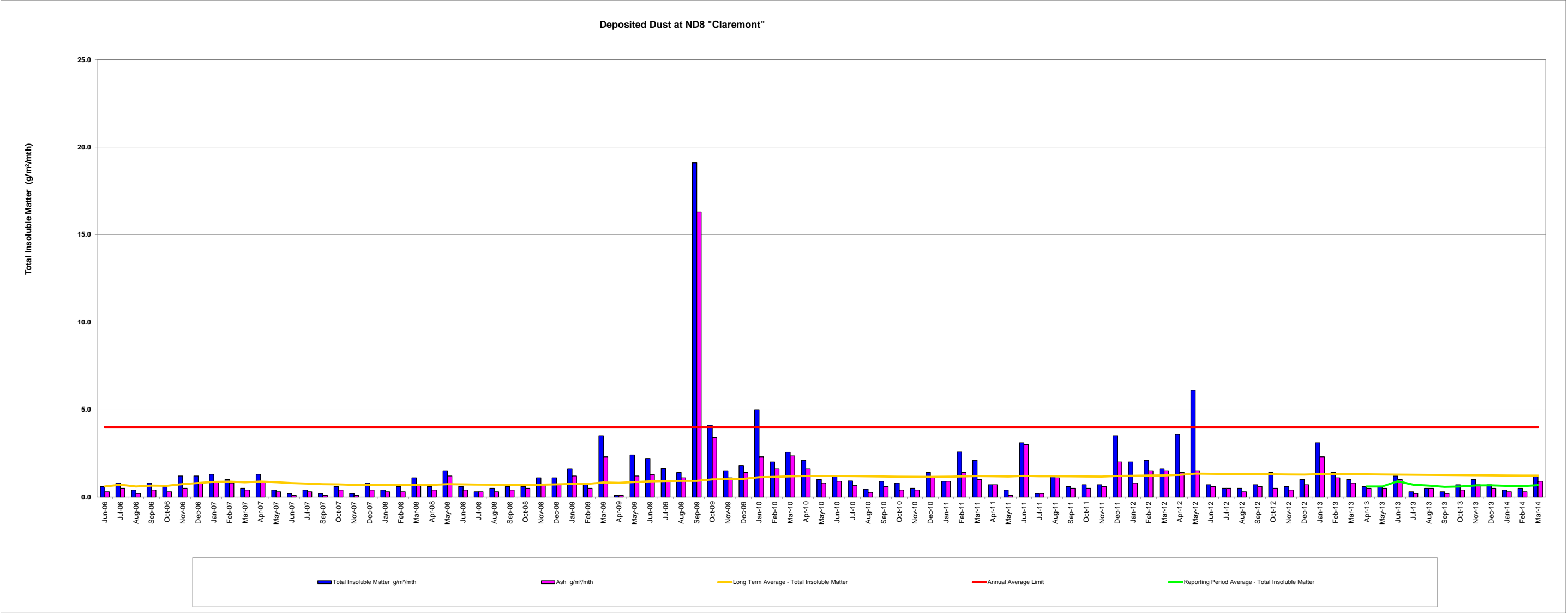




Deposited Dust - ND8 "Claremont"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
23882.08	ND8	28-Jun-06	Jun-06	Client	1658	75	0.6		0.6	4.0	0.3	
24078.08	ND8	31-Jul-06	Jul-06	Client	0905	1300	0.8		0.7	4.0	0.5	
24412.08	ND8	30-Aug-06	Aug-06	Client	1414	10	0.4		0.6	4.0	0.2	
25689.08	ND8	03-Oct-06	Sep-06	Client	1429	400	0.8		0.7	4.0	0.4	
24973.08	ND8	02-Nov-06	Oct-06	Client	1334	200	0.6		0.6	4.0	0.3	
25439.08	ND8	04-Dec-06	Nov-06	Client	1305	370	1.2		0.7	4.0	0.5	
25536.08	ND8	02-Jan-07	Dec-06	Client	1220	500	1.2		0.8	4.0	0.8	
25839.08	ND8	02-Feb-07	Jan-07	Client	1235	170	1.3		0.9	4.0	0.9	
26114.08	ND8	05-Mar-07	Feb-07	Client	1410	750	1.0		0.9	4.0	0.8	
26423.08	ND8	03-Apr-07	Mar-07	Client	1015	<50	0.5		0.8	4.0	0.4	
26626.08	ND8	02-May-07	Apr-07	Client	1105	285	1.3		0.9	4.0	0.9	
26955.08	ND8	05-Jun-07	May-07	Client	1200	1040	0.4		0.8	4.0	0.3	
27299.08	ND8	02-Jul-07	Jun-07	Client	1235	1265	0.2		0.8	4.0	0.1	
27526.08	ND8	03-Aug-07	Jul-07	Client	0855	100	0.4		0.8	4.0	0.3	
28113.08	ND8	04-Oct-07	Sep-07	Client	1155	20	0.2		0.7	4.0	0.1	
28392.08	ND8	05-Nov-07	Oct-07	Client	1510	570	0.6		0.7	4.0	0.4	
28656.08	ND8	04-Dec-07	Nov-07	Client	1150	755	0.2		0.7	4.0	0.1	
28917.08	ND8	03-Jan-08	Dec-07	Client	1500	1595	0.8		0.7	4.0	0.4	
29219.08	ND8	04-Feb-08	Jan-08	Client	1345	1230	0.4		0.7	4.0	0.3	
29219.08	ND8	03-Mar-08	Feb-08	Client	1125	1585	0.6		0.7	4.0	0.3	
29767.08	ND8	02-Apr-08	Mar-08	Client	1120	70	1.1		0.7	4.0	0.7	
30049.08	ND8	09-May-08	Apr-08	Client	0910	410	0.6		0.7	4.0	0.4	
30380.08	ND8	02-Jun-08	May-08	Client	1245	50	1.5		0.7	4.0	1.2	
30654.08	ND8	01-Jul-08	Jun-08	Client	1235	795	0.6		0.7	4.0	0.4	
30896.08	ND8	04-Aug-08	Jul-08	Client	1030	465	0.3		0.7	4.0	0.3	
31204.08	ND8	01-Sep-08	Aug-08	Client	1050	835	0.5		0.7	4.0	0.3	
31522.08	ND8	02-Oct-08	Sep-08	Client	0850	1510	0.6		0.7	4.0	0.4	
31769.08	ND8	03-Nov-08	Oct-08	Client	1120	1455	0.6		0.7	4.0	0.5	
32017.08	ND8	03-Dec-08	Nov-08	Client	1210	1460	1.1		0.7	4.0	0.7	
32512.08	ND8	23-Jan-09	Dec-08	Client	0955	2740	1.1		0.7	4.0	0.7	
32240.08	ND8	02-Feb-09	Jan-09	Client	1007	725	1.6		0.7	4.0	1.2	
32857.08	ND8	02-Mar-09	Feb-09	Client	0906	2250	0.8		0.7	4.0	0.5	
2600 1003.00	ND8	01-Apr-09	Mar-09	ALS		100	3.5		0.8	4.0	2.3	Insects
2600 1021.00	ND8	01-May-09	Apr-09	ALS		800	0.1		0.8	4.0	0.1	Insects
2600 1031.01	ND8	01-Jun-09	May-09	ALS		750	2.4		0.9	4.0	1.2	
2607 1041.01	ND8	06-Jul-09	Jun-09	ALS		350	2.2		0.9	4.0	1.3	Insects
2607 1053.01	ND8	03-Aug-09	Jul-09	ALS	0925	450	1.6		0.9	4.0	0.9	Insects, Plant Material
2600 1065.00	ND8	31-Aug-09	Aug-09	ALS	0940	100	1.4		0.9	4.0	1.1	Insects, Plant Material
2600 1065.00	ND8	28-Sep-09	Sep-09	ALS	1310	800	19.1		0.9	4.0	16.3	Insects
2600 1125.00	ND8	03-Nov-09	Oct-09	ALS	1018	900	4.1		1.0	4.0	3.4	Insects
2600 1204-115	ND8	01-Dec-09	Nov-09	ALS	1000	100	1.5		1.0	4.0	1.1	Insects, Plant Material
2600 1222.00	ND8	31-Dec-09	Dec-09	ALS	1015	2500	1.8		1.0	4.0	1.4	Insects
2600 1234.00	ND8	01-Feb-10	Jan-10	ALS	1130	2200	5.0		1.1	4.0	2.3	Insects, Plant Material
2600 1247.00	ND8	03-Mar-10	Feb-10	ALS	1050	1000	2.0		1.2	4.0	1.6	Insects
2600 1260	ND8	31-Mar-10	Mar-10	ALS	1010	600	2.6		1.2	4.0	2.3	Insects, Plant Material
2600 1268	ND8	28-Apr-10	Apr-10	ALS	0935	150	2.1		1.2	4.0	1.6	Insects, Plant Material
26001277	ND8	26-May-10	May-10	ALS	0935	300	1.0		1.2	4.0	0.8	Insects
2600 1288	ND8	23-Jun-10	Jun-10	ALS	1015	100	1.2		1.2	4.0	0.9	Insects, Plant Material
26001298	ND8	21-Jul-10	Jul-10	ALS	0955	800	0.9		1.2	4.0	0.6	Insects
26001309915	ND8	20-Aug-10	Aug-10	ALS	1410	2300	0.4		1.2	4.0	0.3	Insects, Plant material
26001319	ND8	20-Sep-10	Sep-10	ALS	1235	1200	0.9		1.2	4.0	0.6	Insects, Plant material
2600-1340-18	ND8	20-Oct-10	Oct-10	ALS	1200	800	0.8		1.2	4.0	0.4	
EN1002881.008	ND8	19-Nov-10	Nov-10	ALS	1220	1800	0.5		1.2	4.0	0.4	
EN1003078.008	ND8	21-Dec-10	Dec-10	ALS	0915	2000	1.4		1.2	4.0	1.1	
EN1100178.008	ND8	20-Jan-11	Jan-11	ALS	1000	500	0.9		1.2	4.0	0.9	
EN1100432.008	ND8	21-Feb-11	Feb-11	ALS	0930	400	2.6		1.2	4.0	1.4	
EN1100689.008	ND8	23-Mar-11	Mar-11	ALS	1010	500	2.1		1.2	4.0	1.0	
EN1100923.008	ND8	20-Apr-11	Apr-11	ALS	10-10	800	0.7		1.2	4.0	0.7	Near Plowed Paddock
EN1101164.008	ND8	19-May-11	May-11	ALS	10-00	0	0.4		1.2	4.0	0.1	Insects/Dry
EN1101450.008	ND8	17-Jun-11	Jun-11	ALS	10-20	1000	3.1		1.2	4.0	3.0	Plant material
EN1101813.008	ND8	18-Jul-11	Jul-11	ALS	10-50	50	0.2		1.2	4.0	0.2	Plant material
EN1102302.008	ND8	17-Aug-11	Aug-11	ALS	11-40	300	1.2		1.2	4.0	1.1	Insects, plant material
EN1102771.008	ND8	16-Sep-11	Sep-11	ALS	11-07	800	0.6		1.2	4.0	0.5	Insects, plant material
EN1103120.008	ND8	17-Oct-11	Oct-11	ALS	11-10	1100	0.7		1.2	4.0	0.5	Insects, plant material
EN1103469.008	ND8	15-Nov-11	Nov-11	ALS	10-00	900	0.7		1.2	4.0	0.6	Insects, plant material
EN1104231.008	ND8	15-Dec-11	Dec-11	ALS	10-20	2500	3.5		1.2	4.0	2.0	Insects, plant material
EN1200254.008	ND8	16-Jan-12	Jan-12	ALS	10-30	1200	2.0		1.2	4.0	0.8	Insects, bird droppings, plan material
EN1200646.008	ND8	15-Feb-12	Feb-12	ALS	10-30	2500	2.1		1.2	4.0	1.5	Insects, plant material
EN1201072.007	ND8	16-Mar-12	Mar-12	ALS	11-15	800	1.6		1.2	4.0	1.5	Insects, plant material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m <sup>2</sup> /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m <sup>2</sup> /mth	Comment
EN1201470-007	ND8	17-Apr-12	Apr-12	ALS	11:30	200	2.6		1.3	4.0	1.4	Insects, plant material
EN1201863-007	ND8	17-May-12	May-12	ALS	11:50	600	6.1		1.3	4.0	1.5	Insects, bird droppings, plant material
EN1202257-007	ND8	18-Jun-12	Jun-12	ALS	11:20	900	0.7		1.3	4.0	0.6	Insects, plant material
EN1202680-006	ND8	18-Jul-12	Jul-12	ALS	12:55	1100	0.5		1.3	4.0	0.5	Insects, plant material
EN1203132-007	ND8	17-Aug-12	Aug-12	ALS	11:10	100	0.5		1.3	4.0	0.3	Insects, plant material
EN1203603-007	ND8	18-Sep-12	Sep-12	ALS	13:10	100	0.7		1.3	4.0	0.6	Insects, plant material
EN1203994-007	ND8	18-Oct-12	Oct-12	ALS	12:10	500	1.4		1.3	4.0	0.5	Insects, plant material
EN1204421-007	ND8	19-Nov-12	Nov-12	ALS	13:00	250	0.6		1.3	4.0	0.4	Insects, plant material
EN1204843-008	ND8	19-Dec-12	Dec-12	ALS	11:00	100	1		1.3	4.0	0.7	Insects, plant material
EN1300222-008	ND8	17-Jan-13	Jan-13	ALS	14:00	400	3.1		1.3	4.0	2.3	Insects, plant material
EN1300661-008	ND8	15-Feb-13	Feb-13	ALS	12:00	2000	1.4		1.3	4.0	1.1	Insects, plant material
EN1301080-008	ND8	15-Mar-13	Mar-13	ALS	13:50	1800	1.0		1.3	4.0	0.8	Insects, plant material
EN1301429-008	ND8	15-Apr-13	Apr-13	ALS	12:45	250	0.6	0.6	1.3	4.0	0.5	Insects, plant material
EN1301803-008	ND8	15-May-13	May-13	ALS	11:30	250	0.6	0.6	1.3	4.0	0.5	Insects, plant material
EN1302214-008	ND8	14-Jun-13	Jun-13	ALS	11:15	800	1.2	0.9	1.3	4.0	1	Insects, plant material
EN1302597-008	ND8	15-Jul-13	Jul-13	ALS	10:10	450	0.3	0.7	1.3	4.0	0.2	Insects, plant material
EN1303005-002	ND8	14-Aug-13	Aug-13	ALS	10:30	350	0.5	0.7	1.3	4.0	0.5	Insects, plant material
EN1303432-002	ND8	13-Sep-13	Sep-13	ALS	12:35	100	0.3	0.6	1.3	4.0	0.2	Insects, plant material
EN1303774-002	ND8	14-Oct-13	Oct-13	ALS	11:25	350	0.7	0.6	1.2	4.0	0.4	Insects, plant material
EN1304181-008	ND8	13-Nov-13	Nov-13	ALS	12:00	200	1	0.7	1.2	4.0	0.7	Insects, plant material
EN1304646-008	ND8	13-Dec-13	Dec-13	ALS	11:45	650	0.7	0.7	1.2	4.0	0.5	Insects, plant material
EN1400142-008	ND8	13-Jan-14	Jan-14	ALS	10:10	100	0.4	0.6	1.2	4.0	0.3	Insects, plant material
26001877-008	ND8	12-Feb-14	Feb-14	ALS	10:30	200	0.5	0.6	1.2	4.0	0.3	Insects, plant material
26001889-008	ND8	13-Mar-14	Mar-14	ALS	9:20	750	1.2	0.7	1.2	4.0	0.9	Insects, plant material



Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
1/12/2007	11.1	7	7.00	30	50
7/12/2007	20.5	14	10.50	30	50
13/12/2007	14.2	9	10.00	30	50
19/12/2007	16.1	11	10.25	30	50
25/12/2007	20.7	13	10.80	30	50
31/12/2007	14.1	9	10.50	30	50
6/01/2008	20.9	14	11.00	30	50
12/01/2008	37.4	24	12.63	30	50
18/01/2008	19.4	12	12.56	30	50
24/01/2008	33	21	13.40	30	50
30/01/2008	35.6	23	14.27	30	50
5/02/2008	26.6	17	14.50	30	50
11/02/2008	34	22	15.08	30	50
17/02/2008	20.2	13	14.93	30	50
23/02/2008	74.3	48	17.13	30	50
29/02/2008	13.1	8	16.56	30	50
6/03/2008		31	17.41	30	50
12/03/2008		22	17.67	30	50
18/03/2008		20	17.79	30	50
24/03/2008		26	18.20	30	50
30/03/2008		14	18.00	30	50
5/04/2008	24	15	17.86	30	50
11/04/2008	1.7	1	17.13	30	50
17/04/2008	11.4	7	16.71	30	50
23/04/2008	2	1	16.08	30	50
29/04/2008	1.8	1	15.50	30	50
5/05/2008	14	9	15.26	30	50
11/05/2008	5.3	3	14.82	30	50
17/05/2008	10.9	7	14.55	30	50
23/05/2008	5.7	3	14.17	30	50
29/05/2008	4.1	3	13.81	30	50
4/06/2008	2.5	2	13.44	30	50
10/06/2008	2.5	2	13.09	30	50
16/06/2008	2.4	2	12.76	30	50
22/06/2008	1.3	1	12.43	30	50
28/06/2008	6.7	4	12.19	30	50

Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
4/07/2008	9.4	6	12.03	30	50
10/07/2008	4.3	3	11.79	30	50
16/07/2008	1.8	1	11.51	30	50
22/07/2008	9.2	6	11.38	30	50
28/07/2008	5.7	3	11.17	30	50
3/08/2008	6.5	4	11.00	30	50
9/08/2008	1.2	1	10.77	30	50
15/08/2008	5.5	3	10.59	30	50
21/08/2008	22.2	14	10.67	30	50
27/08/2008	12	7	10.59	30	50
2/09/2008	5.3	3	10.43	30	50
8/09/2008	2	1	10.23	30	50
14/09/2008	17	10	10.22	30	50
20/09/2008	36.7	23	10.48	30	50
26/09/2008	14.7	9	10.45	30	50
2/10/2008	41	26	10.75	30	50
8/10/2008	12.9	8	10.70	30	50
14/10/2008	14.7	9	10.67	30	50
20/10/2008	24.5	16	10.76	30	50
26/10/2008	19.5	12	10.79	30	50
1/11/2008	29.3	19	10.93	30	50
7/11/2008	13.4	9	10.90	30	50
13/11/2008	5	3	10.76	30	50
19/11/2008	3.9	3	10.63	30	50
25/11/2008	2.6	3	10.51	30	50
1/12/2008	14	9	10.54	30	50
7/12/2008	23.5	15	10.56	30	50
13/12/2008	21.2	14	10.64	30	50
19/12/2008	14.5	9	10.61	30	50
25/12/2008	21.6	14	10.62	30	50
31/12/2008	42.3	28	10.93	30	50
6/01/2009	29.2	21	11.05	30	50
12/01/2009	27.4	18	10.95	30	50
18/01/2009	27.2	17	11.03	30	50
24/01/2009	19	13	10.90	30	50
30/01/2009	21.9	14	10.75	30	50

Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
5/02/2009	25.1	17	10.75	30	50
11/02/2009	31.2	20	10.72	30	50
17/02/2009	3.8	2	10.54	30	50
23/02/2009	16.8	11	9.93	30	50
1/03/2009	29.2	19	10.11	30	50
7/03/2009	23.3	15	9.85	30	50
13/03/2009	19.1	12	9.69	30	50
19/03/2009	36.8	24	9.75	30	50
25/03/2009	31	20	9.66	30	50
31/03/2009	11.7	7	9.54	30	50
6/04/2009	19.4	12	9.49	30	50
12/04/2009	12.3	8	9.61	30	50
18/04/2009	46.2	29	9.97	30	50
24/04/2009	9.3	6	10.05	30	50
30/04/2009	12.9	8	10.16	30	50
6/05/2009	20	13	10.23	30	50
12/05/2009	26	16	10.44	30	50
18/05/2009	34.3	21	10.67	30	50
24/05/2009	12.9	8	10.75	30	50
30/05/2009	8.7	5	10.79	30	50
5/06/2009	4.2	3	10.80	30	50
11/06/2009	5	3	10.82	30	50
17/06/2009	1.6	1	10.80	30	50
23/06/2009	2.3	1	10.80	30	50
29/06/2009	4.9	5	10.82	30	50
5/07/2009	5	3	10.77	30	50
11/07/2009	8.5	5	10.80	30	50
17/07/2009	1	1	10.80	30	50
23/07/2009	17	11	10.89	30	50
29/07/2009	5.3	3	10.89	30	50
4/08/2009	10.9	7	10.93	30	50
10/08/2009	35.4	22	11.28	30	50
16/08/2009	14.8	9	11.38	30	50
22/08/2009	25.9	16	11.41	30	50
28/08/2009	16.7	10	11.46	30	50
3/09/2009	25.9	16	11.67	30	50

Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
9/09/2009	1.4	1	11.67	30	50
15/09/2009	29.3	19	11.82	30	50
21/09/2009	10.4	7	11.56	30	50
27/09/2009	61.5	39	12.05	30	50
3/10/2009	57.8	36	12.21	30	50
9/10/2009	17.4	11	12.26	30	50
15/10/2009	32.9	21	12.46	30	50
21/10/2009	44.2	28	12.66	30	50
27/10/2009	11.8	7	12.57	30	50
2/11/2009	24.6	16	12.52	30	50
8/11/2009	18.6	12	12.57	30	50
14/11/2009	28	18	12.82	30	50
20/11/2009	66.1	44	13.49	30	50
26/11/2009	53.7	35	14.02	30	50
2/12/2009	20.4	13	14.08	30	50
8/12/2009	170.1	114	15.70	30	50
14/12/2009	89.5	58	16.43	30	50
20/12/2009	39.9	26	16.70	30	50
26/12/2009	26.5	16	16.55	30	50
1/01/2010	10	7	16.39	30	50
7/01/2010	10.5	7	16.13	30	50
13/01/2010	40	27	16.31	30	50
19/01/2010	40.9	26	16.52	30	50
25/01/2010	44.7	29	16.72	30	50
31/01/2010	17	11	16.67	30	50
6/02/2010	13.9	9	16.48	30	50
12/02/2010	25.8	17	16.73	30	50
18/02/2010	14.1	9	16.70	30	50
24/02/2010	25.3	16	16.65	30	50
2/03/2010	11.3	7	16.52	30	50
8/03/2010	15.7	10	16.48	30	50
14/03/2010	3.5	2	16.12	30	50
20/03/2010	20.6	13	16.00	30	50
26/03/2010	39.3	25	16.30	30	50
1/04/2010	6	4	16.17	30	50
7/04/2010	11.2	7	16.15	30	50

Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
13/04/2010	14.6	9	15.82	30	50
19/04/2010	20.7	13	15.93	30	50
25/04/2010	9.4	6	15.90	30	50
1/05/2010	24	15	15.93	30	50
7/05/2010	11.1	7	15.78	30	50
13/05/2010	23.5	14	15.67	30	50
19/05/2010	15.5	10	15.70	30	50
25/05/2010	52.9	34	16.18	30	50
31/05/2010	2.7	2	16.17	30	50
6/06/2010	1.6	1	16.13	30	50
12/06/2010	3.4	2	16.15	30	50
18/06/2010	4.3	3	16.18	30	50
24/06/2010	3.3	2	16.13	30	50
30/06/2010	3.6	2	16.12	30	50
6/07/2010	10	6	16.13	30	50
12/07/2010	9.6	6	16.22	30	50
18/07/2010	11.6	7	16.15	30	50
24/07/2010	2.3	1	16.12	30	50
30/07/2010	0	0	16.00	30	50
5/08/2010	7.8	5	15.72	30	50
11/08/2010	4.5	3	15.62	30	50
17/08/2010	5.9	4	15.42	30	50
23/08/2010	4.9	3	15.30	30	50
29/08/2010	5.9	4	15.10	30	50
4/09/2010	9.6	6	15.18	30	50
10/09/2010	2.9	2	14.90	30	50
16/09/2010	4	2	14.82	30	50
22/09/2010	24.8	16	14.43	30	50
28/09/2010	26.2	17	14.12	30	50
4/10/2010	12.8	8	14.07	30	50
10/10/2010	12.9	8	13.85	30	50
16/10/2010	2.6	2	13.42	30	50
22/10/2010	16.1	10	13.47	30	50
28/10/2010	16.3	11	13.38	30	50
3/11/2010	8.2	5	13.27	30	50
9/11/2010	9.6	6.8	13.08	30	50

Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
15/11/2010	14	8.6	12.49	30	50
21/11/2010	14	8.6	12.05	30	50
27/11/2010	19.2	11.8	12.03	30	50
3/12/2010	13.5	8	10.26	30	50
9/12/2010	28.5	17	9.58	30	50
15/12/2010	32.5	19.3	9.47	30	50
21/12/2010	7.1	4.2	9.27	30	50
27/12/2010	1.5	0.9	9.17	30	50
2/01/2011	15.7	9.4	9.21	30	50
8/01/2011	17.4	10.4	8.93	30	50
14/01/2011	18	10.7	8.68	30	50
20/01/2011	8.8	5.2	8.28	30	50
26/01/2011	28.1	16.7	8.38	30	50
1/02/2011	38.7	23.7	8.62	30	50
7/02/2011	31.2	19.1	8.66	30	50
13/02/2011	25.5	15.6	8.77	30	50
19/02/2011	33.8	20.7	8.85	30	50
25/02/2011	45.6	28	9.20	30	50
3/03/2011	17.2	10.2	9.20	30	50
9/03/2011	18.7	11.1	9.35	30	50
15/03/2011	9.6	5.7	9.23	30	50
21/03/2011	5.7	3.4	8.87	30	50
27/03/2011	14.6	8.7	8.95	30	50
2/04/2011	16.1	9.6	8.99	30	50
8/04/2011	10	6	8.94	30	50
14/04/2011	18	10.7	8.90	30	50
20/04/2011	24.8	14.8	9.05	30	50
26/04/2011	7.7	4.6	8.88	30	50
2/05/2011	20.5	12.2	8.96	30	50
8/05/2011	21.4	12.7	8.94	30	50
14/05/2011	9.2	5.5	8.87	30	50
20/05/2011	21.2	12.6	8.51	30	50
26/05/2011	2.8	1.7	8.50	30	50
1/06/2011	5.4	3.2	8.54	30	50
7/06/2011	2.9	1.7	8.54	30	50
13/06/2011	5.1	3	8.54	30	50



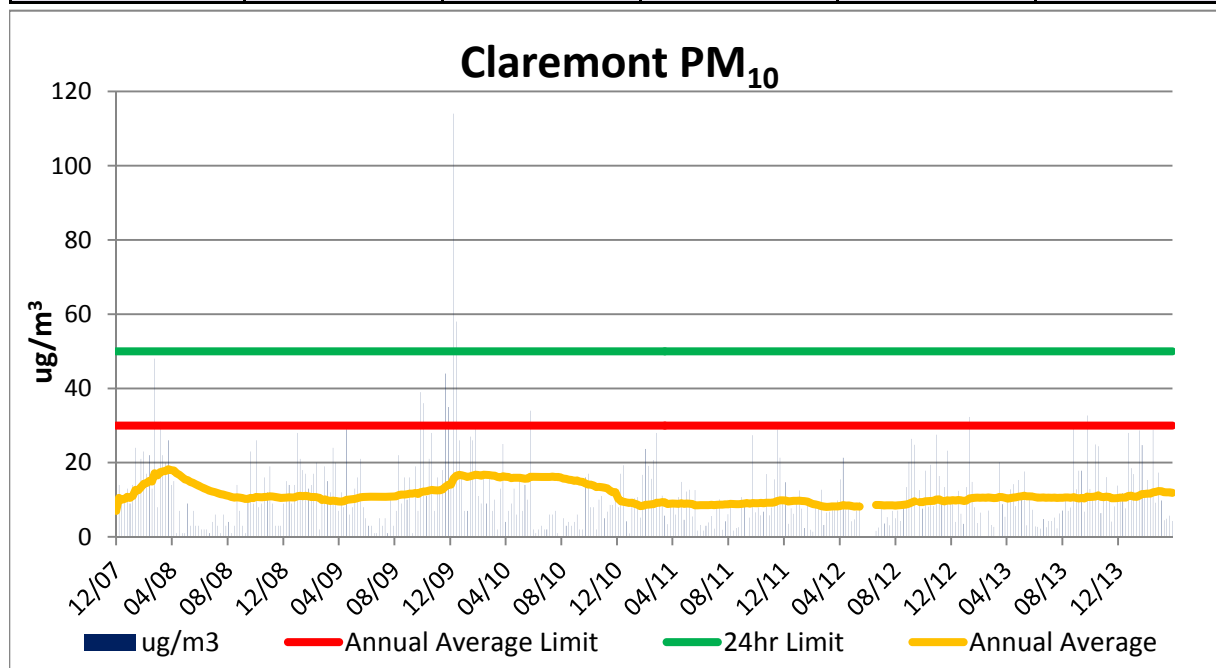
Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
19/06/2011	6.6	3.9	8.57	30	50
25/06/2011	9.4	5.6	8.63	30	50
1/07/2011	3.7	2.2	8.56	30	50
7/07/2011	15.1	9	8.61	30	50
13/07/2011	16.9	10.1	8.67	30	50
19/07/2011	3.2	1.9	8.68	30	50
25/07/2011	7.1	4.2	8.75	30	50
31/07/2011	10.2	6.1	8.77	30	50
6/08/2011	15	9.2	8.87	30	50
12/08/2011	2.8	1.7	8.83	30	50
18/08/2011	4	2.4	8.82	30	50
24/08/2011	4.2	2.6	8.80	30	50
30/08/2011	17.4	10.7	8.88	30	50
5/09/2011	14.2	8.4	8.99	30	50
11/09/2011	<0.1	<0.1	9.10	30	50
17/09/2011	8.7	5.2	8.92	30	50
23/09/2011	46	27.4	9.10	30	50
29/09/2011	7.4	6.6	9.07	30	50
5/10/2011	13.2	7.9	9.07	30	50
11/10/2011	9.8	5.8	9.14	30	50
17/10/2011	11.5	6.8	9.08	30	50
23/10/2011	28.4	16.9	9.18	30	50
29/10/2011	9.8	5.8	9.19	30	50
4/11/2011	13.2	7.9	9.21	30	50
10/11/2011	26.1	15.5	9.33	30	50
16/11/2011	39.2	28.9	9.67	30	50
22/11/2011	35.8	21.3	9.84	30	50
28/11/2011	15.3	9.1	9.85	30	50
4/12/2011	24.7	14.7	9.82	30	50
10/12/2011	5.9	3.5	9.55	30	50
16/12/2011	12.9	7.7	9.61	30	50
22/12/2011	10.5	6.2	9.70	30	50
28/12/2011	16.8	10	9.71	30	50
3/01/2012	21	12.5	9.74	30	50
9/01/2012	12.8	7.6	9.69	30	50
15/01/2012	4	2.4	9.64	30	50

Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
21/01/2012	15.5	9.2	9.52	30	50
27/01/2012	3.2	1.9	9.15	30	50
2/02/2012	2.3	1.4	8.85	30	50
8/02/2012	15.7	9.4	8.74	30	50
14/02/2012	15.8	9.4	8.55	30	50
20/02/2012	16.6	12.7	8.29	30	50
26/02/2012	5.4	3.2	8.17	30	50
3/03/2012	10.9	6.5	8.09	30	50
9/03/2012	11.5	6.8	8.11	30	50
15/03/2012	15.2	9	8.21	30	50
21/03/2012	12.2	7.3	8.18	30	50
27/03/2012	16.4	9.8	8.19	30	50
2/04/2012	26.1	15.5	8.35	30	50
8/04/2012	35.7	21.3	8.53	30	50
14/04/2012	12.1	7.2	8.40	30	50
20/04/2012	12.9	7.7	8.45	30	50
26/04/2012	7.1	4.2	8.32	30	50
2/05/2012	7.9	4.7	8.18	30	50
8/05/2012	12	7.1	8.21	30	50
14/05/2012	15.7	9.4	8.15	30	50
20/05/2012				30	50
26/05/2012				30	50
1/06/2012				30	50
7/06/2012				30	50
13/06/2012				30	50
19/06/2012	2.7	1.6	8.58	30	50
25/06/2012	4.2	2.5	8.59	30	50
1/07/2012	12.2	7.5	8.56	30	50
7/07/2012	5.8	3.6	8.44	30	50
13/07/2012	8.6	5.3	8.50	30	50
19/07/2012	5.1	3.1	8.48	30	50
25/07/2012	11.4	7	8.50	30	50
31/07/2012	8.1	5	8.42	30	50
6/08/2012	11.9	7.1	8.52	30	50
12/08/2012	7.3	4.3	8.56	30	50
18/08/2012	13.1	7.8	8.65	30	50

Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
24/08/2012	22.5	13.4	8.70	30	50
30/08/2012	33.9	20.2	8.92	30	50
5/09/2012	44.1	26.4	9.24	30	50
11/09/2012	41.4	24.8	9.60	30	50
17/09/2012				30	50
23/09/2012	21	12.6	9.38	30	50
29/09/2012	12.7	7.6	9.37	30	50
5/10/2012	30	17.8	9.59	30	50
11/10/2012	13.6	8.1	9.62	30	50
17/10/2012	32.6	19.4	9.66	30	50
23/10/2012	13.9	8.3	9.71	30	50
29/10/2012	46.1	27.5	10.07	30	50
4/11/2012	27.4	16.4	10.09	30	50
10/11/2012	13.7	8.8	9.72	30	50
16/11/2012	22.5	13.4	9.57	30	50
22/11/2012	39	23.2	9.83	30	50
28/11/2012	16.6	9.9	9.74	30	50
4/12/2012	16.4	10	9.86	30	50
10/12/2012	6.5	4	9.80	30	50
16/12/2012	20.3	12.4	9.91	30	50
22/12/2012	10.2	6.2	9.84	30	50
28/12/2012	5.7	3.5	9.67	30	50
3/01/2013	21.9	13.4	9.78	30	50
9/01/2013	53.4	32.3	10.34	30	50
15/01/2013	13.4	14.8	10.44	30	50
21/01/2013	13.5	8	10.55	30	50
27/01/2013	6.2	3.7	10.59	30	50
2/02/2013	10.9	6.5	10.54	30	50
8/02/2013			10.56	30	50
14/02/2013			10.52	30	50
20/02/2013	12	7.1	10.60	30	50
26/02/2013	5.3	3.2	10.53	30	50
4/03/2013	4.5	2.7	10.45	30	50
10/03/2013	<0.1	<0.1	10.48	30	50
16/03/2013	33.8	20.1	10.73	30	50
22/03/2013	14.8	8.8	10.71	30	50
28/03/2013	8.8	5.4	10.52	30	50

Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
3/04/2013	19.2	11.4	10.32	30	50
9/04/2013	21.5	12.8	10.43	30	50
15/04/2013	23.9	14.2	10.56	30	50
21/04/2013	13.9	8.3	10.64	30	50
27/04/2013	25.7	15.3	10.85	30	50
3/05/2013	19.2	11.4	10.93	30	50
9/05/2013	29.6	17.6	11.09	30	50
15/05/2013	5.2	3.1	10.94	30	50
21/05/2013	17.9	10.7	10.93	30	50
27/05/2013	12.3	7.3	10.87	30	50
2/06/2013	4.8	2.8	10.72	30	50
8/06/2013	4.5	2.7	10.58	30	50
14/06/2013	3.7	2.2	10.59	30	50
20/06/2013	8	4.8	10.63	30	50
26/06/2013	4.4	2.6	10.54	30	50
2/07/2013	7.3	4.3	10.55	30	50
8/07/2013	7.3	4.3	10.54	30	50
14/07/2013	8.7	5.2	10.57	30	50
20/07/2013	3.9	2.3	10.49	30	50
26/07/2013	10.6	6.3	10.51	30	50
1/08/2013	12	7.1	10.51	30	50
7/08/2013	18.7	11.1	10.63	30	50
13/08/2013	11.8	7	10.62	30	50
19/08/2013	13.2	7.9	10.52	30	50
25/08/2013	51.9	30.9	10.71	30	50
31/08/2013	21.5	12.8	10.47	30	50
6/09/2013	29.9	17.8	10.34	30	50
12/09/2013	29.9	17.8	10.48	30	50
18/09/2013	11.5	6.8	10.37	30	50
24/09/2013	54.9	32.7	10.81	30	50
30/09/2013	21.5	12.9	10.73	30	50
6/10/2013	18.9	11.2	10.78	30	50
12/10/2013	41.8	24.9	10.88	30	50
18/10/2013	41	24.4	11.16	30	50
24/10/2013	10.7	6.4	10.79	30	50
30/10/2013	13.2	10.4	10.69	30	50
5/11/2013	27	16.1	10.81	30	50
11/11/2013	16.6	9.9	10.75	30	50
17/11/2013	6.9	4.1	10.42	30	50

Claremont PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
23/11/2013	13.8	8.2	10.39	30	50
29/11/2013	23.2	13.8	10.45	30	50
5/12/2013	18.2	10.8	10.57	30	50
11/12/2013	19.8	11.8	10.56	30	50
17/12/2013	12.8	7.7	10.59	30	50
23/12/2013	47.1	28	11.02	30	50
29/12/2013	31.1	18.5	11.11	30	50
4/01/2014	28.4	16.9	10.84	30	50
10/01/2014	19.3	11.5	10.78	30	50
16/01/2014	48.2	28.7	11.14	30	50
22/01/2014	41.4	24.7	11.51	30	50
28/01/2014	17.9	10.7	11.59	30	50
3/02/2014	25.7	15.3	11.65	30	50
9/02/2014	19.2	11.4	11.65	30	50
15/02/2014	48.3	28.8	12.01	30	50
21/02/2014	15.4	9.2	12.12	30	50
27/02/2014	29.1	17.3	12.36	30	50
5/03/2014	16.4	9.8	12.32	30	50
11/03/2014	7.5	4.5	12.06	30	50
17/03/2014	8.2	4.9	12.00	30	50
23/03/2014	9.6	5.7	12.00	30	50
29/03/2014	7.3	4.3	11.88	30	50



Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
11/04/2008	20.9	14	14.00	30	50
17/04/2008	45.8	30	22.00	30	50
23/04/2008	0.9	1	15.00	30	50
29/04/2008	32.4	20	16.25	30	50
5/05/2008	51.4	33	19.60	30	50
11/05/2008	38.7	25	20.50	30	50
17/05/2008	106.6	70	27.57	30	50
23/05/2008	43.9	28	27.63	30	50
29/05/2008	19.4	12	25.89	30	50
4/06/2008	5	3	23.60	30	50
10/06/2008	38.1	24	23.64	30	50
16/06/2008	3.6	2	21.83	30	50
22/06/2008	1.7	1	20.23	30	50
28/06/2008	6.8	4	19.07	30	50
4/07/2008	11.6	7	18.27	30	50
10/07/2008	2.3	1	17.19	30	50
16/07/2008	8	5	16.47	30	50
22/07/2008	18.4	11	16.17	30	50
28/07/2008	3.6	2	15.42	30	50
3/08/2008	4.9	3	14.80	30	50
9/08/2008	9.8	6	14.38	30	50
15/08/2008	16	10	14.18	30	50
21/08/2008	28	18	14.35	30	50
27/08/2008	20.1	13	14.29	30	50
2/09/2008	5.6	4	13.88	30	50
8/09/2008	5.1	3	13.46	30	50
14/09/2008	18.9	12	13.41	30	50
20/09/2008	52.6	35	14.18	30	50
26/09/2008	17.4	11	14.07	30	50
2/10/2008	58.7	38	14.87	30	50
8/10/2008	16.1	10	14.71	30	50
14/10/2008	25.8	17	14.78	30	50
20/10/2008	55.8	37	15.45	30	50
26/10/2008	21.8	14	15.41	30	50
1/11/2008	55.9	37	16.03	30	50
7/11/2008	49.4	33	16.50	30	50
13/11/2008	16.6	11	16.35	30	50
19/11/2008	4.6	3	16.00	30	50
25/11/2008	15.3	10	15.85	30	50

Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
1/12/2008	25	16	15.85	30	50
7/12/2008	14.7	10	15.71	30	50
13/12/2008	22.5	15	15.69	30	50
19/12/2008	19.3	12	15.60	30	50
25/12/2008	19.4	13	15.55	30	50
31/12/2008	47.6	31	15.89	30	50
6/01/2009	36.3	25	16.09	30	50
12/01/2009	30.1	20	16.17	30	50
18/01/2009	27.9	18	16.21	30	50
24/01/2009	21.5	15	16.18	30	50
30/01/2009	24.6	17	16.2	30	50
5/02/2009	33.5	23	16.33	30	50
11/02/2009	27.5	18	16.37	30	50
17/02/2009	7.4	5	16.15	30	50
23/02/2009	24.4	16	16.15	30	50
1/03/2009	31.4	21	16.24	30	50
7/03/2009	27.2	18	16.27	30	50
13/03/2009	44.8	30	16.51	30	50
19/03/2009	43.6	29	16.72	30	50
25/03/2009	34.9	23	16.83	30	50
31/03/2009	14.3	9	16.70	30	50
6/04/2009	12.2	8	16.56	30	50
12/04/2009	9.5	6	16.43	30	50
18/04/2009	38.1	25	16.34	30	50
24/04/2009	4.8	3	16.38	30	50
30/04/2009	10.1	6	16.15	30	50
6/05/2009	23.5	15	15.85	30	50
12/05/2009	35.5	23	15.82	30	50
18/05/2009	27.9	18	14.97	30	50
24/05/2009	18	12	14.70	30	50
30/05/2009	9.2	6	14.61	30	50
5/06/2009	4	3	14.61	30	50
11/06/2009	5.4	4	14.28	30	50
17/06/2009	4.3	3	14.30	30	50
23/06/2009	1.5	1	14.30	30	50
29/06/2009	5.9	6	14.33	30	50
5/07/2009	1.6	1	14.23	30	50
11/07/2009	9	6	14.31	30	50
17/07/2009	2.2	1	14.25	30	50

Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
23/07/2009	18.8	12	14.26	30	50
29/07/2009	6.6	4	14.30	30	50
4/08/2009	10.7	7	14.36	30	50
10/08/2009	24	15	14.51	30	50
16/08/2009	16.5	11	14.52	30	50
22/08/2009	26.4	17	14.51	30	50
28/08/2009	14.5	9	14.44	30	50
3/09/2009	24.4	16	14.64	30	50
9/09/2009	2	1	14.61	30	50
15/09/2009	19.6	13	14.62	30	50
21/09/2009	14.3	9	14.20	30	50
27/09/2009	59.4	38	14.64	30	50
3/10/2009	63.3	41	14.69	30	50
9/10/2009	24.3	16	14.79	30	50
15/10/2009	42.9	28	14.97	30	50
21/10/2009	35.6	23	14.74	30	50
27/10/2009	26.5	16	14.77	30	50
2/11/2009	22.8	15	14.41	30	50
8/11/2009	13.7	9	14.02	30	50
14/11/2009	25.4	17	14.11	30	50
20/11/2009	72.2	49	14.87	30	50
26/11/2009	41.7	28	15.16	30	50
2/12/2009	15.4	10	15.07	30	50
8/12/2009	125.3	86	16.31	30	50
14/12/2009	78.9	53	16.93	30	50
20/12/2009	35.9	24	17.13	30	50
26/12/2009	22.3	15	16.93	30	50
1/01/2010	11.4	8	16.79	30	50
7/01/2010	19.2	13	16.59	30	50
13/01/2010	34.7	24	16.66	30	50
19/01/2010	31.5	21	16.70	30	50
25/01/2010	34	23	16.84	30	50
31/01/2010	25.8	17	16.84	30	50
6/02/2010	12.9	9	16.61	30	50
12/02/2010	19.8	13	16.52	30	50
18/02/2010	16.1	11	16.62	30	50
24/02/2010	21.5	14	16.59	30	50
2/03/2010	14	9	16.39	30	50
8/03/2010	6.4	4	16.16	30	50



Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
14/03/2010	0	<1	15.93	30	50
20/03/2010	26.9	18	15.75	30	50
26/03/2010	39.8	22	15.85	30	50
1/04/2010	10.1	7	15.83	30	50
7/04/2010	7.3	5	15.81	30	50
13/04/2010	12.3	8	15.53	30	50
19/04/2010	2.5	2	15.51	30	50
25/04/2010	8.4	5	15.49	30	50
1/05/2010	16.9	11	15.42	30	50
7/05/2010	14	9	15.19	30	50
13/05/2010	20.4	13	15.10	30	50
19/05/2010	13.6	9	15.05	30	50
25/05/2010	8.8	6	15.05	30	50
31/05/2010	3.5	2	15.03	30	50
6/06/2010	2.2	1	14.98	30	50
12/06/2010	1.4	1	14.95	30	50
18/06/2010	2.9	2	14.97	30	50
24/06/2010	1.9	1	14.88	30	50
30/06/2010	2.1	1	14.88	30	50
6/07/2010	6.4	4	14.85	30	50
12/07/2010	7.4	5	14.92	30	50
18/07/2010	9.7	6	14.81	30	50
24/07/2010	3	2	14.78	30	50
30/07/2010	0	0	14.66	30	50
5/08/2010	5.3	3	14.46	30	50
11/08/2010	8	5	14.36	30	50
17/08/2010	8.6	5	14.15	30	50
23/08/2010	5.8	4	14.07	30	50
29/08/2010	3.2	2	13.83	30	50
4/09/2010	8.7	6	13.92	30	50
10/09/2010	4.1	3	13.75	30	50
16/09/2010	2.3	1	13.61	30	50
22/09/2010	22.5	15	13.22	30	50
28/09/2010	20	13	12.75	30	50
4/10/2010	9.4	6	12.58	30	50
10/10/2010	8	5	12.19	30	50
16/10/2010	0.1	0	11.80	30	50
22/10/2010	8.5	6	11.63	30	50
28/10/2010	15.5	10	11.54	30	50

Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
3/11/2010	8.9	5.4	11.48	30	50
9/11/2010	9.6	5.9	11.29	30	50
15/11/2010	8.5	5.2	10.55	30	50
21/11/2010	10.4	6.4	10.18	30	50
27/11/2010	13.5	8.3	10.16	30	50
3/12/2010	10.3	6.3	8.81	30	50
9/12/2010	12.8	7.8	8.04	30	50
15/12/2010	11.6	7.1	7.75	30	50
21/12/2010	5.9	3.6	7.56	30	50
27/12/2010	2.7	1.6	7.45	30	50
2/01/2011	11.5	7	7.35	30	50
8/01/2011	5.4	3.3	7.00	30	50
14/01/2011	10.2	6.2	6.75	30	50
20/01/2011	11.5	7	6.48	30	50
26/01/2011	23.9	14.6	6.44	30	50
1/02/2011	20.3	12.4	6.49	30	50
7/02/2011	14	8.6	6.42	30	50
13/02/2011	20.8	12.7	6.45	30	50
19/02/2011	12.1	7.4	6.34	30	50
25/02/2011	15.5	9.5	6.34	30	50
3/03/2011	18.5	11.3	6.47	30	50
9/03/2011	9.4	5.8	6.46	30	50
15/03/2011	9.2	5.6	6.25	30	50
21/03/2011	2.8	1.7	5.91	30	50
27/03/2011	14.9	9.1	5.95	30	50
2/04/2011	17.2	10.6	6.01	30	50
8/04/2011	9.9	6.1	6.08	30	50
14/04/2011	13.4	8	6.13	30	50
20/04/2011	18.9	11.6	6.14	30	50
26/04/2011	7.6	4.6	6.06	30	50
2/05/2011	21.3	13	6.06	30	50
8/05/2011	18.7	11.4	6.10	30	50
14/05/2011	8.8	5.4	6.09	30	50
20/05/2011	19.7	12.1	6.26	30	50
26/05/2011	7.4	4.5	6.32	30	50
1/06/2011	8.5	5.2	6.39	30	50
7/06/2011	5.0	3.1	6.41	30	50
13/06/2011	6.0	3.7	6.51	30	50
19/06/2011	7.0	4.4	6.57	30	50

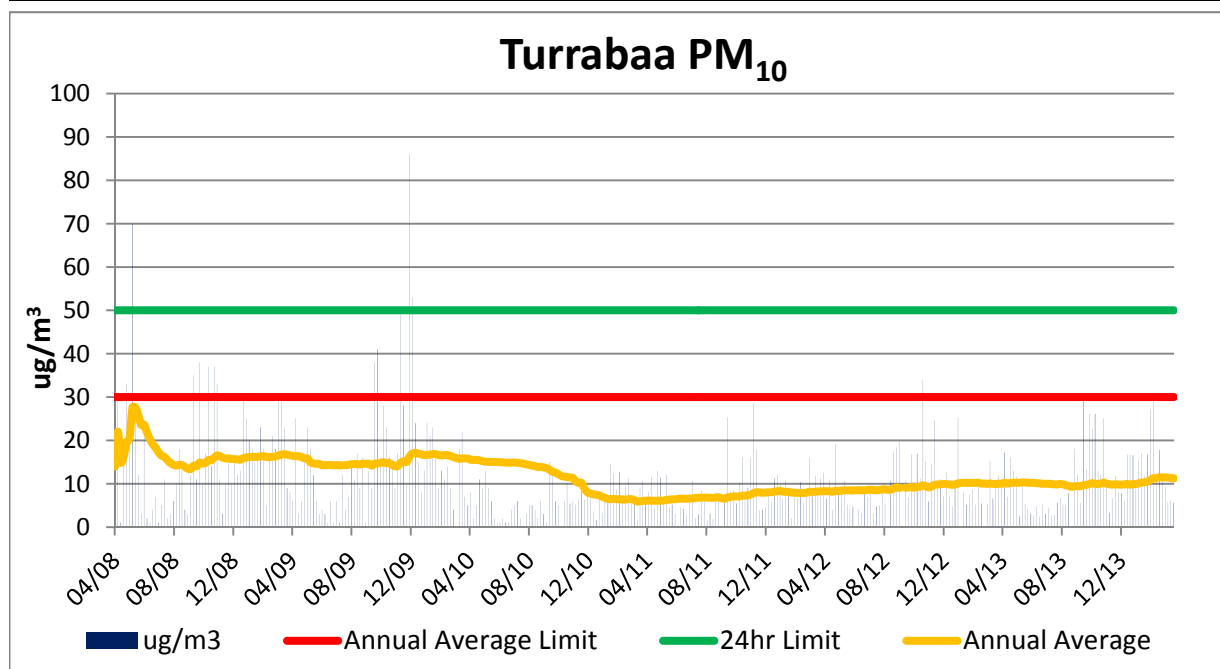
Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
25/06/2011	6.8	4.2	6.57	30	50
1/07/2011	4.7	2.9	6.53	30	50
7/07/2011	9.1	5.6	6.53	30	50
13/07/2011	17.3	10.6	6.67	30	50
19/07/2011	3.5	2.1	6.71	30	50
25/07/2011	4.8	2.9	6.71	30	50
31/07/2011	13.8	8.4	6.77	30	50
6/08/2011	12.9	7.7	6.81	30	50
12/08/2011	2.7	1.6	6.77	30	50
18/08/2011	5.2	3.1	6.79	30	50
24/08/2011	3.2	1.9	6.72	30	50
30/08/2011	13.6	8.1	6.81	30	50
5/09/2011	10.2	6.2	6.90	30	50
11/09/2011	0.5	0.3	6.64	30	50
17/09/2011	11.5	7	6.54	30	50
23/09/2011	41.3	25.3	6.87	30	50
29/09/2011	13.6	8.3	6.93	30	50
5/10/2011	13.8	8.5	7.08	30	50
11/10/2011	9	5.5	7.07	30	50
17/10/2011	16.8	10.3	7.07	30	50
23/10/2011	26.2	16.1	7.26	30	50
29/10/2011	10.9	6.7	7.27	30	50
4/11/2011	14.8	9.1	7.34	30	50
10/11/2011	25.9	15.9	7.50	30	50
16/11/2011	46.7	28.6	7.85	30	50
22/11/2011	29	17.8	8.05	30	50
28/11/2011	6.3	3.9	7.98	30	50
4/12/2011	6.6	4	7.93	30	50
10/12/2011	7.4	4.5	7.95	30	50
16/12/2011	12.2	7.5	8.05	30	50
22/12/2011	9.6	5.9	8.03	30	50
28/12/2011	18.3	11.2	8.17	30	50
3/01/2012	19.7	12.1	8.27	30	50
9/01/2012	15.7	9.9	8.32	30	50
15/01/2012	10.8	6.6	8.18	30	50
21/01/2012	17.6	10.8	8.15	30	50
27/01/2012	11.7	7.2	8.13	30	50
2/02/2012	3.4	2.1	7.94	30	50
8/02/2012	11.2	6.9	7.94	30	50

Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
14/02/2012	10.7	6.6	7.89	30	50
20/02/2012	16.9	10.4	7.87	30	50
26/02/2012	9.2	5.6	7.87	30	50
3/03/2012	12.2	7.5	7.90	30	50
9/03/2012	25.9	15.9	8.14	30	50
15/03/2012	13	8	8.13	30	50
21/03/2012	19.3	11.8	8.15	30	50
27/03/2012	15	9.2	8.20	30	50
2/04/2012	18.5	11.3	8.26	30	50
8/04/2012	20.6	12.6	8.27	30	50
14/04/2012	10.8	6.6	8.31	30	50
20/04/2012	17.9	11	8.27	30	50
26/04/2012	6.6	4	8.15	30	50
2/05/2012	31.2	19.1	8.38	30	50
8/05/2012	13.4	8.2	8.32	30	50
14/05/2012	14.3	8.8	8.39	30	50
20/05/2012	17.4	10.7	8.48	30	50
26/05/2012	8.4	5.2	8.52	30	50
1/06/2012	6.9	4.2	8.45	30	50
7/06/2012	7.7	4.7	8.45	30	50
13/06/2012			8.53	30	50
19/06/2012	6.5	4	8.54	30	50
25/06/2012	5.2	3.2	8.50	30	50
1/07/2012	13.1	8	8.46	30	50
7/07/2012	11.4	7	8.54	30	50
13/07/2012	13.2	8.1	8.63	30	50
19/07/2012	5.1	3.1	8.54	30	50
25/07/2012	7.6	4.7	8.49	30	50
31/07/2012	8.2	5	8.55	30	50
6/08/2012	15.4	9.4	8.66	30	50
12/08/2012	8.8	5.4	8.72	30	50
18/08/2012	0.1	0.1	8.58	30	50
24/08/2012	17.5	10.7	8.66	30	50
30/08/2012	28.1	17.2	8.95	30	50
5/09/2012	29.9	18.4	9.14	30	50
11/09/2012	32	19.7	9.05	30	50
17/09/2012				30	50
23/09/2012	17.4	10.7	9.10	30	50
29/09/2012	11.2	6.9	9.12	30	50

Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
5/10/2012	27.4	16.8	9.24	30	50
11/10/2012	13.4	8.2	9.10	30	50
17/10/2012	27.6	16.9	9.28	30	50
23/10/2012	18.2	11.2	9.32	30	50
29/10/2012	55.4	33.9	9.63	30	50
4/11/2012	24.7	15.1	9.39	30	50
10/11/2012	9.7	5.9	9.19	30	50
16/11/2012	23.6	14.5	9.37	30	50
22/11/2012	40.5	24.8	9.74	30	50
28/11/2012	16.3	10	9.83	30	50
4/12/2012	17.9	11	9.89	30	50
10/12/2012	11.7	7.2	9.92	30	50
16/12/2012	20.6	12.6	9.94	30	50
22/12/2012	11.6	7.1	9.85	30	50
28/12/2012	7.8	4.8	9.76	30	50
3/01/2013	16.8	10.3	9.83	30	50
9/01/2013	41.3	25.3	10.08	30	50
15/01/2013			10.14	30	50
21/01/2013	13.3	8.2	10.24	30	50
27/01/2013	8.3	5.1	10.21	30	50
2/02/2013	12.2	7.5	10.23	30	50
8/02/2013	14.2	8.7	10.20	30	50
14/02/2013	8.5	5.2	10.19	30	50
20/02/2013	12.6	9	10.22	30	50
26/02/2013	8.9	5.4	10.03	30	50
4/03/2013			10.07	30	50
10/03/2013	8.9	5.4	9.95	30	50
16/03/2013	25	15.3	10.06	30	50
22/03/2013	10.7	6.6	9.98	30	50
28/03/2013	14.8	9.1	9.91	30	50
3/04/2013	19.6	12	10.01	30	50
9/04/2013	17.2	10.5	10.00	30	50
15/04/2013	28.1	17.2	10.24	30	50
21/04/2013	11.5	7	10.02	30	50
27/04/2013	26.4	16.2	10.17	30	50
3/05/2013	21.1	12.9	10.24	30	50
9/05/2013	18.9	11.6	10.26	30	50
15/05/2013	4.1	2.5	10.21	30	50
21/05/2013	16.6	10.2	10.32	30	50

Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
27/05/2013	8.6	5.3	10.33	30	50
2/06/2013	7	4.3	10.22	30	50
8/06/2013	5.1	3.1	10.21	30	50
14/06/2013	4.3	2.6	10.19	30	50
20/06/2013	7.8	4.8	10.14	30	50
26/06/2013	3.9	2.4	10.06	30	50
2/07/2013	8.5	5.2	10.00	30	50
8/07/2013	5.1	3.1	10.00	30	50
14/07/2013	7.3	4.5	10.00	30	50
20/07/2013	4.3	2.6	9.96	30	50
26/07/2013	4.6	2.8	9.84	30	50
1/08/2013	9.1	5.6	9.84	30	50
7/08/2013	11	6.7	9.96	30	50
13/08/2013	8.4	5.2	9.86	30	50
19/08/2013	8.5	5.2	9.65	30	50
25/08/2013	12.7	7.8	9.46	30	50
31/08/2013	<0.1		9.27	30	50
6/09/2013	29.6	18.1	9.43	30	50
12/09/2013	19.7	12.1	9.46	30	50
18/09/2013	9.1	5.6	9.43	30	50
24/09/2013	47.9	29.4	9.66	30	50
30/09/2013	21.8	13.4	9.75	30	50
6/10/2013	42.5	26.1	9.91	30	50
12/10/2013	37.4	22.9	10.12	30	50
18/10/2013	42.5	26.1	9.98	30	50
24/10/2013	21	12.9	9.94	30	50
30/10/2013	19.8	12.1	10.06	30	50
5/11/2013	41	25.1	10.24	30	50
11/11/2013	17.9	11	10.00	30	50
17/11/2013	5.4	3.3	9.88	30	50
23/11/2013	10.9	6.7	9.80	30	50
29/11/2013	19.3	11.8	9.88	30	50
5/12/2013	12.9	7.9	9.80	30	50
11/12/2013	12.8	7.8	9.81	30	50
17/12/2013	10	6.1	9.84	30	50
23/12/2013	27.3	16.7	9.95	30	50
29/12/2013	27.2	16.7	9.80	30	50
4/01/2014	27	16.6	9.92	30	50
10/01/2014	14.4	8.8	9.93	30	50

Turrabaa PM <sub>10</sub> High Volume Air Sampler					
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m <sup>3</sup>	Annual Average	Annual Average Limit	24hr Limit
16/01/2014	25.5	15.6	10.11	30	50
22/01/2014	27.8	17	10.28	30	50
28/01/2014	19.4	11.9	10.33	30	50
3/02/2014	27.3	16.7	10.54	30	50
9/02/2014	44.5	27.3	10.86	30	50
15/02/2014	49.1	30.1	11.29	30	50
21/02/2014	17.4	10.7	11.28	30	50
27/02/2014	29	17.8	11.49	30	50
5/03/2014	19	11.6	11.43	30	50
11/03/2014	15.3	9.4	11.48	30	50
17/03/2014	9.5	5.8	11.42	30	50
23/03/2014	10.1	6.2	11.32	30	50
29/03/2014	9.2	5.6	11.24	30	50



## Appendix 5

### WET WEATHER MONITORING DATA



## Kurrajong Creek and Pine Creek Wet Weather Events

Sample No.	Date	Sample Location	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
	31 July 2007	KCUS	7.9	255	22		<10	
	31 July 2007	KCDS	8	205	163		15	
	31 July 2007	KC2US	6.7	75	84		18	
	31 July 2007	KC2DS	6.7	85	21		12	
	31 July 2007	KC1US	8.2	1300	15		<10	
	31 July 2007	KC1DS	6.9	430	39		<10	
31489.01	23 September 2008	KC2US	6.5	65	35	<2	-	
31489.02	23 September 2008	KC1US	8.0	65	320	<2	-	
31489.03	23 September 2008	KCUS	7.7	315	168	<2	-	
31489.04	23 September 2008	KCDS	7.2	230	150	<2	-	
31489.05	23 September 2008	PC	7.2	90	294	<2	-	
31489.06	23 September 2008	PC1	7.0	90	62	<2	-	
31489.07	23 September 2008	KC1DS	7.1	220	1280	<2	-	
31489.08	23 September 2008	KC2DS	7.2	165	444	<2	-	
32276.01	15 December 2008	KCDS	7.1	355	21	<2	-	
32276.02	15 December 2008	KC2DS	6.9	95	8	<2	-	
32276.03	15 December 2008	KCUS	7.5	55	6	<2	-	
32276.04	15 December 2008	PC	7.2	125	12	<2	-	
32276.05	15 December 2008	PC1	6.9	255	23	<2	-	
32276.06	15 December 2008	KC1DS	8.2	315	42	<2	-	
32276.07	15 December 2008	KC2DS	7.4	185	289	<2	-	
32373.01	29 December 2008	KC1US	6.9	95	48	<2	-	
32373.02	29 December 2008	KC2US	6.8	90	17	<2	-	
32373.03	29 December 2008	KCDS	7.1	450	26	<2	-	
32815.01	17 February 2009	KCUS	7.2	280	123	<2	-	
32815.02	17 February 2009	KC2US	6.7	70	14	<2	-	
32815.03	17 February 2009	KCDS	6.9	180	132	<2	-	
32815.04	17 February 2009	PC	7.1	60	57	<2	-	
32815.05	17 February 2009	PC1	7.1	180	38	<2	-	
32815.06	17 February 2009	KC1DS	7.1	145	142	<2	-	
32815.07	17 February 2009	KC2DS	7.1	105	1130	<2	-	
ES0919730-001	29 December 2009	KC2DS	7.15	95	48	-	13	Oil & Grease not reported for any location due to incorrect sample bottle and insufficient sample. No site discharge - only adjacent creek samples
ES0919730-002	29 December 2009	KCDS	6.94	187	33	-	11	
ES0919730-003	29 December 2009	KC2US	6.67	86	4	-	16	
ES0919730-004	29 December 2009	KC1US	6.7	74	47	-	6	
ES0919730-005	29 December 2009	KCUS	7.05	305	52	-	9	
ES0919730-007	29 December 2009	PC	7.23	83	117	-	8	
ES0919730-008	29 December 2009	KC1DS	7.12	171	79	-	10	

## Kurrajong Creek and Pine Creek Wet Weather Events

Sample No.	Date	Sample Location	pH	Electrical Conductivity ( $\mu\text{S}/\text{cm}$ )	Total Suspended Solids ( $\text{mg}/\text{L}$ )	Grease & Oil ( $\text{mg}/\text{L}$ )	Total Organic Carbon (TOC)	Comments
ES1000146-001	5 January 2010	KCUS	7.24	804	2	<5	10	
ES1000146-002	5 January 2010	KC1US	7.42	126	8	<5	12	
ES1000146-003	5 January 2010	KCDS	7.41	456	2	<5	14	
ES1000146-004	5 January 2010	SD5	7.23	155	18	<5	8	Discharge
ES1000146-005	5 January 2010	PC1	7.3	174	7	<5	12	
ES1000146-006	5 January 2010	PC	7.38	121	8	<5	15	
ES1000146-007	5 January 2010	KC1DS	7.28	419	6	<5	10	
ES1000146-008	5 January 2010	KC2DS	7.47	178	22	<5	12	
ES1013938-001	14 July 2010	PC1	8.5	37	126	<5	13	
ES1013938-002	14 July 2010	PC	8.65	226	10	<5	9	
ES1013938-003	14 July 2010	KC1 DS	8.01	552	27	-	13	
ES1013938-004	14 July 2010	KC2 DS	7.92	211	142	<5	16	
ES1015034-001	28 July 2010	KCUS	8.18	72	130	<5	12	
ES1015034-002	28 July 2010	PC	7.95	170	151	<5	11	
ES1015034-003	28 July 2010	PCI	7.978	37	132	<5	9	
ES1015034-004	28 July 2010	KCIDS	7.77	36	90	<5	9	
ES1016053-001	10 August 2010	KCUS	7.45	33	296	<5	5	
ES1016053-002	10 August 2010	KC1US	7.65	169	2760	<5	10	
ES1016053-003	10 August 2010	KC2US	7.7	37	62	<5	12	
ES1016053-004	10 August 2010	PC1	7.54	43	1320	<5	6	
ES1016053-005	10 August 2010	PC	6.83	62	167	<5	7	
ES1016053-006	10 August 2010	KC1DS	6.8	64	380	<5	9	
ES1016053-007	10 August 2010	KC2DS	6.76	114	40	<5	17	
ES1016053-008	10 August 2010	KCDS	7.08	30	326	<5	4	
ES1016966-101	23 August 2010	KCUS	8.04	100	236	<5	9	
ES1016966-102	23 August 2010	KC1US	7.84	210	1600	<5	5	
ES1016966-103	23 August 2010	KC2US	8.05	58	48	<5	15	
ES1016966-104	23 August 2010	KCDS	7.97	50	122	<5	5	
ES1016966-105	23 August 2010	SD5	7.9	60	22	<5	11	No discharge. Sampled to determine sediment level.
ES1016966-106	23 August 2010	PC1	7.94	49	476	<5	7	
ES1016966-107	23 August 2010	KC1DS	7.37	193	146	<5	8	
ES1016966-108	23 August 2010	KC2DS	7.63	94	35	<5	15	
ES1016966-109	23 August 2010	PC	7.71	70	142	<5	10	
ES1018432-001	10 September 2010	KCUS	7.44	909	246	<5	8	
ES1018432-002	10 September 2010	KC1US	7.2	154	193	<5	10	
ES1018432-003	10 September 2010	KC2US	6.84	147	81	<5	11	
ES1018432-004	10 September 2010	KCDS	7.26	492	116	<5	10	
ES1018432-005	10 September 2010	PC1	7.18	65	176	<5	10	
ES1018432-006	10 September 2010	PC	7.21	159	26	<5	17	

## Kurrajong Creek and Pine Creek Wet Weather Events

Sample No.	Date	Sample Location	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
ES1018432-007	10 September 2010	KC1DS	7.66	955	131	<5	12	
ES1018432-008	10 September 2010	KC2DS	7.25	133	84	<5	16	
ES1023281-001	16 November 2010	KCUS	7.83	866	162	10	12	
ES1023281-002	16 November 2010	PC1	7.27	98	260	9	9	
ES1023281-003	16 November 2010	PC	6.94	179	127	39	20	Elevated Oil and Grease
ES1024687-001	30 November 2010	KC2US	6.99	86	40	<5	14	
ES1024687-002	30 November 2010	KCUS	7.12	93	20	<5	15	
ES1024687-003	30 November 2010	KC1US	6.97	64	124	<5	10	
ES1024687-004	30 November 2010	PC	6.9	46	40	<10	14	
ES1024687-005	30 November 2010	PC1	7.42	101	136	<10	10	
ES1024687-006	30 November 2010	KCDS	7.11	191	191	<5	14	
ES1024687-007	30 November 2010	KC1DS	7.23	150	150	<5	15	
ES1024687-008	30 November 2010	KC2DS	7.2	101	101	<5	12	
ES1119821-001	9 September 2011	PC1	6.84	29	38	<5	10	
ES1119821-002	9 September 2011	PC	7.31	134	71	<5	13	
ES1119821-003	9 September 2011	KC1DS	7.58	209	66	<5	22	
ES1119821-004	9 September 2011	KC2DS	7.58	124	101	<5	15	
ES1121355-001	29 September 2011	KC2DS	6.69	76	38	<5	14	
ES1121355-002	29 September 2011	KCUS	6.88	73	160	<5	10	
ES1121355-003	29 September 2011	PC1	7.08	87	255	<5	9	
ES1121355-004	29 September 2011	PC	6.89	63	198	<5	9	
ES1121355-005	29 September 2011	KC1DS	7.17	92	167	<5	9	
ES1121355-006	29 September 2011	KCDS	6.93	434	530	<5	38	
ES1121355-007	29 September 2011	KC2DS	7.41	134	36	<5	12	
ES1124936-001	14 November 2011	KC2US	7.24	94	30	<5	26	
ES1124936-002	14 November 2011	PC1	7.36	158	220	<5	14	
ES1124936-003	14 November 2011	PC	7.93	167	73	<5	8	
ES1124936-004	14 November 2011	KC1DS	7.6	157	104	<5	13	
ES1126001-001	23 November 2011	KC2US	6.74	32	66	<5	12	
ES1126001-002	23 November 2011	KCUS	6.89	38	788	<5	13	
ES1126001-003	23 November 2011	KC1US	7.47	112	144	<5	12	
ES1126001-004	23 November 2011	PC1	7.22	60	202	<5	9	
ES1126001-005	23 November 2011	PC	6.75	72	322	<5	14	
ES1126001-006	23 November 2011	KC1DS	7.09	75	372	<5	16	
ES1126001-007	23 November 2011	KC2DS	7.09	90	59	<5	20	
ES1126001-008	23 November 2011	KCDS	6.87	88	536	<5	16	
ES1126200-001	25 November 2011	SD2	7.24	83	42	<5	7	
ES1126200-002	25 November 2011	SD5	7.48	125	83	<5	6	
ES1126200-003	25 November 2011	SB3	8.54	663	478	<5	4	Sampled overflowing dam

## Kurrajong Creek and Pine Creek Wet Weather Events

Sample No.	Date	Sample Location	pH	Electrical Conductivity ( $\mu\text{S}/\text{cm}$ )	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
ES1126200-004	25 November 2011	KC2DS	7.45	99	49	<5	6	
ES1126200-005	25 November 2011	KC2US	7.04	37	18	<5	6	
ES1126200-006	25 November 2011	KC1US	7.05	62	191	<5	7	
ES1126200-007	25 November 2011	SD4	7.52	131	166	<5	7	
ES1126200-008	25 November 2011	KC1DS	7.19	86	384	<5	4	
ES1127632-001	13 December 2011	SD4	7.69	200	48	<5	5	
ES1127632-002	13 December 2011	SD2	7.2	106	82	<5	8	
ES1127632-003	13 December 2011	SD5	7.62	148	24	<5	6	
ES1127632-004	13 December 2011	KC2DS	7.5	134	16	<5	7	
ES1127632-005	13 December 2011	KCDS	7.41	200	64	<5	10	
ES1127632-006	13 December 2011	KC2US	7.13	58	9	<5	8	
ES1127632-007	13 December 2011	KCUS	7.49	277	120	<5	11	
ES1127632-008	13 December 2011	KC1US	7.35	180	26	<5	11	
ES1127632-009	13 December 2011	PCI	7.54	113	60	<5	8	
ES1127632-010	13 December 2011	PC	7.38	168	12	<5	11	
ES1127632-011	13 December 2011	KC1DS	7.77	741	43	<5	10	
ES1202508-001	1 February 2012	KC2DS	7.58	143	52	<5	11	
ES1202508-002	1 February 2012	KCDS	7.56	544	30	<5	7	
ES1202508-003	1 February 2012	KC2US	7.11	58	41	<5	9	
ES1202508-004	1 February 2012	KCUS	7.51	750	397	<5	6	
ES1202508-005	1 February 2012	KC1US	7.75	172	83	<5	8	
ES1202508-006	1 February 2012	PC1	7.36	63	73	<5	5	
ES1202508-007	1 February 2012	PC	7.29	59	81	<5	5	
ES1202508-008	1 February 2012	KC1DS	7.83	216	58	<5	8	
ES1202508-009	1 February 2012	SD2	7.91	178	20	<5	6	
ES1202508-010	1 February 2012	SD4	7.9	212	247	<5	5	
ES1202508-011	1 February 2012	SD5	7.84	148	36	<5	7	
ES1202509-001	2 February 2012	SB3	8.29	415	215	<5	2	Sampled overflowing dam
ES1202509-002	2 February 2012	PC1	7.43	48	80	<10	3	
ES1202509-003	2 February 2012	KC1US	7.42	70	36	<10	7	
ES1202509-004	2 February 2012	KCUS	7.53	113	300	<10	6	
ES1202509-005	2 February 2012	KC2US	7.28	42	16	<5	4	
ES1202509-006	2 February 2012	KCDS	7.35	54	15	<5	7	
ES1202509-007	2 February 2012	KC2DS	7.75	126	26	<10	5	
ES1202509-008	2 February 2012	KC1DS	7.63	114	84	<10	5	
ES1202509-009	2 February 2012	PC	7.3	67	70	<10	5	

## Kurrajong Creek and Pine Creek Wet Weather Events

Sample No.	Date	Sample Location	pH	Electrical Conductivity (µS/cm)	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
ES1214027-001	4 June 2012	KC2US	7.27	82	20	<5	23	
ES1214027-002	4 June 2012	KCUS	7.82	218	52	<5	13	
ES1214027-003	4 June 2012	PC1	7.51	97	96	<5	16	
ES1214027-004	4 June 2012	PC	7.18	95	48	<5	13	
ES1214027-005	4 June 2012	KC1DS	7.9	1270	8	<5	10	
ES1214027-006	4 June 2012	KC2DS	6.72	136	108	<5	17	
ES1217576-001	12 July 2012	KC2US	6.86	50	32	<5	15	
ES1217576-002	12 July 2012	KCUS	7.11	62	229	<5	13	
ES1217576-003	12 July 2012	PC1	7.43	71	53	<5	10	
ES1217576-004	12 July 2012	PC	7	47	142	<5	8	
ES1217576-005	12 July 2012	KC1DS	7.65	230	88	<5	14	
ES1217576-006	12 July 2012	KC2DS	7.12	85	108	<5	20	
ES1217576-007	12 July 2012	SD5	7.33	98	122	<5	16	
ES1217572-001	13 July 2012	SD2	7.83	205	20	<5	14	
ES1217572-002	13 July 2012	KC1US	7.52	221	133	<5	21	
ES1302189-001	29 January 2013	KCDS	6.82	387	65	<5	16	
ES1302189-002	29 January 2013	KC2US	6.68	89	7	<5	31	
ES1302189-003	29 January 2013	KCUS	7.09	426	72	<5	15	
ES1302189-004	29 January 2013	PC1	6.89	92	90	<5	18	
ES1302189-005	29 January 2013	PC	7.01	162	55	<5	17	
ES1302189-006	29 January 2013	KC1DS	7.09	162	23	<5	20	
ES1305016-001	1 March 2013	KCUS	7.13	195	750	<5	6	
ES1305016-002	1 March 2013	KCDS	6.83	89	322	<5	16	Disturbance along rail line, just flowing @ rail line
ES1305016-003	1 March 2013	KC1US	6.96	88	238	<5	11	
ES1305016-004	1 March 2013	KC1DS	7.15	206	322	<5	10	
ES1305016-005	1 March 2013	KC2US	6.76	45	36	<5	9	
ES1305016-006	1 March 2013	KC2DS	7.33	204	27	<5	17	
ES1305016-007	1 March 2013	PCa	6.83	55	358	<5	10	
ES1305016-008	1 March 2013	PC1	6.78	54	234	<5	8	
ES1406431-001	21 March 2014	PCA	6.58	16	82	<5	5	
ES1406431-002	21 March 2014	PC1	7.02	87	12	<5	14	
ES1406431-003	21 March 2014	KC1DS	7.32	286	53	<5	31	
ES1406546-001	25 March 2014	KCUS	7.25	90	503	<5	6	
ES1406546-002	25 March 2014	KC1DS	7.13	99	68	<5	10	
ES1406546-003	25 March 2014	KC2US	6.65	70	35	<5	12	
ES1406546-004	25 March 2014	KC2DS	6.46	72	22	<5	14	
ES1406546-005	25 March 2014	PCa	6.77	58	302	<5	8	
ES1406546-006	25 March 2014	PC1	7.29	99	122	<5	6	

## Kurrajong Creek and Pine Creek Wet Weather Events

Sample No.	Date	Sample Location	pH	Electrical Conductivity ( $\mu\text{S}/\text{cm}$ )	Total Suspended Solids (mg/L)	Grease & Oil (mg/L)	Total Organic Carbon (TOC)	Comments
ES1406686-001	26 March 2014	PC1	7.41	122	<5	<5	15	
ES1406686-002	26 March 2014	PCA	7.13	72	39	<5	14	
ES1406686-003	26 March 2014	KC1DS	7.85	254	<5	<5	20	
ES1406891-001	27 March 2014	PCA	7.23	82	43	<5	13	
ES1406891-002	27 March 2014	PC1	7.17	78	129	<5	7	
ES1406891-003	27 March 2014	KCUS	7.41	195	92	<5	8	
ES1406891-004	27 March 2014	KCDS	7.38	130	58	<5	8	
ES1406891-005	27 March 2014	KC1US	7.53	113	14	<5	16	
ES1406891-006	27 March 2014	KC1DS	7.47	98	100	<5	12	
ES1406891-007	27 March 2014	KC2US	7.27	65	8	<5	10	
ES1406891-008	27 March 2014	KC2DS	7.19	79	88	<5	13	
ES1407152-001	28 March 2014	SD2	7.21	103	26	<5	12	
ES1407152-002	28 March 2014	SD5	7.06	72	18	<5	10	

## Appendix 6

### GROUNDWATER MONITORING DATA

[illegible]



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Site ID	Piezometer / Water Bore	Date	Time	Depth to Ground mbgl	Depth to Stand - mboc	Field Parameters			Total Metals														pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Major Anions					Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
						pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L			Mercury (Hg) - mg/L	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L		Potassium (K) - mg/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L								Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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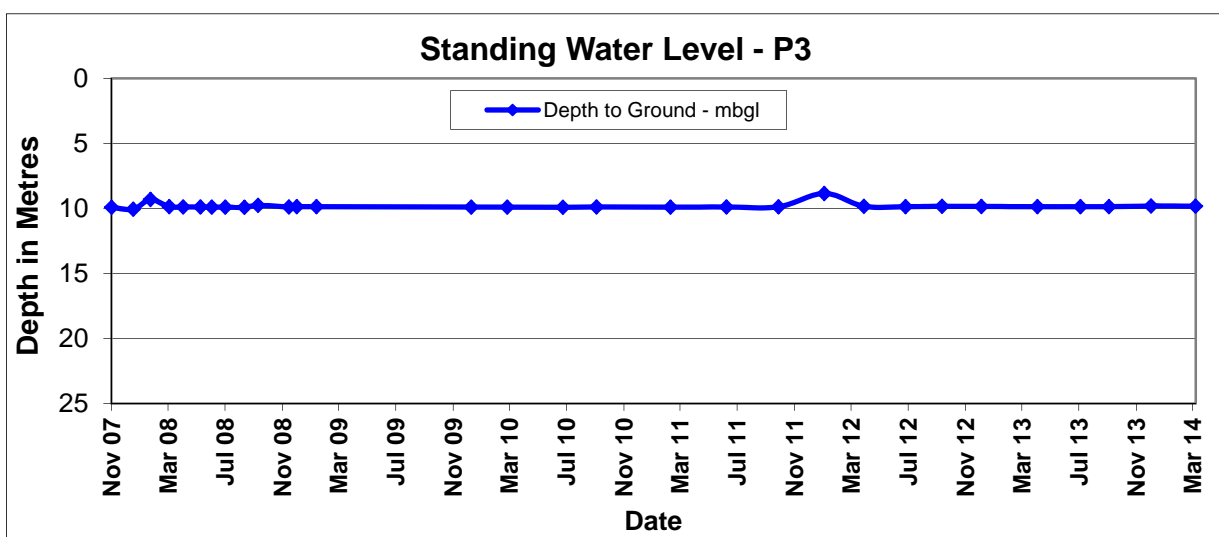
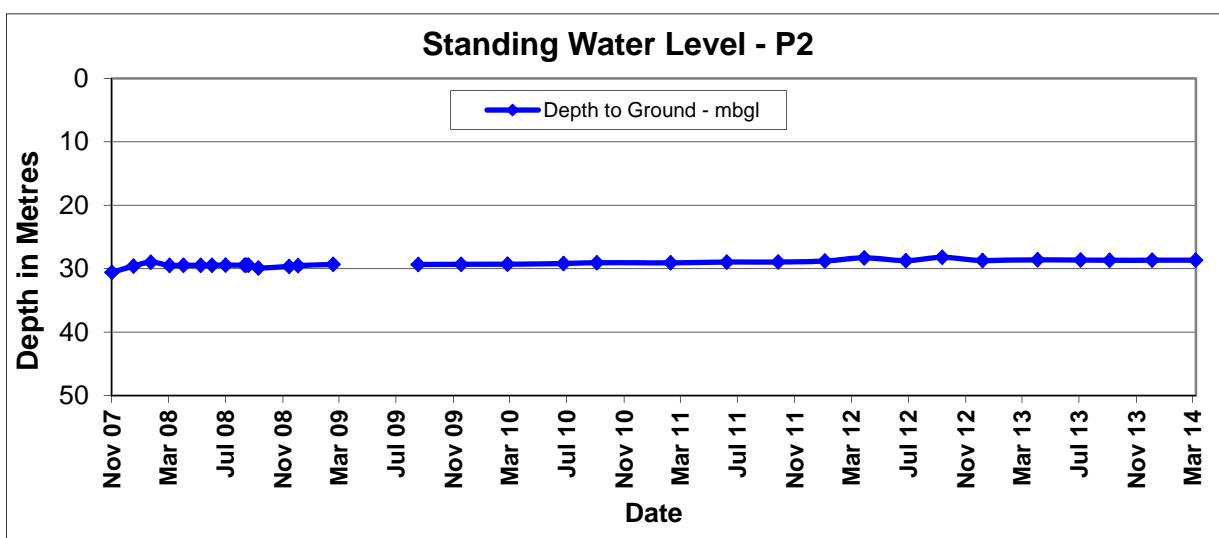
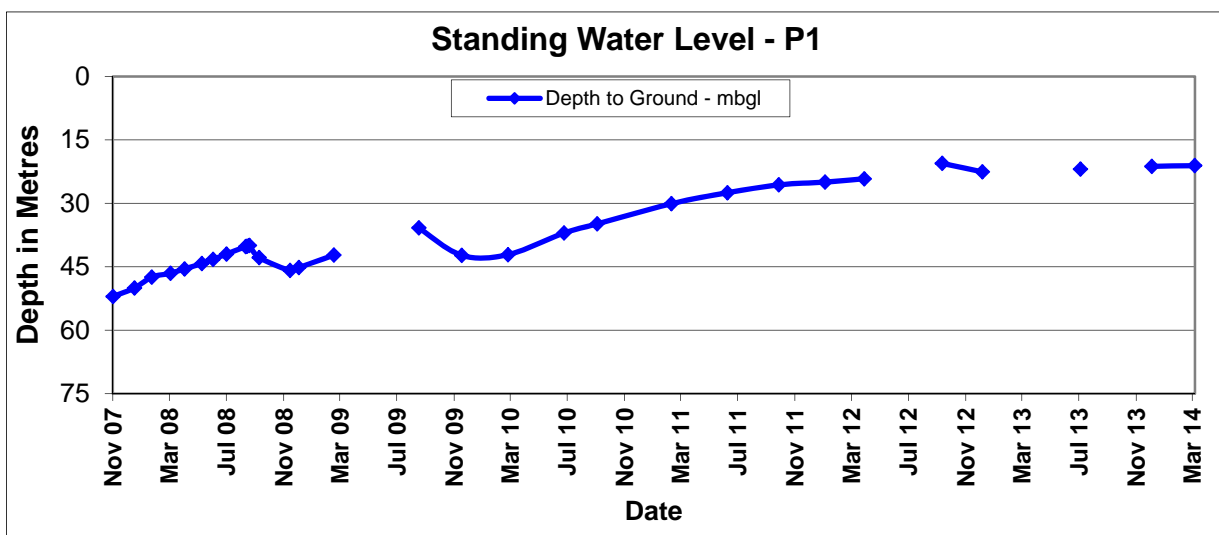


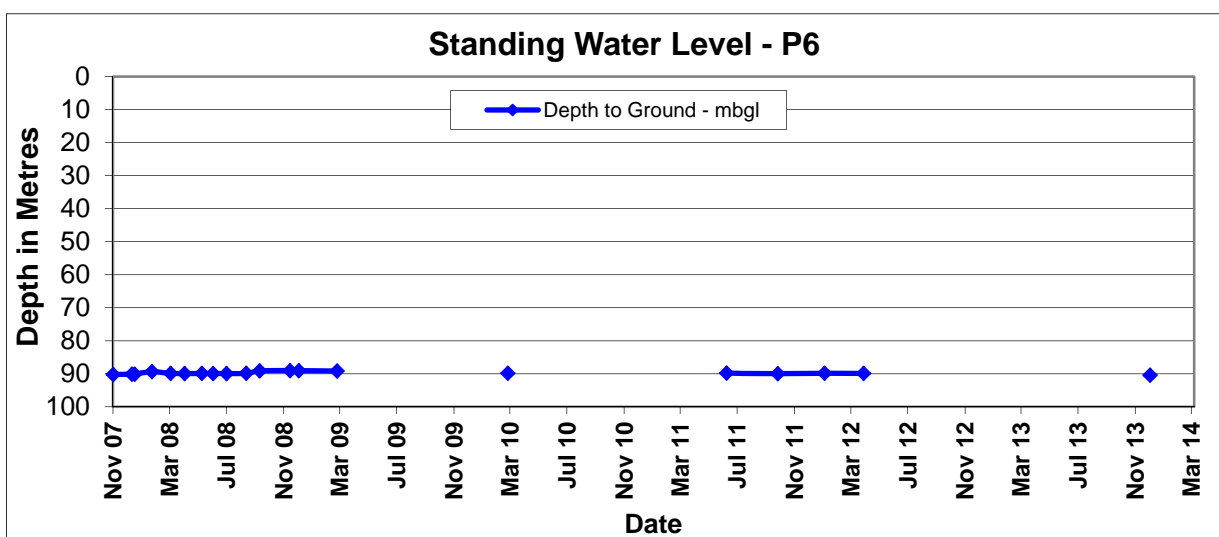
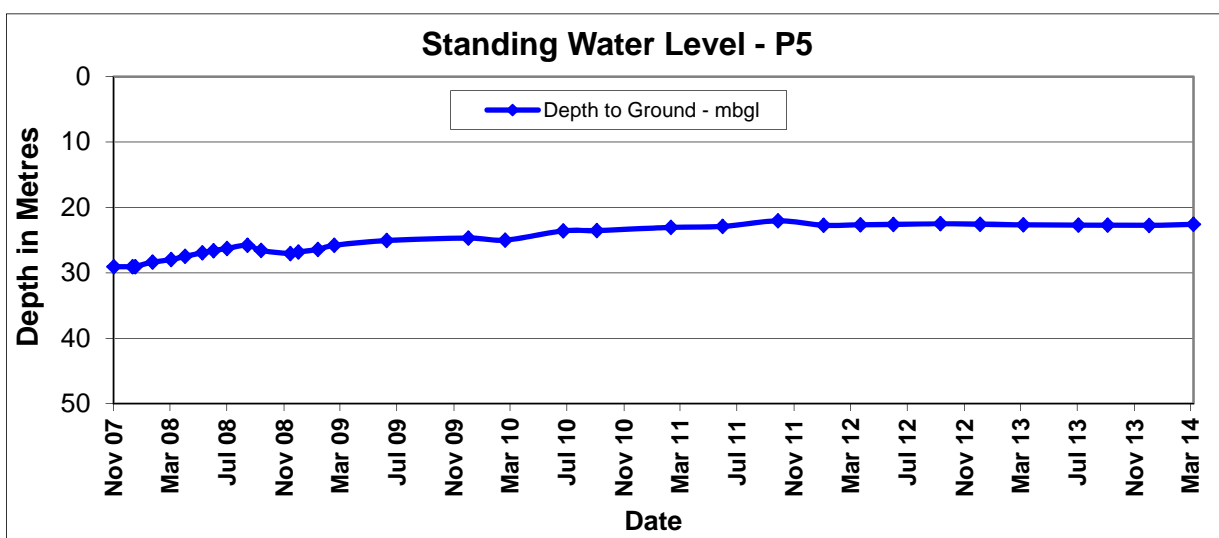
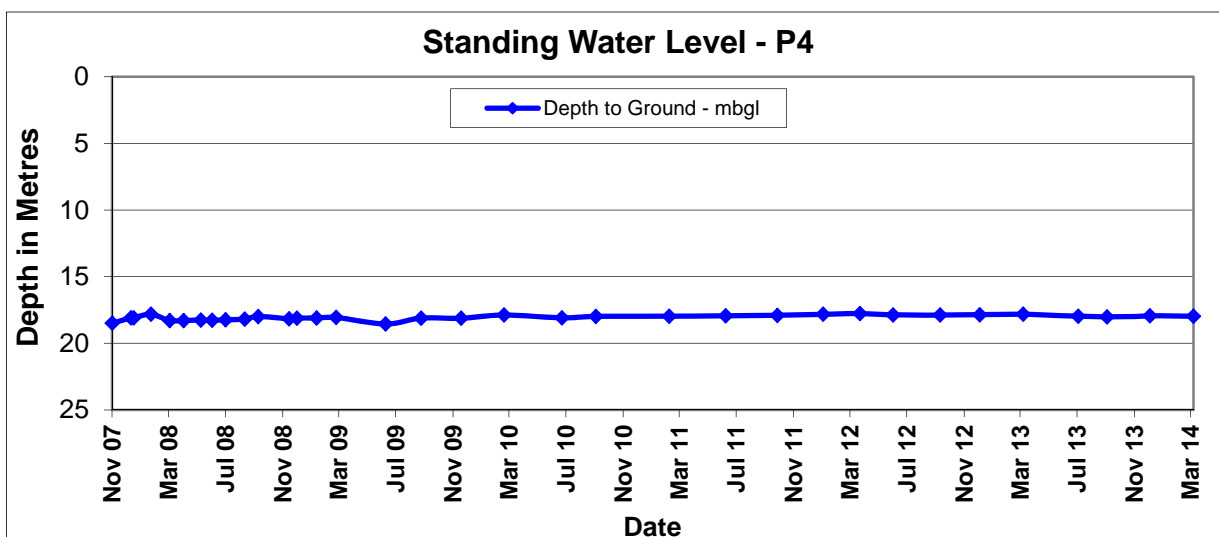
Site ID	Piezometer / Water Bore	Date	Time	Depth to Ground mbgl	Depth to Stand - mboc	Field Parameters			Total Metals														pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Major Anions						Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOx as N - mg/L	Total Dissolved Solids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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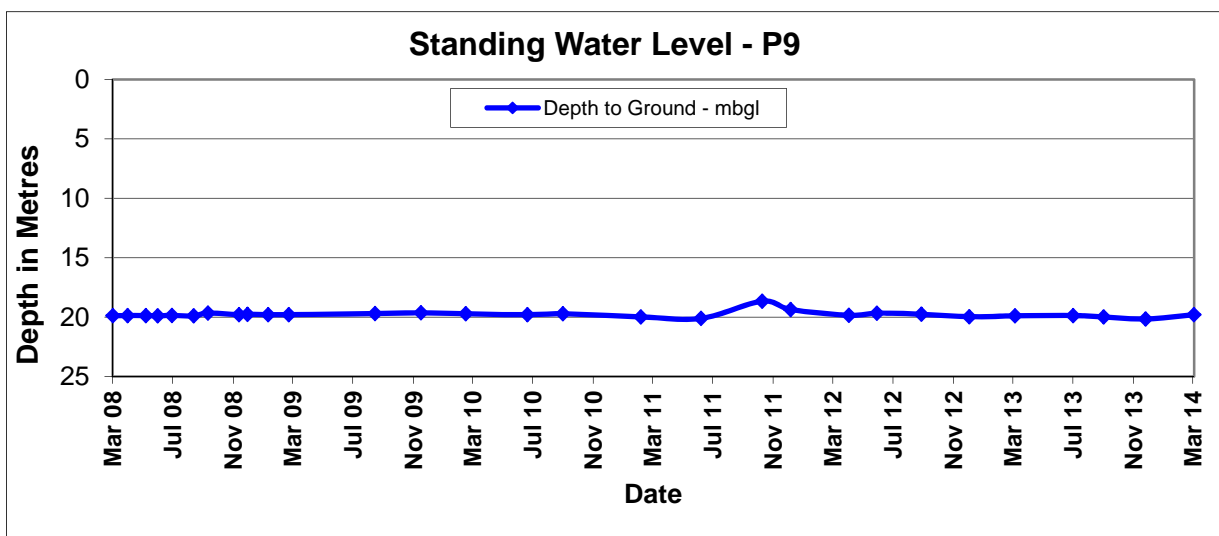
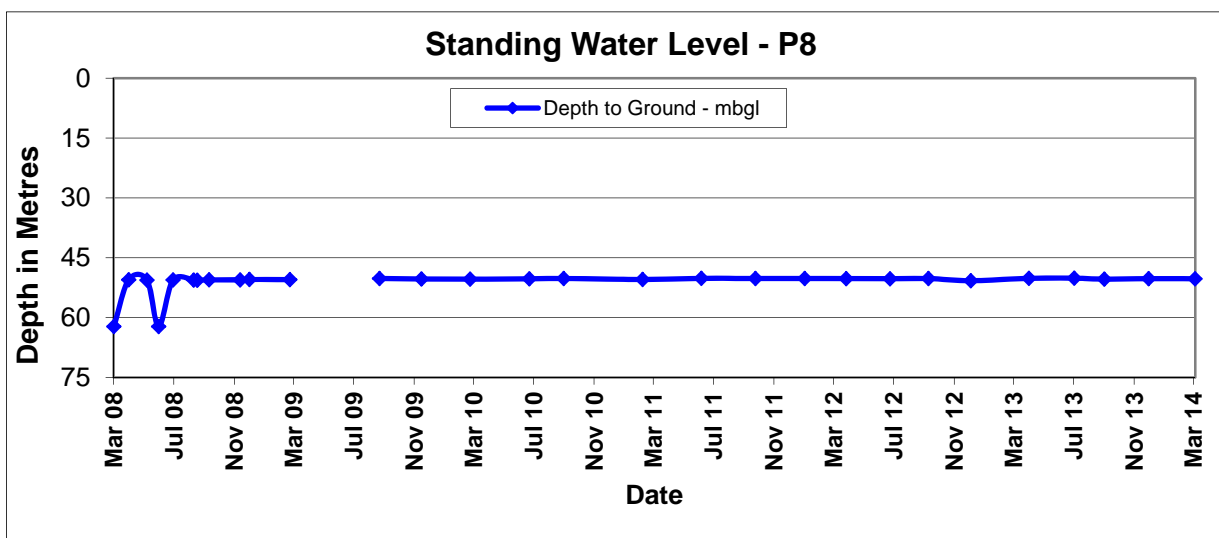
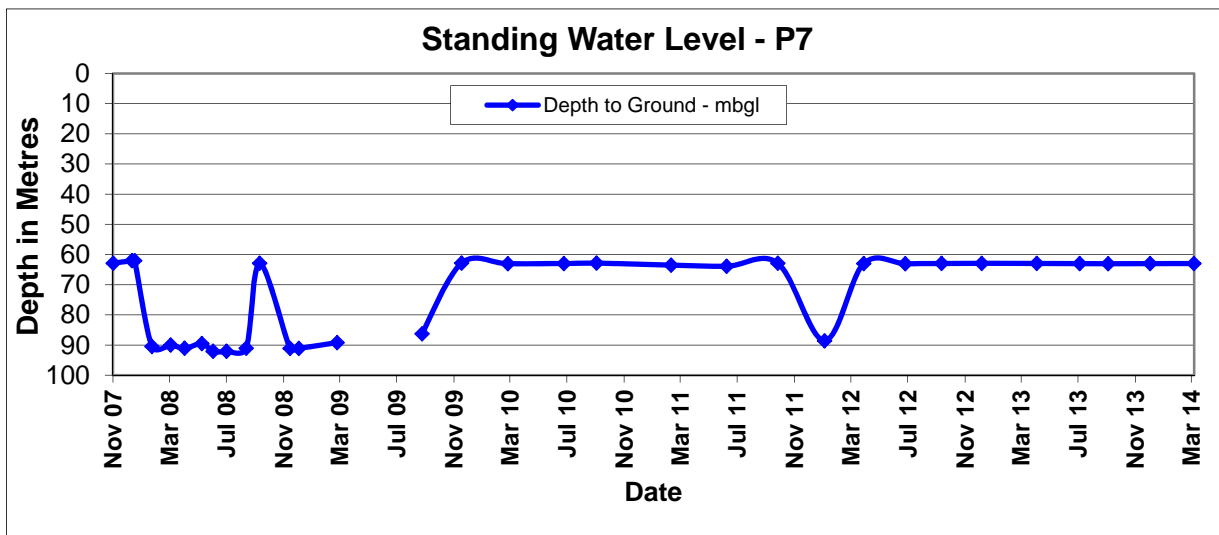
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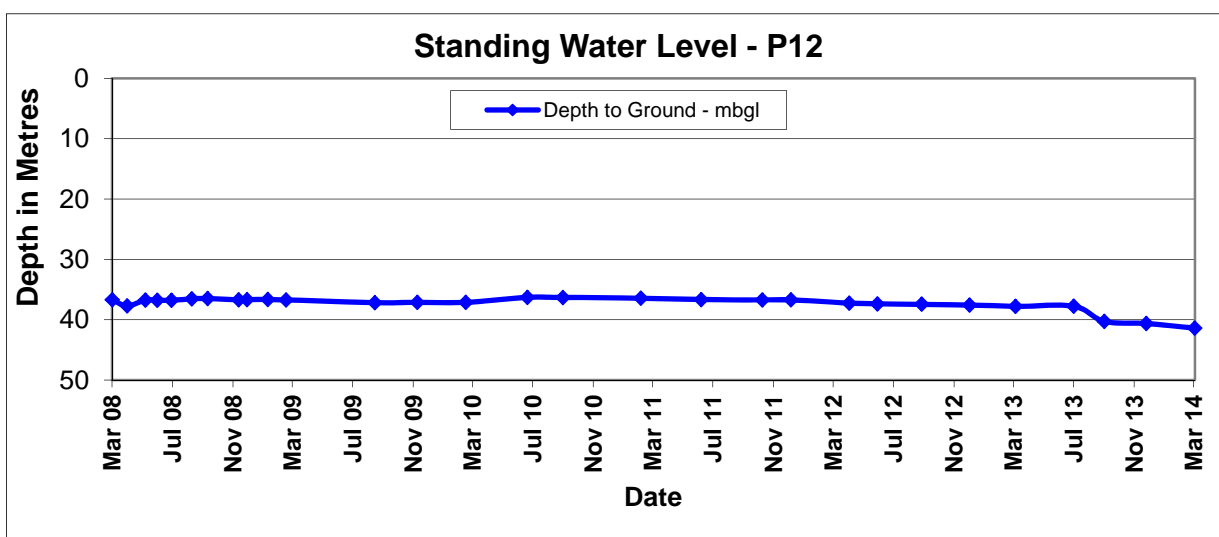
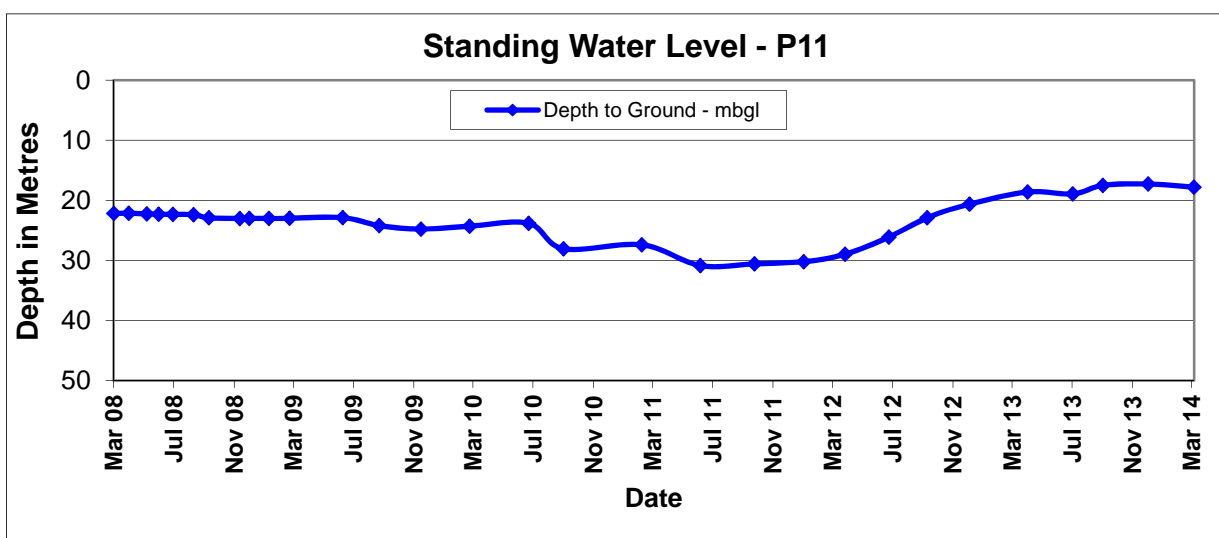
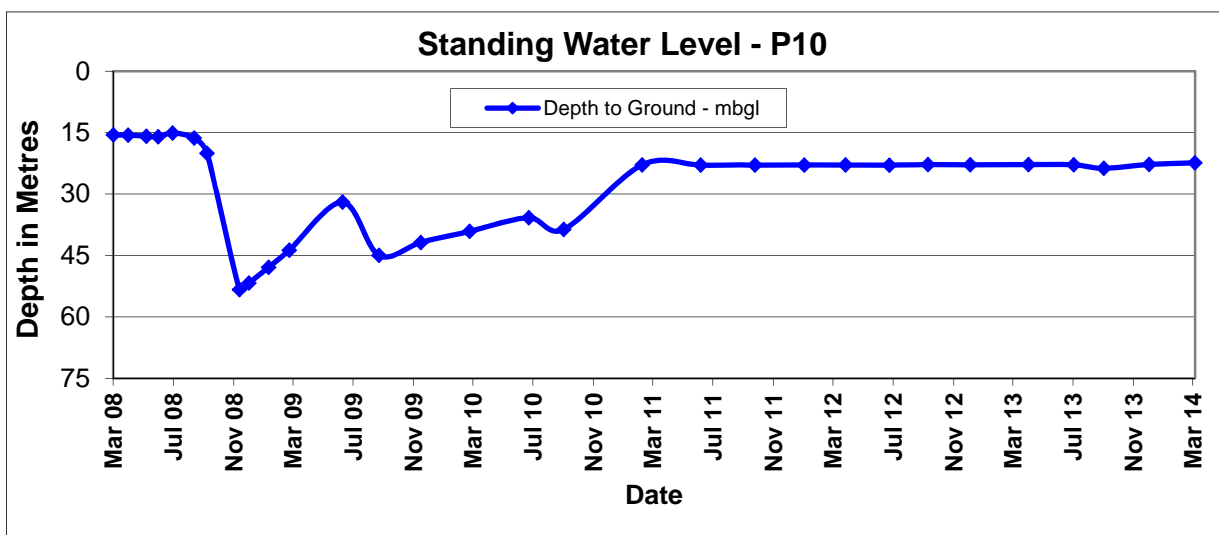


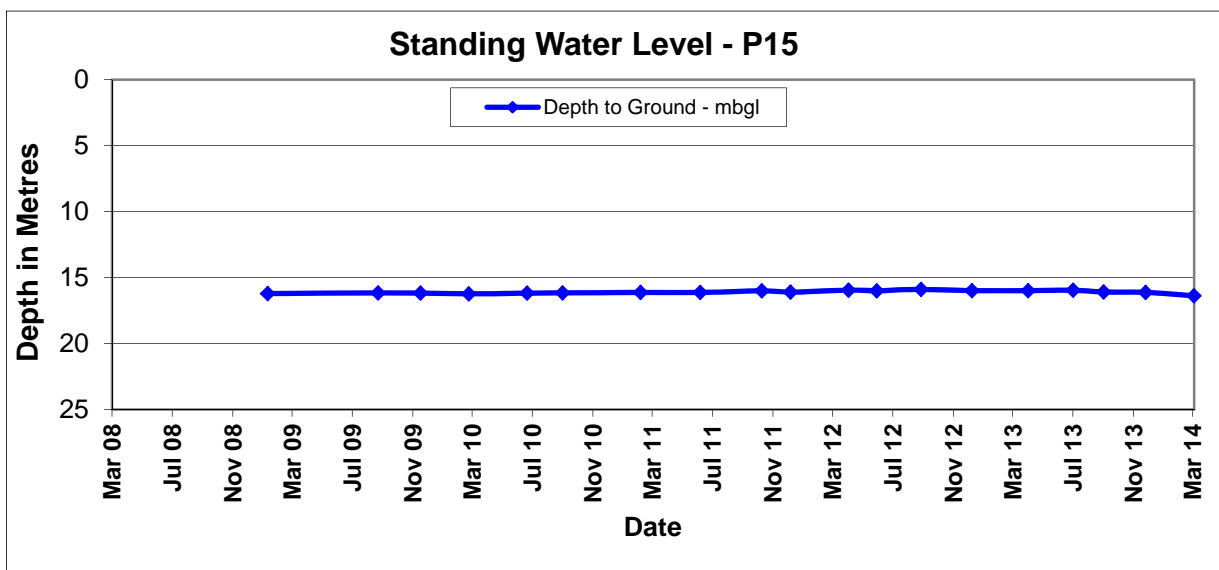
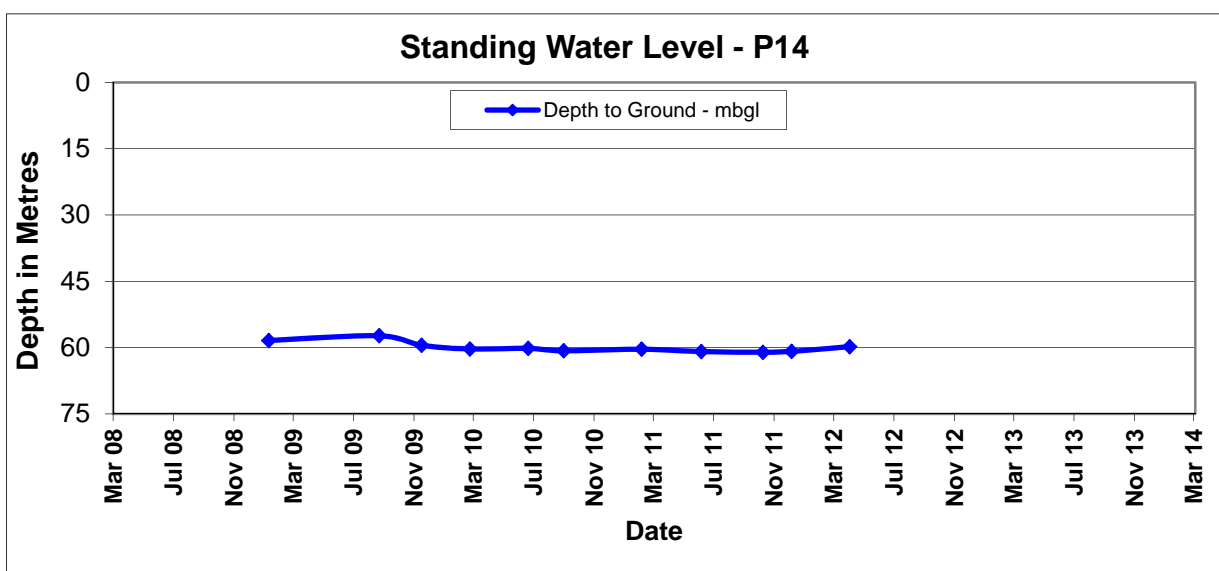
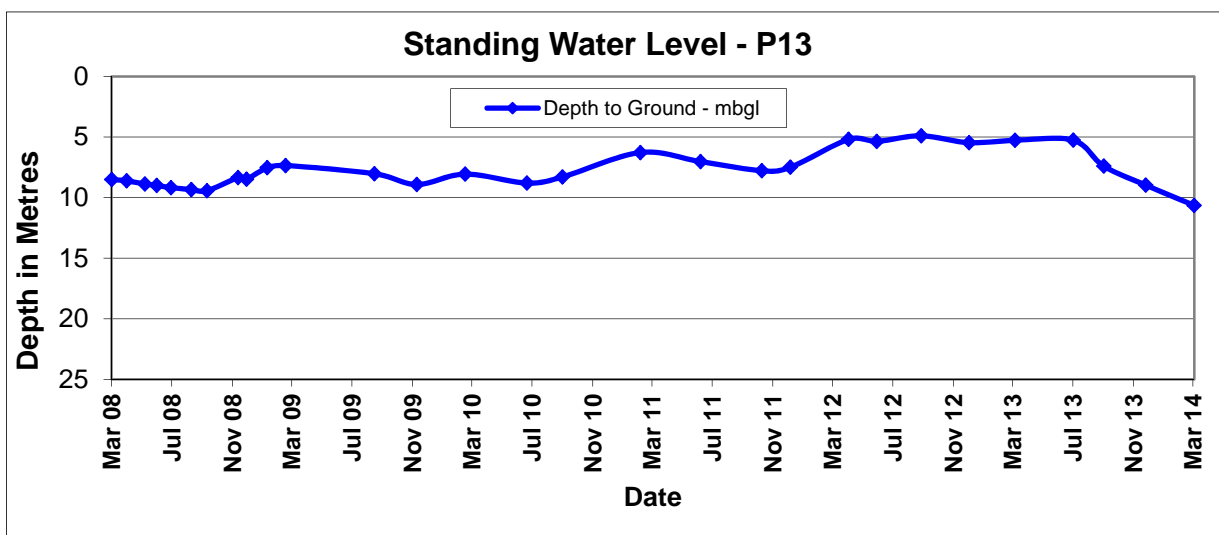
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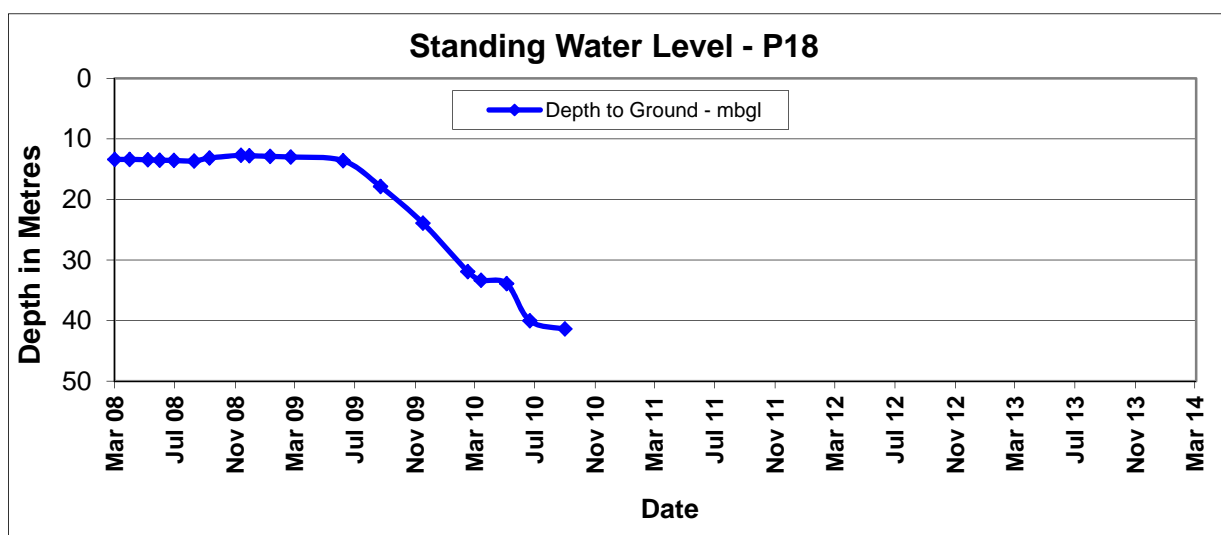
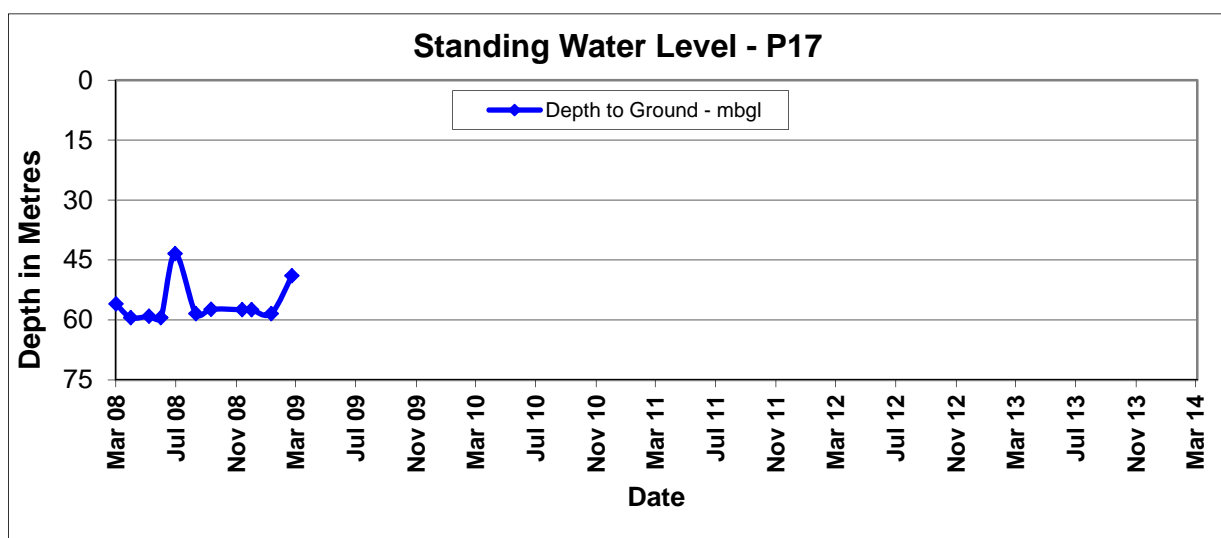
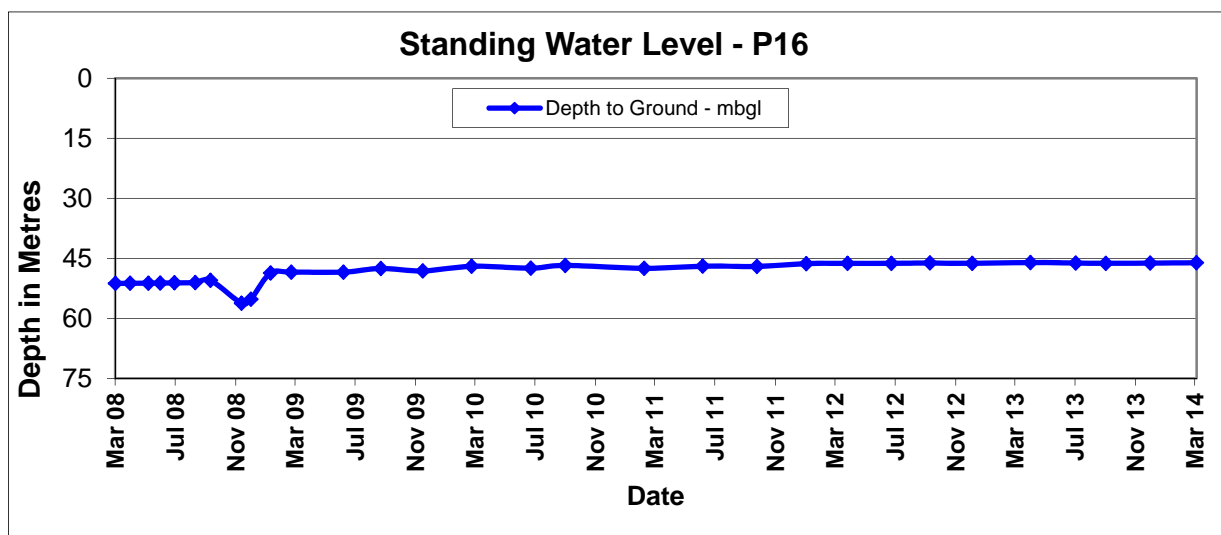


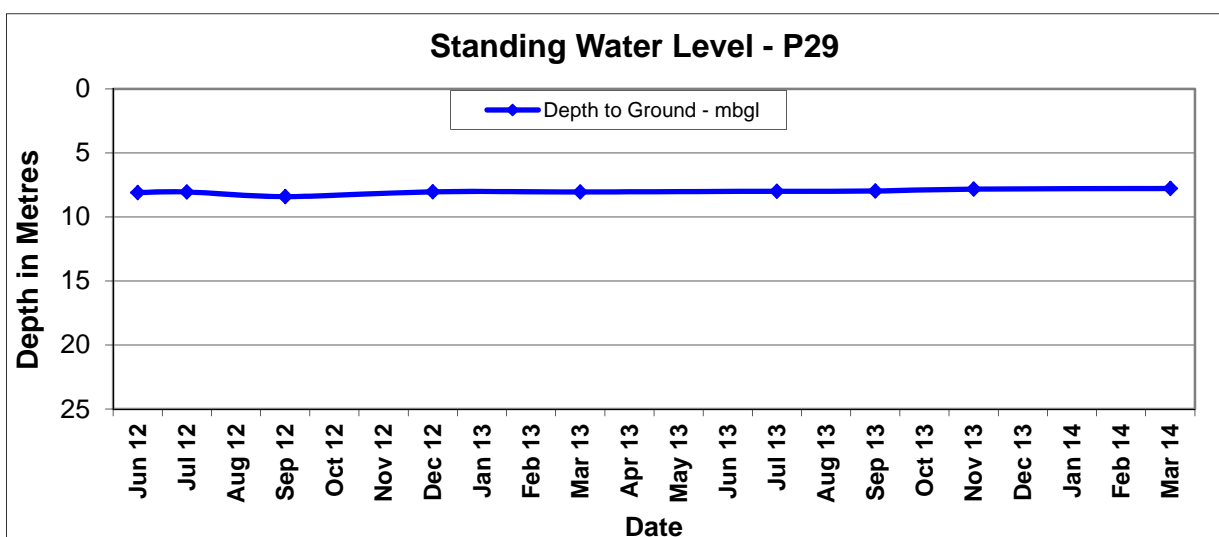
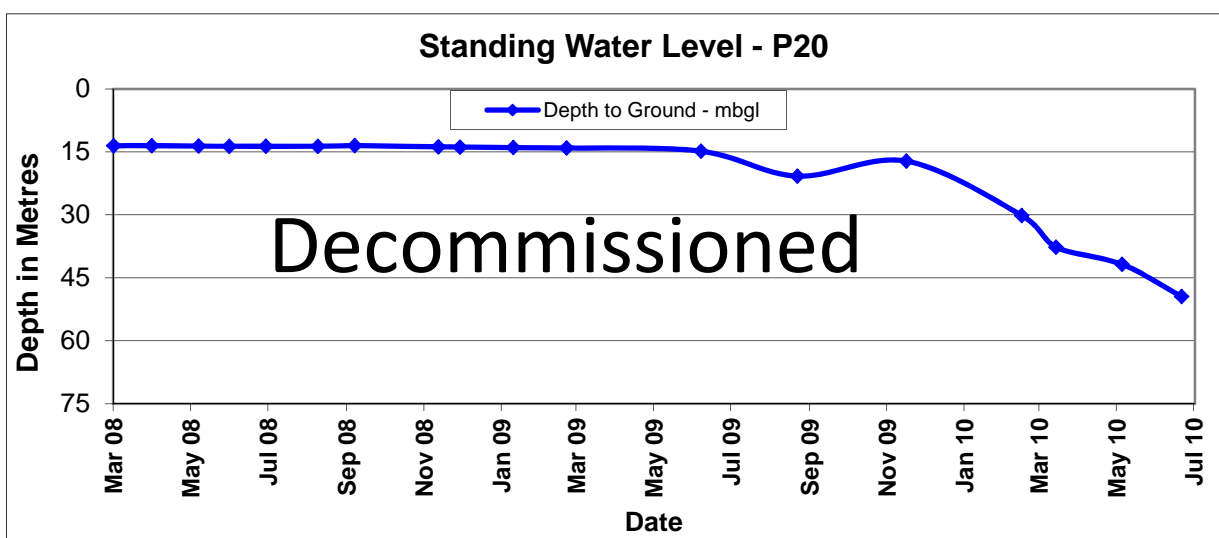
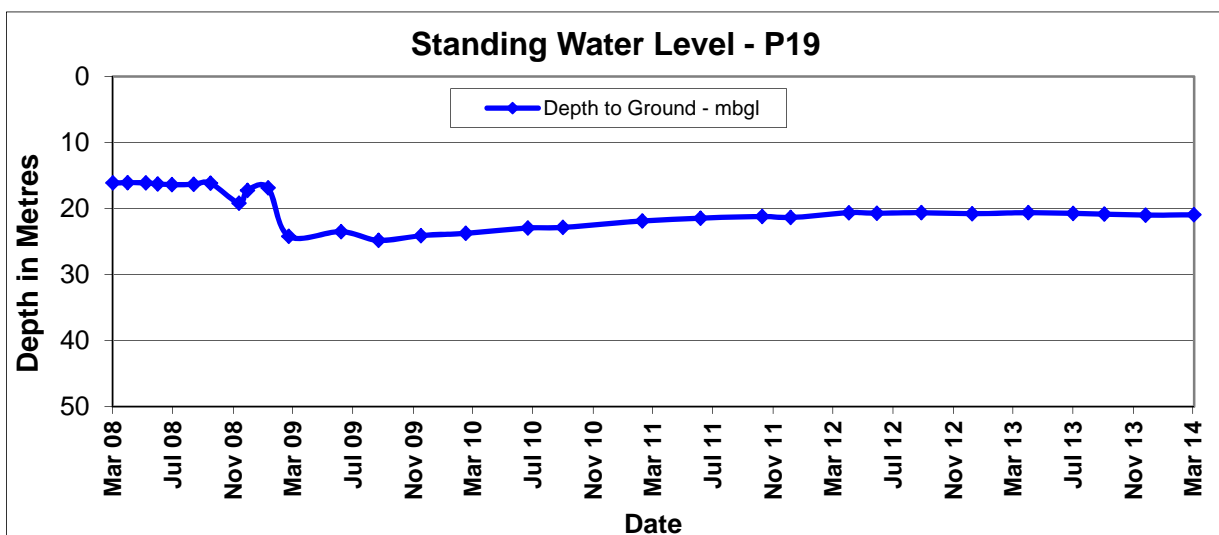




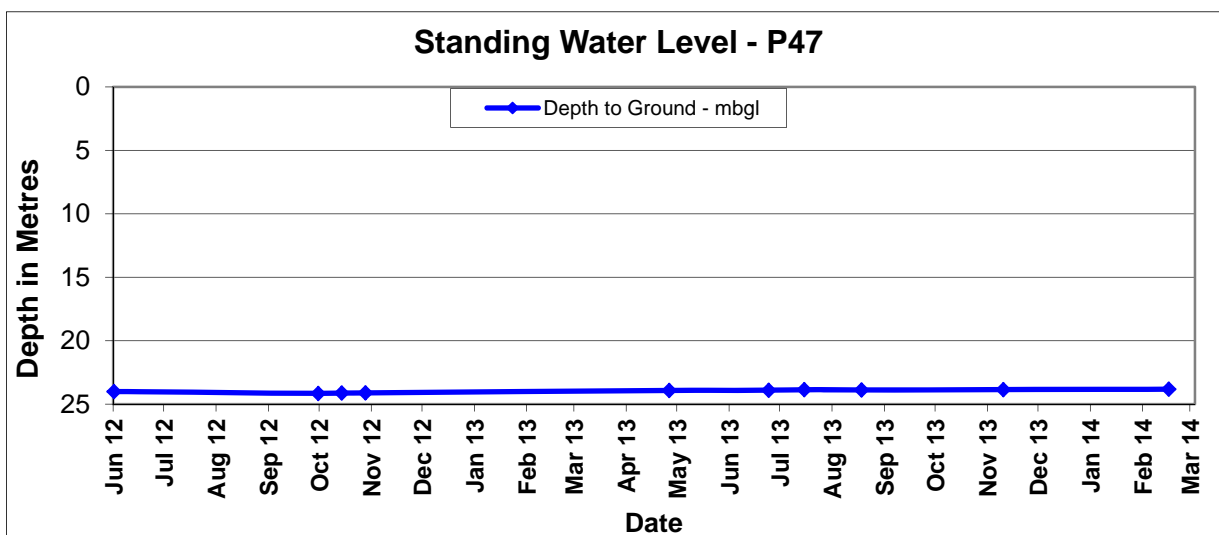
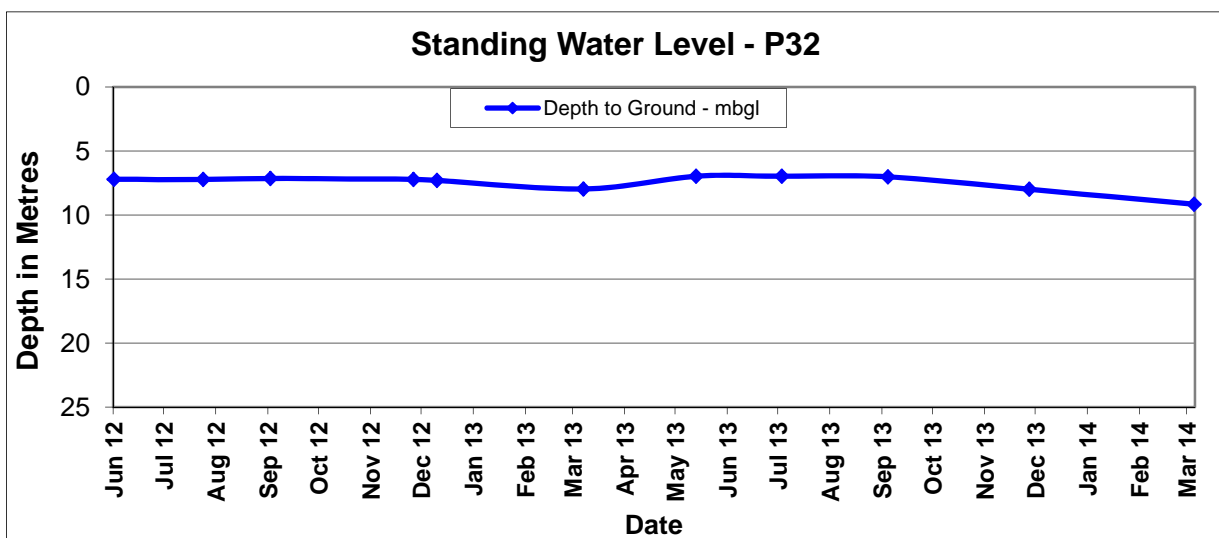
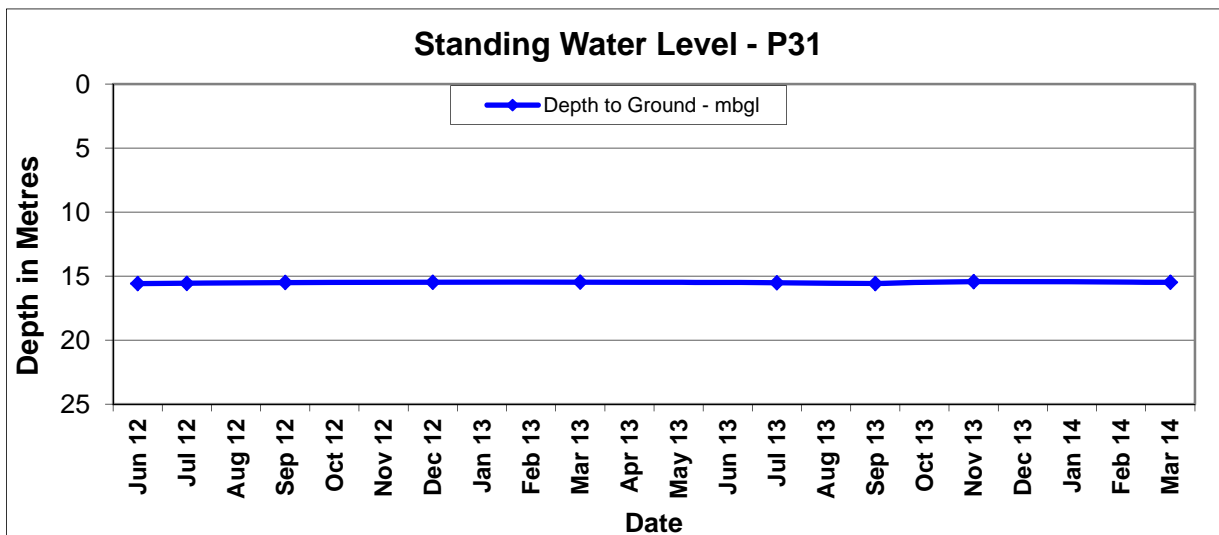


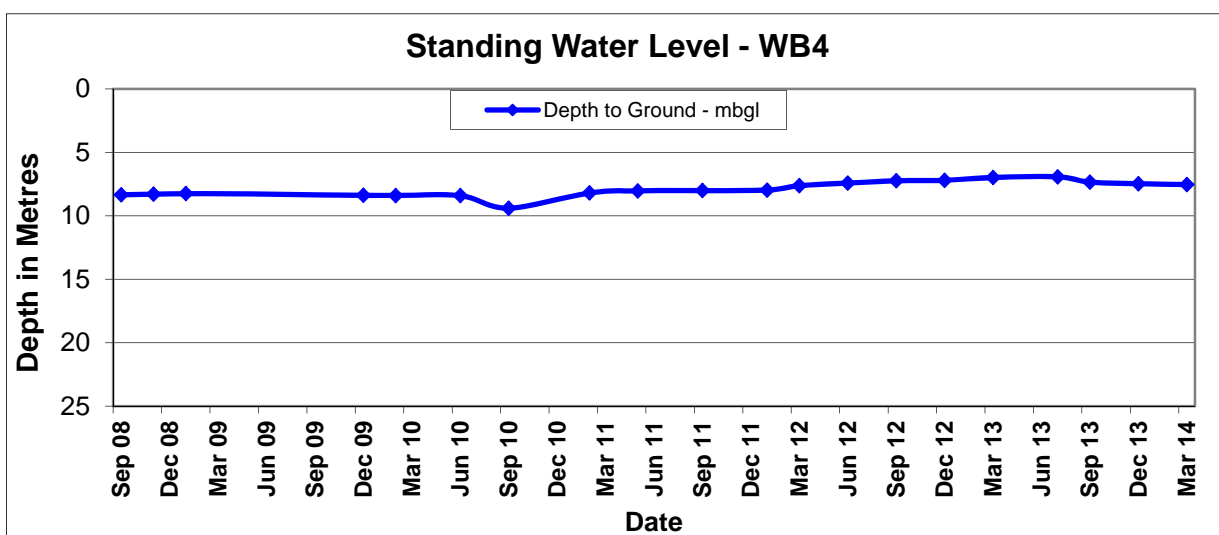
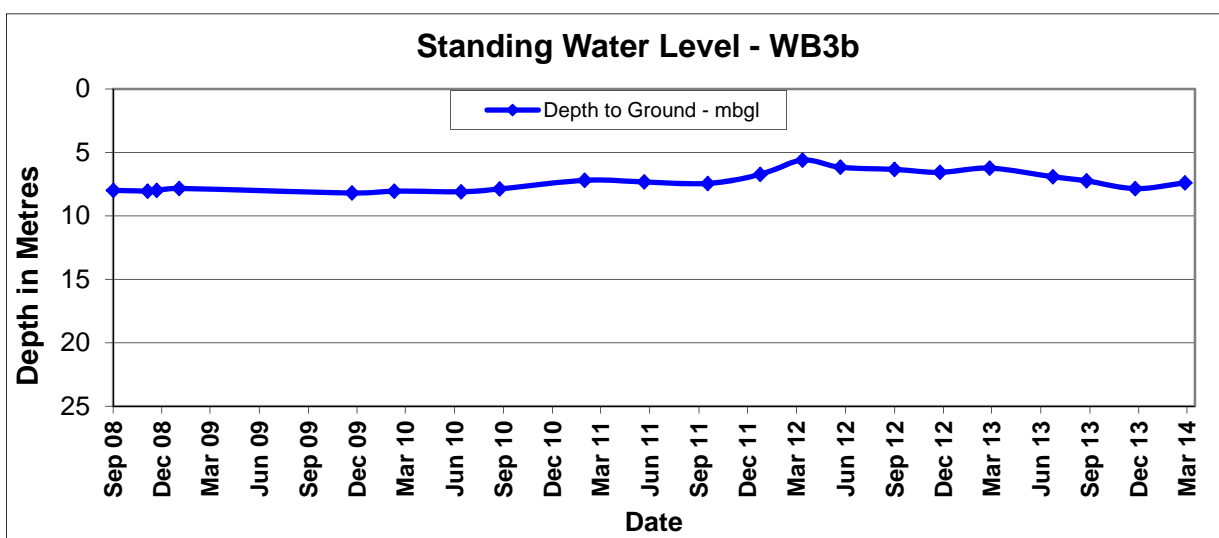
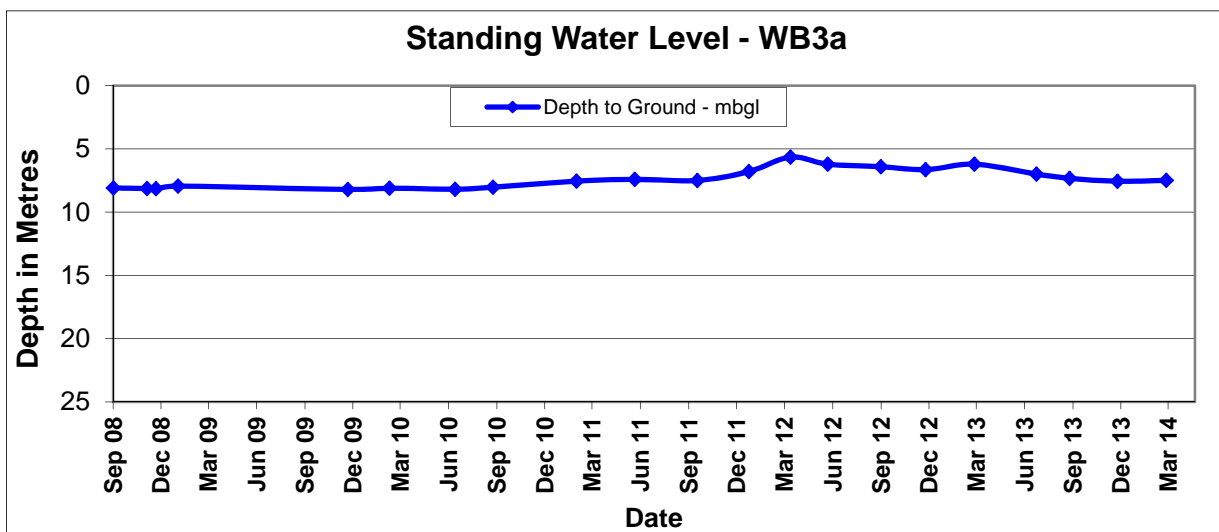


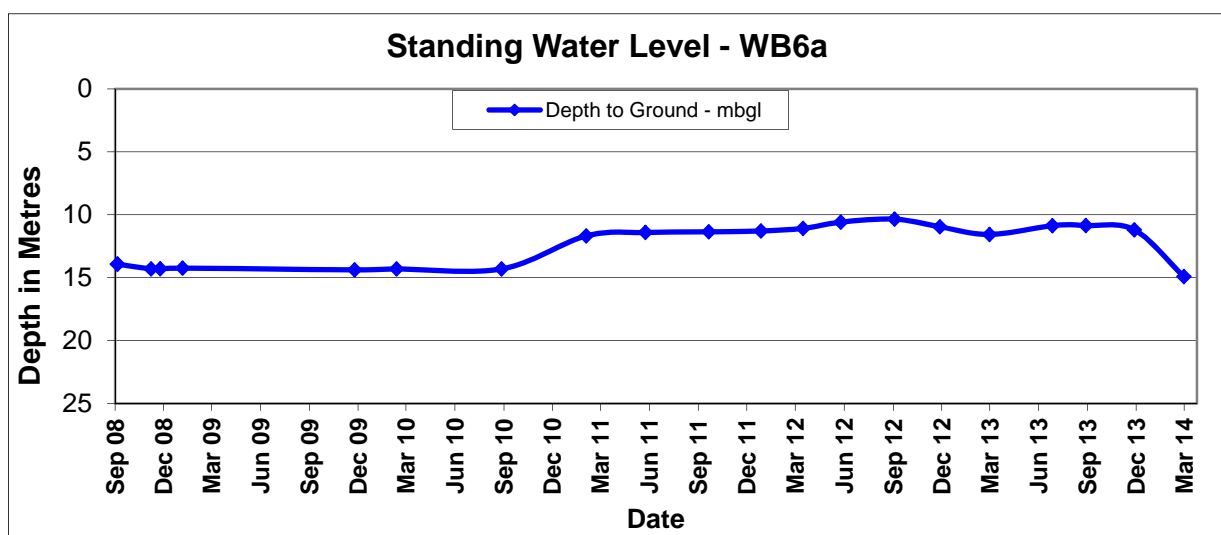
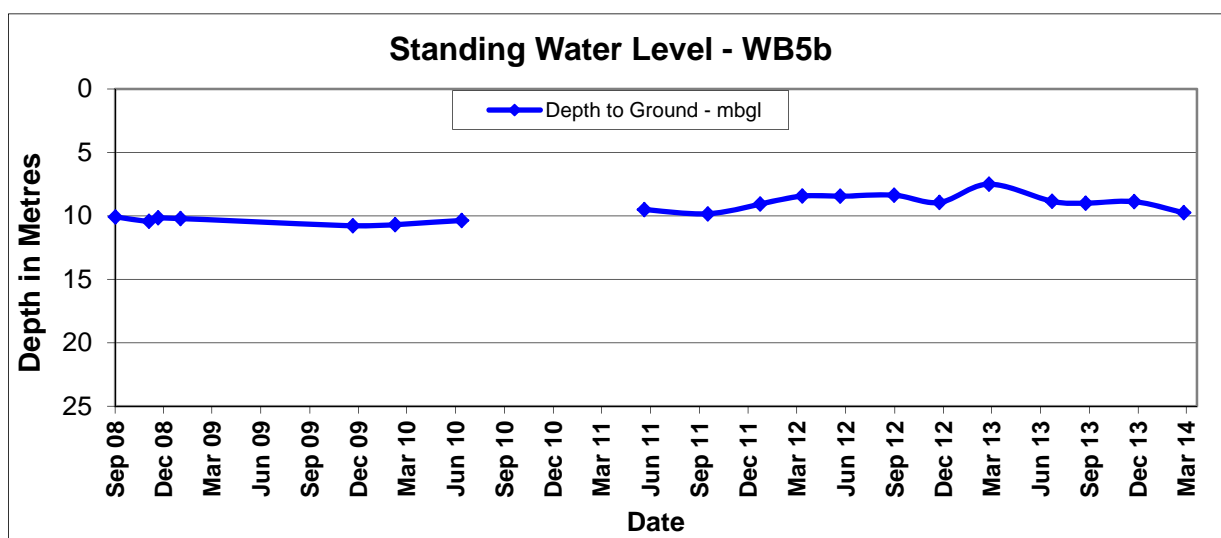
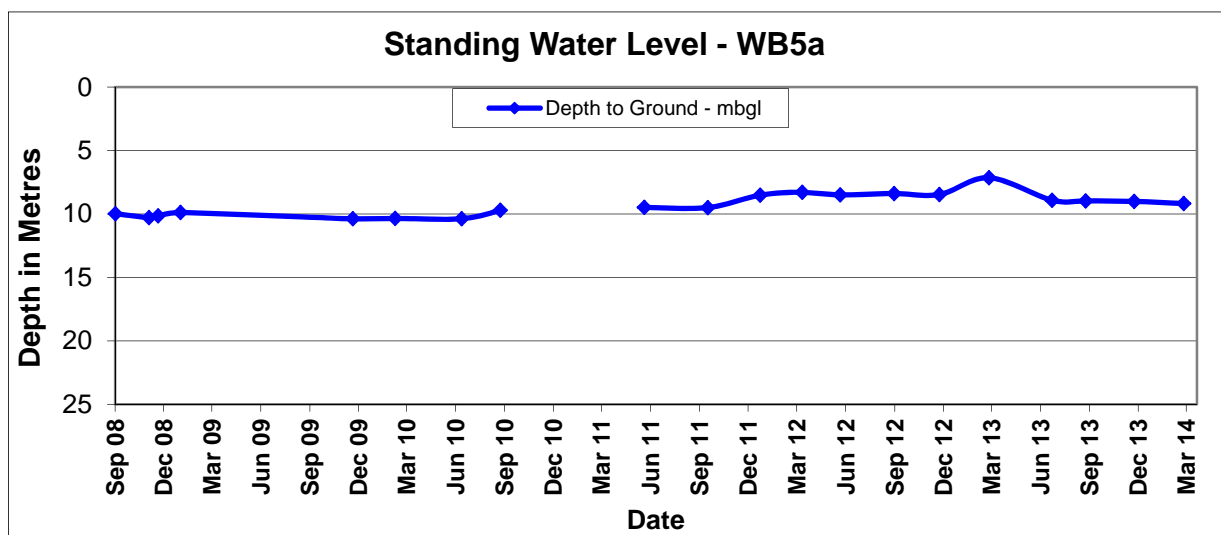


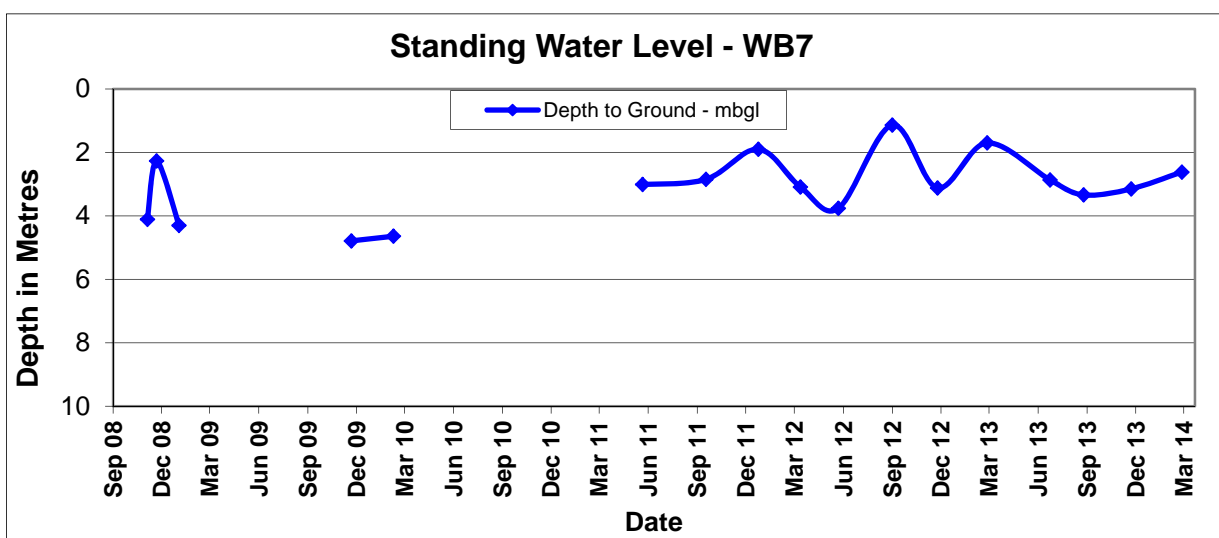
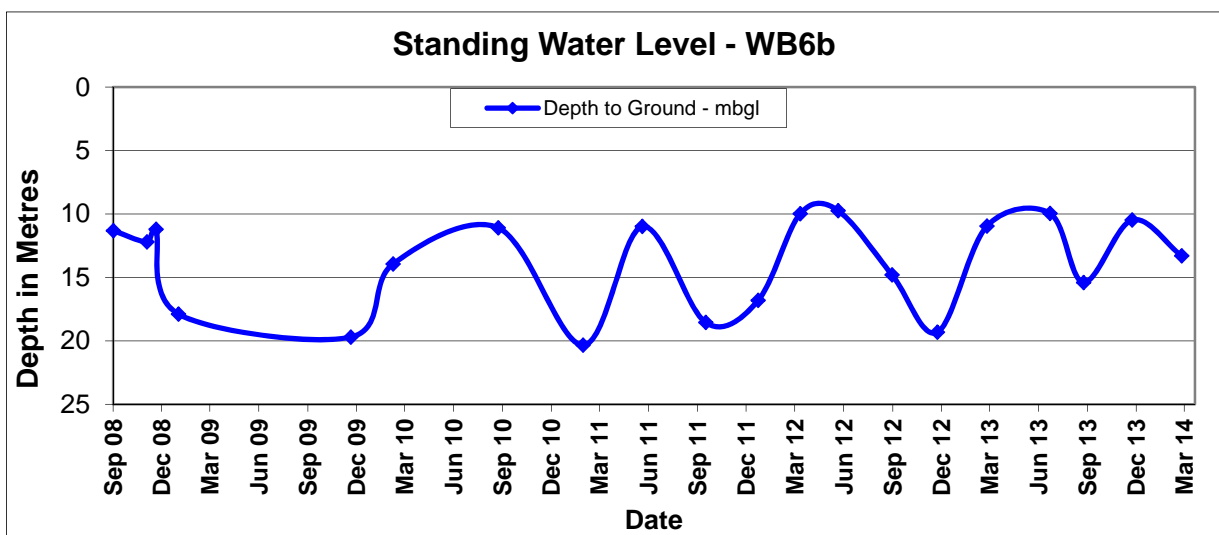


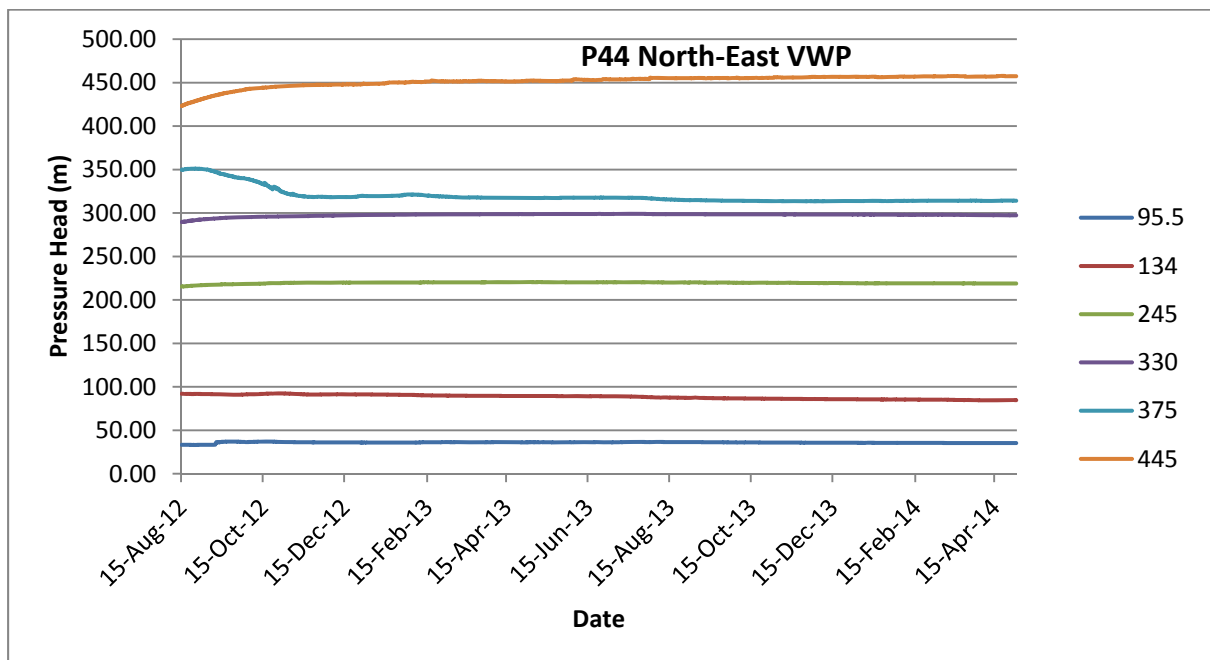
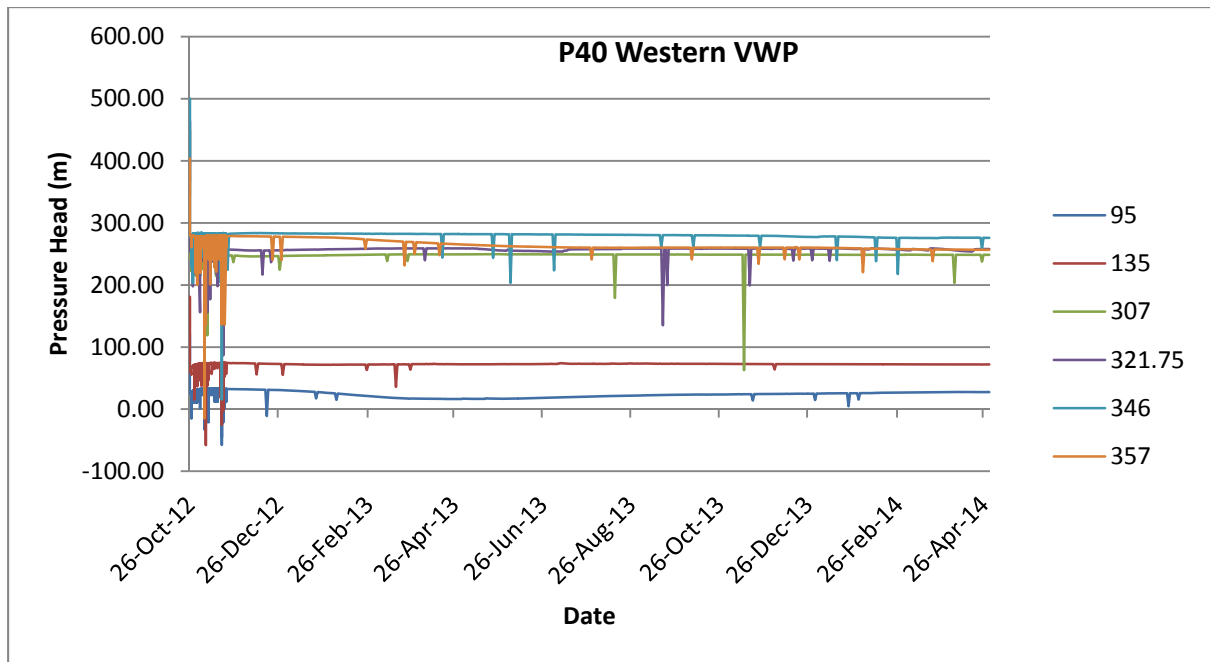


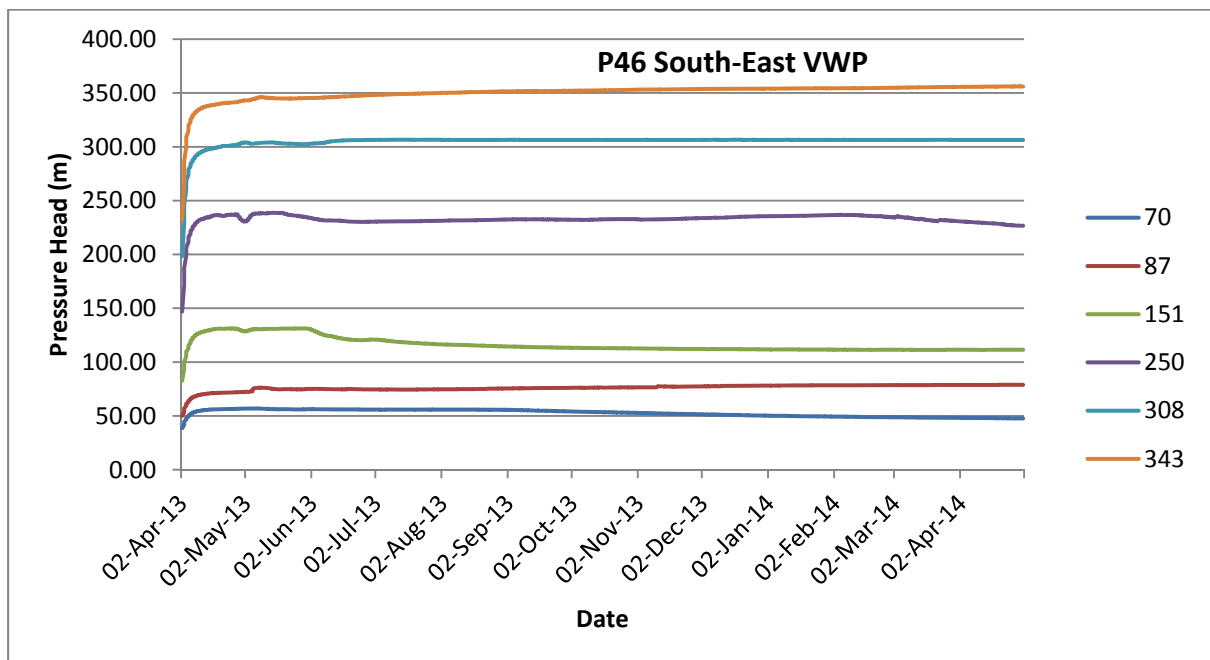
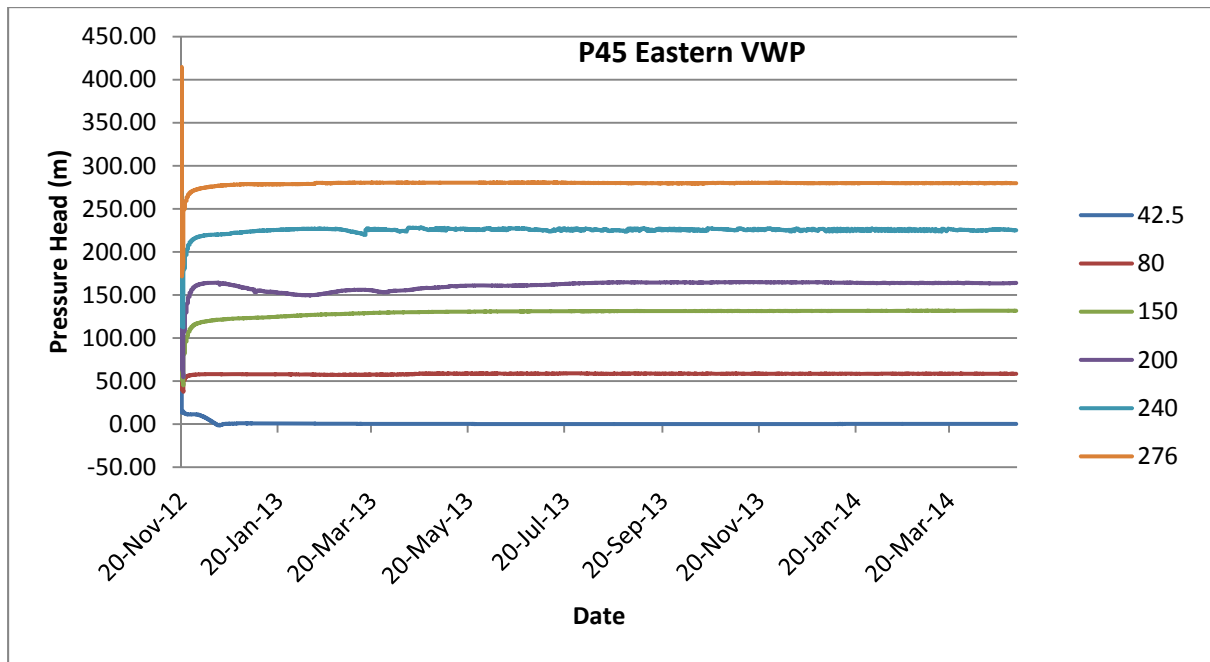












## Appendix 7

### NOISE MONITORING RESULTS

# ATTENDED NOISE MONITORING

May 2013

June 2013

July 2013

August 2013

September 2013

December 2013

March 2014





29 May 2013

Ref: 05168/4773

Mr Steve Farrar  
Narrabri Coal Pty Ltd  
PO Box 600  
GUNNEDAH NSW 2380

## RE: MAY 2013 ATTENDED NOISE MONITORING RESULTS – NARRABRI MINE

This letter report presents the results of attended noise compliance monitoring conducted for the Narrabri Coal Mine (NCM) on Tuesday 21st May 2013. Noise monitoring was carried out in accordance with the conditions of the NCM Noise Management Plan (NMP) as detailed below.

### NOISE CRITERIA

The following is an extract from the Narrabri Coal NMP:

Noise impact assessment criteria for the various stages and activities associated with the mine's development were established in the *Environmental Assessment* using relevant DECC guidelines. These criteria have been incorporated in PA 05\_0102 *Condition 3(12)* which is reproduced below. Additionally, PA 05\_0102 *Condition 3(13)* identifies criteria for ensuring continuous improvement in noise mitigation actions at the mine site.

### Noise Limits

*3(12) The Proponent shall ensure that the noise generated by the project does not exceed the levels set out in Table 1 at any privately-owned residence.*

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night	
			LAeq(15 minute)	LA1(1 minute)
All Privately owned Residences	35	35	35	45

Table 1: Impact assessment criteria dB(A)

*Notes:*

- To determine compliance with the  $LA_{eq}(15 \text{ minute})$  limit, noise from the project is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.
- These limits apply under the relevant meteorological conditions outlined in the assessment procedures in Chapter 5 of the NSW Industrial Relations Policy.
- To determine compliance with the  $LA1(1 \text{ minute})$  noise limits, noise from the project is to be measured at 1 metre from the dwelling façade. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECC may accept alternative means of determining compliance (See Chapter 11 of the NSW Industrial Noise Policy).
- These limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

**NOISE MONITORING LOCATIONS**

Noise measurement locations for the attended noise survey are listed below and shown in Figure 1:

Bow Hills  
Naroo  
Greylands  
Newhaven\*  
Oakleigh  
Belah Park\*\*

\* The owner denied access to Newhaven so the monitoring was carried out at the southern boundary to the property. A correction factor of between 4 and 8 dB should be subtracted from these results to estimate the noise level at the boundary.

\*\* Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.



FIGURE 1. Noise monitoring locations.

## NOISE MEASUREMENTS

Noise emission levels were measured with a Brüel & Kjær Type 2260 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator prior to and at the completion of measurements.

Wind speed and direction data used in this report was obtained from the mine operated weather station. To obtain temperature inversion data, Gemini Tiny Tag temperature loggers were attached to star pickets at a height of approximately 2m above ground level at locations marked T1 and T2 in Figure 1 to coincide with the attended noise surveys. Location T1 is at 246m AHD and Location T2 is at 296m AHD to give the required 50m vertical separation for calculation of temperature gradients in accordance with the INP. Temperature gradients (normalised to °C/100m) during noise monitoring events are included in the following tables of results. Positive gradients indicate inversion conditions and negative gradients indicate a temperature lapse.

## RESULTS

The measured noise levels, over 1 second intervals, were analysed using Brüel & Kjær “*Evaluator*” software. The software enables the contributions of the mine and other significant noise sources to the overall to be quantified.

Noise levels were recorded for each of the Leq (15 min), Lmax, L1, L10, L90 and Lmin percentiles. As shown in Table 1, the noise criterion for the operational phase of the NCM project is **35 dB(A) L<sub>eq</sub> (15 min)** for all operating times.

The results shown in **Tables 1, 2 and 3** below represent the total 15 minute Leq noise level for all noise sources and the relative contributions of each. This is the compliance criterion for the operation of the mine. Levels for the other percentiles are not shown as they have no compliance criteria for comparison but are available on request. The exception is the L1 (1 min) noise level (which is the standard measure of sleep disturbance) which is applicable to noise emissions at night (i.e. between 10 pm and 7 am).

Measured noise levels are shown in **Tables 1-3**. Where the noise from NCM was audible the Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level.

Noise from NCM is shown in bold type. Where noise from NCM is listed as inaudible, this means the maximum levels from the mine were at least 10 dB below the minimum level during the measurement and not measurable.

Table 1 NCM Noise Monitoring Results – 21 May 2013 (Day)				
Location	Time	dB(A), L <sub>eq</sub> (15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	2:28 pm	42	3.6/288	Traffic (42), birds & insects (32), <b>NCM barely audible</b>
Bow Hills	2:53 pm	44	3.1/278	Traffic (44), birds & insects (25), <b>NCM barely audible</b>
Oakleigh	3:22 pm	32	2.5/271	Traffic (30), rail works (27), birds & insects (20), <b>NCM inaudible</b>
Naroo	1:05 pm	45	2.9/259	Birds (40), rail works (40), traffic (40), <b>NCM inaudible</b>
Newhaven	1:43 pm	31	3.0/279	<b>NCM (29)</b> , traffic (26)
Greylands	2:07 pm	34	3.5/286	Construction noise (34), birds & insects (20), <b>NCM inaudible</b>

Table 2 NCM Noise Monitoring Results – 21 May 2013 (Evening)				
Location	Time	dB(A), L <sub>eq</sub> (15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	7:33 pm	40	2.4/294	Traffic (39), <b>NCM (30)</b>
Bow Hills	7:56 pm	43	2.1/289	Traffic (43), <b>NCM (32)</b>
Oakleigh	9:35 pm	36	1.6/290	Traffic (34), <b>NCM (30)</b> , insects (22)
Naroo	9:11 pm	42	2.1/285	<b>NCM (40)</b> , traffic (38)
Newhaven	8:43 pm	31	1.8/262	Traffic (31), <b>NCM barely audible</b>
Greylands	8:19 pm	36	2.2/272	Traffic (36), <b>NCM inaudible</b>

Table 3 NCM Noise Monitoring Results – 21 May 2013 (Night)					
Location	Time	dB(A), L <sub>eq</sub> (15min)	Wind speed (m/s)/ direction°	Temp Grad (°C/100m)	Identified Noise Sources
Merriman	10:53 pm	34	0.9/322	+0.9	Traffic (33), <b>NCM (25)</b> , insects (23)
Bow Hills	11:17 pm	31	0.9/278	+0.9	Traffic (30), <b>NCM (24)</b>
Oakleigh	12:05 am	34	0.4/156	+0.9	Traffic (32), <b>NCM (29)</b>
Naroo	11:39 pm	38	1.1/198	+1.3	Traffic (36), <b>NCM (34)</b>
Newhaven	10:08 pm	26	1.8/326	+1.4	Traffic (26), <b>NCM inaudible</b>
Greylands	10:30 pm	45	1.6/325	+0.9	Train (44), insects (37), traffic (35), <b>NCM inaudible</b>

The results shown in **Tables 1 - 3** indicate that, under the operational and atmospheric conditions at the time, noise emission from NCM exceeded the criterion of 35 dB(A) L<sub>eq</sub> at the Naroo monitoring location during the evening monitoring period.

NCM environmental licence conditions indicate that compliance with noise emission criteria is not applicable under “relevant atmospheric conditions”, which are defined below;

- wind speeds greater than 3 metres/second at 10 metres above ground level; or
- temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level; or
- temperature inversions of greater than 4°C/100 metres.

At the Naroo monitoring location the noise attributed to NCM was mainly from dozer(s) working on the coal stockpiles.

Data for the 15 minute Leq noise levels were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, emissions from NCM must not exceed 45 dB(A) L1 (1 min) between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The measured L1 (1 min) noise levels, from NCM, during the night time measurement circuit are shown below in **Table 4**.

The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents observations measurements made during the 15 minute long operational noise measurement are noted. Where maximum noise levels from mining activity approach 45 dB(A) L1 (1 min) then, where practical, further measurements are made at the sleep disturbance monitoring location.

Note that, as the internal layout of each residence is not known, the measurements are made at the worst case façade in relation to the mine noise. This is not necessarily at the façade of a bedroom window.

Table 4 L1 (1 min) – 21 May 2013 (Night)		
Location	Time	dB(A), L1 (1 min)
Merriman	10:53 pm	31
Bow Hills	11:17 pm	33
Oakleigh	12:05 am	33
Naroo	11:39 pm	41
Newhaven	10:08 pm	n/a
Greylands	10:30 pm	n/a

As shown in Table 4, during the night time measurement circuit the (1 min) noise from NCM did not exceed 45 dB(A) at any monitoring location.

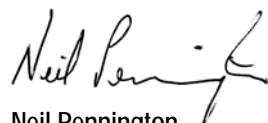


We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,

**SPECTRUM ACOUSTICS PTY LIMITED**

Author:



**Neil Pennington**  
Acoustical Consultant

Review:



**Ross Hodge**  
Acoustical Consultant



Project No: 05168

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## ATTENDED NOISE MONITORING – JUNE 2013

### Narrabri Coal Mine

### Narrabri, NSW

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Prepared for:


Whitehaven Coal Limited  
10 Kurrajong Creek Road  
Baan Baa NSW 2390

Author:



**Ross Hodge**  
*B.Sc.(Hons)*  
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Review:



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July 2013



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## APPENDIX A Description of Acoustical Terms

## EXECUTIVE SUMMARY

Attended noise monitoring has been carried out for the Narrabri Coal Mine (NCM) over a period of three days between 23<sup>rd</sup> and 25<sup>th</sup> June, 2013 in accordance with requirements of Environment Protection Licence (EPL 12789) and other relevant Australian Standards and guidelines.

The mine was in full operation during the entire survey period.

No exceedance of the site-specific operational noise criterion was recorded.

No exceedance of the sleep disturbance criterion was recorded.

Data from those times where NCM operations were audible were analysed using Bruel & Kjaer “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of “modifying factor corrections” in the NSW Industrial Noise Policy.

The operation of NCM was therefore found to be in compliance with all noise-related requirements of EPL 12789 during the June 2013 attended noise monitoring survey.

## 1.0 INTRODUCTION

This letter report presents the results of attended noise compliance monitoring and measurements conducted for the Narrabri Coal Mine (NCM) between Sunday 23<sup>rd</sup> and Tuesday 25<sup>th</sup> March, 2013.

### 1.1 Noise Monitoring Locations

Section M3.6 of EPL 12789 (variation dated February 20, 2012) contains a table detailing a list of residences and corresponding EPA identification numbers (spellings are as per the EPL). The residences are listed below:

N1	Bow Hills
N3	Naroo
N4	Greylands
N5	Oakleigh
N6	Newhaven <sup>1</sup>
N7	Belah Park <sup>2</sup>
N8	Haylin View <sup>3</sup>
N9	Merrilong <sup>3</sup>

1. The owner denied access to Newhaven so the monitoring was carried out at the southern boundary to the property.
2. Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.
3. Monitoring at Haylin View and Merrilong is to commence when surface activities approach the eastern end of the southern longwall panels.

These monitoring locations are illustrated in **Figure 1**.

### 1.2 Monitoring Frequency and Duration

Section M 7.1 of EPL 12789 indicates that the attended noise monitoring must be conducted;

- a) at each of the locations detailed above (except that identified as N4);
- b) quarterly in a reporting period;
- c) during each day, evening and night period for a minimum of:
  - 1.5 hours during the day;
  - 30 minutes during the evening; and
  - 1 hour during the night.
- d) occur for three consecutive operating days.

At location N4 (Greylands) the monitoring is to be carried out for a 15 minute period over each of the day, evening and night time periods during one 24 hour period.

Figure 1  
Noise Monitoring Locations



## 2.0 CRITERIA AND CONDITIONS

### 2.1 Noise Assessment Criteria

At all of the residences, the noise criterion is **35 dB(A) Leq (15 min)** (operational noise criterion) for each of the day, evening and night time periods, with “day” defined as 7am to 10pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays, “evening” being 6pm to 10pm and “night” being all other times.

In addition to the above the noise level at night must not exceed **45 dB(A) L1 (1 min)** (sleep disturbance criterion) at any residence.

### 2.2 Monitoring Location Definition

EPL 12789 states that to determine compliance with the Leq (15 min) operational noise criteria the noise measurement equipment must be located:

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

### 2.3 Applicable Meteorological Conditions

EPL 12798 states that the noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or
3. Stability category G temperature inversion conditions.

The Project Approval for the mine PA 08\_0144 provides further definition and states that these noise limits apply to applicable receivers under all meteorological conditions except for any one of the following;

- wind speeds greater than 3 metres/second at 10 metres above ground level; or
- temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level; or
- temperature inversions of greater than 4°C/100 metres.

### 2.4 Other Conditions

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW industrial Noise policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom

window. To avoid undue disturbance to residents, observations and measurements made during the 60 minute long operational noise measurement are noted.

For consideration of the worst case, the L1 (1 min) noise level made at the operational noise measurement location is considered to be representative of the level at the bedroom façade of each residence (with the exception of the Newhaven location which is significantly removed from the residence).

## 3.0 NOISE MONITORING PROCEDURE

### 3.1 Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (90 minutes/day, 30 minutes/evening and 60 minutes/night) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

### 3.2 Measurement Analysis

The operational noise criteria for compliance with Section L 3.1 of EPL 12789 are based on a 15 minute Leq noise level. The procedures detailed in Section M. 7.1 of EPL 12789 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Section L 3.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from NCM was audible Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from NCM is shown in the tables in bold type.

When no mine noise was audible at a monitoring location, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below. Mining noise levels above the 35dB(A) criterion are shaded grey.

### 3.3 Meteorological Data

The NCM operated weather station was not operating throughout the monitoring period. Meteorological data used in this report were sourced from the mine operated unattended noise monitor and weather station at the “Matilda” property south of the mine. The wind speed and direction monitor is at approximately 2m above ground level.



### 3.3.1 Inversion Monitoring

Gemini Tiny Tag temperature loggers were attached to star pickets at a height of approximately 2m above ground level at locations marked T1 and T2 in Figure 1 to coincide with the attended noise surveys. Location T1 is at 246m AHD and Location T2 is at 296m AHD to give the required 50m vertical separation for calculation of temperature gradients in accordance with the INP. Temperature gradients (normalised to °C/100m) during noise monitoring events are included in the following tables of results. Positive gradients indicate inversion conditions and negative gradients indicate a temperature lapse.

### 3.4 Special Conditions

Before the noise surveys, Spectrum Acoustics personnel were briefed on the current location(s) of activities.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Measured Noise Levels

Measured noise levels for each monitoring location and each period are summarised in **Tables 1 - 9**.

Table 1 NCM Operational Noise Monitoring Results – 23 June 2013 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	2:45 pm	43	0.9 / S	n/a	Traffic (40), cattle (40), NCM inaudible
N3 Naroo	12:41 pm	36	1.3 / S	n/a	Traffic (35), birds (29), NCM inaudible
N5 Oakleigh	12:58 pm	42	1.3 / S	n/a	Birds (38), plane (36), traffic (36), NCM inaudible
N6 Newhaven	4:21 pm	37	Calm	n/a	Birds (34), NCM (34)*
N7 Merriman	2:18 pm	50	1.3 / S	n/a	Tractor (49), traffic (35), NCM (<30)
N4 Greylands	3:58 pm	55	Calm	n/a	Cars (55), traffic (38), NCM (<30)

\*Noise from gas drainage wells

Table 2 NCM Operational Noise Monitoring Results – 23 June 2013 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:22 pm	41	Calm	+6.4	Traffic (39), plane (34), NCM inaudible
N3 Naroo	9:29 pm	49	Calm	+8.4	Traffic (49) NCM inaudible
N5 Oakleigh	7:33 pm	40	Calm	+4.0	Traffic (37), plane (37), NCM inaudible
N6 Newhaven	8:33 pm	36	Calm	+6.4	NCM (36)*
N7 Merriman	9:08 pm	40	Calm	+8.4	Plane (36), traffic (35), dog (33), NCM (<30)
N4 Greylands	9:05 pm	45	Calm	+8.4	Traffic (43), plane (38), NCM (<30)

\*Noise from gas drainage wells

**Table 3**  
**NCM Operational Noise Monitoring Results – 23/24 June 2013 (night)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	10:07 pm	42	Calm	+5.6	Traffic (42), NCM (<30)
N3 Naroo	11:19 pm	34	1.3 / S	+3.8	Traffic (34), NCM inaudible
N5 Oakleigh	12:36 am	28	Calm	+6.8	Traffic (28), NCM inaudible
N6 Newhaven	12:03 am	35	1.3 / S	+3.6	NCM (35)*
N7 Merriman	10:31 pm	46	0.9 / S	+4.8	Train (45), traffic (36), NCM (<30)
N4 Greylands	11:39 pm	32	1.3 / S	+5.2	NCM (31), traffic (<25)

\*Noise from gas drainage wells

**Table 4**  
**NCM Operational Noise Monitoring Results – 24 June 2013 (day)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	2:20 pm	47	0.9 / NW	n/a	Traffic (39), NCM inaudible
N3 Naroo	12:20 pm	40	1.3 / NW	n/a	Traffic (39), NCM (31)
N5 Oakleigh	10:41 am	40	Calm	n/a	Birds (37), traffic (35), NCM (<30)
N6 Newhaven	10:35 am	40	Calm	n/a	Truck (37), NCM (36)*
N7 Merriman	12:36 pm	45	1.3 / NW	n/a	Traffic (43), horse (38), NCM inaudible

\*Noise from gas drainage wells (33), mine noise (32)

**Table 5**  
**NCM Operational Noise Monitoring Results – 24 June 2013 (evening)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:10 pm	47	Calm	Lapse	Traffic (47), NCM (35)
N3 Naroo	8:42 pm	38	Calm	+0.6	Traffic (38), NCM (35)
N5 Oakleigh	7:33 pm	28	Calm	Lapse	Traffic (28), NCM inaudible
N6 Newhaven	8:45 pm	40	Calm	+0.6	NCM (40)*
N7 Merriman	9:25 pm	44	Calm	Lapse	Traffic (43), NCM (34)

\*Noise from gas drainage wells



**Table 6**  
**NCM Operational Noise Monitoring Results – 24/25 June 2013 (night)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:42 pm	44	Calm	+4.9	Traffic (41), <b>NCM (39)</b>
N3 Naroo	12:26 am	41	0.9 / NNW	+5.1	Traffic (39), <b>NCM (34)</b>
N5 Oakleigh	10:17 pm	35	Calm	+1.2	Plane (34), <b>NCM (&lt;25)</b>
N6 Newhaven	10:06 pm	42	Calm	+1.2	<b>NCM (42)*</b>
N7 Merriman	11:16 pm	42	Calm	+3.8	Traffic (39), train (34), <b>NCM (34)</b>

\*Noise from gas drainage wells

**Table 7**  
**NCM Operational Noise Monitoring Results – 25 June 2013 (day)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	12:33 pm	41	1.3 / NNE	n/a	Traffic (41), <b>NCM inaudible</b>
N3 Naroo	2:09 pm	51	Calm	n/a	Car (48), Traffic (43), <b>NCM inaudible</b>
N5 Oakleigh	12:39 pm	38	1.3 / NNE	n/a	Traffic (36), birds (32), <b>NCM inaudible</b>
N6 Newhaven	10:53 am	43	1.8 / NNE	n/a	Helicopter (42), traffic (35), <b>NCM inaudible</b>
N7 Merriman	1:38 pm	38	Calm	n/a	Traffic (38), <b>NCM (&lt;25)</b>

\*Noise from gas drainage wells

**Table 8**  
**NCM Operational Noise Monitoring Results – 25 June 2013 (evening)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:36 pm	40	Calm	+4.2	Traffic (38), birds & insects (36), <b>NCM inaudible</b>
N3 Naroo	8:28 pm	39	Calm	+4.2	Traffic (38), insects (33), <b>NCM inaudible</b>
N5 Oakleigh	9:15 pm	39	Calm	+5.6	Traffic (39), insects (28), <b>NCM inaudible</b>
N6 Newhaven	9:10 pm	35	Calm	+5.6	<b>NCM (33)*</b> , insects (31)
N7 Merriman	8:00 pm	39	Calm	+6.6	Insects (37), traffic (34), <b>NCM (35)</b>

\*Noise from gas drainage wells (33), mine noise (28)

Table 9 NCM Operational Noise Monitoring Results – 25/26 June 2013 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:09 pm	32	Calm	+2.0	Insects (30), traffic (27), NCM (22)
N3 Naroo	10:02 pm	38	Calm	+6.2	Traffic (36), insects (32), NCM (28)
N5 Oakleigh	12:22 am	26	Calm	+1.4	Traffic (24), insects (19), NCM inaudible
N6 Newhaven	11:14 pm	35	Calm	+2.0	NCM (32)*, insects (31)
N7 Merriman	10:04 pm	35	Calm	+6.2	Frogs & insects (35), NCM inaudible

\*Noise from gas drainage wells (29), mine noise (28)

## 4.2 Discussion of Results

The results in Tables 1 to 9 show that, under the operating and meteorological conditions at the times, for the worst case 15 minute compliance measurement periods, the mine noise did not exceed the operational noise criterion at any monitoring location during any of the monitoring periods, with the following exception:

Location	Date, time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	24/6 11:42 pm	44	Calm	+4.9	Traffic (41), NCM (39)

The audible mining noise sources during this measurement were a constant mid-frequency hum described as conveyor noise at 34 dB(A) and dozer track noise at 36 dB(A). At the time of measurement, the temperature inversion strength was +4.9°C/100m which is greater than the upper limit of +4°C/100m under which the noise criteria are applicable. The event, therefore, does not constitute a formal exceedance of the noise criterion.

### 4.2.1 Audible Noise Sources

Mine related noise was measureable on occasion at all of the monitoring locations. The noise was audible as a general hum with occasional noise from mobile plant and reverse beepers. Dozer tracks were audible at times.

At the Newhaven monitoring location the majority of mine related noise was from the gas drainage wells in the vicinity and from the stackers/reclaimers. The monitoring location is near the boundary of the property and not at the residence. Noise levels at the residence would be at least 12 dB lower than those shown in the tables, implying compliance at this receiver.

### 4.2.2 Modifying Factor Corrections

Data from those times where NCM operations were audible were analysed using the “Evaluator” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of “modifying factor corrections” in the NSW Industrial Noise Policy.

#### 4.2.3 Sleep Disturbance

Measured L1 (1 min) noise levels for each night time monitoring period are summarised in **Tables 10 - 12**. The results in these tables show that, under the operating and meteorological conditions at the times, the maximum L1 (1 min) noise emission from NCM did not exceed the sleep disturbance criterion at any location during the night time measurement periods.

Table 10 NCM Sleep Disturbance Monitoring Results – 23/24 June 2013 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	10:07 pm	<35	Calm	+5.6
N3 Naroo	11:19 pm	inaudible	1.3 / S	+3.8
N5 Oakleigh	12:36 am	25	Calm	+6.8
N6 Newhaven	12:03 am	42*	1.3 / S	+3.6
N7 Merriman	10:03 pm	<35	0.9 / S	+4.8

\*Noise from gas drainage wells

Table 11 NCM Sleep Disturbance Monitoring Results – 24/25 June 2013 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:42 pm	43	Calm	+4.9
N3 Naroo	12:26 am	38	0.9 / NNW	+5.1
N5 Oakleigh	10:17 pm	<30	Calm	+1.2
N6 Newhaven	10:06 pm	45*	Calm	+1.2
N7 Merriman	11:16 pm	38	Calm	+3.8

\*Noise from gas drainage wells

Table 12 NCM Sleep Disturbance Monitoring Results – 25/26 June 2013 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:09 pm	32	0.9 / SW	+2.5
N3 Naroo	10:02 pm	35	0.9 / S	+1.9
N5 Oakleigh	12:22 am	n/a	Calm	+2.5
N6 Newhaven	11:14 pm	36*	0.9 / SW	+2.8
N7 Merriman	10:04 pm	n/a	0.9 / S	+1.9

\*Noise from gas drainage wells

#### 4.2.4 Noise Management

Section R 4.1 (b) of EPL 12789 states that the noise monitoring report should include “an outline of any management actions taken within the monitoring period to address any exceedances of the limits detailed in the limit conditions of this licence.”

As there was no exceedance of any noise criteria no noise management actions were necessary.

# APPENDIX A

## DESCRIPTION OF ACOUSTICAL TERMS

**Table A1**  
**Definition of acoustical terms**

Term	Description
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A- Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L90	"Background" Noise Level - the level exceeded for 90% of the monitoring period.



30 July 2013

Ref: 05168/4846

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PO Box 600  
GUNNEDAH NSW 2380

## RE: JULY 2013 ATTENDED NOISE MONITORING RESULTS – NARRABRI MINE

This letter report presents the results of attended noise compliance monitoring conducted for the Narrabri Coal Mine (NCM) on Monday 22nd and Tuesday 23rd July, 2013. Noise monitoring was carried out in accordance with the conditions of the NCM Noise Management Plan (NMP) as detailed below.

### NOISE CRITERIA

The following is an extract from the Narrabri Coal NMP:

Noise impact assessment criteria for the various stages and activities associated with the mine's development were established in the *Environmental Assessment* using relevant DECC guidelines. These criteria have been incorporated in PA 05\_0102 *Condition 3(12)* which is reproduced below. Additionally, PA 05\_0102 *Condition 3(13)* identifies criteria for ensuring continuous improvement in noise mitigation actions at the mine site.

### Noise Limits

*3(12) The Proponent shall ensure that the noise generated by the project does not exceed the levels set out in Table 1 at any privately-owned residence.*

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night	
			LAeq(15 minute)	LA1(1 minute)
All Privately owned Residences	35	35	35	45

Table 1: Impact assessment criteria dB(A)

*Notes:*

- To determine compliance with the  $LA_{eq}(15 \text{ minute})$  limit, noise from the project is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.
- These limits apply under the relevant meteorological conditions outlined in the assessment procedures in Chapter 5 of the NSW Industrial Relations Policy.
- To determine compliance with the  $LA1(1 \text{ minute})$  noise limits, noise from the project is to be measured at 1 metre from the dwelling façade. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECC may accept alternative means of determining compliance (See Chapter 11 of the NSW Industrial Noise Policy).
- These limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

## NOISE MONITORING LOCATIONS

Noise measurement locations for the attended noise survey are listed below and shown in Figure 1:

Bow Hills  
Naroo  
Greylands  
Newhaven\*  
Oakleigh  
Belah Park\*\*

\* The owner denied access to Newhaven so the monitoring was carried out at the southern boundary to the property. A correction factor of between 4 and 8 dB should be subtracted from the monitoring results to estimate the noise level at the residence.

\*\* Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.





FIGURE 1. Noise monitoring locations.



## NOISE MEASUREMENTS

Noise emission levels were measured with a Brüel & Kjær Type 2260 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator prior to and at the completion of measurements.

Wind speed and direction data used in this report was obtained from the mine operated weather station. To obtain temperature inversion data, Gemini Tiny Tag temperature loggers were attached to star pickets at a height of approximately 2m above ground level at locations marked T1 and T2 in Figure 1 to coincide with the attended noise surveys. Location T1 is at 246m AHD and Location T2 is at 296m AHD to give the required 50m vertical separation for calculation of temperature gradients in accordance with the INP. Temperature gradients (normalised to °C/100m) during noise monitoring events are included in the following tables of results. Positive gradients indicate inversion conditions and negative gradients indicate a temperature lapse.

## RESULTS

The measured noise levels, over 1 second intervals, were analysed using Brüel & Kjær “*Evaluator*” software. The software enables the contributions of the mine and other significant noise sources to the overall to be quantified.

Noise levels were recorded for each of the Leq (15 min), Lmax, L1, L10, L90 and Lmin percentiles. As shown in Table 1, the noise criterion for the operational phase of the NCM project is **35 dB(A) L<sub>eq</sub> (15 min)** for all operating times.

The results shown in **Tables 1, 2 and 3** below represent the total 15 minute Leq noise level for all noise sources and the relative contributions of each. This is the compliance criterion for the operation of the mine. Levels for the other percentiles are not shown as they have no compliance criteria for comparison but are available on request. The exception is the L1 (1 min) noise level (which is the standard measure of sleep disturbance) which is applicable to noise emissions at night (i.e. between 10 pm and 7 am).

Where the noise from NCM was audible the Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level.

Noise from NCM is shown in bold type. Where noise from NCM is listed as inaudible, this means the maximum levels from the mine were at least 10 dB below the minimum level during the measurement and not measurable.

Table 1 NCM Noise Monitoring Results – 22/23 July 2013 (Day)				
Location	Time	dB(A), Leq(15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	4:58 pm	46	2.0/291	Traffic (45), birds & insects (38), <b>NCM inaudible</b>
Bow Hills	4:34 pm	44	2.8/281	Traffic (43), birds & insects (37), <b>NCM (30)</b>
Oakleigh	4:09 pm	38	3.6/279	Traffic (34), birds & insects (33), <b>NCM (31)</b>
Naroo (23/7)	7:50 am	48	1.8/315	Traffic (48), birds & insects (39), <b>NCM inaudible</b>
Newhaven	5:41 pm	37	1.6/246	Plane (37), birds (30), <b>NCM (25)*</b>
Greylands	5:18 pm	38	2.0/284	Birds & insects (37), <b>NCM (32)*</b>

\*noise from gas drainage wells

Table 2 NCM Noise Monitoring Results – 22 July 2013 (Evening)				
Location	Time	dB(A), Leq(15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	8:13 pm	41	2.4/233	Traffic (40), <b>NCM (31)</b> , insects (26)
Bow Hills	9:03 pm	38	2.8/230	Traffic (37), <b>NCM (31)</b>
Oakleigh	9:29 pm	28	2.5/230	Traffic (27), <b>NCM (20)</b>
Naroo	8:42 pm	45	2.3/235	Traffic (45), <b>NCM (32)</b>
Newhaven	7:26 pm	31	2.0/250	<b>NCM (31)*</b>
Greylands	7:49 pm	41	2.1/242	Traffic (41), <b>NCM (30)</b>

\*noise from gas drainage wells

Table 3 NCM Noise Monitoring Results – 22 July 2013 (Night)					
Location	Time	dB(A), Leq(15min)	Wind speed (m/s)/ direction°	Temp Grad (°C/100m)	Identified Noise Sources
Merriman	10:50 pm	35	1.2/317	+3.7	Traffic (33), <b>NCM (31)</b>
Bow Hills	11:19 pm	43	1.7/302	+4.3	Traffic (43), <b>NCM (33)</b>
Oakleigh	12:15 am	35	1.1/299	+6.1	Traffic (35), <b>NCM (20)</b>
Naroo	11:40 pm	42	1.3/280	+4.4	Traffic (42), <b>NCM (31)</b>
Newhaven	10:05 pm	34	1.6/256	+7.0	<b>NCM (33)*</b> , traffic (27)
Greylands	10:27 pm	38	1.5/320	+3.4	Traffic (37), <b>NCM (31)</b>

\*noise from gas drainage wells

The results shown in **Tables 1 - 3** indicate that, under the operational and atmospheric conditions at the time, noise emission from NCM did not exceed the noise criterion of 35 dB(A) Leq at any monitoring location at any time.

Data for the 15 minute Leq noise levels were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.

In addition to the operational noise, emissions from NCM must not exceed 45 dB(A) L1 (1 min) between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The measured L1 (1 min) noise levels, from NCM, during the night time measurement circuit are shown below in **Table 4**.

The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents observations measurements made during the 15 minute long operational noise measurement are noted. Where maximum noise levels from mining activity approach 45 dB(A) L1 (1 min) then, where practical, further measurements are made at the sleep disturbance monitoring location.

Note that, as the internal layout of each residence is not known, the measurements are made at the worst case façade in relation to the mine noise. This is not necessarily at the façade of a bedroom window.

Table 4 L1 (1 min) – 22 July 2013 (Night)		
Location	Time	dB(A), L1 (1 min)
Merriman	10:50 pm	37
Bow Hills	11:19 pm	37
Oakleigh	12:15 am	25
Naroo	11:40 pm	40
Newhaven	10:05 pm	35
Greylands	10:27 pm	34

As shown in Table 4, during the night time measurement circuit the (1 min) noise from NCM did not exceed 45 dB(A) at any monitoring location.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,

SPECTRUM ACOUSTICS PTY LIMITED

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Ross Hodge  
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4 September 2013

Ref: 05168/4898

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## RE: AUGUST 2013 ATTENDED NOISE MONITORING RESULTS – NARRABRI MINE

This letter report presents the results of attended noise compliance monitoring conducted for the Narrabri Coal Mine (NCM) on Tuesday 27<sup>th</sup> August, 2013. Noise monitoring was carried out in accordance with the conditions of the NCM Noise Management Plan (NMP) as detailed below.

### NOISE CRITERIA

The following is an extract from the Narrabri Coal NMP:

Noise impact assessment criteria for the various stages and activities associated with the mine's development were established in the *Environmental Assessment* using relevant DECC guidelines. These criteria have been incorporated in PA 05\_0102 *Condition 3(12)* which is reproduced below. Additionally, PA 05\_0102 *Condition 3(13)* identifies criteria for ensuring continuous improvement in noise mitigation actions at the mine site.

### Noise Limits

*3(12) The Proponent shall ensure that the noise generated by the project does not exceed the levels set out in Table 1 at any privately-owned residence.*

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night	
			LAeq(15 minute)	LA1(1 minute)
All Privately owned Residences	35	35	35	45

Table 1: Impact assessment criteria dB(A)

*Notes:*

- To determine compliance with the  $LA_{eq}(15 \text{ minute})$  limit, noise from the project is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.
- These limits apply under the relevant meteorological conditions outlined in the assessment procedures in Chapter 5 of the NSW Industrial Relations Policy.
- To determine compliance with the  $LA1(1 \text{ minute})$  noise limits, noise from the project is to be measured at 1 metre from the dwelling façade. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECC may accept alternative means of determining compliance (See Chapter 11 of the NSW Industrial Noise Policy).
- These limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

## NOISE MONITORING LOCATIONS

Noise measurement locations for the attended noise survey are listed below and shown in Figure 1:

Bow Hills  
Naroo  
Greylands  
Newhaven\*  
Oakleigh  
Belah Park\*\*

\* The owner denied access to Newhaven so the monitoring was carried out at the southern boundary to the property. A correction factor of between 6 and 8 dB should be subtracted from the monitoring results to estimate the noise level at the residence.

\*\* Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.



FIGURE 1. Noise monitoring locations.



## NOISE MEASUREMENTS

Noise emission levels were measured with a Brüel & Kjær Type 2260 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator prior to and at the completion of measurements.

Wind speed and direction data used in this report was obtained from the mine operated weather station. To obtain temperature inversion data, Gemini Tiny Tag temperature loggers were attached to star pickets at a height of approximately 2m above ground level at locations marked T1 and T2 in Figure 1 to coincide with the attended noise surveys. Location T1 is at 246m AHD and Location T2 is at 296m AHD to give the required 50m vertical separation for calculation of temperature gradients in accordance with the INP. Temperature gradients (normalised to °C/100m) during noise monitoring events are included in the following tables of results. Positive gradients indicate inversion conditions and negative gradients indicate a temperature lapse.

## RESULTS

The measured noise levels, over 1 second intervals, were analysed using Brüel & Kjær “*Evaluator*” software. The software enables the contributions of the mine and other significant noise sources to the overall to be quantified.

Noise levels were recorded for each of the Leq (15 min), Lmax, L1, L10, L90 and Lmin percentiles. As shown in Table 1, the noise criterion for the operational phase of the NCM project is **35 dB(A) L<sub>eq</sub> (15 min)** for all operating times.

The results shown in **Tables 1, 2 and 3** below represent the total 15 minute Leq noise level for all noise sources and the relative contributions of each. This is the compliance criterion for the operation of the mine. Levels for the other percentiles are not shown as they have no compliance criteria for comparison but are available on request. The exception is the L1 (1 min) noise level (which is the standard measure of sleep disturbance) which is applicable to noise emissions at night (i.e. between 10 pm and 7 am).

Where the noise from NCM was audible the Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level.

Noise from NCM is shown in bold type. Where noise from NCM is listed as inaudible, this means the maximum levels from the mine were at least 10 dB below the minimum level during the measurement and not measurable.

Table 1 NCM Noise Monitoring Results – 27 August 2013 (Day)				
Location	Time	dB(A), Leq(15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	5:22 pm	47	2.4 / 200	Birds (44), Traffic (43), NCM inaudible
Bow Hills	4:55 pm	44	2.6 / 204	Traffic (44), NCM (<32)
Oakleigh	5:24 pm	40	2.4 / 200	Birds (39), wind (30), NCM (<25)
Naroo	4:29 pm	47	3.5 / 226	Traffic (44), train (43), NCM (34)
Newhaven	4:38 pm	37	3.5 / 226	Birds (34), NCM (34)*
Greylands	5:00 pm	38	2.6 / 204	Birds (35), construction (34), NCM inaudible

\*noise from gas drainage wells

Table 2 NCM Noise Monitoring Results – 27 August 2013 (Evening)				
Location	Time	dB(A), Leq(15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	8:21 pm	44	2.4 / 169	Traffic (43), insects (35), NCM inaudible
Bow Hills	8:45 pm	41	1.2 / 104	Traffic (40), NCM (32)
Oakleigh	9:10 pm	32	2.1 / 63	Traffic (32), NCM inaudible
Naroo	9:34 pm	48	2.5 / 61	Traffic (46), dog (40), NCM (<30)
Newhaven	7:36 pm	36	3.3 / 193	NCM (36)*
Greylands	7:57 pm	38	3.4 / 194	Traffic (35), NCM (34)*

\*noise from gas drainage wells

Table 3 NCM Noise Monitoring Results – 27 August 2013 (Night)					
Location	Time	dB(A), Leq(15min)	Wind speed (m/s)/ direction°	Temp Grad (°C/100m)	Identified Noise Sources
Merriman	10:44 pm	43	1.1 / 107	+5.4	Train (41), traffic (36), NCM (31)
Bow Hills	11:09 pm	37	1.1 / 139	+7.7	Traffic (36), insects (<30), NCM inaudible
Oakleigh	12:00 am	33	1.1 / 153	+7.7	Traffic (33), NCM inaudible
Naroo	11:36 pm	41	1.1 / 148	+8.1	Traffic (41), NCM inaudible
Newhaven	10:01 pm	33	1.9 / 71	+6.5	NCM (32)*, birds (<25)
Greylands	10:22 pm	36	1.3 / 101	+7.4	Traffic (33), NCM (32)*

\*noise from gas drainage wells

The results shown in **Tables 1 - 3** indicate that, under the operational and atmospheric conditions at the time, noise emission from NCM did not exceed the noise criterion of 35 dB(A) Leq at any monitoring location at any time.

Data for the 15 minute Leq noise levels were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions in the NSW Industrial Noise Policy.



In addition to the operational noise, emissions from NCM must not exceed 45 dB(A) L1 (1 min) between the hours of 10 pm and 7 am. This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine. The measured L1 (1 min) noise levels, from NCM, during the night time measurement circuit are shown below in **Table 4**.

The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window.

To avoid undue disturbance to residents observations measurements made during the 15 minute long operational noise measurement are noted. Where maximum noise levels from mining activity approach 45 dB(A) L1 (1 min) then, where practical, further measurements are made at the sleep disturbance monitoring location.

Note that, as the internal layout of each residence is not known, the measurements are made at the worst case façade in relation to the mine noise. This is not necessarily at the façade of a bedroom window.

Table 4		
L1 (1 min) – 27 August 2013 (Night)		
Location	Time	dB(A), L1(1 min)
Merriman	10:44 pm	34
Bow Hills	11:09 pm	N/A
Oakleigh	12:00 am	N/A
Naroo	11:36 pm	N/A
Newhaven	10:01 pm	33
Greylands	10:22 pm	34

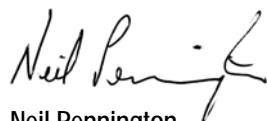
As shown in Table 4, during the night time measurement circuit the (1 min) noise from NCM did not exceed 45 dB(A) at any monitoring location.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,


SPECTRUM ACOUSTICS PTY LIMITED

Author:



Neil Pennington  
Acoustical Consultant

Review:



Ross Hodge  
Acoustical Consultant



Project No: 05168

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## ATTENDED NOISE MONITORING – SEPTEMBER 2013

### Narrabri Coal Mine

### Narrabri, NSW

---

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October 2013

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## APPENDIX A Description of Acoustical Terms

## EXECUTIVE SUMMARY

Attended noise monitoring has been carried out for the Narrabri Coal Mine (NCM) over a period of three days between Sunday 22nd and Tuesday 24th September, 2013 in accordance with requirements of Environment Protection Licence (EPL 12789) and other relevant Australian Standards and guidelines.

The mine was in full operation during the entire survey period.

There were two exceedances of the operational noise and two exceedances of the sleep disturbance criteria due to emission from dozers working on coal stockpiles. In response to this noise modelling has been undertaken using ENM environmental noise software to investigate the implications of various operational scenarios involving the use of dozers in different working conditions and locations. The interpretation of the results of the modelling will create a better understanding of the potential impacts of noise from the dozers and allow for an assessment of noise control and management options.

Data from those times where NCM operations were audible were analysed using Bruel & Kjaer “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of “modifying factor corrections” in the NSW Industrial Noise Policy.

## 1.0 INTRODUCTION

This letter report presents the results of attended noise compliance monitoring and measurements conducted for the Narrabri Coal Mine (NCM) between Sunday 22nd and Tuesday 24th September, 2013.

### 1.1 Noise Monitoring Locations

Section M3.6 of EPL 12789 (variation dated February 20, 2012) contains a table detailing a list of residences and corresponding EPA identification numbers (spellings are as per the EPL). The residences are listed below:

N1	Bow Hills
N3	Naroo
N4	Greylands
N5	Oakleigh
N6	Newhaven <sup>1</sup>
N7	Belah Park <sup>2</sup>
N8	Haylin View <sup>3</sup>
N9	Merrilong <sup>3</sup>

1. The owner denied access to Newhaven so the monitoring was carried out at the southern boundary to the property.
2. Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.
3. Monitoring at Haylin View and Merrilong is to commence when surface activities approach the eastern end of the southern longwall panels.

These monitoring locations are illustrated in **Figure 1**.

### 1.2 Monitoring Frequency and Duration

Section M 7.1 of EPL 12789 indicates that the attended noise monitoring must be conducted;

- a) at each of the locations detailed above (except that identified as N4);
- b) quarterly in a reporting period;
- c) during each day, evening and night period for a minimum of:
  - 1.5 hours during the day;
  - 30 minutes during the evening; and
  - 1 hour during the night.
- d) occur for three consecutive operating days.

At location N4 (Greylands) the monitoring is to be carried out for a 15 minute period over each of the day, evening and night time periods during one 24 hour period.

Figure 1  
Noise Monitoring Locations



## 2.0 CRITERIA AND CONDITIONS

### 2.1 Noise Assessment Criteria

At all of the residences, the noise criterion is **35 dB(A) Leq (15 min)** (operational noise criterion) for each of the day, evening and night time periods, with “day” defined as 7am to 10pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays, “evening” being 6pm to 10pm and “night” being all other times.

In addition to the above the noise level at night must not exceed **45 dB(A) L1 (1 min)** (sleep disturbance criterion) at any residence.

### 2.2 Monitoring Location Definition

EPL 12789 states that to determine compliance with the Leq (15 min) operational noise criteria the noise measurement equipment must be located:

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

### 2.3 Applicable Meteorological Conditions

EPL 12798 states that the noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or
3. Stability category G temperature inversion conditions.

The Project Approval for the mine PA 08\_0144 provides further definition and states that these noise limits apply to applicable receivers under all meteorological conditions except for any one of the following;

- wind speeds greater than 3 metres/second at 10 metres above ground level; or
- temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level; or
- temperature inversions of greater than 4°C/100 metres.

### 2.4 Other Conditions

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW industrial Noise policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom



window. To avoid undue disturbance to residents, observations and measurements made during the 60 minute long operational noise measurement are noted.

For consideration of the worst case, the L1 (1 min) noise level made at the operational noise measurement location is considered to be representative of the level at the bedroom façade of each residence (with the exception of the Newhaven location which is significantly removed from the residence).

## 3.0 NOISE MONITORING PROCEDURE

### 3.1 Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (90 minutes/day, 30 minutes/evening and 60 minutes/night) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

### 3.2 Measurement Analysis

The operational noise criteria for compliance with Section L 3.1 of EPL 12789 are based on a 15 minute Leq noise level. The procedures detailed in Section M. 7.1 of EPL 12789 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Section L 3.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from NCM was audible Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from NCM is shown in the tables in bold type.

When no mine noise was audible at a monitoring location, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below. Mining noise levels above the 35dB(A) criterion are shaded grey.

### 3.3 Meteorological Data

Meteorological data used in this report were sourced from the mine operated weather station on site. The wind speed and direction monitor is at 10m above ground level.



### 3.3.1 Inversion Monitoring

Gemini Tiny Tag temperature loggers were attached to star pickets at a height of approximately 2m above ground level at locations marked T1 and T2 in Figure 1 to coincide with the attended noise surveys. Location T1 is at 246m AHD and Location T2 is at 296m AHD to give the required 50m vertical separation for calculation of temperature gradients in accordance with the INP.

The logger at location T1 did not function properly due to in field battery failure. Temperature gradients could, therefore, not be accurately determined.

### 3.4 Special Conditions

Before the noise surveys, Spectrum Acoustics personnel were briefed on the current location(s) of activities. Access roads to the Newhaven monitoring location were blocked for safety reasons from Monday, September 23. The monitoring at the Newhaven location was therefore, only undertaken on September 22.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Measured Noise Levels

Measured noise levels for each monitoring location and each period are summarised in **Tables 1 - 9**.

Table 1 NCM Operational Noise Monitoring Results – 22 September 2013 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	2:39 pm	37	1.3/73	n/a	Traffic (36), birds & insects (28), <b>NCM inaudible</b>
N3 Naroo	3:51 pm	44	1.9/330	n/a	Birds (41), traffic (41), <b>NCM (25)</b>
N5 Oakleigh	4:25 pm	35	1.9/0	n/a	Birds & insects (33), traffic (32), <b>NCM inaudible</b>
N6 Newhaven	1:45 pm	33	1.3/134	n/a	Insects (31), <b>NCM (29)*</b>
N7 Merriman	1:03 pm	37	1.3/189	n/a	Birds & insects (34), traffic (34), <b>NCM inaudible</b>
N4 Greylands	3:21 pm	52	1.0/126	n/a	Birds (52), traffic (40), <b>NCM inaudible</b>

\*Noise from gas drainage wells

Table 2 NCM Operational Noise Monitoring Results – 22 September 2013 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) <sup>1</sup>	Identified Noise Sources
N1 Bow Hills	8:46 pm	40	0.2/121	n/a	Frogs & insects (36), <b>NCM (36)</b> , traffic (32)
N3 Naroo	9:29 pm	55	0.9/233	n/a	Train (54), birds (45), traffic (38) <b>NCM (&lt;30)</b>
N5 Oakleigh	9:25 pm	33	0.9/233	n/a	<b>NCM (31)</b> , traffic (29)
N6 Newhaven	8:05 pm	33	0.1/269	n/a	Insects (31), <b>NCM (29)*</b>
N7 Merriman	8:06 pm	33	0.1/269	n/a	Frogs & insects (33), traffic (23), <b>NCM inaudible</b>
N4 Greylands	8:40 pm	37	0.3/72	n/a	Traffic (35), <b>NCM (31)*</b> , insects (27)

1. see text

\*Noise from gas drainage wells

**Table 3**  
**NCM Operational Noise Monitoring Results – 22/23 September 2013 (night)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:16 pm	41	0.9/344	n/a	NCM (38), birds & insects (36), traffic (34)
N3 Naroo	12:05 am	44	0.3/353	n/a	NCM (41), traffic (40), insects (35)
N5 Oakleigh	12:23 am	36	Calm	n/a	NCM (33), traffic (33), insects (20)
N6 Newhaven	10:13 pm	37	1.5/281	n/a	NCM (36)*, insects (31)
N7 Merriman	10:10 pm	37	1.5/281	n/a	NCM (34), traffic (33), insects (27)
N4 Greylands	11:39 pm	37	1.5/281	n/a	Traffic (36), NCM (31)*

\*Noise from gas drainage wells

**Table 4**  
**NCM Operational Noise Monitoring Results – 23 September 2013 (day)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	2:36 pm	43	4.4/292	n/a	Traffic (40), birds & insects (38), wind (35), NCM inaudible
N3 Naroo	3:15 pm	47	4.2/315	n/a	Wind (45), traffic (40), NCM (32)
N5 Oakleigh	4:18 pm	37	3.1/311	n/a	Traffic (35), birds (32), NCM barely audible
N6 Newhaven					
N7 Merriman	1:00 pm	42	4.2/315	n/a	Wind (40), traffic (36), birds & insects (33), NCM inaudible

**Table 5**  
**NCM Operational Noise Monitoring Results – 23 September 2013 (evening)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	6:00 pm	42	1.9/321	n/a	Insects (40), traffic (38), NCM inaudible
N3 Naroo	6:00 pm	45	1.9/321	n/a	Traffic (44), birds (40), NCM (31)
N5 Oakleigh	6:45 pm	42	1.9/314	n/a	Traffic (41), insects (33), NCM (30)
N6 Newhaven					
N7 Merriman	6:39 pm	45	1.9/314	n/a	Insects (43), traffic (41), NCM inaudible

**Table 6**  
**NCM Operational Noise Monitoring Results – 23/24 September 2013 (night)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:08 pm	41	3.2/308	n/a	Traffic (40), NCM (30), insects (25)
N3 Naroo	11:48 am	39	3.5/311	n/a	Traffic (36), NCM (35), birds (28)
N5 Oakleigh	12:20 am	35	3.5/314	n/a	Insects (31), traffic (30), NCM (30)
N6 Newhaven					
N7 Merriman	10:42 pm	37	2.9/308	n/a	Traffic (34), insects (33), NCM inaudible

Table 7 NCM Operational Noise Monitoring Results – 24 September 2013 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	12:10 pm	50	6.1/278	n/a	Wind (50), traffic (39), insects (30), <b>NCM inaudible</b>
N3 Naroo	12:48 pm	48	6.0/274	n/a	Wind (46), traffic (41), <b>NCM (35)</b>
N5 Oakleigh	10:26 am	46	7.6/295	n/a	Wind (45), birds & insects (35), traffic (33), <b>NCM inaudible</b>
N6 Newhaven					
N7 Merriman	11:12 am	48	6.6/292	n/a	Wind (43), traffic (42), insects (40), <b>NCM inaudible</b>

Table 8 NCM Operational Noise Monitoring Results – 24 September 2013 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:56 pm	42	3.1/191	n/a	Traffic (40), insects (35), <b>NCM (34)</b>
N3 Naroo	9:11 pm	43	3.3/165	n/a	Traffic (43), <b>NCM (24)</b> , insects (20)
N5 Oakleigh	8:09 pm	46	3.5/189	n/a	Insects (45), traffic (41), <b>NCM inaudible</b>
N6 Newhaven					
N7 Merriman	8:33 pm	39	3.0/170	n/a	Traffic (37), insects & frogs (31), <b>NCM (31)</b>

Table 9 NCM Operational Noise Monitoring Results – 24 September 2013 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:16 pm	34	1.7/150	n/a	Traffic (31), cattle (30), frogs (27), <b>NCM inaudible</b>
N3 Naroo	11:34 pm	26	1.7/155	n/a	Traffic (26), <b>NCM inaudible</b>
N5 Oakleigh	10:01 am	39	2.4/116	n/a	Traffic (37), insects (35), <b>NCM (25)</b>
N6 Newhaven					
N7 Merriman	10:26 pm	37	2.0/114	n/a	Traffic (34), <b>NCM (34)</b> , insects (27)

## 4.2 Discussion of Results

The results in Tables 1 to 9 show that, under the operating and meteorological conditions at the times, for the worst case 15 minute compliance measurement periods, the mine noise exceeded the operational noise criterion at the following monitoring locations and periods:

Location	Date, time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	22/9/13 - 8:46 pm	40	0.1/121	n/a	Frogs & insects (36), NCM (36), traffic (32)
N1 Bow Hills	22/9/13 - 11:16 pm	41	0.9/344	n/a	NCM (38), birds & insects (36), traffic (34)
N3 Naroo	23/9/13 - 12:05 am	44	0.6/353	n/a	NCM (41), traffic (40), insects (35)

The audible mining noise sources during each of these measurements were related to dozers working on the coal stockpiles (both engine and track noise).

In relation to the measured noise at Bow Hills on the evening of September 22, an exceedance of less than 2dB(A) above a statutory noise limit specified in a consent or licence condition is not considered to be a non-compliance as per the discussion in Section 11.1.3 of the NSW Industrial Noise policy.

The EPL and Project Approval for the mine both detail applicable atmospheric conditions for which compliance with the noise criteria is not applicable. Of particular relevance is that the two measured exceedances occurred at night when there is potential for temperature inversions. Due to the failure of a temperature logger it was not possible to get valid data for determining the presence, or strength, of any inversion on the night of the exceedances.

Each of the exceedances occurred when atmospheric conditions were relatively calm and cool with very light breeze and no cloud cover. Under such conditions it is Spectrum Acoustics experience at this locality that moderate to strong temperature inversions are a common feature.

#### 4.2.1 Audible Noise Sources

Mine related noise was measureable on occasion at all of the monitoring locations. The noise was audible as a general hum with occasional noise from mobile plant and reverse beepers. Dozer tracks were audible at times.

At the Newhaven monitoring location the majority of mine related noise was from the gas drainage wells in the vicinity. The monitoring location is near the boundary of the property and not at the residence. Noise levels at the residence would be at least 12 dB lower than those shown in the tables, implying compliance at this receiver.

#### 4.2.2 Modifying Factor Corrections

Data from those times where NCM operations were audible were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of “modifying factor corrections” in the NSW Industrial Noise Policy.

#### 4.2.3 Sleep Disturbance

Measured L1 (1 min) noise levels for each night time monitoring period are summarised in **Tables 10 - 12**.

Table 10 NCM Sleep Disturbance Monitoring Results – 22/23 September 2013 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:16 pm	46	0.9/344	n/a
N3 Naroo	12:05 am	50	0.6/353	n/a
N5 Oakleigh	12:23 am	42	Calm	n/a
N6 Newhaven	10:13 pm	39*	1.5/281	n/a
N7 Merriman	10:10 pm	38	1.5/281	n/a
N4 Greylands	11:39 pm	39	1.5/281	n/a

\*Noise from gas drainage wells

Table 11 NCM Sleep Disturbance Monitoring Results – 23/24 September 2013 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:08 pm	37	3.2/308	n/a
N3 Naroo	11:48 am	39	3.5/311	n/a
N5 Oakleigh	12:20 am	37	3.5/314	n/a
N6 Newhaven				
N7 Merriman	10:42 pm	n/a	2.9/308	n/a

Table 12 NCM Sleep Disturbance Monitoring Results – 24 September 2013 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:16 pm	n/a	1.7/150	n/a
N3 Naroo	11:34 pm	n/a	1.7/155	n/a
N5 Oakleigh	10:01 am	30	2.4/116	n/a
N6 Newhaven				
N7 Merriman	10:26 pm	40	2.0/114	n/a

The results in these tables show that, under the operating and meteorological conditions at the times, the maximum L1 (1 min) noise emission from NCM exceeded the sleep disturbance criterion at the Bow Hills and Naroo monitoring locations during the night time measurement period on 22/23 September.

#### 4.2.4 Noise Management

Section R 4.1 (b) of EPL 12789 states that the noise monitoring report should include “an outline of any management actions taken within the monitoring period to address any exceedances of the limits detailed in the limit conditions of this licence.”

The elevated noise levels measured during the monitoring surveys were due mainly to emissions from dozers working on the coal stockpiles.

Noise modelling was undertaken using ENM environmental noise software to investigate the implications of various operational scenarios involving the use of dozers in different working conditions and locations. The interpretation of the results of the modelling will create a better understanding of the potential impacts of noise from the dozers and allow for an assessment of noise control and management options.

# APPENDIX A

## DESCRIPTION OF ACOUSTICAL TERMS

**Table A1**  
**Definition of acoustical terms**

Term	Description
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A- Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L90	"Background" Noise Level - the level exceeded for 90% of the monitoring period.



Project No: 05168

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## ATTENDED NOISE MONITORING – DECEMBER 2013

### Narrabri Coal Mine

### Narrabri, NSW

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Prepared for:

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December 2013



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## APPENDIX A Description of Acoustical Terms

## EXECUTIVE SUMMARY

Attended noise monitoring has been carried out for the Narrabri Coal Mine (NCM) over a period of three days between Tuesday 10th and Thursday 12th December, 2013 in accordance with requirements of Environment Protection Licence (EPL 12789) and other relevant Australian Standards and guidelines.

The mine was in full operation during the entire survey period.

On three occasions the operational noise was in excess of the noise criterion but the levels were measured under non-compliant meteorological conditions.

The sleep disturbance criterion was exceeded at the Naroo monitoring location but the noise was measured under non-compliant meteorological conditions.

The elevated noise at Naroo was a result of emissions from dozers working on coal stockpiles.

Additional noise modelling has been undertaken using ENM environmental noise software to investigate the implications of various operational scenarios involving the use of dozers in different working conditions and locations. As a result of the noise modelling Naroo is in an acquisition zone.

Data from those times where NCM operations were audible were analysed using Bruel & Kjaer “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of “modifying factor corrections” in the NSW Industrial Noise Policy.

## 1.0 INTRODUCTION

This letter report presents the results of attended noise compliance monitoring and measurements conducted for the Narrabri Coal Mine (NCM) between Tuesday 10th and Thursday 12th December, 2013.

### 1.1 Noise Monitoring Locations

Section M3.6 of EPL 12789 (variation dated February 20, 2012) contains a table detailing a list of residences and corresponding EPA identification numbers (spellings are as per the EPL). The residences are listed below:

N1	Bow Hills
N3	Naroo
N4	Greylands
N5	Oakleigh
N6	Newhaven <sup>1</sup>
N7	Belah Park <sup>2</sup>
N8	Haylin View <sup>3</sup>
N9	Merrilong <sup>3</sup>

1. The owner denied access to Newhaven so the monitoring was carried out at the southern boundary to the property.
2. Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.
3. Monitoring at Haylin View and Merrilong is to commence when surface activities approach the eastern end of the southern longwall panels.

These monitoring locations are illustrated in **Figure 1**.

### 1.2 Monitoring Frequency and Duration

Section M 7.1 of EPL 12789 indicates that the attended noise monitoring must be conducted;

- a) at each of the locations detailed above (except that identified as N4);
- b) quarterly in a reporting period;
- c) during each day, evening and night period for a minimum of:
  - 1.5 hours during the day;
  - 30 minutes during the evening; and
  - 1 hour during the night.
- d) occur for three consecutive operating days.

At location N4 (Greylands) the monitoring is to be carried out for a 15 minute period over each of the day, evening and night time periods during one 24 hour period.

Figure 1  
Noise Monitoring Locations



## 2.0 CRITERIA AND CONDITIONS

### 2.1 Noise Assessment Criteria

At all of the residences, the noise criterion is **35 dB(A) Leq (15 min)** (operational noise criterion) for each of the day, evening and night time periods, with “day” defined as 7am to 10pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays, “evening” being 6pm to 10pm and “night” being all other times.

In addition to the above the noise level at night must not exceed **45 dB(A) L1 (1 min)** (sleep disturbance criterion) at any residence.

### 2.2 Monitoring Location Definition

EPL 12789 states that to determine compliance with the Leq (15 min) operational noise criteria the noise measurement equipment must be located:

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

### 2.3 Applicable Meteorological Conditions

EPL 12798 states that the noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or
3. Stability category G temperature inversion conditions.

The Project Approval for the mine PA 08\_0144 provides further definition and states that these noise limits apply to applicable receivers under all meteorological conditions except for any one of the following;

- wind speeds greater than 3 metres/second at 10 metres above ground level; or
- temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level; or
- temperature inversions of greater than 4°C/100 metres.

### 2.4 Other Conditions

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW industrial Noise policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom

window. To avoid undue disturbance to residents, observations and measurements made during the 60 minute long operational noise measurement are noted.

For consideration of the worst case, the L1 (1 min) noise level made at the operational noise measurement location is considered to be representative of the level at the bedroom façade of each residence (with the exception of the Newhaven location which is significantly removed from the residence).

## 3.0 NOISE MONITORING PROCEDURE

### 3.1 Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (90 minutes/day, 30 minutes/evening and 60 minutes/night) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

### 3.2 Measurement Analysis

The operational noise criteria for compliance with Section L 3.1 of EPL 12789 are based on a 15 minute Leq noise level. The procedures detailed in Section M. 7.1 of EPL 12789 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Section L 3.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from NCM was audible Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from NCM is shown in the tables in bold type.

When no mine noise was audible at a monitoring location, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below. Mining noise levels above the 35dB(A) criterion are shaded grey.

### 3.3 Meteorological Data

Meteorological data used in this report were sourced from the mine operated weather station on site. The wind speed and direction monitor is at 10m above ground level.



### 3.3.1 Inversion Monitoring

Gemini Tiny Tag temperature loggers were attached to star pickets at a height of approximately 2m above ground level at locations marked T1 and T2 in Figure 1 to coincide with the attended noise surveys. Location T1 is at 246m AHD and Location T2 is at 296m AHD to give the required 50m vertical separation for calculation of temperature gradients in accordance with the INP.

### 3.4 Special Conditions

Before the noise surveys, Spectrum Acoustics personnel were briefed on the current location(s) of activities.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Measured Noise Levels

Measured noise levels for each monitoring location and each period are summarised in **Tables 1 - 9**.

Table 1 NCM Operational Noise Monitoring Results – 10 December 2013 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	2:00 pm	45	6.4/319	n/a	Traffic (44), birds & insects (37), <b>NCM inaudible</b>
N3 Naroo	1:33 pm	47	6.1/318	n/a	Birds & insects (45), traffic (42), <b>NCM (30)</b>
N5 Oakleigh	3:40 pm	39	6.2/328	n/a	Traffic (38), birds & insects (30), <b>NCM (25)</b>
N6 Newhaven	3:41 pm	36	6.2/328	n/a	Traffic (33), insects (31), wind (29), <b>NCM inaudible</b>
N7 Merriman	12:26 pm	40	6.1/300	n/a	Traffic (39), birds & insects (34), <b>NCM inaudible</b>
N4 Greylands	3:14 pm	43	6.7/305	n/a	Birds & insects (42), traffic (36), <b>NCM (25)</b>

\*Noise from gas drainage wells

Table 2 NCM Operational Noise Monitoring Results – 10 December 2013 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) <sup>1</sup>	Identified Noise Sources
N1 Bow Hills	8:45 pm	45	4.4/192	n/a	Traffic (45), insects (35), <b>NCM (31)</b>
N3 Naroo	9:17 pm	40	3.9/192	n/a	Traffic (38), insects (34) <b>NCM (23)</b>
N5 Oakleigh	9:23 pm	38	4.0/190	n/a	Insects (37), traffic (30), <b>NCM inaudible</b>
N6 Newhaven	8:18 pm	37	3.4/198	n/a	Insects (36), <b>NCM (30)*</b>
N7 Merriman	8:09 pm	47	3.8/200	n/a	Traffic (45), birds & insects (43), <b>NCM inaudible</b>
N4 Greylands	8:53 pm	37	4.3/192	n/a	Insects (34), <b>NCM (34)**</b>

\*Noise from gas drainage wells

\* Noise from gas drainage wells and mining plant

**Table 3**  
**NCM Operational Noise Monitoring Results – 10/11 December 2013 (night)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:40 pm	35	3.3/108	Lapse	Traffic (32), insects (30), <b>NCM (28)</b> ,
N3 Naroo	11:31 pm	41	3.5/110	Lapse	Insects (37), traffic (36), wind (35), <b>NCM (22)</b>
N5 Oakleigh	1:05 am	24	3.3/135	Lapse	Insects (24), <b>NCM inaudible</b>
N6 Newhaven	10:01 pm	38	5.2/175	Lapse	Insects (37), <b>NCM (30)*</b>
N7 Merriman	10:05 pm	42	5.2/175	Lapse	Traffic (39), insects (38), <b>NCM (32)</b>
N4 Greylands	11:07 pm	38	3.1/103	Lapse	Traffic (35), <b>NCM (33)*</b> , insects (28)

\*Noise from gas drainage wells

**Table 4**  
**NCM Operational Noise Monitoring Results – 11 December 2013 (day)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:51 am	35	3.6/135	n/a	Traffic (32), birds & insects (29), <b>NCM (28)</b>
N3 Naroo	7:13 am	40	4.0/138	n/a	Traffic (38), birds (35), <b>NCM inaudible</b>
N5 Oakleigh	11:09 pm	33	2.4/160	n/a	Birds & insects (30), traffic (28), <b>NCM (25)</b>
N6 Newhaven	8:55 am	34	3.6/135	n/a	<b>NCM (32)*</b> , birds & insects (30)
N7 Merriman	7:06 am	43	4.1/140	n/a	Birds & insects (41), traffic (38), <b>NCM (31)</b>

\*Noise from gas drainage wells

**Table 5**  
**NCM Operational Noise Monitoring Results – 11 December 2013 (evening)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	7:38 pm	45	2.6/216	n/a	Traffic (44), <b>NCM (34)</b> , insects (32)
N3 Naroo	9:17 pm	39	3.0/212	n/a	Traffic (36), <b>NCM (36)</b> , insects (24)
N5 Oakleigh	8:30 pm	33	2.7/240	n/a	Insects (33), <b>NCM barely audible</b>
N6 Newhaven	8:18 pm	33	2.7/240	n/a	Insects (31), <b>NCM (29)*</b>
N7 Merriman	6:57 pm	46	2.7/216	n/a	Birds (44), traffic (40), <b>NCM (31)</b>

\*Noise from gas drainage wells

**Table 6**  
**NCM Operational Noise Monitoring Results – 11/12 December 2013 (night)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:21 pm	41	3.5/191	+1.1	Traffic (39), <b>NCM (35)</b> , insects (31)
N3 Naroo	11:12 pm	36	3.1/196	+1.1	Traffic (34), <b>NCM (30)</b> , insects (26)
N5 Oakleigh	12:31 am	27	3.5/161	+4.1	Insects (24), traffic (24), <b>NCM inaudible</b>
N6 Newhaven	10:00 pm	33	2.7/230	Lapse	<b>NCM (32)*</b> , insects (27)
N7 Merriman	10:14 pm	40	3.0/222	Lapse	Traffic (37), insects (36), <b>NCM (28)</b>

\*Noise from gas drainage wells



**Table 7**  
**NCM Operational Noise Monitoring Results – 12 December 2013 (day)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	9:00 am	38	2.9/111	n/a	Traffic (37), birds (31), <b>NCM inaudible</b>
N3 Naroo	9:18 am	41	2.6/113	n/a	Traffic (40), birds & insects (35), <b>NCM inaudible</b>
N5 Oakleigh	10:45 am	32	2.5/120	n/a	<b>NCM (29)</b> , traffic (26), birds & insects (23)
N6 Newhaven	7:28 am	46	4.0/127	n/a	Birds (46), <b>NCM (35)*</b>
N7 Merriman	7:15 am	40	3.8/130	n/a	Birds & insects (38), traffic (36), <b>NCM (24)</b>

\*Noise from gas drainage wells

**Table 8**  
**NCM Operational Noise Monitoring Results – 12 December 2013 (evening)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:41 pm	41	4.1/269	n/a	Birds (41), traffic (28), <b>NCM (23)</b>
N3 Naroo	9:02 pm	38	4.5/262	n/a	<b>NCM (34)</b> , frogs & insects (34), traffic (31)
N5 Oakleigh	9:22 pm	44	4.5/252	n/a	Traffic (44), <b>NCM (31)</b> , insects (28)
N6 Newhaven	8:17 pm	31	3.3/279	n/a	Insects (31), <b>NCM (18)*</b>
N7 Merriman	7:57 pm	46	3.3/282	n/a	Birds (46), traffic (35), <b>NCM inaudible</b>

\*Noise from gas drainage wells

**Table 9**  
**NCM Operational Noise Monitoring Results – 12/13 December 2013 (night)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:13 pm	38	3.7/236	Lapse	<b>NCM (36)</b> , traffic (32), insects (25)
N3 Naroo	11:20 pm	39	3.7/236	Lapse	<b>NCM (37)</b> , insects (31), traffic (31)
N5 Oakleigh	12:23 am	29	3.3/220	Lapse	Insects (27), traffic (23), <b>NCM inaudible</b>
N6 Newhaven	10:03 pm	38	4.4/236	Lapse	<b>NCM (35)*</b> , insects (35)
N7 Merriman	10:03 pm	41	4.2/236	Lapse	Traffic (40), <b>NCM (35)</b> , insects (28)

\*Noise from gas drainage wells

## 4.2 Discussion of Results

The results in Tables 1 to 9 show that, under the operating and meteorological conditions at the times, for the worst case 15 minute compliance measurement periods, the mine noise exceeded the operational noise criterion at the following monitoring locations and periods:

Location	Date, time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N3 Naroo	11/12/13 - 8:17 pm	39	3.0/212	n/a	Traffic (36), <b>NCM (36)</b> , insects (24)
N1 Bow Hills	12/12/13 – 11:13 pm	38	3.7/236	Lapse	<b>NCM (36)</b> , traffic (32), insects (25)
N3 Naroo	12/12/13 - 11:20 pm	39	3.7/236	Lapse	<b>NCM (37)</b> , insects (31), traffic (31)

The audible mining noise sources during each of these measurements were related to dozers working on the coal stockpiles (both engine and track noise).

NCM environmental licence conditions indicate that compliance with noise emission criteria is not applicable under atmospheric conditions where winds speeds are higher than 3m/s or temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level or temperature inversions of greater than 4°C/100 metres.

Data from the mine operated weather station indicated that all of the elevated noise levels were measured whilst there were winds at 3 and 3.7 m/s. The elevated noise levels were, therefore, measured under non-compliant meteorological conditions.

#### 4.2.1 Audible Noise Sources

Mine related noise was measureable on occasion at all of the monitoring locations. The noise was audible as a general hum with occasional noise from mobile plant and reverse beepers. Dozer tracks were audible at times.

At the Newhaven monitoring location the majority of mine related noise was from the gas drainage wells in the vicinity. The monitoring location is near the boundary of the property and not at the residence. Noise levels at the residence would be at least 12 dB lower than those shown in the tables, implying compliance at this receiver.

#### 4.2.2 Modifying Factor Corrections

Data from those times where NCM operations were audible were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of “modifying factor corrections” in the NSW Industrial Noise Policy.

#### 4.2.3 Sleep Disturbance

Measured L1 (1 min) noise levels for each night time monitoring period are summarised in **Tables 10 - 12**. The measured level shown is for the mine noise only.

Table 10 NCM Sleep Disturbance Monitoring Results – 10/11 December 2013 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:40 pm	32	3.3/108	n/a
N3 Naroo	11:31 pm	25	3.5/110	n/a
N5 Oakleigh	1:05 am	n/a	3.3/135	n/a
N6 Newhaven	10:01 pm	33	5.2/175	n/a
N7 Merriman	10:05 pm	41	5.2/175	n/a
N4 Greylands	11:07 pm	37	3.1/103	n/a

\*Noise from gas drainage wells

Table 11 NCM Sleep Disturbance Monitoring Results – 11/12 December 2013 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:21 pm	44	3.5/191	n/a
N3 Naroo	11:12 pm	37	3.1/196	n/a
N5 Oakleigh	12:31 am	n/a	3.5/161	n/a
N6 Newhaven	10:00 pm	36	2.7/230	
N7 Merriman	10:14 pm	36	3.0/222	n/a

Table 12 NCM Sleep Disturbance Monitoring Results – 12/13 December 2013 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:13 pm	43	3.7/236	Lapse
N3 Naroo	11:20 pm	46	3.7/236	Lapse
N5 Oakleigh	12:23 am	n/a	3.3/220	Lapse
N6 Newhaven	10:03 pm	41	4.4/236	Lapse
N7 Merriman	10:03 pm	41	4.2/236	Lapse

The results in these tables show that, under the operating and meteorological conditions at the times, the maximum L1 (1 min) noise emission from NCM exceeded the sleep disturbance criterion at the Naroo monitoring location during the night time measurement period on 12/13 December.

The elevated noise level at Naroo was measured whilst there was wind at 3.7 m/s. The elevated noise levels were, therefore, measured under non-compliant meteorological conditions.

Additional noise modelling has been undertaken using ENM environmental noise software to investigate the implications of various operational scenarios involving the use of dozers in different working conditions and locations. As a result of the noise modelling Naroo is in an acquisition zone.

#### 4.2.4 Noise Management

Section R 4.1 (b) of EPL 12789 states that the noise monitoring report should include “*an outline of any management actions taken within the monitoring period to address any exceedances of the limits detailed in the limit conditions of this licence.*”

The elevated noise levels measured during the monitoring surveys were due mainly to emissions from dozers working on the coal stockpiles.

Noise modelling was undertaken using ENM environmental noise software to investigate the implications of various operational scenarios involving the use of dozers in different working conditions and locations. The interpretation of the results of the modelling will create a better understanding of the potential impacts of noise from the dozers and allow for an assessment of noise control and management options.

# APPENDIX A

## DESCRIPTION OF ACOUSTICAL TERMS

**Table A1**  
**Definition of acoustical terms**

Term	Description
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A- Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L90	"Background" Noise Level - the level exceeded for 90% of the monitoring period.



Project No: 05168

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## ATTENDED NOISE MONITORING – MARCH 2014

### Narrabri Coal Mine

### Narrabri, NSW

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April 2014

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## APPENDIX A Description of Acoustical Terms

## EXECUTIVE SUMMARY

Attended noise monitoring has been carried out for the Narrabri Coal Mine (NCM) over a period of three days between Monday 17th and Wednesday 19th March, 2014 in accordance with requirements of Environment Protection Licence (EPL 12789) and other relevant Australian Standards and guidelines.

The mine was in full operation during the entire survey period.

The operational noise exceeded the criterion on one occasion but the levels were measured under non-compliant meteorological conditions.

The sleep disturbance criterion was exceeded at the Bow Hills monitoring location but the noise was measured under non-compliant meteorological conditions. The elevated noise at Bow Hills was a result of emissions from dozers working on coal stockpiles.

Mine associated noise from of a vent fan and drill rig was recorded at the Newhaven monitoring location. Extrapolation of the emitted noise to the Newhaven residence suggests that there may have been exceedances of the operational noise criterion although these were found to be under non-compliant meteorological conditions. Given the potential for adverse impacts at Newhaven, a noise reduction strategy has been developed in which a noise bund will be formed along the northern/eastern sides of the fan and an acoustically treated shed will be constructed to partially enclose the vent fan.

Data from those times where NCM operations were audible were analysed using Bruel & Kjaer “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of “modifying factor corrections” in the NSW Industrial Noise Policy.



## 1.0 INTRODUCTION

This letter report presents the results of attended noise compliance monitoring and measurements conducted for the Narrabri Coal Mine (NCM) between Monday 17th and Wednesday 19th March, 2014.

### 1.1 Noise Monitoring Locations

Section M3.6 of EPL 12789 (variation dated February 20, 2012) contains a table detailing a list of residences and corresponding EPA identification numbers (spellings are as per the EPL). The residences are listed below:

N1	Bow Hills
N3	Naroo
N4	Greylands
N5	Oakleigh
N6	Newhaven <sup>1</sup>
N7	Belah Park <sup>2</sup>
N8	Haylin View <sup>3</sup>
N9	Merrilong <sup>3</sup>

1. The owner denied access to Newhaven so the monitoring was carried out at the monitoring location indicated in Figure 1. Review of noise contours for the project reveals a -18dB correction factor from the monitoring location to N6 under worst case inversion conditions. In the tables of results, this factor has been taken into account when presenting the NCM noise level at this receiver.
2. Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.
3. Monitoring at Haylin View and Merrilong is to commence when surface activities approach the eastern end of the southern longwall panels.

These monitoring locations are illustrated in **Figure 1**.

### 1.2 Monitoring Frequency and Duration

Section M 7.1 of EPL 12789 indicates that the attended noise monitoring must be conducted;

- a) at each of the locations detailed above (except that identified as N4);
- b) quarterly in a reporting period;
- c) during each day, evening and night period for a minimum of:
  - 1.5 hours during the day;
  - 30 minutes during the evening; and
  - 1 hour during the night.
- d) occur for three consecutive operating days.

At location N4 (Greylands) the monitoring is to be carried out for a 15 minute period over each of the day, evening and night time periods during one 24 hour period.

Figure 1  
Noise Monitoring Locations



## 2.0 CRITERIA AND CONDITIONS

### 2.1 Noise Assessment Criteria

At all of the residences, the noise criterion is **35 dB(A) Leq (15 min)** (operational noise criterion) for each of the day, evening and night time periods, with “day” defined as 7am to 10pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays, “evening” being 6pm to 10pm and “night” being all other times.

In addition to the above the noise level at night must not exceed **45 dB(A) L1 (1 min)** (sleep disturbance criterion) at any residence.

### 2.2 Monitoring Location Definition

EPL 12789 states that to determine compliance with the Leq (15 min) operational noise criteria the noise measurement equipment must be located:

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

### 2.3 Applicable Meteorological Conditions

EPL 12798 states that the noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or
3. Stability category G temperature inversion conditions.

The Project Approval for the mine PA 08\_0144 provides further definition and states that these noise limits apply to applicable receivers under all meteorological conditions except for any one of the following;

- wind speeds greater than 3 metres/second at 10 metres above ground level; or
- temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level; or
- temperature inversions of greater than 4°C/100 metres.

### 2.4 Other Conditions

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW industrial Noise policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom

window. To avoid undue disturbance to residents, observations and measurements made during the 60 minute long operational noise measurement are noted.

For consideration of the worst case, the L1 (1 min) noise level made at the operational noise measurement location is considered to be representative of the level at the bedroom façade of each residence (with the exception of the Newhaven location which is significantly removed from the residence).

## 3.0 NOISE MONITORING PROCEDURE

### 3.1 Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (90 minutes/day, 30 minutes/evening and 60 minutes/night) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

### 3.2 Measurement Analysis

The operational noise criteria for compliance with Section L 3.1 of EPL 12789 are based on a 15 minute Leq noise level. The procedures detailed in Section M. 7.1 of EPL 12789 require noise monitoring for significantly longer periods than that of the compliance criteria. To determine compliance with the EPL conditions the worst case 15 minute period, in relation to mine noise, was extracted from each measurement and compared to the criteria in Section L 3.1.

This worst case 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from NCM was audible Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from NCM is shown in the tables in bold type.

When no mine noise was audible at a monitoring location, a representative 15 minute noise measurement was made with observations carried out for the remainder of the applicable time period. In these instances, the measured noise level for the representative 15 minute period is that shown in the tables below. Mining noise levels above the 35dB(A) criterion are shaded grey.

### 3.3 Meteorological Data

Meteorological data used in this report were sourced from the mine operated weather station on site. The wind speed and direction monitor is at 10m above ground level. Temperature inversion strength was interpreted from data from the met tower at a nearby mine which has temperature sensors at 2m and 52m above ground level. The met station is located approximately 25km to the south east of the NCM monitoring locations.

### 3.4 Special Conditions

Before the noise surveys, Spectrum Acoustics personnel were briefed on the current location(s) of activities.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Measured Noise Levels

Measured noise levels for each monitoring location and each period are summarised in **Tables 1 - 9**.

Table 1 NCM Operational Noise Monitoring Results – 17 March 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	2:33 pm	40	2.4/167	n/a	Wind (36), birds (35), traffic (34), <b>NCM faintly audible</b>
N3 Naroo	2:37 pm	41	2.4/167	n/a	Traffic (38), birds (37), <b>NCM inaudible</b>
N5 Oakleigh	4:20 pm	34	2.6/325	n/a	Traffic (31), wind (27), <b>NCM (27)</b>
N6 Newhaven	4:21 pm	45*	2.6/325	n/a	<b>NCM (27)</b> , birds (33)
N7 Merriman	12:48 pm	35	2.1/180	n/a	Birds & insects (33), traffic (26), wind (26) <b>NCM inaudible</b>

\*Noise from vent fan and drill rig (see discussion in Section 4.2)

Table 2 NCM Operational Noise Monitoring Results – 17 March 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) <sup>1</sup>	Identified Noise Sources
N1 Bow Hills	9:26 pm	48	2.4/176	9.2/100	Traffic (48), <b>NCM (35)</b> , insects (33)
N3 Naroo	8:33 pm	38	2.7/223	6.4/100	Traffic (38), <b>NCM (20)</b>
N5 Oakleigh	9:15 pm	23	1.4/177	9.0/100	Traffic (23), <b>NCM faintly audible</b>
N6 Newhaven	8:01pm	52*	2.0/224	4.2/100	<b>NCM (34)</b>
N7 Merriman	8:48 pm	43	2.5/211	7.2/100	Insects (40), traffic (40), <b>NCM inaudible</b>

\*Noise from vent fan and drill rig (see discussion in Section 4.2)

Table 3 NCM Operational Noise Monitoring Results – 17/18 March 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	12:35 am	40	2.1/112	6.8/100	<b>NCM (38)</b> , traffic (34), insects (26)
N3 Naroo	10:01 pm	38	3.7/178	6.3/100	Traffic (38), insects (25), <b>NCM inaudible</b>
N5 Oakleigh	11:14 pm	24	3.1/167	6.4/100	Traffic (23), insects (19), <b>NCM inaudible</b>
N6 Newhaven	10:13 pm	56*	3.7/178	5.3/100	<b>NCM (38)</b>
N7 Merriman	11:27 pm	40	3.1/164	6.4/100	Traffic (39), <b>NCM (32)</b> , insects (29)

\*Noise from vent fan and drill rig (see discussion in Section 4.2)



**Table 4**  
**NCM Operational Noise Monitoring Results – 18 March 2014 (day)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	10:32 am	40	1.4/280	n/a	Traffic (40), birds (26), <b>NCM (25)</b>
N3 Naroo	8:02 am	40	3.7/145	n/a	Traffic (39), birds (30), <b>NCM inaudible</b>
N4 Greylands	10:01 am	34	2.8/135	n/a	Wind (32), traffic (30)
N5 Oakleigh	9:45 am	31	1.8/192	n/a	Traffic (29), <b>NCM (23)</b> , birds (21)
N6 Newhaven	8:45 am	52*	3.0/140	n/a	<b>NCM (34)</b> , birds (30)
N7 Merriman	4:27 pm	37	4.1/148	n/a	Wind (35), traffic (30), birds (30), <b>NCM inaudible</b>

\*Noise from vent fan and drill rig (see discussion in Section 4.2)

**Table 5**  
**NCM Operational Noise Monitoring Results – 18 March 2014 (evening)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	9:13 pm	39	3.8/146	1.3/100	Traffic (38), <b>NCM (29)</b> , insects (29)
N3 Naroo	8:22 pm	40	3.2/152	4.9/100	Traffic (38), insects (35), <b>NCM inaudible</b>
N4 Greylands	8:15 pm	37	3.0/153	5.0/100	Traffic (34), <b>NCM (31)</b> , insects (29)
N5 Oakleigh	9:06 pm	31	3.3/146	1.3/100	Traffic (31), insects (19), <b>NCM inaudible</b>
N6 Newhaven	7:37 pm	49*	3.3/157	3.9/100	<b>NCM (31)</b> , insects (28)
N7 Merriman	8:39 pm	38	3.2/152	4.2/100	Traffic (35), <b>NCM (33)</b> , insects 29

\*Noise from vent fan and drill rig (see discussion in Section 4.2)

**Table 6**  
**NCM Operational Noise Monitoring Results – 18/19 March 2014 (night)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	12:40 am	37	3.4/147	6.5/100	Traffic (35), <b>NCM (30)</b> , insects (25)
N3 Naroo	10:00 pm	37	3.2/146	1.8/100	Traffic (35), insects (31), <b>NCM inaudible</b>
N4 Greylands	11:07 pm	35	3.0/150	3.4/100	<b>NCM (35)</b> , insects (25)
N5 Oakleigh	11:15 pm	25	3.0/140	4.7/100	Traffic (24), insects (18), <b>NCM inaudible</b>
N6 Newhaven	10:00 pm	50*	3.2/146	1.8/100	<b>NCM (32)</b> , insects (28)
N7 Merriman	11:33 pm	39	3.1/139	5.5/100	Traffic (38), <b>NCM (30)</b> , insects 25

\*Noise from vent fan and drill rig (see discussion in Section 4.2)

**Table 7**  
**NCM Operational Noise Monitoring Results – 19 March 2014 (day)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	12:40 pm	43	2.3/117	n/a	Traffic (41), birds (35), wind (35), <b>NCM faintly audible</b>
N3 Naroo	7:58 am	43	4.6/147	n/a	Traffic (41), birds (39), <b>NCM inaudible</b>
N5 Oakleigh	9:44 am	38	4.2/156	n/a	Birds (35), traffic (32), wind (30), <b>NCM (24)</b>
N6 Newhaven	7:56 am	48*	4.6/147	n/a	<b>NCM (30)</b> , birds (33)
N7 Merriman	9:38 am	37	4.2/156	n/a	Birds (32), traffic (31), wind (31), <b>NCM (27)</b>

\*Noise from vent fan and drill rig (see discussion in Section 4.2)

**Table 8**  
**NCM Operational Noise Monitoring Results – 19 March 2014 (evening)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	9:03 pm	34	2.4/111	0.2/100	Traffic (32), <b>NCM (26)</b> , birds & insects (25)
N3 Naroo	7:30 pm	49	4.1/85	Lapse	Traffic (46), wind (46), insects (30), <b>NCM inaudible</b>
N5 Oakleigh	8:39 pm	30	2.4/125	0.0	Traffic (29), <b>NCM (20)</b>
N6 Newhaven	7:44 pm	54*	4.5/73	Lapse	<b>NCM (36)</b>
N7 Merriman	8:26 pm	46	2.4/125	Lapse	Wind (46), traffic (35), <b>NCM inaudible</b>

\*Noise from vent fan and drill rig (see discussion in Section 4.2)

**Table 9**  
**NCM Operational Noise Monitoring Results – 19/20 March 2014 (night)**

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	12:17 am	26	2.5/104	1.4/100	Insects (24), traffic (20) <b>NCM faintly audible</b>
N3 Naroo	10:00 pm	41	3.3/96	2.0/100	Traffic (41), insects (28), <b>NCM inaudible</b>
N5 Oakleigh	11:33 pm	35	2.5/113	1.0/100	Traffic (35), insects (25), <b>NCM inaudible</b>
N6 Newhaven	10:00 pm	54*	3.3/96	2.0/100	<b>NCM (36)</b> , insects (27)
N7 Merriman	11:10 pm	38	3/116	0.9/100	Insects (36), traffic (29), wind (29), <b>NCM inaudible</b>

\*Noise from vent fan and drill rig (see discussion in Section 4.2)

## 4.2 Discussion of Results

The results in Tables 1 to 9 show that, under the operating and meteorological conditions at the times, for the worst case 15 minute compliance measurement periods, the mine noise exceeded the operational noise criterion at the monitoring locations and periods summarised in Table 10.

Table 10 Summary of monitoring periods when NCM noise levels exceeded noise criteria						
Location	Date, time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	NCM noise level	Compliant met. conditions (Y/N)
N1 Bow Hills	18/03/13, 12:35 am	40	2.1/112	6.8/100	38	N
N6 Newhaven	17/03/13, 10:13 pm	56*	3.7/178	5.3/100	38	N
N6 Newhaven	19/03/13, 7:44 pm	54*	4.5/73	Lapse	36	N
N6 Newhaven	10:00 pm	54*	3.3/96	2.0/100	36	N

\*Noise from vent fan and drill rig (see discussion below)

The audible mining noise sources during this measurement at the Bow Hills property were related to dozers working on the coal stockpiles (both engine and track noise). Noise sources at the Newhaven property were related to noise from a vent fan and drill rig.

NCM environmental licence conditions indicate that compliance with noise emission criteria is not applicable under atmospheric conditions where winds speeds are higher than 3m/s or temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level or temperature inversions of greater than 4°C/100 metres.

The elevated noise levels were, therefore, measured under non-compliant meteorological conditions.

Discussions with Narrabri Coal commenced after the first day of the survey regarding a noise reduction strategy to mitigate the potential for adverse noise impacts at Newhaven. Temporary noise bunding is to be formed along the northern/eastern sides of the fan and an acoustically treated shed will be constructed over it. At least 10 dB noise reduction will be achieved by these measures.

#### 4.2.1 Modifying Factor Corrections

Data from those times where NCM operations were audible were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of “modifying factor corrections” in the NSW Industrial Noise Policy.

#### 4.2.2 Sleep Disturbance

Measured L1 (1 min) noise levels for each night time monitoring period are summarised in **Tables 11 - 13**. The measured level shown is for the mine noise only.

Table 11 NCM Sleep Disturbance Monitoring Results – 17/18 March 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	12:35 am	47	2.1/112	6.8/100
N3 Naroo	10:1 pm	n/a	3.7/176	6.3/100
N5 Oakleigh	11:14 pm	n/a	3.1/167	6.4/100
N6 Newhaven	10:13 pm	n/a	3.7/178	5.3/100
N7 Merriman	11:27 pm	35	3.1/164	6.4/100



Table 12 NCM Sleep Disturbance Monitoring Results – 18/19 March 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	12:40 am	35	3.4/147	6.5/100
N3 Naroo	10:00 pm	n/a	3.2/146	1.8/100
N4 Greylands	11:07 pm	40	3/150	3.4/100
N5 Oakleigh	11:15 pm	n/a	3/140	4.7/100
N6 Newhaven	10:00 pm	n/a	3.2/146	1.8/100
N7 Merriman	11:33 pm	36	3.1/139	5.5/100

Table 13 NCM Sleep Disturbance Monitoring Results – 19/20 March 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	12:17 am	25	2.5/104	1.4/100
N3 Naroo	10:00 pm	n/a	3.3/96	2.0/100
N5 Oakleigh	11:33 pm	n/a	2.5/113	1.0/100
N6 Newhaven	10:00 pm	n/a	3.3/96	2.0/100
N7 Merriman	11:10 pm	n/a	3/116	0.9/100

The results in these tables show that, under the operating and meteorological conditions at the times, the maximum L1 (1 min) noise emission from NCM exceeded the sleep disturbance criterion at the Bow Hills monitoring location during the night time measurement period on 17/18 March.

The elevated noise level at the Bow Hills location was measured during a temperature inversion of 6.8°C/100m. The elevated noise levels were, therefore, measured under non-compliant meteorological conditions.

#### 4.2.3 Noise Management

Section R 4.1 (b) of EPL 12789 states that the noise monitoring report should include “an outline of any management actions taken within the monitoring period to address any exceedances of the limits detailed in the limit conditions of this licence.”

Although not a non-compliance the measured elevated noise at Bow Hills was as a result of noise emissions from dozers on the stockpiles. NCM is currently negotiating with the resident at Bow Hills in relation to noise and the development of a private agreement.

Elevated noise levels were measured at the Newhaven monitoring location as a result of emissions from a newly operational vent fan. As a result of the measurements a programme commenced to determine the sound power level of the vent fan and compare this to the NCM Statement of Commitments for the project.

The results of the programme indicated that to minimise potential adverse impacts as a result of noise from the vent fan near the Newhaven monitoring location, a temporary noise bund has been constructed along the northern sides of the fan (in the direction of nearest receivers). The fan is to be enclosed in an acoustically treated shed.

Follow up noise measurements are proposed to ensure the effectiveness of the noise control measures and maintain compliance with the relevant criteria.

# APPENDIX A

## DESCRIPTION OF ACOUSTICAL TERMS

**Table A1**  
**Definition of acoustical terms**

Term	Description
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A- Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L90	"Background" Noise Level - the level exceeded for 90% of the monitoring period.



Project No: 05168

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## ATTENDED NOISE MONITORING – 19 MARCH 2014

### Narrabri Coal Mine

### Narrabri, NSW

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Prepared for:


Whitehaven Coal Limited  
10 Kurrajong Creek Road  
Baan Baa NSW 2390

Author:



**Ross Hodge**  
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Review:



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Principal / Director

16 April 2014

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## APPENDIX A Description of Acoustical Terms

## 1.0 INTRODUCTION

This letter report presents the results of attended noise monitoring and measurements conducted for the Narrabri Coal Mine (NCM) on Wednesday 19<sup>th</sup> March, 2014.

### 1.1 Noise Monitoring Location

The noise monitoring location is shown in **Figure 1**.

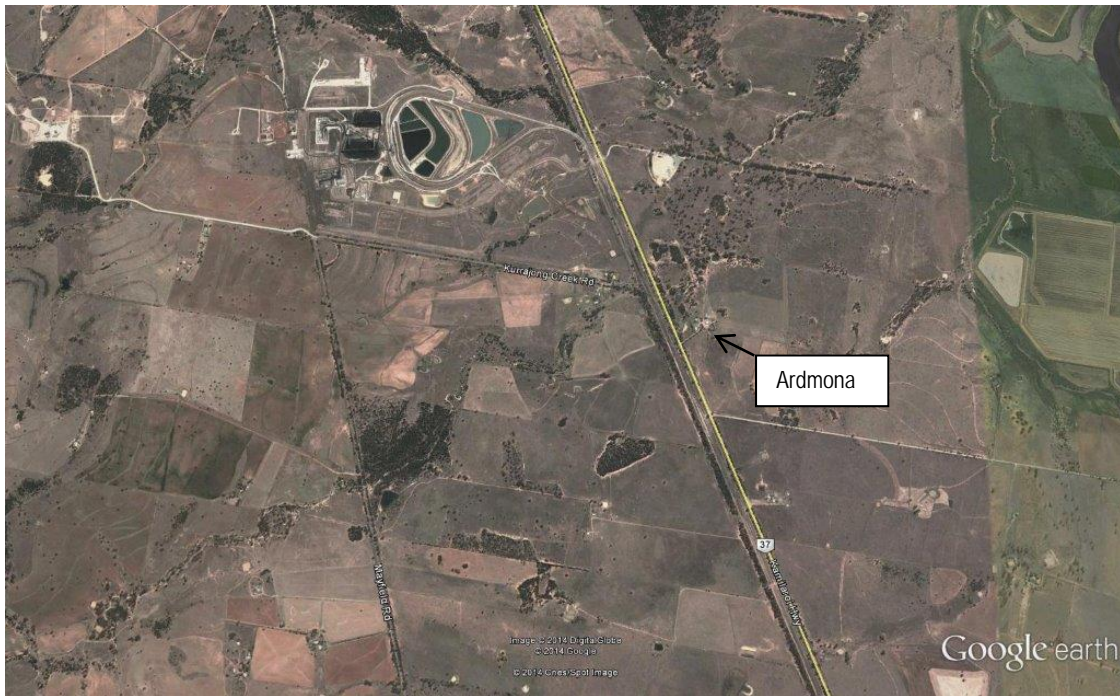


Figure 1  
Noise Monitoring Location

### 1.2 Monitoring Frequency and Duration

At the Ardmona location the monitoring was undertaken for a 15 minute period over each of the day, evening and night time periods during one 24 hour period.

## 2.0 CRITERIA AND CONDITIONS

### 2.1 Noise Assessment Criteria

The noise criterion is **35 dB(A) Leq (15 min)** (operational noise criterion) for each of the day, evening and night time periods, with “day” defined as 7am to 10pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays, “evening” being 6pm to 10pm and “night” being all other times.

In addition to the above the noise level at night must not exceed **45 dB(A) L1 (1 min)** (sleep disturbance criterion) at any residence.

## 2.2 Monitoring Location Definition

EPL 12789 states that to determine compliance with the Leq (15 min) operational noise criteria the noise measurement equipment must be located:

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

## 2.3 Applicable Meteorological Conditions

EPL 12798 states that the noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or
3. Stability category G temperature inversion conditions.

The Project Approval for the mine PA 08\_0144 provides further definition and states that these noise limits apply to applicable receivers under all meteorological conditions except for any one of the following;

- wind speeds greater than 3 metres/second at 10 metres above ground level; or
- temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level; or
- temperature inversions of greater than 4°C/100 metres.

## 2.4 Other Conditions

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW industrial Noise policy must be applied, as appropriate, to the measured noise levels.

To determine compliance with the L1 (1 min) sleep disturbance noise criterion the noise measurement equipment must be located within 1m of a dwelling façade.

The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the façade of a bedroom window. To avoid undue disturbance to residents, observations and measurements made during the night time operational noise measurement are noted.

For consideration of the worst case, the L1 (1 min) noise level made at the operational noise measurement location is considered to be representative of the level at the bedroom façade of each residence.

## 3.0 NOISE MONITORING PROCEDURE

### 3.1 Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (90 minutes/day, 30 minutes/evening and 60 minutes/night) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

### 3.2 Measurement Analysis

The operational noise criteria for compliance with Section L 3.1 of EPL 12789 are based on a 15 minute Leq noise level.

The 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from NCM was audible Bruel & Kjaer “*Evaluator*” analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from NCM is shown in the tables in bold type. Mining noise levels above the 35dB(A) criterion are shaded grey.

### 3.3 Meteorological Data

Meteorological data used in this report were sourced from the mine operated weather station on site. The wind speed and direction monitor is at 10m above ground level. Temperature inversion strength was interpreted from data from the met tower at a nearby mine which has temperature sensors at 2m and 52m above ground level. The met station is located approximately 25km to the south east of the NCM monitoring locations.

### 3.4 Special Conditions

Before the noise surveys, Spectrum Acoustics personnel were briefed on the current location(s) of activities.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Measured Noise Levels

Measured noise levels for each time period are summarised in **Tables 1 - 3**.



Table 1 NCM Operational Noise Monitoring Results – 19 March 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	2:22 pm	45	3.2/128	n/a	Traffic (43), birds (40), NCM inaudible

Table 2 NCM Operational Noise Monitoring Results – 19 March 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) <sup>1</sup>	Identified Noise Sources
Ardmona	8:08 pm	39	3.3/94	n/a	Traffic (36), frogs/insects (35), NCM inaudible

Table 3 NCM Operational Noise Monitoring Results – 19 March 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	11:08 pm	37	3.0/116	1.2/100	Traffic (37), insects (26), NCM inaudible

## 4.2 Discussion of Results

The results in Tables 1 to 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise was compliant with the operational noise criterion.

As the mine was inaudible at night there is no exceedance of the sleep disturbance criterion.

### 4.2.1 Audible Noise Sources

Mine noise was inaudible at the Ardmona monitoring location during the day, evening and night surveys.

### 4.2.2 Noise Management

Section R 4.1 (b) of EPL 12789 states that the noise monitoring report should include “an outline of any management actions taken within the monitoring period to address any exceedances of the limits detailed in the limit conditions of this licence.”

The measured noise did not exceed the criterion at any time and, therefore, no management actions were required.

# APPENDIX A

## DESCRIPTION OF ACOUSTICAL TERMS

**Table A1**  
**Definition of acoustical terms**

Term	Description
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A- Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L90	"Background" Noise Level - the level exceeded for 90% of the monitoring period.



Project No: 05168

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## ATTENDED NOISE MONITORING – 19 MARCH 2014

### Narrabri Coal Mine

### Narrabri, NSW

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16 April 2014

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## APPENDIX A Description of Acoustical Terms

## 1.0 INTRODUCTION

This letter report presents the results of attended noise monitoring and measurements conducted for the Narrabri Coal Mine (NCM) on Wednesday 19<sup>th</sup> March, 2014.

### 1.1 Noise Monitoring Location

The noise monitoring location is shown in **Figure 1**.



Figure 1  
Noise Monitoring Location

### 1.2 Monitoring Frequency and Duration

The monitoring was undertaken for a 15 minute period over each of the day and evening time periods during one 24 hour period. The landowner of the Matilda residence denied access to his property after 10:00pm, therefore, noise measurements could not be conducted during the night period.

## 2.0 CRITERIA AND CONDITIONS

### 2.1 Noise Assessment Criteria

The noise criterion is **35 dB(A) Leq (15 min)** (operational noise criterion) for each of the day, evening and night time periods, with “day” defined as 7am to 10pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays, “evening” being 6pm to 10pm and “night” being all other times.

In addition to the above the noise level at night must not exceed **45 dB(A) L1 (1 min)** (sleep disturbance criterion) at any residence.

## 2.2 Monitoring Location Definition

EPL 12789 states that to determine compliance with the Leq (15 min) operational noise criteria the noise measurement equipment must be located:

- Approximately on the property boundary, where any dwelling is situated 30m or less from the property boundary closest to the premises; or
- Within 30m of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30m from the property boundary closest to the premises; or, where applicable
- Within 50m of the boundary of a National Park or Nature Reserve.

## 2.3 Applicable Meteorological Conditions

EPL 12798 states that the noise limits apply under all meteorological conditions except for the following;

1. Wind speeds greater than 3m/s at 10m above ground level; or
2. Stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or
3. Stability category G temperature inversion conditions.

The Project Approval for the mine PA 08\_0144 provides further definition and states that these noise limits apply to applicable receivers under all meteorological conditions except for any one of the following;

- wind speeds greater than 3 metres/second at 10 metres above ground level; or
- temperature inversions of 1.5 - 4°C/100 metres and a source to receiver wind speed greater than 2 metres/second at 10 metres above ground level; or
- temperature inversions of greater than 4°C/100 metres.

## 2.4 Other Conditions

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NSW industrial Noise policy must be applied, as appropriate, to the measured noise levels.

As no monitoring was conducted during the night period determining compliance with the L1 (1 min) sleep disturbance noise criterion was not possible.

# 3.0 NOISE MONITORING PROCEDURE

## 3.1 Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 and 2260 Precision Sound Analysers. These instruments have Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters” and have current NATA calibration. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the appropriate monitoring periods (90 minutes/day, 30 minutes/evening and 60 minutes/night) with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum

from 20 - 20k Hz which is required for analysing INP 'modifying factors'. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

### 3.2 Measurement Analysis

The operational noise criteria for compliance with Section L 3.1 of EPL 12789 are based on a 15 minute Leq noise level.

The 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from NCM was audible Bruel & Kjaer "Evaluator" analysis software was used to quantify the contributions of the mine and other significant noise sources to the overall level. Mine noise from NCM is shown in the tables in bold type. Mining noise levels above the 35dB(A) criterion are shaded grey.

### 3.3 Meteorological Data

Meteorological data used in this report were sourced from the mine operated weather station on site. The wind speed and direction monitor is at 10m above ground level. Temperature inversion strength was interpreted from data from the met tower at a nearby mine which has temperature sensors at 2m and 52m above ground level. The met station is located approximately 25km to the south east of the NCM monitoring locations.

### 3.4 Special Conditions

Before the noise surveys, Spectrum Acoustics personnel were briefed on the current location(s) of activities. As discussed the resident at Matilda denied access after 10pm.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Measured Noise Levels

Measured noise levels for each period are summarised in **Tables 1** and **2**.

Table 1 NCM Operational Noise Monitoring Results – 19 March 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	11:41 am	38	2.4/128	n/a	Birds (38), NCM faintly audible

Table 2 NCM Operational Noise Monitoring Results – 19 March 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) <sup>1</sup>	Identified Noise Sources
Matilda	9:25 pm	26	3.9/111	n/a	Traffic (23), NCM (23)



## 4.2 Discussion of Results

The results in Tables 1 and 2 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise was compliant with the operational noise criterion.

### 4.2.1 Audible Noise Sources

Mine noise was only faintly audible at the Matilda monitoring location. The noise was audible inconsistently as a faint mine hum.

### 4.2.2 Modifying Factor Corrections

Data from those times where NCM operations were audible were analysed using the “*Evaluator*” software. This analysis showed the noise did not contain any tonal, impulsive or low frequency components as per definitions of “modifying factor corrections” in the NSW Industrial Noise Policy.

### 4.2.3 Noise Management

Section R 4.1 (b) of EPL 12789 states that the noise monitoring report should include “*an outline of any management actions taken within the monitoring period to address any exceedances of the limits detailed in the limit conditions of this licence.*”

The measured noise did not exceed the criterion at any time or location and, therefore, no management actions were required.

# APPENDIX A

## DESCRIPTION OF ACOUSTICAL TERMS

**Table A1**  
**Definition of acoustical terms**

Term	Description
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A- Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L90	"Background" Noise Level - the level exceeded for 90% of the monitoring period.

## Appendix 8

### METEOROLOGICAL DATA

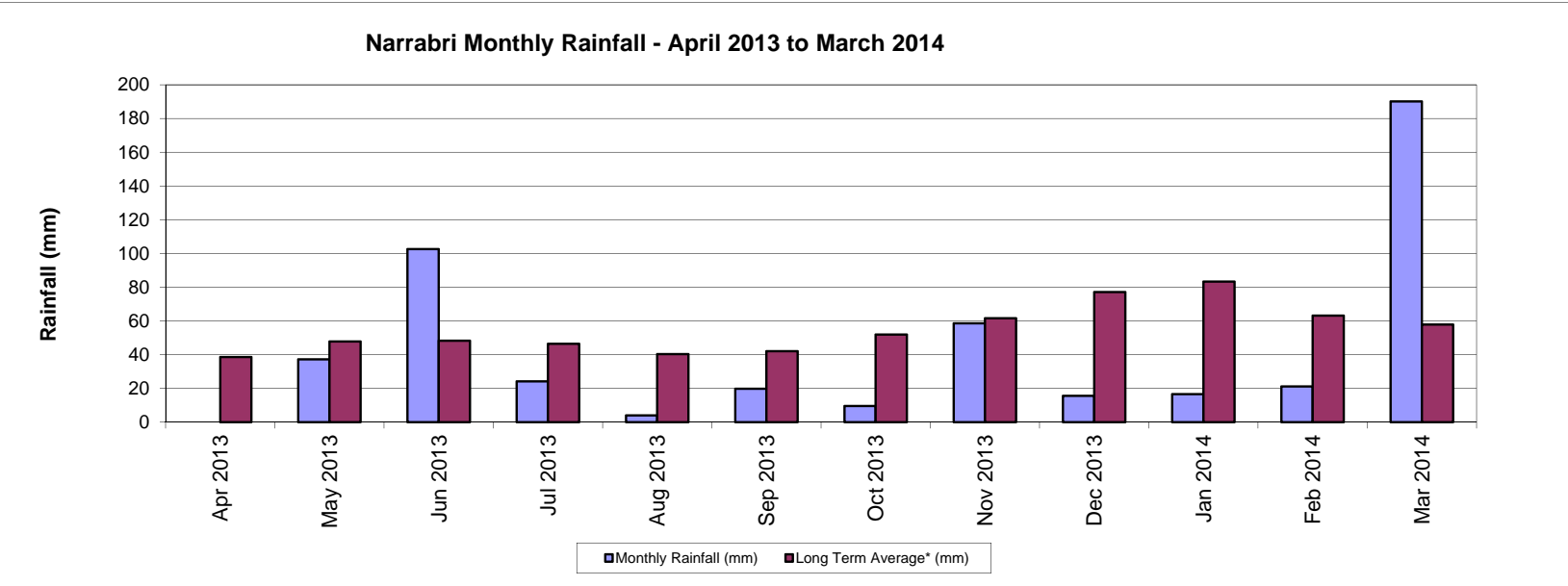
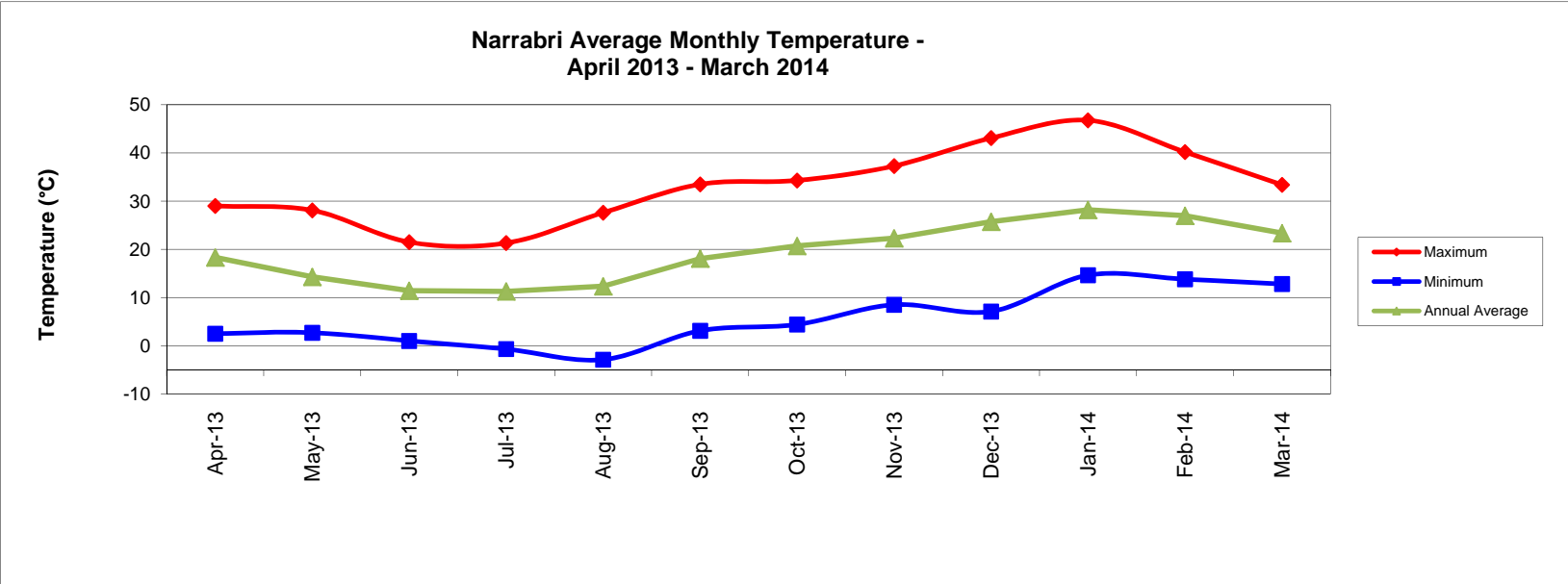
## Narrabri Mine Average Monthly Results

Month	Minimum Air Temp (°C)	Average Air Temp(°C)	Maximum Air Temp (°C)	Minimum Relative Humidity (%)	Average Relative Humidity(%)	Maximum Relative Humidity (%)	Minimum Wind Speed (m/s)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)
Apr 2013	2.5	18.3	29.0	18.9	51.1	94.8	0.0	2.1	8.5
May 2013	2.7	14.3	28.1	22.0	62.1	97.4	0.0	2.2	10.6
Jun 2013	1.0	11.4	21.5	32.6	81.2	99.5	0.0	1.7	11.8
Jul 2013	-0.7	11.3	21.3	31.1	73.7	99.2	0.0	2.0	10.0
Aug 2013	-2.9	12.3	27.6	12.7	58.8	99.9	0.0	1.8	11.6
Sep 2013	3.1	18.1	33.5	7.3	45.7	100.0	0.0	2.2	15.6
Oct 2013	4.4	20.7	34.3	6.6	35.9	95.8	0.0	3.0	13.5
Nov 2013	8.5	22.3	37.3	8.7	43.5	98.4	0.0	3.0	12.9
Dec 2013	7.1	25.7	43.1	10.2	37.6	96.8	0.0	2.6	13.0
Jan 2014	14.6	28.2	46.8	5.8	36.9	89.5	0.0	3.7	12.0
Feb 2014	13.8	27.0	40.2	10.3	45.4	96.8	0.0	2.2	14.0
Mar 2014	12.8	23.4	33.4	19.9	58.8	97.7	0.0	2.3	14.6
<b>Annual Average</b>	<b>5.6</b>	<b>19.4</b>	<b>33.0</b>	<b>16</b>	<b>53</b>	<b>97</b>	<b>0.0</b>	<b>2.4</b>	<b>12.3</b>
<b>Minimum</b>	<b>-2.9</b>	<b>11.3</b>	<b>21.3</b>	<b>6</b>	<b>36</b>	<b>90</b>	<b>0.0</b>	<b>1.7</b>	<b>8.5</b>
<b>Maximum</b>	<b>14.6</b>	<b>28.2</b>	<b>46.8</b>	<b>32.6</b>	<b>81.2</b>	<b>100.0</b>	<b>0.0</b>	<b>3.7</b>	<b>15.6</b>

Month	Monthly Rainfall (mm)	Cumulative Rainfall (mm)	Long Term Average* (mm)	Number of Rain Days**	Long Term Average Rain Days*
Apr 2013	0.0	0.0	38.6	0	2.3
May 2013	37.2	37.2	47.8	5	2.6
Jun 2013	102.6	139.8	48.3	8	3.3
Jul 2013	24.2	164.0	46.5	4	3.1
Aug 2013	4.0	168.0	40.3	1	3.0
Sep 2013	19.8	187.8	42.1	1	3.0
Oct 2013	9.6	197.4	51.9	2	3.5
Nov 2013	58.6	256.0	61.6	3	3.9
Dec 2013	15.6	271.6	77.1	2	4.1
Jan 2014	16.6	288.2	83.3	2	3.7
Feb 2014	21.2	309.4	63.2	5	3.1
Mar 2014	190.2	499.6	57.9	8	2.8
<b>Total</b>	<b>499.6</b>	<b>499.6</b>	<b>658.6</b>	<b>41</b>	<b>38.4</b>

\* Long term average is from Narrabri West Post Office (053030) 1891 - 2014








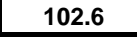


\*\* ≥1mm



Daily Summary							April 2013	Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)
1/04/2013	12.4	18.9	24.2	40.4	52.7	73.2	0.0	0.0	1.8	5.2
2/04/2013	11.9	20.0	26.5	33.3	53.1	80.6	0.0	0.8	2.7	5.6
3/04/2013	13.2	20.6	28.2	23.7	46.1	69.5	0.0	0.0	1.8	4.5
4/04/2013	11.3	19.0	27.8	28.4	53.2	74.0	0.0	0.0	3.4	8.5
5/04/2013	13.5	20.2	27.2	32.3	57.6	83.7	0.0	2.6	4.9	7.5
6/04/2013	13.2	19.8	26.6	29.2	52.5	79.7	0.0	2.8	4.3	7.0
7/04/2013	13.5	18.5	24.3	40.6	59.6	77.4	0.0	0.0	2.5	4.8
8/04/2013	13.0	18.5	26.2	32.9	60.8	81.9	0.0	0.0	2.1	5.6
9/04/2013	12.5	19.1	27.1	21.9	53.0	82.4	0.0	0.2	2.7	5.1
10/04/2013	13.4	19.2	26.3	29.2	55.0	79.0	0.0	0.0	2.7	5.4
11/04/2013	12.9	19.2	26.3	29.9	57.0	85.1	0.0	1.0	3.2	5.0
12/04/2013	13.2	19.6	27.4	18.9	50.1	78.4	0.0	0.0	2.7	4.9
13/04/2013	13.4	20.3	27.6	26.6	50.4	77.8	0.0	0.8	2.7	6.5
14/04/2013	14.3	19.8	27.2	27.4	52.2	72.7	0.0	0.0	2.7	5.2
15/04/2013	11.8	19.4	27.2	28.2	57.5	87.9	0.0	0.0	0.2	3.8
16/04/2013	13.2	20.2	29.0	25.9	49.5	76.7	0.0	0.0	0.7	3.6
17/04/2013	14.5	20.6	28.5	34.0	50.9	77.8	0.0	0.0	1.3	5.2
18/04/2013	12.7	19.6	26.9	25.7	55.3	89.1	0.0	0.0	1.2	4.2
19/04/2013	8.4	18.3	26.8	23.3	51.6	94.8	0.0	0.0	1.3	5.2
20/04/2013	7.6	15.4	22.2	20.0	43.6	69.7	0.0	0.0	2.1	6.3
21/04/2013	2.5	13.6	21.0	38.0	55.7	80.7	0.0	0.0	2.9	7.6
22/04/2013	7.8	15.7	24.0	25.7	57.2	92.0	0.0	0.0	1.8	4.7
23/04/2013	10.6	18.8	26.3	20.7	39.4	58.9	0.0	0.0	2.3	6.7
24/04/2013	6.9	16.6	25.6	21.6	42.8	66.9	0.0	0.0	1.4	4.5
25/04/2013	8.3	16.5	25.1	24.3	46.9	74.1	0.0	0.0	1.3	4.7
26/04/2013	5.2	15.0	23.6	24.1	46.1	78.2	0.0	0.0	1.7	4.5
27/04/2013	8.0	15.3	25.1	21.6	46.2	66.4	0.0	0.0	1.5	6.5
28/04/2013	8.0	16.9	27.2	20.0	42.8	73.3	0.0	0.0	0.9	5.0
29/04/2013	8.2	17.1	27.5	24.5	49.5	71.4	0.0	0.0	1.5	6.4
30/04/2013	8.5	17.7	28.5	19.9	45.3	73.7	0.0	0.0	0.6	3.4
<b>Average</b>	<b>10.8</b>	<b>18.3</b>	<b>26.2</b>	<b>27.1</b>	<b>51.1</b>	<b>77.6</b>		<b>0.3</b>	<b>2.1</b>	<b>5.4</b>
<b>Maximum</b>	<b>14.5</b>	<b>20.6</b>	<b>29.0</b>	<b>40.6</b>	<b>60.8</b>	<b>94.8</b>	<b>0.0</b>	<b>2.8</b>	<b>4.9</b>	<b>8.5</b>
<b>Minimum</b>	<b>2.5</b>	<b>13.6</b>	<b>21.0</b>	<b>18.9</b>	<b>39.4</b>	<b>58.9</b>	<b>0.0</b>	<b>0.0</b>	<b>0.2</b>	<b>3.4</b>
<b>Total</b>							<b>0.0</b>			

Daily Summary							May 2013				Narrabri Mine Weather Station	
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)		
1/05/2013	8.8	18.1	28.1	33	50.5	69.6	0	0	0.3	3.5		
2/05/2013	11.2	19.4	27.7	33.5	54.5	79.2	0	0	1.6	6.9		
3/05/2013	12.6	17.4	23	32.3	48.9	64.7	0	0.7	4.6	7.7		
4/05/2013	8.8	15.8	24.8	32.8	55.3	74.4	0	0	2	6.6		
5/05/2013	8.4	15.9	24.4	22	52.6	90.7	0	0	2.8	5.1		
6/05/2013	8.9	15.3	22.8	41.5	60	80.6	0	1.1	4.1	6.3		
7/05/2013	10.7	16.6	23.8	32.9	54.5	74.1	0	0.7	3.6	5.9		
8/05/2013	10.3	16.4	23.8	28.2	54.2	80.7	0	1.6	3.1	5.2		
9/05/2013	10.2	16.3	23.7	32.2	55.9	81.6	0	0.6	2.1	4		
10/05/2013	10.2	15.9	23.2	24.4	51.6	77.6	0	1.3	3.7	6		
11/05/2013	11	17.2	24.8	28.7	51.4	75.2	0	0.4	3.4	5.1		
12/05/2013	10.8	16.4	24.7	26.8	53.8	79.3	0	0	1.5	4.1		
13/05/2013	12.2	16.2	22.8	44.3	66	96.7	17.4	0	1.3	7.2		
14/05/2013	6	14	19.8	53.6	77.5	96.9	6.4	0	1.4	5.4		
15/05/2013	3.2	10.9	17.6	40.8	70.1	94.8	0	0	1.5	4.3		
16/05/2013	8.6	13.3	19.7	42.9	69.2	91.5	0.4	0	2.4	7.2		
17/05/2013	6.5	11.7	18.2	36	67.3	94.7	0.2	0	2.1	5.8		
18/05/2013	2.8	10.6	17	37.6	62.3	90.8	0	0	1.5	5.1		
19/05/2013	4.5	11.6	16.6	36	54.4	79.4	0	0	2.3	5.4		
20/05/2013	2.7	9.6	18.2	35.9	65.5	88.2	0	0	1	4.1		
21/05/2013	4.6	11.5	18.5	39.2	65.3	87.9	0	0	1.3	4.1		
22/05/2013	9.9	10.8	12	62.4	82.7	96.6	8.8	0	0.6	6.9		
23/05/2013	10.3	12.4	15.4	62.9	85	97.4	2	0	2.3	6.5		
24/05/2013	10.7	13.4	18.2	50.2	71.3	90.9	2	1.5	5.6	10.6		
25/05/2013	7	12.7	19.5	36.9	66.9	90.1	0	0	3.3	7.6		
26/05/2013	4.5	11.7	21.2	27.6	63.4	89.2	0	0	0.8	3.7		
27/05/2013	3.8	11.3	20.3	27.4	62.5	90.9	0	0	2.4	4.9		
28/05/2013	9.1	14.9	21.6	36.8	66.1	87.1	0	0	2.7	5.2		
29/05/2013	10	15.8	23	31	59.2	76.7	0	0	1.4	3.5		
30/05/2013	9	14.3	22.9	36.5	63	80.6	0	0	1.6	5.1		
31/05/2013	10	15.4	23.5	40	64.3	83.3	0	0	0.8	4		
<b>Average</b>	<b>8.3</b>	<b>14.3</b>	<b>21.3</b>	<b>37.0</b>	<b>62.1</b>	<b>84.9</b>		<b>0.3</b>	<b>2.2</b>	<b>5.6</b>		
<b>Maximum</b>	<b>12.6</b>	<b>19.4</b>	<b>28.1</b>	<b>62.9</b>	<b>85.0</b>	<b>97.4</b>	<b>17.4</b>	<b>1.6</b>	<b>5.6</b>	<b>10.6</b>		
<b>Minimum</b>	<b>2.7</b>	<b>9.6</b>	<b>12.0</b>	<b>22.0</b>	<b>48.9</b>	<b>64.7</b>	<b>0.0</b>	<b>0.0</b>	<b>0.3</b>	<b>3.5</b>		
<b>Total</b>							<b>37.2</b>					



Daily Summary				June 2013			Narrabri Mine Weather Station			
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)
1/06/2012	10.3	14.9	19.9	50.3	73.8	91.3	0.6	0	1.5	7.4
2/06/2012	9	14.3	18.3	60.7	83.2	96.6	25.6	2	2.5	8.9
3/06/2012	4.4	9.9	16.3	44.8	74.3	96.8	0	0	2.1	6.3
4/06/2012	2.7	8.8	17.7	41.8	74.8	93.8	0	0	1.9	6.2
5/06/2012	4.8	11.6	19.7	48.4	74.5	93.6	0.2	0	0.5	6.9
6/06/2012	10.8	15.2	19.4	67.1	76.8	85.8	0	0	1.1	6.5
7/06/2012	12.4	16.4	19.9	62.1	75.6	94.1	0	0	2.6	6.6
8/06/2012	10.1	14.5	21.5	47	73.7	94.7	0	1.6	3.3	6.4
9/06/2012	9.3	14.8	20.8	53.8	73.8	89.9	0	0.2	2.4	5
10/06/2012	12	14	16.3	74.6	91.4	97.6	14.8	0	0.4	4.8
11/06/2012	10.2	12.9	17.6	75.2	92.9	98.2	0.4	1.2	2.8	4.1
12/06/2012	10.9	14.6	19.8	72.2	89.7	97.7	20.8	0	1.5	11.8
13/06/2012	10.2	12.8	15.2	74.3	88.1	97.9	7.8	0	3.3	6.7
14/06/2012*	9.8	10.9	13.2	76.0	89.5	95.0	1.0	0	2.5	4.0
15/06/2012*	5.8	11.2	15.4	65.0	84.6	95.0	0.0	0	1.2	3.1
16/06/2012*	3.2	8.2	14.8	65.0	85.6	97.0	0.4	0	0.3	1.8
17/06/2012*	3.3	8.6	15.3	48.0	77.4	96.0	0.2	0	0.4	1.8
18/06/2012*	2.0	7.8	15.0	44.0	76.0	94.0	0.0	0	0.4	1.3
19/06/2012*	1.0	7.6	14.3	60.0	80.1	95.0	0.2	0	1.1	4.9
20/06/2012*	5.4	9.1	13.4	64.0	81.3	92.0	0.0	0	1.0	4.0
21/06/2012*	6.3	10.6	16.9	46.0	75.4	90.0	0.0	0	0.4	2.2
22/06/2012*	4.8	9.3	16.2	51.0	76.4	94.0	0.2	0	0.9	2.2
23/06/2012*	4.6	9.5	16.8	43.0	73.9	92.0	0.0	0	0.9	1.8
24/06/2012	7.2	9.5	15.5	32.6	58.7	73	0	1.3	3	3.8
25/06/2012	3.3	6.8	10.7	73.5	89.3	98.7	1.6	0	1.6	4.3
26/06/2012	1.4	9.6	16.5	62	85.1	99.5	0.2	0	1.1	5.8
27/06/2012	7.9	11.6	14.9	80.3	94.6	99.5	17.4	0	2.2	5.2
28/06/2012	11.3	13.6	18.5	58.1	85.9	99.4	0.4	0.2	2.4	4.2
29/06/2012	9.9	12.2	15.7	75.7	92.8	98.5	10.6	0	2.4	5.9
30/06/2012	9.3	11.9	16.2	66	86.8	98.6	0.2	0	3.4	6.9
<b>Average</b>	<b>7.1</b>	<b>11.4</b>	<b>16.7</b>	<b>59.4</b>	<b>81.2</b>	<b>94.5</b>		<b>0.2</b>	<b>1.7</b>	<b>5.0</b>
<b>Maximum</b>	<b>12.4</b>	<b>16.4</b>	<b>21.5</b>	<b>80.3</b>	<b>94.6</b>	<b>99.5</b>	<b>25.6</b>	<b>2.0</b>	<b>3.4</b>	<b>11.8</b>
<b>Minimum</b>	<b>1.0</b>	<b>6.8</b>	<b>10.7</b>	<b>32.6</b>	<b>58.7</b>	<b>73.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.3</b>	<b>1.3</b>
<b>Total</b>							<b>102.6</b>			

\* - Data from site mobile noise monitor











Daily Summary							July 2013				Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)			
1/07/2012	6.3	11.9	17.8	60.2	79.9	94.5	0	0	3.8	8.5			
2/07/2012	6.1	11.7	18.8	51.4	77.9	96.5	0.2	0.7	3.1	6			
3/07/2012	5.3	10.1	19.3	48.2	81.5	97.2	0	0	1.2	4.6			
4/07/2012	4.4	13.5	20.8	49.3	72.5	98.2	0.2	0	1.6	8			
5/07/2012	7.9	16	20.6	32.3	54.3	79.1	0	1	2.9	7.3			
6/07/2012	2.6	9.3	16.8	31.1	60.7	89	0	0.1	1.9	4.4			
7/07/2012	0.2	6.7	14	35.4	65.9	92.7	0	0	2.2	5.2			
8/07/2012	1.6	7.5	15	39.4	67.2	87.6	0	0.1	2.4	4.9			
9/07/2012	2.8	9	15.2	44.9	66.8	84.8	0	2.6	3.9	5.7			
10/07/2012	8.2	11.2	14.4	58.4	72.3	86.3	0	1.9	4.1	7.9			
11/07/2012	9.2	12.9	19	47.4	72.1	86.1	0	0	2.6	4.3			
12/07/2012	8.9	12.1	18.9	51.6	75.4	89.4	0	0	1.9	4.1			
13/07/2012	5.4	11.9	20.7	37.5	75.1	99.2	0.2	0	1.7	4.7			
14/07/2012	6.6	13.1	19.9	43.3	70.7	95.6	0	0	0.9	4.5			
15/07/2012	8.6	13.6	18.6	58.8	81.7	97.6	3.2	0	0.2	6.6			
16/07/2012	9.7	14.2	20.3	60.2	87.1	98.7	2.4	0	0.2	5.4			
17/07/2012	8.1	13.9	20.8	53.3	83.1	-	0	0	0.1	5			
18/07/2012	9	14.4	20.2	46.9	77.1	96.7	0.2	0	0.6	7			
19/07/2012	13	15.8	19.3	60.2	80.9	98.3	3.6	1.2	4.4	10			
20/07/2012	6.3	13.3	17.4	50.5	81.1	98.7	13.6	1.5	4.2	-			
21/07/2012	3.4	8.7	15.4	39.7	70.8	94.8	0	0.1	1.8	4.8			
22/07/2012	1.6	7.7	15.5	40.2	72.7	98	0	0	1.7	6.1			
23/07/2012	-0.7	7.1	14.9	45.6	73.6	95.8	0	0	2.3	6.6			
24/07/2012	0.4	8.4	15.4	51.4	76.6	-	0	0	2.2	6			
25/07/2012	2.3	9.4	17.8	43.9	75.1	97.1	0.2	0	2.1	5.7			
26/07/2012	2.8	9.4	18.9	37.9	74.7	98.1	0	0	0.3	3.4			
27/07/2012	2	9.1	19.5	31.8	69.9	95.4	0	0	1.7	4.6			
28/07/2012	5.6	11.7	20.3	41	66.2	89.9	0	0	0.5	5			
29/07/2012	5.2	12.6	21.3	35	66.5	93.6	0	0	0.2	4.2			
30/07/2012	4.8	11.5	19.7	47.2	75.7	94.8	0	0	1.3	5.4			
31/07/2012	6.5	11.7	18.3	53.5	78.8	97.7	0.4	1.5	3.8	6.9			
<b>Average</b>	<b>5.3</b>	<b>11.3</b>	<b>18.2</b>	<b>46.0</b>	<b>73.7</b>	<b>93.8</b>		<b>0.3</b>	<b>2.0</b>	<b>5.8</b>			
<b>Maximum</b>	<b>13.0</b>	<b>16.0</b>	<b>21.3</b>	<b>60.2</b>	<b>87.1</b>	<b>99.2</b>	<b>13.6</b>	<b>2.6</b>	<b>4.4</b>	<b>10.0</b>			
<b>Minimum</b>	<b>-0.7</b>	<b>6.7</b>	<b>14.0</b>	<b>31.1</b>	<b>54.3</b>	<b>79.1</b>	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>3.4</b>			
<b>Total</b>							<b>24.2</b>						

Daily Summary						August 2013		Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)
1/08/2012	5.4	11.8	20.5	41.7	75.8	97.5	0	0.2	2.1	6
2/08/2012	7	12.2	19.5	38.5	71.7	95.5	0	0	1.7	6.6
3/08/2012	0.8	9.8	18.5	36.4	66.4	96.6	0	0	1.7	7.5
4/08/2012	1.3	9.9	18.3	42.8	72.5	98.3	0	0	1.7	5.1
5/08/2012	2.6	10.4	18.3	37.8	67.5	94	0	0	0.9	4.8
6/08/2012	1.1	11.2	20.5	31.2	62.3	96.6	0	0	3	7.6
7/08/2012	10.8	16	21.5	26.8	42	81.1	0.2	0.2	3.5	6.9
8/08/2012	1.6	8.8	13.9	43.7	69.8	96.2	0	0	3	7.9
9/08/2012	-0.3	8.5	18.1	37.1	70.6	99.9	0	0	0.2	3.5
10/08/2012	2.9	11.9	22.5	25.7	59.1	92.7	0	0	0.9	4.1
11/08/2012	3.6	12.9	22.6	31.8	60.7	88.3	0	0	0.6	3.6
12/08/2012	8.2	16.4	26.2	12.7	50	77	0	0	1.8	9
13/08/2012	3.3	11	20.9	16.7	58.7	98.5	0	0	1	3.9
14/08/2012	5.3	11.6	21.4	21.4	51	74.6	0	0	1	5
15/08/2012	3.4	10.3	17.3	23.4	51.9	85.6	0	0	3.1	7.6
16/08/2012	0.1	11.3	20.6	19.7	48	89.3	0	0	0.4	-
17/08/2012	8.8	14.8	17.4	36.9	78.2	-	2.2	0	4.2	9
18/08/2012	3.5	11.3	19.9	26	66.5	-	0.4	0	1	4.9
19/08/2012	4.9	12.9	20.9	22.7	49.1	73.2	0	1.8	2.9	8.2
20/08/2012	4.1	8.6	14.4	22.3	49.5	73	0	1.7	3.2	7.5
21/08/2012	-2.9	7.3	16.3	29.6	57.3	93.2	0	0	1.3	6.1
22/08/2012	-1.6	7.8	17	28	59.8	96.1	0	0	2	6.7
23/08/2012	4	11.9	19.6	30.7	48.9	78.6	0	1.5	3.2	6.6
24/08/2012	3.2	12.2	21.7	34.5	65.8	94.9	0	0	0.8	5.2
25/08/2012	5.1	13.2	22.7	30	64.1	98.7	0	0.1	0.7	4.6
26/08/2012	2.5	13.9	23.6	26.2	56.3	97.9	0	0	0.7	3.9
27/08/2012	6.3	15.9	25	22.3	47.9	80.4	0	0.2	1.4	5.4
28/08/2012	7.1	15.7	24.8	25.6	49.7	77	0	0	1.8	4.7
29/08/2012	9.7	17.9	26.5	24.9	45.5	67	0	0.3	1.3	7.2
30/08/2012	9.1	20.1	27.6	20.4	46.9	87.9	0.4	0.1	4.4	11.6
31/08/2012	8.4	15.3	22.4	28.6	58.5	94.2	0.8	0	1.7	6.4
Average	4.2	12.3	20.7	28.9	58.8	88.8		0.2	1.8	6.2
Maximum	10.8	20.1	27.6	43.7	78.2	99.9	2.2	1.8	4.4	11.6
Minimum	-2.9	7.3	13.9	12.7	42.0	67.0	0.0	0.0	0.2	3.5
Total							4.0			

Daily Summary							September 2013	Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)
1/09/2013	10.2	16.9	26	23.5	57.5	95.9	0	0	3.3	5.7
2/09/2013	9.4	16.6	25.7	14.7	45.2	76.9	0	1.4	3.5	5.6
3/09/2013	9.4	17.3	25.3	28.1	50.3	79.9	0	0.1	2.2	15.6
4/09/2013	8.6	16.1	25.5	26.3	53.4	83.2	0	0	1.1	3.2
5/09/2013	7.3	15.4	25.1	30	58	84	0	0	1.4	4.7
6/09/2013	6.3	16.4	26.8	26.2	54.6	88.4	0	0	1	4
7/09/2013	6.9	17.8	29.5	17.9	47	81	0	0	1.6	6.4
8/09/2013	10.3	19.9	30.3	16.3	39	69.9	0	0	1	5.3
9/09/2013	10	19.6	28.5	24.6	45.8	73.5	0	0	1.8	6.7
10/09/2013	16	21.5	28.4	19.5	38.3	59	0	1.5	5.2	10
11/09/2013	9.8	17.9	27.1	11.2	36.5	74.2	0	0.2	1.5	3.7
12/09/2013	6	17	26.1	18.3	34.2	61.6	0	0	1.7	5.8
13/09/2013	10.7	19.1	27	23.3	40.6	64.5	0	0	1.8	5.9
14/09/2013	12.4	20.3	26.4	17.6	44.8	74.6	0	0.3	3.8	9
15/09/2013	8.8	17.5	24.9	23.6	46.1	73.5	0	0	1.9	4.9
16/09/2013	12.6	14.8	17.9	63.6	88.2	100	19.8	0	1	12.9
17/09/2013	11.8	15.5	20.4	52	73	95.1	0	1.9	4.1	9.7
18/09/2013	9.4	17.4	24.4	25.9	57.2	95.9	0	0.9	3.7	8.8
19/09/2013	7	16.3	23.5	25.4	49.2	87.1	0	0	2.2	7
20/09/2013	3.7	13.9	23.4	22.6	54.1	94.9	0	0	2.5	8
21/09/2013	3.1	13.8	22.4	29.5	53.4	90.8	0	0	1	4.4
22/09/2013	4.4	15.3	26.4	14.2	51.1	92.9	0	0	0.3	3.7
23/09/2013	7.6	19.2	29.9	14.6	37.9	76	0	0	2.4	7.9
24/09/2013	15.3	24.4	32.1	11.6	23.7	43.4	0	1.2	3.7	11.2
25/09/2013	13	22.9	33.5	12.6	31.3	53.9	0	0.4	1.1	6.5
26/09/2013	11.1	24.4	33.2	11.8	27.3	45.9	0	1.1	3	9.5
27/09/2013	5.7	16.8	29.2	7.3	33.1	68.4	0	0	2.6	7
28/09/2013	8.9	21.1	30.5	9.1	29.2	61.9	0	0.1	1.8	6.8
29/09/2013	8.5	18.3	27.6	16.4	32	52.6	0	0	1.6	4.3
30/09/2013	6.4	18.8	30.4	16.3	39.3	68.9	0	0	1.3	6.1
<b>Average</b>	<b>9.0</b>	<b>18.1</b>	<b>26.9</b>	<b>21.8</b>	<b>45.7</b>	<b>75.6</b>		<b>0.3</b>	<b>2.2</b>	<b>7.0</b>
<b>Maximum</b>	<b>16.0</b>	<b>24.4</b>	<b>33.5</b>	<b>63.6</b>	<b>88.2</b>	<b>100.0</b>	<b>19.8</b>	<b>1.9</b>	<b>5.2</b>	<b>15.6</b>
<b>Minimum</b>	<b>3.1</b>	<b>13.8</b>	<b>17.9</b>	<b>7.3</b>	<b>23.7</b>	<b>43.4</b>	<b>0.0</b>	<b>0.0</b>	<b>0.3</b>	<b>3.2</b>
<b>Total</b>							<b>19.8</b>			

Daily Summary							October 2013				Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)			
1/10/2013	11.6	21	32.2	20.7	61.1	95.8	7.6	0	5	-			
2/10/2013	12.2	18.3	25.8	34.8	60.7	87.3	0	0.3	1.7	6.6			
3/10/2013	10.6	14.8	19.1	22	42.9	79	0	0.1	3.6	8.4			
4/10/2013	4.5	13.6	22.7	19.2	45.6	73.8	0	0	2.1	6.2			
5/10/2013	4.4	17.5	28.5	12.2	36.6	80.2	0	0	1.2	5.9			
6/10/2013	7.8	20.5	31.9	7.7	28	59.2	0	0	1.8	5.9			
7/10/2013	11.3	20.4	28.2	15.5	25.9	40.9	0	0	1.8	8.6			
8/10/2013	9.2	18.3	26.6	12.8	37.1	80.6	0	0.4	3.6	7.8			
9/10/2013	10.6	19.1	28.9	17.7	41	74.1	0	0.5	0.9	4.2			
10/10/2013	25.6	28.9	33.3	14.4	19	23	0	2.9	5.5	8.8			
11/10/2013	15.2	24.2	30.6	7.2	23	49.8	0	0.5	1.8	9.1			
12/10/2013	11.3	22.7	33.3	21.2	32	50.3	0	0.1	0.8	6.9			
13/10/2013	19.1	25.2	31.2	27.4	43	81.9	2	1.9	6.6	11			
14/10/2013	9	16.4	23	14.1	38.9	75	0	0.9	3.2	6.4			
15/10/2013	5.2	14.9	24.5	15.1	35.3	64	0	0	1.7	6.5			
16/10/2013	6.1	18.1	28.8	14.1	33.1	59	0	0	2.5	7.9			
17/10/2013	13.3	24	32.7	10.6	32.9	49.3	0	1.1	5.6	12.6			
18/10/2013	14.3	20.5	27.1	24.5	33.4	58.1	0	1.2	4.5	7.7			
19/10/2013	10.5	19.8	29	17.2	43	78.7	0	0.4	2.5	5.4			
20/10/2013	14.2	22.4	32.7	19.3	40.4	68.5	0	0	0.7	4.8			
21/10/2013	14.1	24.3	33.3	22	40.9	61.8	0	0	3	8.1			
22/10/2013	15.9	26.1	34.3	21.1	37.3	57.4	0	0	4.2	9.1			
23/10/2013	21.1	27.3	33.4	22.6	30.8	39.6	0	0.2	4.5	9.7			
24/10/2013	13.5	21.1	27.7	11	29.4	47.9	0	0.3	3.9	7.9			
25/10/2013	6.4	17.8	28.5	6.6	23.6	46.7	0	0.5	2.2	6			
26/10/2013	5.3	18.6	28.3	10.4	23.1	51.1	0	0	2.2	6.7			
27/10/2013	9.3	19.8	29.1	9.5	23.1	47.2	0	0.1	1.8	5.3			
28/10/2013	10.6	21.8	31.9	15.7	28.9	44.1	0	0.1	1.9	7.8			
29/10/2013	16.9	23.9	29.9	13	37.4	59	0	1.9	4.8	13.5			
30/10/2013	11.7	20	27.5	21.3	47.6	83.5	0	1.7	4.1	6.5			
31/10/2013	12.7	20.8	29.3	13.1	36.7	64.7	0	0	1.8	4.9			
<b>Average</b>	<b>11.7</b>	<b>20.7</b>	<b>29.1</b>	<b>16.6</b>	<b>35.9</b>	<b>62.3</b>		<b>0.5</b>	<b>3.0</b>	<b>7.5</b>			
<b>Maximum</b>	<b>25.6</b>	<b>28.9</b>	<b>34.3</b>	<b>34.8</b>	<b>61.1</b>	<b>95.8</b>	<b>7.6</b>	<b>2.9</b>	<b>6.6</b>	<b>13.5</b>			
<b>Minimum</b>	<b>4.4</b>	<b>13.6</b>	<b>19.1</b>	<b>6.6</b>	<b>19.0</b>	<b>23.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.7</b>	<b>4.2</b>			
<b>Total</b>							<b>9.6</b>						

Daily Summary							November 2013				Narrabri Mine Weather Station	
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)		
1/11/2013	13.6	21.7	31.2	18.7	33.9	54.9	0	0	0.6	4.9		
2/11/2013	14.7	24.9	33.1	21.3	33.5	51.3	0	0	4.3	9.7		
3/11/2013	20.2	28	36	9.7	22.4	38.8	0	2.1	3.1	8.3		
4/11/2013	12.9	20.4	26.3	17.2	29.1	44.9	0	3.4	5.6	9.7		
5/11/2013	10.2	19	27.5	16	34.8	52.5	0	1.3	5	8.4		
6/11/2013	12.8	21.4	30.3	21.3	39.8	63.4	0	0.2	0.9	5.7		
7/11/2013	13.2	23.8	32.6	17.1	34.5	57.1	0	0	2.6	7.8		
8/11/2013	14.5	26.4	35.1	15.2	28.2	51.6	0	0	3.6	8.6		
9/11/2013	20.8	27.1	34.4	22.2	35.6	59.5	0	0	2.5	9		
10/11/2013	13.6	22.2	30.6	18.3	38	67.4	0.4	0.4	2.4	8.1		
11/11/2013	15.1	20.4	30.8	27.4	66.5	98.2	13.6	0	3.3	12.4		
12/11/2013	15.1	21.7	30.1	14	55.2	94.8	0.6	0.1	2.7	9.9		
13/11/2013	8.5	21.7	31	9.5	30.3	75.7	0	0	2	8.7		
14/11/2013	9.7	22.5	31.6	9.4	23.4	54.7	0	0.3	1.4	6.9		
15/11/2013	11.5	22.6	31.3	8.7	21.1	50.4	0	0.6	1.5	5.9		
16/11/2013	13.9	19.3	26.5	19.2	55.8	84.1	0.2	1.2	4.5	-		
17/11/2013	12.6	18.4	25.9	22.8	54.4	81.8	0	0.8	4.9	10.1		
18/11/2013	10.5	15.5	22.4	40.3	71.2	96.4	0.2	0	3.9	8.5		
19/11/2013	10.3	19.7	28.1	30.2	63.1	98.1	0.2	0.3	3.2	7.1		
20/11/2013	17.5	25.2	33.1	15.6	37.5	67.2	0	0.9	2.8	6.3		
21/11/2013	18.7	27.6	37.3	11.6	33.7	64.8	0.2	0.3	0.1	7.9		
22/11/2013	20.4	24.9	28.6	39.1	58.6	89.7	0.8	1.5	5.2	12		
23/11/2013	16.7	20.9	27.4	46	78.7	98.4	27.4	0.2	1.6	10		
24/11/2013	10.7	21.5	29.3	17	41.4	88.3	0	0	1.7	6.6		
25/11/2013	13.3	22.5	31.6	13.6	37.7	63.7	0	0.1	2.6	8.7		
26/11/2013	13.1	21.2	29.4	14.1	41.1	67.1	0	2	5.8	8.9		
27/11/2013	12.5	22.1	31.1	11.6	39.7	74.2	0	0	2.3	6.7		
28/11/2013	13.9	25.5	35.1	15.7	31.1	50.8	0	0	2.3	7.3		
29/11/2013	17.4	20.8	29.2	26.7	79	95.3	15	0	1.9	12.9		
30/11/2013	13.5	20.4	27.7	25.7	56.6	89.2	0	2.6	5.2	8.5		
<b>Average</b>	<b>14.0</b>	<b>22.3</b>	<b>30.5</b>	<b>19.8</b>	<b>43.5</b>	<b>70.8</b>		<b>0.6</b>	<b>3.0</b>	<b>8.5</b>		
<b>Maximum</b>	<b>20.8</b>	<b>28.0</b>	<b>37.3</b>	<b>46.0</b>	<b>79.0</b>	<b>98.4</b>	<b>27.4</b>	<b>3.4</b>	<b>5.8</b>	<b>12.9</b>		
<b>Minimum</b>	<b>8.5</b>	<b>15.5</b>	<b>22.4</b>	<b>8.7</b>	<b>21.1</b>	<b>38.8</b>	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>4.9</b>		
<b>Total</b>							<b>58.6</b>					

Daily Summary							December 2013		Narrabri Mine Weather Station	
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)
1/12/2013	12.9	20.8	28.2	21.2	47.2	77.6	0	0.8	4	7.3
2/12/2013	14	22.9	30.9	16.9	41.5	76.2	0	0.3	2.7	5.8
3/12/2013	15.7	24.3	34	10.3	33.3	60.8	0	0	1	4.6
4/12/2013	14.2	25.5	34.3	17.5	37.2	70.8	0	0	3.4	10
5/12/2013	11.9	20.2	25.6	23.1	58.7	96.8	11.2	0.1	4.4	10.8
6/12/2013	8.2	17.1	25.2	15.2	35.9	72.6	0	0.2	2.6	7.3
7/12/2013	7.1	19.5	29.2	13.1	34.1	75.4	0	0	0.7	13
8/12/2013	12.6	23.5	33	16.9	34.9	60.9	0	0	1.5	6.9
9/12/2013	16.8	26.9	35.1	21	40.4	70.7	0.4	0	4.5	9.5
10/12/2013	21.9	27.2	33.3	27.4	48.3	77.4	0.4	0.2	2.2	9.8
11/12/2013	15.7	24.8	33.3	10.3	24.5	44.9	0	0.8	2.4	7
12/12/2013	15.7	25.1	32.4	16.2	26	47	0	0.2	0.7	5
13/12/2013	16.8	26.9	34.6	13	28.6	71.3	0	0.4	0.6	4.7
14/12/2013	14.2	27.6	36.5	10.2	25.9	50.9	0	0	1.6	7
15/12/2013	17.7	27.5	36.7	15.8	42.1	74.5	0	0.2	2.1	7
16/12/2013	19.7	24.9	33.3	23.4	50.9	72	2.8	0.2	3.2	9.5
17/12/2013	16.3	25	32.6	17.8	46.9	86.8	0	0	2.2	6.1
18/12/2013	18.4	26.8	34.5	15.4	35.3	63.4	0	0.1	2.1	7.2
19/12/2013	18.1	27.2	35.5	13.2	32.8	61	0	0.1	1.3	7.2
20/12/2013	21.4	28.7	37.1	18	32.1	49.4	0	0.4	2.9	7.6
21/12/2013	24.4	31.2	39.3	16.3	28	39.7	0	0.3	2.9	8.2
22/12/2013	23.8	31.7	38.6	16.4	28.7	47.6	0	0.2	3.9	8.3
23/12/2013	25.2	32.1	36.5	20.2	30.4	49.3	0	0.1	6	10.5
24/12/2013	23.5	29.2	33.3	27	39.2	67.2	0	0.4	2.4	6.5
25/12/2013	21.7	26.6	31.4	35.8	57.1	76.7	0	1.1	3.4	5.9
26/12/2013*	20	-	35.3	-	-	-	0.8	-	-	-
27/12/2013*	19.1	-	37.4	-	-	-	0	-	-	-
28/12/2013*	21	-	38.2	-	-	-	0	-	-	-
29/12/2013*	19.7	-	43.1	-	-	-	0	-	-	-
30/12/2013*	17.7	-	38.2	-	-	-	0	-	-	-
31/12/2013*	16.1	-	37.2	-	-	-	0	-	-	-
<b>Average</b>	<b>17.5</b>	<b>25.7</b>	<b>34.3</b>	<b>18.1</b>	<b>37.6</b>	<b>65.6</b>		<b>0.2</b>	<b>2.6</b>	<b>7.7</b>
<b>Maximum</b>	<b>25.2</b>	<b>32.1</b>	<b>43.1</b>	<b>35.8</b>	<b>58.7</b>	<b>96.8</b>	<b>11.2</b>	<b>1.1</b>	<b>6.0</b>	<b>13.0</b>
<b>Minimum</b>	<b>7.1</b>	<b>17.1</b>	<b>25.2</b>	<b>10.2</b>	<b>24.5</b>	<b>39.7</b>	<b>0.0</b>	<b>0.0</b>	<b>0.6</b>	<b>4.6</b>
<b>Total</b>							<b>15.6</b>			

\* - Temperature and rainfall data taken from the Bureau of Meteorology Station at the Narrabri Airport

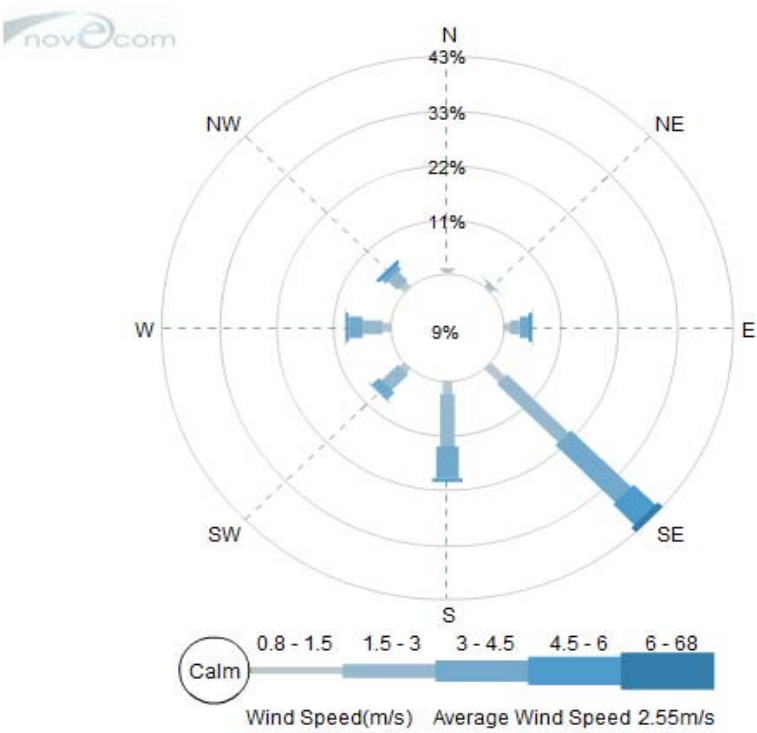
Daily Summary							January 2014				Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)			
1/01/2014	20.3	29.1	37.9	10.5	35.0	66.3	0	0.0	3.8	6.2			
2/01/2014	27.0	32.0	40.1	19.9	34.2	49.3	0	0.3	5.1	9.1			
3/01/2014	24.9	36.7	46.8	6.9	22.1	39.8	0	0.1	6.4	12.0			
4/01/2014	24.0	30.9	35.9	7.6	22.3	42.2	0	2.4	4.1	6.6			
5/01/2014	14.6	27.0	36.7	5.8	19.8	42.0	0	0.6	3.5	6.4			
6/01/2014	16.8	27.3	35.4	7.4	15.7	29.3	0	0.3	3.8	6.8			
7/01/2014	16.0	25.6	35.1	15.9	30.6	54.3	0	0.1	4.0	9.8			
8/01/2014	18.3	25.7	33.5	24.3	45.1	62.9	0	0.7	4.5	7.7			
9/01/2014	20.2	23.7	28.1	35.7	49.4	62.7	0	0.8	4.2	9.1			
10/01/2014	18.3	24.2	31.6	27.5	47.3	62.6	0	0.8	2.6	5.7			
11/01/2014	18.2	26.5	34.1	24.3	45.1	68.1	0	0.4	2.1	4.1			
12/01/2014	19.4	29.7	37.6	16.5	33.6	61.1	0	0.5	3.0	6.1			
13/01/2014	21.6	29.3	35.8	17.5	37.7	67.0	0	0.5	3.7	6.9			
14/01/2014	21.3	29.1	36.5	16.1	36.7	62.9	0	0.8	3.3	5.3			
15/01/2014	22.2	30.2	36.9	16.7	33.0	54.7	0	0.6	3.1	5.7			
16/01/2014	22.8	31.1	38.2	14.5	33.4	58.7	0	0.4	3.2	7.3			
17/01/2014	23.3	30.8	37.9	15.3	31.5	51.5	0	0.1	2.7	4.5			
18/01/2014	20.7	30.0	39.0	15.3	29.9	48.2	0	0.2	2.0	3.7			
19/01/2014	23.7	29.2	38.8	18.4	35.1	63.7	3.4	0.1	4.4	10.7			
20/01/2014	21.8	31.9	40.8	14.5	34.8	66.1	0.2	0.3	3.1	6.1			
21/01/2014	21.9	32.1	41.5	7.6	35.9	74.1	0	0.4	4.4	7.3			
22/01/2014	23.1	28.2	35.9	17.4	44.2	74.5	0	2.0	5.7	10.6			
23/01/2014	19.0	23.5	28.9	40.1	65.3	89.5	13.0	0.8	3.3	6.8			
24/01/2014	18.4	24.2	28.6	49.2	62.5	83.8	0	0.8	3.3	7.0			
25/01/2014	18.6	26.1	33.6	16.6	44.9	79.5	0	1.6	4.8	8.8			
26/01/2014	17.8	25.0	32.4	20.3	41.4	60.5	0	2.1	6.0	9.5			
27/01/2014	16.6	25.5	33.0	20.0	37.2	59.0	0	0.8	3.9	7.0			
28/01/2014	16.8	26.4	34.3	19.0	38.9	70.9	0	0.4	2.6	4.9			
29/01/2014	18.6	27.5	35.9	14.0	34.6	58.2	0	0.5	3.1	6.1			
30/01/2014	18.4	27.9	35.9	13.2	33.4	62.4	0	0.4	2.9	5.2			
31/01/2014	18.1	27.6	36.0	14.1	34.5	60.3	0	0.6	3.0	7.7			
<b>Average</b>	<b>20.1</b>	<b>28.2</b>	<b>35.9</b>	<b>18.1</b>	<b>36.9</b>	<b>60.8</b>		<b>0.7</b>	<b>3.7</b>	<b>7.1</b>			
<b>Maximum</b>	<b>27.0</b>	<b>36.7</b>	<b>46.8</b>	<b>49.2</b>	<b>65.3</b>	<b>89.5</b>	<b>13.0</b>	<b>2.4</b>	<b>6.4</b>	<b>12.0</b>			
<b>Minimum</b>	<b>14.6</b>	<b>23.5</b>	<b>28.1</b>	<b>5.8</b>	<b>15.7</b>	<b>29.3</b>	<b>0.0</b>	<b>0.0</b>	<b>2.0</b>	<b>3.7</b>			
<b>Total</b>							<b>16.6</b>						



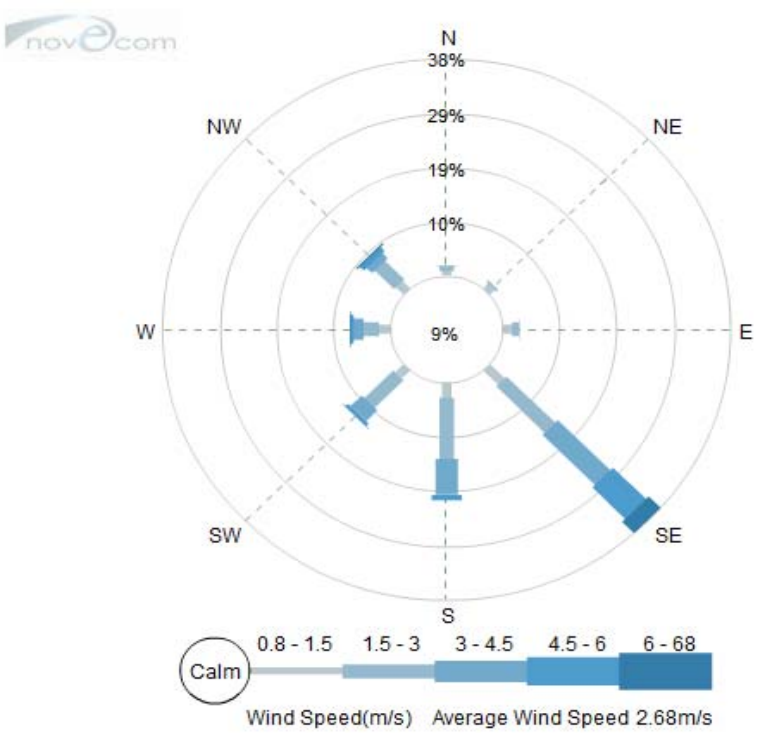
Daily Summary							February 2014	Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)
1/02/2014	18.3	29.3	39.8	11.1	34.4	66.4	0	0.1	1.3	6.3
2/02/2014	21.9	30.3	37.9	14.7	29.1	49.8	0	0.4	0.7	7.8
3/02/2014	20.3	28.1	35.5	16	34.3	59.7	0	0.2	1.8	5.3
4/02/2014	21.7	27.9	35.5	24.1	39.1	64.1	0	0.2	1.6	12.2
5/02/2014	17.4	23.9	31.4	25.6	47.1	68.9	0	5.7	7.8	11.4
6/02/2014	17.1	23.7	31.5	20.1	40.3	58.8	0	0	3.9	7.6
7/02/2014	17.8	26.3	34.7	12.9	35.6	61.4	0	0.2	2	5.3
8/02/2014	21.1	28.7	37	11.4	28.7	54.5	0	0.1	0.2	5.6
9/02/2014	20.8	30	38.5	16.5	32.5	55.9	0	0.6	2.5	6.1
10/02/2014	21	31.7	40.2	10.3	29.6	48.4	0	0	1	6.9
11/02/2014	23.3	30.3	38.9	15.5	34.3	60.8	0	0	1	10
12/02/2014	22.8	30.3	39.8	18.2	36.4	62	1	0.3	0.9	11.2
13/02/2014	23	30.6	38	21.8	40.1	65.8	0	0	2.2	8.7
14/02/2014	23.1	28.4	35.6	28.7	53.8	78.4	0.2	0.2	0.9	8.4
15/02/2014	24.8	30.2	36.8	25.9	45.5	68.8	0	0	1.7	10.8
16/02/2014	19.4	27.2	36.4	28.6	55.6	93.1	7	0.2	1.1	14
17/02/2014	18.7	23.4	29.9	46.4	69.8	91.6	0.2	3.1	5	7.1
18/02/2014	20	26.3	35.4	32.1	62.3	88.7	0	0.9	0.6	11.1
19/02/2014	21.1	24.3	29.5	58.6	82.4	96.8	5.6	0	2.9	12.3
20/02/2014	19.7	24.5	29.2	32.4	63.4	92.9	1.2	0.1	1.5	6.6
21/02/2014	13.8	23.1	32.2	14.9	37.5	73	0	0.1	2.3	4.8
22/02/2014	18.8	25.4	32.6	30.3	48.1	71.1	0	0.4	3.6	7.3
23/02/2014	17.6	24.5	31	23.8	46.3	73.3	0	2.7	5.2	8
24/02/2014	17	24.9	32	22	43.2	71.8	0	0.5	2.5	5.2
25/02/2014	18.9	25.8	32.5	25.2	44.2	68.2	0	0.2	0.8	4.7
26/02/2014	20.7	25.8	31.2	31	44.5	57.4	0	0	4.2	8.1
27/02/2014	20.3	27.4	35	23.8	45.3	67.3	0	0	0.3	6.6
28/02/2014	19.4	23.2	27.7	42.9	68.7	92.3	6	0	2.4	6.4
Average	20.0	27.0	34.5	24.5	45.4	70.0		0.6	2.2	8.1
Maximum	24.8	31.7	40.2	58.6	82.4	96.8	7.0	5.7	7.8	14.0
Minimum	13.8	23.1	27.7	10.3	28.7	48.4	0.0	0.0	0.2	4.7
Total							21.2			

Daily Summary						March 2014		Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)
1/03/2014	19.1	22	28.5	43.2	76.5	93.2	0	0.5	3.7	7.1
2/03/2014	17.6	23	29.6	44.8	68.8	89.8	1.6	1.3	5.2	8.9
3/03/2014	18.1	24.6	31.7	30.6	57.7	82.8	0	0.2	4.2	7.7
4/03/2014	18.1	25	30.8	28.6	47.9	73.8	0	0.6	2.6	5.2
5/03/2014	19	25	31.4	32.2	50.3	78.5	0.8	0	0.9	6
6/03/2014	19.1	25.9	33.1	24.9	52.2	82	0	0.2	1.5	9
7/03/2014	19.6	25	32.8	28.9	56.6	77.8	0	0	1.9	6.7
8/03/2014	18.3	25.1	31.3	26.6	53.4	84.8	0.6	1.5	3.2	6.3
9/03/2014	18	25.4	31.2	24.7	42	67.7	0	0.3	2.5	6.6
10/03/2014	17.8	25.6	32	20.5	40.6	66.1	0	0.7	3.1	7.6
11/03/2014	18.3	25.3	31.8	21.3	40.6	67.3	0	0.8	2.8	5.1
12/03/2014	16.4	25.1	32.2	21.5	39.3	64.4	0.2	0.3	1.7	6
13/03/2014	19.9	26.4	33.1	22.9	40.2	58.9	0	0.2	2.2	8.2
14/03/2014	20	23.2	27.1	39.5	53.3	76.3	0.6	0	1.1	6.1
15/03/2014	14.6	24.2	32.6	24.5	50.9	85.7	0	0	1.8	6.9
16/03/2014	18.7	25.2	31.6	30.7	49.7	82.9	7.2	0.9	3.8	14.6
17/03/2014	12.8	21.5	30.4	19.9	45	78.7	0	0.3	1.5	4.9
18/03/2014	14	23.5	33.4	22.6	40.8	64.5	0	0.6	2.3	5.2
19/03/2014	19.3	25.2	33.4	30	47.2	58.9	0	0.9	3.4	9.5
20/03/2014	19.3	23.8	27.1	37.9	49	62.3	0	1	3.5	6.5
21/03/2014	16.4	21.1	26.8	47	72.9	96.1	22	0.2	2	5.2
22/03/2014	17.5	23.4	30.9	32.8	63.3	85.1	0	0	1	4.5
23/03/2014	15.9	22.8	31.8	29.2	62.7	87.2	4.6	0	0.7	9.7
24/03/2014	15.1	18.8	24.8	58	84.2	96.6	53.6	0.2	1.9	5.9
25/03/2014	16.2	19.7	25.2	53	80.9	94.5	5.4	0	1.7	5.2
26/03/2014	16.8	18.5	19.8	88.9	93.3	95.8	34.8	1.7	3.2	6.1
27/03/2014	-	-	-	-	-	-	57.6	-	-	-
28/03/2014	17.4	20.2	22.1	79.2	87.4	94.7	0.8	0	1.3	3.1
29/03/2014	14.9	20.4	27.5	52.4	81.7	97.7	0.4	0	0.8	3.6
30/03/2014	17.5	23	29	37.9	68.1	93.2	0	0.5	2.5	4.8
31/03/2014	17.8	23.1	29.4	43.4	67.9	88.8	0	0.1	1.6	4.7
Average	17.5	23.4	29.7	36.6	58.8	80.9		0.4	2.3	6.6
Maximum	20.0	26.4	33.4	88.9	93.3	97.7	57.6	1.7	5.2	14.6
Minimum	12.8	18.5	19.8	19.9	39.3	58.9	0.0	0.0	0.7	3.1
Total							190.2			

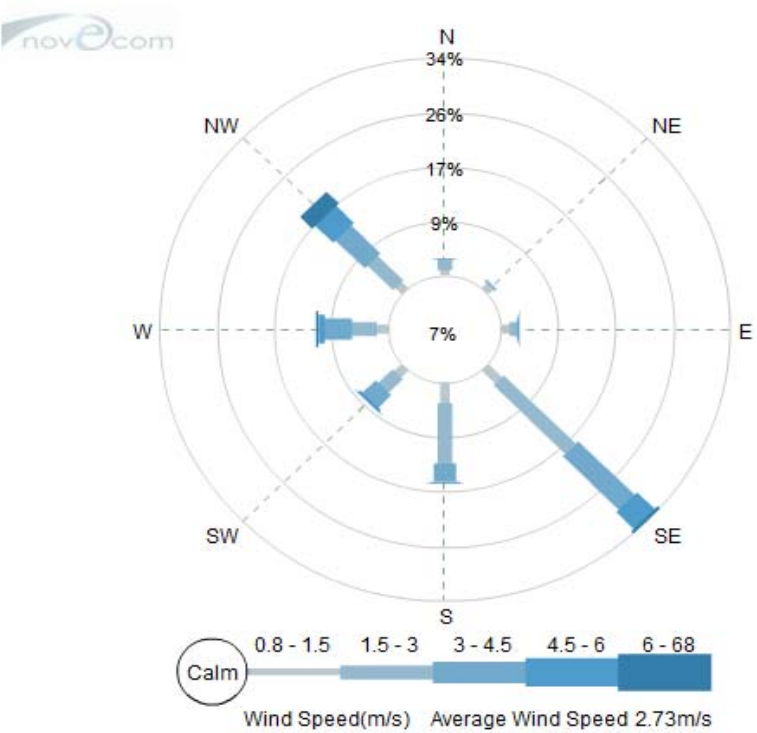
Narrabri Mine Weather Station  
April 2013 Wind Rose



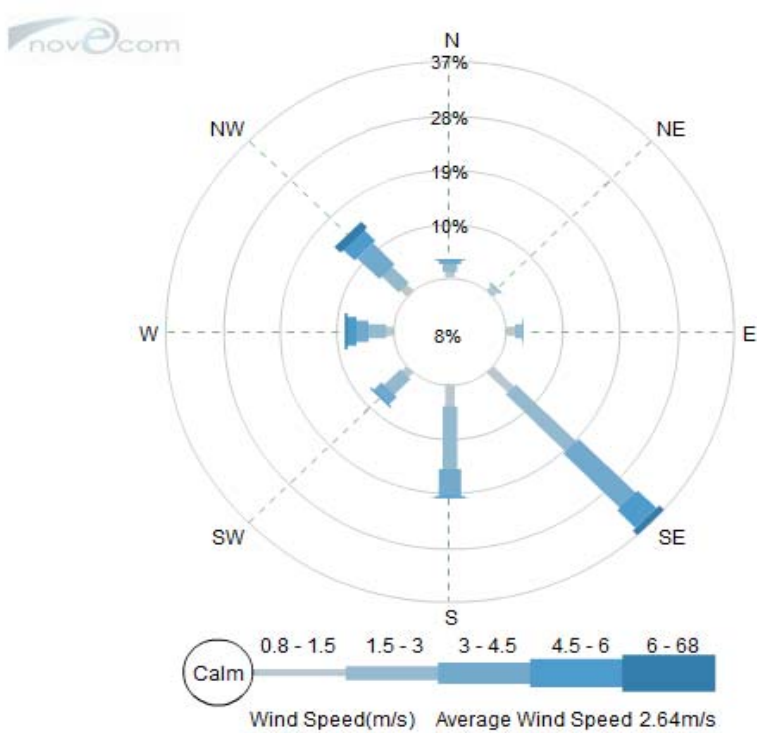
Narrabri Mine Weather Station  
May 2013 Wind Rose



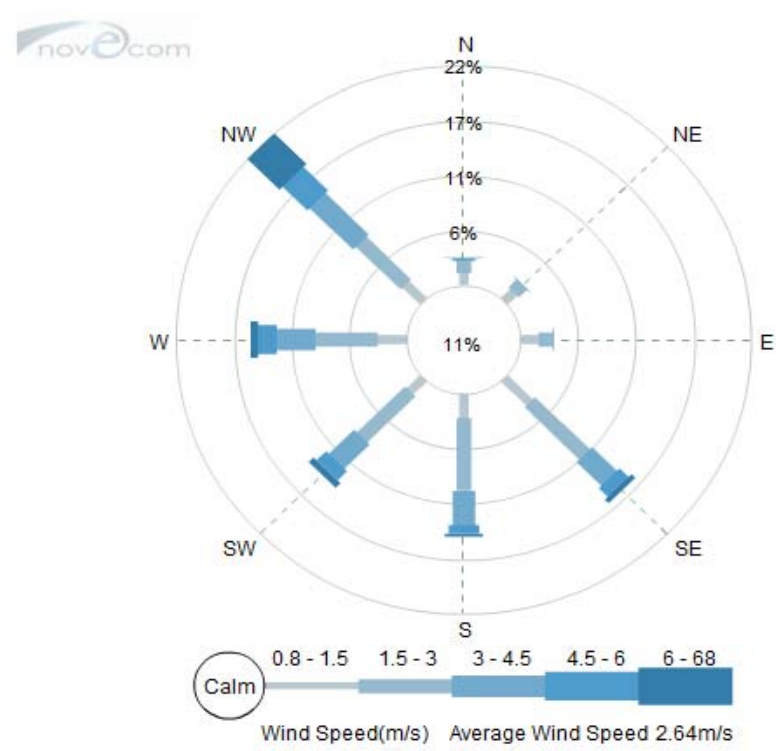
Narrabri Mine Weather Station  
June 2013 Wind Rose



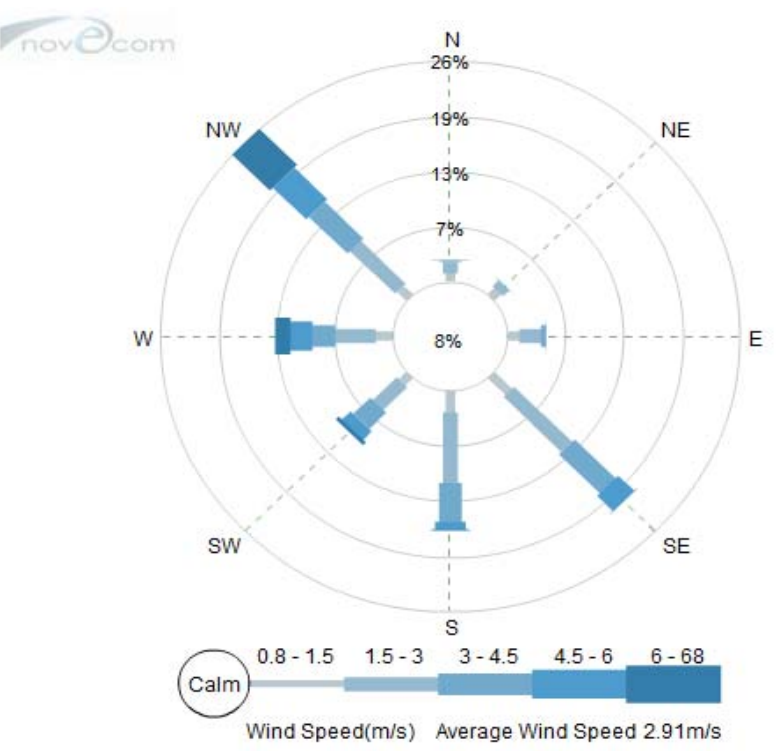
Narrabri Mine Weather Station  
July 2013 Wind Rose



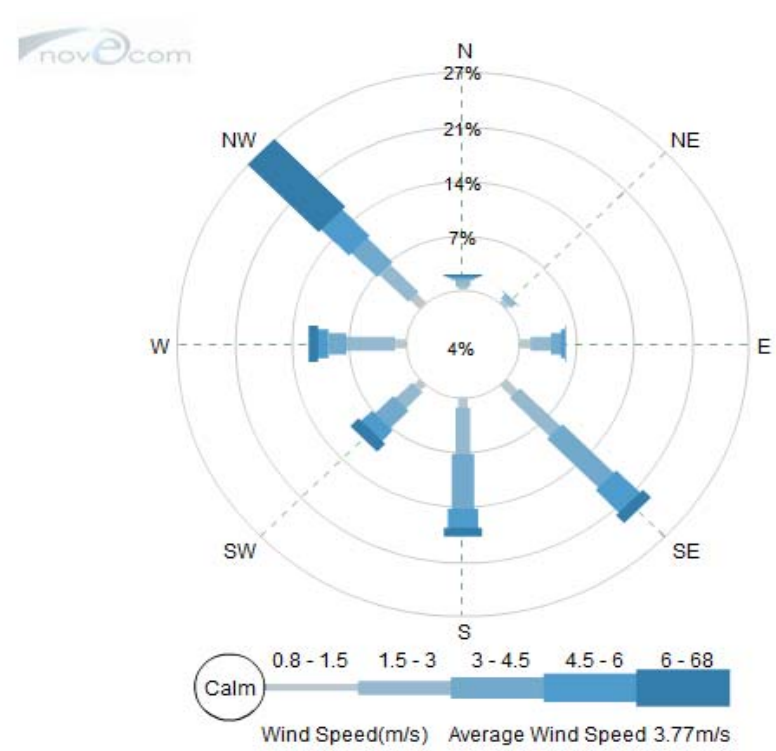
Narrabri Mine Weather Station  
August 2013 Wind Rose



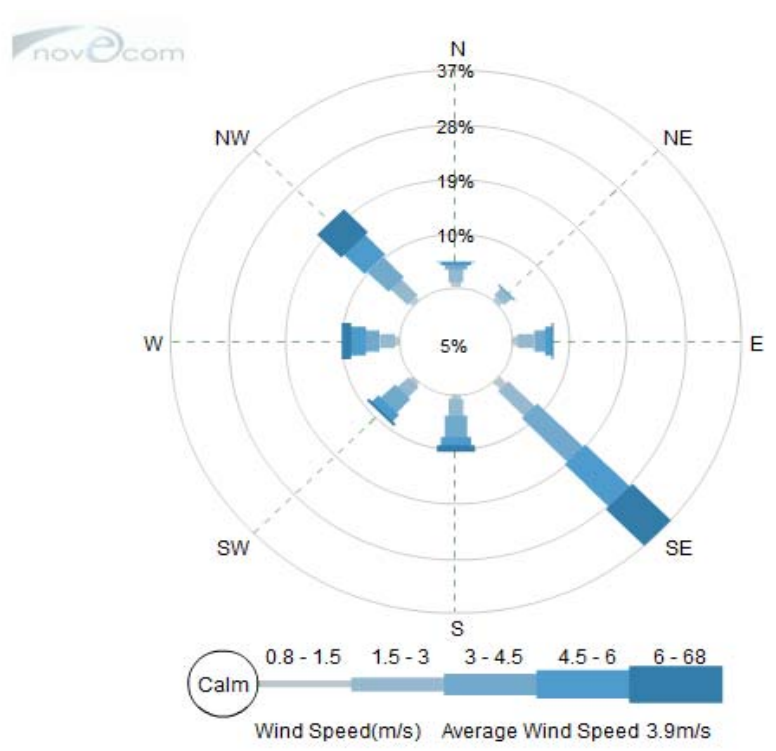
Narrabri Mine Weather Station  
September 2013 Wind Rose



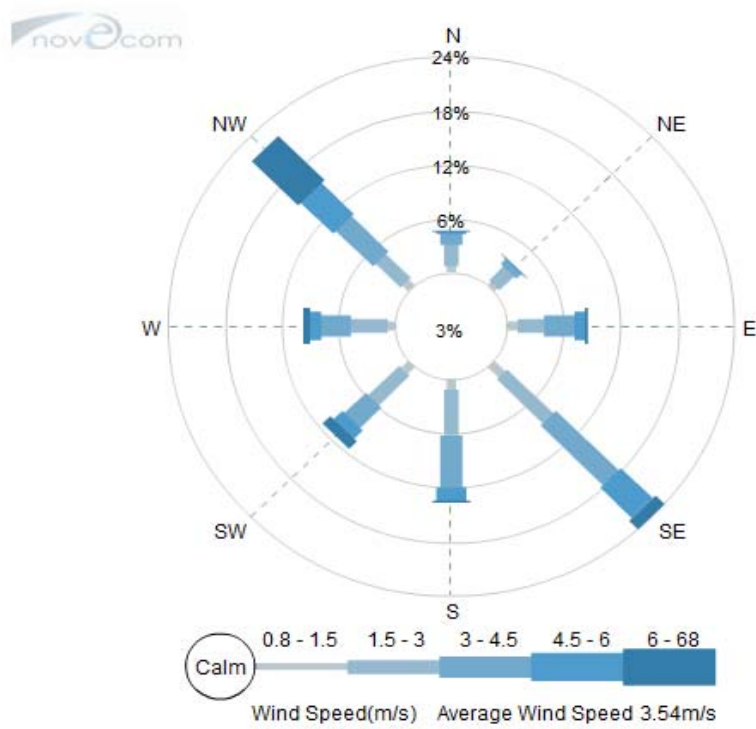
Narrabri Mine Weather Station  
October 2013 Wind Rose



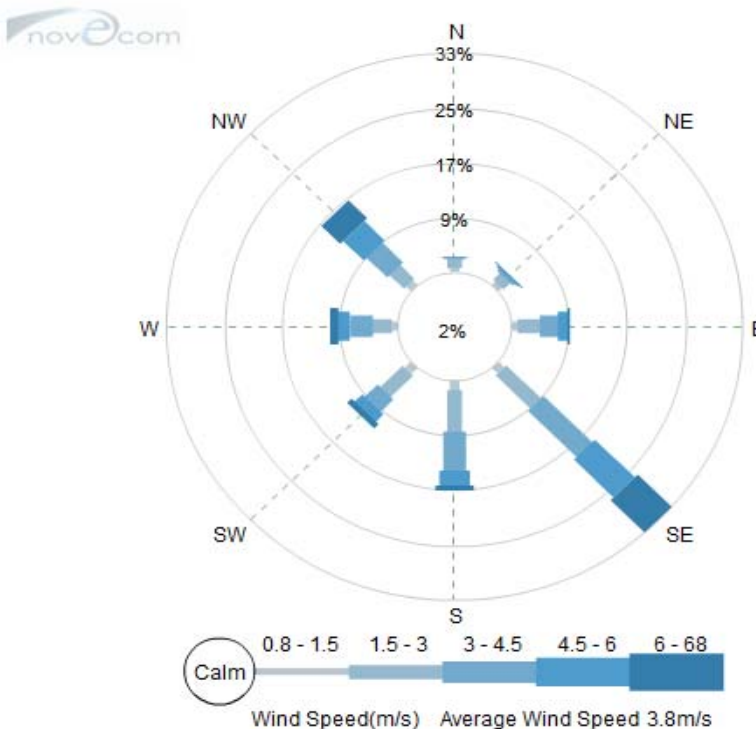
Narrabri Mine Weather Station  
November 2013 Wind Rose



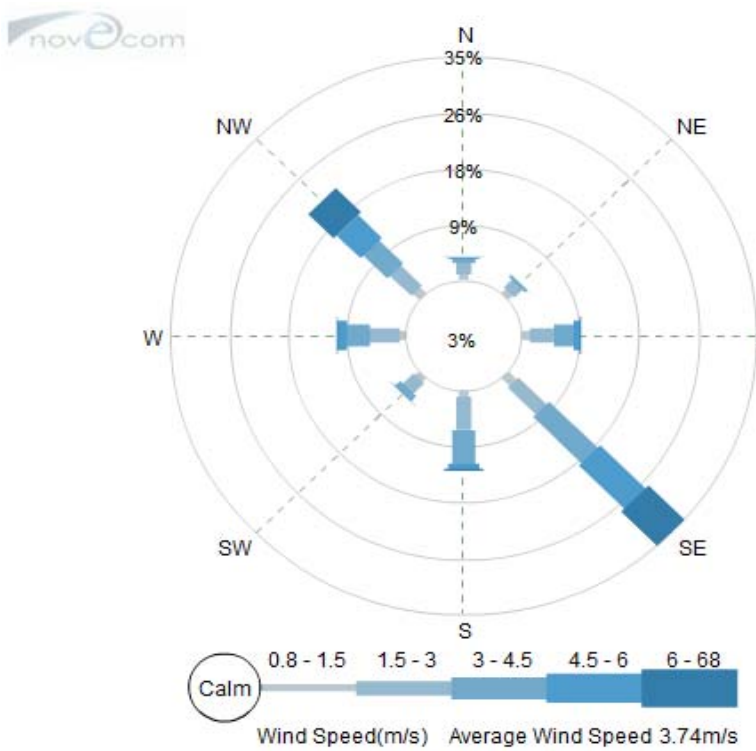
Narrabri Mine Weather Station  
December 2013 Wind Rose



Narrabri Mine Weather Station  
January 2014 Wind Rose



Narrabri Mine Weather Station  
February 2014 Wind Rose



Narrabri Mine Weather Station  
March 2014 Wind Rose

