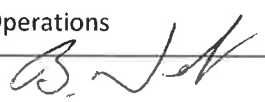
Annual Review 2020

Tarrawonga Coal Mine

Name of operation	Tarrawonga Coal Mine
Name of operator	Whitehaven Coal Mining Pty Ltd
Development consent/project approval number	PA 11_0047
Name of holder of development consent/project approval	Tarrawonga Coal Pty Ltd
Mining lease number	ML 1579, ML 1685, ML 1693, ML1749
Name of holder of mining lease	Tarrawonga Coal Pty Ltd
Water licence number	WAL 31084
Name of holder of water licence	Whitehaven Coal
MOP start date	4/12/2015
MOP end date	01/11/2022
Annual review start date [1]	1/01/2020
Annual review end date	31/12/2020

I, Bernard O'Neill, certify that this audit report is a true and accurate record of the compliance status of the Tarrawonga Coal Mine for the period 1st January 2020 until 31st December 2020, and that I am authorised to make this statement on behalf of Tarrawonga 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	Bernard O'Neill
Title of authorised reporting officer	General Manager – Open Cut Operations
Signature of authorised reporting officer	
Date	30/06/2021

[1] *NSW Annual Review Guideline was released in October 2015*

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APPENDICES

1 STATEMENT OF COMPLIANCE

The compliance status of the Tarrawonga Coal Mine (TCM) as at 31st December 2020 is summarised in Table 1-1 and Table 1-2 below.

Table 1-2 notes non-compliances that occurred during the reporting period, and non-compliances from previous reporting periods that still require management action. References to the Environment Protection Licence (EPL) are limited to those that relate to the Project Approval conditions, specifically Schedule 3 Condition 22, 28(c), 33 and 39(c)(ii).

Table 1-1 -Statement of Compliance

Were all conditions of the relevant approval(s) complied with (Yes/No)?	
PA 11_0047	No
ML 1579	No
ML 1693	No
ML 1685	No
ML 1749	No
WAL 31084	Yes

Compliance status key for Table 1-2- Non-Compliances

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

Table 1-2- Non-Compliances

Relevant Approval	Condition Number	Condition Description (summary)	Compliance status	Comment	Where Addressed in Annual Review
PA11_0047	Schedule 3 condition 24	The Proponent must ensure that all reasonable and feasible avoidance and mitigation measures are implemented so that particular matter emissions generated by the project do not cause exceedances of the criteria in Table 6, Table 7 and Table 8 at any residence on privately owned land or on more than 25 percent of any privately-owned land.	Low Non-Compliance	TCM's HVAS at property 'Coomalgah' measured eight (8) dust exceedances of the 24-hour average limit over 12 months. Investigations showed that all of those elevated PM10 levels were not mine related. DPIE acknowledged that there were 3 out of 8 exceedances recorded on days that regional air quality alerts were issued by the Office of Environment Heritage (OEH) or days of 'extraordinary event' therefore advised criterion could be excluded from the annual averaging calculation. The Air Quality Monitoring Network Summer 2019-2020 Namoi North West Slopes Region report confirmed that on these days there was poor regional air quality.	Section 6.3
PA11_0047	Schedule 3 conditions 33, 39(ii)	The Proponent shall ensure that all surface water discharges from the site comply with the discharge limits (both volume and quality) set for the project in any EPL.	Low Non-compliance	In February 2020, after approximately 158mm of rain in 24hrs, Sediment Dam (SB14) released water from the Licenced Discharge Point 3. EPA investigation concluded that TCM had not implemented all practical measures to dewater the sediment dam within 5 days of the last rainfall event so as to ensure the designed rainfall capacity was available in the pond.	Section 7.1
PA11_0047	Schedule 3 conditions 33, 39(ii)	The Proponent shall ensure that all surface water discharges from the site comply with the discharge limits (both volume and quality) set for the project in any EPL.	Low Non-compliance	In February 2020, approximately 158mm of rain was recorded in 24hrs, TCM exceeded water quality criteria for discharge from SB14 with Oil and Grease measuring 11mg/L, after a licenced discharge event.	Section 7.1

Relevant Approval	Condition Number	Condition Description (summary)	Compliance status	Comment	Where Addressed in Annual Review
ML1579, ML1685, ML1693 and ML1749.	(Section 3.2 of Environmental Risk Management of the approved MOP)	Failure to have the Tarrawonga Surface Water Management Plan (WMP) on the Whitehaven website, as required. This constitutes a contravention of s.378D(1) of the Act.	Low Non-Compliance	TCM Site Water Management Plan was not displayed on WHC website as the document was not yet approved by the relevant agencies. DPIE approved the TCM WMP in June 2020 and the document was subsequently published on WHC website.	Section 7.1
ML 1579	Condition 16	Failure to carry out operations in a manner that does not cause or aggravate water pollution (including sedimentation) or erosion, as required.	Low Non-Compliance	In February 2020, after approximately 158mm of rains in 24hrs, the western embankment of sediment dam (SD2) failed and released sediment laden water beyond the boundary of TCM. EPA investigation concluded that TCM did not operate in a competent manner.	Section 7.1
ML 1579	Condition 16	Failure to carry out operations in a manner that does not cause or aggravate water pollution (including sedimentation) or erosion, as required. This constitutes a contravention of s.378D(1) of the Act.	Low Non-Compliance	TCM was requested information in regards to erosion on Southern Emplacement area. Erosion and runoff occurred as a result of approximately 158mm of rain in 24hrs. In accordance with the MOP, the Southern Emplacement Area was planned to be shaped and in the landform establishment phase by 31 Dec 20.	Section 8.2.3.3

2 INTRODUCTION

This Annual Review (AR) for Tarrawonga Coal Mine (TCM) has been prepared in accordance with Condition 3 of Mining Lease (ML) 1579, Condition 3 of ML 1685, Condition 4 of ML 1693 (Mining Act 1992) and Condition 4 (Schedule 5) of PA 11_0047, as modified.

TCM is located approximately 16km east of Boggabri (Refer Figure 1). TCM is owned by Tarrawonga Coal Pty Ltd (TCPL) and operated by Whitehaven Coal Mining Pty Ltd (WCMPL). Biodiversity offsets locations are shown in Figure 2- Regional Location of Biodiversity Offset and Figure 3- Regional Location of Biobank Site.

The current Mining Operations Plan for TCM was prepared under the new guidelines "ESG3: Mining Operations Plan (MOP) Guidelines". The AR follows the format required by the NSW Government Annual Review Guideline (October 2015). Though primarily covering the period from 1st January 2020 to 31st December 2020 (the reporting period), where relevant the AR provides information on historical aspects of the operations, longer term trends in environmental monitoring results and provides relevant information on activities to be undertaken during the ensuing period, (i.e. from 1st January 2021 to 31st December 2021, or beyond).

2.1 Mine Contacts

The management personnel responsible for operational and environmental performance at the TCM and their relevant contact details are as follows:

- Mr Bernard O'Neill, General Manager-Open Cut Operations:
  Contact: (02) 6741 9301.
- Mr Tian Oosthuizen, Operations Manager:
  Contact: (02) 6741 5030.
- Mr Sebastien Moreno, Environmental Superintendent:
  Contact: (02) 6741 5009.

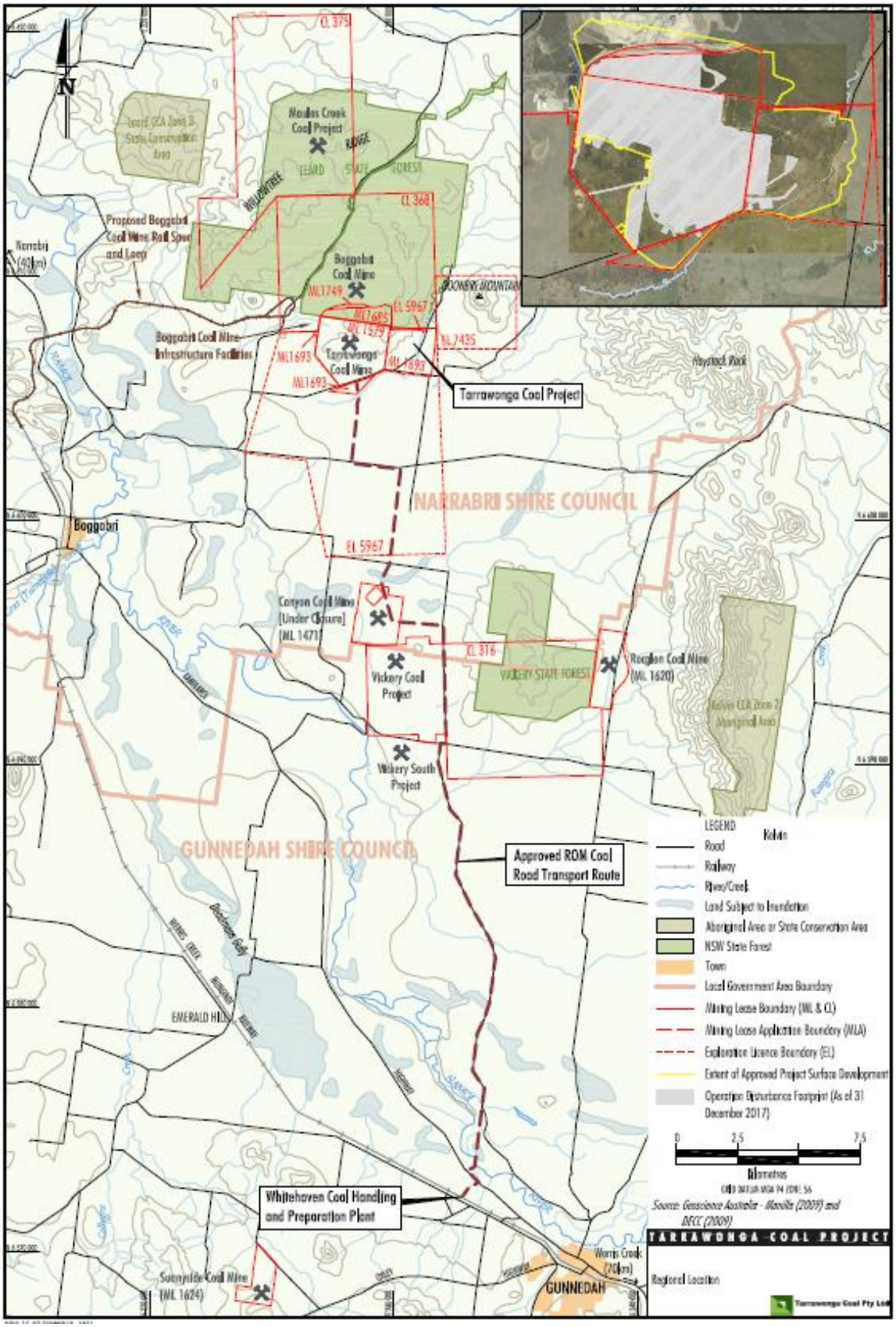


Figure 1- Locality Plan

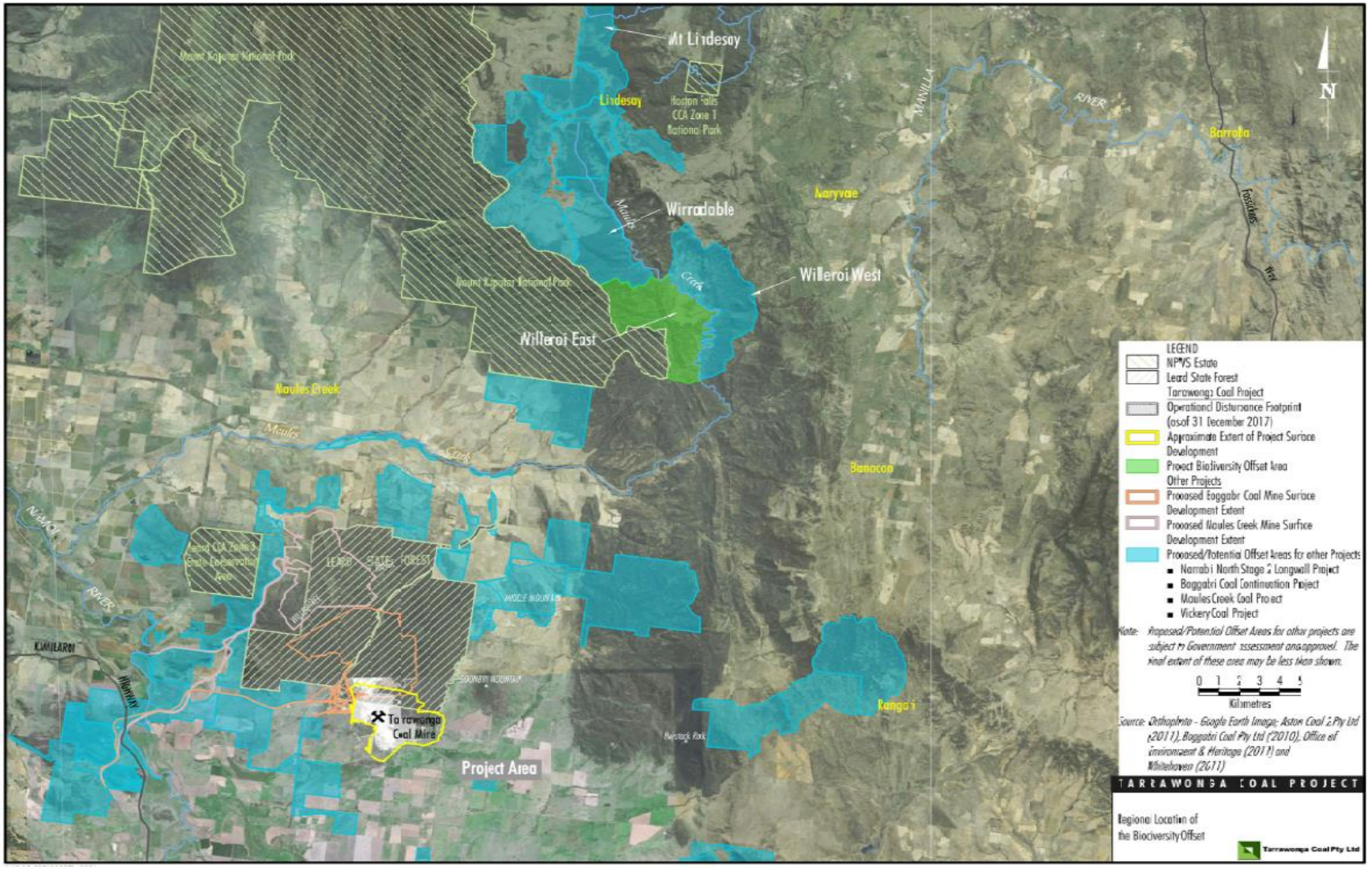


Figure 2- Regional Location of Biodiversity Offset

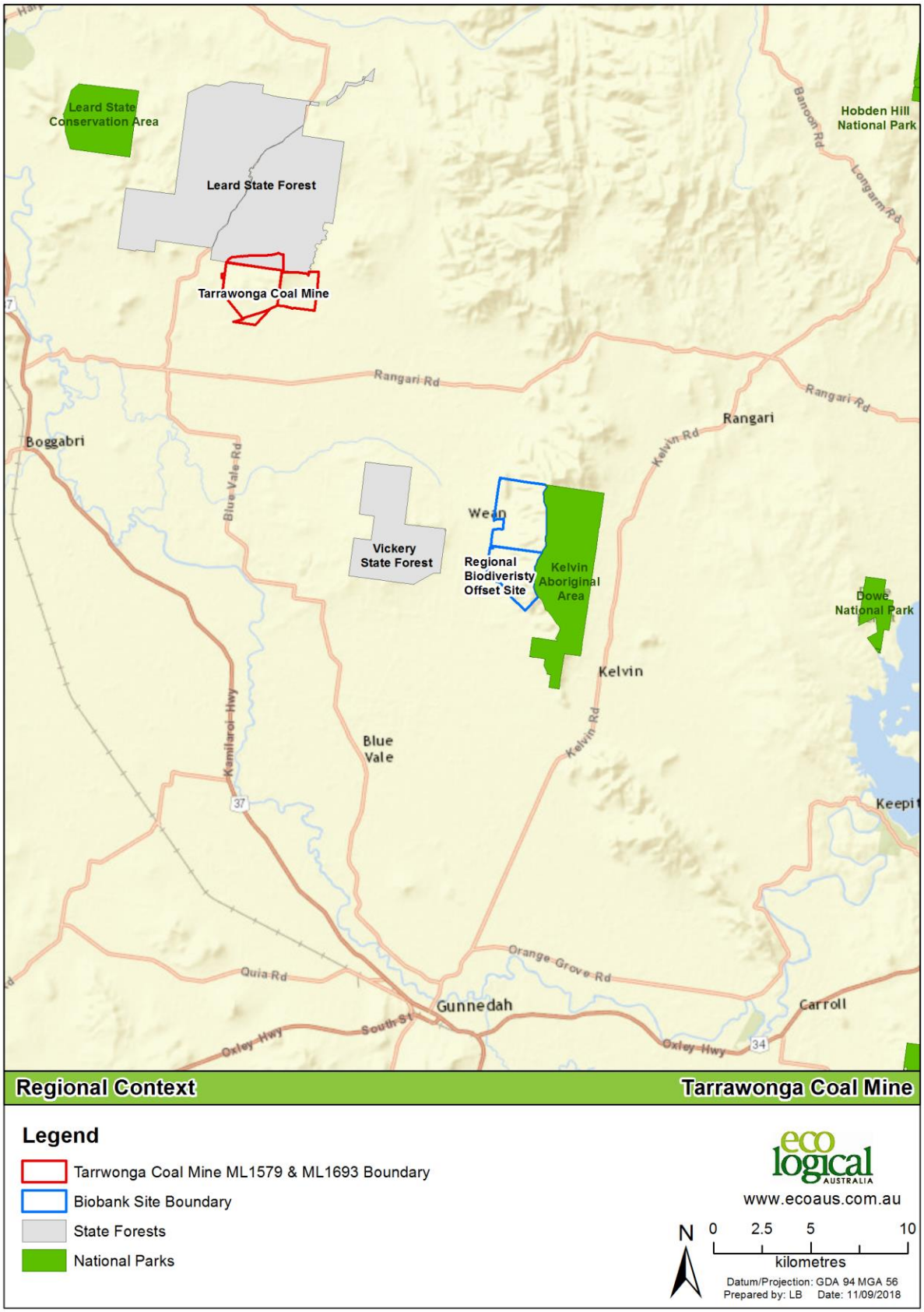


Figure 3- Regional Location of Biobank Site

3 APPROVALS

3.1 Tenements, Licences and Approvals

Table 3-1 Identifies the approvals in place for the TCM at the end of the reporting period, the issuing/responsible Authority, dates of issue, expiry date and relevant comments.

Table 3-1- Tenements, Licences and Approvals

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Division of Resources and Energy (DRE)	Exploration Licence (EL 5967)	10/01/2017	24/07/2021	Exploration Licence
Environment Protection Authority (EPA)	Environment Protection Licence (EPL) No. 12365	09/01/2006	N/A	EPL12365
Environment Protection Authority (EPA)	Variation- Environment Protection Licence (EPL) No. 12365	16/01/2020	N/A	Variation
NSW Department Primary Industry - Water	90BL253276 90BL253278 90BL253279 90BL253280 90BL254253 90BL254254 90BL254255 90BL254221 90BL254214 90BL255766 WAL31084 WAL29548	18/05/2006 18/05/2006 18/05/2006 18/05/2006 18/05/2006 18/05/2006 24/04/2007 05/04/2007 04/04/2007 19/08/2012 02/08/2013 26/07/2012	Perpetuity Perpetuity Perpetuity Perpetuity Perpetuity Perpetuity Perpetuity Perpetuity Perpetuity Perpetuity Perpetuity Perpetuity	Monitoring bores 250 units 50 units
Department of Planning Infrastructure & Environment (DPIE)	Project Approval PA 11_0047	22/01/2013	31/12/2030	
Department of Planning Infrastructure & Environment (DPIE)	Project Approval PA 11_0047	2014	31/12/2030	MOD1 (continued coal haulage to Gunnedah CHPP)
Department of Planning Infrastructure & Environment (DPIE)	Project Approval PA 11_0047	2016	31/12/2030	MOD2 (allow receipt of all types of coal reject)

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Department of Planning Infrastructure & Environment (DPIE)	Project Approval PA 11_0047	February 2017	31/12/2030	MOD3 (Traffic Management Plan)
Department of Planning Infrastructure & Environment (DPIE)	Project Approval PA 11_0047	May 2017	31/12/2030	MOD4 (Sound Power Level modification)
Department of Planning Infrastructure & Environment (DPIE)	Project Approval PA 11_0047	August 2017	31/12/2030	MOD5 (Open Cut Augmentation)
Department of Planning Infrastructure & Environment (DPIE)	Project Approval PA 11_0047	October 2018	31/12/2030	MOD6 (Coal Haulage)
Department of Planning Infrastructure & Environment (DPIE)	Project Approval PA 11_0047	June 2020	31/12/2021	MOD8 (Trucking water) for 18 months
Department of Planning Infrastructure & Environment (DPIE)	Project Approval PA 11_0047	8/02/2021	31/12/2030	MOD7 (Life of Mine)
Department of Agriculture, Water and Environment (DAWE)	EPBC 2011/5923	11/03/2013	31/12/2053	Conditional Federal Project Approval for LOM Project
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Lease (ML) 1579	03/04/2006	02/04/2027	Expires 21 years from commencement
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Lease (ML) 1685	18/07/2013	14/11/2032	
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Lease (ML) 1693	14/10/2013	14/10/2034	Expires 21 years from commencement

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Lease (ML) 1749	17/11/2017	14/11/2032	
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Operations Plan (MOP) Amendment A	14/11/2016	31/12/2020	MOP Amendment A
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Operations Plan (MOP) Amendment B	30/06/2017	30/12/2020	MOP Amendment B
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Operations Plan (MOP) Amendment C	16/03/2015	30/11/2020	MOP Amendment C
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Operations Plan (MOP) Amendment D	12/04/2019	30/11/2020	MOP Amendment D
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Operations Plan (MOP) Amendment E	7/01/2020	30/11/2020	MOP Amendment E
Department of Regional NSW – Division of Mining, Exploration and Geoscience (DMEG)	Mining Operations Plan (MOP) Amendment F	23/10/2020	01/11/2022	MOP Amendment F

4 OPERATIONS SUMMARY

4.1 Mining Operations

Table 4-1 presents the production summary at the end of the reporting period.

Table 4-1 - Production Summary

Material	Approved Limit (Project Approval PA11_0047)	Previous Reporting Period 2019	This Reporting Period 2020 (actual)	Next Reporting Period 2021 (forecast)
Waste Rock/ Overburden (bcm)	***n/a***	21,814,461	23,831,308	24,584,115
ROM Coal/Ore (t)	***3,000,000***	2,258,954	2,507,031	2,475,110
Coarse and Fine Reject (t)	***700,000***	291,683	61,101	700,000
Saleable Product (t)	***n/a***	2,187,249	2,302,724	2,228,299
Gravel Production (m^3)	***90,000***	0	0	90,000

4.1.1 Other Operations

PA 11_0047 permits 24-hour operation of mining activities. TCPL has made some minor changes to operating times to accommodate changes in the working roster for improved production and economic stability.

Open cut mining activities, including processing of coal, generally occurred between the hours of 6:30 am and 5:00 pm (day shift) and 4:30 pm and 3:00 am (night shift) from Monday to Friday. Processing of coal on day shift also occurs almost every Saturday whereas mining activity on Saturday day shift has only occurred on an occasional basis to meet production deadlines.

4.1.2 Coal Haulage

For the reporting period **2,297,403** tonnes of coal was hauled along the approved haulage route from TCM to the Whitehaven Gunnedah CHPP. During the same period **89,970** tonnes of coal was distributed from TCM to the domestic market. Combined haulage of ROM coal from TCM and Rocglen Coal Mine during 2020 was **2,387,373** tonnes. There was no coal haulage from Vickery Coal

Mine during the reporting period. The total tonnage of coal rejects received by TCM during 2020 was **61,101** tonnes. Transport of coal from the site or receipt of coal reject from the Whitehaven CHPP by truck has only occurred during the approved hours of:

(a) 6 am to 9.15 pm Monday to Friday;

(b) 7 am to 5.15 pm Saturday; and

(c) at no time on Sundays or public holidays.

4.1.3 Exploration

Whitehaven Coal geology department undertook exploration drilling during the reporting period. Twenty-five (25) exploration boreholes were completed in the reporting period. Five were completed in January, seven in March, eight in April, and six in October. These will be reported in the ML1579 Annual Report due in May 2020.

Exploration drilling will continue to be undertaken at the TCM to further assess the coal reserves within the tenements. The renewal of the licence (EL5967) took effect on 10 January 2017 and the current term will end on 24 July 2021.

4.2 Next Reporting Period

4.2.1 Mine Operations

The mine production rates are planned for **2,475,110** tonnes per annum of ROM coal and **24,584,115** bank cubic metres (bcm) of overburden during calendar year 2021.

TCM may decide to produce gravel up to 90,000m^3 over the next calendar year.

Vegetation clearing activities in mining areas over the next reporting period will be conducted in accordance with the approved Biodiversity Management Plan (BMP) and the updated Mining Operations Plan Amendment F (2020). The clearing program will be undertaken during the annual twelve week clearing campaign from the 15th February to the 30th April, except under exceptional circumstances and with the approval of the Secretary of the DPIE.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

There were no Actions from previous Annual Review

6 ENVIRONMENTAL PERFORMANCE

The following sub-sections document the implementation and effectiveness of the various control strategies adopted at TCM, together with monitoring data for the reporting period. Life of mine monitoring data is included as Appendices in this AR, where relevant, to allow for discussion on longer-term trends.

6.1 Noise

6.1.1 Criteria

The Project Approval (PA 11_0047) and EPL 12365 describe the noise criteria for site operations and coal haulage as seen in Table 6-1.

Table 6-1- Noise Compliance

Noise Criteria dB(A)			
Location	*Day, Evening & Night LAeq (15 min)*	*Night LAeq (1 min)*	
All other privately-owned residences	35	45	
Road Traffic Noise Criteria dB(A) LAeq (1 hour)			
Location	*Day*	*Evening*	*Night*
Any residence on privately-owned land	60	60	55

A number of other specific conditions (i.e. acquisition, monitoring protocols and cumulative impacts) are listed in the PA and EPL 12365.

6.1.2 Environmental Management Measures

In accordance with the Noise Management Plan, a number of operational measures continue to be implemented on site to maintain compliance with limits. These include but are not limited to:

- Real-time noise monitor and web based interface;
- Automated SMS alarms notifying site personnel of elevated noise levels approaching noise criteria;
- Modification of operations where required;

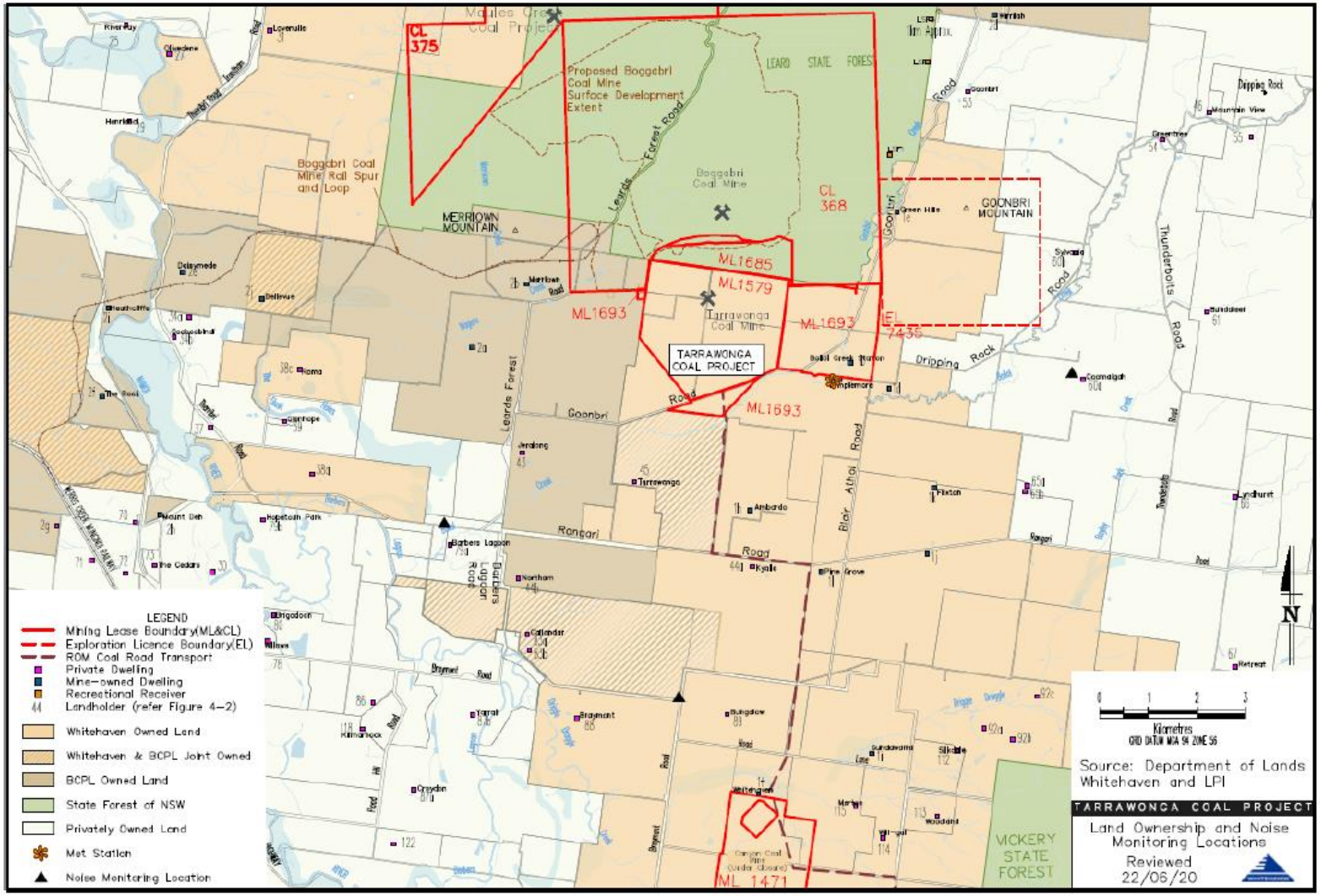


Figure 4 - Noise monitoring locations.

6.1.3 Key Environmental Performance

Attended Noise Monitoring

An independent consultant completed attended noise monitoring programs on a quarterly basis during the reporting period. The noise monitoring sites are identified on Figure 4 and include 3 sites: "Bungalow" (TN4), "Barbers Lagoon" (TN3) and "Matong-Coomalgah" (TN2) properties. Attended noise monitoring results are shown in the table below and show compliance with the criteria specified in the project approval on all occasions during the reporting period.

	TN2 - Coomalgah			**Limits (day/evening/night/night)**
	2018	**2019**	**2020**	
Q1	<25/32/<25/38	31/<25/IA/25	<27/<24/<24/35	**35 / 35 / 35 / 45**
Q2	35/21/31/39	42**/34/29/34	<25/<20/28/29	
Q3	27/30/32/34	<35/33/34/42	<25/34/<29/35	**LAeq, 15min/LAeq, 15min/LAeq, 15min/LA1, 1min**
Q4	32/IA/32/34	<20/<19<13/50*	30/35/<34/IA	
	TN3 - Barbers Lagoon			
	2018	**2019**	**2020**	
Q1	<25/26/30/39	26/IA/31/33	32/33/32/NM	
Q2	34/30/29/33	34/33/33/38	35/33/34/35	
Q3	IA/26/29/32	32/31/33/42	<23/<16/<20/NM	
Q4	31/28/34/32	<20/<19/<13/IA	<16/<35/<35/IA	
	TN4 - Bungalow			
	2018	**2019**	**2020**	
Q1	IA/<20/<30/33	<25/IA/IA/29	34/<34/<30/IA	
Q2	IA/IA/25/34	35/29/30/35	<30/<30/32/35	
Q3	28/IA/27/32	IA/20/IA/IA	<16/<22/27/NM	
Q4	IA/25/30/32	<20/<42#/<19/IA	<27/<26/<34/NM	

Note: Above values are the maximum or only measurements recorded for the indicated period.
Key:
IA = Mine noise inaudible
NM = Not measured due to adverse weather conditions as mentioned in EPL12365
** = taken at TN2 monitor, 9dB reduction to nearest private property not added. Reading within compliance levels.*
***= taken at TN2 monitor, 9dB reduction to nearest private property not added. Reading within compliance levels however was reported to agencies and discussed in Annual Review 2019.*
 # = Consultant report stated that 'Further investigation into these measurements determined that the elevated levels were caused by insects'.

Attended noise monitoring to date indicates that results are generally consistent with previous reporting year's results for all other measurements taken.

Road Noise Monitoring

TCM is required to ensure that the noise generated by road transport along public sections of the coal haulage route was in accordance with the Tarrawonga and Rocglen Road Noise Management Plan and with Schedule 3 condition 12 of PA 11_0047. A road noise survey was undertaken in June and December of 2020. The monitoring occurred at the privately owned residences on the "Weroona" property and "Brooklyn" properties located off Blue Vale Road. Results showed compliance on all occasions, which is consistent with the predictions of the Whitehaven ROM Coal Haulage Modification Environmental Assessment for the southern section of the approval transport route.

Real Time Noise Monitoring

In accordance with the requirements of PA 11_0047 and EPL 12365, TCM continued to undertake real time noise monitoring and managed noise according to the Noise Management Plan during the reporting period.

Annual Sound Power level Testing

In December 2020, sound power level (SPL) testing of all the operating fixed and mobile plant was undertaken. According to MOD 4 (May 2017) of the PA 11_0047, there is no criteria applicable for SPL and levels identified in the Noise and Blasting Environmental Assessment (EA, 2011) are only used for comparison purposes. Each plant item was assessed for different types of activities (i.e. Dynamic and Stationary).

The comparison of sound power levels (Table 6-2) shows that the measured values are generally less than the assumed values in the EA (2011), or very close to the level used. The total sound power level for the equipment indicates that the overall measured sound power levels are lower than was modelled in the EA (2011).

Table 6-2- Summary of Annual Sound Power Level

	Measured Sound Power level			EA (2011) level		
Plant Type	**N# of Plant**	**PWL(dBA)**	**PWL/item (dBA)**	**N# of Plant**	**PWL(dBA)**	**PWL/item (dBA)**
Haul truck	***24***	***127.2***	113.4	23	131.1	117.5
Watercart	***3***	***113.4***	108.7	4	113.0	107.0
Bulldozer	***11***	***125.2***	114.8	5	123.0	116.0
FEL	***4***	***112.4***	106.4	1	116.0	116.0
Grader	***2***	***107.1***	104.1	2	111.0	108.0
Drill	***3***	***122.6***	117.8	3	121.8	117.0
Excavator	***6***	***119.1***	111.3	5	121.8	114.8
Crushing	***2***	***114.5***	111.4	1	113.0	113.0
Scraper	***0***	***nil***	nil	4	121.0	115.0
Total		***130.8***	121.9	-	133.0	124.5
Total (Excluding scraper)		***130.8***	121.9	-	132.7	123.9

Acoustic model annual validation

An independent consultant was engaged to assess and validate the noise model prediction developed in 2011 against the monitoring results for 2020.

The results show that winds towards some locations occur more often in some periods (i.e. day or night time) than others, according to the location. Inversion conditions (stability classes E, F and G) do not appear to cause more elevated results.

The attended monitoring has only been able to obtain limited numerical data on the mine noise contribution at most of the nearest privately owned receptor locations. This arises largely as the private receptors closer to the mine have been acquired since the time of the EIS, hence the existing sensitive receivers are now a significant distance away from the mine, where there is little mine noise.

The results indicate that it is rare for even a trained technician in the field, assisted by a specialised noise analyser to be able to measure any mine noise contribution at the more distant locations (i.e.

Bungalow and Barber's Lagoon). It is noted that for Coomalgah, the monitoring is conducted much closer to the mine than the receptor (hence it is possible to measure the mine noise more often), and these measurements are then extrapolated back to the commensurate mine noise levels at the receptor location; a key reason that makes it possible to obtain more data for this location relative to the other sites.

The assessment indicates that the measured mine noise levels comply with criteria and generally align well with the predicted levels.

6.1.4 Proposed Improvements to Environmental Management

During the reporting period, TCM commissioned new plant items that were tested for sound power levels before use and fitted with noise suppressant technology as required.

A revised Noise Management Plan (NMP) was approved by the Department in October 2020. TCM will review the NMP following the approval of MOD 7 of PA11_0047.

6.2 Blasting

6.2.1 Criteria

Blasting criteria for the TCM are noted in PA 11_0047, and Condition L5 of EPL 12365.

- Blasting must only be carried out between 9.00 am and 5.00 pm, Monday to Saturday inclusive. Blasting is not allowed on Sundays, public holidays or at any other time without the written approval of the Director-General.
- A maximum of one (1) blast per day, unless an additional blast is required following a blast misfire and a maximum of 4 blasts per week averaged over a calendar year for the project:
- For non-project related residences, the overpressure level from blasting operations must not:
    - exceed 115dB (Lin Peak) for more than 5% of the total number of blasts over a period of 12 months; or
    - exceed 120dB (Lin Peak) at any time.
- For non-project related residences, ground vibration peak particle velocity from the blasting operations must not:
    - exceed 5mm/s for more than 5% of the total number of blasts over a period of 12 months; and
    - exceed 10mm/s at any time, at any residence on privately owned land.

6.2.2 Key Environmental Performance

During the reporting period, 85 blasts were initiated. There were no instances where two or more blasts were required to be fired on one day due to safety reasons.

One overpressure was recorded above the 115dB on privately-owned property “Coomalgah” during the reporting period which is equivalent to 1 in 85 (~1.2%) above the 115dB limit over a 12 month period and therefore compliant with the approval condition. There were two instances were overpressure was above 115 dB at the project-related “Tarrawonga” property, which is equivalent to 2 in 85 (~2.3%), noting that criteria only apply to privately owned properties.

On 20th of March 2020, the maximum overpressure recorded at “Coomalgah” was 118.4dB. On 29th of August 2020, the maximum overpressure recorded at the project related property “Tarrawonga” was 119.9dB. As noted above, overpressure criteria does not apply at the project related premises ‘Tarrawonga’.

The maximum ground vibration (3.78mm/s) was recorded at “Coomalgah” on 3rd June 2020 which is below the consent criterion of 5mm/s.

On one occasion during the reporting period, the 'Coomalgah' monitor did not record a blast as the memory card was faulty due to a suspected lightning strike and the blast data could not be downloaded. The card was replaced the following day.
All blast monitoring results for the reporting period, including the time of initiation have been included in Appendix 1.

Performance during the reporting period was consistent with the EA prediction for blasting.

The maximum fume rating for the reporting period was classified as a '3b' per the *Australian Explosives Industry And Safety Group Inc. – Code of Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting*. No instances were recorded of blast fume leaving the premises boundary.

6.2.3 Proposed Improvements to Environmental Management

The BTM Blast Management Strategy was reviewed and updated in 2020. DPIE approved the Strategy in 2021. Following approval of MOD 7, TCM will review and update the BMP.

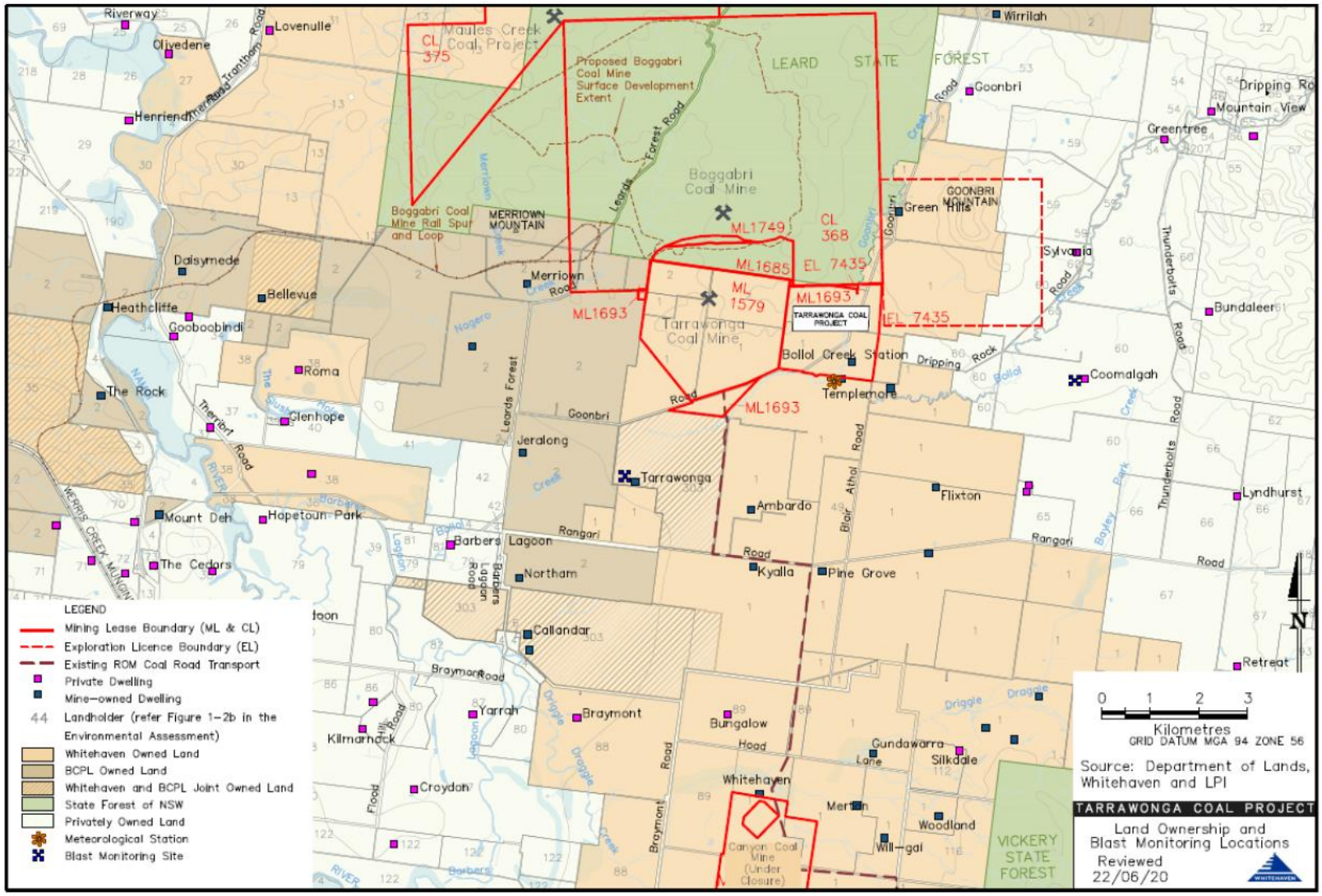


Figure 5- Blast Monitoring locations.

6.3 Air Quality

6.3.1 Criteria

The air quality criteria applicable to the TCM are specified in PA 11_0047 Schedule 3. Air quality criteria is summarised below:

- Acceptable mean annual increase in deposited dust – 2g/m^2/month.
- Mean annual dust deposition (all sources) – 4g/m^2/month.
- Mean annual Total Suspended Particles (TSP) (all sources) – 90 µg/m^3.
- Mean annual Particle Matter under 10 microns (PM_{10}) – 30 µg/m^3.
- 24-hour average PM_{10} particulate level – 50 µg/m^3.

6.3.2 Environmental Management Measures

TCM employs a range of air pollution control measures specified in the Air Quality and Greenhouse Gas Management Plan (AQGGMP), including:

- Maintaining a real time SMS alarming system to key operational personnel;
- Using a prediction and dust forecasting system;
- Modification of work practices where required including changing of excavation and dumping strategies;
- Temporary cessation of operational equipment if required;
- Limiting ground cover removal in advance of mining consistent with operational requirements;
- Application of water to exposed surfaces, with emphasis on those areas subject to frequent vehicle/equipment movements which may cause dust generation and dispersal;
- Use of dust suppressant product on the roads;
- Water injection on drilling rigs;
- Use of aggregates for blast hole stemming;
- Water application at the crusher and on the conveyor discharge point to the coal bin;
- Cessation of coal processing activities during periods of concurrent high winds and temperatures which cause coal dust dispersal, independent of water applications.
- ROM coal pad watering;
- Progressive shaping and rehabilitation of areas once they are no longer required for mining purposes;

- Speed limit restrictions on all vehicles and equipment on the mine site;
- Use of covers on the trays of all product coal trucks. All coal haulage vehicles (road trucks only), including those operated by sub-contractors, are fitted with roll-over tarpaulins.
- TCM continues to liaise with Boggabri Coal Mine (BCM) and Maules Creek Coal Mine (MCCM) during periods of elevated air quality events to manage cumulative impacts.

Figure 6 displays the air quality monitoring locations including the deposited dust gauges (DDG), two Tapered Element Oscillating Micro balance units (TEOM) installed on project related properties (Flixton and Wil-gai), 3 mobile real-time dust samplers (E-samplers) installed near the mine boundary and one High Volume Air Sampler (HVAS) on privately owned property (Coomalgah) operating and serviced during the reporting period.

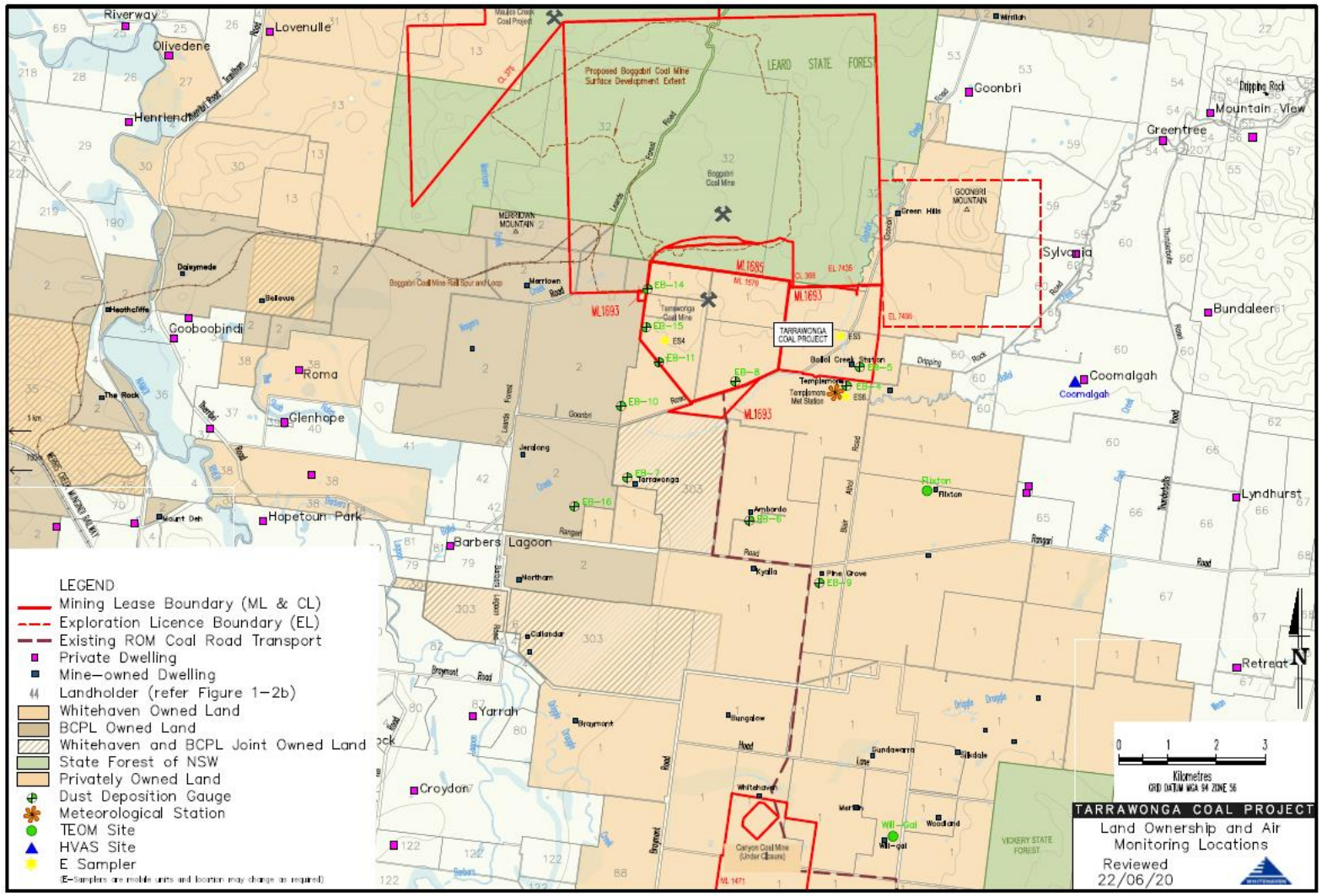


Figure 6 - Air quality monitoring locations.

6.3.3 Key Environmental Performance

Dust Deposition Gauges:

Table 6-3 details the monthly dust deposition levels measured at 11 dust deposition gauges. Monitoring criteria is not applicable at these locations because there are situated on project related land. Despite the relative wet year, some dust gauges recorded sporadic elevated results at (EB-5), (EB-8) and (EB-10) located near Goonbri road (dirt road). Internal investigations indicated that recoded peaks were likely related to localised contamination or environmental factors (regional dust storm) as noted on the contractor's field sheets.

The annual average limit was exceeded at only one monitoring location (EB-15) which is located on the western side of the mine, approximately 200m from Boggabri Coal Mine's ROM. Site (EB5) was destroyed during a flood event and had to be repaired. (EB-8) was decommissioned in October 2020 due to shaping activities on the Southern Emplacement Area and rehabilitation progression.

Table 6-3 -Deposited Dust monitoring data summary 2020 [g/month/m^2]

MONTH	TEMPLEMORE (EB-4)[1]	BOLLOL CREEK STN (EB-5)[1]	AMBARDO (EB-6)[1]	TARRAWONGA (EB-7)[1]	THUIN (EB-8)[1]	PINE GROVE (EB-9)[1]	TARRAWONGA MINE (EB-10)[1]	TARRAWONGA MINE (EB-11)[1]	TARRAWONGA MINE (EB-14)[1]	TARRAWONGA MINE (EB-15)[1]	JERALONG NORTH (EB-16)[2]
Jan 20	3.5	29.7*	3.5	2.5	3.5	6.8	10.9#	2.8	2.5	3.3	2
Feb 20	8.1	Site Destroyed	5.4	2.5	5.7	5	4.2	5.9	7.6	10.4	3.8
Mar 20	1.7	Site being repaired	2.2	2	6.2	2.9	8.3	4.1	2.8	4	2.3
Apr 20	2.2	3.0	7.7	0.7	15.9#	0.8	2.5	1.9	1.5	3.8	5.2
May 20	3	2.5	1.4	2.4	3.2	1.2	4.4	2.4	2.3	4.4	4.2
Jun 20	3.1	2	1.1	1	2.7	1.5	1.9	2.5	1.8	5.3#	2.7
Jul 20	1.3	2.8	0.9	2	3.2	0.8	0.9	2.7	1.5	3.4	1.2
Aug 20	1.1	1.8	1.1	0.5	1.8	0.7	1.9	2	1.2	3.7	0.8
Sep 20	1.4	19.9#	1	0.9	2.4	1.9	0.9	1.3	1.7	3.6	1.9
Oct 20	0.9	2.1	1.3	1.1	d	1.2	3.1	1.9	2.3	5.5#	2.5
Nov 20	3.2	2.7	1.1	1.2	d	1.9	3.1	5	2.4	5.5	3
Dec 20	4.3	2.5	2.0	1.3	d	2.3	12.8#	3.7	2.6	5.1	1.6
2020 Average	2.8	2.4	2.4	1.5	d	2.3	3.8	3.0	2.5	4.7	2.6
2019 Aver.	4.2	4.2	3.5	2.4	4.5	2.4	4.7	3.9	3.1	4.6	3.4
2018 Aver.	7.9	4.4	5.0	1.8	4.3	3.3	6.4	4.7	2.7	4.8	8.6

*[1] Project related land; [2] Land owned by Boggabri Coal Mine; *Contamination confirmed via microscopic analysis; #Contamination/ Environment factors noted on field sheet;* d *decommissioned due to rehabilitation.*

High Volume Air Sampler (HVAS)

TCM has one HVAS which is located at the privately-owned property "Coomalgah". All the results recorded at the HVAS are summarised in Appendix 2.

From all the PM_{10} levels recorded for the reporting period, eight (8) results were above the 24hr average criterion. All but one were recorded between January and March and the most recent in November 2020. TCM notified the Department on all occasions and provided information showing that those results were not mine activity related but were more likely due to prolonged period of drought, bushfires and farming activity within proximity of the monitor (i.e. harvest of wheat and grazing).

Following recommendations from the Department, all the PM_{10} measurements recorded on dates affected by '*an extraordinary event'* have not been included in the annual average calculation. Upon the release of the 'Air quality in the Namoi/North-west Slopes Region: Summer 2019-2020 report', three dates were confirmed to be within these extraordinary conditions and have been removed from the annual average calculation.

Excluding those PM_{10} levels, the PM_{10} annual average at Coomalgah was 19.5 $\mu g/m^3$, which is below the 30 $\mu g/m^3$ criterion specified in Schedule 3 condition 24.

PM_{10} measurements have been summarised in Table 6-4, and Figure 7 shows the trend from 2018 to December 2020 (excluding the values measured during days of "adverse weather").

Table 6-4 - HVAS PM10 24 hour average elevated results [µg/m³]

Date Sampled	24hr average level (µg/m³)	24hr average Limit (µg/m³)	24hr average Regional Air Quality Index (RAQI) value	Comments
06/01/2020	**222.0***	50.0	169.0	Determined as not mining related, date included in DPIE's Namoi and West Slopes Summer 2019-2020 newsletter as an adverse weather condition.
09/01/2020	**757.0***	50.0	220.0	Determined as not mining related, date included in DPIE's Namoi and West Slopes Summer 2019-2020 newsletter as an adverse weather condition.
15/01/2020	**269.0**	50.0	155.0	Determined as not mining related. Regional Air Quality Index value was elevated to more than three times the limit. Wind predominantly from NE and E with gusts of 6m/s. TEOM measured 24hr average of 37.7 µg/m³.
21/01/2020	**100.0***	50.0	50.0	Determined as not mining related, date included in DPIE's Namoi and West Slopes Summer 2019-2020 newsletter as an adverse weather condition.
02/02/2020	**153.0**	50.0	51.0	Determined as not mining related. Smoke/ Haze noted in the field sheet. Wind gusts recorded above 7.5m/s. TEOM measured a 24hr average of 43.3 µg/m³. The real time monitor between site and the HVAS monitor recorded a PM_{10} average of approximately 48.6 µg/m³.
26/02/2020	**82.2**	50.0	41.0	Determined as not mining related. Wind predominantly from W and gusts of 11m/s. TEOM measured a 24hr average of 27.7µg/m³.
03/03/2020	**59.3**	50.0	44.0	Determined as not mining related. Wind predominantly from E and SE with gusts recorded at 6m/s. TEOM measured a 24hr average of 32.7µg/m³.
16/11/2020	**148.0**	50.0	63.0	Determined as not mining-related. Farming and harvesting activity on the property noted on contractor field sheet. Wind predominantly from SSW with gusts recorded at 10.9m/s. TEOM measured a 24hr average of 35µg/m³.

N=North; S=South; E=East; W=West

**After consultation with DPIE, results were deemed to be adverse weather conditions ('extraordinary event') and were allowed to be excluded from the annual average calculation.*

Note: Regional Air Quality Index (RAQI) was retrieved from the OEH websites' database, and values (24 hour rolling average 12am-11:59pm).

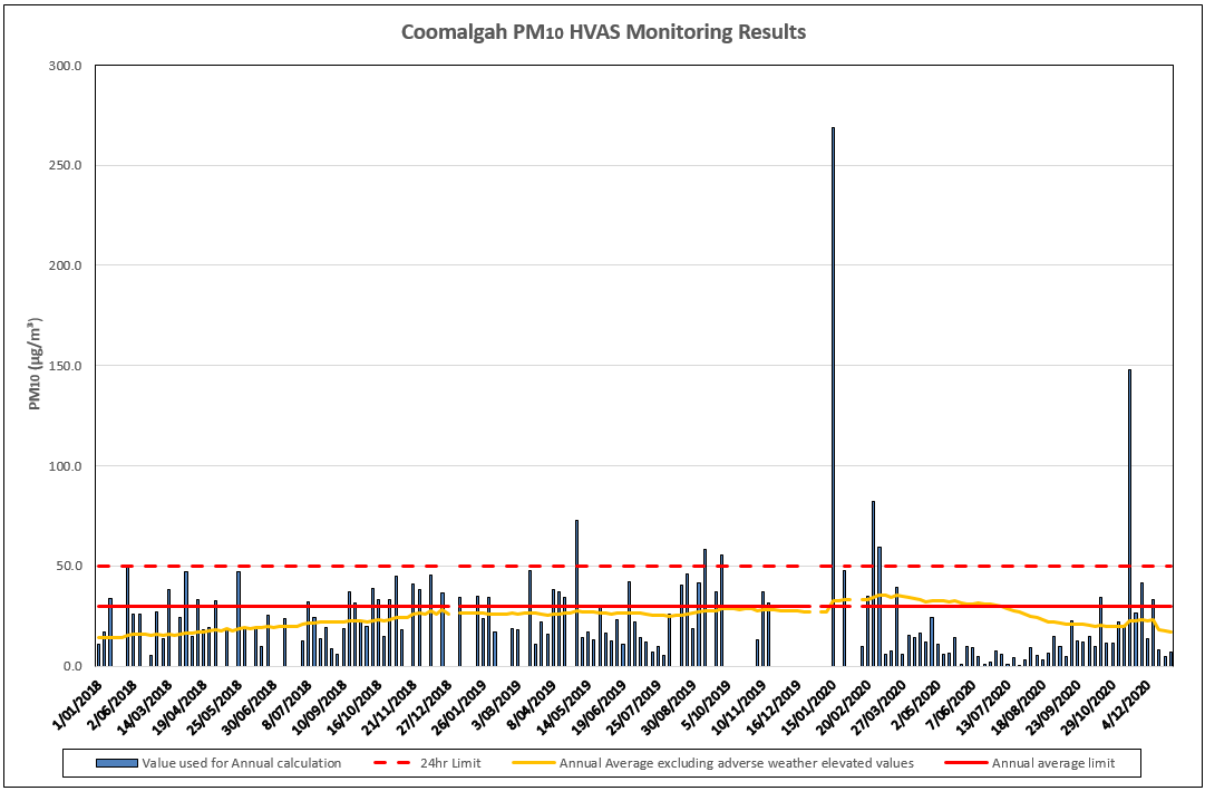


Figure 7- HVAS-PM10 24hr average monitoring data (2018-2020)

Total Suspended Particulate (TSP) is inferred from the measured PM10 data using monitoring conducted at the 'Coomalgah' HVAS. Results indicated the TSP rolling annual average remained below the applicable criteria of 90 µg/m for the reporting period. These are illustrated in Figure 8.

The EA predicted no exceedance of the annual average TSP criterion. TSP results inferred from PM10 data were consistent with the EA for the reporting period.

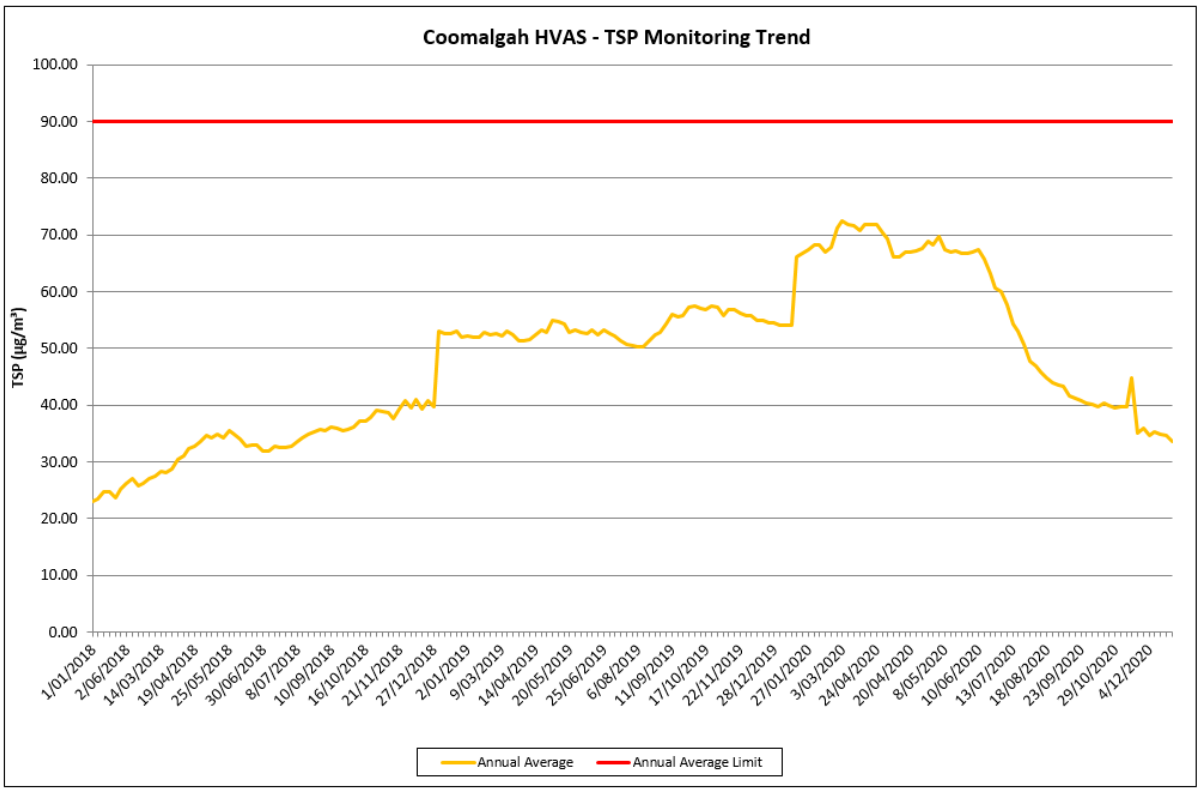


Figure 8 – Coomalgah HVAS- calculated TSP Monitoring Trend (2018- 2020)

E-samplers

The three (3) E-samplers are installed on mine owned land (no criterion applies) and monitor continuously and real-time PM_{10} levels. The monitors are used as a management tool to facilitate the day to day mine operations and for investigation purposes.

TEOMs

Throughout the reporting period, the TEOM located on a mine owned property 'Flixton' monitored continuously and real-time PM_{10} levels. The monitor is used as a management tool to facilitate the day to day mine operations and therefore there is no criterion applicable at that location.

Results recorded at the $PM_{2.5}$ monitor on the project related property 'Wil-gai' remained generally consistent with those recorded during previous reporting periods for most of the year. The Air Quality Greenhouse Gas Management Plan (AQGGMP) states that whilst no criteria applies TCM will compare results against $PM_{2.5}$ annual average target levels of 8.0 µg/m^3 and 25µg/m^3 for 24hr average.

Including all the $PM_{2.5}$ 24hr average values measured during the reporting period, the annual average calculated is 5.3µg/m^3, PM2.5 24hr average level limit (25µg/m^3) was exceeded throughout

the year, particularly on the dates mentioned throughout the DPIE's Namoi and West Slopes Summer 2019-2020 Report.

An air specialist assessed TCM performance against the Key Performance Indicators (KPI's) listed in Table 6-5 of *Tarrawonga Coal Mine – Particulate Matter Control Best Practice Pollution Reduction Program (PRP)*. The assessment of KPI-1 , KPI-2 and KPI-4 has shown that:

- KPI – 1 (PM_{10}/ROM (kilograms/tonne))

For 2020, calculated PM_{10} was 514,472kg/year and ROM was 2,507,032t/year giving a PM_{10}/ROM ratio of 0.2 (kg/t) which is consistent with the baseline ratio of 0.2 specified in the PRP.

- KPI – 2 (PM10 Emission Control (%)):

The level of control applied to operations has not changed since the PRP. As the level of dust control applied to activities at TCM has not changed from previous years the KPI-2 value would also be unchanged.

Table 6-5 - KPI – 2 Summary of PM10 control factor (TAS, 2020)

Mining Activity	Current Control Factor	Control Factor with additional best practicable controls.	K2y
Hauling on unsealed roads	75	80	94%
Unloading Coal to hopper	30	79	38%
Wind Erosion and Maintenance - Stockpiles	25	62.5	40%

- KPI – 4 (Water Intensity for Hauling (L/VKT)):

Whilst total kilometres are not precisely measured there has generally been a significant increase in total water applied to haul roads between 2020 and 2017. Since April 2018 a dust suppressant has been used on the haul roads in periods of low rainfall in order to assist with water management on site. As 2020 was an extremely wet year, the requirement for using dust suppressant and watercarts dropped accordingly and this can affect the utility of this KPI as it now stands.

6.3.4 Proposed Improvements to Environmental Management

The predictive air dispersion model system will continue to be implemented in accordance with the BTM Air Quality Management Strategy. The Air Quality and Greenhouse Gas Management plan will

be reviewed, updated and submitted following the approval of MOD7.

6.4 Biodiversity

TCMs approved Biodiversity Offset Strategy includes the Willeroi West BOA for maintaining and improving 1,660ha of native woodland and forest adjacent to the south-eastern boundary of Mount Kaputar National Park. VCPs approved Biodiversity Offset Strategy includes the Willeroi East (Offset Area 1) BOA for maintaining and improving 1,671ha of native woodland and forest adjacent to Willeroi West BOA and the south eastern boundary of Mount Kaputar National Park; as well as Offset Areas 2 to 5 covering 391.5ha located to the south and east of Boggabri.

Offset Security Management

WHC continued to consult with NSW DPIE and Commonwealth Department Agriculture Water and Environment (DAWE) during the reporting period to keep the regulators abreast of securement progress; including receiving on 18th March 2020 a 12 month extension to the EPBC Approval 2011/5923 Condition 10 securement date until the 31st March 2021. By the end of the reporting period, the BCT and WHC had finalised the Willeroi Conservation Agreement aiming to lodge and register with NSW Land Registry Service by the 31st March 2021. Following registration of the Conservation Agreement; WHC will prioritise negotiations with NPWS whom have previously shown interest in the Willeroi Offset property being transferred to National Park Estate.

Infrastructure Management

During the reporting period, no new fencing was required and no waste infrastructure removal was undertaken. Maintenance of signage and gates was undertaken as required to continue to restrict unauthorised access and minimise livestock incursion. Any remaining derelict assets/infrastructure items will continue to be assessed, removed and remediated as required prior to transfer of the Willeroi Offset property to National Park Estate.

6.4.1 Threatened Flora

Spring flora monitoring in 2020 found that all 8 sites exceeded the completion criteria for native species richness (NPS) (80% native species richness benchmark for relevant biometric vegetation communities). Native overstorey cover (NOS) increased from 0 out of 8 assessed sites in 2019 to 1 out of 8 assessed sites in 2020 meeting or exceeding the completion criteria (minimum overstorey cover benchmark for relevant biometric vegetation communities). Native midstorey cover (NMS) was consistent with the previous year, with 8 out of 8 assessed sites in 2019 and 8 out of 8 assessed

sites in 2020 meeting or exceeding the completion criteria (minimum midstorey cover benchmark for relevant biometric vegetation communities). Native ground cover grass (NGCG) increased from 5 out of 8 assessed sites in 2019 to 8 out of 8 assessed sites in 2020 meeting or exceeding the completion criteria (minimum groundcover grass benchmark for relevant biometric vegetation communities). A total of 105 bird species were recorded during standardised surveys across 26 sites in 2020, with site-level richness ranging from 10 to 51. Bird richness across 12 woodland habitats was 92 (average 31.6; range 10 to 51), 53 species were detected at revegetation/rehabilitation sites (average = 18.7; range 13 to 25), while the 9 regenerated sites recorded 72 species (average 24; range 3 to 36). The 2020 survey results represent a significant increase from the 2019 results when 58 species were detected. Five (5) microbat species were recorded from harp trapping at 4 sites in 2020. This result was slightly higher than 2019 when 4 species were recorded. Average species richness at the 4 woodland sites was 2.75 (range 1 to 4), slightly lower than the 2019 result of 3.25 mean species (range 2 to 4). Ten (10) species were positively identified through ANBAT recordings. One frog and 10 reptile species (average 4; range 3 to 6) were detected during diurnal herpetofauna surveys of 4 sites. Spotlighting surveys at 4 sites detected 24 species of vertebrate taxa (average = 10.75; range = 9 to 13).

6.4.1.1 Seed Collection/ Management

Routine seed assessments completed for the Willeroi BOA identified a turnaround in climatic conditions across the region due to the above average rainfall in 2020. 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. A total of 10 species were collected resulting in 982 grams of local provident seed from across the Willeroi BOA. 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 species seedlings required for the 2020 revegetation program completed as well as planning for the 2021 revegetation program for the Willeroi BOA.

6.4.1.2 Vegetation Clearing- flora

During the pre-clearing survey, a qualified ecologist identified a vulnerable flora species *Tylophora linearis*, listed under the *Environmental Protection and Biodiversity Conservation Act 1999 that* was sighted at three locations and a total of 459 habitat features (hollow bearing trees, large woody

debris or nests) within the overall area to be cleared (approximately 29.3Ha). The ecologist was present during clearing activities in accordance with the Biodiversity Management Plan (BMP).

6.4.2 Threatened Fauna

During the reporting period, the ecological monitoring program of the Willeroi BOA included winter bird surveys that were undertaken in August 2020; spring flora monitoring of 8 sites undertaken during November 2020 and spring fauna monitoring including 6 general fauna monitoring sites and 26 bird survey sites undertaken during October and November 2020. During the winter bird surveys, five threatened species were recorded (Dusky Woodswallow, Brown Treecreeper, Diamond Firetail, Little Lorikeet and Turquoise Parrot).

6.4.2.1 Vegetation Clearing- fauna

No threatened fauna species were observed during the time of pre-clearing survey. However, the proposed disturbance area may have potentially supported threatened fauna species that are likely to use similar habitat or have been observed within the Tarrawonga Mine lease during previous surveys. The threatened fauna species that may potentially occur include Glossy Black-Cockatoo (Calyptorhynchus lathami), Brown Treecreeper (eastern subspecies) (Climacteris picumnus victoriae), Little Lorikeet (Glossopsitta pusilla), Turquoise Parrot (Neophema pulchella), Grey-crowned Babbler (Pomatostomus temporalis temporalis), Speckled Warbler (Pyrrholaemus sagittatus) and Varied Sittella (Daphoenositta chrysoptera) (all listed under the NSW Biodiversity Conservation Act 2016), however, no individuals were observed during the survey.

Over the duration of the clearance supervision 2020, one fauna species was killed (Tree-crevice Skink). A total of 39 arboreal lizards (33 geckos and 6 skinks) were captured from habitat trees immediately after felling, and these were relocated to nearby suitable habitat outside the study area. Of the 33 geckos, twenty-nine were identified as *Gehyra* sp. (Figure 9) and three were identified as Rhobust Velvet gecko (*Nebulifera robusta*). All six skinks (including the deceased) were identified as Tree-crevice skinks, *Egernia striolata.*

One Lesser Long-eared Bat (Nyctophilus geoffroyi) and two Western Broad-nosed Bats (Scotorepens balstoni) (Figure 10) were captured during clearing, were tracked with temporary mounted radio trackers for several nights. This was part of TCMs microbat radio tracking program.

Figure 9 – Photo: Gehyra versicolor (Eastern Tree Dtella) successfully relocated during clearing activities. (EcoLogical 2020)

Figure 10 – Photo: Scotorepens balstoni (Western Broad-nosed Bat) successfully relocated during clearing activities. (EcoLogical 2020)

6.4.3 Habitat Management

During the reporting period, routine habitat management works were undertaken within the Willeroi BOA.

6.4.3.1 Weeds

WHC coordinated routine formal weed monitoring/inspections undertaken across Willeroi BOA in in February, May, August and November 2020. The priority weeds identified included legacy noxious weeds inherited from previous owner's management regimes such as Coolati Grass, St Johns Wort, Sweet Briar and Common Prickly Pear as well as a range of broadleaf weeds within revegetation areas. 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 Willeroi BOA for weed control.

6.4.3.2 Feral Animal Control

WHC coordinated routine formal feral animal monitoring across Willeroi BOA in February, May, September and November 2020. 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 Willeroi BOA. Feral animal monitoring utilises the relevant methodologies for specific feral animals generally in accordance with the NSW DPI *Monitoring Techniques for Vertebrate Pests* so that a range of methods can be used such as transects/spotlighting and camera 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, Foxes can be medium in abundance seasonally with all other feral animal species recorded as scarce to low abundance levels across 2020. 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 Willeroi BOA for feral animal management.

During the reporting period, WHC implemented a comprehensive feral animal control program across the Willeroi BOA with routine 1080 baiting and pig trapping programs undertaken in March (9 Foxes removed from 46 baits presented and 4 Feral Pigs trapped), June (15 Foxes and 1 Wild Dog removed from 115 baits presented and 9 Feral Pigs trapped), September (6 Foxes, 7 Wild Dogs and 2 Feral Pigs removed from 115 baits presented and 1 Feral Pig trapped) and December 2020 (27 Foxes

removed from 115 baits presented and no Feral Pigs trapped from 18 trapping days). Night time open range shooting programs were implemented in conjunction with the other routine programs resulting in an additional 1 Rabbit and 4 Feral Pigs being controlled in 2020. There were no Feral Goats harvested at the Willeroi BOA during the reporting period. 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.

6.4.4 Grazing Management

During the reporting period, the Willeroi BOA was not stocked and subsequently grazing was excluded. There was no reported stock incursion within the reporting period.

Grazing activity continued to occur at several mine owned properties near the mine site including Tarrawonga, Templemore and Bollol Creek properties.

6.4.5 Soil & Erosion Management

Annual inspections were undertaken including unsealed tracks and associated drainage structures across the Willeroi BOA to review appropriate erosion and sediment control measures required in accordance with the Blue Book (Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004)). Due to the above average rainfall during the reporting period; additional targeted maintenance was identified for one site within Willeroi BOA to mitigate further erosion and sediment issues. The remaining sites and tracks/drainage structures will continue to be maintained during the routine WHC Biodiversity fire break track maintenance program.

6.4.6 Key Environmental Performance

Biodiversity was managed in accordance with the Biodiversity Management Plan (BMP). A Biodiversity audit was conducted in 2020 and this is detailed in section 10.1.

Engagement with OEH and NPWS is ongoing regarding the potential to transfer parts of the Willeroi BOA to National Parks Estates as per the letter from NPWS dated 16th August 2017 outlining the WHC BOAs that NPWS were interested in. WHC have requested extensions from DPIE and DAWE for the timing of securing these offset areas and to allow negotiations as to which BOAs would be transferred to Parks Estate. This would also finalise the residual BOAs to be secured via conservation agreements.

6.4.7 Proposed Improvements to Environmental Management

The TCM BMP was approved in December 2020 and it will be reviewed as necessary.

6.5 Aboriginal Heritage Management

6.5.1 Environmental Management Measures

During the reporting period, heritage site and fencing inspections were completed for the 19 known Aboriginal cultural heritage sites within the Willeroi BOA. Each site is maintained with protective fencing around the heritage site perimeter and signage to mitigate access and disturbance.

A Cultural Heritage Assessment was completed in September 2011 as part of the Tarrawonga Coal Project EA. A total of 57 sites (21 open artefacts, 11 scarred trees and 21 isolated artefacts) were located during the surveys of the Project Area. An additional requirement of PA 11_0047 includes the development of an Aboriginal Cultural Heritage Strategy (ACHS) in conjunction with the Boggabri Coal Mine and Maules Creek Project. This Strategy was approved by DPIE in 2017.

To date, the measures in place to protect Aboriginal cultural heritage are considered satisfactory, with all measures identified in the EA, Project Approval and Heritage Management Plan (HMP) in place.

In accordance with the HMP, a qualified archaeologist and RAP representatives conducted a fence audit of all previously identified Aboriginal cultural heritage sites. It was concluded that fence maintenance will be required at some sites damaged by wildlife or livestock. Of the 106 sites listed on the Heritage NSW Aboriginal Heritage information and Management System, many of which have been salvaged or reassessed as 'Not a Site'. This includes nine scar trees within the Mining Lease. During pre-vegetation clearing inspection 2020, the RAP and archaeologist identified no Aboriginal cultural heritage object within the clearance areas.

6.5.2 Key Environmental Performance

In accordance with the current HMP, a registered archaeologist and RAPs inspected archaeological site fences and salvaged any remaining artefacts located in close proximity of the pit or in areas that were cleared in 2020.

6.5.3 Proposed Improvements to Environmental Management

No specific management procedures are required however, the HMP will be reviewed following approval of MOD7.

6.6 Spontaneous Combustion

6.6.1 Environmental Management Measures

TCM has a low percentage of inorganic sulphur content in coal, and hence a low potential for exothermic oxidation reactions. However, TCM personnel are trained to watch for indications of spontaneous combustion. Any incident would be followed by excavation to identify the source and extinguishment through water saturation.

Rehabilitation of the coal reject materials co-disposed amongst spoil is not anticipated to result in any detrimental changes to the quality of surface runoff and seepage. Therefore, the current water quality monitoring program remains suitable for assessing the quality of post-rehabilitation surface runoff and seepage from the final rehabilitated landform.

Previous investigations into the geochemistry of mine materials likely to be generated at Tarrawonga have been completed in 2005 (URS), 2010 (GEM), 2011 (GEM) and 2017 (RGS). The findings are generally consistent and indicated that the overburden and interburden samples are classified as NAF and non-saline. RGS also highlighted that additional testing should be undertaken to include coarse and fine coal reject materials.

In 2020, a geochemist completed an assessment of the coal reject material (fines and coarse) and the key conclusions are similar to previous reporting years:

- The coal reject materials have relatively low and variable sulphur content and excess ANC, and as a bulk material have a high factor of safety with respect to potential acid generation.
- The concentrations of metals and metalloids in coal reject materials are low compared to typical levels in unmineralised soils.
- Surface runoff and seepage from coal reject materials is likely to be pH neutral with low levels of salinity.
- Static leach tests indicate that trace metals/metalloids and major ions will be sparingly soluble in runoff and seepage from coal reject materials. Dissolved concentrations of these parameters are predicted to remain within applied water quality guideline criteria and are not expected to present any significant environmental risks for on-site or downstream water quality. Dilution effects from rainfall and natural attenuation are also likely to occur in the field and further reduce the concentrations of soluble metals and metalloids in any runoff and seepage.

- Based on the predicted geochemical nature of the coal reject materials, no special management measures are required for the handling or storage of these materials, apart from those already planned in the current MOP.
- Surface runoff and seepage from coal reject materials co-disposed amongst spoil should continue to be monitored to ensure that key water quality parameters remain within appropriate criteria.
- Rehabilitation of the coal reject materials co-disposed amongst spoil is not anticipated to result in any detrimental changes to the quality of surface runoff and seepage. Therefore, the current water quality monitoring program remains suitable for assessing the quality of post-rehabilitation surface runoff and seepage from the final rehabilitated landform.
- The coal reject materials at Tarrawonga have a low propensity to spontaneously combust and should be managed in line with the relevant parts of the NSW technical guideline related to this issue (Industry and Investment NSW, 2011).

6.6.2 Key Environmental Performance

A number of minor instances occurred where small amounts of coal smouldered on the ROM pad. These instances were managed accordingly with no offsite impacts. No spontaneous combustion was recorded in the rehabilitated areas. No additional improvements are proposed within the next reporting period.

6.7 Bushfire Management

6.7.1 Environmental Management Measures

In accordance with the BMP, annual fuel load monitoring was undertaken in December 2020 as part of planning and assessment of bushfire and ecological burn strategy for the Willeroi BOA in 2021. During the reporting period, no fire occurred on Willeroi BOA but the average overall fuel load measured was 11t/ha (moderate) and grassland fuel load was 3.2t/ha (moderate). Other fire management implemented by WHC during the reporting period included spatial data collection for 88km of firebreak tracks with maintenance carried out to a zero fuel barrier standard. WHC maintains regular communications throughout the reporting period with the Namoi-Gwydir Zone RFS teams around planning of WHC BOA ecological burn programs as well as providing WHC emergency contacts. WHC maintains a specialist firefighting contractor for an on call engagement during the fire season to respond in the event of a bushfire on WHC BOAs and non-mining lands.

TCM conducted mowing and slashing along roads and tracks to keep grass low and minimize the risk of fire. This program will be maintained as the grass continues to grow.

6.7.2 Key Environmental Performance

No instances occurred where TCM was required to assist to the RFS team or any other landholder or body. TCM installed a water tank connected to a groundwater bore in a property adjacent the mine to assist fire fighter in case of an emergency. In 2020, local RFS teams were invited to site to discuss Emergency Response Plan and familiarise with TCM firefighting capabilities and protocols.

6.7.3 Proposed Improvements to Environmental Management

TCM will continue to engage with the local RFS and with the community via CCC meetings and their members. TCM will continue to conduct mowing and slashing activities along access roads and tracks to keep grass to acceptable levels.

6.8 Meteorological Data

Meteorological monitoring is conducted onsite in accordance with Schedule 3 Condition 30 of the PA11_0047. Table 6-6 summarises the monthly meteorological conditions at TCM for the 2020 reporting period.

The total annual rainfall for the reporting period was 931.1mm; this is more than four times the amount of rain recorded for 2019 (277mm) and almost double the long term mean annual rainfall (585mm). The maximum monthly rainfall was recorded during February with 261.1 mm.

A minimum temperature of -5.6°C was recorded in August and a maximum temperature of 42.1°C in January.

In 2020, prevailing winds were predominately between the South-South Easterly (S-SE) and South-South Westerly (S-SW) direction for most of the year, apart for June which recorded a North- North Easterly (N-NE) prevailing wind direction.

Table 6-6- Templemore weather station monitoring data 2020

Month	2m Temperature (°C)			10m Temperature (°C)			Average Wind Speed (m/s)	Prevailing Wind Direction	Monthly Rainfall (mm)
	Min	Mean	Max	Min	Mean	Max			
January	17	29.6	42.1	18.2	29.5	40.9	2.9	S 173°	109.2
February	12.8	24	38.6	14.5	24.3	37.8	2.3	SSE 156°	261.2
March	9	21	34.6	12.1	21.7	34.4	2.4	SE 137°	119
April	4.2	16.9	28.8	5.9	17.9	28	1.7	SSE 150°	65.8
May	-0.7	11.9	24.9	1.1	13	24	1.8	SSE 164°	16
June	-2	9.7	22.7	0.3	11	22	1.6	NNE 33°	23.4
July	-3.9	9.1	22.5	-0.8	10.5	21.5	1.7	SSE 161°	31
August	-5.6	9.2	23.5	-3.8	11.3	25.9	2.6	SSW 199°	38.3
September	-2.4	13.9	26.9	1.7	16.3	27.1	2.5	SSE 156°	28
October	1.7	17.3	30.4	5	19.5	30.7	2.4	SSE 162°	55.8
November	3.8	22.6	39.6	7	24.2	39.9	3	SSE 159°	3
December	4.8	22	41.4	10	23.8	40.9	3	S 170°	184.4
Total	-								**935.1mm**

6.9 Waste

6.9.1 Environmental Management

During 2020, TCM used the services of a waste contractor to collect and manage the entire waste streams generated at the mine. This initiative has improved record keeping and data reliability.

During the reporting period, waste removed from site for disposal or recycling is summarised in Table 6-7

Table 6-7- Waste management summary

Waste Stream	Container size	2020	2019	2018#	2017	Unit of Measure
General Waste	3m^3	**326,490**	306,530	269,694	600 (2m^3 bin)	Kg
Tyres*	n/a	**43**	61	54	73	each
Batteries **	As listed	**2,037 kg**	21 pallets	57 pallets	72 pallets	Kg/ each
Waste Oil	IBC	**312,200**	273,800	231,000	242,000	L
Oil Filters	3m^3	**12,285**	28,165	8,835	6,160	Kg
Hydraulic Hoses	3m^3	**460**	1,685	885	n/a	Kg
Coolant	IBC	**4,467##**	0	8,000	13,700	L
Scrap Metal* **	15m^3	**54,000**	68,000	70,500	29,260	Kg
Cardboard	10m^3	**9,390**	11,535	9,825	57 (IBC)	Kg
Timber	15m^3	**28,110**	33,480	33,000	n/a	Kg
Septic Waste	Pumped out	**127,500**	90,300	55,500	n/a	L
Paper/Plastic/ Aluminium Can	240Lts	**115**	320	351	37	Kg

**Heavy machine Tyres were reused onsite for traffic management, or are in a storage area pending disposal; **Battery Type N200, N150 & N70 donation to Westpac helicopter; ***Major clean-up of the yard; n/a not applicable or data not available; #to be able to assess performance over the years, TCM has extrapolated using values provided by the Waste contractor from August to December 2018. ## coolant is stored onsite in a 10kL tank that is emptied by the waste contractor before it reaches 100% capacity*

6.9.2 Key Environmental Performance

During the reporting period no incidents relating to waste management occurred.

6.9.3 Proposed Improvements to Environmental Management

Tarrawonga aims to reduce waste via a number of initiatives including recycling (oils, greases, scrap steel and domestic recyclables) and increasing tyre life through education and training of machine operators.

6.10 Environmental Performance Summary

An environmental performance summary for TCM is presented in Table 6-8- Environmental Performance:

Table 6-8- Environmental Performance

Aspect	Approval Criteria or EIS/EA Prediction	Performance during the reporting period	Trend / Key Management Implications	Implemented / proposed management actions
Noise	Refer s6.1	Approval criteria met.	Nil	Nil
Blast	Refer s6.2	Approval criteria met.	Nil	Nil
Air Quality	Refer s6.3	Approval criteria not met.	Nil	TCM's notified DPIE regarding eight (8) PM10 24 hour average exceeding the 50µg/m^3 limit at the 'Coomalgah' property. DPIE advised TCM not to include in the annual average calculation PM10 measured on days of "extraordinary events'. As a result, only five (5) elevated PM10 measurements were included in the annual average calculation of the Annual Review 2020.
Biodiversity	Refer s6.4	Approval criteria met.	Nil	Nil
Heritage	Refer s6.5;s6.6	Approval criteria met.	Nil	Nil
Spontaneous Combustion	Refer s6.7	Approval criteria met.	Nil	Nil
Bushfire Management	Refer s6.8	Approval criteria met.	Nil	Nil
Waste Management	Refer s6.10	Approval Criteria Met	Nil	Nil
Water management	Refer s7	Approval Criteria not Met.	Nil	TCM notified relevant agencies including DPIE regarding two instances where approval criteria was not met following uncontrolled water released (at SD2 and SB14). TCM reviewed dams' design and construction criteria and developed a manual to improve operation and maintenance of all the dams.

7 WATER MANAGEMENT

The mine lies within the catchment of the Namoi River. Locally and within proximity of the project site, Goonbri Creek, Bollol Creek and Nagero Creek all provide flows to the Namoi River during runoff events. The design of sediment basins within the disturbed area of the mine aims to limit the opportunity of discharge of runoff from mine-disturbed area, i.e. after appropriate detention time to satisfy licensed discharge criteria.

Detailed Surface Water and Groundwater monitoring results are provided in Appendix 2 and Appendix 3 respectively.

7.1 Surface Water Performance and Management

Sediment basins, storage dams and associated banks and drains have been designed by an engineering consultant in accordance with the Managing Urban Stormwater: Soils and Construction Vol 2E Mines and Quarries (DECC, 2008) in conjunction with the references to Volume 1 (Landcom, 2004). Water within the Project Approval area is nominally classified either as “clean”, “dirty”, “contaminated” or “pit water” depending on the source of the flow and it’s potential for physical or chemical contamination. The definition of these classifications follows:-

- “Clean Water” comprises water that has not come in contact with mine disturbance and does not have potential to contain hydrocarbons.
- “Dirty Water” comprises water that has come into contact with mine disturbance and does not have potential to contain hydrocarbons.
- “Pit Water” comprises water contained within the open cut sump or pumped to the void water dam for containment and use for dust suppression across the site.
- “Contaminated Water” comprises runoff water, which could potentially contain hydrocarbons.

There are six wet weather discharge points nominated in the current EPL12365 (relevant to PA11_0047 Schedule 3 Conditions 33 and 39). These are SD9, SB14, SD16, SD17, SB23B and SB24B. At the end of the reporting period, SB14 and SD16 were decommissioned due to rehabilitation progression.

February 2020 was a particularly wet month where TCM experienced a heavy rainfall event of approximately 158mm recorded over 24 hours, resulting in uncontrolled water releases.

1. Sediment Dam (SD2) breached the western wall and spilled sediment-laden water to adjacent land owned by Boggabri Coal Mine. This was reported to the relevant agencies and investigated by EPA who issued a Penalty Notice.

2. Sediment Basin (SB14) released water to the environment from the Licenced Discharge Point 3, details as follows:
    - Oil and Grease measured was 1mg/L higher than EPL limit of 10mg/L. This incident was reported to relevant agencies. During the investigation of this incident, the EPA concluded TCM failed to implement all practical measures to dewater the sediment dam within 5 days of the last rain event. As a consequence, an elevated Total Suspended Solids (TSS) level of 17,700mg/L was recorded in the water sampled, resulting in a Penalty Notice from EPA.
    - NSW Resources Regulator conducted an investigation related to Erosion on the Southern Emplacement and found that TCM:
        - Failed to carry out operations in a manner that does not cause or aggravate water pollution (including sedimentation) or erosion, as required by condition 16 of ML1579 (and this resulted in a Penalty Notice).
        - Failed to have the Water Management Plan on the Whitehaven website, as required by section 3.2 Environmental Risk Management of the approved MOP for ML1579, ML1685, ML1693 and ML1749 (and resulted in an "Official Caution"). At the time, TCM Water Management Plan was in a draft version and waiting DPIE's approval. For this reason it was not published on the company's website.

7.1.1 Surface Water Monitoring

TCM has a requirement to undertake surface water monitoring on a quarterly basis in addition to the monitoring of any wet weather discharge event. Historical data is available in Appendix 2. Surface water monitoring locations are shown in Figure 11.

Whilst there are no criteria or concentration limits specified for the quarterly surface water samples, the results do provide an indication as to the quality of water on-site. The assessment of sediment load, salinity, pH, oil and grease and other monitoring parameters during these quarterly water monitoring events was consistent with previous reporting years and summarised in Table 7-1 - Surface water Quarterly monitoring 20.

Quarterly Surface Water Monitoring Results

Sample No.	Date	Sample Locatic	pH	EC (µS/cr	Total Suspended Solids (mg/L)	Total Organic Carbon (mg/L	Grease & Oil (mg/L)	Antimony (mg/L	Arsenic (mg/l	Molybdenum (mg/L)	Selenium (mg/L)	Comments
	13/02/2020	SD16	7.9	421	262	8	<5	<0.001	0.004	0.002	<0.01	Approx. 180mm of rain that week from Saturday 8th to Thurs 13th
	13/02/2020	SB14	8.2	938	37	7	<5	<0.001	0.004	0.005	<0.01	
	13/02/2020	SD17	8	166	1170	4	<5	<0.001	0.004	<0.001	<0.01	
	13/02/2020	SB16A	8.2	493	282	7	<5	<0.001	0.004	0.004	<0.01	
	13/02/2020	GCU	7.3	147	95	14	<5	<0.001	0.002	<0.001	<0.01	
	13/02/2020	GCD	7.2	269	64	14	<5	<0.001	0.002	<0.001	<0.01	
	5/03/2020	VOID	8.17	2420	380	4	<5	0.001	0.001	0.001	0.01	
	6/05/2020	SD16	8.8	397	21	10	<5	<0.001	0.001	0.005	<0.01	
	6/05/2020	SB14	8.7	2250	92	12	<5	<0.001	0.003	0.005	<0.01	
	6/05/2020	SD17	8.4	293	120	8	<5	<0.001	0.001	0.002	<0.01	
	6/05/2020	SB16a	8.8	543	33	9	<5	<0.001	0.002	0.013	<0.01	
	6/05/2020	VOID	7.8	3290	34	<1	<5	----	0.012	----	----	
	19/08/2020	SD17	8.27	367	42	6	<5	<0.001	0.001	0.002	<0.01	
	19/08/2020	SD16	7.75	444	37	5	<5	<0.001	0.001	0.004	<0.01	
	19/08/2020	SB14	8.97	1320	32	9	<5	<0.001	0.003	0.004	<0.01	
	28/08/2020	VOID	8.36	3600	25	30	<5	----	----	----	----	
	12/11/2020	SB16A	8.44	967	78	8	6	0.001	0.003	0.021	0.01	
	12/11/2020	SD17	8.53	645	62	4	6	0.001	0.001	0.003	0.01	
	12/11/2020	VOID	8.58	1700	40	2	5	----	----	----	----	

Table 7-1 - Surface water Quarterly monitoring 2020

Levels of oil and grease were low and in most cases below the level of reporting of 5mg/L. Level of Total Suspended Solids (TSS) fluctuated between 21 and 1,170 mg/L with 50% of the measurements below the 50mg/L.

Overall pH values showed that water sampled was between neutral and alkaline. Concentration levels of antimony, arsenic, molybdenum and selenium were monitored throughout the period. Results remained consistently low and below thresholds outlined in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000).

Surface water monitoring results showed generally similar trends with previous reporting periods.

Commitments with regard to the surface water-monitoring program are detailed in the Water Management Plan which was approved in June 2020.

7.1.2 Water Discharges

There were six (6) wet weather discharges throughout the reporting period. Three occurred in February and three in December 2020.

In accordance with relevant EPL12365 conditions, water samples were collected after discharge and results can be found in Table 7-2.

Wet Weather Discharge Results- EPL12365

Sample No.	Sample Location	Date	Time	Temp (°C)	Field pH [6.5-8.5]	Lab pH [6.5-8.5]	Field Electrical Conductivity (µS/cm)	Lab Electrical Conduct	Total Suspended Solids (mg/L) [<50mg/L]	Grease & Oil (mg/L) [<10mg/L]	Total Organic Carbon (mg/L)	Comments
ES2004513001	SD17	08/02/2020	15:30			7.92		169	2030	6	7	Discharge after approx 160mm of rain on the 8th of February and continuous rain thereafter.
ES2004513002	SB24B	08/02/2020	15:30			7.39		69	463	6	12	Discharge after approx 160mm of rain on the 8th of February and continuous rain thereafter.
ES2004513003	SD9	08/02/2020	15:30			7.77		90	480	6	5	Discharge after approx 160mm of rain on the 8th of February and continuous rain thereafter.
ES2004513004	SB14	08/02/2020	15:30			8.27		542	17700	11	7	Discharge after approx 160mm of rain on the 8th of February and continuous rain thereafter.Oil and Grease level reported to EPA and relevant agencies
ES2004513005	BCU	08/02/2020	15:30			7.51		246	67	<5	20	
ES2004513006	BCD	08/02/2020	15:30			7.31		122	750	6	10	
ES2004513007	GCU	10/02/2020	07:30			7.33		124	158	9	13	
ES2004513008	GCD	10/02/2020	07:30			7.35		113	198	8	12	
ES2004761001	SD2 BREACH	10/02/2020	8:00:00 AM			7.5		497	1520	6	4	Discharge after approx 160mm of rain on the 8th of February and continuous rain thereafter.
ES2004761002	SD2 INLET	10/02/2020	5:00:00 PM			7.79		650	7440	-	-	
ES2004761003	SD2 WALL BREAK	10/02/2020	5:00:00 PM			7.9		470	3900	-	-	
ES2004761004	SB5A SPILLWAY	10/02/2020	5:00:00 PM			7.9		653	9380	-	-	
ES2004761005	SB5A	10/02/2020	9:00:00 AM			7.87		739	835	6	5	Background water quality result to assist in investigation process of SD2 Breach
ES2004761006	SB23B	10/02/2020	5:00:00 PM			7.45		276	369	-	-	
ES2005898-001	SD9 Goonbri Rd	19/02/2020	8:25:00 AM	19	8.46	7.79	166.5	138	300	<5	4	Discharge after ~45mm rains over 5 days
ES2005898-002	SB23B	19/02/2020	8:45:00 AM	20	7.5	7.66	122.5	104	31	<5	5	Discharge after ~45mm rains over 5 days
ES2005898-003	BCU	19/02/2020	9:15:00 AM	19.4	7.3	7.6	174.5	174	348	<5	10	
ES2005898-004	BCD	19/02/2020	9:00:00 AM	19.1	7.2	7.72	198.1	202	57	<5	17	
ES2005898-005	GCU	19/02/2020	9:45:00 AM	18.5	7.9	7.52	169.5	99	418	<5	8	
ES2005898-006	GCD	19/02/2020	10:00:00 AM	18.7	7.24	7.56	116.2	149	1040	<5	7	
ES2045254-001	SD28	17/12/2020	09.50am	21.2	7.68	7.81	229	212	8530	<5	10	Sample taken on the roadside of mine fence
ES2045254-002	SD28 Goonbri Rd	17/12/2020	10.20am	25.1	6.75	6.42	103.7	86	398	<5	23	Sample taken in the flowing water along road as a comparison only.
ES2045939-001	GCU	22/12/2020	10.30am	17.1	6.82	6.55	104.5	89	70	<5	12	Sample taken after ~88mm
ES2045939-002	GCD	22/12/2020	10.15am	17.1	6.97	6.9	115.8	118	207	<5	12	Sample taken after ~88mm
ES2045939-003	BCU	22/12/2020	11.30am	17.1	6.68	6.75	108.7	96	66	<5	10	Sample taken after ~88mm
ES2045939-004	BCD	22/12/2020	11.15am	17.4	6.35	7.03	118.8	138	28	<5	12	Sample taken after ~88mm
ES2045939-005	SD28	22/12/2020	09.50am	18	7.55	6.71	246	221	2600	<5	5	Sample taken after ~88mm
ES2045939-006	SD28	22/12/2020	06.30pm	18.8	7.71	6.65	217	192	2000	<5	6	Sample taken after pumping began from SD8 through to SD28 ~3.5ML
ES2036081-001	SD17	24/12/2020	12:10pm	18.6	7.82	6.62	278	244	327	<5	5	Sample taken after pumping began from SB25 through to SD17 ~0.792ML

Table 7-2 - Discharge results 2020

At SB14, the water released on 8th of February 2020 exceeded by 1mg/L the EPL limit of 10mg/L for Oil and Grease and Total Suspended Solids (TSS) concentration was also exceeded and measured at 17,700 mg/L. This occurred after approximately 158mm of rain was recorded in 24Hrs and it is discussed further in section 7.1.

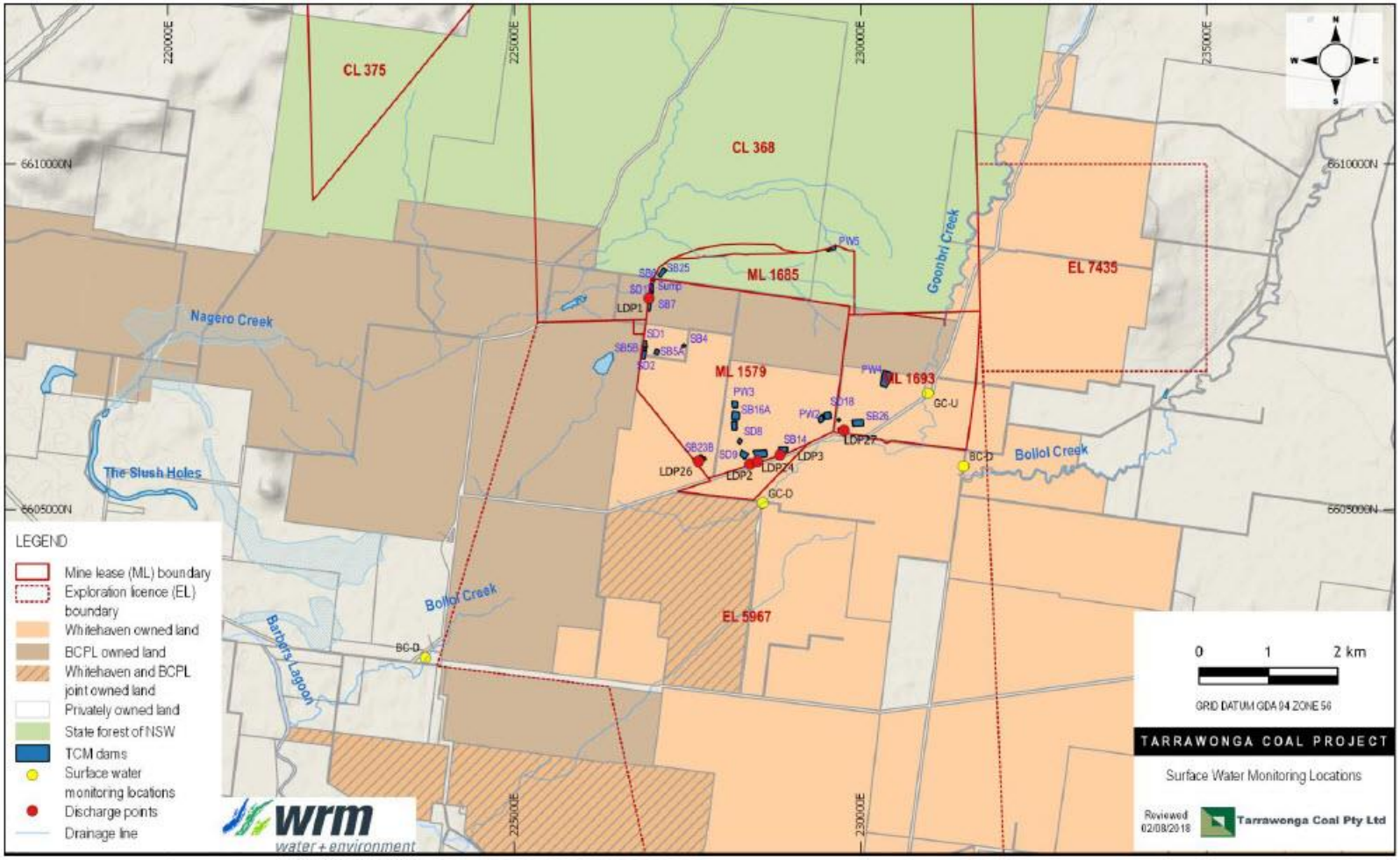


Figure 11 - Surface water monitoring locations (No changes since 2/08/2018)

7.2 Groundwater Management

7.2.1 Environmental Performance and Management

The mine's performance with respect to groundwater performance and management, the prevention of pollution, and the assessment of impacts on groundwater availability to other surrounding users, has been assessed through groundwater level and chemistry monitoring undertaken at a series of piezometers and bores within the Project Area and adjacent properties.

7.2.2 Groundwater Monitoring

Groundwater monitoring was undertaken by a contracted company, accountable for water level measurement, collection of samples and laboratory analysis. Two data loggers monitored water levels at MW1 and MW2 to the South and one Vibrating Wire Piezometers (VWPs) sites (TA65) was operating to the East of the mine.

The groundwater monitoring sites are shown in Figure 122. Historical groundwater quality data and standing water level plots are available in Appendix 4.
During the next reporting period, MW7 will be deemed superseded due to the progression of the pit.

With the assistance of a groundwater consultant, TCM will assess the best locations to install monitoring bores to the East of the mine.

Groundwater levels

Graphs available in Appendix 4 show that groundwater levels at the majority of nominated monitoring bores maintained a steady trend. Most of the bore levels show a significant increase, likely related to rainfall recorded over the year. Sampling and water levels have not been monitored at MW6 since the beginning of 2019, due to a broken casing. This bore is located on Boggabri Coal Mine property. MW3 was removed from the EPL12365 requirement and will not be monitored any more. Samples could not be collected at MW8 due to a damaged casing however, water level could regularly be checked for at that site.

The Vibrating Wire Piezometers (VWPs) installed at TA65 indicated general depressurisation increases with depth (at 110m, 136m and 153m intake). Excluding the 56m intake (which is likely to be faulty), depressurisation of all intakes continued throughout 2019, ranging from 0.04m in the 30m intake to a maximum of 4.81m in the 136m intake, reflecting changes consistent with the presence of an open cut mining operation in proximity to TA65.

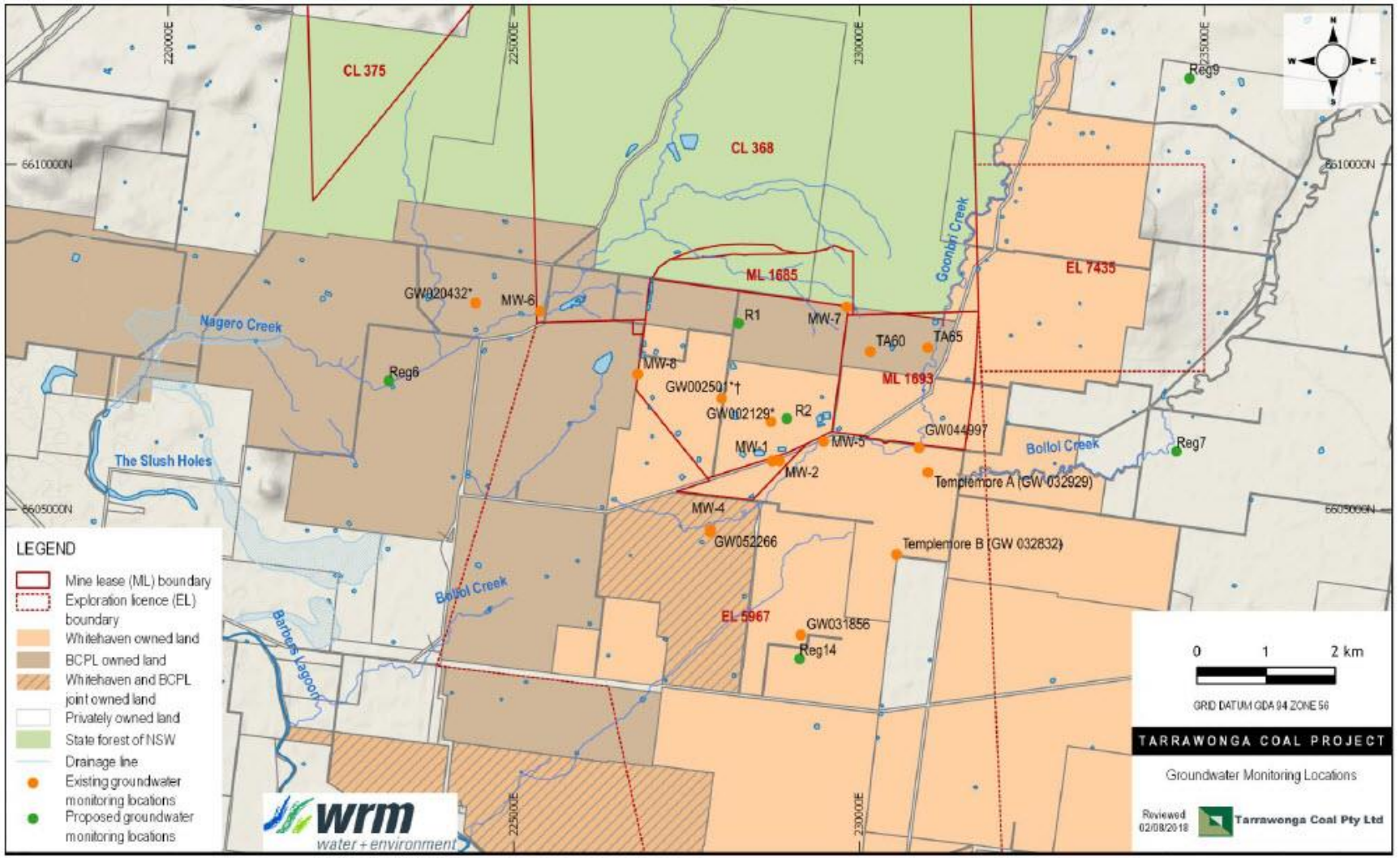


Figure 12 - Groundwater monitoring locations (No changes since 02/08/2018)

Groundwater quality

Analysis of samples taken during the reporting period showed that groundwater quality remained generally in line with historical data at all locations monitored. Water quality was compared to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000) guidelines for stock watering (cattle). There were no recorded instances of groundwater quality exceeding the limits prescribed by those guidelines during the reporting period.

Water quality has also been compared to the National Environment Protection Council (NEPC) Agricultural and Livestock Guidelines. The following instances occurred where water quality did not meet the parameters identified in the guidelines:

- Since there is no Iron limits for livestock in the ANZECC, the agricultural irrigation guidelines for iron (0.2mg/L) was used for comparison. Most of the monitoring sites were above the 0.2mg/l limit on at least one occasion during the reporting period.
- MW1, MW4, MW5, Templemore A, Templemore B and GW044997 were above the agricultural irrigation guideline for TDS (600mg/L) when sampled throughout 2020. GW044997 was the only bore to measure values above the 2,400mg/L NEPC livestock guideline limit, with 2,460mg/L measured. No sites measured above the ANZECC guideline for stock drinking water (4,000mg/L) value.

7.2.3 Groundwater Management

Pit water inflow is a result of combination of rainfall and groundwater seepage:

- Direct rainfall runoff and infiltration through the emplaced overburden which flows down-dip to the open cut sump(s); and
- Inflows from the exposed coal seam.

To prevent any potential risk of contamination with chemical and hydrocarbon, TCM implemented control measures such as:

- Vehicle maintenance carried out in designated areas;
- Any spills being cleaned up; and
- Hydrocarbons products being stored within a bunded area, constructed in accordance with AS 1940-2004 and/or EPA requirements.

Monitoring occurs in surrounding groundwater bores on a regular basis to detect and assess any changes in quality or level that may be mine attributed.

The Tarrawonga Coal Project EA identified that there would be a reduction in the potentiometric head in the aquifers of the porous rock systems to the east and the north. In the past, the Vibrating Wire Piezometers installed in TA60 and TA65 have demonstrated depressurisation as predicted as the mine moves toward the east. Due to pit progression, site TA60 was decommissioned in 2019 and will have to be replaced. Regional Bores (Reg. 6, 7a and 14) maintained a steady trend during the period.

The BTM Complex finalised the updated BTM GW model and submitted it to DPIE in December 2020. This model was prepared with the assistance of a ground water expert and in consultation with several agencies including DPIE-water and NRAR. The BTM mines are waiting on feedback and will undertake a review of the BTM Water strategy during the next reporting period.

During the reporting period, no complaints have been received in relation to impacts upon any other groundwater users. This is consistent with the predictions of the EA; that no significant impact would therefore affect beneficial use of groundwater of other groundwater users.

7.2.4 Water Take

During the water year 2020, no water was extracted from the licenced groundwater bores. Instead, TCM used rainfall and runoff captured in the sediment dams and pit to provide operational water requirements and trucked approximately 42ML of water from the Canyon Mine void. The water extracted from the pit occurred in accordance with WAL31084 that gives an entitlement of 250 units per water annum. In accordance with respective sites approvals and principles of the BTM Water Management Strategy, water sharing opportunities were discussed.

Table 7-3 - Water take

Water Licence Number	Water Sharing Plan Source and Management Zone (As applicable)	Entitlement[#]	Passive take/ inflows	Active Pumping (ML)	TOTAL (ML)
WAL 31084	NSW Murray Darling Basin Porous Rock Groundwater Sources Gunnedah - Oxley Basin Mdb Groundwater Source Gunnedah - Oxley Basin Mdb (Other) Management Zone	250 units	N/A	145.3	145.3
TOTAL		**250**	**N/A**	**145.3**	**145.3**

7.3 Site Water Balance

According to the site water balance developed by a water consultant, the water management system for 2020 had the capacity to be operated and meet operational objectives in normal average weather conditions;

- Wet weather releases occurred on numerous occasions throughout February and December 2020. This allowed excess water release from site and this is also discussed in Section 7.1
- Rainfall and runoff captured in the sediment and pit water dams provided for the majority of water demand in the dry, median and wet years;

These predictions were consistent with the actual outcomes observed during this monitoring period. Table 7-4 provides an overview of water stored and used on site during the reporting period.

Table 7-4 - Water Stored and used during the reporting period

			Table 2-3 EA values (2012) (ML)		
	Jan 2020 – Dec 2020 (ML)	**Jan 2019 – Dec 2019 (ML)**	**Dry Year- 25%-ile (17 years)**	**Average Year (17 years)**	**Wet Year - 75%ile (17 years)**
Total Runoff	2,036	316	325	402	480
Groundwater inflow	59	58	255	255	255
External Source	17	43	n/a	n/a	n/a
TOTAL INPUT	**2,112**	**530**	**580**	**657**	**735**
Evaporation	217	100	118	130	141
Moisture loss in coal	n/a	113	n/a	n/a	n/a
Crusher Dust suppression	30	35	8	8	8
Haul Road and ROM pad dust suppression	329	406	389	394	399
Offsite release/ discharge	279	0	0	0	0
Seepage/ other	20	n/a	n/a	n/a	n/a
TOTAL OUTPUT	**894**	**656**	**515**	**532**	**548**
Change in inventory	*1,218*	-126	*64*	*125*	*193*

Note: For Jan-Dec (annual) period, values must be compared with caution as the EA value is based on 17 year annual average with changing catchment and land uses over time.

8 REHABILITATION

8.1 Post Rehabilitation Land Uses

According to the Mine Site Rehabilitation Management Plan and the MOP, woodland areas will be established on slopes and upper terraces of the Northern and Southern Emplacement Areas.

Rehabilitation on the Southern Emplacement is still immature while it is further advanced on the Northern Emplacement (including in ML1685 adjacent to Boggabri Coal Mine) with some older sections close to achieving open woodland land use target.

However, no rehabilitation to Box Gum Endangered Ecological Community (EEC) woodland was undertaken nor has rehabilitation to agricultural land occurred during the reporting period.

8.2 Rehabilitation Performance during the Reporting Period

8.2.1 Status of Mining and Rehabilitation

Integration with Boggabri Coal's waste emplacement has started with rehabilitation activities to follow as per the MOP. The EA Total disturbance Area generally aligns with the most recent MOP total disturbance Areas.

The status of mining and rehabilitation at the completion of the reporting period is summarised in Table and Figure 13.

Table 8-1- Rehabilitation Status

Mine Area Type 1 [Ha]		2016	2017	2018	2019	2020	*2021*[+]
0	***Total Mine Footprint***	579.5	600.1	627.6	687.5	**741.8**	***760.3***
1	***Total Active Disturbance***	510.6	498.4	540.7	579.4	**607.8**	***639.2***
2	***Land Being Prepared for Rehabilitation***	9.9	8.9	12.9	29.6	**27.6**	***14.7***
3	***Land Under Active Rehabilitation***	59.0	67.2*	74.1	78.5	**106.4**	***106.4***
4	***Completed Rehabilitation***	0.0	0.0	0.0	0.0	**0.0**	***0.0***

[1] *Refer Annual Review Guideline (p.11) for description of mine area types.*
**Active rehabilitation area was incorrectly calculated and reported for 2017 with 83.3Ha.*
[+] *Forecast for 2021 based on MOPF*

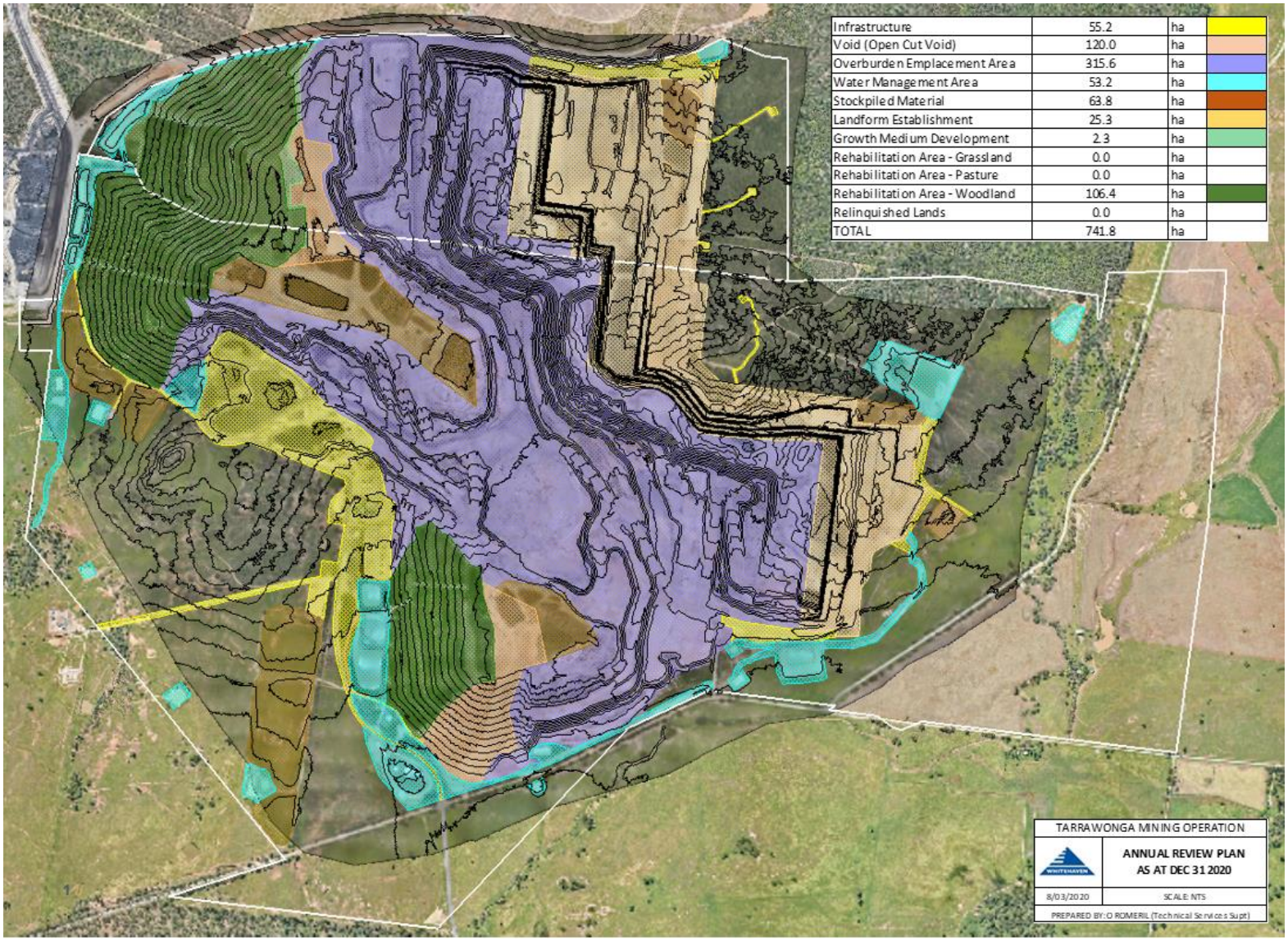


Figure 13- Status of mining rehabilitation as at December 2020

8.2.2 Rehabilitation Fauna and Flora Monitoring

Investigations undertaken by Geoff Cunningham Natural Resource Consultants Pty Ltd as part of the original Mine EIS identified no significant impact on threatened flora species, endangered ecological communities, endangered flora populations or critical habitat as a consequence of the development. Establishment of monitoring plots commenced in April 2007 and has continued as required. Over the life of the mine, quadrats are to be established across rehabilitation sites and control sites. Potential impacts noted in the EA included the clearing of Box-Gum Woodland EEC/CEEC and the groundwater dependent ecosystem - Bracteates Honey myrtle low riparian forest. However these areas had not yet been disturbed or cleared for mining purposes.

On the 25th July 2019 the Resources Regulator issued a Notice under section 240 of the Mining Act 1992 to Whitehaven Coal Mining Limited to prepare and submit a TCM Mine Rehabilitation report prepared by a persons approved by the Director Compliance Operations. Whitehaven Coal Mining Limited engaged an independent ecologist to undertake a gap analysis and prepare the report. He identified inconsistencies regarding the current status of progressive rehabilitation undertaken at TCM and his report outlined proposed measures and actions to improve the progressive rehabilitation performance including annual monitoring and data collection.

As a result, the annual flora and fauna monitoring program 2020 was developed, however slightly varied from previous years, taking into account the recommendations detailed in the gap analysis report.

Qualified ecologists completed this annual monitoring program in accordance with the MOP, the Mine Site Rehabilitation Management Plan, the Biodiversity Management Plan and the recommendations from the gap analysis report and comprised of:

- Native vegetation survey as shown in Figure 14 - Flora Survey 2020
- Fauna Survey as shown in Figure 15 - Fauna Survey 2020.

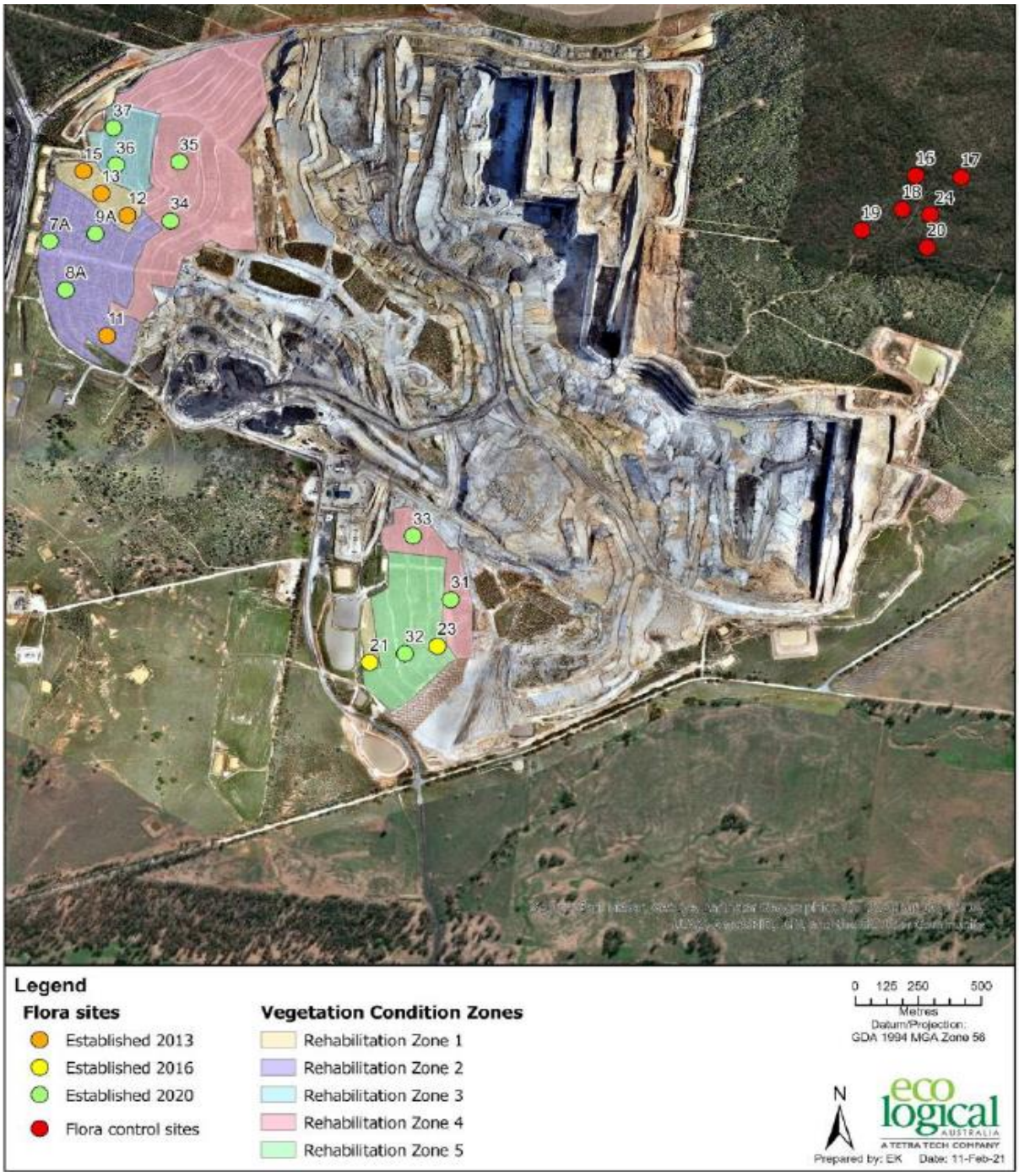


Figure 14 - Flora Survey 2020

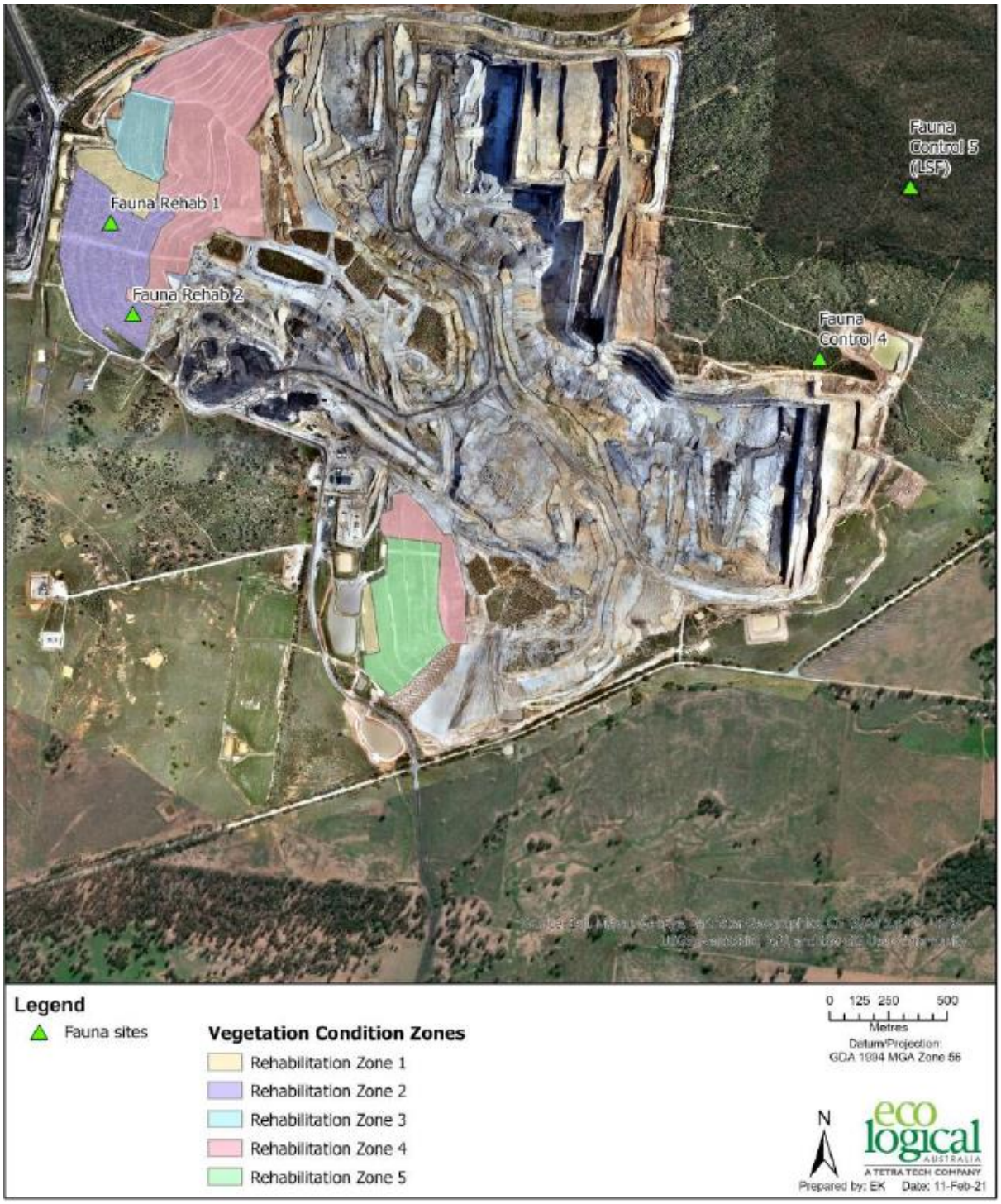


Figure 15 - Fauna Survey 2020

8.2.2.1 Flora Monitoring

Vegetation communities

The requirement in previous MOP (i.e. MOP Amendment A to E) was for the establishment of "native forest and woodland" utilizing local plant species, and 13ha of White Box grassy woodland. However, the requirement for Plant Community Type (PCT) 592 to be the dominant vegetation community of the rehabilitation area was only introduced into the Mine Site Rehabilitation Management Plan (MSRMP, 2020) and MOP F. The current "native woodland/open forest" on the rehabilitation is difficult to type to any PCT given the unnatural eucalypt alliances and some unnatural eucalypt- landscape patterns therefore the lack of achievement of the target PCT592 is understandable.

Approximately 90% of the native plant species currently established on the rehabilitation areas were present on the mine site when floristic surveys were undertaken for the Environmental Assessment in 2010 (Bower, 2011) or were found in the neighbouring Leard State Forest (LSF). This is a high level of fidelity of the native plant species occurring on the rehabilitation areas to those occurring locally.

For Zone 1 to 4 the vegetation community can be described as a mixed-eucalypt shrubby/sparsely grassy woodland dominated by local native plant species. Therefore, Zones 1 to 4 are broadly meeting/approaching the completion requirement set out in various MOPs in force up until August 2020. However, Zone 5 which is dominated by exotic grasses is unlikely to be classified as a native plant community in the medium term even if eucalypts are successfully introduced. Zone 5 has not meet the requirements of MOPs in force up until August 2020 in terms of being a community dominated by local native plant species. However, it would likely meet the requirements of establishment of grazing pastureland required by the current MOP F (2020).

Floristics

A total of 105 species from 33 families were recorded across rehabilitation zones in 2020**.** In total, some 170 native species have been recorded within rehabilitation zones between 2011 and 2020 of which 90% were locals to the project area based on data in 2010 (Bower, 2011) and Bionet for the neighbouring LSF.

Mean native species richness was ranging from 21.3 ± 5.5 species at Zone 5 to 26.3 ± 4.9 species at Zone 1. It is valuable to note that when comparing rehabilitation ranging in age from 1 year to 13 years, the difference in native plant species richness was within the range of 5 species. Mean exotic species richness 2020 ranged from 6 ± 3.2 species at zone 1 to 10.3 ± 1.5 species at Zone 2.

Zones 1, 2 and 5, having been rehabilitated prior to 2014, was assessed against the Ecosystem Sustainability Phase completion criteria. Zones 3 and 4 were also included to view their progress against those final targets, although their required performance is measured by the Ecosystem Establishment phase completion criteria. All rehabilitation zones have not totally meet the

Ecosystem Sustainability phase targets, with mean scores in native species richness, over/mid-storey covers and native groundcover grass percentage covers generally scoring below their associated targets as shown in Figures 16.1 to 16.4

For native species richness all zones are 65% to 75% of benchmarks for the sustainability phase.

Generally native groundcover is significantly lower (<5%) than benchmark of 22% for relinquishment.

The analogue zone (LSF) was monitored six times between (2013 and 2018), and had generally failed to meet the completion criteria. Mean native species richness of the analogue zone was on average 85% of the PCT 592 benchmark. Only in the wet year of 2016 the control zone achieved the mean target of 35 for native plant species richness.

In the analogue zone over-storey cover was below 25% of the benchmark, and mid-storey cover is consistently below 20% of the benchmark.

Historically, native groundcover at the analogue (LSF) zone was collected as either the Braun-Blanquet cover scale or via the 'hit and miss' cover method which collects native groundcover as a one-dimensional score (including all growth forms). Therefore, no accurate comparison could be analysed against the BAM completion criteria. However, the mean native groundcover cover (via the 'hit and miss') across survey years which includes all growth forms, remained below the native groundcover grasses completion criteria. The failure of the LSF control sites to meet PCTs completion criteria raises the question as to whether the rehabilitation completion criteria is realistic for the local area.

Native species richness changed little from close to the time of establishment (1 to 2 years) through to 14 years of age. Native species richness is 65% to 75% of benchmark for Zones 1 to 4, whilst the zones vary in age from 2 years to 14 years. Zone 5 which is dominated by exotic grass and is recommended for being classified as Pasture has a native species richness of 62% of benchmark.

Canopy cover will increase with age, but was about 15% of benchmark by age 14, and even analogue areas in LSF were only 25% of target. Mid-storey data showed that age 14 cover was 30% of benchmark. Analogue sites in LSF was within 15% of benchmark. It is important to note that mid-storey (below 6m in height) data for younger zone included trees which will form the canopy in later years. Grass cover for all rehabilitation zones is below 20% of benchmark**.**

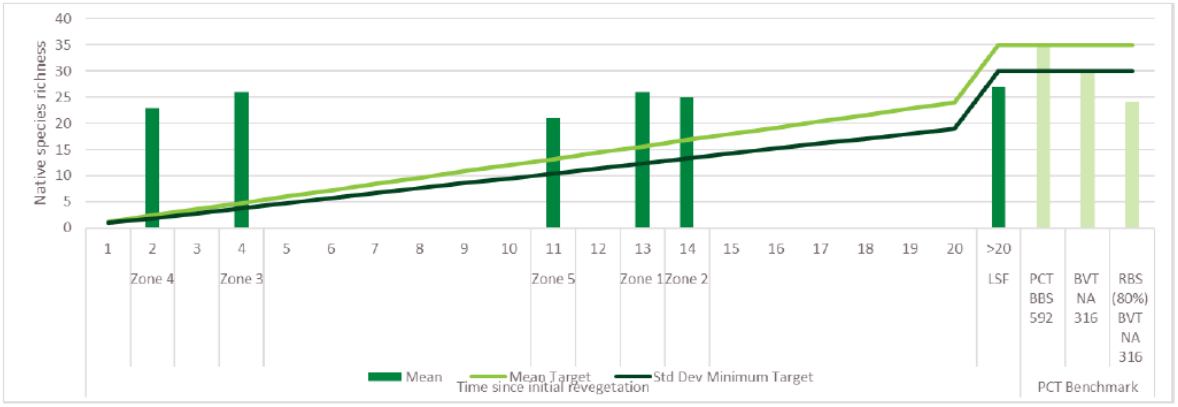


Figure 15. 1: Native Species richness vs benchmark.

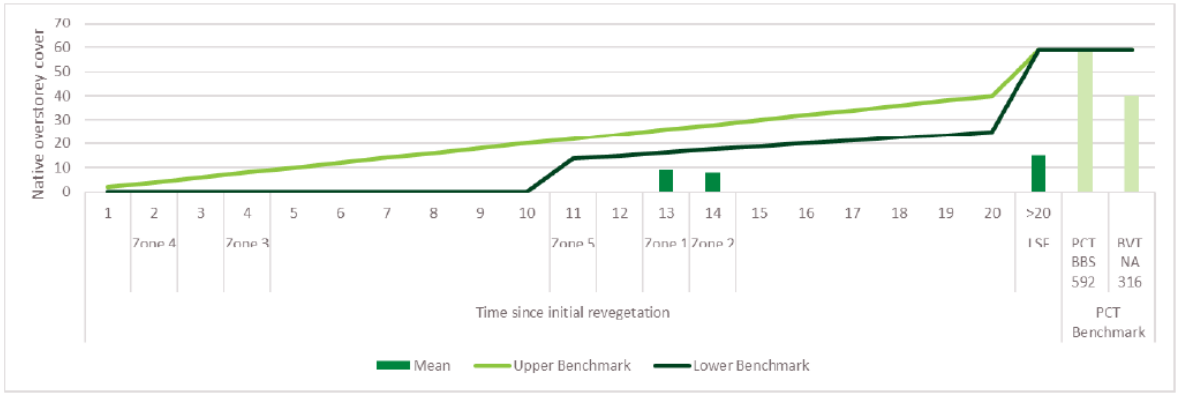


Figure 15. 2: Native overstorey vs benchmark

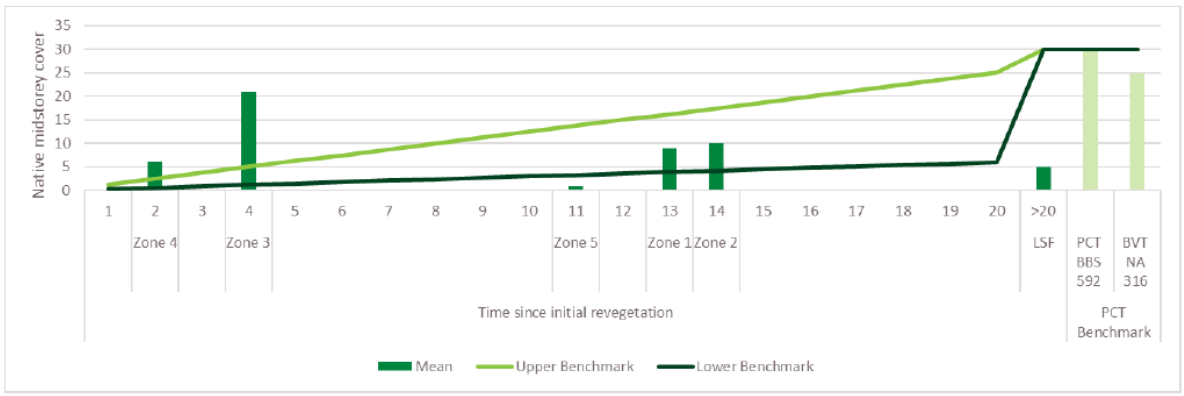


Figure 15. 3: Native Mid-Storey vs benchmark

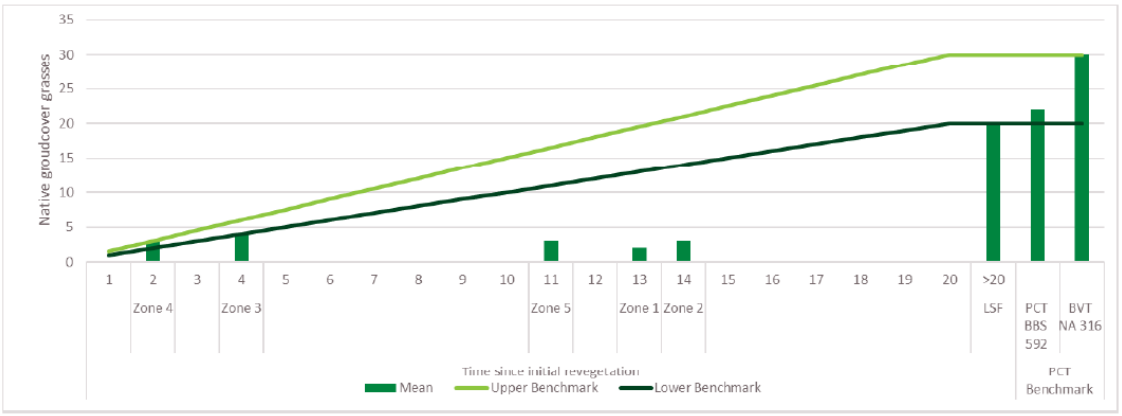


Figure 15. 4: Native ground cover grass vs benchmark

Soil pits

Soil profile and condition assessments were recommended every three years. Two soil pits were established in 2011, one in the rehabilitation zone, and one in each control zone. Soil pits are described using standard field measures with particular notice of horizon boundaries and ecological functionality (e.g. root establishment, evidence of soil fauna). As per the RMP (ELA 2011), soil pits are analysed every three years. As soil pits were analysed in 2018, this parameter is due in the next reporting period in 2021. The soil pit in the rehabilitation zone (Rehabilitation Zone 2) shows a profile reconstruction with topsoil depth at 15 cm and depth to overburden at 30 cm. The control zone shows a similar profile reconstruction with topsoil depth at 10 cm and depth to compact clays at 30 cm. The rehabilitation zone exhibited good establishment of grass. The control zone also showed good establishment of grass and other plant roots including larger tree roots, which were present in all horizons. Soil fauna were not identified in any pits.

An extensive soil testing program was conducted in 2020 to obtain representative soil samples within each rehabilitation area. This program is discussed further in section 8.2.3.3.

Revegetation Management

Between July and August 2020, TCM coordinated rehabilitation activities including planting of approximately 9,000 hiko seedlings of Eucalyptus albens, Eucalyptus blakelyi, Eucalyptus crebra, Eucalyptus melliodora, Eucalyptus pilligaensis, Eucalyptus populanea and Eucalyptus macrocarpa across nearly 25Ha on the Northern Rehabilitation Area. Approximately 2,000 hiko seedlings of the same species were randomly infill planted between the Northern and Southern Rehabilitation areas (maintenance rehabilitation). Ground cover native seed were also spread over the same areas.

Topsoil throughout all rehabilitated areas was generally mixed with mulch from previous tree clearing campaign, spread in 250 to 300mm layers and ameliorated with gypsum.

The above average rainfall recorded throughout the period had a noticeably positive impact with an estimated survival rate of more than 90% on both Rehabilitation areas.

8.2.2.2 Fauna Monitoring

At TCM, fauna and habitat monitoring surveys focused on thirteen sites within the woodland rehabilitation zones and two control sites within the Leard State Forest, as shown in Figure 15. The terrestrial fauna survey target woodland birds and searches for available reptile habitat.

Woodland birds monitoring was undertaken during winter and spring 2020. Woodland birds were recorded while walking in a meandering path within each site, targeting areas of available habitat. All birds seen or heard were recorded in 5 minutes intervals and recording continued until no new species were recorded for three consecutive 5 minutes periods.

Birds:

For the spring surveys, bird communities at the Control sites differed from the Rehabilitation sites for all years surveyed however there is an indication that Rehabilitation communities are becoming more stable and are coming more to resemble the Control communities. White-throated Treecreeper, Red-capped Robin, and Eastern Yellow Robin have been present in the Control sites, but not yet in the Rehabilitation sites. Conversely, White-winged Fairy-wren occur in Rehabilitation sites but not Control sites. Silvereyes occurred at Control sites from 2011 but were not encountered at Rehabilitation sites until 2015 and have been seen there regularly since then. Likewise, Yellow-faced Honeyeater started visiting Rehabilitation sites in 2014 and has been seen several times since.

Winter bird communities also differed between Control and Rehabilitation sites. As with spring, winter bird communities at impact sites are becoming more to resemble those of the control sites, however there are still several species absent including Eastern Yellow Robin, White-throated Treecreeper, Red-capped Robin, Inland Thornbill, and Mistletoebird.

Small to medium-sized insectivorous birds, such as Red-capped Robin and Eastern Yellow Robin, are also yet to be established.

Aging of the rehabilitation sites should increase bird diversity and bring the community to resemble that of the control sites. Bird diversity in the rehabilitation areas will improve with an increase in the understorey and grass layer on-site. However, the bird community at the rehabilitation area is unlikely to be like that in the control sites until it has aged and developed another 10 or more years, and mining has ceased so that it is connected to the Leard State Forest by a contiguous extent of vegetation, and the noise associated with mining operations (including Boggabri Coal Mine) ceases.

Bats:

There were least eight (8) and up to fourteen (14) species recorded during this Spring survey (Table 8-2) including up to two (2) species that are listed as Vulnerable under the NSW BC Act. Based on the call profiles, two species listed as Vulnerable could potentially have been present within the study area, Miniopterus orianae oceanensis (Large Bent-winged Bat) and Nyctophilus corbeni (Corben's Long-eared Bat). Corben's Long-eared Bat is also listed as Vulnerable under the EPBC Act.

The most commonly recorded species / species group within the study area were the Ozimops species complex (Inland Free-tailed Bat, South-eastern Free-tailed Bat and Ride's Free-tailed Bat). Collectively, there were 90 (60%) of the identifiable calls attributed to the Ozimops species complex.

General microbat activity was regarded as being low to moderate at the site with one microbat call recorded every seven or eight minutes on average throughout the survey period, equating to 94 calls recorded per night.

Table 8-2 - Microbat species diversity recorded ultrasonically at Tarrawonga Mine surveys between 4th and 6th November 2020.

Scientific Name	Common Name	Result
Chalinolobus gouldii	Gould's Wattled Bat	D
Chalinolobus morio	Chocolate Wattled Bat	P
*Miniopterus orianae oceanensis**	Large Bent-winged Bat	P
*Nyctophilus corbeni*1*	Corben's Long-eared Bat	P
Nyctophilus geoffroyi	Lesser Long-eared Bat	P
Nyctophilus gouldii	Gould's Long-eared Bat	P
Ozimops petersi	Inland Free-tailed Bat	P
Ozimops planiceps	South-eastern Free-tailed Bat	P
Ozimops ridei	Ride's Free-tailed Bat	P
Scotorepens balstoni	Inland Broad-nosed Bat	D
Scotorepens greyii	Little Broad-nosed Bat	D
Vespadelus darlingtoni	Large Forest Bat	D
Vespadelus regulus	Southern Forest Bat	P
Vespadelus vulturnus	Little Forest Bat	P

*D = Definitely recorded, P = Potentially recorded, *listed as threatened under the BC Act, 1 listed as threatened under the EPBC Act*

8.2.3 Habitat Management

On TCM Northern and Southern Emplacements Rehabilitated areas, several dead trees salvaged from previous years clearing campaign were erected to create habitat for different bird species (Figure 16). Additional woody debris has been deposited on the ground during the rehabilitation process to generate habitat and protection for species.

Tiles were also placed around woody debris throughout the rehabilitation areas to monitor population of reptile and other species

Figure 16 - Photo: Salvaged trees laid down and erected in the Northern Rehabilitation area in 2020

8.2.3.1 Weeds Management

During 2020, a noxious weed monitoring program was conducted at TCM every 6 months. The survey in June and November found that there were seventeen noxious weed species identified. Given the large amount of rainfall recorded onsite in 2020, the infestation of the noxious weeds at TCM was generally high. Management of targeted weed within the mine leases was undertaken at opportune times following suitable weather and with consideration to the NIWAC Weed Management Guide for North West NSW (NSW DPI) including:

- Spot spraying of African Boxthorn , and when necessary manual removal of larger individuals;

- Spot spraying of general weeds and grasses in the vicinity of monitoring stations, administration building, magazine and ROM areas,
- Spot spraying of Prickly Pear around site,
- Spraying of Nagoora Burr and other aggressive species surrounding dams.
- Spot spraying of rampant weeds including boxthorn and prickly pear prior to clearing, to try and exclude them from the topsoil.

8.2.3.2 Feral Animal Management

TCM coordinated the implementation of the Vertebrate Pest Management Plan using infra-red motion cameras installed at strategic locations around the Mining Leases. Findings indicate overall vertebrate pest sighting onsite has significantly dropped since 2018.

The survey for 2020 (Table 8-3) showed there were no sightings of feral goats, cats, dogs, or other species. Sightings for rabbits and hares have decreased significantly from 163 in 2018 to 22 during the reporting period. In case of increased sightings, a baiting program was recommended to be used to control numbers, using 1080 or Pindone. Fox sightings also decreased significantly from 168 in 2018 to 4 in this reporting period.

Feral pig sightings continued to decrease from 159 in 2018 to 17 total sightings for this reporting period. Due to an overall drop in Feral animal sighting, no trapping, shooting or baiting program was conducted within the Mining Leases and rehabilitated areas in 2020 however TCM will continue to monitor and manage feral animals according to the BMP and MSRMP.

Table 8-3- Summary of Vertebrate Pest sighting (2018-2020)

	Feral Pig (descendant of various breeds of Sus scrofa)	Fox (Vulpes vulpes)	Feral Cat Felis catus)	Rabbit/Hare (Oryctolagus cuniculus) / (Lepus capensis))	Wild Dog (canis familiaris)	Other
Quarter 1	5	4	0	12	0	0
Quarter 2*	0	0	0	0	0	0
Quarter 3	6	0	0	1	0	0
Quarter 4	6	0	0	9	0	0
Total 2020	***17***	***4***	***0***	***22***	***0***	***0***
Total 2019	***54***	***73***	***2***	***140***	***0***	***2***
Total 2018	**159**	**168**	**1**	**163**	**0**	**2****

*** 1 Unidentified species & 1 Echidna*

** During Quarter 2 more than 1,500 photos were captured however there was nil vertebrate pest sighting*

8.2.3.3 Soil & Erosion Management

During 2020, significant efforts were made to improve soil management and minimise erosion on site.

Soil Management

A soil specialist conducted an extensive soil testing program in 2020. The objective was to provide a soil inventory of rehabilitated areas through field soil assessment and laboratory testing aimed at improving the growth medium for future revegetation.

The field program was designed to obtain representative samples within each rehabilitation area. Sampling points were irregularly located according to the survey team judgement to enable the delineation of potential soil boundaries based on year of rehabilitation or change in soil type used as growth medium. Soil test sites were excavated by hand to 0.3-0.5m. The number of survey points totalled 35 sites in the Northern Rehabilitation Area and 20 sites in the Southern Rehabilitation Area. This survey density fulfilled the requirement of a 1:10,000 soil survey. Sampling consisted of one bulked topsoil sample at each site with typical sample depth 0-10cm, with occasional 'subsoil' samples taken at 30-40cm for assessment of erosion tunnelling risks.

The laboratory testing suite for these sites included pH and EC (1:5 water); pH (1:5 CaCl); Available (Ammonium, Nitrate, Sulfur); Exchangeable Sodium, Potassium, Calcium, Magnesium, Hydrogen,

Aluminium, Cation Exchange Capacity; Colwell Phosphorus; Available Micronutrients Zinc, Manganese, Iron, Copper, Boron, Silicon; Total Carbon (TC), Total Nitrogen (TN), TC/TN Ratio, Organic Matter; Basic Colour, Basic Texture.

The findings indicate that the soil resources used on the rehabilitated areas at TCM, depth and characteristic of the top soil layer provide an adequate growth medium to establish the desired vegetation species. Following recommendations of the soil specialist approximately 68 tonnes of gypsum was used to improve characteristics of top soil spread on the Northern Emplacement area prior to the start of revegetation activities.

Topsoil was stripped from areas cleared of vegetation in accordance with the stripping ratio recommended by a soil consultant. Where possible topsoil was directly placed onto prepared rehabilitation areas or stockpiled in accordance with the Mine Site Rehabilitation Management Plan.

Erosion and Sediment control

Several water infrastructures including sediment dams, drop structures, diversion drains and contour banks were designed and sized in accordance with the managing-urban-stormwater-soils and construction guide (volume-2E-fourth-edition). TCM constructed engineered drop structures in the Northern Rehabilitation area (Figure 17) and one dam was enlarged from 9ML to approximately 50ML near the Southern Emplacement area.

Figure 17 - Photo: Rocklined Drop structures on the Northern Rehabilitation area

Inlets and spillways of some of the sediment dams were repaired using geotextile fabric and armour rock and several of the sumps and drains were desilted.

Approximately 450m of silt fences and some coir logs were installed across site to control sediment laden waters runoff and minimise erosion.

TCM undertook seeding activities with a couch grass at some of new water infrastructures.

However, despite all those measures, the water management network capacity that was sized to manage 38.4mm of rains over 5 days (as per EPL12365 requirement), was intensively tested during the February rainfall event (i.e.158mm in 24hr). This resulted in high rates of flow in some of the drop structures and contour banks generating significant gullies, scouring and erosion that required development of specific remediation plans.

TCM carried out several remedial works around site and in particular, drainage works on the western and southern sides of the SEA. A section of the SEA was shaped to final RL and this is discussed in section 8.2.7.
In accordance with MOP requirement and TARPs, TCM will continue to implement erosion control measures and remediate affected areas to meet the completion criteria for mine landform stability.

8.2.4 Renovation or Removal of Buildings

During the reporting period, a new heavy machinery workshop shed was constructed. The project offices were relocated from the drop off area, to adjacent to the workshop. The storage containers within the drop off area have also been relocated to the Hitachi build-pad. A new oil separator system was installed at the workshop.

8.2.5 Other Rehabilitation Undertaken

No additional rehabilitation of explorations areas, infrastructure, shafts, dams, fence lines or bunds occurred during the reporting period.

8.2.6 Departmental Sign-off of Rehabilitated Areas

Departmental sign-off has not been requested for any rehabilitated areas during the reporting period.

8.2.7 Variations in Activities against MOP

At the end of 2019, TCM submitted a MOP Amendment E that included rehabilitation progression and future opportunities where rehabilitation could be accelerated into a revised rehabilitation schedule. This MOP E was approved in January 2020 and implemented throughout the reporting period.
Following requirements detailed in the section 240 notice received from the NSW Resources Regulator (RR) in 2019, TCM had to submit a MOP Amendment F by 31st August 2020 that addresses

the RR concerns relating to progressive rehabilitation. MOP F was approved in October 2020 and completion criteria were updated to reflect discussion with the RR and other regulatory bodies (i.e. Office of Environment and Heritage) and to align with the Mine Site Rehabilitation Management Plan approved in March 2020.

At the end of calendar year 2020, TCM achieved the rehabilitation target (21.3Ha) specified in the MOP F and in fact exceeded it by 4.7Ha with 26Ha of rehabilitation achieved.

Approximately 17.5Ha of landform establishment was achieved on the Southern Emplacement Area and approximately 8.5Ha were rehabilitated on the Northern Emplacement Area. For this reason the polygons showing progressive rehabilitation in Plan 3F of MOP F are slightly different to the polygons showing the actual areas rehabilitated during 2020 as per Figure 18 and Figure 19.

Figure 18 - Southern Emplacement Area Rehabilitation at end of CY2020

Figure 19 - Northern Emplacement Area Rehabilitation at end of CY2020

8.2.8 Trials, Research Projects and Initiatives

In 2020, TCM performed two trials, assessing different methodologies and techniques for rehabilitation on Northern emplacement area. These trials assessed the outcome of two different planting methodologies including the use of weed mats and guards around tubestock, and the planting of tubestock with just guards. These trials are showing success in both areas (likely due to favourable conditions), and as growth continues, the outcomes will be assessed and incorporated into future rehabilitation programs.

Rehabilitation monitoring and rehabilitation methodology records are shared among Whitehaven operations to inform decision-making regarding future rehabilitation campaigns.

The NSW Resources Regulator (2019) stated that there had been a poor success in tree planting at TCM. Presumably this was focussing on the low survival and low heights of tree growth on the southern emplacement. As a result, it was proposed that TCM undertake a bud bank trial in 2020 to examine whether vegetative propagation methods could achieve greater success. Results from this trial work indicate strongly that vegetative propagation methods in the bud bank proposal are not a means to greater level of tree establishment since the bud bank trial failed to produce any quantity of woody plant species. The direct seeding method was tried in 2019 on the Southern Emplacement Area and first results do not seem to show any benefit or improved vegetation growth compared to

the tubestock planting method. TCM will continue to undertake monitoring and trials in the future and results will be discussed in the next Annual reviews.

The nearby Whitehaven Coal mine, Maules Creek coal mine has a requirement to undertake a $1M research program into rehabilitation of Box Gum Grassy Woodland upon mine rehabilitation, the findings from which will be considered by TCM and integrated into future MOP amendments as appropriate.

8.2.9 Key challenges to Achieving Successful Rehabilitation

The key issues to achieving successful rehabilitation include:

- excessive erosion and sedimentation (e.g. gullying and sedimentation resulting in land stability and vegetation growth issues);
- weed and feral animal infestation;
- poor vegetation establishment and growth;
- landform stability; and
- climate/ and extreme weather conditions

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

8.3 Actions for Next Reporting Period

- TCM will start the preparation of new MOP. Current MOP Amendment F will expire at the end of 2022.
- Vegetation clearing will be undertaken during the approved window from 15th Feb to 30th April 2021.
- In 2021, rehabilitation monitoring programs will be undertaken in winter and spring and progress will be reported in the next Annual Review.

9 COMMUNITY AND COMPLAINTS

In accordance with PA 11_0047 and, Community Consultative Committee (CCC) meetings were held on a quarterly basis at TCM. The committee comprised representatives of Gunnedah Shire Council, Narrabri Shire Council, TCM and the community including landholders.

Community contributions continued to be managed in accordance with the Whitehaven Coal Donations and Sponsorship Policy. Approximately $105,000 was donated on behalf of TCM to several organisations including Australian Red Cross and NSW Rural Fire Service, Indigenous Sport and the Role Models and Leaders Australia Ltd for the 2020 Girls Academy Sponsorship.

TCM maintained a designated community complaints line. In the event of a complaint, details pertaining to the complainant, complaint and action taken are recorded. Each complaint is investigated and documented with individual complaint records maintained. Any Complaints is reported and findings discussed with CCC members during the meeting. Those meetings give an opportunity to provide an update of the environmental and operations performance.

TCM recorded one complaint during 2020 regarding Blasting activities and related Noise. The number of complaints has significantly decreased in recent years. This is the result of continuous collaboration and constant engagement with community members. Table 9-1 shows the number of complaints received since 2016 annual reporting periods.

Table 9-1- Complaints summary

Category	2016	2017	2018	2019	2020
Air Quality	1	3	1	0	0
Traffic	1	0	0	0	0
Surface Water	1	0	0	0	0
Visual Amenity	0	0	0	0	0
Noise	1	0	0	0	0
Blast	2	0	0	0	1
Other	0	0	0	0	0
TOTAL	**5**	**3**	**1**	**0**	**1**

* Tally of complaints does not necessarily equate to total complaints; some complaints received are for multiple categories.

10 INDEPENDENT AUDIT

In 2020, several Independent Compliance Audits were conducted at TCM.

10.1 Independent Biodiversity Audit (EPBC)

The Commonwealth Department of Agriculture, Water and Environment (DAWE) directed TCM to undertake an Independent Compliance Audit of the EPBC Approval 2011/5923 including site inspections of the mine site and Willeroi BOA which was completed in January 2020 with no Non-Compliance (NC) identified.

10.2 Independent Environmental Audit (IEA)

In accordance with Sch.5 cond. 10 of PA11_0047, a 3 yearly Independent Environmental Audit (IEA) and Biodiversity component were conducted between July and August 2020. There was no outstanding or ongoing actions proposed in the 2020 IEA report which has been published on the company's website. All the Non-Compliances identified during the audit had already been discussed in previous Annual Review reports and notified to the relevant agencies.

Outstanding items from the 2014 and 2017 audits were accessed during the 2020 IEA and their status is detailed in Table 10-1 below.

Table 10-1- 2014/17 Independent Audit- Outstanding Actions Status in 2020

Management Area	Recommendations/ Proposed Action	Status	Comments
Biodiversity	The baseline surveys for threatened species in offset areas should be conducted in accordance with the department's Survey Guidelines for Australia's Threatened Birds and the Survey Guidelines for Australia's Threatened Bats. The annual monitoring reports should confirm compliance with the two stated methodologies	Complete	Baseline threatened species surveys will be undertaken in accordance with, and reported with reference to, the relevant methodologies. Biodiversity Management Plan approved in 2020. Item closed
Rehabilitation	Work be conducted to soften the visual impact of the unrehabilitated southern emplacement, reduce risk of impacts to Goonbri Creek and to lessen the levels of fugitive particulate emissions.	Complete	Assessment of unsuccessful aerial seeding trial undertaken in 18/5/2016. Review and reshaped the area to achieve desired rehabilitation outcomes in accordance with MOP E in 2020. Item closed
	No rehabilitation works were observed that did not comply with the rehabilitation management plan. However, revegetation is not of good quality, some trials have been	Complete	TCM will investigate and compare several revegetation methodologies and conduct some trials. Trials were conducted in 2019/20. More trials will be conducted in the next reporting period.

	conducted, further trials should be implemented to establish the most appropriate vegetation establishment methodologies.		Item closed
	Dirty water management needs review in consideration of the water from around the coal loader not going into the dirty water system.	Complete	Segregate Dirty water from coal contact waters circuit as much as practicable. Approved WMP (2020) addresses DPIE' comments. Item closed
PA 11_0047			
3. 8	No agreements are held with landowners adjacent to haul route. No coal haulage at night. Noise monitoring reports reviewed demonstrated no exceedance of criteria. Three monitoring locations (2 properties) – 2 residences on Brooklyn and Weroona. Report states that for practical reasons it is not possible to undertake monitoring for 15 hours (entire day period). The approach here is to monitor noise over a representative one hour period and utilise the results of this to theoretically predict noise over the compliance period. TMCL should consider updating this condition to reflect the approach used to ensure 100% compliance	Complete	Historic Non-Compliance. No Action required. Item closed.
EPL 12365			
L4.4	Monitoring locations are stated in the NMP and in quarterly monitoring report. Site inspection demonstrated where noise monitoring is undertaken. The location of monitoring at Barbers Lagoon is on the property boundary however the residence is approximately 200m from the monitoring location. Hence this is considered a non-compliance (NC).	Complete	In the most recent EPL variation (Jan 2020) EPA stated: "This condition is a standard condition and cannot be amended. Where agreements with landholders have been reached and where it is not feasible or reasonable to monitor as per the requirements of L4.4, the EPA uses regulatory discretion when considering if any breaches of the monitoring requirements". Item closed.
M7.3	The auditor observed the noise monitoring locations in the field. Monitoring locations are stated in the NMP and in quarterly monitoring report. Site inspection demonstrated where noise monitoring is undertaken. The location of monitoring at Barbers Lagoon is on the property boundary however the residence is approximately 200m from the monitoring location. Hence this is considered a non-compliance.	Complete	As above Item closed
Mining Lease 1693			

5a	Auditor document review and interview with the Environmental Officer identified that no environmental incidents occurred on this mining lease. Other incidents have occurred and evidence of reporting has been observed. The incident report referenced was not submitted within 24 hours. Report all environmental incidents within 24 hours of the incident occurring.	Complete	Ensure any incidents are duly reported. Item closed
Mining Lease 1685			
5a	Evidence of reporting has been observed. However, the incident report referenced was not submitted within 24 hours. Report all environmental incidents within 24 hours of the incident occurring as this is the most stringent criteria at the site.	Complete	Ensure any incidents are duly notified. Item closed
5b	No environmental incidents occurred on this mining lease. Incidents against other conditions have occurred as detailed in this report and evidence of reporting has been observed. However, the incident report referenced was not submitted within 24 hours. Report all environmental incidents within 24 hours of the incident occurring as this is the most stringent criteria at the site	Complete	Ensure after any incidents, report is submitted to department within 7 days. Item closed

11 INCIDENTS AND NON-COMPLIANCES FOR THE REPORTING PERIOD

11.1 Reportable Incidents

Reportable incidents are discussed more in detail in sections 6.3 and 7.1.

11.2 Non-compliances

Non-compliances with relevant approvals noted within Section 1 are outlined in Table 11-1:

Table 11-1- Non-compliance Action plan

Non - Compliance	Date / Location	Cause	Action Plan	Status/Estimated Completion Date
PA11_0047 sch.3 cond. 24	Reporting Period.	During the reporting period, 8 elevated 24hr average PM10 levels were recorded above the air criteria (50 µg/m3) at the HVAS installed at the privately owned property Coomalgah.	DPIE advised TCM not to include in the annual average calculation elevated PM10 values recorded on the days of "extraordinary events". As a result, five elevated PM10 levels were included in the annual average calculation in the annual review 2020.	Applied in this Annual Review report 2020
ML 1579 Cond. 16	Feb 2020. Dam SD2	In February of 2020, after approximately 158mm of rain in 24hrs, the western embankment of sediment dam (SD2) failed and released sediment laden water beyond the boundary of TCM.	TCM notified relevant agencies. A geotechnical engineer inspected the dam and provided recommendations to remediate the dam. Dam was emptied and a diversion bund was constructed. Inlet and spillway levels were assessed.	Complete
PA11_0047 sch.3 cond. 33	Feb 2020. Dam SB14	TCM failed to de-silt and dewater SB14 (sediment dam) which resulted in high Total Suspended Solids result. The exclusion condition related to high TSS concentrations did not apply in this circumstance as the dam was not sufficiently dewatered after the last rainfall event.	TCM shall operate in a competent manner. TCM developed an Operation and Maintenance manual for dams.	Complete
PA11_0047 sch.3 cond. 33, 39(ii)	Feb 2020. Dam SB14	TCM exceeded water quality criteria for discharge from SB14 with Oil and Grease measuring 11mg/L, after a licenced discharge event.	TCM notified relevant agencies and provided the information requested including an investigation report to the EPA. TCM reviewed sampling procedure.	Complete

Non - Compliance	Date / Location	Cause	Action Plan	Status/Estimated Completion Date
ML 1579 Cond. 16	Feb 2020. Southern Emplacement Area (SEA)	Erosion of the Southern Emplacement Area (SEA) and runoff occurred because of a 1 in 500-year rainfall event (i.e.158mm in 24hrs). According to the MOP, the Southern Emplacement Area was planned to be reshaped to landform establishment during the reporting period (by 31 Dec 20).	TCM provided the information requested to Resources Regulator. TCM reshaped the section of the SEA by end of 2020.	Complete
ML1579, ML1685, ML1693 and ML1749. (reference to Section 3.2 of Environmental Risk Management of the Approved MOP)	Feb 2020. Dam SB14	TCM Water Management Plan (WMP) was not displayed on WHC website. The WMP was not yet approved by DPIE therefore not published.	Once the WMP was approved (in June 2020) it was published on WHC website.	Complete

11.3 Regulatory Actions

- EPA completed an investigation and concluded TCM failed to undertake an activity in a competent manner (i.e. SD2 dam failure and discharge) related to EPL12365 condition O1 and issued a 'Penalty Notice' on 09/04/2020.
- EPA completed an investigation and concluded TCM failed to undertake an activity in a competent manner (i.e. SB14 not desilted) related to EPL12365 condition O1 and issued a 'Penalty Notice' on 20/08/2020.
- EPA issued a 'Penalty Notice' on 20/08/2020 related to EPL12365 condition L2.5 because TCM exceeded water quality criteria for discharge from SB14 with (O&G) and TSS concentration measured above EPL limits 11mg/L and 17,500mg/L respectively.
- Following investigation into alleged breaches of the Act related to Erosion of the Southern Emplacement Area, the NSW Resources Regulator issued a 'Penalty Notice' on 28/10/2020 for failure to carry out operations in a manner that does not cause or aggravate water pollution (including sedimentation) or erosion, as required by condition 16 of ML1579.

- Resources Regulator issued an 'Official Caution' on 28/10/2020 related to Erosion of the Southern Emplacement Area for failure to have the TSWMP on the Whitehaven website, as required by section 3.2 Environmental Risk Management of the approved MOP for ML1579, ML1685, ML1693 and ML1749.

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

The following measures will be continued or implemented in the next reporting period:

Table 12-1- Summary of activities for 2021

	Activity Description	Timing
1	Review and update various Environmental Management Plans following approval of MOD7of PA11_0047.	Q2 2021
2	Undertake rehabilitation and mining activities in accordance with the most recent MOP.	Ongoing throughout the year
3	Continue environmental monitoring and management.	Ongoing throughout the year
4	Continue implementation of approved Leard State Forest Precinct Strategies.	Ongoing throughout the year
5	Continue community liaison and engagement with local stakeholders	Ongoing throughout the year

Appendix 1

BLAST MONITORING DATA

Environmental Blast Monitoring

SHOT NO	LOCATION I.D	DATE	MONITOR LOCATION	PEAK GROUND PRESSURE (mm/s)	PEAK OVERPRESSURE (dBL)	TIME	Fume Rating
934	TC43_1820_NG	6-Jan	Tarrawonga	0.21	96.30	12:05pm	0
			Coolmalgah	0.16	94.10		
935	TC30_0409_BW322_2	9-Jan	Tarrawonga	0.19	99.40	4.40pm	0
			Coolmalgah	0.14	96.20		
936	TN2227_02_MN	15-Jan	Tarrawonga	0.38	104.40	12:03pm	0
			Coolmalgah	0.17	105.20		
937	TC28_0910_BW310	16-Jan	Tarrawonga	0.07	90.10	3:15pm	3b
			Coolmalgah	0.04	92.60		
938	TN22_0510_JE	30-Jan	Tarrawonga	0.43	103.70	4.53pm	
			Coolmalgah	0.22	95.90		
939	TC46_1521_JE_PS	31-Jan	Tarrawonga	0.10	98.10	12:28pm	
			Coolmalgah	0.17	107.40		
940	TC44_1821_NG_PS	4-Feb	Tarrawonga	0.28	104.40	12.04pm	
			Coolmalgah	0.31	108.60		
941	TC46_1521_JE	5-Feb	Tarrawonga	0.08	95.30	1.13pm	
			Coolmalgah	0.08	89.40		
942	TC44_1821_NG_PS_2	6-Feb	Tarrawonga	0.42	93.50	4.48pm	
			Coolmalgah	0.79	92.80		
943	TC46_1521_JE_1	14-Feb	Tarrawonga	0.13	102.50	12:02pm	
			Coolmalgah	0.22	94.60		
944	TC43_1216_NG	19-Feb	Tarrawonga	0.26	102.10	11.06am	
			Coolmalgah	0.17	97.40		
945	TC44_2225_MN	24-Feb	Tarrawonga	0.55	103.50	12:22pm	1b
			Coolmalgah	0.38	94.40		
946	TN22_0103_MN	26-Feb	Tarrawonga	0.17	98.30	3.59pm	
			Coolmalgah	0.11	109.20		
947	TC44_EW_PS	27-Feb	Tarrawonga	0.18	90.90	12.02pm	
			Coolmalgah	0.13	98.50		
948	TC30_0103_BC & TN23_0005_MN	5-Mar	Tarrawonga	0.59	106.50	12.21pm	1a
			Coolmalgah	0.35	106.00		
949	TN27_0510_BW	17-Mar	Tarrawonga	0.09	95.50	1.17pm	1b
			Coolmalgah	0.08	91.40		
950	TN22_0510_MNU	13-Mar	Tarrawonga	Not triggered	Not triggered	11.58am	
			Coolmalgah	0.02	95.30		
951	TC44_1821_MN	20-Mar	Tarrawonga	0.72	117.50	9.08am	
			Coolmalgah	1.06	118.40		
952	TC44_1517_MN	26-Mar	Tarrawonga	0.55	111.70	4.17pm	1b
			Coolmalgah	0.86	99.50		
953	TN22_0506_MN	30-Mar	Tarrawonga	0.03	110.60	9:38am	
			Coolmalgah	0.01	92.70		
954	TN22_0104_VY	2-Apr	Tarrawonga	0.13	102.00	12.24pm	2b
			Coolmalgah	0.10	93.20		
955	TC44_1214_MN	8-Apr	Tarrawonga	0.30	108.10	12.03pm	1a
			Coolmalgah	0.56	96.70		
956	TN2227_02_VY	9-Apr	Tarrawonga	0.48	99.00	4:12pm	1b
			Coolmalgah	0.37	93.60		
957	TC47_1521_JE_PS	17-Apr	Tarrawonga	0.06	82.20	11:56am	
			Coolmalgah	0.16	91.40		
958	TC47_2123_BW265	20-Apr	Tarrawonga	0.09	100.30	12:19pm	2b
			Coolmalgah	0.14	100.20		
959	TN22_0509_VY & TN22_09_NG_PS	21-Apr	Tarrawonga	0.32	102.10	3:41pm	
			Coolmalgah	0.23	93.80		
960	TC44_2225_NG	23-Apr	Tarrawonga	0.23	101.90	12.04pm	
			Coolmalgah	0.20	100.20		
961	TN27_03_MN_PS	24-Apr	Tarrawonga	0.60	98.40	12.04pm	2b
			Coolmalgah	0.29	82.50		
962	TC47_1520_JE	28-Apr	Tarrawonga	0.10	107.50	9.03am	
			Coolmalgah	0.19	96.00		
963	TN27_03_MN_PS_PART2	29-Apr	Tarrawonga	0.23	91.80	12.08pm	2b
			Coolmalgah	0.14	91.90		
964	TC45_1214_NG_PS	4-May	Tarrawonga	0.29	92.30	12.08pm	1a
			Coolmalgah	0.35	95.20		
965	TN22_0103_NG	5-May	Tarrawonga	0.21	92.30	4.15pm	
			Coolmalgah	0.11	34.10		
966	TC47_1214_BW285	6-May	Tarrawonga	0.06	97.80	12:27pm	1a
			Coolmalgah	0.09	90.70		
967	TC44_1821_NG	8-May	Tarrawonga	0.18	99.80	12.11pm	
			Coolmalgah	0.25	94.10		
968	TN23_0510_BW	11-May	Tarrawonga	0.04	100.40	12.10pm	
			Coolmalgah	0.02	105.60		
969	TC47_1214_BW285 & TC44_1214_VY	13-May	Tarrawonga	0.07	107.60	11.40am	2a
			Coolmalgah	0.06	98.30		
970	TN2327_02_NG	18-May	Tarrawonga	0.15	99.70	1:06pm	
			Coolmalgah	0.09	97.10		
971	TC44_1517_NG_PS&TC44_1517_NG	20-May	Tarrawonga	0.27	98.30	1:44pm	2b
			Coolmalgah	0.92	97.70		
972	TN23_0509_MN_PS	29-May	Tarrawonga	0.83	91.90	12:05pm	
			Coolmalgah	0.29	85.80		
973	TC45_2025_MN	30-May	Tarrawonga	0.29	99.10	2:14pm	2b
			Coolmalgah	0.34	102.90		
974	TC44_1214_NG	2-Jun	Tarrawonga	0.13	104.90	9.05am	
			Coolmalgah	Monitor Broke down- SIM card corrupted			
975	TC45_1225_NG_PS_Part 3	3-Jun	Tarrawonga	0.35	89.00	12.00pm	2a
			Coolmalgah	3.78	95.00		
976	TN22_0409_NG	11-Jun	Tarrawonga	0.18	96.50	4.20pm	
			Coolmalgah	0.09	89.30		
977	TN2327_02_JE	13-Jun	Tarrawonga	0.34	102.30	2.17pm	2a
			Coolmalgah	0.16	95.60		
978	TC45_1619_MN	18-Jun	Tarrawonga	0.48	112.40	12.07pm	1a
			Coolmalgah	3.71	100.40		

Environmental Blast Monitoring

SHOT NO	LOCATION I.D	DATE	MONITOR LOCATION	PEAK GROUND PRESSURE (mm/s)	PEAK OVERPRESSURE (dBL)	TIME	Fume Rating
979	TN22_0809_NG	24-Jun	Tarrawonga	0.08	95.80	12.35pm	
			Coolmalgah	0.04	95.60		
980	TN23_0109_JER	30-Jun	Tarrawonga	0.45	107.40	4.47pm	3c
			Coolmalgah	0.32	96.10		
981	TC45_1215_MN	3-Jul	Tarrawonga	0.40	110.80	12.05pm	
			Coolmalgah	0.91	102.10		
982	TC45_1925_NG	9-Jul	Tarrawonga	0.16	99.60	12.07pm	
			Coolmalgah	0.25	100.70		
983	TN29_BW300_PS	14-Jul	Tarrawonga	0.22	91.60	1:08pm	
			Coolmalgah	0.12	91.70		
984	TN29_0911_BW320	21-Jul	Tarrawonga	0.24	96.00	1.10pm	2b
			Coolmalgah	0.40	31.70		
985	TN29_0104_BW300	24-Jul	Tarrawonga	0.10	96.80	11.58am	
			Coolmalgah	0.08	93.10		
986	TN29_0104_BW300	31-Jul	Tarrawonga	0.10	104.10	11.57am	1a
			Coolmalgah	0.10	96.90		
987	TC45_1318_NG, TC45_1317_VY & TC46_1425_NG_PS	6-Aug	Tarrawonga	0.35	101.40	1.02pm	1a
			Coolmalgah	0.54	95.80		
988	TC52_0708_BW295	11-Aug	Tarrawonga	0.10	95.50	1.08pm	
			Coolmalgah	0.09	95.50		
989	TN29_0508_BW310_1	14-Aug	Tarrawonga	0.69	109.40	4:07pm	1b
			Coolmalgah	0.35	102.70		
990	TN29_0508_BW300	19-Aug	Tarrawonga	0.15	98.30	9.16am	
			Coolmalgah	0.10	107.70		
991	TC46_1425_NG_PS, TC46_20_MN_ECH_PS & TC47_JE_PS	21-Aug	Tarrawonga	0.24	91.10	9.24am	1b
			Coolmalgah	0.34	106.60		
992	TC46_2025_MN	29-Aug	Tarrawonga	0.31	119.90	9.28am	3b
			Coolmalgah	0.48	96.80		
993	TC45_1315_NG	1-Sep	Tarrawonga	0.14	106.20	11.56am	
			Coolmalgah	0.20	98.10		
994	TC46_16_MN_ECH_PS & TC47_12_JE_EW_PS	4-Sep	Tarrawonga	0.21	92.80	9.02am	1a
			Coolmalgah	0.62	99.10		
995	TN2327_01_MN	11-Sep	Tarrawonga	0.15	98.20	1.08pm	
			Coolmalgah	0.07	98.30		
996	TN23_0405_MN	14-Sep	Tarrawonga	0.02	92.20	1.15pm	
			Coolmalgah	0.04	102.50		
997	TH_0409_BW310	18-Sep	Tarrawonga	0.19	100.10	1.02pm	
			Coolmalgah	0.17	107.20		
998	TN23_0810_MNU	22-Sep	Tarrawonga	0.03	98.70	1.03pm	
			Coolmalgah	0.01	98.70		
999	TC46_1820_MN	28-Sep	Tarrawonga	0.34	113.30	9.22pm	1a
			Coolmalgah	1.27	101.20		
1000	TC47_1214_JE	30-Sep	Tarrawonga	0.09	103.80	2.13pm	1b
			Coolmalgah	0.21	98.70		
1001	TC52_0708_BW282	2-Oct	Tarrawonga	0.11	96.30	2.08pm	1b
			Coolmalgah	0.11	93.30		
1002	TN_BW310_& TN24_0210_MN_PS	9-Oct	Tarrawonga	0.89	92.50	12.04pm	
			Coolmalgah	0.45	106.40		
1003	TH30_09_BW310 & TN23_MN_OS	13-Oct	Tarrawonga	0.12	93.10	12.11pm	
			Coolmalgah	0.07	105.10		
1004	TN23_0610_MN & TN27_01_VY_PS	20-Oct	Tarrawonga	0.31	96.00	1.10pm	
			Coolmalgah	0.15	99.60		
1005	TN27_0101_V Y	28-Oct	Tarrawonga	0.16	99.00	12.23pm	
			Coolmalgah	0.13	104.60		
1006	TN2728_0810_RL310	30-Oct	Tarrawonga	0.07	102.50	9.06am	
			Coolmalgah	0.04	94.80		
1007	TC46_1214_MN_PS & TC46_12_MN_EW_PS	3-Nov	Tarrawonga	0.40	91.40	1.02pm	1a
			Coolmalgah	0.74	98.10		
1008	TC46_1214_MN	10-Nov	Tarrawonga	0.48	112.20	12.06pm	
			Coolmalgah	0.85	99.30		
1009	TH30_0410_BR	17-Nov	Tarrawonga	0.11	91.40	3.58pm	
			Coolmalgah	0.09	93.40		
1010	TC49_1214_BW285	20-Nov	Tarrawonga	0.10	96.80	11.58am	
			Coolmalgah	0.10	105.90		
1011	TN23_0106_VY & TN23_0210_NG_PS	27-Nov	Tarrawonga	0.60	96.30	12.08pm	
			Coolmalgah	0.16	85.30		
1012	TH33_0409_BW320_PS	30-Nov	Tarrawonga	0.39	86.50	12.03pm	
			Coolmalgah	0.31	93.80		
1013	TN23_0710_VY & TN24_0710_MN_PS	4-Dec	Tarrawonga	0.61	90.90	1.59pm	1b
			Coolmalgah	0.40	105.00		
1014	TN27_0101_NG	10-Dec	Tarrawonga	0.14	104.00	12.08pm	
			Coolmalgah	0.11	105.60		
1015	TC46_1316_VY	15-Dec	Tarrawonga	0.12	97.40	12.04pm	
			Coolmalgah	0.17	94.90		
1016	TC46_2025_NG	21-Dec	Tarrawonga	0.19	95.40	2.06pm	
			Coolmalgah	0.35	92.60		
1017	TH2730_0103_BW300	24-Dec	Tarrawonga	0.13	92.80	1.19pm	
			Coolmalgah	0.06	94.80		
1018	TH2730_0103_BW300_Part 2	31-Dec	Tarrawonga	0.06	98.40	1.06pm	
			Coolmalgah	0.03	90.10		

Appendix 2

HVAS MONITORING DATA

COOMALGAH PM_{10} 24Hrs average at HIGH VOLUME AIR SAMPLER

Date	µg/m³	Comments
6/01/2020	222.0	Determined as not mining related, date included in DPIE's Namoi and West Slopes Summer 2019-2020 newsletter as an adverse weather condition.
9/01/2020	757.0	Determined as not mining related, date included in DPIE's Namoi and West Slopes Summer 2019-2020 newsletter as an adverse weather condition.
15/01/2020	269.0	Determined as not mining related. Regional Air Quality Index value was elevated to more than three times the limit. Wind predominantly from NE and E with gusts of 6m/s. TEOM measured 24hr average of 37.7 µg/m³.
21/01/2020	100	Determined as not mining related, date included in DPIE's Namoi and West Slopes Summer 2019-2020 newsletter as an adverse weather condition.
27/01/2020	47.7	
2/02/2020	153	Determined as not mining related. Smoke/ Haze noted in the field sheet. Wind gusts recorded above 7.5m/s. TEOM measured a 24hr average of 43.3 µg/m³. The real time monitor between site and the HVAS monitor recorded a PM_{10} average of approximately 48.6 µg/m³.
8/02/2020	-	Filter was not replaced on that date because the site was not accessible after heavy rainfall event. (~158mm of rain in 24Hrs)
14/02/2020	9.5	
20/02/2020	35	
26/02/2020	82.2	Determined as not mining related. Wind predominantly from W and gusts of 11m/s. TEOM measured a 24hr average of 27.7µg/m³.
3/03/2020	59.3	Determined as not mining related. Wind predominantly from E and SE with gusts recorded at 6m/s. TEOM measured a 24hr average of 32.7µg/m³.
9/03/2020	6.0	
15/03/2020	7.3	
21/03/2020	39.3	
27/03/2020	5.8	
2/04/2020	15.4	
8/04/2020	14.0	
14/04/2020	16.2	
20/04/2020	12.2	
26/04/2020	24.2	
2/05/2020	10.9	
8/05/2020	6.0	
14/05/2020	6.3	
20/05/2020	14.0	
26/05/2020	0.6	
1/06/2020	9.9	
7/06/2020	9.3	
13/06/2020	4.8	
19/06/2020	0.6	
25/06/2020	1.8	
1/07/2020	7.4	
7/07/2020	5.7	
13/07/2020	1.0	
19/07/2020	4.3	
25/07/2020	0.1	
31/07/2020	3.2	
6/08/2020	9.1	
12/08/2020	5.4	
18/08/2020	3.0	
24/08/2020	6.6	
30/08/2020	14.5	
5/09/2020	9.8	
11/09/2020	4.7	
17/09/2020	22.3	
23/09/2020	12.4	
29/09/2020	12.1	
5/10/2020	15.0	
11/10/2020	9.5	
17/10/2020	34.2	
23/10/2020	11.3	
29/10/2020	11.3	
4/11/2020	22.2	
10/11/2020	20	
16/11/2020	148	Determined as not mining-related. Farming and harvesting activity on the property noted on contractor field sheet. Wind predominantly from SSW with gusts recorded at 10.9m/s. TEOM measured a 24hr average of 35µg/m³.
22/11/2020	26.2	
28/11/2020	41.5	
4/12/2020	13.5	
10/12/2020	33.4	
16/12/2020	7.9	
22/12/2020	4.7	
28/12/2020	6.7	

Appendix 3

SURFACE WATER MONITORING DATA

Quarterly Surface Water Monitoring Results

Date	Sample Location	pH	EC (µS/cm)	Total Suspended Solids (mg/L)	Total Organic Carbon (mg/L)	Grease & Oil (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Comments
8 September 2006	SD5	6.5	930	144		<2					
8 September 2006	SD6	7.5	310	104		<2					
8 September 2006	SD8	8.9	190	25		<6					
8 September 2006	SD9	9	285	1940		<2					
11 January 2007	SD5	8.4	3750	20		<2					
11 January 2007	SD8	8.2	420	84							
11 January 2007	SD9	8.6	440	15		<2					
11 January 2007	MV1	7.7	3970	293		<2					
18 April 2007	SD1	8.6	605	86		<2					
18 April 2007	SD2	8.5	395	102		<2					
18 April 2007	SD8	8.6	270	36		<2					
18 April 2007	SD9	8.4	310	133		<2					
18 April 2007	SD20	9.1	520	80		<2					
18 April 2007	MV	7.8	4260	<2		<2					
25 July 2007	SD1	7.5	990	23		<2					
25 July 2007	SB5	8	1150	17		<2					
25 July 2007	MV1	7.6	3130	15		30					
25 July 2007	SD8	8.1	260	25		<2					
25 July 2007	SD9	7.7	290	22		<2					
25 July 2007	SD5	8.4	3370	8		<2					
31 October 2007	SD9	7.8	310	16		<2					
31 October 2007	SD8	8.8	780	32		<2					
31 October 2007	SB5	8.9	1200	60		<2					
31 October 2007	SB8*	9	2000	110		<2					
31 October 2007	SB7	8.4	560	27		<2					
31 October 2007	MV	8.1	2780	45		<2					
31 October 2007	SD5	8.3	2620	44		<2					
18 March 2008	SD9	6.9	245	27		<2					
18 March 2008	SD8	8.4	1340	19		<2					
18 March 2008	SD5										
18 March 2008	SD20	7.4	385	44		<2					
18 March 2008	Pit Water Dam	8.4	1620	14		<2					
18 March 2008	MV	7.8	3110	10		<2					
18 March 2008	SB5	7.8	870	54		<2					
18 March 2008	SB7	7.5	365	387		<2					
18 March 2008	SD17	7.4	460	58		<2					
22 August 2008	SD9	7.9	275	35		<2					
22 August 2008	SD8	8.9	1450	20		<2					
22 August 2008	SB16	8.8	1440	16		<2					
22 August 2008	SD5	8.7	1310	35		<2					
22 August 2008	SB4	8.7	1980	31		<2					
22 August 2008	SB5	8.5	955	13		<2					
22 August 2008	Pit Water Dam	8.7	2420	17		<2					
5 September 2008	BCD	7.2	75	150		<2					
5 September 2008	DAM1	7.4	185	4930		<2					
23 September 2008	BCU	6.8	95	92		<2					
23 September 2008	BCD	6.7	115	107		<2					
23 September 2008	SD8	8.9	995	24		<2					
23 September 2008	SD17	8.3	720	456		<2					
7 October 2008	SD17	8.2	735	75		<2					
7 October 2008	SD8	8.9	775	22		<2					
7 October 2008	SB14	8.5	255	43		<2					
15 December 2008	SD17	7.4	435	152		<2					
15 December 2008	SD9	7.3	245	24		3					
15 December 2008	SD8	8.2	635	22		<2					
15 December 2008	BCD	6.9	135	30		<2					
10 February 2009	MV	8.2	3370	13		<2					
10 February 2009	SD8	8.9	790	11		<2					
10 February 2009	SD9	8.5	330	16		<2					
10 February 2009	SB14	8	380	32		<2					
10 February 2009	SB5	8.8	1070	7		<2					
10 February 2009	SB16	9	1200	6		<2					
24 June 2009	SB7	8.21	401	90	6	<5					
24 June 2009	SB5	8.62	1180	12	8	<5					
24 June 2009	Pit water	8.87	2330	148	5	<5					
24 June 2009	SD9	8.33	335	5	8	<5					
24 June 2009	SD16	8.16	550	20	5	<5					
24 June 2009	SB14	7.71	351	29	9	<5					
27 August 2009	SB7	8.1	418	62	5	<10					
27 August 2009	SB5	8.64	1210	29	8	<10					
27 August 2009	Pit water	8.2	2580	264	6	<10					
27 August 2009	SD9	8.36	389	12	8	<10					
31 August 2009	SB14	8.73	342	56	10	<10					
31 August 2009	SD16	8.3	547	158	5	<10					
22 December 2009	NCD	7.8	137	164	16	19					
22 December 2009	BCU	7.32	150	220	25	-					
22 December 2009	BCD	7.04	146	32	43	-					

Date	Sample Location	pH	EC (µS/cm)	Total Suspended Solids (mg/L)	Total Organic Carbon (mg/L)	Grease & Oil (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Comments
29 December 2009	BCD	6.88	75	47	15						
29 December 2009	NCD	6.73	143	32	10						
29 December 2009	NCU	6.79	95	34	18						
29 December 2009	SD14	8.12	1080	65	4						
29 December 2009	SB14	7.41	374	128	19						
29 December 2009	Goonbri Creek	7.02	60	38	12						
25 February 2010	SB7	8.14	197	194	3	5					
25 February 2010	SB5	8.06	681	77	4	<5					
25 February 2010	SD9	7.95	123	18	8	5					
25 February 2010	SD16	8.49	734	257	3	<5					
25 February 2010	SB14	8.03	232	40	6	<5					
25 February 2010	SD2	8.37	276	15	<5	<5					
24 May 2010	SB7	8.41	291	17	4	13					
24 May 2010	SB5	8.59	531	48	5	13					
24 May 2010	SD9	8.62	148	10	8	6					
24 May 2010	SD16	8.93	810	9	4	8					
24 May 2010	SB14	7.76	251	538	8	6					
6 July 2010	SB14	8.09	245	95	5	<5					
9 August 2010	SB16	8.39	1170	10	3	<5					
9 August 2010	Pit water	7.07	1940	37	2	<5					
9 August 2010	SD9	7.72	147	24	9	<5					
9 August 2010	SD16	8.29	793	40	5	<5					
9 August 2010	SB14	7.69	260	1300	6	<5					
2 November 2010	SB7 (pre floc)	8.33	332	38	4	<5					
4 November 2010	SB7 (post floc)	8.72	339	10	3	<5					
10 November 2010	SB16	9.19	1140	14	3	<5					
10 November 2010	SD9	7.94	168	16	11	<5					
10 November 2010	SD16	9.49	831	11	5	<5					
10 November 2010	SB14	7.72	323	56	5	<5					
9 March 2011	SD17	8.38	393	42	6	<5					
9 March 2011	SB16	7.17	968	20	6	<5					
9 March 2011	VOID	7.95	2540	78	6	<5					
9 March 2011	SD9	7.98	186	30	11	<5					
9 March 2011	SD16	8.71	762	27	5	<5					
9 March 2011	SB14	8.17	361	43	6	<5					
3 May 2011	SD16	8.58	1020	22	6	<5	<0.001	0.002	0.014	<0.01	
3 May 2011	SB14	7.9	434	24	6	<5	<0.001	0.002	0.004	<0.01	
3 May 2011	SD17	8.92	2040	20	6	<5	<0.001	0.004	0.014	<0.01	
3 May 2011	SB16	8.58	1030	13	4	<5	0.003	0.2	0.029	<0.01	
3 May 2011	VOID	Dry									
4 August 2011	SD16	8.64	975	32	8	<5	<0.001	0.002	0.011	<0.01	
4 August 2011	SB14	8.33	414	24	6	<5	<0.001	0.001	0.003	<0.01	
4 August 2011	SD17	8.53	925	10	8	<5	<0.001	0.002	0.006	<0.01	
4 August 2011	SB16	8.52	891	24	4	<5	0.004	0.002	0.028	<0.01	
4 August 2011	VOID	8.52	2890	49	5	<5		0.015			
9 November 2011	SD16	9.03	791	20	7	<5	<0.001	0.003	0.010	<0.01	
9 November 2011	SB14	7.84	431	20	5	<5	<0.001	0.002	0.004	<0.01	
9 November 2011	SD17	8.39	448	56	6	<5	<0.001	0.002	0.003	<0.01	
9 November 2011	SB16	8.39	646	6	3	<5	0.003	0.002	0.026	<0.01	
9 November 2011	VOID	8.08	1790	158	3	<5					
29 February 2012	SD16	7.96	365	34	2	<5	<0.001	0.001	0.009	<0.01	
29 February 2012	SB14	8.15	443	174	5	<5	<0.001	0.002	0.003	<0.01	
29 February 2012	SD17	8.23	434	18	7	<5	<0.001	0.003	0.004	<0.01	
29 February 2012	SB16	8.17	433	23	1	<5	0.001	0.001	0.012	<0.01	
29 February 2012	VOID	8.3	727	1620	2	<5		0.008			
9 March 2012	SB23 Pre-floc	7.84	148	70	4	<5					
10 March 2012	SB23 24hrs post floc	7.82	159	60	16	<5					
11 March 2012	SB23 48hrs post floc	7.75	158	61	16	<5					
2 March 2012	SD16 Pre-floc	8.17	351	16	2	<5					
2 March 2012	SB14 Pre-floc	8.13	452	50	5	<5					
2 May 2012	SD16	8.37	388	14	2	<5	<0.001	<0.001	0.008	<0.01	
2 May 2012	SB14	9.08	1060	57	5	<5	<0.001	0.002	0.004	<0.01	
2 May 2012	SD17	8.74	602	8	6	<5	<0.001	0.001	0.006	<0.01	
2 May 2012	SB16	7.87	456	6	1	<5	0.001	0.001	0.013	<0.01	
2 May 2012	VOID	8.26	2080	10	1	<5	0.002	0.009	0.048	<0.01	
2 May 2012	GCR1	7.99	689	104	35	<5	<0.001	0.003	0.002	<0.01	
11 May 2012	SB23		246	18	8	<5					
22 May 2012	SB24		373	42	11	<5					
22 May 2012	SB14		980	42	5	<5					

Date	Sample Location	pH	EC (µS/cm)	Total Suspended Solids (mg/L)	Total Organic Carbon (mg/L)	Grease & Oil (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Comments
22 May 2012	SD16		400	35	2	<5					
22 May 2012	SD9		133	36	8	<5					
22 May 2012	SD17		618	20	6	<5					
28 May 2012	SD17	8.58	558	16	7	<5					
28 May 2012	SD9	7.97	136	37	8	<5					
28 May 2012	SB14	8.21	661	53	5	<5					
28 May 2012	SB24	8.21	351	42	11	<5					
18 June 2012	SB14	8.05	513	92	5	<5					
18 June 2012	SD16	8.13	445	25	4	<5					
18 June 2012	SD9	7.95	137	23	8	<5					
18 June 2012	SD17	8.54	533	14	6	<5					
18 June 2012	Canyon SD	8.13	304	87	9	<5					
11 July 2012	NCD	7.19	174	150	19	<5					
20 July 2012	SB23-After Floc	7.92	254	16	3	<5					
23 July 2012	SD16-Background info water	8.02	450	25	3	<5					
23 July 2012	SD14-After floc	7.94	590	35	3	<5					
14 August 2012	SD16	8.1	454	<5	3	<5	<0.001	0.001	0.008	<0.01	
14 August 2012	SB14	8.11	646	<5	7	<5	<0.001	0.002	0.007	<0.01	
14 August 2012	SD17	8.08	465	<5	5	<5	<0.001	0.001	0.004	<0.01	
14 August 2012	SB16	7.96	561	<5	2	<5	0.003	0.002	0.02	<0.01	
14 August 2012	VOID	8.39	2220	<5	2	<5					
14 August 2012	GCR1	7.82	190	16	19	<5	<0.001	0.002	<0.001	<0.01	
14 August 2012	GCR2	7.72	182	12	17	<5	<0.001	0.002	<0.001	<0.01	
14 November 2012	SD16	9.84	679	100	6	<5	<0.001	0.004	0.01	<0.01	
14 November 2012	SB14	8.85	890	24	3	<5	<0.001	<0.001	0.006	<0.01	
14 November 2012	SD17	8.7	700	14	4	<5	<0.001	<0.001	0.006	<0.01	
14 November 2012	SB16	8.69	707	76	1	<5	0.004	0.002	0.026	<0.01	
14 November 2012	VOID	8.62	2870	10	<1	<5					
1 February 2013	SD9 pre floc	7.44	262	43	7	<5					
1 February 2013	SD9 post floc	7.39	267	82	8	<5					
20 February 2013	SD9-Pre Discharge	7.89	275	18	8	<5					
6 March 2013	SD16	7.69	252	288	5	<5	<0.001	0.005	0.001	<0.01	
6 March 2013	SB14	7.81	378	99	4	<5	<0.001	0.001	0.002	<0.01	
6 March 2013	SD17	8	229	91	4	<5	<0.001	<0.001	0.002	<0.01	
6 March 2013	SB16A	8.01	365	240	4	<5	0.002	0.004	0.013	<0.01	
6 March 2013	VOID	8.23	1620	16	2	<5					
6 March 2013	GCR1	7.43	126	106	5	<5	<0.001	<0.001	<0.001	<0.01	
6 March 2013	GCR2	7.42	173	48	16	<5	<0.001	0.002	<0.001	<0.01	
30 May 2013	SD16	8.16	341	100	7	<5	<0.001	0.003	0.003	<0.01	
30 May 2013	SB14	8.42	538	38	6	<5	<0.001	0.002	0.003	<0.01	
30 May 2013	SD17	8.47	334	49	6	<5	<0.001	0.002	0.003	<0.01	
30 May 2013	SB16A	8.25	530	108	10	<5	0.004	0.004	0.018	<0.01	
30 May 2013	VOID	8.51	3120	45	4	<5					
7 August 2013	SD16	8.49	390	7	6	<5	<0.001	0.001	0.003	<0.01	
7 August 2013	SB14	8.96	570	8	7	<5	<0.001	<0.001	0.002	<0.01	
7 August 2013	SD17	8.59	371	9	4	<5	<0.001	<0.001	0.003	<0.01	
7 August 2013	SB16A	8.05	585	20	7	<5	0.005	0.003	0.022	<0.01	
7 August 2013	VOID	8.35	2660	29	6	<5					
7 August 2013	TAR-GCD	7.4	155	52	16	<5	<0.001	0.002	<0.001	<0.01	
7 August 2013	TAR-GCU	7.42	208	14	20	<5	<0.001	0.003	<0.001	<0.01	
5 November 2013	SD16	9.42	538	29	15	<5	<0.001	0.004	0.004	<0.01	
5 November 2013	SB14	8.55	1070	172	17	<5	<0.001	0.002	0.005	<0.01	
5 November 2013	SD17	8.87	573	21	9	<5	<0.001	0.002	0.005	<0.01	
5 November 2013	SB16A	8.8	918	38	8	<5	0.008	0.005	0.04	<0.01	
5 November 2013	VOID	8.25	2530	11	29	<5		0.01			
20 February 2014	TAR-SD16	8.35	432	65	6	<5	<0.001	0.006	0.003	<0.01	
20 February 2014	TAR-SB14	8.09	393	1280	8	<5	<0.001	0.005	<0.001	0.01	
20 February 2014	TAR-SD17	8.79	712	46	8	<5	<0.001	0.002	0.007	<0.01	
20 February 2014	TAR-SB16A	8.61	713	330	8	<5	0.004	0.01	0.023	<0.01	
20 February 2014	TAR-VOID	8.63	1350	22	1	<5	0.007	0.026	0.101	<0.01	
20 February 2014	TAR-GCU	6.69	115	433	23	<5	<0.001	0.005	0.001	<0.01	
6 May 2014	TAR-SD16	8.12	404	19	3	21	<0.001	0.004	0.003	<0.01	
6 May 2014	TAR-SB14	8.92	1980	10	4	5	<0.001	0.002	0.008	<0.01	
6 May 2014	TAR-SD17	8.26	351	25	3	<5	<0.001	0.002	0.0002	<0.01	
6 May 2014	TAR-SB16A	8.2	483	134	1	<5	0.003	0.008	0.02	<0.01	
6 May 2014	TAR-VOID	8.31	3280	213	<1	<5		0.006			
6 May 2014	TAR-GCU	7.89	318	<5	14	<5	<0.001	0.002	0.001	<0.01	
6 May 2014	TAR-GCD	7.88	301	<5	17	<5	<0.001	0.001	<0.001	<0.01	
6 August 2014	TAR-SD16	8.7	439	5	6	<5	<0.001	0.002	0.002	<0.01	
6 August 2014	TAR-SB14	8.67	1450	22	7	<5	<0.001	0.001	0.004	<0.01	
6 August 2014	TAR-SD17	8.44	397	48	7	<5	<0.001	0.002	0.003	<0.01	
6 August 2014	TAR-SB16A	8.25	609	63	8	<5	0.005	0.004	0.024	<0.01	
6 August 2014	TAR-VOID	8.5	3260	515	16	<5					

Date	Sample Location	pH	EC (µS/cm)	Total Suspended Solids (mg/L)	Total Organic Carbon (mg/L)	Grease & Oil (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Comments
6 August 2014	TAR-GCU	8.31	392	42	14	<5	<0.001	0.002	<0.001	<0.01	
11 November 2014	TAR-SD16	8.7	507	14	6	<5	<0.001	0.002	0.004	<0.01	
11 November 2014	TAR-SB14	8.85	1480	50	14	<5	<0.001	0.003	0.012	<0.01	
11 November 2014	TAR-SD17	8.7	539	34	7	<5	<0.001	<0.001	0.005	<0.01	
11 November 2014	TAR-SB16A	8.51	740	18	5	<5	0.006	0.003	0.032	<0.01	
11 November 2014	TAR-GCU	7.7	549	1230	57	<5	<0.001	0.022	0.006	<0.01	
11 November 2014	TAR-GCD	7.64	751	62	50	<5	<0.001	0.011	0.004	<0.01	
8 December 2014	TAR-VOID	8.04	3060	170	<1	<5					
18 February 2015	TAR-SD16	8.19	451	16	4	<5	<0.001	0.004	0.006	<0.01	
18 February 2015	TAR-SB14	8	626	12	4	<5	<0.001	0.004	0.005	<0.01	
18 February 2015	TAR-SD17	8.13	313	123	5	<5	<0.001	0.007	0.006	<0.01	
18 February 2015	TAR-SB16A	8.29	574	71	2	<5	0.003	0.007	0.025	<0.01	
18 February 2015	TAR-GCU	7.43	242	86	6	<5	<0.001	0.01	0.02	<0.01	
18 February 2015	TAR-GCD	7.22	444	748	26	<5	<0.001	0.016	0.002	<0.01	
18 February 2015	TAR-VOID	8.72	3170	10	<1	<5					
7 May 2015	TAR-SD16	8.27	409	16	6	<5	<0.001	0.003	<0.001	<0.01	
7 May 2015	TAR-SB14	8.85	1300	17	8	<5	<0.001	0.002	0.002	<0.01	
7 May 2015	TAR-SD17	8.3	539	44	5	<5	0.001	0.003	0.007	<0.01	
7 May 2015	TAR-SB16A	8.19	571	44	2	<5	0.005	0.003	0.008	<0.01	
7 May 2015	TAR-VOID	8.62	2910	5	5	<5					
7 May 2015	TAR-GCD	7.35	147	29	8	<5	<0.001	0.003	<0.001	<0.01	
17 August 2015	TAR-SD16	8.43	426	19	4	8	<0.001	0.003	0.011	<0.01	
17 August 2015	TAR-SB14	8.91	1070	7	5	<5	0.001	0.001	0.02	<0.01	
17 August 2015	TAR-SD17	8.81	902	192	8	7	<0.001	0.002	0.043	<0.01	
17 August 2015	TAR-SB16A	7.95	658	65	2	7	0.007	0.004	0.05	<0.01	
17 August 2015	TAR-GCU	7.67	161	96	6	6	<0.001	0.004	0.001	<0.01	
17 August 2015	TAR-GCD	7.59	202	35	7	<5	<0.001	0.007	<0.001	<0.01	
27 August 2015	TAR-VOID	8.41	1020	49200	<20	6					
17/11/2015	TAR-SD16	8.9	440	10	6	<5	<0.001	0.004	0.004	<0.01	
17/11/2015	TAR-SB14	8.21	455	100	9	<5	<0.001	0.003	0.005	<0.01	
17/11/2015	TAR-SD17	7.98	361	191	10	<5	<0.001	0.004	0.004	<0.01	
17/11/2015	TAR-SB16A	8.08	550	64	6	<5	0.001	0.002	0.048	<0.01	
17/11/2015	TAR-VOID	8.36	1350	43	4	<5					
17/11/2015	TAR-GCU	7.47	157	33	15	<5	<0.001	0.006	<0.001	<0.01	
11/02/2016	TAR-SD16	8.2	289	95	5	<5	<0.001	0.006	0.004	<0.01	
11/02/2016	TAR-SB14	8.29	722	21	4	<5	<0.001	0.004	0.007	<0.01	
11/02/2016	TAR-SD17	8.26	698	174	2	<5	0.002	0.007	0.014	<0.01	
11/02/2016	TAR-SB16A	7.99	622	84	1	<5	0.002	0.003	0.035	<0.01	
11/02/2016	TAR-VOID	8.28	882	53	<1	<5					
11/02/2016	TAR-GCD	7.45	159	129	10	<5	<0.001	0.01	0.002	<0.01	
10/05/2016	TAR-VOID	8.33	3270	<5	2	<5		0.011		<0.01	
10/05/2016	TAR-SD16	8.04	340	66	5	<5	<0.001	0.004	0.003	<0.01	
10/05/2016	TAR-SB14	8.45	535	108	8	<5	<0.001	0.005	0.004	<0.01	
10/05/2016	TAR-SD17	8.45	774	25	9	<5	<0.001	0.003	0.016	<0.01	
10/05/2016	TAR-SB16A	8.42	847	21	4	<5	<0.001	0.002	0.03	<0.01	
10/05/2016	TAR-GCD	7.25	170	119	14	<5	<0.001	0.005	<0.001	<0.01	
10/08/2016	TAR-SD16	8.13	427	19	6	<5	<0.001	0.004	0.003	<0.01	
10/08/2016	TAR-SD14	8.13	644	154	6	<5	<0.001	0.004	0.003	<0.01	
10/08/2016	TAR-SD17	7.85	267	87	5	<5	<0.001	0.005	0.003	<0.01	
10/08/2016	TAR-SB16A	8.13	474	45	3	<5	<0.001	0.002	0.017	<0.01	
10/08/2016	TAR-GCU	7.29	136	18	16	<5	<0.001	0.003	<0.001	<0.01	
10/08/2016	TAR-GCD	7.08	95	33	12	<5	<0.001	0.002	<0.001	<0.01	
10/08/2016	TAR-VOID	8.55	3010	6	1	<5					
15/11/2016	TAR-SD16	8.72	712	7	5	<5	<0.001	0.005	0.004	<0.01	
15/11/2016	TAR-SD17	8.77	557	37	10	<5	<0.001	0.003	0.01	<0.01	
15/11/2016	TAR-SB16A	8.36	603	14	6	<5	<0.001	0.003	0.025	<0.01	
15/11/2016	TAR-VOID	8.6	3000	26	2	<5					
15/11/2016	TAR-GCU	7.89	242	26	16	<5	<0.001	0.004	0.002	<0.01	
15/11/2016	TAR-GCD	8.15	526	12	12	<5	<0.001	0.004	<0.001	<0.01	
2/08/2017	SD14	7.9	459	28	12	<5	<0.001	0.008	0.002	<0.01	
2/08/2017	SD17	8.1	528	202	22	<5	<0.001	0.009	0.006	<0.01	
2/08/2017	SB16a	8.4	551	93	8	<5	<0.001	0.003	0.017	<0.01	
2/08/2017	GCU	7.3	208	70	29	<5	<0.001	0.009	0.001	<0.01	
2/08/2017	GCD	8.1	489	169	33	<5	<0.001	0.026	0.002	<0.01	
2/08/2017	VOID	8.1	3360	8	2	<5	----	----	----	----	
5/09/2017	SB14	8.9	757	67	5	5	<0.001	0.008	0.004	<0.01	
5/09/2017	SD17	9.1	1300	170	12	12	<0.001	0.005	0.023	<0.01	
5/09/2017	SB16a	8.4	957	41	1	1	<0.001	0.003	0.03	<0.01	
5/09/2017	QCU	8.3	15	878	7	7	<0.001	0.006	<0.001	<0.01	
5/09/2017	QCD	7.4	678	225	37	37	<0.001	0.006	0.003	<0.01	
5/09/2017	VOID	8.6	3100	12	1	<5	----	0.006	----	----	
8/09/2017	SD16	9.4	463	19	9	<5	<0.01	<0.01	<0.01	<0.01	
8/09/2017	SD14	9.7	580	47	11	<5	<0.01	<0.01	<0.01	<0.01	
8/09/2017	SD17	8.2	416	120	10	<5	<0.01	<0.01	<0.01	<0.01	
8/09/2017	SB16a	8.1	703	62	6	<5	<0.01	<0.01	0.02	<0.01	
8/09/2017	GCU	7.5	114	121	8	<5	<0.01	<0.01	<0.01	<0.01	

Date	Sample Location	pH	EC (µS/cm)	Total Suspended Solids (mg/L)	Total Organic Carbon (mg/L)	Grease & Oil (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Comments
8/09/2017	GCD	7.9	280	161	12	<5	<0.01	<0.01	<0.01	<0.01	
9/05/2017	VOID	8.5	3050	21	1	<5	---	---	---	---	
13/11/2017	SB14	8.1	440	130	11	<5	<0.001	0.007	0.002	<0.01	
13/11/2017	SD17	9.1	958	122	29	<5	<0.001	0.006	0.017	<0.01	
13/11/2017	SB16A	8.6	901	85	7	<5	<0.001	0.004	0.026	<0.01	
13/11/2017	VOID	8.6	2970	19	2	<5	----	----	----	----	
13/11/2017	GCU	6.5	175	22	14	<5	<0.001	0.007	0.001	<0.01	
13/11/2017	GCD	6.7	234	125	14	<5	<0.001	0.005	0.001	<0.01	
22/02/2018	SD16	9.2	1400	216	34	<5	<0.001	0.018	0.015	<0.01	
22/02/2018	SB14	8.9	823	60	11	<5	<0.001	0.01	0.007	<0.01	
22/02/2018	SB16a	9.4	1330	280	36	<5	<0.001	0.012	0.028	<0.01	
22/02/2018	Void	8.7	3600	15	1	<5	----	----	----	----	
22/02/2018	GCU	7.0	170	166	25	<5	<0.001	0.004	<0.001	<0.01	
22/05/2018	Void	8.9	3340	14	1	6	----	----	----	----	
Other sites were dry											
21/08/2018	SB16A	9.3	5300	54	51	<5	0.002	0.022	0.192	<0.01	
21/08/2018	Void	8.9	3590	<5	2	<5	----	----	----	----	
Other sites were dry											
13/11/2018	SD16	8.5	407	634	4	<5	<0.001	0.014	0.001	0.01	
13/11/2018	SD14	8.9	2020	26	10	5	<0.001	0.004	0.006	<0.01	
13/11/2018	SD17	8.1	439	898	10	<5	<0.001	0.01	0.002	<0.01	
13/11/2018	SB16A	8.4	1090	436	20	<5	<0.001	0.014	0.011	<0.01	
13/11/2018	GCU	7.1	253	14	18	<5	<0.001	0.005	0.001	<0.01	
13/11/2018	GCD	7.2	260	65	18	<5	<0.001	0.011	0.001	<0.01	
13/11/2018	Void	8.2	2880	18	5	<5	----	----	----	----	
22/02/2019	SB14	8.8	2410	536	24	<5	<0.001	0.016	0.007	<0.01	
22/02/2019	SB16A	10	6840	47	126	<5	0.002	0.058	0.238	<0.01	
22/02/2019	Void	8.6	3720	19	3	<5	----	----	----	----	
Other sites were not flowing- no sample taken											
23/05/2019	Void	8	3070	<5	<1	<5	----	----	----	----	
5/09/2019	SD16	7.6	169	83	5	<5	<0.001	0.01	<0.001	0.01	
5/09/2019	SD14	8.4	971	20	5	<5	<0.001	0.002	0.003	<0.01	
5/09/2019	SD17	7.4	435	141	10	<5	0.001	0.003	0.004	<0.01	
5/09/2019	SD16A	8.2	509	276	11	<5	<0.001	0.006	0.005	<0.01	
5/09/2019	GCU	6.8	90	16	10	<5	<0.001	0.002	<0.001	<0.01	
5/09/2019	GCD	6.7	101	39	8	<5	<0.001	0.002	<0.001	<0.01	
23/05/2019	Void	8	3070	<5	<1	<5	----	0.046	----	----	
13/08/2019	SD16	7.8	297	434	4	<5	<0.001	0.012	0.001	0.01	
13/08/2019	SD17	7.9	393	181	6	<5	<0.001	0.002	0.002	<0.01	
13/08/2019	VOID	8.6	3000	15	<1	<5	----	----	----	----	
Other sites were dry- no sample taken											
11/08/2019	VOID	8.6	3700	13	4	<5	----	----	----	----	
Other sites were dry- no sample taken - See photos											
13/02/2020	SD16	7.9	421	262	8	<5	<0.001	0.004	0.002	<0.01	Approx. 180mm of rain that week from Saturday 8th to Thurs 13th
13/02/2020	SB14	8.2	938	37	7	<5	<0.001	0.004	0.005	<0.01	
13/02/2020	SD17	8	166	1170	4	<5	<0.001	0.004	<0.001	<0.01	
13/02/2020	SB16A	8.2	493	282	7	<5	<0.001	0.004	0.004	<0.01	
13/02/2020	GCU	7.3	147	95	14	<5	<0.001	0.002	<0.001	<0.01	
13/02/2020	GCD	7.2	269	64	14	<5	<0.001	0.002	<0.001	<0.01	
5/03/2020	VOID	8.17	2420	380	4	<5	0.001	0.001	0.001	0.01	
6/05/2020	SD16	8.8	397	21	10	<5	<0.001	0.001	0.005	<0.01	
6/05/2020	SB14	8.7	2250	92	12	<5	<0.001	0.003	0.005	<0.01	
6/05/2020	SD17	8.4	293	120	8	<5	<0.001	0.001	0.002	<0.01	
6/05/2020	SB16a	8.8	543	33	9	<5	<0.001	0.002	0.013	<0.01	
6/05/2020	VOID	7.8	3290	34	<1	<5	----	0.012	----	----	
19/08/2020	SD17	8.27	367	42	6	<5	<0.001	0.001	0.002	<0.01	
19/08/2020	SD16	7.75	444	37	5	<5	<0.001	0.001	0.004	<0.01	
19/08/2020	SB14	8.97	1320	32	9	<5	<0.001	0.003	0.004	<0.01	
28/08/2020	VOID	8.36	3600	25	30	<5	----	----	----	----	
12/11/2020	SB16A	8.44	967	78	8	6	0.001	0.003	0.021	0.01	
12/11/2020	SD17	8.53	645	62	4	6	0.001	0.001	0.003	0.01	
12/11/2020	VOID	8.58	1700	40	2	5	----	----	----	----	

Appendix 4

GROUNDWATER MONITORING DATA

Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	Field Parameters			Total Metals																		Major Cations						Total Cations - meq/L	Major Anions							Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
				pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L														
ANZECC Guideline - stock drinking water							5	0.5			0.01	1	1	1	0.1		1	0.02		20			0.002			1000						1000										400		4000					
NEPC Guideline - Agricultural Irrigation (mg/L)							5	0.1			0.01	1	0.05	0.2		2	0.02	0.02		2	0.5	0.2	0.002																				600					
NEPC Guideline - Livestock (mg/L)							5	0.5			0.01		1	0.5			1			20	5		0.002			1000						1000										30	400		2400					
THUIN																																																		
MW1	2-Jun-06	7.77	8.50	7.48				0.006															6330	92	138	1710	43		2680	424				772																
MW1	11-Jan-07	8.49	9.22	7.12				0.001			<0.0001	<0.005		<0.006	<0.001		0.026			0.11			<0.0001		2410	26	33	554	18		346	145				684																
MW1	18-Apr-07	6.77	7.50																																															
MW1	9-Jul-07	7.23	7.96	7.30	2440	17.4		<0.001			<0.0001	<0.005		0.0005	<0.001		0.008			0.09			<0.0001		2500	21	29	504	25		385	143				614										3.1	<20	380		
MW1	10-Jul-07	7.18	7.91																																															
MW1	18-Jul-07	7.18	7.91																																															
MW1	7-Aug-07	7.01	7.74																																															
MW1	22-Aug-07	6.93	7.66																																															
MW1	5-Sep-07	6.97	7.70																																															
MW1	24-Sep-07	6.93	7.66																																															
MW1	11-Oct-07	6.91	7.64																																															
MW1	26-Nov-07	6.89	7.62																																															
MW1	29-Jan-08	6.82	7.55																																															
MW1	4-Mar-08	6.87	7.60																																															
MW1	23-Apr-08	6.94	7.67	7.30	3100	21.3		<0.001			<0.00005	<0.01		0.002	0.0036		0.01			0.007			0.0002		3120	46	50	614	29		567	247				665											<0.025	0.027		
MW1	21-Aug-08	7.00	7.73																																															
MW1	29-Oct-08	7.07	7.82	7.80	3430	21.6		0.001			0.00023	0.015		0.13	0.37		0.03			0.22			<0.0001		3500	44	51	670	32		680	210				690											<0.025	<0.100		
MW1	29-Jan-09	7.08	7.73																																															
MW1	17-Jun-09		7.87	7.20	5470	19.8		0.001	<0.001	0.091	<0.0001	0.013	0.001	0.047	0.008	0.103	0.009		<0.01	0.019		0.71	<0.0001		3870	46	61	762	28	41.2	777	167	<1	<1	725	725	39.9	1.58	<0.01				2320					
MW1	11-Sep-09	7.23	7.90																																														
MW1	14-Dec-09	7.23	7.90	7.5	4670	17.5	<0.01	0.001				<0.005		0.014	0.001	0.131	0.038			0.048		<0.05	<0.0001	7.83	4510	70	95	875	28	50.1	882	234	<1	<1	780	780	45.3	4.99		<0.01	0.2	0.2						
MW1	25-Feb-10	7.17	7.84																																														
MW1	11-May-10	7.46	8.13	7.56	4330	22.6		0.001	<0.001	0.075	0.0001	0.002	0.002	0.011	0.005	0.204	0.009		<0.01	0.012		0.88	<0.0001		4090	43	60	779	26	41.7	795	229	<1	<1	694	694	41	0.75	0.16				1850					
MW1	30-Aug-10	7.47	8.14	7.47	3890	21.5																																											
MW1	9-Nov-10	7.45	8.12	7.06	3170	24.6																																												
MW1	10-Mar-11	7.38	8.05	7.1	3280	23.7	0.04	0.002				0.003		0.063	0.006	0.035	0.006			0.016		0.3	<0.0001	7.26	3650	44	62	771	29	41.6	839	210	<1	<1	658	658	41.2	0.49		<0.01	0.09	0.09						
MW1	6-Jun-11	7.20	7.87	7.2	3110	19.9																																											
MW1	6-Sep-11	7.19	7.86	7.09	3200	22.5	0.1	0.003	<0.001	0.057	0.0001	0.002	0.002	0.019	0.01	0.193	0.005		<0.01	0.014		0.99	<0.0001	7.72	3990	41	56	739	26	39.5	774	246	<1	<1	620	620	39.3	0.12	<0.01	<0.01	0.04	0.04	2080					
MW1	7-Dec-11	7.09	7.76	7.16	3150	20.1																																											
MW1	13-Mar-12	6.90	7.57	7.44	3140	21.9	0.12	<0.001	<0.001	0.067	<0.0001	0.003	<0.001	0.081	0.001	0.028	0.009		<0.01	0.027		0.23	<0.0001	7.78	3590	44	58	758	30	40.7	748	232	<1	<1	629	629	38.5	2.76	<0.01	<0.01	0.12	0.12	2040					
MW1	13-Jun-12	6.53	7.20	7.37	3730	20.3																																											
MW1	4-Sep-12	6.41	7.08	7.44	3340	20.8	0.03	<0.001	<0.001	0.069	<0.0001	0.005	<0.001	0.09	0.003	0.067	0.007		<0.01	0.067		0.2	<0.0001	7.8	3570	39	55	662	26	35.9	676	212	<1	<1	681	681	37.1	1.62	<0.01	<0.01	0.06	0.06	2090					
MW1	27-Nov-12	6.25	6.92	7.54	3140	20.8																																											
MW1	20-Mar-13	6.15	6.82	7.52	3180	21.9	0.05	0.002	<0.001	0.055	<0.0001	0.007	<0.001	0.1	0.008	0.031	0.016		<0.01	0.125		0.25	<0.0001	7.65	3400	35	48	700	25	36.8	575	182	<1	<1	690	690	33.8	4.2	0.08	<0.01	0.1	0.1	1830					
MW1	11-Jul-13	6.18	6.85	7.49	3110	20.1																																											
MW1	5-Sep-13	6.14	6.81	7.48	3040	21.4	0.15	<0.001	<0.001	0.058	<0.0001	0.003	<0.001	0.113	0.005	0.088	0.012	<0.01	<0.01	0.079	0.06	0.24	<0.0001	7.99	3330	31	44	677	27	35.3	586	205	<1	<1	672	672	34.2	1.52	0.02				1900					
MW1	22-Nov-13	5.95	6.62	7.6	3140	20.8																																											
MW1	20-Feb-14	6.08	6.75	7.5	3150	20.2	1.23	0.001	<0.001	0.062	0.0004	0.023	0.001	0.487	0.031	0.073	0.016	<0.01	<0.01	0.624	<0.05	2.49	<0.0001	7.65	3440	29	45	710	30	36.8	516	195	<1	<1	624	624	31.1	8.39	0.07				1800					
MW1	27-May-14	6.25	6.92	7.6	3140	20.7																																											
MW1	9-Sep-14	6.26	6.83	7.7	3220	20.2	0.13	0.002				0.01		0.058	0.006	0.077	0.009			0.098		0.53		7.97	3320	29	40	594	24	31.2	520	206	<1	<1	714	714	33.2	3.19		<0.01	0.17	0.17						
MW1	20-Nov-14	6.36	7.03	7.7	3190	21.6																																											
MW1	26-Feb-15	6.39	7.06	7.6	3170	27.7	0.08	0.001	<0.001	0.056	<0.0001	0.004	<0.001	0.045	0.003	0.078	0.009	<0.01	<0.01	0.118		0.3	<.00001	7.13	800	34	45	634	22	33.5	551	210	<1	<1	739	739	34.7	1.71	0.05	<0.01	0.15	0.15	1700					
MW1	26-May-15	6.47	7.14	7.5	3210	19.2																																											
MW1	27-Aug-15	6.51	7.18	7.6	3280	18.5	0.1	0.001	<0.001	0.066	<0.0001	<0.001	<0.001	0.026	<0.001	0.019	0.004	<0.01	<0.01	0.073	<0.05	0.18	<0.0001	8.03	3440	28	42	651	22	33.7	<1	225	<1	<	636	636	30.1	5.68	0.06	<0.01	0.11	0.11	1900					
MW1	4-Dec-16	6.59	7.26	7.7	3270	21																																											
MW1	24-Feb-16	6.59	7.26	7.6	3290	23.2	0.02	0.001	<0.001	0.061	<0.0001	<0.001	<0.001	0.032	0.001	0.016	0.006	<0.01	<0.01	0.049	<0.05	0.12	<0.0001	8.09	3400	40	48	715	24	37.7	582	233	<1	<1	686	686	35	3.66	0.1	<.01	0.15	0.15	1950					
MW1	23-May-16	6.65	7.32	7.7	3340	21.4																																											
MW1	1-Sep-16	6.67	7.34	7.6	3270	20.8	0.22	0.002				0.008		0.062	0.008	0.708	0.026					2.07	<0.0001	8	3350	36	45	545	20	34.1	572	210	<1	<1	674	674	34	0.1		<0.01	0.03	0.13						
MW1	29-Nov-16	6.68	7.35	7.6	3170	21.7																																											
MW1	23-Mar-17	6.66	7.33	7.7	3210		0.11	0.002	<0.001	0.069	<0.0001	0.003	0.001	0.086	0.011	0.323	0.016	<0.01	<0.01	0.135	<0.05	0.93	<0.0001	8.36	3380	34	45	634	23	33.6	578	188	<1	17	708	725	34.7	1.67	0.03	<0.01	0.15	0.15	2060					
MW1	21-Jun-17	6.74	7.41	7.8	3290	19.4																																											
MW1	13-Sep-17	6.80	7.47	7.8	3270		0.05	<0.001	<0.001	0.047	<0.0001	0.001	<0.001	0.025	0.002	0.065	0.009	<0.01	<0.01	0.028	<0.05	0.17	<0.0001	8.31	3370	31	46	656	22	34.4	550	214	<1	8	784	792	35.8	1.94	0.01	<0.01	0.07	0.07	1850					
MW1	13-Dec-17	6.73	7.4	7.7	3280																																												
MW1	22-Mar-18	6.81	7.48	7.9	3360	20.2	0.76	0.002	<0.001	0.068	<0.0001	0.012	0.002	0.071	0.038	0.286	0.018	<0.01	<0.01	0.2	<0.05	3.81	<0.0001	8.41	3360	33	44	581	24	31.2	646	212	<1	32	754	786	38.3	10.3	0.05	0.06	0.14	0.2	1950					
MW1	12-Jun-18	6.91	7.58	7.9	3350																																												
MW1	13-Sep-18	6.92	7.59	7.7	3300	21.9	0.73	0.002	<0.001	0.061	<0.0001	0.005	0.004	0.036	0.004	0.325	0.01	<0.01	<0.01	0.037	<0.05	1.38	<0.0001	8.09	3430	33	44	603	21	32	639	208	<1	<1	704	704	36.4	6.41	0.19	<0.01	0.01	0.01	1810					
MW1	5-Dec-18	7.03	7.7	7.8	3400	21.7																																											
MW1	14-Mar-19	7.11	7.78	8.1	3430	20.8	0.11	0.001	<0.001	0.054	<0.0001	0.005	<0.001	0.017	0.005	0.064	0.014	<0.01	<0.01	0.04	<0.05	0.62	<0.0001	8.22	3640	31	45	693	27	36.1	561	211	<1	<1	755	755	35.3	1.09	<0.01	0.03	0.11	0.14	2190			<20	<50	<20	<100
MW1	19-Jun-19	7.22	7.89	8	3320	20.3																																												
MW1	11-Sep-19	7.32	7.99	8	3440	21.7	0.06	<0.001	<0.001	0.046	<0.0001	0.002	0.001	0.012	0.003	0.199	0.008	<0.01	<0.01	0.037	<0.05	0.33	<0.0001	8.21	3430	40	51	701	24	37.3	36.3	224	<1	<1	672	672	36.3	1.34		<0.01	0.04	0.04	2010			<20	<50	<20	<100
MW1	5-Dec-19	7.35	8.02	8	3510	21.3																																												
MW1	18-Mar-20	7.36	8.03	7.9	3410	21.6	<0.01	<0.001	<0.001	0.047	<0.0001	<0.001	<0.001	0.005	<0.001	0.208	0.01	<0.01	<0.01	0.013	<0.05	0.11	<0.0001	8.06	3520	38	48	652	22	34.8	675	224	<1	<1	687	687	37.4	3.68	0.02	<0.01	<0.01	<0.01	2020			<20	<50	<20	<100
MW1	11-Jun-20	7.42	8.09	7.8	3490	20.3																																												
MW1	23-Sep-20	7.27	7.94	7.9	3500	19	0.07	<0.001	<0.001	0.05	<0.0001	0.002	<0.001	0.015	0.002	0.064	0.004	<0.01	<0.01	0.015	<0.05	0.25	<0.0001	8.16	3260	34	49	665	23	35.2	616	211	<1	<1	780	780	37.4	2.91	0.03	<0.01	0.14	0.14	2040			<20	<50	<20	<100
MW1	8-Dec-20	6.80	7.47	7.9	3510	17.7																																												
THUIN																																																		
MW2	2-Jun-06	3.63	4.40	7				<0.001															5440	132	106	1400	14		2230	475				432																
MW2	11-Jan-07	3.85	4.62	6.8				0.002			0.0001									0.09			<0.0001		511	1	<1	101	1		25.1	9				176																
MW2	18-Apr-07	2.83	3.60																																															
MW2	9-Jul-07	3.39	4.16	7.15	446	18.8		0.002			0.0002	<0.005		0.003	<0.001		0.002			0.233			<0.0001		496	<1	<1	99	1		27.2	11				175										7.89	<20	250					
MW2	10-Jul-07	3.45	4.22																																															
MW2	18-Jul-07	3.52	4.29																																															
MW2	7-Aug-07	3.58	4.35																																															
MW2	22-Aug-07	3.55	4.32																																															
MW2	5-Sep-07	3.57	4.34																																															
MW2	24-Sep-07	3.57	4.34																																															
MW2	11-Oct-07	3.60	4.37																																															
MW2	26-Nov-07	3.91	4.68																																															
MW2	29-Jan-08	3.48	4.25																																															
MW2	4-Mar-08	3.46	4.23																																															
MW2	23-Apr-08	3.73	4.50	7.3	400	19.9		0.005			0.00018	0.11		0.13	0.14		0.15			0.37			0.0004		440	8.9	5.8	99	17		39	10				165											<0.025	<0.1		
MW2	21-Aug-08	3.74	4.51																																															
MW2	29-Oct-08	3.59	4.37	6.9	600	19.2		0.008			0.00007	0.026		0.027	0.061		0.031			0.17			0.0002		620	6.8	7.1	120	6.8		93	27				180											<0.025	<0.100		
MW2	29-Jan-09	3.73	4.51																																															
MW2	17-Jun-09	3.69	4.53	7.7	660	19.1		0.006	0.004	0.311	0.0002	0.025	0.052	0.047	0.052	1.54	0.041		0.08	0.172		32.6	0.0005		602	1	1	128	2	5.76	59	<10	<1	<1	195	195	5.57	1.62	0.1				1540					
MW2	11-Sep-09	4.01	4.8																																															
MW2	14-Dec-09	3.72	4.51	7.7	691	18.3	<0.01	<0.001				<0.001		<0.001	<0.001	0.018	<0.001			<0.005		<0.05	<0.0001	7.5	640	2	1	134	2	6.07	55.3	12.8	<1	<1	202	202	5.86	1.73		<0.01	0.45	0.45						
MW2	25-Feb-10	1.72	2.51																																														
MW2	11-May-10	2.15	2.94	7.61	717	22.3		0.014	0.006	0.441	0.0002	0.071	0.058	0.073	0.071	1.06	0.094		0.13	0.3		88.3	0.0002		618	2	1	129	2	5.84	76.7	24.3	<1	<1	149	149	5.66	1.6	0.01				780					
MW2	30-Aug-10	2.10	2.89	7.4	590	20.5																																											
MW2	9-Nov-10	2.22	3.01	7.32	513	24.1																																												
MW2	10-Mar-11	2.96	3.75	7.31	566	24.2	0.28	0.001				0.001		0.018	0.002	0.018	0.006			0.045		0.3	0.0001	7.23	457	2	2	124	2	5.69	69	24	<1	<1	156	156	5.57	1.02		<0.01	0.07	0.07						
MW2	6-Jun-11	2.86	3.65	7.3	553	20.3																																											
MW2	6-Sep-11	2.95	3.74	6.9	585	19.8	1.93	<0.001	<0.001	0.016	<0.0001	0.002	<0.001	0.005	0.001	0.028	0.003		<0.01	0.021		1.76	<0.0001	7.33	692	3	3	144	2	6.71	92	32	<1	<1	169	169	6.64	0.5	<0.01	<0.01	0.02	0.02	340					
MW2	7-Dec-11	2.71	3.5	7.08	600	19.2																																											
MW2	13-Mar-12	2.38	3.17	7.06	912	22	0.3	<0.001	<0.001	0.012	<0.0001	0.002	<0.001	0.002	<0.001	0.058	0.004		<0.01	0.01		0.28	<0.0001	7.41	1060	12	10	224	4	11.3	164	50	<1	<1	232	232	10.3	4.44	0.03	<0.01	0.05	0.05	640					
MW2	13-Jun-12	3.13	3.92	7.02	1320	20																																											
MW2	4-Sep-12	3.11	3.9	7.07	1260	19.7	3.48	0.001	<0.001	0.034	<0.0001	0.002	0.002	0.009	0.003	0.145	0.004		<0.01	0.075		2.86	0.0002	7.47	1310	20	17	252	5	13.5	221	68	<1	<1	319	319	14	1.99	<0.01	<0.01	0.06	0.06	802					
MW2	27-Nov-12	3.42	4.21	7.29	905	19.1																																											
MW2	20-Mar-13	2.82	3.61	7.39	670	22.7	1.3	0.002	<0.001	0.022	<0.0001	<0.001	0.004	0.036	0.006	0.293	0.005		<0.01	0.078		0.88	0.0002	6.9	686	3	3	150	3	7	95	26	<1	<1	179	179	6.8	1.41	0.04	<0.01	0.05	0.05	376					
MW2	11-Jul-13	3.64	4.43	7.03	739	19.8																																											
MW2	5-Sep-13	3.45	4.24	6.78	680	19.8	6.39	0.001	0.039	0.1	<0.0001	0.005	0.002	0.037	0.006	0.134	0.006	<0.01	0.02	0.095	<0.001	5.54	0.0002	7.46	674	2	2	142	3	6.52	83	28	<1	<1	173	173	6.38	1.01	0.04				389					

Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L	Total Cations - meq/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L	Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N - mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
				Field Parameters			Total Metals																			Major Cations					Major Anions																	
ANZECC Guideline - stock drinking water							**5**	**0.5**			**0.01**	**1**	**1**	**1**	**0.1**		**1**	**0.02**		**20**			**0.002**			**1000**						**1000**									**400**		**4000**					
MW2	22-Nov-13	3.68	4.47	6.9	694	19.4																																										
MW2	20-Feb-14	3.72	4.51	7.4	675	21.2	1.32	0.001	0.012	0.06	<0.0001	0.004	<0.001	0.055	0.006	0.058	0.004	<0.01	<0.01	0.08	<0.001	1.32	<0.0001	7.01	694	2	2	155	3	7.08	85	27	<1	<1	171	171	6.38	5.2	<0.01				395					
MW2	27-May-14	3.35	4.14	7.4	618	20.9																																										
MW2	9-Sep-14	3.48	4.29	7.6	845	21.4	14.8	0.004				0.01			0.01	0.22	0.012			0.086		11.8	<0.0001	7.27	615	<1	<1	131	2	5.75	57	19	<1	<1	219	219	6.38	5.25		<0.01	0.08	0.08						
MW2	20-Nov-14	3.63	4.42	7.4	615	20.4																																										
MW2	26-Feb-15	3.32	4.11	7.3	495	21.6	0.01	0.002	<0.001	0.007	<0.0001	<0.001	0.001	0.006	0.001	0.066	0.002	<0.01	<0.01	0.027	0.05	0.75	<0.0001	7.59	567	<1	<1	113	2	4.97	27	16	<1	<1	214	214	5.37	3.97	0.02	<0.01	0.02	0.02	306					
MW2	26-May-15	3.44	4.23	7.2	522	19.7																																										
MW2	27-Aug-15	3.46	4.25	7.1	540	18	0.87	0.002	<0.001	0.015	<0.0001	<0.001	<0.001	0.006	0.001	0.035	0.002	<0.01	0.01	0.028	<0.05	0.69	<0.0001	7.32	538	1	1	119	1	5.33	28	13	<1	<	188	188	4.82	5.04	0.04	<0.01	<0.01	0.02	298					
MW2	4-Dec-15	3.49	4.28	7.1	528	20.2																																										
MW2	24-Feb-16	3.62	4.41	7	562	21.4	0.48	0.002	<0.001	0.008	<0.0001	<0.001	<0.001	0.032	<0.001	0.038	0.002	<0.01	<0.01	0.016	<0.05	0.45	<0.0001	7.38	575	2	2	131	2	6.01	37	3.1	<1	<1	209	209	5.66	3	<0.01	<0.01	0.03	0.03	305					
MW2	23-May-16	3.74	4.53	6.9	597	21																																										
MW2	1-Sep-16	3.5	4.29	6.9	554	19.6	11.7	0.004				0.01		0.02	0.007	0.287	0.011			0.091		11.4	0.0001	7.04	557	<1	<1	130	2	5.7	36	19	<1	<1	207	207	5.55	1.35		<0.01	0.27	0.27						
MW2	29-Nov-16	3.54	4.33	7	524	21.2																																										
MW2	23-Mar-17	3.85	4.64	7	650		4.76	0.002	<0.001	0.032	<0.0001	0.004	0.004	0.019	0.004	0.235	0.005	<0.001	0.02	0.045	0.06	4.7	<0.0001	7.7	639	<1	1	138	2	6.14	48	18	<1	<1	232	232	6.36	1.82	0.02	<0.01	0.74	0.74	432					
MW2	21-Jun-17	3.85	4.64	7	591	18.9																																										
MW2	13-Sep-17	3.64	4.43	6.9	548		0.32	0.001	<0.001	0.006	<0.0001	<0.001	0.001	0.002	<0.001	0.077	0.001	<0.01	<0.01	0.01	0.07	0.21	<0.0001	7.54	533	2	1	130	2	5.89	31	16	<1	<1	226	226	5.72	1.42	0.02	<0.01	1.11	1.11	295					
MW2	13-Dec-17	3.68	4.47	7	545	20.2																																										
MW2	22-Mar-18	4.23	5.02	7.3	519	21.2	17.5	0.004	<0.001	0.073	<0.0001	0.013	0.011	0.013	0.01	0.8	0.012	<0.01	0.03	0.056	0.06	16.8	0.0004	7.4	498	3	2	102	1	4.78	34	15	<1	<1	204	204	5.35	5.64	0.04	0.01	0.97	0.98	348					
MW2	12-Jun-18	4.67	5.46	7.3	547																																											
MW2	13-Sep-18	4.79	5.58	6.8	600	21.2	18.3	0.003	0.001	0.077	<0.0001	0.015	0.009	0.013	0.009	0.492	0.013	<0.01	0.03	0.06	0.07	19.2	<0.0001	7.21	615	2	2	119	2	5.49	63	18	<1	<1	192	192	5.99	4.32	0.04	<0.01	0.89	0.89	612					
MW2	5-Dec-18	3.53	4.32	6.8	545	20.4																																										
MW2	14-Mar-19	3.55	4.34	7.1	560	21	4	0.002	<0.001	0.02	<0.0001	0.004	0.002	0.004	0.002	0.168	0.003	<0.01	0.01	0.014	0.07	3.68	<0.0001	7.38	532	<1	<1	122	2	5.36	40	20	<1	<1	186	186	5.26	0.91	0.01	<0.01	3.08	3.08	532				<20	<100
MW2	19-Jun-19	3.41	4.2	7	461	20.4																																										
MW2	11-Sep-19	4.01	4.8	6.9	530	21	11.9	0.003	<0.001	0.049	<0.0001	0.01	0.006	0.007	0.006	0.341	0.009	<0.01	0.02	0.028	0.07	9.97	<0.0001	7.35	530	2	1	113	2	5.15	44	22	<1	<1	166	166	5.02	1.3		<0.01	2.32	2.32	379					
MW2	5-Dec-19	4.65	5.44	7.1	560	21.2																																										
MW2	18-Mar-20	3.15	3.94	7.1	470	22.8	2.78	0.001	<0.001	0.008	<0.0001	0.004	<0.001	<0.001	<0.001	0.028	0.002	<0.01	<0.01	0.009	0.07	1.8	<0.0001	7.59	496	2	2	106	2	4.66	34	19	<1	<1	162	162	4.59	0.71	0.01	<0.01	1.8	1.8	310		<20	<50	<20	<100
MW2	11-Jun-20	3.18	3.97	7.3	490	20.8																																										
MW2	23-Sep-20	3.39	4.18	7.2	505	18.2	1.22	0.001	<0.001	0.008	<0.0001	0.001	<0.001	0.002	<0.001	0.054	0.001	<0.01	<0.01	0.01	0.06	1.1	<0.0001	7.39	435	<1	<1	101	1	4.42	29	14	<1	<1	187	187	4.84	4.61	<0.01	<0.01	0.15	0.15	299		<20	<50	<20	<100
MW2	8-Dec-20	3.71	4.5	7.3	535	16.5																																										
NAGERO																																																
MW3	2-Jun-06	15.08		7.65		20		<0.001																	1525	25	10	356	4		139	16				642												
MW3	15-Oct-06	15.71		7.85		23.1																			1534																							
MW3	11-Jan-07	15.89		7.66		24.9		<0.001				<0.001		0.006	<0.001		0.004								1600	19	7	381	4		127	4				696												
MW3	9-Jun-07	15.9		7.69		19.7		<0.001			<0.0001	<0.005		<0.001	<0.001		0.01			0.1					1028	15	5	389	3			3				673												
MW3	5-Oct-07	15.6		6.8		19.8																			1710																							
MW3	8-Jan-08	15.01		7.9		23.8																			1620																							
MW3	23-Apr-08	14.05		7.8		23.5																			1740																							
MW3	10-Jul-08	14.08		7.8		19																			1630																							
MW3	29-Oct-08	13.85		7.8		22.8																			1770																							
MW3	20-Jan-09	13.3		7.8		21.7																			1770																							
MW3	22-Apr-09	13.78		7.9		21.8																			1780																							
MW3	22-Jul-09	14.13		7.9		21.2																			1780																		890					
MW3	12-Nov-10	14.65		8		23.1																			1800																		890					
MW3	15-Feb-10	14.24		7.9	1440	21.5																			1440																		720					
MW3	16-Apr-10	13.21		8	1440	23.3																			1440																		720					
MW3	19-Jul-10	12.7		7.8	1700	20.3		0.002			<0.0001	<0.001		0.003	<0.001		0.003			0.013		0.27		7.93	1730	12	4	479	3	21.8	104	<1	<1	<1	871	871	20.3	3.56	0.17	<0.01	<0.01	<0.01	1020					
MW3	26-Oct-10	12.2		7.83	1730	21.7																																										
MW3	28-Jan-11	11.7		7.35	1750	26.1		0.001			<0.0001	<0.005		<0.001	<0.001		0.003			0.005		0.16		7.6	1740	10	4	436	3	19.8	108	<1	<1	<1	815	815	19.3	1.27	0.33	<0.01	<0.01	<0.01						
MW3	2-May-11	11.92		8.05	1760	22.2																																										
MW3	18-Jul-11	11.95		7.9	1760	20.8		<0.001			0.0001	0.003		<0.001	<0.001		0.004			0.017		<0.005		7.96	1840	11	4	3	454	20.7	104	<1	<1	<1	798	798	18.9	4.55	0.33	<0.01	0.02	0.02	1060					
MW3	24-Oct-11	12.1		8.08	1810	23.5																																										
MW3	18-Jan-12	11.25		6.86	1670	23.6		0.002			<0.0001	0.004		0.001	<0.001		0.007			0.02		0.49		7.63	1690	29	9	5	410	20.2	112	40	<1	<1	715	715	18.3	4.82	0.14	<0.01	<0.01	<0.01						
MW3	1-May-12	10.4		7.18	1840	22.5																																			910							
MW3	23-Jul-12	9.9		7.56	1700	20.6		<0.001			<0.0001	0.001		<0.001	<0.001		0.004			0.01		<0.05		8.05	1730	19	5	398	4	18.8	104	35	<1	<1	765	765	19	0.52	0.31	<0.01	0.02	0.02	1010					
MW3	23-Oct-12	9.84		7.66	1900	21.7																																					1020					
MW3	7-Mar-13	10.02		7.25	1650	21.9		0.001			<0.0001	0.008		0.001	<0.001		0.013			0.022		0.17		7.68	1830	18	5	470	4	21.9	103	31	<1	<1	815	815	19.8	4.79	0.17	<0.01	<0.01	<0.01	1190					
MW3	16-May-13	10.12		7.78	1730	20.7																																						0.86				
MW3	21-Aug-13	10.23		7.57		20.1		0.003			<0.0001	<0.001		<0.001	<0.001		0.002			0.008		<0.05		7.93	2020	12	4	504	4	23	284	52	<1	<1	592	592	20.9	4.58	0.23	<0.01	<0.01	<0.01						
MW3	14-Nov-13	10.39		8.13	1820	23.6																																						0.91				
MW3	3-Feb-14	10.3		8.41	1.87	23.3		0.001			<0.0001	<0.001		0.002	<0.001		0.002			0.013		<0.05		7.76	2140	17	5	464	4	21.5	319	60	<1	<1	477	477	19.8	4.23	0.12	<0.01	0.12	0.12		0.93				
MW3	17-Jul-14	10.00		7.98	2150																																											
MW3	29-Jan-15	10.47						0.001			<0.0001		<0.001	0.001	<0.001		0.002			0.026		<0.05		7.92	2050	17	5	436	3	20.3	369	74	<1	<	398	398	20.5	0.66	0.2	<0.01	0.02	0.02						
MW3	19-May-15	10.05		7.96	1790	21.9																																										
MW3	13-Aug-15	9.55				20.2		<0.001			<0.0001	<0.001		0.028	<0.001		0.003			0.584		<0.05		7.96	2060	15	5	403	3	18.8	285	78	<1	<1	451	451	18.7	0.2	0.32	<0.01	0.02	0.02						
MW3	30-Nov-15	9.28		7.22		23.2																																										
MW3	24-Feb-16	9.37		6.93		22.9		<0.001			<0.0001	<0.001		<0.001	<0.001		0.002			0.014		<0.05		7.94	2050	17	5	450	3	20.9	397	83	<1	<1	348	348	19.9	2.49	0.22	<0.01	<0.01	<0.01						
MW3	1-Mar-17	8.35		7.48	2060																																											
MW3	1-Jun-17	8.02		7.93	2060										<0.001																																	
MW3	1-Sep-17	8.24		7.44	2070																																											
MW3	1-Nov-17	8.17		7.64	2030										<0.001																																	
MW3	28-Mar-18	8.6		7.87	2050	23.3																																										
MW3	4-Jun-18	8.6		7.31	2050	21.5									<0.0005									6.79	2430																							
MW3	5-Jun-18	8.6		6.33	2040																																											
MW3	3-Sep-18	8.6		7.35	2050	22.5																																										
MW3	5-Dec-18	8.65		7.37	2020	24.1									<0.001									7.77	2130																							
MW3	22-Mar-19	9.1		7.87	2050	36.2																																										
MW3	19-Jun-19	9.35		7.76	2129	23.5		<0.001			<0.0001	<0.0001		<0.001	<0.001	0.105	0.005			<0.005		<0.05		8.28	2120	16	5	436	3		367	82	<1	<1	384	384			0.19	<0.01	0.01	0.01						
MW3	25-Nov-19	9.98		7.85	2097	26.6		<0.001			<0.0001	<0.0001		<0.001	<0.001	0.069	0.006			<0.005		<0.05		7.87	2090	15	5	431	3		447	80	<1	<1	419	419			0.22	<0.01	<0.01	<0.01						
MW3	23-Mar-20	9.59			2102																																						1.37					
MW3	2-Jun-20	9.18		7.61	2085	14.7		<0.001			<0.0001	<0.0001		<0.001	<0.001	0.079	0.008			<0.005		<0.05		7.89	2150	14	5	426	3		353	74	<1	<1	429	429			0.18	<0.01	0.12	0.12						
MW3	16-Sep-20	8.86		7.61	2176	27.7																																					1.42ppt					
TARRAWONGA																																																
MW4	2-Jun-06	8.8	9.5	7				0.006																	3290	157	118	614	19		905	155				1010												
MW4	9-Sep-06	8.6	9.3																																													
MW4	11-Jan-07	8.67	9.37	7.06				0.004			0.0003	<0.005		0.011	0.029		0.014			0.1			<0.0001		3430	152	103	594	17		787	143				1050												
MW4	9-Jul-07	9.13	9.83	6.82	5410	18.9		0.001			0.0004	<0.005		0.008	0.011		0.011			0.13			<0.0001		5400	211	166	829	16		1480	235				989								0.6	<20	330		
MW4	18-Jul-07	9.18	9.88																																													
MW4	7-Aug-07	9.17	9.87																																													
MW4	22-Aug-07	9.17	9.87																																													
MW4	5-Sep-07	9.21	9.91																																													
MW4	24-Sep-07	9.03	9.73																																													
MW4	11-Oct-07	8.97	9.67																																													
MW4	26-Nov-07	9.06	9.76																																													
MW4	29-Jan-08	9.1	9.8																																													
MW4	4-Mar-08	9.17	9.87																																													
MW4	4-Apr-08	9.15	9.85																																													
MW4	23-Apr-08	9.18	9.88	7.1	5160	18		0.004			0.0015	0.042		0.29	0.44		0.16			0.62			0.001		4960	210	158	802	21		1240	317				995									<0.025	<0.1		
MW4	21-Aug-08	9.31	10.01																																													
MW4	29-Oct-08	9.28	9.98	7	5740	22.2		0.001			0.00009	0.008		0.008	0.18		0.016			0.2			<0.0001		5800	220	170	840	23		1400	280				980									<0.025	<0.100		
MW4	29-Jan-09	9.29	9.96																																													
MW4	17-Jun-09		10.05	6.8	5400	21.5		0.007	0.003	1.16	0.0004	0.023	0.015	0.207	0.106	1.82	0.055		0.04	0.278		24.9	0.0004		4920	189	147	755	16	54.8	1160	156	<1	<1	977	977	55.6	0.8	<0.01				2980					
MW4	28-Aug-09	9.48	10.1																																													
MW4	14-Dec-09	9.52	10.14	6.94	5060	25.6	<0.01	0.001				<0.005		0.001	<0.001	0.671	0.016			0.114		<0.05	<0.0001	7.35	5040	187	149	746	16	54.5	64.1	31.6	<1	<1	783	783	45.3	3.41		0.02	0.45	0.48						
MW4	25-Feb-10	9.68	10.3																																													
MW4	11-May-10	9.66	10.28	7.58	5660	21.8		0.012	0.006	1.84	0.0006	0.033	0.03	0.17	0.138	1.26	0.096		0.08	0.238		25.3	0.0002		5210	149	115	821	14	53	1180	200	<1	<1	942	942	56.2	3.01	0.02				3120					
MW4	30-Aug-10	9.69	10.31	7.33	4740	20																																										

Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	Field Parameters			Total Metals																		Major Cations				Total Cations - meq/L	Major Anions						Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
				pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L													
ANZECC Guideline - stock drinking water							**5**	**0.5**			**0.01**	**1**	**1**	**1**	**0.1**		**1**	**0.02**		**20**			**0.002**			**1000**						**1000**								**400**		**4000**					
MW4	9-Nov-10	9.61	10.23	6.9	3810	24.4																																						
MW4	10-Mar-11	9.31	9.93	7.18	3060	24.9	0.77	<0.001				0.005		0.084	0.15	0.188	0.014			0.801		1.08	<0.0001	7.37	3460	78	63	741	11	41.6	730	87	<1	<1	893	893	40.2	1.61		0.04	0.38	0.41						
MW4	6-Jun-11	9.42	10.04	7.25	3080	18.7																																						
MW4	6-Sep-11	9.46	10.08	7.12	3196	21	0.65	<0.001	<0.001	0.146	<0.0001	0.001	0.002	0.008	0.006	0.175	0.006		<0.01	0.418		0.7	<0.0001	7.77	3910	74	58	702	10	39.3	700	104	<1	<1	861	861	39.1	0.15	0.2	<0.01	0.43	0.43						
MW4	7-Dec-11	9.35	9.97	7.1	3180	20.5																																						
MW4	13-Mar-12	9.36	9.98	7.6	2580	22.1	0.16	<0.001	<0.001	0.159	<0.0001	<0.001	<0.001	0.01	<0.001	0.017	0.004		<0.01	0.27		0.3	<0.001	8.01	3690	90	64	759	13	43.1	700	103	<1	<1	898	898	39.8	3.92	<0.01	<0.01	0.85	0.85	2130					
MW4	13-Jun-12	9.22	9.84	7.52	3850	20.6																																						
MW4	4-Sep-12	9.11	9.73	7.72	3410	21.8	0.07	<0.001	<0.001	0.167	<0.0001	<0.001	<0.001	0.058	0.005	0.116	0.007		<0.01	0.513		0.44	<0.0001	7.98	3770	82	65	664	12	38.6	674	108	<1	<1	962	962	40.5	2.37	0.02	0.02	1.04	1.06	2170					
MW4	27-Nov-12	8.94	9.56	7.74	3440	21.7																																						
MW4	20-Mar-13	8.92	9.54	7.53	3420	21.6	0.27	0.001	<0.001	0.156	<0.0001	0.011	<0.001	0.05	0.006	0.158	0.01		<0.01	0.338		0.4	<0.0001	7.65	3730	104	73	672	12	40.7	652	49	<1	<1	880	880	37	4.78	0.02	<0.01	1.68	1.68	2020					
MW4	11-Jul-13	8.87	9.49	7.76	3410	20.9																																						
MW4	5-Sep-13	8.83	9.45	7.63	3560	21.8	0.21	<0.001	0.182	<0.05	0.0002	0.001	0.005	0.144	0.018	0.282	0.008	<0.01	<0.01	0.453	<0.001	0.68	<0.0001	7.99	3950	110	81	704	15	43.2	745	110	<1	<1	908	908	41.4	2	0.09				2260					
MW4	22-Nov-13	8.61	9.23	7.6	3720	21.7																																						
MW4	24-Feb-14	8.74	9.36	7.6	3920	21.4	0.14	<0.001	0.166	<0.05	0.0003	0.005	<0.001	0.128	0.006	0.116	0.007	<0.01	<0.01	0.444	<0.001	1.22	<0.0001	7.98	3890	93	78	644	15	39.5	676	113	<1	<1	875	875	38.9	0.68	0.06				2010					
MW4	27-May-14	8.78	9.4	7.6	3840	21.3																																						
MW4	9-Sep-14	8.76	9.38	7.2	4090	20.5	0.13	<0.001				0.003		0.057	0.007	0.235	0.008			0.334		0.86	<0.0001	7.83	4170	108	79	597	11	38.1	679	118	<1	<1	1020	1020	42	4.83		0.2	0.54	0.74						
MW4	20-Nov-14	8.72	9.34	7.3	3970	21.8																																						
MW4	26-Feb-15	8.71	9.33	7.3	4030	21.6	0.13	<0.001	<0.001	0.159	<0.0001	0.002	0.002	0.033	0.02	0.373	0.007	<0.01	<0.01	0.244	<0.05	3.4	<0.0001	7.7	4430	131	107	687	14	45.6	786	132	<1	<1	1090	1090	46.7	1.23	0.18	0.01	0.97	0.98	2200					
MW4	26-May-15	8.93	9.55	7.3	4120	20.7																																						
MW4	27-Aug-15	8.85	9.47	7.2	4340	19.5	0.02	<0.001	<0.001	0.159	<0.0001	<0.001	<0.001	0.004	0.002	0.359	0.004	<0.01	<0.01	0.149	<0.05	1.21	<0.0001	7.72	4680	123	107	719	14	46.6	711	151	<1	<1	870	870	40.6	6.85	0.56	<0.01	0.6	0.6	2550					
MW4	4-Dec-15	8.85	9.47	7.3	4410	21.1																																						
MW4	24-Feb-16	8.86	9.48	7.4	4450	21.7	0.2	0.003	0.002	0.18	0.0004	0.003	0.003	0.02	0.014	0.46	0.006	<0.01	<0.01	0.209	<0.05	1.84	<0.0001	7.85	4650	156	119	767	17	51.4	899	152	<1	<1	988	988	48.3	3.1	2.22	<0.01	0.07	0.07	2610					
MW4	23-May-16	8.92	9.54	7.4	4480	21.4																																						
MW4	1-Sep-16																																												
MW4	29-Nov-16	8.91	9.53	7.3	4330	22.8																																						
MW4	23/03/2017	8.92	9.54	7.4	4370		0.54	<0.001	<0.001	0.184	0.0002	<0.001	0.002	0.036	0.011	0.356	0.008	<0.01	<0.01	1.57	<0.05	1.05	<0.0001	8.13	4610	145	113	710	16	47.8	882	101	<1	<1	982	982	46.6	1.3	0.1	0.05	1.36	1.41	2800					
MW4	21/06/2017	9	9.62	7.4	4370	19.7																																						
MW4	13/09/2017	8.9	9.52	7.3	4420		0.75	<0.001	<0.001	0.166	<0.0001	<0.001	0.001	0.015	0.009	0.316	0.005	<0.01	<0.01	0.686	<0.05	1.46	<0.0001	7.82	4570	141	116	730	15	48.7	848	147	<1	<1	1040	1040	47.8	0.99	0.03	0.08	1.15	1.23	2450					
MW4	13-Dec-17	8.95	9.57	7.2	4440	22.6																																						
MW4	22-Mar-18	9.08	9.7	7.4	4610	21.3									0.013									7.4	4470																					
MW4	12-Jun-18	9.14	9.76	7.3	4430																																								
MW4	13-Sep-18	9.34	9.96	6.9	4370	22.1	0.05	0.001	<0.001	0.161	<0.0001	<0.001	0.001	0.004	0.002	0.307	0.004	<0.01	<0.01	0.077	<0.05	0.12	<0.0001	7.49	4560	155	102	611	10	43	959	142	<1	<1	919	919	48.4	5.92	0.33	<0.01	0.06	0.06	2310					
MW4	5-Dec-18	9.46	10.08	7	4610	21.9																																						
MW4	14-Mar-19	9.58	10.2	7.2	4480	21.9	0.14	<0.001	<0.001	0.181	<0.0001	0.001	<0.001	0.005	0.008	0.394	0.003	<0.01	<0.01	0.079	<0.05	0.65	<0.0001	7.67	4840	145	112	702	16	47.4	818	145	<1	<1	1010	1010	46.3	1.2	2	0.05	0.21	0.26	2460			<20	360	
MW4	19-Jun-19	9.41	10.03	7.3	3860	20.5																																						
MW4	11-Sep-19	9.62	10.24	7.4	3460	20.8	0.12	<0.001	<0.001	0.075	<0.0001	0.001	<0.001	0.002	0.002	0.141	0.002	<0.01	<0.01	0.023	<0.05	0.4	<0.0001	7.95	3460	78	52	685	8	38.2	682	112	<1	<1	715	715	35.8	3.13		<0.01	0.08	0.08	1930					
MW4	5-Dec-19	10.14	10.76	7.3	3530	21.8																																						
MW4	18-Mar-20	10.46	11.08	7.5	3490	22.5	0.02	<0.001	<0.001	0.077	<0.0001	<0.001	<0.001	0.002	<0.001	0.13	<0.001	<0.01	<0.01	0.017	<0.05	0.21	<0.0001	7.74	3600	70	50	674	8	36.6	716	124	<1	<1	822	822	39.2	3.49	0.82	0.02	0.05	0.07	2040		<20	<50	<20	<100
MW4	11-Jun-20	10.57	11.19	7.4	3530	21.5																																						
MW4	23-Sep-20	10.38	11	7.3	3580	19.4	0.06	<0.001	<0.001	0.086	<0.0001	<0.001	<0.001	0.002	0.002	0.174	0.002	<0.01	<0.01	0.051	<0.05	0.14	<0.0001	8.02	3380	67	50	653	8	36.1	650	94	<1	<1	953	953	39.3	4.33	8.34	0.03	0.12	0.15	2050		<20	<50	<20	<100
MW4	8-Dec-20	10.35	10.97	7.4	3640	19.2																																						
TEMPLEMORE																																												
MW5	2-Jun-06	2.78	3.4	6.9				0.006																	1530	17	13	373	6		169	138				472											
MW5	9-Sep-06	2.98	3.6																																										
MW5	11-Jan-07	3.56	4.18	7.25				0.003			<0.0001	<0.001		<0.001	<0.001		0.013			0.09					4870	44	49	1070	13		1060	435				836											
MW5	18-Apr-07	2.98	3.6																																									
MW5	10-Jul-07	3.85	4.47	7.59	1360	19.7		0.002			<0.0001	<0.005		0.001	<0.001		0.009			0.111			<0.0001		1930	14	15	13	5		291	161				380								1.32	<20	3490		
MW5	18-Jul-07	3.87	4.49																																									
MW5	7-Aug-07	3.92	4.54																																									
MW5	22-Aug-07	3.88	4.5																																									
MW5	5-Sep-07	3.84	4.46																																									
MW5	24-Sep-07	3.86	4.48																																									
MW5	11-Oct-07	3.91	4.53																																									
MW5	26-Nov-07	3.94	4.56																																									
MW5	29-Jan-08	3.06	3.68																																									
MW5	4-Mar-08	3.01	3.63																																									
MW5	4-Apr-08	3.07	3.69																																									
MW5	23-Apr-08	3.15	3.77	7.9	3550	19.9		0.012			0.00017	0.006		0.027	0.054		0.042			0.11			<0.0001		3260	29	33	696	13		553	332				630											
MW5	21-Aug-08	3.10	3.72																																									
MW5	29-Oct-08	2.97	3.59	7.3	3300	19.1		0.008			<0.00005	0.005		0.004	0.018		0.007			0.028			<0.0001		3400	21	24	640	11		560	290				680								<0.025	0.57			
MW5	29-Jan-09	3.12	3.73																																									
MW5	17-Jun-09	3.33	4.18	7.7	2390	19.6		0.012	<0.001	0.054	<0.0001	0.002	0.003	0.02	0.019	0.586	0.006		<0.01	0.105		1.66	<0.0001		2120	13	15	485	8	23.2	315	120	<1	<1	486	486	21.1	4.6	0.07				1370					
MW5	14-Sep-09	3.52	4.32																																									
MW5	14-Dec-09	3.76	4.56	7.21	6900	28.4	0.04	0.016				<0.001		0.002	<0.001	1.4	0.022			0.078		0.19	<0.0001	7.44	7460	9	106	1870	28	91	1720	678	<1	<1	1110	1110	84.9	3.44		<0.01	<0.01	<0.01						
MW5	25-Feb-10	2.91	3.71																																									
MW5	11-May-10	3	3.8	7.73	6590	22		0.032	0.001	0.426	0.009	0.024	0.032	0.07	0.068	1.59	0.071		0.05	0.277		23	<0.0001		5920	38	70	1210	17	60.5	1260	491	<1	<1	838	838	62.4	1.53	0.1				3630					
MW5	30-Aug-10	2.6	3.4	7.85	1740	22.8																																						
MW5	9-Nov-10	2.48	3.28	7.35	2620	24.1																																						
MW5	10-Mar-11	2.51	3.31	7.39	1917	25.2	0.81	0.01				0.001		0.03	0.007	0.64	0.003			0.139		0.79	<0.0001	7.69	1980	11	13	474	8	22.4	396	150	<1	<1	416	416	22.6	0.49		<0.01	0.11	0.11						
MW5	6-Jun-11	2.47	3.27	7.45	1032	20.8																																						
MW5	6-Sep-11	2.7	3.5	7.39	1910	22.6	6.24	0.012	<0.001	0.051	<0.0001	0.004	0.001	0.006	0.004	0.081	0.005		<0.01	0.032		4.1	<0.0001	7.89	2310	10	11	501	7	23.4	385	177	<1	<1	427	427	23.1	0.6	0.11	<0.01	0.04	0.04	1360					
MW5	7-Dec-11	1.96	2.76	7.36	2275	20.5																																						
MW5	13-Mar-12	1.28	2.08	7.52	1110	25.1	1.91	0.006	<0.001	0.027	<0.0001	0.002	<0.001	0.005	<0.001	0.122	0.003		0.01	0.02		1.2	<0.0001	7.78	1250	8	7	292	5	13.8	262	45	<1	<1	269	269	13.7	0.33	<0.01	<0.01	0.43	0.43	736					
MW5	13-Jun-12	1.58	2.38	7.81	977	20.3																																						
MW5	4-Sep-12	1.46	2.26	7.63	1980	20.1	7.89	0.016	<0.001	0.056	<0.0001	0.004	<0.001	0.014	0.007	0.073	0.004		<0.01	0.086		5.13	<0.0001	7.92	2120	9	11	473	8	22.1	380	146	<1	<1	439	439	22.5	0.93	<0.01	<0.01	<0.01	<0.01	1400					
MW5	27-Nov-12	1.84	2.64	7.65	2650	22.5																																						
MW5	20-Mar-13	1.94	2.74	7.54	1430	24.7	0.53	0.011	<0.001	0.029	<0.0001	0.002	<0.001	0.054	0.008	0.33	0.004		<0.01	0.158		0.56	<0.0001	7.61	1520	7	8	321	6	15.1	236	46	<1	<1	323	323	14.1	3.57	0.08	<0.01	0.06	0.06	956					
MW5	11-Jul-13	2.26	3.06	7.62	846	21.5																																						
MW5	5-Sep-13	2.45	3.25	7.55	1640	21.8	4.62	0.011	0.038	0.12	<0.0001	0.003	<0.001	0.062	0.009	0.07	0.004	<0.01	<0.01	0.118	<0.001	3.25	<0.0001	8.07	1810	5	7	406	8	18.7	287	115	<1	<1	396	396	18.4	0.73	0.02				1040					
MW5	22-Nov-13	2.76	3.56	7.7	2430	21.1																																						
MW5	20-Feb-14	3.01	3.81	7.9	1790	22.7	2.6	0.014	0.039	<0.05	0.0004	0.01	0.002	0.166	0.024	0.232	0.007	<0.01	<0.01	0.46	<0.001	2.68	<0.0001	7.77	1850	7	8	394	6	18.3	282	111	<1	<1	377	377	17.8	1.34	<0.01				964					
MW5	27-May-14	2.77	3.57	7.7	925	22.5																																						
MW5	9-Sep-14	2.80	3.6	7.7	2130	20.5	12.7	0.014				0.009		0.059	0.016	0.379	0.019			0.141		8.81	<0.0001	7.99	2200	7	8	462	8	21.3	319	159	<1	<1	476	476	21.8	1.23		0.02	0.65	0.67						
MW5	20-Nov-14	3.00	3.8	7.8	3020	22.3																																						
MW5	26-Feb-15	3.18	3.97	7.8	1890	23.7	1.18	0.01	<0.001	0.026	<0.0001	<0.001	<0.001	0.005	<0.001	0.044	0.002	<0.01	<0.01	0.04	<0.05	0.74	<0.0001	8.15	2060	5	6	399	6	18.2	299	130	<1	<1	433	433	19.8	4.09	0.01	<0.01	0.14	0.14	1060					
MW5	26-May-15	3.29	4.08	7.8	2120	21.3																																						
MW5	27-Aug-15	3.19	3.98	7.7	2110	19.7	1.29	0.023	<0.001	0.051	<0.0001	<0.001	<0.001	0.002	<0.001	0.373	0.002	<0.01	<0.01	0.036	<0.05	1.67	<0.0001	8.08	2210	8	9	465	6	21.5	262	174	<1	<1	424	424	19.5	4.92	0.04	<0.01	0.02	0.02	1300					
MW5	4-Dec-15	3.29	4.08	7.7	3070	21.2																																						
MW5	24-Feb-16	3.36	4.15	7.7	2060	23.5	0.95	0.01	<0.001	0.036	<0.0001	<0.001	<0.001	0.013	0.002	0.209	0.003	<0.01	<0.01	0.071	<0.05	0.79	<0.0001	7.76	2230	12	13	519	7	24.4	361	184	<1	<1	471	471	23.4	2.04	0.09	<.01	0.24	0.24	1180					
MW5	23-May-16	3.41	4.2	7.7	1632	23.4																																						
MW5	1-Sep-16	2.29	3.08	7.7	1700	21	5.55	0.009				0.003		0.007	0.002	0.071	0.004			0.05		3.86	<0.0001	7.96	1750	6	7	378	5	17.4	256		<1	<1	382	382	17.5	0.25		<0.01	1.1	1.1						
MW5	29-Nov-16	2	2.79	7.6	3010	20.7																																						

				Field Parameters			Total Metals																			Major Cations					Major Anions																	
Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L	Total Cations - meq/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L	Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
ANZECC Guideline - stock drinking water							5	0.5			0.01	1	1	1	0.1		1	0.02		20			0.002			1000						1000									400		4000					
MW5	23-Mar-17	2.36	3.15	7.7	1750		0.59	0.007	<0.001	0.042	<0.0001	<0.001	0.002	0.03	0.005	0.638	0.004	<0.01	<0.01	0.144	<0.05	0.5	<0.0001	8.24	1750	8	9	352	7	16.6	293	92	<1	<1	340	340	17	1.02	0.94	0.14	2.4	2.54	1100					
MW5	21-Jun-17	2.55	3.34	7.9	1288	20.7																																										
MW5	13-Sep-17	2.76	3.55	7.8	2610		1.13	0.014	<0.001	0.035	<0.0001	<0.001	<0.001	0.007	0.005	0.082	0.001	<0.01	<0.01	0.085	<0.05	0.74	<0.0001	8.19	2640	12	14	567	8	26.6	421	200	<1	<1	561	561	27.2	1.17	0.06	<0.01	0.06	0.06	1520					
MW5	13-Dec-17	2.79	3.58	7.7	2630	21.4																																										
MW5	22-Mar-18	3.12		7.9	2320																																											
MW5	12-Jun-18	3.31	4.1	7.9	1413																																											
MW5	13-Sep-18	3.56	4.35	7.8	1980	22	1.43	0.01	<0.001	0.03	<0.0001	<0.001	<0.001	0.005	0.002	0.035	<0.001	<0.01	<0.01	0.024	<0.05	1.09	<0.0001	8.07	2040	8	8	386	5	18	341	146	<1	<1	418	418	21	7.78	0.04	<0.01	0.03	0.03	1080					
MW5	5-Dec-18	3.41	4.2	7.7	2130	21.5																																										
MW5	14-Mar-19	3.41	4.2	7.9	1240	24.1	1.65	0.01	<0.001	0.023	<0.0001	<0.001	<0.001	0.004	0.001	0.044	0.002	<0.01	0.01	0.028	<0.05	1.4	<0.0001	8.11	1220	3	3	286	4	12.9	162	69	<1	<1	313	313	12.3	2.69	0.02	<0.01	0.17	0.17	764				<20	<100
MW5	19-Jun-19	2.91	3.7	7.6	1292	22.5																																										
MW5	11-Sep-19	2.9	3.69	7.8	2100	20.4	2.47	0.009	<0.001	0.032	<0.0001	0.002	<0.001	0.004	0.002	0.044	0.002	<0.01	0.01	0.031	<0.05	1.63	<0.0001	8.12	2120	10	10	450	7	21.2	370	164	<1	<1	393	393	21.7	1.47		<0.01	0.09	0.09	1170		<20	<50	<20	<100
MW5	5-Dec-19	3.25	4.04	7.8	2080	21.4																																										
MW5	18-Mar-20	2.41	3.2	7.5	835	24.5	1.8	0.006	<0.001	0.018	<0.0001	<0.001	<0.001	<0.001	<0.001	0.04	0.001	<0.01	0.01	0.02	<0.05	1.35	<0.0001	7.81	874	4	3	182	3	7.89	115	48	<1	<1	180	180	7.84	0.33	0.03	<0.01	1.51	1.51	504		<20	<50	<20	<100
MW5	11-Jun-20	2.3	3.09	7.6	675	20.7																																										
MW5	23-Sep-20	2.34	3.13	7.7	1920	18.3	4.41	0.01	<0.001	0.034	<0.0001	0.002	<0.001	0.006	0.003	0.055	0.002	<0.01	<0.01	0.029	<0.05	3.28	<0.0001	8.09	2090	9	10	432	7	20.2	360	142	<1	<1	461	461	22.3	4.89	0.02	<0.01	0.28	0.28	1390		<20	<50	<20	<100
MW5	8-Dec-20	2.67	3.46	7.8	1960	18.1																																										
NAGERO																																																
MW6	2-Jun-06	8.34	9	7.3				<0.001																	2030	59	29	440	8		308	55				720												
MW6	9-Sep-06	8.84	9.5																																													
MW6	11-Jan-07	9.15	9.81	6.89				<0.001			<0.0001	<0.005		<0.001	<0.001		0.011			0.08			<0.0001		2030	62	30	426	7		252	51				724												
MW6	10-Jul-07	9.37	10.03	7.5	2060	18.1		0.0005			0.00005	0.0025		0.001	0.0005		0.004			0.01			0.00005		2000	58	27	411	8		283	47				666								5.99				
MW6	18-Jul-07	9.35	10.01																																													
MW6	7-Aug-07	9.32	9.98																																													
MW6	22-Aug-07	9.29	9.95																																													
MW6	5-Sep-07	9.31	9.97																																													
MW6	24-Sep-07	9.07	9.73																																													
MW6	11-Oct-07	9.16	9.82																																													
MW6	26-Nov-07	9.17	9.83																																													
MW6	29-Jan-08	9.06	9.72																																													
MW6	4-Mar-08	8.815	9.475																																													
MW6	22-Apr-08	8.62	9.28	7.1	2000	21.1		0.001			<0.00005	0.001		0.002	0.0031		0.006			0.005			<0.0001		2120	64	29	391	9.8		273	51				670									<0.025	<0.1		
MW6	21-Aug-08	8.545	9.205																																													
MW6	29-Oct-08	8.48	9.15	7.1	2050	23.9		0.001			0.00005	0.003		0.003	0.077		0.004			0.034			<0.0001		2100	60	27	380	8.5		280	50				680									<0.025	0.18		
MW6	29-Jan-09	8.33	9.1																																													
MW6	14-Sep-09	8.65	9.43																																													
MW6	14-Dec-09	8.86	9.64	7.13	2112	23.4	<0.01	<0.001				<0.005		<0.001	0.002	0.336	0.008			0.01		<0.05	<0.0001	7.3	2100	56	26	385	8	21.9	252	39.4	<1	<1	652	652	21	2.24		0.02	0.53	0.55						
MW6	25-Feb-10	8.84	9.62																																													
MW6	11-May-10	8.3	9.08	7.56	2360	21.5		<0.001	<0.001	0.193	<0.0001	0.002	0.002	0.002	0.006	0.278	0.003		<0.01	0.008		2.13	<0.0001		2030	56	26	380	7	21.6	261	42.2	<1	<1	645	645	21.1	1.14	<0.01				1160					
MW6	30-Aug-10	8	8.78	7.2	1927	23.8																																										
MW6	9-Nov-10	7.72	8.5	7.03	1835	24.3																																										
MW6	10-Mar-11	7.41	8.19	7.08	1783	24	0.15	<0.001				0.002		0.034	0.015	0.047	0.003			0.216		0.32	<0.0001	7.53	1790	55	27	406	9	22.9	293	42	<1	<1	627	627	21.7	2.61		0.03	0.97	1						
MW6	6-Jun-11	7.44	8.22	7.15	1670	19.6																																										
MW6	6-Sep-11	Piezo damaged																																														
MW6	7-Dec-11	Piezo damaged																																														
MW6	13-Mar-12	5.74	6.52	7.49	1840	23.4	0.15	<0.001	<0.001	0.125	<0.0001	0.002	<0.001	0.009	0.001	0.013	0.004		<0.01	0.071		0.12	<0.0001	7.68	1980	55	24	390	9	21.9	262	46	<1	<1	624	624	20.8	2.54	<0.01	<0.01	1.44	1.44	1150					
MW6	13-Jun-12	5.87	6.65	7.45	2040	21.3																																										
MW6	4-Sep-12	5.58	6.36	7.82	1840	22	0.09	<0.001	<0.001	0.143	<0.0001	<0.001	<0.001	0.012	0.003	0.013	0.003		<0.01	0.072		0.18	<0.0001	8.08	1990	53	25	381	8	21.5	276	39	<1	<1	681	681	22.2	1.69	<0.01	<0.01	1.13	1.13	1210					
MW6	27-Nov-12	5.55	6.33	7.6	1817	21.1																																										
MW6	20-Mar-13	5.75	6.53	7.46	343	22.8	0.49	0.001	<0.001	0.037	<0.0001	0.003	<0.001	0.081	0.009	0.095	0.006		0.02	0.402		0.56	<0.0001	7.43	351	12	3	49	8	3.18	16	28	<1	<1	106	106	3.15	0.44	0.23	0.1	0.6	0.7	252					
MW6	11-Jul-13	5.88	6.66	7.62	452	20.8																																										
MW6	5-Sep-13	5.96	6.74	7.21	465	21.3	0.86	<0.001	0.038	0.08	<0.0001	0.002	<0.001	0.075	0.006	0.058	0.005	<0.01	0.02	0.151	<0.001	0.93	<0.0001	7.8	496	18	3	75	10	4.66	25	60	<1	<1	132	132	4.59	0.74	0.09				327					
MW6	22-Nov-13	5.85	6.63	7.2	486	20.8																																										
MW6	24-Feb-14	5.84	6.62	7.8	215	22.1	0.48	<0.001	0.02	<0.05	<0.0001	0.008	0.001	0.045	0.004	0.094	0.005	<0.01	0.02	0.185	<0.001	0.5	<0.0001	7.51	212	8	1	29	8	1.95	5	26	<1	<1	66	66	2		0.35				182					
MW6	27-May-14	5.64	6.42	7.5	360	22.1																																										
MW6	9-Sep-14	5.54	6.32	7.6	845	21.4	1.63	0.002				0.005		0.006	0.016	0.154	0.012			0.13		1.55	<0.0001	7.61	854	24	7	140	8	8.07	83	46	<1	<1	274	274	8.77	4.22		<0.01	<0.01	<0.01						
MW6	20-Nov-14	5.55	6.33	7.5	712	21.6																																										
MW6	26-Feb-15	5.64	6.43	7.6	543	22.2	0.13	<0.01	<0.01	0.036	<0.0001	0.001	<0.001	0.012	0.002	0.059	0.007	<0.01	<0.01	0.238	<0.05	0.32	<0.0001	7.67	617	25	5	89	10	5.79	43	42	<1	<1	173	173	5.54	2.11	0.06	<0.01	0.62	0.62	353					
MW6	26-May-15	5.65	6.44	7.5	692	19.7																																										
MW6	27-Aug-15																																															
MW6	4-Dec-15	5.4	6.18	7.8	946	21.2																																										
MW6	24-Feb-16	5.38	6.16	7.6	1012	21.2	0.31	0.002	<0.001	0.083	<0.0001	0.004	<0.001	0.018	0.006	0.063	0.01	<0.01	<0.01	0.211	0.06	1.94	<0.0001	7.85	1080	41	12	203	10	12.1	125	46	<1	<1	327	327	11	4.73	0.09	<0.01	0.98	0.98	620					
MW6	23-May-16	5.36	6.14	7.6	1090	21.8																																										
MW6	6-Sep-16	5.15	5.93	7.6	1080	23.3	0.04	<0.001				<0.001		0.004	<0.001	0.016	0.007			0.079		0.49	<0.0001	7.77	1100	34	10	181	9	10.6	129		<1	<1	331	331	11	1.97		<0.01	0.42	0.42						
MW6	29-Nov-16	4.74	5.52	7.5	1416	21.2																																										
MW6	13-Mar-17	4.68	5.46	7.5	1600	22.8	0.04	<0.001	<0.001	0.103	0.0001	0.003	<0.001	0.026	0.002	0.008	0.007	<0.01	<0.01	0.156	0.07	0.21	<0.0001	8.25	1630	44	20	296	9	16.9	269	45	<1	<1	481	481	18.1	3.39	0.01	<0.01	1.1	1.1	980					
MW6	21-Jun-17	4.77	5.55	7.5	1660	21.8																																										
MW6	13-Sep-17	4.57	5.35	7.6	1660		0.05	<0.001	<0.001	0.09	<0.0001	0.007	<0.001	0.006	<0.001	0.006	0.008	<0.01	<0.01	0.121	0.08	0.14	<0.0001	8.15	1710	51	22	318	9	18.4	221	46	<1	<1	573	573	18.6	0.6	0.03	<0.01	1.7	1.7	1710					
MW6	13-Dec-17	4.55	5.33	7.6	1738	21.7																																										
MW6	22-Mar-18	4.76	5.54	7.8	1833																																											
MW6	12-Jun-18	4.75	5.53	7.7	1828																																											
MW6	13-Sep-18	4.84	5.62	8	2020	21.8	0.06	<0.001	<0.001	0.11	<0.0001	0.001	<0.001	0.002	<0.001	0.005	0.003	<0.01	<0.01	0.007	0.07	0.09	<0.0001	8.23	2090	38	26	344	6	19.2	347	48	<1	<1	566	566	22.1	7.14	0.04	<0.01	1.35	1.35	2090					
MW6	5-Dec-18	4.85	5.63	7.6	2200	21.3																																										
MW6	14-Mar-19	Casing broken																																														
MW6	19-Jun-19	Casing broken																																														
MW6	11-Sep-19	Casing broken																																														
MW6	5-Dec-19	Casing broken																																														
MW6	10-Jun-20	Casing broken																																														
MW6	23-Sep-20	Casing broken																																														
MW6	8-Dec-20	Casing broken																																														
TARRAWONGA MINE																																																
MW7	2-Jun-06	73.47	74.3	7.2				0.002																	2250	45	43	536	12		202	34				1100												
MW7	9-Sep-06	79.67	80.5																																													
MW7	11-Jan-07	76.17	77	7.32				<0.001			<0.0001	<0.005		<0.001	<0.001		0.005			0.05			<0.0001		1960	23	36	459	8		189	22				935												
MW7	18-Apr-07	76.07	76.9																																													
MW7	10-Jul-07	77.06	77.89	7.24	2250	18.7		<0.001			<0.0001	<0.005		0.001	<0.001		0.018			0.106			<0.0001		2270	35	36	458	10		170	23				998								4.38	<20	410		
MW7	18-Jul-07	77.1	77.93																																													
MW7	7-Aug-07	78.29	79.12																																													
MW7	22-Aug-07	78.45	79.28																																													
MW7	5-Sep-07	78.6	79.43																																													
MW7	24-Sep-07	78.56	79.39																																													
MW7	11-Oct-07	78.72	79.55																																													
MW7	26-Nov-07	79.34	80.17																																													
MW7	29-Jan-08	79.8	80.63																																													
MW7	4-Mar-08	80.27	81.10																																													
MW7	22-Apr-08	80.85	81.68	7.6	2440	21.9		<0.001			0.00014	0.004		0.033	0.25		0.017			0.12			<0.0001		2370	52	45	483	11		188	5				1050												
MW7	21-Aug-08	83.74	84.57																																													
MW7	29-Oct-08	85.99	86.81	7.4	2310	24.8		0.001			0.00006	0.005		0.014	0.088		0.009			0.099			<0.0001		2300	48	44	470	13		180	24				990									<0.025	0.3		
MW7	28-Jan-09	86.99	87.8																																													
MW7	17-Jun-09	86.45	87.5	7.4	2440	20.7		<0.001	<0.001	0.2	<0.0001	0.001	<0.001	0.057	0.054	0.047	0.007		<0.01	0.13		0.43	<0.0001		2280	46	44	481	11	27.1	169	16	<1	<1	1050	1050	26.1	1.96	0.17				1430					
MW7	27-Aug-09	89.99	91.04																																													
MW7	23-Dec-09	89.53	90.58	7.55	2230	27.4	0.03	<0.001				<0.001		0.002	0.004	0.075	0.007			0.015		0.26	<0.0001	7.49	2240	5	46	556	9	28.5	182	17.1	<1	<1	1050	1050	26.5	3.58		<0.01	<0.01	<0.01						
MW7	25-Feb-10	89.64	90.69																																													
MW7	11-May-10	89.85	90.9	8.32	2950	23.9		<0.001	<0.001	0.227	<0.0001	<0.001	<0.001	0.009	0.046	0.11	0.017		<0.01	0.054		1.5	<0.0001		2330	42	41	478	9	26.5	182	15.9	<1	<1	1010	1010	25.6	1.72	0.45				1380					

Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	Field Parameters			Total Metals																			Major Cations				Total Cations - meq/L	Major Anions					Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
				pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L												
ANZECC Guideline - stock drinking water							**5**	**0.5**			**0.01**	**1**	**1**	**1**	**0.1**		**1**	**0.02**		**20**			**0.002**			**1000**						**1000**								**400**		**4000**					
MW7	30-Aug-10	90.48	91.53	7.52	2385	24.7																																							
MW7	10-Nov-10	90.38	91.43	7.47	2010	26																																							
MW7	14-Mar-11	90.95	92	7.24	2075	26.2	0.2	<0.001				<0.001	0.094		0.036	0.155	0.01			0.274		0.74	<0.0001	7.57	2220	41	41	493	11	27.1	225	23	<1	<1	951	951	25.8	2.43		<0.01	0.07	0.07						
MW7	21-Jun-11	91.31	92.36	7.55	2180	22.3																																							
MW7	8-Sep-11	92.49	93.54	7.35	2160	22.5	0.09	0.001	<0.001	0.18	<0.0001	<0.001	<0.001	0.006	0.028	0.059	0.007		<0.01	0.047		0.41	<0.0001	7.84	2550	10	36	545	10	27.4	255	29	<1	<1	936	936	26.5	1.66	0.55	<0.01	0.02	0.02	1510					
MW7	9-Dec-11	93.89	94.94	7.7	2200	26.8																																							
MW7	19-Mar-12	95.05	96.10	7.25	2460	24.9	0.31	<0.001	<0.001	0.186	<0.0001	0.002	<0.001	0.032	0.065	0.059	0.009		<0.01	0.085		0.61	<0.0001	7.82	2650	35	34	622	11	31.9	321	45	<1	<1	991	991	29.8	3.34	0.52	<0.01	0.03	0.03	1590					
MW7	14-Jun-12	97.70	98.75	7.6	2900	23.6																																							
MW7	6-Sep-12	98.95	100.00	7.33	2730	25.2	0.52	0.002	<0.001	0.205	<0.0001	0.002	<0.001	0.088	0.114	0.057	0.005		<0.01	0.19		2.84	<0.0001	7.93	2840	18	21	678	8	32.3	342	50	<1	<1	1140	1140	33.5	1.79	0.61	<0.01	0.05	0.05	1760					
MW7	28-Nov-12	101.99	103.04																																											
MW7	20-Mar-13	102.49	103.54																																											
MW7	11-Jul-13	103.65	104.7																																											
MW7	5-Sep-13	103.65	104.7																																											
MW7	22-Nov-13	103.43	104.5																																											
MW7	20-Feb-14	103.55	104.6																																											
MW7	27-May-14	103.96	105																																											
MW7	9-Sep-14	103.84	104.9																																											
MW7	20-Nov-14	104.01	105.1																																											
MW7	26-Feb-15	104.09	105.1																																											
MW7	26-May-15	104.67	105.5																																											
MW7	27-Aug-15	104.26	105.1																																											
MW7	4-Dec-15	104.35	105.1																																											
MW7	24-Feb-16	104.77	105.6																																											
MW7	23-May-16	105.13	105.9																																											
MW7	1-Sep-16	104.19	105																																											
MW7	29-Nov-16	104.41	105.2																																											
MW7	21-Jun-17	105.18	106																																											
MW7	13-Dec-17	104.79	105.6																																											
MW7	22-Mar-18	104.97	105.8																																											
MW7	12-Jun-18	106.21	107																																											
MW7	13-Sep-18	104.91	105.7																																											
MW7	5-Dec-18	105.01	105.8	grey mud on probe																																										
MW7	14-Mar-19	106.21	107	Dry																																										
MW7	19-Jun-19	106.21	107	Dry																																										
MW7	11-Sep-19	106.21	107	Dry																																										
MW7	6-Dec-19	106.21	107	Dry																																										
MW7	6-Mar-20	104.19	105.0	slime																																										
MW7	10-Jun-20	104.31	105.1	Slime																																										
MW7	24-Sep-20	ommissioned		No acces, civil works.																																										
MW7	8-Dec-20	ommissioned		No acces, civil works.																																										
TARRAWONGA MINE																																														
MW8	2-Jun-06	13.06	13.8	6.7				<0.001																	2240	161	48	298	9		426	46				588												
MW8	9-Sep-06	13.16	13.9																																											
MW8	11-Jan-07	13.41	14.15	6.7				<0.001			<0.0001	<0.005		0.002	0.001		0.007			0.16			<0.0001		2260	180	53	319	7		411	80				587												
MW8	18-Apr-07	12.86	13.6																																										
MW8	9-Jul-07	13.62	14.36	6.8	2530	18.9		<0.001			<0.0001	<0.005		0.005	0.004		0.006			0.102			<0.0001		2610	196	55	308	8		483	80				616							7.77	<20	250		
MW8	18-Jul-07	13.67	14.41																																										
MW8	7-Aug-07	13.66	14.4																																										
MW8	22-Aug-07	13.66	14.4																																										
MW8	5-Sep-07	13.72	14.46																																										
MW8	24-Sep-07	13.64	14.38																																										
MW8	11-Oct-07	13.63	14.37																																										
MW8	26-Nov-07	13.69	14.43																																										
MW8	29-Jan-08	13.54	14.28																																										
MW8	4-Mar-08	13.56	14.3																																										
MW8	22-Apr-08			Bore blocked no sample																																										
MW8	21-Aug-08	13.78	14.52																																										
MW8	29-Oct-08	13.85	14.59	Bore blocked no sample																																									
MW8	28-Jan-09	13.85	14.6																																										
MW8	17-Jun-09	14.02	14.77	Unable to sample - casing blocked																																									
MW8	27-Aug-09	14.02	14.77																																										
MW8	23-Dec-09	14.1	14.85	Unable to sample - casing blocked																																									
MW8	25-Feb-10	13.8	14.55																																										
MW8	11-May-10	13.72	14.47	Unable to sample - casing blocked																																									
MW8	30-Aug-10	13.71	14.46	Unable to sample - casing blocked																																									
MW8	9-Nov-10	13.74	14.49	Unable to sample - casing blocked																																									
MW8	14-Mar-11	14.12	14.87	Unable to sample - casing blocked																																									
MW8	21-Jun-11	13.62	14.37	Unable to sample - casing blocked																																									
MW8	8-Sep-11	13.80	14.55	Unable to sample - casing blocked																																									
MW8	9-Dec-11	13.24	13.99	Unable to sample - casing blocked																																									
MW8	14-Mar-12	12.57	13.32	Unable to sample - casing blocked																																									
MW8	14-Jun-12	12.76	13.51	Blocked 3.2 down pipe																																									
MW8	6-Sep-12	12.63	13.38	Blocked 3.2 down pipe																																									
MW8	28-Nov-12	12.79	13.54	Blocked about 3m down pipe																																									
MW8	20-Mar-13	12.68	13.43	Blocked 3.2 down pipe																																									
MW8	11-Jul-13	12.95	13.7	Blocked 3.2 down pipe																																									
MW8	5-Sep-13	13.00	13.75	Blocked 3.2 down pipe																																									
MW8	22-Nov-13	13.01	13.76	Blocked 3.2 down pipe																																									
MW8	20-Feb-14	13.07	13.82	Blocked 3.2 down pipe																																									
MW8	27-May-14	13.00	13.75	Blocked 3.2 down pipe																																									
MW8	9-Sep-14	13.13	13.88	Blocked 3.2 down pipe																																									
MW8	20-Nov-15	13.22	13.97	Blocked 3.2 down pipe																																									
MW8	26-Feb-15	13.27	14.02	Blocked 3.2 down pipe																																									
MW8	26-May-15	13.43	14.22	Blocked 3.2 down pipe																																									
MW8	27-Aug-15	13.43	14.22	Blocked 3.2 down pipe																																									
MW8	4-Dec-15	13.46	14.25	Blocked 3.2 down pipe																																									
MW8	24-Feb-16	13.49	14.28	Blocked 3.2 down pipe																																									
MW8	23-May-16	13.54	14.33	Blocked 3.2 down pipe																																									
MW8	1-Sep-16	13.08	13.87	Blocked 3.2 down pipe																																									
MW8	29-Nov-16	12.62	13.41	Blocked 3.2 down pipe																																									
MW8	21-Jun-17	13.07	13.86	Blocked 3.2 down pipe																																									
MW8	13-Dec-17	13.12	13.91	Blocked 3.2 down pipe																																									
MW8	22-Mar-18	12.53	13.32	Blocked 3.2 down pipe																																									
MW8	12-Jun-18	13.33	14.12	Blocked 3.2 down pipe																																									
MW8	13-Sep-18	13.44	14.23	Blocked 3.2 down pipe																																									
MW8	5-Dec-18	13.29	14.08	Blocked 3.2 down pipe																																									
MW8	14-Mar-19	13.62	14.41	Blocked 3.2 down pipe																																									
MW8	19-Jun-19	13.69	14.48	Blocked 3.2 down pipe																																									
MW8	11-Sep-19	13.77	14.56	Blocked 3.2 down pipe																																									
MW8	6-Dec-19	13.76	14.55	Blocked 3.2 down pipe																																									
MW8	18-Mar-20	13.7	14.49	Blocked 3.2 down pipe																																									
MW8	10-Jun-20	13.67	14.46	Blocked 3.2 down pipe																																									
MW8	24-Sep-20	13.44	14.23	Blocked 3.2 down pipe																																									
MW8	8-Dec-20	13.57	14.36	Blocked 3.2 down pipe																																									

Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	Field Parameters			Total Metals																		Major Cations						Total Cations - meq/L	Major Anions						Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
				pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L													
ANZECC Guideline - stock drinking water							5	0.5			0.01	1	1	1	0.1		1	0.02		20			0.002			1000						1000										400		4000					
TEMPLEMORE																																																
GW044997	2-Jun-06	6.19	6.4	6.9				0.001																3000	112	102	544	4		758	170				768													
GW044997	11-Jan-07	6.62	6.83	6.95				0.009			<0.0001	<0.005		0.001	<0.001		0.002			0.04			<0.0001	1570	45	36	298	1		200	55				495													
GW044997	10-Jul-07	6.7	6.91	7.06	785	17.1		0.009			0.0002	<0.005		0.001	<0.001		0.001			0.088			<0.0001	1590	46	41	270	1		211	84				441							9	<20	740		
GW044997	18-Jul-07	6.73	6.94																																											
GW044997	7-Aug-07	6.79	7																																											
GW044997	22-Aug-07	6.76	6.97																																										
GW044997	5-Sep-07	6.83	7.04																																									
GW044997	24-Sep-07	6.62	6.83																																									
GW044997	11-Oct-07	6.73	6.94																																									
GW044997	26-Nov-07	7.05	7.26																																									
GW044997	29-Jan-08	6.44	6.65																																									
GW044997	4-Mar-08	6.23	6.44																																									
GW044997	4-Apr-08	6.295	6.505																																									
GW044997	22-Apr-08	6.31	6.52	7	3370	21.8		0.007			<0.00005	<0.001		0.005	0.0003		0.012			0.008			<0.0001	3150	135	125	461	1.7		656	276				585								<0.025	<0.1		
GW044997	21-Aug-08	6.81	7.02																																										
GW044997	29-Oct-08	6.86	7.06	Bore blocked, no sample																																									
GW044997	29-Jan-09	7	7.2																																										
GW044997	17-Jun-09	7.52	7.77	7.1	3580	18.9		0.066	<0.001	0.523	0.0003	0.001	0.002	0.134	0.016	0.204	0.006		0.09	0.327		46.9	0.0001		3350	112	111	486	8	36	626	132	<1	<1	693	693	34.2	2.53	2.93				2020					
GW044997	28-Aug-09	7.85	8.05																																										
GW044997	23-Dec-09	7.97	8.17	6.95	3050	24.2	0.02	0.008				<0.001		0.005	<0.0010	0.021	0.004			0.065		0.07	<0.0001	6.87	3050	40	118	546	3	35.5	636	203	<1	<1	517	517	32.5	4.4		0.22	21	21.2					
GW044997	25-Feb-10	7.81	8.01																																										
GW044997	11-May-10	7.98	8.18	7.49	3720	22.7		0.018	<0.001	0.258	<0.0001	<0.001	<0.001	0.014	0.002	0.04	0.006		0.04	0.048		7.2	<0.0001		3480	114	119	434	2	34.4	640	192	<1	<1	593	593	33.9	0.66	2.03				1770					
GW044997	30-Aug-10	7.91	8.11	6.82	3720	22.2																																								
GW044997	9-Nov-10	7.8	8	6.8	3010	24.2																																								
GW044997	14-Mar-11	7.25	7.45	6.83	1670	25.9	0.04	0.002				<0.001		0.013	<0.001	0.004	<0.001			0.032		<0.05	<0.0001	7.15	1620	131	67	160	2	19.1	333	87	<1	<1	410	410	19.4	0.84		<0.01	1.8	1.8					
GW044997	6-Jun-11	8.02	8.22	7.3	1514	16.8																																								
GW044997	6-Sep-11	8.73	8.93	6.98	1525	16.7	0.05	0.002	<0.001	0.174	<0.0001	<0.001	<0.001	0.01	<0.001	0.007	<0.001		0.02	0.047		<0.05	<0.0001	7.64	1830	122	58	174	2	18.5	308	110	<1	<1	400	400	19	1.31	0.51	<0.01	1.43	1.43	1000					
GW044997	7-Dec-11	8.32	8.52	7.27	1545	20.6																																								
GW044997	13-Mar-12	5.1	5.3	No sample - pump not operational																																										
GW044997	14-Jun-12	5.18	5.38																																										
GW044997	6-Sep-12	4.8	5	7.95	1750	17.5	0.02	0.002	<0.001	0.128	<0.0001	<0.001	<0.001	0.011	<0.001	0.005	<0.001		0.01	0.027		0.07	<0.0001	7.69	1840	120	56	211	2	19.8	323	147	<1	<1	409	409	20.3	1.29	0.05	<0.01	5	5	1130					
GW044997	27-Nov-12	5.04	5.24	7.61	1665	24.6																																								
GW044997	21-Mar-13	5.78	5.98																																										
GW044997	11-Jul-13	6.37	6.57																																										
GW044997	5-Sep-13	6.65	6.85																																										
GW044997	22-Nov-13	6.87	7.07																																										
GW044997	20-Feb-14	6.93	7.13																																										
GW044997	27-May-14	8.05	8.25																																										
GW044997	9-Sep-14	7.99	8.19																																										
GW044997	20-Nov-14	8.56	8.76																																										
GW044997	26-Feb-15	8.61	8.81																																										
GW044997	26-May-15	8.74	8.94																																										
GW044997	27-Aug-15	10.67	10.87																																										
GW044997	4-Dec-15	10.43	10.63																																										
GW044997	24-Feb-16	10.72	10.92																																										
GW044997	23-May-16	10.99	11.19																																										
GW044997	1-Sep-16	11.18	11.38																																										
GW044997	29-Nov-16	9.17	9.37																																										
GW044997	21-Jun-17	9.68	9.88																																										
GW044997	13-Dec-17	9.67	9.87																																										
GW044997	13-Sep-18	11.6	11.8	7	6120	20.8	0.08	0.005	<0.001	0.137	<0.0001	<0.001	<0.001	0.009	<0.001	0.028	0.002	<0.01	0.02	0.012	0.14	1.08	<0.0001	7.6	6400	179	183	897	3	63.1	1270	618	<1	<1	1010	1010	68.9	4.38	0.04	<0.01	24	24	3400					
GW044997	5-Dec-18	12.09	12.29	7.1	5710	20.7																																								
GW044997	14-Mar-19	12.5	12.7	7.3	5710	21.1	0.05	0.005	<0.001	0.144	<0.0001	0.004	<0.001	0.008	<0.001	0.024	0.002	<0.01	0.02	0.021	0.13	0.35	<0.0001	7.75	6350	166	172	956	4	64.1	994	555	<1	<1	1050	1050	60.6	2.85	0.06	<0.01	17	17	3810				<20	<100
GW044997	19-Jun-19	12.32	12.52	7.1	3470	20.1																																								
GW044997	11-Sep-19	12.66	12.86	7.3	5260	19.9	0.08	0.006	<0.001	0.125	<0.0001	0.001	<0.001	0.007	<0.001	0.043	0.002	<0.01	0.02	0.017	0.12	3.25	<0.0001	7.77	5490	181	166	933	4	63.4	1080	479	<1	<1	892	892	58.3	4.21		<0.01	13.2	13.2	3430		<20	<50	<20	<100
GW044997	5-Dec-19	12.76	12.96	7.3	5290	20.6																																								
GW044997	18-Mar-20	12.67	12.87	7.3	3840	21.5	<0.01	0.005	<0.001	0.106	<0.0001	<0.001	<0.001	0.027	<0.001	0.056	0.003	<0.01	0.02	0.009	0.15	0.1	<0.0001	7.57	3980	141	123	555	6	41.4	791	324	<1	<1	549	549	40	1.68	0.05	0.74	47.6	48.3	2460		<20	<50	<20	<100
GW044997	11-Jun-20	14.7	14.9	7.2	2960	19.5																																								
GW044997	23-Sep-20	10.72	10.92	7.2	3550	20	0.22	0.35	<0.001	0.154	<0.0001	<0.001	0.001	0.012	<0.001	0.324	0.002	<0.01	<0.01	0.029	0.12	0.79	<0.0001	7.9	3320	100	92	543	9	36.4	624	185	<1	<1	926	926	40	4.64	<0.01	<0.01	0.02	0.02	2130		<20	<50	<20	<100
GW044997	8-Dec-20	11.06	11.26	7.2	3580	19.6																																								
AMBARDO																																																
GW031856	2-Jun-06	15.76	16.4	7.3				<0.001			<0.0001	<0.001		0.036	0.001		0.001			0.126			<0.0001		1150	50	33	156	3		105	22				459								<20	<50		
GW031856	11-Jan-07	19.1	19.74	7.27	910	23.1		<0.001			<0.0001	<0.005		0.005	<0.001		<0.001			<0.005			<0.0001		1080	47	30	164	3		75	18				457							3.37	<20	<50		
GW031856	10-Jul-07	15.51	16.15	7.9	1080	13.5		<0.001			<0.0001	<0.005		0.008	0.0005		0.0005			2.29			0.00005		1180	48	34	162	3		94.8	20				440							3.11	10	25		
GW031856	22-Apr-08			7.4	1090	19.8		0.001			<0.00005	<0.001		0.008	0.0004		0.003			0.048			<0.0001		1060	50	33	145	3.6		106	18				480								<0.025	<0.1		
GW031856	29-Oct-08																																														
GW031856	10-Feb-09	17.85	18.49	7.3	1090	26.9		0.002			<0.00005	0.003		0.009	0.0006		0.002			0.26			<0.0001		1100	51	30	150	2.8		81	19				440								<0.025	<0.025		
GW031856	17-Jun-09			7.4	1170	20.1		0.001	<0.001	0.156	<0.0001	<0.001	<0.001	0.004	<0.001	0.001	<0.001		<0.01	0.037		0.06	<0.0001		1110	51	33	149	3	11.8	92	15	<1	<1	453	453	12	0.52	<0.01				704					
GW031856	11-Sep-09	15.51	16.28																																											
GW031856	23-Dec-09	18.4		7.73	1029	29.3	0.01	0.001				<0.001		0.001	0.001	0.012	0.001			0.205		<0.05	<0.0001	7.45	1060	40	34	169	3	12.2	92.2	17.4	<1	<1	422	422	11.4	3.24		<0.01	0.14	0.14					
GW031856	25-Feb-10	16.31	16.91	7.61	1240	25.3	<0.01	0.001				<0.005		0.002	<0.001	0.001	<0.001			0.014		<0.05	<0.0001	7.54	1110	47	34	160	3	12.2	90.8	17.6	<1	<1	436	436	11.6	2.42		<0.01	0.19	0.19					
GW031856	11-May-10	16.58	17.18	8.2	1292	14.9		<0.001	<0.001	0.15	0.0002	<0.001	<0.001	0.116	0.006	<0.001	<0.001		<0.01	0.51		<0.05	<0.0001		1140	49	32	154	3	11.9	91.8	16.8	<1	<1	431	431	11.5	1.45	0.02				576					
GW031856	30-Aug-10	15.35	15.95	7.38	1106	18.2	<0.01	<0.001				<0.001		0.008	<0.001	0.009	<0.001			1.88		<0.05	<0.0001	7.33	1140	49	33	159	3	12.2	98	20	<1	<1	426	426	11.7	1.99		<0.01	0.24	0.24					
GW031856	10-Nov-10	15.52	16.12	7.08	990	27.8	<0.01	0.001				<0.005		0.014	<0.001	0.004	<0.001			1.26		<0.05	<0.0001	7.42	1160	22	33	163	3	11	103	18	<1	<1	440	440	12.1	4.84		<0.01	0.2	0.2					
GW031856	14-Mar-11	19.71	20.31	7.19	945	26.5	<0.01	<0.001				0.001		0.004	<0.001	<0.001	<0.001			0.015		<0.05	<0.0001	7.46	887	45	30	151	3	11.4	92	20	<1	<1	414	414	11.3	0.4		<0.01	0.2	0.2					
GW031856	7-Jun-11	16.08	16.68	7.35	929	19.2																																								
GW031856	9-Sep-11	15.49	16.09	7.33	970	17	<0.01	<0.001	<0.001	0.146	<0.0001	<0.001	<0.001	0.005	<0.001	<0.001	0.001		<0.01	1.25		<0.05	<0.0001	7.71	1120	52	35	161	3	12.6	109	22	<1	<1	412	412	11.8	3.22	<0.01	<0.01	0.16	0.16	620					
GW031856	7-Dec-11	15.65	16.25	7.64	940	20.9																																								
GW031856	19-Mar-12	15.1	15.7	7.27	1070	24.3	0.02	0.002	<0.001	0.161	<0.0001	0.002	<0.001	0.012	<0.001	0.002	<0.001		0.02	0.034		0.06	<0.0001	7.82	1110	53	34	155	3	12.3	106	23	<1	<1	421	421	11.9	1.55	<0.01	<0.01	0.27	0.27	666					
GW031856	14-Jun-12	16.04	16.64	7.57	1170	25.1																																								
GW031856	19-Sep-12	16.6	17.2	7.39	1060	21.2	0.01	0.001	<0.001	0.176	<0.0001	<0.001	<0.001	0.012	0.002	0.004	<0.001		0.01	0.027		0.29	<0.0001	7.84	1160	48	33	158	4	12.1	115	21	<1	<1	410	410	11.9	0.86	<0.01	<0.01	0.17	0.17	670					
GW031856	27-Nov-12	16	16.6	7.43	1048	25.4																																								
GW031856	21-Mar-13	15.7	16.3	7.42	1020	24.2	<0.01	0.001	<0.001	0.166	<0.0001	0.003	<0.001	0.027	0.006	0.005	<0.001		0.01	0.193		<0.05	<0.0001	7.78	1100	49	32	157	3	12	90	21	<1	<1	435	435	11.7	1.31	<0.01	<0.01	0.22	0.22	640					
GW031856	11-Jul-13	17.47	18.07	7.54	1064	19.6																																								
GW031856	5-Sep-13	17.2	17.8	7.56	1070	19.2	<0.01	<0.001	0.141	<0.05	<0.0001	<0.001	<0.001	0.005	<0.001	0.002	<0.001	<0.01	<0.01	0.017	<0.001	0.06	<0.0001	7.92	1130	49	33	158	4	12.1	100	20	<1	<1	432	432	11.9	1.08	<0.01				660					
GW031856	22-Nov-13	15.88	16.48	7.6	1120	24.9																																								
GW031856	24-Feb-14	15.1	15.7	7.7	1120	24.5	<0.01	0.001	0.156	<0.05	<0.0001	<0.001	<0.001	0.007	<0.001	<0.001	<0.001	<0.01	0.01	0.138	<0.001	<0.05	<0.0001	7.84	1150	48	32	155	3	11.8	99	22	<1	<1	430	430	11.8	<0.01	0.02				684					
GW031856	27-May-14	15.20	15.8	7.5	1097	20.1																																								
GW031856	9-Sep-14	14.70	15.3	7.3	1120	18	<0.01	0.002				0.002		0.006		<0.001	<0.001			0.056		0.12	<0.0001	7.82	1140	46	30	142	3	11	101	23	<1	<1	388	388	11.1	0.31		<0.01	0.2	0.2					
GW031856	20-Nov-14	15.87	16.47	7.2	1120	24.5																																								
GW031856	26-Feb-15	15.6	16.2	7.5	1090	25.6	<0.01	0.001	<0.001	0.143	<0.0001	<0.001	<0.001	<0.001		<0.001	0.001	<0.01	0.01	0.197	<0.05	<0.05	<0.0001	7.94	1220	48	33	150	3	11.7	99	22	<1	<1	478	478	12.8	4.47	0.02	<0.01	0.21	0.21	570					
GW031856	26-May-15	15.07	15.67	essure at tap.																																										
GW031856	27-Aug-15	15.1	15.7	6.9	1120	14.7	0.01	0.001	<0.001	0.126	<0.0001	<0.001	<0.001	0.022	0.003	0.002	0.001	<0.01	<0.01	0.348	<0.05	0.19	<0.0001	7.8	1120	49	35	157	2	12.2	66	23	<1	<1	406	406	10.4	7.71	0.04	<0.01	0.21	0.21	592					
GW031856	4-Dec-15	18.77	19.37	7	1118	22.1																																								
GW031856	24-Feb-16	17.83	18.43	7.1	1117	23.8	0.01	0.002	<0.001	0.154	<0.0001	<0.001	<0.001	0.007	<0.001	0.005	<0.001	<0.01	0.01	0.035	<0.05	0.09	<0.0001	7.89	1140	57	38	173	3	13.6	75	23	<1	<1	454	454	11.7	7.53	0.05	<0.01	0.21	0.21	656					
GW031856	23-May-16	16.53	17.13	7.2	1121	21																																								
GW031856	6-Sep-16	14	14.6	7.3	1140	16.7	<0.01	0.001				0.001		0.057	0.009	0.001	0.002			0.594		0.25	<0.0001	7.61	1120	53	33	142	2	11.6	96		<1	<1	424	424	11.6	0.06		<0.01	0.2	0.2					
GW031856	29-Nov-16	15.83	16.43																																											
GW031856	23-Mar-17	15.6	16.2	7.2	1130		<0.01	0.001	<0.001	0.158	<0.0001	<0.001	<0.001	0.03	0.002	0.002	<0.001	<0.01	0.01	0.068	<0.05	0.06	<0.0001	8.08	1110	50	34	149	3	11.8	102	18	<1	<1	460	460	12.4	2.44	0.02	<0.01	0.22	0.22	682					
GW031856	21-Jun-17	14.79	15.39	7.5	1152	14.7																																								
GW031856	13-Sep-17	17	17.6	7.4	1150		<0.01	0.001	<0.001	0.146	<0.0001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.01	<0.01	0.008	<0.05	<0.05	<0.0001	7.99	1130	56	35	159	3	12.7	82	22	<1	<1	497	497	12.7	0.13	0.03	<0.01	0.23	0.23	601					
GW031856	13-Dec-17	14.7	15.3	7.4	1133	25.6																																								
GW031856	13-Sep-18	13.7	14.3	7.3	1130	16.1	0.01	0.002	<0.001	0.132	<0.0001	0.003	<0.001	0.054	0.018	0.002	<0.001	<0.01	<0.01	0.527	<0.05	0.82	<0.0001	7.76	1150	51	32	139	2	11.3	110	20	<1	<1	433	433	12.2	3.82	0.02	<0.01	0.2	0.2	598					
GW031856	5-Dec-18	13.87	14.47	7.1	1190	24.4																																								
GW031856	14-Mar-19	24.4	25	7.2	1100	22.2	0.01	0.001	<0.001	0.147	<0.0001	0.001	<0.001	0.031	0.002	0.002	<0.001	<0.01	0.01	0.022	<0.05	<0.05	<0.0001	7.86	1050	42	29	155	3	11.3	68	19	<1	<1	451	451	11.3	0.1	0.01	<0.01	0.22	0.22	736				<20	<100

				Field Parameters			Total Metals																			Major Cations					Major Anions																	
Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L	Total Cations - meq/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L	Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N - mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
ANZECC Guideline - stock drinking water							5	0.5			0.01	1	1	1	0.1		1	0.02		20			0.002			1000						1000									400		4000					
GW031856	19-Jun-19	23.16	23.76	7.3	1120	18.6																																										
GW031856	11-Sep-19	23.03	23.63	7.4	1160	16.9	<0.01	0.001	<0.001	0.166	<0.0001	0.002	<0.001	0.013	<0.001	0.002	0.001	<0.01	<0.01	0.2	<0.05	<0.05	<0.0001	7.92	1160	63	38	156	3	13.1	104	21	<1	<1	429	429	11.9	4.75		<0.01	0.26	0.26	636		<20	<50	<20	<100
GW031856	6-Dec-19	14.98	15.58	7.4	1180	25.9																																										
GW031856	17-Mar-20	15.32	15.92																																													
GW031856	11-Jun-20	15.07	15.67	7.3	1150	16.3																																										
GW031856	24-Sep-20	16.22	16.82	7.3	1090	19.5																																										
GW031856	8-Dec-20	13.75	14.35	7.5	1150	16.3	<0.01	0.001	<0.01	0.149	<0.0001	<0.001	<0.001	0.015	0.001	0.002	0.001	<0.01	0.01	1.12	<0.05	0.08	<0.0001	7.92	1110	54	35	152	3	12.3	105		<1	<1	480	480	13	2.79	<0.01	<0.01	0.24	0.24	654		<20	<50	<20	<100
TARRAWONGA																																																
GW052266	2-Jun-06	7.67	8.1	7.9				<0.001																	1360	17	13	301	5		134	65				488												
GW052266	11-Jan-07	8.94	9.37	7.58				<0.001			<0.0001	<0.005		<0.001	<0.001		<0.001			0.02			<0.0001		1950	45	29	389	8		362	126				457												
GW052266	10-Jul-07	7.92	8.35	8.01	1330	13.3		<0.001			<0.0001	<0.005		<0.001	<0.001		<0.001			0.01			<0.0001		1480	23	14	315	6		170	79				435								10.6	<20	250		
GW052266	18-Jul-07	7.97	8.4																																													
GW052266	7-Aug-07	7.94	8.37																																													
GW052266	22-Aug-07	7.95	8.38																																													
GW052266	5-Sep-07	8.02	8.45																																													
GW052266	24-Sep-07	7.92	8.35																																													
GW052266	11-Oct-07	7.9	8.33																																													
GW052266	26-Nov-07	8	8.43																																													
GW052266	29-Jan-08	8.01	8.44																																													
GW052266	4-Mar-08	8.04	8.47																																													
GW052266	4-Apr-08	8	8.43																																													
GW052266	22-Apr-08	8.04	8.47	7.2	1230	20.6		<0.001			<0.00005	<0.001		<0.001	0.0002		0.006			<0.005			<0.0001		1250	94	48	110	4.5		131	19				465									<0.025	<0.1		
GW052266	21-Aug-08	5.86	6.29																																													
GW052266	29-Oct-08			8.7	1600	28.4		<0.001			<0.00005	0.002		0.001	0.0003		<0.001			0.013			0.0006		1600	19	17	270	6.5		220	93				450									<0.025	<0.100		
GW052266	28-Aug-09	9.7	10.13																																													
GW052266	14-Dec-09	11.3	11.35	7.4	922	23.3	<0.01	0.003				<0.001		0.003	<0.001	0.006	0.003			0.018		<0.05	<0.0001	7.51	838	55	16	84	<1	7.72	64.1	31.6	<1	<1	252	252	7.51	1.36		<0.01	6.09	6.09						
GW052266	25-Feb-10	10.44	10.49																																													
GW052266	11-May-10	10.43	10.48	8.23	954	18.6		0.002	<0.001	0.078	<0.0001	<0.001	<0.001	0.002	0.002	0.017	0.004		0.01	0.024		0.54	<0.0001		813	54	16	80	<1	7.52	68.3	34	<1	<1	241	241	7.46	0.42	0.05				446					
GW052266	16-Aug-10	9.71	10.21	7.4	860	18.7																																										
GW052266	9-Nov-10	10.53	10.58	6.98	817	24.1																																										
GW052266	10-Mar-11	10.51	11.01	7.04	786	23.5	0.15	0.004				<0.001		0.024	0.002	0.034	0.001			0.103		1.28	<0.0001	7	640	53	17	94	1	8.2	72	34	<1	<1	262	262	7.98	1.34		0.34	4.32	4.66						
GW052266	6-Jun-11	10.19	10.24	7.05	663	20.2																																										
GW052266	6-Sep-11	10.51	10.56	6.94	714	20.2	0.96	0.003	<0.001	0.106	<0.0001	0.002	<0.001	0.009	0.002	0.085	0.008		0.02	0.061		2.63	<0.0001	7.48	823	57	16	90	<1	8.08	71	38	<1	<1	260	260	7.99	0.53	0.14	<0.01	6.35	6.35	464					
GW052266	7-Dec-11	10.55	10.60	6.95	705	20.6																																										
GW052266	13-Mar-12	9.18	9.23	7.04	784	21.6	0.03	0.002	<0.001	0.086	<0.0001	<0.001	<0.001	0.113	0.003	0.005	0.012		0.02	0.15		0.1	<0.0001	7.54	821	57	17	99	<1	8.55	68	37	<1	<1	267	267	8.44	0.65	<0.01	<0.01	5.92	5.92	498					
GW052266	13-Jun-12	8.38	8.43	7.05	837	20.4																																										
GW052266	4-Sep-12	7.91	7.96	7.41	780	22.4	0.04	0.003	<0.001	0.078	<0.0001	<0.001	<0.001	0.018	0.002	0.03	<0.001		0.01	0.068		0.92	<0.0001	7.56	802	50	17	93	<1	7.94	76	32	<1	<1	260	260	8	0.42	0.07	0.01	5.53	5.54	562					
GW052266	27-Nov-12	8.00	8.05	7.28	750	22																																										
GW052266	20-Mar-13	9.24	9.29	7.18	740	21.4	0.02	0.004	<0.001	0.072	<0.0001	<0.001	<0.001	0.034	0.002	0.007	0.001		0.01	0.176		0.16	<0.0001	7.13	798	54	17	89	<1	7.97	80	28	<1	<1	244	244	7.71	1.58	0.02	<0.01	5.9	5.9	326					
GW052266	11-Jul-13	7.79	7.84	7.25	822	18.1																																										
GW052266	5-Sep-13	8.29	8.34	7.09	590	22.4	1.02	0.002	0.091	<0.05	<0.0001	0.004	0.002	0.324	0.006	0.036	0.009	<0.01	0.02	0.19	<0.001	1.72	<0.0001	7.62	782	48	16	95	<1	7.84	73	35	<1	<1	238	238	7.54	1.94	<0.01				493					
GW052266	22-Nov-13	7.84	7.89	7.2	670	21.8																																										
GW052266	24-Feb-14	7.74	7.79	7	727	21.2	0.2	0.002	0.072	<0.05	<0.0001	0.001	<0.001	0.112	0.007	0.03	0.003	<0.01	0.01	0.152	<0.001	0.86	<0.0001	7.48	737	42	14	83	<1	6.86	66	33	<1	<1	203	203	6.6	1.87	0.05				514					
GW052266	27-May-14	7.68	7.73	7.2	692	20.6																																										
GW052266	9-Sep-14	7.73	7.78	7.4	684	20.6	0.22	0.0001				<0.001		0.007	<0.001	0.318	0.003			0.048		3.63	<0.0001	7.83	693	34	12	82	<1	6.25	66	34	<1	<1	222	222	7.01	4.83		<0.01	1.75	1.75						
GW052266	20-Nov-14	7.77	7.82	7.2	748	21.5																																										
GW052266	26-Feb-15	7.51	7.56	7.2	752	21.6	0.44	0.006	<0.001	0.086	<0.0001	0.001	0.001	0.012	0.002	0.141	0.008	<0.01	0.03	0.214	<0.05	22.9	<0.0001	7.13	800	47	15	89	1	7.48	62	81	<1	<1	168	168	9.56	14.2	0.54	0.74	5.12	5.86	430					
GW052266	26-May-15	7.75	7.8	7.3	713	20.2																																										
GW052266	27-Aug-15	7.76	7.81	7.2	707	19.7	0.06	<0.001	<0.001	0.049	<0.0001	<0.001	<0.001	0.006	<0.001	0.273	0.002	<0.01	<0.01	0.093	<0.05	16	<0.0001	7.61	712	40	15	85	2	6.98	48	36	<1	<1	218	218	6.46	3.85	0.19	0.03	0.46	0.49	380					
GW052266	4-Dec-15	7.83	7.88	7.1	734	20.5																																										
GW052266	24-Feb-16	7.86	7.91	7	752	21.7	0.14	0.007	<0.001	0.084	<0.0001	<0.001	<0.001	0.008	<0.001	0.096	<0.001	<0.01	0.03	0.067	<0.05	30.6	<0.0001	7.5	508	52	15	90	<1	7.74	56	37	<1	<1	219	219	7.74	3.82	0.1	<0.01	6.21	6.21	508					
GW052266	23-May-16	7.91	7.96	7	746	20.6																																										
GW052266	6-Sep-16	7.94	7.99	7.1	712	21.5	0.12	0.001				<0.001		0.002	<0.001	0.03	<0.001			0.026		0.34	<0.0001	7.51	719	43	14	80	<1	6.78	66		<1	<1	224	224	7	1.65		<0.01	3.05	3.05						
GW052266	29-Nov-16	7.79	7.84	7.3	752	21.3																																										
GW052266	23-Mar-17	7.67	7.72	7.3	780	21.5	0.07	0.002	<0.001	0.071	<0.0001	<0.001	<0.001	0.013	<0.001	0.03	<0.001	<0.01	0.01	0.05	<0.05	0.39	<0.0001	7.81	780	47	17	90	<1	7.66	67	29	<1	<1	246	246	7.41	1.66	0.02	<0.01	5.97	5.97	490					
GW052266	21-Jun-17	7.81	7.86	7.3	776	19.9																																										
GW052266	13-Sep-17	7.81	7.86	6.9	793	21	0.61	0.001	<0.001	0.067	<0.0001	<0.001	<0.001	0.002	<0.001	0.176	0.001	<0.01	0.01	0.029	<0.05	2.56	<0.0001	7.72	779	58	18	93	<1	8.42	60	35	<1	<1	264	264	7.7	4.5	0.04	<0.01	6.17	6.17	404					
GW052266	13-Dec-17	7.88	7.93	7.1	815	22.3																																										
GW052266	13-Sep-18	8.32	8.37	7	770	21.9	0.14	0.004	<0.001	0.067	<0.0001	<0.001	<0.001	0.002	<0.001	0.055	0.001	<0.01	0.01	0.019	<0.05	0.49	<0.0001	7.54	795	50	15	81	<1	7.25	65	34	<1	<1	233	233	7.2	0.4	0.03	<0.01	6.71	6.71	442					
GW052266	5-Dec-18	8.51	8.56	7	818	21.8																																										
GW052266	14-Mar-19	8.6	8.65	7.1	855	21.6	0.18	0.003	<0.001	0.094	<0.0001	<0.001	<0.001	0.002	<0.001	0.284	0.002	<0.01	0.02	0.047	<0.05	2.92	<0.0001	7.46	824	53	17	95	<1	8.18	64	31	<1	<1	285	285	8.14	0.19	0.03	<0.01	6.68	6.68	581				<20	<100
GW052266	19-Jun-19	8.66	8.71	7	780	19.8																																										
GW052266	11-Sep-19	8.7	8.75	6.9	810	21	0.39	0.002	<0.001	0.075	<0.0001	0.002	<0.001	<0.001	<0.001	0.168	<0.001	<0.01	0.01	0.016	<0.05	1.69	<0.0001	7.6	814	61	17	89	<1	8.31	62	33	<1	<1	227	227	7.47	5.38		<0.01	6.85	6.85	478		<20	<50	<20	<100
GW052266	5-Dec-19	8.7	8.75	7.1	840	21.8																																										
GW052266	17-Mar-20	8.67	8.72																																													
GW052266	11-Jun-20	8.56	8.61	7.1	795	21.1																																										
GW052266	23-Sep-20	8.36	8.41	7.2	780	19	0.1	0.002	<0.001	0.078	<0.0001	<0.001	<0.001	<0.001	<0.001	0.056	<0.001	<0.01	0.01	0.02	<0.05	0.79	<0.0001	7.73	751	57	17	91	<1	8.2	60	34	<1	<1	263	263	7.66	3.45	<0.01	<0.01	7.32	7.32	527		<20	<50	<20	<100
GW052266	8-Dec-20	8.46	8.51	7.1	795	18.7																																										
TEMPLEMORE A																																																
Templemore A	18-Jul-07	8.61	9.07																																													
Templemore A	7-Aug-07	11.33	11.79																																													
Templemore A	22-Aug-07	12.08	12.54																																													
Templemore A	5-Sep-07	12.09	12.55																																													
Templemore A	24-Sep-07	12.22	12.68																																													
Templemore A	11-Oct-07	12.08	12.54																																													
Templemore A	26-Nov-07	12.09	12.55																																													
Templemore A	29-Jan-08	12.05	12.51																																													
Templemore A	4-Mar-08	12.07	12.53																																													
Templemore A	4-Apr-08	9.16	9.62																																													
Templemore A	21-Aug-08	8.68	9.14																																													
Templemore A	29-Jan-09	7.84	8.3																																													
Templemore A	17-Jun-09	8.65	9.39	7.7	1640	19.7		0.003	<0.001	0.132	<0.0001	<0.001	<0.001	0.021	0.002	0.247	0.002		<0.01	0.02			<0.0001	0.16	1500	165	42	106	1	16.3	228	56	<1	<1	426	426	16.1	0.7	0.01				1000					
Templemore A	28-Aug-09	8.92	9.4																																													
Templemore A	23-Dec-09	10.1	10.58	7.2	1473	24	<0.01	0.002				<0.001		0.007	<0.001	0.013	0.001			0.025		<0.05	<0.0001	7.54	1400	72	41	125	1	12.4	246	79	<1	<1	241	241	13.6	4.61		0.07	3.25	3.32						
Templemore A	25-Feb-10	9.16	9.64																																													
Templemore A	11-May-10	9.12	9.6	7.92	1083	21.2		0.004	<0.001	0.21	0.0001	<0.001	<0.001	0.011	<0.001	1.9	0.006		0.01	0.019		0.11	<0.0001		1600	152	38	105	3	15.4	241	68.3	<1	<1	376	376	15.7	1.13	3.1				906					
Templemore A	30-Aug-10	9.19	9.67	7.77	1590	22.1																																										
Templemore A	9-Nov-10	9.24	9.72	7.67	1485	23.7																																										
Templemore A	14-Mar-11	9.44	9.92	7.35	1486	24.8	0.02	0.003				<0.001		0.011	<0.001	3.31	0.005			0.079		0.76	<0.0001	7.56	1420	175	41	120	4	17.4	297	49	<1	<1	402	402	17.4	0.03		<0.01	0.09	0.09						
Templemore A	6-Jun-11	9.36	9.84	7.45	1392	20.2																																										
Templemore A	6-Sep-11	9.5	9.98	7.61	1395	21.8	0.08	0.004	<0.001	0.266	<0.0001	<0.001	<0.001	0.004	<0.001	1.81	0.004		<0.01	0.033		0.1	<0.0001	8.04	1670	169	41	120	3	17.1	285	62	<1	<1	405	405	17.4	0.9	1.37	0.12	0.46	0.58	790					
Templemore A	9-Dec-11		No access to well - paddock flooded																																													
Templemore A	13-Mar-12	2.7	3.18	7.62	960	22.9	0.1	0.003	<0.001	0.093	<0.0001	<0.001	<0.001	<0.001	<0.001	0.006	<0.001		<0.01	0.023		0.11	<0.0001	7.79	988	92	25	74	8	10.1	103	59	<1	<1	222	222	9.98	0.6	0.04	0.01	19.7	19.7	578					
Templemore A	13-Jun-12	3.28	3.76	7.31	826	20.2																																										
Templemore A	6-Sep-12	3.59	4.07	7.32	816	20.1	0.05	0.002	<0.001	0.071	<0.0001	<0.001	<0.001	0.017	<0.001	0.008	<0.001		<0.01	0.026		0.09	<0.0001	7.67	820	80	22	54	4	8.25	103	66	<1	<1	203	203	8.34	0.48	<0.01	<0.01	2.79	2.79	500					
Templemore A	27-Nov-12	3.85	4.33	7.42	812	21.1																																										
Templemore A	21-Mar-13	4.31	4.79	7.67	943	21.8	1.68	0.003	<0.001	0.114	0.0001	0.001	0.001	0.142	0.01	0.501	0.005		<0.01	0.279		2.56	<0.0001	7.75	1020	97	24	60	9	9.66	116	74	<1	<1	242	242	9.65	0.06	2.75	3.32	0.18	3.5	614					
Templemore A	11-Jul-13	5.34	5.82	7.68	1162	19.2																																										
Templemore A	5-Sep-13	4.29	4.77	7.57	1150	20.4	0.07	0.003	0.119	<0.05	<0.0001	<0.001	<0.001	0.068	0.003	0.688	0.003	<0.01	<0.01	0.103	<0.001	0.12	<0.0001	7.96	1240	119	30	93	5	12.6	175	96	<1	<1	284	284	12.6	0.1	0.07				765					
Templemore A	22-Nov-13	7.5	7.98	7.7	1189	19.8																																										
Templemore A	20-Feb-14	4.41	4.89	7.7	1110	20.7	0.23	0.004	0.1	<0.05	<0.0001	0.001	<0.001	0.105	0.012	0.432	0.005	<0.01	<0.01	0.204	<0.001	0.75	<0.0001	7.71	1150	104	27	80	6	11	150	84	<1	<1	272	272	11.4	1.63	4.83				669					
Templemore A	27-May-14	4.57	5.05	7.6	1281	20																																										
Templemore A	9-Sep-14	4.31	4.79	7.8	1150	19.3	0.02	0.004				<0.001		0.012	<0.001	0.011	<0.001			0.031		0.86	<0.0001	7.98	1190	105	26	78	2	10.8	164	98	<1	<1	272	272	12	5.3		<0.01	2.6	2.6						
Templemore A	20-Nov-14	4.78	5.26	7.9	1117	21.2																																										
Templemore A	26-Feb-15	5.27	5.75	7.9	1100	23.7	0.2	0.003	<0.001	0.079	<0.0001	<0.001	<0.001	0.015	<0.001	0.1	0.002	<0.01	<0.01	0.064	<0.05	0.22	<0.0001	7.69	1210	109	27	84	4	11.4	157	105	<1	<1	242	242	12.9	13.7	0.73	0.14	0.3	0.44	674					
Templemore A	26-May-15	5.59	6.07	7.9	1125	19.4																																										

				Field Parameters			Total Metals																
Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L
ANZECC Guideline - stock drinking water							**5**	**0.5**			**0.01**	**1**	**1**	**1**	**0.1**		**1**	**0.02**		**20**			**0.002**
Templemore A	27-Aug-15	5.64	6.12	7.9	1180	18.4	0.04	0.002	<0.001	0.077	<0.0001	<0.001	<0.001	0.019	<0.001	0.014	<0.001	<0.01	<0.01	0.034	<0.05	0.05	<0.0001
Templemore A	4-Dec-15	5.77	6.25	7.8	1192	22.7																	
Templemore A	24-Feb-16	6.08	6.56	7.8	1234	22.5	0.03	0.004	<0.001	0.105	<0.0001	<0.001	<0.001	0.012	0.001	0.415	0.001	<0.01	<0.01	0.037	<0.05	0.11	<0.0001
Templemore A	23-May-16	6.31	6.79	7.9	1302	20.7																	
Templemore A	6-Sep-16	6.43	6.91	7.9	1280	23.8	0.04	0.003				<0.001		0.023	0.002	0.404	0.001			0.26		0.26	<0.0001
Templemore A	29-Nov-16	3.27	3.75	7.5	810	20.5																	
Templemore A	23-Mar-17	4.31	4.79	7.4	824	22.1	0.31	0.002	<0.001	0.07	<0.0001	<0.001	<0.001	0.026	0.001	0.086	0.001	<0.01	<0.01	0.097	<0.05	0.35	<0.0001
Templemore A	21-Jun-17	4.89	5.37	7.6	943	18.7																	
Templemore A	13-Sep-17	5.11	5.59	7.5	1050	20.3	0.1	0.003	<0.001	0.076	0.0002	<0.001	<0.001	0.02	<0.001	0.018	<0.001	<0.01	<0.01	0.07	<0.05	0.1	<0.0001
Templemore A	13-Dec-17	5.22	5.7	7.7	1091	210																	
Templemore A	13-Sep-18	6.39	6.87	7.7	1250	20.2	0.03	0.003	<0.001	0.087	<0.0001	<0.001	<0.001	0.025	0.001	0.078	<0.001	<0.01	<0.01	0.024	<0.05	0.17	<0.0001
Templemore A	5-Dec-18	6.66	7.14	7.7	1278	21.2																	
Templemore A	14-Mar-19	7.11	7.59	7.8	1230	21.3	0.02	0.003	<0.001	0.096	<0.0001	<0.001	<0.001	0.006	<0.001	0.018	<0.001	<0.01	0.01	0.025	<0.05	0.11	<0.0001
Templemore A	19-Jun-19	7.31	7.79	7.5	1240	19.5																	
Templemore A	11-Sep-19	7.53	8.01	7.6	1290	19.6	0.02	0.002	<0.001	0.092	<0.0001	<0.001	<0.001	0.006	<0.001	0.006	<0.001	<0.01	<0.01	0.158	<0.05	0.05	<0.0001
Templemore A	5-Dec-19	7.77	8.25	7.7	1360	20.7																	
Templemore A	18-Mar-20	6.1	6.58	7.5	1480	21.6	0.02	0.003	<0.001	0.061	<0.0001	<0.001	<0.001	0.005	<0.001	0.049	<0.001	<0.01	<0.01	0.067	<0.05	0.07	<0.0001
Templemore A	11-Jun-20	3.62	4.1	7.6	785	19.6																	
Templemore A	23-Sep-20	4.65	5.13	7.8	950	17.8	0.07	0.002	<0.001	0.076	<0.0001	<0.001	<0.001	0.003	<0.001	0.006	<0.001	<0.01	<0.01	0.072	<0.05	0.09	<0.0001
Templemore A	8-Dec-20	5.3	5.78	7.9	1040	17.9																	
TEMPLEMORE B																							
Templemore B	18-Jul-07	9.89	9.89																				
Templemore B	7-Aug-07	8.14	8.14																				
Templemore B	22-Aug-07	8.31	8.31																				
Templemore B	5-Sep-07	8.17	8.17																				
Templemore B	24-Sep-07	8.05	8.05																				
Templemore B	11-Oct-07	8.09	8.09																				
Templemore B	26-Nov-07	7.9	7.9																				
Templemore B	29-Jan-08	8.13	8.13																				
Templemore B	4-Mar-08	8.44	8.44																				
Templemore B	4-Apr-08	8.42	8.42																				
Templemore B	21-Aug-08	10.55	10.55																				
Templemore B	29-Jan-09	15.5	15.5																				
Templemore B	17-Jun-09	9.49	9.63	7.3	1810	19.5		0.002	<0.001	0.145	<0.0001	<0.001	<0.001	0.055	<0.001	0.008	<0.001		0.01	0.052		<0.05	<0.0001
Templemore B	28-Aug-09	12.69	12.83																				
Templemore B	23-Dec-09	15.84	15.98	6.75	1491	24.4	<0.01	0.003				<0.001		0.022	<0.001	0.003	0.002			0.068		<0.05	<0.0001
Templemore B	25-Feb-10	9.36	9.5																				
Templemore B	11-May-10	10.52	10.66	8.01	1722	22.2		0.002	<0.001	0.059	<0.0001	<0.001	<0.001	0.007	<0.001	0.024	<0.001		0.01	0.02		0.11	<0.0001
Templemore B	30-Aug-10	17.65	17.79	7.23	1532	23.8																	
Templemore B	9-Nov-10	9.94	10.08	7.19	1405	24.8																	
Templemore B	14-Mar-11	17.11	17.25	7.21	1460	24.7	0.28	0.002				<0.001		0.055	0.003	0.034	0.002			0.185		0.43	<0.0001
Templemore B	6-Jun-11	10.42	10.56	7.3	1370	21.5																	
Templemore B	8-Sep-11	13.56	13.7	7.12	1387	20.8	0.03	0.003	<0.001	0.076	<0.0001	<0.001	<0.001	0.015	<0.001	0.005	<0.001		0.01	0.019		<0.05	<0.0001
Templemore B	7-Dec-11	10.53	10.67	7.21	1360	21																	
Templemore B	13-Mar-12	9.58	9.72	7.28	1680	23	0.07	0.002	<0.001	0.09	<0.0001	<0.001	<0.001	0.013	<0.001	0.004	<0.001		0.02	0.036		0.1	<0.0001
Templemore B	13-Jun-12	10.51	10.65	7.34	1704	20.8																	
Templemore B	4-Sep-12	8.28	8.42	7.3	1770	21.4	0.05	0.002	<0.001	0.099	<0.0001	<0.001	<0.001	0.01	<0.001	0.005	<0.001		0.01	0.072		0.1	<0.0001
Templemore B	27-Nov-12	7.65	7.79	7.37	1611	21.8																	
Templemore B	20-Mar-13	12.36	12.5	7.29	1570	22.4	0.04	0.004	<0.001	0.069	<0.0001	<0.001	<0.001	0.019	0.001	0.012	<0.001		0.01	0.064		0.09	<0.0001
Templemore B	11-Jul-13	6.08	6.22	7.22	1523	21.7																	
Templemore B	5-Sep-13	6.1	6.24	7.24	1470	22.3	0.28	0.003	0.076	0.06	<0.0001	<0.001	<0.001	0.046	0.002	0.035	<0.001	<0.01	0.02	0.148	<0.001	0.3	<0.0001
Templemore B	22-Nov-13	7.89	8.03	7.4	1483	20.7																	
Templemore B	20-Feb-14	8.31	8.45	7.5	1400	21.6	0.1	0.004	0.061	0.06	<0.0001	<0.001	<0.001	0.045	0.005	0.022	0.002	<0.01	0.02	0.129	<0.001	0.38	<0.0001
Templemore B	27-May-14	10.51	10.65	7.4	1566	19.7																	
Templemore B	9-Sep-14	6.38	6.52	7.4	1390	21.5	0.05	0.004				<0.001		0.007	<0.001	0.004	<0.001			0.028		0.07	0.0001
Templemore B	20-Nov-14	6.96	7.1	7.4	1523	22.3																	
Templemore B	26-Feb-15	7.58	7.72	7.4	1450	23.6	0.15	0.003	<0.001	0.064	<0.0001	<0.001	<0.001	0.01	<0.001	0.013	0.002	<0.01	0.01	0.078	<0.05	0.2	<0.0001
Templemore B	26-May-15	8.37	8.51	7.4	1453	20.6																	
Templemore B	27-Aug-15	8.03	8.17	7.3	1480	19.2	0.03	0.003	<0.001	0.061	<0.0001	<0.001	<0.001	0.006	0.003	0.005	<0.001	<0.01	0.02	0.046	<0.05	0.07	<0.0001
Templemore B	4-Dec-15	10.98	11.12	7.3	1572	22.8																	
Templemore B	24-Feb-16	10.77	10.91	7.2	1465	23.4	0.31	0.004	<0.001	0.069	<0.0001	<0.001	<0.001	0.007	<0.001	0.005	<0.001	<0.01	0.01	0.046	<0.05	1.7	<0.0001
Templemore B	23-May-16	7.18	7.32	7.2	1481	21.8																	
Templemore B	6-Sep-16	13.46	13.6	7.2	1510	23.5	0.25	0.004				<0.001		0.024	0.003	0.021	<0.001			0.153		1.12	<0.0001
Templemore B	29-Nov-16	9.27	9.41	7.2	1345	21.3																	
Templemore B	23-Mar-17	6.91	7.05	7.3	1500	23	0.04	0.003	<0.001	0.069	<0.0001	<0.001	<0.001	0.014	<0.001	0.012	<0.001	<0.01	0.02	0.035	<0.05	0.08	<0.0001
Templemore B	21-Jun-17	6.46	6.6	7.4	1613	19.7																	
Templemore B	13-Sep-17	6.68	6.82	7.6	1600	21.1	<0.01	0.003	<0.001	0.07	<0.0001	0.001	<0.001	0.011	<0.001	0.009	0.004	<0.01	0.01	0.044	<0.05	0.23	<0.0001
Templemore B	13-Dec-17	6.61	6.75	7.4	1425	22.4																	
Templemore B	13-Sep-18	7.22	7.36	7.1	1440	22	0.07	0.003	<0.001	0.058	<0.0001	<0.001	<0.001	0.001	<0.001	0.004	<0.001	<0.01	0.02	0.033	<0.05	0.09	<0.0001
Templemore B	5-Dec-18	10.22	10.36	7.1	1520	21.7																	
Templemore B	14-Mar-19	7.71	7.85	7.3	1390	22.9	0.03	0.003	<0.001	0.063	<0.0001	<0.001	<0.001	0.001	<0.001	0.003	<0.001	<0.01	0.02	0.025	0.05	0.11	<0.0001
Templemore B	19-Jun-19	7.67	7.81	7.2	1580	20.5																	
Templemore B	11-Sep-19	9.01	9.15	7.4	1780	21.3	<0.01	0.002	<0.001	0.134	0.0003	0.001	<0.001	0.02	0.003	0.006	0.06	<0.01	0.02	0.394	<0.05	1.04	<0.0001
Templemore B	5-Dec-19	8.21	8.35	7.4	1820	22.1																	
Templemore B	18-Mar-20	9.66	9.8	7.5	1480	21.6	0.02	0.003	<0.001	0.061	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	0.02	0.019	<0.05	<0.05	<0.0001
Templemore B	11-Jun-20	9.29	9.43	7.4	1460	20.4																	
Templemore B	23-Sep-20	8.88	9.02	7.3	1380	19	0.03	0.002	<0.001	0.06	<0.0001	<0.001	<0.001	0.001	0.001	0.003	<0.001	<0.01	0.02	0.022	<0.05	<0.05	<0.0001
Templemore B	8-Dec-20	11.47	11.61	7.3	1420	19.8																	
REGIONAL BORES																							
Reg 6																							
Reg 6	21-Aug-15		20.08																				
Reg 6	24-Sep-15		20.13	12.28	2580	19.2	<0.01	<0.001		0.126	<0.0001	0.006		0.005	<0.001	<0.001	0.001			0.027	<0.05	<0.05	
Reg 6	29-Oct-15		20.16																				
Reg 6	27-Nov-15		20.15																				
Reg 6	29-Dec-15		20.17	8.02	2310	33.9	<0.01	<0.001		0.048	<0.0001	<0.001		<0.001	<0.001	0.13	0.001			0.006	0.08	<0.05	
Reg 6	15-Jan-16		20.25																				
Reg 6	17-Feb-16		20.31																				
Reg 6	11-Mar-16		20.43	7.95	2336	25.3	<0.01	0.001		0.054	<0.0001	<0.001		<0.001	<0.001	0.129	0.004			<0.005	0.06	<0.05	
Reg 6	18-Apr-16		20.52																				
Reg 6	12-May-16		20.42																				
Reg 6	14-Jun-16		20.43	11.61	2480	16.3	0.04	0.003		0.107	<0.0001	<0.001		0.006	<0.001	0.001	0.004			0.006	0.07	<0.05	
Reg 6	21-Jun-16		20.36	8.33	2280	11.7	<0.01	<0.001		0.058	<0.0001	<0.001		<0.001	<0.001	0.047	0.001			<0.005	0.07	<0.05	
Reg 6	12-Jul-16		20.33																				
Reg 6	8-Aug-16		20.29																				
Reg 6	5-Sep-16		20.27	7.77	2148	17.8	<0.01	0.002		0.053	<0.0001	<0.001		<0.001	<0.001	0.129	0.002			<0.005	0.08	0.08	
Reg 6	5-Oct-16		20.24																				
Reg 6	4-Nov-16		20.24																				
Reg 6	23-Dec-16		20.27	8.46	2108	27.1	<0.01	0.001		0.069	<0.0001	<0.001		<0.001	<0.001	0.071	0.002			<0.005	0.07	<0.05	
Reg 6	18-Jan-17		20.24																				
Reg 6	14-Feb-17		20.27																				
Reg 6																							
Reg 6	9-Mar-17		20.3	8.31	2156	20.8	<0.01	0.001		0.076	<0.0001	<0.001		<0.001	0.012	0.017	0.003			<0.05	1.7	0.21	
Reg 6	5-Apr-17		20.32																				
Reg 6	10-May-17		20.32																				

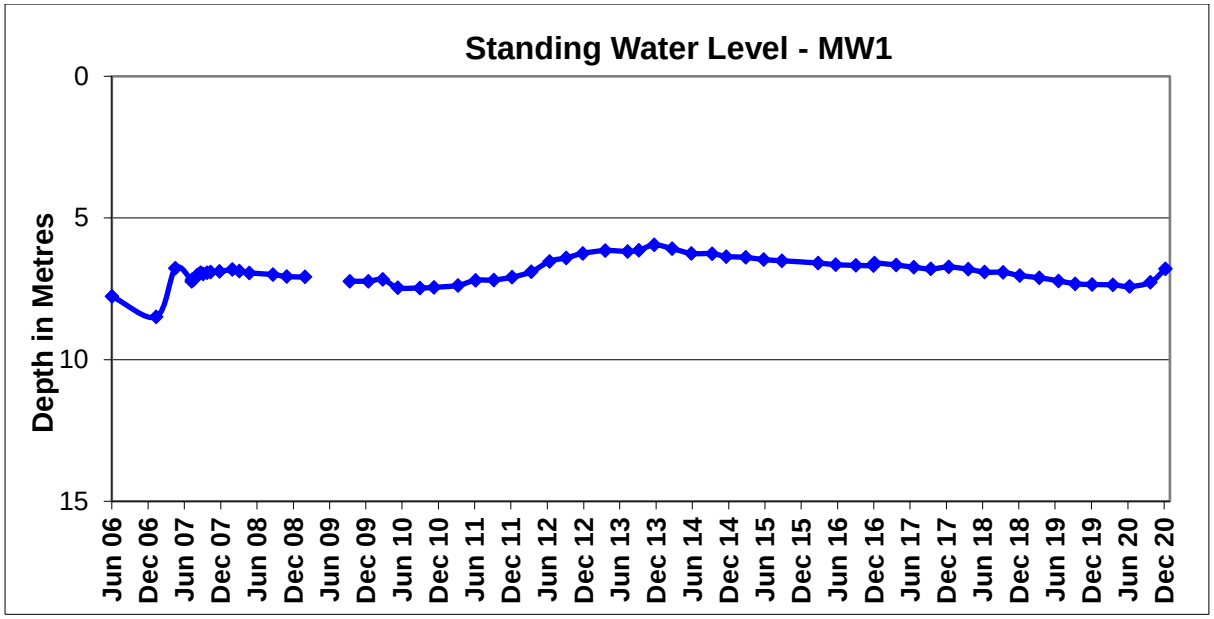
				Major Cations					Major Anions																	
Sample Location	Date	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L	Total Cations - meq/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L	Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N - mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
ANZECC Guideline - stock drinking water				**1000**						**1000**									**400**		**4000**					
Templemore A	27-Aug-15	8.03	1190	113	27	87	3	11.7	134	82	<1	<1	264	264	10.8	4.28	0.04	<0.01	0.93	0.93	755					
Templemore A	4-Dec-15																									
Templemore A	24-Feb-16	8.09	1300	147	30	102	4	14.3	176	88	<1	<1	340	340	13.6	2.71	0.5	0.44	<0.01	0.27	668					
Templemore A	23-May-16																									
Templemore A	6-Sep-16	7.89	1300	134	26	89	4	12.8	183		<1	<1	338	338	13.5	2.64		<.01	2.14	2.14						
Templemore A	29-Nov-16																									
Templemore A	23-Mar-17	7.99	816	65	20	65	4	7.82	112	53	<1	<1	189	189	8.04	1.39	0.56	0.1	3.14	3.24	530					
Templemore A	21-Jun-17																									
Templemore A	13-Sep-17	8.08	1030	110	24	75	4	10.8	143	76	<1	<1	259	259	10.8	0.18	0.05	<0.01	1.79	1.79	575					
Templemore A	13-Dec-17																									
Templemore A	13-Sep-18	7.9	1280	114	26	86	2	11.6	201	84	<1	<1	287	287	13.2	6.19	0.05	<0.01	1.54	1.54	762					
Templemore A	5-Dec-18																									
Templemore A	14-Mar-19	7.77	1200	112	30	83	2	11.7	177	82	<1	<1	276	276	12.2	2.07	0.12	0.08	3.49	3.57	850				<20	<100
Templemore A	19-Jun-19																									
Templemore A	11-Sep-19	8.06	1310	142	34	94	2	14	206	107	<1	<1	271	271	13.4	2.08		<0.01	2.19	2.19	778		<20	<50	<20	<100
Templemore A	5-Dec-19																									
Templemore A	18-Mar-20	7.9	1310	135	31	94	2	13.4	198	91	<1	<1	257	257	12.6	2.98	0.03	<0.01	6.39	6.39	823		<20	<50	<20	<100
Templemore A	11-Jun-20																									
Templemore A	23-Sep-20	7.56	930	81	20	69	3	8.77	125	67	<1	<1	233	233	9.58	4.42	<0.01	<0.01	5.19	5.19	6.18		<20	<50	<20	<100
Templemore A	8-Dec-20																									
TEMPLEMORE B																										
Templemore B	18-Jul-07																									
Templemore B	7-Aug-07																									
Templemore B	22-Aug-07																									
Templemore B	5-Sep-07																									
Templemore B	24-Sep-07																									
Templemore B	11-Oct-07																									
Templemore B	26-Nov-07																									
Templemore B	29-Jan-08																									
Templemore B	4-Mar-08																									
Templemore B	4-Apr-08																									
Templemore B	21-Aug-08																									
Templemore B	29-Jan-09																									
Templemore B	17-Jun-09		1700	118	52	175	2	17.9	240	106	<1	<1	419	419	17.4	1.46	<0.01				1080					
Templemore B	28-Aug-09																									
Templemore B	23-Dec-09	7.44	1420	31	31	221	2	13.8	196	134	<1	<1	291	291	14.1	1.29		<0.01	0.74	0.74						
Templemore B	25-Feb-10																									
Templemore B	11-May-10		1540	85	30	194	2	15.1	204	129	<1	<1	328	328	15	0.48	0.02				854					
Templemore B	30-Aug-10																									
Templemore B	9-Nov-10																									
Templemore B	14-Mar-11	7.28	1400	97	37	200	2	16.6	264	136	<1	<1	339	339	17	1.3		<0.01	2.85	2.85						
Templemore B	6-Jun-11																									
Templemore B	8-Sep-11	7.54	1630	62	38	202	2	15.1	254	137	<1	<1	325	325	16.5	4.62	0.03	<0.01	0.73	0.73	982					
Templemore B	7-Dec-11																									
Templemore B	13-Mar-12	7.7	1790	116	42	228	2	19.2	307	142	<1	<1	338	338	18.4	2.24	0.11	<0.01	3.37	3.37	1040					
Templemore B	13-Jun-12																									
Templemore B	4-Sep-12	7.63	1920	110	46	248	2	20.1	326	181	<1	<1	364	364	20.2	0.31	<0.01	<0.01	7.25	7.25	1200					
Templemore B	27-Nov-12																									
Templemore B	20-Mar-13	7.51	1700	94	36	235	2	17.9	255	137	<1	<1	335	335	16.7	3.41	0.03	<0.01	4.44	4.44	886					
Templemore B	11-Jul-13																									
Templemore B	5-Sep-13	7.79	1620	78	32	230	2	16.6	242	158	<1	<1	304	304	16.2	1.18	0.03				988					
Templemore B	22-Nov-13																									
Templemore B	20-Feb-14	7.47	1470	69	29	204	1	14.7	199	142	<1	<1	293	293	14.4	1.03	0.02				829					
Templemore B	27-May-14																									
Templemore B	9-Sep-14	7.7	1480	63	25	192	1	13.6	195	141	<1	<1	325	325	14.9	4.76		<0.01	2.3	2.3						
Templemore B	20-Nov-14																									
Templemore B	26-Feb-15	7.89	1580	70	30	205	2	14.9	211	144	<1	<1	328	328	15.5	1.9	0.09	<0.01	2.38	2.38	955					
Templemore B	26-May-15																									
Templemore B	27-Aug-15	7.73	1520	74	31	202	1	15	179	158	<1	<1	286	286	14	3.43	0.04	<0.01	2.07	2.07	826					
Templemore B	4-Dec-15																									
Templemore B	24-Feb-16	7.77	1510	82	32	219	1	16.3	214	158	<1	<1	307	307	15.5	2.56	0.05	<0.01	0.21	0.21	874					
Templemore B	23-May-16																									
Templemore B	6-Sep-16	7.58	1560	90	30	196	2	15.5	240		<1	<1	325	325	16.1	1.84		<0.01	2.14	2.14						
Templemore B	29-Nov-16																									
Templemore B	23-Mar-17	8.02	15200	71	31	197	1	14.7	235	129	<1	<1	322	322	15.7	3.48	0.02	<0.01	2.42	2.42	1040					
Templemore B	21-Jun-17																									
Templemore B	13-Sep-17	8.3	1620	89	37	213	2	16.8	245	149	<1	<1	360	360	17.2	1.19	0.04	<0.01	2.31	2.31	916					
Templemore B	13-Dec-17																									
Templemore B	13-Sep-18	7.59	1480	74	27	180	2	13.8	233	135	<1	<1	305	305	15.5	5.74	0.05	<0.01	1.89	1.89	777					
Templemore B	5-Dec-18																									
Templemore B	14-Mar-19	7.58	1410	66	66	66	66	14.4	194	138	<1	<1	319	319	14.7	0.96	0.01	<0.01	1.3	1.3	874				<20	<100
Templemore B	19-Jun-19																									
Templemore B	11-Sep-19	7.84	1820	143	65	174	2	20.1	322	121	<1	<1	376	376	19.1	2.52		<0.01	1.55	1.55	1010		<20	<50	<20	<100
Templemore B	5-Dec-19																									
Templemore B	18-Mar-20	7.71	1550	91	32	202	2	15.5	242	142	<1	<1	291	291	15.6	0.37	0.01	<0.01	1.41	1.41	856		<20	<50	<20	<100
Templemore B	11-Jun-20																									
Templemore B	23-Sep-20	7.78	1450	77	26	162	2	13.1	224	132	<1	<1	340	340	15.9	9.61	<0.01	<0.01	1.36	1.36	878		<20	<50	<20	<100
Templemore B	8-Dec-20																									
REGIONAL BORES																										
Reg 6																										
Reg 6	21-Aug-15																									
Reg 6	24-Sep-15	11.6	2270	14	<1	491	42	23.1	520	111	<1	90	60	150	20	7.29	0.84	<0.01	0.14	0.14	1170					
Reg 6	29-Oct-15																									
Reg 6	27-Nov-15																									
Reg 6	29-Dec-15	8.15	2360	47	23	358	9	20	532	147	<1	<1	234	234	22.7	6.33	0.16	<0.01	0.01	0.01	1420					
Reg 6	15-Jan-16																									
Reg 6	17-Feb-16																									
Reg 6	11-Mar-16	8.05	2300	49	28	359	10	20.6	527	151	<1	<1	228	228	22.6	4.52	0.12	<0.01	<0.01	<0.01	1250					
Reg 6	18-Apr-16																									
Reg 6	12-May-16																									
Reg 6	14-Jun-16	10.7	2270	12	<1	408	31	19.1	528	112	30	95	<1	124	19.7	1.48	1.13	0.43	1.89	2.32	943					
Reg 6	21-Jun-16	7.33	2240	46	21	348	8	19.4	466	148	<1	<1	283	283	21.9	6.12	0.13	<0.01	0.01	0.01	1370					
Reg 6	12-Jul-16																									
Reg 6	8-Aug-16																									
Reg 6	5-Sep-16	8.16	2160	52	23	401	8	22.1	478	161	<1	<1	216	216	21.2	2.25	0.1	<0.01	0.04	0.04	1080					
Reg 6	5-Oct-16																									
Reg 6	4-Nov-16																									
Reg 6	23-Dec-16	8.26	2050	47	22	326	11	18.6	458	137	<1	<1	226	226	20.3	4.29	0.2	0.03	0.02	0.05	1350					
Reg 6	18-Jan-17																									
Reg 6	14-Feb-17																									
Reg 6																										
Reg 6	9-Mar-17	8.23	2140	41	22	350	11		462	137	<1	<1	197	197	1.17		<0.01	<0.01	0.07	19.8	1160					
Reg 6	5-Apr-17																									
Reg 6	10-May-17																									

Sample Location	Date		Depth to Ground - mbgl	Depth to Stand - mbtoc	Field Parameters			Total Metals																				Major Cations							Total Cations - meq/L	Major Anions							Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
					pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L															
ANZECC Guideline - stock drinking water								**5**	**0.5**			**0.01**	**1**	**1**	**1**	**0.1**		**1**	**0.02**		**20**			**0.002**			**1000**									**1000**									**400**		**4000**						
Reg 6	6-Jun-17		20.23		8.65	2126	13.7	<0.01	0.002		0.055	<0.0001	<0.001		<0.001	0.009	0.012	0.003			<0.05		0.11		8.32	2050	46	25	378	10		452	133	<1	1	194	195	4.04		<0.01	0.03	10.9	19.4	1480					
Reg 6	4-Jul-17		20.19																																															
Reg 6	8-Aug-17		20.19																																															
Reg 6	26-Sep-17		20.27		9.06	2450	18.9	<0.01	0.001		0.028	<0.0001	0.001		<0.001	0.047	0.047	0.009			<0.05		0.27		8.58	2320	22	29	457	22		510	109	<1	29	219	248	5.08		0.11	0.2	0.07	21.6	1200					
Reg 6	12-Oct-17		20.23																																														
Reg 6	9-Nov-17		20.29																																														
Reg 6	20-Dec-17		20.3		7.9	2210	41.8	<0.01	<0.001		0.05	<0.0001	<0.001		<0.001	0.01	0.017	0.003			<0.05		0.13		8.25	2090	40	16	325	9		481	156	<1	<1	224	224	9.27		0.03	0.1	0.17	21.3	1080					
Reg 6	11-Jan-18		20.34																																														
Reg 6	7-Feb-18		20.75																																														
Reg 6	27-Mar-18		21.31		8.28	2060	27.1	<0.01	<0.001		0.052	<0.0001	<0.001		<0.001	0.021	0.02	0.002			<0.05		0.26		8.41	2130	40	16	328	13		482	182	<1	10	184	195	8.6		<0.01	0.08	0.08	21.3	1100					
Reg 6	10-Apr-18		20.7																																														
Reg 6	7-May-18		21.65																																														
Reg 6	14-Jun-18		21.92		8.14	2080	15.4	<0.01	<0.001		0.043	<0.0001	<0.001		<0.001	0.006	0.013	0.002			<0.05		0.1		8.21	2020	45	20	344	9		472	135	<1	<1	234	234	4.3		<0.01	0.02	0.76	20.8	1080					
Reg 6	5-Jul-18		22.2																																														
Reg 6	9-Aug-18		22.2																																														
Reg 6	3-Sep-18		22.07		7.69	2076	16.9	<0.01	<0.001		0.048	<0.0001	<0.001		<0.001	0.008	0.014	0.002			<0.05		0.11		8.52	2060	42	20	340	10		429	130	<1	14	200	214	0.78		<0.01	<0.01	0.07	19.1	782					
Reg 6	8-Oct-18		22.02																																														
Reg 6	8-Nov-18		22.16																																														
Reg 6	11-Dec-18		22.36		8.01	2040	29.2	<0.01	0.001		0.049	<0.0001	<0.001		<0.001	0.006	0.013	0.002			<0.05		0.06		8.5	2060	50	22	350	11		459	147	<1	21	200	220	1.47		<0.01	<0.01	0.76	20.4	1150					
Reg 6	8-Jan-19		22.4																																														
Reg 6	11-Feb-19		22.23																																														
Reg 6	5-Mar-19		22.34		8.2	2044	29.9	<0.01	<0.001		0.056	<0.0001	<0.001		<0.001	0.011	0.017	0.002			<0.05		0.13		7.94	2090	40	19	346	10		444	88	<1	<1	188	188	2.03		<0.01	<0.01	0.13	18.1	1090					
Reg 6	2-Apr-19		22.48																																														
Reg 6	2-May-19		22.61																																														
Reg 6	5-Jun-19		22.7		8.15	2146	22.2	<0.01	<0.001		0.055	<0.0001	<0.001		<0.001	0.01	0.016	0.006			<0.05		0.12		8.19	2100	38	18	335	10		459	144	<1	<1	200	200	4.55		0.07	0.12	0.07	19.9	1100					
Reg 6	3-Jul-19		22.75																																														
Reg 6	5-Aug-19		22.79																																														
Reg 6	5-Sep-19		22.81		7.58	2336	33.4	<0.01	0.001		0.057	<0.0001	<0.001		<0.001	0.029	0.017	0.017			0.06		0.12		7.98	2440	43	30	378	15		508	156	<1	<1	201	201	0.36		<0.01	0.02	<0.01	21.6	1320					
Reg 6	10-Oct-19		22.87																																														
Reg 6	4-Nov-19		22.89																																														
Reg 6	28-Nov-19		22.92		8.01	2062	27.5	<0.01	0.001		0.052	<0.0001	<0.001		<0.001	0.008	0.013	0.004			<0.05		0.11		8	2060	40	18	324	10		509	148	<1	<1	216	216	9.93		<0.01	<0.01	0.03	21.8	1060					
Reg 6	14-Jan-20		24.98																																														
Reg 6	13-Feb-20		22.9																																														
Reg 6	12-Mar-20		22.69		8.45	2025	9.9	<0.01	<0.001		0.063	<0.0001			<0.001	<0.001	0.07	0.006			<0.005	0.06	<0.05		8.21	2080	42	17	333	11	18.3	488	146	<1	<1	209	209	21	6.93	0.08	0.09	0.02	0.11	1140					
Reg 6	7-Apr-20		22.43																																														
Reg 6	12-May-20		22.15																																														
Reg 6	10-Jun-20		22.04		7.7	2042	17.2	<0.01	0.001		0.06	<0.0001			0.001	<0.001	0.091	0.004			0.008	0.07	<0.05		7.98	2000	40	19	349	10	19	469	134	<1	<1	212	212	20.2	3.21	0.06	<0.01	0.02	0.02	1060					
Reg 6	7-Jul-20		21.93																																														
Reg 6	10-Aug-20		21.79																																														
Reg 6	10-Sep-20		21.75		7.89	2046	15.8	<0.01	0.001		0.048	<0.0001			0.004	<0.001	0.117	0.002			0.008	<0.05	<0.05		7.79	2020	42	18	342	9	18.7	437	134	<1	<1	218	218	19.5	2.07	0.06	<0.01	0.03	0.03	1110					
Reg 6	19-Oct-20		21.71																																														
Reg 6	4-Nov-20		21.65																																														
Reg 6	26-Nov-20		21.64		7.98	2005	32.4	<0.01	<0.001		0.042	<0.0001			0.002	<0.001	0.105	0.004			0.013	0.06	<0.05		7.97	2120	48	20	333	9	18.8	425	204	<1	<1	216	216	20.6	4.57	0.05	<0.01	<0.01	<0.01	1220					
Reg 7a																																																			
Reg 7a	20-Mar-14		6.61		7.23	1230	21.7	<0.01	0.007		0.084	<0.0001	<0.001		0.002	<0.001	2.53	0.002			0.029	<0.05	1.23		7.83	950	62	30	108	2	10.3	84	25	<1	<1	374	374	10.4	0.26	0.1	<0.01	0.05	0.05	606					
Reg 7a	23-Apr-14		6.19																																														
Reg 7a	27-May-14		6.23																																														
Reg 7a	26-Jun-14		6.28		7.01	846	16.9	<0.01	0.005		0.084	<0.0001	<0.001		<0.001	<0.001	1.83	<0.001			0.013	<0.05	1.38		7.52	884	58	26	103	2	9.57	64	28	<1	<1	369	369	9.76	1.03	0.03	<0.01	0.12	0.12						
Reg 7a	29-Jul-14		6.32																																														
Reg 7a	26-Aug-14		6.37					<0.001	0.006		0.08	<0.0001	<0.001		0.003	<0.001	1.42	0.001			0.048	<0.05	<0.05		7.77	871	55	28	106	2	9.71	61	35	<1	<1	358	358	9.6	0.54	0.03	<0.01	0.06	0.06	354					
Reg 7a	29-Sep-14		6.57																																														
Reg 7a	28-Oct-14		6.58																																														
Reg 7a	27-Nov-14		6.67																																														
Reg 7a	17-Dec-14		6.69		7.6	805	23.8	<0.01	0.004		0.072	<0.0001	<0.001		0.002	<0.001	1.23	0.002			0.076	<0.05	<0.05		8.11	853	45	22	89	2	7.98	66	38	<1	<1	300	300	8.65	4.04	0.03	<0.01	0.02	0.02	428					
Reg 7a	20-Jan-15		6.76																																														
Reg 7a	18-Feb-15		6.85																																														
Reg 7a	17-Mar-15		6.93		7.51	857	22	<0.01	0.008		0.09	<0.0001	<0.001		0.002	<0.001	1.25	0.002			0.051	<0.05	0.69		7.61	834	56	30	111	2	10.1	48	43	<1	<1	393	393	10.1	0.18	0.03	<0.01	0.17	0.17	491					
Reg 7a	21-Apr-15		7.04																																														
Reg 7a	27-May-15		7.19																																														
Reg 7a	29-Jun-15		7.35		7.19	778	20	<0.1	0.008		0.084	<0.0001	<0.001		<0.001	<0.001	0.956	<0.001			0.019	<0.05	0.7		7.31	793	55	26	97	2	9.15	45	42	<1	<1	336	336	8.86	1.63	0.01	<0.01	0.02	0.02	486					
Reg 7a	24-Jul-15		7.41		7.32	1985	19.1																																										
Reg 7a	21-Aug-15		7.58																																														
Reg 7a	18-Sep-15		7.71		7.86	747	20.1	<0.01	0.008		0.085	<0.0001	<0.001		<0.001	<0.001	0.86	<0.001			0.037	<0.05	0.29		7.41	772	52	27	104	2	9.39	55	36	<1	<1	297	297	8.24	6.54	0.07	<0.01	0.09	0.09	450					
Reg 7a	29-Oct-15		7.87																																														
Reg 7a	26-Nov-15		7.93																																														
Reg 7a	29-Dec-15		8.03		7.05	841	23.5	<0.01	0.009		0.089	<0.0001	<0.001		<0.001	<0.001	1.05	0.001			0.008	<0.05	0.7		7.79	860	51	24	94	1	8.63	53	45	<1	<1	332	332	9.06	2.45	<0.01	<0.01	<0.01	<0.01	468					
Reg 7a	15-Jan-16		8.15																																														
Reg 7a	17-Feb-16		8.22																																														
Reg 7a	11-Mar-16		8.29		7.47	778	17.4	<0.01	0.008		0.076	<0.0001	<0.001		<0.001	<0.001	0.711	0.002			0.029	<0.05	0.35		7.77	788	44	24	100	2	8.57	45	31	<1	<1	310	310	8.11	2.75	0.04	<0.01	0.02	0.02	418					
Reg 7a	19-Apr-16		8.42																																														
Reg 7a	11-May-16		8.48																																														
Reg 7a	14-Jun-16		8.65		7.38	786	15	<0.01	0.007		0.078	<0.0001	<0.001		<0.001	<0.001	0.68	0.001			0.022	<0.05	0.31		7.77	758	44	21	86	1	7.69	40	20	<1	<1	300	300	7.54	0.97	0.03	<0.01	<0.01	<0.01	374					
Reg 7a	12-Jul-16		8.62																																														
Reg 7a	8-Aug-16		8.7																																														
Reg 7a	5-Sep-16		7.96		7.25	780	15.7	<0.01	0.006		0.09	<0.0001	<0.001		<0.001	<0.001	0.81	0.002			0.019	<0.05	0.44		7.49	790	50	21	98	1	8.51	41	33	<1	<1	304	304	7.92	3.59	0.03	<0.01	0.05	0.05	416					
Reg 7a	5-Oct-16		6.03																																														
Reg 7a	4-Nov-16		5.76																																														
Reg 7a	15-Dec-16		5.94		7.66	742	16.2	0.06	0.006		0.058	<0.0001	0.002		0.003	<0.001	0.005	0.006			0.023	<0.05	<0.05		7.8	714	43	20	79	2	7.28	46	26	<1	<1	296	296	7.75	3.15	0.02	<0.01	0.56	0.56	496					
Reg 7a	18-Jan-17		6.06																																														
Reg 7a	14-Feb-17		6.25																																														
Reg 7a	9-Mar-17		6.34		7.22	878	17.8	<0.01	0.006		0.096	<0.0001	<0.001		<0.001	0.002	0.001	0.011			0.43	0.3	0.03		7.81	860	53	24	92	2		58	43	<1	<1	305	305	0.28		<0.01	<0.01	0.14	8.62	456					
Reg 7a	3-Apr-17		6.45																																														
Reg 7a	11-May-17		6.61																																														
Reg 7a	6-Jun-17		6.66		7.31	869	14.1	<0.01	0.006		0.093	<0.0001	<0.001		<0.001	0.002	0.002	0.003			0.36		0.02		7.67	833	53	24	98	2		58	36	<1	<1	311	311	1.91		0.02	0.02	0.07	8.6	496					
Reg 7a	4-Jul-17		6.72																																														
Reg 7a	9-Aug-17		6.8																																														
Reg 7a	8-Sep-17		6.81		7.45	806	15.4	<0.01	0.003		0.075	<0.0001	0.001		<0.001	0.002	<0.001	0.003			0.35		0.46		7.92	774	45	20	89	2		45	26	<1	<1	345	345	5.39		0.04	0.04	0.22	8.7	452					
Reg 7a	17-Oct-17		6.93																																														
Reg 7a	8-Nov-17		7.01																																														
Reg 7a	20-Dec-17		7.18		6.79	898	34.5	<0.01	0.005		0.094	<0.0001	0.008		<0.001	0.003	0.003	0.001			0.12		<0.01		7.74	850	52	26	108	2		54	38	<1	<1	358	358	0.08		<0.01	<0.01	0.08	9.47	421					
Reg 7a	9-Jan-18		7.27																																														
Reg 7a	6-Feb-18		7.48																																														
Reg 7a	27-Mar-18		7.75		7.05	852	15.3	<0.01	0.004		0.087	<0.0001	0.008		<0.001	0.002	<0.001	0.002			0.3		0.02		7.44	899	54	24	92	1		58	47	<1	<1	329	329	2.74		0.07	0.07	0.1	9.19	506					
Reg 7a	9-Apr-18		7.84																																														
Reg 7a	7-May-18		8.01																																														
Reg 7a	14-Jun-18		8.18		7.35	790	20.9	<0.01	0.005		0.089	<0.0001	0.004		<0.001	0.002	<0.001	<0.001			0.23		<0.01		7.73	799	49	23	96	1		48	34	<1	<1	350	350	2.93		13.7	13.7	0.12	9.05	427					
Reg 7a	5-Jul-18		8.28																																														
Reg 7a	9-Aug-18		8.46																																														
Reg 7a	10-Sep-18		8.62		7.28	822	22.2	<0.01	0.005		0.077	<0.0001	0.007		<0.001	0.001	<0.001	0.002			0.22		0.02		7.69	766	41	21	89	1		46	28	<1	<1	295	295	0.67		0.02	0.02	0.11	7.77	398					
Reg 7a	8-Oct-18		8.68																																														

				Field Parameters			Total Metals																			Major Cations							Major Anions															
Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	pH - Field	EC - Field - µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L	pH - Lab	EC - Lab - µs/cm	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L	Total Cations - meq/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L	Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
ANZECC Guideline - stock drinking water							**5**	**0.5**			**0.01**	**1**	**1**	**1**	**0.1**		**1**	**0.02**		**20**			**0.002**			**1000**						**1000**									**400**		**4000**					
Reg 7a	8-Nov-18		8.81																																													
Reg 7a	19-Dec-18		8.97	7.33	794	26	<0.01	0.004		0.092	<0.0001	<0.001		<0.001	0.002	0.001	0.001			0.26		0.02		8.51	752	54	25	100	2		51	36	<1	30	293	323	2.87		0.04	0.04	0.12	8.64	460					
Reg 7a	8-Jan-19		8.98																																													
Reg 7a	11-Feb-19		9.05																																													
Reg 7a	13-Mar-19		9.11	7.28	821	30.5	<0.01	0.003		0.089	<0.0001	<0.001		<0.001	0.002	<0.001	0.001			0.2	0.2	0.06		7.61	784	48	22	94	1		52	35	<1	<1	336	336	3.42		0.07	0.07	0.1	8.91	485					
Reg 7a	2-Apr-19		9.21																																													
Reg 7a	2-May-19		9.16																																													
Reg 7a	5-Jun-19		9.04	7.2	936	22.1	<0.01	0.003		0.096	<0.0001	<0.001		<0.001	0.002	<0.001	<0.001			0.31		<0.01		7.85	881	52	27	96	1		60	43	<1	<1	320	320	0.2		0.07	0.07	0.1	8.98	525					
Reg 7a	4-Jul-19		9.12																																													
Reg 7a	5-Aug-19		9.17																																													
Reg 7a	9-Sep-19		9.25	9.53	862	22.1	<0.01	0.004		0.096	<0.0001	0.007		<0.001	0.002	<0.001	0.003			0.21		<0.01		7.32	912	51	25	97	1		47	36	<1	<1	287	287	6.23		0.04	0.04	0.09	7.81	510					
Reg 7a	10-Oct-19		9.35																																													
Reg 7a	4-Nov-19		9.38																																													
Reg 7a	27-Nov-19		9.34	7.28	839	24.6	<0.01	0.004		0.093	<0.0001	0.004		<0.001	0.002	0.001	0.002			0.09		0.02		7.4	888	49	24	96	2		55	39	<1	<1	341	341	2.97		0.02	0.02	0.01	9.18	482					
Reg 7a	21-Jan-20		9.53																																													
Reg 7a	25-Feb-20		8.77																																													
Reg 7a	12-Mar-20		8.37	7.28	912	22.4	<0.01	0.003		0.11	<0.0001			<0.001	<0.001	0.416	0.002			0.064	<0.05	0.17		7.29	885	65	28	100	2	9.95	59	43	<1	<1	376	376	10.1	0.62	0.02	<0.01	<0.01	<0.01	533					
Reg 7a	7-Apr-20		7.83																																													
Reg 7a	13-May-20		7.05																																													
Reg 7a	10-Jun-20		7.03	6.99	961	9	<0.01	0.002		0.123	<0.0001			<0.001	<0.001	0.353	<0.001			0.044	<0.05	0.1		7.19	968	62	28	110	2	10.2	65	60	<1	<1	344	344	9.96	1.38	<0.01	0.02	0.4	0.42	558					
Reg 7a	7-Jul-20		7.05																																													
Reg 7a	11-Aug-20		7.04																																													
Reg 7a	11-Sep-20		7.11	7.07	984	20.4	<0.01	<0.001		0.113	<0.0001			0.001	<0.001	0.343	0.001			0.052	<0.05	0.13		7.18	957	60	27	116	2	10.3	67	60	<1	<1	360	360	10.3	0.09	<0.01	<0.01	0.42	0.42	551					
Reg 7a	19-Oct-20		7.06																																													
Reg 7a	4-Nov-20		7.08																																													
Reg 7a	7-Dec-20		7.06	7.07	469	27.9	<0.01	<0.001		0.109	<0.0001			0.006	<0.001	0.317	0.002			0.064	<0.05	0.07		7.4	896	58	26	103	2	9.56	60	59	<1	<1	343	343	9.77	1.08	<0.01	0.01	0.24	0.25	540					
Reg 14																																																
Reg 14	18-Mar-14		20.58	7.63	1575	26.9	0.7	0.012		0.08	0.0002	<0.001		0.019	0.008		0.006			0.043	<0.05	3.08		7.76	1260	35	14	233	3	13.1	188	36	<1	<1	354	354	13.1	0.09	0.13	<0.01	<0.01	<0.01	959					
Reg 14	23-Apr-14		20.54																																													
Reg 14	27-May-14		19.67																																													
Reg 14	25-Jun-14		19.45				0.03	0.003		0.072	<0.0001	<0.001		0.002	<0.001		0.004			0.015	<0.05	0.09		7.72	1290	38	13	268	4	14.7	170	34	<1	<1	396	396	13.4	4.62	0.2	<0.01	0.34	0.34						
Reg 14	29-Jul-14		19.4																																													
Reg 14	27-Aug-14																																															
Reg 14	29-Sep-14		22.41																																													
Reg 14	28-Oct-14		21.2																																													
Reg 14	27-Nov-14		19.97																																													
Reg 14	17-Dec-14		19.85	7.85	1198	29.1	<0.01	0.01		0.056	<0.0001	<0.001		<0.001	<0.001		0.001			0.024	<0.05	<0.05		8.14	1250	30	10	205	3	11.3	181	24	<1	<1	347	347	12.5	5.17	0.29	<0.01	0.05	0.05	710					
Reg 14	20-Jan-15		20.14																																													
Reg 14	18-Feb-15		20.67																																													
Reg 14	17-Mar-15		20.67	8.23	1226	22.9	<0.01	0.01		0.05	<0.0001	<0.001		<0.001	<0.001		0.002			0.009	0.05	<0.05		8.09	1220	38	12	253	2	13.9	175	30	<1	<1	449	449	14.5	2.12	0.32	<0.01	0.03	0.03	758					
Reg 14	21-Apr-15		19.95																																													
Reg 14	27-May-15		19.77																																													
Reg 14	29-Jun-15		19.65	8.62	1178	21	0.02	0.008		0.044	<0.0001	<0.001		0.001	<0.001		0.001			0.01	<0.05	<0.05		7.85	1200	44	11	239	3	13.6	164	29	<1	<1	380	380	12.8	2.81	0.25	<0.01	0.05	0.05	699					
Reg 14	24-Jul-15		19.59																																													
Reg 14	21-Aug-15		19.57																																													
Reg 14	24-Sep-15		19.54	8.24	786	17.6	<0.01	0.004		0.041	<0.0001	<0.001		<0.001	<0.001		0.002			0.039	<0.05	0.07		7.85	797	22	8	167	2	9.07	59	38	<1	<1	287	287	8.19	5.06	0.01	<0.01	0.05	0.05	480					
Reg 14	29-Oct-15		20.27																																													
Reg 14	27-Nov-15		19.74																																													
Reg 14	29-Dec-15		20	7.26	917	27	<0.01	0.009		0.038	<0.0001	<0.001		<0.001	<0.001		0.002			0.006	<0.05	0.41		7.95	959	27	8	179	2	9.84	77	48	<1	<1	329	329	9.74	0.46	0.03	<0.01	0.02	0.02	535					
Reg 14	15-Jan-16		20.76																																													
Reg 14	17-Feb-16		21.04																																													
Reg 14	11-Mar-16		21.24	7.62	995	29.6	<0.01	0.004		0.034	<0.0001	<0.001		<0.001	<0.001		0.004			0.007	<0.05	0.09		8.01	983	26	10	184	2	10.2	78	40	<1	<1	320	320	9.43	3.78	0.04	<0.01	<0.01	<0.01	504					
Reg 14	18-Apr-16		20.34																																													
Reg 14	11-May-16		20.14																																													
Reg 14	14-Jun-16		19.92	8.08	876	17	<0.01	0.004		0.044	<0.0001	<0.001		<0.001	<0.001		0.002			0.01	<0.05	0.12		8.15	871	25	7	154	2	8.57	68	40	<1	<1	292	292	8.58	0.11	0.12	<0.01	0.04	0.04	444					
Reg 14	12-Jul-16		19.79																																													
Reg 14	5-Aug-16		19.75																																													
Reg 14	5-Sep-16		19.75	8	886	17.4	<0.01	0.003		0.043	<0.0001	<0.001		<0.001	<0.001		0.002			<0.005	<0.05	0.09		7.96	921	21	7	159	1	8.56	64	45	<1	<1	291	291	8.56	0.01	0.16	<0.01	0.04	0.04	519					
Reg 14	5-Oct-16		19.65																																													
Reg 14	4-Nov-16		19.6																																													
Reg 14	15-Dec-16		19.76	8.15	888	17.2	<0.01	0.004		0.041	<0.0001	<0.001		<0.001	<0.001		0.002			<0.005	<0.05	0.08		8.12	856	26	7	162	2	8.97	83	36	<1	<1	297	297	9.02	0.3	0.16	<0.01	0.05	0.05	600					
Reg 14	18-Jan-17		20.53																																													
Reg 14	14-Feb-17		20.43																																													
Reg 14	9-Mar-17		20.23	7.36	972	20.1	<0.01	0.005		0.034	<0.0001	<0.001		<0.001	0.003		0.007			0.34	0.3	0.05		7.88	938	22	8	177	2		76	47	<1	<1	320	320	0.05		0.01	0.01	0.28	9.52	660					
Reg 14	5-Apr-17		19.7																																													
Reg 14	10-May-17		19.72																																													
Reg 14	6-Jun-17		19.56	8.22	908	14.9	<0.01	0.002		0.042	<0.0001	<0.001		<0.001	0.004		0.002			0.1		0.21		8.34	935	29	8	169	2		82	34	<1	5	271	276	5.39		<0.01	<0.01	0.09	8.54	504					
Reg 14	3-Jul-17		19.49																																													
Reg 14	8-Aug-17		19.42																																													
Reg 14	15-Sep-17		19.77	8.16	916	17.3	<0.01	0.003		0.039	<0.0001	<0.001		<0.001	0.003		0.002			0.09		0.23		8.15	893	26	7	163	2		81	41	<1	<1	298	298	0.43		0.03	0.03	0.12	9.09	419					
Reg 14	12-Oct-17		20.33																																													
Reg 14	8-Nov-17		19.97																																													
Reg 14	20-Dec-17		20.15	7.1	938	24.6	<0.01	0.003		0.033	<0.0001	<0.001		<0.001	0.002		0.001			0.09		0.18		8.34	928	26	7	158	2		104	44	<1	6	306	312	6.81		0.04	0.04	0.08	10.1	576					
Reg 14	9-Jan-18		21.27																																													
Reg 14	6-Feb-18		21.65																																													
Reg 14	26-Mar-18		20.77	7.14	1002	18.1	<0.01	0.004		0.028	<0.0001	<0.001		<0.001	0.005		0.002			0.28		0.03		7.62	1050	26	8	178	2		102	75	<1	<1	325	325	5.72		0.02	0.02	0.26	10.9	595					
Reg 14	9-Apr-18		20.77																																													
Reg 14	7-May-18		20.68																																													
Reg 14	14-Jun-18		21.96	7.4	980	18.4	<0.01	0.003		0.03	<0.0001	<0.001		<0.001	<0.001		0.003			0.37		0.03		7.84	978	24	8	184	2		78	54	<1	<1	335	335	0.54		<0.01	<0.01	0.25	10	566					
Reg 14	5-Jul-18		21.04																																													
Reg 14	9-Aug-18		20.91																																													
Reg 14	3-Sep-18		20.44	6.9	1024	22.4	<0.01	0.004		0.032	<0.0001	<0.001		<0.001	<0.001		0.002			0.27		0.05		8.55	988	22	7	170	1		65	41	<1	22	288	310	1.18		<0.01	<0.01	0.24	8.88	520					
Reg 14	8-Oct-18		20.96																																													
Reg 14	8-Nov-18		20.96																																													
Reg 14	11-Dec-18		21.25	7.51	948	25	<0.01	0.003		0.038	<0.0001	<0.001		<0.001	0.001		0.003			0.08		0.03		8.55	951	26	9	189	2		81	45	<1	29	332	361	0.6		<0.01	<0.01	0.23	10.4	588					
Reg 14	8-Jan-19		22.07																																													
Reg 14	11-Feb-19		22.05																																													
Reg 14	4-Mar-19		22.05	7.67	988	29.4	<0.01	0.003		0.021	<0.0001	<0.001		<0.001	0.002		0.003			<0.05		0.08		7.6	993	26	8	185	2		92	58	<1	<1	269	269	4.56		<0.01	<0.01	0.16	9.18	608					
Reg 14	2-Apr-19		21.33																																													
Reg 14	2-May-19		21.01																																													
Reg 14	5-Jun-19		21.03	7.51	1017	23.8	<0.01	0.003		0.032	<0.0001	<0.001		<0.001	0.006		0.005			0.06		0.08		8.22	972	25	9	177	2		88	41	<1	<1	305	305	1.61		<0.01	<0.01	0.21	9.43	588					
Reg 14	4-Jul-19		21																																													
Reg 14	5-Aug-19		21.38																																													
Reg 14	4-Sep-19		20.91	7.22	1223	31.2	<0.01	0.003		0.034	<0.0001	<0.001		<0.001	0.011		0.012			0.13		0.15		7.8	1240	29	14	202	4		157	70	<1	<1	265	265	1.36		0.02	0.02	0.16	11.2	670					
Reg 14	10-Oct-19		21.59																																													
Reg 14	4-Nov-19		21.24																																													
Reg 14	26-Nov-19		21.41	7.48	1435	30.9	<0.01	0.003		0.032	<0.0001	<0.001		<0.001	0.029		0.009			<0.05		0.12		7.75	1360	50	12	222	7		168	243	<1	<1	255	255	5.58		<0.01	<0.01	0.1	14.9	713					
Reg 14	14-Jan-20		21.72																																													
Reg 14	13-Feb-20		21.25																																													
Reg 14	11-Mar-20		20.85	7.75	994	21.4	<0.01	0.003		0.026	<0.0001			<0.001	<0.001		0.009			0.008	<0.05	<0.05		7.72	1010	29	9	175	2	9.85	114	54	<1	<1	337	337	11.1	5.84	0.15	<0.01	<0.01	<0.01	654					

Sample Location	Date	Depth to Ground - mbgl	Depth to Stand - mbtoc	Field Parameters: pH - Field	EC - Field - µs/cm	Temp - Field - °C	Total Metals: Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Beryllium (Be) - mg/L	Barium (Ba) - mg/L	Cadmium (Cd) - mg/L	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Selenium (Se) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Boron (B) - mg/L	Iron (Fe) - mg/L	Mercury (Hg) - mg/L
ANZECC Guideline - stock drinking water							**5**	**0.5**			**0.01**	**1**	**1**	**1**	**0.1**		**1**	**0.02**		**20**			**0.002**
Reg 14	07/04/202		20.64																				
Reg 14	12-May-20		20.54																				
Reg 14	10-Jun-20		20.5	7.27	1048	19.2	<0.01	0.003		0.034	<0.0001			0.001	<0.001		0.011			0.02	<0.05	<0.05	
Reg 14	7-Jul-20		20.45																				
Reg 14	11-Aug-20		20.44																				
Reg 14	10-Sep-20		20.41	7.45	1034	17	<0.01	0.003		0.031	<0.0001			<0.001	<0.001		0.004			0.016	<0.05	<0.05	
Reg 14	19-Oct-20		20.65																				
Reg 14	4-Nov-20		20.57																				
Reg 14	27-Nov-20		21.1	7.52	472	30.5	<0.01	0.003		0.027	<0.0001			<0.001	<0.001		0.004			0.013	<0.05	<0.05	

Sample Location	Date	pH - Lab	EC - Lab - µs/cm	Major Cations: Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L	Total Cations - meq/L	Major Anions: Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L	Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N -mg/L	Nitrate as N - mg/L	Nitrite + Nitrate as N - mg/L	Total Dissolved Solids	Dissolved oxygen	TPH C6-C9	TPH C10-C36	TRH C6- C10	TRH C10-C40
ANZECC Guideline - stock drinking water				**1000**						**1000**									**400**		**4000**					
Reg 14	07/04/202																									
Reg 14	12-May-20																									
Reg 14	10-Jun-20	7.58	1040	24	9	199	2	10.6	126	49	<1	<1	320	320	11	1.49	0.05	<0.01	0.01	0.01	488					
Reg 14	7-Jul-20																									
Reg 14	11-Aug-20																									
Reg 14	10-Sep-20	7.47	1060	28	9	194	2	10.6	106	81	<1	<1	343	343	11.5	4.07	0.06	<0.01	0.04	0.04	646					
Reg 14	19-Oct-20																									
Reg 14	4-Nov-20																									
Reg 14	27-Nov-20	7.54	1040	26	8	184	2	10	109	78	<1	<1	348	348	11.6	7.58	0.04	<0.01	0.02	0.02	694					


Standing Water Level - MW1
Depth in Metres
0
5
10
15
Jun 06
Dec 06
Jun 07
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Jun 08
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Jun 09
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Dec 10
Jun 11
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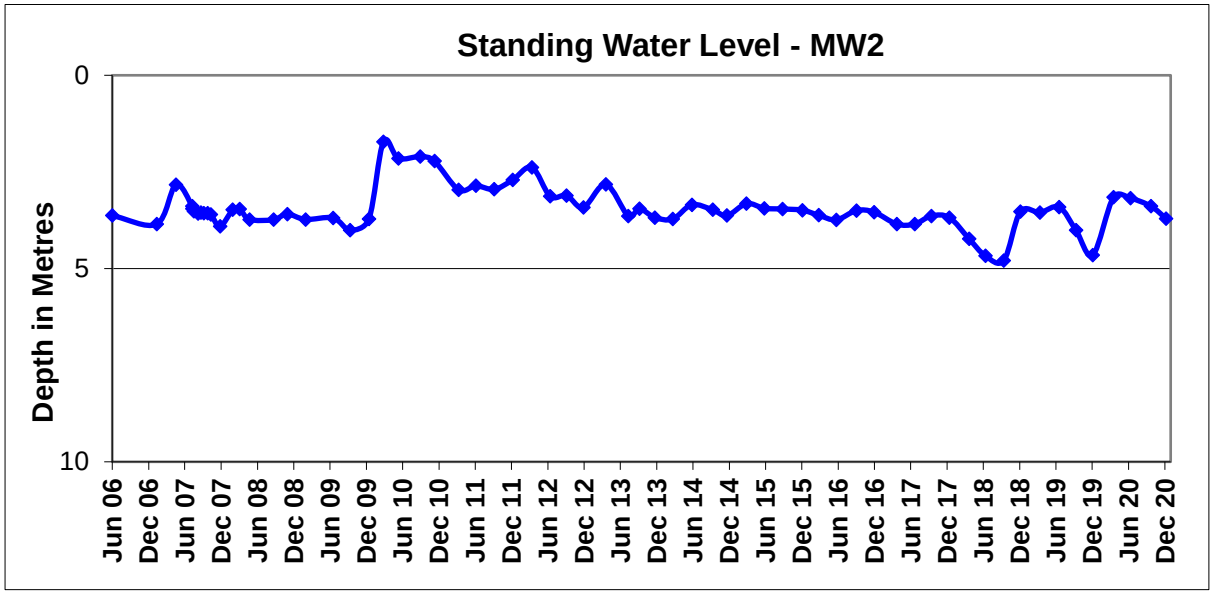
Standing Water Level - MW2
Depth in Metres
0
5
10
Jun 06
Dec 06
Jun 07
Dec 07
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Dec 08
Jun 09
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Jun 11
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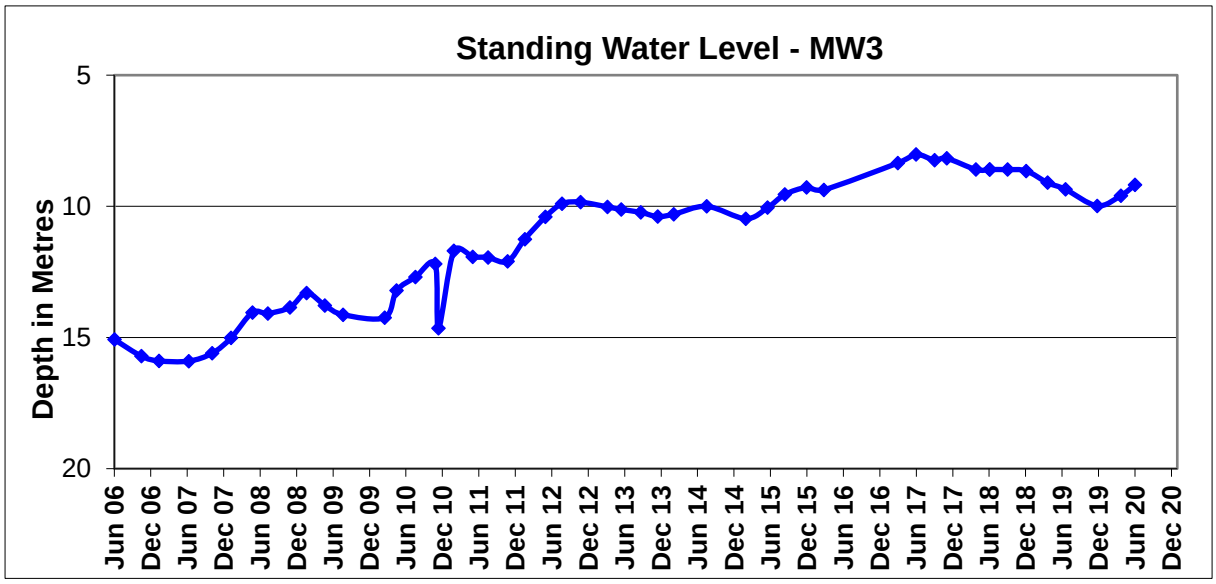
Jun 20
Dec 20


Standing Water Level - MW3
Depth in Metres
5
10
15
20
Jun 06
Dec 06
Jun 07
Dec 07
Jun 08
Dec 08
Jun 09
Dec 09
Jun 10
Dec 10
Jun 11
Dec 11
Jun 12
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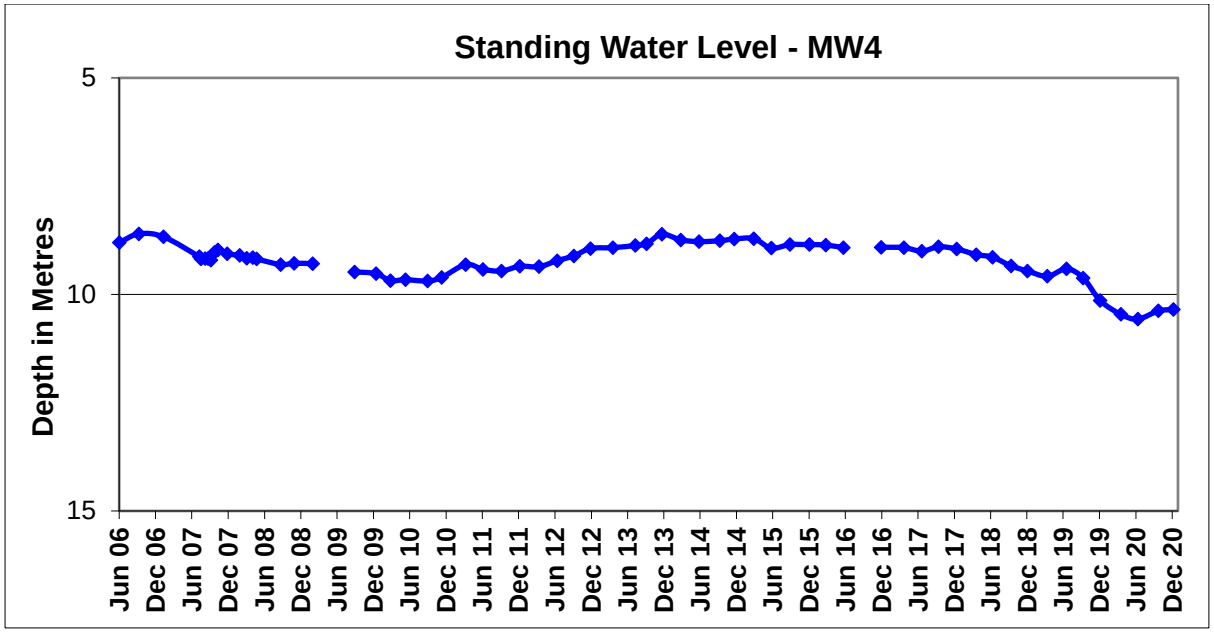
Jun 20
Dec 20


Standing Water Level - MW4
Depth in Metres
5
10
15
Jun 06
Dec 06
Jun 07
Dec 07
Jun 08
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Jun 11
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Jun 20
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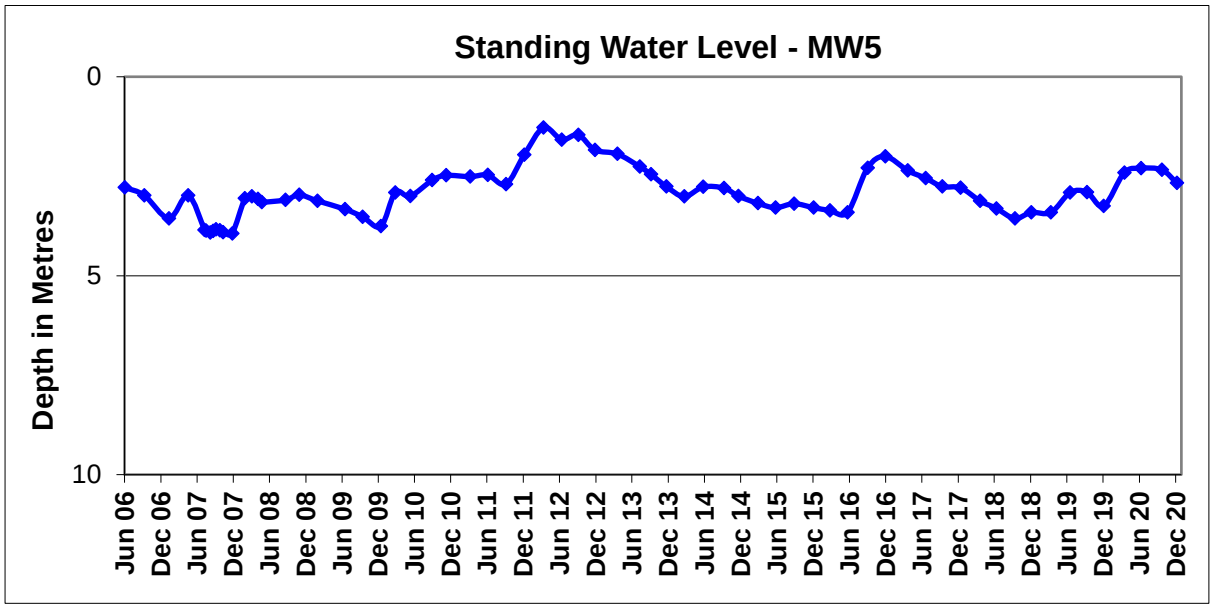
Standing Water Level - MW5
Depth in Metres
0
5
10
Jun 06
Dec 06
Jun 07
Dec 07
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Dec 10
Jun 11
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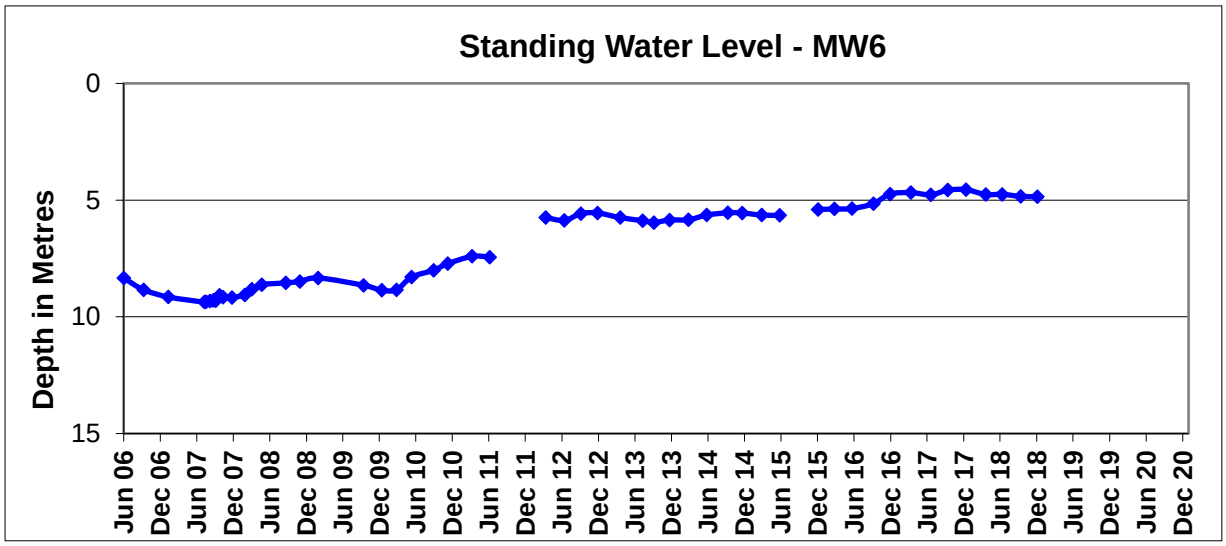
Standing Water Level - MW6
Depth in Metres
0
5
10
15
Jun 06
Dec 06
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Jun 08
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Jun 10
Dec 10
Jun 11
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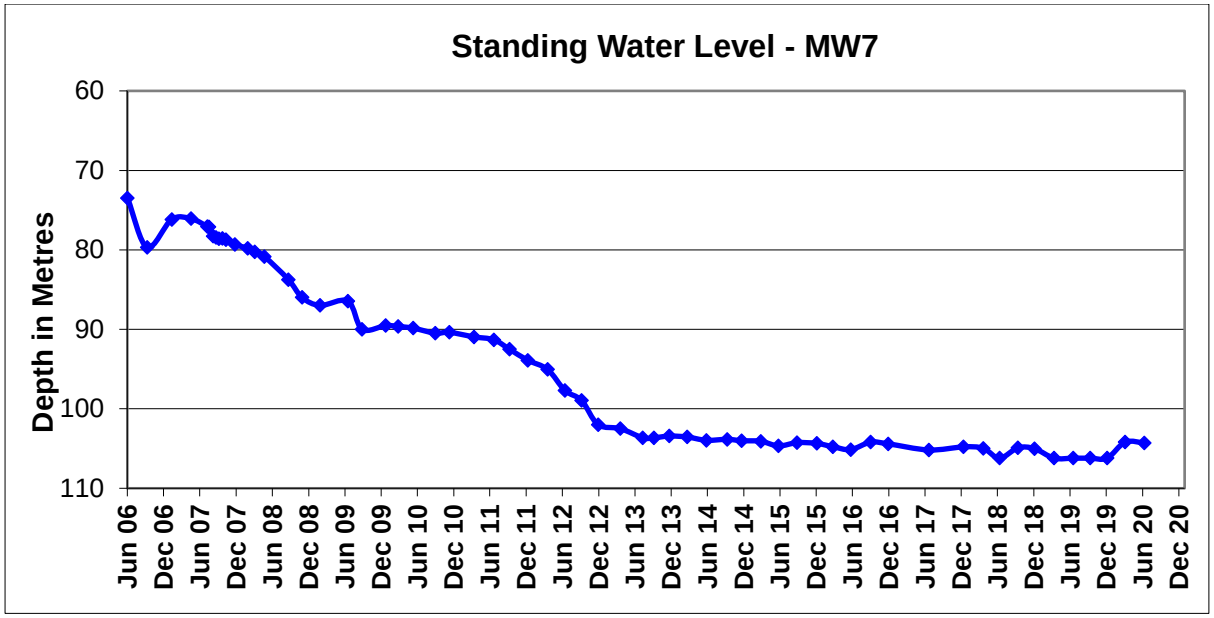
Standing Water Level - MW7
Depth in Metres
60
70
80
90
100
110
Jun 06
Dec 06
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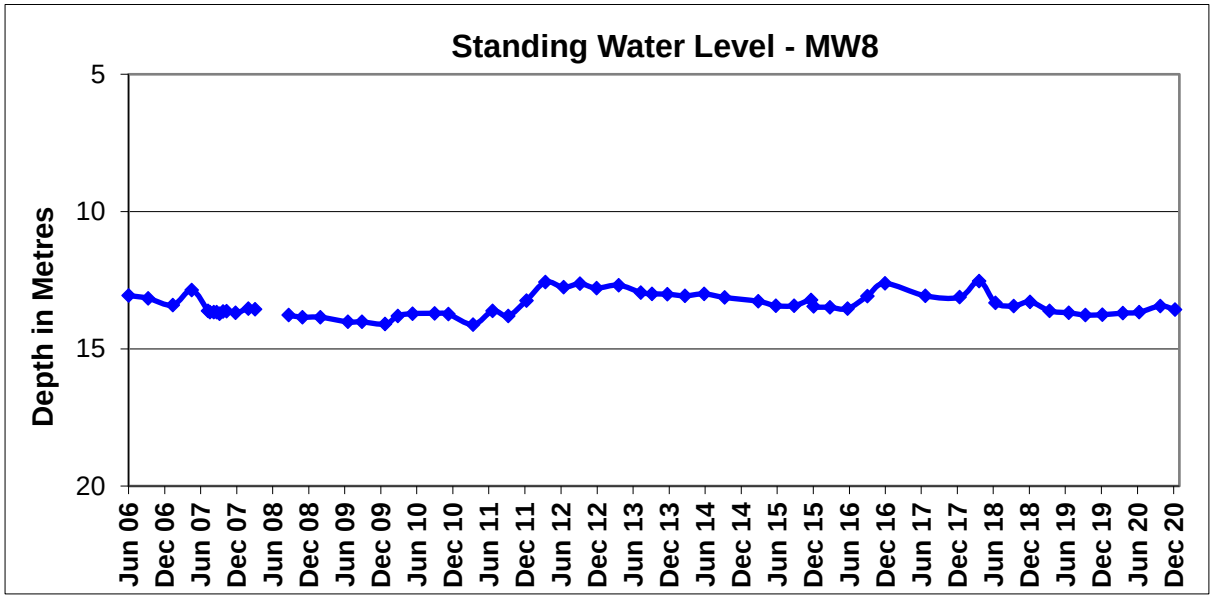
Standing Water Level - MW8
Depth in Metres
5
10
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Jun 06
Dec 06
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Jun 10
Dec 10
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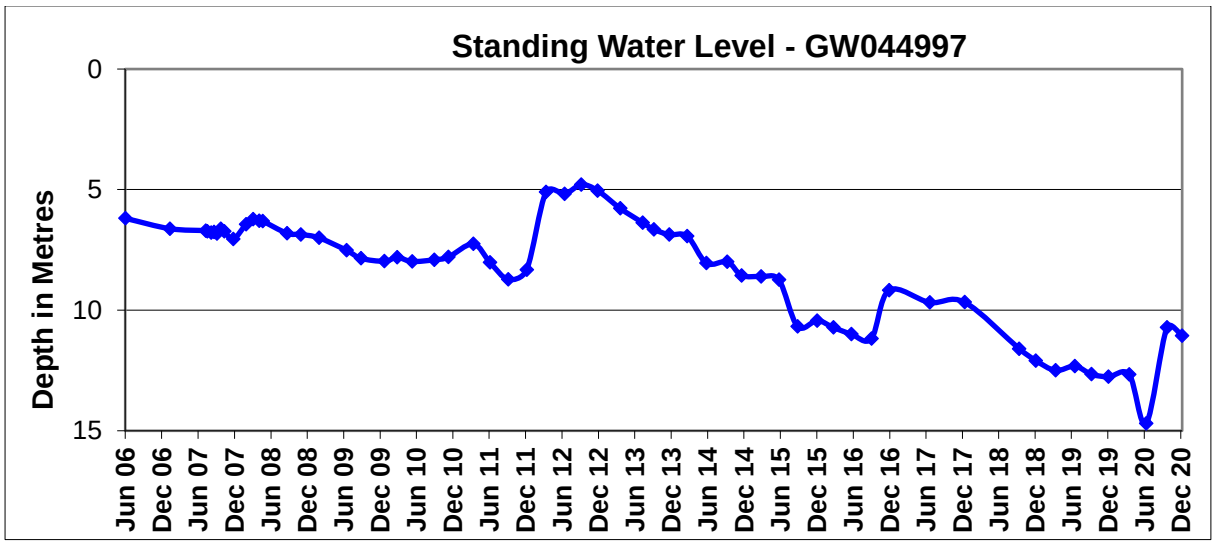
Standing Water Level - GW044997
Depth in Metres
0
5
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Jun 06
Dec 06
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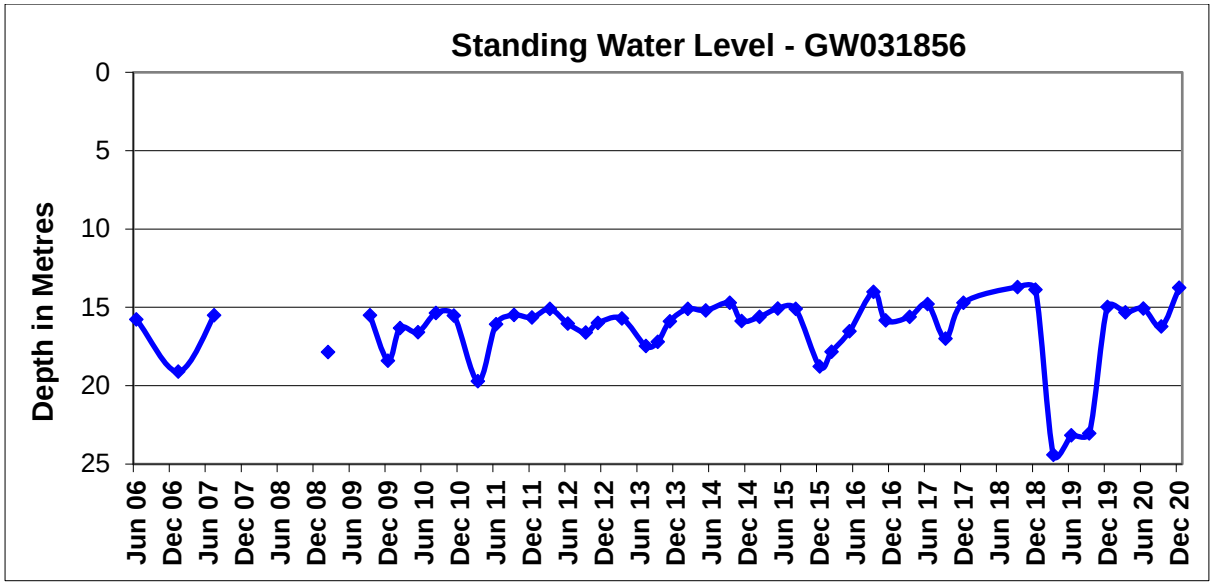
Standing Water Level - GW031856
Depth in Metres
0
5
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25
Jun 06
Dec 06
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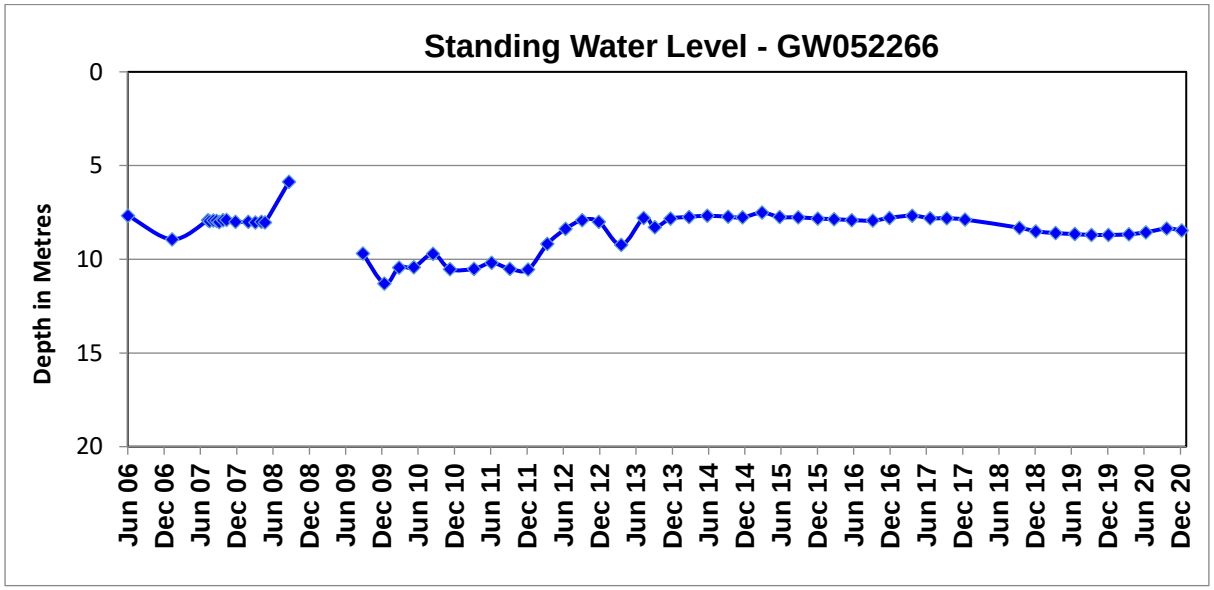
Standing Water Level - GW052266
Depth in Metres
0
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Jun 06
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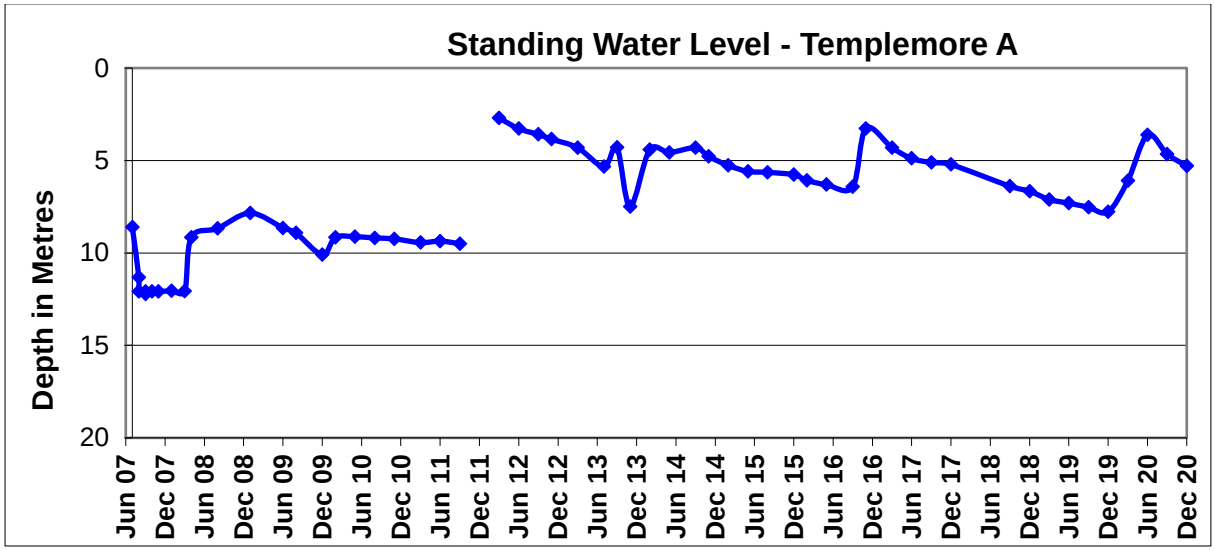
Standing Water Level - Templemore A
Depth in Metres
0
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Jun 07
Dec 07
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Jun 11
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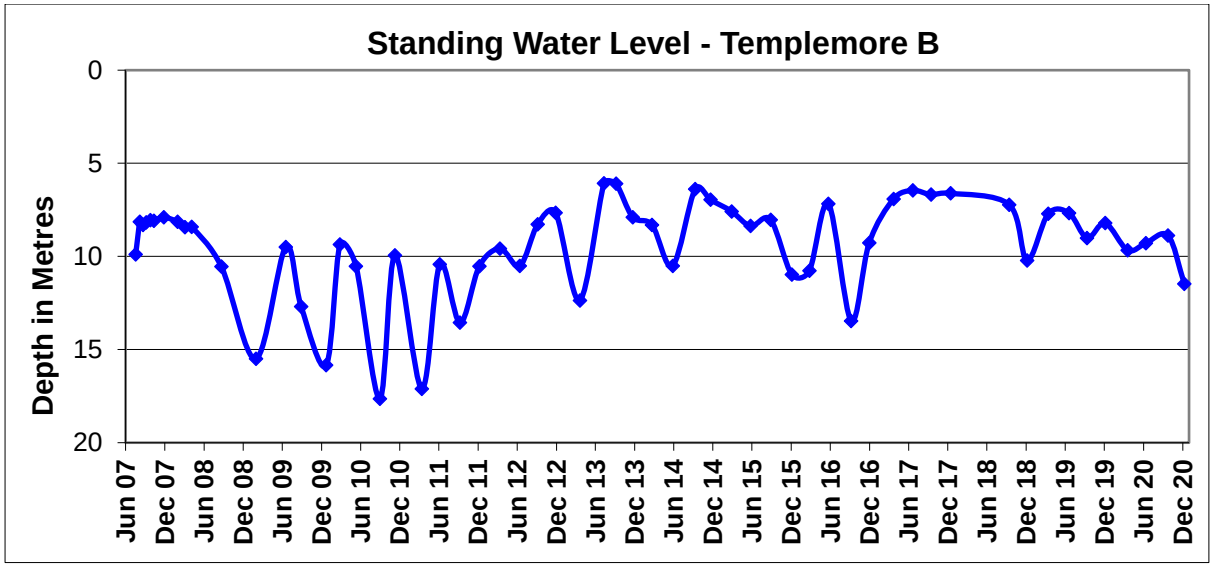
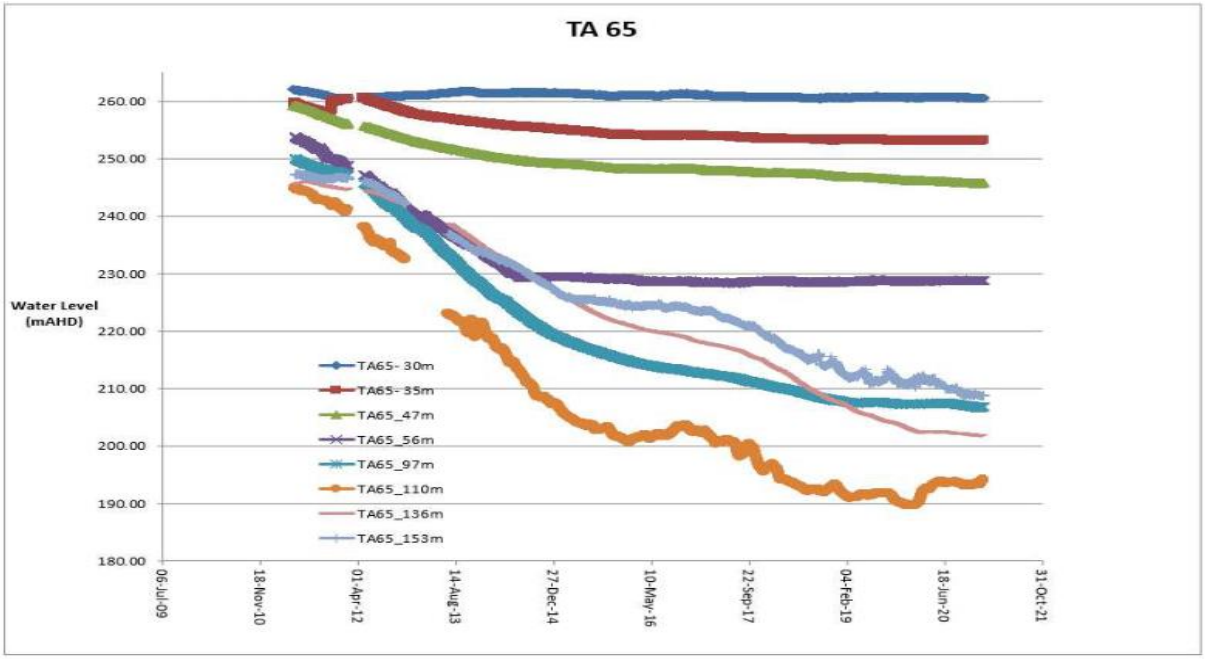


Vibrating Wire Piezometers:



Regional Bores: