



CBased Environmental Pty Limited

ABN 62 611 924 264



Calga Quarry

Environmental Monitoring

Dust Deposition Gauges, Surface and Ground Waters and Meteorological Station

November 2019

Colin Davies BSc MEIA CEnvP
Environmental Scientist
Date: 19 December 2019

Executive Summary

CBased Environmental is contracted by Hanson Quarry Products to conduct environmental monitoring at the Calga Sand Quarry.

The monitoring includes;

- Dust Deposition Gauges;
- Surface Waters;
- Groundwaters; and
- Meteorological Station.

This report was prepared by CBased Environmental and includes the following;

- Dust Deposition results for November 2019;
- Surface Water quality results for November 2019;
- Bi-monthly Groundwater quality results November 2019; and
- Meteorological report for November 2019.

The November 2019 dust deposition results for insoluble solids generally increased when compared to October 2019. There were no excessively contaminated dust gauges this month. All sites, on a rolling annual average basis, are currently below the Air Quality Management Plan exceedance level of 3.7g/m².month. Results were found to be representative of dust levels as determined by the Australian Standard.

Monthly surface water samples were collected at sites A, C1, C2 and F. B and D was dry at the time of sampling. The samples were collected and analysed for a monthly sampling event. Results show pH within the slightly acidic range, low Electrical Conductivity, low Total Dissolved Solids and low Total Suspended Solids. Oil and Grease detected at site A in November.

Bi-monthly groundwaters were sampled on 3 December 2019. Groundwater depth generally increased when compared to September 2019, with water moving away from the surface. pH at all sites is in the acidic range and generally varied when compared to the previous results. EC levels were similar or decreased slightly at a majority of groundwater sites when compared to the September 2019 results.

The Calga Quarry weather station data recovery in November 2019 was approximately 77%. No data was available between 13 November 2019 13:30 and 19 November 2019 17:45. Data for November 2019 shows that rainfall recorded at the Calga Quarry was slightly below the Gosford BOM mean rainfall and well below the Peats Ridge long term rainfall for November.

The rainfall comparison is provided below:

Calga Quarry	21.2 mm
BOM Peats Ridge*	NA
BOM Gosford*	21.8 mm
BOM Peats Ridge Long term mean for November*	100.7 mm

*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au).

Note: Differences in the daily rainfall readings between BOM and the Calga station may occur due to BOM stations reporting rainfall at 9am and the Calga station recording rainfall at midnight.

Sampling Program

Hanson Calga Quarry conducts environmental monitoring in accordance to Development Consent, OEH (EPA) licence and Environmental Management Plans. CBased Environmental are contracted to undertake dust deposition gauge, surface and groundwater and meteorological monitoring for the project. CBased Environmental commenced monitoring from the April 2006 monitoring period.

Dust deposition gauges are operated to the Australian Standard AS3580.10.1 *“Methods for sampling and analysis of ambient air method. Determination of particulates- deposited matter- gravimetric method”*. Sampling is undertaken every 30 +/- 2 days and each gauge is analysed for insoluble solids and ash residue. The results are reported as g/m².month.

Surface waters are sampled in accordance with Australian Standards AS5667.1 *“Guidance on the design of sample programs, sampling techniques and the preservation and handling of samples”*, AS5667.6 *“Water quality sampling—guidance on sampling of rivers and streams”* and AS5667.4 *“Water quality sampling—guidance on sampling from lakes, natural and man-made”*. Surface water monitoring sites include local streams and dams. Basic analysis including pH, Electrical Conductivity, Total Suspended Solids, Total Dissolved Solids and Total Oil and Grease is conducted monthly at Sites A and F (dams) and when Sites B, C and D are flowing. Additional samples are collected when daily rainfall exceeds 50mm.

Groundwaters are sampled in accordance with Australian Standards AS5667.1 *“Guidance on the design of sample programs, sampling techniques and the preservation and handling of samples”* and AS5667.11 *“Water quality sampling—guidance on sampling of ground waters”*. Groundwater monitoring sites are sampled bi-monthly for depth and water quality. Groundwater monitoring loggers continuously record water levels in a selection of bores.

Meteorological monitoring is conducted at the quarry and displayed on the site computer with a real-time display. Metrological parameters are measured according to Australian Standard AS3580.14 *“Methods for sampling and analysis of ambient air. Meteorological monitoring for ambient air quality monitoring applications”*

The weather station has the following sensor configuration;

- Air temperature
- Humidity
- Rainfall
- Atmospheric pressure
- Evaporation
- Solar radiation
- Wind speed
- Wind direction

CBased Environmental continued to operate the monitoring equipment and utilise site collections at their existing locations.

The locations of monitoring points are provided in **Figure 1**.

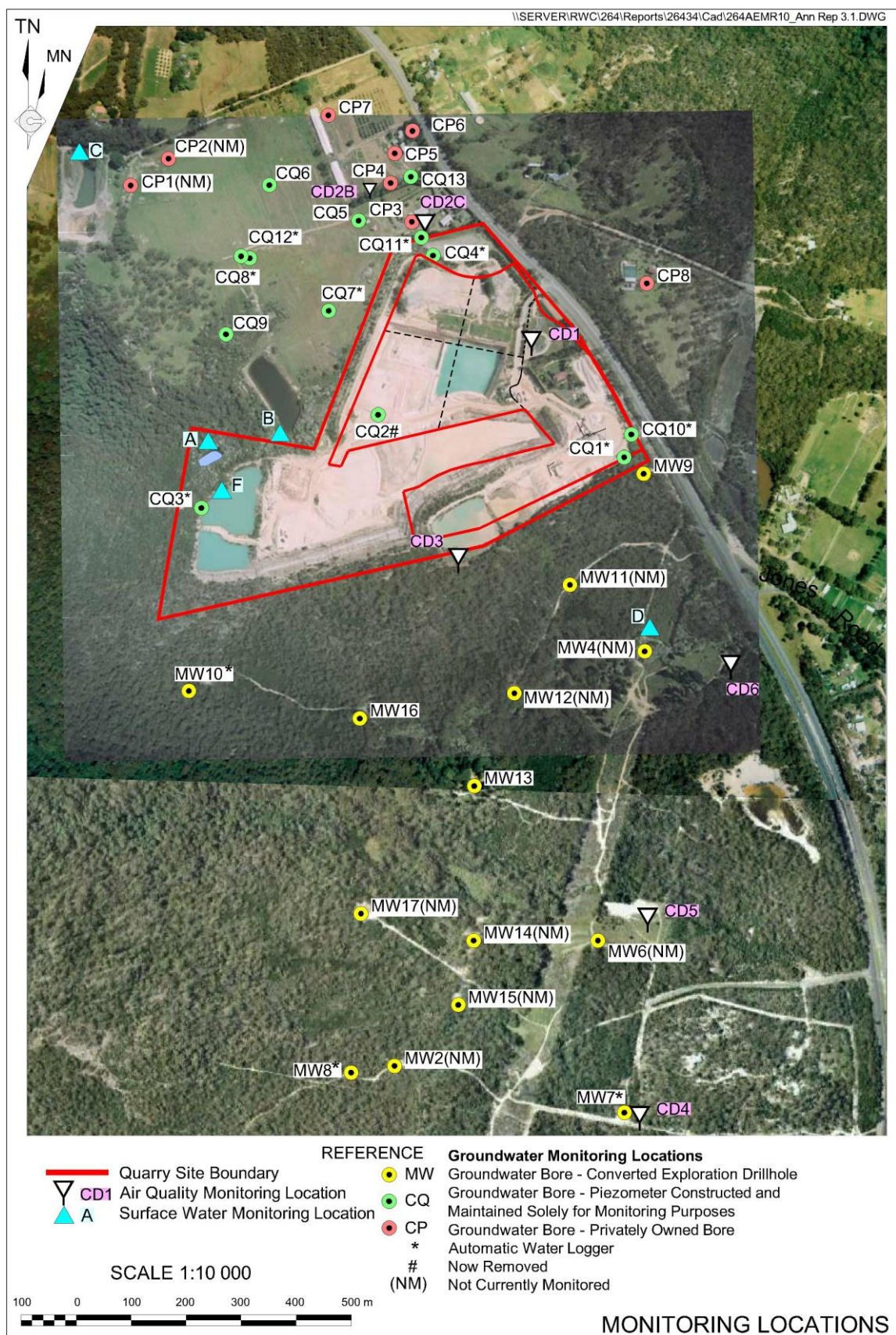


Figure 1: Hanson Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for November 2019 and the project 12-month rolling average. Results are in g/m².month.

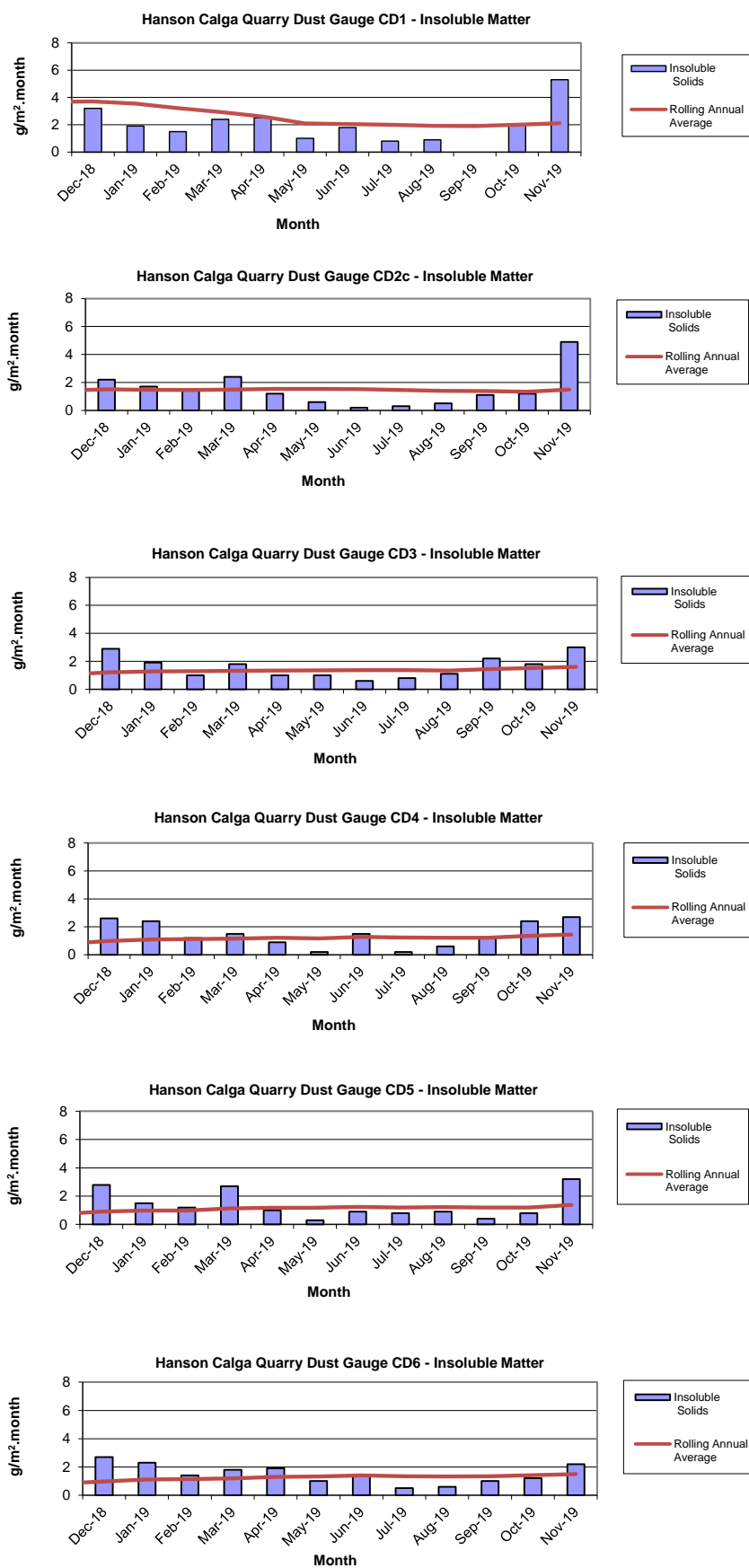
Table 1: Dust Deposition results: 1 November – 3 December 2019 (32 days)

Site	Monthly Insoluble Solids (g/m ² .month)	Monthly Ash Residue (g/m ² .month)	Monthly Combustible Matter (g/m ² .month)	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids (g/m ² .month)
CD1	5.3	4.4	0.9	83	2.1
CD2c	4.9	3.7	1.2	76	1.5
CD3	3.0	2.2	0.8	73	1.6
CD4	2.7	1.7	1.0	63	1.5
CD5	3.2	2.5	0.7	78	1.4
CD6	2.2	1.8	0.4	82	1.5

Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m².month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from December 2018 to November 2019.

CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations “mining out” the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air Quality Management Plan. CD4 was installed on 3 October 2006, to gauge air quality impacts to the south of the site operations, as were CD5 and CD6 which were installed on the 14 December 2006. CD2b was discontinued at the end of January 2010 due to contamination of the gauge by non-quarry related vehicle movements on a track adjacent to the gauge. The replacement gauge, CD2c, was located on a rehabilitated section of land between the extraction area and adjacent resident.

Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The laboratory analysis is provided in **Appendix 1**.

Figure 2: Dust Deposition Charts


2.2 Surface Water Monitoring

Monthly surface water monitoring was conducted on the 3 December 2019 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

Table 2: Monthly surface water monitoring – November grab sample results

Site	Observed Flow Rate	Water Colour	Turbidity	pH	EC ($\mu\text{S/cm}$)	TDS (mg/L)	TSS (mg/L)	Oil and Grease (mg/L)
A	Dam	Brown	Clear	6.24	102	92	7	5
B	Dry							
C1	Dam	Clear	Clear	6.68	114	82	<5	<5
C2	Trickle	Clear	Clear	6.14	100	75	<5	<5
D	Dry							
F	Dam	Clear	Clear	5.96	94	83	11	<5

Samples were collected at sites A, C1, C2 and F. B and D was dry at the time of sampling. The samples were collected and analysed for a monthly sampling event. Results show pH within the slightly acidic range, low Electrical Conductivity, low Total Dissolved Solids and low Total Suspended Solids. Oil and Grease detected at site A in November.

2.2.1 Non-Routine Surface Water Sampling

Nil non-routine sampling was undertaken in November 2019.

2.3 Groundwater Monitoring

Bi-monthly groundwaters were sampled on 3 December 2019. Water quality tests for pH and electrical conductivity were conducted by CBased Environmental Pty Limited. For water quality purposes, water was purged from the bore until constant pH (± 0.1 pH units) and Electrical Conductivity ($\pm 5\%$) was obtained between samples. Data is displayed in **Table 3** and **Figures 3 to 6**.

Groundwater depth generally increased when compared to September 2019, with water moving away from the surface. pH at all sites is in the acidic range and generally varied when compared to the previous results. EC levels were similar or decreased slightly at a majority of groundwater sites when compared to the September 2019 results.

Dataloggers were also downloaded in November 2019 and emailed to site separately.

Bi-monthly groundwater monitoring is next scheduled for January 2020.

Table 3: Groundwater Quality Data

Reference	Bore	Type	Depth to water TOC (m) April 2006	Depth to water TOC (m) This report	pH This report	Electrical Conductivity (μS/cm) This report
CQ3	Voutos	* Monitor	10.53	10.91	6.18	128
CQ4	Voutos	* Monitor	8.78	11.20	5.75	120
CQ5	Gazzana	DIP Only	8.69	7.29	4.29	178
CQ6	Gazzana	DIP Only	16.00	No longer accessible due to damage from an external party.		
CQ7	Gazzana	* Monitor	6.89	6.68	4.28	100
CQ8	Gazzana	* Monitor	11.03	6.47	4.44	119
CQ9	Gazzana	DIP Only	10.10	No longer accessible due to damage from an external party.		
CQ10	Voutos	* Monitor	NI	25.28	4.24	126
CQ11S	Gazzana	* Monitor	NI	11.85	5.34	136
CQ11D	Gazzana	* Monitor	NI	12.87	4.95	137
CQ12	Gazzana	* Monitor	NI	4.50	4.73	117
CQ13	Kashouli	* Monitor	NI	14.16	4.51	139
CP3	Gazzana	Domestic	10.40	No longer accessible due to damage from an external party.		
CP4	Kashouli	Domestic	13.63	11.11	Blocked	
CP5	Kashouli	Domestic	16.61	7.80	5.28	114
CP6	Kashouli	Domestic	16.27	10.38	4.38	130
CP7	Kashouli	Production	8.56	3.13	5.20	84
CP8	Rozmanec	Domestic	22.17	21.98	4.43	108
CP13	W P White	Domestic		12.16	4.15	153
CP15	32 Polins Road Calga	Domestic		3.10	4.37	123
MW7	Rocla Bore	* Monitor	15.76	15.23	5.40	48
MW8	Rocla Bore	* Monitor	9.82	7.36	5.03	61
MW9	Rocla Bore	* Monitor	22.44	23.85	4.54	86
MW10	Rocla Bore	* Monitor	15.41	12.17	4.28	101
MW13	Rocla Bore	DIP Only	NI	8.04	4.53	97
MW16	Rocla Bore	DIP Only	NI	8.7	4.44	98
MW17	Rocla Bore	DIP Only		10.62	4.77	107

Notes:

TOC = Water level measured from top of bore case to water.

NM = Not Monitored – unable to sample water due to non-operational pump.

NR = Not Required by resident.

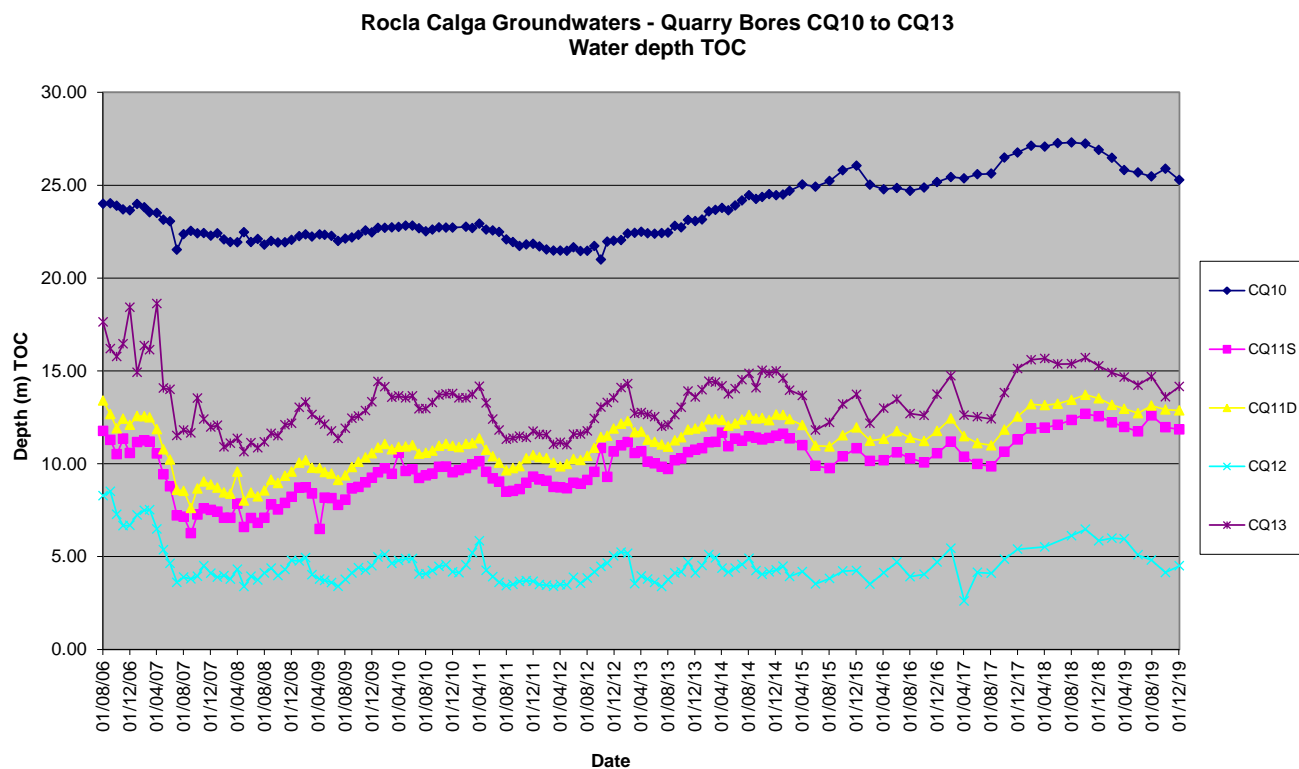
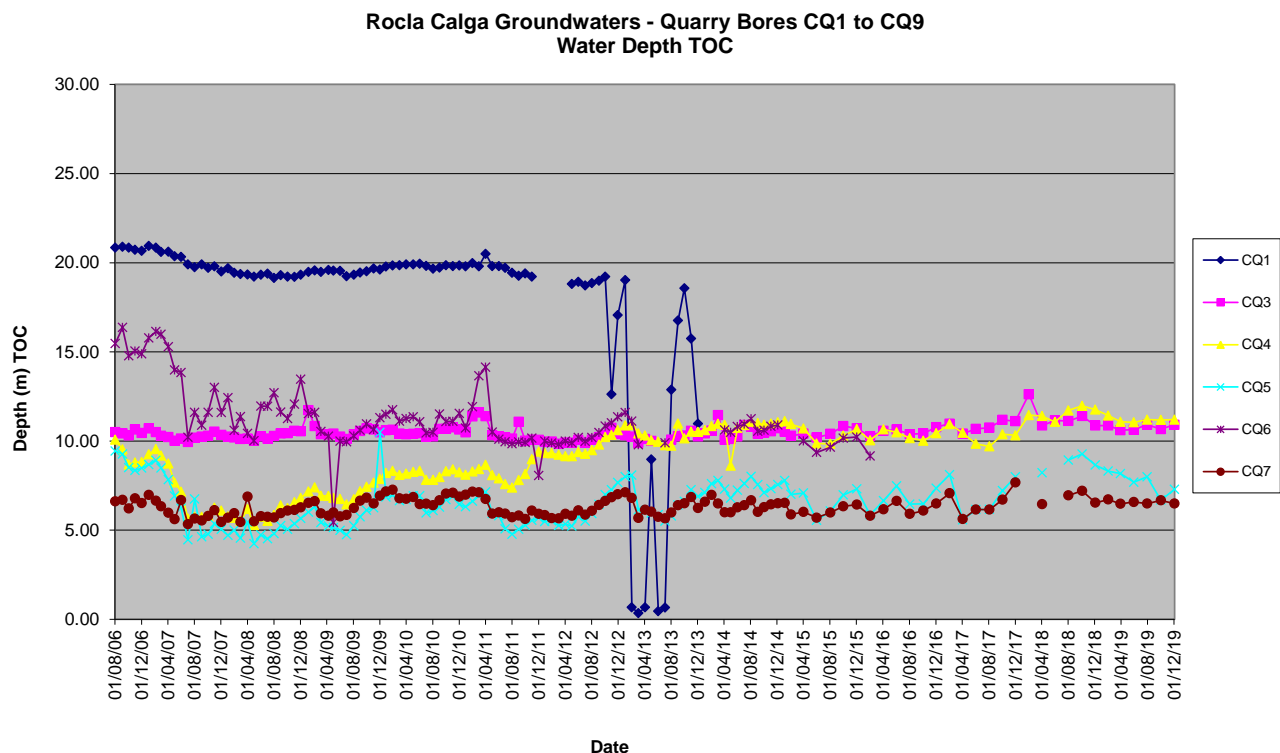
* = Logger Installed.

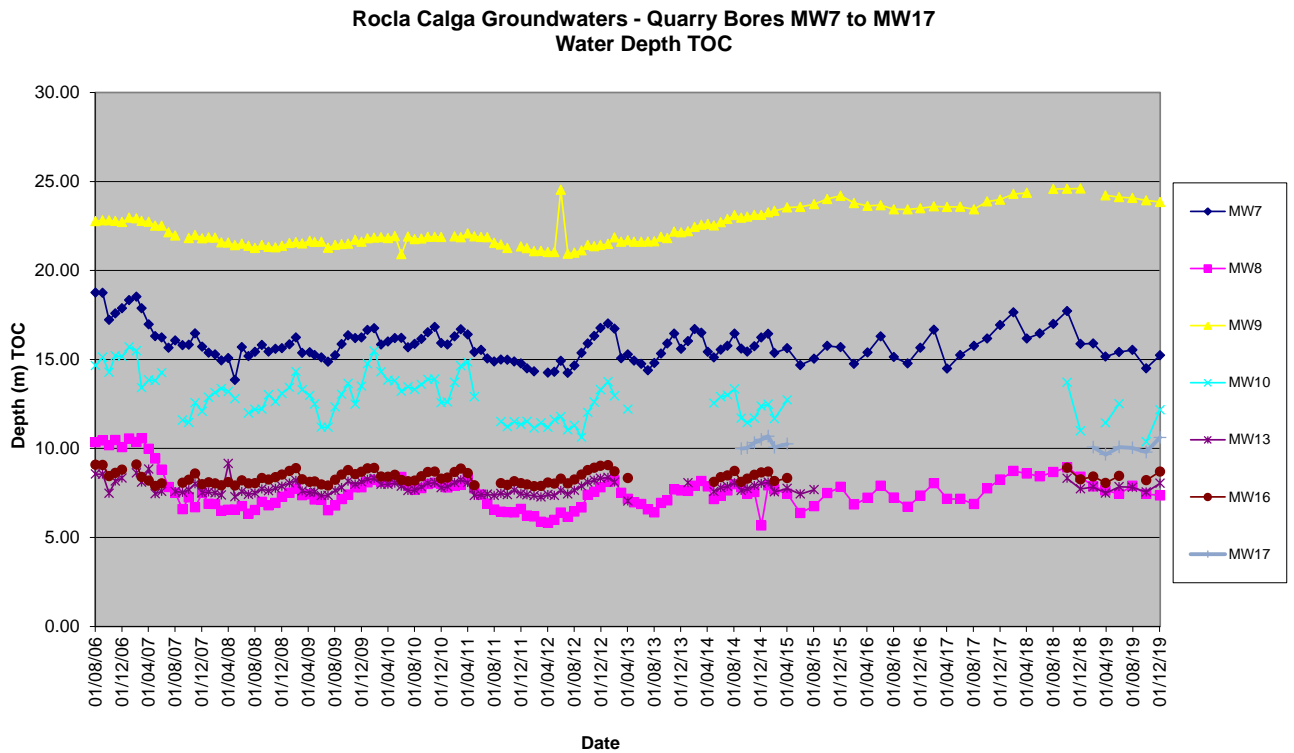
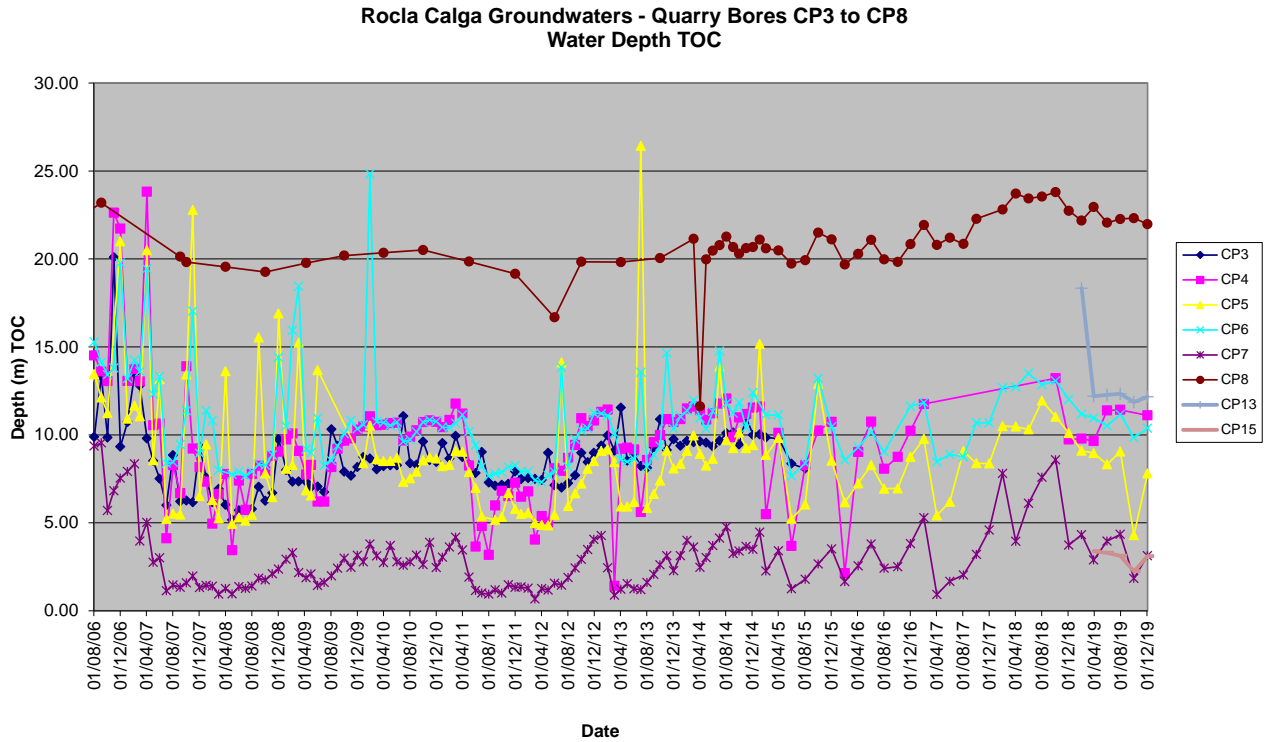
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements taken by Carbon Based Environmental Pty Limited.

Shading is used to indicate the following trends in water depth (compared to the last reading):

	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

Figures 3 to 6: Groundwater Depth Charts.





2.4 Meteorological Monitoring

The Calga Quarry weather station data recovery in November 2019 was approximately 77%. No data was available between 13 November 2019 13:30 and 19 November 2019 17:45.

The weather station data follows and includes;

- Monthly data numerical summary;
- Weather charts of air temperature, humidity, heat index and wind chill, atmospheric pressure, solar radiation, evapotranspiration, rain, wind speed and data reception; and
- Wind rose (frequency distribution diagram of wind speed and direction).

An annual calibration was undertaken on the weather station during March 2019 and is next due in March 2020.

Monthly weather statistics from the nearby Bureau of Meteorology (BOM) at Peats Ridge station are no longer available. However, the long-term rainfall mean is available via a link on the Gosford BOM Daily Weather Observation page.

Data for November 2019 shows that rainfall recorded at the Calga Quarry was slightly below the Gosford BOM mean rainfall and well below the Peats Ridge long term rainfall for November.

The rainfall comparison is provided below:

Calga Quarry	21.2 mm
BOM Peats Ridge*	NA
BOM Gosford*	21.8 mm
BOM Peats Ridge Long term mean for November*	100.7 mm

NA = Not Available

*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au).

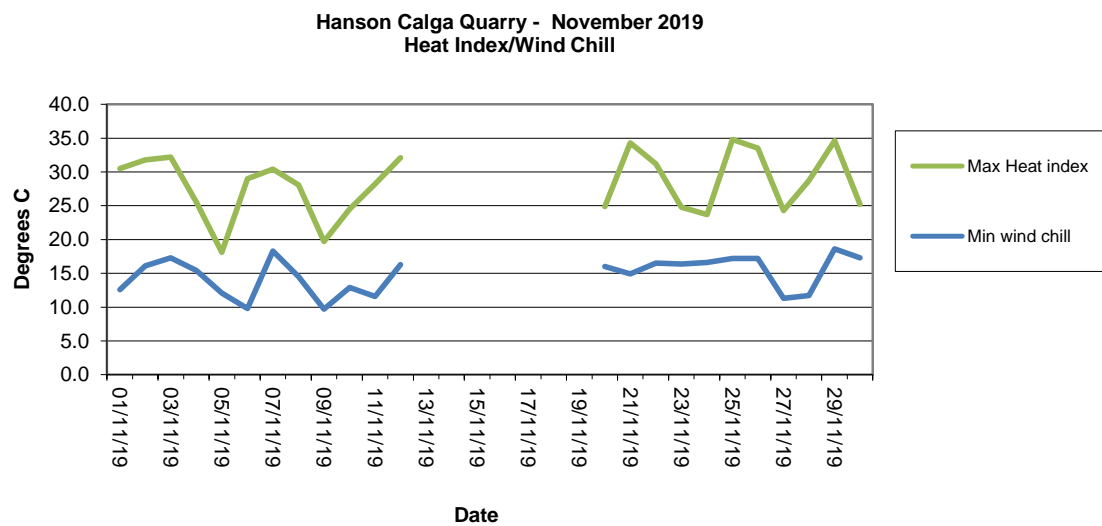
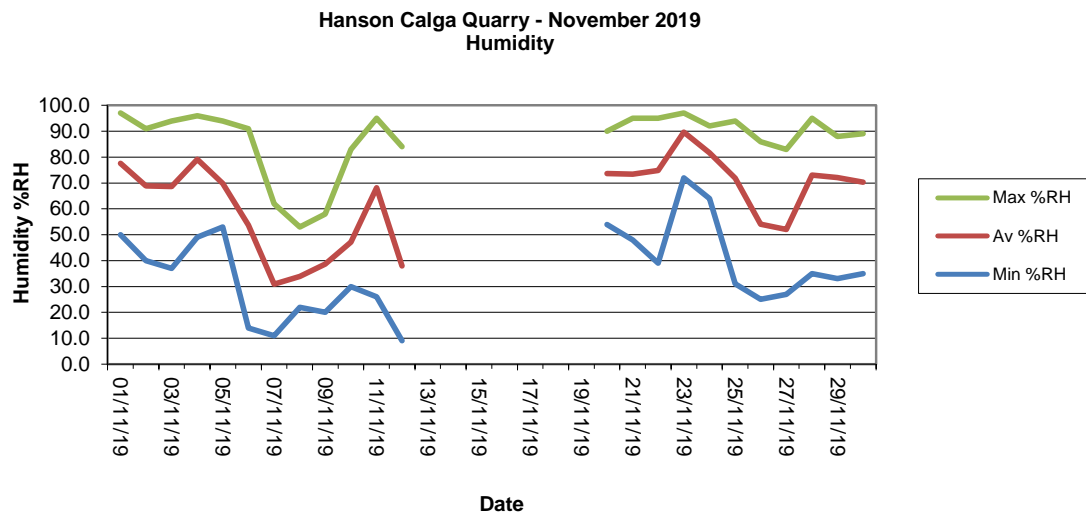
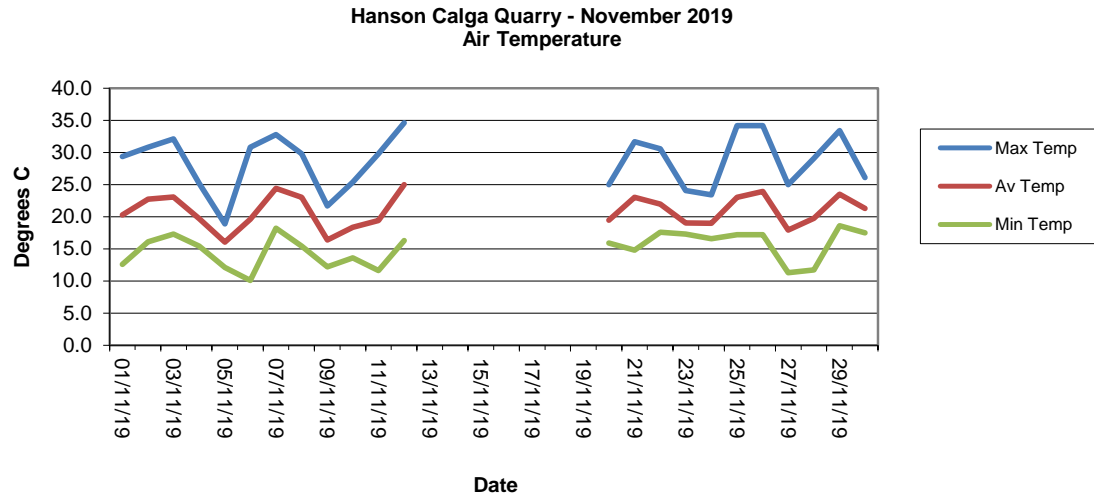
2.4.1 Monthly Meteorological Data Summary

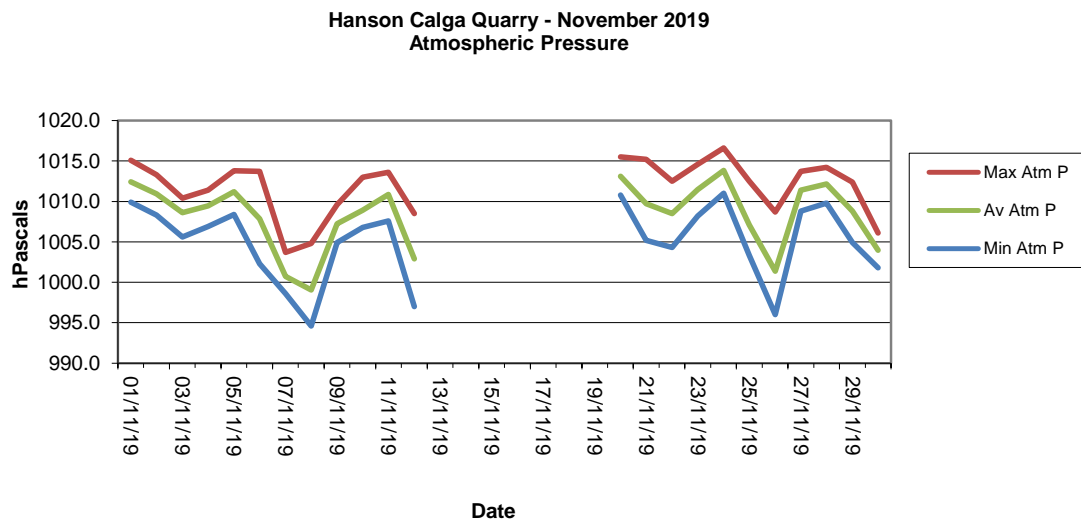
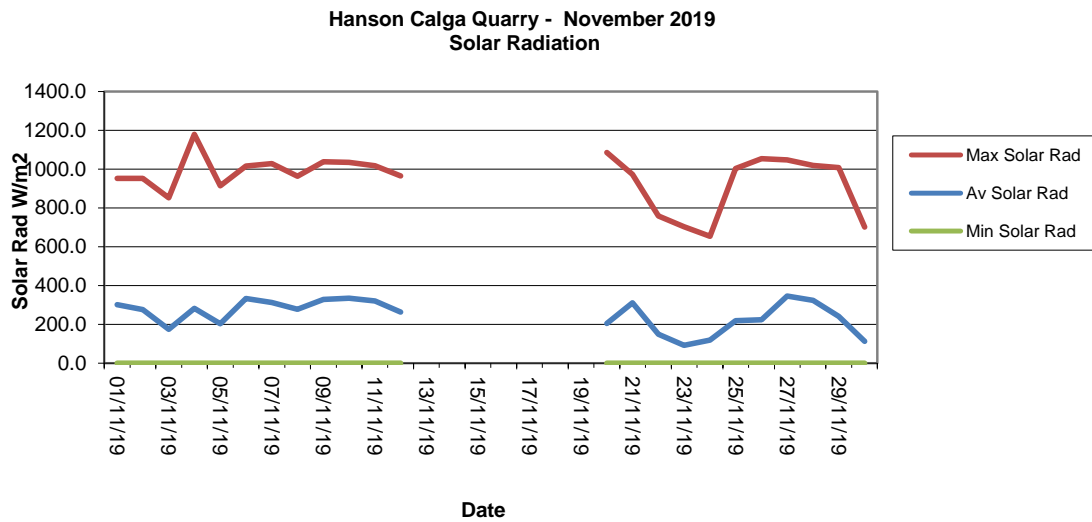
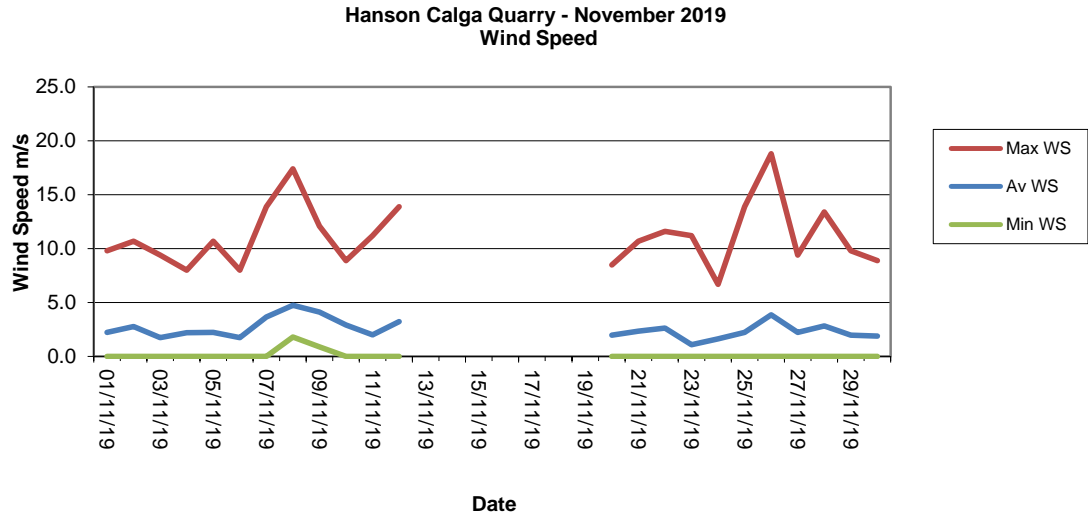
Summary Nov-19 Hanson - Calga

Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/11/2019	12.6	20.3	29.4	50.0	77.5	97.0	0.0	5.5	0.0	2.2	9.8	12.6	30.5	1009.9	1012.4	1015.1	0.0	301.1	952.0	78.9	91.6	100.0
2/11/2019	16.1	22.7	30.8	40.0	68.9	91.0	0.0	6.0	0.0	2.8	10.7	16.1	31.8	1008.3	1010.9	1013.3	0.0	275.6	953.0	83.0	92.5	99.7
3/11/2019	17.3	23.1	32.1	37.0	68.6	94.0	9.6	4.1	0.0	1.7	9.4	17.3	32.2	1005.6	1008.6	1010.4	0.0	173.6	853.0	82.0	93.4	100.0
4/11/2019	15.4	19.7	25.2	49.0	79.1	96.0	2.8	4.9	0.0	2.2	8.0	15.4	25.5	1006.9	1009.5	1011.4	0.0	282.4	1179.0	83.6	91.6	98.1
5/11/2019	12.1	16.0	18.9	53.0	69.8	94.0	0.0	3.8	0.0	2.2	10.7	12.1	18.1	1008.4	1011.2	1013.8	0.0	202.7	915.0	85.8	96.3	100.0
6/11/2019	10.1	19.6	30.8	14.0	53.6	91.0	0.0	6.4	0.0	1.7	8.0	9.8	29.0	1002.3	1007.8	1013.7	0.0	332.4	1016.0	82.0	95.4	100.0
7/11/2019	18.2	24.4	32.8	11.0	30.9	62.0	0.0	9.2	0.0	3.7	13.9	18.3	30.4	998.6	1000.7	1003.7	0.0	312.9	1028.0	83.0	92.9	100.0
8/11/2019	15.4	23.0	29.8	22.0	33.9	53.0	0.0	8.8	1.8	4.8	17.4	14.5	28.1	994.6	999.0	1004.8	0.0	276.6	964.0	78.5	93.2	100.0
9/11/2019	12.2	16.4	21.7	20.0	38.7	58.0	0.0	7.2	0.9	4.1	12.1	9.7	19.7	1004.9	1007.2	1009.6	0.0	328.1	1038.0	85.8	95.2	100.0
10/11/2019	13.6	18.3	25.4	30.0	47.1	83.0	0.0	7.0	0.0	2.9	8.9	12.9	24.5	1006.8	1008.9	1013.0	0.0	334.4	1035.0	87.4	93.6	97.8
11/11/2019	11.6	19.4	29.8	26.0	68.2	95.0	0.0	6.0	0.0	2.0	11.2	11.6	28.2	1007.6	1010.9	1013.6	0.0	320.3	1017.0	83.9	93.8	100.0
12/11/2019	16.3	25.0	34.6	9.0	38.0	84.0	0.0	8.1	0.0	3.2	13.9	16.3	32.1	997.0	1002.9	1008.5	0.0	263.6	965.0	86.4	93.5	99.1
13/11/2019																						
14/11/2019																						
15/11/2019																						
16/11/2019																						
17/11/2019																						
18/11/2019																						
19/11/2019																						
20/11/2019	15.9	19.5	25.0	54.0	73.6	90.0	0.0	3.9	0.0	2.0	8.5	16.0	24.9	1010.8	1013.1	1015.5	0.0	203.5	1086.0	93.1	98.0	100.0
21/11/2019	14.8	23.0	31.7	48.0	73.4	95.0	0.0	6.2	0.0	2.4	10.7	14.9	34.3	1005.2	1009.7	1015.2	0.0	310.1	973.0	82.3	95.1	100.0
22/11/2019	17.6	22.0	30.6	39.0	74.8	95.0	2.2	3.4	0.0	2.6	11.6	16.5	31.2	1004.3	1008.5	1012.5	0.0	149.2	759.0	85.5	95.2	100.0
23/11/2019	17.3	19.0	24.1	72.0	89.7	97.0	0.2	1.6	0.0	1.1	11.2	16.4	24.8	1008.2	1011.5	1014.6	0.0	92.0	703.0	86.4	93.8	98.4
24/11/2019	16.6	19.0	23.4	64.0	81.6	92.0	0.0	2.3	0.0	1.6	6.7	16.6	23.7	1011.0	1013.8	1016.6	0.0	117.8	654.0	88.0	93.6	99.7
25/11/2019	17.2	23.0	34.2	31.0	71.9	94.0	0.2	4.5	0.0	2.2	13.9	17.2	34.8	1003.3	1007.1	1012.5	0.0	219.2	1004.0	78.9	92.0	100.0
26/11/2019	17.2	23.9	34.2	25.0	54.1	86.0	6.2	6.6	0.0	3.9	18.8	17.2	33.5	996.0	1001.4	1008.7	0.0	222.7	1054.0	75.4	90.2	100.0
27/11/2019	11.3	17.9	25.0	27.0	52.1	83.0	0.0	6.6	0.0	2.2	9.4	11.3	24.3	1008.8	1011.4	1013.7	0.0	345.0	1047.0	73.8	91.0	99.7
28/11/2019	11.7	19.8	29.1	35.0	73.1	95.0	0.0	6.3	0.0	2.8	13.4	11.7	28.7	1009.8	1012.2	1014.2	0.0	322.7	1019.0	72.9	91.5	100.0
29/11/2019	18.6	23.5	33.4	33.0	72.0	88.0	0.0	5.0	0.0	2.0	9.8	18.6	34.6	1004.9	1008.8	1012.4	0.0	239.9	1008.0	74.4	91.5	98.4
30/11/2019	17.5	21.3	26.1	35.0	70.3	89.0	0.0	2.7	0.0	1.9	8.9	17.3	25.2	1001.8	1004.0	1006.1	0.0	111.9	702.0	93.7	96.4	100.0
Monthly	10.1	20.9	34.6	9	64	97	21.2	126.1	0	2.5	18.8	9.7	34.8	994.6	1008.3	1016.6	0	249.5	1179	72.9	93.5	100

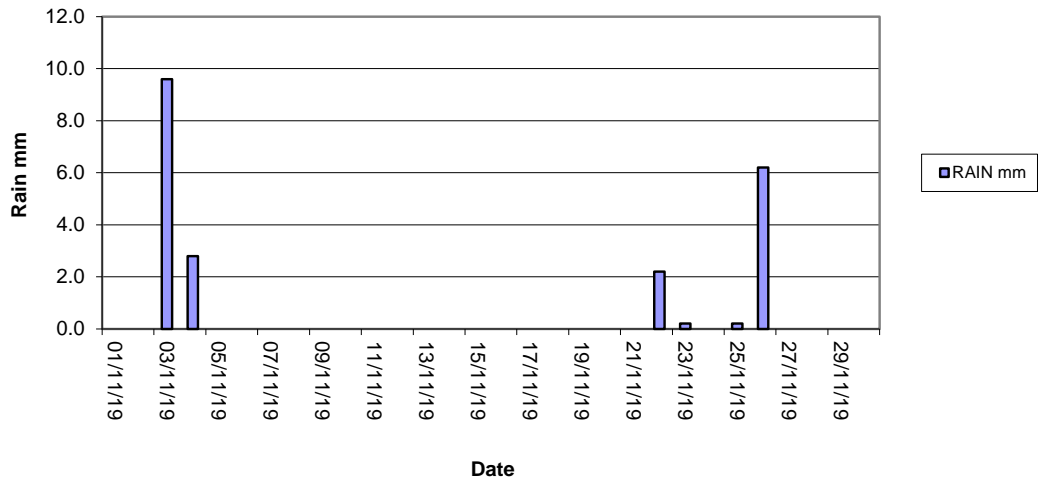
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2.4.2 Monthly Weather Charts

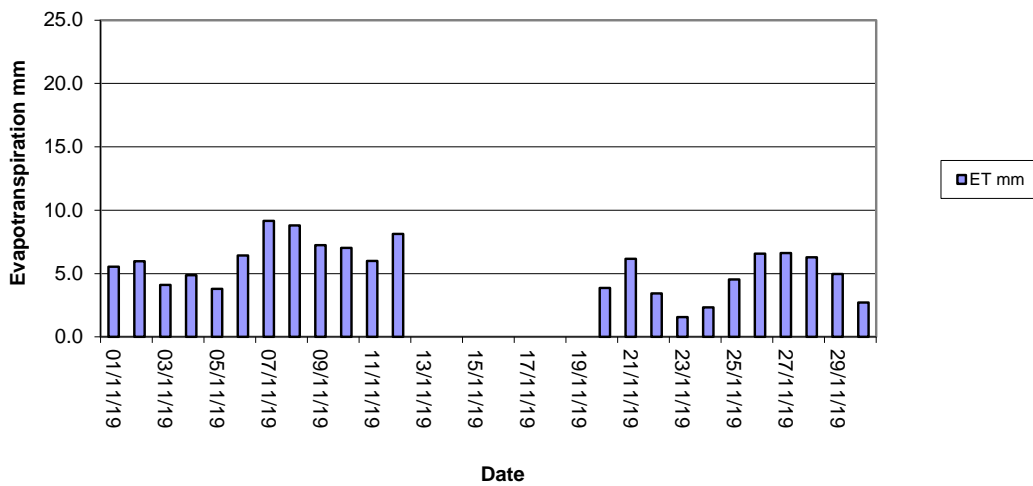




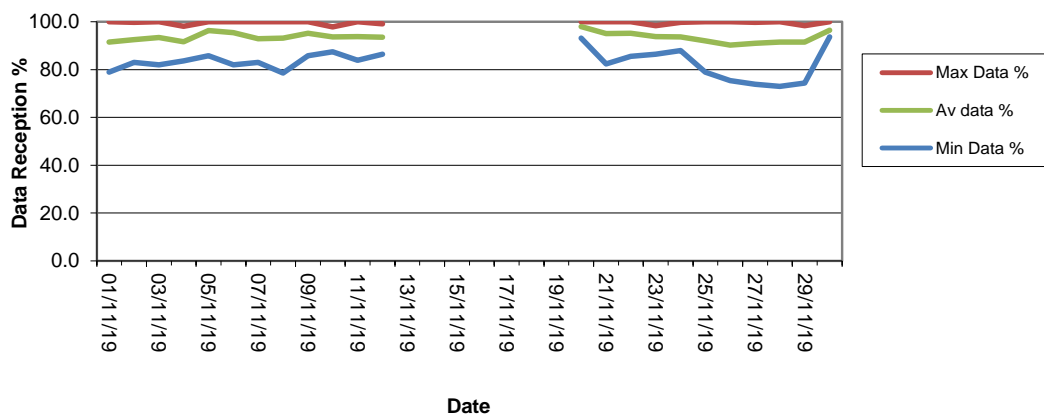
Hanson Calga Quarry - November 2019
Rainfall



Hanson Calga Quarry - November 2019
Evapotranspiration



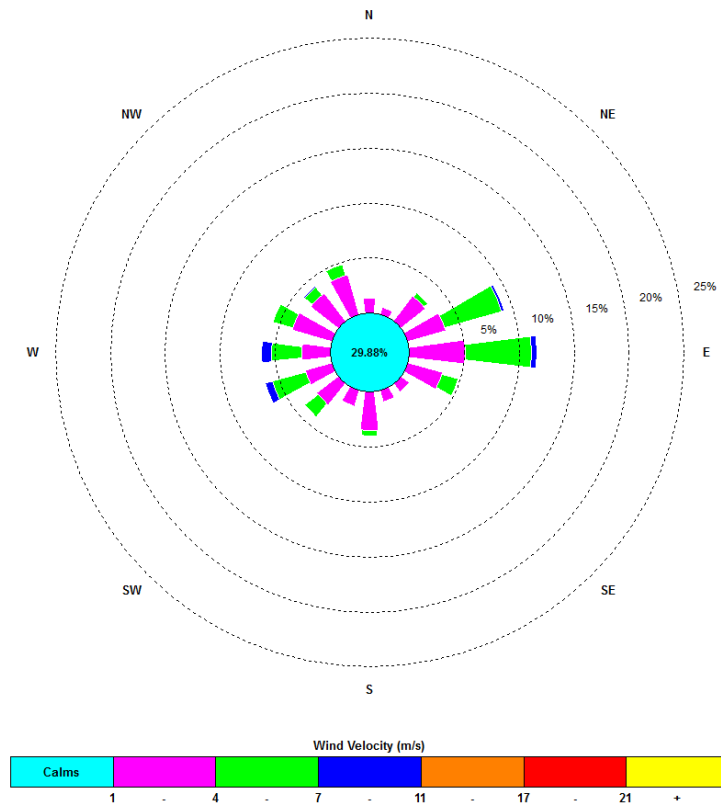
Hanson Calga Quarry - November 2019
Data Reception



2.4.3 Monthly Windrose Plot

Frequency plot of the average wind speed and average direction over each 15-minute sampling period. Wind is considered to be calm when at less than a 15-minute average of 1m/s.

0:00, 1 November 2019 – 23: 45, 30 November 2019



The predominant winds were from the E, with most frequent, strongest winds from the W and E. The maximum wind speed was 18.8 m/s from the W.

Appendix 1

Field Sheets

Chain of Custody

Laboratory Certificates

DEPOSITIONAL DUST MONITORING

Client: **Hanson Calga Quarry**

Date Installed: 1-11-19
Date Collected: 3-12-19

Sampled By: Leesa & Alex

[illegible]

Turbidity: C=Clear, S= Slight, T=Turbid (CIRCLE)

Colour: C=Colourless, O=Orange, Bn=Brown, Gn=Green, Gy = Grey (CIRCLE)

Report broken funnels and replacement diameters

Signed: SLG

[illegible]**AUSTRALIAN LABORATORY SERVICES P/L**

CERTIFICATE OF ANALYSIS

Work Order : **EN1908588**
Client : **CBASED ENVIRONMENTAL PTY LTD**
Contact : All Deliverables
Address : Unit 3 2 Enterprise Cres
 Singleton NSW 2330
Telephone : +61 02 6571 3334
Project : Hanson Calga Dusts
Order number : ----
C-O-C number : ----
Sampler : Alex, Leesa
Site :
Quote number : SYBQ/403/18 - COMPASS
No. of samples received : 6
No. of samples analysed : 6

Page : 1 of 4
Laboratory : Environmental Division Newcastle
Contact :
Address : 5/585 Maitland Road Mayfield West NSW Australia 2304

Telephone : +61 2 4014 2500
Date Samples Received : 04-Dec-2019 12:34
Date Analysis Commenced : 06-Dec-2019
Issue Date : 13-Dec-2019 12:23



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alison Graham	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW



General Comments

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in g/m².mth as sampling data was provided by the client.



Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST**
 (Matrix: **AIR**)

Client sample ID

				CD1 01/11/19 - 03/12/19	CD2c 01/11/19 - 03/12/19	CD3 01/11/19 - 03/12/19	CD4 01/11/19 - 03/12/19	CD5 01/11/19 - 03/12/19
Client sampling date / time				03-Dec-2019 00:00	03-Dec-2019 00:00	03-Dec-2019 00:00	03-Dec-2019 00:00	03-Dec-2019 00:00
Compound	CAS Number	LOR	Unit	EN1908588-001	EN1908588-002	EN1908588-003	EN1908588-004	EN1908588-005
				Result	Result	Result	Result	Result
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	4.4	3.7	2.2	1.7	2.5
Ash Content (mg)	----	1	mg	83	70	41	32	48
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.9	1.2	0.8	1.0	0.7
Combustible Matter (mg)	----	1	mg	16	23	15	18	13
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	5.3	4.9	3.0	2.7	3.2
Total Insoluble Matter (mg)	----	1	mg	99	93	56	50	61



Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST**
 (Matrix: **AIR**)

Client sample ID

				CD6	----	----	----	----
				01/11/19 - 03/12/19				
Client sampling date / time				03-Dec-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EN1908588-006	-----	-----	-----	-----
Result					----	----	----	----
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	1.8	----	----	----	----
Ash Content (mg)	----	1	mg	33	----	----	----	----
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.4	----	----	----	----
Combustible Matter (mg)	----	1	mg	9	----	----	----	----
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	2.2	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	42	----	----	----	----



Date: 3.12.19

Client :
Project :

Hanson Calga

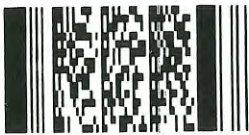
SURFACE WATERS

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	DAM	N	9-25	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
B			9-35	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	DRY
C1	DAM	NO	11-20	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
C2	TRICKLE	NO	11-25	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
D			2-25	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	DRY
F	DAM	NO	9-15	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	

Turbidity: C=Clear, S= Slight, T=Turbid (CIRCLE)

Colour: C=Clear, LO=Light Orange, O=Orange, B=Brown, G=Green (CIRCLE)

Signed: ShySampled by: Leesa + Alex

CHAIN OF CUSTODY DOCUMENTATION										Australian Laboratory Services Pty Ltd											
CLIENT: CBased Environmental Pty Ltd					LABORATORY BATCH NO.:					<div style="text-align: right; font-weight: bold;">leosa & Alex</div>											
POSTAL ADDRESS: PO Box 245 CESSNOCK NSW 2325					SAMPLERS: CBased Environmental Pty Ltd																
SEND REPORT TO: monitoringresults@cbased.com.au			SEND INVOICE TO: renae.mikka@cbased.com.au; accounts@cbased.com.au			PHONE: 0265713334			E-MAIL: monitoringresults@cbased.com.au												
DATA NEEDED BY: 5 working days			REPORT NEEDED BY: 5 working days			REPORT FORMAT: HARD: Yes			FAX: DISK: BULLETIN BOARD: E-MAIL: Yes												
PROJECT ID: Hanson Quarry SW			QUOTE NO.: SYBQ-403-18			QC LEVEL: QCS1:			QCS2: QCS3: Yes QCS4:												
P.O. NO.:			COMMENTS/SPECIAL HANDLING/STORAGE OR DIPOSAL:			ANALYSIS REQUIRED															
FOR LAB USE ONLY COOLER SEAL 3.9⁰¹ Yes No Total unless specified Broken Intact COOLER TEMP: deg.C																					
SAMPLE DATA			CONTAINER DATA																		
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH	EC	TSS	TDS	O + G											
A	Water	3.12.19	9.25	1x 250mlGP, 1x 500mlGP, 1xPG		x	x	x	x	x											
B	Water			1x 250mlGP, 1x 500mlGP, 1xPG		x	x	x	x	x											
C1	Water	3.12.19	11.20	1x 250mlGP, 1x 500mlGP, 1xPG		x	x	x	x	x											
C2	Water	3.12.19	11.25	1x 250mlGP, 1x 500mlGP, 1xPG		x	x	x	x	x											
D	Water			1x 250mlGP, 1x 500mlGP, 1xPG		x	x	x	x	x											
F	Water	3.12.19	9.15	1x 250mlGP, 1x 500mlGP, 1xPG		x	x	x	x	x											
												<div style="text-align: center;"> Environmental Division Sydney Work Order Reference ES1940074  Telephone : + 61-2-8784 8555 </div>									
TOTAL BOTTLES:																					
RELINQUISHED BY: <i>U Peterson</i>					DATE: <i>4.12.19</i>					RECEIVED BY: <i>MM</i>					DATE: <i>04/12/19 12.34pm</i>					METHOD OF SHIPMENT	
OF: CBased Environmental					TIME: <i>10.35</i>					OF:					TIME:					CONSIGNMENT NOTE NO.	
NAME:					DATE:					NAME:					DATE:					TRANSPORT CO. NAME.	
OF:					TIME:					OF:					TIME:						
*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.																					

AUSTRALIAN LABORATORY SERVICES P/L

CERTIFICATE OF ANALYSIS

Work Order : **ES1940074**
Client : **CBASED ENVIRONMENTAL PTY LTD**
Contact : All Deliverables
Address : Unit 3 2 Enterprise Cres
Singleton NSW 2330
Telephone : +61 02 6571 3334
Project : HANSON QUARRY SW
Order number : ----
C-O-C number : ----
Sampler : CARBON BASED ENVIRONMENTAL PTY LTD, LEESA + ALEX
Site :
Quote number : SYBQ/222/16 and PLANNED EVENTS
No. of samples received : 4
No. of samples analysed : 4

Page : 1 of 2
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 04-Dec-2019 12:35
Date Analysis Commenced : 04-Dec-2019
Issue Date : 11-Dec-2019 10:48



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Gregory Towers	Technical Officer	Chemistry, Newcastle West, NSW



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- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.

Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				A	C1	C2	F	----
Client sampling date / time				03-Dec-2019 09:25	03-Dec-2019 11:20	03-Dec-2019 11:25	03-Dec-2019 09:15	----
Compound	CAS Number	LOR	Unit	ES1940074-001	ES1940074-002	ES1940074-003	ES1940074-004	-----
				Result	Result	Result	Result	----
EA005: pH								
pH Value	----	0.01	pH Unit	6.24	6.68	6.14	5.96	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	102	114	100	94	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	92	82	75	83	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	7	<5	<5	11	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	5	<5	<5	<5	----



Date: 3.12.19

Client :
Project :Hanson Calga
Bi-Monthly Bores

GROUNDWATERS

Site	Time	DEPTH	Typical Depth (m)	Odour	Water Turbidity	Water Colour	1		2		Downloaded Logger? (Y/N)*	Comments
							pH	EC	pH	EC		
CQ3	9.05	10.91	10.74	NO	CST	CLO OBG	6.87	136.5us	6.18	128.4us	yes	
CQ4	10.45	11.20	11.19	NO	CST	CLO OBG	5.64	119.8us	5.75	119.8us	yes	
CQ5	2.45	7.29	8.04	NO	CST	CLO OBG	4.33	178.9us	4.29	178.1us		
CQ7	2.55	6.68	6.61	NO	CST	CLO OBG	4.35	98.8us	4.28	99.6us	yes	
CQ8	3.20	6.47	6.93	NO	CST	CLO OBG	4.56	119.9us	4.44	118.6us	yes	
CQ10	10.10	25.28	25.86	NO	CST	CLO OBG	4.26	128.4us	4.74	125.6us	yes	
CQ11S	10.20	11.85	12.1	NO	CST	CLO OBG	5.32	138.4us	5.34	136.1us	yes	
CQ11D	10.30	12.87	12.98	NO	CST	CLO OBG	4.91	145.1us	4.95	136.8us	yes	
CQ12	3.30	4.50	5.46	NO	CST	CLO OBG	4.84	114.2us	4.73	116.7us	yes	
CQ13	10.55	14.16	14.42	NO	CST	CLO OBG	4.55	138.1us	4.51	139.3us	yes	
CP4	11.00	11.11	10.56		CST	CLO OBG	1					BLOCKED -
CP5	11.05	7.80	7.95	NO	CST	CLO OBG	5.29	115.8us	5.28	113.6us		
CP6	11.45	10.38	10.73	NO	CST	CLO OBG	4.54	131.5us	4.38	130.1us		
CP7	11.15	3.13	3.47	NO	CST	CLO OBG	5.19	82.5us	5.20	84.1us		
CP8	12.00	21.98	22.36	NO	CST	CLO OBG	4.50	109.5us	4.43	108.2us		
CP13	12.15	12.16	13.4	NO	CST	CLO OBG	4.20	154.3us	4.15	152.7us		
CP15	11.35	3.10	3.01	NO	CST	CLO OBG	4.40	127.2us	4.37	123.1us		
MW7	12.40	15.23	15.3	NO	CST	CLO OBG	6.43	48.0us	5.40	47.7us	yes	
MW8	12.30	7.36	7.66	NO	CST	CLO OBG	5.04	63.3us	5.03	60.9us	yes	
MW9	10.00	23.85	24.09	NO	CST	CLO OBG	4.50	89.0us	4.54	85.5us	yes	
MW10	2.00	12.17	11.44	NO	CST	CLO OBG	4.34	100.8us	4.28	101.4us	yes	
MW13	2.25	8.04	7.71	NO	CST	CLO OBG	4.62	97.5us	4.53	97.1us		
MW16	2.10	8.10	8.29	NO	CST	CLO OBG	4.49	96.8us	4.44	98.2us		
MW17	12.55	10.62	9.93	NO	CST	CLO OBG	4.77	108.4us	4.77	106.5us		

Turbidity: C=Clear, S=Slight, T=Turbid (CIRCLE)

pH/EC meter #: V374P

Signed: [Signature]

Colour: C=Clear, LO=Light Orange, O=Orange, B=Brown, G=Green (CIRCLE)

Sampled by: Ceesa & Alex

*If unable to download logger please provide comment/
explanation above