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

May 2013

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18 June 2013

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 May 2013;
- Surface Water quality results for May 2013;
- Groundwater depth and quality results for May 2013; and
- Meteorological report for May 2013.

The May 2013 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.

Samples were collected at sites C and D. Sites A, B and F were inaccessible and unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the 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 3 June 2013. Groundwater depth generally decreased across the sampled groundwater bores when compared to last month. Exceptions were CP3, CP5, CP6 and MW9 which increased in depth. Groundwater pH and EC were generally stable this month.

The meteorological station data recovery for the month was approximately 100%. Recorded rainfall on site for May was 82.2 mm, which was slightly lower than the Peats Ridge long-term average for May. A comparison is shown below:

Rocla Calga Quarry	82.2 mm
BOM Peats Ridge*	NA
BOM Gosford*	122.8 mm
BOM Peats Ridge Long term mean for May*	95.9 mm

NA = Not Available

*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 May 2013 and the project 12 month rolling average. Results are in g/m^2.month.

Table 1: Dust Deposition results: 2 May 2013 – 3 June 2013 (32 days)

Site	Monthly Insoluble Solids g/m^2.month	Monthly Ash Residue g/m^2.month	Monthly Combustible Matter g/m^2.month	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids g/m^2.month
CD1	0.6	0.6	<0.1	100	1.4
CD2c	1.2	1.0	0.2	83	0.9
CD3	0.5	0.3	0.2	60	1.3
CD4	0.2	0.1	0.1	50	0.4
CD5	0.2	0.1	0.1	50	0.4
CD6	0.3	0.2	0.1	67	0.5

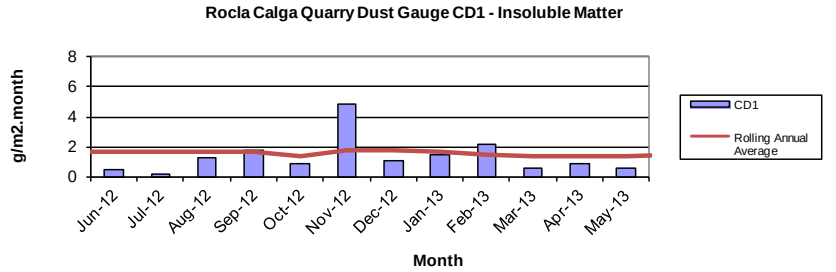
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m^2.month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from June 2012 to May 2013.

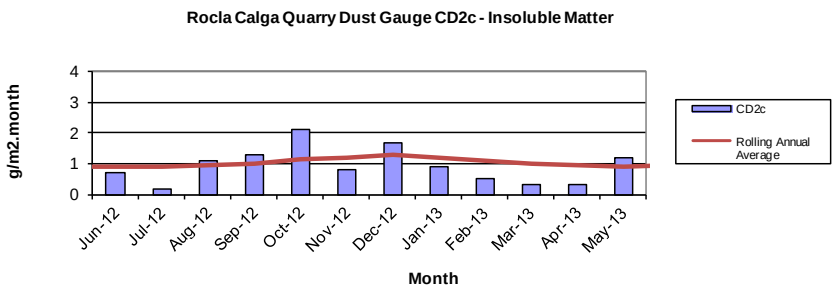
NA= Not Available.

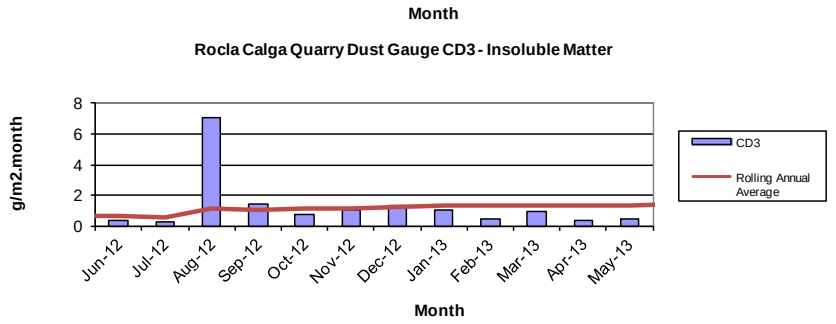
CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air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

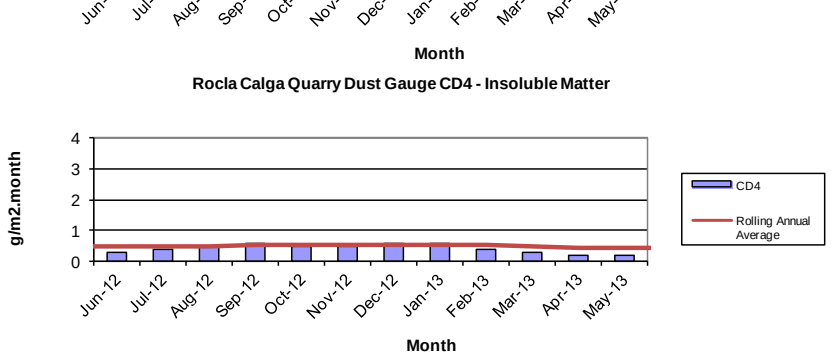
Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The laboratory analysis is provided in **Appendix 1.**

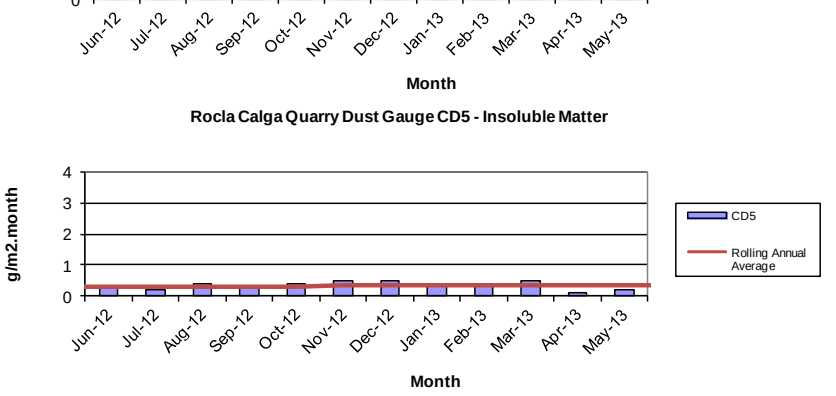
Figure 2: Dust Deposition Charts

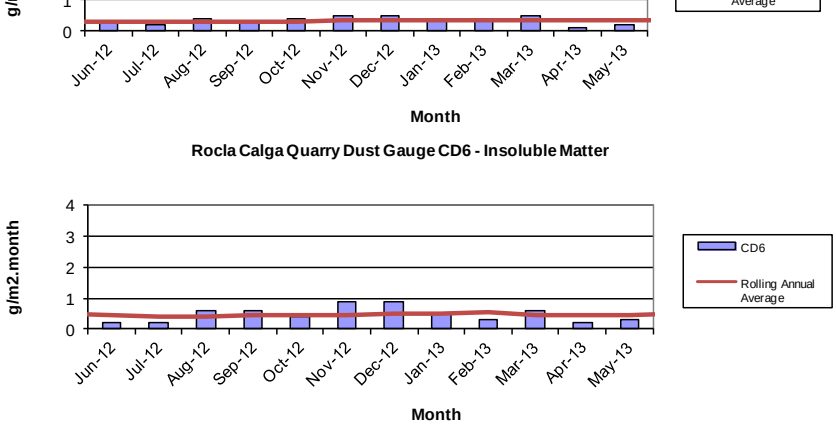












2.2 Surface Water Monitoring

Monthly surface water monitoring was conducted on the 3 June 2013 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1.**

Table 2: Monthly surface water monitoring – May 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	No access							
B	No access							
C	Fast	Clear	Clear	7.96	74	56	18	<5
D	Slow	Clear	Slight	6.30	78	78	<5	<5
F	No access							

Samples were collected at sites C and D. Sites A, B and F were inaccessible and unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the 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 3 June 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 decreased across most of the sampled bores when compared to last month, indicating water generally moving towards the surface. Exceptions were CP3, CP5, CP6 and MW9.

pH at all sites is in the slightly acidic to neutral range, and remained relatively stable across all sampled sites. EC levels generally remained stable compared to the results obtained in April 2013.

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	0.45	7.2	216
CQ3	Voutos	* Monitor	10.53	NM	NM	NM
CQ4	Voutos	* Monitor	8.78	9.96	4.9	102
CQ5	Gazzana	DIP Only	8.69	5.86	4.4	165
CQ6	Gazzana	DIP Only	16.00	NM	NM	NM
CQ7	Gazzana	* Monitor	6.89	5.75	4.7	108
CQ8	Gazzana	* Monitor	11.03	5.17	4.9	144
CQ9	Gazzana	DIP Only	10.10	8.50	4.6	121
CQ10	Voutos	* Monitor	NI	22.38	5.1	185
CQ11S	Gazzana	* Monitor	NI	10.02	4.7	169
CQ11D	Gazzana	* Monitor	NI	11.18	4.9	169
CQ12	Gazzana	* Monitor	NI	3.61	4.5	139
CQ13	Kashouli	* Monitor	NI	12.53	4.6	232
CP3	Gazzana	Domestic	10.40	8.88	4.6	158
CP4	Kashouli	Domestic	13.63	9.17	5.1	196
CP5	Kashouli	Domestic	16.61	6.18	4.4	251
CP6	Kashouli	Domestic	16.27	8.63	4.4	199
CP7	Kashouli	Production	8.56	1.24	4.9	152
CP8	Rozmanec	Domestic	22.17	NM	NM	NM
MW7	Rocla Bore	* Monitor	15.76	14.75	4.7	122
MW8	Rocla Bore	* Monitor	9.82	6.87	4.8	88
MW9	Rocla Bore	* Monitor	22.44	21.62	4.6	98
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

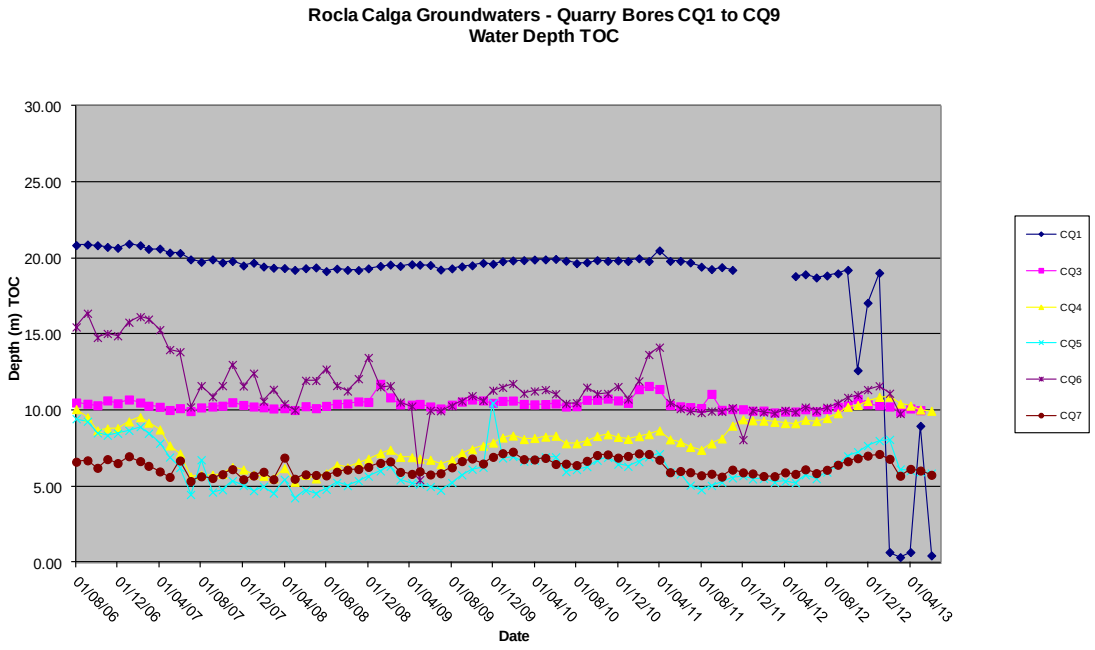
Notes:
TOC = Water level measured from top of bore case to water.
NM = Not Monitored – unable to sample water due to access restrictions.
NR = Not Required by resident.
* = Logger Installed.
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements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

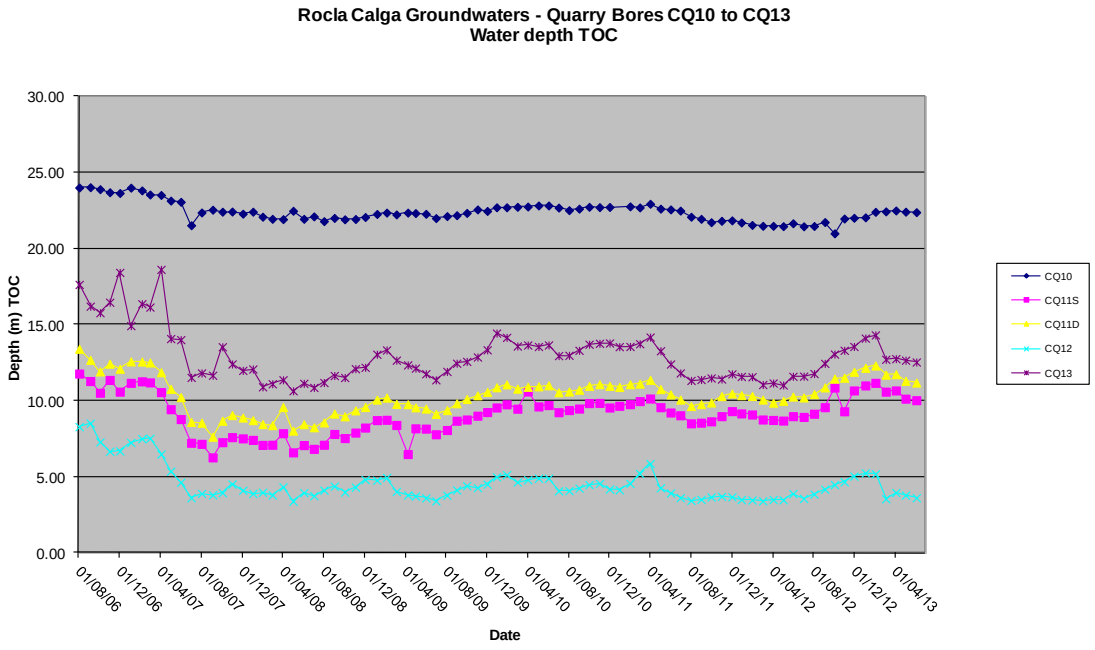
Shading is used to indicate the following trends in water depth (compared to the last reading):

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

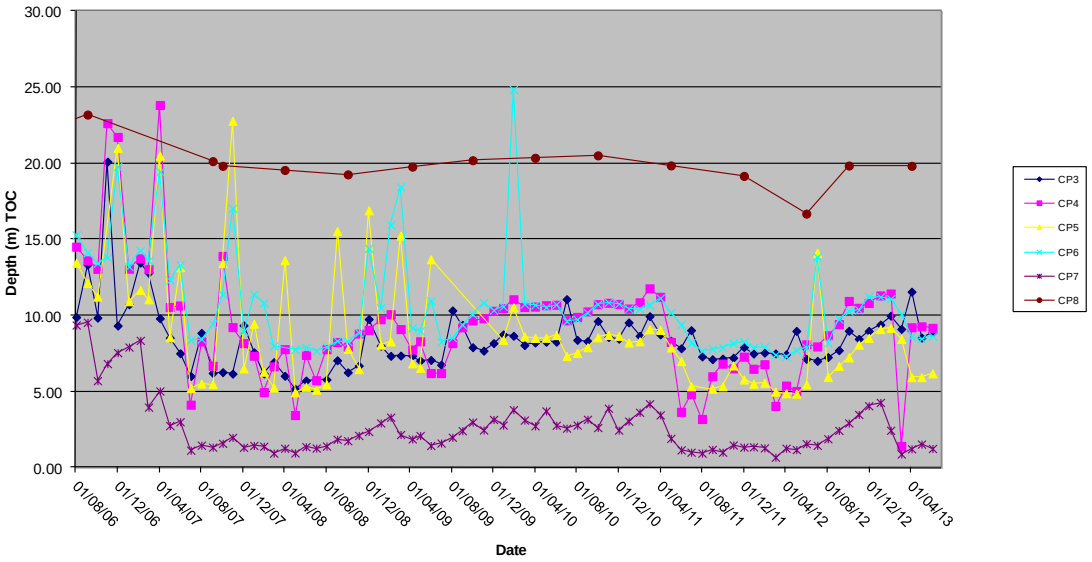
Available groundwater loggers were downloaded and will be forwarded to the Rocla Calga Quarry groundwater consultant.

Figures 3 to 6: Groundwater Depth Charts.

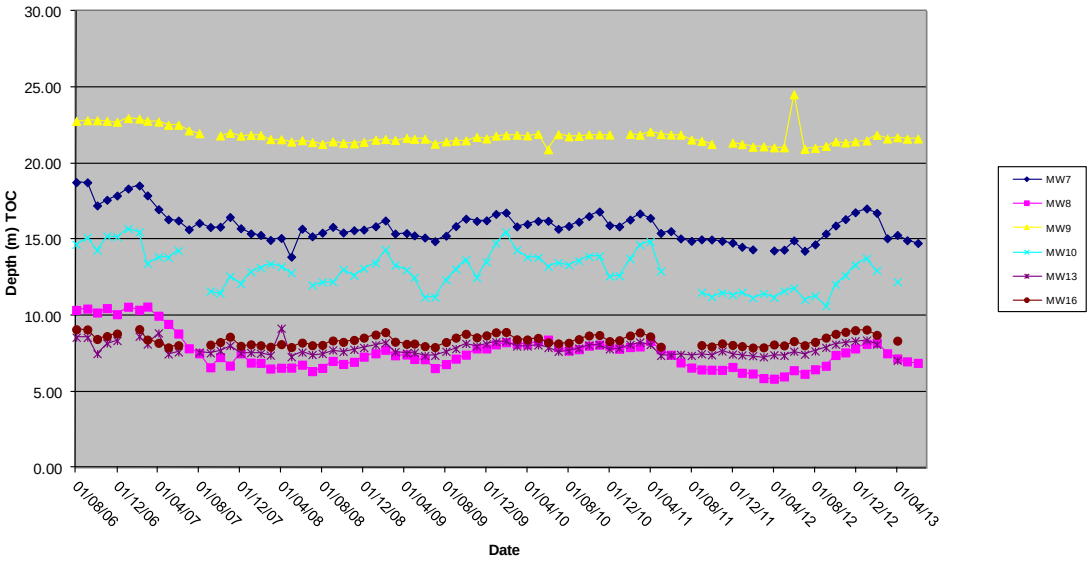




Rocla Calga Groundwaters - Quarry Bores CP3 to CP8
Water Depth TOC



Rocla Calga Groundwaters - Quarry Bores MW7 to MW16
Water Depth TOC



2.4 Meteorological Monitoring

The Rocla Calga Quarry weather station data recovery in May 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) Gosford station is included in **Appendix 2** for comparison purposes. Data from the Peats Ridge BOM station for May 2013 was unavailable.

Data for May 2013 shows that rainfall recorded at the Rocla Calga Quarry was lower than the Gosford BOM station recorded rainfall. Recorded rainfall at Rocla Calga Quarry was slightly lower than the Peats Ridge long term mean rainfall for May. The rainfall comparison is provided below:

Rocla Calga Quarry	82.2 mm
BOM Peats Ridge*	NA
BOM Gosford*	122.8 mm
BOM Peats Ridge Long term mean for May*	95.9 mm

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

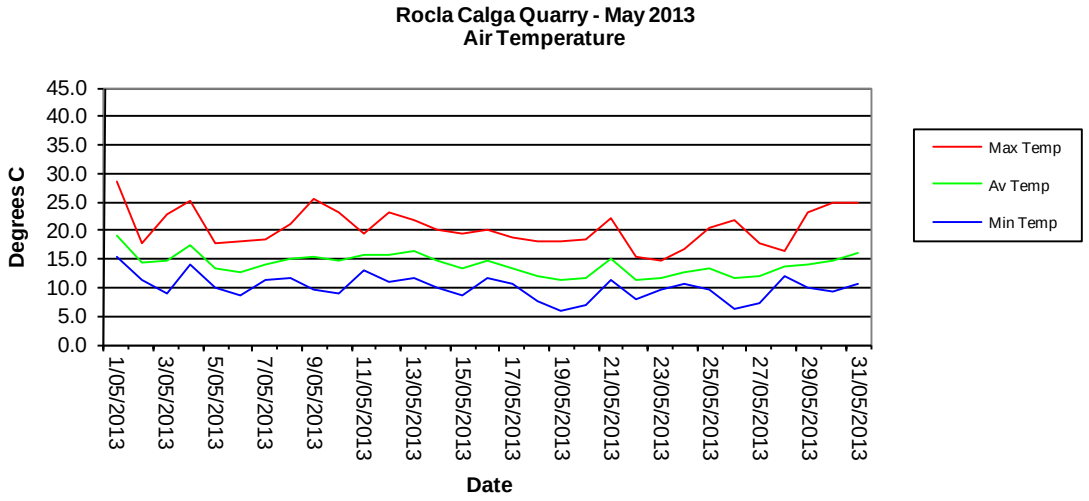
Results are displayed in the following table and figures.

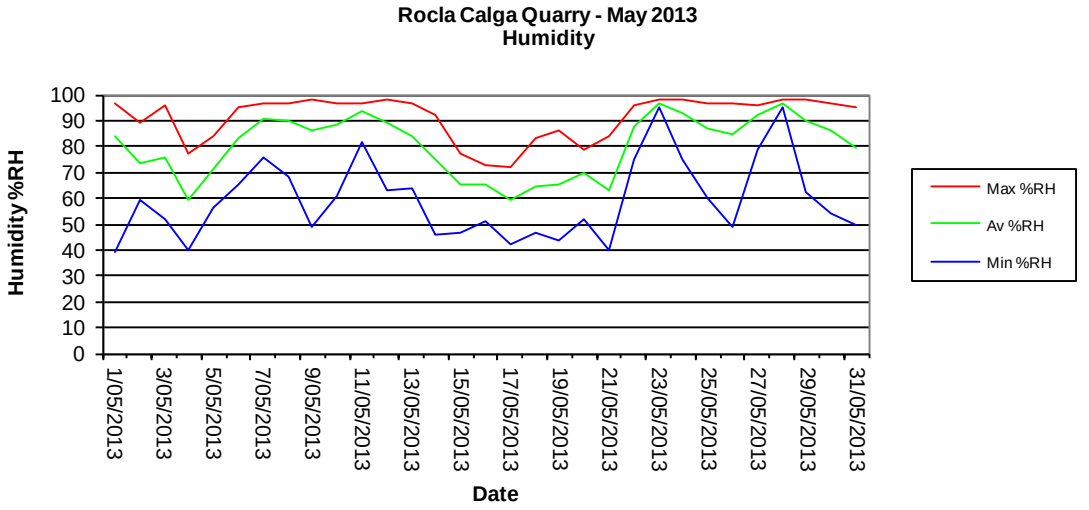
2.4.1 Monthly Meteorological Data Summary

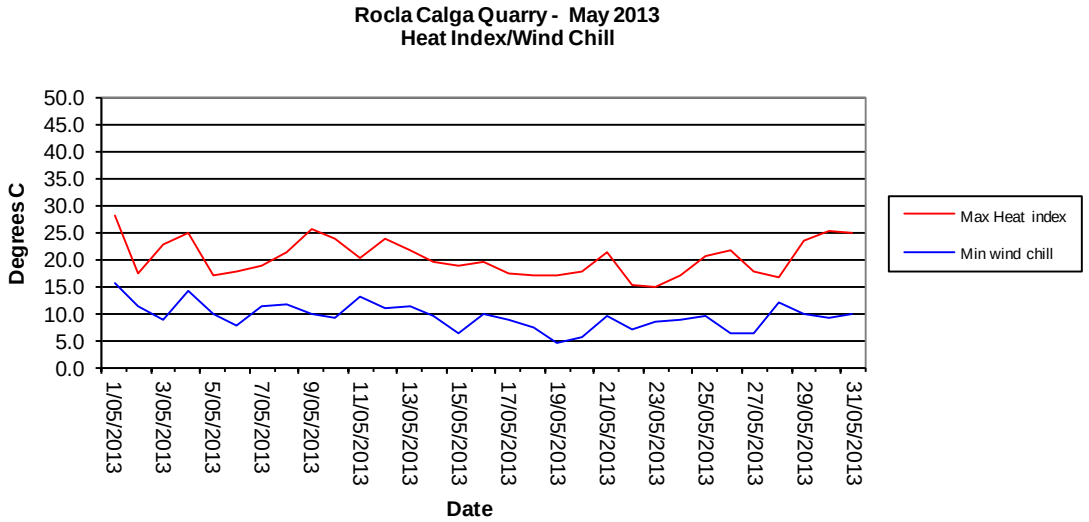
Summary **May-13** **Rocla - Calga**

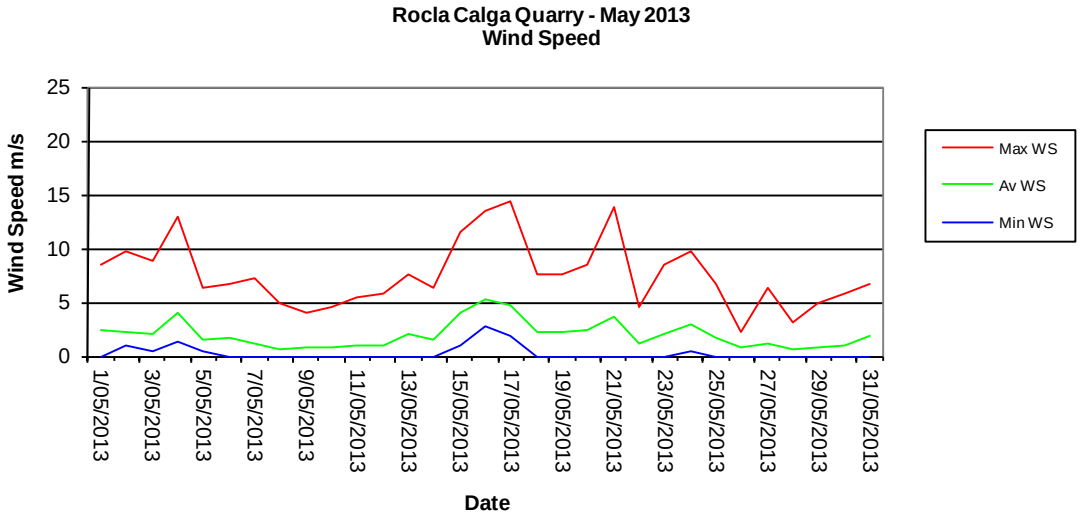
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/05/2013	15.5	19.1	28.5	39	84	97	0.2	2.0	0	2.3	8.5	15.4	28.2	1012.0	1016.3	1020.0	0	75.9	643	98.8	99.9	100
2/05/2013	11.4	14.5	17.9	59	74	89	0.0	1.7	0.9	2.3	9.8	11.1	17.2	1017.7	1023.6	1027.1	0	52.2	406	92.7	99.8	100
3/05/2013	9.1	14.8	22.8	52	76	96	0.0	1.9	0.4	2.0	8.9	8.8	22.7	1017.0	1022.5	1026.7	0	80.1	632	95.9	99.8	100
4/05/2013	14.1	17.5	25.3	40	59	77	0.0	3.3	1.3	4.0	13	14.1	24.8	1014.3	1018.0	1023.3	0	88.6	626	97.7	99.9	100
5/05/2013	10.1	13.3	17.8	56	71	84	0.0	1.3	0.4	1.5	6.3	9.9	16.9	1021.0	1022.8	1024.4	0	40.7	408	100	100.0	100
6/05/2013	8.6	12.8	18.2	65	84	95	5.8	1.3	0	1.7	6.7	7.8	17.6	1023.3	1024.7	1026.2	0	48.6	524	98.5	99.9	100
7/05/2013	11.4	14.1	18.5	76	91	97	0.2	1.0	0	1.1	7.2	11.1	18.7	1025.2	1027.0	1029.0	0	64.4	494	87.4	98.1	100
8/05/2013	11.7	15.0	21.2	68	90	97	0.0	1.0	0	0.6	4.9	11.7	21.2	1026.9	1028.6	1030.4	0	66.3	457	89.8	98.7	100
9/05/2013	9.7	15.4	25.6	49	86	98	0.2	1.4	0	0.7	4	9.8	25.5	1026.5	1028.4	1030.2	0	79.0	606	91.2	98.5	100
10/05/2013	9.1	14.6	23.3	61	89	97	0.2	1.2	0	0.8	4.5	9.1	23.6	1027.3	1028.8	1030.6	0	72.0	605	89.2	99.0	100
11/05/2013	13.1	15.6	19.6	82	94	97	1.6	0.7	0	1.0	5.4	13.2	20.2	1026.4	1027.9	1029.9	0	42.3	254	93.6	99.4	100
12/05/2013	10.9	15.6	23.2	63	89	98	0.2	1.2	0	0.9	5.8	10.9	23.6	1020.3	1024.0	1026.8	0	68.9	597	92.7	98.7	100
13/05/2013	11.6	16.3	21.8	64	84	97	0.2	1.3	0	2.0	7.6	11.2	21.6	1011.8	1015.8	1020.2	0	62.6	495	97.4	99.9	100
14/05/2013	10.0	14.6	20.0	46	75	92	0.0	1.8	0	1.6	6.3	9.4	19.6	1009.6	1011.6	1013.1	0	85.5	588	85.1	99.6	100
15/05/2013	8.6	13.3	19.6	47	65	77	0.0	2.7	0.9	4.0	11.6	6.1	18.7	1009.0	1011.3	1013.4	0	72.4	589	99.1	100.0	100
16/05/2013	11.8	14.6	20.1	51	65	73	0.0	2.7	2.7	5.2	13.4	10.0	19.3	1006.9	1009.1	1010.4	0	47.8	635	97.4	100.0	100
17/05/2013	10.6	13.5	18.8	42	59	72	0.0	3.2	1.8	4.8	14.3	8.7	17.4	1009.1	1011.0	1013.3	0	75.9	586	92.1	99.8	100
18/05/2013	7.5	12.1	18.2	47	65	83	0.0	2.0	0	2.2	7.6	7.2	17.0	1011.2	1013.3	1015.0	0	72.2	582	100	100.0	100
19/05/2013	5.8	11.2	18.1	44	66	86	0.0	2.1	0	2.2	7.6	4.6	17.0	1013.9	1015.4	1016.7	0	75.3	577	93.3	99.9	100
20/05/2013	7.1	11.8	18.3	52	70	79	0.0	1.8	0	2.4	8.5	5.7	17.6	1014.3	1016.2	1018.2	0	70.3	571	91.2	99.8	100
21/05/2013	11.2	15.2	22.2	40	63	84	0.0	3.0	0	3.6	13.9	9.3	21.1	1011.3	1014.0	1015.9	0	78.3	630	93.9	99.9	100
22/05/2013	8.0	11.2	15.3	75	87	96	8.2	0.7	0	1.2	4.5	7.0	15.2	1008.8	1011.7	1014.6	0	41.3	229	91.5	99.3	100
23/05/2013	9.8	11.7	14.8	95	97	98	45.4	0.4	0	2.1	8.5	8.3	14.9	1009.2	1012.6	1016.7	0	29.8	256	71.6	95.2	100
24/05/2013	10.8	12.7	16.9	75	93	98	11.4	0.8	0.4	2.9	9.8	8.8	16.8	1015.9	1017.7	1020.5	0	52.1	435	91.8	99.3	100
25/05/2013	9.8	13.4	20.6	60	87	97	0.4	1.2	0	1.7	6.7	9.4	20.5	1020.2	1022.0	1023.8	0	77.1	559	91.5	99.6	100
26/05/2013	6.1	11.5	21.7	49	85	97	0.0	1.1	0	0.8	2.2	6.1	21.6	1022.3	1023.7	1025.6	0	69.2	559	99.7	100.0	100
27/05/2013	7.4	11.9	17.6	79	92	96	7.4	0.9	0	1.2	6.3	6.1	17.7	1024.3	1027.8	1030.1	0	65.1	491	83.3	97.0	100
28/05/2013	12.0	13.8	16.4	95	96	98	0.6	0.6	0	0.7	3.1	11.9	16.7	1029.0	1030.1	1032.3	0	47.6	267	84.8	98.2	100
29/05/2013	9.9	14.1	23.2	62	90	98	0.2	1.2	0	0.8	4.9	9.9	23.5	1026.5	1028.6	1030.8	0	75.5	526	83.3	95.1	100
30/05/2013	9.2	14.7	24.9	54	86	97	0.0	1.4	0	1.0	5.8	9.2	25.1	1024.7	1026.8	1029.1	0	75.3	547	83.6	96.2	100
31/05/2013	10.6	16.1	24.9	50	80	95	0.0	1.6	0	1.8	6.7	9.9	24.8	1022.2	1024.9	1027.5	0	67.6	532	85.4	96.8	100
Monthly	5.8	14.1	28.5	39	80	98	82.2	48.4	0	2.0	14.3	4.6	28.2	1006.9	1020.5	1032.3	0	65.2	643	71.6	98.9	100

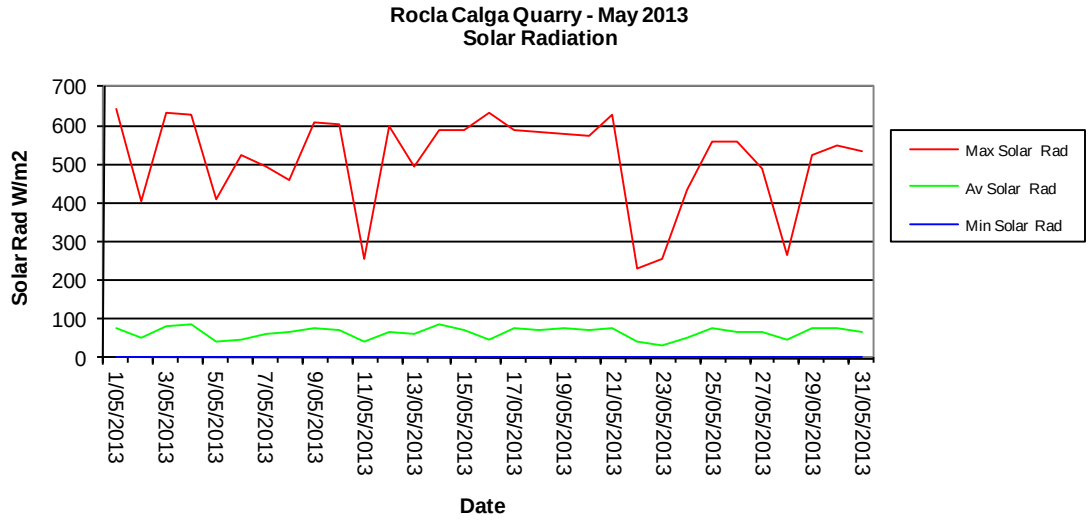
2.4.2 Monthly Weather Charts

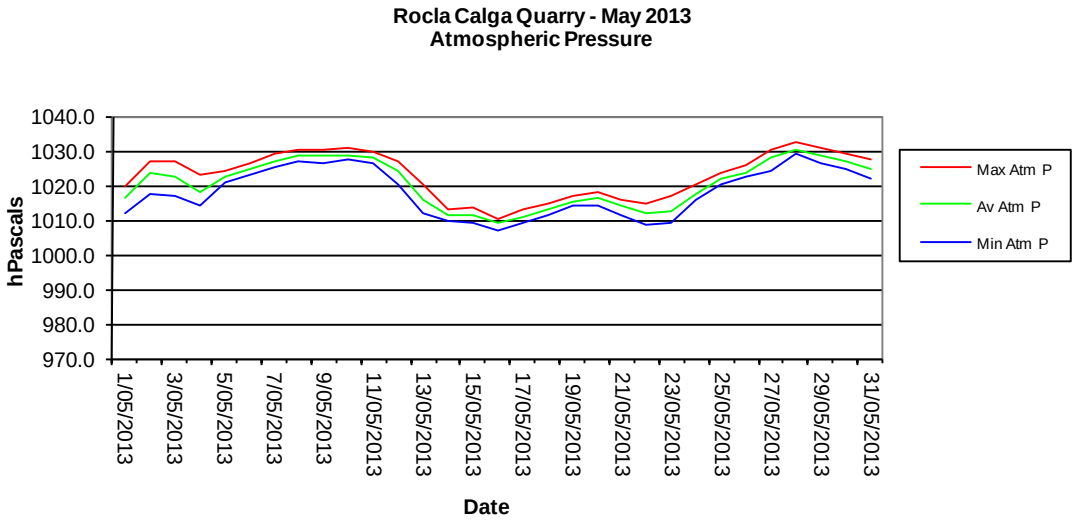


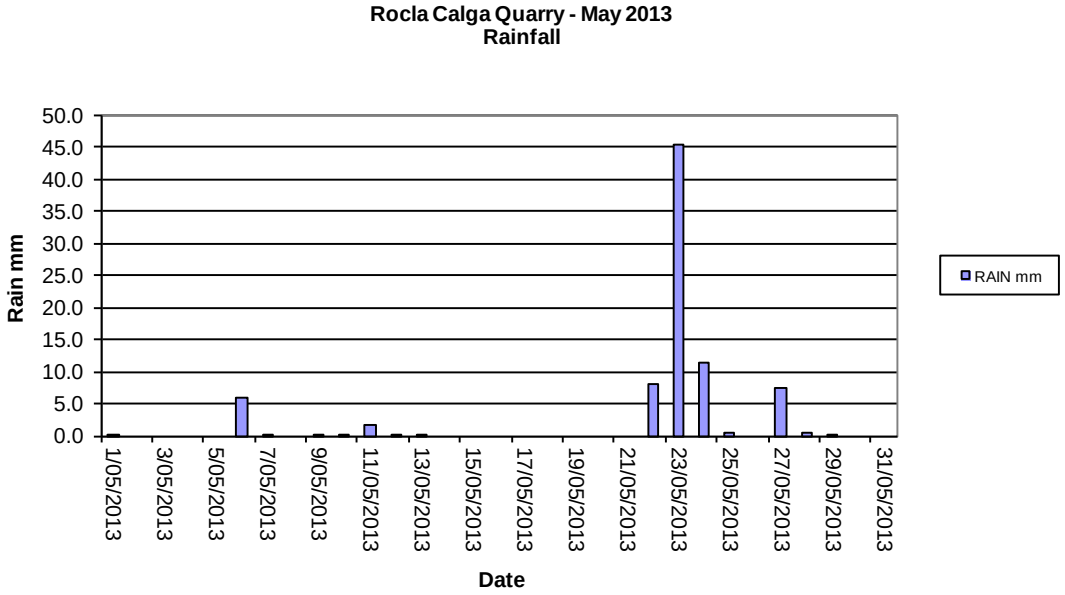


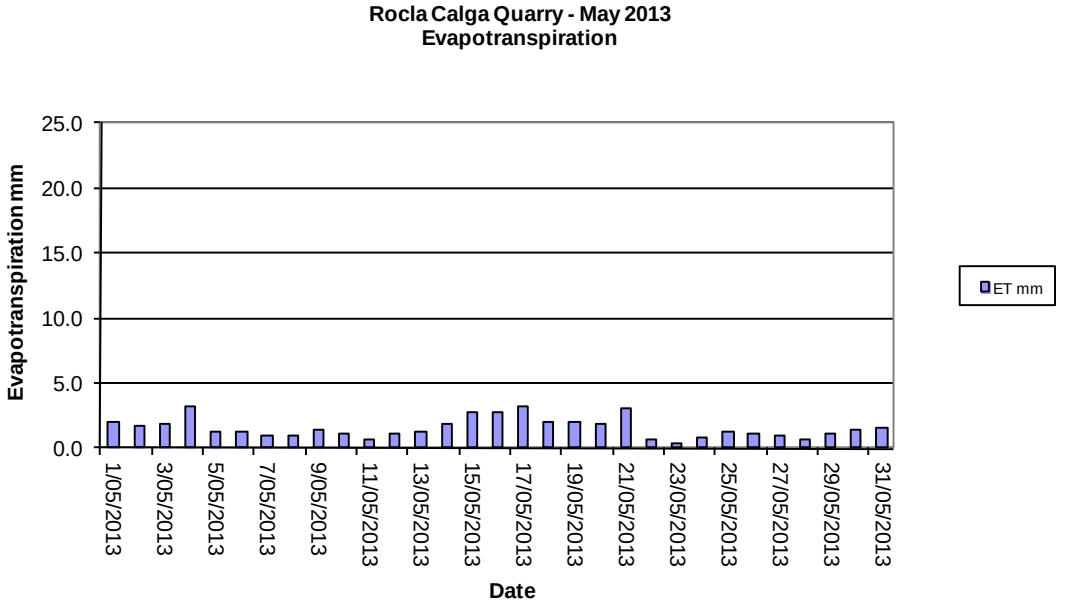


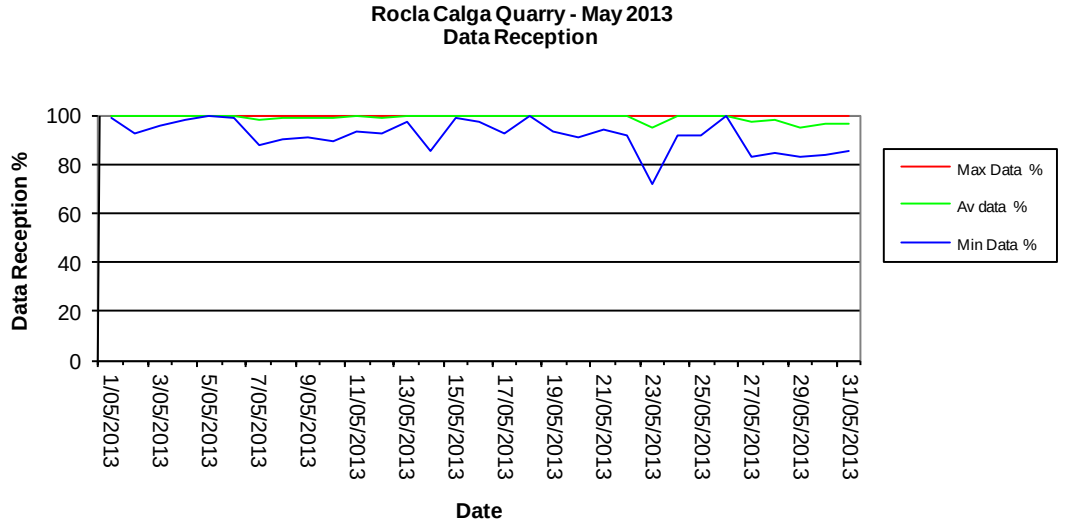

Rocla Calga Quarry - May 2013
Wind Speed
Wind Speed m/s
25
20
15
10
5
0
1/05/2013
3/05/2013
5/05/2013
7/05/2013
9/05/2013
11/05/2013
13/05/2013
15/05/2013
17/05/2013
19/05/2013
21/05/2013
23/05/2013
25/05/2013
27/05/2013
29/05/2013
31/05/2013
Date
Max WS
Av WS
Min WS


Rocla Calga Quarry - May 2013
Solar Radiation
Solar Rad W/m2
700
600
500
400
300
200
100
0
1/05/2013
3/05/2013
5/05/2013
7/05/2013
9/05/2013
11/05/2013
13/05/2013
15/05/2013
17/05/2013
19/05/2013
21/05/2013
23/05/2013
25/05/2013
27/05/2013
29/05/2013
31/05/2013
Date
Max Solar Rad
Av Solar Rad
Min Solar Rad


Rocla Calga Quarry - May 2013
Atmospheric Pressure
hPascals
1040.0
1030.0
1020.0
1010.0
1000.0
990.0
980.0
970.0
1/05/2013
3/05/2013
5/05/2013
7/05/2013
9/05/2013
11/05/2013
13/05/2013
15/05/2013
17/05/2013
19/05/2013
21/05/2013
23/05/2013
25/05/2013
27/05/2013
29/05/2013
31/05/2013
Date
Max Atm P
Av Atm P
Min Atm P


Rocla Calga Quarry - May 2013
Rainfall
Rain mm
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1/05/2013
3/05/2013
5/05/2013
7/05/2013
9/05/2013
11/05/2013
13/05/2013
15/05/2013
17/05/2013
19/05/2013
21/05/2013
23/05/2013
25/05/2013
27/05/2013
29/05/2013
31/05/2013
Date
RAIN mm

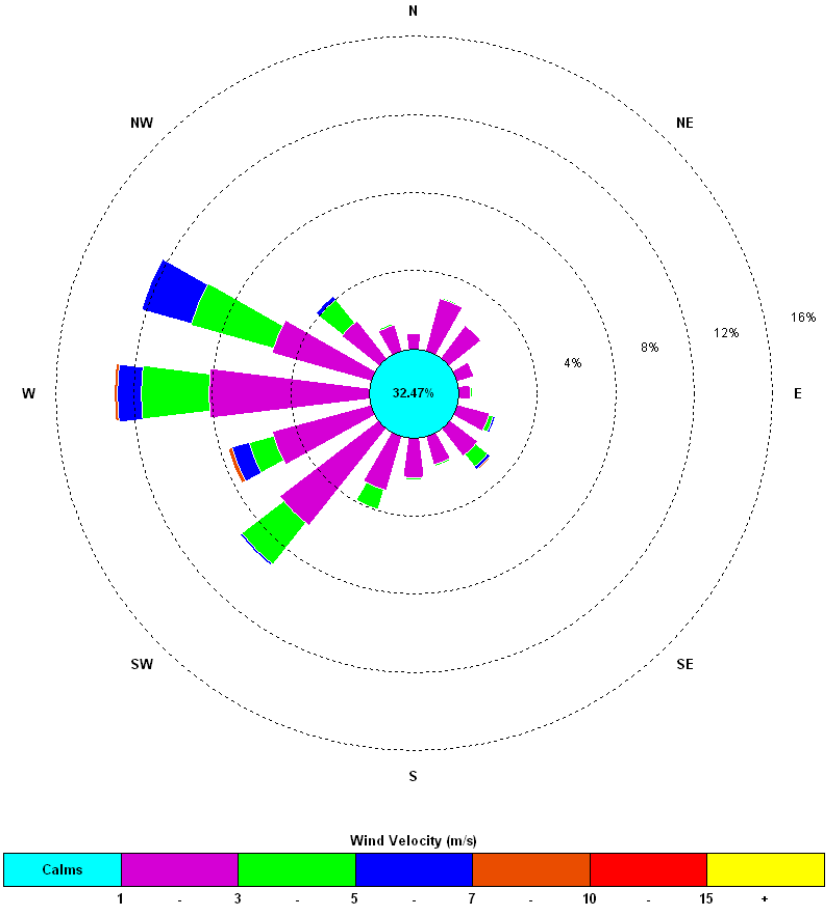

Rocla Calga Quarry - May 2013
Evapotranspiration
Evapotranspiration mm
25.0
20.0
15.0
10.0
5.0
0.0
1/05/2013
3/05/2013
5/05/2013
7/05/2013
9/05/2013
11/05/2013
13/05/2013
15/05/2013
17/05/2013
19/05/2013
21/05/2013
23/05/2013
25/05/2013
27/05/2013
29/05/2013
31/05/2013
Date
ET mm


Rocla Calga Quarry - May 2013
Data Reception
Data Reception %
100
80
60
40
20
0
1/05/2013
3/05/2013
5/05/2013
7/05/2013
9/05/2013
11/05/2013
13/05/2013
15/05/2013
17/05/2013
19/05/2013
21/05/2013
23/05/2013
25/05/2013
27/05/2013
29/05/2013
31/05/2013
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 May 2013 – 23:45, 31 May 2013



The predominant winds were from the W, with strongest winds from the W and WSW. The maximum wind speed was 14.3 m/s from the WSW.

Appendix 1

Laboratory Certificates

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EN1302033	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	: 03-JUN-2013
Sampler	: Carbon Based Enviro	Issue Date	: 11-JUN-2013
Site	: ----		
		No. of samples received	: 6
Quote number	: SY/428/12	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.

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	CD2c	CD3	CD4	CD5
				Client sampling date / time	02/05/13 - 03/06/13 03-JUN-2013 15:00	02/05/13 - 03/06/13 03-JUN-2013 15:00	02/05/13 - 03/06/13 03-JUN-2013 15:00	02/05/13 - 03/06/13 03-JUN-2013 15:00	02/05/13 - 03/06/13 03-JUN-2013 15:00
					EN1302033-001	EN1302033-002	EN1302033-003	EN1302033-004	EN1302033-005
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		0.6	1.0	0.3	0.1	0.1
Ash Content (mg)	----	1	mg		12	19	5	2	2
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		<0.1	0.2	0.2	0.1	0.1
Combustible Matter (mg)	----	1	mg		<1	3	5	2	2
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		0.6	1.2	0.5	0.2	0.2
Total Insoluble Matter (mg)	----	1	mg		12	22	10	4	4

Analytical Results

Sub-Matrix: DUST (Matrix: AIR)				Client sample ID	CD6 02/05/13 - 03/06/13	----	----	----	----
				Client sampling date / time	03-JUN-2013 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EN1302033-006	----	----	----	----
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		0.2	----	----	----	----
Ash Content (mg)	----	1	mg		3	----	----	----	----
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		0.1	----	----	----	----
Combustible Matter (mg)	----	1	mg		2	----	----	----	----
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		0.3	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg		5	----	----	----	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1312474**	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	: ROCAI QUARRY	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 03-JUN-2013
Sampler	: CBE	Issue Date	: 11-JUN-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 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*
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics

General Comments

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

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

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

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

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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

- **EA015 TDS, result has been confirmed for sample #2 by re-analysis.**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	C	D	----	----	----
				Client sampling date / time	[03-JUN-2013]	[03-JUN-2013]	----	----	----
Compound	CAS Number	LOR	Unit		ES1312474-001	ES1312474-002	----	----	----
EA005: pH									
pH Value	----	0.01	pH Unit		7.96	6.30	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		74	78	----	----	----
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L		56	----	----	----	----
Total Dissolved Solids @180°C	----	10	mg/L		----	78	----	----	----
EA025: Suspended Solids									
Suspended Solids (SS)	----	5	mg/L		18	<5	----	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	----	----	----

Appendix 2

Additional Bureau of Meteorology Data from Gosford Monitoring Station

Gosford, New South Wales
May 2013 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	We	13.2	28.8	0			SSE	24	16:16	19.2			ESE	6		23.8			SE	11	
2	Th	13.1	19.0	0			SE	35	16:45	16.2			SSE	7		17.6			SE	11	
3	Fr	7.8	21.6	2.2			NNE	20	12:45	15.3				Calm		21.3			NNE	7	
4	Sa	7.9	24.3	0			SSE	37	15:00	14.5				Calm		22.0			SE	17	
5	Su	9.2	18.6	0			SSE	30	00:28	15.7			ESE	7		17.0			SE	9	
6	Mo	8.1	19.0	0			E	30	13:01	15.6			NW	7		17.8			SE	11	
7	Tu	11.6	20.5	5.6			E	24	12:37	14.5				Calm		17.6			SSE	4	
8	We	9.6	21.8	0.6			SSE	15	14:04	15.7			SE	4		19.3			E	6	
9	Th	8.4	22.8	0			NE	15	12:53	15.3				Calm		22.4			NNE	6	
10	Fr	7.2	22.6	0.2			SE	17	12:11	13.6				Calm		21.1			WSW	2	
11	Sa	11.1	21.2	3.0			SSE	17	10:51	17.4			NNE	6		19.4			NW	4	
12	Su	9.0	22.6	1.4			ENE	19	13:33	14.9				Calm		21.2			NE	6	
13	Mo	9.2	22.9	0.2			NNW	17	11:44	13.4				Calm		19.8				Calm	
14	Tu	13.1	19.7	0.4			SSE	17	11:24	13.4				Calm		18.5			WNW	2	
15	We	4.3	20.1	0.2			NW	30	14:25	13.9			N	11		19.6			NW	7	
16	Th	8.0	20.8	0			N	35	10:56	16.6			NNW	11		19.5			W	7	
17	Fr	9.1	19.9	0			WSW	30	12:34	15.6			WNW	7		18.9			W	6	
18	Sa	6.3	18.9	0			NNW	22	10:35	14.4			NNW	7		18.0			WNW	6	
19	Su	2.9	18.4	0			W	31	11:19	13.2			WNW	9		17.9			WNW	4	
20	Mo	4.7	19.2	0			W	24	11:02	11.8			N	9		18.5			WNW	2	
21	Tu	5.9	23.0	0			W	30	12:41	16.8			NW	6		21.8			W	6	
22	We	6.1	16.5	0			S	15	10:40	11.6			NNE	4		15.1			NNW	2	
23	Th	10.5	15.0	36.0			SSE	37	23:31	12.6			WNW	4		14.4				Calm	
24	Fr	11.6	18.3	57.6			SSE	33	15:57	14.3			NW	7		17.8			SE	13	
25	Sa	9.9	19.8	5.4			NW	22	07:48	14.0			NNW	9		17.4				Calm	
26	Su	4.1	20.9	0.2			SW	13	11:48	10.4				Calm		17.1				Calm	
27	Mo	5.8	18.8	0.2			SSE	22	15:22	11.6			N	2		18.4			SSE	7	
28	Tu	11.0	18.6	9.4			SE	13	12:07	14.1				Calm		17.6				Calm	
29	We	8.4	21.7	0			ENE	13	12:52	13.5				Calm		20.9				Calm	
30	Th	6.9		0.2						12.7				Calm							
Statistics for May 2013																					
	Mean	8.5	20.5							14.4				4		19.0				5	
	Lowest	2.9	15.0							10.4				Calm		14.4				Calm	
	Highest	13.2	28.8	57.6			SSE	37		19.2			#	11		23.8			SE	17	
	Total			122.8																	

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.

IDCJDW2048.201305 Prepared at 13:00 UTC on 14 Jun 2013