Ground Doctor Pty Ltd

ABN: 32 160 178 656

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3 February 2019

Hy-tec Industries Pty Ltd
Austen Quarry
391 Jenolan Caves Road
Hartley NSW 2790
rod.welsh@adbri.com.au

Attention: Mr Rodd Welsh

Dear Rodd,

RE: JANUARY 2019 GROUNDWATER MONITORING RESULTS, AUSTEN QUARRY, HARTLEY, NSW

Ground Doctor was engaged by Hy-tec Industries Pty Ltd (Hy-tec) to undertake the January 2019 round of baseline groundwater monitoring at the Austen Quarry, 391 Jenolan Caves Road, Hartley, NSW (the site).

1 Background Information

The Stage 2 Expansion of the Austen Quarry was approved on 15 July 2015 (development application SSD-6084). An updated site specific Water Management Plan (WMP) (Groundwork Plus, 2017) was developed as required by the conditions of consent for development. The WMP included provisions for managing both surface water and groundwater impacts at the site. The revised WMP was approved in late 2017.

The WMP required the establishment of groundwater monitoring bores at three locations around the periphery of the open pit, establishment of water level data loggers in each bore and collection of four rounds of baseline groundwater quality over two years following establishment of the monitoring bores.

The monitoring bores were established in December 2017. Ground Doctor conducted the first round of baseline monitoring in early January 2018. Water level loggers were installed into the monitoring bores at the completion of the January 2018 monitoring round. Subsequent monitoring was conducted in June 2018.

2 Objectives

The objectives of the work undertaken was to complete the third round (January 2019) of baseline groundwater monitoring in accordance with the WMP.

3 Monitoring Bore Locations

The monitoring bore locations are shown on *Figure 1* of *Attachment A*. Monitoring bore coordinates and details are summarised in *Table 1*. *Table 1* also presents a summary of the monitoring bore construction details.

Table 1: Monitoring Bore Construction Details

Bore ID	Easting	Northing	Approx. Surface Elevation (AHD)	Depth to Bottom (btc)	Screened Intervals (bgl)	Stickup (agl)
MB01S	235245	6281077	700m	7.42m	3.7-6.7m	0.8m
MB01D	235259	6281098	700m	29.30m	20-23m 26-28.5m	0.8m
MB02	235915	6280398	710m	29.10m	10.5-13.5m 22.5-28.5m	0.6m
MB03	236419	6281786	690m	25.31m	18.5-24.5m	0.4m

Eastings and northings are MGA Zone 56.
btc = below top of casing
bgl = below ground level
agl = above ground level

4 Groundwater Sampling Methodology

Each monitoring bore was gauged using an electronic dip meter prior to any disturbance of the water column. Bores were gauged on 2 January 2019. The depth to water was measured from the top of casing at each bore. MB03 was installed into a dry hole and the hole was found to be dry at the time of gauging.

The water level logger was removed from each borehole following gauging. Data stored within the water level loggers were downloaded on 2 January 2019. The water level loggers were reinstated in each monitoring bore following sampling on the morning of 3 January 2019.

Deep bores were purged dry using a bore specific disposable bailer. The deep bores were bailed dry on 2 January 2019. The wells were allowed to recover for a period of approximately 18 hours prior to sample collection. The bailer was lowered gently into the deep bores to collect samples that were free of suspended sediment. After samples had been collected additional water was bailed from the deep bores to allow measurement of field water quality parameters.

The shallow bore (MB01S) was also bailed dry prior to sampling. The well was allowed to recover for a period of approximately 20 minutes prior to sampling. Water quality parameters were measured regularly during purging of MB01S to assess the effectiveness of purging as well as being measured at the time of sampling.

A water sample was collected from a sump in the pit floor on 3 January 2019. An unpreserved sample bottle was filled directly from the ponded water in the sump. This bottle was then used to fill preserved sample bottles and samples requiring field filtering. Once sampling was complete field water quality parameters were measured. The water quality meter was placed in the pond and allowed to equilibrate for a period of approximately 10 minutes. The field water quality parameters were then recorded.

Water quality parameters were measured in Yorkeys Creek adjacent to MB01S on 3 January 2019. The water quality meter was left to equilibrate within standing water in the Creek for a period of approximately 10 minutes prior to recording the results. This location does not form part of the monitoring requirements outlined in the WMP, however, the data was collected to compliment

shallow groundwater measurements in the nearby MB01S, which may interact with water in the Creek or vice versa.

Water quality measurements were made using a YSI water quality meter hired from Airmet Scientific. The meter was calibrated prior to dispatch. A calibration record for the water quality meter is presented as *Attachment C*.

Water samples were collected into laboratory supplied bottles, each marked with the appropriate identification. Sample bottles were appropriately preserved where necessary. The samples for dissolved metals analysis were filtered in the field using disposable 45µm filters. The sampler wore disposable nitrile gloves at all times during sampling to minimise potential for cross contamination. Samples were placed into an esky with ice immediately after collection. Ice was replenished as required to ensure samples remained cool whilst in storage.

Water samples were dispatched to Envirolab (Sydney) on the afternoon of 3 January 2019. An overnight courier service was used to minimise transit time. Samples were received by Envirolab on the morning of 4 January 2019.

Groundwater samples collected from each monitoring bore were analysed for major cations, major anions, nutrients and dissolved metals as specified in Table 37 of the WMP (Groundwork Plus, 2017). The water samples collected from the pit were analysed for major cations, major anions, nutrients, dissolved metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs) as specified in Table 37 of the WMP (Groundwork Plus, 2017).

5 Field Observations

Field observations were recorded on bore sampling forms, which are presented as *Attachment B*. Depth to water results and measured field parameters at the time of sampling are presented in *Table 2* with data collected during the two previous monitoring rounds.

Table 2: Summary of Field Observations – All Monitoring Rounds

Bore ID	Date	DTW (m btc)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
MB01S	Jan-18	4.63m	15.9	6.08	575	6.27	-11.6
	Jun-18	4.48m	16.5	5.41	343	7.41	94
	Jan-19	4.42m	15.7	3.95	495	7.29	122
MB01D	Jan-18	5.49m	16.7	2.64	1170	7.02	-22
	Jun-18	1.94m	14.7	1.56	779	7.44	85
	Jan-19	2.08m	17.3	1.41	931	7.58	95
MB02	Jan-18	17.43m	16.4	3.73	1210	7.03	-5
	Jun-18	17.54m	12.9	5.08	927	7.32	130
	Jan-19	17.74m	16.3	1.77	1180	7.27	127
MB03	Jan-18	Dry	-	-	-	-	-
	Jun-18	Dry	-	-	-	-	-
	Jan-19	Dry	-	-	-	-	-
Pit Water	Jan-18	-	21.9	4.30	820	7.00	8
	Jun-18	-	7.6	6.97	357	7.01	119
	Jan-19	-	25.2	5.30	794	8.20	91
Yorkeys Creek	Jan-18	-	-	-	-	-	-
	Jun-18	-	6.7	12.25	353	7.93	104
	Jan-19	-	21.3	2.31	469	7.53	93

6 Analytical Results

The certificate of analysis for water samples is presented as *Attachment E*.

A summary of analytical data is presented in *Table G1* of *Attachment G*. The summary table presented January 2018, June 2018 and January 2019 baseline groundwater quality against preliminary triggers outlined in the WMP (Groundwork Plus, 2017).

Three rounds of data have been collected from the site to date with the aim of establishing a baseline.

Exceedances of preliminary triggers in the June 2018 monitoring round were as follows:

- The reported zinc concentration in the water sample collected from the "pit" exceeded the ANZECC (2000) threshold for 95% protection of fresh water aquatic ecosystems. Zinc was detected in the "pit" sample in both monitoring rounds, as well as in two of the groundwater monitoring bores.

- The reported cadmium concentration in the water sample collected from the "pit" exceeded the ANZECC (2000) threshold for 95% protection of fresh water aquatic ecosystems and the Australian Drinking Water (2011) threshold. Cadmium was detected in the "pit" sample in both monitoring rounds.

- The report manganese concentration in the sample collected from "MB01D" exceeded the Australian Drinking Water (2011) threshold.

Reported analyte concentrations in water samples collected during the January 2019 monitoring round were less than the preliminary triggers outlined in the WMP.

The significance of previously reported preliminary trigger exceedances will be reassessed once four rounds of baseline data have been collected.

7 Water Level Logger Data

All water level loggers were set to record water level at 6 hour intervals commencing 12am on 12 January 2018. The water level data loggers were not vented. A barologger was deployed to record air pressure at the same recording interval to allow water level logger readings to be corrected to account for changes in air pressure.

Water level data loggers installed in MB01S, MB01D and MB02, and the barometric pressure logger installed at MB03, were downloaded on 2 January 2019.

The raw data was corrected for changes in air pressure using the barometric pressure data. The manual water level measurement collected at the time the loggers were removed from each borehole were used to convert the water level logger data to a depth to water relative to the top of the PVC bore casing.

At the completion of the monitoring round the water level loggers were redeployed in their respective boreholes.

Corrected water level data is presented graphically as *Attachment D*.

7.1 MB01S

The water level in MB01S was relatively consistent over the 12 month monitoring period with variation between approximately 4.3m below top of casing and 4.9m below top of casing. Variation is inferred to be directly related to water level changes in the adjacent Yorkeys Creek.

7.2 MB01D

The water level within MB01D stayed below the water level logger for a period of approximately 3 weeks after each groundwater monitoring event owing to the slow rate of groundwater recharge following purging and sampling of the bore. Once groundwater had risen above the data logger in MB01D the depth to water varied by more than 3m over the monitoring period. The reason for variation in MB01D is not well understood but should become more apparent with the collection of longer term water level data. It is possible that water level changes at MB01D are related to accumulation of water within the base of the Quarry during periods of wet weather, and subsequent dewatering of the excavation.

Relative elevation data is not available for the monitoring bore network. MB01S and MB01D are located approximately 20m apart. The top of casing at MB01D is estimated to be at least 1m above the top of casing at MB01S. The standing water level within MB01D is higher than that in MB01S. This indicates an upward gradient with potential for groundwater intersected from the deeper bore to discharge into Yorkeys Creek.

7.3 MB02

The drawdown effects of purging and sampling are evident in the water level data for MB02 for approximately 48hours after each monitoring event. Stabilised water level readings for MB02 are relatively uniform, with a minor decreasing trend across the 12 month monitoring period from approximately 17.4m to 17.7m below top of casing. affects of bore purging and sampling

At the time of reporting relative bore elevation data was not available. Using the observable elevation difference between MB01D and MB01S it is apparent that the standing water level in MB01D is higher than that in the nearby MB01S. This observation indicates that there is upward flow of groundwater toward Yorkeys Creek in the vicinity of those monitoring bores. That is, water within Yorkeys Creek is likely to be comprised of both surface water and groundwater discharge.

8 Estimated Groundwater Inflow to Pit

The WMP specifies that water inflow to the pit should be estimated on a quarterly basis by measuring changes to water levels within the pit during a period of fine weather and no water extraction. Ground Doctor monitored water level changes in a sump excavated into the lowest part of the pit between 9am on 2 January 2019 and 9am on 3 January 2019.

Water had not been removed from the pit for several days prior to monitoring. There had been no significant rainfall in the days leading up to the monitoring period and there was no obvious overland flow of water into the pit floor during the monitoring period.

A measuring benchmark was established in the sump at the commencement of monitoring and the height of standing water was noted to the nearest millimetre. The height of water at the benchmark was noted 24 hours later. Ground Doctor recorded a change in water level of 7mm during the 24 hour monitoring period.

A photographic log of the measurement point and the extent of the pit and location of the sump is presented as *Attachment F*.

At the time of monitoring the pit floor was covered with water. The pit floor at the time of monitoring was estimated to be approximately 230m long with an average width of 30m, giving an estimated area of approximately 6900m^2. A 7mm (0.007m) change in water level across 6900m^2 equates to approximately 48.3m^3/day (48,300L) of groundwater inflow.

Evaporation data from the nearest BOM gauging station that measures evaporation (Bathurst Agricultural Station) indicated that Pan evaporation for the 24hr period to 9am on 3 January 2019 was 9mm. Ground Doctor used an evaporation rate of 3mm/day as an estimate of site evaporation during the monitoring period. This was justified on the basis that the Quarry floor is surrounded by walls that are 50m or more high, which protects ponded water from wind and reduces the amount of solar radiation reaching the bottom of the pit. In addition, the site is situated further east of Bathurst and evaporation typically decreases as you move closer to the east coast of Australia due to topographical effects and average humidity of the airmass.

A 3mm (0.003m) change in water level across 6900m^2 equates to approximately 20.7m^3/day (20,700L) of water.

Adding estimated evaporation to observed volume increase within the pit gives an estimated total groundwater inflow of 69m^3/day (or 69,000 L/day)

The estimated rate of inflow is equivalent to an annual rate of 25,200m^3/yr (or 25.2ML/yr).

The calculated groundwater inflow exceeds Hy-Tec's licensed annual take of groundwater from the pit (20ML/yr).

Previous estimates of pit inflow are summarised in *Table 3*.

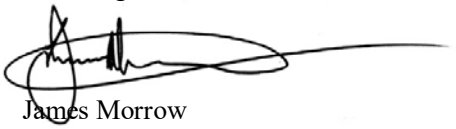
Table 3: Summary of Pit Inflow Estimates

Monitoring Event	Change in Water Level	Description of Pit Conditions	Estimate of Groundwater Inflow
23-24 April 2018	20mm rise. 0mm evaporation as water beneath surface.	Pit floor approximately 6900m^2. Pit floor dry. Monitoring performed at sump in northern corner of the pit.	10.1ML/yr
21-22 June 2018	15mm rise. 0mm evaporation as water beneath surface.	Pit floor approximately 6900m^2. Pit floor dry. Monitoring performed at sump in northern corner of the pit.	7.6ML/yr
20-21 September 2018	25mm rise. 0mm evaporation as water beneath surface.	Pit floor approximately 6900m^2. Pit floor dry. Monitoring performed at sump in northern corner of the pit. Water rise in blasted rock with assumed porosity of 20%.	12.6ML/yr
2-3 January 2019	7mm rise plus 3mm evaporation	Pit floor approximately 6900m^2. Pit floor covered by water.	25.2ML/yr
		Average Inflow Estimate For 2018	**13.9ML/yr**

Four quarterly readings were taken over the 2018 period. The average of four readings was 13.9ML/yr. This suggests that the annual groundwater take from the quarry did not exceed the licenced amount.

If you have any questions regarding the works outlined in this report please contact the undersigned on 0407 875 302.

Kind Regards



James Morrow
Environmental Engineer
Ground Doctor Pty Ltd

2018-GD001-L3

Attachment A – Figure

Attachment B – Groundwater Sampling Forms

Attachment C – Water Quality Meter Calibration Record

Attachment D – Groundwater Level Charts

Attachment E – Laboratory Certificate of Analysis

Attachment F – Pit Water Level Monitoring Photographs

Attachment G – Analytical Results Summary Table

9 References

- Groundwork Plus (2017), "*Austen Quarry Water Management Plan*", Report Number 1517_610_002_RPTO_Water Management Plan_V8, 10 October 2017

Attachment A

Figure

Ground Doctor Pty Ltd

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PO Box 6278
22 Tamworth Street
Dubbo NSW 2830

Project Name:	Groundwater Monitoring Bore Installation and January 2018 Groundwater Monitoring Round
Project Number:	2018-GD001

Figure 1

Groundwater Monitoring Bore Locations

Attachment B

Groundwater Sampling Forms

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	MB01S
Date:	2 and 3 January 2019

Depth to Water:	4.42m
Depth to Bottom:	7.42m
Saturated Well Depth:	3.00m
Well Volume:	6L (Saturated Well Depth x 2L)

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
30L	16.1	3.45	505	7.29	125
40L	15.8	3.4	500	7.23	126
50L	15.8	3.99	492	7.27	124
60L	15.7	3.95	495	7.29	122

Description of Works / Observations:
Good water inflow.
Groundwater was turbid (grey-brown) during purging.
Groundwater was allowed to settle before sampling to minimise turbidy in samples.

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	MB01D
Date:	2 and 3 January 2019

Depth to Water:	2.08m
Depth to Bottom:	29.3m
Saturated Well Depth:	27.2m
Well Volume:	55L

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
48L	17.3	1.41	931	7.58	95

Description of Works / Observations:
Well bailed dry after 48L removed (well volume)
Water was turbid grey-brown during purging, becoming siltier with increased drawdown.
Well allowed to recover overnight.
Water sampled was clear and colourless (low turbidy).

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	MB02
Date:	2 and 3 January 2019

Depth to Water:	17.74m
Depth to Bottom:	29.10m
Saturated Well Depth:	11.4m
Well Volume:	23L

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
24L	16.3	1.77	1180	7.27	127

Description of Works / Observations:
Well bailed dry after 24L removed (well volume)
Water was turbid grey during purging, becoming siltier with increased drawdown.
Well allowed to recover overnight.
Water sampled was clear and colourless (low turbidy).

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	MB03
Date:	2 and 3 January 2019

Depth to Water:	Well Dry
Depth to Bottom:	25.31m
Saturated Well Depth:	NA
Well Volume:	NA

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
NA					

Description of Works / Observations:
Well was dry.

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	Pit Sump
Date:	2 and 3 January 2019

Depth to Water:	NA
Depth to Bottom:	NA
Saturated Well Depth:	NA
Well Volume:	NA

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
NA	25.2	5.3	794	8.2	91

Description of Works / Observations:
Water in pit sump was clear and colourless.
No hydrocarbon sheen visible on surface of pit water.
No unnatural odour noted in sampled water.

Austen Quarry
Groundwater Monitoring Form

Monitoring Bore ID:	Yorkeys Creek
Date:	2 and 3 January 2019

Depth to Water:	NA
Depth to Bottom:	NA
Saturated Well Depth:	NA
Well Volume:	NA

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
NA	21.3	2.31	469	7.53	93

Description of Works / Observations:
Field parametrs measured in Yorkeys Creek adjacent to MB01S

Attachment C

Water Quality Meter Calibration Form

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 18J104341

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		318140	pH 9.91
2. pH 7.00		pH 7.00		317272	pH 7.02
3. pH 4.00		pH 4.00		320612	pH 4.02
4. mV		234mV		325420/324357	233mV
5. EC		2.76mS		320325	2.75mS
6. D.O		0.00ppm		10175	0.01ppm
7. Temp		20.4°C		MultiTherm	20.1°C

Calibrated by: **Sarah Lian**

Calibration date: **19/12/2018**

Next calibration due: **18/01/2019**

Attachment D

Groundwater Level Chart


Depth to Water Vs Time
Time (Days Starting 12 January 2018)
0
50
100
150
200
250
300
350
400
0.00
5.00
10.00
15.00
20.00
25.00
Depth to Water (m below top of PVC casing)
MB01S
MB01D
MB02

Attachment E

Laboratory Certificate of Analysis

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Ground Doctor Pty Ltd
Attention	James Morrow

Sample Login Details

Your reference	Hytec Austen Quarry Baseline GW Monitoring
Envirolab Reference	208963
Date Sample Received	04/01/2019
Date Instructions Received	04/01/2019
Date Results Expected to be Reported	11/01/2019

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	5 WATER
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	6.2
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHsin Water	All metals in water-dissolved	Total Dissolved Solids(grav)	Ammonia as N in water	Nitrate as N in water	Nitrite as N in water	Calcium - Dissolved	Potassium - Dissolved	Sodium - Dissolved	Magnesium - Dissolved	Hydroxide Alkalinity (OH-) as CaCO3	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulphate, SO4	Chloride, Cl
MB01S				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MB01D				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MB02				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PIT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MB05				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 208963

Client Details

Client	Ground Doctor Pty Ltd
Attention	James Morrow
Address	PO Box 6278, Dubbo, NSW, 2830

Sample Details

Your Reference	**Hytec Austen Quarry Baseline GW Monitoring**
Number of Samples	5 WATER
Date samples received	04/01/2019
Date completed instructions received	04/01/2019

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	11/01/2019
Date of Issue	11/01/2019

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Results Approved By
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water		
Our Reference		208963-4
Your Reference	UNITS	PIT
Date Sampled		03/01/2019
Type of sample		WATER
Date extracted	-	07/01/2019
Date analysed	-	07/01/2019
TRH C_6 - C_9	µg/L	<10
TRH C_6 - C_{10}	µg/L	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	98
Surrogate toluene-d8	%	98
Surrogate 4-BFB	%	99

svTRH (C10-C40) in Water		
Our Reference	UNITS	208963-4
Your Reference		PIT
Date Sampled		03/01/2019
Type of sample		WATER
Date extracted	-	07/01/2019
Date analysed	-	07/01/2019
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	<100
TRH C_{29} - C_{36}	µg/L	<100
TRH >C_{10} - C_{16}	µg/L	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Surrogate o-Terphenyl	%	91

PAHs in Water		
Our Reference		208963-4
Your Reference	UNITS	PIT
Date Sampled		03/01/2019
Type of sample		WATER
Date extracted	-	07/01/2019
Date analysed	-	08/01/2019
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j+k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Total +ve PAH's	µg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	108

All metals in water-dissolved						
Our Reference		208963-1	208963-2	208963-3	208963-4	208963-5
Your Reference	UNITS	MB01S	MB01D	MB02	PIT	MB05
Date Sampled		03/01/2019	03/01/2019	03/01/2019	03/01/2019	03/01/2019
Type of sample		WATER	WATER	WATER	WATER	WATER
Date prepared	-	07/01/2019	07/01/2019	07/01/2019	07/01/2019	07/01/2019
Date analysed	-	07/01/2019	07/01/2019	07/01/2019	07/01/2019	07/01/2019
Aluminium-Dissolved	µg/L	<10	<10	<10	10	<10
Arsenic-Dissolved	µg/L	2	5	3	<1	3
Boron-Dissolved	µg/L	<20	360	250	<20	240
Barium-Dissolved	µg/L	11	61	97	71	93
Beryllium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	0.1	<0.1
Cobalt-Dissolved	µg/L	<1	2	<1	<1	<1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1	<1	<1
Iron-Dissolved	µg/L	<10	14	<10	<10	<10
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Manganese-Dissolved	µg/L	85	500	85	<5	83
Molybdenum-Dissolved	µg/L	1	8	3	11	3
Nickel-Dissolved	µg/L	<1	6	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	2	<1	2
Selenium-Dissolved	µg/L	<1	<1	<1	<1	<1
Silver-Dissolved	µg/L	<1	<1	<1	<1	<1
Strontium-Dissolved	µg/L	270	990	3,300	330	3,200
Titanium-Dissolved	µg/L	<1	<1	<1	<1	<1
Vanadium-Dissolved	µg/L	<1	3	3	<1	3
Zinc-Dissolved	µg/L	5	4	7	6	9

Miscellaneous Inorganics						
Our Reference		208963-1	208963-2	208963-3	208963-4	208963-5
Your Reference	UNITS	MB01S	MB01D	MB02	PIT	MB05
Date Sampled		03/01/2019	03/01/2019	03/01/2019	03/01/2019	03/01/2019
Type of sample		WATER	WATER	WATER	WATER	WATER
Date prepared	-	04/01/2019	04/01/2019	04/01/2019	04/01/2019	04/01/2019
Date analysed	-	04/01/2019	04/01/2019	04/01/2019	04/01/2019	04/01/2019
Total Dissolved Solids (grav)	mg/L	350	750	840	560	900
Ammonia as N in water	mg/L	<0.005	<0.005	0.048	<0.005	0.047
Nitrate as N in water	mg/L	0.01	0.01	0.007	1.4	0.01
Nitrite as N in water	mg/L	<0.005	<0.005	<0.005	0.012	<0.005

Ion Balance						
Our Reference		208963-1	208963-2	208963-3	208963-4	208963-5
Your Reference	UNITS	MB01S	MB01D	MB02	PIT	MB05
Date Sampled		03/01/2019	03/01/2019	03/01/2019	03/01/2019	03/01/2019
Type of sample		WATER	WATER	WATER	WATER	WATER
Date prepared	-	04/01/2019	04/01/2019	04/01/2019	04/01/2019	04/01/2019
Date analysed	-	04/01/2019	04/01/2019	04/01/2019	04/01/2019	04/01/2019
Calcium - Dissolved	mg/L	68	140	73	64	77
Potassium - Dissolved	mg/L	1.5	1.4	2.2	4.7	2.3
Sodium - Dissolved	mg/L	18	48	170	20	180
Magnesium - Dissolved	mg/L	13	14	33	44	34
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	230	350	530	170	530
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	230	350	530	170	530
Sulphate, SO4	mg/L	25	200	130	220	130
Chloride, Cl	mg/L	51	26	89	13	89
Ionic Balance	%	-10	-7.0	-6.0	-3.0	-4.0

Metals in Water - Dissolved						
Our Reference		208963-1	208963-2	208963-3	208963-4	208963-5
Your Reference	UNITS	MB01S	MB01D	MB02	PIT	MB05
Date Sampled		03/01/2019	03/01/2019	03/01/2019	03/01/2019	03/01/2019
Type of sample		WATER	WATER	WATER	WATER	WATER
Date digested	-	07/01/2019	07/01/2019	07/01/2019	07/01/2019	07/01/2019
Date analysed	-	10/01/2019	10/01/2019	10/01/2019	10/01/2019	10/01/2019
Silicon*- Dissolved	mg/L	8.9	37	11	5.1	11

Method ID	Methodology Summary
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-055	Nitrate - determined colourimetrically. Soils are analysed following a water extraction.
Inorg-055	Nitrite - determined colourimetrically based on APHA latest edition NO2- B. Soils are analysed following a water extraction.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Soils are analysed following a KCl extraction.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyer.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			07/01/2019	[NT]	[NT]	[NT]	[NT]	07/01/2019	[NT]
Date analysed	-			07/01/2019	[NT]	[NT]	[NT]	[NT]	07/01/2019	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	85	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	85	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	86	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	88	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	103	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate toluene-d8	%		Org-016	98	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate 4-BFB	%		Org-016	98	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			07/01/2019	[NT]	[NT]	[NT]	[NT]	07/01/2019	[NT]
Date analysed	-			07/01/2019	[NT]	[NT]	[NT]	[NT]	07/01/2019	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	117	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	90	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	115	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	117	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	90	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	115	[NT]
Surrogate o-Terphenyl	%		Org-003	101	[NT]	[NT]	[NT]	[NT]	130	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			07/01/2019	[NT]	[NT]	[NT]	[NT]	07/01/2019	[NT]
Date analysed	-			08/01/2019	[NT]	[NT]	[NT]	[NT]	08/01/2019	[NT]
Naphthalene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	76	[NT]
Acenaphthylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Phenanthrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	74	[NT]
Anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	84	[NT]
Benzo(a)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Benzo(b,j+k)fluoranthene	µg/L	2	Org-012	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	124	[NT]	[NT]	[NT]	[NT]	113	[NT]

QUALITY CONTROL: All metals in water-dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	208963-2
Date prepared	-			07/01/2019	1	07/01/2019	07/01/2019		07/01/2019	07/01/2019
Date analysed	-			07/01/2019	1	07/01/2019	07/01/2019		07/01/2019	07/01/2019
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	107	107
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	99	103
Boron-Dissolved	µg/L	20	Metals-022	<20	1	<20	<20	0	107	#
Barium-Dissolved	µg/L	1	Metals-022	<1	1	11	10	10	100	99
Beryllium-Dissolved	µg/L	0.5	Metals-022	<0.5	1	<0.5	<0.5	0	100	103
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	100	102
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	97	95
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	98	98
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	94	92
Iron-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	99	98
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	[NT]		98	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	85	85	0	98	#
Molybdenum-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	104	109
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	99	97
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	103	102
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	97	100
Silver-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	103	99
Strontium-Dissolved	µg/L	1	Metals-022	<1	1	270	270	0	100	#
Titanium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	101	100
Vanadium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	101	102
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	5	5	0	95	97

QUALITY CONTROL: All metals in water-dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	3	07/01/2019	07/01/2019		[NT]	[NT]
Date analysed	-			[NT]	3	07/01/2019	07/01/2019		[NT]	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	[NT]	3	<10	[NT]		[NT]	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	[NT]	3	3	[NT]		[NT]	[NT]
Boron-Dissolved	µg/L	20	Metals-022	[NT]	3	250	[NT]		[NT]	[NT]
Barium-Dissolved	µg/L	1	Metals-022	[NT]	3	97	[NT]		[NT]	[NT]
Beryllium-Dissolved	µg/L	0.5	Metals-022	[NT]	3	<0.5	[NT]		[NT]	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	[NT]	3	<0.1	[NT]		[NT]	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	[NT]	3	<1	[NT]		[NT]	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	[NT]	3	<1	[NT]		[NT]	[NT]
Copper-Dissolved	µg/L	1	Metals-022	[NT]	3	<1	[NT]		[NT]	[NT]
Iron-Dissolved	µg/L	10	Metals-022	[NT]	3	<10	[NT]		[NT]	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	[NT]	3	<0.05	<0.05	0	[NT]	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	[NT]	3	85	[NT]		[NT]	[NT]
Molybdenum-Dissolved	µg/L	1	Metals-022	[NT]	3	3	[NT]		[NT]	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	[NT]	3	<1	[NT]		[NT]	[NT]
Lead-Dissolved	µg/L	1	Metals-022	[NT]	3	2	[NT]		[NT]	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	[NT]	3	<1	[NT]		[NT]	[NT]
Silver-Dissolved	µg/L	1	Metals-022	[NT]	3	<1	[NT]		[NT]	[NT]
Strontium-Dissolved	µg/L	1	Metals-022	[NT]	3	3300	[NT]		[NT]	[NT]
Titanium-Dissolved	µg/L	1	Metals-022	[NT]	3	<1	[NT]		[NT]	[NT]
Vanadium-Dissolved	µg/L	1	Metals-022	[NT]	3	3	[NT]		[NT]	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	[NT]	3	7	[NT]		[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	208963-2
Date prepared	-			04/01/2019	1	04/01/2019	04/01/2019		04/01/2019	04/01/2019
Date analysed	-			04/01/0109	1	04/01/2019	04/01/2019		04/01/0109	04/01/0109
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	350	[NT]		110	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	<0.005	<0.005	0	99	86
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.01	0.01	0	100	100
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	1	<0.005	<0.005	0	109	100

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	208963-2
Date prepared	-			04/01/2019	1	04/01/2019	04/01/2019		04/01/2019	04/01/2019
Date analysed	-			04/01/2019	1	04/01/2019	04/01/2019		04/01/2019	04/01/2019
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	68	69	1	94	#
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1.5	1.5	0	100	100
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	18	19	5	92	#
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	13	13	0	97	88
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	1	<5	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	230	[NT]		[NT]	[NT]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	<5	[NT]		[NT]	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	230	[NT]		107	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	1	25	[NT]		102	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	51	[NT]		101	[NT]
Ionic Balance	%		Inorg-040	[NT]	1	-10	[NT]		[NT]	[NT]

QUALITY CONTROL: Metals in Water - Dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	208963-2
Date digested	-			07/01/2019	1	07/01/2019	07/01/2019		07/01/2019	07/01/2019
Date analysed	-			10/01/2019	1	10/01/2019	10/01/2019		10/01/2019	10/01/2019
Silicon*- Dissolved	mg/L	0.2	Metals-020	<0.2	1	8.9	9.1	2	96	#

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Ion Balance - # Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

All metals in water-dissolved - # Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Metals in Water - Dissolved - # Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

CHAIN OF CUSTODY - Client

Client: Ground Doctor Pty Ltd	Client Project Name / Number / Site etc (ie report title): Hytec Austen Quarry Baseline Groundwater Monitoring	Envirolab Services, 12 Ashley St, Chatswood NSW 2067, Ph: (02) 9910 6200
Contact person: James Morrow ph: 0407 875 302	PO No.:	Phone:
Project Mgr: James Morrow	Envirolab Quote No. :	E-mail:
Sampler: James Morrow	Standard TAT	Contact:
Address: Austen Quarry, 391 Jenolan Caves Road, Hartley, NSW	Or choose: standard / same day / 1 day / 2 day / 3 day	Job No: 208963
	Note: Inform lab in advance if urgent turnaround is required - surcharge applies	Date Received: 4/1/19
	Lab comments:	Time Received: 1640.
Phone: -- Mob: 0407875302		Received By: JYH. 6.2.
Fax: --		Temp: Cool/Ambient
Email:		Cooling: Ice/Icepack
		Security: Intact/Broken/None

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Hy-tec Suite (see table below)	TRH, BTEX, PAHs													Provide as much information about the sample as you can
1	MB01S	-	03-Jan-19	Water	x														
2	MB01D	-	03-Jan-19	Water	x														
3	MB02	-	03-Jan-19	Water	x														
4	Pit	-	03-Jan-19	Water	x	x													
5	MB05	-	03-Jan-19	Water	x														

Relinquished by (company):	James Morrow	Received by (company):	ELS
Print Name:	James Morrow	Print Name:	JYH
Date & Time:	3/1/19 1200	Date & Time:	4/1/19 1040
Signature:	JRM	Signature:	

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: (if applicable)
Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

HYTEC Groundwater Suite

Analyte Group	Analyte
Dissolved Solids	Total Dissolved Solids
Major Cations	Magnesium Calcium Sodium Potassium
Major Anions	Sulphate Chloride Hydroxide as $CaCO_3$ Carbonate as $CaCO_3$ Bicarbonate as $CaCO_3$
Heavy Metals (Dissolved)	Aluminium Arsenic Boron Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Molybdenum Nickel Selenium Silicon Silver Strontium Titanium Vanadium Zinc
Nutrients	Ammonia Nitrate Nitrite

#208063

Attachment F

Pit Water Level Monitoring Photographs

Photograph of measuring post in pit sump. Taken 9am on 2 January 2019.

Photograph of measuring post in pit sump. Taken 9am on 3 January 2019.

Photograph of pit from lower ramp. Photo taken at 0930am on 3 January 2019.

Photograph of pit from lower ramp. Photo taken at 0930am on 3 January 2019.

25/1/18 Quarry Pit Sump

No Rain 5 days prior to photo taken

No pumping out of hole 24hours prior to photo taken

level marked with blue marker

inspected by Craig McDonald

26/1/18 Quarry Pit Sump

No Rain

No Pumping

Water level consistent with marker 24 hours prior

inspected by Rodd Hall

Bathurst, New South Wales
January 2018 Daily Weather Observations

Most observations from Bathurst, but some from Bathurst Airport.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo	13.0	29.8	0	8.0		SW	33	13:07	21.0	78	1	SW	7	1006.7	29.2	30	0	W	11	1003.5
2	Tu	13.4	30.5	0	8.0		WSW	43	15:06	21.4	64	0	NNE	6	1005.0	29.1	41	5	SW	20	1001.7
3	We	10.8	30.2	0	10.0		SE	39	15:20	20.5	73	0	WSW	6	1007.6	29.5	42	6	NNW	11	1006.9
4	Th	13.5	29.8	0	8.0		SW	30	15:39	19.1	55	7	NW	2	1014.8	27.1	50	5	WNW	13	1012.0
5	Fr	13.0	33.3	0	8.0		W	33	14:44	21.5	64	1	W	7	1015.9				WSW	13	1013.0
6	Sa	14.3	35.7	0	8.0		NNW	39	10:09	23.0	66	0	WNW	4	1016.7	34.2	32	6	WNW	17	1013.7
7	Su	17.8	38.7	0	9.0		NNW	44	08:52	31.5	26	0	N	28	1016.0	37.6	19	4	NNW	9	1013.1
8	Mo	20.0	34.0	0.6	10.2		NW	52	15:04	22.8	71	8	NW	13	1015.7	32.7	25	6	W	26	1012.7
9	Tu	18.8	30.0	17.6	7.0		WSW	83	16:19	19.6	95	8	NNE	11	1013.5	28.5	45	6	N	15	1011.8
10	We	14.8	27.8	3.8	4.8		ENE	33	18:51	20.1	72	7	ENE	15	1016.0	27.1	49	5	NNW	7	1014.6
11	Th	14.8	30.5	0	6.0		NNW	41	14:52	18.7	78	6	N	9	1016.6	29.0	45	6	N	19	1013.8
12	Fr	18.0	35.6	0	4.0		NW	41	12:12	23.1	56	4		Calm	1012.8	34.0	57	6	NNW	19	1008.0
13	Sa	20.0	24.5	1.2	8.0		WNW	50	11:09	23.5	64	7	NW	19	1003.5	20.8	59	7	W	20	1003.5
14	Su	10.0	22.4	0	8.2		SSW	52	11:25	14.1	55	4	S	24	1006.3	20.4	31	5	S	31	1008.0
15	Mo	7.5	26.3	0	7.0		S	44	15:37	15.0	42	1	SSW	9	1012.9	26.0	25	1	SSW	22	1011.1
16	Tu			0			SE	37	07:25				SSE	19	1017.6				SSE	15	1015.1
17	We			0			SSW	35	16:46				SSW	7	1017.5				SSW	9	1014.8
18	Th			0			ENE	28	21:10				SW	2	1018.8					Calm	1015.2
19	Fr			0			E	39	17:53					Calm	1016.5				S	15	1012.7
20	Sa			0			NE	35	15:46				WSW	2	1014.6				ENE	19	1011.5
21	Su			0			NNW	31	14:00				SW	7	1013.1				NNW	19	1009.4
22	Mo	15.0	37.2	0			N	30	08:38	25.0	62	1	N	9	1011.2	35.6	40	6	WSW	24	1009.0
23	Tu	22.4	34.6	0	10.0		SSE	28	09:41	25.4	62	7	S	17	1012.8	32.5		7	ESE	13	1011.1
24	We	19.6	33.5	0	7.0		SW	41	11:22	25.0	60	7		Calm	1011.3	32.0	49	6	SSW	30	1010.0
25	Th	19.7	31.2	0	5.2		WNW	61	13:14	23.5	72	7	SW	9	1011.6	24.0	75	8	WNW	22	1011.7
26	Fr	16.5	32.5	1.4	7.6		ENE	44	15:20	23.5	75	1	W	9	1012.0	32.0	57	6	W	13	1009.0
27	Sa	17.2	30.6	10.2	3.4		WSW	50	13:08	22.5	75	5	WNW	4	1012.7	23.5	79	7	SW	26	1010.4
28	Su	19.0	27.2	0.4	6.4		N	44	14:37	23.0	79	7	ESE	6	1013.3	25.1	62	8	N	9	1010.8
29	Mo	15.0	30.8	14.2	0.4		E	37	03:04	20.3	79	0	ENE	20	1012.6	30.0	58	4	SE	11	1009.0
30	Tu	14.5	32.1	0	6.0		SW	48	19:50	19.5	77	2		Calm	1007.8	30.8	55	6	WSW	17	1002.9
31	We	18.3	27.3	0.8	6.2		ENE	39	17:24	20.5	85	8	NE	2	1004.5	25.2	43	6	NNE	11	1003.5
Statistics for January 2018																					
Mean		15.9	31.0		6.9					21.7	67	3		8	1012.5	29.0	46	5		16	1010.1
Lowest		7.5	22.4		0.4					14.1	26	0		Calm	1003.5	20.4	19	0		Calm	1001.7
Highest		22.4	38.7	17.6	10.2		WSW	83		31.5	95	8	N	28	1018.8	37.6	79	8	S	31	1015.2
Total				50.2	166.4																

Temperature, humidity, cloud, evaporation and rainfall observations are from Bathurst Agricultural Station (station 063005). Wind and pressure observations are from Bathurst Airport AWS (station 063291)

IDCJDW2012.201801 Prepared at 13:00 UTC on 3 Apr 2018

23-4-18 Quarry Pit Sump

No Rain 5 days prior to photo taken

No pumping out of pit 24 hrs prior

level marked with nute
Note # Quarry Floor has Approx 120 x 80 x 5 thick rock still in quarry floor full with water
sump # 10 x 6 x 5 deep

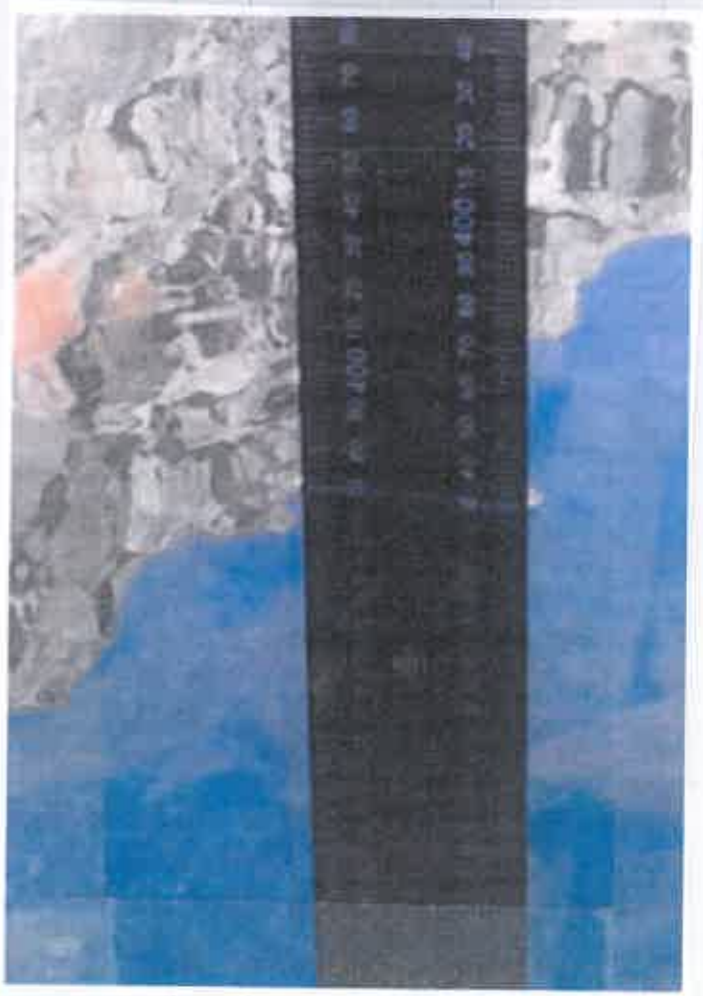
Inspected by Mark Taylor

24-4-18 Quarry Pit Sump

As Above details

water level has risin by 20mm

Inspected by Mark Taylor



Bathurst, New South Wales
April 2018 Daily Weather Observations

Most observations from Bathurst, but some from Bathurst Airport. Note No Rain for Hartley

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Su	10.4	31.2	0	6.8		NW	28	14:01	18.1	79	0	SSW	6	1017.9	30.0	32	2	NW	15	1014.9
2	Mo	12.0	30.2	0	6.0		WNW	39	13:21	19.0	65	6	SW	7	1018.0	28.8	36	7	WNW	24	1015.4
3	Tu	13.1		0	6.0		E	33	08:04	20.1	68	2	ENE	22	1021.9	27.0	46	3	WNW	11	1018.5
4	We	10.0		0	6.0		ENE	33	22:12	19.2	71	0	WSW	7	1021.8	29.3	30	3	E	6	1017.6
5	Th	10.0	28.2	0	5.2		SSW	24	13:10	18.0	73	0		Calm	1019.5	26.8	32	3	W	11	1015.7
6	Fr	14.2	29.5	0	4.0		WSW	28	13:59	18.5	61	0		Calm	1020.2				ENE	6	1017.0
7	Sa	10.2	29.6	0	4.0		NW	31	13:45	19.5	69	0	WNW	6	1022.9				WNW	11	1018.1
8	Su	8.2	29.6	0	5.0		WNW	30	12:15	17.0	50	0	NNW	9	1023.0	28.7	25	4	WSW	15	1018.3
9	Mo	8.2	30.4	0	7.8		WSW	54	15:00	19.0	42	0	NE	2	1021.1	29.0	13	2	WSW	28	1017.6
10	Tu	10.8	29.8	0	6.0		SSW	31	16:24	17.1	66	0	W	2	1023.0	28.2	23	6	S	7	1019.5
11	We	10.0	30.7	0	4.0		NNW	20	13:24	16.1	79	0		Calm	1023.8	29.7	27	2	NNW	2	1019.6
12	Th	10.6	28.2	0	6.0		NW	37	15:21	22.0	45	0	N	20	1021.4	26.8	26	0	WNW	26	1016.2
13	Fr	13.8	28.6	0	6.0		W	67	18:49	23.8	33	1	N	28	1017.1	26.8	33	5	NNW	28	1011.5
14	Sa	14.3	24.5	4.0	7.6		WNW	72	15:46	17.0	81	6	NNW	31	1009.1				NW	46	1004.1
15	Su	11.0	18.8	0	6.0		W	57	11:02	12.0	60	2	W	37	1009.8	18.3	43	2	WNW	31	1009.2
16	Mo	11.8	22.0	0	5.2		W	44	10:11	17.2	62	6	W	22	1015.6	21.0	45	4	W	33	1014.6
17	Tu	6.1	24.2	0	5.0		NE	28	17:38	13.0	80	0	WSW	7	1022.0	23.6	34	2	NW	2	1019.0
18	We	6.5	22.0	0	4.0		ENE	28	04:34	15.0	69	2	NNE	11	1025.1				NNE	11	1021.0
19	Th	7.5	22.3	0.4	4.4		SSW	39	15:32	11.5	94	8	SE	6	1022.3	14.6	100	8	E	7	1019.6
20	Fr	7.0	25.2	33.6	0.4		SE	26	13:37	13.1	77	0		Calm	1022.7	24.1	35	2	SE	15	1018.8
21	Sa	9.1	23.5	0	2.0		NE	30	22:25	15.0	79	0	NE	7	1024.0	23.2	45	3	N	11	1020.3
22	Su	7.5	23.0	0	3.0		WSW	30	16:17	13.5	83	3	NNW	4	1023.8	21.8	43	7	WSW	6	1020.3
23	Mo	7.8	23.9	7.6	3.6		WSW	20	14:22	11.6	86	0		Calm	1021.9	23.0	40	3	WSW	7	1018.4
24	Tu	6.2	25.8	0	3.2		ESE	22	16:09	10.7	87	0		Calm	1021.2	25.1	32	0	WSW	7	1016.2
25	We	5.0	26.2	0	3.8		SE	22	13:42	11.6	70	0	SW	2	1017.8	24.9	32	4	E	15	1013.5
26	Th	9.2	21.6	0	3.0		SW	44	10:50	14.2	77	6	WSW	6	1017.5	20.9	46	0	SW	28	1015.8
27	Fr	4.0	21.0	0	4.0		SSE	28	15:35	12.1	76	0	WSW	7	1022.7	18.1	62	6	SSE	11	1021.1
28	Sa	8.2	18.5	0	2.0		ESE	31	15:55	14.0	63	0	SE	13	1025.4	16.5	66	0	ESE	17	1023.1
29	Su	3.5	19.8	0	2.0		S	22	21:54	12.0	76	0	SSW	9	1026.3	18.5	51	2	SSW	11	1023.2
30	Mo	4.4	19.8	0	3.0		S	28	12:41	12.5	69	0	WSW	11	1026.5	19.1	53	0	ESE	11	1024.4
Statistics for April 2018																					
	Mean	9.0	25.3		4.5					15.8	69	1		9	1020.8	24.0	40	3		15	1017.4
	Lowest	3.5	18.5		0.4					10.7	33	0		Calm	1009.1	14.6	13	0	#	2	1004.1
	Highest	14.3	31.2	33.6	7.8		WNW	72		23.8	94	8	W	37	1026.5	30.0	100	8	NW	46	1024.4
	Total			45.6	135.0																

Photograph of measuring post in pit sump. Taken 9am on 21 June 2018.

Inspected by James Morrow
& Craig McDonald

Photograph of measuring post in pit sump. Taken 9am on 22 June 2018.

22-7-18

Pit water level risin by 20mm in 24 hours

inspected by

James Morrow

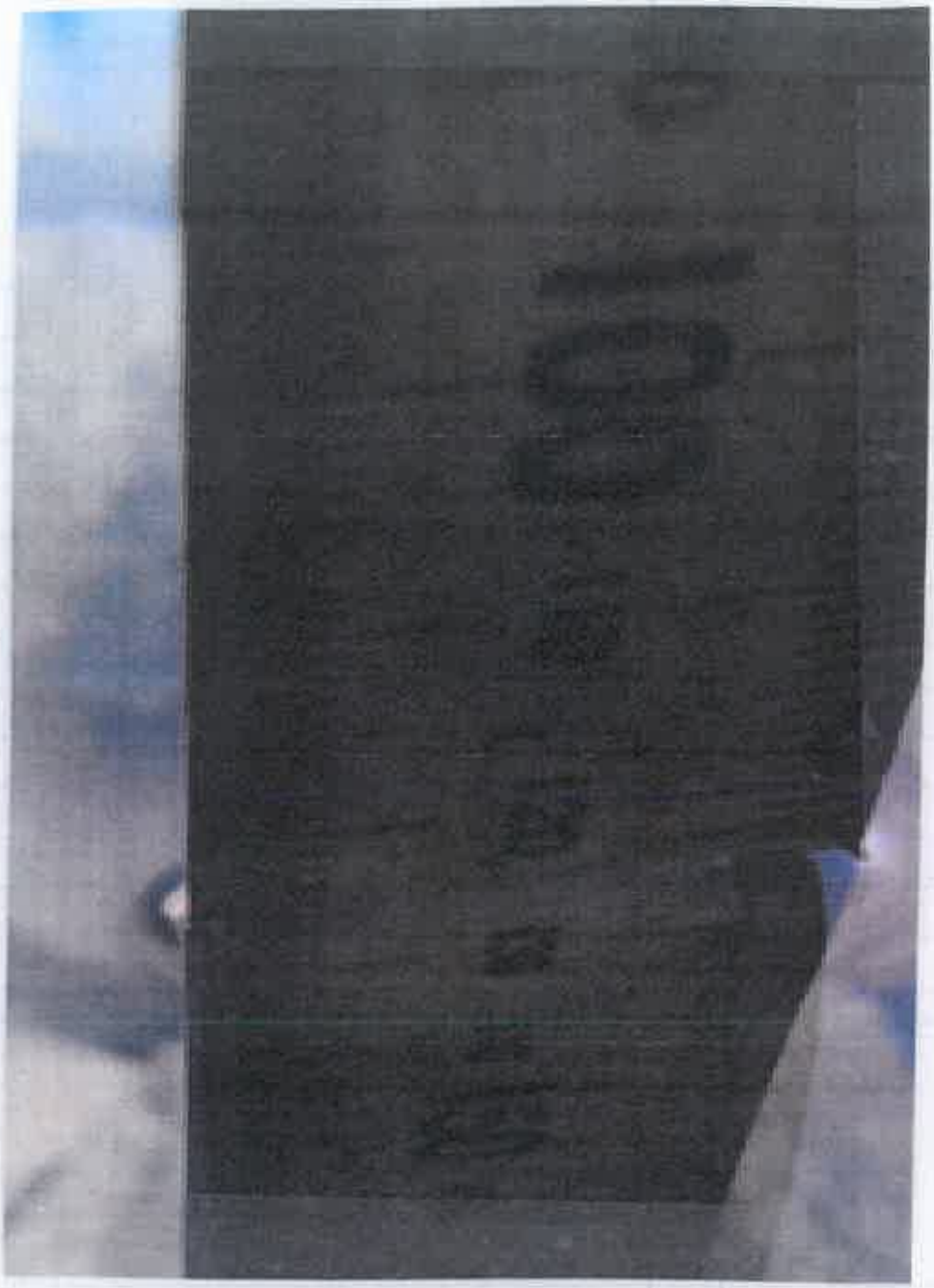
Photograph of pit from the lookout. Photo taken at 0930am on 21 June 2018. The pit sump is visible at the far (north east) end of the pit.

Bathurst, New South Wales
June 2018 Daily Weather Observations

Most observations from Bathurst, but some from Bathurst Airport.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Fr	1.2	13.0	0	0.2		S	37	12:56	5.6	73	0	WSW	11	1025.3	11.0	59	6	SSW	20	1023.9
2	Sa	1.5	13.5	0	0.2		S	33	10:24	7.1	71	7	SW	17	1022.1	11.2	74	6	S	22	1020.5
3	Su	6.5	16.1	0	1.0		ESE	39	13:31	11.0	77	3	SSE	15	1022.3	14.0	53	6	E	20	1020.0
4	Mo	0.2	16.7	0	1.0		S	24	13:59	5.5	93	0	SSW	6	1021.9	13.8	57	7	SE	13	1020.1
5	Tu	1.2	14.0	0	1.0		SE	39	22:43	8.2	79	6		Calm	1026.7	12.1	60	6	ESE	15	1026.0
6	We	1.6	15.1	0	1.6		ENE	41	10:56	9.0	80	4	SW	2	1030.7	13.3	53	6	ENE	20	1029.2
7	Th	5.3	16.0	0	2.0		NE	33	14:23	11.6	71	2	NNE	6	1032.7	15.0	52	6	NE	20	1029.0
8	Fr	3.1	13.1	0	1.6		N	41	13:10	6.4	96	8	N	7	1028.1	12.2	67	8	NW	22	1024.2
9	Sa	6.0	10.9	7.4	0.2		WSW	22	15:07	9.5	100	8	N	6	1024.2	10.4	86	7	WSW	11	1022.3
10	Su	1.5	16.2	4.2	0.2		E	28	15:06	7.1	85	4	SSW	9	1026.7	15.2	46	4	ESE	19	1024.6
11	Mo	1.5	15.2	0	2.0		WNW	17	13:19	7.1	85	4	SW	4	1025.1	14.1	49	4	S	6	1020.9
12	Tu	1.5	15.6	0.4	1.6		NW	46	13:23	4.1	99	7	S	2	1015.2	14.1	57	4	NNW	22	1010.6
13	We	4.0	12.2	0	1.0		WNW	31	13:57	8.0	89	5	N	7	1013.7	11.1	64	6	W	13	1012.2
14	Th	2.7	12.3	0	1.0		WSW	44	11:28	9.0	73	2	NW	9	1016.9	11.5	51	2	W	20	1016.6
15	Fr	2.8	12.8	0	1.2		NW	54	13:26	7.5	70	6	NNW	20	1018.4	8.1	84	8	WNW	33	1015.8
16	Sa	0.5	11.1	1.2	2.0		NW	46	14:25	6.5	78	5		Calm	1019.4	10.2	50	6	NW	30	1015.5
17	Su	1.6	6.3	3.4	0.2		WNW	44	10:33	3.6	76	6	W	19	1015.5	5.3	78	8	WNW	22	1015.3
18	Mo	3.6	10.2	2.4	0.4		SSW	35	12:22	5.6	82	8	SW	17	1019.6	9.0	72	6	SW	20	1020.2
19	Tu	3.2	11.9	0.6	1.8		S	43	13:31	6.2	75	7	SW	17	1024.0	11.0	55	4	S	30	1023.8
20	We	3.8	14.7	0	1.2		ESE	35	10:02	8.3	77	6	ESE	7	1028.0	13.8	46	6	SSE	15	1026.9
21	Th	-0.8	14.6	0	1.0		SSE	13	00:01	4.0	87	7		Calm	1029.9	13.5	48	6	WNW	4	1027.4
22	Fr	-3.0	14.5	0			WNW	17	15:16	1.6	74	0		Calm	1030.3				NNW	4	1027.2
23	Sa	-3.0	14.3	0			WSW	24	15:06	0.5	91	0		Calm	1027.8	13.6	42	5	WSW	13	1024.8
24	Su	-4.5	15.0	0			W	13	13:18	0.0	100	0	SW	6	1028.2	13.5	29	0	WNW	7	1025.7
25	Mo	-4.5	14.3	0			E	15	18:48	0.0	90	0		Calm	1031.8	13.2	38	0		Calm	1029.1
26	Tu	-3.7	15.0	0			E	22	20:53	2.8	70	0	SSW	4	1034.3	14.6	36	0	NNW	4	1031.4
27	We	-2.5	15.3	0	1.0		NE	35	20:24	2.2	73	4	WSW	6	1032.4	13.8	50	6	NE	9	1028.0
28	Th		10.7	4.6	0.6		NE	26	12:26	8.8	91	8	NE	11	1025.6	9.8	84	6	N	9	1022.8
29	Fr	0.2	8.5	13.4	0.2		W	20	12:07	5.3	89	7	E	4	1022.8	8.0	75	6	WNW	11	1022.0
30	Sa	1.2	12.5	0	0.0		WNW	39	10:57	7.1	85	6	N	13	1024.8	10.5	53	6	W	24	1024.7
Statistics for June 2018																					
Mean		1.1	13.4		1.0					6.0	82	4		7	1024.8	12.0	57	5		15	1022.7
Lowest		-4.5	6.3		0.0					0.0	70	0		Calm	1013.7	5.3	29	0		Calm	1010.6
Highest		6.5	16.7	13.4	2.0		NW	54		11.6	100	8	NNW	20	1034.3	15.2	86	8	WNW	33	1031.4
Total				37.6	24.2																



Pit sump level 20-9-18

Inspected by Mark Taylor

Pit sump level 21-9-18

Inspected by Mark Taylor

Water level rose by Approx 25 mm over 24 hour period

Bathurst, New South Wales
September 2018 Daily Weather Observations

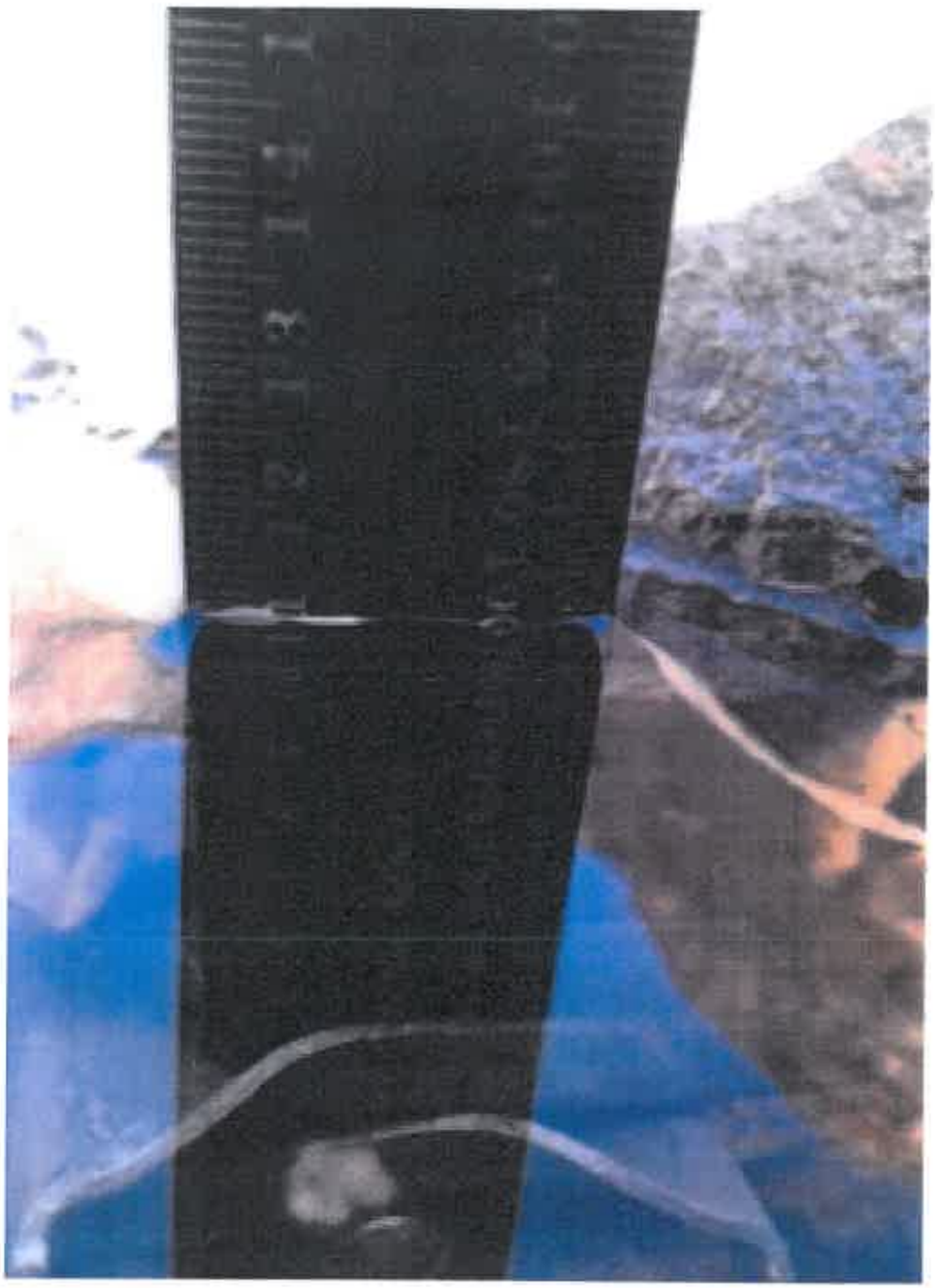
Most observations from Bathurst, but some from Bathurst Airport.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Sa	7.5	11.8	12.4	0.0		WSW	44	10:43	9.5	74	8	W	24	1012.9	10.5	70	7	WSW	26	1012.3
2	Su	2.5	14.4	0	1.2		ENE	26	19:50	8.0	80	3	SW	2	1018.4	14.0	49	3	SW	6	1017.2
3	Mo	5.8	12.9	0.2	1.6		ESE	35	15:57	9.5	68	6	NE	4	1026.1	10.8	68	7	ESE	20	1023.8
4	Tu	6.3	14.3	0.6	3.7		E	39	08:46	9.1	73	7	SE	19	1027.8	11.5	65	6	ESE	24	1025.7
5	We	4.5	16.0	0	1.4		ENE	35	09:00	11.3	71	3	ENE	24	1025.7				NE	24	1021.5
6	Th	6.5	17.6	1.0	2.2		N	37	12:56	11.1	87	7		Calm	1020.6	14.8	67	8	N	22	1015.2
7	Fr	9.2	16.5	14.6	1.4		NNW	35	04:22	14.0	76	8	NNW	19	1015.5	14.6	84	8	N	9	1012.9
8	Sa	8.2	15.5	6.2	0.2		W	30	16:36	12.0	88	6	ENE	17	1016.3	13.5	67	8	SE	2	1014.6
9	Su	1.0	15.5	11.4	1.0		WSW	46	14:02	9.5	74	4		Calm	1022.6	14.0	58	3	WSW	28	1020.5
10	Mo	3.2	19.9	0	1.0		SSE	20	09:47	11.2	76	0	SE	11	1027.0	19.0	49	8	NW	9	1024.2
11	Tu	3.1	21.5	0	0.2		NNW	33	12:00	9.7	92	0	NNW	2	1024.6	20.8	41	0	NW	19	1019.2
12	We	6.0	23.2	0	1.6		WNW	46	15:50	16.1	60	0	N	20	1018.2				NNW	28	1015.4
13	Th	4.5	22.5	0	3.6		WNW	48	14:12	13.0	76	0	WSW	7	1020.1	20.6	50	0	W	20	1017.6
14	Fr	2.5	22.3	0	4.0		NNW	39	15:17	11.0	86	0	NW	4	1020.5				NNW	26	1016.0
15	Sa	1.8	24.3	0	5.0		NW	63	14:18	13.1	66	3	W	6	1011.6	21.0	48	4	NW	24	1006.9
16	Su	0.5	11.3	0	5.2		WSW	46	12:37	5.5	63	1	SW	19	1019.2	10.8	37	4	S	15	1018.6
17	Mo	-3.0	16.2	0	3.6		NNE	28	12:13	8.0	67	0	SW	4	1024.6	15.5	46	0	N	17	1020.3
18	Tu	-1.2	20.2	0	4.0		NNW	46	12:59	12.2	62	0	N	6	1020.7				NNW	28	1014.8
19	We	3.2	18.0	0	3.8		NW	41	09:16	11.5	61	4	N	15	1011.9	16.8	37	0	WSW	28	1011.7
20	Th	-2.5	14.7	0	4.0		SW	44	13:24	7.5	66	0	S	15	1019.2	13.8	40	2	SSW	20	1019.1
21	Fr	-2.5	18.0	0	3.8		SW	26	15:38	7.1	72	0		Calm	1028.0				SW	11	1025.2
22	Sa	-0.5	19.3	0	4.0		SW	35	14:07	10.3	70	7	NW	6	1029.0				SW	24	1025.3
23	Su	0.2	20.6	0	4.0		SW	39	13:01	10.0	69	0	WNW	2	1026.9	18.8	42	0	WSW	22	1023.4
24	Mo	5.5	15.2	0	4.0		ENE	35	15:59	11.3	73	6	ENE	20	1028.4	13.1	66	7	E	24	1025.8
25	Tu	1.7	18.0	0	4.0		ENE	30	20:01	10.5	76	0	WSW	7	1027.0				NW	11	1021.9
26	We	5.0	12.8	0.6	4.6		S	35	08:33	8.5	93	7	ESE	19	1022.3				ESE	17	1019.5
27	Th	-0.6	20.2	0	0.4		NNW	24	11:16	9.6	77	0	SW	2	1021.7				W	9	1017.8
28	Fr	1.8	24.5	0	4.0		W	76	16:40	11.2	72	6	NNW	4	1018.8				NNW	31	1014.6
29	Sa	7.2	13.6	0.2	6.2		W	46	10:17	10.6	52	2	SW	26	1021.2	13.0	52	0	WSW	26	1021.6
30	Su	-1.8	18.3	0	6.0		SSW	30	16:27	9.5	68	0	SE	4	1029.8				SW	13	1026.0
Statistics for September 2018																					
Mean		2.9	17.6		3.0					10.4	72	2		10	1021.9	15.1	54	3		19	1019.0
Lowest		-3.0	11.3		0.0					5.5	52	0		Calm	1011.6	10.5	37	0	SE	2	1006.9
Highest		9.2	24.5	14.6	6.2		W	76		16.1	93	8	SW	26	1029.8	21.0	84	8	NNW	31	1026.0
Total				47.2	89.7																

Pit sump level 26-11-18

Inspected by mark taylor



Pit sump level 27-11-18

Inspected by mark taylor

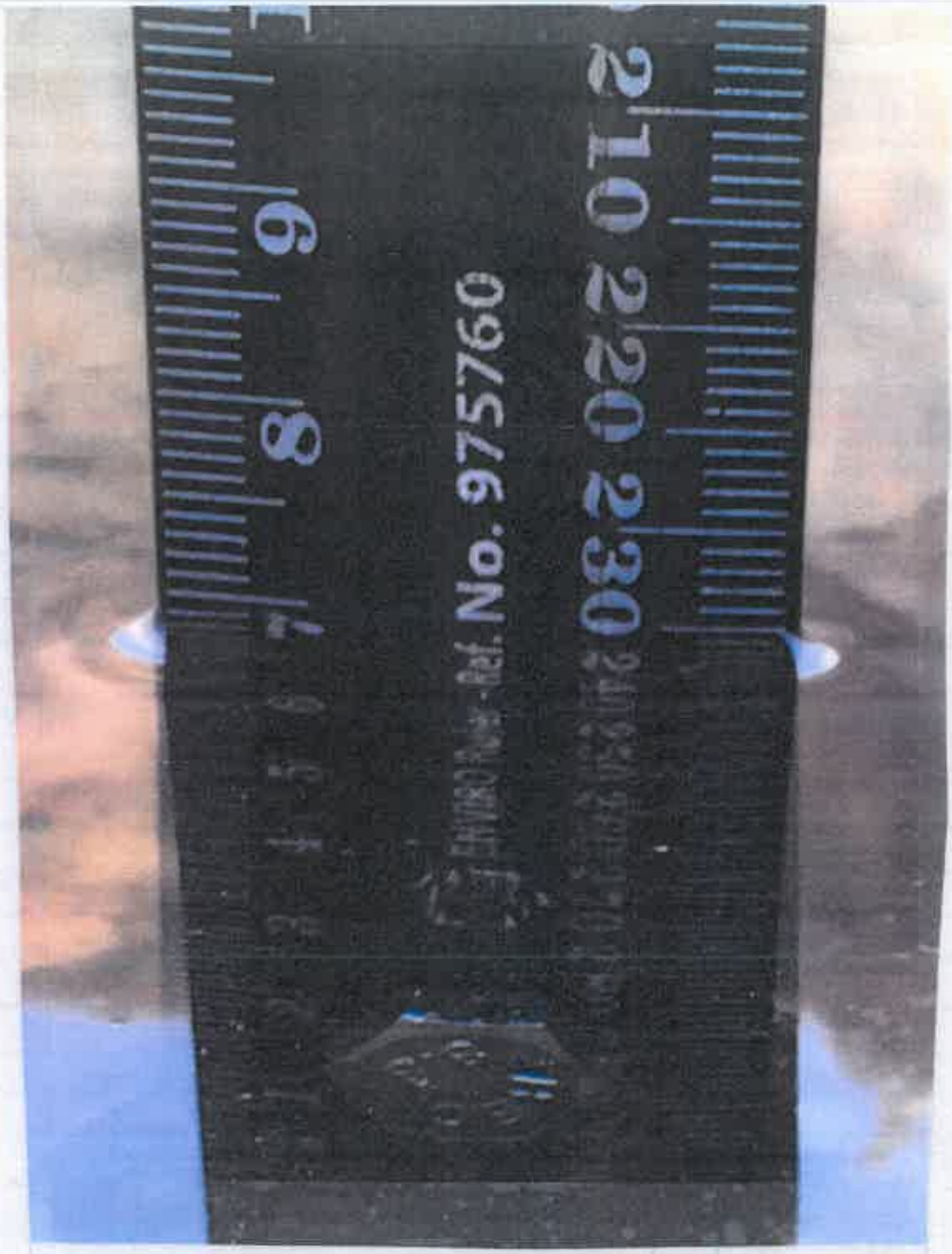
Australian Government
Bureau of Meteorology

Bathurst Airport, New South Wales
November 2018 Daily Weather Observations

Date	Day	Temps Min °C	Temps Max °C	Rain mm	Evap mm	Sun hours	Max wind gust Dir	Max wind gust Spd km/h	Max wind gust Time local	9 am Temp °C	9 am RH %	9 am Cld 8th	9 am Dir	9 am Spd km/h	9 am MSLP hPa	3 pm Temp °C	3 pm RH %	3 pm Cld 8th	3 pm Dir	3 pm Spd km/h	3 pm MSLP hPa
1	Th	12.3	30.5	0.8			NNW	41	10:26	19.8	59		N	9	1023.3	28.9	29	3	NW	22	1019.2
2	Fr	15.4	31.5	0			SW	78	18:24	24.5	35		NNW	28	1019.9	29.5	25		NNW	33	1015.3
3	Sa	16.2	26.8	13.8			WNW	43	07:46	21.5	64	3	WNW	33	1015.2	26.0	27		WNW	24	1013.3
4	Su	8.1	27.2	0			W	33	15:29	14.1	79		W	4	1015.4	25.9	27		W	13	1011.0
5	Mo	9.6	25.2	0			WNW	43	12:43	17.1	61	7	WSW	11	1012.3	23.6	38	8	W	19	1012.0
6	Tu	14.6	26.2	1.2			N	31	16:18	18.2	99	6	SW	15	1009.8	25.4	42	6	W	15	1007.4
7	We	14.5	19.1	0.8			N	50	01:40	18.5	94	3	NNW	4	1006.9	15.6	100	8	N	20	1005.7
8	Th	5.2	16.3	11.4			WSW	33	11:05	9.9	70	1	WSW	22	1014.6	15.4	35		SSW	17	1015.4
9	Fr	3.9	19.6	0			W	28	12:49	9.8	85		WSW	4	1020.8	19.0	36		WNW	13	1016.7
10	Sa	3.5	22.1	0			SW	31	15:52	12.0	63		WSW	4	1018.3	21.2	28	2	SW	13	1016.1
11	Su	5.8	25.0	0			ENE	33	19:53	14.8	58		WSW	4	1020.4	23.6	23		W	11	1017.8
12	Mo	8.5	26.8	0			NE	35	19:56	17.6	41		N	6	1022.0	25.1	24		E	13	1018.0
13	Tu	11.2	28.2	0			N	28	12:08	20.2	44	6	NE	7	1018.6	27.0	22		NW	9	1015.3
14	We	14.4	21.9	0			N	39	14:36	16.9	69	5	ENE	7	1015.9	20.4	57	8	NNW	22	1015.0
15	Th	9.1	26.9	0.4			N	43	13:19	18.6	72		NW	2	1018.5	23.1	49	5	NW	17	1016.4
16	Fr	10.2	24.1	0			ENE	31	23:01	15.4	69	8	ENE	13	1019.3	23.0	37	6	E	7	1015.7
17	Sa	8.7	23.1	0			ESE	43	17:26	16.0	77		SSE	7	1017.2	20.3	45	6	ESE	24	1016.1
18	Su	10.6	22.2	0			NE	43	12:35	15.5	60		ENE	28	1021.0	20.4	43		ENE	22	1019.2
19	Mo	7.2	26.3	0			ENE	30	18:42	16.4	57		NW	9	1020.1	26.2	31	5	W	19	1015.3
20	Tu	10.3	29.9	0			NW	46	20:17	19.4	57	1	NNW	11	1014.2	28.7	29	1	NW	17	1007.2
21	We	15.3	21.2	5.0			WNW	57	12:23	20.4	74	8	NW	35	1003.3	21.1	66	7	NW	31	1001.5
22	Th	11.7	17.6	20.4			W	74	14:44	12.7	64	8	W	35	999.9	17.4	30		NW	46	999.4
23	Fr	7.0	14.8	2.2			W	57	12:15	8.2	78	7	W	31	1003.5	12.7	51	8	WNW	39	1003.0
24	Sa	7.4	19.4	0			W	59	14:32	10.5	73	8	WSW	26	1004.5	16.9	45	8	W	33	1003.6
25	Su	8.5	22.3	0			WSW	50	15:14	14.4	83	6	W	11	1002.7	20.6	35	5	WSW	31	999.9
26	Mo	6.6	23.8	0			WSW	26	09:42	14.9	57		S	9	1004.7	23.1	32	1	S	11	1003.5
27	Tu	10.6		0						15.6	76	5	NW	6	1006.3	23.7	30	6	WNW	20	1002.8
Statistics for the first 27 days of November 2018																					
Mean		9.9	23.8							16.0	66	5		14	1013.7	22.4	38	5		20	1011.2
Lowest		3.5	14.8	0						8.2	35	1	NW	2	999.9	12.7	22	1	E	7	999.4
Highest		16.2	31.5	20.4			SW	78		24.5	99	8	#	35	1023.3	29.5	100	8	NW	46	1019.2
Total				56.0																	

IDCJDW2168.201811 Prepared at 05:36 UTC on Tuesday 27 November 2018

Pit sump level rose approx 15 mm over 24 hour period.



Pit sump level 2.1.19

Inspected by Mark Taylor

Pit sump level rose by 9mm from 9am to 9.
with possibly 5.7 mm of rain over night.

Bathurst Airport, New South Wales
January 2019 Daily Weather Observations

Date	Day	Temps Min °C	Temps Max °C	Rain mm	Evap mm	Sun hours	Max wind gust Dir	Max wind gust Spd km/h	Max wind gust Time local	9 am Temp °C	9 am RH %	9 am Cld 8th	9 am Dir	9 am Spd km/h	9 am MSLP hPa	3 pm Temp °C	3 pm RH %	3 pm Cld 8th	3 pm Dir	3 pm Spd km/h	3 pm MSLP hPa
1	Tu	16.6	34.2	1.0			WSW	35	11:56	23.8	60		Calm		1013.3	33.0	25	2	W	11	1009.4
2	We	18.1	34.5	0.2			SSW	46	13:46	26.7	45		N	13	1011.7	31.0	30	8	SSW	20	1008.6
3	Th	18.5	32.5	1.6			ESE	54	16:27	21.7	74	8	NNW	6	1012.6	32.0	30		SSE	9	1010.1
4	Fr	15.3	35.6	2.2			WNW	46	16:12	22.3	74		SW	2	1013.6	33.6	26	2	N	9	1010.0
5	Sa	20.0	35.8	0			NW	52	15:35	28.4	45		NNW	28	1011.7	32.5	30	1	NW	31	1007.7
6	Su	16.8	26.5	1.6			ENE	39	15:58	20.7	90	1	W	4	1013.1	25.9	58	8	NNE	17	1012.8
7	Mo	16.1	27.1	0.2			ENE	35	03:44	19.7	73	7	E	19	1017.3	23.4	60	8	NNE	17	1015.3
8	Tu	18.2	30.5	0.4			WNW	57	16:50	21.9	75	8	NE	7	1013.5	27.0	51	4	N	11	1010.0
9	We	16.0	31.7	12.0			W	37	17:01	21.5	78	1	N	9	1012.3	30.0	35		WSW	11	1010.3
10	Th	17.7		0						21.9	68	2	E	6	1015.3	30.0	41	8	NW	17	1012.3

Statistics for the first 10 days of January 2019

Mean	17.3	32.0								22.9	68	4		9	1013.4	29.8	38	5		15	1010.6
Lowest	15.3	26.5	0							19.7	45	1	Calm		1011.7	23.4	25	1	#	9	1007.7
Highest	20.0	35.8	12.0			WNW	57			28.4	90	8	NNW	28	1017.3	33.6	60	8	NW	31	1015.3
Total			19.2																		

IDCJDW2168.201901 Prepared at 05:36 UTC on Thursday 10 January 2019

Attachment G

Analytical Results Summary Table

Table G1

Baseline Analytical Data Summary - January 2018 to January 2019

		ANZECC (2000)	Aust. Drinking Water	10/01/2018	22/06/2018	03/01/19	10/01/2018	22/06/2018	03/01/19	10/01/2018	22/06/2018	03/01/19	10/01/2018	22/06/2018	03/01/19	Units
		2000 (Fresh)	2011	MB01S	MB01S	MB01S	MB01D	MB01D	MB01D	MB02	MB02	MB02	PIT	PIT	PIT	
Major Cations (mg/L)	Calcium	-	-	66	74	68	144	150	140	52	71	73	71	49	64	mg/L
	Magnesium	-	-	14	13	13	16	15	14	24	31	33	45	26	44	mg/L
	Sodium	-	-	23	22	18	95	59	48	200	190	170	26	25	20	mg/L
	Potassium	-	-	1	1	1.5	3	1	1.4	2	2	2.2	4	3	4.7	mg/L
Major Anions (mg/L)	Sulphate	-	-	22	23	25	259	248	200	120	127	130	183	98	220	mg/L
	Chloride	-	-	43	44	51	58	23	26	68	78	89	9	10	13	mg/L
	Hydroxide as CaCO3	-	-	<1	<1	<5	<1	<1	<5	<1	<1	<5	<1	<1	<5	mg/L
	Carbonate as CaCO3	-	-	<1	<1	<5	<1	<1	<5	<1	<1	<5	<1	<1	<5	mg/L
	Bicarbonate as CaCO3	-	-	216	232	230	307	335	350	476	520	530	181	201	170	mg/L
Heavy Metals (Dissolved) (mg/L)	Aluminium	0.055	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	mg/L
	Arsenic	0.013	0.01	0.003	0.001	0.002	0.005	0.005	0.005	0.004	0.004	0.003	<0.001	<0.001	<0.001	mg/L
	Barium	-	2	0.015	0.013	0.011	0.08	0.055	0.061	0.065	0.085	0.097	0.032	0.029	0.071	mg/L
	Beryllium	-	0.06	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	<0.001	<0.0005	mg/L
	Boron	0.37	4	<0.05	<0.05	<0.02	0.33	0.32	0.36	0.32	0.27	0.25	<0.05	<0.05	<0.02	mg/L
	Cadmium	0.0002	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0088	0.0019	0.0001	mg/L
	Chromium	0.001	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Cobalt	-	-	<0.001	<0.001	<0.001	0.002	0.003	0.002	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	mg/L
	Copper	0.0014	2	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Iron	-	-	<0.05	<0.05	<0.01	<0.05	<0.05	0.014	<0.05	<0.05	<0.01	<0.05	<0.05	<0.01	mg/L
	Lead	0.0034	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	mg/L
	Manganese	1.9	0.5	0.123	0.153	0.085	0.353	0.53	0.5	0.038	0.046	0.085	2	0.188	<0.005	mg/L
	Mercury	0.6	0.001	<0.0001	<0.0001	<0.00005	<0.0001	<0.0001	<0.00005	<0.0001	<0.0001	<0.00005	<0.0001	<0.0001	<0.00005	mg/L
	Molybdenum	-	0.05	0.002	<0.001	0.001	0.03	0.004	0.008	0.009	0.002	0.003	0.004	<0.001	0.011	mg/L
	Nickel	0.011	0.02	0.001	<0.001	<0.001	0.018	0.003	0.006	0.003	0.002	<0.001	0.008	0.001	<0.001	mg/L
	Selenium	0.005	0.01	<0.01	<0.01	<0.001	<0.01	<0.01	-0.001	<0.01	<0.01	<0.001	<0.01	<0.01	<0.001	mg/L
	Silver	0.00005	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Strontium	-	-	0.208	0.245	0.27	0.897	0.897	0.99	2.36	3.01	3.3	0.298	0.231	0.33	mg/L
	Titanium	-	-	<0.01	<0.01	<0.001	<0.01	<0.01	<0.001	<0.01	<0.01	<0.001	<0.01	<0.01	<0.001	mg/L
	Vanadium	-	-	<0.01	<0.01	<0.001	<0.01	<0.01	0.003	<0.01	<0.01	0.003	<0.01	<0.01	<0.001	mg/L
	Zinc	0.008	-	0.03	<0.005	0.005	<0.005	0.006	0.004	<0.005	<0.005	0.007	0.443	0.16	0.006	mg/L
Silicon (mg/L)	Silicon	-	-	9.15	10.1	8.9	24.4	31.6	37	9.6	11.3	11	15.2	19.4	5.1	mg/L
Nutrients (mg/L)	Nitrate*	10 (as N)	50 (as NO3)	0.05	<0.01	0.01	0.08	<0.01	0.01	<0.01	<0.01	0.007	4.45	0.48	1.4	mg/L
	Nitrite	None	-	<0.01	<0.01	<0.005	<0.01	<0.01	<0.005	<0.01	<0.01	<0.005	0.01	<0.01	0.012	mg/L
	Ammonia	0.9	-	0.03	0.05	<0.005	0.03	0.02	<0.005	<0.01	0.08	0.048	0.4	0.05	<0.005	mg/L
Hydrocarbons (ug/L)	TRH	-	-	-	-	-	-	-	-	-	-	-	<EQL	<EQL	<EQL	ug/L
	Benzene	950	1	-	-	-	-	-	-	-	-	-	<1	<1	<1	ug/L
	Toluene	-	800	-	-	-	-	-	-	-	-	-	<2	<2	<1	ug/L
	Ethylbenzene	-	300	-	-	-	-	-	-	-	-	-	<2	<2	<1	ug/L
	Xylene	200	600	-	-	-	-	-	-	-	-	-	<2	<2	<3	ug/L
	Naphthalene	16	-	-	-	-	-	-	-	-	-	-	<5	<5	<1	ug/L
	Benzo(a)pyrene	-	0.01	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<1	ug/L