ANNUAL REVIEW
2014
(Annual Environmental Management Report)

Annual Review Title Block

MAULES CREEK COAL MINE		
Mining Operations Plan		
Name of Mine	Maules Creek Coal Mine	
Annual Review Commencement Date	1 January 2014	
Annual Review Completion Date	31 December 2014	
Mining Authorisations (Lease/License No.)	CL375, A346, MLA404, ML1701 and EL8072	
Name of Authorisation / Authorisation holder(s)	Aston Coal 2 Pty Ltd (75%), ICRA MC Pty Ltd (15%), J Power Australia Pty Ltd (10%)	
Name of Mine Operator (if different)	Maules Creek Coal Pty Limited	
Name and Contact Details of the Mine Manager (or equivalent)	**Name** **Title** **Address** **Phone Number** **Fax Number** **Email**	Peter Wilkinson General Manager, Maules Creek 121 Merton Street, Boggabri, NSW 2382 02 6749 7800 02 6749 7899 pwilkinson@whitehavencoal.com.au
Name and Contact Details of the Environmental Representative	**Name** **Title** **Address** **Phone Number** **Fax Number** **Email**	Craig Simmons Area Manager - Services, Maules Creek 121 Merton Street, Boggabri, NSW 2382 02 6749 7800 02 6749 7899 csimmons@whitehavencoal.com.au
Name of Representative of the Authorisation Holder (s)	**Name** **Title** **Address** **Phone Number** **Fax Number** **Email**	Matthew Sparkes Mine Manager – Maules Creek Coal 121 Merton Street, Boggabri, NSW 2382 02 6749 7800 02 6749 7899 msparkes@whitehavencoal.com.au
Name of Representative of the Authorisation Holder (s)	**Name** **Title** **Address** **Phone Number** **Fax Number** **Email**	Brian Cole Executive General Manager – Project Delivery 121 Merton Street, Boggabri, NSW 2382 02 6749 7800 02 6749 7899 bcole@whitehavencoal.com.au
Signature		
Date	24/07/15.	

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1.0 INTRODUCTION

Aston Coal 2 Pty Ltd submitted a Project Application to the New South Wales (NSW) Department of Planning (now the Department of Planning and Environment [DP&E]) in August 2010, for approval under Part 3A of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) to enable the construction and operation of the Maules Creek Coal Project. Project Approval (PA) 10_0138 for the Maules Creek Coal Mine (MCCM) was issued by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure on 23 October 2012.

This Annual Review has been prepared in accordance with Condition 4 of Schedule 5 of PA 10_0138. The relevant condition is repeated in **Table 1.1** below. Also included in the table are cross-references to the relevant sections in this document where each aspect is addressed.

Table 1.1: Condition 4 of PA 10_0138

Condition	Relevant Section of this Annual Review
Annual Review 4. By the end of March each year, the Proponent shall review the environmental performance of the project for the previous calendar year to the satisfaction of the Director-General. This review must:	All
a) describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year.	Sections 2 and 5
b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against the: • relevant statutory requirements, limits or performance measures/criteria; • monitoring results of previous years; and • relevant predictions in the EA;	Sections 3 and 4
c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	Section 3, 4 and 5
d) identify any trends in the monitoring data over the life of the project;	Section 3
e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and	Section 3
f) describe what measures will be implemented over the next year to improve the environmental performance of the project.	Section 3

This Annual Review also addresses the requirements of Condition 4 of Coal Lease (CL) 375, which was issued under the NSW *Mining Act, 1992.* As a result, the document has been given the subtitle of 'Maules Creek Annual Environmental Management Report (AEMR)'. The relevant CL 375 condition, and cross references to the relevant sections of this report are provided in **Table 1.2**. There are currently no guidelines associated with the preparation of AEMRs in the new format and therefore this Annual Review generally follows the format identified in the NSW Department of Primary Industries Mineral Resources (DPI-MR) (2006) document entitled "*EDG03 - Guidelines to the Mining, Rehabilitation and Environmental Management Process*" Version 3 dated January 2006 where appropriate.

Table 1.2: Condition 4 of CL 375

Condition	Relevant Section of this Annual Review
4. Environmental Management Report (a) The lease holder must lodge Environmental Management Reports (EMR) with the Director General annually or at dates otherwise directed by the Director General.	
(b) The EMR must: i. report against compliance with the Mining Operations Plan (MOP);	Section 3
ii. report on progress in respect of rehabilitation criteria;	Section 5
iii. report on the extent of compliance with regulatory requirements; and	Section 3
iv. have regard to any relevant guidelines adopted by the Director General.	Section 1

Although it primarily covers the period from 1 January 2014 to 31 December 2014 (the reporting period), where relevant this Annual Review also provides information on historical aspects of the MCCM, longer term trends in environmental monitoring results, and provides relevant information on activities to be undertaken during the ensuing period, i.e. 2015 calendar year, or beyond.

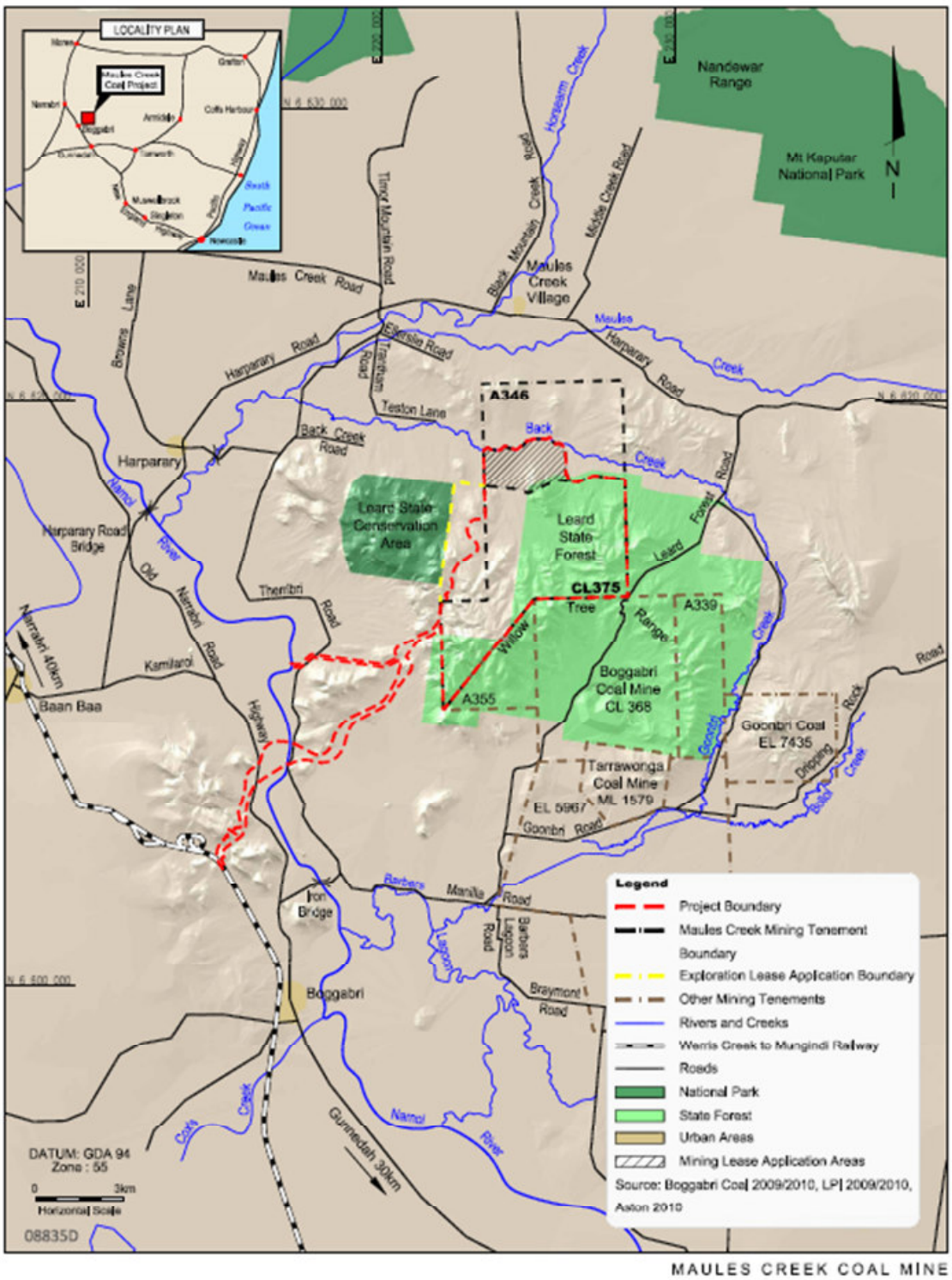
The MCCM is located within Narrabri Local Government Area (LGA), approximately 45 kilometres (km) north north-west of Gunnedah and 15 km north-east of Boggabri (**Figure 1.1**).

1.1 Project Background

The ownership of the MCCM currently lies with the Maules Creek Coal Joint Venture (MCCJV), a joint venture between Aston Coal 2 Pty Limited (a company 100% owned by Whitehaven Coal Limited [Whitehaven]) (75%), ITOCHU Coal Resources Australia Maules Creek Pty Ltd (ICRA MC Pty Ltd) (15%) and J-Power Australia Pty Limited (J-Power) (10%). The MCCM is managed by Maules Creek Coal Pty Ltd (MCC) a wholly owned subsidiary of Whitehaven) on behalf of the MCCJV.

The Construction Mining Operations Plan (CMOP) applicable to the earlier part of the 2014 reporting period was approved by the NSW Department of Trade and Investment – Division of Resources and Energy (DRE) on 5 June 2013. The current Mining Operations Plan (MOP) for MCCM was prepared under the new guidelines *"ESG3: Mining Operations Plan (MOP) Guidelines"* and was approved by the DRE on 24 February 2014 and covers the period 1 March 2014 to 1 March 2016.

Figure 1.1 – Project Locality Plan



MAULES CREEK COAL MINE

1.2 Project Description

Key components of the approved MCCM include:

- the construction and operation of an open cut mining operation extracting up to 13 million tonnes per annum (Mtpa) Run of Mine (ROM) coal from numerous seams down to the Templemore Seam;
- procurement of an open cut mining fleet including excavator / shovels and fleet of haul trucks, dozers, graders and water carts, utilising up to 470 permanent employees;
- the construction and operation of a Coal Handling and Preparation Plant (CHPP) with a throughput capacity of 13 Mtpa;
- the construction and operation of a Tailings Drying Area;
- the construction and operation of a rail spur, rail loop, associated load out facility and connection to the Werris Creek to Mungindi Railway Line;
- the construction and operation of a Mine Access Road;
- the construction and operation of administration, workshop and related facilities;
- the construction and operation of water management infrastructure including a water pipeline, pumping station and associated infrastructure for access to water from the Namoi River;
- the installation of supporting power and communications infrastructure; and
- the construction and operation of explosive magazine and explosives storage areas.

In April 2013, MCC lodged an application to modify PA 10_0138 under Section 75W of the EP&A Act. In the application, MCC sought approval for the following activities:

- construction and operation of a 5 km section of TransGrid's high voltage (132 kilovolt [kV]) electricity transmission line (ETL);
- construction of TransGrid's Boggabri North 132 kV Switching Station;
- a minor extension of an existing low voltage (11 kV) ETL to the MCCM Project Boundary to supplement power supplies; and
- a minor realignment of the CHPP and associated facilities including the product stockpiles and construction water pipeline.

The application was assessed by the DP&E and approved by a delegate of the Minister for Planning and Infrastructure on 25 July 2013.

In February 2014, MCC lodged an application to modify PA 10_0138 under Section 75W of the EP&A Act. In the application, MCC sought approval for the:

- Realignment of the raw water pipeline and the location of the pump installation adjacent the Namoi River.

The application was assessed by the DP&E and approved by a delegate of the Minister for Planning and Infrastructure on 10 March 2014.

The key activities undertaken during the current Annual Review reporting period involved the following tasks:

- Earthworks associated with the proposed activities including vegetation clearing, soil stripping and stockpiling;
- Construction of access roads;
- Installation of electrical infrastructure including substations, switch houses, overhead power lines and underground cables;
- Installation of communication infrastructure;
- Construction of the CHPP;

- Construction of a train load out facility and train provisioning facility;
- Construction of the Mine Infrastructure Area (MIA) including offices, parking area, bathhouse, electrical substation, workshops, wash bays, fuel and lubricants storage, water truck fill points;
- Construction of the ROM coal pad and hopper;
- Clearing of the areas required for the initial 2 years of open cut mining;
- Construction of product coal stockpile areas; and
- Construction of water management structures including dams, drains, culverts, water pump stations and pipelines.

Other activities associated with the MCCM that are located outside the lease boundaries include:

- Construction of the rail spur and loop;
- Construction of the mine access road;
- Upgrade of local Shire Roads;
- Construction of a raw water supply pump station and pipeline;
- Construction of communications and other facilities; and
- Construction of high voltage switchyard, substation and associated distribution lines.

1.3 Leases Licences and Approvals

Table 1.3 below provides a summary of the key licences, leases and approvals required for the MCCM under NSW and Commonwealth legislation to enable the construction and operation of the mine and associated infrastructure. The MCCM is considered to be a State Significant Development under Part 3A of the EP&A Act, and in line with the Mining Operations Plan (MOP) guidelines, is a Level 1 Mine.

1.4 Mine Contacts

The contact details relevant for the MCCM are provided in the Title Block at the front of this document.

Table 1.3: Licenses, Leases and Approvals

Approval	Reference	Detail	Validity Dates
Project Approval	PA 10_0138	Pursuant to the Maules Creek Coal Project Environmental Assessment (EA), the PAC approval of the Maules Creek Coal Mine referred to in schedule 1 subject to the conditions in schedules 2 to 5.	Granted 23 October 2012
Project Approval Modification	PA 10_0138 (MOD1)	Pursuant to the Maules Creek Project Approval Modification EA, the Modification was granted to allow modifications to infrastructure requirements.	Granted on 25 July 2013
Project Approval Modification	PA 10_0138 (MOD2)	Pursuant to the Maules Creek Project Approval Modification EA, the Modification was granted to allow modifications to infrastructure requirements.	Granted on 10 March 2014
Commonwealth Environmental Approval	EPBC 2010/5566	Approval granted under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act).	Granted on 11 February 2013.
Coal Lease	CL 375	Covers an area of approximately 4,200 hectares (ha). The southern part of the lease covers rights to mine from the surface to unlimited depth (~2,500 ha). The northern part of the lease covers rights to mine from 20 m depths to unlimited depth (~1,700 ha).	4 June 1991 to 4 June 2033
Authorisation	A 346	Covers the rights of the northern part of CL 375 from the surface to 20 metres (m) depth (~1,700 ha).	Expires 27 February 2016
Mining Lease Application	MLA 404	Covers the area to the north of the surface rights of CL 375, over a portion of A 346 that will accommodate part of the Northern Overburden Emplacement Area for the MCCM.	Submitted 25 May 2011 *(Not yet approved – subject to a right to negotiate process)
Exploration Lease Application	EL 8072	Covers the area to the west of CL 375 that will facilitate the extraction of some coal and accommodate some mine related infrastructure.	Expires 12 March 2018
Mining Lease	ML 1701	Covers the area to the west of CL 375 within EL 8072 and the MCCM Project Boundary that will facilitate the extraction of some coal and accommodate some mine related infrastructure.	Granted 9 October 2014
Environmental Protection Licence (EPL)	EPL20221	Applies to activities associated with the construction of the MCCM.	Latest Revision from 5 February 2014
Surface Water Licence	90SL101060	Water supply for mining and irrigation one Overshot dam and a 150 millimetre (mm) Centrifugal Pump.	1 November 2010 to 01 November 2015
Water Access Licence (WAL)	WAL 13050	3000 units (equivalent to 3,000 megalitres [ML]) of water entitlements for site supply.	Transferred to Aston 11 May 2010
Water Supply Works Approval	90WA801901 DWE Ref no: 90AL801900	Allows construction of a 610 mm Axial Flow Pump located on the Namoi River.	1 July 2004 to 30 June 2017

Approval	Reference	Detail	Validity Dates
Bore Licence	90WA809078	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam to Gins Leap) Groundwater Source.	Commencement 1 November 2006
Bore Licence	90WA809079	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam to Gins Leap) Groundwater Source.	Commencement 1 November 2006
Bore Licence	90WA809300	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Gins Leap to Narrabri) Groundwater Source.	Commencement 1 November 2006
Bore Licence	90WA809127	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam to Gins Leap) Groundwater Source.	Commencement 1 November 2006
Bore Water Licence	90BL255704	6 ML bore licence for industrial and mining purposes.	Granted 7 June 2010 to 6 June 2015
Bore Water Licence	90BL001144	Bore will be used for stock and domestic services.	Granted 28 February 1939 for perpetuity
Water Access Licence	WAL12811	135 units with works approval 90CA807230. Upper Namoi Zone 5 Namoi Valley (Gins Leap to Narrabri) Groundwater Source.	Transferred to Aston 16 November 2010 Tenure continuing
Water Access Licence	WAL29467	6 ML water licence from porous rock water source for construction purposes.	Tenure continuing
Water Access Licence	WAL29588	300 ML water licence from porous rock water source under works approval 90CA826925.	Granted 21 June 2012 for perpetuity
Water Access Licence	WAL 27385	38 ML water licence from Namoi Groundwater Zone 4.	Granted 24 April 2012 for perpetuity.
Water Access Licence	WAL12479	78 ML water licence from Namoi Groundwater Zone 11 under works approval 90CA807652.	Granted 2 November 2011 for perpetuity
Water Access Licence	WAL27383	0 ML water licence from Namoi Groundwater Zone 11.	Spare WAL. Granted 24 October 2011 for perpetuity
Water Access Licence	WAL13050	3,000 ML water licence from Lower Namoi Regulated River Water under works approval 90WA801901.	Granted 23 August 2011 for perpetuity
Forests NSW Occupation Agreement	N/A	Agreement applies to access road within part of Leard State Forest No. 420 that allows access to CL 375.	1 July 2013 including option to extend.
FCNSW Compensation Deed	N/A	Compensation Deed with Forest Corporation New South Wales for access the part of the Leard State Forest No 420 that occurs within CL375	25 March 2014
Construction MOP	N/A	Approved by DRE.	Covering the period from 1 June 2013 to 1 June 2014.
MOP	N/A	Approved by DRE. Superseded Construction MOP	Covering the period from 1 March 2014 to 1 March 2016

1.5 Actions Requested from Previous Annual Review

DRE, DP&E and the NSW Environment Protection Authority (EPA) reviewed the 2013 Annual Review and followed up with a joint site visit to the MCCM on 8 October 2014. Formal advice was received from the DRE on 14 October 2014. Three action plan items were proposed following this review, and MCC's response to these in the 2014 Annual Report is indicated below. No formal advice was received from the EPA or DP&E.

1. Report to be signed and dated	Title page of this report.
2. Report to include a statement on public safety	Section 3.15
3. Address topsoil management to optimise performance of topsoil in future rehabilitation works	Section 5

2.0 SUMMARY OF ACTIVITIES DURING THE REPORTING PERIOD

Construction of MCCM infrastructure commenced in December 2013, and continued throughout the reporting period. Table 2.1 below summarises the main components of the construction program and the status of these at the end of the reporting period (31 December 2014).

Table 2.1 – Status of Construction at End of Reporting Period

Component	Status
Open cut mining operation including haul roads and ROM coal storage.	Operating
Water supply pipeline and associated infrastructure from the Namoi River to the mine site.	Complete
Surface water drainage infrastructure including Mine Water Dams and a Raw Water Dam.	Under construction
Electrical power supply and communications infrastructure.	Still to commission
Administration offices, workshops and related facilities.	Temporary facilities complete
Rail spur, rail loop and associated load out facility.	Complete
Mine Access Road.	Under construction
Coal storage and conveyor system, including coal stockyard and stacker / reclaimer.	Under construction
CHPP.	Under construction
Explosives magazine, mixing plant and storage areas.	Complete

2.1 Exploration Activities

During the term of this Annual Review, no exploration activities have been undertaken within the Project area.

2.2 Water Supply Pipeline

Whitehaven holds an allocation of 3,000 units from the Namoi River Water Source. Construction of a temporary pump station and associated 8.3 km HDPE pipeline to supply construction water from the Namoi River to the MCCM commenced in late December 2013 and the pipeline was functioning by March 2014.

The pipeline follows the line of the rail and road access to the MIA area and includes storage tanks at the western end and mid-point, and an 8 ML temporary storage dam adjacent to the rail loop.

2.3 Rail Construction

Clearing of the rail route commenced in January 2014, with work proceeding under the site's Land Disturbance Protocol (LDP) process, utilising teams of ecologists and Registered Aboriginal Parties (RAPs). The route required the blasting of three separate rail cuts through solid rock, with the first blast undertaken in February 2014. Blasted material was crushed on site and used in the fill areas to minimise the importation of materials.

Surface water drainage infrastructure (both temporary and permanent) commenced from the start of construction with the permanent structure being completed towards the completion of the rail construction.

Construction of the rail loop was completed during December 2014 and following the commissioning of the rail and approval of the use of manual rail signalling, the first train was loaded in mid December. Construction of an access roadway along the rail corridor was incomplete at the end of reporting period.

2.4 Bulk Earthworks and Infrastructure

Clearing and site preparation at the mine infrastructure area commenced in late January 2014, with the construction of temporary office accommodation and maintenance areas, upgrading and realignment of the construction access road to permit wide load access.

Initial works included surface drainage, sediment and erosion control measures, soil stripping and construction of temporary water storage dams. Following this, the construction of laydown areas, infrastructure pads, permanent roadways and water storage dams (RWD and MWD) commenced. The first blast for the construction of the ROM pad took place in March 2014.

Construction of the coal handling and loading infrastructure commenced in mid-2014, including the Train Load Out (TLO), CHPP, ROM bin, coal conveyor and bypass system, and the product stockyard stacker / reclaimer components. The ROM, TLO, and conveyor systems were completed and functioning by December 2014.

2.5 Mining Operations

Clearing, mulching and soil stripping in this area commenced in May 2014, with clearing activities working under the site LDP process, utilising teams of ecologists and RAPs.

Construction works in the open cut area included the provision of temporary surface water management infrastructure (sediment dams and drains), haul roads, construction pads for the assembly of mining plant, and facilities for explosives storage and preparation.

Blasting for the initial box cut commenced in August 2014, with stripping of overburden down to the Braymont, Teston and Onavale Seams. First coal was produced and railed in December.

2.6 Power Supply Lines

In September 2014, construction commenced on a 132 kV power line from the site boundary along the rail corridor to a transformer sub-station at Mid-point. A 22 kV power line was constructed from this point alongside the rail corridor to connect the sub-station to the MIA area. Works on the power supply infrastructure were still underway at the end of the current reporting period.

2.7 Rehabilitation

MCC has minimised the disturbance during the construction phase of the MCCM by ensuring that temporary laydown and storage areas are located where possible within areas that are to be disturbed during mining operations. Rehabilitation activities are further discussed in **Section 5**.

2.8 Waste and Hazardous Materials Management

2.8.1 Waste Management

Wastes produced from the construction activities associated with the MCCM are managed by the respective contractor under their Construction Environmental Management Plans (CEMP), and comprise the following:

- general domestic-type wastes from on-site offices and routine maintenance consumables;
- waste oils, grease and oily water;
- contaminated soil material from leaks and spills in the maintenance areas;
- effluents from site ablution facilities; and
- recyclable materials (timber, scrap metals, paper, plastics, glass and other recyclable wastes).

Wastes generated by the operations phase of the project are managed under the Materials Safety Management Plan (MSMP). A more detailed description of the management of MCCM wastes is provided in **Section 3.9**.

2.8.2 Hazardous Materials Management

Management of potentially hazardous materials during the construction phase is undertaken via the contractors individual CEMPs. The MSMP also covers the management of potentially hazardous materials for the operations phase of the MCCM.

Safety Data Sheets (SDSs) are retained on-site for all hazardous materials, independent of the quantity. Additionally, all contractors are required to supply SDSs for any hazardous goods they plan to bring onto the site.

Fuels

Diesel fuel for the operations is stored in a temporary fuel farm, comprising four 105 kilolitre (kL) self bunded, double walled TransTanks. The main bulk earthworks contractor stores diesel fuel in two 110 kL self bunded Fuel2Go wrap tanks. Both these installations are located well away from any drainage lines, protected by additional earth bunds.

Explosives

No explosive materials were stored at the MCCM during the first half of the 2014 reporting period. The supplier for the rail corridor (Orica Mining Services) has a storage facility nearby from which materials were transported when required. The supplier for the MIA construction area (Maxim) transported the required quantity to the site on the day of the blast.

An on-site explosives magazine and an ammonium nitrate mixing plant were commissioned in June 2014 to supply the operations phase of the MCCM. Additional data on blasting activities is provided in **Section 3.4**.

3.0 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

The following sub-sections describe the implementation and effectiveness of the various control strategies adopted at the MCCM, together with monitoring data for the reporting period. Existing monitoring sites for air quality, noise and vibration, weather and surface water are indicated in the respective sections.

3.1 Meteorological Monitoring

An automatic weather station (AWS) was installed on the western edge of the MCCM on 14 May 2010, in accordance with the *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* guideline (NSW DEC 2005a), and in general accordance with condition 35 (a) of the PA 10_0138 (see below). The monitoring site and instrumentation is in compliance with Australian Standard (AS) 2923 – 1987: "*Ambient Air Guide for the measurement of horizontal wind for air quality applications*". The existing weather station records sigma theta which can be subsequently used to derive stability class and inversion strength in accordance with the NSW Industrial Noise Policy (as required by condition 35 (b)). The parameters measured are presented in **Table 3.1**.

METEOROLOGICAL MONITORING

35. For the life of the project, the Proponent shall ensure that there is a meteorological station in the vicinity of the site that:

(a) complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline; and

(b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the *NSW Industrial Noise Policy*, unless a suitable alternative is approved by the Director-General following consultation with the EPA.

The AWS was upgraded in May 2014 to allow real time access. Additional weather data is available from the TEOM installation (**Section 3.2.5**) for back-up.

Table 3.1: Weather Station Parameters

Parameter	Unit	Frequency	Averaging Period
Rainfall	mm	Continuous	1 hour
Temperature @ 2 m	^{O}C		10 Minute
Temperature @ 10 m	^{O}C		
Wind Speed @ 10 m	m/s		
Wind Direction @ 10 m	Degrees		
Sigma Theta	Degrees		
Solar Radiation	W/m^2		

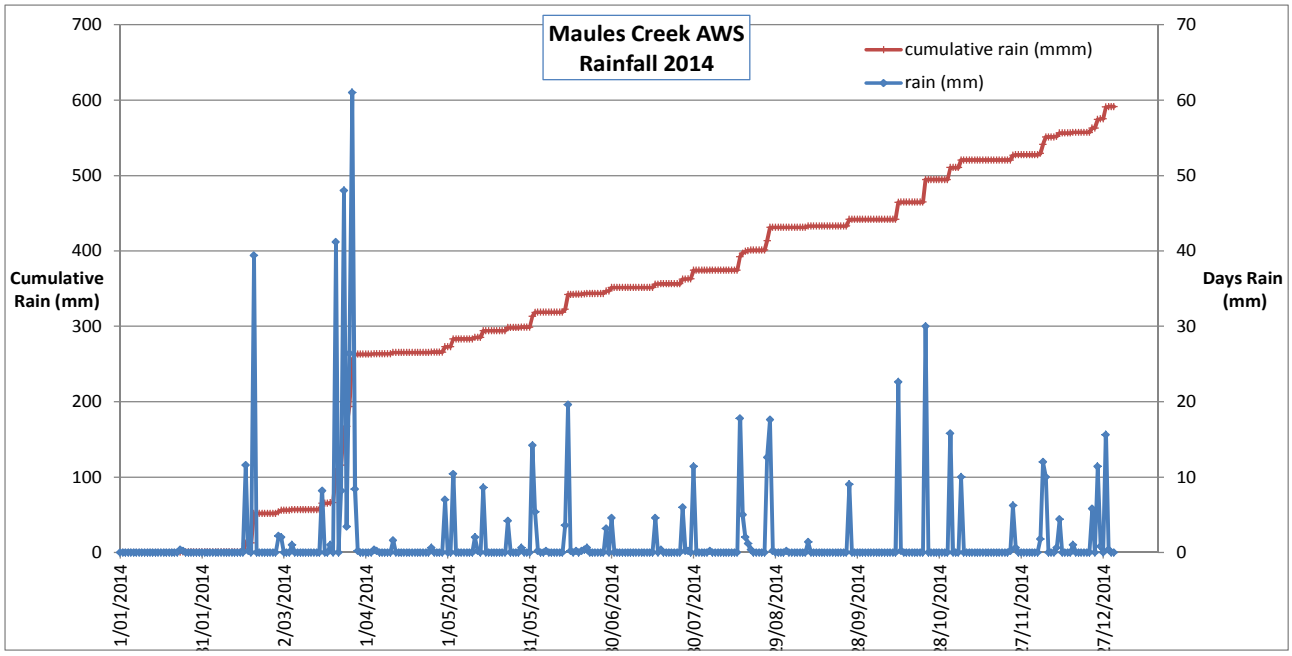
The following sections summarise rainfall, wind and temperature data for the reporting period. Additional meteorological data is presented in **Appendix C**.

3.1.1 Rainfall

Rainfall data for the reporting period recorded from the MCCM AWS is presented in **Table 3.2** and **Figure 3.1**. The total annual rainfall for the year was 591 millimetres (mm).

Measured rainfall at the site for 2014 is only slightly above the regional average when compared to nearby Bureau of Meteorology (BOM) stations at Gunnedah and Narrabri (Gunnedah Airport mean 557 mm, Narrabri Airport mean 559 mm).

Figure 3.1: Rainfall at the Maules Creek Automatic Weather Station



3.1.2 Wind Speed and Direction

Ten minute average wind speed and direction data is collected from the MCCM AWS, as this, together with operational records and environmental monitoring results, can be used to assess the environmental effects or consequences of specific activities undertaken at the mine site or in the surrounding areas. Additional data on these parameters is also collected from the TEOM on a monthly basis.

Wind data is summarised in **Table 3.2** below and monthly wind rosettes from the Maules Creek AWS are provided in **Appendix C**.

3.1.3 Temperature

Monthly maximum and minimum temperatures, taken from 2 m elevation, for the reporting period are presented in **Table 3.2**.

3.1.4 Review of Weather Monitoring

Aside from downtime for maintenance and upgrading (installation of modem) during May 2014, there were no significant gaps in the meteorological data during the reporting period.

Table 3.2: Summary of MCCM Weather Station Data

Month	Measured Rain (mm)	[1] Average Rain AWS	[2]Average Rain (mm)	2 m Temperature (°C)			Wind Speed / Direction	
				Minimum	Mean	Maximum	Average (m/s)	Predominant Direction
Jan-14	0.6	49.4	71.3	11.0	28.4	46.0	2.7	SE
Feb-14	53.4	117.5	66.5	13.0	26.9	40.4	2.2	SSE
Mar-14	209.0	124.3	48.1	10.6	23.2	33.9	1.9	SE
Apr-14	9.8	5.5	37.7	3.8	19.5	31.7	1.6	SSE
May-14	26.0	15.5	42.4	1.5	14.3	27.2	1.5	SE
Jun-14	52.6	39.3	43.9	-0.6	10.7	21.2	1.6	SE
Jul-14	22.8	17.9	42.7	-3.2	9.0	22.8	1.5	SE, NW
Aug-14	57.0	32.7	41.3	-3.6	11.0	21.6	1.9	SE
Sep-14	10.6	17.5	39.9	-0.8	14.6	31.2	2.0	SE
Oct-14	52.8	24.0	55.4	3.8	20.3	38.9	2.1	SE
Nov-14	32.8	40.9	60.9	4.4	25.4	41.6	2.5	SE
Dec-14	63.8	28.4	68.6	12.0	25.3	38.9	2.7	SE

[1] Average rainfall figures for AWS from 2012 to 2014 [2] Average rainfall figures for Gunnedah Pool (from BOM).

The annual rainfall total is close to average for Gunnedah Pool, as used in the Maules Creek EA, though the 2014 monthly totals displayed a much bigger variation than the long term averages. The months of January, February, April and September were relatively dry, with less than 50% of the mean values, whereas only March was significantly wetter than average. Average rainfall figures for the MCCM AWS are also shown on **Table 3.2**, but are of limited value in this assessment, as data has only been collected since 2012.

Measured winds were predominantly from the SE / SSE throughout the entire year, with only one month (July) where winds from the NW quadrant are measured as frequently as from the SE. Comparison of 2014 wind rosettes with data from previous years indicates broadly comparable wind patterns.

3.2 Air Quality Management and Performance

An Air Quality and Greenhouse Gas Management Plan (AQGGMP) has been developed for the MCCM that details the management measures and monitoring to be undertaken to ensure the MCCM complies with conditions of PA 10_0138. Continuous monitoring of air quality associated with the MCCM has been undertaken since 2011 to gather baseline data. Monitoring has been undertaken monthly during the reporting period and is used to assess compliance with the relevant criteria in PA 10_0138 and EPL 20221.

In line with **Section 8.3** of the AQGGMP, this section reviews the environmental performance of the MCCM with regard to air quality for the 2014 reporting period, and includes the following:

- a comprehensive review of the air quality monitoring results and complaints and comparison against:
  - relevant statutory requirements, limits or performance measures/criteria;
  - monitoring results of previous years; and
  - relevant predictions in the Maules Creek EA;
- any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- any trends in the monitoring data over the life of the MCCM;
- any discrepancies between the predicted and actual impacts of the MCCM, and the potential cause of any significant discrepancies; and
- measures to be implemented over the next year to improve the air quality performance of the MCCM.

3.2.1 Air Quality Monitoring

The air quality criteria applicable to the MCCM are specified in Condition 29 of Schedule 3 of PA 10-0138, which is reproduced below.

Table 9: Long-term criteria for particulate matter

Pollutant	Averaging Period	[d] Criterion
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3

Table 10: Short-term criteria for particulate matter

Pollutant	Averaging Period	[d] Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 50 µg/m^3

Table 11: Long-term criteria for deposited dust

Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level
[c] Deposited dust	Annual	[b] 2 g/m^2/month	[a] 4 g/m^2/month

Notes to Table 9, Table 10 and Table 11:

[a] Total impact (ie incremental increase in concentrations due to the project plus background concentrations due to all other sources);

[b] Incremental impact (ie incremental increase in concentrations due to the project on its own);

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

[d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Director-General.

'reasonable and feasible avoidance and mitigation measures' includes, but is not limited to, the operational requirements in condition 33 and the requirements in conditions 33 and 34 to develop and implement a real-time air quality management system that ensures effective operational responses to the risks of exceedance of the criteria.

Routine air quality monitoring at the MCCM is required for deposited dust, PM_{10} and particulates. Monitoring of deposited dust is undertaken on a monthly basis and PM_{10} levels are monitored continuously via a TEOM and every six days via a HVAS.

3.2.2 Control Procedures

The clearing of vegetation and the use of earth moving equipment during the construction phase has the potential to be a significant source of dust and particulate emissions if not controlled. Mitigation measures as detailed in the AQGGMP include:

- the use of water sprays during construction;
- modified work practices where conditions are excessively dusty and windy;
- limiting the extent of clearing of vegetation and topsoil to the designated footprint required for construction;
- site vehicles restricted to designated routes, with speed limits enforced; and
- appropriate staging of any vegetation clearing activities.

Further discussion of the control measures implemented during 2014 is provided in **Section 3.2.8.**

3.2.3 Depositional Dust

Depositional dust monitoring is undertaken by a subcontractor at the MCCM. Four dust deposition gauges are operated to the *Australian Standard AS3580.10.1 —Methods for Sampling and Analysis of Ambient Air Method 10.1 Determination of Particulates—Deposited Matter—Gravimetric Method* ǁ. Sampling is undertaken monthly and each gauge is analysed for insoluble solids and ash residue. The results are

reported as g/m^2/month. All laboratory analysis is conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Figure 3.2.1 identifies the locations of the four depositional dust gauges maintained during the reporting period. Monthly data from these four gauges has been generated since 2010. **Figures 3.2.2** to **3.2.5** summarise the results of deposited dust monitoring (total insoluble solids and ash content) undertaken during the 2014 reporting period.

Appendix D presents the results of all deposited dust monitoring at the MCCM.

Gaps in the monthly measurements have arisen due to the presence of excessive contaminants in the dust gauges, specifically bird droppings, decomposed insect remains and vegetation debris. This occurred on three occasions (August, September and November) at MC1, on six occasions (January, February, April, August, October and December) at MC2 and on one occasion at MC3 (March).

Figure 3.2.1: Air Quality Monitoring Network for Construction Activities

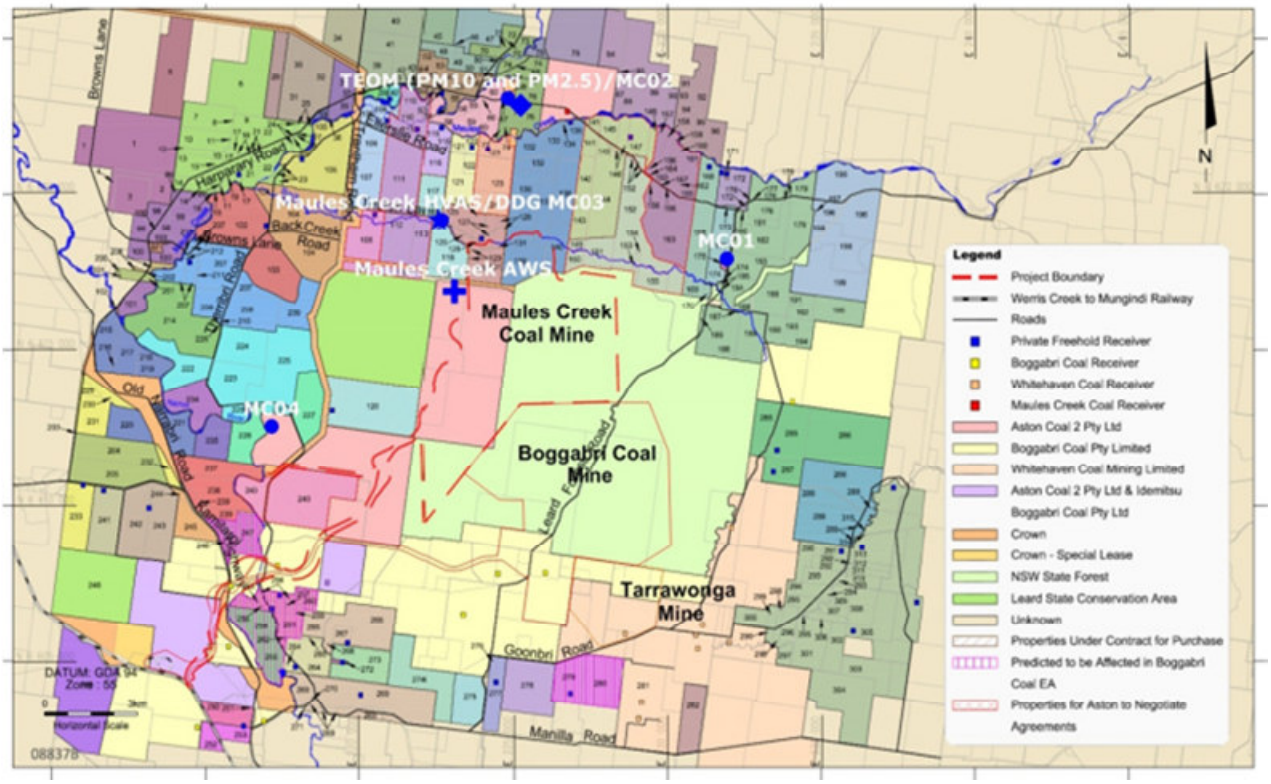


Figure 3.2.2: Results from Depositional Dust Gauge MC1

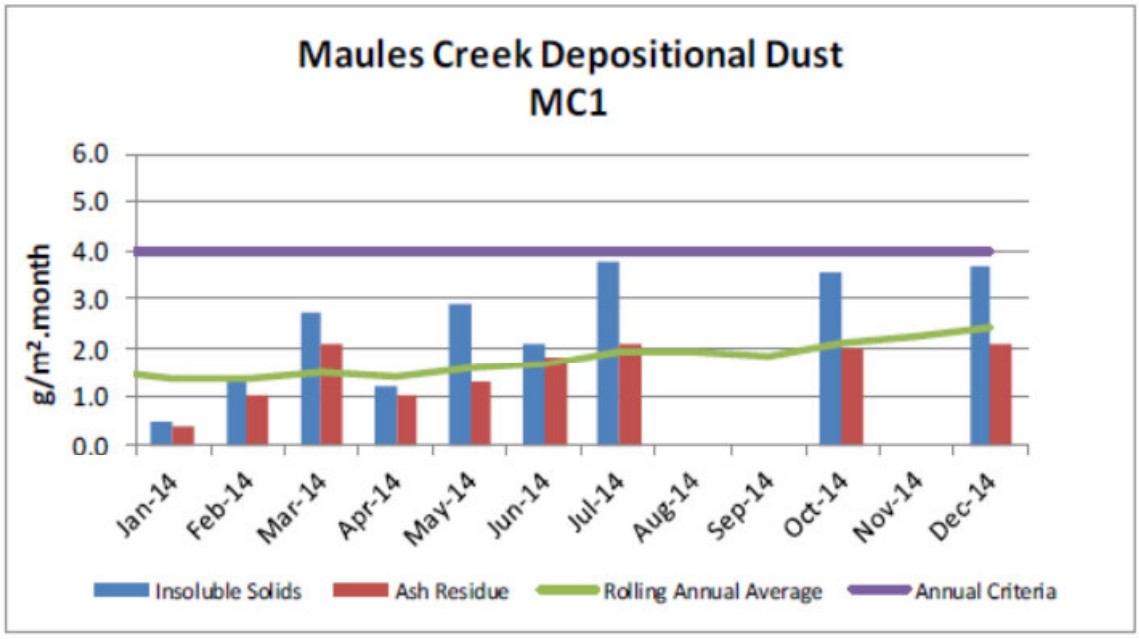


Figure 3.2.3: Results from Depositional Dust Gauge MC2

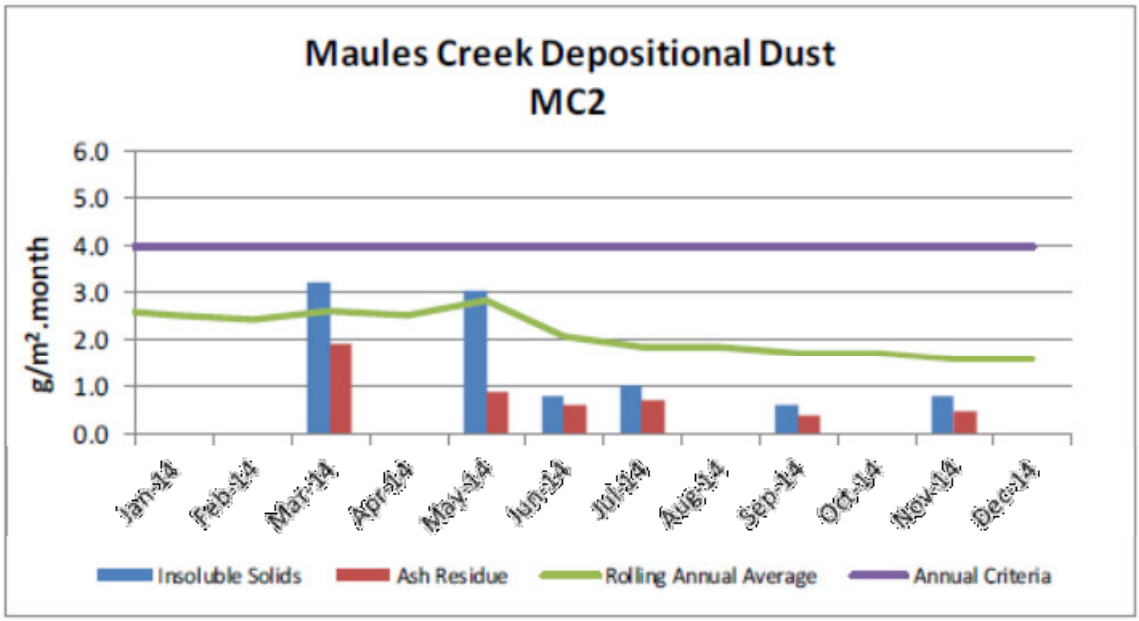


Figure 3.2.4: Results from Depositional Dust Gauge MC3

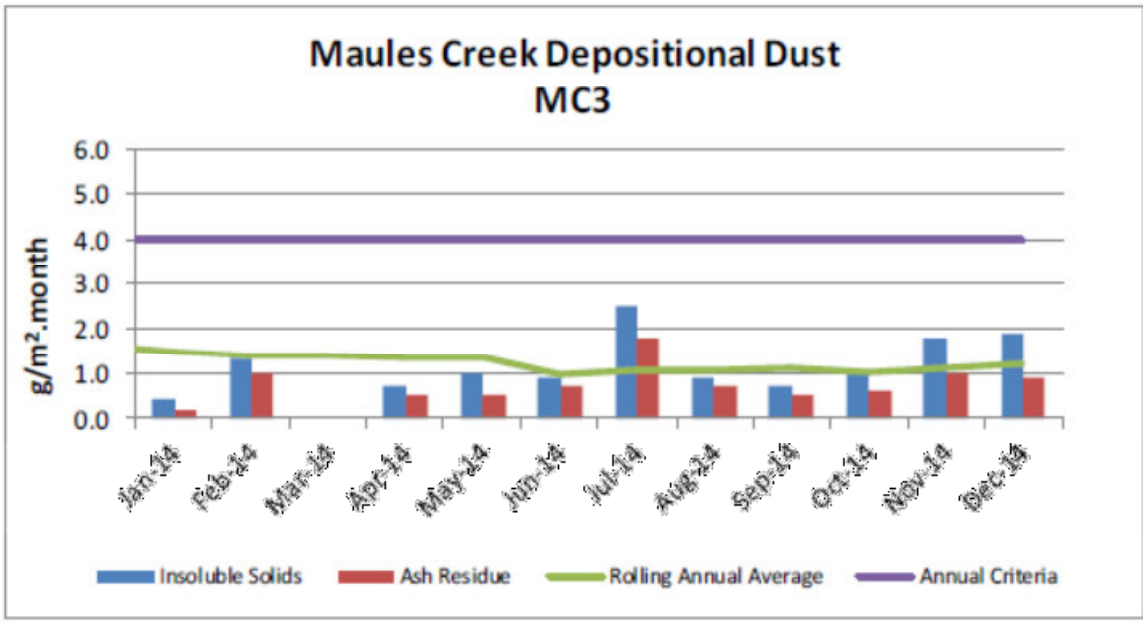
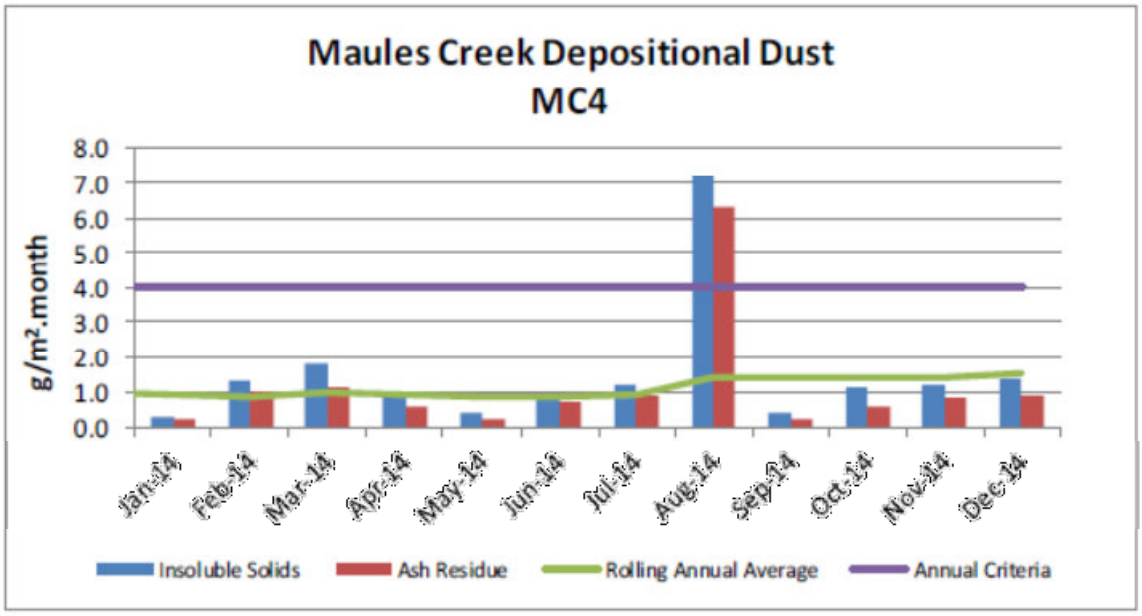


Figure 3.2.5: Results from Depositional Dust Gauge MC4

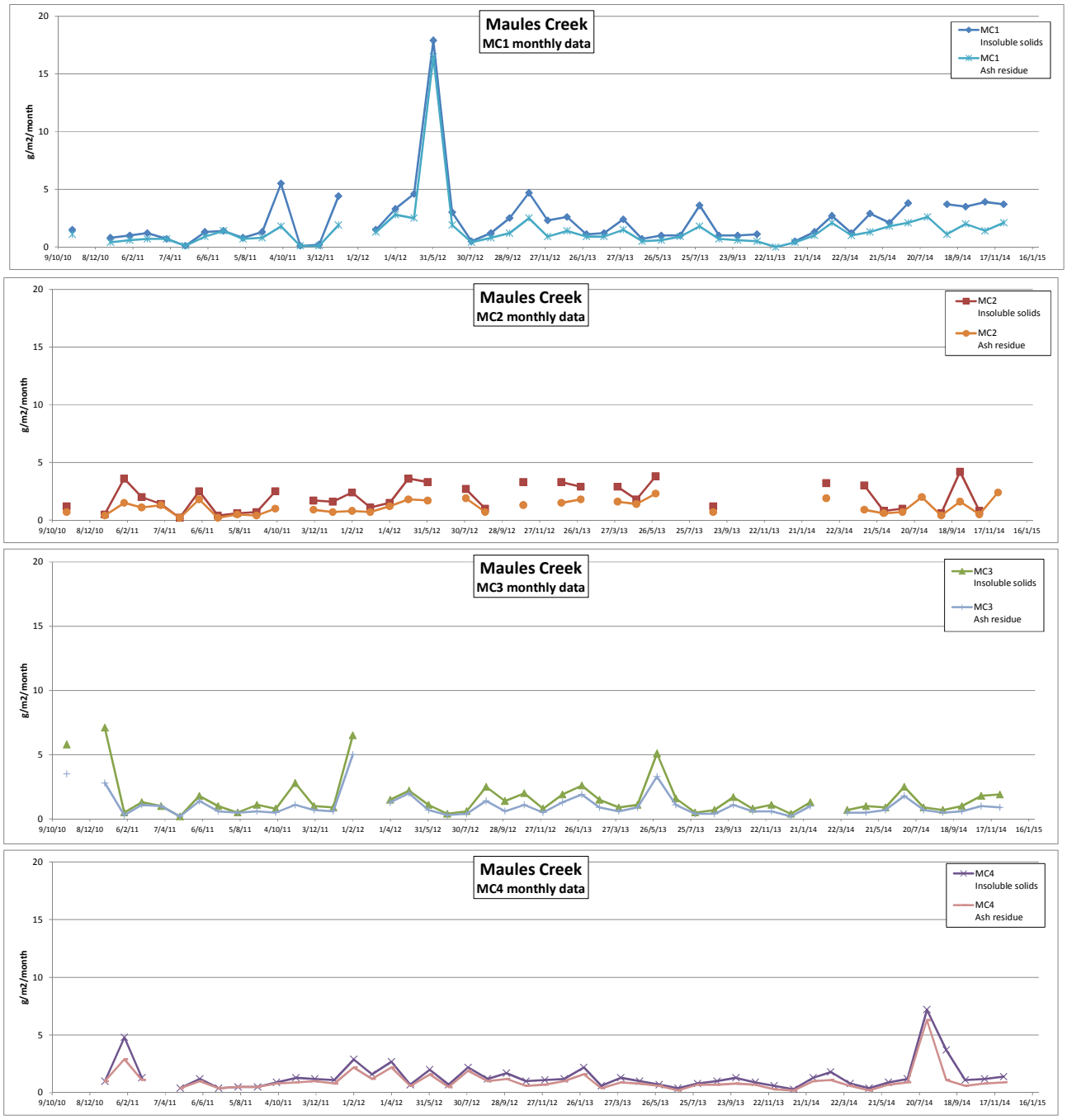


The mean annual total insoluble solids (deposited dust) criterion of 4 g/m^2/month was satisfied at all four monitoring locations throughout the reporting period.

The measurement at MC4 for the month of August 2014 was investigated and the most likely cause of the elevated reading was agricultural activities in the immediate area.

Figure 3.2.6 summarises the depositional dust results at each of the four gauges since their installation in 2010.

Figure 3.2.6: Results from Depositional Dust Gauges Since 2010



3.2.4 HVAS

A High Volume Air Sampler (HVAS) originally located at the property "Tralee", to the north of the MCCM, was subsequently relocated to "Olivedene" in September 2014. This instrument measures PM_{10} (particulate matter with a mean aerodynamic diameter <10µm). The HVAS is sited and operated to the *Australian Standards AS3580.1.1.2007* and *AS3580.9.6.2003*. Sampling is scheduled for 24 hours every 6 days to the NSW Environment Protection Authority (EPA) protocol, with filter papers sent to an accredited laboratory for analysis. The results are reported as micrograms per cubic metre (µg/m^3).

Throughout the 2014 reporting period, the PM_{10} results from the monitoring device have indicated compliance with the 24 hour criteria (**Figures 3.2.7a** and **3.2.7b**). The HVAS measurements remain within the annual average compliance criteria of 30 µg/m^3, with an annual average for the period up to December 2014 of 15.0 µg/m^3. Interruptions to the power supply at "Tralee" meant that significant gaps in the data were experienced between April and June 2014. This issue was resolved when the HVAS machine was relocated to the Olivedene location in September 2014.

Figure 3.2.7a: Summary of 2014 Results from HVAS Instrument at Tralee / Olivedene

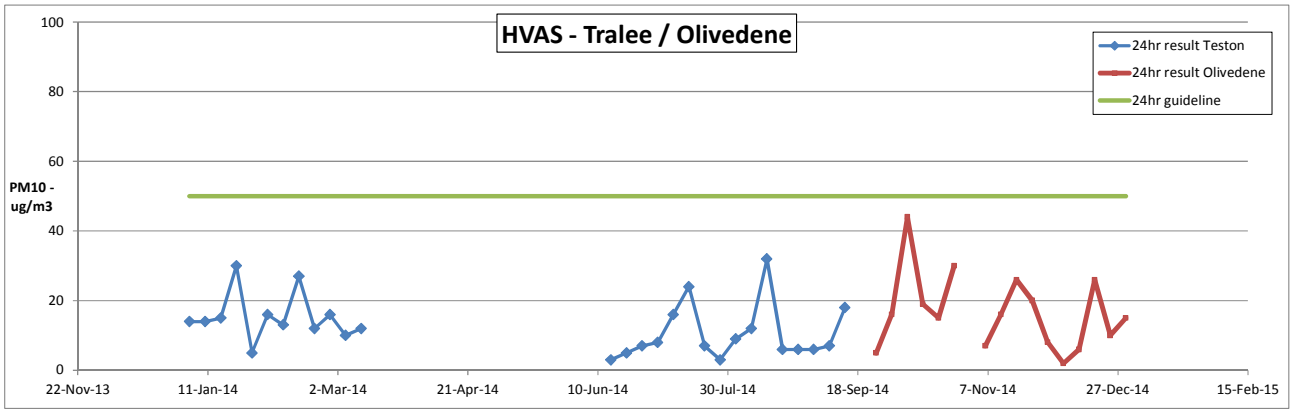
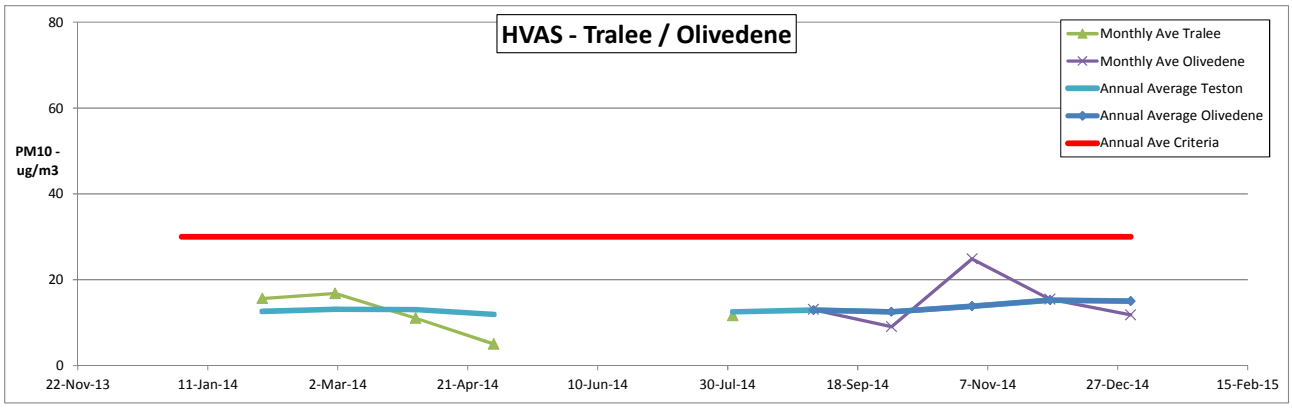


Figure 3.2.7b: Summary of 2014 Results from HVAS Instrument at Tralee / Olivedene

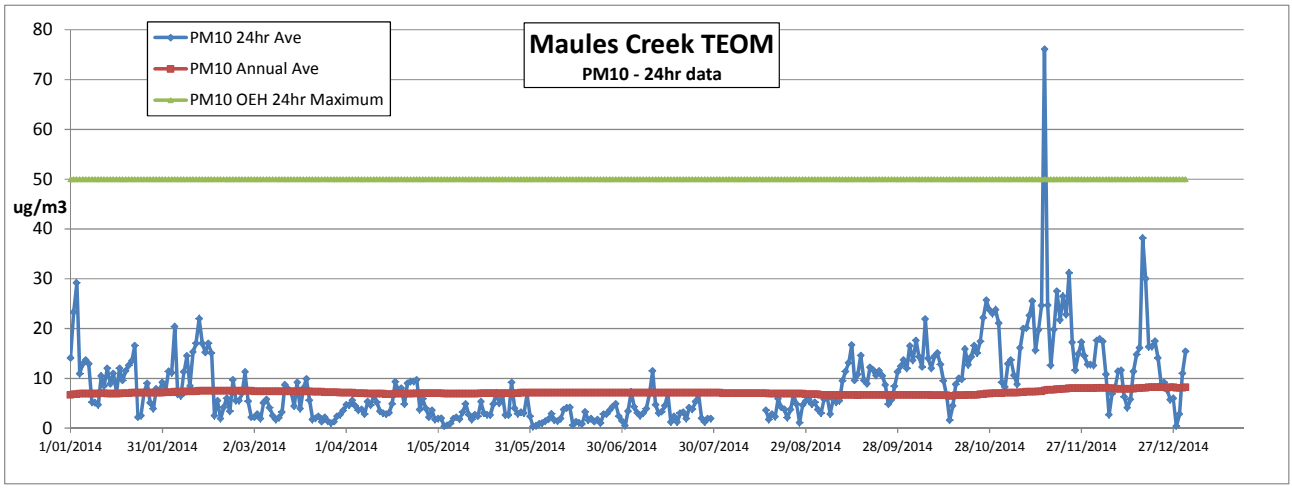


3.2.5 TEOM

The MCCM has a continuous TEOM for Fine Particulates, located adjacent to the Maules Creek village, to the north of the mine site. TEOM PM_{10} results provided in this report are 24 hour averages calculated at midnight and are reported as µg/m^3 corrected to 0 degrees Celsius and 101.3 kPa. The location of the air quality monitoring equipment meets the *Australian Standard AS 2922 (1987) Ambient Air – Guide for the Siting of Sampling Units*. The TEOM has NextG telemetry and is downloaded remotely. Data from this instrument has been generated since 2011.

Results for particulate matter PM_{10} are summarised in **Figures 3.2.8** below. Note that there is no data for the period 30th July to 15th August, due to a power failure.

Figure 3.2.8: PM_{10} Results from Maules Creek TEOM



One measurement from 15th November 2014 exceeds the MCCM short term criteria for PM_{10} (24hr maximum of 50 µg/m^3). At the time, investigations indicated that this exceedance coincided with a period of strong westerly winds, suggesting that the elevated particulate levels were most likely unrelated to MCCM activities. All other results remain below the criteria.

3.2.6 Cumulative Impacts

PA 10_0138 requires the coordination of air quality management strategies of mine sites within the Leard Forest Mining Precinct to minimise the cumulative air quality impacts of the mines, as well as the development of a Leard Forest Mining Precinct Air Quality Management Strategy (refer **Section 5.1** of the AQGGMP). The Precinct Air Quality Management Strategy (PAQMS) is still being finalised.

A second PM_{10} monitor is located on the "Merriown" property, to the south of the MCCM, which is operated by Boggabri Coal Pty Ltd. On approval of the Boggabri, Tarrawonga, Maules Creek Complex (BTM) Strategies, data from this source will be combined with the Tralee data and used as a cumulative impact monitoring mechanism.

3.2.7 GHG Emissions

Issues related to Greenhouse Gas (GHG) emissions are reported in **Section 3.11** of this Annual Review.

3.2.8 Spontaneous Combustion

Spontaneous combustion events have the potential to give rise to odour impacts. A Spontaneous Combustion Management Plan has been developed for the MCCM (March 2014) for implementation prior to the stockpiling of coal. This plan outlines management and mitigation measures to reduce the potential for spontaneous combustion events.

Coal has been stockpiled on the ROM pad since initial production commenced in mid-December 2014. Regular visual inspection and monitoring of the stockpiles is undertaken, and to date no indicators of spontaneous combustion have been recorded. It is also noted that MCCM's geological evaluation of the prospective coal seams and their host rocks at the MCCM has considered the likelihood of spontaneous combustion to be very low risk.

3.2.9 Review of Performance

Sections 3.2.2 to **3.2.7** above summarise the air quality monitoring results. Complaints related issues and comparisons against the relevant statutory requirements or limits / criteria. Additional comparisons against performance measures or objectives are provided below.

In summary, no exceedance of the particulate matter criteria in PA 10_0138 was recorded as a result of MCCM. One event was recorded in November (PM_{10}) that was attributed to a regional wind event.

During the reporting period. thirteen community complaints concerning air quality issues were received, of which four were related to dust generation from off-site on unsealed roads due to project traffic and the remainder related to dust generation at the project operations.

Actions taken in response to complaints concerning dust generation on unsealed roads included the following:

- Provision of additional dust suppression water carts to unsealed roads affected by MCCM related traffic; and
- Provision of signage and improved awareness of road use restrictions in the unsealed routes in the vicinity of the MCCM.

Actions taken in response to complaints concerning dust generation from the MCCM activities on site included the following:

- Provision of additional water carts and rescheduling of shift patterns to maintain dust suppression measures on mine haul roads and access roadways throughout higher risk periods;
- Commissioning of additional water fill points for dust suppression purposes in the mining area; and
- Application of chemical dust suppressants to haul routes and roadways in and around the site.

In addition, a range of management controls or changes have been introduced during the reporting period to mitigate air quality impacts by activities on the site.

- Implementation of both reactive and predictive measures, involving Trigger Action Response Plans (TARPS), with use of weather forecasts, real time weather alerts and dissemination of relevant information at daily planning meetings;
- Modified materials handling and heavy vehicle utilisation, involving the use of alternative locations during adverse weather conditions. This involves the ongoing identification of less exposed excavation locations, haulage routes, drilling sites and dump locations; and
- Suspension of some or all activities liable to generate significant dust in unfavourable weather conditions.

No significant discrepancies have yet been identified between the predicted and actual impacts of the MCCM.

As the reporting period represents the commencement of first year of production at the MCCM, it is too early to be able to identify long term trends in the monitoring data.

Those measures to be implemented over the next year to improve the air quality performance of the MCCM will focus on continued efforts to improve employee awareness of dust generation issues, to work on predictive responses as well as improved reactions to negative air quality indicators.

3.3 Noise Management and Performance

The MCCM is located in a rural area some distance from major sources of background noise such as arterial roads or other industrial developments. The Boggabri Coal Mine is located approximately 3 km to the south of the MCCM. Background noise monitoring completed for the MCCM has indicated background levels regularly occur below 30 dBA during all time periods at all monitoring locations.

The Noise Impact Assessment conducted for the MCCM (Bridges Acoustics, 2011) as described in **Section 7.3** of the Maules Creek EA (Hansen Bailey, 2010a) included an assessment of construction noise impacts. This assessment was based on the worst case scenario for construction activities (assuming certain activities being undertaken concurrently) and also considered prevailing weather conditions for comparison of predicted noise levels against the relevant criteria.

The earthmoving phase for each construction project typically produces the highest sound power level and is therefore considered in this assessment. The following components were included in the construction noise assessment which, would most likely occur simultaneously and would therefore represent a worst case assessment:

- water pump station, power supply and pipeline;
- permanent Mine Access Road and rail spur;
- water management structures including dams;
- power supply to the MCCM;
- MIA including offices, workshop, fuel storage and bathhouse; and
- CHPP.

The Noise Impact Assessment (Bridges Acoustics, 2011) confirmed the potential for adverse noise impacts to be experienced to some sensitive receivers located adjacent to the proposed rail spur and the water supply pipeline. It is noted that the construction for the rail spur adjacent to these residences is being undertaken by Boggabri Coal Pty Ltd. The Bridges Acoustic (2011) assessment of construction noise indicated that the construction noise criterion would potentially be exceeded on occasions at the following receivers:

- Receiver 264 – Due to Therribri Road upgrade work;
- Receiver 236 – Primarily from water pipeline construction work with a minor contribution from rail spur construction work; and
- Receiver 225 – Primarily from water pipeline and pump construction work.

These sensitive receivers have been consulted with in relation to the potential noise impacts and have either been purchased or are currently negotiating noise mitigation measures line with the relevant conditions of PA 10_0138.

A Noise Management Plan (NMP) has been prepared in accordance with conditions 16 of Schedule 3 of PA 10_0138. The aim of the NMP is to manage project specific and cumulative noise impacts associated with the construction and operational phases of the MCCM. The NMP has been prepared in consultation with the EPA, and was approved for implementation during the construction phase of the MCCM. A revised NMP for mining operations was approved for the site in March 2014.

The objectives of the NMP are to:

- ensure that construction noise, operational noise and vibration from MCCM are minimised;
- maintain compliance with conditions of the development approval, environmental protection licence and legislation relating to noise;

- provide a protocol for monitoring and evaluation of noise impacts on surrounding private residences and sensitive receivers;
- manage project specific and cumulative noise impacts associated with the MCCM mining operations; and
- communicate with the local community and regulators regarding MCCM activities.

The management and performance of noise and vibration related to construction blasting activities is addressed in **Section 3.4** below.

Contractor CEMPs are designed and implemented to address specific noise controls on plant and machinery and related construction noise management issues. Measures used on-site during the reporting period include the use of effective silencers, reversing alarms, restrictions on out-of-hours work, regular monitoring of noise levels from specific plant activities, switch off policies for machinery not in use and by following plant service and maintenance programs.

3.3.1 Noise Monitoring

Construction noise and vibration levels were measured on a monthly basis at residences in close proximity to the construction activities that MCCM has agreements for access to.

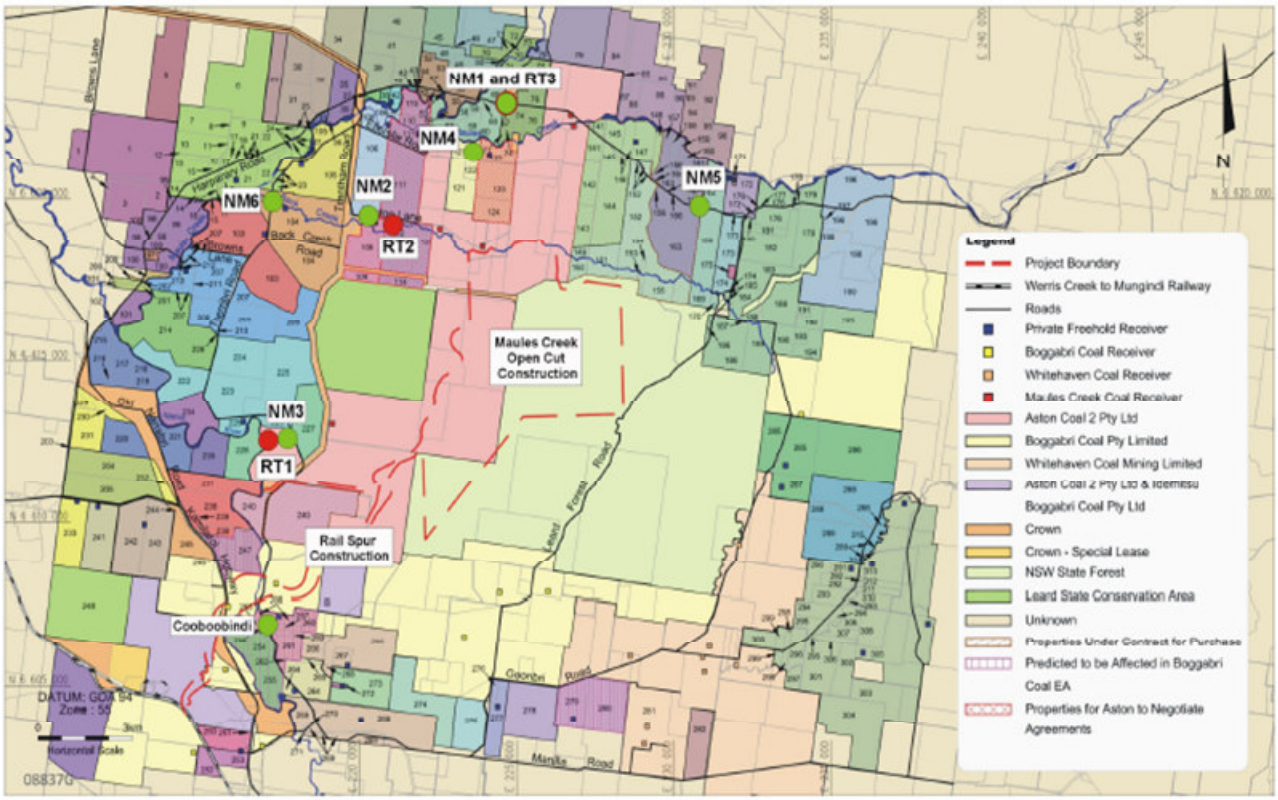
Unattended real time monitoring units were installed during the period, once the real time monitoring units have been fully commissioned, they will be used to manage and monitor noise emissions from the operation. The number and location of monitoring units is shown in **Figure 3.3.1**.

Attended noise monitoring is also undertaken monthly. Attended monitoring is the methodology for determining compliance with prescribed limits; since it allows an accurate determination of the contribution by activities associated with the MCCM, if any, to measured noise levels.

Unattended monitoring data allows management by site staff if and when noise issues arise. It also provides a history that can be used to identify trends and is useful for management, planning and decision-making related to noise control.

Both forms of monitoring can quantify cumulative mining noise.

Figure 3.3.1: Construction Noise Monitoring Locations



Unattended Monitoring

Continuous unattended ('*real time*') noise monitoring is required as a management tool to satisfy the requirements of *Schedule 3, Conditions 15 b) and e) and Condition 16 b)*, of PA 10_0138. However, results from the real time monitoring system are not used to determine compliance, since the noise levels recorded do not represent only noise from the MCCM but noise from all sources. Compliance is the measured performance of the site relative to compliance limits. Any modifications to the site operations as a result of real time noise monitoring are to be documented.

Attended Monitoring

Attended monitoring is required to assess compliance with regulatory limits. The limits relevant to construction activities being undertaken during the reporting period cover the following aspects:

- Construction noise: Noise from road and rail construction; and
- Construction vibration: Vibration, not from blasting, from road and rail construction.

In line with the requirements of PA 10_0138, construction noise and vibration monitoring is undertaken one day per month. Noise monitoring is conducted at the nearest residences to the activity that MCCM has an agreement to access within 2 km of construction current at that time. Vibration monitoring is only required at residences within 500 m of construction current at that time. These locations are to be determined in consideration of the location of works at the time of monitoring and the requirement has not been triggered during the present reporting period.

3.3.2 Review of Performance

Conditions 4 to 6 of Schedule 3 of PA 10_0138 address the construction noise requirements and these are reproduced below.

Construction Noise and Vibration Criteria – Maules Creek and Boggabri Shared Rail Spur Lines

4. During the hours of:
   (a) 7 am to 6 pm Monday to Fridays, inclusive;
   (b) 8 am to 1 pm on Saturdays; and
   (c) at no time on Sundays or public holidays,
   noise from activities associated with the construction and/or upgrade of the Maules Creek rail spur line and shared section of the Boggabri rail spur line shall meet the criteria in Table 4.

Table 4: Rail spur line construction noise criteria dB(A)

Location Property/ID	Construction Noise Criteria
	Day dB(A) $L_{Aeq(15\ min)}$
256	50
259	45
All other privately-owned residences	40

Note: To interpret the locations referred to in Table 4, see the applicable figure in Appendix 4.

5. Vibration from activities associated with the construction and/or upgrade of the Maules Creek rail spur line and shared section of the Boggabri rail spur line shall comply with the following:
   (a) for structural damage, the vibration limits set out in the German Standard *DIN 4150-3: Structural Vibration - effects of vibration on structures*; and
   (b) for human exposure, the acceptable vibration values set out in the *Environmental Noise Management Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006).

6. If the Proponent proposes to undertake any construction works associated with the Maules Creek rail spur line (and shared section of the Boggabri rail spur line) outside the hours specified above, then the Proponent must prepare and implement an Out of Hours Work protocol for these works to the satisfaction of the Director-General. This protocol must be prepared in consultation with the EPA and the residents who would be affected by the noise generated by these works, and be consistent with the requirements of the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009). The Proponent shall not carry out any out of hours construction works before this protocol has been approved by the Director-General.

   Note: For areas where construction noise from the Maules Creek rail spur line and shared section of the Boggabri rail spur line is predicted to be at or below 35 dB(A) and/ or below operational noise criteria at sensitive receptors, this is likely to provide sufficient justification for the need to operate outside of recommended standard hours as specified in the ICNG.

Monthly attended noise monitoring of construction activities commenced in January 2014. Results of the attended noise monitoring are described below in Section 3.3.3.

3.3.3 Attended Noise Monitoring Results

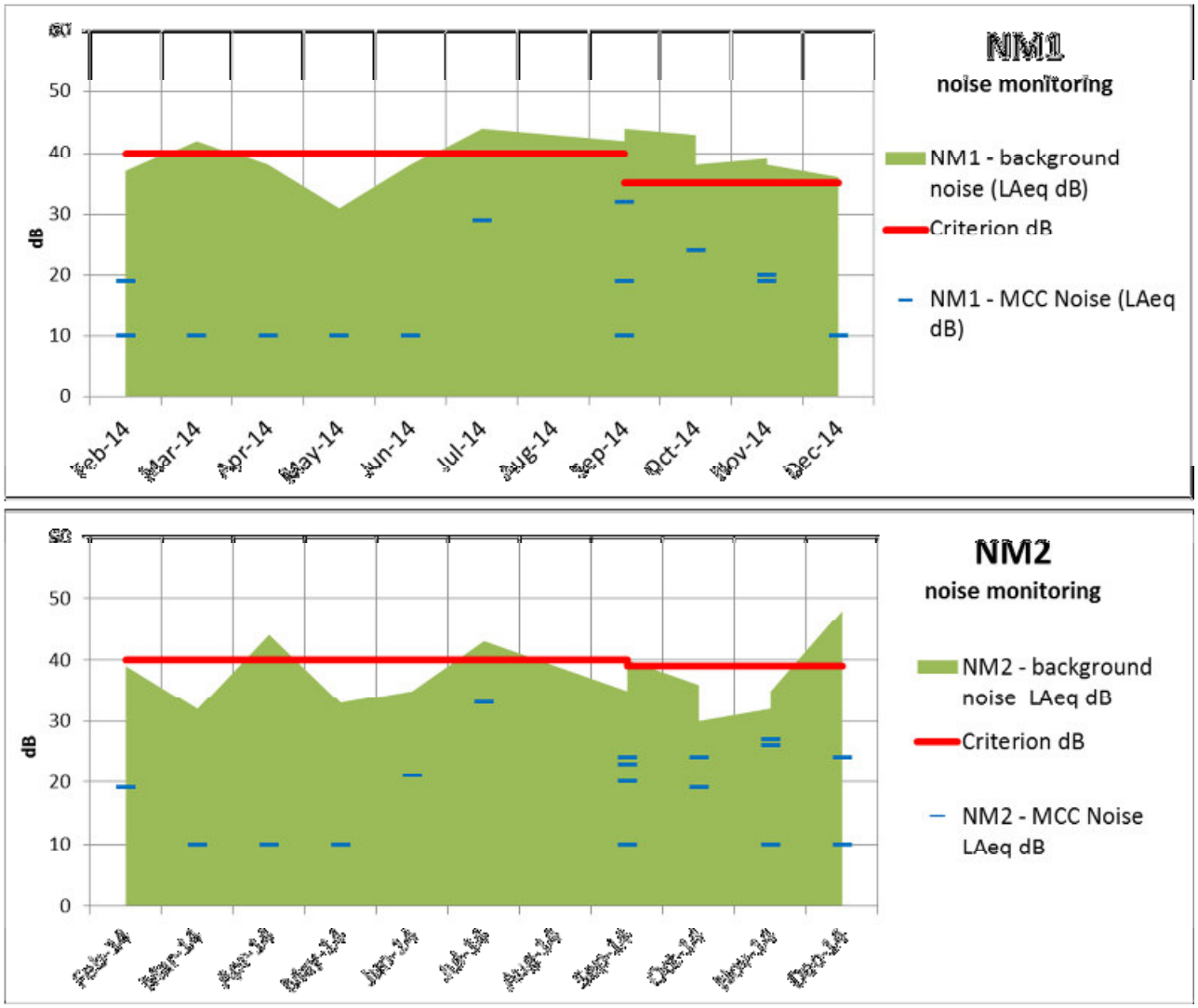
Attended noise monitoring began in February 2014 to align with the commencement of rail and infrastructure construction activities. Attended monitoring has been undertaken in accordance with the requirements of the PA 10_0138, EPL 20221, the approved Noise Mangement Plan and the various Principal Contractor CEMP's at locations as shown above in **Figure 3.3.1**. The construction phase had an applicable noise criteria of 40dB LAeq at all privately owned residences. In September 2014 MCC commenced mine operations although construction was ongoing. Operational noise monitoring criteria are more conservative than construction 35dB LAeq and the transition is represented as the step change in criteria in the **Figure 3.3.3.** Operational noise monitoring required a shift from monitoring at Cooboobindi to NM6.

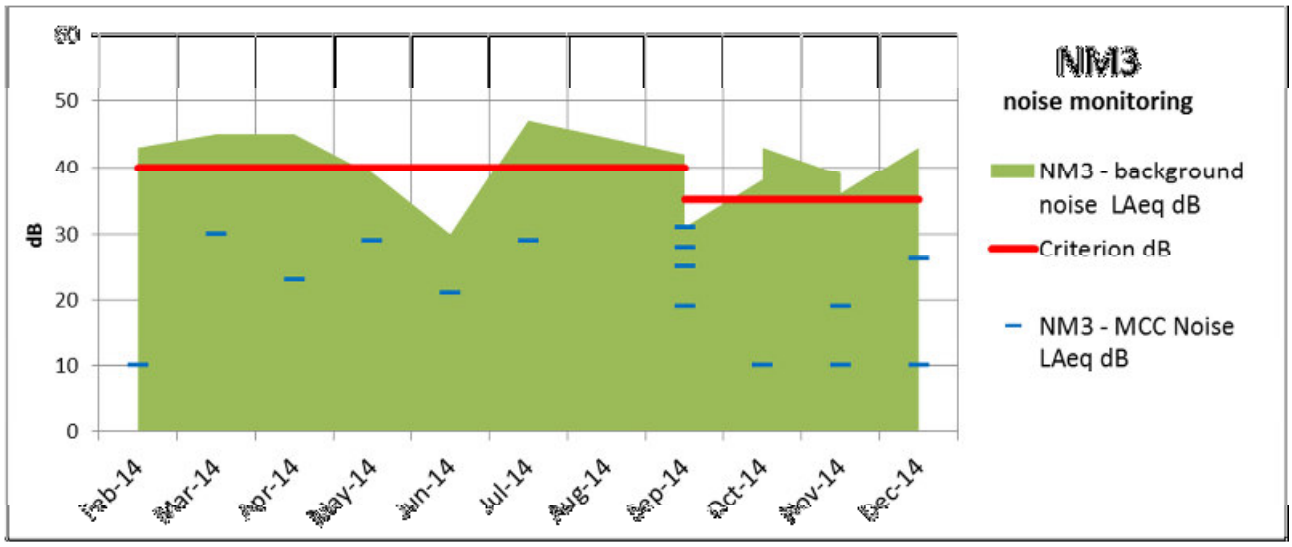
Noise monitoring was completed for 15 minute intervals during the day during construction and evening and night for operations. All noise recorded with exception for obvious non-mine sources (pumps, cars, birds etc.) where the meter is paused. Upon processing, the recorded meteorological conditions from the MCC Weather Station were used to disqualify data where wind speed exceed 3 meters/second, to calculate background and attribute the MCC component of the overall total noise recorded. During August 2014, there was a sustained windy period at the same time as the scheduled monitoring cycle. The monitoring was delayed by a few days however, this meant that it fell in the following calendar month, consequently, there were two monitoring rounds in September 2014 as shown below in **Figure 3.3.3.** All other monitoring occurred as scheduled.

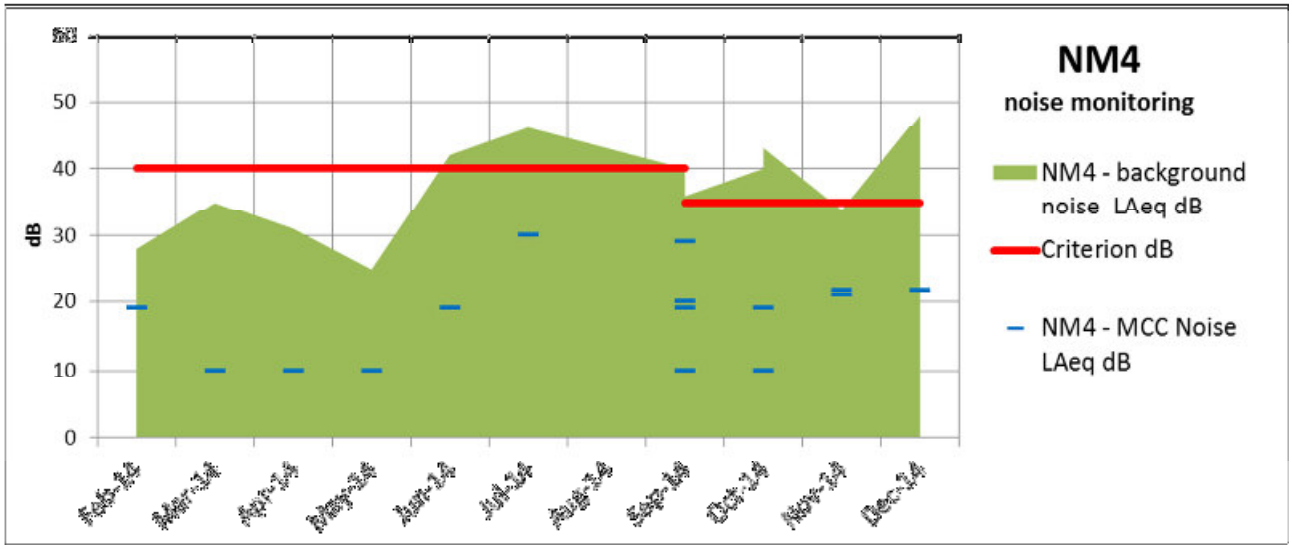
During the 2014 reporting period there were no exceedances of the applicable attended noise monitoring criteria. Attended noise monitoring data is included in Appendix E1.

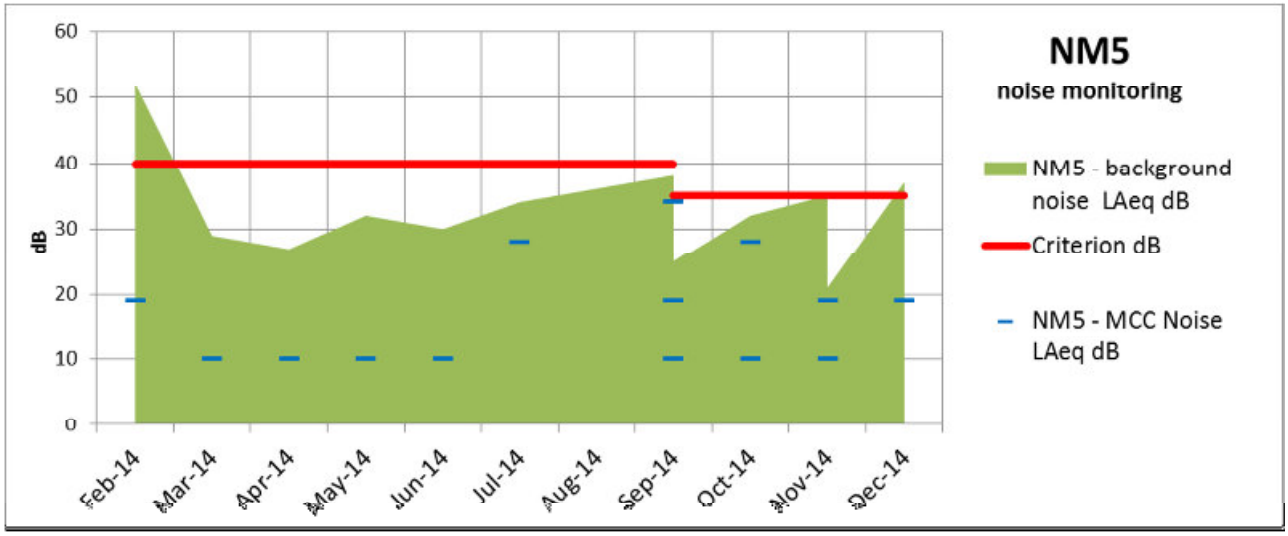
A network of real-time noise monitors (RT1, RT2 and RT3) were installed in September 2014, as per the approved Noise Management Plan. The noise monitors are currently in the process of being field tested through the summer period to ensure they can function adequately at high temperatures. Baseline data from this network is currently being assessed before being published via the Whitehaven Coal website. Data from the network will also be included in the next Annual Review.

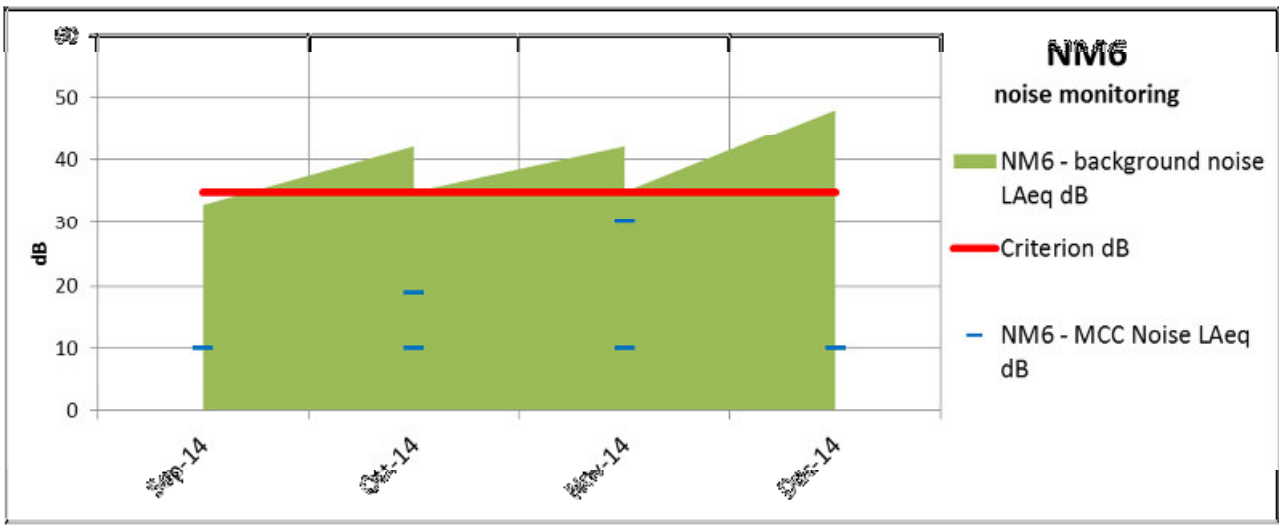
Figure 3.3.3: Attended Noise Monitoring (dBL), NM1, NM2, NM3, NM4, NM5, NM6 &Cooboobindi.

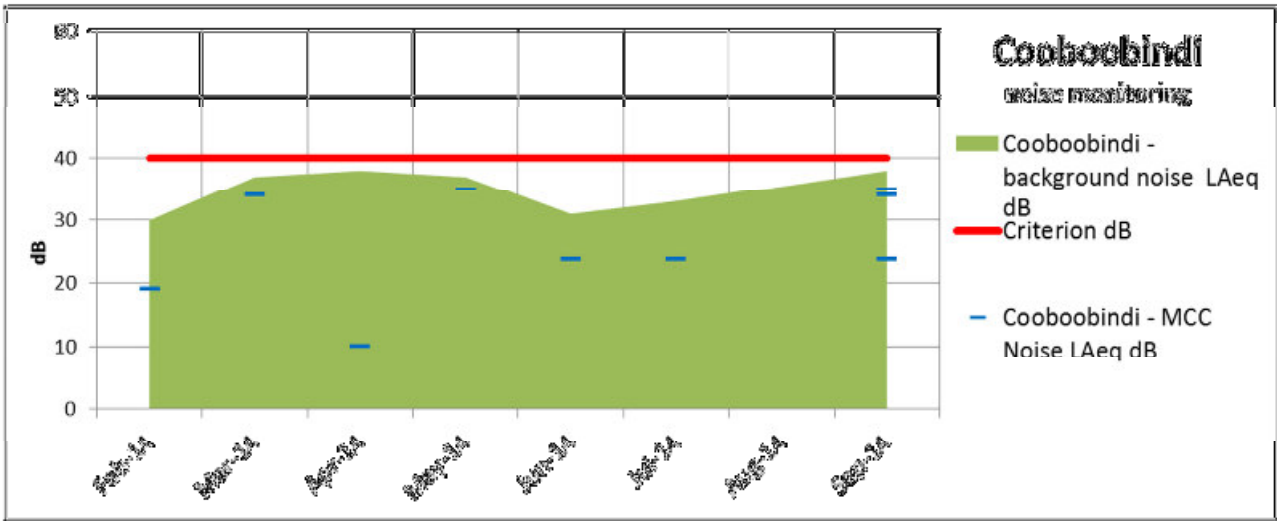



NM3
noise monitoring
NM3 - background noise LAeq dB
Criterion dB
NM3 - MCC Noise LAeq dB
dB
60
50
40
30
20
10
0
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14


NM4
noise monitoring
NM4 - background noise LAeq dB
Criterion dB
NM4 - MCC Noise LAeq dB
dB
60
50
40
30
20
10
0
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14


NM5
noise monitoring
NM5 - background noise LAeq dB
Criterion dB
NM5 - MCC Noise LAeq dB
dB
60
50
40
30
20
10
0
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14


NM6
noise monitoring
NM6 - background noise LAeq dB
Criterion dB
NM6 - MCC Noise LAeq dB
dB
50
40
30
20
10
0
Sep-14
Oct-14
Nov-14
Dec-14


Cooboobindi
noise monitoring
Cooboobindi - background noise LAeq dB
Criterion dB
Cooboobindi - MCC Noise LAeq dB
dB
50
40
30
20
10
0

3.3.4 Assessment of Results

During the 2014 reporting period there were no exceedances of the applicable attended noise monitoring criteria.

There were 11 community complaints or enquiries during the reporting period (refer to Section 4).

3.3.5 Next reporting period

Assessment of the noise contributions from the MCCM in relationship to noise generated by the adjacent operational mines is planned for the 2015 reporting period.

3.4 Blast Management and Performance

Blasting was required during construction of the MCCM to fragment shallow bedrock to permit removal by earth moving machinery. It was predicted that construction blasting may generate detectable overpressure and vibration at privately owned residences. PA 10_0138 defines a blast as a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.

Blasting generates noise (i.e. overpressure or air blast) and vibration, which can be detectable at residential receptor locations. Vibration levels may also impact infrastructure in proximity to the site. At times, blasting may also generate fume (coloured gas emissions), which can result in adverse community reaction, and has the potential to be harmful to human health.

The Noise Impact Assessment conducted as part of the Maules Creek EA by Bridges Acoustic (2011) predicted blast vibration associated with construction activities to be well below criteria for all privately owned residences. Similarly, overpressure was predicted to be less than criteria, although the Maules Creek EA (Hansen Bailey, 2010a) did indicate that throw blasts (not anticipated in construction phase) have the potential to cause exceedances. However, this was only for residences likely to be acquired due to noise affectation and the Maules Creek EA showed no overpressure exceedances are likely for more distant receptors, regardless of blast type.

A Blast Management Plan has been developed for the MCCM construction works that details the management measures and monitoring to be undertaken to ensure the MCCM complies with conditions of PA 10_0138. The following limits apply to privately owned residences;

- Noise 95% Criteria 115dBL;
- Noise 100% Criteria 120dBL;
- Vibration 95% Criteria 5mm/s;
- Vibration 100% Criteria 10mm/s.

3.4.1 Blast Monitoring

Blast monitoring commenced in February 2014, with the first construction blast in the rail corridor. During the 2014 reporting period, there have been 70 construction blasts, 61 associated with rail and 9 associated with mine infrastructure earthworks. Operational / mine pit blasting commenced in August and there were 28 operations blasts to December 2014.

Results of blast monitoring are reported below.

3.4.2 Performance

During the monitoring period, there were 5 community enquiries regarding noise, dust and / or vibration in relation to blasting activities at the MCCM. Three enquiries were made via the Community Hotline, one call direct to the Environment Manager and one via the EPA. In each instance, the enquiry was investigated and feedback provided. Review of the dust, noise and vibration data for each enquiry showed that there were no exceedances of applicable limits.

Construction

Construction blasts are generally small and monitoring was undertaken at key pieces of infrastructure and heritage features closer to the blasting locations.

Operations

Blast monitoring is triggered and reports generated for 2 intervals, 1 minute and 30 minutes. Monitors are omnidirectional and capture all vibration and noise within each reporting window. Incidental sources of noise and vibration may arise from passing vehicle traffic, farm machinery, livestock etc.

Blast Monitor BM3 was found to have a faulty hard drive and was away for maintenance and repairs between 14 November and 1 December 2015. Data capture from all other blast monitors was 100% for the monitoring period.

All blast monitoring results were well below the applicable vibration and noise criteria. Blast monitoring results for Vibration and Noise are shown below in Figures 3.4.2 and 3.4.3 respectively (refer Appendix E2).

Figure 3.4.1: Operations Blast Monitoring, Vibration / Peak Particle Velocity.

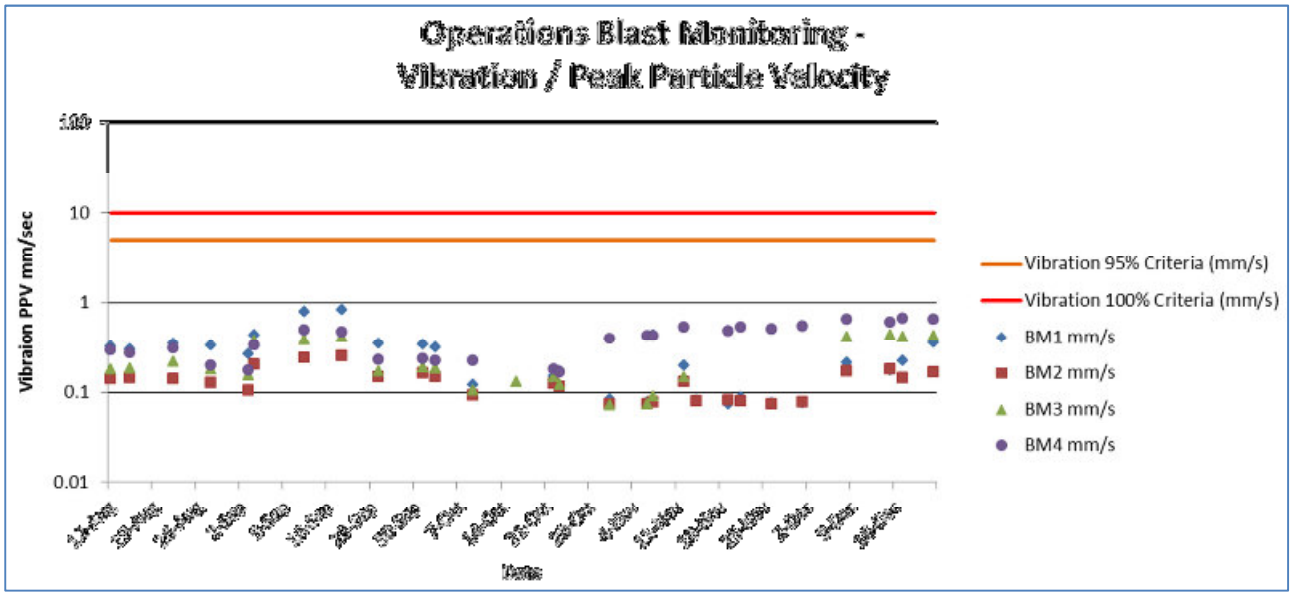
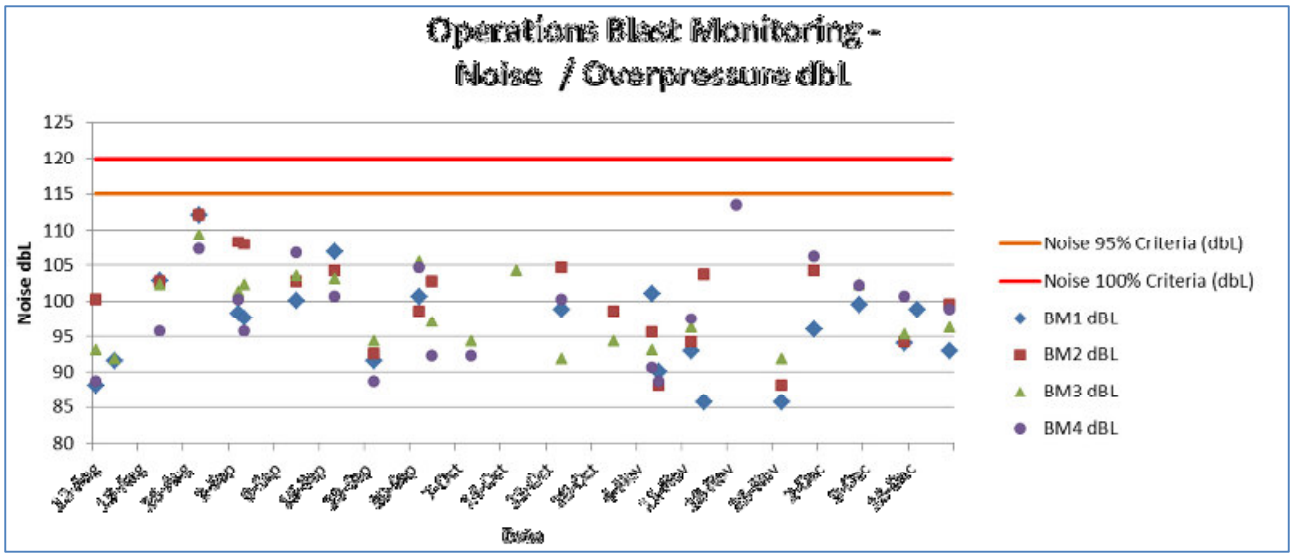


Figure 3.4.2: Operations Blast Monitoring, Noise / Overpressure dBL



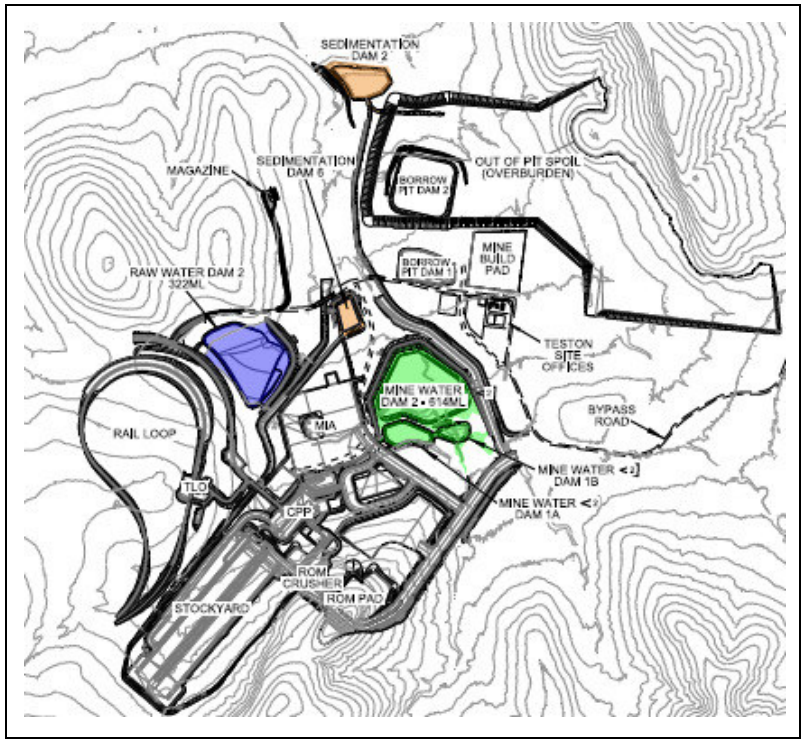
3.5 Site Water Management and Performance

A Water Management Plan (WMP) has been developed for the MCCM. The WMP details the management measures and monitoring to be undertaken to ensure the MCCM complies with the relevant conditions of PA 10_0138. In accordance with Condition 4 of Schedule 5 of PA 10_0138 and the approved WMP, the Annual Review is to include the following:

- a review of the monitoring results and complaints records of the development over the past year, which includes a comparison of these results against the relevant performance measures/criteria, the monitoring results from previous years, and against relevant predictions in the Maules Creek EA;
- a check of the calibration parameters of the water balance model to ensure that the model adequately simulates observed conditions on site;
- identification any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- identification any trends in the monitoring data over the life of the development;
- identification of any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
- a description of measures that will be implemented over the next year to improve the performance of the water management system.

The review of monitoring results and assessment of trends and performance is described below under separate headings for surface water (**Section 3.5.5**) and groundwater (**Section 3.5.9**). **Figure 3.5.1** summarises the main components of the surface water storage at the site.

Figure 3.5.1 – Surface Water Management Layout – Storage Dams



3.5.1 Water Supply and Discharges

A pipeline from the Namoi River is the main source of raw water supply for the MCCM. Water volumes pumped from the Namoi River during the reporting period for use in construction and the start of operations was approximately 630ML. There were no surface water discharges from the site during the reporting period.

3.5.2 Erosion and Sediment Control Measures

The approach to the control of erosion and sedimentation on site is presented in the WMP. In summary, the use of control measures is designed to effectively manage clean surface water and sediment laden runoff from all disturbed areas. Sediment mobilisation and erosion are minimised by:

- installing appropriate erosion and sediment controls prior to disturbance of any land;
- limiting the extent of the disturbance to the practical minimum;
- reducing the flow rate of water across the ground particularly on exposed surfaces and in areas where water concentrates;
- progressively rehabilitating disturbed land and constructing drainage controls to improve stability of rehabilitated land;
- treating rehabilitation areas to promote infiltration;
- protecting natural drainage lines and watercourses by the construction of erosion control devices such as diversion banks, channels and sediment retention dams;
- installing appropriate erosion and sediment controls around all soil stockpiling areas;
- installing suitable control measures in areas with steep gradients, as required (e.g. rock riprap, geotextile fabric); and
- restricting access to rehabilitated areas.

The activities undertaken during the current reporting period have been dominated by construction phase works, in which significant areas of ground have been disturbed to allow the installation of a permanent surface water drainage network. Prior to this taking place, temporary control measures were required to ensure the impacts of any rainfall events were minimised. In those areas where the clearing of trees has been undertaken, the spreading of mulched timber on the newly cleared land reduces the potential impacts of wind and water erosion.

The effectiveness of the procedures for erosion and sediment control are assessed visually as part of the routine inspection and monitoring programmes undertaken by site environmental staff. Maintenance works are subsequently undertaken on these structures as required, including repair of any erosion damage to channel banks, emptying and desilting of sediment control dams to maintain sufficient capacity for sediment storage and runoff capture. To date there has been little requirement to de-silt any of the sediment dams.

The relatively low rainfall recorded at the site during the main construction and clearing phases of the project have meant that maintenance requirements on the erosion and sediment control measures have been limited.

3.5.3 Surface Water Monitoring Network

The MCCM surface water monitoring network described in the WMP consists of four main components:

- scheduled (monthly and quarterly) monitoring;

- event based monitoring;
- discharge based monitoring; and
- geomorphological monitoring.

The MCCM surface water monitoring network, frequency and parameters is summarised in **Table 3.5.1** and shown in **Figure 3.5.1a** and **Figure 3.5.1b** below.

Flow meters were installed in Back Creek during the reporting period. However, since their installation, no surface water flow has occurred. For this reporting period, use has therefore been made of the data available on the NSW Office of Water (NOW) website.

A number of the listed locations are associated with the monitoring of operational storages that have not yet been commissioned as part of the MCCM. Monitoring of these locations has therefore not yet commenced. Similarly, the mine surface water management infrastructure was incomplete at the end of the reporting period, so monitoring of the Mine Water Dams and Raw Water Dam has not yet commenced. No seepage in the open pit or from the waste emplacement had been observed.

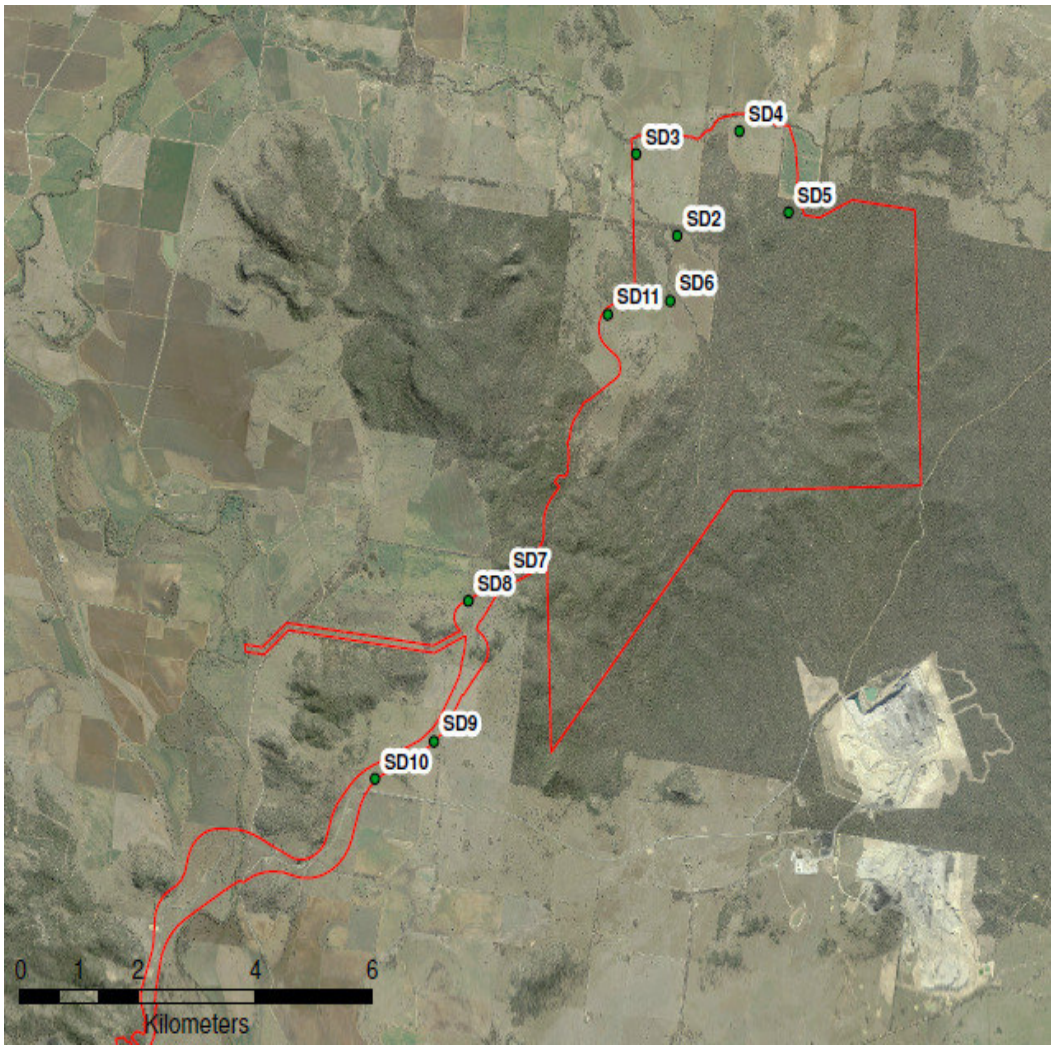
Aside from the EPL and PA 10_0138 related monitoring and sampling, regular monitoring of physical parameters in all site surface water infrastructure is undertaken by site environmental staff to assist with the day to day management of surface water at the site.

Table 3.5.1: Maules Creek Surface Water Monitoring Parameters and Sampling

Location		Parameters	Frequency	Sampling undertaken
Maules Creek	SW1 SW2	Suite 1	Daily during runoff events	No run-off events
		Suite 2	Monthly if flowing	Sampled when flowing
Namoi River	SW5	Flow [a]	Continuous	Not installed
		BTM Complex Monitoring Suite	Monthly until baseline established, then quarterly	Monthly
			+ Daily during runoff events	No run-off events
	SW6	Suite 1	Monthly	Monthly
	SW7			Monthly
	SW8	Flow [a]	Continuous	Not installed
		BTM Complex Monitoring Suite	Monthly until baseline established, then quarterly	Monthly
			+ Daily during runoff events	No run-off events
Back Creek	SW4	Flow [a]	Continuous	Due for installation Jan 2015
		BTM Complex Monitoring Suite	Monthly until baseline established, then quarterly	
			+ Daily during runoff events	No run-off events
	SW3	Suite 2	Daily during runoff events	No run-off events
	SW10			No run-off events
	SW9	Flow [a]	Continuous	Due for installation Jan 2015
		BTM Complex Monitoring Suite	Quarterly	
			+ Daily during runoff events	No run-off events
	BCP1 to BCP9	Creek Stability Photographs	Annual	November 2014
Site Clean Water Discharge Point	SW11	Suite 2	Daily during runoff events	Not yet commissioned
Mine Water Dam		Suite 2	Monthly	Dam not yet commissioned
Raw Water Dam & Sediment Dams		Suite 2	Monthly until baseline established, then quarterly	Dams not yet commissioned
Sediment Dam overflows		Suite 1 + Oil & grease	Daily during overflows	No run-off events
Pit Water Seepage		Suite 2	Quarterly	No seepage to date
Emplacement Seepage		Suite 2	Quarterly	No seepage to date

Suite 1 = pH, Electrical Conductivity (EC), Total Suspended Solids (TSS), Total Disolved Solids (TDS), Turbidity.
Suite 2 = Suite 1 + Major Anions, Major Cations, Alkalinity, Metals, Total Nitrogen, Total Phosphorus.
[a] Rating curve to be developed to convert recorded water levels to flow rates.

Figure 3.5.1a: Surface Water Discharge Locations



Legend

Discharge Point Monitoring Locations

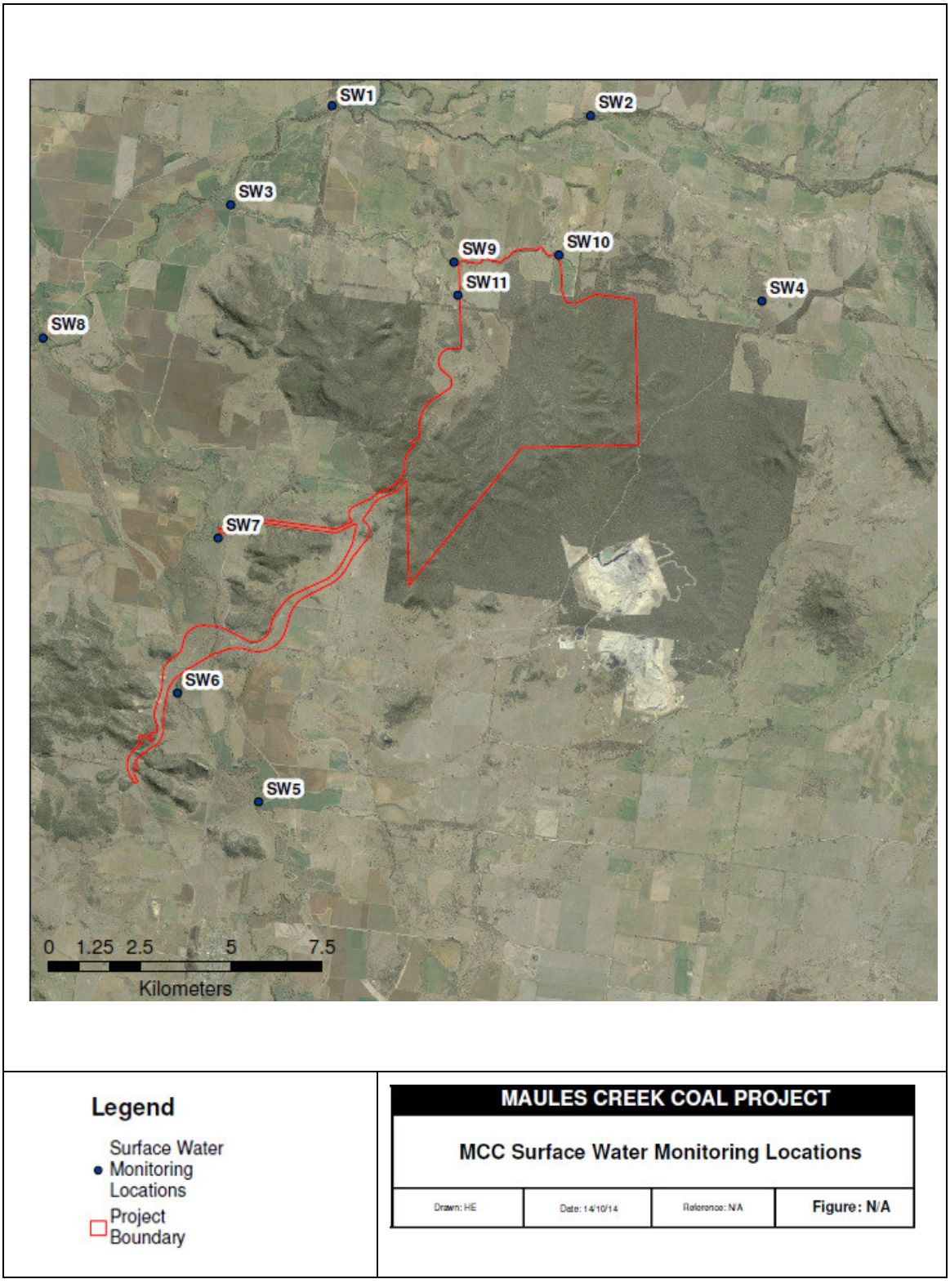
Project Boundary

MAULES CREEK COAL PROJECT

MCC Discharge Point Monitoring Locations

Drawn: HE	Date: 14/10/14	Reference: N/A	Figure: N/A

Figure 3.5.1b: Surface Water Monitoring Locations



3.5.4 Surface Water Impact Assessment Criteria

Preliminary Trigger Values (PTVs) for twenty six key water quality parameters for Maules Creek, Back Creek and the Namoi River have been proposed in the WMP (**Appendix F**). Where insufficient data is available, ANZECC eco-system trigger values have been adopted (eleven parameters). Trigger values have been proposed using background data for fifteen parameters. The adopted trigger values will be refined based on further sampling to be undertaken as the operational stages of the MCCM proceed.

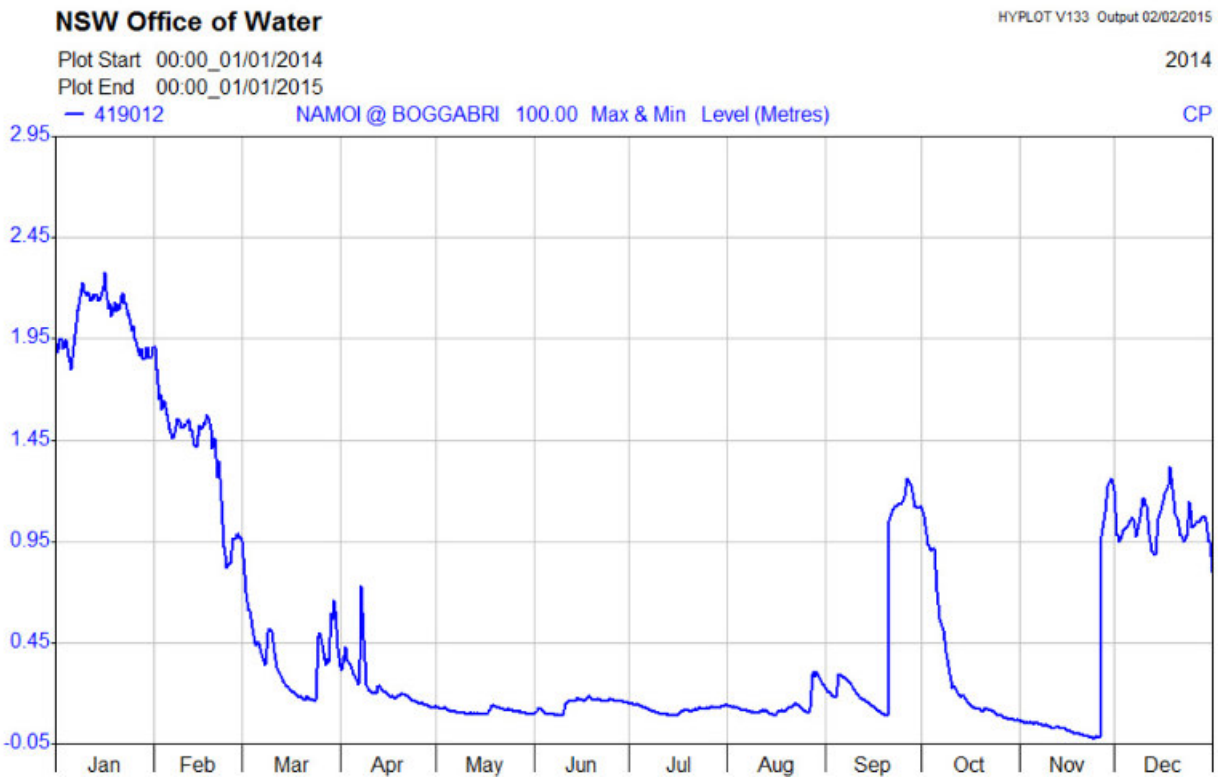
3.5.5 Surface Water Monitoring Results

Monitoring during the 2014 reporting period has been limited to the scheduled monitoring of ambient (receiving) waters and continued establishment of the base line conditions of receiving creeks. Geomorphological monitoring has also been undertaken at Back Creek.

Of the eight surface water monitoring locations sampled on a monthly basis during the reporting period, two are on Maules Creek (SW1 and SW2), two are on Back Creek (SW3 and SW4) and four are on the Namoi River (SW5 to SW8). Water levels in the Namoi River adjacent to SW5 are presented in **Figure 3.5.2** using data from NSW Government website (www.waterinfo.nsw.gov.au). Note that throughout the reporting period, flow in the Namoi River has been largely dictated by water releases from the Keepit Dam, with significant releases in January-February, September-October and again in December. Note the small group of peaks in late March-April coincide with the one significant rain event which triggered flow in the Maules Creek catchment area during the present reporting period. No flow data is available from either Maules Creek or Back Creek. At three of the monitoring locations (SW2, SW3 and SW4), apart from a three week spell in March/April, there has been no surface water flow in the Back Creek or tributaries throughout the reporting period. Maules Creek above SW1 is fed by a spring and has experienced continuous flow throughout the monitoring period.

Physical parameters measured as part of this monitoring are detailed below in **Figures 3.5.3** to **3.5.8**. Additional results are provided in **Appendix F**.

Figure 3.5.2: 2014 Mean Monthly Water Level in Namoi River at Boggabri



As per the WMP, continuous flow meters were installed at two locations in Back Creek during December 2014. As no flow has been experienced since their commissioning no data has been generated.

Figure 3.5.3: MCCM Surface Water pH Levels

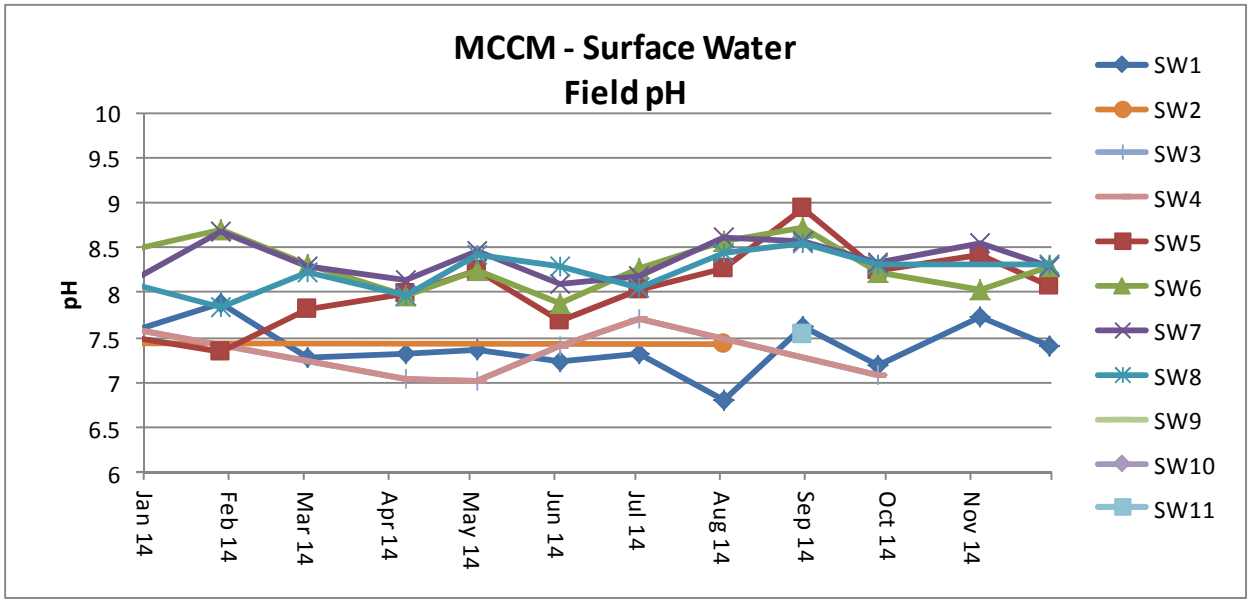


Figure 3.5.4: MCCM Surface Water Electrical Conductivity Levels.

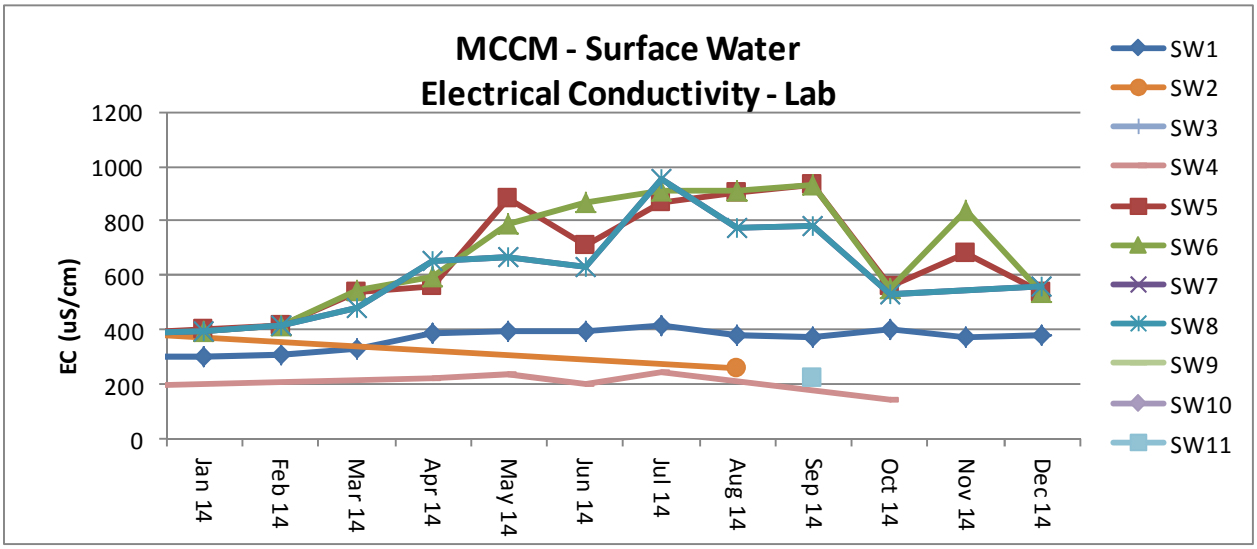


Figure 3.5.5: MCCM Surface Water Total Suspended Solids Levels

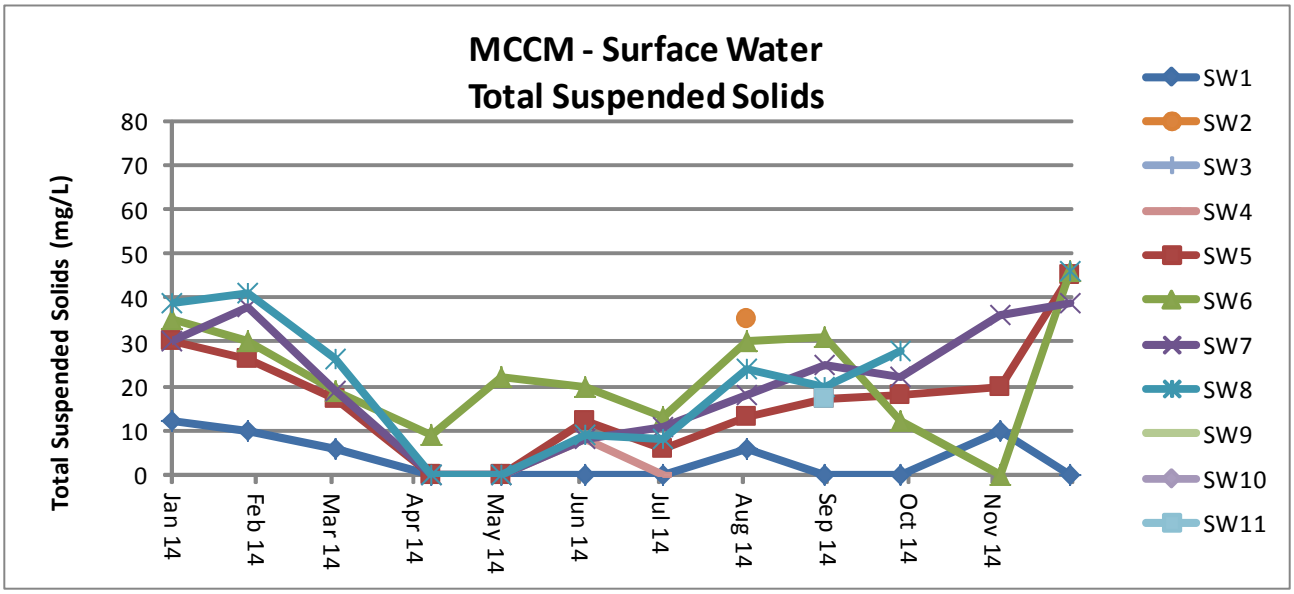


Figure 3.5.6: MCCM Surface Water Total Dissolved Solids Levels

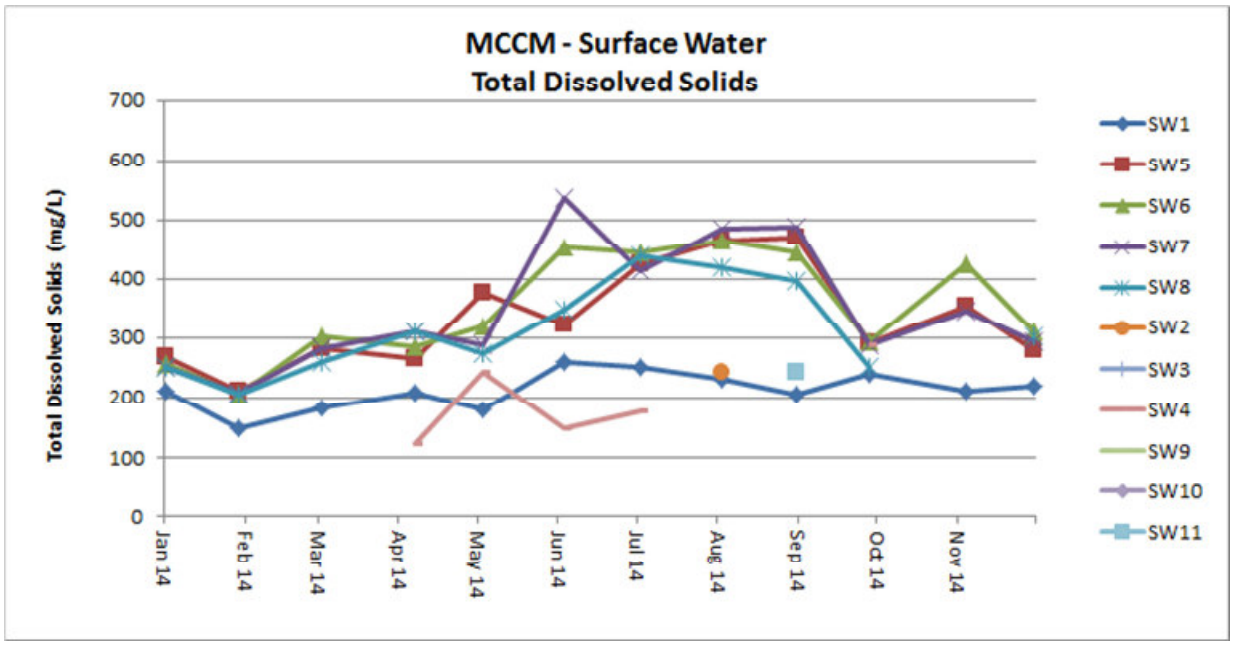


Figure 3.5.7: MCCM Surface Water Sulphate Levels (note log scale used)

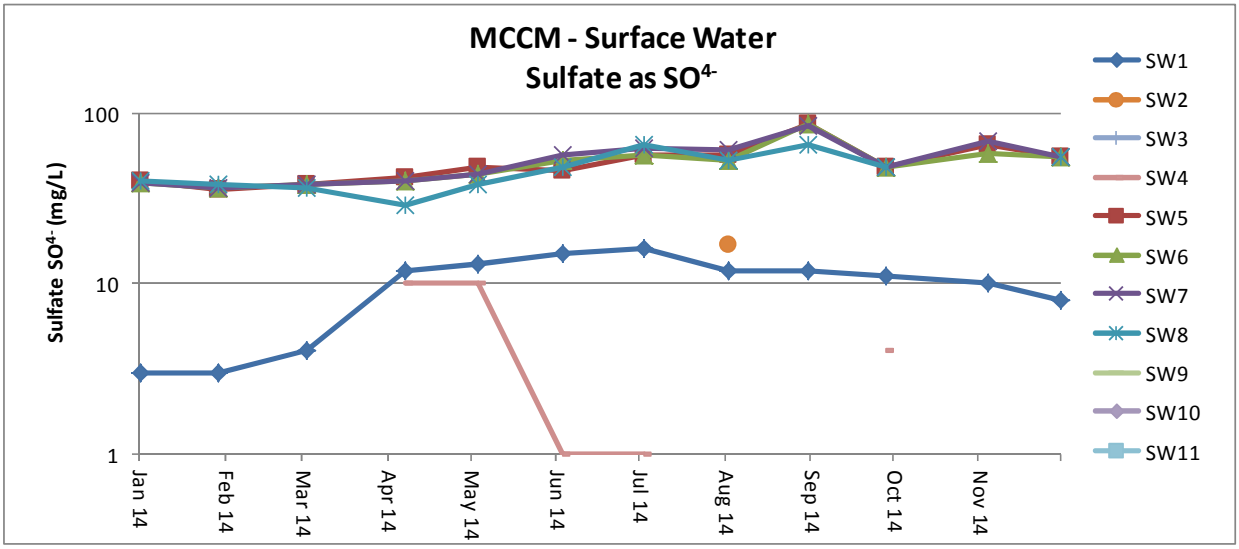
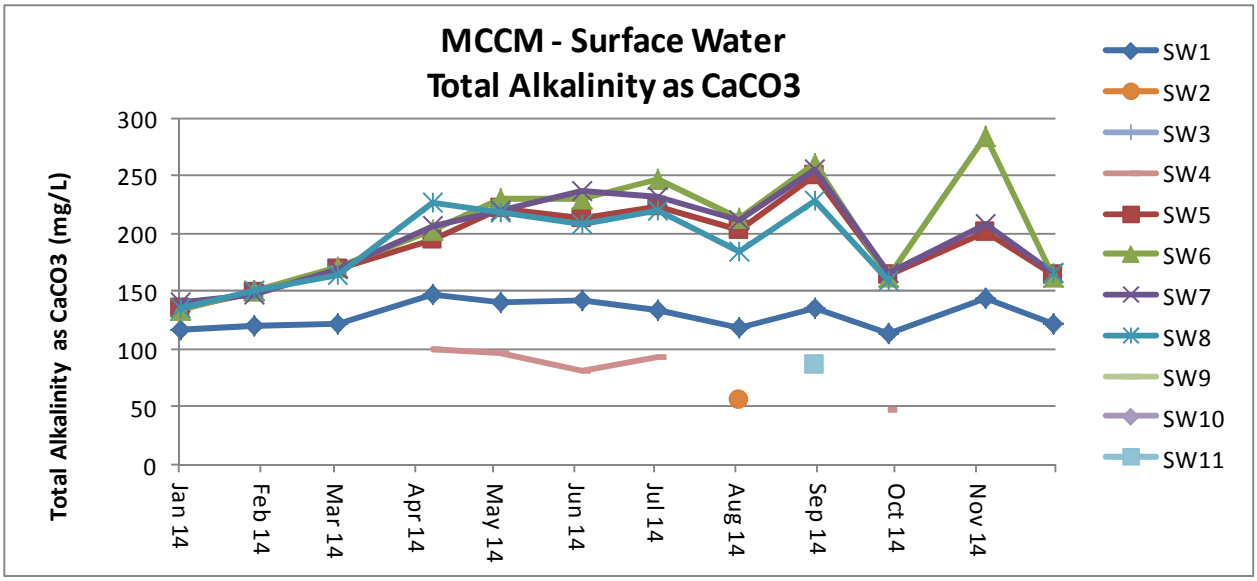


Figure 3.5.8: MCCM Surface Water Total Alkalinity Levels



Additional monitoring results from these locations, including metals, and covering a more extensive period, are provided in **Appendix F**.

3.5.6 Assessment of Performance

Further appraisal of available monitoring data will be made during the next revision of the WMP, to determine which Trigger Values (if any) may require adjustment to reflect background variations within the drainage system.

No non-compliances relevant to surface water management were recorded during the reporting period. Identified trends are shown above under each individual SW component.

One community complaint was received relevant to surface water during the reporting period. This related to flow levels in Back Creek during the March 2014 rain event. Follow up investigation indicated that the issue raised was not caused by activities at the MCCM (see Section 4.0).

A photographic survey of the downstream drainage system was undertaken during late 2014, with assessments of the Back Creek existing geomorphological condition at accessible monitoring locations. No significant impacts were identified at the monitoring locations.

The proposed surface water management and monitoring activities that are scheduled to occur in the next reporting period are as follows:

- Revision of the WMP and submission for approval;
- Refinement of surface water trigger values, which requires accumulation of sufficient baseline data; and
- Continued operational monitoring in line with the approved WMP.

3.5.7 Groundwater Monitoring Network

During the 2014 reporting period the existing MCCM groundwater monitoring network was updated through the installation of seventeen additional groundwater monitoring bores within and around the proposed MCCM operations for the following purposes:

- to form the BTM complex monitoring network;
- to confirm the extent of regional groundwater drawdown caused by the cumulative mining in the Leard State Forest, Leard State Forest Conservation Area and surrounding region; and
- to validate the site groundwater model and predictions made in the Maules Creek EA (Hansen Bailey, 2010a).

To coincide with installation of the BTM network, additional monitoring bores were installed to replace existing bores that were scheduled to be removed by mining operations in accordance with the WMP. During this process it was also decided that bores recording high alkalinity due to cement grout ingress would also be replaced as they were deemed unsuitable for ongoing water quality monitoring.

The combined network was designed in consultation with NOW and comprises seventeen open hole monitoring bores (standpipes) and eleven nested vibrating wire piezometers (VWPs).

To monitor potential impacts on groundwater levels in surrounding private properties, MCC has in consultation with landholders implemented a private bore monitoring network.

During quarter one 2014, increased protestor activity was observed across the Leard State Forest Area specifically. Coincidentally, there were numerous gates and locks vandalised preventing access and monitoring bores damaged and rendered inoperable.

The groundwater monitoring network now consists of the following elements:

- Baseline MAC series bores;
- Replacement / Regional bores;
- VWPs; and
- Private bores.

Of the old MAC series bores, 252, 252R, 263, 267P, 268P, 1261, 1283 and 1284 have been rendered inoperable however, only four due to mine pit development. Bore 1279 was found to have a blockage and can no longer be dipped or sampled.

Of the new replacement bore series, data for BCM01, BCM03, Reg10 and RB01 is not shown, as the bores have been dry or contained insufficient water to be sampled since monitoring commenced.

All 11 VWP bores are functional and operational. The private bore network continues to be monitored on a 6 monthly basis.

The network general arrangement is shown as **Figure 3.5.9** and detailed in **Tables 3.5.2** to **3.5.5** below.

Table 3.5.2: Existing Monitoring Boreholes

Drill Hole ID	Type	Screen or VWP Depth (mBGL)	Screen or VWP Zone Geology
MAC252	Standpipe	92.5 – 98.5	Braymont Seam
MAC1218	Standpipe	107 – 110	Nagero, Upper/Lower Northam, Therribri and Flixton Seams
MAC1219	Standpipe	107 – 110	Jeralong and Merriown Seams
MAC1259	Standpipe	94 – 97	Boggabri Volcanics
MAC1261	Standpipe	161 – 164	Braymont Seam
MAC1279	Standpipe	70 – 73	Jeralong Seam
MAC1280	Standpipe	56 – 59	Conglomerate/ Interburden
MAC1283	Standpipe	61 – 64	Velyama Seam
MAC263	VWP	105 183	Braymont Seam, Velyama, Nagero, Upper Northam
MAC267P	VWP	154 260	Braymont Seam, Velyama, Nagero, Upper Northam
MAC268P	VWP	280	Velyama, Nagero, Upper Northam

Table 3.5.3: Replacement Monitoring Boreholes

Drill Hole ID	Type	Screen or VWP Depth (mBGL)	Screen or VWP Zone Geology
RB01	VWP	97 140 194.5	Braymont Merriown Flixton
RB01a	Standpipe	220.5	Templemore Seam
RB02	VWP	110 162 225	Braymont Merriown Nagero
RB02a	Standpipe	234	Nagero
RB03	VWP	164 242 289 317	Braymont Merriown Nagero 4.Templemore
RB04	VWP	209 272.5 309 339	Braymont Merriown Nagero 4.Lower Northam
RB05	VWP	107 213 280 382	Braymont Jeralong Nagero 4.Templemore
RB05a	Standpipe	246.5	Merriown

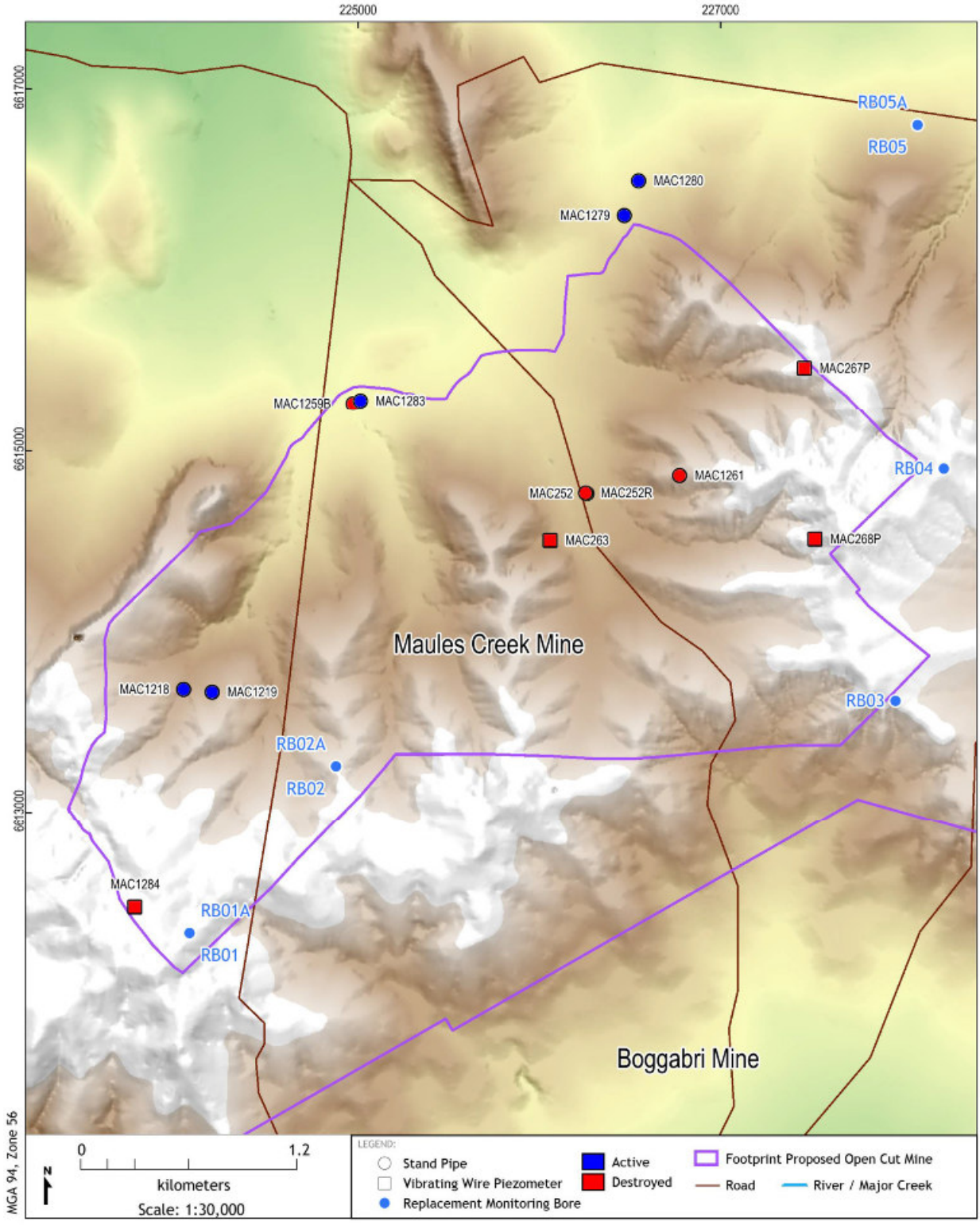
Table 3.5.4: BTM Cumulative Monitoring Network

Drill Hole ID	Type	Screen or VWP Depth (mBGL)	Screen or VWP Zone Geology
BCM01	Standpipe	10	Alluvium
BCM03	Standpipe	10	Alluvium
Reg1	VWP	118.7 134.5 193.5 281.5	Jeralong Merriown Nagero Therribri Upper
Reg2	VWP	60 120 200 260	Leard formation
Reg3	Standpipe		Boggabri Volcanics
Reg4	Standpipe	72.5	Boggabri Volcanics
Reg5	Standpipe	78.7	Boggabri Volcanics
Reg5a	Standpipe	22	Alluvium
Reg6	Standpipe	96	Boggabri Volcanics
Reg7[1]	VWP	67.5 148.2 242.5	Braymont[1] Merriown[1] Nagero[1]
Reg7a	Standpipe	36	Alluvium
Reg8[2]	VWP	91.50 221 274	Braymont Middle Merriown Nagero
Reg9[1]	VWP	115.75 175.2 269.5	Braymont[1] Merriown[1] Nagero[1]
Reg10	VWP	55 144.2 178 185.5	Braymont Merriown Nagero Upper Northam
Reg10a	Standpipe	10	Alluvium
Reg11[2]	Standpipe		Boggabri Volcanics
Reg11a[2]	Standpipe		Alluvium
Reg12	Standpipe	48.3	Boggabri Volcanics
Reg13	Standpipe	133	Boggabri Volcanics
Reg14	Standpipe	102	Alluvium

Table 3.5.5: Private Monitoring Bore Network

Work No.	Land Ownership	Usage	Bore Depth (m)
GW000583	MJ Brennan[#‡]	Stock	98.7
GW020434	Boggabri Coal	Monitoring	85.3
GW002748	Aston Coal 2 Pty Limited	Stock	72.2
GW002831	PF Murphy[#‡]	Stock	33.2
GW003115	Boggabri Coal	Monitoring	82.9
GW003466	VA and MA Younger[‡]	Stock	50
GW003478	DJC Watson[‡]	Stock and domestic	33.8
GW003483	DJC Watson[‡]	Stock	32.9
GW003489	MJ & ML Nott[‡]	Stock and domestic	45.4
GW006529	Aston Coal 2 Pty Limited		34.7
GW006567	PF Murphy[#‡]	Stock	59.1
GW008221	Aston Coal 2 Pty Limited		108.2
GW008255	MJ Brennan[#‡]	None	91.4
GW001869	CM & RRF Morse[#‡]	No access	63.1
GW020607	JM Morris[#‡]	No access	29.9
GW028893	Aston Coal 2 Pty Limited	Stock	54.9
GW028894	Aston Coal 2 Pty Limited	Stock	48.8
GW053825	NSW State Forest	None	257
GW900043	JM Morris[#‡]	No access	32.9
GW967856	NSW State Forest	Monitoring	66.5
GW967861	NSW State Forest	Monitoring	59
GW967862	NSW State Forest	Monitoring	85

Figure 3.5.9: Monitoring Borehole Locations



3.5.8 Groundwater Impact Assessment Criteria

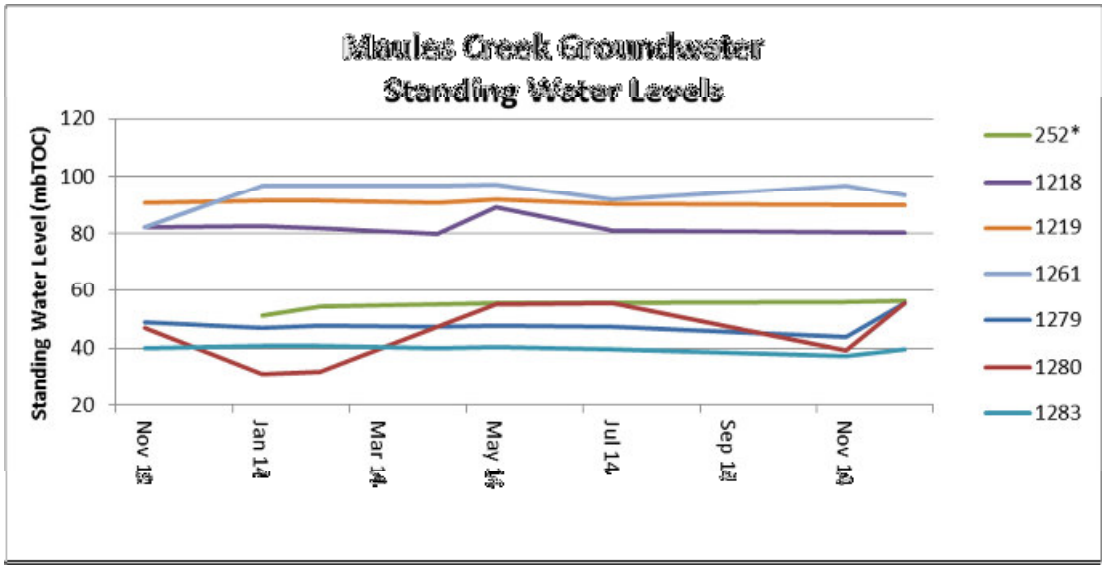
As described in the WMP, groundwater impact assessment criteria will be determined from monitoring results obtained over an extended period. The relevant predictions from the Groundwater Impact Assessment (AGE, 2011) that will be monitored and reviewed throughout the operations include:

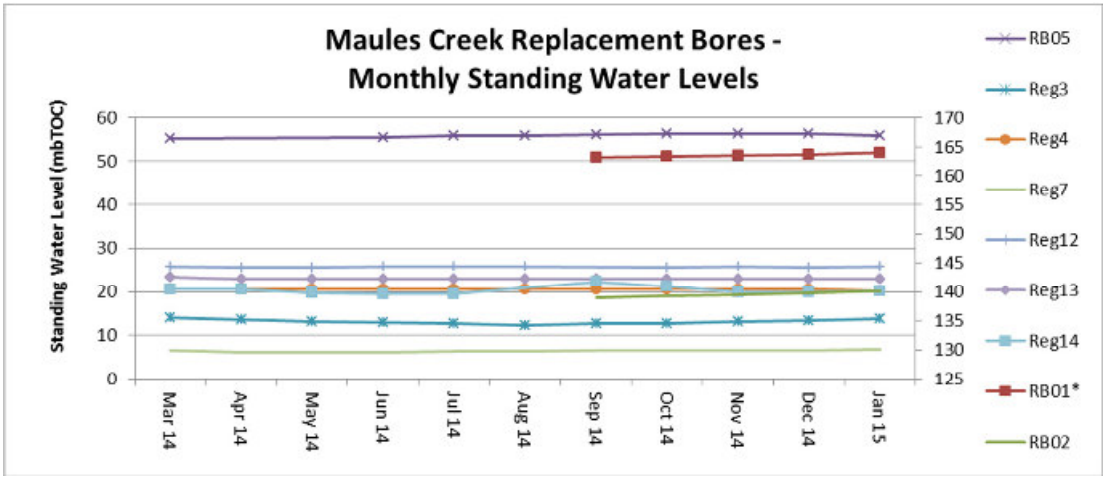
- pit seepage between 0.5 ML/day and 2.5 ML/day;
- loss of recharge to the neighbouring alluvial aquifers;
- no change in alluvial aquifers beyond natural fluctuation;
- groundwater pressures of Permian coal measures declining; and
- not change in water quality of the Permian aquifer.

3.5.9 Groundwater Monitoring Results – MAC and Replacement Bores

Parameters recorded as part of the scheduled groundwater monitoring for this reporting period are summarised below in **Figures 3.5.10** to **3.5.15**. Additional summaries of laboratory data are presented in **Appendix G**. As the mine pit expands many of the remaining MAC series bores installed to provide baseline date for the Maules Creek EA, will be removed. However, the groundwater monitoring network was strengthened with installation of Replacement Bores and VWP's in 2013 / 14. The monitoring results for MAC and Replacement bores are illustrated separately in the figures below.

Figure 3.5.10: MCCM Groundwater Standing Water Levels

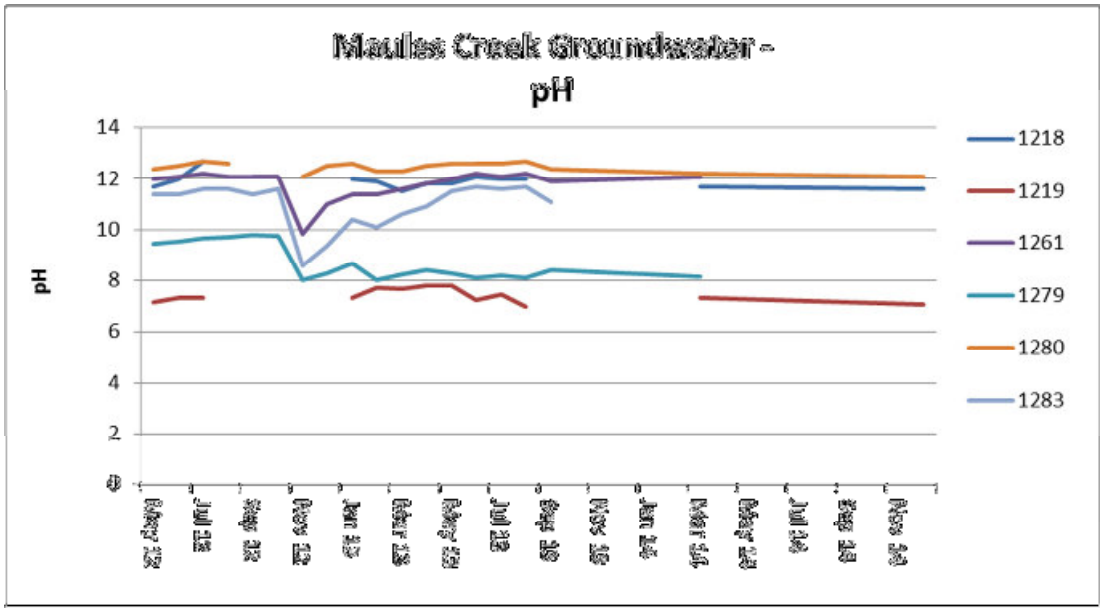


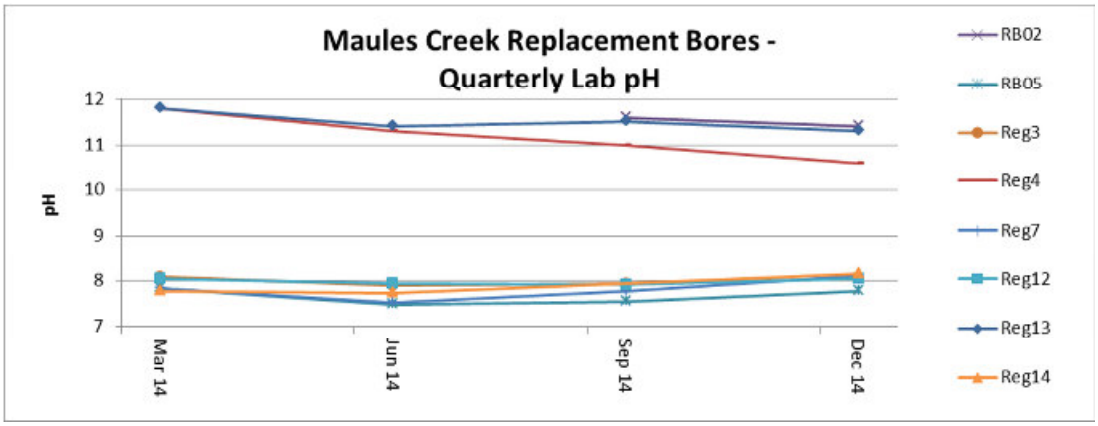


RB01 water level is featured on the secondary axis, however, it was recently identified that this bore contains insufficient water to be sampled and likely contains less than a meter of water in the base at ~220m and target the Templemore seam.*

Groundwater levels in all monitored bores have remained relatively static over the monitoring period. As the mine pit continues to expand, drawdown is expected to occur in line with predictions made in the Maules Creek EA (Hansen Bailey, 2010a). No drawdown trends have been observed during the monitoring period.

Figure 3.5.11: MCCM Groundwater pH Levels



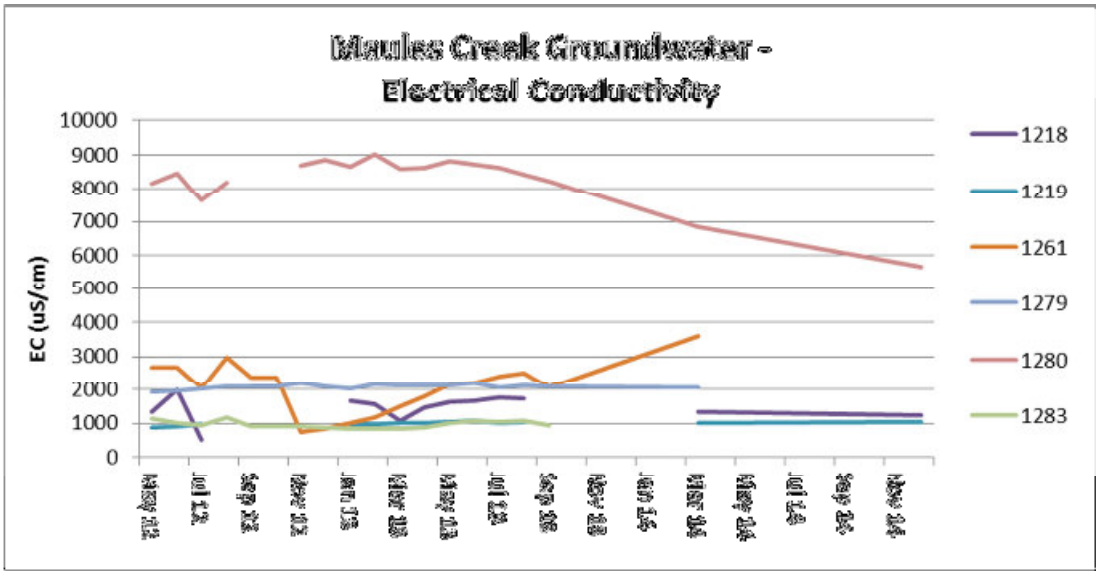


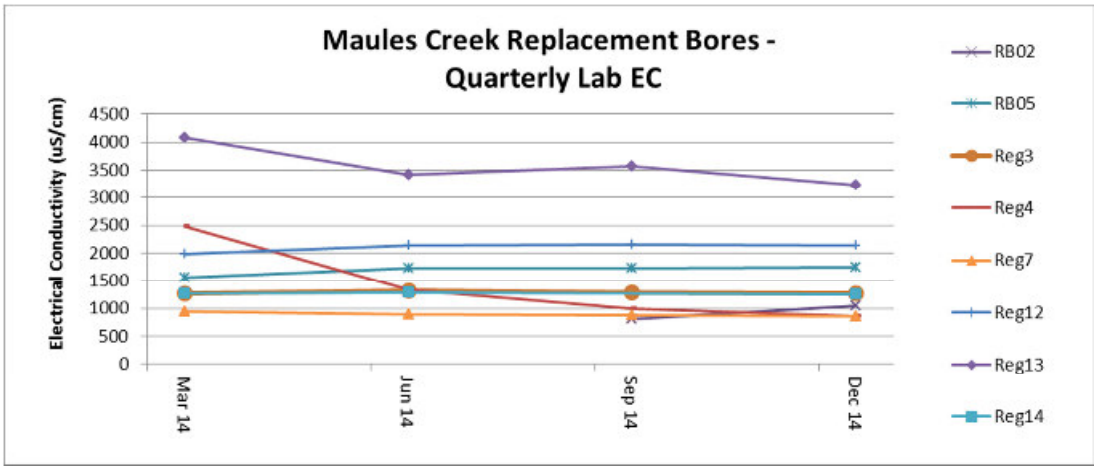
Groundwater quality results for pH indicate that all MAC series bores, with the exception of MAC1219 and 1279, recorded consistently elevated alkaline (above 8.5) pH levels.

The replacement bore series show Reg13, 4 and RB02 have elevated pH of around pH 11. Previous investigations of elevated pH in other bores identified that drilling grout had potentially influenced the groundwater quality. Target seams of bores (refer **Tables 3.5.2 to 3.5.4**) with eleveted pH are not consistent to support an aquifer characterised by elevated pH. In review of the Maules Creek EA, the seams targeted by these bores have one thing in common, very low hydraulic conductivity and transmissivity.

Other replacement bores show stable groundwater pH that is characteristic of coal seams and interburden of between pH 7.5 and 8.0.

Figure 3.5.12: MCCM Groundwater EC Levels

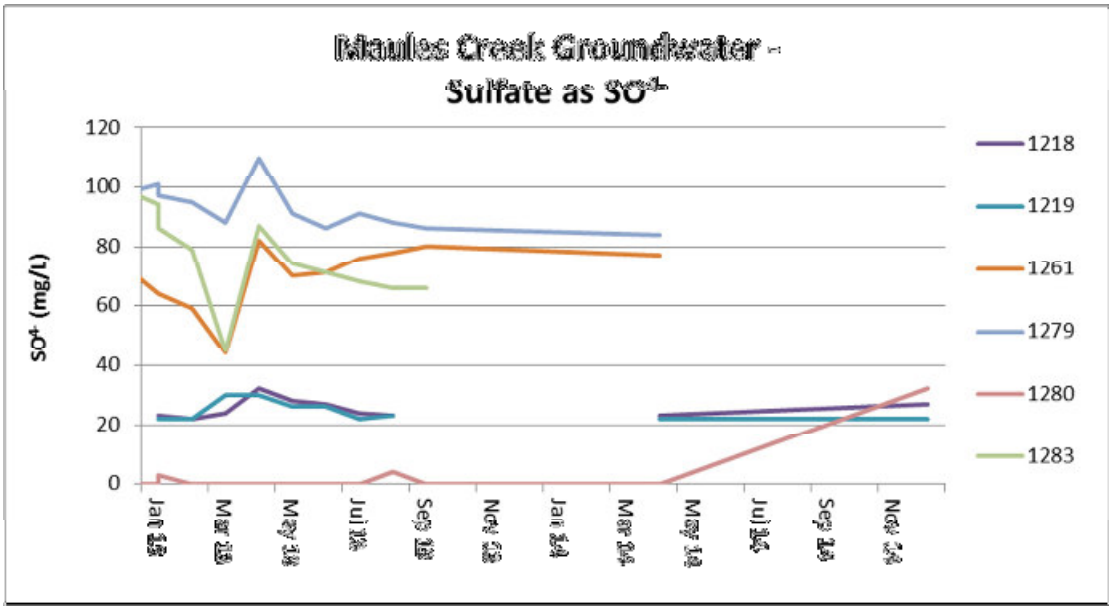


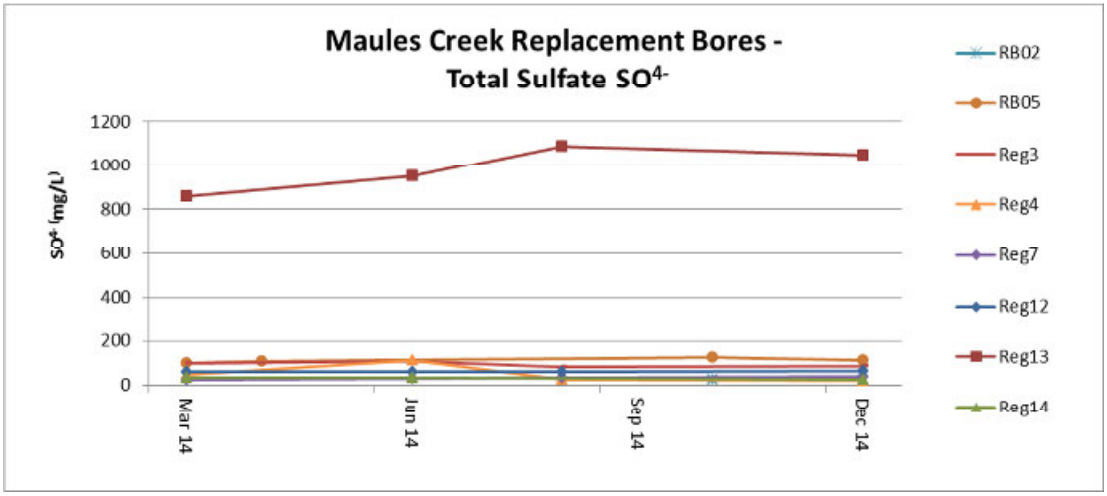


Recorded EC levels remained relatively stable during the 2014 reporting period and indicate a slightly saline groundwater quality that is characteristic of coal seam lithology. These levels are relatively consistent with original sampling undertaken as part of the Maules Creek EA in 2010.

Bores MAC1280 and Reg13 show elevated EC with declining trends for conductivity of 5750 and 3250 respectively.

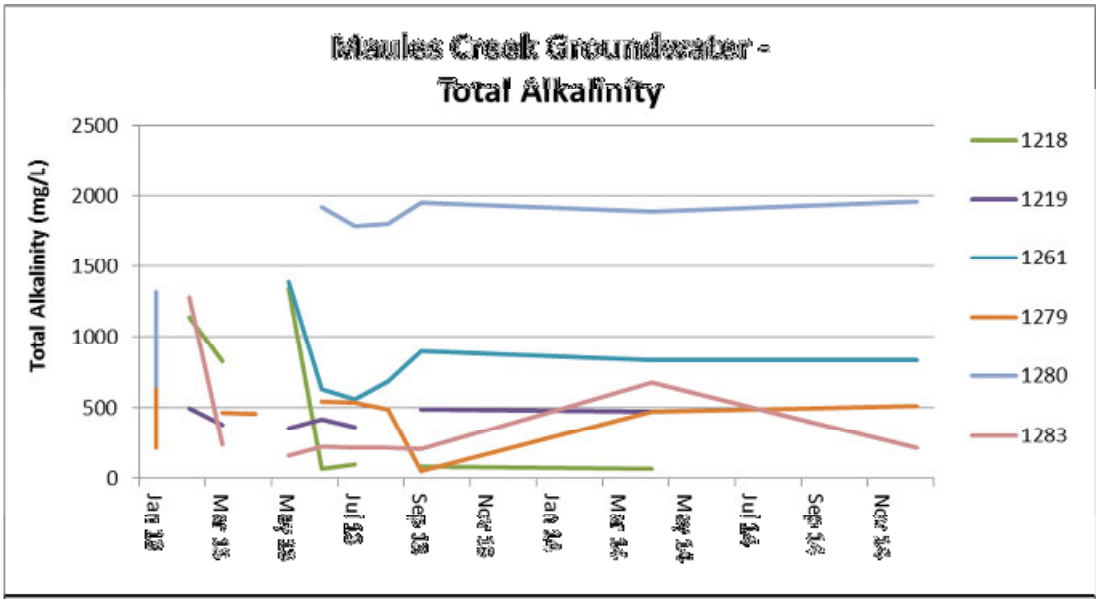
Figure 3.5.13: MCCM Groundwater Sulfate Levels

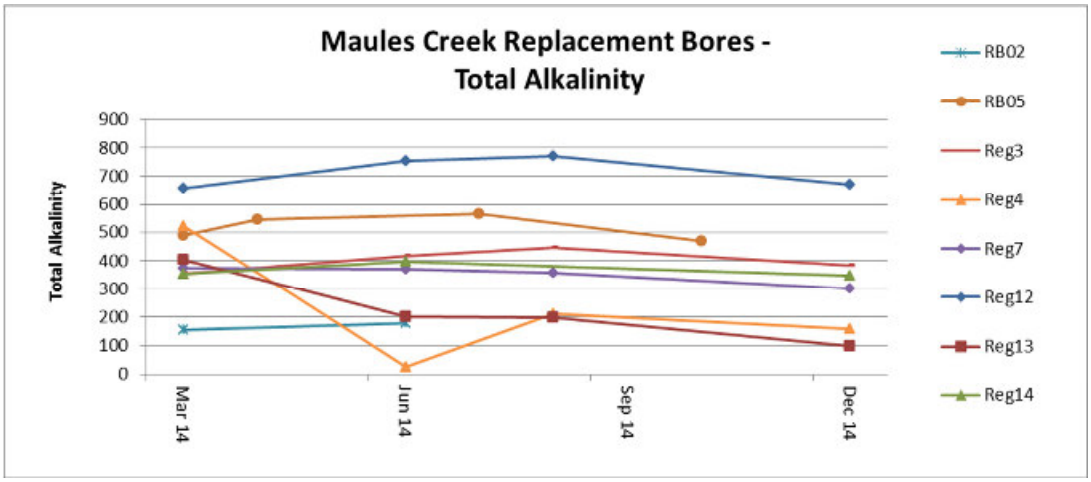




Concentrations of sulfate were stable and generally low >150 mg/L, within monitoring bores during the 2014 reporting period. These levels are consistent with the 2010 EA where the highest recording was 282 mg/L at MAC1279 (24/10/2010). However, Reg13 which targets the Boggabri Volcanics, shows elevated sulfate of >1000 mg/L which places it within the suitability category of 'Livestock' according to the ANZECC guideline.

Figure 3.5.14: MCCM Groundwater Alkalinity Levels

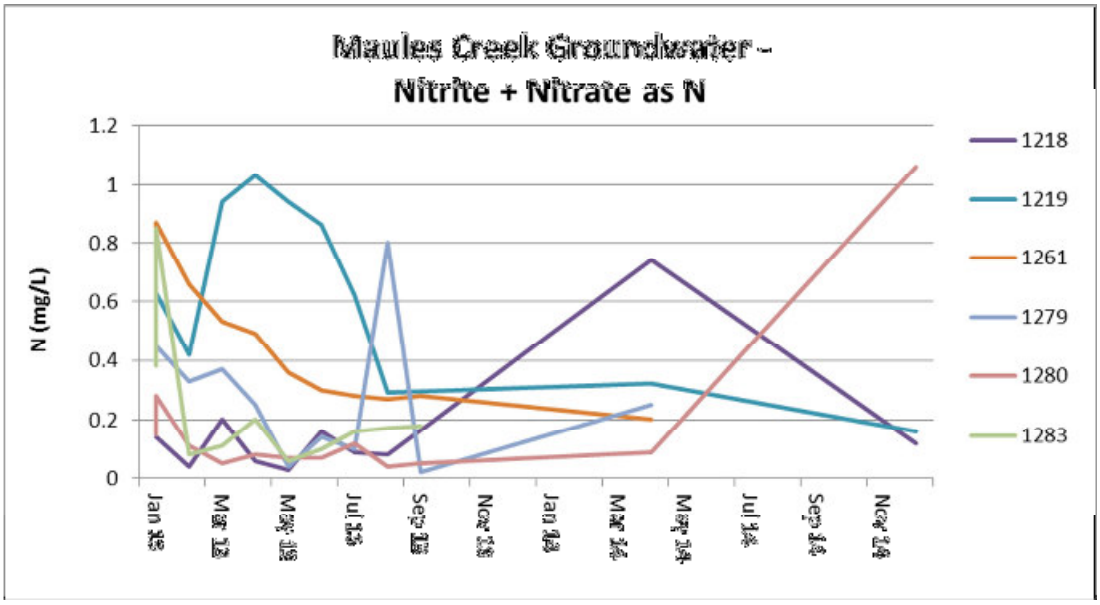


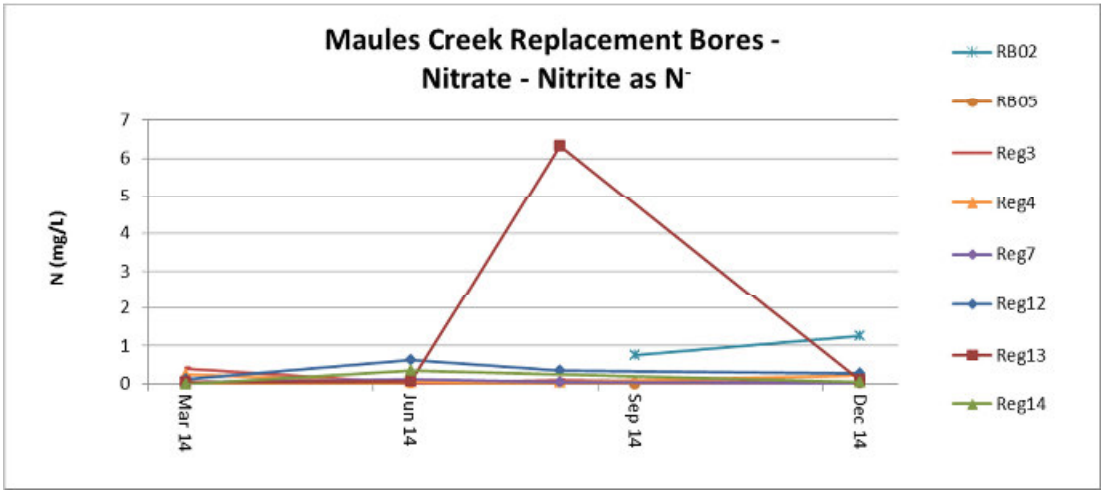


Alkalinity levels have been relatively stable this reporting period. With exception for MAC1280 and 1261 alkalinity levels are consistent with the Maules Creek EA. Bores MAC1283 and Reg4 have shown slight variability throughout the year.

Replacement bores Reg13, 4 and RB2 all show very low levels of alkalinity which supports the observation that each of these bores also have elevated pH.

Figure 3.5.15: MCCM Groundwater Nitrate Levels





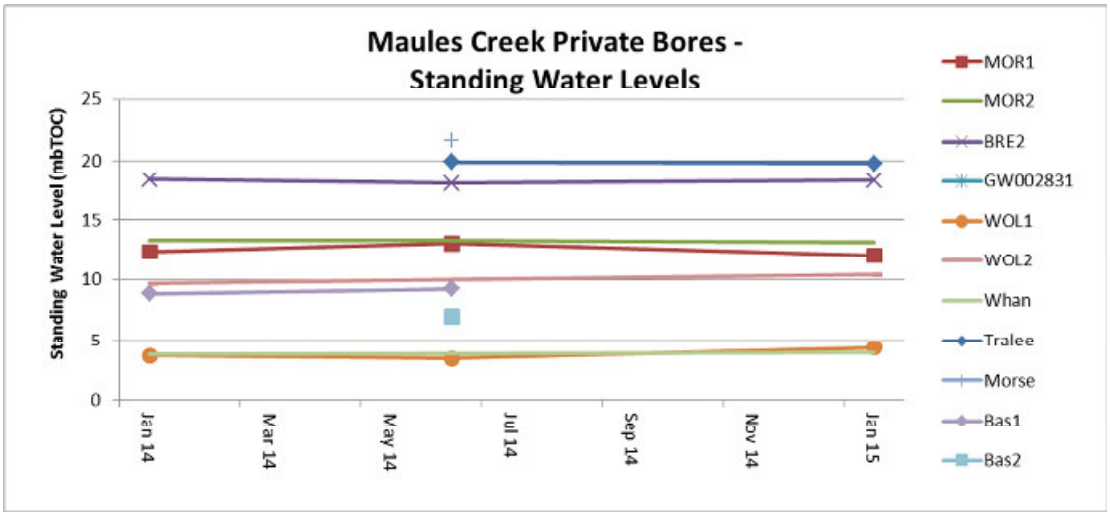
Nitrogen compounds recorded during the 2014 reporting period were all below 1.3 mg/L with exception for Reg13 which spiked to 6.3 mg/L before returning back down to background levels.

3.5.10 Groundwater Monitoring Results – Private Bores

Parameters recorded as part of the scheduled Private groundwater monitoring for this reporting period are summarised below in **Figures 3.5.16** to **3.5.18**. Private bores are monitored on a 6 monthly basis. In order to better illustrate trends, an additional data point from 2015 has been included.

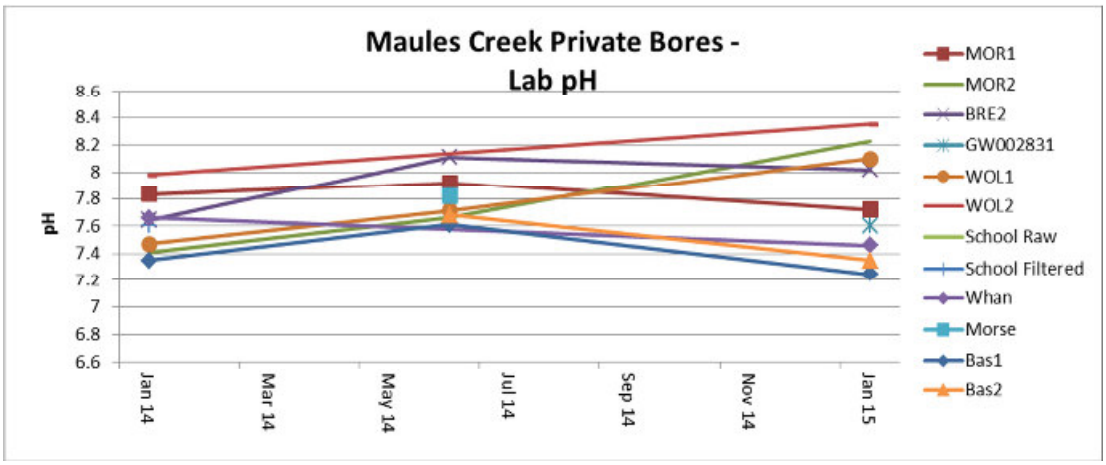
Access to private bores GW002831, School Raw, School Filtered and Morse was restricted during monitoring period on two of the three monitoring events.

Figure 3.5.16: Private Groundwater Standing Water Levels



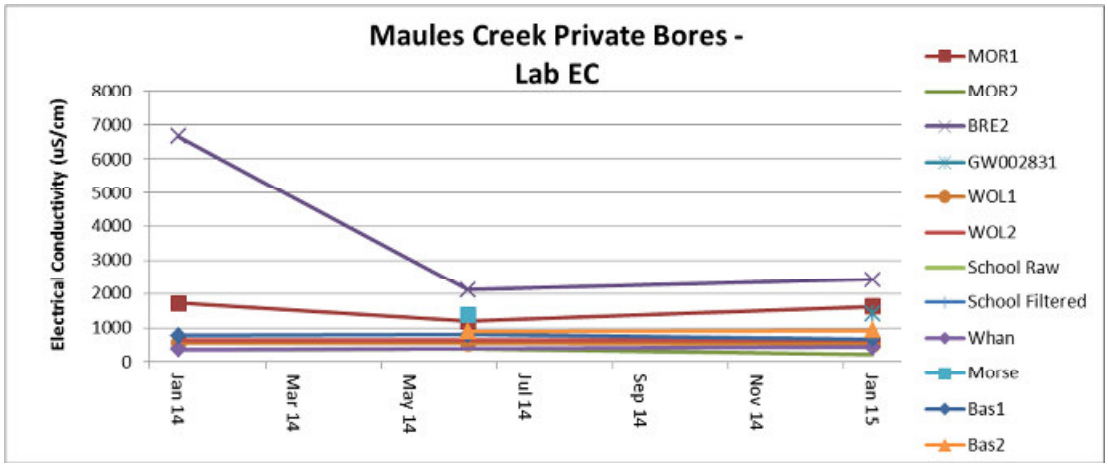
Standing water levels in private bores remained stable during the monitoring period.

Figure 3.5.17: Private Groundwater – Laboratory pH



Laboratory pH of private bores were generally stable each location not fluctuating by more than pH 0.2. Overall the water quality is good and the acidity sits between *circa* neutral pH 7.2 and 8.2.

Figure 3.5.18: Private Groundwater – Laboratory Electrical Conductivity (EC)



3.5.11 Vibrating Wire Piezometers

In 2013 and 2014 a network of new replacement bores were installed that included 11 VWP's. Each VWP contains three to four sensors installed at various depths targeting coal seams as per **Table 3.5.3** above. Each sensor is grouted in place with slurry that isolates the sensor from vertical groundwater movement but enables measurement of water pressure applied from the rock or coal at a specific depth. Following drilling and installation and depending on the hydraulic conductivity and transmissivity, it can take up to several weeks for groundwater pressures to stabilise.

VWP's are downloaded each month along with the level monitoring in open standpipes. VWP's record a hertz frequency value that is converted into an *equivalent meters head pressure* of groundwater above sensor.

The groundwater pressure trends are summarised in **Figures 3.5.19** to **3.5.29** in **Appendix G**. Each sensor records temperature shown in red and equivalent water level in blue.

Many of the VWP sensors show a slight reducing trend, however, this is not able to be attributed to MCC mine activities since the mine pit depth is approx. 30 m and has not intersected all these seams. More likely, the groundwaters are still equilibrating from drilling and development due to very low flow characteristics.

Groundwater trends will continue to become evident during the 2015 reporting period.

3.5.12 Assessment of Performance

There were no non-compliance issues relevant to groundwater management recorded during the reporting period. Nor have there been any community complaints relating to groundwater during 2014.

In terms of trend analysis, all bores show trends / characteristics that are within the historic range. Since the commencement of mine pit excavation, the maximum depth exposed to date is approx 30 m below surface. During the reporting period there have not been any significant groundwater inflows into the pit, certainly far less than the 225 ML per annum modelled in the Maules Creek EA. To date there has not been sufficient

groundwater accumulation to enable pumping. Consequently, standing water levels in site and private bores remains unchanged at this stage.

The proposed groundwater management and monitoring activities scheduled to occur in the next reporting period are:

- monitoring of the BTM complex, private and existing network in compliance with the WMP;
- progressive installation of pressure transducers in all monitoring bores;
- determination of groundwater impact assessment criteria.

3.6 Biodiversity Management and Performance

Construction activities took place throughout the reporting period and were undertaken in accordance with the MCCM Biodiversity Management Plan (BMP), which was prepared to satisfy Condition 52 of Schedule 3 of PA 10_0138. The construction phase BMP was approved by the DP&E in June 2013. Revisions of the BMP were undertaken to support the operational phase of the Project, which commenced during the reporting period. These revised BMP's were approved by the DP&E in May 2014 and October 2014.

This section discusses environmental performance, environmental management, and any non-conformance issues associated with the activities undertaken during the reporting period. This includes identifying trends in monitoring results, comparisons to predictions in the Maules Creek EA and statutory requirements, and a description of measures that will be implemented over the following year.

3.6.1 Weed Management

A number of noxious weed species were recorded at the MCCM during baseline surveys, and disturbance as a result of the mine has the potential to exacerbate the impact of weeds on areas of retained native vegetation, particularly Leard State Forest. The principal mechanisms for weeds establishing in an area include:

- elevated nutrients in stormwater runoff;
- physical disturbances to the soil;
- increased soil moisture from shading / reduced water infiltration;
- increased light at the margins of vegetation; and
- weed introduction on vehicles and equipment.

During the construction phase, contractors undertook weed management measures in line with their own CEMPs, typically involving inspections of plant and equipment before mobilising to the site and regular inspections when working on site.

Throughout the reporting period, weed monitoring inspections were being undertaken within the MCCM area, particularly in those areas where vegetation clearing was under way. This work also included routine inspection of topsoil stockpiles, and disturbed areas.

Weed control actions

Weed species were encountered in all areas during 2014 Clearance Works, which covered the Construction Clearance Phase and Operational Phase pre-clearance surveys. These observations included three Weeds of National Significance (WONS) (*Opuntia sp.* (Prickly and Tiger Pears) and *Lycium ferocissimum* (African Boxthorn)).

Opuntia sp. was encountered throughout the Clearance Areas; however, occurrences of *Lycium ferocissimum* were restricted to the Construction Clearance Areas (primarily in the Velyama property and pipeline corridor areas).

Surveys for weed species consisted of random meander surveys, done in conjunction with the fauna habitat marking surveys. Occurrences of weeds were recorded using a handheld GPS device and the following information was recorded:

- Species;
- Health (Alive/Dead);

- Size of occurrence (small/medium/large patch);
- Number flowering; and
- Number fruiting.

Occurrences of these species were comprehensively recorded throughout all clearing areas. The data collected was used to inform the control measures to be introduced during clearance operations.

Opuntia sp. was controlled on site through mechanical destruction during clearing operations (by the actions of clearing machinery). *Lycium ferocissimum* was managed through stockpiling on site for later disposal.

3.6.2 Feral Pests

Surveys of feral pests consisted of opportunistic sightings during surveys associated with the vegetation clearing operations. In addition, observations by site environmental staff whilst undertaking routine site inspection and monitoring works are also recorded. The following species have been encountered:

- European Rabbit (*Oryctolagus cuniculus*);
- European Red Fox (*Vulpes vulpes*);
- Wild Pig (*Sus scrofa*);
- Deer (*Cervus* and/or *Dama* sp.);
- Feral Cat (*Felis cattus*) and
- European Hare (*Lepus europaeus*).

Rabbits, foxes and hares were observed mainly in the cleared areas around the edge of forest in both the north and south of the MIA. Deer, pigs and cats have been predominantly seen in Leard State Forest (along roads and adjacent bush) as well as in the biodiversity offset areas to the north of the MCCM (i.e. Eastern offsets).

3.6.1 Pre-clearing and Clearing Surveys

Ecological works associated with vegetation clearing works at MCCM were undertaken during the reporting period in two main phases. Ecological works for the 2014 clearance program occurred between 6th January and 1st May 2014 (Construction Clearance Phase) and 15th May and 12nd June 2014 (Operational Clearance Phase). These works consisted of marking the limits of clearing, weed mapping, pre-clearance fauna surveys, clearance supervision, fauna rescue and secondary checks on the day following clearing. **Figure 3.6.1** shows the locations and clearance boundaries of these two phases of clearance works.

Flora Surveys

Prior to clearing, pre-clearing flora surveys were conducted to search for threatened plant species that have potential to occur in the area, based on available habitat. One threatened plant species listed under the *Threatened Species Conservation (TSC) Act 1995* and/or *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*) was recorded, namely *Tylophora linearis.* The BMP approved by the DP&E in October 2014 provides a propagation and translocation program for the species.

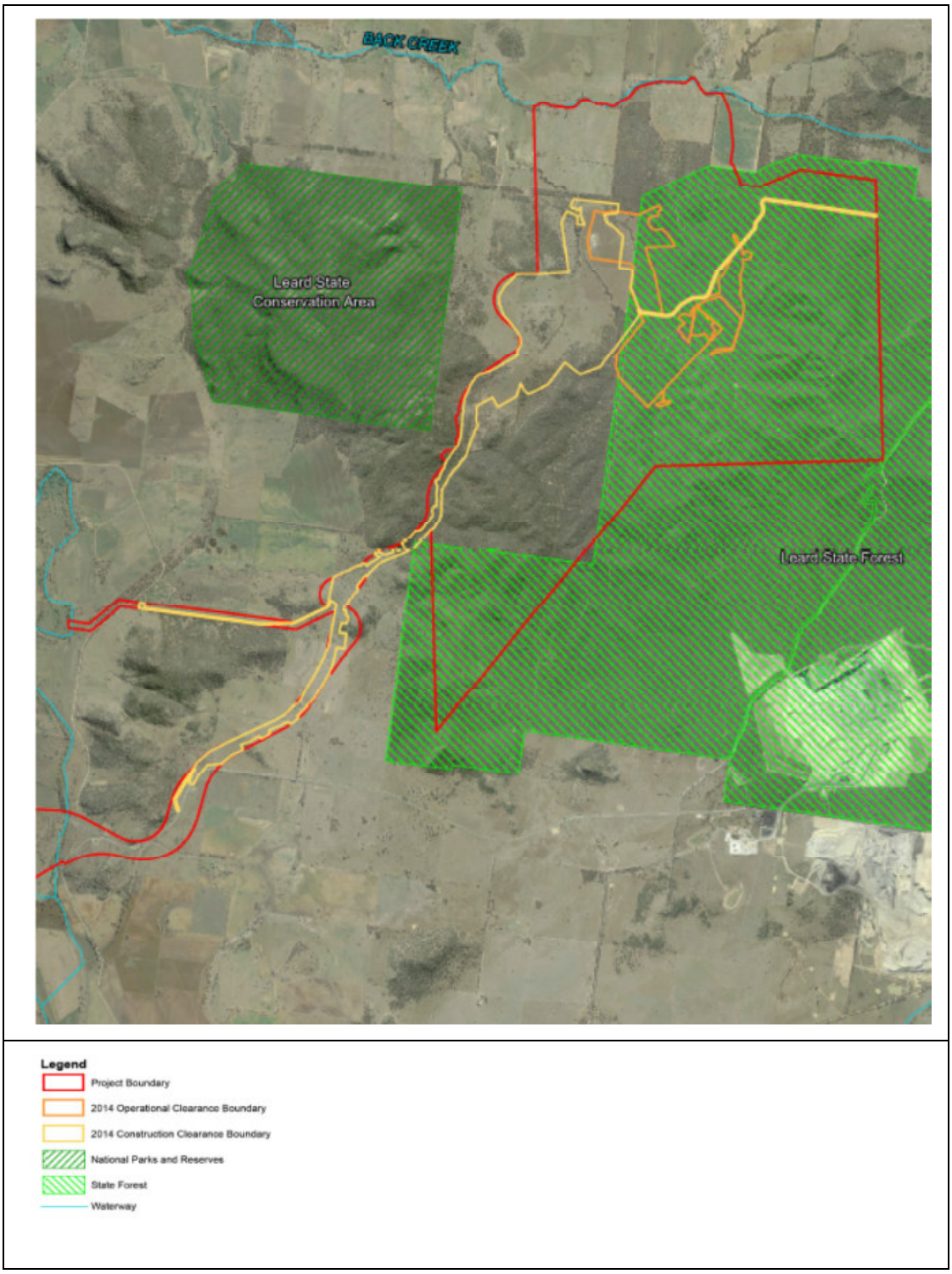
Fauna Surveys

Prior to the commencement of vegetation clearance, 50 m by 20 m habitat density survey plots were conducted in the representative vegetation communities to be cleared, in order to determine the appropriate salvage density. These were conducted in August of 2013 for the Construction Clearance Phase and in May 2014 for the Operational Clearance Phase. A selection of hollow-bearing trees, logs and bushrock piles were identified, marked and assembled during the 2014 Clearance Works. **Table 3.6.1** below summarises the results of plots conducted in the vegetation community types cleared during the 2014 Clearance Phases.

Table 3.6.1 – Summary of Pre-Clearance Habitat Density Surveys

Vegetation Community	Survey Plots Undertaken		Average Tree Density		Average Log Density		Average Boulder Density	
	Construction	Operations	Construction	Operations	Construction	Operations	Construction	Operations
Belah woodland	1	0	40		190		<5%	
Dwyers Red Gum Ironbark woodland	1	3	10	27	130	67	<5%	20
Dwyers Red Gum woodland	1	0	10		100		<5%	
Narrow-leaved Ironbark-White Cypress Pine shrubby open forest	1	3	20	73	80	120	<5%	0
Piliga Box-Poplar Box-White Cypress Pine grassy open forest	1	0	40		50		<5%	
White Box-Blakely's Red Gum-Melaleuca riparian forest	1	0	20		260		<5%	
White Box- Narrow Leaved Ironbark-White Cypress Pine grassy open forest	1	3	10	60	20	83	<5%	0
White Box-Wilga-Belah woodland	1	0	40		170		<5%	
White Box-shrubby woodland	1	0	50		80		<5%	
Derived native grassland	0	2		0				
Derived native grassland (Low diversity White Box woodland)	0	2		0				
Silver -leaved Ironbark Heathy woodland	0	3		40		83		90
White Box- Narrow Leaved Ironbark-White Cypress Pine shrubby open forest	0	3		63		103		20

Figure 3.6.1 – 2014 Clearance Boundaries



Fauna was encountered during all work tasks on the 2014 Clearance Works, including species of frogs, birds, mammals and reptiles. Threatened species (under the *Threatened Species Conservation (TSC) Act 1995* and/or *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*) were encountered. The following paragraphs summarise the fauna species encountered.

During the Construction Clearance Phase a total of 259 fauna encounters were recorded and during the Operational Clearance Phase a total of 760 fauna encounters were recorded. The most frequently encountered species from both clearance phases was the Dubious Dtella (*Gehyra dubia*) with 368 individuals recorded (322 captured and relocated). Seven species not identified during prior surveys were encountered during the 2014 clearance period:

- Boulenger's Snake-eyed Skink (*Morethia boulengeri*). Ten individuals were captured during clearing works with one fatality;
- Common Dunnart (*Sminthopsis murina*). One individual was captured during clearance works;
- Eastern Broad-nosed Bat (*Scotorepens orion*). Nine individuals were captured during clearance works;
- Elegant Snake-eyed Skink (*Cryptoblepharus pulcher*). 23 individuals were encountered, with 21 captures;
- Inland Freetail Bat (*Mormopterus petersi*). Six individuals were captured during clearance works;
- Jacky Lizard (*Amphibolurus muricatus*). Three individuals were captured during clearance works with an additional two individuals encountered;
- Pacific Baza (*Aviceda subcristata*). One individual was seen during pre-clearance surveys;
- Pale-headed Snake (*Hoplocephalus bitorquatus*), listed as Vulnerable under the TSC Act. Three individuals were encountered, with one capture.

The following threatened fauna species listed under the TSC Act were encountered during the 2014 Clearance Works (none of the fauna species are listed under the *EPBC Act*):

- Barking Owl (*Ninox connivens*) – listed as Vulnerable under the TSC Act. 14 encounters;
- Brown Treecreeper (Eastern Subspecies) (*Climacteris picumnus victoriae*) – listed as Vulnerable under the TSC Act. Six encounters;
- Grey-crowned Babbler (Eastern Subspecies) (*Pomatostomus temporalis temporalis*) – listed as Vulnerable under the TSC Act.
- Masked Owl (*Tyto novaehollandiae*) – listed as Vulnerable under the TSC Act.
- Pale Headed Snake (*Hoplocephalus bitorquatus*) – listed as Vulnerable under the TSC Act.
- Speckled Warbler (*Chthonicola sagittatus*) – listed as Vulnerable under the TSC Act.
- Turquoise Parrot (*Neophema pulchella*) – listed as Vulnerable under the TSC Act.
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) – listed as Vulnerable under the TSC Act; and
- Squirrel Glider (*Petaurus norfolcensis*) – listed as Vulnerable under the TSC Act.

3.6.2 Relocation of habitat resources

During the Construction Clearance Phase a total of 181 items were marked as salvage (120 trees, 47 logs and six bushrock piles). During the Operational Clearance Phase a total of 709 items were marked as salvage (672 trees and 37 logs). This was from a total of 6231 habitat items marked, as such, 11.4% of the total marked habitat items were marked for salvage to be used in future onsite rehabilitation.

3.6.3 Offset Monitoring

The offset area monitoring programme commenced in spring 2014. A summary of the methods and results of the spring surveys is provided below from the monitoring report (Australian Museum Consulting, 2015).

Vegetation and habitat data was collected at 25 potential monitoring sites. At each site a base plot of 20 by 50 m was permanently marked and within this plot a smaller 20 by 20 m quadrat was established. A nested flora survey, which involved recording the presence of all flora species within subplots, was undertaken within the 20 by 20 m quadrat. Other variables recorded within the 20 by 20 m quadrat were cryptogam cover; rock cover; proportion of bare ground; structure of the canopy, mid storey and ground layers; and tree species and size class. Information recorded within the 20 by 50 m plot included data regarding tree hollows, fallen logs, litter, proximity to water, rocks, caves and overhangs, evidence of erosion, dense stands of regeneration, past and current disturbance, eucalypt dieback, presence/absence of honeyeaters, flowering eucalypts, overstorey cover, midstorey cover, ground cover and fire fuel loads. General descriptions and photographs were also recorded.

An additional 15 photo points were established in riparian areas and areas proposed for revegetation. Variables recorded within the 20 by 50 m plot were similar to those described above for the vegetation and habitat monitoring. At riparian sites additional details were recorded including stream order, active channel width, substrate, riparian vegetation, fringing ground habitat, water movement and colour. To classify the condition of the riparian habitats, nine aspects from the Stream Visual Assessment Protocol were scored including channel condition, riparian zone, bank stability, water appearance, nutrient enrichment, barriers to fish movement, instream fish cover, pools and invertebrate habitat.

Vertebrate fauna surveys were undertaken at 16 survey sites. Techniques used at each site included Elliott traps, funnel traps, remote cameras, spotlighting, hand searches, call-playback and diurnal bird surveys. Frog and tadpole surveys were also undertaken in suitable habitat.

The vertebrate fauna surveys recorded a total of 204 species, comprising 10 frogs, 34 reptiles, 120 birds and 40 mammals. Nine introduced species were recorded within the offset areas. Foxes, pigs and goats were considered to be abundant, while cats and rabbits were considered moderately common. Thirteen species recorded within the offset areas during these surveys are listed as threatened under the TSC Act and/or EPBC Act and two are listed as migratory under the EPBC Act.

A total of 373 plant species were recorded in the offset areas, of which 70 were introduced weed species. Of the total plants recorded, 333 were identified to species level and 40 were identified to genus level. An additional 24 species were recorded in four reference sites located outside of the offset areas.

The condition of fauna habitats throughout the offset areas ranged from very poor to good. Habitats within the eastern and western offsets were generally in poorest condition. The areas in best condition were recorded in the northern offset area. Hollow-bearing trees were recorded in most areas, but most frequently in areas containing White Box (*Eucalyptus albens*). These features were recorded in greater numbers in the northern and western offset areas. Water sources were an uncommon feature, while habitat features such as rocky gorges and cliffs were recorded only in the northern offset and shared offset. Most survey sites were impacted by grazing to varying extents, the most severe occurring in the eastern and western offsets. The offsets appear to have been impacted by land clearing at some stage historically to varying extents.

Sites surveyed in the riparian habitat were generally in poor to moderate condition, while cleared areas (that will be subject to revegetation) were in poor condition. Most areas have been subjected to previous agriculture-related vegetation clearance and livestock grazing, to varying extents. Most watercourses within the offset areas were dry at the time of the survey.

3.6.1 Offset Performance

Further detailed planning around the management of the offset areas was undertaken during the reporting period. The *MCCM Threatened Fauna Implementation Plan* (Whitehaven, 2015a) and *MCCM Box-Gum*

Woodland Endangered Ecological Community Implementation Plan (Whitehaven, 2015b) have been prepared by Whitehaven in accordance with Conditions 48 and 50 of Schedule 3 of PA 10_0138.

The *MCCM Threatened Fauna Implementation Plan* (Whitehaven, 2015a) was developed to maximise the likely prospects for the provision of suitable habitats for threatened fauna on the offset areas and on the post mining landform (including threatened species listed in Condition 49 of Schedule 3 of PA 10_0138). The implementation plan requires 21 individual actions relating to the Biodiversity Offset Strategy.

The *MCCM Box-Gum Woodland Endangered Ecological Community Implementation Plan* (Whitehaven, 2015b) was developed to maximise the prospects for rehabilitation and regeneration of the Box-Gum Woodland EEC/CEEC on the offset areas and the mine site. The implementation plan requires 52 individual actions relating to the Biodiversity Offset Strategy.

Grazing livestock has begun to be removed from the offset areas.

Tylophora linearis

Tylophora linearis (a threatened flora species listed under the TSC Act and EPBC Act) was identified in the MCCM Project Boundary during pre-clearing flora surveys during 2014. It was also found in the offset areas, Leard State Forest and in other local conservation reserves.

Following the identification of *Tylophora linearis* in the MCCM Project Boundary, a propagation and translocation program was prepared for the species in consultation with Dr Colin Driscoll (Hunter Eco), OEH, DP&E and the Commonwealth Department of the Environment (DotE). The propagation and translocation program is provided in the BMP.

There are multiple stages to the propagation and translocation program:

- Stage 1 - Root Architecture and Growth Study;
- Stage 2 - Seed Production Monitoring;
- Stage 3 - Seed Collection and Storage;
- Stage 4 - Seed Propagation; and
- Stage 5 - Translocation Trials.

Stages 1 to 4 were undertaken in the second half of 2014. This research approach has resulted in the first documented examination of *Tylophora linearis* root architecture and growth and the first documented collection of seed pods from *Tylophora linearis*. From the seeds collected, *Tylophora linearis* plants are being propagated. It is expected that approximately 80 seedlings will be available for translocation in the third or fourth quarter of 2015. *Tylophora linearis* plants will be translocated into the offset areas or in mine rehabilitation.

3.7 Aboriginal Cultural Heritage Management and Performance

Construction activities during the reporting period were undertaken in accordance with the Aboriginal Archaeology and Cultural Heritage Management Plan (AACHMP) which was prepared to satisfy Condition 58 of Schedule 3 of PA 10_0138. It sets out the procedures for care and salvage of Aboriginal objects identified at the MCCM. The AACHMP requires that annual monitoring of all sites to be reported in the Annual Review.

The aim of the AACHMP is to provide for the appreciation of Aboriginal heritage values within the MCCM Project boundary by future generations either through protection of sites where impact is avoidable or through salvage collections and excavations of Aboriginal objects. The main objectives of the AACHMP are:

- to identify ongoing management measures for the care of Aboriginal sites where mining impacts are avoidable;
- to establish an ongoing RAP consultation process;
- to describe the manner in which certain Aboriginal sites will be salvaged and cared for; and
- to provide a summary research design and work plan for the sub surface excavation of select sites and areas.

3.7.1 Annual Monitoring Program

Annual inspection of all Indigenous archaeological sites is undertaken as part of the MCCM compliance auditing program. An archaeologist and two Aboriginal representatives are engaged to conduct the annual monitoring program.

A compliance audit of previously salvaged Aboriginal objects is undertaken as part of the annual review.

Annual Site Audit

In accordance with Section 6.4.1 of the AACHMP, Archaeologists and Registered Aboriginal Parties inspected all previously identified heritage sites listed on the Aboriginal Heritage Information Management System (AHIMS) located in the MCCM area. This site audit is part of the annual cultural heritage monitoring program and was conducted from the 3rd to the 6th June 2014.

In accordance with the AACHMP the main categories of the inspection:

- Condition of site;
- Condition of fencing;
- Nearby disturbance; and
- Photographs.

Fence maintenance was undertaken as required at a number of sites, most commonly due to wildlife damaging demarcation fencing. Any maintenance identified in the site audits was carried out immediately during the inspection.

Annual Compliance Audit of Salvaged Objects

In accordance with the AACHMP, a compliance audit was undertaken of salvaged artefacts following the site monitoring audit in June 2014. Artefacts are currently stored in a secure facility that is located geographically 'on-country' and close to the MCCM as requested by the RAP's. Artefacts will be transferred for long term storage at a Keeping Place once negotiations are complete.

3.7.2 Review of Performance

Inspection, salvage and monitoring within construction areas occurred during the 2014 reporting period. In accordance with the AACHMP, the following activities took place onsite during this reporting period:

- cultural values / walk on country (Stage 2);
- salvage (Stage 2);
- monitoring;
- community liaison; and
- specialist studies and reports.

A summary of these activities is provided in the following sections.

Cultural Values and Walk on Country

The walk on-country and Cultural Values assessment was facilitated by Dr Dee Gorring and Dr Andrew Sneddon (University of Queensland Culture and Heritage Unit) during January 2014.

A report detailing the assessments was drafted in consultation with the RAP's and the findings were presented in a group forum in March 2014. The finalised report has restricted distribution as requested by the RAP's who participated.

Salvage

In accordance with the AACHMP, a comprehensive salvage program involving RAPs, and supervised by Archaeologists, was conducted in 2014 for the mining operations area during the reporting period.

The salvage process included;

- site visit(s);
- survey(s) of known site boundaries and environs;
- flagging of artefacts;
- recording of artefact location by differential GPS;
- photographic record of each artefact/site compiled;
- recording of unique provenance data for each artefact recorded; and
- individual bagging of artefacts with a unique ID.

Shovel Test Pits (STPs), measuring 0.5 by 0.5 m (total area of 0.25 m^2), were manually excavated with a shovel in 100 mm depth increments with all excavated material sieved through a 3 mm mesh sieve. The test pits were completed to a depth where clay, gravel or culturally sterile deposits were encountered. No significant occurrences of archaeological material were recovered from any of the additional test excavations.

Stage 2A Salvage Program Summary

A summary of the archaeological salvage undertaken during the reporting period in the Maules Creek Stage 2/A footprint area follows:

- 13 known sites including 3 new sites (Teston AS16; Leard SF AS3 and Leard SF AS4);
- 860 artefacts identified;
- Boundaries of 20-4-0028 changed to incorporate 20-4-0029;
- Leard SF IA1 site name changed to Leard SF AS4;
- 60 STPs excavated;
- Potential scarred trees assessed by arborist;

- Portable grindstones collected;
- Boundary changes to sites: 20-4-0028; 20-4-0029; 20-4-0078; Leard SF IA1; Teston AS3; and
- Leard SF AS1 12 STP's to investigate salvage methodology.

The stage 2/A archaeological salvage works involved the successful salvage of 10 registered sites and 3 new sites. All RAPs present during the salvage of each site also agree that they have been successfully salvaged in accordance with the AACHMP and is supported by the clearance 'sign-off' process. No further archaeological investigation is required for the aforementioned 13 sites with monitoring recommendations for the purposes of cultural salvage.

Monitoring

In accordance with the AACHMP, the aboriginal heritage monitoring team consists of an Archaeologist accompanied by two RAPs. Monitoring is required in the following areas:

- within cultural heritage sensitive areas including the 20 m buffer of registered recorded sites;
- within 200 m of named creeks; and
- within 100 m either side of mapped drainage lines.

During this reporting period there were 2093 'monitoring' transects during progressive topsoil removal that yielded 204 artefacts.

Community Liaison

In addition to the involvement of RAPs on-site for salvage and monitoring, MCC facilitates forums in which findings or results of packages of works are disseminated to the community as a 'group'.

Community liaison on this subject is also covered by the Maules Creek Coal Community Consultative Committee (MCC CCC) (**Section 4**).

In 2014 Whitehaven engaged a full time indigenous Aboriginal Community Relations Officer whose role involves liaising with community, facilitating meetings, engaging steering committees, development of strategies such as Aboriginal employment.

Specialist Studies and Reports

In accordance with the AACHMP, and in response to the identification of features throughout the salvage and monitoring processes, specialist advice, re-assessment, laboratory analysis and reporting was undertaken on various areas / sites during the 2014 reporting period. A list of specialist investigations and reports undertaken during the 2014 reporting period is provided below:

- Cultural Values Assessment;
- Lithics - Stages 1 and 2;
- 2 Due Diligence Reports;
- 4 Scar Tree Reports;
- Geophysics Report on potential burial site;
- Report on excavation of Clay Features;
- Assessments of groove features;
- Salvage Methodology;
- Assessment of Monitoring Compliance;
- Heritage Sites Audit 2014; and
- Quinine Trees.

In addition to those reports identified above, there has also been a review and update of the AACHMP.

Other Heritage matters

- Blast monitoring is required to be undertaken at a number of locations in order to ensure compliance with PA 10_0138 and the EPL requirements and also to monitor noise and vibration on heritage features identified as potentially 'sensitive receivers'. A number of these sites were included in blast monitoring activities during the construction phase (see **Section 3.4**). Throughout blast monitoring, routine weekly PC inspections and heritage site audits, there have been no impacts on unsalvaged heritage sites noted during the reporting period.
- Regional Cultural Heritage Strategy compiled and submitted for approval

2015 Reporting Period

During the next reporting period, it is anticipated that Archaeologist / RAP monitoring activities will continue with the expansion of the mine pit area.

3.8 Historic Heritage

Activities during the 2014 reporting period were undertaken in accordance with the Historic Heritage Management Plan (HHMP), which was prepared to satisfy Condition 58 of Schedule 3 of PA 10_0138. The HHMP sets out the procedures for the care and salvage of historic relics, deposits and structures identified on land within and immediately adjacent to the MCCM. The HHMP was prepared in accordance with the management recommendations made in the Non Indigenous Heritage Impact Assessment (NIHIA) for the MCCM (Archaeology Australia, 2010) which was included within the Maules Creek EA (Hansen Bailey, 2010a).

A total of five sites were identified in proximity to the MCCM Project Boundary. Three sites associated with the Velyama Homestead site (i.e. the homestead, shearing shed and burial ground) were determined to be of local significance.

Warriahdool Hut was identified to be of local significance and is located to the north of the MCCM. The Therribri Homestead Site was also determined to be of local significance, and is located to the west of the MCCM. Each of these sites is located outside the MCCM Project Boundary and will not be impacted by the mine.

No sites of European heritage significance have been identified within the MCCM Project Boundary. Any heritage objects identified in the future will be managed in line with the HHMP that details the management measures and monitoring to be undertaken to ensure the MCCM complies with the conditions of PA 10_0138.

A regular inspection and monitoring program of the identified historic sites has been implemented to ensure the preservation of the site is maintained, which will include but not be limited to fencing condition, signage, weed control and evidence of impacts. Monitoring is required if any ground disturbing works are to occur within 50 m of identified historic heritage sites. Monitoring is not required for land use activities in areas where no historic heritage has been identified.

No impacts to identified historic heritage sites are expected to occur as a result of the MCCM.

3.8.1 Review of performance

A dilapidation survey was undertaken prior to undertaking any construction activities within the rail infrastructure corridor. The survey provided a baseline photographic record of each site and included the following locations:

- homestead foundations;
- heritage grave sites;
- overhead power poles; and
- shearing shed.

In accordance with the HHMP, both the homestead foundations *and* the sheering shed were fenced with a 4 strand wire / stock fence with steel strainer posts and gates. The Velyama European grave site has been fenced with a robust all steel modern stock fence style construction.

Throughout construction of the rail line and mine infrastructure area, there were a total of 70 construction blasts conducted. Depending on the location and proximity of the blast, portable noise and vibration monitors were placed out at heritage features.

Routine weekly site inspections of all Principal Contractor area included monitoring of heritage features where relevant.

There were no community complaints in relation to Historic Heritage features during the 2014 reporting period.

Looking ahead to 2015, construction activities will cease and monitoring of historic heritage features will be included in an annual monitoring program. Fence maintenance and weed control will be undertaken as required.

3.9 Waste Management

Condition 70 of Schedule 3 of PA 10_0138 addresses waste management as follows:

> **WASTE**
>
> 70. The Proponent shall:
>
> (a) implement all reasonable and feasible measures to minimise the waste (including coal reject) generated by the project;
>
> (b) ensure that the waste generated by the project is appropriately stored, handled and disposed of; and
>
> (c) monitor and report on the effectiveness of the waste minimisation and management measures in the Annual Review.

Waste materials at the MCCM are managed in accordance with the legal and strategic framework for managing wastes in NSW, including the:

- *Protection of the Environment Operations Act, 1997* (POEO Act);
- *Waste Avoidance and Resource Recovery Act, 2001*; and
- *Protection of the Environment Operations (Waste) Regulation, 2005*.

Waste streams that are, or will be, generated by the MCCM include general waste, hazardous wastes and ablution effluents. Under the POEO Act, MCC is required to monitor, remove, track and report wastes on a regular basis. While the aim is to avoid and minimise waste, activities associated with construction of the MCCM will generate a range of wastes which requires ongoing management.

The following sub-sections identify the management procedures adopted for each of these wastes during the 2014 reporting period and beyond.

For construction activities, the Principal Contractors manage their own waste outputs according to their respective CEMP. Waste management in the Mine Operations area falls under the MCC Materials Safety Management Plan (MSMP). At present, all waste materials are transported off site by registered waste contractors

General Wastes

All general and recyclable (metal, glass and plastic co-disposal) wastes are collected on-site and placed into suitable covered or enclosed storage receptacles within the contractor compound areas. A licensed waste collector removes this waste off-site, typically on a weekly basis.

Effluent Treatment and Disposal

There is no on-site effluent treatment proposed during construction or initial mining operations. Effluent from the ablutions facilities at the construction and mining operations areas (both temporary and long-term) is managed through the NSC-approved septic system, which is serviced by a licensed contractor. Pump outs and removal off-site are undertaken by a licensed waste disposal contractor on an as-needs-basis.

Other Wastes

Other waste materials such as waste oils and containers, solvents, oily rags, timber, scrap metal, tyres and used batteries are stored in designated lay down areas, in accordance with the defined waste management practice in the contractor CEMP (or MCC MSMP) for collection and disposal by a licensed regulated waste contractor when required.

Mining Wastes and Coal Rejects

As the coal processing plant was not yet commissioned by the end of December 2014, no coal reject or related waste materials have been generated within the reporting period.

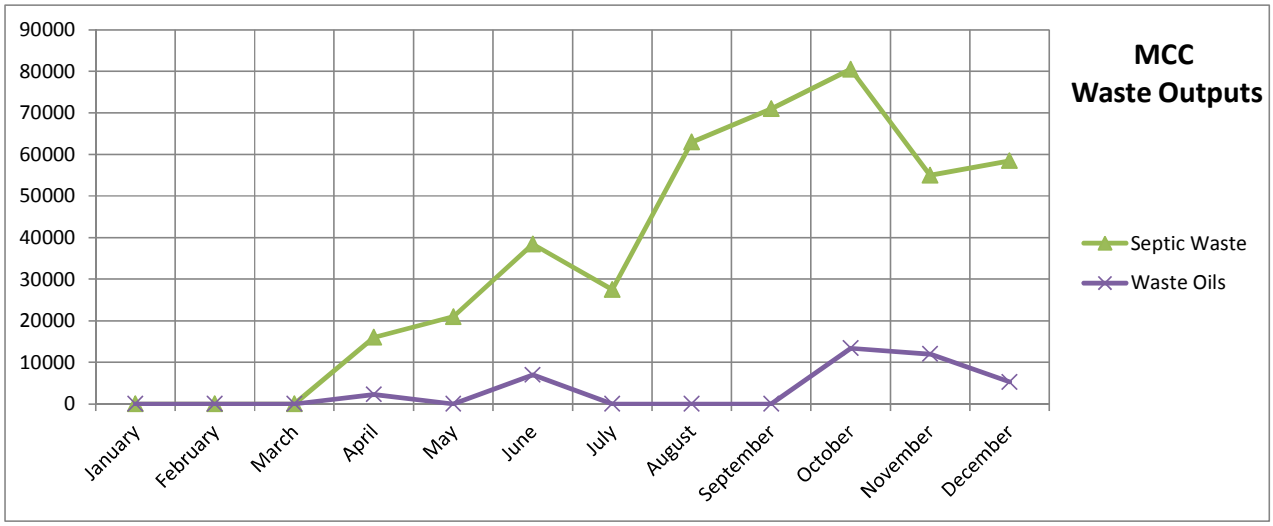
Overburden and interburden materials at the mine comprise conglomerates, sandstones, shales and mudstones which are prone to various degrees of breakdown on exposure to the atmosphere. The overburden is removed from above the coal seam by a combination of dozer pushing and excavator loading and hauling using dump trucks. Interburden removal to enable lower coal ply excavation is undertaken by excavator and dump truck. During the reporting period, all excavated overburden and interburden materials were dumped within areas nominated in the MOP for overburden emplacement.

3.9.1 Performance

Inspections and audits of waste management practice are carried out regularly by both MCCM and contractor personnel. No incidents relating to waste management practice were recorded during the 2014 reporting period.

Data on waste streams are collated on a weekly or monthly basis (depending on the nature of the waste and the frequency of disposal) from throughout the site. The quantities of materials being sent to recycling is indicative of some success in the minimisation of material going directly to landfill.

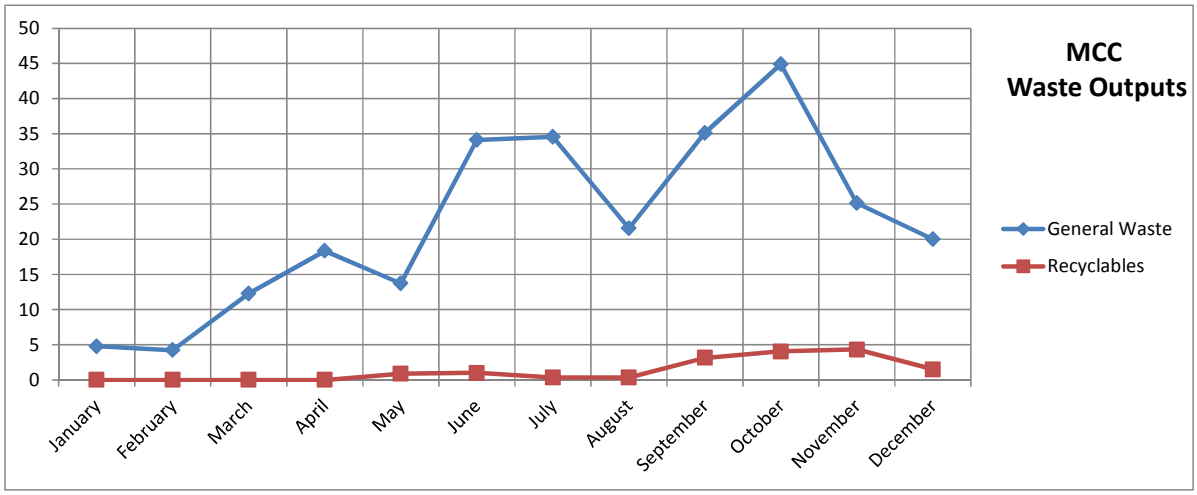
Figure 3.10.1 - MCC Project Liquid Wastes 2014



Note: Figures in litres (L)

Key waste outputs for 2014 are summarised in **Figures 3.10.1** and **3.10.2**. Figure **3.10.1** shows liquid wastes generated from combined construction and mining activities during the 2014 reporting period. **Figure 3.10.2** shows selected solid wastes generated from combined construction and mining activities during the 2014 reporting period.

Figure 3.10.2 - MCC Project Solid Wastes 2014



Note: Figures in tonnes (T)

3.10 Hazardous Materials Management and Performance

The MSMP describes the management measures and monitoring to be undertaken at the MCCM. A Pollution Incident Reporting Management Plan (PIRMP) has also been developed for the MCCM.

The MCCM requires the use of a range of hazardous materials which are, or will be, managed and disposed of in accordance with the *Waste Classification Guidelines* (DECCW 2008), the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (National Transport Division 2007, the *SEPP 33 – Hazardous and Offensive Development Application Guidelines* (DUAP 1994) (SEPP 33 Guidelines) and the *Hazardous Industry Planning Advisory Papers* (HIPAPs) developed under SEPP 33.

The Principal Contractors are required to ensure that hydrocarbon products (such as diesel, coolants, lubricating oils and greases) are transported, stored, handled, disposed and stored in a manner that minimises the potential for pollution and complies with the requirements of the *Work Health and Safety Act 2011* (as the relevant legislation for dangerous goods) and AS1940 – *The Storage and Handling of Flammable and Combustible Liquids*.

Any spillages of potentially hazardous materials, however minor in nature, are required to be reported immediately the Manager (or delegate) who determines if the incident is reportable. A report is then prepared describing the nature and scale of the incident, how it has been dealt with and any additional measures to be put in place to ensure that the risk of similar incidents reoccurring is minimised. Restoration works required for any spillage of hydrocarbon products are to be undertaken to the satisfaction of the Construction Manager. The Principal Contractors are responsible for spill clean-up, disposal of contaminated soil materials and any subsequent site restoration works.

The following sections summarise the performance during the 2014 reporting period.

Hydrocarbons

Bulk hydrocarbon storage facilities constructed and utilised during the reporting period were designed to comply with the requirements of *AS1940 – The storage and handling of flammable and combustible liquids*.

No reportable incidents involving fuel storage, handling or delivery occurred during the 2014 reporting period.

Minor leaks and spills associated with plant maintenance and operation were dealt with in line with individual PC CEMPs.

Explosives

No environmental incidents involving explosives handling or storage occurred during the 2014 reporting period.

Other Materials

No reportable incidents involving the handling or storage of other potentially hazardous materials occurred during the 2014 reporting period.

Contaminated or Polluted Land

There was no action taken or required during the 2014 reporting period to manage contaminated or polluted land at the MCCM. Small quantities of soil material impacted by minor spills in the construction maintenance areas were removed off-site by licensed waste contractors in line with the CEMPs.

3.11 Greenhouse Gas Management

The AQGGMP addresses the management of GHG emissions. GHG emissions not considered in the AQGGMP are those not under MCC's operational control (e.g. coal transportation off site or energy production from product coal). The main sources of GHG emissions considered in the AQGGMP are:

- fuel consumption (diesel) during mining operations – Scope 1;
- release of fugitive methane (CH_4) from the fracturing of coal seams – Scope 1; and
- indirect emissions resulting from the MCCM's consumption and use of purchased electricity - Scope 2.

Ongoing monitoring and management of greenhouse gas emissions and energy consumption at the MCCM will be achieved through participation in the Commonwealth Government's National Greenhouse and Energy Report Scheme (NGERS). Under NGERS requirements, relevant sources of greenhouse gas emissions and energy consumption are measured and reported on an annual basis, allowing major sources and trends in emissions/energy consumption to be identified.

The objectives of the AQGGMP relevant to GHG emissions are in accordance with the conditions of PA 10-0138 (specifically Condition 27 of Schedule 3), which requires that the MCCM implements all reasonable and feasible measures to minimise the release of GHG emissions from the site.

Data associated with GHG emissions from the construction and mining operations activities during the 2014 reporting period are summarised in the following sections, along with a summary of overall performance.

Diesel Consumption

During the 2014 reporting period, a total of 14,022,441 L of diesel fuel was used on site for construction and mining activities (see **Figure 3.11.1** below). As all electrical power used on site is provided by diesel generators, there is no additional consideration required in this section for consumption of mains electricity.

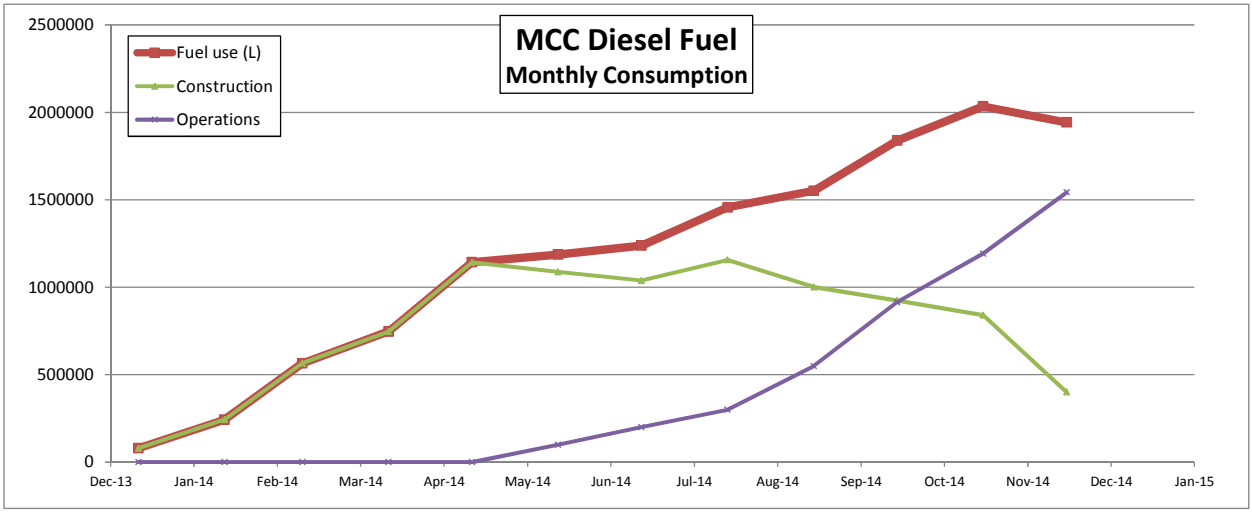
Explosives

A total of 6,129,756 kg explosives were used at the MCCM during the 2014 reporting period.

Fugitive Emissions

ROM coal production is used to estimate fugitive emission factors. The total amount of coal produced at the MCCM during the 2014 reporting period was 93,504 t.

Figure 3.11.1 – Monthly MCC Diesel Fuel consumption for 2014.



Performance

The performance of the MCCM with regard to GHG emissions and proposed actions for the next reporting period are summarised in **Table 3.11.1** below.

Table 3.11.1 – Summary of Greenhouse Gas Related Issues

Aspect	2014 Reporting Period	2015 Reporting Period
Fuel use	First year of operations. No figures from previous years to allow comparison. Utilisation of fleet of new, state-of-the-art mining vehicles and plant. Installation of computer based maintenance and monitoring system for all heavy vehicle use.	Regular audits will be undertaken to identify inefficiencies in fuel use.
Electrical consumption	Not yet applicable	Regular audits will be undertaken to identify energy savings.
Explosives	First year of operations. No figures from previous years to allow comparison. Best practice utilised in blast design to minimise inefficiencies.	Best practice utilisation in blast design to minimise inefficiencies.
Fugitive emissions from coal	First year of operations. No figures from previous years to allow comparison.	Annual comparison of ROM coal production
Energy savings projects	None commenced	Suitable projects to be identified as operations progress.

3.12 Visual Impact

A visual and lighting assessment of the potential impacts of the MCCM was undertaken as part of the Maules Creek EA (Hansen Bailey, 2010a). This assessment was undertaken to identify the character of the surrounding visual landscape and provide management and mitigation measures for visual impacts associated with the mine.

A primary viewing catchment was determined where views to the MCCM had a potential to occur, within which the visual impact of the MCCM was determined by a combined consideration of both visual effect and visual sensitivity. Lighting impacts were evaluated qualitatively and considered both direct lighting effects and indirect lighting effects of the MCCM at night.

Onsite treatments during construction were implemented to mitigate visual impacts of the MCCM including (but not limited to):

- use of directional lighting in lieu of general area lighting; and
- consideration of fixed versus mobile lighting (locations and orientation) for night time use.

The majority of construction and operational works undertaken during the reporting period were not generally visible from public roadways or vantage points, due to the surrounding topography. However, a small number of works compound and vehicle / plant storage or maintenance locations at the northern end of the site are visible from public roadways to the north and as a result, lighting facilities had the potential to be visible after dark.

One community complaint was received during the reporting period, relating to security lighting associated with the rail construction works. This was rectified by altering the direction of lighting and no more complaints occurred.

3.13 Bushfire Management

The MCCM lies within the Leard State Forest which is densely vegetated and has a potential for bushfire. The area surrounding the MCCM Project Boundary and the Leard State Forest is predominantly agricultural land, dominated by grazing and cropping activities which present a much lower bushfire hazard. The Leard State Conservation Area lies to the west of the MCCM Project Boundary consisting of dense forest vegetation and consequently is a higher bushfire hazard.

Due to the relatively low rainfall and dry nature of the landscape combined with the build-up of high fuel loads (leaf drop and tinder) over time, a risk of bushfire presents itself to the MCCM. Onsite bushfires and potential bushfire hazards will be managed in accordance with the *Rural Fires Act, 1999*.

Condition 69 of Schedule 3 of PA 0138 requires the MCCM to be suitably prepared and equipped to respond to any fires and that MCC be able to assist the relevant emergency services and NSW authorities in the event of a fire in the surrounding area.

The Bushfire Management Plan was completed and implemented during the reporting period.

One fire occurred on the construction project when a dump truck caught fire in a park bay in the MIA. This fire was contained and no significant impacts resulted. No other significant incidents involving fire were recorded at the MCCM during the 2014 reporting period.

3.14 Other Aspects

3.14.1 Social Impact

Housing and Accommodation

In accordance with Condition 77 of Schedule 3 of PA 10-0138, MCCM has developed, implemented and monitored the Maules Creek Construction Workforce Accommodation Plan (CWAP). The Maules Creek CWAP was approved in April 2013.

In line with the commmitments in the CWAP, MCC secured sufficient rooms in the Boggabri and Narrabri Accommodation Villages to house non-local construction workers to reduce the pressures on local housing and rental markets.

Whitehaven has strong focus on employing local people at its operations. This includes recruiting locally wherever possible, and encouraging employees from outside the Narrabri or Gunnedah LGAs to relocate to the region. Whitehaven has also developed a subsidised village accommodation program under which the cost of accommodation increases every three months, in order to encourage employees to move to the area permanently. This also assists with limiting the impact on the local housing market in the intial period as MCCM increases it's employee numbers in the initial years.

MCCM will continue to monitor in conjunction with the local council, the ongoing housing and accommodation market to encure impacts are managed.

Training

MCC and Whitehaven provide opportunities for apprenticeships, traineeships and scholarships, in order to support local employment and increase local skills levels. Currently (i.e. as at March 2015) through the Whitehaven apprentice program, there are 14 apprentices, which includes school-based apprentice electricians and mechanics, and full-time electrical and mechanic apprentices. Whitehaven also provides opportunities for scholarships for tertiary studies.

MCC has also provided opportunities for new entrants into the mining industry. To date 35 new entrants to the mining industry are currently engaged in training at the MCCM.

Community Infrastructure

Whitehaven is committed to assisting local community infrastructure providers with maintaining and enhancing the community facilities and services in the local area, particularly in the Narrabri LGA. MCCM has entered a Voluntary Planning Agreement (VPA) with NSC. During the period MCCM contributed $4,518,750 to Narrabri Shire Council for various infrastructure projects. The following table provides further details of the projects the funds have been allocated to.

Description	Amount
Funds to upgrade infrastructure and roads including Therribri Road and Tarrioro Bridge	$3,000,000
Funds to upgrade the Narrabri Airport	$1,000,000
Funds to be utilised on various projects within the township of Boggabri and its surrounds	$200,000
Funds to be contributed to the Maules Creek Community	$68,750
Funds to be utilised on CBD upgrades in the Narrabri Shire	$250,000

3.14.2 Workforce

During the construction phase of the MCCM, the majority of the workforce was employed by Principal Contractors and or sub contractors, with an average of 400 Full Time Equivalent (FTE) construction workers employeed during the period. On average, local workers (i.e. from the Narrabri and Gunnedah LGAs) comprised approximately 25% of the construction workforce.

During the period, MCCM has employed approximately 160 operations people (34% of the anticipated steady state workforce) off whom 61 are Narrabri or Gunnedah residents, representing 38% of employees. The remaining workforce (including management and professional staff) have been recruited from outside the Narrabri and Gunnedah LGAs, due to the small local pool of trained mine workers available .

Whitehaven's *Workforce Diversity Policy* has supported strong representation of women, Indigenous people and young people. Of the 160 operational MCCM employees recruited during the period:

- 26 employees (approximately 16%) are Indigenous;
- 18 (approximately 11%) are women; and
- 35 (approximately 22%) are new to mining.

3.14.3 Traffic Management

The management of traffic and transportation related impacts during construction activities is undertaken in accordance with the Traffic Management Plan (TMP), which has been prepared by MCCM to satisfy Condition 64 of Schedule 3 of PA 10_0138. The initial TMP was approved by the DP&E in April 2013, and the subsequent revision was approved in September 2014.

A number of items required by PA 10_0138 were addressed during the reporting period, as described below.

Road upgrades and maintenance

The rail bridge over the Kamilaroi Highway was constructed in line with Condition 59 of Schedule 3 of PA 10_0138.

The upgrade and sealing of the unsealed section of Manila Road undertaken in line with Condition 61 of Schedule 3 of PA 10_0138.

Shuttle Bus System for Construction and Mine Workers

A shuttle bus system has been initiated by MCCM and construction contractors for construction and mine workers as required by Condition 61 of Schedule 3 of PA 10_0138. In excess of twenty buses operated from Boggabri, Gunnedah and Narrabri.

Monitoring of Coal Transport

Records of the amount of coal transported from the site have been kept, as required by Condition 65 of Schedule 3 of PA 10_0138. These are summarised in **Table 3.15.1** below.

Table 3.15.1 – Summary of Coal Transport for 2014

Month	No of Trains	Total Coal (Tonnes)
*December 2014	10	53,864

* No coal railed prior to December 2014.

Performance

Of all complaints received by MCCM in the 2014 reporting period, seven were logged under the category of traffic, of which three were considered more than likely related to MCCM activities.

One complaint related to the inappropriate use of flashing beacons on Leard State Forest Road, which is outside the MCCM Project Boundary.

One of two complaints related to use of unauthorised use of unsealed roads around the site for access to the project was accepted as most likely being attributable to MCCM-related traffic.

One concerned the length of time required to wait at the red light during the upgrade of Rangari Road.

3.15 Public Safety

The mine is located on land owned by Whitehaven and also on State Forest land in a relatively remote rural area, generally in excess of 1 km from any public road. The site is predominately fenced and appropriate gates and warning signs are installed at all vehicle access points . Security personnel are employed by MCCM to ensure that members of the public do not inadvertantely enter the mine property.

Access to the site is via two security check points and visitors to the mine are required to be escorted and report to the mine office and unauthorised personnel are not permitted to move around the mine area unaccompanied. With regard to blasting, procedures are in place to ensure that the area around each blast site is clear of personnel and that all surrounding residents are advised in advance of proposed blasts.

3.15.1 Performance

The procedures in place have been generally effective throughout the reporting period to prevent unauthorised access to the mine site. However, anti-coal activists have on numerous occasions bypassed locked gates, security guards, fences and ignored mine area safety signage to access areas of the mine site.

4.0 COMMUNITY RELATIONS

4.1 Community Enquiries

MCC maintains a designated Community Hotline (1800 MAULES) for the MCCM, with messages checked on a daily basis by the Environmental Manager. The Hotline is advertised in the local press. In the event of a complaint or enquiry, details pertaining to the complainant, the complaint and action taken are recorded on the complaints and enquiries register.

4.1.1 Review of Enquiries and Actions

Thirty five complaints and enquiries regarding MCCM-related activities were received during the 2014 reporting period and placed on the MCCM Complaints and Enquiries Register. A summary and breakdown of these entries is provided in **Table 4.1** below. Each complaint is reviewed and investigated and the cause determined where possible. Of the 37 entries listed, 32 were deemed to have been possibly connected with or directly attributable to MCCM-related activities or actions.

The Complaints Register is updated monthly and posted on the Whitehaven website. The complete list for the 2014 reporting period is provided as **Appendix H**.

Table 4.1 – Summary of Community Complaints and Enquiries

Reporting Period	Air Quality	Traffic	Surface Water	Visual Impact	Noise / Vibration	Blast	Other
2013	0	0	0	0	0	0	0
2014	12	7	1	1	11	4	1

The most frequent complaints relate to dust and noise. Actions taken in response to complaints concerning dust included the following:

- Provision of dust suppression water carts to unsealed roads affected by MCCM-related traffic;
- Provision of additional water carts and rescheduling of shift patterns to maintain dust suppression measures on mine haul roads and access roadways throughout higher risk periods;
- Commissioning of additional water fill points for dust suppression purposes in the mining area;
- Application of chemical dust suppressants to haul routes and roadways in and around the site

Actions taken in response to complaints concerning vibration or noise (including blast related vibration) included the following:

- Investigations into specific mining/construction activities (including blasts), to determine the source of the noise and/or if noise/vibration criteria were exceeded;
- Undertaking of attended monitoring events to investigate blast vibration levels at specific locations;
- Relocation of blast monitoring devices to investigate vibration levels at specific locations.

Further details are provided in the relevant sections of this report. In comparison, no complaints or enquiries were received during the 2013 reporting period, although it is noted that site based construction activities only commenced during mid-December 2013.

4.2 Community Liaison

As required by PA 10_0138, MCCM has established a Community Consultaive Committee (CCC), with meetings held quarterly. Four MCCM CCC meetings were held during the reporting period, plus one joint meeting with the Boggabri Coal and Tarrawonga Mine CCCs:

- 12th February 2014 (10 attendees);
- 21st May 2014 (8 attendees);
- 6th August 2014 (8 attendees);
- 18th November 2014 (10); and
- 19th November 2014 (20 attendees – joint meeting held in Boggabri Bowling Club).

Minutes of these meetings are posted on the Whitehaven website.

5.0 REHABILITATION PLANNING AND MANAGEMENT

The Maules Creek EA (Hansen Bailey, 2010a) describes the conceptual rehabilitation management and final landform development procedures to be implemented during and at the completion of mining operations. In addition, the Maules Creek EA details a number of objectives and targets that the MCCM final rehabilitation and mine closure plan must address. These rehabilitation objectives are replicated in Condition 71 of Schedule 3 of PA 10_0138.

The MCCM construction activities can be subdivided into three domains: Infrastructure, Water Management and Construction Disturbance.

The Infrastructure Domain consists of buildings, structures and hardstand areas that will be used throughout the life of the MCCM. The key rehabilitation objective for this domain will be primarily to enable the stabilisation of the batters and slopes surrounding this infrastructure to a stable landform, minimising erosion concerns for the downstream waterways.

The Water Management Domain is situated immediately adjacent to the Infrastructure Domain and Construction Disturbance Domain and will store and manage water runoff from these areas (potentially contaminated with sediment) and water used during the construction activities for dust suppression and other purposes. The primary objective for this domain will be to ensure that the Water Management Structures are constructed and quickly stabilised to ensure that MCC's environmental requirements are complied with.

The Construction Disturbance Domain includes areas beyond the Infrastructure Domain that will be disturbed by the construction activities, however will not form part of the infrastructure or water management system. During the construction phase, the primary rehabilitation objective for this domain will be to stabilise and temporarily revegetate areas that will not be utilised for substantial periods of time. A significant proportion of this domain will ultimately be disturbed by mining operations. However, it has been identified that temporary revegetation will be required to these areas minimise air quality and water impacts.

5.1 Rehabilitation of Disturbed Land

As construction works have been the main activity undertaken, very limited rehabilitation of MCCM disturbance areas, landforms or other infrastructure was conducted during the 2014 reporting period. Only minor rehabilitation and/or stabilisation of railway batters, road embankments, water management infrastructure and temporary stockpiles has been undertaken to date (see **Section 5.2** below).

Mine rehabilitation trials and research have not yet commenced, but will do so when suitable trial areas are available within the mining areas.

5.2 Rehabilitation Monitoring and Performance

The Mining Operations Plan (MOP) has been prepared to satisfy the requirements of Condition 73 of PA 10_0138 in relation to the Rehabilitation Management Plan (RMP) required for the MCCM. Overall, the key goal of the rehabilitation activities will be to ensure a safe, stable, non-polluting, adequately drained post mining landform that is consistent with local surrounding landscape.

Long term performance goals and objectives for the Project are:

1. Mitigate impacts on areas of high ecological value;
2. Enhance local vegetation communities with the prioritisation of the reestablishment of Box-Gum Woodland CEEC;
3. Improve the connectivity from the Namoi River to Mt Kaputar National Park; and

4. Retain highly productive agricultural land.

The MOP describes the proposed rehabilitation measures for all operational activities and associated infrastructure being undertaken as part of the MCCM. Construction activities requiring rehabilitation at the MCCM are managed via the Construction Mining Operations Plan (CMOP).

Rehabilitation objectives in the short term are to:

- progressively reshape and stabilise disturbed areas;
- provide short-term erosion control measures;
- manage soil to ensure suitability and beneficial reuse during rehabilitation;
- ameliorate wastes and soils as necessary to address physical and chemical constraints to revegetation and erosion stability; and
- refine rehabilitation methods.

Rehabilitation objectives in the medium term will focus on:

- establishment of the functionally important and structurally dominant species from the relevant native vegetation communities;
- demonstrating rehabilitation succession in comparison with analogue sites; and
- reducing reliance on structural drainage and erosion control methods.

The long terms rehabilitation objectives are to:

- monitor rehabilitation areas to ensure succession of planted native vegetation with functionality trending toward analogue native vegetation communities;
- apply adaptive management measures if natural succession is not occurring; and
- demonstrating rehabilitation performance.

5.2.1 Construction Activities

Rehabilitation works undertaken for the construction activities to date fall under the short term objectives as defined in **Section 5.2** above.

Limited rehabilitation of construction areas occurred during the 2014 reporting period, being primarily the stabilisation of batters and embankments on the rail corridor. In the MIA construction area, similar work was underway in December 2014, on those completed components that were amenable to rehabilitation work, such as the coal stockyard batters, roadway verges and water management structures. As such, the process generally involved spreading topsoil onto those areas that have a slope of less than 1 in 2 and vegetating with grass. Areas with excessively steep slopes (such as steep embankments adjacent to the rail spur line) were managed according to the design, and generally involved the use of concrete stabilisation.

By December 2014, hydro seeding of embankments and batters had been undertaken within the rail corridor. The two permanent topsoil stockpiles in MIA area had been shaped, ripped and seeded. Routine (monthly) monitoring of stockpiles includes assessment of weed growth, stability of batters and effectiveness of erosion and sediment control measures.

5.2.2 Mining Operations

Rehabilitation works undertaken for the mining operations activities to date fall under the short term objectives as defined in **Section 5.2** above.

Topsoil stockpiles in the mine operations area (one permanent and one temporary) were still being constructed at the end of the reporting period and no long term stabilisation activities had been commenced.

Routine (monthly) monitoring of stockpiles includes assessment of weed growth, stability of batters and effectiveness of erosion and sediment control measures.

5.2.3 Topsoil Management

In line with Condition 39 of Schedule 3 of PA10_0138, the management of topsoil at the MCCM has been governed by the Soil Management Protocol.

During 2014, topsoils and suitable subsoils were stripped for later use in rehabilitation; either on construction areas once construction is completed or in rehabilitation of the mining areas and Overburden Emplacement Area (OEA). The management of topsoils and subsoils is detailed in the Soil Management Protocol. Areas disturbed during construction that are outside the MCCM open cut areas and OEA areas are to be rehabilitated during and at the end of construction. Areas for rehabilitation include topsoil spreading and revegetation of temporary stockpile areas, construction access tracks and laydown areas, batters, and drainage channels. Revegetation of topsoil includes initial surface preparation, topsoiling, fertilising, sowing of seed and watering.

Detailed soil surveys have been undertaken within the construction and mining footprint, prior to the stripping of topsoil. These surveys generated assessments of the suitability of topsoil and subsoils for mine rehabilitation and the preparation of stripping plans for each of the topsoil areas. During the soil stripping process, monitoring allowed the accumulation of soil volume data to prepare soil balances to assist with soil handling and management. Topsoil volumes stored to date are summarised in **Table 5.1** below.

Part of the clearing process includes the utilisation of ecologists in the maximisation of materials for salvage, with the identification of suitable top-soils and sub-soils and biodiversity habitat components such as bush rocks, tree hollows and fallen timber for rehabilitation of disturbed areas within the site and for enhancement of biodiversity offset areas

At the end of the reporting period, no coal rejects and no potentially acid forming interburden materials had been generated by the mining activities. In addition, it was not possible for water to drain from the out of pit emplacement area to any watercourse or to any land beyond the lease boundary.

Stockpile Health

Limitations placed on vegetation clearing within the project boundary have generated the need to minimise the footprint of the topsoil stockpiles. To accommodate the volume of stripped topsoil, it has been necessary to increase the maximum stockpile height to 4m. Concerns regarding the likely rapid deterioration in topsoil health are being addressed by a number of approaches, including the use of dump trucks to transport the topsoil, the incorporation of mulched timber into topsoil and then stockpiled, monitoring of stockpiles and removal of soils in increments and proposals to treat and condition the stored topsoil with fresh topsoil where appropriate, prior to its incorporation as a growing medium into rehabilitation programmes.

5.2.4 Monitoring

As described in the MOP, rehabilitation monitoring will commence in due course, utilising specialist independent consultants on an annual basis, using a modified Landscape Function Analysis (LFA) monitoring program and the assessment of other indicators.

Table 5.1a – Topsoil Volumes Stockpiled (Mining Operations Area)

Area	% Stripped	Stockpile	Soil Type	Topsoil (m)	Subsoil (m)	Actual stripped (m)	Area Ha	Volume m^3
1	0		2	0.15			3.5	0
2	100	4b	2	0.15		0.25	10.0	25000
3	10	3	2	0.15		0.25	1.4	35000
4	0		4	0.15			7.4	0
	0		5	0.15				0
5	100	4b	3	0.15	0.6	0.3	8	2400
	100	4b	4	0.15		0.3	20	6000
	100	4a	5	0.15		0.15	20	3000
6	100	4b	3	0.15		0.3	15	45000
	100	4b	4	0.15		0.3		0
7	100	3	1	0.10		0.15	0.5	810
	100	3	2	0.15		0.3	1.9	5670
	100	3	3	0.15		0.3	0.3	810
8	100	4b	1	0.10		0.15	3.7	5550
9	100	4b	3	0.15	0.6	0.3	5.0	15000
10	0		2	0.15			4.4	0
11	100	3	3	0.15	0.6	0.3	5.0	15000
12	100	3	3	0.15	0.6	0.3	13.7	41100
13	40	3	1	0.10		0.1	1.6	1630
	40	3	2	0.15		0.3	6.5	19560
	40	3	3	0.15	0.6	0.3	8.1	24450
14	0		1	0.10			5.4	0
	0		2	0.15			2.3	0
15	0		1	0.10			17.4	0
	0		2	0.15			2.2	0
	10		3	0.15	0.6	0.3	2.2	6510

Table 5.1a – Topsoil Volumes Stockpiled (MIA Construction Area)

Area	% Stripped	Stockpile	Soil Type	Topsoil (m)	Actual stripped (m)	Area Ha	Volume m^3
ROM / Ramp	100	N1	1	0	0	15.4	0
Magazine Road	100	N1	3a	0.2	0.2	6.1	12260
TLO	100	N2	3b	0.2	0.2	11.9	23880
Build Pad	100	N1	4a	0.2	0.2	28.2	56480
MIA	50	N1	4a	0.2	0.2	28.2	23240
Borrow Pit	100	N1	4b-1	0.2	0.2	12.5	25020
MIA	100	N1		0.2	0.2	10.4	20920
CSA	100	N1		0.2	0.2	14.0	28180
OEA	10	N1	4b-2	0.2	0.2	35.0	7002
Haul Road 1	100	N1		0.2	0.2	19.0	38040
CSA	100	N1		0.2	0.2	8.1	16112
MIA	100	N1	4b-3	0.2	0.2	21.2	42360
CSA	100	S	4c-1	0.2	0.8	7.2	57752
CHPP	100	N2	4c-2	0.2	0.8	13.2	105360
RWD1	50	N2	4c-3	0.2	0.8	20.6	82560

6.0 DEFINITIONS

Abbreviation	Description
Aston Coal 2 Pty Limited	100% owned by Whitehaven Coal Limited
CCC	Community Consultative Committee
CEEC	Critically Endangered Ecological Community
CHPP	Coal Handling and Preparation Plant
CL	Coal Lease
CMHS Act	*Coal Mines Health and Safety Act 2002*
CMOP	Construction Mining Operations Plan
CRIA	Country Rail Infrastructure Authority
dBA	The peak sound pressure level, expressed as decibels (dB) and scales on the 'A-weighted' scale, which attempts to closely approximate the frequency response of the human ear
DEWHA	Commonwealth Department of Environment, Water, Heritage and the Arts (now Department of the Environment)
DG	Director General
DP&E	NSW Department of Planning and Environment (formerly Department of Planning and Infrastructure, Department of Planning, DIPNR, Planning NSW and DUAP)
DRE	NSW Trade & Investment-Division of Resources & Energy
DTIRIS	Department of Trade and Investment, Regional Infrastructure and Services
EA	Environmental Assessment
EC	Electrical Conductivity
EL	Exploration Licence
EMP	Environmental Monitoring Program
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPA	NSW Environment Protection Authority
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPL	Environmental Protection Licence
Forestry Act	*Forestry Act 1916*
GSC	Gunnedah Shire Council
ha	Hectare
Hansen Bailey	Hansen Bailey Environmental Consultants
km	Kilometre
LGA	Local Government Area
m	Metre
MCC	Maules Creek Coal Pty Limited, a joint venture between Aston Coal 2 Pty Limited (75%), ITOCHU Coal Resources Australia, Maules Creek Pty Ltd (ICRA MC) (15%) and J-Power Australia Pty Limited (J-Power) (10%).
MCCCC	Maules Creek Community Consultative Committee
MCCM	Maules Creek Coal Mine
MIA	Mine Infrastructure Area
Mining Act	*Mining Act 1992*
ML	Megalitre
MLA	Mining Lease Application
mm	Millimetre
MNES	Matter of National Environmental Significance
MOP	Mining Operations Plan
Mt	Million tonnes
Mtpa	Million tonnes per annum
Namoi CMA	Namoi Catchment Management Authority
NOW	NSW Office of Water
NSC	Narrabri Shire Council

Abbreviation	Description
OEA	Overburden Emplacement Area
OEH	Office of Environment and Heritage
PAC	Planning Assessment Commission
PM_{10}	Particulate Matter <10 microns
POEO Act	*Protection of the Environment Operations Act 1997*
PA	*Project Approval under Part 3A of the EP&A Act*
Project Boundary	Project Application Boundary
RMS	Roads and Maritime Services
ROM	Run of Mine
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities (formerly Commonwealth Department of Environment, Water, Heritage and the Arts, now Department of the Environment)
T	Tonne
TSC Act	*Threatened Species Conservation Act 1995*
TSS	Total Suspended Solids
Whitehaven / WHC	Whitehaven Coal Limited

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APPENDIX A
PROJECT APPROVAL

APPENDIX B
EPL

APPENDIX C

METEOROLOGY

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Table 8: Summary Jan-14 Maules Creek Meteorological Station

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	Delta Temp Max	RAIN mm	Wind Speed Min	Wind Speed Ave	Wind Speed Max	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/01/2014	17.7	28.6	37.3	18.2	28.0	35.7	-2.5	-0.6	3	0	0.0	2.1	6.5	0.0	24	82	0.0	341	1106
2/01/2014	22.8	31.7	38.4	24.4	31.2	37.1	-2.1	-0.5	2.3	0	0.0	2.6	7.5	1.0	22	87	0.0	354	1220.7
3/01/2014	27.2	37.6	46	27.6	36.9	44.7	-1.7	-0.6	1.8	0	0.3	4.7	8.8	7.0	19	90	0.0	356	1130.4
4/01/2014	19.6	30.4	36.3	21.8	29.8	34.2	-2.6	-0.6	3.4	0	0.0	3.0	7.0	1.0	22	96	0.0	296	1098.6
5/01/2014	11	25.6	36.5	12.1	25.4	34.7	-2.5	-0.2	2.8	0	0.0	2.4	7.8	0.0	22	103	0.0	197	1142.6
6/01/2014	13.5	26.2	36.2	14.8	25.7	34	-2.6	-0.4	2.8	0	0.0	2.5	6.8	0.0	25	92	0.0	349	1125.5
7/01/2014	11.9	25.0	35	13	24.6	33.3	-2.8	-0.4	3.8	0	0.0	2.9	8.3	1.0	25	94	0.0	346	1130.4
8/01/2014	19.8	25.8	33.3	19.3	24.7	31.5	-2.7	-1.1	-0.2	0	1.3	3.7	6.5	8.0	21	82	0.0	347	1132.8
9/01/2014	21.1	24.3	29.2	20.4	23.4	28	-2.2	-0.9	0.4	0	0.8	3.1	5.3	7.0	21	86	0.0	276	1125.5
10/01/2014	19.6	25.2	31.5	19.8	24.3	29.4	-2.5	-0.9	0.9	0	0.0	2.2	6.8	0.0	23	89	0.0	239	1066.9
11/01/2014	16.2	25.7	33.8	16.4	25.2	32.3	-2.2	-0.5	2.1	0	0.0	1.5	4.8	1.0	27	82	0.0	260	1088.9
12/01/2014	18.7	29.4	37.8	19.4	29.0	35.9	-2.4	-0.4	2.9	0	0.0	2.2	5.5	1.0	23	82	0.0	331	1120.6
13/01/2014	22.1	29.4	35.9	21.9	28.4	34.6	-2.4	-1.0	-0.1	0	0.8	2.9	4.8	6.0	25	92	0.0	331	1130.4
14/01/2014	21.7	29.9	37	22.1	29.0	35.3	-2.2	-0.9	1.2	0	0.3	2.4	4.8	5.0	26	87	0.0	296	1196.3
15/01/2014	21.4	30.4	37.4	21.5	29.5	36.1	-2.4	-0.9	2.2	0	0.5	2.4	4.8	3.0	25	87	0.0	276	1189
16/01/2014	23	30.5	38.4	22.8	29.8	37.1	-2.4	-0.7	2.3	0	0.0	2.1	5.5	1.0	29	98	0.0	185	1164.6
17/01/2014	21.6	30.2	37.8	23.9	29.9	36.5	-2.4	-0.4	3.2	0	0.0	1.9	4.8	1.0	25	83	0.0	292	1220.7
18/01/2014	22.9	30.2	37.6	22.8	29.5	36.1	-2.6	-0.8	3.2	0	0.3	2.2	4.8	3.0	27	94	0.0	326	1091.3
19/01/2014	20.5	29.6	39	22	29.1	37.1	-2.5	-0.5	2.8	0	0.0	2.6	9.5	0.0	25	87	0.0	325	1101.1
20/01/2014	21.5	32.3	40.3	21.5	31.4	39	-2.5	-0.9	2.5	0	0.0	2.4	6.3	1.0	23	71	0.0	322	1096.2
21/01/2014	22.2	32.3	41.4	21.8	31.1	39.5	-2.5	-1.1	0.2	0	0.0	2.8	5.8	1.0	24	92	0.0	323	1088.9
22/01/2014	23.2	29.0	36.5	22.9	28.2	34.7	-2	-0.7	1.4	0	0.0	3.5	7.3	1.0	20	82	0.0	313	1140.1
23/01/2014	19.6	24.7	29.2	19	24.1	27.9	-1.7	-0.6	0.9	0.4	0.5	2.7	5.5	9.0	20	75	0.0	265	1113.3
24/01/2014	20.7	25.8	29.7	20.6	25.1	28.4	-2	-0.7	0.6	0.2	0.8	3.0	7.5	6.0	16	59	0.0	124	627.4
25/01/2014	17.9	26.2	33.9	18.4	25.4	32.4	-2.1	-0.8	0.8	0	0.0	2.9	5.5	7.0	23	81	0.0	101	888.7
26/01/2014	17.9	25.8	33	17.5	24.8	31.7	-2.2	-1.0	-0.2	0	1.5	3.6	5.5	7.0	20	73	0.0	298	1184.1
27/01/2014	18.4	26.0	33.3	18.2	25.0	32	-2.1	-1.0	-0.2	0	1.5	3.5	5.5	7.0	21	84	0.0	310	1257.3
28/01/2014	17.7	27.0	35	18.4	26.0	33.6	-2.4	-1.0	1	0	0.3	2.2	4.5	5.0	32	99	0.0	335	1145
29/01/2014	19.6	28.5	36.9	19.9	27.6	35.5	-2.4	-0.9	0.7	0	0.5	2.5	5.3	4.0	24	86	0.0	344	1113.3
30/01/2014	20.2	28.4	37.3	20.1	27.7	35.3	-2.3	-0.7	1.9	0	0.0	2.4	4.5	1.0	25	97	0.0	334	1208.5
31/01/2014	19.9	28.4	37.1	19.6	27.5	35.7	-2.2	-0.9	1.3	0	0.5	2.5	4.8	6.0	23	76	0.0	344	1137.7
Month	11	28.4	46	12.1	27.7	44.7	-2.8	-0.7	3.8	0.6	0	2.7	9.5	0	23.4	103	0	295	1257

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Table 9: Summary Feb-14 Maules Creek Meteorological Station

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	Delta Temp Max	RAIN mm	Wind Speed Min	Wind Speed Ave	Wind Speed Max	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/02/2014	16.7	28.9	40.4	17.5	28.6	39	-2.5	-0.3	2.7	0	0.0	1.9	4.5	1.0	31	93	0.0	380	1086.4
2/02/2014	20.3	29.3	38.2	21.7	28.7	36.7	-2.6	-0.6	2.9	0	0.0	2.6	5.3	1.0	24	97	0.0	369	1071.8
3/02/2014	21.5	28.1	35.3	21.2	27.3	33.8	-2.4	-0.8	2.6	0	0.3	2.4	4.5	4.0	26	92	0.0	359	1064.5
4/02/2014	19.2	27.0	35.2	21.5	26.6	34.2	-2.2	-0.4	3.6	0	0.0	3.2	8.3	1.0	23	69	0.0	346	1047.4
5/02/2014	17.3	24.3	31.7	16.9	23.4	30.1	-2	-0.9	-0.4	0	1.8	4.6	6.5	9.0	17	31	0.0	349	1110.8
6/02/2014	17.7	24.1	31.9	17.1	23.2	30.1	-2.8	-0.9	0.8	0	0.5	2.5	5.0	4.0	22	98	0.0	309	1147.5
7/02/2014	13.6	24.6	34.8	13.9	24.3	33.1	-2.8	-0.3	5.3	0	0.0	1.2	3.8	0.0	26	89	0.0	365	1071.8
8/02/2014	17.1	27.4	37.2	18.2	27.3	35.9	-2.5	-0.2	3.9	0	0.0	1.8	4.8	1.0	29	97	0.0	367	1079.1
9/02/2014	18.4	28.2	38	20.7	28.3	36.3	-2.3	0.0	3.7	0	0.0	1.4	3.8	1.0	28	91	0.0	369	1074.2
10/02/2014	19.3	30.9	40.3	20.2	30.4	38.6	-2.5	-0.5	2.6	0	0.0	2.2	5.0	0.0	20	75	0.0	367	1093.7
11/02/2014	22	30.0	38.2	21.5	29.2	35.9	-2.8	-0.8	2.8	0	0.0	1.9	4.8	1.0	27	100	0.0	328	1040
12/02/2014	21.3	30.3	39.5	21.5	29.8	37.8	-2.5	-0.6	2.2	0	0.0	2.0	5.0	3.0	30	93	0.0	348	1049.8
13/02/2014	21.5	31.4	37.8	22.2	30.5	36.1	-2.2	-0.9	0.9	0	0.0	2.4	6.3	0.0	23	89	0.0	307	1103.5
14/02/2014	24.5	29.5	33.6	24.1	28.7	32.3	-2	-0.8	0	0	0.0	1.9	4.3	3.0	19	71	0.0	118	676.3
15/02/2014	26.9	31.4	36.7	26.2	30.9	35.6	-1.2	-0.5	0.7	0	0.3	2.6	7.3	2.0	22	95	0.0	96	532.2
16/02/2014	19.9	27.4	36.2	19.4	26.8	35	-1.9	-0.6	0.5	11.6	0.0	2.4	9.8	1.0	23	94	0.0	135	752
17/02/2014	18.9	23.8	30.4	18.5	23.1	29.2	-1.6	-0.7	-0.3	0.2	0.8	2.7	4.8	8.0	16	32	0.0	160	752
18/02/2014	19.6	26.5	34.6	19.2	25.7	32.9	-2.1	-0.8	1.1	0	0.0	2.2	6.0	1.0	24	80	0.0	280	1103.5
19/02/2014	21.6	25.5	30.4	21.1	25.0	29.3	-1.2	-0.5	0.5	39.4	0.0	2.1	6.5	1.0	23	85	4.9	83	725.1
20/02/2014	17.9	24.5	29.1	18.4	23.9	27.9	-1.9	-0.7	0.8	0	0.0	1.8	4.0	1.0	21	77	4.9	182	813
21/02/2014	13	22.3	31.9	12.9	21.7	30.1	-2.4	-0.6	2	0	0.0	1.3	3.8	1.0	24	96	9.8	361	1223.1
22/02/2014	16.3	25.2	31.9	16.5	24.5	30.8	-2.5	-0.7	1.7	0	0.0	2.5	4.3	1.0	20	79	22.0	302	1420.9
23/02/2014	17.9	25.0	31.7	17.3	24.1	30.3	-1.9	-0.9	0.2	0	1.8	3.3	5.8	8.0	18	72	29.3	391	1142.6
24/02/2014	19.1	25.2	32.2	19	24.6	30.4	-2.2	-0.6	3	0	0.0	2.4	4.5	1.0	20	83	26.9	379	1167
25/02/2014	19.7	25.8	33	19.9	25.1	31	-2.4	-0.7	2.6	0	0.0	1.7	3.5	0.0	25	89	22.0	377	1193.8
26/02/2014	19.2	25.9	31	19.6	25.4	29.8	-1.9	-0.4	1.8	0	0.0	1.9	4.8	1.0	22	88	22.0	256	983.9
27/02/2014	19.4	27.1	34.9	19.2	26.3	33.1	-2.1	-0.7	1.2	0	0.0	1.5	5.0	0.0	25	83	14.6	311	1169.4
28/02/2014	19.9	23.5	28.1	19.4	22.8	26.7	-2.3	-0.7	0	2.2	0.3	2.0	4.0	3.0	20	86	19.5	137	742.2
Month	13	26.9	40.4	12.9	26.3	39	-2.8	-0.6	5.3	53.4	0	2.2	9.8	0	23.1	100	0	290	1421

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Table 9: Summary **Mar-14** **Maules Creek Meteorological Station**

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	Delta Temp Max	RAIN mm	Wind Speed Min	Wind Speed Ave	Wind Speed Max	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/03/2014	19.8	22.8	28.8	19.4	22.0	27	-2.2	-0.8	-0.4	2	1.0	2.6	4.8	8.0	18	79	26.9	217	939.9
2/03/2014	18.8	23.7	30.5	18.4	22.8	29.2	-2.3	-0.9	-0.3	0	0.8	3.1	5.8	8.0	18	95	19.5	348	1174.3
3/03/2014	19.2	25.5	32.5	18.7	24.6	31	-2.3	-0.8	1.1	0	0.3	2.7	5.0	6.0	22	74	24.4	333	1257.3
4/03/2014	20.1	25.5	31.2	19.8	24.7	29	-2.2	-0.8	0	0	0.8	2.6	5.0	7.0	18	83	14.6	271	1164.6
5/03/2014	18.1	24.8	31.2	19.3	24.3	29.7	-2.1	-0.5	1.5	1	0.0	1.6	7.0	1.0	26	93	2.4	302	1154.8
6/03/2014	18	25.7	33.3	18.1	24.9	32	-2.1	-0.7	1.3	0	0.0	2.2	6.5	0.0	26	100	7.3	323	1159.7
7/03/2014	18.2	24.7	33.2	18.7	24.0	31.6	-2.8	-0.6	1.4	0	0.0	1.6	4.3	1.0	25	88	14.6	294	1189
8/03/2014	16.7	25.1	31.6	17	24.4	30.2	-2.1	-0.7	0.9	0	0.0	2.1	5.0	1.0	23	79	14.6	342	1181.6
9/03/2014	18.8	25.8	31.7	19.3	25.0	30.2	-2.2	-0.8	1.2	0	0.8	2.5	5.0	6.0	21	86	12.2	348	1174.3
10/03/2014	19.3	26.1	32.1	19.5	25.3	30.7	-2.1	-0.8	0.5	0	0.8	2.9	5.0	6.0	20	68	0.0	339	1040
11/03/2014	19	25.5	32.4	18.8	24.8	30.9	-2.1	-0.7	2.7	0	0.0	2.5	4.8	4.0	23	101	0.0	333	1044.9
12/03/2014	13.9	24.1	32.1	15.1	23.8	30.6	-2.3	-0.3	3	0	0.0	1.4	4.3	1.0	22	100	0.0	311	1042.5
13/03/2014	15.9	25.7	33.9	16.4	25.3	32.2	-2.5	-0.4	2.6	0	0.0	1.4	4.3	1.0	26	93	0.0	278	1106
14/03/2014	19.1	23.4	27.3	19.6	22.8	25.7	-1.6	-0.6	1.3	0	0.0	2.3	4.5	6.0	18	80	0.0	153	822.8
15/03/2014	13.8	23.7	32.2	14.1	23.2	30.6	-2.4	-0.4	1.7	0	0.0	1.4	5.0	1.0	25	88	0.0	277	1098.6
16/03/2014	17.8	24.4	32.7	17.8	24.3	31.4	-1.6	0.0	3.6	8.2	0.0	2.8	11.0	1.0	22	89	0.0	195	1020.5
17/03/2014	11.3	20.9	29.7	11.6	20.4	28.2	-2.2	-0.4	2.7	0	0.0	1.4	4.0	0.0	24	88	0.0	332	1040
18/03/2014	10.6	22.5	33	10.8	22.0	31.3	-2.1	-0.5	1.9	0	0.0	1.4	3.8	0.0	24	100	0.0	320	1020.5
19/03/2014	16.9	24.8	33.5	17.7	24.4	31.6	-1.9	-0.4	2.5	1	0.0	2.2	7.0	1.0	20	68	2.4	228	1057.1
20/03/2014	18.8	23.6	26.9	19.6	23.1	25.8	-1.4	-0.5	1.1	0	0.0	2.3	4.0	5.0	16	53	12.2	151	734.9
21/03/2014	17.2	21.1	26.5	16.7	20.6	25.5	-1.5	-0.5	1.8	41.2	0.0	1.8	4.3	1.0	17	81	4.9	175	893.6
22/03/2014	15.4	22.8	31.4	15.3	22.4	29.5	-2.2	-0.4	1.9	0	0.0	1.1	3.5	0.0	22	86	4.9	320	1059.6
23/03/2014	14.9	22.4	31.2	15.2	22.0	29.9	-2	-0.4	2.3	8.2	0.0	1.8	5.8	0.0	24	89	2.4	314	1074.2
24/03/2014	16.3	19.2	25.3	15.6	18.7	23.7	-1.9	-0.5	0.7	48	0.0	1.8	6.5	4.0	21	92	9.8	120	690.9
25/03/2014	15.4	20.0	26.4	15.2	19.5	25.3	-1.6	-0.5	0.7	3.4	0.0	1.2	3.5	0.0	21	86	24.4	165	874
26/03/2014	17.3	18.9	20.4	16.8	18.4	19.7	-0.7	-0.5	-0.1	26.4	0.5	2.3	5.5	5.0	10	31	12.2	56	163.6
27/03/2014	18	19.2	21.9	17.4	18.7	21.1	-0.9	-0.5	0.4	61	0.0	2.0	4.0	4.0	17	95	29.3	73	280.8
28/03/2014	16.6	20.1	23.6	16.9	19.5	22	-1.7	-0.6	0.4	8.4	0.0	1.5	3.3	1.0	17	89	41.5	160	695.8
29/03/2014	14.3	20.4	28	14.2	20.0	26.2	-2.1	-0.4	1.6	0.2	0.0	0.7	3.0	0.0	23	96	63.5	273	803.2
30/03/2014	15.8	22.8	30.6	15.9	22.5	28.6	-2.1	-0.3	4	0	0.0	1.3	3.5	0.0	19	100	63.5	334	891.1
31/03/2014	15.9	23.0	30.8	15.8	22.6	29.2	-1.8	-0.4	2.3	0	0.0	1.1	2.8	0.0	21	90	78.1	354	1022.9
Month	10.6	23.2	33.9	10.8	22.6	32.2	-2.8	-0.5	4	209.0	0	1.9	11.0	0	20.9	101	0	259	1257

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Table 9: Summary Apr-14 Maules Creek Meteorological Station

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	Delta Temp Max	RAIN mm	Wind Speed Min	Wind Speed Ave	Wind Speed Max	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/04/2014	16.3	22.6	28.9	16.3	22.3	27.6	-1.7	-0.3	1.7	0.0	0.0	1.3	3.8	1.0	19.9	67.0	58.6	325.0	1013.2
2/04/2014	17.9	23.4	29.5	18.0	23.0	28.3	-1.7	-0.3	1.8	0.0	0.0	1.5	5.0	0.0	19.1	87.0	41.5	317.5	1005.9
3/04/2014	16.9	23.4	31.7	17.1	23.2	30.2	-1.7	-0.2	1.8	0.0	0.0	0.9	3.3	0.0	20.1	83.0	12.2	312.2	979.0
4/04/2014	19.6	23.6	28.3	20.0	23.3	27.3	-1.6	-0.3	2.1	0.4	0.0	2.0	6.8	1.0	16.9	77.0	12.2	214.9	969.2
5/04/2014	19.2	23.0	28.2	19.2	22.6	27.1	-1.6	-0.4	1.7	0.2	0.0	1.5	4.8	1.0	12.7	62.0	39.1	210.7	878.9
6/04/2014	18.5	22.4	28.0	18.2	21.9	26.7	-1.8	-0.6	0.7	0.0	0.0	2.2	4.5	0.0	19.7	77.0	31.7	308.0	1035.2
7/04/2014	15.7	20.7	26.4	15.4	20.3	25.3	-1.3	-0.5	0.6	0.0	1.3	3.2	5.5	5.0	13.0	32.0	12.2	307.8	966.8
8/04/2014	14.1	19.6	26.4	15.0	19.5	25.2	-2.0	-0.1	3.7	0.0	0.0	2.0	3.5	1.0	17.5	67.0	22.0	307.0	942.4
9/04/2014	11.4	19.3	28.2	11.8	19.3	26.4	-1.8	0.0	3.3	0.0	0.0	0.9	3.5	1.0	20.9	94.0	22.0	283.4	998.5
10/04/2014	13.5	20.1	26.8	13.8	20.0	25.1	-1.8	-0.1	1.8	0.0	0.0	0.7	3.0	0.0	23.1	91.0	12.2	190.3	793.5
11/04/2014	17.8	22.4	27.6	17.5	22.2	26.4	-1.9	-0.2	1.8	1.6	0.0	2.4	6.0	1.0	18.9	85.0	26.9	231.3	827.6
12/04/2014	12.4	20.3	26.2	13.1	19.9	24.9	-2.4	-0.4	2.4	0.0	0.0	1.2	3.8	1.0	20.0	81.0	26.9	275.5	1030.3
13/04/2014	13.6	19.9	26.4	13.9	19.5	25.5	-1.4	-0.3	1.4	0.0	0.3	2.5	4.0	1.0	15.0	39.0	14.6	295.3	903.3
14/04/2014	14.8	20.1	26.1	14.8	19.6	24.9	-1.6	-0.6	0.1	0.0	1.3	3.1	4.5	6.0	15.7	39.0	14.6	284.3	900.9
15/04/2014	14.0	19.0	25.0	13.9	18.5	23.7	-1.8	-0.5	1.7	0.0	0.5	2.4	3.8	3.0	17.8	97.0	31.7	246.4	979.0
16/04/2014	10.3	18.0	24.7	10.6	17.8	23.6	-1.6	-0.2	2.3	0.0	0.0	1.9	4.0	0.0	16.8	81.0	19.5	270.8	922.9
17/04/2014	9.0	16.8	24.7	9.3	16.5	23.2	-1.8	-0.2	2.0	0.0	0.0	1.1	3.8	0.0	19.6	84.0	14.6	276.6	966.8
18/04/2014	6.5	15.9	25.7	7.1	15.7	24.3	-2.1	-0.1	2.9	0.0	0.0	1.0	3.5	0.0	16.1	87.0	4.9	267.7	869.1
19/04/2014	7.4	16.1	25.5	8.0	16.3	24.0	-1.8	0.2	3.1	0.0	0.0	1.2	4.3	0.0	16.6	75.0	9.8	225.6	947.3
20/04/2014	6.1	14.5	23.9	7.2	14.8	22.6	-1.7	0.3	2.4	0.0	0.0	1.4	5.3	0.0	13.9	92.0	12.2	266.8	859.4
21/04/2014	3.8	13.7	24.5	4.7	14.0	23.3	-1.9	0.3	3.7	0.0	0.0	1.0	4.5	0.0	17.8	94.0	2.4	247.1	849.6
22/04/2014	6.1	16.8	27.6	6.8	17.0	26.7	-2.1	0.3	3.5	0.0	0.0	1.3	5.8	0.0	22.7	95.0	0.0	202.5	827.6
23/04/2014	12.2	19.9	28.1	13.2	20.5	27.0	-1.6	0.6	3.2	0.0	0.0	1.8	6.5	0.0	18.8	86.0	4.9	245.8	842.3
24/04/2014	10.2	19.8	28.9	10.8	20.0	27.8	-1.8	0.2	2.6	0.0	0.0	1.4	5.3	1.0	17.7	97.0	0.0	247.1	832.5
25/04/2014	14.8	21.4	29.3	15.7	21.4	27.2	-2.3	0.0	3.6	0.6	0.0	1.8	7.0	1.0	24.9	100.0	0.0	214.7	839.8
26/04/2014	10.4	19.0	26.3	11.4	19.3	25.2	-1.7	0.3	4.0	0.0	0.0	1.4	5.8	1.0	22.5	91.0	9.8	163.1	793.5
27/04/2014	14.4	19.4	23.9	14.5	19.6	22.8	-1.2	0.2	2.5	0.0	0.0	1.0	3.3	1.0	19.1	88.0	14.6	88.0	344.2
28/04/2014	13.2	19.2	26.6	13.9	19.2	25.3	-1.8	0.0	3.4	0.0	0.0	1.7	3.5	1.0	16.9	80.0	0.0	225.8	864.3
29/04/2014	9.4	17.4	25.4	9.7	17.7	23.7	-2.0	0.3	3.4	0.0	0.0	1.1	3.8	1.0	19.9	83.0	0.0	222.1	800.8
30/04/2014	12.3	16.2	19.2	13.8	16.3	18.3	-1.4	0.1	3.6	7.0	0.0	1.2	4.5	0.0	14.0	74.0	17.1	88.9	373.5
Month	3.8	19.5	31.7	4.7	19.4	30.2	-2.4	-0.1	4	9.8	0	1.6	7.0	0	18.3	100	0	245	1035

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Table 9: Summary May-14 Maules Creek Meteorological Station

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	Delta Temp Max	RAIN mm	Wind Speed Min	Wind Speed Ave	Wind Speed Max	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/05/2014	7.6	14.5	21.9	7.7	14.4	20.3	-1.9	-0.1	2.2	0	0.0	1.1	3.8	0.0	21	91	2.4	193.9	747
2/05/2014	6.7	12.5	19.7	6.9	12.5	18.5	-1.9	0.0	2.7	0	0.0	1.7	5.8	1.0	16	95	14.6	198.8	784
3/05/2014	5.8	8.9	10.8	7.1	8.8	10.3	-1	-0.2	2.6	10.4	0.0	3.4	8.0	1.0	16	78	2.4	82.3	464
4/05/2014	7.5	10.2	13.3	7.2	9.8	12.7	-0.9	-0.4	1	0	0.0	2.9	5.5	1.0	13	24	19.5	77.8	347
5/05/2014	2.4	9.7	16.8	3.3	9.6	15.2	-2.1	-0.1	1.9	0	0.0	1.0	3.3	1.0	13	97	0.0	159.2	745
6/05/2014	1.5	9.1	17.8	1.7	9.0	16.3	-2.3	-0.1	2.3	0	0.0	0.7	3.3	0.0	13	68	0.0	210.7	774
7/05/2014	3.6	12.3	21.9	4.7	12.3	20.0	-1.9	-0.1	2.5	0	0.0	1.6	3.8	0.0	13	76	4.9	194.8	862
8/05/2014	9.1	15.0	21.9	10.3	15.0	20.7	-1.5	0.0	5.8	0	0.0	2.3	3.8	2.0	12	37	17.1	224.9	845
9/05/2014	7.8	15.1	23.2	9.7	15.4	21.3	-2	0.3	4.2	0	0.0	1.8	3.5	1.0	15	82	14.6	223.7	798
10/05/2014	9.8	14.9	21.4	10.2	15.6	19.6	-1.9	0.7	3.9	0	0.0	0.8	2.5	1.0	19	89	22.0	122.8	701
11/05/2014	11.0	15.8	22.0	12.4	15.7	20.6	-1.4	-0.1	1.9	2	0.0	1.5	7.3	0.0	17	88	24.4	146.9	701
12/05/2014	7.5	15.6	23.9	8.9	15.8	22.6	-1.9	0.2	3.3	0.2	0.0	1.7	3.5	1.0	14	100	31.7	239.4	762
13/05/2014	9.7	16.2	23.6	11.1	16.6	22.4	-1.8	0.4	4.4	0	0.0	2.3	4.0	1.0	15	91	19.5	236.3	767
14/05/2014	8.4	15.2	24.3	11.0	16.6	23.0	-1.5	1.4	6.2	8.6	0.0	1.7	5.1	2.0	19	92	0.0	105.8	623
15/05/2014	7.4	14.4	23.2	10.0	16.3	23.0	-0.8	1.9	6.6	0	0.1	1.7	4.3	3.9	23	104	0.0	54.3	240
16/05/2014	6.0	14.4	23.2	7.0	16.1	23.0	-0.8	1.6	5.8	0	0.0	1.5	6.2	2.6	31	107	0.0	59.4	260
17/05/2014	9.2	15.7	23.6	10.0	17.2	24.0	-1	1.5	5.2	0	0.1	1.4	5.7	4.7	27	108	0.0	48.2	260
18/05/2014	8.0	14.9	22.4	9.0	16.2	23.0	-0.6	1.2	4.3	0	0.1	0.7	2.8	4.2	35	93	0.0	34.5	200
19/05/2014	10.4	16.0	23.6	12.0	16.9	24.0	-1.1	0.8	2.5	0	0.0	0.8	2.9	3.0	29	103	0.0	44.7	250
20/05/2014	10.8	15.3	21.2	12.0	16.2	21.0	-0.7	0.8	2.7	0	0.0	0.9	3.7	4.2	26	89	0.0	32.4	140
21/05/2014	7.2	14.4	23.6	9.0	15.5	24.0	-0.9	1.0	3.9	0	0.0	1.0	5.6	3.7	27	97	0.0	48.1	230
22/05/2014	6.2	14.3	24.6	8.0	15.5	26.0	-1	1.2	3.3	0	0.0	0.9	4.4	3.3	30	93	0.0	54.5	240
23/05/2014	9.6	15.4	22.8	11.0	16.2	23.0	-1.1	0.8	2.8	4.2	0.0	1.2	4.9	5.7	32	117	0.0	37.1	260
24/05/2014	7.8	14.7	23.6	9.0	15.7	25.0	-0.9	0.9	3.4	0	0.1	0.8	3.8	6.9	29	105	0.0	51.5	210
25/05/2014	7.6	15.3	25.6	9.0	16.3	25.0	-0.9	0.9	3.9	0	0.1	1.2	6.9	4.8	27	102	0.0	43.9	210
26/05/2014	8.4	16.2	27.2	9.0	17.2	27.0	-1.2	1.1	3.4	0	0.0	0.8	3.4	6.5	32	88	0.0	43.3	200
27/05/2014	10.4	18.8	24.8	12.0	20.2	24.0	-0.9	1.3	4.8	0	0.0	2.4	8.7	7.5	24	86	0.0	42.4	240
28/05/2014	8.4	17.2	23.6	10.0	18.1	23.0	-1.2	0.8	3.3	0.6	0.0	2.0	6.9	4.4	26	106	0.0	43.3	225
29/05/2014	4.8	12.5	22.0	6.0	13.6	22.0	-0.7	1.0	3.3	0	0.0	1.1	3.9	6.5	28	96	0.0	46.7	215
30/05/2014	4.2	13.1	21.6	6.0	14.1	22.0	-0.7	0.9	4.1	0	0.0	1.4	4.6	2.0	23	93	0.0	31.9	140
31/05/2014	8.8	16.8	23.6	10.0	17.4	24.0	-0.8	0.5	3.4	0	0.1	1.6	5.7	4.6	25	101	0.0	39.1	270
Month	1.5	14.3	27.2	1.7	15.0	27	-2.3	0.6	6.6	26.0	0	1.5	8.7	0	22	117	0	102	862

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Summary **Jun-14** **Maules Creek Meteorological Station**

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	DeltaTemp Max	Wind Speed Min (m/s)	Wind Speed Ave (m/s)	Wind Speed Max	Rain mm	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/06/2014	12.8	15.8	20	14	16.3	20	-0.5	0.5	2	0.1	1.9	8.9	14.2	4.22	18.95	112.75			
2/06/2014	6.8	13.0	18.2	8	13.6	18	-0.6	0.6	2.8	0.1	1.0	4.0	5.4	3.92	30.41	111.48			
3/06/2014	4.0	10.6	18.4	5.0	11.4	18.0	-1.3	0.7	2.7	0.1	1.0	5.0	0.2	4.30	28.08	105.62			
4/06/2014	2.4	9.2	17.6	3.0	10.1	17.0	-0.9	0.9	3.5	0.1	1.0	3.6	0.0	4.03	27.80	100.76			
5/06/2014	2.2	9.5	19.4	3.0	10.5	19.0	-1.2	1.0	3.6	0.0	1.0	4.3	0.0	3.68	26.89	124.93			
6/06/2014	3.0	11.5	20.0	4.0	12.2	20.0	-1.0	0.6	3.4	0.0	1.7	7.2	0.2	5.28	24.57	111.87			
7/06/2014	4.0	11.8	18.8	6.0	12.7	19.0	-0.8	0.8	4.3	0.1	2.0	6.5	0.0	1.71	20.74	122.09			
8/06/2014	4.0	11.4	18.4	5.0	12.2	18.0	-0.9	0.8	3.8	0.0	1.9	5.6	0.0	4.03	22.17	99.40			
9/06/2014	5.8	12.4	18.4	8.0	12.9	18.0	-0.8	0.4	3.1	0.1	2.6	7.7	0.0	3.05	15.08	40.18			
10/06/2014	4.4	13.0	20.4	5.0	13.9	20.0	-0.7	0.8	4.3	0.1	2.7	7.1	0.0	2.28	14.26	71.11			
11/06/2014	3.6	10.7	19.2	4.0	11.9	19.0	-0.8	1.1	4.9	0.0	1.6	4.5	0.0	3.12	21.83	112.29			
12/06/2014	3.2	10.9	21.2	5.0	12.6	21.0	-0.9	1.6	6.4	0.0	1.0	3.8	0.0	2.69	31.04	109.26			
13/06/2014	6.6	13.2	20.0	9.0	14.2	20.0	-0.7	1.0	4.8	0.1	1.1	4.4	3.6	3.18	25.46	113.80			
14/06/2014	6.4	12.2	16.4	8.0	12.7	16.0	-0.4	0.4	2.2	0.1	1.5	5.2	19.6	1.57	17.61	94.79			
15/06/2014	4.4	8.8	12.8	6.0	9.3	13.0	-1.2	0.4	2.2	0.0	2.1	7.2	0.2	6.49	17.69	110.34			
16/06/2014	3.6	9.5	16.0	5.0	10.1	16.0	-1.2	0.6	2.5	0.0	1.0	5.2	0.0	3.90	26.96	107.96			
17/06/2014	1.2	7.5	16.2	3.0	8.7	16.0	-0.7	1.1	3.3	0.0	1.1	5.1	0.2	0.00	31.72	128.00			
18/06/2014	1.0	8.5	18.0	2.0	9.6	18.0	-0.7	1.0	4.1	0.0	1.2	4.9	0.0	0.00	24.83	111.73			
19/06/2014	3.6	10.2	20.4	5.0	11.4	20.0	-0.6	1.2	2.9	0.0	0.8	3.9	0.2	0.00	30.18	103.50			
20/06/2014	10.6	14.4	20.4	12.0	15.4	20.0	-0.9	0.9	3.2	0.1	1.6	6.9	0.4	2.50	25.16	101.81			
21/06/2014	7.4	13.0	20.4	9.0	13.9	20.0	-1.3	0.8	2.5	0.1	0.9	3.9	0.6	3.79	31.79	116.78			
22/06/2014	3.6	10.3	19.6	4.0	11.4	19.0	-1.0	1.0	3.1	0.0	0.9	4.2	0.0	0.00	27.46	108.35			
23/06/2014	3.0	10.0	18.8	4.0	11.1	19.0	-0.5	1.1	4.6	0.0	1.1	5.9	0.0	0.00	31.78	104.91			
24/06/2014	5.2	10.6	16.0	8.0	11.3	16.0	-1.0	0.7	3.5	0.1	2.8	8.7	0.0	4.72	15.05	90.68			
25/06/2014	2.4	8.4	16.8	4.0	9.7	16.0	-1.3	1.3	3.3	0.0	1.6	7.4	0.0	4.94	26.74	106.26			
26/06/2014	0.6	7.1	16.4	2.0	8.3	16.0	-0.9	1.2	3.4	0.0	1.1	5.2	0.0	0.00	28.66	144.50			
27/06/2014	-0.6	6.6	18.0	1.0	8.3	18.0	-0.6	1.6	7.1	0.0	0.7	3.8	0.0	0.00	27.94	157.34			
28/06/2014	2.0	12.7	20.4	5.0	14.1	20.0	-0.8	1.4	7.8	0.2	3.2	11.5	3.2	6.11	21.28	90.23			
29/06/2014	5.4	8.7	13.0	6.0	9.3	13.0	-1.1	0.5	2.0	0.1	2.6	8.6	0.0	4.69	15.74	90.73			
30/06/2014	1.6	8.0	14.0	3.0	8.7	14.0	-1.0	0.6	3.6	0.0	2.0	6.9	4.6	4.48	17.80	94.17			
Monthly	-0.6	10.7	21.2	1.0	11.6	21.0	-1.3	0.9	7.8	0.0	1.6	11.5	52.6	0.0	24.2	157.3			

Anomolous results

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Summary **Jul-14** **Maules Creek Meteorological Station**

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	DeltaTemp Max	Wind Speed Min (m/s)	Wind Speed Ave (m/s)	Wind Speed Max	Rain mm	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/07/2014	-1.0	5.8	14.0	0.0	6.8	14.0	-0.8	1.0	3.1	0.0	0.9	3.8	0.0	4.69	34.52	113.95			
2/07/2014	-1.8	5.5	14.8	-1.0	6.6	15.0	-0.9	1.0	4.1	0.0	0.9	3.8	0.0	3.54	30.27	109.88			
3/07/2014	-1.4	7.0	18.8	0.0	8.1	19.0	-0.8	1.1	4.1	0.0	0.9	4.2	0.0	4.82	27.85	108.88			
4/07/2014	-0.6	7.7	19.6	1.0	8.8	19.0	-0.8	1.1	4.6	0.0	1.1	7.3	0.0	5.05	31.94	116.10			
5/07/2014	2.2	9.4	18.8	3.0	10.4	18.0	-1.1	1.0	4.1	0.0	1.9	7.1	0.0	3.57	25.05	109.81			
6/07/2014	3.8	8.7	14.0	5.0	9.2	14.0	-1.6	0.4	2.8	0.1	1.8	8.4	0.0	3.65	21.84	112.49			
7/07/2014	0.2	7.5	14.8	2.0	8.2	15.0	-1.1	0.7	3.1	0.0	1.1	4.7	0.0	3.25	31.03	140.91			
8/07/2014	-2.0	4.8	16.4	-1.0	6.0	16.0	-0.8	1.1	3.2	0.0	0.7	3.2	0.0	3.67	29.51	115.95			
9/07/2014	-2.2	9.0	19.8	-1.0	10.1	20.0	-0.6	1.1	4.2	0.0	2.0	9.8	0.0	4.93	30.72	112.03			
10/07/2014	0.0	6.5	13.2	4.0	7.8	13.0	-0.8	1.2	5.1	0.0	2.4	9.6	0.0	4.47	22.26	99.88			
11/07/2014	-2.0	5.7	14.8	-1.0	6.7	15.0	-1.0	1.0	3.7	0.0	0.9	5.6	0.0	4.42	32.73	106.13			
12/07/2014	-2.4	6.5	16.4	-1.0	7.7	16.0	-1.0	1.1	5.5	0.0	1.4	5.6	0.0	3.68	26.87	104.62			
13/07/2014	-0.8	9.0	14.8	1.0	9.5	15.0	-1.0	0.5	3.8	0.1	2.2	6.3	0.0	5.36	19.94	111.68			
14/07/2014	-1.4	8.3	17.4	0.0	9.1	17.0	-0.9	0.8	3.2	0.0	1.3	6.0	0.0	3.79	26.57	100.07			
15/07/2014	8.6	14.0	19.6	12.0	14.9	20.0	-0.8	0.8	3.3	0.0	1.4	3.8	0.0	4.26	23.36	123.55			
16/07/2014	6.2	12.7	16.8	8.0	13.6	17.0	-1.0	0.8	3.4	0.0	2.4	7.8	4.6	5.55	17.87	88.22			
17/07/2014	2.8	10.1	16.8	5.0	10.7	16.0	-1.0	0.6	2.4	0.0	2.0	8.1	0.0	3.96	24.24	104.84			
18/07/2014	1.6	7.1	12.0	3.0	7.7	12.0	-1.1	0.5	3.5	0.0	2.4	6.5	0.4	5.03	22.86	105.15			
19/07/2014	-3.2	4.6	14.0	-2.0	5.7	14.0	-0.9	1.1	6.2	0.0	0.9	4.3	0.0	2.41	31.98	101.33			
20/07/2014	-2.6	7.6	16.8	-1.0	8.4	17.0	-0.8	0.8	5.6	0.0	1.8	6.3	0.0	3.97	24.41	112.10			
21/07/2014	5.2	12.1	19.6	7.0	12.9	19.0	-1.2	0.7	3.4	0.0	1.7	5.1	0.0	3.17	20.22	107.78			
22/07/2014	4.0	10.2	19.6	5.0	11.2	19.0	-1.2	0.9	3.1	0.0	1.3	5.4	0.0	1.38	28.13	106.04			
23/07/2014	3.6	11.6	18.8	5.0	12.6	19.0	-0.8	0.9	5.4	0.1	1.5	4.1	0.0	2.63	23.71	108.08			
24/07/2014	6.6	13.2	20.4	9.0	14.6	21.0	-1.1	1.3	5.9	0.1	1.0	4.7	0.0	5.52	31.53	110.12			
25/07/2014	8.6	16.8	22.4	12.0	18.1	22.0	-0.8	1.3	5.4	0.0	2.0	8.1	0.0	4.43	23.85	129.97			
26/07/2014	5.4	14.2	20.4	8.0	14.9	21.0	-0.6	0.6	3.5	0.1	2.0	9.0	6.0	4.73	22.97	108.03			
27/07/2014	2.0	8.8	17.6	3.0	9.9	18.0	-1.1	1.0	3.2	0.1	1.1	6.7	0.2	6.73	34.18	107.97			
28/07/2014	0.0	7.6	17.6	1.0	8.6	18.0	-1.0	1.0	3.1	0.0	0.9	4.1	0.2	5.35	31.99	107.44			
29/07/2014	0.4	8.2	19.6	2.0	9.3	19.0	-1.2	1.0	3.9	0.0	1.0	5.1	0.0	4.56	29.06	101.83			
30/07/2014	1.0	9.4	21.2	2.0	10.6	21.0	-1.1	1.1	4.2	0.0	1.2	6.4	11.4	6.96	30.95	102.95			
31/07/2014	1.0	10.2	22.8	2.0	11.6	22.0	-1.1	1.4	5.1	0.0	1.2	6.4	0.0	6.96	31.14	106.46			
Monthly	-3.2	9.0	22.8	-2.0	10.0	22.0	-1.6	0.9	6.2	0.0	1.5	9.8	22.8	1.4	27.2	140.9			

no data - anamolous results due to faulty sensor

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Summary **Aug-14** **Maules Creek Meteorological Station**

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	DeltaTemp Max	Wind Speed Min (m/s)	Wind Speed Ave (m/s)	Wind Speed Max	Rain mm	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/08/2014	1.0	11.2	19.2	5.0	13.4	19.0	-1.2	2.2	8	0.0	2.9	10.0	0.0	4.95	20.44	107.30			
2/08/2014	-2.6	5.7	13.6	-1.0	6.8	14.0	-1.2	1.0	4	0.1	1.4	5.8	0.0	4.64	25.71	93.78			
3/08/2014	-2.6	9.6	17.6	-1.0	10.6	18.0	-0.9	0.9	6.7	0.1	2.3	6.3	0.0	2.58	16.09	69.57			
4/08/2014	6.0	12.8	19.6	8.0	13.5	19.0	-0.7	0.6	3.8	0.1	2.0	5.4	0.0	1.74	19.07	105.81			
5/08/2014	4.2	10.7	20.0	6.0	11.6	20.0	-1.1	0.9	2.9	0.0	0.9	4.7	0.2	4.66	34.88	112.79			
6/08/2014	0.6	8.4	20.0	2.0	9.6	20.0	-1.4	1.0	3.4	0.1	1.2	6.4	0.0	3.56	30.23	107.90			
7/08/2014	-2.6	7.3	20.0	-1.0	8.6	20.0	-1.1	1.3	4.5	0.1	1.0	4.4	0.0	2.54	28.75	102.10			
8/08/2014	-2.0	7.8	21.2	-1.0	9.0	21.0	-0.9	1.1	4.6	0.0	1.0	4.3	0.0	5.54	27.99	108.45			
9/08/2014	-0.8	9.4	21.2	1.0	10.4	21.0	-1.1	1.1	4.4	0.1	1.2	6.1	0.0	4.94	30.36	116.32			
10/08/2014	0.2	9.6	20.4	2.0	10.9	20.0	-0.8	1.3	4.7	0.0	1.5	6.2	0.0	4.01	27.81	97.07			
11/08/2014	-0.4	7.8	18.0	1.0	9.0	18.0	-1.4	1.2	5.1	0.1	1.1	4.7	0.0	4.19	33.05	125.71			
12/08/2014	-3.6	7.9	18.4	-2.0	8.9	18.0	-1.0	0.9	7.0	0.0	1.4	5.1	0.0	5.22	28.38	105.12			
13/08/2014	4.8	12.7	19.2	7.0	12.9	19.0	-1.2	0.2	3.5	0.6	3.2	6.8	0.0	3.80	14.26	49.20			
14/08/2014	4.8	12.5	20.4	7.0	13.1	20.0	-1.0	0.4	4.4	0.0	2.5	5.7	0.0	5.04	19.76	93.03			
15/08/2014	5.0	15.2	21.6	11.0	15.8	22.0	-1.0	0.5	6.1	0.1	2.3	5.6	0.0	4.65	19.72	103.81			
16/08/2014	10.4	13.2	16.0	11.0	13.6	16.0	-0.3	0.3	1.2	0.2	2.5	5.8	17.8	2.71	13.12	84.73			
17/08/2014	5.2	11.0	15.6	7.0	11.3	16.0	-0.8	0.3	2.6	0.0	2.4	7.3	5.0	7.80	21.45	105.78			
18/08/2014	7.6	10.4	12.8	8.0	10.5	13.0	-0.4	0.1	0.6	0.3	3.3	8.0	2.0	7.29	11.69	20.06			
19/08/2014	6.0	10.5	13.6	7.0	10.9	14.0	-0.6	0.4	2.3	0.0	1.3	4.8	1.2	3.61	20.29	97.69			
20/08/2014	1.8	10.7	17.6	4.0	11.3	18.0	-0.9	0.5	2.4	0.1	2.2	6.4	0.4	3.87	18.13	109.10			
21/08/2014	7.8	13.4	20.0	9.0	13.7	20.0	-0.8	0.2	1.8	0.7	2.7	6.5	0.0	3.93	14.67	72.15			
22/08/2014	9.4	14.1	20.8	11.0	14.7	20.0	-0.8	0.5	3.8	0.1	2.3	5.6	0.0	4.12	16.88	91.87			
23/08/2014	5.6	13.1	20.4	6.0	14.1	20.0	-0.9	0.9	4.2	0.1	2.2	5.8	0.0	2.40	13.20	78.31			
24/08/2014	5.6	13.2	20.8	8.0	14.4	21.0	-1.0	1.2	5.0	0.1	2.1	6.3	0.0	1.62	15.96	66.13			
25/08/2014	4.8	12.2	21.2	6.0	13.1	21.0	-1.0	0.9	3.6	0.0	1.3	5.6	0.0	3.92	29.17	99.98			
26/08/2014	3.4	11.2	20.0	4.0	11.6	19.0	-1.2	0.4	2.5	0.1	1.6	5.2	12.6	4.01	25.69	100.42			
27/08/2014	9.8	12.0	15.6	10.0	12.3	16.0	-0.4	0.1	1.6	0.1	2.0	6.4	17.6	3.96	18.29	94.93			
28/08/2014	5.4	12.9	18.4	7.0	13.3	19.0	-0.7	0.4	2.8	0.0	2.7	6.4	0.2	6.69	18.63	100.55			
29/08/2014	2.2	10.2	17.6	3.0	11.2	18.0	-1.1	0.9	3.9	0.0	1.9	7.4	0.0	2.85	19.36	109.81			
30/08/2014	1.8	11.0	18.4	4.0	12.0	18.0	-0.8	1.0	4.5	0.1	1.9	6.4	0.0	3.50	20.89	110.75			
31/08/2014	4.2	11.9	20.8	5.0	12.8	21.0	-1.0	0.8	3.8	0.0	1.4	5.4	0.0	3.31	27.26	94.21			
Monthly	-3.6	11.0	21.6	-2.0	11.8	22.0	-1.4	0.8	8.0	0.0	1.9	10.0	57.0	1.6	22.0	125.7			

no data - anamolous results due to faulty sensor

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Summary **Sep-14** **Maules Creek Meteorological Station**

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	DeltaTemp Max	Wind Speed Min (m/s)	Wind Speed Ave (m/s)	Wind Speed Max	Rain mm	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/09/2014	4.0	13.1	22.0	5.0	14.2	22.0	-1.3	1.1	3.3	0.0	1.6	7.5	0.0	4.36	29.99	110.77			
2/09/2014	4.4	11.5	17.6	7.0	12.4	17.0	-1.2	0.8	5.5	0.0	2.6	11.2	0.2	4.98	24.47	108.10			
3/09/2014	0.0	9.2	17.2	2.0	10.1	17.0	-1.1	0.9	3.5	0.1	2.8	9.6	0.0	4.58	19.39	103.41			
4/09/2014	-0.8	8.3	17.2	1.0	9.2	17.0	-1.0	0.9	4.3	0.0	1.2	5.8	0.0	2.23	31.90	94.15			
5/09/2014	1.4	10.3	17.6	3.0	11.1	18.0	-1.0	0.7	3.6	0.0	2.0	6.3	0.0	5.05	20.67	83.85			
6/09/2014	3.8	13.1	20.8	5.0	13.7	21.0	-1.0	0.6	3.1	0.2	2.8	8.5	0.0	2.05	14.11	56.20			
7/09/2014	8.4	15.3	22.4	10.0	15.6	22.0	-1.2	0.3	2.0	0.2	2.9	5.9	0.0	1.99	15.61	101.74			
8/09/2014	8.4	15.6	22.8	9.0	16.4	23.0	-1.1	0.7	4.0	0.1	2.0	5.6	0.0	4.48	23.89	103.77			
9/09/2014	10.2	17.4	24.8	13.0	18.5	25.0	-1.0	1.1	4.0	0.0	1.8	6.9	0.0	6.36	29.25	110.68			
10/09/2014	8.0	18.5	23.2	9.0	18.9	23.0	-1.1	0.3	2.4	0.1	4.0	12.3	1.4	4.12	17.96	102.89			
11/09/2014	3.6	12.7	23.2	5.0	13.9	23.0	-1.2	1.1	3.9	0.0	1.2	6.3	0.0	3.43	34.58	103.76			
12/09/2014	3.6	13.6	24.0	4.0	14.8	24.0	-0.9	1.1	5.8	0.1	1.5	6.8	0.0	3.45	28.33	113.02			
13/09/2014	4.6	14.1	24.4	6.0	15.2	24.0	-1.2	1.0	3.8	0.0	1.4	7.2	0.0	3.82	31.72	105.75			
14/09/2014	5.8	15.2	25.2	7.0	16.2	25.0	-1.5	1.0	4.1	0.0	1.9	8.5	0.0	5.73	30.98	103.87			
15/09/2014	6.0	15.7	26.4	8.0	16.8	26.0	-1.2	1.1	4.6	0.0	1.2	6.1	0.0	4.81	28.20	114.44			
16/09/2014	7.4	17.3	24.0	9.0	18.5	24.0	-1.3	1.1	6.0	0.0	3.1	10.8	0.0	3.49	25.41	111.60			
17/09/2014	4.0	13.3	22.0	6.0	14.3	21.0	-1.5	0.9	5.3	0.0	2.0	8.3	0.0	2.78	27.62	108.73			
18/09/2014	1.8	12.2	21.6	4.0	13.2	21.0	-1.6	0.8	6.2	0.0	1.8	7.1	0.0	5.48	26.38	106.61			
19/09/2014	-0.8	10.2	20.0	0.0	11.3	19.0	-1.8	1.1	4.0	0.1	1.2	5.4	0.0	4.98	31.45	114.50			
20/09/2014	0.4	12.3	22.4	2.0	13.6	22.0	-1.2	1.2	7.0	0.1	1.8	7.0	0.0	2.39	24.63	102.17			
21/09/2014	8.4	16.2	21.6	11.0	16.6	21.0	-0.9	0.4	2.7	0.8	2.7	7.7	0.0	2.50	14.67	80.67			
22/09/2014	11.4	17.3	23.6	12.0	17.8	24.0	-1.1	0.5	4.8	0.0	2.1	5.9	0.0	2.89	21.66	95.96			
23/09/2014	6.6	16.4	26.4	9.0	17.8	26.0	-1.2	1.3	5.8	0.0	1.5	6.1	0.0	2.65	30.67	110.16			
24/09/2014	10.6	17.6	25.2	13.0	18.8	25.0	-1.7	1.2	6.3	0.1	1.6	7.7	0.0	4.58	23.17	92.64			
25/09/2014	14.6	16.9	22.0	15.0	17.0	22.0	-0.8	0.1	0.9	0.3	2.8	9.5	9.0	4.44	17.17	95.90			
26/09/2014	9.6	17.1	22.8	11.0	17.6	23.0	-1.4	0.4	2.7	0.1	2.0	6.4	0.0	2.36	22.58	109.85			
27/09/2014	5.4	14.2	22.4	7.0	15.0	22.0	-1.3	0.8	4.7	0.0	1.5	7.0	0.0	4.70	31.40	106.57			
28/09/2014	6.8	16.2	25.2	8.0	17.7	25.0	-1.2	1.5	6.1	0.1	1.5	5.7	0.0	4.50	33.82	114.40			
29/09/2014	7.0	17.5	28.4	9.0	18.5	29.0	-1.8	1.0	3.9	0.0	1.3	7.6	0.0	3.89	31.52	105.79			
30/09/2014	10.6	21.0	31.2	12.0	22.3	31.0	-1.1	1.2	8.1	0.1	1.9	8.5	0.0	3.42	25.66	98.04			
Monthly	-0.8	14.6	31.2	0.0	15.6	31.0	-1.8	0.9	8.1	0.0	2.0	12.3	10.6	2.0	25.6	114.5			

no data - anamolous results due to faulty sensor

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Summary **Oct-14** **Maules Creek Meteorological Station**

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	DeltaTemp Max	Wind Speed Min (m/s)	Wind Speed Ave (m/s)	Wind Speed Max	Rain mm	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/10/2014	11.0	18.3	23.6	12.0	19.0	23.0	-1.4	0.6	7.3	0.1	2.5	7.9	0.0	6.53	25.52	110.87			
2/10/2014	3.8	14.5	24.8	5.0	15.3	25.0	-1.4	0.8	4.6	0.1	1.7	5.6	0.0	4.39	25.60	91.65			
3/10/2014	4.2	16.4	28.0	6.0	17.7	28.0	-1.5	1.1	4.6	0.0	1.2	5.7	0.0	4.68	32.56	109.80			
4/10/2014	6.4	18.6	29.6	8.0	19.7	29.0	-1.6	1.1	4.9	0.0	1.5	7.4	0.0	4.99	33.79	119.18			
5/10/2014	10.2	21.0	30.4	11.0	21.7	30.0	-1.7	0.6	4.0	0.0	1.7	7.1	0.0	0.89	28.36	97.01			
6/10/2014	10.2	21.6	32.4	12.0	22.5	32.0	-1.5	0.8	4.0	0.0	1.4	6.3	0.0	5.46	33.90	104.04			
7/10/2014	15.0	24.5	33.6	18.0	25.3	33.0	-1.2	0.8	4.7	0.2	3.8	12.6	0.0	5.10	22.37	109.67			
8/10/2014	6.8	18.1	27.2	8.0	18.7	27.0	-1.7	0.6	4.2	0.1	2.2	6.5	0.0	6.52	28.67	95.21			
9/10/2014	10.0	17.8	27.2	11.0	18.5	27.0	-1.5	0.6	4.0	0.1	2.0	5.1	0.0	3.68	23.15	92.61			
10/10/2014	8.0	19.2	28.4	10.0	20.3	28.0	-1.5	1.0	6.9	0.1	1.5	5.5	0.0	3.92	33.87	109.41			
11/10/2014	11.8	20.7	30.3	14.0	21.9	30.0	-1.6	1.1	6.7	0.0	1.7	7.3	0.0	3.96	30.57	99.99			
12/10/2014	13.4	22.8	30.5	16.0	23.7	30.0	-1.5	0.9	5.6	0.0	1.7	6.7	0.0	4.71	29.10	104.64			
13/10/2014	12.2	20.8	26.9	16.0	21.6	27.0	-2.6	0.7	6.0	0.1	2.5	11.6	22.6	5.66	24.79	99.74			
14/10/2014	4.1	13.4	17.2	7.0	13.5	17.0	-1.4	0.1	7.2	0.1	3.5	10.3	0.2	3.50	16.11	90.09			
15/10/2014	5.5	12.2	20.6	7.0	12.8	20.0	-1.2	0.5	5.4	0.0	1.8	5.8	0.0	4.50	25.65	111.59			
16/10/2014	4.0	14.2	24.2	5.0	15.2	24.0	-1.5	0.9	5.2	0.1	1.9	7.9	0.0	2.61	27.37	99.39			
17/10/2014	4.0	15.7	24.3	5.0	16.3	24.0	-1.5	0.6	5.6	0.0	2.0	6.1	0.0	5.67	27.52	102.05			
18/10/2014	9.6	17.9	25.7	12.0	18.5	26.0	-1.5	0.5	5.7	0.1	2.4	9.7	0.0	4.60	20.71	101.14			
19/10/2014	7.5	18.7	28.2	9.0	19.7	28.0	-1.4	0.9	6.4	0.0	1.5	5.6	0.0	4.46	31.34	99.36			
20/10/2014	10.5	21.1	31.8	12.0	21.7	32.0	-1.6	0.6	6.4	0.1	2.5	8.0	0.0	2.93	27.89	111.53			
21/10/2014	13.1	21.2	28.2	15.0	21.3	28.0	-1.7	0.1	5.8	0.5	3.1	8.6	0.0	7.62	20.60	93.93			
22/10/2014	8.2	20.4	28.8	12.0	21.0	29.0	-1.7	0.5	6.4	0.0	2.1	6.0	0.0	5.24	23.80	100.98			
23/10/2014	12.4	22.8	30.8	16.0	23.7	30.0	-1.7	0.8	6.6	0.1	2.0	8.3	30.0	5.66	24.73	108.62			
24/10/2014	15.0	24.8	34.2	16.0	25.9	34.0	-1.6	1.1	6.9	0.1	1.9	6.4	0.0	4.65	24.54	112.54			
25/10/2014	15.0	27.8	36.0	20.0	29.0	35.0	-1.5	1.1	7.1	0.0	1.9	6.1	0.0	6.33	27.43	113.95			
26/10/2014	15.8	29.8	38.9	20.0	30.9	39.0	-1.8	1.0	8.8	0.1	3.1	11.4	0.0	5.24	21.29	104.76			
27/10/2014	12.4	26.1	37.7	16.0	27.1	37.0	-1.7	1.0	7.2	0.1	2.8	12.3	0.0	3.64	26.72	111.78			
28/10/2014	10.7	22.7	31.2	13.0	23.2	30.0	-1.8	0.5	6.3	0.0	2.4	8.5	0.0	6.35	28.28	101.59			
29/10/2014	8.0	20.2	30.6	10.0	21.2	30.0	-1.7	0.9	6.1	0.1	1.5	5.9	0.0	5.56	29.37	99.45			
30/10/2014	8.2	21.7	32.4	11.0	22.9	32.0	-1.9	1.1	7.3	0.0	1.6	7.6	0.0	3.87	28.72	121.85			
31/10/2014	10.1	24.8	36.3	13.0	25.5	35.0	-1.6	0.7	7.1	0.0	2.3	14.9	0.0	5.19	26.07	91.02			
Monthly	3.8	20.3	38.9	5.0	21.1	39.0	-2.6	0.8	8.8	0.0	2.1	14.9	52.8	0.9	26.8	121.9			

no data - anamolous results due to faulty sensor

APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Summary **Nov-14** **Maules Creek Meteorological Station**

Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	DeltaTemp Max	Wind Speed Min (m/s)	Wind Speed Ave (m/s)	Wind Speed Max	Rain mm	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/11/2014	15.9	26.0	33.9	19.0	26.3	33.0	-2.5	0.2	6.5	0.1	3.9	12.4	15.8	6.36	23.59	92.52			
2/11/2014	11.6	19.0	25.0	14.0	19.4	25.0	-1.3	0.4	8.8	0.2	2.2	5.7	0.0	3.51	22.63	108.50			
3/11/2014	4.4	19.4	28.7	9.0	20.1	29.0	-2.7	0.7	6.2	0.1	1.8	6.0	0.0	3.92	24.87	101.06			
4/11/2014	13.9	22.0	28.8	18.0	22.4	28.0	-1.7	0.4	6.7	0.1	2.1	5.6	0.0	3.12	23.69	112.67			
5/11/2014	11.2	21.3	31.0	15.0	22.0	31.0	-4.7	0.8	6.0	0.0	3.1	10.8	10.0	4.89	23.58	104.63			
6/11/2014	11.7	21.3	29.6	13.0	21.7	30.0	-1.5	0.4	6.3	0.1	2.0	6.3	0.0	5.19	26.40	106.20			
7/11/2014	7.9	21.5	30.5	11.0	22.3	30.0	-1.2	0.7	5.9	0.1	1.9	5.9	0.0	4.94	23.44	92.33			
8/11/2014	17.0	25.1	32.6	19.0	25.6	33.0	-1.6	0.4	7.3	0.0	2.2	8.4	0.0	3.61	24.77	113.94			
9/11/2014	12.7	25.2	34.7	16.0	26.2	35.0	-1.8	1.0	6.5	0.0	1.6	7.4	0.0	5.38	32.32	117.50			
10/11/2014	17.1	28.3	36.2	22.0	29.3	36.0	-2.0	0.9	7.0	0.1	2.5	8.5	0.0	5.45	22.79	104.46			
11/11/2014	15.0	25.6	35.1	18.0	25.6	35.0	-1.5	0.0	5.9	0.1	2.8	8.0	0.0	7.48	25.93	91.94			
12/11/2014	14.5	25.0	33.5	17.0	25.6	34.0	-1.7	0.5	7.2	0.0	2.4	5.6	0.0	2.88	22.78	113.03			
13/11/2014	14.7	26.6	35.3	18.0	27.3	35.0	-1.8	0.6	6.7	0.0	1.6	5.6	0.0	4.59	31.50	104.80			
14/11/2014	17.6	29.4	37.3	22.0	30.1	37.0	-1.8	0.6	7.7	0.0	2.7	9.7	0.0	7.72	24.98	111.11			
15/11/2014	20.3	33.8	41.5	26.0	34.8	41.0	-1.9	0.9	8.2	0.1	3.7	10.9	0.0	3.97	22.17	102.93			
16/11/2014	17.9	25.5	31.1	20.0	25.5	31.0	-1.7	-0.1	3.8	0.0	3.5	10.3	0.0	5.09	18.73	89.30			
17/11/2014	10.7	21.9	31.4	13.0	22.5	32.0	-1.8	0.6	6.6	0.0	1.7	5.4	0.0	3.82	30.86	110.00			
18/11/2014	9.7	22.7	32.0	13.0	23.7	32.0	-1.9	0.9	6.7	0.1	1.9	9.3	0.0	4.94	30.50	118.35			
19/11/2014	10.1	25.5	34.7	14.0	26.1	35.0	-2.0	0.5	8.6	0.1	2.4	7.0	0.0	4.85	27.70	107.37			
20/11/2014	14.8	28.4	36.2	19.0	29.1	36.0	-2.3	0.6	7.7	0.0	2.6	9.1	0.0	6.31	24.59	101.38			
21/11/2014	23.6	31.8	39.2	26.0	32.1	39.0	-1.6	0.3	7.7	0.1	3.9	13.0	0.0	2.69	19.89	87.30			
22/11/2014	14.9	29.9	40.6	19.0	30.8	40.0	-2.2	0.9	6.9	0.0	2.1	9.1	0.0	4.83	30.18	122.00			
23/11/2014	19.6	31.6	41.6	21.0	32.3	41.0	-4.1	0.7	8.4	0.1	3.1	9.9	0.2	5.09	26.46	97.87			
24/11/2014	18.7	29.7	38.9	22.0	30.0	38.0	-2.5	0.2	7.5	0.0	3.8	11.1	6.2	5.42	19.79	99.07			
25/11/2014	20.6	23.3	29.9	21.0	23.5	28.0	-2.0	0.1	1.3	0.1	1.4	4.1	0.6	3.28	25.55	101.20			
26/11/2014	16.7	23.9	31.3	17.0	24.4	31.0	-1.2	0.4	3.6	0.1	1.8	7.5	0.0	2.93	25.97	105.34			
27/11/2014	11.0	23.7	33.6	12.0	24.2	33.0	-1.9	0.5	4.5	0.0	2.7	10.6	0.0	4.97	28.10	101.22			
28/11/2014	17.4	25.7	32.7	18.0	25.5	32.0	-1.5	-0.2	0.5	0.1	2.8	8.1	0.0	6.76	21.64	96.26			
29/11/2014	20.0	24.5	31.3	20.0	24.4	31.0	-1.7	-0.1	1.2	0.0	2.1	7.6	0.0	3.60	23.59	107.62			
30/11/2014	16.0	25.6	32.0	18.0	25.7	32.0	-2.0	0.1	2.8	0.1	2.3	7.9	0.0	4.50	24.21	96.30			
Monthly	4.4	25.4	41.6	9.0	25.9	41.0	-4.7	0.5	8.8	0.0	2.5	13.0	32.8	2.7	25.1	122.0			

no data - anamolous results due to faulty sensor

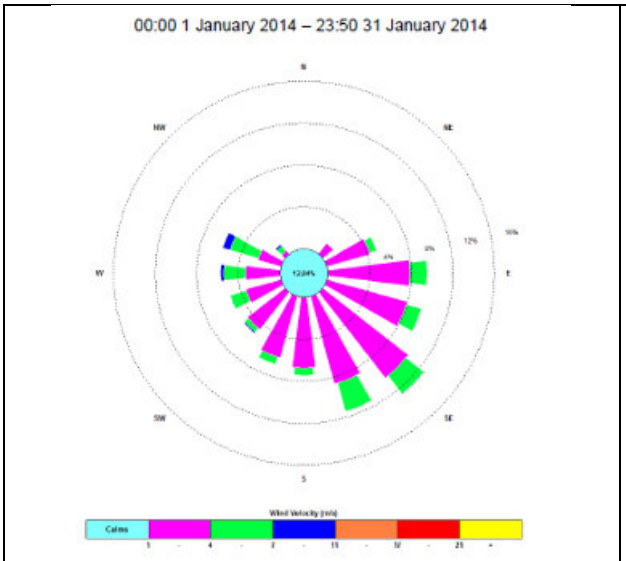
APPENDIX C – MAULES CREEK AWS - WEATHER SUMMARY TABLES

Summary **Dec-14** **Maules Creek Meteorological Station**

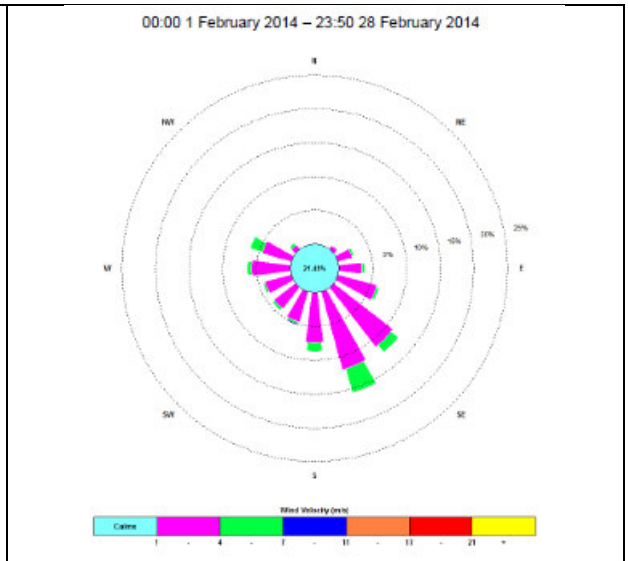
Date	2m Temp Min	2m Temp Ave	2m Temp Max	10m Temp Min	10m Temp Ave	10m Temp Max	Delta Temp Min	Delta Temp Ave	DeltaTemp Max	Wind Speed Min (m/s)	Wind Speed Ave (m/s)	Wind Speed Max	Rain mm	Sigma Theta Min	Sigma Theta Ave	Sigma Theta Max	Solar Rad Min	Solar Rad Ave	Solar Rad Max
1/12/2014	20.6	26.1	30.7	21.0	26.0	31.0	-1.9	-0.1	2.3	0.0	2.8	8.2	0.0	4.93	17.77	88.47			
2/12/2014	18.6	27.9	34.6	20.0	28.0	34.0	-2.2	0.0	2.9	0.1	2.6	11.5	0.0	4.83	23.75	104.96			
3/12/2014	21.4	29.5	36.1	24.0	29.8	36.0	-2.1	0.3	8.3	0.1	3.1	10.5	0.0	5.94	19.70	93.85			
4/12/2014	16.9	26.3	33.1	20.0	26.3	33.0	-2.0	-0.1	7.1	0.2	2.7	10.6	1.8	4.83	17.51	84.56			
5/12/2014	15.6	25.1	33.6	19.0	25.2	33.0	-1.6	0.0	6.8	0.0	2.9	10.7	12.0	3.12	19.71	82.17			
6/12/2014	18.9	23.5	30.9	19.0	23.4	30.0	-2.1	-0.1	6.0	0.0	2.3	8.2	10.0	4.80	22.58	98.07			
7/12/2014	16.2	23.7	33.5				-2.7	1.6	3.5				0.0						
8/12/2014	20.1	25.7	33.2	22.0	29.2	33.0	-1.5	0.6	6.8	0.0	1.7	10.4	0.0	6.20	27.74	114.20			
9/12/2014	19.2	25.6	35.0	20.0	26.6	34.0	-1.9	0.9	7.0	0.1	2.0	7.5	0.0	4.51	27.40	105.61			
10/12/2014	17.3	27.8	37.4	19.0	28.2	37.0	-1.8	0.3	7.4	0.0	2.1	9.0	0.6	5.73	28.41	105.26			
11/12/2014	17.3	26.4	33.2	19.0	26.4	33.0	-3.3	0.1	6.8	0.7	4.3	14.9	4.4	4.91	16.21	90.13			
12/12/2014	15.4	21.0	26.9	16.0	20.8	26.0	-1.7	-0.2	5.1	0.6	4.8	12.3	0.0	8.42	15.73	30.50			
13/12/2014	14.3	21.7	28.8	15.0	21.5	28.0	-1.6	-0.2	5.7	0.8	3.7	9.7	0.0	7.16	15.41	43.17			
14/12/2014	15.3	22.9	30.3	16.0	23.2	30.0	-1.4	0.2	6.6	0.1	2.3	7.2	0.0	3.99	22.74	91.07			
15/12/2014	13.0	24.5	34.0	15.0	25.3	34.0	-2.0	0.8	7.9	0.1	1.8	7.5	0.0	3.89	30.82	109.17			
16/12/2014	17.2	26.8	36.3	19.0	27.7	36.0	-1.7	0.9	6.9	0.1	2.6	12.1	1.0	5.32	23.97	107.58			
17/12/2014	17.8	29.0	38.9	19.0	30.1	39.0	-1.8	1.0	8.2	0.1	3.1	10.9	0.0	3.83	23.46	112.54			
18/12/2014	19.0	27.5	35.4	20.0	28.1	35.0	-2.1	0.5	6.7	0.1	3.2	12.9	0.0	5.55	20.43	113.02			
19/12/2014	15.8	25.3	33.1	19.0	25.7	32.0	-2.2	0.4	6.5	0.1	3.4	11.4	0.0	4.41	19.69	88.72			
20/12/2014	12.7	24.8	33.3	13.0	25.1	33.0	-2.0	0.3	7.3	0.1	2.4	6.6	0.0	5.11	24.42	102.27			
21/12/2014	19.5	27.1	34.6	20.0	27.3	34.0	-2.0	0.1	7.1	0.1	2.7	8.6	0.0	4.74	25.15	102.14			
22/12/2014	20.0	28.4	34.5	21.0	28.6	34.0	-2.0	0.1	7.0	0.1	2.6	14.2	0.0	6.80	22.82	104.84			
23/12/2014	16.0	24.0	28.7	20.0	24.2	28.0	-1.6	0.1	6.1	0.3	2.2	10.8	5.8	4.13	18.98	96.07			
24/12/2014	18.4	26.9	34.9	19.0	27.0	34.0	-1.9	0.0	6.8	0.1	2.4	8.4	0.0	2.83	23.17	90.66			
25/12/2014	21.3	26.0	32.7	21.0	25.9	32.0	-2.8	-0.1	1.9	0.1	2.0	9.0	11.4	5.56	22.39	108.72			
26/12/2014	21.2	25.2	32.6	21.0	25.3	33.0	-1.0	0.1	6.5	0.2	2.5	8.0	0.8	6.17	18.62	62.60			
27/12/2014	16.4	22.2	26.0	19.0	22.3	26.0	-0.6	0.0	5.9	0.2	3.1	7.2	0.0	6.67	13.80	47.56			
28/12/2014	15.7	19.5	21.6	17.0	19.4	22.0	-0.7	-0.1	5.0	0.6	3.1	7.1	15.6	4.80	12.41	26.09			
29/12/2014	16.4	23.1	31.4	19.0	23.6	31.0	-1.5	0.5	6.9	0.0	1.4	6.4	0.4	5.72	25.24	104.73			
30/12/2014	18.0	26.0	36.2	20.0	27.2	36.0	-1.6	1.2	7.3	0.0	3.3	10.1	0.0	5.68	23.12	113.64			
31/12/2014	12.0	24.4	34.6	13.0	25.5	35.0	-1.3	1.0	7.3	0.1	1.7	5.6	0.0	3.83	29.74	110.67			
Monthly	12.0	25.3	38.9	13.0	25.8	39.0	-3.3	0.3	8.3	0.0	2.7	14.9	63.8	2.8	21.8	114.2			

no data - anamolous results due to faulty sensor

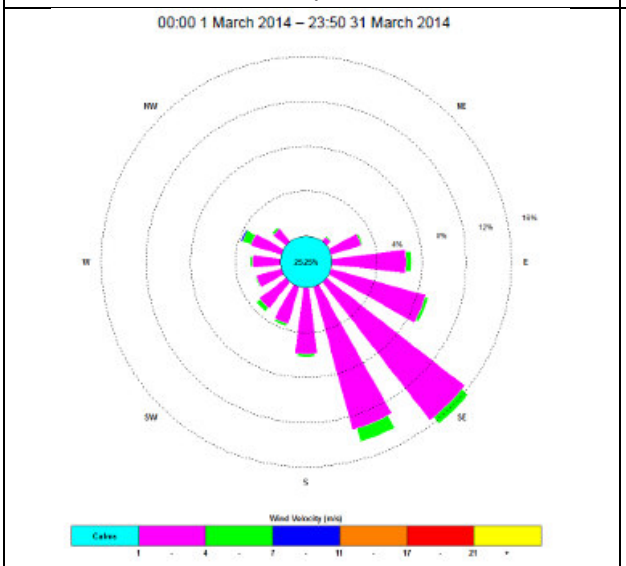
MCC AUTOMATIC WEATHER STATION - WIND ROSETTES 2014



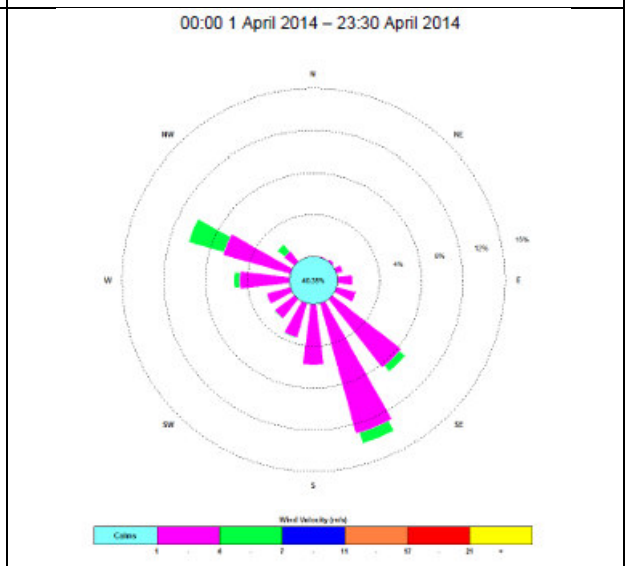
January 2014



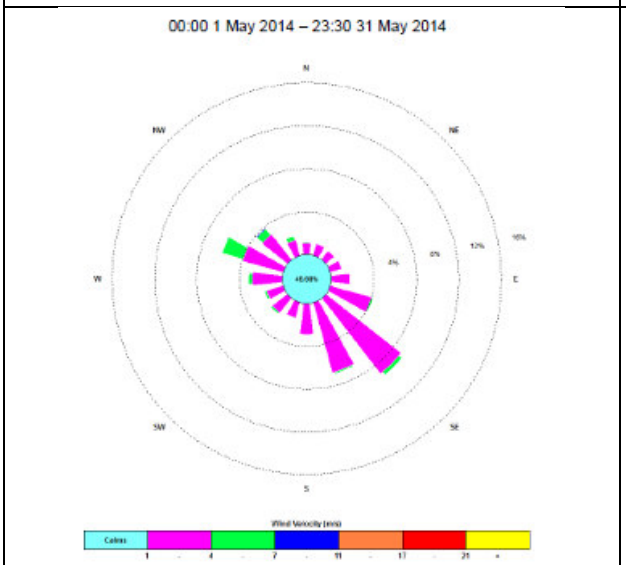
February 2014



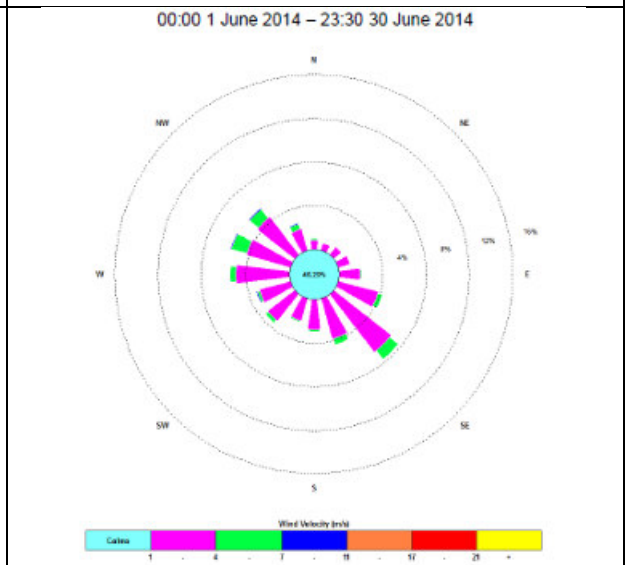
March 2014



April 2014



May 2014



June 2014

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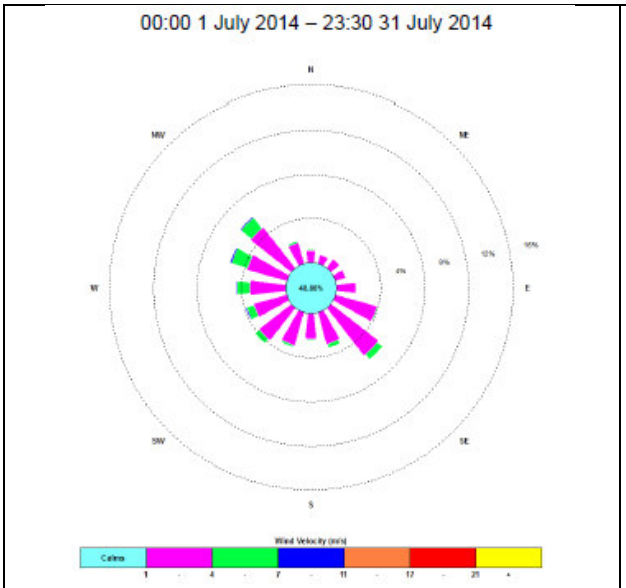
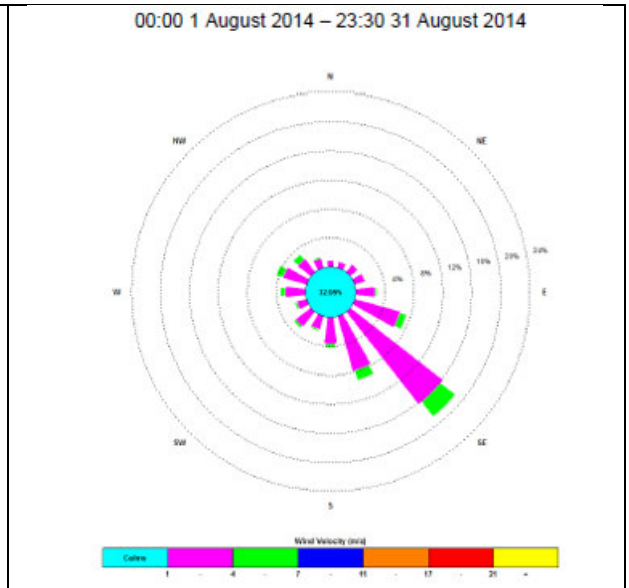
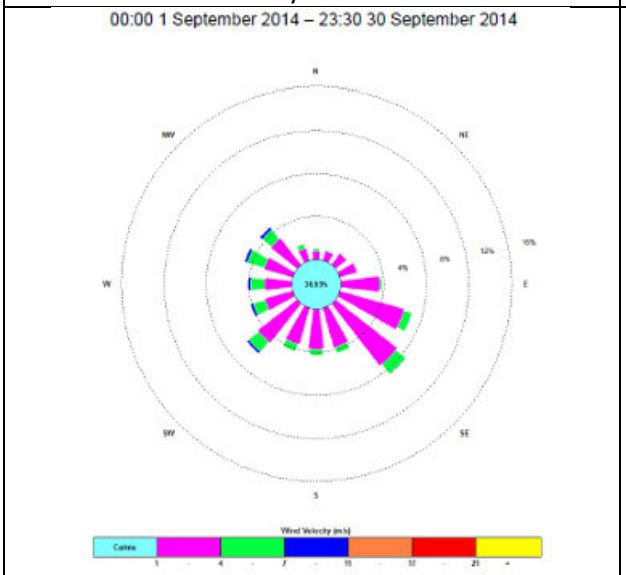


July 2014



August 2014



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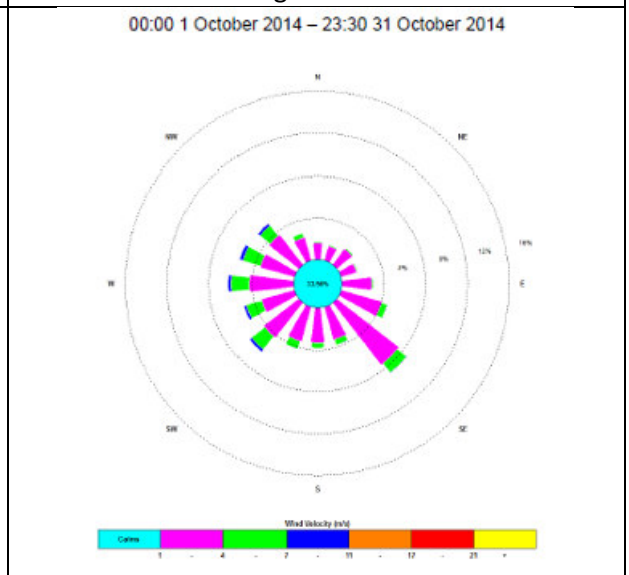
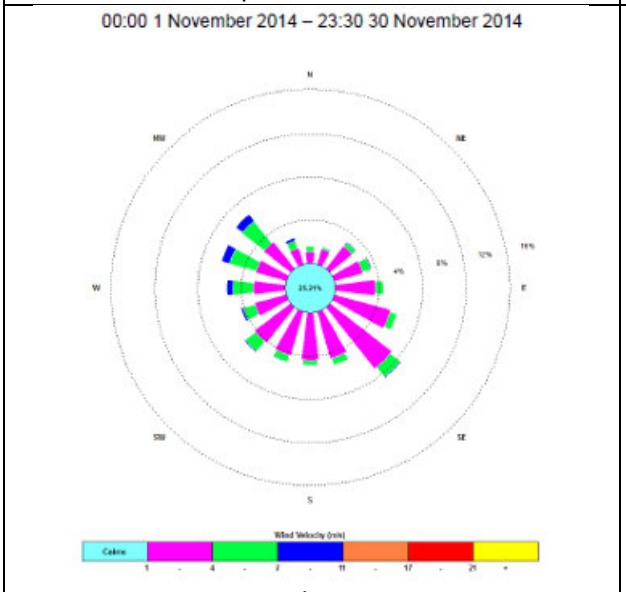
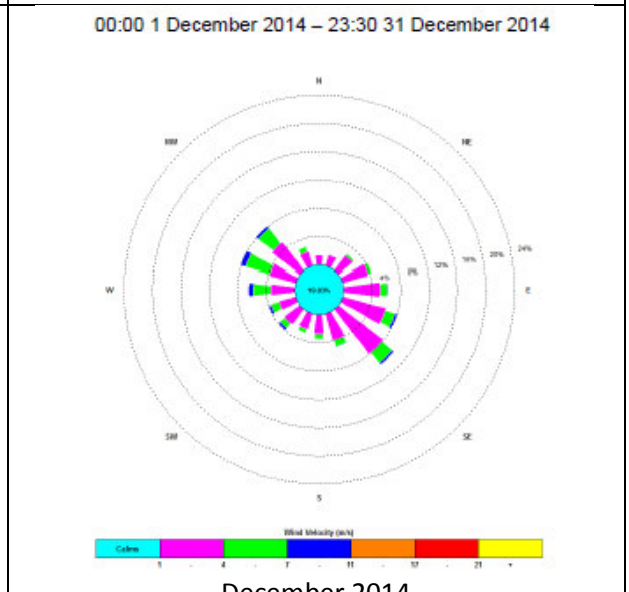


October 2014



November 2014



December 2014

APPENDIX D

AIR QUALITY

MAULES CREEK COAL - DUST MONITORING
MONTHLY DEPOSITED DUST MEASUREMENTS

			MC1				
Month	On Date	Off Date	Insoluble Solids g/m².month	Rolling Annual Average	Ash Residue g/m².month	Combustible Matter g/m².month	%(AR/IS)
Nov-10		19/11/2010	1.5	1.5	1.1	0.4	73
Jan-11		20/01/2011	0.8	1.2	0.4	0.4	50
Feb-11	20/01/2011	21/02/2011	1.0	1.1	0.6	0.4	60
Mar-11	22/02/2011	23/03/2011	1.2	1.1	0.7	0.5	58
Apr-11	23/03/2011	20/04/2011	0.7	1.0	0.7	<0.1	100
May-11	20/04/2011	18/05/2011	0.1	0.9	0.1	<0.1	100
Jun-11	18/05/2011	17/06/2011	1.3	0.9	0.9	0.4	69
Jul-11	17/06/2011	18/07/2011	1.4	1.0	1.4	<0.1	100
Aug-11	18/07/2011	17/08/2011	0.8	1.0	0.7	0.1	88
Sep-11	17/08/2011	19/09/2011	1.3	1.0	0.8	0.5	62
Oct-11	19/09/2011	17/10/2011	5.5	1.4	1.8	3.7	33
Nov-11	17/10/2011	15/11/2011	0.1	1.3	0.1	<0.1	100
Dec-11	15/11/2011	15/12/2011	0.2	1.2	0.1	0.1	50
Jan-12	15/12/2011	16/01/2012	4.4	1.5	1.9	2.5	43
Feb-12	16/01/2012	15/02/2012		1.5			
Mar-12	15/02/2012	16/03/2012	1.5	1.6	1.3	0.2	87
Apr-12	16/03/2012	17/04/2012	3.3	1.8	2.8	0.5	85
May-12	17/04/2012	15/05/2012	4.6	2.2	2.5	2.1	54
Jun-12	15/05/2012	13/06/2012	17.9	3.7	16.5	1.4	92
Jul-12	13/06/2012	24/07/2012	3.0	3.9	1.9	1.1	63
Aug-12	24/07/2012	22/08/2012	0.5	3.8	0.4	0.1	80
Sep-12	22/08/2012	19/09/2012	1.2	3.8	0.8	0.4	67
Oct-12	19/09/2012	18/10/2012	2.5	3.6	1.2	1.3	48
Nov-12	18/10/2012	19/11/2012	4.7	4.0	2.5	2.2	53
Dec-12	19/11/2012	19/12/2012	2.3	4.2	0.9	1.4	39
Jan-13	19/12/2012	18/01/2013	2.6	4.0	1.4	1.2	54
Feb-13	19/01/2013	19/02/2013	1.1	3.8	0.9	0.2	82
Mar-13	19/02/2013	18/03/2013	1.2	3.7	0.9	0.3	75
Apr-13	18/03/2013	18/04/2013	2.4	3.7	1.5	0.9	63
May-13	18/04/2013	24/05/2013	0.7	3.3	0.5	0.2	71
Jun-13	24/05/2013	21/06/2013	1.0	1.9	0.6	0.4	60
Jul-13	21/06/2013	19/07/2013	1.0	1.8	0.9	0.1	90
Aug-13	19/07/2013	23/08/2013	3.6	2.0	1.8	1.8	50
Sep-13	23/08/2013	19/09/2013	1.0	2.0	0.7	0.3	70
Oct-13	19/09/2013	22/10/2013	1.0	1.9	0.6	0.4	60
Nov-13	22/10/2013	22/11/2013	1.1	1.6	0.5	0.6	45
Dec-13	22/11/2013	19/12/2013	10.1c	1.5	3.3c	6.8	
Jan-14	19/12/2013	17/01/2014	0.5	1.3	0.4	0.1	80
Feb-14	17/01/2014	17/02/2014	1.3	1.3	1.0	0.3	77
Mar-14	17/02/2014	18/03/2014	2.7	1.5	2.1	0.6	78
Apr-14	18/03/2014	16/04/2014	1.2	1.4	1.0	0.2	83
May-14	16/04/2014	19/05/2014	2.9	1.6	1.3	1.6	45
Jun-14	19/05/2014	19/06/2014	2.1	1.7	1.8	0.3	86
Jul-14	19/06/2014	18/07/2014	3.8	1.9	2.1	1.7	55
Aug-14	18/07/2014	18/08/2014	9.6c	1.9	2.6c	7.0	
Sep-14	18/08/2014	16/09/2014	3.7c	1.8	1.1c	2.6	
Oct-14	16/09/2014	14/10/2014	3.5	2.1	2.0	1.5	57
Nov-14	14/10/2014	14/11/2014	3.9c	2.3	1.4c	2.5	36
Dec-14	14/11/2014	16/12/2014	3.7	2.4	2.1	1.6	57
			c = excessive contamination detected (bird droppings, vegetation or insects)				

MAULES CREEK COAL - DUST MONITORING
MONTHLY DEPOSITED DUST MEASUREMENTS

			MC2				
Month	**On Date**	**Off Date**	**Insoluble Solids g/m².month**	**Rolling Annual Average**	**Ash Residue g/m².month**	**Combustible Matter g/m².month**	**%(AR/IS)**
Nov-10		19/11/2010	1.2	1.2	0.7	0.5	58
Jan-11		20/01/2011	0.5	0.9	0.4	0.1	80
Feb-11	20/01/2011	21/02/2011	3.6	1.8	1.5	2.1	42
Mar-11	22/02/2011	23/03/2011	2.0	1.8	1.1	0.9	55
Apr-11	23/03/2011	20/04/2011	1.4	1.7	1.3	0.1	93
May-11	20/04/2011	18/05/2011	0.2	1.5	0.2	<0.1	100
Jun-11	18/05/2011	17/06/2011	2.5	1.6	1.8	0.7	72
Jul-11	17/06/2011	18/07/2011	0.4	1.5	0.2	0.2	50
Aug-11	18/07/2011	17/08/2011	0.6	1.4	0.5	0.1	83
Sep-11	17/08/2011	19/09/2011	0.7	1.3	0.4	0.3	57
Oct-11	19/09/2011	17/10/2011	2.5	1.4	1.0	1.5	40
Nov-11	17/10/2011	15/11/2011	c8.7	1.4	c2.3	6.4	
Dec-11	15/11/2011	15/12/2011	1.7	1.5	0.9	0.8	53
Jan-12	15/12/2011	16/01/2012	1.6	1.6	0.7	0.9	44
Feb-12	16/01/2012	15/02/2012	2.4	1.5	0.8	1.6	33
Mar-12	15/02/2012	16/03/2012	1.1	1.4	0.7	0.4	64
Apr-12	16/03/2012	17/04/2012	1.5	1.4	1.2	0.3	80
May-12	17/04/2012	15/05/2012	3.6	1.7	1.8	1.8	50
Jun-12	15/05/2012	13/06/2012	3.3	1.8	1.7	1.6	52
Jul-12	13/06/2012	24/07/2012	12.1c	1.9	6.7c	5.4	
Aug-12	24/07/2012	22/08/2012	2.7	2.1	1.9	0.8	70
Sep-12	22/08/2012	19/09/2012	1.0	2.1	0.7	0.3	70
Oct-12	19/09/2012	18/10/2012	5.1c	2.1	1.3	3.8	
Nov-12	18/10/2012	19/11/2012	3.3	2.2	1.3	2.0	39
Dec-12	19/11/2012	19/12/2012	6.1c	2.3	1.4c	4.7	
Jan-13	19/12/2012	18/01/2013	3.3	2.5	1.5	1.8	45
Feb-13	19/01/2013	19/02/2013	2.9	2.5	1.8	1.1	62
Mar-13	19/02/2013	18/03/2013	6.7c	2.7	2.1c	4.6	
Apr-13	18/03/2013	18/04/2013	2.9	2.9	1.6	1.3	55
May-13	18/04/2013	24/05/2013	1.8	2.7	1.4	0.4	78
Jun-13	24/05/2013	21/06/2013	3.8	2.7	2.3	1.5	61
Jul-13	21/06/2013	19/07/2013	8.7c	2.7	5.4c	3.3	
Aug-13	19/07/2013	23/08/2013	4.9c	2.7	1.2c	3.7	
Sep-13	23/08/2013	19/09/2013	1.2	2.7	0.7	0.5	58
Oct-13	19/09/2013	22/10/2013	4.6c	2.7	2.2c	2.4	
Nov-13	22/10/2013	22/11/2013	10.1c	2.7	2.3c	7.8	
Dec-13	22/11/2013	19/12/2013	28.5c	2.7	7.1c	21.4	
Jan-14	19/12/2013	17/01/2014	14.7c	2.5	4.2c	10.5	
Feb-14	17/01/2014	17/02/2014	25.1c	2.4	10.1c	15.0	
Mar-14	17/02/2014	18/03/2014	3.2	2.6	1.9	1.3	59
Apr-14	18/03/2014	16/04/2014	25.9c	2.5	13.3c	12.6	
May-14	16/04/2014	19/05/2014	3.0	2.8	0.9	2.1	30
Jun-14	19/05/2014	19/06/2014	0.8	2.1	0.6	0.2	75
Jul-14	19/06/2014	18/07/2014	1.0	1.8	0.7	0.3	70
Aug-14	18/07/2014	18/08/2014	5c	1.8	2c	3.0	
Sep-14	18/08/2014	16/09/2014	0.6	1.7	0.4	0.2	67
Oct-14	16/09/2014	14/10/2014	4.2c	1.7	1.6c	2.6	
Nov-14	14/10/2014	14/11/2014	0.8	1.6	0.5	0.3	63
Dec-14	14/11/2014	16/12/2014	4.1c	1.6	2.4c	1.7	59
			c = excessive contamination detected (bird droppings, vegetation or insects)				

MAULES CREEK COAL - DUST MONITORING
MONTHLY DEPOSITED DUST MEASUREMENTS

			MC3				
Month	**On Date**	**Off Date**	**Insoluble Solids g/m².month**	**Rolling Annual Average**	**Ash Residue g/m².month**	**Combustible Matter g/m².month**	**%(AR/IS)**
Nov-10		19/11/2010	5.8	5.8	3.5	2.3	60
Jan-11		20/01/2011	7.1	6.5	2.8	4.3	39
Feb-11	20/01/2011	21/02/2011	0.5	4.5	0.3	0.2	60
Mar-11	22/02/2011	23/03/2011	1.3	3.7	1.1	0.2	85
Apr-11	23/03/2011	20/04/2011	1.0	3.1	1.0	<0.1	100
May-11	20/04/2011	18/05/2011	0.2	2.7	0.2	<0.1	100
Jun-11	18/05/2011	17/06/2011	1.8	2.5	1.4	0.4	78
Jul-11	17/06/2011	18/07/2011	1.0	2.3	0.6	0.4	60
Aug-11	18/07/2011	17/08/2011	0.5	2.1	0.5	<0.1	100
Sep-11	17/08/2011	19/09/2011	1.1	2.0	0.6	0.5	55
Oct-11	19/09/2011	17/10/2011	0.8	1.9	0.5	0.3	63
Nov-11	17/10/2011	15/11/2011	2.8	2.0	1.1	1.7	39
Dec-11	15/11/2011	15/12/2011	1.0	1.6	0.7	0.3	70
Jan-12	15/12/2011	16/01/2012	0.9	1.1	0.6	0.3	67
Feb-12	16/01/2012	15/02/2012	6.5	1.6	5.0	1.5	77
Mar-12	15/02/2012	16/03/2012	14.7c	1.6	6.1c	8.6	
Apr-12	16/03/2012	17/04/2012	1.5	1.6	1.3	0.2	87
May-12	17/04/2012	15/05/2012	2.2	1.8	2.0	0.2	91
Jun-12	15/05/2012	13/06/2012	1.1	1.8	0.7	0.4	64
Jul-12	13/06/2012	24/07/2012	0.4	1.7	0.3	0.1	75
Aug-12	24/07/2012	22/08/2012	0.6	1.7	0.4	0.2	67
Sep-12	22/08/2012	19/09/2012	2.5	1.8	1.4	1.1	56
Oct-12	19/09/2012	18/10/2012	1.4	1.9	0.6	0.8	43
Nov-12	18/10/2012	19/11/2012	2.0	1.8	1.1	0.9	55
Dec-12	19/11/2012	19/12/2012	0.8	1.8	0.5	0.5	63
Jan-13	19/12/2012	18/01/2013	1.9	1.9	1.3	0.6	68
Feb-13	19/01/2013	19/02/2013	2.6	1.5	1.9	0.7	73
Mar-13	19/02/2013	18/03/2013	1.5	1.5	0.9	0.6	60
Apr-13	18/03/2013	18/04/2013	0.9	1.5	0.6	0.3	67
May-13	18/04/2013	24/05/2013	1.1	1.4	0.9	0.2	82
Jun-13	24/05/2013	21/06/2013	5.1	1.7	3.3	1.8	65
Jul-13	21/06/2013	19/07/2013	1.6	1.8	1.1	0.5	69
Aug-13	19/07/2013	23/08/2013	0.5	1.8	0.4	0.1	80
Sep-13	23/08/2013	19/09/2013	0.7	1.7	0.4	0.3	57
Oct-13	19/09/2013	22/10/2013	1.7	1.7	1.1	0.6	65
Nov-13	22/10/2013	22/11/2013	0.8	1.6	0.6	0.2	75
Dec-13	22/11/2013	19/12/2013	1.1	1.6	0.6	0.5	55
Jan-14	19/12/2013	17/01/2014	0.4	1.5	0.2	0.2	50
Feb-14	17/01/2014	17/02/2014	1.3	1.4	1.0	0.3	77
Mar-14	17/02/2014	18/03/2014	5.0c	1.4	1.7c	3.3	
Apr-14	18/03/2014	16/04/2014	0.7	1.4	0.5	0.2	71
May-14	16/04/2014	19/05/2014	1.0	1.4	0.5	0.5	50
Jun-14	19/05/2014	19/06/2014	0.9	1.0	0.7	0.2	78
Jul-14	19/06/2014	18/07/2014	2.5	1.1	1.8	0.7	72
Aug-14	18/07/2014	18/08/2014	0.9	1.0	0.7	0.2	78
Sep-14	18/08/2014	16/09/2014	0.7	1.1	0.5	0.2	71
Oct-14	16/09/2014	14/10/2014	1.0	1.0	0.6	0.4	60
Nov-14	14/10/2014	14/11/2014	1.8	1.1	1.0	0.8	56
Dec-14	14/11/2014	16/12/2014	1.9	1.2	0.9	1.0	47
			c = excessive contamination detected (bird droppings, vegetation or insects)				

MAULES CREEK COAL - DUST MONITORING
MONTHLY DEPOSITED DUST MEASUREMENTS

			MC4				
Month	**On Date**	**Off Date**	**Insoluble Solids g/m².month**	**Rolling Annual Average**	**Ash Residue g/m².month**	**Combustible Matter g/m².month**	**%(AR/IS)**
Nov-10		19/11/2010		#DIV/0!			
Jan-11		20/01/2011	1.0	1.0	1.0	<0.0	100
Feb-11	20/01/2011	21/02/2011	4.8	2.9	2.9	1.9	60
Mar-11	22/02/2011	23/03/2011	1.3	2.4	1.1	0.2	85
Apr-11	23/03/2011	20/04/2011		2.4			
May-11	20/04/2011	18/05/2011	0.4	1.9	0.4	<0.1	100
Jun-11	18/05/2011	17/06/2011	1.2	1.7	1.0	0.2	83
Jul-11	17/06/2011	18/07/2011	0.4	1.5	0.4	<0.1	100
Aug-11	18/07/2011	17/08/2011	0.5	1.4	0.5	<0.1	100
Sep-11	17/08/2011	19/09/2011	0.5	1.3	0.5	<0.1	100
Oct-11	19/09/2011	17/10/2011	0.9	1.2	0.8	0.1	89
Nov-11	17/10/2011	15/11/2011	1.3	1.2	0.9	0.4	69
Dec-11	15/11/2011	15/12/2011	1.2	1.2	1.0	0.2	83
Jan-12	15/12/2011	16/01/2012	1.1	1.2	0.8	0.3	73
Feb-12	16/01/2012	15/02/2012	2.9	1.1	2.2	0.7	76
Mar-12	15/02/2012	16/03/2012	1.6	1.1	1.2	0.4	75
Apr-12	16/03/2012	17/04/2012	2.7	1.2	2.2	0.5	81
May-12	17/04/2012	15/05/2012	0.7	1.3	0.6	0.1	86
Jun-12	15/05/2012	13/06/2012	2.0	1.3	1.6	0.4	80
Jul-12	13/06/2012	24/07/2012	0.7	1.3	0.5	0.2	71
Aug-12	24/07/2012	22/08/2012	2.2	1.5	1.9	0.3	86
Sep-12	22/08/2012	19/09/2012	1.2	1.5	1.0	0.2	83
Oct-12	19/09/2012	18/10/2012	1.7	1.6	1.2	0.5	71
Nov-12	18/10/2012	19/11/2012	1.0	1.6	0.6	0.4	60
Dec-12	19/11/2012	19/12/2012	1.1	1.6	0.7	0.4	64
Jan-13	19/12/2012	18/01/2013	1.2	1.6	1.0	0.2	83
Feb-13	19/01/2013	19/02/2013	2.2	1.5	1.6	0.6	73
Mar-13	19/02/2013	18/03/2013	0.6	1.4	0.4	0.2	67
Apr-13	18/03/2013	18/04/2013	1.3	1.3	0.9	0.4	69
May-13	18/04/2013	24/05/2013	1.0	1.4	0.8	0.2	80
Jun-13	24/05/2013	21/06/2013	0.7	1.2	0.6	0.1	86
Jul-13	21/06/2013	19/07/2013	0.4	1.2	0.2	0.2	50
Aug-13	19/07/2013	23/08/2013	0.8	1.1	0.7	0.1	88
Sep-13	23/08/2013	19/09/2013	1.0	1.1	0.7	0.3	70
Oct-13	19/09/2013	22/10/2013	1.3	1.1	0.8	0.7	62
Nov-13	22/10/2013	22/11/2013	0.9	1.0	0.7	0.2	78
Dec-13	22/11/2013	19/12/2013	0.6	1.0	0.3	0.3	50
Jan-14	19/12/2013	17/01/2014	0.3	0.9	0.2	0.1	67
Feb-14	17/01/2014	17/02/2014	1.3	0.9	1.0	0.3	77
Mar-14	17/02/2014	18/03/2014	1.8	1.0	1.1	0.7	61
Apr-14	18/03/2014	16/04/2014	0.8	0.9	0.6	0.2	75
May-14	16/04/2014	19/05/2014	0.4	0.9	0.2	0.2	50
Jun-14	19/05/2014	19/06/2014	0.9	0.9	0.7	0.2	78
Jul-14	19/06/2014	18/07/2014	1.2	0.9	0.9	0.3	75
Aug-14	18/07/2014	18/08/2014	7.2	1.4	6.3	0.9	88
Sep-14	18/08/2014	16/09/2014	0.4	1.4	0.2	0.2	50
Oct-14	16/09/2014	14/10/2014	1.1	1.4	0.6	0.5	55
Nov-14	14/10/2014	14/11/2014	1.2	1.4	0.8	0.4	67
Dec-14	14/11/2014	16/12/2014	1.4	1.5	0.9	0.5	64
			c = excessive contamination detected (bird droppings, vegetation or insects)				

APPENDIX E

NOISE AND BLAST MONITORING RESULTS

APPENDIX E-1 – NOISE MONITORING RESULTS

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	Applies 1	dB 2,4	dB 3,4
NM1	24/02/2014	12:37	2.5	A	40	Yes	<20	Nil
NM2	24/02/2014	11:25	2.5	A	40	Yes	<20	Nil
NM3	24/02/2014	10:37	2	A	40	Yes	IA	Nil
NM4	24/02/2014	12:02	3.3	A	40	No	<20	NA
NM5	24/02/2014	13:13	2.8	A	40	Yes	<20	NA
Cooboobindi	24/02/2014	10:07	1.8	A	45	Yes	<20	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	Applies 1	dB 2,4	dB 3,4
NM1	25/02/2014	11:21	1.3	A	40	Yes	IA	Nil
NM2	25/02/2014	10:19	2	A	40	Yes	<20	Nil
NM3	25/02/2014	9:32	2.5	A	40	Yes	IA	Nil
NM4	25/02/2014	10:50	1.5	A	40	Yes	<20	Nil
NM5	25/02/2014	11:46	2.3	A	40	Yes	<20	Nil
Cooboobindi	25/02/2014	8:58	1.8	A	45	Yes	<20	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	Applies 1	dB 2,4	dB 3,4
NM1	31/03/2014	11:26	1.8	A	40	Yes	IA	Nil
NM2	31/03/2014	9:21	0.3	D	40	Yes	IA	Nil
NM3	31/03/2014	8:43	0.5	A	40	Yes	30	Nil
NM4	31/03/2014	9:58	1	C	40	Yes	IA	Nil
NM5	31/03/2014	11:51	2.8	B	40	Yes	IA	Nil
Cooboobindi	31/03/2014	8:10	0	C	45	Yes	34	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	Applies 1	dB 2,4	dB 3,4
NM1	17/04/2014	10:29	1	A	40	Y	IA	Nil
NM2	17/04/2014	9:28	1	D	40	Y	IA	Nil
NM3	17/04/2014	8:45	0.8	A	40	Y	23	Nil
NM4	17/04/2014	9:59	0.5	A	40	Y	IA	Nil
NM5	17/04/2014	10:56	2	A	40	Y	IA	Nil
Cooboobindi	17/04/2014	12:06	2.3	A	45	Y	IA	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	Applies 1	dB 2,4	dB 3,4
NM1	15/05/2014	11:26	2.8	0	40	Yes	IA	Nil
NM2	15/05/2014	10:26	2.4	0	40	Yes	IA	Nil
NM3	15/05/2014	9:48	2.8	0	40	Yes	<30	Nil
NM4	15/05/2014	10:57	2.7	0	40	Yes	IA	Nil
NM5	15/05/2014	11:53	1.6	0	40	Yes	IA	Nil
Cooboobindi	15/05/2014	9:13	2.1	0	45	Yes	35	Nil

APPENDIX E-1 – NOISE MONITORING RESULTS

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	Applies 1	dB 2,4	dB 3,4
NM1	12/06/2014	10:09	1.4	C	40	Yes	IA	Nil
NM2	12/06/2014	9:07	1.6	E	40	Yes	21	Nil
NM3	12/06/2014	11:18	2	D	40	Yes	21	Nil
NM4	12/06/2014	9:36	1.5	C	40	Yes	<20	Nil
NM5	12/06/2014	10:35	2	D	40	Yes	IA	Nil
Cooboobindi	12/06/2014	11:48	1.5	A	45	Yes	24	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	Applies 1	dB 2,4	dB 3,4
NM1	23/07/2014	9:25	1.6	0	40	Yes	<30	Nil
NM2	23/07/2014	8:29	0.5	0	40	Yes	33	Nil
NM3	23/07/2014	10:29	1.9	0	40	Yes	<30	Nil
NM4	23/07/2014	8:56	1.3	0	40	Yes	30	Nil
NM5	23/07/2014	9:49	1.1	0	40	Yes	28	Nil
Cooboobindi	23/07/2014	10:56	0.6	0	45	Yes	<25	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	Applies 1	dB 2,4	dB 3,4
NM1	4/09/2014	8:25	1	0	40	Yes	32	Nil
NM2	4/09/2014	9:48	1.8	0	40	Yes	24	Nil
NM3	4/09/2014	11:07	2.6	0	40	Yes	25	Nil
NM4	4/09/2014	8:52	0.8	0	40	Yes	29	Nil
NM5	4/09/2014	8:00	1.5	0	40	Yes	34	Nil
Cooboobindi	4/09/2014	11:41	2	0	45	Yes	<25	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	Applies 1	dB 2,4	dB 3,4
NM1	19/09/2014	10:59	2.2	0	40	Yes	IA	Nil
NM2	19/09/2014	9:03	1.8	0	40	Yes	23	Nil
NM3	19/09/2014	8:27	1.3	0	40	Yes	31	Nil
NM4	19/09/2014	10:31	1.4	0	40	Yes	<20	Nil
NM5	19/09/2014	11:25	1.6	0	40	Yes	IA	Nil
Cooboobindi	19/09/2014	8:00	1.3	0	45	Yes	35	Nil

APPENDIX E-1 – NOISE MONITORING RESULTS

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion Applies	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	1	dB 2,4	dB 3,4
NM1	29/09/2014	9:02 PM	0.2	0	35	Yes	<20	Nil
NM1	30/09/2014	8:45 PM	0.3	0	35	Yes	IA	Nil
NM1	29/09/2014	10:27 PM	0.5	0	35	Yes	<20	Nil
NM1	30/09/2014	10:26 PM	0.3	0	35	Yes	IA	Nil
NM2	29/09/2014	8:07 PM	0.9	0	39	Yes	20	Nil
NM2	30/09/2014	7:50 PM	0.8	0	39	Yes	IA	Nil
NM2	29/09/2014	11:23 PM	0.2	0	39	Yes	IA	Nil
NM2	30/09/2014	11:20 PM	2.8	0	39	Yes	IA	Nil
NM3	29/09/2014	7:11 PM	0.8	0	35	Yes	25	Nil
NM3	30/09/2014	6:54 PM	0.6	0	35	Yes	<20	Nil
NM3	30/09/2014	12:23 AM	0.2	0	35	Yes	28	Nil
NM3	1/10/2014	12:14 AM	1.4	0	35	Yes	<20	Nil
NM4	29/09/2014	8:34 PM	0.5	0	35	Yes	20	Nil
NM4	30/09/2014	8:17 PM	0.6	0	35	Yes	IA	Nil
NM4	29/09/2014	10:55 PM	0.4	0	35	Yes	<20	Nil
NM4	30/09/2014	10:53 PM	0.7	0	35	Yes	IA	Nil
NM5	29/09/2014	9:27 PM	0.4	0	35	Yes	<20	Nil
NM5	30/09/2014	9:14 PM	0.4	0	35	Yes	IA	Nil
NM5	29/09/2014	10:01 PM	0.3	0	35	Yes	<20	Nil
NM5	30/09/2014	10:00 PM	0.5	0	35	Yes	IA	Nil
NM6	29/09/2014	7:41 PM	1.0	0	35	Yes	IA	Nil
NM6	30/09/2014	7:21 PM	1.4	0	35	Yes	IA	Nil
NM6	29/09/2014	11:53 PM	0.1	0	35	Yes	IA	Nil
NM6	30/09/2014	11:47 PM	2.0	0	35	Yes	IA	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion Applies	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	1	dB 2,4	dB 3,4
NM1	23/10/2014	2:33 PM	3.9	0	40	N	IA	NA
NM2	23/10/2014	2:04 PM	3.5	0	40	N	IA	NA
NM3	23/10/2014	1:01 PM	5.5	0	40	N	IA	NA
NM4	23/10/2014	1:37 PM	3	0	40	Y	IA	NA
NM5	23/10/2014	2:58 PM	3.1	0	40	N	IA	NA
Cooboobindi	23/10/2014	12:20 PM	6	0	45	N	<35	NA

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion Applies	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	1	dB 2,4	dB 3,4
NM1	23/10/2014	8:42 PM	1.3	0	35	Yes	<25	Nil
NM1	23/10/2014	10:43 PM	1.9	0	35	Yes	<25	Nil
NM2	23/10/2014	7:47 PM	0.4	0	39	Yes	<20	Nil
NM2	23/10/2014	11:41 PM	2.3	0	39	Yes	24	Nil
NM3	23/10/2014	6:45 PM	0.8	0	35	Yes	IA	Nil
NM3	24/10/2014	12:40 AM	1.8	0	35	Yes	IA	Nil
NM4	23/10/2014	8:14 PM	1	0	35	Yes	<20	Nil
NM4	23/10/2014	11:12 PM	1.7	0	35	Yes	<20	Nil
NM5	23/10/2014	9:37 PM	1.8	0	35	Yes	IA	Nil
NM5	23/10/2014	10:17 PM	1.5	0	35	Yes	28	Nil
NM6	23/10/2014	7:19 PM	0.6	0	35	Yes	IA	Nil
NM6	24/10/2014	12:10 AM	2.2	0	35	Yes	<20	Nil

APPENDIX E-1 – NOISE MONITORING RESULTS

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion Applies	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	1	dB 2,4	dB 3,4
NM1	26/11/2014	1:46 PM	3.7	0	40	No	IA	NA
NM2	26/11/2014	12:29 PM	3	0	40	Yes	IA	Nil
NM3	26/11/2014	11:41 AM	2.1	0	40	Yes	IA	Nil
NM4	26/11/2014	1:15 PM	3.9	0	40	No	IA	NA
NM5	26/11/2014	2:10 PM	4.1	0	40	No	IA	NA
Cooboobindi	26/11/2014	11:16 AM	1.8	0	45	Yes	30	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion Applies	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	1	dB 2,4	dB 3,4
NM1	25/11/2014	21:16	1.8	0	35	Yes	20	Nil
NM1	25/11/2014	22:26	2.4	0	35	Yes	<20	Nil
NM2	25/11/2014	20:21	2.2	0	39	Yes	27	Nil
NM2	25/11/2014	23:56	1.1	0	39	Yes	26	Nil
NM3	25/11/2014	19:22	0.8	0	35	Yes	IA	Nil
NM3	25/11/2014	23:22	0.4	0	35	Yes	<20	Nil
NM4	25/11/2014	20:49	1.7	0	35	Yes	22	Nil
NM4	26/11/2014	0:23	0.5	0	35	Yes	21	Nil
NM5	25/11/2014	21:41	2.1	0	35	Yes	NM	Nil
NM5	25/11/2014	22:01	1.8	0	35	Yes	<20	Nil
NM6	25/11/2014	19:54	3	0	35	No	IA	NA
NM6	25/11/2014	22:54	2	0	35	Yes	IA	Nil

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion Applies	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	1	dB 2,4	dB 3,4
NM1	10/12/2014	5:19 PM	2.7	0	40	Yes	IA	Nil
NM2	11/12/2014	9:53 AM	8.1	0	40	No	IA	NA
NM3	10/12/2014	5:55 PM	2	0	40	Yes	IA	Nil
NM4	11/12/2014	10:20 AM	7	0	40	No	IA	NA
NM5	10/12/2014	4:54 PM	4	0	40	No	IA	NA
Cooboobindi	11/12/2014	9:12 AM	4.2	0	45	No	<40	NA

Location	Date	Start Time	Wind Speed	Rainfall	Criterion	Criterion Applies	MCC $LAeq_{(15min)}$	Exceedance
			m/s	mm	dB	1	dB 2,4	dB 3,4
NM1	10/12/2014	17:19	2.7	0	35	Yes	IA	Nil
NM1	10/12/2014	23:04	1.9	0	35	Yes	IA	Nil
NM2	10/12/2014	20:34	0.6	0	39	Yes	IA	Nil
NM2	11/12/2014	0:01	2.5	0	39	Yes	<25	Nil
NM3	10/12/2014	18:15	3.3	0	35	No	IA	NA
NM3	11/12/2014	1:21	2.7	0	35	Yes	26	Nil
NM4	10/12/2014	20:58	4.1	0	35	No	IA	NA
NM4	10/12/2014	23:33	1.4	0	35	Yes	22	Nil
NM5	10/12/2014	16:54	4	0	35	No	IA	NA
NM5	10/12/2014	22:40	3	0	35	Yes	<20	Nil
NM6	10/12/2014	18:43	2	0	35	Yes	IA	Nil
NM6	11/12/2014	0:53	3.8	0	35	No	IA	NA

APPENDIX E-1 – NOISE MONITORING RESULTS

Location	Date	Start Time	Wind Speed m/s	Rainfall mm	Criterion dB	Criterion Applies	MCC $L_{A1(1min)}$ dB	Exceedance dB 3,4
NM1	29/09/2014	22:27	0.5	0	45	Yes	23	Nil
NM1	30/09/2014	22:26	0.3	0	45	Yes	IA	Nil
NM2	29/09/2014	23:23	0.2	0	45	Yes	IA	Nil
NM2	30/09/2014	23:20	2.8	0	45	Yes	IA	Nil
NM3	30/09/2014	0:23	0.2	0	45	Yes	29	Nil
NM3	1/10/2014	0:14	1.4	0	45	Yes	<20	Nil
NM4	29/09/2014	22:55	0.4	0	45	Yes	<20	Nil
NM4	30/09/2014	22:53	0.7	0	45	Yes	IA	Nil
NM5	29/09/2014	22:01	0.3	0	45	Yes	23	Nil
NM5	30/09/2014	22:00	0.5	0	45	Yes	IA	Nil
NM6	29/09/2014	23:53	0.1	0	45	Yes	IA	Nil
NM6	30/09/2014	23:47	2	0	45	Yes	IA	Nil

Location	Date	Start Time	Wind Speed m/s	Rainfall mm	Criterion dB	Criterion Applies	MCC $L_{A1(1min)}$ dB	Exceedance dB 3,4
NM1	23/10/2014	22:43	1.9	0	45	Yes	28	Nil
NM2	23/10/2014	23:41	2.3	0	45	Yes	35	Nil
NM3	24/10/2014	0:40	1.8	0	45	Yes	IA	Nil
NM4	23/10/2014	23:12	1.7	0	45	Yes	<25	Nil
NM5	23/10/2014	22:17	1.5	0	45	Yes	36	Nil
NM6	24/10/2014	0:10	2.2	0	45	Yes	<20	Nil

Location	Date	Start Time	Wind Speed m/s	Rainfall mm	Criterion dB	Criterion Applies	MCC $L_{A1(1min)}$ dB	Exceedance dB 3,4
NM1	25/11/2014	22:26	2.4	0	45	Yes	24	Nil
NM2	25/11/2014	23:56	1.1	0	45	Yes	33	Nil
NM3	25/11/2014	23:22	0.4	0	45	Yes	24	Nil
NM4	26/11/2014	0:23	0.5	0	45	Yes	28	Nil
NM5	25/11/2014	22:01	1.8	0	45	Yes	20	Nil
NM6	25/11/2014	22:54	2	0	45	Yes	IA	Nil

Location	Date	Start Time	Wind Speed m/s	Rainfall mm	Criterion dB	Criterion Applies	MCC $L_{A1(1min)}$ dB	Exceedance dB 3,4
NM1	10/12/2014	23:04	1.9	0	45	Yes	IA	Nil
NM2	11/12/2014	0:01	2.5	0	45	Yes	33	Nil
NM3	11/12/2014	1:21	2.7	0	45	Yes	29	Nil
NM4	10/12/2014	23:33	1.4	0	45	Yes	31	Nil
NM5	10/12/2014	22:40	3	0	45	Yes	23	Nil
NM6	11/12/2014	0:53	3.8	0	45	No	IA	NA

1. Noise emission limits do not apply during periods of rainfall or wind speeds greater than 3 metres per second (at 10 metres);
2. Estimated or measured LAeq,15minute attributed to Maules Creek Coal (MCC);
3. NA in exceedance column means atmospheric conditions outside those specified in project approval and criterion is not applicable;
4. Bolded results in red indicate exceedance of criteria; and

APPENDIX E-2 – BLAST MONITORING RESULTS

Mine Operations Area - Blast Monitoring Results 2014

Date	Location / Name	BM1 (mm/s)	BM1 (dB)L	BM2 (mm/s)	BM2 (dB)L	BM3 (mm/s)	BM3 (dB)L	BM4 (mm/s)	BM4 (dB)L
12-Aug	Dam Area 8	0.321	88.1	0.14	100.2	0.178	93.1	0.297	88.7
15-Aug	Dam Area 8	0.298	91.6	0.144		0.18	91.8	0.273	NA
22-Aug	Pit	0.347	102.9	0.142	102.7	0.213	102.3	0.313	95.7
28-Aug	Ramp	0.324	112	0.127	112.1	0.178	109.3	0.2	107.3
		0.324	107.4	0.127	113.9	0.178	NA	0.2	107.3
3-Sep	Drain	0.263	98.3	0.106	108.2	0.153	101.4	0.178	100.2
4-Sep	Pit	0.43	97.6	0.203	107.9	0.37	102.3	0.334	95.7
		0.43	NA	0.203	107.9	0.37	NA	0.334	NA
12-Sep	Pit	0.779	100.1	0.241	102.7	0.375	103.5	0.501	106.7
		0.779	100.1	0.241	102.7	0.375	103.5	0.501	106.7
18-Sep	Pit	0.811	106.9	0.253	104.2	0.41	103.1	0.473	100.7
24-Sep	Pit	0.344	91.6	0.149	92.6	0.169	94.3	0.233	88.7
		0.344	NA	0.149	NA	0.169	NA	NA	NA
1-Oct	Pit	0.337	100.6	0.164	98.6	0.187	105.5	0.237	104.6
		NA	NA	NA	NA	0.187	95.3	NA	NA
3-Oct	Pit	0.312	NA	0.149	102.7	0.179	97.1	0.227	92.2
		0.312	88.1	0.149	100.2	NA	NA	NA	NA
9-Oct	Pit	0.119	NA	0.093	NA	0.102	94.3	0.224	92.2
		0.119	106.1	0.093	99.5	0.102	101.4	NA	NA
16-Oct	Pit	NA	NA	NA	NA	0.129	104.2	NA	NA
		0.067	88.1	0.071	98.6	NA	NA	0.072	101.7
22-Oct	Pit	0.147	NA	0.124	NA	0.144	NA	0.179	NA
		0.147	95.1	0.124	96.7	0.144	94.3	0.179	100.2
23-Oct	Pit	0.167	98.9	0.117	104.7	0.119	91.8	0.168	100.2
		0.167	NA	0.117	104.7	0.119	NA	0.168	NA
31-Oct	Pit	0.082	NA	0.075	98.6	0.071	94.3	0.399	NA
	Pit	NA	NA	0.157	NA	0.14	NA	0.572	NA
6-Nov	Pit	0.076	101.1	0.075	95.5	0.072	93.1	0.432	90.6
		0.427	NA	0.087	NA	0.089	NA	0.486	NA
7-Nov	Pit	0.427	90	0.078	88.2	0.089	NA	0.426	88.7
		0.427	NA	0.087	NA	0.089	NA	0.486	106.5
12-Nov	Pit	0.194	92.9	0.132	94.2	0.145	96.2	0.53	97.5
		0.194	NA	0.132	NA	0.145	NA	0.577	NA
14-Nov	Pit	0.079	85.6	0.079	103.7	*ND*	*ND*	NA	NA
		NA	NA	0.1	NA	*ND*	*ND*	0.592	NA

APPENDIX E-2 – BLAST MONITORING RESULTS

19-Nov	Pit	0.072	NA	0.082	NA	*ND*	*ND*	0.48	113.5
		0.133	NA	0.112	NA	*ND*	*ND*	NA	113.5
21-Nov	Pit	0.086	NA	0.079	NA	*ND*	*ND*	0.539	NA
		NA	NA	0.215	NA	*ND*	*ND*	0.765	NA
26-Nov	Pit	0.075	85.6	0.075	88.2	*ND*	91.8	0.512	NA
		0.218	NA	0.145	NA	*ND*	101.4	0.653	112.1
1-Dec	Pit	0.074	96	0.078	104.2	NA	NA	0.545	106.2
		NA	NA	0.12	NA	NA	NA	NA	NA
8-Dec	Pit	0.21	99.5	0.171	NA	0.407	102.3	0.653	102.2
		0.21	NA	0.171	NA	0.407	NA	NA	NA
15-Dec	Pit	0.173	94.1	0.181	94.2	0.424	95.3	0.611	100.7
		0.173	NA	NA	NA	0.424	NA	0.611	NA
17-Dec	Pit	0.222	98.9	0.143	NA	0.41	NA	0.66	NA
		0.222	NA	0.143	NA	0.41	NA	NA	NA
22-Dec	Pit	0.351	92.9	0.166	99.5	0.419	96.2	0.655	98.9
		0.351	NA	0.166	NA	0.419	NA	0.655	NA

NA	*Peak result reported associated with background sources and not associated with actual blast event.*
ND	*BM3 Hard drive faulty and offline for repairs and maintenance.*

APPENDIX F

SURFACE WATER

APPENDIX F - SURFACE WATER DATA

Site	Sampling Date	Calcium (filt.)	Magnesium (filt.)	Sodium (filt.)	Potassium (filt.)	Aluminium (total)	Arsenic (total)	Barium (total)	Cadmium (total)	Chromium (total)	Copper (total)	Lead (total)	Lithium (total)	Manganese (total)	Nickel (total)	Rubidium (total)	Strontium (total)	Zinc (total)	Boron (total)	Iron (Total)	Bromine (total)	Ammonia as N	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Total Phosphorus as P
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Preliminary Trigger		40	30	40		0.7	0.013	1	0.0002	0.001	0.007	0.0034		0.1	0.011			0.03	0.37	0.9		0.04			0.3	0.18
MAULES CREEK AND BACK CREEK SAMPLES																										
SW1	17/01/2014	17	8	32	1	0.31	<0.001	0.023	<0.0001	<0.001	<0.001	<0.001	0.002	0.056	<0.001	<0.001	0.232	<0.005	<0.05	0.79	0.12	<0.01	<0.01	<0.01	<0.01	0.14
SW1	14/02/2014	22	9	24	1	0.2	0.001	0.022	<0.0001	<0.001	0.002	<0.001	0.001	0.08	<0.001	<0.001	0.235	<0.005	<0.05	0.59	0.08	0.02	<0.01	0.01	0.01	0.17
SW1	18/03/2014	23	10	27	2	0.2	0.002	0.026	<0.0001	<0.001	0.002	<0.001	0.002	0.072	<0.001	<0.001	0.306	0.018	<0.05	0.61	0.12	<0.01	<0.01	<0.01	<0.01	0.13
SW1	23/04/2014	28	11	36	2	0.12	<0.001	0.026	<0.0001	<0.001	0.002	<0.001	0.002	0.104	<0.001	<0.001	0.29	0.006	<0.05	0.44	0.25	0.02	<0.01	0.23	0.23	0.1
SW1	19/05/2014	30	11	32	1	0.08	0.001	0.03	<0.0001	0.002	<0.001	<0.001	0.001	0.071	<0.001	<0.001	0.332	<0.005	<0.05	0.4	0.14	0.02	<0.01	0.36	0.36	0.11
SW1	19/06/2014	29	12	37	1	0.07	<0.001	0.025	<0.0001	<0.001	<0.001	<0.001	0.002	0.053	<0.001	<0.001	0.303	<0.005	<0.05	0.31	0.12	0.03	<0.01	0.11	0.11	0.1
SW1	18/07/2014	32	12	34	2	0.06	0.001	0.024	<0.0001	<0.001	<0.001	<0.001	0.002	0.048	<0.001	<0.001	0.287	<0.005	<0.05	0.33	0.1	<0.01	<0.01	0.12	0.12	0.09
SW1	18/08/2014	28	12	33	4	0.11	0.001	0.027	<0.0001	<0.001	<0.001	<0.001	0.002	0.057	<0.001	<0.001	0.321	<0.005	<0.05	0.46	0.05	0.02	<0.01	0.04	0.04	0.12
SW1	16/09/2014	26	11	32	1	0.11	0.002	0.025	0.0002	0.002	0.003	<0.001	0.002	0.056	0.001	<0.001	0.284	<0.005	<0.05	0.43	0.1	0.01	<0.01	0.01	0.01	0.09
SW1	14/10/2014	27	11	28	14	0.1	<0.001	0.027	<0.0001	<0.001	<0.001	<0.001	0.001	0.053	<0.001	<0.001	0.276	<0.005	<0.05	0.45	0.12	0.02	<0.01	0.02	0.02	0.18
SW1	20/11/2014	38	10	26	2	0.33	0.001	0.027	<0.0001	<0.001	<0.001	<0.001	0.001	0.058	<0.001	<0.001	0.291	0.023	<0.05	0.64	0.15	0.01	<0.01	0.03	0.03	0.12
SW1	16/12/2014	25	10	27	2	0.09	<0.001	0.024	<0.0001	<0.001	<0.001	<0.001	0.004	0.05	<0.001	<0.001	0.289	<0.001	<0.05	0.24	0.1	<0.01	<0.01	0.01	0.01	0.12
SW2	17/01/2014	Dry - No Sample																								
SW2	14/02/2014	Dry - No Sample																								
SW2	18/03/2014	Dry - No Sample																								
SW2	23/04/2014	Dry - No Sample																								
SW2	19/05/2014	Dry - No Sample																								
SW2	19/06/2014	Dry - No Sample																								
SW2	18/07/2014	Dry - No Sample																								
SW2	18/08/2014	13	3	35	9	8.35	0.003	0.172	<0.0001	0.005	0.006	0.004	0.007	0.016	0.004	0.172	0.017	0.1	<0.05	5.02	<0.05	0.11	0.06	0.99	1.05	0.25
SW2	16/09/2014	Dry - No Sample																								
SW2	14/10/2014	Dry - No Sample																								
SW2	20/11/2014	Dry - No Sample																								
SW2	16/12/2014	Dry - No Sample																								
SW3	17/01/2014	DRY-No Sample																								
SW3	14/02/2014	DRY-No Sample																								
SW3	18/03/2014	DRY-No Sample																								
SW3	23/04/2014	DRY-No Sample																								
SW3	19/05/2014	DRY-No Sample																								
SW3	19/06/2014	DRY-No Sample																								
SW3	18/07/2014	DRY-No Sample																								
SW3	18/08/2014	DRY-No Sample																								
SW3	16/09/2014	DRY-No Sample																								
SW3	14/10/2014	DRY-No Sample																								
SW3	20/11/2014	DRY-No Sample																								
SW3	16/12/2014	DRY-No Sample																								
SW4	17/01/2014	Dry-No sample																								
SW4	14/02/2014	Dry-No sample																								
SW4	18/03/2014	Dry-No sample																								
SW4	23/04/2014	14	4	19	12	0.1	0.001	0.17	<0.0001	<0.001	<0.001	<0.001	0.002	0.07	0.003	0.003	0.338	0.013	<0.05	0.51	0.14	0.02	<0.01	<0.01	<0.01	0.06
SW4	19/05/2014	13	4	22	9	0.21	0.001	0.173	<0.0001	<0.001	<0.001	<0.001	0.001	0.145	0.004	0.002	0.349	0.021	<0.05	1.11	0.06	0.04	<0.01	<0.01	<0.01	0.08
SW4	19/06/2014	10	3	24	8	0.68	<0.001	0.134	<0.0001	<0.001	<0.001	<0.001	0.001	0.306	0.004	0.003	0.242	0.009	<0.05	1.36	0.07	0.02	<0.01	<0.01	<0.01	0.1
SW4	18/07/2014	15	4	21	8	0.27	0.002	0.135	<0.0001	<0.001	<0.001	<0.001	<0.001	0.146	0.004	0.002	0.28	<0.005	<0.05	0.89	0.06	0.01	<0.01	<0.01	<0.01	0.05
SW4	18/08/2014	Dry-No sample																								
SW4	16/09/2014	Dry-No sample																								
SW4	14/10/2014	8	3	10	14	15.8	0.005	0.338	0.0001	0.012	0.022	0.012	0.007	0.545	0.014	0.035	0.176	0.051	<0.05	12.5	<0.05	<0.01	<0.01	0.29	0.29	1.31
SW4	20/11/2014	Dry-No sample																								
SW4	16/12/2014	Dry-No sample																								

NAMOI RIVER SAMPLES

Site	Sampling Date	Calcium (filt.)	Magnesium (filt.)	Sodium (filt.)	Potassium (filt.)	Aluminium (total)	Arsenic (total)	Barium (total)	Cadmium (total)	Chromium (total)	Copper (total)	Lead (total)	Lithium (total)	Manganese (total)	Nickel (total)	Rubidium (total)	Strontium (total)	Zinc (total)	Boron (total)	Iron (Total)	Bromine (total)	Ammonia as N	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Total Phosphorus as P
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Preliminary Trigger		40	30	40		0.7	0.013	1	0.0002	0.001	0.007	0.0034		0.1	0.011			0.03	0.37	0.9		0.04			0.3	0.18
SW5	17/01/2014	25	15	30	5	1.87	0.002	0.039	<0.0001	0.002	0.004	<0.001	0.002	0.079	0.004	0.003	0.306	0.012	<0.05	2.0	0.1	0.01	<0.01	0.07	0.07	0.03
SW5	14/02/2014	32	18	25	5	0.61	0.002	0.038	<0.0001	<0.001	0.003	<0.001	0.001	0.067	0.002	0.002	0.315	<0.005	<0.05	0.7	0.06	0.05	<0.01	0.09	0.09	0.07
SW5	18/03/2014	42	24	37	5	0.77	0.003	0.049	<0.0001	0.004	0.003	<0.001	0.001	0.102	0.002	0.001	0.363	0.008	0.08	0.92	0.18	<0.01	<0.01	<0.01	<0.01	0.08
SW5	23/04/2014	37	24	49	4	0.95	0.002	0.052	<0.0001	0.001	0.003	<0.001	0.001	0.089	0.003	0.001	0.444	<0.005	<0.05	0.95	0.25	0.03	<0.01	<0.01	<0.01	0.09
SW5	19/05/2014	52	32	68	4	0.31	0.001	0.061	<0.0001	<0.001	0.001	<0.001	<0.001	0.082	0.002	<0.001	0.645	<0.005	<0.05	0.34	0.48	0.01	<0.01	<0.01	<0.01	0.06
SW5	19/06/2014	39	27	71	4	0.44	<0.001	0.049	<0.0001	<0.001	0.002	<0.001	0.001	0.118	0.002	<0.001	0.529	<0.005	<0.05	0.42	0.28	0.46	<0.01	1.53	1.53	0.07
SW5	18/07/2014	51	32	74	4	0.71	0.001	0.053	<0.0001	0.001	0.002	<0.001	0.001	0.12	0.002	0.001	0.515	<0.005	<0.05	0.87	0.31	<0.01	<0.01	<0.01	<0.01	0.07
SW5	18/08/2014	52	33	97	4	1.0	0.002	0.054	<0.0001	0.002	0.005	<0.001	0.002	0.132	0.003	0.001	0.499	<0.005	0.07	1.18	0.36	0.02	<0.01	<0.01	<0.01	0.07
SW5	16/09/2014	56	38	81	4	0.52	0.002	0.066	<0.0001	0.001	0.004	<0.001	0.001	0.18	0.002	<0.001	0.632	<0.005	0.06	0.52	0.38	0.02	<0.01	<0.01	<0.01	0.08
SW5	14/10/2014	39	24	30	5	1.01	0.002	0.046	<0.0001	0.001	0.002	<0.001	0.001	0.07	0.002	0.002	0.418	<0.005	<0.05	1.11	0.15	0.02	<0.01	<0.01	<0.01	0.07
SW5	20/11/2014	47	30	50	5	0.29	0.002	0.049	<0.0001	<0.001	0.002	<0.001	0.002	0.113	0.002	<0.001	0.492	<0.005	0.05	0.27	0.32	<0.01	<0.01	0.02	0.02	0.09
SW5	16/12/2014	34	22	33	5	1.2	0.002	0.046	<0.0001	0.002	0.002	<0.001	0.005	0.117	0.002	0.002	0.407	0.037	0.05	1.47	0.12	<0.01	<0.01	<0.01	<0.01	0.09
SW6	17/01/2014	25	15	30	5	2.13	0.002	0.042	<0.0001	0.003	0.005	<0.001	0.002	0.087	0.004	0.003	0.303	0.007	<0.05	2.2	0.07	0.03	<0.01	0.05	0.05	0.05
SW6	14/02/2014	32	18	26	5	1.43	0.002	0.037	<0.0001	0.002	0.003	<0.001	0.001	0.074	0.003	0.002	0.309	<0.005	<0.05	1.49	0.07	0.03	<0.01	0.04	0.04	0.05
SW6	18/03/2014	39	22	32	4	1.24	0.002	0.046	<0.0001	0.001	0.003	<0.001	0.002	0.101	0.003	0.002	0.359	<0.005	0.06	1.31	0.2	<0.01	<0.01	<0.01	<0.01	0.09
SW6	23/04/2014	37	25	52	5	1.24	0.002	0.053	<0.0001	0.002	0.003	<0.001	0.002	0.098	0.004	0.002	0.462	0.006	<0.05	1.27	0.33	0.02	0.01	<0.01	0.01	0.11
SW6	19/05/2014	50	29	60	4	1.12	0.002	0.064	<0.0001	0.016	0.002	<0.001	0.001	0.132	0.004	0.001	0.584	<0.005	<0.05	1.32	0.36	0.04	<0.01	0.02	0.02	0.10
SW6	19/06/2014	41	29	93	4	0.97	0.001	0.056	<0.0001	0.001	0.002	<0.001	0.001	0.15	0.002	0.001	0.578	<0.005	<0.05	0.9	0.42	0.01	<0.01	<0.01	<0.01	0.10
SW6	18/07/2014	53	33	78	4	0.75	0.001	0.058	<0.0001	<0.001	0.002	<0.001	0.001	0.244	0.002	0.001	0.577	<0.005	<0.05	0.82	<0.05	<0.01	<0.01	<0.01	<0.01	0.09
SW6	18/08/2014	51	32	97	4	1.54	0.001	0.058	<0.0001	0.002	0.004	<0.001	0.002	0.274	0.004	0.002	0.492	<0.005	0.05	1.72	0.38	0.01	<0.01	0.13	0.13	0.09
SW6	16/09/2014	56	37	79	4	0.76	0.001	0.106	<0.0001	0.002	0.010	0.003	0.002	0.085	0.003	0.004	0.349	0.317	0.06	2.12	0.36	0.03	<0.01	<0.01	<0.01	0.12
SW6	14/10/2014	39	24	30	5	0.72	<0.001	0.044	<0.0001	0.001	0.003	<0.001	0.001	0.06	0.002	0.001	0.409	<0.005	<0.05	0.86	0.15	0.02	<0.01	<0.01	<0.01	0.05
SW6	20/11/2014	69	35	61	5	0.42	0.004	0.06	<0.0001	<0.001	0.002	<0.001	0.001	0.294	0.002	0.001	0.589	0.014	0.06	0.49	0.42	0.03	<0.01	0.03	0.03	0.14
SW6	16/12/2014	35	22	33	5	<0.01	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.05	<0.05	0.13	<0.01	<0.01	<0.01	<0.01	0.04
SW7	17/01/2014	26	15	30	5	1.96	0.002	0.042	<0.0001	0.002	0.003	<0.001	0.002	0.083	0.003	0.003	0.303	<0.005	<0.05	2.07	0.11	0.01	<0.01	0.05	0.05	0.02
SW7	14/02/2014	31	18	25	5	1.23	0.001	0.038	<0.0001	0.002	0.003	<0.001	0.001	0.077	0.002	0.002	0.303	0.008	<0.05	1.37	0.06	0.03	<0.01	0.04	0.04	0.04
SW7	18/03/2014	39	22	32	4	1.42	0.002	0.048	<0.0001	0.003	0.004	<0.001	0.002	0.09	0.003	0.002	0.353	<0.005	0.05	1.45	0.18	<0.01	<0.01	0.04	0.04	0.09
SW7	23/04/2014	38	26	56	5	0.9	0.002	0.053	<0.0001	0.002	0.003	<0.001	0.001	0.069	0.004	0.001	0.48	<0.005	<0.05	0.89	0.34	0.03	<0.01	<0.01	<0.01	0.11
SW7	19/05/2014	41	25	57	4	0.39	0.001	0.054	<0.0001	0.005	<0.001	<0.001	<0.001	0.058	0.002	<0.001	0.525	<0.005	<0.05	0.41	0.26	0.02	<0.01	<0.01	<0.01	0.06
SW7	19/06/2014	52	36	95	4	0.34	<0.001	0.06	<0.0001	<0.001	0.002	<0.001	0.001	0.108	0.001	<0.001	0.696	0.013	<0.05	0.32	0.52	0.02	<0.01	<0.01	<0.01	0.07
SW7	18/07/2014	50	32	79	4	0.7	0.001	0.067	<0.0001	0.001	0.002	<0.001	0.001	0.16	0.003	0.001	0.643	<0.005	<0.05	0.84	0.23	<0.01	<0.01	<0.01	<0.01	0.09
SW7	18/08/2014	55	35	100	4	1.06	0.001	0.064	<0.0001	<0.001	0.002	<0.001	0.001	0.13	0.002	0.001	0.527	<0.005	<0.05	1.01	0.42	0.02	<0.01	<0.01	<0.01	0.08
SW7	16/09/2014	54	37	80	4	1.22	0.002	0.074	<0.0001	0.002	0.004	<0.001	0.002	0.195	0.003	0.002	0.628	0.006	0.08	1.31	0.36	0.01	<0.01	<0.01	<0.01	0.08
SW7	14/10/2014	39	24	28	5	1.41	0.001	0.048	<0.0001	0.002	0.002	<0.001	0.001	0.078	0.003	0.002	0.404	<0.005	<0.05	1.53	0.13	0.02	<0.01	<0.01	<0.01	0.26
SW7	20/11/2014	45	29	53	5	1.24	0.002	0.056	<0.0001	0.002	0.003	<0.001	0.002	0.156	0.003	0.002	0.448	<0.005	0.06	1.25	0.34	0.04	<0.01	0.07	0.07	0.16
SW7	16/12/2014	34	22	35	5	1.37	0.002	0.048	<0.0001	0.002	0.002	<0.001	0.007	0.128	0.003	0.002	0.409	0.057	0.05	1.65	0.13	0.01	<0.01	<0.01	<0.01	0.09
SW8	17/01/2014	26	16	30	5	1.82	0.002	0.041	<0.0001	0.002	<0.001	<0.001	0.002	0.07	0.003	0.002	0.306	<0.005	<0.05	1.87	0.09	0.01	<0.01	0.03	0.03	0.04
SW8	14/02/2014	32	18	26	5	2.13	0.002	0.04	<0.0001	0.002	0.004	<0.001	0.002	0.086	0.004	0.003	0.313	0.006	<0.05	2.32	0.07	0.08	<0.01	0.02	0.02	0.05
SW8	18/03/2014	37	21	28	4	1.11	0.002	0.047	<0.0001	0.002	0.004	<0.001	0.001	0.088	0.004	0.002	0.325	0.017	0.05	1.17	0.14	0.03	<0.01	<0.01	<0.01	0.09
SW8	23/04/2014	37	28	59	6	1.33	0.002	0.055	<0.0001	0.001	0.004	<0.001	0.001	0.0659	0.005	0.002	0.496	<0.005	<0.05	1.25	0.39	0.03	0.03	<0.01	<0.01	0.12
SW8	19/05/2014	41	24	55	4	0.14	0.002	0.054	<0.0001	<0.001	<0.001	<0.001	<0.001	0.085	0.002	<0.001	0.482	<0.005	<0.05	0.18	0.24	0.03	<0.01	<0.01	<0.01	0.07
SW8	19/06/2014	37	26	55	4	0.78	<0.001	0.049	<0.0001	<0.001	0.002	<0.001	<0.001	0.072	0.002	0.001	0.511	<0.005	<0.05	0.7	0.25	0.02	<0.01	<0.01	<0.01	0.07
SW8	18/07/2014	48	31	99	5	0.16	<0.001	0.054	<0.0001	0.011	0.001	<0.001	<0.001	0.057	0.002	<0.001	0.515	<0.005	<0.05	0.28	0.4	0.01	<0.01	0.04	0.04	0.05
SW8	18/08/2014	44	28	84	4	1.32	0.001	0.061	<0.0001	0.002	0.003	<0.001	0.001	0.072	0.003	0.002	0.466	0.007	<0.05	1.34	0.26	0.03	<0.01	<0.01	<0.01	0.08
SW8	16/09/2014	45	31	67	4	1.38	0.001	0.069	<0.0001	0.002	0.003	<0.001	0.001	0.117	0.003	0.002	0.538	<0.005	0.06	1.39	0.26	0.04	<0.01	<0.01	<0.01	0.09
SW8	14/10/2014	38	23	31	5	1.24	<0.001	0.05	<0.0001	0.002	0.003	<0.001	0.001	0.06	0.002	0.002	0.408	0.011	<0.05	1.42	0.11	0.02	<0.01	0.03	0.03	0.15
SW8	20/11/2014	Dry-no sample																								
SW8	16/12/2014	35	23	35	5	1.4	0.002	0.048	<0.0001	0.002	0.002	<0.001	0.002	0.139	0.003	0.002	0.411	0.043	0.06	1.61	0.13	0.02	<0.01	0.05	0.05	0.09

APPENDIX F - SURFACE WATER DATA

OTHER SAMPLES

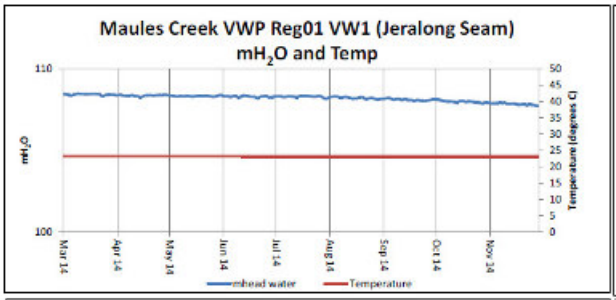
Site	Sampling Date	Calcium (filt.)	Magnesium (filt.)	Sodium (filt.)	Potassium (filt.)	Aluminium (total)	Arsenic (total)	Barium (total)	Cadmium (total)	Chromium (total)	Copper (total)	Lead (total)	Lithium (total)	Manganese (total)	Nickel (total)	Rubidium (total)	Strontium (total)	Zinc (total)	Boron (total)	Iron (Total)	Bromine (total)	Ammonia as N	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Total Phosphorus as P
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	Preliminary Trigger	40	30	40		0.7	0.013	1	0.0002	0.001	0.007	0.0034		0.1	0.011			0.03	0.37	0.9		0.04			0.3	0.18
SW9	16/09/2014	Dry-no sample																								
SW9	14/10/2014	Dry-no sample																								
SW9	20/11/2014	Dry-no sample																								
SW9	16/12/2014	Dry-no sample																								
SW10	16/09/2014	Dry-no sample																								
SW10	14/10/2014	Dry-no sample																								
SW10	20/11/2014	Dry-no sample																								
SW10	16/12/2014	Dry-no sample																								
SW11	16/09/2014	10	4	18	14	6.96	0.004	0.187	<0.0001	0.004	0.005	0.005	0.003	0.705	0.007	0.012	0.272	0.012	0.05	7.54	0.06	0.28	0.09	0.01	0.1	0.24
SW11	14/10/2014	Dry-no sample																								
SW11	20/11/2014	Dry-no sample																								
SW11	16/12/2014	Dry-no sample																								

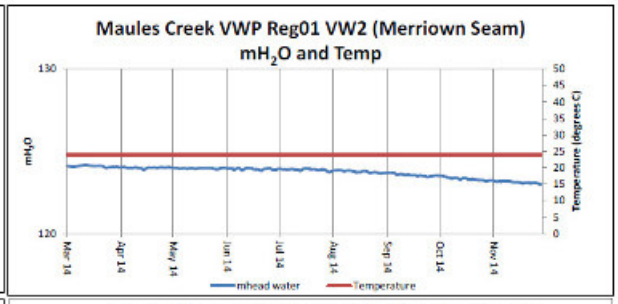
APPENDIX G

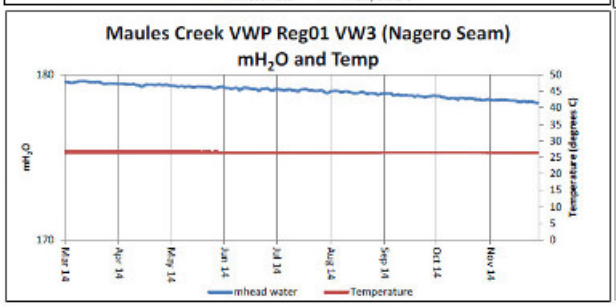
GROUNDWATER

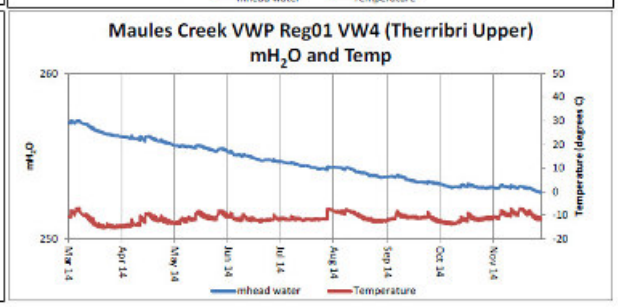
APPENDIX G – GROUNDWATER MONITORING DATA

Reg01 Vibrating Wire Piezometer

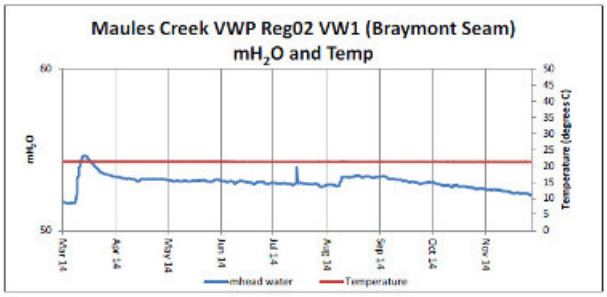


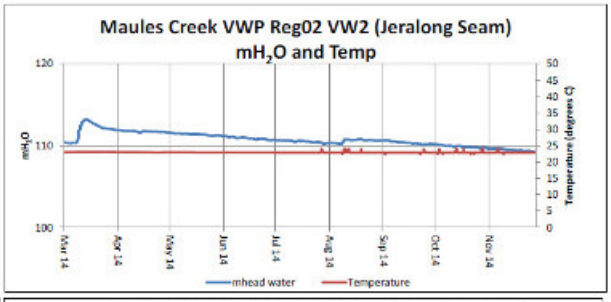


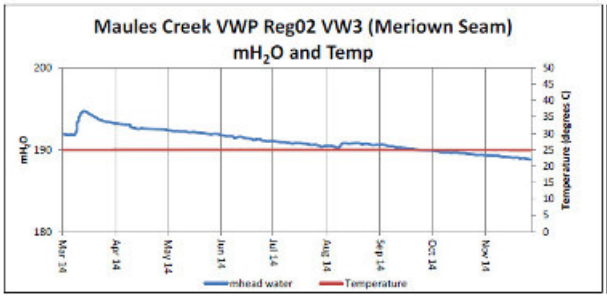


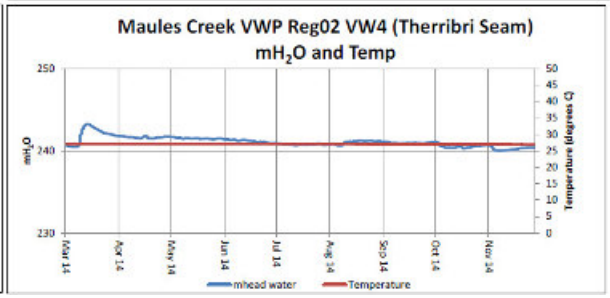


Reg02 Vibrating Wire Piezometer



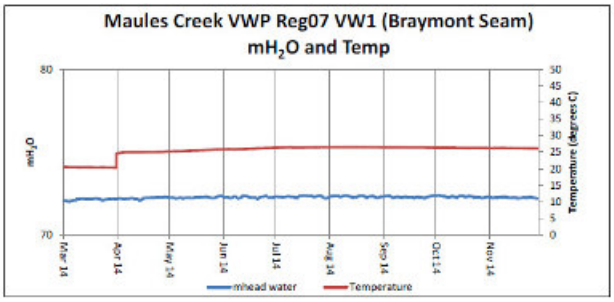


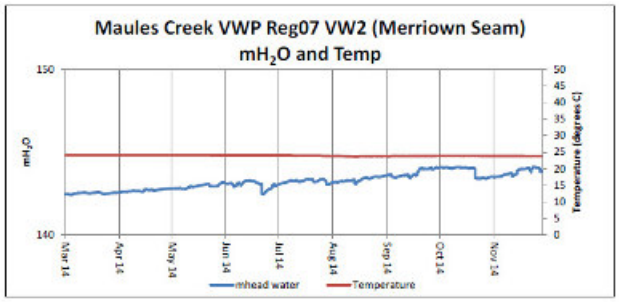


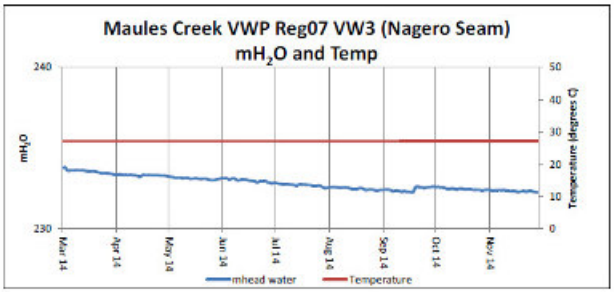


APPENDIX G – GROUNDWATER MONITORING DATA

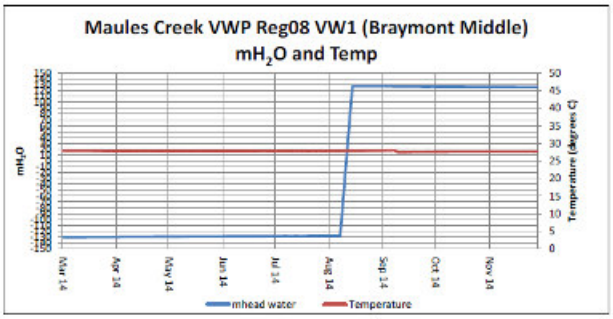
Reg07 Vibrating Wire Piezometer

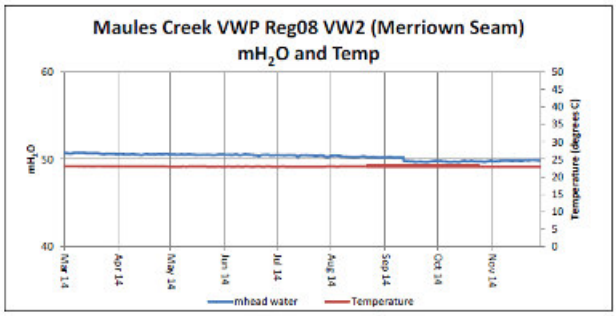


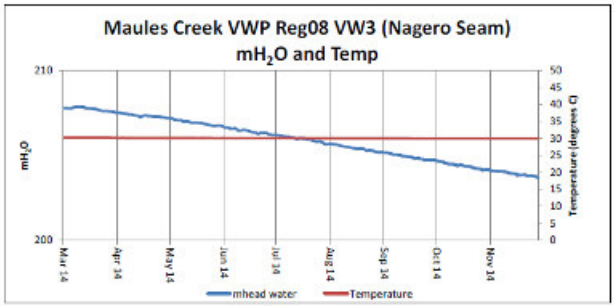




Reg08 Vibrating Wire Piezometer



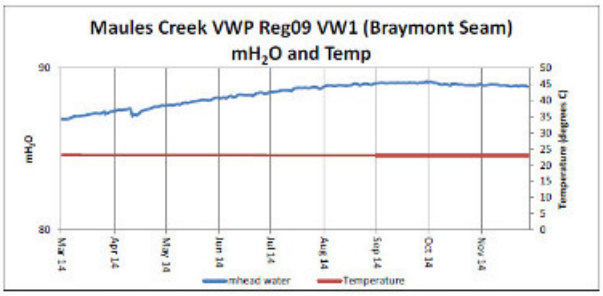


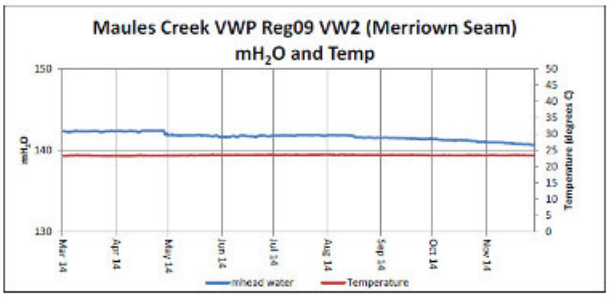


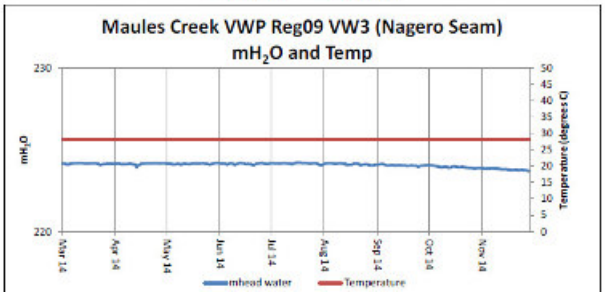
VWP Reg08 Braymont middle was reset after a calibration error was identified resulting in a step change in the graph above.

APPENDIX G – GROUNDWATER MONITORING DATA

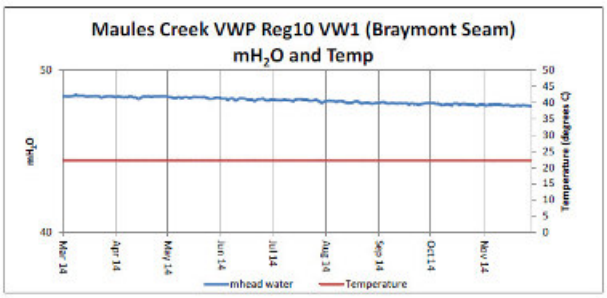
Reg09 Vibrating Wire Piezometer

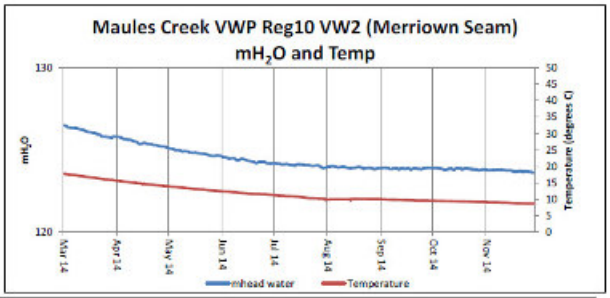


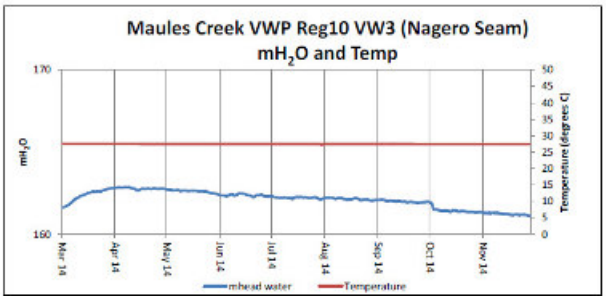


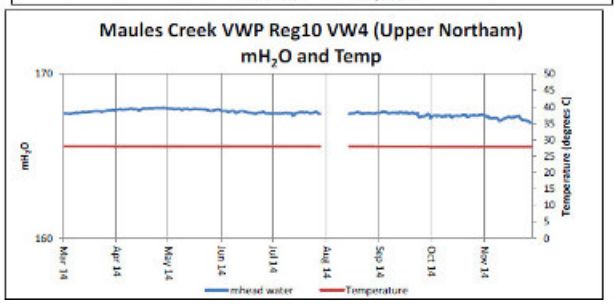


Reg10 Vibrating Wire Piezometer



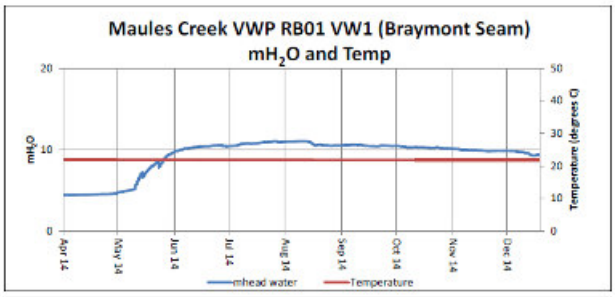


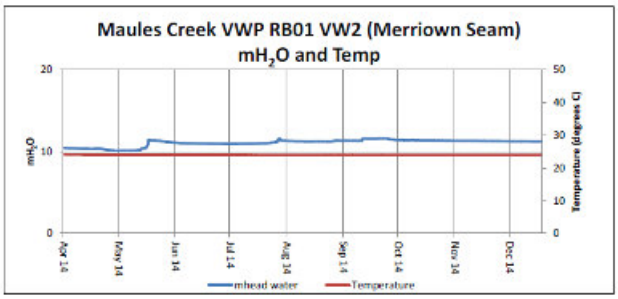


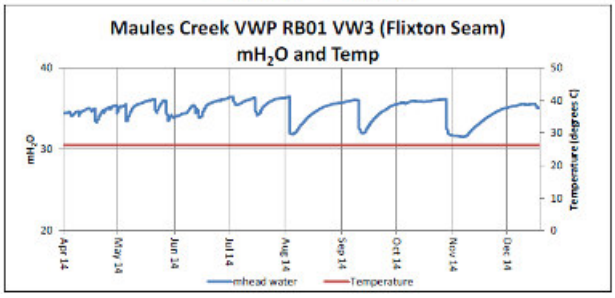


APPENDIX G – GROUNDWATER MONITORING DATA

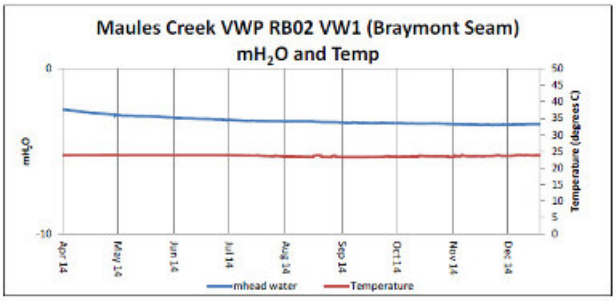
RB01 Vibrating Wire Piezometer

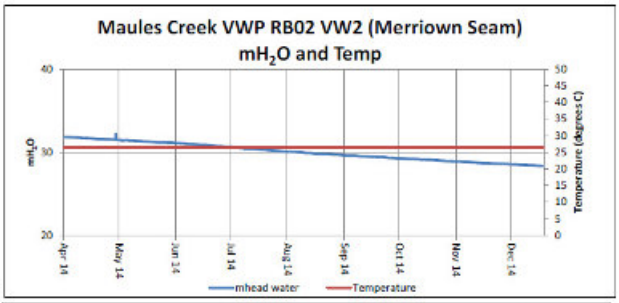


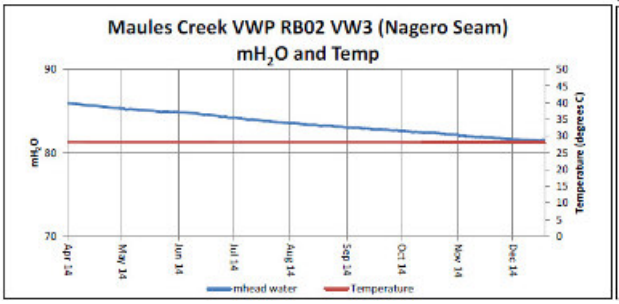


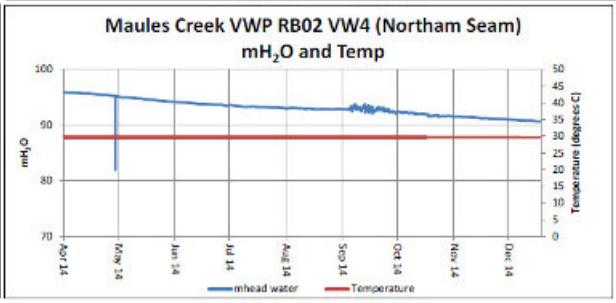


RB02 Vibrating Wire Piezometer



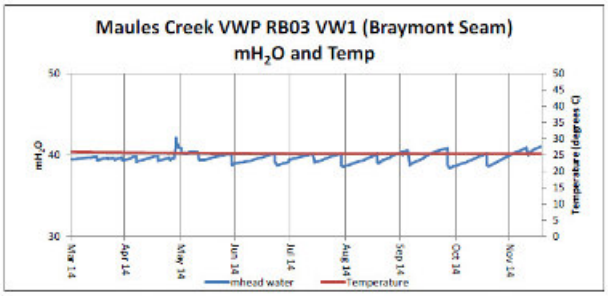


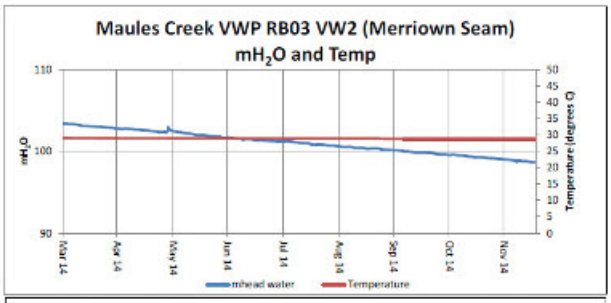


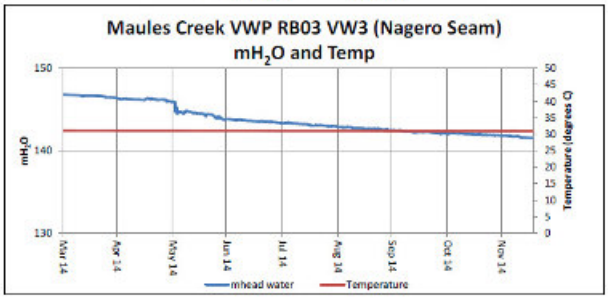


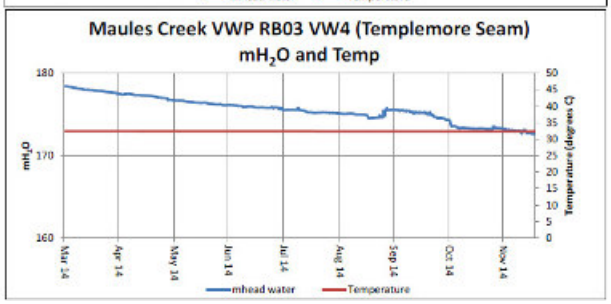
APPENDIX G – GROUNDWATER MONITORING DATA

RB03 Vibrating Wire Piezometer

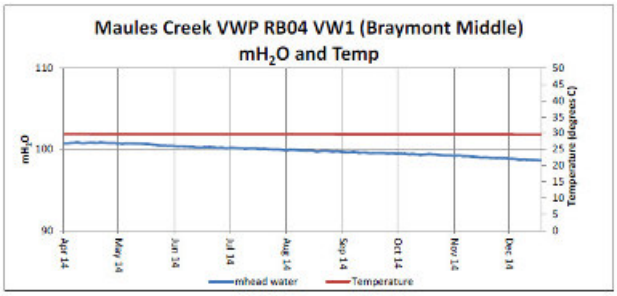


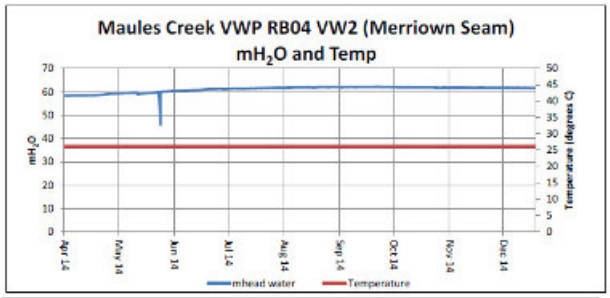


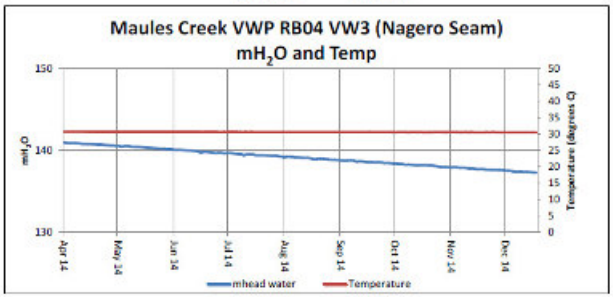


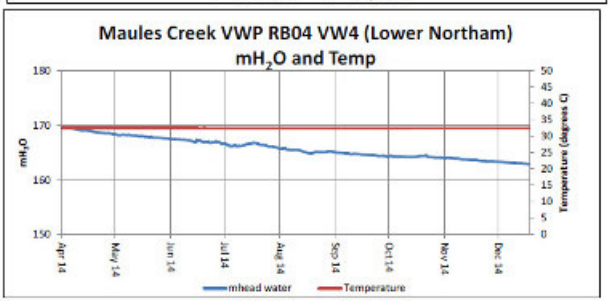


RB04 Vibrating Wire Piezometer



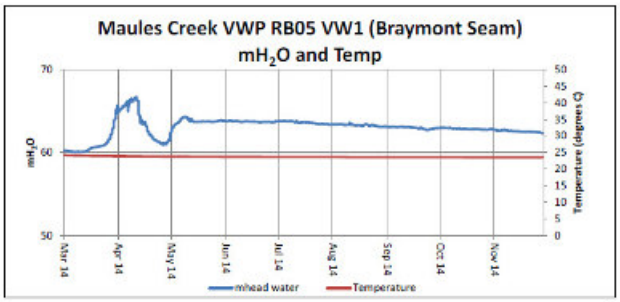


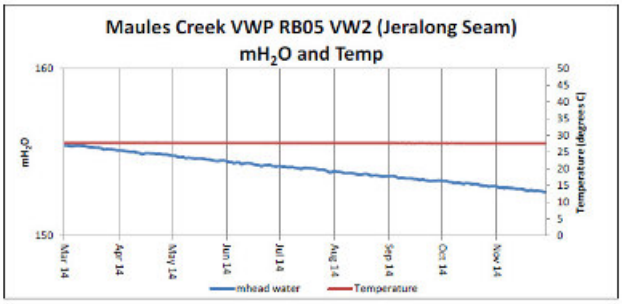


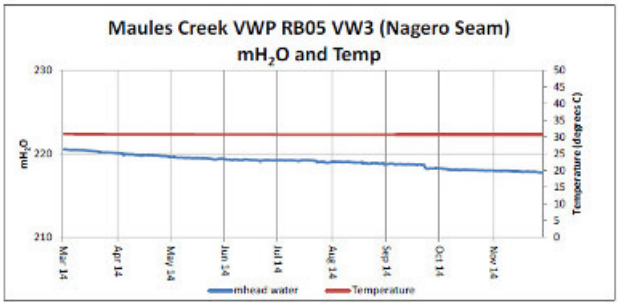


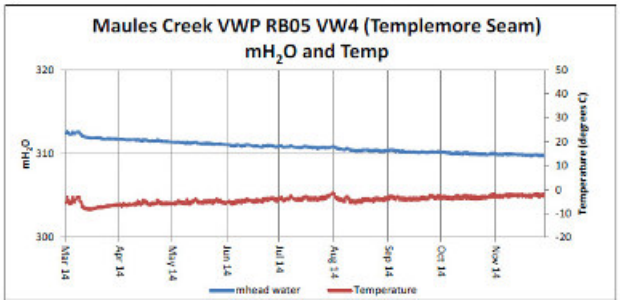
APPENDIX G – GROUNDWATER MONITORING DATA

RB05 Vibrating Wire Piezometer









APPENDIX H

COMPLAINTS REGISTER

MAULES CREEK COAL PROJECT

2014 Complaints Register

Date	Time	Method used	Category	Nature of Complaint / Enquiry	Action Taken	if no action, why not
		Call to Environment Manager	Air Quality	Complaint from resident regarding the generation of dust by site traffic on Therribri Road in proximity to residences.	Dust suppression truck subsequently mobilised to Therribri Road daily. Dust suppression application made to road surface in vicinity of property concerned and at others in the neighbourhood. It is also noted that the volume of site traffic on Therribri Road was reduced significantly by the provision of preferred access gates off the Boggabri Haul Road and from the Leard Forest Road.	N/A
		Call to Environment Manager	Traffic	Complaint received from resident regarding vehicles using flashing beacons whilst driving on Leard Forest Road.	Toolbox talks held with construction employees about the use of Leard Forest Road. It was noted that at the time of the complaint, Narrabri Council were undertaking roadworks on that stretch of the public road and the conditions were also very dusty.	N/A
13/03/2014	14.30pm	Call to Project Office	Traffic	Complaint received regarding speeding traffic along Boston Street on the way to and from the Accommodation Village	Notification sent to staff and contractors toolbox talked on obeying the speed limits on local road network.	N/A
13/03/2014		Call to Project Office	Traffic	Complaint from resident regarding contractor minibuses observed utilising Therribri Road for route to Narrabri and the north (contrary to the Traffic Management Plan, which prohibits normal access by this route).	Toolbox talk held with contractors and follow up monitoring of road use by MCC staff to confirm that the practice had ceased. MCC Project Manager met with the resident subsequently to communicate the outcome.	N/A
29/03/2014		Call to Environment Manager	Surface water	The landowner called to enquire if the high flows of water in Back Creek were emanating from the Project.	Environmental Manager went out that afternoon to Back Creek to photograph the creek flow at various locations and was able to ascertain that the volumes of water flowing in the creek did not originate from the Project, but from further upstream to the east.	Root cause of enquiry deemed not to be MCC Project related
3/04/2014	11.00am	Call to Community Hot Line	Visual Impact	Complaint from Maules Creek resident concerning excessive light emanating from construction works at night time.	Investigation undertaken into possible source of light, with review of security lighting direction and intensity. Lighting plants were adjusted accordingly. No comparable complaints received since this date.	N/A
3/04/2014	11.00am	Call to Community Hot Line	Other	Complaint from Maules Creek resident concerning the nature of police action on public roads near the project.	Nature of complaint discussed with police, who pointed out that they were marshalling access to the local roads during a weekend of intensive protestor activity.	N/A

WHITEHAVEN COAL

Date	Time	Method used	Category	Nature of Complaint / Enquiry	Action Taken	if no action, why not
4/04/2014	13.00pm	Call to Community Hot Line	Noise / Vibration	Complaint from resident regarding blast related vibration felt on neighbouring property on successive days, possibly from construction blasts on MCC Project.	Investigation into timing of project construction blasts and also blasts at neighbouring mines. Blast monitoring data reviewed and within limits. Attended blast monitoring undertaken at residence on subsequent construction blasts to confirm that blasts were within limits.	N/A
21/05/2014		Called in person to Project Office	Traffic	Complaint received regarding speeding traffic along Boston Street on the way to and from the Accommodation Village	Reminder notification send to staff and contractors toolbox talked on obeying the speed limits on local road network.	N/A
17/06/2014	10.20am	Call to Community Hot Line	Blast vibration	Complaints from a number of residents regarding blast related vibration felt at properties north of the MCC Project.	Full investigation into event was undertaken by WHC and the EPA. Results show that limits were not in breach of the company's EPL or Approval limits. Additional monitoring locations will now be provided for construction blasts.	N/A
18/06/2014	11.34am	Community Feedback Form	General Enquiry	General enquiry requesting the location of the monitoring locations, monitoring results, community complaints register and blast notifications.	Results on monitoring are being compiled to be added to the WHC web page. Locations of monitoring points can be found in the management plans which are on the WHC web site.	N/A
19/07/2014	10.00am	Call to Community Hot Line	Noise / Vibration	Two residents called about excessive noise coming from the vicinity of Maules Creek Project on Friday the 19th through to Sunday the 20th.	Noise monitoring data was subsequently downloaded and submitted for analysis to determine the likely source. Results indicated project noise was below required levels and feed back provided.	N/A
22/07/2014		Call to Project Office	Traffic	Complaint received regarding the traffic control on the Rangari Road upgrade works remaining too long on red.	Investigation undertaken concerning the red/green timing cycle at the road works. The apparent lengthy time between green lights was considered necessary to allow traffic to pass safely through the works area. Findings communicated to the complainant by telephone message.	N/A
28/07/2014	8.00pm	E-mail to Community Hot Line	Traffic	Query regarding possible Project vehicles using Therribri Road, where access to Project traffic was prohibited.	Investigation undertaken regarding the vehicles specified by the complainant. Neither were found to be related to the Maules Creek Project. E-mail reply sent to the enquirer regarding the findings.	N/A
31/07/2014		Call to Community Hot Line	Traffic	A property owner called enquiring about the proposed closure of Leard Forest Road, as he used this road for access to his property.	The Environmental Manager telephoned the enquirer to explain the reasons for the proposed closure and the alternative routes that could be used during the closure period.	N/A

WHITEHAVEN COAL

Date	Time	Method used	Category	Nature of Complaint / Enquiry	Action Taken	if no action, why not
8/08/2014		Call to Community Hot Line	Blast Noise / Vibration	A resident called about excessive noise and vibration from a blast on the morning of 08/08.	The Environmental Manager called the resident and confirmed that the monitoring of the blast yielded results which were within the acceptable limits. Follow up correspondence has been conducted with the EPA to provide a more thorough investigation into the noise and vibration levels associated with that specific blast event.	N/A
8/08/2014		E-mail to Community Hot Line	Ideological	General comment provided by the complainant, disagreeing with the nature of the coal and coal seam gas industries and their perceived impacts on the environment. The complainant also requested that MCC instead develop solar, wind and geothermal energy at the site.	None taken	The nature of the complaint was considered to be beyond the scope of the site based team.
19/08/2014		Call to Community Hot Line	Noise / Vibration	Complaint regarding noise emanating from the mine site	The Environmental Manager met with the complainant and initiated an investigation of data on the noise monitoring device located at the residence. Data from the date in question was noted to be within acceptable levels.	N/A
26/08/2014		Calls to Community Hot Line	Noise / Vibration	The residents made a series of calls to the Community Hot Line (8 between 12/07 and 26/07) concerning noise levels emanating from the mine site. An additional nine calls were made during September.	The Environmental Manager met with the residents to discuss the source of the noise and the placing of a monitoring device at their property Available data from nearby monitoring devices is not suggestive of any breach of permitted noise levels.	N/A
29/08/2014		Telephone calls to Project Office	Blast Fume	A local resident expressed concern at 'blast fumes' from a blast on Wed 27th and requested further information on monitoring of blast fume and potential risks to the general public.	The Operations Manager contacted the individual and discussed the methodology of blast fume monitoring and normal procedures associated with blast fume events. No fume generation has been identified from the Maules Creek operation.	N/A
11/09/2014		Calls to Community Hot Line	Noise / Vibration	A local resident called on numerous occasions between 03/09 and 11/09 regarding noise levels emanating from the mine site.	Resident was contacted to discuss the details of the complaints. Concerns seem to be in the early morning. Regular monitoring still shows the project to be compliant with approval conditions.	N/A
17/09/2014		Telephone call to Project Office	Air Quality	A local resident called to indicate that the public road past her property was not being sufficiently watered, as the dust levels caused by passing traffic were increasing.	Resident was contacted to discuss the issue of dust from the road. Water Carts have been deployed daily and the area has been regularly monitored to ensure dust levels from the road network are not excessive.	N/A

WHITEHAVEN COAL

Date	Time	Method used	Category	Nature of Complaint / Enquiry	Action Taken	if no action, why not
27/09/2014		Telephone call to Project Office	Noise / Vibration	The residents made a series of calls to the Community Hot Line (9 between 03/09 and 25/09) concerning noise levels emanating from the mine site.	The Environmental Manager met with the residents to discuss the source of the noise and the placing of a monitoring device at their property Available data from nearby monitoring devices is not suggestive of any breach of approval limits	N/A
1/10/2014	5:30am	Complaint to EPA	Air Quality	A complaint had been made regarding dust generation from the mine construction activities from a neighbouring property.	Response was provided to the EPA describing activities on site at the time of complaint and the measures being taken to control dust on site at that particular time. In addition, it was outlined what additional measures were proposed for minimising dust generation in the months ahead. including additional water carts available and operation responses will be undertaken	N/A
23/10/2014	7:40am	Call to Community Hot Line	Air Quality	The resident made a complaint that the dust coming from the public road outside their property was excessive due to unusually high traffic volume that morning. A complaint was also made regarding the poor condition of the road.	The Environmental Manager called to explain that the traffic to the site had been diverted due to protestor activity blocking the main site entrance. Water carts had been running on the public road all day, because of the situation. Arrangements were to be made to have dust suppressants used on that stretch of road at the earliest opportunity	N/A
23/10/2014	5:15pm	Complaint to EPA	Air Quality	A complaint had been made regarding dust generation from the mine construction activities, followed by observations made from a neighbouring property.	Response was provided to the EPA describing activities on site at the time of complaint and the measures being taken to control dust on site at that particular time. Continued monitoring of dust generating activities on site being undertaken with in the construction area	N/A
27/10/2014	3:26pm	Complaint to EPA	Noise / Vibration	EPA received a noise complaint concerning the Maules Creek Coal Mine. EPA has requested most recent attended noise monitoring data.	EPA to be provided the attended noise monitoring data following receipt of the monthly monitoring	N/A
27/10/2014	9:00am	Call to Community Hot Line	Air Quality	The resident made a complaint regarding excessive dust levels coming from the public road outside their property over the previous three days.	The Environmental Manager called to explain that water carts are deployed along this road to mitigate dust generation. A review of water cart operations would be made and use of dust suppressing agents had commenced	N/A
31/10/2014	5:00am and 7:00am	Complaint to EPA	Air Quality	A complaint had been made by a local resident regarding dust generation from the site activities on the morning of 31/10/2014.	Response was provided to the EPA describing activities on site at the time of complaint and the measures being taken to control dust on site at that particular time. In addition, it was outlined what additional measures were proposed for minimising dust generation in the months ahead. Including additional water cart being mobilised to site and implementation of the use of dust suppressant agents.	N/A

Date	Time	Method used	Category	Nature of Complaint / Enquiry	Action Taken	if no action, why not
11/11/2014	All day	Complaint to EPA	Air Quality	The complaint related to an air quality event that appeared as a brown haze that was noticeable from 80 kilometres away.	Response was provided to the EPA about the activities that were conducted on site during the day. Details in the response included what measures were conducted for dust control, the weather records and air quality readings. After reviewing the monitoring records there were no recorded exceedance of the approval limits.	N/A
17/11/2014	12:00am to 3:00am	Telephone call to project member	Noise / Air Quality	A local resident made a call to advise that machine noise, believed to be coming from the project was intrusive from late Monday night the 10th through to the earlier hours of Tuesday morning concluding at approx. 2.30am. The resident also notified the site of a dust complaint from the 11th and would be notifying the EPA about this occurrence.	The Environmental Manager discussed with the residents that attended monitoring had just taken place during the month and results show that there was no exceedance. In regards to the dust, a review was completed and report sent to the EPA, please refer to complaint on the 11th of Nov.	N/A
19/11/2014	12:50pm	Complaint to EPA	Air Quality	The entire site is generating dust with a haze coming across the whole valley at 12:51pm	A response was provided to the EPA about daily work activities, air quality monitoring results and weather results. Just prior to the time of the complaint Maules Creek Coal undertook a blast which resulted in a short term dust event that would have been visible from off site.	N/A
27/11/2014	12:00am to 3:00am	Telephone call to project member	Noise	The residents made a call to the Environmental Manager to discuss the intrusive noise coming from the mine site. The noise events occurred on and around mid night on the 24th through to 26th and lasted for a couple of hours.	Maules Creek Coal provided the EPA with attended noise monitoring reports. These reports provide results from monitoring events that have occurred on a monthly basis. The results of the reports show no noise exceedances. Further discussions with the EPA and residents are continuing with unattended monitoring units being reviewed and considered.	N/A

WHITEHAVEN COAL

Date	Time	Method used	Category	Nature of Complaint / Enquiry	Action Taken	if no action, why not
9/12/2014	12:00am to 3:00am	Complaint to EPA	Noise	Complaint logged with the EPA on the 28th of November. Details of the complaint; On Friday night 21/11/14 and Saturday night 22/11/14 the noise from Maules Creek (Whitehaven Coal) was extremely noisy but not in their front yard. Caller advised that they use their front yard as in indicator as to how close the work is to their house and how noisy it is. On Monday night 24/11/14 through to Tuesday morning 25/11/14 it was extremely noisy in their front yard. Caller said the noise started on Monday night but doesnt recall the time it went through until Tuesday morning about 9:00am or 10:00am but there was a short break during this time. The noise was from trucks, beeping, machinery etc.Then last night Wednesday 26/11/14 the noise started again at about 11:00pm or 12:00am and went on and off until this morning the 27th when the wind started blowing. The noise was extremely noisy and in their front yard. Caller advised that they run the ceiling fan to try to drown out the noise but this didnt work last night or Monday night.	Maules Creek Coal provided the EPA with attended noise monitoring reports. These reports provide results from monitoring events that have occurred on a monthly basis. The results of the reports show no noise exceedances.	N/A
15/12/2014	12:00am to 3:00am	Complaint to EPA	Noise and Air Quality	The dust complaint relates to the blast that occurred about 12:50pm today where the dust cloud blew directly towards their property. The dust cloud travelled across about 2/3 of their property. The dust cloud did not drift across his residence. It dissipated beforehand. Also noise was a concern on the night of 9 Dec, the morning of 10 Dec and the night of 11 Dec.	Investigation into the complaint revealed that a blast event was undertaken onsite at this time. This caused a short term dust event. From the visual inspections following the blast the dust cloud had dissipated prior to leaving site. No breach in air quality was recorded at the monitors	N/A
16/12/2014	12:00am to 3:00am	Complaint to EPA	Air Quality	EPA received a complaint this morning at 8:15am about dust levels from the mine site. Dust was sitting over the site at 7am at 8am there appears to be a number of constant dust sources. These appear to be from specific activities.	Response provided to the EPA on what activities were undertaken to control/mitigate dust generation on site. Records of monitoring results and weather conditions were provided. Further resources have been investigated including additional water carts, additional water fill points and dust control suppressants.	N/A

WHITEHAVEN COAL

Date	Time	Method used	Category	Nature of Complaint / Enquiry	Action Taken	if no action, why not
17/12/2014	12:00am to 3:00am	Complaint to EPA	Air Quality	The EPA has received a dust related complaint this morning from Maules Creek Coal Mine. The complainant stated that when they went outside this morning at about 6am, dust was thick across their property. It did not disperse until the wind from the NW picked up at around 8am.	Response provided to the EPA along with monitoring results. An operational a review on effectiveness was completed. Additional water carts are being used, additional water fill point has been installed and the use of dust suppressants being applied.	N/A