



**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**

JULY 2006

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

Colin Davies BSc MEIA CENVP
Environmental Scientist
1 September 2006

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
- Ground Waters; and
- Meteorological Station.

This report was prepared by Carbon Based Environmental and includes the following;

- Dust deposition results for July 2006;
- Surface Water quality results for July 2006;
- Ground Water depth and quality results for July 2006; and
- Meteorological report for July 2006.

The July 2006 dust deposition results show a low level of insoluble solids immediately east of the operations at CD1 and south of the operations at CD3. Site CD3 is located on the mining premises. The gauge at CD2 was contaminated by bird droppings and the extremely close proximity of extraction operations. The result was excluded from average calculations. Due to the progression of quarry operations, gauge CD2 was removed and relocated to site CD2b in accordance with the Air Quality Management Plan. All sites, on a year to date average basis, are currently below the exceedence 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 the 2 August 2006. Most sites were dry at the time of sampling with three samples collected; these were Site A, Site F and a small dam below site F, additional to the Site Water Management Plan requirements. At the time of sample collection, there was no water discharges observed from the site. Site A is a sediment dam that contained water after recent rain; it appeared to have not overflowed from the site. The samples were collected and analysed for a monthly sampling event. Results show very good quality water at site F with near neutral pH, low Electrical Conductivity, low Total Suspended Solids and no detectable Total Oil and Grease. The water in the sediment dam at site A had a slightly alkaline pH and low electrical conductivity. The Total Suspended Solids were high at 145mg/L and the oil and grease was moderate at 7mg/L. The sediment dam appeared to be operating correctly in collecting and settling sediment.

Ground waters were sampled on the 2 August 2006. The groundwater monitoring program is currently under development with most groundwater loggers installed in late June 2006. Groundwater depths slightly increased and decreased at various sites with relatively stable water quality, compared to last month.

The meteorological station continued to return high data recovery and operated well in July 2006. The recorded winds show dominant SSW, WNW and W winds.

Rocla Calga Quarry Environmental Monitoring – July 2006

Recorded rainfall on site for July 2006 was slightly less than the BOM Peats Ridge Station. Both stations recorded rainfall similar to the Peats Ridge long term average. Results are detailed below:

Rocla Calga Quarry	64.2mm
BOM Peats Ridge*	73.4mm
BOM Gosford*	103.6mm
BOM Peats Ridge Long term mean for June*	71.1mm

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

1.0 SAMPLING PROGRAM

Rocla Calga Quarry conducts environmental monitoring in accordance to Development Consent, DEC (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 water sites include local streams and dams. Basic analysis including pH, Electrical Conductivity, Total Suspended Solids and Total Oil and Grease is conducted monthly with additional samples collected when daily rainfall exceeds 50mm.

Ground water sites are monitored at least bi-monthly for water quality and 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.

2.0 MONTHLY RESULTS

2.1 DUST DEPOSITION GAUGES

Table 1 displays the results for July 2006 and the project average. Results are in g/m².month

Table 1: Dust deposition results: 3/07/2006 to 2/08/2006.

Site	Monthly Insoluble Solids	Monthly Ash Residue	Monthly Combustible Matter	Monthly Insoluble Solids/Ash Residue %	Current Project Average Insoluble Solids
CD1	0.7	0.3	0.2	43	1.0
CD2a	CT	CT	CT	NA	3.0
CD3	1.1	1.0	0.1	50	0.5

Results marked with CT indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen, seeds), and insects. Results in bold indicate insoluble solids levels above 3.7 g/m².month, the Development Consent annual average amenity criteria at residential locations. Project average was calculated from 28 October 2005 (start of the Development Consent period) from results supplied by Rocla and is not currently an annual amount of data for averaging purposes.

NA= Not Available. CD1 was installed on the 1 May 2006.

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

Site CD2a was contaminated by bird droppings and the extremely close proximity of the extraction operations. The gauge was relocated, on the 2 August 2006, to site CD2b in conformance with the Air Quality Management Plan. Predominant wind directions for the month were SSW to WNW.

Rocla Calga Quarry Environmental Monitoring – July 2006

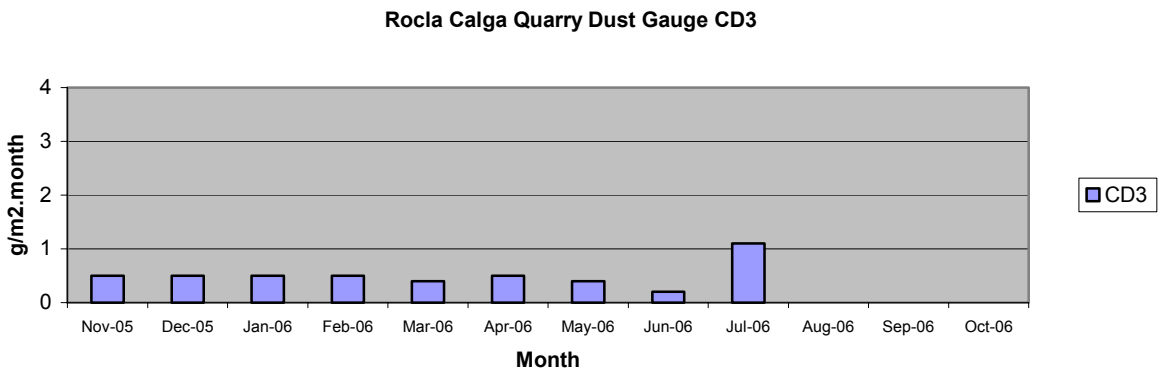
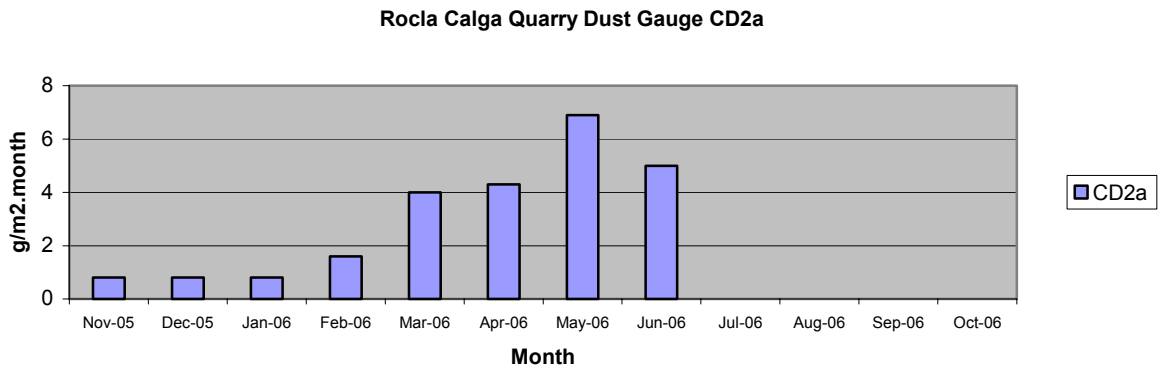
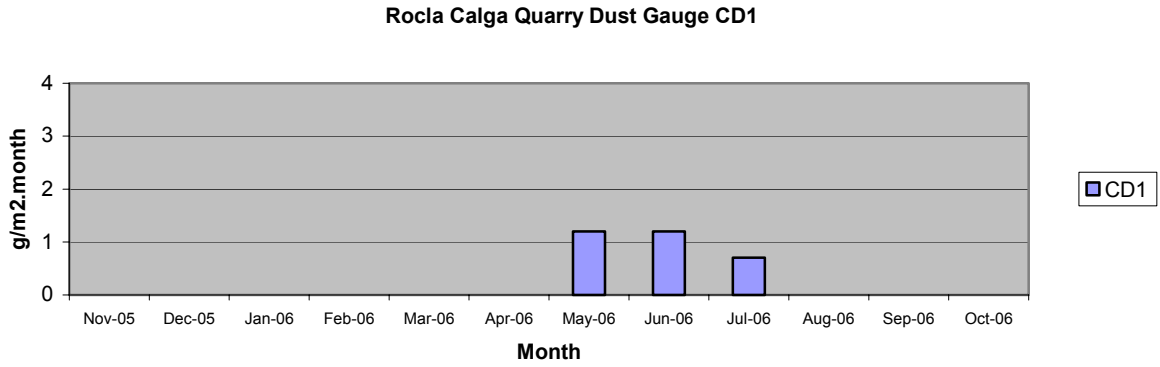


Figure 1: Dust Deposition Charts

2.2 WATER MONITORING

2.2.3 Surface Waters

Monthly surface water monitoring was conducted on the 2 August 2006. Results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

Table 2: Monthly surface water monitoring - grab sample results

Site	Observed Flow Rate	Water Colour Description	Turbidity Description	pH	EC (uS/cm)	TSS (mg/l)	Oil and Grease (mg/l)
A	Pool	Light Brown	Turbid	7.63	55	145	7
B	Dry	-	-	-	-	-	-
C	Dry	-	-	-	-	-	-
D	Dry	-	-	-	-	-	-
E	Dry	-	-	-	-	-	-
F	Dam	Clear	Low	6.32	93	2	<5
Dam below F (Lower dam)*	Dam	Clear	Low	5.35	97	<1	<5

At the time of sampling, no water was observed discharging off site from any sampling location.

* The dam below Site F is not a requirement of the Site Water Management Plan.

Most sites were dry at the time of sampling with three samples collected; these were Site A, Site F and a small dam below site F, additional to the Site Water Management Plan requirements. At the time of sample collection, there was no water discharges observed from the site. Site A is a sediment dam that contained water after recent rain; it appeared to have not overflowed from the site. The samples were collected and analysed for a monthly sampling event. Results show very good quality water at site F with near neutral pH, low Electrical Conductivity, low Total Suspended Solids and no detectable Total Oil and Grease. The water in the sediment dam at site A had a slightly alkaline pH and low electrical conductivity. The Total Suspended Solids were high at 145mg/L and the oil and grease was moderate at 7mg/L. The sediment dam appeared to be operating correctly in collecting and settling sediment.

2.2.3 Ground Waters

Ground waters were sampled on the 2 August 2006. 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 2 to 5.

Rocla Calga Quarry Environmental Monitoring – July 2006

Table 3: Ground Water Quality Data

Reference	Bore	Type	Depth to water TOC (m) April 06	Depth to water TOC (m) This report	pH This report	Electrical Conductivity (uS/cm) This report
CQ1	Voutos	* Monitor	20.59	20.85	4.5	130
CQ2	Voutos	DIP Only	6.23	6.45	5	70
CQ3	Voutos	* Monitor	10.53	10.5	6.5	140
CQ4	Voutos	* Monitor	8.78	10.07	4.9	100
CQ5	Gazzana	DIP Only	8.69	9.44	4.3	195
CQ6	Gazzana	DIP Only	16.00	15.47	4.2	280
CQ7	Gazzana	* Monitor	6.89	6.61	4.7	105
CQ8	Gazzana	* Monitor	11.03	10.46	4.3	190
CQ9	Gazzana	Dip Only	10.1	9.74	5.2	120
CQ10	Voutos	* Monitor	NI	24	5.8	160
CQ11s	Gazzana	* Monitor	NI	11.77	5.6	145
CQ11d	Gazzana	* Monitor	NI	13.4	5.8	130
CQ12	Gazzana	* Monitor	NI	8.28	4.4	145
CQ13	Kashouli	* Monitor	NI	17.63	5.6	195
CP3	Gazzana	Domestic	10.4	9.88	4.7	160
CP4	Kashouli	Domestic	13.63	14.51	NM	NM
CP5	Kashouli	Domestic	16.61	13.45	NM	NM
CP6	Kashouli	Domestic	16.27	15.28	NM	NM
CP7	Kashouli	Production	8.56	9.36	NM	NM
CP8	Rozmanec	Domestic	22.17	NM	NM	NM
MW7	Rocla Bore	* Monitor	15.76	18.75	4.8	145
MW8	Rocla Bore	* Monitor	9.82	10.35	4.9	95
MW9	Rocla Bore	* Monitor	22.44	22.77	4.7	95
MW10	Rocla Bore	* Monitor	15.41	14.66	5.5	145

TOC = Water depth measured from top of case to water level.

NI = Not currently installed

NM = Not Monitored

* = Logger Installed

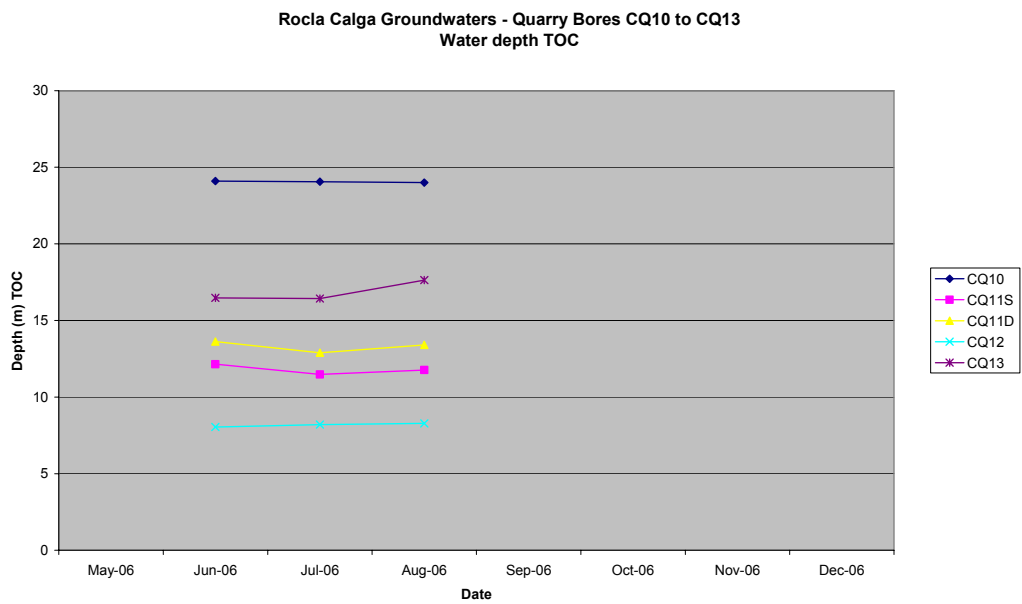
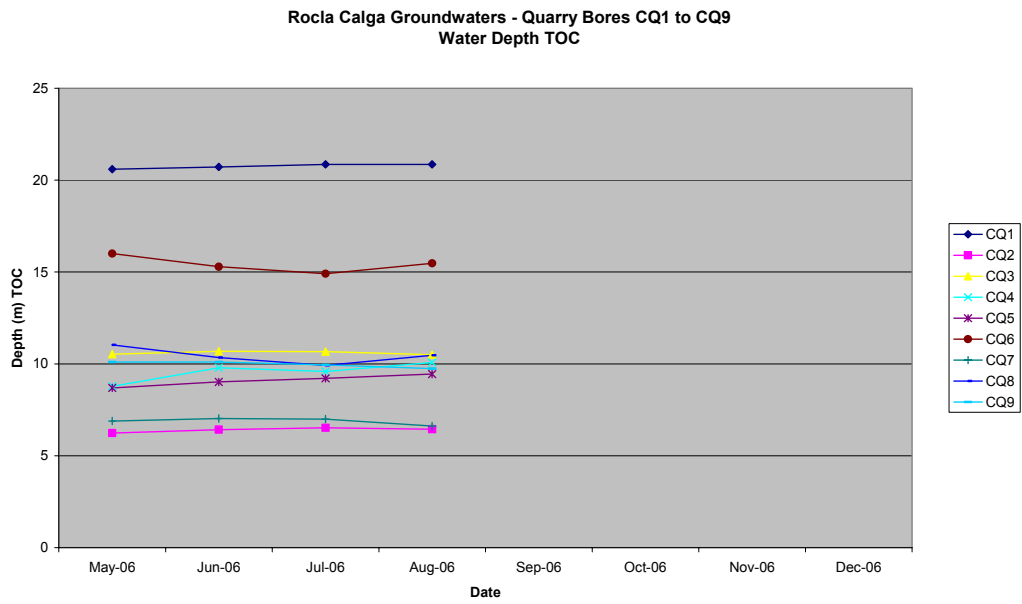
Shading is used to indicate the following trends in water depth (compared to the last reading):

	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth

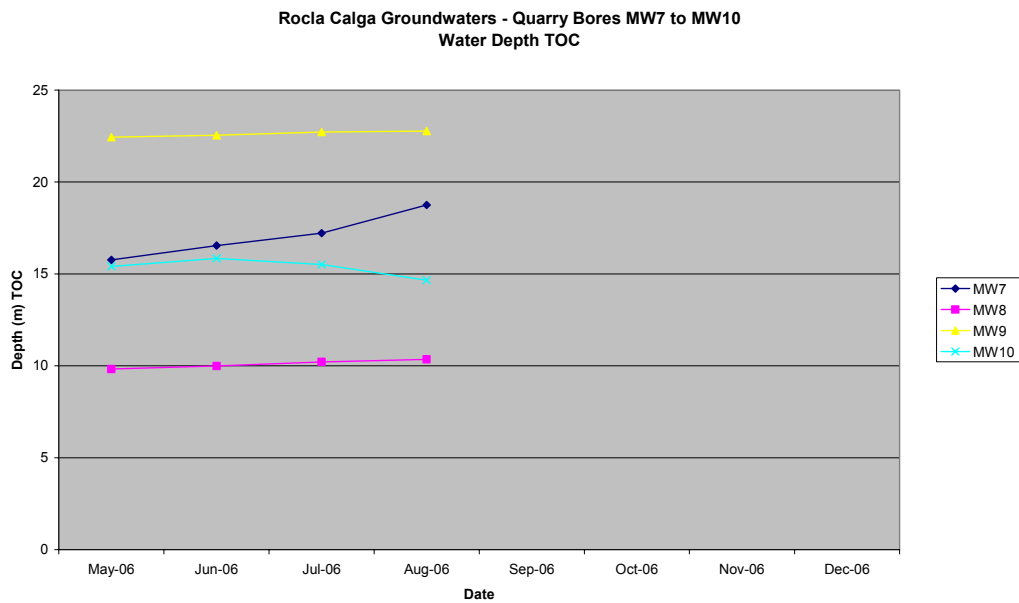
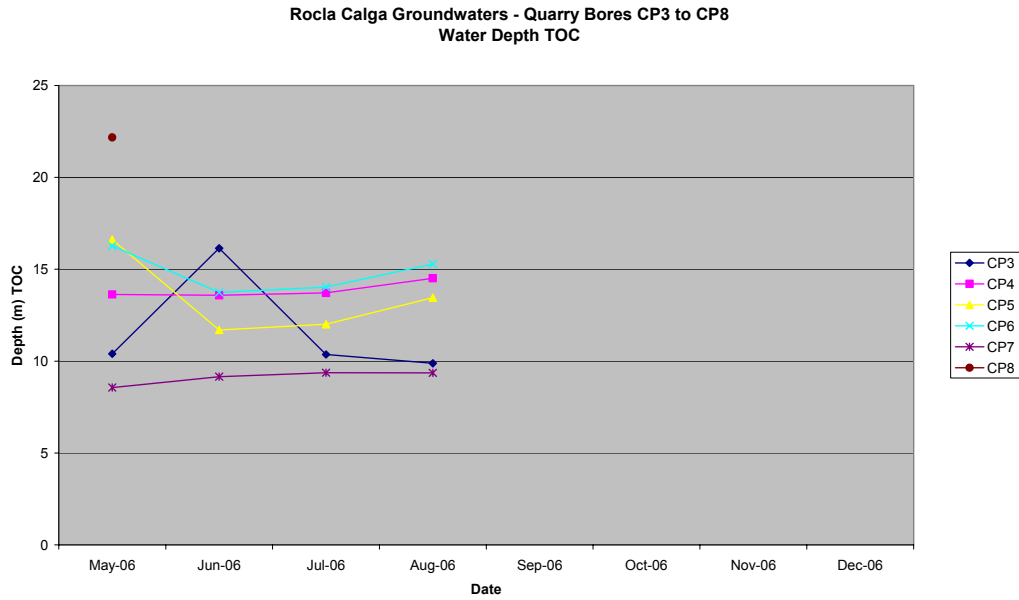
Water depth indicated slight increases and decreases this month at all sites. Longer term monitoring is required to evaluate groundwater depth trends.

Rocla Calga Quarry Environmental Monitoring – July 2006

Figures 2 to 5 Groundwater Depth Charts.



Rocla Calga Quarry Environmental Monitoring – July 2006



Groundwater quality results remained relatively stable compared to last month. Water quality results returned similar values to last month and indicate acidic water of low electrical conductivity.

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

2.3 METEOROLOGICAL MONITORING

The Rocla Calga Quarry weather station was fully operational in July 2006 with 100% data recovery. 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.
- 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 for July 2006 shows good correlation between the Rocla Calga Quarry station and the nearby Peats Ridge BOM station, the Gosford BOM station recorded substantially more rainfall. The rainfall comparison is provided below and shows close to average rainfall conditions.

Rocla Calga Quarry	64.2mm
BOM Peats Ridge*	73.4mm
BOM Gosford*	103.6mm
BOM Peats Ridge Long term mean for July*	71.1mm

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

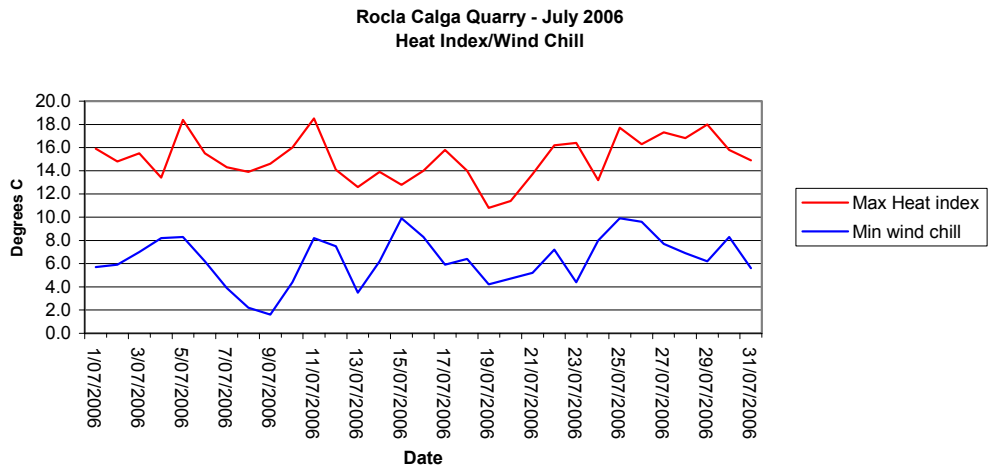
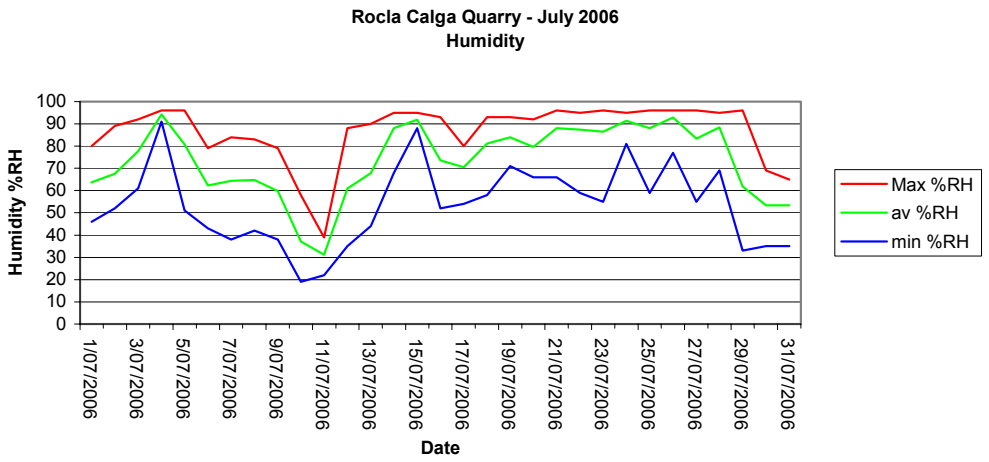
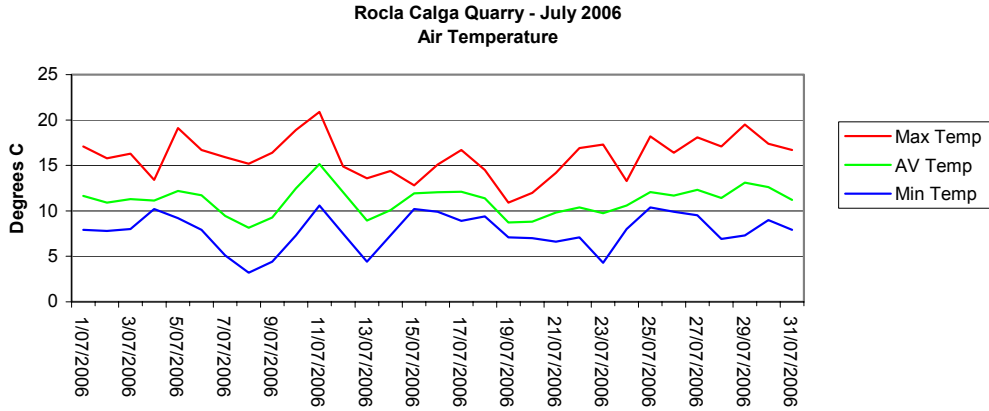
Results are displayed in the following table and figures.

Rocla Calga Quarry Environmental Monitoring – July 2006

Summary Jul-06 Rocla - Calga

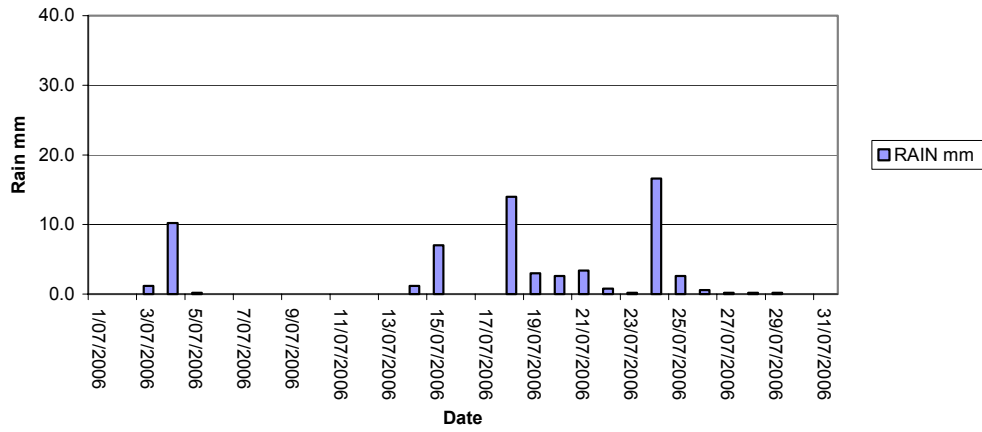
Date	Min Temp	AV Temp	Max Temp	min %RH	av %RH	Max %RH	RAIN mm	ET mm	min WS	Av WS	max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/07/2006	7.9	11.7	17.1	46	64	80	0.0	2.8	4.8	11.6	29	5.7	15.9	1013.5	1015.7	1017.1	0	123.5	536	98	99.9	100
2/07/2006	7.8	10.9	15.8	52	68	89	0.0	2.0	0	7.6	30.6	5.9	14.8	1015.4	1016.9	1019	0	92.6	514	97.7	99.9	100
3/07/2006	8	11.3	16.3	61	78	92	1.2	1.9	1.6	10.1	32.2	7	15.5	1018.6	1020.9	1025.1	0	90.5	455	98.2	99.9	100
4/07/2006	10.2	11.1	13.4	91	94	96	10.2	0.6	3.2	9.6	27.4	8.2	13.4	1024.7	1027.2	1029	0	41.0	229	94.7	99.9	100
5/07/2006	9.2	12.2	19.1	51	81	96	0.2	1.9	1.6	5.6	20.9	8.3	18.4	1023.7	1026.6	1028.9	0	122.5	526	94.2	99.6	100
6/07/2006	7.9	11.7	16.7	43	62	79	0.0	2.9	1.6	10.5	33.8	6.2	15.5	1021.8	1024.2	1026.4	0	123.8	537	94.7	98.8	100
7/07/2006	5.1	9.5	15.9	38	64	84	0.0	2.2	1.6	5.7	19.3	3.9	14.3	1022.7	1025.3	1027	0	126.8	546	97.1	99.7	100
8/07/2006	3.2	8.2	15.2	42	65	83	0.0	2.1	0	4.9	19.3	2.2	13.9	1023.3	1025.6	1027.2	0	127.4	548	97.7	99.8	100
9/07/2006	4.4	9.3	16.4	38	60	79	0.0	2.7	1.6	9.3	29	1.6	14.6	1020.5	1023.1	1025.7	0	125.8	555	98.2	99.9	100
10/07/2006	7.3	12.5	18.9	19	37	58	0.0	4.9	11.3	17.8	45.1	4.4	16	1017	1019.7	1022.1	0	130.0	555	98.5	100.0	100
11/07/2006	10.6	15.2	20.9	22	31	39	0.0	6.0	6.4	19.3	56.3	8.2	18.5	1013	1015.7	1018.6	0	130.2	555	98	99.9	100
12/07/2006	7.5	12.0	14.9	35	61	88	0.0	2.1	0	6.5	33.8	7.5	14.1	1014.3	1018.0	1022.3	0	78.4	494	94.7	98.8	100
13/07/2006	4.4	8.9	13.6	44	68	90	0.0	2.2	3.2	7.3	27.4	3.5	12.6	1022.5	1026.4	1030.2	0	115.6	557	97.7	99.8	100
14/07/2006	7.3	10.1	14.4	68	88	95	1.2	0.9	0	4.0	14.5	6.2	13.9	1023.5	1027.2	1029.8	0	61.0	313	93.3	99.7	100
15/07/2006	10.2	11.9	12.8	88	92	95	7.0	0.6	3.2	9.0	43.5	9.9	12.8	1011.7	1016.9	1023.4	0	20.3	177	99.4	100.0	100
16/07/2006	9.9	12.1	15.1	52	74	93	0.0	2.6	3.2	12.8	38.6	8.3	14	1010.4	1012.0	1013.8	0	113.5	576	99.1	100.0	100
17/07/2006	8.9	12.1	16.7	54	71	80	0.0	2.4	3.2	11.7	32.2	5.9	15.8	1011.6	1013.4	1015.1	0	106.8	558	98.8	99.9	100
18/07/2006	9.4	11.4	14.5	58	81	93	14.0	1.8	4.8	16.5	53.1	6.4	14	1014.7	1020.4	1026.2	0	65.2	603	99.4	100.0	100
19/07/2006	7.1	8.7	10.9	71	84	93	3.0	1.2	6.4	14.8	41.8	4.2	10.8	1026.3	1029.0	1030.8	0	48.5	233	97.4	99.8	100
20/07/2006	7	8.8	12	66	80	92	2.6	1.7	1.6	11.5	40.2	4.7	11.4	1029.6	1031.1	1033.1	0	81.0	595	98	99.8	100
21/07/2006	6.6	9.8	14.2	66	88	96	3.4	1.3	1.6	5.9	29	5.2	13.7	1032.4	1033.7	1035	0	84.7	576	98.2	99.9	100
22/07/2006	7.1	10.4	16.9	59	87	95	0.8	1.4	0	3.7	17.7	7.2	16.2	1029.9	1032.2	1034.7	0	98.6	598	98.5	99.9	100
23/07/2006	4.3	9.8	17.3	55	86	96	0.2	1.6	0	2.9	14.5	4.4	16.4	1023.5	1026.5	1029.7	0	115.7	573	94.7	99.8	100
24/07/2006	8	10.6	13.3	81	91	95	16.6	0.7	0	3.8	19.3	8	13.2	1022	1023.3	1024.8	0	60.2	411	96.5	99.7	100
25/07/2006	10.4	12.1	18.2	59	88	96	2.6	1.3	0	4.1	19.3	9.9	17.7	1022.3	1024.8	1027.8	0	83.8	579	88.9	99.3	100
26/07/2006	9.9	11.7	16.4	77	93	96	0.6	0.9	0	4.6	20.9	9.6	16.3	1024	1025.8	1027.8	0	66.7	434	95	98.9	100
27/07/2006	9.5	12.3	18.1	55	83	96	0.2	2.2	0	7.9	29	7.7	17.3	1018.3	1020.6	1024.6	0	142.6	583	96.5	98.9	100
28/07/2006	6.9	11.4	17.1	69	88	95	0.2	1.3	0	3.0	16.1	6.9	16.8	1015.3	1017.7	1019.9	0	104.6	649	94.7	99.0	100
29/07/2006	7.3	13.1	19.5	33	62	96	0.2	3.5	3.2	10.9	33.8	6.2	18	1014.4	1015.9	1017.7	0	146.6	598	93.6	99.3	100
30/07/2006	9	12.6	17.4	35	53	69	0.0	3.4	0	8.4	29	8.3	15.8	1016.4	1018.4	1020.7	0	151.2	612	96.5	98.9	100
31/07/2006	7.9	11.2	16.7	35	53	65	0.0	4.0	8	17.4	53.1	5.6	14.9	1012.2	1015.5	1017.6	0	132.9	610	92.7	98.6	100
Monthly	3.2	11.1	20.9	19	73	96	64.2	67.2	0	9.0	56.3	1.6	18.5	1010.4	1022.2	1035	0	100.4	649	88.9	99.6	100

Rocla Calga Quarry Environmental Monitoring – July 2006

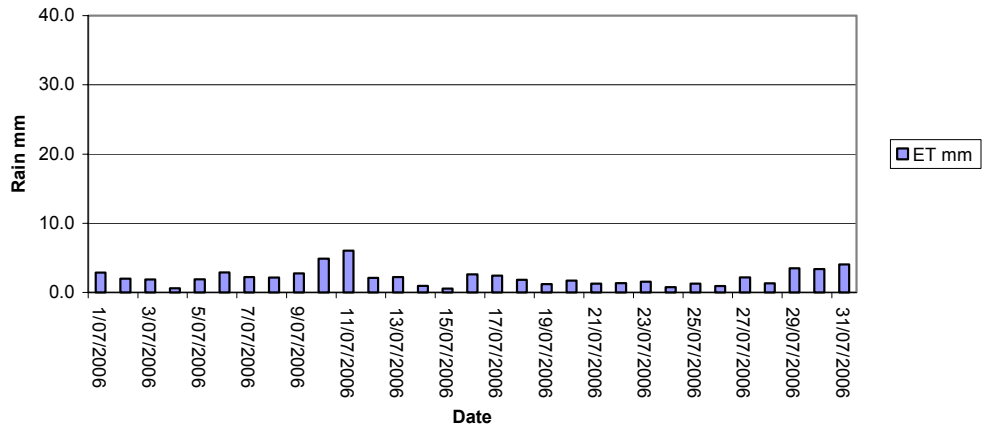


Rocla Calga Quarry Environmental Monitoring – July 2006

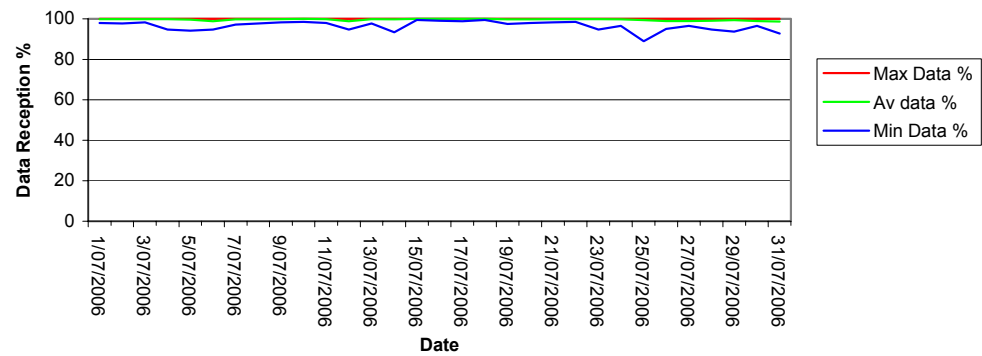
Rocla Calga Quarry - July 2006
Rain



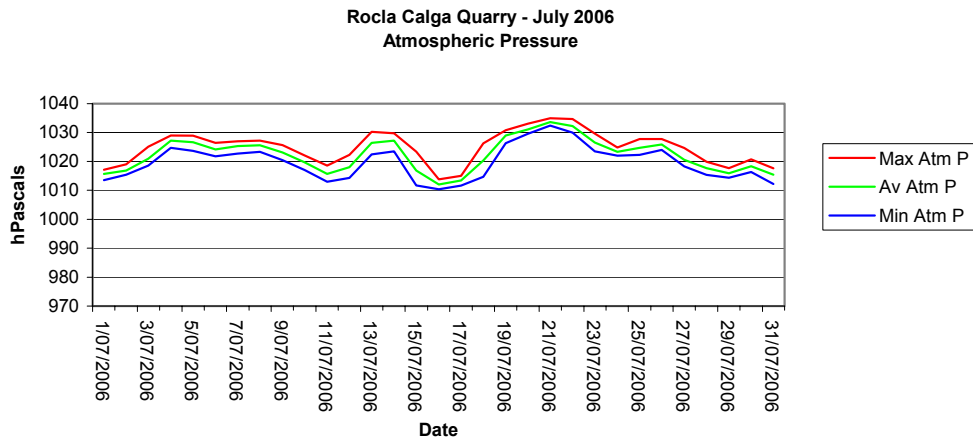
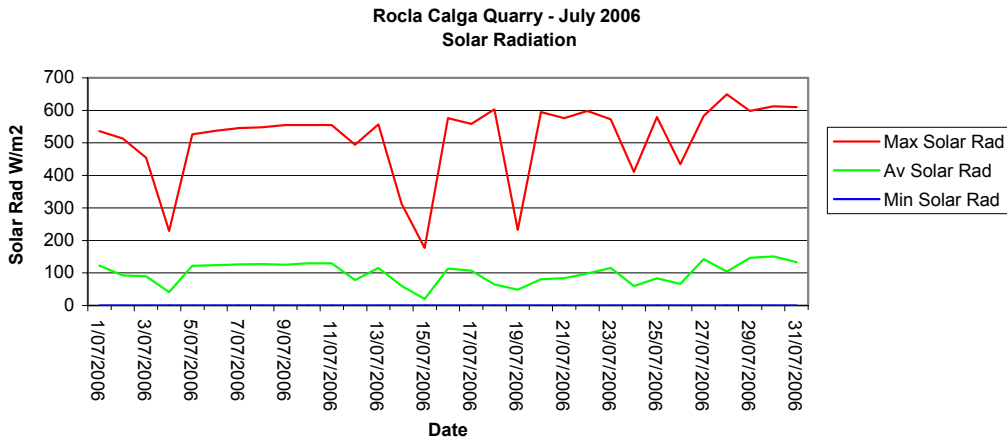
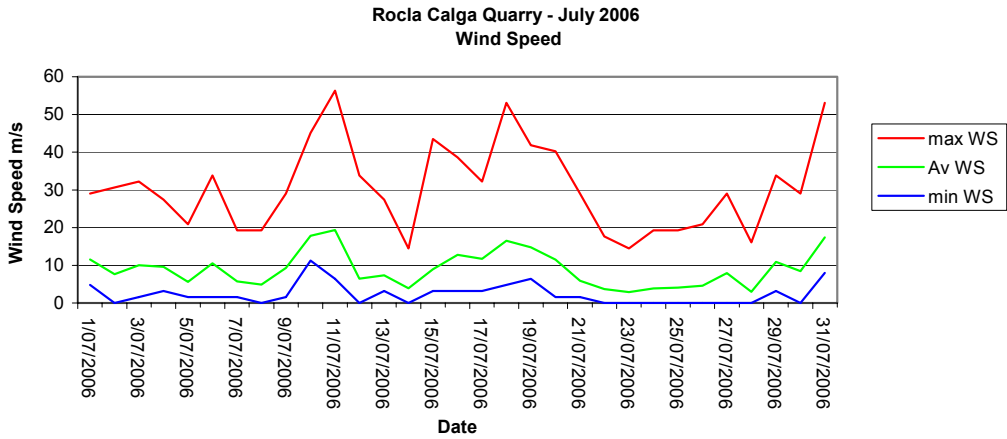
Rocla Calga Quarry - July 2006
Evapotranspiration



Rocla Calga Quarry - July 2006
Data Reception

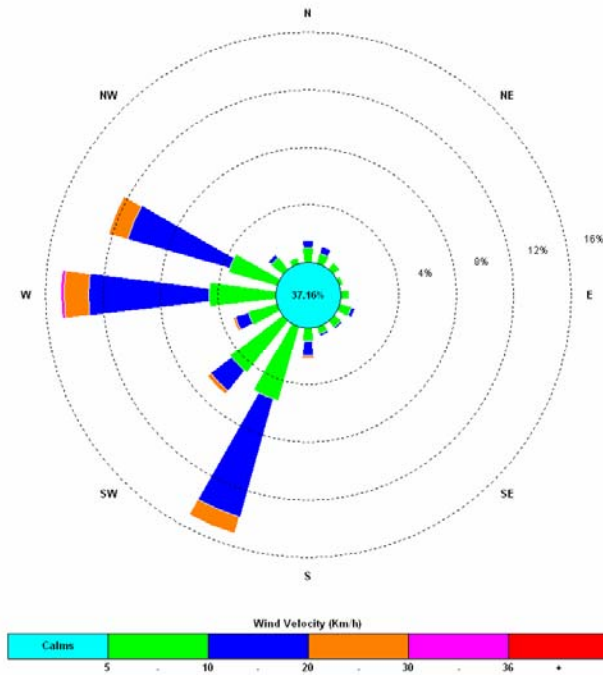


Rocla Calga Quarry Environmental Monitoring – July 2006



2.4.3 Windrose plots

Frequency plot of the average wind speed and average direction over each 15 minute sampling period. Wind is considered calm when less than a 15 minute average of 5km/hr.



The windrose shows dominant strong winds from the SSW, SW, W and WNW. The maximum wind speed was 56.3km/hr recorded from the W.

APPENDIX 1
LABORATORY CERTIFICATES

APPENDIX 2

**ADDITIONAL BUREAU OF METEOROLOGY DATA
FROM PEATS RIDGE AND GOSFORD
MONITORING STATIONS**