



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

October 2012

A handwritten signature in black ink that reads 'Colin Davies'.

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 3 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 October 2012;
- Surface Water quality results for October 2012;
- Groundwater depth and quality results for October 2012; and
- Meteorological report for October 2012.

The October 2012 dust deposition results for insoluble solids were generally varied when compared to those of September 2012. 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 for the normal monthly sampling event on the 31 October 2012 at sites A and F. Sites B and D were dry and Site C was inaccessible and unable to be sampled. At the time of sample collection, there was no water discharge observed from the site. Results show generally good water quality with all sites sampled maintaining low Electrical Conductivity, Total Dissolved Solids and Total Suspended Solids. Oil and Grease was detected at site F. pH levels increased slightly but remained within the slightly acidic to neutral range.

Groundwaters were sampled for normal monthly monitoring on 31 October 2012. Groundwater depths generally increased across the bores compared to last month with water moving away from the surface. Groundwater pH and EC levels remained relatively stable. An attempt to purge bore CQ1 on 29 October 2012 resulted in a rise in the water level and decrease in pH and EC.

The meteorological station data recovery for the month was approximately 95%. Data was fragmented from the 22-25 October for all parameters and no wind data was available from the 22-31 October due to a technical problem. Recorded rainfall on site for October was 16.6 mm, which was similar to that recorded at the BOM Peats Ridge Station and lower than the Peats Ridge long-term average for October. Results are detailed below:

Rocla Calga Quarry	16.6 mm
BOM Peats Ridge*	14.6 mm
BOM Gosford*	17.4 mm
BOM Peats Ridge Long term mean for October	90.6 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/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**.

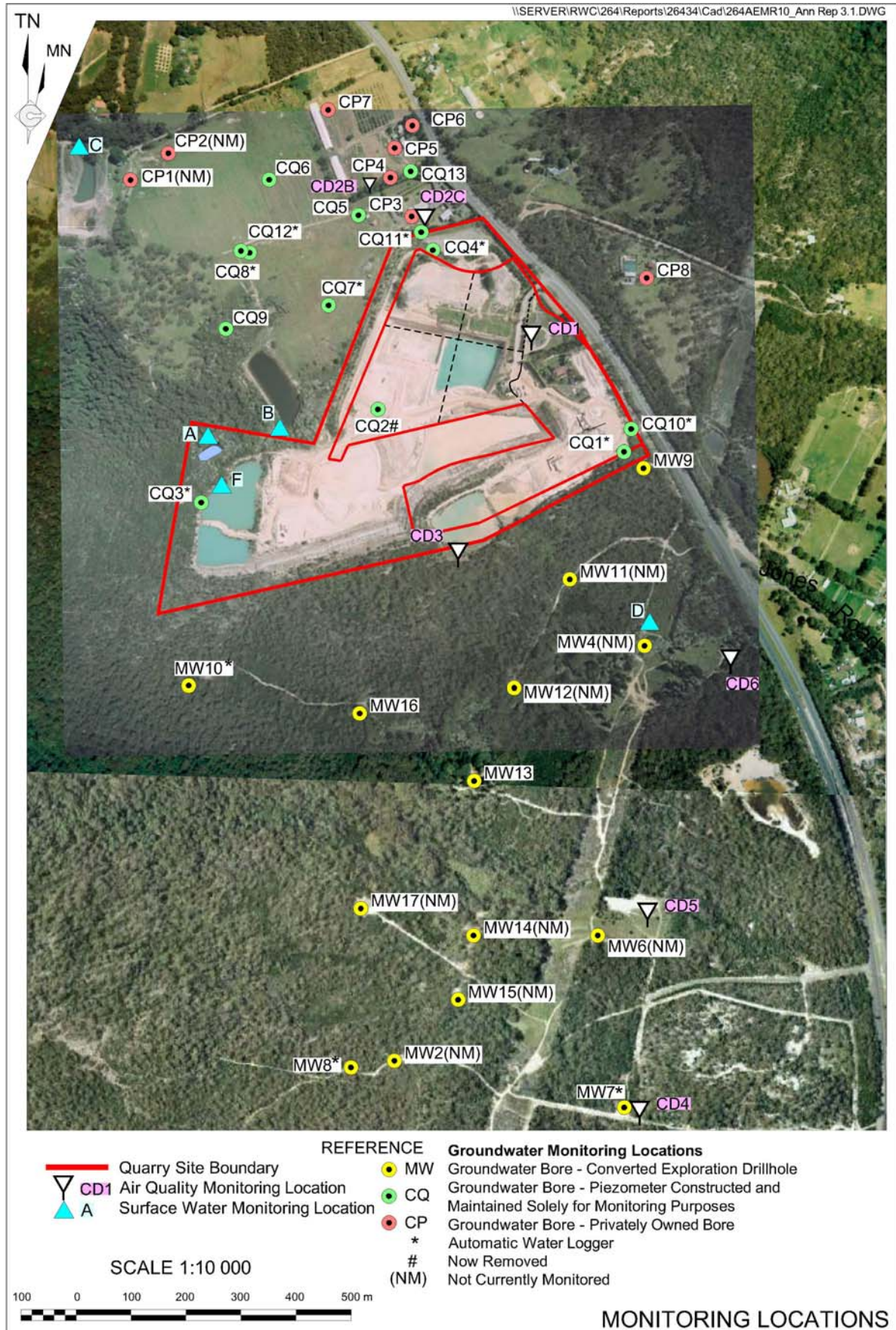


Figure 1: Rocla Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for October 2012 and the project 12 month rolling average. Results are in g/m².month.

Table 1: Dust Deposition results: 2 October 2012 – 31 October 2012 (29 days)

Site	Monthly Insoluble Solids g/m ² .month	Monthly Ash Residue g/m ² .month	Monthly Combustible Matter g/m ² .month	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids g/m ² .month
CD1	0.9	0.8	0.1	89	1.4
CD2c	2.1	1.2	0.9	57	1.2
CD3	0.8	0.5	0.3	63	1.1
CD4	0.5	0.2	0.3	40	0.5
CD5	0.4	0.2	0.2	50	0.3
CD6	0.4	0.2	0.2	50	0.4

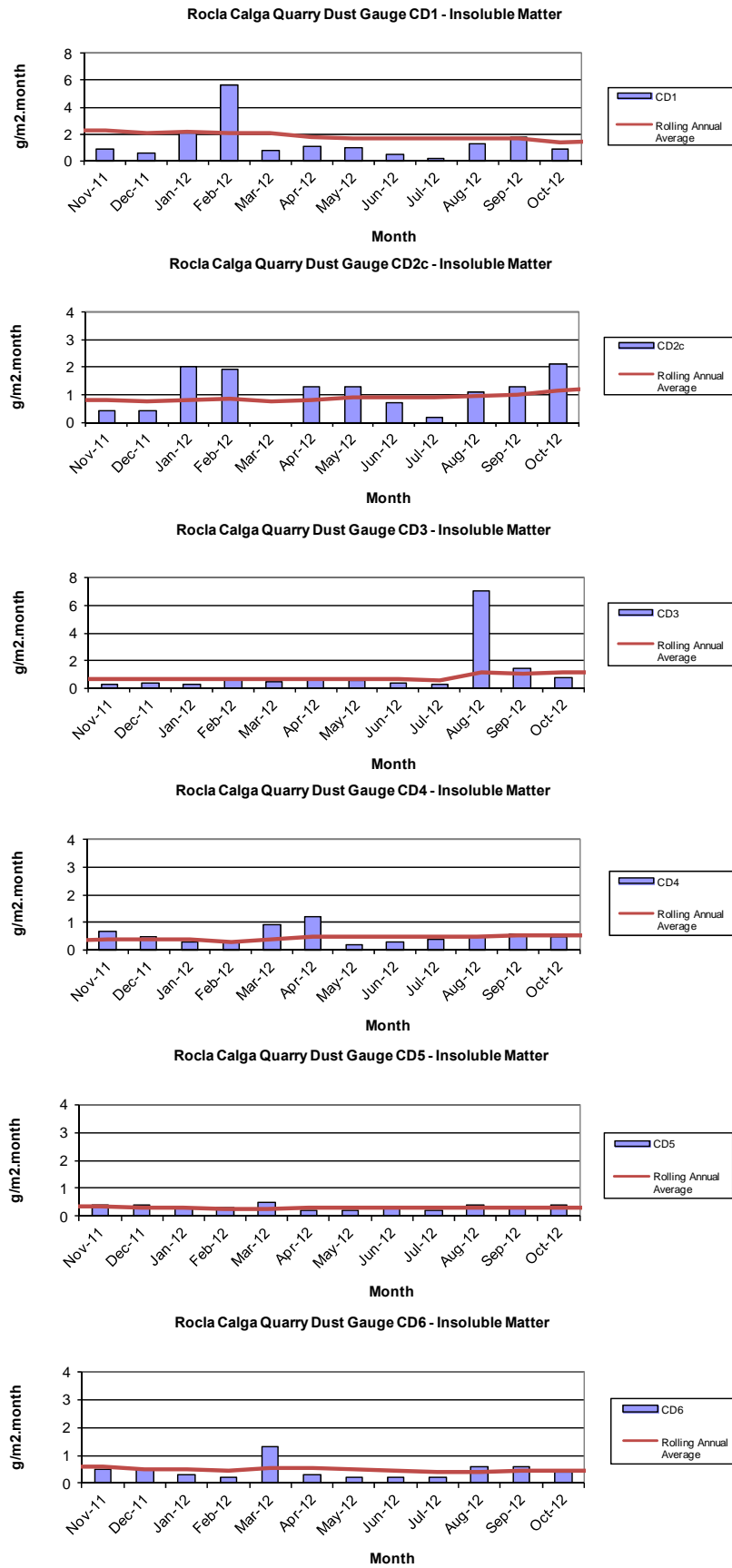
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m².month; the Development Consent’s annual average amenity criteria at residential locations. The current rolling annual average is calculated from November 2011 to October 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 31 October 2012 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

Table 2: Monthly surface water monitoring – October 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	6.80	71	52	14	<5
B	Dry							
C	No Access							
D	Dry							
F	Still	Clear	Clear	6.83	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, low Total Suspended Solids. Oil and Grease was detected at site F.

2.3 Groundwater Monitoring

Groundwaters were sampled on 31 October 2012. Water quality tests for pH and electrical conductivity were conducted by Carbon Based Environmental Pty Limited. For water quality purposes, water was purged from the bore until constant pH (+/- 0.1 pH units) and Electrical Conductivity (+/- 5%) was obtained between samples. Data is displayed in **Table 3** and **Figures 3 to 6**.

Groundwater depth generally increased across the sampled groundwater bores compared to last month indicating water moving away from the surface. Exceptions were CQ1, CQ11S, CP3, CP4 and MW9 which decreased in water depth.

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

An attempt to purge bore CQ1 on the 29 October 2012 resulted in a rise in water level within the borehole and a decrease in pH and EC. Levels should return to normal over the coming months.

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	12.62	7.7	82
CQ3	Voutos	* Monitor	10.53	10.74	5.6	108
CQ4	Voutos	* Monitor	8.78	10.34	4.9	80
CQ5	Gazzana	DIP Only	8.69	7.27	4.4	182
CQ6	Gazzana	DIP Only	16.00	11.02	4.5	215
CQ7	Gazzana	* Monitor	6.89	6.84	4.6	98
CQ8	Gazzana	* Monitor	11.03	6.20	4.6	149
CQ9	Gazzana	DIP Only	10.10	9.28	4.7	107
CQ10	Voutos	* Monitor	NI	21.96	4.5	171
CQ11S	Gazzana	* Monitor	NI	9.29	4.4	163
CQ11D	Gazzana	* Monitor	NI	11.50	4.9	151
CQ12	Gazzana	* Monitor	NI	4.65	4.6	135
CQ13	Kashouli	* Monitor	NI	13.30	4.9	206
CP3	Gazzana	Domestic	10.40	8.45	4.3	150
CP4	Kashouli	Domestic	13.63	10.49	5.2	163
CP5	Kashouli	Domestic	16.61	8.07	4.4	248
CP6	Kashouli	Domestic	16.27	10.36	4.3	201
CP7	Kashouli	Production	8.56	3.48	4.6	217
CP8	Rozmanec	Domestic	22.17	NR	NR	NR
MW7	Rocla Bore	* Monitor	15.76	16.32	4.1	113
MW8	Rocla Bore	* Monitor	9.82	7.56	4.6	84
MW9	Rocla Bore	* Monitor	22.44	21.36	4.5	87
MW10	Rocla Bore	* Monitor	15.41	12.61	4.3	122
MW13	Rocla Bore	DIP Only	NI	8.21	4.3	99
MW16	Rocla Bore	DIP Only	NI	8.91	4.6	108

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.

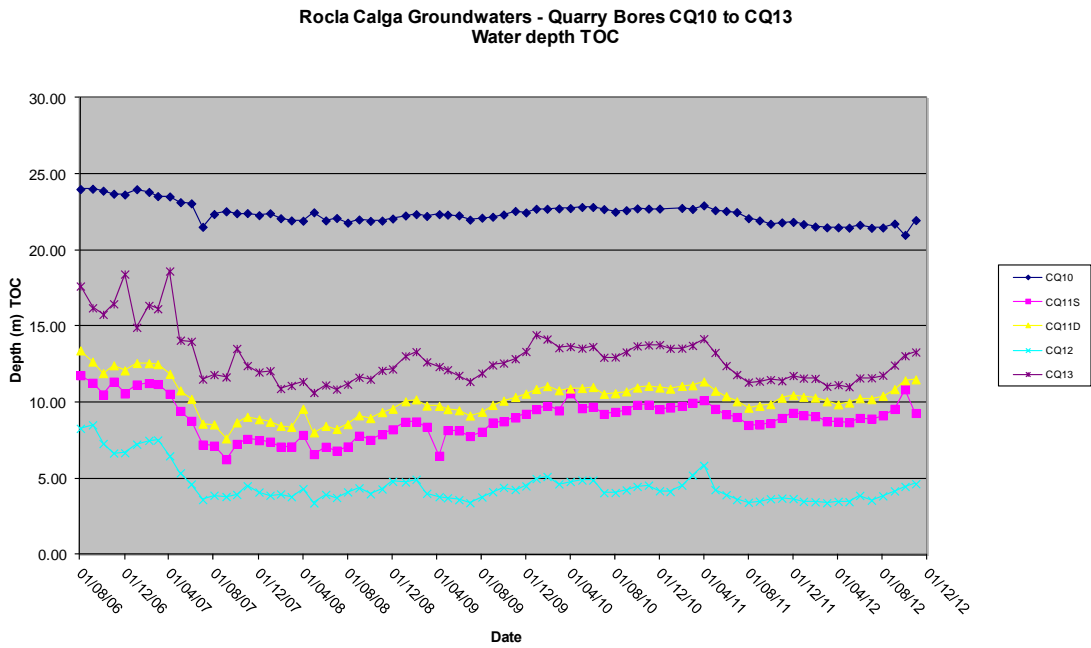
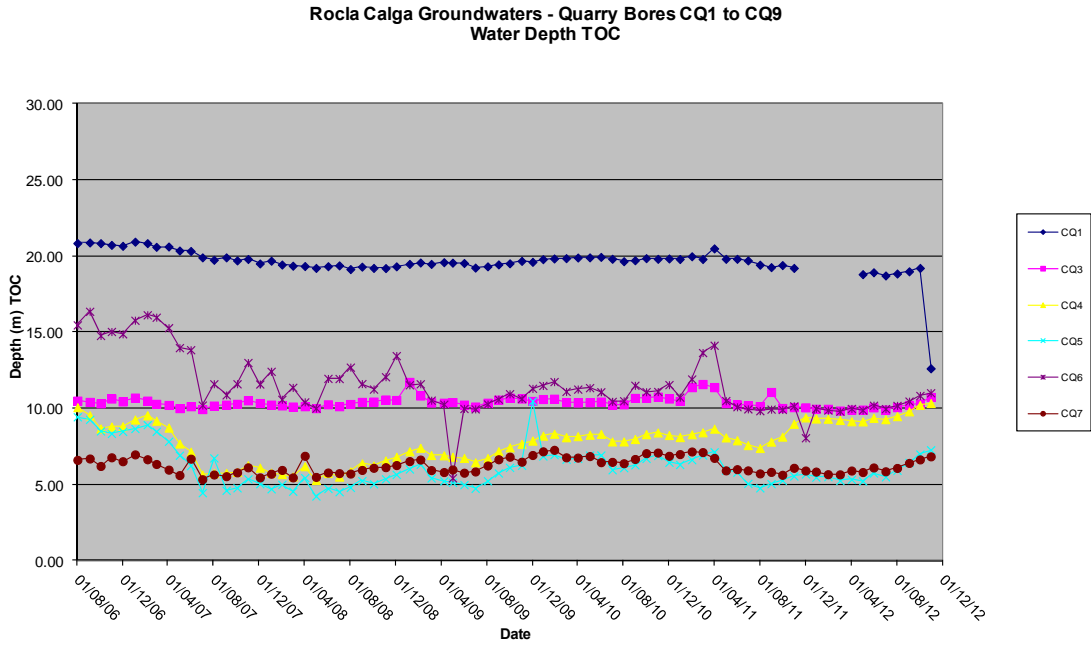
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements taken by Carbon Based Environmental Pty Limited.

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

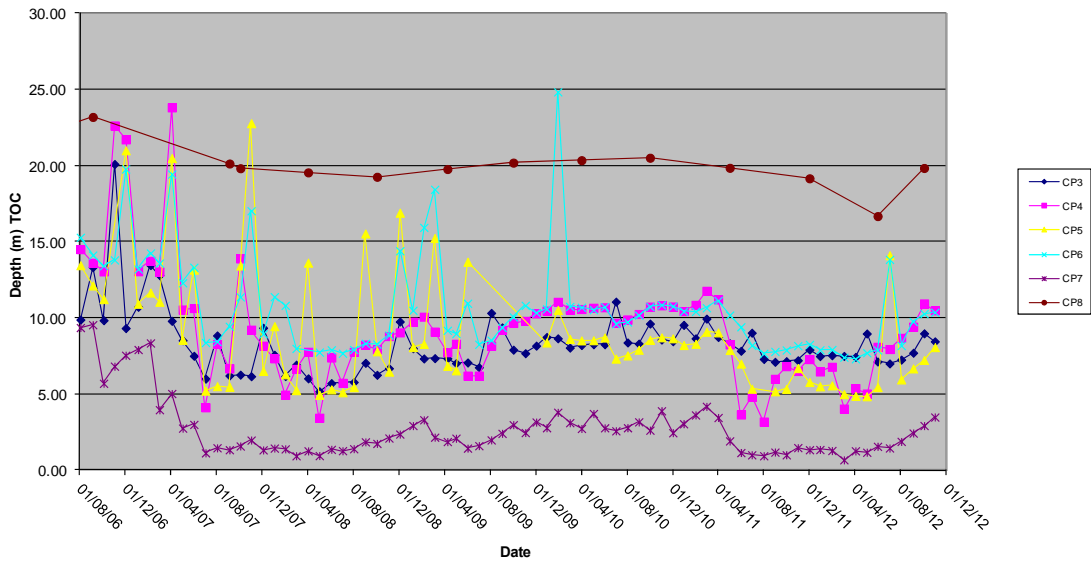
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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

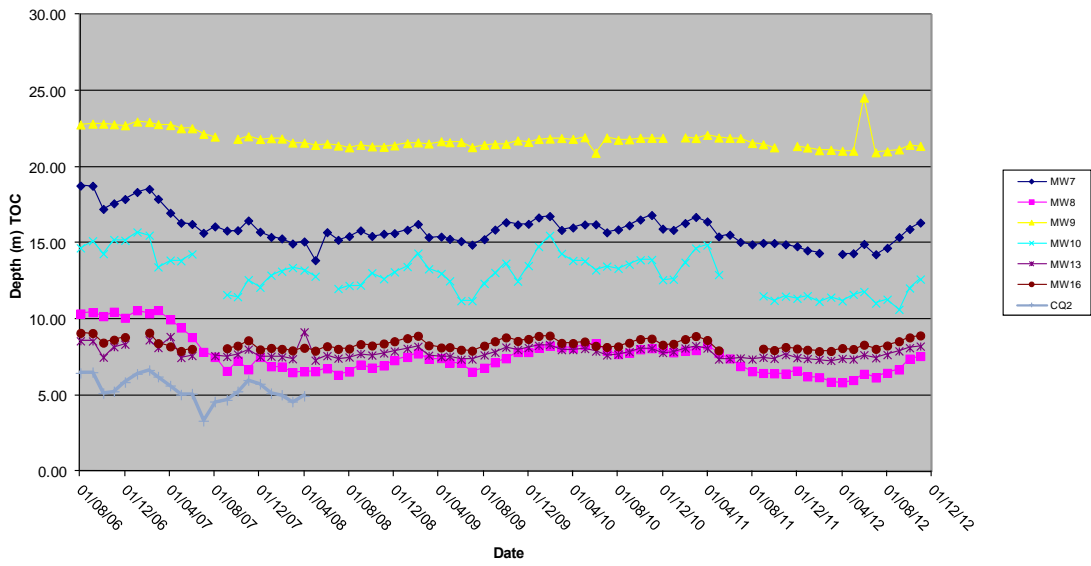
Figures 3 to 6: Groundwater Depth Charts.



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 October was approximately 95%. Data was fragmented from the 22-25 October for all parameters and no wind data was available from the 22-31 October due to a technical problem. 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. Only rainfall data was available from the Peats Ridge BOM for October 2012.

Data for October 2012 shows that rainfall recorded at the Rocla Calga Quarry was similar to that recorded at nearby Peats Ridge BOM station and lower than the Gosford BOM station recorded rainfall. Recorded rainfall at Rocla Calga Quarry was lower than the Peats Ridge long term mean rainfall for October. The rainfall comparison is provided below:

Rocla Calga Quarry	16.6 mm
BOM Peats Ridge*	14.6 mm
BOM Gosford*	17.4 mm
BOM Peats Ridge Long term mean for October*	90.6 mm

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

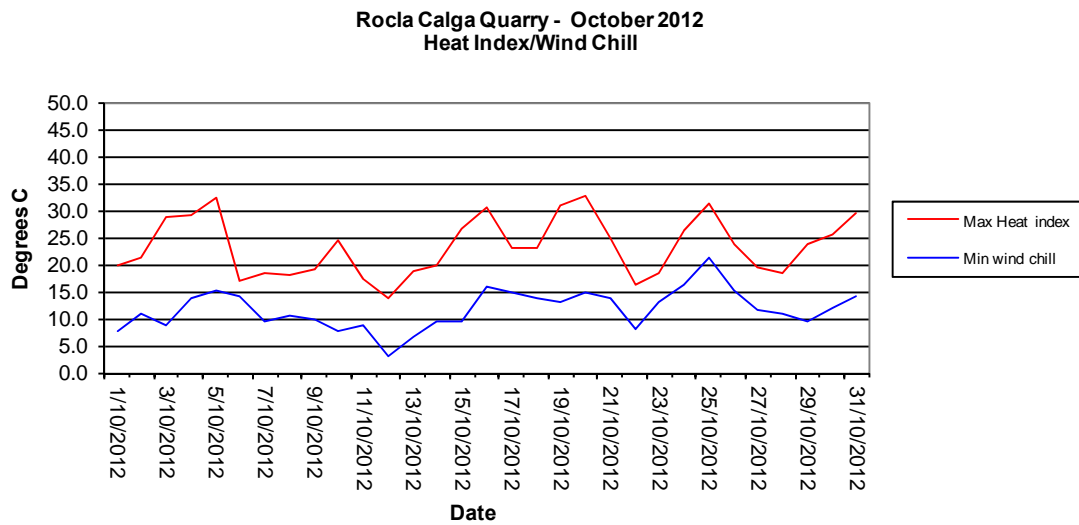
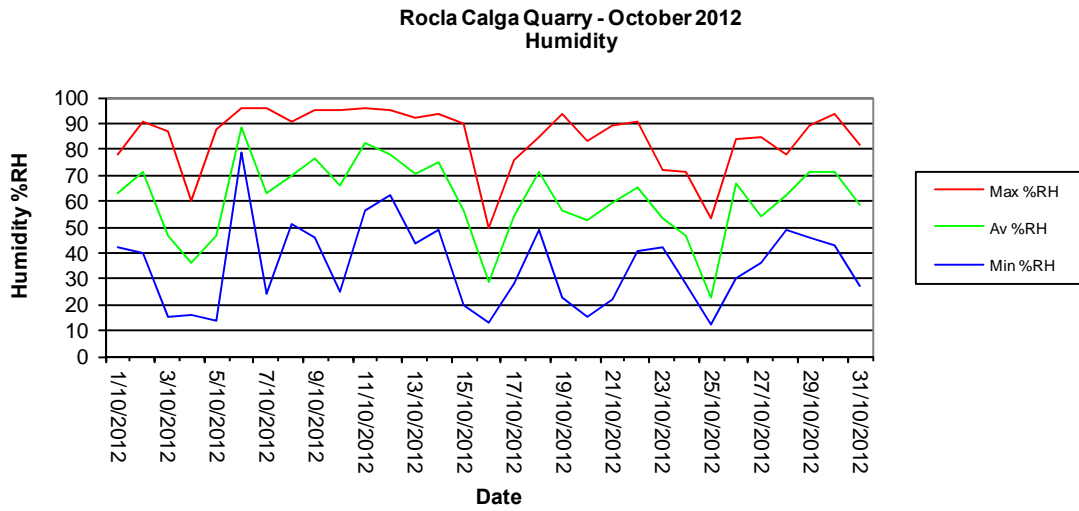
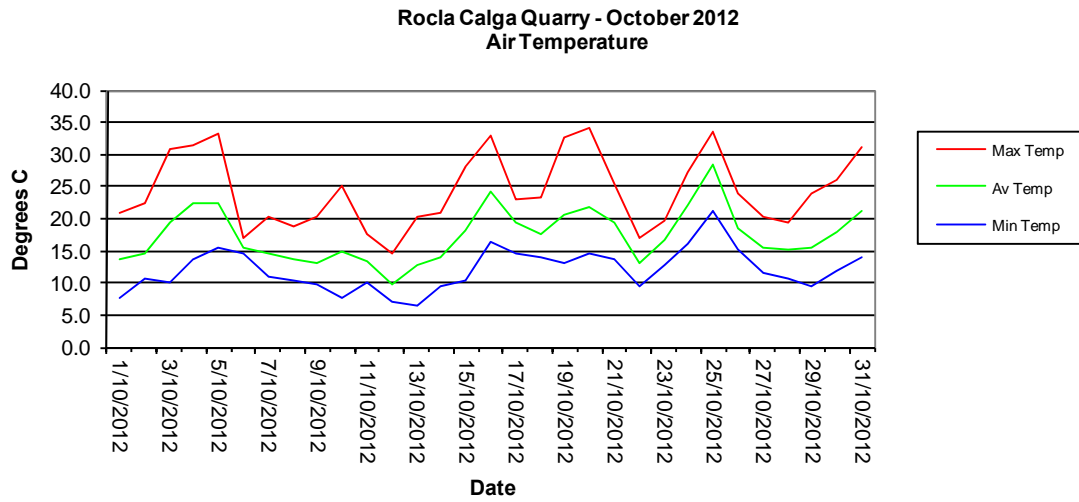
Results are displayed in the following table and figures.

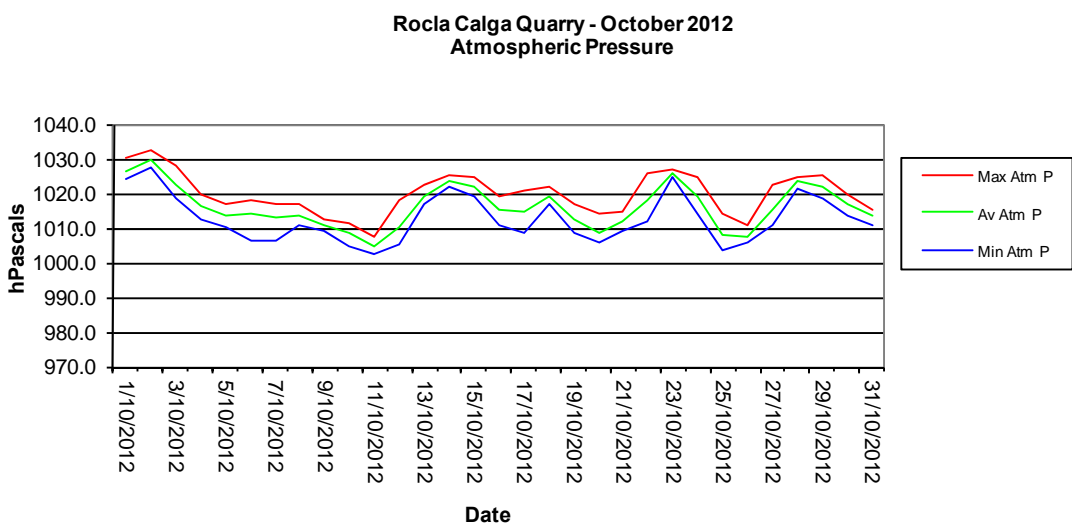
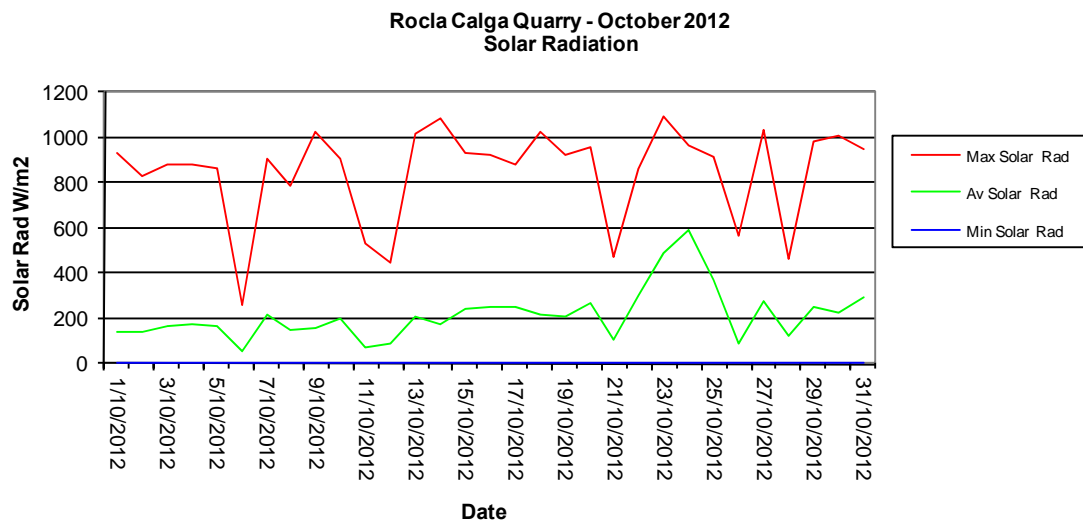
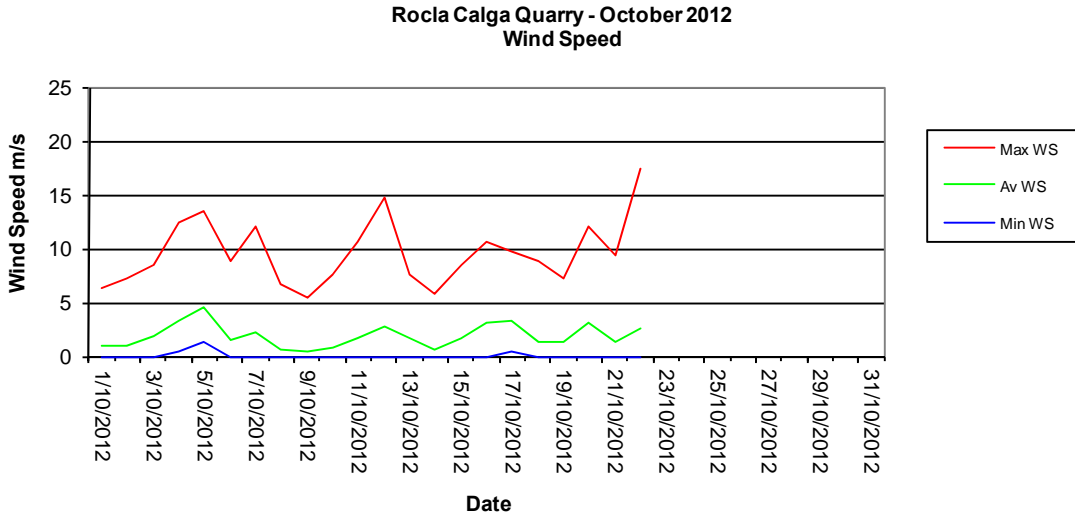
2.4.1 Monthly Meteorological Data Summary

Summary Oct-12 Rocla - Calga

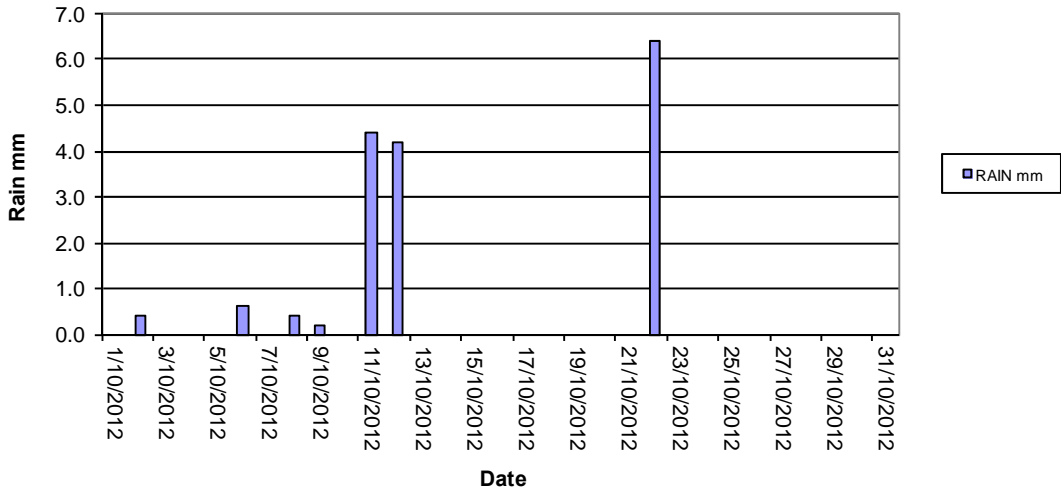
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/10/2012	7.7	13.6	20.9	42	63	78	0.0	2.5	0	1.1	6.3	7.7	19.7	1024.2	1026.4	1030.2	0	136.2	934	96.5	99.6	100
2/10/2012	10.8	14.5	22.3	40	71	91	0.4	2.6	0	1.0	7.2	10.8	21.2	1027.7	1029.6	1032.4	0	143.4	827	85.4	99.0	100
3/10/2012	10.1	19.3	30.7	15	46	87	0.0	4.2	0	1.9	8.5	8.9	28.6	1018.4	1022.6	1028.0	0	165.3	883	91.5	99.0	100
4/10/2012	13.6	22.3	31.3	16	36	60	0.0	6.3	0.4	3.4	12.5	13.6	29.0	1012.7	1016.2	1019.5	0	172.7	884	95.9	99.6	100
5/10/2012	15.5	22.5	33.2	14	47	88	0.0	6.9	1.3	4.6	13.4	15.3	32.2	1010.3	1013.6	1017.1	0	162.9	865	94.7	99.7	100
6/10/2012	14.7	15.6	16.9	79	88	96	0.6	1.1	0	1.5	8.9	14.2	17.1	1006.4	1014.0	1018.2	0	54.7	258	98.2	99.8	100
7/10/2012	11.0	14.5	20.4	24	63	96	0.0	3.9	0	2.2	12.1	9.3	18.3	1006.6	1012.8	1016.9	0	220.9	910	98.2	99.8	100
8/10/2012	10.3	13.8	18.9	51	70	91	0.4	2.4	0	0.6	6.7	10.4	17.9	1011.1	1013.8	1016.9	0	148.5	789	91.8	99.7	100
9/10/2012	9.7	13.2	20.2	46	77	95	0.2	2.3	0	0.4	5.4	9.8	19.1	1009.1	1010.9	1012.5	0	160.4	1023	95.9	99.4	100
10/10/2012	7.7	14.9	25.2	25	66	95	0.0	3.4	0	0.8	7.6	7.8	24.4	1004.7	1008.6	1011.2	0	201.2	907	96.8	99.5	100
11/10/2012	10.1	13.3	17.6	56	82	96	4.4	1.4	0	1.6	10.7	8.6	17.3	1002.4	1004.8	1007.3	0	73.6	534	90.1	97.9	100
12/10/2012	7.0	9.9	14.7	62	78	95	4.2	1.6	0	2.8	14.8	3.1	13.8	1005.1	1010.4	1018.0	0	91.5	444	88.6	96.7	100
13/10/2012	6.6	12.8	20.2	44	71	92	0.0	3.5	0	1.6	7.6	6.5	18.8	1016.7	1019.4	1022.6	0	208.5	1017	93.3	98.8	100
14/10/2012	9.4	14.0	20.8	49	75	94	0.0	2.7	0	0.6	5.8	9.4	19.8	1022.0	1023.8	1025.4	0	177.3	1081	92.4	98.8	100
15/10/2012	10.3	18.3	28.2	20	56	90	0.0	4.7	0	1.8	8.5	9.4	26.7	1019.0	1021.9	1024.7	0	238.6	935	93.6	99.0	100
16/10/2012	16.4	24.2	32.8	13	29	50	0.0	7.3	0	3.2	10.7	16.0	30.4	1010.6	1015.2	1019.3	0	247.5	921	93.3	99.6	100
17/10/2012	14.7	19.4	23.1	28	54	76	0.0	5.7	0.4	3.3	9.8	14.8	22.9	1008.7	1014.9	1020.6	0	249.3	878	96.5	99.4	100
18/10/2012	13.9	17.4	23.4	49	71	85	0.0	3.7	0	1.4	8.9	13.9	22.9	1017.0	1019.4	1021.9	0	213.6	1029	96.5	99.3	100
19/10/2012	13.1	20.7	32.6	23	57	94	0.0	4.4	0	1.3	7.2	13.1	30.8	1008.4	1012.4	1016.8	0	210.1	923	92.4	99.0	100
20/10/2012	14.5	21.7	34.1	15	52	83	0.0	6.7	0	3.1	12.1	14.7	32.8	1005.8	1008.5	1013.9	0	267.4	959	98.2	99.8	100
21/10/2012	13.8	19.4	25.4	22	59	89	0.0	2.6	0	1.3	9.4	13.6	24.7	1009.2	1011.8	1014.6	0	107.2	474	0	97.3	100
22/10/2012	9.6	13.1	17.1	41	66	91	6.4	2.8	0	2.6	17.4	8.1	16.2	1012.1	1018.1	1025.9	0	304.0	868	0	47.1	100
23/10/2012	12.8	16.7	19.7	42	53	72	0.0	3.0				12.9	18.4	1024.6	1025.6	1026.9	0	485.8	1093	0	46.9	100
24/10/2012	16.1	22.1	27.1	28	47	71	0.0	3.9				16.4	26.1	1014.4	1019.3	1024.6	0	588.1	968	0	42.9	100
25/10/2012	21.2	28.4	33.4	12	23	53	0.0	4.0				21.2	31.1	1003.5	1008.3	1014.3	0	373.6	912	0	61.8	100
26/10/2012	15.2	18.4	23.9	30	67	84	0.0	1.8				15.2	23.8	1005.7	1007.6	1010.7	0	92.9	570	93	99.5	100
27/10/2012	11.6	15.5	20.3	36	54	85	0.0	4.1				11.6	19.3	1010.9	1015.5	1022.3	0	277.5	1035	93.9	99.1	100
28/10/2012	10.8	15.1	19.3	49	62	78	0.0	1.9				10.8	18.4	1021.5	1023.4	1025.0	0	124.5	466	93.3	99.3	100
29/10/2012	9.4	15.6	24.0	46	71	89	0.0	3.6				9.4	23.8	1018.8	1022.0	1025.2	0	247.2	985	94.7	99.5	100
30/10/2012	11.8	17.9	25.9	43	71	94	0.0	3.5				11.9	25.4	1013.8	1016.9	1019.6	0	227.2	1008	93	98.9	100
31/10/2012	14.1	21.3	31.2	27	58	82	0.0	4.9				14.2	29.6	1010.9	1013.5	1015.4	0	293.1	953	96.2	99.6	100
Monthly	6.6	17.4	34.1	12	61	96	16.6	113.3	0	1.9	17.4	3.1	32.8	1002.4	1016.2	1032.4	0	215.0	1093	0	92.8	100

2.4.2 Monthly Weather Charts

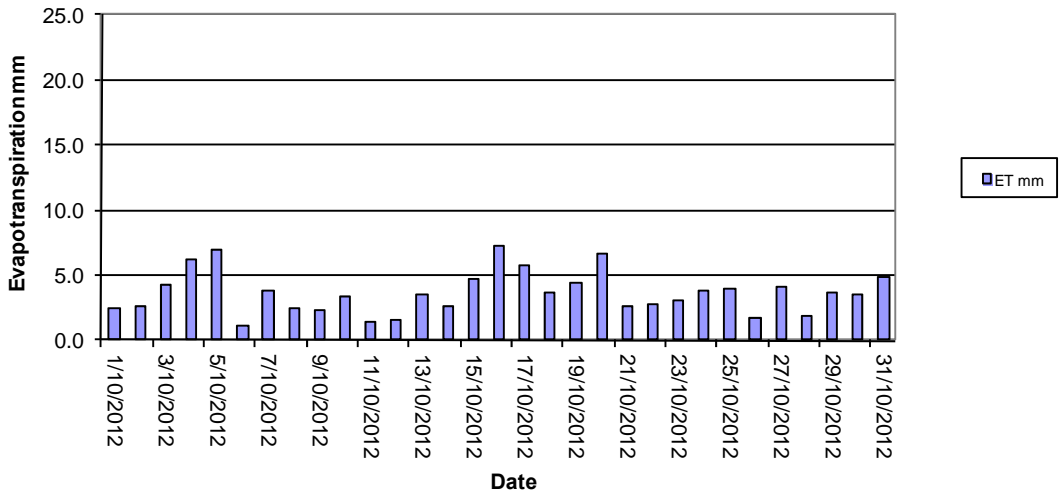




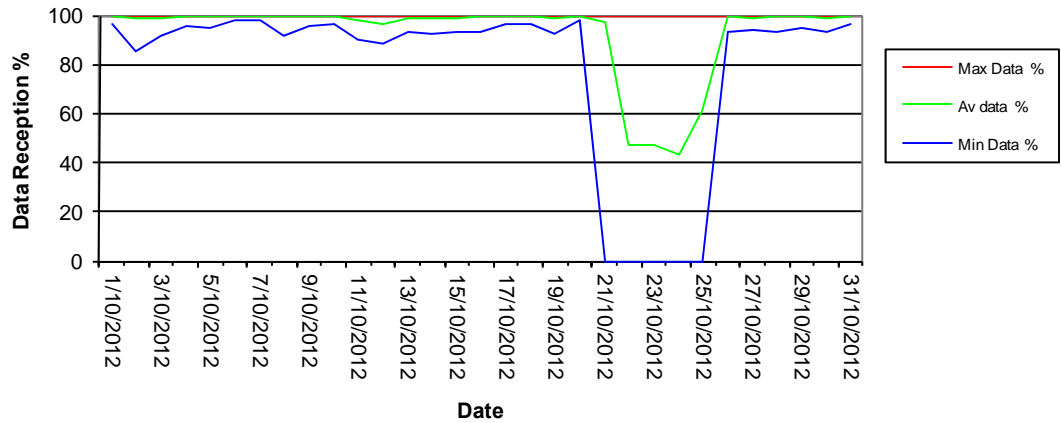
Rocla Calga Quarry - October 2012
Rainfall



Rocla Calga Quarry - October 2012
Evapotranspiration



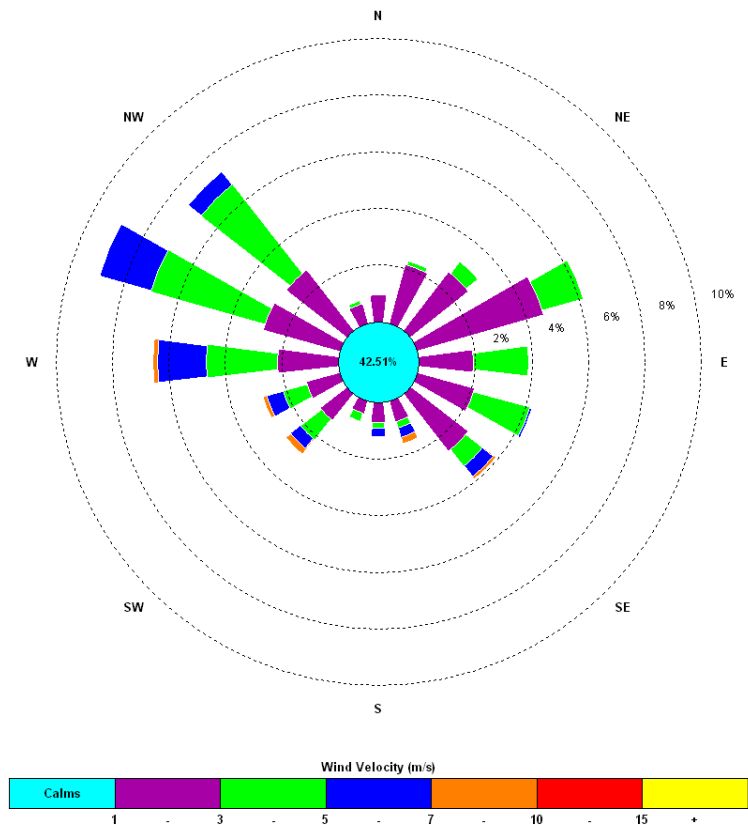
Rocla Calga Quarry - October 2012
Data Reception



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, 1 October 2012 – 20:00, 22 October 2012



The predominant winds were from the WNW, with strongest winds from the W. The maximum wind speed was 17.4 m/s from the WSW.

Appendix 1
Laboratory Certificates

Appendix 2

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

Peats Ridge, New South Wales
October 2012 Daily Weather Observations



Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain mm	Evap mm	Sun hours	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C					km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo			0	4.6																
2	Tu			0.4	3.6																
3	We			0	2.0																
4	Th			0	6.2																
5	Fr			0	7.4																
6	Sa			0	5.0																
7	Su			1.2	1.8																
8	Mo			0	5.2																
9	Tu			0.2	1.8																
10	We			1.0	3.6																
11	Th			2.0	4.6																
12	Fr			0.6	2.0																
13	Sa			5.0	0.2																
14	Su			2.0	4.4																
15	Mo			0	2.4																
16	Tu			0	4.8																
17	We			0	7.8																
18	Th			0	5.6																
19	Fr			0																	
20	Sa			0	3.8																
21	Su			0	6.0																
22	Mo			0	3.2																
23	Tu			2.2	2.6																
24	We			0	3.4																
25	Th			0	5.6																
26	Fr			0	5.0																
27	Sa			0	3.0																
28	Su			0	5.0																
29	Mo			0	3.0																
30	Tu			0	4.0																
31	We			0	3.8																
Statistics for October 2012																					
Mean					4.0																
Lowest					0.2																
Highest				5.0	7.8																
Total				14.6	121.4																

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

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

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Gosford, New South Wales
October 2012 Daily Weather Observations



Date	Day	Temps		Rain mm	Evap mm	Sun hours	Max wind gust			9am					3pm						
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C					km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Mo	5.2	19.7	0			SE	20	14:51	17.3	50		SE	6		18.5	50		ESE	11	
2	Tu	9.8	21.5	0			SSE	24	09:37	17.4	66		SE	7		19.0	46		ENE	7	
3	We	5.5	29.9	0			NNW	24	11:54	21.5	35		NNW	11		29.4	13		NNW	7	
4	Th	7.9	32.1	0			N	35	14:24	24.6	32		NW	11		31.1	14		NW	9	
5	Fr	13.0	34.6	0			SW	43	11:45	28.6	23		NW	13		24.5	47		ESE	11	
6	Sa	15.7	17.8	0.6			ESE	24	16:53				Calm			17.7	96		ESE	6	
7	Su	9.7	19.7	1.4			SE	33	17:55	16.2	51		E	7		17.5	40		SE	17	
8	Mo	10.3	18.9	0.2			SE	22	14:17	12.7	99		Calm			17.6	57		E	9	
9	Tu	9.4	19.1	6.4			SE	24	15:13				Calm			18.7	54		E	7	
10	We	5.2	24.5	0			NW	24	09:30	15.7	84		E	6		21.9	41		ESE	11	
11	Th	10.6	17.1	1.8			NW	20	02:54				NNW	2		16.6	89		NE	6	
12	Fr	7.4	15.2	0.6			SSE	39	13:09	10.6	72		WNW	11		13.5	89		SSW	13	
13	Sa	4.2	19.3	4.0			SSE	26	15:19	14.3	58		SW	7		18.3	47		SSE	11	
14	Su	8.5	20.1	0			ESE	22	15:05	15.2	90		NNE	2		18.7	52		SE	9	
15	Mo	5.8	27.1	0			ENE	30	15:45	18.0	80		ENE	6		27.1	21		NW	6	
16	Tu	8.0	33.3	0			N	35	10:15	24.0	31		N	9		32.5	12		NE	7	
17	We	13.8	24.0	0			SE	28	09:17	23.4	34		SE	13		20.0	60		ESE	13	
18	Th	14.3	22.3	0			NE	28	13:04	16.7	98		Calm			21.7	54		E	9	
19	Fr	11.0	30.4	0			SSE	20	13:59	16.5	99		Calm			29.2	36		E	9	
20	Sa	11.4	35.4	0			SE	35	12:09	28.7	30		NNW	13		23.7	54		SE	15	
21	Su	10.9	27.6	0			WSW	30	15:49	18.5	91		N	9		26.3	32		N	6	
22	Mo	11.8	20.2	0			S	56	15:16	18.7	66		SE	7		17.4	39		SE	20	
23	Tu	8.7	19.9	2.4			ESE	28	10:27	15.9	51		SE	11		18.2	42		E	9	
24	We	5.9	23.8	0			ENE	28	13:47	17.3	60		ENE	6		22.3	44		NE	13	
25	Th	7.8	34.7	0			NW	33	11:40	18.3	83		S	4		30.6	30		E	9	
26	Fr	14.1	22.7	0			SE	19	12:33	18.6	81		SSE	7		20.3	67		ENE	6	
27	Sa	7.8	21.1	0			ESE	31	13:03	17.8	37		S	11		19.3	43		SE	15	
28	Su	13.9	20.8	0			SE	24	08:21	17.3	49		SE	7		18.6	50		SE	11	
29	Mo	6.7	22.8	0			ESE	28	16:05	18.2	64		E	6		20.3	53		E	11	
30	Tu	9.4	24.6	0			SE	24	10:40	17.8	92		Calm			22.0	53		NE	9	
31	We	10.7	29.8	0			SE	20	13:25	23.3	57		ESE	6		28.9	32		ESE	9	
Statistics for October 2012																					
Mean		9.5	24.2							18.7	62			6		22.0	47			10	
Lowest		4.2	15.2							10.6	23			Calm		13.5	12		#	6	
Highest		15.7	35.4	6.4			S	56		28.7	99		#	13		32.5	96		SE	20	
Total				17.4																	

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.

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