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

December 2012

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

The December 2012 dust deposition results for insoluble solids were generally similar when compared to those of November 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 2 January 2013 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 2 January 2013. 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%. Recorded rainfall on site for December was 89.8 mm, which was slightly lower than the Peats Ridge long-term average for December. No data is available from the Peats Ridge BOM station in December for comparison. Results are detailed below:

Rocla Calga Quarry	89.8 mm
BOM Peats Ridge*	Not Available
BOM Gosford*	118.0 mm
BOM Peats Ridge Long term mean for December*	95.4 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 December 2012 and the project 12 month rolling average. Results are in g/m^2.month.

Table 1: Dust Deposition results: 29 November 2012 – 2 January 2013 (34 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	1.1	1.0	0.1	91	1.8
CD2c	1.7	1.2	0.5	71	1.3
CD3	1.3	1.0	0.3	77	1.3
CD4	0.6	0.3	0.3	50	0.5
CD5	0.5	0.3	0.2	60	0.3
CD6	0.9	0.5	0.4	56	0.5

****Note:** The dust gauges could not be collected on the originally scheduled sampling date (28/12/12) as the quarry was closed.

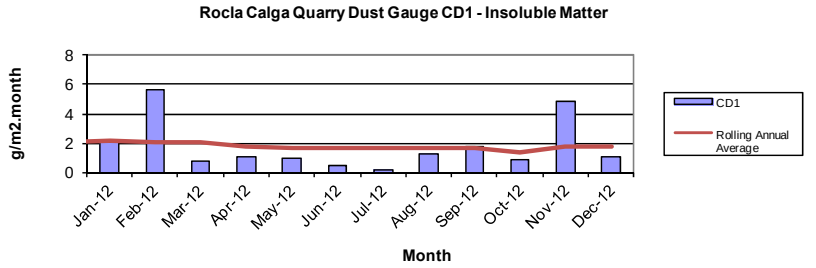
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m^2.month; the Development Consent's annual average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

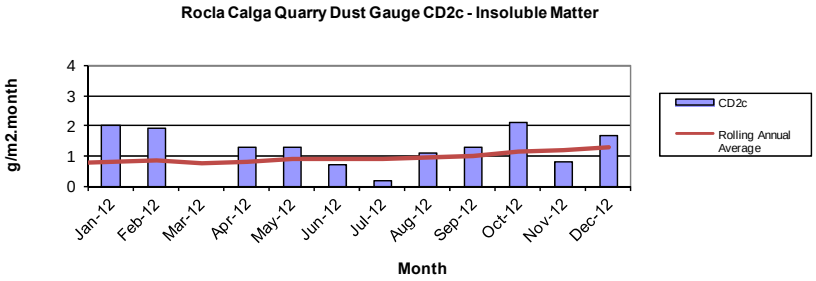
NA= Not Available.

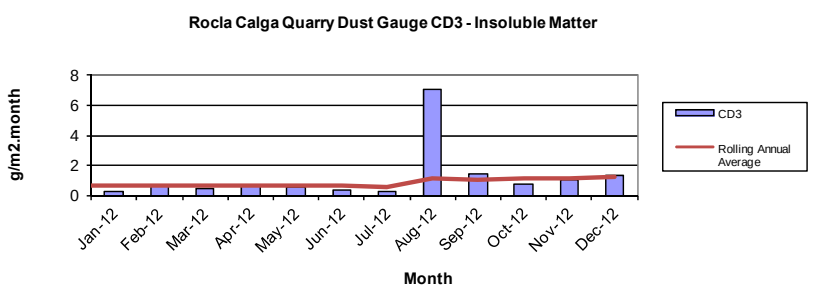
CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air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

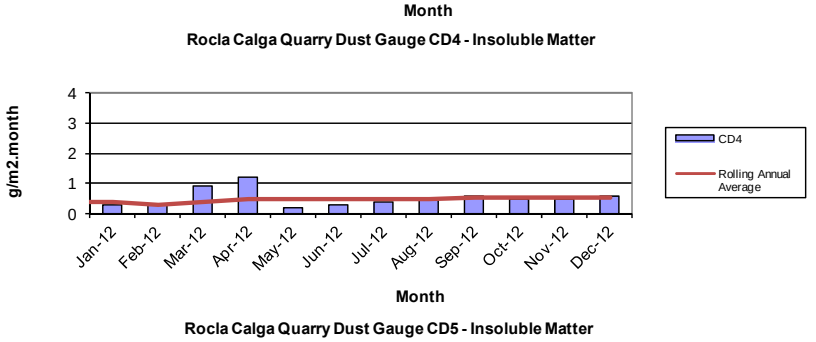
Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The laboratory analysis is provided in **Appendix 1.**

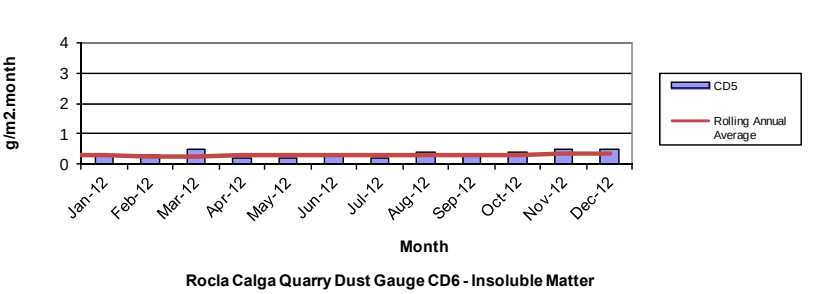
Figure 2: Dust Deposition Charts

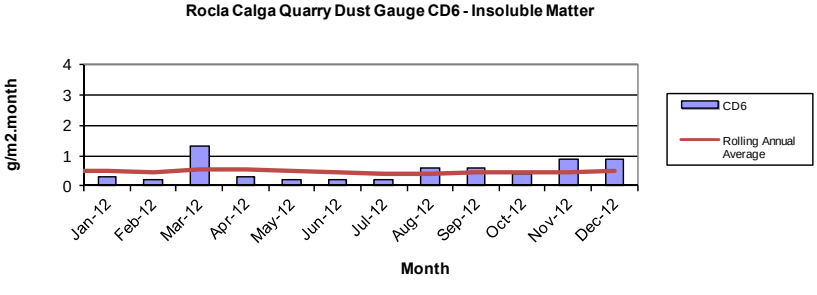












2.2 Surface Water Monitoring

Monthly surface water monitoring was conducted on the 2 January 2013 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1.**

Table 2: Monthly surface water monitoring – December 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	6.21	69	37	<5	<5
B	Dry							
C	No Access							
D	Dry							
F	Still	Clear	Clear	6.31	62	38	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 2 January 2013. 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. Exceptions were CQ3, CQ9 and CP6 which decreased in water depth.

pH levels were generally similar when compared to last month except for CQ1 which decreased. pH at all sites is in the acidic range. EC levels remained low and relatively stable compared to the results obtained in November 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	19.03	5.5	103
CQ3	Voutos	* Monitor	10.53	10.32	5.5	113
CQ4	Voutos	* Monitor	8.78	10.87	4.2	91
CQ5	Gazzana	DIP Only	8.69	8.00	3.8	188
CQ6	Gazzana	DIP Only	16.00	11.60	3.8	220
CQ7	Gazzana	* Monitor	6.89	7.12	4.1	101
CQ8	Gazzana	* Monitor	11.03	6.79	3.9	154
CQ9	Gazzana	DIP Only	10.10	9.28	4.0	111
CQ10	Voutos	* Monitor	NI	22.04	4.9	187
CQ11S	Gazzana	* Monitor	NI	10.99	4.0	169
CQ11D	Gazzana	* Monitor	NI	12.15	4.1	159
CQ12	Gazzana	* Monitor	NI	5.24	3.9	127
CQ13	Kashouli	* Monitor	NI	14.10	4.1	226
CP3	Gazzana	Domestic	10.40	9.39	4.0	160
CP4	Kashouli	Domestic	13.63	11.30	4.4	212
CP5	Kashouli	Domestic	16.61	9.09	3.9	257
CP6	Kashouli	Domestic	16.27	11.21	3.8	202
CP7	Kashouli	Production	8.56	4.27	4.2	182
CP8	Rozmanec	Domestic	22.17	NR	NR	NR
MW7	Rocla Bore	* Monitor	15.76	17.02	4.1	122
MW8	Rocla Bore	* Monitor	9.82	8.12	4.1	108
MW9	Rocla Bore	* Monitor	22.44	21.49	4.0	91
MW10	Rocla Bore	* Monitor	15.41	13.75	3.8	128
MW13	Rocla Bore	DIP Only	NI	8.37	4.0	105
MW16	Rocla Bore	DIP Only	NI	9.06	3.9	114

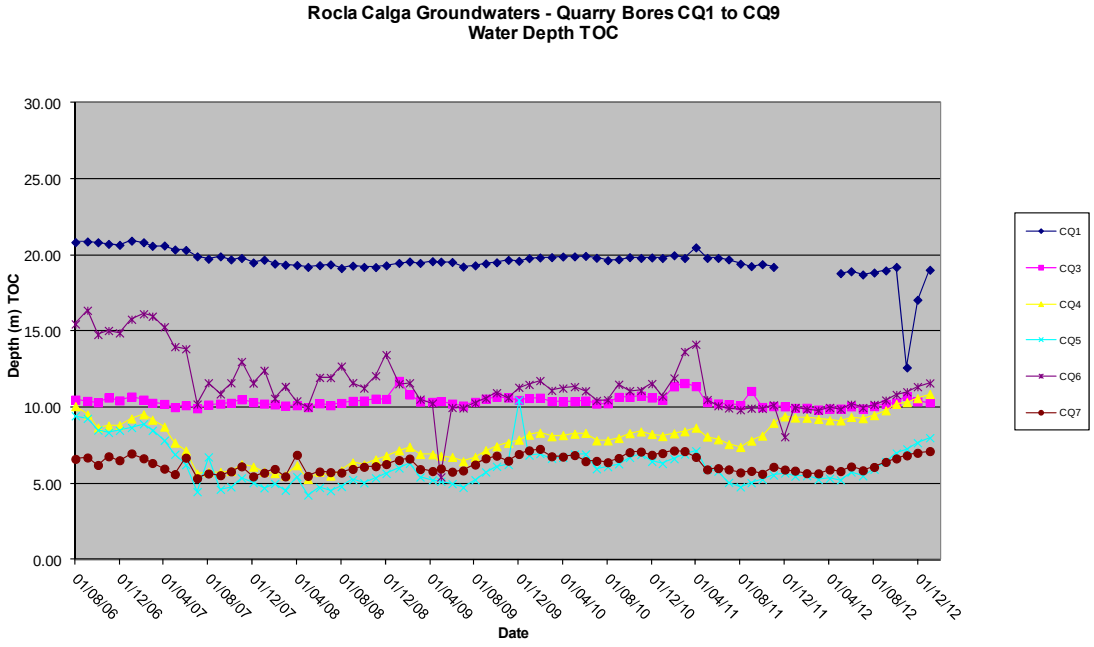
Notes:
TOC = Water level measured from top of bore case to water.
NM = Not Monitored – unable to sample water due to access restrictions.
NR = Not Required by resident.
* = Logger Installed.
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements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

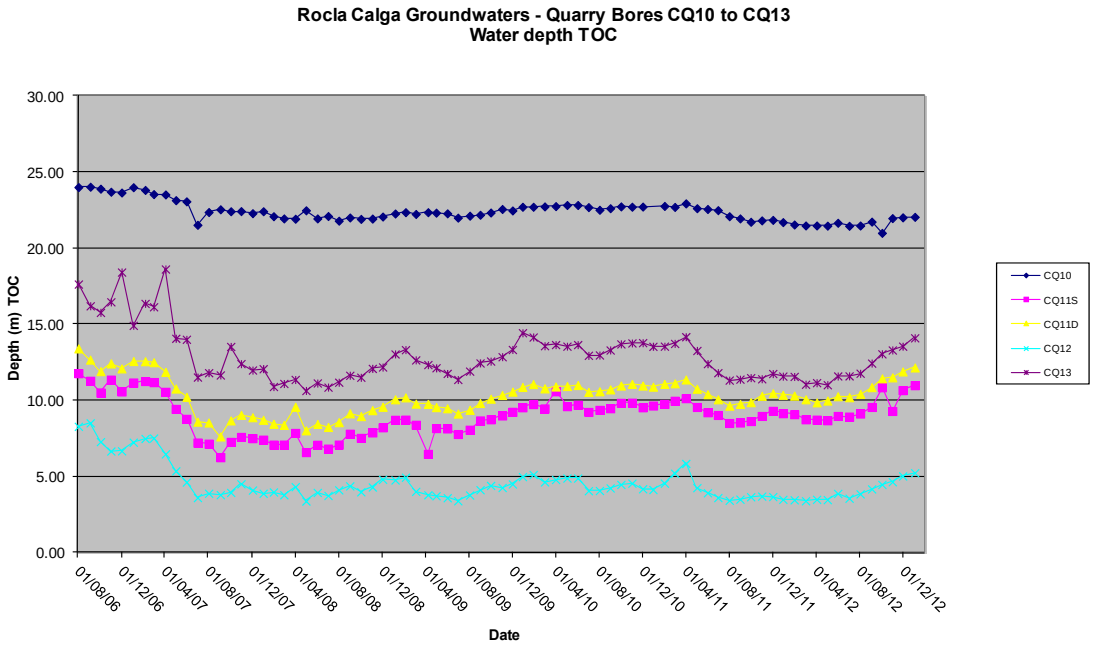
Shading is used to indicate the following trends in water depth (compared to the last reading):

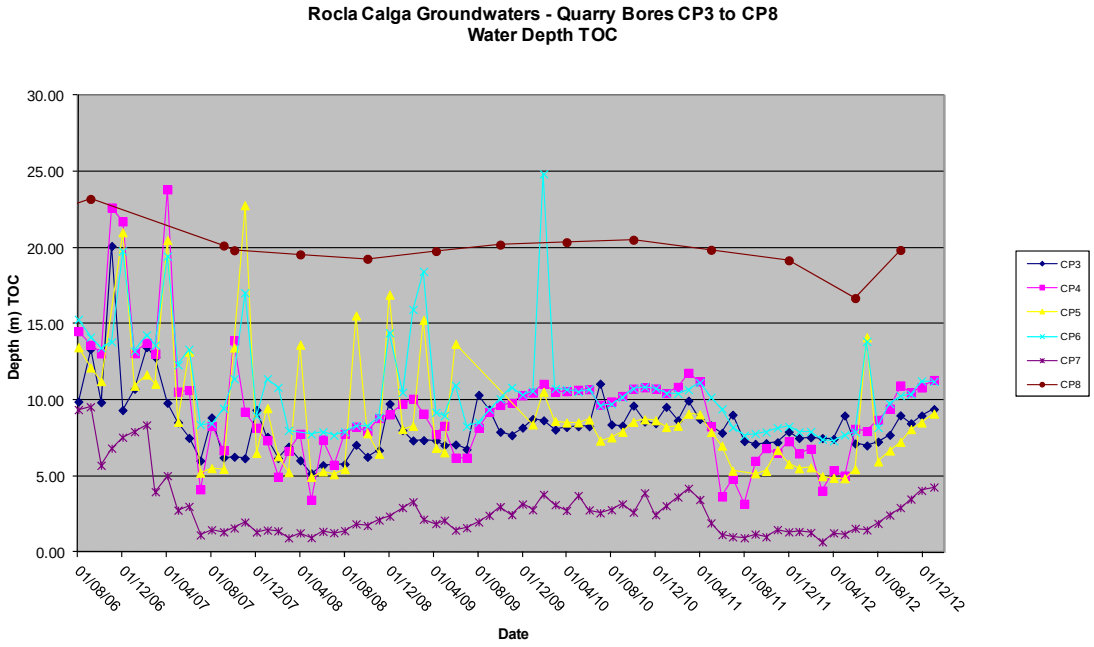
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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
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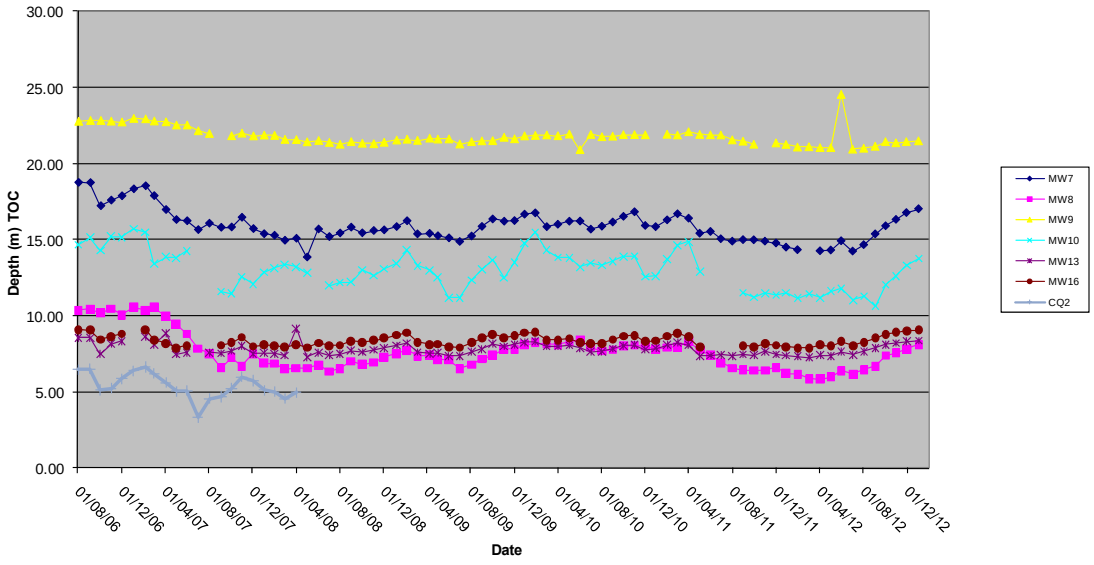
Date
CP3
CP4
CP5
CP6
CP7
CP8


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 December 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 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 December 2012 was unavailable.

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

Rocla Calga Quarry	89.8 mm
BOM Peats Ridge*	Not Available
BOM Gosford*	118.0 mm
BOM Peats Ridge Long term mean for December*	95.4 mm

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

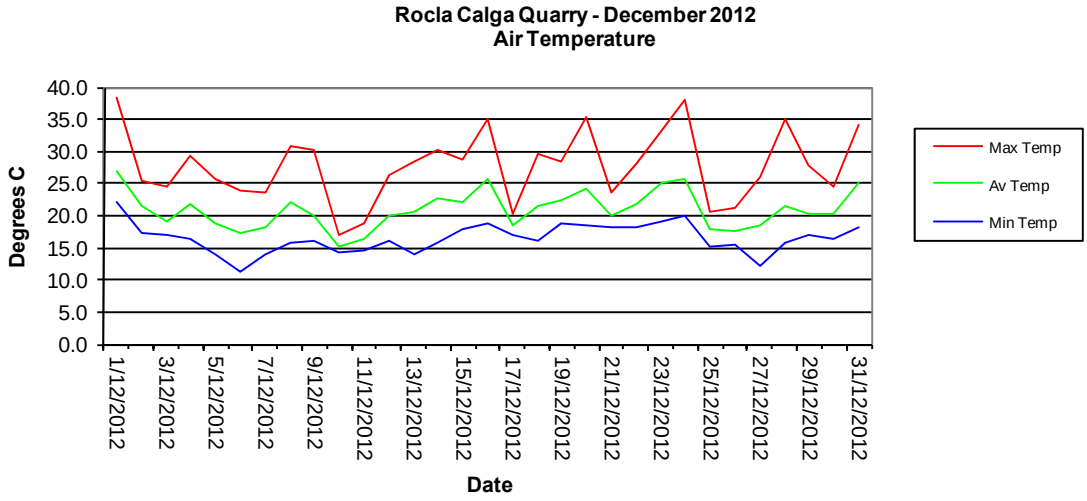
Results are displayed in the following table and figures.

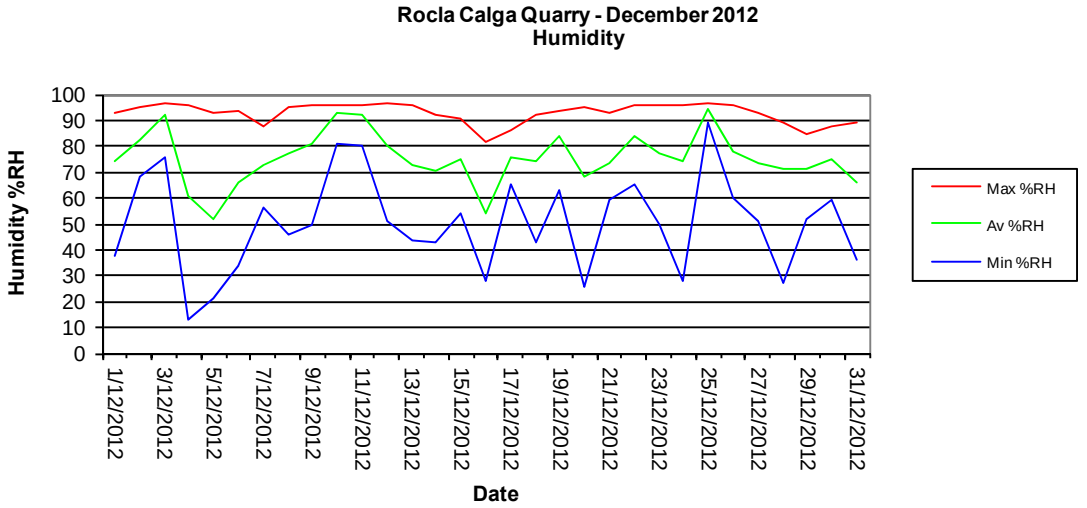
2.4.1 Monthly Meteorological Data Summary

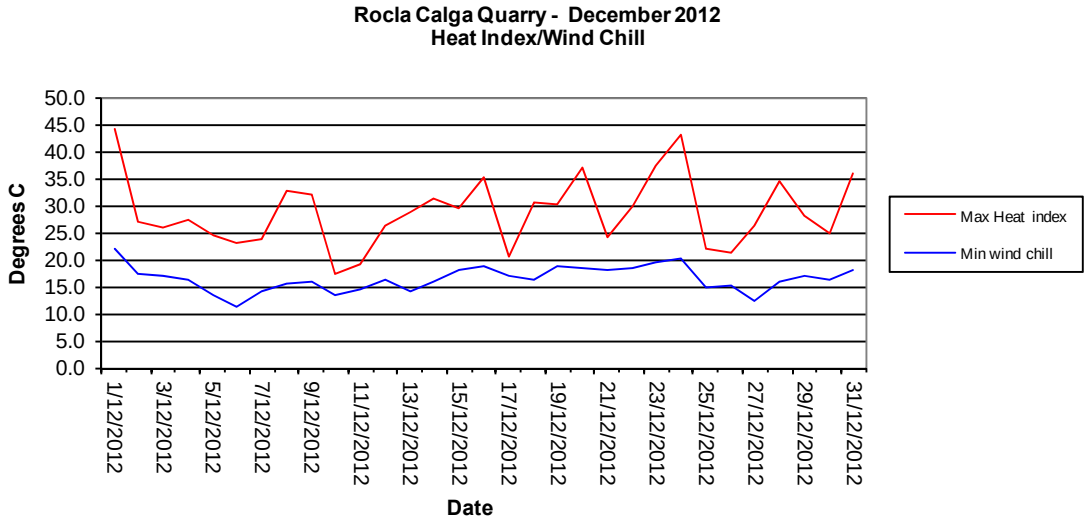
Summary **Dec-12** **Rocla - Calga**

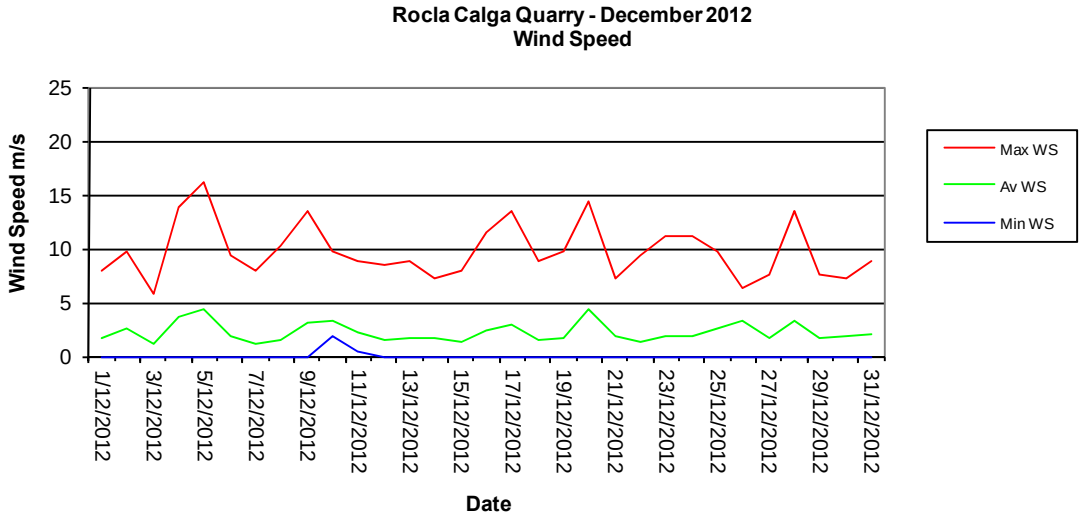
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/12/2012	22.1	27.0	38.4	38	74	93	1.0	4.0	0	1.6	8	22.1	44.2	1008.2	1010.9	1014.1	0	181.5	1012	99.7	100.0	100
2/12/2012	17.2	21.6	25.5	68	82	95	9.6	2.6	0	2.6	9.8	17.2	26.9	1008.9	1011.7	1015.0	0	118.0	594	77.5	97.8	100
3/12/2012	17.1	19.0	24.6	76	93	97	2.6	1.5	0	1.2	5.8	17.1	25.8	1003.6	1008.6	1014.3	0	96.6	878	71.1	91.5	100
4/12/2012	16.3	21.7	29.4	13	61	96	0.0	8.2	0	3.6	13.9	16.3	27.4	1000.9	1003.3	1007.9	0	355.3	1050	93.6	99.9	100
5/12/2012	13.9	18.7	25.7	21	52	93	0.0	8.6	0	4.4	16.1	13.3	24.5	1005.5	1007.5	1013.4	0	356.8	1075	99.7	100.0	100
6/12/2012	11.4	17.4	23.8	34	66	94	0.0	6.1	0	1.9	9.4	11.4	22.9	1013.0	1016.7	1022.1	0	348.9	1034	91.2	99.9	100
7/12/2012	14.1	18.3	23.7	56	73	88	0.0	2.7	0	1.1	8	14.1	23.8	1019.2	1021.2	1023.3	0	135.5	650	100	100.0	100
8/12/2012	15.7	22.0	30.9	46	77	95	0.0	4.8	0	1.5	10.3	15.7	32.7	1012.4	1015.7	1019.4	0	254.5	1091	91.5	99.8	100
9/12/2012	16.2	19.9	30.1	50	81	96	0.4	3.7	0	3.1	13.4	15.8	31.9	1011.0	1015.2	1021.6	0	182.3	926	99.7	100.0	100
10/12/2012	14.4	15.2	17.1	81	93	96	15.8	1.2	1.8	3.3	9.8	13.4	17.2	1021.3	1024.1	1026.4	0	71.3	365	82.7	96.9	100
11/12/2012	14.7	16.5	18.7	80	92	96	12.6	1.2	0.4	2.2	8.9	14.4	19.2	1024.6	1025.5	1026.6	0	70.7	344	72.2	94.0	100
12/12/2012	16.0	19.9	26.4	51	80	97	0.2	4.8	0	1.5	8.5	16.1	26.4	1022.7	1024.4	1026.5	0	281.6	1135	71.9	97.1	100
13/12/2012	13.9	20.6	28.4	44	73	96	0.0	5.9	0	1.8	8.9	14.0	28.7	1016.0	1019.7	1023.3	0	328.5	1162	93.3	99.9	100
14/12/2012	15.8	22.8	30.3	43	71	92	0.0	4.5	0	1.8	7.2	15.8	31.4	1009.0	1012.3	1015.7	0	218.4	813	98	99.9	100
15/12/2012	18.0	22.2	28.8	54	75	91	0.2	2.2	0	1.3	8	18.1	29.6	1004.9	1006.9	1010.0	0	94.2	899	100	100.0	100
16/12/2012	18.7	25.9	35.1	28	54	82	0.2	5.7	0	2.4	11.6	18.9	35.3	1000.2	1003.3	1006.3	0	232.1	1066	92.1	99.9	100
17/12/2012	17.1	18.5	20.3	65	75	86	0.2	2.4	0	3.0	13.4	16.8	20.4	1006.5	1010.3	1012.1	0	96.0	393	99.4	100.0	100
18/12/2012	16.0	21.6	29.7	43	75	92	0.0	5.3	0	1.5	8.9	16.1	30.7	1007.7	1009.8	1012.2	0	296.7	1045	93.6	99.9	100
19/12/2012	18.7	22.3	28.4	63	84	94	0.0	2.7	0	1.6	9.8	18.7	30.3	1005.7	1009.5	1012.6	0	143.8	965	99.7	100.0	100
20/12/2012	18.6	24.3	35.4	26	69	95	0.0	5.3	0	4.3	14.3	18.4	37.0	1002.9	1007.2	1015.4	0	178.3	1195	92.4	99.9	100
21/12/2012	18.2	20.1	23.7	59	74	93	0.2	3.0	0	1.8	7.2	18.2	24.1	1014.9	1016.1	1017.5	0	144.3	540	99.7	100.0	100
22/12/2012	18.3	21.9	28.1	65	84	96	0.0	2.4	0	1.3	9.4	18.3	29.7	1012.1	1014.9	1016.7	0	131.6	872	97.1	100.0	100
23/12/2012	19.2	25.1	33.3	50	78	96	0.0	5.4	0	1.9	11.2	19.3	37.4	1010.3	1013.1	1015.0	0	274.7	1093	92.1	99.9	100
24/12/2012	20.1	25.7	38.0	28	74	96	5.2	5.4	0	1.9	11.2	20.1	43.1	1006.0	1010.7	1014.2	0	262.1	1008	93	99.9	100
25/12/2012	15.3	17.9	20.7	89	94	97	41.2	0.6	0	2.5	9.8	15.0	22.0	1007.4	1012.6	1015.3	0	31.3	245	82.5	96.8	100
26/12/2012	15.5	17.7	21.3	60	78	96	0.4	3.1	0	3.2	6.3	15.1	21.2	1013.8	1015.8	1018.0	0	141.3	680	86.3	99.4	100
27/12/2012	12.2	18.6	26.0	51	74	93	0.0	4.2	0	1.7	7.6	12.2	26.1	1011.9	1014.8	1017.5	0	234.0	990	86.3	99.9	100
28/12/2012	15.9	21.4	34.9	27	71	89	0.0	6.4	0	3.3	13.4	15.9	34.5	1004.6	1009.9	1015.5	0	296.8	1049	93.3	99.9	100
29/12/2012	17.1	20.4	27.8	52	72	85	0.0	4.3	0	1.7	7.6	17.1	28.1	1012.8	1015.2	1017.9	0	227.3	1128	100	100.0	100
30/12/2012	16.4	20.2	24.6	59	75	88	0.0	3.3	0	1.8	7.2	16.4	24.9	1016.5	1018.1	1019.5	0	156.9	627	99.7	100.0	100
31/12/2012	18.2	25.1	34.2	36	66	89	0.0	6.7	0	2.0	8.9	18.2	35.9	1009.1	1013.8	1018.2	0	336.8	1021	100	100.0	100
Monthly	11.4	20.9	38.4	13	75	97	89.8	127.9	0	2.2	16.1	11.4	44.2	1000.2	1013.5	1026.6	0	202.5	1195	71.1	99.1	100

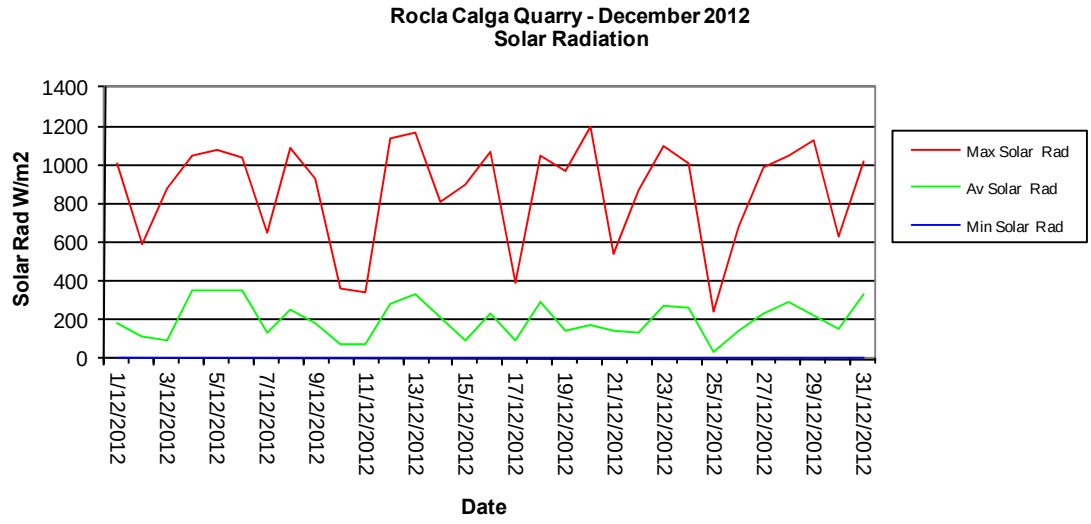
2.4.2 Monthly Weather Charts

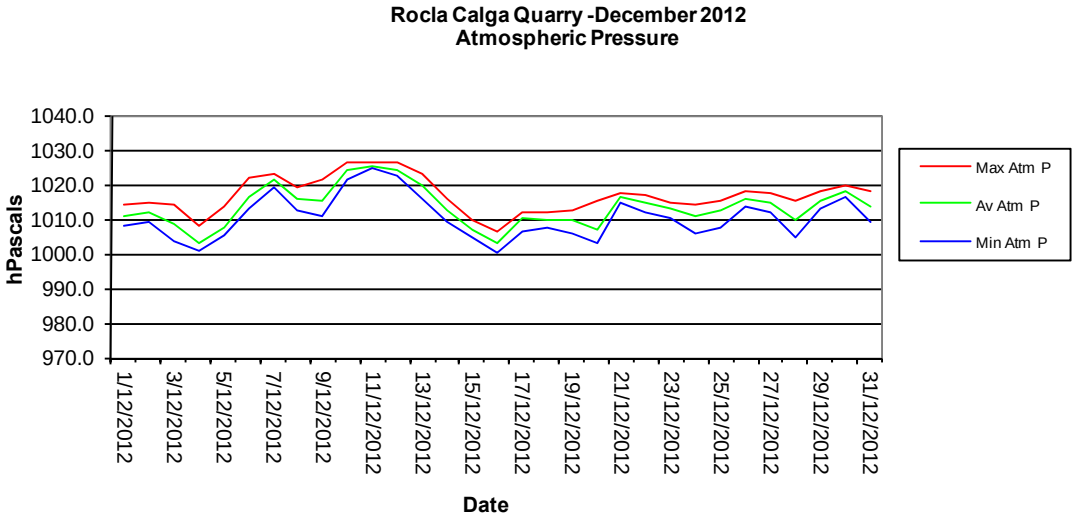


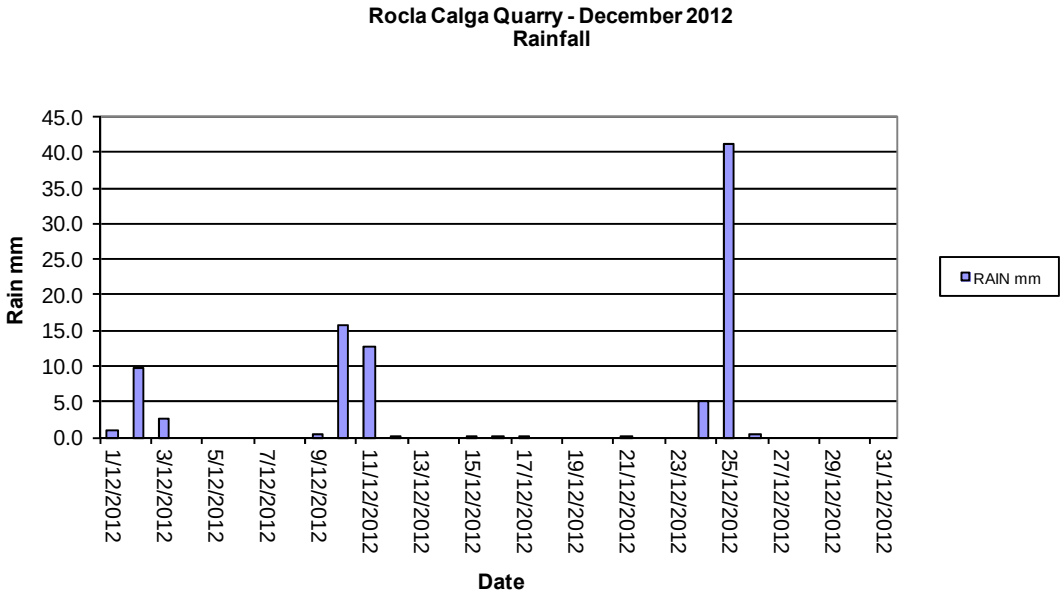


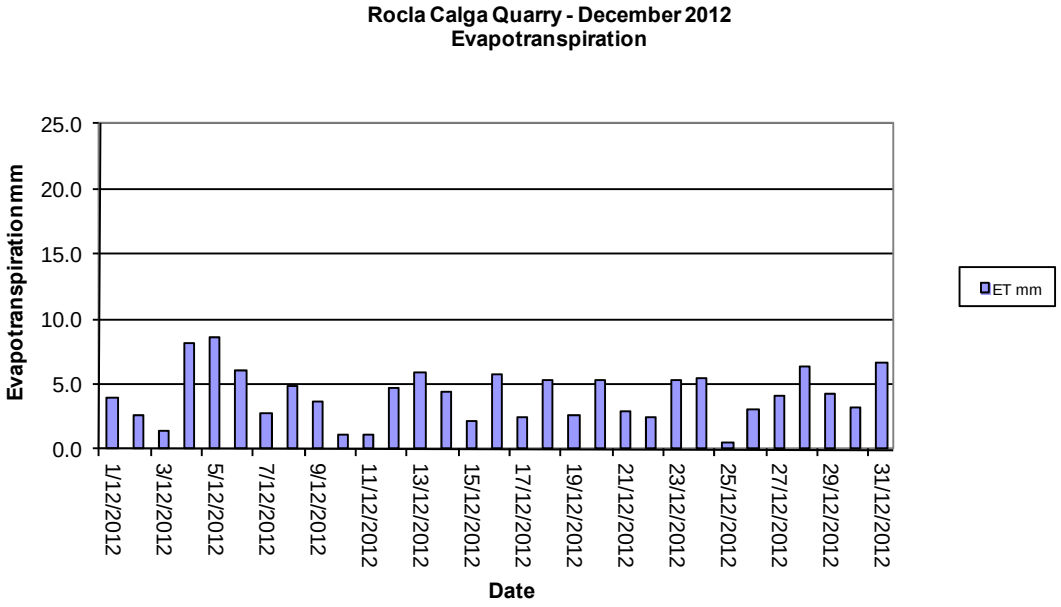


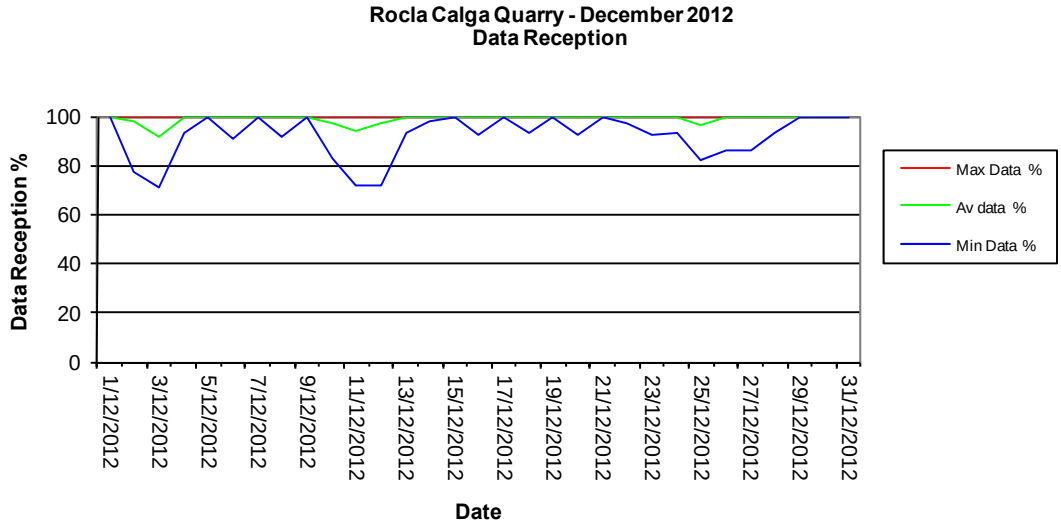

Rocla Calga Quarry - December 2012
Wind Speed
Wind Speed m/s
25
20
15
10
5
0
1/12/2012
3/12/2012
5/12/2012
7/12/2012
9/12/2012
11/12/2012
13/12/2012
15/12/2012
17/12/2012
19/12/2012
21/12/2012
23/12/2012
25/12/2012
27/12/2012
29/12/2012
31/12/2012
Date
Max WS
Av WS
Min WS


Rocla Calga Quarry - December 2012
Solar Radiation
Solar Rad W/m2
1400
1200
1000
800
600
400
200
0
1/12/2012
3/12/2012
5/12/2012
7/12/2012
9/12/2012
11/12/2012
13/12/2012
15/12/2012
17/12/2012
19/12/2012
21/12/2012
23/12/2012
25/12/2012
27/12/2012
29/12/2012
31/12/2012
Date
Max Solar Rad
Av Solar Rad
Min Solar Rad


Rocla Calga Quarry -December 2012
Atmospheric Pressure
hPascals
1040.0
1030.0
1020.0
1010.0
1000.0
990.0
980.0
970.0
1/12/2012
3/12/2012
5/12/2012
7/12/2012
9/12/2012
11/12/2012
13/12/2012
15/12/2012
17/12/2012
19/12/2012
21/12/2012
23/12/2012
25/12/2012
27/12/2012
29/12/2012
31/12/2012
Date
Max Atm P
Av Atm P
Min Atm P


Rocla Calga Quarry - December 2012
Rainfall
Rain mm
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1/12/2012
3/12/2012
5/12/2012
7/12/2012
9/12/2012
11/12/2012
13/12/2012
15/12/2012
17/12/2012
19/12/2012
21/12/2012
23/12/2012
25/12/2012
27/12/2012
29/12/2012
31/12/2012
Date
RAIN mm

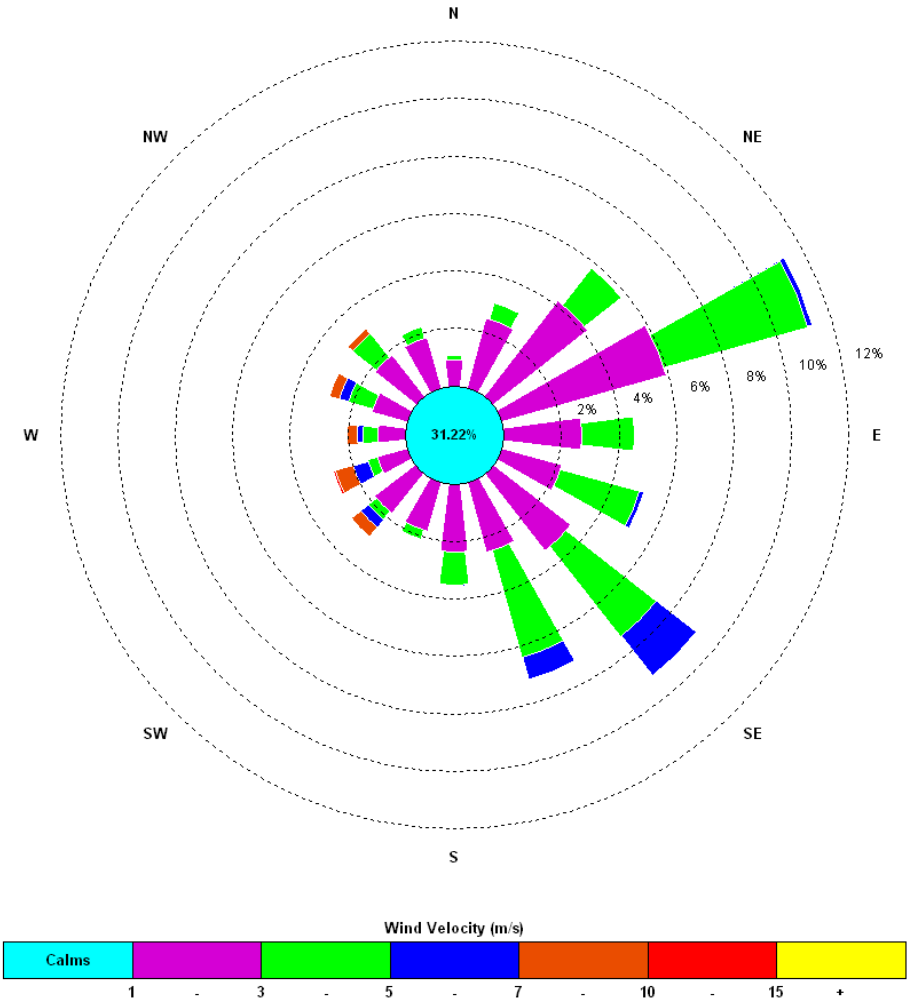

Rocla Calga Quarry - December 2012
Evapotranspiration
Evapotranspiration mm
25.0
20.0
15.0
10.0
5.0
0.0
1/12/2012
3/12/2012
5/12/2012
7/12/2012
9/12/2012
11/12/2012
13/12/2012
15/12/2012
17/12/2012
19/12/2012
21/12/2012
23/12/2012
25/12/2012
27/12/2012
29/12/2012
31/12/2012
Date
ET mm


Rocla Calga Quarry - December 2012
Data Reception
Data Reception %
100
80
60
40
20
0
1/12/2012
3/12/2012
5/12/2012
7/12/2012
9/12/2012
11/12/2012
13/12/2012
15/12/2012
17/12/2012
19/12/2012
21/12/2012
23/12/2012
25/12/2012
27/12/2012
29/12/2012
31/12/2012
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.

00:15, 01 December 2012 – 23:45, 31 December 2012



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

Appendix 1

Laboratory Certificates

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EN1300014**	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	: 02-JAN-2013
Sampler	: ----	Issue Date	: 08-JAN-2013
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 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 29/11/12 - 2/1/13	CD2C 29/11/12 - 2/1/13	CD3 29/11/12 - 2/1/13	CD4 29/11/12 - 2/1/13	CD5 29/11/12 - 2/1/13
			Client sampling date / time	02-JAN-2013 15:00	02-JAN-2013 15:00	02-JAN-2013 15:00	02-JAN-2013 15:00	02-JAN-2013 15:00
				EN1300014-001	EN1300014-002	EN1300014-003	EN1300014-004	EN1300014-005
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	1.0	1.2	1.0	0.3	0.3
Ash Content (mg)	----	1	mg	20	24	20	7	7
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	0.1	0.5	0.3	0.3	0.2
Combustible Matter (mg)	----	1	mg	3	10	7	5	3
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	1.1	1.7	1.3	0.6	0.5
Total Insoluble Matter (mg)	----	1	mg	23	34	27	12	10

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID: CD6 29/11/12 - 2/1/13	----	----	----	----
				Client sampling date / time: 02-JAN-2013 15:00	----	----	----	----
				EN1300014-006	----	----	----	----
EA120: Ash Content								
Ash Content	----	0.1	g/m².month	0.5	----	----	----	----
Ash Content (mg)	----	1	mg	11	----	----	----	----
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m².month	0.4	----	----	----	----
Combustible Matter (mg)	----	1	mg	7	----	----	----	----
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m².month	0.9	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	18	----	----	----	----

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1230316**	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	: 02-JAN-2013
Sampler	: CARBON BASED ENVIRO	Issue Date	: 10-JAN-2013
Site	: ----		
		No. of samples received	: 2
Quote number	: SY/428/12	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*
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 EN120316001 shows poor duplicate results due to sample matrix. Confirmed by re-analysis.**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID	A	F	----	----	----
				Client sampling date / time	02-JAN-2013 09:30	02-JAN-2013 09:10	----	----	----
					ES1230316-001	ES1230316-002	----	----	----
EA005: pH									
pH Value	----	0.01	pH Unit		6.21	6.31	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		69	62	----	----	----
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L		37	38	----	----	----
EA025: Suspended Solids									
Suspended Solids (SS)	----	5	mg/L		<5	5	----	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	----	----	----

Appendix 2

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

Gosford, New South Wales
December 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	Sa	22.2	35.7	5.6			ESE	24	15:15					Calm		34.8	40		NW	9	
2	Su	20.7	24.3	0			ESE	44	19:18	21.1			SE	15		22.6	88		SE	13	
3	Mo	17.9	23.3	6.0			SSE	19	23:17					Calm		22.6			E	4	
4	Tu	14.9	30.0	0.8			WSW	35	12:19	22.8	48		W	9		29.4	19		NW	11	
5	We	10.5	26.5	0			W	39	09:09	20.0	30		WNW	13		25.2	18		W	15	
6	Th	9.1	23.4	0			ESE	30	11:19	20.0	34		SE	9		21.6	48		SE	13	
7	Fr	12.0	23.6	0			ESE	24	12:53	19.4	62		SE	4		21.1	60		NE	7	
8	Sa	14.7	28.4	0			E	33	16:07	23.0	76		NNW	9		26.8	59		NNE	17	
9	Su	16.7	30.0	0			SSE	48	19:09	27.0	70		ENE	6		19.4			SE	15	
10	Mo	15.1	18.0	12.6			SSW	33	04:04				SE	11					SSE	7	
11	Tu	15.4	21.6	23.2			SE	33	11:40	18.0			SE	15					SE	9	
12	We	15.3	25.4	17.2			E	24	14:53	20.1			SE	6		24.7	52		ESE	11	
13	Th	11.8	26.0	0			ESE	31	13:02	22.7	75		SSE	2		25.4	45		NE	11	
14	Fr	13.2	27.8	0			SE	24	15:08	23.2			ENE	4		25.7			ENE	9	
15	Sa	16.8	27.7	0			NE	13	10:31	21.7			N	2		22.6				Calm	
16	Su	14.6	34.3	0.6			SSE	44	22:11	27.3				Calm		30.1			NE	9	
17	Mo	18.2	21.7	0			SSW	52	16:38	19.4			SE	11		20.9			SE	11	
18	Tu	14.6	27.2	0			ENE	24	17:30	21.3				Calm		26.4			E	9	
19	We	18.0	29.7	0			ENE	28	15:18	22.2			ESE	4		24.5			NE	9	
20	Th	19.8	33.2	0			SE	39	17:54	29.7			NNW	15		24.8			S	7	
21	Fr	19.6	23.9	0			ESE	28	14:18	20.6			SE	7		22.8			ESE	9	
22	Sa	19.0	26.0	0			NE	24	16:20	22.9			SE	6		24.3			ENE	7	
23	Su	17.5	30.4	0			N	30	13:56	25.6			NNW	4		29.0			NE	17	
24	Mo	18.5	32.3	0			SSE	31	21:01	25.6			ESE	7		30.8			ENE	11	
25	Tu	19.6	19.9	9.6			SE	33	08:18	19.6			SE	13		17.8			SSE	7	
26	We	16.5	22.3	43.0			SE	37	13:00	19.8			SE	13		21.3			SE	15	
27	Th	11.1	23.8	0.2			SE	24	14:26	21.1			SE	7		23.1			E	9	
28	Fr	12.5	35.2	0			SSW	52	13:44	23.5				Calm		22.7			SSE	22	
29	Sa	17.9	24.4	0			NNE	22	16:34	19.6			ESE	6		23.2			ENE	11	
30	Su	16.0	23.9	0			SSE	22	13:42	20.6			S	6		22.5			SE	11	
31	Mo	17.6	29.2	0			ENE	30	14:56	23.2			N	13		28.1			E	13	
Statistics for December 2012																					
	Mean	16.0	26.7							22.2	56			7		24.6	47			10	
	Lowest	9.1	18.0							18.0	30			Calm		17.8	18			Calm	
	Highest	22.2	35.7	43.0			SSW	52		29.7	76		#	15		34.8	88		SSE	22	
	Total			118.8																	

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.

IDCJDW2048.201212 Prepared at 13:00 UTC on 21 Jan 2013
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