MUSWELLBROOK COAL COMPANY LIMITED

ESTABLISHED 1907

2013-2014

Annual Environmental Management Report

Environmental Department

Muswellbrook Coal Company

2013-2014

www.idemitsu.com.au

ESTABLISHED 1907

MUSWELLBROOK COAL COMPANY LIMITED

www.idemitsu.com.au

Name of Leaseholder:	**Muswellbrook Coal Company Limited**
Name of Mines:	**Muswellbrook No.1 Open Cut Extension** **Muswellbrook No.2 Open Cut Mine**
Titles/Mining Leases:	**Consolidated Coal Lease 713** **Mining Lease 1304** **Mining Lease 1562**

No.1 and No.2 Open Cut Operations MOP Commencement Date:	**13 December 2012**
No.1 and No.2 Open Cut Extension MOP Completion Date:	**28 November 2014**
AEMR Commencement Date:	**1 July 2013**
AEMR End Date:	**30 June 2014**

Reporting Officer: **Julie Thomas**

Title: **Environmental Coordinator**

Signature: J Thomas.

Date: 29/10/14

Contents

APPENDICES

DEFINITIONS

ACHMP	Archaeology and Cultural Heritage Management Plan
AEMR	Annual Environmental Management Report
APS	Automatic Positioning System
BAM	Beta Attenuation Mass Monitor
BL	Bore Licence
BMP	Bushfire Management Plan
BVMP	Blast-Vibration Management Plan
BOM	Bureau of Meteorology
CCC	Community Consultative Committee
CCL	Consolidated Coal Lease
CHPP	Coal Handling and Preparation Plant
CPP	Coal Preparation Plant
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	Development Application
DMP	Dust Management Plan
DPI	Department of Primary Industries
DRE	NSW Trade & Investment - Division of Resources and Energy
EC	Electrical Conductivity
EEA	Eastern Emplacement Area
EIS	Environmental Impact Statement
EL	Exploration Lease
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EP&A	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
FFMP	Flora and Fauna Management Plan
HCRCMA	Hunter Central Rivers Catchment Management Authority
HVAS	High Volume Air Sampler
INP	Industrial Noise Policy
LFA	Landscape Function Analysis
LGA	Local Government Area
LiMP	Lighting Management Plan
LMP	Land Management Plan
MCC	Muswellbrook Coal Company
MIA	Mine Infrastructure Area
ML	Mining Lease or Megalitre
MMS	Meteorological Monitoring Stations
MOP	Mining Operations Plan
MTPA	Million Tonnes per Annum
NATA	National Association of Testing Authorities
NERDDC	National Energy Research, Development and Demonstration Council
NMP	Noise Management Plan
OC	Open Cut
OEH	Office of Environment and Heritage

OGM	Organic Growth Medium
PM	Particulate Matter
POELA	Protection of the Environment Legislation Amendment Act 2011
POEO	Protection of the Environment Operations Act 1997
PRP	Pollution Reduction Program
RL	Relative Level
RLPB	Rural Lands Protection Board
ROM	Run of Mine
RTEMS	Real Time Environmental Monitoring System
SGMP	Surface and Groundwater Monitoring Plan
SL	Surface-water Licence
SWMP	Site Water Management Plan
TEOM	Tapered Element Oscillating Microbalance
TPH	Tonnes per Hour
TPI	Transpacific Industries
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
VAMP	Visual Amenity Management Plan
WMP	Waste Management Plan

1 INTRODUCTION

The Muswellbrook Coal Company mining operations are located approximately 3 km to the northeast of the Township of Muswellbrook, in the Hunter Valley of New South Wales, Australia. Muswellbrook Coal Company Limited (MCC) is a wholly owned subsidiary of Idemitsu Kosan Co. Ltd. Group. Idemitsu Kosan Co. Ltd. is a Japanese energy company with commercial interests in various parts of the world.

MCC has a long association with coal mining in Muswellbrook and was the first open cut coal mining operation in the Southern Hemisphere. The Greta Coal Measures, currently mined at Muswellbrook Coal, were encountered by chance during water boring operations on the Muswellbrook Common in 1907. Underground mining commenced in 1908 and finished in 1997 with the closure of the No.2 Underground mine. Open cut mining commenced in 1944 in the No.1 Open Cut and still continues in the No.2 Open Cut and the No.1 Open Cut Extension.

The No.2 Open Cut commenced operations in 1972 and was operational until a major highwall failure occurred in January 2005. Mining activities remobilised in the No.2 Open Cut during September 2007 to stabilise the highwall. There is no coal remaining in No.2 Open Cut to be mined. Shaping and dumping of overburden will continue in No.2 until mine closure. Currently, mining operations remain focused on the No.1 Open Cut Extension which was granted approval on 1 September 2003 and began operations on 8 March 2005.

The No.1 Open Cut Extension is an expansion of the No.1 Open Cut that was closed in 1970, re-opened in 2000 and closed again in 2002 after removing a seam of coal that had been left un-mined below the pit floor. Mining in the No.1 Open Cut Extension progresses eastwards away from the Muswellbrook township, between the existing No.1 Open Cut void and the previous western mining limits of the No.2 Open Cut, almost joining the two pits together. The No.1 Open Cut Extension mines through old underground workings created by the No.2 Underground (1980-1997) and St Helier's Colliery (circa 1924-1966). Mining operations in the No.1 Open Cut Extension are planned until 2018, to a maximum approved 2 million tonnes per annum (mtpa) of product coal.

A Mining Operation Plan (MOP) is currently approved and is due to expire on 28 November 2014.

Information in this Annual Environmental Management Report (AEMR) relates to the MCC No.1 Open Cut Extension and the No. 2 Open Cut and reports on mining operations for the past year (July 2013 to June 2014). The AEMR is prepared in accordance with the DPI - Mineral Resources "Guidelines to the Mining, Rehabilitation and Environmental Management Process" document EDG03, Version 3, January 2006, and meets the requirements of the MCC Development Consent for the No.1 Open Cut Extension.

An EPL variation was issued in March 2013 that required the submission of a Program to assess MCC's compliance with the Pollution Reduction Program (PRP) under Conditions U1.1 and U2.1. MCC submitted an Assessment Program to EPA on 31 May 2013 but additional clarification was sought on a number of items so a final submission was made during the reporting period on 29 July 2013.

In response to changes introduced in the Protection of the Environment Operations Act 1997 (POEO Act) by the Protection of the Environment Legislation Amendment Act 2011(POELA Act), MCC now publishes and maintains pollution monitoring data on the internet. This information is available to members of the public and can be found at the following website address: *http://www.idemitsu.com.au* .

MCC's current workforce as of 30 June 2014 consisted of 91 full time employees, including, administration, technical services, production, maintenance and open cut staff. There is also an average of 32 contractors and casuals on site who primarily perform production and maintenance orientated duties. The percentage of MCC employees residing in the Muswellbrook LGA is 54%, 28% in the Upper Hunter LGA, 9% in the Singleton LGA, 4% in Maitland LGA and the remaining 4% in other LGA's.

1.1 Consents, Leases and Licences

1.1.1 Development Consents

The MCC platform of planning approvals is shown in **Table 1**.

Table 1 - DEVELOPMENT CONSENTS

Date	Development Consent Number	Consent
11 Aug 1982	Minister for Planning and Environment	Surface facilities for the Underground Mine (since decommissioned and removed)
16 Aug 1985	Muswellbrook Shire Council (MSC)	Offices, bathhouses and coal handling facilities at the No.2 Open Cut
16 Aug 1985	DA 721 (MSC)	Coal Washery as part of existing coal handling facilities
13 Apr 1989	DA 18/88 (MSC)	Coal Haul Road and Road Haulage
14 Oct 1992	DA 78/92 (MSC)	Eastern Area of No.2 Open Cut
1 Sep 2003	DA 205/2002 (MSC)	Approval for Extension of MCC No.1 Open Cut
19 Dec 2005	DA 205/2002 (MSC) – Amendment to Condition 1.1	Power line relocation and additions to Workshop
13 July 2009	DA 205/2002 (MSC) – Amendment to 1.1 and 11.3	Relocate office buildings, workshop and bathhouse
23 December 2010	DA 205/2002 (MSC) – Amendment to Condition 1.1	Extension of mining into Area C
29 October 2013	DA 205/2002 (MSC) -Amendment to Condition 1.1(a), 31, 33, 39, 45 and 58.	Revision to Mining Infrastructure Building Requirements and Rehabilitation Plan.

Date	Development Consent Number	Consent
12 December 2013	DA 205/2002 (MSC) -Amendment to Condition 1.1, 1.2 & 6.3.2 and additional condition 59 & 60.	Modification to Permit the Continuation of Mining Operations at Muswellbrook Coal Mine for an additional Five (5) years- Multiple Allotments- Coal Road Muswellbrook.

1.1.2 Mining Leases

MCC has operated under a succession of mining titles issued under the relevant legislation since underground mining operations commenced in 1907.

The No.1 Open Cut Extension operates under mining lease 1562. The No.2 Open Cut and the No.2 Underground operations were conducted under CCL713 and ML1304. Prior to the granting of ML1562 in 2005, the No.1 Open Cut operated under numerous individual mining leases before their consolidation in 1991 into CCL713. Current mining leases are shown in **Table 2**.

Table 2 - MINING LEASES

Instrument	Authority	Validity Periods
Consolidated Coal Lease 713	DRE	5 April 1990 – 24 November 2024 *(renewed on 4 December 2008)*
Mining Lease 1304	DRE	12 January 1993 - 12 January 2014 *(application for renewal sought)*
Mining Lease 1562	DRE	16 February 2005 – 16 February 2026

1.1.3 Licenses

MCC operates under the following licenses:

- Environmental Protection License (EPL) No. 656 issued under the Protection of the Environment Operations Act 1997;
- License for Keeping Dangerous Goods No. 35/021999;
- NSW Office of Water (NOW), Hunter Region license issued under Part 5 of the Water Act, 1912 (WA) for extraction of ground water – 20BL169014, 20BL169037, 20BL169038 and 20BL170473; and
- NSW Office of Water (NOW) license issued under Section 10 of the Water Act, 1912 for cutting an unnamed watercourse (creek diversion required after high wall failure in March 2005) – 20SL061536.

1.1.4 Mining Operation Plan

The Mining Operation Plan (MOP) MOP applies to mining operations in both the No.1 Open Cut Extension and the No.2 Open Cut. An amended MOP was approved in December 2012 which initially covered a period of one year till December 2013. A second MOP amendment was submitted in December 2013 which sought modification to the direction of mining operations, this amendment was approved on 20 December 2013 for a period until 31 December 2014.

At the time of writing this report another revision has been approved by DRE which incorporates an amendment for an out of pit dump. The overburden from this dump will be used to control spontaneous combustion in final high walls at mine closure. This MOP has been approved up until 28 November 2014. MCC are currently developing the final MOP that will include mine closure in 2018.

1.2 Mine Contacts

Site personnel responsible for mining, rehabilitation and environmental management, planning and support functions are provided below.

Name	Position	Contact Number
John Furner	General Manager	(02) 6542 2300
Kim Nguyen	Operations Manager	(02) 6542 2300
Julie Thomas	Environmental Coordinator	(02) 6542 2300

1.3 Inspection by NSW Trade and Investment – Division of Resources and Energy

Two environmental inspections were conducted by NSW Trade & Investment – Division of Resources and Energy (DRE) during the AEMR reporting period. The first inspection was held on 22 August 2013 and the second held on the 7 November 2013. A number of issues, mostly related to geotechnical stability and hydrocarbon management, were noted by DRE at time of inspection. Action items are noted in **Table 3**. MCC can confirm that all noted issues have been remediated within the AEMR period.

Table 3 – ACTION ITEMS FROM DRE INPECTION (22 August 2013)

No.	Issue/Observation	Action	Response
1	Monitoring highwall cracking within workshop area	1. Continue monitoring highwall cracking within workshop area 2. Continue repairing of cracks within bunded areas	• Monitoring continue twice daily until MIA was relocated. • Survey lines established and monitored weekly. • Footings within workshop and Lube Bay monitored fortnightly. • Groundprobe radar was deployed on-site. • GHD was engaged for geotechnical advice and review.

No.	Issue/Observation	Action	Response
2	Storage and disposal of liquids and contaminated soil within lube bay	1. Remove and dispose of contaminated soil piles with Lube Bay area 2. Improve storage of containers within bunded areas	• Cleanup of Lube Bay and re-organisation of containers around in the bunded area was completed on 30 August 2013. • Hydrocarbon Management training developed and rolled out to Maintenance Personnel. • Hydrocarbon Management competency training for new maintenance contractors and employees now required. • Bioremediation area has been developed and is now is use. • Contaminated Land assessment was conducted by DLA to facilitate requirements under SEPP55 for MIA relocation.
3	Lube Bay run off is bypassing the wash down bay sump	1. Redirect Lube Bay run off to wash down bay sump	• Run off water from Lube Bay area was redirected to the Wash Down Bay sump was completed on 30 August 2013.
4	WA Wattle present in rehabilitation areas	1. Consider additional procedures to manage WA Wattle within new rehabilitation areas to reduce the risk of domination	• Continue to identify this species in rehabilitation monitoring surveys. • That WA Wattle is not part of MCC's tree species planting mix.
5	AEMR Reporting	1. Ensure that Section 5 (Rehabilitation) of the AEMR guidelines is fully addressed in the AEMR	• Covered in this AEMR

2 OPERATIONS DURING THE REPORTING PERIOD

The AEMR Plan (**Appendix 1**) shows the current status of operations including active mining areas, overburden emplacement areas and rehabilitated areas. This plan is a combination of plans required by DRE: Plan 3 - Land Preparation, Plan 4 - Proposed Mining Activities and Plan 5 - Proposed Rehabilitation.

2.1 Exploration

During the reporting period, no exploration was completed within CCL 713, ML 1304 and ML 1562.

2.2 Land Preparation

Land preparation is the process of preparing the land for open cut mining. Activities include vegetation clearing, topsoil stripping and topsoil stockpiling. During the reporting period, no topsoil stripping occurred, or was required, in either the No.1 or No.2 Open Cuts, because all natural surface areas approved for mining have been cleared.

Areas to be cleared of vegetation are delineated in the field by survey. Bulldozers are used to fell the timber, leaving behind habitat trees in accordance with the clearance plan. Felled timber is windrowed or stockpiled for mulching and subsequent reuse on rehabilitation.

Topsoil is generally stripped, stockpiled and strategically placed for ease of recovery or direct use on rehabilitation. All topsoil stockpiles are signposted (refer to **Figure 1**), and inspections are undertaken by MCC's Environmental Staff to assess vegetative cover and weed infestation. Weed control was required on some topsoil stockpiles during this monitoring period principally for Galenia and Paterson's Curse. Areas where the noxious weed Mother-of-Millions was found to occur were not disturbed and the soil taken directly to the overburden emplacement area and buried. This may cause a loss of some topsoil, but it is considered a better option than spreading the noxious weed across the rehabilitation.

Figure 1 – SIGNPOSTED TOPSOIL STOCKPILE

The volume of soil recovered, soil directly re-spread on rehabilitated areas, soil currently stockpiled, and soil recovered from stockpiles and re-spread on rehabilitated areas is displayed in **Table 4**.

Table 3 - APPROXIMATE TOPSOIL VOLUMES FOR THE No.1 OPEN CUT EXTENSION and No.2 OPEN CUT

	No.1 Volume (m^3)	**No.2 Volume** (m^3)
Soil Recovered at Start AEMR (topsoil in inventory)	0	30,000
Soil Stockpiled at End AEMR (topsoil in inventory)	16,894	30,000
Soil Directly Respread on Rehabilitated Areas (AEMR)	0	0
Soil Recovered from Stockpiles and Spread on Rehabilitated Areas (AEMR)	0	0

2.3 Construction

During the AEMR reporting period, MCC relocated the Mining Infrastructure Area (MIA). This move included relocation of the workshop, bath house, fuel storage, lube bay and office facilities approximately 800 metres to the west to allow continued mining within the No.1 Open Cut Extension area and to alleviate the geotechnical issues associated with the Muswellbrook Anticline.

An aerial photo showing the location of the new offices is shown in **Figure 2.**

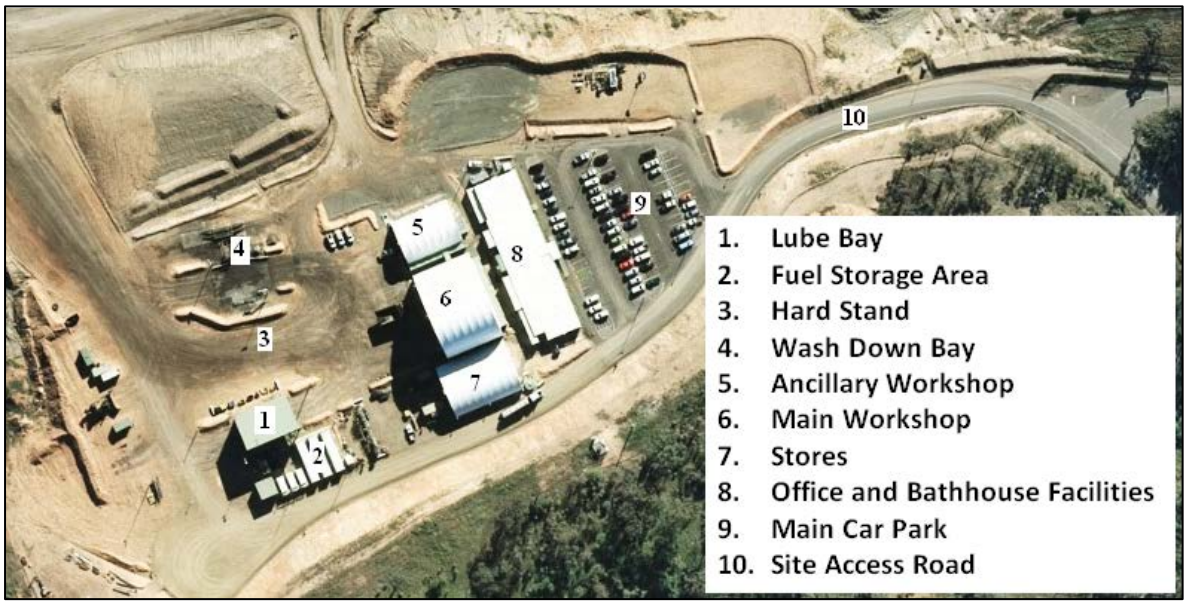


Figure 2 – Mining Infrastructure Area Layout.

A total of 17,000 man hours were utilised during construction of the new facilities with no personal injury or incident event.

Within the reporting period, decommissioning of the previous lube bay, hard stand, workshop, bathhouse and office area was completed. A contaminated land assessment was undertaken with the report provided to DRE on 16 January 2014. The report indicated that there was only minor hydrocarbon staining and contamination of the target area. Although hydrocarbon contamination was found in the area immediately surrounding the targeted area, the results indicate the site met soil chemical land use criteria for Commercial/Industrial within the National Environmental Protection Measure 1999 (as Revised 2013 (NEPM 2013).

A final validation report was completed in April 2014 after all excavations and remediation was completed. A copy of this report was provided to DRE on 15 August 2014.

2.4 Mining

Mining operations at MCC are conducted in the following sequence:

1. Removal of vegetation;
2. Topsoil Stripping;
3. Removal of overburden; and
4. Excavation of coal from the exposed coal seams.

Mining of the No.1 Open Cut Extension began on 8 March 2005 and continued throughout this reporting period, with operations taking place as required within a 24-hour day, 7 days per week period. Blasting operations were carried out between 9:00 am to 5:00 pm Monday to Friday, except on public holidays. Mining is achieved through open cut methods utilising a face shovel, excavators, front-end loaders and rear dump trucks. Mining during the reporting period continued in a northerly direction, but due to an assessment of spontaneous combustion, the pit was re-oriented and mining commenced in southern portion of the open cut. Issues with geotechnical stability promoted fast tracking of mining toward the east with removal and relocation of the previous offices and workshop. Mining direction is now finalised and will continue toward the East, progressing then to take the down dip sections as the pit progresses North until mine closure.

Refer to **Figure 3** for the active mining area and seam identification during the reporting period in the No.1 Open Cut.

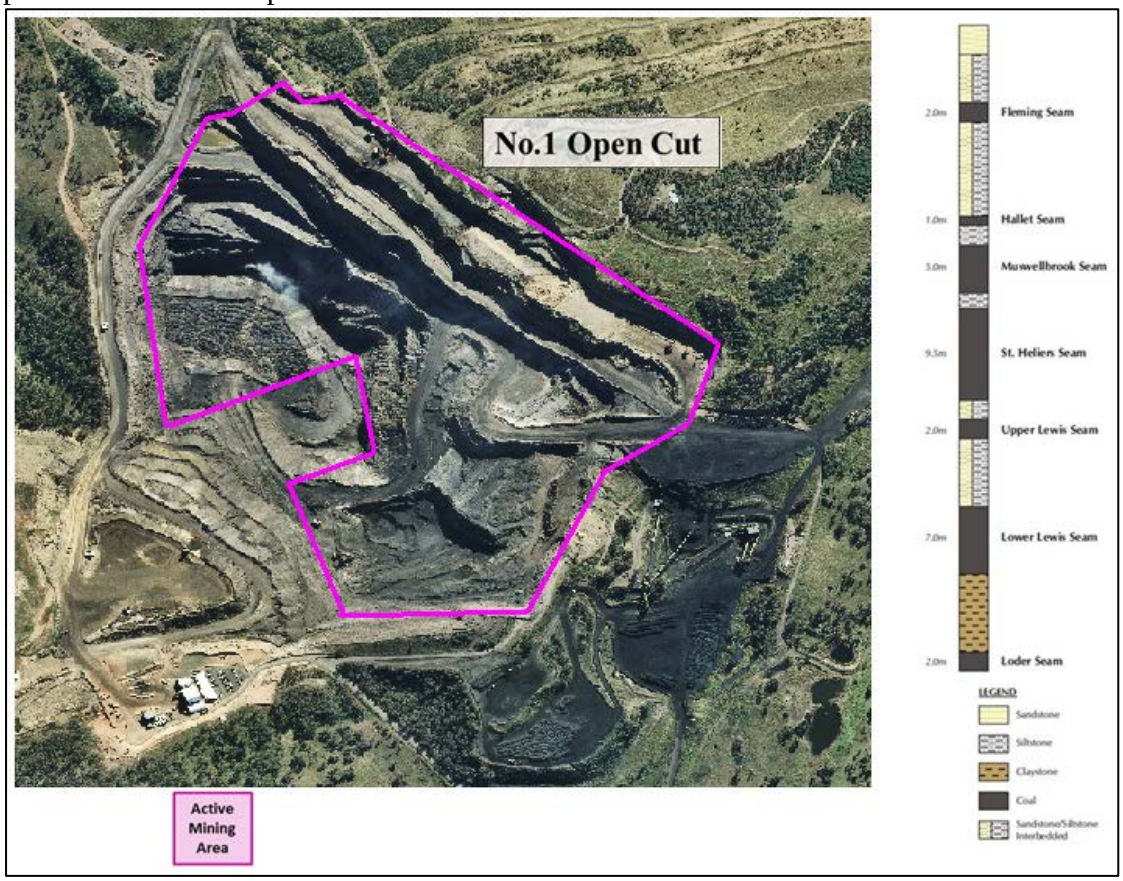


Figure 3 – ACTIVE MINING AREAS IN No.1 Open Cut Extension and Seam Identification.

The current fleet used for mining the No.1 Open Cut Extension is provided in **Table 5**.

Table 4 - MINING FLEET

Equipment	Model	No.	Work Area
Shovel	## CAT 5230 Hydraulic Face Shovel	1	Overburden, interburden and coal removal
Excavator	Hitachi EX3600 Hydraulic Excavator	2	Overburden, interburden and coal removal
	## Komatsu PC-3000 Hydraulic Excavator	2	Overburden, interburden and coal removal
	Hitachi EX2600 Hydraulic Excavator	1	Overburden, interburden and coal removal
Dump Truck	## Komatsu 730E (190 Ton)	11	Overburden, interburden and coal removal
	Hitachi 3500 (170 Ton)	8	Overburden, interburden and coal removal
	CAT 777C (85 Ton)	3	Overburden, coal and rejects
Front End Loader	CAT 990H	1	Coal stockpile management
Blast Hole Drill	I.R. DML45	1	Drilling for blasting in overburden, interburden and coal
Grader	CAT 16H Grader	2	Surface preparation, road maintenance
Water Cart	Water Cart (CAT 777) 70,000 litre	2	Dust suppression, road maintenance
Dozer	##CAT D11R	2	Dumps, roads, coal and overburden area preparation
	CAT D10T	3	Dumps, roads, coal and overburden area preparation
	##CAT 690D (rubber tyred)	1	Dumps, roads, coal and overburden area preparation

Machinery out of service at end of AEMR period.

Most overburden/interburden is drilled and blasted prior to being removed by an excavator. However, if the interburden layer is too thin the material will be ripped and pushed by a dozer. The waste is hauled by a fleet of 170 tonne rear dump trucks and sequentially emplaced in the existing No.1 and No.2 Open Cut voids. Material is placed selectively to encapsulate carbonaceous material to minimise the occurrence of spontaneous combustion in the overburden waste dumps.

Coal seams are drilled and blasted or ripped with dozers. Coal is removed by hydraulic excavators, and transported to the Run of Mine (ROM) coal stockpile or directly into the ROM coal bin by rear dump trucks.

2.5 Mineral Processing

MCC produces thermal coal for the export market. High ash coal is mined, crushed and washed through the Coal Preparation Plant (CPP) while low ash coal bypasses the CPP.

2.5.1 Coal Crushing and Classification Process

ROM coal is dumped into a 400 tonne raw coal receival bin by rear dump trucks. The bin has a 450 x 450 mm grizzly to prevent coal choking the chute. Coal is fed from the bin by a variable speed controlled chain feeder onto the No.1 belt conveyor passing under a self-cleaning magnet to remove any ferrous material prior to crushing. **Figure 4** displays a photo of the coal crushing area.

The conveyor feeds into a rotary breaker which crushes the coal to a size of minus 50 mm. The rated capacity of the crushing system is 450 tonnes per hour (tph). Due to the varying qualities and hardness of the coal the feed rate can be varied by the chain feeder to allow efficient operations of the crusher. There was a total of 1,390,627 tonnes of coal crushed during the reporting period.

After crushing, the No.2 belt conveyor system has two self-cleaning electromagnets positioned across the coal stream to remove any ferrous materials. Coal passes under a belt ash analyser. If the analyser detects high ash coal, it is directed to a high ash stockpile in the CPP area. Low ash coal is directed to a bypass bin of 300 tonne capacity. The cut point of the diversion depends upon product specifications of purchase contracts. Product coal from either the bypass or washed product bin, is hauled by an 85 tonne truck to product stockpile (Refer to **Section 2.8 Ore and Product Stockpiles**). There was a total of 715,977 tonnes of coal that was directed to bypass over the AEMR reporting period.

Figure 4 - COAL CRUSHING PLANT - *coal is placed into a receival bin then fed into a rotary breaker*

2.5.2 Coal Preparation Plant

Coal that is high in ash is washed in the CPP to reduce ash content to meet contract requirements. The CPP uses a jig as the main method of separation, which has a maximum capacity of approximately 300 tonnes per hour but averages about 150 tonnes per hour. The CPP removes stone and other contaminants from the coal, producing a reject stream and a product stream. The CPP is a closed circuit plant that does not require a tailings settlement pond for recycling of water and disposal of fines slurry. Separation of fine reject material is achieved by using a thickener tank and flocculating the material. Raw pit water is used in the flocculation process at a rate of approximately 100 litres per minute with usage totaling around 12 megalitres per year. A band press filter dewaters the tailings which are then discharged as a solid reject material known as “cake”. The water reclaimed by this process is then recycled in the CPP. Both coarse and fine reject material is trucked back into the pit for

disposal at a low level in the mining void. **Figure 5** displays a photo of the CPP. During the reporting period, there was a total of 674,640 tonnes of coal washed.

Figure 5 - COAL PREPARATION PLANT - *crushed coal is reclaimed and processed in the CPP*

2.6 Waste Management

The main objective of waste management is to minimise the amount of waste generated and ensure responsible handling of all wastes. Waste management services at MCC are conducted by Transpacific Industries (TPI), a NSW Environment Protection Authority (EPA) approved contractor, who provides a total waste management program to the mine site.

MCC does not receive waste from outside sources unless under the approval of a waste exemption. Such exemptions include Organic Growth Medium (OGM) and recycled plaster board (gypsum) for mine site rehabilitation.

2.6.1 General Waste Disposal

2.6.1.1 Oil & Grease Containment & Disposal

Both the oily water runoff from the re-fuelling bay that drains into a self-bunded containment area and the waste oil container stored in the workshop, are removed from site by TPI on an as-needed basis. Runoff from the wash-down bay flows into a concrete pit fitted with a free-floating oil skimmer. This oily water is then pumped through an oil recovery system and stored in 5200 litre decant tank where the accumulated oil is removed from TPI when required and the water is returned back into the system. Silt that accumulates in the concrete pit is routinely removed and placed into the bio-remediation for treatment. The Final Settling Pond contains an oil boom which collects any remnant oil that may be present in the dam.

2.6.1.2 Rubbish Disposal

The disposal of rubbish generated on site is undertaken in accordance with the local ordinances and within existing regulatory guidelines. Currently, scrap steel, plastic bottles and containers (PET), cardboard, wooden pallets, used batteries and aluminium cans are recycled. Putrescible waste is collected bi-weekly and disposed of by TPI.

2.6.1.3 Sewage Treatment

Waste water from the bathhouse, office and workshop facilities is processed through a septic tank system and the effluent is pumped out and disposed of offsite by TPI. Septic tank is primary treatment.

2.6.2 Waste Stream Inspection, Classification and Recycling

The Waste Management Plan (WMP) identifies and classifies waste streams at MCC and their applicable management, storage and disposal requirements. To ensure that the correct classification is applied to waste, an inspection of all waste streams are undertaken every six months as well as a weekly service audit conducted by a TPI site representative. Quantities of waste generated are quantified in a monthly report supplied by TPI. Waste classifications in these reports include the following:

Effluent	Printer/Toner Cartridges
Oily Sludge	Paper
Oily Water	Plastic Containers/Bottles (PET)
Oil	Oily Rags
General Waste	Oil Filters
Cardboard	Tyres
Confidential Paper Documents	Rebates (batteries, timber, and scrap metal)

As demonstrated in **Table 5**, there was a total increase of only 1% in general waste, sewerage and hydrocarbon contaminated materials during the reporting period when compared to the previous AEMR period. After an increase in the tonnage for timber collected in 2012-2013, amounts recorded for this reporting period returned to more historical levels (7-8 tonnes), which also reflected as an overall decrease in recycled materials. Due to the demolition of the old MIA Workshop, a substantial increase in the amount of scrap steel collected can also be noted. MCC staff and employees continue to separate and recycle waste materials, when possible, to assist in reducing the amount of waste going to the local landfill.

Table 5 - ANNUAL WASTE STREAM GENERATION (tonnes)

Waste Description	**2010-2011**	**2011-2012**	**2012-2013**	**2013-2014**
General Waste	43.1	33.1	57.4	57.4
Sewerage	1485.0	1459.3	1450.7	1414.0
Oil Filters	2.5	1.1	0.6	7.4
Oily Rags	0.2	0.2	2.0	0.4
Fixation Treatment (*hydraulic hoses*)	3.6	3.4	1.6	1.6
TOTAL WASTE	**1534.4**	**1497.1**	**1579.7**	**1595.2** (↑1%)
RECYCLED MATERIALS				
Co-mingle/Paper-Cardboard	6.384	4.04	3.93	4.8
Confidential Docs/Secure Destruction	0.54	3.96	2.1	NA
Timber	8.78	8.04	11.53	7.68
TOTAL RECYCLED	**15.70**	**16.04**	**17.56**	**12.52** (↓40%)

Waste Description	2010-2011	2011-2012	2012-2013	2013-2014
REBATE MATERIALS				
Scrap Steel	29.6	8.7	8.3	76.1
Batteries	5.676	5.256	3.4035	6.1
Waste Oil	120.4	97.8	109.5	128.8

2.7 Overburden and Production

Overburden from the No.1 Open Cut Extension was placed in the existing No.1 Open Cut and No.2 Open Cut voids. There was no out of pit emplacement of overburden material during the reporting period. **Figure 6** displays in-pit emplacement in the No.1 Open Cut Extension and **Table 7** provides production and waste generated over the reporting period.

Figure 6 - No.1 OPEN CUT EXTENSION IN-PIT EMPLACEMENT (June 2014)

Table 6 - PRODUCTION and WASTE SUMMARY

	ANNUAL PRODUCTION	
	Reporting Period	**End Next Reporting Period** (Estimate)
Topsoil Stripped *(m^3)*	0	0
Topsoil Used/Spread *(m^3)*	0	30,600
Waste Rock (Overburden/Interburden) *(kbcm)*	8,197	7,795
ROM Coal *(kt)*	1,364	1,500
Saleable Coal *(tonnes)*	1,199,689	1,400,500

The amount of saleable coal produced (bypass + washed) during the reporting period was below the maximum of 2.0 mtpa as specified in Consent Condition 2.3.

2.8 Ore and Product Stockpiles

Product coal is hauled from the product bin by an 85 tonne truck to the stockpiles. There are five product stockpiles with a total capacity of 250,000 tonnes. Product coal is trucked off site (refer to **Figure 7**) via Muscle Creek Road and the New England Highway to the Ravensworth Coal Terminal (RCT) for train loading. This coal is then transported to the port of Newcastle.

Figure 7 - PRODUCT COAL STOCKPILE

2.9 Water Management

The primary objective of the Surface and Groundwater Management Plan (SGMP) is to enable the effective management of on-site water to minimise the impact of mining operations on surface and ground water resources both on and adjacent to the mine site. There were no changes to the water management system in the reporting period and MCC will continue using the SGMP in 2014-2015.

2.9.1 Water Management Systems

The water management system encompasses seven catchments within the current mining area. Refer to the AEMR Plan in **Appendix 1** for an outline of the MCC water management system. **Table 8** lists MCC's water management structures.

The water management system at MCC principally consists of:

- Use of the No.1 Open Cut as storage until the end of the No.1 Open Cut Extension project;
- Use of the No.2 Open Cut as water storage after completion of mining – ground water inflows into the pit will gradually decrease because of the head of water in the underground workings;
- Gradual reduction of the No.2 Open Cut in-pit emplacement catchment by up to 50%, reducing the amount of water entering the mine water system;
- Use of the underground workings as water storage; and
- Water storage in mine dams for use in dust suppression.

The water management system achieves the effective management of on-site water by:

- Meeting the water supply needs of the mine;

- Separating clean water runoff produced by undisturbed catchments from sediment laden and contaminated runoff from disturbed catchments;
- Using appropriate sediment controls for dirty water;
- Recycling and reusing dirty and contaminated water for dust suppression and wash down activities;
- Using disused open cuts and underground workings as mine water storage;
- Ensuring nil discharge by containing all saline mine water on site and minimising the risk of accidental off site discharge; and
- Monitoring surface and ground waters to determine significant impacts to water quality or beneficial use and undertaking remedial action where required.

Table 7 - WATER MANAGEMENT STRUCTURES

Sediment & Erosion Control Dams	Restricted Catchment Recirculation Dams (Mine Water)	Groundwater Management Structures
East Emplacement Dam North (MCC25)	Dam 1	No.1 Open Cut Void
East Emplacement Dam South (MCC23)	Dam 2	No.2 Open Cut Void
Final Settling Pond		
Coal Stockpile Dam		
Brickworks Dam 1 (MCC 9)		
Brickworks Dam 2		
Blues Crusher Dam (MCC 26)		
Dam 3 (MCC 27)		
West Emplacement Dam		

2.9.2 Water Classification

Water at MCC is classified as clean water, saline/mine water, dirty water, or potable water.

2.9.2.1 Clean Water

Clean water is water which runs off from undisturbed catchments. Clean water is separated, where practicable, from dirty, saline or contaminated water streams. Clean water may be collected and used under the harvestable rights allowance.

2.9.2.2 Saline / Mine Water

Saline water generally has elevated salinity and suspended sediment generated from disturbed catchments where coal is mined or handled, including the open cut voids, coal stockpiles, CPP, workshop and haul roads. During the reporting period saline water was kept separate from clean water runoff and was collected and reused for processing water or dust suppression.

2.9.2.3 Dirty Water

Dirty water is storm water with increased sediment loads principally from disturbed catchments and rehabilitation areas not fully vegetated. Dirty water runoff is collected from disturbed areas using drains and bunds, and minimised by diverting clean water from upslope. It is then stored until suitable for use in dust suppression or processing.

2.9.2.4 Potable Water

Potable water is supplied via a 75 mm diameter pipeline connected to the Muswellbrook Shire Council (MSC) town water supply. This water is used for amenities in the workshop, washery, office, and bathhouse. Potable water is also used for a high pressure/low volume equipment wash down facility. During the reporting period the average daily consumption was approximately 10 kL per day.

2.9.3 Site Water Catchments

Volumes of stored water available at MCC are provided in **Table 9**.

Table 8 - STORED WATER

	VOLUMES HELD (m^3) as of 30 June 2014		
	Start Reporting Period	**End Reporting Period**	**Storage Capacity**
CLEAN WATER			
Bimbadeen Dam	-	-	-
DIRTY WATER			
Blues Crusher Dam (MCC26)	6,800	4,250	8,500
Brickworks Dam 1 (MCC9)	9,000	15,000	30,000
Brickworks Dam 2	10,000	10,000	20,000
East Emplacement Dam South (MCC23)	8,000	5,000	10,000
East Emplacement Dam North (MCC25)	0	0	10,000
East Haul Road Dam (MCC24)	1,350	2,700	5,400
Final Settling Pond	5,000	2,020	10,100
Dam 3 (MCC27)	6,400	8,800	8,000
SALINE OR MINE WATER			
Dam1	27,000	24,000	30,000
Dam 2	14,000	20,000	20,000
Workshop Dam	*mined*	-	8,600
Open Cut Sump (No.2 O/C Void)	100,000	60,000	100,000
CONTAMINATED WATER			
	0	0	0

2.9.4 CPP and Product Stockpile Water Management

The existing stockpile water management system continued to be used in 2013 - 2014. Post-stockpile catchment dams were desilted and maintained throughout the reporting period.

2.9.5 Fuel Storage

Diesel fuel is stored in three, Class C1 above ground, self bunded tanks, with a capacity of 105,000L each. The tanks are located 50m from any major buildings. They are currently listed under MCC's License for Keeping Dangerous Goods No. 35/021999, issued by Workcover NSW.

2.9.6 Chem Alert System

MCC use a web based Chem Alert system to manage chemical use at the mining operation and system users can access the database from the MCC intranet site. The Chem Alert system is a chemical hazard management tool that contains information on the storage, transportation, use and disposal of chemicals. A Dangerous Goods manifest and safe operating procedures for chemical selection and use can be readily accessed from the MCC intranet server. Audits are undertaken with a focus on safe chemical use and storage by the Occupational Health and Safety Committee representatives.

2.9.7 Explosives

Only explosive precursors are kept on site and are securely stored in accordance with all relevant legislation. Bulk explosive product is used on an as needs basis and although MCC have a license to store a small amount (i.e. kept in the back of the explosives truck), it is not common practice to do so. A blasting contractor is employed to carry out charging and blasting activities.

2.10 Other Infrastructure Management

None to report for this AEMR reporting period.

3 ENVIRONMENTAL MANAGEMENT and PERFORMANCE

3.1 Air Quality Management

3.1.1 Dust Management

The primary objective of air quality management on the mine site is to manage and minimise the impact of dust from mining operations on the environment and nearby residences.

Dust mitigation measures have been divided into control procedures for wind-blown dust and mining generated dust sources.

The main sources of wind-blown dust are from areas disturbed by mining, coal handling facilities and stockpiling areas. Control procedures for wind-blown dust include:

- Disturbing only the minimum area necessary for mining;
- Reshaping, topsoiling and rehabilitating overburden emplacement areas as soon as practicable after the completion of overburden tipping;
- Maintaining coal handling areas in a moist condition using water carts to minimise wind-blown and traffic generated dust;
- Promptly cleaning up after any spillage; and
- Operating water carts around the coal stockpile area to suppress dust on roadways and the coal stockpiles.

Mining generated dust sources include, haul roads, minor roads, topsoil stripping, topsoil stockpiling, drilling, blasting, removing overburden, mining coal and raw coal receival bin. Control procedures for mining generated dust include:

- Watering all roads and traffic areas using water carts;
- Sheeting haul roads with hard wearing material;
- Controlling haul roads, using marker posts to clearly define edges;
- Ripping and re-vegetating obsolete haul roads and minor roads;
- Limiting the development of minor roads and clearly defining their location;
- Watering minor roads that are used regularly for access etc.;
- Watering access tracks used by topsoiling machinery, during loading and unloading;
- Shaping and locating topsoil stockpiles to minimise area exposed to prevailing wind;
- Re-vegetating long term topsoil stockpiles, not used for over 3 months;
- Lowering dust aprons during drilling;
- Drills are equipped with dust extraction cyclones or water injection systems;
- Using adequate stemming at all times;
- Ensuring blasting occurs in accordance to the Blast & Vibration Management Plan relating to meteorological conditions;
- Using automatic sprays when tipping raw coal into the receival bin; and
- Fitting automatic sprays and shielding at conveyor transfer points.

Further control procedures are implemented during periods of high dust emissions and for short term episodic events.

Dust emissions from the premises are controlled by implementing the appropriate dust control methods detailed in the approved Dust Management Plan (DMP) and ensuring that at least 80% efficiency in dust control is achieved during periods of operation.

3.1.2 Air Quality Monitoring Network and RTEMS

The current Air Quality Monitoring Network is displayed in **Figure 8** and details are provided in **Table 10**. The PM_{10} HVAS unit located on the 'Nisbet' property is not required by the Development Approval or Environment Protection Licence but is an additional dust management tool undertaken by MCC.

During this reporting period, the TEOM at Site 3 failed and was replaced with a Beta Attenuation Mass Monitor (BAM) unit in November 2013 following advice from MCC's air quality consultant. The BAM unit measures continuous PM_{10}. MCC has advised the EPA of the change in the type of monitoring unit and is currently waiting on a final review.

Table 9 - AIR QUALITY MONITORING NETWORK

No.	Apparatus	Parameter Monitored / Measured	Unit
17	Dust Gauges	Depositional dust	g/m^2.month
3	TSP High Volume Air Samplers (HVAS)	Total suspended particulates (TSP)	$\mu g/m^3$
2*	Tapered Element Oscillating Microbalances (TEOM)	Fine particulate matter (PM_{10})	$\mu g/m^3$
1#	Beta Attenuation Mass Monitor (BAM)	Fine particulate matter (PM_{10})	$\mu g/m^3$
1	PM_{10} High Volume Air Samplers (HVAS) at 'Nisbet'	Fine particulate matter (PM_{10})	$\mu g/m^3$
4	Meteorological Monitoring Stations (MMS)	Wind speed Wind direction Temperature Rainfall Barometric pressure Temperature Inversion Humidity	m/s Degrees ^oC mm hPa ^oC/100m elevation %

* Up until November 2013, 3 TEOM's were used, and then one was replaced by a BAM.
# The TEOM at Site 3 was replaced by a BAM unit in November 2013

3.1.3 Real Time Environmental Monitoring System

The Real Time Environmental Monitoring System (RTEMS) consists of:

- Tapered Element Oscillating Microbalance (TEOMs)
- Beta Attenuation Mass Monitor (BAM)
- Meteorological Monitoring Stations (MMS)
- A Real-Time Directional Noise Monitoring System
- 4 Blast Monitors

There are four RTEMS sites surrounding MCC mining operations. Site locations are displayed in **Figure 8**, and the monitoring equipment situated at each site is provided in **Table 11**. Photographs of each site are displayed in **Figures 9-12**.

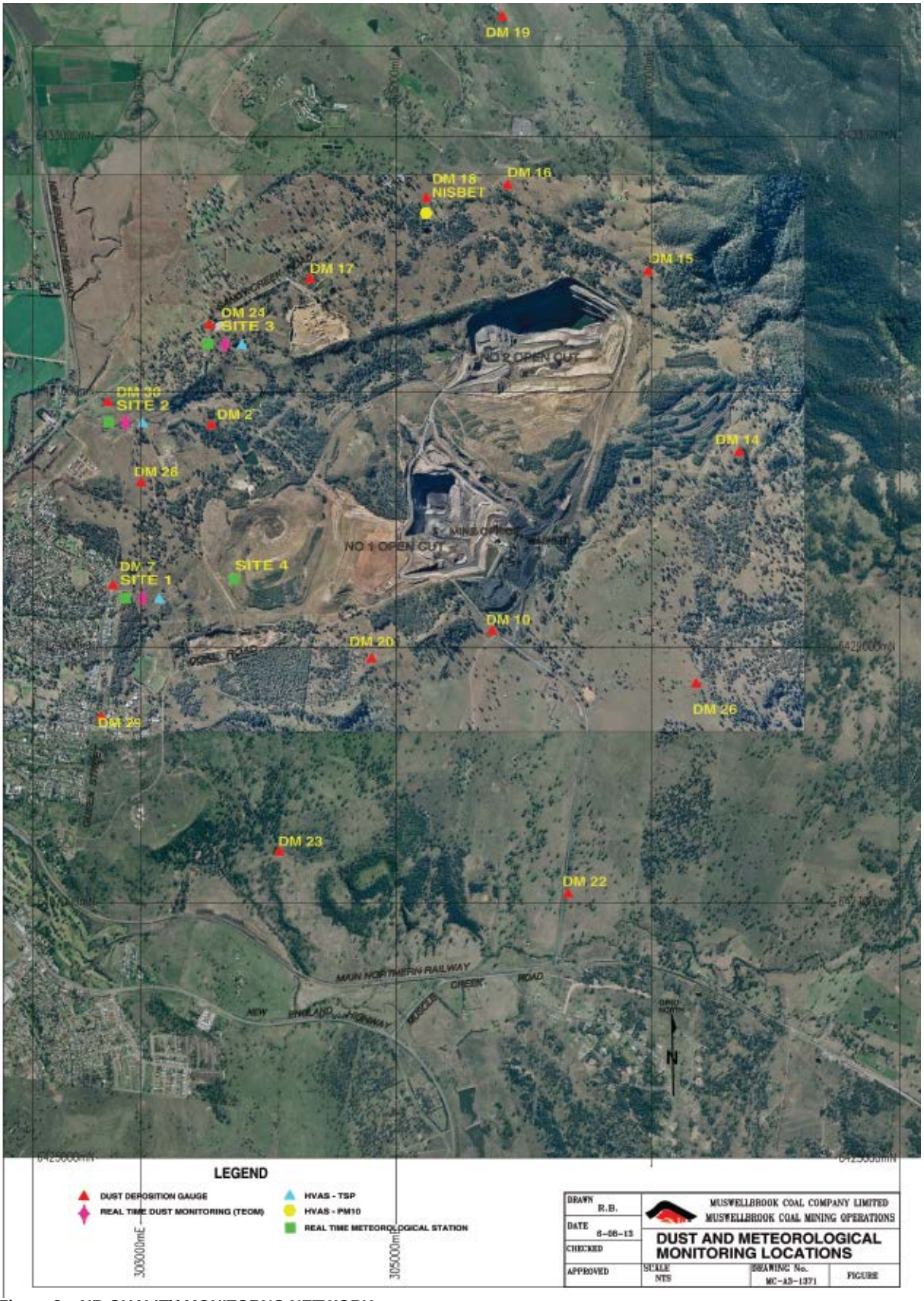


Figure 8 - AIR QUALITY MONITORNG NETWORK

Figure 9 - SITE 1 RTEMS LOCATION *(Queen Street, Muswellbrook)*

Figure 10 - SITE 2 RTEMS LOCATION *(Sandy Creek Road, Muswellbrook)*

Figure 11 - SITE 3 RTEMS LOCATION *(Intersection of Sandy Creek Road and St. Helier's Road, Muswellbrook)*

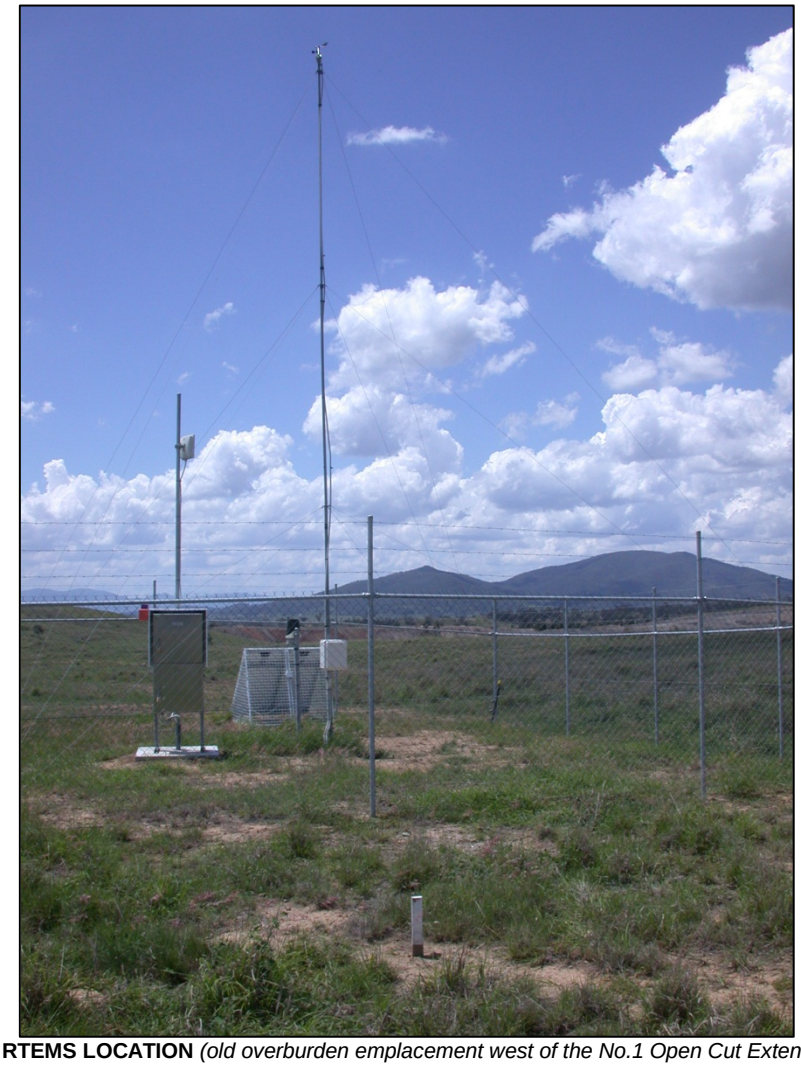


Figure 12 - SITE 12 RTEMS LOCATION *(old overburden emplacement west of the No.1 Open Cut Extension)*

Table 10 - MONITORING EQUIPMENT AT REAL TIME ENVIRONMENTAL MONITORING SYSTEM SITES

RTEMS Site 1	RTEMS Site 2	RTEMS Site 3	RTEMS Site 4
Tapered Element Oscillating Microbalance (TEOM) – Fine Particulates (PM_{10})	Tapered Element Oscillating Microbalance (TEOM) – Fine Particulates (PM_{10})	Beta Attenuation Mass Monitor (BAM) – Fine Particulates (PM_{10})	-
Meteorology Monitoring Station (MMS)	Meteorology Monitoring Station (MMS)	Meteorology Monitoring Station (MMS)	Principal MMS
Real-Time Directional Noise Monitoring System	-	-	-
Blast Monitor – Queen St	-	-	-
Monitoring Equipment Not Available Real Time:			
High Volume Air Sampler (HVAS) – Total Suspended Particulates (TSP)	High Volume Air Sampler (HVAS) – Total Suspended Particulates (TSP)	High Volume Air Sampler (HVAS) – Total Suspended Particulates (TSP)	-
Dust Deposition Gauge #7	Dust Deposition Gauge #30	Dust Deposition Gauge #24	-

3.1.4 Depositional Dust Gauges

The monitoring of depositional dust has occurred in the area surrounding the MCC No.2 Open Cut since 1983. Currently there are a total of 17 dust gauges positioned around the No.2 Open Cut and the No.1 Open Cut Extension. All gauges are analysed for insoluble solids, ash residue and combustible matter. The annual average EPA maximum for depositional dust on non-mine owned land is 4.0 g/m2.month. Dust Deposition gauge locations are displayed in **Figure 8**.

All dust gauges were sampled on a monthly basis and sent to a NATA accredited laboratory for analysis. Samples with excessive contamination, including bird droppings, insects and vegetation, were excluded from the annual average. Contamination was determined on the basis of field observation and laboratory analysis.

3.1.5 TSP High Volume Air Samplers

Three TSP HVAS units are located at each of the three real time dust monitoring stations and have been operational since March 2005. Samples are collected over a 24-hour period on the EPA nominated six-day run cycle. Filter papers are then collected and sent to a NATA accredited laboratory for analysis. The locations of the HVAS are detailed in **Figure 8**.

3.1.6 Tapered Element Oscillating Microbalance (TEOM)

Three TEOM's have been operational since March 2005. In November 2013, the TEOM at Site 3 was replaced by a BAM unit (See Section 3.1.7). Both the BAM and TEOM units continuously monitor fine suspended particulates (PM_{10}) at the Real Time Environmental

Monitoring Stations (RTEMS). The data collected by these units are transmitted to Muswellbrook Coal by telemetry on a real time basis.

3.1.7 Beta Attenuation Mass Monitor (BAM)

In November 2013, a BAM monitor unit was installed to replace one of the TEOM's which had failed. This monitor was recommended as a suitable replacement by the air quality consultants used by Muswellbrook Coal Company. The BAM monitor continuously monitors fine suspended particulates (PM_{10}). It is located at the Site 3 Real Time Environmental Monitoring Station and the data collected by the BAM is transmitted to Muswellbrook Coal by telemetry on a real time basis.

A picture of a TEOM sampling inlet and the BAM's filter/beta gauge are provided in **Figure 13.** TEOM and BAM locations are displayed in **Figure 8**. An example of the Real Time PM_{10} data display is provided in **Figure 14**.

Figure 12 - TEOM PM_{10} MONITOR (top) and BAM PM_{10} MONITOR

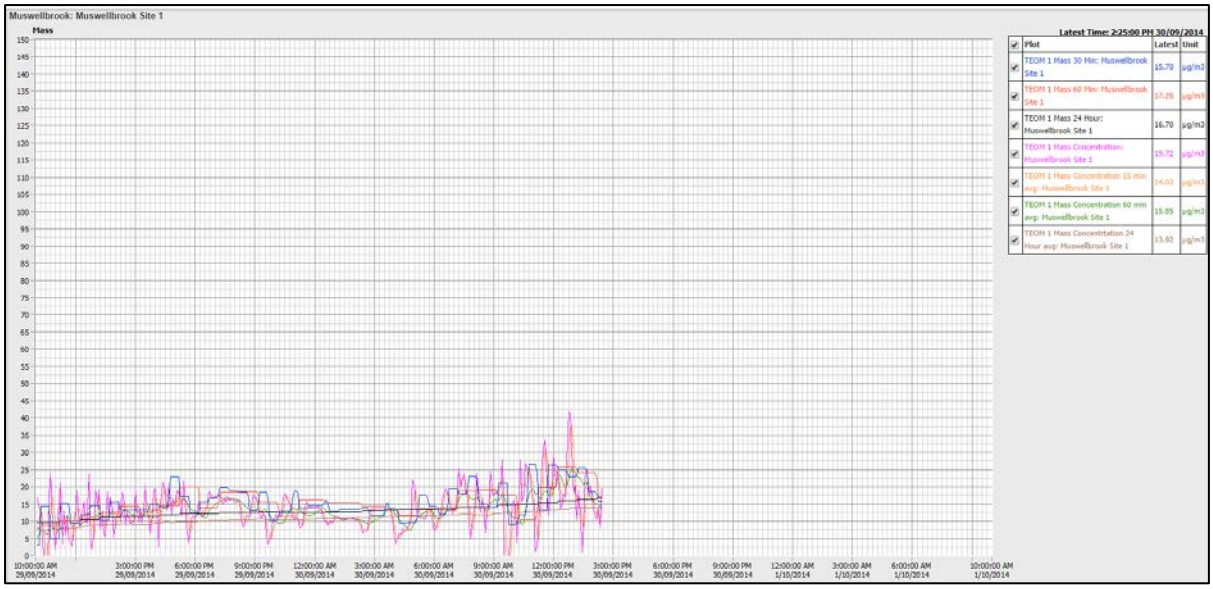


Figure 14 - REAL TIME PM_{10} (TEOM) DATA SCREEN

3.1.8 PM_{10} High Volume Air Samplers

A PM_{10} HVAS was maintained on a voluntary basis at the dust gauge DM18 location on the 'Nisbet' property which is approximately 1km north of Limestone Road just off Sandy Creek Road. Samples are collected over a 24-hour period on the EPA nominated six-day run cycle, and then the filter papers are sent to a NATA accredited laboratory for analysis.

3.1.9 Pollution Studies and Reduction Programs

As part of recent changes to EPL 656 (Conditions U1, U2 and U3), MCC conducted dust monitoring as outlined in the Muswellbrook Coal Company Particulate Matter Control Best Practice Implementation Monitoring Program to evaluate the effectiveness of control measures for wheel-generated dust and disturbing/handling of overburden in adverse weather conditions. The results indicate that a control efficiency greater than 90% is being achieved at MCC.

3.1.10 Meteorological Monitoring Stations

During the reporting period, MCC continued to maintain a principal Meteorological Monitoring Station (MMS) on rehabilitated land to the immediate west of the No.1 Open Cut. This station is part of the Real Time Environmental Monitoring System (RTEMS). Three other Meteorological Monitoring Stations, located around the perimeter of the mine property at the TEOM and BAM sites, provide supplemental information. All four weather stations continuously relay weather data by telemetry to MCC.

The principal MMS provides 10m elevation wind speed and direction, 2m elevation air temperature, rainfall, humidity, barometric pressure and calculated atmospheric temperature inversion. The inversion calculation is based on the 2m elevation air temperature from the principal MMS and the supplementary MMS at Site 2. These sites were selected due to the RL difference of 88m between the sites, allowing the temperature inversion to be extrapolated and reported over a 100m elevation interval. The supplementary MMSs provide 2m elevation wind speed, direction, and air temperature for the purpose of interpreting TEOM and BAM results. Wind direction is referenced to magnetic north.

Photographs of the four RTEMS Sites are provided in **Figures 9-12**. Real-Time meteorological data computer screens are displayed in **Figure 15** and **Figure 16**.

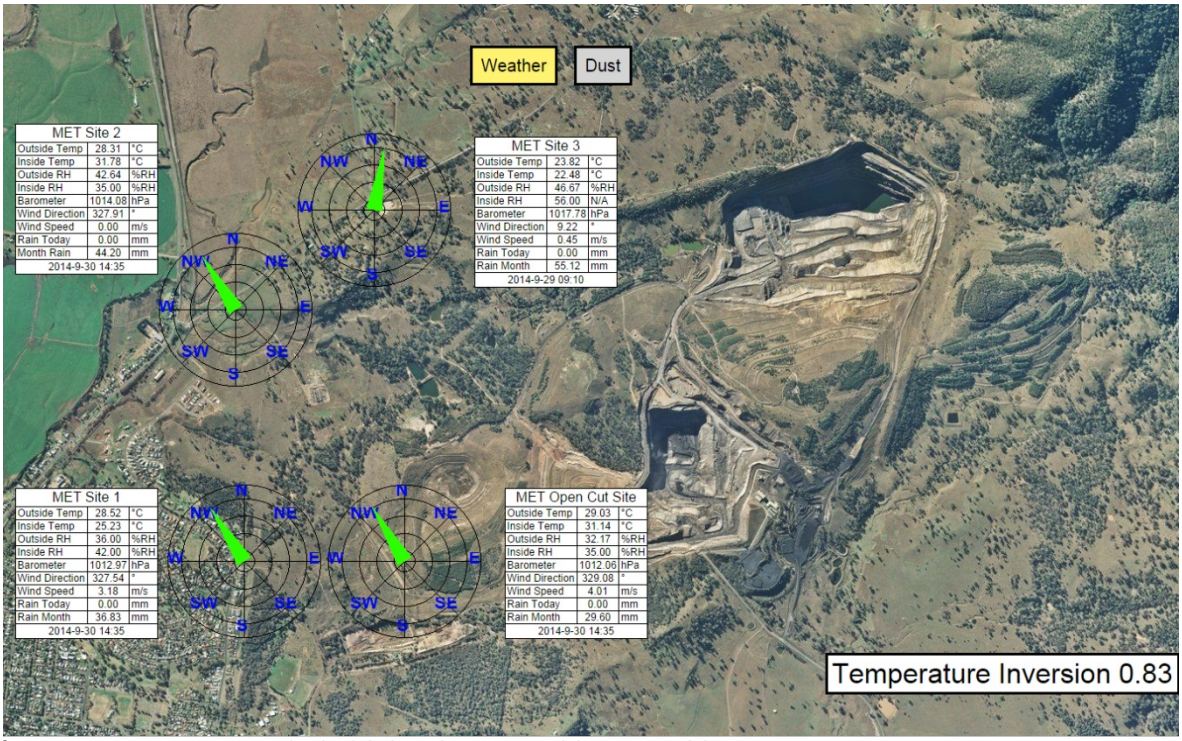


Figure 15 - REAL TIME METEOROLOGICAL OVERVIEW COMPUTER SCREEN

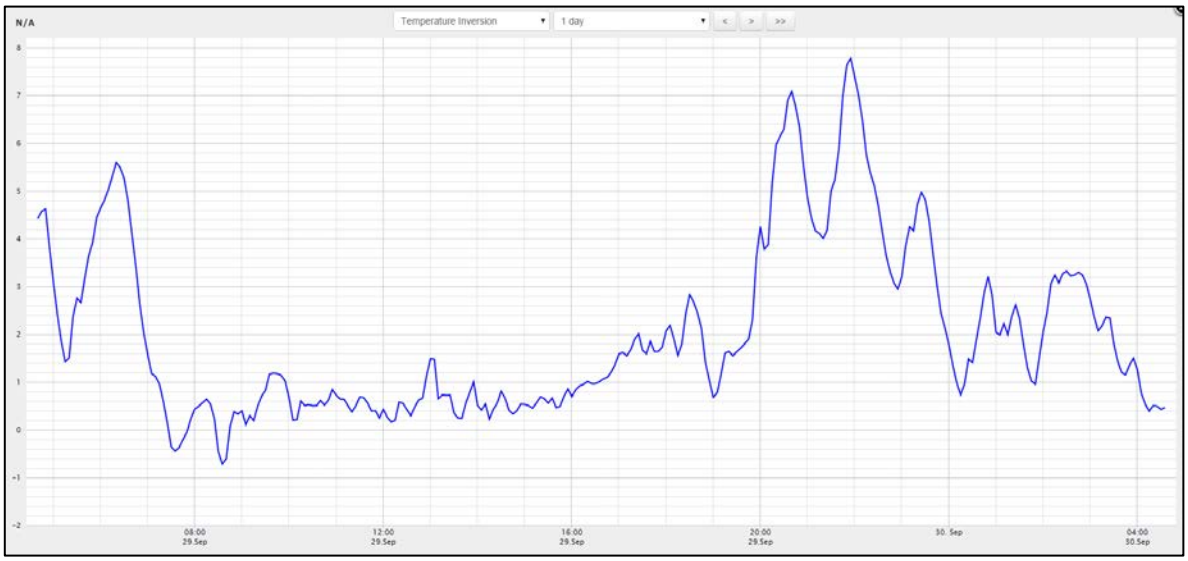


Figure 16 - REAL TIME TEMPERATURE INVERSION CHART COMPUTER SCREEN

3.1.11 Meteorological Monitoring Results

Meteorological data provided in this report was sourced from the principal Meteorological Station at Site 4 (RTEM 4). Wind, rainfall and temperature results are summarised below. Data recovery for the monitoring period was 99.8%.

3.1.11.1 Wind Speed and Direction

Quarterly wind roses are provided in **Figures 17-20**. Prevailing wind directions were from the northwest during the cooler months of the year (July-September 2013) and south-easterly in the warmer months (October-December 2013 and January-March 2014). April-June 2014 indicated a fairly even split in wind patterns from both the northwest and the southeast. These results are generally consistent with the predominant wind patterns in the Hunter Valley.

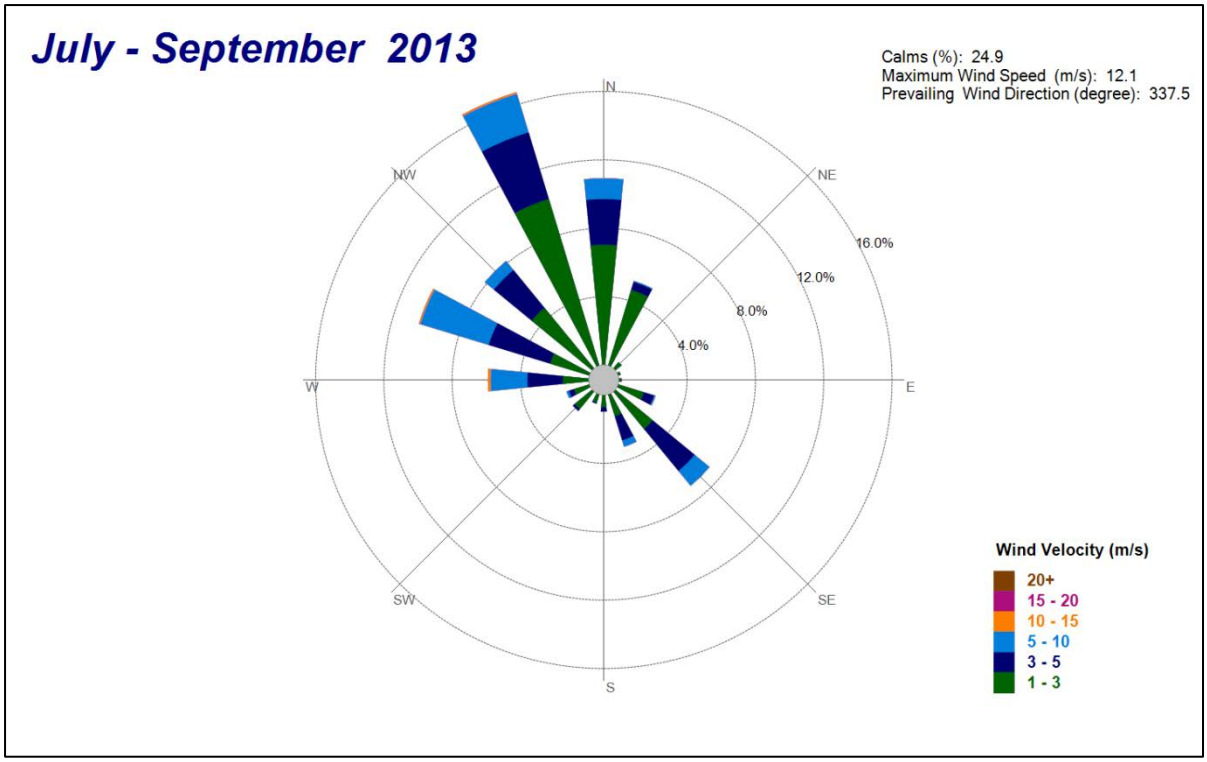


Figure 17 - WIND ROSE JULY TO SEPTEMBER 2013

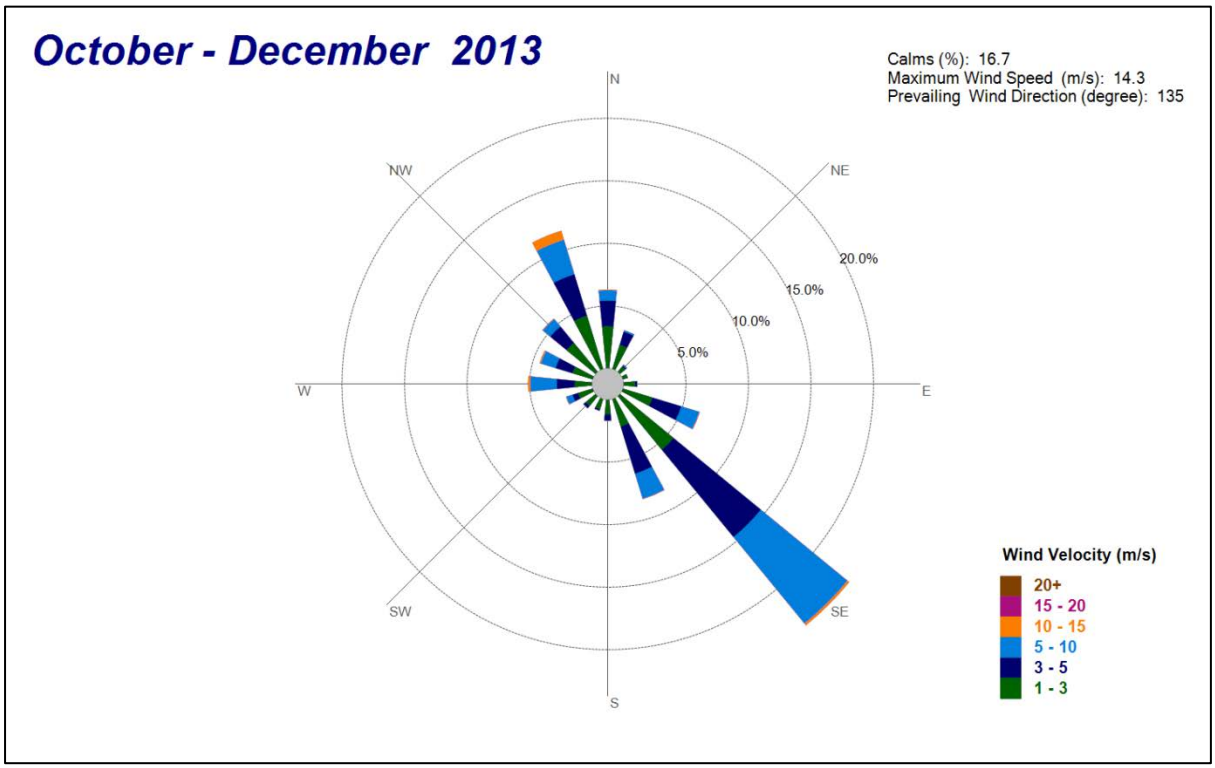


Figure 18 - WIND ROSE OCTOBER TO DECEMBER 2013

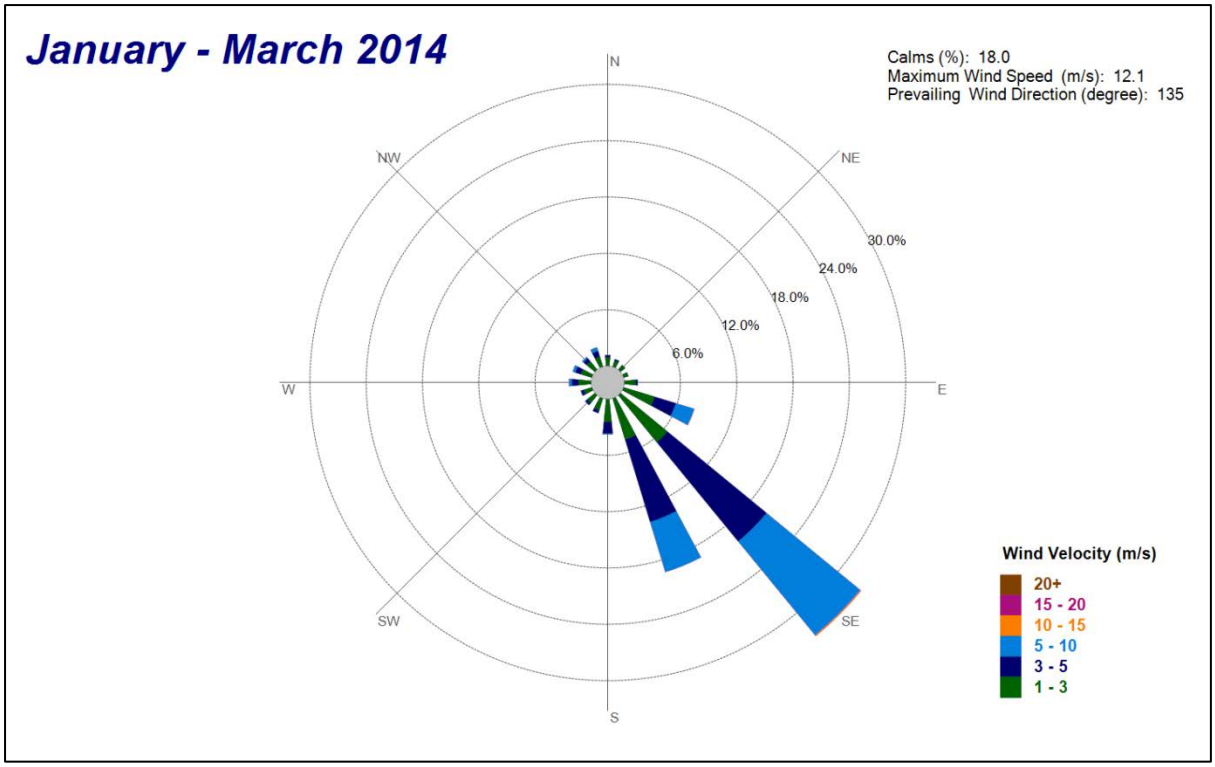


Figure 19 - WIND ROSE JANUARY TO MARCH 2014

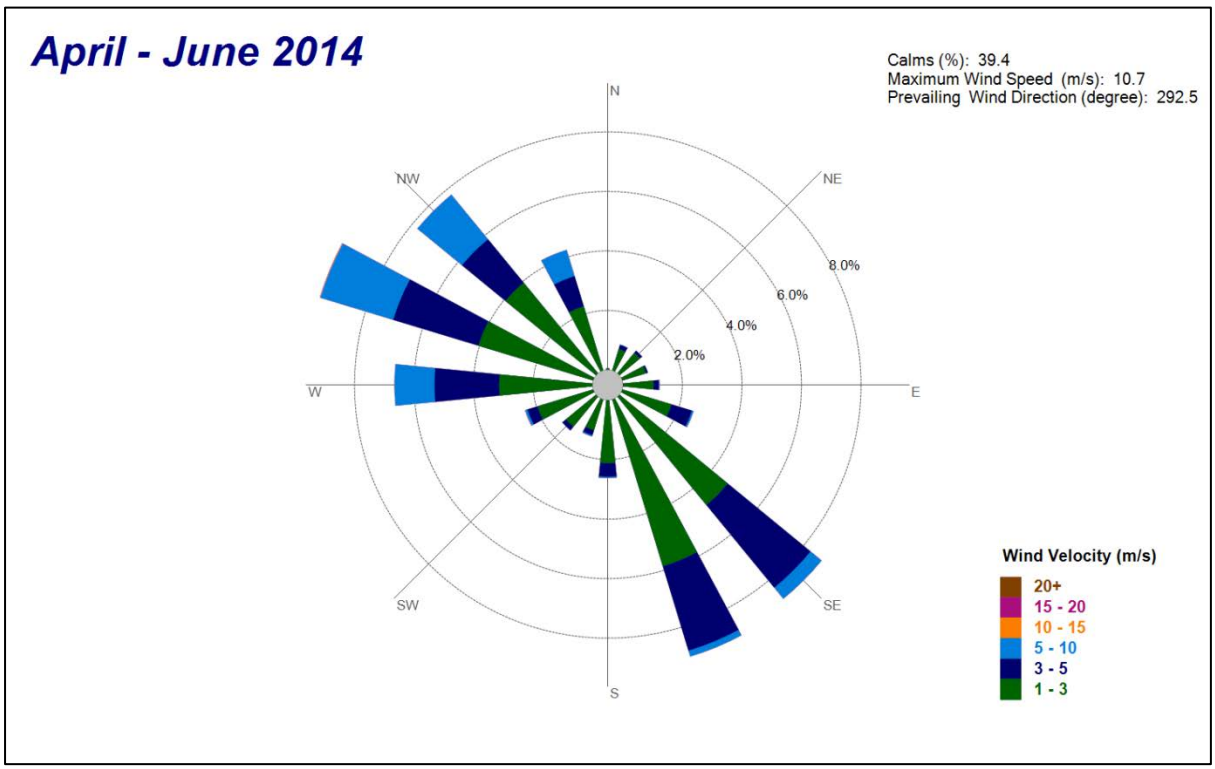


Figure 20 - WIND ROSE APRIL TO JUNE 2014

3.1.11.2 Rainfall

Total annual rainfall recorded during the reporting period was 434mm, which is below the long-term average of 620.8mm recorded at the nearest Australian Bureau of Meteorology (BOM) site at Lower Hill Street in Muswellbrook. A summary of rainfall during the reporting period, compared to the annual average rainfall at the closest BOM station in Muswellbrook, is provided in **Figure 21**. MCC recorded rainfall greater than the Muswellbrook historical average in 3 out of the 12 months with November 2013 having the largest difference of 84.9m.

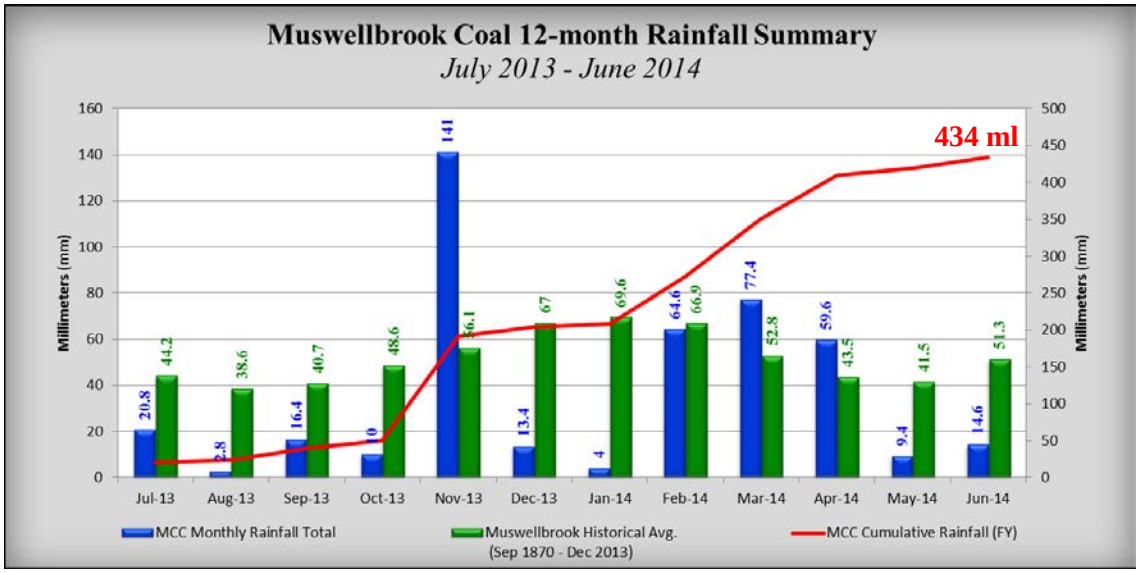


Figure 21 - MCC MONTHLY RAINFALL TOTAL COMPARED WITH MUSWELLBROOK HISTORICAL AVERAGES 2013-2014

3.1.11.3 Temperature

Maximum temperature recorded was 39.3 °C and the minimum was -0.4 °C. This is within the long term minimum and maximum recorded by the Australian Bureau of Meteorology site at Scone, -5.1 °C and 44.2 °C. A summary of minimum, maximum and average monthly temperatures during the reporting period is provided in **Figure 22**.

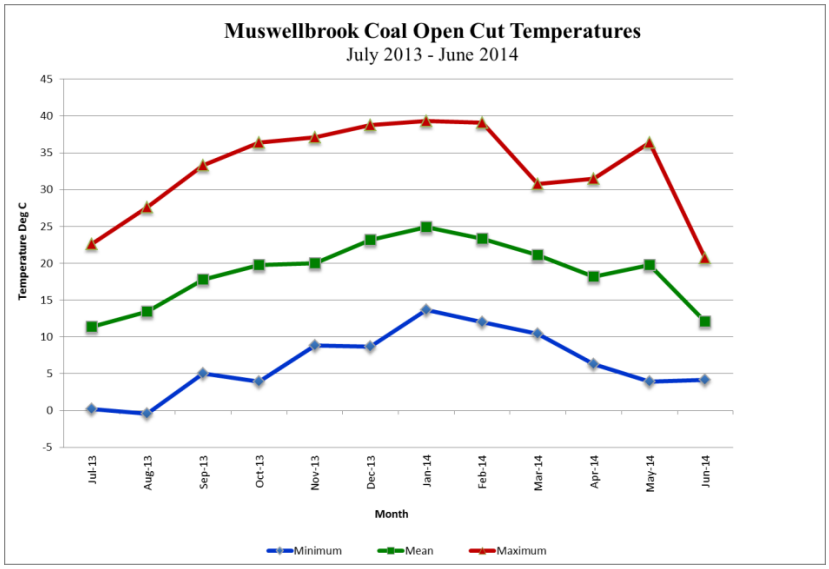


Figure 22 - TEMPERATURE VARIATION AT MCC 2013-2014

3.1.11.4 Inversion Monitoring

Inversion strength is measured between the Open Cut meteorological station (Site 4) and the Sandy Creek Road station (Site 2). The sites have an elevation difference of 88 metres and recorded temperatures are used to calculate the temperature differential per 100 metres (inversion strength). Temperatures normally decrease with increase in height above the ground. A temperature inversion is a temperature increase with height. Meteorological conditions, such as temperature inversion, may increase noise levels by focusing sound-wave propagation paths at a single point. The effect on noise levels can be significant. The trend line displayed in **Figure 23** illustrates typical inversion data that is available on the MCC's Real Time Environmental Monitoring System (RTEMS) on a continual basis. Inversions over 3 °C per 100 metres are considered to be strong and occur primarily during the evening to early morning in the cooler months.

Over the reporting period, inversions were monitored and the daily maximum recorded. The days in each month that recorded an inversion level of 3°C/100m or greater (strong inversion) are displayed in **Figure 24**. There was a total of 129 days during the 12-month period that a strong inversion was recorded, June 2014 being the highest with 23 days.

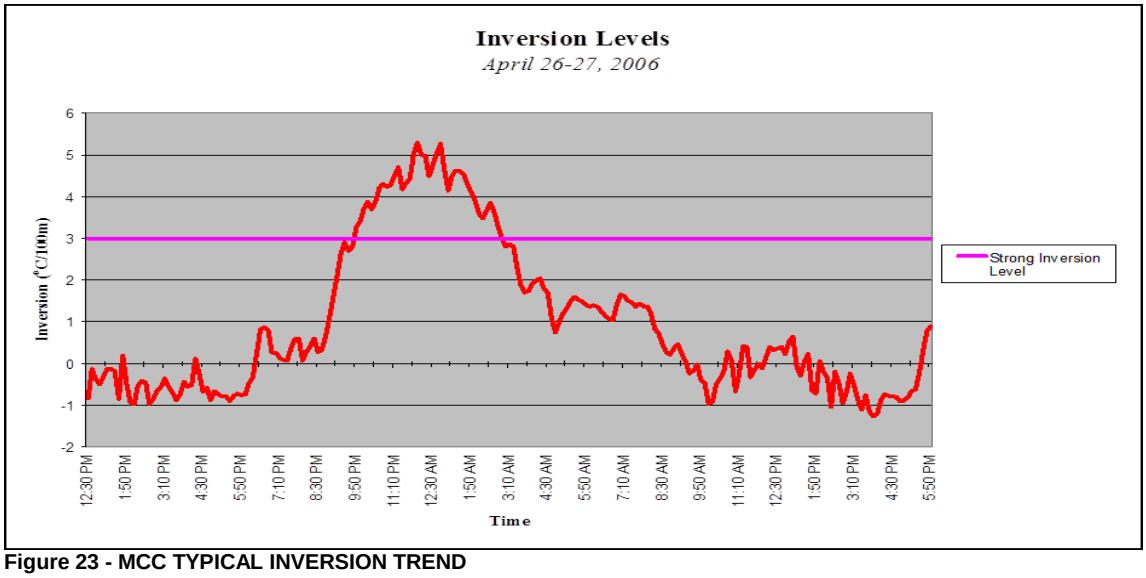


Figure 23 - MCC TYPICAL INVERSION TREND

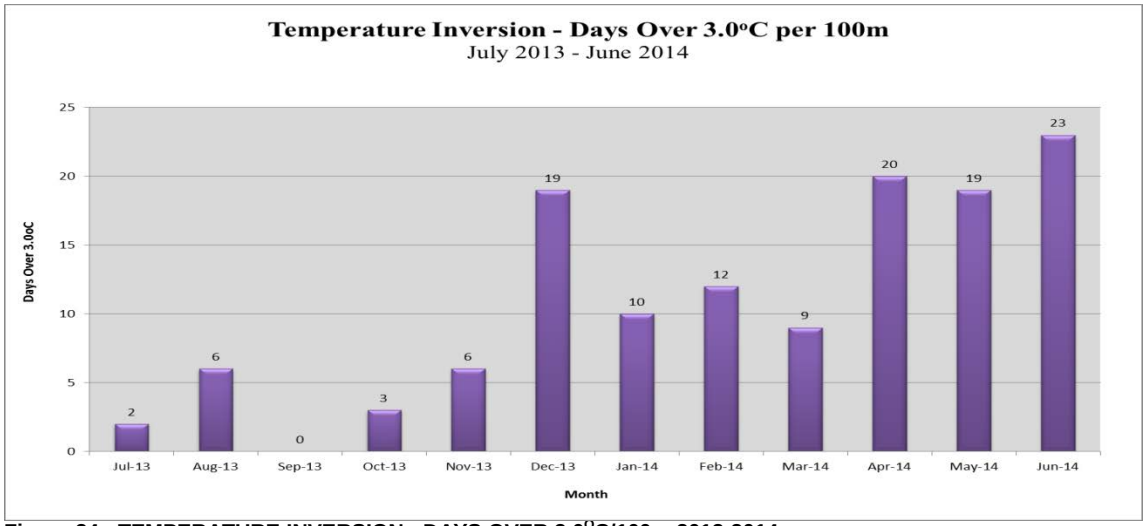


Figure 24 - TEMPERATURE INVERSION - DAYS OVER 3.0^{O}C/100m 2013-2014

3.1.12 Depositional Dust Monitoring Results

All gauges, except for DM10, conformed to the EPA's maximum annual dust criteria of 4 g/m^2.month. Monitoring site DM10 is located directly adjacent to mining operations on mine owned property. The mean dust deposition rate for insoluble solids from July 2013 to June 2014 for all monitoring sites was 2.1 g/m^2.month. This average is a slight increase from the average reported in 2012-2013 AEMR (1.8 g/m^2.month). This level could easily be the result of the below average rainfall experienced over the reporting period.

Annual average values and historical average values are displayed in **Figure 25**. The results of the depositional dust monitoring program for the reporting period are presented in **Appendix 2**. A contour plot showing the annual average dust deposition isopleths based on the available monitoring sites is shown in **Figure 26**.

As expected, the contour plot indicates higher dust deposition rates near the No.1 Open Cut mining area, adjacent to dust gauge DM10, but the levels begin to drop outside of this area to levels well within the Development Consent criteria.

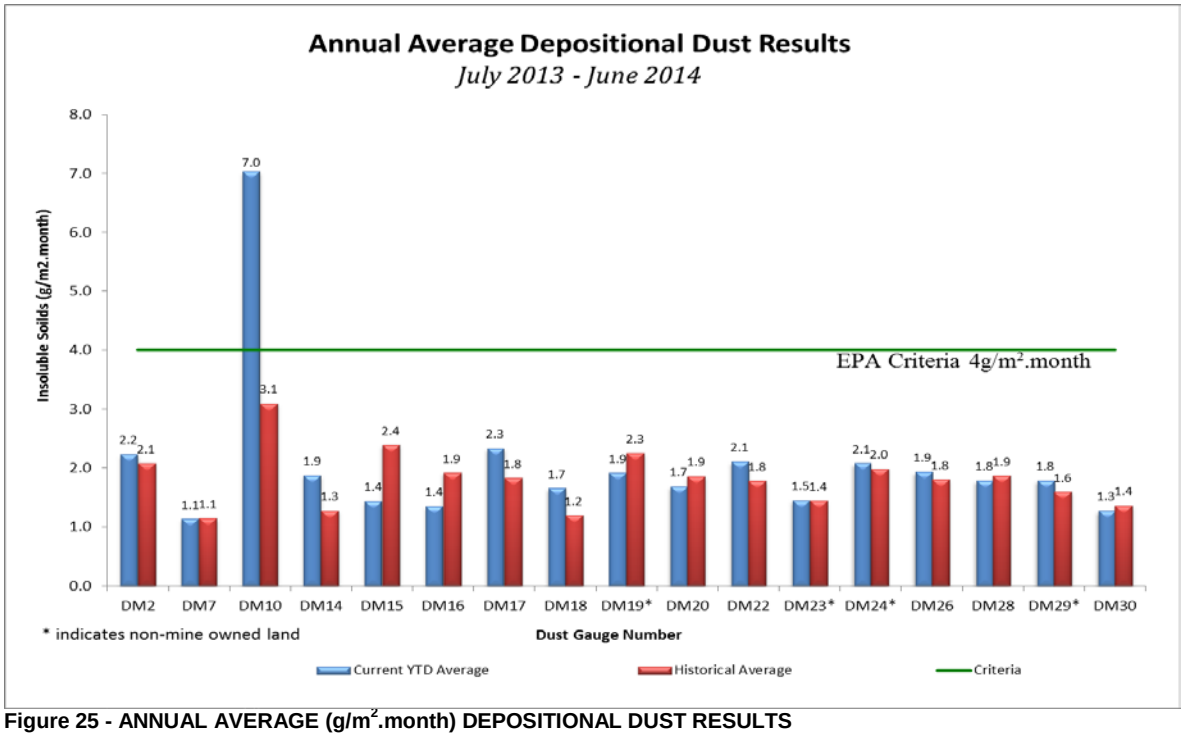


Figure 25 - ANNUAL AVERAGE (g/m^2.month) DEPOSITIONAL DUST RESULTS

Dust deposition gauges outside of the mining lease, on privately owned land, have shown increases above background from 0.3 to 0.9 at an average of 0.5g/m^2.month. The nearest affected residence (Residence 13) dust gauge (DM24) returned an annual average insoluble solids for this reporting period of 2.3 g/m^2.month. The dust deposition rate of 2.3 g/m^2.month is less than the predicted level of 2.4 g/m^2.month, for project years 4-9. Overall, dust deposition insoluble solids levels are within the EIS predictions and the EPA criteria of background +2 g/m^2.month.

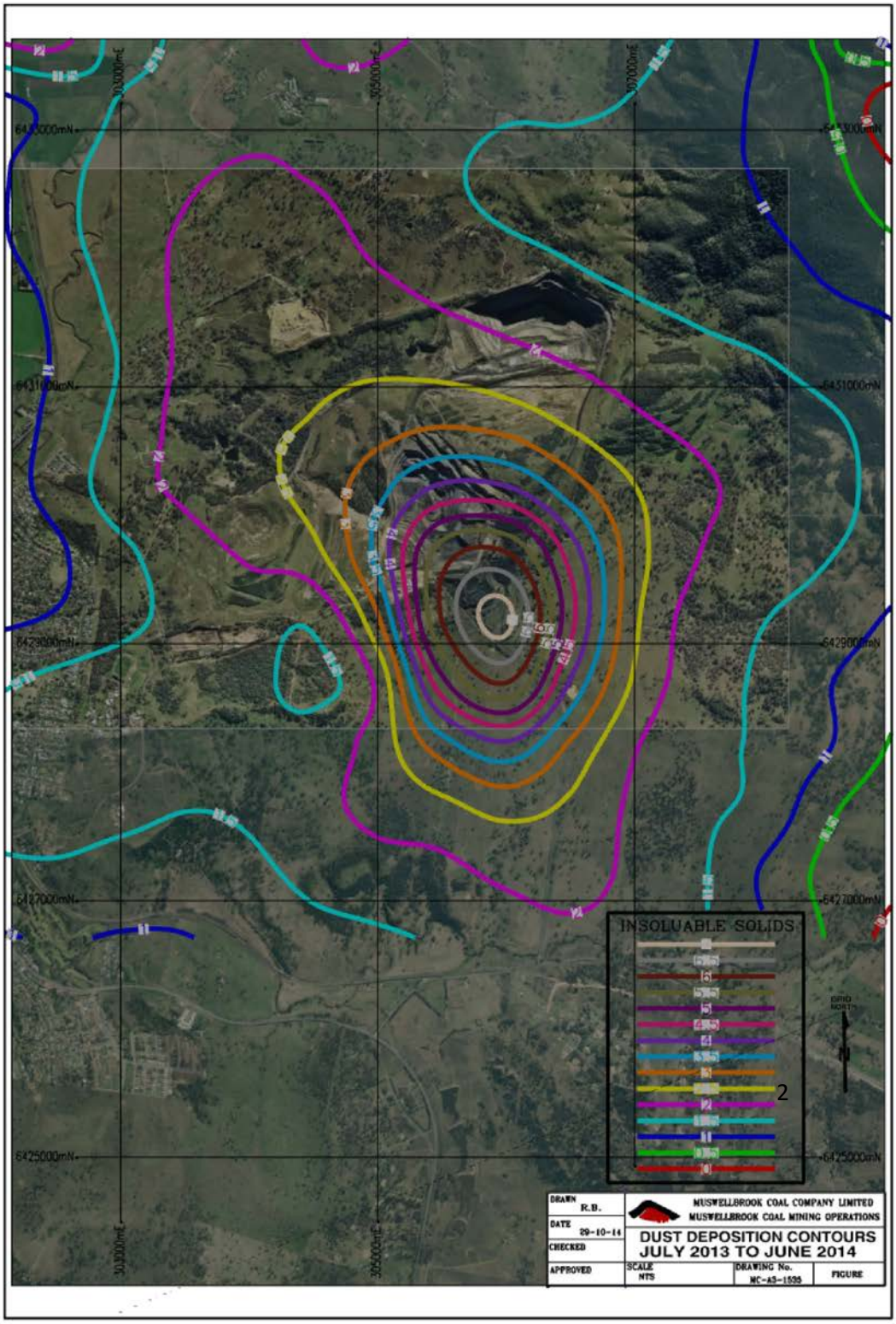


Figure 26 - ANNUAL AVERAGE (g/m^2.month) DEPOSITIONAL DUST INSOLUBLE SOLIDS CONTOUR PLOT

Note: Dust deposition contours are based on the annual average dust deposition gauge data at specific sites and do not show representative levels in the open cut.

3.1.13 Total Suspended Particulate (TSP) Results

Annual Average TSP results for the reporting period were well below the Development Consent, EPA and the National Health and Medical Research Council (NHMRC) long term criteria of 90 µg/m^3 at all sites. The ratio of PM_{10} to TSP on TSP run days is 42%. This is a similar ratio to those found at other sites in the Hunter Valley. **Table 12** displays the average TSP value at each monitoring location during the reporting period. **Figures 27-29** display the 24-hour TSP results over the monitoring period. A comprehensive table of TSP results is provided in **Appendix 2**.

Table 11 - TSP AVERAGES - 1 JULY 2013 - 30 JUNE 2014

Site	Annual Average TSP Concentration (µg/m^3)*	Development Consent & EPA Annual Average Criteria (µg/m^3)	Data Recovery %
1	36.4	90	100
2	40.4	90	100
3	41.5	90	100
Average (all sites)	**39.4**		**100**

Note: *Results are total contribution from all sources.

The annual average TSP results at all three monitoring sites are below the annual average TSP predictions in the EIS of 51.6µg/m^3. The Annual Average remains below maximum criteria.

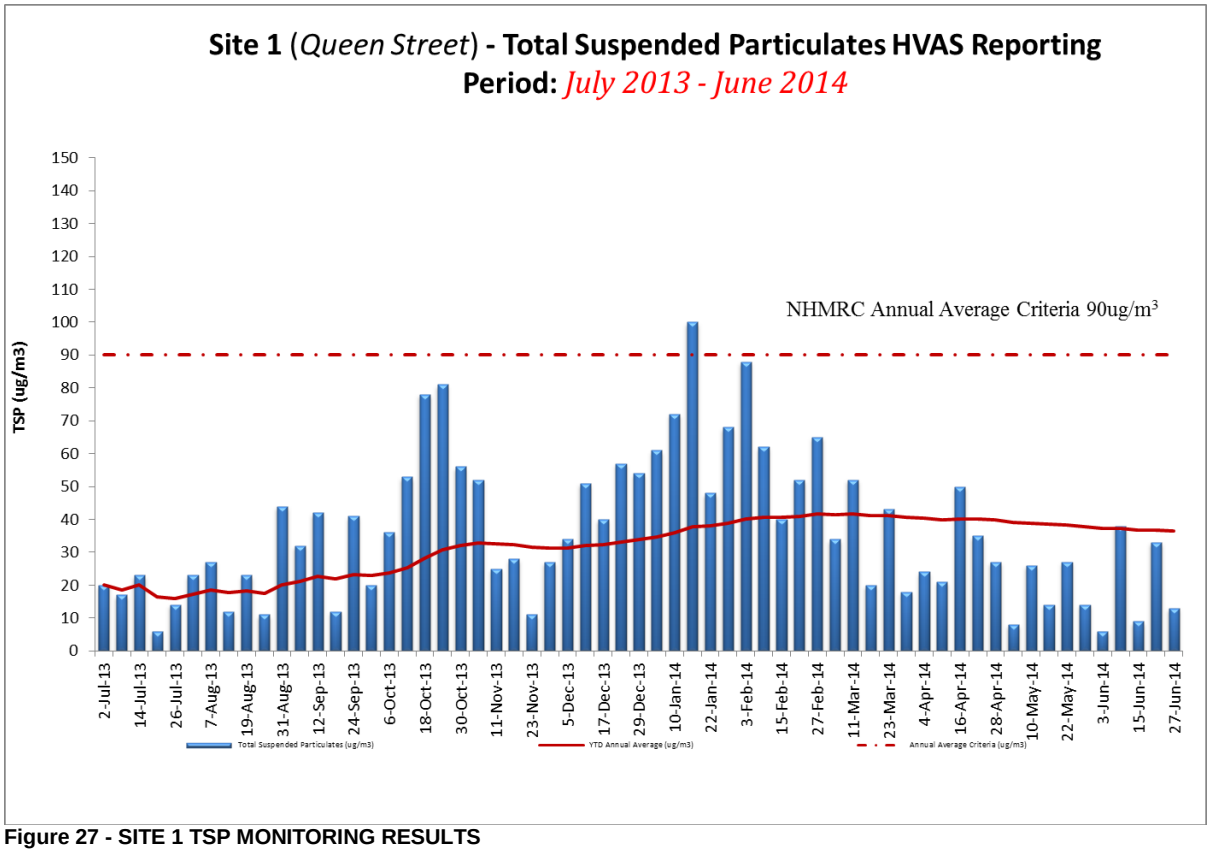


Figure 27 - SITE 1 TSP MONITORING RESULTS

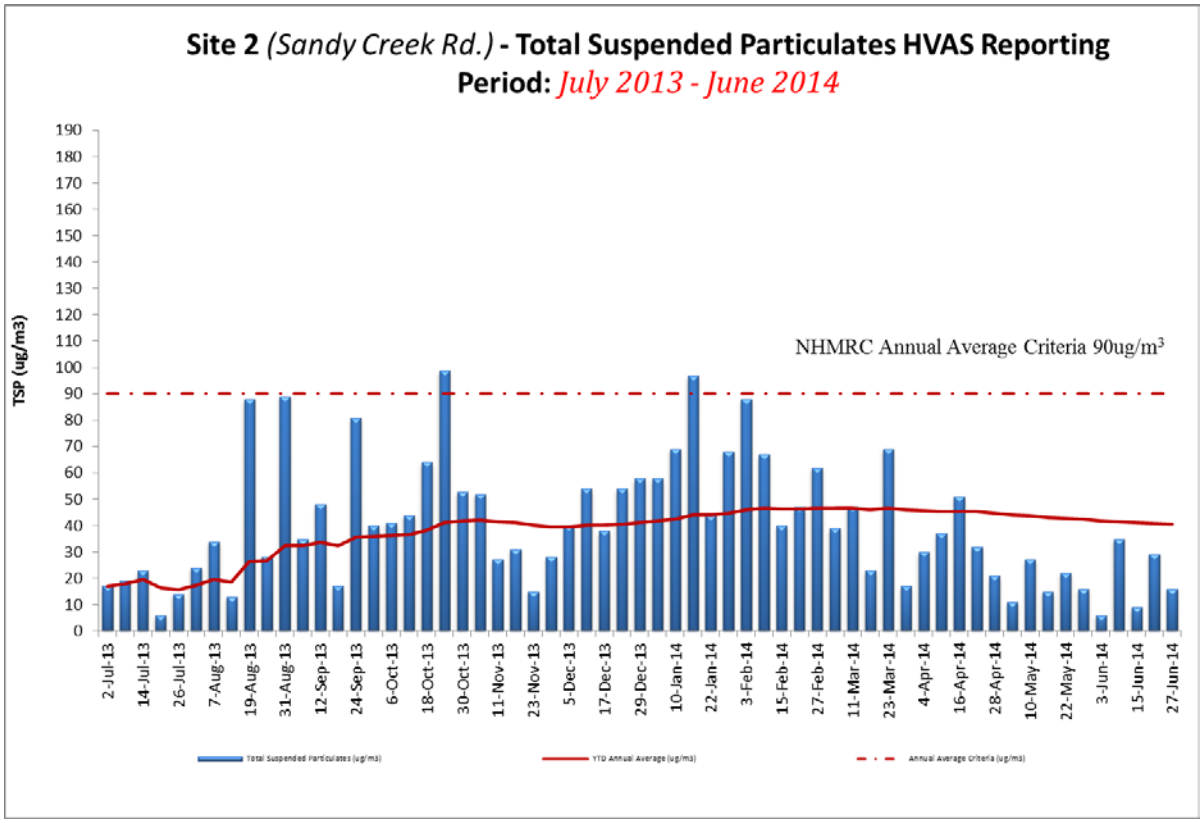


Figure 28 - SITE 2 TSP MONITORING RESULTS

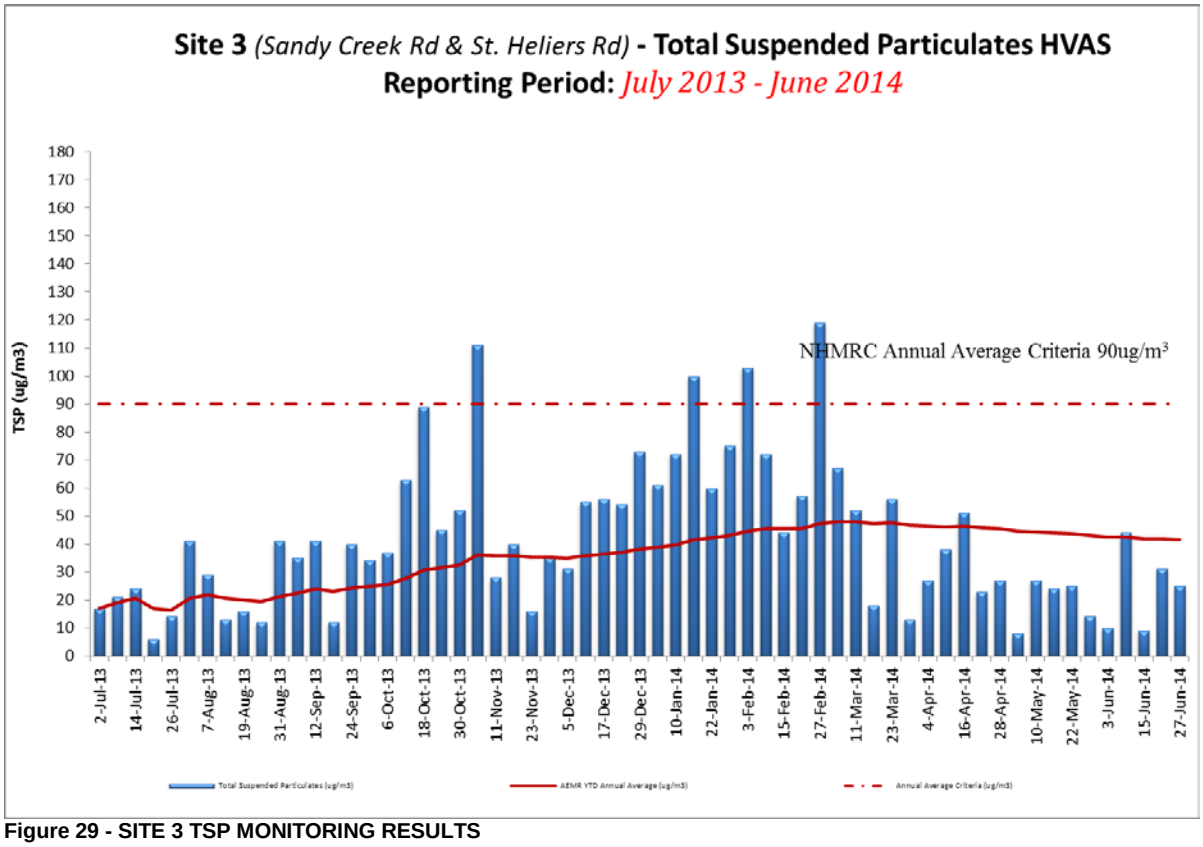


Figure 29 - SITE 3 TSP MONITORING RESULTS

3.1.14 Fine Particulate (PM_{10}) Monitoring Results

3.1.14.1 TEOM

Particulate matter less than 10µg mean aerodynamic diameter (PM_{10}) was continuously monitored utilising two Tapered Element Oscillating Microbalances (TEOM) and one Beta Attenuation Mass (BAM) monitor. PM_{10} data collected by the TEOMs and BAM was transmitted by telemetry to the on-site RTEMS.

3.1.14.2 Data Recovery and Results Discussion

The TEOMs and the BAM are continuous electronic monitoring systems that are subject to equipment faults, communication losses, power outages and maintenance time. High data recovery is considered essential and data recovery levels obtained in 2013-2014 were 96%.

Annual average PM_{10} results for the reporting period were below the Development Consent and EPA short term 24-hour average criteria of 50 µg/m^2 maximum at all sites. The long term 24-hour annual average PM_{10} did not exceed the 30 µg/m^2 Long Term EPA Criteria. **Table 13** displays the average PM_{10} value at each site during the reporting period.

Table 12 - TEOM PM_{10} AVERAGES - 1 JULY 2013 TO 30 JUNE 2014

Site Number	*Annual Average PM_{10} Concentration ($\mu g/m^3$)*	*Development Consent & EPA Long Term 24-hour Annual Average Criteria ($\mu g/m^3$)*	*Data Recovery %*
1	17.3	30	100
2	18.3	30	93
3	16.7	30	94
Average (all sites)**:**	17.4		96

A display of the 24-hour average PM_{10} results for each site during the reporting period is shown in **Figures 30-33**. A table of comprehensive PM_{10} results is provided in **Appendix 2**.

There was no exceedance of the EPA short term 24-hour average PM_{10} criteria of 50 $\mu g/m^3$ or the long term criteria of 30 $\mu g/m^3$ at Site 1, the Queen Street monitoring site. Due to stockpiling of earthworks next to the monitoring unit at Site 2, located in the Sandy Creek area, PM_{10} dust levels were impacted between August and September 2014. At Site 3, crushing activities from the quarry, directly adjacent to monitoring station, also resulted in elevated dust levels during the reporting period. The higher particulate levels in these areas were not caused by mining activities.

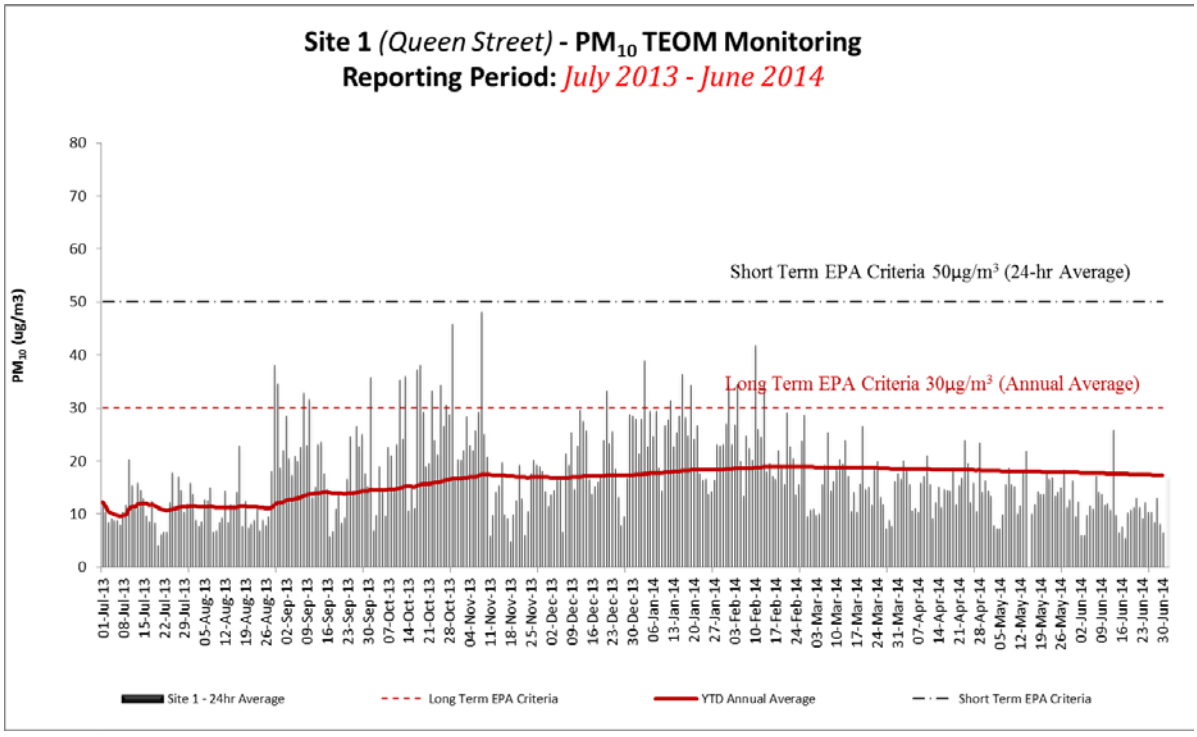


Figure 30 - SITE 1 TEOM PM_{10} MONITORING RESULTS

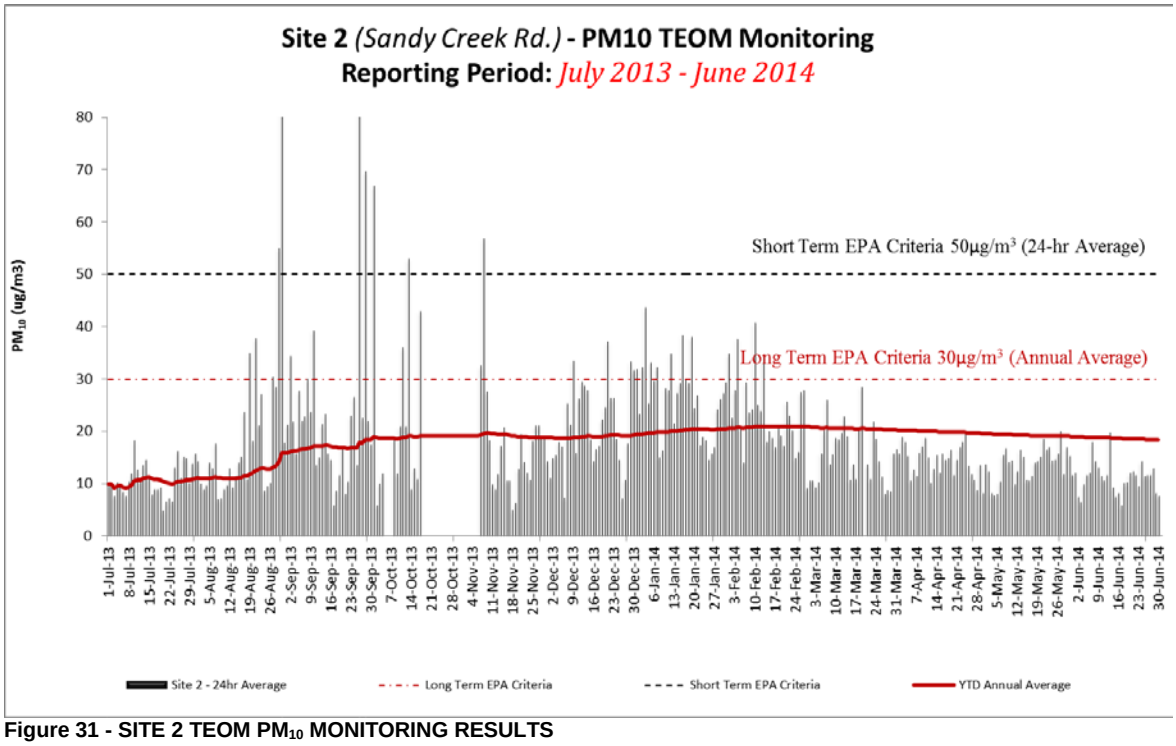


Figure 31 - SITE 2 TEOM PM_{10} MONITORING RESULTS

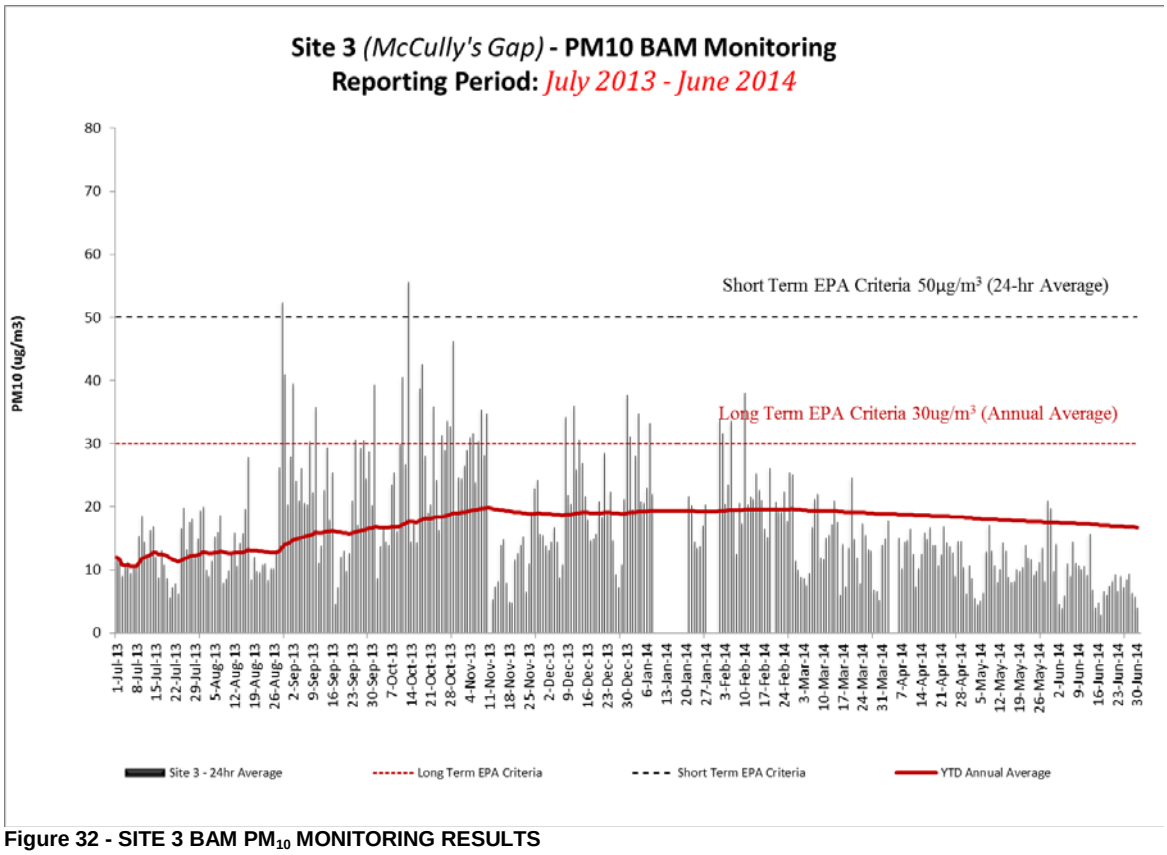


Figure 32 - SITE 3 BAM PM_{10} MONITORING RESULTS

3.1.14.3 Nisbet PM_{10} HVAS

The Nisbet PM_{10} HVAS is not a compliance monitor required by the Development Consent or EPL but is operated for additional site dust management data. The annual average PM_{10} HVAS recorded over the reporting period was 16.7µg/m3. Results are displayed in **Figure 30**

and **Table 14** and show the recorded average is well below the EPA maximum annual average of 30µg/m^3. The location of the 'Nisbet' monitor is indicated on **Figure 8**.

Table 13 - PM_{10} HVAS AVERAGE - 1 JULY 2013 to 30 JUNE 2014

Site	*Annual Average PM_{10} Concentration (µg/m^3)**	*Development Consent & OEH Annual Average Criteria (µg/m^3)*	*Data Recovery %*
Nisbet	16.7	30	100

Notes: *Results are total contribution from all sources.

The annual average PM_{10} is below the predicted impact level of 21.6 µg/m^3 provided in the EIS for years 4-9 of the project.

Please note that this monitor only operates on a 6-day schedule which may explain why the annual average was slightly lower at this site compared to the MCC continuous PM_{10} monitoring sites.

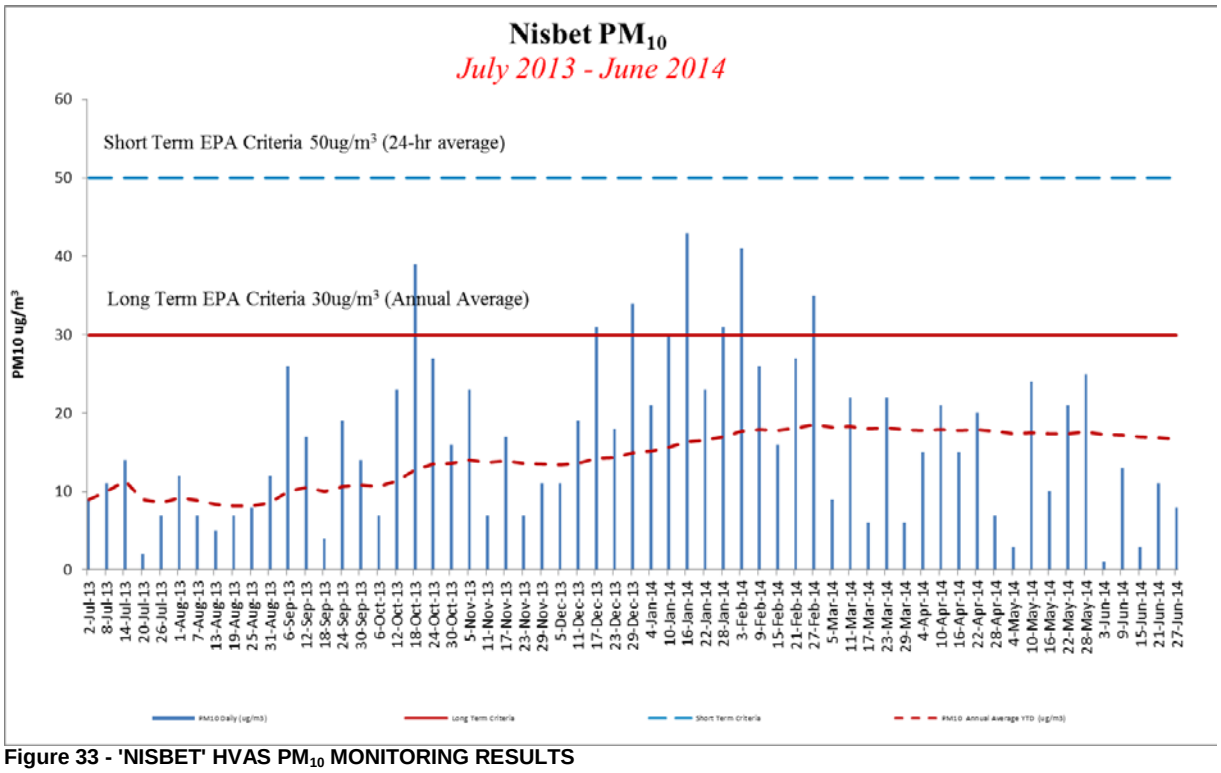


Figure 33 - 'NISBET' HVAS PM_{10} MONITORING RESULTS

There was no exceedence of the 24-hour short term 50 µg/m^3 or the annual average 30 µg/m^{3}criteria at this site.

3.2 Erosion and Sediment Control

The main objective of Erosion and Sediment Control Plan (ESCP) is to prevent the erosion of soil from the site and its transport downstream resulting in sedimentation of watercourses. This is achieved through the implementation of the following strategies:

- Separating clean water runoff produced by undisturbed catchments from dirty and contaminated runoff from disturbed catchments;
- Reducing water runoff velocity;
- Controlling flow volume and path;
- Constructing sediment control dams at the base of rehabilitated emplacement areas and rehabilitated disturbed areas to improve quality of discharged water; and
- Implementing control structures that promote stable landforms.

There are two main natural catchments in the area of mining, associated with Muscle Creek and Sandy Creek. The No.1 Open Cut Extension area contains undisturbed land surfaces that drain towards Sandy Creek; however, some of the runoff is captured by dams. Water from undisturbed catchments in the No.1 Open Cut Extension area is diverted around mining operations by diversion banks and channeled into adjacent watercourses.

Drainage from mine infrastructure areas, including the coal crushing plant and stockpile area, is collected in a dam and is re-used around the mine site for dust suppression. All disturbed or newly rehabilitated areas contain diversion banks (major and minor graded banks) to control the flow of water from catchment areas and to contain dirty runoff on the mine site.

Runoff from disturbed or newly rehabilitated areas is directed to sediment control dams, constructed at the base of spoil emplacement areas, or along graded banks as appropriate. Sediment control dams are regularly cleaned out to maintain maximum volume and ensure efficient settlement of solids from stormwater.

Sediment mobilisation and erosion is minimised by the incorporation of the following controls:

- The installation of erosion and sediment controls, if required, prior to disturbance of any land;
- The restriction of the extent of disturbance to the minimum that is practical and in accordance with the MOP;
- The progressive rehabilitation of disturbed land and the construction of drainage controls to improve the stability of rehabilitated land;
- The protection of natural drainage lines and watercourses by the construction of erosion control devices such as diversion banks and channels and sediment retention dams as necessary;
- The restriction of access to rehabilitated areas;
- Management of erosion and sediment control of affected surface watercourses/water bodies, including creek lines within or adjacent to the DA area; and
- Regular inspection of dams to monitor their efficiency and any required maintenance.

Re-vegetation of pasture areas, tree plots and tree corridors in the East Emplacement rehabilitation area is preforming well. The rock-lined waterways and the sediment dams are also operating effectively.

3.3 Surface Water Management

3.3.1 Surface Water Monitoring

MCC has been monitoring the quality of surface water for many years. The surface water monitoring program includes the following in accordance with the Surface and Groundwater Monitoring Plan (SGMP).

- Monthly monitoring of mine site storage dams (Dam 1, Final Settling Pond, and the No.1 and No.2 Open Cut voids) for pH, Electrical Conductivity (EC) and Total Suspended Solids (TSS);
- Quarterly monitoring of MCC 7, MCC8, MCC9, MCC23, MCC24, MCC25, MCC26 and MCC27 for pH, EC and TSS;
- Comprehensive water quality analysis is conducted annually at these sites and results can be found in **Appendix 3;** and
- All analytical testing conducted as per the SGMP.

Refer to **Figures 34-35** for the location of surface water monitoring sites. Site descriptions are provided in **Table 15**.

Table 14 – SURFACE WATER MONITORING LOCATIONS AND DESCRIPTIONS

Site Reference	Description of Structure	Classification of Structure
Dam 1	Dam 1 – overflows to Dam 2	Restricted Catchment – Mine Water Recirculation Dam
Dam 2	Dam 2	Restricted Catchment – Mine Water Recirculation Dam
No.1 OC Void	In Pit Catchment	Groundwater Management
No.2 OC Void	In Pit Sump	Groundwater Management Structure
MCC7	Muscle Creek Upstream	Surface Water Monitoring
MCC8	Muscle Creek Downstream	Surface Water Monitoring
MCC9	Brickworks Dam 1	Sediment and Erosion Control Dam
MCC12	Final Settling Pond	Sediment and Erosion Control Dam
MCC23	East Emplacement Dam South	Sediment and Erosion Control Dam
MCC24	East Haul Road Dam	Sediment and Erosion Control Dam
MCC25	East Emplacement Dam North	Sediment and Erosion Control Dam
MCC26	Blues Crusher Dam	Sediment and Erosion Control Dam
MCC27	Dam 3	Sediment and Erosion Control Dam

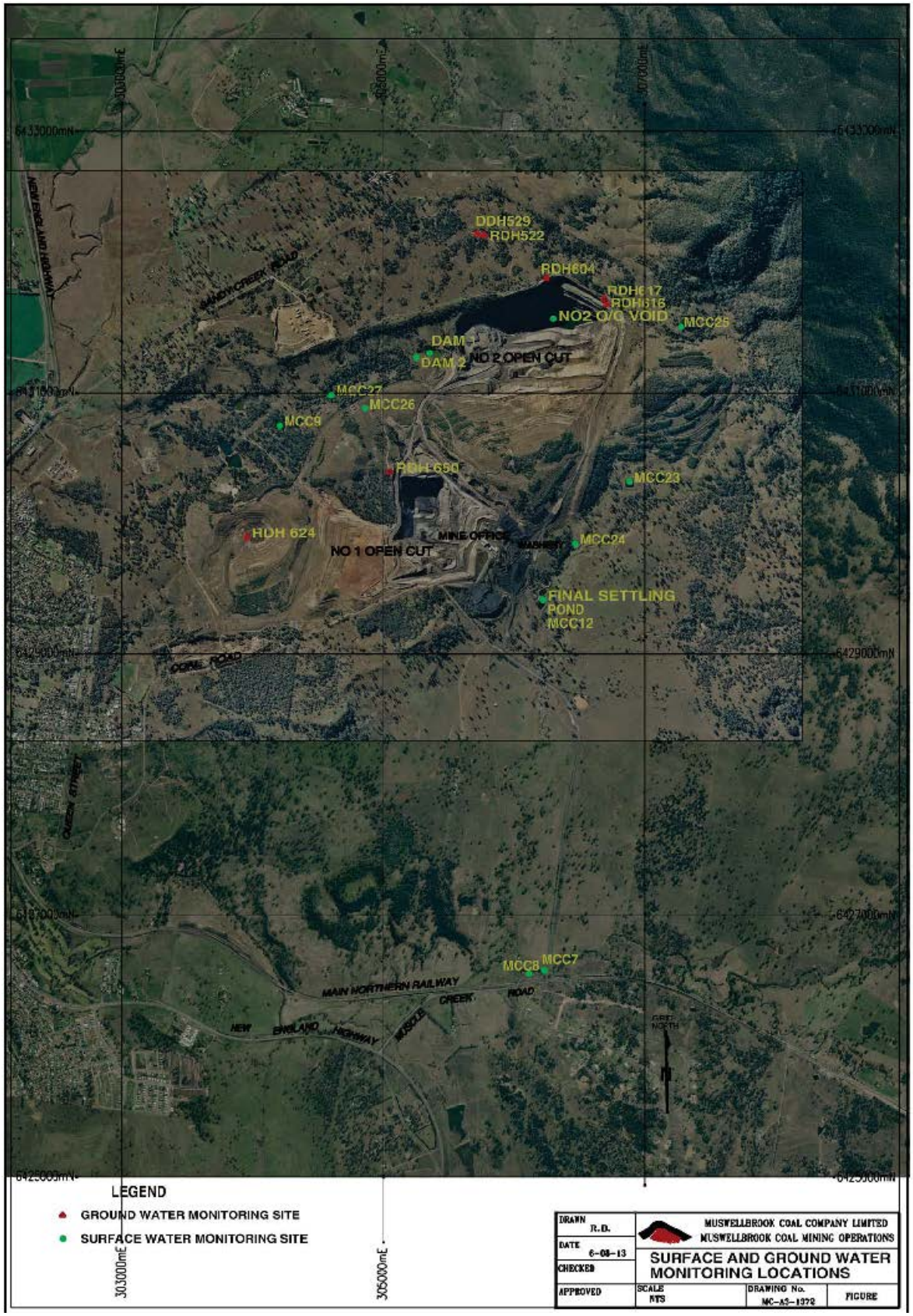


Figure 34 - SURFACE and GROUND WATER MONITORING LOCATIONS

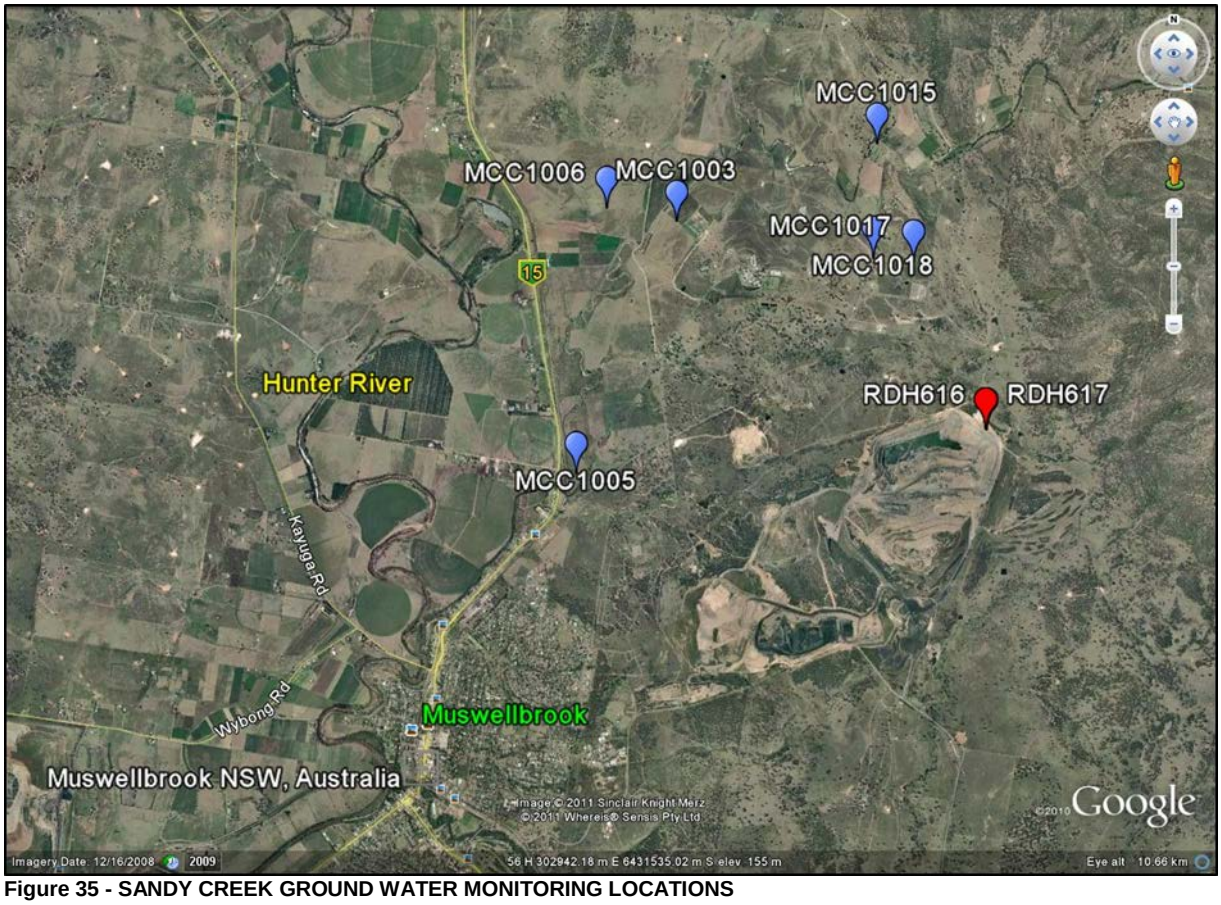


Figure 35 - SANDY CREEK GROUND WATER MONITORING LOCATIONS

3.3.2 Monthly Surface Water Monitoring Results

Annual average pH, EC and TSS results and range are displayed for monthly surface water monitoring sites in **Figures 36-40**. Monthly and annual comprehensive surface water monitoring results are provided in **Appendix 3**. Maximum and minimum values are shown in each chart.

3.3.2.1 pH

The annual average pH levels for monthly surface water monitoring sites (Dam 1, Final Settling Pond, and the No.1 & No.2 Open Cut Voids) were slightly alkaline, ranging from 7.7- 8.3. The minimum and maximum pH levels recorded during the reporting period were 7.2 and 9.0, respectively. The pH levels at monthly monitoring sites were within recommended ecosystem pH levels of 6.5 – 9.5 throughout the reporting period.

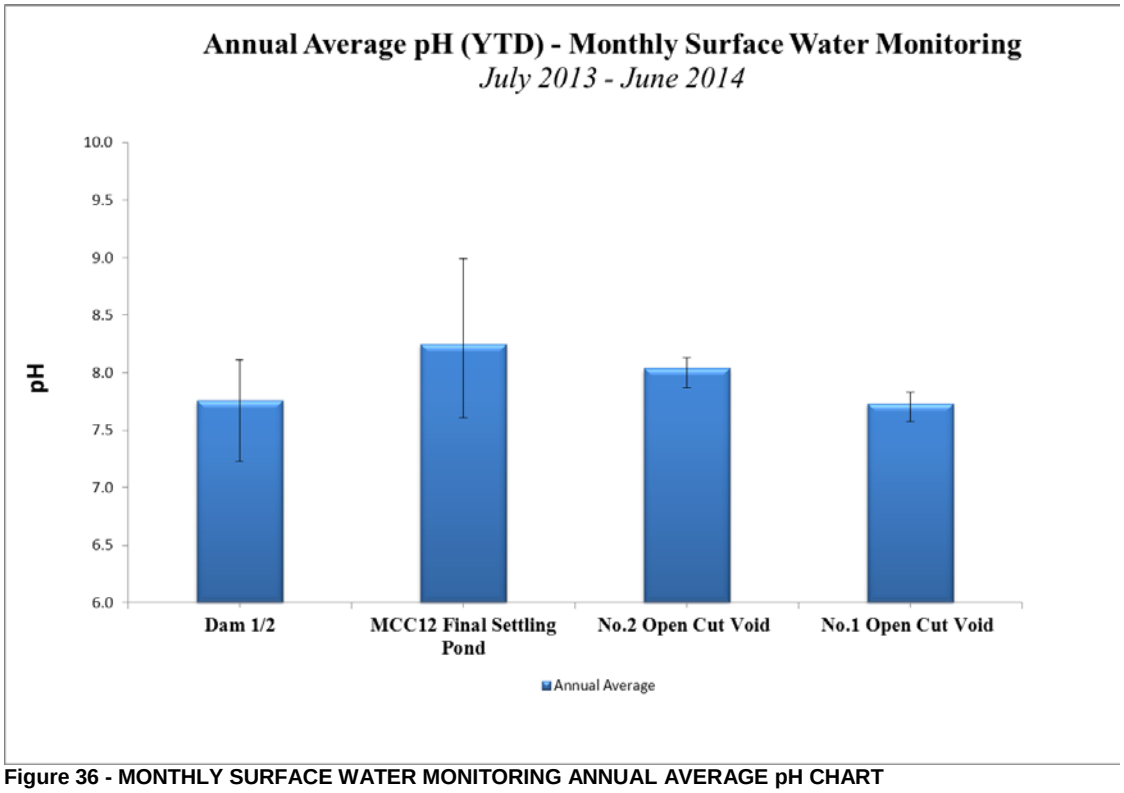


Figure 36 - MONTHLY SURFACE WATER MONITORING ANNUAL AVERAGE pH CHART

3.3.2.2 Electrical Conductivity (EC)

Annual average EC results for monthly surface water monitoring sites (Dam 1, Final Settling Pond, and No.1 & No.2 Open Cut Voids) ranged from 5533 µS/cm to 8359 µS/cm. Across all four monitoring sites, the minimum and maximum EC levels recorded during the reporting period were 3060 µS/cm and 14,400 µS/cm, respectively. Typically, EC levels for mine water are greater than 4000 µS/cm, similar to previous results.

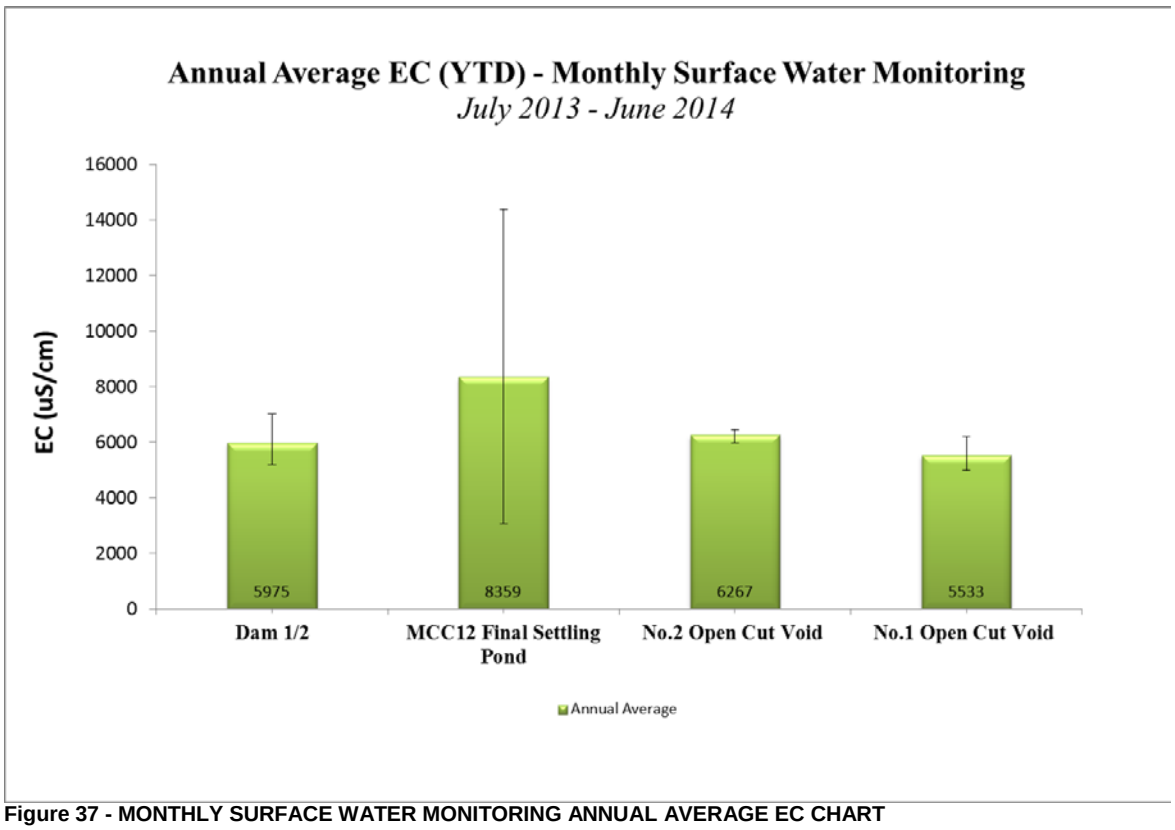


Figure 37 - MONTHLY SURFACE WATER MONITORING ANNUAL AVERAGE EC CHART

3.3.2.3 Total Suspended Solids (TSS)

Annual average TSS results for monthly surface water monitoring sites (Dam 1, Final Settling Pond, and No. 1 & No.2 Open Cut Voids) ranged from 13 mg/L to 22 mg/L. The minimum and maximum TSS levels recorded during the reporting period were 5 mg/L and 53 mg/L. TSS results were below 30 mg/L for approximately 86% of the monitoring period.

The Final Settling Pond can receive water of high suspended solids however, water is pumped back to mine water storage areas by a permanent electric pump. This water is used for dust suppression. The No.1 and No.2 Open Cut Voids collect run-off from un-rehabilitated spoil and can show high TSS levels. The No.1 OC Void also intercepts ground water from the underground storage. The Open Cut Void water is used for spontaneous combustion suppression and recirculated around the open cut which can lead to high TSS values. This water is not released off-site.

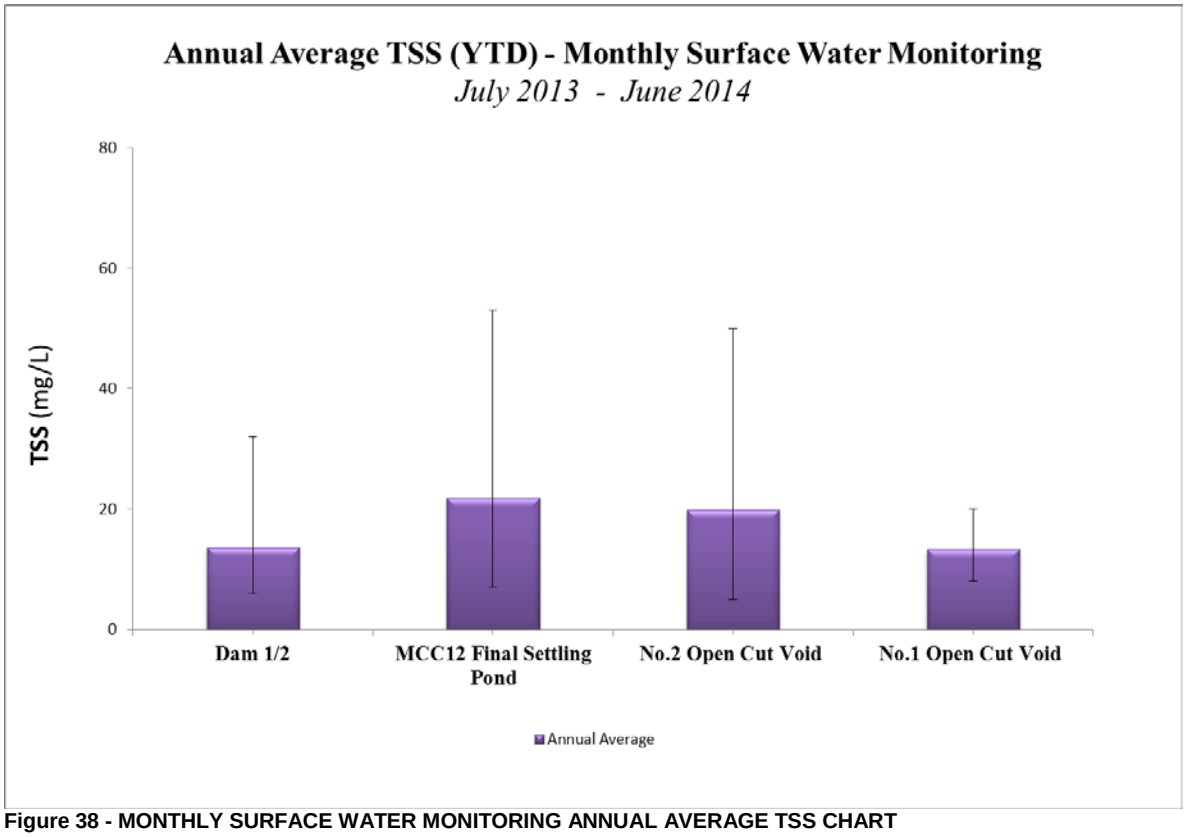


Figure 38 - MONTHLY SURFACE WATER MONITORING ANNUAL AVERAGE TSS CHART

3.3.3 Quarterly Surface Water Monitoring Results

Annual average pH, EC and TSS results and ranges are displayed for quarterly surface water monitoring sites in **Figures 39-41**. Details of sampling results are provided in **Appendix 3**. Refer to **Figure 35** for the location of the surface water monitoring sites.

3.3.3.1 pH

The annual average pH levels for quarterly surface water monitoring sites (MCC7, MCC8, MCC9, MCC23, MCC24, MCC25, MCC26 and MCC27) were alkaline ranging from 7.5 to 8.7. The minimum and maximum pH levels recorded during the reporting period were 7.5 and 9.1, respectively. Annual average pH levels at quarterly monitoring sites were within recommended ecosystem pH levels of 6.5 – 9.5, throughout most of the reporting period.

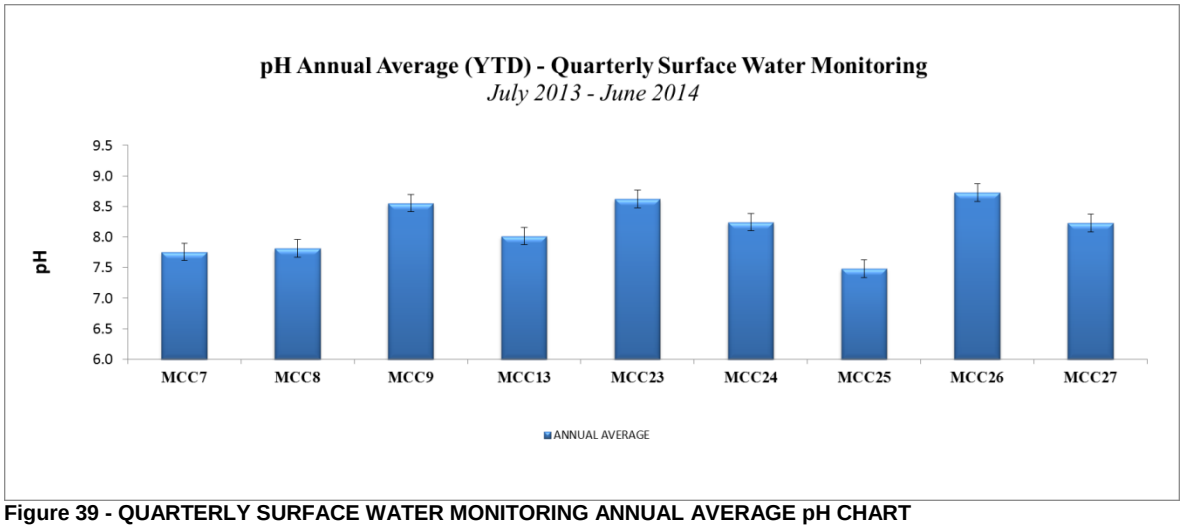


Figure 39 - QUARTERLY SURFACE WATER MONITORING ANNUAL AVERAGE pH CHART

3.3.3.2 Electrical Conductivity

Annual average electrical conductivity (EC) results for quarterly surface water monitoring sites (MCC7, MCC8, MCC9, MCC23, MCC24, MCC25, MCC26 and MCC27) ranged from 1,740 µS/cm at MCC25, to 9,588 µS/cm at MCC27. The minimum and maximum EC levels recorded during the reporting period were 1,100 µS/cm at MCC23 and 10,600 µS/cm at MCC27, respectively.

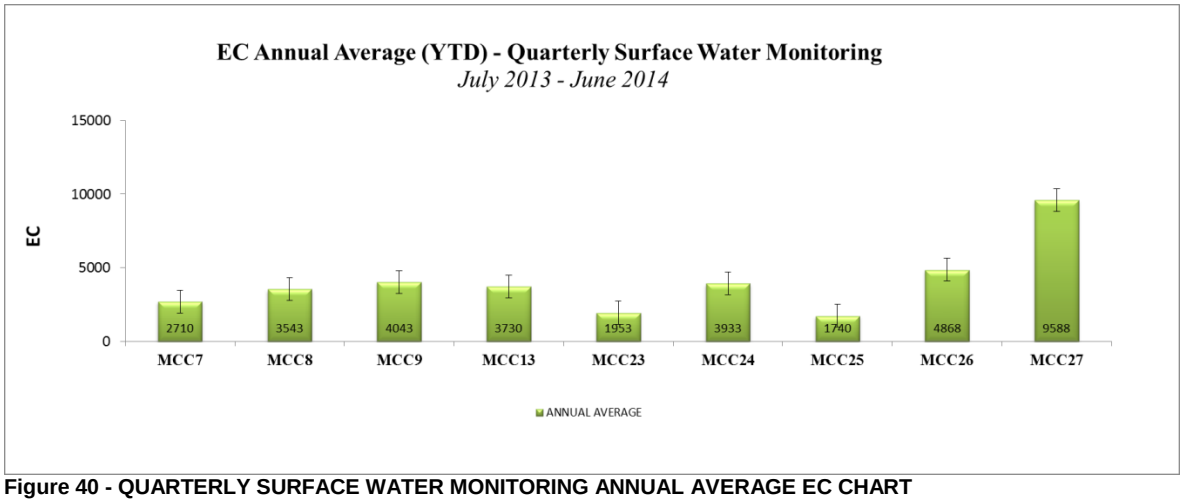


Figure 40 - QUARTERLY SURFACE WATER MONITORING ANNUAL AVERAGE EC CHART

3.3.3.3 Total Suspended Solids (TSS)

Annual average TSS results for quarterly surface water monitoring sites (MCC7, MCC8, MCC9, MCC23, MCC24, MCC25, MCC26 and MCC27) ranged from 9.3 mg/L to 20.3 mg/L. The minimum and maximum TSS recorded during the reporting period were 5 mg/L and 55 mg/L, respectively. TSS for all quarterly monitoring sites was well below the recommended guidelines of less than 120 mg/L for ecosystems and undisturbed surface water.

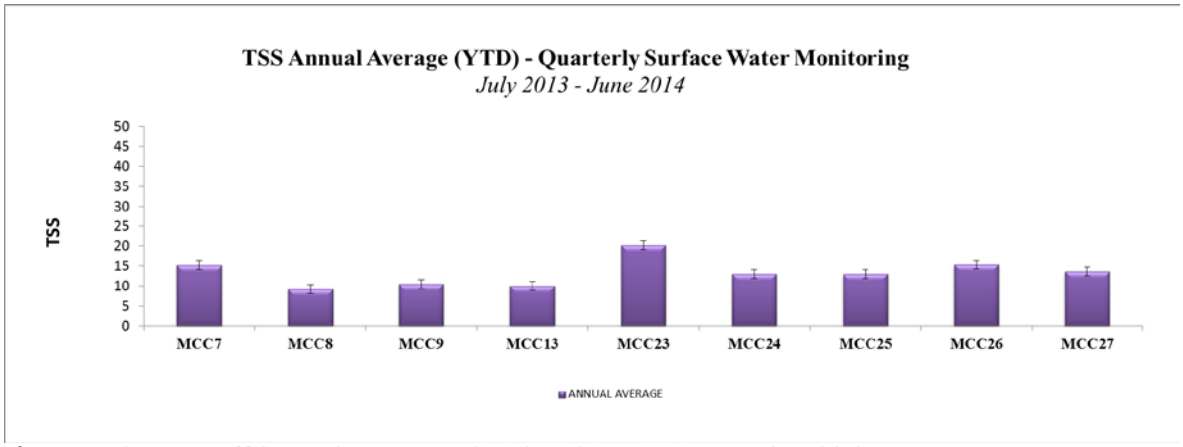


Figure 41 - QUARTERLY SURFACE WATER MONITORING ANNUAL AVERAGE TSS CHART

3.4 Ground Water Management

The coal seams are the main aquifers in the coal measure strata. The No.1 Open Cut Extension mines through strata and ground water regimes already disturbed by mining. The disused underground mine workings constitute the major source of ground water in this area. The No.1 Open Cut Extension extracts remnant coal from the Muswellbrook No.2 and St Heliers Colliery underground workings.

Mining will lower the water levels in the Greta Coal Measures to the base of the Loder Seam over a small area.

Historically, as detailed in the 2002 EIS, ground water quality parameters (pH and EC) within the No.1 Open Cut Extension area were determined through the analysis of samples from 12 wells which intersect un-worked Greta Coal Measures. Mean EC was 5,535 µS/cm and mean pH was 7.6. The water is not suitable for potable uses or irrigation, and is generally only potentially useful for stock consumption and therefore is considered an unproductive ground water resource.

Mining the No.1 Open Cut Extension should improve the ground water regime in the area, because a large portion of mined workings will be removed and replaced with spoil. This will create a better environment for ground water recovery and may improve ground water quality in the long term.

The approved Site Water Management Plan (SWMP) continued to apply to the MCC mine site during the reporting period 2013-2014.

3.4.1 Ground Water Monitoring

The ground water monitoring program is based on two bores intersecting the Muswellbrook No.2 Underground workings (Bore RDH529 or RDH650 – Lewis Seam) and St Heliers Colliery workings (Bore RDH615 – Loder Seam). During the 2011-2012 reporting period, the monitoring of RDH615 ceased due to mining operations moving through the area of the bore. The ground water monitoring program is conducted on a monthly basis, measuring:

- Ground water level;
- pH; and
- EC.

Refer to **Figures 34-35** for the location of ground water monitoring sites. Site descriptions are provided in **Table 16**.

An annual comprehensive water quality analysis is normally undertaken during the month of March. Sampling was taken from bore RDH650 and lab results can be found in **Appendix 3**.

Table 15 - GROUND WATER MONITORING LOCATIONS AND DESCRIPTIONS

Site Reference	Description of Structure	Classification of Structure
DDH 529	Ground Water Bore	Small Borehole pump, Intersects St. Heliers Seam, 202 Panel No.2 Underground
RDH522	Ground Water Bore	Intersects the St. Helier's seam in the No.2 Underground
DDH 604	Ground Water Bore	Cut 17 Highwall
DDH 607	Ground Water Bore	Large Borehole Pump, Intersects St Heliers Seam, No.2 Underground Mine
RDH650	Ground Water Bore	Intersects Lower Lewis Seam at North No.2 Undergrouond
RDH 615	Water Monitoring Piezo	Natural ground surface to Loder Seam
MCC1003	Ground Water well	Alluvial Aquifer - Sandy Creek
MCC1005	Ground Water well	Alluvial Aquifer - Sandy Creek
MCC1006	Ground Water well	Alluvial Aquifer - Sandy Creek
MCC1015	Ground Water well	Alluvial Aquifer - Sandy Creek
MCC1017	Ground Water bore	Hard Rock Aquifer - Sandy Creek
MCC1018	Ground Water well	Hard Rock Aquifer - Sandy Creek
RDH616	Ground Water bore	Hard Rock Aquifer - Sandy Creek
RDH617	Ground Water bore	Hard Rock Aquifer - Sandy Creek

3.4.2 Ground Water Monitoring Results

Historical ground water results are provided in **Appendix 3**. Relative level, pH and Electrical Conductivity sampling results for Borehole RDH529/RDH650 are shown in **Figures 42-43**.

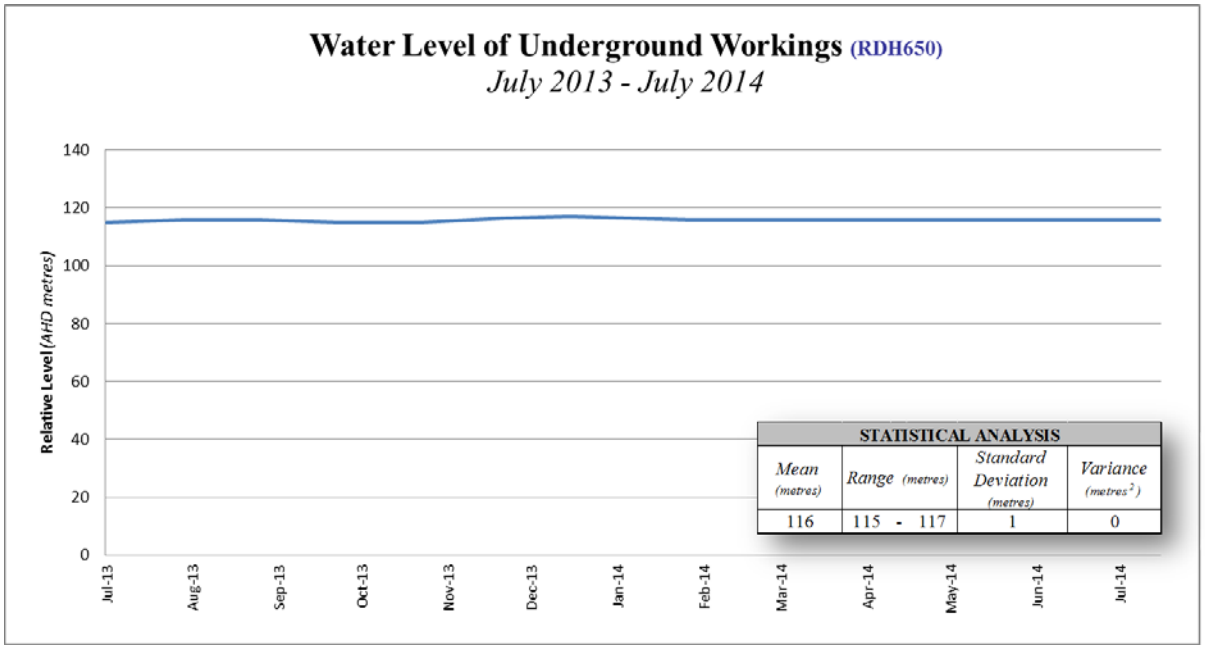


Figure 42 - RELATIVE LEVEL FOR UNDERGROUND WORKINGS (Lewis Seam RDH650)

A ground water contour plot could not be generated due to insufficient data across the open cut site however a catenary transect plot from the open cut to the Sandy Creek alluvial monitoring bores is provided in Section 3.4.2.1.

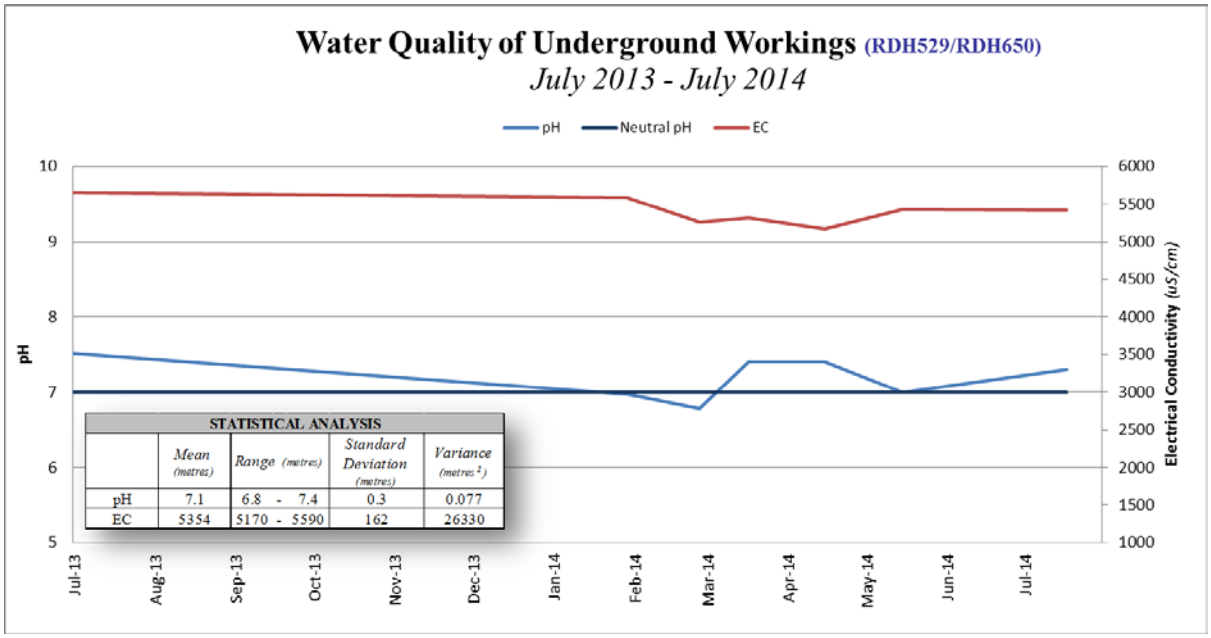


Figure 43 - WATER QUALITY FOR DDH529 (Lewis Seam)

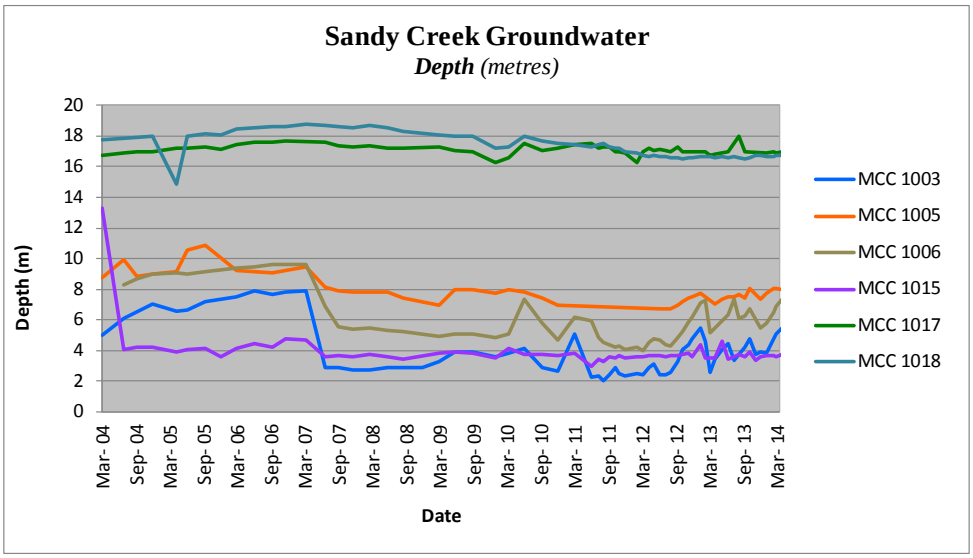
As shown in **Table 17**, historical ground water quality results, as presented in the 2002 EIS, were compared against the results obtained in this and the previous AEMR periods. Ground water levels (Lewis seam) and water quality on average, including 2013-2014, are similar to the historical results reported in the 2002 EIS.

Table 16 - GROUND WATER MONITORING PROGRAM

RDH 522	Average pH	Average EC *(µs/cm)*	*EC Range* µs/cm	Relative Level (RL) *(AHD metres)*
2002 EIS- Historical	7.6	5535		154
2007-2008 AEMR	7.4	4881	*4510-5710*	108-127
2008-2009 AEMR	7.1	4811	*4540-5000*	131-153
2009-2010 AEMR	6.8	4960	*4350-5950*	148-158
2010-2011 AEMR	7.2	5119	*3590-5930*	147-154
2011-2012 AEMR	7.6	5245	*4720-5530*	135-147
2012-2013 AEMR	7.6	5711	*5590-5885*	123-146
2013-2014 AEMR	7.1	5078	*3730-5920*	115-117

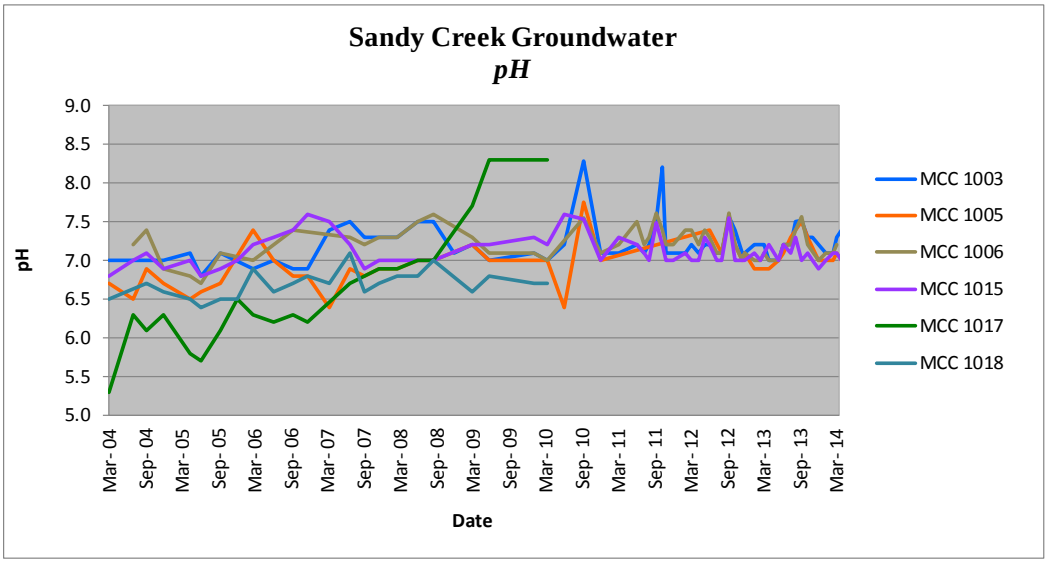
3.4.2.1 Ground Water Monitoring Results – Sandy Creek Area

The alluvial and hard rock aquifers in the Sandy Creek area are a significant lateral distance from the open cut footprint and no impacts have been determined. However, after consultation with the NSW Office of Water, the Site Water Management Plan was revised in June 2011 to incorporate a monitoring and trigger response plan. Ground water depths and quality results are presented in **Figures 44-46** and trigger levels in **Table 18**.



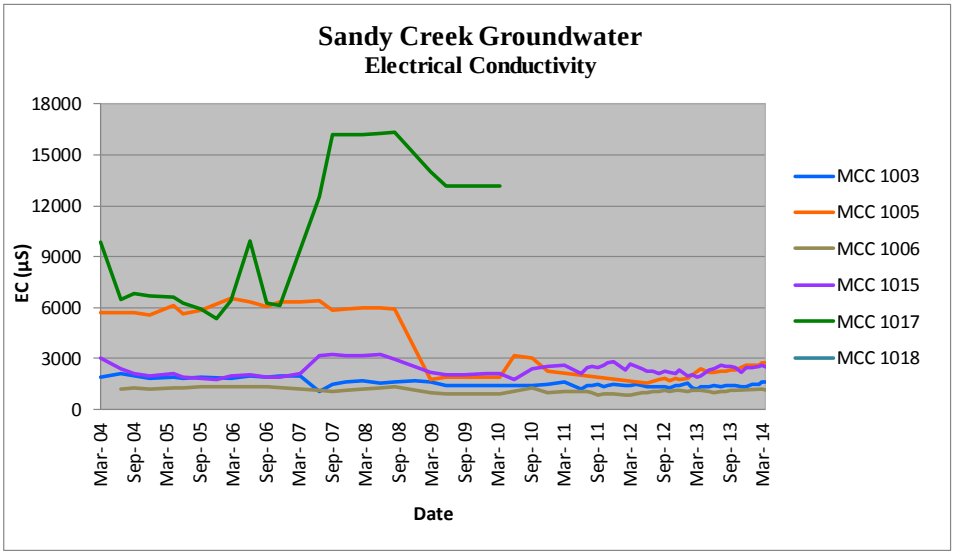
STATISTICAL ANALYSIS - *Depth*						
	Mean (metres)	*Range (metres)*			*Standard Deviation (metres)*	*Variance (metres)*
MCC 1003	4.5	3.3	-	5.7	0.8	0.7
MCC 1005	7.8	7.3	-	8.1	0.3	0.1
MCC 1006	6.5	5.4	-	7.4	0.7	0.4
MCC 1015	3.6	3.4	-	3.9	0.1	0.0
MCC 1017	17.1	16.9	-	18.0	0.4	0.1
MCC 1018	16.7	16.5	-	16.8	0.1	0.0

Figure 44 - SANDY CREEK GROUND WATER DEPTH (metres) HISTORY



STATISTICAL ANALYSIS - *pH*						
	Mean	*Range*			*Standard Deviation*	*Variance*
MCC 1003	7.3	7.1	-	7.5	0.1	0.0
MCC 1005	7.2	7.0	-	7.5	0.2	0.0
MCC 1006	7.2	7.0	-	7.6	0.2	0.0
MCC 1015	7.1	6.9	-	7.3	0.1	0.0

Figure 45 - SANDY CREEK GROUND WATER QUALITY HISTORY (pH)



STATISTICAL ANALYSIS - EC						
	Mean (µS)	*Range (µS)*			*Standard Deviation (µS)*	*Variance (µS)*
MCC 1003	1480	1315	-	1687	133.8	17915
MCC 1005	2544	2270	-	2770	199.9	39965.5
MCC 1006	1117	1062	-	1218	51.3	2632
MCC 1015	2452	2160	-	2600	137.9	19015

Figure 46 - SANDY CREEK GROUND WATER QUALITY HISTORY (Electrical Conductivity - EC)

Table 17 - SANDY CREEK GROUND WATER MONITORING TRIGGER LEVELS

WATER LEVELS

Bore/Well	Aquifer	Historical Water Level Range (m)TOC			Lower Trigger Level (m)TOC	Upper Trigger Level (m)TOC
MCC1003	Alluvial	2.3	-	7.9	2.17	8.34
MCC1005	Alluvial	6.6	-	10.9	6.27	11.46
MCC1006	Alluvial	4.2	-	9.7	4.00	10.14
MCC1015	Alluvial	3.4	-	13.3	3.27	13.97
MCC1017	Hardrock	15.5	-	17.7	14.71	18.53
MCC1018	Hardrock	14.8	-	18.8	14.10	19.69

TOC = Top of case reference point.

pH

Bore/Well	Aquifer	Historical pH			Lower Trigger pH	Upper Trigger pH
MCC1003	Alluvial	6.8	-	8.3	6.3	8.8
MCC1005	Alluvial	6.4	-	7.8	5.9	8.3
MCC1006	Alluvial	6.7	-	7.6	6.2	8.1
MCC1015	Alluvial	6.8	-	7.6	6.3	8.1

EC

Bore/Well	Aquifer	Historical EC			Lower Trigger EC	Upper Trigger EC
MCC1003	Alluvial	1030	-	2140	876	2461
MCC1005	Alluvial	1780	-	6550	1513	7533
MCC1006	Alluvial	900	-	1400	765	1610
MCC1015	Alluvial	1758	-	3240	1494	3726

The trigger levels are initiated if monitored conditions are outside the upper or lower trigger levels for 3 continuous monthly results. There were no exceedances of the water level or quality triggers in this reporting period.

A sectional plan depicting the location of the monitoring sites in the Sandy Creek area is shown in **Figure 47**. To assist in determining if any reversal in ground water gradient or other consequences to de-pressurisation in the ground water is occurring, a catenary transect has been developed and is presented in **Figure 48**. The transect graph clearly indicates there has been no sign of a draw-down effect in the Sandy Creek area during the reporting period. June level for bore MCC1006 was un-obtainable and not included in chart.

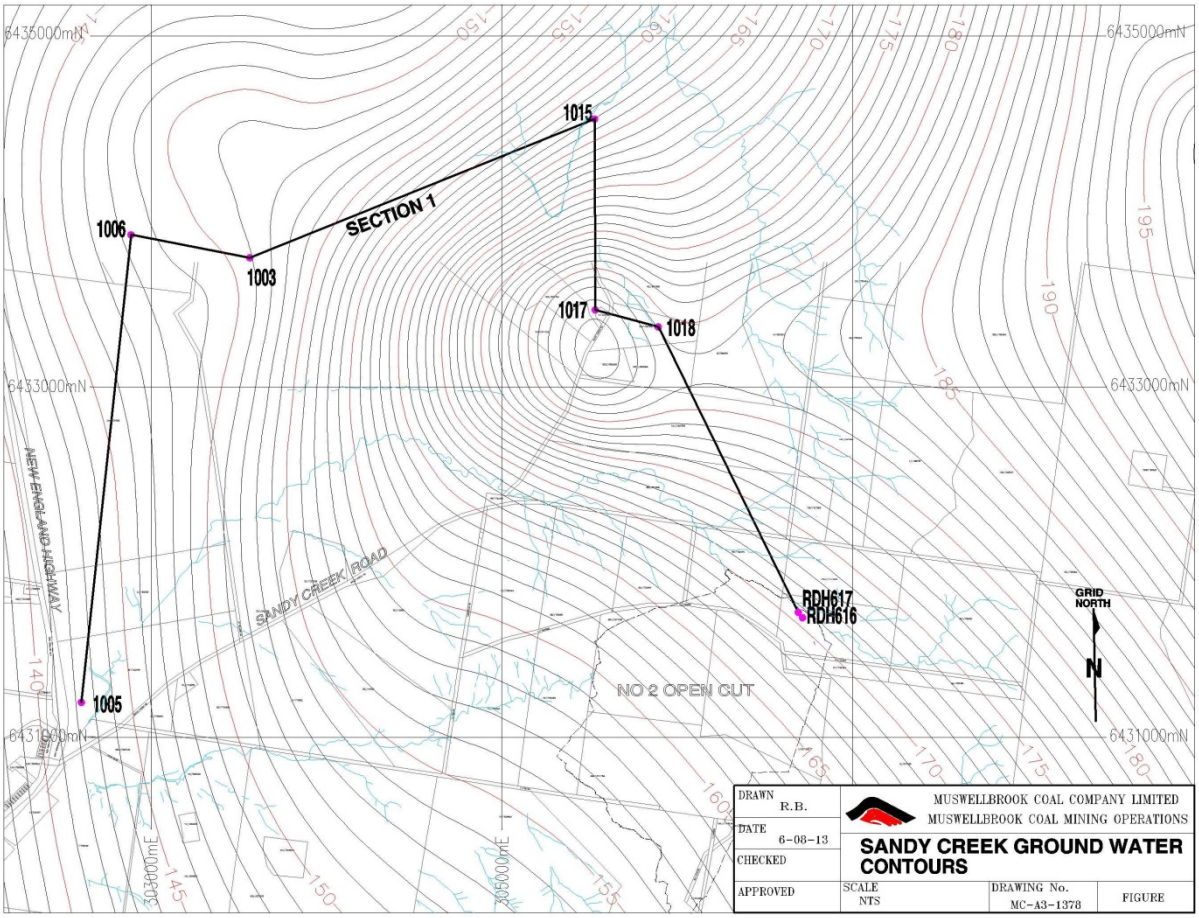


Figure 47 - SANDY CREEK GROUND WATER MONITORING NETWORK, SECTIONAL PLAN

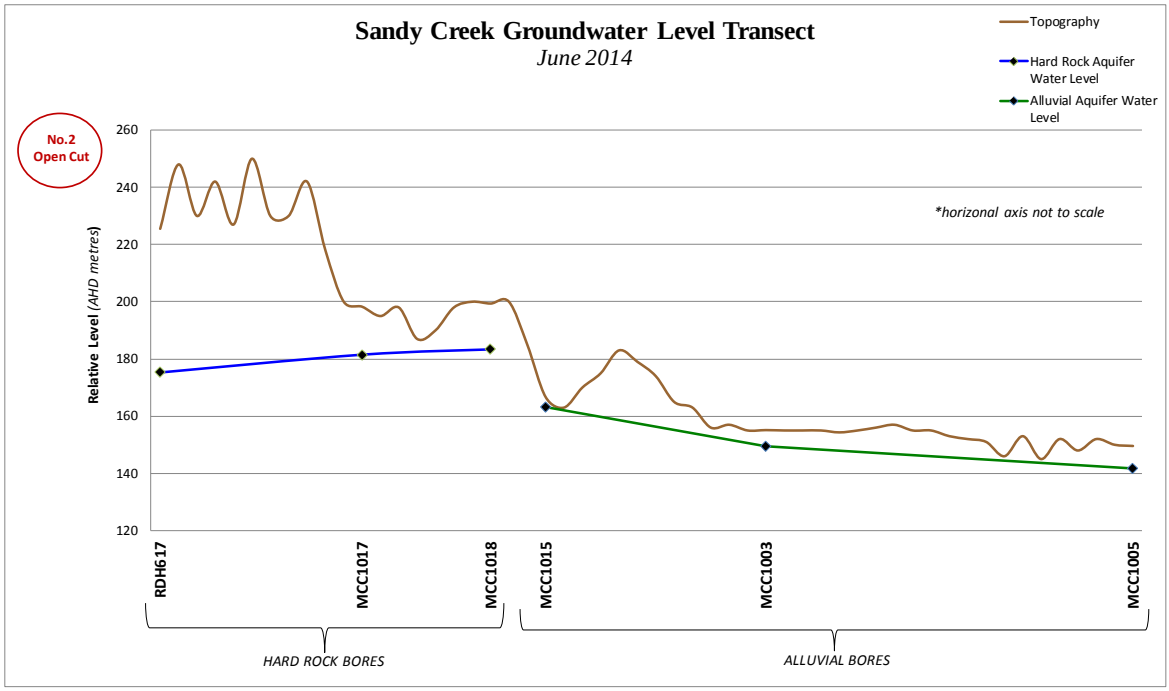


Figure 48 - SANDY CREEK GROUND WATER LEVEL CATENARY TRANSECT FOR 2013-2014

There appears to be no connection between the alluvial and hard rock aquifer.

3.4.3 Ground Water Extraction

MCC holds four licences to extract ground water under Part 5 of the Water Act 1912. The following volumes of groundwater were extracted in this reporting period.

Licence No.	2013-2014 Extraction Volume *(ML)*	Extraction Entitlement *(ML per Annum Limit)*
20BL169014 (borehole RDH529)	31	1,000
20BL169037 (No.1 O/C Void)	563	2,000
20BL169038 (No.2 O/C Void)	702	2,000
20BL170473 (borehole RDH607)	987	3,000

3.4.4 Water Balance

The calculated water balance for 2013-2014 was prepared and is provided in **Table 19**. The water balance indicates a water deficit for the year but less than the deficit predicted in the EIS for a dry Year 9 of the No.1 Open Cut Extension. The deficit is not considered a major risk to future operations. Sufficient water storage is available in underground workings, site dams and mine voids for future operational requirement.

INPUTS	ML/year	ML/day
Ground Water Seepage	0.0	0.00
Surface Water Runoff	123.0	0.34
Entrainment in Coal	100.5	0.28
Potable Water	3.4	0.01
Underground Workings - Dewatering Bores (pumped to surface storage)	1019.0	2.79
TOTAL	**1246**	**3.41**
OUTPUTS		
Entrainment in Coal	102	0.28
Discharge Off Site	0	0
Dust Suppression - water infusion and sprays (spontaneous combustion)	827	2.26
Dust Suppression - water carts	436	1.19
Evaporation from Dams	126	0.34
Pumped to Council Void	0	0.00
Septic Pump Out	2	0.00
TOTAL	**1492**	**4.08**
2013-2014 Balance		**-0.66**
EIS Prediction for No.1 Open Cut Extension Only - Year 9		**-1.96**

Table 18 - WATER BALANCE 2013-2014

To provide more accurate data in recording volumes of water transferred around the site, MCC has installed flow meters in key areas around the mine site.

3.5 Contaminated Land

Prior to transfer to the new MIA, a contaminated land assessment was undertaken and a report was submitted to DRE on 16 January 2014. A final validation report was completed in April 2014 after all excavations and remediation was done. A copy of this report was provided to DRE on 15 August 2014. The report indicated that there was only minor hydrocarbon staining and contamination of the target area. Although hydrocarbon contamination was found in the area immediately surrounding the targeted area, the results

indicate the site met soil chemical land use criteria for Commercial/Industrial within the National Environmental Protection Measure 1999 (as Revised 2013) (NEPM 2013). A final validation report was completed in April 2014 after all excavations and remediation was completed. A copy of this report was provided to DRE on 15 August 2014.

There are no known areas of contaminated land at Muswellbrook Coal.

3.6 Flora and Fauna Management

The assessment flora and fauna assessment conducted as part of the EIS for the No.1 Open Cut Extension identified existing and potential threatened species. The objectives of the approved Fauna and Flora Management Plan (FFMP) are:

- Comply with the development consent conditions for DA205/2002;
- Define the existing environment, including details of any strategic vegetation;
- Identify any strategic habitat areas on site;
- Outline the strategic mitigation measures to be adopted in the FFMP;
- Detail timeframes for clearing and revegetation activities;
- Establish methods to manage remnant vegetation;
- Establish a process for the approval of clearing activities that recognises sensitive hibernation and breeding periods and incorporates pre-clearance inspections;
- Detail the process to be adopted if any threatened flora and fauna not identified in the EIS are encountered;
- Establish a process for the care of injured animals;
- Define the post-mining landscape;
- Detail how the post-mining flora will be established; and
- Define the measures to protect, monitor and maintain revegetated areas.

The operational controls detailed in the approved FFMP that have been implemented for tree clearing include:

- Restricted clearance of vegetation through areas adjacent to the old Bimbadeen homestead area between March and August due to potential breeding of Grey-Crowned Babbler and Eastern False Pipistrelle;
- Collection and stockpiling of topsoil, vegetation and arboreal habitat features;
- Implementing feral animal, wild dog and weed control programs;
- Assessing kangaroo population and planning a culling program;
- Pre-clearance inspections for threatened species and leaving identified hollow bearing trees for 24 hours after adjacent clearing for fauna escape;
- Stockpiling of selected felled hollow trees for use in revegetation or relocation to areas adjacent to mining; and
- Establishment of roost, den and nest boxes in areas adjacent to mine operations.

The site environmental induction presentation includes a section covering the Flora and Fauna Management Plan and highlights the identification of specific threatened species.

A sample of the booklet that is available to MCC employees and contractors is shown in **Figure 49**.

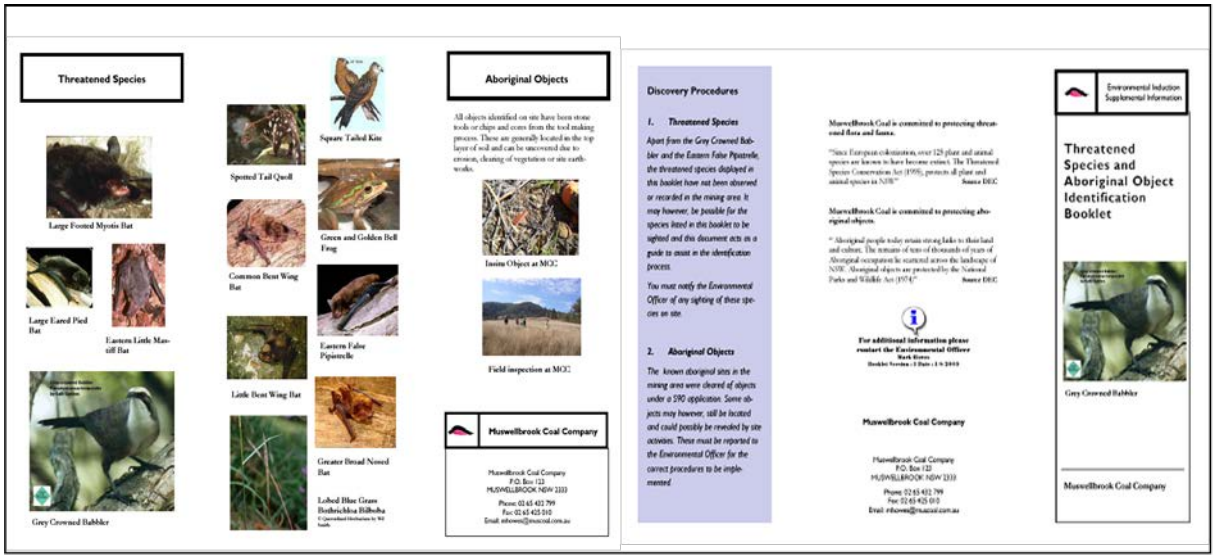


Figure 49 - MCC THREATENED SPECIES AND ABORIGINAL OBJECT IDENTIFICATION BOOKLET

Inspections of nesting boxes were performed every 6 months during the reporting period (28 October 2013 and 22 April 2014). Results are shown below.

Sugar Glider (2) –no signs of sugar glider activity were observed. Both the October and April inspections observed a nest of leaves indicating a possible resident (mouse?), but no occupant was identified.
Bat (4) – not occupied and no signs of activity were observed
Brushtail Possum (2) – one of the two nest boxes had a resident brushtail possum that was observed in the October inspection (**Figure 50**). This was the same nestbox noted in the previous AEMR.

Figure 50 - BRUSHTAIL POSSUM FOUND IN NESTBOX ON 9 APRIL 2013

3.7 Fauna Management for Site Rehabilitation

A cull of Eastern Grey (*Macropus giganteus*) kangaroos commenced during June 2013 and continued through July 2013 on MCC property, primarily around the perimeter of the mine site. This was conducted under the approval of NPWS. MCC made an application under Commercial Harvesting to remove Eastern Greys under the NPWS Scheme. These kangaroos were sent to Macro Meats in Blanford for processing for human consumption.

3.8 Weeds

The Land Management Plan (LMP) contains a section on weed control, and specifies that all noxious weeds will be managed and controlled as per the requirements of the Noxious Weeds Act 1993, in consultation with the Rural Lands Protection Board (RLPB) and the Upper Hunter Weeds Authority, utilising a combination of control strategies.

Weed control and eradication techniques used at MCC include:

- Promotion of vigorous growth of pasture to out-compete weeds;
- Minimisation of area available for weed infestation, through prompt revegetation of bare areas;
- Spraying with selective herbicides; and
- Physical removal by chipping/slashing.

Mother-of-Millions, classified as a noxious weed, was treated by spraying with selective herbicide in areas near and beside Coal Road. Other noxious weeds treated around the mine site included Prickly Pear, African Boxthorn, Noogoora Burr, Blackberry, Sweet Briar and Paterson's Curse. Buffer lands and rehabilitated areas of the mine were also sprayed with selective herbicides for Galenia, Castor Oil Bush and Bathurst Burr. There was a total of approximately 18.5 hectares treated to control noxious weed species around the mine site and adjacent mine owned property. MCC maintains records of all herbicides used on the property in accordance Pesticides Amendment (Records) Regulation, Pesticides Act 1999.

3.9 Blasting

MCC continues its commitment to ensuring that both ground vibration and airblast overpressure continues to comply with the Development Consent and EPA blast criteria. A Blast Information Service Line, phone number 1-800-772-799, is advertised in local newspapers and is updated by 9am, Monday through Friday, when blasting. The recorded message gives information regarding the scheduled blast time, location of the blast (strip), maximum instantaneous charge and expected vibration at Queen Street. The date and time of scheduled blasts are also provided on the "Blasting Notices" page of the Muswellbrook Shire Council Website.

3.9.1 Blast Criteria

MCC Development Consent Conditions for overpressure level and ground vibration are listed below.

The overpressure level from blasting operations on the premises must not:

- Exceed 115dB (Linear Peak) for more than 5% of the total number of blasts over a period of 12 months; and
- Exceed 120dB (Linear Peak) at any time, when measured at any residence or noise sensitive location (such as a school or hospital) that is not owned by the licensee, or subject of a private agreement between the owner of the residence, or noise sensitive location and the licensee as to an alternative overpressure level.

Ground vibration peak particle velocity from the blasting operations at the premises must not:

- Exceed 5mm/s for more than 5% of the total number of blasts over a period of 12 months; and

- Exceed 10mm/s at any time, when measured at any residence or noise sensitive location (such as a school or hospital) that is not owned by the licensee, or subject of a private agreement between the owner of the residence, or noise sensitive location and the licensee as to an alternative overpressure level.

To achieve compliance with blast criteria, MCC aims to design every blast pattern so as not to exceed 2mm/s of ground vibration at the nearest non-mine owned residence, which is 20% of the EPA maximum ground vibration limit of 10mm/s.

If a blast criteria exceedance is confirmed from Muswellbrook Coal operations, EPA and MSC will be notified immediately.

3.9.2 Best Practice Drill and Blast

MCC has adopted best practice drill and blast activities to demonstrate its commitment to blast criteria compliance. The intent of best practice in drill and blast activities is to deliver a high degree of reliability that the actual outcomes of the blast conform to the design outcomes.

Best practice drill and blast activities include:

- A high degree of accuracy in the placement of drill holes to ensure that design spacing and burden is achieved using APS (Automatic Positioning System);
- Use of water when drilling to reduce dust;
- Correct selection of bulk product in wet blast holes to prevent fume;
- Regular inspections to identify any geological abnormalities that may create a path for the premature release of gaseous products from explosive material;
- Loading of the explosive material to ensure that holes are not loaded in excess of the design;
- Proper placement of decking charges if required;
- Effective placement of good quality stemming material to ensure containment of the blast;
- Minimise the sleep time of the blast pattern to minimise the potential for deterioration of the explosive material;
- Take into account any adverse meteorological conditions that may be prevailing at the time of the blast (e.g. winds greater than 5m/s averaged over 10 minutes from the mining operation towards residential areas) and, if possible, defer or modify the blast to accommodate those conditions; and
- Video recording of blasts as a tool to compare actual blast results with predicted outcomes.

3.9.3 Blast Monitoring

All blasts are monitored by four automatically triggered blast monitors. The ‘Nisbet’ Monitor (B4) is the closest blast monitor to the No.2 Open Cut and the Queen Street monitor (B1) is the closest to the No.1 Open Cut Extension. The monitors are maintained in accordance with the relevant standards and calibrated annually. Daily testing is conducted by an independent blast consultant to confirm that communication links are active.

All blasting activities are recorded on video. Each blast is reviewed to compare the actual monitoring results with the predicted results from the blast design.

A photo of a blast monitor is provided in **Figure 51**. The blast monitoring network is provided in **Table 20** and locations are displayed in **Figure 52**.

Table 19 - BLAST MONITORING NETWORK

Blast Monitor	Location
B1 (Queen St)	In the vicinity of the nearest non-company owned residence
B2 (School)	At the Muswellbrook Public School, Roger Street, North Muswellbrook
B3 (99 Queen St)	At the northern end of Queen Street, North Muswellbrook
B4 (Nisbet)	Sandy Creek Road, approximately 1.2km to the north of the No.2 Open Cut

Figure 51 - BLAST MONITOR (microphone and geophone) AT QUEEN STREET (B1)

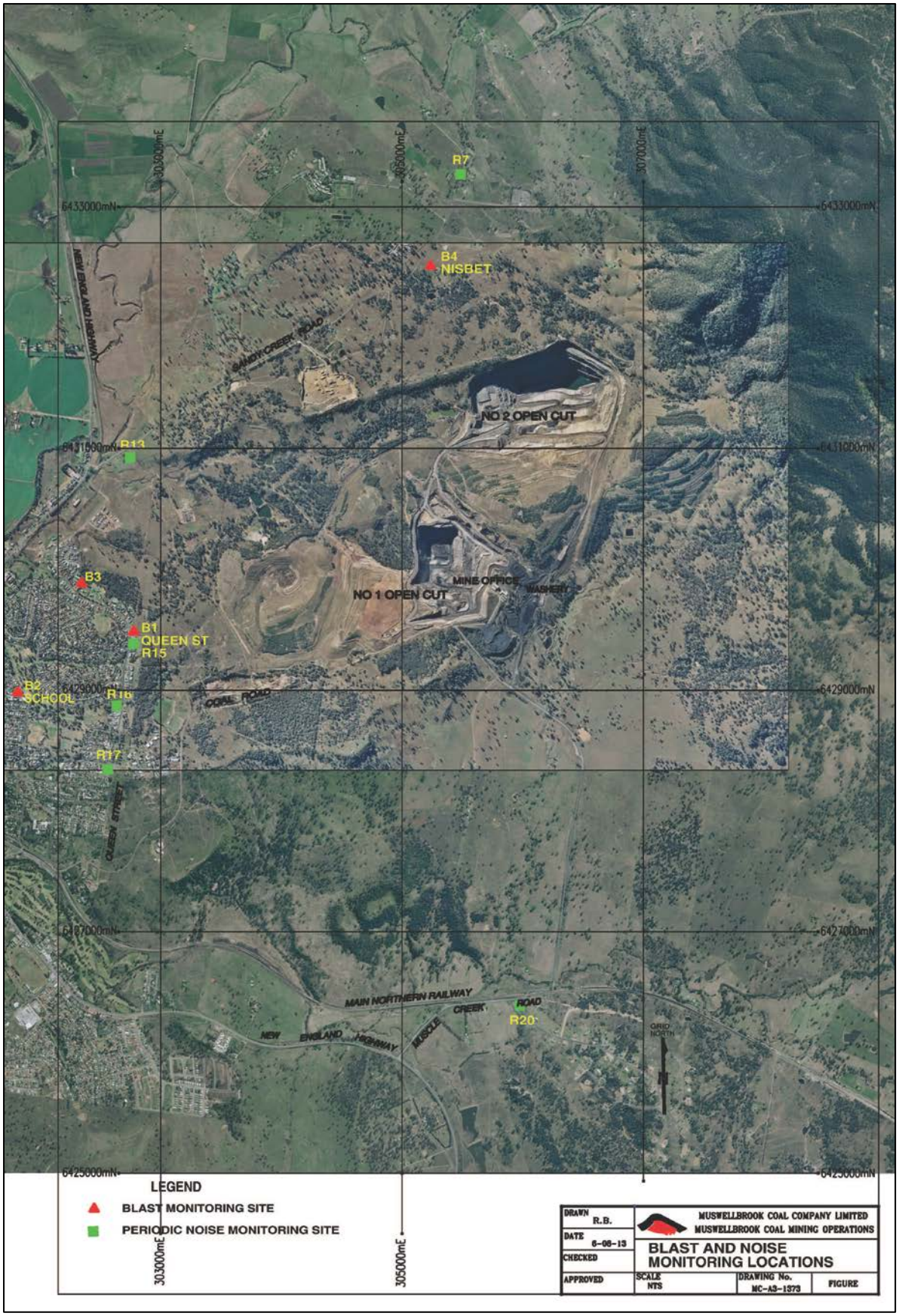


Figure 52 - BLAST and NOISE MONITORING LOCATIONS

3.9.4 No.1 Open Cut Extension Blast Results

During the reporting period, 96 blast events occurred at the No.1 Open Cut Extension. Due to the completion of coal mining activities in the No.2 Open Cut, blasting in this area is no longer required.

All four blast monitors were operational throughout the reporting period however some data was lost due to equipment malfunction or communication issues. The annual data recovery from all units combined was 96.1%.

All blasts during the reporting period were below the Development Consent Condition criteria for maximum overpressure of 120dB(L) and maximum ground vibration of 10mm/s. All blasts were below MCC's self-imposed 2mm/s vibration criteria for Queen Street. The percentage of the total number of blasts resulting in an overpressure above 115dB(L) during the reporting period was 1.04%. The allowed criteria of blasts above 115dB(L), but not exceeding 120dB(L), is 5%.

Over the reporting period, the maximum ground vibration of 1.54 mm/s was recorded at the B2 monitor and the maximum overpressure of 117.2 dB(L) was recorded at the B4 monitor.

A summary of B1 blast monitoring results are displayed in **Figure 53**. Blast data for all monitors are provided in **Appendix 4**.

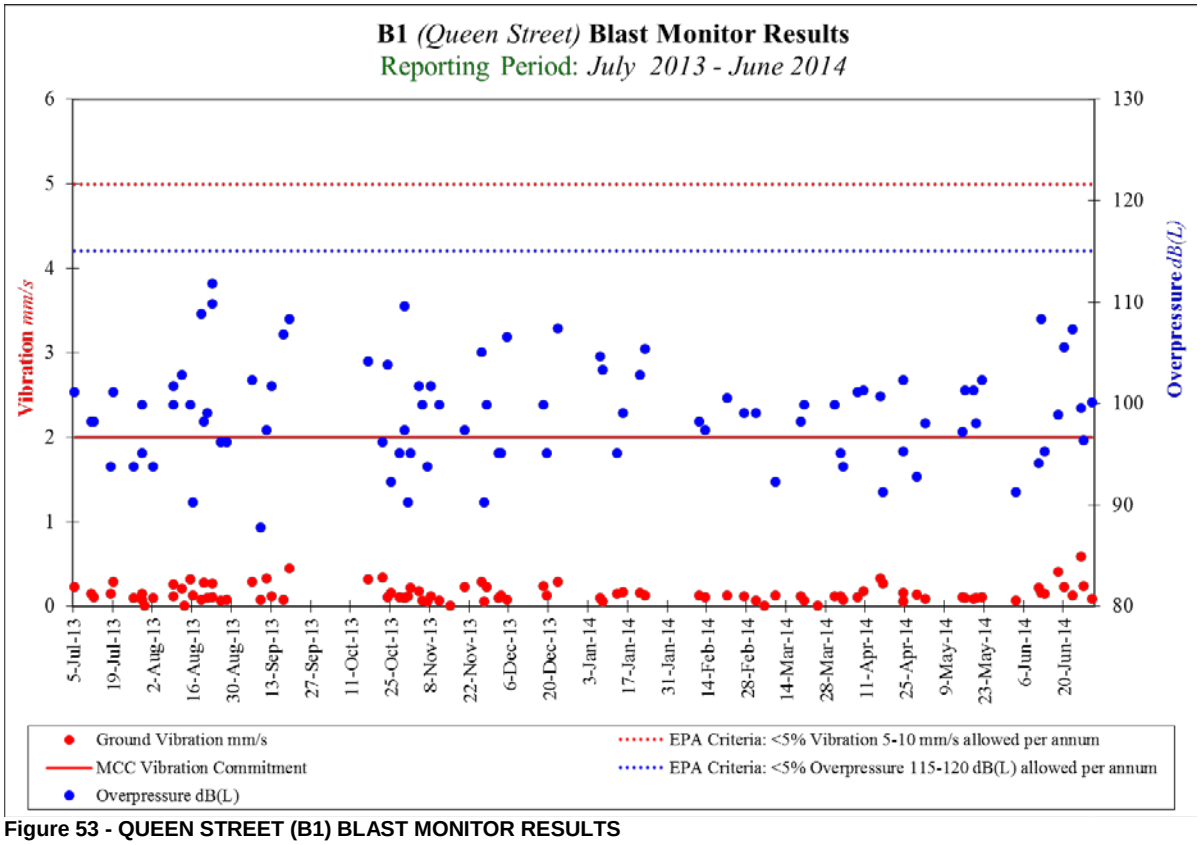


Figure 53 - QUEEN STREET (B1) BLAST MONITOR RESULTS

3.10 Operational Noise

The main objective of the Noise Management Plan (NMP) is to ensure that activities conducted at the mine are undertaken in an appropriate manner and in compliance with the EPL and Consent Conditions. Noise limits are listed in **Table 21**.

Table 20 - EPL and CONSENT CONDITION NOISE LIMITS

Location	Day	Evening	Night	
	$L_{Aeq(15\ minute),dB(A)}$	$L_{Aeq(15\ minute),dB(A)}$	$L_{Aeq(15\ minute),dB(A)}$	$L_{(1\ minute),dB(A)}$
R7 - Watts	36	36	36	44
R13 - McMaster	40	40	40	51
R15 - Collins	35	35	35	46
R16 - Tuckey	35	35	35	46
R17 - Colvin	35	35	35	46
R20 - Gordon	38	38	38	48

The locations of the noise monitoring sites are displayed in **Figure 52**.

In general, the infrastructure associated with mining operations is well concealed from the public due to the surrounding topography. The industrial areas that have potential for noise generation, including the Workshop and Coal Handling Plant, are well isolated from neighbouring residences. As a result, any concern from neighbouring residents is generally from the operation of mining equipment.

A number of mitigation measures are implemented to reduce the operational noise impacts on surrounding landholders, which include:

- Height of the rehabilitation area known as the ‘saddle’ at RL224 and the in-pit overburden emplacement area at RL264, both located to the west of the No.1 Open Cut, act as acoustical barriers to noise transmission towards North Muswellbrook;
- The loading of large rocks onto mine trucks is undertaken outside the night time period where possible. The loading procedure for oversized material requires fine material to be loaded into trucks prior to placement of large rocks;
- Mining operations are modified or shut down during unfavourable climatic conditions;
- Mobile plant and machinery is maintained and operated in a proper and efficient manner;
- Regular road maintenance is carried out to minimise noise associated with corrugated or deteriorated road conditions;
- The haul road from the No.1 Open Cut Extension to the ROM area has been planned to follow as much as practicable, gullies and lower elevation areas to minimise the emission of noise to residential areas;
- MCC has developed procedures and has conducted training of operators in working methods that minimise noise impacts;
- Excavators are used in backhoe configuration to allow larger material and rocks to be carefully ‘placed’ into the back of trucks; and
- The dumping of overburden is “in pit” and noise from this operation is shielded from North Muswellbrook by the walls of the pit and the existing spoil emplacement to the west of the Open Cut.

3.10.1 Real Time Directional Noise Monitoring

Noise is continually being monitored through the voluntary installation of a Real Time Directional Noise Monitoring System (BarnOwl), located at MCC RTEMS Site 1 adjacent to Queen Street, North Muswellbrook. The system measures noise from the direction of the No.1 Open Cut Extension providing an accurate representation of mine related noise. Total and spatial selective noise levels are relayed to MCC's office instantaneously. With regular monitoring of the results, mining operations can be modified or stopped as required to ensure noise criteria is met. Refer to **Figure 54-56** for examples of the noise monitoring system and computer screen displays.

In May 2014, two of the microphones were damaged from an infestation of ants, rendering the BarnOwl system non-operational. The new lemo connectors and repaired microphones were returned to MCC for re-installation in October 2014.

Figure 54- REAL TIME NOISE MONITORING MICROPHONE ASSEMBLY

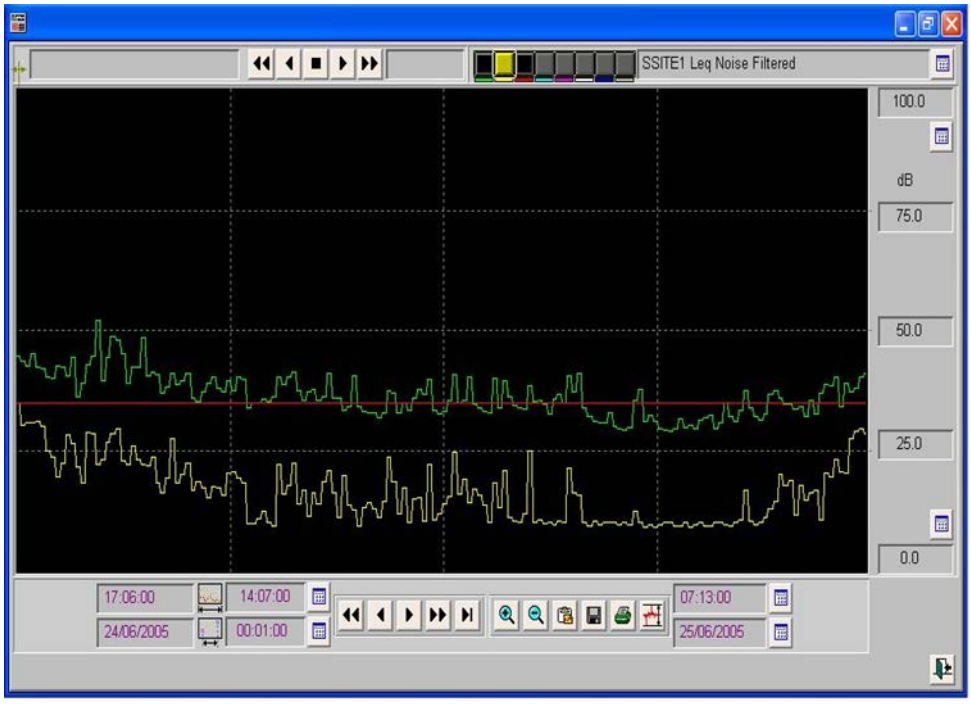


Figure 55 - NOISE TREND SCREEN

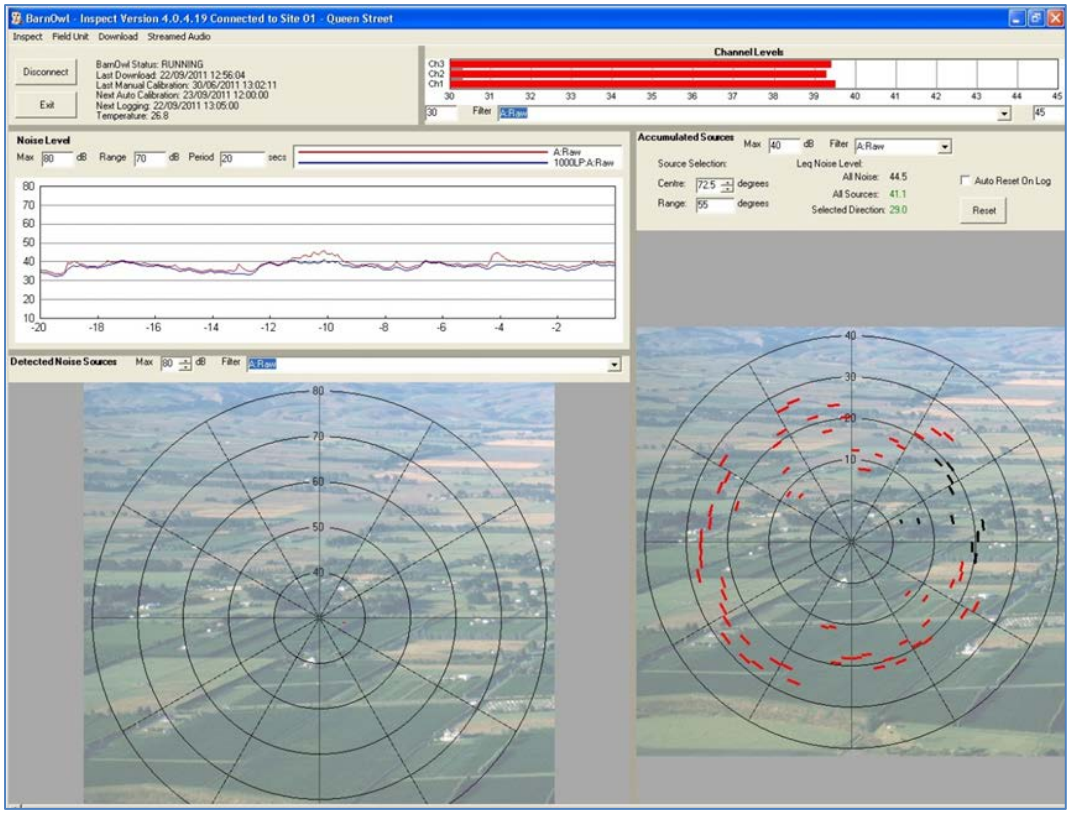


Figure 56 - DIRECTIONAL NOISE (BarnOwl) SCREEN

3.10.2 Periodic Noise Monitoring Program

All noise surveys are performed in accordance with the EPA " NSW Industrial Noise Policy" (INP) guidelines, the Periodic Noise Monitoring programme and Australian Standard 1055 "Acoustics, Description and Measurement of Environmental Noise" as specified in the NMP. Two six-monthly attended noise surveys were undertaken during the reporting period by Global Acoustics.

Each attended noise survey was conducted over a 24-hour period so that each of the Day, Evening and Night-time periods were monitored. Generally, each residence was surveyed twice during the Day period, once during the Evening period, and twice during the Night period for a total of five measurements at each location.

Measurements were taken in third-octave bands with an instrument that has Type 1 characteristics as defined in AS1259-1990 "Acoustics – Sound Level Meters". The instrument had a current calibration as per manufacturer's instructions and calibration was also confirmed prior to and at the completion of measurements with a Sound Level Calibrator. The LAeq (15-minute) noise emission levels, at each monitoring site, were determined.

The actual noise level received at individual residences may vary as a result of:

- The location of mining equipment;
- The elevation of mining equipment;
- Impacts from other noise sources;
- Prevailing wind conditions; and
- Prevailing meteorological conditions.

3.10.3 Periodic Noise Monitoring Results

Attended noise monitoring was conducted by Global Acoustics during 14-15 November 2013 and 21-22 May 2014. The purpose of the measurements was to quantify the overall noise levels at the nominated noise monitoring locations and determine the proportion contributed from MCC mining operations.

Noise levels from the November 2013 and May 2014 survey complied with the day, evening and night Consent $L_{Aeq(15minute)}$ and also the night $L_{A1(1minute)}$ noise limits at all monitoring locations during the monitoring period. Noise measurement results for both of these surveys are summarised in **Table 22-23**.

Table 21 – NOVEMBER 2013 NOISE SURVEY RESULTS (14-15 November 2013)

Location	Start Date And Time	Wind Speed m/s	VTG °C per 100m	Criterion dB	Criterion Applies?[1]	MCC L_{Aeq} dB [2]	Exceedance [3,4]
R7	14/11/13 14:14	5.3	-0.8	36	No	IA	NA
R7	14/11/13 17:21	5.4	-0.6	36	No	IA	NA
R7	14/11/13 18:00	5.4	-0.7	36	No	IA	NA
R7	15/11/13 00:10	3.1	0.1	36	No	NM	NA
R7	15/11/13 02:57	0.9	0.5	36	Yes	29	Nil
R13	14/11/13 13:48	4.9	-1.1	40	No	IA	NA
R13	14/11/13 16:56	3.6	-0.9	40	No	IA	NA
R13	14/11/13 18:24	5.4	-0.6	40	No	IA	NA
R13	14/11/13 23:45	4.5	0.2	40	No	31	NA
R13	15/11/13 02:34	1.3	0.7	40	Yes	28	Nil
R15	14/11/13 13:11	5.8	-0.9	35	No	IA	NA
R15	14/11/13 16:22	4.9	-0.8	35	No	IA	NA
R15	14/11/13 20:30	2.2	0.6	35	Yes	IA	Nil
R15	14/11/13 23:16	5.8	0.2	35	No	NM	NA
R15	15/11/13 02:04	2.7	0.8	35	Yes	NM	Nil
R16	14/11/13 12:43	5.8	-0.6	35	No	IA	NA
R16	14/11/13 16:00	4.0	-0.8	35	No	IA	NA
R16	14/11/13 20:07	4.0	0.1	35	No	IA	NA
R16	14/11/13 22:55	5.4	0.1	35	No	NM	NA
R16	15/11/13 01:42	2.2	0.7	35	Yes	IA	Nil
R17	14/11/13 12:18	4.0	-1.0	35	No	IA	NA
R17	14/11/13 15:35	4.0	-0.7	35	No	IA	NA
R17	14/11/13 19:42	4.5	0.0	35	No	IA	NA
R17	14/11/13 22:34	6.7	0.2	35	No	IA	NA
R17	15/11/13 01:20	1.8	0.9	35	Yes	IA	Nil
R20	14/11/13 11:42	3.1	-0.6	38	No	IA	NA
R20	14/11/13 14:53	4.9	-1.1	38	No	IA	NA
R20	14/11/13 19:01	4.5	-0.4	38	No	IA	NA
R20	14/11/13 22:00	5.8	0.0	38	No	IA	NA
R20	15/11/13 00:48	3.1	0.5	38	No	IA	NA

Notes:
1. *Limits apply for winds up to 3 m/s (at a height of 10 metres above ground level) & vertical temperature gradients of up to 3 °C /100m;*
2. *These are results for MCC in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable); and*
4. *NA means atmospheric conditions outside conditions specified in development consent, criterion is not applicable.*

Table 22 – MAY 2014 NOISE SURVEY (21-22 May 2014)

Location	Start Date And Time	Wind Speed m/s	VTG °C per 100m	Criterion dB	Criterion Applies?[1]	MCC L_{Aeq} dB [2]	Exceedance [3,4]
R7	21/05/14 14:43	3.1	0.5	36	No	<30	NA
R7	21/05/14 17:33	1.7	0.5	36	Yes	IA	Nil
R7	21/05/14 18:00	1.3	4.1	36	No	<25	NA
R7	22/05/14 00:29	2.0	3.0	36	No	30	NA
R7	22/05/14 03:22	2.1	3.0	36	No	33	NA
R13	21/05/14 14:18	2.3	0.5	40	Yes	NM	Nil
R13	21/05/14 17:09	1.0	0.5	40	Yes	<30	Nil
R13	21/05/14 18:26	1.2	3.0	40	No	<30	NA
R13	21/05/14 23:45	1.6	4.1	40	No	31	NA
R13	22/05/14 02:59	1.5	4.1	40	No	30	NA
R15	21/05/14 13:49	2.3	3.0	35	No	IA	NA
R15	21/05/14 16:38	1.2	3.0	35	No	<30	NA
R15	21/05/14 20:54	2.2	3.0	35	No	<30	NA
R15	21/05/14 23:15	1.9	3.0	35	No	<35	NA
R15	22/05/14 02:31	1.1	0.5	35	Yes	32	Nil
R16	21/05/14 13:28	2.8	0.5	35	Yes	IA	Nil
R16	21/05/14 16:17	1.5	4.1	35	No	IA	NA
R16	21/05/14 21:18	2.5	-1.0	35	Yes	IA	Nil
R16	21/05/14 22:51	2.1	3.0	35	No	IA	NA
R16	22/05/14 02:10	2.2	3.0	35	No	IA	NA
R17	21/05/14 13:07	2.8	3.0	35	No	IA	NA
R17	21/05/14 15:54	2.0	4.1	35	No	IA	NA
R17	21/05/14 20:30	1.0	3.0	35	No	IA	NA
R17	21/05/14 22:30	1.3	4.1	35	No	29	NA
R17	22/05/14 01:39	1.4	0.5	35	Yes	32	Nil
R20	21/05/14 12:09	1.1	0.5	38	Yes	IA	Nil
R20	21/05/14 15:22	2.8	3.0	38	No	IA	NA
R20	21/05/14 19:04	0.9	3.0	38	No	IA	NA
R20	21/05/14 22:01	1.4	3.0	38	No	IA	NA
R20	22/05/14 01:10	2.0	3.0	38	No	34	NA

Notes:
1. *Limits apply for winds up to 3 m/s (at a height of 10 metres above ground level) & temperature inversions of up to 3 °C /100m;*
2. *These are results for MCC in the absence of all other noise sources;*
3. *Bolded results in red are those greater than the relevant criterion (if applicable); and*
4. *NA means atmospheric conditions outside conditions specified in development consent, criterion is not applicable.*

3.11 Visual, Stray Light

The main objectives of Lighting Management Plan (LiMP) on site include the following:

- To ensure that sufficient lighting is provided on site to facilitate safety and security to mining operations;
- To ensure that lighting is of an appropriate standard and appropriately directed;
- To minimise the impact of on-site lighting sources on residents or road users; and
- To outline a process to address light spillage issues.

During the reporting period there were no impacts on the community at night time from lighting at the No.1 Open Cut Extension. MCC's operations are screened from direct view of residents or the travelling public by existing overburden emplacement areas, and the natural topography of the surrounding area.

3.12 Aboriginal Heritage

The main objectives of the Archaeology and Cultural Heritage Management Plan (ACHMP) are:

- Minimise disturbance to existing cultural resources within the No.1 Open Cut Extension;
- Retrieve cultural information from the identified cultural resources before they are destroyed by open cut mining development; and
- Comply with the legal obligations under Federal and State statutes.

As part of the EIS process, Aboriginal cultural heritage surveys were conducted in the No.1 Open Cut Extension area using archaeological consultants and Aboriginal community representatives. Four Aboriginal sites were identified and described as occupation sites being scatters or isolated finds of stone artefacts. Consent to destroy was obtained from the DECC and the artefacts recovered and placed at one site location.

As part of DA205/2002, Section 96 Modification for Area C, Consent Condition 57 states that an Aboriginal Cultural Education program must be developed in collaboration with the Aboriginal community for the induction of MCC personnel and contractors. Following consultation with interested Aboriginal parties during the 2011-2012 reporting period, MCC is working with Ungooroo Aboriginal Corporation to help finalise and present the programme.

3.12.1 Cultural Management

Management of an Aboriginal cultural site at MCC involves the following:

- Site is kept intact and preserved until they are ready to be salvaged;
- Site is actively managed to avoid accidental impacts;
- Staff (including contractors) are trained and made aware of their responsibilities concerning aboriginal sites and objects during site induction. As a reference an Aboriginal Object Identification Booklet is available upon request (refer to **Figure 49**);
- The ACHMP spells out clear roles and responsibilities of all staff in managing cultural resources;
- Site is clearly identified in the field. Area is fenced and appropriate signage used, where relevant (refer to **Figure 57**);
- Supervisors and plant operators are made aware of the location of the site and the boundaries; and
- All plans and operation notes show the location of known sites.

MCC has successfully completed salvage operations and continues to maintain and protect the Aboriginal cultural site located within the mine lease boundary. The information described in the archaeological salvage report provides educational material, explaining the mine site's Aboriginal history and cultural significance.

Figure 57 - ABORIGINAL CULTURAL SITE CB1

3.12.2 Aboriginal Consultation

MCC consults with the original Aboriginal community groups involved in the No.1 Open Cut Extension site assessment in accordance with Section 3.3(d) of the No.1 Open Cut Extension Development Consent (205/2002). MCC use consultation principles and strategies consistent with those outlined in the "Guidelines for Best Practice Community Consultation in NSW Mining and Extractive Industries" and will consult with all available aboriginal stakeholder groups.

During the reporting period, no ground disturbance operations required consultation with Aboriginal groups.

As a community representative, a member of the Wanaruah Local Aboriginal Lands Council presently sits on the MCC Community Consultative Committee (CCC).

3.13 European Heritage

No European Heritage was impacted this reporting period.

3.14 Spontaneous Combustion

The main objective of the Spontaneous Combustion Management Plan (SCMP) is to minimise the occurrence and manage the effect from spontaneous combustion by identification, control, removal, mitigation and prevention in the following areas:

- Existing open cut and underground workings;
- Drilling and blasting;
- Mining of overburden;
- Mining of coal;
- Emplacement of overburden and interburden;
- Emplacement of washery reject; and
- Coal stockpiles.

The Greta Coal Measures are mined at Muswellbrook Coal. These measures have a history of spontaneous combustion. Spontaneous combustion has been a long term issue at MCC.

Incidents of spontaneous combustion have taken place over a number of years, particularly in the spoil piles on the western side of the No.1 Open Cut. During the 1980's this was successfully dealt with by sealing both the burning area and the material liable to spontaneous combustion with up to 20 metres of inert overburden.

Prior to mining in the No.1 Open Cut Extension, there were existing areas of surficial spontaneous combustion caused by previous underground mining. During mining operations these areas have been remediated.

MCC has assisted with ACARP and NERDDC projects investigating spontaneous combustion, including:

- NERDDC Self Heating of Spoil Piles in Open Cut Mines
- C1609 Self Heating in Spoil Piles: A Field Trial of Fly Ash Grouting and an Assessment of Cover Materials
- C3055 and C6003 Continuation of Monitoring Probes
- C9031 Rehabilitation of Spontaneous Combustion Prone Spoil Piles
- C9062 Infra Red Thermography for Monitoring Spoil Piles

3.14.1 Quarterly Spontaneous Combustion Reports

Regular spontaneous combustion reports are provided to both the DRE and EPA. Reports identify existing and new incidents of spontaneous combustion, mitigation procedures and improvements to these procedures, effectiveness of actions, areas capped, areas mined, areas under water infusion and complaints received. The report also includes a plan showing the extent and location of problem areas.

Three spontaneous combustion reports were submitted to DRE and EPA for the reporting periods July-August 2013, October-December 2013 and January-June 2014. The majority of affected areas were within the open cut and overburden emplacement areas. Controls were successfully completed on all affected areas. There was an increase in the occurrence of spontaneous combustion affected areas over the reporting period and were classified in the "C" category ("*Minor: visible steam or smoke – area affected is less than 200m^2*") A

historical comparison, along with a summary of all the quarterly reports during the reporting period, is provided in **Tables 24-25**.

While some new outbreaks occurred in the reporting period, they have been managed to reduce the long term issues associated with spontaneous combustion.

Table 23 - HISTORICAL SUMMARY OF AREAS AFFECTED BY SPONTANEOUS COMBUSTION

Total Area Affected by Spontaneous Combustion *(m^2)*								
	2006-2007	***2007-2008***	***2008-2009***	***2009-2010***	***2010-2011***	***2011-2012***	***2012-2013***	***2013-2014***
Jul-Sep	16405	3721	1076	34	135	85	45	149
Oct-Dec	7690	3918	646.5	70	45	64	57	45
Jan-Mar	6694	1726	641.5	40	215	71	65	
Apr-Jun	25546	661	187	85	95	53	57	156
Yearly Average	**14084**	**2507**	**638**	**57**	**123**	**68**	**56**	**117**

Table 24 - SPONTANEOUS COMBUSTION (SC) MONTHLY REPORT SUMMARY JULY 2013 - JUNE 2014

Reporting Month	**SC Areas Capped** *(m^2)*		**SC Areas Mined** *(m^2)*		**No. 1 O/C - Area Under Water Infusion** *(m^2)*		**Complaints Relating to SC**
	No. 1 O/C	**No. 2 O/C**	**No. 1 O/C**	**No. 2 O/C**	**No. 1 O/C**	**No. 2 O/C**	
Jul-13	2700	0	0	0	0	0	0
Aug-13	0	0	0	0	0	0	0
Sep-13	0	8	0	0	8030	0	4
Oct-13	53500	0	0	0	8030	0	1
Nov-13	32000	0	0	0	8030	0	0
Dec-13	0	0	0	0	8030	0	0
Jan-Jun 14	25000	0	0	0	19450	0	2

* SC = Spontaneous Combustion

3.14.2 Bushfire

The main objectives of the Bushfire Management Plan (BMP) are as follows:

- Activities on site are managed to minimise the risk of outbreak of fire;
- Fuel loads are contained to acceptable levels to moderate any fire intensity;
- Hazard mitigation measures are in place to contain an outbreak of fire should one occur; and
- Arrangements are in place to liaise with and support the Rural Fire Service (RFS) should an outbreak of fire occur within the DA area.

There were no incidences of bushfire threat or outbreak on the mine site during the reporting period. The annual Bushfire Site Inspection Risk Assessment was conducted on 29 August 2013.

3.15 Hydrocarbon Contamination

Above ground fuel storage tanks are self-bunded to contain any spillage which may occur. Waste oil from the workshop is stored in a waste oil tank. Oily water runoff from the re-fuelling bay drains into an above ground sump which is fully bunded. Runoff from the hardstand wash-down bay passes through a three-staged silt trap and an oil/water separator. The collected silt is routinely cleaned out, and waste oil is removed as required by an EPA approved contractor.

The Final Settling Pond Dam has an oil boom which contains any oil that may be present on the dam's surface. Surface water monitoring of the Final Settling Pond Dam demonstrates that hydrocarbon contamination controls were successful. Oil and grease results were less than 50 µg/L on all sampling occasions during the reporting period.

Hydrocarbon management was previously identified as an issue in the 2012 environmental audit as per DA202/2005. This audit identified that hydrocarbon management is an area for improvement. During the AEMR period all workshop and maintenance personnel were trained in the correct use, handling and housekeeping of hydrocarbons. A competency based assessment of all maintenance and workshop personnel was undertaken. Attainment of this competency is now a requirement of employment in the workshop and or maintenance department at MCC.

3.16 Methane Drainage/Ventilation

There were no methane drainage or ventilation issues associated with the No.1 or No.2 Open Cut operations in this reporting period. There are a number of boreholes intersecting the underground workings that are used for gas and water monitoring. These boreholes are capped and opened only for monitoring purposes.

3.17 Public Safety

During the reporting period public safety was managed in accordance with current MCC procedures. Fences surrounding the Open Cut operational areas were inspected. Repairs including the replacement of sections were undertaken to provide a minimum standard of 5 strand wire rural fence (or equivalent), with sign posting warning of mining operations.

A security patrol is conducted by a local security firm over weekends and other nominated periods (Christmas, shutdowns, etc.) when the site is not manned.

Fences along the Muswellbrook Coal property boundary adjacent to Queen Street in North Muswellbrook and along Sandy Creek Road were maintained during the term of this report.

3.18 Other Issues and Risks

Prior to the advancement of each mining strip an assessment for potential infrastructure damage from mining operations was carried out. The assessment includes blast vibration design and impact studies (fly-rock, blast design, etc.) for infrastructure, including buildings, fuel storage and coal processing facilities.

No incidents of damage to surface infrastructure were recorded in this AEMR reporting period.

4 COMMUNITY RELATIONS

MCC undertakes community consultation by way of ongoing direct contact with nearby neighbours through meetings, telephone contact, Community Consultative Committee and operating a toll free 24-hour Environmental Contact Line (1800 600 205).

4.1 Environmental Complaints

Muswellbrook Coal operates a toll free 24-hour Environmental Contact Line, where residents can be connected with the mine personnel directly or leave details about an enquiry or complaint. The Environmental Contact Line number is 1800 600 205, and is advertised bi-weekly in the Hunter Valley News and the Muswellbrook Chronicle.

On receiving a complaint, MCC staff promptly investigates and isolates the source of the complaint and reports back to the complainant with the findings. The recording of environmental complaints and the operation of the Environmental Contact Line is conducted in accordance with the MCC Environmental Protection Licence and Development Consent Conditions.

During the reporting period MCC was responsible for:

- maintaining the complaint recording system;
- ensuring that an initial response was provided to the complainant immediately or within 24 hours of receipt of complaint; and
- ensuring all complaints were entered into a database and logbook.

The MCC complaints logbook and database includes the following details for all complaints:

- Date and time of complaint;
- Any personal details the complainant wishes to provide;
- The nature of the complaint, including time and duration of incident;
- Action taken by MCC in relation to complaint, including any follow-up contact with the complainant; and
- If no action was taken by MCC, the reason why no action was taken.

There were a total of 17 complaints recorded during the reporting period. In comparison, this was an increase in the number of complaints recorded during the previous AEMR period as shown in the complaint history chart in **Figure 58**.

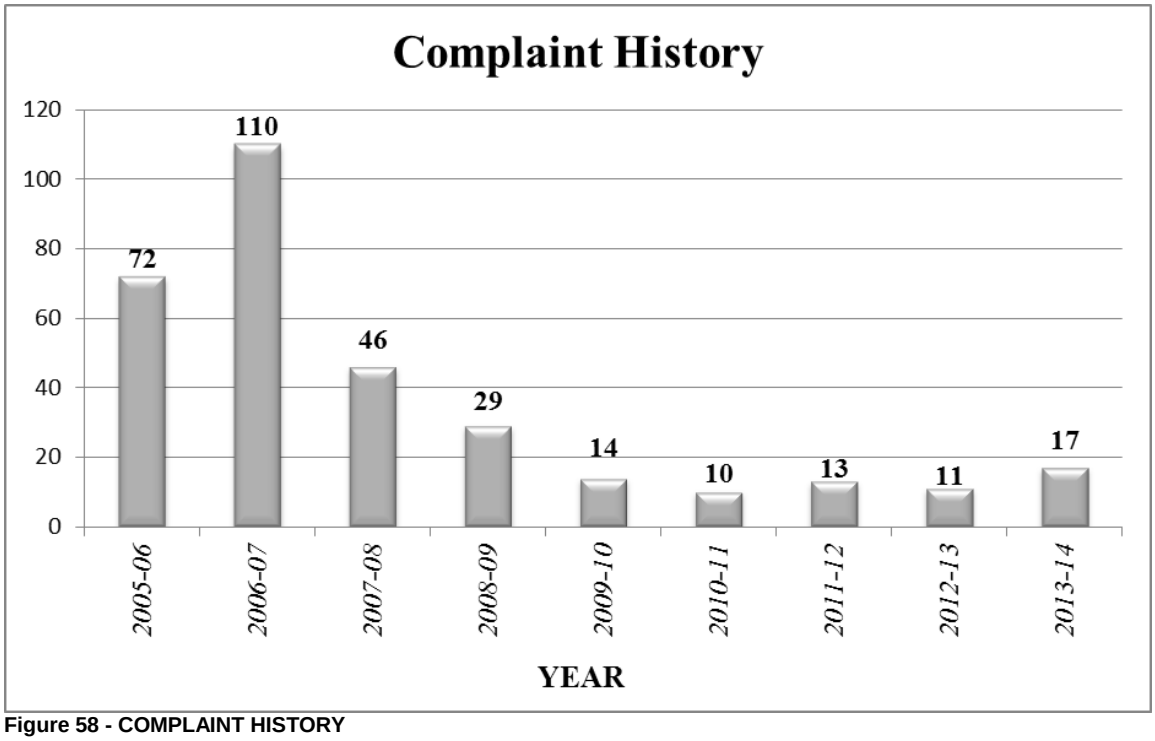


Figure 58 - COMPLAINT HISTORY

A summary of the complaints are provided in **Appendix 5**. **Figure 59** displays the number of complaints in each category that were received and **Figure 60** shows the distribution of complaints by complainant.

The complaints were lodged by 12 individual complainants. 17% of the complaints recorded were received anonymously.

Nine complaints concerning dust were recorded during the AEMR reporting period. This represents 53% of the total number of complaints received. 4 complaints were directly related to the mining of hot areas (spontaneous combustion), 4 were from operational activities and 1 complaint was in regards to dust produced from a blast event.

There were 5 complaints (4-odour, 1-smoke), 29% of total recorded, that was associated with the mining of spontaneous combustion affected areas.

Blasting noise/vibration complaints during the reporting period comprised 12% of the total number of complaints received. Both complaints were from 2 seperate blast events. All blasts complied with EPL and Development Consent conditions.

One complaint (6% of total received) was regarding operational noise. Additional information on each incident is provided in **Appendix 5** (Complaints Summary).

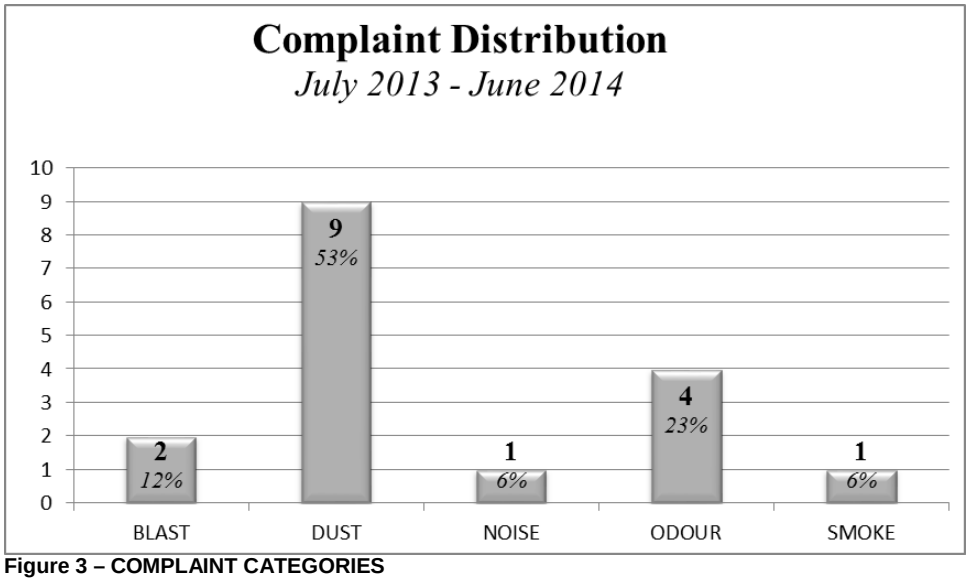


Figure 3 – COMPLAINT CATEGORIES

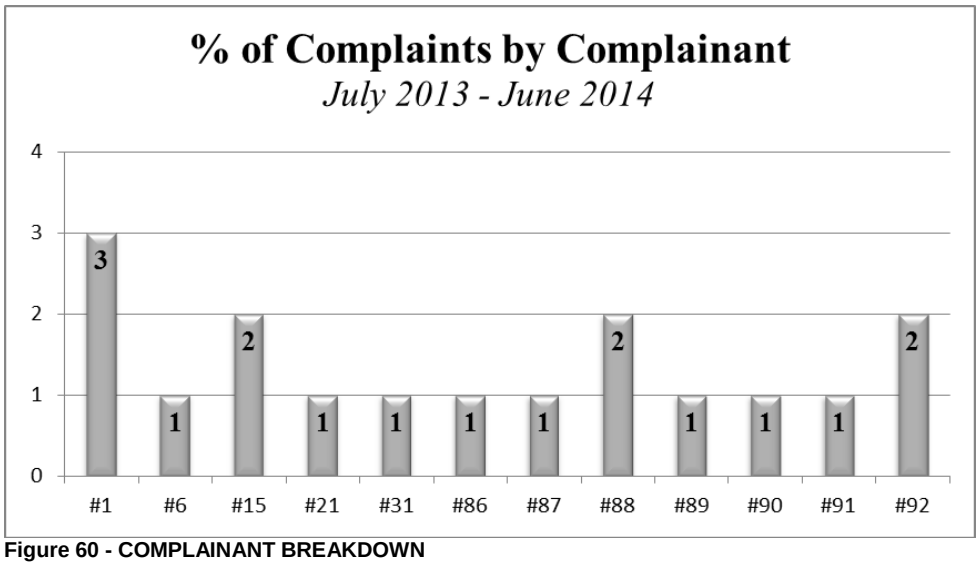


Figure 60 - COMPLAINANT BREAKDOWN

4.2 Community Consultation

MCC personnel maintain contact with nearby residents and are committed to continually fostering and developing strong links with the community.

4.2.1 Community Consultative Committee

MCC utilises a Community Consultative Committee (CCC) to provide information regarding mine operations to the local community. The CCC is comprised of 3 council representatives, 3 community representatives and 2 MCC representatives. The aim of the committee is to provide an effective communication mechanism to ensure members of the local community have adequate information on mining and environmental matters. CCC meetings are generally held quarterly at the MCC office and committee members are actively involved in the review of environmental monitoring data and are kept up to date on mining operations through presentations and site visits. The March meeting was delayed due to moving from previous offices to the new MIA complex.

Meetings were held on the:

- 3rd September 2013
- 9th December 2013;
- 28th March 2014; and
- 3rd June 2014.

4.3 Community Participation

Muswellbrook Coal contributed time and resources for several community activities during the reporting period.

- MCC participated in the *Bursting with Energy Expo* as part of the Upper Hunter Regional Show held in April 2014. The marquee, manned by community representatives from all the mining operations in the Muswellbrook Shire, presented activities, displays and information about the mining and energy industry (**Figure 61**).
- MCC was a Sponsor and active participants in MSC's *Solar Boat Challenge* for local schools in October 2013 (**Figure 62**).

Figure 61 - *Bursting with Energy Expo* MARQUEE DISPLAYS AND ACTIVITIES - UPPER HUNTER REGIONAL SHOW 4-5 April 2014.

Figure 62 - *Solar Boat Challenge* HELD AT THE MUSWELLBROOK POOL ON 16 OCTOBER 2013.

- Other community donations made through the reporting period:
  - Muswellbrook Chamber of Commerce
  - Muswellbrook Family and Historical Society – Shelving
  - Muswellbrook Public School
  - Muswellbrook South Public School
  - Dunmore Lang Christian School
  - St James Primary School
  - Muswellbrook Ceramics Group
  - Muswellbrook Out of School Hours Care
  - NSW Minerals Council – Scholarships
  - Muswellbrook Shire Council – Solar Boat Challenge
  - St Joseph's High School
  - Muswellbrook Polocrosse – Sponsorship for 2014 Carnival Polocross
  - Muswellbrook High School
  - Upper Hunter Community Services
  - Upper Hunter Conservatorium of Music
  - Upper Hunter Education Foundation
  - Hunter Valley Research Foundation
  - Westpac Rescue Helicopter – Black Coal Cup Charity Golf Day

5 REHABILITATION

The objectives of the Land Management Plan (LMP) are to reduce the impact of mining operations on existing native flora and fauna species, implement sustainable land practices and enhance habitat connectivity within the site and surrounding areas. This will be achieved by:

- Preventing land degradation and rehabilitating areas that have been subjected to land degradation;
- Progressively rehabilitating disturbed areas;
- Controlling weeds and feral animals;
- Ensuring that all suitable topsoil is recovered and segregated according to soil properties; and
- The enhancement of agricultural productivity across the entire site.

The extension of the No.1 Open Cut is set amongst an area that has been affected by previous open cut and underground mining activities:

- No.1 Colliery (underground) – 1907 to 1980;
- No.1 Open Cut – 1944 to1977 and 2001 to 2002;
- No.1 Open Cut Extension – 2005 to current;
- Common Open Cut – January 1992 to June 1992;
- St Heliers Colliery (underground) – 1923 to 1966;
- No.2 Colliery (underground) – 1980 to 1997; and
- No.2 Open Cut – 1965 to current.

Surrounding land uses include a combination of agricultural activities (beef cattle grazing), light industrial and rural-residential.

All overburden mined during the No.1 Open Cut Extension will either be placed back in the No.1 Open Cut void and ensuing work areas, or the No.2 Open Cut. The areas disturbed as part of the No.1 Open Cut Extension will be rehabilitated as an integral part of the open cut mining process. Methods of rehabilitation used for the No.1 Open Cut Extension will be very similar to those used for the No.2 Open Cut and will follow guidelines originally recommended by the Department of Primary Industries - Mineral Resources (DPI).

Rehabilitation is conducted generally in accordance with the MOP.

5.1 Buildings

During the AEMR period MCC relocated its Mining Infrastructure Area. This included the relocation of the Lube Bay structure as well as the installation of new relocatable stores, main workshop, ancillary workshop, bath house and offices. All buildings have been designed to be easily removed at mine closure. See Section 2.3.

5.2 Rehabilitation of Disturbed Lands

5.2.1 Rehabilitation Process

The existing strategy at Muswellbrook Coal for rehabilitation is as follows:

- Overburden waste dumps are initially shaped by a track dozer.

- Rock raked with a track dozer to remove rocks greater than 20cm in size. Raked rock is later used to construct rock lined drains.
- Contour banks were constructed in accordance with the Erosion and Sediment Control Plan.
- Major drains are constructed in accordance with Department of Natural Resources Draft Guidelines for Establishing Stable Drainage Lines on Rehabilitated Mine Sites (1999).
- Topsoil is recovered by front end loader or excavator and hauled by trucks from topsoil stockpiles and spread by a dozer to a depth of approximately 10cm.
- Gypsum is applied to the topsoil at a rate of 7-10 tonnes per hectare. The area is then ripped by dozer along the contour in preparation for planting.
- Where available, green-waste mulch, compost and/or Organic Growth Medium (OGM) is spread at a rate of approximately 100 tonnes per hectare.
- Prior to seeding, the area is ploughed with a stubble bladed plough to incorporate topsoil and ameliorative materials. If ground conditions require, a light harrow may be needed following pasture seeding operations.
- Rehabilitated areas are planted with a combination of pasture and native trees (refer to **Figure 63**). Native trees are typically planted via direct seeding in plots, situated at strategic locations throughout the shaped landform. MCC is currently planting an increased percentage of trees to allow development of wildlife corridors between Skelletar Ridge and Bells Mountain. Overall percentage of trees across the entire site will be over 50%.

Figure 63 - CONTOUR BANK AND TREE SEED PLOTS

5.2.2 Species Selection

A number of vegetation species are utilised in the rehabilitation, refer to **Table 26**. Species vary depending upon the seasonal requirements and the type of cover that is required due to topography and other physical factors. Areas that are prone to spontaneous combustion or situated on steep slopes are sown to pasture using a variety of vigorous growing pasture

species. The pasture seed mix is applied at a rate of 60 kg/Ha. Fertiliser is combined with the pasture mix at a rate of 200 kg/ha.

Table 25 - REHABILITATION SPECIES LIST

NATIVE TREE SPECIES		PASTURE SPECIES	
Botanical Name	**Common Name**	**Botanical Name**	**Common Name**
Eucalyptus camaldulensis	River Red Gum	*Cynodon dactylon*	Couch
Eucalyptus citriodora	Lemon Scented Gum	*Chloris gayana*	Pioneer Rhodes
Eucalyptus cladocalyx	Sugar Gum	*Lolium rigidum*	Wimmera Rye
Eucalyptus crebra	-	*Lolium perenne*	Kangaroo Valley Perennial Rye
Eucalyptus fibrosa	Broad-leaved Red Ironbark	*Medicago sativa*	Lucerne
Eucalyptus molucanna	-	*Trifolium repens*	Haifa White Clover
Eucalyptus punctata	-	*Trifolium subterraneum*	Subterranean Clover
Eucalyptus tereticornis	Forest Red Gum		Rye Corn and/or Millet
Acacia concurrens	-		
Acacia deccurrens	Black Wattle		
Acacia falcata	-		
Acacia decora	-		
Acacia filicifolia	Fern Leaf Wattle		
Casarina glauca	-		
Corymbia maculata	-		

Note: legumes are inoculated and lime coated.

The tree seed mix, applied at 8 kg/ha, contains a combination of pre-treated Acacia and Eucalypt species. This mix is then blended with a seasonal grass species (3-5 kg/ha) as a cover crop and bran as a bulking agent. The seed is then applied by an air assisted seeding implement attached to the back of a 90hp tractor as shown in **Figure 64**.

Figure 64 - Air Assisted Planter for Tree Seeding

Forested areas are an important component of mine site rehabilitation, refer to **Figure 65**. Trees provide a stable long term landform and add to the visual amenity of the surrounding area. Trees also provide the necessary habitat for the reconstruction of valuable ecosystems

that assist in the re-colonisation of fauna across the mine site and provide a corridor for movement into adjacent remnant vegetation.

Acacia saligna has been removed from the MCC rehabilitation species list. DRE does not support the use of *Acacia saligna* for mine rehabilitation in the Hunter Valley. The species is non-endemic to the Hunter Valley and there is concern that the species may become a dominant monoculture. MCC has not removed any previously sown *Acacia saligna*, except in "dehab" areas where established rehabilitation has been disturbed. MCC will monitor the spread of the plant and remove if it becomes necessary.

5.2.3 Wildlife Corridor

MCC intends to link existing remnant vegetation in Bells Mountain and Skelletar Ridge areas north and south of the lease area by planting corridors of native vegetation across the lease area creating a viable wildlife corridor. This strategy was developed in the Land Management Plan and is based on the Department of Primary Industries Synoptic Plan. Sections of the corridor are currently in place across the No.2 Open Cut and infill tree plantings will be conducted to complete a continuous corridor, refer to **Figure 65** for a photograph of a typical corridor planting at MCC. Rehabilitation planning for the No.1 Open Cut includes the incorporation of native vegetation areas to continue the corridor from the No.2 Open Cut.

Figure 65 - EXISTING WILDLIFE CORRIDOR AREA AT MCC

5.2.4 Description of Areas Rehabilitated

Details of these areas, including a rehabilitation maintenance summary for the reporting period, can be found in **Tables 27-28**, respectively.

There was no new rehabilitation completed during the reporting period. As noted in the 2012-2013 AEMR, the estimated total rehabilitated area target for the 2013-2014 was 367 hectares and, as indicated in **Table 27**, the total rehabilitation area at the end of the reporting period was 348.5ha, a difference of 18.5 hectares. Some older rehabilitated areas in the No.2 Open Cut, classified as "dehab", were removed as part of the planned progression of mining operations. This area totaled 9.13 hectares. The area in the No.1 Open Cut that was slated for rehabilitation during this reporting period has been bulk shaped. Due to the need for assessment of water and soil erosion management mitigation measures in this area, which lies adjacent to the non-disturbance line, progress has been further delayed. Shaping of the

planned rehabilitation area in the No.2 Open Cut was also postponed due to additional dumping requirements needed for access into the void.

The AEMR Plan, which includes rehabilitation details, is provided in **Appendix 1**.

The rehabilitation commitments indicated in the amended MCC Open Cut Operations MOP (June 2014), specified a total rehabilitated target of 321.9 hectares would be reached by 31 December 2014. At the end of this reporting period, 30 June 2014, the rehabilitated area on site totaled 348.52 hectares. This difference is mainly due to the fact that disturbance of older rehabilitated areas did not progress as anticipated. Current mining activities and rehabilitation works will bring the MOP rehab target in line by the end of the year.
A rehabilitation trial conducted in 2007-2008 to evaluate soil structure and fertility with use of composted green waste from the Muswellbrook Shire Council Waste facility indicated that the compost was very effective in helping to establish newly seeded pasture areas and young tree seedlings. With this success, the application of 100 tonnes per hectare of composted green waste, when available, has become an option for MCC's rehabilitation process.

In 2007, OGM was applied to a rehabilitation area in No.2 Open Cut in place of topsoil before seeding operations for both pasture and trees commenced. OGM is designed to assist plant growth and plant nutrient and water retaining properties. As shown in **Figure 66**, the use of this material has proven to be quite successful and has become another viable option when topsoil is in short supply.

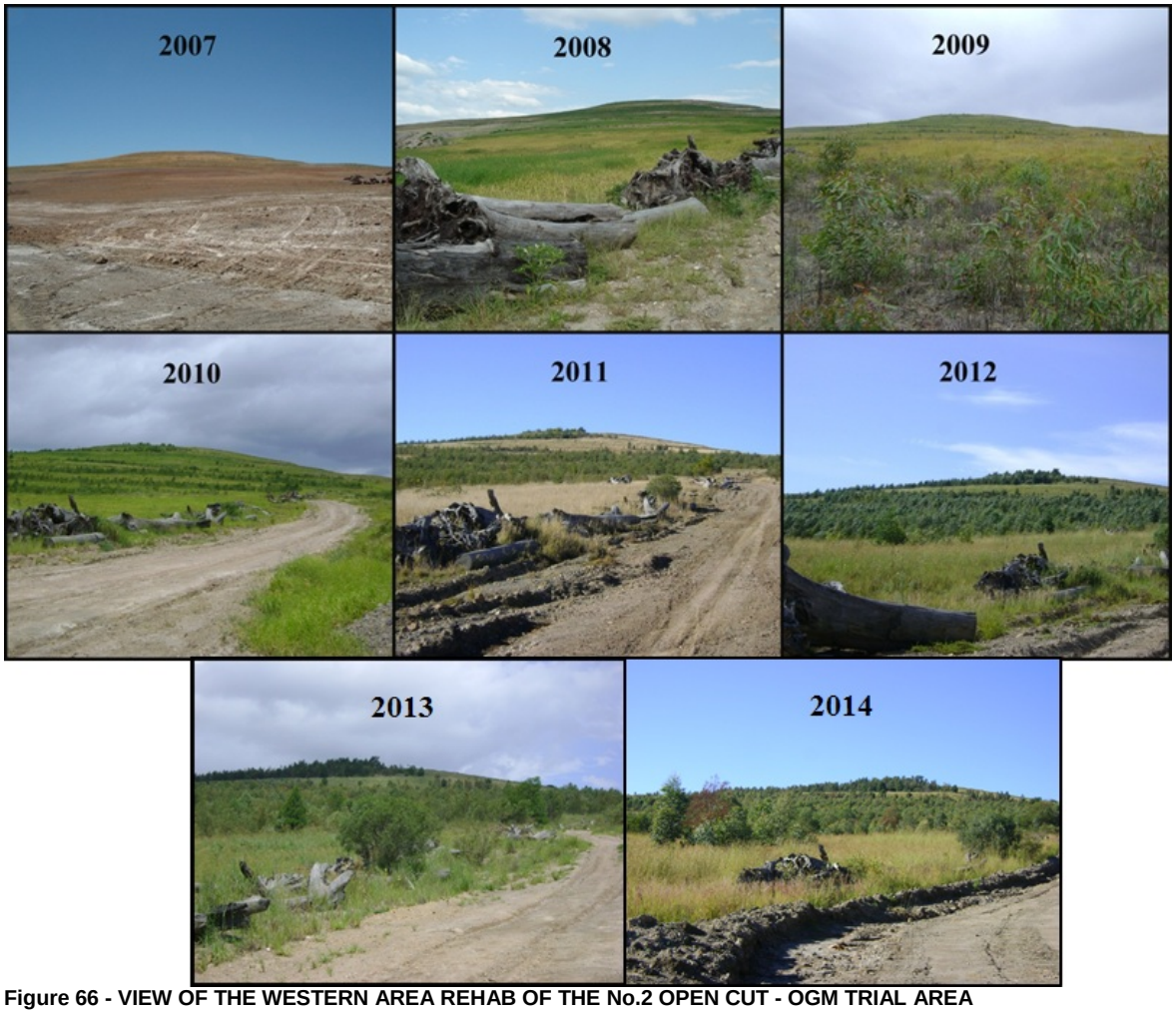


Figure 66 - VIEW OF THE WESTERN AREA REHAB OF THE No.2 OPEN CUT - OGM TRIAL AREA

Table 26 - REHABILITATION SUMMARY 2013-2014

				AREA AFFECTED /		
				To Date	Last Report	Next Report (Estimated)
A	**MINE LEASE AREA**					
	A1	**Mine Lease Area: CCL 713, ML 1304 and ML1562**		1788	1778	1788
B	**DISTURBED AREAS**					
	B1	**Infrastructure Area** (total No.1 and No.2)		54.7	51.4	46.7
	B2	**Active Mining Area** (excluding items B3-B5 below)	**No.1 O/C**	68.8	56.1	60.8
			No.2 O/C	37.3	37.3	37.3
	B3	**Waste Emplacements** (active/unshaped/in or out-of-pit)	**No.1 O/C**	13.8	21.1	13.8
			No.2 O/C	72.0	72.0	64.5
	B4	**Tailing Emplacements** (active/unshaped/uncapped)	**No.1 O/C**	0.0	0.0	0.0
			No.2 O/C	0.0	0.0	0.0
	B5	**Shaped Waste Emplacement** (awaits final vegetation)	**No.1 O/C**	14.5	11.0	9.8
			No.2 O/C	1.5	1.5	0.0
	ALL DISTURBED AREAS		**No.1 O/C**	151.8	139.6	131.1
			No.2 O/C	110.8	110.8	101.8
C	**REHABILITATION PROGRESS**					
	C1	**Total Rehabilitation Area** (except for maintenance)		348.52	357.65	354.6
D	**REHABILITATION ON SLOPES**					
	D1	**10 to 18 degrees**		45.7	45.7	45.7
	D2	**Greater than 18 degrees**		0	0	0
E	**SURFACE OF REHABILITATED LAND**					
	E1	**Pasture and grasses**	**No.1 O/C**	72.7	74.4	72.7
			No.2 O/C	158.50	158.5	154.1
	E2	**Native forest/ecosystems**	**No.1 O/C**	58.6	58.6	63.8
			No.2 O/C	58.8	66.2	64.1
	E3	**Plantation and crops**		0	0	0
	E4	**Other** (include non-vegetative outcomes)		0	0	0
F	**DE-HAB -** *disturbed areas previously rehabilitated, figures reflected in Section E*					
	F1	**Pasture and grasses**	**No.1 O/C**	1.69	0.00	0.0
			No.2 O/C	0.00	0.24	4.4
	F2	**Native forest/ecosystems**	**No.1 O/C**	0.0	0.00	0.0
			No.2 O/C	7.44	4.78	2.9
G	**SURFACE CONVERSION -** *previously reported pasture (cover crop) areas planted to trees, hectares*					
	G1	**Pasture/Cover Crop areas planted to Trees**	**No.1 O/C**	0.00	8.19	0.0
			No.2 O/C	0.00	0.00	0.0

Table 27 - MAINTENANCE ACTIVITIES ON REHABILITATED LAND 2013-2014

NATURE OF TREATMENT	AREA TREATED (Ha)		Comment / Control Strategies / Treatment Detail
	Report Period	Next Period	
Additional erosion control works (drains, re-contouring, rock protection)	0	0	NA
Re-covering (detail - further topsoil, subsoil sealing etc.)	0	0	NA
Soil Treatment (detail - fertiliser, lime gypsum etc.)	0	0	NA
Treatment / Management (detail - grazing, cropping, slashing)	0	0	Slashing was conducted along fire breaks in accordance with the Bushfire Management Plan
Re-seeding / Replanting (detail - species density, season etc.)	0	0	
Adversely Affected by Weeds (detail – type and treatment)	18.5	12	Areas of major occurrence of weeds (Galenia, Castor Oil Bush, Patterson's Curse, Boxthorn) were treated with selective herbicide and will continue during the next reporting period
Feral Animal Control (detail – additional fencing, trapping, shooting, baiting etc.)	0	0	Not undertaken during this reporting period

5.3 Rehabilitation Monitoring

In November 2008, MCC commenced a detailed program of rehabilitation monitoring which would assist in demonstrating some of the key indicators/criteria required for mine closure. In assessing a self-sustainable ecosystem, the program provides a mechanism to identify positive recovery trends and rapid detection of rehabilitation failure, along with detailed remedial action as required. This program includes both Reference and Rehabilitation Monitoring sites as indicated on the location map in **Figure 67**.

A total of six Permanent Reference sites have been established on MCC property representing both native woodlands (3) and exotic grazing pasture (3). Sites are spread out where possible to maximize the spatial distribution and subsequent variations in community composition across the local landscape, but were not situated on areas subjected to subsidence.

Rehabilitation Monitoring sites were also selected to represent final land use, vegetation community type and year of establishment. These sites were considered to be representative

of the rehabilitation area as a whole or were similar to and representative of other smaller areas of rehabilitation and include six Woodland and three Pasture rehabilitation monitoring sites situated on the Eastern Emplacement area (2), No.2 Open Cut In-pit dump area (3), and No.1 Open Cut rehab areas (4).

Monitoring activities have been conducted since 2008. The methodology used for monitoring was originally developed by CSIRO and has been accepted and widely utilised for ecological assessment on mine rehabilitation areas. These methodologies are a combination of Landscape Function Analyses (LFA), comprehensive soil analyses, and an assessment of ecosystem characteristics.

A rehabilitation monitoring assessment was completed during the reporting period in December 2013 by Carbon Based Environmental. Nine rehabilitation sites, 6 woodland and 3 pasture, were compared to the six reference sites.

Of the six woodland rehabilitation sites, three appear to be moving towards achieving the completion targets. Two of the other sites, sown in 2012 and 2013, in time are expected to further establish and move towards achieving final completion targets. The remaining site (EEWood03) may require follow up rehabilitation maintenance to achieve targets by concentrating on the establishment of understory and ground cover species.

Of the three pasture rehabilitation sites, two appear to be moving towards achieving the completion target, but the remaining site (No1Past01) may require follow up maintenance that could include slashing to allow other species to germinate.

MCC is currently developing a final MOP which will detail all requirements for mine closure.

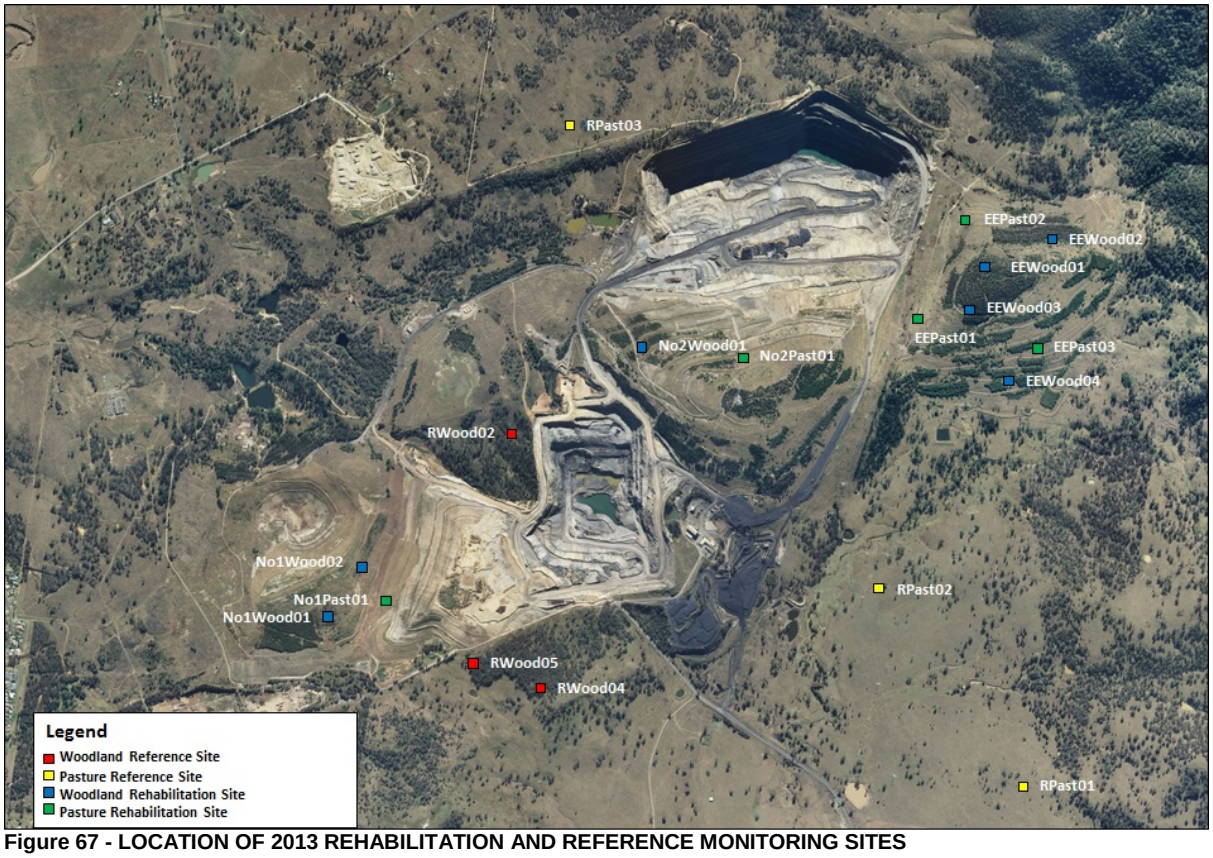


Figure 67 - LOCATION OF 2013 REHABILITATION AND REFERENCE MONITORING SITES

5.4 Rehabilitation Trials and Research

MCC has participated in a number of ACARP trials into the sealing and rehabilitation of material which is liable to spontaneous combustion. These reports include the following:

- Development of Rehabilitation Completion Criteria for Native Ecosystem Establishment on Coal Mines in the Hunter Valley (C13048)
- Rehabilitation of Spontaneous Combustion – Prone Spoil Piles (C9031)
- Infra-red Thermography for Monitoring Spoil Piles (C9062)
- Development of a Biochar Trial with Crucible and Patrice Newell (Tom Farrell Institute, University of Newcastle) to evaluate the benefits (improved soil quality, carbon sequestration and biodiversity) of incorporating the use of biochar in the rehabilitation process.

5.5 Further Development of the Final Rehabilitation Plan

Once final mine closure has been completed, the creation of a multi-layered vegetation community will provide wildlife habitat and protected corridors for fauna movement between the mine site and adjacent remnant vegetation areas. This will encourage the re-population of the area by a range of native fauna. On final completion it is anticipated that tree corridors will run from Bells Mountain into the eastern emplacement area and across the mine site to Skelletar Ridge.

Habitat reinstatement areas across the mine site are at various stages of development. The majority of tree areas on the mine site are healthy and in some areas quite vigorous growth has occurred (refer to **Figure 68**).

Figure 68 - TYPICAL TREE PLOT DISPLAYING VIGOROUS GROWTH

6 ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

During the next reporting period, the following activities are planned:

- Rehabilitation of the No.1 Open Cut Extension will continue in the in-pit emplacement area.
- Overburden from the No.1 Open Cut will be used to reduce spontaneous combustion areas and allow rehabilitation to continue in the No.2 Open Cut.
- Spontaneous Combustion will continue to be reviewed every 3 months with reports provided to DRE and EPA.
- MCC will continue, where possible, to use organic soil treatments rehabilitation for both the No.1 and No.2 Open Cuts.
- Investigate the feasibility of a Biochar Trial.
- Update the Mining Operations Plan (MOP) to identify mining and rehabilitation areas. Closure criteria will be developed as part of this process.
- Commence 5-yearly review of Environmental Management Plans.
- Conduct 3-yearly Environmental Audit as per Consent Condition of 8.1 of DA 205/2002.

APPENDIX 1

AEMR Plan

E 303 000
E 304 000
E 305 000
E 306 000
E 307 000
E 308 000
N 6 432 000
N 6 431 000
N 6 430 000
N 6 429 000

NO 2 OPEN CUT VOID
MCC25
MCC27
MCC26
MCC9
MCC23
MCC24
Final Settling Pond MCC12
Dam 2
Dam 1
West Emplacement Dam
West Haul Road Dam
Magazine Dam
Brickworks Dam 2
North No1 Dam 1
North No1 Dam 2
North No1 Dam 3
Coal Stockpile Dam
2015

GRID NORTH

0 100 200 300 400 500
All distances are in metres

LEGEND

- Lease Boundary
- Colliery Holding Boundary
- Current Disturbance Bdy
- Area Not Disturbed
- Active Mining Area
- Infrastructure
- Topsoil Stockpiles

OVERBURDEN DUMPS

- Unshaped Emplacement Area
- 2015 Proposed Emplacement 2014–2015
- Shaped Emplacement Area
- 2015 Proposed Mining 2014–2015

REHABILITATION AREAS

- This Report
- Previous Reports
- 2015 Proposed Rehabilitation 2014–2015

WATER MANAGEMENT STRUCTURES

- Clean Water
- Water Course
- Dirty Water
- Existing Power Line

MUSWELLBROOK COAL COMPANY LIMITED
MUSWELLBROOK COAL MINING OPERATIONS

MUSWELLBROOK OPEN CUT - AEMR - 30 JUNE 2014

Plan No. MC/AO–71

Date	Scale	Drawn	Checked	Approved	Plan size
24–09–2014	1:5000	REJB	JT	JT	A0

APPENDIX 2

Dust Monitoring Results

DEPOSITIONAL DUST RESULTS – July 2013 to June 2014

DATE	DM2	DM7	DM10	DM14	DM15	DM16	DM17	DM18	*DM19	DM20	DM22	*DM23	*DM24	DM26	DM28	*DM29	DM30
Jul-13	9.7	0.6	6.8	3.3	3.0	1.1	1.1	0.8	c6.6	0.6	0.3	0.6	1.0	c4.5	0.1	0.6	0.5
Aug-13	2.3	0.5	10.0	0.4	3.1	0.4	0.9	0.6	c7.5	4.3	1.3	c7.2	0.9	0.8	0.9	0.5	0.8
Sep-13	1.4	0.9	10.9	1.5	0.4	0.9	2.2	1.1	1.1	0.9	3.0	1.2	1.6	1.8	2.8	0.6	1.9
Oct-13	1.9	1.0	11.0	2.5	0.8	c3.8	1.9	1.7	2.4	1.0	2.2	1.3	2.0	1.7	c7.9	1.3	1.1
Nov-13	1.8	2.1	3.6	1.7	2.8	4.0	3.7	1.9	11.1c	3.3	2.0	59.7c	3.4	6.5c	4.1	7.6	1.9
Dec-13	1.8	1.1	6.7	c6	1.0	1.0	4.1	2.4	1.4	2.2	1.4	1.2	c6.2	1.1	NR	2.9	2.1
Jan-14	1.6	1.7	3.2	4.3	2.1	0.8	2.9	0.7	5.1c	1.3	1.1	2.2	3.5	1.3	2.2	1.6	1.3
Feb-14	1.8	1.6	4.0	1.0	0.9	3.4	3.2	1.7	3.4	1.9	1.5	1.4	3.8	4.1	1.6	1.6	1.5
Mar-14	1.0	1.6	c19.6	2.3	1.1	1.6	2.8	3.6	3.4	2.1	c9.2	NR	2.5	c14.2	1.2	1.5	1.3
Apr-14	1.0	1.0	c11.6	1.1	1.1	0.7	1.5	1.3	1.4	1.0	1.0	0.9	1.5	c14.1	0.7	0.9	0.8
May-14	0.6	0.5	c67.4	0.7	0.6	0.3	1.4	2.4	1.5	0.8	c7	1.1	0.6	2.3	3.2	1.2	0.9
Jun-14	1.9	1.0	c95.2	c16.1	0.4	0.7	c6.6	1.7	0.7	0.9	7.3	3.2	c7	2.4	1.1	1.2	1.2
ANNUAL Average *(July 2013 - Jun 2014)*	2.2	1.1	7.0	1.9	1.4	1.4	2.3	1.7	1.9	1.7	2.1	1.5	2.1	1.9	1.8	1.8	1.3
HISTORICAL Average *(since 1987)*	2.1	1.1	3.1	1.3	2.4	1.9	1.8	1.2	2.3	1.9	1.8	1.4	2.0	1.8	1.9	1.6	1.4

c = Contaminated result due to the presence of bird droppings, insects, or vegetation in sample. Contaminated results excluded from averages. * = non mine owned land

NR = No result. Includes broken or missing bottles.

PM10 MONITORING RESULTS – 1 July 2013 to 30 June 2014 *(µg/m³)*

July 2013			
SAMPLE DATE	SITE 1 24-hr Average (µg/m³)	SITE 2 24-hr Average (µg/m³)	SITE 3 24-hr Average (µg/m³)
01-Jul-13	12.3	10.0	12.0
02-Jul-13	10.5	9.9	11.2
03-Jul-13	8.6	7.7	9.1
04-Jul-13	9.4	10.3	10.5
05-Jul-13	9.0	9.9	11.2
06-Jul-13	9.0	8.5	9.5
07-Jul-13	8.2	7.7	10.5
08-Jul-13	10.6	10.5	10.2
09-Jul-13	11.9	12.0	15.4
10-Jul-13	20.5	18.3	18.5
11-Jul-13	15.6	12.8	14.5
12-Jul-13	11.3	10.6	12.2
13-Jul-13	16.1	13.6	16.3
14-Jul-13	14.7	14.7	16.9
15-Jul-13	13.1	11.4	12.1
16-Jul-13	9.8	8.0	8.8
17-Jul-13	8.7	9.1	13.1
18-Jul-13	12.7	9.1	10.8
19-Jul-13	8.5	9.4	8.7
20-Jul-13	4.3	4.9	5.7
21-Jul-13	6.4	6.6	7.3
22-Jul-13	6.8	7.3	7.9
23-Jul-13	6.9	6.7	6.3
24-Jul-13	12.4	13.2	16.6
25-Jul-13	18.0	16.2	19.9
26-Jul-13	11.3	11.1	13.3
27-Jul-13	17.2	15.3	17.6
28-Jul-13	14.7	15.0	18.1
29-Jul-13	10.5	10.2	12.1
30-Jul-13	12.2	13.9	15.0
31-Jul-13	16.1	15.9	19.4

August 2013			
SAMPLE DATE	SITE 1 24-hr Average (µg/m³)	SITE 2 24-hr Average (µg/m³)	SITE 3 24-hr Average (µg/m³)
01-Aug-13	14.0	14.4	20.0
02-Aug-13	9.0	10.0	10.0
03-Aug-13	7.9	9.1	9.1
04-Aug-13	8.7	9.8	11.5
05-Aug-13	13.0	14.0	15.3
06-Aug-13	12.8	13.0	16.0
07-Aug-13	15.1	17.7	18.7
08-Aug-13	6.8	7.1	8.0
09-Aug-13	7.2	7.3	8.6
10-Aug-13	8.6	9.0	9.9
11-Aug-13	9.5	9.8	12.8
12-Aug-13	14.5	13.0	15.9
13-Aug-13	8.6	9.3	10.6
14-Aug-13	12.1	11.6	14.2
15-Aug-13	11.9	14.0	15.8
16-Aug-13	14.3	15.2	19.6
17-Aug-13	23.0	23.8	27.8
18-Aug-13	7.9	11.0	8.5
19-Aug-13	12.7	35.0	12.0
20-Aug-13	7.6	18.2	9.8
21-Aug-13	8.4	37.9	9.7
22-Aug-13	9.1	21.2	10.9
23-Aug-13	11.1	27.2	11.0
24-Aug-13	7.1	8.7	8.3
25-Aug-13	9.0	9.6	10.2
26-Aug-13	8.1	10.2	10.2
27-Aug-13	9.7	30.4	13.2
28-Aug-13	18.3	28.6	26.2
29-Aug-13	38.1	55.1	52.4
30-Aug-13	34.8	120.7	40.9
31-Aug-13	18.9	17.9	20.4

September 2013			
SAMPLE DATE	SITE 1 24-hr Average (µg/m³)	SITE 2 24-hr Average (µg/m³)	SITE 3 24-hr Average (µg/m³)
01-Sep-13	22.1	21.3	27.9
02-Sep-13	28.6	34.4	39.5
03-Sep-13	20.6	21.9	24.1
04-Sep-13	17.5	15.8	20.9
05-Sep-13	21.1	27.8	26.1
06-Sep-13	20.0	22.0	20.6
07-Sep-13	22.7	22.9	20.3
08-Sep-13	33.0	30.1	30.3
09-Sep-13	23.2	23.8	22.3
10-Sep-13	31.7	39.3	35.7
11-Sep-13	13.3	13.6	11.1
12-Sep-13	15.3	15.1	13.9
13-Sep-13	23.3	21.4	22.6
14-Sep-13	23.8	23.3	29.4
15-Sep-13	17.8	15.8	18.0
16-Sep-13	14.9	14.6	25.4
17-Sep-13	6.0	5.9	4.6
18-Sep-13	7.0	8.8	7.3
19-Sep-13	11.1	11.7	12.1
20-Sep-13	13.8	17.0	13.0
21-Sep-13	8.5	8.2	9.8
22-Sep-13	9.5	10.5	12.7
23-Sep-13	16.8	23.0	21.0
24-Sep-13	24.8	26.6	30.6
25-Sep-13	14.5	13.6	17.1
26-Sep-13	26.7	93.7	29.3
27-Sep-13	22.9	22.6	30.5
28-Sep-13	25.2	69.8	24.5
29-Sep-13	17.8	22.0	28.8
30-Sep-13	15.4	17.6	20.2

October 2013			
SAMPLE DATE	SITE 1 24-hr Average (µg/m³)	SITE 2 24-hr Average (µg/m³)	SITE 3 24-hr Average (µg/m³)
01-Oct-13	36.0	67.0	39.3
02-Oct-13	7.2	6.0	8.7
03-Oct-13	10.0	10.0	13.7
04-Oct-13	19.1	12.0	16.8
05-Oct-13	14.7	NR	14.5
06-Oct-13	9.8	NR	14.0
07-Oct-13	22.7	NR	23.5
08-Oct-13	21.2	19.0	25.4
09-Oct-13	14.6	12.0	16.2
10-Oct-13	23.3	21.0	29.8
11-Oct-13	35.5	36.0	40.5
12-Oct-13	24.4	21.0	26.7
13-Oct-13	36.1	53.0	55.6
14-Oct-13	10.8	9.0	14.5
15-Oct-13	15.3	13.0	17.5
16-Oct-13	11.3	11.0	14.3
17-Oct-13	37.4	43.0	38.8
18-Oct-13	38.2	NR	42.6
19-Oct-13	29.4	NR	28.0
20-Oct-13	19.2	NR	19.0
21-Oct-13	19.7	NR	20.3
22-Oct-13	33.4	NR	35.9
23-Oct-13	24.0	NR	24.2
24-Oct-13	21.4	NR	16.3
25-Oct-13	34.5	NR	31.3
26-Oct-13	26.7	NR	29.0
27-Oct-13	30.8	NR	33.6
28-Oct-13	29.0	NR	32.8
29-Oct-13	45.8	NR	46.2
30-Oct-13	16.8	NR	19.2
31-Oct-13	20.5	NR	24.6

November 2013			
SAMPLE DATE	SITE 1 24-hr Average ($\mu g/m^3$)	SITE 2 24-hr Average ($\mu g/m^3$)	SITE 3 24-hr Average ($\mu g/m^3$)
01-Nov-13	20.4	NR	24.5
02-Nov-13	22.2	NR	26.5
03-Nov-13	28.5	NR	29.0
04-Nov-13	23.1	NR	30.9
05-Nov-13	22.2	NR	31.7
06-Nov-13	25.9	NR	23.8
07-Nov-13	29.4	32.6	30.4
08-Nov-13	48.2	56.9	35.4
09-Nov-13	25.2	27.7	28.2
10-Nov-13	20.9	18.3	34.8
11-Nov-13	6.1	9.9	NR
12-Nov-13	10.0	9.0	5.3
13-Nov-13	14.3	11.8	7.4
14-Nov-13	15.6	17.3	8.3
15-Nov-13	19.9	20.8	14.0
16-Nov-13	10.1	10.6	14.9
17-Nov-13	9.4	10.6	8.0
18-Nov-13	5.0	5.1	5.0
19-Nov-13	10.1	6.4	4.9
20-Nov-13	12.8	12.9	11.6
21-Nov-13	19.5	19.5	12.7
22-Nov-13	13.1	14.2	13.9
23-Nov-13	6.2	12.2	15.3
24-Nov-13	10.7	10.8	6.6
25-Nov-13	17.8	18.2	10.9
26-Nov-13	20.3	21.1	18.8
27-Nov-13	19.5	21.2	22.9
28-Nov-13	19.1	19.2	24.2
29-Nov-13	18.3	19.0	15.7
30-Nov-13	14.4	14.3	15.5

December 2013			
SAMPLE DATE	SITE 1 24-hr Average ($\mu g/m^3$)	SITE 2 24-hr Average ($\mu g/m^3$)	SITE 3 24-hr Average ($\mu g/m^3$)
01-Dec-13	11.6	11.1	13.9
02-Dec-13	13.9	15.0	13.1
03-Dec-13	14.7	15.5	14.5
04-Dec-13	16.6	18.1	16.7
05-Dec-13	17.0	17.2	14.4
06-Dec-13	6.8	7.4	8.8
07-Dec-13	21.6	25.5	10.8
08-Dec-13	19.5	21.3	34.2
09-Dec-13	25.6	33.5	22.0
10-Dec-13	14.9	16.0	20.5
11-Dec-13	23.0	26.3	36.0
12-Dec-13	29.8	29.6	25.9
13-Dec-13	27.7	28.9	30.6
14-Dec-13	25.8	27.9	26.9
15-Dec-13	16.8	18.5	21.7
16-Dec-13	13.9	14.3	18.0
17-Dec-13	15.4	16.7	14.7
18-Dec-13	16.2	17.3	15.0
19-Dec-13	17.4	22.3	15.7
20-Dec-13	24.1	24.6	20.8
21-Dec-13	33.4	37.3	18.3
22-Dec-13	23.4	26.5	28.5
23-Dec-13	25.7	26.5	18.8
24-Dec-13	18.7	18.7	22.5
25-Dec-13	13.3	14.7	14.7
26-Dec-13	8.0	7.3	9.3
27-Dec-13	9.7	10.9	7.3
28-Dec-13	17.0	17.8	10.9
29-Dec-13	28.9	33.4	21.2
30-Dec-13	28.7	31.7	37.7
31-Dec-13	28.1	31.9	31.0

January 2014			
SAMPLE DATE	SITE 1 24-hr Average ($\mu g/m^3$)	SITE 2 24-hr Average ($\mu g/m^3$)	SITE 3 24-hr Average ($\mu g/m^3$)
01-Jan-14	21.5	23.4	19.5
02-Jan-14	28.1	32.3	28.0
03-Jan-14	39.0	43.7	34.7
04-Jan-14	22.9	25.5	20.9
05-Jan-14	29.6	33.3	20.6
06-Jan-14	24.8	29.7	23.0
07-Jan-14	29.6	32.4	33.3
08-Jan-14	18.8	15.1	22.1
09-Jan-14	14.6	16.4	NR
10-Jan-14	26.9	28.3	NR
11-Jan-14	27.9	27.9	NR
12-Jan-14	31.6	34.9	NR
13-Jan-14	22.8	21.6	NR
14-Jan-14	25.6	27.4	NR
15-Jan-14	28.6	29.3	NR
16-Jan-14	36.5	38.5	NR
17-Jan-14	28.3	30.1	NR
18-Jan-14	24.9	29.3	NR
19-Jan-14	34.4	38.1	NR
20-Jan-14	24.3	24.5	NR
21-Jan-14	26.9	26.9	21.7
22-Jan-14	17.8	17.5	20.2
23-Jan-14	16.7	18.9	14.5
24-Jan-14	16.8	18.3	13.5
25-Jan-14	14.0	14.6	13.8
26-Jan-14	14.4	15.8	17.0
27-Jan-14	16.6	17.0	20.3
28-Jan-14	23.3	24.2	NR
29-Jan-14	23.0	26.1	NR
30-Jan-14	23.3	27.4	NR
31-Jan-14	27.2	29.4	NR

February 2014			
SAMPLE DATE	SITE 1 24-hr Average ($\mu g/m^3$)	SITE 2 24-hr Average ($\mu g/m^3$)	SITE 3 24-hr Average ($\mu g/m^3$)
01-Feb-14	34.4	34.9	33.9
02-Feb-14	23.3	22.6	31.7
03-Feb-14	27.0	27.9	20.5
04-Feb-14	34.6	37.7	23.4
05-Feb-14	20.1	20.9	33.6
06-Feb-14	13.5	14.0	19.5
07-Feb-14	25.0	29.4	12.5
08-Feb-14	22.5	23.6	20.6
09-Feb-14	20.4	24.2	17.4
10-Feb-14	41.9	40.8	38.1
11-Feb-14	26.2	25.2	20.3
12-Feb-14	24.6	24.0	21.5
13-Feb-14	34.7	34.5	21.1
14-Feb-14	18.1	18.0	25.3
15-Feb-14	19.8	20.1	22.6
16-Feb-14	17.4	18.8	21.1
17-Feb-14	16.8	17.0	16.5
18-Feb-14	22.2	21.0	15.1
19-Feb-14	19.0	19.2	26.1
20-Feb-14	15.8	17.3	NR
21-Feb-14	29.3	25.7	20.7
22-Feb-14	22.8	23.0	19.3
23-Feb-14	20.7	20.3	19.2
24-Feb-14	13.8	15.0	22.4
25-Feb-14	15.7	16.1	17.7
26-Feb-14	23.9	27.5	25.5
27-Feb-14	28.8	27.9	25.1
28-Feb-14	9.6	9.2	11.4

March 2014			
SAMPLE DATE	SITE 1 24-hr Average ($\mu g/m^3$)	SITE 2 24-hr Average ($\mu g/m^3$)	SITE 3 24-hr Average ($\mu g/m^3$)
01-Mar-14	11.0	10.7	10.0
02-Mar-14	11.2	10.7	8.9
03-Mar-14	9.9	9.4	8.7
04-Mar-14	10.2	10.3	7.6
05-Mar-14	15.8	15.9	9.5
06-Mar-14	19.4	20.2	16.7
07-Mar-14	25.5	26.0	21.2
08-Mar-14	14.5	13.8	22.1
09-Mar-14	16.4	15.7	11.9
10-Mar-14	18.6	18.8	11.8
11-Mar-14	20.5	18.5	15.0
12-Mar-14	19.6	19.7	15.6
13-Mar-14	24.1	22.9	17.2
14-Mar-14	17.4	19.1	20.9
15-Mar-14	10.7	10.8	17.6
16-Mar-14	14.2	13.8	6.1
17-Mar-14	10.5	10.9	14.2
18-Mar-14	15.9	20.8	7.4
19-Mar-14	26.8	28.6	13.5
20-Mar-14	14.8	NR	24.5
21-Mar-14	15.3	13.7	14.8
22-Mar-14	11.9	10.9	12.0
23-Mar-14	19.2	21.9	7.9
24-Mar-14	20.1	18.7	17.3
25-Mar-14	13.3	14.3	15.6
26-Mar-14	12.0	11.4	13.2
27-Mar-14	7.4	8.1	13.0
28-Mar-14	9.0	8.9	6.9
29-Mar-14	7.9	8.6	6.6
30-Mar-14	16.4	15.9	5.2
31-Mar-14	17.8	16.7	13.9

April 2014			
SAMPLE DATE	SITE 1 24-hr Average ($\mu g/m^3$)	SITE 2 24-hr Average ($\mu g/m^3$)	SITE 3 24-hr Average ($\mu g/m^3$)
01-Apr-14	16.8	15.8	15.0
02-Apr-14	20.2	19.0	17.8
03-Apr-14	18.5	18.0	NR
04-Apr-14	15.8	15.4	NR
05-Apr-14	10.9	10.7	NR
06-Apr-14	11.3	12.7	15.1
07-Apr-14	10.6	11.6	10.3
08-Apr-14	16.0	16.0	14.5
09-Apr-14	17.4	17.2	14.7
10-Apr-14	21.3	18.8	16.5
11-Apr-14	15.8	15.1	12.5
12-Apr-14	9.3	10.2	7.4
13-Apr-14	12.4	12.9	10.3
14-Apr-14	15.3	15.5	12.6
15-Apr-14	11.4	12.2	15.9
16-Apr-14	14.9	15.8	14.8
17-Apr-14	14.7	14.7	16.7
18-Apr-14	14.6	15.0	14.0
19-Apr-14	18.6	16.5	14.0
20-Apr-14	12.0	11.7	10.7
21-Apr-14	15.6	14.7	12.4
22-Apr-14	16.9	17.0	16.9
23-Apr-14	24.0	18.1	14.4
24-Apr-14	19.7	19.9	13.8
25-Apr-14	12.3	13.5	12.8
26-Apr-14	16.0	11.8	9.1
27-Apr-14	10.7	10.8	14.6
28-Apr-14	23.6	8.9	14.6
29-Apr-14	14.2	13.7	10.4
30-Apr-14	16.5	8.3	6.3

May 2014			
SAMPLE DATE	SITE 1 24-hr Average ($\mu g/m^3$)	SITE 2 24-hr Average ($\mu g/m^3$)	SITE 3 24-hr Average ($\mu g/m^3$)
01-May-14	14.5	13.8	10.7
02-May-14	13.5	12.5	8.7
03-May-14	8.0	8.3	5.6
04-May-14	7.4	7.9	4.5
05-May-14	7.5	8.2	5.1
06-May-14	10.1	10.5	6.4
07-May-14	15.7	15.5	12.9
08-May-14	18.8	16.8	17.1
09-May-14	15.7	14.2	13.0
10-May-14	15.4	14.5	10.7
11-May-14	10.3	9.9	8.1
12-May-14	11.7	12.5	10.2
13-May-14	18.6	16.5	14.4
14-May-14	22.0	15.3	13.1
15-May-14	NR	10.8	8.9
16-May-14	10.3	10.7	8.1
17-May-14	12.0	11.6	8.2
18-May-14	14.4	14.1	10.1
19-May-14	14.0	14.3	9.8
20-May-14	13.9	15.3	10.3
21-May-14	18.3	18.7	14.0
22-May-14	16.8	16.5	11.9
23-May-14	17.1	17.0	11.7
24-May-14	13.5	14.5	9.2
25-May-14	14.2	14.7	9.8
26-May-14	15.1	15.9	11.2
27-May-14	18.6	20.1	13.5
28-May-14	11.5	11.8	8.2
29-May-14	12.9	17.0	21.0
30-May-14	16.5	15.4	19.7
31-May-14	9.7	11.7	9.8

June 2014			
SAMPLE DATE	SITE 1 24-hr Average ($\mu g/m^3$)	SITE 2 24-hr Average ($\mu g/m^3$)	SITE 3 24-hr Average ($\mu g/m^3$)
01-Jun-14	4.1	17.2	11.7
02-Jun-14	6.0	5.2	9.0
03-Jun-14	3.6	4.3	4.1
04-Jun-14	13.9	12.1	5.6
05-Jun-14	13.4	13.5	10.1
06-Jun-14	11.6	12.6	9.1
07-Jun-14	9.5	10.1	14.4
08-Jun-14	14.3	16.3	11.1
09-Jun-14	11.2	10.7	11.0
10-Jun-14	12.4	8.8	10.5
11-Jun-14	14.6	8.3	10.4
12-Jun-14	13.5	10.7	9.7
13-Jun-14	32.8	24.4	14.6
14-Jun-14	4.4	4.1	8.4
15-Jun-14	4.6	5.0	4.0
16-Jun-14	3.8	4.0	4.0
17-Jun-14	5.4	3.7	4.4
18-Jun-14	10.5	4.3	4.5
19-Jun-14	11.1	9.4	6.4
20-Jun-14	8.2	8.5	7.0
21-Jun-14	10.8	9.9	8.0
22-Jun-14	9.7	6.6	9.1
23-Jun-14	5.5	6.3	6.6
24-Jun-14	8.3	8.3	6.7
25-Jun-14	8.5	9.3	9.0
26-Jun-14	7.3	8.1	7.5
27-Jun-14	12.2	10.5	8.9
28-Jun-14	2.0	3.6	8.1
29-Jun-14	5.7	7.3	6.1
30-Jun-14	6.9	7.3	4.7

TSP-HVAS MONITORING RESULTS – July 2013 to June 2014

SAMPLE DATE	SITE 1 TSP ($\mu g/m^3$)	SITE 2 TSP ($\mu g/m^3$)	SITE 3 TSP ($\mu g/m^3$)
2-Jul-13	20.0	17.0	17.0
8-Jul-13	17.0	19.0	21.0
14-Jul-13	23.0	23.0	24.0
20-Jul-13	6.0	6.0	6.0
26-Jul-13	14.0	14.0	14.0
1-Aug-13	23.0	24.0	41.0
7-Aug-13	27.0	34.0	29.0
13-Aug-13	12.0	13.0	13.0
19-Aug-13	23.0	88.0	16.0
25-Aug-13	11.0	28.0	12.0
31-Aug-13	44.0	89.0	41.0
6-Sep-13	32.0	35.0	35.0
12-Sep-13	42.0	48.0	41.0
18-Sep-13	12.0	17.0	12.0
24-Sep-13	41.0	81.0	40.0
30-Sep-13	20.0	40.0	34.0
6-Oct-13	36.0	41.0	37.0
12-Oct-13	53.0	44.0	63.0
18-Oct-13	78.0	64.0	89.0
24-Oct-13	81.0	99.0	45.0
30-Oct-13	56.0	53.0	52.0
5-Nov-13	52.0	52.0	111.0
11-Nov-13	25.0	27.0	28.0
17-Nov-13	28.0	31.0	40.0
23-Nov-13	11.0	15.0	16.0
29-Nov-13	27.0	28.0	35.0
5-Dec-13	34.0	40.0	31.0
11-Dec-13	51.0	54.0	55.0
17-Dec-13	40.0	38.0	56.0
23-Dec-13	57.0	54.0	54.0
29-Dec-13	54.0	58.0	73.0

SAMPLE DATE	SITE 1 TSP ($\mu g/m^3$)	SITE 2 TSP ($\mu g/m^3$)	SITE 3 TSP ($\mu g/m^3$)
4-Jan-14	61.0	58.0	61.0
10-Jan-14	72.0	69.0	72.0
16-Jan-14	100.0	97.0	100.0
22-Jan-14	48.0	44.0	60.0
28-Jan-14	68.0	68.0	75.0
3-Feb-14	88.0	88.0	103.0
9-Feb-14	62.0	67.0	72.0
15-Feb-14	40.0	40.0	44.0
21-Feb-14	52.0	47.0	57.0
27-Feb-14	65.0	62.0	119.0
5-Mar-14	34.0	39.0	67.0
11-Mar-14	52.0	47.0	52.0
17-Mar-14	20.0	23.0	18.0
23-Mar-14	43.0	69.0	56.0
29-Mar-14	18.0	17.0	13.0
4-Apr-14	24.0	30.0	27.0
10-Apr-14	21.0	37.0	38.0
16-Apr-14	50.0	51.0	51.0
22-Apr-14	35.0	32.0	23.0
28-Apr-14	27.0	21.0	27.0
4-May-14	8.0	11.0	8.0
10-May-14	26.0	27.0	27.0
16-May-14	14.0	15.0	24.0
22-May-14	27.0	22.0	25.0
28-May-14	14.0	16.0	14.0
3-Jun-14	6.0	6.0	10.0
9-Jun-14	38.0	35.0	44.0
15-Jun-14	9.0	9.0	9.0
21-Jun-14	33.0	29.0	31.0
27-Jun-14	13.0	16.0	25.0
Annual Average	**36.4**	**40.4**	**41.5**

APPENDIX 3

Water Monitoring Results

MONTHLY SURFACE WATER MONITORING RESULTS – July 2013 to June 2014

	pH					EC (µS/cm)					TSS (mg/L)				
DATE	Dam 1/2	MCC12 Final Settling Pond	No.2 Open Cut Void	No.1 Open Cut Void	Washdown Dam	Dam 1/2	MCC12 Final Settling Pond	No.2 Open Cut Void	No.1 Open Cut Void	Washdown Dam	Dam 1/2	MCC12 Final Settling Pond	No.2 Open Cut Void	No.1 Open Cut Void	Washdown Dam
31-Jul-13	7.88	8.3	7.97	7.7	7.78	5400	6860	5980	5320	2340	6	11.0	5	8	91
27-Aug-13	8.09	8.3	8.05	7.83		5900	11200	6250	5270		12	7.0	17	12	
24-Sep-13	8.11	8.2	8.13			6410	12700	6160			13	24.0	16		
23-Oct-13	7.5	8.2	8.07	7.72		5940	14400	6460	6220		6	13.0	<5	<5	
21-Nov-13	7.85	7.6	7.87		7.15	5200	3060	5990		2540	32	12.0	38		14
17-Dec-13	7.3	9.0	8.04			6090	6690	6460			12	31.0	50		
21-Jan-14	7.85	8.3	8.06	7.8		6260	11600	6380	5700		<5	53.0	<5	<5	
26-Feb-14	7.23	8.6	8.05			5800	7690	6380			6	7.0	<5		
17-Mar-14	7.71	8.1	8.08	7.78	7.54	5910	5270	6290	5700	3870	<5	45.0	8	<5	11
15-Apr-14	7.72	7.9	8.13	7.57		5570	5230	5980	4990		28	34.0	15	20	
15-May-14	7.8	8.3	7.99			6200	6360	6420			8	16.0	10		
25-Jun-14	8.1	8.3	8.04			7020	9250	6450			<5	9.0	<5		
Annual Average	**7.8**	**8.3**	**8.0**	**7.7**	**7.5**	**5975**	**8359**	**6267**	**5533**	**2917**	**14**	**22**	**20**	**13**	**39**

QUARTERLY SURFACE WATER MONITORING RESULTS – July 2013 to June 2014

	DATE	MCC7	MCC8	MCC9	MCC23	MCC24	MCC25	MCC26	MCC27
pH	24-Sep-13	7.7	7.9	8.5	8.7	8.1	dry	8.7	8.2
	17-Dec-13	7.6	7.7	8.9	8.1	8.8	7.5	8.6	8.4
	17-Mar-14	7.7	7.7	8.6	8.7	8.1	0.0	8.6	8.3
	25-Jun-14	8.0	8.0	8.3	9.1	8.0	0.0	9.0	8.1
EC (µS/cm)	24-Sep-13	3110	3930	4230	2860	4860	dry	6900	9850
	17-Dec-13	1750	2560	4080	1100	2850	1740	2800	9440
	17-Mar-14	2550	2960	4200	1810	4190	0	4490	8460
	25-Jun-14	3430	4720	3660	2040	3830	0	5280	10600
TSS (mg/L)	24-Sep-13	8	10	8	13	14	dry	15	17
	17-Dec-13	30	5	24	5	16	13	25	<5
	17-Mar-14	18	17	5	8	<5	0	<5	13
	25-Jun-14	5	5	5	55	9	0	6	11

ANNUAL COMPREHENSIVE SURFACE WATER QUALITY ANALYSIS – *17 March 2014*

ANALYTE	Dam 1/2	MCC12 Final Settling Pond	Washdown Dam	No.1 Open Cut Void	No.2 Open Cut Void	MCC6	MCC7	MCC8	MCC9	MCC13	MCC17	MCC23	MCC24	MCC25	MCC26	MCC27
pH	7.71	8.13	7.54	7.78	8.08	7.62	7.73	7.66	8.56	8.08	7.71	8.73	*8.14*	dry	8.62	8.28
EC (*µS/cm*)	5910	5270	3870	5700	6290	4440	2550	2960	4200	3170	8460	1810	*4190*	dry	4490	8460
TDS *(mg/L)*	4620	4520	2830	4630	5490	3240	1460	1740	3400	2050	7060	1260	*2100*	dry	3300	6360
TSS *(mg/L)*	<5	45	11	<5	8	10	18	17	5	8	24	8	*<5*	dry	<5	13
Hardness - total (calculation - *mg/L*)	2880	2790	1920	2960	3140	1520	605	722	2120	1090	2990	778	*1890*	dry	2350	1000
Alkalinity - Carbonate *(mg $CaCO_3$/L)*	<1	<1	<1	<1	<1	<1	<1	<1	11	<1	<1	29	*<1*	dry	22	<1
Alkalinity - Bicarbonate *(mg $CaCO_3$/L)*	274	113	76	153	180	215	206	171	54	204	296	107	*77*	dry	91	286
Sulfates *(mg/L)*	3030	2940	2040	3200	3070	1380	274	478	2270	899	3080	737	*2010*	dry	2630	4400
Chloride *(mg/L)*	543	359	268	530	577	606	544	565	308	441	1170	93	*313*	dry	204	714
Calcium - total *(mg/L)*	548	422	292	582	541	297	130	144	210	135	440	84	*280*	dry	158	387
Magnesium - total *(mg/L)*	366	422	288	365	434	188	68	88	388	182	459	138	*290*	dry	474	738
Sodium - total *(mg/L)*	468	410	276	456	498	521	361	404	356	372	1230	130	*427*	dry	347	906
Potassium - total *(mg/L)*	44	31	21	45	47	8	5	5	27	10	23	18	*26*	dry	21	32
Iron- filterable *(mg/L)*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	*<0.05*	dry	<0.05	<0.05
Arsenic *(mg/L)*	0.001	<0.001	<0.001	<0.001	0.002	0.002	0.004	0.004	<0.001	0.004	0.003	0.006	*0.003*	dry	0.001	<0.001
Barium *(mg/L)*	0.032	0.033	0.031	0.045	0.022	0.038	0.068	0.059	0.026	0.057	0.114	0.063	*0.025*	dry	0.028	0.027
Cadmium *(mg/L)*	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	*<0.0001*	dry	<0.0001	<0.0001
Chromium *(mg/L)*	<0.001	<0.001	0.002	<0.001	<0.001	0.01	<0.001	0.001	<0.001	0.002	0.002	<0.001	*0.003*	dry	<0.001	0.006
Copper *(mg/L)*	<0.001	0.002	0.003	0.002	0.001	<0.001	0.001	0.001	<0.001	<0.001	0.002	0.002	*0.001*	dry	0.001	0.001
Nickel *(mg/L)*	0.018	0.011	0.011	0.165	0.063	0.002	<0.001	<0.001	0.003	0.002	0.002	0.004	*0.006*	dry	0.003	0.007
Lead *(mg/L)*	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	*<0.001*	dry	<0.001	<0.001
Zinc *(mg/L)*	<0.005	0.005	0.007	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.017	<0.005	*<0.005*	dry	0.006	<0.005
Manganese - filterable *(mg/L)*	1	0.07	0.26	0.529	0.554	0.557	0.118	0.115	0.034	1.2	0.428	0.114	*0.121*	dry	0.008	0.119
Selenium *(mg/L)*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	*<0.01*	dry	<0.01	<0.01
Boron *(mg/L)*	0.46	0.25	0.18	0.42	0.62	0.13	0.08	0.07	0.07	0.06	0.15	0.12	*<0.05*	dry	0.08	0.18
Iron - total *(mg/L)*	1.59	0.14	0.11	<0.05	0.09	0.33	0.57	0.61	0.1	0.33	0.9	0.29	*0.28*	dry	0.07	0.18
Mercury *(mg/L)*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	*<0.0001*	dry	<0.0001	<0.0001
Fluoride - total *(mg/L)*	0.6	0.9	0.7	0.8	0.6	0.4	0.4	0.4	0.3	0.3	0.4	0.6	*0.6*	dry	0.5	0.7
Nitrogen Ammonia *(mg N/L)*	4.16	0.02	0.02	0.7	1.87	0.03	0.02	0.02	0.02	0.06	0.05	<0.01	*0.1*	dry	<0.01	0.04
Nitrates *(mg N/L)*	0.62	0.53	0.11	4.88	2.7	0.04	0.04	0.15	<0.01	<0.01	<5	<0.01	*<0.01*	dry	<0.01	<0.01
Oil & Grease *(mg/L)*	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1.0	<5	*<5*	dry	<5	<5
PAH *(mg/L)*	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<70	<1.0	*<1.0*	dry	<1.0	<1.0
Total Petroleum Hydrocarbons *(mg/L)*	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	*<70*	dry	<70	<70

MONTHLY GROUND WATER MONITORING RESULTS – July 2013 to June 2014

BORE RDH650 *No.2 Underground Workings*			
DATE	**RL** *(Metres,AHD)*	**pH**	**EC** *(µS/cm)*
02-Jul-13	114.93		
29-Jul-13	115.98		
27-Aug-13	115.98		
24-Sep-13	114.97		
23-Oct-13	114.98		
22-Nov-13	116.48		
16-Dec-13	117.03		
29-Jan-14	115.96	7.0	5590
26-Feb-14	115.97	6.8	5260
17-Mar-14	115.98	7.4	5320
16-Apr-14	115.93	7.4	5170
15-May-14	115.98	7.0	5430
23-Jun-14	115.95		
AVERAGE	**115.81**	**6.9**	**5425**

ANNUAL COMPREHENSIVE GROUND WATER QUALITY ANALYSIS – *17 March 2014*

ANALYTE	RDH650
pH	7.4
EC (*µS/cm*)	5320
TDS *(mg/L)*	3980
TSS *(mg/L)*	50
Hardness - total (calculation - *mg/L*)	2710
Alkalinity - Carbonate *(mg $CaCO_3$/L)*	<1
Alkalinity - Bicarbonate *(mg $CaCO_3$/L)*	306
Sulfates *(mg/L)*	2350
Chloride *(mg/L)*	599
Calcium - total *(mg/L)*	510
Magnesium *(ppm)*	
Magnesium - total *(mg/L)*	348
Sodium - total *(mg/L)*	386
Potassium - total *(mg/L)*	34
Iron- filterable *(mg/L)*	23.7
Arsenic *(mg/L)*	<0.001
Barium *(mg/L)*	0.033
Cadmium *(mg/L)*	<0.0001
Chromium *(mg/L)*	0.002
Copper *(mg/L)*	0.002
Nickel *(mg/L)*	0.37
Lead *(mg/L)*	<0.001
Zinc *(mg/L)*	0.107
Manganese - filterable *(mg/L)*	1.98
Selenium *(mg/L)*	<0.01
Boron *(mg/L)*	0.24
Iron - total *(mg/L)*	27.7
Mercury *(mg/L)*	<0.0001
Fluoride - total *(mg/L)*	0.6
Nitrogen Ammonia *(mg N/L)*	2.3
Nitrates *(mg N/L)*	0.01
Oil & Grease *(mg/L)*	<5
PAH *(mg/L)*	<1.0
Total Petroleum Hydrocarbons (mg/L)	<70

HISTORICAL GROUND WATER *(underground workings)* MONITORING RESULTS

RDH522/RDH529/RDH650

DEPTH (RL)	
DATE	RL
30-Jan-02	154.7
07-Feb-02	154.6
19-Feb-02	154.1
03-Apr-02	152.5
12-Apr-02	151.7
19-Apr-02	152.2
26-Apr-02	152.7
06-May-02	153.2
10-May-02	153.4
18-May-02	153.7
27-May-02	153.4
31-May-02	153.2
07-Jun-02	153.1
14-Jun-02	153.1
26-Jun-02	153.0
08-Jul-02	152.5
16-Jul-02	152.4
23-Jul-02	152.3
20-Dec-02	148.5
16-Feb-04	137.3
26-Jul-04	133.4
13-Aug-04	133.0
21-Jan-05	127.5
08-Jul-05	124.1
28-Jul-05	130.6
31-Aug-05	136.1
29-Sep-05	142.7
10-Oct-05	145.3
09-Nov-05	149.4
09-Dec-05	149.2
10-Jan-06	139.5
17-Feb-06	148.7
31-Mar-06	152.2
16-Feb-07	126.92
26-Feb-07	125.34
12-Mar-07	124.55
24-May-07	89.07
31-May-07	92.84
28-Jun-07	121.07
11-Jul-07	114.95
27-Jul-07	114.15
15-Aug-07	112.58
05-Sep-07	114.54
21-Sep-07	108.82
16-Oct-07	108.42
14-Nov-07	106.31
18-Dec-07	115.32
09-Jan-08	118.39
20-Feb-08	125.41
12-Mar-08	123.78
15-May-08	121.48
19-Jun-08	122.00
17-Jul-08	130.65
22-Aug-08	133.28
11-Sep-08	135.41
02-Oct-08	134.40
31-Oct-08	138.36
11-Nov-08	139.54
24-Nov-08	142.12
03-Dec-08	141.89
09-Dec-08	141.45
15-Dec-08	143.77

DEPTH (RL)	
11-Feb-09	148.73
16-Feb-09	149.67
24-Feb-09	150.16
04-Mar-09	150.52
12-Mar-09	151.16
28-Mar-09	151.33
15-Apr-09	152.51
29-May-09	152.98
22-Jul-09	153.44
20-Aug-09	155.83
07-Sep-09	156.85
25-Sep-09	157.99
15-Oct-09	157.77
10-Nov-09	157.18
24-Nov-09	157.33
03-Dec-09	157.74
08-Dec-09	157.84
18-Dec-09	158.14
06-Jan-10	158.15
25-Jan-10	156.98
04-Feb-10	156.25
11-Feb-10	156.37
26-Feb-10	155.82
14-Apr-10	153.62
12-May-10	148.75
08-Jun-10	148.34
08-Jul-10	149.90
09-Aug-10	148.12
12-Oct-10	153.69
08-Dec-10	149.84
06-Jan-11	148.99
09-Feb-11	149.93
08-Mar-11	147.43
11-Apr-11	150.74
10-May-11	148.04
20-Jul-11	143.77
23-Aug-11	138.83
12-Sep-11	134.97
26-Sep-11	135.19
25-Oct-11	135.56
15-Nov-11	135.56
20-Dec-11	139.12
04-Jan-12	142.84
07-Feb-12	144.19
21-Feb-12	144.58
20-Apr-12	144.69
23-May-12	145.15
22-Jun-12	146.75
24-Jul-12	145.97
22-Aug-12	138.83
26-Oct-12	134.14
14-Dec-12	130.90
04-Jan-13	130.87
08-Feb-13	138.202
08-Mar-13	131.822
16-Apr-13	125.482
26-Jun-13	114.875
02-Jul-13	114.932
29-Jul-13	115.982
27-Aug-13	115.982
24-Sep-13	114.972
23-Oct-13	114.982
22-Nov-13	116.482
16-Dec-13	117.032
29-Jan-14	115.96
26-Feb-14	115.97
17-Mar-14	115.98
16-Apr-14	115.93
15-May-14	115.98
23-Jun-14	115.95

WATER QUALITY		
DATE	pH	EC
01-Jul-02	7.2	6000
09-Dec-05	6.9	3270
10-Jan-06	6.7	3250
17-Feb-06	6.9	3300
31-Mar-06	6.9	6400
12-Mar-07	6.6	6740
11-Apr-07	7.2	5110
15-Aug-07	6.69	4930
05-Sep-07	7.34	4610
21-Sep-07	7.14	4950
16-Oct-07	7.81	4510
14-Nov-07	7.91	4690
18-Dec-07	7.98	4740
09-Jan-08	7.97	4790
20-Feb-08	7.99	4770
12-Mar-08	6.7	5710
15-May-08	6.84	5110
11-Sep-08	6.7	4540
06-Jan-09	7.2	4920
16-Feb-09	7.2	4770
12-Mar-09	7.3	4810
15-Apr-09	7.0	5000
29-May-09	7.1	4810
15-Jun-09	7.2	4960
22-Jul-09	5.9	4350
20-Aug-09	7.0	5080
25-Sep-09	7.2	4820
15-Oct-09	6.4	4590
24-Nov-09	7.0	4930
18-Dec-09	6.3	4610
25-Jan-10	6.9	4990
04-Feb-10	7.1	5950
14-Apr-10	7.5	5300
12-May-10	6.9	4980
08-Jun-10	7.8	4670
08-Jul-10	7.0	3590
10-Aug-10	7.1	5275
14-Sep-10	7.1	5420
01-Dec-10	7.5	5270
06-Jan-11	7.8	4800
09-Feb-11	6.8	5150
08-Mar-11	7.4	5390
11-Apr-11	7.5	5250
10-May-11	7.0	5930
20-Sep-11	7.6	4720
25-Oct-11	7.7	5340
15-Nov-11	7.7	5390
21-Feb-12	7.6	5530
22-Aug-12	7.6	5885
14-Dec-12	7.3	5680
21-Mar-13	7.6	5740
16-Apr-13	7.3	5720
10-May-13	7.5	5590
26-Jun-13	7.5	5650
29-Jan-14	7.0	5590
26-Feb-14	6.8	5260
17-Mar-14	7.4	5320
15-Apr-14	7.4	5170
15-May-14	7.0	5430

APPENDIX 4

Blast Monitoring Data

No.1 OPEN CUT BLAST MONITORING RESULTS – July 2013 to June 2014

Blast ID	Date	Time	Type	School (B2)		Nisbet (B4)		*99 Queen Street (B3)*		Queen Street (B1)	
				Overpressure *dB(L)*	Ground Vibration *mm/s*	Overpressure *dB(L)*	Ground Vibration *mm/s*	Overpressure *dB(L)*	Ground Vibration *mm/s*	Overpressure *dB(L)*	Ground Vibration *mm/s*
OR892	5-Jul-13	12:17	I	90.9	0.06	106.7	0.23	101	0.15	101.1	0.22
OR893	11-Jul-13	14:00	I	90.9	0.05	100.7	0.147	93.6	0.1	98.2	0.14
OR894	12-Jul-13	12:46	I	92.4	0.04	92.6	0.096	88.5	0.09	98.2	0.1
OR895	18-Jul-13	12:46	I	90.4	0.05	92.5	0.13	91.4	0.1	93.7	0.14
OR896	19-Jul-13	12:50	I	98.4	0.09	103.8	0.338	96.1	0.2	101.1	0.28
OR897	26-Jul-13	12:49	I	95.6	0.08	94.3	0.104	99.6	0.08	93.7	0.09
OR898	29-Jul-13	13:06	O	101.3	0.06	107.2	0.149	100.5	0.11	99.8	0.14
OR899	29-Jul-13	12:51	I	95.3	0.04	105.7	0.058	98.6	0.08	95.1	0.07
OR900	30-Jul-13	12:09	I	90.4	0.04	96.6	0.084	92.6	0.08	NR	NR
OR901	2-Aug-13	12:14	I	91.9	0.06	99.7	0.084	93.6	0.09	93.7	0.09
OR903	9-Aug-13	12:51	I	87.2	0.06	101.3	0.097	99.6	0.09	101.7	0.11
OR902	9-Aug-13	12:55	O	100.3	0.11	103.8	0.383	99.1	0.2	99.8	0.25
OR904	12-Aug-13	12:51	O	95.3	0.09	101.4	0.299	102.1	0.2	102.8	0.2
OR905	13-Aug-13	12:39	O	94.6	0.1	104.5	0.331	97.4	0.23	NR	NR
OR906	15-Aug-13	12:42	O	98.4	0.19	107.4	0.455	100.1	0.38	99.8	0.31
OR907	16-Aug-13	12:43	Other	90.4	0.09	107.1	0.266	92.6	0.18	90.2	0.12
OR908	19-Aug-13	12:54	I	104.7	0.08	114.2	0.156	110.2	0.1	108.8	0.07
OR909/910	20-Aug-13	14:38	O/Other	90.9	0.2	102.4	0.403	93.6	0.45	98.2	0.27
OR911	21-Aug-13	12:54	I	99.2	0.05	103.1	0.195	101.8	0.14	99	0.09
OR912	23-Aug-13	13:05	O	113.7	0.22	110.3	0.533	99.1	0.32	111.8	0.26
OR913	23-Aug-13	13:08	I	96.4	0.06	107.4	0.253	102.8	0.17	109.8	0.1
OR914	26-Aug-13	13:46	I	96.7	0.04	102.8	0.136	98.6	0.11	96.2	0.06
OR915	28-Aug-13	12:50	I	96.2	0.04	103.9	0.188	99.6	0.09	96.2	0.07
OR916	6-Sep-13	12:49	O	101.9	0.16	106.1	0.617	103.2	0.34	102.3	0.28
OR917	9-Sep-13	12:55	Other	88.6	0.05	99.7	0.162	90.1	0.11	87.7	0.07
OR918	11-Sep-13	11:52	O	98.2	0.2	104.4	0.611	98.6	0.36	97.3	0.32
OR919	13-Sep-13	12:26	Other	92.4	0.08	114.3	0.156	99.1	0.14	101.7	0.11
OR920	17-Sep-13	12:54	O	112.6	1.54	107.1	0.162	104.9	0.13	106.8	0.07
OR921	19-Sep-13	12:46	O	0.27	1.46	113.6	1.085	100.1	0.56	108.3	0.44
OR922	17-Oct-13	10:32	I	100.5	0.14	105.8	0.643	102.9	0.28	104.1	0.31
OR923	22-Oct-13	10:16	I	94.6	0.11	103.8	0.786	98	0.46	96.2	0.33
OR924	24-Oct-13	12:46	I	104.5	0.06	113	0.162	102.8	0.14	103.8	0.1
OR925	25-Oct-13	12:52	I	91.9	0.13	100.2	0.325	94.5	0.27	92.2	0.15
OR926	28-Oct-13	12:41	I	93.6	0.09	103.2	0.227	96.8	0.19	95.1	0.1
OR927	30-Oct-13	10:03	I	95.6	0.04	100.5	0.136	97.4	0.11	97.3	0.09
OR928	30-Oct-13	13:01	I	102.6	0.1	117.2	0.104	111.7	0.06	109.5	0.09
OR929	31-Oct-13	12:42	I	95.3	0.05	95.7	0.097	93.6	0.08	90.2	0.11

Blast ID	Date	Time	Type	School (B2)		Nisbet (B4)		*99 Queen Street (B3)*		Queen Street (B1)	
				Overpressure *dB(L)*	Ground Vibration *mm/s*	Overpressure *dB(L)*	Ground Vibration *mm/s*	Overpressure *dB(L)*	Ground Vibration *mm/s*	Overpressure *dB(L)*	Ground Vibration *mm/s*
OR930	1-Nov-13	12:11	I	95.9	0.08	105.2	0.169	98	0.15	95.1	0.21
OR931	4-Nov-13	14:35	I	95.6	0.09	112.7	0.026	98	0.13	101.7	0.17
OR932	5-Nov-13	9:25	I	94.6	0.04	100.3	0.045	98.6	0.06	99.8	0.06
OR933	7-Nov-13	12:09	I	89.9	0.04	96.3	0.097	92.6	0.08	93.7	0.05
OR934	8-Nov-13	13:23	O	97.7	0.04	104.4	0.071	92.6	0.09	101.7	0.11
OR935	11-Nov-13	12:46	I	89.9	0.03	98.7	0.052	97.4	0.05	99.8	0.06
OR936	15-Nov-13	12:47	O	NR	NR	NR	NR	NR	NR	NR	NR
OR937	20-Nov-13	12:55	I	95.9	0.1	105	0.208	98.6	0.19	97.3	0.22
OR938	26-Nov-13	12:50	I	99.2	0.11	108	0.253	100.1	0.29	105	0.28
OR939	27-Nov-13	12:51	O	87.9	0.1	92.3	0.039	90.1	0.06	90.2	0.05
OR940	28-Nov-13	14:12	I	98.6	0.06	98	0.182	93.6	0.13	99.8	0.22
OR941	2-Dec-13	12:45	I	89.3	0.06	99.2	0.13	95.4	0.1	95.1	0.09
OR942	3-Dec-13	12:43	I	100.7	0.05	101.5	0.117	96.1	0.17	95.1	0.12
OR943	5-Dec-13	12:14	I	105.3	0.04	109	0.078	107.4	0.08	106.5	0.07
OR944	18-Dec-13	12:43	I	95.6	0.11	105.3	0.357	97.4	0.29	99.8	0.23
OR945	19-Dec-13	12:40	I	91.9	0.04	97.4	0.117	97.4	0.13	95.1	0.12
OR946	23-Dec-13	14:37	I	109	0.1	108.1	0.234	105.7	0.18	107.4	0.28
OR947	7-Jan-14	12:42	I	99.8	0.04	108.8	0.078	100.1	0.06	104.6	0.09
OR948	8-Jan-14	12:46	I	95.6	0.03	110.5	0.071	92.6	0.06	103.3	0.05
OR949	13-Jan-14	12:50	I	93.2	0.05	102.6	0.188	98	0.17	95.1	0.14
OR950	15-Jan-14	12:59	I	95.9	0.05	108.5	0.143	100.1	0.17	99	0.16
OR951	21-Jan-14	14:55	I	93.9	0.05	102.3	0.182	97.4	0.14	102.8	0.15
OR952	23-Jan-14	12:41	I	98.4	0.05	110.5	0.156	100.1	0.1	105.4	0.12
OR593	11-Feb-14	12:58	I	94.6	0.05	97.6	0.097	97.4	0.09	98.2	0.12
OR594	13-Feb-14	11:58	I	96.4	0.05	100.2	0.11	98	0.1	97.3	0.1
OR595	21-Feb-14	10:40	I	99	0.08	102.9	0.104	101.4	0.14	100.5	0.12
OR956	27-Feb-14	10:50	I	91.9	0.06	97.6	0.156	94.5	0.1	99	0.11
OR957	3-Mar-14	12:48	O	100.1	0.05	101.6	0.092	100.5	0.09	99	0.06
OR958	6-Mar-14	12:52	O	NR	NR	NR	NR	NR	NR	NR	NR
OR959	10-Mar-14	12:45	I	89.9	0.08	99.3	0.117	94.5	0.17	92.2	0.12
OR960	19-Mar-14	12:44	O	98.4	0.06	NR	NR	102.5	0.15	98.2	0.11
OR961	20-Mar-14	14:13	I	98.4	0.04	104.7	0.11	102.1	0.08	99.8	0.06
OR962	25-Mar-14	12:28	O	NR	NR	NR	NR	NR	NR	NR	NR
OR963	31-Mar-14	15:23	I	98.6	0.1	100.1	0.21	100.1	0.11	99.8	0.11

Blast ID	Date	Time	Type	School (B2)		Nisbet (B4)		*99 Queen Street (B3)*		Queen Street (B1)	
				Overpressure *dB(L)*	Ground Vibration *mm/s*	Overpressure *dB(L)*	Ground Vibration *mm/s*	Overpressure *dB(L)*	Ground Vibration *mm/s*	Overpressure *dB(L)*	Ground Vibration *mm/s*
OR964	2-Apr-14	14:14	O	94.6	0.05	103	0.05	96.1	0.09	95.1	0.11
OR965	3-Apr-14	12:36	O	95.6	0.04	97.4	0.23	96.1	0.08	93.7	0.07
OR966	8-Apr-14	12:44	I	101.9	0.05	102.3	0.05	104.6	0.09	101.1	0.1
OR967	10-Apr-14	12:45	O	97.7	0.11	108.7	0.254	101.7	0.16	101.3	0.17
OR968	16-Apr-14	14:16	I	98.2	0.1	101.8	0.191	101.7	0.19	100.7	0.32
OR969	17-Apr-14	12:49	I	87.2	0.09	92.9	0.451	94.3	0.33	91.2	0.26
OR970	24-Apr-14	13:08	O	100.1	0.11	106.5	0.311	98.8	0.25	102.3	0.15
OR971	24-Apr-14	12:58	I	88.6	0.03	97.3	0.064	95.7	0.06	95.2	0.05
OR972	29-Apr-14	12:51	I	95.9	0.06	98.3	0.133	94.3	0.1	92.7	0.13
OR973	2-May-14	11:33	I	101.9	0.05	108.4	0.1	96.8	0.09	98	0.08
OR974	15-May-14	12:51	I	93.9	0.064	101.9	0.14	97.9	0.11	97.2	0.1
OR975	16-May-14	12:51	O	97.1	0.038	109	0.135	100.4	0.08	101.3	0.09
OR976	19-May-14	11:38	I	98.4	0.057	106.3	0.14	101.7	0.08	101.3	0.08
OR977	20-May-14	13:14	O	93.5	0.057	108.9	0.127	108.9	0.127	98	0.09
OR978	22-May-14	12:46	O	96	0.045	105	0.21	101.1	0.11	102.3	0.1
OR979	3-Jun-14	12:09	I	97.3	0.07	97.1	0.044	97.9	0.06	91.2	0.06
OR980	11-Jun-14	12:55	I	89.3	0.07	99.3	0.146	96.8	0.13	94.1	0.21
OR981	12-Jun-14	12:56	I	105.5	0.07	107.1	0.192	105.2	0.11	108.3	0.15
OR982	13-Jun-14	12:46	I	93.3	0.08	95.1	0.114	96.8	0.11	95.2	0.14
OR983	18-Jun-14	12:43	I	96.5	0.14	106.2	0.203	101.1	0.21	98.8	0.4
OR984	20-Jun-14	12:55	I	107.8	0.16	108.2	0.292	100.4	0.19	105.5	0.22
OR985	23-Jun-14	14:09	I	107.6	0.12	104.9	0.178	98.8	0.15	107.3	0.12
OR986	26-Jun-14	9:33	I	101.5	0.17	106.4	0.356	96.8	0.34	99.5	0.58
OR987	27-Jun-14	12:47	I	95.7	0.08	96.1	0.216	96.8	0.13	96.3	0.23
OR988	30-Jun-14	12:49	I	86.4	0.05	103.4	0.108	100.4	0.08	100.1	0.08

		School (B2)		Nisbet (B4)		*99 Queen Street (B3)*		Queen Street (B1)	
		Overpressure *dB(L)*	**Ground Vibration** *mm/s*	**Overpressure** *dB(L)*	**Ground Vibration** *mm/s*	**Overpressure** *dB(L)*	**Ground Vibration** *mm/s*	**Overpressure** *dB(L)*	**Ground Vibration** *mm/s*
AVERAGE		95.45	0.11	103.41	0.20	98.55	0.15	99.19	0.15
No Trigger:		0		0		0		0	
No Result:		3		4		3		5	
Equipment Fault:		0		0		0		0	
Blast Events Recorded per Monitor:		93	93	92	92	93	93	91	91
	OVERALL								
Total Number of Blast Events:	96								
Blast Data Captured (all monitors):	738								
% Data Captured (average):	96.1%	96.9%	96.9%	95.8%	95.8%	96.9%	96.9%	94.8%	94.8%
Blast Vibration >5mm/sec:	0		0		0		0		0
Blast Vibration >10mm/s:	0		0		0		0		0
Blast Overpressure >115dB:	1	0		1		0		0	
Blast Overpressure >120dB:	0	0		0		0		0	
% of Blast Events Over 115 dB:	1.04%	0.00%		1.09%		0.00%		0.00%	

APPENDIX 5

Complaints Summary

SUMMARY OF COMPLAINTS – July 2013 to June 2014

Date of Incident	Time of Complaint	Complainant ID	Nature of Complaint	Mode of Complaint	Complaint Comments	Action Taken
17-Aug-13	9:45 AM	86	DUST	Environmental Hotline - OCE responded	Dust leaving site and blowing towards house - very visable	Actions taken as per Dust Management Plan. OCE was aware of the issue and had commenced corrective actions prior to call.
10-Sep-13	3:22 PM	1	ODOUR	EPA Complaint Line - complaint noted and recorded accordingly	Dust leaving site and blowing towards house - very visable	Action taken as per Spontaneous Combustion Management Plan. Information only, no reply to EPA required.
11-Sep-13	11:00 AM	31	BLAST	Direct call to EA	Blast on 9 September was felt quite strongly, but no noise issues	Blast results below Consent conditions criteria - information explained to resident
17-Sep-13	5:30 PM	87	ODOUR	Environmental Hotline - Mine Geologist responded	Odour from mine	Actions taken as per Spontaneous Combustion Management Plan
19-Sep-13	12:51 PM	21	BLAST	Environmental Hotline - EA responded	felt tremor of blast, came in 2 waves	Blast results below Consent conditions criteria - information explained to resident
20-Sep-13	7:52 AM	15	ODOUR	Environmental Hotline - EA responded	Odour from mine	Actions taken as per Spntaneous Combustion Management Plan
25-Sep-13	11:28 AM	88	DUST	Environmental Hotline - EA responded	Dust cloud coming from MCC	Digger encountered an area that contained sealing material (fly ash), which was quite powdery. Equipment was shut down immediately and would not resume until water was applied to the area.
27-Sep-13	9:27 AM	88	DUST	Environmental Hotline - OCE responded	Large amount of dust this mornIng leaving the mine site.	Action taken as per Dust and Spontaneous Combustion Management Plan. 3 water carts in operations attending to fire/hot areas in pit and on ROM.
30-Sep-13	9:18 PM	15	SMOKE/ODOUR	Environmental Hotline - EA responded	How much longer will this issue continue. Worst he has ever seen in the 10 years he's live in Woodlands Ridge. The smoke was so bad he could not see his neighbor's house or go outside.	Action taken as per Spontaneous Combustion Management Plan. Water infustion and water carts in full operation to handle hot areas in pit and on ROM.
02-Oct-13	8:49 AM	89	DUST	Environmental Hotline - EA responded	Appreciative of the call back and information given regarding control measures being taken.	Action taken as per Dust and Spontaneous Combustion Management Plan. Water sprays on affected areas and 3 water carts operating continuously.
15-Apr-14	4:30 PM	90	DUST	Environmental Hotline - EO responded	Being covered in dust - what is going on?	Production stopped - water infusion to be carried out prior to re-entering work area.
08-May-14	7:30 PM	91	ODOUR	Environmental Hotline - OCE responded	sulphur smell	Action taken as per Spon Com Management Plan.
23-May-14	4:00 PM	6	NOISE	Direct Call - EO	Noise- Dozer tracks and reverse alarms	EO conducted investigation- tracks adjusted and reverse alarms changed to squelch type alarm
27-May-14	11:00 AM	92	DUST	Environmental Hotline - EO responded	Dust emitting from mine.	Crust up Old Turkeys Nest drill cuttings and run water carts
27-May-14	11:00 AM	1	DUST	EPA Complaint Line - EO responded	Very dusty towards Woodlands Ridge - have received numerous complaints	Extra water carts. Crust up drill cuttings.
20-Jun-14	1:03 PM	1	DUST	Environmental Hotline - OCE responded	Black dust blowing down the valley. Asked if we were running a watercart	Explained to the complainant that we had just let off a blast at MCC
28-Jun-14	7:55 AM	92	DUST	Environmental Hotline - OCE responded	observed dust on Friday (27 June) and again this morning.	Action taken as per Dust Management Plan. Relocated digger onto coal and monitored dust on horizon.