



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 2014 – 31 March 2015



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 Date 31.12.2017

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AEMR/Annual Review Completion Date 31.03.2015

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

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ACRONYMS USED THROUGHOUT THIS DOCUMENT

ACHMP	-	Aboriginal Cultural Heritage Management Plan
AQMP	-	Air Quality Monitoring Program
CHPP	-	Coal Handling and Preparation Plant
DP&E	-	Department of Planning and Environment
DRE	-	Division of Resources and Energy
DoE	-	Commonwealth Department of 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
WCL	-	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 seventh 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 2014 to 31 March 2015 (the reporting period), where relevant this AEMR/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 2015 to 31 March 2016, 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).

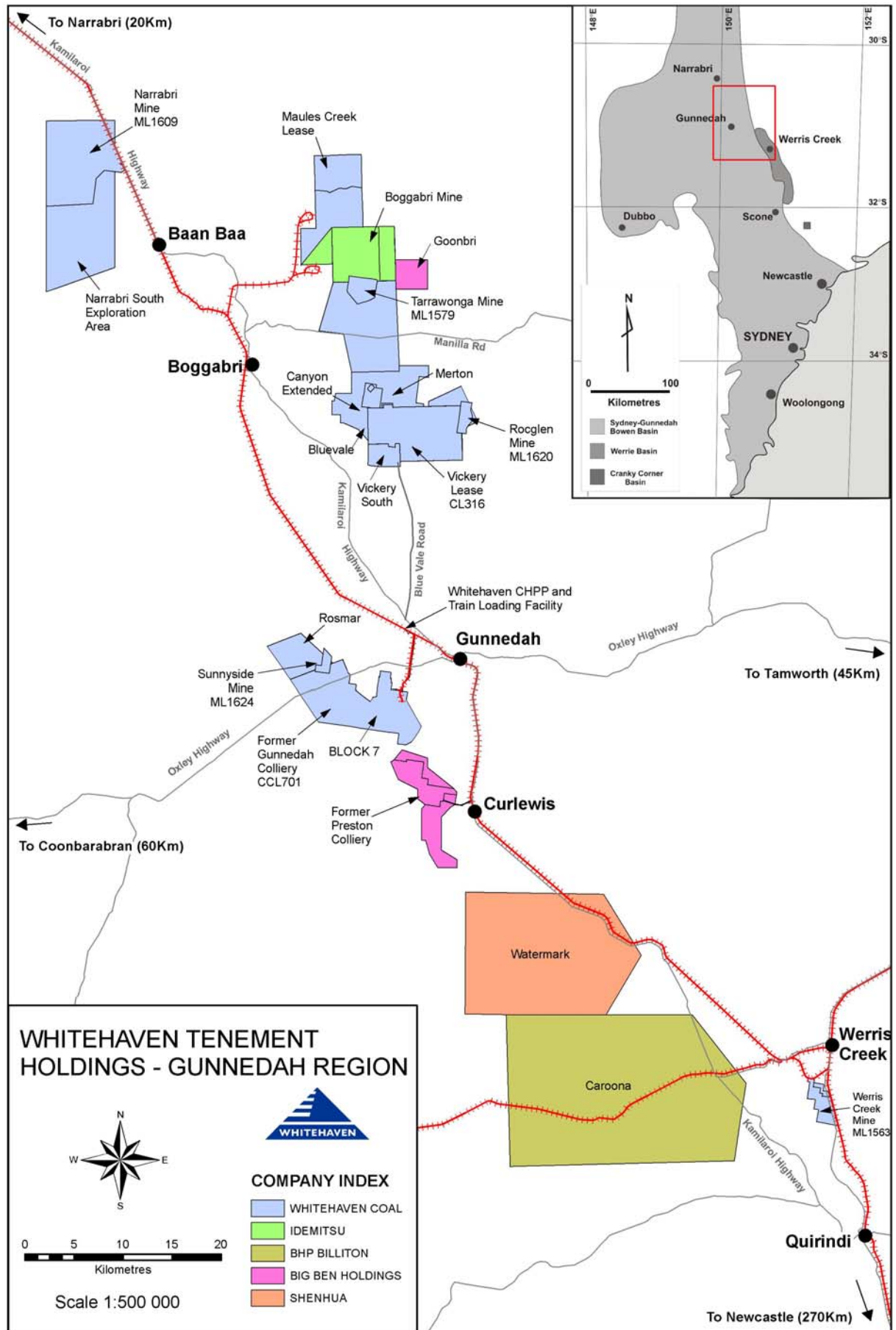


Figure 1: Project Locality

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 (WCL), a publicly listed Company (ASX:WHC) with several mining interests in the Gunnedah-Narrabri region of NSW.

WCL owns and operates a number of open cut coal projects in the Gunnedah basin. The WCL 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 (currently in care and maintenance), the Tarrawonga Open Cut Coal Mine (a joint venture between WCL (70%) and Idemitsu Australian Resources Pty Ltd (30%)) and Werris Creek Open Cut Coal Mine (through subsidiary company Werris Creek Coal Pty Ltd).

WCL has recently received approval to develop the Vickery Project. The Vickery Project is 100% owned by WCL. WCL 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 WCL (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 26th 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 26th 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. The Stage 1 approval was subsequently surrendered on 2 August 2011.

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 – Mining Engineering 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, gas drainage, 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 environmental assistance as and when required. Specialist environmental 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;
- URS Australia Pty Ltd;
- Heritage Computing Pty Ltd; 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 relevant legislation.

1.1.6 Corporate Environmental Policy

WCL 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 90CA802130 / WAL20152 90BL254679 / WA822539 90WA822539 90BL254481 - 90BL254487 90BL254660 - 90BL254663 90BL254658	Various	Various	GAB – Water supply (248ML) GW – Water supply (150ML) GW – Water supply (67ML) River – High Security (20ML) River (48ML) River (10ML) River (600ML) Mining (Low Security) (818ML) Mine De-gassing/De-Watering Groundwater Monitoring Purposes

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
	90BL254659 90BL254701 90BL254958 - 90BL254967 90BL255167 - 90BL255173 90BL255216 - 90BL255218 90BL255769 - 90BL255772 90BL256060 - 90BL256064			
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"> Coal Resource Recovery Plan; Subsidence Predictions; Subsidence Monitoring Program; Built Features Management Plan; Public Safety Management Plan; Landscape Management Plan; Water Management Plan; Biodiversity Management Plan; Land Management Plan; and Heritage Management Plan. 	Longwall panels (LW) 101 to LW105 approved by the DP&E on 27 th March 2012 and DRE on 5 th June 2012.	Schedule 3, Condition 3
Noise Management Plan	Stage 2 plan approved 6 th December 2011	Schedule 4, Condition 4
Air Quality Monitoring Program	Stage 2 plan approved 6 th December 2011	Schedule 4, Condition 7
Water Management Plan, including a: <ul style="list-style-type: none"> site water balance; erosion and sediment control plan; surface water monitoring plan; raffinate discharge and transfer control and monitoring plan; groundwater monitoring program; and surface and groundwater response plan. 	Stage 2 plan approved 5 th April 2013	Schedule 4, Condition 13
Aboriginal Cultural Heritage Management Plan	Stage 2 plan approved 6 th December 2011	Schedule 4, Condition 23
Energy Savings Action Plan	Stage 2 revised plan approved 11 August 2014	Schedule 4, Condition 30
Greenhouse Gas Minimisation Plan	Stage 2 plan approved 12 th June 2012	Schedule 4, Condition 32
Waste Management Plan	Stage 2 plan approved 6 th December 2011	Schedule 4, Condition 33
Landscape Management Plan	Plan approved 27 th March 2012, updated as part of the Extraction Plan	Schedule 5, Condition 3
Environmental Management Strategy	Stage 2 plan approved 6 th December 2011	Schedule 6, Condition 1
Pollution Incident Response Management Plan	Submitted August 2012	EPL 12789

Title	Status	Project Approval Condition (PA 08_0144 MOD 2)
Biodiversity Offset Strategy	Approved by the DP&E on 11 August 2014 and the Commonwealth DoE on 30 May 2014.	Schedule 5, Conditions 6 & 7
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> <i>Work Health and Safety Act 2011</i>

1.2.2 Amendments to Leases, Licences and Approvals

No modifications of PA 08_0144 MOD 2 occurred during the 2014/2015 AEMR period. Narrabri Mine will be seeking a modification to PA 08_0144 MOD 2 during the next reporting period to extend the product and run-of-mine (ROM) coal stockpiles onsite. The mine is also progressing assessments to assess the viability of operating the mine with a wider longwall face. Should this be considered an option Narrabri Mine will consult with the relevant Government agencies at that time.

The Mining Operations Plan (MOP) and the Subsidence Monitoring Program for the Narrabri Mine were not amended during the reporting period.

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 9 October 2014. In correspondence dated 28 November 2014, the DRE reviewed the Narrabri Mine AEMR/Annual Review for the 2013-2014 period and found that the report was acceptable for the reporting period. In correspondence dated 13 October 2014, the EPA reiterated issues identified while undertaking the inspection. In correspondence dated 24 October 2014, the DP&E also reiterated issues identified while undertaking the inspection. Table 3 outlines the actions identified by the DRE, EPA and DP&E.

Table 3: Actions from 2013/2014 AEMR/Annual Review Site Inspection

Department	Action/Statement	Progress
DRE	Legend error on Plan 3 – 'topsoil' not shown.	Corrected for this reporting period.
	Bioremediation area liner needs repair.	New area being commissioned that is lined with trafficable plastic. See Section 3.17.
	Poor hydrocarbon management within Workshop Area.	New hydrocarbon storage area being commissioned. See Section 3.17.
	Exploration sumps unlined.	Exploration drilling sumps now lined with plastic.
	Rehabilitation Cost Estimate.	Revised RCE to be submitted based on new DRE tool.

Department	Action/Statement	Progress
EPA	The mixed waste stockpile from underground will need to be segregated and disposed of accordingly	Stockpile has been segregated and disposed. New area for dumping underground rejects to be commissioned in the Reject Emplacement Area.
	The bioremediation area at the reject emplacement area needs to be commissioned. The plastic liner needs to be properly installed.	New area being commissioned that is lined with trafficable plastic. See Section 3.17.
	Drill cuttings were being stored at the reject emplacement area within a series of 3 dams. The 3 dams do not appear to be lined. This is a fundamental requirement that must be addressed urgently to protect any underlying groundwater.	New area has been commissioned with compacted clay floors to achieve the required permeability. See Section 2.5.
	The disused transformer near the exhaust outlet fans needs to be inspected to determine if its oil has been removed.	The mine is investigating options for disposal and long-term safe storage.
	Maintenance to the internal lining of the CHPP walls is still to be completed.	New materials sourced and maintenance regime developed to repair/add lining to the internal walls.
	Dust was observed coming off the secondary conveyor and needs to be better managed. The installation of a chute from this structure needs to be considered.	Existing spray bar located at discharge point. The spray control valves have been upgraded due to poor reliability. Chute not considered an option due to interactions with dozers. See Section 3.1.
	Housekeeping at the workshop area was poor:	
	* Products were located on pallets in the open which were unbunded and had potential to be damaged from forklifts/light vehicles.	New hydrocarbon storage area being commissioned. Additional bunded pallets purchased. See Section 3.17.
	* Self-bunded pallets in the open require decanting, with some pallets overflowing product/rainwater mix onto the ground.	Monthly work order raised (including following rainfall) to inspect bunded pallets are not filling up.
	* Compressor outlet containing hydrocarbons was overflowing into open drainage line behind workshop.	Discharge line directed to oil/water separator.
	* The open drainage line adjacent workshop contained runoff from workshop area, including hydrocarbons. Hydrocarbons should be prevented from entering the drainage line and any contamination needs to be taken to the bio-remediation area for treatment.	Waiting the commissioning of the bio-remediation area. Oil/water separator line has been removed from drain and oil/water separators cleaned regularly.
	* Solids should be removed from truck wash and bio-remediated.	Waiting commissioning of the bio-remediation area. Being managed by licensed waste contractor currently. See Section 3.17.
DP&E	Coal contact water management	Being addressed by WCL as it affects all sites.
	Storage of lubricating oils without secondary containment and potentially overflowing secondary containment.	New hydrocarbon storage area being commissioned. See Section 3.17.
	Discharge of air compressor oil/water to open drain at rear of workshop.	Discharge line directed to oil/water separator.
	Sizing of rejects area surface water collection dam.	Dam has been increased in size to ~22ML. See Section 3.3.
	Workshop and vehicle wash down oil/water separator discharges.	Drain to be cleaned and oil/water separators now emptied regularly.
	Coal contact water management.	Being addressed by WCL as it affects all sites.
	Bioremediation area – in-ground plastic lined sump not suitable.	New area being commissioned that is lined with trafficable plastic. See Section 3.17.

2 SUMMARY OF OPERATIONS

2.1 Exploration, Resources / Reserves and Mine Life

2.1.1 Exploration

During the reporting period 25 exploration drill holes of varying type were drilled across the Narrabri Mine. Over 325 exploratory drill holes totalling approximately 59,000 m of drilling have been completed to date. The drilling has included cored, partly cored and open hole drilling.

Exploration drilling during the reporting period focused on a number of important disciplines over the northern longwall panels, namely mine planning, gas modelling, coal quality, structure definition and geotechnical assessments. Overall the exploration activities comprised 25 partly cored HQ holes. Narrabri Mine is planning to drill 19 exploration boreholes during the next reporting period to focus on mine planning, gas modelling, coal quality, structure definition and geotechnical assessments.

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
- Minor clearing of woodland areas in consultation with a qualified ecologist for exploration and gas drainage activities.

Table 4, the “Cumulative Production and Waste Summary”, shows that at the end of the reporting period a total of 691,403 m³ of subsoil and topsoil had been stripped over the life of the mine, with 289,320 m³ respread across re-profiled areas. A further 402,083 m³ of topsoil and subsoil remains stockpiled on site for future rehabilitation purposes.

Table 4: Cumulative Production and Waste Summary

	Cumulative Production			
	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 ³)	570,986	120,417	691,403	760,810
Soil Used/spread (m ³)	199,799	89,521	289,320	361,314
Waste Rock (m ³)	657,000	0	657,000	657,000
ROM Coal (t)*	8,249,952	6,730,974	14,980,926	21,980,926
Processing Waste (t)	313,005	134,979	447,984	587,984
Product (t)	7,923,552	6,094,158	14,017,710	20,877,710

* - 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

Dam SB3, located at the Reject Emplacement Area, was enlarged during the reporting period from 11 ML to approximately 22 ML. No other construction activities were undertaken during the reporting period.

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 main gate (MG) of LW105 (33c/t) and the MG of LW106 (7c/t). Development had also extended

to 51c/t in the mains, or the 100 panel. The longwall unit has previously extracted LW101, LW102 and LW103. At the end of the reporting period the longwall unit was extracting LW104.

The underground-in-seam (UIS) drilling program continues using contractors to undertake this work. There are currently three 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 6,730,974t of ROM coal. Of this the longwall unit accounted for 6,202,722t and at the end of the reporting period the longwall had retreated 1,336m in LW104, which has a total length of 2,934m.

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 six 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 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 has been 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	10	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	3	U/G pre-drainage
Dozers	5	Coal handling – Komatsu 375 & 475, 2 x Caterpillar D11 Reject Emplacement Area – Caterpillar D9
Water Carts	2	Dust Suppression and drilling operations
Drill Rigs	2	Drilling operations (pre-drainage, goaf and gas compliance 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 Tipplers	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
Mining Operations	
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
CHPP reject disposal	24 hours / 7 days ¹
Raw materials / supply delivery	7:00am to 10:00pm / 7 days
1: 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 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 2% 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

Narrabri Mine is investigating options for the expansion of the ROM and product coal stockpiles. Should the expansion of the ROM and product coal stockpiles be approved, the mine will aim to construct the new stockpiles during the next reporting period. During the reporting period Narrabri Mine utilised the REA to temporarily store ROM coal, refer to Section 2.6.

2.5.3 Waste

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;
- Sewage; and
- Drill Cuttings.

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.

2.5.3.1 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 1,027 tonnes of general waste was transferred offsite during the reporting period (approximately two-thirds are transported to Namoi Waste Corp's transfer facility where it is segregated further to maximise recycling). This amount indicates the level of waste produced when at full production at the mine.

2.5.3.2 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 15,200 litres of waste oil was collected by the waste contractor, Northern Lubequip, for recycling.

2.5.3.3 Recycling

Approximately 136 tonnes of scrap metal has been collected for offsite recycling during the reporting period, which has decreased when compared to the previous reporting period. This is a result of excess underground infrastructure being scrapped during the previous reporting period.

Narrabri Mine also collects waste paper, ink cartridges and cardboard for recycling. Approximately 11.2 tonnes of cardboard was recycled during the reporting period.

2.5.3.4 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.

2.5.3.5 Mine Equipment Tyres

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

2.5.3.6 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.

2.5.3.7 Drill Cuttings

Drilling cuttings from exploration, gas drainage and service borehole drilling activities is excavated from sumps and disposed of in the REA or consolidated with excavated soil to backfill the sump (where minor amounts of cuttings are present). An area at the REA has been established to allow excess water from the drill cuttings to decant off and then the cuttings are added to the REA to help consolidate material when emplacing reject from the CHPP.

2.6 Stockpile Capacity

The ROM coal stockpile has a capacity of approx. 400,000t and the product stockpile is approx. 200,000t with dozer push. Both were developed as per the specifications in the Mining Operations Plan (MOP). Narrabri Mine will seek to expand the ROM and product coal stockpiles and should this be approved, the ROM and product stockpiles will have an additional combined capacity for approximately 450,000t.

During the reporting period Narrabri Mine utilised a portion of the REA for temporary ROM coal storage. The requirement for additional coal storage onsite was due to three factors: 1) limited capacity in the existing stockpiles, especially during times of above planned production from the longwall; 2) limitations on the rail network; and 3) stockpile constraints at the port. The additional coal storage area was used when extraction from LW103 was nearing completion and when the longwall was being relocated. The storage of coal at the REA is intended to be a short-term measure until the Stockpile Modification Extension has been approved, assuming approval would be granted.

The REA was chosen as an additional storage area as it has the environmental safeguards in place that the existing stockpiles have, i.e. surface water capture and containment, compacted floor with a permeability of $<1 \times 10^{-9}$ m/s, dust control measures for reject emplacement, and noise sources approved as part of the Stage 2 EA and confirmed via re-modelling of the coal haul fleet currently used. Narrabri Mine have also restricted the stockpiling height of coal to 15m, i.e. consistent with the REA approved height, and the hours of operation. Narrabri Mine considered the use of this area before proceeding as a coal storage area and was satisfied that this is generally in accordance with the approvals for the mine.

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 Water Management Plan (WMP). The Stage 2 Water Management Plan (WMP) was approved by the Department of Planning and Infrastructure on 5 April 2013. The WMP 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 is being 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

There were no wet weather discharges from licensed discharge points however the creek system surrounding the site was sampled on four separate occasions during the reporting period. The results are included in Appendix 5 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 onsite 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 with the exception of the CHPP office/bathhouse and the longwall emulsion mix. 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, when required.

During the reporting period, a total of approximately 87 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.

During the reporting period:

- Potable water was generated onsite utilising the mine's WTP with some areas still requiring trucked potable water; 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 ³)		Available Storage Capacity at the end of the Reporting Period (m ³)
	Start of Reporting Period	At end of Reporting Period	
Clean Water (in Storage Dams)	103,760	16,225	90,575
Dirty Water (in Sediment Basins)	22,722	8,280	62,720
Controlled Discharge Water (salinity trading schemes)	N/A	N/A	N/A
Evaporation Ponds*	289,012	379,348	353,352
* = Additional 40ML of storage in containment bund in rail loop.			
N/A = Not applicable for the Narrabri Mine			
Note: 1m ³ = 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 Well's (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 guideline: EDG01 – Borehole Sealing Requirements on Land: Coal Exploration (DRE 2012);
- 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 Sheet's (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.

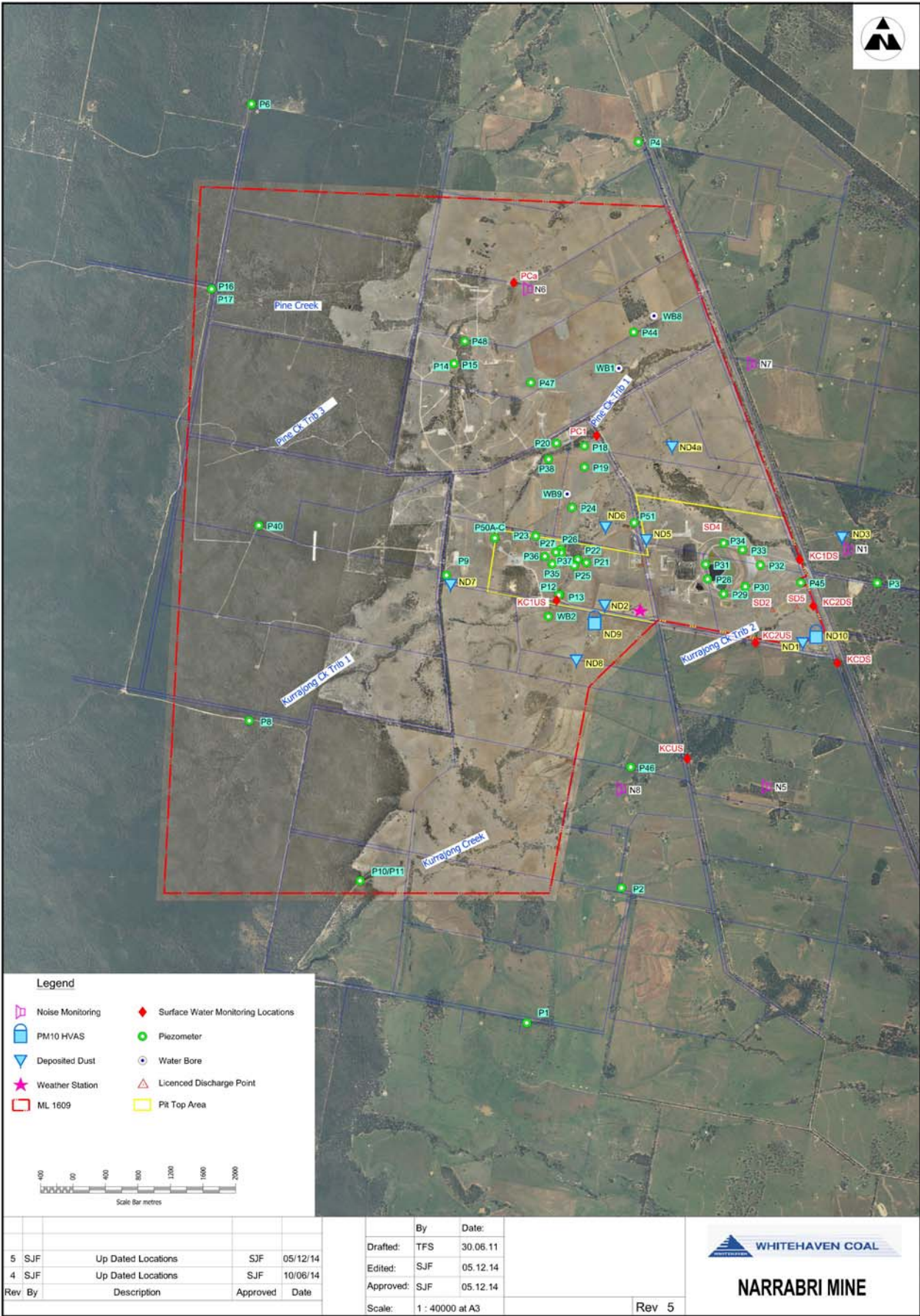


Figure 2: Current Environmental Monitoring Locations

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 PM_{10} particulate level of $30\text{ }\mu\text{g/m}^3$.
- 24 hour average 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 PM_{10} particulates. Monitoring of deposited dust is undertaken on a monthly basis whilst 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 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 (also refer to Section 3.1.4):

- 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 ² /month		Ash Content g/m ² /month	
		Mean	Standard Deviation	Mean	Standard Deviation
ND1	Turrabaa	15.9	26.2	3.5	2.8
ND2	Claremont	10.0	27.7	1.2	0.6
ND3	Bow Hills	1.3	0.8	0.7	0.5
ND4a	Matoppo	0.9	0.7	0.5	0.4
ND5	Claremont	7.4	13.5	1.5	0.9
ND6	Willarah	1.0	0.9	0.5	0.5
ND7	Claremont	1.9	1.4	1.1	1.0
ND8	Claremont	2.9	6.6	0.7	0.7

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 with the exception of ND1, ND2 and ND5.
- The results for ND1 and ND2 are from a high level recorded during February 2015. As the ash content in these samples, which indicates mineral type contamination, were 0.6 g/m²/month and 0.3 g/m²/month, respectively, the

high results indicate significant contamination from organic matter, which is not attributable to site operations.

- The ash content analysis for ND5 indicates that 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 ND1, ND2 and ND5, all located on project-related land, as described above.

As part of ongoing review and continuous improvement of environmental management across Whitehaven Coal's mine sites an internal assessment of particulate deposition monitoring, in accordance with Approved Method 19, was undertaken during the reporting period.

The assessment identified opportunities for improvement in monitoring practices including:

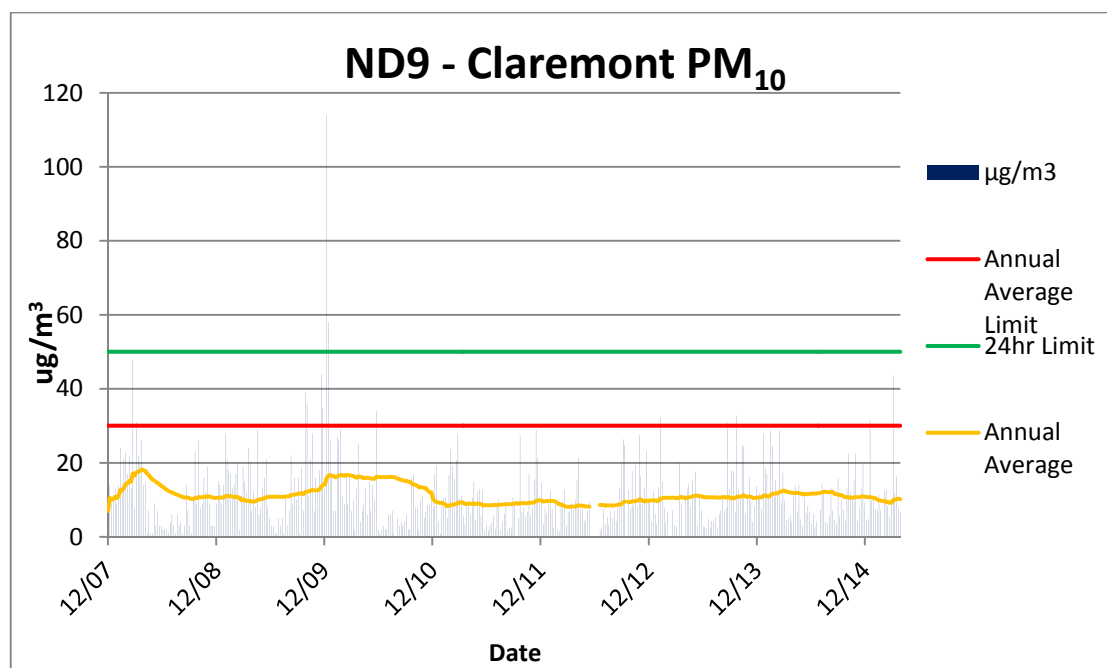
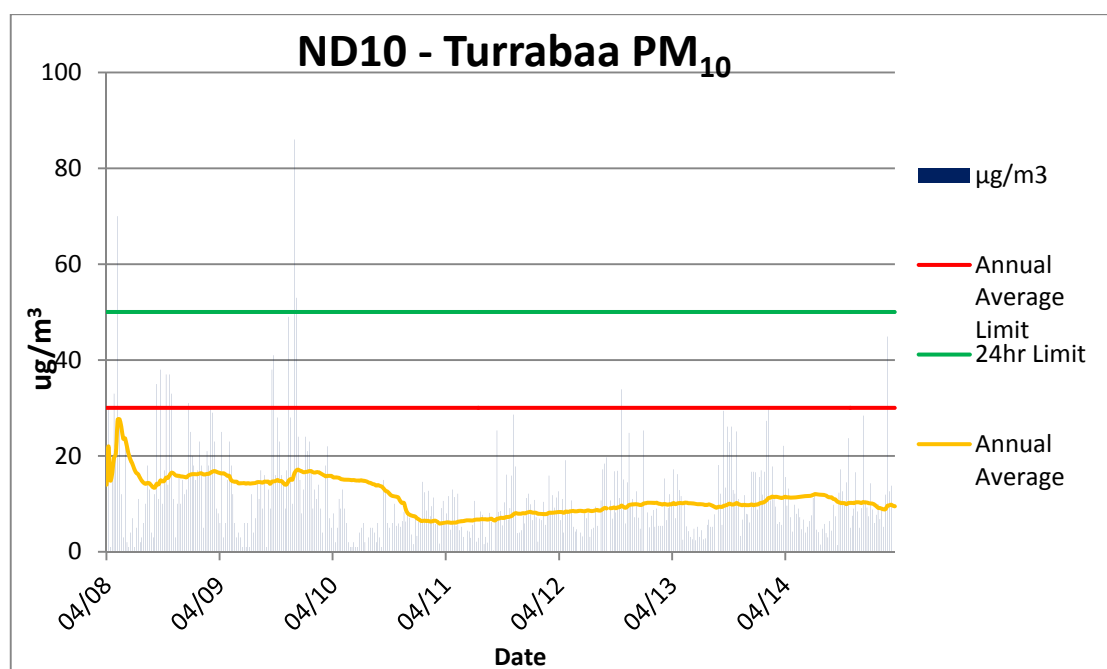
- Installation of funnel stoppers;
- Increased stability of some monitoring stands; and
- Introduction of a more comprehensive inspection and maintenance regime.

Implementation of the opportunities for improvement commenced during the reporting period.

Narrabri Mine also has two High Volume Air Samplers (HVAS) (PM₁₀) located on the project-related properties "Claremont" (ND9) and "Turrabaa" (ND10) 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/m³) throughout the reporting period. At the end of the reporting period the annual average was 10.18 µg/m³ at "Claremont" and 9.50 µg/m³ at "Turrabaa".

The full data set for PM₁₀ monitoring is contained within Appendix 4.

Figure 3: HVAS PM₁₀ Data – ND9 “Claremont”Figure 4: HVAS PM₁₀ Data – ND10 “Turrabaa”

The results for the PM₁₀ monitoring also confirm that the TSP criteria for the mine are well within the compliance limits. The DP&E have previously advised that Whitehaven’s method for determining TSP concentrations, i.e. multiplying PM₁₀ concentrations by a factor of 2, is satisfactory. Based on the above, the annual average TSP concentrations of 20.36 $\mu\text{g}/\text{m}^3$ at “Claremont” and 19.0 $\mu\text{g}/\text{m}^3$ at “Turrabaa” 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, PM₁₀ 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 g/m²/month above the background level of 1.6 g/m²/month. The reporting period average for “Bow Hills” is 1.3 g/m²/month and the long-term average is 1.6 g/m²/month. The results indicate that the dust deposition levels for this reporting period and the long term average are below the predicted levels. 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 PM₁₀

Although PM₁₀ 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/m³. The highest annual average results for the Narrabri Mine monitoring program is 10.18 µg/m³. In addition, the highest 24-hour concentration recorded during the reporting period was 44.9 µg/m³. The highest predicted 24-hour level in the AQA for residences further away from the mine than the monitored locations was 69.7 µg/m³. No exceedances of the 24-hour criteria (i.e. 50 µg/m³) occurred during the reporting period.

3.1.4.3 Visible Dust

During the previous reporting period it was noted that numerous complaints were made in relation to visible dust being generated from the coal processing area. Since this time Narrabri Mine has undertaken the following as required by the EPA and through Pollution Reduction Program’s (PRP) included on the site’s EPL 12789:

- shrouding around Radiator Fan and Blade on Dozers on Stockpiles;
- trial of variable Coal flow options to minimise thermal coal exposure to wind;

- review of chute shape and cover, and application of spray ring at discharge point;
- implemented a fully automated sprinkler system around the coal stockpiles, dozer transfer roads and parking areas;
- developed and implemented dust Trigger Action Response Plans (TARPs) for all dust generating activities onsite; and
- redesigned the product coal tripper chute to concentrate the flow of coal and installed fixed dust chutes to use during adverse weather conditions.

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 Water Management Plan (WMP) 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 (*Soils and Land Capability Assessment for the Narrabri Coal Mine Stage 2 Longwall Project, Specialist Consultant Studies Compendium, Volume 2, Parts 9a and 9b, November 2009*).

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 cognisant 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, refer to Section 3.2.3.

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 that 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&E 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 creeks above LW101 to LW104. Further detail is provided in Section 3.16.2.2.

- *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 to a lesser extent in LW102 to LW104, flows within the creeks are generally consistent with surrounding creeks indicating no significant losses of water from the drainage lines. It should also be noted that ponded water, prior to pumping downstream, maintained a consistent level indicating negligible water is being lost to the sub-surface area.
- *Possible impacts on trees and shrubs by disturbing their root systems:* Refer to Section 3.16.2.2.
- *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 within the longwall panels will be ploughed once soil conditions improve. Also refer to Section 3.20.2.2 for results from the annual monitoring undertaken in accordance with the Extraction Plan – Land Management Plan.
- *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 are to be ploughed when soil conditions improve which will aid in filling any remaining cracks. Also refer to Section 3.20.2.2 for results from the annual monitoring undertaken in accordance with the Extraction Plan – Land Management Plan.
- *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 are to be ploughed when soil conditions improve which will aid in filling any remaining cracks. Also refer to Section 3.20.2.2 for results from the annual monitoring undertaken in accordance with the Extraction Plan – Land Management Plan.
- *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. Some lesser areas of erosion

were highlighted in the annual monitoring undertaken in accordance with the Extraction Plan – Land Management Plan. Narrabri Mine will engage a specialist to review remediation options as recommended in the report during the next reporting period. Also refer to Section 3.20.2.2 for results from the annual monitoring undertaken in accordance with the Extraction Plan – Land Management Plan.

- *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. Also refer to Section 3.20.2.2 for results from the annual monitoring undertaken in accordance with the Extraction Plan – Land Management Plan.
- *Possible impacts to soil salinity:* Refer to Section 3.20.2.2 for results from the annual monitoring undertaken in accordance with the Extraction Plan – Land Management Plan, which indicates that salinity levels are within the thresholds for agricultural activities.
- *Possible impacts to farms dams:* Refer to Section 3.16.2.2.
- *Possible impacts to roads and tracks:* Refer to Section 3.16.2.2.

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.

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 approved Water Management Plan (WMP).

Above average rainfall was received during June and August 2014 and March 2015. No discharge events occurred from the EPL discharge points onsite during the reporting period however, the surrounding creeks were sampled once during August

2014. The flow event was sampled in accordance with the requirements of EPL 12879, with the results provided in Appendix 5. Rainfall records are shown in Appendix 8.

27 August 2014

As a result of rainfall in August 2014, all but one of the creek sampling locations nominated in EPL 12789 were sampled and analysed for a range of parameters, refer to Appendix 5. The results for Total Suspended Solids (TSS) ranged from 42 mg/L to 98 mg/L in the upstream samples, and between 16 mg/L to 238 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) in the previous reporting period 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 onsite. 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 WMP. 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 WMP,

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. SB3 was increased in size during the reporting period from approx. 11ML to approx. 22ML.
- *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. Narrabri Mine has received advice from experts in surface water management and the mine may apply to remove Dam SD5 as a licenced discharge point as the area it captures is no longer disturbed and the water quality of the creeks draining the mine site and SD5 are of similar quality.
- *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 Dams A1, A2 or A3 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. A review of brine water management required by Schedule 4, Condition 21 of PA 08_0144 MOD2 was commissioned during the reporting period and the results will be reported in the AEMR/Annual Review for the next reporting period.

Mine Subsidence Management Strategy

- *Visible cracks in the bed of the creek would be filled in where necessary:* The creek beds in LW101 to LW103 are 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:* Seven contour banks, or parts thereof, were undermined during the extraction of LW103. 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 320 ML with some of this water held in storage in Dam D, which at the end of the reporting period was holding 97 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 and some technical issues with the WTP requiring more water to be filtered for use onsite.

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 that are 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 WMP, are identified in Table 9.

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

Table 9: 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, P50, P51, 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. Bores P12, P13 and P15 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.

Bore P13 has shown a steady decrease in water levels since September 2013. 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 and dry period the drop in water level in P13 is expected to be associated with increased production from WB2.

Monitoring well P15 has shown a steady decrease in water level since March 2014. P15 is located above LW105 which is currently being developed for extraction and this is the likely cause of the water level drop in P15.

The groundwater monitoring network was expanded during the reporting period with three wells installed at the southern end of LW103 to monitor groundwater levels and longwall progression, i.e. bores P50A, B and C. Another bore was also installed at the Reject Emplacement Area (REA), i.e. P51 with two additional bores to be installed during the next reporting period, i.e. P52 and P53. P51 was installed to monitor groundwater quality surrounding the REA however as it was only recently installed trends in water quality/levels have not yet been determined.

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*).

Total dissolved solids (TDS) concentrations were recorded above the ANZECC criteria in wells P2, P3, P4, P5, P9 and P51. 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 WMP, 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 6.50 mbgl (P32) to 15.54 mbgl (P31). During a previous reporting period 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 concluded 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 are not being impacted by water stored within the rail loop.

Narrabri Mine commissioned Dr Noel Merrick to undertake a calibration of the groundwater model as required by Schedule 4, Condition 9 of PA 08_0144 MOD2. This work was not finalised during the reporting period and as such will be reported in the next AEMR/Annual Review. Narrabri Mine also commissioned URS Australia to undertake a review of brine water management and beneficial use of water and brine as required by Schedule 4, Condition 21 of PA 08_0144 MOD2. This work was not finalised during the reporting period and as such will be reported in the next AEMR/Annual Review.

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 1.220 ML/day (comprising on average 1.155 ML/day of mine dewatering and 0.066 ML/day of pre-drainage water). It should be noted that although 1.155 ML/day is removed from the mine the operation consumes on average 1.080 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 1.155 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 1.220 ML/day. A groundwater model calibration was commissioned during the reporting period and the results will be reported in the next AEMR/Annual Review.

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 of cultural heritage origin were also discovered in the same stand of trees this exclusion zone serves a dual purpose.

The Biodiversity Offset Strategy was approved by the Department of Planning and Environment (DP&E) on 11 August 2014. Narrabri Mine is currently investigating mechanisms for securing the offsets based on comments received by DP&E. Baseline spring surveys of the offset areas have been undertaken during the reporting period to assist in managing the offset areas. Management activities undertaken to date include stock exclusion and weed management. In addition, Narrabri Mine is subdividing the land to aid in implementing the management plans.

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 30.1 ha. 16.4 ha was in previously cleared farm paddocks and was associated with surface activities including: gas drainage infrastructure works; drilling operations; access tracks and existing road maintenance across LW101 to LW107. The remaining 13.7 ha was in vegetated areas in the western portion of the lease and was associated with exploration activities. With the disturbance reported in the previous reporting period over LW101 to LW107, this totals approx. 70 ha. The Stage 2 EA has a total area of disturbance of approximately 76 ha for LW101 to LW107. The disturbance areas for these panels have been used as the gas drainage infrastructure has been installed over the first seven 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 (BOA), with management measures specified in the Biodiversity Offset Management Plans which were approved during the reporting period as part of the over-arching offset strategy.

Other operational safeguards to minimise impacts to fauna include undertaking pre-clearing surveys (as detailed in Section 3.6), relocating 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 and cat 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, refer to Section 3.20.1.

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, Mother-of-Millions and Prickly Pear. The Thistles, African Boxthorn and Prickly Pear are generally located within previously

disturbed areas and in LW101 to LW106 where ploughing had been undertaken. Other weed control comprised spot spraying of Mother-of-Millions adjacent to creek lines, 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 14.5 ha outside the mining area was spot sprayed for Mother-of-Millions and approximately 2 ha above LW101, LW102 and outside the mining area was spot sprayed for African Boxthorn.

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 $1.5 - 4^{\circ}\text{C}/100$ 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 $4^{\circ}\text{C}/100$ 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 onsite 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.

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 review of management options as detailed in Section 3.10.4.2.

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. Copies of all monitoring reports are presented in Appendix 7.

3.10.3.2 Attended Noise Monitoring

May 2014

On the 6th May 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 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 “Belah Park”, “Greylands” (mine-owned) and “Bow Hills” properties during the night period. At the time of measurement, the temperature inversion strength was +4.2 and +4.7°C/100m at the “Bow Hills” and “Greylands” properties respectively. This 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. The recorded level of 36 dB(A) at the monitoring location “Belah Park” is not considered to be a non-compliance as it is less than 2 dB(A) above the statutory limit as outlined in Section 11.1.3 of the NSW Industrial Noise Policy (INP).

During the night time measurement circuit the $L_{1(1 min)}$ noise from mine exceeded the 45 dB(A) criteria at the “Bow Hills” monitoring location however as noted above this measurement was recorded during non-compliant meteorological conditions. The mine did not exceed the 45 dB(A) at any other monitoring location.

June 2014

On the 2nd to 5th June 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 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.

July 2014

On the 29th July 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 approved Stage 2 NMP. The results indicated that noise emissions from the site exceeded the criterion of 35 dB(A), $L_{eq(15min)}$ at the "Bow Hills", "Greylands" (mine-owned), "Oakleigh" and "Naroo" properties. At the time of measurement, the temperature inversion strength was +7.4, +4.9, +5.6 and +7.2°C/100m at the "Bow Hills", "Naroo", "Greylands" and "Oakleigh" properties, respectively. This 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 exceeded the 45 dB(A) criteria at the "Bow Hills" monitoring location however as noted above this measurement was recorded during non-compliant meteorological conditions. The mine did not exceed the 45 dB(A) at any other monitoring location.

August 2014

On the 20th and 21st August 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 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 2014

On the 17th to 19th September 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 NMP and the site's EPL. The results indicated that noise emissions from the site were recorded above the relevant criteria at the "Bow Hills", "Greylands" (mine-owned) and "Belah Park" monitoring locations.

The exceedances at the mine-owned "Greylands" property were measured when the temperature inversion strength was +5.1°C/100m, which is greater than the upper

limit of $+4^{\circ}\text{C}/100\text{m}$ and when the wind speed was $>3\text{m/s}$, under which the noise criteria are not applicable.

The exceedance at the “Belah Park” property was measured when the temperature inversion strength was $+5.5^{\circ}\text{C}/100\text{m}$, which is greater than the upper limit of $+4^{\circ}\text{C}/100\text{m}$ under which the noise criteria are not applicable.

Of the five exceedances recorded at “Bow Hills” property one of the exceedances was determined to be a non-compliance with the others either recorded under non-compliant meteorological conditions or where the results were within 2 dB(A) of the compliance limit as noted above. Narrabri Mine notified the land owner and relevant Government agencies of the exceedance. Narrabri Mine was at this stage negotiating a private agreement with the land owner of the “Bow Hills” property which was finalised during March 2015.

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.

December 2014

On the 1st to 3rd December 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 did not exceed the criterion of 35 dB(A), $L_{\text{eq}(15\text{min})}$ at any receivers.

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.

March 2015

On the 17th to 19th March 2015, 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 did not exceed the criterion of 35 dB(A), $L_{\text{eq}(15\text{min})}$ at any receivers with the exception of the “Naroo” property which is now mine-owned and therefore the limits do not apply.

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.

3.10.3.3 Additional Monitoring

As reported in the previous AEMR/Annual Review, Narrabri Mine undertook a validation of the noise model developed for the Stage 2 Environmental Assessment. The noise model validation report indicated that two properties were 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 commenced monitoring at these two locations in conjunction with the monitoring outlined above. The results for these two properties are outlined in Table 10.

Table 10: Attended Noise Monitoring Results for “Ardmona” and “Haylin Views”

Receiver	2013 Modelling – predicted noise levels dB(A), _{Leq(15minute)} , 6°C/100 m inversion conditions	Attended Monitoring Noise Levels – dB(A), _{Leq(15minute)} , Night (all meteorological conditions)						
		2014						2015
		May	June	July	August	September	December	March
“Ardmona”	35	32	IA	28	IA	IA	28	34
“Haylin Views”	32	IA	IA	32	IA	IA	IA	30
<p>Bold noise measurements were conducted during inversions greater than 4°C/100 m.</p> <p><u>Underlined</u> noise measurements were conducted during wind speeds greater than 3 m/s at 10 m (i.e. a non-compliant meteorological condition as outlined in Condition 1, Schedule 4 of Project Approval [08_0144 MOD 2]).</p> <p>IA = inaudible.</p>								

3.10.3.4 Unattended Noise Monitoring

No unattended noise monitoring was conducted during the reporting period.

3.10.3.5 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.

The monitor was located at the “Merriman” property from December 2013 to March 2015 when it was relocated to the “Matilda” property. 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),_{Leq(15min)}. 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. The mine has developed monthly reports issued to the

landowner of where the monitor is located summarising the results of the previous months readings. In addition, NM will continue to investigate, develop and implement real-time response protocols to assess the performance of the mine. This will include alarms generated from the real-time noise unit when noise levels approach compliance limits.

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 with one D9 dozer operating in the area.
- *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.
- *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 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”. The “Greylands”, “Kurrajong” and “Naroo” properties have been purchased since the assessment was undertaken. Narrabri Mine has also entered into a private agreement with the owners of “Bow Hills” which requires mitigation measures to be installed at the residence. This work should be completed during the next reporting period.

3.10.4.1 Noise SPL Measurements

During the reporting period Narrabri Mine commissioned Spectrum Acoustics to undertake Sound Power Level (SPL) measurements of equipment onsite to determine compliance with the levels used in the model developed for the Stage 2 Environmental Assessment. Table 11 outlines the equipment SPL measurements undertaken during the report period and measurements undertaken during previous reporting periods.

Table 11: Narrabri Mine Measured SPL's

Noise Sources	Noise Level dB(A)	Date Measured
15t LHD	112	March 2012
60t LHD	115	March 2012
Personnel carrier	109	March 2012
Goaf Drainage Fan	115	March 2014
CHPP (attenuated)	110	July 2014
Bypass crusher (attenuated)	108	July 2014
Vent fans (attenuated)	117	July 2014
Conveyors	80dB/m	January 2015
Dozers at stockpiles	117/118	January 2015
Dust suppression chutes	108	January 2015
Drill – MDR142	119	January 2015
Drill – DR2010	114	January 2015
Drill – DR800	110	January 2015

3.10.4.2 Noise Management Review

During the reporting period, Narrabri Mine considered the option of limiting reverse speeds on dozers as a noise control option to reduce noise levels associated with a proposed modification to PA 08_0144 MOD 2. The review found that while restricting dozers to first gear reverse would reduce the sound power level of the dozers, it would also result in the requirement for an additional two dozers on the ROM and product coal stockpiles due to the restricted dozer speed. As a result, noise reduction due to operating in first gear, would be largely offset by the need for two extra dozers. Given the significant cost associated with purchasing two new dozers,

and the minimal environmental gain this option (i.e. restricting dozers to first gear) would provide, this option was not considered to be a reasonable and feasible noise control measure available to the mine.

Narrabri Mine also undertakes inspections of the rail track within the rail loop to monitor rail condition and highlight issues requiring rectification. Rectification works include grinding the railway lines to maintain the shape of the rail line which aids in limiting wheel squeal.

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. 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 or substantial vegetation, which will 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. During the previous reporting period Narrabri Mine organised for a contractor to collect rubbish from this area in front of the mine and along the Kamilaroi Highway. Approximately 16 m³ of rubbish was collected but it should be noted that not all of this rubbish originated from mining related personnel. Narrabri Mine has since engaged a contractor to undertake regular cleaning of the area adjacent to the mine's entrance to limit the amount of rubbish that accumulates in this area.

One complaint was received during the reporting period due to lighting impacts from the mine. The source of the light was a lighting tower located on the western side of the Reject Emplacement Area (REA) to illuminate this area for dozer operators. The lighting plant was rectified on the day of the complaint by facing it away from the complainant's property and directing the lights on the tower down, i.e. 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 LW108 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 (LW) 108 to LW113 during 2013. This survey is required prior to surface disturbance works occurring in this area. The ACHMP was revised during the reporting period however it is currently being reviewed by the Registered Aboriginal Parties (RAPs) and 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. An incident occurred during the reporting period involving Aboriginal cultural heritage, refer to Section 3.12.4.

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 representative of the Registered Aboriginal Parties (RAPs) 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 (ACMP), required by PA 08_0144 MOD 2, was approved by the Department of Planning and Environment (DP&E) 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 RAPs raised the potential for temporary salvage of artefacts from areas of higher significance as identified in the Stage 2 cultural heritage assessment. The mine has since updated the ACHMP to include the temporary salvage however at the end of the reporting period the ACHMP was being reviewed and had not been finalised.

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 with the exception of Site 15, as described in Section 3.12.4. All known sites above LW101 to LW113 have since been fenced.
- *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* – As a result of the incident described below all known sites above LW101 to LW113 have been fenced. Fencing consists of star pickets and a top wire with reflective signs identifying the area as an archaeological site, refer to Photo 1.



Photo 1: Fenced Aboriginal Cultural Heritage Site

- *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”. All other sites have signs identifying them as archaeological site.*
- *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 – two cultural heritage awareness education packages will be developed in consultation with the RAPs. One of the packages will focus on general information to be included in the Narrabri Mine or Whitehaven*

Generic Inductions and the other package will be a more comprehensive package to be developed for those employees/contractors involved with surface disturbance work at the site. Prior to these packages being developed all soil disturbance activities in areas not already disturbed will be subject to cultural heritage monitoring surveys by representatives from the RAPs.

3.12.4 Aboriginal Cultural Heritage Incident

During October 2014, the mine reported an environmental incident when an area previously identified as a cultural heritage site (Site 15) was disturbed by site civil works. Investigations have been undertaken in consultation with the Department of Planning and Environment (DP&E) and representatives from the Registered Aboriginal Parties (RAPs). One of the two artefacts previously identified at the site have since been relocated along with an additional eight artefacts following wet sieving works. The mine was issued with a fine from DP&E in relation to a non-compliance with the ACHMP. All corrective actions have since been implemented.

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. Narrabri Mine did notify the Environment Protection Authority (EPA) of spontaneous combustion events at the mine that may have led to community enquiries, as requested by the EPA.

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 for LW101 – LW105 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.

Narrabri Mine has undertaken a review of ventilation options at the mine following operational delays due to gas concentrations in LW102, LW103 and LW104. To minimise gas concentrations at the mine the following initiatives were implemented:

- Increased longwall ventilation quantity;
- Forcing fan and duct supplying fresh air to tail gate (TG) roadway;
- Modified underground-in-seam (UIS) longwall panel gas drainage design;
- Monitoring and remediation of other gas sources in the main gate (MG) and TG roadways; and
- Goaf drainage improvements.

As a consequence of the increased ventilation quantities the main ventilation fans have been operating at close to 100% of capacity from midway through LW103. This is unsustainable as the ventilation quantity available will reduce as the mine is developed.

A review of the ventilation options available to deliver sufficient ventilation quantity to the longwall was conducted and determined that 3 heading gate roads were the only practicable and timely solution. By implementing 3 heading gate roads a number of additional benefits are present:

- Mine operating pressure is lowered reducing the spontaneous combustion risk;
- Improvement in the ventilation system is immediate (although initially small); and
- Potential elimination of another ventilation shaft or a deferment of the timing of the shaft.

The 3 heading gate road design has increased the size of the gate road footprint by 18m. The size increase is based upon geotechnical evaluation to maintain the same stability as a 2 heading gate road. Narrabri Mine will seek advice on first workings during the next reporting period as outlined in Schedule 3, Condition 6 of PA 08_0144 MOD 2 for the three heading gate roads.

- *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 or Turrawan). A fire break has been installed around the northern section of longwall panels. This fire break will assist emergency vehicles requiring access to the western portion of the mining

lease. Narrabri Mine has also met with the NSW Rural Fire Service (RFS), Namoi/Gwydir team, along with other industry representatives during the reporting period. Information on equipment available onsite, locations of watering points/access tracks/infrastructure areas and Geographic Information System (GIS) mapping information have been provided to the RFS for the Narrabri Mine.

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 (RMP), 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 for 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 by the conditions of their respective lease arrangements to manage their respective parcels of land, which includes measures to manage bushfire potential, as most are currently operating farms. Although not required by PA 08_0144 MOD 2, Narrabri Mine will develop a Bushfire Management Plan (BMP) during the next reporting period to implement at the site based upon the information provided in the RMP.

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

At the beginning of the reporting period, i.e. 1 April 2014, the longwall unit had retreated 204 m in LW103 which was 2,197 m in total length. At the end of the reporting period the longwall unit had retreated 1,336 m in LW104, which has a total length of 2,934 m. Mining height since LW103 has been 4.3 m. The target mining height focuses on the bottom section of the Hoskissons Coal seam. The overburden thickness above LW104 ranges from 175 m to 225 m. The final extraction void is 306.5 m which includes the gate roads. Chain pillar dimensions are nominally 35 m rib-to-rib at generally 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 LW104 in accordance with the approved Extraction Plan. The subsidence monitoring survey lines are illustrated on Figure 5. Table 12 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 12.

Table 12: Subsidence Parameters

Longwall Panels (LW) 101, LW102, LW103 and LW104		
	Maximum Predicted Extraction Plan	Maximum Measured
Line 101 – Centre of LW101		
Subsidence (m)	2.44	2.633
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
Line 102 – Centre of LW102		
Subsidence (m)	2.44	2.694
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
Line 103 North – Centre of LW103 Northern End		
Subsidence (m)	2.44	2.671
Tilt (mm/m)	35	40.2
Tensile Strain (mm/m)	8 – 16^	18.8
Compressive Strain (mm/m)	10 – 20^	27.9
Angle of Draw (°, Degrees)	22.5 – 26.5	18.1
Line 103 South – Centre of LW103 Southern End		
Subsidence (m)	2.44	2.494
Tilt (mm/m)	35	30.3
Tensile Strain (mm/m)	8 – 16^	9.3
Compressive Strain (mm/m)	10 – 20^	8.5
Angle of Draw (°, Degrees)	22.5 – 26.5	20.2
Line 104 North – Centre of LW104 Northern End		
Subsidence (m)	2.44	2.749*
Tilt (mm/m)	32	48.4*
Tensile Strain (mm/m)	7 – 14^	42.6*
Compressive Strain (mm/m)	8 – 16^	42.3*
Angle of Draw (°, Degrees)	22.5 – 26.5	18.7*
Line A – Cross Panel Survey Line		
Subsidence (m)	2.44	2.590*
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*
Line B – Pine Creek Tributary 1		

Longwall Panels (LW) 101, LW102, LW103 and LW104		
Subsidence (m)	2.44	2.587*
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*
Line D – Pine Creek		
Subsidence (m)	2.44	0.341*
Tilt (mm/m)	32	4.7*
Tensile Strain (mm/m)	7 – 14^	2.6*
Compressive Strain (mm/m)	8 – 16^	1.7*
Gradient Change (%)	Up to 6	0.47*
Line E – Pine Creek Tributary 1 Crossline 1		
Subsidence (m)	2.44	1.013*
Tilt (mm/m)	47	26.9*
Tensile Strain (mm/m)	11 – 22^	9.2*
Compressive Strain (mm/m)	14 – 28^	2.9*
Line F – Pine Creek Tributary 1 Crossline 2		
Subsidence (m)	2.44	2.669*
Tilt (mm/m)	41	59.1*
Tensile Strain (mm/m)	10 – 20^	6.6*
Compressive Strain (mm/m)	12 – 24^	21.7*
Line G – Pine Creek Tributary 1 Crossline 3		
Subsidence (m)	2.44	1.120*
Tilt (mm/m)	47	22.2*
Tensile Strain (mm/m)	11 – 22^	8.0*
Compressive Strain (mm/m)	14 – 28^	1.5*
Electricity Transmission Lines – 11kV Power Lines		
<i>Pole 2</i>		
Subsidence (m)	0	0.046
Dynamic Tilt (mm/m)	0	9.09
Final Tilt (mm/m)	0	9.09
Conductor length change between poles 2-3 (m)	0.13	0.56
Conductor Clearance Loss (m)	0.77	+0.759
<i>Pole 3</i>		
Subsidence (m)	2.18	2.085
Dynamic Tilt (mm/m)	30	66.3
Final Tilt (mm/m)	12	50.08
Conductor length change between poles 3 - 4 (m)	0.28	0.53
Conductor Clearance Loss (m)	1.10	-1.377
<i>Pole 4</i>		
Subsidence (m)	2.11	2.061
Dynamic Tilt (mm/m)	25	74.23
Final Tilt (mm/m)	15	31.80
Conductor length change between poles 4 - 5 (m)	0.13	0.59

Longwall Panels (LW) 101, LW102, LW103 and LW104		
Conductor Clearance Loss (m)	0.07	+1.400
<i>Pole 5</i>		
Subsidence (m)	0.31	0.183
Dynamic Tilt (mm/m)	2	25.66
Final Tilt (mm/m)	2	19.40
Conductor length change between poles 5 - 6 (m)	0.024	0.30
Conductor Clearance Loss (m)	0.30	+2.042
<i>Pole 6</i>		
Subsidence (m)	0.01	1.540
Dynamic Tilt (mm/m)	1	129.68
Final Tilt (mm/m)	1	129.68
Conductor length change between poles 6 - (m)	-	-
Conductor Clearance Loss (m)	-	-

* - subsidence development incomplete.

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

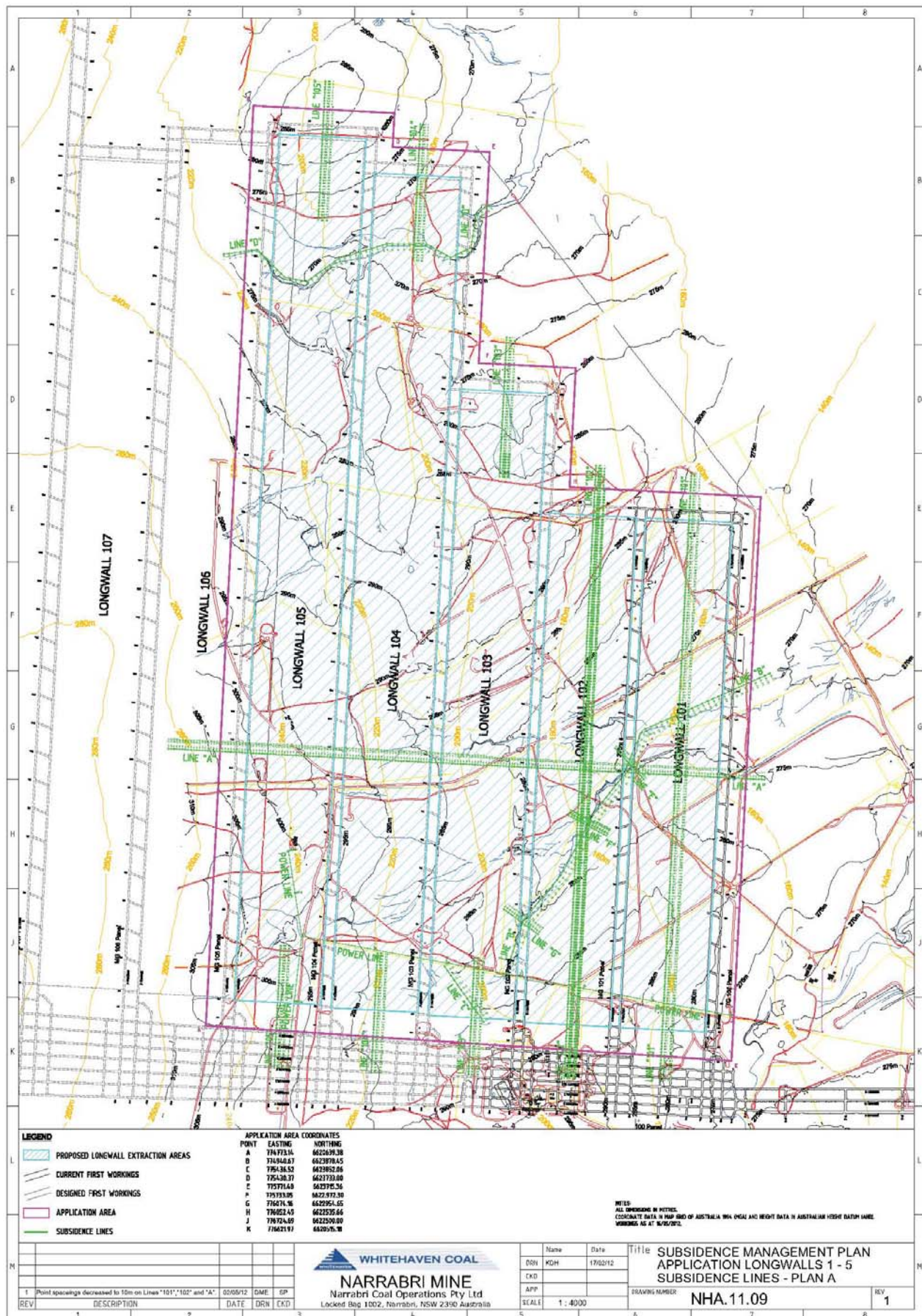


Figure 5: Subsidence Monitoring Plan

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. Portions of LW102 and LW103 have been ploughed but not seeded 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 to LW104 when conditions improve.

Pine Creek and Tributaries

Water ponding has been observed in LW101 to LW104 in Pine Creek and its tributaries, refer to Photo 2 and Photo 3. The ponding observed in Pine Creek and its tributaries 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 and LW103 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 to LW103.

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. The procedure will also include improving the area of ponding in LW101 as a semi-permanent wetland. 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.



Photo 2: Ponding in Pine Creek Tributary 1, LW103



Photo 3: Ponding in Pine Creek, LW104

Natural Vegetation

As reported in the previous AEMR/Annual Review, large trees have been impacted by subsidence above LW101 and LW102. Narrabri Mine can report that no impacts to trees were recorded during the extraction of LW103 and only minor impacts have been recorded in LW104, i.e. within predicted levels. In late November 2014 a report was issued on the tree deaths that occurred in LW101 and LW102, a summary of the findings are included below:

- Increased tree condition in a gradient from LW101 showing the most impact grading to LW103 showing no clear evidence of impact. Conditions that vary in the transition from LW101 to LW102 and then to LW103 include:
 - Increasing depth of cover;
 - Change of soils with a distinct change in texture from heavy clays to lighter soils; and
 - Moist soil conditions associated with the undermining of the target area with LW103.
- Lateral movement of overburden occurred in the top 20 – 30 m, resulting in surface cracks more than 100 mm at about 8 m apart. Evidence of visible root shearing was found and is a likely cause of declining tree condition. It was likely that root shearing is exacerbated by dry conditions, heavy soil texture with associated high consistence, and shallow depth of cover with increased surface impacts including cracking and surface deformation.
- Groundwater level and quality is unlikely to be a contributing factor to the decline in tree health in this particular instance. Analysis of groundwater data showed no apparent fluctuations coinciding with subsidence of the impacted area.
- For LW104 and longwalls further to the west the depth of cover increases and the soil texture becomes lighter and as a result further impacts on trees are expected to be minimal.
- Natural regeneration is occurring over LW101 and LW102 with *Eucalyptus microcarpa* (Grey Box) saplings recorded in both regeneration monitoring plots. *Geijera parviflora* (Wilga) and *Casuarina cristata* (Belah) which were not impacted by the longwall subsidence were also recorded to be emerging.

Narrabri Mine provided the full report to both the Department of Planning and Environment (DP&E) and the Division of Resources and Energy (DRE) on 28 November 2014.

Public Utilities

Public Roads

Greylands Road was undermined during the extraction of LW101, LW102 and LW103 however it was not undermined in LW104 during the reporting period. Remediation works were undertaken however the road remains closed to the public in accordance with the Greylands Road Management Plan (GRMP), refer to Photo 4. The GRMP was revised during the reporting period as a result of an inspection undertaken by Narrabri Shire Council (NSC). Following the inspection NSC requested that an amended plan be submitted for approval to close Greylands Road under a Traffic Control Plan (TCP) until the road is purchased to minimise risks to public safety. The revised GRMP was signed by both Narrabri Mine and Narrabri Shire Council on 9 April 2015.

Narrabri Mine has previously applied to Crown Lands to purchase the section of Greylands Road that is within the mining lease and the 'Offer of Sale' form was signed and returned to Crown Lands during the reporting period to progress the application.



Photo 4: Greylands Road Closure

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 September 2014 when extracting LW103. 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 12.

Farm Land and Facilities

Agricultural Utilisation or Agricultural Suitability of Farm Land

Portions of LW102 and LW103 have been ploughed but not seeded due to the hot, dry weather experienced over the summer/autumn period. Ploughing and seeding of LW102 to LW104 will be undertaken when soil moisture conditions improve. The only area affected by subsidence where agricultural suitability is impacted is where water ponds at the ephemeral creek in LW101 as other ponding areas are generally limited to within the banks of the creeks. The ponded water is currently pumped downstream when required however as noted above a procedure will be developed for ponding management onsite. 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 in LW101 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

One small farm dam was undermined during the reporting period. Rain in March 2015 refilled this dam which is now holding water although its catchment has been modified. Subsidence has not impacted on the function of this dam.

Soil Conservation Works

Three 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 12, subsidence prediction exceedances have occurred above LW101 to LW104:

- The maximum subsidence measurements were within +/- 15% of the predicted value of 2.44 m.
- The maximum tilt measurements were within 15% of the predicted values for the centreline lines of LW101, LW102 and LW103. 94% of measured tilts in LW104 were within the predicted range.
- 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) with the exception of LW104 which recorded a maximum tensile strain of 42.6 mm/m, however 92% of the measured tensile strain values in LW104 were within the predicted range.
- 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, and LW104 which recorded a maximum compressive strain of 42.3 mm/m.

The centreline subsidence results for LW101 to LW104 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 4.3 m. However, since the measured subsidence effects were all within 15% of the current predicted maximum values, and surface impacts have not

been greater than anticipated, it is not considered necessary to increase the values presented in the Extraction Plan for future longwall panels at this stage.

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.

A bio-remediation area is being upgraded for minor spills to treat impacted soil which will be available for use during the next reporting period. A permanent area is also being constructed to house hydrocarbons onsite which has historically been done in containers with false floors or bunded pallets. 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 and will be transferred to the new storage area when construction is completed during the next reporting period. 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 is upgrading the bio-remediation area. When complete, impacted soil will be transferred to this area, 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 Chapter 7, 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 11,569 Mm³ of air vented from the mine with an average composition of 0.04 % methane (CH₄) and 0.26 % CO₂.

During the reporting period, a total of 4,643,529 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 – December 2014*, the estimated direct – Scope 1 Greenhouse Gas emissions including all CO₂ and non CO₂ gasses are shown in Table 13.

Electricity consumption totalled approximately 71,797,957 kWh, which is an approximate 122% increase from the previous year. This is a direct result of the increase to full production levels. Table 13 shows the estimated CO₂-e emissions which are based on the NGERs NSW and ACT emission factor for consumption of electricity purchased from a grid.

Table 13: Greenhouse Gas Emissions

	Usage	Emission Factor	CO ₂ Equivalent Tonnes
Diesel (kL)	4,643,529	69.2 t CO ₂ -e/GJ	12,403
Electricity (kWh)	71,797,957	0.86 kg CO ₂ -e/kWh	61,746

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 drilling 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 LW101 to LW106, 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&E 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 and approved by DP&E during the previous reporting period. 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 4,644 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 71,798 MWh during the reporting period which is higher than predicted but is considered to indicate electricity consumption closer to full production levels;*
- *Predicted gas-drainage volumes and composition annualised for a 30 year mine life (GHGA, Table 2) were 50.77 Mm³ of CO₂ (73 % of total gas-drainage composition) and 17.93 Mm³ of CH₄ (27 % total gas-drainage composition) – Narrabri Mine has produced 46.1 Mm³ of CO₂ (55 % of total gas-drainage composition) and 3.5 Mm³ of CH₄ (4 % of total gas-drainage composition) during the reporting period. The remaining gas composition is made up of O₂, N₂ and other gases;*
- *Predicted ventilation gas volumes for longwall panel 1 was 9.8 Mm³ of CO₂ and 4.6 Mm³ of CH₄ – Narrabri Mine has produced 29.6 Mm³ of CO₂ (0.26 % of total ventilation gas composition) and 5.1 Mm³ of CH₄ (0.04 % of total ventilation gas composition) during the reporting period; and*
- *Predicted CO₂-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 0.33 Mt of CO₂-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-In-Seam (SIS) works have now extended to LW107 and will extend into LW108 during the next reporting period.

At the end of the reporting period there were 17 active Vertical Production Wells (VPW's) and 41 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 in 3-4 branches, 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 purchase Greylands Road and it is closed to the public. Once the mine takes possession of Greylands Road it will be closed permanently. All access is 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 infrastructure management plans described below:

- The Greylands Road Management Plan (GRMP) outlines the management measures that have been implemented to reduce the risk to public safety in relation to Greylands Road. The GRMP was revised during the reporting period following an inspection by Narrabri Shire Council, refer to Section 3.16.2.2.

- The Essential Energy Management Plan (EEMP) was developed in consultation with Essential Energy 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 (TCP) 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 via an approved TCP.
- *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. Narrabri Mine also undertook trapping of feral cats around the administration buildings onsite, capturing approximately 10 feral cats. The captured feral cats were transferred to a local veterinary clinic to be euthanised. The trapping is undertaken on an as needs basis and will continue through the next 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 over the life of the development 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 *LW101-105 Land Management – 2014 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 ploughed; conditions too dry for seeding. Surface cracking evident in Pine Creek Tributary 1, above LW102, forming gully erosion.*
- *Topographic form (LiDAR):*
 - *Landscape morphology – Subsidence across landscape does not exceed subsidence predictions for LW 101-105: Lidar analysis indicates that areas within LW101 and LW102 have subsided > 2 m from 2007 to 2013. This is confirmed by longwall subsidence results.*
 - *Creek lines – No identifiable change to overall drainage pattern: No comments, assessed as satisfactory.*
- *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 in 2014.*
- *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 NDVI 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 comments, assessed as satisfactory.*
 - *Weed species Weed species identified and managed according to the weed management measures provided in the Rehabilitation MP: No comments, assessed as satisfactory.*

- *Weed cover Less than 10% increase in weed cover in impact zones in comparison to the control zone:* No comments, assessed as satisfactory.
- *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):* Changes exceeded +0.5 pH unit of baseline unit, but remains within recommended range for pasture.
 - *EC - Less than 20% increase in EC in comparison to baseline values:* Whilst soil EC has increased it is currently within thresholds suitable for agricultural activities (0.15 dS/m).
 - *Organic matter - Less than 20% reduction in organic matter in comparison to baseline values:* No comments, assessed as satisfactory.
 - *Nitrogen - Less than 20% reduction in total nitrogen in comparison to baseline values:* No comments, assessed as satisfactory.
 - *Phosphorus - Less than 20% reduction in phosphorus in comparison to baseline values:* Greater than 20% reduction in phosphorus across all zones. Consultation with an agronomist regarding management is recommended.
- *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):* No areas of significant area increase identified; however, some data unreliable due to misalignment of transect.

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.

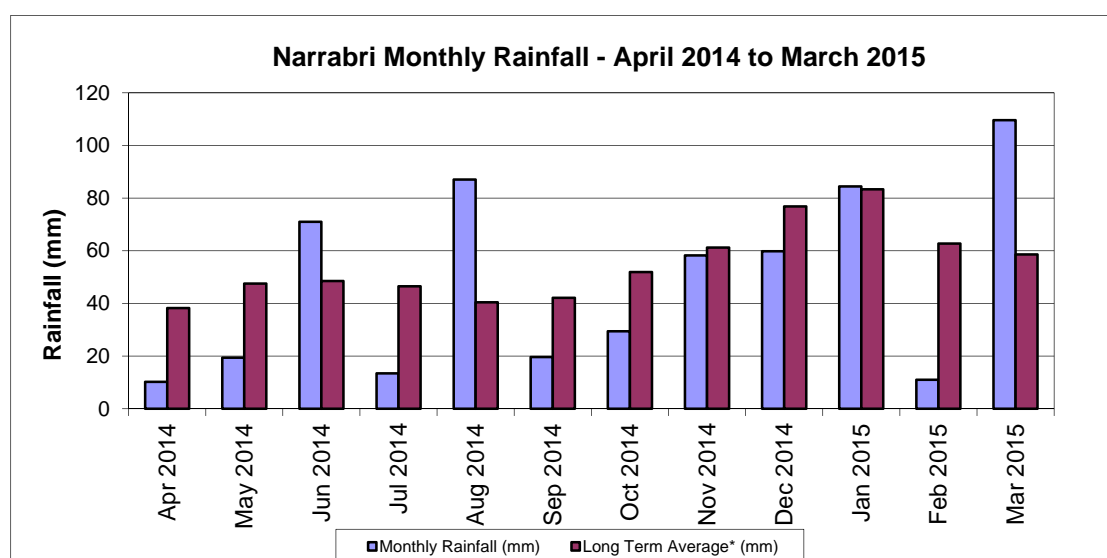
3.20.3.2 Rainfall

Rainfall data for the reporting period is presented in Table 14 and Figure 6.

Table 14: Rainfall Data

Month	Monthly Rainfall (mm)	Cumulative Rainfall (mm)	Long Term Average* (mm)	Number of Rain Days**	Long Term Average Rain Days*
Apr 2014	10.2	10.2	38.2	3	2.2
May 2014	19.4	29.6	47.5	4	2.6
Jun 2014	71.0	100.6	48.5	5	3.3
Jul 2014	13.4	114.0	46.5	2	3.1
Aug 2014	87.0	201.0	40.4	5	2.9
Sep 2014	19.6	220.6	42.1	1	3.0
Oct 2014	29.4	250.0	51.9	2	3.5
Nov 2014	58.2	308.2	61.2	8	3.9
Dec 2014	59.8	368.0	76.8	12	4.1
Jan 2015	84.4	452.4	83.3	6	3.7
Feb 2015	11.0	463.4	62.7	2	3.1
Mar 2015	109.6	573.0	58.6	7	2.8
Total	573.0	573.0	657.7	57	38.2

* – Narrabri West Post Office averages from 1891-2015. ** – >1mm.

**Figure 6: Monthly Rainfall Data**

A review of Table 14 and Figure 6 shows that the total rainfall at the mine site during the reporting period was 573 mm, which is 85 mm below the long term average for Narrabri West Post Office and 73 mm more than the site total during the previous reporting period.

Below average rainfall was experienced for 8 of the 12 months during the reporting period. The rainfall totals illustrate the dry weather experienced at the mine during the reporting period, particularly during Autumn and Spring.

Total rain days during the reporting period was more than the long term average and more than that recorded during the previous reporting period. The highest daily rainfall total recorded for the reporting period was 47.8 mm on 27 January 2015.

3.20.3.3 Temperature

Average maximum and minimum temperatures for the reporting period are presented in Table 15 together with long-term monthly averages for Narrabri West Post Office (Bureau of Meteorology Station 053030).

Table 15: Average Maximum and Minimum Temperatures

Month	Average Daily Temperature			
	Reporting Period (°C)		Station 053030 (°C)	
	Min	Max	Min	Max
Apr 2014	13.9	26.7	11.9	27.3
May 2014	9.3	21.9	8.3	22.5
Jun 2014	6.0	17.8	5.2	18.7
Jul 2014	3.5	17.4	3.7	18
Aug 2014	5.5	18.5	4.6	19.8
Sep 2014	7.2	22.8	7.6	23.4
Oct 2014	12.0	29.9	11.7	27.1
Nov 2014	17.3	34.5	14.8	30.1
Dec 2014	18.9	33.3	17.7	33.0
Jan 2015	19.2	33.0	19.3	33.8
Feb 2015	19.1	33.0	19.1	33.2
Mar 2015	16.4	31.7	16.4	31.2

Table 15 shows that average minimum temperatures at the mine site were generally higher or 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 lower during the period from April 2014 to September 2014 and then similar to the long term averages for the remainder of the period with the exception of November 2014. November 2014 minimum temperatures were 2.5 degrees higher and maximum temperatures were 4.4 degrees higher than the long term averages. Above average temperatures were recorded, both minimum and maximums, from October 2014 to December 2014 which coincided with a period of below average rainfall.

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 October to December 2014.

3.20.3.5 Inversions

The Noise Management Plan (NMP) provides details more specific to inversion monitoring requirements. During the winter months of 2014 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 3.10.3.5.

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 7Appendix 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 May to September 2014, the EPL meteorological inversion conditions were present for 8% (May 2014), 3% (June 2014), 5% (July 2014), 2% (August 2014) and 2% (September 2014) of the night time periods, i.e. from 10 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. Fourteen of these complaints were received via the designated complaints line. The nature of the complaint, details and response are presented in Table 16.

Table 16: Complaints Summary 2013/2014 Reporting Period

Method	Date/Time of Complaint	Nature of Complaint	Investigation	Action Taken / Follow-up
Phone call to site	4/04/2014 3:30pm	Concerned about residents in a mine owned house that is sublet by the leasee.	Complainant advised that as it is sublet there may be little Whitehaven can do.	Complaint referred to the Community Relations Manager who advised the leasee of the complaint. Leasee to follow up with tenants.
Phone call to Complaints Hotline	6/05/2014 8:37am	Noise coming from mine especially over previous 3 days and this morning.	EO listened to sound recording from early 7th May. Mining noise hard to distinguish over general environmental noise. EO investigated weather data which confirmed atmospheric stability classes ranging from Class E to Class G with Classes F & G indicative of temperature inversion conditions. The weather over the previous 5 days has also been much cooler than preceding period.	EO rang complainant back at 8:35 am on 7th May. EO advised complainant that temperature has cooled off recently and conditions may lead to temperature inversions which mean noise travels further. EO also advised that coal stockpiles are high on the product side but are small on the ROM side so no shielding can occur from the ROM stockpile. Complainant stated that noise monitoring has just been undertaken. EO said that the results of this monitoring and the real-time noise monitor located at the residence will give a good indication of the mines performance now that it is cooling down and identify any trends. EO notified all CHPP supervisors of the complaint and outlined noise management options that could be implemented to reduce noise impacts, especially during the night/early morning periods. Complainant said she would call again if noise from the mine was considered excessive.
Phone call to Complaints Hotline	12/07/2014 10:06pm	Noise is very loud from the mine.	EO investigated operations at the time of the complaint, audio and noise levels recorded on the mobile noise unit and weather data for the time of the complaint. The bypass crusher was running at the time but the CHPP was not. A train was being loaded meaning there would have been 2 dozers on the product stockpile. Audio recording does have some general mine hum noise in the background and also general traffic noise. Weather data indicated that temperature inversion conditions were present at the time of the complaint based on stability class and wind speeds.	EO contacted complainant at 1:56 pm on 15 July 2014. EO explained operations at the time and noise recorded on the mobile noise unit. EO also explained temperature inversion conditions were present at the time of the complaint. Complainant asked if inversion conditions mean the noise levels don't apply which the EO confirmed. Complainant also noted a vibration in the house at the time of the complaint and that it had been noisy for the last week and a half. Complainant stated they would ring again if the noise is thought to be excessive. EO has since sought advice on low frequency noise mitigation options at the CHPP. The complainant has been notified that this investigation may be extended to include the affected property.
Attended site	23/09/2014	Complainant frustrated with the mine for	Operational activities being undertaken	EO issued TBT to all surface personnel

Method	Date/Time of Complaint	Nature of Complaint	Investigation	Action Taken / Follow-up
	9:30am	leaving gates open on leased land that is currently being used for operational activities. Complainant wants to stock paddock but is not satisfied mine will keep gates closed. Previously put signs on gates to alert people that stock were present which have been removed and gates secured open.	on leased area requiring truck/drill rig access etc and gates left open.	reminding them that gates must remain closed, no exceptions. Complainant to replace signs on gates to alert people of stock in the paddock.
Phone call to site / Complaints Hotline	23/09/2014 12:25pm	Three issues: Dust – dusty last couple of days and a while ago it was windy and gantry sprays not on; Light – lighting tower direct at the complainant's residence; and Noise – very noisy last night while loading a train.	Dust – coal processing area and rejects haul route creating dust. Light – Lighting plant at rejects area directed towards complainant's residence. Noise – train being loaded when complaint made on complaint line, complainant phoned the next day as well. Met data shows wind blowing away from complainant's residence and towards mobile noise trailer which showed noise results below relevant criteria.	Dust – Civil contractor notified of complaint and reminded of need to manage dust onsite. Civil contractor disappointed with complaint as they felt they were managing dust appropriately. EO requested CHPP Superintendent remind staff of TARP's for dust management in the coal processing area. Light – Civil contractor rectified the lighting plant noted in the complaint on the day of the complaint. Noise – CHPP confirmed train being loaded but nothing out of the ordinary occurring. Noise data shows levels within compliance limits and wind blowing away from residence towards noise trailer.
Phone call to site	4/10/2014 3:45pm	Dust coming from the CHPP. Complainant advised it had been dusty all day but the last 30mins was severe.	CRO rang CHPP Supervisor who advised CRO that dozer had come off stockpile to fuel up and crossed a dusty area	CHPP Supervisor arranged for dozer operators to avoid the area where possible and move at a slower speed in areas where there is dust. Extra sprays were also activated. EO also advised CHPP Superintendent who will also inspect areas to determine if the finer dust requires clean out as done previously. Complainant phoned on Tuesday 7/10/2014 at 1109 to talk about the complaint and to also complain again in relation to the 3 dozers working on the coal stockpile which were making dust and no sprays were activated. EO advised CHPP Superintendent who shut the dozers on the stockpile down. This in turn stopped production from the longwall as no dozers could operate to clear coal from beneath the ROM gantry. EO advised complainant at 1313 that this had been done.
Phone call to site	11/10/2014 10:26am	Dust on Saturday morning was blowing to complainants house and it looked as though the dust sprays were not on	CRO notified CHPP Supervisor of the complaint	Prior to the complaint CHPP Control Operator had been getting Level 1 and Level 2 Wind Tarp warnings. The wind speed had been ranging from 2m/s to a max that peaked at 9m/s. This had prompted the operator to turn on the Product sprays, Rotary Breaker and ROM tunnel Sprays. The By-Pass sprays were also turned on at the time. Prior to the complaint 2 of the dozers had to relocate from ROM to Product Stockpiles. The Komatsu was the first which did create some dust prompting a call to the civil contractor onsite to give the area Nth of the Product pile a good wet down which occurred. The Cat relocated approx. 20 mins before the complaint but with minimal dust at low speed. After talking to the Dozer operators, the CHPP Supervisor was confident that the minimal dust that was created from the product and By-Pass streams did not leave the stockpile area. CHPP Supervisor discussed

Method	Date/Time of Complaint	Nature of Complaint	Investigation	Action Taken / Follow-up
				the dust issue with the operators again and outlined the importance of acting promptly and correctly when dust events occur on any of the coal stockpiles.
Phone call to site	15/10/2014 07:00am	Noisy this morning and Monday evening.	Noise unit located residence is faulty and to be rectified.	As previously discussed with complainant, attended noise monitoring to be undertaken as soon as possible to determine impacts.
Phone call to site	16/10/2014 15:41pm	Dust coming from the mine and sprays not on. Also noted lights visible and hard to sell property when mine making dust. Sprays also seem to go off at shift change time. Complainant stated that management should be more involved and direct all operators to be responsible for controlling dust.	EO advised CHPP CRO at 15:46pm. CHPP CRO advised that spray's shown as active on control screens, EO advised that there is no water coming from them. EO followed up with CHPP Superintendent at 15:47pm who stated that there was a problem with the sprays and it is being looked into. Decision made at this time to shut the plant down as the sprays could not be fixed.	EO rang complainant back at 16:21 pm to advise that the plant was being shut down due to problem with the sprays.
Phone call to Complaints Hotline	20/10/2014 08:03am	Extremely noisy Friday night, all weekend and a large plume of dust at approximately 10am Saturday morning.	EO reviewed noise levels. EO also reviewed camera footage at the time of the dust complaint. The noise levels on Friday night were propagated by a strong southerly breeze of >4m/s. The camera footage showed dozers working but no dust plumes were evident however the cameras do not cover the entire ROM/Product stockpile area.	EO contacted complainant and stated another round of attended noise monitoring would be organized for as soon as possible but likely the following week due to availability. EO advised complainant to continue to let the mine know if they think the noise levels are too high.
Phone call to site	27/10/2014 11:19am	Dust from product tripper and dozer working on ROM stockpile	EO contacted CHPP CRO at 13:47pm in relation to dust from tripper, no dozer on ROM stockpile at this time.	CHPP Superintendent advised wind levels only recent issue with speeds around 7m/s. CHPP shut down due to windy conditions at around 13:50pm.
Phone call to EO	29/10/2014 07:40am	Extremely noisy this morning and last night, not sure if loading a train.	EO reviewed noise levels at the time of the complaint & at 01:00am on 29 October 2014 (train loaded at this time) and mining noise hard to determine above other noise sources. No trains were being loaded on the morning of 29 October at the time of the complaint.	EO contacted complainant at 08:05am and stated that the stockpiles are low at the moment but dozers still working. EO also stated that extra activity on the surface as longwall move underway. EO noted that attended monitoring was undertaken at the residence on Monday night/Tuesday morning and that when the results received these would be compared to the mobile noise unit data and provided to the complainant. EO advised complainant to continue to let the mine know if they think the noise levels are too high.
Phone call to EO	29/10/2014 10:00am	Complainant called EO and stated that dust coming from tripper and dozers and the sprays were not on.	EO inspected coal area and dust was being blown from the product tripper but didn't appear to be leaving the coal processing area. Dozer also parking up at this time.	EO contacted the CHPP CRO at 10:03am and advised of the complaint. Sprays were activated. Wind speed approx. 4m/s and blowing from the SE, i.e. away from Complainants residence
Phone call to EO	3/11/2014 9:56am	Complainant called EO and complained about dust generated during windy conditions on Friday afternoon, 31st October 2014, and Saturday 1st November 2014. Complainant advised he rang CRO Friday afternoon around 5pm. Complainant advised that he had coal in his house and when he walks around his feet get black and he is having breathing difficulties. Complainant also stated that it was not only him that was affected.	EO reviewed footage of operations. No operational activities were being undertaken during the storm event that occurred at 7:20pm on Friday evening. During Saturday, the tripper was off from 8:40am due to wind speeds as noted in the CHPP shift reports. Dozers were operating at 1pm and 6pm on 1 November but wind speeds had dropped by these times and dozers generating minimal dust.	EO advised complainant of dust suppression system to be implemented and that previously the fine material around the stockpiles has been removed.
Phone call to EO	24/11/2014 9:15am	Dust coming from emplacement area and coal processing area	Coal haulage works, bypass crusher and product tripper generating dust. Wind at the time ~7m/s. Sprinklers on product gantry shown as on in CHPP – CRO but not actually working.	Emplacement area operations ceased until water cart saturated work area. Operations then stopped at 11:35am due to weather. Coal processing operations stopped while sprinkler issue resolved. CHPP not operated again due to weather conditions.

Method	Date/Time of Complaint	Nature of Complaint	Investigation	Action Taken / Follow-up
Phone call to EO	27/11/2014 12:02pm	Dust coming from the product tripper and stockpile	CHPP manager had already shut down the plant as dust generation was not normal and had commenced an investigation.	The investigation confirmed that a combination of very dusty coal and an issue with the conveyor spray system automation was the cause. The spray system automation issue was rectified and the CHPP restarted within 0.5hrs with no issues. EO rang complainant back at 12:49pm to advise that the plant was shut down and restarted without any issues.
Phone call to EO	16/12/2014 14:55pm	Complaint related to dust being generated at the emplacement area.	Coal haulage works creating dust. Wind speed at the time was 6.8m/s and coming from the north-west.	EO rang emplacement area supervisor at 15:02pm and advised of complaint. Supervisor advised water cart there at the moment and would keep going. EO advised that more needs to be done and operator should be the first person making a call about the conditions and organising appropriate mitigation measures to be implemented. EO also advised the CSC of the complaint.
Phone call to EO	19/12/2014 12:17pm	Complaint related to dust coming from the coal processing area, thought to be a dozer	EO rang CHPP Manager who advised issue was from plant start-up and not a dozer. Plant had an unplanned shutdown which left coal on a reclaim conveyor for 12hrs. Upon start up coal was very dry and generated dust. Dust suppression on the conveyors is triggered by feed rates so no sprays were activated during the initial start-up.	CHPP to review start-up procedure to investigate options for dust suppression during times when CHPP running at low feed rates, including plant start-up. EO rang complainant and advised of reason for dust and investigation to be undertaken.
Phone call to site	20/12/2014 10:15am	Complaint related to dust from the coal processing area	EO reviewed camera footage on Monday 22/12/2014 and dust generation was visible from dozer operations. EO requested information from CHPP Manager.	At the time of the complaint the CRO contacted the CHPP CRO to advise of the complaint. CHPP CRO advised they were trying to minimise dust from the operation. CHPP Manager provided the statutory report stating that dust mitigation measures were implemented on the day. Narrabri Mine is also installing a spray system for the coal processing area which will assist in minimising dust generation.
Phone call to Complaints Hotline	25/12/2014 7:00am	Complaint related to noise coming from the mine	Train loading was occurring at the time.	TSM spoke with complainant on 31/12/2014 and advised that when EO back to site, EO will follow up with noise monitoring results and weather conditions at time and provide more feedback. EO reviewed noise files and mine noise audible as well as transportation and wildlife noises recorded. Low Frequency noise contribution around this time was 32dB(A). Wind coming from the south-east at the time of the complaint with near calm conditions. EO contacted complainant on 19 January 2015.
Phone call to EO	5/01/2015 8:05pm	Very noisy at the mine	Winds at the time around 2.5m/s and coming from the SE. No trains were being loaded and CHPP plant being fed by dozers on the ROM pad. The CHPP advised that likely cause is rock coming out of the mine on the drift conveyor which is a rare occurrence.	EO contacted complainant on 19/01/2015.
Phone call to site	18/01/2015 4:10pm	Dust being generated at the site	The CHPP was shut down at the time of the complaint and a train was being loaded at the time. Dust sprays were on at the time.	CRO notified CHPP of the complaint. EO contacted complainant on 21/01/2015.

EO – Environmental Officer, TSM – Technical Services Manager, GM – General Manager, EM – Environment Manager, CHPP – Coal Handling and Preparation Plant, CRO – Control Room Operator, TBT – Tool Box Talk, EPA – Environment Protection Authority, CSC – Civil Services Coordinator, EA – Environmental Assessment

The number of complaints received during the reporting period was the same when compared to the previous reporting period. Generally complaints related to dust (30), Noise (11), and other issues with some complaints covering multiple issues. The dusty conditions were related to the hot, dry and windy period experienced during the second half of 2014. Additional measures are now in place at the site to manage dust including an automated spray system for the stockpiles and dozer transfer roads, refer to Section 3.1.4.3.

Any complaints that are made are reported to the Community Consultative Committee (CCC) 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 276 employees and approximately 80 long term contractors (not all onsite at the one time). Of the mine employees, 72% 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 \$15,000 to the local community, including being a major sponsor for the 2015 'Nosh on the Namoi' and a proud supporter of the 2014 NBN BEST Narrabri Business Awards and the Narrabri Lioness Club hosting the 2014 Narrabri Garden, Flower and Craft Expo. During financial year 2014 Whitehaven's total sponsorships, including Narrabri and its other mines were well over \$160,000, 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. During the reporting period Narrabri Mine advertised for a replacement chair and community member following the resignation of the Independent Chair, Mr Terry Miller. The mine received two applications who were both appointed to the CCC including the new Independent Chair, Mr Russell Stewart.

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 18 June 2014, 8 October 2014, 10 December 2014 and 11 March 2015.

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.

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 and relevant corrective actions for rehabilitation at the mine are outlined in the Landscape Management Plan, and presented in Table 17:

Table 17: Rehabilitation Completion Criteria

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

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 18 presents a Rehabilitation Summary while Table 19 presents a listing of maintenance activities undertaken during the reporting period. As the majority of cover crop establishment occurred during previous reporting periods in LW101 and weather conditions were unfavourable to seed cover crops over LW102 and LW103, rehabilitation during this reporting period was limited to minor cover crop maintenance. 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%. 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.

Table 18: Rehabilitation Summary

		Area Affected (hectares)		
		This Report Period (as of 31.03.15)	Last Report Period (up to 31.03.14)	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	44.9
B2:	Active Mining Area (excluding items B3 - B5 below)	90.5	60.4	107.9
B3	Waste emplacements, (active/unshaped/in or out-of-pit)	5.5	5.5	10
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		152.7	122.6	178.3
C REHABILITATION PROGRESS*				
C1	Total Rehabilitated area (except for maintenance)	97.2	74.8	115.2
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	59.9	37.5	77.9
E: SURFACE OF REHABILITATED LAND				
E1	Pasture and grasses	94.6	73.3	112.3 ¹
E2	Native forest/ecosystems	2.6	1.5	2.9
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.

¹ Re-vegetation works are weather dependent.

Table 19: Maintenance Activities on Rehabilitated Land

NATURE OF TREATMENT	Area Treated (ha)		Comment/control strategies/ treatment detail
	Reporting period	Next period	
Additional erosion control works (drains re-contouring, rock protection)	5	5	Establishment of sediment controls along access roads and construction of spoon drains.
Re-covering (detail – further topsoil, subsoil sealing etc)	Nil	Nil	
Soil treatment (detail – fertilizer, lime, gypsum etc)	Nil	Nil	
Treatment/Management (detail – grazing, cropping, slashing etc)	Nil	Nil	
Re-seeding/Replanting (detail – species density, season etc)	7	25	Cumulative total for life-of-mine.
Adversely Affected by Weeds (detail – type and treatment)	54.5	10	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.
Feral animal control (detail – additional fencing, trapping, baiting etc)	2*	2*	Feral cats trapped around the site's administration buildings. * See Section 3.20.1.

5.2.3 Rehabilitation Monitoring and Performance

Internal rehabilitation/revegetation monitoring undertaken to date has primarily been limited to 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 in previous reporting periods. Management measures for water ponding 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 gas/water 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 seventh 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 Registered Aboriginal Parties (RAPs). 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;
- Implementation of the Biodiversity Offset Strategy;
- Ongoing real-time monitoring in areas with the potential of increased impact. Two neighbouring properties monitored during the reporting period; and
- Effective rehabilitation of areas of disturbance.

6.2 Targets and Goals for 2015/2016

Targets and goals for the 2015/2016 reporting period include:

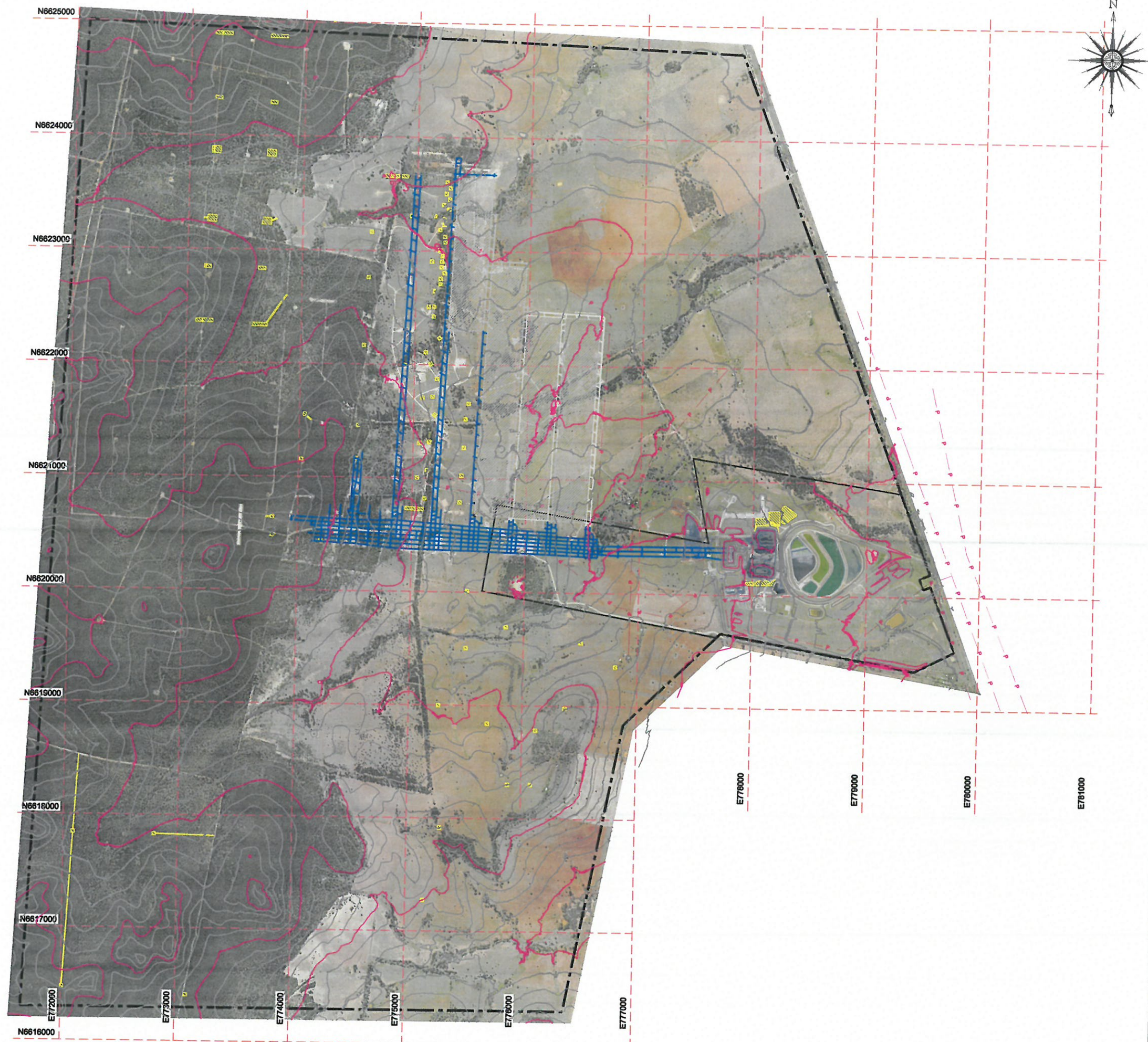
- Maintenance of established groundcover and rehabilitation across areas of disturbance, i.e. 18 ha of rehabilitation as outlined on Plan 5 and ploughing/seeding of LW102 to LW104;
- Continued improvement in noise management and amenity, including real time noise assessment;
- Continued community liaison, 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 as required by PA 08_0144 MOD 2;
- Investigate and implement management measures for water ponding in the subsidence affected area; and
- Continue to implement the Biodiversity Offset Strategy and Management Plans that meets the requirements of DP&E, OEH and DoE.

Plans

AEMR Plan 3: 2015-2016 Proposed Land
Preparation Narrabri Mine

AEMR Plan 4: 2014-2015 Mining Activities
Narrabri Mine

AEMR Plan 5: Current and Proposed
Rehabilitation 2015-2016 Narrabri Mine



NARRABRI MINE



LEGEND

- Soil Stripping Area Prior to this AEMR
- Soil Stripping Area (2014/2015 AEMR)
- Proposed Soil Stripping Area (2015/2016 AEMR)
- Rehab Area Prior to 2014-2015 Less then 10 deg slope
- Rehab Area Prior to 2014-2015 10 to 18 deg slope
- Rehab Area Prior to 2014-2015 Greater then 18 deg slope
- Rehabed Areas (2014/2015 AEMR) Less the 10 deg slope
- Rehab Area (2013/2014 AEMR) 10 to 18 deg slope
- Rehab in progress area (Prior 2014-2015 AEMR)
- Proposed Rehab Area (2015-2016 AEMR)
- Rehab Areas in Progress (2014-2015 AEMR)
- Subsoil Stockpile
- Topsoil Stockpile
- 15cm Topsoil Stripping Depth
- 25cm Subsoil Stripping Depth
- Mining Lease Boundary & Colliery Holding Boundary
- Mining Surface Lease
- Power Line
- Minor Contours 5m
- Major Contours 25m





















AEMR PLAN 3
2015-2016 PROPOSED
LAND PREPARATION
NARRABRI MINE
SCALE 1:12,500

File Ref:	NC_AEMR(2014-15) - Plan 3
Surveyor:	Peter Coffey
Signature:	
Date:	27/05/2015

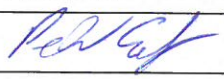
NARRABRI MINE

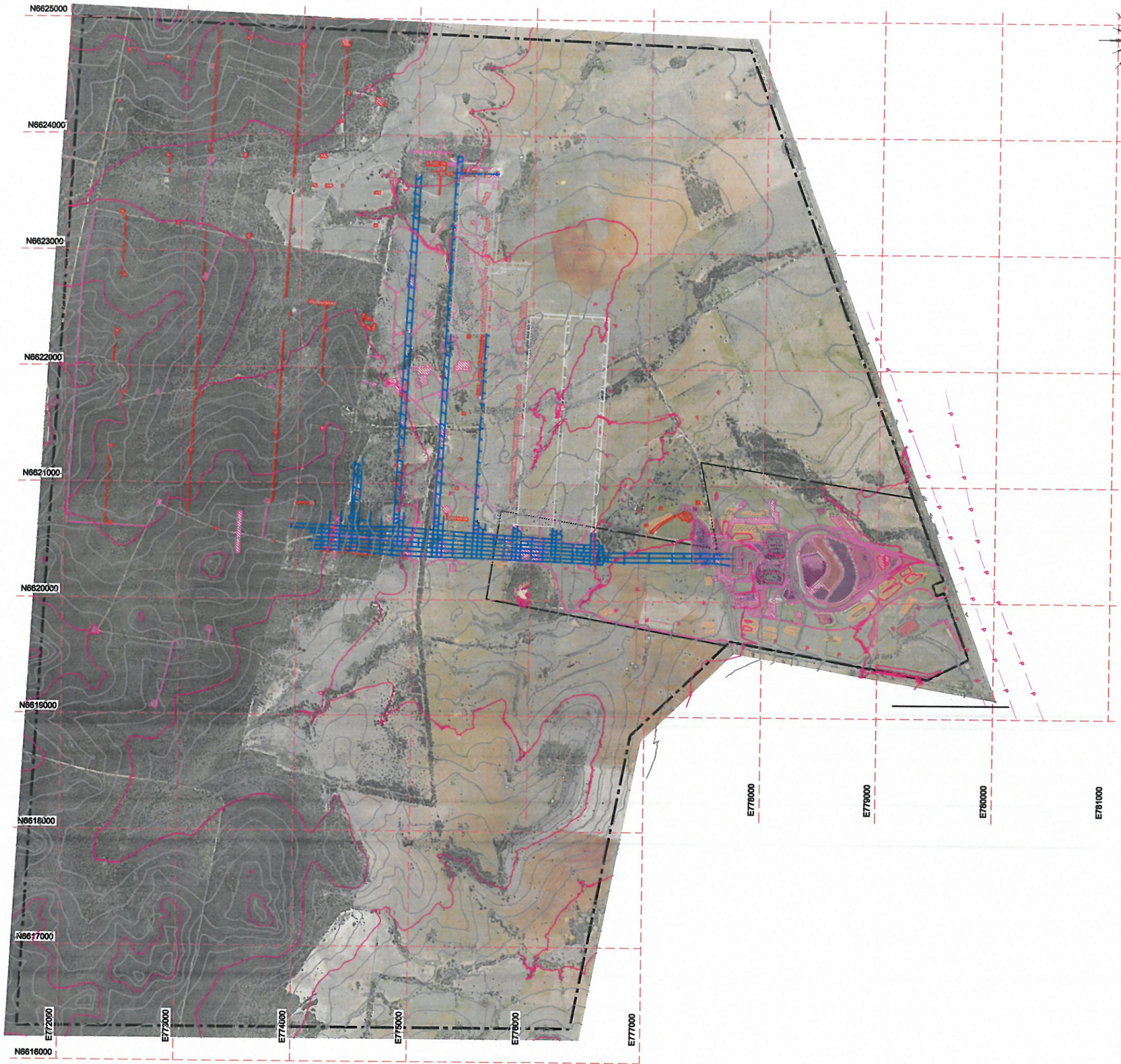


LEGEND

-  Soil Stripping Area Prior to this AEMR
-  Soil Stripping Area (2014/2015 AEMR)
-  Proposed Soil Stripping Area (2015/2016 AEMR)
-  Rehab Area Prior to 2014-2015 Less then 10 deg slope
-  Rehab Area Prior to 2014-2015 10 to 18 deg slope
-  Rehab Area Prior to 2014-2015 Greater then 18 deg slope
-  Rehabed Areas (2014/2015 AEMR) Less the 10 deg slope
-  Rehab Area (2013/2014 AEMR) 10 to 18 deg slope
-  Rehab in progress area (Prior 2014-2015 AEMR)
-  Proposed Rehab Area (2015-2016 AEMR)
-  Rehab Areas in Progress (2014-2015 AEMR)
-  Subsoil Stockpile
-  Topsoil Stockpile
-  15cm Topsoil Stripping Depth
-  25cm Subsoil Stripping Depth
-  Mining Lease Boundary & Colliery Holding Boundary
-  Mining Surface Lease
-  Power Line
-  Minor Contours 5m
-  Major Contours 25m

AEMR PLAN 4
2014-2015 MINING ACTIVITES
NARRABRI MINE
SCALE : 1:12,500

File Ref:	NC_AEMR(2014-15) - Plan 4
Surveyor:	Peter Coffey
Signature:	
Date:	27/05/2015



NARRABRI MINE

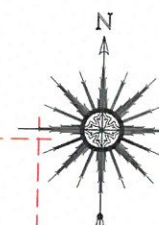
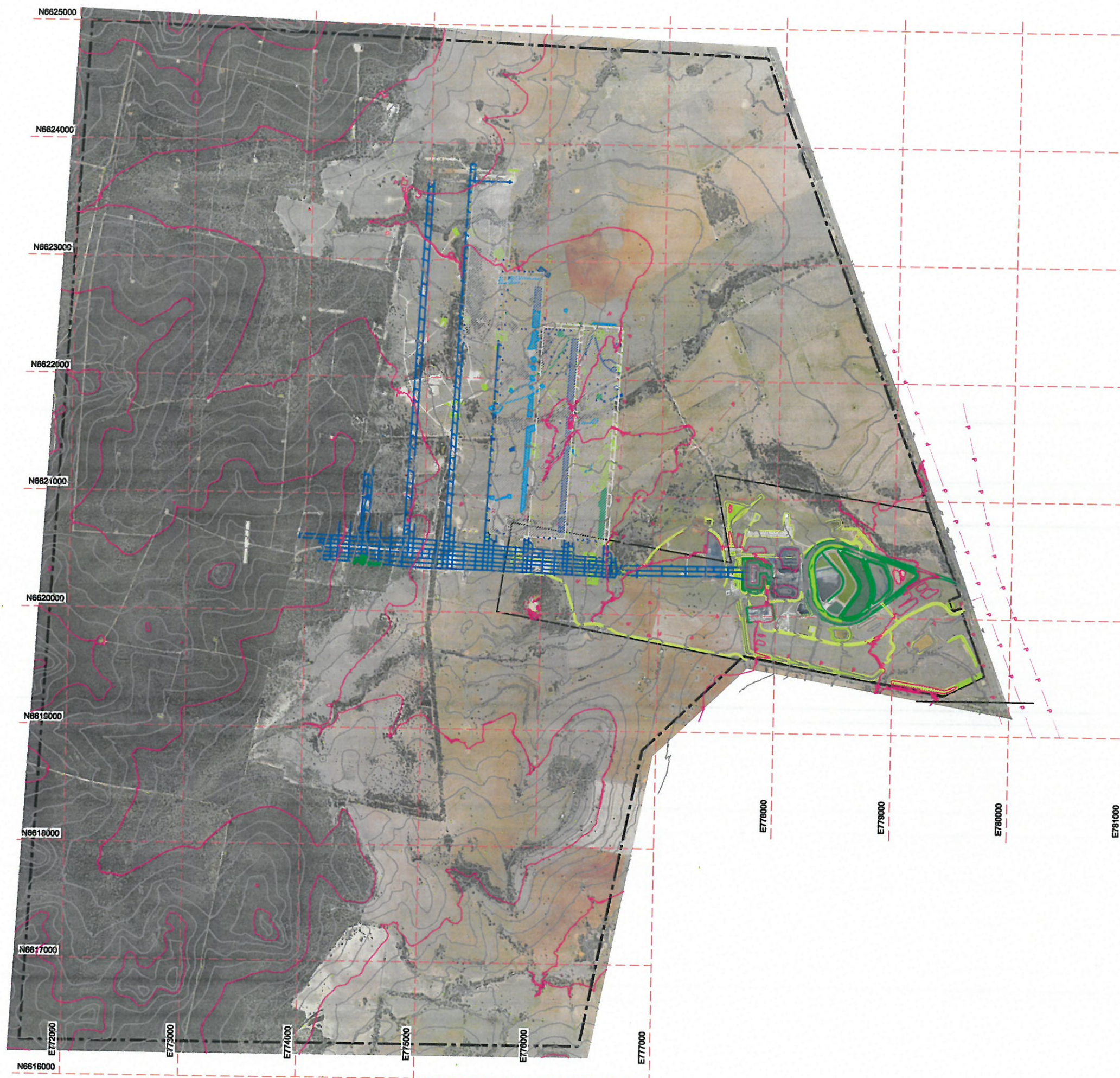


LEGEND

- Soil Stripping Area Prior to this AEMR
- Soil Stripping Area (2014/2015 AEMR)
- Proposed Soil Stripping Area (2015/2016 AEMR)
- Rehab Area Prior to 2014-2015 Less then 10 deg slope
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- Proposed Rehab Area (2015-2016 AEMR)
- Rehab Areas in Progress (2014-2015 AEMR)
- Subsoil Stockpile
- Topsoil Stockpile
- 15cm Topsoil Stripping Depth
- 25cm Subsoil Stripping Depth
- Mining Lease Boundary & Colliery Holding Boundary
- Mining Surface Lease
- P - P - Power Line
- Minor Contours 5m
- Major Contours 25m

AEMR PLAN 5
CURRENT REHABILITATION &
PROPOSED REHABILITATION 2015-2016
NARRABRI MINE
SCALE : 1:12,500

File Ref:	NC_AEMR(2014-15) - Plan 5
Surveyor:	Peter Coffey
Signature:	
Date:	27/05/2015



Appendix 1: Environmental 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

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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).

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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.

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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.

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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.

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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).

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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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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

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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:

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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, 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"
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

M4.1 Requirement to monitor weather

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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/m ²	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:
- the date of the issue of this licence or
 - 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:
- at each one of the locations listed in the Noise Limits table;
 - occur quarterly in a reporting period;
 - occur during each day, evening and night period as defined in the NSW Industrial Noise Policy for a minimum of:
 - 1.5 hours during the day;
 - 30 minutes during the evening; and
 - 1 hour during the night.
 - 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 Statement of Compliance; and
 - 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:
- 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
 - 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.

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 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.

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- 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

U1 Development of TARPs

- U1.1 The licensee must develop and implement a Trigger Action Response Plan (TARP) specific to each activity undertaken onsite which have the potential to generate dust.

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The purposes of this PRP is to build on the TARPs already developed for the coal stockpiles and should include dust from adverse weather.

A copy of each TARP must be submitted to the Armidale office of the EPA by 27 June 2014.

U2 Fully automated water spray system

- U2.1 The licensee must install a fully automated water spray system for dust suppression at the Coal Handling Facility.

The fully automated water spray system is to cover the toe of the ROM and product stockpiles as well as the transfer road between the stockpiles.

The fully automated water spray system is to be installed and operating at the premises by 31 December 2014.

- U2.2 The licensee must notify the Armidale office of the EPA of the works completed above by 31 December 2014.

U3 Tripper discharge chute redesign

- U3.1 The licensee must redesign the product tripper discharge chute to:
- concentrate the fine and coarse coal stream together,
 - fit a fixed chute to the gantry that supports the product tripper for use during adverse weather, and;
 - review the need for an additional spray ring at the discharge point once performance of the new chute shape and fixed chute has been tested.

The licensee must complete the 3 above works by 29 August 2014.

- U3.2 The licensee must notify the Armidale office of the EPA of the works completed above by 29 August 2014.

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.

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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

3DGM [in relation to a concentration limit]	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
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	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> .
AMG	Australian Map Grid
anniversary date	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.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	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> .
COD	Means chemical oxygen demand
composite sample	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.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	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.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	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.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	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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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	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
- 9 Licence varied by notice 1521420 issued on 30-Jun-2014
- 10 Licence varied by notice 1526561 issued on 24-Nov-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

SCHEDULE 1

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

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

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DEFINITIONS

Annual Review	The review required by Condition 6 of Schedule 6
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
MSB	Mine Subsidence Board
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 including the remediation of impacts
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
Safe, serviceable & repairable	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
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, such as 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

Water Resources	
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.
Biodiversity	
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

Built Features	
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.
Public Safety	
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 _{Aeq} (15 minute)	Evening L _{Aeq} (15 minute)	Night L _{Aeq} (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 ³
Particulate matter < 10 µm (PM ₁₀)	Annual	30 µg/m ³

Table 5: Short term impact assessment criteria for particulate matter

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

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 ² /month	4 g/m ² /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 1×10^{-14} m/s whenever these ponds are in use for the storage of saline waters and less than 1×10^{-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 1×10^{-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 Goimeroi 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

Domain	Rehabilitation objective
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"> • comprised of local native plant species; with • a landform consistent with the surrounding environment
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**

Area	Land Title Reference
<i>Pit Top Area</i>	<i>Lot 60 DP 757124, Part Lot 115 DP757124</i> <i>Lot 152 DP816020, Part Lots 151 & 152 DP816020</i> <i>Lots 381 & 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 & 68 DP757104</i> <i>Part Lots 57, 58, 63 to 65 DP757114</i> <i>Lot 61 DP 757124, Part Lots 81 & 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 & 68 DP 757104</i> <i>Part Lots 57, 63 to 65 DP 757114</i> <i>Part Lots 81 & 83 DP 757124</i> <i>Part Lot 1 DP798487</i> <i>Part Lot 1 DP811171</i> <i>Part Lots 151 & 152 DP816020</i> <i>Part Lot 3 DP1005608</i> <i>Part Jacks Creek State Forest (Part Lot 58 DP 757114 & 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 & 89 DP757124</i> <i>Lot 151 DP816020</i> <i>Lots 381 & 382 DP1028753</i> <i>Lot 1 DP1124652</i> <i>Various Crown and Council roads.</i>

APPENDIX 2 PROJECT MAPS

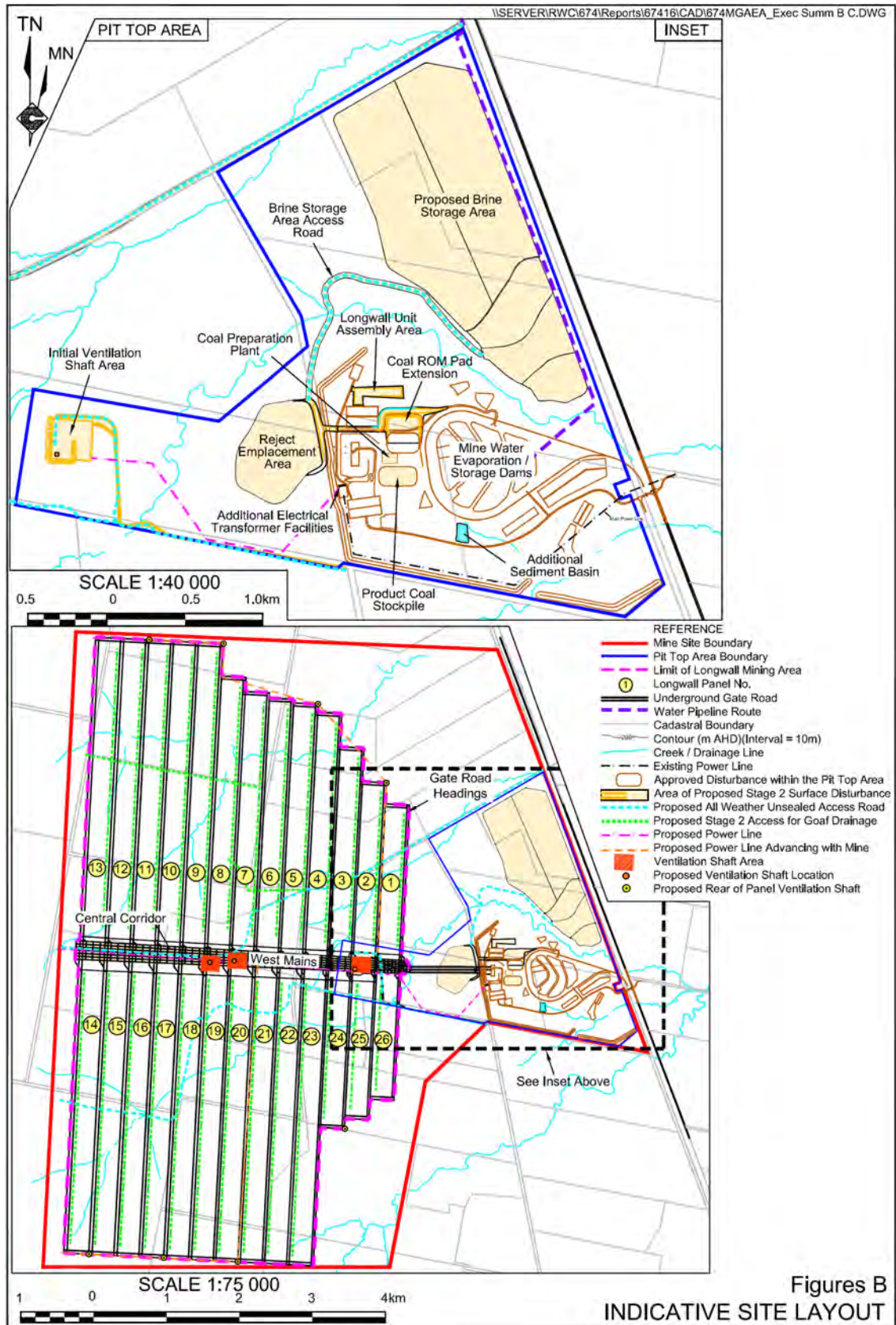


Figure 1: Project Layout

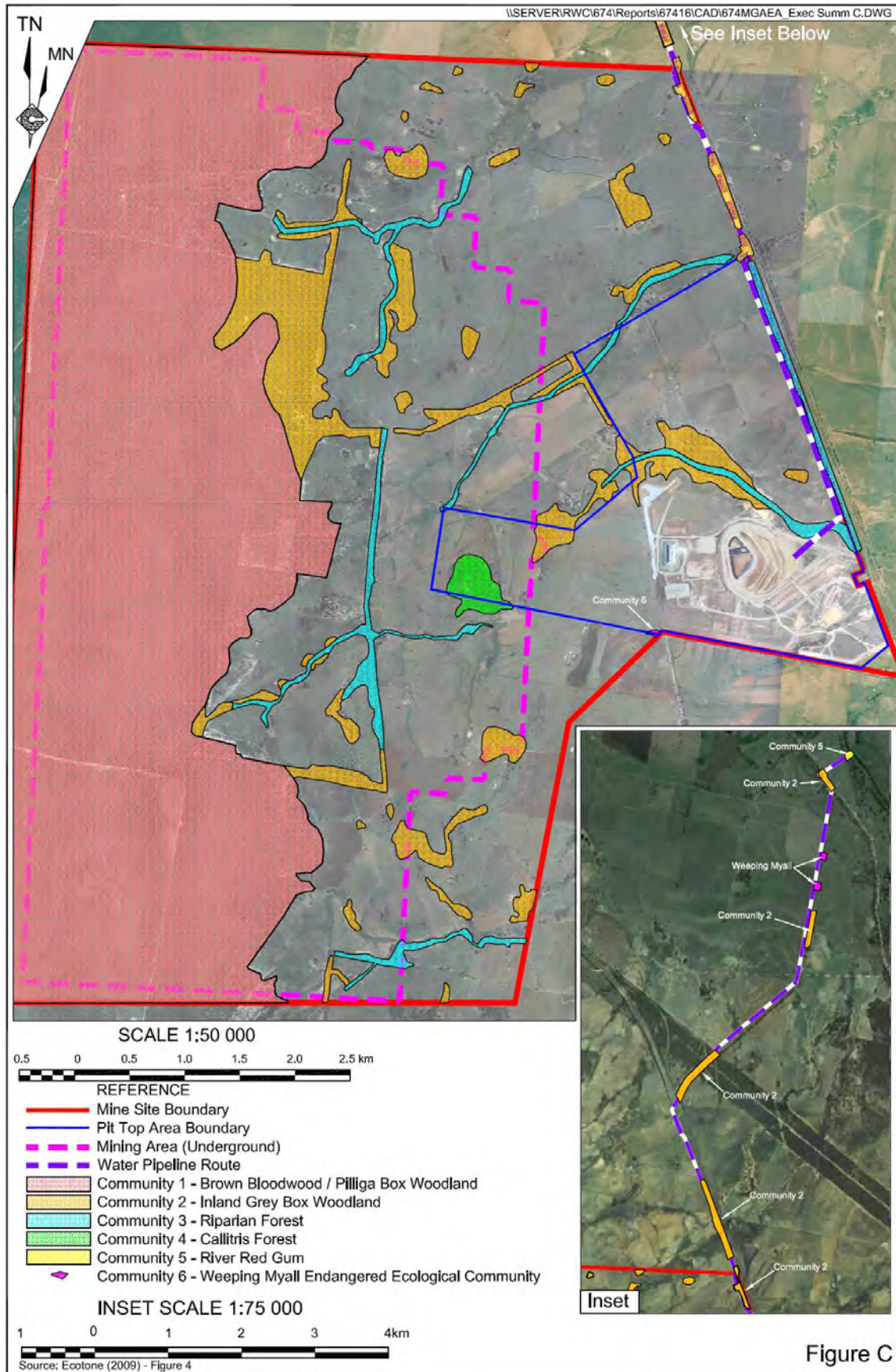


Figure 2: Vegetation communities and pipeline route



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

Figure 3: Surface Facilities Layout

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.

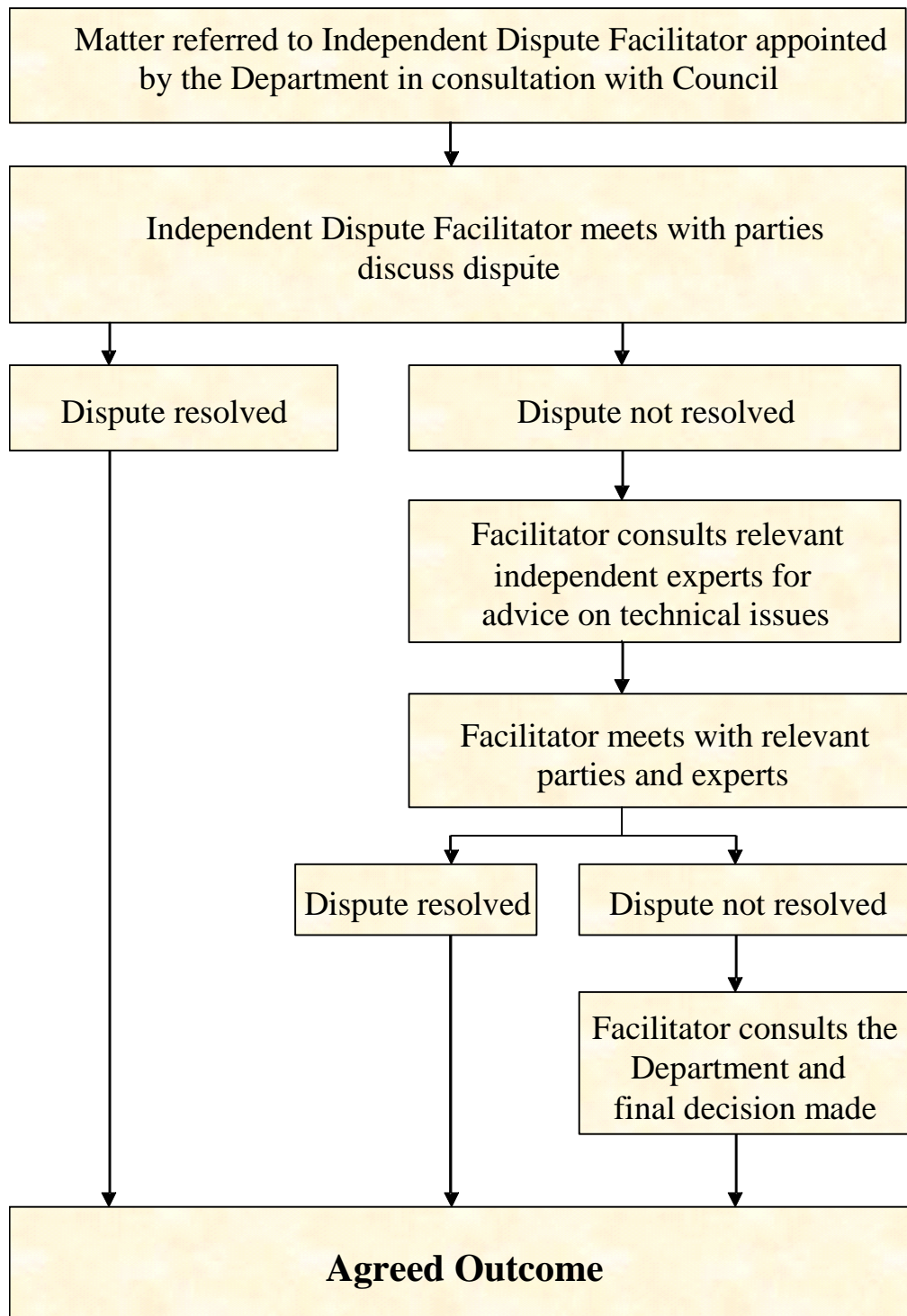
Stage 2 Planning Agreements

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
Schedule 2: Administrative Conditions			
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 2014 calendar year was 5,225,083t.
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.
Schedule 3: Specific Environmental Conditions - Mining Area			

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.	Yes	As per condition.
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.	N/A	No disputes during the reporting period.
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.	N/A	Extraction Plan not modified during the reporting period.
Schedule 4: Specific Environmental Conditions - Surface Facilities Area and General			
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	One noise exceedance was recorded during the reporting period, refer to Section 3.10 of the 2014/2015 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.	Yes	As per condition.

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	As per condition.
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 (NMP) was submitted to the Department on 24 June 2011 and approved on 6 December 2011. NMP reviewed during the reporting period but not approved by 31 March 2015.
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, refer to Section 3.1.4.3 of the 2014/2015 AEMR/Annual Review.
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 (AQMP) was submitted to the Department on 30 June 2011 and approved on 6 December 2011. AQMP reviewed during the reporting period but not approved by 31 March 2015.
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.....	Yes	Transient calibration commissioned during the reporting period. Results to be reported in the 2015/2016 AEMR/Annual Review.
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 (WTP) operational during the reporting period. The WTP was commissioned during the 2012-2013 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 1×10^{-14} m/s whenever these ponds are in use for the storage of saline waters and less than 1×10^{-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 1×10^{-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....	Yes	Review commissioned during the reporting period. Results to be reported in the 2015/2016 AEMR/Annual Review.
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 (ACHMP) was submitted to the Department on 27 June 2011 and approved on 6 December 2011. ACHMP reviewed during the reporting period but not approved by 31 March 2015.
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. LW101 to LW113 area has been surveyed.
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 Narrabri Shire Council (NSC) which was revised during the reporting period, refer to Section 3.16.2.2 of the 2014/2015 AEMR/Annual Review. 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. Results of Study reported to Gunnedah Shire Council October 2012.
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> .	No	One instance occurred during the reporting period where a lighting tower was installed so that the lights were shining above the horizontal.
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 Stage 2 Energy Savings Action Plan was updated during the reporting period and approved by DP&E on 11 August 2014. Refer to Section 3.18.1 of the 2014/2015 AEMR/Annual Review.
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"> (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. 	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"> (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. 	Yes	The revised Waste Management Plan was submitted to the Department on 27 June 2011 and approved on 6 December 2011. The Waste Management Plan was updated during the reporting period but not approved by DP&E by 31 March 2015.
Schedule 5: Rehabilitation and Offsets			
1	The Proponent shall rehabilitate the site to the satisfaction of the Director-General and I&I NSW.	N/A	Not yet triggered.
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.	Yes	The Biodiversity Offset Strategy was approved on 11 August 2014. The initial version was first submitted during September 2010.
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	While the BOS was approved during the reporting period, the long-term security of the offset areas has not yet been resolved. DP&E authorised an extension to 30 June 2015 to allow for the long-term security of the offset areas once the NSW Government has issued a policy on their preferred method for securing offset areas.

Condition	PA 08_0144 MOD 2 – Conditional Requirement	Compliance	Comments
Schedule 6: Environmental Management, Monitoring, Auditing and Reporting			
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"> (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: <ul style="list-style-type: none"> - 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. 	Yes	The revised Environmental Management Strategy (EMS) was submitted to the Department on 30 June 2011 and was approved on 6 December 2011. The EMS was updated during the reporting period but not approved by DP&E by 31 March 2015.
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 commissioned prior to 13 September 2013, reported during August 2014.
8	Within 6 weeks of the completing of this audit....	Yes	Independent Audit received June 2014 and submitted August 2014.

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 has added to the company's website a copy of the Subsidence Management Plan approval as well as documentation in relation to modifications 1 and 2. DP&E audited the website on 30 September 2014 and found it complied with all conditions relating to website content.
Schedule 7: Additional Procedures for Air Quality and Noise Management			
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	Exceedance 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...	Yes	As per condition.
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 works (>5,000,000 T handled) – 5,693,316, Mining for coal (>5,000,000 T produced) – 6,121,458 T.
A2.1	Premises or plant to which the licence applies	Yes	Premises details correct
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.	No	Non-compliances outlined below.
P1.3-P1.4	Location of monitoring/discharge points and areas	Yes	As per condition. Refer to Section 3.3 of the 2014/2015 AEMR/Annual Review.
L1.1	Pollution of waters	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 2014/2015 AEMR/Annual Review.
L3.1-L3.5	Noise Limits	No	Exceeded limit on one occasion. Reported to DP&E, EPA and landowner. Refer to Section 3.10 of the 2014/2015 AEMR/Annual Review.
L4.1-4.8	Blasting	N/A	N/A
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	Yes	As per condition.
M1.1-M1.3	Record and retain monitoring results required as per this licence.	Yes	As per condition.
M2.1-M2.6	Monitor each monitoring point for pollutants as specified in licence	Yes	As per condition.

Condition	EPL 12789 – Conditional Requirement	Compliance	Comments
M3.1-M3.8	Testing methods – concentrations limits.	Yes	As per condition.
M4.1	Monitor weather parameters specified	Yes	As per condition.
M5.1-M5.4	Recording of pollution complaints	Yes	As per condition.
M6.1-M6.3	Telephone complaints line	Yes	As per condition.
M7.1	<p>To determine compliance with Noise Limits table, monitoring must be undertaken as follows:</p> <p>(a) At each one of the locations listed in the Noise Limits table;</p> <p>(b) Occur quarterly in a reporting period;</p> <p>(c) Occur during each day, evening and night period as defined in the NSW Industrial Noise Policy for a minimum of:</p> <p style="margin-left: 40px;">i) 1.5 hours during the day;</p> <p style="margin-left: 40px;">ii) 30 minutes during the evening; and</p> <p style="margin-left: 40px;">iii) 1 hour during the night.</p> <p>(d) Occur for three consecutive operating days.</p>	Yes	As per condition. Monitoring at location N6 is undertaken at the boundary with the mine as access has not been granted which the EPA were advised of in the December 2011 variation. All other points monitored as per the condition.
R1.1-R1.7	<p>Annual Return Documents Complete and supply Annual Return to EPA comprising:</p> <p>(a) Statement of Compliance; and</p> <p>(b) Monitoring & Complaints Summary.</p>	Yes	As per condition. 2014/2015 Annual Return submitted by 21 April 2015.
R2.1-R2.2	Notify of environmental harm	N/A	None reported.
R3.1-R3.4	Written report	N/A	No written requests received.
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> <p>(a) An assessment of compliance with noise limits; and</p> <p>(b) An outline of any management actions taken within the monitoring period to address any exceedances.</p>	Yes	As per condition.

Condition	EPL 12789 – Conditional Requirement	Compliance	Comments
G1.1- G1.3	Copy of licence kept at the premises	Yes	As per condition.
U1.1	Development of TARPs	Yes	As per condition.
U2.1	Install a fully automated water spray system	No	Water spray system not installed by due date, EPA notified of this by the due date but could not issue EPL variation.
U2.2	Must be done by 31 December 2014	No	Water spray system not installed by due date, EPA notified of this by the due date but could not issue EPL variation.
U3.1	Tripper discharge chute redesign	Yes	As per condition.
U3.2	Must be done by 29 August 2014	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	N/A	Not triggered.
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.	N/A	Noise complaints received during calm conditions generally associated with temperature inversions not wind speeds of >3m/s.

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. 2013/2014 AEMR submitted 30 June 2014.
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)-(d)	Prepare an Extraction Plan prior to commencing any underground mining operations.	Yes	Extraction Plan for LW101 to LW105 approval received from the Department on 5 June 2012.
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.	N/A	None requested.
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.	Yes	Crown Lands approval received for timber removal from lease area to allow for exploration activities.

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 in place.
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.

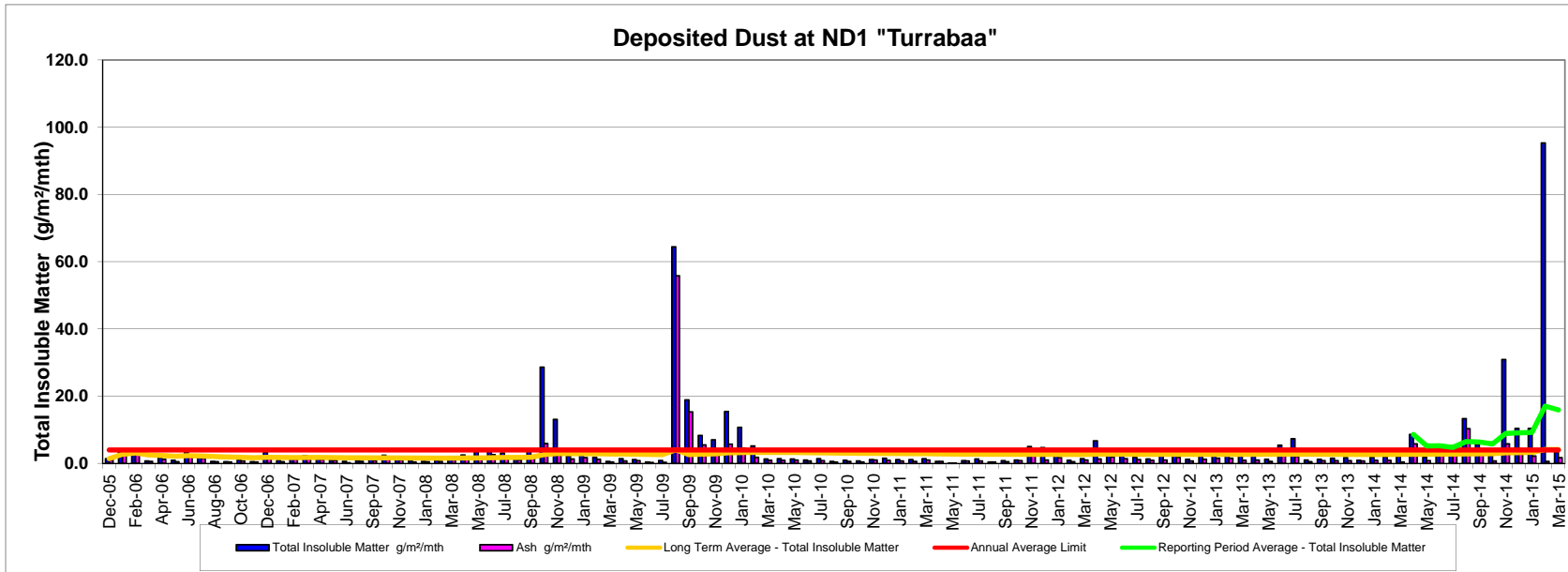
Appendix 4: Dust monitoring Results

Deposited Dust - ND1 "Turrabaa"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /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
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

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
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
EN1301429-001	ND1	15-Apr-13	Apr-13	ALS	12:25	250	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		2.7	4.0	0.6	Insects, plant material
EN1302214-001	ND1	14-Jun-13	Jun-13	ALS	11:30	900	5.4		2.7	4.0	2.5	Insects, plant material
EN1302597-001	ND1	15-Jul-13	Jul-13	ALS	9:40	500	7.3		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		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		2.7	4.0	0.8	Insects, plant material
EN1303774-003	ND1	14-Oct-13	Oct-13	ALS	11:40	350	1.5		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	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		2.7	4.0	0.7	Insects, bird droppings, plant material
EN1400142-001	ND1	13-Jan-14	Jan-14	ALS	10:40	100	1.8		2.7	4.0	0.9	Insects, bird droppings, plant material
26001877-001	ND1	12-Feb-14	Feb-14	ALS	11:00	150	2.0		2.7	4.0	0.9	Insects, bird droppings, plant material
26001889-001	ND1	13-Mar-14	Mar-14	ALS	9:05	750	2.1		2.7	4.0	0.4	Plant material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
26001906-001	ND1	14-Apr-14	Apr-14	ALS	11:45	3000	8.6	8.6	2.7	4.0	5.8	Insects, plant material
26001919-001	ND1	14-May-14	May-14	ALS	11:40	500	1.8	5.2	2.7	4.0	0.8	Insects, plant material
26001933-001	ND1	13-Jun-14	Jun-14	ALS	11:25	1000	5.4	5.3	2.7	4.0	4.2	Insects, bird droppings
26001946-001	ND1	14-Jul-14	Jul-14	ALS	11:20	750	3.3	4.8	2.7	4.0	2.9	Plant material
26001959-001	ND1	13-Aug-14	Aug-14	ALS	12:15	400	13.3	6.5	2.8	4.0	10.3	Insects, plant material
26001973-001	ND1	12-Sep-14	Sep-14	ALS	11:35	1400	5.7	6.4	2.9	4.0	3.6	Insects, bird droppings, plant material
26001987-001	ND1	13-Oct-14	Oct-14	ALS	11:30	260	2.4	5.8	2.9	4.0	0.7	Insects, plant material
26002002-001	ND1	13-Nov-14	Nov-14	ALS	12:20	750	30.9	8.9	3.1	4.0	5.8	Insects, plant material
26002019-001	ND1	13-Dec-14	Dec-14	ALS	12:30	750	10.4	9.1	3.2	4.0	3.7	Insects, plant material
26002034-001	ND1	15-Jan-15	Jan-15	ALS	11:45	1500	10.4	9.2	3.3	4.0	2.2	Insects, plant material
26002049-001	ND1	13-Feb-15	Feb-15	ALS	10:40	1100	95.3	17.0	4.1	4.0	0.6	Insects, plant material
26002064-001	ND1	16-Mar-15	Mar-15	ALS	12:40	0	3.3	15.9	4.1	4.0	1.7	Insects, plant material, bushfire early March 2015

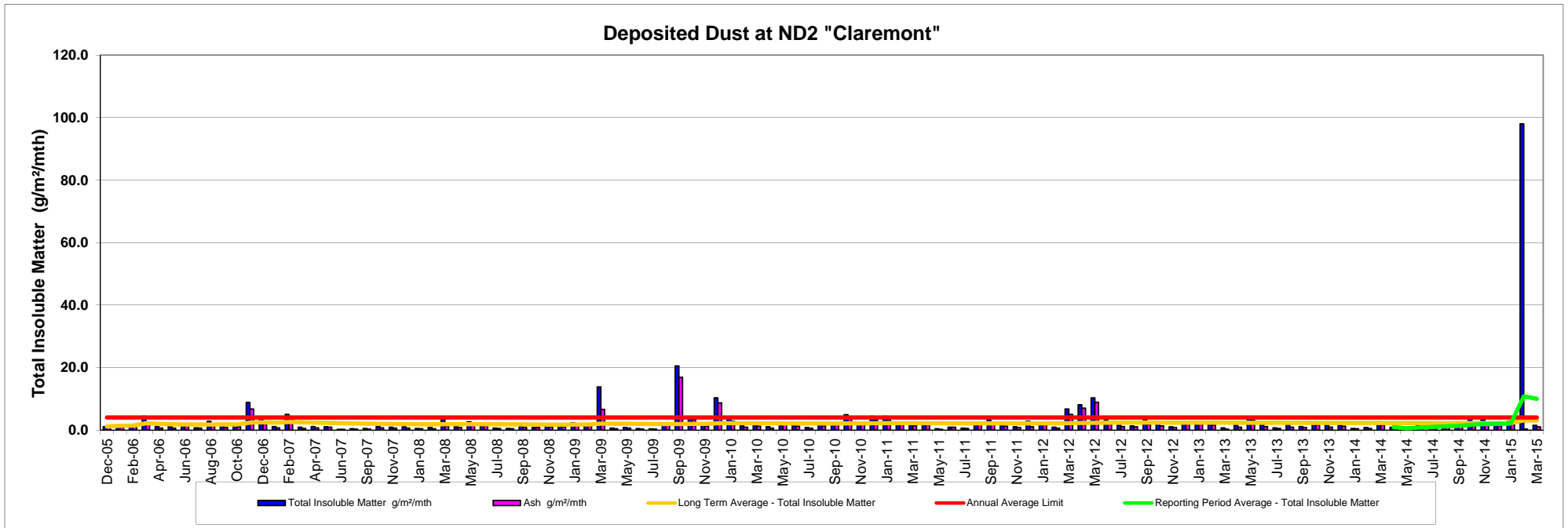


Deposited Dust - ND2 "Claremont"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /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
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

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
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
2600130915	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, plant 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
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		2.3	4.0	0.9	Insects, plant material
EN1301803-002	ND2	15-May-13	May-13	ALS	11:15	300	3.9		2.3	4.0	3.1	Insects, bird droppings, plant material
EN1302214-002	ND2	14-Jun-13	Jun-13	ALS	11:00	1050	1.6		2.3	4.0	1.1	Insects, bird droppings, plant material
EN1302597-002	ND2	15-Jul-13	Jul-13	ALS	9:50	500	0.7		2.3	4.0	0.5	Insects, plant material
EN1303005-001	ND2	14-Aug-13	Aug-13	ALS	10:45	350	1.8		2.3	4.0	0.9	Insects, plant material
EN1303432-001	ND2	13-Sep-13	Sep-13	ALS	12:15	100	1.1		2.3	4.0	0.8	Insects, plant material
EN1303774-001	ND2	14-Oct-13	Oct-13	ALS	11:15	350	2.1		2.3	4.0	1.7	Insects, plant material
EN1304181-002	ND2	13-Nov-13	Nov-13	ALS	12:15	200	1.6		2.3	4.0	0.9	Insects, plant material
EN1304646-002	ND2	13-Dec-13	Dec-13	ALS	11:30	650	1.5		2.3	4.0	1.2	Insects, plant material
EN1400142-002	ND2	14-Jan-14	Jan-14	ALS	10:25	100	0.5		2.2	4.0	0.4	Insects, plant material
26001877-002	ND2	12-Feb-14	Feb-14	ALS	10:45	100	0.8		2.2	4.0	0.5	Insects, plant material
26001889-002	ND2	13-Mar-14	Mar-14	ALS	9:35	750	2.6		2.2	4.0	1.7	Insects, plant material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
26001906-004	ND2	14-Apr-14	Apr-14	ALS	11:30	3000	0.9	0.9	2.2	4.0	0.5	Plant material
26001919-004	ND2	14-May-14	May-14	ALS	11:25	500	0.2	0.6	2.2	4.0	0.2	Insects
26001933-002	ND2	13-Jun-14	Jun-14	ALS	11:10	1000	1.3	0.8	2.2	4.0	0.8	
26001946-002	ND2	14-Jul-14	Jul-14	ALS	11:10	700	1.6	1.0	2.2	4.0	1.4	Plant material
26001959-002	ND2	13-Aug-14	Aug-14	ALS	12:00	500	1.9	1.2	2.2	4.0	1.0	Plant material
26001973-002	ND2	12-Sep-14	Sep-14	ALS	11:20	1300	1.9	1.3	2.2	4.0	1.7	Insects
26001987-002	ND2	13-Oct-14	Oct-14	ALS	11:15	490	4.1	1.7	2.2	4.0	1.9	Insects, plant material
26002002-002	ND2	13-Nov-14	Nov-14	ALS	12:10	900	3.4	1.9	2.2	4.0	2.0	Plant material
26002019-002	ND2	13-Dec-14	Dec-14	ALS	12:20	1000	2.4	2.0	2.2	4.0	1.4	Insects, plant material
26002034-002	ND2	15-Jan-15	Jan-15	ALS	11:20	1500	2.8	2.1	2.2	4.0	2.0	Insects
26002049-002	ND2	13-Feb-15	Feb-15	ALS	11:10	1000	98.0	10.8	3.1	4.0	0.3	Insects, bird droppings, plant material
26002064-002	ND2	16-Mar-14	Mar-15	ALS	12:30	0	1.5	10.0	3.1	4.0	1.0	Insects, plant material, bushfire early March 2015

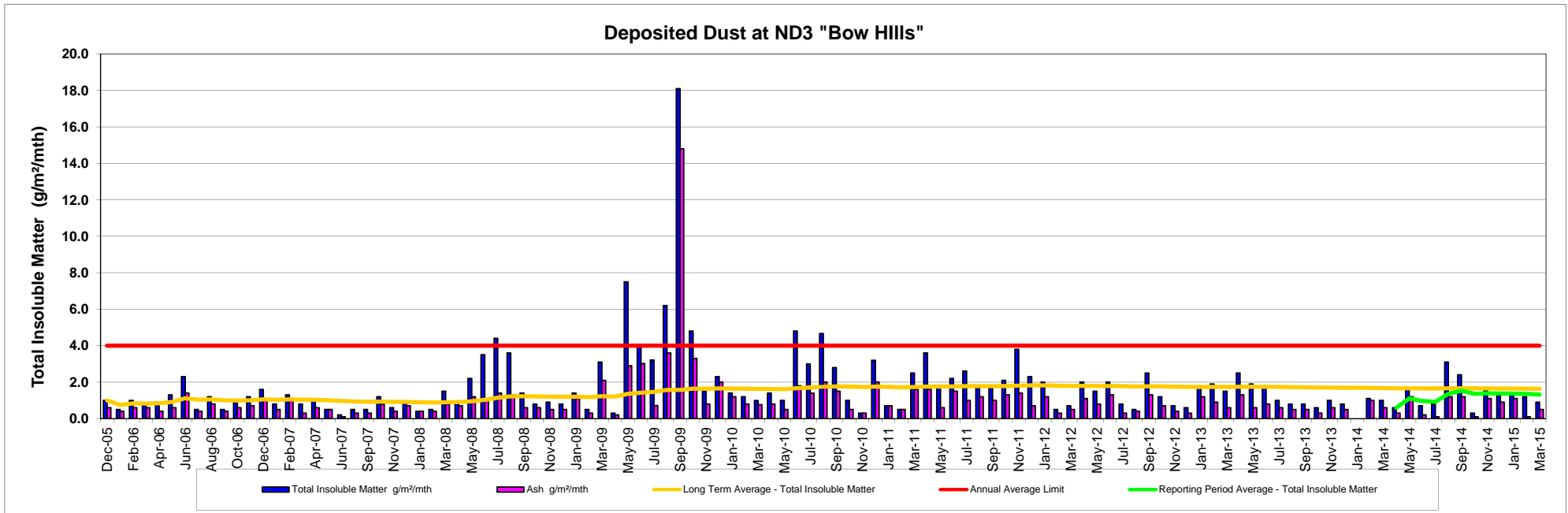


Deposited Dust - ND3 "Bow Hills"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /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
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

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
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
2600130915	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, plant 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, plant material
EN1203132-003	ND3	17-Aug-12	Aug-12	ALS	11:10	100	0.5		1.8	4.0	0.4	Insects, bird droppings, plant material
EN1203603-003	ND3	18-Sep-12	Sep-12	ALS	12:10	100	2.5		1.8	4.0	1.3	Insects, bird droppings, plant 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
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		1.7	4.0	1.3	Insects, plant material
EN1301803-003	ND3	15-May-13	May-13	ALS	10:00	250	1.9		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		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		1.7	4.0	0.6	Insects, plant material
EN1303005-006	ND3	14-Aug-13	Aug-13	ALS	9:10	350	0.8		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		1.7	4.0	0.5	Insects, bird droppings, plant material
EN1303774-006	ND3	14-Oct-13	Oct-13	ALS	9:55	350	0.6		1.7	4.0	0.3	Insects, bird droppings, plant material
EN1304181-003	ND3	13-Nov-13	Nov-13	ALS	9:45	250	1.0		1.7	4.0	0.6	Insects, plant material
EN1304646-003	ND3	13-Dec-13	Dec-13	ALS	9:50	650	0.8		1.7	4.0	0.5	Insects, plant material
EN1400142-003	ND3	13-Jan-14	Jan-14	ALS	8:55	150			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		1.7	4.0	1.0	Insects, plant material
26001889-003	ND3	13-Mar-14	Mar-14	ALS	11:00	750	1.0		1.7	4.0	0.6	Insects, plant material

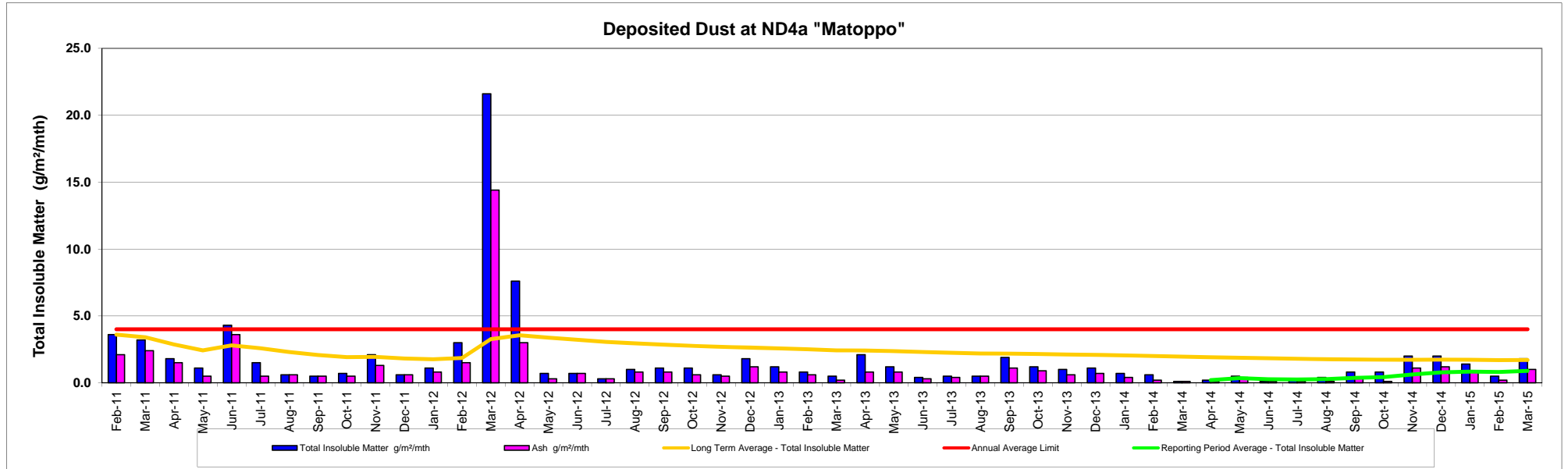
Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
26001906-005	ND3	14-Apr-14	Apr-14	ALS	9:40	3000	0.6	0.6	1.7	4.0	0.3	Insects, plant material
26001919-005	ND3	14-May-14	May-14	ALS	9:30	400	1.6	1.1	1.7	4.0	1.2	Plant material
26001933-003	ND3	13-Jun-14	Jun-14	ALS	9:15	750	0.7	1.0	1.7	4.0	0.2	Plant material
26001946-003	ND3	14-Jul-14	Jul-14	ALS	9:35	500	0.8	0.9	1.6	4.0	0.1	Plant material, Ash content <0.1
26001959-003	ND3	13-Aug-14	Aug-14	ALS	9:50	250	3.1	1.4	1.7	4.0	1.2	Plant material
26001973-003	ND3	12-Sep-14	Sep-14	ALS	9:20	1250	2.4	1.5	1.7	4.0	1.2	Insects, plant material
26001987-003	ND3	13-Oct-14	Oct-14	ALS	9:30	260	0.3	1.4	1.7	4.0	0.1	Insects, bird droppings, plant material, Ash content <0.1
26002002-003	ND3	13-Nov-14	Nov-14	ALS	9:30	750	1.6	1.4	1.7	4.0	1.1	Insects, plant material
26002019-003	ND3	13-Dec-14	Dec-14	ALS	9:35	750	1.3	1.4	1.6	4.0	0.9	Insects
26002034-003	ND3	15-Jan-15	Jan-15	ALS	9:10	1500	1.3	1.4	1.6	4.0	1.1	Insects
26002049-003	ND3	13-Feb-15	Feb-15	ALS	9:30	1000	1.2	1.4	1.6	4.0	0.1	Insects, plant material, Ash content <0.1
26002064-003	ND3	16-Mar-15	Mar-15	ALS	9:50	0	0.9	1.3	1.6	4.0	0.5	Insects, bushfire early March 2015



Deposited Dust - ND4a "Matoppo"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /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, plant 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		2.4	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		2.4	4.0	0.8	Insects, plant material
EN1302214-004	ND4A	14-Jun-13	Jun-13	ALS	9:50	800	0.4		2.3	4.0	0.3	Insects, plant material
EN1302597-004	ND4A	15-Jul-13	Jul-13	ALS	11:15	450	0.5		2.2	4.0	0.4	Insects, plant material
EN1303005-008	ND4A	14-Aug-13	Aug-13	ALS	9:30	350	0.5		2.2	4.0	0.5	Insects, plant material
EN1303432-008	ND4A	13-Sep-13	Sep-13	ALS	11:15	150	1.9		2.2	4.0	1.1	Insects, plant material
EN1303774-008	ND4A	14-Oct-13	Oct-13	ALS	10:10	350	1.2		2.1	4.0	0.9	Insects, plant material
EN1304181-004	ND4A	13-Nov-13	Nov-13	ALS	12:45	200	1.0		2.1	4.0	0.6	Insects, plant material
EN1304646-004	ND4A	13-Dec-13	Dec-13	ALS	10:05	700	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		2.0	4.0	0.4	Insects, plant material
26001877-004	ND4A	12-Feb-14	Feb-14	ALS	9:30	200	0.6		2.0	4.0	0.2	Insects, plant material
26001889-004	ND4A	13-Mar-14	Mar-14	ALS	10:30	750	0.1		2.0	4.0	0.1	Insects, Total & Ash content <0.1

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
26001906-006	ND4A	14-Apr-14	Apr-14	ALS	10:10	3000	0.2	0.2	1.9	4.0	0.1	Insects, plant material, Ash content <0.1
26001919-006	ND4A	14-May-14	May-14	ALS	10:10	300	0.5	0.4	1.9	4.0	0.4	Insects
26001933-004	ND4A	13-Jun-14	Jun-14	ALS	9:50	600	0.1	0.3	1.8	4.0	0.1	Insects, Total & Ash content <0.1
26001946-004	ND4A	14-Jul-14	Jul-14	ALS	10:05	500	0.2	0.3	1.8	4.0	0.1	Plant material, Ash content <0.1
26001959-004	ND4A	13-Aug-14	Aug-14	ALS	10:30	400	0.4	0.3	1.8	4.0	0.1	
26001973-004	ND4A	12-Sep-14	Sep-14	ALS	10:00	1200	0.8	0.4	1.7	4.0	0.4	Insects
26001987-004	ND4A	13-Oct-14	Oct-14	ALS	10:00	250	0.8	0.4	1.7	4.0	0.1	Insects, plant material, Ash content <0.1
26002002-004	ND4A	13-Nov-14	Nov-14	ALS	10:00	500	2.0	0.6	1.7	4.0	1.1	Insects, plant material
26002019-004	ND4A	13-Dec-14	Dec-14	ALS	10:05	500	2.0	0.8	1.7	4.0	1.2	Insects
26002034-004	ND4A	15-Jan-15	Jan-15	ALS	9:40	500	1.4	0.8	1.7	4.0	0.8	Insects
26002049-004	ND4A	13-Feb-15	Feb-15	ALS	10:00	500	0.5	0.8	1.7	4.0	0.2	Insects, plant material
26002064-004	ND4A	16-Mar-15	Mar-15	ALS	10:20	0	1.8	0.9	1.7	4.0	1	Insects, plant material, bushfire early March 2015, funnel broken but replaced

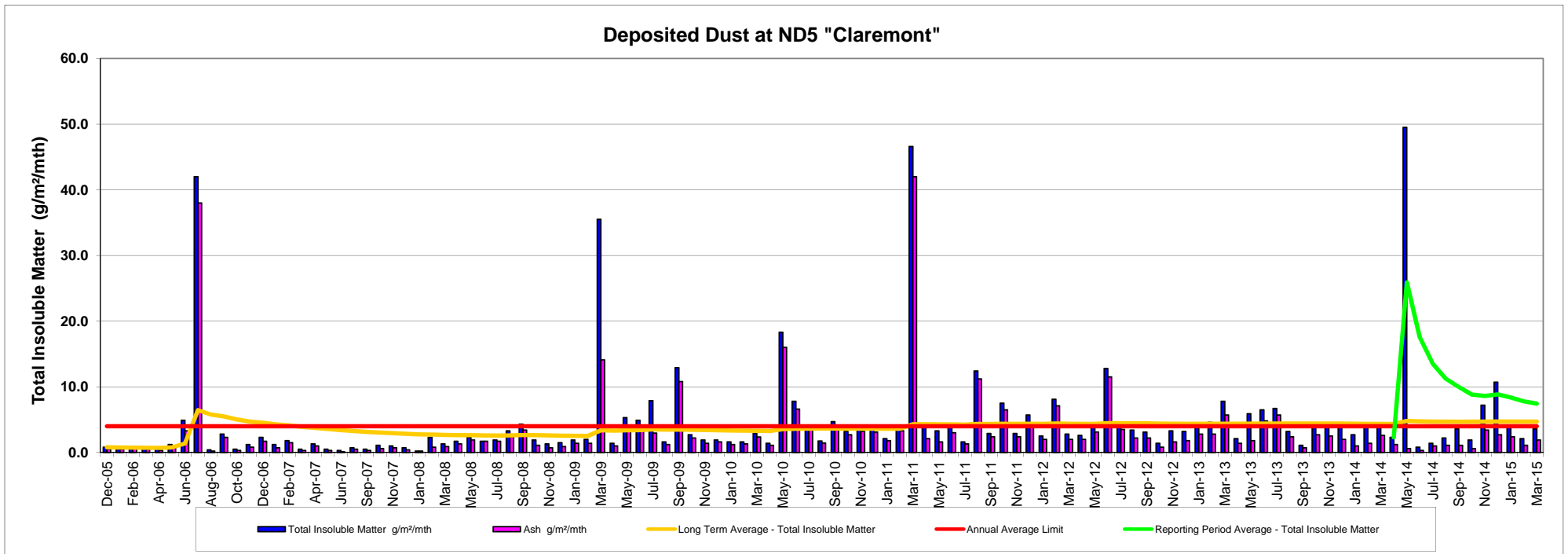


Deposited Dust - ND5 "Claremont"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /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
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

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
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
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		4.4	4.0	1.4	Insects, plant material
EN1301803-005	ND5	15-May-13	May-13	ALS	10:40	250	5.9		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		4.4	4.0	4.8	Insects, plant material
EN1302597-005	ND5	15-Jul-13	Jul-13	ALS	10:45	400	6.7		4.4	4.0	5.7	Insects, plant material
EN1303005-007	ND5	14-Aug-13	Aug-13	ALS	9:50	350	3.2		4.4	4.0	2.4	Insects, plant material
EN1303432-007	ND5	13-Sep-13	Sep-13	ALS	11:45	100	1.1		4.4	4.0	0.7	Insects, plant material
EN1303774-007	ND5	14-Oct-13	Oct-13	ALS	10:45	300	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		4.4	4.0	2.5	Insects, plant material
EN1304646-005	ND5	13-Dec-13	Dec-13	ALS	10:45	650	3.8		4.4	4.0	2.0	Insects, plant material
EN1400142-005	ND5	13-Jan-14	Jan-14	ALS	9:25	100	2.7		4.4	4.0	1.0	Insects, plant material
26001877-005	ND5	12-Feb-14	Feb-14	ALS	9:45	100	3.9		4.4	4.0	1.4	Insects, plant material
26001889-005	ND5	13-Mar-14	Mar-14	ALS	10:15	500	3.8		4.4	4.0	2.6	Insects, plant material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
26001906-007	ND5	14-Apr-14	Apr-14	ALS	10:30	3000	2.3	2.3	4.3	4.0	1.2	Insects
26001919-007	ND5	14-May-14	May-14	ALS	10:25	450	49.5	25.9	4.8	4.0	0.6	Plant material
26001933-005	ND5	13-Jun-14	Jun-14	ALS	10:20	1000	0.8	17.5	4.7	4.0	0.3	
26001946-005	ND5	14-Jul-14	Jul-14	ALS	10:20	550	1.4	13.5	4.7	4.0	1.0	Insects
26001959-005	ND5	13-Aug-14	Aug-14	ALS	11:20	500	2.2	11.2	4.7	4.0	1.1	Insects, plant material
26001973-005	ND5	12-Sep-14	Sep-14	ALS	10:20	1250	3.6	10.0	4.7	4.0	1.1	Insects, bird droppings, plant material
26001987-005	ND5	13-Oct-14	Oct-14	ALS	10:15	240	1.9	8.8	4.7	4.0	0.6	Insects, plant material
26002002-005	ND5	13-Nov-14	Nov-14	ALS	11:20	800	7.2	8.6	4.7	4.0	3.4	Insects, plant material
26002019-005	ND5	13-Dec-14	Dec-14	ALS	11:30	700	10.7	8.8	4.7	4.0	2.7	Insects, plant material
26002034-005	ND5	15-Jan-15	Jan-15	ALS	10:50	1250	4.0	8.4	4.7	4.0	2.4	Insects
26002049-005	ND5	13-Feb-15	Feb-15	ALS	11:55	1100	2.1	7.8	4.7	4.0	1.1	Insects, plant material
26002064-005	ND5	16-Mar-15	Mar-15	ALS	11:40	0	3.6	7.4	4.7	4.0	1.9	Insects, plant material, bushfire early March 2015

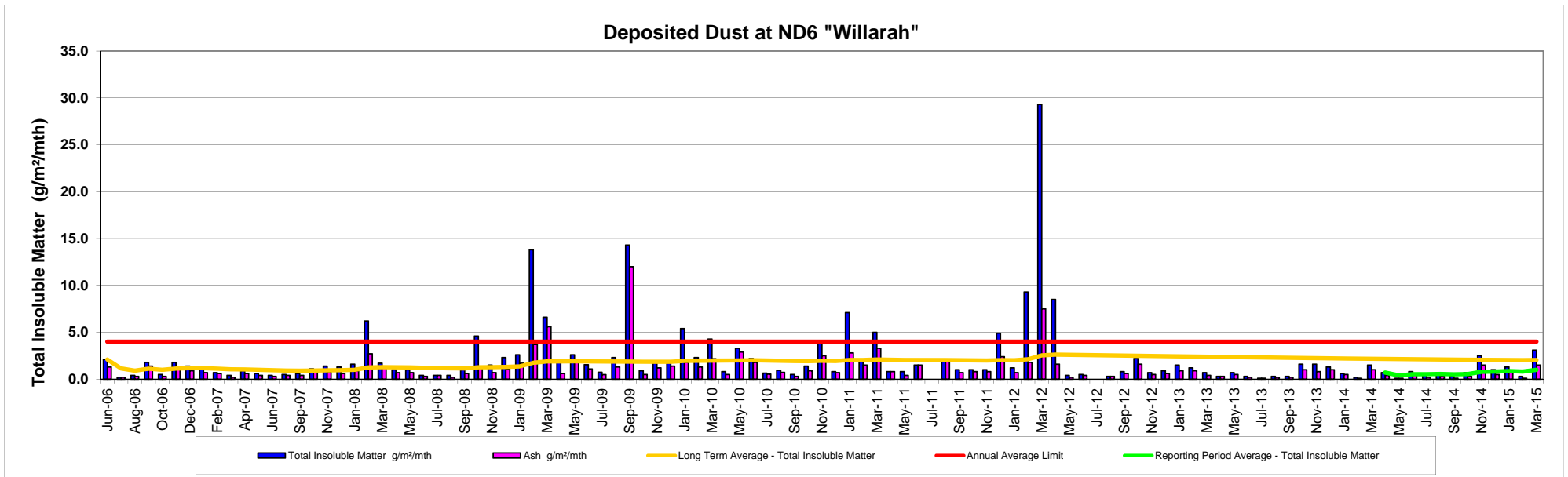


Deposited Dust - ND6 "Willarah"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /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
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

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
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
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		2.4	4.0	0.3	Insects, plant material
EN1301803-006	ND6	15-May-13	May-13	ALS	10:50	250	0.7		2.4	4.0	0.5	Insects, plant material
EN1302214-006	ND6	14-Jun-13	Jun-13	ALS	10:30	800	0.3		2.3	4.0	0.2	Insects, plant material
EN1302597-006	ND6	15-Jul-13	Jul-13	ALS	11:00	400	0.1		2.3	4.0	0.1	Insects, plant material
EN1303005-004	ND6	14-Aug-13	Aug-13	ALS	10:05	350	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		2.3	4.0	0.2	Insects, plant material
EN1303774-004	ND6	14-Oct-13	Oct-13	ALS	10:30	300	1.6		2.2	4.0	1.0	Insects, plant material
EN1304181-006	ND6	13-Nov-13	Nov-13	ALS	11:20	200	1.6		2.2	4.0	0.8	Insects, plant material
EN1304646-006	ND6	13-Dec-13	Dec-13	ALS	10:35	650	1.3		2.2	4.0	1.0	Insects, plant material
EN1400142-006	ND6	13-Jan-14	Jan-14	ALS	9:40	100	0.6		2.2	4.0	0.5	Insects, plant material
26001877-006	ND6	12-Feb-14	Feb-14	ALS	10:00	100	0.2		2.2	4.0	0.1	Insects, plant material
26001889-006	ND6	13-Mar-14	Mar-14	ALS	10:05	600	1.5		2.2	4.0	1.0	Insects, plant material

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
26001906-008	ND6	14-Apr-14	Apr-14	ALS	10:45	3000	0.7	0.7	2.2	4.0	0.4	Insects, plant material
26001919-008	ND6	14-May-14	May-14	ALS	10:40	500	0.1	0.4	2.1	4.0	0.1	Insects, Total & Ash content <0.1
26001933-006	ND6	13-Jun-14	Jun-14	ALS	10:05	1000	0.8	0.5	2.1	4.0	0.5	
26001946-006	ND6	14-Jul-14	Jul-14	ALS	10:35	550	0.5	0.5	2.1	4.0	0.2	Insects
26001959-006	ND6	13-Aug-14	Aug-14	ALS	10:55	400	0.7	0.6	2.1	4.0	0.3	Plant material
26001973-006	ND6	12-Sep-14	Sep-14	ALS	10:35	1300	0.3	0.5	2.1	4.0	0.1	Insects, plant material
26001987-006	ND6	13-Oct-14	Oct-14	ALS	10:30	260	0.7	0.5	2.1	4.0	0.3	Insects, plant material
26002002-006	ND6	13-Nov-14	Nov-14	ALS	11:35	750	2.5	0.8	2.1	4.0	1.5	Insects, plant material
26002019-006	ND6	13-Dec-14	Dec-14	ALS	11:45	800	1.0	0.8	2.1	4.0	0.5	Insects
26002034-006	ND6	15-Jan-15	Jan-15	ALS	10:40	1000	1.3	0.9	2.0	4.0	0.7	Insects
26002049-006	ND6	13-Feb-15	Feb-15	ALS	11:40	900	0.3	0.8	2.0	4.0	0.1	Plant material
26002064-006	ND6	16-Mar-15	Mar-15	ALS	11:55	0	3.1	1.0	2.0	4.0	1.5	Insects, plant material, bushfire early March 2015

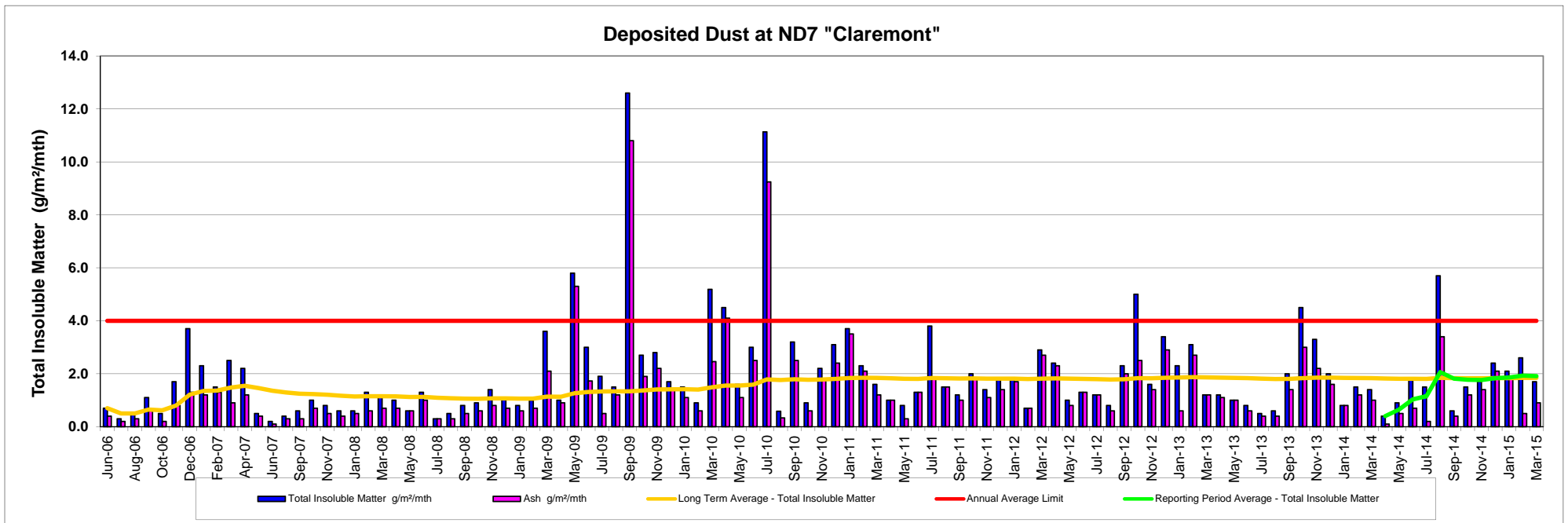


Deposited Dust - ND7 "Claremont"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /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

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
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	
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	1025	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		1.9	4.0	1.1	Insects, plant material
EN1301803-007	ND7	15-May-13	May-13	ALS	11:00	300	1.0		1.8	4.0	1.0	Insects, plant material
EN1302214-007	ND7	14-Jun-13	Jun-13	ALS	10:45	800	0.8		1.8	4.0	0.6	Insects, plant material
EN1302597-007	ND7	15-Jul-13	Jul-13	ALS	10:30	400	0.5		1.8	4.0	0.4	Insects, plant material
EN1303005-005	ND7	14-Aug-13	Aug-13	ALS	11:10	350	0.6		1.8	4.0	0.4	Insects, plant material
EN1303432-005	ND7	13-Sep-13	Sep-13	ALS	12:00	100	2.0		1.8	4.0	1.4	Insects, plant material
EN1303774-005	ND7	14-Oct-13	Oct-13	ALS	11:00	350	4.5		1.8	4.0	3.0	Insects, plant material
EN1304181-007	ND7	13-Nov-13	Nov-13	ALS	11:40	200	3.3		1.9	4.0	2.2	Insects, plant material
EN1304646-007	ND7	13-Dec-13	Dec-13	ALS	10:20	550	2.0		1.9	4.0	1.6	Insects, plant material
EN1400142-007	ND7	13-Jan-14	Jan-14	ALS	9:55	100	0.8		1.8	4.0	0.8	Insects, plant material
26001877-007	ND7	12-Feb-14	Feb-14	ALS	10:15	200	1.5		1.8	4.0	1.2	Insects, plant material
26001889-007	ND7	13-Mar-14	Mar-14	ALS	9:50	750	1.4		1.8	4.0	1.0	Insects

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
26001906-009	ND7	14-Apr-14	Apr-14	ALS	11:00	3000	0.4	0.4	1.8	4.0	0.1	Insects, Ash content <0.1
26001919-009	ND7	14-May-14	May-14	ALS	11:00	450	0.9	0.7	1.8	4.0	0.5	
26001933-007	ND7	13-Jun-14	Jun-14	ALS	10:35	750	1.8	1.0	1.8	4.0	0.7	Insects
26001946-007	ND7	14-Jul-14	Jul-14	ALS	10:50	550	1.5	1.2	1.8	4.0	0.2	Insects
26001959-007	ND7	13-Aug-14	Aug-14	ALS	11:35	500	5.7	2.1	1.8	4.0	3.4	Insects, plant material
26001973-007	ND7	12-Sep-14	Sep-14	ALS	10:50	1250	0.6	1.8	1.8	4.0	0.4	Insects, plant material
26001987-007	ND7	13-Oct-14	Oct-14	ALS	10:45	400	1.5	1.8	1.8	4.0	1.2	Insects
26002002-007	ND7	13-Nov-14	Nov-14	ALS	11:50	500	1.7	1.8	1.8	4.0	1.4	Insects, plant material
26002019-007	ND7	13-Dec-14	Dec-14	ALS	12:00	700	2.4	1.8	1.8	4.0	2.1	Insects
26002034-007	ND7	15-Jan-15	Jan-15	ALS	11:05	750	2.1	1.9	1.8	4.0	1.9	Insects, plant material
26002049-007	ND7	13-Feb-15	Feb-15	ALS	11:25	600	2.6	1.9	1.8	4.0	0.5	Insects, plant material
26002064-007	ND7	16-Mar-15	Mar-15	ALS	12:10	0	1.7	1.9	1.8	4.0	0.9	Insects, plant material, bushfire early March 2015

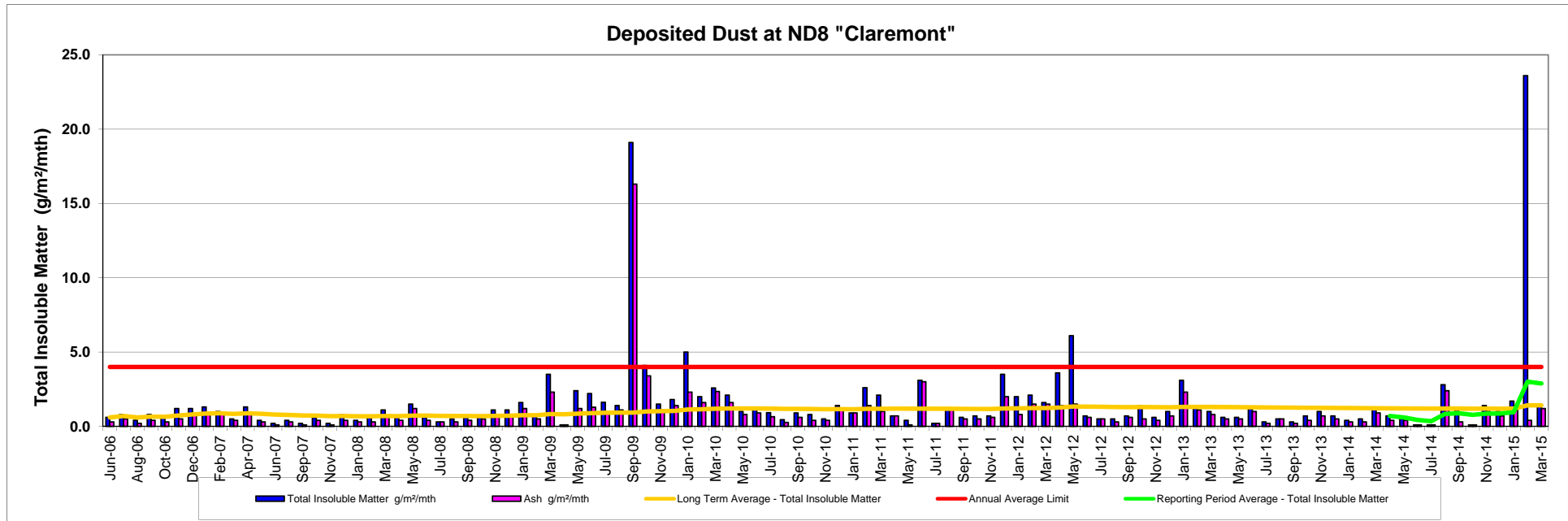


Deposited Dust - ND8 "Claremont"

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /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	05-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	

Sample Number	Sample Location	Sample Date	Sample Month	Sampler	Time: (d)	Volume Collected (ml)	Total Insoluble Matter g/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
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, plant 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
EN1201470-007	ND8	17-Apr-12	Apr-12	ALS	11:30	200	3.6		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		1.3	4.0	0.5	Insects, plant material
EN1301803-008	ND8	15-May-13	May-13	ALS	11:30	250	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		1.3	4.0	1.0	Insects, plant material
EN1302597-008	ND8	15-Jul-13	Jul-13	ALS	10:10	450	0.3		1.3	4.0	0.2	Insects, plant material
EN1303005-002	ND8	14-Aug-13	Aug-13	ALS	10:30	350	0.5		1.3	4.0	0.5	Insects, plant material
EN1303432-002	ND8	13-Sep-13	Sep-13	ALS	12:35	100	0.3		1.3	4.0	0.2	Insects, plant material
EN1303774-002	ND8	14-Oct-13	Oct-13	ALS	11:25	350	0.7		1.2	4.0	0.4	Insects, plant material
EN1304181-008	ND8	13-Nov-13	Nov-13	ALS	12:00	200	1.0		1.2	4.0	0.7	Insects, plant material
EN1304646-008	ND8	13-Dec-13	Dec-13	ALS	11:45	650	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		1.2	4.0	0.3	Insects, plant material
26001877-008	ND8	12-Feb-14	Feb-14	ALS	10:30	200	0.5		1.2	4.0	0.3	Insects, plant material
26001889-008	ND8	13-Mar-14	Mar-14	ALS	9:20	750	1.2		1.2	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/m ² /mth	Reporting Period Average - Total Insoluble Matter	Long Term Average - Total Insoluble Matter	Annual Average Limit	Ash g/m ² /mth	Comment
26001906-010	ND8	14-Apr-14	Apr-14	ALS	11:15	3000	0.7	0.7	1.2	4.0	0.4	Insects
26001919-010	ND8	14-May-14	May-14	ALS	11:10	350	0.5	0.6	1.2	4.0	0.4	
26001933-008	ND8	13-Jun-14	Jun-14	ALS	10:55	950	0.1	0.4	1.2	4.0	0.1	Plant material, Ash content <0.1
26001946-008	ND8	14-Jul-14	Jul-14	ALS	11:00	500	0.1	0.4	1.2	4.0	0.1	Insects, Plant Material
26001959-008	ND8	13-Aug-14	Aug-14	ALS	11:50	400	2.8	0.8	1.2	4.0	2.4	Insects, Plant Material
26001973-008	ND8	12-Sep-14	Sep-14	ALS	11:05	1300	1.1	0.9	1.2	4.0	0.3	Insects, Plant Material
26001987-008	ND8	13-Oct-14	Oct-14	ALS	11:00	450	0.1	0.8	1.2	4.0	0.1	Insects, Total & Ash content <0.1
26002002-008	ND8	13-Nov-14	Nov-14	ALS	12:00	900	1.4	0.9	1.2	4.0	1.0	Insects
26002019-008	ND8	13-Dec-14	Dec-14	ALS	12:10	800	1.0	0.9	1.2	4.0	0.7	Insects
26002034-008	ND8	15-Jan-15	Jan-15	ALS	11:35	1000	1.7	1.0	1.2	4.0	1.4	Insects
26002049-008	ND8	13-Feb-15	Feb-15	ALS	10:55	900	23.6	3.0	1.4	4.0	0.4	Insects
26002064-008	ND8	16-Mar-15	Mar-15	ALS	12:20	0	1.5	2.9	1.4	4.0	1.2	Insects, bushfire early March 2015



Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	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
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

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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			10.62	30	50
3/04/2013	19.2	11.4	10.42	30	50
9/04/2013	21.5	12.8	10.53	30	50
15/04/2013	23.9	14.2	10.66	30	50
21/04/2013	13.9	8.3	10.74	30	50
27/04/2013	25.7	15.3	10.96	30	50
3/05/2013	19.2	11.4	11.04	30	50
9/05/2013	29.6	17.6	11.21	30	50
15/05/2013	5.2	3.1	11.05	30	50
21/05/2013	17.9	10.7	11.04	30	50
27/05/2013	12.3	7.3	10.97	30	50
2/06/2013	4.8	2.8	10.82	30	50
8/06/2013	4.5	2.7	10.67	30	50
14/06/2013	3.7	2.2	10.68	30	50
20/06/2013	8	4.8	10.72	30	50
26/06/2013	4.4	2.6	10.63	30	50
2/07/2013	7.3	4.3	10.65	30	50
8/07/2013	7.3	4.3	10.63	30	50
14/07/2013	8.7	5.2	10.67	30	50
20/07/2013	3.9	2.3	10.58	30	50
26/07/2013	10.6	6.3	10.61	30	50
1/08/2013	12	7.1	10.61	30	50
7/08/2013	18.7	11.1	10.73	30	50
13/08/2013	11.8	7	10.71	30	50

Claremont PM₁₀ High Volume Air Sampler

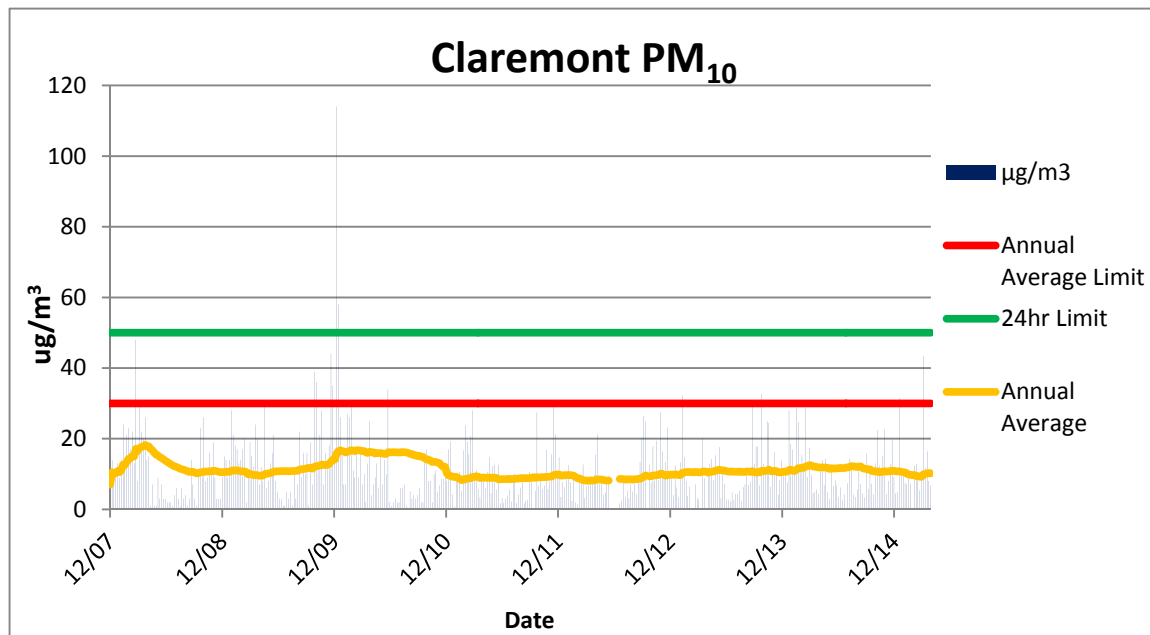
Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
19/08/2013	13.2	7.9	10.61	30	50
25/08/2013	51.9	30.9	10.81	30	50
31/08/2013	21.5	12.8	10.56	30	50
6/09/2013	29.9	17.8	10.43	30	50
12/09/2013	29.9	17.8	10.57	30	50
18/09/2013	11.5	6.8	10.46	30	50
24/09/2013	54.9	32.7	10.91	30	50
30/09/2013	21.5	12.9	10.82	30	50
6/10/2013	18.9	11.2	10.88	30	50
12/10/2013	41.8	24.9	10.98	30	50
18/10/2013	41	24.4	11.26	30	50
24/10/2013	10.7	6.4	10.89	30	50
30/10/2013	13.2	10.4	10.78	30	50
5/11/2013	27	16.1	10.91	30	50
11/11/2013	16.6	9.9	10.85	30	50
17/11/2013	6.9	4.1	10.51	30	50
23/11/2013	13.8	8.2	10.48	30	50
29/11/2013	23.2	13.8	10.54	30	50
5/12/2013	18.2	10.8	10.67	30	50
11/12/2013	19.8	11.8	10.66	30	50
17/12/2013	12.8	7.7	10.68	30	50
23/12/2013	47.1	28	11.12	30	50
29/12/2013	31.1	18.5	11.21	30	50
4/01/2014	28.4	16.9	10.94	30	50
10/01/2014	19.3	11.5	10.88	30	50
16/01/2014	48.2	28.7	11.25	30	50
22/01/2014	41.4	24.7	11.62	30	50
28/01/2014	17.9	10.7	11.70	30	50
3/02/2014	25.7	15.3	11.76	30	50
9/02/2014	19.2	11.4	11.75	30	50
15/02/2014	48.3	28.8	12.13	30	50
21/02/2014	15.4	9.2	12.23	30	50
27/02/2014	29.1	17.3	12.48	30	50
5/03/2014	16.4	9.8	12.44	30	50
11/03/2014	7.5	4.5	12.17	30	50
17/03/2014	8.2	4.9	12.11	30	50
23/03/2014	9.6	5.7	12.00	30	50
29/03/2014	7.3	4.3	11.88	30	50
4/04/2014	20.7	12.3	11.87	30	50
10/04/2014	23.3	13.9	11.87	30	50
16/04/2014	11.6	6.9	11.85	30	50
22/04/2014	23.8	14.2	11.83	30	50

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
28/04/2014	8	4.8	11.72	30	50
4/05/2014	4.9	2.9	11.47	30	50
10/05/2014	19.5	11.6	11.61	30	50
16/05/2014	11.1	6.6	11.55	30	50
22/05/2014	13.9	8.3	11.56	30	50
28/05/2014	11.4	6.8	11.63	30	50
3/06/2014	5.9	3.5	11.64	30	50
9/06/2014	10.5	6.2	11.71	30	50
15/06/2014	4.5	2.7	11.67	30	50
21/06/2014	7.1	4.2	11.70	30	50
27/06/2014			11.83	30	50
3/07/2014	12.4	7.4	11.88	30	50
9/07/2014	24	14.3	12.03	30	50
15/07/2014	20.8	12.4	12.20	30	50
21/07/2014	7.1	4.2	12.17	30	50
27/07/2014	5.9	3.5	12.11	30	50
2/08/2014	9.5	5.6	12.01	30	50
8/08/2014	22.4	13.3	12.12	30	50
14/08/2014	11.9	7.1	12.11	30	50
20/08/2014	7.6	4.5	11.66	30	50
26/08/2014	5.8	3.4	11.50	30	50
1/09/2014	26.3	15.7	11.46	30	50
7/09/2014	9.6	5.7	11.26	30	50
13/09/2014	16.6	9.9	11.31	30	50
19/09/2014	12.3	7.3	10.88	30	50
25/09/2014	7.2	4.3	10.74	30	50
1/10/2014	21.9	13	10.77	30	50
7/10/2014	37.6	22.4	10.72	30	50
13/10/2014	20.6	12.3	10.52	30	50
19/10/2014	17.1	10.2	10.58	30	50
25/10/2014	25.6	15.2	10.66	30	50
31/10/2014	37.9	22.6	10.77	30	50
6/11/2014	7.2	4.3	10.68	30	50
12/11/2014	13.4	8	10.75	30	50

Claremont PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Claremont PM10	ND-9	MGA	55	777047	6619621
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
18/11/2014	21.7	12.9	10.83	30	50
24/11/2014	33.3	19.8	10.93	30	50
30/11/2014	15.5	9.2	10.90	30	50
6/12/2014	7.6	4.5	10.78	30	50
12/12/2014	8	4.8	10.73	30	50
18/12/2014	52.9	31.5	10.79	30	50
24/12/2014	16.3	9.7	10.64	30	50
30/12/2014	17.3	9.9	10.52	30	50
5/01/2015	12.4	7.4	10.45	30	50
11/01/2015	12	7.1	10.08	30	50
17/01/2015	19.3	11.5	9.86	30	50
23/01/2015	12.1	7.2	9.80	30	50
29/01/2015			9.71	30	50
4/02/2015	20.7	12.3	9.72	30	50
10/02/2015	21.7	12.9	9.45	30	50
16/02/2015	13.7	8.2	9.43	30	50
22/02/2015	9.1	5.4	9.22	30	50
28/02/2015	17.1	10.2	9.23	30	50
6/03/2015	73	43.5	9.90	30	50
12/03/2015	19.9	11.8	10.02	30	50
18/03/2015	27.5	16.4	10.21	30	50
24/03/2015	13.5	8	10.27	30	50
30/03/2015	11.5	6.8	10.18	30	50



Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	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
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

Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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
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

Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
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	8.8	5.4	9.98	30	50
10/03/2013	8.9	5.4	9.87	30	50
16/03/2013	25	15.3	9.98	30	50
22/03/2013	10.7	6.6	9.89	30	50
28/03/2013	14.8	9.1	9.83	30	50
3/04/2013	19.6	12	9.93	30	50
9/04/2013	17.2	10.5	9.92	30	50
15/04/2013	28.1	17.2	10.16	30	50
21/04/2013	11.5	7	9.94	30	50
27/04/2013	26.4	16.2	10.08	30	50
3/05/2013	21.1	12.9	10.16	30	50
9/05/2013	18.9	11.6	10.17	30	50
15/05/2013	4.1	2.5	10.12	30	50
21/05/2013	16.6	10.2	10.23	30	50
27/05/2013	8.6	5.3	10.24	30	50
2/06/2013	7	4.3	10.14	30	50
8/06/2013	5.1	3.1	10.12	30	50
14/06/2013	4.3	2.6	10.11	30	50
20/06/2013	7.8	4.8	10.05	30	50
26/06/2013	3.9	2.4	9.97	30	50
2/07/2013	8.5	5.2	9.92	30	50
8/07/2013	5.1	3.1	9.92	30	50
14/07/2013	7.3	4.5	9.92	30	50
20/07/2013	4.3	2.6	9.88	30	50
26/07/2013	4.6	2.8	9.76	30	50
1/08/2013	9.1	5.6	9.76	30	50
7/08/2013	11	6.7	9.88	30	50
13/08/2013	8.4	5.2	9.78	30	50
19/08/2013	8.5	5.2	9.57	30	50
25/08/2013	12.7	7.8	9.39	30	50
31/08/2013	<0.1		9.20	30	50
6/09/2013	29.6	18.1	9.36	30	50
12/09/2013	19.7	12.1	9.38	30	50
18/09/2013	9.1	5.6	9.36	30	50
24/09/2013	47.9	29.4	9.58	30	50
30/09/2013	21.8	13.4	9.67	30	50
6/10/2013	42.5	26.1	9.84	30	50
12/10/2013	37.4	22.9	10.04	30	50

Turrabaa PM₁₀ High Volume Air Sampler

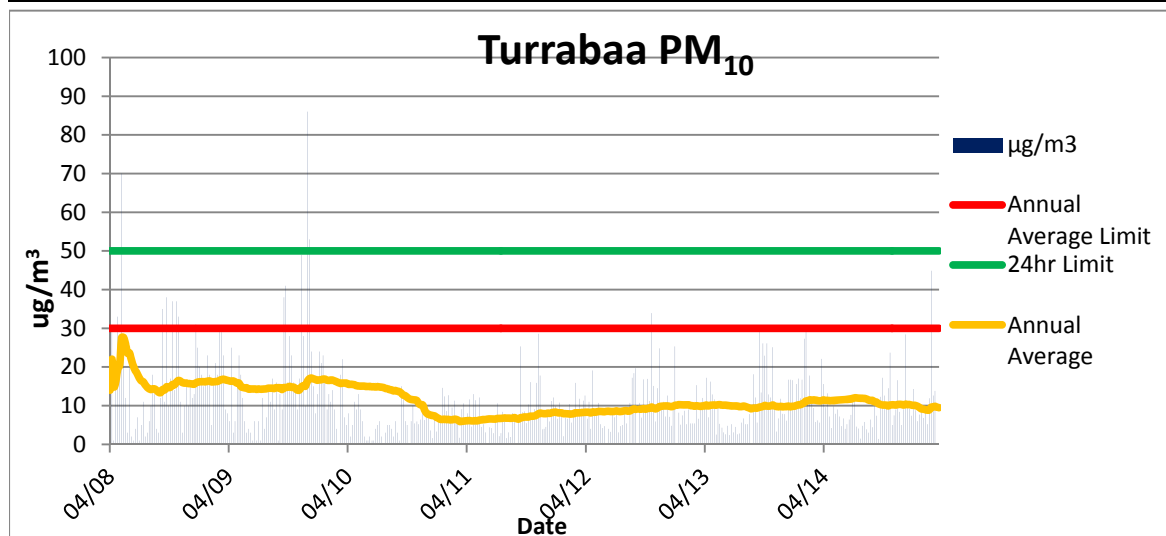
Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
18/10/2013	42.5	26.1	9.90	30	50
24/10/2013	21	12.9	9.86	30	50
30/10/2013	19.8	12.1	9.97	30	50
5/11/2013	41	25.1	10.16	30	50
11/11/2013	17.9	11	9.92	30	50
17/11/2013	5.4	3.3	9.80	30	50
23/11/2013	10.9	6.7	9.72	30	50
29/11/2013	19.3	11.8	9.81	30	50
5/12/2013	12.9	7.9	9.72	30	50
11/12/2013	12.8	7.8	9.74	30	50
17/12/2013	10	6.1	9.76	30	50
23/12/2013	27.3	16.7	9.87	30	50
29/12/2013	27.2	16.7	9.72	30	50
4/01/2014	27	16.6	9.84	30	50
10/01/2014	14.4	8.8	9.85	30	50
16/01/2014	25.5	15.6	10.03	30	50
22/01/2014	27.8	17	10.19	30	50
28/01/2014	19.4	11.9	10.25	30	50
3/02/2014	27.3	16.7	10.45	30	50
9/02/2014	44.5	27.3	10.76	30	50
15/02/2014	49.1	30.1	11.19	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
4/04/2014	36	22.1	11.32	30	50
10/04/2014	25.4	15.6	11.47	30	50
16/04/2014	15.6	9.6	11.36	30	50
22/04/2014	21.6	13.2	11.36	30	50
28/04/2014	11.7	7.2	11.28	30	50
4/05/2014	6.9	4.2	11.31	30	50
10/05/2014	16	9.8	11.31	30	50
16/05/2014	12.9	7.9	11.35	30	50
22/05/2014	14.6	9	11.43	30	50
28/05/2014	11.8	7.2	11.50	30	50
3/06/2014	7.7	4.7	11.54	30	50
9/06/2014	11	6.7	11.57	30	50
15/06/2014	6.6	4	11.60	30	50
21/06/2014	8.5	5.2	11.60	30	50

Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
27/06/2014	10.4	6.4	11.66	30	50
3/07/2014	12.4	7.6	11.71	30	50
9/07/2014	18.3	11.2	11.86	30	50
15/07/2014	20	12.3	12.02	30	50
21/07/2014	7.5	4.6	12.01	30	50
27/07/2014	6.7	4.1	11.96	30	50
2/08/2014	2.5	1.5	11.90	30	50
8/08/2014	7.8	4.8	11.89	30	50
14/08/2014	9.4	5.8	11.86	30	50
20/08/2014	6.4	3.9	11.72	30	50
26/08/2014	4.9	3	11.46	30	50
1/09/2014	10.4	6.4	11.37	30	50
7/09/2014	7.1	4.4	11.35	30	50
13/09/2014	16	9.8	11.02	30	50
19/09/2014	12.1	7.4	10.91	30	50
25/09/2014	2.3	1.4	10.49	30	50
1/10/2014	20	12.3	10.32	30	50
7/10/2014	28.1	17.2	10.16	30	50
13/10/2014	20.6	12.6	10.16	30	50
19/10/2014	17	10.4	10.13	30	50
25/10/2014	23.6	14.5	9.95	30	50
31/10/2014	38.6	23.7	10.17	30	50

Turrabaa PM₁₀ High Volume Air Sampler

Site	Site Id	Datum	Zone	Easting	Northing
Turrabaa PM10	ND-10	MGA	55	779775	6619367
Date	mg/paper	µg/m ³	Annual Average	Annual Average Limit	24hr Limit
6/11/2014	8.1	5	10.19	30	50
12/11/2014	12.2	7.5	10.21	30	50
18/11/2014	14.7	9	10.16	30	50
24/11/2014	27.1	16.6	10.31	30	50
30/11/2014	13.7	8.4	10.32	30	50
6/12/2014	8.2	5	10.30	30	50
12/12/2014	14.8	9.1	10.17	30	50
18/12/2014	46.4	28.4	10.37	30	50
24/12/2014	17.7	10.8	10.27	30	50
30/12/2014	15	9.2	10.28	30	50
5/01/2015	12.1	7.4	10.14	30	50
11/01/2015	23.4	14.3	10.09	30	50
17/01/2015	14.3	8.8	10.04	30	50
23/01/2015	9.8	6	9.86	30	50
29/01/2015	12.6	7.7	9.53	30	50
4/02/2015	16.7	9.9	9.18	30	50
10/02/2015	11.4	6.8	9.12	30	50
16/02/2015	15.5	9.2	8.97	30	50
22/02/2015	8.7	5.2	8.86	30	50
28/02/2015	20	11.9	8.91	30	50
6/03/2015	75.4	44.9	9.57	30	50
12/03/2015	21.1	12.6	9.68	30	50
18/03/2015	23.1	13.8	9.82	30	50
24/03/2015			9.61	30	50
30/03/2015			9.50	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 (mg/L)	Grease & Oil (mg/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	

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
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	
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	

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
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
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	

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
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	
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	

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
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	
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	
ES1419357-001	27 August 2014	KC2DS	6.8	50	28	<5	21	
ES1419357-002	27 August 2014	KCDS	7.11	203	113	<5	11	
ES1419357-003	27 August 2014	KC2US	6.91	52	42	<5	16	
ES1419357-004	27 August 2014	KCUS	7.14	353	98	<5	11	
ES1419357-005	27 August 2014	PC1	7.41	77	16	<5	12	
ES1419357-006	27 August 2014	PC	7.35	98	238	<5	12	
ES1419357-007	27 August 2014	KC1DS	7.48	116	56	<5	15	

Appendix 6: Groundwater Monitoring Data

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1. *Journal of the American Medical Association*, 2000; 283: 2689-2696.

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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water - mbgl	Depth to Stand - mbtoc	Field Parameters			Total Metals																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	pH Lab	EC - Lab - µs/cm	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 Water - mbgl	Depth to Stand - mbtoc	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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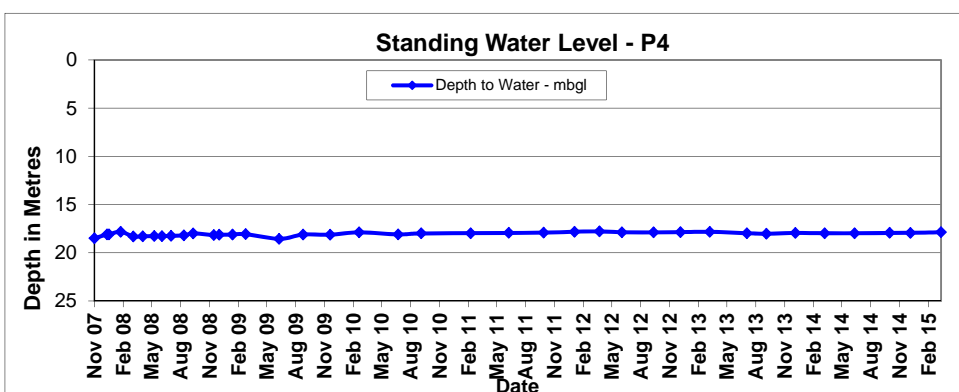
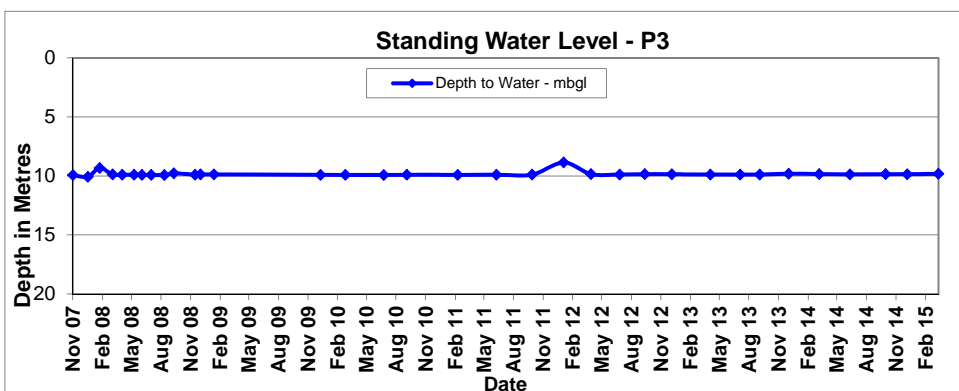
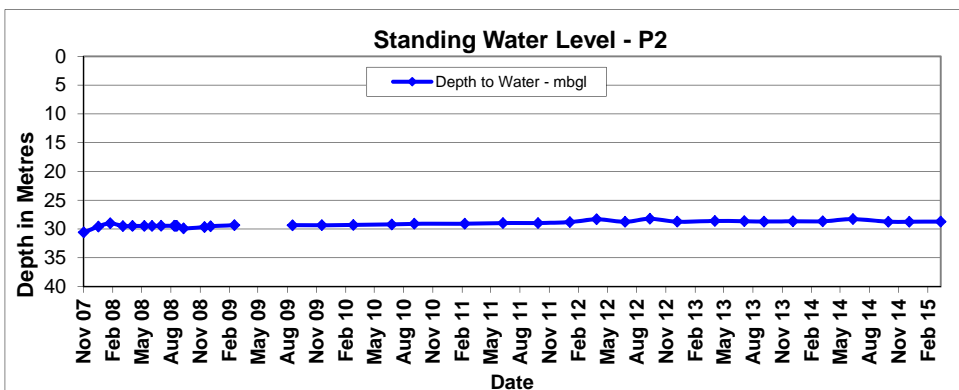
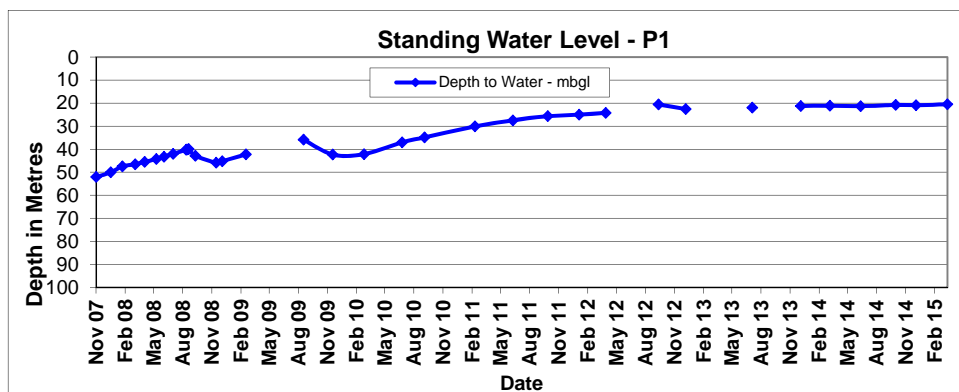
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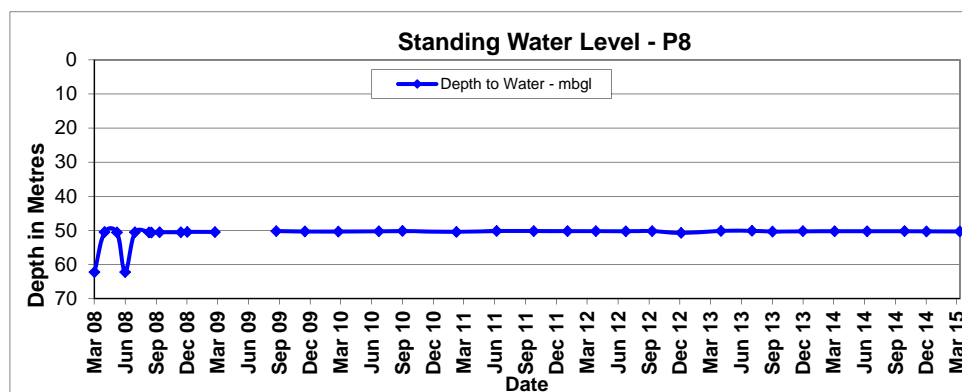
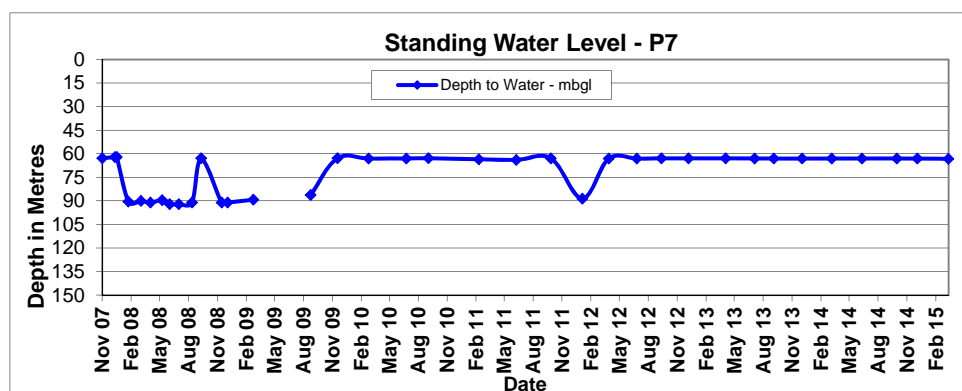
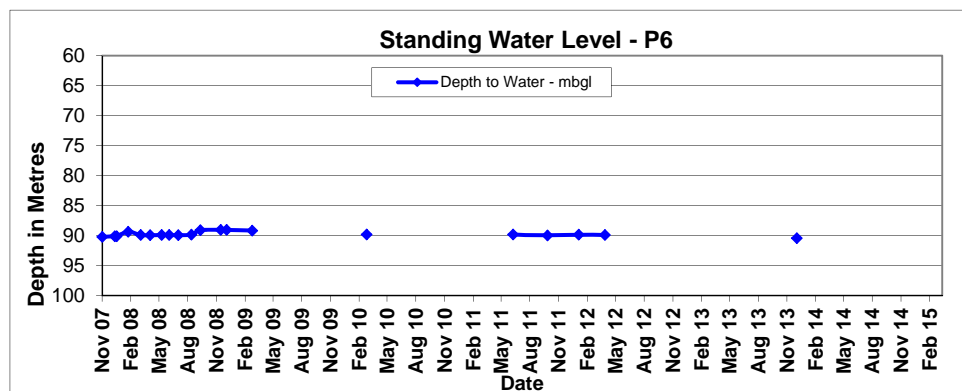
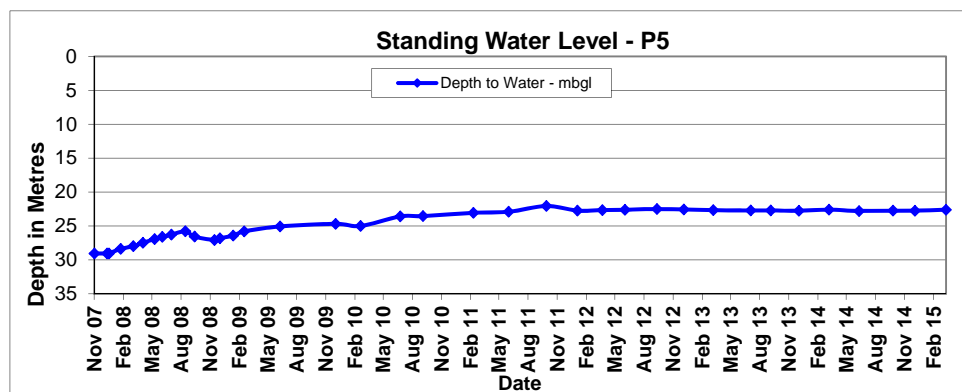
Site ID	Piezometer / Water Bore	Date	Time	Depth to Water - mbgl	Depth to Stand - mbtoc	Field Parameters			Total Metals																Major Cations				Total Cations - meq/L	Major Anions						Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOx as N - 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	pH Lab	EC - Lab - µs/cm	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
ANZECC Guideline - stock drinking water									5	0.5			0.01	1	1	1		0.1		1		20	0.002			1000					1000								1500	400		4000	
P28		1-Jun-12	1000		0.93	Dry																																					
		24-Jul-12	1130		0.93	Dry																																					
		2-Sep-12	1240		0.93	Dry																																					
		10-Dec-12	1305		0.93	Dry																																					
		7-Mar-13	1035		0.93	Dry																																					
		3-Jul-13	945		0.93	Dry																																					
		4-Sep-13	1140		0.93	Dry																																					
		27-Nov-13	955		0.93	Dry																																					
		5-Mar-14	1020		0.93	Dry																																					
		11-Jun-14	945		0.93	Dry																																					
		30-Sep-14	1110		0.93	Dry																																					
		5-Dec-14	1020		0.93	Dry																																					
		11-Mar-15	1040		0.93	Dry																																					
P29		1-Jun-12	1010	8.10	9.03	8.02	11700	21.4																																			
		24-Jul-12	1150	8.05	8.98	7.53	9950	23.1	15.6	0.008	0.448	<0.001	0.0001	0.018	0.013	0.044	24.9	0.775	0.576	0.024	0.04	0.278	<0.0001	7.8	13100	67	196	2590	16	132	3780	717	1	<1	1090	1090	143	3.94	<0.10	<0.01	0.93	0.93	8170
		2-Sep-12	1300	8.41	9.34	8.08	12440	22.7	2.34	0.002	0.259	<0.001	<0.0001	0.006	0.001	0.01	3.77	0.061	0.076	0.004	0.01	0.042	0.0002	7.83	14400	79	216	2690	16	139	4050	839	<1	<1	1100	1100	154	5	<0.01	<0.01	1.76	1.76	8750
		10-Dec-12	1315	8.04	8.97	7.69	10870	22.3																																			
		07-Mar-13	1050	8.05	8.98	7.7	11100	22.3	0.06	0.001	0.145	<0.001	<0.0001	0.002	<0.001	0.002	0.13	0.005	<0.001	<0.001	<0.01	0.012	<0.0001	7.73	14000	39	205	2720	16	138	3720	735	<1	<1	1130	1130	143	1.91	0.04	<0.01	0.44	0.44	7800
		3-Jul-13	1015	8.00	8.93	7.69	11530	20.8																																			
		04-Sep-13	1150	7.98	8.91	7.92	10800	22.4	0.71	0.002	0.188	<0.001	<0.0001	0.001	<0.001	0.054	1.76	0.031	0.032	0.002	<0.01	0.079	<0.0001	8.03	12400	60	178	2540	15	128	3370	632	<1	<1	1160	1160	131	1.14	0.05	0.24	0.28	0.52	7470
		27-Nov-13	920	7.83	8.76	8.5	16220	21.9																																			
		05-Mar-14	1040	7.78	8.71	7.9	9940	22.5	0.46	0.001	0.146	<0.001	<0.0001	0.004	<0.001	0.042	1.11	0.01	0.028	0.003	<0.01	0.069	<0.0001	7.97	10800	43	131	2410	12	118	2520	552	<1	<1	1240	1240	107	4.72	0.08	<0.01	0.42	0.42	5920
		11-Jun-14	1015	7.55	8.48	7.6	9200	20.3																																			
		30-Sep-14	1140	7.20	8.13	7.4	10710	22.7	0.42	0.002	0.136	<0.001	<0.0001	0.002	<0.001	0.014	1.1	0.011	0.037	0.007	<0.01	0.073	<0.0001	8.04	8690	31	95	1890	8	91.8	1590	428	<1	<1	1140	1140	76.5	9.02	0.04	<0.01	0.29	0.29	4590
		05-Dec-14	1040	6.85	7.78	8.1	5010	21.5																																			
		11-Mar-15	1110	6.54	7.47	8	3970	22.4	0.07	0.004	0.093	<0.001	<0.0001	<0.001	<0.001	0.006	0.3	0.008	0.005	0.002	<0.01	0.041	<0.0001	8.29	4120	14	29	1120	11	52.1	544	155	<1	<1	1460	1460	47.7	4.3	0.04	<0.01	0.6	0.6	2250
P30		1-Jun-12	1030		0.79	Dry																																					
		24-Jul-12	1200		0.79	Dry																																					
		2-Sep-12	1315		0.79	Dry																																					
		10-Dec-12	1325		0.79	Dry																																					
		7-Mar-13	1100		0.79	Dry																																					
		3-Jul-13	1025		0.78	Dry																																					
		4-Sep-13	1200		0.78	Dry																																					
		27-Nov-13	900		0.78	Dry																																					
		5-Mar-14	1050		0.78	Dry																																					

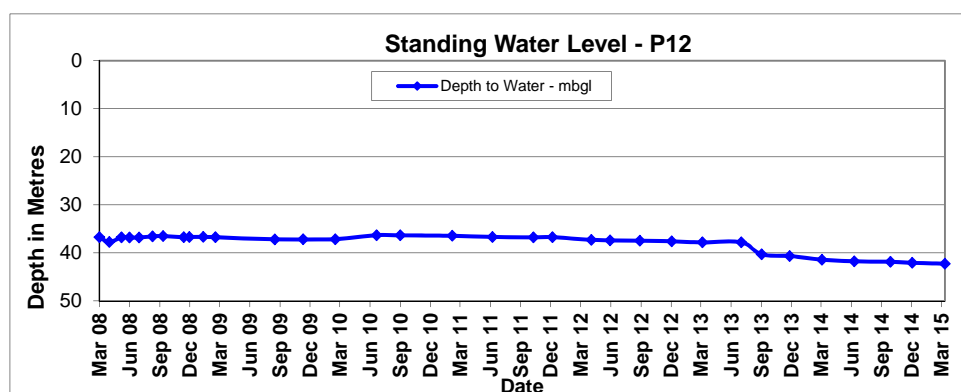
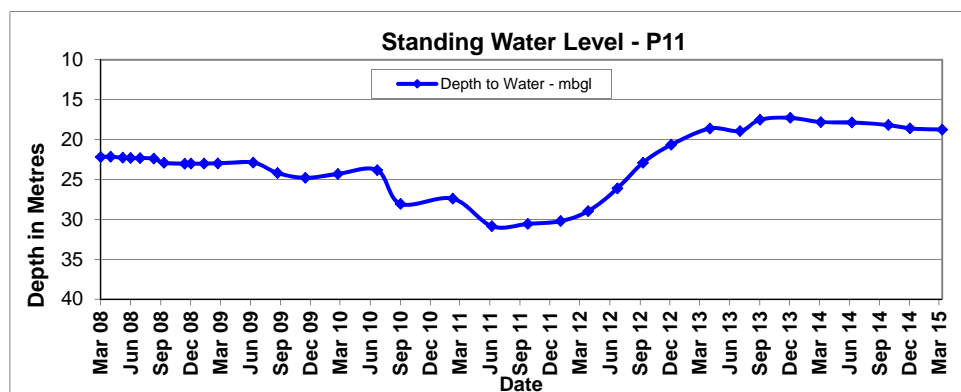
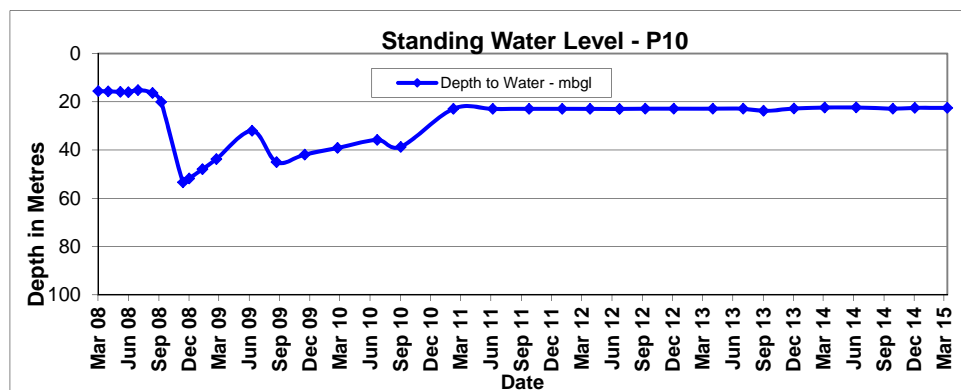
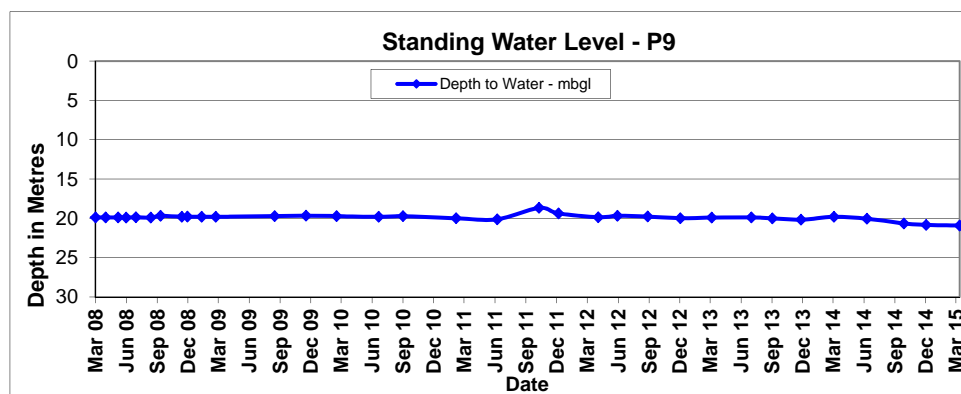
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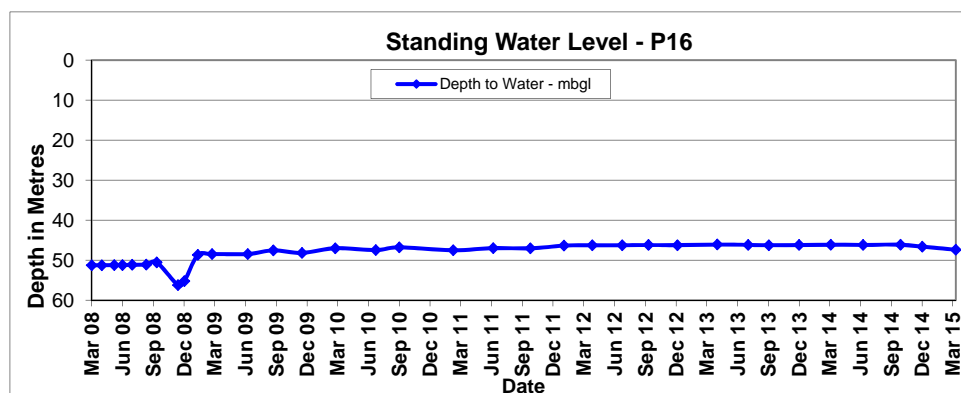
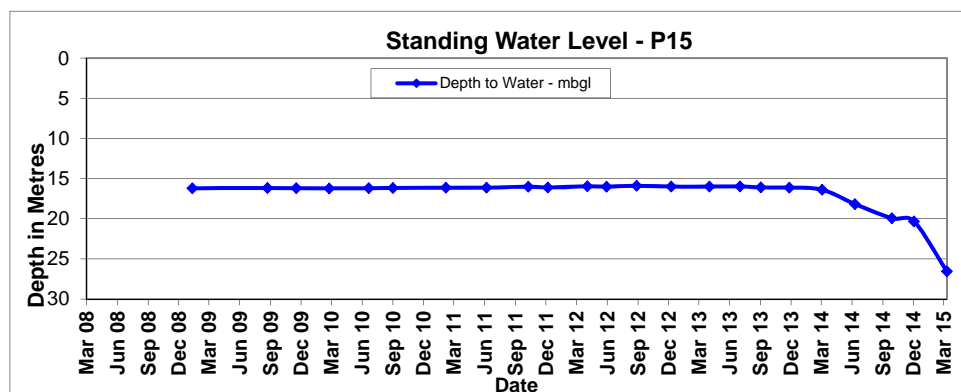
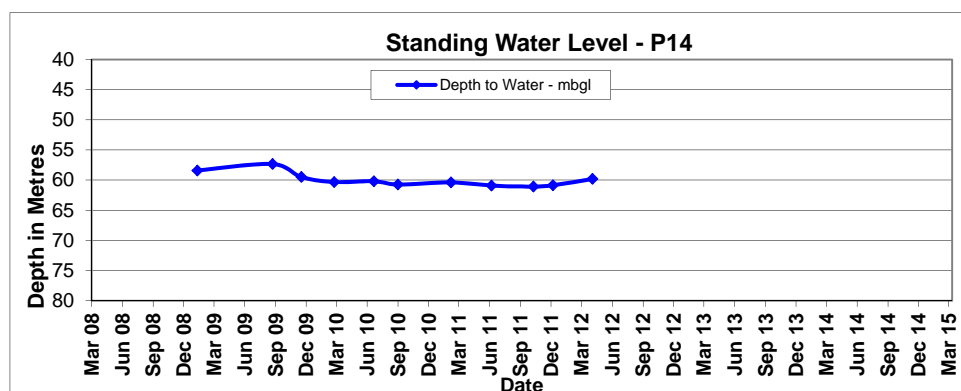
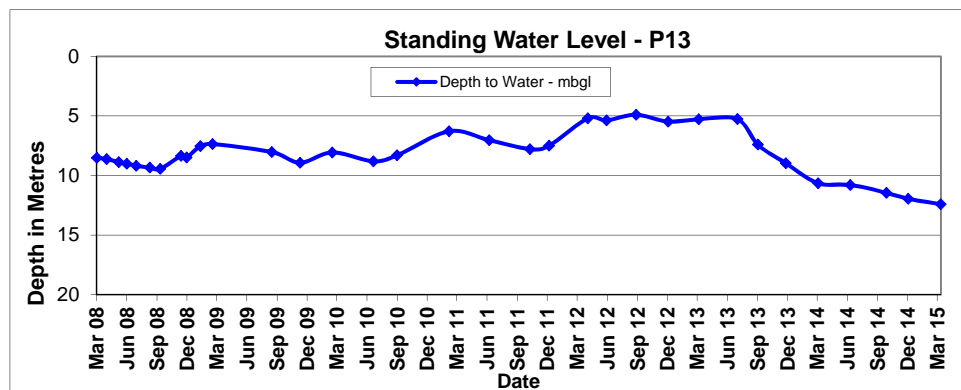
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						pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	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												
ANZECC Guideline - stock drinking water									5	0.5			0.01	1	1	1		0.1		1		20	0.002			1000						1000																
WB7		11-Sep-08	1330			6.9	1175	20.5		<0.001	0.006	<0.001	<0.0001	<0.001	<0.001	0.013	<0.05	<0.001	<0.001	<0.001	<0.01	0.040	<0.0001		765	33	18	92	2	7.16	60	23	<1	<1	250	250	7.16	0.06	0.04								410	
		14-Nov-08	0841	4.11	4.99																																											
		01-Dec-08	1045	2.27	3.15																																											
		12-Jan-09	1315	4.30	5.18																																											
		25-Aug-09	1500							<0.001	0.006	<0.001	<0.0001	<0.001	<0.001	0.049	<0.05	0.006	0.002	<0.001	<0.01	0.044	<0.0001		633	26	14	80	2		47.4	23	<1	<1	224	224			<0.01							348		
		01-Dec-09	1330	4.79		8.18	1002	23.3	0.05	0.005				<0.001		0.013	0.32	<0.001	0.038	0.004		<0.005	<0.0001	7.91	848	12	7	164	1	8.35	65.2	32	<1	<1	272	272	8.05	1.82		0.02	1.45	1.48						
		18-Feb-10	1240	4.64						<0.01	<0.001			<0.001		0.01	<0.05	<0.001	<0.001	<0.001		0.007	<0.0001	7.22	621	29	16	93	2	6.89	51	17.8	<1	<1	250	250	6.81	0.59		<0.01	0.31	0.31						
		23-Jun-10	1340		4.81	8.2	796	21	<0.01	<0.001				<0.001		0.01	<0.05	<0.001	<0.001	<0.001		0.007	<0.0001	7.22	621	29	16	93	2	6.89	51	17.8	<1	<1	250	250	6.81	0.59		<0.01	0.31	0.31						
		03-Sep-10	1305		1.93	7.39	625	22.3						<0.001			<0.05	<0.001	<0.001	<0.001			0.007	<0.0001	7.22	621	29	16	93	2	6.89	51	17.8	<1	<1	250	250	6.81	0.59		<0.01	0.31	0.31					
		08-Feb-11	1330		2.12	7.36	964	27.3	0.02	<0.001				<0.005		0.023	<0.05	<0.001	<0.001	<0.001			0.012	<0.001	7.2	766	41	24	125	2	9.52	65	33	<1	<1	345	345	9.41	0.52		<0.01	0.43	0.43					
		31-May-11	1215	3.01	3.01	7.55	613	14.8						<0.001			<0.05	<0.001	<0.001	<0.001			0.012	<0.001	7.2	766	41	24	125	2	9.52	65	33	<1	<1	345	345	9.41	0.52		<0.01	0.43	0.43					
		27-Sep-11	1240	2.85	2.85	7.61	701	22.3	<0.01	<0.001	0.007	<0.001	<0.0001	<0.001	<0.001	0.016	0.2	0.002	0.004	<0.001	<0.01	0.009	<0.0001	7.95	740	30	17	105	2	7.51	61	25	<1	<1	260	260	7.44	0.5	<0.01	<0.01	0.35	0.35	402					
		3-Jan-12	1230	1.90	1.90	7.52	732	25.7						<0.001			<0.05	<0.001	<0.001	<0.001			0.007	<0.0001	7.95	740	30	17	105	2	7.51	61	25	<1	<1	260	260	7.44	0.5	<0.01	<0.01	0.35	0.35	402				
		22-Mar-12	1250	3.09	3.09	7.45	722	24.2	<0.01	0.007	0.011	<0.001	<0.0001	<0.001	<0.001	0.016	1.14	0.006	0.163	0.002	<0.01	0.012	<0.0001	7.69	654	24	14	112	3	7.3	60	23	<1	<1	245	245	7.07	1.58	0.14	<0.01	<0.01	<0.01	490					
		01-Jun-12	1230	3.76	3.76	7.55	704	16.1						<0.001			<0.05	<0.001	<0.001	<0.001			0.012	<0.001	7.69	654	24	14	112	3	7.3	60	23	<1	<1	245	245	7.07	1.58	0.14	<0.01	<0.01	<0.01	490				
		10-Sep-12	1015	1.14	1.14	7.27	597	17.5	0.01	<0.001	0.008	<0.001	<0.0001	<0.001	<0.001	0.008	<0.05	<0.001	0.027	<0.001	<0.01	0.005	<0.0001	7.65	636	23	12	98	2	6.45	56	20	<1	<1	234	234	6.67	1.72	<0.01	<0.01	0.05	0.05	362					
		04-Dec-12	920	3.12	3.12									<0.001			<0.05	<0.001	0.027	<0.001	<0.01	0.005	<0.0001	7.65	636	23	12	98	2	6.45	56	20	<1	<1	234	234	6.67	1.72	<0.01	<0.01	0.05	0.05	362					
		07-Mar-13	1340	1.7	1.7	7.4	673	25.2	<0.01	<0.001	0.009	<0.001	<0.0001	<0.001	<0.001	0.064	0.16	0.042	0.01	<0.001	<0.01	0.015	<0.0001	7.3	693	34	17	90	2	7.06	54	18	<1	<1	255	255	6.99	0.46	<0.01	<0.01	0.51	0.51	398					
		03-Jul-13	1410	2.87	2.87	7.47	668	13.4						<0.001			<0.05	<0.001	0.027	<0.001	<0.01	0.015	<0.0001	7.3	693	34	17	90	2	7.06	54	18	<1	<1	255	255	6.99	0.46	<0.01	<0.01	0.51	0.51	398					
		04-Sep-13	945	3.34	3.34	7.1	688	17.1	0.02	<0.001	0.012	<0.001	<0.0001	<0.001	<0.001	0.022	0.87	0.002	0.306	0.002	<0.01	0.021	<0.0001	7.63	715	32	18	102	2	7.57	58	26	<1	<1	254	254	7.27	1.97	<0.01	<0.01	0.06	0.06	387					
		02-Dec-13	1415	3.15	3.15	9.2	992	19.2						<0.001			<0.05	<0.001	0.002	<0.001	<0.01	0.008	<0.0001	7.46	821	38	21	107	2	8.33	75	28	<1	<1	268	268	8.05	1.66	0.01	<0.01	1.85	1.85	491					
		07-Mar-14	1320	2.62	2.62	7.7	846	26.2	<0.01	<0.001	0.01	<0.001	<0.0001	<0.001	<0.001	0.014	<0.05	<0.001	0.002	<0.001	<0.01	0.008	<0.0001	7.46	821	38	21	107	2	8.33	75	28	<1	<1	268	268	8.05	1.66	0.01	<0.01	1.85	1.85	491					
		10-Jun-14	1315	4.62	4.62	7.9	740	15						<0.001			<0.05	<0.001	0.012	0.002	<0.01	0.012	<0.0001	7.53	708	28	17	92	2	6.85	61	28	<1	<1	222	222	6.74	0.78	0.01	<0.01	0.52	0.52	393					
		25-Sep-14	1150	3.71	3.71	7.7	704	18.1	0.02	<0.001	0.009	<0.001	<0.0001	<0.001	<0.001	0.011	<0.05	<0.001	0.012	0.002	<0.01	0.012	<0.0001	7.53	708	28	17	92	2	6.85	61	28	<1	<1	222	222	6.74	0.78	0.01	<0.01	0.52	0.52	393					
		03-Dec-14	1245	2.79	2.79	7.6	702	19.6						<0.001			<0.05	<0.001	0.005	0.001	<0.01	0.026	<0.0001	7.6	810	42	25	114	2	9.16	64	46	<1	<1	292	292	8.6	3.16	0.03	<0.01	1.76	1.76	426					
		11-Mar-15	1350	2.65	2.65	7.8	1010	24.7	<0.01	<0.001	0.011	<0.001	<0.0001	<0.001	<0.001	0.013	<0.05	<0.001	0.005	0.001	<0.01	0.026	<0.0001	7.6	810	42	25	114	2	9.16	64	46	<1	<1	292	292	8.6	3.16	0.03	<0.01	1.76	1.76	426					
WB8		12-Sep-08																																														
		14-Nov-08																																														
WB9	NC-008	1-Dec-08	1235	19.2	19.67																																											

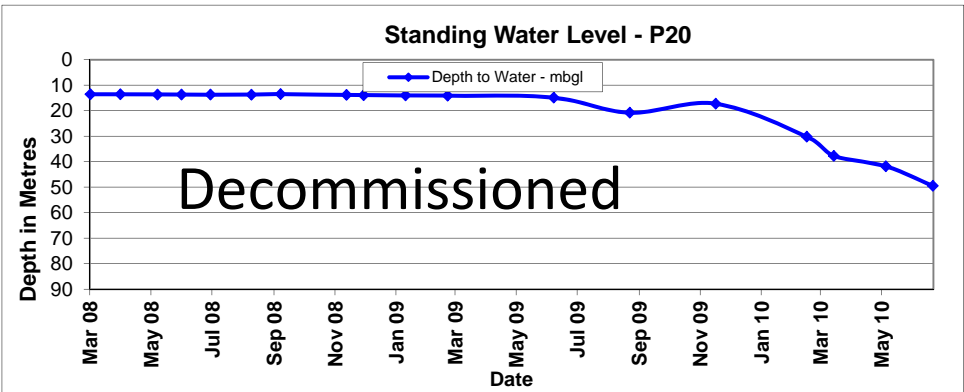
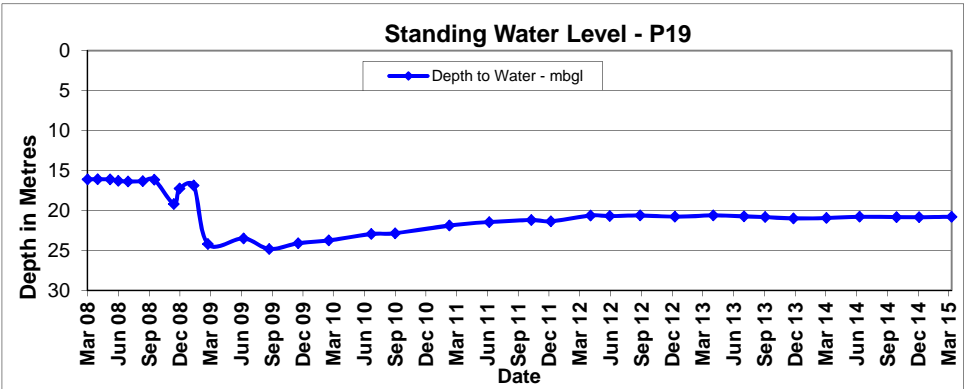
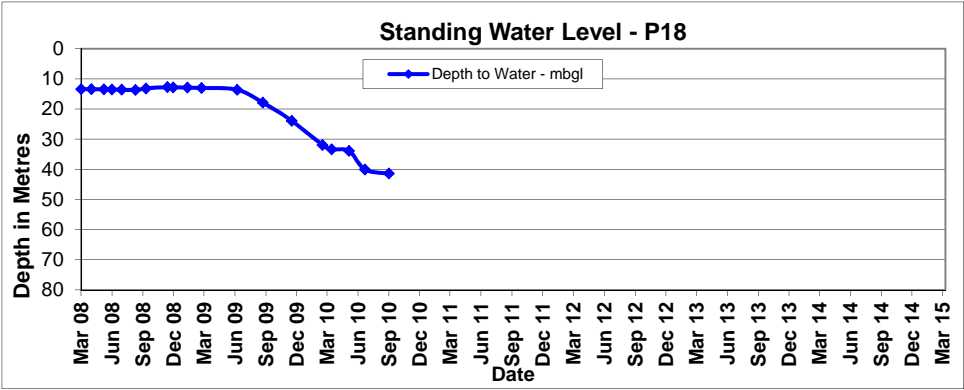
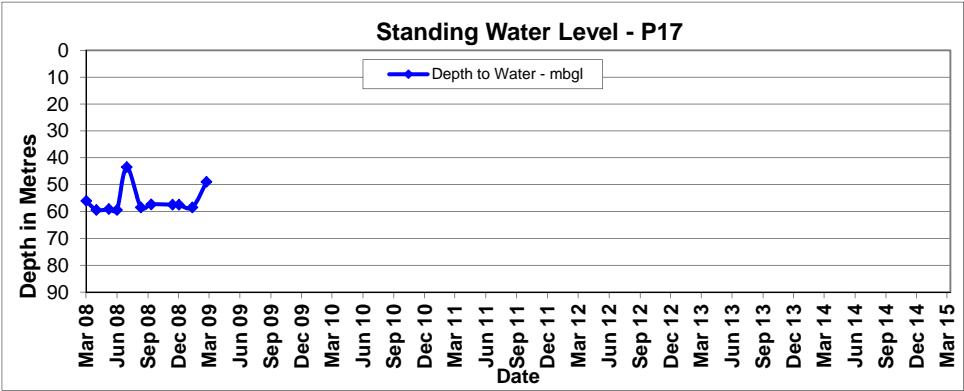
Denotes dissolved metals

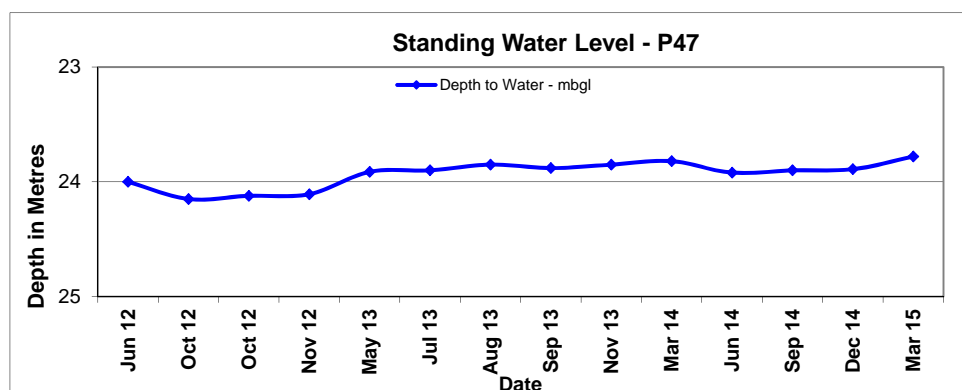
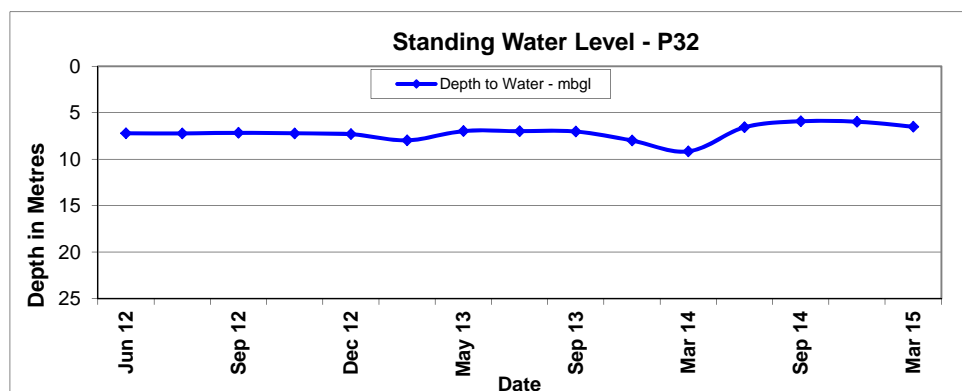
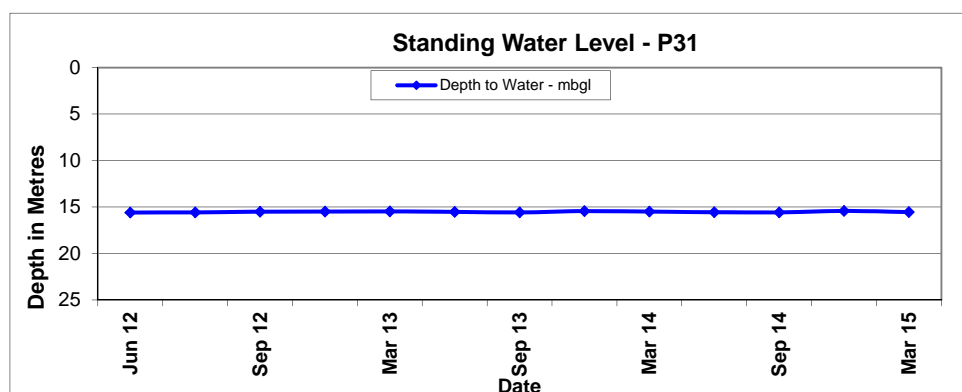
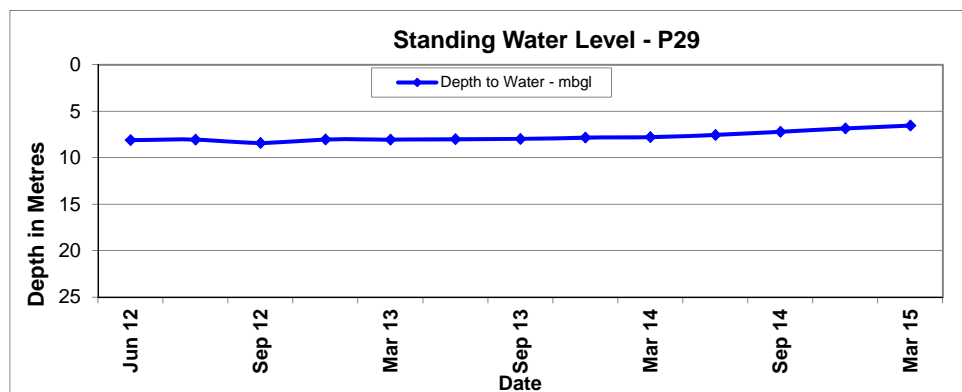


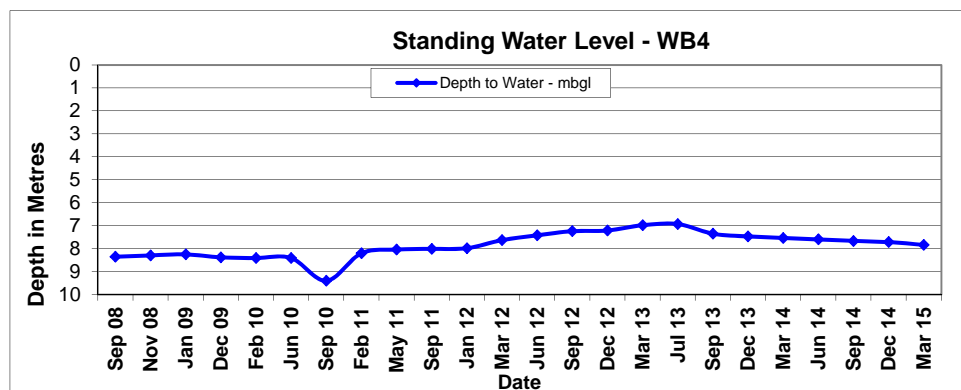
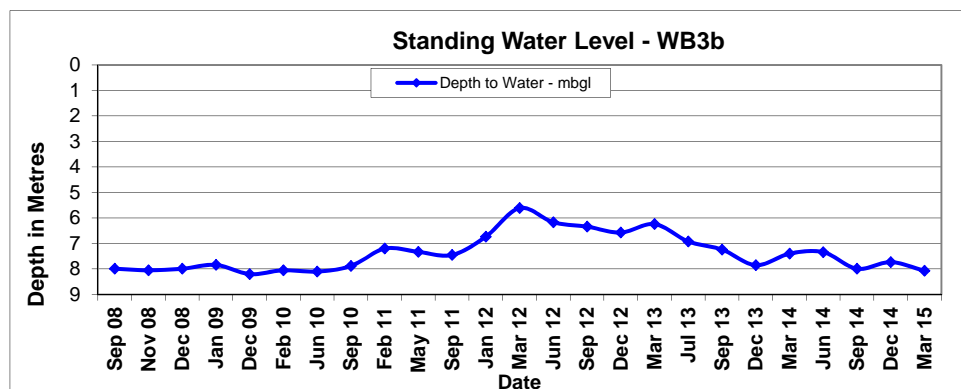
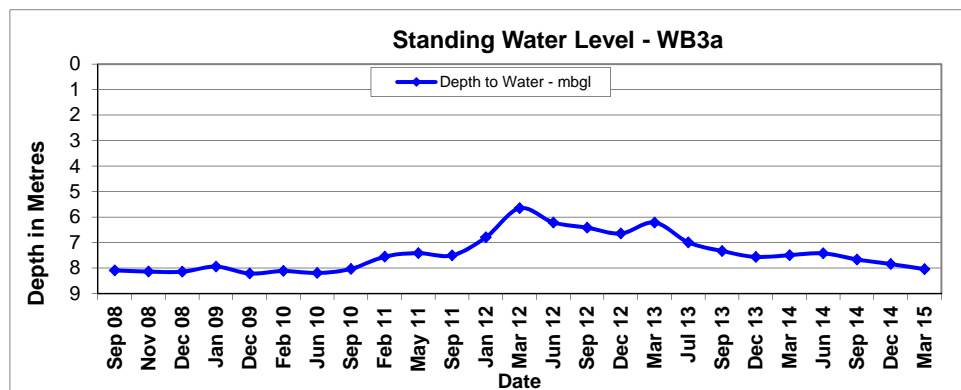
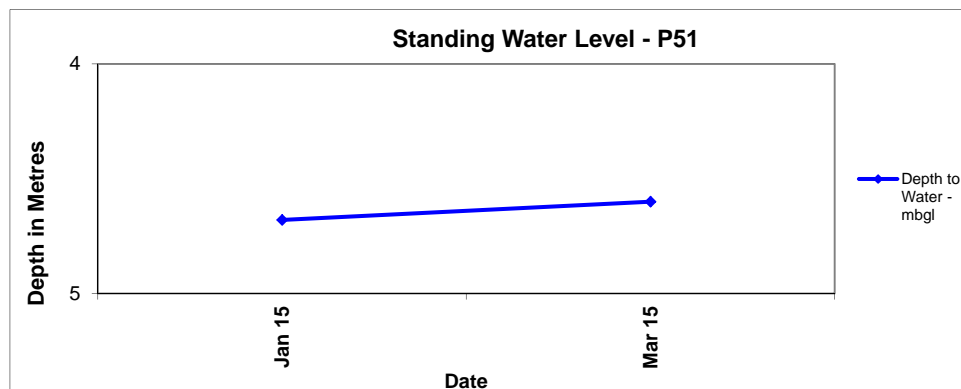


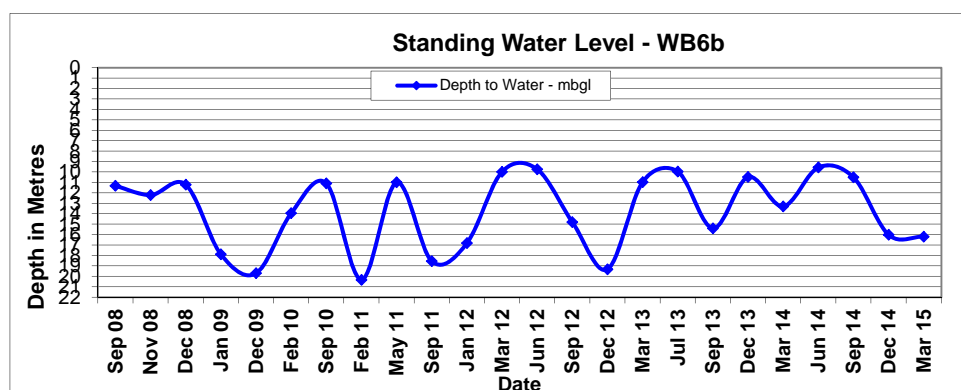
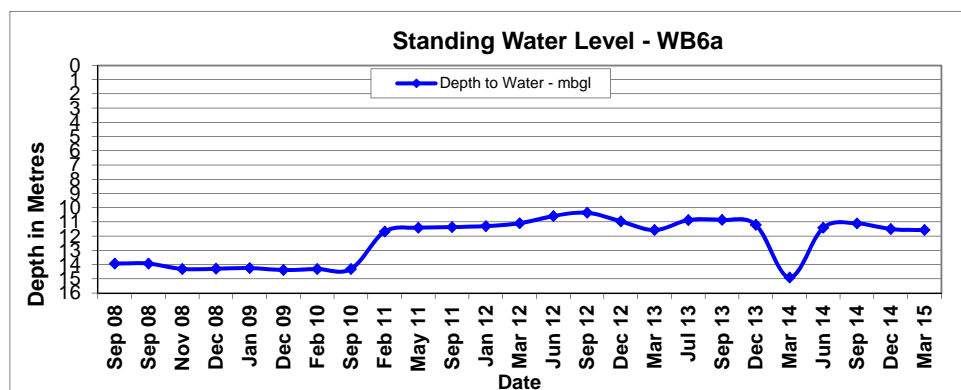
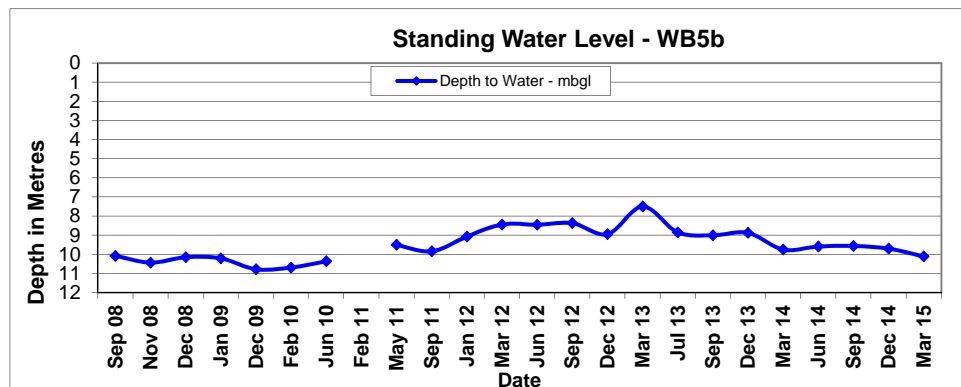
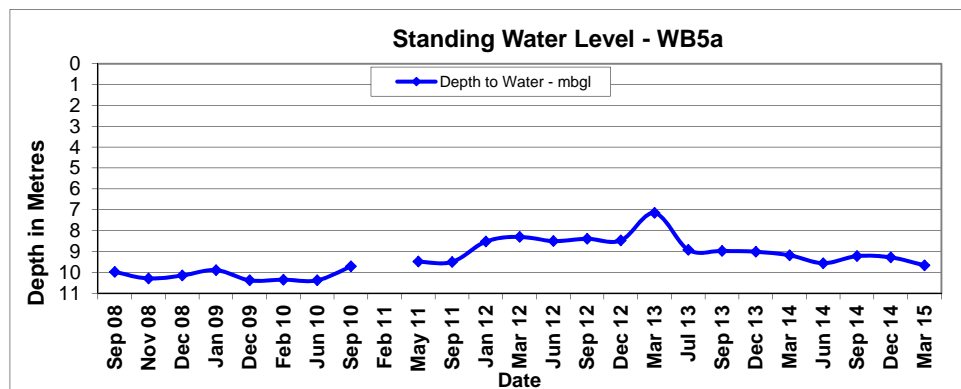


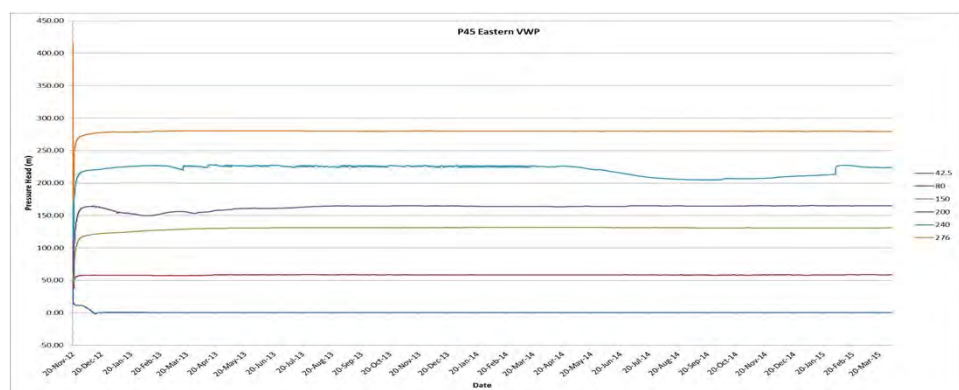
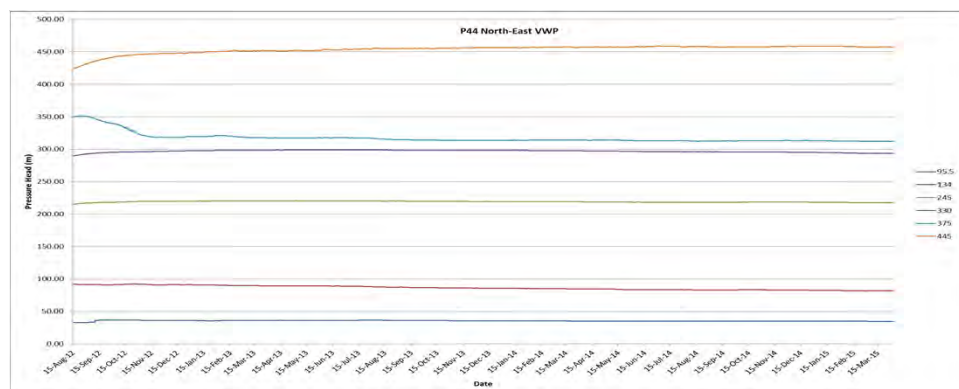
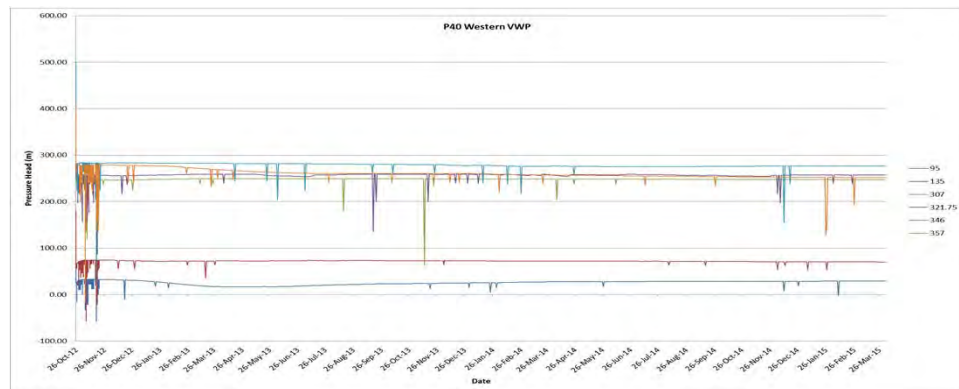
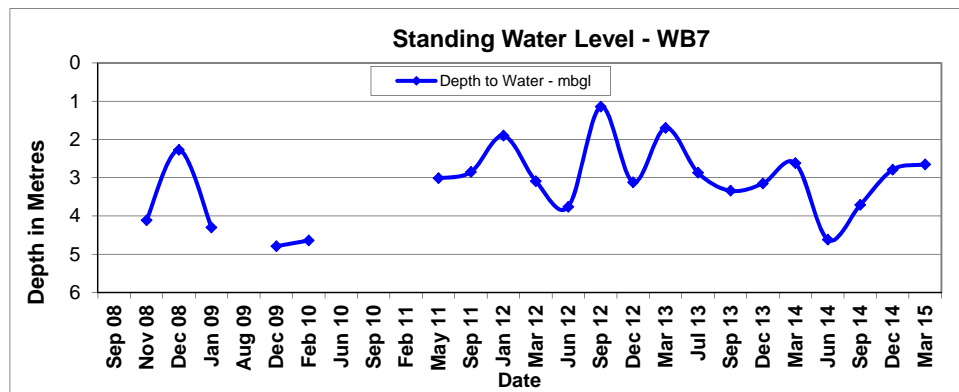


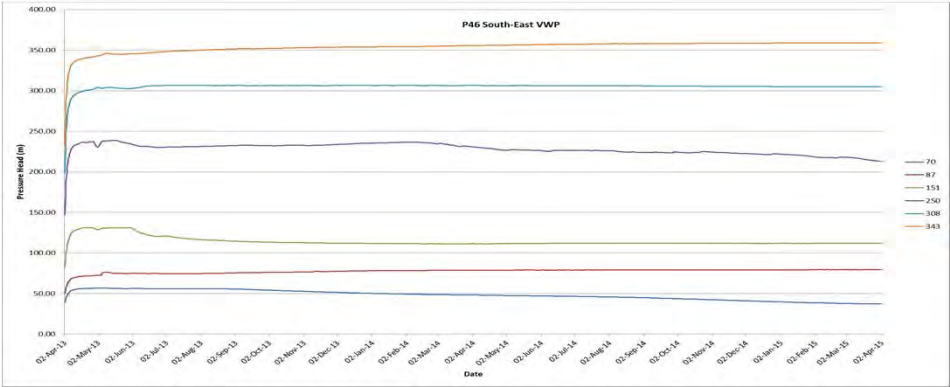












Appendix 7: Noise Monitoring Results

ATTENDED NOISE MONITORING RESULTS

May 2014

June 2014

July 2014

August 2014

September 2014

December 2014

March 2015



13 May 2014

Ref: 05168/5183

Mr Steve Farrar
Narrabri Coal Pty Ltd
PO Box 600
GUNNEDAH NSW 2380

RE: MAY 2014 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 6th May, 2014. 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 monitoring location indicated in Figure 1. Review of noise contours for the project reveals a -18dB correction factor from the monitoring location to the Newhaven residence 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.

** Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.

The monitoring is additional to the quarterly compliance noise monitoring and is to be undertaken for a 15 minute period over each of the day, evening and night time periods during one 24 hour period. The monitoring is to be done during winter months for the first two years of operation of NCM.

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.



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 L_{eq} (15 min), L_{max} , L_1 , L_{10} , L_{90} and L_{min} percentiles. The noise criterion for the operational phase of the NCM project is **35 dB(A) L_{eq} (15 min)** for all operating times.

The results shown in **Tables 1, 2 and 3** below represent the total 15 minute L_{eq} 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 L_1 (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 Brüel & Kjær “*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 – 6 May 2014 (Day)

Location	Time	dB(A), Leq(15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	2:58 pm	43	3.3 / 126	Birds (41), traffic (36), wind (32), NCM inaudible
Bow Hills	2:31 pm	38	3.4 / 129	Traffic (38), birds (25), NCM faintly audible
Oakleigh	4:31 pm	44	1.6 / 95	Birds (43), traffic (38), NCM inaudible
Naroo	2:08 pm	41	3.2 / 130	Traffic (37), birds (34), wind (34), NCM inaudible
Newhaven	3:30 pm	43	3.4 / 114	NCM (25)*
Greylands	3:55 pm	37	2.0 / 107	Traffic (33), wind (32), birds (29), NCM (26)

*noise from vent fan – see text

Table 2 NCM Noise Monitoring Results – 6 May 2014 (Evening)				
Location	Time	dB(A), Leq(15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	8:17 pm	38	0.9 / 176	Traffic (38), insects (23), NCM inaudible
Bow Hills	8:39 pm	36	0.8 / 201	Traffic (36), insects (20), NCM inaudible
Oakleigh	9:20 pm	35	1.0 / 208	Traffic (35) insects (22), NCM inaudible
Naroo	6:58 pm	47	1.4 / 173	Traffic (47), insects (20), NCM inaudible
Newhaven	7:28 pm	42	0.9 / 187	NCM (23)*, drill rig (35), insects (23)
Greylands	7:54 pm	37	1.1 / 176	Traffic (37), insects (21), NCM inaudible

*noise from vent fan – see text

Table 3 NCM Noise Monitoring Results – 6 May 2014 (Night)					
Location	Time	dB(A), Leq(15min)	Wind speed (m/s)/ direction°	Temp Grad (°C/100m)	Identified Noise Sources
Merriman	11:32 pm	38	CALM	+2.1	NCM (36), traffic (34), insects (20)
Bow Hills	11:55 pm	43	0.2 / 101	+4.2	NCM (42), traffic (37), insects (22)
Oakleigh	12:37 am	36	0.9 / 61	+2.9	NCM (35), traffic (28), insects (27)
Naroo	10:22 pm	44	0.9 / 183	+7.7	Traffic (44), insects (23), NCM inaudible
Newhaven	10:51 pm	47	0.3 / 239	+5.8	NCM (29)*, drill rig (35)
Greylands	11:11 pm	40	0.9 / 202	+4.7	NCM (38), traffic (36), insects (23)

*noise from vent fan – see text

The results shown in Tables 1 - 3 indicate that, under the operational and atmospheric conditions at the time, noise emission from NCM were higher than the noise criterion of 35 dB(A) Leq at the Merriman, Bow Hills and Greylands monitoring locations during the night period.

Temperature inversion data showed, however, that the noise measurements at Bow Hills and Greylands were made under non-compliant meteorological conditions (i.e. *temperature inversions of greater than 4°C/100 metres*).

At Merriman the noise was 1 dB(A) above the noise criterion. It is noted that an exceedance of less than 2 dB (A) above a statutory noise limit specified in a 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 noise levels shown for Newhaven include the correction factors detailed earlier in this report. In keeping with previous recommendations the vent fan has been partially enclosed in the direction of the receiver at Newhaven.

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) – 6 May 2014 (Night)		
Location	Time	dB(A),L1(1 min)
Merriman	10:44 pm	42
Bow Hills	11:09 pm	48
Oakleigh	12:00 am	44
Naroo	11:36 pm	N/A
Newhaven	10:01 pm	31*
Greylands	10:22 pm	44

*noise from vent fan

As shown in Table 4, during the night time measurement circuit the (1 min) noise from NCM exceeded 45 dB(A) at the Bow Hills monitoring location.

The measurement at Bow Hills was made under non-compliant meteorological conditions.

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

ATTENDED NOISE MONITORING – 6 MAY 2014

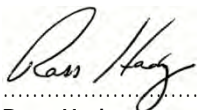
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Narrabri, NSW

Prepared for:

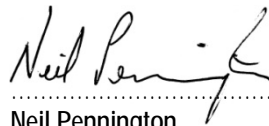
Whitehaven Coal Limited
10 Kurrajong Creek Road
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13 May 2014

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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 19th 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 monitoring period 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 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

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 at 246m AHD and 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.

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 – 6 May 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	4:06 pm	45	2.0 / 104	n/a	Traffic (45), birds (31), NCM inaudible

Table 2 NCM Operational Noise Monitoring Results – 6 May 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Ardmona	8:53 pm	43	0.8 / 204	n/a	Traffic (43), insects (23), NCM inaudible

Table 3 NCM Operational Noise Monitoring Results – 7 May 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	12:12 am	47	0.9 / 64	+3.1	Traffic (47), NCM (32) , insects (21)

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.

4.2.1 Audible Noise Sources

Mine noise was inaudible at the Ardmona monitoring location during the day and evening surveys. At night the noise from a dozer on coal stockpiles was audible.

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

ATTENDED NOISE MONITORING – 6 MAY 2014

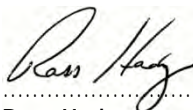
Narrabri Coal Mine

Narrabri, NSW

Prepared for:

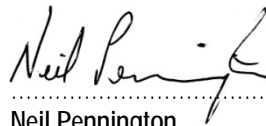
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13 May 2014

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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 19th 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 requested night time monitoring be done at approximately 10:00pm.

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 monitoring period 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

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 at 246m AHD and 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.

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 – 6 May 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	1:31 pm	38	2.8 / 132	n/a	Birds (37), wind (27), traffic (22), NCM inaudible

Table 2 NCM Operational Noise Monitoring Results – 6 May 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	6:35 pm	30	1.9 / 172	n/a	NCM (27) , traffic (27)

Table 3 NCM Operational Noise Monitoring Results – 6 May 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	10:00 pm	27	0.5 / 160	+9.7	traffic (27), NCM inaudible

4.2 Discussion of Results

The results in Tables 1 and 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.

4.2.1 Audible Noise Sources

Mine noise was only audible at the Matilda monitoring location during the evening. The noise was audible consistently 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.

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

ATTENDED NOISE MONITORING – JUNE 2014

Narrabri Coal Mine

Narrabri, NSW

Prepared for:

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June 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 2nd and Thursday 5th June, 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 criterion was not exceeded at any time or location throughout the monitoring survey.

The sleep disturbance criterion was not exceeded at any monitoring location during the night time monitoring periods.

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 2nd and Thursday 5th June, 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 ¹
N7	Belah Park ²
N8	Haylin View ³
N9	Merrilong ³

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.

The mine operated weather station experienced technical difficulties at times throughout the monitoring survey period. As a result of this wind speed and direction data was not available for all survey periods. Where this is the case the table has been left blank. The weather station has since been repaired.

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.

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 – 2 June 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:15 pm	47	2.1/223	0	Traffic (47), NCM (35) , insects (25)
N3 Naroo	8:07 pm	40	2.2/225	0	Traffic (36), NCM (34) , frogs & insects (34)
N5 Oakleigh	8:45 pm	36	1.1/205	+1.1	Frogs & insects (34), traffic (30), NCM (23)
N6 Newhaven	9:25 pm	n/a	0.6/90	+1.3	See text
N7 Merriman	8:56 pm	42	1.8/127	+1.3	Traffic (41), NCM (32) , frogs & insects (33)

Table 2 NCM Operational Noise Monitoring Results – 2 June 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
N1 Bow Hills	10:17 pm	40	0.5/265	+1.2	Traffic (38), frogs & insects (34), NCM (31)
N3 Naroo	10:10 pm	42	0.4/282	+1.2	Traffic (41), NCM (32) , frogs & insects (32)
N5 Oakleigh	11:15 pm	40	0.6/263	+1.3	Traffic (38), NCM (32) , frogs & insects (31)
N6 Newhaven	12:40 am	n/a	1.8/253	+2.9	See text
N7 Merriman	11:30 pm	32	0.6/284	+1.2	Frogs & insects (28), traffic (28), NCM (24)

Table 3
NCM Operational Noise Monitoring Results – 3 June 2014 (day)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	9:05 am	43	0.6/333	n/a	Traffic (43), birds (30), NCM (26)
N3 Naroo	9:48 am	52	0.8/312	n/a	Birds (52), traffic (34), NCM (28)
N4 Greylands	9:22 am	37	0.4/327	n/a	Birds (36), traffic (30), NCM inaudible
N5 Oakleigh	11:54 am	36	1.6/272	n/a	Birds & insects (34), traffic (30), NCM (25)
N6 Newhaven	11:38 am	37	1.5/278	n/a	NCM (29*) , birds (27)
N7 Merriman	1:17 pm	36	1.1/276	n/a	Traffic (35), birds (29), NCM inaudible

*Noise from vent fan and drill rig (see note in Section 1.1)

Table 4
NCM Operational Noise Monitoring Results – 3 June 2014 (evening)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	9:22 pm	47	2.3/186	+1.1	Traffic (46), insects (40), NCM (35)
N3 Naroo	7:47 pm	37	2.7/170	Lapse	Traffic (36), NCM (29) , frogs & insects (26)
N4 Greylands	8:24 pm	37	3.0/198	Lapse	NCM (34) , frogs & insects (34)
N5 Oakleigh	9:28 pm	30	2.3/186	+2.4	Traffic (29), frogs & insects (23) NCM inaudible
N6 Newhaven	8:10 pm	38	2.8/192	Lapse	Insects (26), NCM (20*)
N7 Merriman	8:47 pm	43	2.8/191	Lapse	Traffic (42), NCM (33) , insects (30)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

Table 5
NCM Operational Noise Monitoring Results – 3 June 2014 (night)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	12:21 am	38	0.4/121	+1.1	Traffic (36), insects (31), NCM (31)
N3 Naroo	10:32 pm	41	0.3/111	+2.2	Traffic (41), frogs & insects (28), NCM inaudible
N4 Greylands	11:38 pm	39	-	+2.9	Traffic (37), NCM (34) , frogs & insects (30)
N5 Oakleigh	12:25 am	35	0.4/121	+1.1	Frogs & insects (33), traffic (31), NCM inaudible
N6 Newhaven	10:10 pm	39	0.5/133	+2.4	NCM (21*) , insects (20)
N7 Merriman	11:15 pm	37	-	+2.1	Traffic (34), NCM (33)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

Table 6
NCM Operational Noise Monitoring Results – 4 June 2014 (day)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	1:55 pm	40	1.2/139	n/a	Traffic (39), NCM (34) , insects (25)
N3 Naroo	9:40 am	46	2.6/145	n/a	Birds (46), traffic (35), NCM inaudible
N5 Oakleigh	11:28 am	43	1.3/137	n/a	Birds (43), traffic (24), NCM barely audible
N6 Newhaven	10:42 am	37	2.0/142	n/a	Birds & insects (36), NCM (16*)
N7 Merriman	12:49 pm	34	1.1/128	n/a	Traffic (32), NCM (28) , insects (25)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

Table 7
NCM Operational Noise Monitoring Results – 4 June 2014 (evening)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	9:15 pm	47	-	+3.9	Traffic (44), frogs & insects (44), NCM inaudible
N3 Naroo	9:02 pm	40	-	+2.5	Traffic (40), frogs & insects (27), NCM (20)
N5 Oakleigh	8:25 pm	39	0.4/166	+2.9	Traffic (37), frogs & insects (34), NCM inaudible
N6 Newhaven	8:00 pm	34	-	+3.5	Traffic (27), NCM (16*)
N7 Merriman	8:37 pm	39	0.5/177	+3.3	Traffic (38), frogs & insects (33), NCM inaudible

*Noise from vent fan and drill rig (see discussion in Section 1.1)

Table 8
NCM Operational Noise Monitoring Results – 4 June 2014 (night)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	12:26 am	39		+1.3	Traffic (37), frogs & insects (34), NCM (27)
N3 Naroo	11:15 pm	40		+0.4	Traffic (39), NCM (30) , frogs & insects (23)
N5 Oakleigh	10:02 pm	40		+0.3	Frogs & insects (37), traffic (36), NCM (24)
N6 Newhaven	10:01 pm	37		+0.3	NCM (19*)
N7 Merriman	11:11 pm	35		+0.4	Traffic (34), NCM (28) , frogs & insects (25)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

Table 9
NCM Operational Noise Monitoring Results – 5 June 2014 (day)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:37 am	43	2.5/144	n/a	Traffic (41), birds & insects (37), NCM (30)
N3 Naroo	8:40 am	45	1.6/148	n/a	Birds & insects (44), traffic (36), NCM (30)
N5 Oakleigh	10:20 am	47	-	n/a	Birds & insects (47), traffic (34), NCM (30)
N6 Newhaven	10:52 am	38	-	n/a	Birds & insects (37), NCM (12*)
N7 Merriman	9:16 am	45	1.1/147	n/a	Birds & insects (44), traffic (38), NCM (29)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

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 locations during at any time.

Safe access to the Newhaven monitoring location could not be gained during the evening and night of June 2 due to mining operational constraints.

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 10 - 12**. The measured level shown is for the mine noise only.

Table 10 NCM Sleep Disturbance Monitoring Results – 2 June 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	10:17 pm	39	0.5/265	+1.2
N3 Naroo	10:10 pm	40	0.4/282	+1.2
N5 Oakleigh	11:15 pm	36	0.6/263	+1.3
N6 Newhaven	12:40 am	n/a	1.8/253	+2.9
N7 Merriman	11:30 pm	30	0.6/284	+1.2

Table 11 NCM Sleep Disturbance Monitoring Results – 3 June 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	12:21 am	37	0.4/121	+1.1
N3 Naroo	10:32 pm	n/a	0.3/111	+2.2
N4 Greylands	11:38 pm	40	-	+2.9
N5 Oakleigh	12:25 am	n/a	0.4/121	+1.1
N6 Newhaven	10:10 pm	n/a	0.5/133	+2.4
N7 Merriman	11:15 pm	39	-	+2.1

Table 12 NCM Sleep Disturbance Monitoring Results – 4 June 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	12:26 am	35	2.0/165	+1.3
N3 Naroo	11:15 pm	39	1.7/150	+0.4
N5 Oakleigh	10:02 pm	28	-	+0.3
N6 Newhaven	10:01 pm	n/a	-	+0.3
N7 Merriman	11:11 pm	36	1.7/150	+0.4

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 monitoring location during the night time measurement periods.

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.*”

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.



Project No: 05168

ATTENDED NOISE MONITORING – 3 JUNE 2014

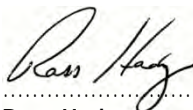
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Narrabri, NSW

Prepared for:

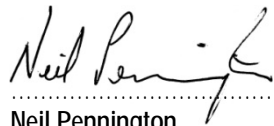
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June 2014

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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 Tuesday 3rd June, 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 monitoring period 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 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

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 at 246m AHD and 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.

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 – 3 June 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	3:09 pm	49	0.4/36	n/a	Traffic (49), birds (27), NCM inaudible

Table 2 NCM Operational Noise Monitoring Results – 3 June 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Ardmona	8:48 pm	50	2.8/194	Lapse	Traffic (50), NCM (30) , frogs & insects (23)

Table 3 NCM Operational Noise Monitoring Results – 3 June 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	11:56 pm	47	0.1/114	+2.1	Traffic (42), frogs & insects (24), 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 the mine noise did not exceed the operational noise criterion.

4.2.1 Audible Noise Sources

Mine noise was inaudible at the Ardmona monitoring location during the day and night time surveys. During the evening the noise from a dozer on coal stockpiles was audible.

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

ATTENDED NOISE MONITORING – 3 JUNE 2014

Narrabri Coal Mine

Narrabri, NSW

Prepared for:

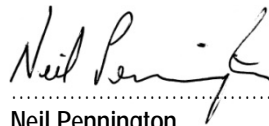
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June 2014

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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 Tuesday 3rd June, 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 requested night time monitoring be done at approximately 10:00pm.

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.

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 monitoring period 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

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 at 246m AHD and 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.

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

Measured noise levels for each period are summarised in **Tables 1 to 3**.

Table 1 NCM Operational Noise Monitoring Results – 3 June 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	10:47 am	39	0.8/290	n/a	Birds (39), NCM (24)

Table 2 NCM Operational Noise Monitoring Results – 3 June 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	7:25 pm	26	3.0/203	Lapse	Traffic (24), insects (22), NCM inaudible

Table 3 NCM Operational Noise Monitoring Results – 3 June 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	10:07 pm	24	0.5/144	+3.2	Traffic (21), frogs & insects (21), 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 the mine noise did not exceed the operational noise criterion.

4.2.1 Audible Noise Sources

Mine noise was only audible at the Matilda monitoring location during the day. The noise was audible consistently 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.

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.



5 August 2014

Ref: 05168/5315

Mr Steve Farrar
Narrabri Coal Pty Ltd
PO Box 600
GUNNEDAH NSW 2380

RE: JULY 2014 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 29th July, 2014. 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 Naroo and Greylands properties are owned by NCM.

** 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 the Newhaven residence 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.

*** Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.

The monitoring is additional to the quarterly compliance noise monitoring and is to be undertaken for a 15 minute period over each of the day, evening and night time periods during one 24 hour period. The monitoring is to be done during winter months for the first two years of operation of NCM.

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.



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 L_{eq} (15 min), L_{max} , L_1 , L_{10} , L_{90} and L_{min} percentiles. The noise criterion for the operational phase of the NCM project is **35 dB(A) L_{eq} (15 min)** for all operating times.

The results shown in **Tables 1, 2 and 3** below represent the total 15 minute L_{eq} 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 L_1 (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 Brüel & Kjær “*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 – 29 July 2014 (Day)				
Location	Time	dB(A), L _{eq} (15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	12:38 pm	38	3.9 / 299	Traffic (36), birds (32), wind (29), NCM inaudible
Bow Hills	1:03 pm	43	3.3 / 237	Traffic (43), NCM (30) , birds (26)
Oakleigh	1:51 pm	33	2.3 / 294	Wind (30), NCM (27) , birds (27)
Naroo	11:14 am	44	4.3 / 305	Birds (41), traffic (40), wind (35), NCM inaudible
Newhaven	11:53 am	30	3.9 / 299	Wind (28), birds (25), NCM inaudible
Greylands	12:14 pm	35	2.3 / 293	Birds (31), traffic (30), wind (30), NCM inaudible

Table 2 NCM Noise Monitoring Results – 29 July 2014 (Evening)					
Location	Time	dB(A), L _{eq} (15min)	Wind speed (m/s)/ direction°	Temp Grad (°C/100m)	Identified Noise Sources
Merriman	8:22 pm	39	1.2 / 296	+6.1	Traffic (39), NCM (27) , frogs (25)
Bow Hills	8:46 am	46	Calm	+7.4	Traffic (44), NCM (41) , frogs (28)
Oakleigh	9:31 am	37	1.8 / 284	+7.3	Traffic (35), NCM (33) , frogs (23)
Naroo	7:06 pm	45	1.7 / 226	+4.9	Traffic (44), NCM (37) , frogs (27)
Newhaven	7:34 pm	28	1.6 / 286	+6.8	Traffic (23), NCM (<20)*
Greylands	7:58 pm	40	2.1 / 302	+5.6	Traffic (38), NCM (36, vent fan (35)**, mine (27))

*noise from drill rig – see text

**noise from vent fan – see text

Table 3 NCM Noise Monitoring Results – 29/30 July 2014 (Night)					
Location	Time	dB(A), L _{eq} (15min)	Wind speed (m/s)/ direction°	Temp Grad (°C/100m)	Identified Noise Sources
Merriman	11:41 pm	29	0.7 / 335	+6.5	NCM (26) , domestic (24), frogs (21)
Bow Hills	12:04 am	45	0.9 / 318	+6.5	NCM (44) , traffic (38), frogs (22)
Oakleigh	12:53 am	41	0.7 / 286	+7.2	NCM (38) , traffic (38)
Naroo	10:28 pm	50	0.3 / 303	+8.4	Traffic (50), NCM (39) , frogs (24)
Newhaven	10:56 pm	39	Calm	+6.9	Traffic (35), NCM (<20)*
Greylands	11:18 pm	35	1.0 / 28	+7.2	Traffic (34), NCM (30, mine (27), vent fan (26)**)

*noise from drill rig – see text

**noise from vent fan – see text

The results shown in Tables 1 - 3 indicate that, under the operational and atmospheric conditions at the time, noise emissions from NCM were higher than the noise criterion of 35 dB(A) L_{eq} at the Bow Hills and Naroo monitoring locations during both the evening and night time periods and at Greylands during the evening. The Naroo and Greylands properties are owned by NCM.

Temperature inversion data showed, however, that noise measurements made during the evening and night time periods were done under non-compliant meteorological conditions (i.e. *temperature inversions of greater than 4°C/100 metres*). Noise emissions from NCM, therefore, did not exceed the relevant noise criterion at any location during any monitoring period.

The measured noise at Greylands was a result of emissions from a vent fan as well as a contribution from general mining noise.

At the Newhaven monitoring location the measured noise was a result of emissions from a drill rig approximately 400 metres away. The noise level shown in the tables for Newhaven includes the correction factors detailed earlier in this report. The total noise level shown in the tables is that measured at the monitoring location.

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) – 29/30 July 2014 (Night)		
Location	Time	dB(A), L1(1 min)
Merriman	11:41 pm	32
Bow Hills	12:04 pm	49
Oakleigh	12:53 am	42
Naroo	10:28 pm	44
Newhaven	10:56 pm	<20*
Greylands	11:18 pm	35

*modified by correction factor

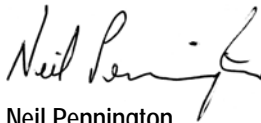
As shown in Table 4, during the night time measurement circuit the (1 min) noise from NCM exceeded 45 dB(A) at the Bow Hills monitoring location. The noise was a result from of emissions from a dozer on the stockpile. The measurement at Bow Hills was made under non-compliant meteorological conditions.

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

ATTENDED NOISE MONITORING – 29 JULY 2014

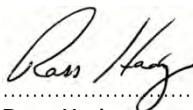
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Narrabri, NSW

Prepared for:

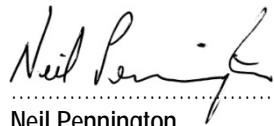
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August 2014

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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 Tuesday 29th July, 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 monitoring period 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 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

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 at 246m AHD and 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.

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 – 29 July 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	1:27 pm	46	3.1/296	n/a	Traffic (46), birds (27), NCM faintly audible

Table 2 NCM Operational Noise Monitoring Results – 29 July 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Ardmona	9:06 pm	45	1.3/295	+5.5	Traffic (44), NCM (37), frogs (24)

Table 3 NCM Operational Noise Monitoring Results – 30 July 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	12:27 am	51	0.6/293	+6.9	Traffic (51), NCM (28)

4.2 Discussion of Results

The results in Tables 1 to 3 show that, under the operating and meteorological conditions at the times, for 15 minute compliance measurement periods, the noise emissions from NCM were higher than the noise criterion of 35 dB(A) Leq at the Ardmona monitoring location during the evening period. Temperature inversion data showed, however, that the noise measurement was made under non-compliant meteorological conditions (i.e. *temperature inversions of greater than 4°C/100 metres*). Noise emissions from NCM, therefore, did not exceed the relevant noise criteria at the Ardmona location during any monitoring period.

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 period was 34 dB(A) which is in compliance with the criterion.

4.2.1 Audible Noise Sources

Mine noise was audible at the Ardmona monitoring location during the day, evening and night time surveys. General mine hum was audible during all three monitoring periods and dozer tracks became audible in the evening and night.

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.

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

ATTENDED NOISE MONITORING – 29 JULY 2014

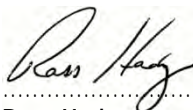
Narrabri Coal Mine

Narrabri, NSW

Prepared for:

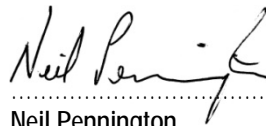
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August 2014

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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 Tuesday 29th July, 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, evening and night time periods during one 24 hour period. The landowner of the Matilda residence requested that the night time monitoring be done at approximately 10:00pm.

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.

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 monitoring period 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

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 at 246m AHD and 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.

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

Measured noise levels for each period are summarised in **Tables 1 to 3**.

Table 1 NCM Operational Noise Monitoring Results – 29 July 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	10:49 am	43	4.2/306	n/a	Birds (43), wind (30), NCM faintly audible

Table 2 NCM Operational Noise Monitoring Results – 29 July 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	6:43 pm	26	1.9/233	+3.8	NCM (23), traffic (20), frogs (20)

Table 3 NCM Operational Noise Monitoring Results – 29 July 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	10:04 pm	33	Calm	+2.5	NCM (32), traffic (26)

4.2 Discussion of Results

The results in Tables 1 to 3 show that, under the operating and meteorological conditions at the times the mine noise did not exceed the operational noise criterion.

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 period was 39 dB(A) which is in compliance with the criterion.

4.2.1 Audible Noise Sources

Mine noise was audible at the Matilda monitoring location during the day, evening and night. The noise was audible consistently as a faint mine hum and dozer tracks became audible in the night time period.

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.

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.



25 August 2014

Ref: 05168/5353

Mr Steve Farrar
Narrabri Coal Pty Ltd
PO Box 600
GUNNEDAH NSW 2380

RE: AUGUST 2014 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 Wednesday 20th and Thursday 21st August, 2014. 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 Naroo and Greylands properties are owned by NCM.

** 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 the Newhaven residence 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.

*** Belah Park is now owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.

The monitoring is additional to the quarterly compliance noise monitoring and is to be undertaken for a 15 minute period over each of the day, evening and night time periods during one 24 hour period. The monitoring is to be done during winter months for the first two years of operation of NCM.

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.



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.

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 L_{eq} (15 min), L_{max} , L_1 , L_{10} , L_{90} and L_{min} percentiles. The noise criterion for the operational phase of the NCM project is **35 dB(A) L_{eq} (15 min)** for all operating times.

The results shown in **Tables 1, 2 and 3** below represent the total 15 minute L_{eq} 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 L_1 (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 Brüel & Kjær “*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 – 20 August 2014 (Evening)					
Location	Time	dB(A), L _{eq} (15min)	Wind speed (m/s)/ direction°	Temp Grad (°C/100m)	Identified Noise Sources
Merriman	8:14 pm	39	3.1 / 150	Lapse	Traffic (38), NCM (29) , frogs (24)
Bow Hills	8:38 pm	42	4.3 / 144	Lapse	Traffic (40), frogs (37), NCM (24)
Oakleigh	9:29 pm	35	4.2 / 142	Lapse	Traffic (32), wind (30), frogs (27), NCM inaudible
Naroo	6:58 pm	54	3.7 / 149	Lapse	Dog (53), traffic (46), frogs (27), NCM inaudible
Newhaven	7:27 pm	39	3.2 / 153	Lapse	Traffic (31), NCM (21, drill rig (20)*, mine (11))
Greylands	7:50 pm	39	2.8 / 154	Lapse	Traffic (37), NCM (35, mine (33), drill rig (30)*)

*noise from drill rig – see text

Table 2 NCM Noise Monitoring Results – 20/21 August 2014 (Night)					
Location	Time	dB(A), L _{eq} (15min)	Wind speed (m/s)/ direction°	Temp Grad (°C/100m)	Identified Noise Sources
Merriman	11:33 pm	42	4.3 / 138	Lapse	Traffic (39), wind in trees (39), NCM faintly audible
Bow Hills	11:57 pm	45	4.6 / 139	Lapse	Traffic (44), frogs (38), NCM faintly audible
Oakleigh	12:44 am	31	4.1 / 135	Lapse	Wind in trees (29), traffic (26), NCM inaudible
Naroo	10:22 pm	38	4.1 / 134	Lapse	Traffic (37), wind in trees (30), frogs (26), NCM inaudible
Newhaven	10:48 pm	39	4.2 / 133	Lapse	Traffic (32), NCM (20, mine (18), drill rig (15)*)
Greylands	11:11 pm	37	4.2 / 138	Lapse	NCM (35, mine (33), drill rig (30)*) , wind in trees (33)

*noise from drill rig – see text

Table 3 NCM Noise Monitoring Results – 21 August 2014 (Day)				
Location	Time	dB(A), L _{eq} (15min)	Wind speed (m/s)/ direction°	Identified Noise Sources
Merriman	9:43 am	50	6.0 / 136	Wind in trees (49), birds (40), traffic (33), NCM inaudible
Bow Hills	10:05 am	44	5.4 / 134	Traffic (41), wind in trees (41), birds (27), NCM inaudible
Oakleigh	10:58 am	40	5.3 / 137	Wind (39), birds (31), traffic (25), NCM inaudible
Naroo	8:27 am	47	5.3 / 142	Traffic (44), wind in trees (44), birds (34), NCM inaudible
Newhaven	8:56 am	40	5.6 / 137	Birds (36), wind in trees (31), traffic (29), NCM (17)*
Greylands	9:17 am	46	5.5 / 130	Wind in trees (44), traffic (40), birds (34), NCM inaudible

*noise from drill rig – see text

The results shown in Tables 1 - 3 indicate that, under the operational and atmospheric conditions at the time, noise emissions from NCM did not exceed the relevant noise criteria at any location during any monitoring period.

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) – 20/21 August 2014 (Night)		
Location	Time	dB(A), L1(1 min)
Merriman	11:33 pm	n/a
Bow Hills	11:57 pm	25
Oakleigh	12:44 am	n/a
Naroo	10:22 pm	n/a
Newhaven	10:48 pm	24*
Greylands	11:11 pm	37

*modified by correction factor

As shown in Table 4, during the night time measurement circuit the L1 (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

ATTENDED NOISE MONITORING – 20/21 AUGUST 2014

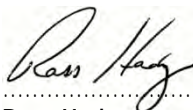
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Narrabri, NSW

Prepared for:

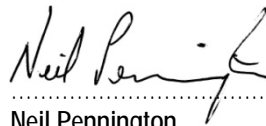
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10 Kurrajong Creek Road
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August 2014

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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 20th and Thursday 21st August, 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 monitoring period 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 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

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 at 246m AHD and 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.

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 – 20 August 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	9:04 pm	44	4.0/140	Lapse	Traffic (44), frogs (25), NCM inaudible

Table 2 NCM Operational Noise Monitoring Results – 21 August 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Ardmona	12:20 pm	39	4.4/136	Lapse	Traffic (39), frogs (23), NCM inaudible

Table 3 NCM Operational Noise Monitoring Results – 21 August 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	10:33 am	46	5.5/129	n/a	Traffic (45), birds (38), wind in trees' (31), 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 15 minute compliance measurement periods, the noise emissions from NCM did not exceed the relevant noise criteria at the Ardmona location during any monitoring period.

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. Noise from NCM was inaudible during the night time measurement period.

4.2.1 Audible Noise Sources

Mine noise was inaudible at the Ardmona monitoring location during the day, evening and night time surveys.

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.

APPENDIX A

DESCRIPTION OF ACOUSTICAL TERMS

Table A1
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Term	Description
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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

ATTENDED NOISE MONITORING – 20/21 AUGUST 2014

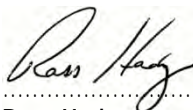
Narrabri Coal Mine

Narrabri, NSW

Prepared for:

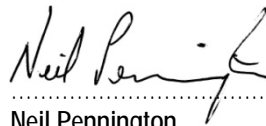
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August 2014

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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 20th and Thursday 21st August, 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, evening and night time periods during one 24 hour period. The landowner of the Matilda residence requested that the night time monitoring be done at approximately 10:00pm.

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.

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 monitoring period 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

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 at 246m AHD and 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.

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

Measured noise levels for each period are summarised in **Tables 1 to 3**.

Table 1 NCM Operational Noise Monitoring Results – 20 August 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	6:34 pm	33	2.9/151	Lapse	Wind (30), traffic (29), frogs (23), NCM inaudible

Table 2 NCM Operational Noise Monitoring Results – 20 August 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	10:00 pm	31	3.8/139	Lapse	Traffic (27), wind (27), frogs (24), NCM inaudible

Table 3 NCM Operational Noise Monitoring Results – 21 August 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	8:03 am	47	5.7/146	n/a	Birds (46), traffic (38), wind (33), 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 the mine noise did not exceed the operational noise criterion.

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. Noise from NCM was inaudible during the night time measurement period.

4.2.1 Audible Noise Sources

Mine noise was inaudible at the Matilda monitoring location during the day, evening and night.

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.

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

ATTENDED NOISE MONITORING – September 2014

Narrabri Mine

Narrabri, NSW

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APPENDIX A Description of Acoustical Terms

EXECUTIVE SUMMARY

Attended noise monitoring has been carried out for the Narrabri Mine (NM) over a period of three days from Wednesday 17th to Friday 19th September, 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.

There was one non-compliance with the noise criterion at Bow Hills as discussed in Section 4.2

The sleep disturbance criterion was not exceeded at any monitoring location during the night time monitoring periods.

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 Wednesday 17th and Friday 19th September, 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 ¹
N4	Greylands ²
N5	Oakleigh
N6	Newhaven ³
N7	Belah Park ⁴
N8	Haylin View ⁵
N9	Merrilong ⁵

1. This receiver is now mine-owned and noise criteria do not apply.
2. This receiver is not included in the 3-day monitoring requirement included in the most recent version of EPL 12789 and is only monitored for one day.
3. The owner denies access to Newhaven so the monitoring is 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.
4. Belah Park is owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.
5. 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.

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.

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 September 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	45	4.4/210	n/a	Wind in trees (45), traffic (27), birds (25), NM faintly audible
N3 Naroo	12:54 pm	44	4.7/225	n/a	Wind in trees (44), traffic (31), birds (30), NM (25)
N5 Oakleigh	3:51 pm	48	3.9/226	n/a	Domestic construction noise (47), wind in trees (41), birds (30), NM inaudible
N6 Newhaven	2:06 pm	45	4.9/218	n/a	Wind in trees (45), NM (<20*)
N7 Merriman	4:12 pm	42	3.6/221	n/a	Traffic (41), wind in trees (34), birds (26), NM inaudible

*Noise from vent fan and drill rig (see note in Section 1.1)

Table 2 NCM Operational Noise Monitoring Results – 17 September 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
N1 Bow Hills	8:19 pm	41	2.1/218	+2.9	Traffic (39), NM (37) , insects (24)
N3 Naroo	9:06 pm	40	2.5/234	+2.6	Traffic (38), NM (36) , insects (25)
N5 Oakleigh	9:09 pm	36	2.5/234	+2.6	Traffic (35), NM (29)
N6 Newhaven	8:21 am	36	2.1/218	+2.9	NM (<20*)
N7 Merriman	7:40 pm	41	2.1/213	Lapse	Traffic (40), NM (32) , insects (25)

Table 3
NCM Operational Noise Monitoring Results – 17/18 September 2014 (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	40	3.5/209	+3.1	NM (39), traffic (33), frogs & insects (22)
N3 Naroo	12:15 am	31	3.5/184	Lapse	NM (27), traffic (26), wind in trees (26)
N5 Oakleigh	11:21 pm	24	3.6/200	+1.8	Traffic (23), NM (<20)
N6 Newhaven	10:00 pm	35	2.5/228	+3.7	NM (<20*)
N7 Merriman	10:00 pm	38	2.5/228	+3.7	Traffic (36), NM (33), insects (21)

*Noise from vent fan and drill rig (see note in Section 1.1)

Table 4
NCM Operational Noise Monitoring Results – 18 September 2014 (day)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	10:14 am	42	2.0/131	n/a	Birds (39), traffic (39), NM (29)
N3 Naroo	11:52 am	40	1.9/207	n/a	Birds (38), traffic (34), NM (29)
N4 Greylands	8:48 am	39	2.8/130	n/a	Wind in trees' (36), traffic (34), NM (32)
N5 Oakleigh	12:15 pm	36	2.1/218	n/a	Birds (36), wind in trees (25) NM faintly audible
N6 Newhaven	9:22 am	33	2.5/138	n/a	Birds (30), wind in trees (28), traffic (24), NM faintly audible
N7 Merriman	8:37 am	35	2.8/126	n/a	Birds (32), traffic (31), NM (24)

Table 5
NCM Operational Noise Monitoring Results – 18 September 2014 (evening)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:38 pm	42	1.9/167	+4.4	Traffic (40), NM (37), frogs & insects (25)
N3 Naroo	9:17 pm	43	1.0/156	+4.1	Traffic (43), NM (32)
N4 Greylands	7:54 pm	40	3.5/208	+1.6	NM (40), traffic (24)
N5 Oakleigh	9:07 pm	23	1.8/159	+3.7	Frogs & insects (20), traffic (20), NM inaudible
N6 Newhaven	8:18 pm	37	0.9/344	+4.1	NM (19, drill rig (17*), mine (14)), insects (24)
N7 Merriman	7:58 pm	40	3.5/208	+1.6	Traffic (39), insects (32), NM (29)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

Table 6
NCM Operational Noise Monitoring Results – 18/19 September 2014 (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	41	1.0/49	+4.9	Traffic (41), frogs & insects (23), NM faintly audible
N3 Naroo	12:17 am	45	0.7/162	+6.4	Traffic (45), NM (23)
N4 Greylands	10:51 pm	40	1.2/37	+5.1	NM (40), vent fan (37), mine (36)), traffic (28)
N5 Oakleigh	12:31 am	27	0.8/166	+7	Traffic (26), insects (21), NM inaudible
N6 Newhaven	11:14 pm	37	0.8/69	+4.9	NM (19, mine (16), drill rig (16*)), insects (23)
N7 Merriman	10:00 pm	43	0.8/339	+5.8	Traffic (41), NM (36), frogs & insects (25)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

Table 7
NCM Operational Noise Monitoring Results – 19 September 2014 (day)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	12:13 pm	40	0.9/176	n/a	NM (38), traffic (34), birds (33)
N3 Naroo	8:53 am	47	3.4/113	n/a	Birds (46), traffic (39), NM inaudible
N5 Oakleigh	11:24 am	38	1.2/177	n/a	Birds (37), wind in trees (28), traffic (24), NM inaudible
N6 Newhaven	9:36 am	37	3.0/111	n/a	Wind in trees (35), birds (30), NM (12*)
N7 Merriman	10:31 am	34	1.8/141	n/a	Birds (30), wind in trees (28), NM (26), traffic (25)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

Table 8
NCM Operational Noise Monitoring Results – 19 September 2014 (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	46	3.4/216	+0.3	Traffic (45), NM (38), insects (28)
N3 Naroo	9:17 pm	36	3.1/219	+1	NM (33), wind in trees (33)
N5 Oakleigh	9:24 pm	25	3.1/213	+0.2	Traffic (25), NM faintly audible
N6 Newhaven	8:40 pm	39	3.4/216	+1	NM (21, drill rig (20*), mine (14)), insects (20)
N7 Merriman	8:00 pm	43	303/221	Lapse	Traffic (42), NM (33), insects (32)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

Table 9 NCM Operational Noise Monitoring Results – 19/20 September 2014 (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	36	1.2/82	+1	Traffic (35), NM (28)
N3 Naroo	12:17 am	41	1.6/144	+2.7	Traffic (41), birds (30), NM (30)
N5 Oakleigh	11:24 pm	32	1.1/104	+2.4	Traffic (32), insects (21), NM inaudible
N6 Newhaven	10:09 pm	39	2.1/139	+1	NM (21, drill rig (19*), mine (16)), insects (23)
N7 Merriman	10:01 pm	43	2.5/171	+1.1	Traffic (43), NM (30)

*Noise from vent fan and drill rig (see discussion in Section 1.1)

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 was greater than the operational noise criterion at some receivers on eight occasions. These events are summarised in **Table 10** and assessed against the atmospheric conditions for applicability of the noise criteria discussed in Section 2.3.

Table 10 Summary of NCM noise levels greater than noise criteria						
Location	Date/Time	Wind speed (m/s)	Temp Grad (°C/100m)	NCM dB(A) Leq (15 min)	Applicable?*	Exceedance?
N1 Bow Hills	17/9 8:19 pm	2.1	2.9	37	Y	Y
N1 Bow Hills	17/9 11:08 pm	3.5	3.1	39	N (wind)	N
N4 Greylands	18/9 7:54 pm	3.5	1.6	40	N (wind)	N
N1 Bow Hills	18/9 8:38 pm	1.9	4.4	37	N (inversion)	N
N7 Merriman	18/9 10:00 pm	0.8	5.5	36	N (inversion)	N
N4 Greylands	18/9 10:51 pm	1.2	5.1	40	N (inversion)	N
N1 Bow Hills	19/9 12:13 pm	0.9	N/A (day)	38	Y	Y
N1 Bow Hills	19/9 8:41 pm	3.4	0.3	38	N (wind)	N

* Are the meteorological conditions within the ranges for which the noise criterion of 35 dB(A) applicable?

Table 10 shows that six of the events occurred under meteorological conditions outside the range of applicability of the noise criteria and are not exceedances.

The exceedance at Bow Hills on the evening of 17 September was 2 dB and is not a non-compliance. Section 11.1.3 of the EPA's *NSW Industrial Noise Policy* (INP) defines non-compliance as follows:

“A development will be deemed to be in non-compliance with a noise consent or license condition if the monitored noise level is more than 2 dB above the statutory noise level specified in the consent or license condition.”

The 2 dB ‘tolerance’ is given because this represents the theoretical minimum noise level difference discernible by the human ear. Section 11.1.3 of the INP goes on to define a breach as:

“A development will be in breach of a noise consent or license condition if sustained non-compliances are not addressed and rectified.”

These statements mean that a breach only occurs when noise emissions are repeatedly measured at a level more than 2 dB above the limit given in the consent, and the proponent does not endeavour to manage or mitigate the exceedance.

The level of 38 dB(A) measured at Bow Hills during the day on 19 September is a non-compliance. Narrabri Coal has been in negotiations with this landowner for some time and it is expected that an agreement will soon be formalised.

4.2.1 Modifying Factor Corrections

Data from those times where NM 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 September 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:08 pm	45	3.5/209	+3.1
N3 Naroo	12:15 am	33	3.5/184	Lapse
N5 Oakleigh	11:21 pm	23	3.6/200	+1.8
N6 Newhaven	10:00 pm	21	2.5/228	+3.7
N7 Merriman	10:00 pm	36	2.5/228	+3.7

Table 12 NCM Sleep Disturbance Monitoring Results – 18/19 September 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:09 pm	23	1.0/49	+4.9
N3 Naroo	12:17 am	26	0.7/162	+6.4
N4 Greylands	10:51 pm	41	1.2/37	+5.1
N5 Oakleigh	12:31 am	n/a	0.8/166	+7
N6 Newhaven	11:14 pm	23	0.8/69	+4.9
N7 Merriman	10:00 pm	40	0.8/339	+5.8

Table 13 NCM Sleep Disturbance Monitoring Results – 19/20 September 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:08 pm	34	1.2/82	+1
N3 Naroo	12:17 am	35	1.6/144	+2.7
N5 Oakleigh	11:23 pm	n/a	1.1/104	+2.4
N6 Newhaven	10:09 pm	25	2.1/139	+1
N7 Merriman	10:01 pm	35	2.5/171	+1.1

The results in Tables 11-13 show that, under the operating and meteorological conditions at the times, the maximum L1 (1 min) noise emission from NM did not exceed the sleep disturbance criterion at any monitoring location during the night time measurement periods.

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.”*

Narrabri Coal has been in negotiations with the landowner at Bow Hills for some time and it is expected that an agreement will soon be formalised.

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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

ATTENDED NOISE MONITORING – 18 SEPTEMBER 2014

Narrabri Coal Mine

Narrabri, NSW

Prepared for:

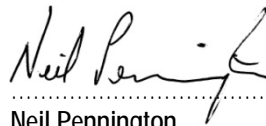
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September 2014

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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 Thursday 18th September, 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 monitoring period 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 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

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 at 246m AHD and 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.

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 – 18 September 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	11:48 am	48	1.9/170	n/a	Birds (48), traffic (36), NCM inaudible

Table 2 NCM Operational Noise Monitoring Results – 18 September 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Ardmona	7:01 pm	43	2.4/225	Lapse	Traffic (43), frogs & insects (25), NCM (22)

Table 3 NCM Operational Noise Monitoring Results – 18 September 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	10:27 pm	42	0.8/348	+4.6	Traffic (42), frogs & insects (20), 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 the mine noise did not exceed the operational noise criterion.

4.2.1 Audible Noise Sources

Mine noise was inaudible at the Ardmona monitoring location during the day and night time surveys. During the evening the noise from a dozer on coal stockpiles was audible.

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

ATTENDED NOISE MONITORING – 18 SEPTEMBER 2014

Narrabri Coal Mine

Narrabri, NSW

Prepared for:

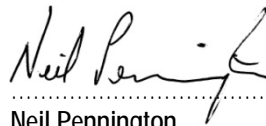
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September 2014

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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 Thursday 18th September, 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 requested night time monitoring be done at approximately 10:00pm.

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.

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 monitoring period 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

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 at 246m AHD and 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.

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

Measured noise levels for each period are summarised in **Tables 1 to 3**.

Table 1 NCM Operational Noise Monitoring Results – 18 September 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	11:15 am	42	2.5/130	n/a	Birds (42), traffic (25), NCM faintly audible

Table 2 NCM Operational Noise Monitoring Results – 18 September 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	7:26 pm	32	3.1/212	+1.8	Wind in trees (31), traffic (22), frogs & insects (21), NCM inaudible

Table 3 NCM Operational Noise Monitoring Results – 18 September 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
Matilda	10:00 pm	22	0.8/348	+4.6	Insects (21), traffic (15), 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 the mine noise did not exceed the operational noise criterion.

4.2.1 Audible Noise Sources

Mine noise was audible at the Matilda monitoring location during the day, evening and night. The noise was audible consistently as a faint mine hum and dozer tracks in the night time period.

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.

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

ATTENDED NOISE MONITORING – December 2014

Narrabri Mine

Narrabri, NSW

Prepared for:

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December 2014

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APPENDIX A Description of Acoustical Terms

EXECUTIVE SUMMARY

Attended noise monitoring has been carried out for the Narrabri Mine (NM) over a period of three days from Monday 1st to Wednesday 3rd December, 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 mine noise was compliant at all times and at all monitoring locations.

The sleep disturbance criterion was not exceeded at any monitoring location during the night time monitoring periods.

Data from those times where NM 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 Mine (NM) between Monday 1st and Wednesday 3rd December, 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 ¹
N4	Greylands ²
N5	Oakleigh
N6	Newhaven ³
N7	Belah Park ⁴
N8	Haylin View ⁵
N9	Merrilong ⁵

1. This receiver is now mine-owned and noise criteria do not apply.
2. This receiver is not included in the 3-day monitoring requirement included in the most recent version of EPL 12789 and is only monitored for one day.
3. The owner denies access to Newhaven so the monitoring is 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 NM noise level at this receiver.
4. Belah Park is owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.
5. 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 NM 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 NM 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.

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.

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 NM Operational Noise Monitoring Results – 1 December 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	3:44 pm	42	4.3/317	n/a	Traffic (42), wind (29), birds (27), NM inaudible
N3 Naroo	12:27 pm	54	7.1/332	n/a	Wind (53), traffic (48), birds (31), NM faintly audible
N5 Oakleigh	1:42 pm	48	6.0/329	n/a	Wind (45), birds (43), traffic (40), NM inaudible
N6 Newhaven	3:31 pm	43	4.4/314	n/a	Birds (34), wind (28), NM (24*)
N7 Merriman	2:06 pm	43	5.7/325	n/a	Traffic (39), wind (39), birds (35), NM inaudible

*Noise from drill rig (see note in Section 1.1)

Table 2 NM Operational Noise Monitoring Results – 1 December 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
N1 Bow Hills	8:45 pm	41	2.8/332	+0.5	Traffic (39), insects (36), NM (29)
N3 Naroo	9:23 pm	36	2.3/324	+1.0	Traffic (33), insects (30), NM (29)
N5 Oakleigh	9:18 pm	37	2.2/324	+1.0	Frogs & insects (34), traffic (33), NM (26)
N6 Newhaven	8:33 pm	34	3.1/331	+0.5	Insects (33), traffic (25), NM (<10*)
N7 Merriman	8:01 pm	34	3.2/323	+0.3	Traffic (33), insects (25), domestic (25), NM inaudible

*Noise from drill rig (see note in Section 1.1)

Table 3 NM Operational Noise Monitoring Results – 1/2 December 2014 (Night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:14 pm	38	3.2/284	Lapse	Traffic (36), NM (30) , frogs & insects (27), wind (27)
N3 Naroo	12:22 am	36	2.1/291	Lapse	Traffic (33), birds & insects (31), NM (28)
N5 Oakleigh	11:19 pm	36	3.2/284	Lapse	Traffic (32), frogs & insects (32), NM (30)
N6 Newhaven	10:04 pm	34	2.6/320	+0.9	Insects (31), traffic (28), NM (<20*)
N7 Merriman	10:00 pm	37	2.6/320	+0.9	Traffic (35), insects (33), NM inaudible

*Noise from drill rig (see note in Section 1.1)

Table 4 NM Operational Noise Monitoring Results – 2 December 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	10:49 am	46	6.0/314	n/a	Wind (45), traffic (39), birds (27), NM (24)
N3 Naroo	9:51 am	55	6.7/316	n/a	Wind (55), traffic (40), NM inaudible
N4 Greylands	2:15 pm	46	5.6/326	n/a	Wind (45), traffic (34), birds & insects (33), NM inaudible
N5 Oakleigh	11:32 am	51	5.8/307	n/a	Wind (50), birds (43), traffic (29), NM inaudible
N6 Newhaven	2:56 pm	42	3.5/309	n/a	Wind (40), birds (36), NM (<20*)
N7 Merriman	12:28 pm	43	5.6/252	n/a	Wind (42), traffic (33), birds (28), NM inaudible

*Noise from drill rig (see note in Section 1.1)

Table 5 NM Operational Noise Monitoring Results – 2 December 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:03 pm	39	1.9/309	+1.6	Traffic (38), insects (28), NM (26) , sheep (24)
N3 Naroo	9:20 pm	37	1.9/301	+1.7	Traffic (36), frogs & insects (30), NM (25)
N5 Oakleigh	9:15 pm	38	1.9/307	+1.6	Traffic (37), insects (30), NM (25)
N6 Newhaven	8:31 pm	31	2.1/326	+1.7	Traffic (26), insects (26), NM (<10*)
N7 Merriman	7:14 pm	43	2.0/303	+1.6	Birds & insects (42), traffic (32), NM inaudible

*Noise from drill rig (see discussion in Section 1.1)

Table 6
NM Operational Noise Monitoring Results – 2/3 December 2014 (night)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:57 pm	41	2.8/316	+3.9	Traffic (40), insects (34), NM (26)
N3 Naroo	12:01 am	38	2.8/316	+3.9	Traffic (35), NM (34) , frogs & insects (26)
N5 Oakleigh	1:26 am	38	4.6/325	+0.3	Wind (37), traffic (30), insects (26), NM (25)
N6 Newhaven	10:49 pm	36	2.3/314	+3.9	Insects (30), traffic (30), NM (<20*)
N7 Merriman	10:31 pm	38	2.1/312	+3.2	Traffic (37), insects (32), NM inaudible

*Noise from drill rig (see discussion in Section 1.1)

Table 7
NM Operational Noise Monitoring Results – 3 December 2014 (day)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	2:08 pm	42	4.7/303	n/a	Traffic (39), wind (39), birds & insects (26), NM inaudible
N3 Naroo	12:34 pm	47	5.5/316	n/a	Birds (45), traffic (40), wind (39), NM inaudible
N5 Oakleigh	10:51 am	53	6.9/312	n/a	Birds (50), wind (50), NM inaudible
N6 Newhaven	12:42 pm	43	5.0/315	n/a	Wind (38), birds (34), NM (<20*)
N7 Merriman	10:57 am	50	6.7/313	n/a	Wind (49), traffic (42), birds & insects (28), NM inaudible

*Noise from drill rig (see discussion in Section 1.1)

Table 8
NM Operational Noise Monitoring Results – 3 December 2014 (evening)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:08 pm	34	1.6/341	+0.3	Traffic (33), birds & insects (27), NM inaudible
N3 Naroo	8:41 pm	43	1.8/339	+0.6	Traffic (43), NM (30) , insects (27)
N4 Greylands	9:40 pm	47	6.1/231	Lapse	Wind (47), NM (26)
N5 Oakleigh	9:25 pm	36	6.4/232	Lapse	Traffic (35), insects (29), NM (25)
N6 Newhaven	9:02 pm	41	2.8/289	+0.6	Insects (28), NM (23*)
N7 Merriman	7:31 pm	39	1.7/352	0.0	Traffic (36), birds & insects (36), NM inaudible

*Noise from drill rig (see discussion in Section 1.1)

Table 9 NM Operational Noise Monitoring Results – 3/4 December 2014 (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	40	2.4/101	Lapse	Traffic (39), NM (33), insects (26)
N3 Naroo	12:58 am	51	4.2/118	Lapse	Wind (50), traffic (44), insects (26), NM inaudible
N4 Greylands	12:31 am	38	5.1/128	Lapse	Traffic (37), wind (30), insects (24), NM inaudible
N5 Oakleigh	11:28 pm	47	5.3/121	Lapse	Wind (47), insects (25), NM inaudible
N6 Newhaven	11:20 pm	41	2.4/101	Lapse	Insects (36), NM (23*)
N7 Merriman	10:03 pm	45	4.5/200	Lapse	Traffic (44), wind (39), insects (28), NM inaudible

*Noise from drill rig (see discussion in Section 1.1)

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 criterion at any of the receiver locations at any time.

4.2.1 Modifying Factor Corrections

Data from those times where NM 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 NM Sleep Disturbance Monitoring Results – 1/2 December 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:14 pm	34	3.2/284	Lapse
N3 Naroo	12:22 am	31	2.1/291	Lapse
N5 Oakleigh	11:19 pm	33	3.2/284	Lapse
N6 Newhaven	10:04 pm	<20	2.6/320	+0.9
N7 Merriman	10:00 pm	n/a	2.6/320	+0.9

Table 12 NM Sleep Disturbance Monitoring Results – 2/3 December 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:57 pm	30	2.8/316	+3.9
N3 Naroo	12:01 am	38	2.8/316	+3.9
N5 Oakleigh	1:26 am	28	4.6/325	+0.3
N6 Newhaven	10:49 pm	<20	2.3/314	+3.9
N7 Merriman	10:31 pm	n/a	n/a	+3.2

Table 13				
NM Sleep Disturbance Monitoring Results – 3/4 December 2014 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:09 pm	37	2.4/101	Lapse
N3 Naroo	12:58 am	n/a	4.2/118	Lapse
N4 Greylands	12:31 am	n/a	5.1/18	Lapse
N5 Oakleigh	12:28 am	n/a	5.3/121	Lapse
N6 Newhaven	11:20 pm	25	2.4/101	Lapse
N7 Merriman	10:03 pm	n/a	4.5/200	Lapse

The results in Tables 11-13 show that, under the operating and meteorological conditions at the times, the maximum L1 (1 min) noise emission from NM did not exceed the sleep disturbance criterion at any monitoring location during the night time measurement periods.

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

ATTENDED NOISE MONITORING – 2/3 DECEMBER 2014

"Ardmona"

Narrabri Mine

Narrabri, NSW

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Whitehaven Coal Limited
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December 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 Mine (NM) on Tuesday 2nd and Wednesday 3rd December, 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. For logistical reasons the monitoring was undertaken over a 48 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 location is 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 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 monitoring period 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 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from NM 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 NM is shown in the tables in bold type. Mining noise levels above the 35dB(A) criterion are shaded grey.

3.3 Meteorological Data

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 at 246m AHD and 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.

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 NM Operational Noise Monitoring Results – 2 December 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	10:24 am	52	6.8/315	n/a	Traffic (52), birds (38), wind (29), domestic (27), NM inaudible

Table 2 NM Operational Noise Monitoring Results – 3 December 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	8:30 pm	40	1.5/336	+0.8	Traffic (40), NM (28), insects (23)

Table 3 NM Operational Noise Monitoring Results – 3 December 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	10:45 pm	36	4.8/197	Lapse	Traffic (34), NM (28), wind (27), insects (23)

4.2 Discussion of Results

The results in Tables 1 to 3 show that, under the operating and meteorological conditions at the times the mine noise did not exceed the operational noise criterion.

4.2.1 Audible Noise Sources

Mine noise was inaudible at the Ardmona monitoring location during the day time measurement. During the evening and night time measurements the noise from a dozer on the coal stockpiles was occasionally audible as well as general mine hum.

4.2.2 Modifying Factor Corrections

Data from those times where NM 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

The maximum noise level during the night time measurement was 32 dB(A) as a result of emissions from dozer tracks. This is in compliance with the sleep disturbance criterion.

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

ATTENDED NOISE MONITORING – 2/3 DECEMBER 2014

“Matilda”

Narrabri Coal Mine

Narrabri, NSW

Prepared for:


Whitehaven Coal Limited
10 Kurrajong Creek Road
Baan Baa NSW 2390

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December 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 Mine (NM) on Tuesday 2nd and Wednesday 3rd September, 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 Matilda location the monitoring was undertaken for a 15 minute period over each of the day, evening and night time periods. The landowner of the Matilda residence requested night time monitoring be done at approximately 10:00pm.

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.

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 monitoring period 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 NM 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 NM is shown in the tables in bold type. Mining noise levels above the 35dB(A) criterion are shaded grey.

3.3 Meteorological Data

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 at 246m AHD and 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.

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

Measured noise levels for each period are summarised in **Tables 1 to 3**.

Table 1 NM Operational Noise Monitoring Results – 2 December 2014 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	9:45 am	52	6.7/321	n/a	Wind (52), birds (27), NM inaudible

Table 2 NM Operational Noise Monitoring Results – 2 December 2014 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	8:00 pm	43	1.9/309	+0.3	Birds (43), traffic (25), NM faintly audible

Table 3 NM Operational Noise Monitoring Results – 3 December 2014 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	10:14 pm	42	4.9/208	Lapse	Wind (42), insects (25), NM inaudible

4.2 Discussion of Results

The results in Tables 1 to 3 show that, under the operating and meteorological conditions at the times the mine noise did not exceed the operational noise criterion.

4.2.1 Audible Noise Sources

Mine noise was only faintly audible at the Matilda monitoring location during the evening measurement. The audible noise was recorded as faint mine hum.

4.2.2 Modifying Factor Corrections

Data from those times where NM 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

Noise from NM was inaudible during the night time measurement and thus in compliance with the sleep disturbance criterion.

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

ATTENDED NOISE MONITORING – MARCH 2015

Narrabri Mine

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April 2015

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APPENDIX A Description of Acoustical Terms		

EXECUTIVE SUMMARY

Attended noise monitoring has been carried out for the Narrabri Mine (NM) over a period of three days from Tuesday 17th to Thursday 19th March, 2015 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 mine noise was compliant at all times and at all monitoring locations.

The sleep disturbance criterion was not exceeded at any monitoring location during the night time monitoring periods.

Data from those times where NM 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 Mine (NM) between Tuesday 17th and Thursday 19th March, 2015.

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 ¹
N4	Greylands ²
N5	Oakleigh
N6	Newhaven ³
N7	Belah Park ⁴
N8	Haylin View ⁵
N9	Merrilong ⁵

1. This receiver is now mine-owned and noise criteria do not apply.
2. This receiver is not included in the 3-day monitoring requirement included in the most recent version of EPL 12789 and is only monitored for one day.
3. The owner denies access to Newhaven so the monitoring is 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 NM noise level at this receiver.
4. Belah Park is owned by the owner of Merriman and monitoring was carried out at the residence at Merriman.
5. 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 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 NM 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 NM 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.

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.

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 NM Operational Noise Monitoring Results – 17 March 2015 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	1:56 pm	36	4.8/325	n/a	Traffic (34), wind (29), NM (27)
N3 Naroo	3:34 pm	44	4.8/328	n/a	Wind (41), traffic (40), birds (30), NM (26)
N5 Oakleigh	2:49 pm	38	4.9/325	n/a	Traffic (36), birds (32), wind (28), NM (25)
N6 Newhaven	1:05 pm	59	5.4/330	n/a	Wind (59), NM (<20*)
N7 Merriman	12:20 pm	42	5.8/329	n/a	Wind (40), birds (36), traffic (32), NM inaudible

*Noise from vent fan (see note in Section 1.1)

Table 2 NM Operational Noise Monitoring Results – 17 March 2015 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m) ¹	Identified Noise Sources
N1 Bow Hills	9:16 pm	39	1.5/299	+1.1	Traffic (37), insects (34), NM (25)
N3 Naroo	8:01 pm	44	2.6/347	+1.1	Traffic (42), frogs & insects (40), NM (27)
N5 Oakleigh	9:16 pm	40	1.5/299	+1.1	Frogs & insects (39), traffic (31), NM (27)
N6 Newhaven	8:33 pm	36	3.3/333	+1.1	Insects (23), NM (<20*)
N7 Merriman	8:40 pm	38	2.8/335	+1.4	Frogs & insects (36), traffic (34), NM inaudible

*Noise from vent fan (see note in Section 1.1)

Table 3
NM Operational Noise Monitoring Results – 17/18 March 2015 (Night)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:07 pm	38	1.7/347	+2.4	Traffic (37), NM (28) , frogs & insects (25)
N3 Naroo	12:12 am	38	3.6/145	+0.7	NM (35) , traffic (34), frogs & insects (29)
N5 Oakleigh	11:25 pm	46	1.7/106	+2.0	Frogs & insects (46), traffic (27), NM (23)
N6 Newhaven	10:02 pm	35	2.0/204	+1.2	Insects (22), NM (<20*)
N7 Merriman	10:00 pm	39	2.0/204	+1.2	Traffic (37), frogs & insects (35), NM inaudible

*Noise from vent fan (see note in Section 1.1)

Table 4
NM Operational Noise Monitoring Results – 18 March 2015 (day)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	9:40 am	52	9.9/324	n/a	Wind (52), traffic (33), NM inaudible
N3 Naroo	11:18 am	64	10.7/322	n/a	Wind (64), traffic (35), NM inaudible
N4 Greylands	10:45 am	54	10.9/320	n/a	Wind (54), traffic (25), birds (25), NM inaudible
N5 Oakleigh	7:49 am	44	6.0/329	n/a	Birds (43), traffic (35), NM (33)
N6 Newhaven	11:10 am	52	10.7/322	n/a	Wind (52), NM (<20*)
N7 Merriman	8:03 am	49	6.5/328	n/a	Wind (48), birds (42), traffic (31), NM inaudible

*Noise from vent fan (see note in Section 1.1)

Table 5
NM Operational Noise Monitoring Results – 18 March 2015 (evening)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:33 pm	37	4.6/313	+1.1	Traffic (36), NM (29) , frogs & insects (26)
N3 Naroo	9:10 pm	44	4.4/286	+1.6	Traffic (43), NM (35) , wind (34), frogs & insects (28)
N4 Greylands	8:48 pm	32	4.3/311	+0.9	Traffic (30), wind (26), insects (24), NM inaudible
N5 Oakleigh	7:17 pm	41	6.5/328	0.0	Wind (40), insects (31), traffic (28), NM faintly audible
N6 Newhaven	9:11 pm	41	4.4/286	+1.6	Insects (27), NM (23*)
N7 Merriman	7:56 pm	39	5.7/321	+0.3	Wind (37), insects (31), domestic (29), traffic (27), NM inaudible

*Noise from vent fan (see discussion in Section 1.1)

Table 6
NM Operational Noise Monitoring Results – 18/19 March 2015 (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	39	3.7/290	+0.7	Traffic (36), NM (33) , frogs & insects (33)
N3 Naroo	12:17 am	44	3.4/288	+1.4	Frogs & insects (41), traffic (38), NM (38)
N4 Greylands	11:59 pm	33	3.5/286	+1.0	Traffic (31), domestic (27), frogs & insects (22), NM inaudible
N5 Oakleigh	10:01 pm	44	4.1/296	+1.1	Frogs & insects (43), traffic (36), wind (33), NM (27)
N6 Newhaven	12:22 am	40	3.4/288	+1.4	Insects (27), NM (22*)
N7 Merriman	10:00 pm	41	4.1/296	+1.1	Traffic (40), wind (31), domestic (29), insects (27), NM inaudible

*Noise from vent fan (see discussion in Section 1.1)

Table 7
NM Operational Noise Monitoring Results – 19 March 2015 (day)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	9:36 am	37	0.5/32	n/a	Traffic (35), birds (32), NM (26)
N3 Naroo	11:14 am	45	1.7/306	n/a	Birds & insects (44), traffic (38), NM (27)
N5 Oakleigh	9:07 am	33	0.3/33	n/a	Birds (31), traffic (27), NM (24)
N6 Newhaven	10:55 am	32	1.8/343	n/a	Birds & insects (28), NM (<20*)
N7 Merriman	7:59 am	38	0.5/45	n/a	Traffic (34), NM (34) , birds (31)

*Noise from vent fan (see discussion in Section 1.1)

Table 8
NM Operational Noise Monitoring Results – 19 March 2015 (evening)

Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	8:43 pm	44	2.4/286	+3.9	Traffic (41), frogs & insects (40), NM (35)
N3 Naroo	9:21 pm	43	2.5/293	+4.0	Traffic (41), NM (36) , frogs & insects (34)
N5 Oakleigh	9:25 pm	46	2.5/293	+3.6	Insects (46), traffic (31), NM (25)
N6 Newhaven	8:46 pm	41	2.4/286	+3.9	Insects (29), NM (23*)
N7 Merriman	8:05 pm	39	1.5/296	+2.2	Frogs & insects (38), traffic (31), domestic (26), NM inaudible

*Noise from vent fan (see discussion in Section 1.1)

Table 9 NM Operational Noise Monitoring Results – 19/20 March 2015 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
N1 Bow Hills	11:11 pm	41	2.1/299	+5.1	Traffic (39), NM (35) , frogs & insects (30)
N3 Naroo	12:19 am	43	2.0/290	+6.8	Traffic (42), NM (36) , frogs & insects (26)
N5 Oakleigh	11:17 pm	40	2.1/299	+5.1	Insects (40), traffic (25), NM (25)
N6 Newhaven	10:05 pm	40	2.4/292	+3.6	Insects (26), NM (22*)
N7 Merriman	10:02 pm	38	2.4/292	+3.6	Traffic (35), NM (32) , frogs & insects (32)

*Noise from vent fan (see discussion in Section 1.1)

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 criterion at any of the receiver locations at any time.

Noise from NM was measured at higher than of 35 dB(A) Leq (15 min) on three occasions at the Naroo monitoring location, however, this residence is now mine owned and therefore, the noise criterion does not apply.

When NM was measured at 38 dB(A) Leq (15 min) during the night on the 18th of March at the Naroo monitoring location it was conducted under non-complying meteorological conditions with wind speeds greater than 3.0m/s.

On the night of the 19th of March when NM was measured at 36 dB(A) Leq (15 min) at the Naroo monitoring location it occurred during a temperature inversion equivalent to a stability category G (+6.8) which is under non-complying meteorological conditions.

4.2.1 Modifying Factor Corrections

Data from those times where NM 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 10 - 12**. The measured level shown is for the mine noise only.

Table 10 NM Sleep Disturbance Monitoring Results – 17/18 March 2015 (night)				
Location	Time	dB(A), L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:07 pm	35	1.7/347	+2.4
N3 Naroo	12:12 am	39	3.6/145	+0.7
N5 Oakleigh	11:25 pm	28	1.7/106	+2.0
N6 Newhaven	10:02 pm	23 ¹	2.0/204	+1.2
N7 Merriman	10:00 pm	n/a	2.0/204	+1.2

1. Noise from vent fan

Table 11 NM Sleep Disturbance Monitoring Results – 18/19 March 2015 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:09 pm	37	3.7/290	+0.7
N3 Naroo	12:17 am	42	3.4/288	+1.4
N4 Greylands	11:59 pm	n/a	3.5/286	+1.0
N5 Oakleigh	10:01 pm	31	4.1/296	+1.1
N6 Newhaven	12:22 pm	24 ¹	3.4/288	+1.4
N7 Merriman	10:00 pm	n/a	4.1/296	+1.1

1. Noise from vent fan

Table 12 NM Sleep Disturbance Monitoring Results – 19/20 March 2015 (night)				
Location	Time	dB(A),L1 (1 min)	Wind speed / direction	Temp Grad(°C/100m)
N1 Bow Hills	11:11 pm	39	2.1/299	+5.1
N3 Naroo	12:19 am	41	2.0/290	+6.8
N5 Oakleigh	11:17 pm	28	2.1/299	+5.1
N6 Newhaven	10:05 pm	24 ¹	2.4/292	+3.6
N7 Merriman	10:02 pm	37	2.4/292	+3.6

1. Noise from vent fan

The results in Tables 10-12 show that, under the operating and meteorological conditions at the times, the maximum L1 (1 min) noise emission from NM did not exceed the sleep disturbance criterion at any monitoring location during the night time measurement periods.

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

ATTENDED NOISE MONITORING – 18 MARCH 2015

“Ardmona”

Narrabri Mine

Narrabri, NSW

Prepared for:

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April 2015

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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 Mine (NM) on Wednesday 18th March, 2015.

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.

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 location is 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 the residence.

3.0 NOISE MONITORING PROCEDURE

3.1 Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 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 monitoring period 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 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from NM 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 NM is shown in the tables in bold type. Mining noise levels above the 35dB(A) criterion are shaded grey.

3.3 Meteorological Data

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 at 246m AHD and 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.

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 NM Operational Noise Monitoring Results – 18 March 2015 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	9:31 am	48	7.2/321	n/a	Traffic (48), wind (32), birds (29), NM inaudible

Table 2 NM Operational Noise Monitoring Results – 18 March 2015 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	7:56 pm	44	5.9/325	0.0	Traffic (41), frogs & insects (40), wind (32), NM (30)

Table 3 NM Operational Noise Monitoring Results – 18 March 2015 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Ardmona	11:08 pm	44	3.8/293	+0.8	Traffic (43), NM (34) , frogs & insects (30)

4.2 Discussion of Results

The results in Tables 1 to 3 show that, under the operating and meteorological conditions at the times the mine noise did not exceed the operational noise criterion.

4.2.1 Audible Noise Sources

Mine noise was inaudible at the Ardmona monitoring location during the day time measurement. During the evening and night time measurements the noise from a dozer on the coal stockpiles was clearly audible as well as general mine hum.

4.2.2 Modifying Factor Corrections

Data from those times where NM 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

The maximum noise level during the night time measurement was 37 dB(A) as a result of emissions from dozer tracks. This is in compliance with the sleep disturbance criterion.

APPENDIX A

DESCRIPTION OF ACOUSTICAL TERMS

Table A1
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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

ATTENDED NOISE MONITORING – 18 MARCH 2015

“Matilda”

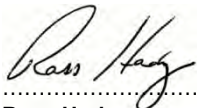
Narrabri Coal Mine

Narrabri, NSW

Prepared for:

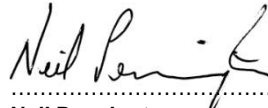
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April 2015

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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 Mine (NM) on Wednesday 18th March, 2015.

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 Matilda location the monitoring was undertaken for a 15 minute period over each of the day, evening and night time periods.

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.

3.0 NOISE MONITORING PROCEDURE

3.1 Monitoring Equipment

Attended noise monitoring was conducted with Brüel & Kjær Type 2250 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 monitoring period 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 NM 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 NM is shown in the tables in bold type. Mining noise levels above the 35dB(A) criterion are shaded grey.

3.3 Meteorological Data

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 at 246m AHD and 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.

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

Measured noise levels for each period are summarised in **Tables 1 to 3**.

Table 1 NM Operational Noise Monitoring Results – 18 March 2015 (day)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	10:02 am	52	8.7/327	n/a	Wind (52), birds (28), NM inaudible

Table 2 NM Operational Noise Monitoring Results – 18 March 2015 (evening)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	8:22 pm	46	5.7/321	+0.9	Insects (45), wind (38), NM (25) , traffic (24)

Table 3 NM Operational Noise Monitoring Results – 18 March 2015 (night)					
Location	Time	Total dB(A), Leq (15 min)	Wind speed/ direction	Temp Grad (°C/100m)	Identified Noise Sources
Matilda	11:33 pm	44	3.7/290	+1.0	Frogs & insects (43), wind (34), NM (30)

4.2 Discussion of Results

The results in Tables 1 to 3 show that, under the operating and meteorological conditions at the times the mine noise did not exceed the operational noise criterion.

4.2.1 Audible Noise Sources

Mine noise was audible at the Matilda monitoring location during the evening and night time periods as mine hum and dozer tracks.

4.2.2 Modifying Factor Corrections

Data from those times where NM 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

The maximum noise level during the night time measurement was 33 dB(A) as a result of emissions from dozer tracks. This is in compliance with the sleep disturbance criterion.

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

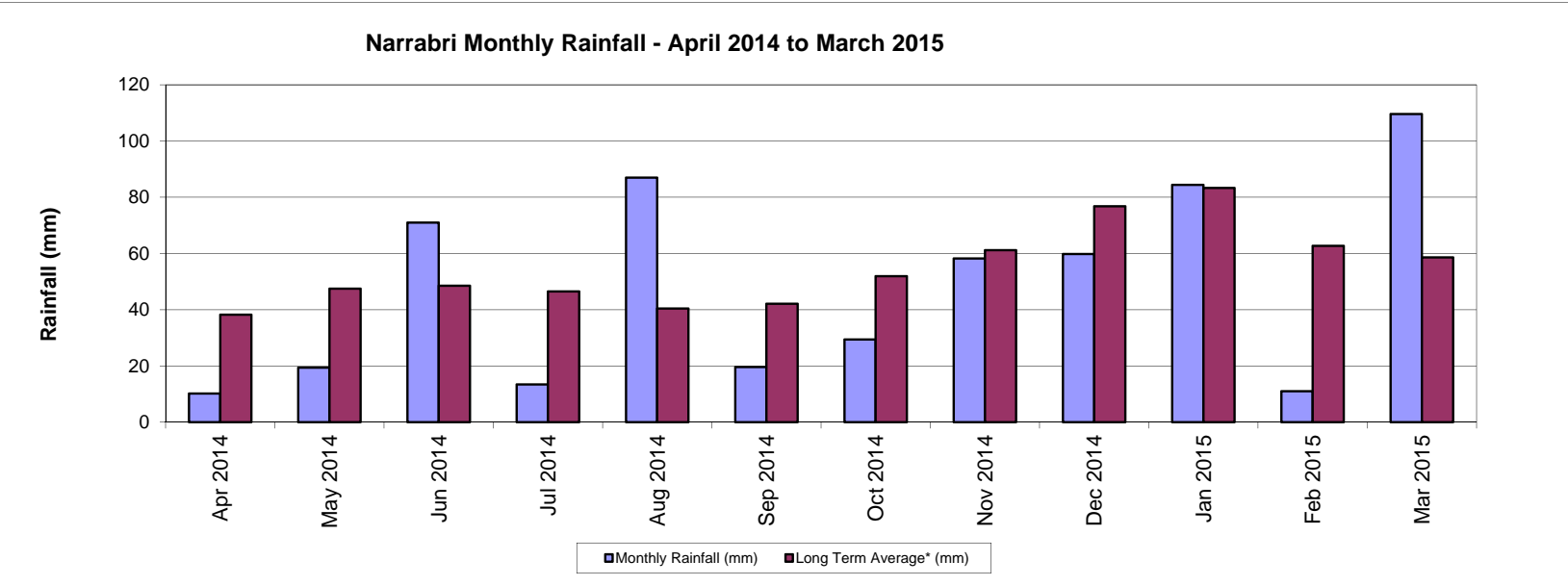
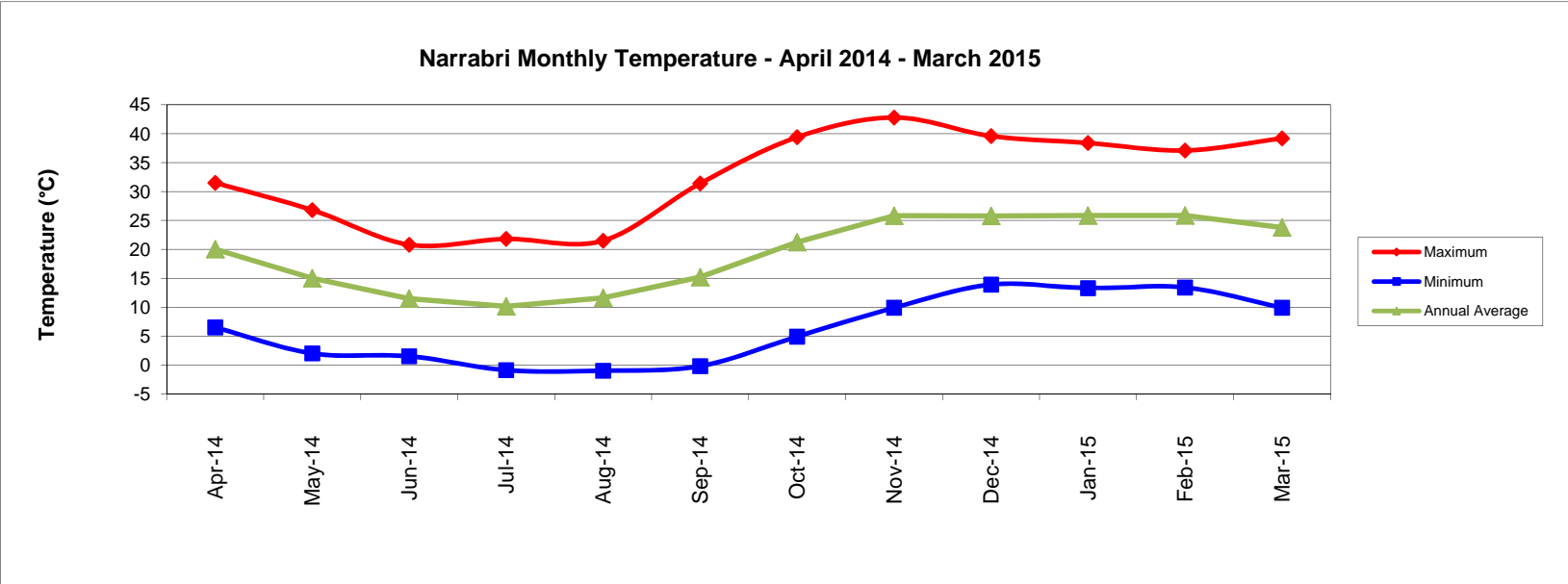
Narrabri Mine Average Monthly Results

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 2014	6.5	20.0	31.5	23.8	61.0	95.5	0.0	2.2	8.6
May 2014	2.0	15.0	26.8	24.6	65.4	97.3	0.0	2.0	10.3
Jun 2014	1.5	11.5	20.8	35.5	75.1	100.0	0.0	2.1	10.7
Jul 2014	-0.9	10.1	21.8	21.1	66.2	100.0	0.0	1.9	9.9
Aug 2014	-1.0	11.6	21.5	17.8	67.2	100.0	0.0	2.7	9.7
Sep 2014	-0.2	15.2	31.4	14.6	55.8	100.0	0.0	2.2	11.1
Oct 2014	4.9	21.2	39.4	9.0	42.4	100.0	0.0	2.1	12.7
Nov 2014	9.9	25.8	42.8	8.5	40.1	95.5	0.0	2.5	12.8
Dec 2014	13.9	25.8	39.6	9.5	50.5	96.8	0.0	2.5	12.6
Jan 2015	13.3	25.8	38.4	7.7	51.9	98.9	0.0	2.2	12.3
Feb 2015	13.4	25.9	37.1	17.9	48.2	93.1	0.0	2.9	10.4
Mar 2015	9.9	23.8	39.2	9.9	50.4	98.6	0.0	2.3	15.2
Annual Average	6.1	19.3	32.5	17	56	98	0.0	2.3	11.4
Minimum	-1.0	10.1	20.8	8	40	93	0.0	1.9	8.6
Maximum	13.9	25.9	42.8	35.5	75.1	100.0	0.0	2.9	15.2











Month	Monthly Rainfall (mm)	Cumulative Rainfall (mm)	Long Term Average* (mm)	Number of Rain Days**	Long Term Average Rain Days*
Apr 2014	10.2	10.2	38.2	3	2.2
May 2014	19.4	29.6	47.5	4	2.6
Jun 2014	71.0	100.6	48.5	5	3.3
Jul 2014	13.4	114.0	46.5	2	3.1
Aug 2014	87.0	201.0	40.4	5	2.9
Sep 2014	19.6	220.6	42.1	1	3.0
Oct 2014	29.4	250.0	51.9	2	3.5
Nov 2014	58.2	308.2	61.2	8	3.9
Dec 2014	59.8	368.0	76.8	12	4.1
Jan 2015	84.4	452.4	83.3	6	3.7
Feb 2015	11.0	463.4	62.7	2	3.1
Mar 2015	109.6	573.0	58.6	7	2.8
Total	573.0	573.0	657.7	57	38.2








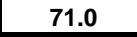


* Long term average is from Narrabri West Post Office (053030) 1891 - 2015

** ≥1mm













Daily Summary						April 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)
1/04/2014	18.5	23.1	29.3	42.5	69.3	86.8	0	0	0.8	5.8
2/04/2014	18.9	23.8	30.2	41.8	65.5	84.4	0	0	0.6	6.6
3/04/2014	18.5	24.3	31.5	38.8	65.6	90.2	0	0.1	0.2	4
4/04/2014	20.7	23.5	28.8	48.9	72.1	92.8	0.6	0	1.8	7.5
5/04/2014	19.6	23.1	28.8	50.4	77.4	95.5	0.2	0	1.3	6
6/04/2014	17.1	21.9	28	31.7	65.5	88.2	0	1.7	4.1	8.1
7/04/2014	15.5	20.4	26.6	35.8	58.8	81.7	0	3.7	5.6	7.4
8/04/2014	13.2	19.5	26.3	31.2	56.6	81.4	0	0.5	2.8	5.3
9/04/2014	13.8	20.8	28.1	35.1	60.5	86.9	0	0	1.2	4.3
10/04/2014	14.8	21.3	27	43.1	63.2	87.2	0	0	1.6	6.8
11/04/2014	17.9	22.9	28.5	41.4	61	86.6	1.8	1.6	3.6	8.5
12/04/2014	13.7	20.6	25.8	42	66	95	0	0	1.5	5.3
13/04/2014	13.9	19.7	26.3	34.6	60.4	82.6	0	3.2	4.6	7
14/04/2014	14.4	19.4	25.8	38.9	61.5	82.3	0	2.7	5.2	6.7
15/04/2014	13.1	18.3	24.6	36.8	62	86.6	0	1.5	4.6	6.2
16/04/2014	12	17.9	24.1	36.9	62.2	83.8	0	1	3.2	5.5
17/04/2014	11.4	17.4	24.3	34.2	58.5	87.2	0	0	2.5	4.4
18/04/2014	8.5	17.2	26.2	26.2	52.1	83.6	0	0	1.3	5
19/04/2014	8.9	17.5	26.5	28.3	53.2	82.7	0	0	1.2	5.2
20/04/2014	7.5	16.1	24.4	26.7	46.9	76.4	0	0	1.7	7.9
21/04/2014	6.5	15.5	25.1	23.8	48.7	76	0	0	0.8	6.2
22/04/2014	8.6	18.7	28.2	33.4	53	75.5	0	0	1.2	7.6
23/04/2014	14.4	21.3	29	24	48.1	71.6	0	0	2.5	8.1
24/04/2014	13.2	21.6	29.2	27.3	48.5	75	0	0.1	2	6.5
25/04/2014	16.1	21	28.6	26.2	55.8	85.1	1.6	0	1	7.1
26/04/2014	12.4	19.5	25.6	41.7	61	80.9	0	0	1.1	8.6
27/04/2014	15.3	19.5	23.7	49.4	68.2	85.1	0	0	0.7	3.9
28/04/2014	13.7	19.1	26.3	37.7	65.7	89.5	0	0.6	2.9	5.5
29/04/2014	11.9	18.7	25.1	42.9	64.3	88.8	0	0.2	0.9	4.9
30/04/2014	13.3	17.1	20	52.6	78.5	94.1	6	0	2.5	7.3
Average	13.9	20.0	26.7	36.8	61.0	84.8		0.6	2.2	6.3
Maximum	20.7	24.3	31.5	52.6	78.5	95.5	6.0	3.7	5.6	8.6
Minimum	6.5	15.5	20.0	23.8	46.9	71.6	0.0	0.0	0.2	3.9
Total							10.2			

Daily Summary							May 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)			
1/05/2014	8.7	14.3	21.5	52.3	72.1	85.9	0	0.4	0.7	4.8			
2/05/2014	7.2	13.3	20.4	37.8	61	89.7	0	0	2.8	8.1			
3/05/2014	7	9.3	11.8	59.2	82	94.1	12	1.3	5	10.3			
4/05/2014	6.8	10.2	13.7	63.7	78.2	93.2	0.4	0.9	3.5	6.6			
5/05/2014	4.9	10.8	16.1	40.1	62.3	85	0	0	2.2	5.5			
6/05/2014	2	10.3	17.7	44.8	69.8	95.3	0	0	1.2	6.1			
7/05/2014	6.1	12.8	20.1	47.7	70.6	89.4	0	0	3.2	5.6			
8/05/2014	8.4	14	21.4	32.7	64.4	89.1	0	1.9	3.9	6			
9/05/2014	8.4	14.4	21.6	32.9	62.9	89.2	0	0	2.7	5.1			
10/05/2014	10.7	15.7	20.9	43.7	62.2	75.9	0	0	0.8	4.5			
11/05/2014	12.5	15.8	21.4	57.8	80.5	94.1	3.2	0	1	6.5			
12/05/2014	9.8	15.4	22.9	32.5	69.4	95.4	0.4	0.6	3.2	5.3			
13/05/2014	10.1	15.3	22.7	28.4	65.5	88.6	0	1.5	3.5	5.6			
14/05/2014	10	15.2	22.5	33.4	62.7	89.7	0	1.1	3.1	4.7			
15/05/2014	10.1	15.3	23	34.9	60.3	81.9	0	0.1	2.8	4.9			
16/05/2014	10.2	15.9	23.2	24.6	53.6	77.6	0	0.7	2.9	5.1			
17/05/2014	10.7	16.3	23.9	31.5	54	76.4	0	0	1.9	4.5			
18/05/2014	10.8	16.1	23.3	40.9	60.9	80.6	0	0	1.1	3.4			
19/05/2014	10.8	16.6	23.1	35	60.9	84.2	0	0	0.5	3.3			
20/05/2014	12.9	16.1	21.6	45.2	63.9	77.5	0	0	0.4	3.9			
21/05/2014	8.6	15.7	23.6	38.7	64.9	90.4	0	0	1.7	4.3			
22/05/2014	9.7	16.4	24.7	36.3	60.1	81.2	0	0	0.9	3.7			
23/05/2014	12.2	16.9	24	45.1	76.2	93	1.8	0	1.5	5.8			
24/05/2014	9.3	16.2	25.2	40.6	75.8	97.3	0.2	0	0.4	3.2			
25/05/2014	8.8	16.9	26.2	35	67.1	95	0	0	1	5.7			
26/05/2014	10.3	17.6	26.8	32.3	61.9	84.8	0	0	0.6	3.1			
27/05/2014	10.7	19	24.3	34.5	55.9	80.6	0	0	2.5	9.6			
28/05/2014	11.4	18	23.9	37.9	62.1	88.9	1.4	-	-	-			
29/05/2014	7	13.7	21.1	32.6	60.5	86.3	0	-	-	-			
30/05/2014	9	14.6	21.3	47.6	63.2	74.2	0	-	-	-			
31/05/2014	12.1	17	23.6	40.9	63.7	81.2	0	-	-	-			
Average	9.3	15.0	21.9	40.0	65.4	86.6		0.3	2.0	5.4			
Maximum	12.9	19.0	26.8	63.7	82.0	97.3	12.0	1.9	5.0	10.3			
Minimum	2.0	9.3	11.8	24.6	53.6	74.2	0.0	0.0	0.4	3.1			
Total							19.4						

Daily Summary							June 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)			
1/06/2014	11.8	15	19.3	57.9	88.3	97.3	27.8	0	0	0			
2/06/2014	8.6	14.1	18.6	54.4	84.8	98	10	0	0.6	3.4			
3/06/2014	5.3	12.1	18.6	46.5	76.5	97.4	0.2	0	0.8	4			
4/06/2014	5.9	10.7	17.5	49.2	77.8	93.6	0	0	1.1	4.3			
5/06/2014	6.4	11.6	19.5	50.3	77.9	92.6	0.2	0	1.2	3.6			
6/06/2014	7.5	12.8	19.2	49.7	79.2	96.2	0.2	0	3.4	5.3			
7/06/2014	7.5	12.2	18.3	52.8	76.7	94.1	0.2	0.8	3.2	6.7			
8/06/2014	6.6	11.5	17.7	50.6	75.9	94.5	0	1.2	3.6	6			
9/06/2014	6.2	11.4	17.6	36.6	68.1	93.2	0.2	0.4	4.4	7			
10/06/2014	6.6	12.7	19.5	36.2	68	93.8	0	0.2	4.5	8.4			
11/06/2014	6	11.1	18	38.8	66.3	89.5	0	0	2.7	4.9			
12/06/2014	7	12.3	20.8	36.4	66	85.7	0	0	1.5	4.2			
13/06/2014	8.6	13.6	19.3	50.6	72.6	96.8	7	0	0.9	5.2			
14/06/2014	8.1	12.7	16.7	63.6	87.9	99.3	19.4	0	2.1	5.5			
15/06/2014	5.8	9	13.4	70.9	90.1	99.9	0.2	0	2.3	5			
16/06/2014	4.5	11.1	16.8	45.9	75.6	97.3	0	0	1.2	4.3			
17/06/2014	2.4	9	16.7	52	78.5	99.1	0.2	0	1.1	5.2			
18/06/2014	4.4	10.4	17.8	54.8	79.9	96.4	0	0	2.5	5.4			
19/06/2014	8	13	20.5	44.5	78.7	95	0.4	0	0.9	4.3			
20/06/2014	11.4	14.6	19.2	58.1	84.2	98.7	4	0	2.2	8.1			
21/06/2014	7.3	13.7	20.4	48.9	82.5	100	0.4	0	0.8	3.5			
22/06/2014	6	10.9	18.4	43.7	83.6	100	0.2	0	0.6	3.6			
23/06/2014	4.3	11.2	18.4	43.6	72.2	98.5	0	0	2.1	7			
24/06/2014	6.1	10.6	14.7	41.8	58.6	78.5	0	0.5	3.2	7.9			
25/06/2014	4.7	9.5	16.4	43	68.2	88.3	0	0	2.4	5.8			
26/06/2014	1.6	8.5	16.9	44	75.8	98.6	0	0	1	4.5			
27/06/2014	1.5	8.3	18	35.5	75.6	98.3	0.4	0	0.3	4.3			
28/06/2014	5.6	13.5	18.9	35.9	57.5	89.4	0	0	5.6	10.7			
29/06/2014	3.5	8.7	13.2	44.1	60.8	77.2	0	0	3	7.2			
30/06/2014	2.1	8.3	13.9	40.5	63.7	88.2	0	0	2.6	6.4			
Average	6.0	11.5	17.8	47.4	75.1	94.2		0.1	2.1	5.4			
Maximum	11.8	15.0	20.8	70.9	90.1	100.0	27.8	1.2	5.6	10.7			
Minimum	1.5	8.3	13.2	35.5	57.5	77.2	0.0	0.0	0.0	0.0			
Total							71.0						











* - Data from site mobile noise monitor

Daily Summary							July 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)			
1/07/2014	0.2	7.9	14.5	52.2	73.7	92.1	0	0	0.9	5.4			
2/07/2014	1.7	7.3	14.3	48.8	76.8	96.3	0	0	1.8	4.7			
3/07/2014	2.6	9	18.9	31.6	69.1	93.1	0	0	0.6	3.5			
4/07/2014	2	9.1	19.8	24.6	65.9	96.5	0.2	0	0.8	5.6			
5/07/2014	3.7	11	18.5	27.8	55.1	82.1	0	0	2.3	6.7			
6/07/2014	1.8	8.8	13.9	40.6	59.9	89.2	0	0	1.7	5.8			
7/07/2014	3.6	9.4	15.9	40.2	65.2	91.9	0	0	0.7	3.2			
8/07/2014	-0.4	6.5	16.1	32.5	74.8	99.3	0	0	0.2	2			
9/07/2014	-0.2	10.8	19.5	21.6	50.2	94.5	0	0	3.3	9.9			
10/07/2014	3.2	7.8	13.5	34	53.8	75.1	0	0	3.2	8.4			
11/07/2014	-0.5	7.7	16.1	37.2	64.4	92.4	0	0	1	3.9			
12/07/2014	-0.9	7.9	16.4	33.7	64.5	96.9	0	0	1.1	5			
13/07/2014	2.3	8.4	14.1	32.9	60	87.5	0	0	3.3	6.6			
14/07/2014	2	9.4	16.2	43.1	63.4	83.4	0	0	2.8	5.9			
15/07/2014	8.9	13.1	19.3	44.8	65.2	90.7	0.4	0	1.3	3.6			
16/07/2014	7.6	12.8	16.9	52.8	79.5	97.3	7.2	0	3.8	8.7			
17/07/2014	3.9	10.4	16.6	39.8	72.6	100	0.2	0	2.7	7.7			
18/07/2014	2.3	7.4	11.3	46.7	68.5	95.9	0.4	0	3	7.5			
19/07/2014	-0.7	6.4	13.9	35.6	69.2	98.5	0	0	1.4	5.9			
20/07/2014	1	8.4	16.1	51.2	73.5	94.1	0	0	2.7	5.7			
21/07/2014	7.6	11.8	19.9	42.5	73.9	93.2	0	0	2.3	5.1			
22/07/2014	7.2	12	19.4	36.9	71.9	89.1	0	0	2.1	6.1			
23/07/2014	5.9	11.4	18.8	40.8	68.6	90.3	0.2	0	2	4.8			
24/07/2014	8.8	13.1	19.9	46	63.8	81.4	0	0	0.7	7.1			
25/07/2014	12	16.9	21	49.6	61.3	83.2	0	0	3.7	8.9			
26/07/2014	9.1	15.2	19.8	50.8	70.5	100	4.6	0	1.3	8.4			
27/07/2014	3.4	10.4	17.5	44.5	72.9	100	0	0	1	5.8			
28/07/2014	2.1	9.4	17.7	42.3	74	100	0.2	0	0.3	3.2			
29/07/2014	2	9.9	19.9	28.5	66.3	98.6	0	0	1.1	4.9			
30/07/2014	2.9	11.7	21.4	27.3	55.6	88.7	0	0	1.7	5.1			
31/07/2014	4.4	13.1	21.8	21.1	47.8	79.6	0	0	2.7	7.2			
Average	3.5	10.1	17.4	38.8	66.2	92.0		0.0	1.9	5.9			
Maximum	12.0	16.9	21.8	52.8	79.5	100.0	7.2	0.0	3.8	9.9			
Minimum	-0.9	6.4	11.3	21.1	47.8	75.1	0.0	0.0	0.2	2.0			
Total							13.4						

Daily Summary							August 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)			
1/08/2014	3.2	13	19	27.4	42.7	67.2	0	1.5	3.5	7.1			
2/08/2014	-1	6.9	13.3	33.5	55.8	90.2	0	0	1.6	4.4			
3/08/2014	1.5	8.9	17	26.8	57.8	76.1	0	2.1	3.8	5.4			
4/08/2014	8.2	12.4	19.7	39.8	62.7	77.1	0	0	2.5	4.7			
5/08/2014	6.7	12.5	19.7	42.3	64.8	90.7	0	0	0.8	3.1			
6/08/2014	2.8	11.9	21.1	17.8	49.9	79.1	0	0	1	4			
7/08/2014	1	10.1	20	25.1	52.9	84.5	0	0	1.1	3.1			
8/08/2014	3.3	10.5	21	23.4	56.6	84.3	0	0	1.1	4.3			
9/08/2014	3.4	11.3	21.3	29.3	54.3	78.2	0	0	0.9	5.9			
10/08/2014	1	11.5	21.3	21.6	51.3	92.1	0	0	1.3	5.6			
11/08/2014	1.9	9.3	19.1	21.3	49	75	0	0	1	5.1			
12/08/2014	1.9	9.3	19.1	26.9	56.8	85.5	0	0	2.2	5.4			
13/08/2014	6.5	11.9	18.9	33.5	57.3	77.4	0	2	4.4	7			
14/08/2014	5.7	11.5	19.2	28.5	57.1	86	0	2	4	5.8			
15/08/2014	7.3	14	21.5	28.3	51.9	74.6	0	0	2.2	5.2			
16/08/2014	10.2	12.4	14	52.9	85.7	100	21.6	0.1	2.6	5.7			
17/08/2014	6.8	11.1	15.1	51.5	86.6	100	7.4	1.5	3.9	7.6			
18/08/2014	8.4	10.8	14.2	73.6	90.7	100	0.8	1.9	4	6.5			
19/08/2014	6.8	10.9	14.1	77.4	93.6	100	5.8	0	1.5	4.7			
20/08/2014	4.8	11	17.1	43.9	76.6	100	0.2	1.2	3.5	6.1			
21/08/2014	7	12.2	19.1	43.5	72.5	95	0	1.2	4.3	6.6			
22/08/2014	8.1	13.3	19.4	39.7	71.8	100	0	0	3.8	6.3			
23/08/2014	7.6	13.2	19.7	46.2	72.8	100	0	1.4	3.3	5.6			
24/08/2014	7.5	13.4	20.1	39.5	72.4	100	0	0.8	3.3	5.3			
25/08/2014	7.3	13.6	20.8	33	67.2	96.1	0.2	0	2.4	4.6			
26/08/2014	6	12.1	18.6	51.6	79.7	100	33.6	0	1.8	9.7			
27/08/2014	9.9	11.9	15	71.2	90.9	100	17	0.6	4.1	8.6			
28/08/2014	9	13.1	18.5	49.7	71.9	89.3	0	0.7	5.2	8.1			
29/08/2014	5.1	11.1	17.3	43.2	71.6	98.6	0.2	1	3.1	6.8			
30/08/2014	5.1	11.8	18.5	55.9	76.3	98.1	0	0	3.1	7.4			
31/08/2014	7.5	12.8	20.4	49.2	80.9	100	0.2	0	2.1	4.9			
Average	5.5	11.6	18.5	40.2	67.2	90.2		0.6	2.7	5.8			
Maximum	10.2	14.0	21.5	77.4	93.6	100.0	33.6	2.1	5.2	9.7			
Minimum	-1.0	6.9	13.3	17.8	42.7	67.2	0.0	0.0	0.8	3.1			
Total							87.0						

Daily Summary						September 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)
1/09/2014	4.9	13.8	22.2	33.8	66.5	100	0	0	1.5	6.1
2/09/2014	6.7	13	17	34.7	54.6	72.2	0	0.5	2.9	9.4
3/09/2014	2.2	10.3	17.3	19.5	51.6	95.9	0	0.2	3.5	10.7
4/09/2014	-0.2	9.4	16.7	37.7	62.5	96.5	0	0	1	4.7
5/09/2014	5.7	11.2	17.6	43	64.3	86.8	0	1.4	3.7	6.8
6/09/2014	5.1	12.8	19.8	37.6	64.5	96	0	2.3	4.4	6.6
7/09/2014	6.7	13.8	20.9	28.7	58.7	84.8	0	0.7	3.4	6.1
8/09/2014	8.3	14.7	23	34.9	62.5	82.9	0	0	1.8	4.1
9/09/2014	9.7	17.4	23.6	39	57.5	88	0	0	4.1	9.1
10/09/2014	10.8	18.6	22.6	30.1	50.2	76.1	0.8	0	3.6	11.1
11/09/2014	4.5	14.4	23.3	33.1	60.5	94.7	0	0	1.1	5.4
12/09/2014	5.6	14.5	23	28.2	58.2	90.4	0	0	2.3	5.5
13/09/2014	8.8	15.7	23.9	33.9	64.5	91.6	0	0	0.5	6.8
14/09/2014	8.3	16.9	25.3	24.6	53.8	84.2	0	0	2.3	7.7
15/09/2014	6.2	16.7	26.8	19.2	48.9	83	0	0	0.4	4.7
16/09/2014	9.4	17.8	24	23.9	40.7	72.1	0	0	3.2	9.7
17/09/2014	3.7	13.8	21.9	26	52.8	95.7	0	0	1.7	7.2
18/09/2014	3.2	13.8	22.2	18.4	40.6	82.4	0	0	1.5	4.6
19/09/2014	2.4	11.7	19.6	20.3	44.5	73.8	0	0	1.3	4.9
20/09/2014	4.5	13.2	21.7	14.6	42.3	74.7	0	0.7	2.6	5.6
21/09/2014	7.8	14.9	21.5	25.8	48.8	79.4	0	0	3.6	5.8
22/09/2014	9.3	16.4	24.2	29.5	51	76.4	0	0	2	5
23/09/2014	9.6	16.8	26.2	26	51.9	73.6	0	0	1.3	4.6
24/09/2014	8.9	17.8	25.4	30	52.4	86.4	0	0	1.3	7.4
25/09/2014	14.7	16.7	22.1	47.8	83.6	100	18.8	0	2.9	8.5
26/09/2014	11.2	17.4	25	31.1	61.7	98.5	0	0	1.9	4.7
27/09/2014	8.5	15.4	22.2	35.1	59.4	87.9	0	0	2.2	5.5
28/09/2014	9.3	16.8	25.5	27.6	57.3	81.2	0	0.4	0.7	3.3
29/09/2014	8.2	18.2	28.2	25.1	59.4	91.2	0	0	1.6	6.7
30/09/2014	11.2	21.7	31.4	23	49.7	86.4	0	0	2.8	7.8
Average	7.2	15.2	22.8	29.4	55.8	86.1		0.2	2.2	6.5
Maximum	14.7	21.7	31.4	47.8	83.6	100.0	18.8	2.3	4.4	11.1
Minimum	-0.2	9.4	16.7	14.6	40.6	72.1	0.0	0.0	0.4	3.3
Total							19.6			











Daily Summary							October 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)			
1/10/2014	9	18.1	24	17.6	34.1	56	0	0	2.8	6.8			
2/10/2014	11.1	20	25.9	21.8	33.4	59.6	0	0.3	1.2	4.1			
3/10/2014	7.5	18.1	28.4	19.9	41.9	72.7	0	0	0.2	3.6			
4/10/2014	9.8	20.2	29.8	23.2	48.7	69.8	0	0	1.4	6.8			
5/10/2014	13.2	21.7	32.3	19.4	49.1	79.2	0	0	2.1	5.9			
6/10/2014	11.7	22.4	32.3	18.9	41.6	73.5	0	0	1.7	5.9			
7/10/2014	17.5	25.2	33.3	20	33.8	50	0	0.9	4.9	10			
8/10/2014	9.2	19.4	27.3	22	39.9	74.3	0	0	3	6.1			
9/10/2014	10.7	19	27.5	22.1	46.5	89.2	0	0	2.6	4.6			
10/10/2014	8.8	19.9	29.6	20.8	48.3	84.1	0	0	0.8	6.1			
11/10/2014	12.3	21.5	30.3	21.3	46.7	70.2	0	0	0.7	7.4			
12/10/2014	13.7	22.5	30.3	29.2	46.3	70.1	0	0	0.6	5.6			
13/10/2014	15.9	21.2	27.6	39.3	62.5	100	15.4	0	4.9	12.3			
14/10/2014	6.4	13.5	17.4	29.1	51.5	94.5	0	1.2	3.6	7.9			
15/10/2014	6.3	13.5	22.6	26.4	58.8	90.2	0	0.4	1.9	4.5			
16/10/2014	4.9	15.9	24.8	15.2	44.7	93.5	0.6	0	1.4	5.1			
17/10/2014	7.9	17	24.9	16.5	41	66.5	0	0	2.6	6			
18/10/2014	9.4	17.9	25.9	18.7	46.2	82.4	0	0.3	3.4	6.5			
19/10/2014	11.2	19.7	28.7	21.9	47.4	75.9	0	0	1.1	4.3			
20/10/2014	10.3	21.7	32.4	18.1	46.2	77.1	0	0	1.9	9.4			
21/10/2014	13	20.8	28.6	29	51.3	81	0	0.4	4.5	8			
22/10/2014	11.8	20.6	30.4	26.9	50.3	73.9	0	0	1.4	7.3			
23/10/2014	15.7	23.1	33.1	21.7	49.4	97.9	13.2	0	1.9	10.7			
24/10/2014	15.6	25.1	34.1	20.9	46.2	82.1	0.2	0	1.1	6.7			
25/10/2014	21.3	28.5	36.4	13.8	29.4	44.3	0	0.1	2.1	6.3			
26/10/2014	16.7	30.1	39.4	9	24.7	60.2	0	0	2.3	8			
27/10/2014	19.5	27.8	37.8	11.8	25.1	42.5	0	0	2.2	8.9			
28/10/2014	13.2	23	30.7	9.3	25.2	50.7	0	0.4	2.5	6.4			
29/10/2014	12.2	22.3	31.9	16.6	28.7	46.5	0	0	1.6	5.4			
30/10/2014	11.7	23.2	33.6	17.2	37.4	60.4	0	0	1.2	6.4			
31/10/2014	13.8	25.6	36.6	17	38.8	75.9	0	0	2.8	12.7			
Average	12.0	21.2	29.9	20.5	42.4	72.4		0.1	2.1	7.0			
Maximum	21.3	30.1	39.4	39.3	62.5	100.0	15.4	1.2	4.9	12.7			
Minimum	4.9	13.5	17.4	9.0	24.7	42.5	0.0	0.0	0.2	3.6			
Total							29.4						

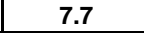









Daily Summary							November 2014				Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)			
1/11/2014	20.3	26.2	33.3	29.4	48.6	72.8	1.6	1.5	4.8	12.8			
2/11/2014	11.9	19	25.6	9.9	27.1	53.1	0	1.1	3.4	6.4			
3/11/2014	9.9	20.1	29.8	18.6	31.8	53.6	0	0	1.7	4.9			
4/11/2014	14.8	21.8	29.7	22.5	44.6	67.2	0	0	1	6.2			
5/11/2014	15	21.7	31.6	28.7	55.4	94.8	13.6	0	3	10.9			
6/11/2014	13.7	22.1	30.9	17.7	52.1	95.5	0	0	1.7	5.7			
7/11/2014	12.5	22	31.2	16.1	41.6	80.2	0	0	2.6	5.2			
8/11/2014	16.5	24.8	34.1	19.3	44.2	74.1	0	0	1.3	4.5			
9/11/2014	18.1	26.6	36.2	18.1	36.5	56.9	0	0	1.6	8.5			
10/11/2014	18.1	28	37.6	16.9	35.8	59.2	1.6	0	2.7	10.7			
11/11/2014	16.8	25.7	36.4	11.1	48.6	83.1	21.8	0.2	4.3	9.6			
12/11/2014	15.6	24.9	34.7	18.1	44.6	74.1	0	0	3	7.2			
13/11/2014	18.9	27.1	36	20	40.5	67.3	0	0	0.7	4.3			
14/11/2014	19.8	29.2	38.5	17	36.9	61.6	0	0	3	7.4			
15/11/2014	23.1	34.8	42.8	10.8	20.9	44.4	0	0.6	4.4	9.7			
16/11/2014	18.9	25.8	31.8	19.8	38.4	55.8	0	1.1	3.5	8.7			
17/11/2014	12.4	23.2	33.2	14.4	35.8	72.6	0	0	1.8	6.6			
18/11/2014	14.4	24.2	33.4	9.6	23.6	45.7	0	0	1.7	5.9			
19/11/2014	15.6	25.7	35.5	12.7	31.3	61.1	0	0	2.2	7			
20/11/2014	19	28.3	36.5	19.2	39.2	67.2	0	0.5	2.2	7.9			
21/11/2014	26.1	32.2	40.2	8.5	32.9	56.4	0	1.1	5.3	10.6			
22/11/2014	21.5	31.9	41.3	10.3	22.5	37.8	0	0	1	6.5			
23/11/2014	21.5	31.9	42.7	14.7	31.8	63.8	1.4	0	1.9	9.3			
24/11/2014	21.9	29	39.1	23	53.8	94	8.6	0.1	3.7	10.5			
25/11/2014	20.6	24.3	28.5	37.5	66.5	93.4	1.4	0	2	5.2			
26/11/2014	17.3	24.5	32.7	17.5	42.8	60.9	0	0.6	1	5.8			
27/11/2014	12.5	24.7	33.6	18.5	37.5	57.5	0	0	2.8	10.4			
28/11/2014	16.6	25.2	32.9	18.4	41.5	73.5	0	0.1	3.1	8.5			
29/11/2014	17.9	23.9	32	27.4	51.6	76.1	8	0	0.3	9.4			
30/11/2014	17.3	25.6	32.5	23.4	45.4	80.6	0.2	0	3.1	6.9			
Average	17.3	25.8	34.5	18.3	40.1	67.8		0.2	2.5	7.8			
Maximum	26.1	34.8	42.8	37.5	66.5	95.5	21.8	1.5	5.3	12.8			
Minimum	9.9	19.0	25.6	8.5	20.9	37.8	0.0	0.0	0.3	4.3			
Total							58.2						

Daily Summary							December 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)
1/12/2014	19.7	25.7	31.3	31.1	48.1	77.8	0	0.3	2.8	8.4
2/12/2014	20.8	27.8	35.2	21.2	42	70.8	0	0	3.2	8.2
3/12/2014	24.8	29.9	35.9	21.6	36.5	60	0	1.3	4.3	9.4
4/12/2014	19	26	33.6	30.4	57	91.9	8.8	0.7	1.7	9.2
5/12/2014	18.3	25	33.5	30.8	65	96.7	2.6	0.2	1.7	8.1
6/12/2014	18.5	23.3	30.6	37.3	69.1	93.5	7.8	0	2.8	7.5
7/12/2014	16.7	23.2	33.8	32.4	75.4	96.1	2.2	0.2	0.5	8.9
8/12/2014	19.7	26.1	34	20.9	58.2	91.3	1.2	0.2	2.1	7.8
9/12/2014	20.7	26.9	36.5	22.1	55	82.8	3.6	0.2	0.9	8.3
10/12/2014	20.3	28.2	37.9	19.4	51.1	87	1.8	0.1	0.3	9.6
11/12/2014	18.9	26.4	33.4	25.8	58.2	87.3	1.4	0	2.2	12.1
12/12/2014	15.9	20.8	26.8	36.5	52.1	72.6	0	5.1	8.8	12.6
13/12/2014	14.7	21.7	28.9	25.4	46	72.5	0	1.8	5.8	8.4
14/12/2014	13.9	23.1	31.1	21.3	41.4	76.4	0	0	3	6.8
15/12/2014	14.4	26.5	34.5	13.4	31.2	62.7	0	0	1.4	7.9
16/12/2014	17.2	26.9	37.1	17.3	36.6	65.9	0.6	0.3	2.5	10.1
17/12/2014	24.9	32	39.6	11.8	28.4	47	0.2	0.4	4.2	9.7
18/12/2014	20.7	27.7	35.5	11	33.1	60	0	0.2	2.8	11.5
19/12/2014	19.3	26.1	33.2	9.5	31.1	73.2	0	0.3	2.7	8.4
20/12/2014	14.5	25.2	34.9	13.6	32.7	74.4	0	0	0.9	5.9
21/12/2014	19.6	27.4	35.2	20.7	44.5	70.8	0	0	0.3	7.1
22/12/2014	21.8	29.2	36.4	20.7	40.6	65.4	0	0	2.3	8.4
23/12/2014	19.4	23.8	28.9	42.7	67.1	90.7	6.8	0	2.1	6.7
24/12/2014	19.5	27.8	36.2	25.6	56	92.4	0	0	0.9	5.4
25/12/2014	21.5	25.7	33.6	36	66.5	95.2	4.2	0	2.2	10.6
26/12/2014	20.6	25.6	32.2	22.6	61.7	96.4	5	0.2	1.1	7.2
27/12/2014	18.8	22.4	26.3	43.8	62.8	78.5	0	1.6	4.5	7.4
28/12/2014	16.8	19	21.4	61.1	85.3	96.8	13.6	1.5	4	6.8
29/12/2014	18.7	24.5	33.6	25.6	63.4	93.6	0	0.4	0.2	6.2
30/12/2014	21.3	28.7	36.7	12.5	40.2	77.7	0	1.9	3.8	8.6
31/12/2014	15.8	26.4	35.6	13.1	28.9	60.2	0	0	2.5	6.3
Average	18.9	25.8	33.3	25.1	50.5	79.3		0.5	2.5	8.4
Maximum	24.9	32.0	39.6	61.1	85.3	96.8	13.6	5.1	8.8	12.6
Minimum	13.9	19.0	21.4	9.5	28.4	47.0	0.0	0.0	0.2	5.4
Total							59.8			

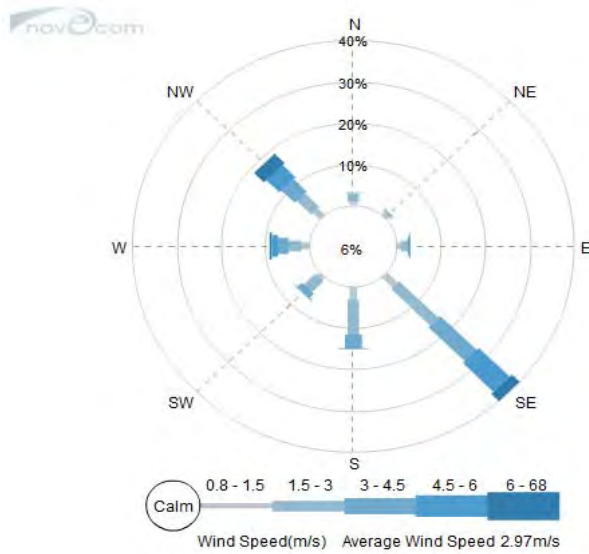
* - Temperature and rainfall data taken from the Bureau of Meteorology Station at the Narrabri Airport

Daily Summary							January 2015				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)			
1/01/2015	20.3	29	37.6	20.1	46.2	77.2	0	0	0.9	7.6			
2/01/2015	19.6	23.8	29.5	36.7	63.3	86.5	1.6	0.7	1.7	7			
3/01/2015	19.7	27.3	34.2	29.5	51.1	76.8	0.4	0	0.4	5.4			
4/01/2015	23	27.3	33.1	33.7	50.3	69.1	0	0.1	2.8	7.5			
5/01/2015	18.3	24.3	30.7	44.1	68.7	98.9	21.6	0	1.9	10.9			
6/01/2015	19.7	26.4	33.8	26.4	56.9	86.5	0	0.4	1.4	5.3			
7/01/2015	19.7	27.1	33.3	25.3	47	74.5	0	0	2.2	6.5			
8/01/2015	19.6	27.1	34.5	23.5	43.6	69.4	0	0.1	1	4.5			
9/01/2015	21.6	28	34.8	26.6	44.7	66.9	0	0.6	3.7	8.8			
10/01/2015	25.2	28.2	33.4	33.1	47.5	62.2	0	0	2.4	8.9			
11/01/2015	23	25.9	29.8	41.9	60.3	79.3	0	0.1	0.8	5.8			
12/01/2015	20.2	23.6	28.9	53.1	75.1	95.5	0.6	1.2	4.5	7.1			
13/01/2015	21	26.2	31	48.3	62.1	77.8	0.2	0.1	0.4	7.4			
14/01/2015	22.3	27.9	35.3	29.4	62.1	95.4	5.4	2.2	3.6	9.5			
15/01/2015	15.9	25.4	33.7	19.9	49.9	91.5	0	0	2	5.7			
16/01/2015	15.7	25.9	34.1	13.3	36.3	74.2	0	0	1.8	6.1			
17/01/2015	13.3	26.4	36.5	12.9	30.9	63	0	0	1.5	5.7			
18/01/2015	19.6	28.3	36.8	7.7	23.2	42.7	0	0.5	2.2	5.8			
19/01/2015	18	26.5	35.8	17.6	37.8	65	0	0.1	3.5	10.8			
20/01/2015	19.4	25.1	34.4	23.8	55	85.5	3.8	0.8	2	8.1			
21/01/2015	19.7	24.5	30.4	37.2	59.7	93.8	2.4	0	0.4	7.7			
22/01/2015	19	25.9	33.9	28.8	60	94.2	0.2	0.3	2.3	6.8			
23/01/2015	22.1	25.6	30.7	42.6	60.4	75.2	0	0.2	0.9	5.4			
24/01/2015	17.4	27.6	36.7	19.1	50.9	93.2	0	0	0	4.8			
25/01/2015	23	30.8	38.4	19.8	42.5	72.7	0	0.4	2.1	6.2			
26/01/2015	21.8	28	37.5	22.5	47.5	74	0	0.1	3.9	12.3			
27/01/2015	17.1	21.7	31	42.7	75.3	97.4	47.8	0.2	3.7	12.2			
28/01/2015	16.6	20.1	24.9	56.8	71.1	89	0.4	3.4	5.7	10.8			
29/01/2015	14.1	20.8	27.8	26	56.3	88.7	0	1.1	4	7.3			
30/01/2015	14.3	22.6	30.8	21.4	43.2	74.5	0	0	1.9	5.9			
31/01/2015	14.2	23.6	31	13.2	31.1	61	0	0.1	2	5.8			
Average	19.2	25.8	33.0	28.9	51.9	79.1		0.4	2.2	7.4			
Maximum	25.2	30.8	38.4	56.8	75.3	98.9	47.8	3.4	5.7	12.3			
Minimum	13.3	20.1	24.9	7.7	23.2	42.7	0.0	0.0	0.0	4.5			
Total							84.4						

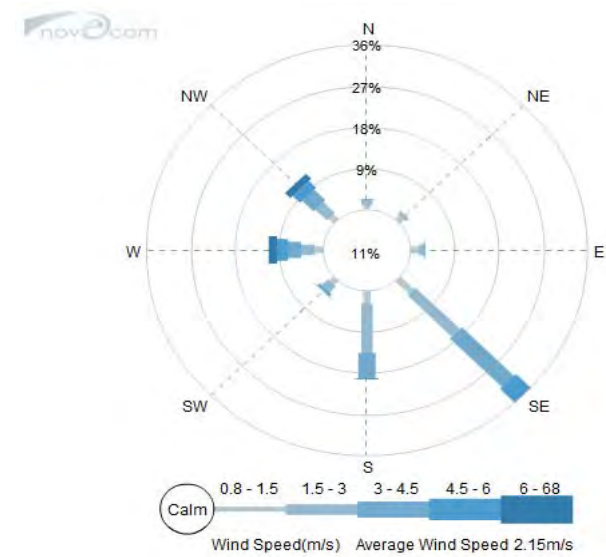
Daily Summary							February 2015				Narrabri Mine Weather Station		
Date	Min Temp (°C)	Ave Temp (°C)	Max Temp (°C)	Min RH (%)	Ave RH (%)	Max RH (%)	Rain (mm)	Min WS (m/s)	Ave WS (m/s)	Max WS (m/s)			
1/02/2015	13.4	24	32.2	18.5	35.7	65.5	0	0	1.3	4.4			
2/02/2015	19.3	24.4	31.7	21.4	50.7	74.2	0	0.7	4.4	9.6			
3/02/2015	17.5	22.5	28.1	33.7	51.8	73.4	0	1.6	4.9	8.5			
4/02/2015	15.6	23.1	30.2	23.2	45.9	74.8	0	1.8	4.3	7.9			
5/02/2015	16.9	24	31.1	23.6	45.6	68.3	0	2.1	4.4	7.4			
6/02/2015	16.5	23.8	30.7	20.1	46	72.7	0	2	4.6	6.9			
7/02/2015	16.2	24.2	32.2	23.4	44.2	69.8	0	0	2.1	5.4			
8/02/2015	17.1	26.9	35.7	18.8	39.4	62.9	0	0	0.2	6.8			
9/02/2015	20.3	29.2	37.1	17.9	32.1	46.2	0	0	2.7	6			
10/02/2015	21.8	27.9	34.4	24.8	41.7	61.8	0	0.7	4	6.4			
11/02/2015	19.6	26.9	32.7	24	43	65.8	0	0.6	2.9	5.3			
12/02/2015	19.5	26.8	34.2	22.6	44.5	69.2	0	0.2	2.6	10.4			
13/02/2015	22.6	26.9	32.8	18.2	41.4	58.5	0	0	2.4	6.5			
14/02/2015	19.6	26.9	32.9	24.8	40.1	62.7	0	0	1.9	5.8			
15/02/2015	21.1	25.4	33.3	27.1	49.4	73.3	1.8	0.6	1.1	9.1			
16/02/2015	17.6	25.5	33.7	28.1	51.3	80.5	0	0.1	1.3	4.2			
17/02/2015	20.2	26.6	32.9	25	43.9	67.9	0	0.2	1.7	5.6			
18/02/2015	18.2	26.9	33.8	19	35.4	55.5	0	0.3	2.2	5.7			
19/02/2015	20.4	27.5	34.9	25.3	41.3	54.9	0	0.7	5.2	7.4			
20/02/2015	20.4	23.6	27.7	48.3	64.4	86.1	0.6	2.2	4	6.4			
21/02/2015	20.9	25.4	31.4	41.6	63.3	86.9	0	2.8	5.7	9.3			
22/02/2015	20.7	27.4	35	30.4	54.1	77.8	0	2.5	4.9	7.1			
23/02/2015	20.8	28.2	35.6	26.9	49.7	77.6	0	1.5	4.2	6.9			
24/02/2015	21.1	27.4	35.2	29.2	50.7	72.4	0	0.2	3.2	7.1			
25/02/2015	19.6	25.5	34.8	27.7	58.4	89.6	7.6	0.4	2.7	9.1			
26/02/2015	19.5	25.2	33.5	35.6	66.8	92.4	0.8	0	0	7.2			
27/02/2015	18.5	24.8	33.3	31	63.7	93.1	0.2	0.1	2.5	5.9			
28/02/2015	20.8	26.9	33.2	37.1	54.8	75.7	0	0.1	0.7	5.4			
Average	19.1	25.9	33.0	26.7	48.2	71.8		0.8	2.9	6.9			
Maximum	22.6	29.2	37.1	48.3	66.8	93.1	7.6	2.8	5.7	10.4			
Minimum	13.4	22.5	27.7	17.9	32.1	46.2	0.0	0.0	0.0	4.2			
Total							11.0						

Daily Summary							March 2015				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)			
1/03/2015	22.6	27	32.7	39.8	58.9	81.3	0.2	0	3.2	8.8			
2/03/2015	18.6	26.1	34.3	27.3	57.1	84	0	0.5	5.2	7.9			
3/03/2015	18.2	27.3	35.9	29.4	50.1	77.7	0	0.2	1.2	6.5			
4/03/2015	25.5	31.3	38.6	19.1	36.4	59.3	0	1.7	5.2	11.3			
5/03/2015	20.6	27	33.4	10.1	23.3	41.6	0	0	3.4	8.6			
6/03/2015	13.5	22.4	30.3	9.9	23.9	49.6	0	0.2	2.7	5.7			
7/03/2015	13.5	23.8	33.2	11.3	24.4	41.8	0	0	0.3	5.4			
8/03/2015	15	23.8	32.4	20.2	44.4	63.2	0	0	1.9	7.3			
9/03/2015	16.4	26.3	34.9	16.7	35.1	59.8	0	0	1	4.4			
10/03/2015	18.4	25	34.8	26.1	52.4	98.3	15.2	0.2	1	12.3			
11/03/2015	20.2	24.5	30.9	35.7	65	87.1	0	0	0.9	4.9			
12/03/2015	17.5	23.2	31.8	38	71.1	98.3	21.8	0	0.3	15.2			
13/03/2015	17.8	22.9	30.3	35.5	63.3	88.1	0	0	4.4	9.6			
14/03/2015	14.7	21.7	28.7	27.7	54.9	85.7	0	0.1	3.7	5.9			
15/03/2015	14.5	23.5	32.3	16.2	44.8	75.4	0	0.2	2.3	8.6			
16/03/2015	15	22.1	29.6	20.5	48.3	79.1	0	0.7	3.9	7.5			
17/03/2015	15.9	23.4	31.1	33.7	51.2	80.6	6.8	0.1	0.5	8.2			
18/03/2015	17.5	25.3	31	44.3	64.3	98.6	19.4	0	5.2	12.5			
19/03/2015	18.9	27.1	34.5	22.2	49.5	87.5	0	0	1.2	4.2			
20/03/2015	16.8	28.5	39.2	15.4	38	78	0	0	1.4	6.3			
21/03/2015	19.8	24.8	33.1	37.1	60.3	97.3	11.8	3.2	6.8	10.7			
22/03/2015	15.6	21.3	31	37.7	69.2	98.3	19	0	3.1	10.1			
23/03/2015	16.7	23.1	30.5	38.2	63	81.6	0	0.2	0.3	4.3			
24/03/2015	19	24.9	32.1	41.1	67.8	92.9	0	0.5	3.7	9.8			
25/03/2015	14.8	22.1	30.4	20.3	49.1	93.8	0.2	0.6	1.7	7.4			
26/03/2015	9.9	20.5	29.8	12.3	38.4	80.5	0	0	1.2	5.8			
27/03/2015	10.8	18.4	26.3	16.8	35.1	60.7	0	0	2.5	6.6			
28/03/2015	10.6	19.2	28.7	17.4	38.1	63.1	0	0	1.4	4.8			
29/03/2015	12.7	21.4	30.2	23.6	42.2	65.6	0	0	0.5	6.9			
30/03/2015	13.4	19.1	22.9	34	69.7	98.3	15.2	0	0.1	5.5			
31/03/2015	15.5	20.2	26.8	40.3	73.3	93.1	0	0.2	2	6.3			
Average	16.4	23.8	31.7	26.4	50.4	78.7		0.3	2.3	7.7			
Maximum	25.5	31.3	39.2	44.3	73.3	98.6	21.8	3.2	6.8	15.2			
Minimum	9.9	18.4	22.9	9.9	23.3	41.6	0.0	0.0	0.1	4.2			
Total							109.6						

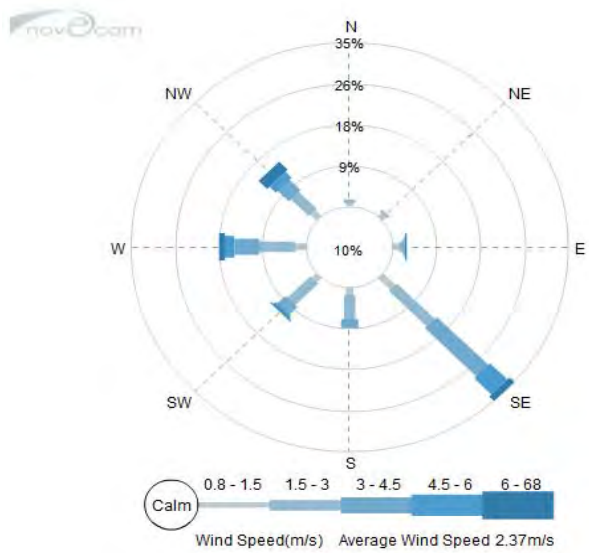
Narrabri Mine Weather Station
April 2014 Wind Rose



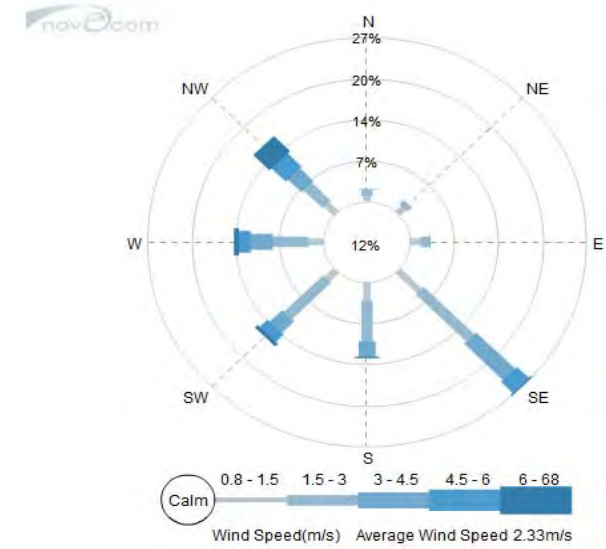
Narrabri Mine Weather Station
May 2014 Wind Rose



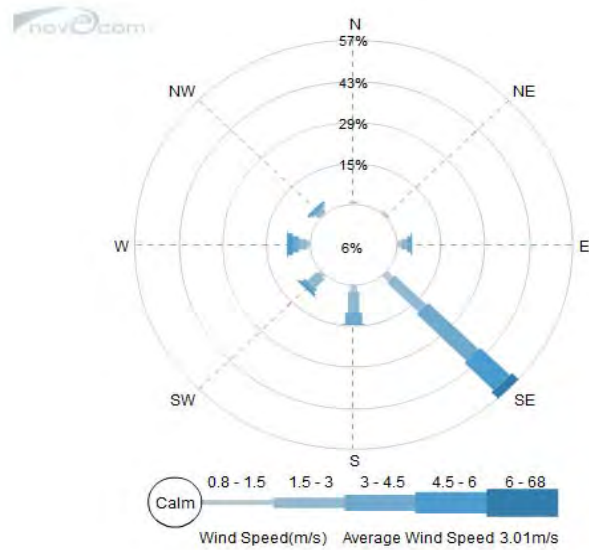
Narrabri Mine Weather Station
June 2014 Wind Rose



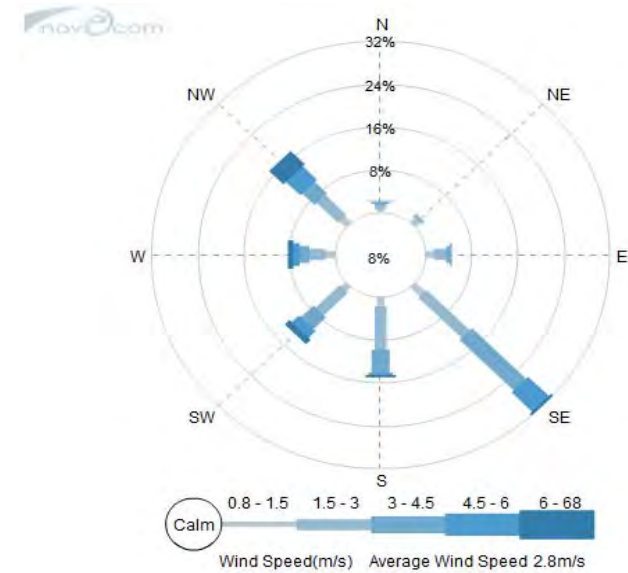
Narrabri Mine Weather Station
July 2014 Wind Rose



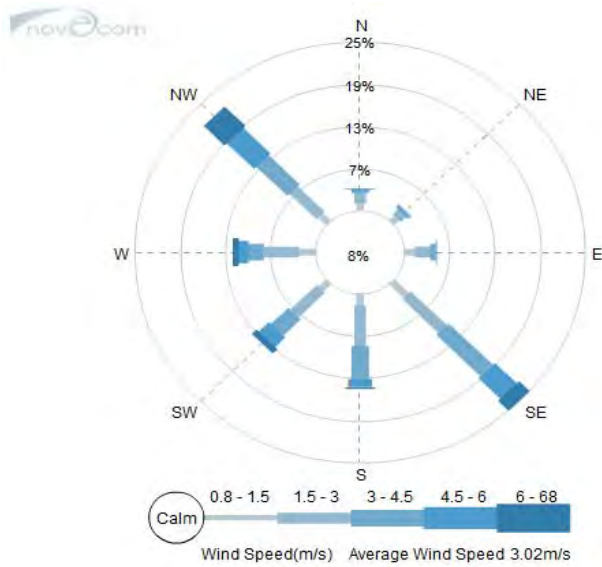
Narrabri Mine Weather Station
August 2014 Wind Rose



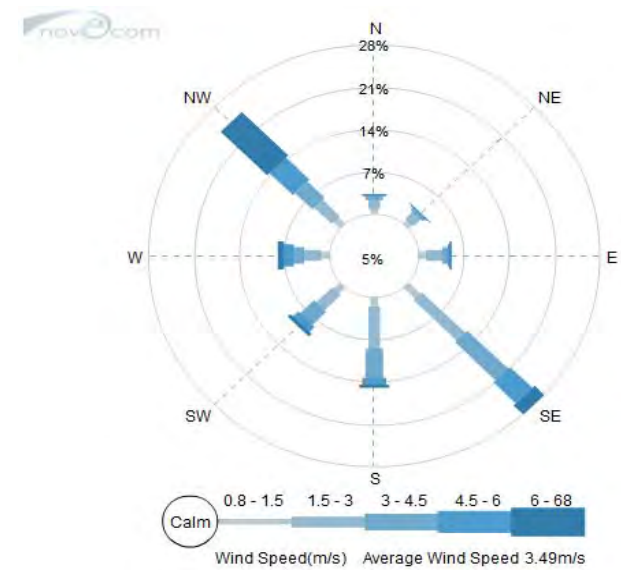
Narrabri Mine Weather Station
September 2014 Wind Rose



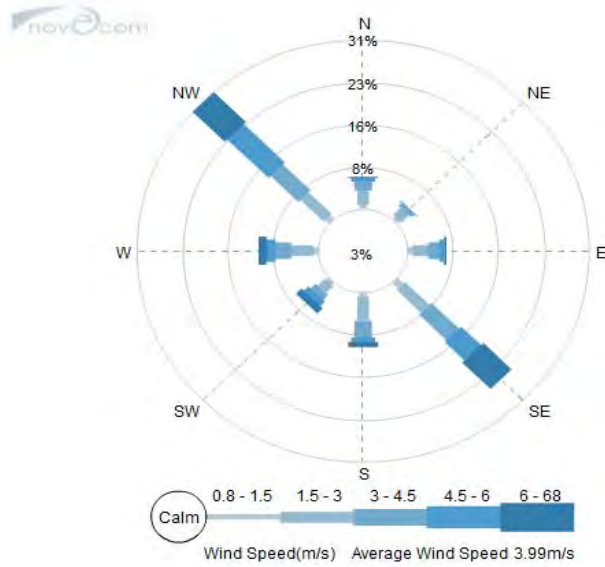
Narrabri Mine Weather Station
October 2014 Wind Rose



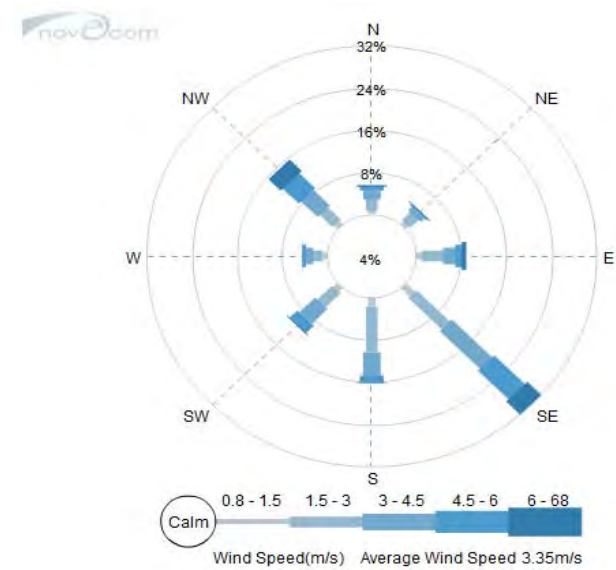
Narrabri Mine Weather Station
November 2014 Wind Rose



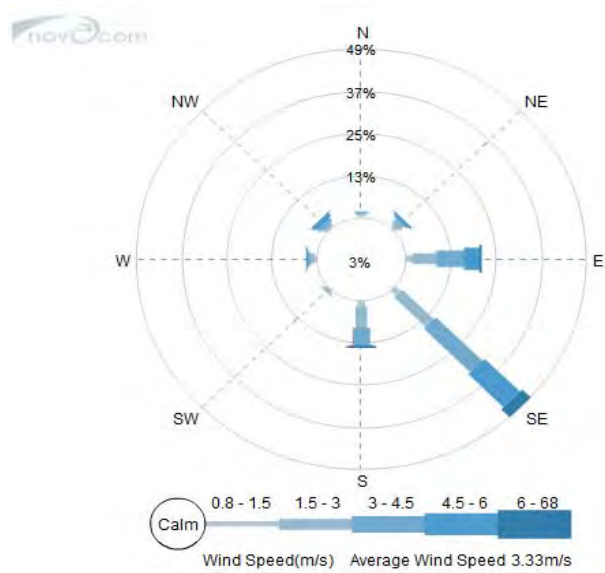
Narrabri Mine Weather Station
December 2014 Wind Rose



Narrabri Mine Weather Station
January 2015 Wind Rose



Narrabri Mine Weather Station
February 2015 Wind Rose



Narrabri Mine Weather Station
March 2015 Wind Rose

