

MAULES CREEK COAL MINE

2019 ANNUAL REVIEW



Table 1 Annual Review Title Block

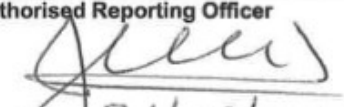
Name of Operation	Maules Creek Coal Mine
Name of Operator	Maules Creek Coal Pty Ltd
Development consent / Project Approval #	Project Approval 10_0138
Name of holder of development consent/project approval	Aston Coal 2 Pty Ltd.
Mining lease #	CL 375, ML1719 and ML1701.
Name of holder of mining lease	Maules Creek Coal JV which comprises: Aston Coal 2 Pty Ltd (75%), ICRA MC Pty Ltd (15%), J Power Australia Pty Ltd (10%)
Water Licence #	Refer to Water Licences in Table 1
Name of holder of water licence	Aston Coal 2 Pty Ltd, ICRA MC Pty Ltd, J Power Australia Pty Ltd
MOP/ RMP start date	November 2018
MOP/RMP end date	January 2023
Annual Review Commencement Date	1 January 2019
Annual Review Completion Date	31 December 2019
I, Jorge Moraga, certify that this audit report is a true and accurate record of the compliance status of Maules Creek Coal Mine for the period 1 January 2019 to 31 December 2019, and that I am authorised to make this statement on behalf of Maules Creek Coal Pty Ltd. Note. 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. 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).	
Name of Authorised Reporting Officer	Jorge Moraga
Title of Authorised Reporting Officer	General Manager
Signature	
Date	31/03/2020

TABLE OF CONTENTS

1	STATEMENT OF COMPLIANCE	1
2	INTRODUCTION	4
2.1	PROJECT BACKGROUND AND DESCRIPTION.....	4
2.2	MINE CONTACTS	5
3	APPROVALS	8
4	OPERATIONS SUMMARY	12
4.1	EXPLORATION ACTIVITIES	12
4.2	CONSTRUCTION	12
4.3	MINING OPERATIONS	12
4.4	COAL HANDLING AND PROCESSING.....	13
4.5	OTHER OPERATIONS.....	13
4.6	NEXT REPORTING PERIOD	13
5	ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW.....	14
6	ENVIRONMENTAL PERFORMANCE	14
6.1	METEOROLOGICAL MONITORING	14
6.2	AIR QUALITY	16
6.3	GREENHOUSE GAS.....	24
6.4	NOISE.....	25
6.5	BLAST.....	29
6.6	BIODIVERSITY	32
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
7	WATER MANAGEMENT	44
7.1	WATER SUPPLY	44
7.2	SURFACE WATER MANAGEMENT.....	45
7.3	GROUNDWATER.....	51
7.4	SITE WATER BALANCE	59

8	REHABILITATION.....	60
8.1	REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD	60
9	COMMUNITY.....	65
9.1	COMMUNITY ENGAGEMENT ACTIVITIES	65
9.2	COMMUNITY CONTRIBUTIONS & INITIATIVES	65
9.3	COMMUNITY COMPLAINTS	68
10	INDEPENDENT AUDITS.....	69
10.1	INDEPENDENT REHABILITATION AUDIT	69
10.2	INDEPENDENT ENVIRONMENTAL AUDIT	73
11	INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD	78
11.1	NON-COMPLIANCES	78
11.2	REPORTABLE INCIDENTS OR EXCEEDANCES	79
11.3	REGULATORY ACTIONS.....	79
12	ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD.....	79

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.....	8
Table 6 Production Summary.....	12
Table 7 Coal Transport.....	13
Table 8 Deposited Dust Monitoring Results.....	19
Table 9 Summary of Blasting Results.....	30
Table 10 Traffic Survey Results.....	42
Table 11 Water Take For the 2018-2019 Water Year	44
Table 12 Groundwater Trigger Events.....	56
Table 13 Site Water Balance (Calendar Year 2019)	59
Table 14 Rehabilitation Objectives.....	60
Table 15 Rehabilitation Status	61
Table 16 Topsoil Balance	63
Table 17 Summary of Community Complaints and Enquiries.....	68
Table 18 Summary of Rehabilitation Audit.....	69
Table 19 IEA Recommendations and Actions	73
Table 20 Non-Compliance Details and Proposed Action Plan.....	78

LIST OF FIGURES

Figure 1 Project Locality Plan.....	6
Figure 2 Biodiversity Offset Areas	7
Figure 3 AWS Monitoring Location.....	15
Figure 4 Air Quality Monitoring Locations	18
Figure 5 Noise Monitoring Network Locations.....	27
Figure 6 Blasting Monitoring Network Locations.....	31
Figure 7 Sediment Dam Monitoring Locations	46
Figure 8 Surface Water and Geomorphological Monitoring Locations	47
Figure 9 Ground Water Monitoring Locations.....	55
Figure 10 Mining Domains at Completion of the Reporting Period (2019).....	62

LIST OF APPENDICES

Appendix A Blast Monitoring Records	81
Appendix B Coal Transport Records.....	86
Appendix C Annual Sound Power Testing	94
Appendix D Surface Water	100
Appendix E Groundwater.....	112
Appendix F DPIE Response Table	149

**MAULES CREEK COAL MINE
2019 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 2019) 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)	Yes
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
WAL 12718	Yes
WAL 12722	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: - potential for serious environmental consequences, but is unlikely to occur; or - potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: - potential for moderate environmental consequences, but is unlikely to occur; or - potential for low environmental consequences, but is likely to occur
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 12 a)	Ensure all equipment and noise control measures deliver sound power levels that are equal to or better than the MCC EA	Non-compliant	Technical non-compliance of a limited number of individual items. Overall site sound power level is compliant.	Section 6.4.2
PA10_0138	Schedule 3 Condition 7	Proponent shall ensure that operational noise generated by the project does not exceed the given criteria. 35 dB LAeq (15min) 45 dB LA1 (1min)	Non-Compliant	An exceedance was measured at NM1 at 22:45 on 23 September . During the monitoring a mine site contribution of LA1 (1minute) of 46dBA was recorded. This is considered a minor technical exceedance of the criteria detailed in PA10_0138 by 1dBA.	Section 6.4.2
PA10_0138	Schedule 5 Condition 4	By the end of March each year, the Proponent shall review the environmental performance of the project for the previous year to the satisfaction of the Secretary.	Non-Compliant	An Official Caution from DPIE-RR was received in July in relation to Schedule 5 Condition 4 of the approval regarding the submission of the annual review after the specified date. This is considered a minor technical non-compliance of the criteria detailed in PA10_0138 as an extension was requested and approved from DPIE.	Section 11.3
AUTH346	Condition 6	Notify the Department 14 days prior to undertaking any surface disturbing activities associated with an assessable prospecting operation.	Non-Compliant	An Official Caution was received from DPIE-RR in October in relation to AUTH346 condition 6 – Failure to notify 14 days prior to undertaking surface disturbance activities associated with assessable prospecting. This is considered a technical non-compliance.	Section 11.3

2 INTRODUCTION

This is the seventh 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 (DPIE) Integrated Mining Policy – Annual Review Guideline, October 2015. This document has been prepared to satisfy the following requirements:

- the Annual Review requirements of the DPIE under the Project Approval PA 10_0138 (Condition 4 Schedule 5);
- Environmental Management Report requirements of the Department Planning and Environment - Resources Regulator under the MCCM Mining Leases; and
- the routine reporting expectations of DoI-Water.

Though primarily covering the period from 1 January 2019 to 31 December 2019 (the reporting period), where relevant the Annual Review provides information on historical aspects of the Maules Creek Coal Mine, longer term trends in environmental monitoring results and provides relevant information on activities to be undertaken during the ensuing reporting period, or beyond.

2.1 PROJECT BACKGROUND AND DESCRIPTION

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 MCCM's regional locality is illustrated in **Figure 1**.

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) 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. 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.

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.

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 PA10_0138 was Lodged in December 2019 and approved in January 2020 to allow for installation of a water pipeline from three of Whitehaven Coal's properties to the mining operation.

2.2 MINE CONTACTS

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

Name	Nigel Wood (January – December) Jorge Moraga (December)
Title	General Manager
Address	Therribri Road, Boggabri, NSW 2382
Phone Number	02 6749 7800

Name	Blair Meyers
Title	Mine Manager
Address	Therribri Road, Boggabri, NSW 2382
Phone Number	02 6740 7003

Name	Scott Mitchell (January – March) Emma Bulkeley (March – December)
Title	Environmental Superintendent
Address	Therribri Road, Boggabri, NSW 2382
Phone Number	02 6749 7800

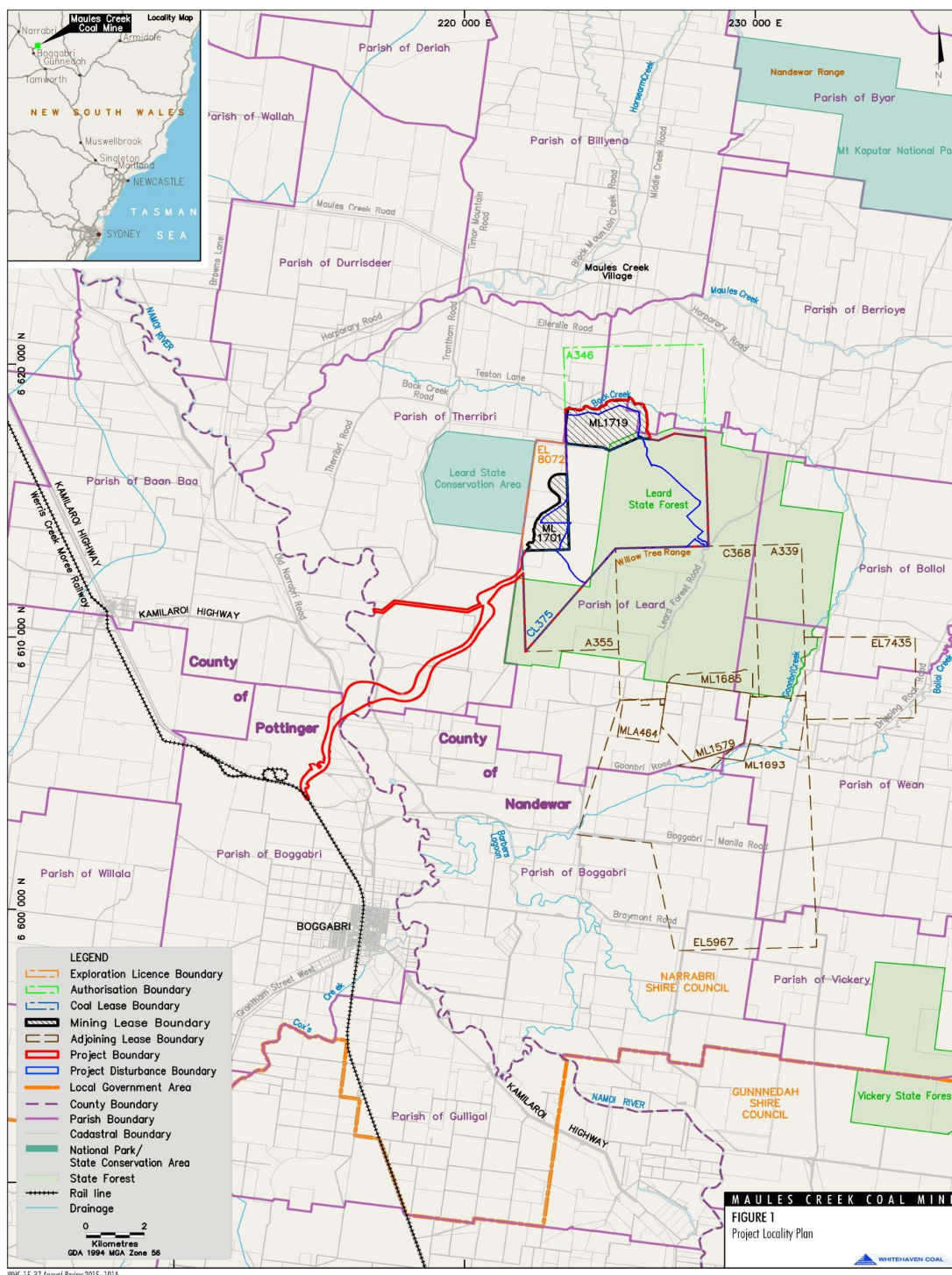


Figure 1 Project Locality Plan

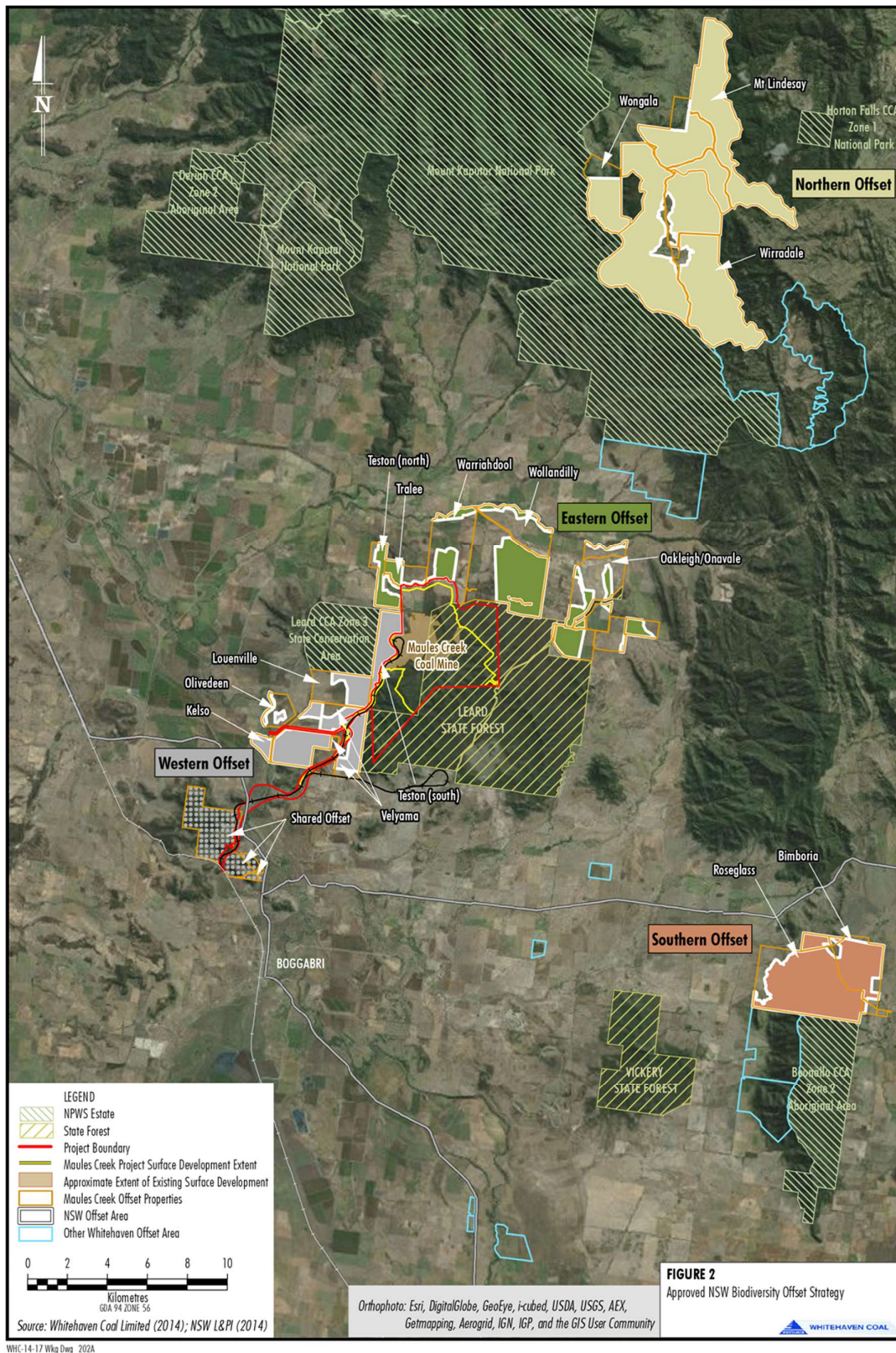


Figure 2 Biodiversity Offset Areas

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

Approval	Reference	Detail	Validity Dates
Exploration Lease	EL 8072	Covers the area to the west of ML1701 that will facilitate the extraction of some coal and accommodate some mine related infrastructure.	Renewal pending
Surface Water Licence Water Supply Works and Water Use Approval	WAL41585 90CA834999	Previously 90SL101060. Water supply for mining and irrigation one overshot 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.
Bore Licence	90CA807012	Bore Constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin'S Leap) Groundwater Source. Works approval for WAL12718.	Issue Date: 1/11/2006 Expiry Date 19/05/2021
Bore Licence	90CA807023	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin'S Leap) Groundwater Source. Works approval for WAL12722.	Issues Date: 1/11/2006 Expiry Date: 27/5/2021

Approval	Reference	Detail	Validity Dates
Bore License	90MW8333037	Gunnedah - Oxley Basin Mdb Groundwater Source. Works approval for WAL36641	Perpetuity
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 ML 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

Approval	Reference	Detail	Validity Dates
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.
Water Access Licence	WAL12718	102 ML Water licence from the upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin'S Leap) Groundwater Source.	Issue Date: 1/11/2006 Expiry Date: 19/05/2021
Water Access Licence	WAL12722	77 ML water licence from Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin'S Leap) Groundwater Source.	Issues Date: 1/11/2006 Expiry Date: 27/5/2021
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 2018-2020 Amendment B	Details mining and rehabilitation activities during the applicable period at MCCM.	Approved November 2018

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.

Core and chip holes were undertaken to further define coal quality, geotechnical and structural information.

4.2 CONSTRUCTION

During the reporting period the following construction works occurred:

- Construction of new crib room in the workshop area.
- Construction of new pipeline from Olivdene bore to site.
- Construction of a new pipeline from 2 newly procured groundwater bores to the existing river pump pipeline.

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 2019 vegetation clearing activities were completed during the approved annual clearing period (15th February to the 30th 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	81,000,000m3 (MOP Year 1, 2017, Table 4)	63,683,876	61,853,755	72,187,157
ROM Coal	13 Million Tonnes (PA 10_0138 Sch. 2 Cond.6) > 5 Million Tonnes handled (EPL 20221)	12,064,021	9,690,770	11,520,000
Reject Material*	NA	1,230,409	2,962,768	2,880,000
Saleable Product	12.4 Million Tonnes (PA 10_0138 Sch.2 Cond.9) > 5 Million Tonnes produced (EPL 20221)	9,755,073	8,850,258	9,216,775

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	7
Maximum number of laden trains from the site in a day when averaged over a calendar year	7	3
Maximum Tonnes of product coal transported from the site (Mt)	12.4	8.48

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:

- 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 CHPP, mine, administration and maintenance infrastructure areas.

4.6.3 Mine Operations

The mine production rates are planned to ramp up to approximately 11.5 Mtpa of ROM coal and approximately 73 million bank cubic metres (Mbcm) of overburden during 2020.

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 DPIE.

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 2019-22 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 2020. Planning and the commencement of a trial to assess autonomous operation of equipment is ongoing.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The DPIE requested the modification of several sections of the Annual Review. Appendix F includes a table summarising the feedback and the relevant section where this is addressed.

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, Error! Reference source not found. summarises the monthly meteorological conditions at the MCC AWS for the reporting period. The total annual rainfall recorded for the year was approximately 277.4 millimetres (mm). The annual rainfall total is below the average rainfall recorded in the EA. The maximum rainfall was recorded during March (84.2mm), which is higher than the historical average of (45.5mm). In addition, several months across the 2019 calendar year produced below average rainfall results, these were significantly lower than the mean rainfall recorded in the EA. During 2019 NSW experienced drought conditions, this is represented by the below average rainfall which was recorded on site.

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 20.3°C, a minimum temperature of -3.8°C was recorded in June and a maximum temperature of 41.8°C was recorded in December. South easterly winds were predominant throughout the first half of 2019. August through to December 2019 recorded measured winds coming predominantly from the southern quadrants.

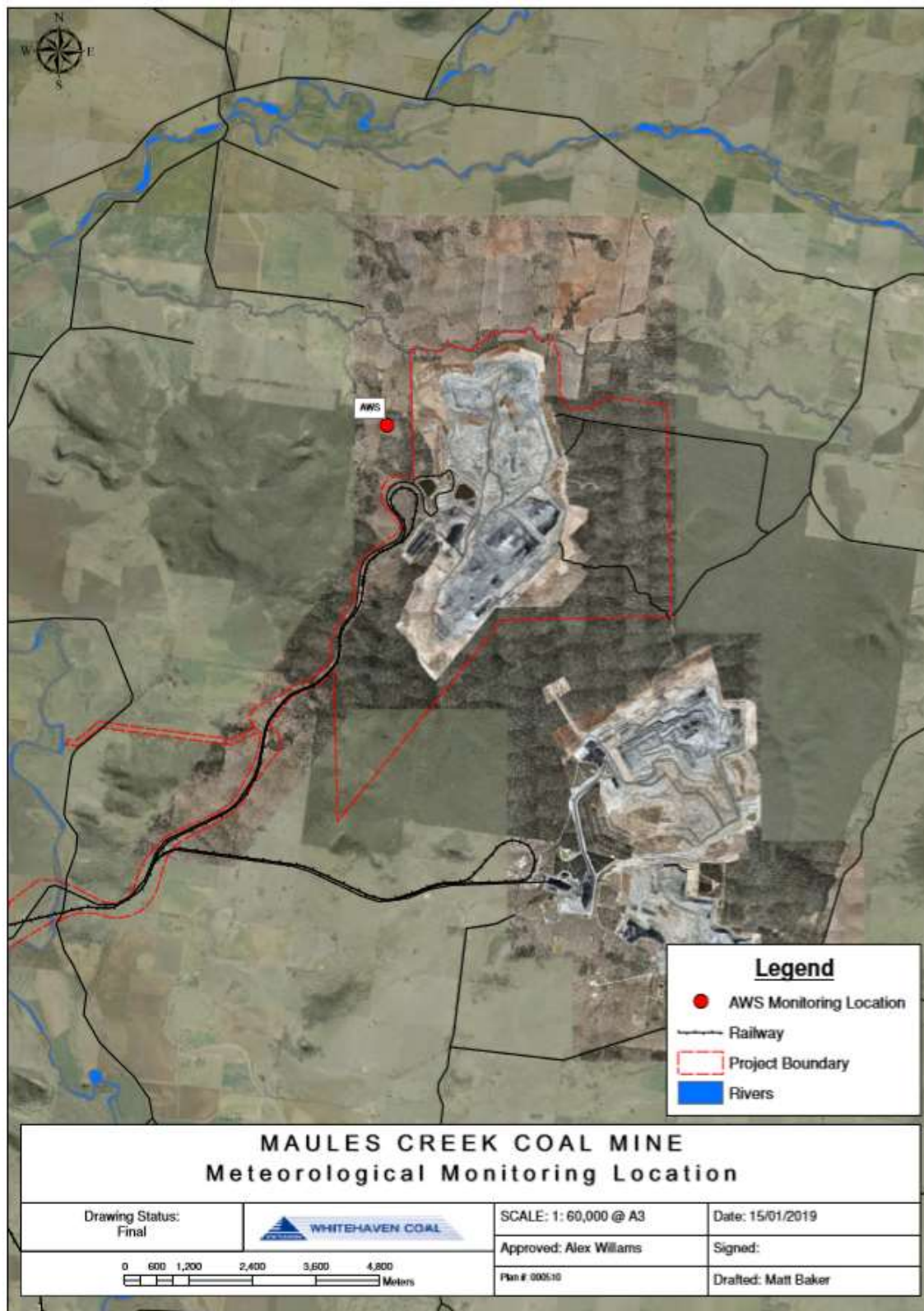


Figure 3 AWS Monitoring Location

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 roads, 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 PM₁₀ 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.
- PM₁₀ 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 PM₁₀ data;
- a network of four dust deposition gauges (DDG's), measuring deposited dust and particulates on a monthly basis; and
- additional sampling units (E-sampling trailer units) to provide input data for the predictive air quality monitoring software.

In addition to the above, the Boggabri - Tarrawonga - Maules Creek (BTM) Air Quality Management Strategy (AQMS) was approved in 2017. New predictive air quality modelling simulation software was fully implemented to inform operational risk.

The NSW Office Environment & Heritage (OEH) and the NSW EPA installed a number of TEOM monitoring units in late 2017. The Namoi Region Air Quality Advisory Committee was established by the Minister for the Environment of which Whitehaven Coal is a stakeholder on the committee.

Daily ambient air quality data for PM10 and PM2.5 particulate sizes from the Maules Creek TEOM1 monitoring unit is provided and published on the OEH managed air quality website since. This has occurred since 2016 prior to the establishment of the Namoi Region Air Quality Monitoring Project.

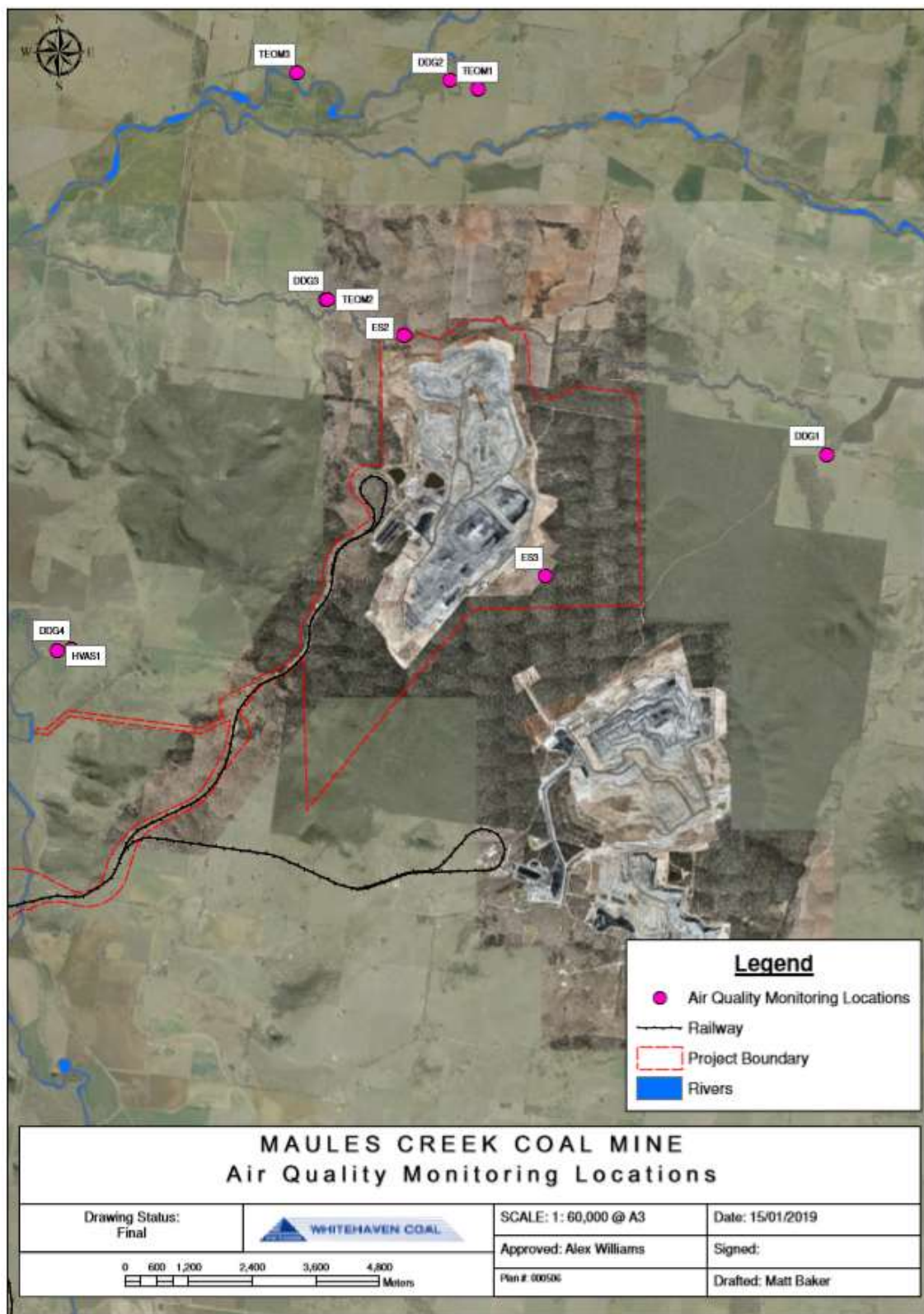


Figure 4 Air Quality Monitoring Locations

6.2.2 Environmental Performance

A summary of the Depositional Dust air quality monitoring results at MCCM for the 2019 reporting period is provided in **Table 8**.

Table 8 Deposited Dust Monitoring Results

Month	MC1 (g/m ²)	MC2 (g/m ²)	MC3 (g/m ²)	MC4 (g/m ²)
January	1.6	3.0	2.8	4.0
February	4.0	2.7	1.9	*
March	2.2	*	3.0	1.2
April	1.0	3.7	3.9	0.6
May	1.6	1.6	2.4	1.3
June	*	*	2.7	0.9
July	0.8	1.8	4.2	0.7
August	1.4	1.0	2.2	1.0
September	1.3	1.1	2.2	2.9
October	3.9	3.7	1.6	51.7 ^A
November	2.6	2.5	1.8	3.2
December	3.1	4.3	4.5	5.8
Annual Average	2.1	2.5	2.8	2.2 ^B

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

^A Results not contaminated but deemed unrelated to mining activities.

^B Average has been recalculated excluding results deemed unrelated to mining activities. If the value of 51.7g/m² (unrelated to mining activity) were to be included in the annual average calculation then the annual average would be 6.7g/m².

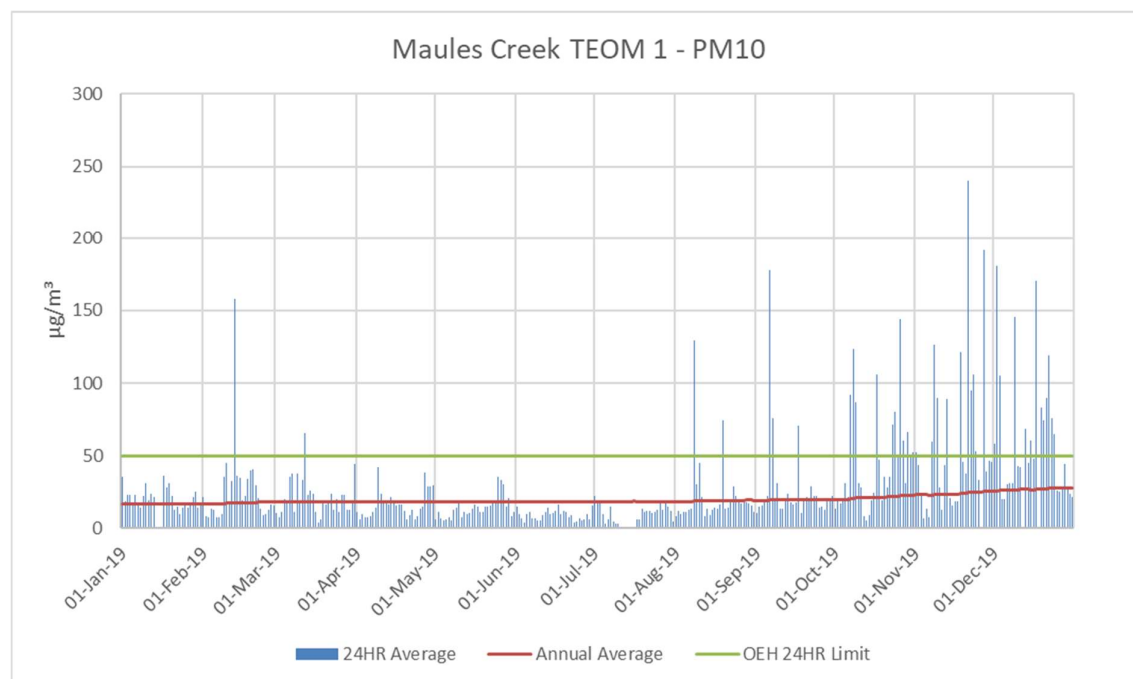
Deposited dust monitoring data demonstrated compliance with the Project Approval (<4g/m²) throughout the 2019 calendar year. A result of 51.7 g/m² recorded at MC4 during October was further investigated and the result can be attributed to drought conditions and significant bushfires in the area. The elevated result was determined as not to be attributable to MCCM based on reviewing meteorological conditions and historical monitoring results for both MC4 and other monitoring locations closer to the operation. When this value is removed the annual average is below the PA criteria at all locations. See Table 8 above.

The PM₁₀ annual average remained below the applicable criteria of 30 µg/m³ at TEOM1 during the reporting period. The PM₁₀ monitoring results from TEOM1 are included in the Graph 1 below. Results are also provided and publically available on the NSW OEH website, and communicated to the Maules Creek Coal Community Consultative Committee on a regular basis. The PM₁₀ annual average at TEOM1 was 28.0µg/m³.

Elevated results above the 24 hour average occurred 42 times during the reporting period. The results corresponded with extraordinary air quality events associated with drought conditions and severe bushfires. As shown in Graph 1, the vast majority of exceedances take place towards the end of the year during localised bushfires.

The annual average trend indicated in Graph 1 is on an upward trend during the reporting period. This was attributable to the frequency of elevated 24hr average results which occurred during the period, and were due to significant fires, extended dry conditions and low ground vegetation cover during the 2019 period.

Todoroski Air Sciences conducted a review of the available MCCM air quality data for the reporting period. The results from this review concluded that MCCM made no significant contribution during each of the 24 hours PM₁₀ exceedances at TEOM1 and operated appropriately to mitigate dust levels.



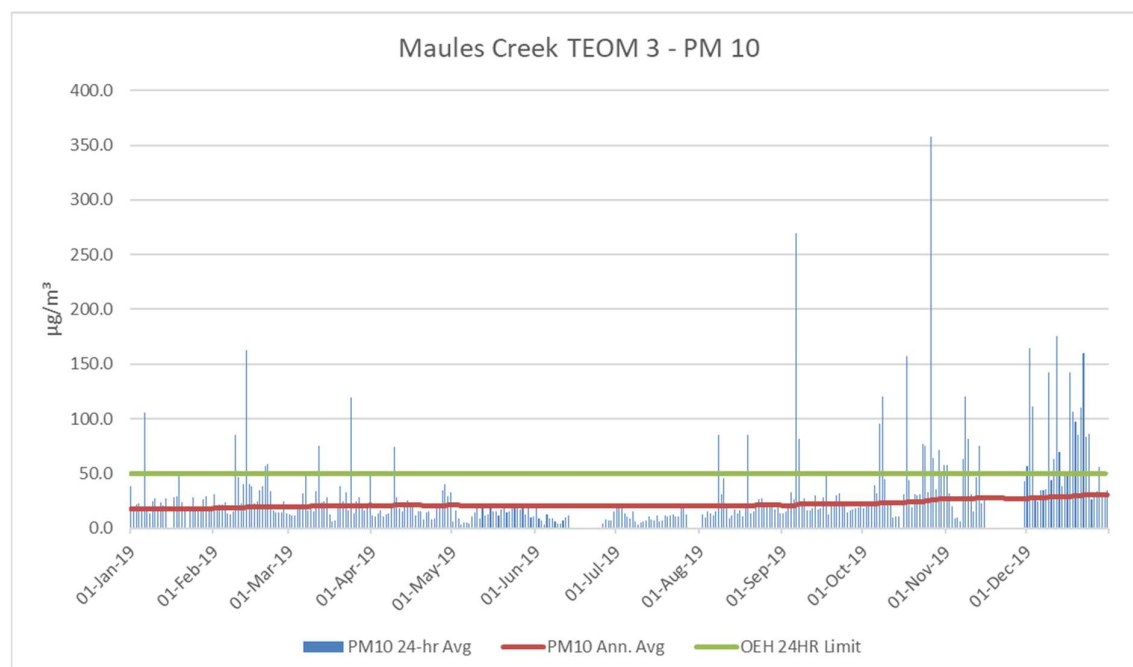
Graph 1 – TEOM 1 Results

The PM₁₀ annual average rose above criteria of 30 µg/m³ at TEOM3 during the reporting period. At the end of the reporting period the rolling average was 30.8µg/m³. The PM₁₀ monitoring results from TEOM3 are included in the Graph 2 below. Results are also provided and publically available on the WHC website, and communicated to the Maules Creek Coal Community Consultative Committee on a regular basis.

Elevated results above the 24 hour average occurred 45 times during the reporting period. The results corresponded with extraordinary air quality events associated with drought conditions and severe bushfires. As shown in Graph 2, the vast majority of exceedances take place towards the end of the year during a large scale bushfire.

The annual average PM₁₀ level indicated in Graph 2 is on an upward trend during the reporting period. This was attributable to the frequency of elevated 24hr average results which occurred during the reporting period, and were due to significant fires, extended dry conditions and low ground vegetation cover during the 2019 period.

When results that occurred on days of extraordinary events are excluded from the annual average calculation as per schedule 3 section 32, the annual average decreases to 29.8 µg/m³ which is lower than the given criteria. These extraordinary events are listed in the Summer 2018-2019, Autumn 2019 and Winter 2019 air quality monitoring in the Namoi-North-West Slopes regional seasonal newsletters. At the time of writing this report the Spring 2019 and Summer 2019-20 newsletters had yet to be published. Due to the severe bushfires during the spring and summer, it is expected that there are many days which will be confirmed as extraordinary events and hence the average annual PM₁₀ level is expected to be significantly lower than 29.8µg/m³ once these extraordinary events are confirmed and published.



Graph 2 – TEOM 3 Results

The HVAS PM₁₀ monitoring results are illustrated in Graph 3 below. Monitoring conducted at the MCC HVAS indicated the PM₁₀ rolling average did not remain below the applicable criteria of 30 µg/m³.

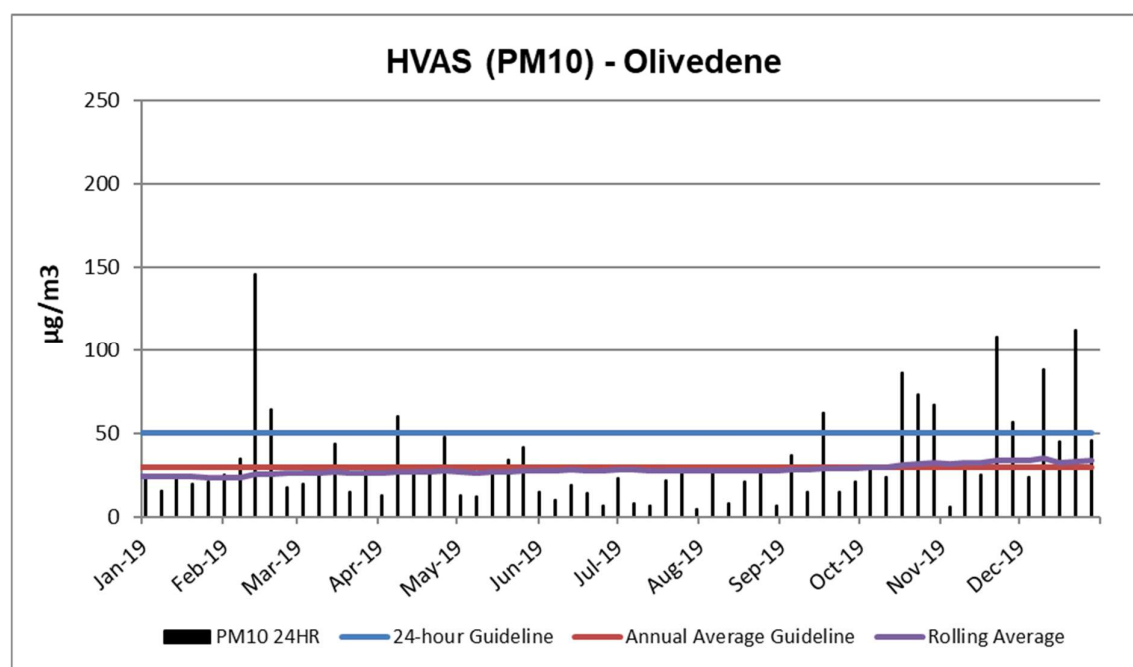
During the reporting period, on 11 occasions the HVAS recorded a PM₁₀ result greater than the 24 hour criteria of 50 µg/m³. Multiple investigation into MCC's meteorological and operational data during these time periods revealed sources were non-mining related. The results corresponded with extraordinary air quality events associated with drought conditions and severe bushfires. As illustrated in graph 3, the rolling PM₁₀ average exceeded the criteria of 30µg/m³ on the 17th of October. The rolling average then continued to trends upwards. These elevated results can be attributed to drought conditions, lack of ground cover in the region and the severe widespread bushfires which took place throughout the 4th quarter of the year.

An in depth air quality monitoring review was carried out by Todoroski Air Sciences for the reporting period. The investigation concluded that MCCM's maximum potential contributions were found to be less than 9% of the total annual average PM10 level of 33.6µg/m³ recorded at the HVAS monitor in 2019. The investigation also shows that MCCM made no significant contribution during the 11 occasions that the HVAS recorded a PM₁₀ result greater than the 24 hour criteria of 50 µg/m³.

The amended annual PM₁₀ average at the HVAS is 24.86µg/m³ when the following results are removed from the calculation:

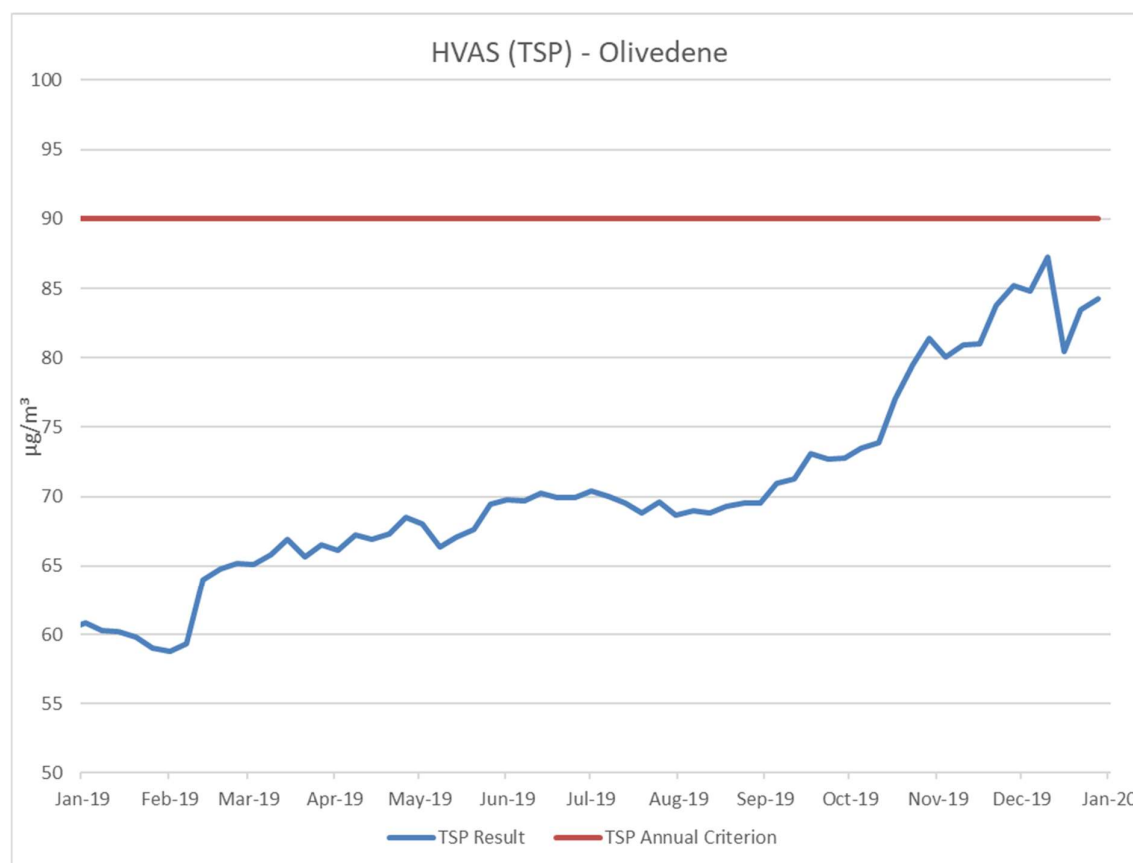
- Days listed as extraordinary events in the Summer 2018-2019, Autumn 2019 and Winter 2019 air quality monitoring in the Namoi-North-West Slopes regional seasonal newsletters.
- Exceedances of the 24Hr average limit that have been determined to have been caused by the significant bushfires that took place Q4. Confirmations of these bushfires as extraordinary events will be available once the spring and summer air quality monitoring in the Namoi-north-west slopes regional seasonal newsletters have been published.

This amended annual average is below the applicable criteria of 30 µg/m³.



Graph 3 – HVAS PM₁₀ Results

Total Suspended Particulates (TSP) is inferred from the measured PM₁₀ data. Monitoring conducted at the MCC HVAS indicated the TSP rolling annual average remained below the applicable criteria provided in Schedule 3 Condition 29 of PA10_0138 of 90 µg/m³. The TSP monitoring results are illustrated in Graph 4 below.



Graph 4 – HVAS TSP Results

6.2.3 Proposed Improvement Measures

Proposed measures to continuously improve include:

- continued application of the BTM predictive modelling software and refinement where necessary;
- Continued implementation of recommendations from the independent Katestone Best Practice Dust Benchmarking Study;
- a move to in-pit dumping;
- continue overburden shaping to assist with enabling the placement of topsoil and rehabilitation establishment 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 (CH₄) 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
- management of 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:

- 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;
- mine planning efficiencies to minimise the gradient, length and height of loaded haul runs for dump trucks, where possible;
- in-pit and mobile refueling facilities;
- monitoring system for 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 2019 Financial Year (FY) reporting period was 905,276t CO₂-e.¹ The following sections detail the three key GHG contributors calculated for the 2019 NGER reporting period.

Diesel Usage

¹ Amendment made to rectify incorrect units of measure (kt to t) 11th November 2021.

90266.588 kL of diesel (stationary and transport use) was consumed equating to 244,601 tCO₂-e GHG Emissions.

Fugitive Emissions

There was an estimated total of 632,902t CO₂-e fugitive emissions from MCCM in the 2019 FY.² This is lower than the EA estimation.

Electricity Consumption

27,272.7 kWh³ power equating to approximately 22.36 kT CO₂-e was consumed by MCCM. This is less than the predicted consumption from the EA of scope 2 emissions of 49,280 tCO₂-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 rates and some haulage distances 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 DPIE, and prepared to satisfy the requirements of the EPL and PA 10_0138.

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 validation (refer 6.4.2);
- 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;
- 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;

² Amendment made to rectify incorrect units of measure (kg to t) 11th November 2021.

³ Amendment made to rectify incorrect units of measure (MWh to kWh) 11th November 2021.

- 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;
- purchase of attenuated dozer's for dump operations;
- low frequency noise assessments; and
- investigations 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. Monthly noise survey results are available in the EPL monitoring data reports available on the MCCM website.

During this reporting period one noise exceedance occurred on September 23rd. The exceedance was measured at NM1 at 22:45. During the monitoring a mine site contribution of LA1 (1minute) of 46dBA was recorded. A follow up measurement was taken at 23:06 and site only noise levels complied with relevant criteria. This is considered a minor technical exceedance of the criteria detailed in PA10_0138 by 1dBA. All other monitoring results were compliant with relevant criteria.

The Noise Policy for Industry (NPfI) was introduced in late 2017. The application of the low frequency assessment consistent with the NPfI applied during the reporting period.

MCCP noise levels measured during attended monitoring in 2019 were lower than or equal to predicted noise levels in the EA during all measurements when site contributions were directly quantifiable.

Site only L_{Aeq} noise levels have been low for the large majority of attended monitoring at all monitoring locations. Long term trends indicated:

- NM1 and NM2, site-only L_{Aeq} noise levels increased slightly over the last 3-year period however still within EA predictions;
- NM3, NM5, and NM6, site-only L_{Aeq} noise levels remained very low throughout the last 3-year period; and
- NM4, site-only L_{Aeq} noise levels have decreased slightly over the last 3-year period.



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**. 145 individual pieces of mobile plant were tested during the reporting period. Sound power levels from all mobile plant were less than the predicted sound power targets described in the Project EA for modelling purposes. The total sound power level for stationary plant this reporting period is lower than last reporting period. Results recorded for some pieces of stationary plant within the CHPP were once again greater than the power targets described in the Project EA due the layout and operation of the CHPP and other surface plant. During testing it was not always possible to measure each fixed plant item in isolation. Due to the low-frequency content of the CHPP, it interfered with measurement of other nearby sources. Feed/product conveyors and other transfer stations could not always be isolated which likely increased background noise levels and/or reduced the possible measurement positions used during the assessment.

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.

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.

Additional works in relation to SPL for fixed CHPP plant infrastructure were undertaken during the reporting periods of 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.

Annual Validation

Maules Creek Coal 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 2019, and validate the results against the model predictions from EA Acoustics Impact Assessment (NIA).

The validation exercise occurred comparing a period in June and concluded that the EA Project acoustic impact assessment model was generally more conservative in predicting noise impact relative to predictions for actual operations. Measured 90th percentile low pass LAeq were compared with 90th percentile model predictions to evaluate correlation between model predictions and measured mining noise. Results indicate the model provided a good level of accuracy in predicting noise at RT3 and RT4 when considering a wide range of weather conditions, but over-predicted at RT1 and RT2, and possibly under predicted at RT5.

In summary model predictions for a mining configuration in effect during winter 2019, for which reliable off-site noise levels were measured, were generally consistent with, or less than, model predictions presented in the Project AIA. Model validation showed model predictions correlated well with measured levels, indicating the model developed for the assessment accurately represented noise emission during the period of interest.

Proposed Improvement Measures

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

- further review of exhaust systems on haul trucks;
- operational planning to continue to include screening options for overburden dumps;
- pending approval and implementation of the updated NMP; 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 114 blasts carried out during the reporting period. All blast monitors were fully operational during the reporting period. All events remained well within the applicable criteria at these locations. Details of blasts are included in Appendix A. Complete capture rate for each unit occurred where blasts were above the trigger threshold. **Table 9** summarises the blasting monitoring results during the period.

Table 9 Summary of Blasting Results

Location	Parameter	Average	Maximum	100% Limit	Exceedance
BM1	Air blast overpressure (dB(Lin Peak))	91.46	106.10	120	-
	Vibration (mm/s)	0.12	0.54	10	-
BM2 [#]	Air blast overpressure (dB(Lin Peak))	90.59	115.00	120	-
	Vibration (mm/s)	0.17	0.78	10	-
BM3	Air blast overpressure (dB(Lin Peak))	95.08	113.20	120	-
	Vibration (mm/s)	0.20	1.12	10	-
BM4 [#]	Air blast overpressure (dB(Lin Peak))	93.36	110.00	120	-
	Vibration (mm/s)	0.32	1.39	10	-

* 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 2019 reporting period on mine owned property. Both overpressure and ground vibration monitoring results are consistent with the blasting related details of the EA. During the reporting period no results were above the 95th percentile limit. This is an improvement on last year's results where the 95th percentile was exceeded once.

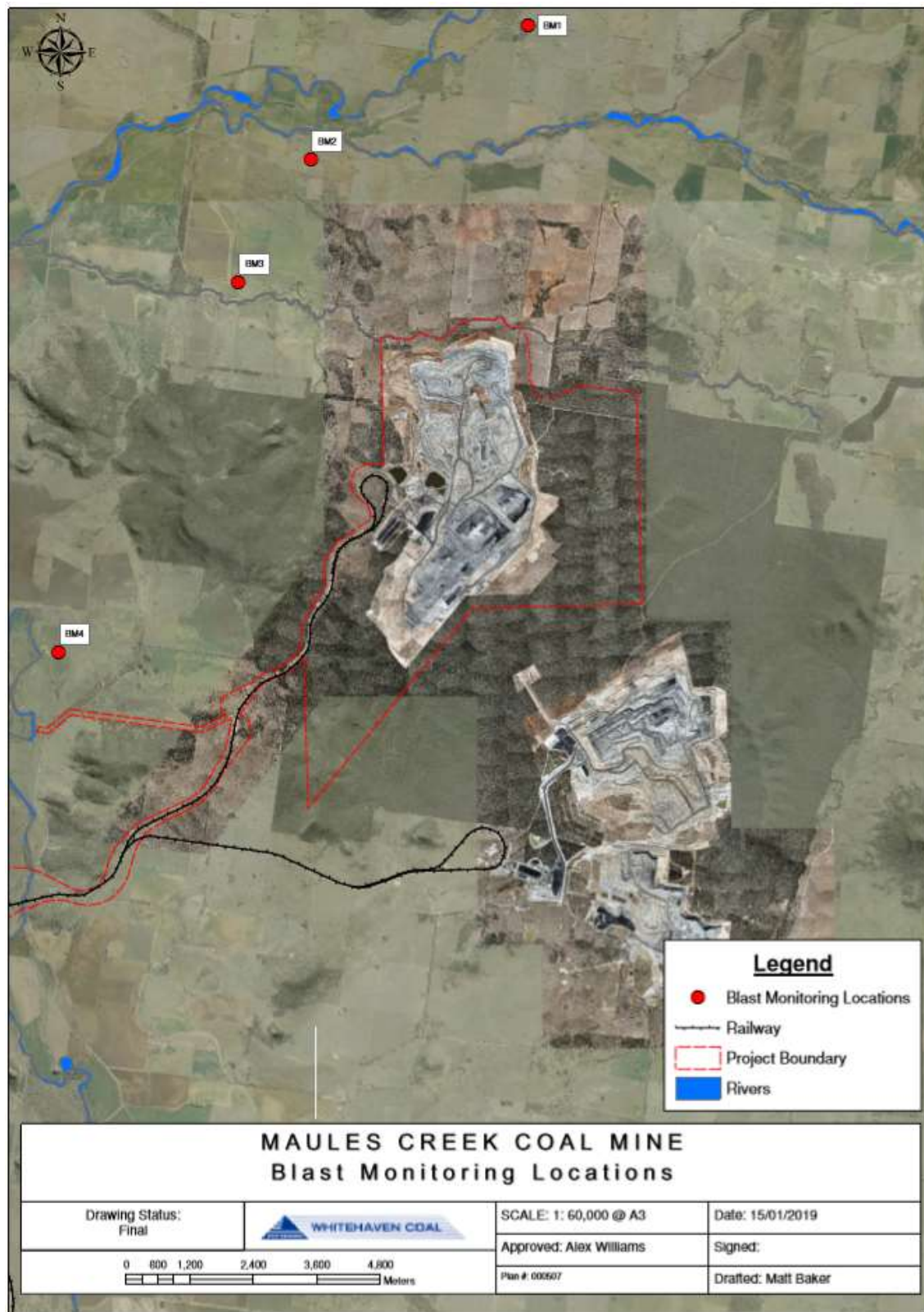


Figure 6 Blasting Monitoring Network Locations

Blast fume generation, including visible NO_x fume, varies from yellow to orange to dark red depending on the concentration of NO₂ 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 40 recorded blasts with fume observed within the 2019 calendar year. 12 of those were classed as 1A, 4 classed as 1B, 13 classed as 2A, 5 classed as 2B, 2 classed as 3A and 4 classed as 3B. All blasts were video recorded and categorised in line with the BLMP and relevant industry guidelines.

6.5.3 Proposed Improvement Measures

Continual refinement to blasting design, geological definition, and engagement with blasting product suppliers, occurred during the reporting period.

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 Revised Biodiversity Management Plan (BMP) was approved by DPIE on 26th April 2017 and the Revised NSW Biodiversity Offset Strategy was approved by DPIE on 27th October 2015 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 undertook detailed survey and contemporised vegetation mapping for populating 13 Conservation Agreements in consultation with the NSW Biodiversity Conservation Trust (BCT). Four of the Conservation Agreements have been lodged with the NSW Land Registry Service to be registered on the land title to provide in perpetuity security for the MCCM BOA. WHC have also consulted with NSW DPIE and Commonwealth DoEE/DAWE as required during the reporting period to keep key regulators abreast of securement progress; including requesting a 12 month extension to the EPBC Approval 2010/5566 Condition 13 current securement timeline of 31st March 2020. Following registration of Conservation Agreements; WHC will prioritise negotiations of those BOAs that NPWS has previously shown interest in being transferred to National Park Estate.

Infrastructure & Waste Management

During the reporting period, a total of 18.3km 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, 14.2km 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. Hazardous material assessments and remediation projects were completed at Wirradale, Teston North and Tralee during the reporting period for redundant and derelict assets/infrastructure (i.e. sheds and cottages) associated with the former agricultural use of MCCM BOAs to ensure that these items have been removed prior to transfer to National Park Estate.

Seed Management

Routine seed assessments completed for the MCCM BOA were impacted by the severe drought conditions that were experienced during 2019. The routine seed assessments aim 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. Because of the drought conditions, additional seed collection opportunities within the MCCM BOA were limited. 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 2019 revegetation program that was completed for the MCCM BOA as well as planning for the 2020 revegetation program.

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 utilised the following equipment and methods including 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/or tractor/excavator mounding or augered holes (to a depth >0.3m) 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 for the planned 2019 revegetation program on the Bimbooria, Roseglass, Olivedeem, Kelso, Velyama West, Teston North, Tralee, Wollandilly and Onavale BOAs. WHC coordinated two revegetation programs during the reporting period consisting of an understorey revegetation (direct seeding) program and an overstorey planting program. The understorey revegetation was undertaken on the Bimbooria, Roseglass, Onavale, Cattle Plain and Olivedeem BOAs between May and August 2019 with over 300ha sown including 2,400kg of native grass seed (19 species), 300kg of native forb seed (9 species) and 4,800kg of bulking agent (lime). Overstorey revegetation program was undertaken between April and December 2019 with a total of 77,402 hiko seedlings of Box-Gum Woodland and Riparian Forest species over approximately 1000ha of MCCM BOA. Despite the prevailing drought conditions throughout 2019; routine tree watering and maintenance activities post planting have been successful to ensure that over an 70% survival has been achieved for the MCCM BOA which is commensurate with the target Box Gum Woodland vegetation structure.

Heritage Management

During the reporting period, heritage site and fencing inspections were completed on the 160 known Aboriginal cultural heritage sites within the MCCM BOA with each site maintained with identification/demarcating fencing around the heritage site perimeter and signage to mitigate access and disturbance. Also during the reporting period, WHC completed the cultural values heritage survey program in May 2019 in accordance with the approved Aboriginal Heritage Conservation Strategy for the BTM complex.

Habitat Management

During the reporting period, no specific habitat management works were undertaken however WHC have commenced a Habitat Needs Assessment program aiming to strategically survey existing fauna habitat and resources to inform a schedule of habitat augmentation projects to commence implementation in 2020/2021.

Weed Management

WHC coordinated routine formal weed monitoring/inspections undertaken across MCCM BOA in February, May, August and November 2019. 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, St Johns Wort, 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 732ha treated across the Eastern and Western BOAs, 339ha treated on Southern BOA and 447ha 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.

Feral Animals Management

WHC coordinated routine formal feral animal monitoring across MCCM BOAs in February, May, August and November 2019. 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 BOAs. 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 and cameras traps where practicable and relevant to specific offset areas/properties. Monitoring demonstrated that certain animals like Eastern Grey Kangaroos and Feral Pigs can be high, Goats can be medium in abundance seasonally with all other feral animal species recorded as scarce to low abundance levels across 2019. 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 BOAs for feral animal management.

During the reporting period, WHC implemented a comprehensive feral animal control program across the MCCM BOAs with routine 1080 baiting and pig trapping programs undertaken in March (70 Foxes

and 5 Wild Dogs removed from 522 baits presented and 80 Feral Pigs trapped), June (90 Foxes, 5 Wild Dogs and 1 Feral Pig removed from 513 baits presented and 29 Feral Pigs trapped), September (63 Foxes, 7 Wild Dogs and 1 Feral Pig removed from 687 baits presented and 64 Feral Pigs trapped) and December 2019 (76 Foxes, 5 Wild Dogs and 12 Feral Pigs removed from 680 baits presented and 89 Feral Pigs trapped). Night time open range shooting programs were implemented in conjunction with the other routine programs resulting in an additional 7 Foxes, 11 Feral Pigs, 67 Hares and 54 Rabbits and a Deer being controlled in 2019. The Feral Goat harvesting during the reporting period resulted in 355 being captured with the Feral Goats then on sold to an abattoir. Only appropriately qualified and experienced feral animal contractors (appropriate feral animal management qualifications, NSW fire arm licence and pesticide accreditation where relevant) were engaged to undertake feral animal control works for WHC.

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 2019 as existing licences expire and the lands being transferred over to biodiversity management. Some strategic grazing occurred for African Lovegrass weed control purposes on Onavale BOA but no habitat management, threatened species, active revegetation or riparian areas were stocked and/or grazed during the reporting period.

Bushfire Management

In accordance with the BMP, annual fuel load monitoring was undertaken in December 2019 as part of planning and assessment of bushfire hazard and ecological burn strategy in 2020. During the reporting period, the average overall fuel load measured and fire risk for the Northern BOA ranged between 12.6t/ha and 18.4t/ha (moderate to high) and moderate fire risk; Southern BOA was 8t/ha (moderate) and moderate fire risk; Eastern BOA ranged between 9t/ha and 12t/ha (moderate) and low to moderate fire risk; while for the Western BOA ranged between 8t/ha and 13t/ha (moderate) ranging low to moderate fire risk. Other fire management implemented by WHC during the reporting period included the maintenance of fire break tracks (180km) to a zero fuel barrier standard across the MCCM BOA. WHC also completed a total of 79ha ecological burns on the Bimbooria and Olivadeen BOAs in May 2019; as well as a large bushfire started from a lightning strike on 17th October 2019 that burnt out of the Mount Kaputar National Park into the Wirradale and Wongala South BOAs impacting 620ha. WHC maintains regular communications throughout the reporting period with both the Liverpool Range and Namoi-Gwydir Zone RFS teams around planning of other WHC BOA site ecological burn programs as well as providing WHC emergency contacts. WHC maintains a specialist fire fighting contractor for an oncall engagement during the fire season to respond in the event of a bushfire on WHC BOAs and non-mining lands.

***Tylophora linearis* Management**

In accordance with the BMP, Stages 1 (Root Architecture) to 4 (Seed Propagation) of the *Tylophora linearis* translocation program were completed previously in 2014 and 2015; with the Growth Study ongoing during the reporting period. Monitoring has continued of the 77 *Tylophora linearis* seedlings transplanted within Wollandilly BOA during December 2015 that were propagated from seed collected onsite at MCCM during 2014. Despite the drought conditions throughout 2019; of the five plants presenting with above ground growth by the end of the period one of these plants was the first time that it had been recorded since 2016, marking over 3 years without any previous above ground growth

demonstrating the cryptic ecology of this species. The release of seed from one of these transplanted *Tylophora linearis* marks a major milestone in the translocation process where the ultimate aim is to establish a self-sustaining population (Hunter Eco, 2020) with monitoring to continue for the appearance of germinants from the shed seed at Wollandilly BOA. No further opportunities to collect seed were identified during clearing operations in February 2019; however translocation of soil from 11 donor sites of *Tylophora linearis* habitat within the MCCM 2019 clearing area was undertaken establishing 5 enclosures and a control site within the adjacent Teston South BOA. Ongoing monitoring of the Teston South BOA *Tylophora linearis* topsoil enclosures did not identify any above ground growth or germination from potential below ground rhizomes in 2019.

***Pomaderris queenslandica* Management**

In accordance with the BMP, Stages 1 (Root Architecture) to 4 (Seed Germination) of the *Pomaderris queenslandica* translocation program were completed previously in 2015 and 2016. Monitoring continued during the reporting period of the translocated *Pomaderris queenslandica* plant that was propagated from a cutting in 2015 and planted within the Wollandilly BOA during November 2017. In addition during the reporting period; a germination and propagation trial commenced from *Pomaderris queenslandica* seed collected during 2014/2015 to identify and treat both physical or internal dormancy limiters which occurred successfully resulting in 41 seedlings being produced to date and will be ready to be transplanted in 2020. No further opportunities to collect seed was identified during either clearing operations in February 2019 or from other wild populations in the area during the reporting period.

Monitoring Program

During the reporting period, the ecological monitoring program of the Maules Creek BOA included winter bird surveys that were undertaken in June and July 2019, flora/vegetation monitoring of 44 treatment sites, 8 control sites, 8 reference sites and 8 new sites was undertaken in November and December 2019 and fauna monitoring of 24 sites undertaken during November 2019. Due to continuing drought conditions for 2019, native plant species richness decreased from 41 sites last monitoring to 37 out of the 44 treatment sites meeting or exceeding the performance criteria (80% of native species richness benchmark for relevant biometric vegetation communities i.e. 23 native species). Native overstorey cover increased from 11 sites last monitoring to 12 out of the 44 treatment sites meeting or exceeding the performance criteria (overstorey cover benchmark for relevant biometric vegetation communities i.e. between 6% and 25% cover). Native midstorey cover increased from 42 sites last monitoring to 44 out of the 44 sites meeting or exceeding the performance criteria (midstorey cover benchmark for relevant biometric vegetation communities i.e. between 0% and 5% cover). Native ground cover grasses decreased from 37 sites last monitoring to 16 out of the 44 treatment sites meeting or exceeding the performance criteria (grass groundcover benchmark for relevant biometric vegetation communities i.e. between 30% and 40% cover). During the winter bird surveys, seven threatened species were recorded (Brown Treecreeper, Diamond Firetail, Dusky Woodswallow, Grey-crowned Babbler, Little Lorikeet, Speckled Warbler and Turquoise Parrot). A total of 104 bird species were recorded during standardised bird surveys in 2019 with average species richness at 16 woodland sites was 18.5 and ranged from 13 to 27 and average species richness at the 8 revegetation/rehabilitation sites was 11.25 and ranged from 4 to 18. These results are similar to 2018, although average species richness at woodland sites is slightly lower (in 2018 it was 21 ranging from 8 to 41), and average species richness at revegetation/rehabilitation sites is slightly higher (in 2018 it was 8 ranging from 2 to 13). A total of 10 microbat species were recorded from harp trapping in 2019. Average species richness at 16 woodland sites was 2.6 but ranged from 0 to 6. The results are similar to 2018 where a total of 10 microbat species were also recorded (site average 3, ranging from 0 to 8).

Independent Biodiversity Audit

During the reporting period, NSW DPIE provided comments on the "Leard Forest Regional Biodiversity Strategy Stage 3 – Preliminary Strategy Review" as required by the Boggabri Coal, Tarrawonga Coal and Maules Creek Coal Project Approvals; with BCM and WHC engaging a consultant to update the Stage 3 Review Report.

Research

In accordance with Condition 15 & 16 of the MCCM EPBC Approval 2010/5566, 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; Maules Creek Coal funded the following activities during 2019 including:

- Annual spring surveys at over 1000 potential Swift Parrot foraging habitat sites across their breeding range in Tasmania;
- Twice yearly rapid assessment monitoring at 650 priority search locations for the Regent Honeyeater across Queensland, ACT, Victoria and NSW;
- Research continued into using improved acoustic techniques to identify the calls of various *Nyctophilus* species so that it is possible to use ultrasonic detection (i.e. anabats) to survey for the South-eastern Long-eared Bat; and
- Investigation of the seed bank within natural and stockpiled soil samples at the MCCM (draft) identified a range of native species that likely to persist within soil stockpiles and have potential to transfer to the rehabilitation areas; as well as what management strategies can be implemented to maximise the native seed bank within topsoil onsite.

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.

Pre-Clearing and Clearing Surveys

The 2019 clearing program occurred during February - March 2019 and consisted of the clearance of a total of 33.6ha to facilitate the expansion of the mining pit area 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 2019 clearance works, including species of 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 2019 clearing works:

- Brown Treecreeper (Eastern Subspecies) (*Climacteris picumnus victoriae*) ;
- Dusky Woodswallow (*Artamus cyanopterus*);
- Turquoise Parrot (*Neophema pulchella*).

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 undertaken by an

independent consultant in 2018 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 in 2016 by Whincop Archaeology and was approved in March 2017 by DPIE; the AACHMP is currently being revised to improve the methodology for monitoring of annual clearance works, and to update the data within the document. The BTM Aboriginal Cultural Heritage Strategy was 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 Site Audit was undertaken on 24-25 July 2019 by Registered Aboriginal Party (RAP) representatives accompanied by a specialist archaeologist approved by DPIE.

The Annual Site Audit included an inspection of all extant previously identified Aboriginal cultural heritage sites within the MCCM boundary. The inspection assessed the condition of 48 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.

All Aboriginal cultural heritage objects recovered from MCCM are stored securely at the Red Chief Local Aboriginal Land Council as part of an approved Care Agreement, which was approved in early 2018.

Additional Monitoring / Inspection of Sensitive Heritage Areas

Archaeological monitoring of Aboriginal cultural heritage sensitive areas, as defined in the AACHMP, are undertaken prior to topsoil clearance with RAP representatives accompanied by specialist archaeologists. Archaeological monitoring was undertaken between 25 February and 7 March 2019 during the clearing program, and included the visual inspection of 44 scrapes totalling approximately 6 km of ground surface inspection. Archaeological monitoring identified fifty-eight new artefacts in the clearance area, constituting five new Aboriginal cultural heritage sites registered on AHIMS. One of these sites (Leard SF AS7) extends beyond the 2019 clearance area, and therefore has only been partially destroyed. This site was further investigated through the use of 9 shovel test pits, in order to

understand the nature and extent of the site. Once it was discovered, however, this site was already disturbed by the grader scrapes, and the material was no longer considered in situ. This raised some concern amongst the attending RAPs regarding the best methodology for monitoring the clearance areas. As a result, the methodology for the monitoring/inspection of Aboriginal cultural heritage sensitive areas is being reviewed within the latest revision of the MCCM AACHMP.

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 Report

All identified artefact scatters within the MCCM disturbance area have been salvaged in previous reporting periods through a combination of surface collection, test excavation and open-area excavation. The MCCM Archaeological Salvage report is being prepared and will be completed in 2020.

Aboriginal Heritage Conservation Strategy (AHCS)

As previously mentioned, the Aboriginal Heritage Conservation Strategy was approved by the DPIE in November 2017 and the implementation of commitments within the strategy continued in 2019. In May 2019, a Cultural Values survey of the Maules Creek Coal Mine biodiversity offset areas was undertaken by Whincop Archaeology in association with three RAPs. A draft report of the results of this survey has been prepared, and is currently being reviewed by the RAPs that attended the survey. The final Cultural Values report will be presented to the wider Aboriginal community at an 'On-Country' workshop event to be held on one of the Maules Creek offsets. This event is expected to occur in April 2020, after which a final report on the results of the AHCS works will be prepared and finalised to meet the May 2020 deadline.

Ongoing Consultation

In accordance with the AACHMP, meetings with RAPs are convened on approximately a six-monthly basis. Two meetings were held during 2019 (June and November), and were open to all RAPs. These meetings in 2019 resulted in proposed improvements to the MCCM AACHMP (see below)

Management of Quinine Bush

Quinine Bush (*Alstonia constricta*) continues to be mapped across the project as part of the land pre-clearance surveys, with the aim of identifying opportunities for seed collection and propagation. Ecologists have also been trained on the identification of potential Aboriginal scarred trees during the pre-clearance surveys.

6.7.3 Proposed Improvement Measures

In 2020, several aspects of cultural heritage work will continue, including the review and revision of the MCCM Aboriginal Archaeology Cultural Heritage Management Plan (AACHMP). In particular, the AACHMP has been updated to reflect the current status of Aboriginal sites, but also to develop an improved methodology for the inspection of annual clearance areas. The AACHMP, which has been updated by Whincop Archaeology and is currently being reviewed by Whitehaven Coal, has been updated to replace the use of grader scrapes during clearance with a targeted inspection of the ground surface prior to disturbance. This main change to the clearance methodology within the AACHMP was proposed by RAPs during the two 2019 6-monthly RAP meetings. The intention is to remove the use of grader scrapes from the process, as it was considered both ineffective and unnecessarily arduous work.

The proposed change is for the ground surface of all Aboriginal cultural heritage sensitive areas to be inspected prior to land clearance works.

Other Aboriginal cultural heritage work in 2020 will include the annual audit of Aboriginal cultural heritage site fencing. Consultation via meetings will continue in 2020, and RAPs will be consulted regarding the results of the cultural values survey of the MCCM biodiversity offset areas. The MCCM salvage report, which provides a history of Aboriginal occupation and land use in the project area based on the results of the archaeological salvage program, will also be progressed during 2020.

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 during the reporting period that impacted on historic heritage items identified in the EA.

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.

6.8.3 Proposed Improvement Measures

Annual monitoring of historic heritage sites will continue in 2020. The newly developed Conservation Management Plan (CMP) for the Velyama Site Complex will be followed, 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 employees 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 an annual audit regarding local road access restrictions as described in the TMP.

Analysis of employee transport records demonstrated that generally over 70% of wages employees utilised the bussing services provided over the 2019 reporting period, therefore within the specified limit.

There were no complaints regarding traffic generated by the MCCM received during the reporting period.

The utilisation of the Boggabri access road off the Kamilaroi Highway was the primary access for mine related traffic during the reporting period which assisted in reducing vehicle interactions of mine and public traffic on Therribri Road.

6.9.3 Proposed Improvement Measures

Annual audits of restricted roads, quarterly monitoring of traffic volumes to the site and responses to any community complaints will continue to be implemented during the next reporting period. Section 6 of the MCC Traffic Management Plan requires quarterly traffic surveys to be undertaken, these surveys assess operations, maintenance and CHPP wages employees utilise the bussing service. Results for these surveys are presented in **Table 10** below.

Table 10 Traffic Survey Results

Period	Wages Employees Accessing Site During Survey Period	Wages Employees Utilising Bus	Bus Utilisation (%)
Q1	25,626	21,958	86.92
Q2	27,292	23,674	86.73
Q3	27,391	23,589	86.12
Q4	26,286	22,755	86.57

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 decreased by approximately 6% for general waste when compared with the previous reporting period.

A total of 527 t of general waste and 1,770 kl of septic were removed in the 2019 reporting period. Approximately 253 t of solid recyclable material and 1,197 kl of used oils were collected for recycling by a licenced contractor. 94 t of regulated waste and 487kl of drill mudd was also removed from site by a licensed contractor.

No significant 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 and report waste streams on a regular basis to effectively manage waste generated by the operation of the MCCM.

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

No reportable or significant incidents involving hazardous materials 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.

6.11.3 Proposed Improvement Measures

Continued operation of a bioremediation area will occur during the next reporting period.

7 WATER MANAGEMENT

7.1 WATER SUPPLY

Table 11 Water Take For the 2018-2019 Water Year

Water Licence #	Water Sharing Plan	Water Source and Management Zone	Entitlement units	Passive Take/ Inflows ML	Active Pumping by MCCM ML	Total ML
WAL 27385	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 4 Namoi Valley (Keepit Dam to Gin's Leap) Groundwater Source	38^	51	0	51
WAL 12718	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin'S Leap) Groundwater Source	102	0	0	0
WAL 12722	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin'S Leap) Groundwater Source	77	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	2	0	2
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*	333	23	356
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	0	0	0
WAL 13050	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source	3,000	0	2025	2025

[^] Additional 38ML carryover from 2017/18 Water Year

^{*} Additional 76.5ML carryover from 2017/18 Water Year

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 conditions 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;
- 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.

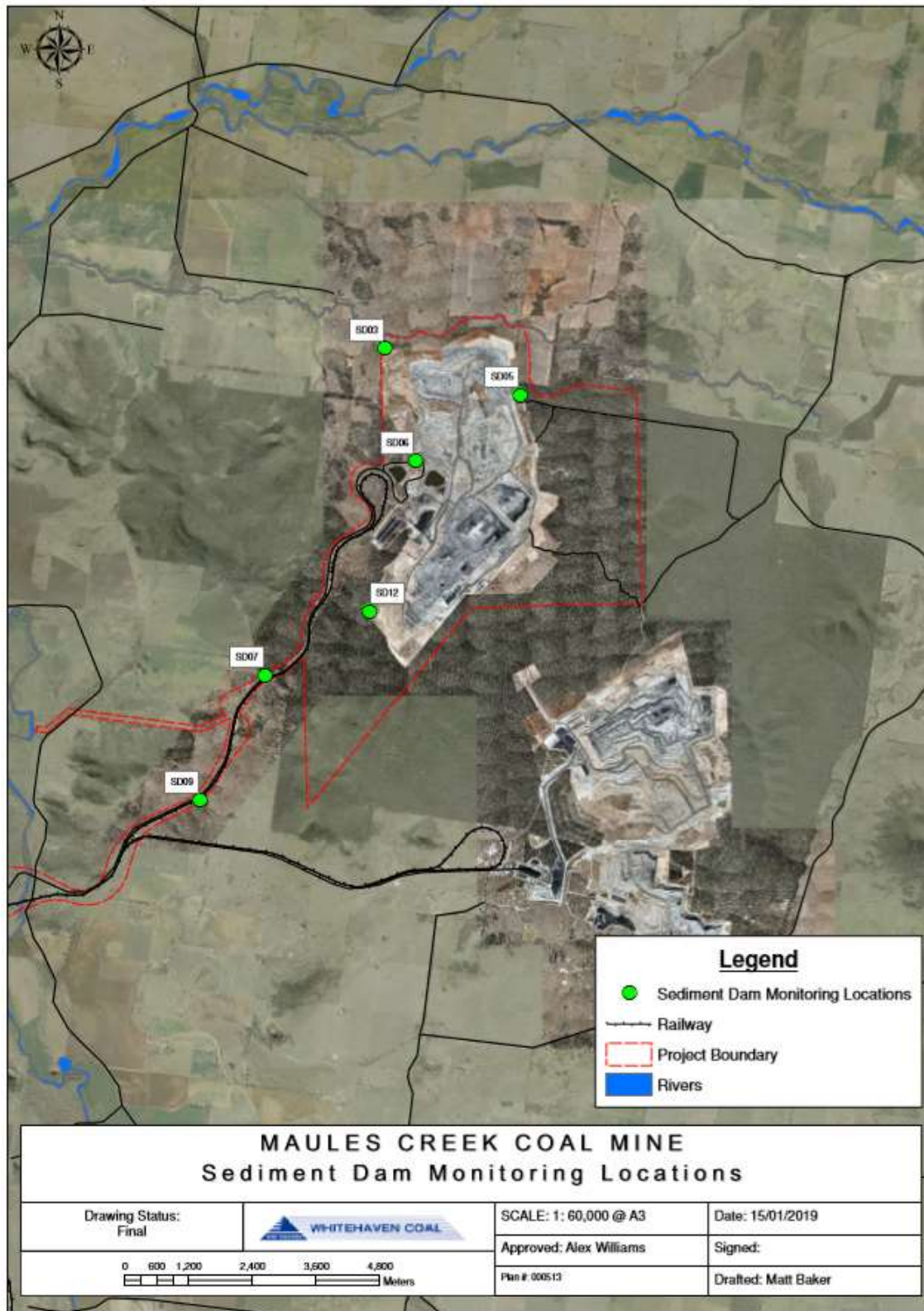


Figure 7 Sediment Dam Monitoring Locations

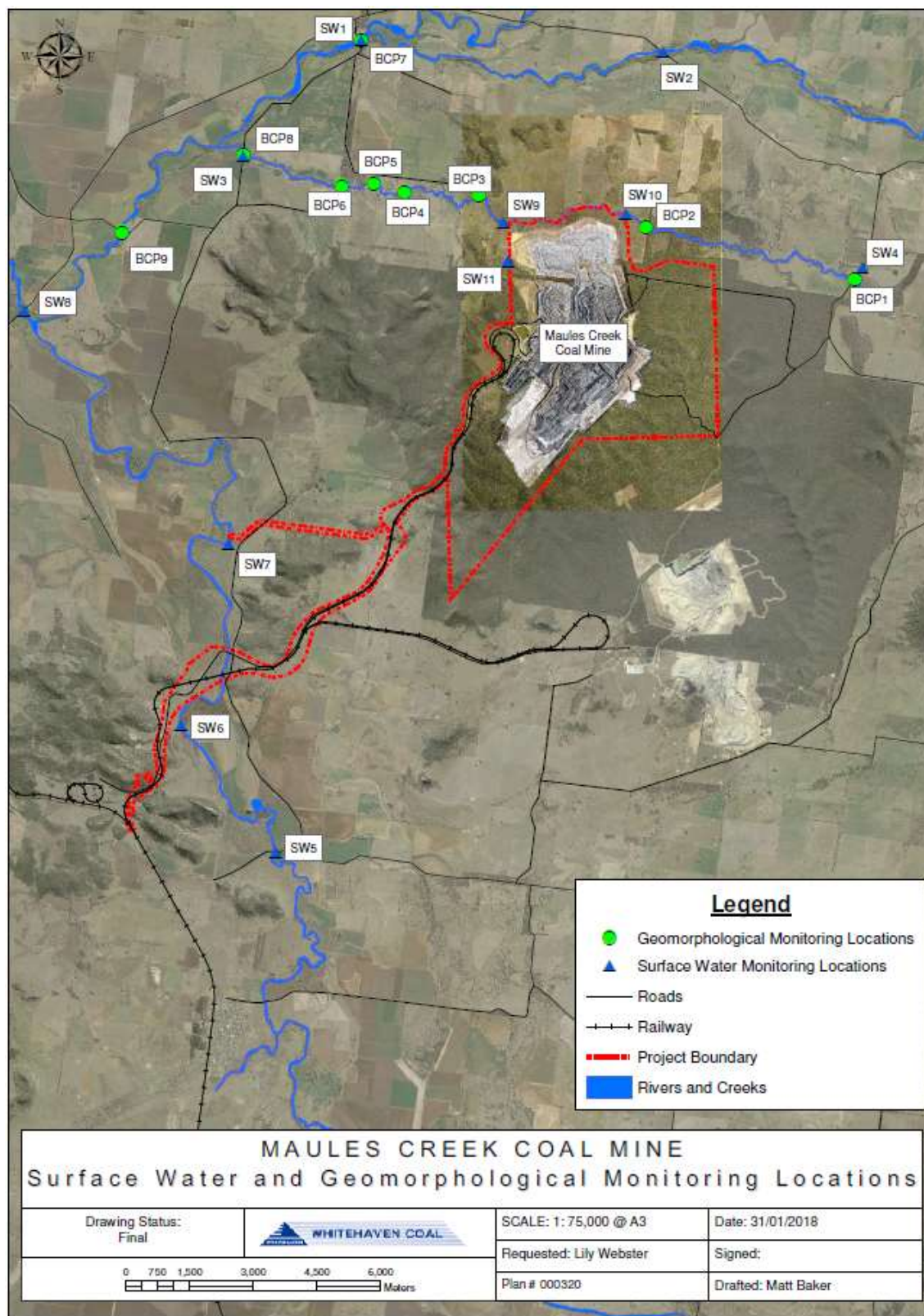


Figure 8 Surface Water and Geomorphological Monitoring Locations

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. These elevated results were recorded during flow events and are consistent with the principle of first flush within the river system. This indicates that MCCM did not impact on the metal levels recorded at these locations. Overall, 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. Water quality trends from 2014 are included in **Appendix D**. The EC, TDS and TSS values fluctuate between wet and dry periods over the monitoring periods from the commencement of monitoring.

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) in **Appendix D**. 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. 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 2019 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 2019 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. Actual Namoi River pumping inflow was much lower than predicted in the EA for Year 5 (1,620 ML). Annual 2019 rainfall was well below the historical median (approximately 10th percentile), and additional Namoi River water was likely required to offset the associated reduction in the volume of mine catchment runoff.

Wet Weather Discharge Monitoring

On two occasions during the reporting period a discharge occurred from sediment 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 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 November 2019 at upstream and downstream locations along Maules Creek, Back Creek and the Namoi River as illustrated on Figure D-4. 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 Water Management Plan (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 one Namoi River site (SW5) and three sites along Back Creek (BCP4, BCP5, BCPX). No water quality measurements were taken at SW8 (Namoi River), BCP1, BCP2, BCP3, BCP6, BCP8 (Back Creek) or either of the Maules Creek sites as these sections were dry and lacked any remnant pools.

The in situ water quality recordings for pH was within the acceptable trigger values listed in the ANZECC guidelines for all sites sampled, while Electrical Conductivity (EC) was within the trigger values for sites sampled along Back Creek, although was well above the trigger values at SW5.

Turbidity levels were significantly higher than the trigger value ranges at all sites which is consistent with the stagnant nature of the streams present during the 2019 surveys. The relative lack of macrophytes, in particular submerged macrophytes, observed within the sites is consistent with the high levels of turbidity recorded as plants are unlikely to absorb sufficient light for photosynthetic processes. This low level of macrophyte growth in turn results in a decreased food supply and paucity of microhabitats for aquatic fauna.

Dissolved oxygen recordings were outside of the accepted ranges at all sites. Levels of dissolved oxygen vary depending on factors including water temperature, time of day, depth and rate of flow. The decreased oxygen levels recorded is consistent with the observations of increased stagnation/reduced flow, with the reduced flow being influenced by the prevailing drought conditions in the region. Pollution

can also affect oxygen levels and the decreased dissolved oxygen levels correspond with observations of increased sedimentation and turbidity in the channels during the surveys. The reduced levels of dissolved oxygen are also consistent with the reduced level of macrophytes.

Elevated conductivity levels were recorded at SW5 along with correspondingly high alkalinity levels while BCPX and BCP5 showed reduced conductivity with correspondingly reduced alkalinity. The alkalinity of water is determined by the soil and bedrock through which it passes, the main sources being rocks which contain carbonate, bicarbonate, silicates or phosphates compounds. Natural impacts on conductivity in water are rain, geology and evaporation while anthropogenic impacts include road salt, septic/landfill leachate, impervious surface runoff and agricultural runoff.

The specific reasons for increased alkalinity and conductivity at SW5 is unclear. However, the site is subject to a high degree of anthropogenic disturbance and has increased temperature compared to the other sites, likely due to relatively lower proportion of shading. Therefore, it is highly likely that the high conductivity levels may be due to a combination of site-specific geology, reduced water levels/increased evaporation and anthropogenic disturbance from surrounding land uses. BCP4, BCP5 and BCPX are generally dry and the existing water at time of survey is likely due to ponding from low levels of rainfall in the nights immediately preceding the surveys. This, in combination with the difference in vegetation and bank/channel conditions compared to SW5 may be influencing the difference in conductivity and alkalinity levels.

A total of 16 taxa were recorded across the five sampled habitats (3 pools, 1 edge and 1 bed) with an average of approximately 6 taxa per habitat, which is approximately a 50% reduction compared to the 2018 survey period. Overall the highest level of taxa richness was recorded in the edge habitat at SW5 (9 taxa) while the lowest diversity was recorded in the pool at BCP4 (2 taxa).

The taxon Corixidae (Water boatman) was recorded across all habitats at all sites. Other common taxa (present in at least 3 of the 5 sampled habitats) included Notonectidae (backswimmers) and Physidae (a snail).

Lower numbers of taxa were recorded at SW5 and BCPX compared to previous years. As samples were not taken in previous survey periods at BCP4 and BCP5, direct comparisons could not be made. However, significantly lower numbers of taxa were recorded in 2019 compared to Back Creek pools samples (BCP1, BCP2, BCP6) from previous survey periods. The overall total number of taxa recorded across all sites in the 2019 surveys (16 taxa) shows a significant reduction to that recorded during the 2015 - 2018 surveys (34, 35, 31 and 35 taxa respectively). Some taxa regularly recorded in at least one site/habitat during previous monitoring periods that were absent from the 2019 survey period included Hydropsychidae (a caddisfly), Caenidae (a mayfly), Hydrochidae (a beetle), Glossiphoniidae (leeches), Coenagrionidae (a damelfly) and Libellulidae (a dragonfly).

The overall reduction in macroinvertebrate diversity is considered to be a direct artefact of the reduced water quantity and degraded habitat quality observed during the 2019 surveys as the reduced water levels from the prevailing drought conditions exacerbate/concentrate anthropogenic impacts from surrounding land uses.

The relatively low number of taxa recorded across the different habitats is likely to be due to the relatively disturbed nature of the waterbodies. The relative paucity of aquatic microhabitats are also likely contributing factors to the low numbers of taxa and individuals recorded.

Overall the waterbodies surveyed during the November 2019 monitoring surveys remained in a highly disturbed condition, a condition that was exacerbated by the prevailing drought conditions. Riparian vegetation was generally in a highly disturbed state mainly due to high levels of exotic vegetation, sediment disturbance from stock and bank erosion. Vegetation in 2019 also showed signs of reduced groundcover and decline in health of trees, likely due to water stress from prevailing drought conditions experienced during this period.

Water quality was also relatively low mainly due to lower levels of dissolved oxygen and increased conductivity which may be a reflection of stagnation and concentration of runoff/erosion. Macroinvertebrate taxa richness was significantly reduced compared to previous years and was generally dominated by pollution tolerant taxa which is likely a reflection of the decreased water quality and habitat conditions from the drought conditions and resultant exacerbation of anthropogenic disturbances experienced in 2019. The AusRivAS models also indicate a decrease in integrity in some habitats in drier periods.

7.3 GROUNDWATER

7.3.1 Environmental Management

Groundwater at MCCM is managed in accordance with:

- the groundwater criteria prescribed under schedule 3 conditions 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 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 collect pre-mining information ('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 MCCM in consultation with DPI-Water in 2013. The majority of the replacement 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 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 cumulative impact of the BTM complex on the groundwater regime. The bores were installed between 2013 and 2014 and positioned in lines radiating out from the Maules Creek Mine. The purpose of these 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 PVC monitoring bores (standpipes) for shallow strata, or arrays of multi-level vibrating wire piezometers (VWPs) installed within multiple coal seams at different depths. A pair of a shallow standpipe and a deeper VWP array was installed in some sites to allow for monitoring of the connectivity between shallow aquifers and deeper 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 monitoring and understanding connectivity between the different geological units. These bores have the prefix 'REG' indicating they are for monitoring behaviour of 'regional' groundwater systems.

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. The appendix also includes graphs that compare the measured groundwater levels with predicted water levels from the 2018 groundwater model for each bore, 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 5th and 95th 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 (until the end of 2016). Equivalent percentiles are used to assist interpretation. Trigger events occur when:

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

When evaluating the results from control charts it is important to note that water chemistry results for each bore have some natural variability, with a range determined by factors such as the bore construction, depth, sample collection method, climatic conditions, and aquifer conditions. Therefore, changes on observed trends do not necessarily indicate impact from mining, but simply trigger further investigations to determine the cause for the variability within the trends.

Control charts were developed for total dissolved solids (TDS) but not for electrical conductivity (EC) as there are no ANZECC guideline values for EC. 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 and nutrients in groundwater samples were compared against the ANZECC guideline values. The concentrations of dissolved metals are commonly low and often below the level of laboratory detection. It is important to note that the ANZECC thresholds simply provide information on the beneficial uses of the water, and are not necessarily indicators of impacts from mining.

Regional Groundwater Bores

The groundwater level trends observed during the reporting period include stable trends at MAC1280, REG13, REG14; fluctuating but overall declining trends at REG3; slightly declining trends at REG4, REG5, REG12; and steadily declining trends at RB05A, REG6, REG7A. The changes during 2019 and the long term trends since 2014 are shown on the graphs within **Appendix E**. Overall groundwater levels have decreased during the 2019 calendar year. This decline correlates with the below average rainfall and drought conditions experience during the calendar year. This is evident in the CRD plots included in Appendix E that show a declining slope due to below average rainfall and indicate the declining water levels trends observed in the regional monitoring bores are due to climatic effects, not mining.

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 Permian monitoring bores in close proximity to the mining area, as has been previously predicted by numerical modelling. The Permian monitoring locations east of the Maules Creek mining area recorded the greatest reductions in water level across the monitoring network during 2019. The monitoring network targets a range of different stratigraphic units and groundwater systems at different vertical elevations, and therefore it is not appropriate to present water level contour lines on **Figure E1**. Despite this the available water level hydrographs can be interpreted to assess hydraulic gradients vertically and spatially.

The results of pH analysis did not exceed any triggers during 2019, with the exception of REG13 in the Nov/Dec 2019 sampling round, and MAC1280. Also, in December 2018, an increase in pH was detected in some bores exceeding the trigger threshold. During 2019, all bores returned to within the trigger limits, this suggests that the increase in pH observed in some locations in December 2018 was a temporal anomaly (or problem with sampling collection/analysis), rather than an indicator of a substantial change in the system.

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. One bore triggered for TDS (REG13). In addition, seven bores triggered for sulfate; three bores were higher than thresholds (REG5, REG13, REG14), and four bores were lower (REG3, REG4, REG6, REG12). The trigger events are discussed further in Section 7.3.2.

Private Groundwater Bores

Groundwater monitoring was conducted at private bores twice during the reporting period. Not all bores could be sampled for level or quality on both occasions due to bore access restrictions or the pump not being active. Graphs showing trends in groundwater level and water quality for the private bores are included within **Appendix E**. During 2019 all of the bores recorded relatively stable groundwater levels, with the exception of WOL1 and WOL2 that recorded declining levels.

The declining trend in WOL1 commenced late 2016/ early 2017 following the last significant rainfall event in the region before drought conditions. Bore BRE2 also shows a high water level at this point in time and a slow decline during the drought. WOL2 has recorded a long term decline, with a notable increase in the rate of decline in mid 2018. The water level in this bore is expected to be influenced by the geology in the bore screen zone which can influence the water level decline and the drought conditions. WOL2 is noted as no longer being a privately used bore.

The pH, EC, TDS and sulfate concentrations all remained relatively stable during the reporting period and consistent with historical data. The sulfate concentration in BAS2 is higher than other bores, and a data point collected in 2019 is even higher if compared to results from 2014 and 2015. However, data is not available between 2016 and 2018, so it is not clear if this data point reflects a real change in the condition. The slightly increasing trends in EC and TDS observed at BRE2 during 2017 remain stable.

Vibrating Wire Piezometers

The locations of Vibrating Wire Piezometers (VWP) is illustrated in **Figure 9**. **Appendix E** includes graphs of water levels for each VWP group plus any adjacent shallow standpipe monitoring bores for the duration of the records.

The data collected by the VWP data loggers is downloaded on a monthly basis. The VWPs measure the water pressure (equivalent to water level) within selected coal seams, and show the differing groundwater levels that occur vertically within the geological sequence. The water level trends at the VWPs show cycles related to climatic conditions and mining. The VWPs within proximity to the mining areas show a depressurisation attributed to mining in alignment with 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. Graphs of annual trends at the VWPs is also included in **Appendix E**. During 2019 the groundwater level trend kept decreasing at a large number of VWP sites, continuing a trend that started since 2017. In 2019, however, the drop was slightly more pronounced at some of the locations; this reflects the effects of the ongoing drought. Three of the VWP sites with the greatest declines during 2019 (RB03, RB04, and RB05) lie close to the Maules Creek Mine which progressed below the water table in 2018. The greatest total fall in the wider monitoring network is observed in the RB04_V3 sensor (Nagero seam), which lies to the east of Maules Creek Mine.

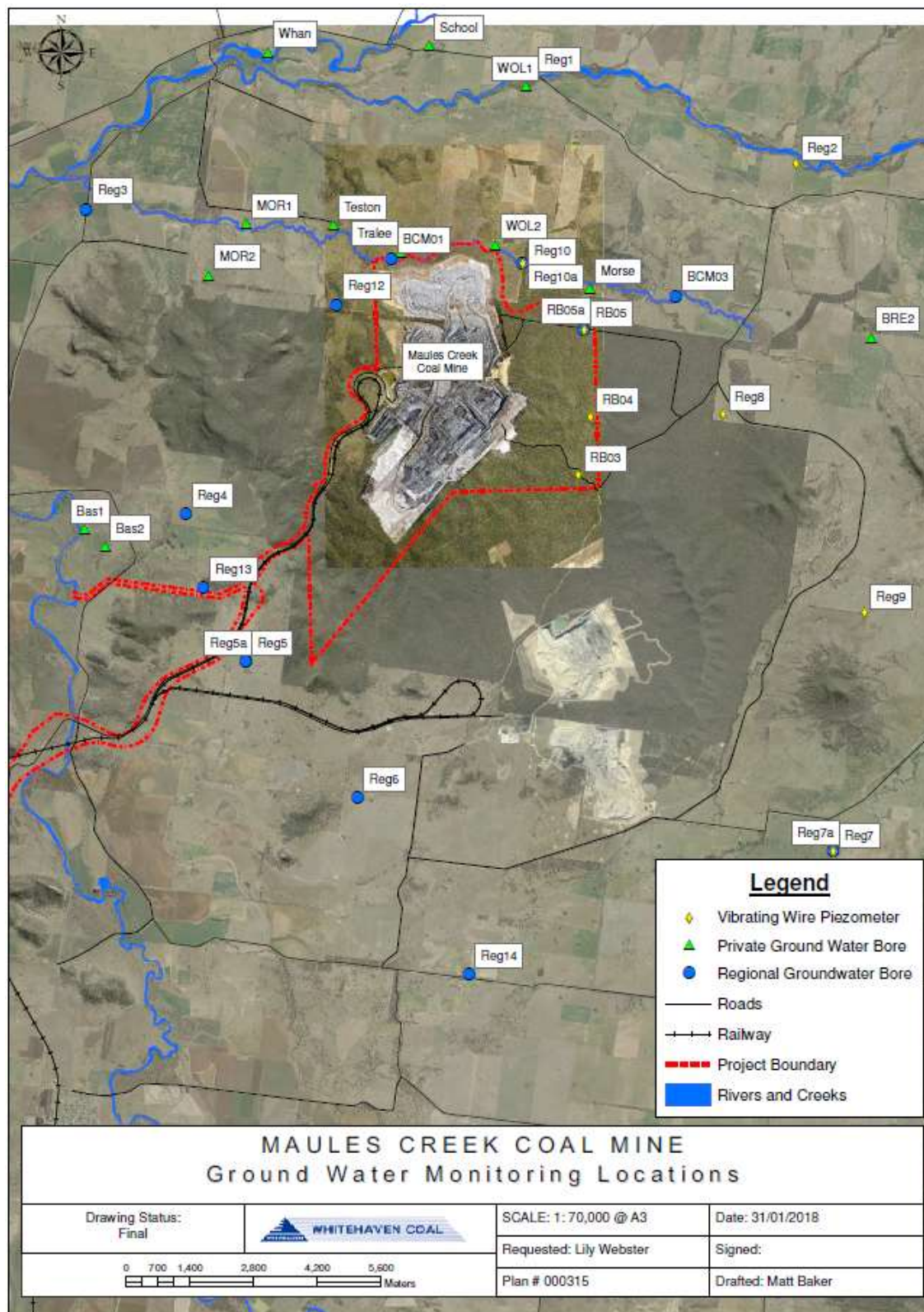


Figure 9 Ground Water Monitoring Locations

7.3.2 Trigger events

Analysis of trigger events against the WMP were undertaken and shown within figures and tables in **Appendix E**. The trigger events are also summarised below in **Table 12**. 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 and quality records within these bores will continue to be monitored and further investigated.

Table 12 Groundwater Trigger Events

Bore	Geology	Triggered?				Comment
		Level	TDS	SO ₄	pH (lab)	
MAC1280	Permian	No	No	No	Yes	pH consistently higher than trigger value since the start of sampling – attributed to cement grout usage.
RB05A	Merriown seam	Yes – falling	No	No	No	Water level falling as predicted due to proximity to active mining.
REG12	Boggabri volcanics	Yes – falling	Yes - high	Yes - low	No	The level decrease is correlated with the ongoing drought. Increased TDS potentially related to ongoing capture of natural range or ongoing drought. Peak TDS value obtained in late 2017 and beneficial use remains unchanged. Sulfate was highly variable, being low in March and September but within previous ranges in June and December.
REG13	Boggabri volcanics	Yes – stable	Yes - high	Yes – high	No	Water level stable during 2019 but higher than trigger by ~0.2m. Rise in groundwater level occurred in 2016 and is correlated with last recharge event in region. In 2019 it slightly decreased, which seems to be correlated with drought. Both events seem to be reflected in the water level very slowly (during years). High TDS and sulfate are potentially related to increase in water level or drought. Concentrations seem to be trending back to baseline conditions since June 2019. Based on this, trigger levels will be re-calculated for this bore during the 2020 annual review.
REG14	Basement	Yes – falling	No	Yes - high	Yes - high	Water level has been variable throughout the record, with levels similar to those of 2018. The past trends and bore location suggest the trigger is likely a response to nearby abstractions from the alluvium and the effects of drought rather than mining. Sulfate high in March, September and November 2019, with a sharp increase in the December 2019 sample. The sharp increase does not seem to correlate to trends in other parameters, so potential issues in sample collection/analysis need to be determined (comparing with future sampling rounds) before proceeding with further investigations.
REG3	Boggabri volcanics	Yes – falling	No	Yes - low	No	The water levels oscillate throughout the record. The past trends and bore location suggest the recent trigger is likely a combination response to the ongoing drought and nearby abstractions from alluvium, rather than mining. Based on this, trigger levels will be re-calculated for this bore during the 2020 annual review.
REG4	Boggabri volcanics	No	No	Yes - low	No	The lower sulfate trigger is very close to the median because of the low standard deviation in the data. Therefore a slight variation in concentration causes exceedance of triggers. Values are similar to previous sampling rounds and are likely to be related to natural variability.

REG5	Boggabri volcanics	Yes – low	No	Yes - high	No	The level exceeded the lower trigger in a single measurement in August 2019; however this point seems to be an “outlier”, with the general trend in 2019 well within the baseline range. Sulfate has been rising since early 2017. The rate of increase slowed during 2018 and slightly increased in 2019. The increased sulfate trend seems to be inversely related to the CRD curve, suggesting there is a direct relationship between recharge and sulfate concentration.
REG6	Boggabri volcanics	Yes - falling	No	Yes – low	No	Water levels have declined approximately 0.5 m during 2019, and approximately 2.5 m since 2018. Other bores in alluvial and Boggabri Volcanics bores closer to the mining complex (monitored by Boggabri Mine) do not show the same decline in water levels. The REG6 response therefore seems to be a local response to drought conditions. Its water level curve shows strong correlation with the CRD curve, suggesting this is the mechanism causing the decline. Sulfate rose above the upper trigger value for one sample in March 2019, but returned to within the baseline range in the next sampling rounds. Based on this, trigger levels will be re-calculated for this bore during the 2020 annual review.
REG7A	Alluvium	Yes - falling	No	No	No	The water level decline observed in 2019 is a continuation of the trend observed after the sudden rise following the large recharge event in late 2016, and a repeat of the falling trend seen prior to the 2016 recharge event. The decline to below the trigger value is likely a result of the drought conditions. Based on this, trigger levels will be re-calculated for this bore during the 2020 annual review.

7.3.3 Groundwater Inflows

There has been an increase in the estimated (surface water balance) groundwater inflows over the last two years, from less than 10 ML/year in 2017, to 578 ML/year in 2018 and 233 ML/year in 2019 (WRM, 2020). This reflects the deepening of the pit below the regional water table. As mining progresses, groundwater inflows are predicted to vary with the changing mine layout, depending on the interception of porous rock water sources and the area of the mine being developed.

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. The groundwater model was further updated in 2018 (AGE, 2018). The Maules Creek mine plan used in the 2018 model update was the same as used in the 2014 model and to date the depth of actual mining has been shallower than the mine plan represented in the groundwater model.

The 2014 model predicted groundwater inflows of approximately 103 ML/year (0.28 ML/day) into the open cut for 2019 (as model yr1 is 2015), and the 2018 model predicted 233 ML/year (0.6 ML/d). These values are approximately 44% - 100% of the estimated inflows from the site water balance model (WRM, 2020). The initial discrepancy between the model estimates is likely due to a range of factors including the depth and footprint of mining in the models, the uncertainty involved in accurately estimating groundwater inflows using the water balance method grouping of coal seams in the numerical model, higher bedrock permeability than modelled, and non-uniqueness in the model calibration. The match in values for 2019 between the 2018 groundwater model and the surface water balance means there is good correspondence between them; however, the groundwater model did not consider the drought conditions. Therefore although the model does include a dry 2017 it does not represent the ongoing

significant drought that has been occurring around Maules Creek during 2018 and 2019. Including the drought, the groundwater model predictions would have been slightly lower.

Monitoring bores to the east of Maules Creek Mine (RB03, RB04, RB05, REG08, REG10) have shown continued or increased drawdown trends in 2019 compared to previous years. This depressurisation of the coal seams is expected to be a response to mining at Maules Creek since the pit floor moved below the water table. Additionally, Boggabri Mine is progressing northwards towards Maules Creek Mine, and a cumulative impact is likely to be contributing to the observed depressurisation.

Inflows for the 2019 calendar year have been attributed to the different groundwater licenses held by Maules Creek (listed in **Section 7.1**) using the proportional impacts predicted from the groundwater model for each water source as a guide.

It must be highlighted that the passive take from the alluvial Upper and Lower Namoi Groundwater Sources cannot be directly measured or validated, and therefore the takes must be estimated via numerical groundwater modelling, and validated through groundwater level monitoring between the mines and the alluvial zones. There is therefore an inherent uncertainty in the estimates of the passive takes from the alluvial aquifers that cannot be reduced as direct measurement of this flow change is not possible

7.3.4 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 groundwater model was updated and recalibrated in 2017-2018 (AGE, 2018). Modelled water levels for the 2018 model are provided in Appendix E for comparison with observed monitoring data. The 2018 groundwater model contains observed rainfall data to December 2017, and uses a synthetic average rainfall dataset after that time. Therefore although the model does include a dry 2017 it does not represent the ongoing significant drought that has been occurring around Maules Creek during 2018 and 2019. Overall, the trends observed in the standpipe monitoring bores are comparable, even if the matches to absolute water level elevations are variable. The modelled VWP results show similar trends to the observed data. Some mismatches observed during 2019 are highly correlated to the ongoing drought, as would be expected because the drought is not represented in the model. It is acknowledged the model's ability to replicate the VWP vertical hydraulic gradients could be improved at several locations. Updates to the model were occurring at the time of writing and planned for completion in 2020 calendar year.

Estimated pit inflows have decreased in 2019 compared to the previous year. The estimated inflow of 233 ML/year (0.64 ML/d) (WRM, 2020) shows a good match with the groundwater model as discussed in **Section 7.3.3**.

7.3.5 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 started being undertaken in 2019, and are planned to be completed in 2020.

7.4 SITE WATER BALANCE

The site water balance for the reporting period is presented below in **Table 13**.

A review of the water balance found that inflows to the site during the reporting period were higher than 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 below the water year period of 2018/2019 (see Table 12) however significantly lower than that predicted for year 5 due to lack of flow. Additional ground water bores were acquired during the reporting period. A series of pipelines were constructed to transport groundwater to the existing pipeline that runs from the river pump into the raw water dam.

Annual 2019 rainfall was below the historical median and additional ground water was required to offset the reduction in rain fall and runoff. Net CHPP water usage was less than that modelled for year 5 and 10. Dust suppression usage was higher than those predicted in year 5, this was due to the dry conditions being faced by the region. Additional water was needed for dust suppression on haul roads and active pit areas.

Negligible groundwater inflows were recorded in prior years. Over the last 2 reporting years notable groundwater inflow was observed in the operation. This is likely to be attributed to the mining sequence progressing deeper within the stratigraphy, resulting in increased groundwater inflow from the coal seams.

Table 13 Site Water Balance (Calendar Year 2019)

Aspect	Volume (ML)
Change in Storage	
Start of 2019	1,537
End of 2019 ²	454
Net Change in Storage	-1,083
Water Inflows	
Namoi River Pumping	275
MAC1498 Bore	73
Olivdene Bore	46
Brighton Bore	153
Roma Bore	230
BCM Bore	410
Rainfall & runoff [^]	655
CHPP Water Recycling	2,392
In-pit Groundwater Seepage ⁴	233
Total Inflows	4,467
Water Outflows	
CHPP water use	3,428
Dust suppression	1,672
Evaporation from storages ³	395
Clearing / construction process water	55
Miscellaneous (wash-down bay, etc.)	-
Total Outflows	5,550
Water Balance (2019)	-1,083

* Volume for calendar year

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

Based on flow meter readings

[^] Based on the calibrated MCCM water balance model, using site rainfall data

³ Based on the calibrated MCCM water balance model, using SILO datadrill evaporation data

⁴ 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. Progressive shaping occurred on the northern emplacement, with approximately 115 hectares prepared with subsoil and topsoil applied to the final landform. At the end of 2019 60 hectares of land were being prepared for rehabilitation.

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 14** and also included in the MOP.

Table 14 Rehabilitation Objectives

Feature	Objective
Mine site	• Safe, stable and non-polluting • Constructed landforms drain to the natural environment
Final void	• Minimise the size and depth of the final void as far as is reasonable and feasible • Minimise the drainage catchment of the final void as far as is reasonable and feasible
Surface Infrastructure	• To be decommissioned and removed, unless the Executive Director Mineral Resources agrees otherwise
All land, other than the final void	• Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: ○ local native plant species; and ○ 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).
Community	• Ensure public safety • Minimise the adverse socio-economic effects associated with mine closure

Rehabilitation Performance Indicators **Table 15** summarises the rehabilitation status for the MCCM. Short term (or temporary) rehabilitation occurred from the construction phase and 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 15 Rehabilitation Status

Mine Area Type	Previous Reporting Period 2018	This Reporting Period 2019 (Actual)	Next Reporting Period 2020 (Forecast)
A. Total mine footprint	1,347	1,362	1,433
B. Total active disturbance	1,624	1,659	1,676
C. Land being prepared for rehabilitation	57	60.46	74
D. Land under active rehabilitation	5.58	115.03	190
E. Completed rehabilitation	-	-	-

Decommissioning and Demolition Activities

As anticipated in the MOP, no decommissioning activities of permanent infrastructure was undertaken during the reporting period.

8.1.3 Other Rehabilitation Activities

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

8.1.4 Departmental Sign-off of Rehabilitated Areas

Departmental sign-off has not been requested.

8.1.5 Variations in Activities against MOP/RMP

A new MOP was approved during the 2018 reporting period that included modifications and refinement to the mine design, topsoil stockpiles, completion criteria description, rehabilitation trials and disturbance areas within the MOP term. The MOP was approved for the period November 2018 – January 2023 and is available on the Whitehaven Coal website.

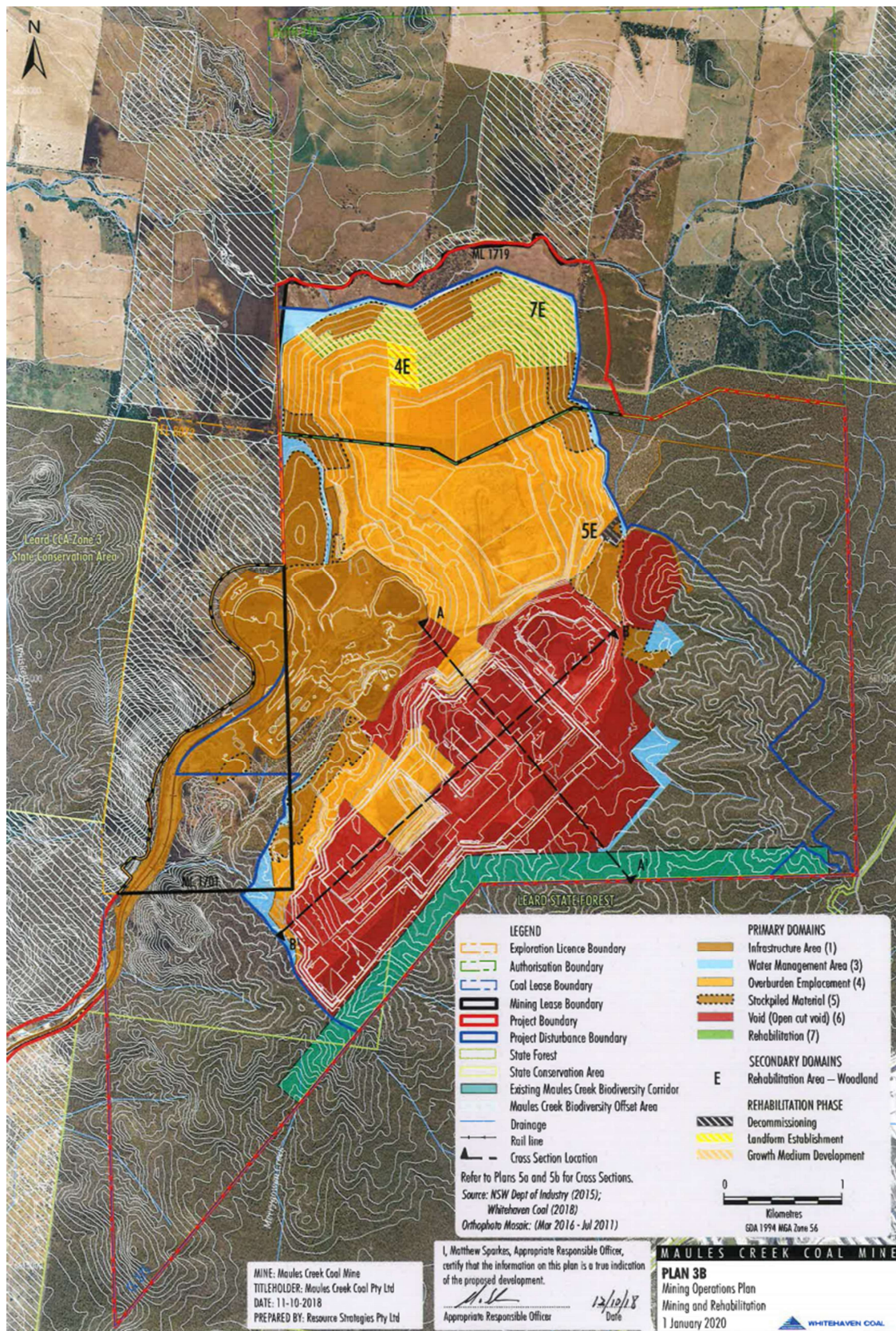


Figure 10 Mining Domains at Completion of the Reporting Period (2019)

8.1.6 Monitoring

Progressive bulk shaping, soil amelioration and topsoil placement on rehabilitation was undertaken in the reporting period. Accordingly, there are no monitoring results to report for the 2019 period. Visual inspections of short term (or temporary) rehabilitation are undertaken to assess surface stabilisation around infrastructure areas and topsoil stockpiles.

8.1.7 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 16**. 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 16 Topsoil Balance

Topsoil Balance (M ³)							
Area	2014	2015	2016	2017	2018	2019	Total
MIA / Construction	539,166	145,990	-	-	-	-	685,156
Mining Operations	252,490	349,928	852,524	762,718	251,075	225,173	2,693,908
Still to clear / strip	-	-	-	-	-	-	579,500
Totals	791,656	495,918	852,524	762,718	251,075	225,173	3,958,564
EA Total for rehab	-	-	-	-	-	-	2,368,000
Net difference	-	-	-	-	-	-	1,590,564

8.1.8 Trials, Research Projects and Initiatives

In accordance with Condition 15 & 16 of the MCCM EPBC Approval 2010/5566, 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; Maules Creek Coal funded the following activities during 2018 including:

- Annual surveys were undertaken at over 1000 potential Swift Parrot foraging habitat sites across their breeding range in Tasmania during Spring 2018 with Swift Parrot presence-absence and abundance was recorded at each site;

- Twice yearly rapid assessment monitoring (five minute bird surveys in May and August 2018) of over 800 historical or potential Regent Honeyeater habitat sites across Victoria and NSW that is used to identify likely breeding sites to target for additional monitoring;
- Research to investigate if there are more effective field techniques (particularly ultrasonic detection) to survey for the South-eastern Long-eared Bat and determine detection probability using conventional trapping techniques to clarify the distribution patterns of the species with targeted surveys to determine the roosting requirements during both the non-breeding and breeding seasons;
- Germination trials of insitu seed out of the seed bank of natural and stockpiled soil samples at the Maules Creek Coal Mine is close to completion due to very few new germinant being recorded in the hot house experiments. Research will now move to focus on using microscope identification and analysis of seeds found within the sampled soil by sieving methods; and
- Preliminary root architecture assessment was undertaken of ten Box-Gum Woodland tree species at Maules Creek Coal Mine mapping the structural and tree protection zones of root systems and comparing to profiles and physical/chemical properties of insitu soils.

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.

The conceptual design of an area of rehabilitation on the northern emplacement area utilising geomorphic landform design principles was developed during 2018. This was trialled in 2019 and will involve establishment of an area to provide a landform with variable relief in shape without traditional linear contour bank drainage systems. Additional trials will be completed in 2020.

8.1.9 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.). An updated 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.

8.1.10 Actions for the next reporting period

The rehabilitation actions and detailed justification for the next reporting period will be detailed in the MOP. Rehabilitation is continuing on the northern overburden emplacement area.

8.1.11 Proposed Research and Rehabilitation for 2020

MCCM will continue to progressively shape available areas that are at final landform and elevation for rehabilitation. Continuing shaping and rehabilitation of available areas will be targeted in the north-eastern extent of the overburden emplacement during the 2020 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 joint meetings between Maules Creek Coal, Boggabri Coal and Tarrawonga Coal Mines CCC's were held in May and October 2019. 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 and business 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 included:

Australian Indigenous Oztag
Boggabri Workshop
Boggabri Aged for Home
Boggabri Business & Community Progress Association
Boggabri Public School
Boggabri Rotary Club
Children's Charity Network
Clontarf Foundation
Country Education Foundation of Australia
Dorothea Mackellar Memorial Society
Eulah Creek Recreation Reserve Trust
Forest Coach Lines Pty Ltd
Gunnedah Community Scholarship Fund
Killarney Bike Classic Committee

Life Without Barriers Narrabri
Lions Club of Boggabri
Manilla Minor League
Manilla Show Society
Maules Creek Campdraft Club
McGrath Cancer Foundation
Men of League Foundation
Narrabri & District Chamber of Commerce
Narrabri Community Radio
Narrabri High School
Narrabri Jockey Club
Narrabri Local Aboriginal Land Council
Narrabri Public School P & C Association
Narrabri Shire Council
Narrabri Show Society
Nosh Narrabri Committee
NW Courier - Narrabri
Role Models and Leaders Australia Ltd
Rotary Australia Districts
Rotary Club of Narrabri
Sacred Heart School P & C
Wean Amateur Picnic Race Club
Westpac Rescue Helicopter Service
Winanga-Li Aboriginal Child & Family Centre

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.

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 701 with over 60% residing in the local area, which is the same as 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 MCCM workforce at the end of the period:

- 85 (approximately 12%) are Indigenous, with the percentage down from 14% on the previous reporting period;
- 94 (approximately 13%) are women, with the percentage remaining the same as the previous reporting period; and
- 35 commenced roles as a Trainee Operator (new to mining).

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 four (4) locals accepted positions as one (1) auto electrician, one (1) HV electrician, and two (2) Diesel mechanics as part of the WHC MCCM apprenticeship program. This takes the total number of apprenticeships accepted under the program to 50, since 2011.

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 2019 Whitehaven spent:

- \$204.5m in salaries, wages, taxes and superannuation to employees (on an equity joint venture basis)
- \$161.3m in royalties to the New South Wales Government (on an equity joint venture basis)
- Over \$732.3m on mining, washing and delivering coal onto trains at our mine sites
- Over \$335.9m in port and rail charges for track access haulage costs and port costs

Community Infrastructure

During the reporting period MCCM paid Narrabri Shire Council (NSC) over \$700,000 under its VPA as a result of coal sales directly from the MCCM, to be spent on further infrastructure projects.

During the 2019 period WHC spent approximately \$384 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 (1800 628537) for the MCCM and 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 17**. The Community Complaints Register is also available on the Whitehaven Coal website and a summary provided at CCC meetings.

Table 17 Summary of Community Complaints and Enquiries

Category	2018	2019
Air quality	4	5
Traffic	0	5
Lighting	0	0
Noise	36	1
Blasting	16	9
Social impacts	0	1
Other	0	0
TOTAL	56	21

Note: a single complaint may involve multiple categories.

9.3.1 Complaint Trends

The total number of complaints received in 2019 is significantly lower than those recorded in the 2018 reporting period.

Traffic complaints for 2019 increased to five up from zero in 2018. Three of these complaints related to traffic management and traffic control undertaken as part of the pipeline build on Therrabri Road. Of the remaining two, one related to a WHC employee driving a personal car in Narrabri Township outside of work hours. The remaining complaint related to a delivery driver, however during the investigation it was found that they weren't not servicing MCCM at the time of the complaint.

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 INDEPENDENT REHABILITATION AUDIT

In response to a notice under section 240(1)C issued by DPIE in April 2019, an audit was undertaken on Maules Creek Coal's rehabilitation progress. As a result of the audit the actions presented in **Table 18** were proposed.

Table 18 Summary of Rehabilitation Audit

Theme	Proposed measures or actions	Outline of the implementation of works	Current Status	Indicative Timeline
Progressive rehabilitation	Annual rehabilitation planning process	Develop and implement an annual rehabilitation planning process that details how the annual rehabilitation targets will be met. Include suitable drought adaptation and resilience components and integrate into the rehabilitation plan. These components should detail protocols to facilitate successful ecosystem establishment and sustainability in the context of current and future climatic conditions of north-western NSW. To facilitate this, the Annual Rehabilitation Plan should detail and document protocols and procedures for: · Achieving MOP commitments; · management and/or risk assessment tools for post-mining ecosystem rehabilitation (e.g. Halwatura et al. 2015); · predicting seasonal conditions; · monitoring environmental conditions (e.g. soil moisture); · risk and triage analyses of current and future rehabilitation investments.	An annual rehabilitation planning document is being developed, this will feed into the short term planning document identified in Item 2.	Dec 2020

Theme	Proposed measures or actions	Outline of the implementation of works	Current Status	Indicative Timeline
Progressive rehabilitation	Mine planning– Rehabilitation Program Integration	Enact a program to integrate rehabilitation into mine planning activities, Including Soil management.	A short term planning document is being prepared. This will include all rehabilitation activities into the short term mine plan	Dec 2020
Record keeping & Monitoring	Record keeping practices review	Implement a procedure for rehabilitation-, soil-, vegetation- and biodiversity- monitoring and record keeping practices with the objective of ensuring that the requirements specified in applicable plans, programs and strategies are recorded and controlled include tracking the implementation of corrective actions. The specified procedure should include (without limitation) detail on how required corrective measures are recorded and controlled.	Whitehaven Coal Rehabilitation Monitoring Plan under development. This plan will standardise record keeping for rehabilitation projects.	Dec 2020
Record keeping	Rehabilitation spatial data maintenance	Implement a protocol of keeping rehabilitation data up to date with Rehabilitation Phase changes. This should include integrating data attributes relating to rehabilitation (e.g. ameliorant application rate, seed mix, soil source) into the rehabilitation polygon feature class. This data can then be utilised to understand contributing factor into rehab success or failure.	Rehabilitation to be included in the monthly survey. This information will be captured and reported in accordance with the Rehabilitation Monitoring Plan Item 3.	Dec 2020

Theme	Proposed measures or actions	Outline of the implementation of works	Current Status	Indicative Timeline
Biodiversity Management	Weed monitoring and management	Implement a weed monitoring procedure within the lease boundaries. The developed methodology should be implemented with the objective of delivering data such that weed treatment can: • ensure that obligations under the Biosecurity Act 2015 can be met; • ensure that weed densities do not interfere with any of the rehabilitation performance indicators; and • track weed treatment effectiveness and weed population dynamics.	Currently the weed monitoring procedure is imbedded in the site Biodiversity Management Plan. A standalone document will be created from the approved BMP.	Dec 2020
Training & development: organisational learning	Rehabilitation knowledge sharing program	Implement a process for rehabilitation-, soil-, vegetation- and biodiversity- related knowledge sharing between business units to appropriately utilise the knowledge, skills and resources already existing in the organisation.		Dec 2020
Soil Management and Growing Media Development	Soil management review and Action Plan	Implement a monthly review process of any activities that have been undertaken in association with the following three soil management stages: • Topsoil Stockpile Destination • Topsoil Rehandle (ie. stockpile relocation) • Rehabilitation Management are then to ensure that all specific soil handling management task events have been undertaken in accordance with the Soil Management Protocol (MOP app D s 1.2), and ensure corrective actions are taken in instances where they have not.		Oct - 2020

Theme	Proposed measures or actions	Outline of the implementation of works	Current Status	Indicative Timeline
Soil Management	Stockpile Management	Implement the following soil management-related actions: • conduct a strategic analysis of potential alternative or additional soil storage locations; - and • seed current topsoil that will be in storage for over one year with native grasses and understorey mix.	Additional soil location areas have been reviewed. Currently no additional areas would be available outside of the mining area and inside of the disturbance boundary. Topsoil stockpiles will be seeded, utilising the current seed mix used for ecosystem establishment	

10.2 INDEPENDENT ENVIRONMENTAL AUDIT

An IEA was undertaken in 2018 by an independent consultancy approved by the DP&E as required under Schedule 5, Condition 10 of the PA10_0138.

The following actions were identified during the 2018 IEA in **Table 19 below**. A copy of the audit report and the action plan in response to the audit recommendations is available on the Whitehaven Coal website. These include recommendations that may have been relevant during the audit period however outside the applicable Annual Review reporting period.

Table 19 IEA Recommendations and Actions

Item	Assessment requirement	Auditor recommendation	Proposed Action	Estimated completion date						
Sch 2 Cond 10	<i>By the end of 2013, or as otherwise agreed by the Secretary, the Proponent shall surrender the existing development consent (i.e. DA85/1819) for mining on the site in accordance with Section 104A of the EP&A Act.</i>	This is a legacy Administrative Non Compliance. MCCM satisfied the requirements of this condition during the current audit period, however the required date was not met. No further action required.	No further action required	Not applicable.						
Cond 17	<i>By the end of March 2013, unless the Secretary agrees otherwise, the Proponent shall enter into a planning agreement with Council in accordance with:</i> <i>(a) Division 6 of Part 4 of the EP&A Act; and</i> <i>(b) the terms of the Proponent's offer in Appendix 3.</i>	No further action required as this is a legacy ANC relating to timeframe.	No further action required	Not applicable						
Sch 3 Cond 7	Noise Criteria <i>Except for the noise affected land in Table 1, the Proponent shall ensure that operational noise generated by</i> <table><tr><td colspan="2">Table 5: Noise criteria dB(A)</td></tr><tr><td>Land</td><td>Day/Evening/Night L_{Aeq}(5 min)</td></tr><tr><td>All privately-owned residences</td><td>35</td></tr></table> Note: - Noise generated by the project is to be measured in accordance with the (including certain meteorological conditions) of the NSW Industrial Noise Policy - Operational noise includes noise from the mining operations and the use of <i>the project does not exceed the criteria in Table 5.</i> <i>However, these noise criteria do not apply if the Proponent has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.</i>	Table 5: Noise criteria dB(A)		Land	Day/Evening/Night L_{Aeq}(5 min)	All privately-owned residences	35	MCCM is to ensure that all noise mitigation measures are implemented and TARPs are monitored and responded to accordingly to minimise the potential for noise exceedances.	MCC will continue to monitor real time noise levels and respond to TARP levels and responsibilities specified within the NMP. Attended monitoring results and compliance will be reported within the required external reports (EPL monthly report and Annual Review).	Ongoing
Table 5: Noise criteria dB(A)										
Land	Day/Evening/Night L_{Aeq}(5 min)									
All privately-owned residences	35									
12	Attenuation of Plant <i>The Proponent shall:</i> <i>(a) ensure that:</i> <i>all mining trucks and water carts used on the site are commissioned as noise suppressed (or attenuated) units;</i> <i>ensure that all equipment and noise control measures deliver sound power levels that are equal to or better than the sound power levels identified in the EA, and correspond to best practice or the application of the best available</i>	MCCM needs to continue to implement improvement of controls to reduce the sound power levels of the equipment that exceeds the EA criteria.	MCCM will continue to undertake SPL testing and report on mitigation measures within the Annual Review.	Ongoing						

	technology economically achievable; • where reasonable and feasible, improvements are made to existing noise suppression equipment as better technologies become available; and (b) monitor and report on the implementation of these requirements annually on its website.			
24	BLASTING Operating Conditions The Proponent shall not undertake blasting on-site within 500 metres of: (a) any public road without the approval of Council; or. (b) any land outside the site that is not owned by the Proponent, unless: • the Proponent has a written agreement with the relevant landowner to allow blasting to be carried out closer to the land, and the Proponent has advised the Department in writing of the terms of this agreement, or • the Proponent has: ○ demonstrated to the satisfaction of the Secretary that the blasting can be carried out closer to the land without compromising the safety of the people or livestock on the land, or damaging the buildings and/or structures on the land; and ○ updated the Blast Management Plan to include the specific measures that would be implemented while blasting is being carried out within 500 metres of the land.	No further action required, as all necessary agreements are now in place.	Complete	Complete
33	AIR QUALITY & GREENHOUSE GAS Operating Conditions The Proponent shall: (a) implement best management practice to minimise the off-site odour, fume and dust	No further action required as the predictive model is now operational and the official caution related to a specific event with no ongoing air quality impacts.	Operation of the predictive tool is implemented and safeguards in place to ensure continued operation.	Complete

	emissions of the project, including best practice coal loading and profiling and other measures to minimise dust emissions from coal transportation by rail; (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 to guide the day to day planning of mining operations and implementation of both proactive and reactive air quality mitigation measures (such as relocate, modify and/or suspend operations) to ensure compliance with the relevant conditions of this approval; (c) manage PM2.5 levels in accordance with any requirements of an EPL; (d) minimise the air quality impacts of the project during adverse meteorological conditions and extraordinary events (see note d in condition 29); (e) minimise any visible off-site air pollution; (f) minimise the surface disturbance of the site generated by the project; and (g) co-ordinate the air quality management on site with the air quality management at other mines within the Leard Forest Mining Precinct to minimise the cumulative air quality impacts of the mines, to the satisfaction of the Secretary.			
66	Rail Transport Within 12 months of the completion of the Gunnedah Traffic Study, the Proponent shall: b) provide a report of the outcomes of this liaison and identify reasonable and feasible proposals recommended by the Proponent and/or the Gunnedah Shire Council towards implementing the Study's recommendations, to the satisfaction of the Secretary.	No further action required as this is a legacy ANC.	No further action required.	Complete.
70	WASTE The Proponent shall: (a) implement all reasonable and feasible measures to	Review waste management practices around segregation of waste.	Reviewed. New waste management	Complete.

	<i>minimise the waste (including coal reject) generated by the project;</i> <i>(b) ensure that the waste generated by the project is appropriately stored, handled and disposed of; and</i> <i>monitor and report on the effectiveness of the waste minimisation and management measures in the Annual Review.</i>		contract provider implemented.	
Schedule 4 Condition 2	NOTIFICATION OF LANDOWNERS/TENANTS <i>Prior to entering into any tenancy agreement for any land owned by the Proponent that is predicted to experience exceedances of the recommended dust and/or noise criteria, or for any of the land listed in Table 1 that is subsequently purchased by the Proponent, the Proponent shall:</i> <i>(a) advise the prospective tenants of the potential health and amenity impacts associated with living on the land, and give them a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time);</i> <i>(b) advise the prospective tenants of the rights they would have under this approval; and</i> <i>(c) request the prospective tenants consult their medical practitioner to discuss the air quality monitoring data and predictions and health impacts arising from this information, to the satisfaction of the Secretary.</i>	No further action required given that Tenancy Agreement is in accordance with this condition.	No further action required.	Complete.
Schedule 4 Condition 13	Online Communication of Onsite Activities and Monitoring of Noise and Air Quality <i>The Proponent shall, within 3 months of the date of this approval:</i> <i>(a) make the following information for the project publicly available on its website, on a daily basis and in a clearly understandable form:</i> <i>daily weather forecasts for the coming week;</i> <i>proposed operational responses to these weather forecasts;</i> <i>real-time noise and air quality monitoring data (subject to any necessary caveats); and</i> <i>any operational responses that were taken in</i>	MCCM should include on its website details about its daily "operational responses" to the weather forecast.	Complete. Daily website details now address the recommendation. Additionally, operational responses are already included within the respective management plans. Furthermore, a daily risk output from 'Envirosuite' informs weather conditions and risk levels, with controls already identified within the management plans applied accordingly. An administrative change was made to the new website format to include reference to proposed operational responses.	Complete

	response to the noise and air quality monitoring data, and (b) make provision on its website for the provision of on-line and/or email comments by members of the community regarding this information, to the satisfaction of the Secretary			
Appendix 5 Statement of Commitments	Mining Operations Maules Creek Coal shall surrender its existing development consent DA 85/1819 following the grant of the Project Approval.	Refer to CoA Schedule 2 condition 10. This is a legacy ANC. No further action required.	No further action required.	Complete.
Coal Lease 375				
Condition 10.	Blasting Blast Overpressure The lease holder must ensure that the blast overpressure noise level generated by any blasting within the lease area does not exceed 120 dB (linear) and does not exceed 115 dB (linear) in more than 5% of the total number of blasts over a period of 12 months, at any dwelling or occupied premises, as the case may be, unless determined otherwise by the Department of Environment, Climate Change and Water.	Refer to CoA Condition 18.	Noted. No further exceedances have occurred since this event. This unit was on mine owned land.	Not applicable.
Condition 14	Roads and Tracks During wet weather the use of any road or track must be restricted so as to prevent damage to the road or track.	MCCM should endeavour and commit to restricting unnecessary traffic movement on roads and tracks in wet weather.	The Resources Regulator completed an audit in May 2018 and identified this condition was compliant. Many tracks and roads are inaccessible in wet conditions. Pre-work notification to biodiversity contractors is provided to specify the level of access permitted, including excluding access where required. Section 6.12 of the Biodiversity Management Plan addresses control of access and designated tracks. No further controls are proposed.	Not applicable
CoA PA10_0138 Management Plans				
25	Blast Management Plan The Proponent shall prepare and implement a Blast Management Plan	Ensure approval records for all plans requiring Secretary approval are maintained.	Noted.	As required

	for the project to the satisfaction of the Secretary.	Ensure that all blast notifications are issued in accordance with the BMP.		
45	<i>Revised Biodiversity Offset Strategy</i> <i>The Proponent shall prepare and implement a revised biodiversity offset strategy for the identified offset areas in Table 16 to the satisfaction of the Secretary. The revised Strategy must:</i> <i>(a) not reduce the size or quality of the proposed offset areas;</i> <i>(b) be consistent (as far as is possible) with the recommendations and objectives of the Leard Forest Mining Precinct Regional Biodiversity Strategy;</i>	There is an opportunity to update the BOS to ensure the consistency as required by condition (b).	Noted. The BOS has been revised to align, as far as possible, with the objectives of the RBS and is still pending approval from DP&E.	Complete.

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 2019). Further details of any actions undertaken or proposed for non-compliances, including within the following reporting period, are summarised in **Table 20**.

Table 20 Non-Compliance Details and Proposed Action Plan

Non - Compliance	Date / Location	Cause	Action Plan	Estimated Completion Date
Schedule 3 Condition 12 a)	1/8/2020 MCC CHPP	Technical non-compliance of a limited number of individual items. Overall site sound power level is compliant.	Continue maintenance program, testing and reporting	Complete
PA10_0138 Schedule 3 Condition 7	NM 1	Impact noise audible on one occasion.	MCC completed a number of mitigating actions in accordance with the controls specified in the approved MCC Noise Management Plan. Real time monitoring units were in operation and being monitored by the dispatch team. The production team and supervisor undertook various control measures, including modifying operation of equipment. Further investigation was also undertaken in relation to the event by operational and environmental personnel.	Complete

11.2 REPORTABLE INCIDENTS OR EXCEEDANCES

There were no reportable incidents during the period. **Section 6.4.2** outlines the exceedances which were recorded during 2019. Other exceedances related to air quality were investigated and not attributed to mining activities (i.e. 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. There were no penalty notices received during the reporting period.

- Notice under section 240(1)(C) issued by DPIE in April. Actions arising from the S240 are discussed in **Section 10**.
- An Official Caution from DPIE-RR was received in July in relation to Schedule 5 Condition 4 of the approval regarding the submission of the annual review after the specified date. This has been noted by MCC and for any future extensions both DPIE and RR will be consulted.
- An Official Caution was received from DPIE-RR in October in relation to AUTH346 condition 6 – Failure to notify 14 days prior to undertaking surface disturbance activities associated with assessable prospecting.

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 continuing 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)
3/01/2019	15:45	JEA03-35-OB & TNN06-35-OB	0.14	93.6	0.13	94.6	0.11	87.4	0.3	93.7
7/01/2019	15:33	TSM-06-43-OB & TES06-45-OB	0.12	92.6	0.14	93.4	0.13	100.5	0.19	97.3
10/01/2019	15:33	JEA04-26-OB & TES06-40-TRIM	0.11	86.6	0.13	90.5	0.11	81.4	0.14	97.3
12/01/2019	11:13	TEB03-28-PS	0.16	88.5	0.23	90.5	0.31	84.9	0.83	92.1
17/01/2019	15:10	TNN-04-20-OB	0.12	91.4	0.17	92.1	0.23	97.7	0.33	97.3
22/01/2019	15:52	JEB03-38-OB	0.48	84.1	0.13	98.8	0.11	104	0.24	90.2
24/01/2019	15:22	TNN05-45-OB	0.11	88.5	0.13	93.4	0.11	89.4	0.14	105.8
25/01/2019	12:11	ROCKS-1	0.11	88.5	0.13	102.9	0.11	96.2	0.13	93.7
5/02/2019	12:59	MER03-27-OB	0.24	92.6	0.13	88.5	0.39	81.4	1.09	84.2
7/02/2019	16:35	JEB03-40-TO & TNN06-38-OB & TES06-36-TO	0.15	99.6	0.2	96.5	0.22	101.8	0.24	93.7
11/02/2019	15:20	BRA06-32-OB	0.13	94.5	0.17	105.1	0.14	101	0.25	95.1
15/02/2019	15:33	VEL03-44-PS & HRN07-38-OB	0.11	96.8	0.15	103.3	0.18	100	0.22	101.1
21/02/2019	12:45	BRA05-45-OB	0.12	103.2	0.15	100.6	0.18	106.3	0.24	99
28/02/2019	14:32	BRY-05-18-TSB	0.12	96.1	0.15	102.5	0.21	103.3	0.3	103.3
1/03/2019	12:51	HRN-07-36-OB & BRY-05-18-TSB	0.13	99.6	0.19	100.6	0.1	89.4	0.19	95.1
6/03/2019	15:34	ONV06-17-OB & JEB03-40-OB	0.12	96.1	0.13	94.6	0.19	101	0.26	102.8
8/03/2019	12:21	385-07-18-PS	0.13	84.1	0.14	88.5	0.16	93.4	0.24	90.2
12/03/2019	12:25	TEB03-27-PS	0.11	88.5	0.12	98.1	0.13	95.4	0.22	93.7
13/03/2019	12:29	JEB05-33-OB	0.16	91.4	0.25	93.4	0.21	94.5	0.26	87.7
15/03/2019	12:17	BRA06-36-TR & BRA06-36-PS	0.15	95.4	0.16	95.6	0.25	92.3	0.28	87.7
19/03/2019	12:18	JEB04-40-OB & JEA05-44-TO	0.13	96.1	0.2	94.6	0.2	98.9	0.23	96.2
22/03/2019	12:27	TNN06-36-OB & TSM06-43-OB-B & VEL03-27-OB & BRA06-39-PS	0.12	96.1	0.18	95.6	0.24	103.3	0.32	92.1
27/03/2019	12:33	ONV06-20-OB	0.11	91.4	0.12	96.5	0.15	84.9	0.26	90.2
28/03/2019	12:25	TNN06-40-OB & VEL03-44-PS-B	0.12	95.4	0.19	86	0.17	87.4	0.18	101.7
1/04/2019	12:24	HRN07-42-OB	0.12	91.4	0.15	92.1	0.16	97	0.2	95.1
5/04/2019	13:57	MER03-42-OB & ONV-06-20-OB-B	0.12	90.1	0.19	92.1	0.25	90.9	0.5	90.2
10/04/2019	12:33	JEA04-16-OB-RL335	0.15	96.1	0.17	102.1	0.48	87.4	0.51	104.6
12/04/2019	15:28	HRN07-42-OB-B	0.11	93.6	0.14	96.5	0.13	101.8	0.17	96.2
17/04/2019	15:31	MER-04-31 & MER04-33	0.15	96.8	0.17	98.1	0.18	95.4	0.31	90.2

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)
18/04/2019	15:51	MER-03-39 & BRA-06-42-PS	0.14	93.6	0.2	97.3	0.38	94.5	0.43	90.2
24/04/2019	12:33	BRA-06-38OB	0.12	96.8	0.16	95.6	0.18	97	0.23	93.7
26/04/2019	12:27	TNN-06-42-OB	0.11	84.1	0.14	86	0.1	89.4	0.15	92.1
30/04/2019	12:23	JEA04-22-OB-RL325	0.13	88.5	0.17	93.4	0.13	90.9	0.35	90.2
3/05/2019	10:20	BRA06-37-OB	0.12	84	0.15	86	0.15	84.9	0.19	90.2
6/05/2019	15:25	MER04-27-OB	0.1	84.1	0.14	93.4	0.1	87.4	0.39	84.2
9/05/2019	15:33	BRA06-40-OB-A	0.11	97.5	0.13	104.1	0.11	108.4	0.32	87.7
11/05/2019	15:35	MER03-38-OB-B & JEB03-40-TOE-A	0.12	92.6	0.19	92.1	0.25	84.9	0.49	84.2
13/05/2019	12:17	BRA06-43-TR	0.13	86.6	0.19	93.4	0.24	95.4	0.19	100.4
16/05/2019	12:36	JEB03-40-TOE & MER04-39-OB	0.11	92.6	0.12	90.5	0.1	87.4	0.12	84.2
17/05/2019	15:33	MER04-27-OB-B & JEB03-40-TOE	0.12	92.6	0.15	93.4	0.15	96.2	0.33	84.2
18/05/2019	12:42	BRA-04-19-TS-310	0.11	84.1	0.12	92.1	0.17	84.9	0.11	84.2
20/05/2019	12:08	JEB03-40-TO-B & MER05-29-PS	0.1	88.5	0.13	90.5	0.13	93.4	0.19	87.7
22/05/2019	12:24	BRA-06-41-OB	0.13	88.5	0.21	90.5	0.23	97.7	0.23	92.1
24/05/2019	12:15	MER03-40-OB-A	0.12	90.1	0.15	94.6	0.15	94.5	0.24	92.1
27/05/2019	12:02	JEB05-33-OB-B	0.14	88.5	0.21	105.1	0.25	103.3	0.33	95.1
28/05/2019	12:01	HRN07-42-OB-C	0.1	84.1	0.12	96.5	0.12	84.9	0.15	97.3
30/05/2019	15:45	BRA06-42-OB	0.14	96.1	0.22	90.5	0.18	101	0.25	92.1
31/05/2019	12:03	JEA04-18-RL335	0.1	84.1	0.1	82.5	0.2	94.5	0.32	92.1
6/06/2019	15:08	JEB03-35-OB-AB & MER03-40-OB-BENCHTOP	0.1	80.5	0.17	88.5	0.2	81.4	0.28	84.2
11/06/2019	12:21	MER04-40-OB-A	0.11	86.6	0.14	88.5	0.14	89.4	0.2	90.2
14/06/2019	12:28	HRN07-37-OB & JEB04-40-TO	0.14	97.5	0.16	93.4	0.13	103	0.18	96.2
19/06/2019	13:58	VEL04-29-CA & ONV06-18-OB-385	0.1	84.1	0.36	86	0.7	84.9	1.36	90.2
21/06/2019	12:35	JEB05-40-TO & HRN07-38-OB & TEA04-27-PS & MER-MER05-27-PS-BRY	0.13	96.1	0.22	98.8	0.27	93.4	0.27	87.7
25/06/2019	12:27	ONV07-33-OB-360	0.1	100.5	0.15	105.1	0.21	100	0.54	90.2
28/06/2019	12:21	VEL-04-27-CA	0.19	88.5	0.24	90.5	0.29	81.4	1.39	92.1
1/07/2019	12:25	ONV07-35-OB	0.1	86.6	0.11	90.5	0.11	89.4	0.16	90.2
2/07/2019	12:15	MER04-40-OB-B & MER05-27-PS-B	0.11	88.5	0.13	86	0.16	89.4	0.19	95.1
6/07/2019	12:18	HRN07-35-OB	0.1	100.5	0.1	103.7	0.09	101	0.11	99.8
11/07/2019	9:33	VEL04-28-OB	0.1	106.1	0.38	99.4	0.46	98.3	0.89	96.2
12/07/2019	14:23	VEL03-42-OB	0.17	90.1	0.14	103.7	0.1	100	0.2	93.7
16/07/2019	12:12	ONV06-17-OB-395 & 385-07-17-PS-TOPO	0.1	88.5	0.12	115	0.19	98.9	0.31	93.7
19/07/2019	12:04	MER04-40-OB-C	0.11	88.5	0.1	86	0.14	81.4	0.2	90.2
22/07/2019	14:44	VEL04-30-OB & ONV06-15-OB	0.15	84.1	0.2	97.3	0.22	99.5	0.69	87.7
24/07/2019	14:45	JEB05-31-OB-A	0.13	84.1	0.22	86	0.2	84.9	0.38	84.2

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)
26/07/2019	12:32	BRA06-42-OB & BRL06-44-PT	0.1	80.5	0.14	92.1	0.16	98.3	0.19	95.1
31/07/2019	14:35	JEB05-31-OB-B & ONV07-43-OB	0.15	92.6	0.23	98.1	0.21	94.5	0.36	90.2
2/08/2019	14:33	VEL03-39-OB & NAG05-40-PS	0.11	84.1	0.14	96.5	0.18	100	0.25	95.1
6/08/2019	13:02	MER05-40-OB	0.12	86.6	0.16	99.4	0.19	95.4	0.24	103.7
7/08/2019	11:53	HANWHA PAD	0.1	86.6	0.1	86	0.12	84.9	0.11	84.2
9/08/2019	9:06	JEB05-29-OB-A	0.14	95.4	0.2	102.5	0.24	105.2	0.5	103.7
12/08/2019	13:18	VEL03-40-OB	0.1	86.6	0.12	90.5	0.13	97	0.19	98.2
13/08/2019	12:34	ONV07-41-OB	0.12	92.6	0.15	92.1	0.13	94.5	0.2	95.1
19/08/2019	12:01	VEL-03-41-OB & MER-05-39-OB	0.13	91.4	0.17	104.1	0.19	110.2	0.31	84.2
23/08/2019	14:44	JEA05-25-OB-A & JEB04-35-OB & NAG05-40-PS-B & HRD07-40-PA	0.54	84.1	0.28	86	0.29	87.4	0.74	90.2
27/08/2019	12:15	ONV06-16-OB-RL395	0.11	88.5	0.13	95.6	0.13	98.3	0.25	95.1
29/08/2019	12:30	MER03-36-OB	0.08	93.4	0.2	71.4	0.26	87.2	0.31	77.4
31/08/2019	12:30	VEL04-43-OB & RL385-07-15-PS	0.07	92.2	0.15	71.4	0.23	92.5	0.36	97.7
31/08/2019	13:16	VEL04-43-OB & RL385-07-15-PS	0.05	99	0.12	69.5	0.11	88.2	0.14	95.3
3/09/2019	12:37	MER05-42-OB	0.04	87.6	0.11	71.4	0.1	90.7	0.12	87.9
5/09/2019	12:01	JEB 05-29-OB-B	0.12	92.2	0.2	73	0.22	90	0.75	92.7
6/09/2019	9:06	MER03-35-OB	0.11	72.5	0.1	71.4	0.09	103.2	0.17	93.2
12/09/2019	12:39	JEA05-25-OB-B & ONV07-39-OB	0.11	101	0.21	79	0.23	107.2	0.56	97.1
16/09/2019	12:21	TSL-07-43-PS & MER-06-32-PS	0.11	97.5	0.16	73	0.22	93.7	0.57	100.9
19/09/2019	14:31	JEA-05-25-OB-C	0.12	90.4	0.18	74.4	0.47	78.5	0.98	92.6
20/09/2019	14:39	ONV07-17-OB-415	0.04	87.4	0.06	69.5	0.18	105.8	0.4	110
23/09/2019	12:34	TSU07-43-OB	0.05	93.3	0.08	71.4	0.09	79.5	0.12	102.9
25/09/2019	15:16	MER-04-35-OB & ONV07-21-OB	0.07	84.9	0.1	71.4	0.18	88.8	0.31	90.8
26/09/2019	12:11	MER04-35-OB & TSL07-43-PS-B	0.05	92	0.07	75.5	0.08	99	0.15	89.9
30/09/2019	15:38	JEB06-34-OB	0.17	94.4	0.52	73	0.5	107	0.74	96.8
9/10/2019	15:29	275-05-21-PS-BRY	0.38	96.4	0.78	73	1.12	96.1	0.53	99.7
10/10/2019	15:24	JEA06-28-OB & JEB06-31-OB	0.16	97.5	0.27	74.4	0.32	98.4	0.58	94.7
11/10/2019	12:25	NAG03-42-OB & VEL04-42-CAP & VEL-03-40-TO	0.03	92.9	0.06	71.4	0.07	108.4	0.09	107.9
16/10/2019	12:30	LRN03-36-PS-MER & JEA-0417-OB	0.08	87.2	0.26	71.4	0.4	99.1	0.36	101.9
18/10/2019	13:12	ONV07-17-OB-A & VEL03-35-OB	0.02	91.3	0.03	71.4	0.07	99.1	0.07	92.5
21/10/2019	15:26	VEL 03-35-OB & LRN 03-36-PS-B	0.08	105.3	0.25	69.5	0.37	98.3	0.42	96.1
22/10/2019	12:44	ONV-07-19-OB-B	0.04	85.8	0.05	69.5	0.11	94.5	0.18	89.5
25/10/2019	12:07	TST06-OB	0.03	98	0.05	85.4	0.1	113.2	0.2	102

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)
28/10/2019	12:29	VEL03-34-OB	0.04	93.2	0.08	73	0.12	103.6	0.14	89.4
31/10/2019	12:27	JEB 06-35-OB	0.16	100.1	0.26	102.5	0.3	103.1	0.43	88.6
4/11/2019	15:33	VEL04-39-OB & NAG04-29-OB & VEL-DP-TOE	0.09	94.8	0.19	95.5	0.24	97.7	0.28	90.4
8/11/2019	9:27	TSU-07-40-OB	0.07	90.1	0.21	102.3	0.12	99.5	0.22	86.8
11/11/2019	12:36	NAG03-40-OB	0.07	83	0.16	87.2	0.2	89.3	0.35	89.4
14/11/2019	12:21	ONV07-38-OB & TSM07-43-OB	0.06	92.2	0.09	93	0.1	95.9	0.14	88.9
18/11/2019	12:39	MER05-34-OB & MER04-27-TO	0.13	99.3	0.22	92.8	0.17	93.6	0.23	97.4
20/11/2019	15:14	VEL04-40-OB-1	0.03	100.2	0.14	95.2	0.07	99.1	0.13	86.2
27/11/2019	12:30	JEB06-36-32-OB & NAG03-35-OB	0.08	98.5	0.19	95.9	0.18	95.8	0.33	99.8
29/11/2019	10:07	TNN06-16-OB	0.09	90.4	0.14	94.2	0.2	95.8	0.27	98.4
4/12/2019	12:03	TNN06-17-OB	0.06	92.9	0.11	103.5	0.18	99.8	0.31	90.5
9/12/2019	12:05	TSL-07-44-PT	0.01	83.7	0.02	92.4	0.02	91.4	0.03	102.2
10/12/2019	15:10	NAG 03-34-OB & TEA 04-35-PS-MER	0.13	83.2	0.32	106.7	0.3	100.7	0.59	98.3
13/12/2019	12:31	MER05-30-OB	0.06	88.3	0.1	101.2	0.11	86.8	0.36	89.5
18/12/2019	15:36	VEL05-43-OB	0.07	94.2	0.17	96.2	0.14	97.6	0.17	91.7
20/12/2019	13:07	VEL04-34-OB & TSL07-42-PT	0.04	95.1	0.1	96.7	0.11	105.1	0.27	91.1
24/12/2019	12:18	VEL05-40-OB	0.03	99.7	0.06	92.3	0.07	104.7	0.12	87.4

*Results may be influenced by a mechanical malfunction of monitoring equipment

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

Month	Coal Transported (MT)
January	0.89
February	0.79
March	0.74
April	0.64
May	0.81
June	0.99
July	0.87
August	0.50
September	0.68
October	0.58
November	0.47
December	0.49
TOTAL	8.48

Table B-2
Daily Train Movements

Date and Time of Loading				
01/01/2019 02:11	02/03/2019 18:20	14/05/2019 18:46	09/07/2019 21:28	22/09/2019 18:30
01/01/2019 08:48	02/03/2019 23:40	14/05/2019 23:40	10/07/2019 03:24	22/09/2019 20:59
01/01/2019 12:43	03/03/2019 15:11	15/05/2019 03:07	10/07/2019 05:59	22/09/2019 23:38
01/01/2019 17:53	03/03/2019 19:06	15/05/2019 06:12	10/07/2019 21:59	23/09/2019 02:07
01/01/2019 23:45	04/03/2019 00:55	15/05/2019 12:38	11/07/2019 05:20	27/09/2019 10:19
02/01/2019 02:32	04/03/2019 01:47	15/05/2019 20:34	11/07/2019 08:01	27/09/2019 13:20
02/01/2019 10:08	04/03/2019 17:45	15/05/2019 23:13	11/07/2019 10:41	27/09/2019 19:59
02/01/2019 13:14	04/03/2019 21:10	16/05/2019 06:46	11/07/2019 22:34	28/09/2019 00:12
02/01/2019 16:23	05/03/2019 04:06	16/05/2019 23:39	12/07/2019 02:29	28/09/2019 17:39
02/01/2019 20:47	05/03/2019 07:29	17/05/2019 09:15	12/07/2019 06:14	28/09/2019 20:21
02/01/2019 23:20	05/03/2019 18:08	17/05/2019 12:30	12/07/2019 11:00	29/09/2019 00:21
03/01/2019 04:32	06/03/2019 04:50	17/05/2019 15:49	12/07/2019 20:28	29/09/2019 04:11
03/01/2019 07:05	06/03/2019 10:05	17/05/2019 19:14	13/07/2019 03:33	29/09/2019 14:04
03/01/2019 18:32	06/03/2019 13:04	17/05/2019 22:44	13/07/2019 07:56	29/09/2019 20:30
04/01/2019 02:18	06/03/2019 18:04	18/05/2019 08:42	13/07/2019 21:06	30/09/2019 00:22
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17/02/2019 03:18	04/05/2019 05:46	30/06/2019 10:02	10/09/2019 20:46	19/12/2019 17:50
22/02/2019 08:03	04/05/2019 12:05	30/06/2019 12:35	11/09/2019 05:02	20/12/2019 04:48
22/02/2019 16:26	04/05/2019 14:43	30/06/2019 15:32	11/09/2019 07:29	20/12/2019 07:54
22/02/2019 19:40	04/05/2019 17:18	30/06/2019 18:46	11/09/2019 14:51	20/12/2019 10:52
22/02/2019 22:11	04/05/2019 20:48	30/06/2019 23:28	11/09/2019 19:25	21/12/2019 03:55
23/02/2019 00:58	05/05/2019 12:03	01/07/2019 05:30	12/09/2019 02:54	21/12/2019 09:26
23/02/2019 14:31	05/05/2019 15:43	01/07/2019 13:47	12/09/2019 11:40	21/12/2019 13:25
23/02/2019 19:12	06/05/2019 04:27	01/07/2019 20:02	12/09/2019 18:40	22/12/2019 01:30
23/02/2019 21:32	06/05/2019 18:18	02/07/2019 01:16	13/09/2019 05:52	22/12/2019 11:35
23/02/2019 23:56	07/05/2019 11:42	02/07/2019 03:43	13/09/2019 15:17	22/12/2019 19:10
24/02/2019 03:04	07/05/2019 17:25	02/07/2019 20:38	14/09/2019 06:53	23/12/2019 04:53
24/02/2019 06:20	07/05/2019 21:04	02/07/2019 23:21	14/09/2019 15:28	26/12/2019 09:45
24/02/2019 15:34	08/05/2019 03:08	03/07/2019 04:02	15/09/2019 01:42	26/12/2019 14:00
24/02/2019 21:23	08/05/2019 13:41	03/07/2019 19:06	15/09/2019 09:28	26/12/2019 17:26
25/02/2019 01:32	09/05/2019 01:42	04/07/2019 05:53	15/09/2019 19:57	26/12/2019 19:56
25/02/2019 08:04	09/05/2019 10:47	04/07/2019 08:40	16/09/2019 01:29	27/12/2019 00:57
25/02/2019 20:59	09/05/2019 21:20	04/07/2019 11:32	16/09/2019 21:07	27/12/2019 13:02
26/02/2019 01:34	10/05/2019 10:20	04/07/2019 21:30	17/09/2019 04:50	27/12/2019 18:08
26/02/2019 06:27	10/05/2019 15:22	05/07/2019 20:49	17/09/2019 12:50	27/12/2019 22:48
26/02/2019 10:09	10/05/2019 22:00	06/07/2019 00:14	17/09/2019 19:14	28/12/2019 09:17
26/02/2019 14:32	11/05/2019 00:30	06/07/2019 08:13	18/09/2019 22:47	28/12/2019 13:30
26/02/2019 19:59	11/05/2019 05:59	06/07/2019 15:48	19/09/2019 00:17	28/12/2019 17:07

27/02/2019 03:26	11/05/2019 10:21	06/07/2019 19:50	19/09/2019 11:07	28/12/2019 21:20
27/02/2019 06:41	11/05/2019 13:03	06/07/2019 23:42	19/09/2019 18:23	29/12/2019 10:26
27/02/2019 09:47	11/05/2019 16:24	07/07/2019 02:45	20/09/2019 06:02	29/12/2019 13:40
27/02/2019 12:53	12/05/2019 09:44	07/07/2019 06:27	20/09/2019 14:08	29/12/2019 22:03
27/02/2019 15:55	12/05/2019 15:00	08/07/2019 04:00	20/09/2019 20:54	30/12/2019 13:51
27/02/2019 23:35	12/05/2019 23:15	08/07/2019 07:25	21/09/2019 13:22	30/12/2019 18:04
28/02/2019 13:14	13/05/2019 01:52	08/07/2019 09:50	21/09/2019 16:16	30/12/2019 21:15
28/02/2019 16:49	13/05/2019 04:18	08/07/2019 14:29	21/09/2019 19:23	31/12/2019 01:38
28/02/2019 19:41	13/05/2019 09:10	09/07/2019 03:28	21/09/2019 22:56	31/12/2019 16:32
01/03/2019 14:33	13/05/2019 17:53	09/07/2019 06:18	22/09/2019 02:18	31/12/2019 19:29
02/03/2019 07:55	14/05/2019 02:44	09/07/2019 08:58	22/09/2019 09:45	31/12/2019 22:52
02/03/2019 15:42	14/05/2019 05:26			

APPENDIX C

Annual Sound Power Testing

Appendix C
Annual Sound Power Testing

Table C-1
Sound Power Level Testing Results

Equipment Model	Plant ID	EA model Lw	EA model LwA	2019 Lw	2019 LwA
REAR DUMP TRUCKS					
Hitachi EH5000	001	124	117	122	116
Hitachi EH5000	002	124	117	119	114
Hitachi EH5000	003	124	117	121	115
Hitachi EH5000	004	124	117	120	115
Hitachi EH5000	005	124	117	122	116
Hitachi EH5000	006	124	117	121	117
Hitachi EH5000	007	124	117	122	116
Hitachi EH5000	008	124	117	123	117
Hitachi EH5000	009	124	117	123	116
Hitachi EH5000	010	124	117	122	116
Hitachi EH5000	011	124	117	122	116
Hitachi EH5000	012	124	117	123	117
Hitachi EH5000	013	124	117	122	116
Hitachi EH5000	014	124	117	123	118
		124	117	118 ¹	113 ¹
Hitachi EH5000	015	124	117	123	117
Hitachi EH5000	016	124	117	122	117
Hitachi EH5000	017	124	117	122	116
Hitachi EH5000	018	124	117	122	117
Hitachi EH5000	019	124	117	117	113
Hitachi EH5000	020	124	117	123	118
		124	117	115 ¹	111 ¹
Hitachi EH5000	021	124	117	122	115
Hitachi EH5000	022	124	117	121	115
Hitachi EH5000	023	124	117	122	117
Hitachi EH5000	024	124	117	121	116
Hitachi EH5000	025	124	117	122	117
Hitachi EH5000	026	124	117	121	117
Hitachi EH5000	027	124	117	122	116

Equipment Model	Plant ID	EA model Lw	EA model LwA	2019 Lw	2019 LwA
Hitachi EH5000	028	124	117	121	116
Hitachi EH5000	029	124	117	121	116
Hitachi EH5000	030	124	117	122	117
Hitachi EH5000	031	124	117	122	117
Hitachi EH5000	032	124	117	123	117
Hitachi EH5000	033	124	117	121	116
Hitachi EH5000	034	124	117	123	117
Hitachi EH5000	035	124	117	120	115
Hitachi EH5000	036	124	117	121	116
Hitachi EH5000	037	124	117	122	116
Hitachi EH5000	039	124	117	121	116
Hitachi EH5000	040	124	117	122	117
Hitachi EH3500	051	124	117	121	115
Hitachi EH3500	052	124	117	121	115
Hitachi EH3500	053	124	117	120	114
Hitachi EH3500	054	124	117	121	115
Hitachi EH3500	055	124	117	121	114
Hitachi EH4000	071	124	117	122	117
Hitachi EH4000	072	124	117	123	117
Hitachi EH4000	073	124	117	122	117
Hitachi EH4000	074	124	117	123	115
Hitachi EH4000	075	124	117	123	117
Hitachi EH4000	076	124	117	123	118
		124	117	117 ¹	112 ¹
Hitachi EH4000	077	124	117	122	116
Hitachi EH4000	078	124	117	122	116
Hitachi EH4000	079	124	117	124	119
		124	117	116 ¹	111 ¹
CAT 789 DXQ	101	124	117	123	118
		124	117	115 ¹	111 ¹
CAT 789 DXQ	102	124	117	122	117
CAT 789 DXQ	103	124	117	123	117
CAT 789 DXQ	104	124	117	121	115
CAT 789 CXQ	880	124	117	119	114

Equipment Model	Plant ID	EA model Lw	EA model LwA	2019 Lw	2019 LwA
CAT 789 CXQ	882	124	117	121	115
CAT 789 CXQ	883	124	117	121	115
CAT 789 CXQ	884	124	117	122	117
CAT 789 CXQ	885	124	117	123	117
CAT 789 CXQ	887	124	117	120	115
CAT 789 CXQ	888	124	117	118	113
CAT 789 CXQ	889	124	117	119	115
CAT 789 CXQ	890	124	117	123	117
CAT 789 CXQ	891	124	117	122	117
TRUCKS (Moxxy)					
Moxxy	23	124	117	113	109
Moxxy	24	124	117	114	109
Moxxy	25	124	117	115	110
CAT 740	019	122	115	114	109
WATER CARTS					
CAT 740	051	122	115	117	113
FYH300350	084	122	115	113	109
CAT 777G	501	122	115	119	113
CAT 777G	502	122	115	116	112
CAT 777G	503	122	115	118	113
CAT 777G	802	122	115	118	113
CAT 777G	803	122	115	117	113
CAT 777F	806	122	115	119	114
CAT 777F	807	122	115	119	115
CAT 777G	821	122	115	120	114
EXCAVATORS					
Hitachi EX3600	221	131	119	119	110
Hitachi EX3600	222	131	119	120	113
Hitachi EX3600	223	131	119	119	111
Hitachi EX3600	224	131	119	118	109
Hitachi EX8000	261	128	123	124	114
Hitachi EX8000	262	128	123	123	114
Hitachi EX8000	263	128	123	122	113
Hitachi EX3600	264	131	119	121	113

Equipment Model	Plant ID	EA model Lw	EA model LwA	2019 Lw	2019 LwA
Hitachi EX3600	265	131	119	122	113
Hitachi EX3600	810	131	119	113	107
TRACKED BULLDOZERS²					
CAT 11T	865	129	127	118 ¹	115 ¹
CAT D9T	D26	129	127	120	117
CAT D10	D12	129	127	125	122
CAT D11R	D36	129	127	127	124
CAT D10T	301	129	127	122	120
CAT D10T	302	129	127	123	120
CAT D10T2	303	129	127	127	125
CAT D11T	320	129	127	123	120
CAT D11T	321	129	127	123	120
CAT D11T	322	129	127	127	126
CAT D11T	323	129	127	126	123
CAT D11T	324	129	127	127	125
Komatsu 475	350	129	127	120	118
Komatsu 475	351	129	127	120	117
Komatsu 475	352	129	127	124	121
CAT D11T	858	129	127	128	125
CAT D11T	859	129	127	123	120
CAT D11T	860	129	127	127	124
CAT D10T	870	129	127	125	123
CAT D10T	872	129	127	124	120
CAT D10T	876	129	127	122	119
CAT D10T	879	129	127	125	122
WHEELED BULLDOZERS					
CAT 834G	873	122	115	113	109
CAT 85G	877	122	115	116	111
GRADERS					
CAT 14H	WTC15	118	112	107	103
CAT 14H	WTC21	118	112	113	110
CAT 16M	401	118	112	116	111
CAT 16M	402	118	112	117	112
CAT 24M	415	118	112	115	111

Equipment Model	Plant ID	EA model Lw	EA model LwA	2019 Lw	2019 LwA
CAT 24M	416	118	112	114	110
CAT 16M	862	118	112	115	110
CAT 16M	864	118	112	115	110
LOADERS					
Komatsu WA1200	430	122	115	119	115
CAT 930H	805	122	115	114	109
CAT 930H	807	122	115	115	112
CAT 992K	812	122	115	115	110
CAT 966H	817	122	115	114	110
CAT 980K	818	122	115	118	113
DRILLS					
Reedmill SKF	150	122	118	120	116
Reedmill SKF	151	122	118	118	115
CAT MD6290	451	122	118	120	118
CAT MD6290	452	122	118	120	117
CAT MD6290	453	122	118	119	116
CAT MD6290	454	122	118	119	117
CAT MD6290	455	122	118	119	116
CAT MD6290	456	122	118	121	118
STATIONARY PLANT					
Coal Preparation Plant		133	117	132	117
Conveyors (200m section)		113	108	108	103
Conveyors (500m section)		117	112	112	107
Primary ROM sizer		117	109	115	108
Secondary ROM sizer		121	112	120	113
Product Stacker		111	104	109	100
Product Reclaimer		122	115	114	104
Raw Coal Transfer Station		117	103	116	107
CPP product Transfer Station		117	103	115	105
Train Loadout		114	103	120	115

1. Raw coal transfer station measurements included noise from the nearby secondary sizer..

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

Location	Date		pH Value		Electrical Conductivity @ 25°C	Total Dissolved Solids (TDS)	Suspended Solids (SS)	Turbidity	Total Alkalinity as CaCO3	Calcium (filt.)	Magnesium (filt.)	Sodium (filt.)	Potassium (filt.)	Aluminium (total)	Cadmium (total)	Chromium (total)	Copper (total)	Lead (total)	Manganese (total)	Nickel (total)	Selenium (total)	Silver (total)	Zinc (total)	Boron (total)	Iron (Total)	Arsenious Acid, As (III)	Arsenic Acid As (V)	Mercury	Nitrite + Nitrate as N	Total Nitrogen	Total Phosphorus as P	Total Anions	Total Cations
			pH Unit	µS/cm	mg/L	mg/L	NTU	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	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	
SW 1	18/01/2019	7.35	365	284	28	14.9	137	31	11	29	2	0.48	<0.0001	<0.001	0.003	<0.001	0.308	<0.001	<0.01	<0.001	0.006	<0.05	1.67	0.8	<0.5	<0.0001	<0.01	0.3	0.13	3.97	3.76		
	19/02/2019	7.55	359	269	24	24.5	157	33	12	34	3	0.44	<0.0001	<0.001	<0.001	<0.001	0.748	<0.001	<0.01	<0.001	0.023	<0.05	2.76	1.1	0.6	<0.0001	0.02	0.5	0.04	4.34	4.19		
	20/03/2019	7.47	364	222	62	33.3	131	32	11	30	2	0.69	<0.0001	<0.001	<0.001	<0.001	0.76	<0.001	<0.01	<0.001	<0.005	<0.05	2.94	0.7	0.8	<0.0001	0.01	0.5	0.22	3.94	3.86		
	17/04/2019	7.37	518	406	107	94.7	116	57	19	34	3	5.14	<0.0001	0.003	0.003	0.002	1.47	0.003	<0.01	<0.001	0.017	<0.05	4.14	0.7	1.1	<0.0001	0.05	1.8	0.34	6.04	5.96		
	16/05/2019	7.74	403	293	176	161	115	36	12	29	3	6.91	<0.0001	0.004	0.003	0.002	0.947	0.004	<0.01	<0.001	0.013	0.06	4.74	1.6	0.8	<0.0001	<0.01	1.1	0.31	3.88	4.12		
	14/06/2019	7.53	480	262	190	216	142	40	16	32	5	8.98	<0.0001	0.005	0.003	0.002	0.608	0.004	<0.01	<0.001	0.014	<0.05	7.18	3.1	<0.5	<0.0001	0.72	3.3	0.36	4.9	4.83		
	16/07/2019	7.74	380	306	224	237	111	37	12	30	4	8.25	<0.0001	0.004	0.004	0.003	0.241	0.004	<0.01	<0.001	0.016	<0.05	6.29	<0.5	0.6	<0.0001	0.01	2.4	0.36	4.27	4.24		
	16/08/2019	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low

Page 101

	19/02/2019																													
	20/03/2019	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	17/04/2019	7.66	285	237	32	36.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	16/05/2019	7.67	237	292	76	240	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	14/06/2019	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	16/07/2019																													
	16/08/2019																													
	12/09/2019																													
	14/10/2019																													
	15/11/2019																													
	16/12/2019																													
	SW7	18/01/2019	8.29	595	442	23	35.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
19/02/2019		8.45	639	390	30	41.1																								
20/03/2019		8.68	739	429	97	79.2																								
17/04/2019		7.82	217	210	88	152																								
16/05/2019		7.86	192	298	110	261																								
14/06/2019		7.84	231	214	50	199																								
16/07/2019		7.96	200	268	96	185																								
16/08/2019		7.95	301	198	127	209																								
13/09/2019		7.82	375	241	76	132																								
14/10/2019		7.94	481	247	80	75																								
15/11/2019		Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low	Water Too Low
16/12/2019																														
SW8		20/03/2019	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	14/06/2019																													

[illegible]

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 th percentile
Oil and grease (mg/L)	10
pH	6.5-8.5
Total suspended solids (mg/L)	50

Table D-3
Off-site Discharge Monitoring Laboratory Results

Location	Date	pH	Electrical Conductivity @ 25°C	Total Dissolved Solids @180 °C	Suspended Solids	Turbidity	Total Alkalinity as CaCO3	Calcium	Magnesium	Sodium	Potassium	Aluminium (total)	Cadmium (total)	Chromium (total)	Copper (total)	Lead (total)	Manganese (total)	Nickel (total)	Selenium (total)	Silver (total)	Zinc (total)	Boron (total)	Iron (total)	Arsenious Acid, As (III)	Arsenic Acid, As (V)	Mercury	Nitrite + Nitrate as N	Total Nitrogen as N	Total Phosphorus as P	Total Anions	Total Cations	Oil and Grease
		pH Unit	µS/cm	mg/L	mg/L	NTU	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	µg/L	µg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	
SW 1	1/04/2019	7.52	319	306	83	234	63	28	9	27	6	3.39	<0.0001	0.001	0.004	0.004	0.354	0.006	<0.01	<0.001	0.009	<0.05	2.29	<0.5	2.29	<0.0001	1.88	3.3	0.5	3.25	3.46	----
	6/05/2019	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
SW 2	1/04/2019																															
	6/05/2019																															
SW 3	1/04/2019	7.73	161	304	278	549	85	18	3	19	4	19.6	<0.0001	0.011	0.008	0.005	0.329	0.011	<0.01	<0.001	0.04	<0.05	12.6	<0.5	12.6	<0.0001	0.2	1.3	0.53	1.81	2.07	----
	6/05/2019	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
SW 4	1/04/2019																															
	6/05/2019	7.58	171	279	25	135	95	19	4	8	8	11.5	<0.0001	0.006	0.003	0.003	0.149	0.006	<0.01	<0.001	0.021	<0.05	6.82	<0.5	1.9	<0.0001	0.52	1.9	0.21	2.25	1.83	<5
SW 5	1/04/2019	7.35	84	176	926	1370	31	7	4	11	3	43.4	<0.0001	0.052	0.028	0.01	0.659	0.051	<0.01	<0.001	0.07	<0.05	35.9	<0.5	35.9	<0.0001	1.29	3.7	1.2	0.96	1.23	<5
	6/05/2019	7.52	166	350	157	421	79	14	8	11	6	22.9	<0.0001	0.018	0.013	0.006	0.306	0.018	<0.01	<0.001	0.031	<0.05	16.3	<0.5	1.4	0.0001	0.75	2.2	0.51	2.09	1.99	<5
SW 8	1/04/2019	7.28	73	228	924	1500	28	6	3	11	2	42	<0.0001	0.057	0.03	0.012	0.664	0.059	<0.01	<0.001	0.069	<0.05	36.3	<0.5	36.3	<0.0001	1.01	3	1.07	0.71	1.08	<5
	6/05/2019	7.56	291	264	124	140	120	28	15	16	5	10.5	0.0001	0.012	0.01	0.002	0.173	0.016	<0.01	<0.001	0.014	<0.05	9.11	<0.5	1.6	<0.0001	0.27	1.5	0.31	3.17	3.46	<5
SW 9	1/04/2019	7.14	89	222	66	191	27	10	3	10	6	8.03	<0.0001	0.005	0.004	0.003	0.1	0.008	<0.01	<0.001	0.015	<0.05	4.85	<0.5	4.85	<0.0001	3.33	4.8	0.28	0.92	1.33	12
	6/05/2019	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
SW 10	1/04/2019																															
	6/05/2019																															
SW 11	1/04/2019																															
	6/05/2019																															

Site Water Monitoring

Table D-4
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	18/02/2019	-	-	<5
	Conductivity	µs/cm				-	-	1430
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	7.98
Mine Void	TSS	mg/L	Every 2 Months	1	16/04/2019	-	-	82
	Conductivity	µs/cm				-	-	1260
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	7.92
Mine Void	TSS	mg/L	Every 2 Months	1	13/06/2019	-	-	13
	Conductivity	µs/cm				-	-	1080
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	7.9
Mine Void	TSS	mg/L	Every 2 Months	1	15/08/2019	-	-	97
	Conductivity	µs/cm				-	-	813
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.22
Mine Void	TSS	mg/L	Every 2 Months	1	14/10/2019	-	-	588
	Conductivity	µs/cm				-	-	1630
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.48
Mine Void	TSS	mg/L	Every 2 Months	1	16/12/2019	-	-	465
	Conductivity	µs/cm				-	-	1410
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	7.69

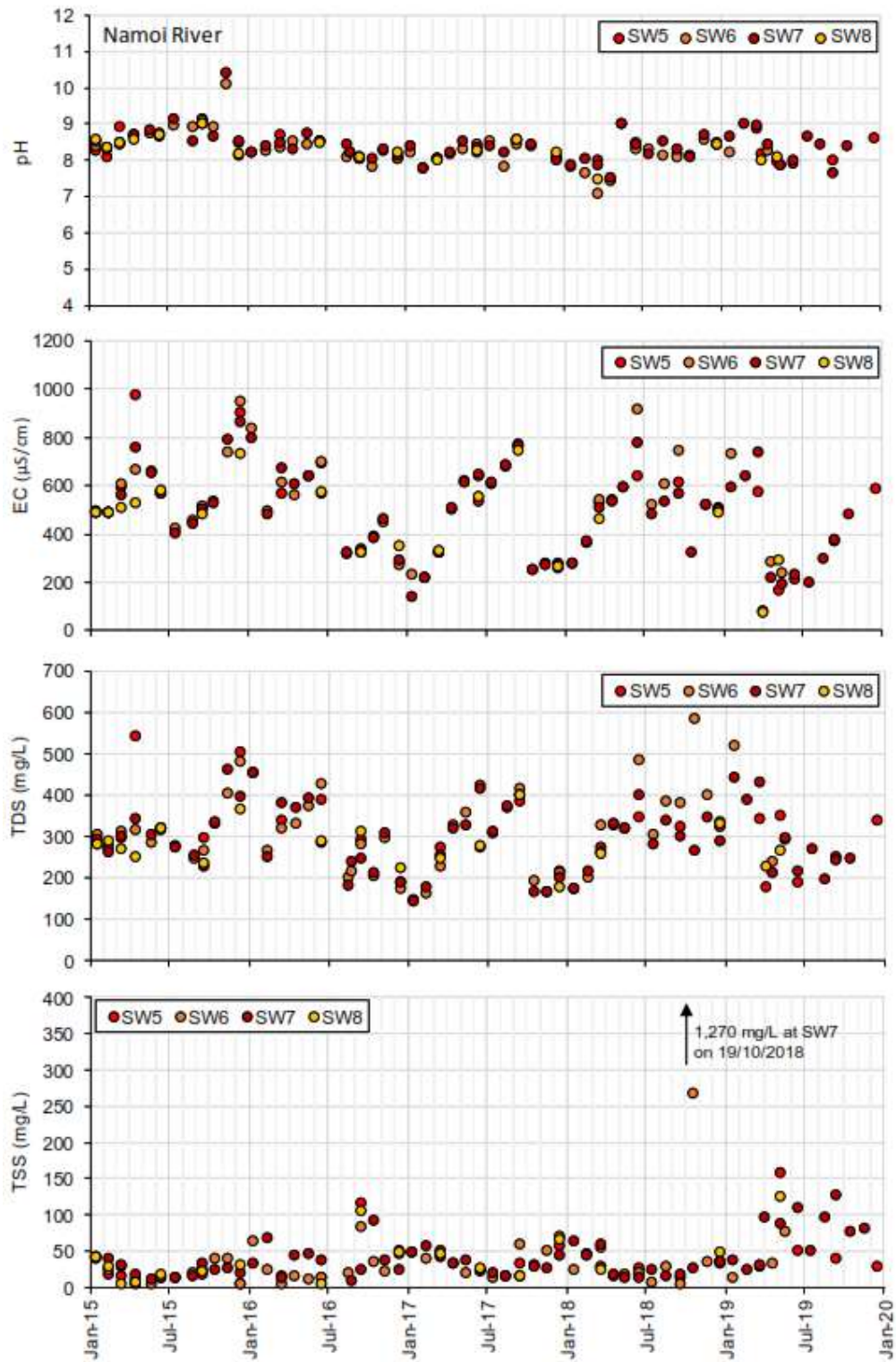


Figure D-1 – Surface water quality trends

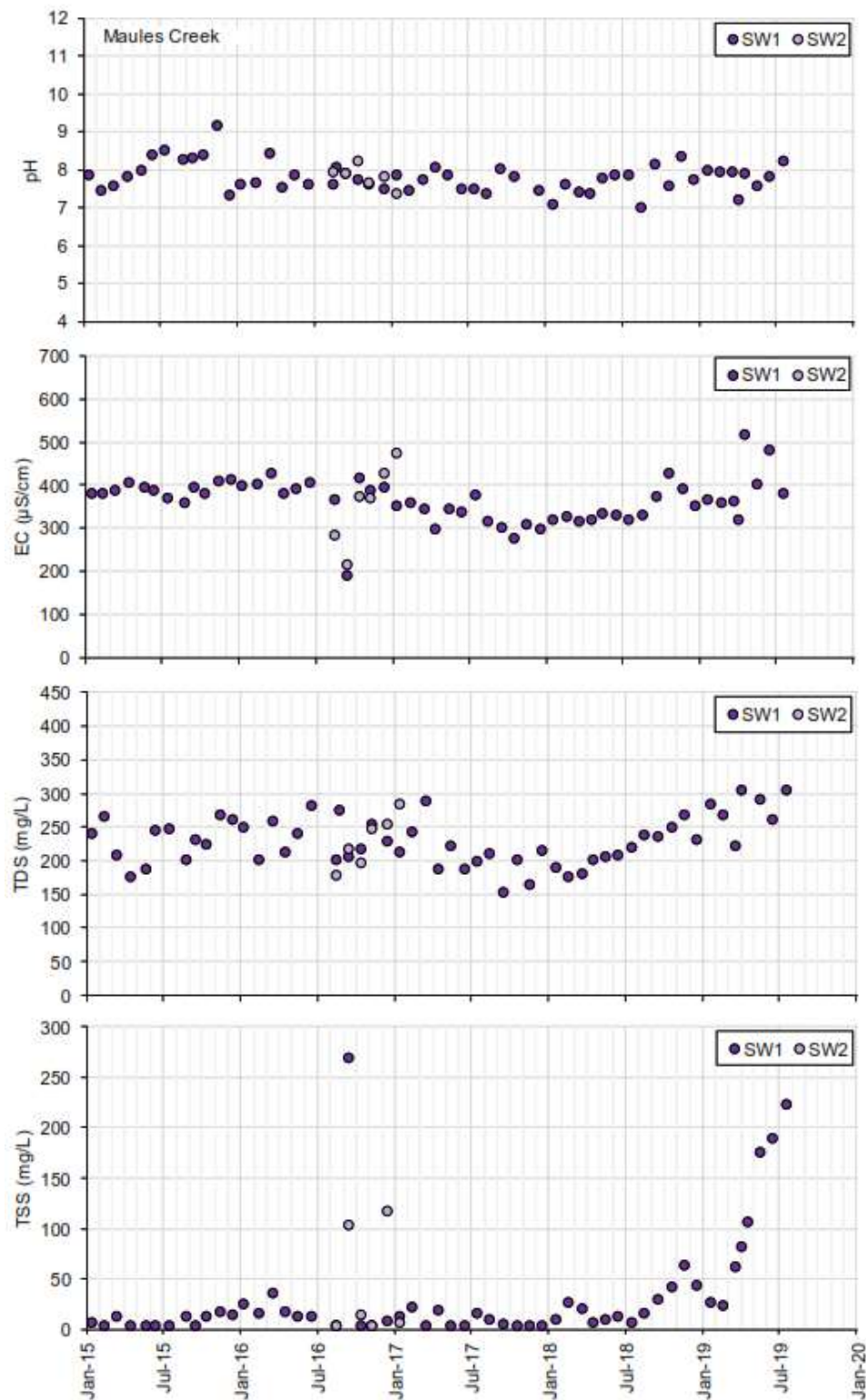


Figure D-2 – Surface water quality trends Maules Creek

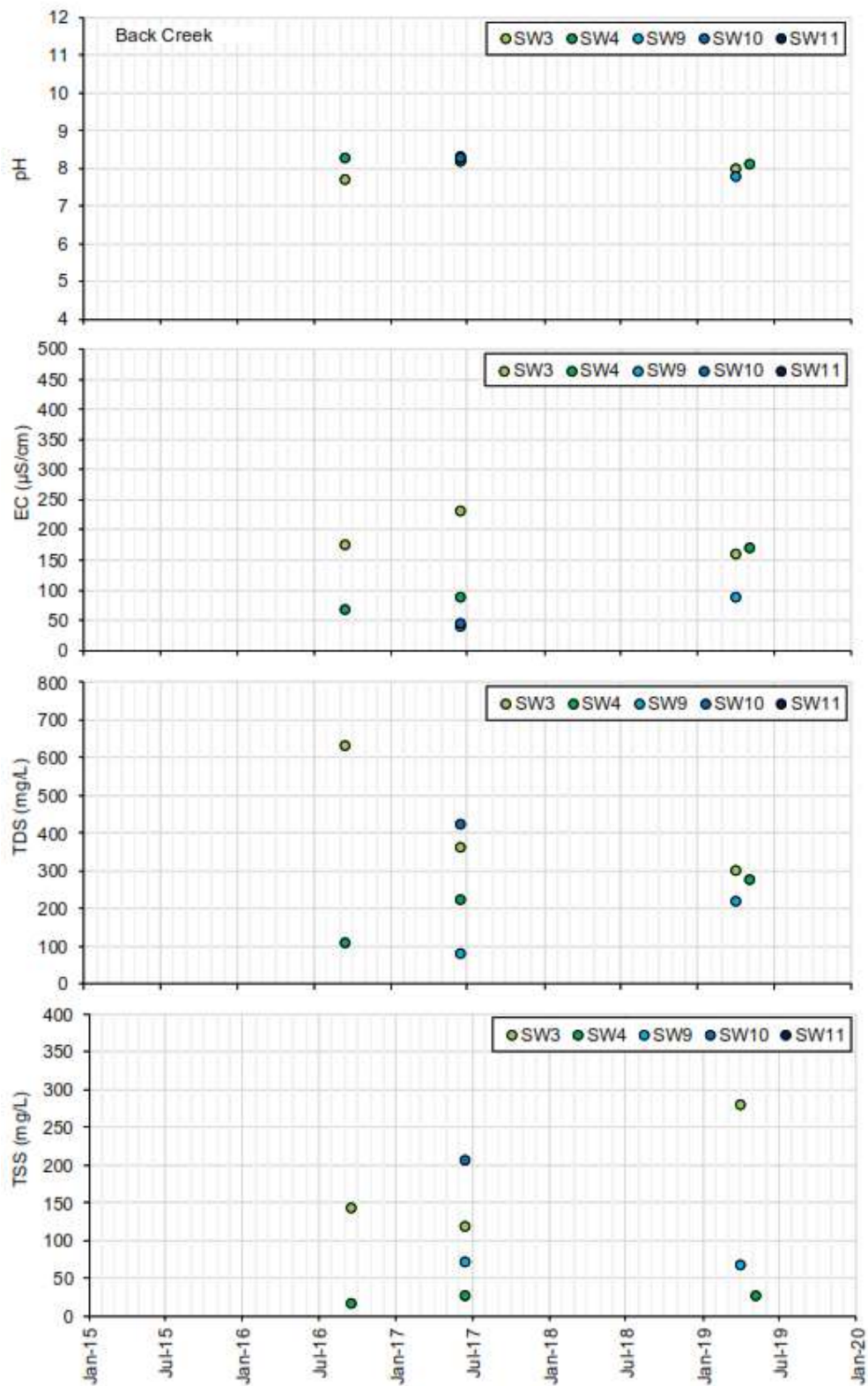


Figure D-3 – Surface water quality trends Back Creek



\\L116186\Figures\RP120200207\Figure 1. Location_Aquatic Monitoring Sites

APPENDIX E

Groundwater

Appendix E Groundwater

Table E-1
Active monitoring bore details

Bore ID	Approx. EIS proposed site	Type	Network	Easting (GDA94Z56)	Northing (GDA94Z56)	GL (mAHD)	Bore depth (m)	Screen/sensor depth (mbgl)	Target geology
BCM01	BCMB01	SP (dry)	Maules Creek	223841	6618371	273.39	10	6.75 - 9.75	Alluvium
BCM03	BCMB03	SP (dry)	Maules Creek	230085	6617546	305.02	10	6.75 - 9.75	Alluvium
MAC1280	-	SP	Maules Creek	226525	6616503	322.5	146	56 – 59	Interburden between Braymont seams
RB03_VW1	-	VWP	Maules Creek	227947	6613635	407.89	-	164	Braymont seam
RB03_VW2	-	VWP	Maules Creek	227947	6613635	407.89	-	242	Merriown seam
RB03_VW3	-	VWP	Maules Creek	227947	6613635	407.89	-	289	Nagero seam
RB03_VW4	-	VWP	Maules Creek	227947	6613635	407.89	-	317	Templemore seam
RB04_VW1	-	VWP	Maules Creek	228213	6614910	437.53	-	209	Braymont seam
RB04_VW2	-	VWP	Maules Creek	228213	6614910	437.53	-	272.5	Merriown seam
RB04_VW3	-	VWP	Maules Creek	228213	6614910	437.53	-	309	Nagero seam
RB04_VW4	-	VWP	Maules Creek	228213	6614910	437.53	-	339	Lower Northam seam
RB05A	-	SP + logger	Maules Creek	228065	6616810	328.1	246.5	239 - 245	Merriown seam
RB05_VW1	-	VWP	Maules Creek	228071	6616813	328.4	-	107	Braymont seam
RB05_VW2	-	VWP	Maules Creek	228071	6616813	328.4	-	213	Jeralong seam
RB05_VW3	-	VWP	Maules Creek	228071	6616813	328.4	-	280	Nagero seam
RB05_VW4	-	VWP	Maules Creek	228071	6616813	328.4	-	390	Templemore seam
REG1_VW1	L1VWP2	VWP	Regional	226946	6622396	286.17	-	118.7	Jeralong seam
REG1_VW2	L1VWP2	VWP	Regional	226946	6622396	286.17	-	134.5	Merriown seam

Bore ID	Approx. EIS proposed site	Type	Network	Easting (GDA94Z56)	Northing (GDA94Z56)	GL (mAHD)	Bore depth (m)	Screen/sensor depth (mbgl)	Target geology
REG1_VW3	L1VWP2	VWP	Regional	226946	6622396	286.17	-	193.5	Nagero seam
REG1_VW4	L1VWP2	VWP	Regional	226946	6622396	286.17	-	281.5	Therribri seam
REG2_VW1	-	VWP	Regional	232722	6620459	317.01	-	60	Fault zone
REG2_VW2	-	VWP	Regional	232722	6620459	317.01	-	120	Fault zone
REG2_VW3	-	VWP	Regional	232722	6620459	317.01	-	200	Fault zone
REG2_VW4	-	VWP	Regional	232722	6620459	317.01	-	260	Fault zone
REG3	L2VWP2	SP + logger	Regional	217164	6619558	241.6	57	50.50 - 56.50	Boggabri Volcanics
REG4	L3MB1	SP + logger	Regional	219323	6612763	259.95	72.5	65.5 - 71.5	Boggabri Volcanics
REG5	-	SP + logger	Regional	220649	6609521	252.17	78.7	72.2 - 78.2	Boggabri Volcanics
REG5A	-	SP (dry)	Regional	220646	6609514	252.03	22	18 - 21	Alluvium
REG6	L4VWP1	SP + logger	Regional	223100	6606534	250.65	96	88.0 - 94.0	Boggabri Volcanics
REG7_VW1	-	VWP	Regional	233543	6605348	291.62	-	67.5	Braymont seam
REG7_VW2	-	VWP	Regional	233543	6605348	291.62	-	148.2	Merriown seam
REG7_VW3	-	VWP	Regional	233543	6605348	291.62	-	242.5	Nagero seam
REG7A	-	SP + logger	Regional	233545	6605359	291.71	36	24 - 30	Alluvium
REG8_VW1	L5VWP1	VWP	Regional	230030	6615113	341.6	-	91.5	Braymont seam
REG8_VW2	L5VWP1	VWP	Regional	230030	6615113	341.6	-	221	Merriown seam
REG8_VW3	L5VWP1	VWP	Regional	230030	6615113	341.6	-	274	Nagero seam
REG9_VW1	-	VWP	Regional	234233	6610591	346.81	-	115.8	Braymont seam
REG9_VW2	-	VWP	Regional	234233	6610591	346.81	-	175.2	Merriown seam
REG9_VW3	-	VWP	Regional	234233	6610591	346.81	-	268	Nagero seam
REG10_VW1	L1VWP1	VWP	Regional	226723	6618261	287.12	-	55	Braymont seam
REG10_VW2	L1VWP1	VWP	Regional	226723	6618261	287.12	-	144.2	Merriown seam
REG10_VW3	L1VWP1	VWP	Regional	226723	6618261	287.12	-	178	Nagero seam

Bore ID	Approx. EIS proposed site	Type	Network	Easting (GDA94Z56)	Northing (GDA94Z56)	GL (mAHD)	Bore depth (m)	Screen/sensor depth (mbgl)	Target geology
REG10_VW4	L1VWP1	VWP	Regional	226723	6618261	287.12	-	185.5	Upper Northam seam
REG10A	BCMB02	SP (dry)	Regional	226717	6618260	287.12	10	6.75 - 9.75	Alluvium
REG12	L2MB1	SP + logger	Regional	222632	6617358	285.61	48.3	38.4 - 44.4	Boggabri Volcanics
REG13	-	SP + logger	Regional	219713	6611129	277.08	133	128 - 132	Boggabri Volcanics
REG14	-	SP + logger	Regional	225547	6602649	250.18	102	90 - 96	Basement
WHAN (GW060214)	-	Bore + logger	Private	221134	6622897	264*	10	TBC	TBC
School (GW027653)	-	Bore	Private	224673	6623048	282*	8.4	TBC	Gravel
WOL1 (GW062778)	-	Bore + logger	Private	226799	6622149	290*	7.2	TBC	TBC
WOL2	-	Bore	Private	226119	6618673	285*	TBC	TBC	TBC
MOR1	-	Bore + logger	Private	220649	6619125	260*	TBC	TBC	TBC
MOR2	-	Bore + logger	Private	219871	6618803	2560*	TBC	TBC	TBC
TESTON (GW003489)	-	Bore	Private	222568	6619102	270*	45.4	TBC	Hard rock
TRALEE (GW003478)	-	Bore	Private	224102	6618538	278*	33.8	TBC	Basalt
MORSE (GW001869)	-	Bore	Private	228203	6617691	302*	63.1	TBC	Sandstone
BRE2 (GW000583)	-	Bore	Private	234377	6616639	354*	96.3	TBC	Hard rock
BAS1	-	Bore	Private	217107	6612427	239*	TBC	TBC	TBC
BAS2	-	Bore	Private	217548	6612037	238*	TBC	TBC	TBC

SP = standpipe bore, VWP = vibrating wire piezometer, logger = datalogger installed, dry = bore currently dry so no datalogger installed.

Details for private bores have been estimated based on the registered bore closest to the monitored location. Not all construction details are available for each site, and several bores are some distance from the closest registered bore so all construction details remain uncertain. * = elevation of private bore interpolated from groundwater model DEM, TBC = To be confirmed.

Regional Groundwater Bores

Table E-2
Groundwater Levels (metres below bore datum)

month (yyyy-mm)	RB05A	Reg3	Reg4	Reg5	Reg5A	Reg6	Reg7A	Reg10Aa	Reg12	Reg13	Reg14	BCM01	BCM03
2019-01	64.05	15.65	20.37	17.79	Dry	22.4	8.98	Dry	25.93	22.49	22.07	Dry	Dry
2019-02	64.24	16.41	20.33	17.78	Dry	22.23	9.05	Dry	25.9	22.46	22.05	Dry	Dry
2019-03	64.44	16.32	20.45	17.85	Dry	22.34	9.11	Dry	26	22.59	22.05	Dry	Dry
2019-04	64.05	15.92	20.5	17.83	Dry	22.48	9.21	Dry	25.99	22.65	21.33	Dry	Dry
2019-05	65.27	15.4	20.45	17.82	Dry	22.61	9.16	Dry	25.99	23.6	21.01	Dry	Dry
2019-06	65.96	15.19	20.47	17.8	Dry	22.7	9.04	Dry	26.1	22.56	21.03	Dry	Dry
2019-07	66.95	15.05	20.48	17.87	Dry	22.75	9.12	Dry	26.08	22.62	21	Dry	Dry
2019-08	67.35	14.98	20.5	18.1	Dry	22.79	9.17	Dry	26.02	22.63	21.38	Dry	Dry
2019-09	68.11	15.03	20.46	17.87	Dry	22.81	9.25	Dry	25.98	22.6	20.91	Dry	Dry
2019-10	68.69	15.54	20.52	17.9	Dry	22.87	9.35	Dry	25.99	22.64	21.59	Dry	Dry
2019-11	69.06	15.97	20.54	17.9	Dry	22.89	9.38	Dry	25.99	22.64	21.24	Dry	Dry
2019-12	69.41	16.35	20.5	17.87	Dry	22.92	9.34	Dry	26	22.61	21.41	Dry	-

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 SO ₄ - turbimetric	Aluminium (filt.)	Arsenic (filt.)	Barium (filt.)	Cadmium (filt.)	Copper (filt.)	Lead (filt.)	Lithium (filt.)	Manganese (filt.)	Molybdenum (filt.)	Nickel (filt.)	Zinc (filt.)	Boron (filt.)	Iron (filt.)	Ammonia as N	Nitrite as N	Nitrate as N	Total anions	Total cations	Ionic balance
		pH Unit	µS/cm	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	meq/L	meq/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	-	-	3000-13000	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
RB05A	2019-03-13	7.82	1830	1070	78	<0.01	<0.001	0.3	<0.0001	<0.001	<0.001	0.026	0.089	0.004	0.006	0.006	0.06	0.5	0.72	0.01	0.21	20.8	19.1	4.11
	2019-06-07	7.93	1920	960	80	<0.01	<0.001	0.323	<0.0001	<0.001	<0.001	0.024	0.084	0.008	0.01	0.006	0.07	0.83	0.78	<0.01	0.04	18.8	19.2	1
	2019-09-10	7.63	1990	1020	79	<0.01	<0.001	0.31	<0.0001	<0.001	<0.001	0.027	0.081	0.007	0.012	0.02	0.06	0.25	0.85	<0.01	0.05	18.9	19.2	0.71
	2019-11-29	7.67	1810	1080	81	0.01	<0.001	0.314	<0.0001	<0.001	0.002	0.026	0.084	0.006	0.009	0.011	0.07	0.26	0.85	0.02	<0.01	20.2	20	0.64
Reg3	2019-03-05	7.95	1260	707	72	<0.01	0.003	0.015	<0.0001	<0.001	0.002	<0.001	0.174	0.019	0.003	0.014	0.07	0.17	0.07	<0.01	<0.01	11.4	13.2	7.57
	2019-06-07	8.03	1290	749	80	<0.01	0.003	0.03	<0.0001	<0.001	<0.001	<0.001	0.192	0.016	0.002	0.014	0.06	0.1	0.04	<0.01	0.09	12.2	12.3	0.75
	2019-09-09	7.96	1270	698	80	<0.01	0.003	0.02	<0.0001	<0.001	<0.001	<0.001	0.154	0.02	0.002	0.007	0.06	<0.05	0.06	<0.01	<0.01	11.6	12.1	2.47
	2019-11-28	7.96	1210	636	82	<0.01	0.003	0.0018	<0.0001	-	<0.001	0.003	<0.001	0.155	0.001	-	-	<0.005	0.07	0.06	-	<0.01	<0.01	0.3
Reg4	2019-03-04	8.35	1120	650	10	<0.01	0.001	0.019	<0.0001	<0.001	<0.001	0.051	0.048	0.007	0.001	0.006	0.07	<0.05	0.21	0.21	0.05	10.5	11.2	3.16
	2019-06-04	8.45	1110	628	12	<0.01	<0.001	0.023	<0.0001	<0.001	<0.001	0.047	0.04	0.005	0.001	0.008	0.06	<0.05	0.12	0.19	<0.01	11	11.1	0.51
	2019-09-04	8.41	1170	634	9	<0.01	0.001	0.028	<0.0001	<0.001	<0.001	0.042	0.046	0.006	0.002	0.01	0.07	<0.05	0.09	0.16	<0.01	10.7	11.5	3.38
	2019-11-26	8.36	1090	581	11	<0.01	<0.001	0.026	<0.0001	-	<0.001	<0.001	0.068	0.017	0.001	-	-	0.005	0.07	<0.05	-	0.08	0.38	0.02
Reg5	2019-03-04	7.94	1960	1060	237	<0.01	<0.001	0.018	<0.0001	<0.001	<0.001	0.007	0.52	0.004	0.002	0.006	<0.05	<0.05	0.42	0.02	<0.01	18.2	18.7	1.33
	2019-06-04	8.28	1940	1130	312	<0.01	<0.001	0.021	<0.0001	<0.001	<0.001	0.005	0.586	0.003	0.008	0.008	<0.05	<0.05	0.33	<0.01	<0.01	19.9	18	5.04
	2019-09-05	7.9	2020	1100	257	<0.01	<0.001	0.026	<0.0001	<0.001	<0.001	0.005	0.528	0.003	0.017	<0.005	<0.05	<0.05	0.3	<0.01	<0.01	18.4	18.4	0.07
	2019-11-28	7.93	1920	1150	295	<0.01	<0.001	0.019	<0.0001	-	<0.001	<0.001	0.007	0.045	0.002	0.006	<0.05	<0.05	0.28	<0.01	<0.01	20.9	18	7.38
Reg5A	2019-03-04	Dry																						
	2019-06-04	Dry																						
	2019-09-05	Dry																						
	2019-11-28	Dry																						
Reg6	2019-03-05	7.94	2090	1090	88	<0.01	<0.001	0.056	<0.0001	<0.001	<0.001	0.011	0.104	0.017	0.002	0.006	0.07	<0.05	0.13	0.01	<0.01	18.1	18.9	2.03
	2019-06-05	8.19	2100	1100	144	<0.01	<0.001	0.055	<0.0001	<0.001	<0.001	0.01	0.093	0.016	0.006	<0.005	0.06	<0.05	0.12	0.05	0.07	19.9	18.2	4.55
	2019-09-05	7.98	2440	1320	156	<0.01	0.001	0.057	<0.0001	<0.001	<0.001	0.029	0.113	0.017	0.017	0.01	0.07	0.06	0.12	0.03	<0.01	21.6	21.4	0.36
	2019-11-28	8	2060	1060	148	<0.01	0.001	0.052	<0.0001	<0.001	<0.001	0.008	0.084	0.013	0.004	0.008	0.06	<0.05	0.11	<0.01	<0.01	21.8	17.8	9.93
Reg7A	2019-03-13	7.61	784	485	35	<0.01	0.003	0.089	<0.0001	<0.001	<0.001	0.002	0.421	<0.001	0.001	0.063	<0.05	0.2	0.06	<0.01	0.07	8.91	8.32	3.42
	2019-06-05	7.85	881	525	43	<0.01	0.003	0.096	<0.0001	<0.001	<0.001	0.002	0.436	<0.001	<0.001	0.051	<0.05	0.31	<0.01	<0.01	0.07	8.98	9.02	0.2
	2019-09-09	7.32	912	510	36	<0.01	0.004	0.096	<0.0001	0.007	<0.001	0.002	0.406	<0.001	0.003	0.051	<0.05	0.21	<0.01	<0.01	0.04	7.81	8.85	6.23
	2019-11-27	7.4	888	482	39	<0.01	0.004	0.093	<0.0001	0.004	<0.001	0.002	0.369	0.001	0.002	0.062	<0.05	0.09	0.02	<0.01	0.02	9.18	8.65	2.97
Reg10A	2019-03-13	Dry																						
	2019-06-07	Dry																						
	2019-09-10	Dry																						
	2019-11-29	Dry																						

Location	Date	Lab pH value	Lab electrical conductivity @ 25°C	TDS @ 180°C	Sulfate as SO4 - turbimetric	Aluminium (filt.)	Arsenic (filt.)	Barium (filt.)	Cadmium (filt.)	Copper (filt.)	Lead (filt.)	Lithium (filt.)	Manganese (filt.)	Molybdenum (filt.)	Nickel (filt.)	Zinc (filt.)	Boron (filt.)	Iron (filt.)	Ammonia as N	Nitrite as N	Nitrate as N	Total anions	Total cations	Ionic balance
		pH Unit	µS/cm	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	meq/L	meq/L	%
Reg12	2019-03-05	7.67	2280	1280	41	0.01	<0.001	0.067	<0.0001	<0.001	<0.001	0.031	0.121	0.004	0.001	0.053	0.1	0.11	0.07	<0.01	<0.01	22.9	23.8	1.87
	2019-06-07	7.91	2460	1340	50	<0.01	0.001	0.081	<0.0001	<0.001	<0.001	0.033	0.102	0.004	0.001	0.022	0.11	0.19	0.03	<0.01	<0.01	24.7	24.4	0.47
	2019-09-09	7.62	2360	1290	45	<0.01	<0.001	0.073	<0.0001	<0.001	<0.001	0.034	0.118	0.004	0.002	0.009	0.1	0.07	0.06	<0.01	<0.01	22.1	24	4.08
	2019-11-29	7.59	2200	1380	59	<0.01	0.001	0.067	<0.0001	<0.001	0.002	0.032	0.119	0.002	0.001	0.033	0.1	<0.05	0.05	<0.01	<0.01	24.7	23.7	1.97
Reg13	2019-03-04	7.64	3540	2460	1550	0.19	<0.001	0.05	<0.0001	<0.001	<0.001	0.029	0.267	0.016	0.006	0.01	0.14	<0.05	0.09	<0.01	<0.01	45.3	37.6	9.33
	2019-06-04	7.88	3570	2580	1490	<0.01	<0.001	0.048	<0.0001	<0.001	<0.001	0.018	0.286	0.012	0.003	0.018	0.14	<0.05	0.05	<0.01	<0.01	45.1	37.7	8.95
	2019-09-04	7.86	3570	2310	846	<0.01	<0.001	0.041	<0.0001	<0.001	<0.001	0.128	0.1	0.027	0.005	<0.005	0.1	<0.05	0.29	<0.01	<0.01	29.7	35.3	8.58
	2019-11-26	9.18	3280	2140	1110	<0.01	<0.001	0.037	<0.0001	<0.001	<0.001	0.175	0.012	0.026	0.002	<0.005	0.08	<0.05	0.39	<0.01	0.01	35.1	32.6	3.67
Reg14	2019-03-04	7.6	993	608	58	<0.01	0.003	0.021	<0.0001	<0.001	<0.001	0.002	0.216	0.007	0.003	0.009	<0.05	<0.05	0.08	<0.01	<0.01	9.18	10	4.56
	2019-06-05	8.22	972	588	41	<0.01	0.003	0.032	<0.0001	<0.001	<0.001	0.006	0.263	0.007	0.005	0.011	<0.05	0.06	0.08	<0.01	<0.01	9.43	9.74	1.61
	2019-09-04	7.8	1240	670	70	<0.01	0.003	0.034	<0.0001	<0.001	<0.001	0.011	0.166	0.011	0.012	0.009	<0.05	0.13	0.15	<0.01	0.02	11.2	11.5	1.36
	2019-11-26	7.75	1360	713	243	<0.01	0.003	0.032	<0.0001	<0.001	<0.001	0.029	0.14	0.011	0.009	0.019	<0.05	<0.05	0.12	<0.01	<0.01	14.9	13.3	5.58
BCM01	2019-03-05	Dry																						
	2019-06-07	Dry																						
	2019-09-09	Dry																						
	2019-11-29	Dry																						
BCM03	2019-03-13	Dry																						
	2019-06-07	Dry																						
	2019-09-09	Dry																						
	2019-11-04	Dry																						
MAC1280	2019-03-13	11.6	3960	2290	14	2.32	<0.001	0.203	<0.0001	0.014	<0.001	0.15	0.002	0.024	0.022	0.014	<0.05	<0.05	5.99	0.33	<0.01	31.9	29.4	4.21
	2019-06-07	11.6	4020	1920	6	2.2	<0.001	0.21	<0.0001	0.009	<0.001	0.154	0.003	0.026	0.019	0.007	<0.05	0.05	5.49	0.55	0.24	28.8	29.3	0.94
	2019-09-10	11.9	4310	2180	12	2.26	<0.001	0.243	<0.0001	0.009	<0.001	0.148	0.001	0.027	0.026	<0.005	<0.05	<0.05	6.82	0.33	0.01	27.9	31.5	6.04
	2019-11-29	11.9	3780	2280	14	2.37	<0.001	0.205	<0.0001	0.01	<0.001	0.138	<0.001	0.024	0.021	0.007	<0.05	<0.05	7.1	0.4	0.1	31.7	31.8	0.12

Private Groundwater Bores

Table E-4
Groundwater Levels

Date (yyyy-mm)	MOR1	MOR2	BRE2	WOL1	WOL2	School	Whan	Tralelee	Morse	Bas1	Bas2	Teston
2019-02	12.25	13.13	18.79	6.31	14.63	9.71	5.56	20.27	21.82	*Tap	*Pump	19.83
2019-08	12.36	13.26	18.89	6.56	15.91	*Tap	5.55	20.21	21.93	*Tap	10.2	19.8

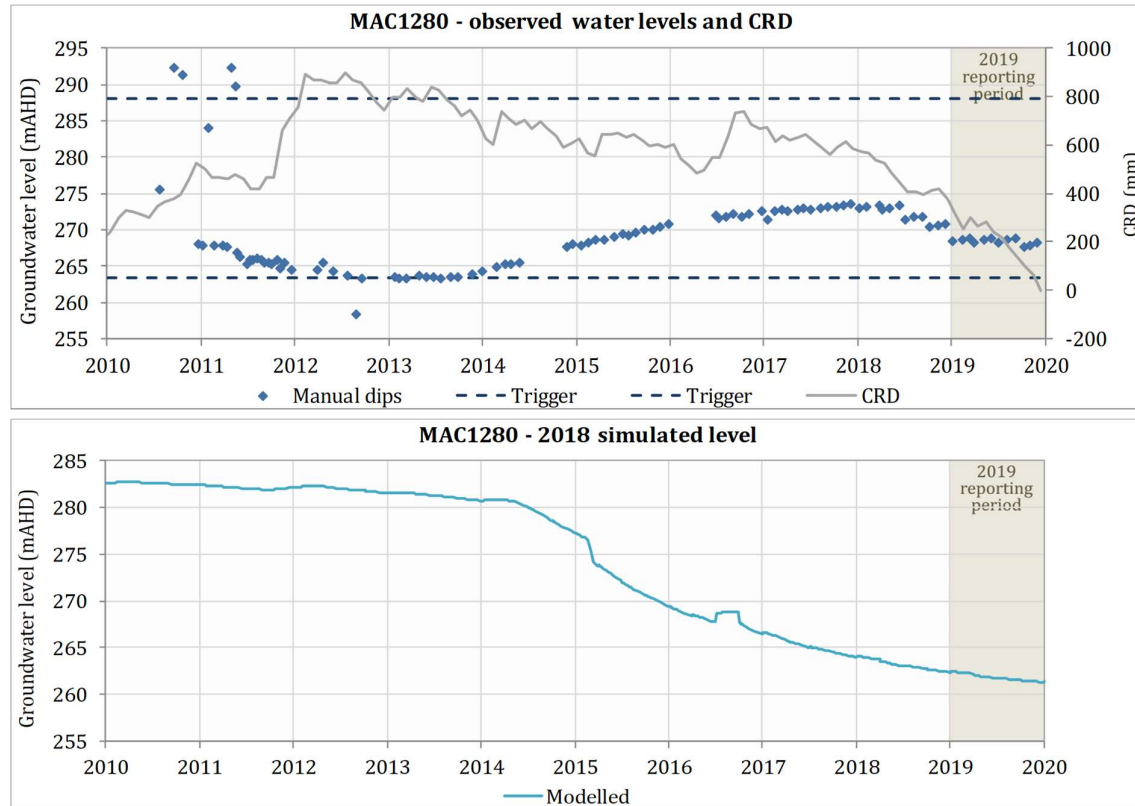
Notes: * Groundwater level could not be obtained due to obstructions.

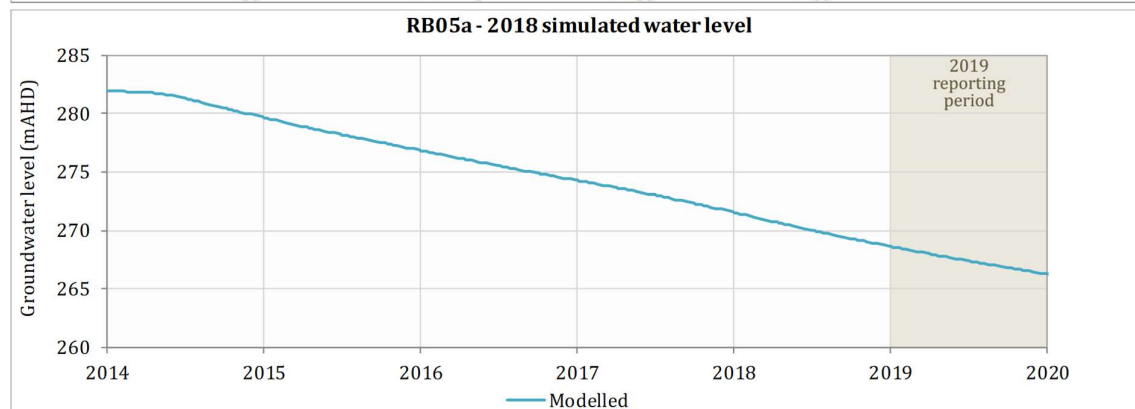
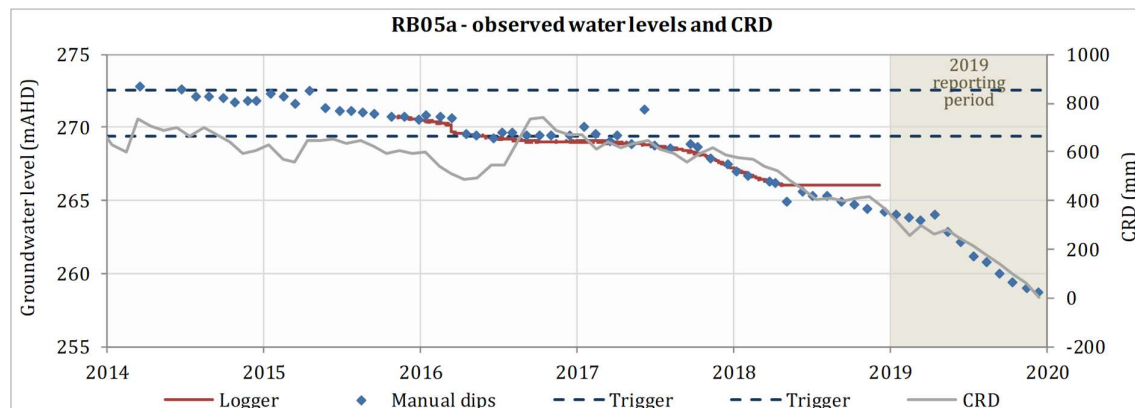
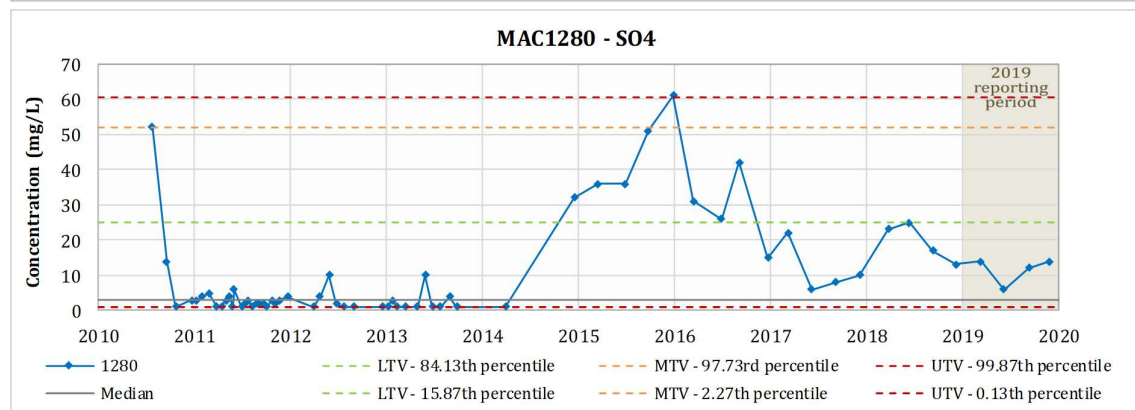
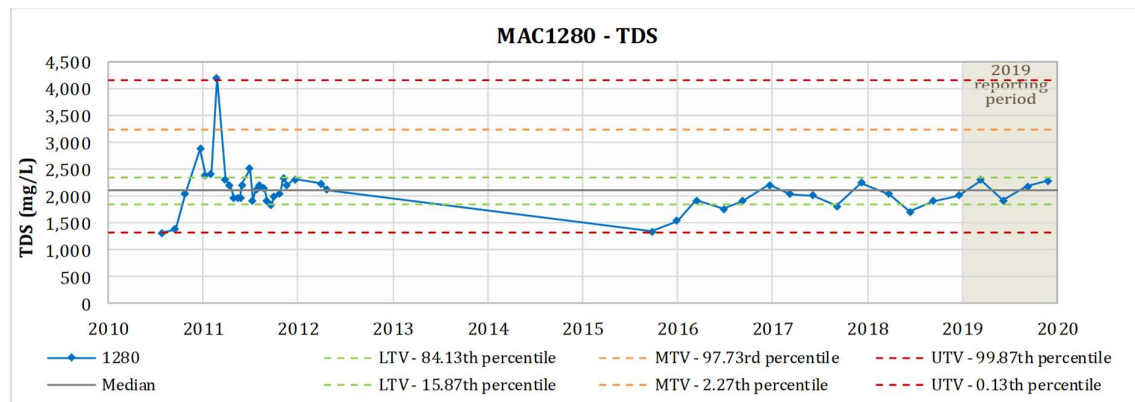
Table E-5
Groundwater Monitoring Results and comparison with ANZECC guideline trigger values

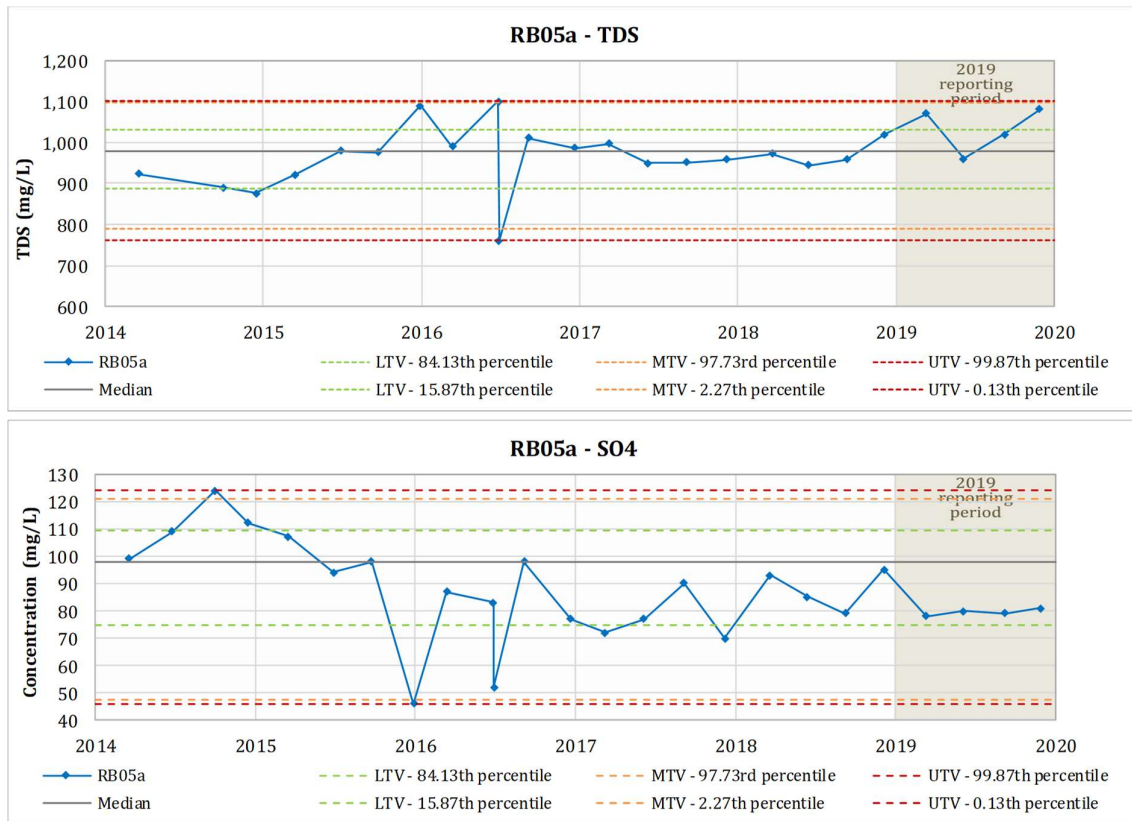
Site	Date	Lab pH value	Lab electrical conductivity @ 25°C µS/cm	TDS @ 180°C mg/L	Sulfate as SO ₄ - turbimetric mg/L	Arsenic (filt.) mg/L	Cadmium (filt.) mg/L	Copper (filt.) mg/L	Lead (filt.) mg/L	Nickel (filt.) mg/L	Zinc (filt.) mg/L	Iron (filt.) mg/L	Ammonia as N mg/L	Nitrite as N mg/L	Nitrate as N 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	2019-02-05	7.7	1480	950	44	<0.001	<0.0001	0.01	<0.001	0.001	0.021	<0.05	<0.01	<0.01	12.2	16.9	16.1	2.45
	2019-08-12	7.98	1640	1000	45	<0.001	<0.0001	0.006	<0.001	<0.001	0.014	<0.05	<0.01	<0.01	12.4	16.1	18	5.7
MOR2	2019-02-05	7.38	72	53	<1	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.005	0.06	0.06	<0.01	0.03	0.86	0.69	----
	2019-08-12	7.37	129	68	<1	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.005	1.22	0.1	<0.01	0.02	1.11	1.04	----
BRE2	2019-02-06	8.17	3780	2000	<5	0.006	<0.0001	<0.001	<0.001	0.001	<0.005	0.16	1.92	<0.01	0.03	40.4	35.9	5.93
	2019-08-13	8.29	3370	2150	<1	0.007	<0.0001	<0.001	<0.001	<0.001	<0.005	0.24	0.82	<0.01	0.04	35.8	39	4.21
WOL1	2019-02-05	7.4	458	332	34	<0.001	<0.0001	<0.001	<0.001	<0.001	0.007	0.08	0.03	<0.01	1.08	5.36	5.03	3.09
	2019-08-13	7.7	488	286	33	<0.001	<0.0001	0.001	<0.001	<0.001	0.021	<0.05	0.01	0.04	1.17	4.85	5.34	4.76
WOL2	2019-02-06	8.31	576	396	4	<0.001	<0.0001	0.008	<0.001	<0.001	0.014	<0.05	0.53	0.02	<0.01	6.71	6.16	4.28
	2019-08-12	8.1	598	368	9	<0.001	<0.0001	0.011	<0.001	<0.001	0.019	<0.05	3.12	1.19	0.47	5.97	6.76	6.23
School raw	2019-02-05	7.39	405	272	16	<0.001	<0.0001	0.007	<0.001	<0.001	0.014	<0.05	0.01	<0.01	0.7	4.53	4.3	2.53
	2019-08-12	7.47	557	320	11	<0.001	<0.0001	0.006	<0.001	<0.001	0.014	<0.05	<0.01	<0.01	1.34	5.11	5.88	6.99
Whan	2019-02-05	7.53	344	249	17	<0.001	<0.0001	0.003	<0.001	<0.001	0.005	<0.05	<0.01	<0.01	0.54	4.1	3.69	5.31
	2019-08-13	7.53	412	259	22	<0.001	<0.0001	0.011	<0.001	<0.001	0.053	<0.05	<0.01	0.01	0.88	4.02	4.6	6.66
Tralee	2019-02-06	7.28	1140	737	37	<0.001	<0.0001	<0.001	<0.001	0.005	0.037	4.44	0.3	0.02	<0.01	14.7	12.8	7.12
	2019-08-12	7.74	1310	735	38	<0.001	<0.0001	<0.001	<0.001	0.007	0.073	4.07	0.34	<0.01	<0.01	14.5	14.9	1.4
Morse	2019-02-06	7.37	1180	740	12	<0.001	0.018	<0.001	<0.001	0.004	0.05	3.64	0.25	<0.01	0.04	14.7	13.6	3.69
	2019-08-12	7.56	755	531	10	<0.001	0.014	0.001	<0.001	0.003	0.069	6.07	0.29	<0.01	0.04	8.18	9.11	5.37
Bas1	2019-02-05	7.07	415	252	18	<0.001	<0.0001	<0.001	<0.001	0.002	0.026	0.24	0.03	<0.01	0.02	4.94	4.28	7.25
	2019-08-12	7.44	442	264	21	<0.001	<0.0001	<0.001	<0.001	0.001	<0.005	0.17	0.03	<0.01	<0.01	4.92	4.82	1.1
Bas2	2019-02-05*																	
	2019-08-12	7.35	981	592	128	<0.001	<0.0001	<0.001	<0.001	0.004	0.049	10.6	0.21	0.01	0.01	10.8	10.7	0.61
Teston	2019-02-06	7.82	2250	1310	9	<0.001	0.0001	<0.001	<0.001	<0.001	0.006	1.48	0.08	<0.01	0.03	26.6	22.8	7.77
	2019-08-12	8.02	2300	1300	11	<0.001	0.0002	<0.001	<0.001	<0.001	<0.005	1.69	0.04	<0.01	0.02	24.8	26.5	3.3

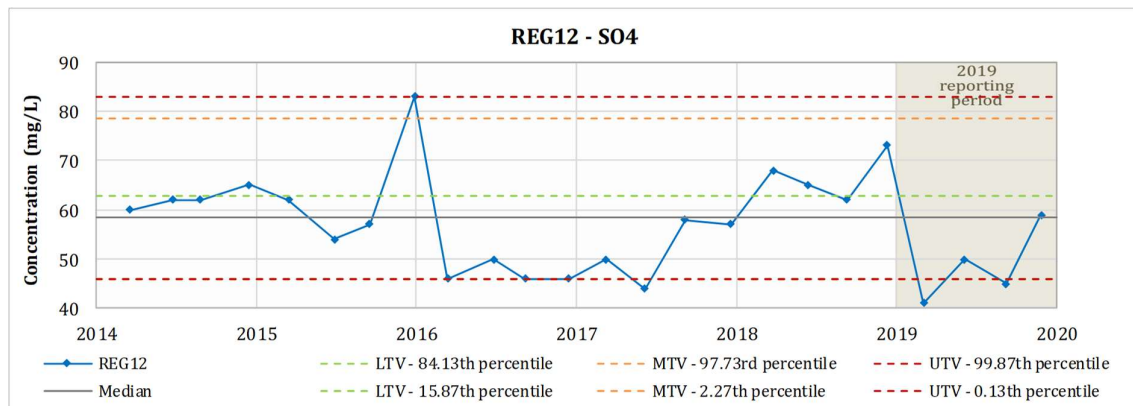
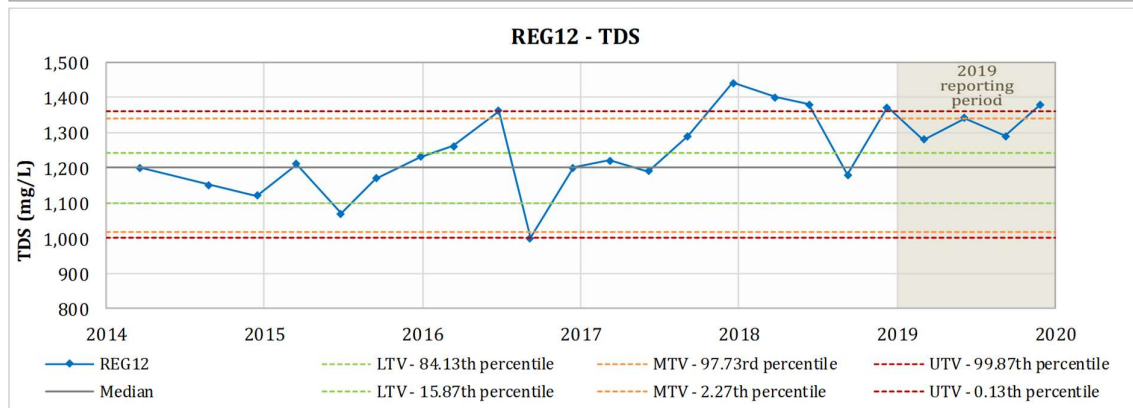
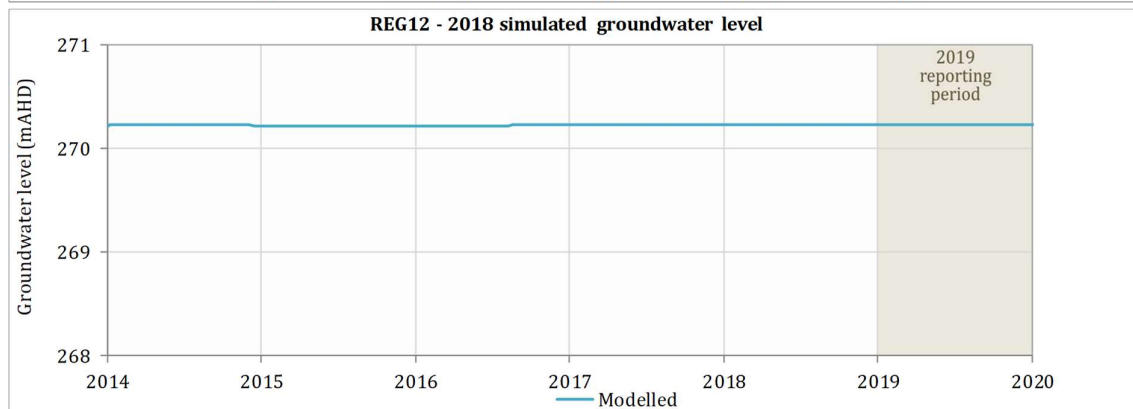
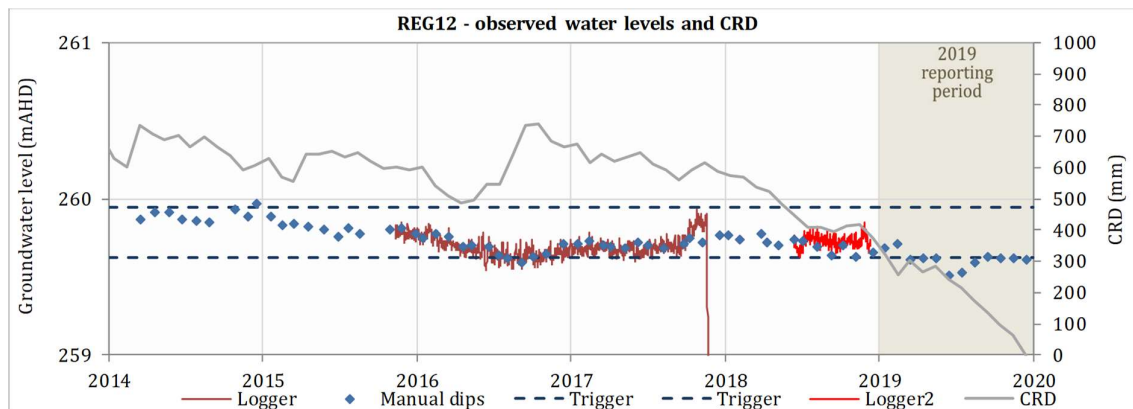
Notes: * Groundwater sample could not be obtained due to obstructions.

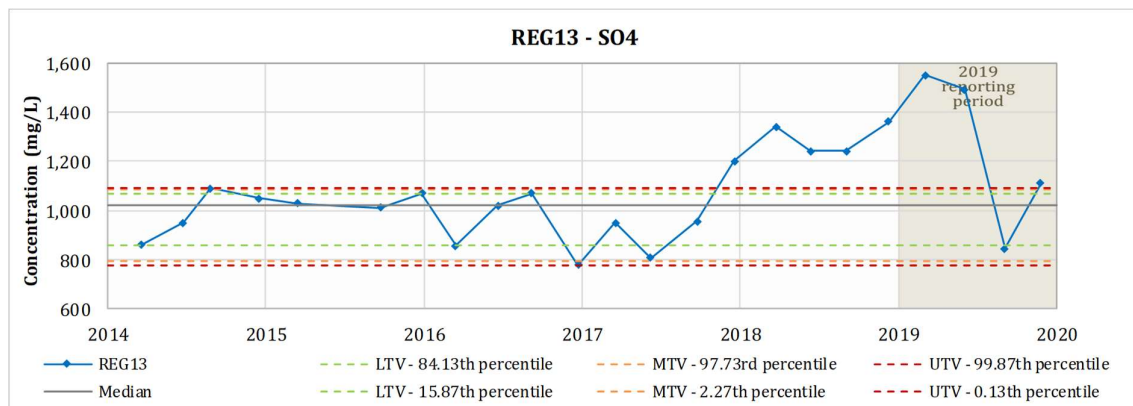
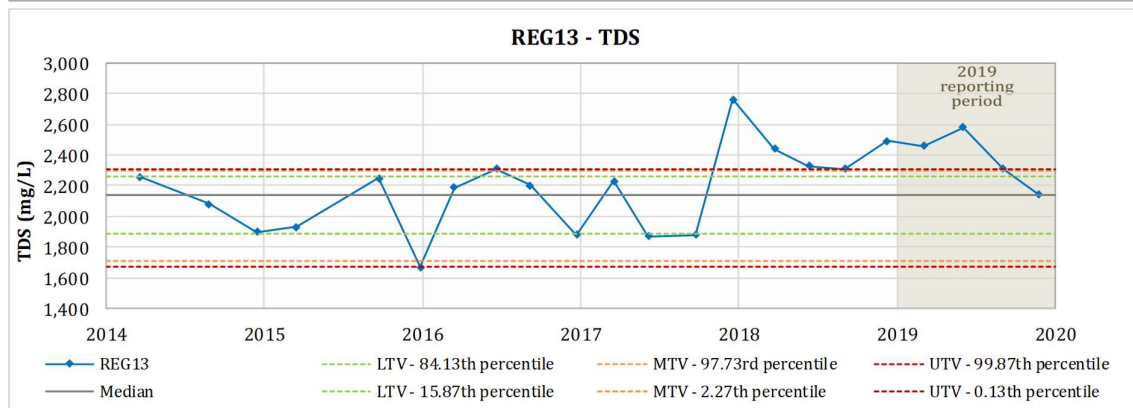
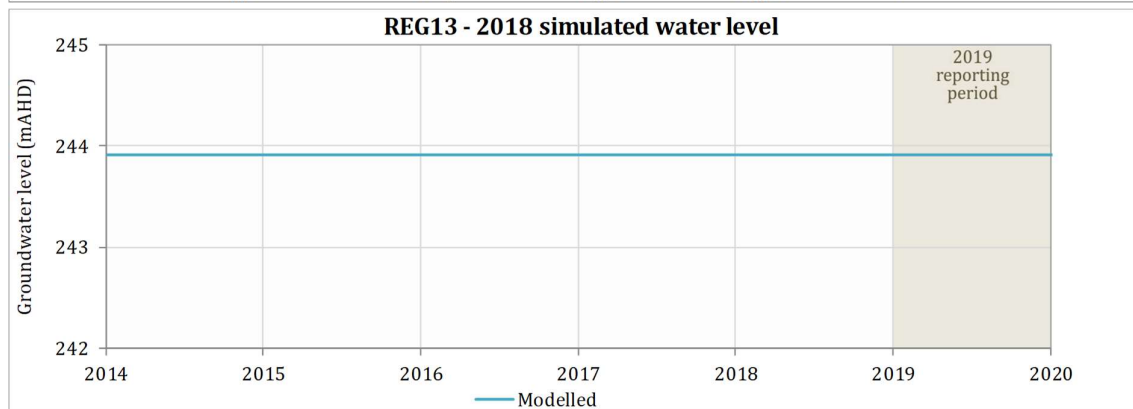
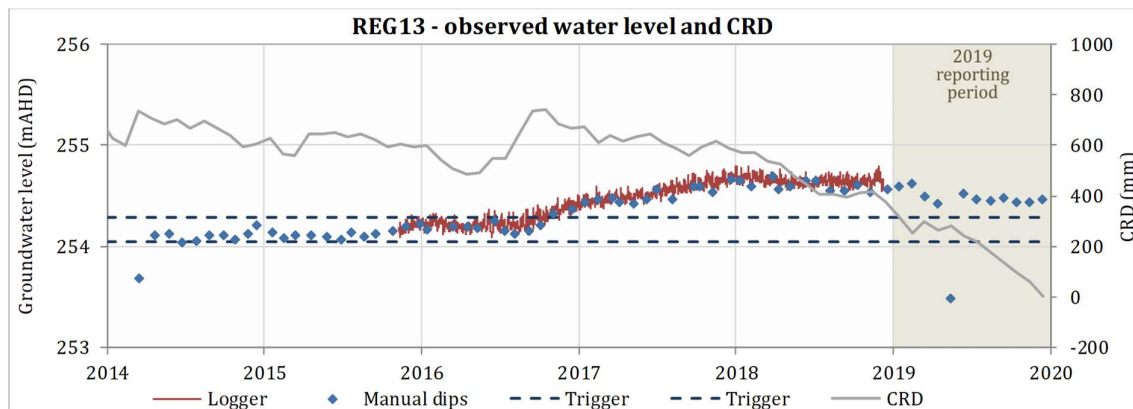
Regional standpipe monitoring bores – observed and modelled water levels, and water quality trigger parameters

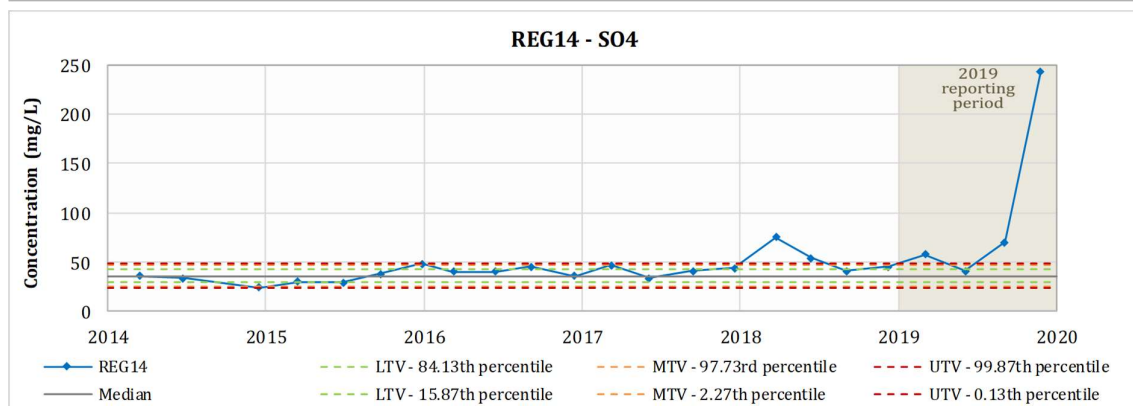
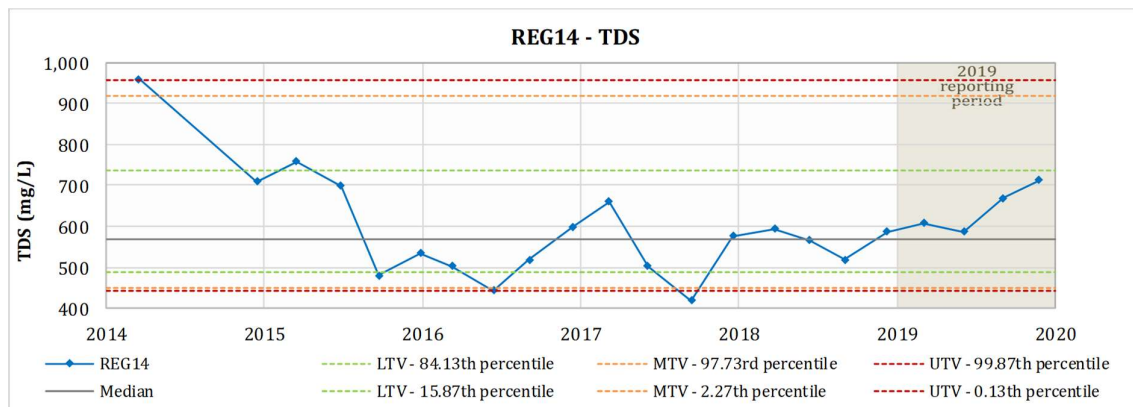
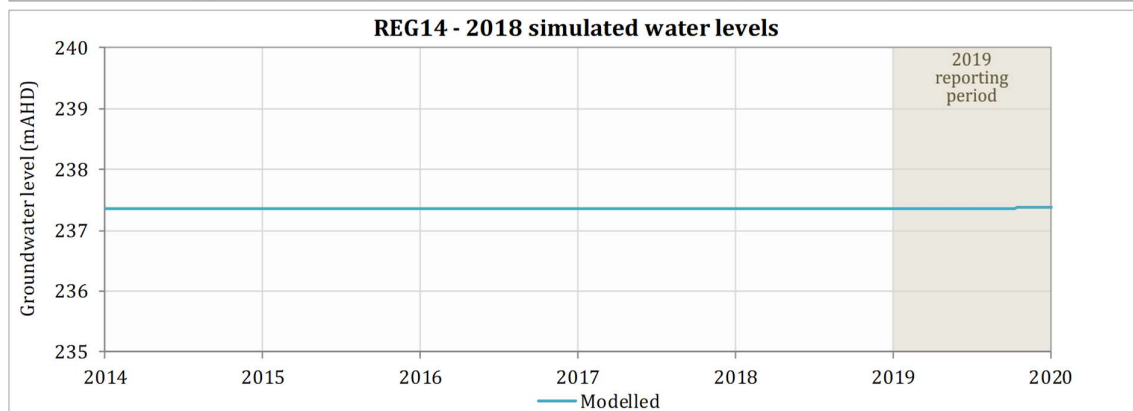
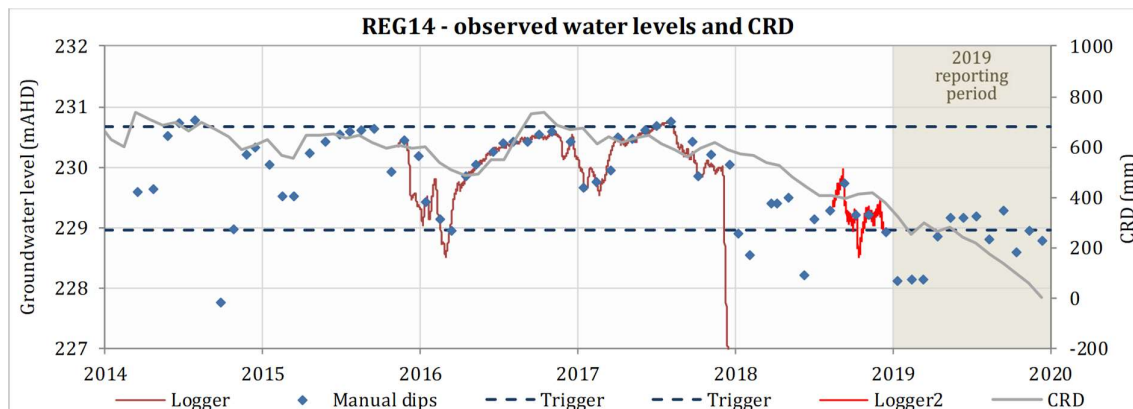


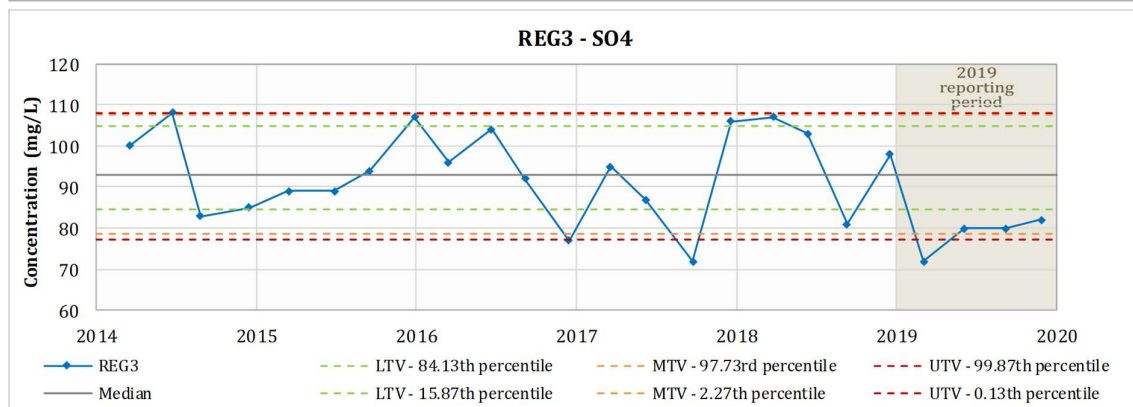
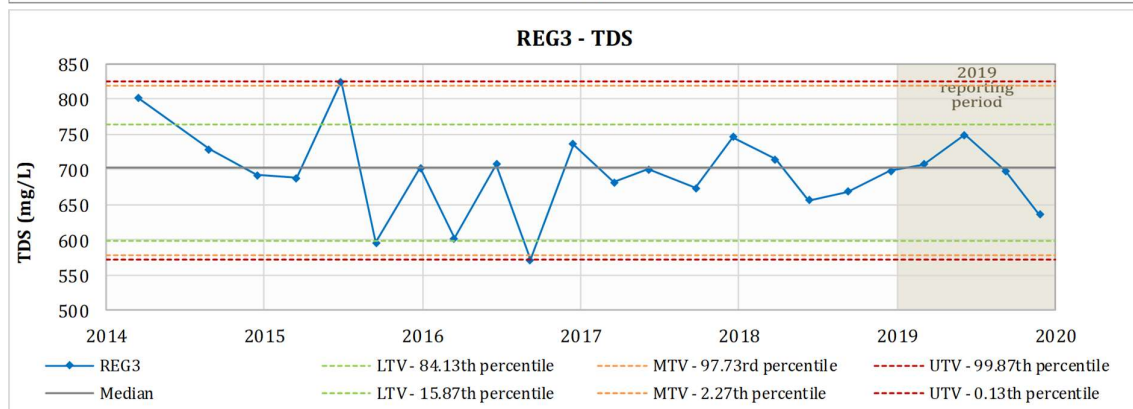
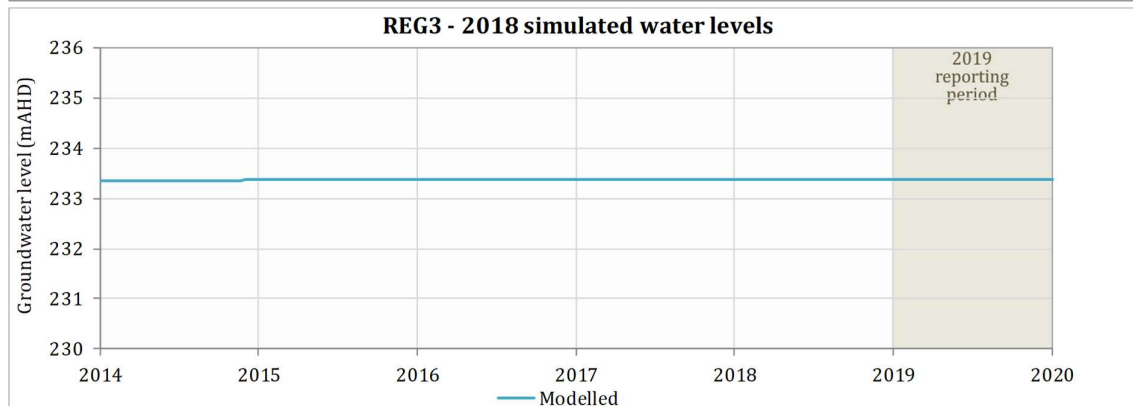
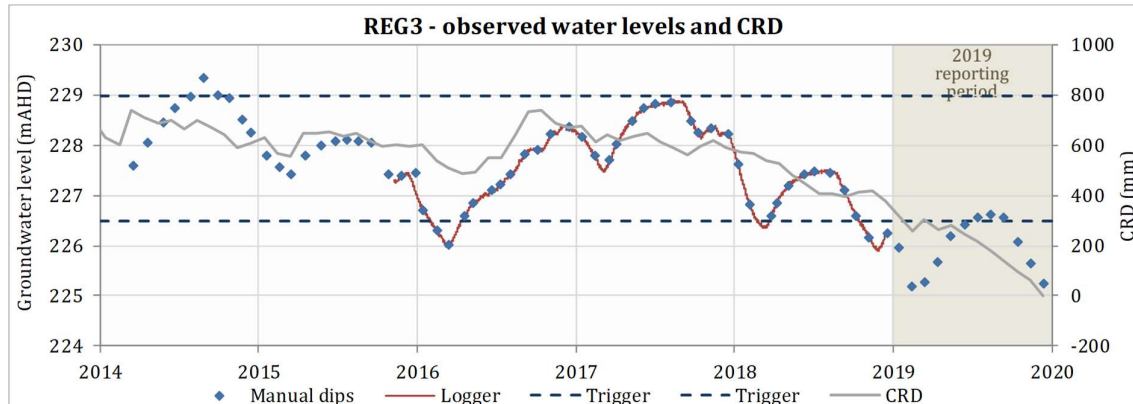


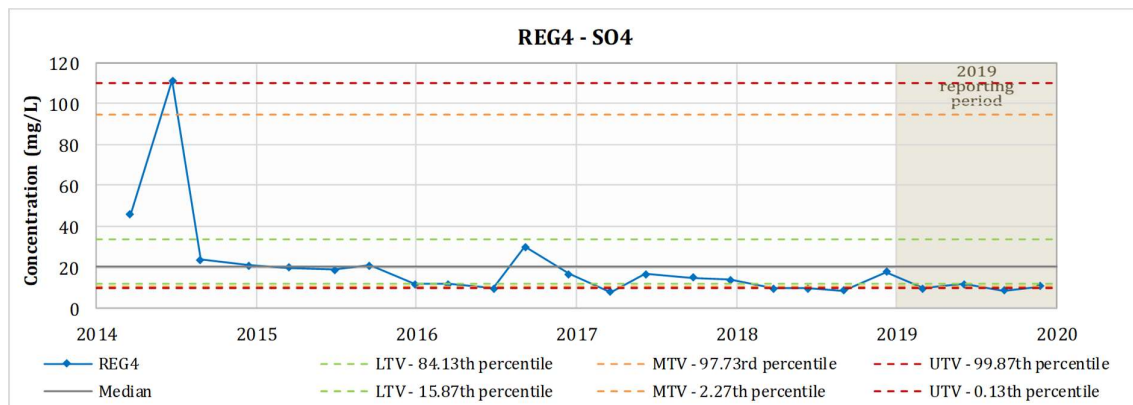
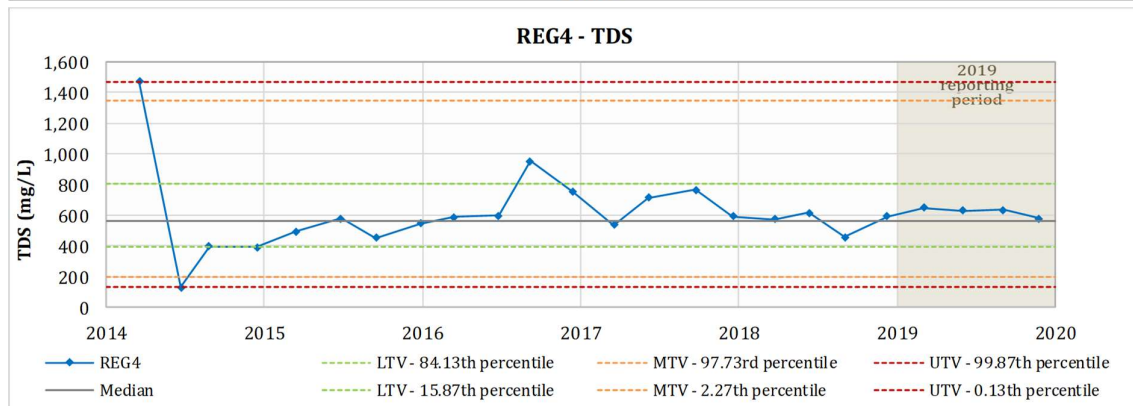
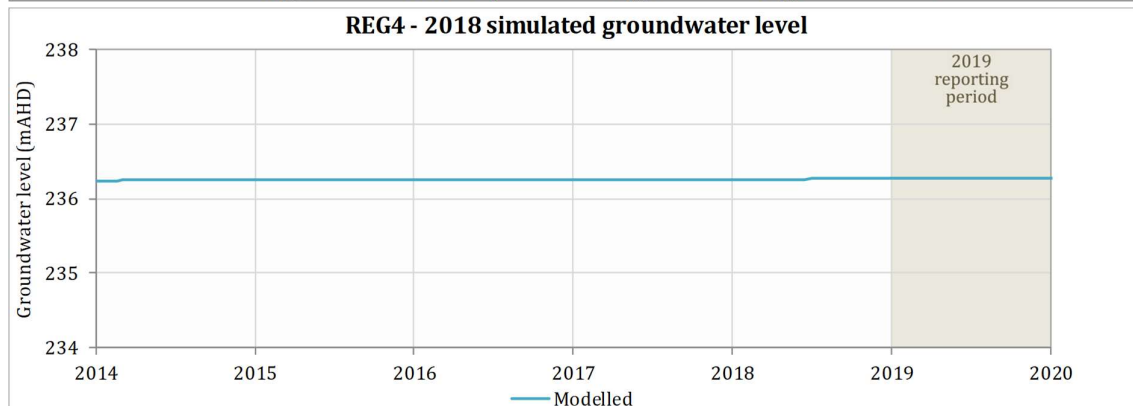
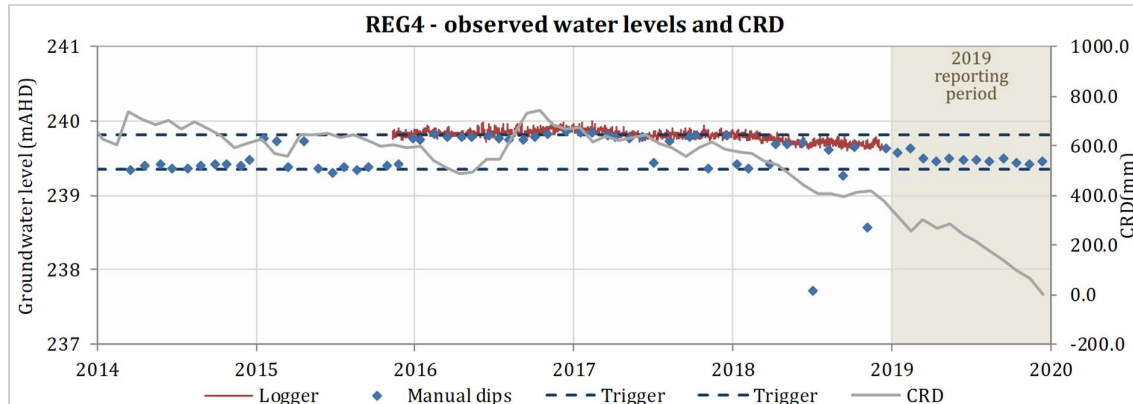


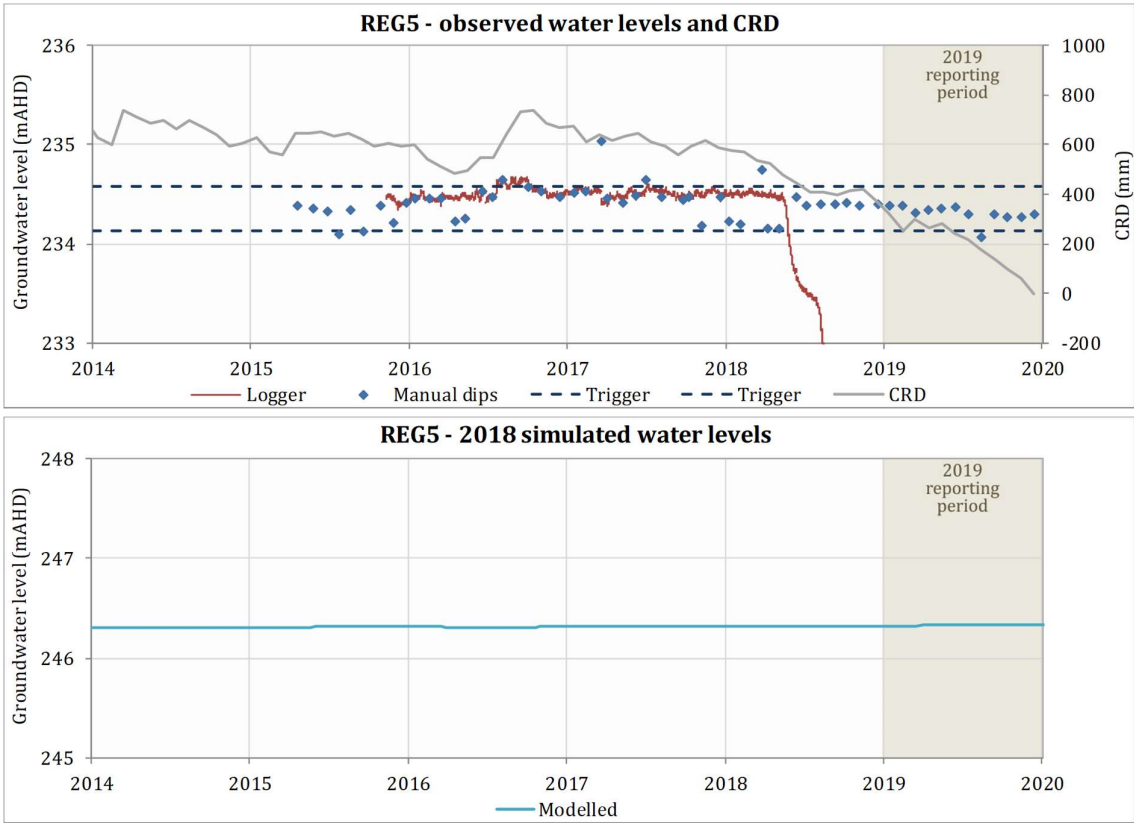


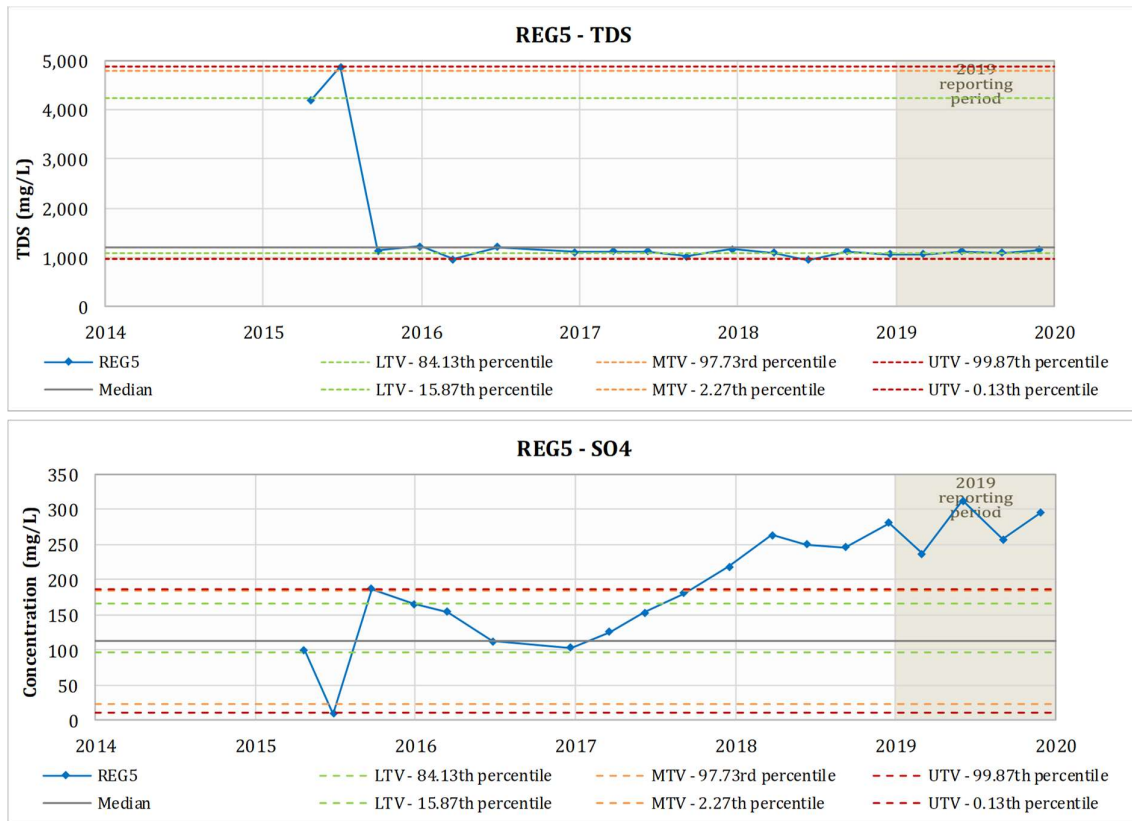


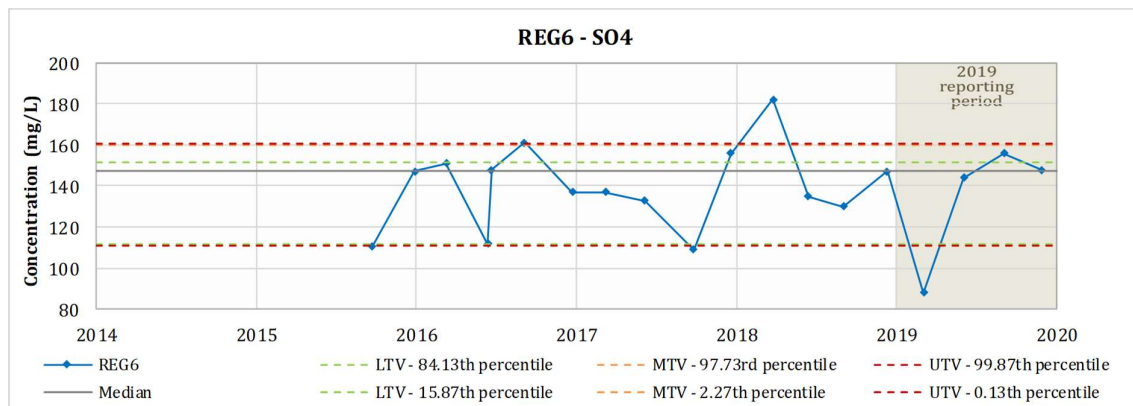
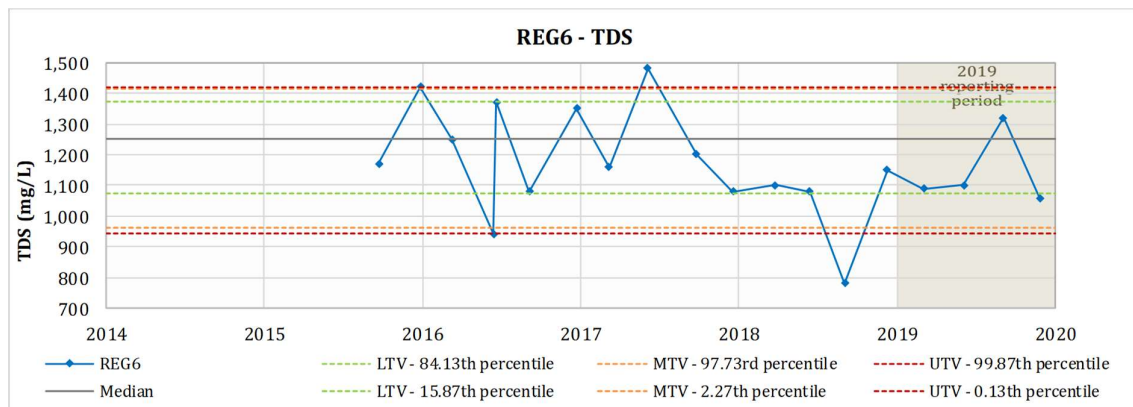
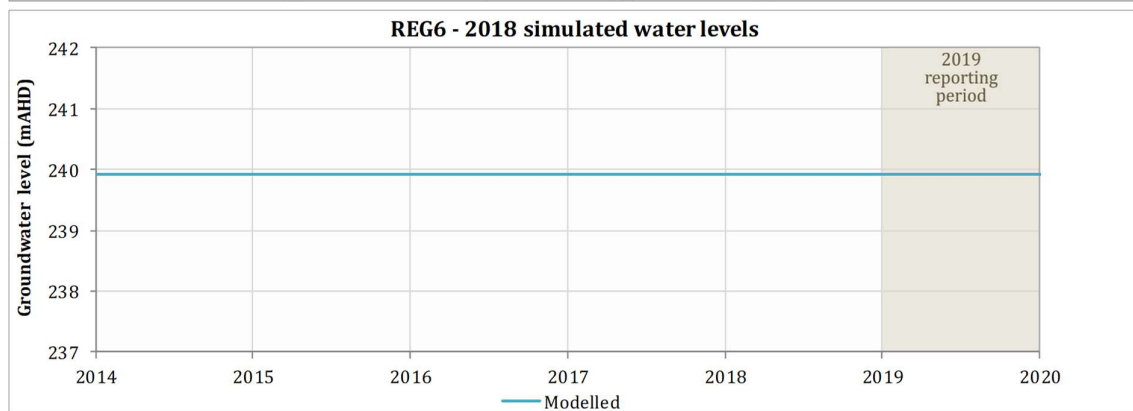
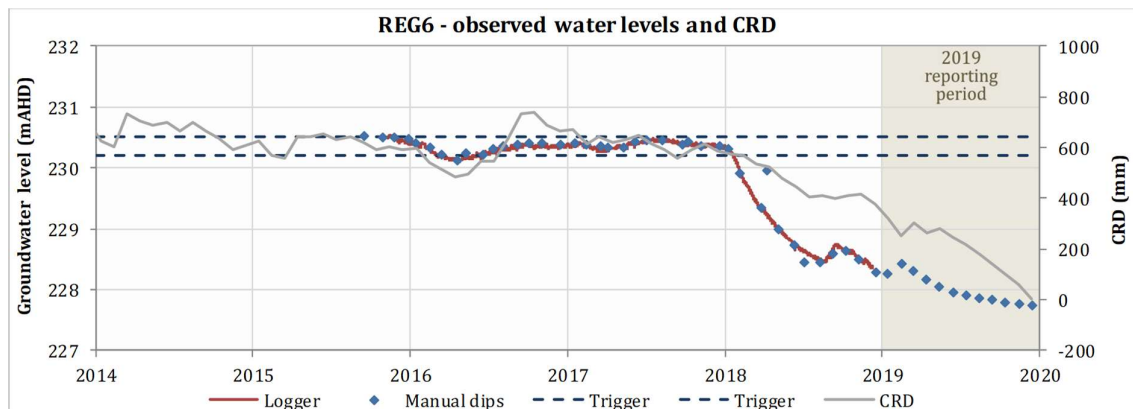


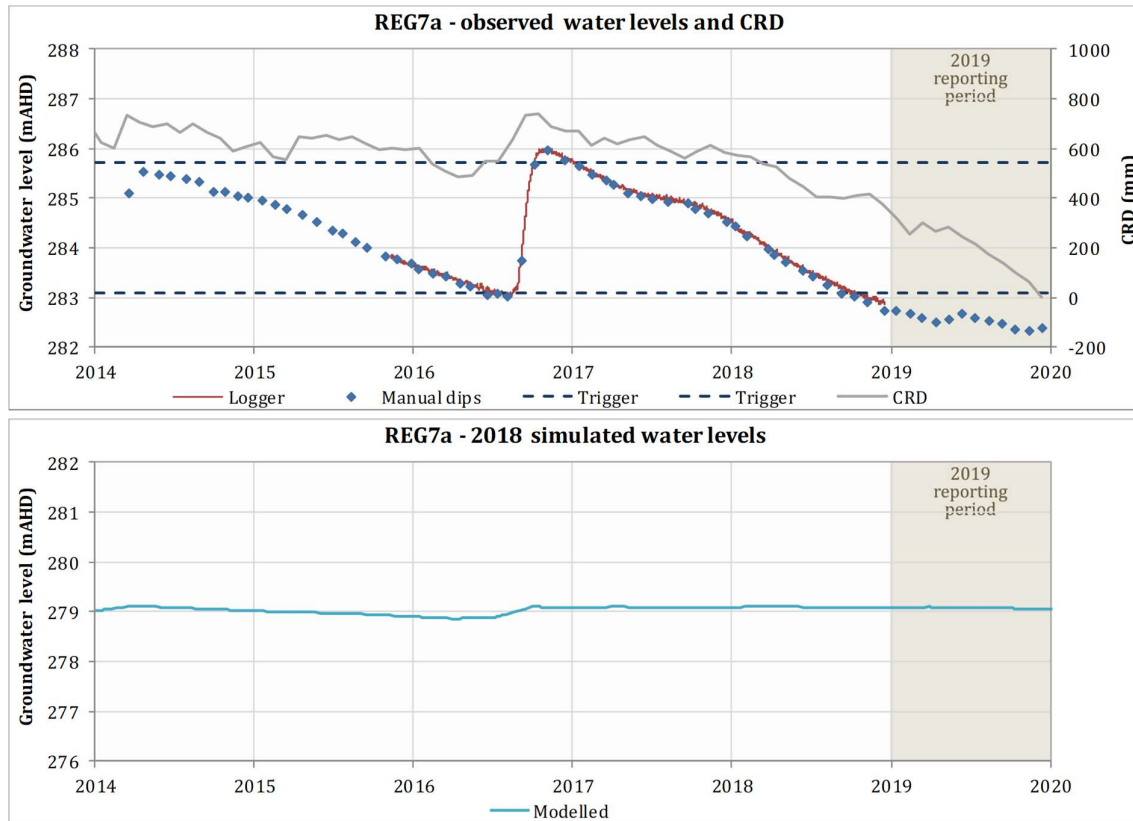


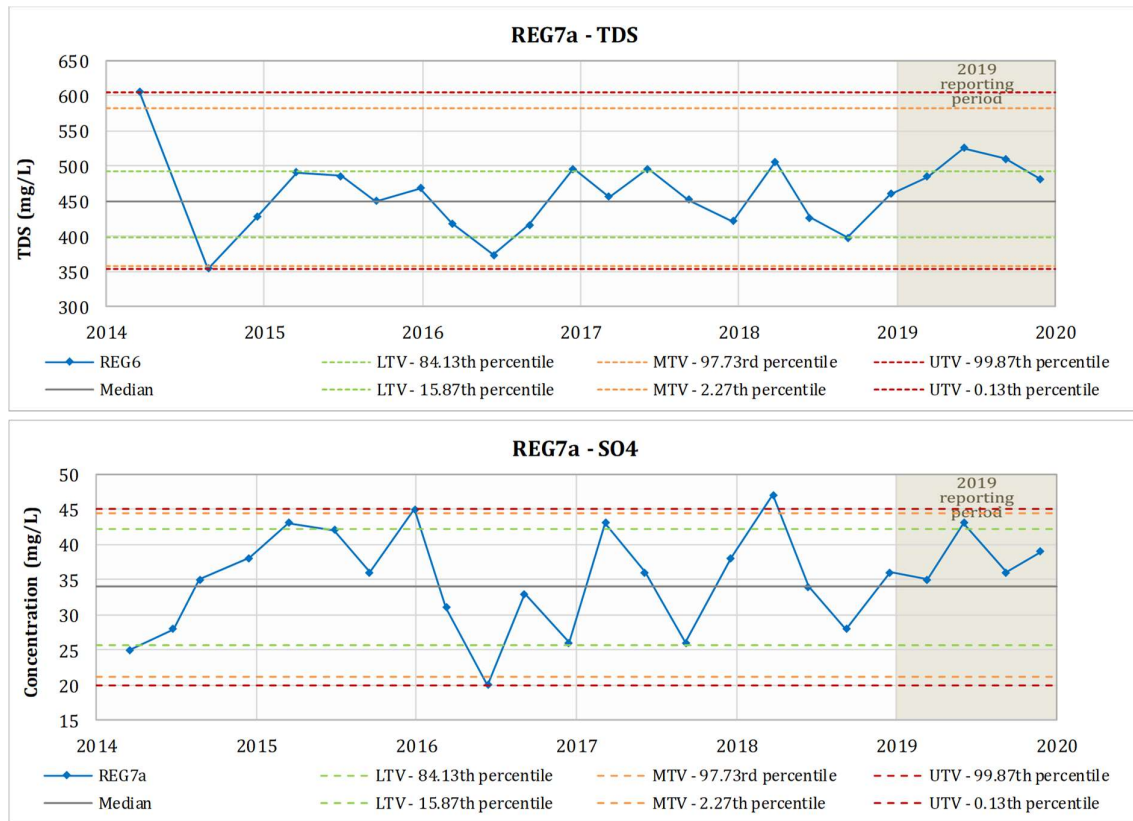




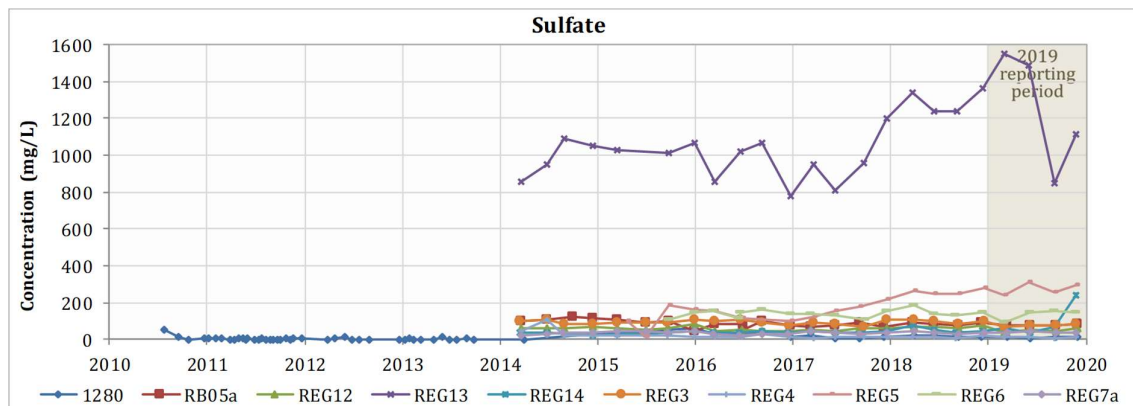
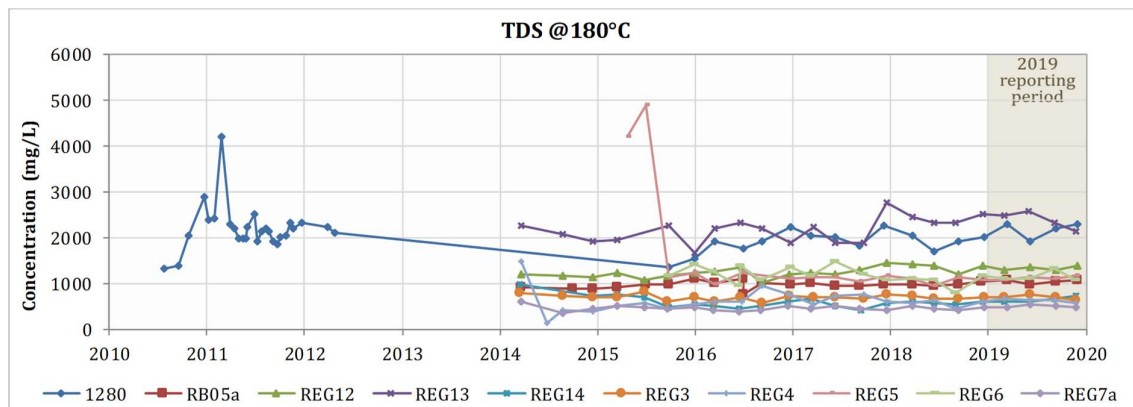
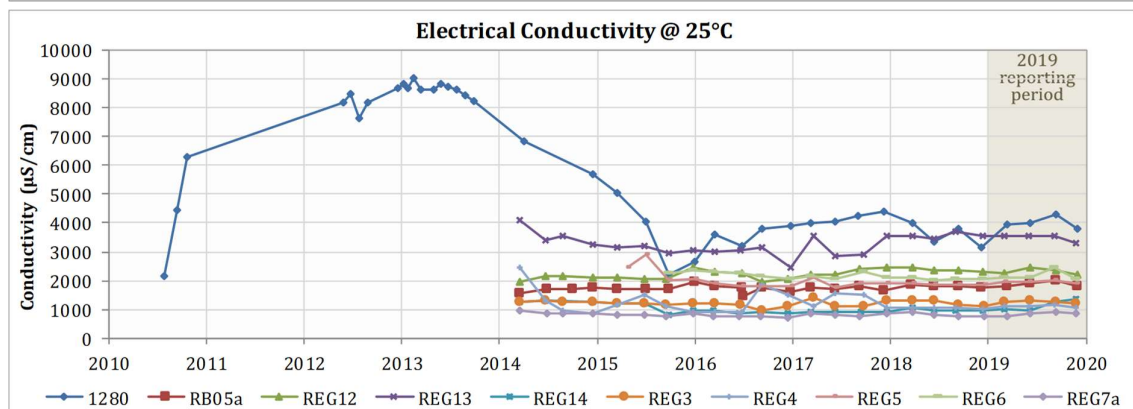
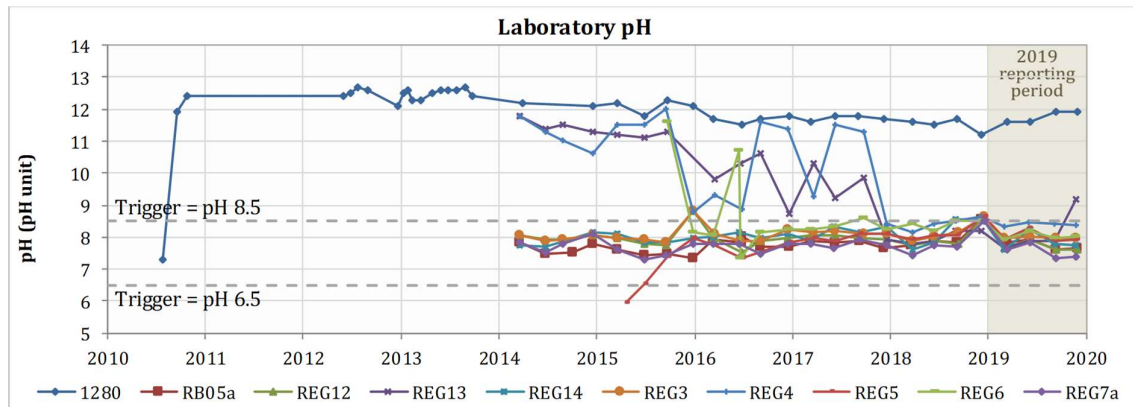




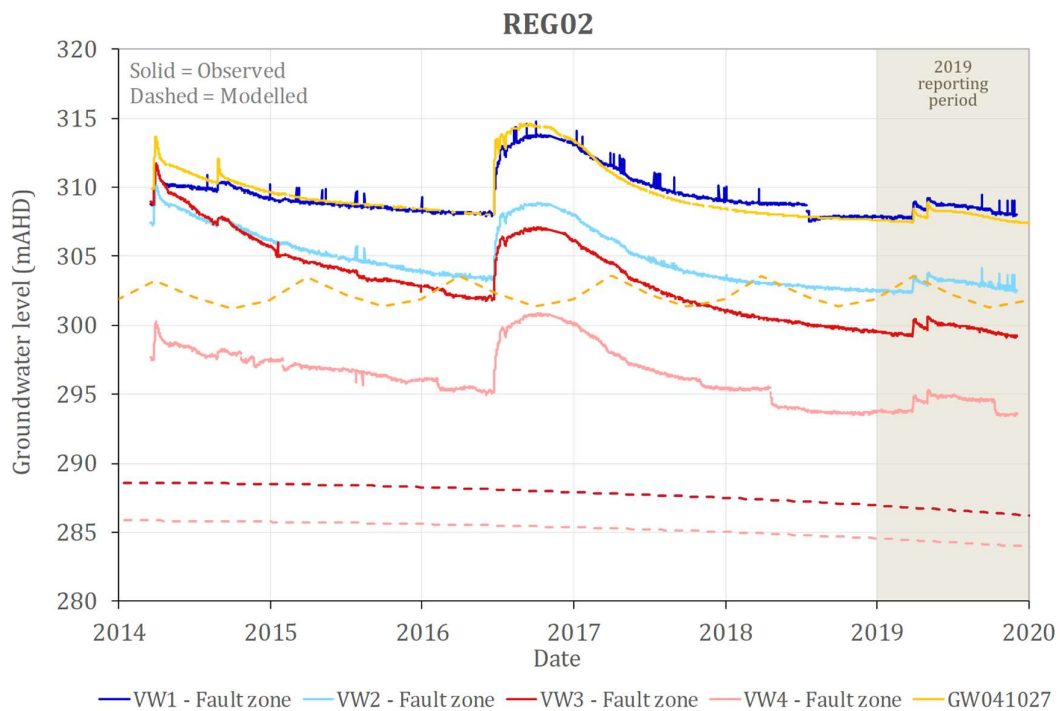
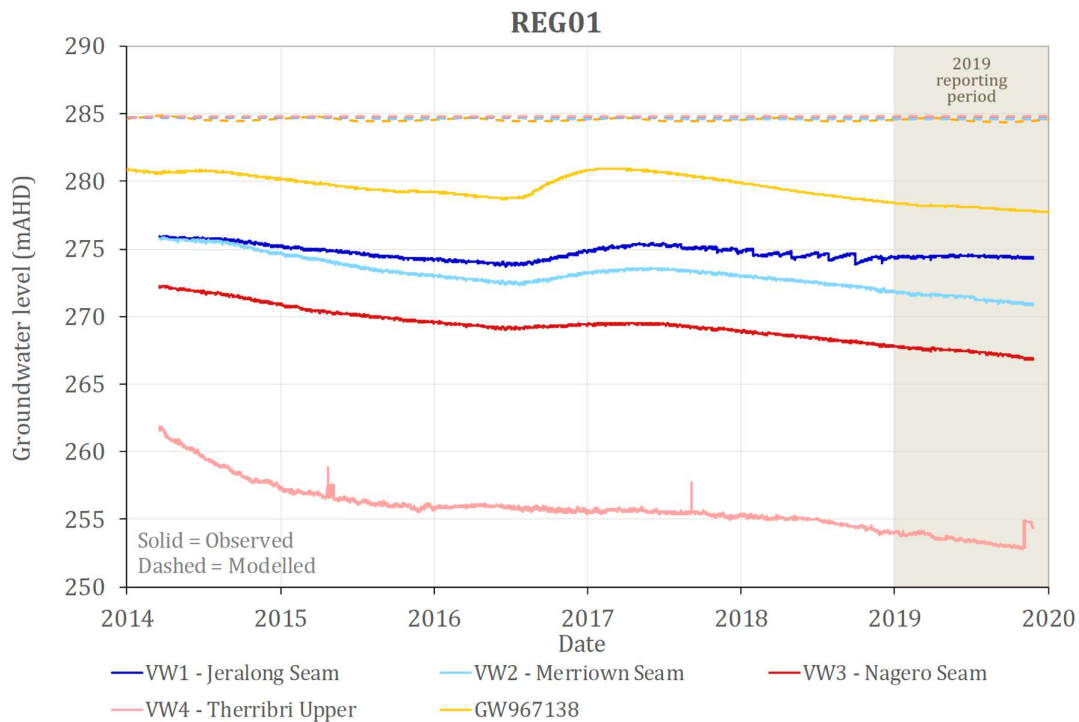


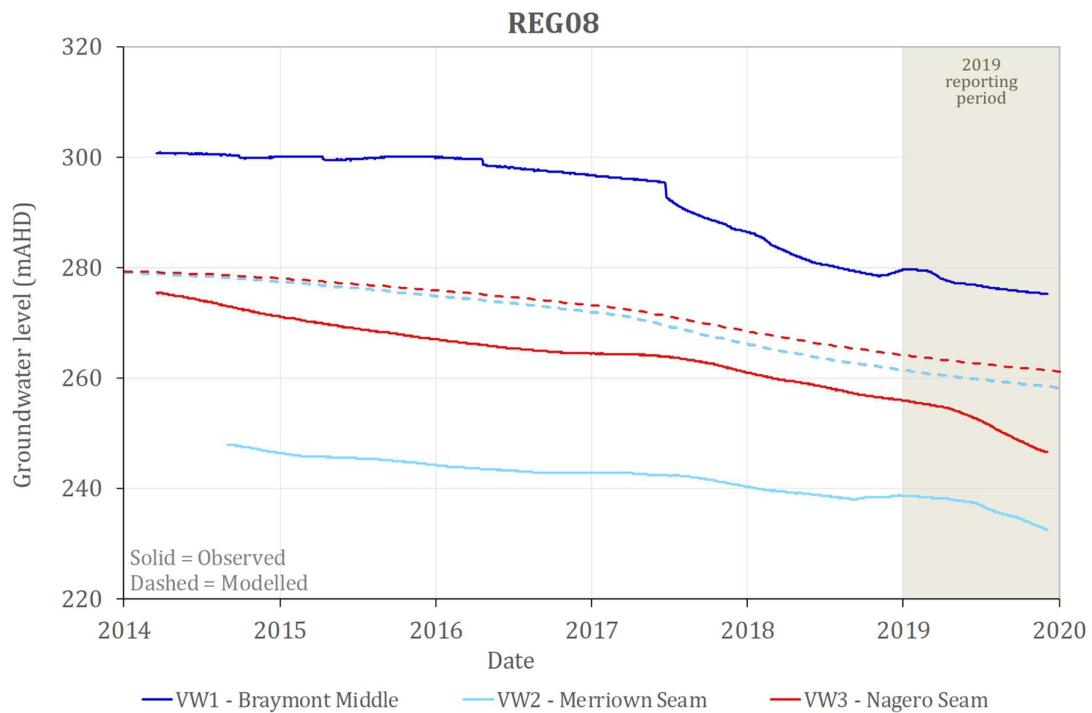
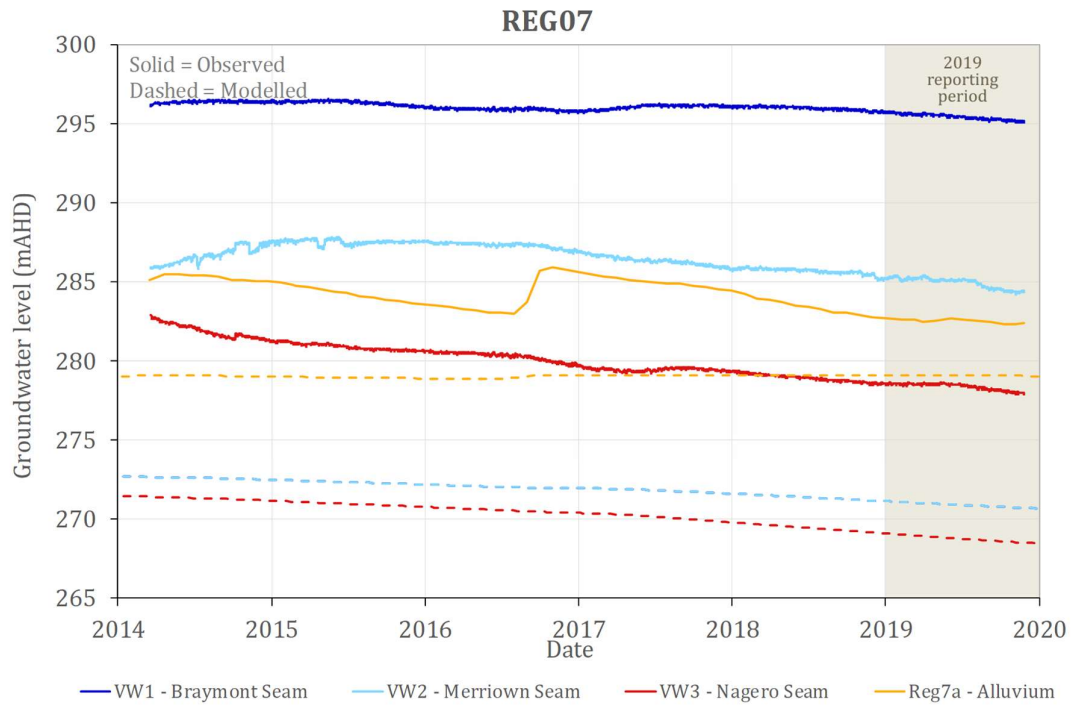


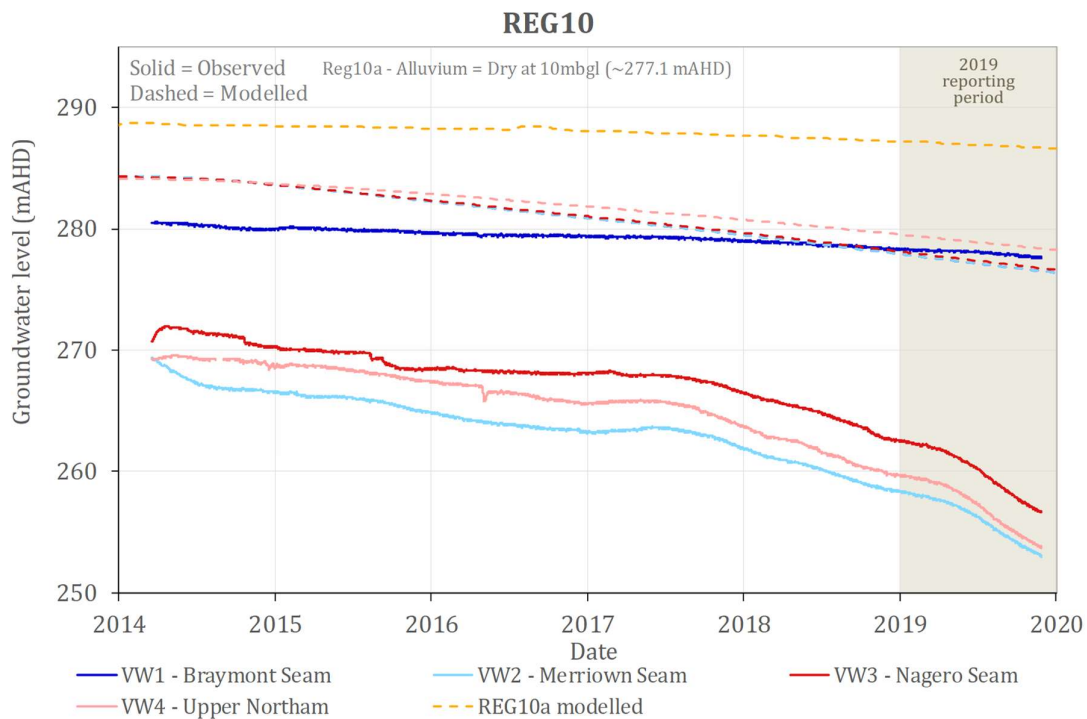
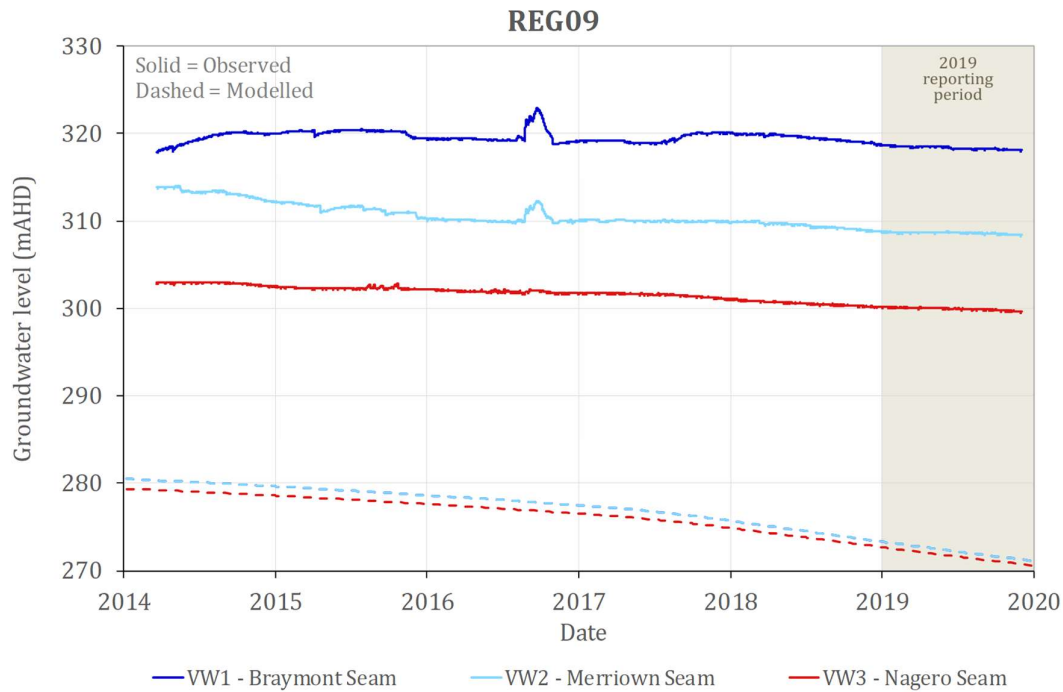
Regional standpipe monitoring bores – Individual water quality parameters

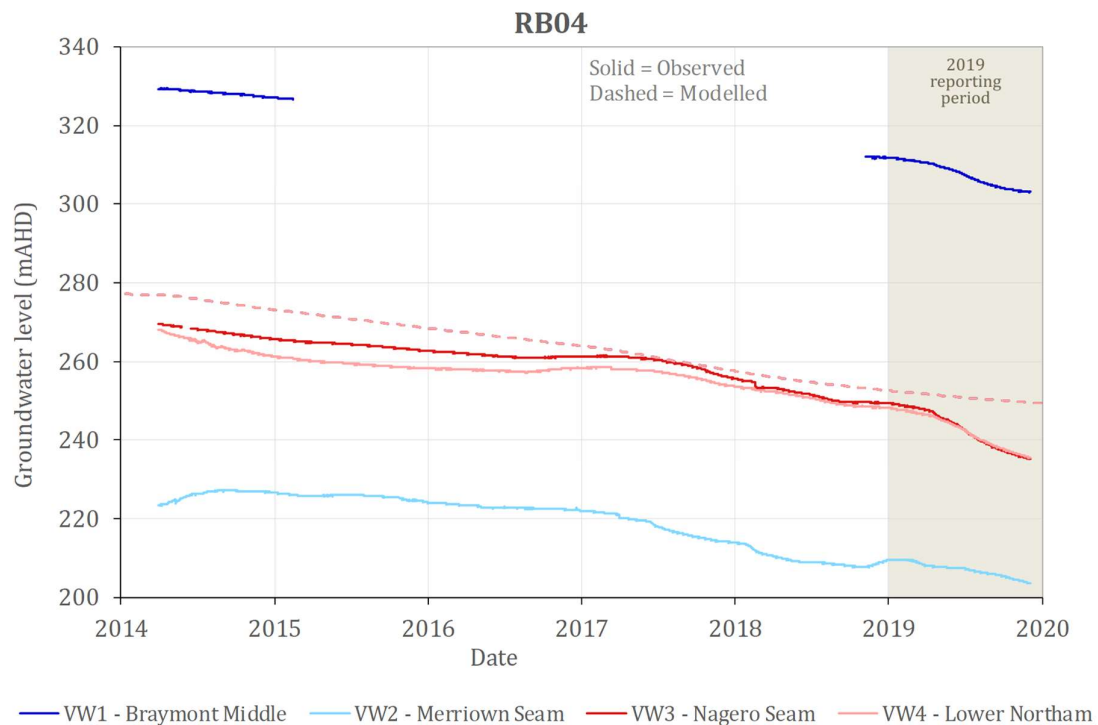
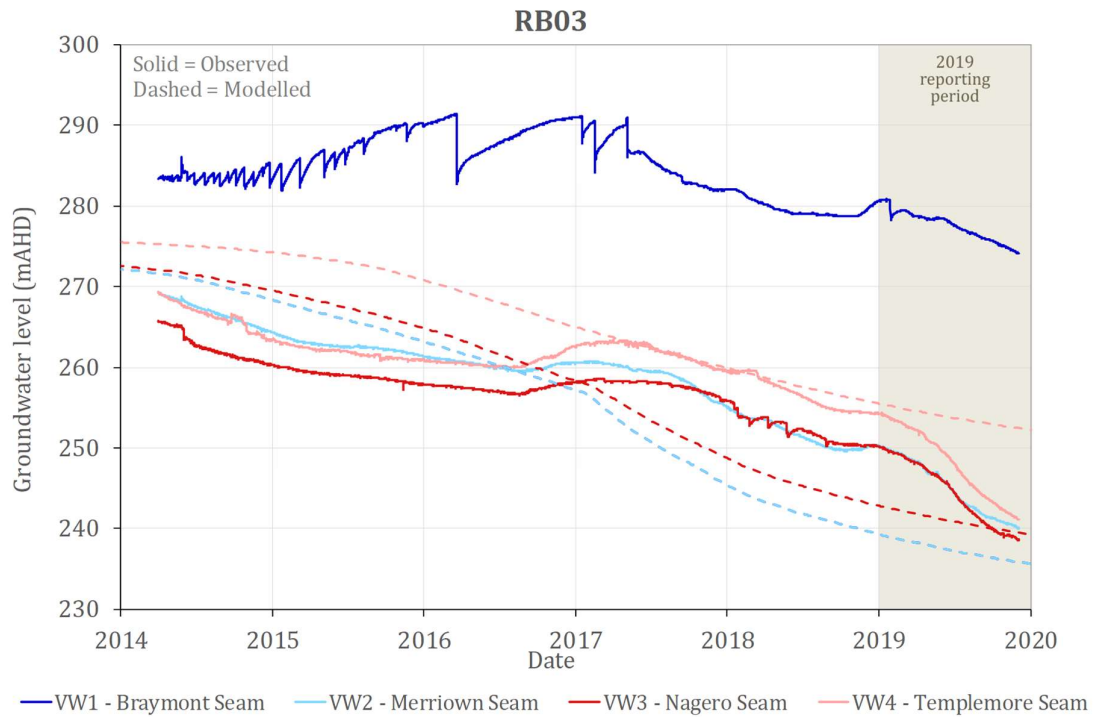


Regional Vibrating Wire Piezometers - observed and modelled (2018) water levels









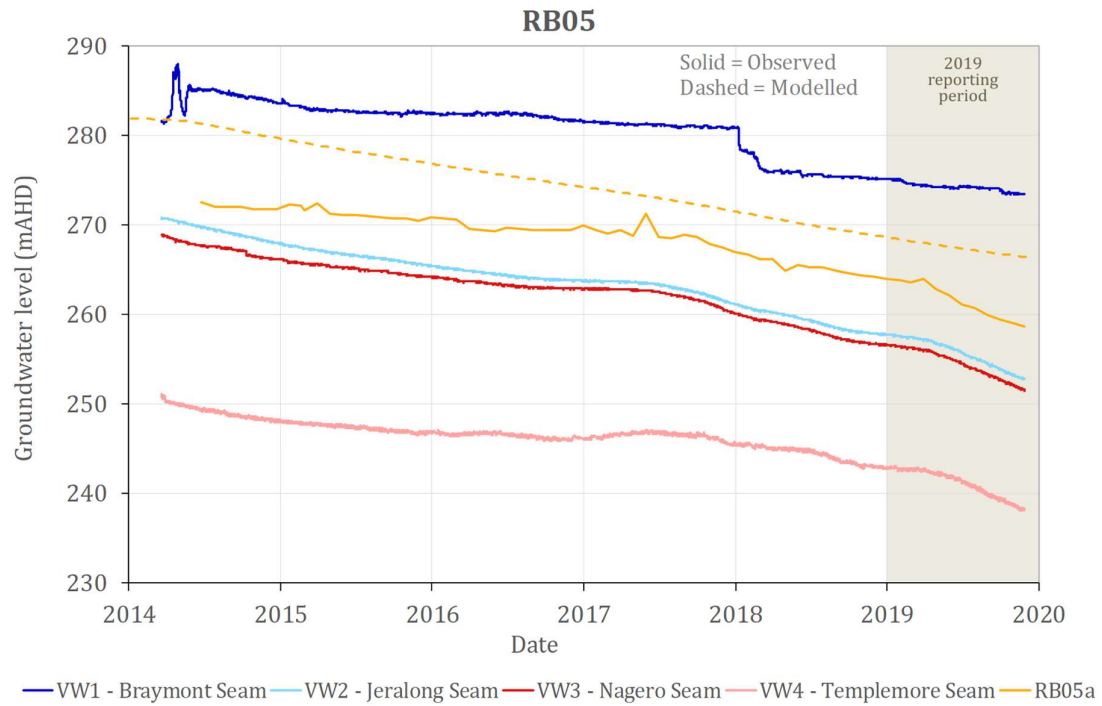


Table E-6
Annual trend analysis

Bore	Annual difference (m)					Geology
	Dec'14-Dec'15	Dec'15-Dec'16	Dec'16-Dec'17	Dec'17-Dec'18	Dec'18-Dec'19	
GW967138	-1.03	1.32	-0.52	-1.53	-0.72	Alluvium
REG1_VW1	-1.04	0.40	0.32	-0.52	-0.06	Jeralong seam
REG1_VW2	-1.71	-0.01	0.09	-1.22	-0.98	Merriown seam
REG1_VW3	-1.46	-0.27	-0.29	-1.16	-0.98	Nagero seam
REG1_VW4	-2.12	-0.15	-0.39	-1.16	0.52	Therribri seam
GW041027	-1.38	5.28	-5.22	-0.91	-0.05	Alluvium
REG2_VW1	-1.11	5.12	-4.29	-1.31	0.06	Fault zone
REG2_VW2	-2.52	4.32	-4.80	-1.00	-0.12	Fault zone
REG2_VW3	-3.15	3.67	-5.37	-1.69	-0.51	Fault zone
REG2_VW4	-1.18	4.57	-4.99	-1.84	-0.19	Fault zone
REG7A	-1.34	2.09	-1.24	-1.79	-0.37	Alluvium
REG7_VW1	-0.27	-0.31	0.37	-0.36	-0.63	Braymont seam
REG7_VW2	0.53	-0.53	-1.03	-0.40	-1.08	Merriown seam
REG7_VW3	-0.81	-0.80	-0.43	-0.79	-0.64	Nagero seam
REG8_VW1	-2.29	-1.65	-2.11	-2.25	-2.62	Braymont seam
REG8_VW2	0.07	-3.08	-9.92	-8.23	-6.90	Merriown seam
REG8_VW3	-4.24	-2.85	-2.85	-5.36	-9.63	Nagero seam
REG9_VW1	-0.48	-0.57	1.18	-1.15	-0.88	Braymont seam
REG9_VW2	-1.50	-0.94	-0.04	-1.05	-0.58	Merriown seam
REG9_VW3	-0.44	-0.51	-0.49	-0.96	-0.64	Nagero seam
REG10_VW1	-0.24	-0.31	-0.31	-0.71	-0.76	Braymont seam
REG10_VW2	-1.68	-1.56	-1.10	-3.77	-5.54	Merriown seam
REG10_VW3	-1.98	-0.38	-1.16	-4.13	-6.13	Nagero seam
REG10_VW4	-1.37	-1.79	-1.62	-4.12	-6.33	Upper Northam seam

Bore	Annual difference (m)					Geology
	Dec'14-Dec'15	Dec'15-Dec'16	Dec'16-Dec'17	Dec'17-Dec'18	Dec'18-Dec'19	
RB03_VW1	5.47	1.33	-8.80	-2.57	-5.20	Braymont seam
RB03_VW2	-3.15	-1.23	-4.77	-5.68	-9.96	Merriown seam
RB03_VW3	-2.61	-0.12	-1.41	-6.27	-11.67	Nagero seam
RB03_VW4	-3.29	1.06	-2.13	-5.41	-13.22	Templemore seam
RB04_VW2	-2.16	-2.44	-8.09	-5.76	-4.89	Merriown seam
RB04_VW3	-3.14	-1.71	-4.91	-6.77	-14.37	Nagero seam
RB04_VW4	-3.50	-0.10	-4.06	-5.79	-12.86	Lower Northam seam
RB05A	-1.27	-1.08	-1.93	-3.29	-5.54	Merriown seam
RB05_VW1	-1.39	-0.79	-0.83	-5.75	-1.69	Braymont seam
RB05_VW2	-2.57	-1.82	-2.20	-3.73	-5.09	Jeralong seam
RB05_VW3	-1.99	-1.39	-2.22	-3.95	-5.15	Nagero seam
RB05_VW4	-1.59	-0.71	-0.09	-2.91	-4.87	Templemore seam
MAC1280	2.69	1.90	0.99	-2.80	-2.68	Interburden
REG3	-0.80	0.91	-0.13	-1.99	-0.98	Boggabri Volcanics
REG4	0.30	0.09	-0.06	-0.18	-0.17	Boggabri Volcanics
REG5	---	0.06	0.00	-0.07	-0.10	Boggabri Volcanics
REG6	---	-0.10	-0.03	-2.06	-0.56	Boggabri Volcanics
REG12	-0.19	-0.07	0.06	-0.11	-0.05	Boggabri Volcanics
REG13	0.02	0.13	0.30	-0.09	-0.10	Boggabri Volcanics
REG14	-0.15	0.24	-0.39	-1.10	-0.16	Basement

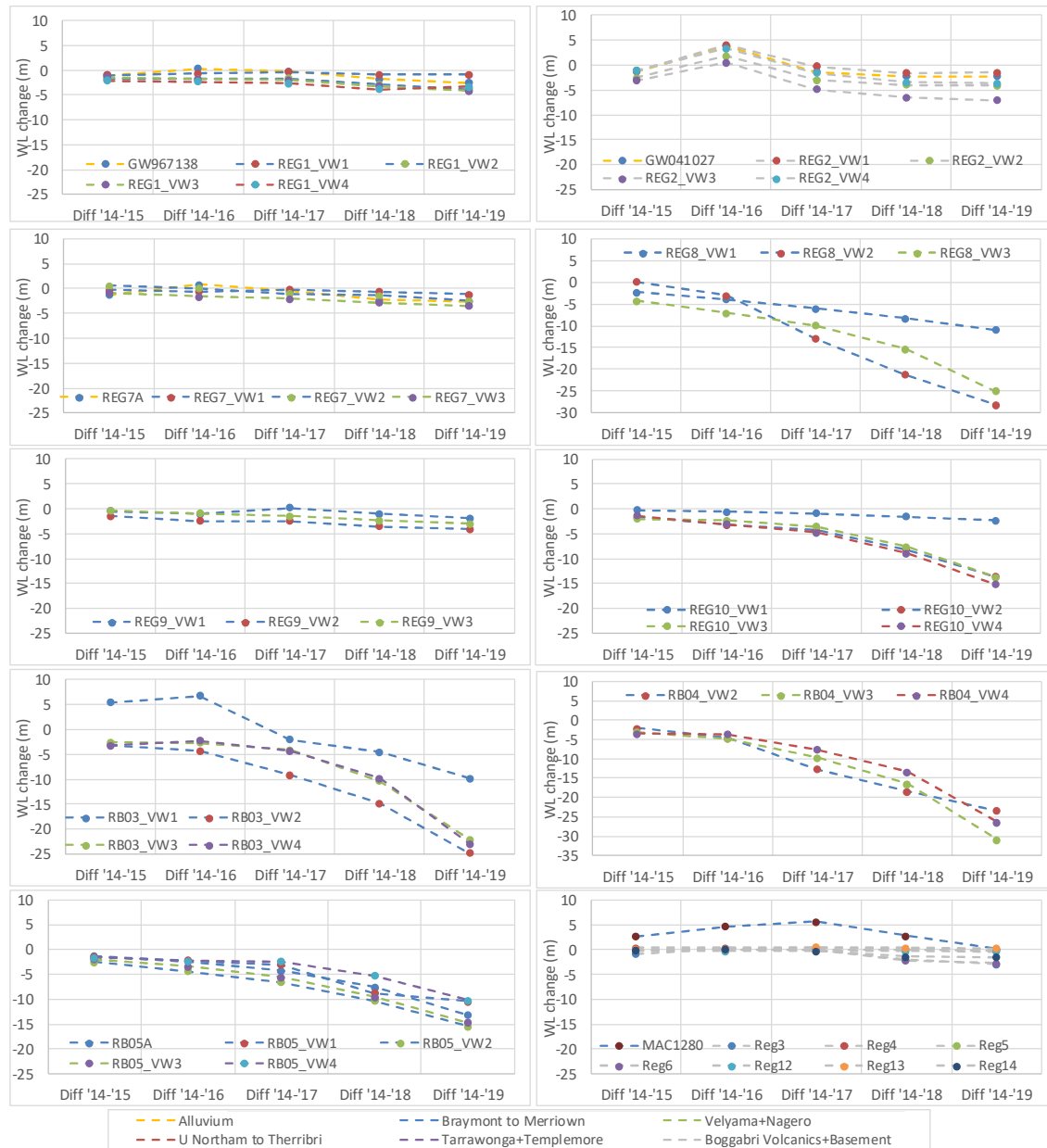
Bore	Cumulative annual difference since December 2014 (m)					Geology
	Diff '14-'15	Diff '14-'16	Diff '14-'17	Diff '14-'18	Diff '14-'19	
GW967138	-1.03	0.29	-0.23	-1.76	-2.48	Alluvium
REG1_VW1	-1.04	-0.64	-0.32	-0.85	-0.91	Jeralong seam
REG1_VW2	-1.71	-1.72	-1.63	-2.85	-3.83	Merriown seam
REG1_VW3	-1.46	-1.74	-2.03	-3.18	-4.17	Nagero seam
REG1_VW4	-2.12	-2.27	-2.66	-3.82	-3.30	Therribri seam
GW041027	-1.38	3.90	-1.32	-2.22	-2.27	Alluvium
REG2_VW1	-1.11	4.01	-0.28	-1.59	-1.53	Fault zone
REG2_VW2	-2.52	1.80	-3.00	-4.00	-4.12	Fault zone
REG2_VW3	-3.15	0.52	-4.85	-6.54	-7.05	Fault zone
REG2_VW4	-1.18	3.39	-1.60	-3.44	-3.63	Fault zone
REG7A	-1.34	0.75	-0.49	-2.28	-2.65	Alluvium
REG7_VW1	-0.27	-0.59	-0.22	-0.57	-1.20	Braymont seam
REG7_VW2	0.53	0.00	-1.04	-1.44	-2.51	Merriown seam
REG7_VW3	-0.81	-1.61	-2.04	-2.83	-3.47	Nagero seam
REG8_VW1	-2.29	-3.93	-6.04	-8.29	-10.92	Braymont seam
REG8_VW2	0.07	-3.00	-12.93	-21.16	-28.07	Merriown seam
REG8_VW3	-4.24	-7.09	-9.94	-15.30	-24.93	Nagero seam
REG9_VW1	-0.48	-1.04	0.14	-1.02	-1.90	Braymont seam
REG9_VW2	-1.50	-2.44	-2.49	-3.53	-4.11	Merriown seam
REG9_VW3	-0.44	-0.95	-1.44	-2.39	-3.04	Nagero seam
REG10_VW1	-0.24	-0.55	-0.87	-1.57	-2.33	Braymont seam
REG10_VW2	-1.68	-3.24	-4.34	-8.11	-13.65	Merriown seam
REG10_VW3	-1.98	-2.35	-3.51	-7.64	-13.76	Nagero seam
REG10_VW4	-1.37	-3.15	-4.77	-8.89	-15.22	Upper Northam seam
RB03_VW1	5.47	6.79	-2.01	-4.58	-9.78	Braymont seam

Bore	Cumulative annual difference since December 2014 (m)					Geology
	Diff '14-'15	Diff '14-'16	Diff '14-'17	Diff '14-'18	Diff '14-'19	
RB03_VW2	-3.15	-4.38	-9.15	-14.84	-24.80	Merriown seam
RB03_VW3	-2.61	-2.73	-4.13	-10.40	-22.07	Nagero seam
RB03_VW4	-3.29	-2.23	-4.36	-9.77	-22.99	Templemore seam
RB04_VW2	-2.16	-4.60	-12.69	-18.45	-23.34	Merriown seam
RB04_VW3	-3.14	-4.85	-9.76	-16.53	-30.89	Nagero seam
RB04_VW4	-3.50	-3.60	-7.66	-13.45	-26.31	Lower Northam seam
RB05A	-1.27	-2.35	-4.28	-7.57	-13.11	Merriown seam
RB05_VW1	-1.39	-2.18	-3.01	-8.77	-10.45	Braymont seam
RB05_VW2	-2.57	-4.38	-6.59	-10.32	-15.41	Jeralong seam
RB05_VW3	-1.99	-3.39	-5.60	-9.55	-14.71	Nagero seam
RB05_VW4	-1.59	-2.30	-2.39	-5.30	-10.17	Templemore seam
MAC1280	2.69	4.59	5.58	2.78	0.10	Interburden
REG3	-0.80	0.11	-0.02	-2.01	-2.99	Boggabri Volcanics
REG4	0.30	0.39	0.33	0.15	-0.02	Boggabri Volcanics
REG5	---	0.06	0.06	-0.01	-0.11	Boggabri Volcanics
REG6	---	-0.10	-0.13	-2.19	-2.75	Boggabri Volcanics
REG12	-0.19	-0.26	-0.20	-0.31	-0.36	Boggabri Volcanics
REG13	0.02	0.15	0.45	0.36	0.26	Boggabri Volcanics
REG14	-0.15	0.09	-0.30	-1.40	-1.56	Basement

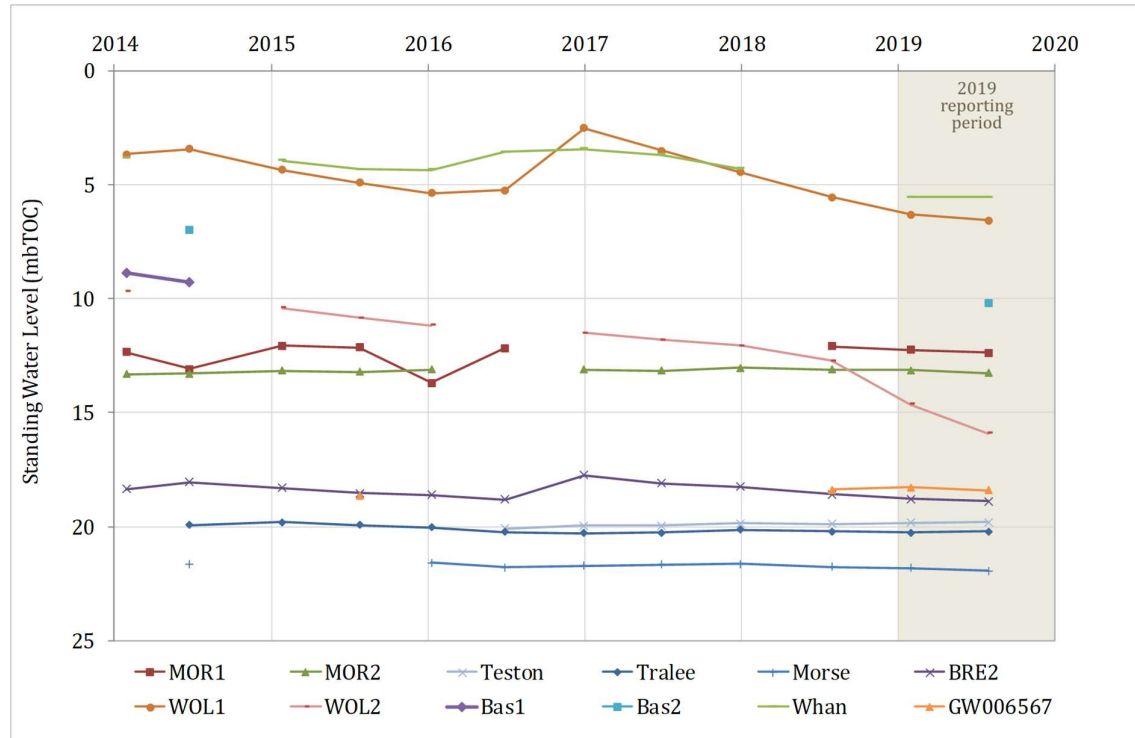
Colour scale (m change)

Rise 5 to 10	2 to 5	1 to 2	1 to -1	-1 to -2	-2 to -5	-5 to -10	-10 to -15	>-15	Fall
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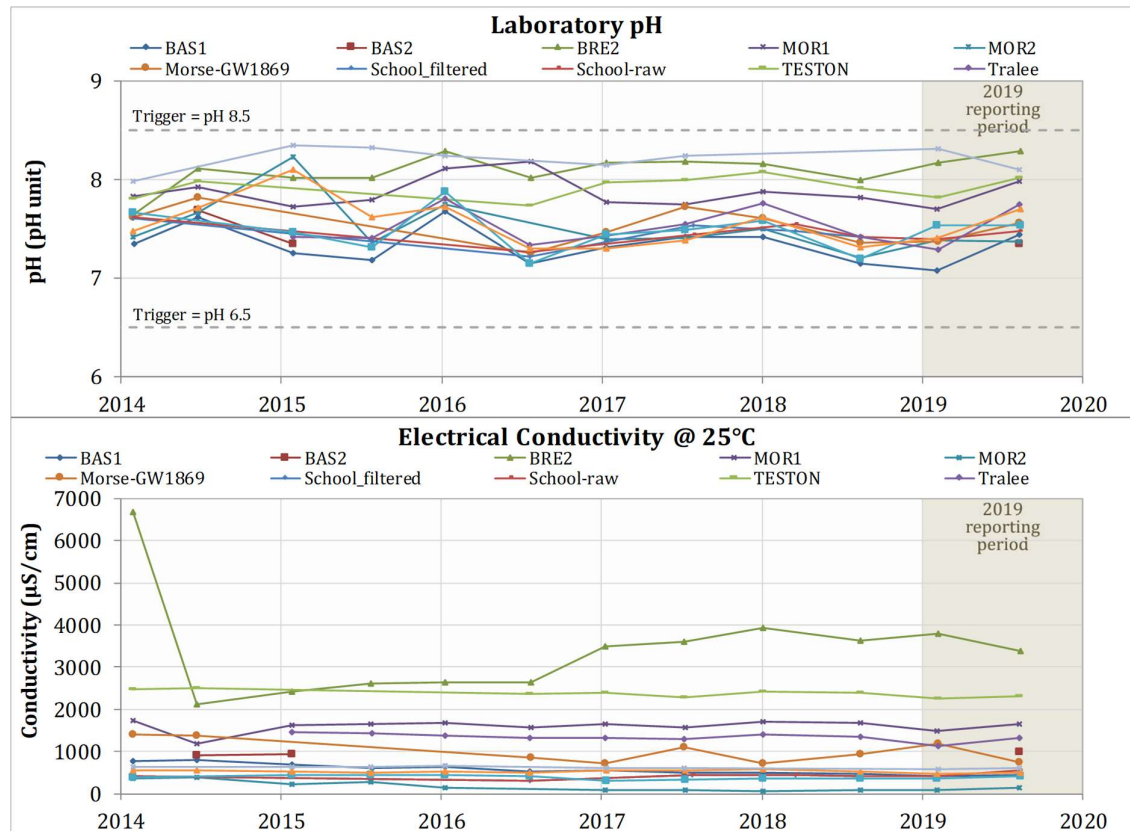
Cumulative annual difference in water level since December 2014

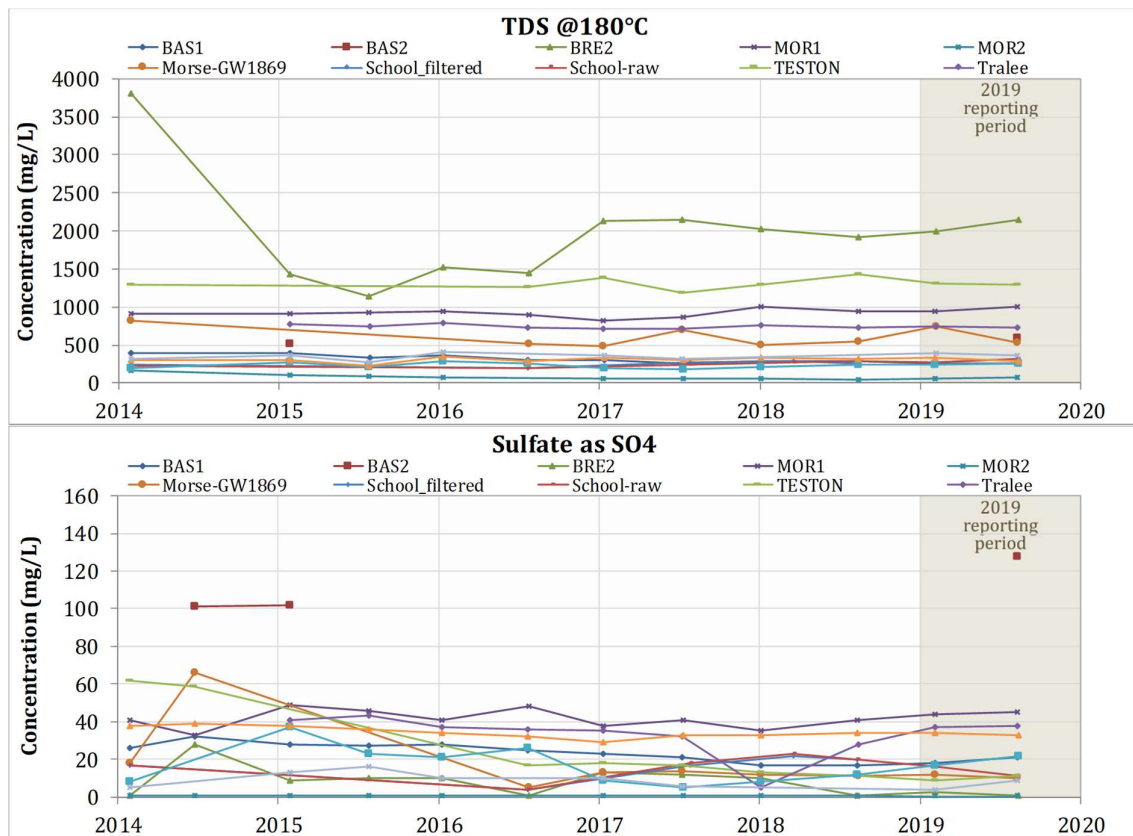


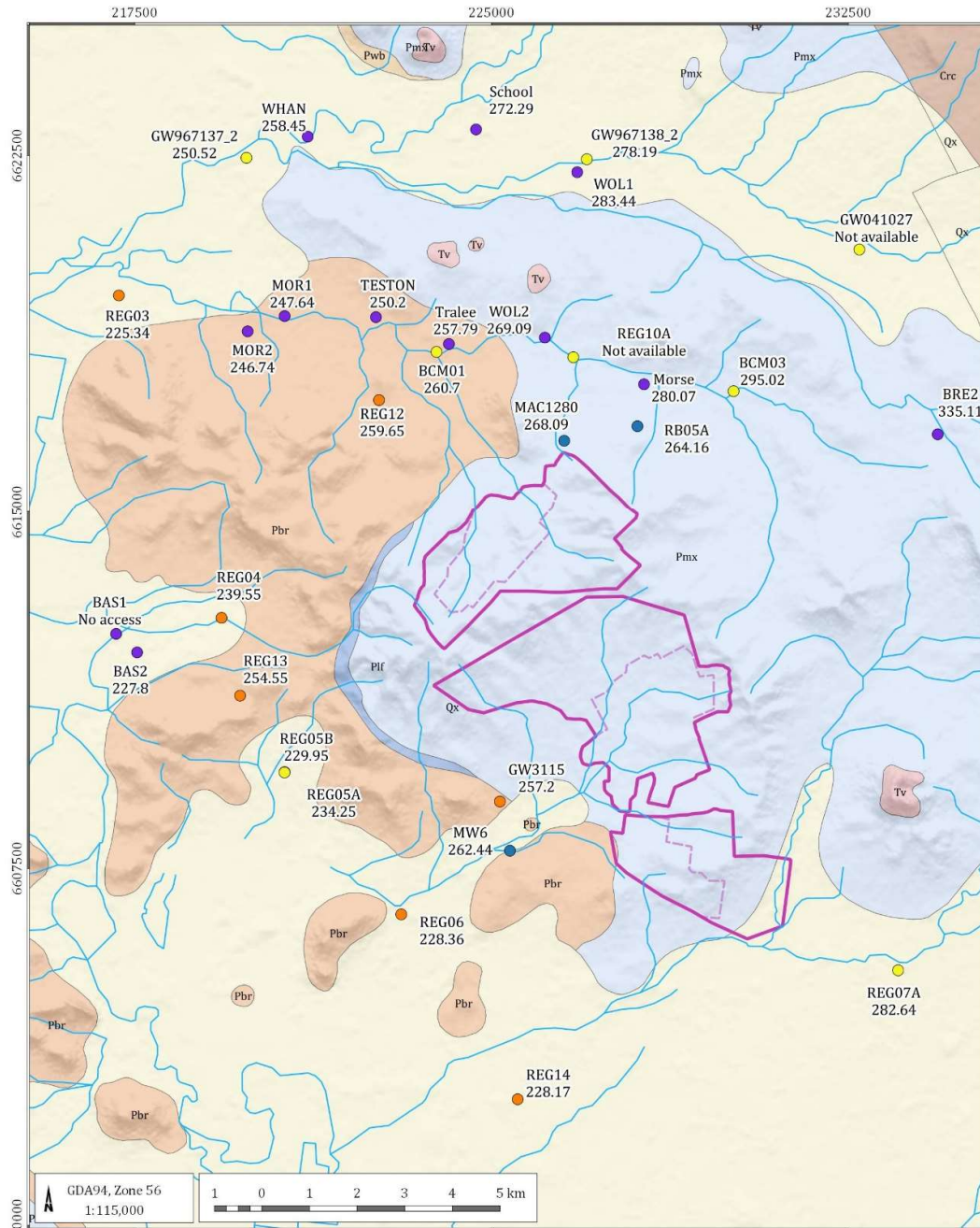
Private Groundwater Bores – Water levels



Private Groundwater Bores – Individual water quality parameters







LEGEND

Standpipe piezometer water levels - late 2019 (mAHD)

- Alluvium bore
- Permian bore
- Private bore
- Boggabri Volcanics bore
- Drainage
- ▭ Mine maximum open cut pit outline
- ▭ Approx. 2018 mining extent

Gunnedah Coalfield rock unit (1:100k)

- Qx - Quaternary Sediments
- Tv - Tertiary Volcanics
- Pmx - Maules Creek and Goonbri formations
- Plf - Leard Formation
- Pbr - Boggabri Volcanics
- Cbc - Currahubula Formation
- Crc - Rocky Creek Conglomerate

Maules Creek Mine Annual Review (G1850S)

Approximate groundwater elevations in standpipe bores - late 2019



DATE
06/03/2020

FIGURE No:
E-1

©2020 Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) - www.ageconsultants.com.au
Source: 1 second SRTM Derived DEM-S - © Commonwealth of Australia (Geoscience Australia) 2011; GEDDATA TOPO 250K Series 3 - © Commonwealth of Australia (Geoscience Australia) 2006;
G:\Projects\G1850S\Minles_annual_review_2019\3_GIS\Workspaces\001_Deliverable1\E-1_G1850S_GWL_elevations_2019.mxd

Table E-7
Additional (non-Maules Creek mine) bores used in this report

Bore ID	Typ	Network	Easting (GDA94Z5 6)	Northing (GDA94Z5 6)	Ground El ev (mAHD)	Bore Dept h (m)	Screen/sens or depth (mbgl)	Target geolo gy
GW967137	SP	DPI Water	219846	6622452	258.79	84	8-11	Alluvium
GW967138	SP	DPI Water	227001	6622422	288.55	89.6	7-10	Alluvium
GW041027	SP	DPI Water	232730	6620523	318.45	83.5	8.3-14.3	Alluvium
IBC2102	SP	Boggabri Coal	226892	6611771	322	85	78-82	Merriown seam
IBC2103	SP	Boggabri Coal	226898	6611773	321.8	59	50-56	Jeralong seam
IBC2104	SP	Boggabri Coal	228336	6612215	331.1	87	80-84	Braymont seam
IBC2105	SP	Boggabri Coal	228321	6612212	331.4	160	151-157	Merriown seam
IBC2110 (MW 3)	SP	Boggabri Coal	225939	6607684	272.8	100	91-97	Boggabri Volcanics
IBC2111	SP	Boggabri Coal	225950	6607683	272.7	45	36-42	Boggabri Volcanics
IBC2181	SP	Boggabri Coal	226848	6612477	335.2	114	105-111	Merriown seam
MW6	SP	Tarrawonga Coal	225385	6607871	264.41	32	29-32	Alluvium
GW3115	Bor	Private/Bogga bri	225174	6608903	280 (estimated)	TBC	TBC	Boggabri Volcanics

APPENDIX F

DPI&E RESPONSE TABLE

TABLE F-1

Item	DPIE response	MCCM response
1	Operations summary – please include the production summary as per Table 4 of the Annual Review Guideline.	Table inserted, Table 6 of Annual Review.
2	Biodiversity - (Tylophora linearis Management and Pomaderris queenslandica Management) – Sections 7.2.5 and 7.2.6 of the Biodiversity Management Plan require annual reports for the Tylophora linearis Propagation and Translocation Program and Pomaderris queenslandica Propagation and Translocation Program to be submitted to the Department. There is no record of the 2018 annual reports being submitted to the Department. Please submit these annual reports either as an appendix to the 2018 Annual Review or under separate cover.	The 2018 annual reports will be submitted under a separate cover independently of the annual review. This was occurred on 15 August 2019
3	Traffic – Please report the quarterly results for the traffic surveys (shuttle bus use) as per Section 6 of the Traffic Management Plan.	Quarterly traffic survey results have been reported in Table 11.
4	Water Take – please revise Table 10 to report on the water year (1 July 2017 to 30 June 2018), as per Section 7 of the Annual Review Guideline.	Table 12 has been revised to report MCC water take against the water year. Note Table numbers have been updated.
5	Site Water Balance – please revise the text in Section 7.4 to provide a consistent comparison to the Year 5 predictions provided in the EA and Water Management Plan (Table 5.3).	Section 7.4 updated to compare the 2018 water balance against the Year 5 water predictions.
6	Independent Environmental Audit – The status of actions proposed to address non-compliances/recommendations for Schedule 3 condition 40 and Schedule 3 condition 51 of the approval are not included in Table 17. Please revise Table 17 to include a status update for these actions.	Conditions 40 and 51 of schedule 3 have been inserted into table 20. Note Table numbers have been adjusted.