



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

September 2013

A handwritten signature in black ink, appearing to read 'Colin Davies'.

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 25 October 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 September 2013;
- Surface Water quality results for September 2013;
- Groundwater depth and quality results for September 2013; and
- Meteorological report for September 2013.

The September 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/m².month. Results were found to be representative of dust levels as determined by the Australian Standard.

Surface water samples were collected on 1 October at sites A, and F. Sites B, C and D 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 1 October 2013. Groundwater depth generally increased across the sampled groundwater bores when compared to last month with the exceptions being CQ4, CQ10 and MW9 which decreased in depth. Groundwater pH and EC were generally stable this month with the exception of CQ8 and CQ10 which showed higher pH and CP5 which had a lower pH result when compared to the previous month.

The meteorological station data recovery for the month was approximately 100%. Recorded rainfall on site for September was 16.8 mm, which was lower than the Peats Ridge long-term average for September. A comparison is shown below:

Rocla Calga Quarry	16.8 mm
BOM Peats Ridge*	NA
BOM Gosford*	29.6 mm
BOM Peats Ridge Long term mean for September*	73.6 mm

NA = Not Available

*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au). No data was available from the BOM Peats Ridge station for September 2013

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/m².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**.

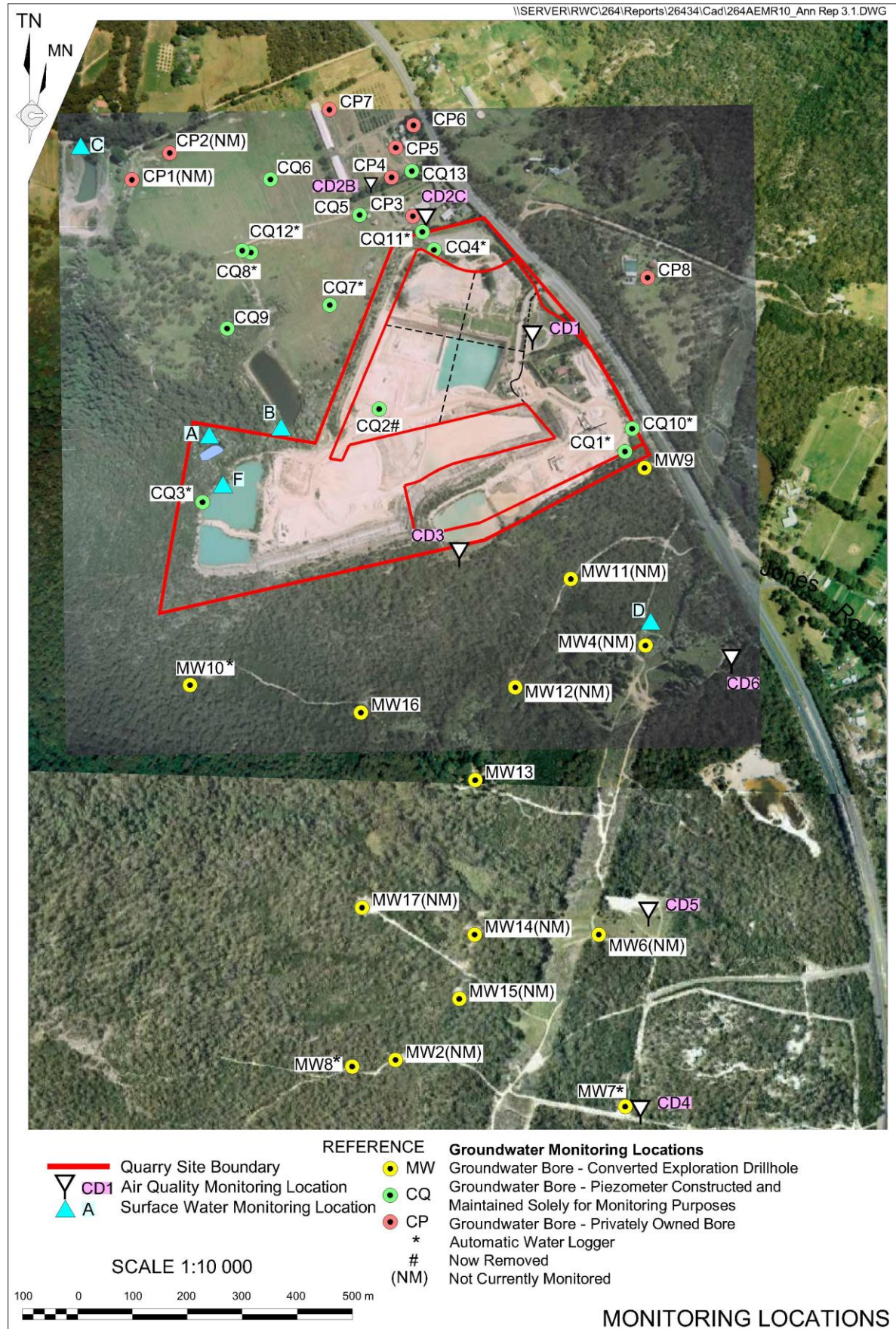


Figure 1: Rocla Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for September 2013 and the project 12 month rolling average. Results are in g/m².month.

Table 1: Dust Deposition results: 2 September 2013 – 1 October 2013 (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	2.3	2.2	0.1	96	1.4
CD2c	0.9	0.8	0.1	89	1.1
CD3	1.7	1.5	0.2	88	0.9
CD4	0.4	0.2	0.2	50	0.4
CD5	0.2	0.2	<0.1	100	0.3
CD6	0.3	0.3	<0.1	100	0.5

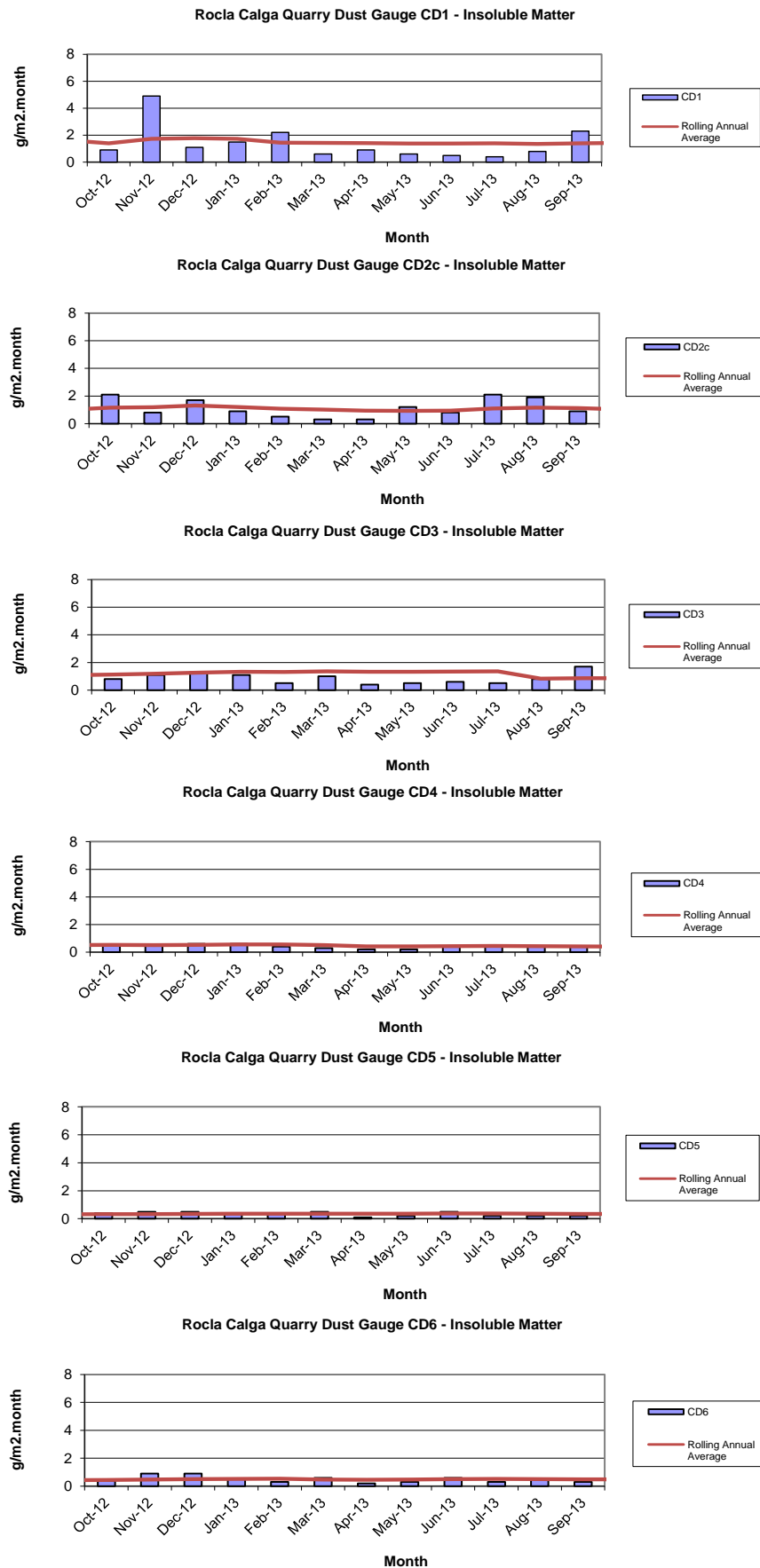
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m².month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from October 2012 to September 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 1 October 2013 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

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

Site	Observed Flow Rate	Water Colour	Turbidity	pH	EC (µS/cm)	TDS (mg/L)	TSS (mg/L)	Oil and Grease (mg/L)
A	Dam	Brown	Slight	6.23	64	45	<5	<5
B	Dry							
C	No access							
D	Dry							
F	Dam	Clear	Clear	6.17	61	36	<5	<5

Samples were collected at sites A and F. Sites B, C and D were dry or 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 1 October 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 increased at a majority of sites compared to last month, indicating water generally moved away from the surface. The exceptions being CQ4, CQ10 and MW9 which all showed a slight decrease in depth.

pH at all sites is in the acidic to neutral range. pH levels remained steady across all sampled sites with the exception of CQ8 and CQ10 which increased in pH. EC levels were generally similar when compared to the results obtained in August 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	18.57	7.6	316
CQ3	Voutos	* Monitor	10.53	10.30	6.0	167
CQ4	Voutos	* Monitor	8.78	10.15	4.9	95
CQ5	Gazzana	DIP Only	8.69	6.61	4.2	199
CQ6	Gazzana	DIP Only	16.00	NM	NM	NM
CQ7	Gazzana	* Monitor	6.89	6.51	4.6	106
CQ8	Gazzana	* Monitor	11.03	6.24	4.4	159
CQ9	Gazzana	DIP Only	10.10	9.11	4.5	120
CQ10	Voutos	* Monitor	NI	22.73	4.6	198
CQ11S	Gazzana	* Monitor	NI	10.28	4.6	164
CQ11D	Gazzana	* Monitor	NI	11.42	4.7	166
CQ12	Gazzana	* Monitor	NI	4.18	4.4	144
CQ13	Kashouli	* Monitor	NI	13.04	4.3	261
CP3	Gazzana	Domestic	10.40	10.88	4.6	159
CP4	Kashouli	Domestic	13.63	9.99	NM	NM
CP5	Kashouli	Domestic	16.61	7.39	2.3	273
CP6	Kashouli	Domestic	16.27	9.36	NM	NM
CP7	Kashouli	Production	8.56	2.61	4.8	184
CP8	Rozmanec	Domestic	22.17	20.05	4.3	163
MW7	Rocla Bore	* Monitor	15.76	15.9	4.5	123
MW8	Rocla Bore	* Monitor	9.82	7.08	4.7	84
MW9	Rocla Bore	* Monitor	22.44	21.82	4.5	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.

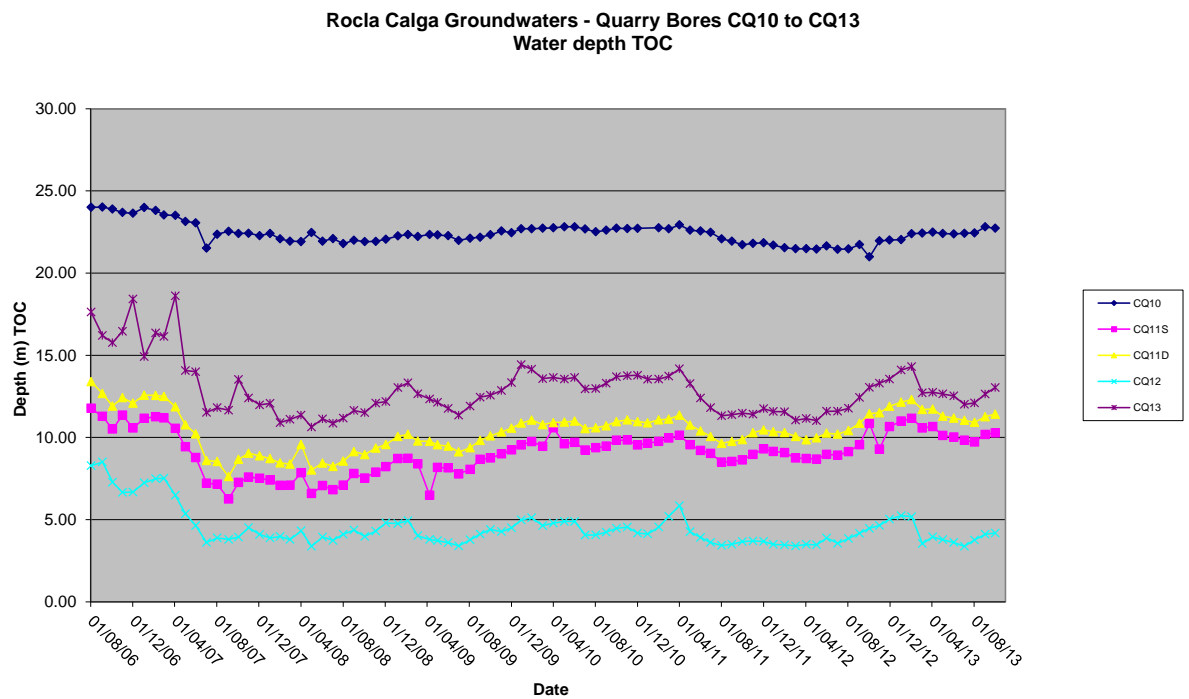
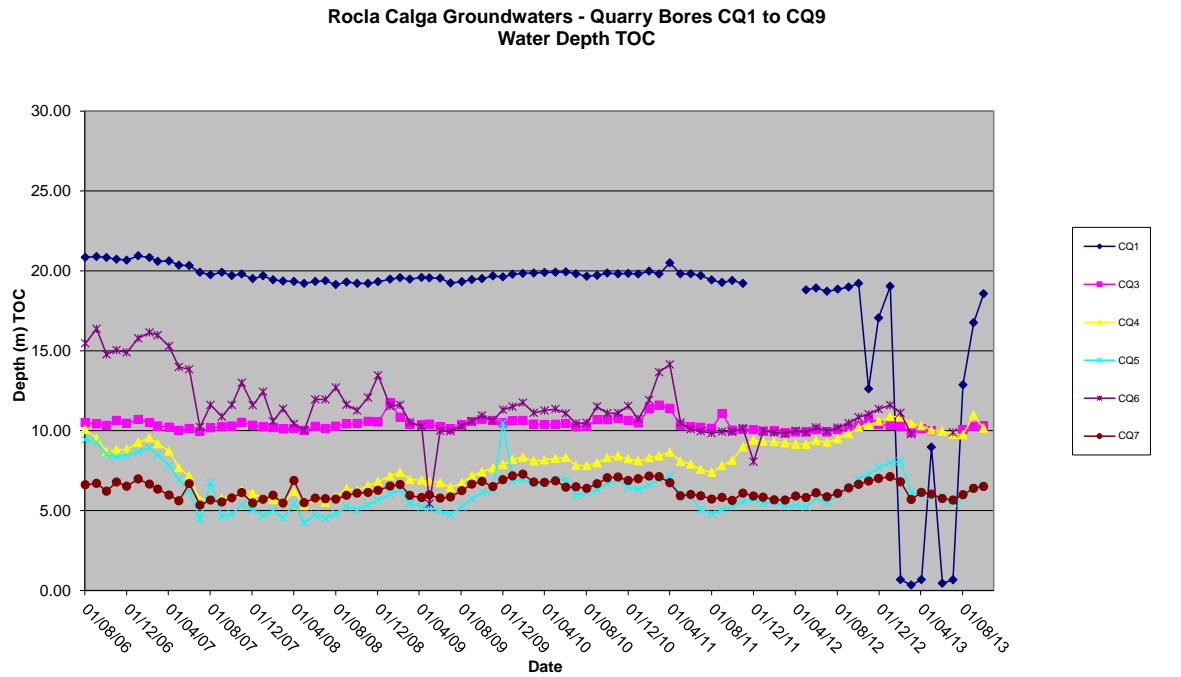
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements taken by Carbon Based Environmental Pty Limited.

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

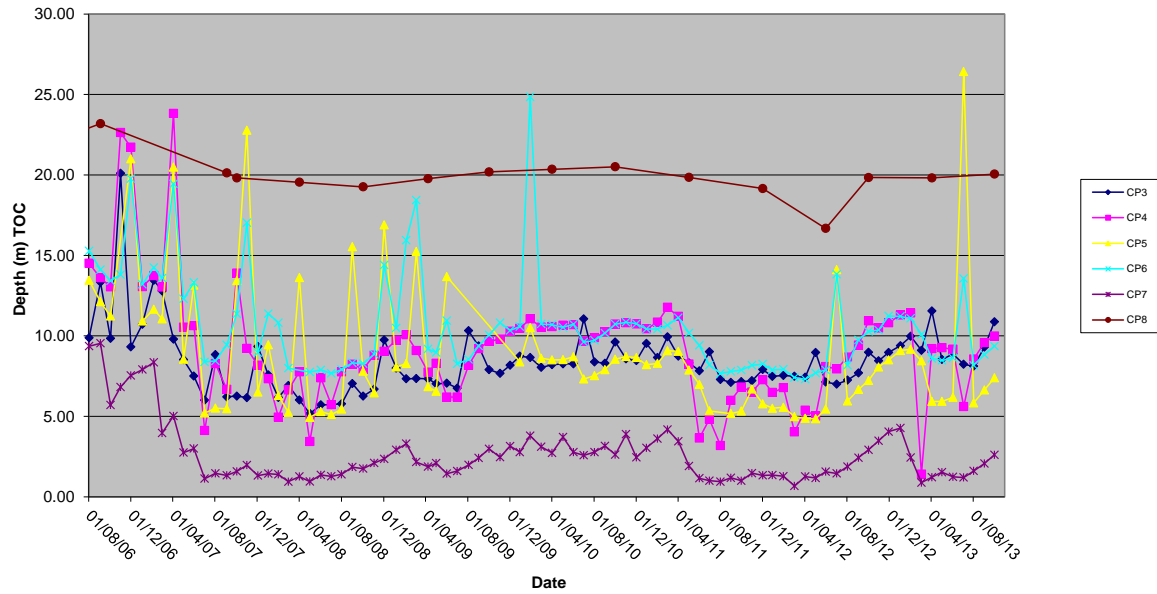
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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

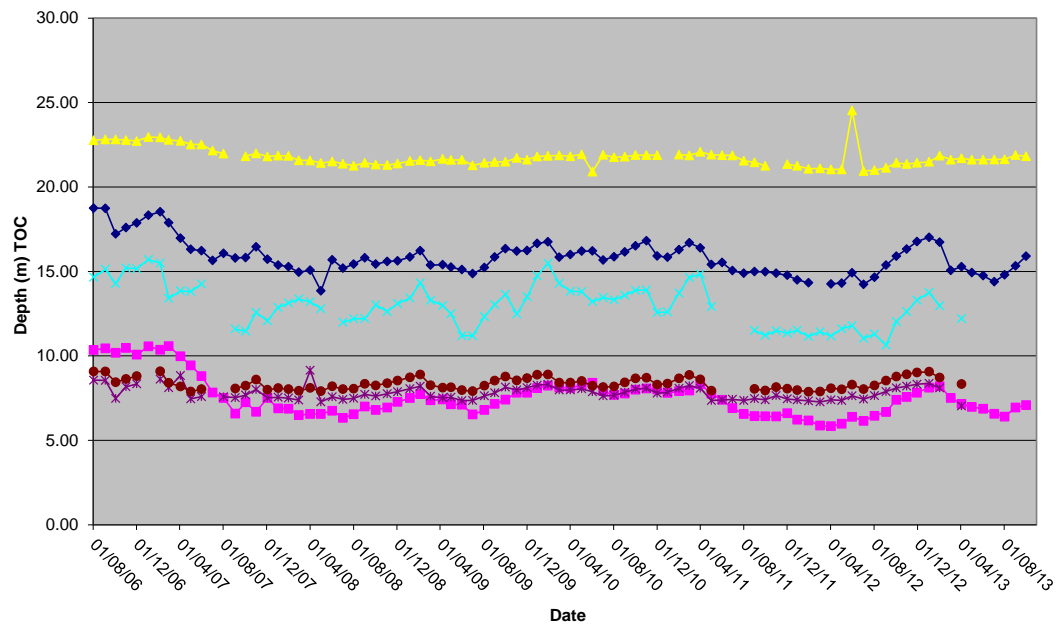
Figures 3 to 6: Groundwater Depth Charts.



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 September 2013 was approximately 100%. The weather station data follows and includes;

- Monthly data numerical summary;
- Weather charts of air temperature, humidity, heat index and wind chill, atmospheric pressure, solar radiation, evapotranspiration, rain, wind speed and data reception; and
- Wind rose (frequency distribution diagram of wind speed and direction).

Monthly weather statistics from the nearby Bureau of Meteorology (BOM) at Peats Ridge station was unavailable for September 2013.

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

Rocla Calga Quarry	16.8 mm
BOM Peats Ridge*	NA
BOM Gosford*	29.6 mm
BOM Peats Ridge Long term mean for September*	73.6 mm

NA = Not Available

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

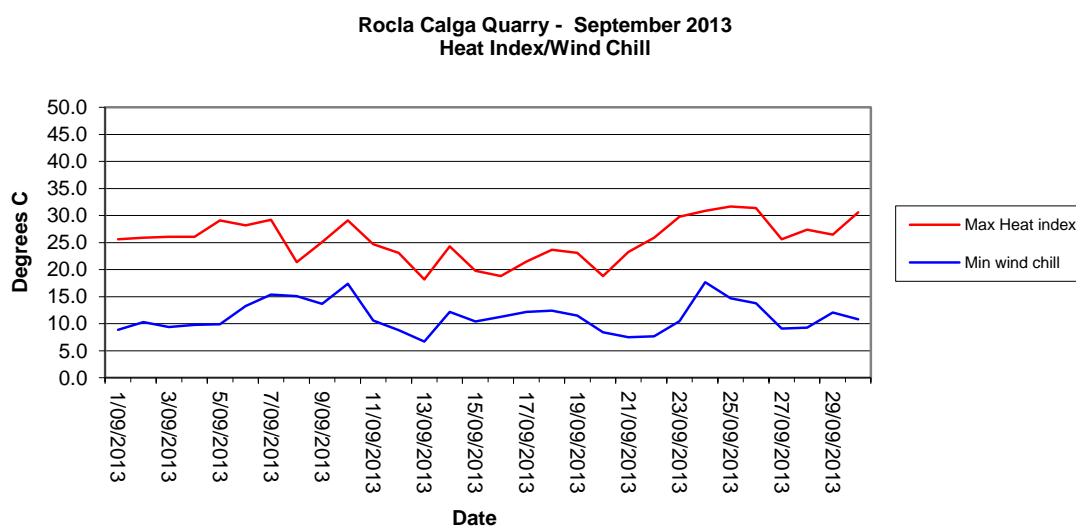
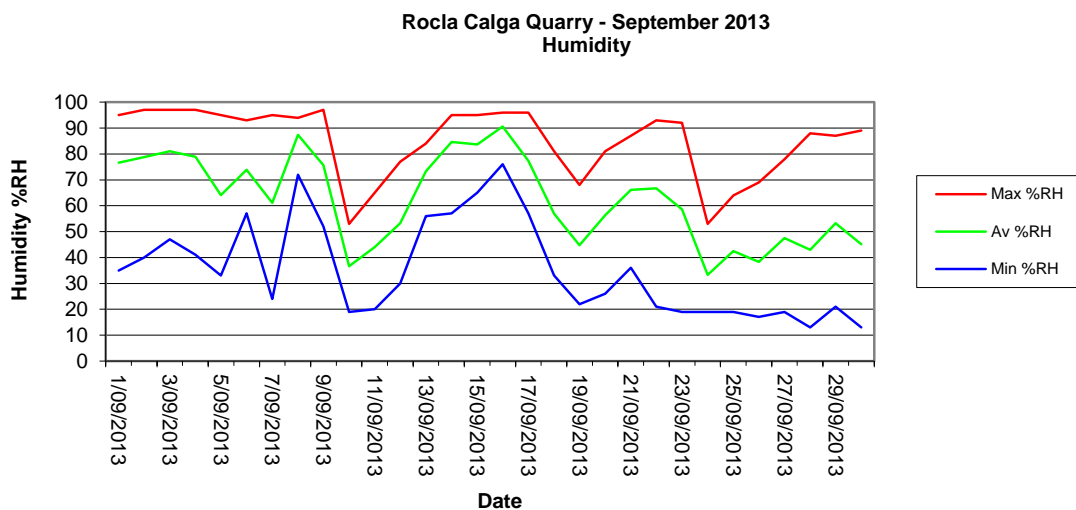
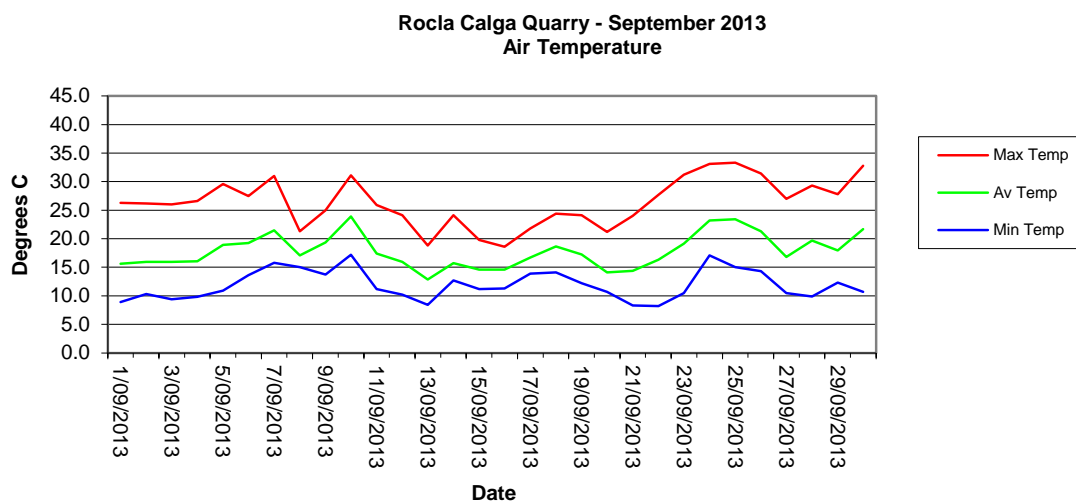
Results are displayed in the following table and figures.

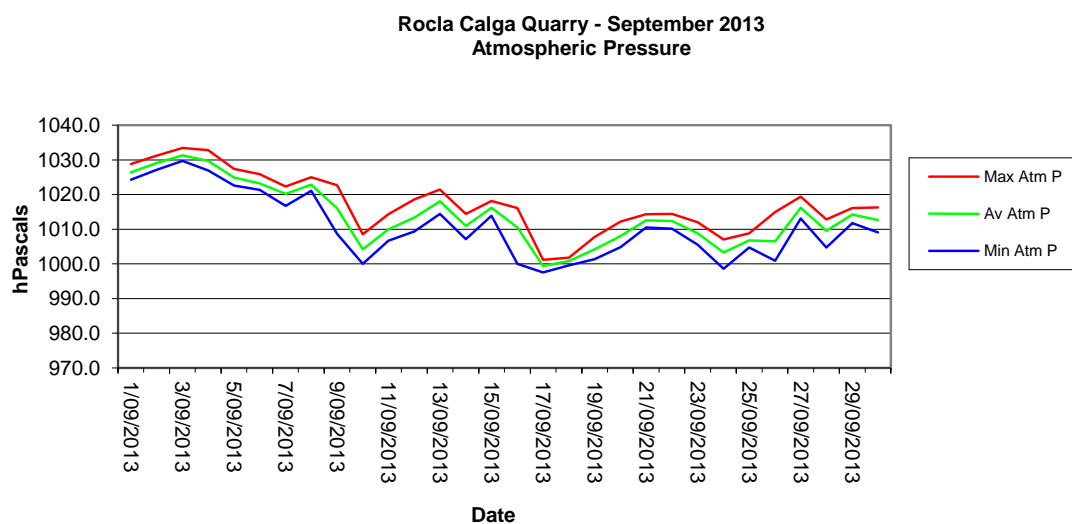
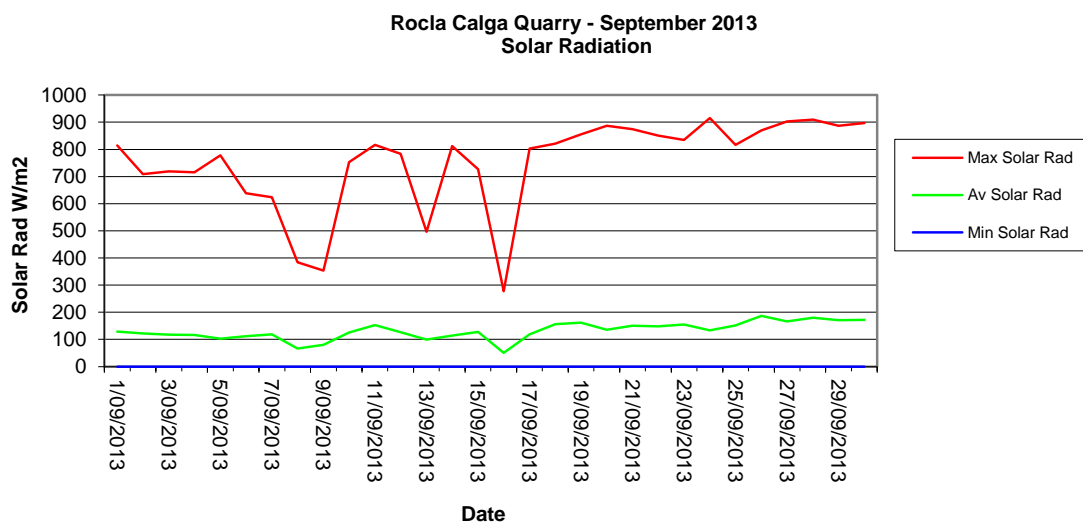
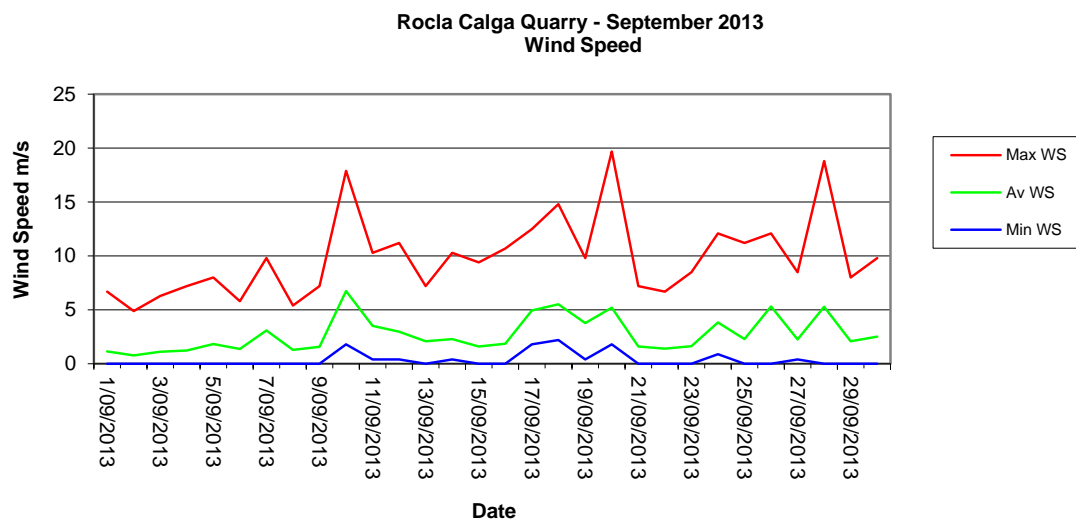
2.4.1 Monthly Meteorological Data Summary

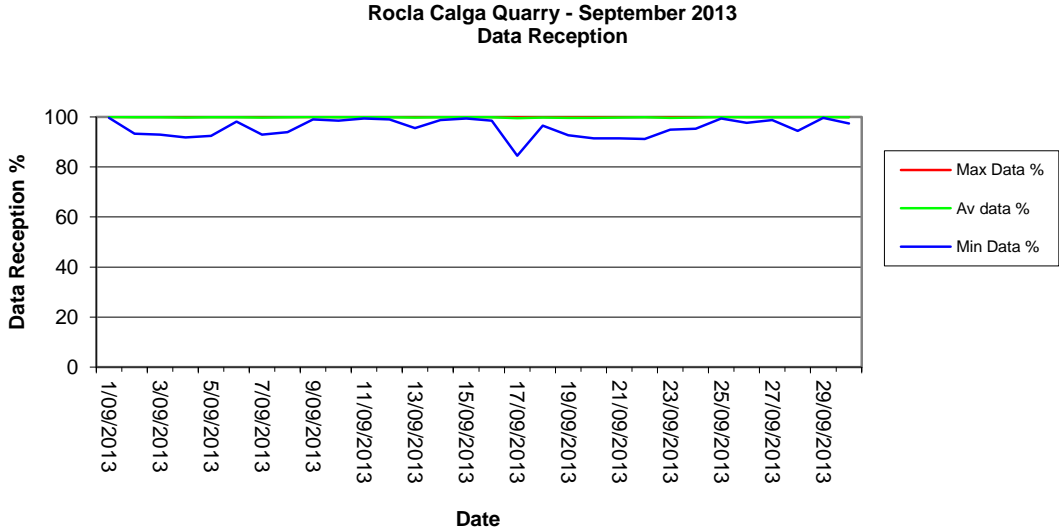
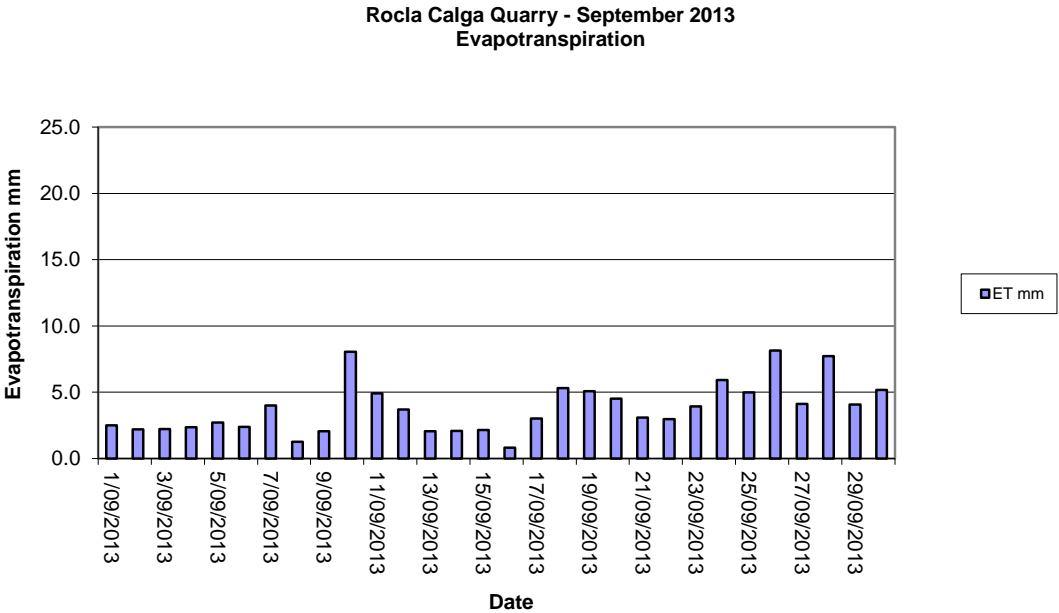
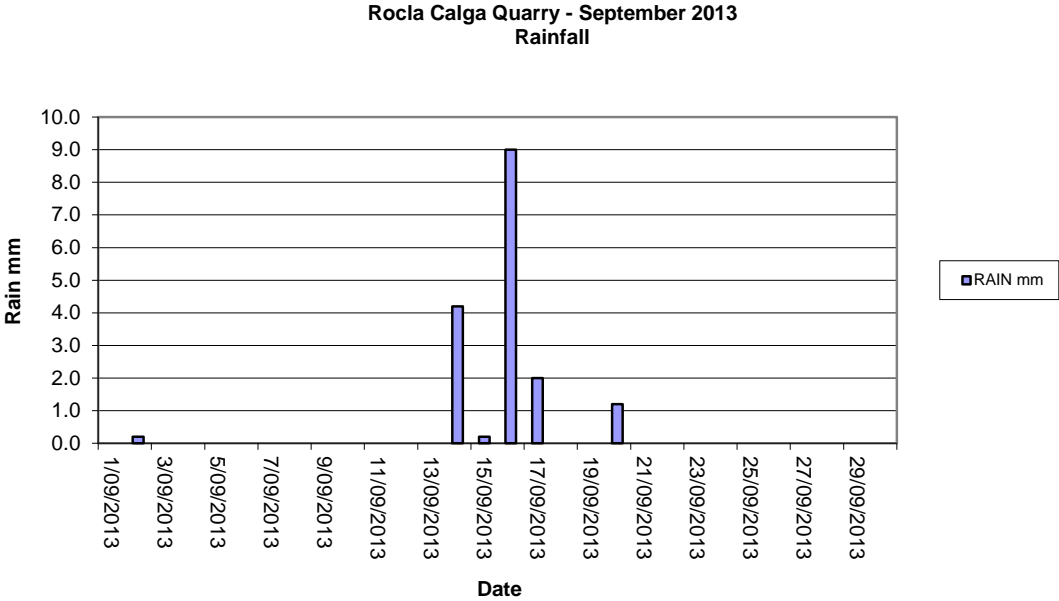
Summary Sep-13 Rocla - Calga

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 %
1/09/2013	8.9	15.6	26.3	35	77	95	0.0	2.5	0	1.1	6.7	8.9	25.6	1024.3	1026.4	1028.8	0	128.8	814	99.7	100.0	100
2/09/2013	10.3	15.9	26.2	40	79	97	0.2	2.2	0	0.8	4.9	10.3	25.9	1027.1	1029.1	1031.2	0	122.2	709	93.3	99.9	100
3/09/2013	9.4	15.9	26.0	47	81	97	0.0	2.2	0	1.1	6.3	9.4	26.1	1029.7	1031.3	1033.4	0	117.6	719	93	99.9	100
4/09/2013	9.8	16.1	26.6	41	79	97	0.0	2.4	0	1.2	7.2	9.8	26.1	1026.9	1029.7	1032.8	0	116.4	715	91.8	99.8	100
5/09/2013	10.9	18.9	29.6	33	64	95	0.0	2.7	0	1.8	8	9.9	29.1	1022.6	1024.9	1027.4	0	102.1	778	92.4	99.9	100
6/09/2013	13.6	19.2	27.5	57	74	93	0.0	2.4	0	1.4	5.8	13.3	28.2	1021.3	1023.2	1025.9	0	112.0	638	98.2	99.9	100
7/09/2013	15.8	21.5	31.0	24	61	95	0.0	4.0	0	3.1	9.8	15.4	29.2	1016.7	1020.2	1022.3	0	118.5	623	93	99.8	100
8/09/2013	15.0	17.1	21.3	72	87	94	0.0	1.3	0	1.3	5.4	15.1	21.4	1021.1	1022.8	1025.0	0	66.8	384	93.9	99.9	100
9/09/2013	13.7	19.3	25.0	52	76	97	0.0	2.1	0	1.6	7.2	13.7	25.1	1008.6	1016.0	1022.7	0	80.4	354	99.1	100.0	100
10/09/2013	17.2	23.9	31.1	19	37	53	0.0	8.1	1.8	6.8	17.9	17.4	29.1	1000.0	1004.2	1008.5	0	125.8	753	98.5	100.0	100
11/09/2013	11.2	17.4	25.9	20	44	65	0.0	4.9	0.4	3.5	10.3	10.6	24.7	1006.7	1009.9	1014.3	0	152.2	816	99.4	100.0	100
12/09/2013	10.2	16.0	24.1	30	53	77	0.0	3.7	0.4	3.0	11.2	8.8	23.1	1009.3	1013.3	1018.6	0	127.1	783	99.1	100.0	100
13/09/2013	8.4	12.9	18.8	56	73	84	0.0	2.1	0	2.1	7.2	6.7	18.2	1014.4	1018.1	1021.4	0	98.9	496	95.6	99.8	100
14/09/2013	12.7	15.7	24.1	57	85	95	4.2	2.1	0.4	2.3	10.3	12.2	24.3	1007.1	1010.9	1014.4	0	114.1	812	98.8	100.0	100
15/09/2013	11.2	14.6	19.8	65	84	95	0.2	2.2	0	1.6	9.4	10.4	19.8	1013.9	1016.2	1018.1	0	127.4	727	99.4	100.0	100
16/09/2013	11.3	14.6	18.6	76	91	96	9.0	0.8	0	1.9	10.7	11.3	18.8	1000.0	1010.4	1016.1	0	50.3	277	98.5	99.9	100
17/09/2013	13.9	16.7	21.8	57	77	96	2.0	3.0	1.8	5.0	12.5	12.2	21.5	997.5	999.4	1001.2	0	119.1	803	84.5	99.5	100
18/09/2013	14.1	18.6	24.4	33	57	81	0.0	5.3	2.2	5.5	14.8	12.4	23.7	999.6	1000.8	1001.8	0	156.0	821	96.5	99.8	100
19/09/2013	12.2	17.2	24.1	22	45	68	0.0	5.1	0.4	3.8	9.8	11.5	23.1	1001.3	1004.1	1007.7	0	161.9	855	92.7	99.7	100
20/09/2013	10.7	14.1	21.2	26	56	81	1.2	4.5	1.8	5.2	19.7	8.4	18.8	1004.8	1008.0	1012.2	0	135.1	887	91.5	99.7	100
21/09/2013	8.3	14.4	24.0	36	66	87	0.0	3.1	0	1.6	7.2	7.5	23.3	1010.5	1012.6	1014.3	0	150.8	874	91.5	99.8	100
22/09/2013	8.2	16.3	27.7	21	67	93	0.0	3.0	0	1.4	6.7	7.7	25.9	1010.1	1012.4	1014.4	0	148.6	851	91.2	99.9	100
23/09/2013	10.5	19.1	31.2	19	59	92	0.0	3.9	0	1.6	8.5	10.5	29.8	1005.5	1008.8	1012.0	0	155.1	835	95	99.7	100
24/09/2013	17.1	23.2	33.1	19	33	53	0.0	5.9	0.9	3.8	12.1	17.7	30.9	998.6	1003.3	1007.0	0	132.8	915	95.3	99.8	100
25/09/2013	15.0	23.4	33.3	19	42	64	0.0	5.0	0	2.3	11.2	14.7	31.7	1004.7	1006.8	1008.8	0	151.5	817	99.4	100.0	100
26/09/2013	14.3	21.3	31.4	17	38	69	0.0	8.1	0	5.3	12.1	13.8	31.4	1000.9	1006.5	1014.9	0	186.2	870	97.7	99.9	100
27/09/2013	10.5	16.8	27.0	19	47	78	0.0	4.1	0.4	2.3	8.5	9.1	25.6	1013.1	1016.1	1019.4	0	165.7	903	98.8	100.0	100
28/09/2013	9.9	19.7	29.3	13	43	88	0.0	7.7	0	5.3	18.8	9.3	27.4	1004.7	1009.5	1012.8	0	179.8	909	94.4	99.9	100
29/09/2013	12.3	17.9	27.8	21	53	87	0.0	4.1	0	2.1	8	12.1	26.5	1011.7	1014.3	1016.1	0	170.4	887	99.7	100.0	100
30/09/2013	10.7	21.7	32.8	13	45	89	0.0	5.2	0	2.5	9.8	10.8	30.6	1009.1	1012.6	1016.3	0	171.7	897	97.4	99.9	100
Monthly	8.2	17.8	33.3	13	62	97	16.8	113.5	0	2.7	19.7	6.7	31.7	997.5	1014.1	1033.4	0	131.5	915	84.5	99.9	100

2.4.2 Monthly Weather Charts



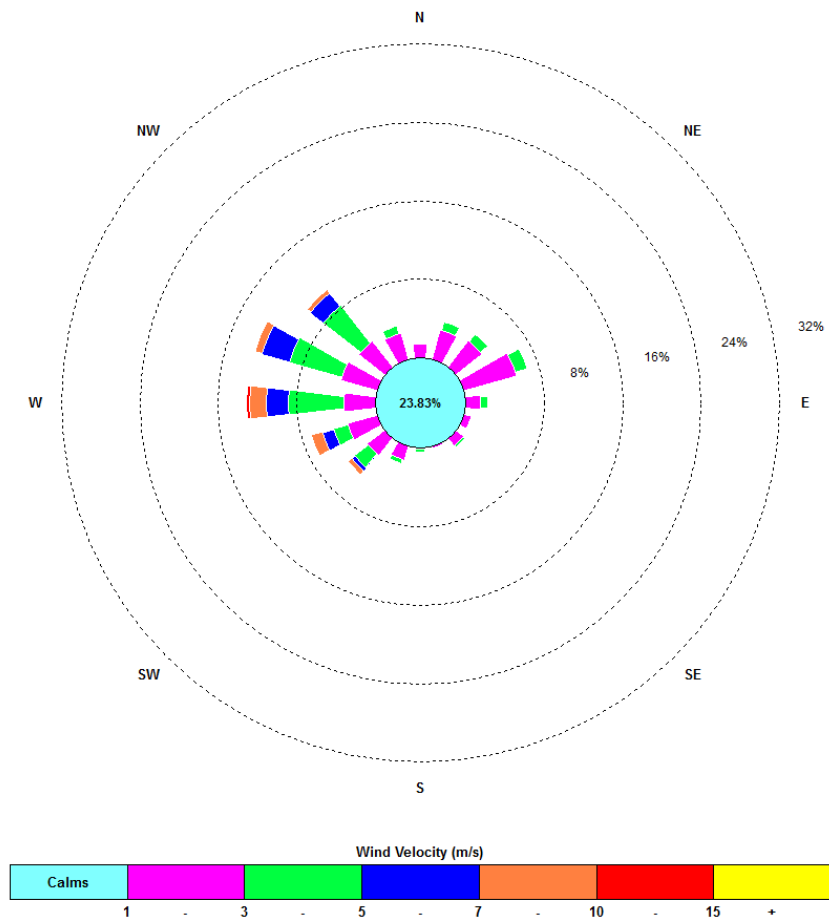




2.4.3 Monthly Windrose Plot

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 September 2013 – 23:45, 30 September 2013



The predominant winds were from the W to NW, with strongest winds from the W/WNW. The maximum wind speed was 19.7 m/s from the WSW.

Appendix 1

Laboratory Certificates



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EN1303685	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 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 04-OCT-2013
Sampler	: CBE	Issue Date	: 15-OCT-2013
Site	: ----		
Quote number	: SY/428/12	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 - 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)

Client sample ID

Client sampling date / time

				CD1	CD2c	CD3	CD4	CD5
				02/09/13 - 01/10/13	02/09/13 - 01/10/13	02/09/13 - 01/10/13	02/09/13 - 01/10/13	02/09/13 - 01/10/13
				01-OCT-2013 15:00	01-OCT-2013 15:00	01-OCT-2013 15:00	01-OCT-2013 15:00	01-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EN1303685-001	EN1303685-002	EN1303685-003	EN1303685-004	EN1303685-005
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	2.2	0.8	1.5	0.2	0.2
Ash Content (mg)	----	1	mg	38	13	26	4	3
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.1	0.1	0.2	0.2	<0.1
Combustible Matter (mg)	----	1	mg	2	2	3	2	<1
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	2.3	0.9	1.7	0.4	0.2
Total Insoluble Matter (mg)	----	1	mg	40	15	29	6	3



Analytical Results

Sub-Matrix: DUST (Matrix: AIR)

Client sample ID

Client sampling date / time

				CD6	----	----	----	----
				02/09/13 - 01/10/13	----	----	----	----
				01-OCT-2013 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EN1303685-006	----	----	----	----
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	0.3	----	----	----	----
Ash Content (mg)	----	1	mg	5	----	----	----	----
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	<0.1	----	----	----	----
Combustible Matter (mg)	----	1	mg	<1	----	----	----	----
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	0.3	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	5	----	----	----	----



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: ES1321554	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 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 02-OCT-2013
Sampler	: CBE	Issue Date	: 08-OCT-2013
Site	: ----		
Quote number	: SY/428/12	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 Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics

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Environmental

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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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LOR = Limit of reporting

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Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				A	F	----	----	----
				01-OCT-2013 15:00	01-OCT-2013 15:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1321554-001	ES1321554-002	----	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	6.23	6.17	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	64	61	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	45	36	----	----	----
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	<5	<5	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	----	----	----