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

February 2014

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Date: 1 April 2014

Executive Summary

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 February 2014;
- Surface Water quality results for February 2014;
- Groundwater depth and quality results for February 2014; and
- Meteorological report for February 2014.

The February 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 5 March 2014 at sites A, B, D and F. Site C was inaccessible and 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.

Groundwaters were sampled for normal monthly monitoring on 5 March 2014. Groundwater depth generally varied across the sampled groundwater bores when compared to last month. Groundwater pH and EC were generally stable this month with the exception of CQ9 and CP5 which showed an increase in pH.

The meteorological station data recovery for the month was approximately 100%. Recorded rainfall on site for February was 106.6 mm, which was lower than the Peats Ridge long-term average for February. A comparison is shown below:

Rocla Calga Quarry	106.6 mm
BOM Peats Ridge*	NA
BOM Gosford*	175.0 mm
BOM Peats Ridge Long term mean for February*	159.3 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 February 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**.

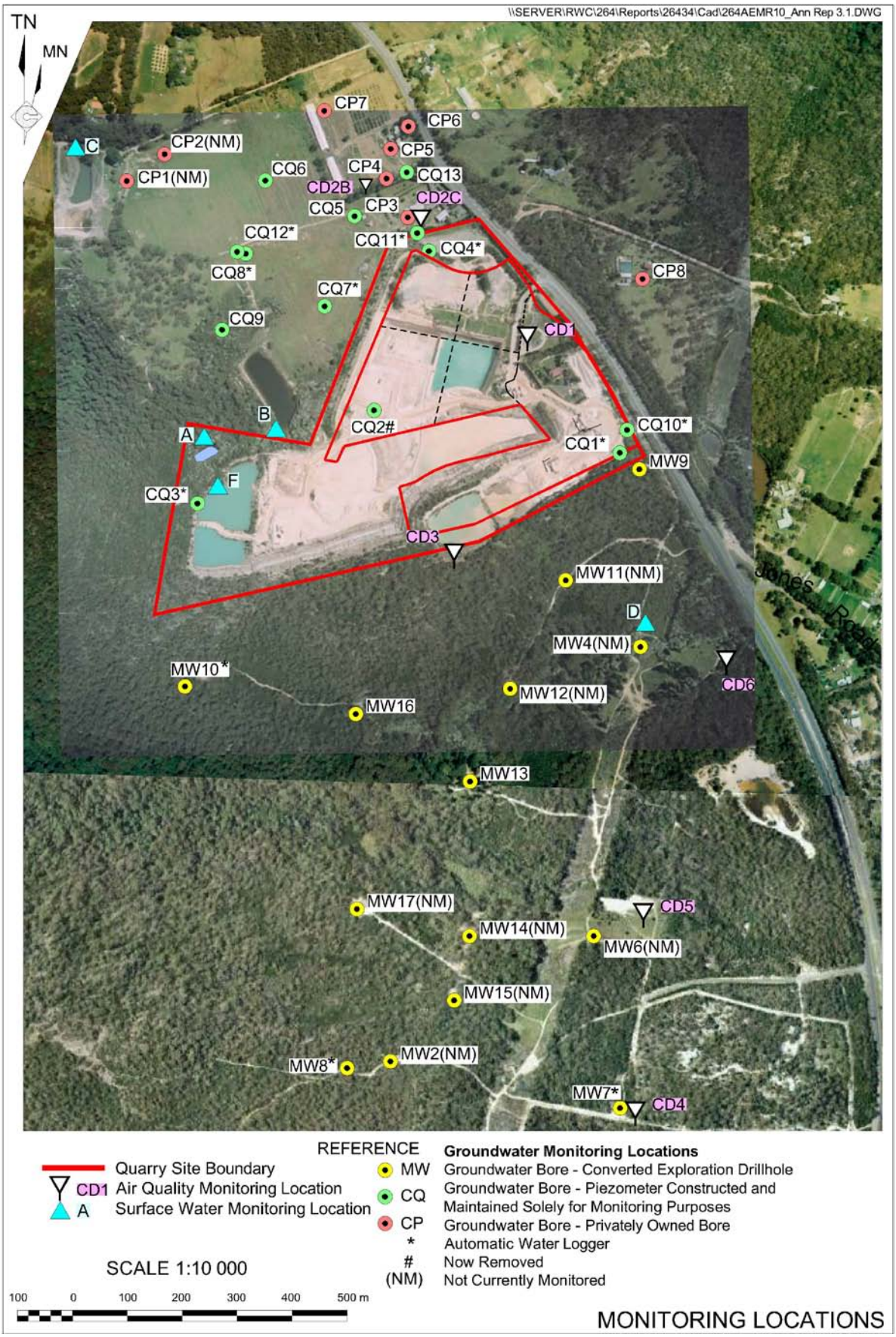


Figure 1: Rocla Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

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

Table 1: Dust Deposition results: 3 February 2014 – 5 March 2014 (30 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	1.7	1.0	0.7	60	1.3
CD2c	1.0	0.5	0.5	50	1.2
CD3	1.2	0.8	0.4	67	2.2
CD4	0.6	0.4	0.2	67	0.6
CD5	0.8	0.5	0.3	63	0.5
CD6	1.0	0.5	0.5	50	0.7

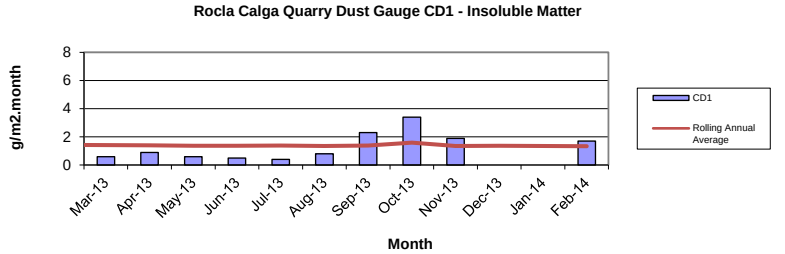
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m^2.month; the Development Consent's annual average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

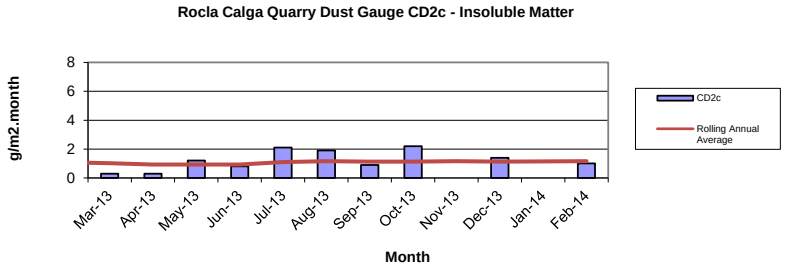
NA= Not Available.

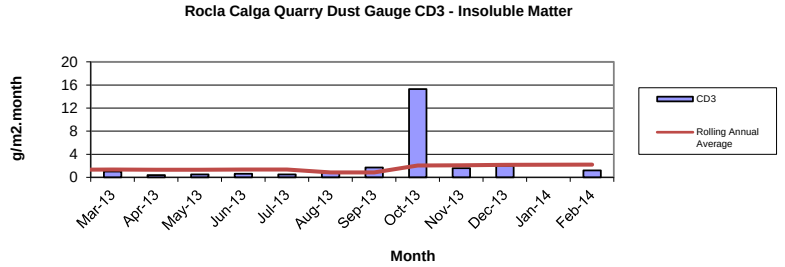
CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air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

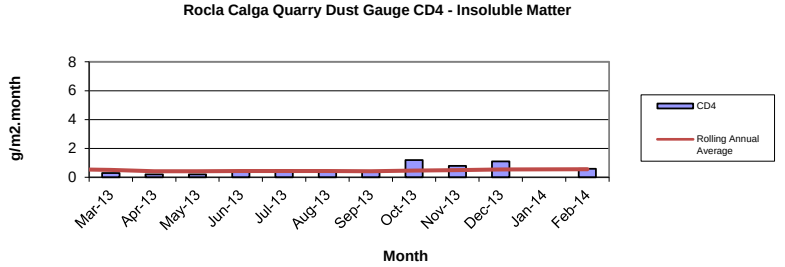
Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The laboratory analysis is provided in **Appendix 1.**

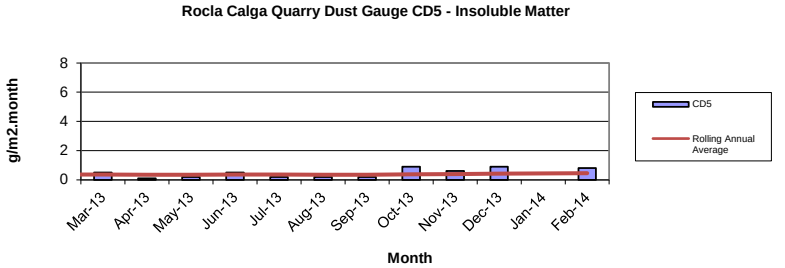
Figure 2: Dust Deposition Charts

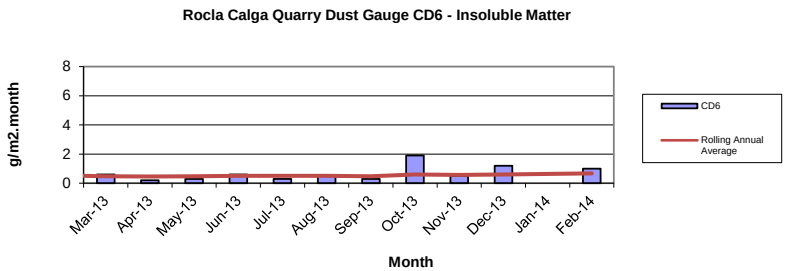












2.2 Surface Water Monitoring

Monthly surface water monitoring was conducted on the 5 March 2014 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1.**

Table 2: Monthly surface water monitoring – February 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	5.45	91	71	<5	<5
B	Dam	Clear	Clear	5.55	86	67	<5	<5
C	No access							
D	Still	Clear	Clear	5.36	118	93	<5	<5
F	Dam	Clear	Clear	5.57	85	66	<5	<5

Samples were collected at sites A, B, D and F. Site C was inaccessible and 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.

2.3 Groundwater Monitoring

Groundwaters were sampled on 5 March 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 varied at all sampled sites compared to last month, with water moving away from the surface at some sites and towards the surface at others.

pH at all sites is in the acidic to neutral range. pH levels remained steady across all sampled sites with the exception of CQ9 and CP5 which showed an increase in pH. EC levels were generally similar when compared to the results obtained in January 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	11.45	7.3	211
CQ4	Voutos	* Monitor	8.78	10.97	5.7	120
CQ5	Gazzana	DIP Only	8.69	7.78	5.2	182
CQ6	Gazzana	DIP Only	16.00	NM	NM	NM
CQ7	Gazzana	* Monitor	6.89	6.49	5.5	111
CQ8	Gazzana	* Monitor	11.03	6.25	5.3	153
CQ9	Gazzana	DIP Only	10.10	8.82	6.6	113
CQ10	Voutos	* Monitor	NI	23.67	5.4	189
CQ11S	Gazzana	* Monitor	NI	11.18	5.4	163
CQ11D	Gazzana	* Monitor	NI	12.40	5.5	168
CQ12	Gazzana	* Monitor	NI	4.93	5.3	144
CQ13	Kashouli	* Monitor	NI	14.39	5.2	238
CP3	Gazzana	Domestic	10.40	9.58	5.5	154
CP4	Kashouli	Domestic	13.63	11.6	NM	NM
CP5	Kashouli	Domestic	16.61	9.97	5.9	202
CP6	Kashouli	Domestic	16.27	11.95	5.4	203
CP7	Kashouli	Production	8.56	3.62	6.2	135
CP8	Rozmanec	Domestic	22.17	21.14	5.3	154
MW7	Rocla Bore	* Monitor	15.76	16.5	5.3	122
MW8	Rocla Bore	* Monitor	9.82	8.16	5.7	92
MW9	Rocla Bore	* Monitor	22.44	22.57	5.6	96
MW10	Rocla Bore	* Monitor	15.41	NM	NM	NM
MW13	Rocla Bore	DIP Only	NI	NM	NM	NM
MW16	Rocla Bore	DIP Only	NI	NM	NM	NM

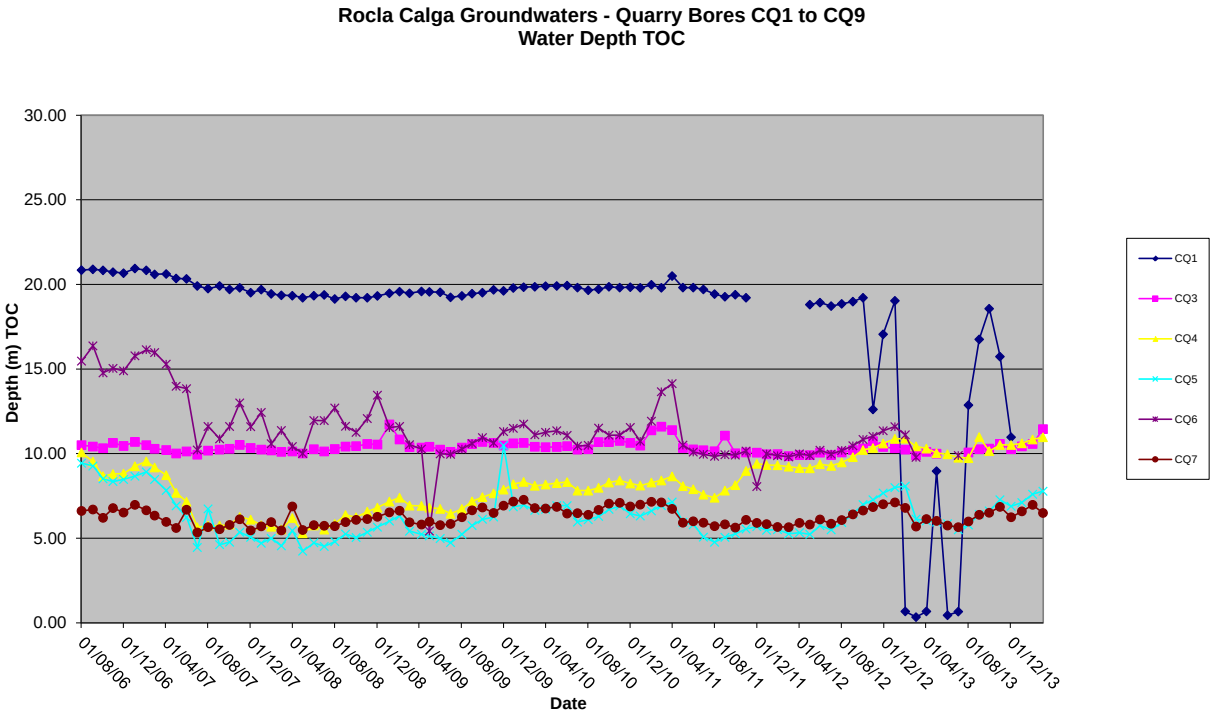
Notes:
TOC = Water level measured from top of bore case to water.
NM = Not Monitored – unable to sample water due to access restrictions.
NR = Not Required by resident.
* = Logger Installed.
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements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

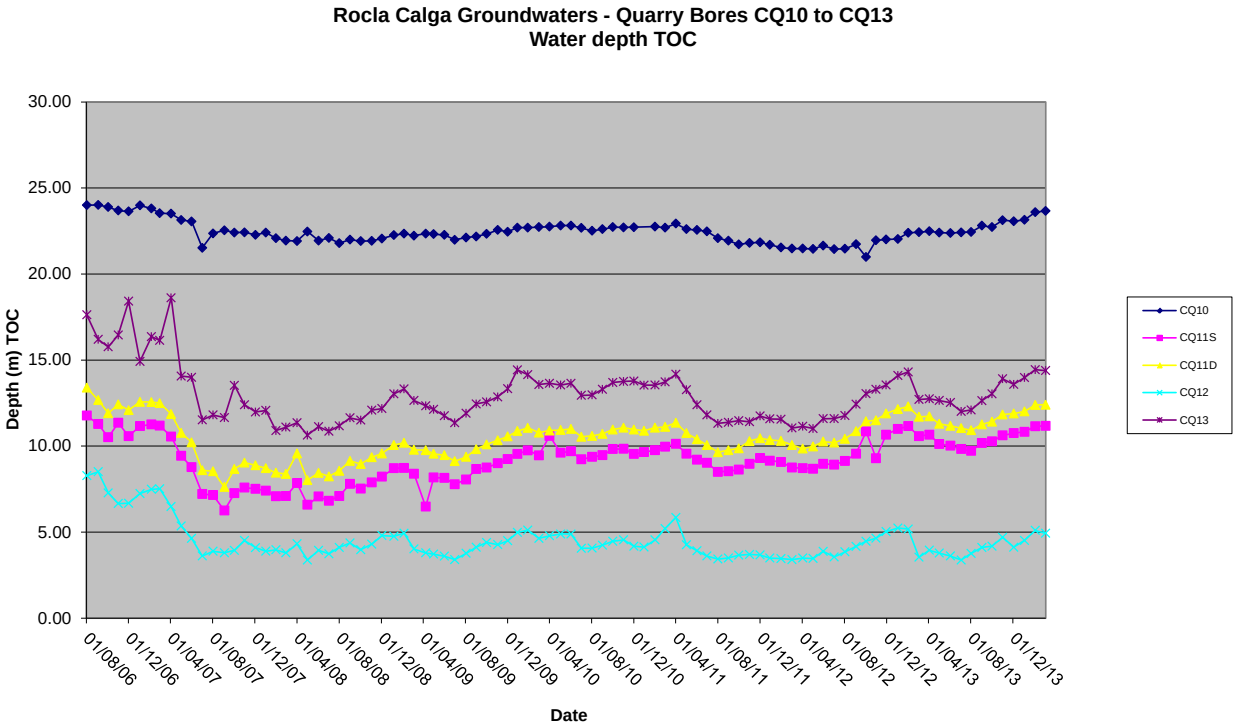
Shading is used to indicate the following trends in water depth (compared to the last reading):

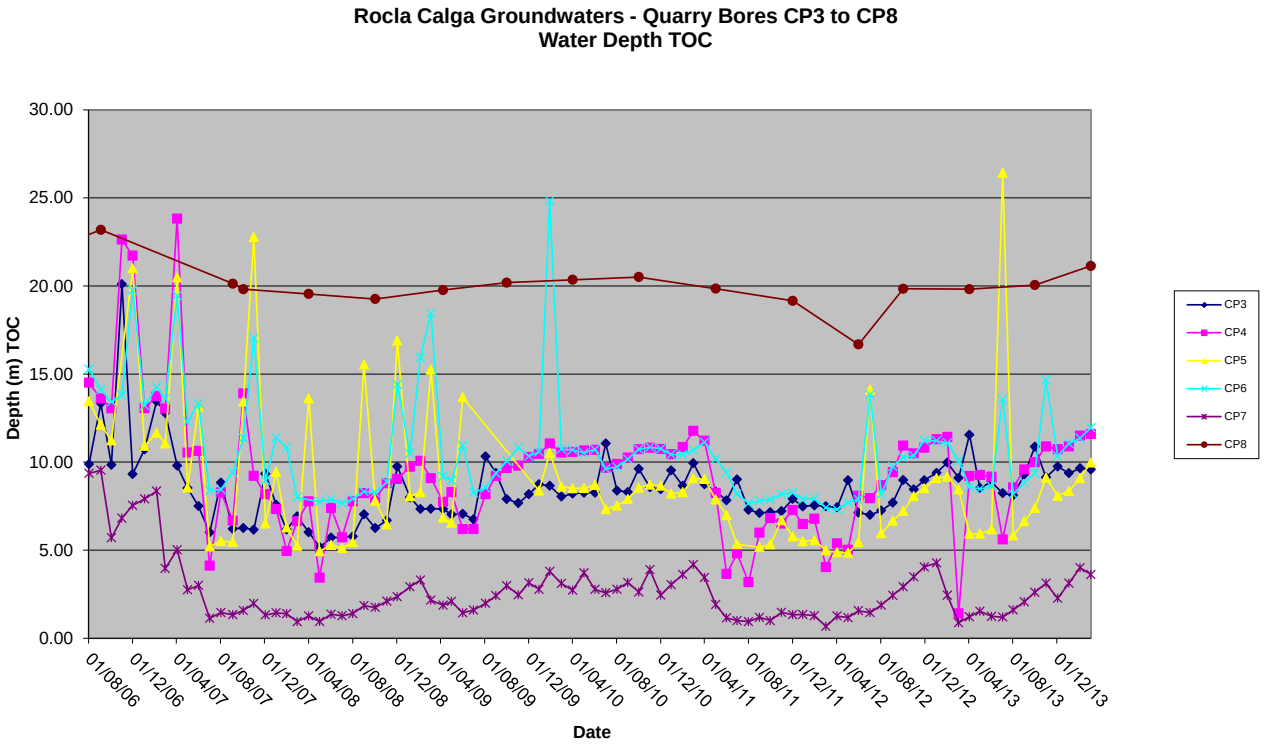
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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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01/08/11
01/12/11
01/04/12
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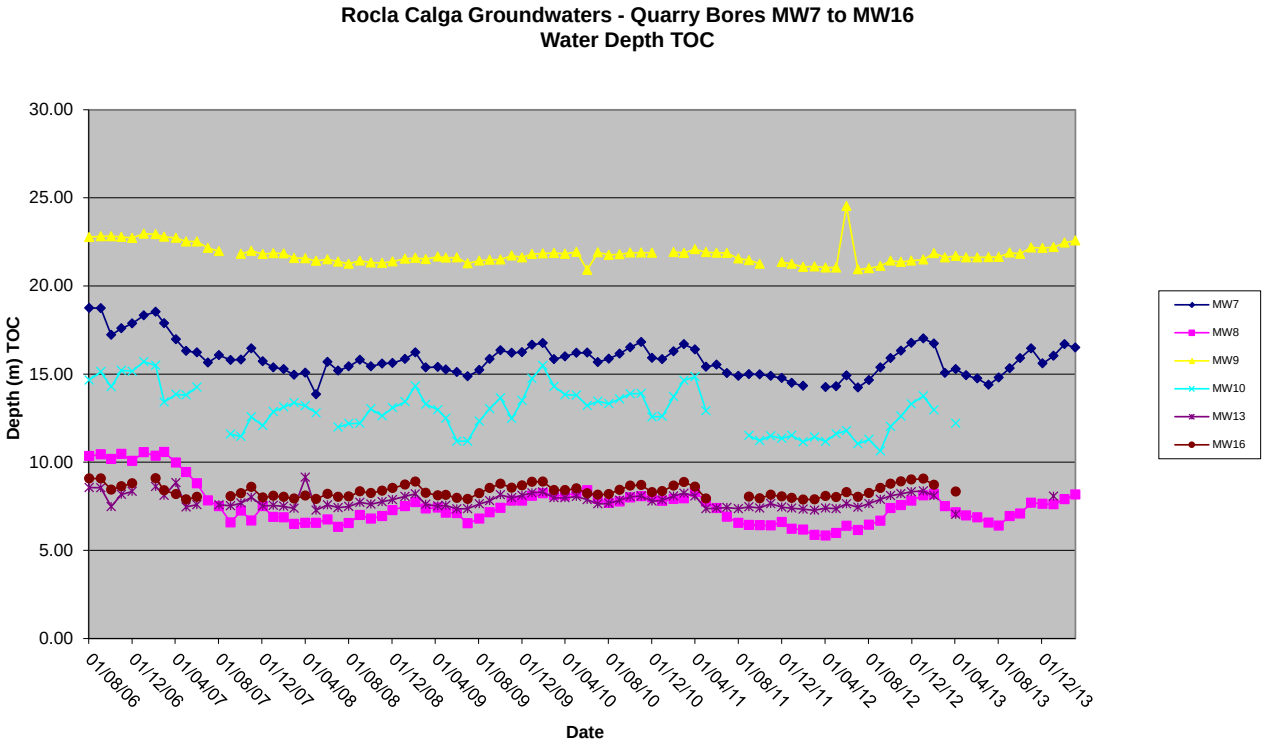
01/12/13
Date
CP3
CP4
CP5
CP6
CP7
CP8


Rocla Calga Groundwaters - Quarry Bores MW7 to MW16
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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01/08/11
01/12/11
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01/08/12
01/12/12
01/04/13
01/08/13
01/12/13
Date
MW7
MW8
MW9
MW10
MW13
MW16

2.4 Meteorological Monitoring

The Rocla Calga Quarry weather station data recovery in February 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 February 2014 shows that rainfall recorded at the Rocla Calga Quarry was lower than the Gosford BOM and lower than the Peats Ridge long term mean rainfall for February 2014. The rainfall comparison is provided below:

Rocla Calga Quarry	106.6 mm
BOM Peats Ridge*	NA
BOM Gosford*	175.0mm
BOM Peats Ridge Long term mean for February*	159.3 mm

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

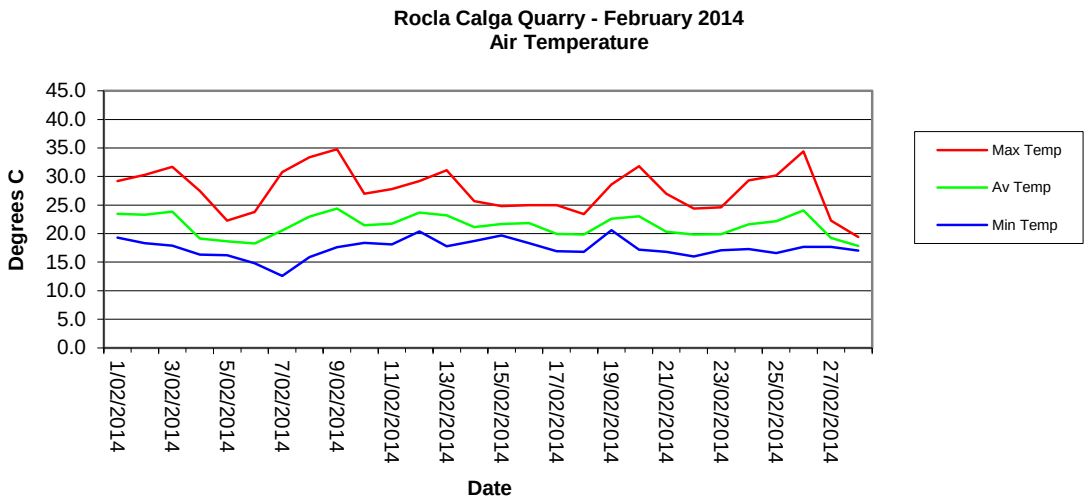
Results are displayed in the following table and figures.

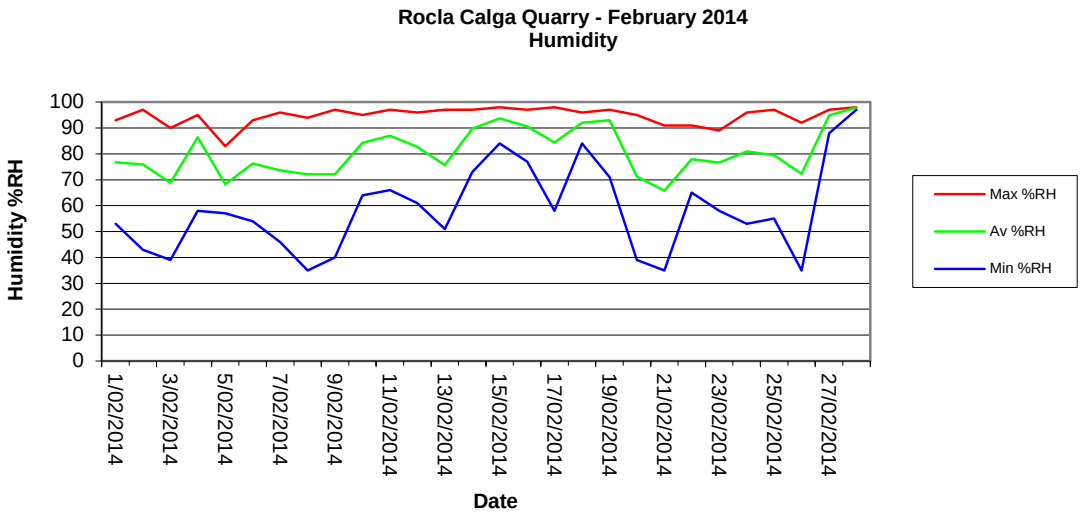
2.4.1 Monthly Meteorological Data Summary

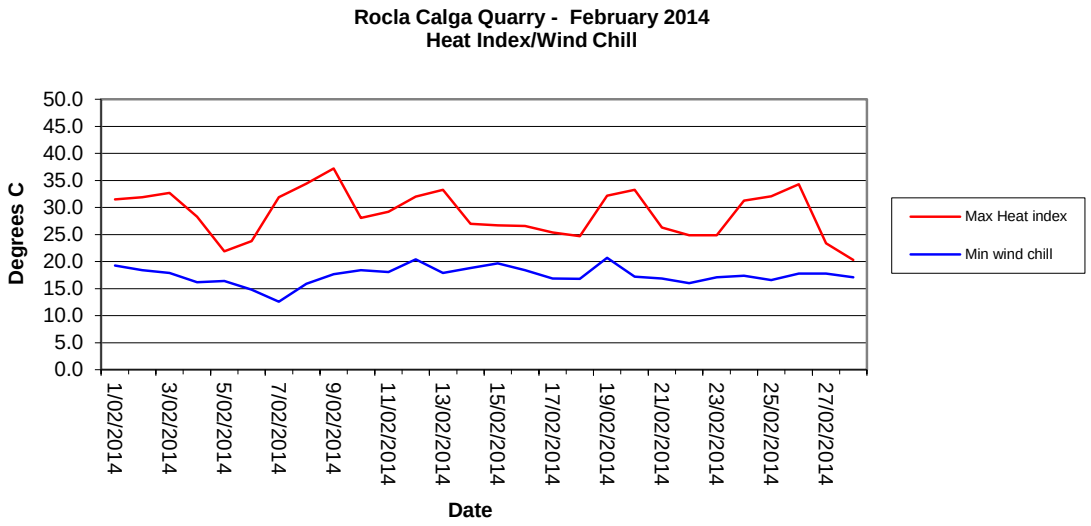
Summary **Feb-14** **Rocla - Calga**

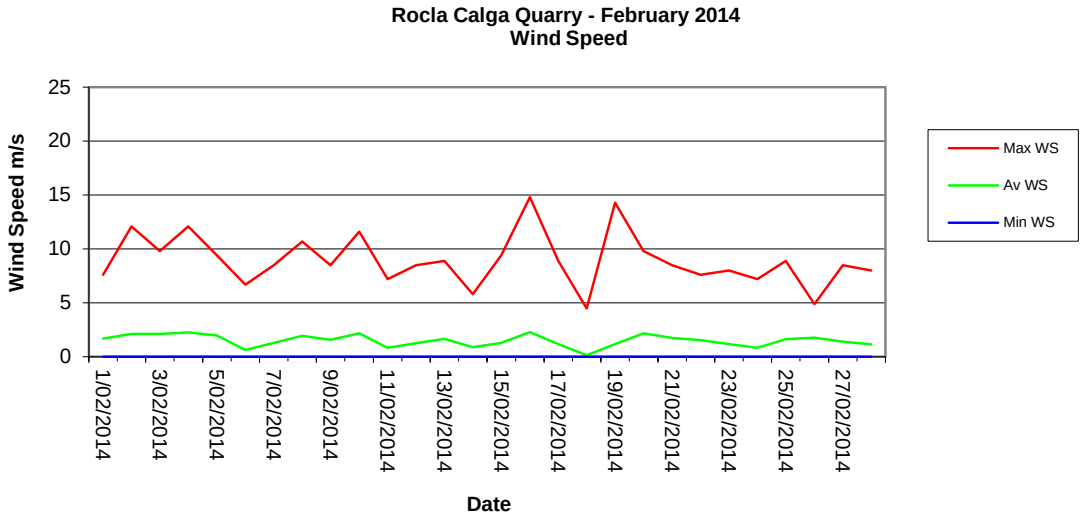
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/02/2014	19.3	23.5	29.2	53	77	93	0.0	4.2	0	1.7	7.6	19.3	31.5	1009.0	1011.7	1013.9	0	212.3	1069	92.1	99.4	100
2/02/2014	18.3	23.3	30.3	43	76	97	0.0	5.1	0	2.1	12.1	18.4	31.9	1011.5	1012.9	1014.3	0	242.5	972	100	100.0	100
3/02/2014	17.9	23.8	31.7	39	69	90	0.0	5.7	0	2.1	9.8	17.9	32.7	1009.0	1011.6	1014.7	0	275.8	985	93.9	99.8	100
4/02/2014	16.3	19.1	27.5	58	86	95	5.0	2.3	0	2.3	12.1	16.2	28.3	1008.7	1015.9	1021.9	0	116.7	806	85.7	96.5	100
5/02/2014	16.2	18.7	22.3	57	68	83	0.0	3.2	0	2.0	9.4	16.4	21.9	1020.3	1021.4	1022.9	0	146.1	594	89.8	98.5	100
6/02/2014	14.8	18.3	23.8	54	76	93	0.0	2.5	0	0.6	6.7	14.8	23.8	1015.7	1017.7	1020.3	0	139.4	811	86.3	99.2	100
7/02/2014	12.6	20.6	30.8	46	74	96	0.0	4.9	0	1.3	8.5	12.6	31.9	1013.5	1015.1	1016.9	0	271.7	983	95.9	99.8	100
8/02/2014	15.9	23.0	33.4	35	72	94	0.0	5.2	0	2.0	10.7	15.9	34.4	1014.0	1015.4	1017.2	0	259.4	961	97.4	99.9	100
9/02/2014	17.6	24.4	34.8	40	72	97	0.2	5.3	0	1.6	8.5	17.7	37.2	1011.3	1014.6	1017.9	0	266.3	988	99.7	100.0	100
10/02/2014	18.4	21.5	27.0	64	84	95	0.2	2.4	0	2.2	11.6	18.4	28.1	1011.3	1015.7	1018.6	0	123.0	657	86.3	99.6	100
11/02/2014	18.1	21.7	27.8	66	87	97	2.0	2.5	0	0.8	7.2	18.1	29.2	1011.9	1014.8	1017.1	0	144.8	902	95.3	99.8	100
12/02/2014	20.4	23.7	29.2	61	83	96	0.0	3.2	0	1.3	8.5	20.4	32.0	1013.1	1014.4	1016.2	0	167.9	808	95.6	99.8	100
13/02/2014	17.8	23.2	31.1	51	76	97	8.4	3.9	0	1.7	8.9	17.9	33.3	1008.7	1011.8	1015.4	0	192.2	778	78.7	98.9	100
14/02/2014	18.7	21.1	25.7	73	90	97	0.4	1.4	0	0.9	5.8	18.8	27.0	1003.9	1006.2	1009.9	0	86.0	444	50.9	90.1	100
15/02/2014	19.7	21.7	24.8	84	94	98	3.6	1.2	0	1.3	9.4	19.7	26.7	996.9	1000.3	1005.1	0	74.3	348	71.1	91.8	100
16/02/2014	18.3	21.8	25.0	77	91	97	28.8	0.9	0	2.3	14.8	18.4	26.6	997.2	1001.0	1009.1	0	37.8	277	11.4	73.9	99.1
17/02/2014	16.9	20.0	25.0	58	84	98	1.4	3.2	0	1.2	8.9	16.9	25.4	1008.6	1011.7	1013.7	0	183.6	955	14.3	84.0	100
18/02/2014	16.8	19.9	23.4	84	92	96	0.4	0.9	0	0.1	4.5	16.8	24.7	1006.4	1009.9	1013.1	0	64.9	306	81.3	95.2	100
19/02/2014	20.6	22.6	28.6	71	93	97	24.2	1.3	0	1.2	14.3	20.7	32.2	1000.3	1002.6	1006.2	0	76.1	391	72.8	94.8	100
20/02/2014	17.2	23.0	31.8	39	71	95	0.0	5.0	0	2.2	9.8	17.2	33.3	1000.8	1006.3	1011.8	0	252.9	974	71.9	92.1	100
21/02/2014	16.8	20.3	27.0	35	66	91	0.0	4.4	0	1.8	8.5	16.9	26.3	1011.6	1014.7	1018.4	0	227.2	971	83	94.8	100
22/02/2014	16.0	19.8	24.4	65	78	91	0.0	3.0	0	1.5	7.6	16.0	24.9	1017.2	1018.7	1021.2	0	157.4	897	82.2	96.7	100
23/02/2014	17.1	19.9	24.6	58	77	89	0.2	3.0	0	1.2	8	17.1	24.9	1019.8	1021.0	1022.6	0	150.0	933	96.5	99.6	100
24/02/2014	17.3	21.6	29.3	53	81	96	0.0	3.6	0	0.8	7.2	17.4	31.3	1015.9	1018.1	1020.4	0	206.3	1070	93	99.0	100
25/02/2014	16.6	22.2	30.2	55	80	97	0.2	4.2	0	1.6	8.9	16.6	32.1	1010.5	1014.0	1017.4	0	225.9	990	70.8	97.5	100
26/02/2014	17.7	24.1	34.4	35	72	92	1.4	3.9	0	1.8	4.9	17.8	34.3	1008.2	1010.5	1013.9	0	172.5	986	87.7	97.2	100
27/02/2014	17.7	19.2	22.3	88	95	97	3.6	0.8	0	1.4	8.5	17.8	23.4	1011.4	1016.5	1021.0	0	50.1	333	86.3	96.4	100
28/02/2014	17.0	17.9	19.4	97	98	98	26.6	0.3	0	1.2	8	17.1	20.3	1019.6	1021.1	1022.5	0	21.9	99	43.3	83.8	100
Monthly	12.6	21.4	34.8	35	81	98	106.6	87.4	0	1.5	14.8	12.6	37.2	996.9	1013.1	1022.9	0	162.3	1070	11.4	95.6	100

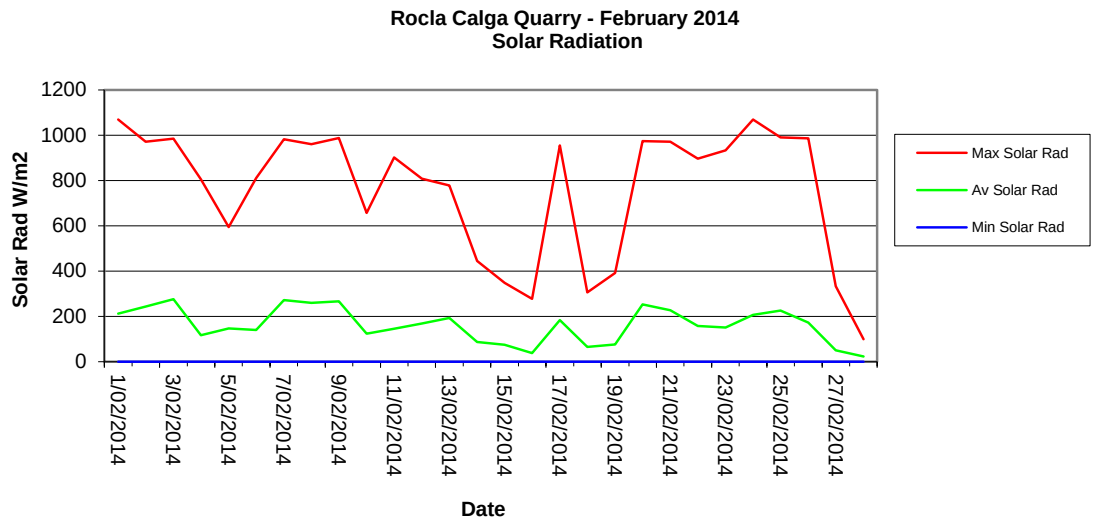
2.4.2 Monthly Weather Charts

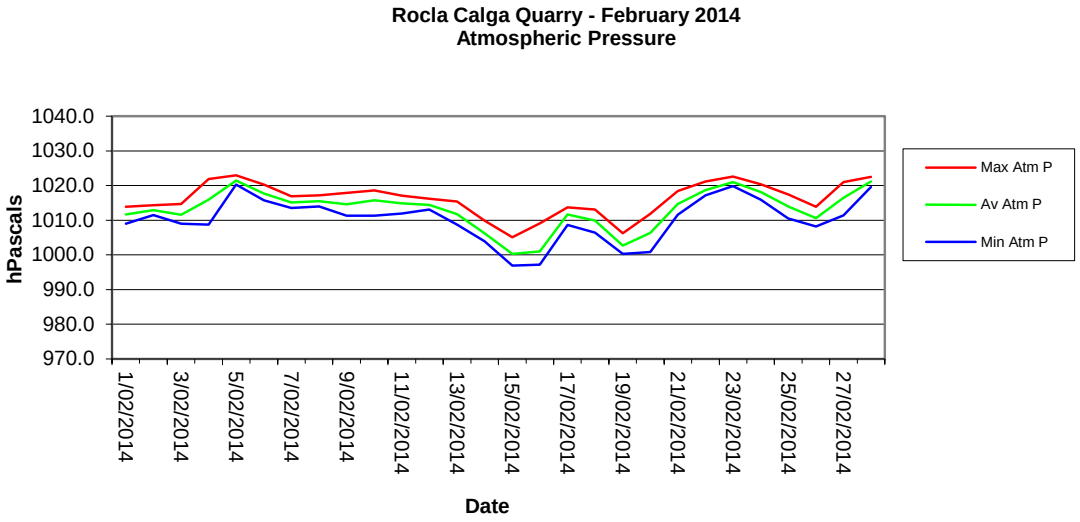


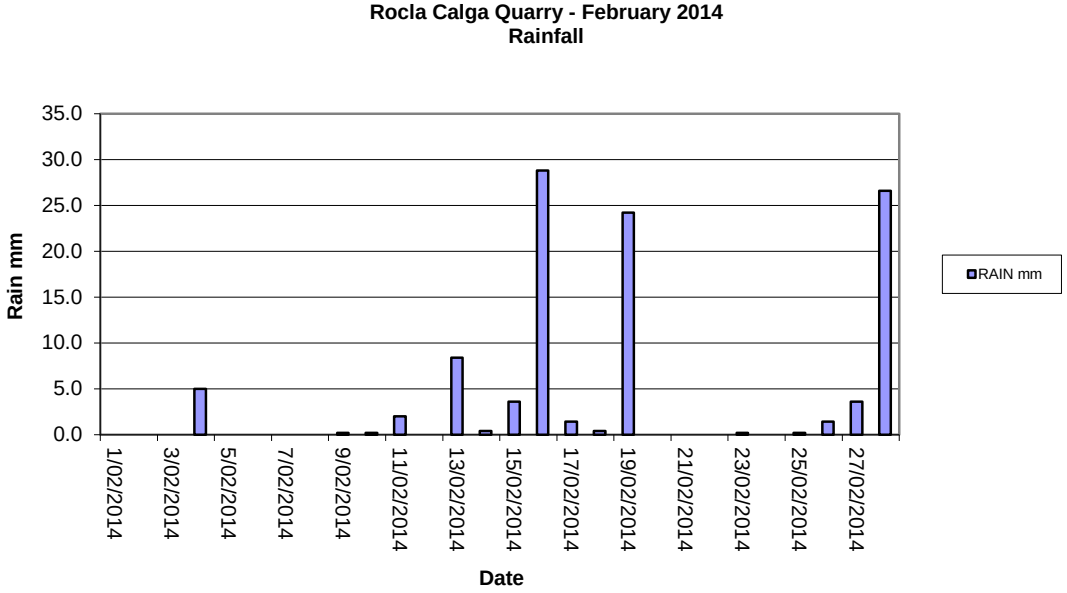


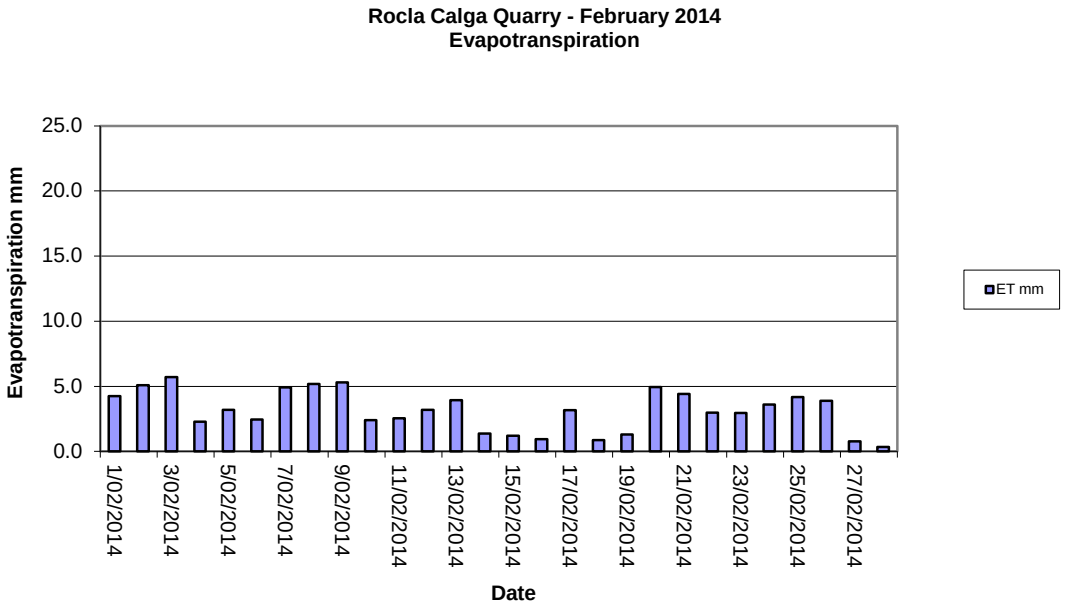


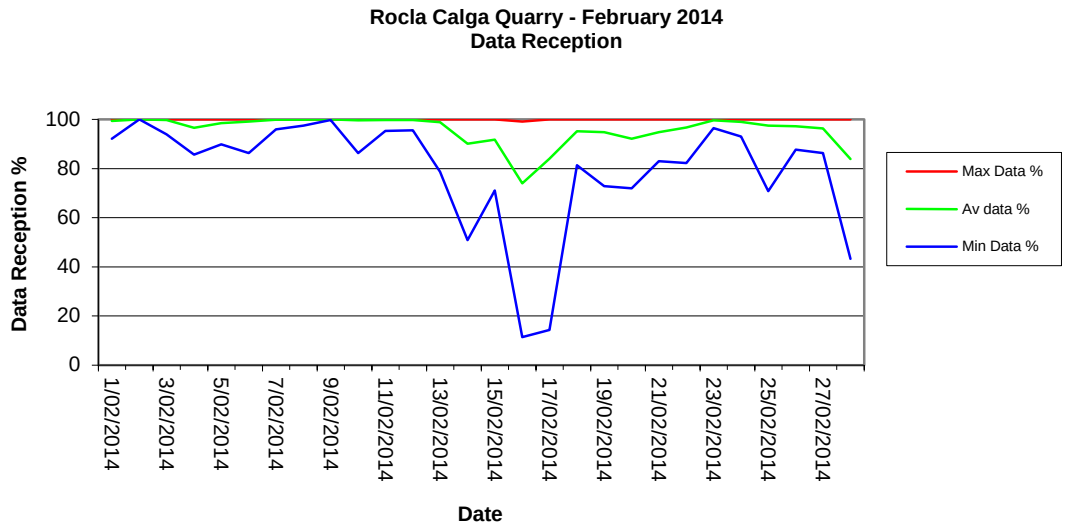

Rocla Calga Quarry - February 2014
Wind Speed
Wind Speed m/s
25
20
15
10
5
0
1/02/2014
3/02/2014
5/02/2014
7/02/2014
9/02/2014
11/02/2014
13/02/2014
15/02/2014
17/02/2014
19/02/2014
21/02/2014
23/02/2014
25/02/2014
27/02/2014
Date
Max WS
Av WS
Min WS


Rocla Calga Quarry - February 2014
Solar Radiation
Solar Rad W/m2
1200
1000
800
600
400
200
0
1/02/2014
3/02/2014
5/02/2014
7/02/2014
9/02/2014
11/02/2014
13/02/2014
15/02/2014
17/02/2014
19/02/2014
21/02/2014
23/02/2014
25/02/2014
27/02/2014
Date
Max Solar Rad
Av Solar Rad
Min Solar Rad


Rocla Calga Quarry - February 2014
Atmospheric Pressure
hPascals
1040.0
1030.0
1020.0
1010.0
1000.0
990.0
980.0
970.0
1/02/2014
3/02/2014
5/02/2014
7/02/2014
9/02/2014
11/02/2014
13/02/2014
15/02/2014
17/02/2014
19/02/2014
21/02/2014
23/02/2014
25/02/2014
27/02/2014
Date
Max Atm P
Av Atm P
Min Atm P


Rocla Calga Quarry - February 2014
Rainfall
Rain mm
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1/02/2014
3/02/2014
5/02/2014
7/02/2014
9/02/2014
11/02/2014
13/02/2014
15/02/2014
17/02/2014
19/02/2014
21/02/2014
23/02/2014
25/02/2014
27/02/2014
Date
RAIN mm

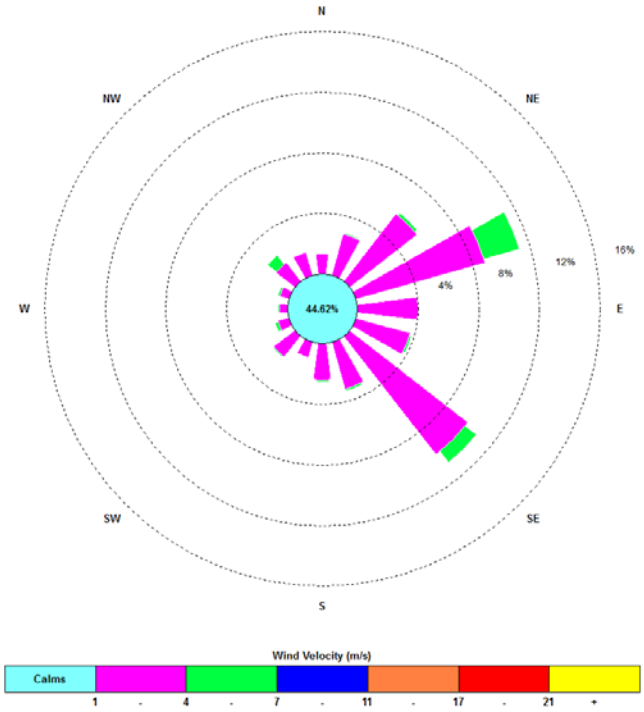

Rocla Calga Quarry - February 2014
Evapotranspiration
Evapotranspiration mm
25.0
20.0
15.0
10.0
5.0
0.0
1/02/2014
3/02/2014
5/02/2014
7/02/2014
9/02/2014
11/02/2014
13/02/2014
15/02/2014
17/02/2014
19/02/2014
21/02/2014
23/02/2014
25/02/2014
27/02/2014
Date
ET mm


Rocla Calga Quarry - February 2014
Data Reception
Data Reception %
100
80
60
40
20
0
1/02/2014
3/02/2014
5/02/2014
7/02/2014
9/02/2014
11/02/2014
13/02/2014
15/02/2014
17/02/2014
19/02/2014
21/02/2014
23/02/2014
25/02/2014
27/02/2014
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.

00:15, 01 February 2014 – 23:45, 28 February 2014



The predominant winds were from the SE, with most frequent, strongest winds from the ENE. The maximum wind speed was 14.8 m/s from the SE.

Appendix 1

Laboratory Certificates

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1400778**	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@als.com.au
Telephone	: +61 49904443	Telephone	: 61-2-4968-9433
Facsimile	: +61 02 49904442	Facsimile	: +61-2-4968 0349
Project	: ROCLA CALGA DUSTS	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 06-MAR-2014
Sampler	: CBE	Issue Date	: 14-MAR-2014
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. 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*
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.

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

- **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 03/02/14 - 05/03/14	CD2c 03/02/14 - 05/03/14	CD3 03/02/14 - 05/03/14	CD4 03/02/14 - 05/03/14	CD5 03/02/14 - 05/03/14
			Client sampling date / time	05-MAR-2014 15:00	05-MAR-2014 15:00	05-MAR-2014 15:00	05-MAR-2014 15:00	05-MAR-2014 15:00
Compound	CAS Number	LOR	Unit	EN1400778-001	EN1400778-002	EN1400778-003	EN1400778-004	EN1400778-005
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	1.0	0.5	0.8	0.4	0.5
Ash Content (mg)	----	1	mg	18	9	14	7	9
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	0.7	0.5	0.4	0.2	0.3
Combustible Matter (mg)	----	1	mg	12	8	7	4	6
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	1.7	1.0	1.2	0.6	0.8
Total Insoluble Matter (mg)	----	1	mg	30	17	21	11	15

Analytical Results

Sub-Matrix: DUST (Matrix: AIR)			Client sample ID	CD6 03/02/14 - 05/03/14	----	----	----	----
			Client sampling date / time	05-MAR-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EN1400778-006	----	----	----	----
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	0.5	----	----	----	----
Ash Content (mg)	----	1	mg	8	----	----	----	----
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	0.5	----	----	----	----
Combustible Matter (mg)	----	1	mg	9	----	----	----	----
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	1.0	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	17	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1404795**	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	: ROCLA QUARRY	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 05-MAR-2014
Sampler	: CARBON BASED ENVIRO	Issue Date	: 13-MAR-2014
Site	: ----		
		No. of samples received	: 4
Quote number	: SY/428/12	No. of samples analysed	: 4

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
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.

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

- **TDS by method EA-015 may bias high 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	B	D	F	----
			Client sampling date / time	05-MAR-2014 15:00	05-MAR-2014 15:00	05-MAR-2014 15:00	05-MAR-2014 15:00	----
Compound	CAS Number	LOR	Unit	ES1404795-001	ES1404795-002	ES1404795-003	ES1404795-004	----
EA005: pH								
pH Value	----	0.01	pH Unit	5.45	5.55	5.36	5.57	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	91	86	118	85	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	71	67	93	66	----
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	----

Murray

CARBON BASED ENVIRONMENTAL PTY LIMITED

Todays Collection	
Time Start:	11·45
Time Finish:	4.00

Date: 5-3-14

Client : Rocla Calga

Project :

GROUNDWATERS

Site	DEPTH	Odour	Water Turbidity	Water Colour	1		2		Bottles (Apr/Oct)	Downloaded Logger? (Y/N)
					pH	EC	pH	EC		
CQ1			CST	CLOOBG					1x 250ml GP, 1x 1L GP, 1RP	Removed
CQ3	11.45	yes	CST	CLOOBG	7-29	210·0uS	7·29	210·8uS	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ4	10·97	NO	CST	CLOOBG	5·74	119·8uS	5·71	119·5uS	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ5	7·78	NO	CST	CLOOBG	5·17	180·7uS	5·17	182·1uS	1x 250ml GP, 1x 1L GP, 1RP	
CQ6			CST	CLOOBG					1x 250ml GP, 1x 1L GP, 1RP	electric fence
CQ7	6·49	NO	CST	CLOOBG	5·54	111·4uS	5·51	110·7uS	1x 250ml GP, 1x 1L GP, 1RP	NO
CQ8	6·25	NO	CST	CLOOBG	5.33	151·1uS	5·30	153·3uS	1x 250ml GP, 1x 1L GP, 1RP	NO
CQ9	8·82	NO	CST	CLOOBG	5·66	112·8uS	6·61	113·3uS	1x 250ml GP, 1x 1L GP, 1RP	
CQ10	23·67	NO	CST	CLOOBG	5·44	186·9uS	5·40	188·8uS	1x 250ml GP, 1x 1L GP, 1RP	NO
CQ11S	11·18	NO	CST	CLOOBG	5·42	162·0uS	5·44	163·2uS	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ11D	12·40	NO	CST	CLOOBG	5·46	169·9uS	5·48	168·4uS	1x 250ml GP, 1x 1L GP, 1RP	NO
CQ12	4.93	NO	CST	CLOOBG	5·26	140·3uS	5·25	143·9uS	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ13	14·39	NO	CST	CLOOBG	5·28	236·2uS	5.24	238·3uS	1x 250ml GP, 1x 1L GP, 1RP	yes
CP3	9·58	NO	CST	CLOOBG	5·57	153·9uS	5·51	154·2uS	1x 250ml GP, 1x 1L GP, 1RP	
CP4	11·60		CST	CLOOBG					1x 250ml GP, 1x 1L GP, 1RP	Pump not working.
CP5	9·97	NO	CST	CLOOBG	5·87	202·2uS	5·85	202·2uS	1x 250ml GP, 1x 1L GP, 1RP	
CP6	11·95	NO	CST	CLOOBG	5·45	201·7uS	5·43	202·7uS	1x 250ml GP, 1x 1L GP, 1RP	
CP7	3·62	NO	CST	CLOOBG	6·21	133·9uS	6·20	134·6uS	1x 250ml GP, 1x 1L GP, 1RP	
CP8	21·14	NO	CST	CLOOBG	5·30	153·2uS	5·26	153·9uS	1x 250ml GP, 1x 1L GP, 1RP	Only required Apr/Oct
MW7	16·50	NO	CST	CLOOBG	5·32	123·3uS	5·30	121·9uS	1x 250ml GP, 1x 1L GP, 1RP	yes
MW8	8·16	NO	CST	CLOOBG	5·79	92·5uS	5·74	91·9uS	1x 250ml GP, 1x 1L GP, 1RP	yes
MW9	22·57	NO	CST	CLOOBG	5·62	96·7uS	5·60	96·0uS	1x 250ml GP, 1x 1L GP, 1RP	yes
MW10			CST	CLOOBG					1x 250ml GP, 1x 1L GP, 1RP	NO ACCESS
MW13			CST	CLOOBG					1x 250ml GP, 1x 1L GP, 1RP	
MW16			CST	CLOOBG					1x 250ml GP, 1x 1L GP, 1RP	Bad track

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

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

pH/EC meter #: 6

Signed: [signature]

Sampled by: Leon + Jill

4-98