

# MAULES CREEK COAL MINE

## 2017 ANNUAL REVIEW



Table 1 Annual Review Title Block

<b>Name of Operation</b>	Maules Creek Coal Mine
<b>Name of Operator</b>	Maules Creek Coal Pty Ltd
<b>Development consent / Project Approval #</b>	Project Approval 10_0138
<b>Name of holder of development consent/project approval</b>	Aston Coal 2 Pty Ltd.
<b>Mining lease #</b>	CL 375, ML1719 and ML1701.
<b>Name of holder of mining lease</b>	Maules Creek Coal JV which comprises: Aston Coal 2 Pty Ltd (75%), ICRA MC Pty Ltd (15%), J Power Australia Pty Ltd (10%)
<b>Water Licence #</b>	Refer to Water Licences in Table 1
<b>Name of holder of water licence</b>	Aston Coal 2 Pty Ltd, ICRA MC Pty Ltd, J Power Australia Pty Ltd
<b>MOP/ RMP start date</b>	January 2016
<b>MOP/RMP end date</b>	January 2018
<b>Annual Review Commencement Date</b>	1 January 2017
<b>Annual Review Completion Date</b>	31 December 2017
<p><b>I, Peter Wilkinson, certify that this audit report is a true and accurate record of the compliance status of Maules Creek Coal Mine for the period 1<sup>st</sup> January 2017 to 31 December 2017, and that I am authorised to make this statement on behalf of Maules Creek Coal Pty Ltd.</b></p> <p>Note.</p> <p>a) The Annual Review is an 'environmental audit' for the purposes of section 122B (2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</p> <p>b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</p>	
<b>Name of Authorised Reporting Officer</b>	<b>Peter Wilkinson</b>
<b>Title of Authorised Reporting Officer</b>	<b>General Manager</b>
<b>Signature</b>	
<b>Date</b>	26 /03 /18

## TABLE OF CONTENTS

<b>1</b>	<b>STATEMENT OF COMPLIANCE .....</b>	<b>1</b>
<b>2</b>	<b>INTRODUCTION .....</b>	<b>5</b>
2.1	PROJECT BACKGROUND .....	5
2.2	PROJECT DESCRIPTION .....	5
<b>3</b>	<b>APPROVALS .....</b>	<b>9</b>
<b>4</b>	<b>OPERATIONS SUMMARY .....</b>	<b>13</b>
4.1	EXPLORATION ACTIVITIES .....	13
4.2	CONSTRUCTION .....	13
4.3	MINING OPERATIONS .....	13
4.4	COAL HANDLING AND PROCESSING .....	13
4.5	OTHER OPERATIONS .....	14
4.6	NEXT REPORTING PERIOD .....	14
<b>5</b>	<b>ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW .....</b>	<b>15</b>
<b>6</b>	<b>ENVIRONMENTAL PERFORMANCE .....</b>	<b>16</b>
6.1	METEOROLOGICAL MONITORING .....	16
6.2	AIR QUALITY .....	19
6.3	GREENHOUSE GAS .....	24
6.4	NOISE .....	25
6.5	BLAST .....	30
6.6	BIODIVERSITY .....	33
6.7	ABORIGINAL CULTURAL HERITAGE .....	39
6.8	HISTORIC HERITAGE .....	41
6.9	TRAFFIC .....	41
6.10	WASTE MANAGEMENT .....	42
6.11	HAZARDOUS MATERIALS .....	43
6.12	VISUAL & LIGHTING .....	44
6.13	BUSHFIRE .....	44
6.14	PUBLIC SAFETY .....	45
<b>7</b>	<b>WATER MANAGEMENT .....</b>	<b>46</b>
7.1	WATER SUPPLY .....	46
7.2	SURFACE WATER MANAGEMENT .....	47

7.3	GROUNDWATER.....	52
7.4	SITE WATER BALANCE.....	56
<b>8</b>	<b>REHABILITATION.....</b>	<b>58</b>
8.1	REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD.....	58
<b>9</b>	<b>COMMUNITY.....</b>	<b>63</b>
9.1	COMMUNITY ENGAGEMENT ACTIVITIES.....	63
9.2	COMMUNITY CONTRIBUTIONS & INITIATIVES.....	63
9.3	COMMUNITY COMPLAINTS.....	66
<b>10</b>	<b>INDEPENDENT AUDITS.....</b>	<b>68</b>
10.1	MANDATORY ENVIRONMENTAL NOISE AUDIT.....	68
10.2	EPA & DPE DUST BENCHMARKING STUDY.....	68
10.3	INDEPENDENT BIODIVERSITY AUDIT.....	68
10.4	INDEPENDENT ENVIRONMENTAL AUDIT.....	69
<b>11</b>	<b>INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD.....</b>	<b>70</b>
11.1	NON-COMPLIANCES.....	70
11.2	REPORTABLE INCIDENTS OR EXCEEDANCES.....	71
11.3	REGULATORY ACTIONS.....	71
<b>12</b>	<b>ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD.....</b>	<b>72</b>

**LIST OF TABLES**

Table 1	Annual Review Title Block.....	i
Table 2	Statement of Compliance.....	1
Table 3	Compliance Status Key.....	2
Table 4	Non-Compliances.....	3
Table 5	Licences, Leases and Approvals.....	9
Table 6	Production Summary.....	13
Table 7	Coal Transport.....	14
Table 8	Summary of Weather recorded at the MCC AWS.....	17
Table 9	Deposited Dust Monitoring Results.....	22
Table 10	Summary of Blasting Results.....	31
Table 11	Water Take.....	46
Table 12	Site Water Balance (Calenda Year 2017).....	57
Table 13	Rehabilitation Objectives.....	58
Table 14	Rehabilitation Status.....	59
Table 15	Topsoil Balance.....	61
Table 16	Summary of Community Complaints and Enquiries.....	66

Table 17 IEA Action Plan Progress.....	69
Table 18 Non-Compliance Details and Proposed Action Plan .....	70

## LIST OF FIGURES

Figure 1 Project Locality Plan .....	7
Figure 2 Biodiversity Offset Areas .....	8
Figure 3 AWS Monitoring Location .....	18
Figure 4 Air Quality Monitoring Location .....	21
Figure 5 Noise Monitoring Network Locations .....	28
Figure 6 Blasting Monitoring Network Locations.....	32
Figure 7 Sediment Dam Monitoring Locations.....	48
Figure 8 Surface Water and Geomorphological Monitoring Locations .....	49
Figure 9 Groundwater Monitoring Locations.....	55
Figure 10 Mining Domains at Completion of the Reporting Period (2017) .....	60

## LIST OF APPENDICES

APPENDIX A BLAST MONITORING RECORDS.....	74
APPENDIX B COAL TRANSPORT RECORDS .....	78
APPENDIX C ANNUAL SOUND POWER TESTING .....	88
APPENDIX D SURFACE WATER .....	93
APPENDIX E GROUNDWATER.....	101

**MAULES CREEK COAL MINE  
2017 ANNUAL REVIEW**

**1 STATEMENT OF COMPLIANCE**

This Annual Review has been prepared to provide a summary of the environmental performance of the Maules Creek Coal Mine (MCCM) over the reporting period. The compliance status of the MCCM against relevant approvals during the reporting period was assessed as at the end of the reporting period (i.e. 31 December 2017) and is summarised in **Table 2**. In addition, compliance with the Environment Protection Licence (EPL) has been assessed where required against the Project Approval, specifically Schedule 3, conditions 26, 30, 33 (c), 38 (b) and 40 (b).

**Table 2 Statement of Compliance**

Were all the conditions of the relevant approvals complied with?	Yes/No
Project Approval PA 10_0138	No
Coal Lease CL 375	Yes
Mining Operations Plan (MOP)	Yes
Mining Lease ML 1701	Yes
Mining Lease ML 1719	Yes
Exploration Licence A 346	Yes
Environment Protection Licence (No. 20221) (applicable conditions as above)	No
90WA801901 DWE Ref no: 90AL801900	Yes
Groundwater Monitoring Bores: 90BL255779, 90BL255780, 90BL255781, 90BL255782, 90BL255783, 90BL255784, 90BL255785, 90BL255786, 90BL255787, 90BL255788, 90WA822412, 90BL255789 and 90BL255790.	Yes
WAL12811	Yes
WAL29467	Yes
WAL29588	Yes
WAL27385	Yes
WAL12479	Yes
WAL27383	Yes
WAL13050	Yes
WAL41585	Yes
WAL36641	Yes
WAL12491	Yes
WAL12480	Yes
WAL12645	Yes

Any non-compliances during the reporting period are detailed in **Table 4** and ranked according to the compliance status key presented in **Table 3**. **Section 11** provides further details of any non-compliance and actions undertaken or proposed for the following reporting period to prevent re-occurrence and mitigate any potential adverse effects.

**Table 3 Compliance Status Key**

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> <li>potential for serious environmental consequences, but is unlikely to occur; or</li> <li>potential for moderate environmental consequences, but is likely to occur</li> </ul>
Low	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> <li>potential for moderate environmental consequences, but is unlikely to occur; or</li> <li>potential for low environmental consequences, but is likely to occur</li> </ul>
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

**Table 4 Non-Compliances**

Relevant Documentation	Condition. #	Condition Description (Summary)	Compliance Status	Comment	Where addressed in Annual Review
PA10_0138	Schedule 3 Condition 25	Section 5.2 of the Blast Management Plan - MCCM will set up a SMS notification to contact local residents 24 hours prior to blasting event.	Non-compliant	Notification of four (4) community members prior to a blast on Monday 5 June 2017 did not occur due to a technical error with the automated messaging system provider.	Section 11
	Schedule 3 Condition 33(b)	The proponent shall <i>(b) operate a comprehensive air quality management system on site that uses a combination of predictive meteorological forecasting, predictive and real time air dispersion modelling and real-time air quality monitoring data.</i>	Non-compliant	A real time modelling system was in a trial phase and an alternative interim system was in operation. The BTM Air Quality Strategy requiring the operation of a predictive modelling system was pending regulatory approval. Despite the recorded technical non-compliance of a predictive air dispersion model not in final operation, a monitoring and modelling system was in place as part of management measures.	Section 6.2 Section 11
	Schedule 3 Condition 12	Ensure all equipment and noise control measures deliver SPL's that are equal to or better than the MCC EA.	Non-compliant	Not all fixed plant sound power levels for plant tested in 2016 met the predicted sound power targets described in the Project EA. Five individual fixed plant items at the CHPP were above the EA modelled values, however overall the CHPP was quieter than modelled. These were progressively retested and improvements implemented, where feasible, during 2017. A modification to Schedule 3 Condition 12 of PA10_0138 is pending determination.	Section 11
	Schedule 3 Condition 7	The proponent shall ensure that operational noise generated by the project does not exceed the criteria in Table 5.	Non-compliant	Attended noise monitoring recorded technical exceedances of the night time criteria at monitoring points NM1 and NM5 due to the addition of the low frequency modifying factor under the NSW Industrial Noise Policy.	Section 11

Relevant Documentation	Condition. #	Condition Description (Summary)	Compliance Status	Comment	Where addressed in Annual Review
EPL 20221	M7.3 Condition 7	The Licensee must monitor the noise or vibration parameter specified in the licence.	Non-compliant	Blast monitoring results were not captured due to an equipment error on 28 and 29 February 2017.	Section 6.5 Section 11
	Condition 3 (L3.1)	Noise generated at the premises must not exceed the noise limits specified in the licence.	Non-compliant	Attended noise monitoring recorded a technical exceedance of the noise criteria at monitoring points NM1 and NM5 due to the addition of the low frequency modifying factor applied under the NSW Industrial Noise Policy.	Section 11
	P1.3 Condition 2	Specified points for the purposes of monitoring (EPA identification number 13 and 14).	Non-compliant	Groundwater samples unable to be taken from RB01a and RB02a from early 2017 onwards as these were removed due the progression of mining. An alternative monitoring location is proposed in the licence amendment pending approval.	Section 7.3 Section 11



## 2 INTRODUCTION

This is the fifth Annual Review produced for the Maules Creek Coal Mine (MCCM) and has been prepared in accordance with the NSW Department of Planning and Environment's (DPE) Integrated Mining Policy – Annual Review Guideline, October 2015. This document has been prepared to satisfy the following requirements:

- the Annual Review requirements of the DPE under the Project Approval PA 10\_0138 (Condition 4 Schedule 5);
- Environmental Management Report requirements of the Division of Resources & Geoscience (DRG) under the MCCM Mining Leases; and
- the routine reporting expectations of DPI-Water.

### 2.1 PROJECT BACKGROUND

The Maules Creek Coal Mine (MCCM) is located on the north-west slopes and plains of New South Wales (NSW), approximately 18 kilometres (km) north-east of Boggabri within the Narrabri Local Government Area (LGA). The regional centres of Narrabri and Gunnedah are situated approximately 45 km to the north-west and 55 km to the south from the MCCM respectively. The MCCM's regional locality is illustrated in **Figure 1**.

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

An Environmental Assessment for the Maules Creek Coal Project (referred to herein as the EA) was prepared by Hansen Bailey (2011) and was assessed under the NSW Environmental Planning and Assessment Act, 1979 (EP&A Act). The NSW Planning Assessment Commission (PAC), as a delegate for the NSW Minister for Planning and Infrastructure, issued the State environmental approval for the MCCM on 23 October 2012 (i.e. Project Approval PA 10\_0138). The MCCM Commonwealth environmental approval (i.e. EPBC 2010/5566) was granted on 11 February 2013 by the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities.

### 2.2 PROJECT DESCRIPTION

Project Approval (PA 10\_0138) was granted on 23 October 2012 for the construction and operation of an open cut coal mine with an approved maximum ROM coal production rate of 13 Mtpa until the end of December 2034. MCCM covers three mining leases CL 375, ML 1701 and ML1719. The Project Boundary (as defined by PA 10\_0138) and mining authorities are shown on Figure 1 and Biodiversity Offset areas on Figure 2.

A modification to PA 10\_0138 was lodged and approved in 2013 to allow minor adjustments to the alignment of the CHPP infrastructure and the construction and operation of electrical infrastructure.

A second modification to PA 10\_0138 was lodged and approved in 2014 to adjust the location of the raw water pipeline and associated pump station.

A third modification to PA 10\_0138 was lodged in May 2016 and approved in January 2017 to amend the percentage of employee bus use to better reflect the locally residing workforce and associated transport regime.

A fourth modification to PA 10\_0138 was lodged in September 2017 proposing to amend Condition 12a, Schedule 3 of Project Approval 10\_0138 whilst maintaining conditions which require MCC to manage equipment and to maintain compliance with relevant noise levels at private receivers surrounding the MCCM. This modification is currently pending approval at the end of the reporting period and determination anticipated early 2018.

Construction of the MCCM commenced in December 2013 and was substantially completed in 2015. The operations phase of the MCCM commenced in June 2014, and coal was first transported from the MCCM via the rail spur in December of 2014.

The key operational personnel responsible for environmental management at MCCM during the reporting period included:

Name	Peter Wilkinson
Title	General Manager
Address	Therribri Road, Boggabri, NSW 2382
Phone Number	02 6749 7800

Name	Matthew Sparkes
Title	Mine Manager
Address	Therribri Road, Boggabri, NSW 2382
Phone Number	02 6749 7800

Name	Scott Mitchell
Title	Environmental Superintendent
Address	Therribri Road, Boggabri, NSW 2382
Phone Number	02 6749 7800

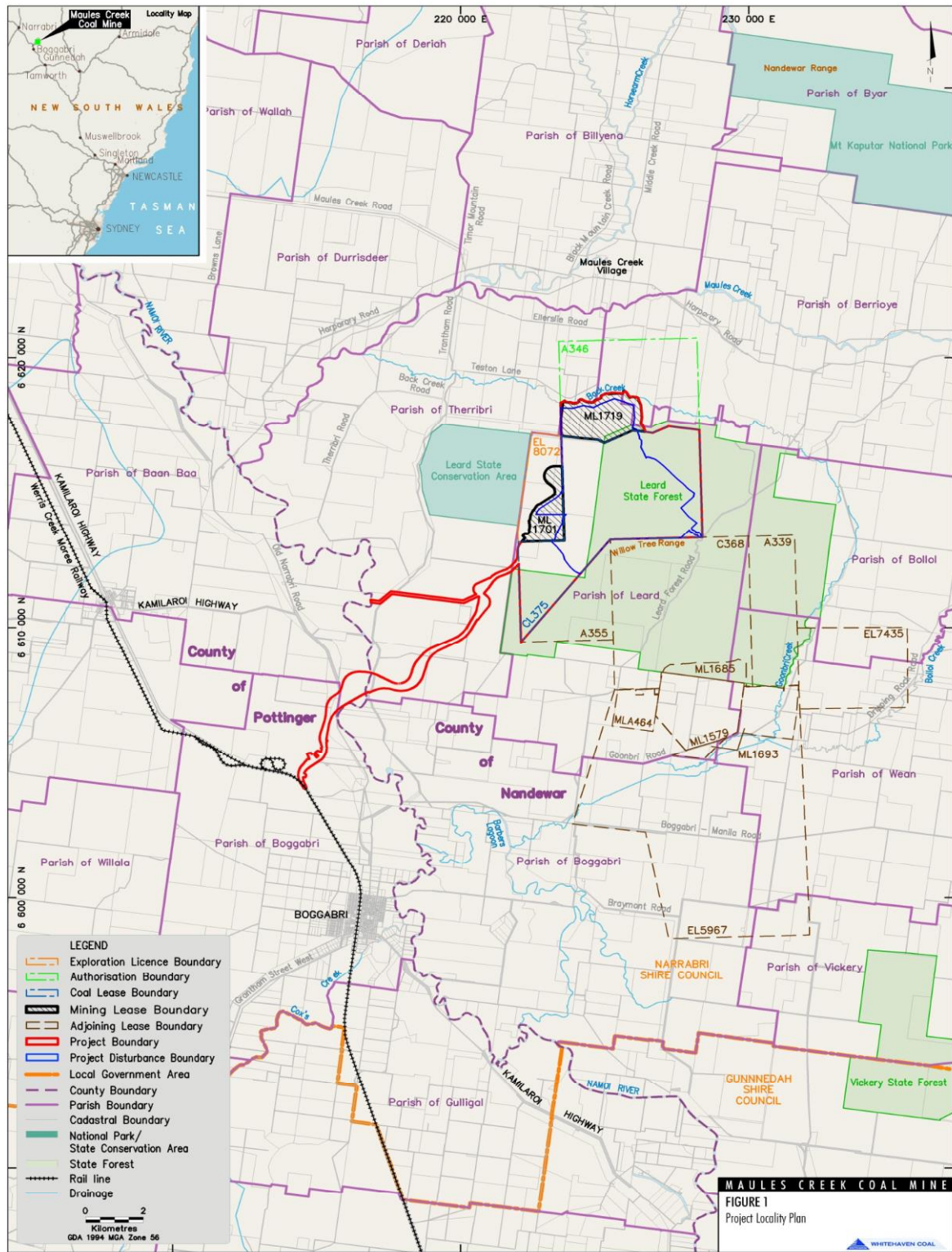
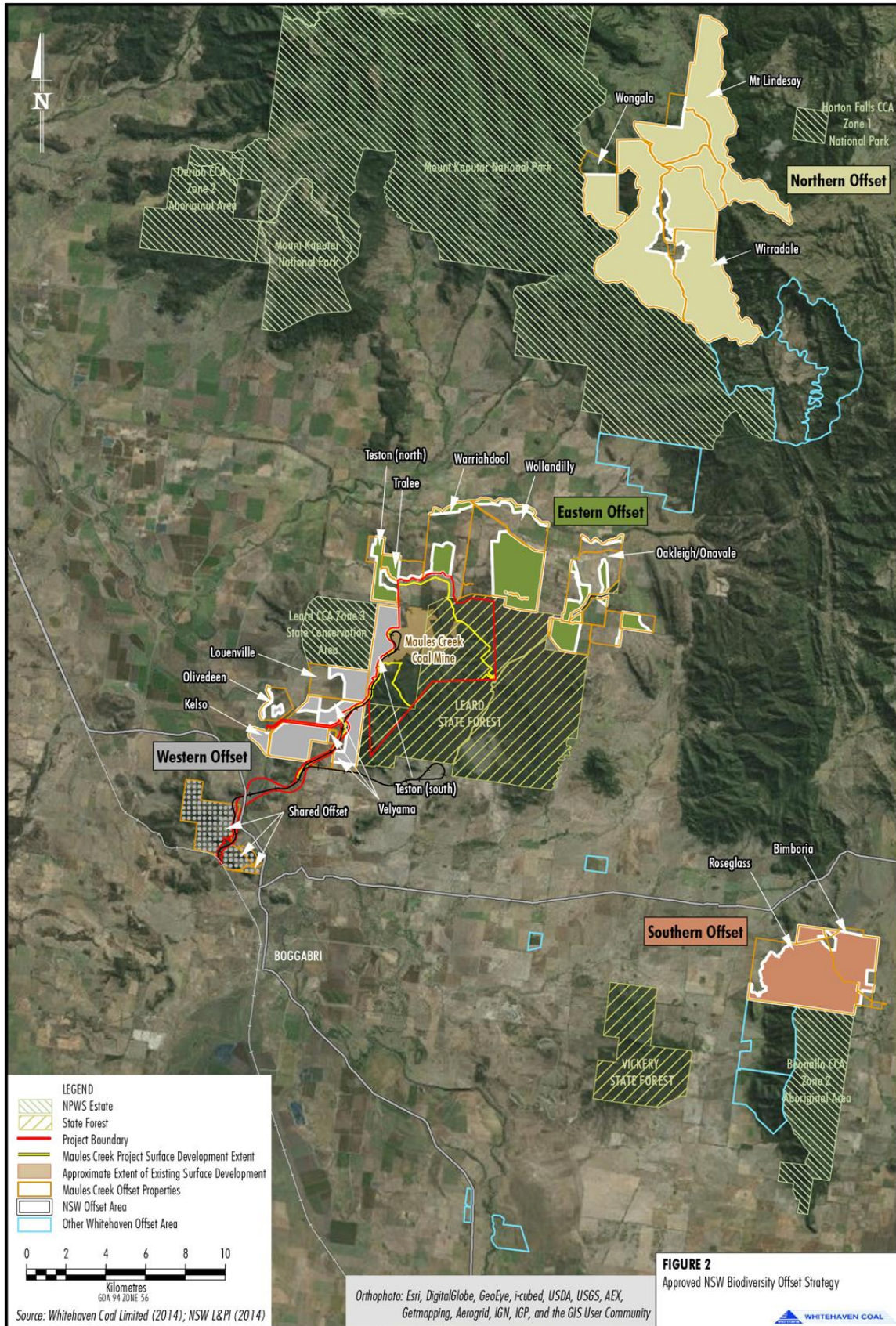


Figure 1 Project Locality Plan





**Figure 2 Biodiversity Offset Areas**

### 3 APPROVALS

**Table 5** provides a summary of the key licences, leases and approvals that have been obtained for the MCCM to enable the construction and operation of the mine.

**Table 5 Licences, Leases and Approvals**

Approval	Reference	Detail	Validity Dates
Project Approval	PA 10_0138	Pursuant to the Project EA, the PAC approval of the MCCM referred to in Schedule 1 subject to the conditions in Schedules 2 to 5.	23 October 2012 to December 2034
Project Approval Modification	PA 10_0138 (MOD1)	Pursuant to the Maules Creek Project Approval Modification Environmental Assessment, 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 Environmental Assessment, the Modification was granted to allow the design of key water related infrastructure to be optimised.	Granted on 10 March 2014
Project Approval Modification	PA 10_0138 (MOD3)	Pursuant to the Maules Creek Project Approval Modification Environmental Assessment, the Modification was granted to amend the employee bus use percentage to better reflect the locally residing workforce and associated transport regime.	Granted on 13 January 2017
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 metre (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 m depth (~1,700 ha).	Expires 28 February 2021
Mining Lease	ML 1719	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 (OEA) for the MCCM.	Granted 11 November 2015 to 11 November 2036
Mining Lease	ML 1701	Covers the area to the west of CL 375 within the Project Boundary that will facilitate the extraction of some coal and accommodate some mine related infrastructure.	Granted 9 October 2014 to 9 October 2035
Exploration Lease	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



Approval	Reference	Detail	Validity Dates
Surface Water Licence Water Supply Works and Water Use Approval	WAL41585 90CA834999	Previously 90SL101060. Water supply for mining and irrigation one overshoot dam and a 150 millimetre (mm) Centrifugal Pump. 30 units.	Converted to WAL41585 Renewed 1 July 2017. Expires 9 November 2025
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 2027
Forest Corporation NSW Compensation	N/A	Agreement applies to part of Leard State Forest No. 420 that occurs within CL 375 and any mining lease pursuant to MLA 404 being ML1719.	From 1 July 2016
Emergency Tailings Emplacement	N/A	Notification of High Risk Activity – Emergency Tailings Emplacement	Notification provided April 2015.
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 Licence	90WA822412	Previously 90BL255704. Gunnedah – Oxley Basin Murray Darling Basin Groundwater Source. Works approval for WAL29467.	Granted 16 January 2012 to 06 June 2025
Bore Licence	90WA820120	Previously 90BL001144. Gunnedah – Oxley Basin Murray Darling Basin Groundwater Source.	Granted 28 February 1939 for perpetuity. Converted 16 January 2012.

Approval	Reference	Detail	Validity Dates
Bore Licences	90BL255779 90BL255780 90BL255781 90BL255782 90BL255783 90BL255784 90BL255785 90BL255786 90BL255787 90BL255788 90BL255789 90BL255790	For the purpose of Monitoring Bores.	Granted 25 August 2010 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	306 ML water licence from porous rock water source for construction purposes. Refer 90WA822412	Tenure continuing
Water Access Licence	WAL29588	0ML 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	3000 ML water licence from Lower Namoi Regulated River Water under works approval 90WA801901.	Granted 23 August 2011 for perpetuity.
Water Access Licence	WAL36641	800 ML water licence from Gunnedah-Oxley Basin MDB groundwater source.	Perpetuity
Water Access Licence	WAL12491	77 ML water licence from Upper Namoi Zone 11.	Granted 1 November 2006 until 31 October 2019
Water Access Licence	WAL12480	215 ML water licence from Upper Namoi Zone 11 under works approval 90CA807654.	Granted 1 November 2006 until 31 October 2019.

Approval	Reference	Detail	Validity Dates
Environment Protection Licence	EPL 20221	The NSW Environment Protection Authority (EPA) issues environment protection licences to the owners or operators of various industrial premises under the <i>Protection of the Environment Operations Act, 1997</i> (POEO Act).	Issued 2 May 2013
Mining Operations Plan Amendment B	MOP 2016-2018	Details mining and rehabilitation activities during the applicable period at MCCM.	8 November 2016 to 30 November 2017  Note: a new amendment was submitted and was pending approval at the end of the reporting period.



## 4 OPERATIONS SUMMARY

### 4.1 EXPLORATION ACTIVITIES

Exploration drilling was undertaken during the reporting period in accordance with the approved Mining Operations Plan (MOP) to further assist production planning and assess coal reserves within CL 375.

All exploration drilling was completed within previously cleared areas to minimise disturbance. Core and chip holes were undertaken to further define coal quality, geotechnical and structural information.

### 4.2 CONSTRUCTION

Construction of a mobile equipment wash plant, permanent maintenance workshop, stores building, tyre change area and associated storage areas were all completed during the last quarter of 2017.

### 4.3 MINING OPERATIONS

MCCM is an open cut coal mine with an approved maximum ROM coal production rate of 13 Mtpa to December 2034. Pre-mining clearance activities including ecological, archaeological and soil analysis were undertaken in line with the relevant approvals and management plans. The 2017 vegetation clearing activities were completed during the approved annual clearing period (15<sup>th</sup> February to the 30<sup>th</sup> April each year).

Topsoil was reclaimed from the area to be mined and stockpiled for later use on rehabilitation areas. Overburden is blasted prior to being removed by loader and / or excavator and trucks before proceeding with coal extraction. **Table 6** presents the production summary for the previous and current reporting periods and the anticipated production schedule for the next reporting period.

**Table 6 Production Summary**

Material	Approved limit	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Waste Rock / Overburden	81,000,000m <sup>3</sup> (MOP Year 1, 2017, Table 4)	48,818,073	63,205,733	75,634,842
ROM Coal	13 Million Tonnes (PA 10_0138 Sch. 2 Cond.6) > 5 Million Tonnes handled (EPL 20221)	8,904,234	10,494,587	11,700,375
Reject Material*	NA	560,272	999,530	1,374,241
Saleable Product	12.4 Million Tonnes (PA 10_0138 Sch.2 Cond.9) > 5 Million Tonnes produced (EPL 20221)	8,240,527	9,583,239	10,327,796

\* Coarse and fine reject materials have been combined for reporting purposes as the rejects streams are blended at the CHPP to form a combined reject and tailings material prior to disposal.

### 4.4 COAL HANDLING AND PROCESSING

Product coal generated by the MCCM includes bypass coal (i.e. ROM coal that is crushed and screened but not washed in the CHPP) and washed coal that is processed in the CHPP. The product coal is stockpiled and then reclaimed and fed via conveyors to the Train Loading Facility. Once loaded, trains

travel from the MCCM via the Maules Creek Rail Spur, Shared Rail Spur and the Werris Creek to Mungindi Railway Line to the Port of Newcastle for export.

#### 4.5 OTHER OPERATIONS

##### 4.5.1 Hours of Operation

Mining operations are conducted up to 24 hours per day, seven days per week.

##### 4.5.2 Transport Rates

Coal is only transported from the MCCM via the Maules Creek rail spur and the shared portion of the Boggabri Coal rail spur.

The number of laden trains and amount of coal transported from MCCM, presented in

Table 7 has been recorded in accordance with:

- Schedule 2 Condition 8 and 9 of PA 10\_0138, 'Coal Transport'; and
- Schedule 3 Condition 65 of PA 10\_0138, 'Monitoring of Coal Transport'.

**Table 7 Coal Transport**

Parameter	Criteria	Total
Maximum number of laden trains from the site in any one day	10	8
Maximum number of laden trains from the site in a day when averaged over a calendar year	7	3.5
Maximum Tonnes of product coal transported from the site (Mt)	12.4	9.6

**Appendix B** details the coal transport records in accordance with the reporting requirements under Condition 65 (a) and (b) of PA 10\_0138.

#### 4.6 NEXT REPORTING PERIOD

##### 4.6.1 Exploration

Exploration drilling will continue to be undertaken at the MCCM to further assess the coal reserves within the tenements. The focus of the ongoing exploration drilling is likely to involve the following:

- investigation of the JORC resource status within A346, in accordance with the DRE requirements for exploration leaseholders;
- further exploration within CL 375; and
- further delineation of outlying coal prospective areas.

Further details of the proposed drilling program are provided in the approved MOP.

##### 4.6.2 Construction Activities

Infrastructure upgrades are currently being investigated and may be implemented within the following reporting period including improvements to the mine and maintenance infrastructure areas.

##### 4.6.3 Mine Operations

The mine production rates are planned to ramp up to approximately 12 Mtpa of ROM coal and approximately 76 million bank cubic metres (Mbcm) of overburden during 2018.

Vegetation clearing activities in mining areas over the next reporting period will be conducted in accordance with relevant Environmental Management Plans. The clearing program will be undertaken

during the annual clearing period from the 15 February to the 30 April as specified within the BMP, except under exceptional circumstances and with the approval by the Secretary of the DPE.

#### **4.6.4 Overburden Emplacements**

The OEA will continue to develop generally in accordance with Project Approval PA 10\_0138 and the Mining Operations Plan 2018-22 which are available on the Whitehaven Coal website.

#### **4.6.5 Mining Fleet Upgrades**

Additional procurement of mining fleet will be subject to mine planning requirements during 2018

## **5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW**

There were no actions required by the departments as an outcome from the 2016 Annual Review.

## 6 ENVIRONMENTAL PERFORMANCE

The following sub-sections report on the environmental performance achieved during the reporting period and provide a summary of the environmental monitoring data compared to data predictions, trends and management measures.

### 6.1 METEOROLOGICAL MONITORING

Meteorological monitoring is conducted onsite in accordance with Schedule 3 Condition 35 of the PA 10\_0138 at the MCC Automatic Weather Station (AWS). Additional weather data is available from other monitoring locations for reference purposes. The location of the MCCM AWS is illustrated on **Figure 3** below, **Table 8** summarises the monthly meteorological conditions at the MCC AWS for the reporting period. The total annual rainfall recorded for the year was approximately 546.8 millimetres (mm). The annual rainfall total is below the average rainfall recorded in the EA. The maximum rainfall was recorded during October (94.6mm), which is higher than the historical average of (51.2mm). In addition, several months across the 2017 calendar year produced average rainfall results that were relatively lower than the mean rainfall recorded in the EA.

The temperature records and wind patterns are relatively consistent with the long term climatic data recorded at nearby BOM sites, and the predictions from the EA. The average temperature during the reporting period was 19.1°C, a minimum temperature of -3.3°C was recorded in August and a maximum temperature of 45.3°C was recorded in February. South easterly winds were predominant throughout the first half of 2017. July through to December 2017 recorded measured winds coming predominantly from the western quadrants with the exception of November which experience primarily south easterly winds.

**Table 8 Summary of Weather recorded at the MCC AWS**

Month	Measured Rain (mm)	Cumulative Rainfall (mm)	Rainfall Days	2m Temperature (°C)			10m Temperature (°C)			Sigma Theta			10m Wind	
				Min	Mean	Max.	Min	Mean	Max	Min	Mean	Max	Av. Speed (m/s)	Predominant Direction
January	76.4	76.4	10	15.5	29.0	42.3	16.0	29.0	41.2	0.0	22.5	100.6	2.6	SE
February	17.6	94.0	5	8.3	28.2	45.3	10.1	28.4	44.2	0.0	24.6	103.2	2.4	SE
March	59.0	153.0	11	12.2	23.6	34.3	12.8	23.6	33.2	0.1	14.7	98.7	2.4	SE
April	9.6	162.6	3	1.5	18.0	28.4	2.8	18.3	27.5	0.0	9.8	91.5	2.2	SE
May	78.0	240.6	7	-0.5	14.8	25.9	0.5	15.4	25.2	0.5	12.8	92.3	1.5	SE
June	63.8	304.4	13	-1.5	11.4	21.1	0.0	11.9	20.9	0.0	11.5	93.2	1.6	SE
July	9.2	313.6	6	-2.2	9.2	24.4	-1.5	10.2	24.1	0.5	13.9	91.2	1.4	WNW
August	19.6	333.2	3	-3.3	10.5	26.2	-2.3	11.4	26.0	0.5	13.3	90.2	1.7	WNW
September	7.0	340.2	4	-1.0	15.7	34.7	0.2	16.5	34.1	0.5	13.2	92.6	2.1	WNW
October	94.6	434.8	11	5.8	20.3	35.4	8.0	20.6	34.6	0.3	10.6	85.9	2.4	WNW/SE
November	84.4	519.2	13	4.4	21.5	33.4	6.5	21.7	33.3	0.0	10.4	94.4	2.3	SE
December	27.6	546.8	5	9.4	26.6	40.3	11.0	26.8	39.1	0.6	11.7	87.4	2.4	WNW



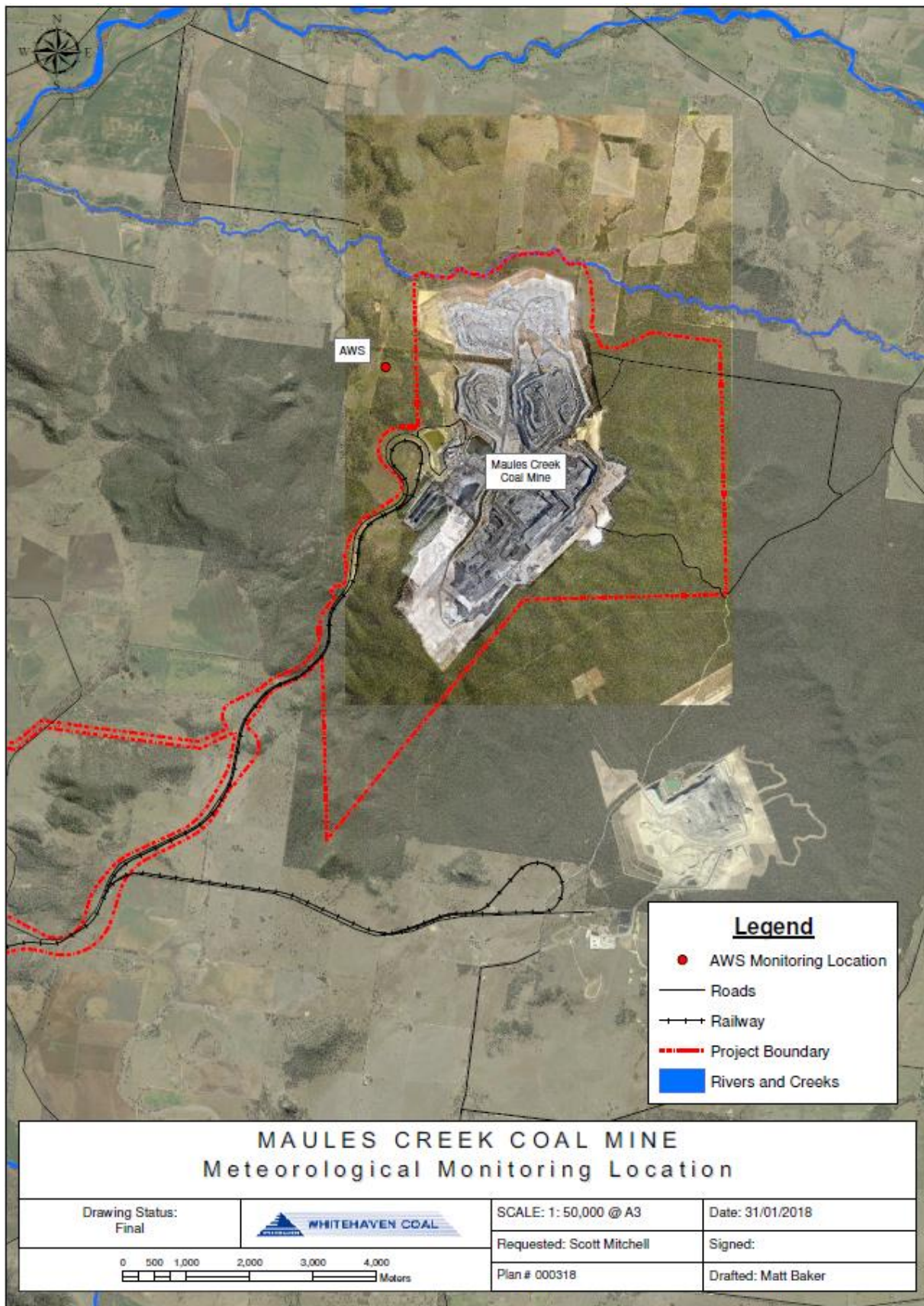


Figure 3 AWS Monitoring Location

## 6.2 AIR QUALITY

### 6.2.1 Environmental Management

Potential impacts to air quality are managed in accordance with the:

- air quality criteria prescribed under schedule 3 condition 29 of the Project Approval;
- relevant EPL conditions; and
- the MCC Air Quality and Greenhouse Gas Management Plan (AQGGMP).

Maules Creek Coal Mine implements a range of controls to manage dust, including but not limited to:

- utilising water carts across the site with water fill points appropriately positioned. Additional contractor water carts are also employed around infrastructure areas and light vehicle road, together with during clearing, mulching and topsoil stripping activities;
- use of a dust suppressant additive on targeted haul roads;
- visual dust assessments regularly undertaken on haul roads;
- modification of work practices where required including changing dumping strategies;
- temporary cessation of operational equipment as required;
- predictive controls and Air Quality Trigger Action Response Plan (TARP) together with the daily risk response report presented to key operational personnel;
- pre-strip areas are kept to a minimum and mulch cover used on cleared areas ahead of mining activities where possible;
- operation of a real time SMS alarming system notifying of elevated dust levels;
- site vehicles restricted to designated routes, with speed limits enforced;
- blasting activities restricted to suitable weather conditions;
- 24 hour notification to key stakeholders and residents of planned blasts;
- water suppression on conveyor transfers and stockpiles at the CHPP;
- additional units within the air quality monitoring network; and
- meteorological monitoring system used to identify conditions pertaining to elevated dust risk.

The MCC Air Quality Monitoring network is illustrated on **Figure 4** and includes:

- continuous monitoring of PM<sub>10</sub> levels at the MCC TEOM (TEOM1). These results are available publically via the EPA website. It is noted that monitoring results from location MCC TEOM2 shown on **Figure 4** which is located on mine owned land are used by MCC for internal management purposes only.
- a third TEOM (TEOM 3) was installed in the Maules Creek area for management purposes during late 2017. This was commissioned as a recommendation from the Katestone Dust Benchmarking Study;
- PM<sub>10</sub> levels are measured at a High Volume Air Sampler (HVAS) on a twenty-four hour basis every six days. Total Suspended Particulate Matter (TSP) is inferred from the measured PM<sub>10</sub> data;
- a network of four dust deposition gauges (DDG's), measuring deposited dust and particulates on a monthly basis; and
- additional sampling units to provide input data for the predictive air quality monitoring software.

The AQMS was submitted to DPE during 2016 and approved in 2017. New predictive air quality modelling simulation software was fully implemented to inform operational risk.

The NSW EPA commenced engagement with regards to a regional Namoi Air Quality monitoring network. The NSW Office Environment & Heritage (OEH) installed a number of units within late 2017. Whitehaven Coal will continue to liaise with the NSW EPA and stakeholders as part of a working group coordinated by the EPA.

An independent Dust Management Benchmarking Study was undertaken in 2016 that was commissioned by regulatory agencies. The report was finalised during March 2017 and available on government websites together with a fact sheet available on the Whitehaven Coal website. Results demonstrated a good level of compliance. MCC has considered the application of the report recommendations and further liaised with EPA and DPE to implement these. Further information can be found in **Section 10.2**.



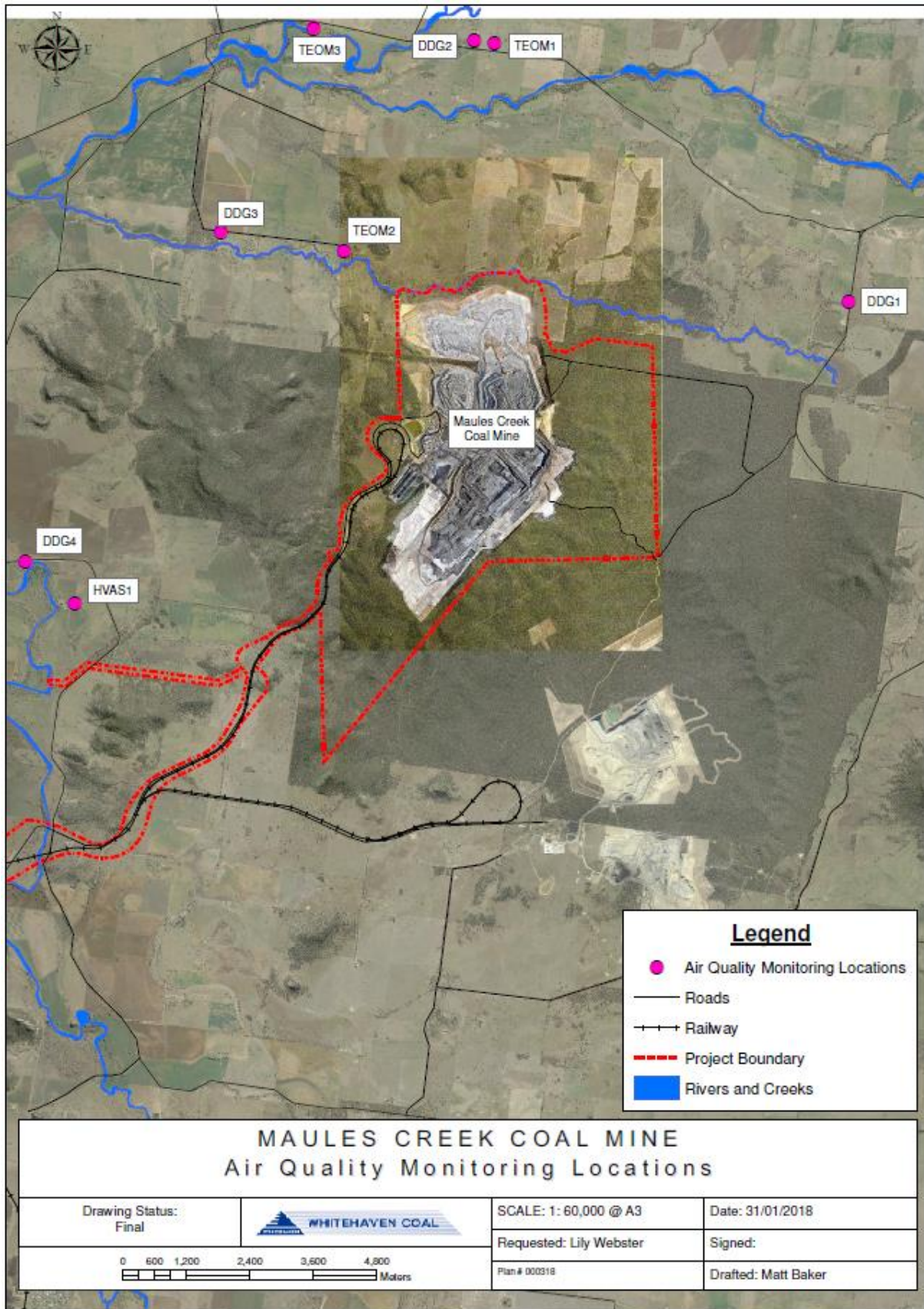


Figure 4 Air Quality Monitoring Location

## 6.2.2 Environmental Performance

A summary of the Depositional Dust air quality monitoring results at MCCM for the reporting period is provided in **Table 9**.

**Table 9 Deposited Dust Monitoring Results**

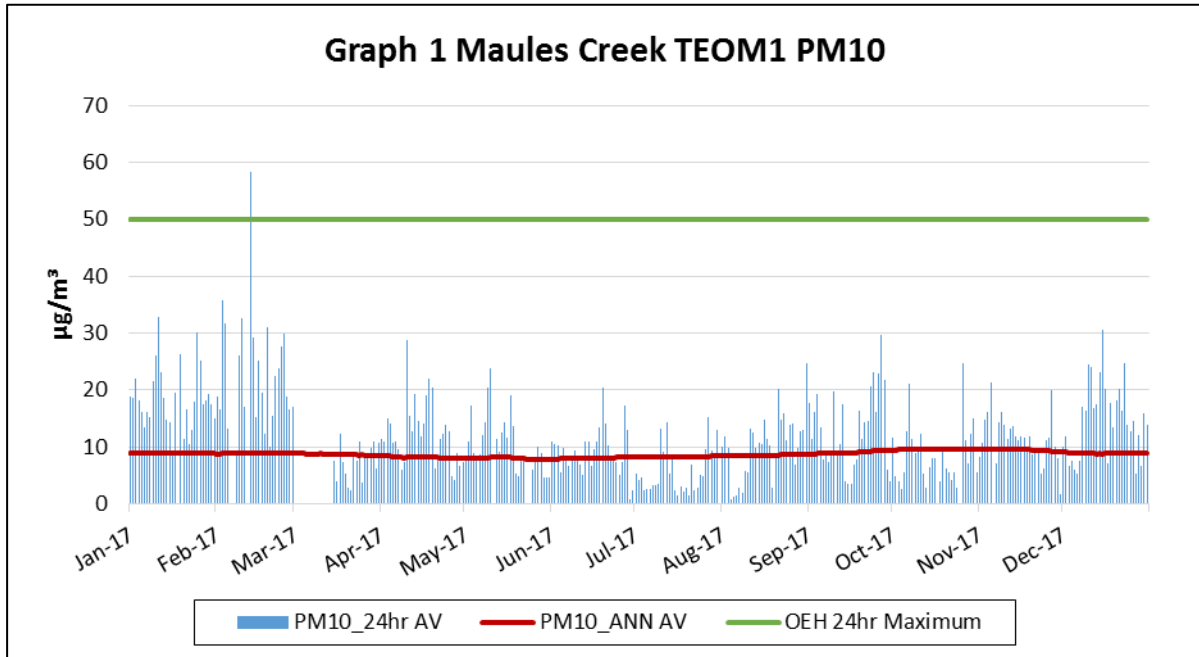
Month	MC1 (g/m <sup>2</sup> )	MC2 (g/m <sup>2</sup> )	MC3 (g/m <sup>2</sup> )	MC4 (g/m <sup>2</sup> )
January	2.2	2.1	0.7	0.8
February	1.1	1.4	1.2	1.5
March	1.3	1.8	2.8	2.0
April	*	*	1.9	1.4
May	*	3.7	1.5	1.1
June	*	1.1	1.3	1.3
July	1.7	0.7	20.2	1.3
August	0.8	1.6	3.2	0.9
September	0.6	3.0	1.9	1.9
October	1.2	2.2	1.9	1.9
November	*	2.6	1.4	1.2
December	1.9	*	0.8	2.4
Annual Average	1.4	2.0	3.2	1.5

\*Results have been removed as they were contaminated (bird droppings, insects and vegetation).

Deposited dust monitoring data demonstrated compliance with the Project Approval (<4g/m<sup>2</sup>) throughout the 2017 calendar year. A result of 20.2 g/m<sup>2</sup> recorded at MC3 for July was further investigated and is unlikely to be attributable to MCCM based on reviewing meteorological conditions and historical monitoring results for both MC3 and other monitoring locations closer to the operation. The annual average was calculated to be below the PA criteria. See **Table 9** above.

Monitoring conducted at the MCC TEOM1 is maintained by an independent consultant and reported the PM<sub>10</sub> annual average remained below the applicable criteria of 30 µg/m<sup>3</sup>. Results are also provided and publically available on the NSW EPA website. On the 13<sup>th</sup> February 2017, TEOM1 recorded a PM<sub>10</sub> result of 58.28 µg/m<sup>3</sup>, slightly above the 24 hour criteria of 50 µg/m<sup>3</sup>. This elevated level corresponds with a bushfire event near the township of Boggabri (within 20km of MCCM). Results from the 1<sup>st</sup> March 2017 to 14<sup>th</sup> March 2017 were determined to be invalid due to mechanical errors that were repaired.

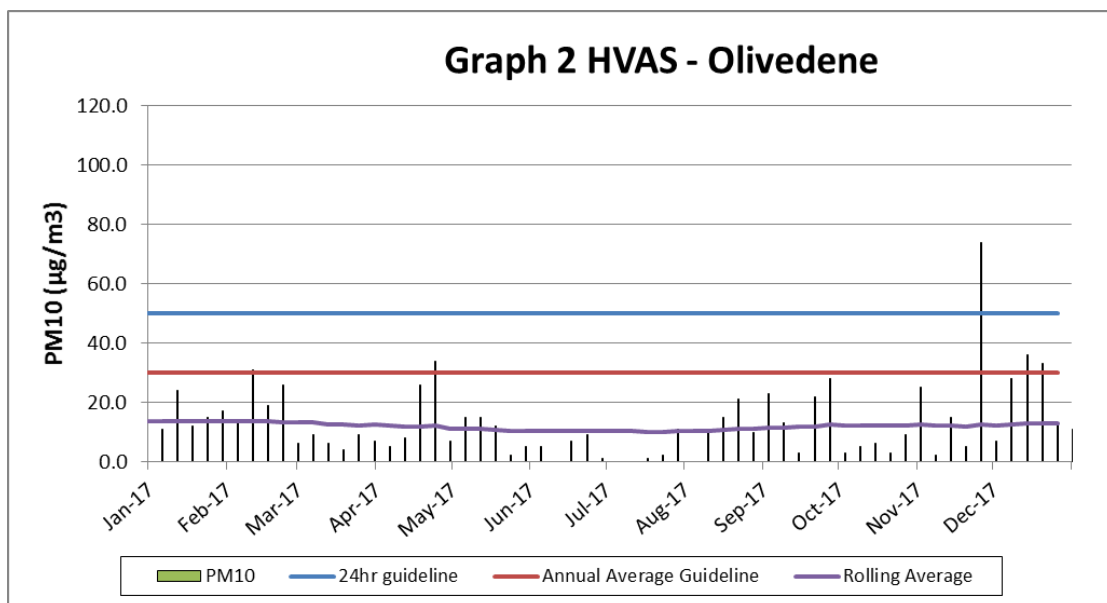
The PM<sub>10</sub> monitoring results from TEOM1 are included in the **Graph 1** below.



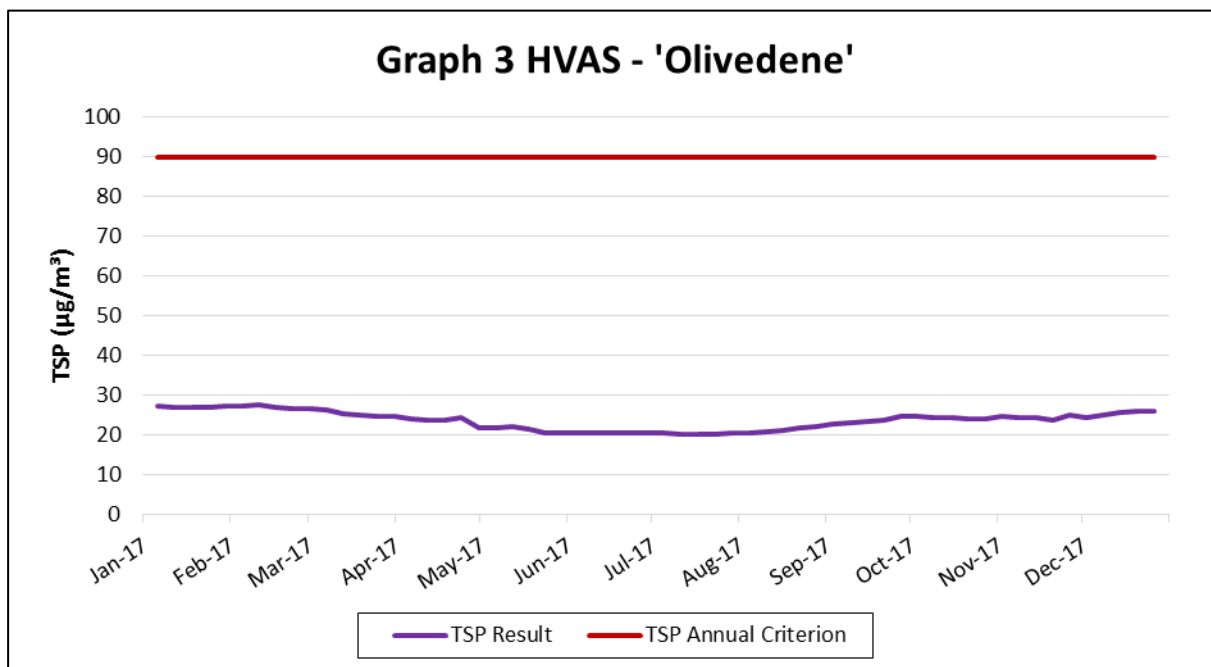
The HVAS PM<sub>10</sub> monitoring results are illustrated in **Graph 2** below.

Monitoring conducted at the MCC HVAS indicated the PM<sub>10</sub> rolling average remained below the applicable criteria of 30 µg/m<sup>3</sup>. On the 26<sup>th</sup> November 2017, the HVAS recorded a PM<sub>10</sub> result of 74 µg/m<sup>3</sup>, above the 24 hour criteria of 50 µg/m<sup>3</sup>. An investigation into MCC’s meteorological and operational data during the 24 hour sampling period revealed that likely sources were from localised non-mining related activities including trucks nearby; as well as other localised dust observed during the time of sample collection. Results recorded at all other approved MCCM air quality monitoring sites, including closer to the operation, on that day remained within the relevant Project Approval criteria.

The air quality monitoring results are generally consistent with previous reporting periods and are in concurrence with the EA predictions.



Total Suspended Particulates (TSP) is inferred from the measured PM<sub>10</sub> data. Monitoring conducted at the MCC HVAS indicated the TSP rolling annual average remained well below the applicable criteria provided in Schedule 3 Condition 29 of PA10\_0138 of 90 µg/m<sup>3</sup>. The TSP monitoring results are illustrated in **Graph 3** below.



### 6.2.3 Proposed Improvement Measures

Proposed measures to continuously improve include:

- continued application of the BTM predictive modelling software and refinement where necessary;
- as mentioned in **Section 6.2.1**, a third TEOM was installed in late December 2017;
- investigations into loading and unloading practices of coal and overburden to address a recommendation from the independent Katestone Best Practice Dust Benchmarking Study;
- commence overburden shaping to assist with enabling the placement of topsoil and rehabilitation in the northern emplacement of the MCCM footprint; and
- continued engagement with the EPA regarding the Namoi Regional Air Quality Monitoring network.

## 6.3 GREENHOUSE GAS

### 6.3.1 Environmental Management

Greenhouse Gas (GHG) emissions at MCCM are managed in accordance with Schedule 3 Condition 27 of PA 10\_0138 and the AQGHGMP. The main sources of GHG emissions considered in the AQGHGMP are:

- fuel consumption (diesel) during mining operations – Scope 1; and
- release of fugitive methane (CH<sub>4</sub>) from the fracturing of coal seams – Scope 1; and indirect emissions resulting from the MCCM’s consumption and use of purchased electricity – Scope 2.

#### **Electricity**

A number of controls were applied to reduce electricity consumption at the MCCM during the reporting period, including:



- the energy efficiency of new electrical equipment is considered during procurement;
- use of variable speed drives on pumps and conveyors in the CHPP;
- avoiding idle running of conveyors in the CHPP; and
- turning off unnecessary lighting around the mine site.

### ***Diesel Consumption***

A number of controls were applied to reduce diesel consumption at the MCCM during the reporting period including:

- the fuel efficiency of all mobile and fixed equipment is considered during procurement;
- ensuring dump trucks are fully loaded where possible prior to hauling to maximise efficiency, i.e. fuel used per unit of material moved;
- maximising the efficiency of the mining fleet through regular maintenance;
- minimising the gradient, length and height of loaded haul runs for dump trucks, where possible;
- in-pit and mobile refueling facilities;
- monitoring system for all heavy vehicle use and fuel burn. This system also determines individual equipment utilisation which assists in minimising fleet size and associated wastage; and
- continued operation of the employee shuttle bus system to and from site.

### **6.3.2 Environmental Performance**

GHG emissions associated with the MCCM are reported through participation in the National Pollutant Inventory (NPI) and as part of the Whitehaven Group in the National Greenhouse and Energy Report Scheme (NGERS). NPI data is publically available on the Commonwealth Department of the Environment website. The total GHG Emissions attributed to the MCCM reported for the NGERS 2017 Financial Year (FY) reporting period was 725,896 tCO<sub>2</sub>-e. The following sections detail the three key GHG contributors calculated for the 2016 NGER reporting period.

#### ***Diesel Usage***

Approximately 67,161 kL of Diesel (Stationary and Transport) was consumed equating to 182,325 tCO<sub>2</sub>-e GHG Emissions. This is less than the scope 1 emissions predicted in the EA.

#### ***Fugitive Emissions***

There was an estimated total of 525,347 tCO<sub>2</sub>-e fugitive emissions from MCCM in the 2017 FY. This is higher than the EA estimate as a result of the emissions calculation method used for fugitive gas that utilised the Method 1 approach versus a site specific emission factor applied during the EA.

#### ***Electricity Consumption***

Approximately 21,687,419 kWh power equating to 18,217 tCO<sub>2</sub>-e was consumed by MCCM. This is less than the predicted consumption from the EA of scope 2 emissions of 51,025 tCO<sub>2</sub>-e.

### **6.3.3 Proposed Improvement Measures**

Management measures described above will continue to be implemented during the next reporting period, however total emissions are expected to increase as production rate and associate fleet increase.

## **6.4 NOISE**

### **6.4.1 Environmental Management**

Potential noise impacts associated with the MCCM are managed in accordance with the:

- Noise criteria and operating conditions prescribed under Schedule 3 Conditions 7 and 15 of PA 10\_0138;
- EPL 20221 Conditions L3 and M7; and
- the MCC Noise Management Plan (NMP) approved by DPE, and prepared to satisfy the requirements of the EPL and PA 10\_0138.

A range of amendments addressing recommendations from the independent Mandatory Environmental Audit were undertaken in 2017. The revised NMP was submitted to DPE for approval during the 2017 reporting period including revision from recommendations within the MEA. The BTM Noise Management Strategy was approved by DPE in 2017 and is available on the Whitehaven Coal website.

Additionally, various controls were implemented to manage noise during the reporting period, including but not limited to:

- real-time unattended noise monitoring systems at representative locations within the local area;
- monthly compliance attended monitoring by independent acoustic consultants;
- meteorological forecasting and daily risk reporting to advise of weather conditions in advance;
- annual noise model validations;
- continued monitoring of TARP trigger levels and dissemination of trigger alerts to MCCM personnel via SMS;
- training of dispatch and supervisors regarding noise management and TARP's;
- dispatch operator that monitors real time noise data and can advise of any required modifications to work practices. Modifications may include changing dumping strategies, reducing the number of machines operating or ceasing operations entirely;
- roaming inspections by personnel at offsite locations to identify any audible mine related noise;
- utilising overburden emplacement areas with acoustic shielding and higher windrows;
- equipment sound power testing and analysis of fixed and mobile fleet;
- operator training and awareness to reduce equipment noise;
- usage of 'silent horns' on the excavator and supporting truck fleet;
- ongoing maintenance of the MCC mining fleet including any noise suppression equipment;
- design and trials of new muffler systems on Hitachi 5100 class trucks;
- acoustic screening and paneling of parts of the CHPP;
- engaging a rubber tyre loader to reduce audible track noise;
- two attenuated Komatsu dozer's purchased for next calendar year for dump operations;
- low frequency noise assessments;
- investigation including truck revs and earthen bunds.

The MCCM noise monitoring network is illustrated on **Figure 5** and includes:

- continuous monitoring at real-time monitoring units that are utilised for daily management purposes; and
- monthly attended monitoring at six locations as described in the EPL (NM1 to NM6).

## 6.4.2 Environmental Performance

### ***Attended Monitoring***

Attended monitoring is completed on a monthly basis by an independent consultant and is used to assess compliance with licence and approval limits for mining generated noise. A summary of the noise

monitoring results above criteria at MCCM for the reporting period is provided below. Monthly noise survey results are also available in the EPL monitoring data reports available on the MCCM website.

During the reporting period there were technical exceedances above the relevant noise criteria when the INP modifying factor was applied. An exceedance of up to 2 dB is not considered significant in accordance with Chapter 11 of the NSW Industrial Noise Policy, which states that a development is only deemed to be in non-compliance when “*the monitored noise level is more than 2 dB above the statutory noise limit specified in the consent or licence condition.*” Notwithstanding, results are reported below.

Two measurements of the 15 minute  $L_{Aeq}$  at points NM1 and NM5 with the addition of the low frequency modifying factor required under the INP, recorded levels of 4 and 3 dB respectively, over the criteria in 2017. These results were reported to the required stakeholders. The EPA introduced the Noise Policy for Industry in late 2017 that includes an improved process for the assessment of low frequency noise. Transitional arrangements released by the EPA were applied by MCCM from November for the assessment of low frequency noise.

Comparison of attended monitoring results from the 2016 and 2017 reporting periods indicates that the noise management performance at MCCM has improved during 2017. There were no exceedances recorded against the cumulative noise criteria detailed in PA10\_0138.

A noise assessment of the joint Boggabri Maules Creek Rail Spur (BMCR) was undertaken in 2016 and completed 2017 to address Schedule 3, conditions 14(c) and 14(d) of the MCCM Project Approval. Monitoring results indicated the retention of existing rail spur speed limits as appropriate.

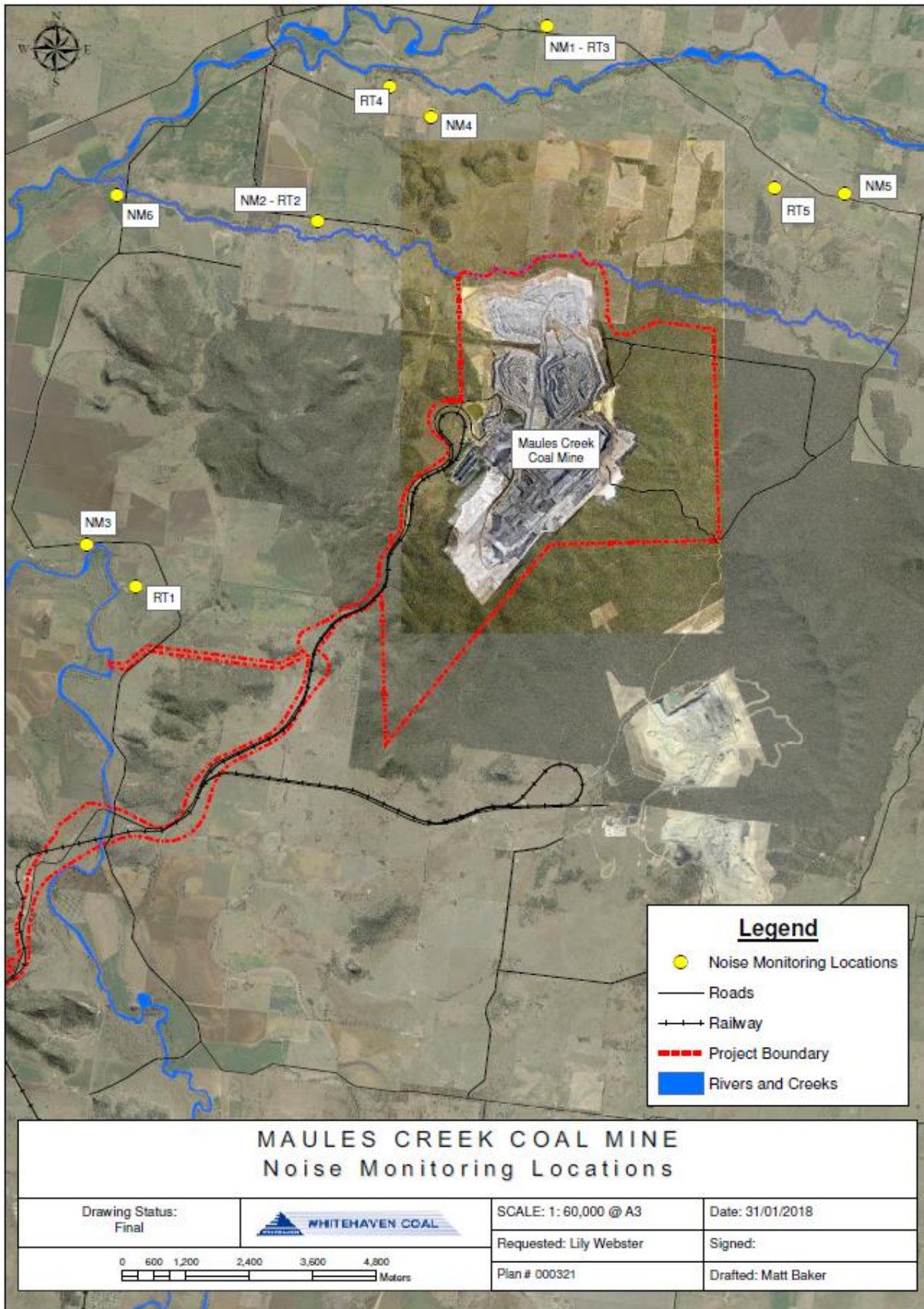


Figure 5 Noise Monitoring Network Locations



### **Annual Sound Power Testing**

Sound power level testing of fixed and mobile plant has been undertaken and results are provided in **Appendix C**.

Performance measurements by monthly attended monitoring results support the position that MCCM is operating generally in accordance with the respective Project Approval and EPL 20221 criteria for mining noise. Overall sound power output from the site is lower than modelled within the EA.

MCCM is continuing to further develop solutions and reduce sound power levels on mobile equipment. Ongoing work continued during the reporting period to improve exhaust systems on the Hitachi class truck fleet together with trials to assist in mitigating dozer track noise.

Additional works in relation to SPL for fixed CHPP plant infrastructure were undertaken during 2016 and 2017 related to various pieces of infrastructure and installation of screening in proximity to the ROM crusher, CPP and acoustic screening walls near train load out infrastructure. Upgrade of water pumps also included enclosure of primary and secondary transfer pumps for the supply of river water.

MCC advised regulatory agencies during the course of the reporting period regarding progress on noise attenuation and improvement measures.

An application to modify condition 12a, Schedule 3 of Project Approval 10\_0138 was submitted in 2017 regarding mobile and fixed plant sound power levels equalling indicative sound power levels within the Maules Creek Coal Project EA. Following a period of public exhibition and submissions, a determination remained pending at the end of the Annual Review reporting period.

### **Annual Validation**

Maules Creek Coal (MCC) engaged an acoustic consultancy to undertake a validation assessment of the site noise model to fulfil the requirements of the MCC Noise Management Plan (NMP) and Schedule 3 Condition 16(f). The assessment aimed to review real-time and attended monitoring data for 2017, and validate the results against the model predictions from EA Acoustics Impact Assessment (NIA).

The validation exercise concluded that monitoring data from the current unattended monitoring locations are considered to provide a good indication of the upper range of received noise levels for the specific noise enhancing meteorological conditions modelled. In summary, model predictions correlated well with actual measured levels at three locations and over-predicted for two locations.

Attended monitoring results indicate mine contributed noise levels are generally consistent with the modelled noise predictions for the Project.

#### **6.4.3 Proposed Improvement Measures**

A number of improvement measures are proposed for the next reporting period including:

- An application to amend the Project Approval relating to achieving Sound Power Level's specified within the Project EA remains under assessment by the DPE at the end of the reporting period;
- ongoing trials and testing of exhaust systems on haul trucks;
- commissioning of dozers with comparatively lower sound power levels;
- finalise work relating to inversion strength and reclassification of stability classes; and
- additional improvements to the real time environmental noise monitoring system.

## 6.5 BLAST

### 6.5.1 Environmental Management

Blast management measures are implemented at MCCM to support the management and control of post blast fume generation, dust impacts, rock fragmentation, blast overpressure and ground vibration. Blasting impacts associated with the MCCM are managed in accordance with the:

- blasting criteria prescribed under Schedule 3 Conditions 18 to 20 of PA 10\_0138; and
- Blast Management Plan (BLMP), relevant MCC procedures and the BTM Blast Management Strategy (BTMBS) that have been approved to satisfy the requirements of the EPL and PA 10\_0138.

During the reporting period a number of controls were applied to reduce the potential for impacts associated with blasting at the MCCM. The key controls implemented include, but were not limited to:

- best practice blast design and drill practices in accordance with the relevant Australian Standards;
- blast scheduling considering meteorological conditions, including wind speed and direction;
- pre-blast assessment for each blast to determine blast exclusion zones, potential fume generation risks and appropriate controls measures to minimise potential risks;
- review of blasts and investigations as required;
- revision to the BLMP and improving commitments and control measures;
- coordination of blasts to avoid cumulative impacts in accordance with the BLMS; and
- the likelihood of fume generation is reduced through consideration of explosive product, geological conditions, best practice loading procedures, blast scheduling, 'sleep-time' and meteorological conditions.

Air blast overpressure and ground vibration monitoring are undertaken at four monitoring locations shown on **Figure 6**.

### 6.5.2 Environmental Performance

There were 110 blasts carried out during the reporting period. A mechanical failure at BM3, as well as communication network outages, resulted in no blast data being recorded for two blasts occurring on the 27<sup>th</sup> and 28<sup>th</sup> February 2017. All other blast monitors were fully operational during these periods and indicated all blast events remained well within the applicable criteria at these locations. Modelled results indicated all missed blasts were likely to be within the criteria for both ground vibration and overpressure. Capture rates for each unit were 98% for BM3 and 100% for BM1, 2 and 4, respectively. Details of blasts are included in **Appendix A**.

**Table 10** summarises the blasting monitoring results during the period.

**Table 10 Summary of Blasting Results**

Location	Parameter	Average	Maximum	100% Limit	Exceedance
BM1	Air blast overpressure (dB(Lin Peak))	96.27	112.50	120	N
	Vibration (mm/s)	0.21	0.66	10	N
BM2 <sup>#</sup>	Air blast overpressure (dB(Lin Peak))	96.59	109.60	120	N
	Vibration (mm/s)	0.15	0.55	10	N
BM3	Air blast overpressure (dB(Lin Peak))	94.99	114.10	120	N
	Vibration (mm/s)	0.19	0.71	10	N
BM4 <sup>#</sup>	Air blast overpressure (dB(Lin Peak))	95.87	116.60	120	N
	Vibration (mm/s)	0.29	0.92	10	N

\* BM1 is on mine owned property.

# BM2 and BM4 are on property either owned or acquired during the course of the reporting period.

As stated above, there were no exceedances of the applicable ground vibration and air blast overpressure limits during the 2017 reporting period on mine owned property. On the 10<sup>th</sup> June the blast overpressure was recorded at 116.6 dBL, above the 95<sup>th</sup> percentile (115 dBL). This is an improvement from the 2016 reporting period which recorded one exceedance of the applicable overpressure limit. Average results for the 2016 and 2017 reporting periods at corresponding monitoring sites were generally comparable. This indicates that overall, the potential impacts of blasting were effectively managed during the 2017 reporting period. Both overpressure and ground vibration monitoring results are consistent with the blasting related details of the EA.

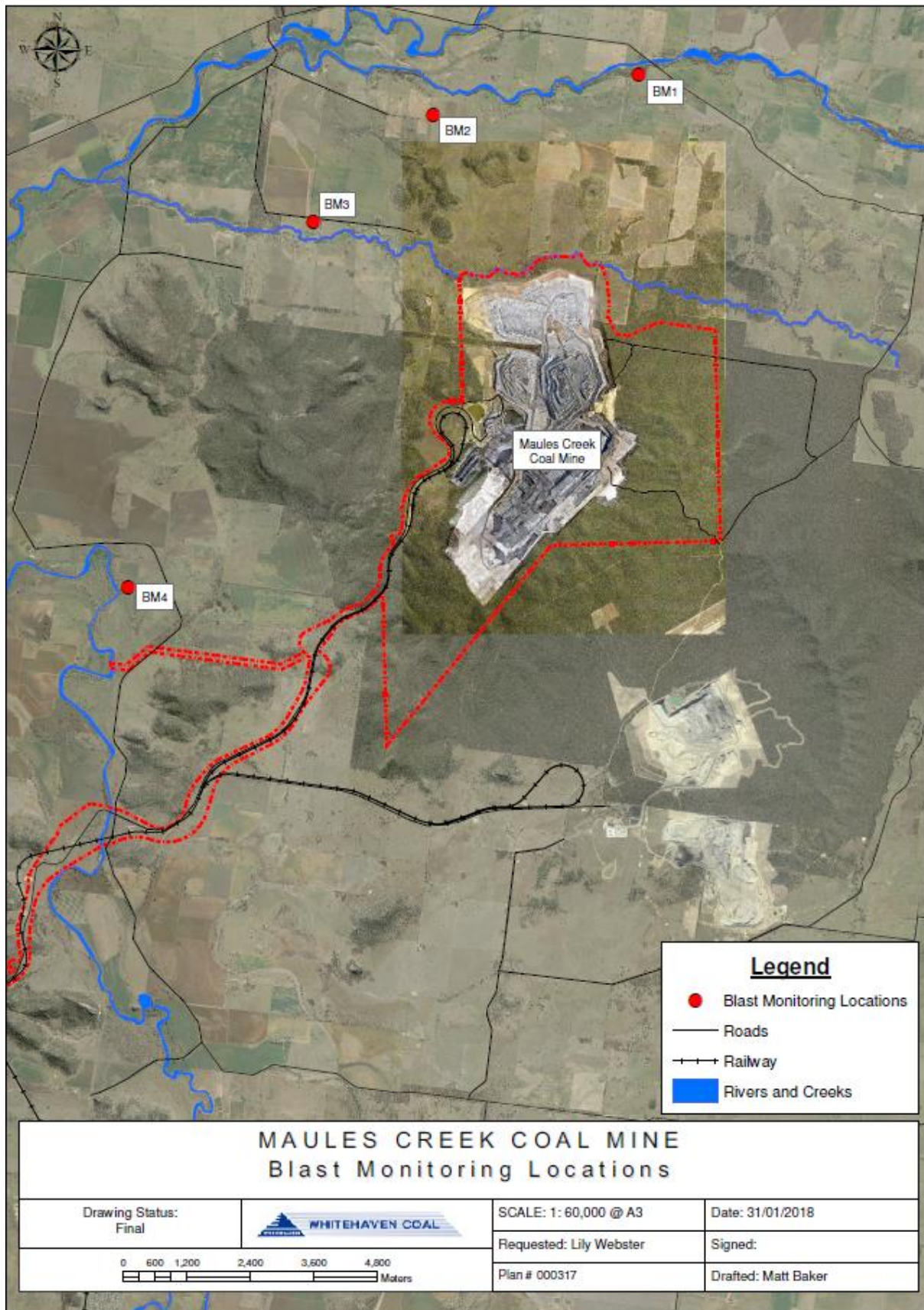


Figure 6 Blasting Monitoring Network Locations



Blast fume generation, including visible NO<sub>x</sub> fume, varies from yellow to orange to dark red depending on the concentration of NO<sub>2</sub> in the post-blast gases. There were no significant fume events (i.e. greater than Level 3C classified against the Australia Explosives Industry & Safety Group guideline) during the reporting period. There was a total of 25 fume events within the 2017 calendar year, 11 of those were classed as 1A, 2 were classed as 1B, 5 classed as 2A, 4 classed as 2B and 3 classed as 3A. All blasts were video recorded and categorised in line with the BLMP and relevant industry guidelines.

### **6.5.3 Proposed Improvement Measures**

MCC revised the BLMP during 2016 and have continued to implement the improvements during 2017, including restrictions on blasting under certain meteorological conditions. A revised management plan was submitted in 2017 following agency feedback, and is pending approval at the time of reporting. Additional improvements also included the use of pre-blast predictive dust dispersion modelling software, improved geological definition, and improvements to the pre-blast community notification process.

## **6.6 BIODIVERSITY**

### **6.6.1 Environmental Management**

Biodiversity was managed in accordance with:

- Schedule 3 Conditions 52 of the PA 10\_0138; and
- the MCC Biodiversity Management Plan (BMP) and Biodiversity Offset Strategy (BOS) prepared to satisfy the requirements of PA 10\_0138.

Various treatments were implemented during the reporting period to mitigate impacts of the MCCM including (but not limited to):

- weed monitoring and inspections;
- feral animal monitoring and inspections;
- seed management and collection;
- flora and fauna monitoring; and
- fuel load assessment.

### **6.6.2 Environmental Performance**

MCCM's Revised Biodiversity Management Plan (BMP) was approved by DPE on 26<sup>th</sup> April 2017. MCCM has an approved NSW Revised Biodiversity Offset Strategy for maintaining and improving 12,169ha of native woodland and forest covering four precincts called the Eastern and Western BOA (adjacent to MCCM, Leard Forest and Leard State Conservation Area); the Southern BOA (adjacent to the Boonalla Aboriginal Area) and the Northern BOA (adjacent to the eastern boundary of Mount Kaputar National Park).

#### ***Offset Security Management***

During the reporting period, WHC continued to negotiate with OEH and NPWS regarding the potential to transfer parts of the MCCM BOAs to National Parks Estates as per the letter from NPWS dated 16<sup>th</sup> August 2017 outlining the WHC BOAs that NPWS were interested in. WHC have requested extensions from DPE and DoEE for the timing of securing these offset areas until 31<sup>st</sup> December 2018 to allow negotiations on which BOAs are to be transferred to Parks Estate with the residual BOAs to be secured via conservation agreements.

### **Infrastructure & Waste Management**

WHC have continued to support an indigenous start up business (Gomeroi Contracting Pty Ltd) to undertake the relevant infrastructure and waste management activities during 2017. During the reporting period, a total of 8.5km of new fencing (fauna friendly) was constructed along the perimeter of MCCM BOA as well as maintenance of signage and gates undertaken as required to continue to restrict unauthorised access and prevent inadvertent livestock grazing. Also during the reporting period, 33.4km of redundant internal fences were deconstructed across the MCCM BOA and combined with general waste removal of former agricultural rubbish (inherited from previous owners/land managers) that is either recycled (in the case for scrap metal) or disposed offsite (general municipal waste and tyres) at the Narrabri Waste Management Facility.

### **Seed Management**

Four routine seed assessments were completed across the MCCM BOA as well as including the mine site vegetation in February (prior to the annual clearing program), March, August and November 2017 designed to identify on a seasonal basis the life cycle stage and development of native plants to identify what, where, when and how to target appropriate resources to collect seed for future revegetation programs. The seed assessments resulted in timely and prioritised seed collection with the spatial information directly given to seed collection contractors to undertake the targeted seed collection. Seed collection programs undertaken by WHC during the reporting period targeted overstorey and groundcover species both from MCCM mine site and Northern BOA between January and April 2017 in accordance with the Florabank guidelines.

As part of the WHC group wide revegetation planning; the onsite collected seed was supplemented with commercially sourced local and regional provident seed by reputable seed collectors. A local revegetation provider was engaged to propagate the seed to produce Box Gum and non-EEC/CEEC Woodland overstorey species seedlings required for the FY17 and FY18 revegetation programs for the Eastern, Western and Wirradale BOA.

### **Revegetation Management**

The MCCM BMP revegetation strategy focuses on restoration and revegetation of cleared non-native grassland (former cultivation) and derived native grasslands and assisting natural regeneration in better quality woodland areas. During the reporting period, revegetation ground preparation using dozer ripping (three tynes wide to a depth >0.3m every 5m along the contour and lightly scarifying the soil surface in lower condition areas) and tractor/excavator augered holes (to a depth >0.3m every 10m in higher condition areas) to relieve compaction, improve permeability and infiltration to increase sub-surface soil moisture as well improve soil seed bed to maximise soil-seed contact during sowing was completed over 257ha and 146ha respectively of the Wirradale BOA between January and December 2017. WHC coordinated two revegetation programs during the reporting period across the Western and Eastern BOAs with the understorey revegetation (direct seeding) undertaken only on the Western Offset between May and June 2017 across 494ha sown with 2,124kg of native grass seed, 99kg of native forb seed and 3,952kg of bulking agent (lime). Overstorey revegetation program was undertaken between May and September 2017 with 102,178 hiko seedlings of *Eucalyptus albens*, *Eucalyptus blakelyi*, *Eucalyptus melliodora* and *Angophora floribunda* planted across 1080ha. Despite a very dry July to September period; tree watering and maintenance tree planting activities between September and December 2017 have been successful to ensure that a better than minimum survival (aim for >20 trees per hectare) is achieved commensurate with the target open Box Gum Woodland vegetation structure of the MCCM BOAs.

### ***Heritage Management***

During the reporting period, WHC coordinated aboriginal cultural heritage surveys of the MCCM Southern and Northern BOAs between July and September 2017 in accordance with the approved Aboriginal Heritage Conservation Strategy identifying 68 new heritage sites in addition to the 17 previously identified heritage sites in the Northern BOA. WHC also organised further heritage due diligence assessments on the Cattle Plain, Wollandilly and Onavale BOAs resulting in a total of 65 known heritage sites in the Eastern & Western BOAs (not including Rocklea Shared BOA). MCCM also organised for grinding groove rocks to be relocated from the mining areas and placed at Teston GG4 new site adjacent to the Teston North BOA. In total, WHC undertook a further minimum 6.9km of identification/demarcating fencing installed around new heritage sites within and adjacent to MCCM BOAs.

### ***Habitat Management***

During the reporting period, MCCM has salvaged timber from its clearing areas and stockpiled on the mine boundary adjacent to the Eastern & Western BOA ready for installation. A total of 11 rock debris habitat structures were constructed from salvaged bush rock on Roseglass, Louenville and Wollandilly BOAs in October and November 2017.

### ***Weed Management***

WHC coordinated routine formal weed monitoring/inspections undertaken across MCCM BOA in February, April, August and November 2017; as well as routine inspections undertaken by Narrabri Shire Council weeds officer. The priority weeds for control were noted as general broadleaf weeds (noxious and environmental species) in areas proposed for revegetation as well as legacy noxious weeds inherited from previous owners management regimes such as African Box Thorn, Briar Rose, Green Cestrum and Cactus species (Common, Tiger and Rope Pear). The weed monitoring/inspections ensure that timely and prioritised weed control is undertaken on a seasonal basis with the spatial information directly given to spraying contractors to identify what, where, when and how to target appropriate resources across the MCCM BOA for weed control.

During the reporting period, WHC implemented a comprehensive weed control program across all MCCM BOAs including 3861ha treated across the Eastern and Western BOAs, 2231ha treated on Southern BOA and 1102ha treated on Northern BOA. Only appropriately qualified and experienced weed contractors (AQF3 accreditation or higher for use of herbicide) were engaged to undertake weed control works for WHC. A qualitative comparison between the Spring 2016 and 2017 Quarterly Weed Monitoring reports show weed infestations being effectively managed and the trend decreasing based on the summary of observations from both reports. The 50% reduction performance criteria metric is not triggered until Year 4 which is outside the reporting period with the completion criteria set at 80% reduction in the cover of weeds not yet triggered. The IBA Report (ERM, 2018) recommends that the methodology used in the initial weed monitoring report be repeated in Year 4 to allow quantitative comparison of weed populations and determine what percentage reduction has been achieved. WHC has committed to undertaking Year 4 weed monitoring of Maules Offsets using the same methodology from the initial weed monitoring report (AMBS February 2016) by end of Spring 2018.

### ***Feral Animals Management***

WHC coordinated routine formal feral animal monitoring across MCCM BOA in February, April, August and November 2017. The adoption of a “monitor, measure and manage” approach to feral animal

management will allow WHC to implement adaptive management in response to changes being measured through monitoring in feral animal abundance specific to the different geographical regions of the MCCM BOA. Feral animal monitoring utilises the relevant methodologies for specific feral animals generally in accordance with the NSW DPI *Monitoring Techniques for Vertebrate Pests* so that a range of methods can be used such as transects/spotlighting, sandpads, camera traps where practicable and relevant to specific offset areas/properties. Monitoring demonstrated that the feral animals in moderate to high abundance were the European Red Fox, Feral Pig and Feral Goat. The feral animal monitoring ensures that timely and prioritised feral animal control is undertaken on a seasonal basis identifying what, where, when and how to target appropriate resources across the MCCM BOA for feral animal management.

During the reporting period, WHC implemented a comprehensive feral animal control program across all MCCM BOA with fox and dog baiting; cat and pig trapping undertaken in March (43 Foxes baited from 124 baits presented and 38 Feral Pigs trapped), June (32 Foxes baited from 94 baits presented and 54 Feral Pigs trapped), August (27 Foxes baited from 146 baits presented and 41 Feral Pigs trapped) and November 2017 (49 Foxes baited from 148 baits presented and 82 Feral Pigs trapped). The Feral Goat harvesting during the reporting period resulted in 253 captured with the Feral Goats on sold to an abattoir. Only appropriately qualified and experienced feral animal contractors (appropriate feral animal management qualifications, NSW gun licence and pesticide accreditation where relevant) were engaged to undertake feral animal control works for WHC. The IBA Report (ERM, 2018) found that the routine feral animal monitoring reporting presents baseline abundance of feral animals and trends in changes for individual feral animals species. In accordance with the performance criteria for Year 2 and 3 in the BMP; WHC does undertake feral animal control, as per monitoring, with a downward trend in abundance noting that there can be seasonal fluctuations in feral numbers but overall abundance is declining.

### **Soil & Erosion Management**

No soil and erosion management works were required in MCCM BOA during the reporting period.

### **Grazing Management**

MCCM BOAs continued to be destocked during 2017 as existing licences expire and the lands being transferred over to biodiversity management. No revegetation or sensitive waterways were stocked and/or grazed during the reporting period.

### **Bushfire Management**

Fuel load monitoring was undertaken in October 2017 with the Northern BOA grassland fuel coverage assessed as 93% (considered 'High' on the CFA Grassland Curing Guideline, July 2010) and the average fuel load of 3.8 t/ha considered to be low (July 2010). In accordance with the BMP, WHC undertook maintenance and upgrade of Northern Offset fire break tracks in January 2017 and then the Southern Offset in November 2017 with 59.0km and 65.3km of tracks respectively maintained to a zero fuel barrier standard across the MCCM BOA.

### **Tylophora linearis Management**

In accordance with the BMP, Stages 1 (Root Architecture and Growth Study) to 4 (Seed Propagation) of the *Tylophora linearis* translocation program were completed previously in 2014 and 2015. During the reporting period, monitoring continued of the 77 *Tylophora linearis* seedlings transplanted in December 2015 that were propagated from seed collected onsite at MCCM during 2014. The ongoing monitoring of the translocated plants within Wollandilly BOA is providing important but previously



unknown information on the species including the identification of one *Tylophora linearis* plant resprouting a stem in December 2017; a full 12 months after the last recorded stem at the plant known as G13. While it is known that *Tylophora linearis* is affected by hot weather resulting in the above ground growth form of the plant to undergo senescence; it was unknown how long lived the species could survive underground in its tuber form. The monitoring also has identified that in addition to rain; it also appears to be important to have vertical structures present for *Tylophora linearis* stems to resprout and for the vine to twine onto. No further opportunities to collect seed were identified during either clearing operations in February 2017 or from other wild populations in the area during the reporting period.

### ***Pomaderris queenslandica* Management**

In accordance with the BMP, Stages 1 (Root Architecture) to 4 (Seed Germination) of the *Pomaderris queenslandica* translocation program previously commenced in 2015. During the reporting period, translocation of a *Pomaderris queenslandica* plant that was propagated from a cutting in 2015 was planted at the Wollandilly BOA in November 2017. No further opportunities to collect seed were identified during either clearing operations in February 2017 or from other wild populations in the area during the reporting period.

### **Monitoring Program**

During the reporting period, vegetation and habitat monitoring of MCCM BOA was completed in October 2017; while bird survey for winter migratory species was undertaken in August 2017 with the full fauna monitoring program undertaken in November 2017. The consulting ecologists detected the first species sown in Autumn 2016 across the Eastern BOA to have germinated and produce seed in particular Kangaroo Grass (*Themeda Triandra*) at Wollandilly BOA.

### **Independent Biodiversity Audit**

During the reporting period, an Independent Biodiversity Audit for MCCM BOAs was undertaken during December 2017 with no non-compliances identified regarding management of biodiversity against the performance and completion criteria outlined in the BMP. Recommendations identified during the Independent Biodiversity Audit for MCCM BOAs will be assessed, and where relevant, updated into a revision of the BMP.

### **Pre-Clearing and Clearing Surveys**

The 2017 clearing program occurred between February 2017 and March 2017 and consisted of the clearance of a total of approx. 239.1 ha to facilitate the expansion of the mining pit area (PIT) and the outer pit and overburden area (OOP).

The ecological works for the clearing program consisted of the following activities;

- Weed Mapping;
- Threatened Flora Surveys;
- Fauna Pre-clearing Surveys;
- Clearance Supervision; and
- Post-felling re-inspections.

Prior to the commencement of any clearing activities the limits of clearing are surveyed and marked with flagging tape.

The pre-clearance and clearance flora and fauna surveys are conducted in several stages, some of which were ongoing throughout the entire period of works and others were conducted in discrete phases.

Targeted threatened flora surveys were conducted prior to clearing activities commencing in conjunction with weed mapping surveys. All threatened flora identified during these surveys were recorded and their locations mapped using hand held GPS units.

Fauna pre-clearance surveys were also commenced prior to the beginning of clearance works to ensure that the areas were surveyed within one week of the clearance to minimise the risk of birds nesting between the time of the fauna habitat survey and the commencement of clearance works. This process ensured the maximum possible wellbeing of the native fauna within the clearance areas as outlined in the BMP. Fauna pre-clearance surveys consisted of identifying, marking and documenting suitable fauna habitat features. These features include significant rock outcrops and crevices, large boulders, nests and, in particular, trees bearing hollows which have the potential to support species such as bats, gliders, possums, reptiles and birds. All fauna pre-clearing teams were equipped with endoscopic cameras to enable the examination of hollows considered likely to contain fauna. Features identified as likely to support resident fauna were marked with a large “H” using fluorescent spray paint as well as with flagging tape and the habitat feature details were recorded using a hand-held GPS unit.

In addition to the identification and marking of likely habitat features, nocturnal spotlight surveys were also conducted throughout the clearing footprint area to identify hollows in use by resident fauna such as the Squirrel Glider (*Petaurus norfolcensis*) as well as potential microbat roosting trees. These surveys were typically conducted through the area surveyed diurnally on that date by the same field team. These surveys were conducted from dusk until approximately two hours after sunset.

Vegetation clearance was conducted following a two stage process, as follows:

- Stage 1 - After an area has been suitably surveyed for fauna habitat features grubbing, dozers then removed all understory vegetation leaving the marked habitat features isolated. Following grubbing works habitat items were allowed to stand overnight. This was to allow resident fauna the opportunity to self-relocate to adjacent undisturbed vegetation; and
- Stage 2 - In the following days, felling machinery conducted the removal of the isolated habitat items under the supervision of an ecology team. Habitat trees were shaken by the clearing machinery prior to felling to encourage fauna which had not already vacated the tree to now do so. After the shaking of the tree and following approval from the ecological team, the habitat tree was felled as softly as possible. Following felling the supervising ecology team inspected hollows and loose bark for resident fauna which had not self-relocated and rescued any present fauna.

Fauna was encountered during all work tasks on the 2017 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 also encountered.

The following threatened fauna species were encountered during 2017 clearing works:

- Brown Treecreeper (Eastern Subspecies) (*Climacteris picumnus victoriae*) – listed as Vulnerable under the TSC Act;
- Grey-crowned Babbler (Eastern Subspecies) (*Pomatostomus temporalis temporalis*) – listed as Vulnerable under the TSC Act;
- Pale Headed Snake (*Hoplocephalus bitorquatus*) – listed as Vulnerable under the TSC Act;
- Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*) – listed as Vulnerable under the TSC Act; and
- Barking Owl (*Ninox connivens*) – listed as Vulnerable under the TSC Act.
- Dusty Woodswallow (*Artamus cyanopterus*) – listed as Vulnerable under the TSC Act.

- Corben's Long-eared Bat (*Nyctophilus corbeni*) – listed as under the TSC Act and EPBC Act.

### **Geomorphological Assessment**

In accordance with PA 10\_0138, previous monitoring for Stygofauna and Groundwater Dependent Ecosystems were completed as required near the mine in 2015, including portions of Maules Creek and Namoi River alluviums. The results of the current geomorphological survey indicate that the ecosystem condition along Maules Creek Alluvium is stable along this sub-catchment as indicated by the relatively consistent invertebrate community composition. There have been no adverse effects on at the Maules Creek subterranean aquatic ecosystem as a result of the mine's operations to date.

### **6.6.3 Proposed Improvement Measures**

A number of improvement measures are proposed for the next reporting period including:

- Follow up monitoring of revegetation and weed management works across the offset areas and associated adaptive management;
- Continued implementation and progression of research projects required under the EPBC approval (refer section 8.1.9) ;
- Continuation of propagation and translocation programs for *Tylophora linearis* and *Pomaderris queenslandica*; and
- Implement improvements from audit findings.

## **6.7 ABORIGINAL CULTURAL HERITAGE**

### **6.7.1 Environmental Management**

Aboriginal cultural heritage is managed in accordance with the Aboriginal Archaeology and Cultural Heritage Management Plan (AACHMP) which was prepared to satisfy Schedule 3 Condition 58 and the SOC detailed in the PA 10\_0138. The AACHMP was revised during 2016 and approved in March 2017 by DPE. The BTM Aboriginal Cultural Heritage Strategy was also submitted to OEH and DPE and approved in November 2017.

### **6.7.2 Environmental Performance**

#### **Annual Monitoring Program**

The annual monitoring program was undertaken at MCCM in accordance with the requirements of section 6.4.1 of the AACHMP. The annual monitoring program, including an Annual Site Audit and the Annual Compliance Audit of salvaged objects, was undertaken during November 2017 by Registered Aboriginal Party (RAP) representatives accompanied by a specialist archaeologist approved by DPE.

The Annual Site Audit included an inspection of all extant previously identified Aboriginal cultural heritage sites within the MCCM boundary in November 2017. The inspection assessed the condition of 46 extant sites including fencing, potential nearby disturbance and photographic records. Any required fence maintenance identified during the audit was carried out immediately during the inspection.

An Annual Compliance Audit of cultural objects collected during previous salvage campaigns was also undertaken. The audit confirmed that the artefacts are currently stored securely as an interim measure by Whitehaven Coal Limited. Consultation with RAPs to establish a culturally appropriate keeping place for all salvaged material for the MCCM was finalised and approved by OEH in 2017 to be located at Red Chief Local Aboriginal Land Council.

### **Additional Monitoring / Inspection of Sensitive Heritage Areas**

Monitoring inspections are undertaken prior to or during topsoil clearance with RAP representatives accompanied by specialist archaeologists. Archaeological monitoring of Cultural Heritage Sensitive Areas was undertaken in February and March 2017 during the clearing program. Monitoring included the visual inspection of 159 scrapes and close to 8.6km of drainage lines, totalling approximately 50km of ground surface inspection.

Monitoring inspections identified eleven additional artefacts in the area, however no new sites were registered. Salvage and relocation of 'Teston GG4' was completed successfully in late March 2017 under the supervision of MCCM environmental and aboriginal representatives, an independent geotechnical engineer, and in consultation with registered Aboriginal representatives. This followed consultation by MCCM and thorough assessments by specialist archaeologists to inform the RAP community.

There remains low potential for finding significant archaeological sites during the archaeological monitoring process. This is consistent with the findings of the Aboriginal Archaeology Heritage Assessment undertaken as part of the EA.

### **Archaeological Salvage Program**

The majority of identified artefact scatters within the MCCM Boundary have been salvaged in previous reporting periods through surface collection and excavation, however, two further artefact scatters were salvaged during March 2017. An Archaeologist and RAP representatives recorded and salvaged artefacts in accordance with the Aboriginal Archaeology and Cultural Heritage Management Plan (AACHMP). As stated above, the salvage and relocation of Teston GG4 rock features also occurred during 2017 and were relocated to a nearby offset property.

In addition the three known sites Teston IA6, IA7 and AS3 situated within the Travelling Stock Route (TSR) were salvaged on the 6<sup>th</sup> June 2017 by a team of two archaeologists and five indigenous representatives. Salvage of these sites was completed and signed off in accordance with procedures in the approved AACHMP. During salvage of these sites, an additional Isolated Artefact site was identified and the artefact collected (Teston IA26).

### **Ongoing Consultation**

In accordance with the AACHMP, meetings are convened on approximately a six monthly basis which are open to all RAPs. Two meetings were held during 2017.

A newly elected Aboriginal community representative joined the MCC Community Consultative Committee in 2017.

Furthermore, MCCM have engaged and supported the development of an indigenous start up business as mentioned in section 6.6.2, Gomeroi Country Services Pty Ltd, to undertake a number of projects during the reporting period.

### **Management of Quinine Bush**

Quinine Bush (*Alstonia constricta*) continues to be mapped across the project as part of the pre-clearing surveys continue with identifying any opportunities for seed collection and propagation.

### **6.7.3 Proposed Improvement Measures**

In 2018, several aspects of cultural heritage work will continue, including the annual monitoring program and archaeological monitoring and salvage as required of Cultural Heritage Sensitive Areas during pre-mining clearing works.

As previously mentioned, the Aboriginal Heritage Conservation Strategy and revised AACHMP were approved by the DPE in November 2017 and March 2017 respectively and the implementation of these will continue to progress during 2018.

## **6.8 HISTORIC HERITAGE**

### **6.8.1 Environmental Management**

Historic heritage will be managed in accordance with Schedule 3 Condition 58 of PA 10\_0138 and the Statement of Commitments included in Appendix 5 of PA 10\_0138. No development work has occurred that may impact on historic heritage items identified in the EA. An inspection and preparation of the Historic Heritage Management Plan (HHMP) was prepared by an independent consultant and is pending approval at the time of reporting.

### **6.8.2 Environmental Performance**

Inspections of the identified historic heritage sites have been undertaken to assess condition and record any evidence of impacts. These inspections assist in determining ongoing maintenance requirements such as weed control and fence integrity. Photographic records are also recorded at each inspection.

Since Historic Heritage Assessment was undertaken as part of the EA there have been no additional sites identified within MCC owned land. As predicted in the EA, there have been no direct impacts to historic heritage items.

In accordance with the Statement of Commitments, oral history interview and transcripts were completed during the reporting period.

### **6.8.3 Proposed Improvement Measures**

Annual monitoring of historic heritage sites will continue in 2018 and maintenance and weed control will be undertaken as required.

## **6.9 TRAFFIC**

### **6.9.1 Environmental Management**

Traffic impacts associated with the MCCM are managed in accordance with Schedule 3 Condition 59 to 66 of the PA 10\_0138 and the Traffic Management Plan (TMP). Various management measures were implemented during the reporting period to mitigate the traffic impacts of the MCCM including:

- a code of conduct for drivers of heavy and light vehicles;
- notification to contractors and staff regarding the driver code of conduct and to advise of any updated access arrangements;
- nominated access routes for all vehicles travelling to and from the MCCM, reinforced by approved signage and quarterly audits;
- provision of a shuttle bus service for staff to access site;
- consideration of school bus pick up and drop off times when scheduling shift changeovers;



- monitoring of traffic volumes, road safety inspections, quarterly auditing of approved access routes;
- results for coal transport monitoring are made publically available on the MCC website annually;
- community feedback via MCCM community contact line, website request and email, as well as consultation with the Community Consultative Committee (CCC); and
- consultation with the relevant authorities to obtain necessary permits prior to the movement of oversized loads on public roads.

### **6.9.2 Environmental Performance**

MCC has conducted quarterly audits with regard to access restrictions as described in the TMP.

Analysis of employee transport records demonstrated that generally over 80% of wages employees utilised the bussing services provided over the 2017 reporting period, therefore within the specified project approval limit.

There were five complaints regarding traffic generated by the MCCM received during the reporting period. This is a small increase compared with the 2016 reporting period.

### **6.9.3 Proposed Improvement Measures**

A modification to PA10\_0138 was submitted to DPE in May 2016 and approved in January 2017. This modification addresses employee transport to site and reflects the changes in workforce demographics and ongoing bus transportation requirements. The MCCM Traffic Management Plan was subsequently revised in June 2017 to address this modification.

Quarterly audits of restricted roads, monitoring of traffic volumes to the site and responses to any community complaints will continue to be implemented during the next reporting period.

## **6.10 WASTE MANAGEMENT**

MCC aims to implement all reasonable and feasible measures to minimise waste and ensure it is appropriately stored, handled and disposed of. Waste materials at MCCM are managed in accordance with:

- Schedule 3 Condition 70 of PA 10\_0138;
- Condition A1 & A3 of the EPL;
- the Materials Safety Management Plan (MSMP) & Pollution Incident Response Management Plan (PIRMP); and
- the legal and strategic framework for managing wastes in NSW.

MCCM waste streams include general waste, hazardous waste and sewage, and are collected and disposed of at authorised waste disposal sites by a licenced contractor. Sewage waste from the CHPP office building is now treated on site.

Any mineral waste material within the operation that is determined to be potentially acid forming (PAF) are placed (buried) in the OEA or within mined-out sections of the open cut and covered with non-acid generating material at a location to minimise further oxidation. Additional management measures are detailed in the approved MOP.

### **6.10.1 Environmental Performance**

#### **Waste Streams**

Inspections of waste management practices are carried out to ensure general, hydrocarbon and recyclable waste is segregated.

Data on waste streams are collated using information provided by the licenced contractors. During the reporting period waste output increased by approximately 20% for general waste when compared with the previous reporting period. An increase in waste production occurred consistent with increased production levels, workforce numbers and operational fleet in 2017.

A total of approximately 441 t of general waste and 1,803 kL of septic removed in the 2017 reporting period. Approximately 110 t of solid recyclable material and 771,100 L of used oils were collected to be recycled by a licenced contractor.

No incidents relating to waste management practices occurred during the reporting period. Waste management was consistent with relevant management details in the EA.

### **6.10.2 Proposed Improvement Measures**

MCC will continue to monitor, remove, track and report waste streams on a regular basis to effectively manage waste generated by the operation of the MCCM and maximise recycling efficiencies.

MCC will continue to manage and check for potential PAF material and dispose of this material as per the requirements of the MOP.

## **6.11 HAZARDOUS MATERIALS**

### **6.11.1 Environmental Management**

Hazardous materials at the MCCM are managed and disposed of in accordance with the relevant Australian standards. Any spillages of potentially hazardous materials are required to be reported immediately to determine the appropriate response.

### **6.11.2 Environmental Performance**

#### ***Hydrocarbons***

No reportable or significant incidents involving fuel storage, handling or delivery occurred during the reporting period. Minor leaks and spills associated with plant maintenance and operation were managed on site. The PIRMP was not required to be activated for any significant reportable incidents. This will continue to be managed during the next reporting period.

#### ***Explosives***

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

#### ***Other Materials***

Soil material from temporary maintenance area and material impacted by minor spills in the operational areas were removed and are stored in the Soil Reclamation Area prior to treatment. No reportable incidents involving the handling or storage of other potentially hazardous materials occurred during the reporting period.

### 6.11.3 Proposed Improvement Measures

Continued operation of a bioremediation area will occur during the next reporting period. Completion of the permanent work shop facility in the next reporting period will also include provision of resources to ensure suitable hydrocarbon spill response.

## 6.12 VISUAL & LIGHTING

### 6.12.1 Environmental Management

Visual amenity and lighting impacts associated with the MCCM are managed in accordance with Schedule 3 Condition 67 and 68 of the PA 10\_0138. Various onsite treatments were implemented during the reporting period to mitigate visual impacts of the MCCM including, but not limited to:

- use of directional lighting in lieu of general area lighting;
- consideration of fixed versus mobile lighting, locations and orientation;
- fixed lighting designed and procured in general accordance with Australian Standard *AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting (AS4282)*;
- visual lighting inspections as required; and
- mine infrastructure designed and managed to blend with the surrounding landscape as far as practicable.

### 6.12.2 Environmental Performance

A visual and lighting assessment was undertaken during 2017 to review the lighting levels at nearby receptors and roads. It was determined that there was minimal direct line of sight exposure for the closest sensitive residences to the north west of MCCM. Illuminance at all locations was within the allowable criteria stated under Condition 67 Schedule 3 of the project approval.

No significant discrepancies have yet been identified between the EA predictions and actual visual impacts of the MCCM.

### 6.12.3 Proposed Improvement Measures

Management measures described above will continue to be implemented during the next reporting period.

## 6.13 BUSHFIRE

### 6.13.1 Environmental Management

Bushfire hazards and risks associated with the MCCM are managed in accordance with Schedule 3 Condition 69 of the PA 10\_0138, the MCC Bushfire Management Plan and the BMP. Various treatments were implemented during the reporting period to manage and control potential bushfire risks including:

- the addition of a 1000L fire trailer onsite which can be utilised to control any fire outbreaks if required;
- onsite water trucks fitted with water cannons;
- meetings held with Namoi-Gwydir Regional Fire Control;
- implementation of various bushfire hazard controls during the reporting period including Hot Work areas and permits, maintenance of equipment and infrastructure, establishing Asset Protection Zones and assessment of fuel loads;
- monitoring and management of fuel loads occurred in the MCC offset areas prior to the bushfire season; and

- maintenance of the roads and tracks within the MCCM was undertaken prior to the bushfire season. Roads and tracks can act as firebreaks and help to facilitate access across the site. Specific fire breaks also installed in adjacent Offset areas.

### **6.13.2 Environmental Performance**

No bushfires occurred adjacent to or within the MCCM boundary during the reporting period. There were fires regionally and as part of localised stubble burning across private properties within the Maules Creek and Boggabri areas. No significant discrepancies have been identified from the EA predictions.

### **6.13.3 Proposed Improvement Measures**

Management measures described above will continue to be undertaken during the next reporting period being fuel load assessment, maintenance of access tracks, hot work permits and asset protection zones.

## **6.14 PUBLIC SAFETY**

The mine is located on land owned by Whitehaven and 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, designated access points, warning signs and security personnel are in place.

During blasting, procedures are in place to ensure that the area around each blast site is clear of personnel and relevant residents are advised in advance of blast scheduling.

### **6.14.1 Performance**

The procedures in place have been effective throughout the reporting period to prevent unauthorised access to the mine site by the general public. On occasion individuals have bypassed locked gates, security guards and fences, and ignored mine area safety signage to access areas of the MCCM.

## 7 WATER MANAGEMENT

### 7.1 WATER SUPPLY

A pipeline from the Namoi River is the main source of raw water supply for the MCCM. Table 11 summarises the water taken by MCC in the previous water year (1 July 2016 – 30 June 2017).

**Table 11 Water Take**

Water Licence #	Water Sharing Plan	Water Source and Management Zone	Entitlement	Passive Take/ Inflows	Active Pumping by MCCM**	Total
WAL 27385	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 4 Namoi Valley (Keepit Dam to Gin's Leap) Groundwater Source	38	0	0	0
WAL 12811	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source	135	0	0	0
WAL 12491	Upper and Lower Namoi Groundwater Sources	Upper Namoi Zone 11 Maules Creek Groundwater Source	77	0	0	0
WAL 12479	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 11 Maules Creek Groundwater Source	78	0	0	0
WAL 27383	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 11 Maules Creek Groundwater Source	0	0	0	0
WAL 12480	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 11 Maules Creek Groundwater Source	215	0	0	0
WAL 29467	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah - Oxley Basin Mdb Groundwater Source	306	0	0	0
WAL 29588	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah - Oxley Basin Mdb Groundwater Source	0	0	0	0
WAL 41585	NA	Catchment: Unnamed Water Source	30	0	0	0
WAL 36641	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah - Oxley Basin Mdb Groundwater Source	800	<10	0	<10
WAL 13050	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source	3,000	0	1,104	1,104

\* Water use applicable to MCCM operations only and excludes any water use by tenants for stock and domestic or irrigation purposes.

\*\* Note: In addition to the ML utilised by the MCCM during the water year period, 1850ML of MCCM water allocation was transferred to an alternate water user in June 2017.



## 7.2 SURFACE WATER MANAGEMENT

### 7.2.1 Environmental Management

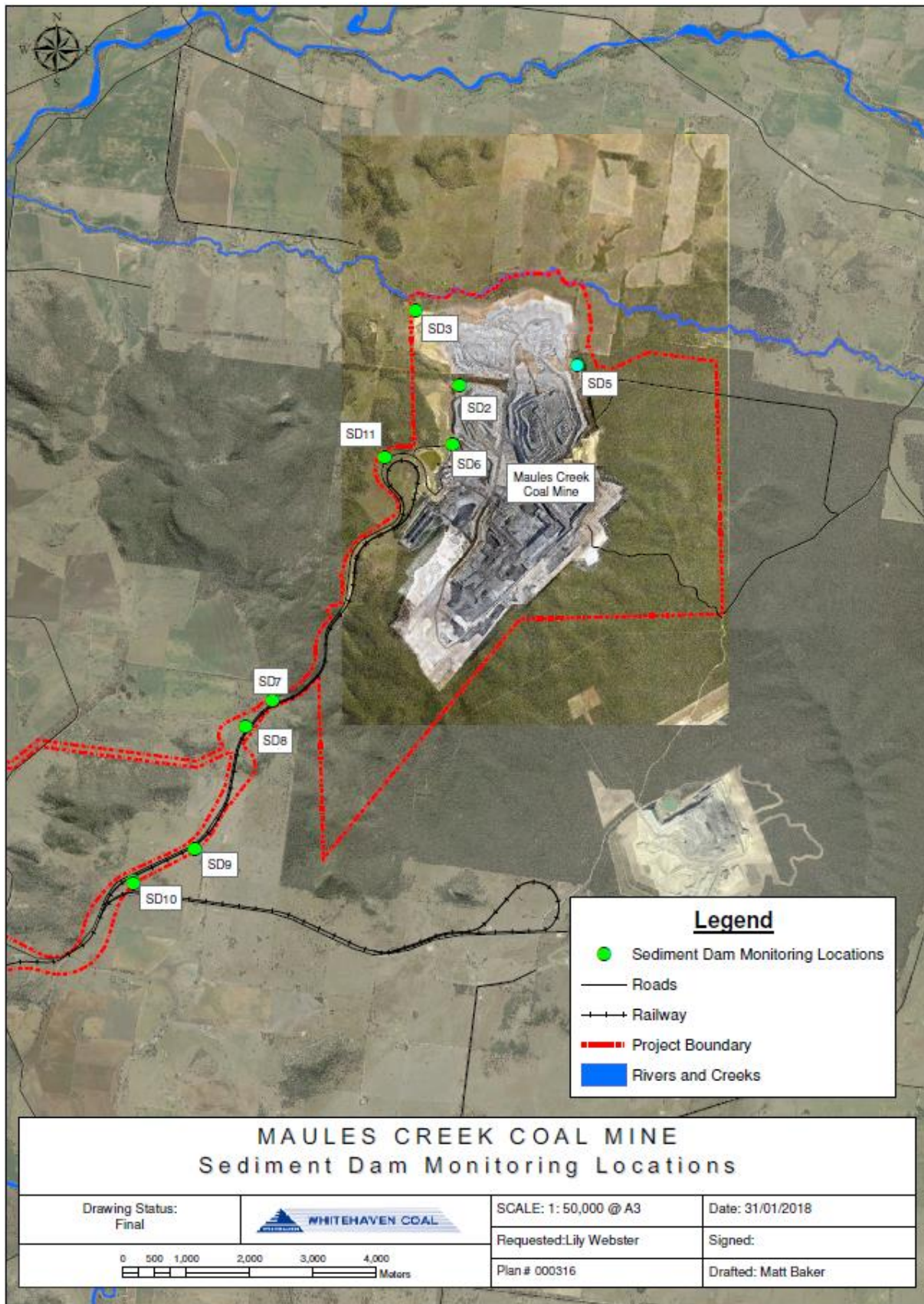
The MCCM water management system aims to ensure there are no adverse impacts on receiving water quality, to allow for early detection of any potential impacts and develop appropriate corrective actions. Potential impacts to surface water quality are managed in accordance with:

- the surface water criteria prescribed under schedule 3 condition 36 to 40 of the PA 10\_0138;
- EPL 20221 Conditions P1, L1, L2, L3 and M2; and
- the MCC Water Management Plan (WMP) prepared to satisfy the requirements of the EPL and PA 10\_0138.

During the reporting period various controls strategies were implemented to manage surface water quality including:

- prior to disturbance of land, appropriate erosion and sediment controls were established;
- construction of HWD to divert clean water around the site and SD12 is currently underway;
- maintenance of a number of sediment dams previously constructed to collect runoff from disturbed areas, which is then used for dust suppression or pumped to the mine water dam for re-use on site;
- a combination of temporary and permanent clean and dirty water drains have been established to divert runoff from undisturbed areas and collect runoff from disturbed areas;
- additional erosion and sediment control measures have been used for other small disturbance areas including silt fences, rock checks and other measures as required;
- any water collected within the open cut pits is contained and reused on-site;
- no uncontrolled discharge of mine water off-site;
- maintaining an up-to-date water balance to ensure on-site water demands are satisfied whilst minimising offsite water impacts;
- validation of the site water balance model; and
- regular sampling and inspections of the onsite and surrounding surface water system.

Surface water monitoring locations are illustrated on **Figure 7** and **Figure 8**. A summary of the surface water quality findings from the reporting period is provided below.



**Figure 7 Sediment Dam Monitoring Locations**



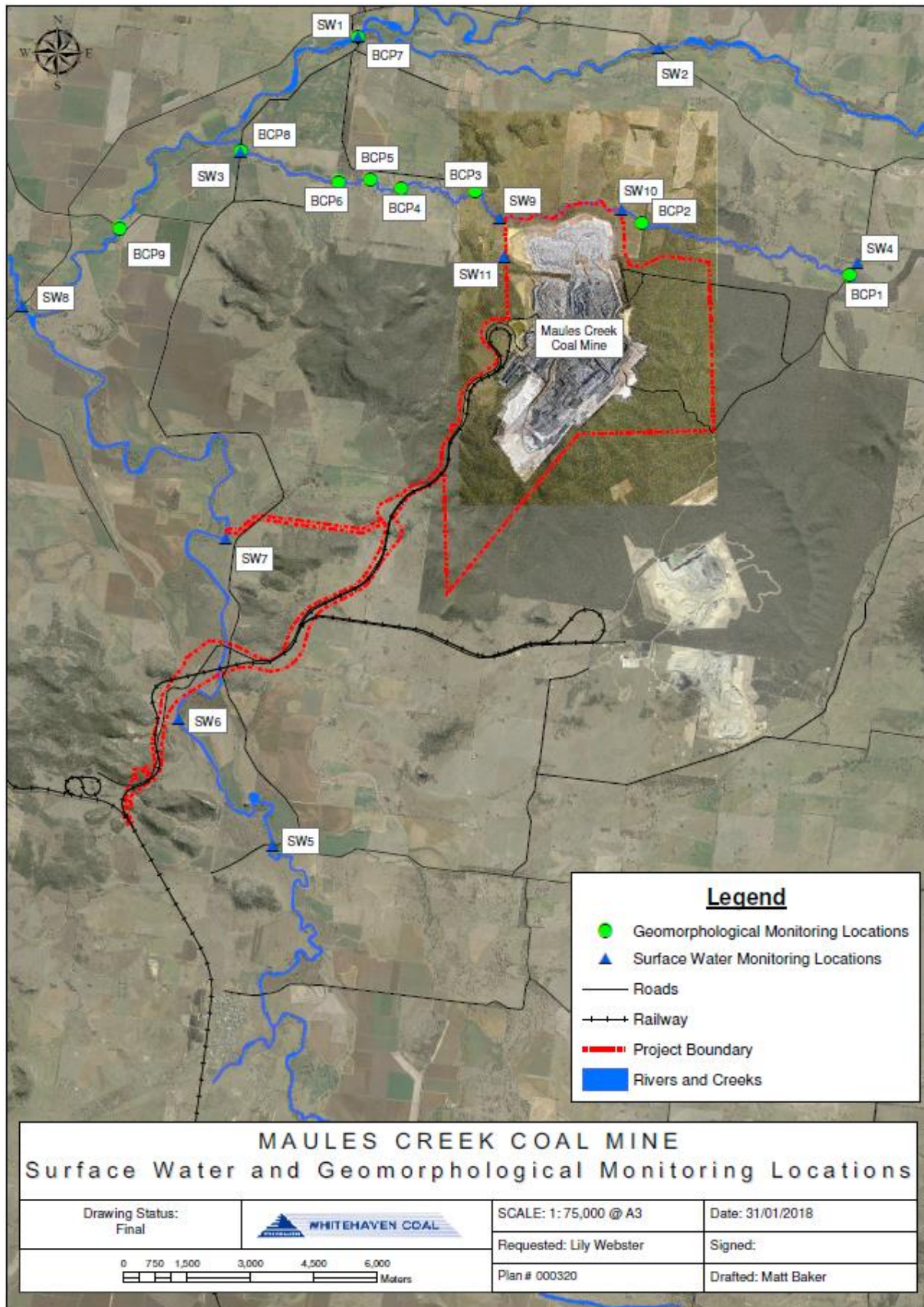


Figure 8 Surface Water and Geomorphological Monitoring Locations

## 7.2.2 Environmental Performance

### **Surface Water Quality**

Routine surface water monitoring is conducted in surrounding watercourses on a monthly basis and the pH, EC and TSS monitoring results detailed in **Appendix D**. Samples are collected consistent with Water Sampling Methods, AS/NZS5667.1 and AS/NZS 5667.6. All laboratory analyses are conducted by a NATA accredited laboratory. Laboratory pH in creeks and rivers surrounding the project are all trending generally within the ANZECC acceptable range for Irrigation, Ecosystem Health and Recreation. Back Creek and upper Maules Creek are ephemeral and rarely contain flowing water. No community complaints were received during the reporting period in relation to surface water quality. Surface water EC and TSS trends are shown in **Appendix D**.

During the year, though some higher EC and metal levels were recorded at surface water sites, the upstream locations had the same or higher results than the downstream sites. This indicates that MCCM did not impact on the metal levels recorded at these locations.

The surface water quality results recorded during the reporting period were generally consistent with historical trends recorded during baseline monitoring and previous years of operations at the MCCM. Additionally, the monitoring results are consistent with the EA prediction that the Project will not adversely affect surface water quality in downstream receiving waters.

Preliminary Trigger Values (PTVs) for twenty six key water quality parameters for Maules Creek, Back Creek and the Namoi River have been included in the WMP. Where insufficient data is available, ANZECC eco-system trigger values have been adopted (eleven parameters). Trigger values have been developed 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. Monitored values above the PTV's are related to variable flow and upstream effects not attributable to the operation.

### **Onsite Water Quality**

MCC monitors 'mine water' defined in the WMP as water that has come into contact with coal (e.g. groundwater inflows and surface runoff to the open cut pit or stormwater runoff from the ROM and product coal stockpiles). The water quality sampling of any 'mine water' conducted during the 2017 reporting period has been characterised as coal contact water and results shown are in **Appendix D**.

### **Flow**

There was negligible to very low flow recorded at the monitoring points in Back Creek at SW9 or SW10 as well as point SW2 along Maules Creek during the 2017 reporting period. Throughout the reporting period, flow in the Namoi River has been largely dictated by water releases from the Keepit Dam regulated by WaterNSW.

There are no sediment or clean water dams on existing higher stream orders that harvest clean water for operational use, with due consideration to the storage size and volumes under the Harvestable Right Dam Policy and relevant regulatory exemptions. For the 2017 period, the estimated runoff volume captured by the mine was 1,141 ML. However, this volume does not represent the actual volume of water that would have flowed to the receiving waters if the project was not constructed because land disturbance, construction of impervious surfaces and the presence of the dam water surfaces vary the volume of runoff above pre-mine conditions.

### **Wet Weather Discharge Monitoring**

On three occasions during the reporting period a discharge occurred from sedimentation dam SD9 as a result of rainfall measured at MCCM that exceeded 38.4mm over a consecutive 5 day period immediately prior to the discharge occurring. Water samples from SD9 and the upstream and downstream environment were collected and analysed in accordance licence requirements. Water quality results for all events at discharge point SD9 remained compliant with the concentration limits specified in conditions the Maules Creek EPL 20221 and are summarised in **Appendix D**. Site water balance modelling was also undertaken and is discussed in Section 7.4.

### **Geomorphological Assessment**

Stream and riparian vegetation health assessments were conducted by a qualified consultant in October/November 2017 at upstream and downstream locations along Maules Creek, Back Creek and the Namoi River as illustrated on **Figure 8**. All sites were selected for photographic survey of the existing geomorphological condition of the downstream drainage system, from the mine site to the Namoi River. The assessment included macroinvertebrate monitoring as well as physical and chemical monitoring in accordance with Australian River Assessment System (AusRivAS) guidelines as required in the WMP.

Visual habitat assessments were conducted at twelve of the aquatic monitoring sites during the survey period in accordance with the NSW AusRivAS Manual. All twelve surveyed sites showed indications of disturbance from current land uses to varying degrees. All observations were recorded utilising the standard NSW AusRivAS field datasheets. A photograph was also taken at each sampling location, both upstream and downstream to provide a visual indication of the habitat at each location, and to form a baseline record of current conditions. The primary disturbances noted at all sites included presence of exotic vegetation, erosion of banks, disturbance from stock, feral animals and disruption of natural hydrology from existing tracks, roads, causeways and other infrastructure. Bank stabilisation and erosion control measures are also in place at SW5.

Water quality measurements were conducted at Namoi River sites (SW5, SW8) and one Maules Creek site (BCP7), as well as within remnant pools of two Back Creek sites (BCP1, BCPX) (total five sites). No water quality measurements could be taken at Maules Creek site BCP9 and Back Creek sites BCP2, BCP3, BCP4, BCP5, BCP6 and BCP8 as these were all dry.

The in situ water quality recordings for EC and pH for the majority of the sites were largely within the acceptable trigger values listed in the ANZECC guidelines.

Dissolved oxygen for the majority of sites with flowing water were within the trigger value ranges. Unlike previous surveys, BCP7 demonstrated a dissolved oxygen value below the trigger value range; this could be potentially due to disturbances associated with the adjacent causeway and frequent pumping of water. Only one of the two sites with discrete pools (BCP1) recorded lower than the trigger value range for dissolved oxygen; this is consistent with the lack of flow and stagnant nature of water present.

Macroinvertebrate samples were collected at each of the five sites where water quality measurements were conducted. Similar to previous years, a total of 31 different macroinvertebrate taxa were recorded across the 8 sampled habitats (3 edge, 3 bed and 2 pool samples) with an average of approximately 12 taxa per habitat. The relatively low number of taxa recorded is reflective of the low levels of dissolved oxygen, turbidity and ephemeral nature of Back Creek. Plecoptera, Ephemeroptera and Trichoptera



(PET) ratios were similar to, or higher than those in previous years. Stream invertebrate grade number (SIGNAL) scores for the sites ranged from a minimum of 2.9 to a maximum of 4.5.

Overall the watercourses surveyed during October/November 2017 remained in a moderately to highly disturbed condition due to high levels of exotic vegetation, sediment disturbance from stock and bank erosion which remained consistent with the geomorphological condition of surrounding waterways recorded during the EA. Vegetation showed some signs of reduced cover but this is likely due to the drier conditions present compared to previous years.

### 7.2.3 Proposed Improvement Measures

Water diversion works will continue to target segregation of clean and dirty water as the site expands and new infrastructure is installed. Construction of SD12 and HWD4 will be finalised in the next reporting period.

Ongoing work will continue to occur with management of sediment drainage systems, including desilting and maintenance.

## 7.3 GROUNDWATER

### 7.3.1 Environmental Management

Groundwater at MCCM is managed in accordance with:

- the groundwater criteria prescribed under schedule 3 condition 36 to 40 of the PA 10\_0138;
- EPL 20221 Conditions P1 and M2; and
- the MCCM WMP prepared to satisfy the requirements of the EPL and PA 10\_0138.

Currently groundwater monitoring is conducted at a network of regional bores and privately owned bores as illustrated in **Figure 9**. The groundwater sampling sites on privately owned land are sampled biannually for depth to water and water quality.

The regional bores are currently sampled monthly for depth to water and quarterly for water quality. Once the baseline groundwater quality of the regional bore network has been established water quality monitoring will be conducted on a biannual basis as per the WMP. Bores are sampled in accordance with the OEH Approved Water Sampling Methods and AS/NZS5667.11. All laboratory analysis is conducted by a NATA accredited laboratory.

In 2010, eight groundwater monitoring bores and four vibrating wire piezometers were constructed within former exploration holes to form a baseline monitoring network ('MAC' bores) as part of the Environmental Assessment (EA). All of these bores were progressively removed by mining or external activities, with the exception of one bore (MAC1280).

A replacement monitoring network was developed by MCC in consultation with DPI-Water in 2013. The majority of the regional bores were installed between 2013 and 2014. The replacement bores have the prefix 'RB' or 'BCM'. The two 'BCM' bores were installed along Back Creek to investigate the potential for a shallow water table to be present that could support vegetation occurring within the riparian zone along the drainage line. The progression of the mining resulted in the removal of RB01, RB01a, RB02 and RB02a in 2017, and an alternative sampling location was identified, and continued to be sampled, pending amendment of the EPL.

A network of 17 additional monitoring bores and VWP's were proposed as part of the EA to monitor the influence of mining on the groundwater regime. The bores were installed and positioned in lines radiating out from the Maules Creek Mine. The purpose of these proposed sites was to monitor for

depressurisation in the Permian strata and any potential water level drawdown within the surrounding alluvial aquifer. Details for each of the monitoring sites are provided in Appendix E.

The table indicates where a bore has been installed in proximity to the preliminary sites recommended within the Maules Creek EA, and the original bore numbering proposed within the EA. The monitoring sites are either open PVC monitoring bores (standpipes) for shallow strata or arrays of multi-level vibrating wire piezometers (VWPs) installed within multiple deeper coal seams. In some sites a pair consisting of a shallow standpipe and a deeper VWP array was installed to allow monitoring of connectivity between the bedrock and coal seams. The sites chosen also aimed, where possible, to be adjacent to existing shallow alluvial monitoring bores monitored by the NSW government to further assist in understanding and monitoring connectivity between the different geological units.

### 7.3.2 Environmental Performance

Parameters recorded as part of the scheduled groundwater monitoring for this reporting period are summarised below and results provided in **Appendix E**.

Appendix E includes graphs for each bore that compare the measured groundwater levels with predicted water levels by the 2014 groundwater model, and water level and water quality triggers developed generally in accordance with the methodology proposed in the Water Management Plan.

Groundwater level trigger values were based on the 5<sup>th</sup> and 95<sup>th</sup> percentile values of all manual data collected for the regional monitoring bores from the start of data collection at each site until the end of 2016, noting this is a preliminary period of operation and contributes to establishing a greater data set for analysis.

Groundwater quality trigger values were developed for Total Dissolved Solids (TDS) and sulfate using the control chart methodology. A control chart is an x-y chart with three additional horizontal 'control lines' running parallel to the horizontal axis. The 'control lines' are equivalent to one, two and three standard deviations based on the baseline data. Equivalent percentiles are used to assist interpretation. Trigger events occur when:

- one data point is greater than the 99.87th percentile (3 x std dev);
- two consecutive data points greater than the 97.73rd percentile (2 x std dev); and
- five successive data points greater than the 84.13th percentile (1 x std dev).

When evaluating the results from control charts it is important to note that water chemistry results have some natural variability with a range that is determined by a variety of unique factors for each bore including the bore construction, depth, sample collection method, climatic conditions, and aquifer conditions as examples. Because of these factors water sample results from bores all exhibit some natural variability. This does not necessarily indicate an impact from mining, but is simply a trigger to further investigate and determine the cause for the variability within the sample results.

Control charts were not developed for electrical conductivity (EC) as there are no ANZECC guideline values for EC, and TDS is directly correlated with EC, allowing control charts developed for TDS to be used to evaluate changes in salinity of groundwater.

The concentrations of dissolved metals are commonly low and often below the level of laboratory detection. The concentrations of dissolved metals and nutrients in groundwater samples were therefore compared against ANZECC guideline values. It is important to note when sample results exceed these thresholds it simply provides information on the beneficial uses of the water, not necessarily an indication of impacts from mining.

### **Regional Groundwater Bores**

The groundwater level trends have been observed during the reporting period include a rising trend at MAC1280, REG13; fluctuating trend at REG03, REG14, and stable trend at REG04, REG05, REG06, REG12; and a slight decline at RB05 and REG07a.

Throughout the reporting period REG4, REG6, REG13 and MAC1280 all recorded pH levels (above pH 8.5). Elevated pH levels have generally been measured in these bores since the commencement of monitoring. It is expected an extended period of time (years) will be required for the pH levels within these bores to return to within the normal range due to the limited yield of monitoring bores. The high pH also can influence the solubility of dissolved metals and ions so the water chemistry results from these bores are not considered representative of the wider aquifers. Other regional bores show stable groundwater pH levels, between pH 7 and 8.5, characteristic of coal seam lithology, and consistent with historical pH level monitoring results from these bores.

Recorded TDS concentrations are variable within the monitoring network ranging from fresh to brackish. The majority of the samples collected from the monitoring bores recorded TDS concentrations generally consistent with historical trends and within the trigger thresholds. The TDS trends within these bores will be further monitored.

Figure E1 included within Appendix E shows groundwater levels from the standpipe bores measured within the monitoring network spatially. The groundwater levels generally reduce in elevation down the alignment of Maules Creek and Back Creek. This indicates groundwater flow is a reflection of the topography in these areas. Slightly depressed groundwater levels are evident in the bores in close proximity to the mining area, as has been previously predicted by numerical modelling. The monitoring network targets a range of different groundwater systems at differing levels and therefore it is not appropriate to prepare water level contour lines when water level data is measured in different aquifer units. Despite this the available water level hydrographs can be interpreted to assess hydraulic gradients vertically and spatially.

#### **Private Groundwater Bores**

Groundwater monitoring was conducted at private bores twice during the reporting period. Graphs showing trends in groundwater level and water quality for the private bores are included within Appendix E. All of the bores have recorded relatively stable groundwater levels aligning with baseline data from previous years. The exception is WOL2, which has slowly declined since monitoring commenced in 2014. This is noted as no longer a private bore.

The pH, EC, TDS and sulfate concentrations all remained relatively stable during the reporting period and consistent with historical data. The exception is BRE2 which recorded a slightly increasing trend in EC and TDS which will be further investigated. It was noted that several of the private groundwater bores are showing signs of deterioration that may have the potential to effect sample results.

#### **Vibrating Wire Piezometers**

Data from the Vibrating Wire Piezometers (VWPs) is downloaded on a monthly basis, the locations of VWPs is illustrated in **Figure 9. Appendix E** includes graphs of water levels for each WVP group plus any adjacent shallow standpipe monitoring bores for the reporting period. The WVP's measure the equivalent water level within selected coal seams and show the differing groundwater levels that occur within the geological sequence vertically. The VWPs show cycles related to climatic conditions and mining. The VWPs within proximity to the mining areas show a depressurisation trend that is also generally indicated by numerical modelling. Climatic influences are also evident within some of the VWPs with rising groundwater levels recorded in response to significant rainfall that occurred in winter 2016, followed by declining water levels due to the low rainfall recharge since this time.



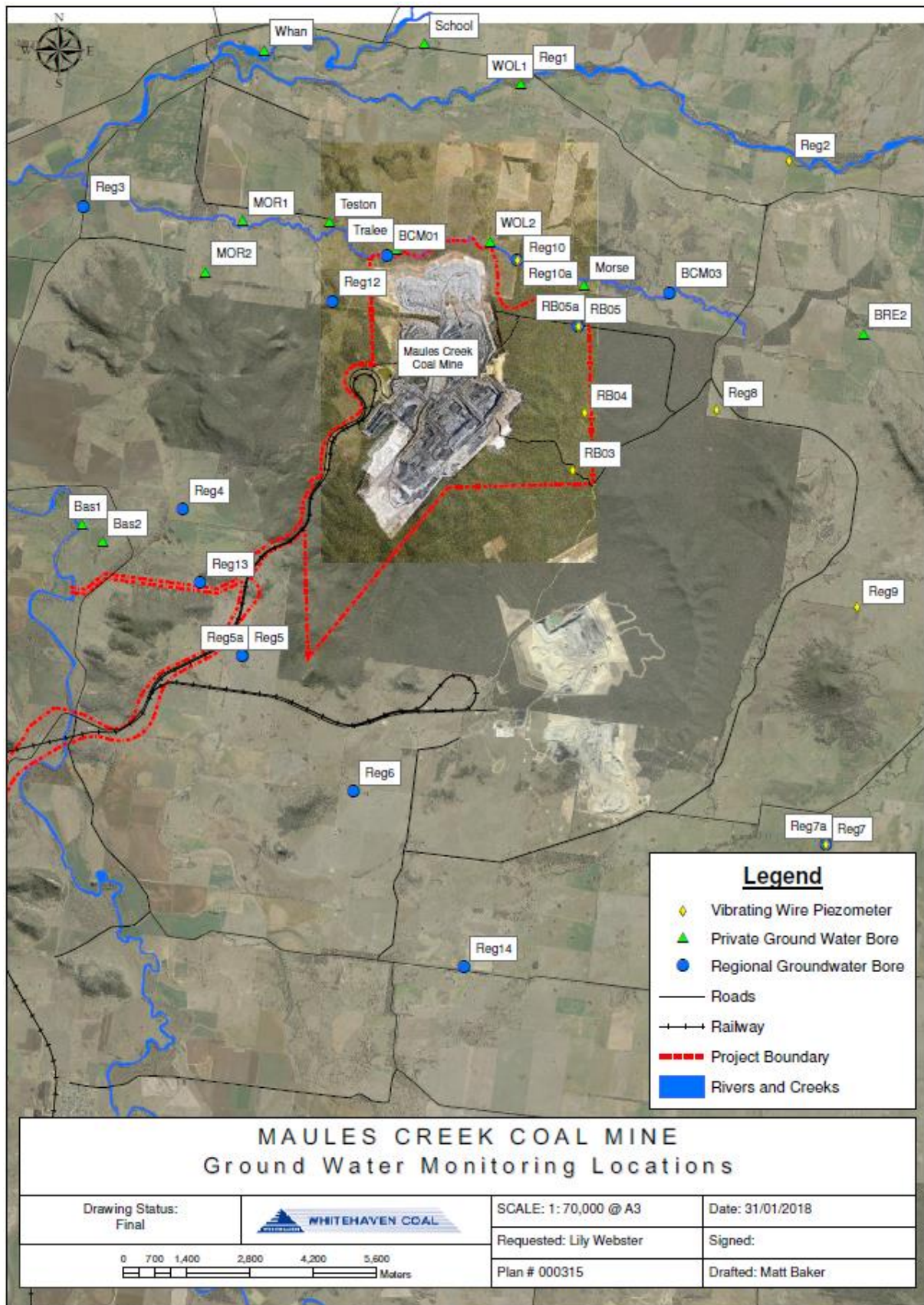


Figure 9 Groundwater Monitoring Locations

### 7.3.1 Trigger events

Analysis of trigger events against the WMP were undertaken and shown within figures and tables in Appendix E. The following trigger events occurred during the reporting period including water levels at RB05, REG13, pH at REG4, REG6, REG13 and MAC1280, and TDS triggers at REG12, REG13, REG14 and REG6 were also monitored. The concentrations of dissolved metals and nutrients within the monitoring bores were compared with the thresholds from the ANZECC guidelines (refer Appendix E, Table E-3). The water level records within these bores will continue to be monitored and further investigated.

### Groundwater Inflows

The Groundwater Impact Assessment (AGE, 2011) estimated the rate of groundwater seepage to the open cut pits in the mining complex using a numerical model. AGE (2014) updated the groundwater model and seepage estimates as summarised in the WMP.

As mining progresses, groundwater inflows are predicted to vary with the changing mine layout, depending on the interception of porous rock water sources. The predicted groundwater inflows into the open cut for year 6 were approximately 1.9 ML/day. Groundwater inflows into the active pit have been negligible during 2017 and notably below the modelled volume for year 5 of the operation. This most likely reflects the shallower than modelled mining to the end of 2017 and the minor groundwater seepages that have occurred to date have been subject to evaporation prior to any accumulation and major pooling in-pit.

### 7.3.2 Validation of Groundwater Model

As required by Schedule 3, condition 40 c) of PA10\_0138, a review of the measured groundwater monitoring results against predictions made within the 2014 groundwater model was undertaken by AGE commencing in 2016 as part of a wider review of groundwater processes occurring in the Maules Creek area. The validation/verification process involved comparing:

- measured groundwater levels and trends in the monitoring bore and vibrating wire piezometer (VWP) network with the model predictions; and
- estimates of pit inflow from site water balances with model predictions.

The model was significantly updated and recalibrated in 2017. The review indicated that the model does achieve these requirements and improvements will continue to occur as data and models progressively develop with future validation.

Following a peer review, a report will be submitted to the government in the next reporting period.

### 7.3.3 Proposed Improvement Measures

The groundwater monitoring program and management measures described above will continue to be implemented during the next reporting period. Additional BTM complex wide groundwater modelling will also be finalised.

## 7.4 SITE WATER BALANCE

The site water balance for the reporting period is presented below in **Table 12**.

A review of the water balance found that inflows to the site during the reporting period were generally in accordance with the predictions made in the EA for Year 5 of MCCM operations. Pumping from the Namoi River to site was within the allocated water licence entitlement and slightly below the water year



period of 2015/16 (see **Table 12**). An upgrade was completed to pumping infrastructure including pump and pipeline capacity to facilitate improved efficiency during licenced flow and extraction periods. Captured rainfall and runoff volumes were slightly less than predicted in the EA and WMP in Year 5, while the seepage of groundwater into the pit was negligible during the reporting period and lower than predicted.

Water usage during the reporting period was generally similar to the volumes predicted in the EA for the Year 5 scenario, with the exception of the requirements for dust suppression. These volumes were higher than predicted in the EA and Water Management Plan in order to minimise potential dust emissions from haul roads and other exposed areas during the reporting period.

**Table 12 Site Water Balance (Calendar Year 2017)**

Aspect	Volume (ML)
<b>Change in Storage</b>	
Start of 2017	685
End of 2017 <sup>2</sup>	671
<b>Net Change in Storage</b>	<b>-14</b>
<b>Water Inflows</b>	
Namoi River Pumping <sup>#</sup>	1,860
Rainfall & runoff <sup>^</sup>	1,141
CHPP Water Recycling	1,216
In-pit Groundwater Seepage <sup>4</sup>	<10ML
<b>Total Inflows</b>	<b>4,217</b>
<b>Water Outflows</b>	
CHPP water use	2,223
Dust suppression	1,576
Evaporation from storages <sup>3</sup>	320
Clearing / construction process water	109
Miscellaneous (washdown bay, etc)	<5
<b>Total Outflows</b>	<b>4,231</b>
<b>Water Balance (2017)</b>	<b>-14</b>

\* Volume for calendar year

<sup>2</sup> Includes recorded volumes in RWD2 and MWD1&2, as well as estimated volumes in sediment dams and pits.

<sup>#</sup> Based on flow meter readings

<sup>^</sup> Based on the calibrated MCCM water balance model, using site rainfall data

<sup>3</sup> Based on the calibrated MCCM water balance model, using SILO datadrill evaporation data

<sup>4</sup> Based on model calibration, operational observation & pumping meter records

## 8 REHABILITATION

The Rehabilitation Strategy for the MCCM is described in Section 7.16 of the EA. The State and Commonwealth approvals both specify that the rehabilitation of the MCCM must be consistent with the Rehabilitation Strategy (i.e. Condition 71 of Schedule 3 of PA 10\_0138 and Condition 26 of EPBC 2010/5566). The MOP summarises the key elements of the Rehabilitation Strategy as well as providing a description of activities and mine landforms.

### 8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

#### 8.1.1 Status of Mining and Rehabilitation

At the completion of the reporting period, all domains were classed as 'active' with only minor rehabilitation activities completed in association with stabilisation following the completion of particular construction activities. **Figure 10** below from the approved MOP represents the mining domains at the completion of the reporting period.

#### 8.1.2 Post Rehabilitation Land Uses

The proposed post mining land use for MCCM will be consistent with the description contained in the EA and as per the requirements of the State and Commonwealth approvals. The area will be returned to a mixture of native vegetation communities including grassy woodland, shrubby woodland/open forest and riparian forest natural forest and woodland. Condition 71 of Schedule 3 of PA 10\_0138 lists the overall rehabilitation objectives for the MCCM. These are outlined below in **Table 13** and also included in the MOP.

**Table 13 Rehabilitation Objectives**

Feature	Objective
Mine site	<ul style="list-style-type: none"> <li>• Safe, stable and non-polluting</li> <li>• Constructed landforms drain to the natural environment</li> </ul>
Final void	<ul style="list-style-type: none"> <li>• Minimise the size and depth of the final void as far as is reasonable and feasible</li> <li>• Minimise the drainage catchment of the final void as far as is reasonable and feasible</li> </ul>
Surface Infrastructure	<ul style="list-style-type: none"> <li>• To be decommissioned and removed, unless the Executive Director Mineral Resources agrees otherwise</li> </ul>
All land, other than the final void	<ul style="list-style-type: none"> <li>• Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of:                             <ul style="list-style-type: none"> <li>○ local native plant species; and</li> <li>○ a landform consistent with the surrounding environment, in accordance with the Revised Biodiversity Offset Strategy and the BMP (i.e. Conditions 45 and 53 of Schedule 3 of PA 10_0138 respectively).</li> </ul> </li> </ul>
Community	<ul style="list-style-type: none"> <li>• Ensure public safety</li> <li>• Minimise the adverse socio-economic effects associated with mine closure</li> </ul>

Rehabilitation Performance Indicators **Table 14** summarises the rehabilitation status for the MCCM. Short term (or temporary) rehabilitation, ongoing from the construction phase has included stabilisation of railway batters, road embankments, water management infrastructure and temporary stockpiles. These activities have been undertaken in accordance with the short term objectives defined in the MOP.

**Table 14 Rehabilitation Status**

Mine Area Type	Previous Reporting Period (Actual)	This Reporting Period 2017 (Actual)	Next Reporting Period 2018 (Forecast)
A. Total mine footprint	1,274	1,494	1,598
B. Total active disturbance	1,274	1,494	1,598
C. Land being prepared for rehabilitation	0	19	91
D. Land under active rehabilitation	0	0	0
E. Completed rehabilitation	0	0	0

### 8.1.3 Decommissioning and Demolition Activities

As anticipated in the MOP, no decommissioning activities were undertaken during the reporting period.

### 8.1.4 Other Rehabilitation Activities

Rehabilitation activities associated with the exploration activities have been undertaken during the reporting period. Where possible, exploration holes were located on previously disturbed land in order to minimise disturbance.

### 8.1.5 Departmental Sign-off of Rehabilitated Areas

Departmental sign-off has not been requested.

### 8.1.6 Variations in Activities against MOP/RMP

A MOP amendment was approved during the period, modifications included a refined mine design including high wall dam, topsoil stockpiles, and drainage which resulted in less native vegetation disturbance within the MOP term compared to the previous MOP.

A new MOP was submitted at the end of the reporting period and pending approval at the end of the reporting period. There were no other variations in activities undertaken at the MCCM to those proposed in the MOP. Representatives from DRE visited MCCM during the 2017 reporting period.



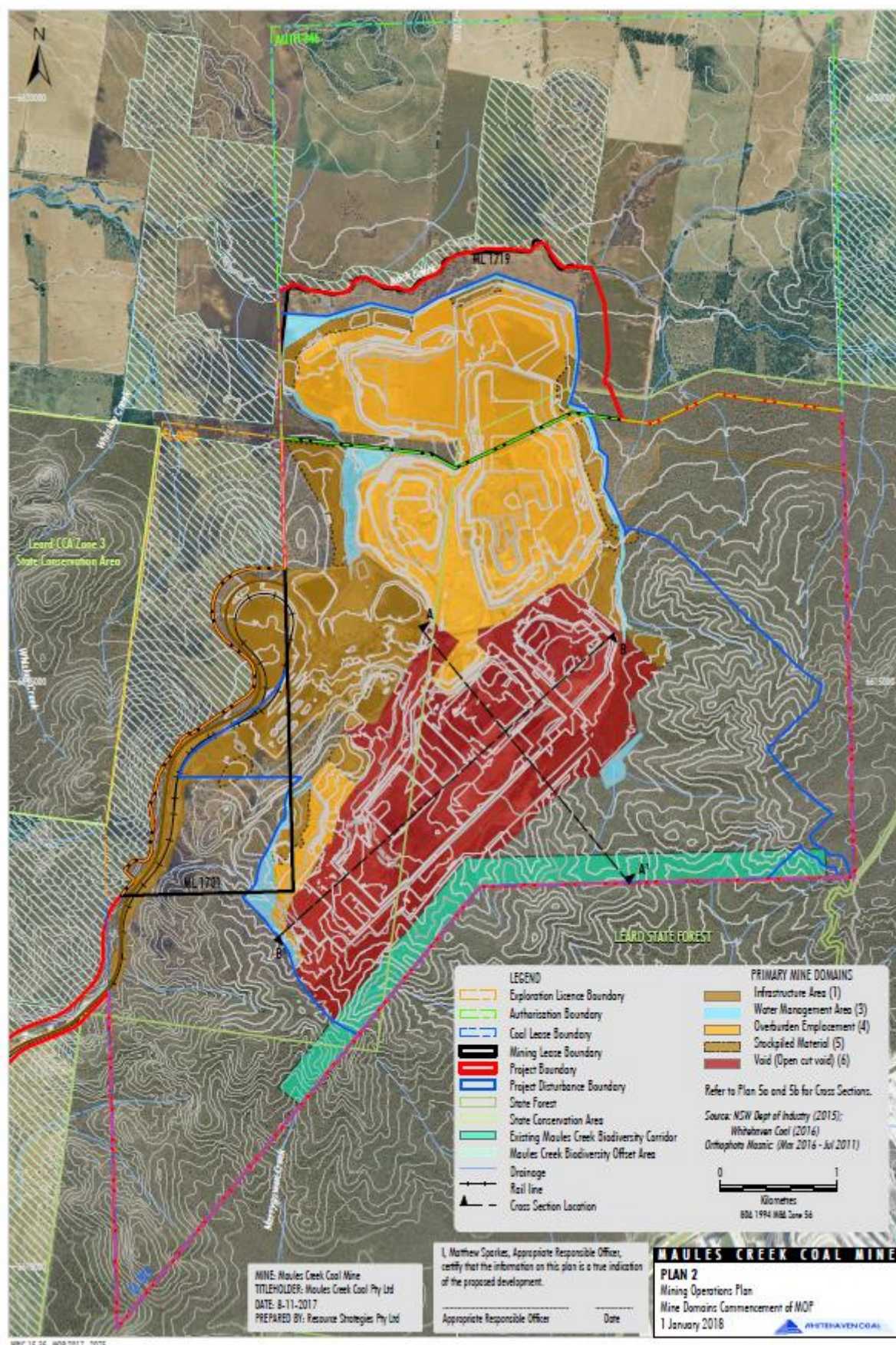


Figure 10 Mining Domains at Completion of the Reporting Period (2017)

### 8.1.7 Monitoring

There was no progressive rehabilitation undertaken, and accordingly, there are no monitoring results to report for the 2017 period. Visual inspections of short term (or temporary) rehabilitation are undertaken to assess surface stabilisation around infrastructure areas and topsoil stockpiles.

### 8.1.8 Topsoil Balance

In line with Condition 39 of Schedule 3 of PA 10\_0138, and Conditions 26(b), 27(c) and 27(d) of EPBC 2010/5566, the management of topsoil at the MCCM is undertaken in accordance with the Soil Management Protocol.

Detailed soil surveys have been undertaken within the disturbance footprint, prior to the stripping of topsoil. An independent consultant completed surveys assessing suitability of topsoil and subsoils for use on mine rehabilitation and the preparation of stripping plans for each of the topsoil areas. Topsoil volumes stored to date are summarised in **Table 15**. These include a forecast estimate for the ensuing period. MCCM will continue to monitor topsoil volumes to ensure appropriate volumes are recovered for later use on rehabilitation areas. A number of topsoil stockpiles may also require relocation during the following reporting period to enable to progression of mining operations.

**Table 15 Topsoil Balance**

Area	2014 Soil Balance (m <sup>3</sup> )	2015 Soil Balance (m <sup>3</sup> )	2016 Soil Balance (m <sup>3</sup> )	2017 Soil Balance (m <sup>3</sup> )	2018 Soil Balance (m <sup>3</sup> )	Total Soil Balance (m <sup>3</sup> )
MIA / Construction	539,166	145,990	0	-	-	685,156
Mining Operations	252,490	349,928	852,524	762,718	-	2,217,660
Still to clear / strip	-	-	-	-	577,567	577,567
<b>Totals</b>	<b>791,656</b>	<b>495,918</b>	<b>852,524</b>	<b>762,718</b>	<b>577,567</b>	<b>3,480,383</b>
EA Total for rehab	-	-	-	-	-	2,368,000
Net difference	-	-	-	-	-	1,112,383

### 8.1.9 Trials, Research Projects and Initiatives

In accordance with Condition 15 & 16 of the MCCM EPBC Approval, MCC must fund \$1 million into research of Box Gum Woodland mining rehabilitation as well as \$1.5 million into research for threatened species recovery actions for the Regent Honeyeater, Swift Parrot and South-eastern (Corbens) Long-eared Bat. In accordance with approved Research Project Plans; MCC funded the following activities during the reporting period:

- Annual monitoring of the Swift Parrot particularly focused on identification and mapping of foraging and nesting habitat throughout the breeding range during the 2017 breeding season;
- Completed soil sampling of natural and stockpiled soils onsite at MCCM, as part of the Box Gum Woodland research, to commence soil physical and chemical testing, seed sieving and microscope analysis and germination trials to determine residual species within the soil seed bank.

The findings of these research projects will be used to inform MCC on potential improvements to rehabilitation and restoration practices in particular during Box-Gum Woodland revegetation activities but also the management of threatened species both onsite and in the Biodiversity Offset Areas.



### 8.1.10 Key Issues to Achieving Successful Rehabilitation

The key issues to achieving successful rehabilitation at MCCM include:

- excessive erosion and sedimentation (e.g. gullyng and sedimentation resulting in land stability and vegetation growth issues);
- weed and feral animal infestation;
- poor vegetation establishment and growth (including the Box-Gum Woodland EEC/CEEC); and
- landform instability.

In cases where rehabilitation performance is sub-optimal, additional management measures will be implemented (e.g. replanting, repairing landform and water management features, application of mulch/fertilisers, feral animal and weed control etc.). A TARP for rehabilitation at the MCCM has been included in the MOP, which outlines appropriate actions and varied responses that will be implemented as required.

### 8.1.11 Actions for the next reporting period

The rehabilitation actions and detailed justification for the next reporting period will be detailed in the MOP that is pending approval at the time of preparation of this report. Rehabilitation is proposed on the northern overburden emplacement area.

### 8.1.12 Proposed Research and Rehabilitation for 2018

MCCM will continue to progressively shape available areas that are near final landform and elevation for rehabilitation. The first available rehabilitation will be targeted in the north-eastern extent of the overburden emplacement during the 2018 reporting period. Minor exploration site rehabilitation and short term (or temporary) rehabilitation will also occur as required. As outlined in **Section 8.1.9**, implementation of research into both the Box-Gum Woodland rehabilitation and Threatened Species recovery actions is underway and, on the research schedule, is on track for completion in 2022/2023.

## 9 COMMUNITY

Social impacts and opportunities associated with the MCCM are managed in accordance with the Social Impact Management Plan (SIMP), Schedule 3 Condition 78 and the Statement of Commitments (SoC) Appendix 5 of PA 10\_0138.

### 9.1 COMMUNITY ENGAGEMENT ACTIVITIES

MCC uses a variety of community engagement and consultation methods including the MCCM Community Consultative Committee (CCC), Whitehaven website, MCCM phone hotline, local media updates, MCCM Open Days, local school visits, sponsorship of local community events and groups, meetings as required with neighbours and a range of stakeholders including government and non-government agencies.

MCCM operates a Community Consultative Committee, with meetings held quarterly during the reporting period. In addition annual joint meetings between Maules Creek Coal, Boggabri Coal and Tarrawonga Coal Mines CCC's were held in May and November 2017. Minutes of these meetings are posted on the Whitehaven website once ratified at the following meeting.

MCCM are also involved and attend various community events and information forums as part of engaging with the local community including; Business Chamber forums, Progress Association meetings, Council meetings, industry forums, local school functions, community gatherings and charity club functions.

### 9.2 COMMUNITY CONTRIBUTIONS & INITIATIVES

As well as attending functions, WHC and MCCM also contribute to the community by providing financial support and sponsorship to various community events and initiatives throughout the community, these include:

- Aboriginal Girls Academy
- Academy Publishing Ltd Partnership
- Apex Gunnedah
- Baan Baa Community Hall\*
- Bernie Irwin – Ride with Pride
- Black and Blue Gym
- Boggabri Business & Community Progress Association\*
- Boggabri Health Service\*
- Boggabri Rotary Club\*
- Boggabri Sacred Heart School PT & F Association\*
- Boggabri Showground Trust\*
- Can Assist, Narrabri Hospital Palliative Care, Cancer Council
- Country Education Foundation
- Curlewis Public School
- Gunnedah & District Chamber of Commerce
- Gunnedah & District Historical Society
- Gunnedah Community Scholarship Fund
- Gunnedah Cycling & Triathlon Club
- Gunnedah Eisteddfod Society

- Gunnedah Gomeri Roo's RL
- Gunnedah High School
- Gunnedah Men of League
- Gunnedah Miner Support Group
- Gunnedah Ministers Fraternal
- Gunnedah PCYC
- Gunnedah Rural Health Centre
- Gunnedah Show Society
- Gunnedah West Rotary
- Kamilaroi Aging & Disability
- Kogil Street Preschool Association Inc.
- Lions Club of Boggabri\*
- Manilla Show Society
- Maules Creek Camp Draft Committee\*
- McGrath Foundation
- Motor Neuron Disease
- Mullaley Public School P&C
- Narrabri & District Chamber of Commerce
- Narrabri Aboriginal Girls Netball Team
- Narrabri High School
- Narrabri Local Aboriginal Land Council
- Narrabri Nandewar Wedgetails RL
- Narrabri Show Society
- Nosh Narrabri Committee
- Page Research Centre Limited
- Quirindi Public School P&C
- Quirindi Show Society
- Rotary Club of Tamworth – First Light
- Sacred Heart Primary School Boggabri\*
- Stacey Cooke – Cancer Council
- Walhallow Local Aboriginal Land Council
- Westpac Rescue Helicopter Service
- Wimnet Mentoring Program
- Winanga-Li Aboriginal Child & Family Centre\*

\* Maules Creek individually sponsored

The MCCM Social Impact Management Plan (SIMP) outlines a number of objectives to monitor the effect of the MCCM within the local community relating to housing, employment, training, economic development, community infrastructure and traffic. The following reports on the activities, monitoring and results with regards to the objectives outlined in the SIMP.

### **Housing**

To reduce the pressure on the local short term housing market during this phase of operations third party accommodation was supplied to contractors at the Civeo Accommodation Villages in predominantly Boggabri with some to Narrabri. At the WHC/MCCM peak occupation rate at the Boggabri village which occurred during February 2017 there was still 76 % available rooms, showing that suitable accommodation remained available at the peak time during the reporting period.

In addition, with the ramp up of mining employment this third party accommodation is also available to mine operations employees at a subsidised rate, to assist in reducing peak rental/leasing concerns in the local area. The fee for use, increases every three months in order to encourage employees to move to the area permanently. Whitehaven has a strong focus on employing local people at its operations, and this subsidised approach has been positively received as a short term housing solution by new employees to the mine as they investigate and look to relocate to the local area. WHC will continue to monitor in conjunction with local councils the ongoing housing and accommodation market to ensure impacts are managed.

### ***Employment and Training***

As at the end of the reporting period, MCCM workforce, including supplementary labour hire, was 569 with over 77% residing in the local area, which is on par with the previous reporting period. The remaining workforce (including management and professional staff) have permanent residence listed as being outside the Narrabri and Gunnedah LGAs. The associated transport solution of both residential and non –residential workforce is satisfied by the ongoing shuttle bus service that is provided by MCCM for both operational employees as well as staff/management where this is practicable.

Whitehaven's *Workforce Diversity Policy* has supported strong representation of women, Indigenous and young people. Of the 569 MCCM workforce at the end of the period:

- 71 employees (approximately 12.5%) are Indigenous, with the percentage slightly down from 13% on the previous reporting period;
- 75 employees (approximately 13%) are women, with the percentage up from 14% for the previous reporting period; and
- 97 employees who commenced production operators roles (approximately 17%) are new to mining, an increase from the previous reporting period of 9%.

Whitehaven and MCCM provide training opportunities for apprenticeships and traineeships in order to support local employment and increase local skills levels. During the reporting period nine (9) young locals accepted positions as four (4) Apprentice Electricians, one Apprentice Automotive Electrician, one Apprentice Fitter and three as Apprentice Plant Mechanics as part of the WHC MCCM apprenticeship program. This takes the total number of apprenticeships accepted under the program to 42, since 2011. In addition, one apprentice successfully completed his training and received trade qualifications during the period and successfully gained employment as a tradesmen with MCCM.

Whitehaven also provides opportunities for scholarships for tertiary studies. During the period MCCM also provided vacation employment to five students in the fields of environment, electrical engineering, geology and mechanical engineering.

Provision of employment figures and amount of local spend by WHC is also available and provided to councils as requested to assist the councils in their forward planning, these figures are also included in financial reports released by WHC.

### ***Economic Development***

Whitehaven, which includes MCCM contributes financially to the economy at both state and federal level and to the communities in which we operate. Employees and contractors also add a significant economic contribution to the Gunnedah, Narrabri, Boggabri and Werris Creek townships through their purchases from local businesses.

In 2017 Whitehaven spent:

- \$174.4m in salaries, wages, taxes and superannuation to employees (on an equity joint venture basis)
- \$153.6m in royalties to the New South Wales Government (on an equity joint venture basis)
- Over \$624.4m on mining, washing and delivering coal onto trains at our mine sites
- Over \$320.0m in port and rail charges for track access haulage costs and port costs
- More than \$400,000 towards local education activities and community groups.

### Community Infrastructure

During the reporting period MCCM paid a lump sum cash contributions to Narrabri Shire Council (NSC) of \$1,268,750 under its VPA to go towards infrastructure projects and upgrades within the Narrabri, Boggabri and Maules Creek communities. In addition, as a result of coal sales directly from the MCCM, over \$730,000 has been paid to NSC during 2017 to be spent on further infrastructure projects.

During the 2017 period WHC spent approximately \$260 million with local businesses and suppliers in the Narrabri, Gunnedah, Tamworth and Liverpool Plains Shires. Local jobs and local spend with local businesses will remain a focus in future years.

## 9.3 COMMUNITY COMPLAINTS

MCC maintains a dedicated Community Hotline (1800 MAULES) for the MCCM is answered by an operator. The contact line is advertised on the Whitehaven Coal website.

A summary of the complaints (by category) received by MCCM over the last two reporting years are detailed in **Table 16**. The Community Complaints Register is also available on the Whitehaven Coal website and a summary provided at CCC meetings.

**Table 16 Summary of Community Complaints and Enquiries**

Category	2016	2017
Air quality	37	33
Traffic	2	4
Lighting	0	1
Noise	35	109
Blasting	9	13
Social impacts	0	1
Other	4	3
TOTAL	87	164

*Note: a single complaint may involve multiple categories.*

### 9.3.1 Complaint Trends

The total number of complaints received in 2017 is higher than those recorded in the 2016 reporting period. The increase in complaints is primarily related to noise and blasting. The majority of noise complaints came from a single complainant, with voluntary acquisition criteria specified within the Project Approval, and were received via the MCCM community line.



### 9.3.2 Actions & Proposed Improvements

Community complaints primarily related to noise, air quality and blasting concerns. Actions taken in response to complaints included a range of measures, including however not limited to, the following:

- Investigations into specific mining activities and trialing and implementing equipment upgrades;
- Reviewing video footage or visual media where available;
- Reviewing real time data monitoring and operational activities;
- Reviewing daily risk reports to determine appropriate TARP levels dependent on specific mining activities and weather patterns to support operational management;
- Analysis of meteorological data and physical inspections of offsite locations;
- Communicating learnings and issues to operational personnel;
- Community consultation; and
- Ongoing engagement with regulatory agencies and local community members.

## 10 INDEPENDENT AUDITS

### 10.1 MANDATORY ENVIRONMENTAL NOISE AUDIT

The Mandatory Environmental Noise Audit (MEA) was required under Condition E3 of the Environmental Protection Licence No. 20221, as per the licence variation of 25 February 2016. MCC commissioned EMM Consulting Pty Limited (EMM), who were approved by the EPA as the independent auditor, to complete a noise management audit at MCCM. The final MEA report was approved during the 2017 reporting period. Actions were undertaken in response to a number of recommendations. These included:

- Recommended that the Project Approval – Schedule 3 Condition 17 (and the relevant sections of the EPL) be modified;
- Amendment of monthly attended compliance monitoring reports to include further assessment specific to privately owned residences north, north-west and north-east of the mine;
- Additional detailed reporting on the method used to determine site noise contributions;
- Additional training for the roving noise monitor;
- Updates to the Noise Management Plan;
- Detailed assessment of plant with sound power levels remaining above EA levels; and
- Further consideration to noise mitigation at the CHPP and addressing dozer related noise.

### 10.2 EPA & DPE DUST BENCHMARKING STUDY

Katestone Environmental Pty Ltd (Katestone) was commissioned by regulatory agencies to complete a Best Practice Benchmarking Study of dust controls applied at MCCM. The final study report was completed by Katestone during the 2017 reporting period and is publically available on the DPE website.

Katestone concluded that MCCM is generally operating in accordance with best practices for bulldozing, drilling, blasting, managing stockpiles, cleared areas, conveyors, transfer stations, stacking, reclaiming and train loading. Katestone also found that MCCM is conducting truck loading, hauling and dumping activities, and managing rail wagon emissions using some best practice measures.

In response to the recommendations provided by Katestone, MCCM has undertaken actions including:

- a third TEOM monitoring unit (TEOM3) was installed during December 2017;
- revision of the Blast Management Plan (BMP) to address recommendations regarding consideration of blast size and dust potential;
- completed installation of a predictive and real time air dispersion modelling system;
- revision of the AQMP;
- trialling and implementing drill rigs with an increased water tank size; and
- Submission of an EPL amendment application relating to investigating overburden and coal loading and unloading options.

### 10.3 INDEPENDENT BIODIVERSITY AUDIT

A biodiversity audit was required in accordance with Schedule 3 Condition 56 of PA10\_0138. This was commissioned and commenced in 2017 with results and a finalised report anticipated the first half of 2018. For further information refer to **Section 6.6.2**.

#### 10.4 INDEPENDENT ENVIRONMENTAL AUDIT

The next IEA is required under Schedule 5, Condition 10 of the PA 10\_0138 to be submitted to the DPE by the end of September 2018. The following actions that were reported as outstanding in the 2016 Annual Review, are included below.

**Table 17 IEA Action Plan Progress**

IEA Recommendations	Original MCCM Response to Recommendations in IEA	Annual Review Progress Status
<p>The air quality management system includes observations, daily weather reports and forecasts, and ongoing analysis of trends in monitoring. The site should develop a predictive and real time air dispersion model to inform operational decisions around air quality or revise the AQGHGMP to reflect the sites management of air quality without a predictive real time air dispersion model.</p>	<p>The predictive and real time dispersion model will be implemented as part of the BTM Air Quality Management Strategy (AQMS). MCCM will raise the importance of progressing and finalising the AQMS as soon as possible for approval by the DPE with the other mines in the BTM complex.</p>	<p>BTM AQMS was approved in 2017 and implementation of the associated predictive system is complete.</p>
<p>The BTM Complex Strategies constitute an important part of the cumulative management of the impacts from mining in the area. If they remain unapproved, MCCM should consider whether cumulative impacts are adequately addressed and mitigated through a review of the pertinent MCCM management plans.</p>	<p>The BTM Complex Strategies are currently being prepared, consulted and reviewed. MCCM will raise the importance of progressing and finalising the Strategies as soon as possible for approval by the DPE and with the other mines in the BTM complex.  MCCM will also continue to monitor and consider any potential cumulative impacts to determine whether further revisions of the MCCM Management Plans are required.</p>	<p>The BTM Strategies for Air, Noise, Biodiversity and Aboriginal Heritage were approved in 2017.</p>

## 11 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

### 11.1 NON-COMPLIANCES

The compliance status of the MCCM against relevant approvals during the reporting period was assessed in **Section 1** as of the end of the reporting period (31 December 2017). Further details of any actions undertaken or proposed for non-compliances, including within the following reporting period, are summarised in **Table 18 Non-Compliance Details and Proposed Action Plan**

**Table 18 Non-Compliance Details and Proposed Action Plan**

Non - Compliance	Date / Location	Cause	Action Plan	Estimated Completion Date
Notification was not received by four (4) recipients prior to a blast event.	June	Technical failure by the messaging service provider and telecommunication issue.	Implemented additional verification measures as well as secondary SMS's/phone calls. Blast times continue to remain updated on the Whitehaven Coal website.	Complete
Operation of a predictive air dispersion model not in accordance with Schedule 3 Condition 33 of the Project Approval.	July	BTM Air Quality Strategy was not yet approved.	Interim management measures were implemented and trial of the dispersion model was in progress. Software is now fully implemented.	Complete
Not all SPL's for plant in 2017 satisfied the predicted sound power targets described in the Project EA.	2017	Specific components of CHPP higher than modelled within the EA.	Lodgement of a modification to PA10_0138. Five fixed plant components over the EA modelled values, however overall the CHPP is quieter than modelled. Improvements to the CHPP were undertaken during 2017 and further review in the next reporting period.	2018
Technical exceedance of the licenced noise criteria recorded during attended noise monitoring.	July & August	Technical exceedance due to the addition of a low frequency modifying factor under the NSW INP	Ongoing operational management of noise and improvements to equipment. Technical exceedances pre-dated the Noise Policy for Industry that is now implemented.	Complete
All blast monitoring results were not captured at BM3.	February	Equipment and mobile network failures.	Failed components were replaced. A secondary blast monitor, as contingency, was also installed.	Complete

Non - Compliance	Date / Location	Cause	Action Plan	Estimated Completion Date
Dust generation on an internal haul road non-compliant.	February	Haul trucks reassigned to a section of dump prior to inspection.	Completed. Actions advised to EPA including formal warning to supervisor, communication to operational team, and targeted dust suppressant application.	Complete
Groundwater samples unable to be taken at RB01, RB02.	January and February	Progression of the mine resulting in the removal of sampling points RB01 and RB02 in February.	New monitoring point application submitted for RB01 and RBO2.	Pending licence amendment approval by the regulatory agency in 2018.

## 11.2 REPORTABLE INCIDENTS OR EXCEEDANCES

MCCM reported exceedances related to attended noise monitoring results in July and August that were low level resulting from the addition of a modifying factor required under the NSW INP as referred to in **Section 6.4.2**. Other exceedances related to air quality were not attributed to mining activities (ie regional air quality events).

## 11.3 REGULATORY ACTIONS

The following official cautions, warning letters and penalty notices were issued to MCC during the reporting period. Penalty notices are included in **Table 4** in **Section 1**.

- A warning letter was issued by the DPE for not notifying a small number of tenants and landholders in writing of noise exceedance and tenant rights under the Project Approval (Schedule 4 Conditions 2[c] and 3[a]) in a previous reporting period.
- An official caution was received from the EPA related to not minimising dust emissions following a helicopter flight undertaken by the EPA during April 2016 across three mining operations in the Boggabri and Maules Creek area.
- An official caution was issued by the Department of Industry – Lands for the failure to seek authority for maintaining vegetation along an existing track as part of bushfire management during March 2017. The works were in alignment with the Maules Creek Biodiversity Management Plan.
- A notice advising of non-compliance was received from the DPE in July in relation to implementation of a predictive dispersion modelling tool. It is noted the system was installed and trialled prior to the letter, together with a suitably effective system in place as contingency. The BTM Air Quality Management Strategy was approved less than one month prior, requiring implementation by August 2017. MCCM completed the action by the due date.
- A penalty notice was issued by the EPA in relation to the hauling of overburden and dust generation on an internal haul road at an overburden dump.
- A penalty notice was issued by the EPA in relation to not providing all requested information in relation to an information request. All information was provided as part of subsequent responses.
- A notice advising of assessment of non-compliance regarding not providing notification to a small number of neighbours prior to a blast event.



## 12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Activities to be completed in the next reporting period to improve the environmental or community performance of the MCCM, in addition to those separately identified in **Section 11** include implementing revised management plans, progressing overburden shaping and rehabilitation opportunities, undertaking research related projects regarding Box-Gum Grassy Woodlands, and identification of community support opportunities.

**APPENDIX A**

***BLAST MONITORING RECORDS***

## Appendix A Blast Monitoring Records

The records presented in Table A-1 have been included to satisfy the blast reporting requirements of Schedule 3 Condition 19 and 20 of PA 10\_0138.

**Table A-1  
Blast Monitoring Records**

Date	Time	ID/Location	BM1 mm/s	BM1 dBL	BM2 mm/s	BM2 dBL	BM3 mm/s	BM3 dBL	BM4 mm/s	BM4 dBL
Exceedance Criteria (0% (5%))			10 (5)	120 (115)	10 (5)	120 (115)	10 (5)	120 (115)	10 (5)	120 (115)
4/01/2017	12:57	TES58_ONV27_PS019 B	0.099	97.6	0.052	102.9	0.07	99	0.087	97.9
9/01/2017	13:07	TES63	0.121	89.3	0.113	94.3	0.146	93.9	0.249	93
13/01/2017	13:18	BRA46	0.269	106.4	0.125	100.9	0.152	103.2	0.38	106.3
18/01/2017	13:00	BRA57_BRA46b	0.262	96.1	0.201	96.5	0.212	97.4	0.336	102.6
19/01/2017	12:53	RL395_02	0.2	94.4	0.156	95.4	0.318	96.2	0.427	93
23/01/2017	12:44	TSM65	0.057	93.4	0.036	94.3	0.044	92	0.055	87
24/01/2017	12:48	PS020	0.186	87.3	0.114	100.9	0.271	104	0.311	102.9
25/01/2017	12:50	TES64	0.183	96.9	0.123	97.4	0.15	96.8	0.222	98.5
30/01/2017	12:56	BRA58	0.182	99.4	0.117	96.5	0.135	92	0.181	101
31/01/2017	13:00	ONV26	0.174	96.9	0.105	98.5	0.144	100.8	0.146	94
1/02/2017	12:56	TES57_TES53c	0.247	93.4	0.131	99	0.146	99.5	0.699	103.3
3/02/2017	12:59	BRA47	0.328	102.2	0.169	96.5	0.189	98.5	0.355	95.8
6/02/2017	13:00	ONV28	0.27	98.2	0.122	103.4	0.141	95.5	0.126	96.5
9/02/2017	12:54	RL355_08	0.17	93.4	0.107	97.4	0.214	97.4	0.158	102.6
10/02/2017	12:59	PS028	0.428	96.9	0.155	89.4	0.225	87.9	0.205	90.5
14/02/2017	13:01	ONV29	0.394	96.1	0.148	98.2	0.26	95.5	0.311	98.5
15/02/2017	13:05	ONV30	0.279	103.3	0.068	100.9	0.103	100.8	0.146	94
16/02/2017	13:03	TES60b	0.088	94.4	0.039	97.4	0.056	94.7	0.125	97.9
17/02/2017	12:59	TES59	0.163	100.4	0.069	98.2	0.094	99.9	0.141	101.8
20/02/2017	13:00	TES54c_TES40b	0.059	97.6	0.043	94.3	0.046	97.4	0.07	93
22/02/2017	12:55	BCK04	0.082	101.3	0.052	99	0.058	98	0.096	97.9
24/02/2017	13:01	BRA58B	0.219	103.6	0.139	104.6	0.159	106.9	0.187	97.9
27/02/2017	13:26	BRL17_BRL18	0.256	101.8	0.152	100.3	*	*	0.139	99
28/02/2017	13:16	RL373_08	0.263	96.1	0.141	98.2	*	*	0.289	101.8
2/03/2017	12:59	BCK03_BCK05_PS030	0.664	105.7	0.257	102.5	0.706	103.3	0.575	100.1
6/03/2017	12:49	RL413_01	0.117	96.9	0.076	102.5	0.373	97.3	0.215	105.6
11/03/2017	14:37	BCK02_BCK05_PS26	0.307	99.9	0.121	105	0.16	91.5	0.383	95.8
16/03/2017	12:55	BCK04B	0.105	104.8	0.058	104.2	0.095	97.5	0.13	99
20/03/2017	12:53	TSL66	0.105	100.4	0.065	98.2	0.119	76.7	0.072	88.9
21/03/2017	13:16	TNN32	0.546	98.2	0.224	94.3	0.28	76.7	0.531	94
23/03/2017	12:54	BCK05C_BCK05B	0.11	95.3	0.06	97.4	0.065	90.7	0.093	95
30/03/2017	13:07	BRA49 & PS021_25	0.394	96.9	0.224	92.9	0.324	92.3	0.557	96.5
5/04/2017	13:01	TNN33_TES47B	0.219	112.5	0.218	109.6	0.307	102.7	0.517	101.8

Date	Time	ID/Location	BM1 mm/s	BM1 dBL	BM2 mm/s	BM2 dBL	BM3 mm/s	BM3 dBL	BM4 mm/s	BM4 dBL
Exceedance Criteria (0% (5%))			10 (5)	120 (115)	10 (5)	120 (115)	10 (5)	120 (115)	10 (5)	120 (115)
6/04/2017	12:58	ONV24	0.085	100.9	0.045	97.4	0.072	88.7	0.074	99
11/04/2017	12:38	BCK04C	0.138	99.9	0.076	99	0.102	98.3	0.093	99
13/04/2017	13:00	TNN31	0.317	105.4	0.277	105	0.181	102.3	0.427	99.6
22/04/2017	13:09	TNN35_PS033	0.483	101.8	0.283	102	0.394	101.3	0.922	97.2
27/04/2017	12:54	RL373_09	0.072	108.9	0.057	104.6	0.057	102.3	0.073	96.5
3/05/2017	13:04	TNN36_37	0.276	100.9	0.23	94.3	0.204	92.3	0.349	96.5
8/05/2017	12:56	RL373	0.179	108.7	0.13	103.4	0.176	99.6	0.168	104.2
10/05/2017	12:50	BCK09	0.146	106.7	0.088	101.5	0.139	101.3	0.121	97.9
15/05/2017	12:50	BRL19	0.117	97.6	0.091	94.3	0.147	95.9	0.103	93
18/05/2017	12:58	TNN34	0.241	108.2	0.146	97.4	0.221	95.8	0.459	97.2
19/05/2017	13:00	BRA63	0.345	98.2	0.149	99.6	0.165	102.3	0.174	112.6
22/05/2017	12:55	BRA63B	0.079	92.2	0.043	91.3	0.067	90.7	0.044	84.5
24/05/2017	13:02	BRA60	0.198	96.9	0.133	100.3	0.2	94.8	0.364	94
30/06/2017	12:59	TNN39	0.27	96.1	0.17	100.3	0.276	82.7	0.55	100.1
2/06/2017	11:07	ONV31	0.145	90.9	0.076	96.5	0.165	88.7	0.316	99
5/06/2017	12:58	BCK10_BCK04D_BRL2 1_PS040_PS041	0.239	104.6	0.135	104.6	0.217	96.7	0.229	103.3
8/06/2017	12:48	ONV32	0.188	98.8	0.126	106.3	0.229	96.7	0.26	96.5
10/06/2017	10:03	BRA61	0.273	100.4	0.17	106.3	0.182	114.1	0.247	116.6
15/06/2017	12:53	BRL22_PS033B	0.345	100.4	0.159	99	0.354	96.7	0.657	95
20/06/2017	12:59	TNN38	0.181	96.9	0.128	97.4	0.195	95.8	0.27	102.6
21/06/2017	13:00	TSU68	0.167	92.2	0.09	91.3	0.1	90.7	0.116	95.8
26/06/2017	12:52	ONV33	0.281	102.2	0.14	104.6	0.427	105.6	0.259	107.6
27/06/2017	13:01	BRA62	0.242	102.5	0.18	105	0.182	104.7	0.264	100.5
10/07/2017	13:18	TNN40_41_TSU69	0.271	101.8	0.196	98.2	0.313	101.8	0.234	97.2
11/07/2017	12:58	PS021D	0.245	89.3	0.093	86.9	0.144	82.7	0.168	93
13/07/2017	12:53	BRA64_65	0.293	92.2	0.161	94.3	0.153	88.7	0.32	90.5
17/07/2017	12:51	BCK01	0.131	87.3	0.086	89.4	0.088	82.7	0.188	91.9
21/07/2017	12:52	BRL23_BRL24	0.036	85	0.036	84.5	0.05	86.1	0.095	94.4
21/07/2017	13:01	RL299	0.116	92.1	0.148	93	0.173	94.6	0.334	98.3
26/07/2017	12:58	TSU67	0.105	100.6	0.108	101.8	0.121	107.1	0.104	102.2
27/07/2017	12:49	BRA66	0.146	92.1	0.147	93	0.16	93.4	0.421	92.2
4/08/2017	13:12	RL377_02	0.219	95.9	0.123	94	0.129	95.6	0.158	92.2
10/08/2017	13:04	PS021E_JEA01	0.212	95.3	0.182	94.9	0.256	92.1	0.443	93.4
11/08/2017	12:54	TES72 HRN07 TSU69b	0.084	97.1	0.098	90.5	0.096	99.4	0.103	104.3
16/08/2017	13:10	BRA67_68	0.226	101.3	0.205	105.6	0.209	99.4	0.916	94.4
19/08/2017	9:05	ONV34	0.091	95.9	0.086	94.4	0.1	93.4	0.133	98.3
22/08/2017	12:53	BCK07	0.131	91.5	0.09	90.5	0.098	94.6	0.201	90.9
24/08/2017	12:59	HRN07B	0.128	93.8	0.085	97.9	0.129	93.4	0.129	81.4
28/08/2017	13:00	BRA69_ONV29bc	0.098	96.5	0.095	103.2	0.161	100.6	0.206	97.6

Date	Time	ID/Location	BM1 mm/s	BM1 dBL	BM2 mm/s	BM2 dBL	BM3 mm/s	BM3 dBL	BM4 mm/s	BM4 dBL
<b>Exceedance Criteria (0% (5%))</b>			<b>10 (5)</b>	<b>120 (115)</b>	<b>10 (5)</b>	<b>120 (115)</b>	<b>10 (5)</b>	<b>120 (115)</b>	<b>10 (5)</b>	<b>120 (115)</b>
1/09/2017	12:51	RL373_11	0.136	94.6	0.104	99.5	0.215	96.6	0.343	93.4
7/09/2017	9:56	JEA05_PS045	0.24	105.1	0.301	95.8	0.292	97.3	0.464	89.3
9/09/2017	12:44	RL409_01	0.109	88.5	0.075	88.9	0.088	92.1	0.142	92.2
14/09/2017	9:08	JEA06A	0.195	98.8	0.15	93	0.22	95.6	0.345	95.3
18/09/2017	12:58	RL395_03	0.138	103.9	0.089	97.2	0.2	99.4	0.246	104.3
20/09/2017	12:26	TNN42_PS042	0.365	93.4	0.195	97.2	0.169	92.1	0.163	87.4
22/09/2017	12:40	JEA06B	0.155	98.2	0.129	87	0.161	88.6	0.291	87.4
28/09/2017	12:24	TNN43	0.059	104.2	0.14 <sup>#</sup>	104.5 <sup>#</sup>	0.05	95.6	0.084	96.2
29/09/2017	12:28	RL413_02	0.129	88.5	0.34 <sup>#</sup>	106.5 <sup>#</sup>	0.224	95.6	0.454	90.9
3/10/2017	12:27	PS043	0.209	88.5	0.152	88.9	0.275	96.5	0.705	93.4
5/10/2017	12:36	JEA02	0.346	106	0.291	100	0.333	100	0.722	90.9
9/10/2017	12:26	PS047	0.1	84.8	0.069	94.9	0.103	88.6	0.16	84.9
11/10/2017	10:26	ONV36	0.23	81.3	0.133	94	0.126	98.1	0.248	101.8
18/10/2017	12:24	ONV37	0.151	96.5	0.089	95.8	0.108	95.6	0.175	95.3
19/10/2017	12:22	JEB01	0.096	95.3	0.072	94.9	0.099	98.1	0.207	92.2
20/10/2017	12:25	TNN44	0.224	93.4	0.268	94.9	0.16	98.1	0.178	89.3
25/10/2017	12:26	JEA07	0.278	85	0.245	102.5	0.224	108.8	0.602	105.4
27/10/2017	12:22	BRA72	0.185	98.5	0.154	90.5	0.153	92.1	0.314	96.2
31/10/2017	12:25	TNN45	0.207	101.3	0.34	94	0.338	95.8	0.393	94.4
3/11/2017	12:16	JEA03	0.17	98.1	0.168	94	0.143	98.1	0.298	93.4
7/11/2017	12:21	RL355_10_ONV39	0.188	97.6	0.102	101.8	0.207	97.3	0.295	98.3
10/11/2017	12:30	JEA04	0.16	87.9	0.15	96.4	0.17	99.6	0.16	92.7
14/11/2017	12:29	BRA70_PS049	0.38	90.4	0.55	86.8	0.45	82.7	0.64	88.3
16/11/2017	12:40	Drain	0.11	92.3	0.1	86.8	0.14	86.2	0.18	90.8
17/11/2017	12:36	JEA10	0.18	84.4	0.23	86.8	0.2	86.2	0.33	88.3
22/11/2017	12:37	BRA71	0.42	90.4	0.34	94.2	0.58	82.7	0.55	97.8
23/11/2017	12:23	BRA75A_PS050	0.18	84.4	0.23	83.3	0.23	86.2	0.21	84.7
27/11/2017	12:17	Drain B	0.11	100	0.11	101.9	0.15	98.2	0.13	95.6
28/11/2017	12:21	BRA75B	0.42	90.4	0.28	91.3	0.35	95.7	0.24	88.3
30/11/2017	12:28	BRA73_ONV34_Misfire	0.18	84.4	0.14	95.4	0.18	90.6	0.26	84.7
1/12/2017	12:23	BRA75C	0.22	84.4	0.32	83.3	0.34	82.7	0.54	90.8
7/12/2017	12:30	TES73	0.2	87.9	0.18	98.1	0.29	88.7	0.52	88.3
12/12/2017	12:28	BRA74_PS045B_PS054	0.36	84.4	0.22	86.8	0.24	86.2	0.27	84.7
15/12/2017	12:31	TNN46	0.15	99.2	0.15	95.4	0.16	99.6	0.14	99.5
19/12/2017	12:24	TES74	0.18	96.4	0.21	96.4	0.28	88.7	0.39	97.8
20/12/2017	12:17	HRN08	0.13	96.4	0.11	97.3	0.15	99.6	0.11	101
21/12/2017	12:29	JEA09A_PS046	0.18	84.4	0.18	83.3	0.24	82.7	0.42	88.3

\*No Results due to mechanical failure

#Results from monitor show peak mm/s & dBL at time frames before or after the blast, or results determined not to be related to the blast event.



**APPENDIX B**

***COAL TRANSPORT RECORDS***

**Appendix B  
Coal Transport Records**

The records presented in **Appendix B** have been included to satisfy the coal transport reporting requirements of Condition 65 (a) and (b) of PA 10\_0138. The amount of coal transported from the site on a monthly basis and the date and time of each rail movement generated by the MCCM has been listed in the **Table B-1 and Table B-2** below.

**Table B-1  
Coal Transported Monthly**

<b>Month</b>	<b>Coal Transported (MT)</b>
January	0.70
February	0.73
March	0.93
April	0.85
May	0.91
June	0.66
July	0.77
August	0.87
September	0.88
October	0.83
November	0.72
December	0.76
<b>TOTAL</b>	<b>9.59</b>

**Table B-2  
Daily Train Movements**

(next page)

Date	Time	Date	Time	Date	Time	Date	Time
1/01/2017	4:04	14/01/2017	4:05	29/01/2017	5:32	9/02/2017	0:24
1/01/2017	12:41	14/01/2017	10:40	29/01/2017	13:22	10/02/2017	1:57
1/01/2017	16:10	14/01/2017	15:12	29/01/2017	19:08	10/02/2017	7:50
2/01/2017	3:10	15/01/2017	8:43	30/01/2017	6:20	10/02/2017	10:25
2/01/2017	8:10	15/01/2017	15:12	30/01/2017	13:00	11/02/2017	1:26
2/01/2017	9:07	15/01/2017	21:51	30/01/2017	20:35	11/02/2017	1:33
2/01/2017	13:37	15/01/2017	0:44	30/01/2017	0:12	11/02/2017	8:11
3/01/2017	6:46	16/01/2017	1:44	31/01/2017	0:41	11/02/2017	18:18
3/01/2017	12:40	16/01/2017	11:55	31/01/2017	12:45	12/02/2017	7:14
3/01/2017	15:15	18/01/2017	0:22	31/01/2017	15:38	12/02/2017	9:44
3/01/2017	19:45	19/01/2017	12:46	31/01/2017	22:23	12/02/2017	12:19
3/01/2017	0:47	19/01/2017	23:00	1/02/2017	1:59	13/02/2017	2:30
4/01/2017	8:17	20/01/2017	1:40	1/02/2017	4:50	13/02/2017	5:17
4/01/2017	16:42	20/01/2017	14:42	1/02/2017	12:36	13/02/2017	9:28
4/01/2017	0:46	20/01/2017	20:00	1/02/2017	22:30	13/02/2017	12:45
5/01/2017	1:43	20/01/2017	23:36	2/02/2017	12:57	13/02/2017	17:27
5/01/2017	10:04	21/01/2017	8:03	2/02/2017	18:50	13/02/2017	23:46
5/01/2017	19:56	21/01/2017	11:57	3/02/2017	1:30	14/02/2017	4:28
5/01/2017	23:30	21/01/2017	20:46	3/02/2017	7:21	14/02/2017	21:10
6/01/2017	5:38	22/01/2017	4:50	3/02/2017	12:24	15/02/2017	4:07
6/01/2017	21:25	22/01/2017	8:00	3/02/2017	15:42	15/02/2017	7:00
7/01/2017	2:30	23/01/2017	1:30	3/02/2017	19:02	15/02/2017	12:44
8/01/2017	1:15	23/01/2017	5:46	4/02/2017	6:17	15/02/2017	20:28
8/01/2017	9:54	23/01/2017	12:48	4/02/2017	16:32	16/02/2017	2:04
8/01/2017	16:55	23/01/2017	19:57	4/02/2017	22:56	16/02/2017	9:24
9/01/2017	5:04	24/01/2017	5:07	5/02/2017	15:45	16/02/2017	13:48
9/01/2017	13:20	24/01/2017	22:11	5/02/2017	20:45	16/02/2017	17:11
10/01/2017	2:05	25/01/2017	17:01	6/02/2017	3:42	17/02/2017	1:25
10/01/2017	14:53	25/01/2017	20:48	6/02/2017	9:10	17/02/2017	9:15
10/01/2017	17:45	25/01/2017	23:58	6/02/2017	14:10	17/02/2017	13:37
11/01/2017	2:27	25/01/2017	0:36	6/02/2017	21:21	17/02/2017	18:55
11/01/2017	10:45	26/01/2017	8:50	7/02/2017	3:23	17/02/2017	23:26
11/01/2017	14:09	26/01/2017	12:26	7/02/2017	6:30	18/02/2017	1:50
11/01/2017	21:20	26/01/2017	15:48	7/02/2017	10:21	18/02/2017	7:11
12/01/2017	5:25	26/01/2017	23:24	7/02/2017	18:29	18/02/2017	10:11
12/01/2017	12:40	27/01/2017	6:31	7/02/2017	23:08	18/02/2017	18:22
12/01/2017	19:40	27/01/2017	15:01	7/02/2017	0:40	18/02/2017	22:05
12/01/2017	23:05	27/01/2017	17:35	8/02/2017	19:52	19/02/2017	1:06
13/01/2017	5:30	27/01/2017	20:36	9/02/2017	5:44	19/02/2017	6:07
13/01/2017	13:10	28/01/2017	8:52	9/02/2017	11:30	19/02/2017	9:04
13/01/2017	15:34	28/01/2017	19:17	9/02/2017	15:20	19/02/2017	12:47
13/01/2017	19:33	29/01/2017	0:06	9/02/2017	21:08	19/02/2017	16:24

Date	Time	Date	Time	Date	Time	Date	Time
19/02/2017	23:30	4/03/2017	7:14	12/03/2017	8:15	25/03/2017	8:33
20/02/2017	2:36	4/03/2017	9:55	12/03/2017	19:07	25/03/2017	13:59
20/02/2017	8:12	4/03/2017	15:39	12/03/2017	21:51	25/03/2017	21:34
24/02/2017	1:20	4/03/2017	20:53	13/03/2017	1:28	26/03/2017	2:01
24/02/2017	1:34	5/03/2017	3:30	13/03/2017	4:45	26/03/2017	7:50
24/02/2017	8:45	5/03/2017	6:29	13/03/2017	8:15	26/03/2017	12:25
24/02/2017	14:05	5/03/2017	9:05	13/03/2017	14:15	26/03/2017	17:48
24/02/2017	17:00	5/03/2017	16:12	13/03/2017	21:33	26/03/2017	22:41
25/02/2017	7:34	5/03/2017	21:50	14/03/2017	0:23	27/03/2017	12:48
25/02/2017	13:46	5/03/2017	0:53	16/03/2017	1:45	27/03/2017	16:48
25/02/2017	20:16	6/03/2017	9:26	16/03/2017	19:28	27/03/2017	19:24
26/02/2017	6:55	6/03/2017	12:48	16/03/2017	23:15	28/03/2017	7:19
26/02/2017	9:53	6/03/2017	15:00	17/03/2017	15:48	28/03/2017	12:53
26/02/2017	15:05	6/03/2017	20:08	17/03/2017	23:16	28/03/2017	16:53
26/02/2017	21:59	6/03/2017	22:30	18/03/2017	3:35	29/03/2017	8:37
26/02/2017	0:40	7/03/2017	6:50	18/03/2017	13:07	29/03/2017	13:49
27/02/2017	3:48	7/03/2017	14:23	19/03/2017	4:14	29/03/2017	17:38
27/02/2017	7:16	7/03/2017	19:35	19/03/2017	11:13	30/03/2017	2:58
27/02/2017	14:26	7/03/2017	22:25	19/03/2017	15:20	30/03/2017	11:24
27/02/2017	19:30	8/03/2017	1:42	19/03/2017	18:17	30/03/2017	16:15
28/02/2017	7:06	8/03/2017	5:20	19/03/2017	22:02	30/03/2017	19:55
28/02/2017	14:02	8/03/2017	11:43	20/03/2017	1:17	31/03/2017	4:47
28/02/2017	16:36	8/03/2017	14:58	20/03/2017	5:29	31/03/2017	14:45
28/02/2017	21:41	8/03/2017	19:05	20/03/2017	8:28	31/03/2017	23:26
28/02/2017	0:10	9/03/2017	2:10	20/03/2017	16:33	2/04/2017	15:22
1/03/2017	6:39	9/03/2017	5:47	21/03/2017	8:54	2/04/2017	22:27
1/03/2017	9:00	9/03/2017	10:20	21/03/2017	14:35	3/04/2017	8:26
1/03/2017	12:40	9/03/2017	14:49	21/03/2017	21:40	7/04/2017	8:14
1/03/2017	16:05	9/03/2017	19:15	22/03/2017	13:31	7/04/2017	16:21
1/03/2017	21:35	9/03/2017	21:45	22/03/2017	23:07	7/04/2017	20:36
1/03/2017	0:08	10/03/2017	6:29	23/03/2017	5:46	8/04/2017	4:02
2/03/2017	6:10	10/03/2017	13:25	23/03/2017	10:48	8/04/2017	13:51
2/03/2017	8:35	10/03/2017	16:21	23/03/2017	13:42	8/04/2017	0:32
2/03/2017	11:41	10/03/2017	22:41	23/03/2017	19:53	9/04/2017	6:37
2/03/2017	16:23	10/03/2017	0:38	24/03/2017	3:06	9/04/2017	18:37
2/03/2017	20:10	11/03/2017	3:57	24/03/2017	3:53	9/04/2017	20:41
2/03/2017	0:51	11/03/2017	9:37	24/03/2017	6:50	10/04/2017	10:04
3/03/2017	8:36	11/03/2017	12:25	24/03/2017	9:16	10/04/2017	14:24
3/03/2017	1:58	11/03/2017	15:55	24/03/2017	12:57	10/04/2017	20:36
3/03/2017	15:30	11/03/2017	19:18	24/03/2017	21:44	10/04/2017	23:16
3/03/2017	22:05	12/03/2017	1:08	25/03/2017	0:16	11/04/2017	4:11
4/03/2017	1:15	12/03/2017	5:20	25/03/2017	5:35	11/04/2017	11:27

Date	Time	Date	Time	Date	Time	Date	Time
11/04/2017	17:31	18/04/2017	13:54	28/04/2017	6:04	7/05/2017	16:21
11/04/2017	20:03	18/04/2017	16:48	28/04/2017	15:40	7/05/2017	20:31
12/04/2017	1:24	18/04/2017	20:12	28/04/2017	0:36	8/05/2017	6:11
12/04/2017	6:22	18/04/2017	23:09	29/04/2017	2:19	8/05/2017	10:09
12/04/2017	13:04	19/04/2017	2:42	29/04/2017	7:08	8/05/2017	15:23
12/04/2017	16:13	19/04/2017	6:38	29/04/2017	11:40	8/05/2017	18:09
12/04/2017	19:15	19/04/2017	19:52	29/04/2017	14:49	9/05/2017	2:49
12/04/2017	21:51	20/04/2017	3:46	29/04/2017	20:51	9/05/2017	10:21
13/04/2017	5:51	20/04/2017	9:00	30/04/2017	6:10	9/05/2017	15:25
13/04/2017	10:10	20/04/2017	13:35	30/04/2017	15:31	9/05/2017	22:22
13/04/2017	13:15	20/04/2017	16:26	30/04/2017	21:24	10/05/2017	3:15
13/04/2017	16:53	20/04/2017	19:19	1/05/2017	5:47	10/05/2017	6:15
13/04/2017	22:08	20/04/2017	0:04	1/05/2017	9:08	10/05/2017	13:25
13/04/2017	0:32	21/04/2017	7:08	1/05/2017	11:46	10/05/2017	16:35
14/04/2017	3:39	21/04/2017	12:12	1/05/2017	15:32	10/05/2017	20:14
14/04/2017	11:33	21/04/2017	16:20	1/05/2017	23:43	11/05/2017	3:00
14/04/2017	14:21	21/04/2017	20:33	1/05/2017	0:34	11/05/2017	7:48
14/04/2017	16:56	21/04/2017	23:50	2/05/2017	3:39	11/05/2017	12:59
14/04/2017	19:23	21/04/2017	0:29	2/05/2017	6:51	11/05/2017	19:06
15/04/2017	3:28	22/04/2017	3:15	2/05/2017	9:59	12/05/2017	5:55
15/04/2017	7:39	22/04/2017	6:35	2/05/2017	12:40	12/05/2017	13:09
15/04/2017	12:29	22/04/2017	12:22	2/05/2017	18:48	12/05/2017	18:32
15/04/2017	14:37	22/04/2017	15:08	2/05/2017	22:57	12/05/2017	22:38
15/04/2017	19:00	22/04/2017	17:36	3/05/2017	3:20	13/05/2017	2:22
15/04/2017	22:13	22/04/2017	20:17	3/05/2017	6:13	13/05/2017	6:56
16/04/2017	1:49	23/04/2017	6:56	3/05/2017	9:17	13/05/2017	11:45
16/04/2017	4:37	23/04/2017	12:35	3/05/2017	12:50	13/05/2017	20:41
16/04/2017	6:37	23/04/2017	21:59	3/05/2017	16:38	13/05/2017	23:19
16/04/2017	9:59	23/04/2017	0:43	3/05/2017	19:44	14/05/2017	5:02
16/04/2017	13:39	24/04/2017	7:46	4/05/2017	2:44	14/05/2017	9:32
16/04/2017	16:30	24/04/2017	10:16	4/05/2017	5:19	14/05/2017	12:03
16/04/2017	20:27	24/04/2017	21:31	4/05/2017	7:52	14/05/2017	17:50
16/04/2017	23:09	24/04/2017	0:39	4/05/2017	13:45	14/05/2017	20:24
17/04/2017	4:01	25/04/2017	5:01	4/05/2017	17:12	15/05/2017	1:44
17/04/2017	8:35	25/04/2017	12:10	4/05/2017	22:21	15/05/2017	8:02
17/04/2017	10:50	25/04/2017	23:23	5/05/2017	5:17	15/05/2017	10:46
17/04/2017	13:31	26/04/2017	2:32	5/05/2017	18:08	15/05/2017	19:58
17/04/2017	16:14	26/04/2017	7:52	5/05/2017	23:08	16/05/2017	1:24
17/04/2017	21:41	26/04/2017	19:12	6/05/2017	8:02	16/05/2017	7:56
18/04/2017	3:11	26/04/2017	21:22	6/05/2017	12:46	16/05/2017	12:45
18/04/2017	6:17	27/04/2017	6:21	7/05/2017	8:15	16/05/2017	16:21
18/04/2017	10:24	27/04/2017	21:19	7/05/2017	12:36	17/05/2017	6:27



Date	Time	Date	Time	Date	Time	Date	Time
17/05/2017	9:04	31/05/2017	9:33	16/06/2017	9:46	29/06/2017	1:43
17/05/2017	12:54	31/05/2017	15:57	16/06/2017	12:33	29/06/2017	8:46
17/05/2017	17:40	31/05/2017	19:38	16/06/2017	18:42	29/06/2017	12:54
17/05/2017	22:02	31/05/2017	22:09	16/06/2017	23:13	29/06/2017	23:16
18/05/2017	1:05	1/06/2017	13:56	16/06/2017	0:36	30/06/2017	1:45
18/05/2017	4:01	1/06/2017	23:26	17/06/2017	7:19	30/06/2017	11:15
18/05/2017	8:17	2/06/2017	5:20	17/06/2017	18:38	30/06/2017	22:13
18/05/2017	15:19	2/06/2017	12:36	17/06/2017	21:22	1/07/2017	0:38
19/05/2017	5:24	2/06/2017	18:02	18/06/2017	10:16	1/07/2017	13:33
19/05/2017	9:24	2/06/2017	20:23	18/06/2017	22:21	2/07/2017	0:47
19/05/2017	12:49	3/06/2017	7:36	18/06/2017	0:55	2/07/2017	6:18
19/05/2017	23:18	3/06/2017	15:31	19/06/2017	9:01	2/07/2017	9:51
20/05/2017	3:49	3/06/2017	20:47	19/06/2017	20:02	2/07/2017	22:00
20/05/2017	11:30	3/06/2017	0:47	19/06/2017	23:06	3/07/2017	1:12
20/05/2017	15:32	4/06/2017	11:35	20/06/2017	2:50	3/07/2017	4:47
20/05/2017	21:07	4/06/2017	14:03	20/06/2017	7:42	3/07/2017	8:18
21/05/2017	7:38	4/06/2017	0:57	20/06/2017	15:51	3/07/2017	15:39
21/05/2017	15:29	5/06/2017	1:01	20/06/2017	21:55	4/07/2017	4:13
21/05/2017	20:59	5/06/2017	4:22	21/06/2017	7:30	4/07/2017	10:54
22/05/2017	5:43	5/06/2017	7:04	21/06/2017	16:45	4/07/2017	13:23
22/05/2017	10:24	5/06/2017	16:29	21/06/2017	23:34	4/07/2017	23:38
23/05/2017	2:37	5/06/2017	20:39	22/06/2017	12:45	5/07/2017	9:32
23/05/2017	5:33	5/06/2017	23:21	22/06/2017	15:20	5/07/2017	17:07
23/05/2017	9:13	6/06/2017	5:25	22/06/2017	19:04	6/07/2017	18:30
23/05/2017	14:25	6/06/2017	13:06	23/06/2017	6:05	6/07/2017	0:50
24/05/2017	4:24	6/06/2017	15:41	23/06/2017	19:41	7/07/2017	5:00
24/05/2017	23:24	6/06/2017	20:10	23/06/2017	0:57	7/07/2017	7:23
25/05/2017	8:22	6/06/2017	23:41	24/06/2017	6:47	7/07/2017	22:16
26/05/2017	6:34	7/06/2017	3:47	24/06/2017	10:58	8/07/2017	6:48
26/05/2017	13:56	7/06/2017	6:32	24/06/2017	20:45	8/07/2017	12:27
26/05/2017	19:30	7/06/2017	12:31	24/06/2017	23:38	8/07/2017	21:16
26/05/2017	0:19	7/06/2017	19:10	25/06/2017	17:36	8/07/2017	0:47
27/05/2017	15:28	7/06/2017	22:54	25/06/2017	20:42	9/07/2017	6:55
28/05/2017	15:09	8/06/2017	7:26	26/06/2017	9:53	9/07/2017	14:52
28/05/2017	17:45	8/06/2017	12:56	26/06/2017	18:08	10/07/2017	9:38
28/05/2017	21:50	8/06/2017	15:29	27/06/2017	2:29	10/07/2017	13:43
29/05/2017	7:26	8/06/2017	23:31	27/06/2017	9:22	10/07/2017	21:40
29/05/2017	16:19	9/06/2017	7:55	27/06/2017	12:51	12/07/2017	3:50
30/05/2017	5:52	12/06/2017	22:55	27/06/2017	16:19	12/07/2017	11:49
30/05/2017	10:15	14/06/2017	4:44	27/06/2017	23:15	12/07/2017	18:14
30/05/2017	14:57	14/06/2017	10:41	28/06/2017	9:03	13/07/2017	10:00
31/05/2017	4:56	16/06/2017	4:09	28/06/2017	18:22		

Date	Time	Date	Time	Date	Time	Date	Time
13/07/2017	18:49	25/07/2017	9:27	6/08/2017	3:09	17/08/2017	21:45
13/07/2017	22:56	25/07/2017	15:40	6/08/2017	7:03	18/08/2017	5:45
14/07/2017	4:00	26/07/2017	4:21	6/08/2017	9:46	18/08/2017	8:57
14/07/2017	6:46	26/07/2017	15:00	7/08/2017	3:09	18/08/2017	21:01
14/07/2017	16:33	26/07/2017	20:12	7/08/2017	7:35	18/08/2017	23:47
14/07/2017	20:02	26/07/2017	22:45	7/08/2017	15:17	18/08/2017	0:41
15/07/2017	4:46	27/07/2017	3:48	7/08/2017	18:15	19/08/2017	6:08
15/07/2017	8:56	27/07/2017	7:59	7/08/2017	21:08	19/08/2017	9:33
15/07/2017	13:46	27/07/2017	14:01	7/08/2017	21:31	19/08/2017	17:56
15/07/2017	18:34	27/07/2017	18:34	7/08/2017	0:14	19/08/2017	23:00
16/07/2017	2:58	27/07/2017	21:40	8/08/2017	5:23	20/08/2017	1:58
16/07/2017	6:23	28/07/2017	6:21	8/08/2017	7:47	20/08/2017	6:22
16/07/2017	12:03	28/07/2017	13:07	8/08/2017	10:50	20/08/2017	12:34
16/07/2017	20:53	28/07/2017	15:55	8/08/2017	18:33	20/08/2017	15:24
17/07/2017	5:22	28/07/2017	21:14	8/08/2017	20:58	20/08/2017	19:24
17/07/2017	9:31	29/07/2017	4:14	8/08/2017	0:32	20/08/2017	22:06
18/07/2017	4:28	29/07/2017	14:27	9/08/2017	3:06	21/08/2017	3:27
18/07/2017	9:04	29/07/2017	23:05	9/08/2017	8:07	21/08/2017	6:22
18/07/2017	18:46	30/07/2017	2:13	9/08/2017	11:27	21/08/2017	13:47
19/07/2017	1:30	30/07/2017	9:22	9/08/2017	14:03	21/08/2017	19:08
19/07/2017	12:03	30/07/2017	14:38	9/08/2017	22:26	22/08/2017	3:04
19/07/2017	22:46	30/07/2017	20:30	10/08/2017	1:37	22/08/2017	6:52
20/07/2017	7:45	31/07/2017	9:22	10/08/2017	6:05	22/08/2017	13:32
20/07/2017	20:38	31/07/2017	11:56	10/08/2017	9:05	22/08/2017	16:58
21/07/2017	2:16	31/07/2017	23:36	10/08/2017	23:04	22/08/2017	0:19
21/07/2017	7:11	1/08/2017	3:29	11/08/2017	9:45	23/08/2017	6:40
21/07/2017	13:19	1/08/2017	20:07	11/08/2017	12:18	23/08/2017	12:57
21/07/2017	23:26	1/08/2017	23:36	11/08/2017	21:47	24/08/2017	3:44
22/07/2017	8:41	2/08/2017	4:49	12/08/2017	1:24	24/08/2017	6:10
22/07/2017	15:31	2/08/2017	10:07	12/08/2017	8:54	24/08/2017	18:46
22/07/2017	19:15	2/08/2017	18:22	12/08/2017	15:22	24/08/2017	0:23
22/07/2017	21:35	3/08/2017	2:54	12/08/2017	23:11	25/08/2017	1:20
23/07/2017	3:51	3/08/2017	6:54	13/08/2017	1:47	25/08/2017	5:35
23/07/2017	7:03	3/08/2017	12:19	13/08/2017	8:48	25/08/2017	11:41
23/07/2017	12:56	3/08/2017	14:57	13/08/2017	11:55	25/08/2017	15:55
23/07/2017	21:30	3/08/2017	22:36	13/08/2017	14:40	25/08/2017	22:03
24/07/2017	5:54	4/08/2017	1:19	13/08/2017	17:46	26/08/2017	4:31
24/07/2017	15:18	4/08/2017	12:57	13/08/2017	20:21	26/08/2017	9:12
24/07/2017	18:02	5/08/2017	2:15	14/08/2017	1:16	26/08/2017	16:37
24/07/2017	21:02	5/08/2017	7:21	14/08/2017	3:48	26/08/2017	22:40
25/07/2017	2:31	5/08/2017	13:37	14/08/2017	8:00	27/08/2017	21:30
25/07/2017	6:29	5/08/2017	19:23	14/08/2017	10:41	28/08/2017	4:15

Date	Time	Date	Time	Date	Time	Date	Time
28/08/2017	21:07	9/09/2017	2:52	20/09/2017	19:34	30/09/2017	12:41
28/08/2017	23:16	9/09/2017	6:06	21/09/2017	7:02	30/09/2017	16:35
29/08/2017	1:37	9/09/2017	10:15	21/09/2017	9:33	30/09/2017	19:31
29/08/2017	8:40	9/09/2017	17:57	21/09/2017	18:23	30/09/2017	23:33
29/08/2017	20:34	9/09/2017	20:40	21/09/2017	21:06	1/10/2017	4:58
29/08/2017	23:45	10/09/2017	8:08	22/09/2017	4:00	1/10/2017	7:36
30/08/2017	6:24	10/09/2017	12:15	22/09/2017	10:48	1/10/2017	10:06
30/08/2017	13:27	10/09/2017	21:54	23/09/2017	3:42	1/10/2017	16:32
30/08/2017	16:23	11/09/2017	6:58	23/09/2017	8:01	2/10/2017	1:16
31/08/2017	6:12	11/09/2017	9:48	23/09/2017	19:02	2/10/2017	10:06
31/08/2017	12:33	11/09/2017	18:03	24/09/2017	11:33	2/10/2017	15:39
31/08/2017	0:45	11/09/2017	21:19	24/09/2017	15:22	2/10/2017	17:06
1/09/2017	5:29	11/09/2017	0:56	24/09/2017	21:37	2/10/2017	22:18
1/09/2017	8:20	12/09/2017	2:43	25/09/2017	2:30	3/10/2017	1:42
1/09/2017	12:27	12/09/2017	6:15	25/09/2017	5:17	3/10/2017	11:34
1/09/2017	20:42	12/09/2017	11:05	25/09/2017	8:00	3/10/2017	14:43
2/09/2017	1:52	12/09/2017	14:05	25/09/2017	14:11	3/10/2017	18:15
2/09/2017	12:31	13/09/2017	1:35	25/09/2017	20:40	3/10/2017	21:59
2/09/2017	15:51	13/09/2017	4:39	25/09/2017	23:32	4/10/2017	2:04
2/09/2017	19:24	13/09/2017	9:44	26/09/2017	3:30	4/10/2017	23:39
3/09/2017	1:43	13/09/2017	15:55	26/09/2017	15:18	5/10/2017	2:05
3/09/2017	4:26	13/09/2017	18:33	26/09/2017	20:21	5/10/2017	7:07
3/09/2017	7:37	14/09/2017	22:46	27/09/2017	2:45	5/10/2017	10:31
3/09/2017	12:57	15/09/2017	14:30	27/09/2017	5:14	5/10/2017	15:12
3/09/2017	14:01	15/09/2017	21:31	27/09/2017	7:52	5/10/2017	23:57
3/09/2017	16:25	16/09/2017	5:43	27/09/2017	12:22	6/10/2017	4:28
3/09/2017	23:10	16/09/2017	11:49	27/09/2017	16:08	6/10/2017	12:54
4/09/2017	1:36	16/09/2017	19:25	28/09/2017	2:04	6/10/2017	17:46
4/09/2017	4:08	16/09/2017	22:07	28/09/2017	5:07	6/10/2017	22:30
5/09/2017	8:19	17/09/2017	1:42	28/09/2017	8:30	7/10/2017	1:19
5/09/2017	13:53	17/09/2017	4:33	28/09/2017	11:10	7/10/2017	1:31
5/09/2017	16:31	17/09/2017	8:26	28/09/2017	19:38	7/10/2017	5:46
6/09/2017	6:31	17/09/2017	20:01	28/09/2017	23:47	7/10/2017	8:26
6/09/2017	14:45	18/09/2017	7:39	29/09/2017	3:24	7/10/2017	12:13
6/09/2017	21:42	18/09/2017	15:19	29/09/2017	6:38	7/10/2017	21:20
7/09/2017	4:52	19/09/2017	5:53	29/09/2017	9:30	8/10/2017	4:10
7/09/2017	11:20	19/09/2017	8:33	29/09/2017	12:02	8/10/2017	6:53
7/09/2017	18:36	19/09/2017	13:04	29/09/2017	16:19	8/10/2017	12:29
8/09/2017	3:24	20/09/2017	1:32	29/09/2017	23:08	8/10/2017	20:54
8/09/2017	10:04	20/09/2017	4:32	30/09/2017	1:56	9/10/2017	4:36
8/09/2017	21:38	20/09/2017	7:13	30/09/2017	6:15	9/10/2017	12:34
8/09/2017	0:40	20/09/2017	16:35	30/09/2017	8:47	9/10/2017	0:26

Date	Time	Date	Time	Date	Time	Date	Time
13/10/2017	5:02	24/10/2017	1:35	5/11/2017	14:48	15/11/2017	11:32
13/10/2017	7:57	24/10/2017	4:57	6/11/2017	5:28	15/11/2017	14:09
13/10/2017	16:02	24/10/2017	10:38	6/11/2017	10:15	15/11/2017	21:19
14/10/2017	3:05	24/10/2017	20:14	6/11/2017	15:40	15/11/2017	0:36
14/10/2017	9:58	25/10/2017	17:02	7/11/2017	2:35	16/11/2017	3:36
14/10/2017	16:37	25/10/2017	13:53	7/11/2017	11:58	16/11/2017	9:57
14/10/2017	19:35	25/10/2017	20:08	7/11/2017	16:08	16/11/2017	14:26
15/10/2017	4:29	25/10/2017	0:22	7/11/2017	20:54	17/11/2017	8:21
15/10/2017	12:38	26/10/2017	16:44	8/11/2017	1:08	17/11/2017	11:06
15/10/2017	15:34	26/10/2017	19:57	8/11/2017	4:13	17/11/2017	20:53
15/10/2017	20:46	27/10/2017	3:24	8/11/2017	9:23	18/11/2017	1:30
16/10/2017	1:14	27/10/2017	6:06	8/11/2017	15:59	18/11/2017	8:45
16/10/2017	6:46	27/10/2017	10:28	8/11/2017	0:35	18/11/2017	13:34
16/10/2017	10:01	27/10/2017	16:43	9/11/2017	4:57	19/11/2017	1:03
16/10/2017	13:12	27/10/2017	22:03	9/11/2017	9:46	19/11/2017	4:56
16/10/2017	16:01	27/10/2017	0:45	9/11/2017	12:45	19/11/2017	8:01
16/10/2017	18:54	28/10/2017	1:28	9/11/2017	18:48	24/11/2017	4:00
17/10/2017	4:55	28/10/2017	2:21	10/11/2017	3:08	24/11/2017	10:46
17/10/2017	7:58	28/10/2017	9:15	10/11/2017	7:29	24/11/2017	21:23
17/10/2017	16:16	28/10/2017	15:44	10/11/2017	10:17	25/11/2017	2:38
17/10/2017	20:43	29/10/2017	1:28	10/11/2017	13:03	25/11/2017	6:25
17/10/2017	22:54	30/10/2017	22:31	10/11/2017	17:48	25/11/2017	11:10
18/10/2017	2:14	31/10/2017	9:37	10/11/2017	22:28	25/11/2017	21:59
18/10/2017	4:33	31/10/2017	12:20	11/11/2017	2:37	26/11/2017	5:25
18/10/2017	14:08	31/10/2017	21:57	11/11/2017	6:00	26/11/2017	15:45
18/10/2017	17:44	1/11/2017	1:54	11/11/2017	9:45	27/11/2017	2:40
18/10/2017	20:53	1/11/2017	4:46	11/11/2017	17:50	27/11/2017	7:14
19/10/2017	3:03	1/11/2017	13:54	11/11/2017	20:38	27/11/2017	15:00
19/10/2017	5:44	1/11/2017	19:44	11/11/2017	23:37	28/11/2017	1:57
19/10/2017	8:12	2/11/2017	1:25	12/11/2017	2:53	28/11/2017	6:59
19/10/2017	13:23	2/11/2017	4:04	12/11/2017	6:12	29/11/2017	11:47
19/10/2017	16:23	2/11/2017	8:13	12/11/2017	9:59	29/11/2017	16:04
19/10/2017	22:10	2/11/2017	11:01	12/11/2017	13:45	30/11/2017	5:29
20/10/2017	10:10	2/11/2017	19:27	12/11/2017	23:58	30/11/2017	19:57
20/10/2017	22:37	3/11/2017	3:35	13/11/2017	1:09	30/11/2017	23:40
21/10/2017	5:58	3/11/2017	8:08	13/11/2017	2:40	1/12/2017	8:40
21/10/2017	15:20	3/11/2017	11:21	13/11/2017	5:36	1/12/2017	15:24
22/10/2017	7:35	3/11/2017	16:18	13/11/2017	9:37	1/12/2017	21:47
22/10/2017	10:37	3/11/2017	19:45	13/11/2017	16:04	2/12/2017	2:52
22/10/2017	16:55	5/11/2017	1:59	13/11/2017	19:07	2/12/2017	7:46
23/10/2017	20:19	5/11/2017	5:16	14/11/2017	13:37	2/12/2017	11:00
23/10/2017	22:46	5/11/2017	10:10	14/11/2017	20:46	2/12/2017	17:51

Date	Time	Date	Time	Date	Time
2/12/2017	22:00	16/12/2017	17:29	30/12/2017	12:19
3/12/2017	4:12	17/12/2017	12:45	30/12/2017	16:00
3/12/2017	9:06	17/12/2017	16:07	30/12/2017	19:43
3/12/2017	12:24	17/12/2017	20:47	30/12/2017	22:43
3/12/2017	18:06	17/12/2017	23:35	31/12/2017	2:44
4/12/2017	3:57	17/12/2017	0:10	31/12/2017	8:05
4/12/2017	8:34	18/12/2017	3:00	31/12/2017	10:26
5/12/2017	12:09	18/12/2017	11:51	31/12/2017	18:35
5/12/2017	20:18	18/12/2017	20:43	31/12/2017	22:55
7/12/2017	5:44	20/12/2017	4:50		
8/12/2017	4:33	20/12/2017	23:58		
8/12/2017	17:44	21/12/2017	9:07		
9/12/2017	3:55	21/12/2017	23:58		
9/12/2017	9:38	21/12/2017	3:29		
9/12/2017	15:35	22/12/2017	7:49		
9/12/2017	23:15	22/12/2017	15:45		
10/12/2017	6:03	22/12/2017	21:27		
10/12/2017	14:37	23/12/2017	5:42		
10/12/2017	17:09	23/12/2017	10:03		
10/12/2017	22:06	23/12/2017	12:20		
11/12/2017	13:23	23/12/2017	18:22		
11/12/2017	0:37	23/12/2017	20:52		
12/12/2017	1:32	23/12/2017	0:12		
12/12/2017	19:22	24/12/2017	8:02		
13/12/2017	7:19	24/12/2017	19:22		
13/12/2017	9:51	26/12/2017	20:16		
13/12/2017	16:22	26/12/2017	23:20		
13/12/2017	20:08	27/12/2017	3:03		
14/12/2017	3:33	27/12/2017	5:37		
14/12/2017	4:34	27/12/2017	9:35		
14/12/2017	8:39	28/12/2017	3:19		
14/12/2017	11:32	28/12/2017	6:24		
15/12/2017	7:11	28/12/2017	8:46		
15/12/2017	10:16	28/12/2017	11:29		
15/12/2017	13:58	28/12/2017	0:53		
15/12/2017	17:10	29/12/2017	8:53		
16/12/2017	3:56	29/12/2017	16:27		
16/12/2017	9:29	29/12/2017	20:31		



## **APPENDIX C**

### ***Annual Sound Power Testing***

**Appendix C**  
**Annual Sound Power Testing**

**Table C-1**

**Sound Power Level Testing Results**

Unit	Equipment Type	Parameter	Criteria dBA	Result dBA
DOZ301	Dozer - CAT D10T	Stationary	115	111.0
		1 Gear Back	127	117.0
DOZ302	Dozer - CAT D10T	Stationary	115	105.0
		1 Gear Back	127	114.0
DOZ303	Dozer - CAT D10T	Stationary	115	113.0
		1 Gear Back	127	117.0
DOZ320	Dozer - CAT D11T	Stationary	115	104.0
		1 Gear Back	127	118.0
DOZ321	Dozer - CAT D11T	Stationary	115	107.0
		1 Gear Back	127	118.0
DOZ322	Dozer - CAT D11T	Stationary	115	106.0
		1 Gear Back	127	121.0
DOZ323	Dozer - CAT D11T	Stationary	115	105.0
		1 Gear Back	127	118.0
DOZ324	Dozer - CAT D11T	Stationary	115	109.0
		1 Gear Back	127	118.0
DDM10	Dozer - Cat D10T - DDM10	Stationary	115	110.0
		1 Gear Back	127	112.0
DOZ858	Dozer - Cat D11T - Emeco D	Stationary	115	109.0
		1 Gear Back	127	120.0
DOZ859	Dozer - Cat D11T - Emeco D	Without track noise	115	105.0
		1 Gear Back (with track noise)	127	119.0
DOZ860	Dozer - Cat D11T - Emeco DZ280	Stationary	115	109.0
		1 Gear Back (with track noise)	127	116.0
DOZ870	Dozer - Cat D10T - Emeco	Stationary	115	107.0
		1 Gear Back (with track noise)	127	117.0
DOZ871	Dozer - Cat D10T - Emeco DZ252	Without track noise	115	114.0
		1 Gear Back (with track noise)	127	117.0
DOZ872	Dozer - Cat D11T - Emeco DZ273	Without track noise	115	106.0
		1 Gear Back (with track noise)	127	120.0
DOZ876	Dozer - Cat D10T - Emeco DZ236	Without track noise	115	107.0
		1 Gear Back (with track noise)	127	115.0
DOZ877	Dozer/Wheeled - Cat 854G - Emeco WD007	Without track noise	115	111.0
		1 Gear Back (with track noise)	127	112.0
DRG451	Drill - CAT MD6290	Stationary	118	114.0
DRG452	Drill - CAT MD6290	Stationary	118	116.0
DRG453	Drill - CAT MD6290	Stationary	118	116.0
DRG454	Drill - CAT MD6290	Stationary	118	117.0
DRG455	Drill - CAT MD6290	Stationary	118	117.0
DRG456	Drill - CAT MD6290	Stationary	118	115.0
DRG830	Drill - SK50F - CJC Drilling - 1V68L71	Stationary	118	115.0
DRG837	Drill - SK50I - CJC Drilling - 1Z69546	Stationary	118	114.0

Unit	Equipment Type	Parameter	Criteria dBA	Result dBA
EXC221	Excavator - Hitachi EX3600	Dynamic	119	113.0
EXC222	Excavator - Hitachi EX3600	Dynamic	119	113.0
EXC223	Excavator - Hitachi EX3600	Dynamic	119	112.0
EXC224	Excavator - Hitachi EX3600	Dynamic	119	114.0
EXC261	Excavator - Hitachi EX8000	Dynamic	123	115.0
EXC262	Excavator - Hitachi EX8000	Dynamic	123	118.0
EXC263	Excavator - Hitachi EX8000	Dynamic	123	114.0
EXC264	Excavator - Hitachi EX8000	Dynamic	123	115.0
EXC810	Excavator - Hitachi EX3600-6	Dynamic	119	114.0
GRD401	Grader - CAT 16M	1 Gear Forward	112	104.0
GRD402	Grader - CAT 16M	1 Gear Forward	112	103.0
GRD415	Grader - CAT 24M	1 Gear Forward	112	108.0
GRD416	Grader - CAT 24M	1 Gear Forward	112	107.0
GRD862	Grader - CAT 16M - Emeco MG082	1 Gear forward	112	104.0
GRD864	Grader - CAT 16M - Emeco MG082	1 Gear Forward	112	101.0
RDT001	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	116.0
RDT002	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.5
RDT003	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.5
RDT004	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	117.0
RDT005	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.0
RDT006	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	114.5
RDT007	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	116.0
RDT008	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	116.0
RDT009	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.0
RDT010	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	113.5
RDT011	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.0
RDT012	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.0
RDT013	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	116.0
RDT014	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	117.0
RDT015	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	114.5
RDT016	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.0
RDT017	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.5
RDT018	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.0
RDT019	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	116.5
RDT020	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.0
RDT021	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	117.0
RDT022	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	116.5
RDT023	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.0
RDT024	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	117.0
RDT025	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	116.5
RDT026	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.5
RDT027	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	114.5
RDT028	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	113.0
RDT029	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	113.5
RDT030	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	114.5
RDT031	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	113.0

Unit	Equipment Type	Parameter	Criteria dBA	Result dBA
RDT032	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	115.0
RDT033	Dump Truck - Hitachi EH5000-3	Average Uphill / Downhill	117	112.0
RDT051	Dump Truck - Hitachi EH3500-3	Average Uphill / Downhill	117	114.5
RDT052	Dump Truck - Hitachi EH3500-3	Average Uphill / Downhill	117	114.5
RDT053	Dump Truck - Hitachi EH3500-3	Average Uphill / Downhill	117	115.5
RDT054	Dump Truck - Hitachi EH3500-3	Average Uphill / Downhill	117	115.5
RDT055	Dump Truck - Hitachi EH3500-3	Average Uphill / Downhill	117	115.5
RDT071	Dump Truck - Hitachi EH4000-AC2	Average Uphill / Downhill	117	116.5
RDT072	Dump Truck - Hitachi EH4000-AC2	Average Uphill / Downhill	117	115.5
RDT073	Dump Truck - Hitachi EH4000-AC2	Average Uphill / Downhill	117	114.5
RDT074	Dump Truck - Hitachi EH4000-AC2	Average Uphill / Downhill	117	114.0
RDT075	Dump Truck - Hitachi EH4000-AC2	Average Uphill / Downhill	117	113.0
RDT076	Dump Truck - Hitachi EH4000-AC2	Average Uphill / Downhill	117	116.5
RDT077	Dump Truck - Hitachi EH4000-AC2	Average Uphill / Downhill	117	116.5
RDT101	Dump Truck - CAT 789D XQ	Average Uphill / Downhill	117	112.0
RDT102	Dump Truck - CAT 789D XQ	Average Uphill / Downhill	117	112.0
RDT103	Dump Truck - CAT 789D XQ	Average Uphill / Downhill	117	114.0
RDT104	Dump Truck - CAT 789D XQ	Average Uphill / Downhill	117	113.0
RDT882	Dump Truck - Cat 789D - EMECO - RD280	Average Uphill / Downhill	117	114.0
RDT883	Dump Truck - Cat 789D - EMECO - RD281	Average Uphill / Downhill	117	115.0
RDT884	Dump Truck - Cat 789D - EMECO - RD284	Average Uphill / Downhill	117	115.0
RDT885	Dump Truck - Cat 789D - EMECO - RD289	Average Uphill / Downhill	117	115.0
RDT887	Dump Truck - Cat 789C - EMECO - RD182	Average Uphill / Downhill	117	113.0
RDT888	Dump Truck - Cat 789C - EMECO - RD246	Average Uphill / Downhill	117	113.0
RDT889	Dump Truck - Cat 789C - EMECO - RD334	Average Uphill / Downhill	117	114.0
RDT890	Dump Truck - Cat 789C - EMECO - RD335	Average Uphill / Downhill	117	111.0
RDT891	Dump Truck - Cat 789C - EMECO - RD340	Average Uphill / Downhill	117	114.0
WAT501	Watercart - Cat777G	Average	115	111.0
WAT502	Watercart - Cat777G	Average	115	109.0
WAT503	Watercart - Cat777G	Average	115	109.3
WAT801	Watercart - Cat773 - EMECO	Average	115	113.7
WAT802	Watercart - Cat773 - EMECO	Average	115	113.0
WAT803	Watercart - Cat777 - EMECO	Average	115	114.0
WAT814	Watercart - Cat773 - EMECO	Average	115	113.3
WAT821	Watercart - Cat773D - EMECO	Average	115	112.3
WLO430	Wheel Loader - Komatsu - WA1200	1 <sup>st</sup> gear forward	115	114
WLO812	Wheel Loader - Cat992K - EMECO	Average	115	109.5
<b>FIXED PLANT</b>				
CHPP			117	115
Primary sizer			109	109
Secondary sizer			112	114
Stacker			104	102
Reclaimer			115	105
Conveyor 200m			108	108
Conveyor 500m			112	109

Unit	Equipment Type	Parameter	Criteria dBA	Result dBA
Raw coal transfer station			103	106
Train load out transfer station			103	115
CHPP Product Transfer Station			103	105
Train loadout			103	110
Access road			95	93

\*No change to locomotive and trains on rail spur during the reporting period. These plant are not within MCCM control.



## **APPENDIX D**

### ***Surface Water***

## Appendix D Surface Water

The surface water monitoring results for the reporting period are detailed in the table below.

### Table D-1 MCC Surrounding Surface Water Monitoring Results

Site	Date	pH Value	Electrical Conductivity @ 25°C	Total Dissolved Solids (mg/L)	Suspended Solids (mg/L)	Turbidity (NTU)	Total Alkalinity as CaCO <sub>3</sub> (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Aluminium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Zinc (mg/L)	Boron (mg/L)	Iron (mg/L)	Arsenious Acid, As (III) (µg/L)	Arsenic Acid, As (V) (µg/L)	Mercury (mg/L)	Nitrite + Nitrate as N (mg/L)	Total Nitrogen (mg/L)	Total Phosphorous as P (mg/L)	Total Anions (mg/L)	Total Cations (mg/L)
SW1	10/01/2017	7.41	351	214	13	5	126	28	10	29	1	0.13	<0.0001	<0.001	<0.001	<0.001	0.071	<0.001	<0.01	<0.001	<0.005	<0.05	0.38	<0.5	0.9	<0.0001	0.05	0.6	0.19	3.63	3.51
SW1	10/02/2017	7.6	357	244	23	3	132	27	11	31	2	0.22	<0.0001	<0.001	<0.001	<0.001	0.086	<0.001	<0.01	<0.001	<0.005	<0.05	0.56	<0.5	0.9	<0.0001	0.04	1.8	0.28	3.57	3.65
SW1	14/03/2017	7.79	343	290	5	2.1	123	23	9	31	2	0.03	<0.0001	<0.001	<0.001	<0.001	0.054	<0.001	<0.01	<0.001	<0.005	<0.05	0.36	<0.5	1.1	<0.0001	0.03	<0.1	0.11	3.42	3.29
SW1	12/04/2017	8.01	297	188	19	3.5	105	14	9	28	1	0.03	<0.0001	<0.001	<0.001	<0.001	0.029	<0.001	<0.01	<0.001	0.011	<0.05	0.29	<0.5	<0.5	<0.0001	<0.01	<0.1	0.07	2.93	2.68
SW1	12/05/2017	7.7	345	224	<5	1.8	111	20	8	29	1	0.03	<0.0001	<0.001	<0.001	<0.001	0.031	<0.001	<0.01	<0.001	0.103	0.23	0.25	<0.5	0.9	<0.0001	0.04	<0.1	0.1	3.08	2.94
SW1	13/06/2017	7.69	337	188	<5	1.1	117	25	10	24	1	0.04	<0.0001	<0.001	0.002	<0.001	0.042	<0.001	<0.01	<0.001	<0.005	<0.05	0.37	<0.5	0.9	<0.0001	0.04	0.8	0.06	3.22	3.14
SW1	14/07/2017	7.68	375	199	16	1.8	121	23	9	25	1	0.06	<0.0001	<0.001	<0.001	<0.001	0.041	<0.001	<0.01	<0.001	<0.005	<0.05	0.32	<0.5	0.9	<0.0001	0.05	<0.1	0.12	3.31	3
SW1	14/08/2017	7.81	317	212	10	2.9	115	24	9	26	1	0.05	<0.0001	<0.001	<0.001	<0.001	0.038	<0.001	<0.01	<0.001	<0.005	<0.05	0.27	<0.5	0.7	<0.0001	0.02	<0.1	0.19	3.06	3.09
SW1	14/09/2017	7.98	303	155	6	2.6	129	24	9	25	1	0.06	<0.0001	<0.001	<0.001	<0.001	0.038	<0.001	<0.01	<0.001	<0.005	<0.05	0.3	<0.5	1.2	<0.0001	0.03	<0.1	0.11	3.24	3.05
SW1	16/10/2017	7.51	277	202	5	2.5	140	23	9	24	1	0.08	<0.0001	<0.001	<0.001	<0.001	0.039	<0.001	<0.01	<0.001	<0.005	<0.05	0.36	<0.5	1	<0.0001	<0.01	<0.1	0.09	3.37	2.96
SW1	15/11/2017	7.8	310	166	<5	3.1	114	18	8	23	1	0.1	<0.0001	<0.001	<0.001	<0.001	0.05	<0.001	<0.01	<0.001	<0.005	<0.05	0.44	<0.5	0.8	<0.0001	<0.01	0.1	0.09	2.79	2.56
SW1	15/12/2017	7.35	297	217	<5	2.9	112	21	9	25	1	0.07	<0.0001	<0.001	<0.001	<0.001	0.058	<0.001	<0.01	<0.001	<0.005	<0.05	0.44	<0.5	1.1	<0.0001	<0.01	0.1	0.08	2.96	2.9
SW2	10/01/2017	7.82	472	286	7	0.5	164	39	14	32	1	<0.01	<0.0001	<0.001	<0.001	<0.001	0.015	<0.001	<0.01	<0.001	<0.005	<0.05	<0.05	<0.5	1.2	<0.0001	1.63	1.9	0.03	4.69	4.52
SW2	10/02/2017	Dry - No Sample																													
SW2	14/03/2017	Dry - No Sample																													
SW2	12/04/2017	Dry - No Sample																													
SW2	12/05/2017	Dry - No Sample																													
SW2	13/06/2017	Dry - No Sample																													
SW2	14/07/2017	Dry - No Sample																													
SW2	14/08/2017	Dry - No Sample																													
SW2	14/09/2017	Dry - No Sample																													
SW2	16/10/2017	Dry - No Sample																													
SW2	15/11/2017	Dry - No Sample																													
SW2	15/12/2017	Dry - No Sample																													
SW3	10/01/2017	No Sample Required - No Discharge at this Location this Month																													
SW3	10/02/2017	No Sample Required - No Discharge at this Location this Month																													
SW3	14/03/2017	No Sample Required - No Discharge at this Location this Month																													

Site	Date	pH Value	Electrical Conductivity @ 25°C	Total Dissolved Solids (mg/L)	Suspended Solids (mg/L)	Turbidity (NTU)	Total Alkalinity as CaCO <sub>3</sub> (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Aluminium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Zinc (mg/L)	Boron (mg/L)	Iron (mg/L)	Arsenious Acid, As (III) (µg/L)	Arsenic Acid, As (V) (µg/L)	Mercury (mg/L)	Nitrite + Nitrate as N (mg/L)	Total Nitrogen (mg/L)	Total Phosphorous as P (mg/L)	Total Anions (meq/L)	Total Cations (meq/L)					
SW3	12/04/2017	No Sample Required - No Discharge at this Location this Month																																		
SW3	12/05/2017	No Sample Required - No Discharge at this Location this Month																																		
SW3	13/06/2017	Discharge Recorded - See Table D-4																																		
SW3	14/07/2017	No Sample Required - No Discharge at this Location this Month																																		
SW3	14/08/2017	No Sample Required - No Discharge at this Location this Month																																		
SW3	14/09/2017	No Sample Required - No Discharge at this Location this Month																																		
SW3	16/10/2017	No Sample Required - No Discharge at this Location this Month																																		
SW3	15/11/2017	No Sample Required - No Discharge at this Location this Month																																		
SW3	15/12/2017	No Sample Required - No Discharge at this Location this Month																																		
SW4	10/01/2017	No Sample Required - Non Sampling Month																																		
SW4	10/02/2017	No Sample Required - Non Sampling Month																																		
SW4	14/03/2017	Dry - No Sample																																		
SW4	12/04/2017	No Sample Required - Non Sampling Month																																		
SW4	12/05/2017	No Sample Required - Non Sampling Month																																		
SW4	29/06/2017	6.69	89	225	26	203	27	5	2	9	5	7.77	<0.0001	0.005	0.002	0.004	0.112	0.005	<0.01	<0.001	0.013	<0.05	5.33	<0.5	0.6	<0.0001	0.43	1.2	0.13	0.82	0.93					
SW4	14/07/2017	No Sample Required - Non Sampling Month																																		
SW4	14/08/2017	No Sample Required - Non Sampling Month																																		
SW4	14/09/2017	Dry - No Sample																																		
SW4	16/10/2017	No Sample Required - Non Sampling Month																																		
SW4	15/11/2017	No Sample Required - Non Sampling Month																																		
SW4	15/12/2017	Dry - No Sample																																		
SW5	10/01/2017	No Sample Required - Non Sampling Month																																		
SW5	10/02/2017	No Sample Required - Non Sampling Month																																		
SW5	14/03/2017	7.93	325	272	42	42.4	114	20	12	26	3	1.92	<0.0001	0.002	0.004	<0.001	0.108	0.004	<0.01	<0.001	0.008	<0.05	2.46	<0.5	1.6	<0.0001	0.02	0.8	0.1	3.27	3.19					
SW5	12/04/2017	No Sample Required - Non Sampling Month																																		
SW5	12/05/2017	No Sample Required - Non Sampling Month																																		
SW5	29/06/2017	7.95	534	272	23	9.9	165	40	24	43	3	0.71	<0.0001	<0.001	0.001	<0.001	0.046	0.002	<0.01	<0.001	<0.005	<0.05	0.81	<0.5	1.2	<0.0001	0.12	0.3	0.04	4.89	5.92					
SW5	14/07/2017	No Sample Required - Non Sampling Month																																		
SW5	14/08/2017	No Sample Required - Non Sampling Month																																		
SW5	14/09/2017	8.32	763	386	32	24.3	243	52	32	65	4	1.18	<0.0001	0.002	<0.001	<0.001	0.174	0.003	<0.01	<0.001	<0.005	<0.05	1.52	<0.5	1.3	<0.0001	0.06	0.5	0.07	7.94	8.16					
SW5	16/10/2017	No Sample Required - Non Sampling Month																																		
SW5	15/11/2017	No Sample Required - Non Sampling Month																																		
SW5	15/12/2017	7.84	276	214	57	10	107	19	11	21	3	1.85	<0.0001	0.003	0.004	0.001	0.098	0.005	<0.01	<0.001	0.005	<0.05	2.26	<0.5	1.3	<0.0001	<0.01	0.7	0.03	2.96	2.84					
SW6	10/01/2017	7.89	233	148	48	30.4	Suite 2 Not Required																													
SW6	10/02/2017	7.86	218	163	40	24.6	Suite 2 Not Required																													
SW6	14/03/2017	7.99	322	226	46	40.5	Suite 2 Not Required																													
SW6	12/04/2017	8.26	503	326	32	24.5	Suite 2 Not Required																													

Site	Date	pH Value	Electrical Conductivity @ 25°C	Total Dissolved Solids (mg/L)	Suspended Solids (mg/L)	Turbidity (NTU)	Total Alkalinity as CaCO <sub>3</sub> (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Aluminium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Zinc (mg/L)	Boron (mg/L)	Iron (mg/L)	Arsenious Acid, As (III) (µg/L)	Arsenic Acid, As (V) (µg/L)	Mercury (mg/L)	Nitrite + Nitrate as N (mg/L)	Total Nitrogen (mg/L)	Total Phosphorous as P (mg/L)	Total Anions (meq/L)	Total Cations (meq/L)					
SW6	12/05/2017	8.36	618	358	20	12.8	Suite 2 Not Required																													
SW6	13/06/2017	8.26	639	422	22	9.4	Suite 2 Not Required																													
SW6	14/07/2017	8.36	607	309	12	4.5	Suite 2 Not Required																													
SW6	14/08/2017	8.35	681	370	15	6.4	Suite 2 Not Required																													
SW6	14/09/2017	8.29	769	414	58	38.5	Suite 2 Not Required																													
SW6	16/10/2017	8.08	250	192	30	12.6	Suite 2 Not Required																													
SW6	15/11/2017	8.14	278	166	51	35.5	Suite 2 Not Required																													
SW6	15/12/2017	7.91	273	210	70	48.9	Suite 2 Not Required																													
SW7	10/01/2017	8	232	143	57	35.5	Suite 2 Not Required																													
SW7	10/02/2017	7.62	222	179	50	28.8	Suite 2 Not Required																													
SW7	14/03/2017	7.9	324	254	33	39.1	Suite 2 Not Required																													
SW7	12/04/2017	8.3	511	320	37	29.6	Suite 2 Not Required																													
SW7	12/05/2017	8.37	611	326	25	18.2	Suite 2 Not Required																													
SW7	13/06/2017	8.3	649	416	19	8.3	Suite 2 Not Required																													
SW7	14/07/2017	8.44	612	310	16	4.6	Suite 2 Not Required																													
SW7	14/08/2017	8.39	685	372	16	10.4	Suite 2 Not Required																													
SW7	14/09/2017	8.38	766	401	28	23.1	Suite 2 Not Required																													
SW7	16/10/2017	8.03	250	164	26	13	Suite 2 Not Required																													
SW7	15/11/2017	8.07	269	165	44	28.8	Suite 2 Not Required																													
SW7	15/12/2017	7.85	260	200	63	26.2	Suite 2 Not Required																													
SW8	10/01/2017	No Sample Required - Non Sampling Month																																		
SW8	10/02/2017	No Sample Required - Non Sampling Month																																		
SW8	14/03/2017	7.96	328	248	46	43.1	114	21	12	26	4	1.97	<0.0001	0.003	0.004	<0.001	0.111	0.004	<0.01	<0.001	0.006	<0.05	2.5	<0.5	1.7	<0.0001	0.01	0.8	0.11	3.29	3.27					
SW8	12/04/2017	No Sample Required - Non Sampling Month																																		
SW8	12/05/2017	No Sample Required - Non Sampling Month																																		
SW8	29/06/2017	7.81	554	278	27	15	178	41	25	46	3	0.8	<0.0001	0.001	0.002	<0.001	0.048	0.002	<0.01	<0.001	<0.005	<0.05	0.94	<0.5	1.1	<0.0001	0.07	0.3	0.04	5.25	6.18					
SW8	14/07/2017	No Sample Required - Non Sampling Month																																		
SW8	14/08/2017	No Sample Required - Non Sampling Month																																		
SW8	14/09/2017	8.41	742	398	16	11.7	240	51	31	62	4	0.57	<0.0001	<0.001	<0.001	<0.001	0.103	0.001	<0.01	<0.001	<0.005	<0.05	0.75	<0.5	1	<0.0001	0.03	0.3	0.04	7.66	7.9					
SW8	16/10/2017	No Sample Required - Non Sampling Month																																		
SW8	15/11/2017	No Sample Required - Non Sampling Month																																		
SW8	15/12/2017	7.69	265	178	65	47.2	94	18	11	21	3	2.16	<0.0001	0.003	0.004	<0.001	0.097	0.004	<0.01	<0.001	0.006	<0.05	2.56	<0.5	1.5	<0.0001	<0.01	0.8	0.05	2.73	2.79					
SW9	10/01/2017	No Sample Required - Non Sampling Month																																		
SW9	10/02/2017	No Sample Required - Non Sampling Month																																		
SW9	14/03/2017	Dry - No Sample																																		
SW9	12/04/2017	No Sample Required - Non Sampling Month																																		
SW9	12/05/2017	No Sample Required - Non Sampling Month																																		

Site	Date	pH Value	Electrical Conductivity @ 25°C	Total Dissolved Solids (mg/L)	Suspended Solids (mg/L)	Turbidity (NTU)	Total Alkalinity as CaCO <sub>3</sub> (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Aluminium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Zinc (mg/L)	Boron (mg/L)	Iron (mg/L)	Arsenious Acid, As (III) (µg/L)	Arsenic Acid, As (V) (µg/L)	Mercury (mg/L)	Nitrite + Nitrate as N (mg/L)	Total Nitrogen (mg/L)	Total Phosphorous as P (mg/L)	Total Anions (meq/L)	Total Cations (meq/L)
SW9	29/06/2017	6.81	40	83	70	137	18	3	1	1	5	5.33	<0.0001	0.003	0.003	0.002	0.117	0.004	<0.01	<0.001	0.01	<0.05	3.95	<0.5	0.8	<0.0001	0.14	0.8	0.24	0.36	0.4
SW9	14/07/2017	No Sample Required - Non Sampling Month																													
SW9	14/08/2017	No Sample Required - Non Sampling Month																													
SW9	14/09/2017	Dry - No Sample																													
SW9	16/10/2017	No Sample Required - Non Sampling Month																													
SW9	15/11/2017	No Sample Required - Non Sampling Month																													
SW9	15/12/2017	Dry - No Sample																													
SW10	10/01/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	10/02/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	14/03/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	12/04/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	12/05/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	29/06/2017	Discharge Recorded - See Table D-4																													
SW10	14/07/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	14/08/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	14/09/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	16/10/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	15/11/2017	No Sample Required - No Discharge at this Location this Month																													
SW10	15/12/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	10/01/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	10/02/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	14/03/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	12/04/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	12/05/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	29/06/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	14/07/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	14/08/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	14/09/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	16/10/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	15/11/2017	No Sample Required - No Discharge at this Location this Month																													
SW11	15/12/2017	No Sample Required - No Discharge at this Location this Month																													

Sampling was unable to be taken at all monitoring locations as Back Creek and upper Maules Creek are ephemeral.



**Table D-2  
Sediment Dam Triggers**

Parameter	100 <sup>th</sup> percentile
Oil and grease (mg/L)	10
pH	6.5-8.5
Total suspended solids (mg/L)	50

**Table D-3  
Sediment Dam Discharge Laboratory Monitoring Results**

Location	Date	pH Value	Electrical Conductivity @ 25°C (µS/cm)	Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Turbidity (NTU)	Oil & Grease (mg/L)
SD9	22/05/2017	7.76	606	50	416	97.4	<5
SD9	24/05/2017	7.76	527	48	382	116	<5
SD9	29/06/2017	8.18	688	128	458	145	<5

**Table D-4  
Off-site Discharge Monitoring Laboratory Results**

Site	Date	pH Value	Electrical Conductivity @ 25°C	Total Dissolved Solids (mg/L)	Suspended Solids (mg/L)	Turbidity (NTU)	Total Alkalinity as CaCO <sub>3</sub> (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Aluminium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Zinc (mg/L)	Boron (mg/L)	Iron (mg/L)	Mercury (mg/L)	Nitrite + Nitrate as N (mg/L)	Total Nitrogen (mg/L)	Total Phosphorous as P (mg/L)	Total Anions (meq/L)	Total Cations (meq/L)
SW5	22/05/2017	8.18	604	350	26	19.4	181	41	23	43	2	1.22	<0.0001	0.002	0.003	<0.001	0.072	0.003	<0.01	<0.001	0.008	<0.05	1.46	<0.0001	0.02	0.4	0.08	5.68	5.86
SW7	22/05/2017	8.22	607	359	24	20.3	175	42	23	43	2	0.91	<0.0001	0.001	0.002	<0.001	0.072	0.001	<0.01	<0.001	<0.005	<0.05	1.09	<0.0001	0.01	0.4	0.07	5.54	5.91
SW4	24/05/2017	6.98	51	310	165	952	18	6	1	2	4	16.5	<0.0001	0.01	0.007	0.014	0.306	0.012	<0.01	<0.001	0.058	<0.05	13.1	<0.0001	0.08	1.3	0.35	0.55	0.57
SW5	24/05/2017	8.21	644	382	24	19.5	186	46	24	46	3	0.73	<0.0001	<0.001	0.002	<0.001	0.067	<0.001	<0.01	<0.001	<0.005	<0.05	0.94	<0.0001	<0.01	0.4	0.08	5.91	6.35
SW6	24/05/2017	8.12	601	354	23	21.1	175	42	22	43	2	0.83	<0.0001	0.001	0.002	<0.001	0.068	0.002	<0.01	<0.001	<0.005	<0.05	0.99	<0.0001	<0.01	0.5	0.09	5.52	5.83
SW7	24/05/2017	8.21	607	351	22	19.6	166	45	23	44	3	0.96	<0.0001	0.001	0.003	<0.001	0.063	0.002	<0.01	<0.001	0.006	<0.05	1.11	<0.0001	<0.01	0.6	0.08	5.38	6.13
SW8	24/05/2017	8.23	598	368	18	21.9	177	42	22	42	3	0.79	<0.0001	0.001	0.003	<0.001	0.061	0.002	<0.01	<0.001	0.006	<0.05	0.97	<0.0001	<0.01	0.5	0.1	5.53	5.81
SW11	24/05/2017	7.73	351	228	6	4.3	114	27	9	25	1	0.04	<0.0001	<0.001	<0.001	<0.001	0.038	<0.001	<0.01	<0.001	<0.005	<0.05	0.34	<0.0001	0.04	0.2	0.11	3.16	3.2
SW1	29/06/2017	7.45	327	170	16	3.8	115	26	10	28	2	0.08	<0.0001	<0.001	0.005	<0.001	0.027	<0.001	<0.01	<0.001	<0.005	<0.05	0.3	<0.0001	0.08	0.2	0.11	3.21	3.39
SW3	29/06/2017	7.31	232	353	118	346	51	14	4	27	8	16.1	<0.0001	0.009	0.006	0.006	0.234	0.008	<0.01	<0.001	0.035	<0.05	11.2	<0.0001	1.51	2.7	0.74	1.97	2.41
SW4	29/06/2017	6.69	89	225	26	203	27	5	2	9	5	7.77	<0.0001	0.005	0.002	0.004	0.112	0.005	<0.01	<0.001	0.013	<0.05	5.33	<0.0001	0.43	1.2	0.13	0.82	0.93
SW5	29/06/2017	7.95	534	272	23	9.9	165	40	24	43	3	0.71	<0.0001	<0.001	0.001	<0.001	0.046	0.002	<0.01	<0.001	<0.005	<0.05	0.81	<0.0001	0.12	0.3	0.04	4.89	5.92
SW8	29/06/2017	7.81	554	278	27	15	178	41	25	46	3	0.8	<0.0001	0.001	0.002	<0.001	0.048	0.002	<0.01	<0.001	<0.005	<0.05	0.94	<0.0001	0.07	0.3	0.04	5.25	6.18
SW9	29/06/2017	6.81	40	83	70	137	18	3	1	1	5	5.33	<0.0001	0.003	0.003	0.002	0.117	0.004	<0.01	<0.001	0.01	<0.05	3.95	<0.0001	0.14	0.8	0.24	0.36	0.4
SW10	29/06/2017	6.49	46	424	205	453	16	2	1	6	4	21	<0.0001	0.014	0.007	0.008	0.153	0.014	<0.01	<0.001	0.026	<0.05	15.8	<0.0001	0.13	0.5	0.16	0.66	0.54

\*SW6 and SW7 used as monitoring locations, as SW5 and SW8 were inaccessible due to wet weather.

**Site Water Monitoring**

**Table D-5  
On-site Surface Water Monitoring**

Site	Parameter	Units	Frequency	Samples	Date	Min	Mean	Max/Only Value
Mine Void	TSS	mg/L	Every 2 Months	1	24/02/2017	-	-	<5
	Conductivity	µs/cm				-	-	1030
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.55
Mine Void	TSS	mg/L	Every 2 Months	1	19/04/2017	-	-	9
	Conductivity	µs/cm				-	-	671
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.32
Mine Void	TSS	mg/L	Every 2 Months	1	22/06/2017	-	-	<5
	Conductivity	µs/cm				-	-	2220
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	7.69
Mine Void	TSS	mg/L	Every 2 Months	3	29/08/2017	-	-	168
	Conductivity	µs/cm				-	-	1360
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	7.91
Mine Void	TSS	mg/L	Every 2 Months	2	31/10/2017	-	-	14
	Conductivity	µs/cm				-	-	2190
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	7.53
Mine Void	TSS	mg/L	Every 2 Months	1	18/12/2017	-	-	6
	Conductivity	µs/cm				-	-	2110
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	7.56

**APPENDIX E**  
*Groundwater*

**Appendix E  
Groundwater**

**Table E-1  
Monitoring bore details**

Bore ID	Approx. EIS proposed site	Type	Network	GL (mAHD)	Bore depth (m)	Screen/sensor depth (mbgl)	Target geology
BCM01	BCMB01	SP	Maules Creek	273.39	10	6.75 - 9.75	Alluvium
BCM03	BCMB03	SP	Maules Creek	305.02	10	6.75 - 9.75	Alluvium
MAC1280	-	SP	Maules Creek	322.5	146	56 – 59	Interburden between Braymont seams
RB03_V1	-	VWP	Maules Creek	407.89	-	164	Braymont
RB03_V2	-	VWP	Maules Creek	407.89	-	242	Merriown
RB03_V3	-	VWP	Maules Creek	407.89	-	289	Nagero
RB03_V4	-	VWP	Maules Creek	407.89	-	317	Templemore
RB04_V1	-	VWP	Maules Creek	437.53	-	209	Braymont
RB04_V2	-	VWP	Maules Creek	437.53	-	272.5	Merriown
RB04_V3	-	VWP	Maules Creek	437.53	-	309	Nagero
RB04_V4	-	VWP	Maules Creek	437.53	-	339	Lower Northam
RB05A	-	SP	Maules Creek	328.1	246.5	239 - 245	Merriown
RB05_V1	-	VWP	Maules Creek	328.4	-	107	Braymont
RB05_V2	-	VWP	Maules Creek	328.4	-	213	Jeralong
RB05_V3	-	VWP	Maules Creek	328.4	-	280	Nagero
RB05_V4	-	VWP	Maules Creek	328.4	-	390	Templemore
REG1_V1	L1VWP2	VWP	Regional	286.17	-	118.7	Jeralong
REG1_V2	L1VWP2	VWP	Regional	286.17	-	134.5	Merriown

Bore ID	Approx. EIS proposed site	Type	Network	GL (mAHD)	Bore depth (m)	Screen/sensor depth (mbgl)	Target geology
REG1_V3	L1VWP2	VWP	Regional	286.17	-	193.5	Nagero
REG1_V4	L1VWP2	VWP	Regional	286.17	-	281.5	Therribri
REG2_V1	-	VWP	Regional	317.01	-	60	Braymont
REG2_V2	-	VWP	Regional	317.01	-	120	Jeralong
REG2_V3	-	VWP	Regional	317.01	-	200	Merriown
REG2_V4	-	VWP	Regional	317.01	-	260	Therribri
REG3	L2VWP2	SP	Regional	241.6	57	50.50 - 56.50	Boggabri Volcanics
REG4	L3MB1	SP	Regional	259.95	72.5	65.5 - 71.5	Boggabri Volcanics
REG5	-	SP	Regional	252.17	78.7	72.2 - 78.2	Boggabri Volcanics
REG5A	-	SP	Regional	252.03	22	18 - 21	Alluvium
REG6	L4VWP1	SP	Regional	250.65	96	88.0 - 94.0	Boggabri Volcanics
REG7_V1	-	VWP	Regional	291.62	-	67.5	Braymont
REG7_V2	-	VWP	Regional	291.62	-	148.2	Merriown
REG7_V3	-	VWP	Regional	291.62	-	242.5	Nagero
REG7A	-	SP	Regional	291.71	36	24 - 30	Alluvium
REG8_V1	L5VWP1	VWP	Regional	341.6	-	91.5	Braymont
REG8_V2	L5VWP1	VWP	Regional	341.6	-	221	Merriown
REG8_V3	L5VWP1	VWP	Regional	341.6	-	274	Nagero
REG9_V1	-	VWP	Regional	346.81	-	115.8	Braymont
REG9_V2	-	VWP	Regional	346.81	-	175.2	Merriown
REG9_V3	-	VWP	Regional	346.81	-	268	Nagero
REG10_V1	L1VWP1	VWP	Regional	287.12	-	55	Braymont
REG10_V2	L1VWP1	VWP	Regional	287.12	-	144.2	Merriown
REG10_V3	L1VWP1	VWP	Regional	287.12	-	178	Nagero



Bore ID	Approx. EIS proposed site	Type	Network	GL (mAHD)	Bore depth (m)	Screen/sensor depth (mbgl)	Target geology
REG10_V4	L1VWP1	VWP	Regional	287.12	-	185.5	Upper Northam
REG10A	BCMB02	SP	Regional	287.12	10	6.75 - 9.75	Alluvium
REG12	L2MB1	SP	Regional	285.61	48.3	38.4 - 44.4	Boggabri Volcanics
REG13	-	SP	Regional	277.08	133	128 - 132	Boggabri Volcanics
REG14	-	SP	Regional	250.18	102	90 - 96	Basement

### Regional Groundwater Bores

**Table E-2  
Groundwater Levels**

SWL	RB05a	Reg3	Reg4	Reg5	Reg5a	Reg6	Reg7a	Reg10a	Reg12	Reg13	Reg14	BCM01	BCM03
Jan-17	58.07	13.43	20.10	17.65	-	20.24	6.06	-	25.90	22.64	20.53	-	-
Feb-17	58.59	13.82	20.10	17.64	-	20.27	6.25	-	25.88	22.62	20.43	-	-
Mar-17	59.05	13.91	20.14	17.14	-	20.30	6.34	-	25.91	22.60	20.23	-	-
Apr-17	58.69	13.58	20.16	17.71	-	20.32	6.45	-	25.92	22.64	19.70	-	-
May-17	59.24	13.11	20.19	17.76	-	20.32	6.61	-	25.93	22.66	19.72	-	-
Jun-17	56.86	12.87	20.17	17.68	-	20.23	6.66	-	25.89	22.61	19.56	-	-
Jul-17	59.37	12.78	20.51	17.52	-	20.19	6.72	-	25.91	22.52	19.49	-	-
Aug-17	59.56	12.75	20.22	17.70	-	20.19	6.80	-	25.93	22.61	19.42	-	-
Sep-17	59.22	13.11	20.17	17.73	-	20.27	6.81	-	25.90	22.48	19.77	-	-
Oct-17	59.47	13.35	20.15	17.70	-	20.23	6.93	-	25.86	22.49	20.33	-	-
Nov-17	60.22	13.26	20.59	17.98	-	20.29	7.01	-	25.89	22.54	19.97	-	-
Dec-17	60.58	13.38	20.15	17.70	-	20.30	7.18	-	25.84	22.42	20.15	-	-

Shaded cells indicate dry bore.

**Table E-3 Groundwater Monitoring Results and comparison with ANZECC guideline trigger values**

Location	Date	Lab pH value	Lab electrical conductivity @ 25°C	TDS @ 180°C	Sulfate as SO4 - turbidimetric	Aluminium	Arsenic	Barium	Cadmium	Copper	Lead	Lithium	Manganese	Molybdenum	Nickel	Zinc	Boron	Iron	Ammonia as N	Nitrite as N	Nitrate as N	Total anions	Total cations	Ionic balance
						(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)
ANZECC Guideline value	Drinking water	6.5-8.5	-	600	500/250	0.2**	0.01	0.2*	0.002*	2/1	0.01*	-	0.5*/0.1**	0.05*	0.02*	3	4*	0.3**	0.5	3	50	-	-	-
	Livestock drinking water	-	-	3000-1300	1000-2000	5	0.5	-	0.01	0.5-5	0.1	-	-	0.15	1	20	5	-	-	30	-	-	-	-
	Long-term irrigation water	6.0-8.5	-	-	-	5	0.1	-	0.01	0.2	2	2.5	0.2	0.01	0.2	2	0.5	0.2	-	-	-	-	-	-
	Limit of reporting	0.1	1	1	1	0.01	0.001	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.01
RBO5a	10-03-17	7.89	1780	996	72	<0.01	<0.001	0.298	<0.0001	<0.001	<0.001	0.026	0.07	0.003	0.006	0.007	0.06	0.62	0.64	<0.01	0.03	18.2	18.6	0.99
	07-06-17	7.83	1690	950	77	<0.01	<0.001	0.297	<0.0001	<0.001	<0.001	0.026	0.074	0.004	0.015	0.01	0.07	0.61	0.64	<0.01	0.11	17.4	18.7	3.6
	07-09-17	7.89	1800	951	90	<0.01	<0.001	0.296	<0.0001	0.002	<0.001	0.02	0.073	0.006	0.012	0.024	<0.05	0.61	0.59	<0.01	0.37	20	17.6	6.42
	08-12-17	7.66	1650	958	70	<0.01	<0.001	0.229	<0.0001	<0.001	<0.001	0.021	0.054	0.006	0.018	0.02	0.05	0.33	0.42	<0.01	0.5	18.4	15.2	9.68
Reg3	20-03-17	8.17	1420	682	95	<0.01	0.002	0.015	<0.0001	<0.001	<0.001	0.005	0.038	0.016	0.004	0.015	0.06	<0.05	0.07	<0.01	<0.01	12.6	12.6	0.27
	08-06-17	8.18	1120	700	87	0.01	0.002	0.058	<0.0001	<0.001	<0.001	<0.001	0.192	0.011	0.001	0.006	0.08	5	0.06	<0.01	<0.01	11	12	4.29
	25-09-17	8.12	1110	673	72	<0.01	0.003	0.018	<0.0001	<0.001	<0.001	<0.001	0.159	0.018	0.003	0.006	0.06	0.1	0.08	<0.01	0.02	11.8	11.8	0.24
	20-12-17	8.1	1290	746	106	<0.01	0.001	0.016	<0.0001	0.007	<0.001	0.001	0.185	0.013	0.001	0.019	0.05	5	0.02	<0.01	0.02	13.9	11.7	8.44
Reg4	20-03-17	9.26	1140	538	8	<0.01	<0.001	0.018	<0.0001	<0.001	<0.001	0.088	0.031	0.014	<0.001	<0.001	0.06	<0.05	0.91	0.08	0.08	9.68	9.82	0.72
	08-06-17	11.5	1580	716	17	0.05	<0.001	0.008	<0.0001	0.002	<0.001	0.289	0.002	0.029	0.003	5	0.07	5	2.09	0.54	0.09	10.6	11.2	2.68
	25-09-17	11.3	1490	765	15	0.02	<0.001	0.06	<0.0001	0.004	<0.001	0.274	0.001	0.038	0.003	0.012	<0.05	5	2.14	0.52	0.12	11.8	11.1	3.15
	19-12-17	8.43	1060	592	14	<0.01	<0.001	0.02	<0.0001	<0.001	<0.001	0.035	0.032	0.007	0.002	<0.05	0.19	0.03	0.04	0.03	11.4	-	-	10.5
Reg5	20-03-17	7.97	2130	1130	126	0.02	<0.001	0.032	<0.0001	0.004	<0.001	0.009	0.66	0.003	0.009	0.024	<0.05	0.2	0.57	<0.01	<0.01	19.2	17.9	3.49
	08-06-17	7.88	1780	1130	153	0.02	0.003	0.029	<0.0001	0.002	<0.001	0.008	0.771	0.003	0.004	0.027	0.06	5	0.46	<0.01	<0.01	17.9	19.2	3.31
	07-09-17	8.12	1890	1020	181	0.02	<0.001	0.037	<0.0001	<0.001	<0.001	0.007	0.672	0.004	0.007	0.027	<0.05	0.16	0.48	<0.01	0.02	19.9	17.9	5.33
	19-12-17	8.09	1900	1170	218	<0.01	<0.001	0.025	<0.0001	0.005	<0.001	0.005	0.516	0.003	0.004	0.043	<0.05	5	0.4	<0.01	<0.01	20.2	16.4	10.2
Reg5a	20-03-17 08-06-17 07-09-17 19-12-17	Dry Dry Dry Dry																						
Reg6	09-03-17	8.23	2140	1160	137	<0.01	0.001	0.076	<0.0001	<0.001	<0.001	0.012	0.085	0.017	0.003	<0.001	0.07	<0.05	0.21	<0.01	<0.01	19.8	19.4	1.17
	06-06-17	8.32	2050	1480	133	<0.01	0.002	0.055	<0.0001	<0.001	<0.001	0.009	0.046	0.012	0.003	5	0.08	5	0.11	0.04	<0.01	19.4	21	4.04
	26-09-17	8.58	2320	1200	109	<0.01	0.001	0.028	<0.0001	0.001	<0.001	0.047	0.021	0.047	0.009	5	<0.05	5	0.27	0.09	0.11	21.6	23.9	5.08
	20-12-17	8.25	2090	1080	156	<0.01	<0.001	0.05	<0.0001	<0.001	<0.001	0.01	0.07	0.017	0.003	0.01	0.06	5	0.13	0.07	0.03	19.8	19.4	9.27
Reg7a	09-03-17	7.81	860	456	43	<0.01	0.006	0.096	<0.0001	<0.001	<0.001	0.002	0.564	0.001	0.011	0.015	<0.05	0.43	0.03	<0.01	<0.01	8.62	8.67	0.28
	06-06-17	7.67	833	496	36	<0.01	0.006	0.093	<0.0001	<0.001	<0.001	0.002	0.526	0.002	0.003	0.016	<0.05	0.36	0.02	<0.01	0.02	8.6	8.93	1.91
	08-09-17	7.92	774	452	26	<0.01	0.003	0.075	<0.0001	0.001	<0.001	0.002	0.668	<0.001	0.003	<0.001	<0.05	0.35	0.46	<0.01	0.04	8.7	7.81	5.39
	20-12-17	7.74	850	421	38	<0.01	0.005	0.094	<0.0001	0.008	<0.001	0.003	0.509	0.003	0.001	0.05	<0.05	0.12	<0.01	<0.01	<0.01	9.47	9.48	0.08
Reg10a	10-03-17 07-06-17	Dry Dry																						

	04-09-17 20-12-17	Dry Dry																								
Reg12	10-03-17	8.05	2190	1220	50	<0.01	0.001	0.064	<0.0001	<0.001	<0.001	1	0.027	0.144	0.004	0.011	0.005	0.11	5	<0.0	0.06	<0.01	0.01	22.8	21.8	2.11
	07-06-17	8.05	2190	1220	44	<0.01	0.001	0.064	<0.0001	<0.001	<0.001	1	0.027	0.144	0.003	0.003	0.012	0.12	0.46	<0.0	0.61	<0.01	0.04	22	23.5	3.23
	07-09-17	7.96	2400	1290	58	<0.01	0.002	0.091	<0.0001	0.001	1	0.033	0.42	0.011	0.008	0.02	0.09	0.12	<0.0	<0.0	0.09	<0.01	0.02	27.7	27.1	1.08
	20-12-17	7.93	2440	1440	57	<0.01	<0.001	0.067	<0.0001	0.023	1	0.035	0.06	0.002	1	0.036	0.09	5	<0.0	<0.0	0.01	<0.01	<0.01	27.6	24.1	6.64
Reg13	20-03-17	10.3	3570	2230	951	<0.01	<0.001	0.035	<0.0001	<0.001	<0.001	1	0.255	0.001	0.037	<0.001	<0.001	5	<0.0	<0.0	0.42	0.02	0.05	29.8	29.7	0.19
	08-06-17	9.21	2850	1870	807	0.03	---	0.07	<0.0001	0.002	1	0.244	0.035	0.029	0.013	0.009	0.07	5	<0.0	<0.0	1.82	0.62	0.32	26.2	28.2	3.7
	25-09-17	9.85	2900	1880	957	0.01	<0.001	0.04	<0.0001	0.002	1	0.231	0.009	0.042	0.005	0.013	0.06	5	<0.0	<0.0	0.75	0.02	0.26	30.2	31.4	1.89
	19-12-17	7.94	3570	2760	1200	<0.01	<0.001	0.046	<0.0001	<0.001	<0.001	1	0.008	0.26	0.012	0.002	0.007	0.13	5	<0.0	<0.0	0.01	<0.01	<0.01	38.7	34.2
Reg14	09-03-17	7.88	938	660	47	<0.01	0.005	0.034	<0.0001	<0.001	<0.001	1	0.003	0.313	0.004	0.007	0.014	<0.05	0.34	<0.0	0.05	<0.01	0.01	9.52	9.51	0.05
	06-06-17	8.34	935	504	34	<0.01	0.002	0.042	<0.0001	<0.001	<0.001	1	0.004	0.169	0.009	0.002	0.012	<0.05	0.1	<0.0	0.21	<0.01	<0.01	8.54	9.51	5.39
	15-09-17	8.15	893	419	41	<0.01	0.003	0.039	<0.0001	<0.001	<0.001	1	0.003	0.144	0.01	0.002	<0.001	<0.05	0.09	<0.0	0.23	<0.01	0.03	9.09	9.01	0.43
	20-12-17	8.34	928	576	44	<0.01	0.003	0.033	<0.0001	<0.001	<0.001	1	0.002	0.119	0.01	0.001	0.006	<0.05	0.09	<0.0	0.18	<0.01	0.04	10.1	8.8	6.81
BCM01	10-03-17 07-06-17 04-09-17 20-12-17	Dry Dry Dry Dry																								
BCM03	10-03-17 06-06-17 04-09-17 20-12-17	Dry Dry Dry Dry																								
MAC128 0	10-03-17	11.6	4010	2030	22	1.34	0.001	0.247	<0.0001	0.012	<0.001	1	0.178	<0.001	0.021	0.019	<0.001	<0.001	<0.0	<0.0	4.6	1.25	1.39	27.8	27.6	0.35
	17-06-17	11.8	1050	2010	6	1.51	<0.001	0.25	<0.0001	0.013	<0.001	1	0.187	<0.001	0.015	0.019	0.009	<0.05	<0.0	<0.0	5.24	1.13	0.07	29.4	31	2.72
	05-09-17	11.8	4250	1810	8	1.76	<0.001	0.254	<0.0001	0.019	<0.001	1	0.122	0.001	0.024	0.02	0.029	<0.05	<0.0	<0.0	5.53	0.36	0.89	32.4	31.4	1.51
	08-12-17	11.7	4380	2240	10	1.21	<0.001	0.18	<0.0001	0.006	<0.001	1	0.123	<0.001	0.017	0.011	0.011	<0.05	<0.0	<0.0	6.24	0.45	0.03	32.2	28.1	6.8

Private Groundwater Bores

Table E-4  
Groundwater Levels

SWL	MOR1	MOR2	BRE2	WOL1	WOL2	School	Whan	Tralee	Morse	Bas1	Bas2	Teston
Jan-17	- <sup>2</sup>	13.10	17.74	2.53	11.51	- <sup>1</sup>	3.44	20.28	21.72	- <sup>2</sup>	- <sup>2</sup>	19.96
Jul-17	- <sup>2</sup>	13.15	18.10	3.53	11.80	- <sup>2</sup>	3.70	20.27	21.67	- <sup>2</sup>	- <sup>2</sup>	19.95

Shaded cells indicate dry bore.

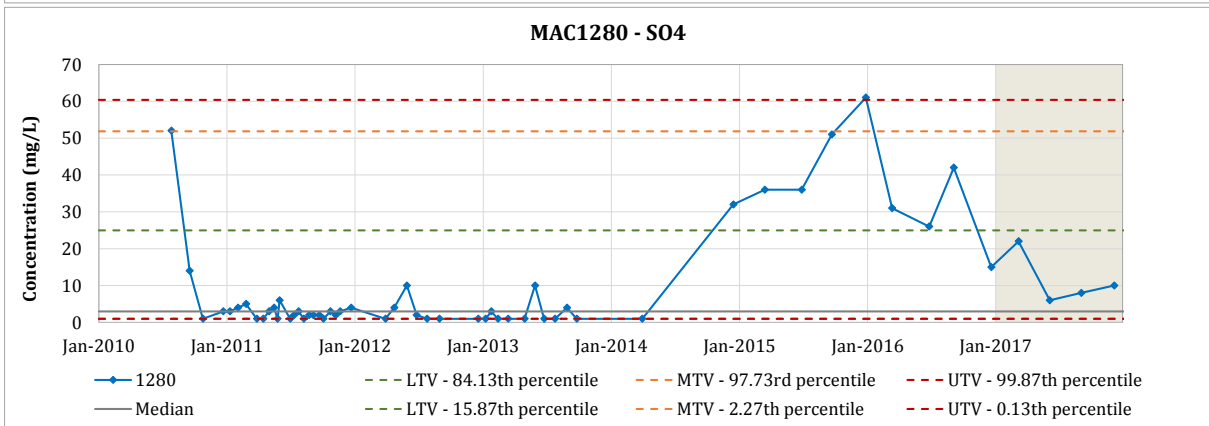
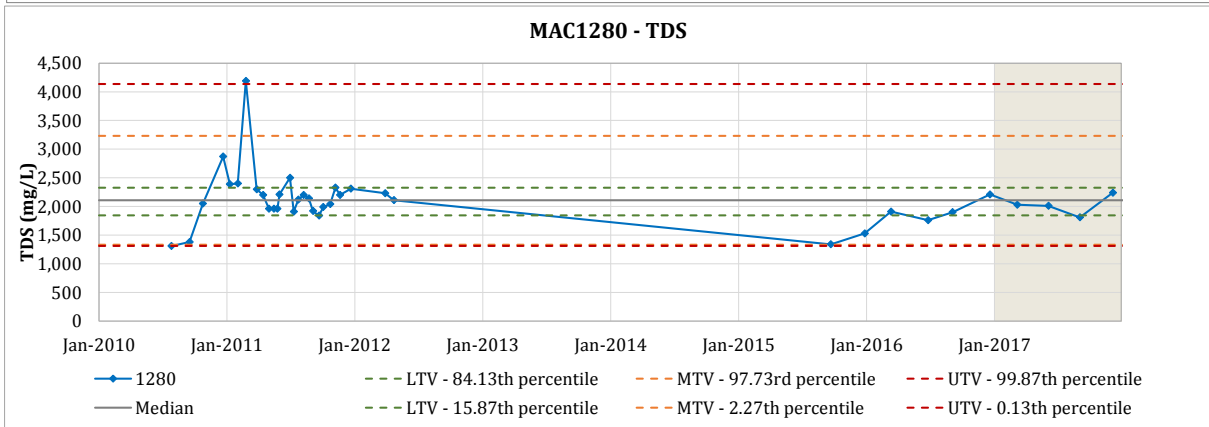
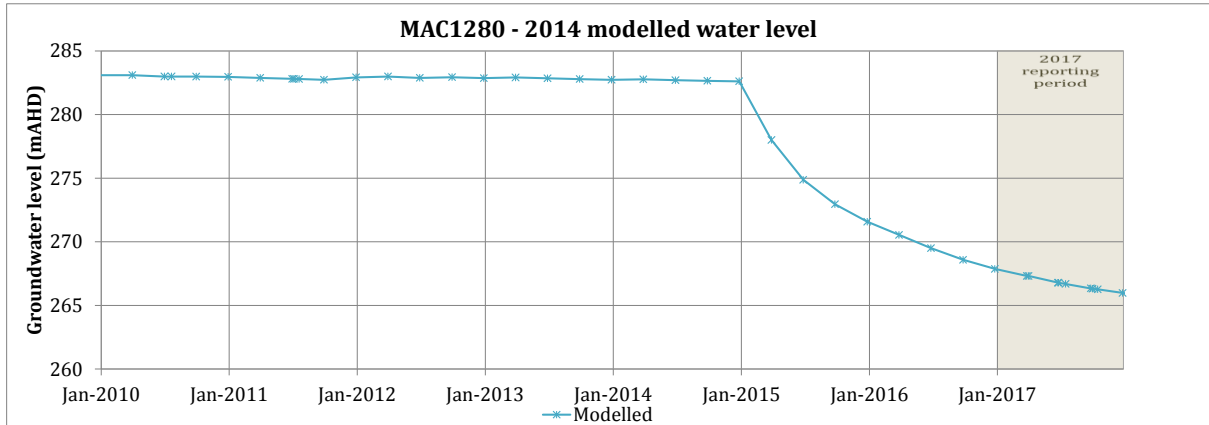
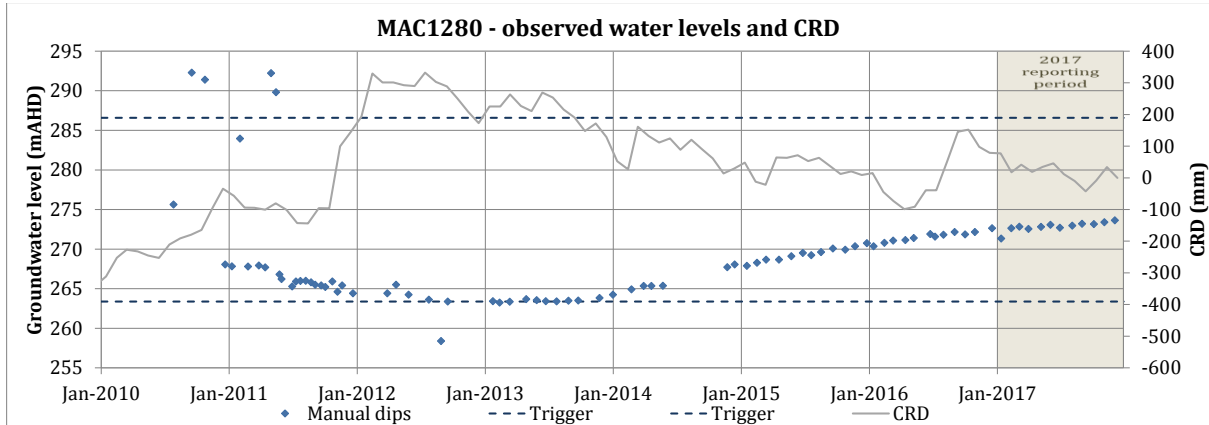
- 1 Groundwater level could not be obtained as personnel were unable to access the site.
- 2 Groundwater level could not be obtained as the site is a capped bore.

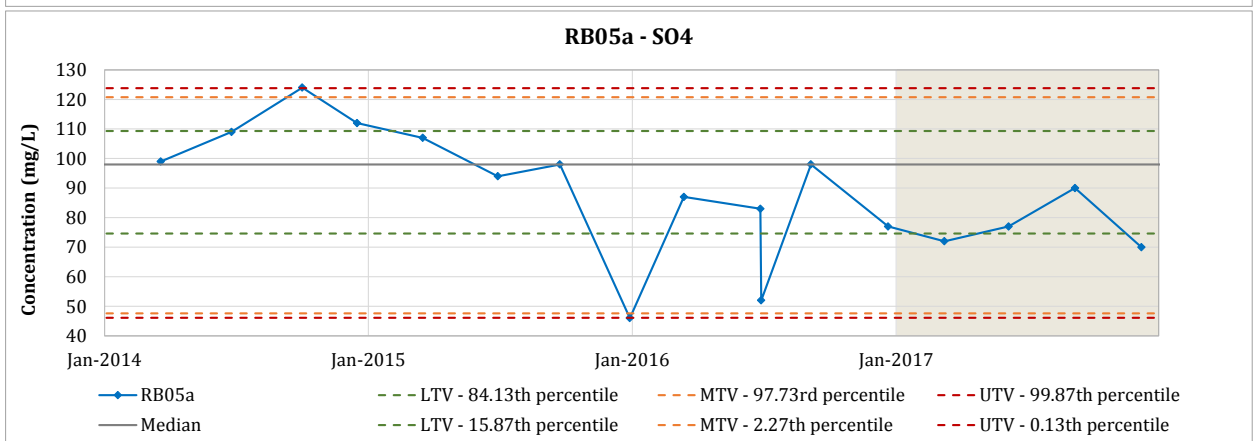
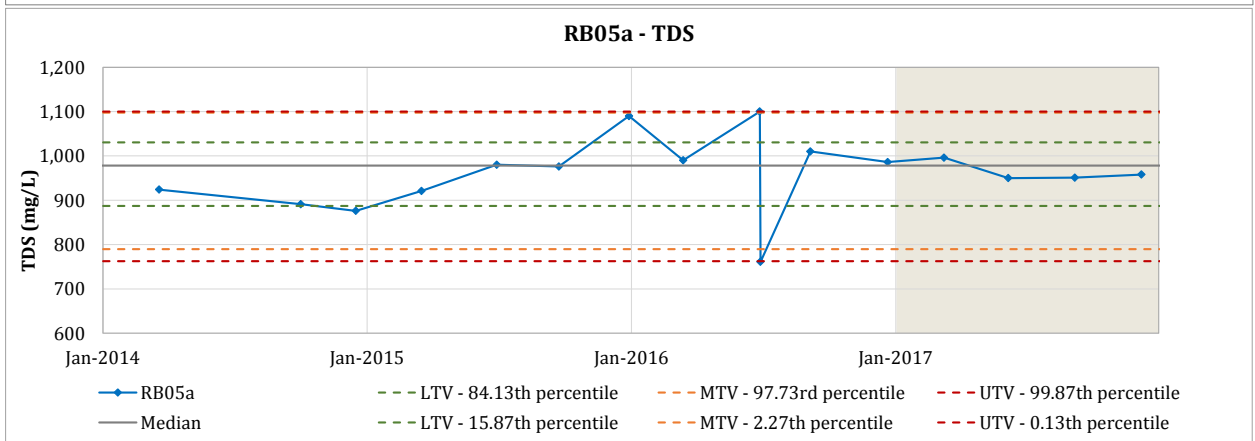
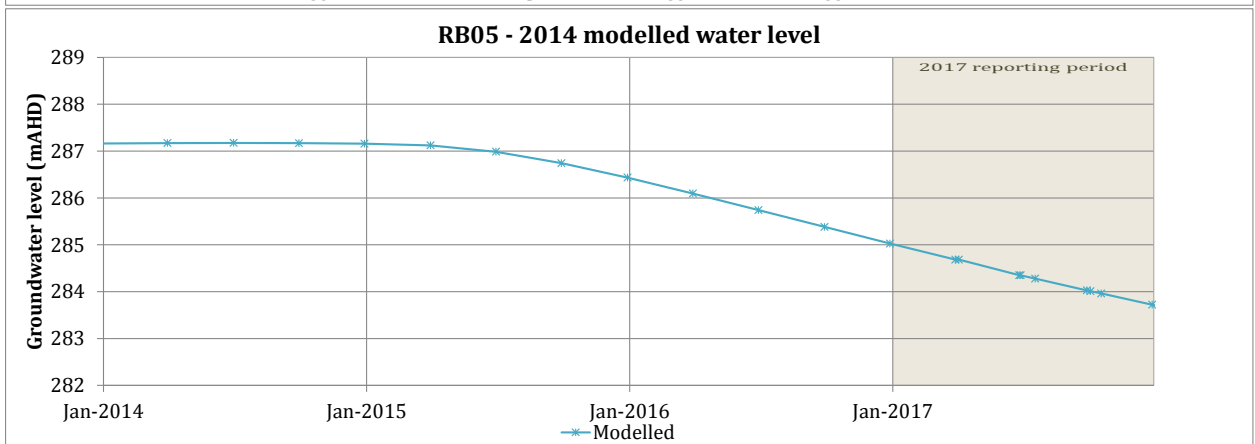
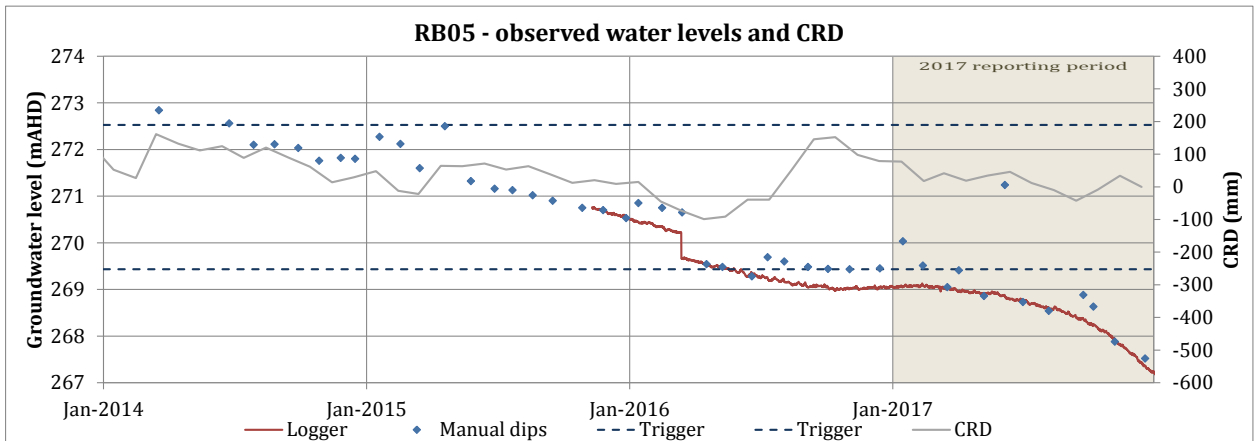
**Table E-5  
Groundwater Monitoring Results and comparison with ANZECC guideline trigger values**

Location	Date	Lab pH value pH Unit	Lab electrical conductivity @ 25°C µS/cm	TDS @ 180°C mg/L	Sulfate as SO <sub>4</sub> - turbimetric mg/L	Arsenic (filt.) mg/L	Cadmium (filt.) mg/L	Copper (filt.) mg/L	Lead (filt.) mg/L	Nickel (filt.) mg/L	Zinc (filt.) mg/L	Iron (filt.) mg/L	Ammonia as N mg/L	Nitrite as N mg/L	Nitrate as N mg/L	Total anions meq/L	Total cations meq/L	Ionic balance %
ANZECC Guideline value	Drinking water	6.5-8.5	-	600	500/250	0.01	0.002*	2/1	0.01*	0.02*	3	0.3**	0.5	3	50	-	-	-
	Livestock drinking water	-	-	3000- 13000	1000-2000	0.5	0.01	0.5-5	0.1	1	20	-	-	30	-	-	-	-
	Long-term irrigation water	6.0-8.5	-	-	-	0.1	0.01	0.2	2	0.2	2	0.2	-	-	-	-	-	-
	Limit of reporting	0.1	1	1	1	0.001	0.0001	0.001	0.001	0.001	0.005	0.05	0.01	0.01	0.01	0.01	0.01	0.01
MOR1	11-01-17	7.77	1650	828	38	<0.001	<0.0001	0.002	0.001	0.001	0.025	<0.05	<0.01	<0.01	8.37	17.2	17.5	0.76
	11-07-17	7.75	1570	870	41	<0.001	<0.0001	0.004	<0.001	0.016	0.573	<0.05	<0.01	<0.01	9.13	16.8	16.2	1.7
MOR2	11-01-17	7.39	78	63	<1	<0.001	<0.0001	0.028	<0.001	<0.001	0.007	2.13	0.22	<0.01	<0.01	1.33	1.51	---
	11-07-17	7.4	93	52	<1	<0.001	<0.0001	<0.001	<0.001	<0.001	0.009	0.6	0.04	<0.01	<0.01	0.9	0.66	---
BRE2	11-01-17	8.17	3480	2130	13	0.01	<0.0001	<0.001	<0.001	<0.001	0.005	4.72	1.07	<0.01	<0.01	37.6	37.4	0.3
	10-07-17	8.18	3600	2150	12	0.002	<0.0001	<0.001	<0.001	<0.001	0.006	0.12	9.47	0.01	<0.01	38.1	37.7	0.42
WOL1	12-01-17	7.3	552	336	29	<0.001	<0.0001	0.012	<0.001	<0.001	0.006	<0.05	0.02	<0.01	0.96	5.64	5.67	0.33
	11-07-17	7.38	558	309	33	<0.001	<0.0001	0.001	<0.001	<0.001	0.01	<0.05	0.02	<0.01	1.45	5.32	5.34	0.2
WOL2	12-01-17	8.15	618	364	10	<0.001	<0.0001	<0.001	<0.001	0.002	0.032	<0.05	1.71	0.3	<0.01	6.73	6.42	2.35
	10-07-17	8.24	607	320	6	<0.001	<0.0001	0.001	<0.001	<0.001	0.02	<0.05	1.57	<0.01	0.03	5.91	6.32	3.34
School raw	12-01-17	Sample not obtainable <sup>1</sup>																
	28-07-17	7.44	434	245	18	<0.001	<0.0001	0.012	<0.001	<0.001	0.027	<0.05	<0.01	<0.01	0.79	4.09	4.25	1.86
Whan	12-01-17	7.44	314	198	9	<0.001	<0.0001	0.001	<0.001	<0.001	0.041	<0.05	0.04	<0.01	1.03	3.28	3.02	4.07
	11-07-17	7.49	338	186	5	<0.001	<0.0001	<0.001	<0.001	<0.001	0.01	<0.05	<0.01	<0.01	0.14	3.04	2.78	4.39
Tralee	11-01-17	7.43	1330	720	35	<0.001	<0.0001	<0.001	<0.001	0.01	0.054	6.94	0.57	0.09	<0.01	15.2	14.6	2.1
	10-07-17	7.55	1300	710	32	<0.001	<0.0001	<0.001	<0.001	0.009	0.02	9.8	0.23	<0.01	<0.01	14.4	13.3	3.78
Morse	11-01-17	7.46	726	490	13	<0.001	<0.0001	0.002	<0.001	0.004	0.114	4.4	0.18	<0.01	<0.01	8.11	8.12	0.08
	10-07-17	7.72	1110	700	14	<0.001	<0.0001	<0.001	<0.001	0.004	0.011	1.01	1.11	<0.05	<0.05	12.4	11.8	2.05
Bas1	12-01-17	7.31	542	300	23	<0.001	<0.0001	<0.001	<0.001	0.002	0.019	<0.05	0.02	<0.01	<0.01	5.81	5.37	4
	10-07-17	7.41	489	263	21	0.001	<0.0001	0.001	<0.001	0.003	0.028	0.14	0.03	<0.01	<0.01	5.2	4.86	3.39
Bas2	12-01-17	Sample not obtainable <sup>2</sup>																
	10-07-17	Sample not obtainable <sup>2</sup>																
Teston	11-01-17	7.97	2400	1390	18	<0.001	<0.0001	0.004	<0.001	0.001	0.019	2.48	0.05	<0.01	<0.01	25.8	25.2	1.12
	10-07-17	7.99	2280	1190	17	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.005	<0.05	0.04	<0.01	<0.01	24.5	21.3	7.02

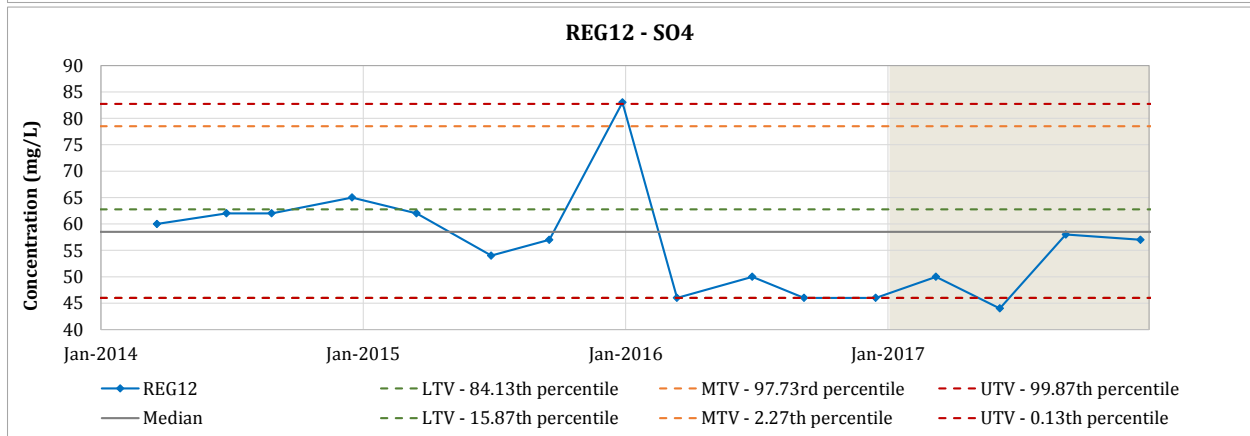
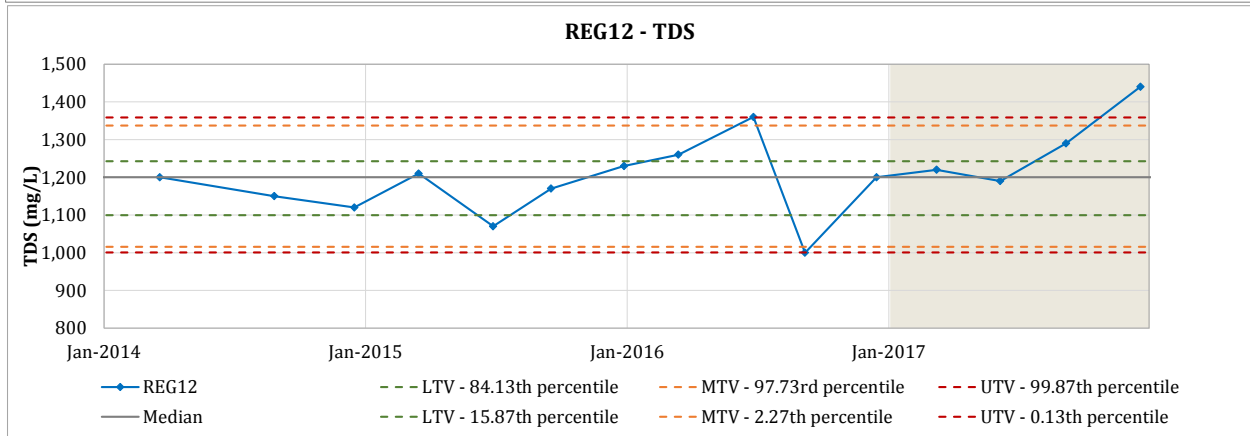
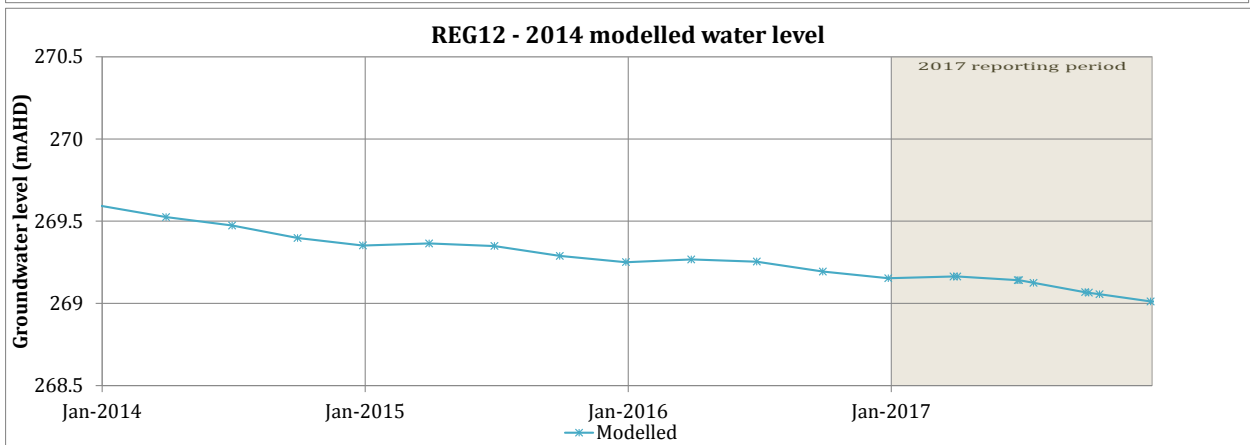
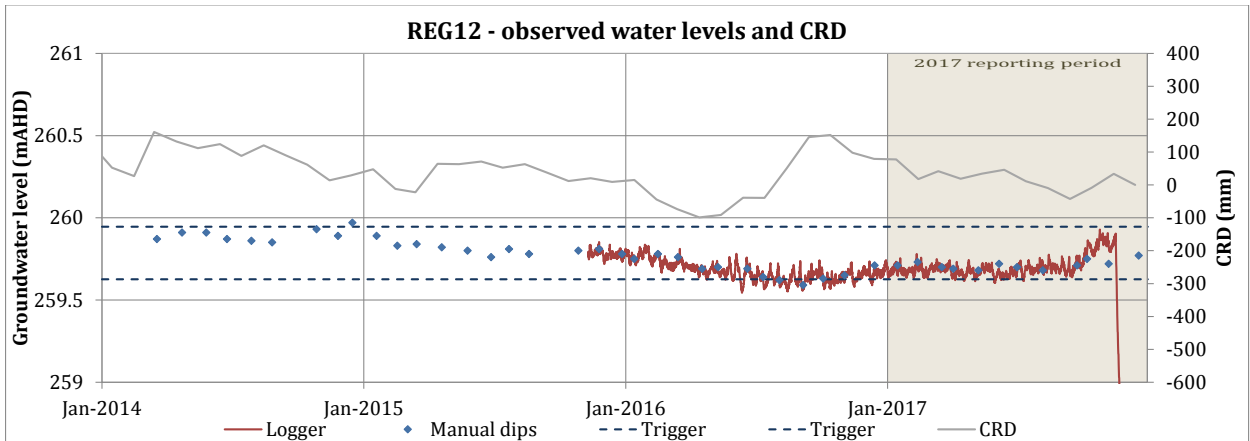
- 1 Sample could not be obtained as personnel were unable to access the site.
- 2 Sample could not be obtained as the site is a capped bore and the pump was not operating at the time of sampling.

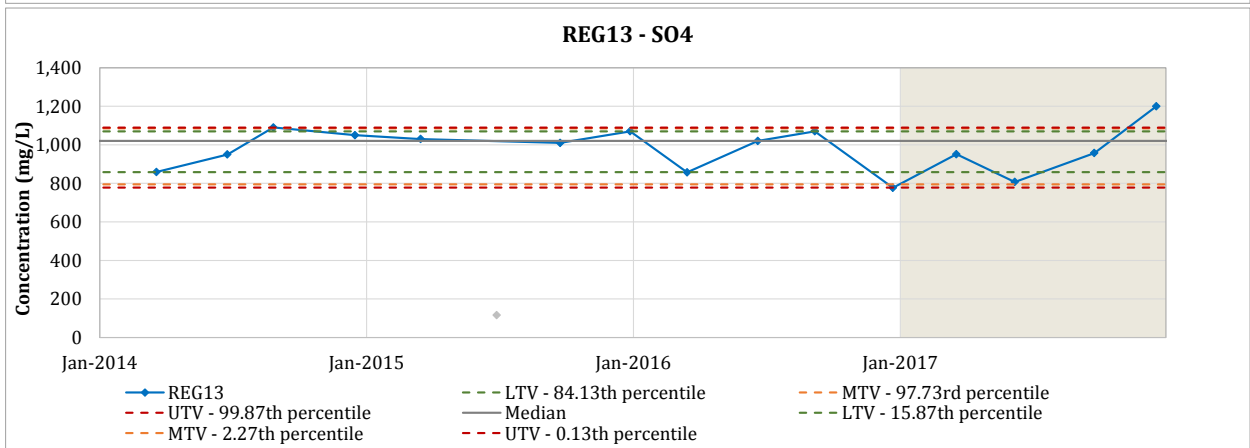
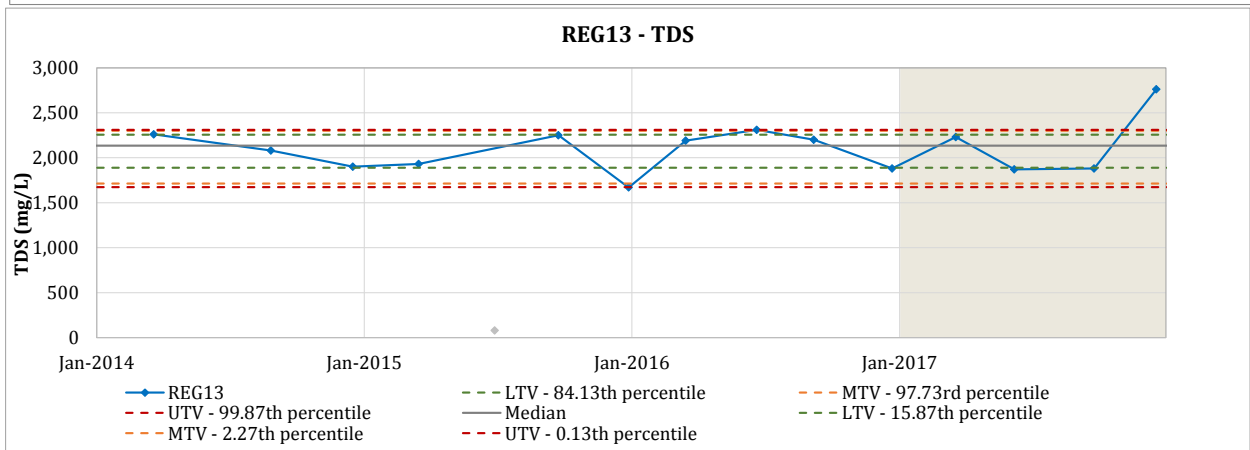
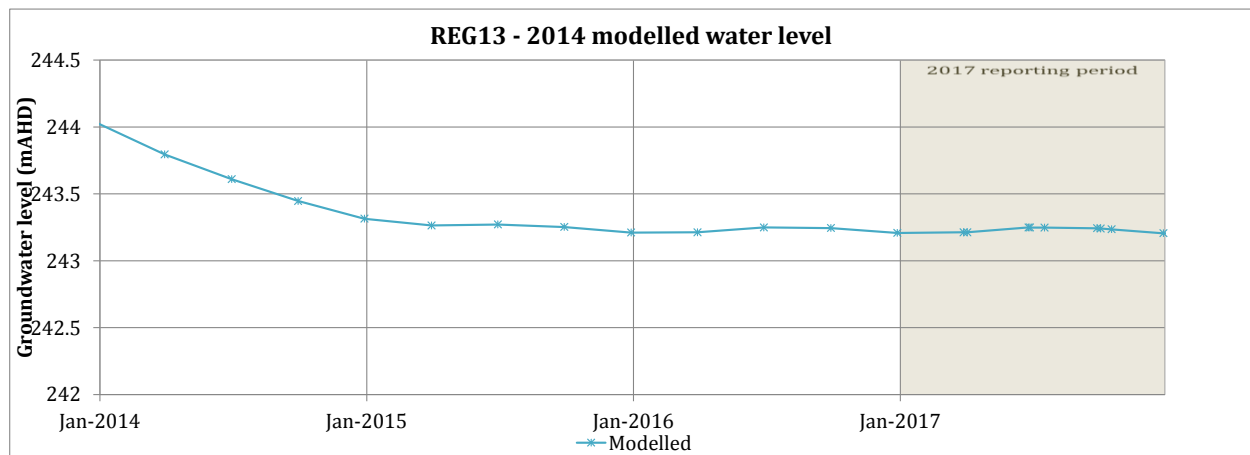
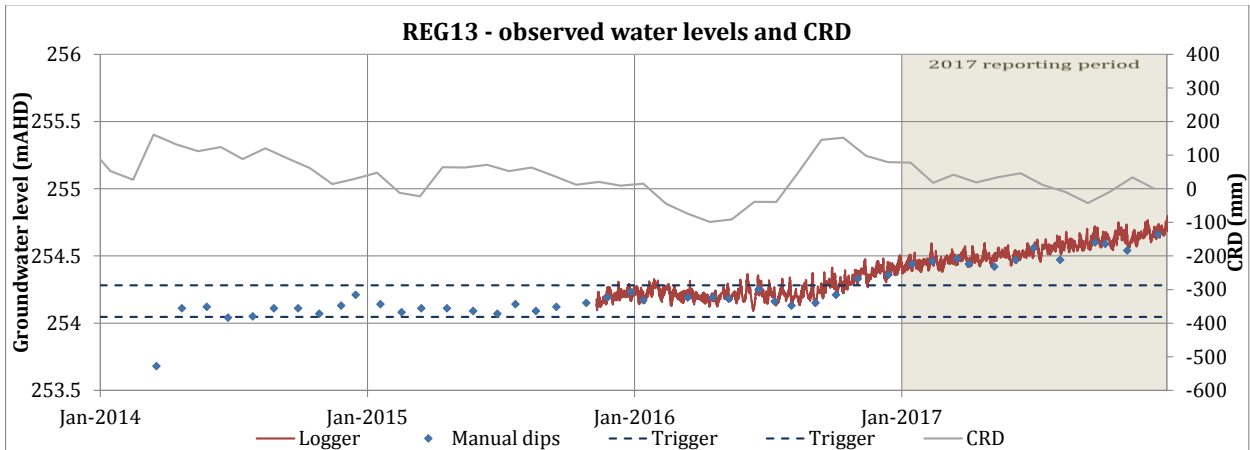
**Regional standpipe monitoring bores – water levels and water quality trigger parameters**

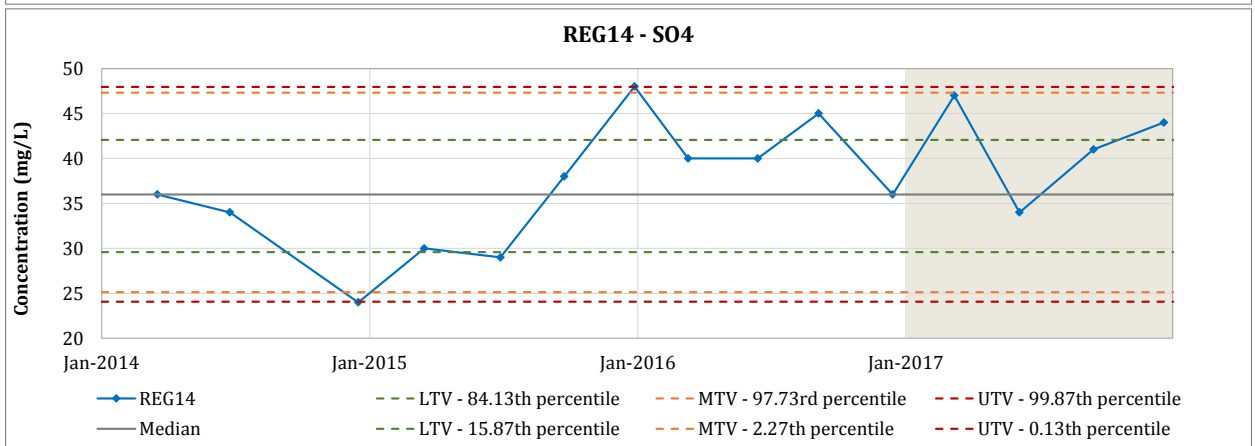
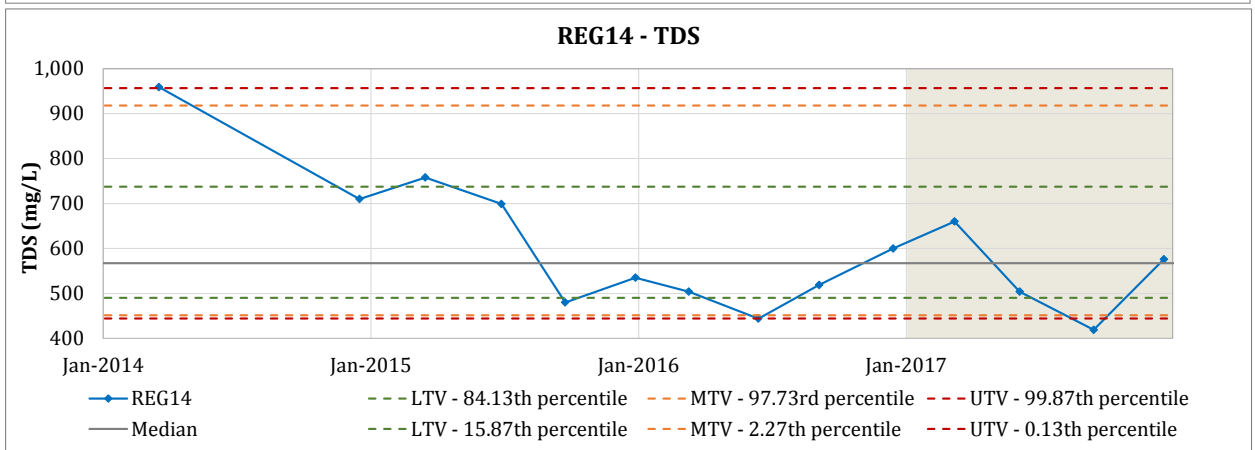
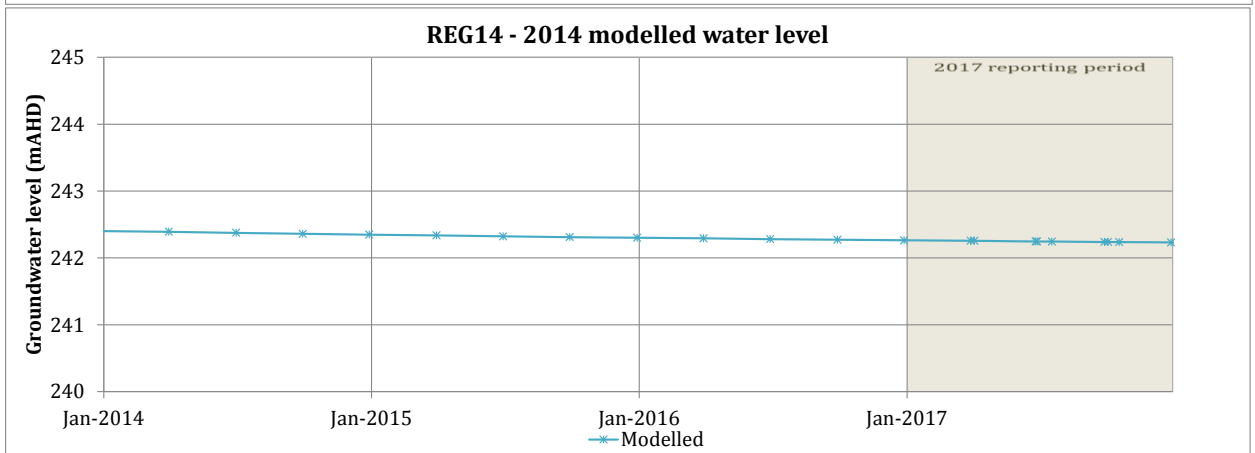
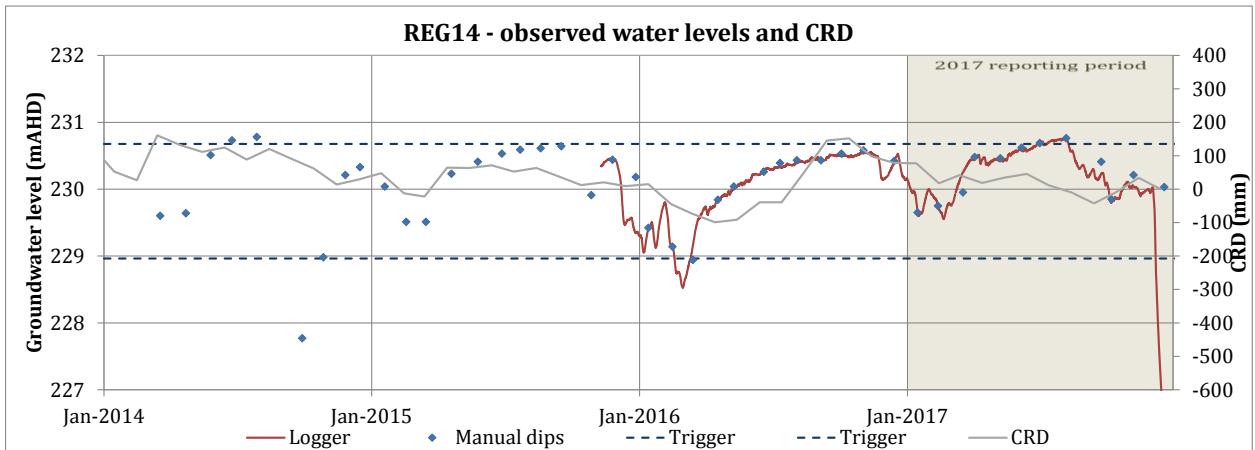


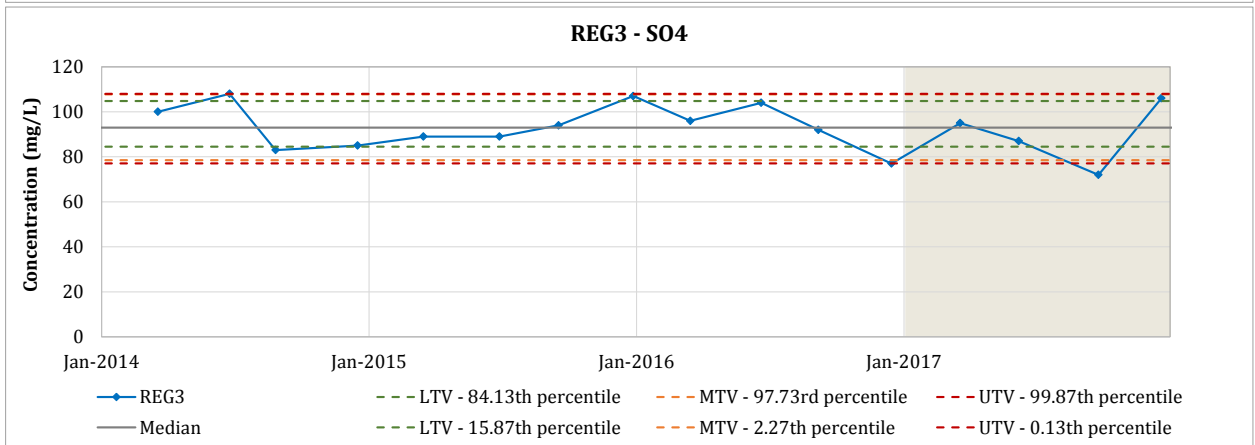
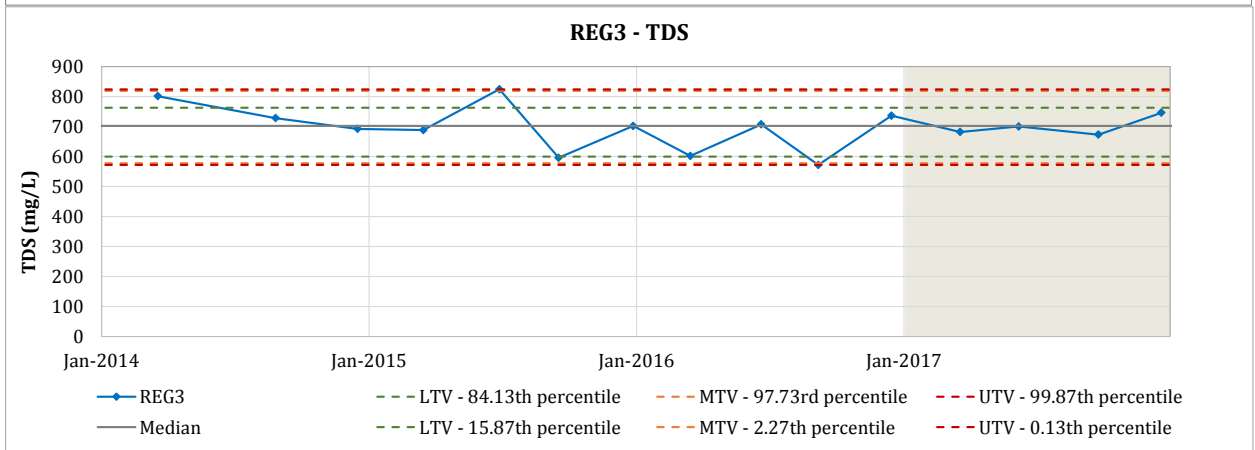
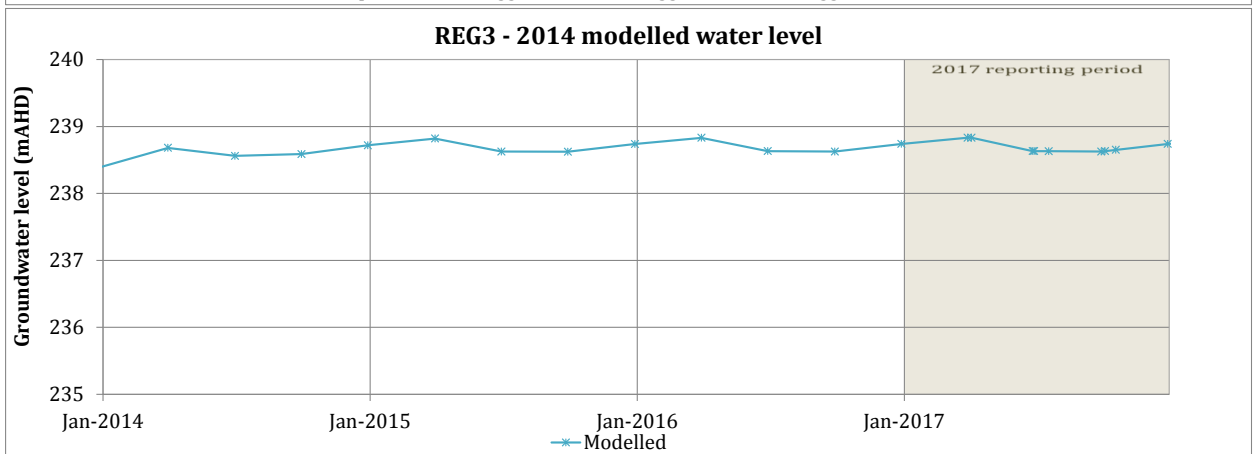
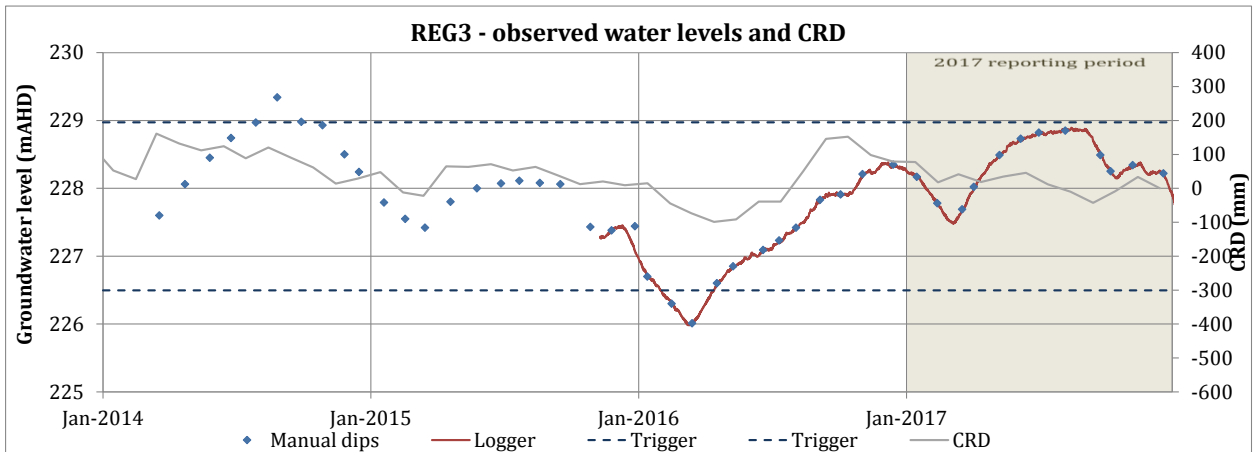


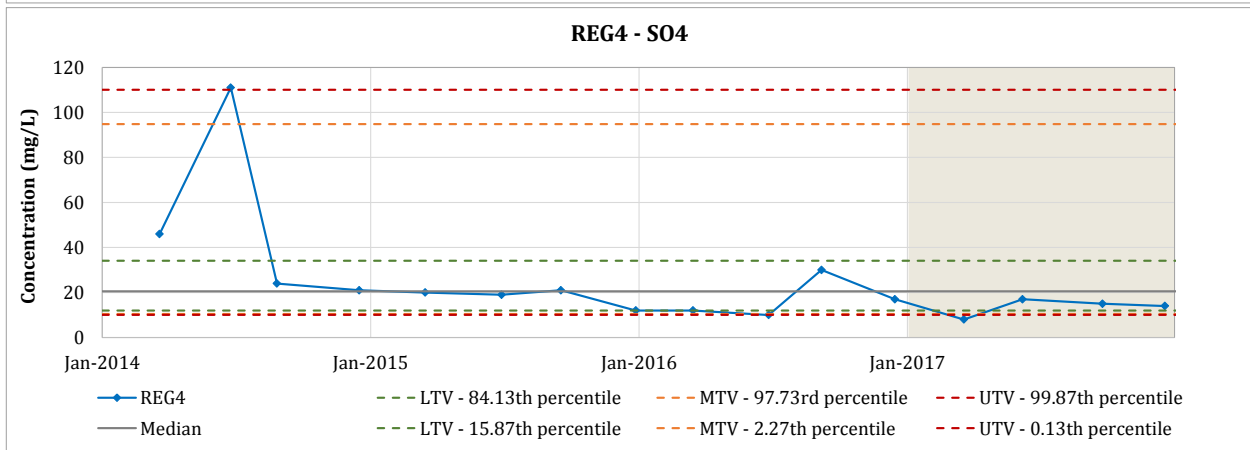
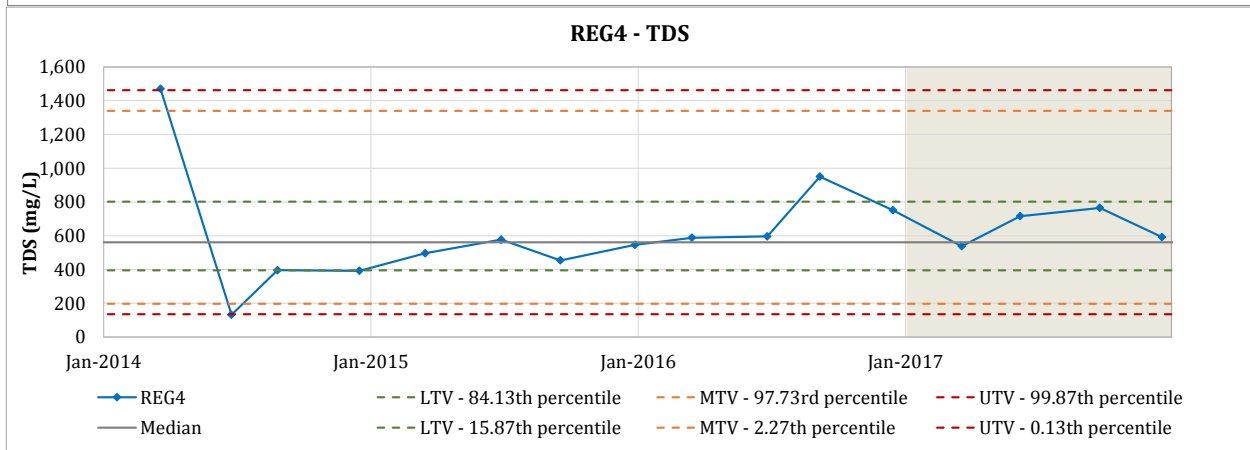
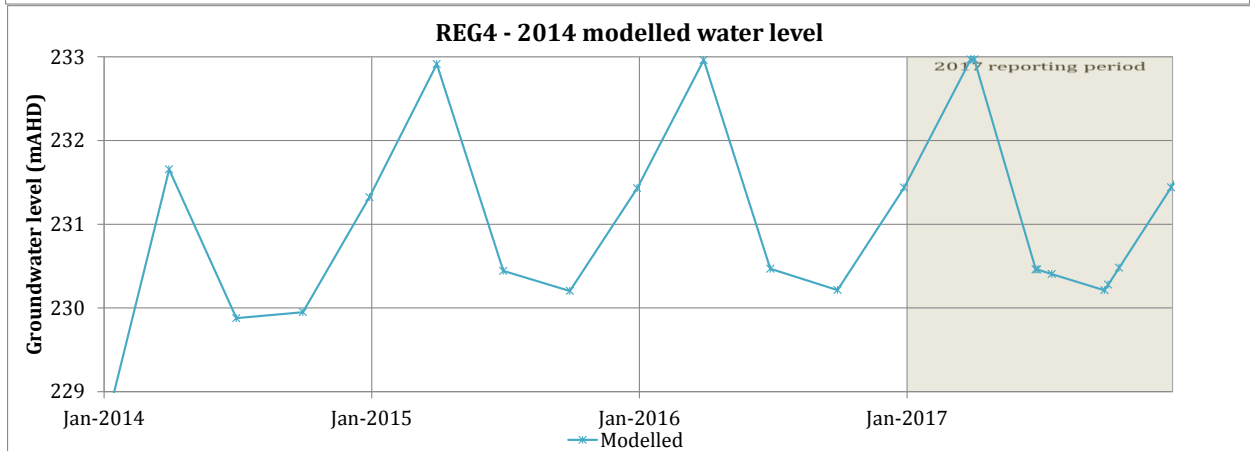
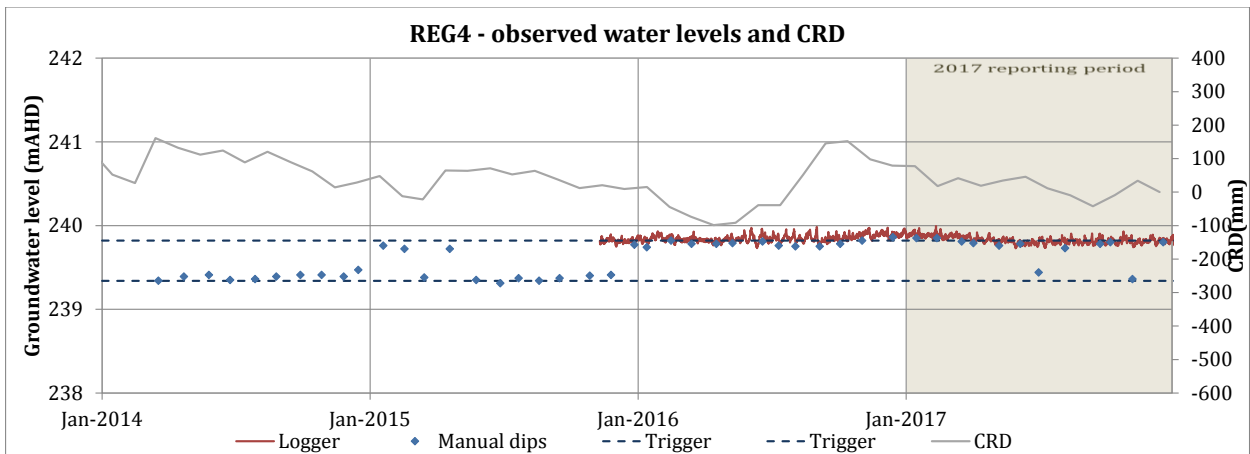


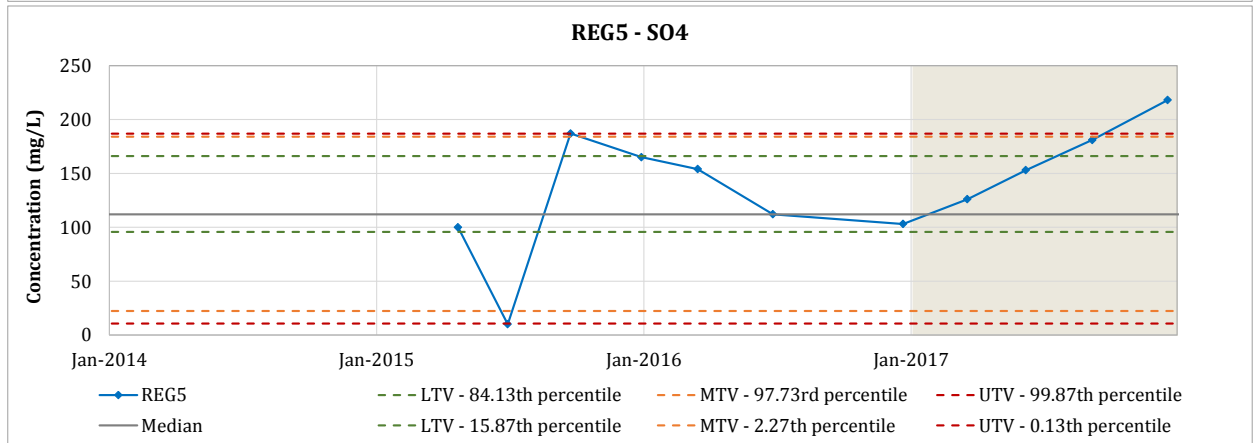
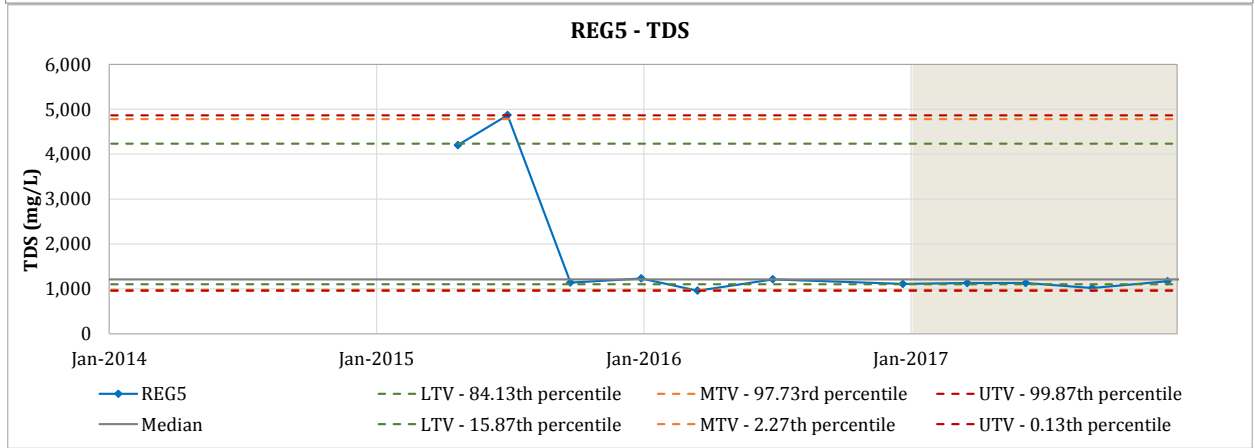
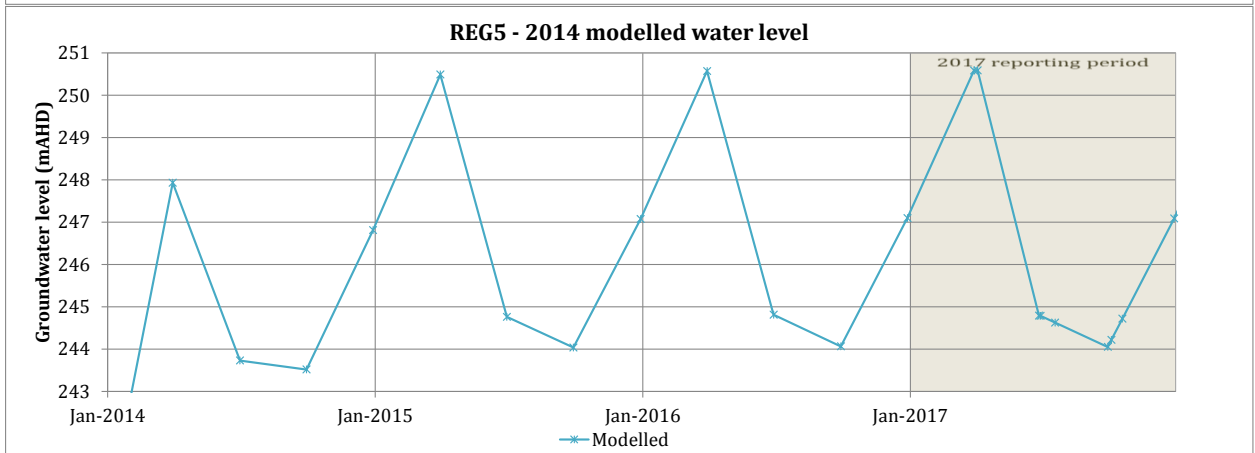
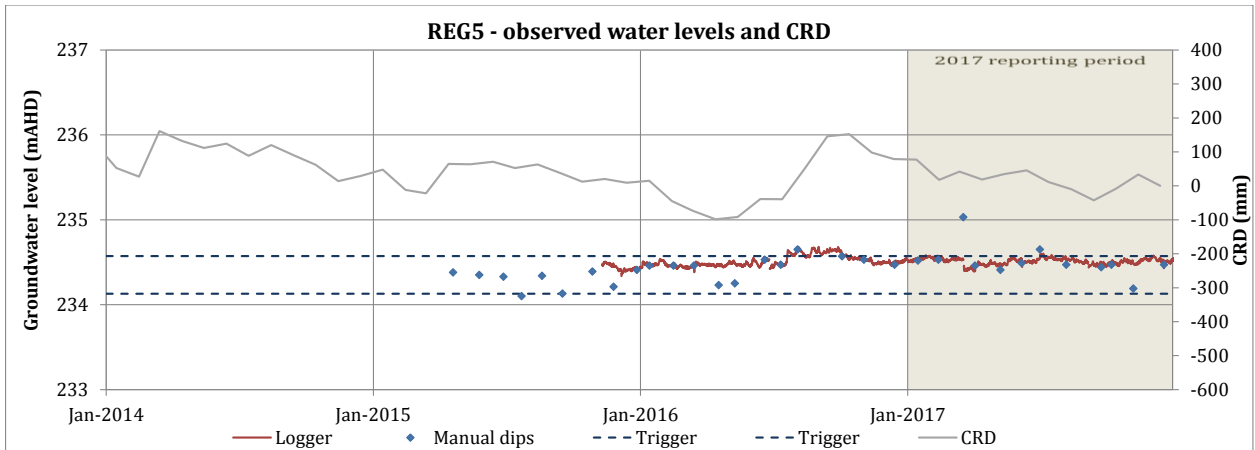




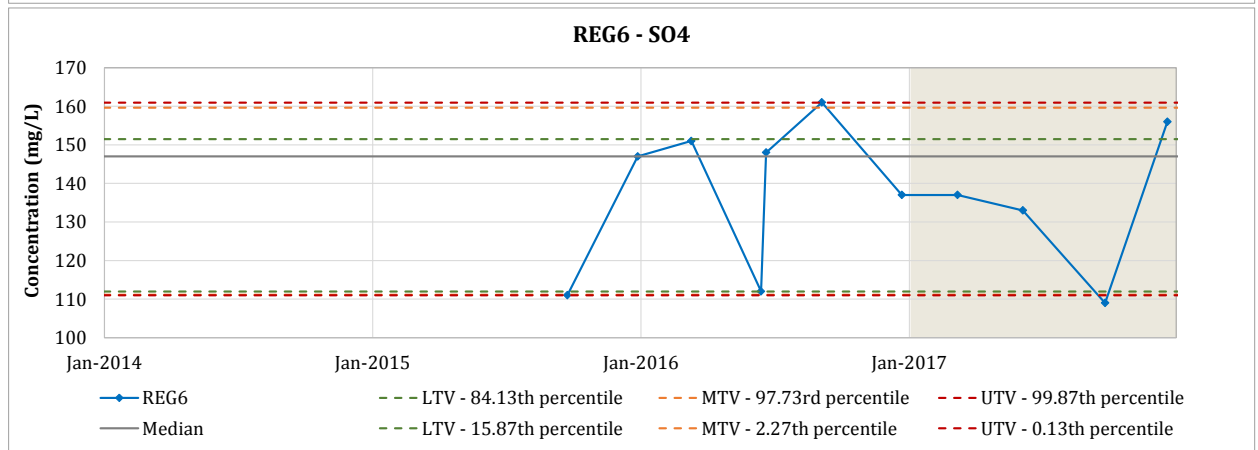
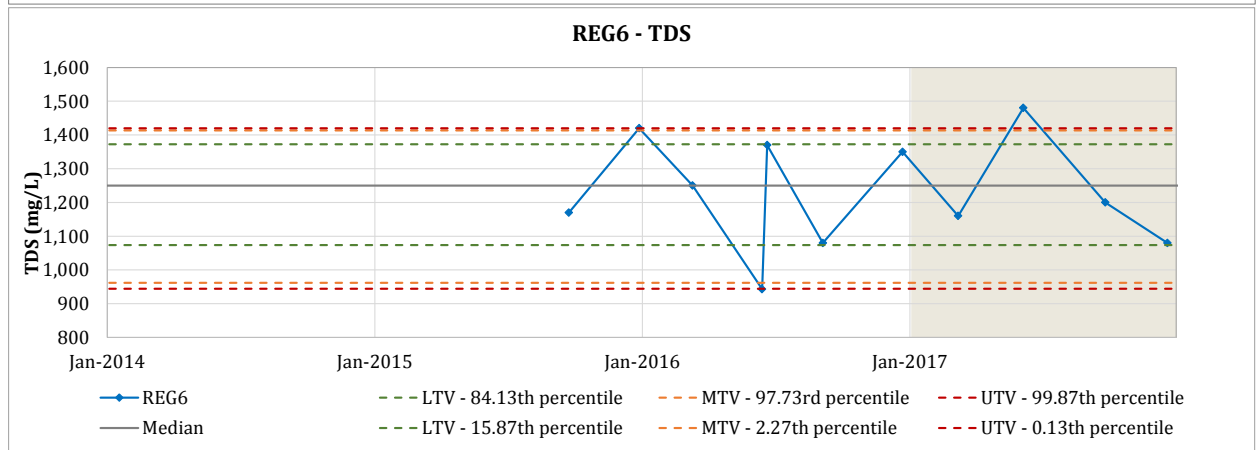
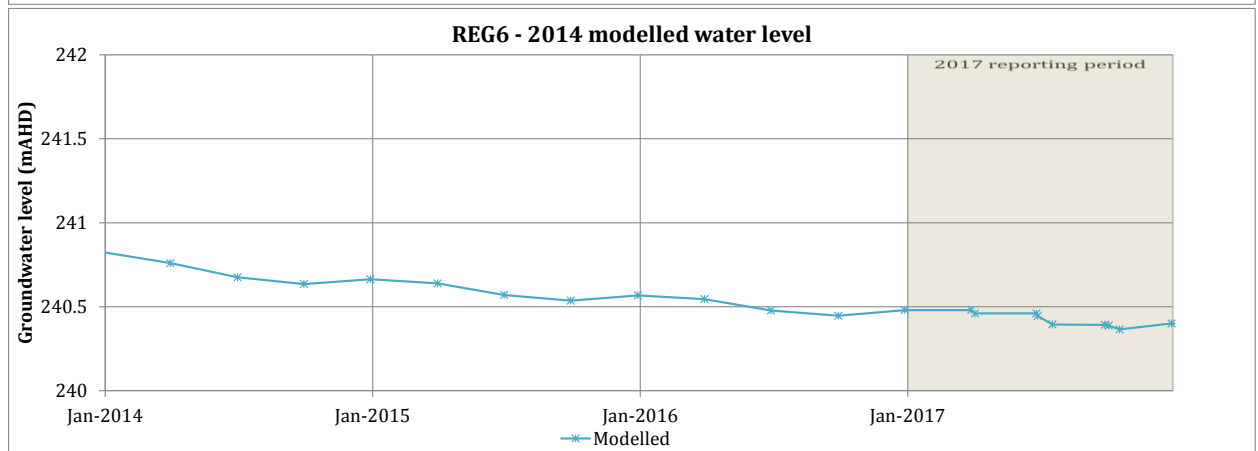
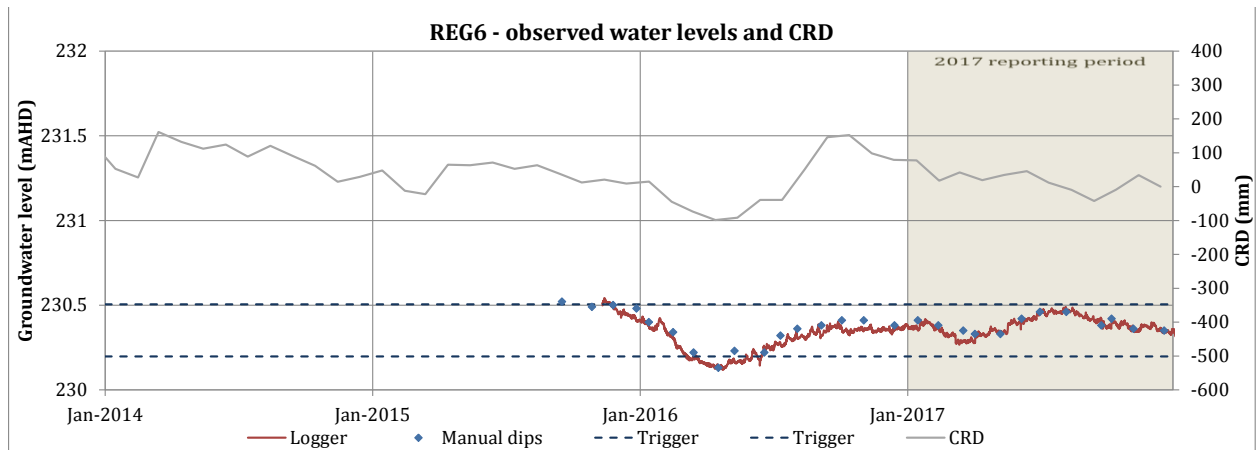


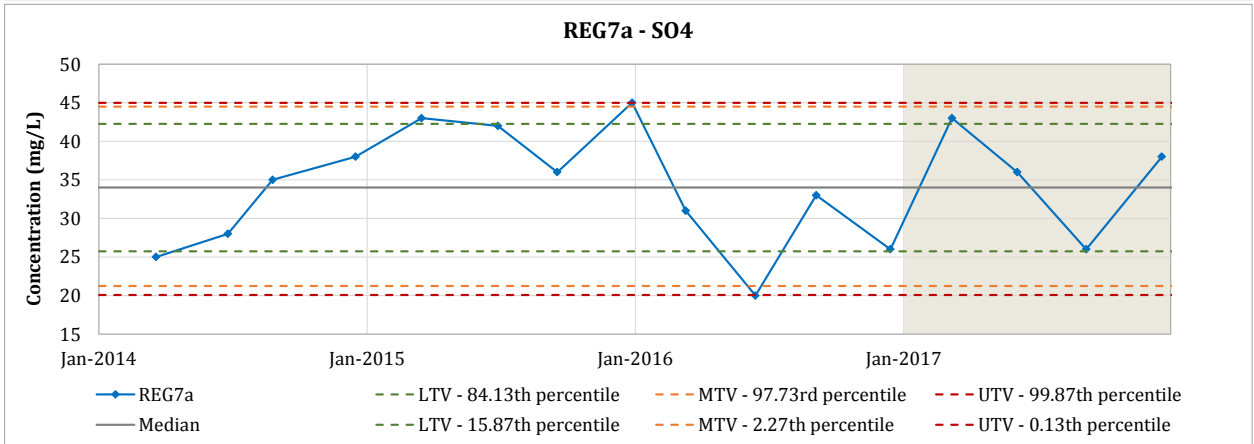
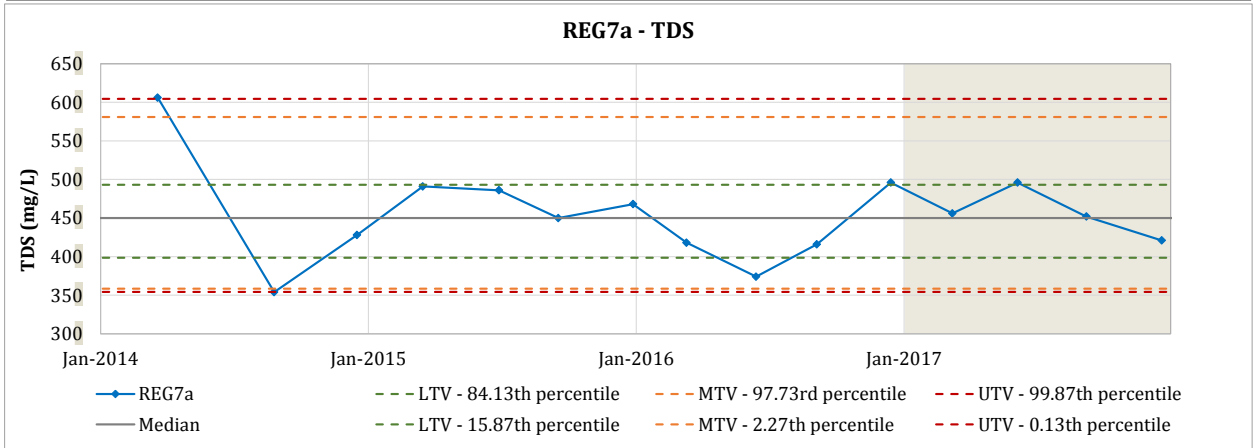
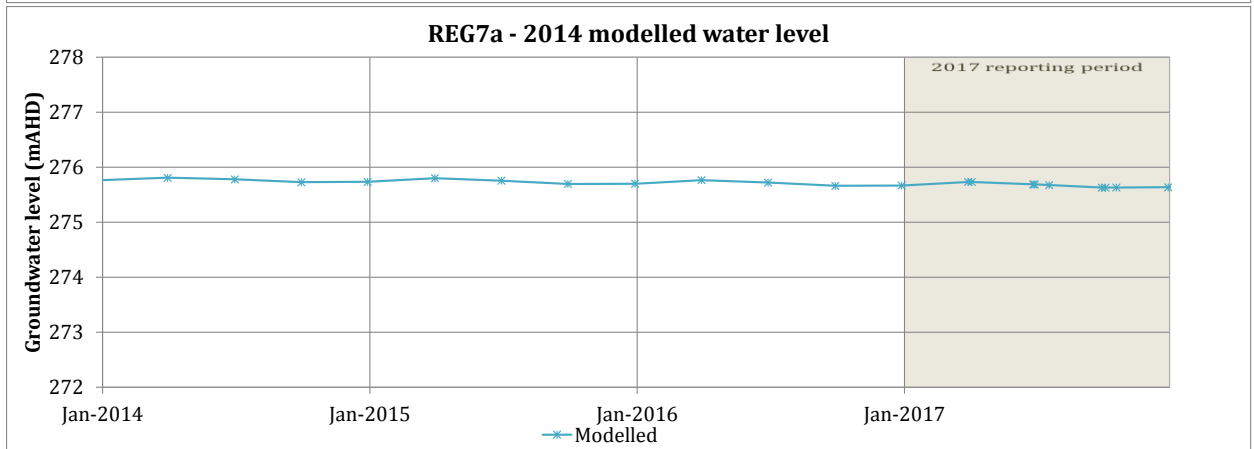
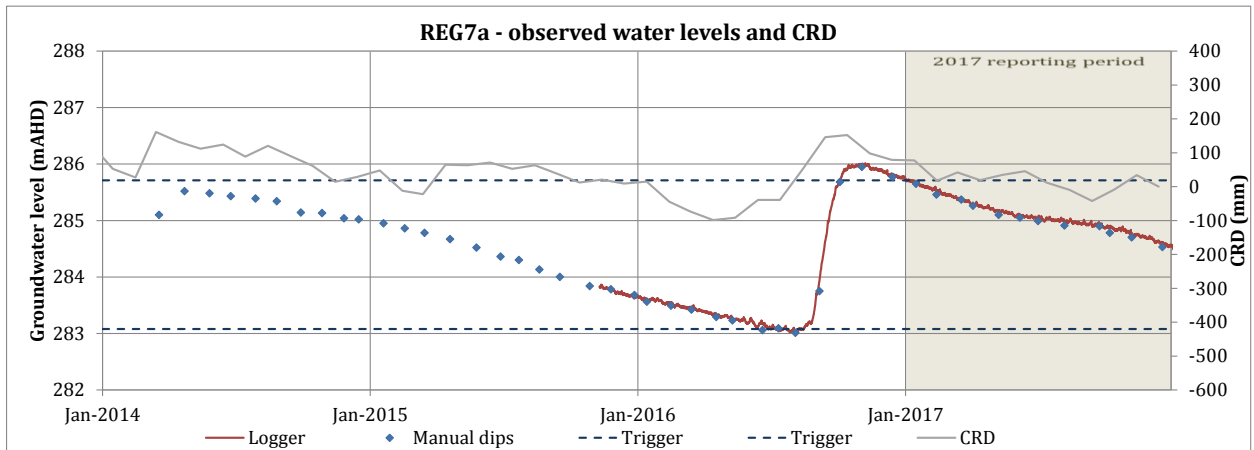




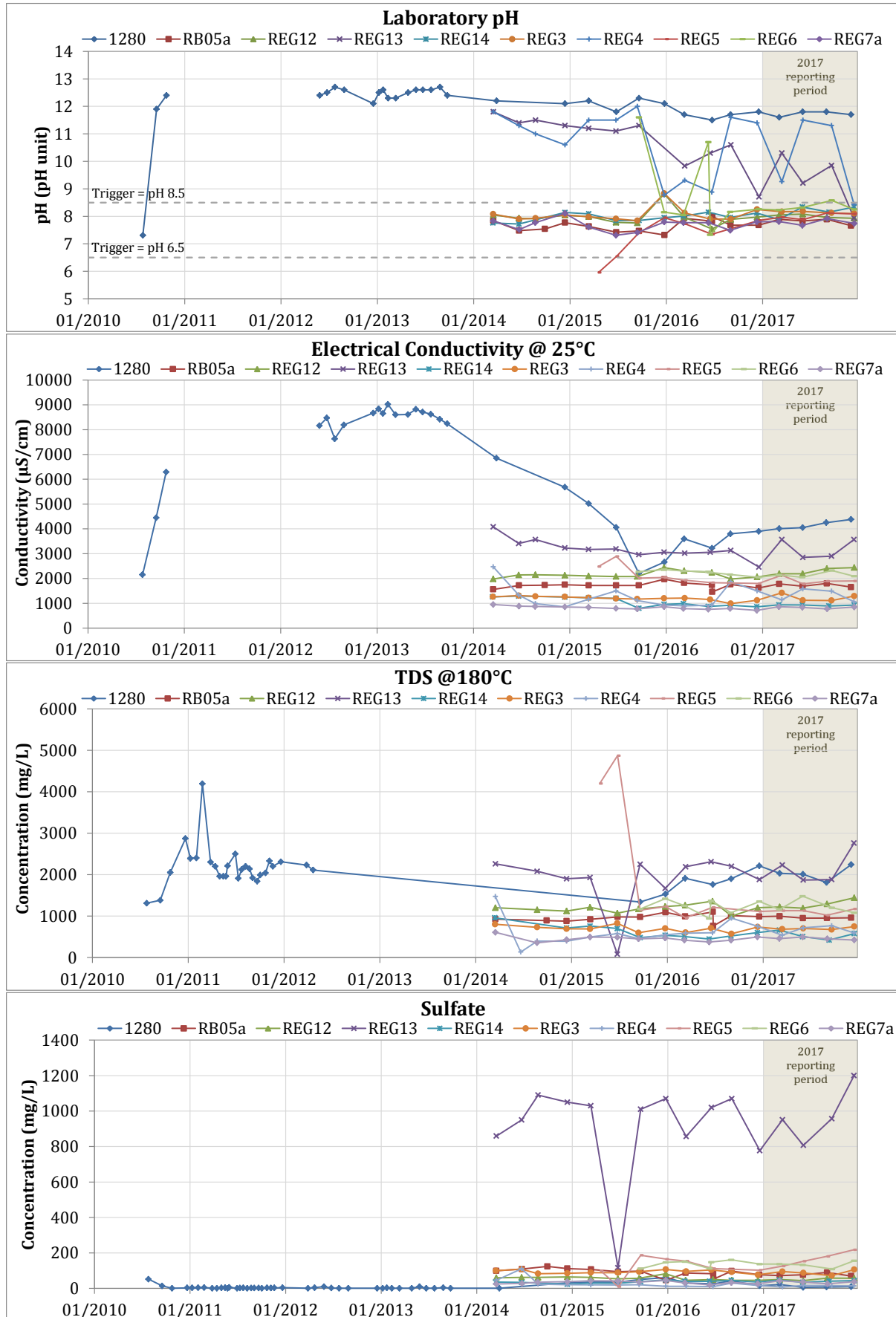




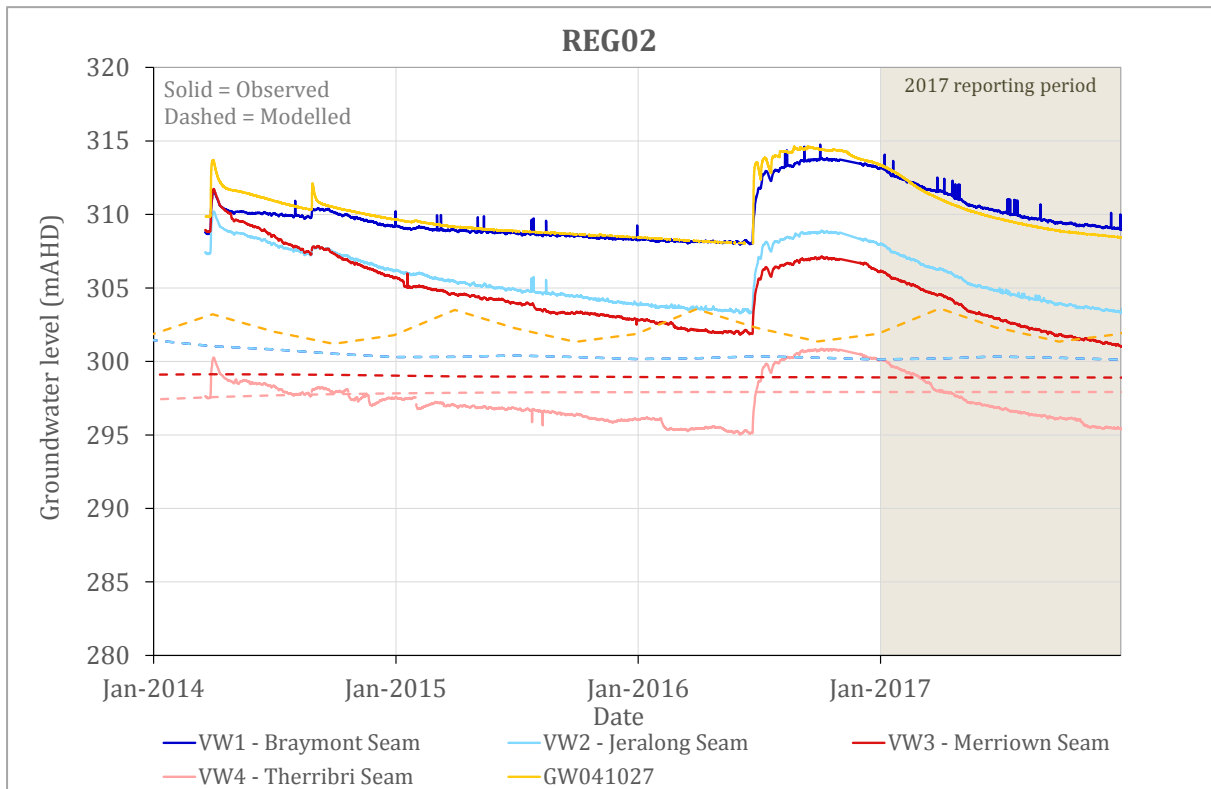
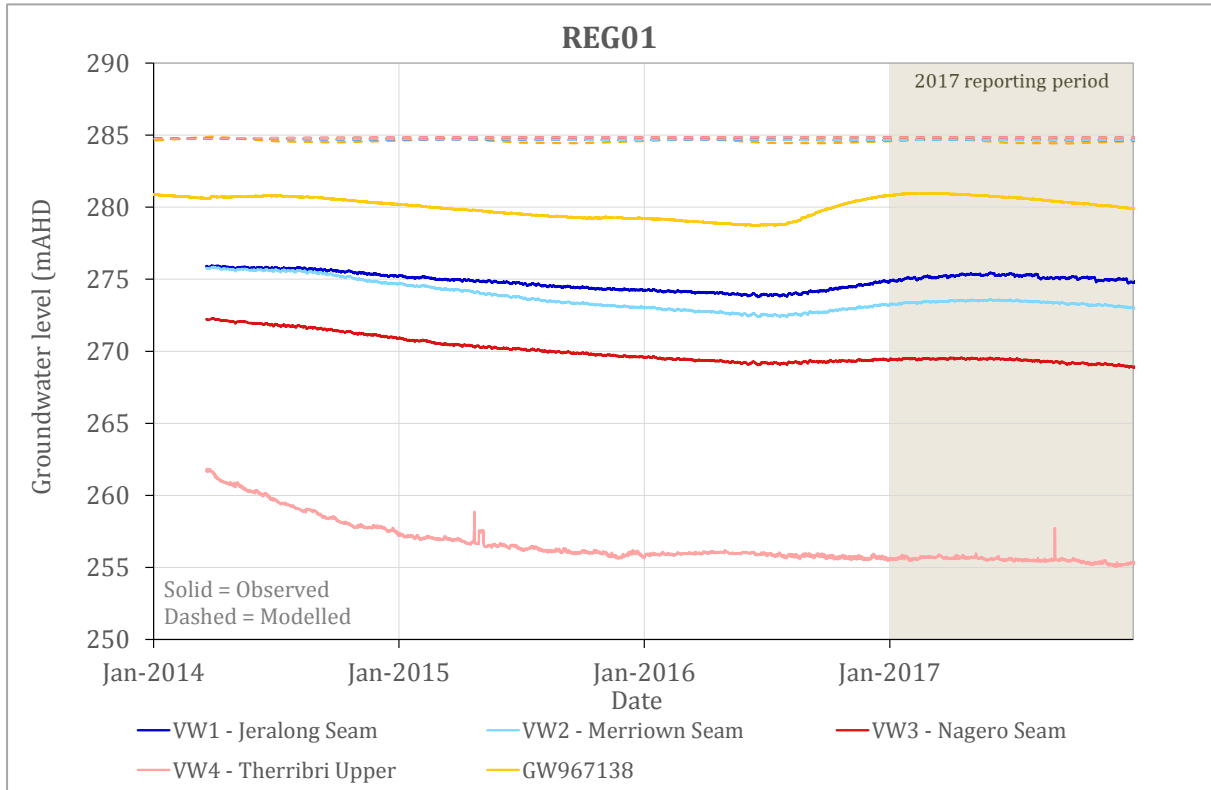


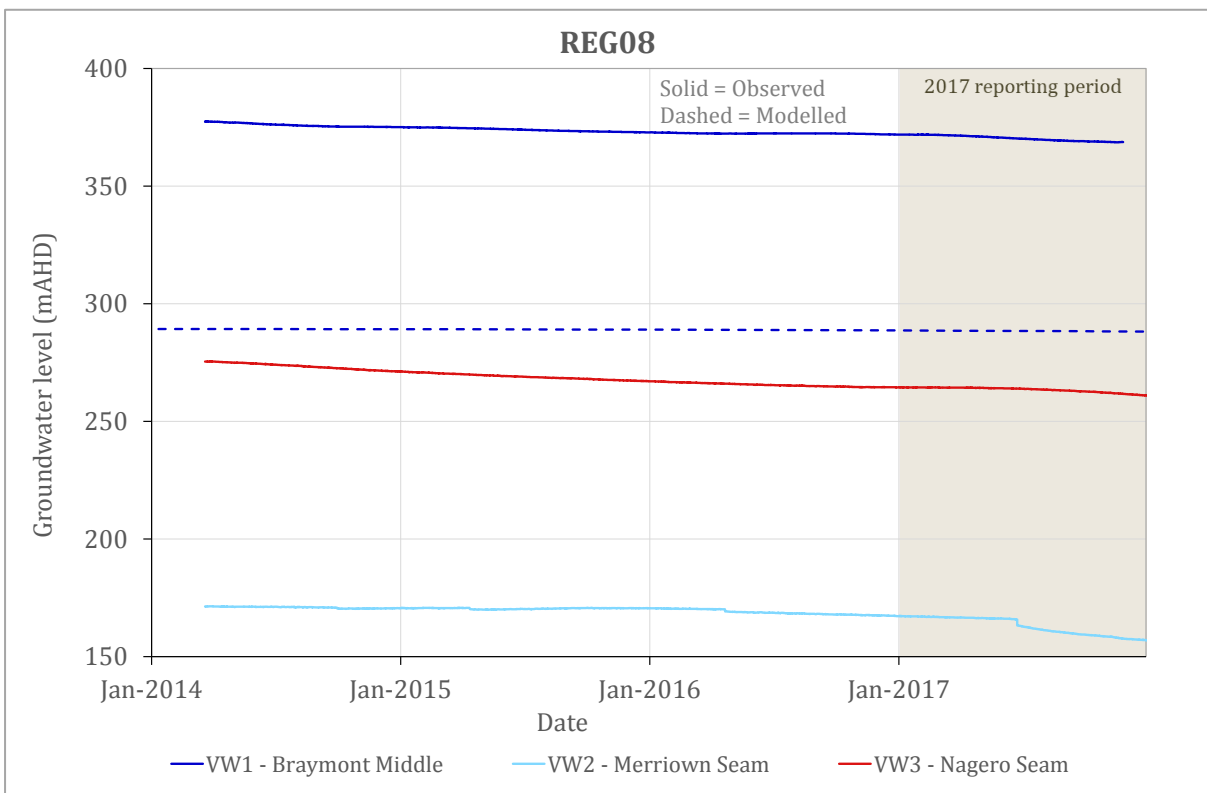
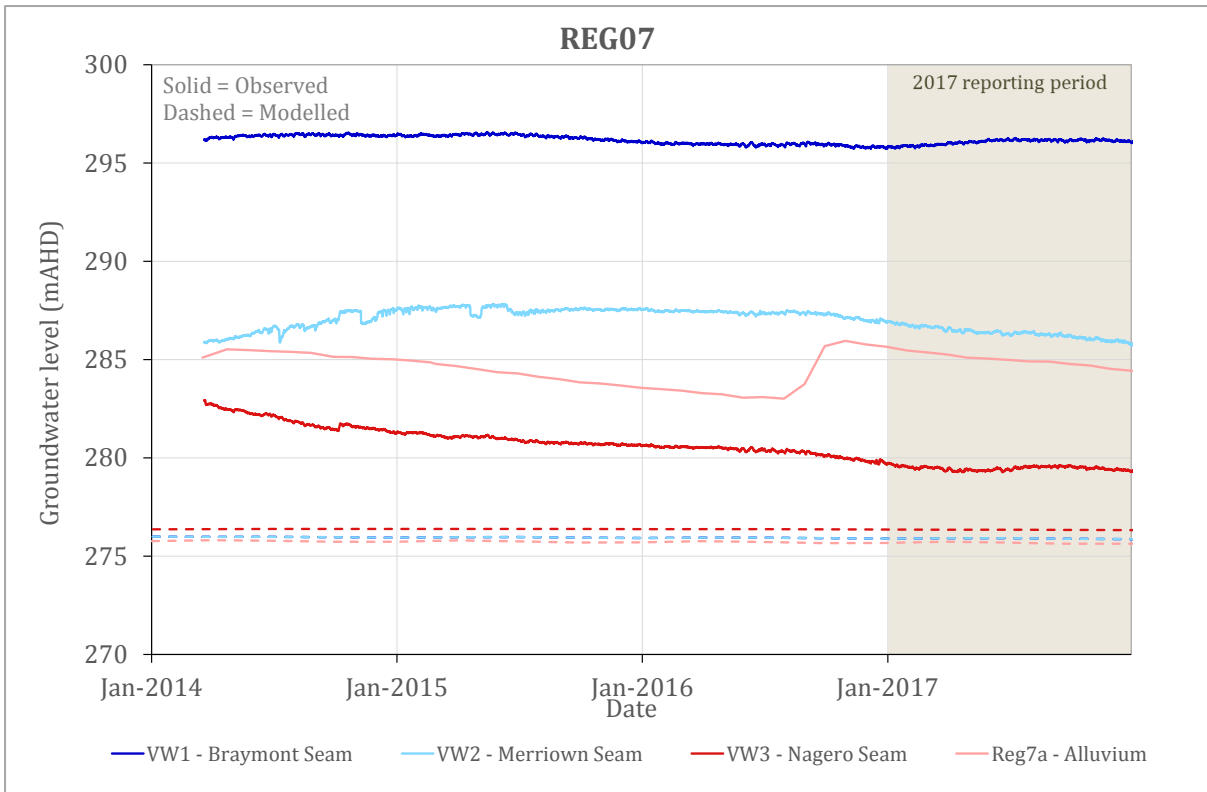


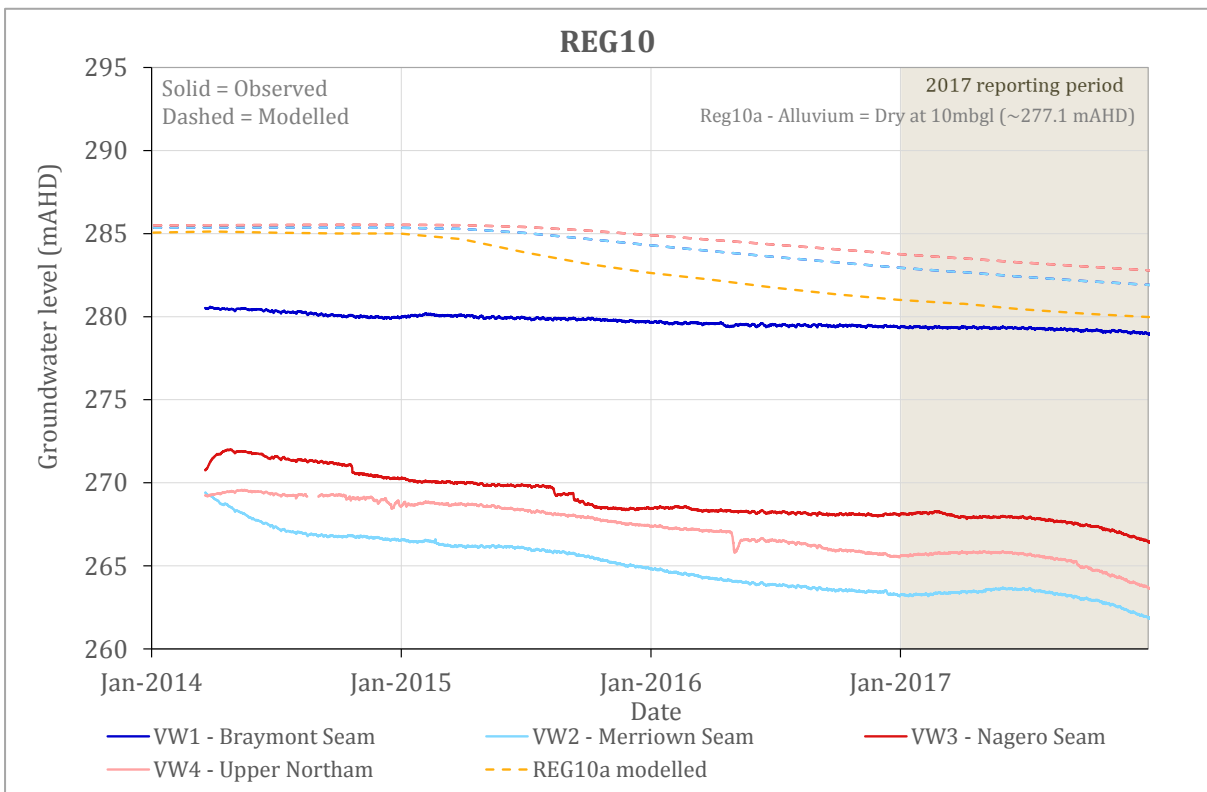
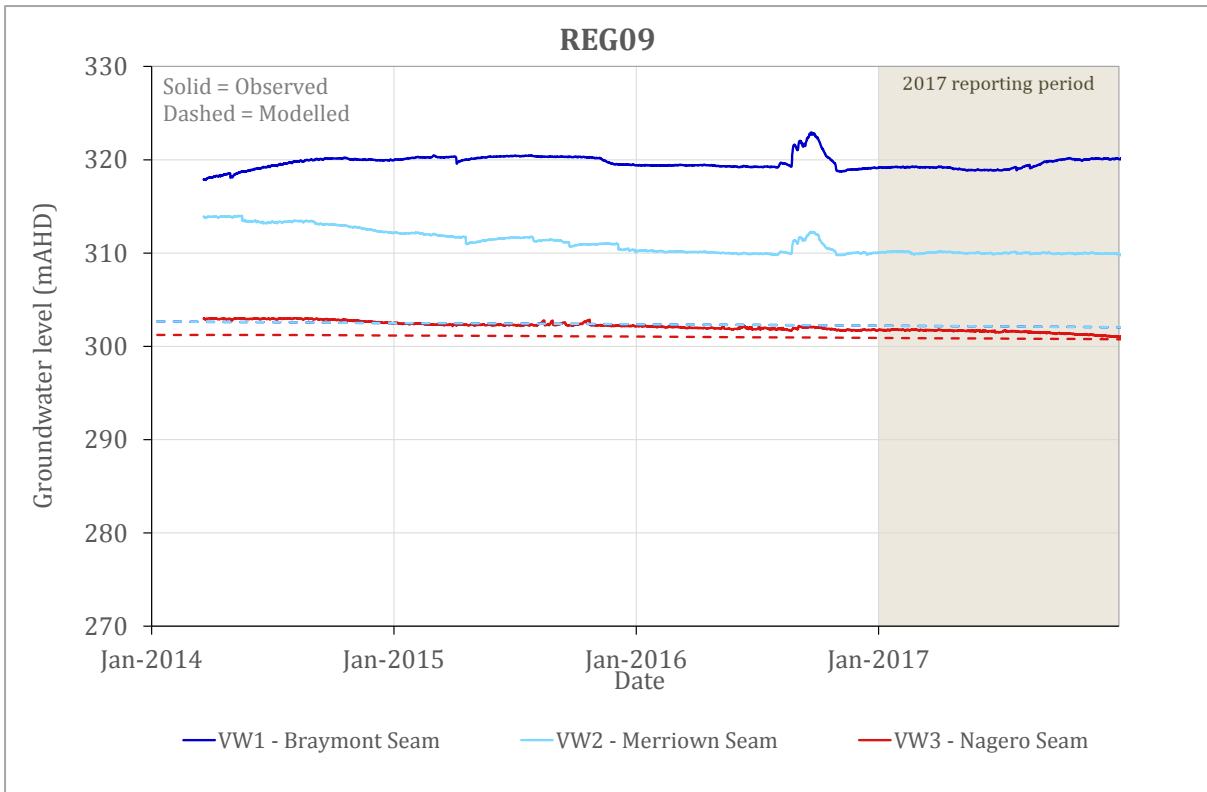
Regional standpipe monitoring bores – Individual water quality parameters



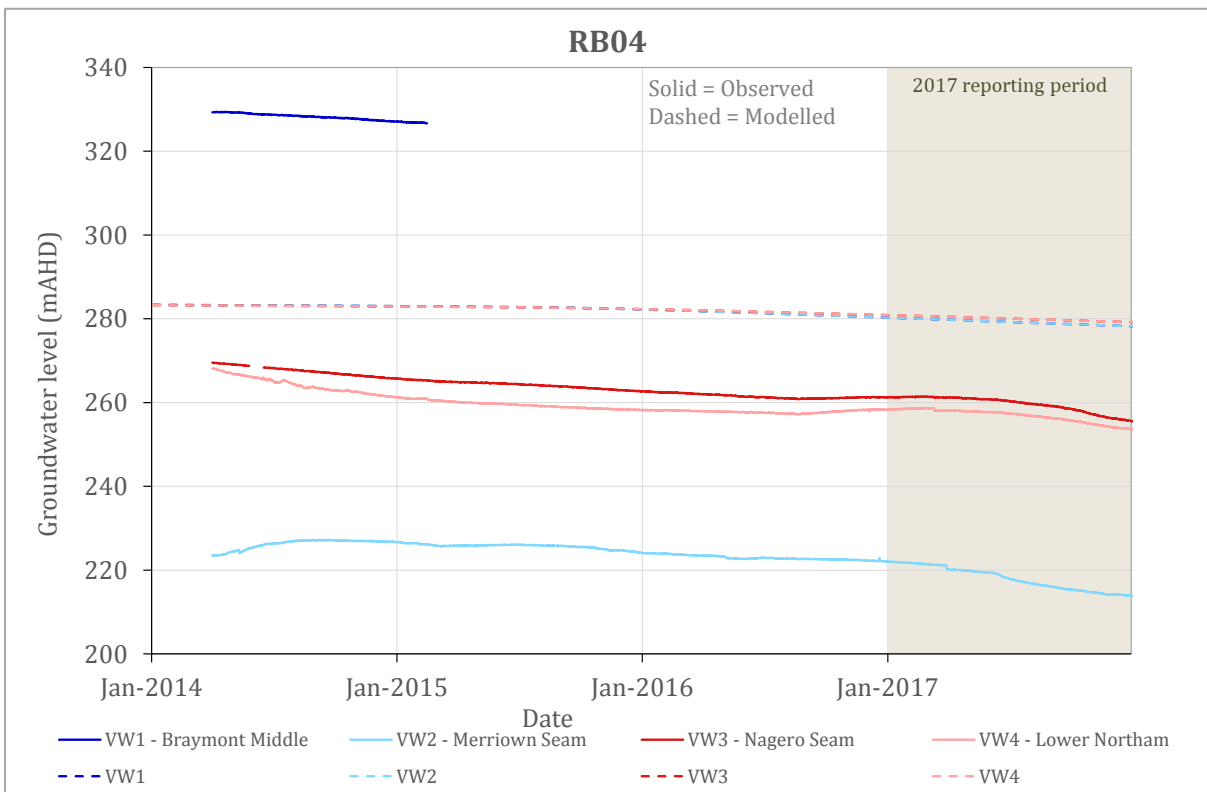
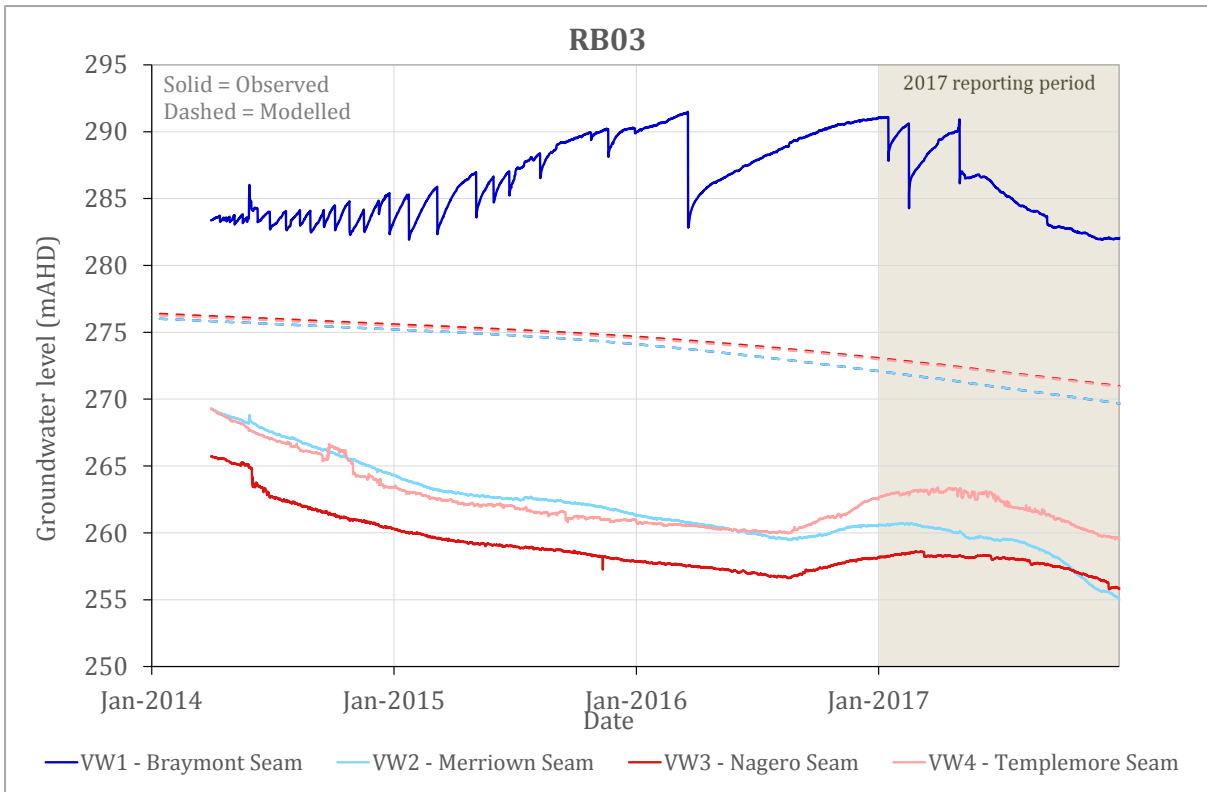
**Regional Vibrating Wire Piezometers - observed and modelled (2014) water levels**

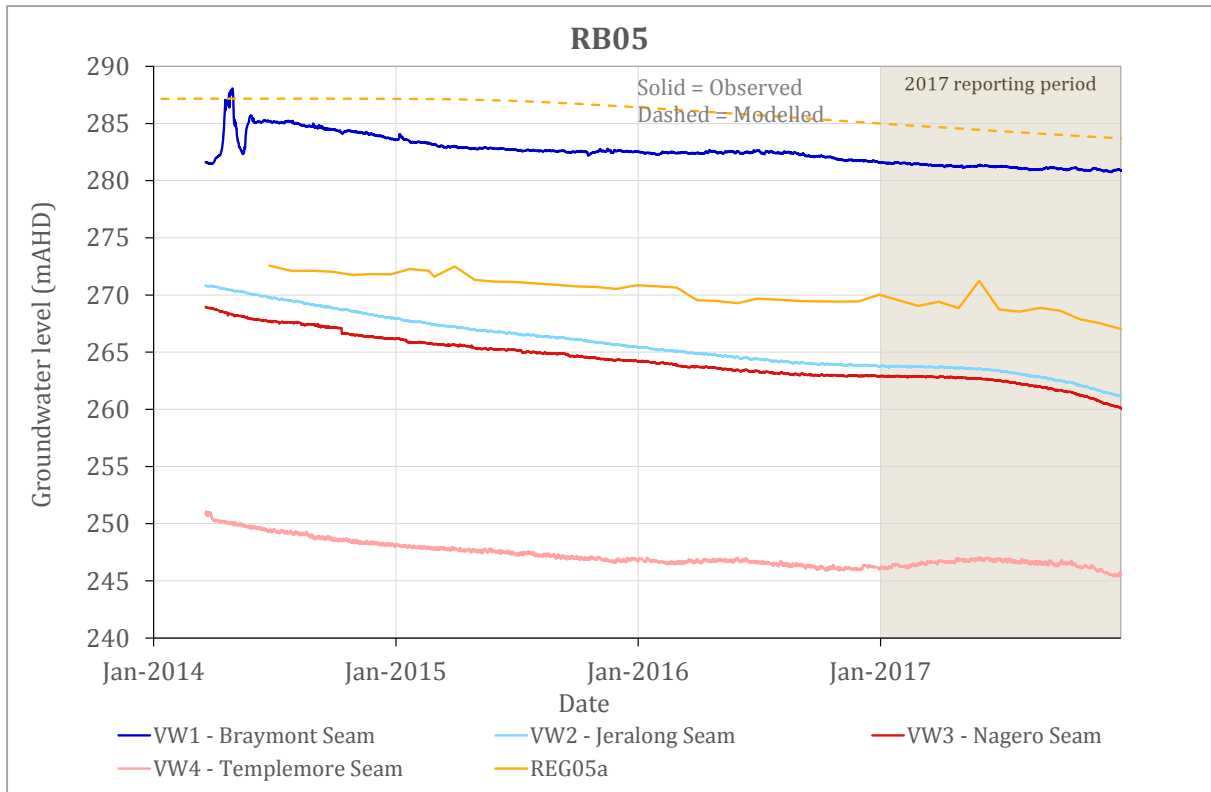




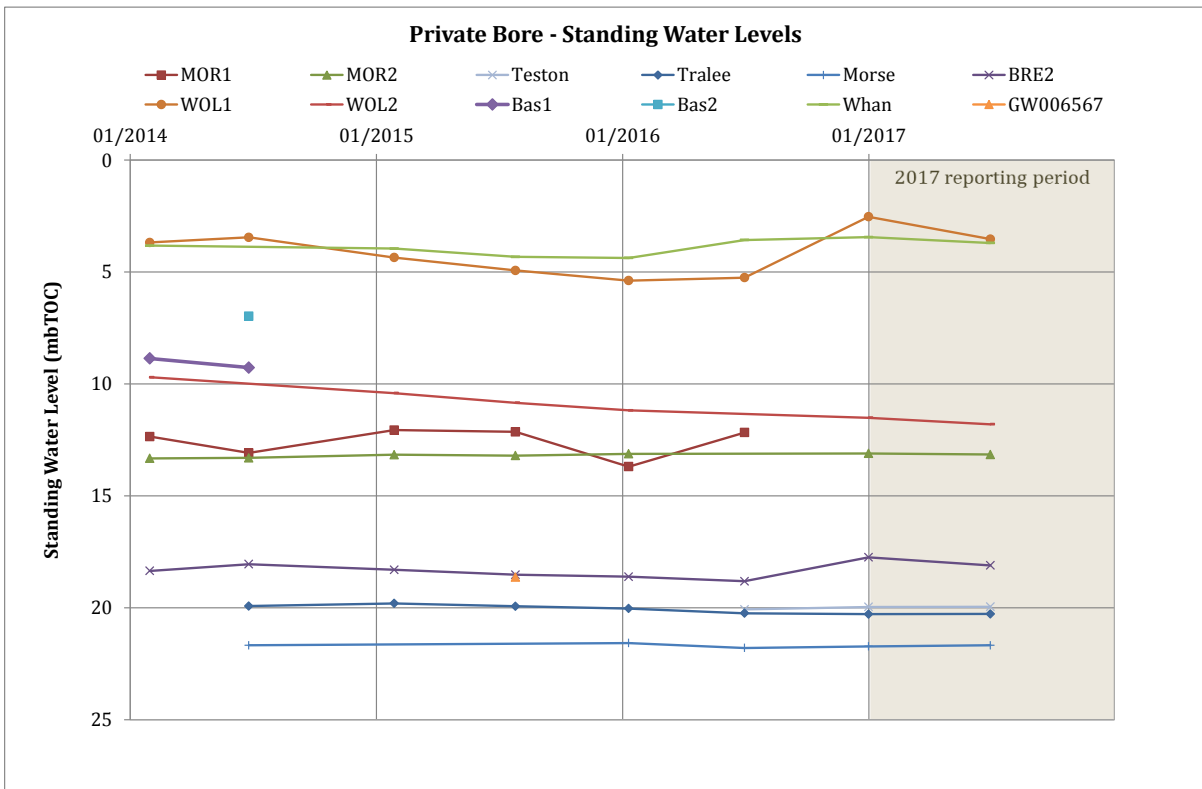




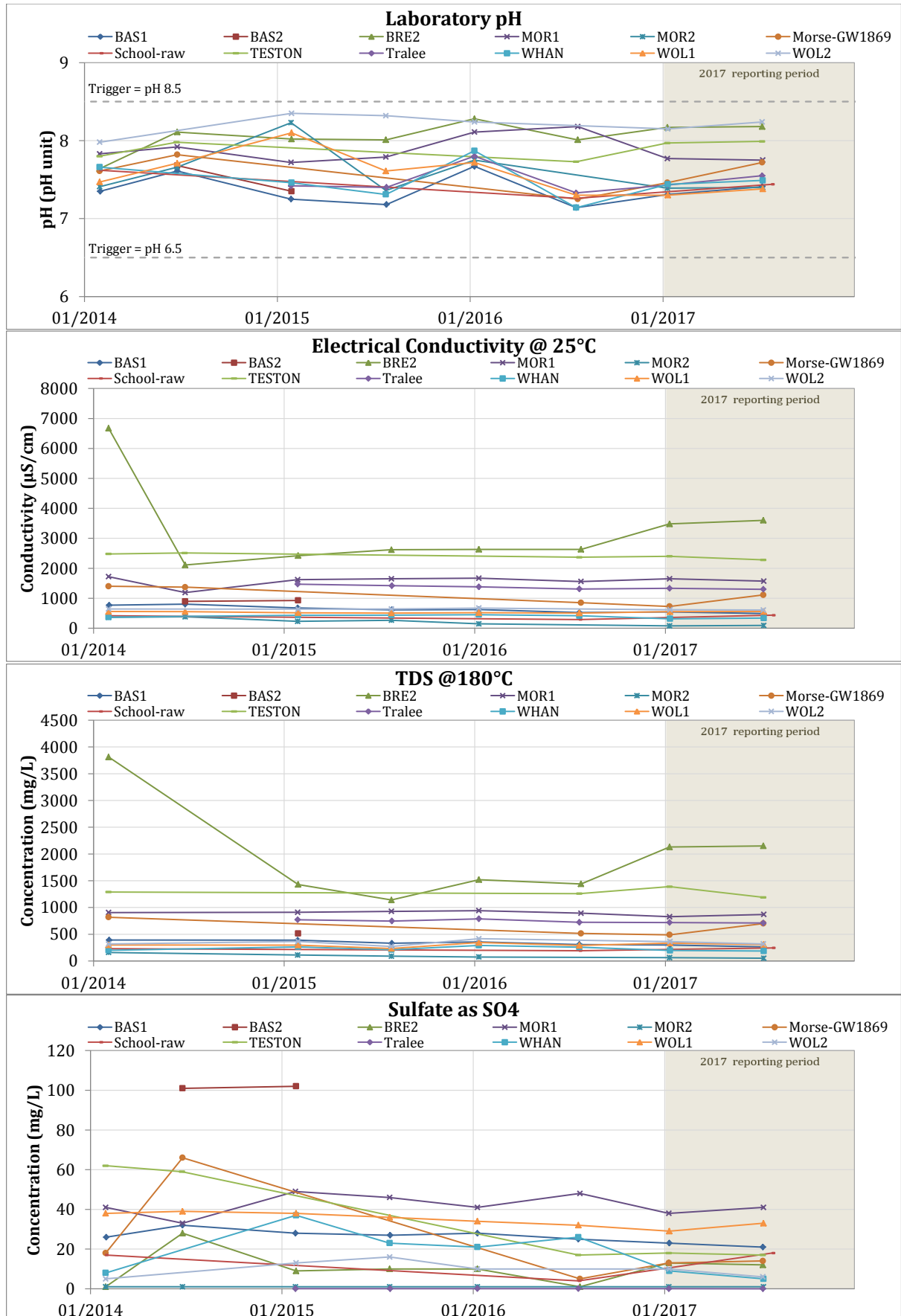


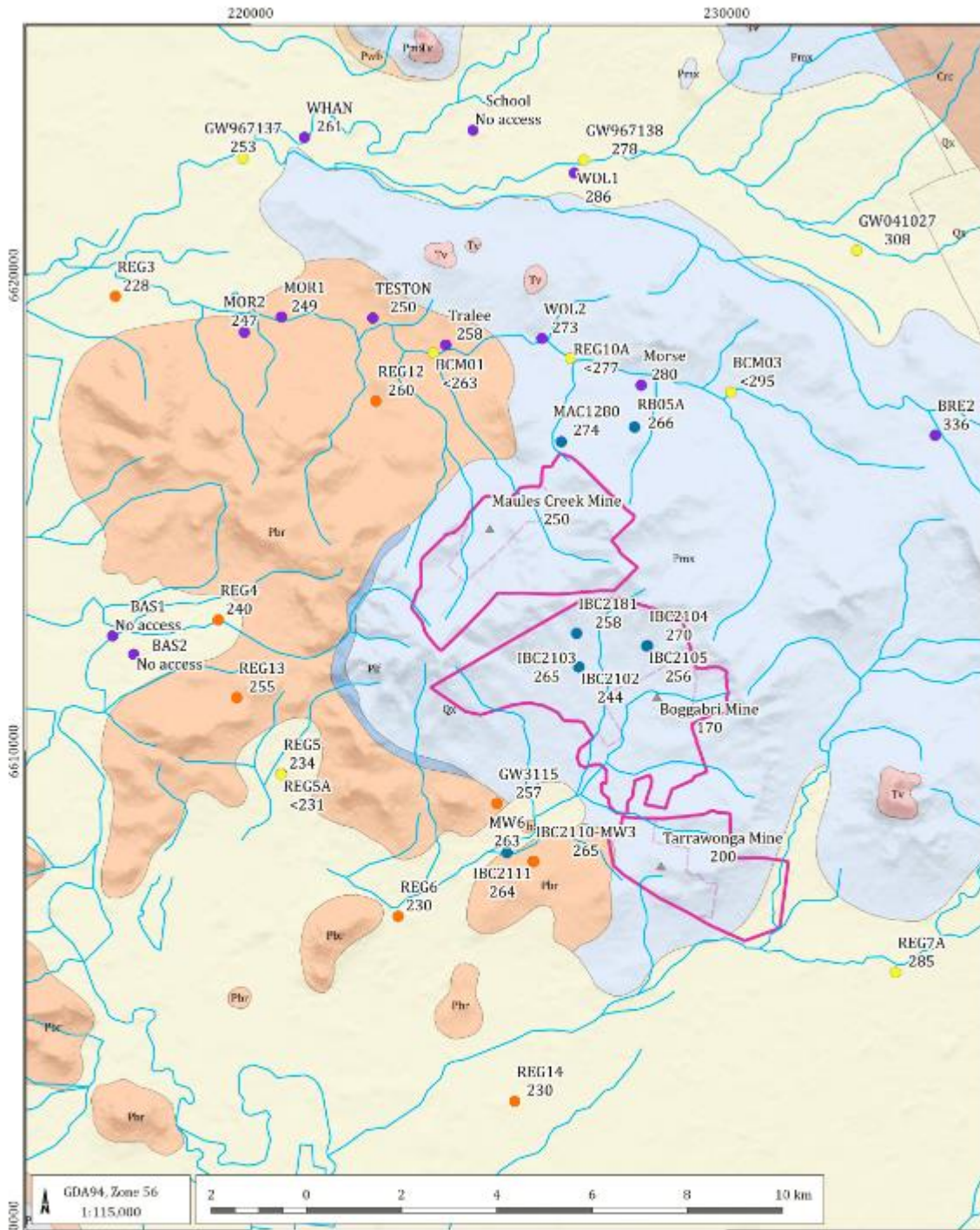


### Private Groundwater Bores – Water levels



**Private Groundwater Bores – Individual water quality parameters**





**Standpipe piezometer water levels - late 2017 (mAHD)**

- Private bore (TOC level estimated)
- Alluvium bore
- Private bore
- Approximate pit depths (2017)
- Drainage
- Mine maximum open cut pit outline

**Gunnedah Coalfield rock unit (1:100k)**

LEFT SYMB

- Tn - Tertiary Nandewar Volcanics
- Pps - Porcupine Formation
- Pmx - Maules Creek and Gombri formations
- Pwb - Weirrie Basalt
- ?Pbr - Boggabri Volcanics
- Clis - Lark Hill Formation

Maules Creek Mine 2017 Annual Review [G1850]  
**Approximate groundwater elevations in standpipe bores - late 2017**

DATE: 20/08/2018 FIGURE No: **E-1**

©2018 Australian Geoscientific and Environmental Consultants Pty Ltd (AGE) - www.ageconsultants.com.au  
Source: 1:50,000 SRM Derived DEM-5 - © Commonwealth of Australia (Geoscience Australia) 2011, GD01N7M T0F0 270K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006.  
G:\Projects\G1850\MaulesCk\_Annual\_review\_and\staircase\3\_CIS\Workspaces\999\_Working\G1850\DW\_level\_2017.apx