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

November 2012

Colin Davies BSc MEIA CEnvP
Environmental Scientist
28 December 2012

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 November 2012;
- Surface Water quality results for November 2012;
- Groundwater depth and quality results for November 2012; and
- Meteorological report for November 2012.

The November 2012 dust deposition results for insoluble solids were generally higher when compared to those of October 2012. 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 for the normal monthly sampling event on the 29 November 2012 at sites A and F. Sites B and D were dry and Site C was inaccessible and unable to be sampled. At the time of sample collection, there was no water discharge observed from the site. Results show generally good water quality with all sites sampled maintaining steady pH within the slightly acidic range, and low Electrical Conductivity, Total Dissolved Solids and Total Suspended Solids. Oil and Grease was not detected at any site.

Groundwaters were sampled for normal monthly monitoring on 29 November 2012. Groundwater depths generally increased across the bores compared to last month with water moving away from the surface. Groundwater pH and EC levels remained relatively stable.

The meteorological station data recovery for the month was approximately 100%. No wind data is available from the 1-22 November due to a technical problem. Recorded rainfall on site for November was 58.2 mm, which was lower than the Peats Ridge long-term average for November. No data is available, for comparison in November, at the Peats Ridge BOM station. Results are detailed below:

Rocla Calga Quarry	58.2 mm
BOM Peats Ridge*	Not Available
BOM Gosford*	63.8 mm
BOM Peats Ridge Long term mean for November*	107.0 mm

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

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.

1.0 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 November 2012 and the project 12 month rolling average. Results are in g/m^2.month.

Table 1: Dust Deposition results: 31 October 2012 – 29 November 2012 (29 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	**4.9**	4.6	0.3	94	1.7
CD2c	0.8	0.8	<0.1	100	1.2
CD3	1.1	1.0	0.1	91	1.2
CD4	0.5	0.2	0.3	40	0.5
CD5	0.5	0.2	0.3	40	0.3
CD6	0.9	0.4	0.5	44	0.5

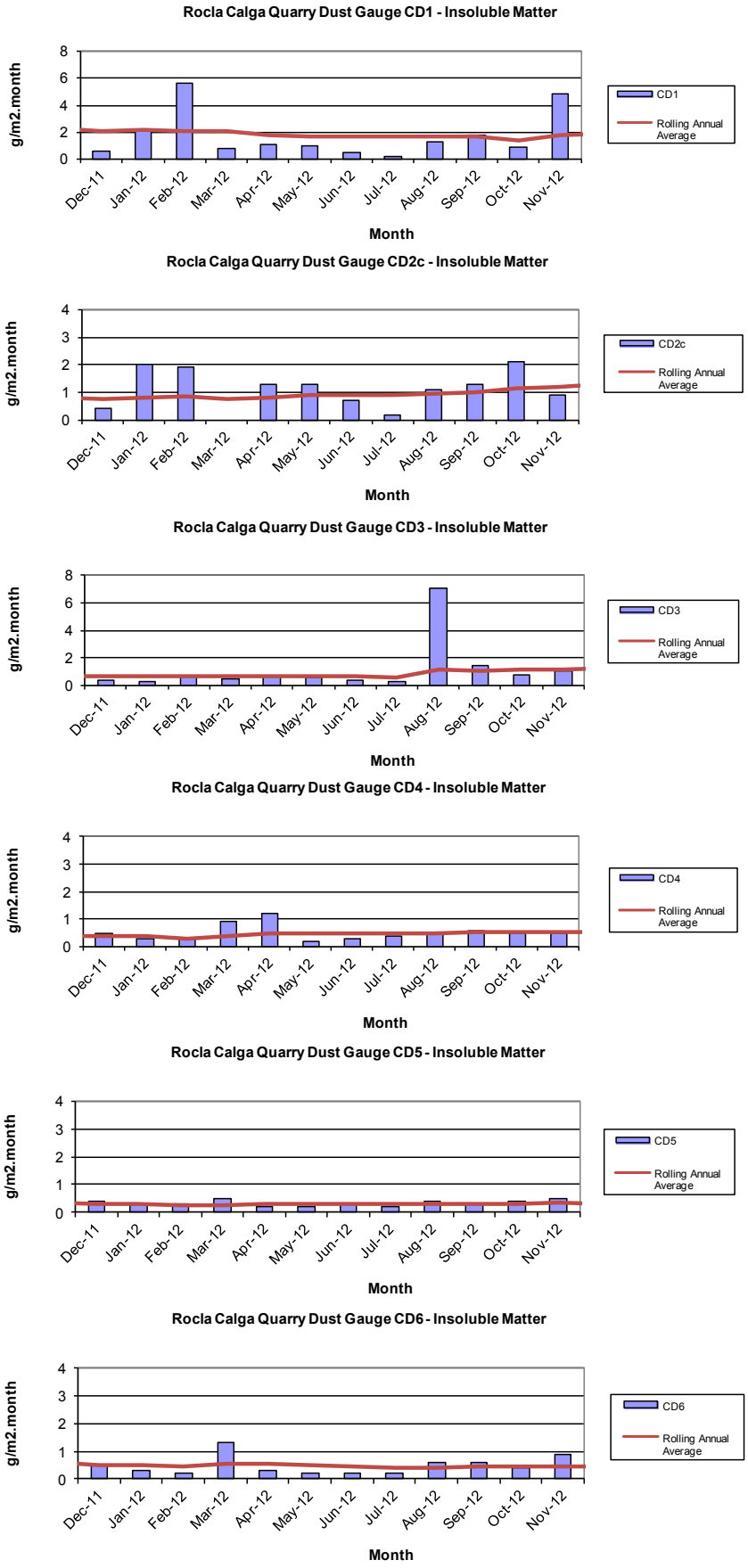
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m^2.month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from December 2011 to November 2012.

NA= Not Available.

CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations ~~"m~~ining 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 29 November 2012 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 (µS/cm)	TDS (mg/L)	TSS (mg/L)	Oil and Grease (mg/L)
A	Still	Brown	Slight	6.75	76	62	7	<5
B	Dry							
C	No Access							
D	Dry							
F	Still	Clear	Clear	6.49	65	43	<5	<5

At the time of sampling, there were no water discharges off site from any sampling location observed. Samples were collected at sites A and F. Site C was inaccessible and Sites B and D were dry 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 29 November 2012. 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 across the sampled groundwater bores compared to last month indicating water moving away from the surface. The only exception was CQ3 which decreased in water depth.

pH levels were generally similar when compared to last month and in the acidic range, except for CQ1 which decreased and was in the neutral range. EC levels remained low and relatively stable compared to the results obtained in October 2012.

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	17.06	6.5	78
CQ3	Voutos	* Monitor	10.53	10.39	5.8	110
CQ4	Voutos	* Monitor	8.78	10.60	4.2	87
CQ5	Gazzana	DIP Only	8.69	7.67	3.6	185
CQ6	Gazzana	DIP Only	16.00	11.35	3.6	215
CQ7	Gazzana	* Monitor	6.89	7.01	3.9	98
CQ8	Gazzana	* Monitor	11.03	6.47	3.8	152
CQ9	Gazzana	DIP Only	10.10	9.34	3.6	109
CQ10	Voutos	* Monitor	NI	22.01	4.6	168
CQ11S	Gazzana	* Monitor	NI	10.66	3.9	164
CQ11D	Gazzana	* Monitor	NI	11.89	4.3	154
CQ12	Gazzana	* Monitor	NI	5.03	3.8	131
CQ13	Kashouli	* Monitor	NI	13.55	4.3	212
CP3	Gazzana	Domestic	10.40	8.97	4.1	156
CP4	Kashouli	Domestic	13.63	10.81	4.5	167
CP5	Kashouli	Domestic	16.61	8.51	4.0	211
CP6	Kashouli	Domestic	16.27	11.24	3.9	204
CP7	Kashouli	Production	8.56	4.05	4.3	201
CP8	Rozmanec	Domestic	22.17	NR	NR	NR
MW7	Rocla Bore	* Monitor	15.76	16.77	4.2	113
MW8	Rocla Bore	* Monitor	9.82	7.82	4.3	82
MW9	Rocla Bore	* Monitor	22.44	21.43	4.3	87
MW10	Rocla Bore	* Monitor	15.41	13.30	4.1	125
MW13	Rocla Bore	DIP Only	NI	8.32	4.2	100
MW16	Rocla Bore	DIP Only	NI	9.02	4.4	111

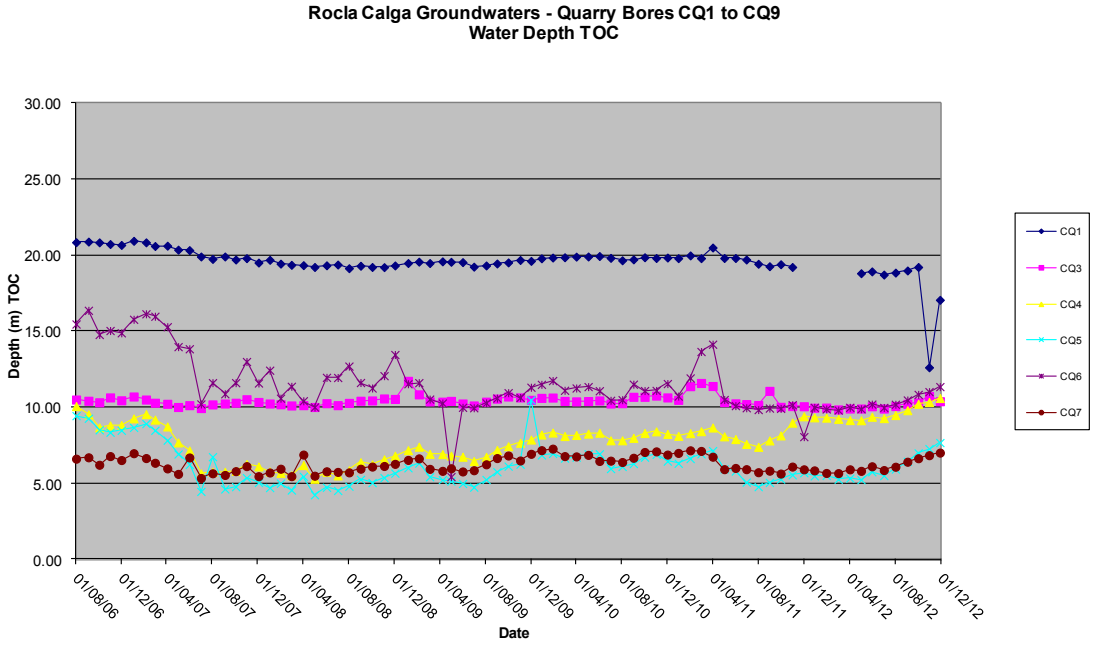
Notes:
TOC = Water level measured from top of bore case to water.
NM = Not Monitored – unable to sample water due to access restrictions.
NR = Not Required by resident.
* = Logger Installed.
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements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

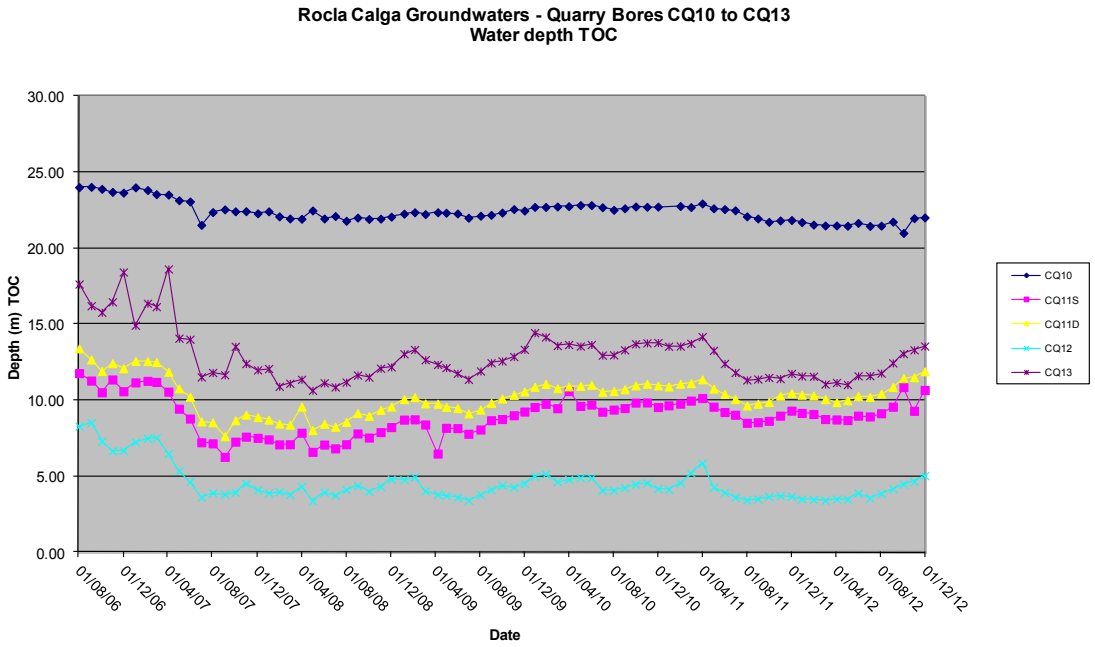
Shading is used to indicate the following trends in water depth (compared to the last reading):

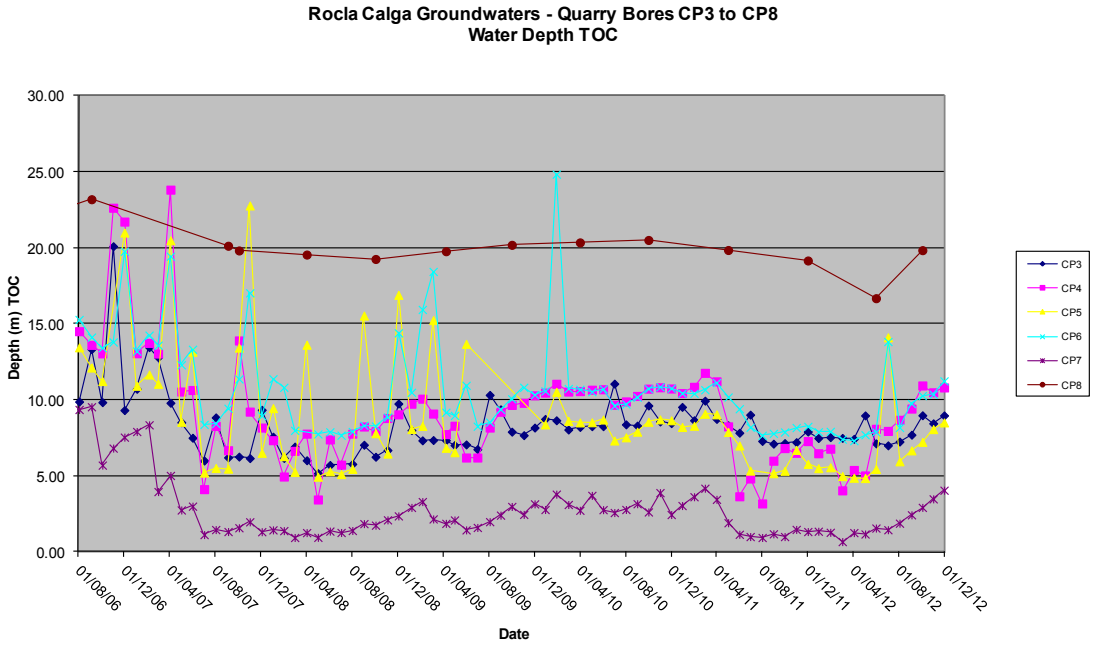
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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
01/12/09
01/04/10
01/08/10
01/12/10
01/04/11
01/08/11
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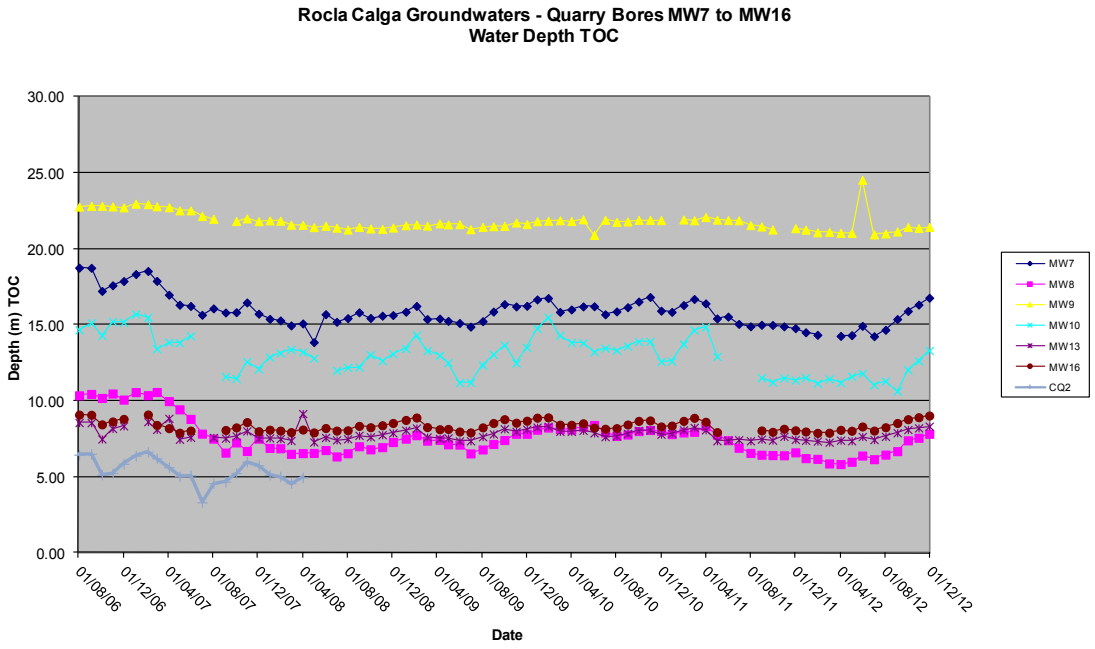
01/08/12
01/12/12
Date
CP3
CP4
CP5
CP6
CP7
CP8


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
01/08/09
01/12/09
01/04/10
01/08/10
01/12/10
01/04/11
01/08/11
01/12/11
01/04/12
01/08/12
01/12/12
Date
MW7
MW8
MW9
MW10
MW13
MW16
CQ2

2.4 Meteorological Monitoring

The Rocla Calga Quarry weather station data recovery in November was approximately 95%. No wind data is available from the 1-22 November due to a technical issue with field equipment. 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 two nearby Bureau of Meteorology (BOM) stations, Peats Ridge and Gosford are included in **Appendix 2** for comparison purposes. Data from the Peats Ridge BOM station for November 2012 was incomplete.

Data for November 2012 shows that rainfall recorded at the Rocla Calga Quarry was slightly lower than the Gosford BOM station recorded rainfall. Data is unavailable for Peats Ridge BOM station in November. Recorded rainfall at Rocla Calga Quarry was lower than the Peats Ridge long term mean rainfall for November. The rainfall comparison is provided below:

Rocla Calga Quarry	58.2 mm
BOM Peats Ridge*	NA
BOM Gosford*	63.8 mm
BOM Peats Ridge Long term mean for November*	107.0 mm

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

Results are displayed in the following table and figures.

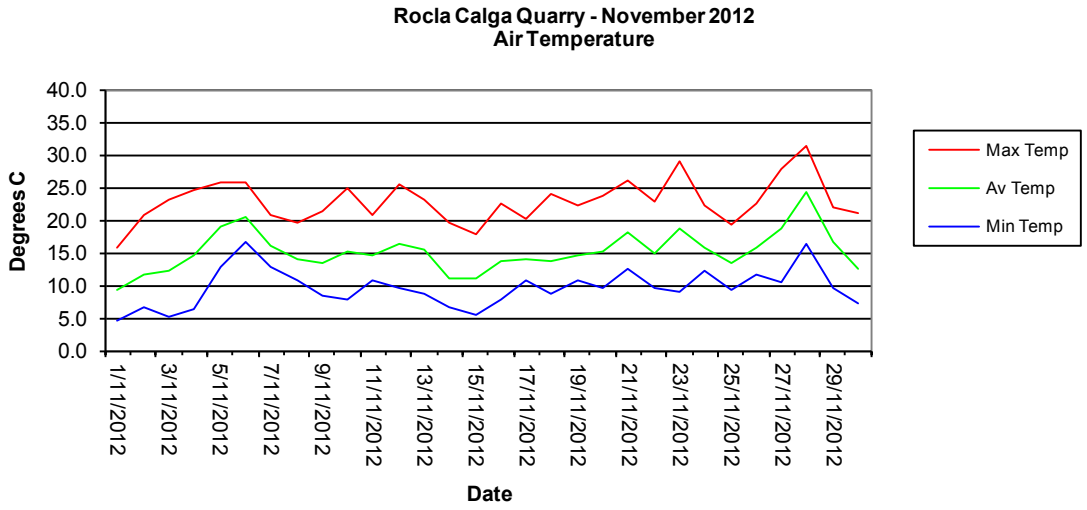
2.4.1 Monthly Meteorological Data Summary

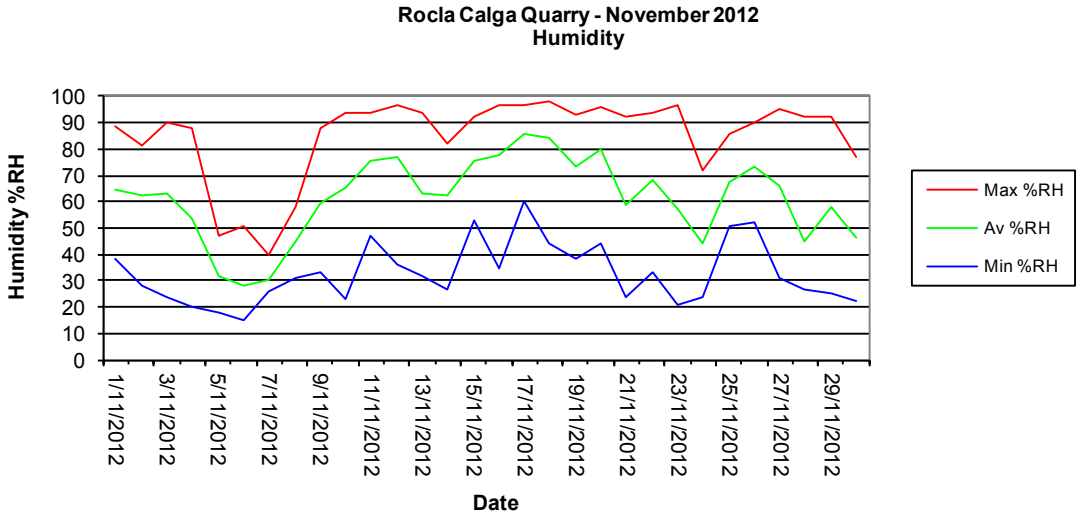
Summary **Nov-12** **Rocla - Calga**

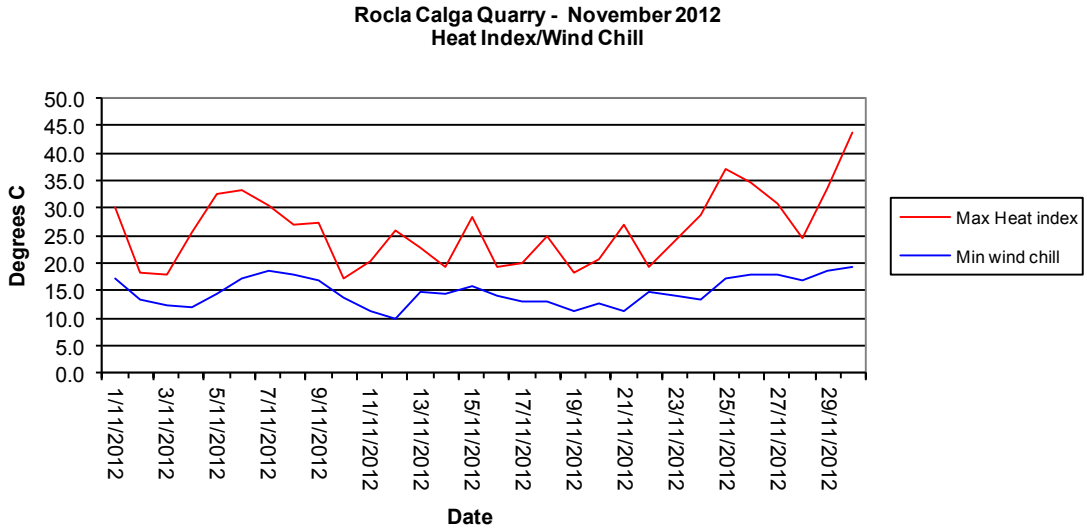
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/11/2012	4.6	9.4	15.7	38	64	89	0.0	3.0				17.4	30.2	999.7	1005.8	1012.0	0	149.6	763	98.5	99.9	100
2/11/2012	6.7	11.8	20.9	28	62	81	0.0	4.2				13.4	18.3	1006.8	1012.7	1018.2	0	280.3	1047	93.3	99.3	100
3/11/2012	5.3	12.4	23.2	24	63	90	0.8	1.4				12.3	17.8	1017.3	1019.1	1020.7	0	89.8	345	86	98.6	100
4/11/2012	6.5	14.8	24.6	20	53	88	0.4	3.5				12.1	25.5	1015.0	1017.9	1020.5	0	227.5	1120	95.6	99.3	100
5/11/2012	13.0	19.1	25.7	18	32	47	0.0	4.7				14.3	32.7	1013.6	1015.6	1018.0	0	296.3	973	96.5	99.8	100
6/11/2012	16.6	20.6	25.8	15	28	51	0.0	4.5				17.4	33.4	1010.4	1013.0	1015.3	0	258.7	968	96.2	99.8	100
7/11/2012	12.8	16.2	20.8	26	30	40	2.6	2.5				18.6	30.4	1006.7	1010.5	1013.0	0	151.0	674	96.5	99.8	100
8/11/2012	10.7	14.1	19.8	31	45	58	11.6	2.4				17.8	27.0	1006.8	1010.6	1014.0	0	148.8	928	93.3	99.6	100
9/11/2012	8.4	13.5	21.3	33	59	88	10.0	3.0				16.9	27.4	1011.0	1013.1	1017.6	0	208.6	904	93.6	99.2	100
10/11/2012	7.9	15.1	24.9	23	65	94	0.0	1.2				13.6	17.1	1017.7	1021.8	1026.2	0	87.3	409	95.6	99.1	100
11/11/2012	10.9	14.5	20.8	47	76	94	0.0	4.3				11.2	20.3	1024.3	1026.2	1027.6	0	319.5	1263	95.3	99.4	100
12/11/2012	9.8	16.4	25.4	36	77	97	0.0	4.9				9.8	26.1	1016.9	1021.4	1026.9	0	326.0	1019	94.2	98.5	100
13/11/2012	8.9	15.7	23.3	32	63	94	0.0	4.3				14.7	22.7	1014.6	1018.1	1021.1	0	296.4	996	98	99.6	100
14/11/2012	6.8	11.2	19.7	27	63	82	0.4	0.9				14.3	19.3	1015.2	1017.6	1020.4	0	63.6	346	89.2	99.1	100
15/11/2012	5.5	11.1	18.0	53	75	92	0.0	3.6				15.7	28.3	1008.4	1012.1	1017.4	0	224.8	951	94.2	99.5	100
16/11/2012	7.8	13.7	22.7	35	78	97	19.6	0.5				14.1	19.4	1008.3	1010.4	1014.3	0	30.6	153	91.8	99.1	100
17/11/2012	10.8	14.1	20.2	60	86	97	0.0	1.9				13.0	20.2	1013.3	1014.5	1016.0	0	135.9	757	88.3	99.0	100
18/11/2012	8.9	13.8	24.2	44	84	98	0.0	3.3				12.9	25.1	1005.2	1010.3	1014.3	0	211.4	1086	97.4	99.6	100
19/11/2012	10.7	14.5	22.3	38	73	93	0.0	2.9				11.2	18.3	1011.5	1014.4	1019.3	0	202.7	968	94.7	99.0	100
20/11/2012	9.7	15.4	23.9	44	80	96	0.6	3.4				12.8	20.6	1018.7	1020.4	1021.9	0	232.8	1172	92.7	99.3	100
21/11/2012	12.7	18.3	26.1	24	59	92	0.0	4.0				11.5	27.0	1009.1	1014.0	1019.6	0	261.8	1037	90.9	99.3	100
22/11/2012	9.8	15.0	23.0	33	68	94	0.0	1.1				14.7	19.2	1009.1	1015.5	1019.3	0	65.8	374	94.2	99.6	100
23/11/2012	9.1	18.7	29.0	21	57	97	0.4	2.8	0	0.7	6.7	14.2	24.3	1016.8	1018.2	1019.3	0	156.9	645	81	99.4	100
24/11/2012	12.2	15.9	22.4	24	44	72	0.0	3.6	0	1.2	8	13.4	28.6	1011.8	1015.3	1018.6	0	192.5	959	92.4	99.9	100
25/11/2012	9.4	13.6	19.4	51	68	86	0.0	6.3	0	1.8	8	17.2	37.0	1010.8	1012.1	1013.7	0	300.2	1082	100	100.0	100
26/11/2012	11.7	16.0	22.7	52	73	90	1.0	4.0	0	1.6	10.7	17.8	34.7	1010.3	1012.9	1014.6	0	208.7	1034	98.8	100.0	100
27/11/2012	10.6	18.7	27.8	31	66	95	3.8	4.3	0	2.6	9.8	17.8	30.7	1009.8	1013.2	1019.1	0	221.3	974	92.4	99.9	100
28/11/2012	16.5	24.3	31.3	27	45	92	3.6	1.3	0	1.1	6.7	17.0	24.7	1013.5	1015.6	1017.6	0	81.3	400	94.3	99.8	100
29/11/2012	9.8	16.8	21.9	25	58	92	0.4	4.0	0	1.5	9.4	18.5	33.5	1011.1	1013.7	1015.8	0	208.5	922	94.9	99.5	100
30/11/2012	7.4	12.6	21.1	22	46	77	3.0	5.5	0	2.3	14.8	19.3	43.7	1007.8	1010.8	1013.1	0	249.3	1076	97.7	99.9	100
Monthly	4.6	15.3	31.3	15	61	98	58.2	97.2	0	1.6	14.8	9.8	43.7	999.7	1014.9	1027.6	0	196.3	1263	81	99.5	100

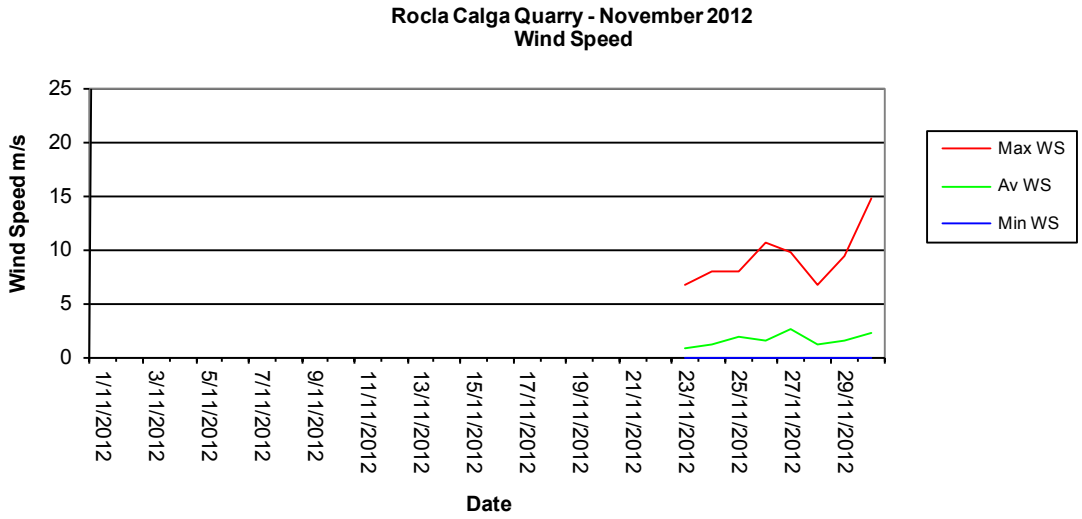
No data available

2.4.2 Monthly Weather Charts








Rocla Calga Quarry - November 2012
Wind Speed
Wind Speed m/s
25
20
15
10
5
0
1/11/2012
3/11/2012
5/11/2012
7/11/2012
9/11/2012
11/11/2012
13/11/2012
15/11/2012
17/11/2012
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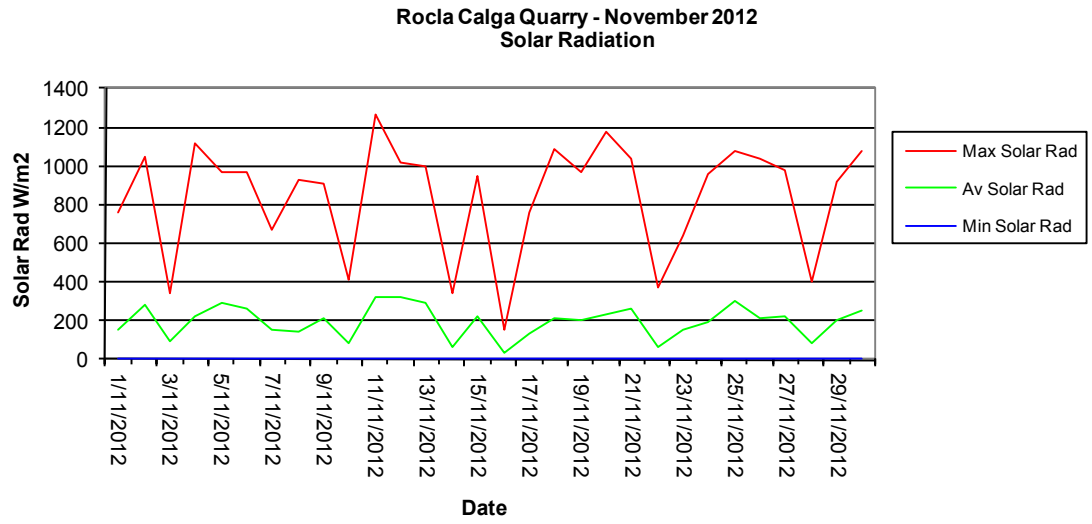
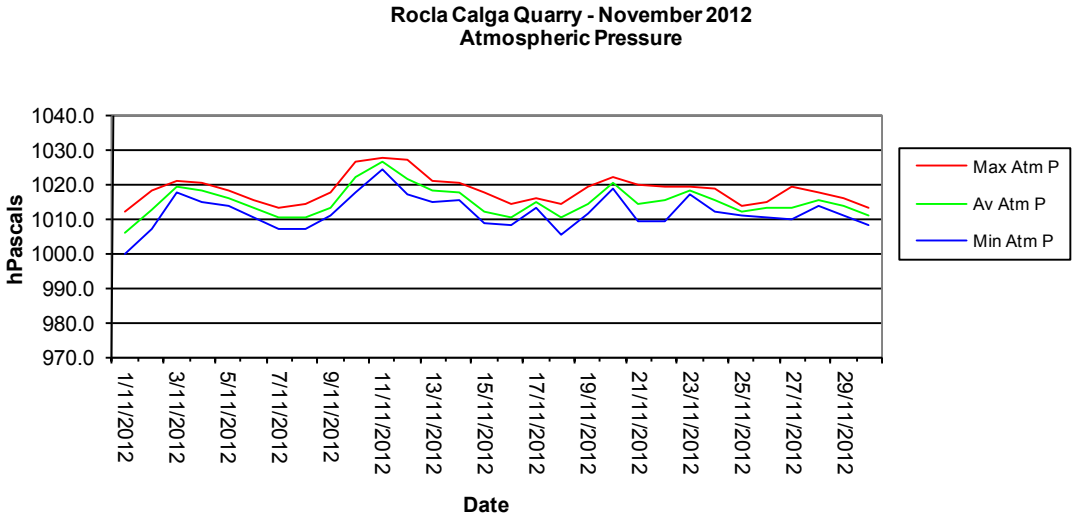
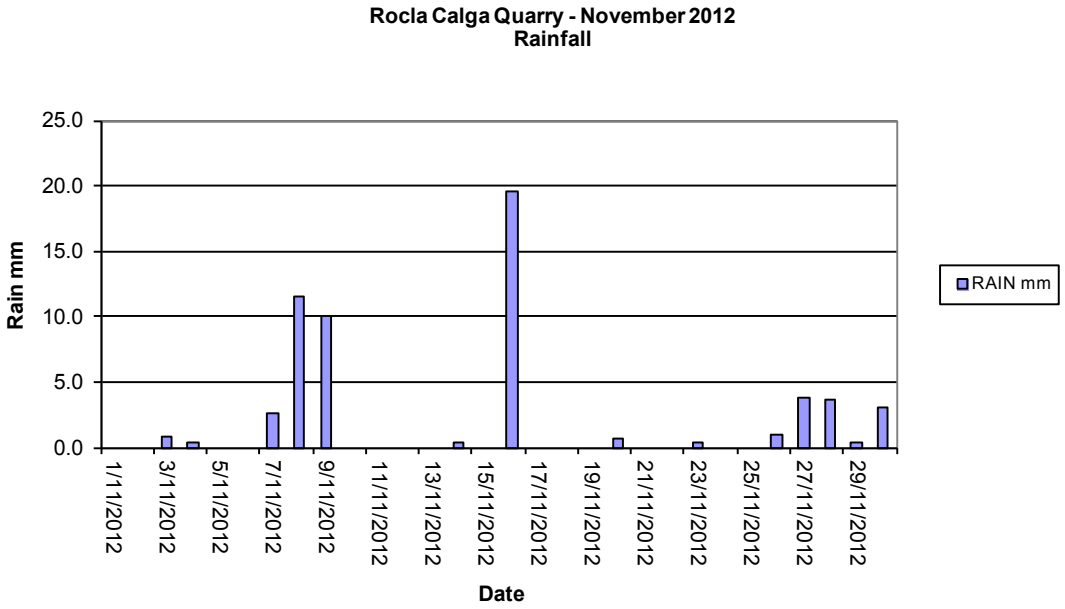
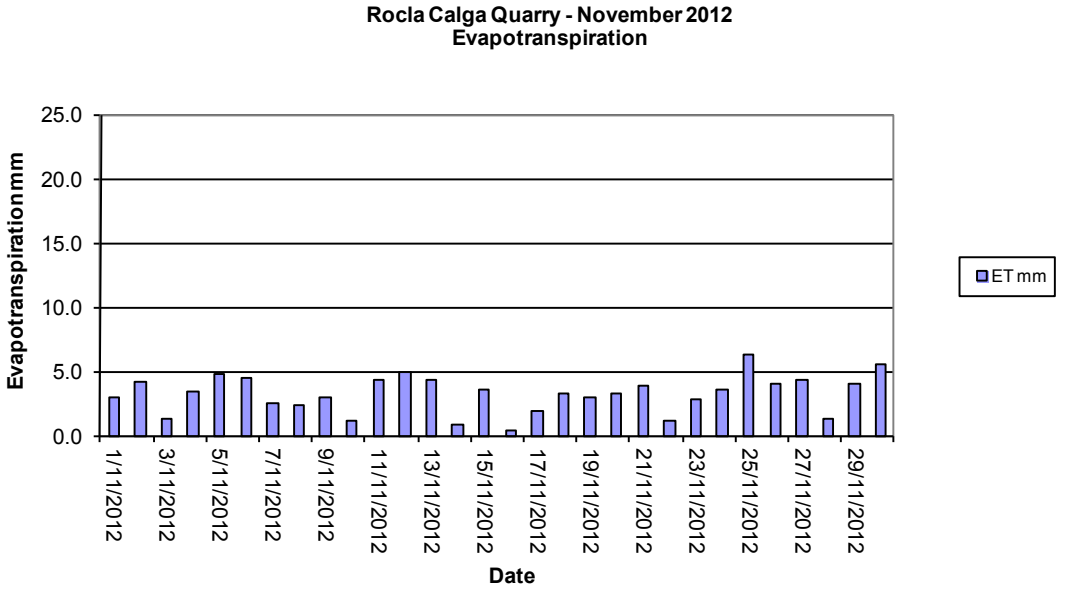
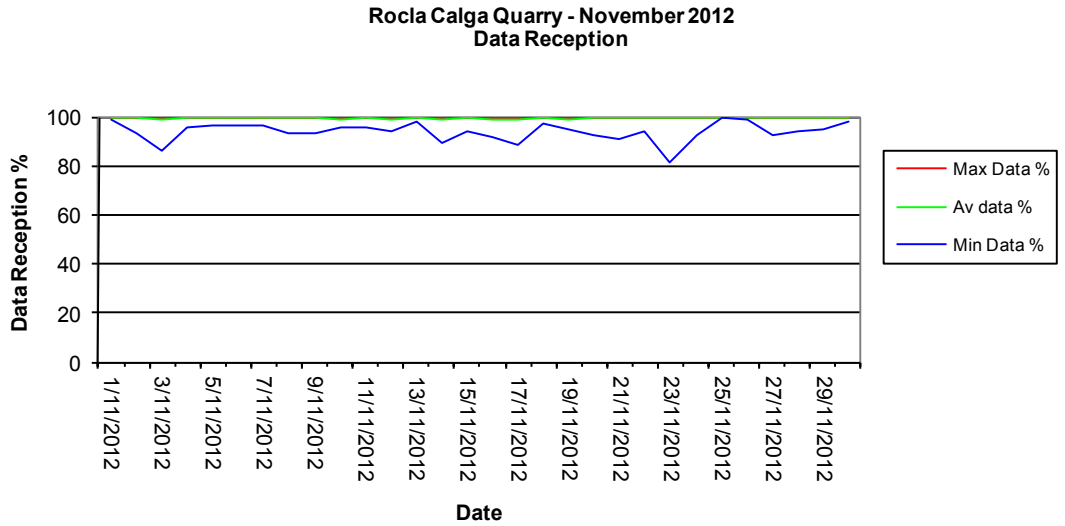
27/11/2012
29/11/2012
Date
Max WS
Av WS
Min WS


Rocla Calga Quarry - November 2012
Solar Radiation
Solar Rad W/m2
1400
1200
1000
800
600
400
200
0
1/11/2012
3/11/2012
5/11/2012
7/11/2012
9/11/2012
11/11/2012
13/11/2012
15/11/2012
17/11/2012
19/11/2012
21/11/2012
23/11/2012
25/11/2012
27/11/2012
29/11/2012
Date
Max Solar Rad
Av Solar Rad
Min Solar Rad


Rocla Calga Quarry - November 2012
Atmospheric Pressure
hPascals
1040.0
1030.0
1020.0
1010.0
1000.0
990.0
980.0
970.0
1/11/2012
3/11/2012
5/11/2012
7/11/2012
9/11/2012
11/11/2012
13/11/2012
15/11/2012
17/11/2012
19/11/2012
21/11/2012
23/11/2012
25/11/2012
27/11/2012
29/11/2012
Date
Max Atm P
Av Atm P
Min Atm P


Rocla Calga Quarry - November 2012
Rainfall
Rain mm
25.0
20.0
15.0
10.0
5.0
0.0
1/11/2012
3/11/2012
5/11/2012
7/11/2012
9/11/2012
11/11/2012
13/11/2012
15/11/2012
17/11/2012
19/11/2012
21/11/2012
23/11/2012
25/11/2012
27/11/2012
29/11/2012
Date
RAIN mm

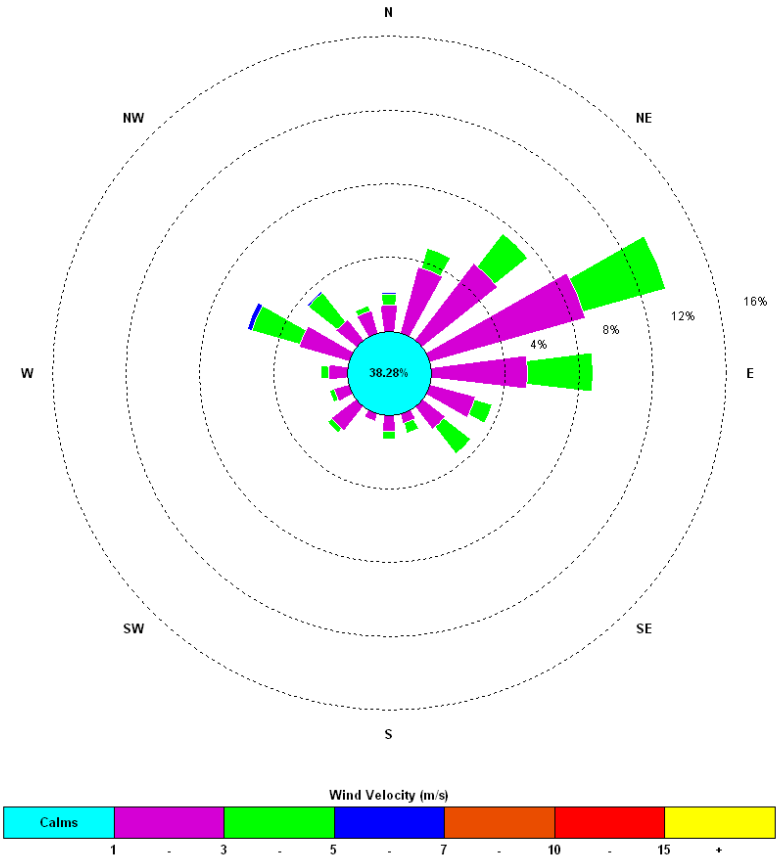

Rocla Calga Quarry - November 2012
Evapotranspiration
Evapotranspiration mm
25.0
20.0
15.0
10.0
5.0
0.0
1/11/2012
3/11/2012
5/11/2012
7/11/2012
9/11/2012
11/11/2012
13/11/2012
15/11/2012
17/11/2012
19/11/2012
21/11/2012
23/11/2012
25/11/2012
27/11/2012
29/11/2012
Date
ET mm


Rocla Calga Quarry - November 2012
Data Reception
Data Reception %
100
80
60
40
20
0
1/11/2012
3/11/2012
5/11/2012
7/11/2012
9/11/2012
11/11/2012
13/11/2012
15/11/2012
17/11/2012
19/11/2012
21/11/2012
23/11/2012
25/11/2012
27/11/2012
29/11/2012
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.

15:00, 23 November 2012 – 23:45, 30 November 2012



The predominant winds were from the NNE, with strongest winds from the WNW. The maximum wind speed was 14.8 m/s from the WSW.

Appendix 1

Laboratory Certificates

CARBON BASED ENVIRONMENTAL

DEPOSITIONAL DUST MONITORING

Client: ..... **Rocla Calga Quarry** .....

Date Installed: 31-10-12

Date Collected: 29-11-12

Collection Start Time: 7.55

Collection Stop Time: 10.40

Sampled By: Leesa King Jill peterson

Sampling ID: .....

Site	Time Collected	Water Level (mL)	Insoluble Material (✔ = slight, ✔ ✔ = mod etc)				Water Turbidity	Water Colour	Stand Level (Y/N)	Funnel Level (Y/N)	New Funnel Diameter (mm)	Comments
			Insects	Bird droppings	Vegetation	Dust						
CD1	7.50	1100ml	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	y	y		
CD2C	10.40	1100ml	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	y	y		
CD3	8.25	1100ml	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	y	y		
CD4	10.15	1100ml	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	y	y		
CD5	10.00	1100ml	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	y	y		
CD6	9.15	1100ml	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	y	y		
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				

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

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

Report broken funnels and replacement diameters

Signed: L King

AIN OF CUSTODY DOCUMENTATION

Carbon Based Environmental Pty Ltd
ADDRESS: 47 Boomerang St CESSNOCK NSW 2325
EPORT TO: Colin Davies, Renae Mikka SEND INVOICE TO: Carbon Based Environmental
EEDED BY: 7 working days REPORT NEEDED BY: 7 working days
T ID: Rocla Calga Dusts QUOTE NO.: SY/269/10
: COMMENTS/SPECIAL HANDLING/STORAGE OR DIPOSAL:
USE ONLY **also email cbased1@bigpond.com**
SEAL
No ..... Total unless specified
.... Intact ...
TEMP: deg.C

LABORATORY BATCH NO.:
SAMPLERS:Carbon Based Environmental Pty Ltd
PHONE: 0439604443 FAX: 0249904442 E-MAIL: cbased@bigpond.com, cbased1@bigpond.com
REPORT FORMAT: HARD: Yes FAX: DISK: BULLETIN BOARD: E-MAIL: Yes
QC LEVEL: QCS1: QCS2: QCS3: Yes QCS4:

Australian Laboratory Services Pty Ltd

SAMPLE DATA				CONTAINER DATA		ANALYSIS REQUIRED				NOTES
SAMPLE ID	MATRIX	DATE ON	DATE OFF	TYPE & PRESERVATIVE	NO.	Insoluable Solids	Ash Residue	Combustable Matte		
CD1	Dust	31-10-12	29-11-12							
CD2c	Dust	↓	↓			x	x	x		
CD3	Dust					x	x	x		
CD4	Dust					x	x	x		
CD5	Dust					x	x	x		
CD6	Dust					x	x	x		

RELINQUISHED BY:

olin Davies + Leesa King DATE: 29-11-12
n Based Environmental TIME: 1-10
DATE:
TIME:

RECEIVED BY

NAME : Sma DATE: 29/11/12
OF: ALS TIME: 13:10.
NAME : DATE:
OF: TIME:

METHOD OF SHIPMENT
CONSIGNMENT NOTE NO.
TRANSPORT CO. NAME.

Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle;
ochloric 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;
.

AUSTRALIAN LABORATORY SERVICES P/L

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EN1204542	Page	: 1 of 4
Client	: CARBON BASED ENVIRONMENTAL	Laboratory	: Environmental Division Newcastle
Contact	: MR COLIN DAVIES	Contact	: Peter Keyte
Address	: 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325	Address	: 5 Rosegum Road Warabrook 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 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 29-NOV-2012
Sampler	: CB	Issue Date	: 07-DEC-2012
Site	: ----		
Quote number	: ----	No. of samples received	: 6
		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

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

- **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)

Compound	CAS Number	LOR	Unit	Client sample ID	CD1 31/10/12 - 29/11/12	CD2C 31/10/12 - 29/11/12	CD3 31/10/12 - 29/11/12	CD4 31/10/12 - 29/11/12	CD5 31/10/12 - 29/11/12
				Client sampling date / time	[29-NOV-2012]	[29-NOV-2012]	[29-NOV-2012]	[29-NOV-2012]	[29-NOV-2012]
					EN1204542-001	EN1204542-002	EN1204542-003	EN1204542-004	EN1204542-005
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		4.6	0.8	1.0	0.2	0.2
Ash Content (mg)	----	1	mg		79	13	17	4	4
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		0.3	<0.1	0.1	0.3	0.3
Combustible Matter (mg)	----	1	mg		4	1	1	4	4
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		4.9	0.8	1.1	0.5	0.5
Total Insoluble Matter (mg)	----	1	mg		83	14	18	8	8

Analytical Results

Sub-Matrix: DUST (Matrix: AIR)

Compound	CAS Number	LOR	Unit	Client sample ID: CD6 31/10/12 - 29/11/12	----	----	----	----
				Client sampling date / time: [29-NOV-2012]	----	----	----	----
				EN1204542-006	----	----	----	----
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	0.4	----	----	----	----
Ash Content (mg)	----	1	mg	7	----	----	----	----
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	0.5	----	----	----	----
Combustible Matter (mg)	----	1	mg	8	----	----	----	----
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	0.9	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	15	----	----	----	----

CARBON BASED ENVIRONMENTAL PTY LIMITED

Date:

Todays Collection	
Time Start:	8.40
Time Finish:	9.00

Client : Rocla Calga

Project :

SURFACE WATERS

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	Still	N	9.00	1x 250ml GP, 1x 1L GP, 1x PG	C (S) T	C LO O (B) G	light Brown
B	~~—~~			1x 250ml GP, 1x 1L GP, 1x PG	~~C S T~~	~~C LO O B G~~	DRY
C	~~—~~			1x 250ml GP, 1x 1L GP, 1x PG	C S T	~~C LO O B G~~	No ACCESS
D	~~—~~			1x 250ml GP, 1x 1L GP, 1x PG	~~C S T~~	~~C LO O B G~~	
F	Still	N	8.40	1x 250ml GP, 1x 1L GP, 1x PG	(C) S T	(C) LO O B G	DRY
					C S T	C LO O B G	
					C S T	C LO O B G	
					C S T	C LO O B G	
					C S T	C LO O B G	
					C S T	C LO O B G	

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

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

Signed: L King

Sampled by: Leesa King + Jill Peterson

AIN OF CUSTODY DOCUMENTATION

: Carbon Based Environmental Pty Ltd
L ADDRESS: 47 Boomerang St CESSNOCK NSW 2325
EPORT TO: Colin Davies, Renae Mikka SEND INVOICE TO: Carbon Based Environmental
EEDED BY: 7 working days REPORT NEEDED BY: 7 working days
CT ID: Rocla Quarry QUOTE NO.: SY/ 428/12
.: COMMENTS/SPECIAL HANDLING/STORAGE OR DIPOSAL:
B USE ONLY **also email results to cbased1@bigpond.com**
R SEAL
No ..... Total unless specified
..... Intact ...
R TEMP: deg.C

LABORATORY BATCH NO.:
SAMPLERS:Carbon Based Environmental Pty Ltd
PHONE: 0439604443 FAX: 0249904442 E-MAIL: cbased@bigpond.com, cbased1@bigpond.com
REPORT FORMAT: HARD: Yes FAX: DISK: BULLETIN BOARD: E-MAIL: Yes
QC LEVEL: QCS1: QCS2: QCS3: Yes QCS4:

Australian Laboratory Services Pty Ltd

ANALYSIS REQUIRED

SAMPLE DATA				CONTAINER DATA		Ph	EC	TSS	TDS	O + G	NOTES
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.						
A	Water	29-11-12				x	x	x	x	x	
B	~~Water~~					x	x	x	x	x	
C	~~Water~~					x	x	x	x	x	
D	~~Water~~					x	x	x	x	x	
F	Water	29-11-12				x	x	x	x	x	

Environmental Division
Sydney
Work Order
ES1228189

Telephone : +61-2-8784 8555

RELINQUISHED BY:
Colin Davies & Leesa King DATE: 29-11-12
on Based Environmental TIME: 1-10
DATE:
TIME:

RECEIVED BY
NAME : [illegible] DATE: 29/11/12
OF: MS TIME: 17:00
NAME : DATE:
OF: TIME:

METHOD OF SHIPMENT
CONSIGNMENT NOTE NO.
TRANSPORT CO. NAME.

er Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle;
rochloric 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;
er.

AUSTRALIAN LABORATORY SERVICES P/L

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1228189**	Page	: 1 of 3
Client	: **CARBON BASED ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: MR COLIN DAVIES	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 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 29-NOV-2012
Sampler	: ----	Issue Date	: 05-DEC-2012
Site	: ----		
Quote number	: SY-273-11	No. of samples received	: 2
		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*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle
Sarah Millington	Senior Inorganic Chemist	Sydney 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

- **Sample ES1228189-001 shows poor duplicate results for pH due to the sample matrix. Confirmed by re-analysis. Results were 6.75, 6.66, 6.70, 6.62.**
- **Sample ES1228189-002 shows poor duplicate results for pH due to the sample matrix. Confirmed re-analysis. Results were 6.49, 6.30, 6.18.**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID	A	F	----	----	----
				Client sampling date / time	[29-NOV-2012]	[29-NOV-2012]	----	----	----
					ES1228189-001	ES1228189-002	----	----	----
EA005: pH									
pH Value	----	0.01	pH Unit		6.75	6.49	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		76	65	----	----	----
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L		62	43	----	----	----
EA025: Suspended Solids									
Suspended Solids (SS)	----	5	mg/L		7	<5	----	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	----	----	----

CARBON BASED ENVIRONMENTAL PTY LIMITED

Todays Collection	
Time Start:	8·10
Time Finish:	12-00

Date: 29·11·12

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	17.06	Nil	(C) S T	(C) LO O B G	6.72	82.5us	6.45	77.6us	1x 250ml GP, 1x 1L GP, 1RP	Yes
CQ3	10.39	N	(C) S T	(C) LO O B G	5-88	112-2us	5-83	109·8us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ4	10·60	N	(C) S T	(C) LO O B G	4.16	88·2us	4.17	86.5us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ5	7·67	N	(C) S T	(C) LO O B G	3·62	182·3us	3·61	185·4us	1x 250ml GP, 1x 1L GP, 1RP	
CQ6	11·35	N	(C) S T	(C) LO O B G	3·62	216·5us	3·64	214.7us	1x 250ml GP, 1x 1L GP, 1RP	
CQ7	7·01	N	(C) S T	(C) LO O B G	3·86	99·5us	3·90	98·2us	1x 250ml GP, 1x 1L GP, 1RP	NO
CQ8	6·47	N	(C) S T	(C) LO O B G	3·83	152·0us	3·82	152·1us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ9	9·34	N	(C) S T	(C) LO O B G	3·63	109·9us	3·60	108·9us	1x 250ml GP, 1x 1L GP, 1RP	
CQ10	22·01	N	(C) S T	(C) LO O B G	4·68	169·7us	4·59	168·3us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ11S	10.66	N	(C) S T	(C) LO O B G	3·85	163·9us	3·85	163·7us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ11D	11·89	N	(C) S T	(C) LO O B G	4·18	154·4us	4·27	153·8us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ12	5·03	N	(C) S T	(C) LO O B G	3·81	129·7us	3·79	130·5us	1x 250ml GP, 1x 1L GP, 1RP	NO
CQ13	13·55	N	(C) S T	(C) LO O B G	4·26	211·9us	4·28	211·8us	1x 250ml GP, 1x 1L GP, 1RP	NO
CP3	8·97	N	(C) S T	(C) LO O B G	4·11	156·8us	4·13	156·4us	1x 250ml GP, 1x 1L GP, 1RP	
CP4	10.81	N	(C) S T	(C) LO O B G	4.45	167.4us	4.48	167.1us	1x 250ml GP, 1x 1L GP, 1RP	
CP5	8·51	N	(C) S T	(C) LO O B G	3·98	210·8us	3·97	210·7us	1x 250ml GP, 1x 1L GP, 1RP	
CP6	11·24	N	(C) S T	(C) LO O B G	3·96	202·7us	3·94	204·us	1x 250ml GP, 1x 1L GP, 1RP	
CP7	4.05	N	(C) S T	(C) LO O B G	4·22	199·5us	4·26	201·3us	1x 250ml GP, 1x 1L GP, 1RP	
CP8			C S T	C LO O B G					1x 250ml GP, 1x 1L GP, 1RP	Only required Apr/Oct
MW7	16.77	N	(C) S T	(C) LO O B G	4·21	90.7us	4.15	113·1us	1x 250ml GP, 1x 1L GP, 1RP	NO
MW8	7·82	N	(C) S T	(C) LO O B G	4·36	84·1us	82·3us	4·29	1x 250ml GP, 1x 1L GP, 1RP	yes
MW9	21·43	N	(C) S T	(C) LO O B G	4·43	86·9us	4·29	86·5us	1x 250ml GP, 1x 1L GP, 1RP	yes
MW10	13·30	N	(C) S T	(C) LO O B G	4·18	124·0us	4·09	124·9us	1x 250ml GP, 1x 1L GP, 1RP	yes
MW13	8·32	N	(C) S T	(C) LO O B G	4·37	100·6us	4·23	99·7us	1x 250ml GP, 1x 1L GP, 1RP	
MW16	9·02	N	(C) S T	(C) LO O B G	4·48	111·5us	4·35	110.7us	1x 250ml GP, 1x 1L 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 #: 5

Signed: LKing

Sampled by: Leesa King
Jill Peterson

Appendix 2

Additional Bureau of Meteorology Data from Peats Ridge and Gosford Monitoring Stations

Peats Ridge, New South Wales
November 2012 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Th			0	6.2																
2	Fr			0	6.4																
3	Sa																				
4	Su			0.6	2.4																
5	Mo			0	4.6																
6	Tu			0	5.2																
7	We			0	6.0																
8	Th																				
9	Fr																				
10	Sa																				
11	Su																				
12	Mo																				
13	Tu																				
14	We																				
15	Th																				
16	Fr																				
17	Sa																				
18	Su																				
19	Mo																				
20	Tu																				
21	We																				
22	Th																				
23	Fr																				
24	Sa																				
25	Su																				
26	Mo																				
27	Tu																				
28	We																				
29	Th			2.0	1.6																
Statistics for November 2012																					
Mean					4.6																
Lowest					1.6																
Highest				2.0	6.4																
Total				2.6	32.4																

Observations were drawn from Peats Ridge (Waratah Road) {station 061351}

The closest station with pressure observations is at Norah Head, about 32 km to the east. The closest station with sunshine observations is at Williamtown, about 82 km to the northeast.

IDCJDW2110.201211 Prepared at 13:01 UTC on 21 Dec 2012

Gosford, New South Wales
November 2012 Daily Weather Observations

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Th	11.0	35.5	0			W	37	18:02	24.3	58		E	4		33.6	16		NW	9	
2	Fr	11.0	20.3	0			SE	35	10:24	17.7	51		SE	19		19.3	44		SE	15	
3	Sa	11.9	19.8	1.8			ESE	20	15:41	15.4	99			Calm		18.4	59		SE	11	
4	Su	11.0	24.9	0.2			NE	28	15:30	19.0	95		SE	7		23.7	56		NE	13	
5	Mo	11.8	29.4	0			NNE	24	15:26	21.9	86			Calm		26.4	54		E	13	
6	Tu	14.3	30.1	0			NNE	46	13:24	24.7	66		E	6		27.8	50		E	13	
7	We	17.2	29.2	0			NNE	19	14:24	22.2	98		NNE	4		25.9	60		NE	9	
8	Th	15.7	28.6	0			S	31	10:23	24.7	56		NNW	9		25.7	54		ESE	13	
9	Fr	18.2	27.6	13.2			E	26	22:02	23.2	83		N	6		21.8	100		NNE	6	
10	Sa	16.8	19.6	4.6			S	31	16:40	17.4	74		SE	11		17.3	70		SE	13	
11	Su	9.0	21.8	0.4			ESE	35	12:08	19.3	38		E	7		20.4	44		ESE	13	
12	Mo	7.0	24.6	0			NW	31	10:37	19.8	52		N	13		23.4	44		ENE	11	
13	Tu	10.9	21.9	0			ESE	35	12:32	20.4	64		SE	11		20.1	61		SE	17	
14	We	15.3	20.0	0			SE	19	11:24	17.9	98		NNE	2		17.9	99		ENE	6	
15	Th	15.2	26.6	0.4			NE	20	15:36	19.9	98		ESE	2		26.1	55		ENE	6	
16	Fr	16.8	17.5	3.8			S	26	22:23				NW	4						Calm	
17	Sa	12.8	20.8	16.4			NE	19	12:00	16.9	86		SE	7		19.2	56		E	7	
18	Su	11.1	24.6	0			SE	39	21:06	20.6	69		ENE	7		23.2	61		E	15	
19	Mo	11.3	20.6	0			SE	39	14:38	18.0	43		SSE	11		18.1	50		SSE	11	
20	Tu	14.3	21.3	13.6			SE	37	03:27	18.7	81		SE	17		19.8	58		SE	13	
21	We	9.1	25.1	0			NE	26	14:58	20.0	75		NNW	11		23.4	66		E	9	
22	Th	15.3	20.6	0			SSE	35	03:49	18.4	83		SE	11		18.7	71		SE	13	
23	Fr	14.4	21.7	0			SSE	20	11:51	19.0	74		SE	7		20.6	61		E	7	
24	Sa	11.5	27.4	0			E	26	16:36	20.8	94		S	4		23.6	76		ENE	9	
25	Su	14.7	34.2	0			SE	22	11:46	27.4	70		SSE	7		30.1	39		SE	11	
26	Mo	16.3	27.6	0			S	24	15:52	23.3			SSE	6		25.9			SSE	6	
27	Tu	17.6	26.7	2.2			SE	31	10:25	23.4			SSE	6		23.5			SSE	9	
28	We	16.1	24.2	4.4			NNW	19	20:46				ENE	2		23.0			SSW	2	
29	Th	18.0	28.1	2.8			NE	26	16:36	22.3			NE	2		27.8	75		E	9	
30	Fr	17.6	35.7	0			NNW	26	19:39	27.0			ENE	2		31.6	55		ESE	11	
Statistics for November 2012																					
	Mean	13.8	25.2							20.8	74			6		23.3	59			10	
	Lowest	7.0	17.5							15.4	38			Calm		17.3	16			Calm	
	Highest	18.2	35.7	16.4			NNE	46		27.4	99		SE	19		33.6	100		SE	17	
	Total			63.8																	

Observations were drawn from Gosford (Narara Research Station) AWS {station 061087}

The closest station with pressure observations is at Norah Head about 27 km to the northeast. The closest station with cloud and evaporation data is at Peats Ridge about 15 km to the northwest . The closest station with sunshine observations is at Sydney Airport about 59 km to the south.

IDCJDW2048.201211 Prepared at 13:00 UTC on 21 Dec 2012