Carbon Based Environmental
Pty Limited
ABN 74 102 920 285

Rocla Quarry Products
Calga Quarry

Environmental Monitoring

Dust Deposition Gauges, Surface and Ground Waters and Meteorological Station

October 2014

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Executive Summary4

Carbon Based Environmental is contracted by Rocla 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 Carbon Based Environmental and includes the following;

- Dust Deposition results for October 2014;
- Surface Water quality results for October 2014;
- Groundwater depth and quality results for October 2014; and
- Meteorological report for October 2014.

The October 2014 dust deposition results for insoluble solids were generally low and free of major contamination this month. All sites, on a rolling annual average basis, are currently below the Air Quality Management Plan exceedance level of 3.7g/m^2.month. Results were found to be representative of dust levels as determined by the Australian Standard.

Surface water samples were collected on 3 November 2014 at sites A and F. Site B and Site D were dry and Site C was inaccessible and was unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the slightly acidic to neutral range, low Electrical Conductivity, low Total Dissolved Solids and low Total Suspended Solids. Oil and Grease was not detected at any site in October 2014.

Groundwaters were sampled for normal monthly monitoring on 3 November 2014. Groundwater depth generally increased across the sampled groundwater bores when compared to last month. Groundwater pH increased slightly and EC remained steady across all bores this month.

Data for October 2014 shows that rainfall recorded at the Rocla Calga Quarry was lower than the Gosford BOM and the Peats Ridge long term mean rainfall for September. The rainfall comparison is provided below:

Rocla Calga Quarry	57.3 mm
BOM Peats Ridge*	NA
BOM Gosford*	88.2 mm
BOM Peats Ridge Long term mean for October*	90.6 mm

NA = Not Available

*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au). No data was available from the BOM Peats Ridge station for October 2014

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

Sampling Program

Rocla Calga Quarry conducts environmental monitoring in accordance to Development Consent, OEH (EPA) licence and Environmental Management Plans. Carbon Based Environmental are contracted to undertake dust deposition gauge, surface and groundwater and meteorological monitoring for the project. Carbon Based 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 10.1 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/m^2.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 at least bi-monthly for water quality and at least quarterly for water level. 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. Wind parameters are measured according to Australian Standard AS 2923 "Ambient Air— Guide for Measurement of Horizontal Wind for Air Quality Applications".

The weather stations have the following sensor configuration;
Air temperature

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

Carbon Based 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**.

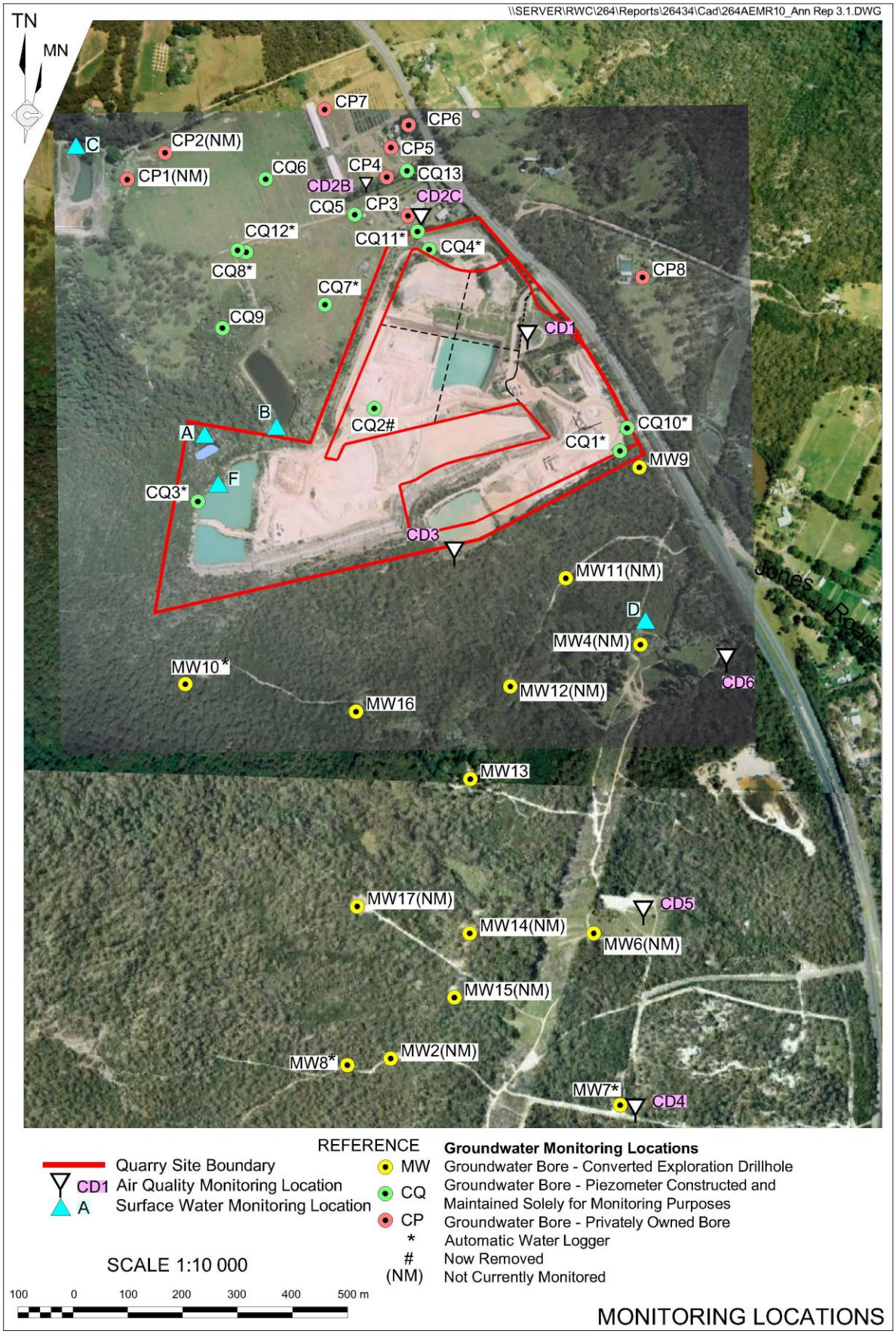


Figure 1: Rocla Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for October 2014 and the project 12 month rolling average. Results are in g/m^2.month.

Table 1: Dust Deposition results: 2 October 2014 – 3 November 2014 (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	1.2	0.8	0.4	67	1.1
CD2c	1.1	0.8	0.3	73	1.0
CD3	2.0	1.8	0.2	90	1.4
CD4	0.7	0.3	0.4	43	0.6
CD5	0.3	0.3	<0.1	100	0.4
CD6	0.6	0.4	0.2	67	0.8

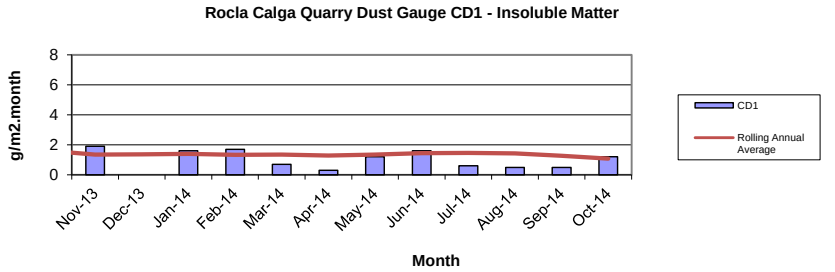
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m^2.month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from November 2013 to October 2014.

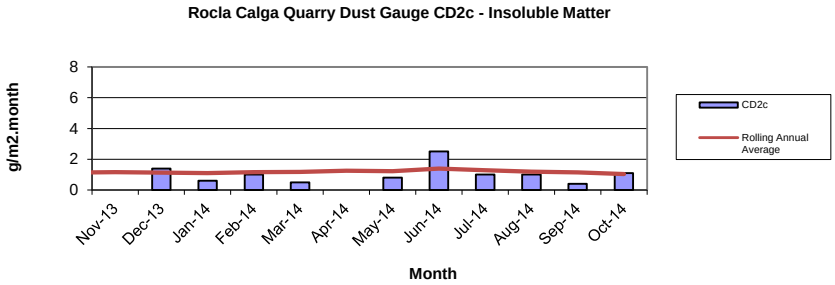
NA= Not Available.

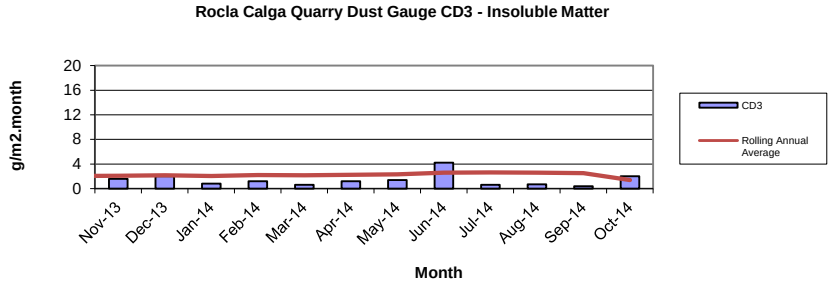
CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air 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.

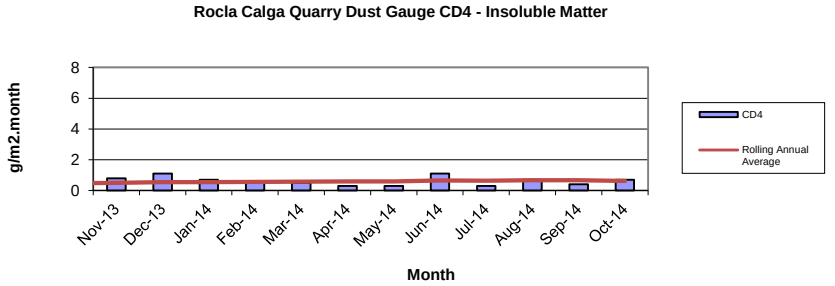
Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The laboratory analysis is provided in **Appendix 1.**

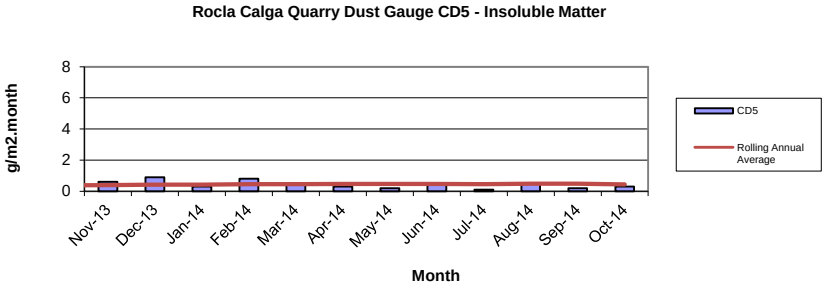
Figure 2: Dust Deposition Charts

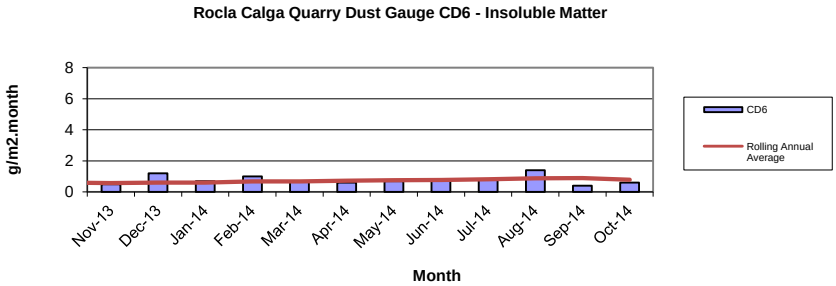












2.2 Surface Water Monitoring

Monthly surface water monitoring was conducted on the 3 November 2014 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1.**

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

Site	Observed Flow Rate	Water Colour	Turbidity	pH	EC (µS/cm)	TDS (mg/L)	TSS (mg/L)	Oil and Grease (mg/L)
A	Dam	Clear	Clear	5.95	79	32	<5	<5
B	Dry							
C	No access							
D	Dry							
F	Dam	Clear	Clear	5.65	91	43	5	<5

Samples were collected at sites A and F. Site B and Site D were dry and Site C was inaccessible and was unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the slightly acidic to neutral range, low Electrical Conductivity, low Total Dissolved Solids and low Total Suspended Solids. Oil and Grease was not detected at any site in October 2014.

2.3 Groundwater Monitoring

Groundwaters were sampled on 3 November 2014. Water quality tests for pH and electrical conductivity were conducted by Carbon Based Environmental Pty Limited. For water quality purposes, water was purged from the bore until constant pH (+/- 0.1 pH units) and Electrical Conductivity (+/- 5%) was obtained between samples. Data is displayed in **Table 3** and **Figures 3 to 6.**

Groundwater depth generally increased compared to last month, indicating water generally moving away from the surface. The exceptions were CQ11D, CQ13, CP5 and CP6 which showed a slight decrease in depth.

pH at all sites is in the acidic to neutral range. pH levels decreased slightly across a majority of sampled sites. EC levels decreased when compared to the results obtained in September 2014.

Table 3: Groundwater Quality Data

Reference	Bore	Type	Depth to water TOC (m) April 06	Depth to water TOC (m) This report	pH This report	Electrical Conductivity (µS/cm) This report
CQ1	Voutos	* Monitor	20.59	Removed		
CQ3	Voutos	* Monitor	10.53	10.54	7.58	98
CQ4	Voutos	* Monitor	8.78	10.98	4.15	85
CQ5	Gazzana	DIP Only	8.69	7.32	3.83	128
CQ6	Gazzana	DIP Only	16.00	10.82	3.87	138
CQ7	Gazzana	* Monitor	6.89	6.44	3.99	75
CQ8	Gazzana	* Monitor	11.03	5.90	3.96	101
CQ9	Gazzana	DIP Only	10.10	9.04	3.98	81
CQ10	Voutos	* Monitor	NI	24.52	3.78	134
CQ11S	Gazzana	* Monitor	NI	11.39	4.23	110
CQ11D	Gazzana	* Monitor	NI	12.34	4.21	118
CQ12	Gazzana	* Monitor	NI	4.17	3.95	100
CQ13	Kashouli	* Monitor	NI	14.87	3.83	166
CP3	Gazzana	Domestic	10.40	11.00	4.33	105
CP4	Kashouli	Domestic	13.63	11.18	NM	NM
CP5	Kashouli	Domestic	16.61	9.24	3.99	158
CP6	Kashouli	Domestic	16.27	10.40	3.97	147
CP7	Kashouli	Production	8.56	3.66	4.24	73
CP8	Rozmanec	Domestic	22.17	20.62	3.88	105
MW7	Rocla Bore	* Monitor	15.76	15.74	4.49	83
MW8	Rocla Bore	* Monitor	9.82	7.55	4.14	58
MW9	Rocla Bore	* Monitor	22.44	23.12	3.96	63
MW10	Rocla Bore	* Monitor	15.41	11.70	3.71	92
MW13	Rocla Bore	DIP Only	NI	7.91	4.06	76
MW16	Rocla Bore	DIP Only	NI	8.52	3.86	83
MW17	Rocla Bore	DIP Only		10.32	4.81	85

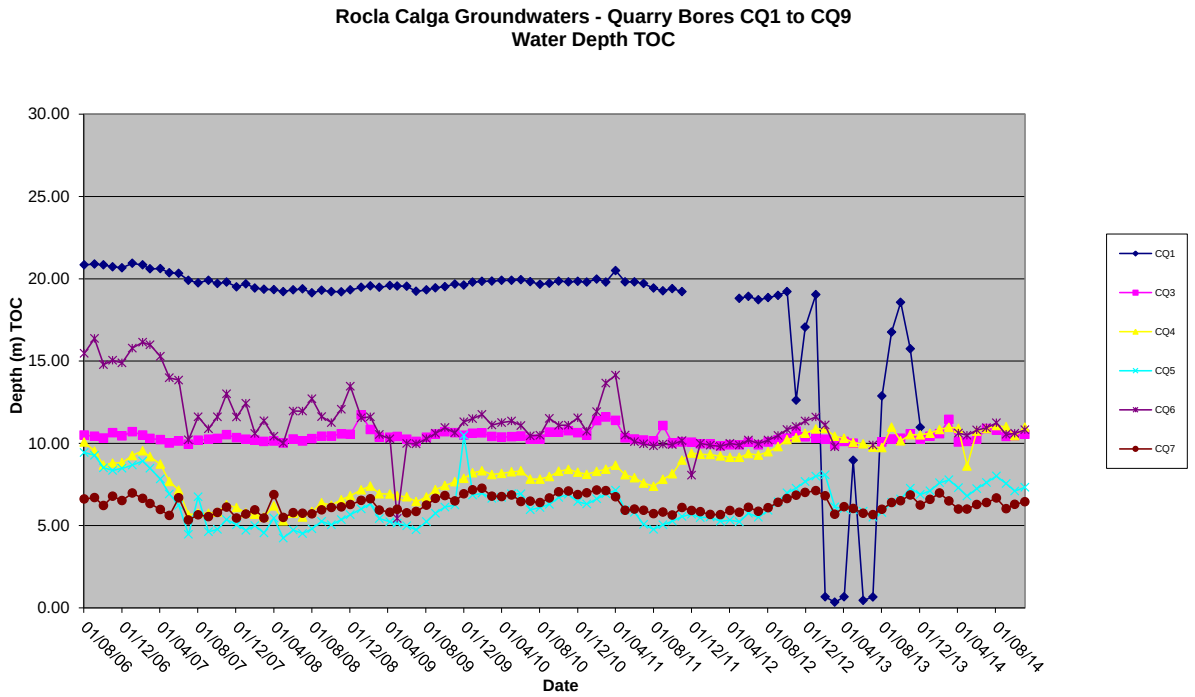
Notes:
TOC = Water level measured from top of bore case to water.
NM = Not Monitored – unable to sample water due to non-operational pump.
NR = Not Required by resident.
* = Logger Installed.
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements taken by Carbon Based Environmental Pty Limited.

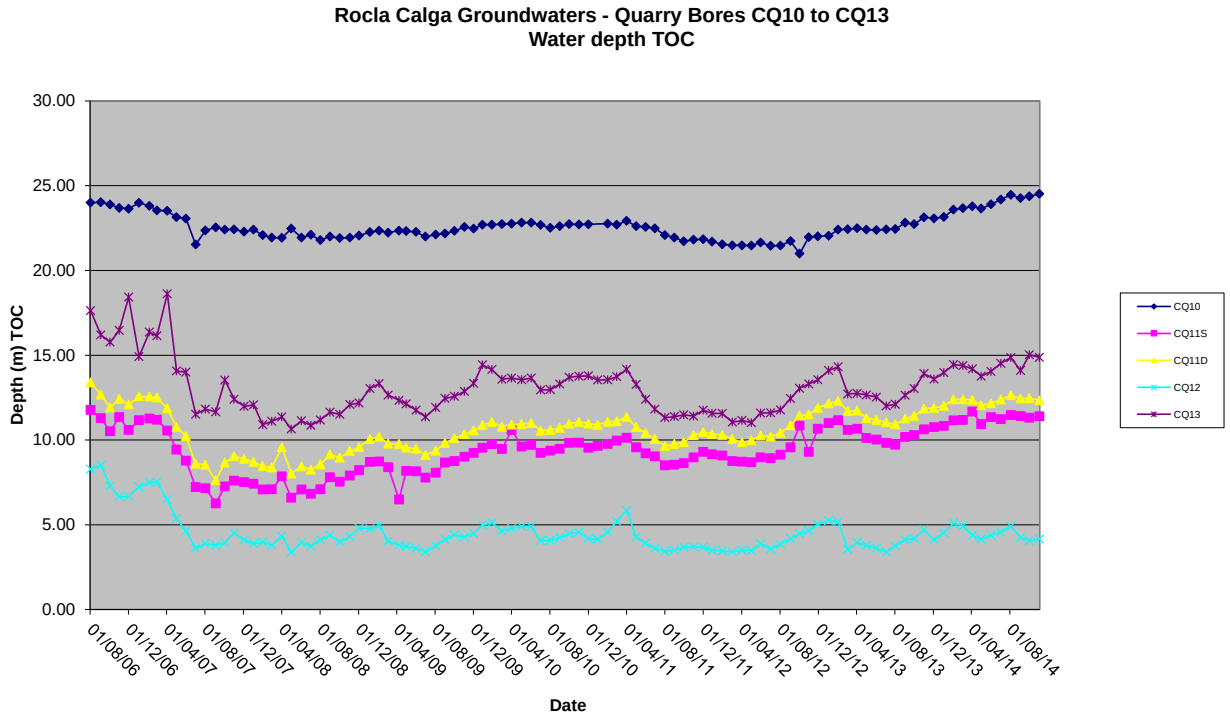
Shading is used to indicate the following trends in water depth (compared to the last reading):

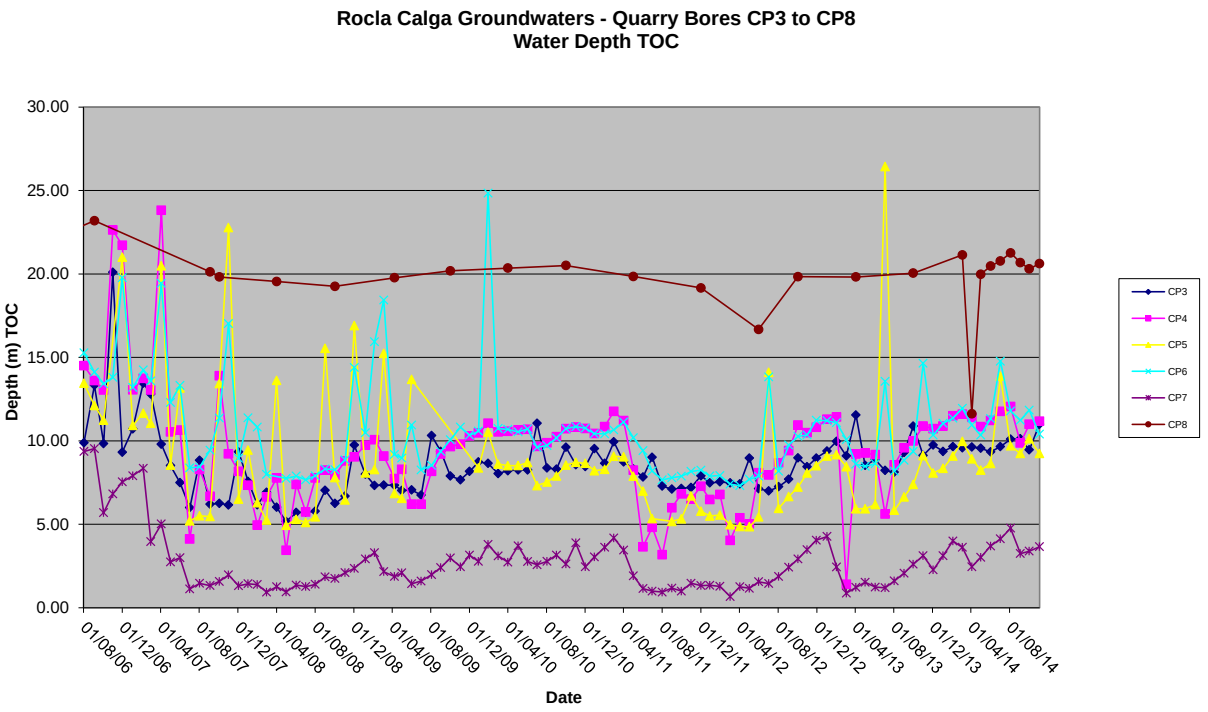
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

Available groundwater loggers were downloaded and will be forwarded to the Rocla Calga Quarry groundwater consultant.

Figures 3 to 6: Groundwater Depth Charts.






Rocla Calga Groundwaters - Quarry Bores CP3 to CP8
Water Depth TOC
Depth (m) TOC
30.00
25.00
20.00
15.00
10.00
5.00
0.00
01/08/06
01/12/06
01/04/07
01/08/07
01/12/07
01/04/08
01/08/08
01/12/08
01/04/09
01/08/09
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01/12/11
01/04/12
01/08/12
01/12/12
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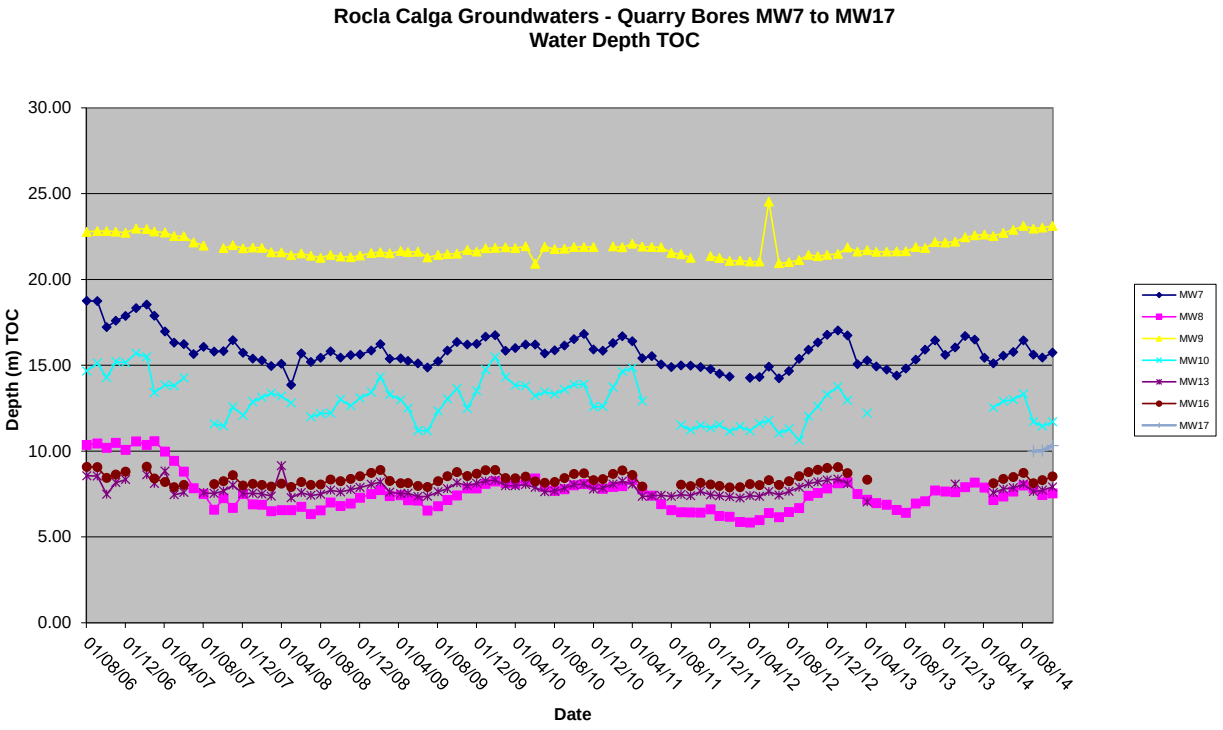
01/04/14
01/08/14
Date
CP3
CP4
CP5
CP6
CP7
CP8


Rocla Calga Groundwaters - Quarry Bores MW7 to MW17
Water Depth TOC
Depth (m) TOC
30.00
25.00
20.00
15.00
10.00
5.00
0.00
01/08/06
01/12/06
01/04/07
01/08/07
01/12/07
01/04/08
01/08/08
01/12/08
01/04/09
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01/12/13
01/04/14
01/08/14
Date
MW7
MW8
MW9
MW10
MW13
MW16
MW17

2.4 Meteorological Monitoring

The Rocla Calga Quarry weather station data recovery in October 2014 was approximately 100%.

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).

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 October 2014 shows that rainfall recorded at the Rocla Calga Quarry was lower than the Gosford BOM and the Peats Ridge long term mean rainfall for October.

The rainfall comparison is provided below:

Rocla Calga Quarry	57.3 mm
BOM Peats Ridge*	NA
BOM Gosford*	88.2 mm
BOM Peats Ridge Long term mean for October*	90.6 mm

NA = Not Available
*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au).

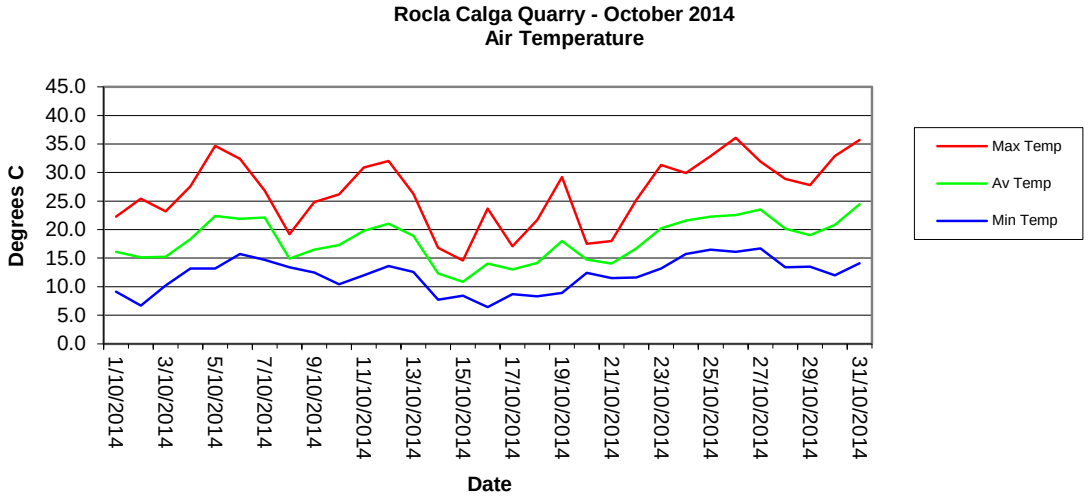
Results are displayed in the following table and figures.

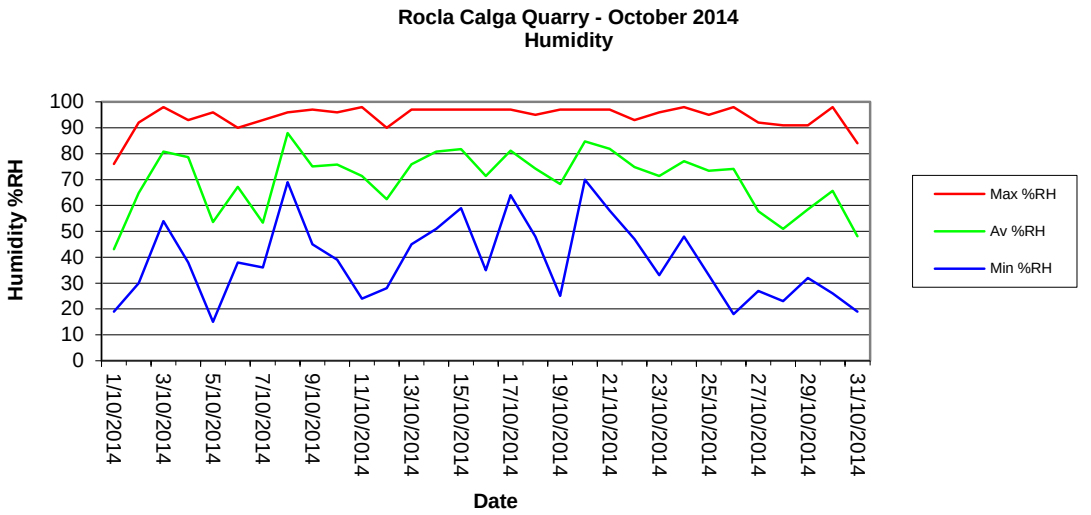
2.4.1 Monthly Meteorological Data Summary

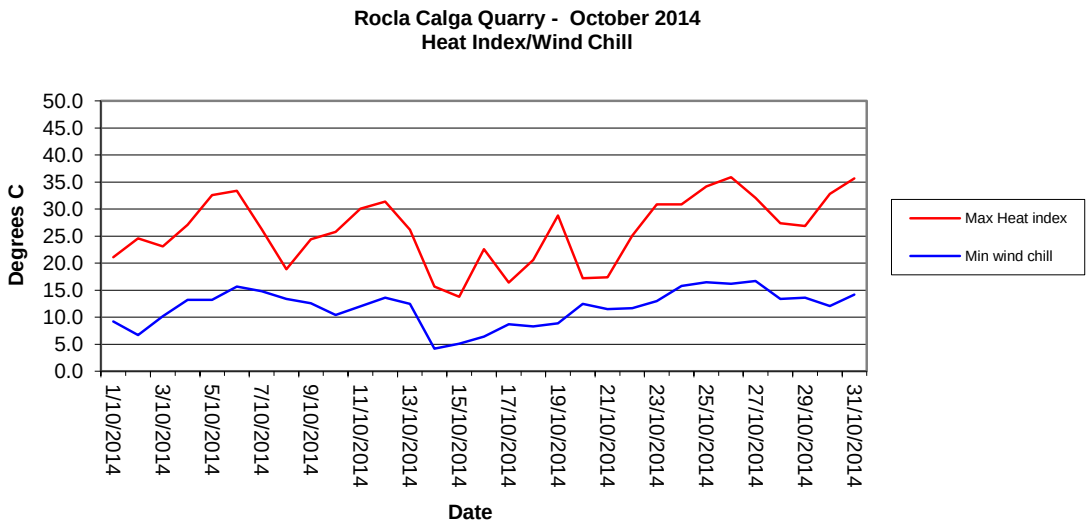
Summary **Oct-14** **Rocla - Calga**

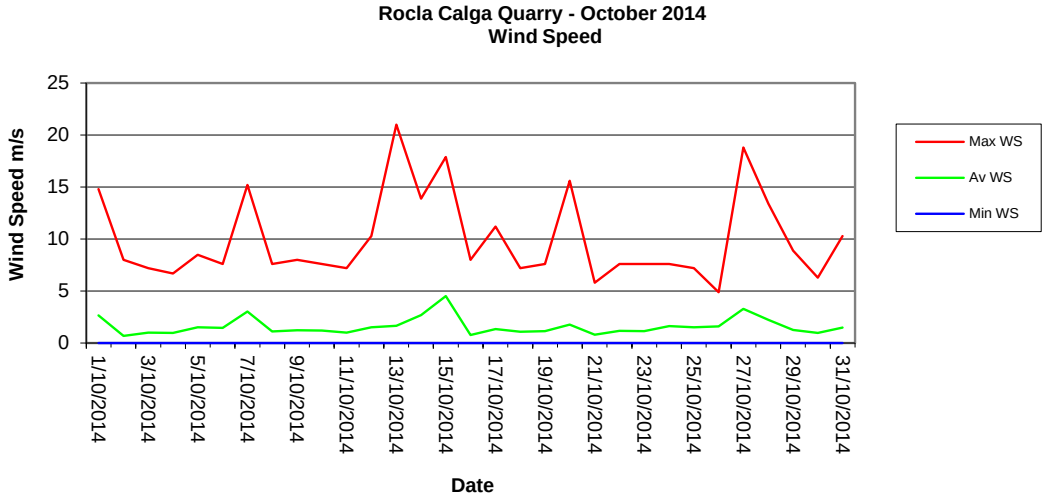
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/10/2014	9.1	16.1	22.3	19	43	76	0.0	5.0	0	2.7	14.8	9.2	21.1	1006.0	1015.7	1022.3	0	187.5	900	97.1	99.4	100
2/10/2014	6.7	15.1	25.4	30	65	92	0.0	3.2	0	0.7	8	6.7	24.6	1015.5	1019.0	1022.0	0	180.4	858	92	99.8	100
3/10/2014	10.2	15.2	23.2	54	81	98	0.0	2.5	0	1.0	7.2	10.2	23.1	1017.2	1018.8	1020.5	0	154.3	890	93.6	98.2	100
4/10/2014	13.2	18.3	27.6	38	79	93	0.0	2.7	0	1.0	6.7	13.2	27.1	1013.3	1016.7	1019.6	0	155.5	994	97.1	97.8	98
5/10/2014	13.2	22.4	34.7	15	54	96	0.0	4.3	0	1.5	8.5	13.2	32.6	1011.1	1014.2	1017.5	0	191.6	908	90.9	97.7	98
6/10/2014	15.7	21.9	32.4	38	67	90	0.0	3.7	0	1.5	7.6	15.7	33.4	1006.2	1012.8	1018.0	0	178.4	886	91.8	97.7	98
7/10/2014	14.7	22.1	26.8	36	53	93	0.0	4.8	0	3.0	15.2	14.8	26.3	1002.5	1007.8	1014.5	0	159.2	914	95.9	97.5	98
8/10/2014	13.4	14.9	19.2	69	88	96	0.5	1.4	0	1.1	7.6	13.4	18.9	1014.0	1017.4	1021.0	0	86.7	660	93.9	97.1	98
9/10/2014	12.5	16.5	24.8	45	75	97	0.0	3.1	0	1.2	8	12.6	24.4	1017.6	1020.0	1022.3	0	169.8	1093	88.9	97.5	100
10/10/2014	10.4	17.3	26.2	39	76	96	0.0	2.8	0	1.2	7.6	10.4	25.8	1012.8	1015.9	1018.9	0	152.7	696	90.6	97.6	98
11/10/2014	12.0	19.8	30.9	24	71	98	0.0	3.5	0	1.0	7.2	12.0	30.1	1012.1	1014.2	1015.8	0	182.7	940	90.9	97.6	98
12/10/2014	13.6	21.0	32.0	28	62	90	0.0	4.3	0	1.5	10.3	13.6	31.4	1008.5	1012.7	1016.1	0	185.4	884	90.4	97.7	98
13/10/2014	12.6	18.9	26.3	45	76	97	16.3	2.4	0	1.7	21	12.5	26.2	1001.9	1005.7	1008.3	0	107.1	481	91.8	97.1	98
14/10/2014	7.7	12.3	16.8	51	81	97	22.3	1.6	0	2.7	13.9	4.2	15.7	1006.3	1007.9	1010.1	0	79.4	413	93	98.1	100
15/10/2014	8.4	10.9	14.6	59	82	97	16.0	1.7	0	4.5	17.9	5.1	13.8	1006.9	1012.3	1016.8	0	95.8	432	83.3	93.6	100
16/10/2014	6.4	14.0	23.7	35	71	97	0.0	2.9	0	0.8	8	6.4	22.6	1014.1	1016.9	1019.9	0	175.7	1017	77.5	93.8	98
17/10/2014	8.7	13.0	17.1	64	81	97	0.0	1.9	0	1.3	11.2	8.7	16.4	1019.0	1023.6	1027.3	0	111.6	530	84.8	97.1	100
18/10/2014	8.3	14.2	21.7	48	74	95	0.0	3.2	0	1.1	7.2	8.3	20.6	1025.2	1027.2	1029.0	0	194.6	1002	92.6	99.6	100
19/10/2014	8.9	18.0	29.2	25	68	97	0.0	3.8	0	1.1	7.6	8.9	28.8	1020.3	1023.7	1027.1	0	209.2	950	94.8	99.2	100
20/10/2014	12.4	14.8	17.5	70	85	97	0.0	1.2	0	1.8	15.6	12.5	17.2	1019.9	1026.9	1031.0	0	60.0	340	96	99.9	100
21/10/2014	11.5	14.0	18.0	58	82	97	0.8	1.5	0	0.8	5.8	11.5	17.4	1028.7	1030.1	1031.8	0	91.9	384	89.8	99.5	100
22/10/2014	11.6	16.7	25.2	47	75	93	1.0	3.4	0	1.2	7.6	11.7	25.1	1018.0	1022.8	1028.6	0	197.5	970	93.8	99.8	100
23/10/2014	13.2	20.2	31.3	33	71	96	0.0	3.5	0	1.2	7.6	13.0	30.9	1014.0	1016.6	1018.8	0	176.9	939	95.1	99.9	100
24/10/2014	15.7	21.6	29.9	48	77	98	0.0	3.1	0	1.6	7.6	15.8	30.9	1010.5	1015.1	1019.6	0	155.1	855	94.2	99.9	100
25/10/2014	16.5	22.3	32.9	33	73	95	0.3	3.6	0	1.5	7.2	16.5	34.2	1010.3	1012.8	1016.1	0	186.6	889	100	100.0	100
26/10/2014	16.1	22.5	36.1	18	74	98	0.3	4.1	0	1.6	4.9	16.2	35.9	1005.4	1009.4	1012.7	0	213.5	950	100	100.0	100
27/10/2014	16.7	23.5	31.9	27	58	92	0.0	5.4	0	3.3	18.8	16.7	32.1	1001.0	1006.0	1012.5	0	140.9	628	98.2	100.0	100
28/10/2014	13.4	20.2	28.9	23	51	91	0.0	5.1	0	2.2	13.4	13.4	27.4	1007.1	1009.7	1012.3	0	194.0	909	100	100.0	100
29/10/2014	13.5	19.0	27.8	32	58	91	0.0	4.0	0	1.3	8.9	13.6	26.9	1012.1	1014.4	1016.3	0	197.6	989	92.9	99.9	100
30/10/2014	12.0	20.8	32.9	26	66	98	0.0	4.1	0	1.0	6.3	12.1	32.8	1009.9	1012.6	1015.1	0	206.8	992	93.8	99.8	100
31/10/2014	14.1	24.4	35.7	19	48	84	0.0	5.0	0	1.5	10.3	14.2	35.7	1004.3	1008.8	1012.0	0	204.3	953	100	100.0	100
Monthly	6.4	18.1	36.1	15	70	98	57.3	102.8	0	1.6	21	4.2	35.9	1001	1015.7	1031.8	0	160.7	1093	77.5	98.5	100

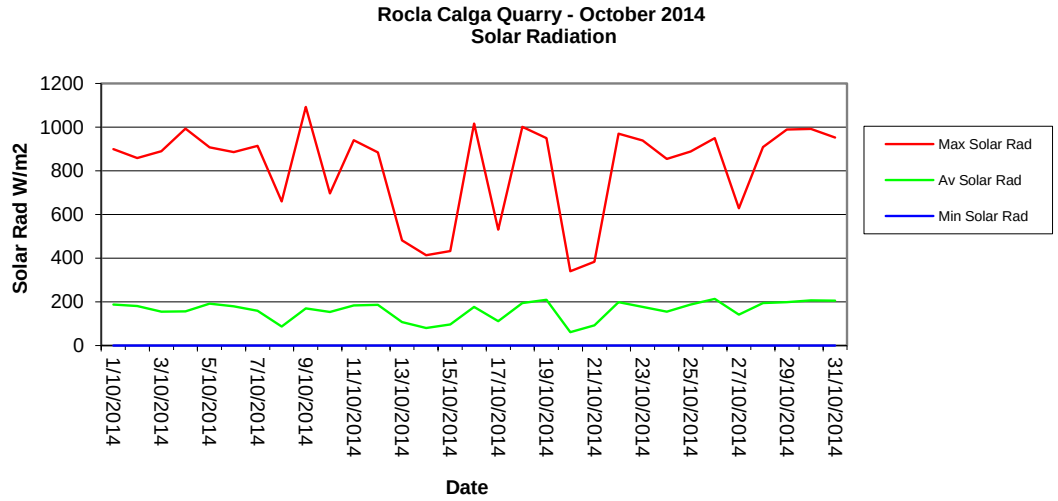
2.4.2 Monthly Weather Charts

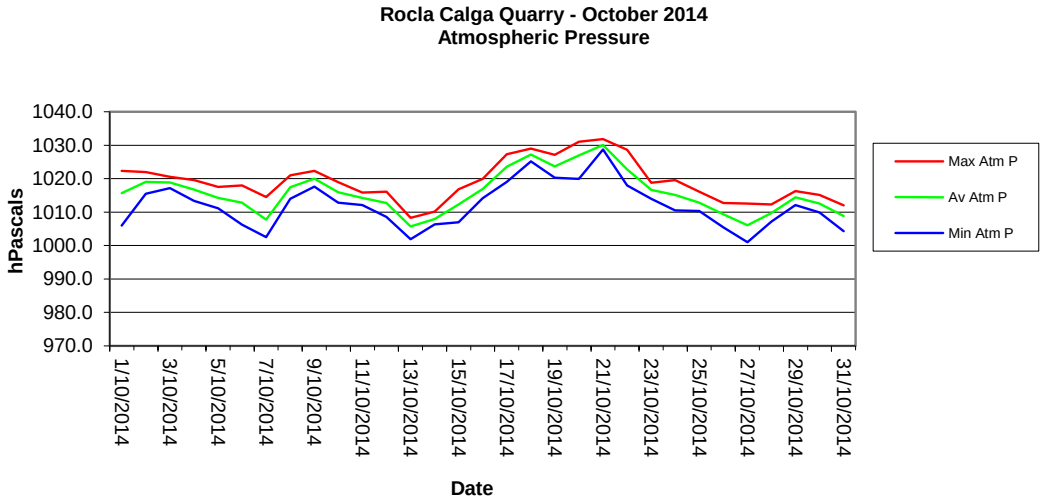


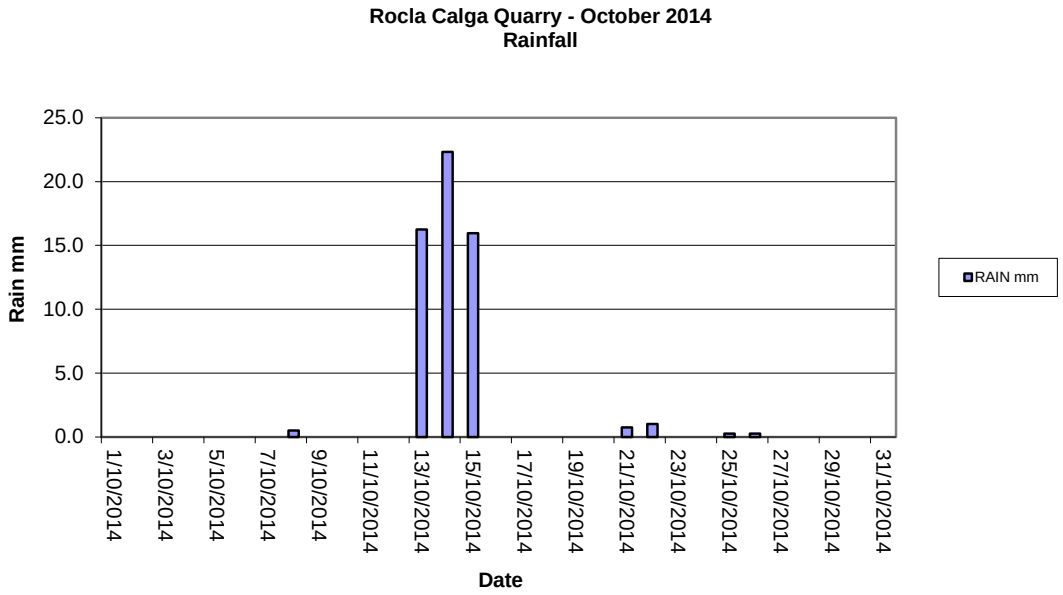


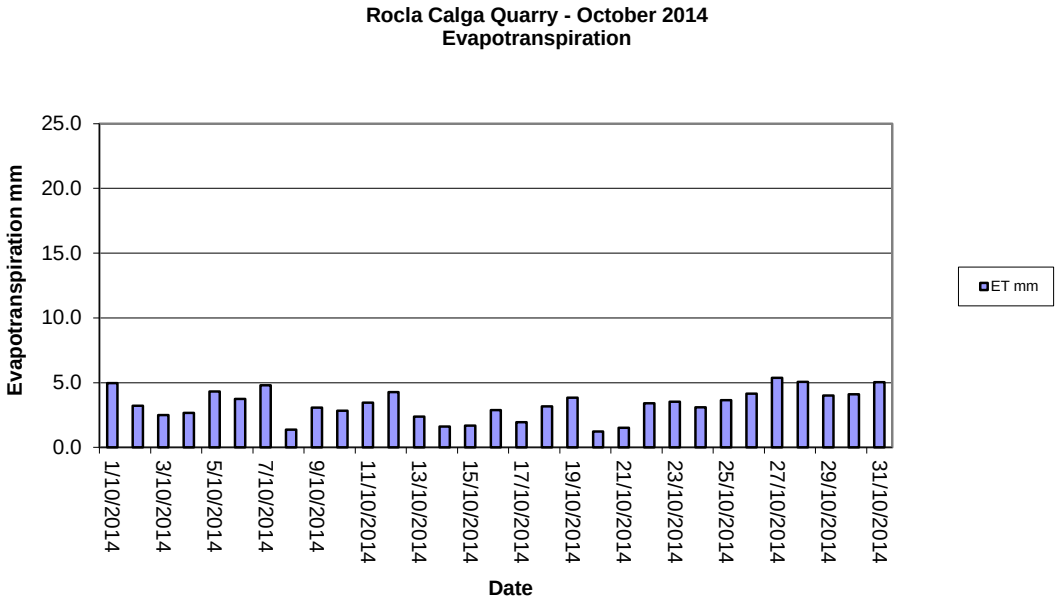


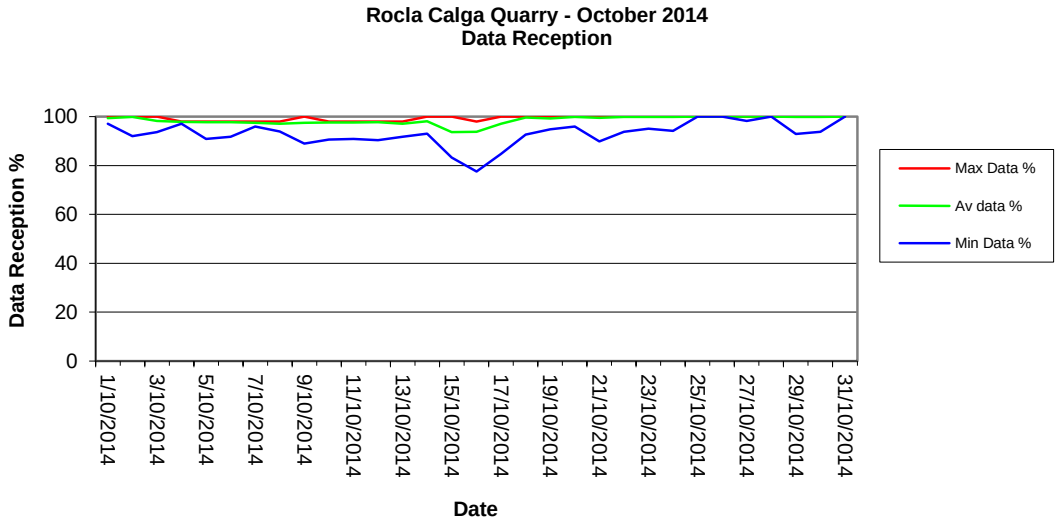

Rocla Calga Quarry - October 2014
Wind Speed
Wind Speed m/s
25
20
15
10
5
0
1/10/2014
3/10/2014
5/10/2014
7/10/2014
9/10/2014
11/10/2014
13/10/2014
15/10/2014
17/10/2014
19/10/2014
21/10/2014
23/10/2014
25/10/2014
27/10/2014
29/10/2014
31/10/2014
Date
Max WS
Av WS
Min WS


Rocla Calga Quarry - October 2014
Solar Radiation
Solar Rad W/m2
1200
1000
800
600
400
200
0
1/10/2014
3/10/2014
5/10/2014
7/10/2014
9/10/2014
11/10/2014
13/10/2014
15/10/2014
17/10/2014
19/10/2014
21/10/2014
23/10/2014
25/10/2014
27/10/2014
29/10/2014
31/10/2014
Date
Max Solar Rad
Av Solar Rad
Min Solar Rad


Rocla Calga Quarry - October 2014
Atmospheric Pressure
hPascals
1040.0
1030.0
1020.0
1010.0
1000.0
990.0
980.0
970.0
1/10/2014
3/10/2014
5/10/2014
7/10/2014
9/10/2014
11/10/2014
13/10/2014
15/10/2014
17/10/2014
19/10/2014
21/10/2014
23/10/2014
25/10/2014
27/10/2014
29/10/2014
31/10/2014
Date
Max Atm P
Av Atm P
Min Atm P


Rocla Calga Quarry - October 2014
Rainfall
Rain mm
25.0
20.0
15.0
10.0
5.0
0.0
1/10/2014
3/10/2014
5/10/2014
7/10/2014
9/10/2014
11/10/2014
13/10/2014
15/10/2014
17/10/2014
19/10/2014
21/10/2014
23/10/2014
25/10/2014
27/10/2014
29/10/2014
31/10/2014
Date
RAIN mm

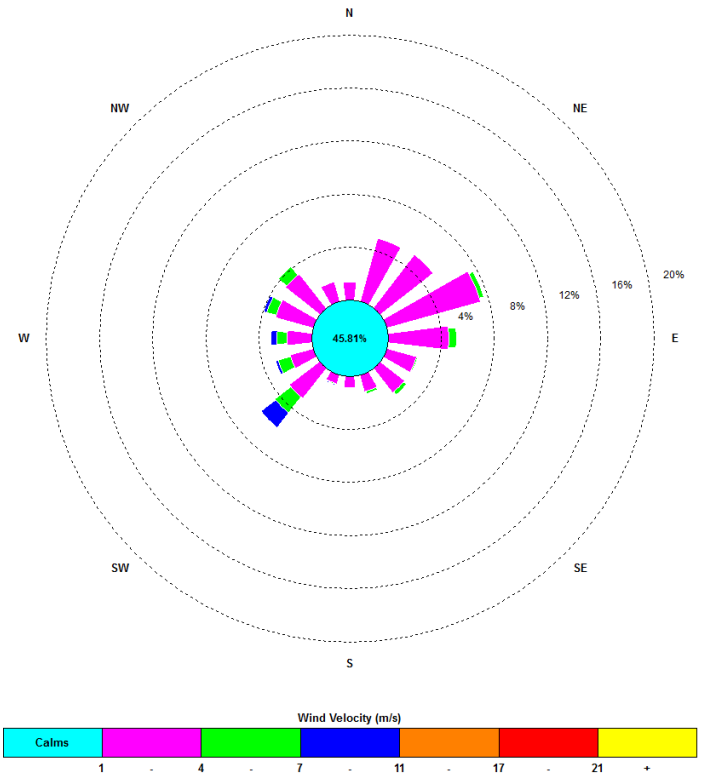

Rocla Calga Quarry - October 2014
Evapotranspiration
Evapotranspiration mm
25.0
20.0
15.0
10.0
5.0
0.0
1/10/2014
3/10/2014
5/10/2014
7/10/2014
9/10/2014
11/10/2014
13/10/2014
15/10/2014
17/10/2014
19/10/2014
21/10/2014
23/10/2014
25/10/2014
27/10/2014
29/10/2014
31/10/2014
Date
ET mm


Rocla Calga Quarry - October 2014
Data Reception
Data Reception %
100
80
60
40
20
0
1/10/2014
3/10/2014
5/10/2014
7/10/2014
9/10/2014
11/10/2014
13/10/2014
15/10/2014
17/10/2014
19/10/2014
21/10/2014
23/10/2014
25/10/2014
27/10/2014
29/10/2014
31/10/2014
Date
Max Data %
Av data %
Min Data %

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 less than a 15 minute average of 1m/s.

00:00, 1 October 2014 – 23:45, 31 October 2014



The predominant winds were from the ENE and SW, with most frequent, strongest winds from the SW. The maximum wind speed was 21.0 m/s from the W.

Appendix 1

Laboratory Certificates

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1410402**	Page	: 1 of 4
Client	: **CARBON BASED ENVIRONMENTAL**	Laboratory	: Environmental Division Newcastle
Contact	: MR COLIN DAVIES (cbased)	Contact	: Peter Keyte
Address	: 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: cbased@bigpond.com	E-mail	: peter.keyte@alsglobal.com
Telephone	: +61 49904443	Telephone	: +61 2 4014 2500
Facsimile	: +61 02 49904442	Facsimile	: +61 2 4967 7382
Project	: Rocla Calga Dusts	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 03-Nov-2014 14:00
C-O-C number	: ----	Date Analysis Commenced	: 04-Nov-2014
Sampler	: ----	Issue Date	: 07-Nov-2014 19:55
Site	: ----		
		No. of samples received	: 6
Quote number	: ----	No. of samples analysed	: 6

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
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.

- **Analysis as per AS3580.10.1-2003. 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: DUST (Matrix: AIR)			Client sample ID	CD1 02/10/14 - 03/11/14	CD2c 02/10/14 - 03/11/14	CD3 02/10/14 - 03/11/14	CD4 02/10/14 - 03/11/14	CD5 02/10/14 - 03/11/14
			Client sampling date / time	[03-Nov-2014]	[03-Nov-2014]	[03-Nov-2014]	[03-Nov-2014]	[03-Nov-2014]
Compound	CAS Number	LOR	Unit	EN1410402-001	EN1410402-002	EN1410402-003	EN1410402-004	EN1410402-005
				Result	Result	Result	Result	Result
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	**0.8**	**0.8**	**1.8**	**0.3**	**0.3**
Ash Content (mg)	----	1	mg	**16**	**15**	**33**	**6**	**5**
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	**0.4**	**0.3**	**0.2**	**0.4**	<0.1
Combustible Matter (mg)	----	1	mg	**6**	**6**	**5**	**8**	<1
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	**1.2**	**1.1**	**2.0**	**0.7**	**0.3**
Total Insoluble Matter (mg)	----	1	mg	**22**	**21**	**38**	**14**	**5**

Analytical Results

Sub-Matrix: **DUST** (Matrix: **AIR**)			Client sample ID	**CD6 02/10/14 - 03/11/14**	----	----	----	----
			Client sampling date / time	[03-Nov-2014]	----	----	----	----
Compound	CAS Number	LOR	Unit	**EN1410402-006**	-------	-------	-------	-------
				Result	Result	Result	Result	Result
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	**0.4**	----	----	----	----
Ash Content (mg)	----	1	mg	**8**	----	----	----	----
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	**0.2**	----	----	----	----
Combustible Matter (mg)	----	1	mg	**3**	----	----	----	----
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	**0.6**	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	**11**	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1423959**	Page	: 1 of 3
Client	: **CARBON BASED ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: MR COLIN DAVIES (cbased)	Contact	: Client Services
Address	: 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: cbased@bigpond.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 49904443	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 49904442	Facsimile	: +61-2-8784 8500
Project	: ROCIA QUARRY	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 03-NOV-2014
Sampler	: CBE	Issue Date	: 06-NOV-2014
Site	: ----		
		No. of samples received	: 2
Quote number	: SY/485/14	No. of samples analysed	: 2

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	A	F	----	----	----
			Client sampling date / time	[03-NOV-2014]	[03-NOV-2014]	----	----	----
Compound	CAS Number	LOR	Unit	ES1423959-001	ES1423959-002	----	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	5.95	5.65	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	79	91	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	32	43	----	----	----
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	<5	5	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	----	----	----

CARBON BASED ENVIRONMENTAL PTY LIMITED

Todays Collection	
Time Start:	8:15
Time Finish:	12:43

Date: 3.11.14

Client : Rocla Calga

Project :

GROUNDWATERS

1 cable faulty.

Site	DEPTH	Odour	Water Turbidity	Water Colour	1		2		Bottles (Apr/Oct)	Downloaded Logger? (Y/N)
					pH	EC	pH	EC		
CQ3	10.54	NIL	C S T	C LO O B G	7.81	102.3mS	7.58	98.2mS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ4	10.98	NIL	C S T	C LO O B G	4.19	85.6uS	4.15	85.1uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ5	7.32	NIL	C S T	C LO O B G	3.89	1.26.9uS	3.83	128.2uS	1x 250ml GP, 1x 500mL GP, 1RP	
CQ6	10.82	NIL	C S T	C LO O B G	3.91	139.3uS	3.87	138.1uS	1x 250ml GP, 1x 500mL GP, 1RP	
CQ7	6.44	Nil	C S T	C LO O B G	4.07	74.0uS	3.99	74.6uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ8	5.90m	NIL	C S T	C LO O B G	3.98	100.5uS	3.96	100.7uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ9	9.04m	NIL	C S T	C LO O B G	4.05	81.0uS	3.98	81.2uS	1x 250ml GP, 1x 500mL GP, 1RP	
CQ10	24.52	NIL	C S T	C LO O B G	3.84	133.9uS	3.78	133.9uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ11S	11.39	NIL	C S T	C LO O B G	4.22	110.6uS	4.23	110.0uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ11D	12.34	NIL	C S T	C LO O B G	4.18	119.1uS	4.21	118.0uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ12	4.17m	NIL	C S T	C LO O B G	3.96	98.0uS	3.95	99.7uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ13	14.87m	NIL	C S T	C LO O B G	3.87	165.9uS	3.83	166.0uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CP3	11.00m	NIL	C S T	C LO O B G	4.37	104.5uS	4.33	104.7uS	1x 250ml GP, 1x 500mL GP, 1RP	
CP4	11.18	—	C S T	C LO O B G					1x 250ml GP, 1x 500mL GP, 1RP	→ NO PUMP TO EXTRACT SAMPLE
CP5	9.24m	NIL	C S T	C LO O B G	3.94	160.2uS	3.99	158.0uS	1x 250ml GP, 1x 500mL GP, 1RP	
CP6	10.40	NIL	C S T	C LO O B G	3.94	147.3mS	3.97	147.0mS	1x 250ml GP, 1x 500mL GP, 1RP	
CP7	3.66	NIL	C S T	C LO O B G	4.18	74.2uS	4.24	73.3uS	1x 250ml GP, 1x 500mL GP, 1RP	
CP8	20.62	NIL	C S T	C LO O B G	3.89	104.5uS	3.88	105.2uS	1x 250ml GP, 1x 500mL GP, 1RP	
MW7	15.74	NIL	C S T	C LO O B G	4.28	83.5uS	4.49	83.2uS	1x 250ml GP, 1x 500mL GP, 1RP	N
MW8	7.55	NIL	C S T	C LO O B G	4.22	57.5uS	4.14	57.6uS	1x 250ml GP, 1x 500mL GP, 1RP	N
MW9	23.12	NIL	C S T	C LO O B G	4.14	60.9uS	3.96	62.5uS	1x 250ml GP, 1x 500mL GP, 1RP	N
MW10	11.70m	NIL	C S T	C LO O B G	3.84	93.7uS	3.71	92.0uS	1x 250ml GP, 1x 500mL GP, 1RP	N
MW13	7.91	NIL	C S T	C LO O B G	3.91	73.4uS	4.06	75.6uS	1x 250ml GP, 1x 500mL GP, 1RP	
MW16	8.52	NIL	C S T	C LO O B G	3.92	81.4uS	3.86	82.9uS	1x 250ml GP, 1x 500mL GP, 1RP	
MW17	10.32	NIL	C S T	C LO O B G	4.69	88.9uS	4.81	85.4uS	1x 250ml GP, 1x 500mL GP, 1RP	

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

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

pH/EC meter #: 14

Signed: K. Fox

Sampled by: