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

April 2013

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

The April 2013 dust deposition results for insoluble solids were generally lower when compared to those of March 2013. 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 A, D and F. Site B was dry, and Site C was 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 2 May 2013. Groundwater depth generally decreased across the sampled groundwater bores when compared to last month. 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 April was 116.2 mm, which was similar to the Peats Ridge long-term average for April. A comparison is shown below:

Rocla Calga Quarry	116.2 mm
BOM Peats Ridge*	Not Available
BOM Gosford*	208.4 mm
BOM Peats Ridge Long term mean for April*	127.0 mm

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

Note: Differences in the daily rainfall readings between BOM and the Rocla station may occur due to BOM stations reporting rainfall at 9am and the Rocla station recording rainfall at midnight.

1.0 Sampling Program

Rocla Calga Quarry conducts environmental monitoring in accordance to Development Consent, OEH (EPA) licence and Environmental Management Plans. Carbon Based Environmental are contracted to undertake dust deposition gauge, surface and groundwater and meteorological monitoring for the project. Carbon Based Environmental commenced monitoring from the April 2006 monitoring period.

Dust deposition gauges are operated to the Australian Standard AS3580.10.1 "Methods for Sampling and Analysis of Ambient Air Method 10.1 Determination of Particulates—Deposited Matter—Gravimetric Method". Sampling is undertaken every 30 +/- 2 days and each gauge is analysed for insoluble solids and ash residue. The results are reported as g/m^2.month.

Surface waters are sampled in accordance with Australian Standards AS5667.1 "Guidance on the Design of Sample Programs, Sampling Techniques and the Preservation and Handling of Samples", AS5667.6 "Water Quality Sampling—Guidance on sampling of rivers and streams" and AS5667.4 "Water Quality Sampling—Guidance on sampling from lakes, natural and man-made". Surface water monitoring sites include local streams and dams. Basic analysis including pH, Electrical Conductivity, Total Suspended Solids, Total Dissolved Solids and Total Oil and Grease is conducted monthly at Sites A and F (dams) and when Sites B, C and D are flowing. Additional samples are collected when daily rainfall exceeds 50mm.

Groundwaters are sampled in accordance with Australian Standards AS5667.1 "Guidance on the Design of Sample Programs, Sampling Techniques and the Preservation and Handling of Samples" and AS5667.11 "Water Quality Sampling—Guidance on sampling of ground waters". Groundwater monitoring sites are sampled at least bi-monthly for water quality and at least quarterly for water level. Groundwater monitoring loggers continuously record water levels in a selection of bores.

Meteorological monitoring is conducted at the quarry and displayed on the site computer with a real time display. Wind parameters are measured according to Australian Standard AS 2923 "Ambient Air— Guide for Measurement of Horizontal Wind for Air Quality Applications".

The weather stations have the following sensor configuration;
Air temperature

- Humidity
- Rainfall
- Atmospheric pressure
- Evaporation
- Solar radiation
- Wind speed
- Wind direction

Carbon Based Environmental continued to operate the monitoring equipment and utilise site collections at their existing locations.

The locations of monitoring points are provided in **Figure 1**.

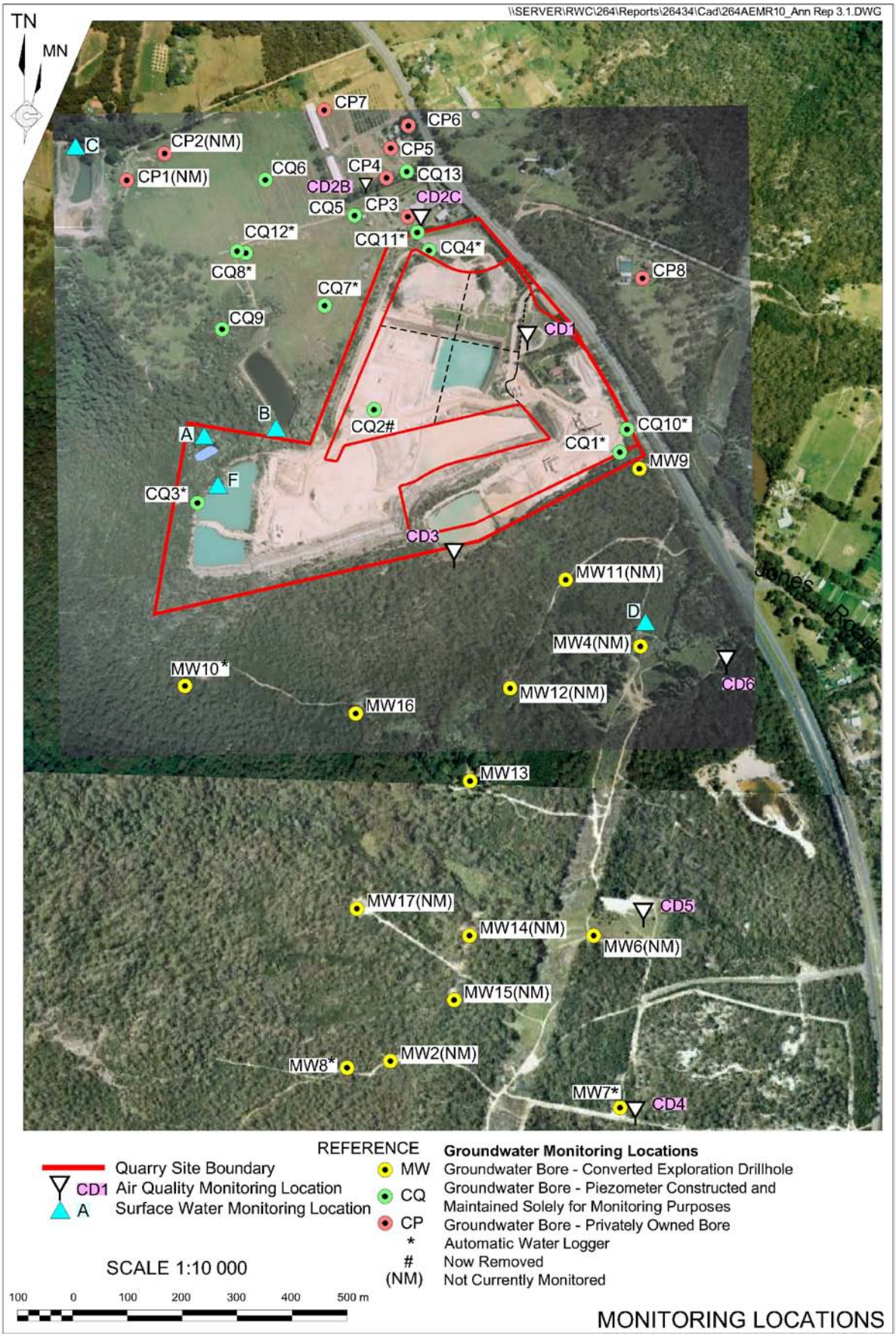


Figure 1: Rocla Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for April 2013 and the project 12 month rolling average. Results are in g/m^2.month.

Table 1: Dust Deposition results: 3 April 2013 – 2 May 2013 (30 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	0.3	0.2	0.1	59	0.9
CD3	0.4	0.2	0.2	50	1.3
CD4	0.2	0.1	0.1	50	0.4
CD5	0.1	0.1	<0.1	100	0.4
CD6	0.2	0.1	0.1	50	0.5

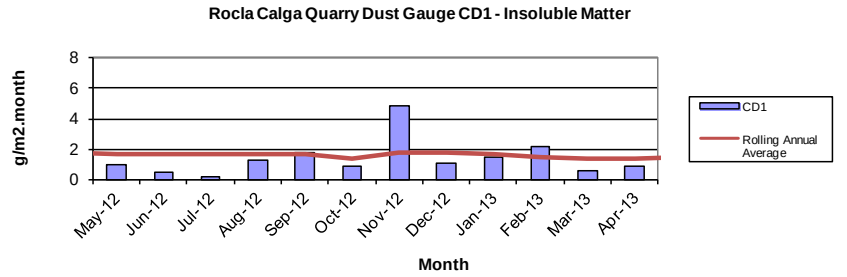
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m^2.month; the Development Consent's annual average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

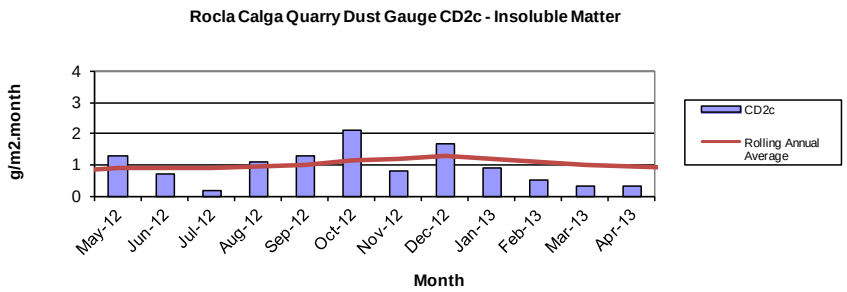
NA= Not Available.

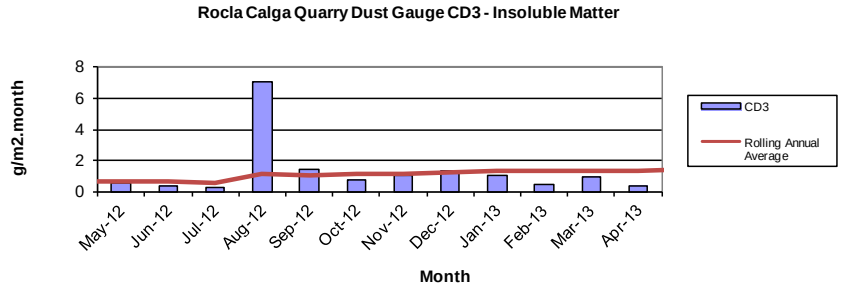
CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air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

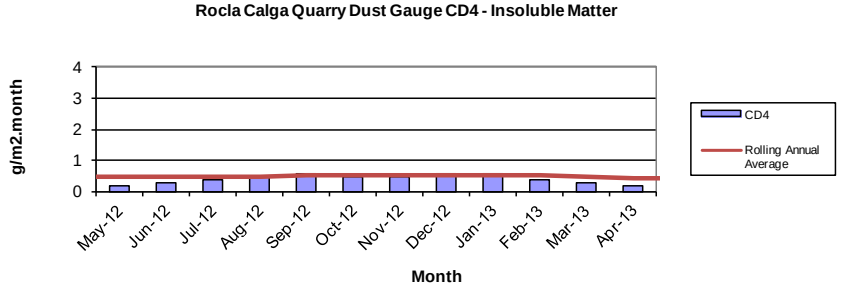
Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The laboratory analysis is provided in **Appendix 1.**

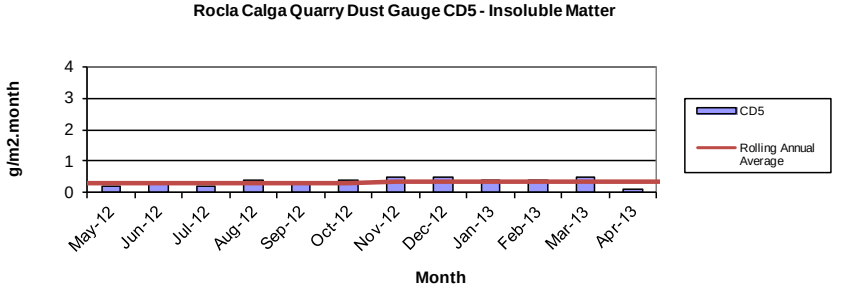
Figure 2: Dust Deposition Charts

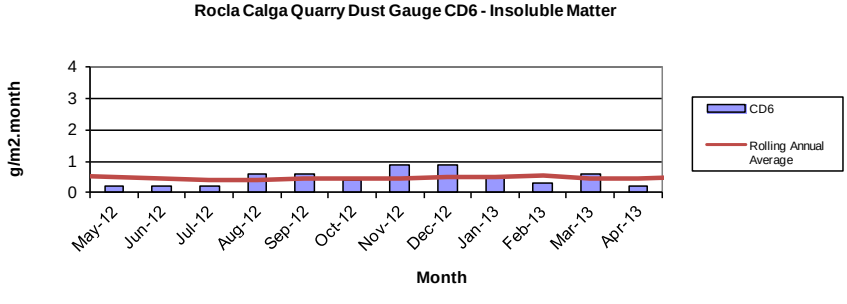












2.2 Surface Water Monitoring

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

Table 2: Monthly surface water monitoring – April 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	Clear	Clear	6.10	57	30	6	<5
B	Dry							
C	No Access							
D	Still	Clear	Slight	5.64	94	86	<5	<5
F	Still	Clear	Clear	6.04	56	40	10	<5

Samples were collected at sites A, D and F. Site B was dry, and Site C was 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 2 May 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 CQ1, CP4, CP5 & CP7.

pH at all sites is in the slightly acidic to neutral range, and remained quite stable across all sampled sites. EC levels generally remained stable compared to the results obtained in March 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	8.97	6.34	130.1
CQ3	Voutos	* Monitor	10.53	10.00	6.12	173.5
CQ4	Voutos	* Monitor	8.78	10.04	4.78	102.3
CQ5	Gazzana	DIP Only	8.69	5.95	4.32	162.4
CQ6	Gazzana	DIP Only	16.00	NM	NM	NM
CQ7	Gazzana	* Monitor	6.89	6.03	4.67	105.7
CQ8	Gazzana	* Monitor	11.03	5.48	4.36	154.1
CQ9	Gazzana	DIP Only	10.10	8.78	4.54	120.3
CQ10	Voutos	* Monitor	NI	22.41	5.06	180.5
CQ11S	Gazzana	* Monitor	NI	10.12	4.52	169.8
CQ11D	Gazzana	* Monitor	NI	11.29	4.79	164.9
CQ12	Gazzana	* Monitor	NI	3.78	4.49	129.1
CQ13	Kashouli	* Monitor	NI	12.65	4.42	237.7
CP3	Gazzana	Domestic	10.40	8.53	4.65	153.4
CP4	Kashouli	Domestic	13.63	9.27	5.15	205.7
CP5	Kashouli	Domestic	16.61	5.93	4.93	173.5
CP6	Kashouli	Domestic	16.27	8.47	4.25	205.2
CP7	Kashouli	Production	8.56	1.53	4.93	143.1
CP8	Rozmanec	Domestic	22.17	NM	NM	NM
MW7	Rocla Bore	* Monitor	15.76	14.93	4.44	119.8
MW8	Rocla Bore	* Monitor	9.82	6.97	4.69	86.6
MW9	Rocla Bore	* Monitor	22.44	21.61	4.97	94.3
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

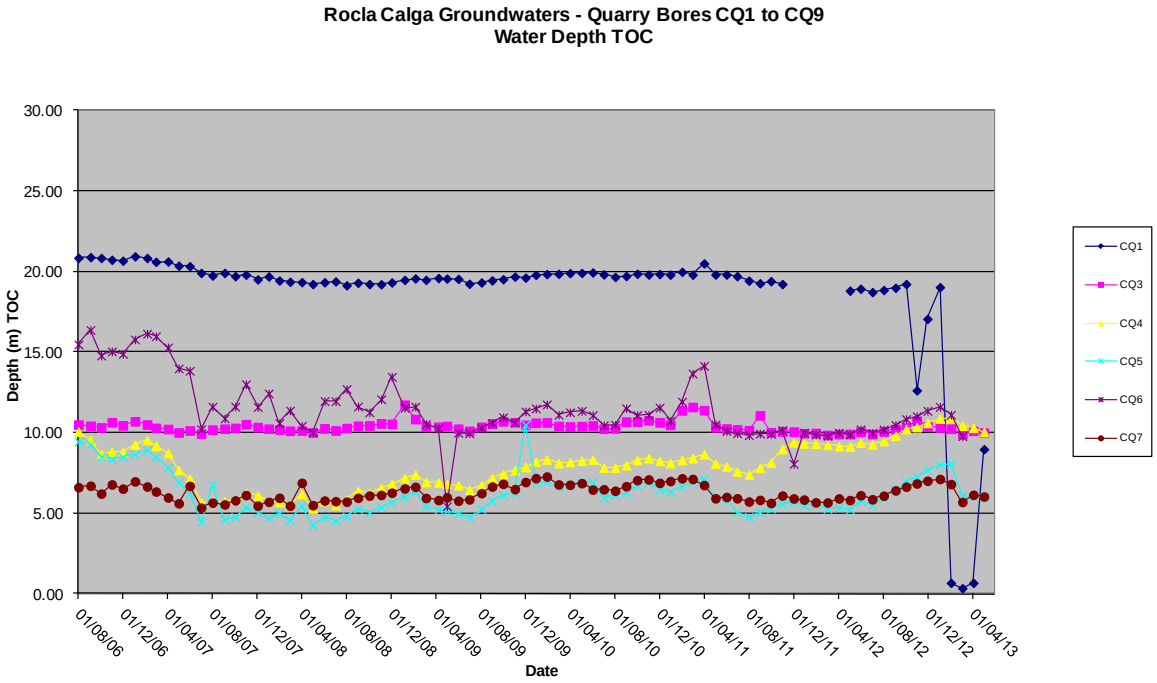
Notes:
TOC = Water level measured from top of bore case to water.
NM = Not Monitored – unable to sample water due to access restrictions.
NR = Not Required by resident.
* = Logger Installed.
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements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

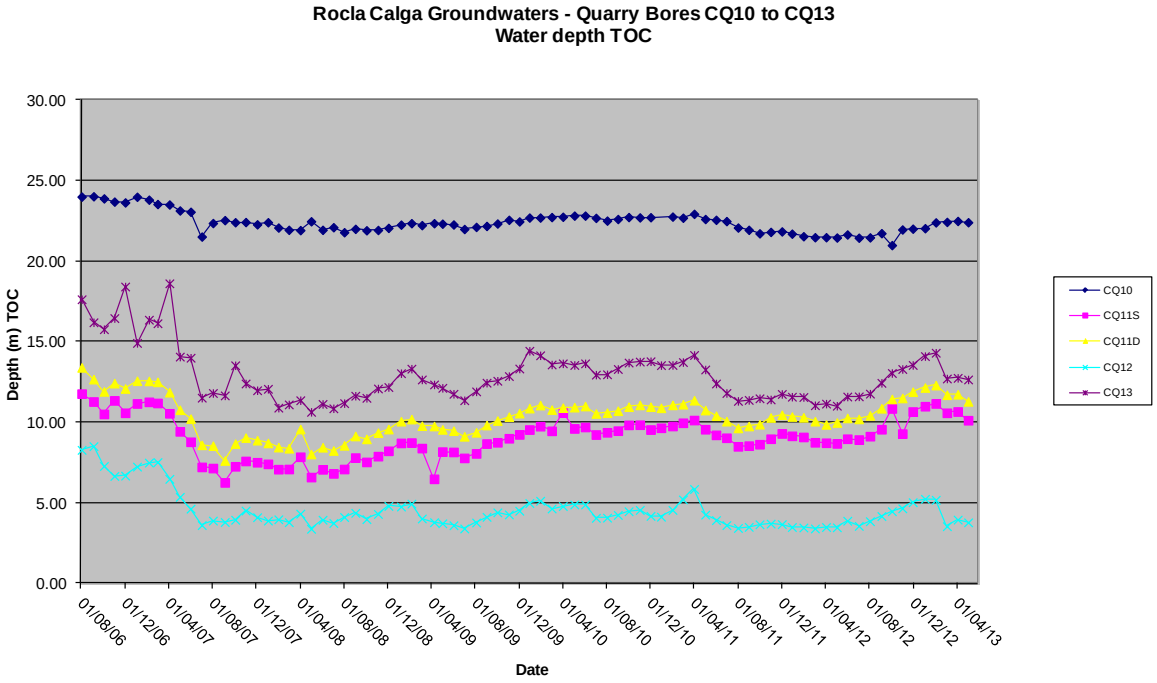
Shading is used to indicate the following trends in water depth (compared to the last reading):

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

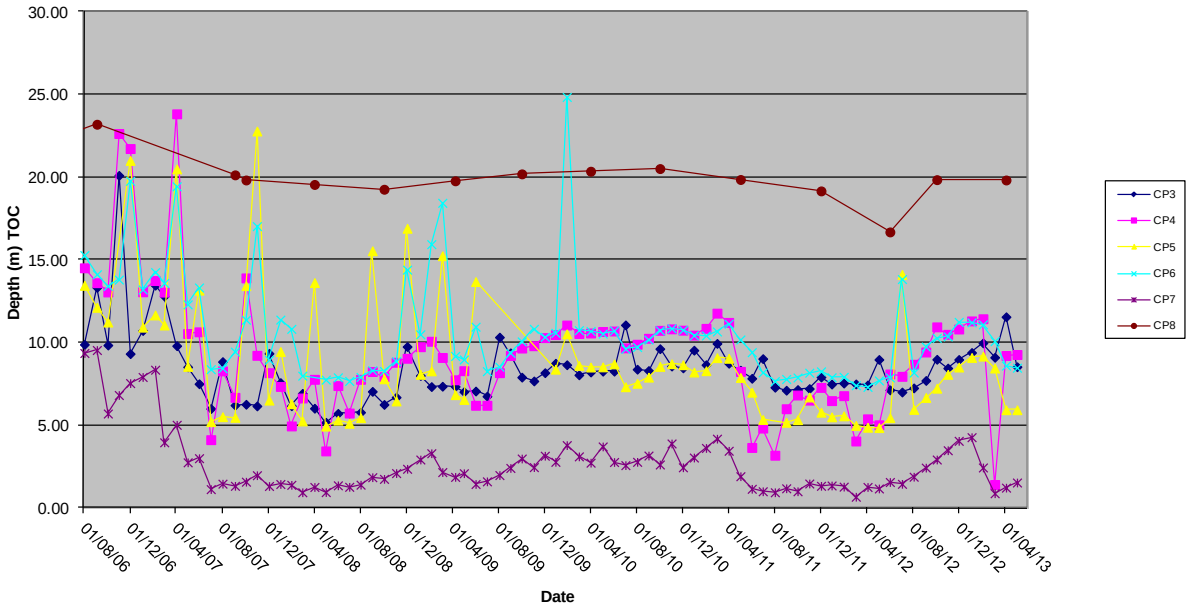
Available groundwater loggers were downloaded and will be forwarded to the Rocla Calga Quarry groundwater consultant.

Figures 3 to 6: Groundwater Depth Charts.

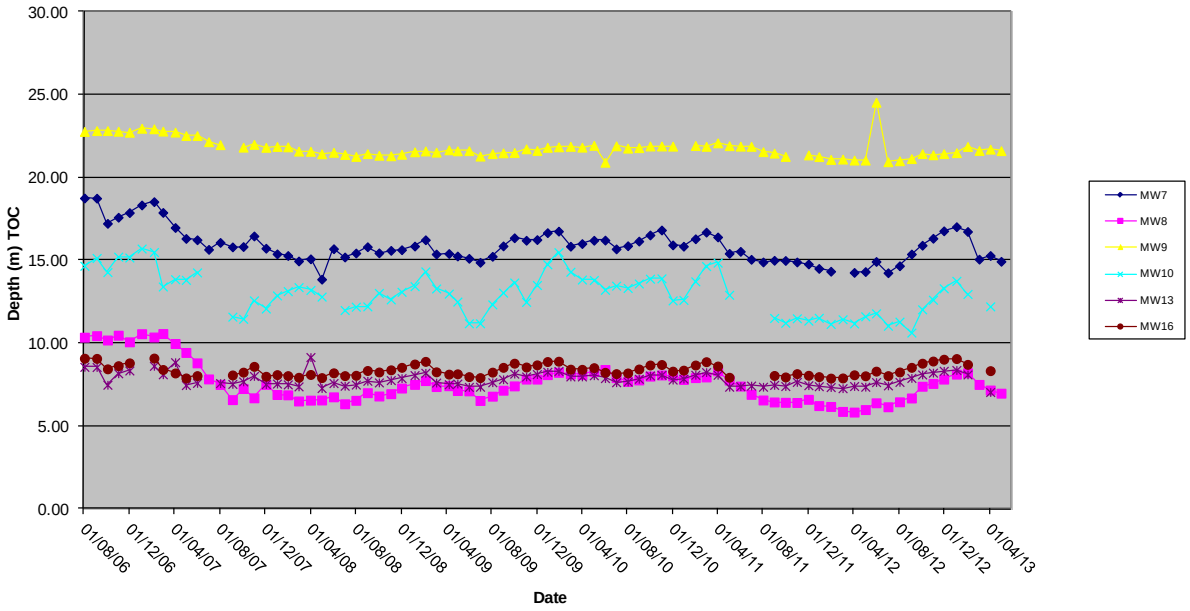




Rocla Calga Groundwaters - Quarry Bores CP3 to CP8
Water Depth TOC



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



2.4 Meteorological Monitoring

The Rocla Calga Quarry weather station data recovery in April 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 April 2013 was unavailable.

Data for April 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 similar to the the Peats Ridge long term mean rainfall for April. The rainfall comparison is provided below:

Rocla Calga Quarry	116.2 mm
BOM Peats Ridge*	Not Available
BOM Gosford*	208.4 mm
BOM Peats Ridge Long term mean for April*	127.0 mm

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

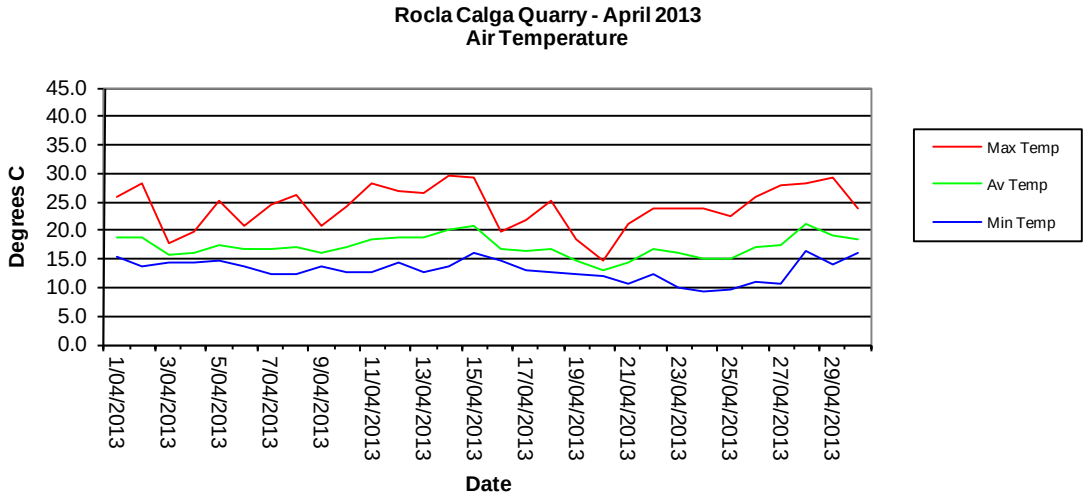
Results are displayed in the following table and figures.

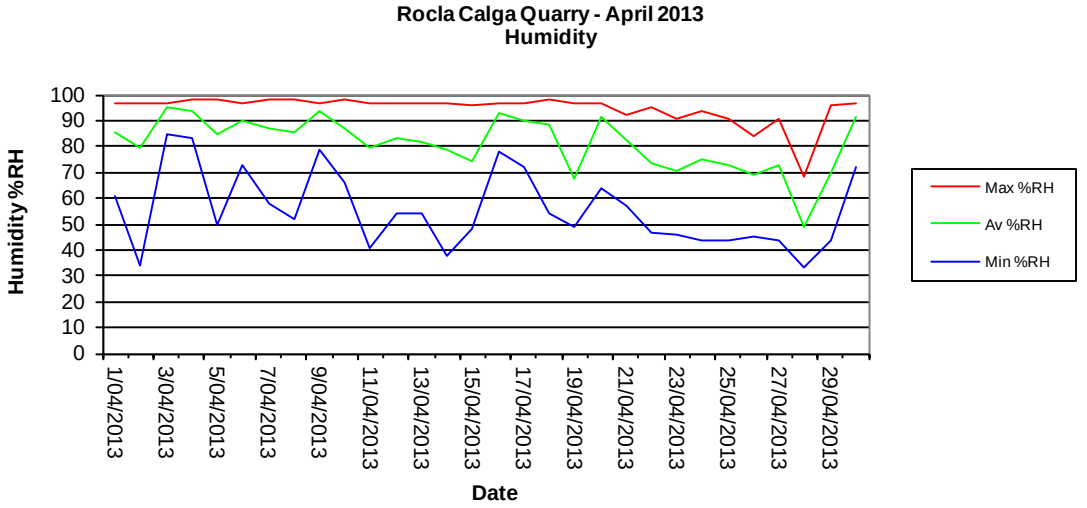
2.4.1 Monthly Meteorological Data Summary

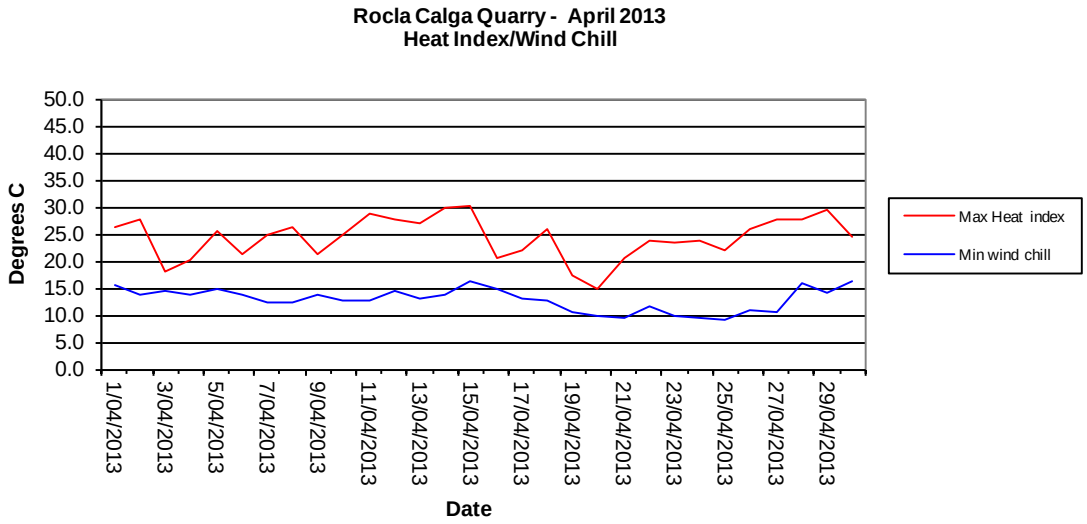
Summary **Apr-13** **Rocla - Calga**

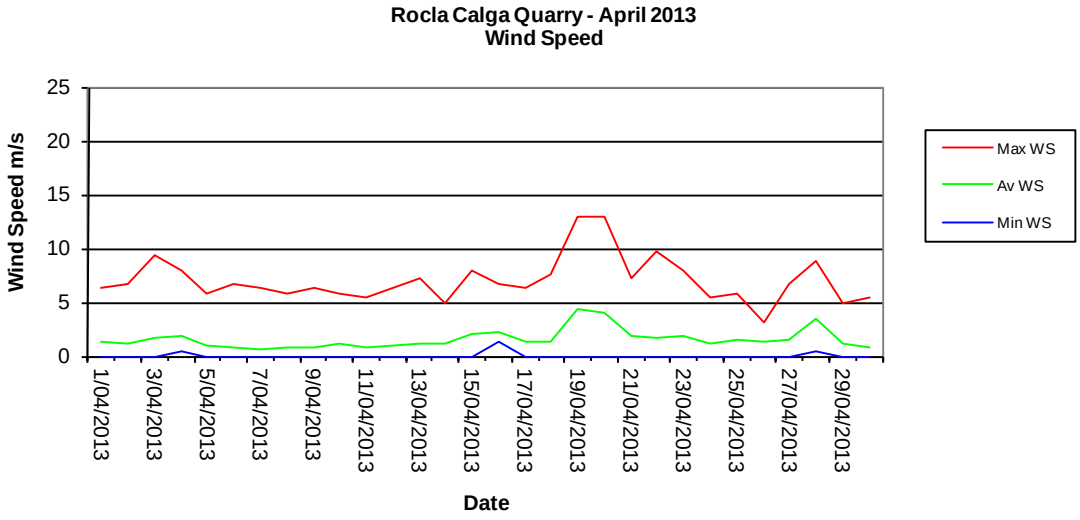
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/04/2013	15.4	18.7	25.9	61	85	97	5.4	1.9	0	1.3	6.3	15.4	26.4	1013.6	1015.3	1017.1	0	103.7	752	87.7	97.8	100
2/04/2013	13.8	18.8	28.1	34	80	97	0.2	2.5	0	1.2	6.7	13.9	27.7	1012.0	1014.5	1016.6	0	131.7	792	92.4	99.8	100
3/04/2013	14.3	15.6	17.6	85	95	97	12.8	0.7	0	1.8	9.4	14.3	17.9	1016.0	1020.4	1024.2	0	49.5	278	83.9	97.3	100
4/04/2013	14.4	16.2	19.7	83	94	98	26.6	1.3	0.4	1.9	8	13.9	20.2	1024.0	1026.8	1029.4	0	88.6	618	86	97.1	100
5/04/2013	14.6	17.6	25.3	50	84	98	0.8	2.2	0	1.0	5.8	14.7	25.4	1026.8	1028.2	1030.1	0	132.3	827	88.6	98.7	100
6/04/2013	13.8	16.6	20.8	73	90	97	0.4	1.4	0	0.8	6.7	13.8	21.3	1023.3	1025.2	1027.2	0	93.4	448	95.6	99.7	100
7/04/2013	12.3	16.8	24.6	58	87	98	0.2	1.8	0	0.7	6.3	12.3	24.9	1020.2	1022.5	1024.1	0	106.8	849	93	99.7	100
8/04/2013	12.2	17.2	26.3	52	86	98	0.0	1.8	0	0.8	5.8	12.2	26.4	1021.7	1023.4	1025.0	0	109.7	837	90.9	99.7	100
9/04/2013	13.8	16.2	20.8	79	94	97	5.8	0.8	0	0.7	6.3	13.9	21.4	1022.7	1024.1	1025.8	0	57.4	498	90.9	98.4	100
10/04/2013	12.6	17.2	24.2	66	87	98	0.2	1.8	0	1.1	5.8	12.6	24.9	1020.2	1022.3	1024.4	0	103.2	863	81.6	97.9	100
11/04/2013	12.8	18.6	28.4	41	80	97	0.0	2.2	0	0.7	5.4	12.8	28.6	1019.9	1021.7	1023.8	0	118.5	737	98	99.9	100
12/04/2013	14.3	18.8	27.0	54	83	97	0.0	2.4	0	1.0	6.3	14.3	27.6	1021.0	1022.8	1025.3	0	129.4	882	84.8	99.3	100
13/04/2013	12.8	18.7	26.7	54	82	97	0.0	2.0	0	1.2	7.2	12.9	26.9	1014.2	1017.6	1021.2	0	103.7	728	98.2	99.9	100
14/04/2013	13.6	20.1	29.6	38	78	97	0.2	2.3	0	1.1	4.9	13.6	29.8	1009.5	1011.6	1014.0	0	114.5	713	99.7	100.0	100
15/04/2013	16.1	20.9	29.1	48	75	96	7.6	2.5	0	2.0	8	16.1	30.3	1005.9	1008.2	1010.1	0	109.8	615	90.6	99.7	100
16/04/2013	14.7	16.9	19.9	78	93	97	8.6	1.0	1.3	2.2	6.7	14.8	20.5	1009.6	1012.7	1015.4	0	61.0	405	82.7	97.8	100
17/04/2013	13.0	16.3	21.7	72	90	97	0.0	1.0	0	1.3	6.3	13.0	21.9	1012.6	1014.3	1015.9	0	61.8	506	85.4	96.4	100
18/04/2013	12.7	16.6	25.3	54	88	98	0.2	1.8	0	1.3	7.6	12.7	25.8	1010.5	1012.8	1014.2	0	103.9	727	83.9	97.2	100
19/04/2013	12.3	14.8	18.3	49	68	97	0.0	3.0	0	4.4	13	10.4	17.3	1010.9	1012.7	1014.2	0	78.8	688	98	99.7	100
20/04/2013	11.9	13.0	14.7	64	92	97	46.6	0.7	0	4.0	13	9.8	14.7	1010.5	1013.2	1016.1	0	10.7	130	94.2	99.6	100
21/04/2013	10.7	14.3	21.3	57	82	92	0.0	1.7	0	1.9	7.2	9.4	20.6	1010.3	1013.3	1015.8	0	84.2	738	90.4	97.1	100
22/04/2013	12.2	16.6	23.9	47	74	95	0.6	2.3	0	1.7	9.8	11.7	23.8	1006.1	1009.0	1011.0	0	100.0	681	90.4	98.7	100
23/04/2013	9.9	16.2	23.8	46	71	91	0.0	2.5	0	1.8	8	10.0	23.5	1009.9	1012.1	1015.4	0	103.5	679	92.1	99.6	100
24/04/2013	9.4	15.2	24.0	44	75	94	0.0	2.1	0	1.1	5.4	9.3	23.7	1014.8	1016.8	1019.0	0	104.0	692	93	99.3	100
25/04/2013	9.6	14.9	22.4	44	73	91	0.0	2.1	0	1.5	5.8	9.2	21.9	1018.3	1019.9	1021.6	0	99.7	673	99.7	100.0	100
26/04/2013	10.9	17.1	26.0	45	69	84	0.0	2.2	0	1.4	3.1	10.9	25.9	1018.4	1020.5	1022.8	0	93.2	665	95.6	99.8	100
27/04/2013	10.7	17.5	27.8	44	73	91	0.0	2.1	0	1.6	6.7	10.7	27.7	1016.3	1018.7	1021.6	0	88.5	628	97.4	99.9	100
28/04/2013	16.3	21.0	28.2	33	49	68	0.0	3.9	0.4	3.4	8.9	16.0	27.6	1014.9	1016.7	1018.4	0	91.0	663	100	100.0	100
29/04/2013	14.1	19.2	29.2	44	70	96	0.0	2.0	0	1.2	4.9	14.2	29.6	1017.5	1020.3	1023.3	0	83.5	634	92.7	99.5	100
30/04/2013	16.1	18.3	23.8	72	92	97	0.0	1.0	0	0.9	5.4	16.2	24.6	1020.4	1022.3	1024.6	0	62.2	415	92.1	99.3	100
Monthly	9.4	17.2	29.6	33	81	98	116.2	57.2	0	1.6	13	9.2	30.3	1005.9	1018.0	1030.1	0	92.6	882	81.6	99.0	100

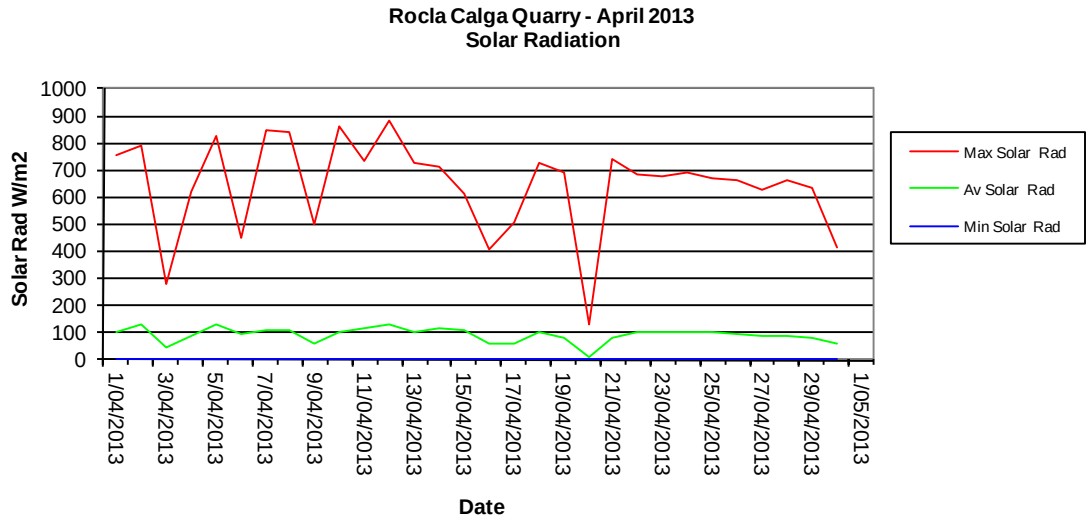
2.4.2 Monthly Weather Charts

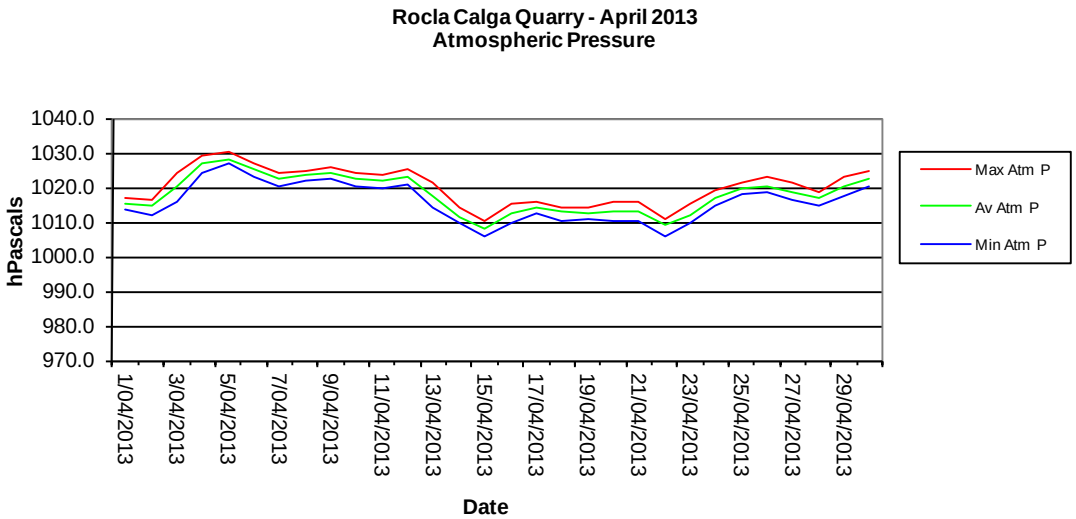


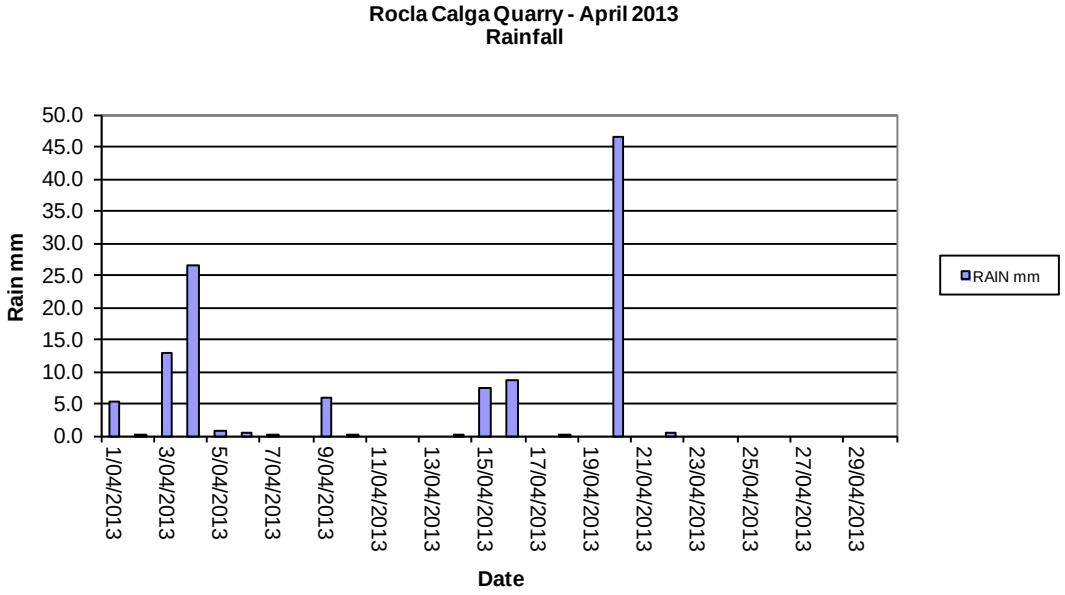


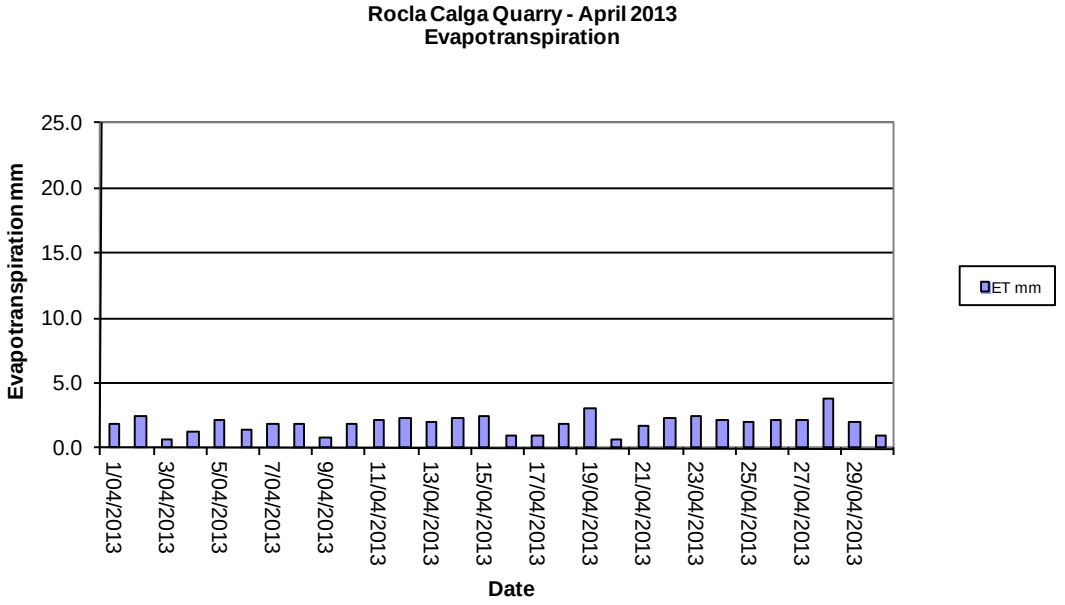


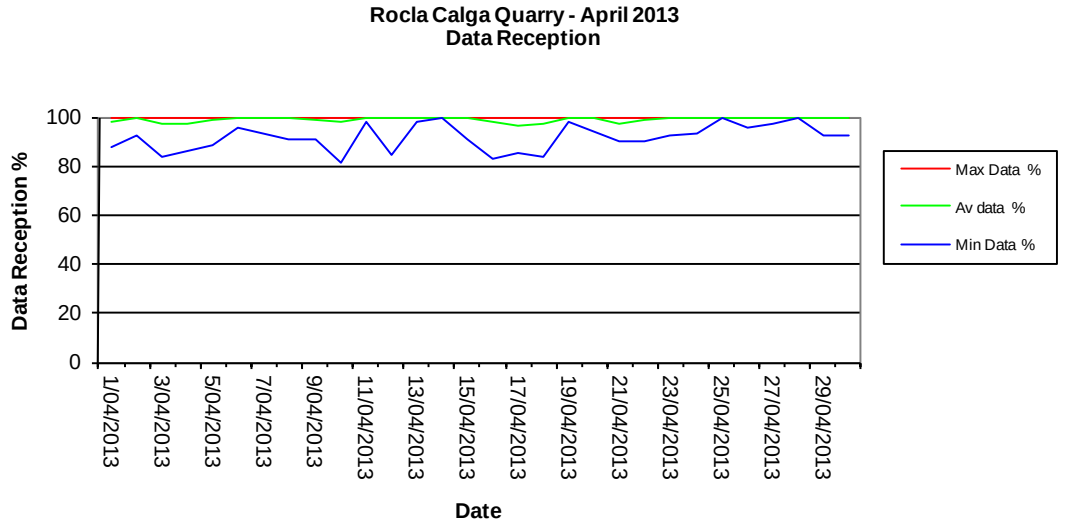

Rocla Calga Quarry - April 2013
Wind Speed
Wind Speed m/s
25
20
15
10
5
0
1/04/2013
3/04/2013
5/04/2013
7/04/2013
9/04/2013
11/04/2013
13/04/2013
15/04/2013
17/04/2013
19/04/2013
21/04/2013
23/04/2013
25/04/2013
27/04/2013
29/04/2013
Date
Max WS
Av WS
Min WS


Rocla Calga Quarry - April 2013
Solar Radiation
Solar Rad W/m2
1000
900
800
700
600
500
400
300
200
100
0
1/04/2013
3/04/2013
5/04/2013
7/04/2013
9/04/2013
11/04/2013
13/04/2013
15/04/2013
17/04/2013
19/04/2013
21/04/2013
23/04/2013
25/04/2013
27/04/2013
29/04/2013
1/05/2013
Date
Max Solar Rad
Av Solar Rad
Min Solar Rad


Rocla Calga Quarry - April 2013
Atmospheric Pressure
hPascals
1040.0
1030.0
1020.0
1010.0
1000.0
990.0
980.0
970.0
1/04/2013
3/04/2013
5/04/2013
7/04/2013
9/04/2013
11/04/2013
13/04/2013
15/04/2013
17/04/2013
19/04/2013
21/04/2013
23/04/2013
25/04/2013
27/04/2013
29/04/2013
Date
Max Atm P
Av Atm P
Min Atm P


Rocla Calga Quarry - April 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
1/04/2013
3/04/2013
5/04/2013
7/04/2013
9/04/2013
11/04/2013
13/04/2013
15/04/2013
17/04/2013
19/04/2013
21/04/2013
23/04/2013
25/04/2013
27/04/2013
29/04/2013
Date
RAIN mm

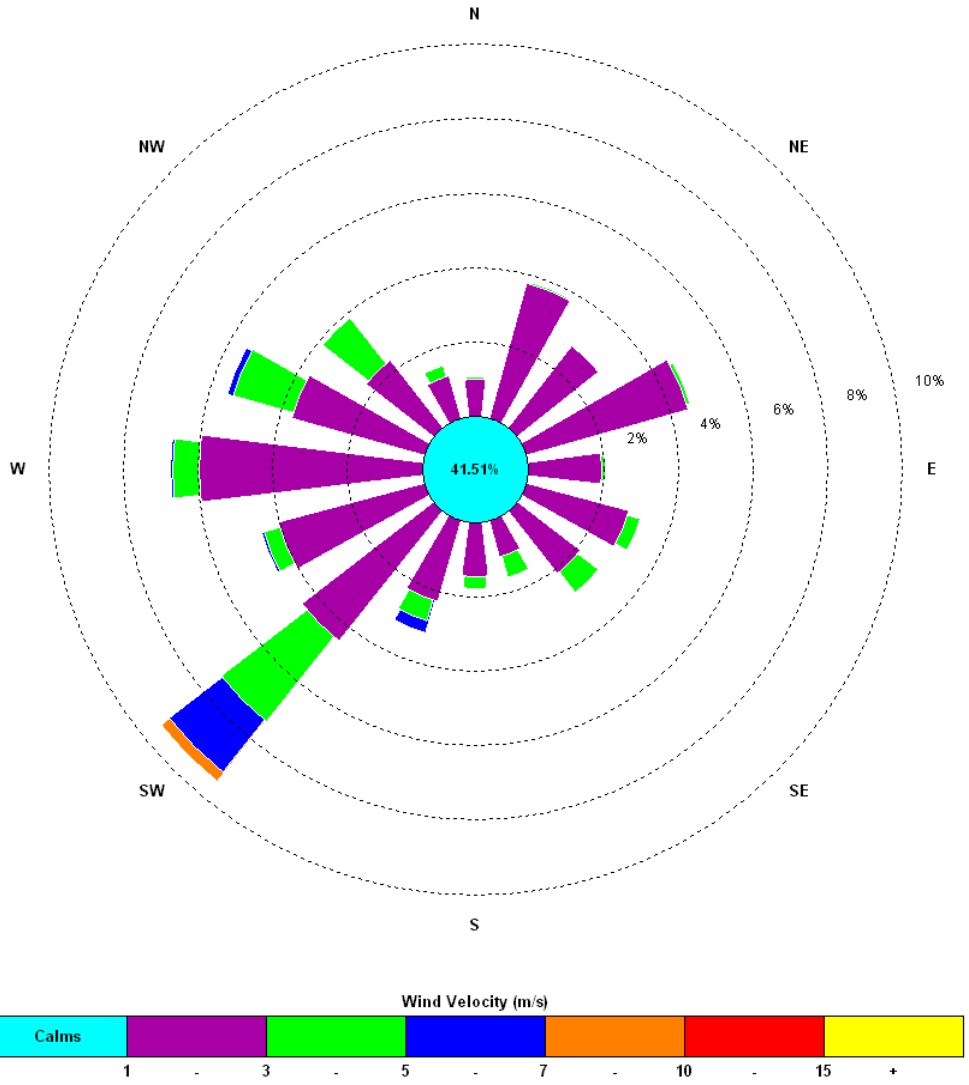

Rocla Calga Quarry - April 2013
Evapotranspiration
Evapotranspiration mm
25.0
20.0
15.0
10.0
5.0
0.0
1/04/2013
3/04/2013
5/04/2013
7/04/2013
9/04/2013
11/04/2013
13/04/2013
15/04/2013
17/04/2013
19/04/2013
21/04/2013
23/04/2013
25/04/2013
27/04/2013
29/04/2013
Date
ET mm


Rocla Calga Quarry - April 2013
Data Reception
Data Reception %
100
80
60
40
20
0
1/04/2013
3/04/2013
5/04/2013
7/04/2013
9/04/2013
11/04/2013
13/04/2013
15/04/2013
17/04/2013
19/04/2013
21/04/2013
23/04/2013
25/04/2013
27/04/2013
29/04/2013
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 April 2013 – 23:45, 30 April 2013



The predominant winds were from the SW, with strongest winds from the SW. The maximum wind speed was 13.0 m/s from the SSW.

Appendix 1

Laboratory Certificates

Appendix 2

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

Gosford, New South Wales
April 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	Mo	14.8	24.6	26.6			NW	17	01:16	16.8				Calm		22.6			ESE	4	
2	Tu	12.0	25.6	0			W	24	09:41	17.1				Calm		24.6			ESE	9	
3	We	12.9	18.3	15.4			S	37	07:50	16.7			SSE	13		17.8				Calm	
4	Th	14.6	19.8	47.2			SE	19	10:59	15.8			W	7		18.2			SE	4	
5	Fr	14.5	23.5	12.2			SE	20	13:56	15.9			NNW	2		22.4			SSE	13	
6	Sa	13.0	21.6	1.6			SE	20	14:23	16.2			E	2		21.4			SSE	9	
7	Su	11.2	23.7	0			E	19	12:56	18.4			N	6		23.1			E	7	
8	Mo	10.7	24.5	0.2			SE	17	14:50	18.2			N	2		23.1			ESE	9	
9	Tu	13.2	22.7	0.2			N	22	17:06	20.4			SSE	6		19.6			S	4	
10	We	10.9	23.9	4.4			E	15	15:03	18.5				Calm		23.0			ENE	7	
11	Th	9.6	25.7	0.2			ENE	19	16:00	18.9				Calm		24.9			ENE	6	
12	Fr	12.2	24.9	0.2			NE	22	15:37	17.2				Calm		23.8			ENE	9	
13	Sa	10.4	24.8	0			NE	24	14:25	19.0			ESE	2		23.8			ENE	9	
14	Su	11.6	28.1	0.2			ENE	17	14:06	19.5				Calm		27.5			NE	6	
15	Mo	11.9	27.9	0			SW	19	12:40	18.2				Calm		26.7				Calm	
16	Tu	16.4	20.8	26.0			SE	22	16:27	17.1				Calm		20.2			SSE	11	
17	We	12.5	22.8	0.6			SSE	22	11:48	18.9			ENE	7		21.5			SE	9	
18	Th	11.9	23.8	0			S	31	15:47	18.7			ENE	2		22.1			SE	11	
19	Fr	12.1	19.4	0			SW	33	15:40	15.9			SW	9		18.9			SE	7	
20	Sa	13.0	16.0	12.4			S	50	17:25	13.7			NW	11		14.2			S	6	
21	Su	9.5	20.2	59.6			SE	19	09:17	15.9			SW	4		18.3				Calm	
22	Mo	10.7	24.8	0.8			WNW	24	12:41	14.9				Calm		24.0			NW	9	
23	Tu	7.2	23.9	0			S	24	13:49	17.4			NNW	9		23.3			NW	4	
24	We	7.8	22.8	0.2			NW	20	09:26	16.9			N	7		22.2			N	2	
25	Th	8.2	21.8	0			N	20	12:50	15.7				Calm		21.8			N	2	
26	Fr	6.7	25.2	0.2			N	19	11:29	16.6			E	6		24.4			WNW	4	
27	Sa	8.1	25.0	0			NE	19	14:33	16.5				Calm		23.1			NNE	7	
28	Su	9.0	27.8	0.2			WNW	20	10:18	17.5				Calm		27.5			NW	7	
29	Mo	8.8	26.6	0			SSW	19	14:02	18.1			N	6		24.4			SE	6	
30	Tu	14.2	23.1	0			ESE	19	13:25	19.4			S	6		22.2			SE	9	
Statistics for April 2013																					
Mean		11.3	23.5							17.3				3		22.4				6	
Lowest		6.7	16.0							13.7				Calm		14.2				Calm	
Highest		16.4	28.1	59.6			S	50		20.4			SSE	13		27.5			SSE	13	
Total				208.4																	

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.

IDCJDW2048.201304 Prepared at 13:00 UTC on 14 May 2013

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EN1301680**	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-MAY-2013
Sampler	: CBE	Issue Date	: 14-MAY-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 Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

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 03/04/13 - 02/05/13	CD2c 03/04/13 - 02/05/13	CD3 03/04/13 - 02/05/13	CD4 03/04/13 - 02/05/13	CD5 03/04/13 - 02/05/13
				Client sampling date / time	02-MAY-2013 14:00	02-MAY-2013 14:00	02-MAY-2013 14:00	02-MAY-2013 14:00	02-MAY-2013 14:00
					EN1301680-001	EN1301680-002	EN1301680-003	EN1301680-004	EN1301680-005
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		0.8	0.2	0.2	0.1	0.1
Ash Content (mg)	----	1	mg		13	4	3	2	2
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		0.1	0.1	0.2	0.1	<0.1
Combustible Matter (mg)	----	1	mg		3	1	4	1	<1
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		0.9	0.3	0.4	0.2	0.1
Total Insoluble Matter (mg)	----	1	mg		16	5	7	3	2

Analytical Results

Sub-Matrix: DUST (Matrix: AIR)				Client sample ID	CD6 03/04/13 - 02/05/13	----	----	----	----
				Client sampling date / time	02-MAY-2013 14:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EN1301680-006	----	----	----	----
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		0.1	----	----	----	----
Ash Content (mg)	----	1	mg		2	----	----	----	----
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		0.1	----	----	----	----
Combustible Matter (mg)	----	1	mg		1	----	----	----	----
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		0.2	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg		3	----	----	----	----

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1310127**	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	: ROCIA QUARRY	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 03-MAY-2013
Sampler	: CBE	Issue Date	: 09-MAY-2013
Site	: ----		
		No. of samples received	: 3
Quote number	: SY/428/12	No. of samples analysed	: 3

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
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics

General Comments

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

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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

- **EA-015:TDS may bias high for sample id D due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	A	D	F	-----	-----
				Client sampling date / time	02-MAY-2013 15:00	02-MAY-2013 15:00	02-MAY-2013 15:00	----	----
Compound	CAS Number	LOR	Unit		ES1310127-001	ES1310127-002	ES1310127-003	----	----
EA005: pH									
pH Value	----	0.01	pH Unit		6.10	5.64	6.04	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		57	94	56	----	----
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L		30	----	40	----	----
Total Dissolved Solids @180°C	----	10	mg/L		----	86	----	----	----
EA025: Suspended Solids									
Suspended Solids (SS)	----	5	mg/L		6	<5	10	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	<5	----	----

CARBON BASED ENVIRONMENTAL PTY LIMITED

Todays Collection	
Time Start:	9.30
Time Finish:	2.00

Date: 2-5-13

GROUNDWATERS

Client : Rocla Calga

Project :

Site	DEPTH	Odour	Water Turbidity	Water Colour	1		2		Bottles (Apr/Oct)	Downloaded Logger? (Y/N)
					pH	EC	pH	EC		
CQ1	8.97	No	C S T	C LO O B G	6.29	133.2us	6.34	130.1us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ3	10.00	H2S	C S T	C LO O B G	6.09	175.1us	6.12	173.5us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ4	10.04	NO	C S T	C LO O B G	4.79	102.6us	4.78	102.3us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ5	5.95	NO	C S T	C LO O B G	4.35	162.1us	4.32	162.4us	1x 250ml GP, 1x 1L GP, 1RP	
CQ6			C S T	C LO O B G					1x 250ml GP, 1x 1L GP, 1RP	No access - electric fence
CQ7	6.03	NO	C S T	C LO O B G	4.72	105.5us	4.67	105.7us	1x 250ml GP, 1x 1L GP, 1RP	Could not download
CQ8	5.48	NO	C S T	C LO O B G	4.33	154.1us	4.36	154.1 us	1x 250ml GP, 1x 1L GP, 1RP	Could not download.
CQ9	8.78	NO	C S T	C LO O B G	4.57	119.6us	4.54	120.3us	1x 250ml GP, 1x 1L GP, 1RP	
CQ10	22.41	NO	C S T	C LO O B G	5.09	183.1us	5.06	180.5us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ11S	10.12	NO	C S T	C LO O B G	4.54	170.1us	4.52	169.8us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ11D	11.29	NO	C S T	C LO O B G	4.77	164.8us	4.79	164.9us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ12	3.78	NO	C S T	C LO O B G	4.51	129.8us	4.49	129.1us	1x 250ml GP, 1x 1L GP, 1RP	yes
CQ13	12.65	NO	C S T	C LO O B G	4.41	237.8us	4.42	237.7us	1x 250ml GP, 1x 1L GP, 1RP	yes.
CP3	8.53	No	C S T	C LO O B G	4.68	154.0us	4.65	153.4us	1x 250ml GP, 1x 1L GP, 1RP	
CP4	9.27	NO	C S T	C LO O B G	5.05	206.2us	5.15	205.7us	1x 250ml GP, 1x 1L GP, 1RP	
CP5	5.93	NO	C S T	C LO O B G	4.94	173.3us	4.93	173.5us	1x 250ml GP, 1x 1L GP, 1RP	
CP6	8.47	NO	C S T	C LO O B G	4.27	204.9us	4.25	205.2us	1x 250ml GP, 1x 1L GP, 1RP	
CP7	1.53	NO	C S T	C LO O B G	4.93	143.2us	4.93	143.1us	1x 250ml GP, 1x 1L GP, 1RP	
CP8			C S T	C LO O B G					1x 250ml GP, 1x 1L GP, 1RP	Only required Apr/Oct
MW7	14.93	NO	C S T	C LO O B G	4.47	119.2us	4.44	119.8us	1x 250ml GP, 1x 1L GP, 1RP	yes
MW8	6.97	NO	C S T	C LO O B G	4.71	87.5us	4.69	86.6us	1x 250ml GP, 1x 1L GP, 1RP	yes
MW9	21.61	No	C S T	C LO O B G	4.98	95.5us	4.97	94.3us	1x 250ml GP, 1x 1L GP, 1RP	yes
MW10			C S T	C LO O B G					1x 250ml GP, 1x 1L GP, 1RP	No access Bad track
MW13			C S T	C LO O B G					1x 250ml GP, 1x 1L GP, 1RP	
MW16			C S T	C LO O B G					1x 250ml GP, 1x 1L GP, 1RP	

Turbidity: C=Clear, S= Slight, T=Turbid (CIRCLE)

Colour: C=Clear, LO=Light Orange, O=Orange, B=Brown, G=Green (CIRCLE)

pH/EC meter #: 5 Calibrated 2.5.13

Signed: LK

Sampled by: Leesa + Jill