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 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 September 2012;
- Surface Water quality results for September 2012;
- Groundwater depth and quality results for September 2012; and
- Meteorological report for September 2012.

The September 2012 dust deposition results for insoluble solids were generally varied when compared to those of August 2012. 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.

Surface water samples were collected for the normal monthly sampling event on the 3 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 not detected at any of the sites. pH levels remained stable and within the slightly acidic range.

Groundwaters were sampled for normal monthly monitoring on 2 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.

The meteorological station data recovery for the month was approximately 100%. Recorded rainfall on site for September was 29.6 mm, which was similar to that recorded at the BOM Peats Ridge Station and lower than the Peats Ridge long-term average for September. Results are detailed below:

Rocla Calga Quarry	29.6 mm
BOM Peats Ridge*	27.6 mm
BOM Gosford*	40.0 mm
BOM Peats Ridge Long term mean for August	73.6 mm

*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au). **Only partial data available for Peats Ridge BOM for the month of September.**

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**.

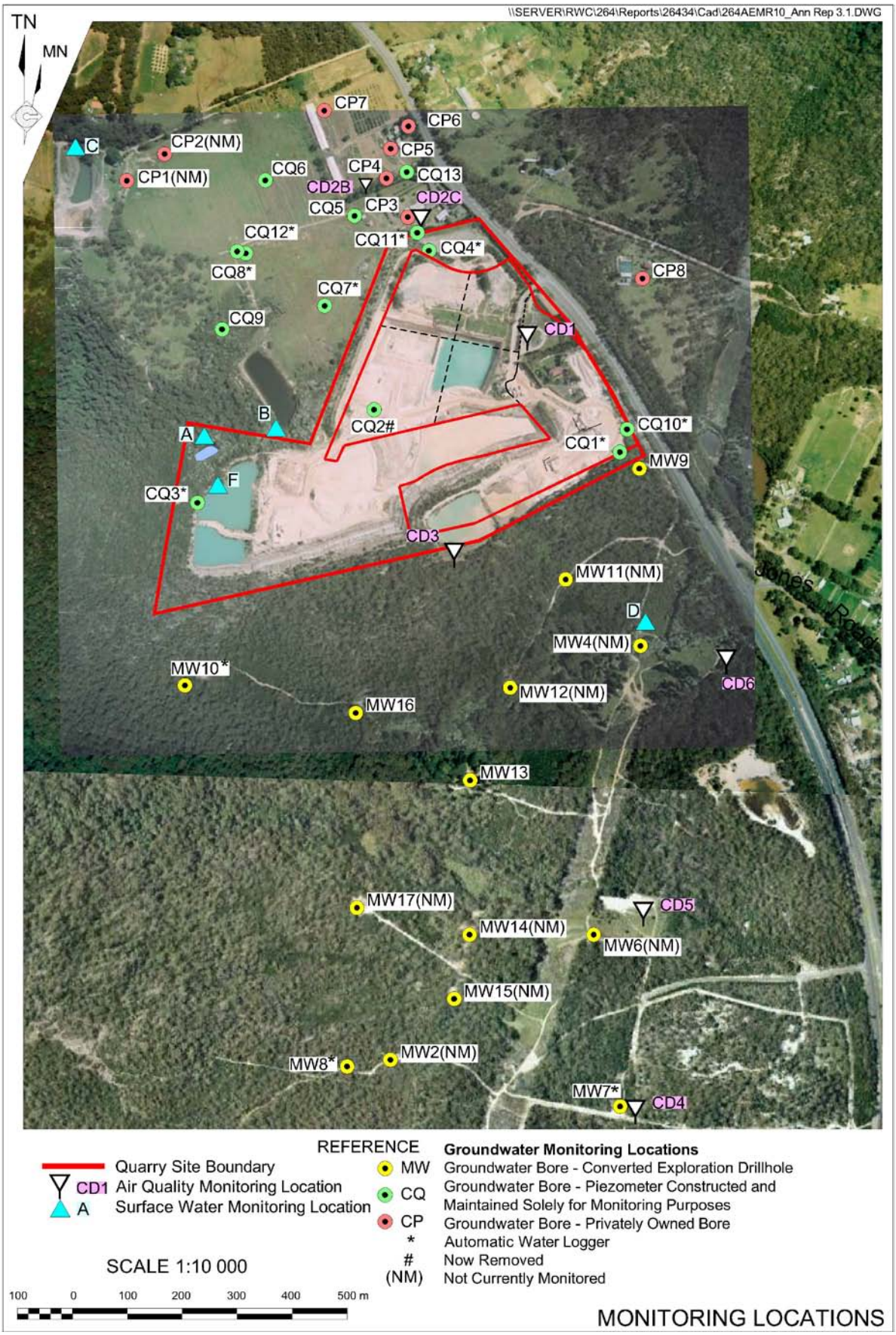


Figure 1: Rocla Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for September 2012 and the project 12 month rolling average. Results are in g/m^2.month.

Table 1: Dust Deposition results: 3 September 2012 – 2 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	1.8	1.5	0.3	83	1.6
CD2c	1.3	0.8	0.5	62	1.0
CD3	1.4	1.2	0.2	86	1.1
CD4	0.6	0.3	0.3	50	0.5
CD5	0.3	0.3	<0.1	100	0.3
CD6	0.6	0.4	0.2	67	0.4

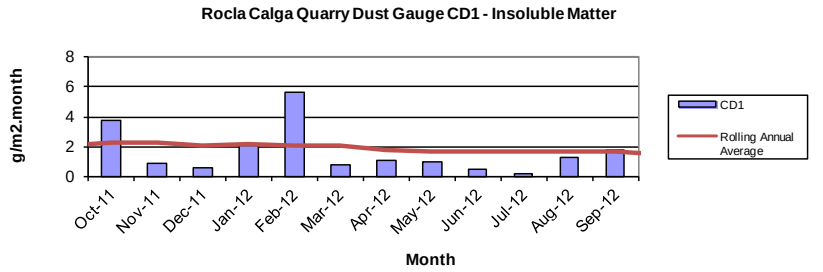
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m^2.month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from October 2011 to September 2012.

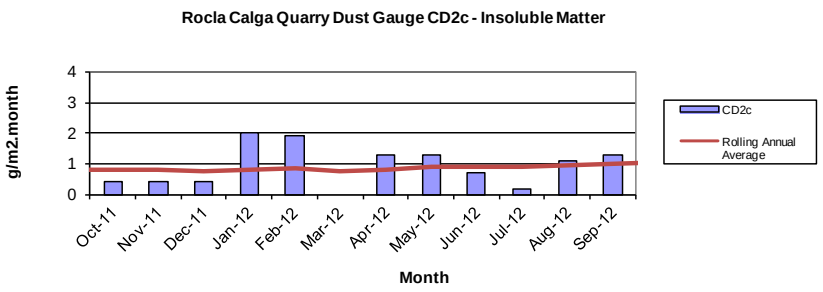
NA= Not Available.

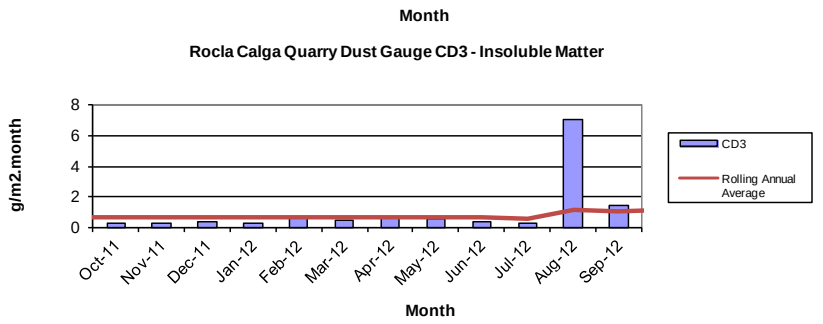
CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air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

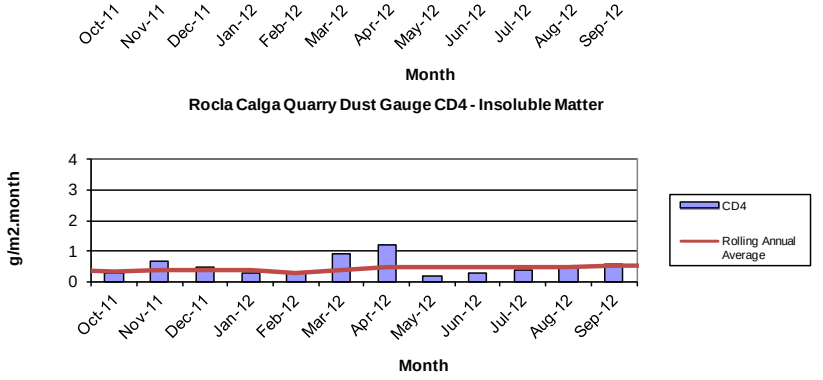
Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The laboratory analysis is provided in **Appendix 1.**

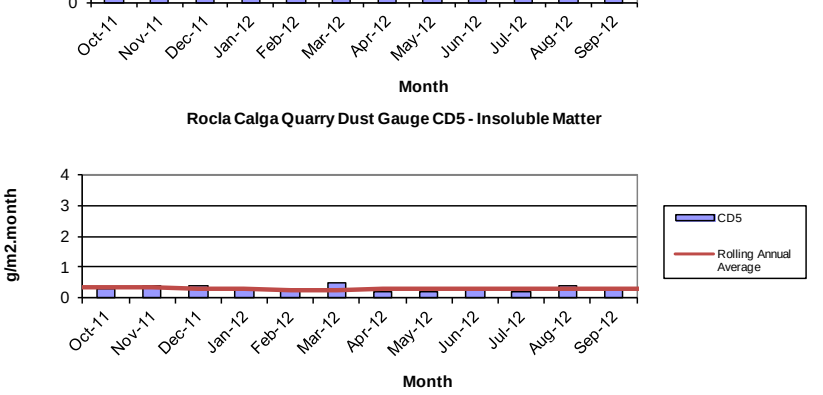
Figure 2: Dust Deposition Charts

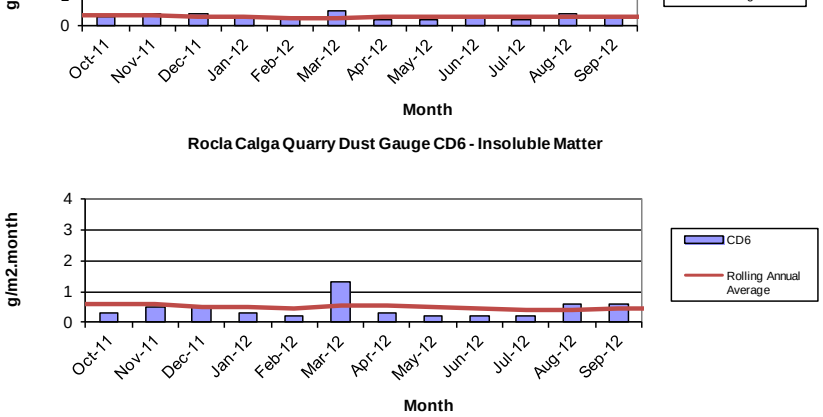












2.2 Surface Water Monitoring

Monthly surface water monitoring was conducted on the 3 September 2012 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1.**

Table 2: Monthly surface water monitoring – August 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	NR	NR	5.69	65	52	6	<5
B	Dry							
C	No Access							
D	Dry							
F	Still	Clear	Clear	5.68	60	43	<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 range, low Electrical Conductivity, low Total Dissolved Solids, low Total Suspended Solids and no detectable Oil and Grease.

2.3 Groundwater Monitoring

Groundwaters were sampled on 2 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. The exception was CQ10 which decreased in water depth.

pH levels were generally lower when compared to last month and in the acidic range, except for CQ1 which was in the alkaline range. EC levels remained low and relatively stable compared to the results obtained in August 2012.

The CQ1 bore monument was damaged by a vehicle in November 2011 and the borehole was not operational for a number of months. The monument was concreted and the bore re-established in May 2012. The concrete has resulted in increases to the pH and EC of the groundwater however; further purging of the bore should result in a return to normal groundwater quality.

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	19.22	9.9	182
CQ3	Voutos	* Monitor	10.53	10.31	6.1	116
CQ4	Voutos	* Monitor	8.78	10.22	4.7	79
CQ5	Gazzana	DIP Only	8.69	6.99	4.1	184
CQ6	Gazzana	DIP Only	16.00	10.84	4.2	206
CQ7	Gazzana	* Monitor	6.89	6.64	4.4	98
CQ8	Gazzana	* Monitor	11.03	6.02	4.3	146
CQ9	Gazzana	DIP Only	10.10	9.20	4.3	109
CQ10	Voutos	* Monitor	NI	20.99	4.0	168
CQ11S	Gazzana	* Monitor	NI	10.85	4.4	166
CQ11D	Gazzana	* Monitor	NI	11.44	4.7	149
CQ12	Gazzana	* Monitor	NI	4.47	4.2	133
CQ13	Kashouli	* Monitor	NI	13.05	4.8	204
CP3	Gazzana	Domestic	10.40	8.98	4.7	151
CP4	Kashouli	Domestic	13.63	10.94	5.0	166
CP5	Kashouli	Domestic	16.61	7.23	4.2	247
CP6	Kashouli	Domestic	16.27	10.27	4.3	203
CP7	Kashouli	Production	8.56	2.92	4.6	221
CP8	Rozmanec	Domestic	22.17	19.84	4.1	145
MW7	Rocla Bore	* Monitor	15.76	15.9	4.4	110
MW8	Rocla Bore	* Monitor	9.82	7.39	4.6	82
MW9	Rocla Bore	* Monitor	22.44	21.43	4.5	85
MW10	Rocla Bore	* Monitor	15.41	12.03	4.2	121
MW13	Rocla Bore	DIP Only	NI	8.1	4.7	95
MW16	Rocla Bore	DIP Only	NI	8.78	4.4	107

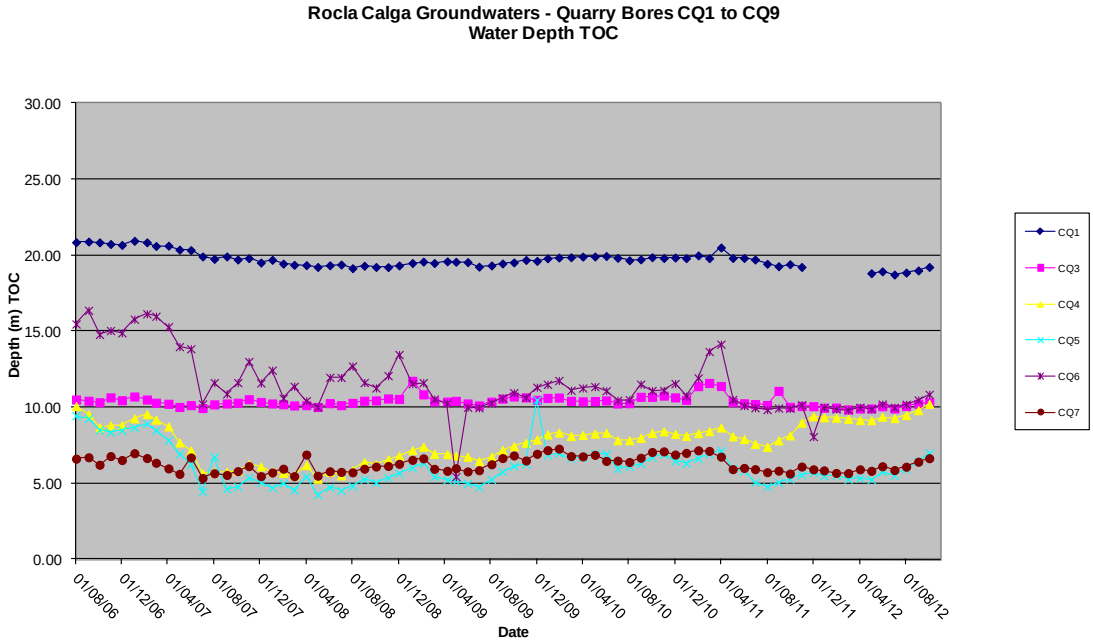
Notes:
TOC = Water level measured from top of bore case to water.
NM = Not Monitored – unable to sample water due to access restrictions.
NR = Not Required by resident.
* = Logger Installed.
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements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

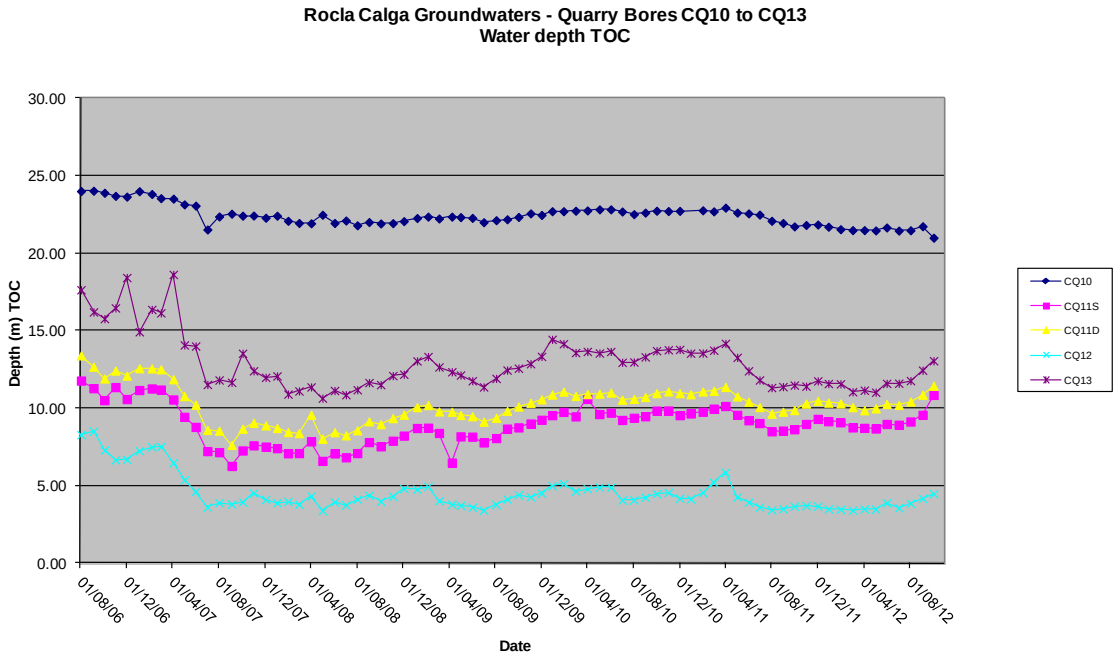
Shading is used to indicate the following trends in water depth (compared to the last reading):

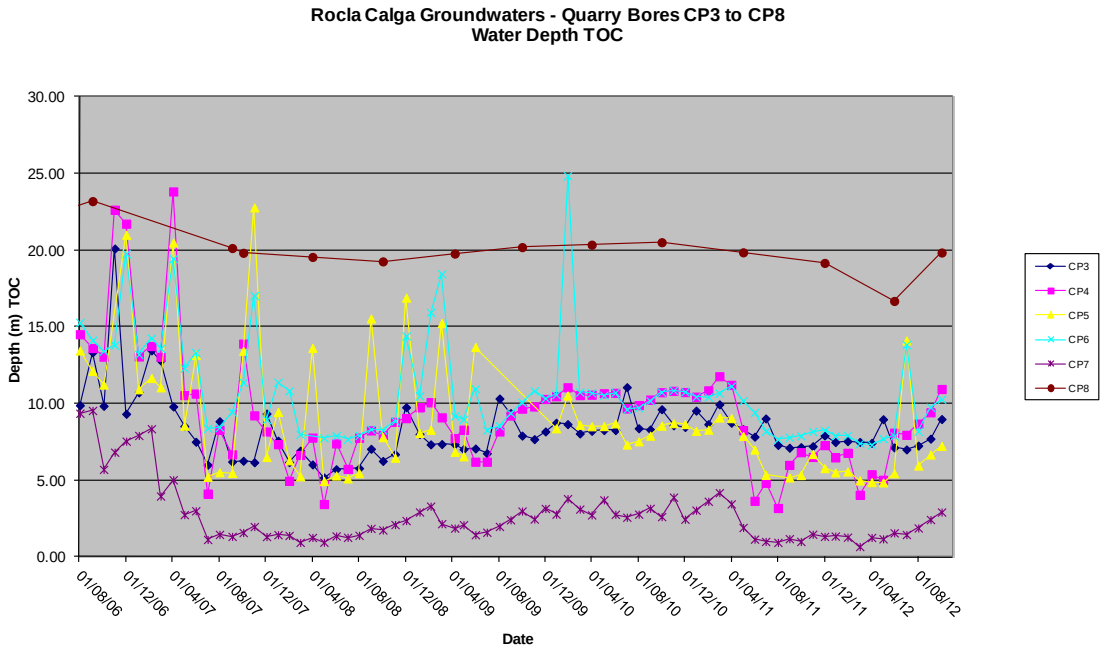
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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
Depth (m) TOC
30.00
25.00
20.00
15.00
10.00
5.00
0.00
01/08/06
01/12/06
01/04/07
01/08/07
01/12/07
01/04/08
01/08/08
01/12/08
01/04/09
01/08/09
01/12/09
01/04/10
01/08/10
01/12/10
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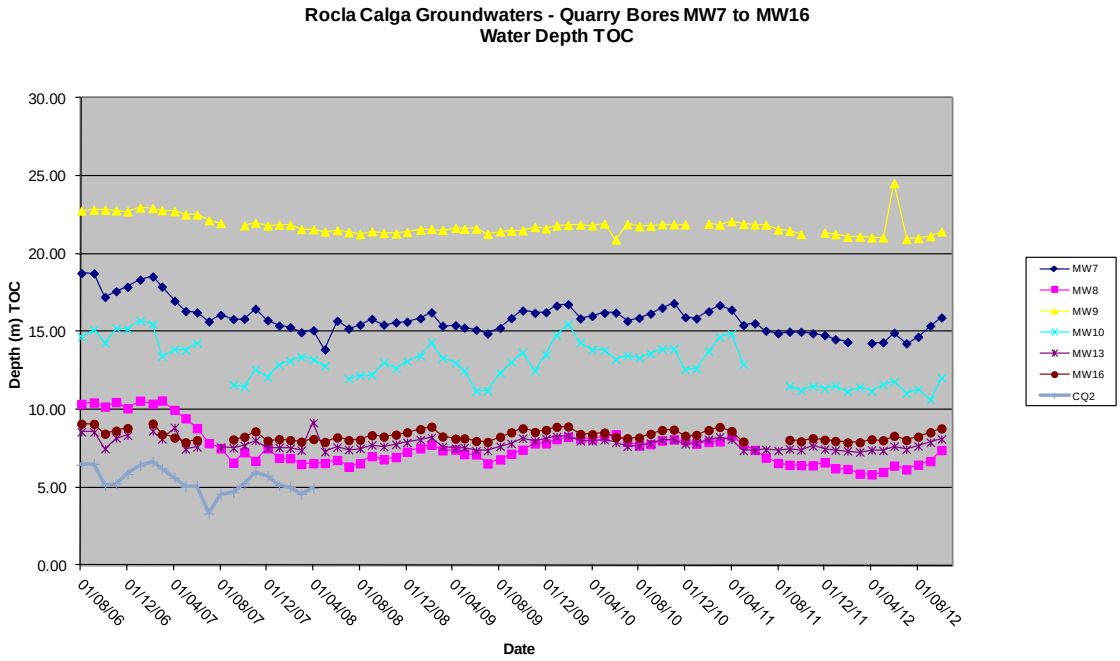
01/08/12
Date
CP3
CP4
CP5
CP6
CP7
CP8


Rocla Calga Groundwaters - Quarry Bores MW7 to MW16
Water Depth TOC
Depth (m) TOC
30.00
25.00
20.00
15.00
10.00
5.00
0.00
01/08/06
01/12/06
01/04/07
01/08/07
01/12/07
01/04/08
01/08/08
01/12/08
01/04/09
01/08/09
01/12/09
01/04/10
01/08/10
01/12/10
01/04/11
01/08/11
01/12/11
01/04/12
01/08/12
Date
MW7
MW8
MW9
MW10
MW13
MW16
CQ2

2.4 Meteorological Monitoring

The Rocla Calga Quarry weather station data recovery in September 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 two nearby Bureau of Meteorology (BOM) stations, Peats Ridge and Gosford are included in **Appendix 2** for comparison purposes. No data was available at Peats Ridge BOM for September 2012 for any parameter except rainfall. Rainfall data was available from the 13 September at Peats Ridge BOM.

Data for September 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 September. The rainfall comparison is provided below:

Rocla Calga Quarry	29.6 mm
BOM Peats Ridge*	27.6 mm
BOM Gosford*	40.0 mm
BOM Peats Ridge Long term mean for September*	73.6 mm

*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au). **Only partial data available for Peats Ridge BOM for the month of September.**

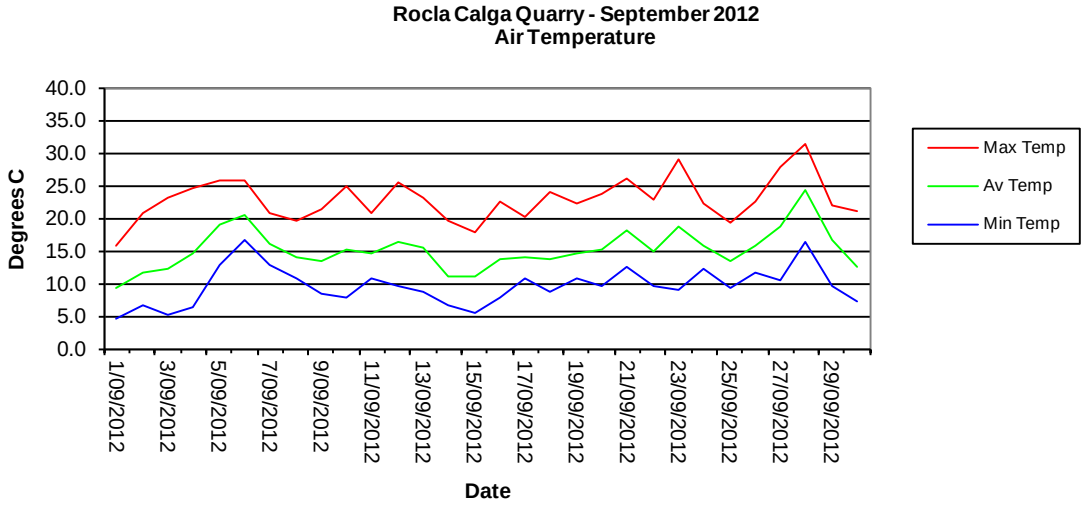
Results are displayed in the following table and figures.

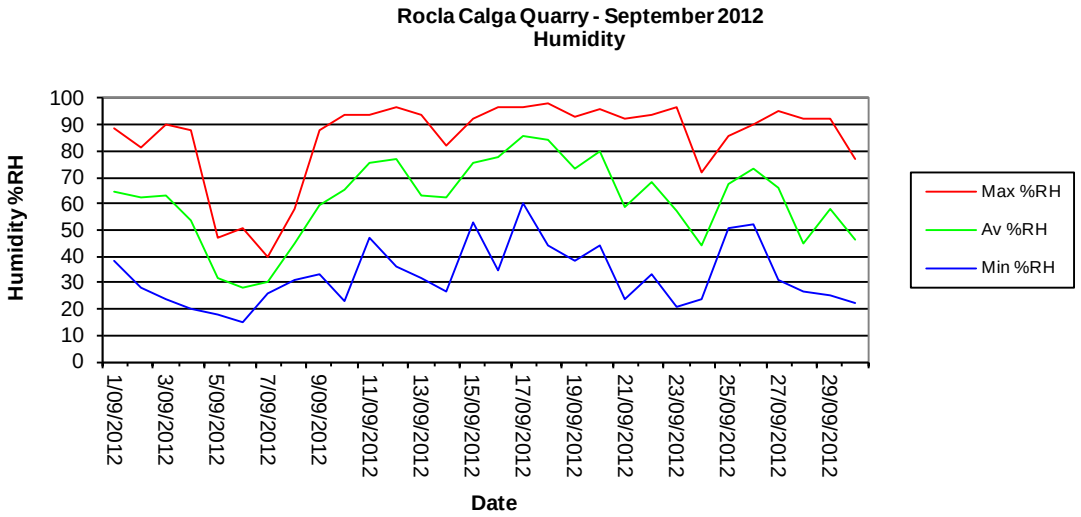
2.4.1 Monthly Meteorological Data Summary

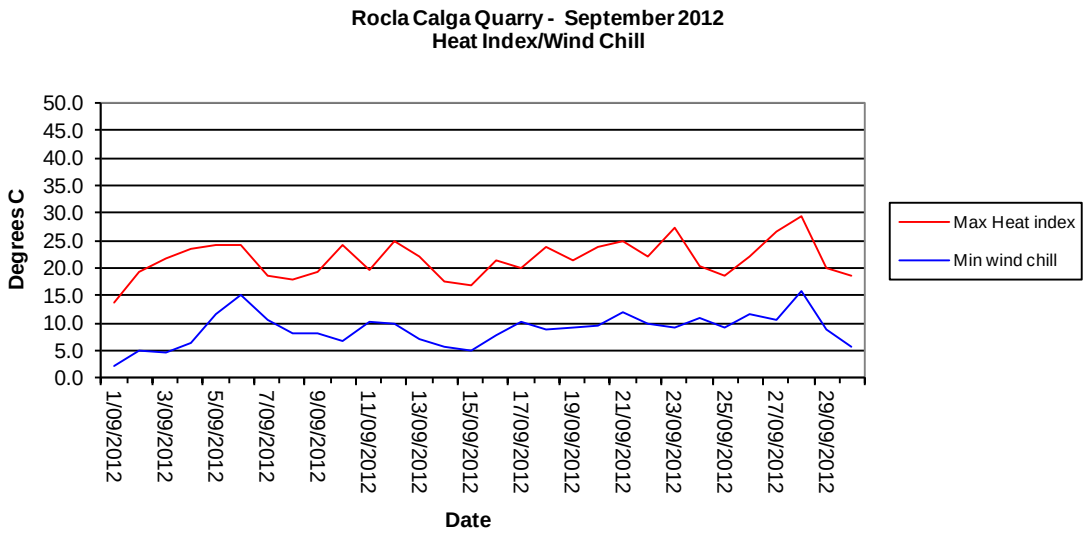
Summary **Sep-12** **Rocla - Calga**

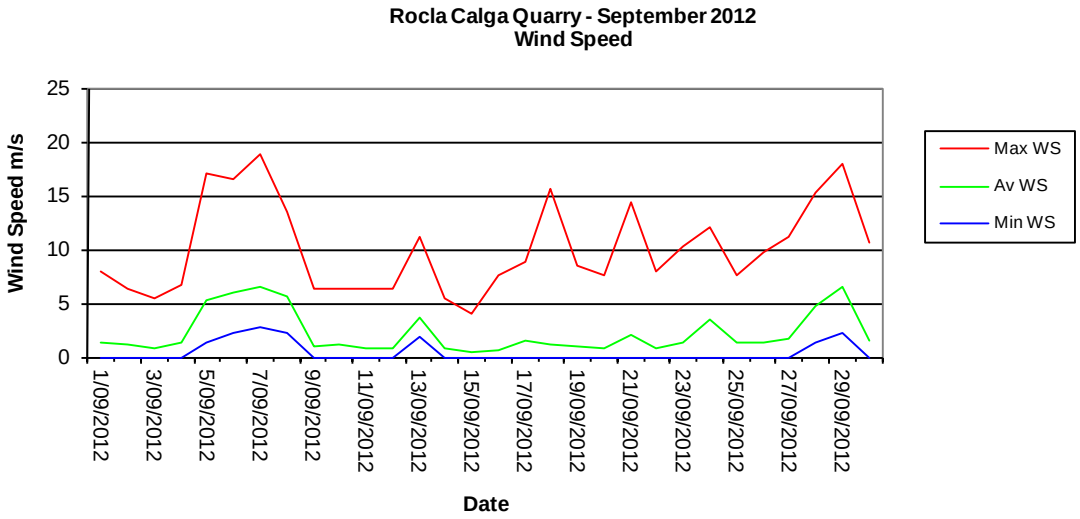
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/09/2012	4.6	9.4	15.7	38	64	89	0.2	1.6	0	1.4	8	2.3	13.9	1019.1	1020.9	1023.5	0	93.2	642	86.5	98.2	100
2/09/2012	6.7	11.8	20.9	28	62	81	0.0	1.9	0	1.1	6.3	5.0	19.2	1018.6	1021.7	1024.1	0	98.8	636	97.4	99.8	100
3/09/2012	5.3	12.4	23.2	24	63	90	0.0	1.9	0	0.8	5.4	4.7	21.8	1018.7	1020.6	1021.9	0	97.9	667	90.6	97.8	100
4/09/2012	6.5	14.8	24.6	20	53	88	0.0	2.8	0	1.3	6.7	6.5	23.6	1018.1	1020.1	1022.7	0	112.4	661	91.8	97.7	100
5/09/2012	13.0	19.1	25.7	18	32	47	0.0	6.3	1.3	5.3	17	11.7	24.3	1004.6	1011.2	1017.9	0	100.1	642	85.1	99.3	100
6/09/2012	16.6	20.6	25.8	15	28	51	0.0	7.1	2.2	5.9	16.5	15.3	24.2	1004.4	1006.3	1008.1	0	107.8	661	91.8	99.2	100
7/09/2012	12.8	16.2	20.8	26	30	40	0.0	6.2	2.7	6.5	18.8	10.8	18.6	1004.0	1006.7	1010.8	0	79.6	727	93.3	99.0	100
8/09/2012	10.7	14.1	19.8	31	45	58	0.0	4.9	2.2	5.6	13.4	8.2	17.8	1010.7	1013.7	1016.8	0	114.7	673	92.4	99.6	100
9/09/2012	8.4	13.5	21.3	33	59	88	0.0	2.4	0	1.1	6.3	8.1	19.3	1016.5	1020.5	1023.8	0	113.3	670	93.3	97.8	100
10/09/2012	7.9	15.1	24.9	23	65	94	0.0	2.5	0	1.2	6.3	6.7	24.1	1018.7	1022.0	1025.1	0	118.2	751	94.4	99.1	100
11/09/2012	10.9	14.5	20.8	47	76	94	0.0	1.8	0	0.9	6.3	10.4	19.7	1020.8	1022.7	1024.5	0	97.9	607	95.6	99.2	100
12/09/2012	9.8	16.4	25.4	36	77	97	0.0	2.2	0	0.9	6.3	9.8	24.8	1011.6	1018.3	1023.7	0	129.5	682	90.9	99.0	100
13/09/2012	8.9	15.7	23.3	32	63	94	3.4	2.7	1.8	3.6	11.2	7.1	22.3	1004.5	1008.6	1014.5	0	62.1	339	87.7	98.0	100
14/09/2012	6.8	11.2	19.7	27	63	82	0.0	2.3	0	0.8	5.4	5.6	17.7	1014.6	1017.6	1020.3	0	132.0	778	90.1	96.8	100
15/09/2012	5.5	11.1	18.0	53	75	92	0.0	1.5	0	0.4	4	5.2	16.9	1020.2	1023.2	1024.8	0	102.4	670	91.5	98.8	100
16/09/2012	7.8	13.7	22.7	35	78	97	0.2	2.1	0	0.7	7.6	7.8	21.6	1014.9	1018.7	1023.9	0	131.3	766	95.3	99.2	100
17/09/2012	10.8	14.1	20.2	60	86	97	17.8	1.7	0	1.5	8.9	10.3	19.9	1015.2	1017.2	1019.5	0	109.5	593	89.8	98.9	100
18/09/2012	8.9	13.8	24.2	44	84	98	3.8	1.8	0	1.2	15.6	8.9	23.9	1011.9	1015.8	1018.0	0	112.8	791	83.3	95.0	100
19/09/2012	10.7	14.5	22.3	38	73	93	0.0	2.1	0	1.0	8.5	9.2	21.5	1012.9	1014.8	1017.2	0	133.0	815	84.2	95.7	100
20/09/2012	9.7	15.4	23.9	44	80	96	0.0	2.2	0	0.8	7.6	9.7	24.0	1011.9	1015.5	1018.9	0	128.5	784	87.4	97.8	100
21/09/2012	12.7	18.3	26.1	24	59	92	0.0	3.5	0	2.1	14.3	12.1	24.9	1008.2	1011.6	1014.3	0	127.9	696	90.6	98.3	100
22/09/2012	9.8	15.0	23.0	33	68	94	0.0	2.5	0	0.7	8	9.9	22.1	1011.8	1013.7	1015.6	0	145.9	834	93	99.5	100
23/09/2012	9.1	18.7	29.0	21	57	97	0.2	3.3	0	1.3	10.3	9.1	27.4	1003.9	1008.3	1013.1	0	143.1	787	92.4	99.8	100
24/09/2012	12.2	15.9	22.4	24	44	72	0.0	5.0	0	3.5	12.1	11.0	20.5	1007.7	1011.9	1018.5	0	166.7	831	97.4	99.7	100
25/09/2012	9.4	13.6	19.4	51	68	86	0.2	2.3	0	1.3	7.6	9.3	18.8	1017.9	1020.0	1021.6	0	121.2	795	95.6	99.5	100
26/09/2012	11.7	16.0	22.7	52	73	90	0.0	2.6	0	1.4	9.8	11.7	22.3	1017.0	1019.6	1021.8	0	145.5	775	91.8	98.7	100
27/09/2012	10.6	18.7	27.8	31	66	95	0.0	2.9	0	1.7	11.2	10.7	26.6	1010.7	1015.3	1018.9	0	127.1	792	91.2	99.1	100
28/09/2012	16.5	24.3	31.3	27	45	92	2.2	6.0	1.3	4.8	15.2	15.7	29.6	1003.5	1006.9	1010.7	0	125.7	804	93.6	99.6	100
29/09/2012	9.8	16.8	21.9	25	58	92	1.8	5.6	2.2	6.6	17.9	9.0	20.1	1001.7	1007.4	1016.3	0	157.3	877	95	99.4	100
30/09/2012	7.4	12.6	21.1	22	46	77	0.0	3.5	0	1.6	10.7	5.8	18.6	1016.2	1019.2	1024.9	0	173.7	874	96.5	99.4	100
Monthly	4.6	15.3	31.3	15	61	98	29.8	95.2	0	2.2	18.8	2.3	29.6	1001.7	1015.7	1025.1	0	120.3	877	83.3	98.6	100

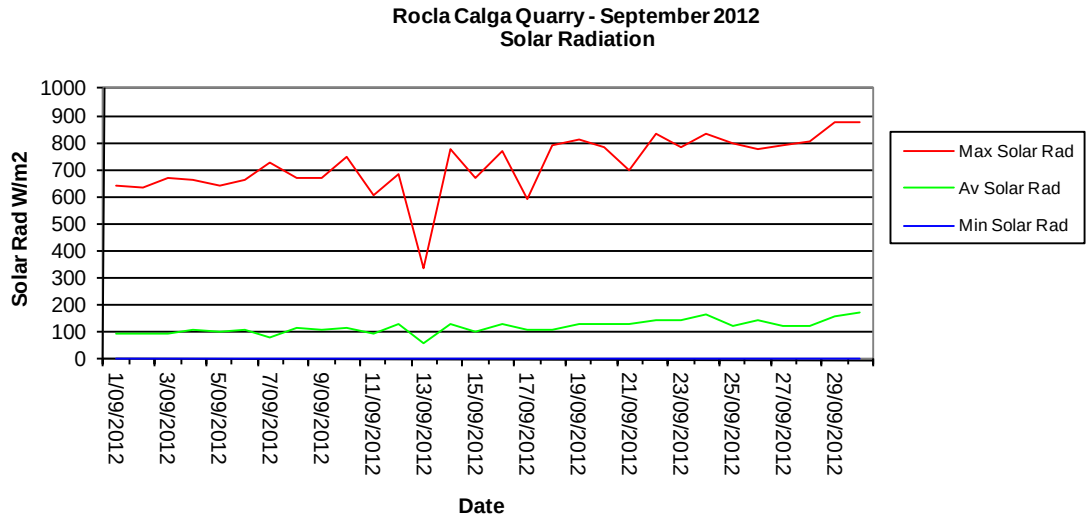
2.4.2 Monthly Weather Charts

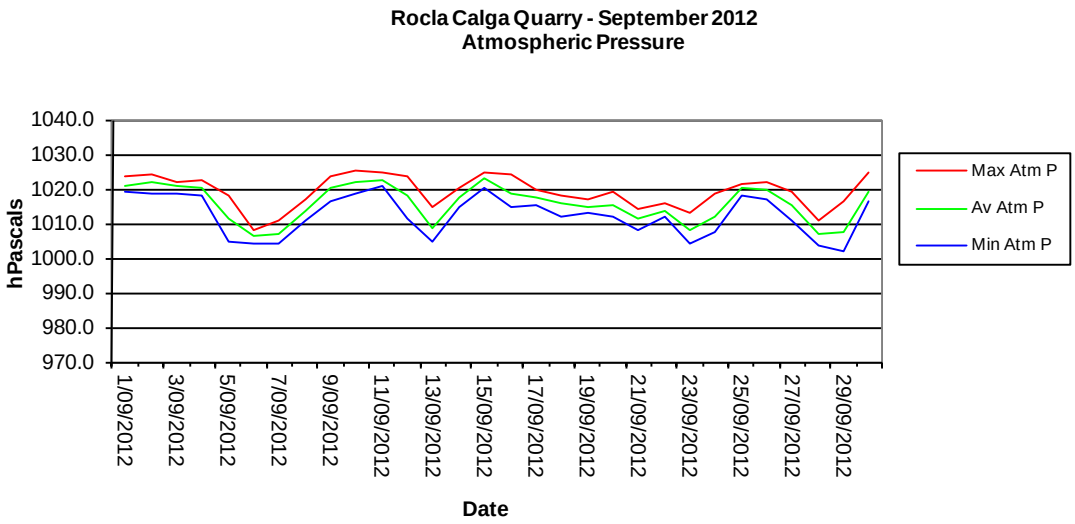


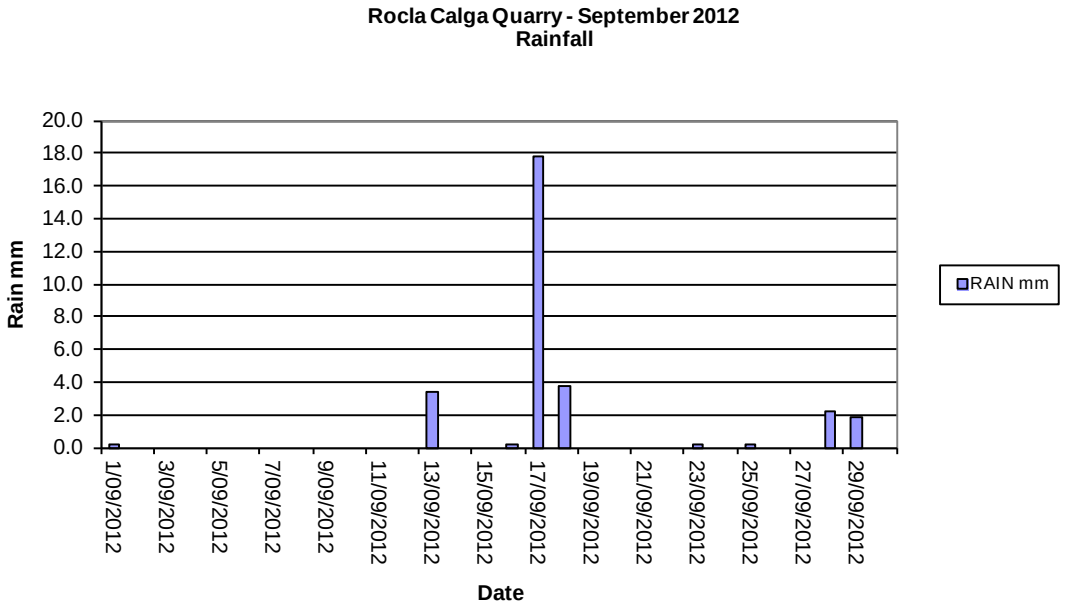


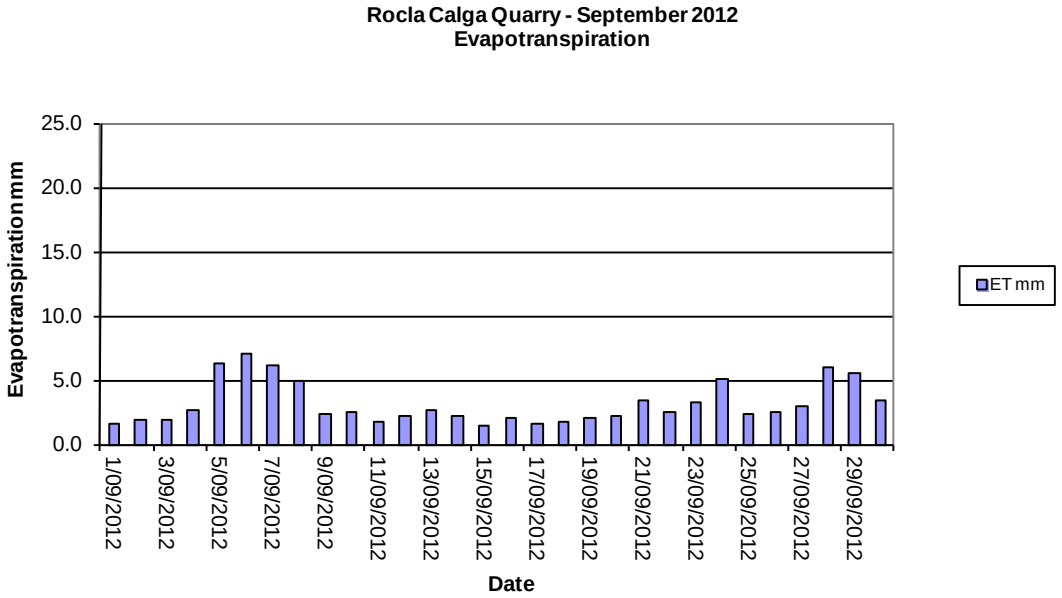


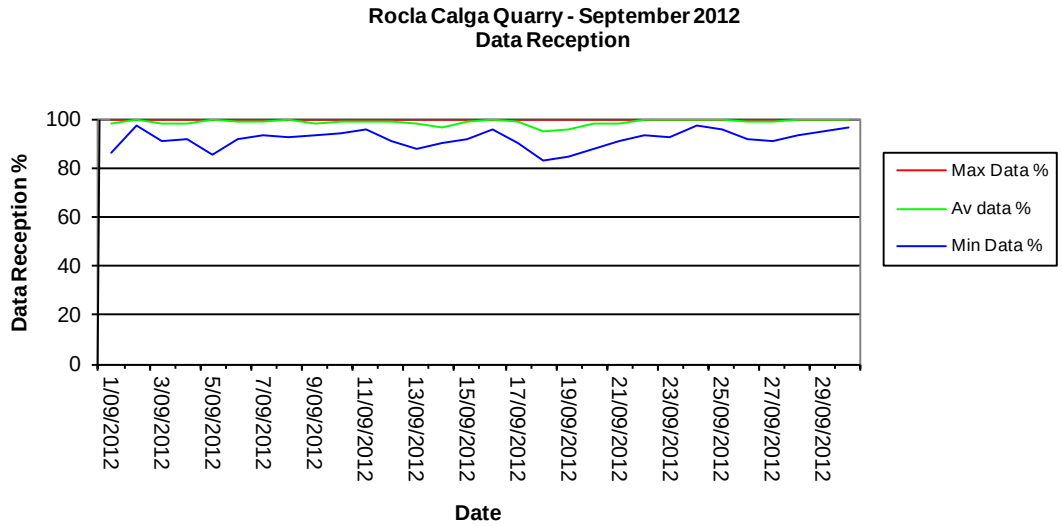

Rocla Calga Quarry - September 2012
Wind Speed
Wind Speed m/s
25
20
15
10
5
0
1/09/2012
3/09/2012
5/09/2012
7/09/2012
9/09/2012
11/09/2012
13/09/2012
15/09/2012
17/09/2012
19/09/2012
21/09/2012
23/09/2012
25/09/2012
27/09/2012
29/09/2012
Date
Max WS
Av WS
Min WS


Rocla Calga Quarry - September 2012
Solar Radiation
Solar Rad W/m2
1000
900
800
700
600
500
400
300
200
100
0
1/09/2012
3/09/2012
5/09/2012
7/09/2012
9/09/2012
11/09/2012
13/09/2012
15/09/2012
17/09/2012
19/09/2012
21/09/2012
23/09/2012
25/09/2012
27/09/2012
29/09/2012
Date
Max Solar Rad
Av Solar Rad
Min Solar Rad


Rocla Calga Quarry - September 2012
Atmospheric Pressure
hPascals
1040.0
1030.0
1020.0
1010.0
1000.0
990.0
980.0
970.0
1/09/2012
3/09/2012
5/09/2012
7/09/2012
9/09/2012
11/09/2012
13/09/2012
15/09/2012
17/09/2012
19/09/2012
21/09/2012
23/09/2012
25/09/2012
27/09/2012
29/09/2012
Date
Max Atm P
Av Atm P
Min Atm P


Rocla Calga Quarry - September 2012
Rainfall
Rain mm
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
1/09/2012
3/09/2012
5/09/2012
7/09/2012
9/09/2012
11/09/2012
13/09/2012
15/09/2012
17/09/2012
19/09/2012
21/09/2012
23/09/2012
25/09/2012
27/09/2012
29/09/2012
Date
RAIN mm

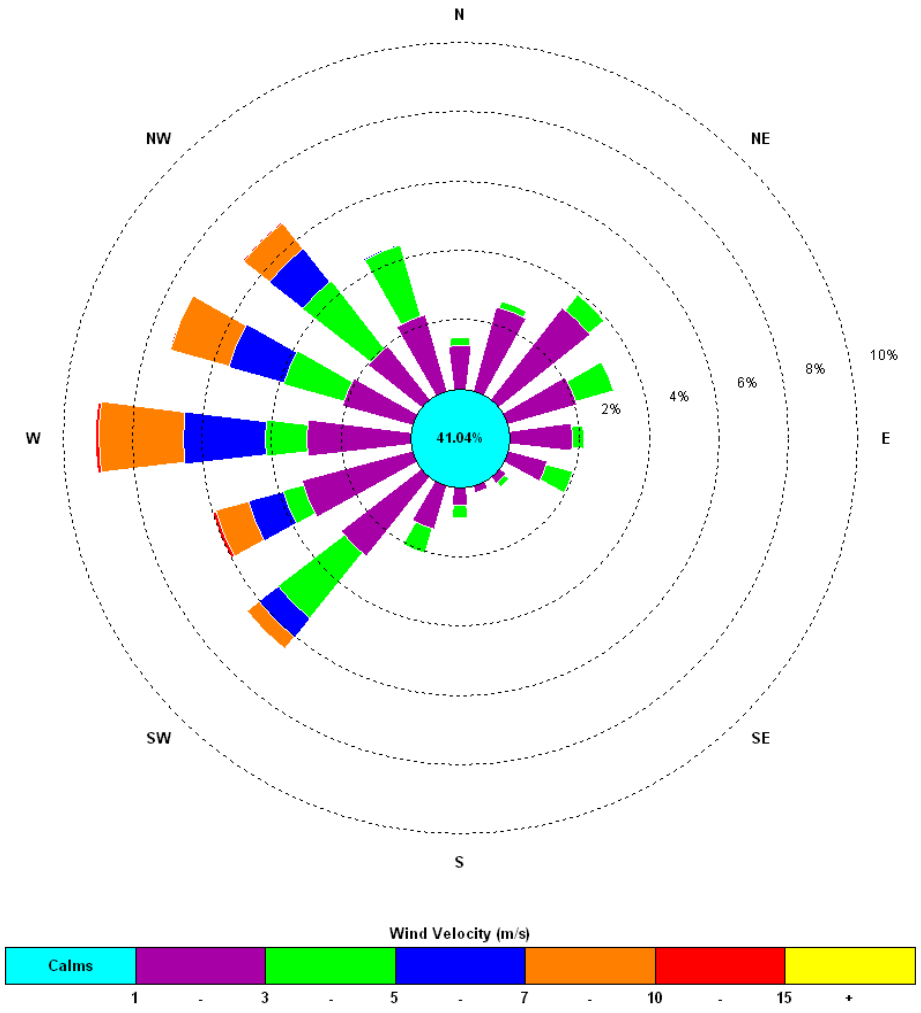

Rocla Calga Quarry - September 2012
Evapotranspiration
Evapotranspiration mm
25.0
20.0
15.0
10.0
5.0
0.0
1/09/2012
3/09/2012
5/09/2012
7/09/2012
9/09/2012
11/09/2012
13/09/2012
15/09/2012
17/09/2012
19/09/2012
21/09/2012
23/09/2012
25/09/2012
27/09/2012
29/09/2012
Date
ET mm


Rocla Calga Quarry - September 2012
Data Reception
Data Reception %
100
80
60
40
20
0
1/09/2012
3/09/2012
5/09/2012
7/09/2012
9/09/2012
11/09/2012
13/09/2012
15/09/2012
17/09/2012
19/09/2012
21/09/2012
23/09/2012
25/09/2012
27/09/2012
29/09/2012
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, 1 September 2012 – 23:45, 30 September 2012



The predominant and strongest winds were from the W. The maximum wind speed was 18.8 m/s from the WSW.

Appendix 1

Laboratory Certificates

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EN1203744**	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	: 02-OCT-2012
Sampler	: CARBON BASED	Issue Date	: 11-OCT-2012
Site	: ROCLA CALGA		
		No. of samples received	: 6
Quote number	: ----	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 Supervisor	Newcastle

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 3/9/12 - 2/10/12	CD2C 3/9/12 - 2/10/12	CD3 3/9/12 - 2/10/12	CD4 3/9/12 - 2/10/12	CD5 3/9/12 - 2/10/12
				Client sampling date / time	02-OCT-2012 15:00	02-OCT-2012 15:00	02-OCT-2012 15:00	02-OCT-2012 15:00	02-OCT-2012 15:00
					EN1203744-001	EN1203744-002	EN1203744-003	EN1203744-004	EN1203744-005
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		1.5	0.8	1.2	0.3	0.3
Ash Content (mg)	----	1	mg		26	14	20	5	5
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		0.3	0.5	0.2	0.3	<0.1
Combustible Matter (mg)	----	1	mg		5	9	4	5	<1
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		1.8	1.3	1.4	0.6	0.3
Total Insoluble Matter (mg)	----	1	mg		31	23	24	10	5

Analytical Results

Sub-Matrix: DUST (Matrix: AIR)				Client sample ID	CD6 3/9/12 - 2/10/12	----	----	----	----
				Client sampling date / time	02-OCT-2012 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EN1203744-006	----	----	----	----
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		0.4	----	----	----	----
Ash Content (mg)	----	1	mg		7	----	----	----	----
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		0.2	----	----	----	----
Combustible Matter (mg)	----	1	mg		3	----	----	----	----
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		0.6	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg		10	----	----	----	----

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1223401**	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 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 02-OCT-2012
Sampler	: CARBON BASED ENVIRO	Issue Date	: 08-OCT-2012
Site	: ----		
		No. of samples received	: 2
Quote number	: SY-273-11	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
Dianne Blane	Laboratory Supervisor	Newcastle
Sarah Millington	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.

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

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	A	F	----	----	----
				Client sampling date / time	[02-OCT-2012]	[02-OCT-2012]	----	----	----
					ES1223401-001	ES1223401-002	----	----	----
EA005: pH									
pH Value	----	0.01	pH Unit		5.69	5.68	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		65	60	----	----	----
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L		52	43	----	----	----
EA025: Suspended Solids									
Suspended Solids (SS)	----	5	mg/L		6	<5	----	----	----
EP020: Oil and Grease (O&G)									
Oil & Grease	----	5	mg/L		<5	<5	----	----	----

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1223400**	Page	: 1 of 12
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 G WATERS	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 02-OCT-2012
Sampler	: CABRON BASED ENVIRO	Issue Date	: 09-OCT-2012
Site	: ----		
		No. of samples received	: 25
Quote number	: SY-273-11	No. of samples analysed	: 25

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*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Dianne Blane	Laboratory Supervisor	Newcastle
Sarah Millington	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.

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

Analytical Results

Sub-Matrix: WATER

Compound	CAS Number	LOR	Unit	Client sample ID / Client sampling date / time	CQ1 [02-OCT-2012] ES1223400-001	CQ3 [02-OCT-2012] ES1223400-002	CQ4 [02-OCT-2012] ES1223400-003	CQ5 [02-OCT-2012] ES1223400-004	CQ6 [02-OCT-2012] ES1223400-005
EA005: pH									
pH Value	----	0.01	pH Unit		9.84	6.14	5.37	4.78	4.75
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		202	128	95	204	226
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		26	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		9	23	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		35	23	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		22	4	9	28	8
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		24	20	19	26	23
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		13	2	<1	1	3
Magnesium	7439-95-4	1	mg/L		<1	4	1	5	11
Sodium	7440-23-5	1	mg/L		20	12	12	16	12
Potassium	7440-09-7	1	mg/L		8	1	<1	<1	1
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		1.13	1.01	0.20	1.68	1.26
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		0.003	0.001	0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L		0.005	0.003	0.002	0.001	0.003
Lead	7439-92-1	0.001	mg/L		0.002	0.004	0.001	<0.001	0.001
Manganese	7439-96-5	0.001	mg/L		0.005	1.52	0.003	0.004	0.008
Nickel	7440-02-0	0.001	mg/L		0.001	0.012	<0.001	<0.001	0.002
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.054	0.125	0.028	0.023	0.057
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		0.40	8.25	0.15	0.05	0.12
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L		0.09	<0.01	<0.01	<0.01	0.03

Analytical Results

Sub-Matrix: WATER				Client sample ID	CQ1	CQ3	CQ4	CQ5	CQ6
				Client sampling date / time	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]
Compound	CAS Number	LOR	Unit		ES1223400-001	ES1223400-002	ES1223400-003	ES1223400-004	ES1223400-005
EK057G: Nitrite as N by Discrete Analyser - Continued									
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		1.33	0.02	0.21	2.38	13.0
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		1.42	0.02	0.21	2.38	13.0
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		1.83	1.11	0.72	1.32	----
Total Anions	----	0.01	meq/L		----	----	----	----	1.75
Total Cations	----	0.01	meq/L		1.72	0.98	0.60	1.16	1.60

Analytical Results

Sub-Matrix: WATER

Compound	CAS Number	LOR	Unit	Client sample ID: CQ7	CQ8	CQ9	CQ10	CQ11s
				Client sampling date / time: [02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]
				ES1223400-006	ES1223400-007	ES1223400-008	ES1223400-009	ES1223400-010
EA005: pH								
pH Value	----	0.01	pH Unit	5.06	4.83	4.99	4.79	4.78
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	112	166	125	190	184
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	5	3	30	36
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	25	21	25	28	20
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	2	<1
Magnesium	7439-95-4	1	mg/L	2	6	2	4	5
Sodium	7440-23-5	1	mg/L	13	15	14	18	15
Potassium	7440-09-7	1	mg/L	<1	<1	<1	<1	4
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.22	0.65	0.28	1.28	1.35
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0002	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.003	0.009	0.008
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	0.011	0.011
Manganese	7439-96-5	0.001	mg/L	0.002	0.002	0.002	0.027	0.012
Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	<0.001	0.008	0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.014	0.021	0.010	0.127	0.083
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	0.08	0.06	0.19	<0.05	0.26
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER				Client sample ID	CQ7	CQ8	CQ9	CQ10	CQ11s
				Client sampling date / time	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]
Compound	CAS Number	LOR	Unit		ES1223400-006	ES1223400-007	ES1223400-008	ES1223400-009	ES1223400-010
EK057G: Nitrite as N by Discrete Analyser - Continued									
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		1.44	7.68	0.88	1.25	0.33
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		1.44	7.68	0.88	1.25	0.33
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		0.75	----	0.77	1.41	1.31
Total Anions	----	0.01	meq/L		----	1.25	----	----	----
Total Cations	----	0.01	meq/L		0.73	1.15	0.77	1.21	1.17

Analytical Results

Sub-Matrix: WATER

Compound	CAS Number	LOR	Unit	Client sample ID: CQ11d Client sampling date / time: [02-OCT-2012] ES1223400-011	CQ12 [02-OCT-2012] ES1223400-012	CQ13 [02-OCT-2012] ES1223400-013	CP3 [02-OCT-2012] ES1223400-014	CP4 [02-OCT-2012] ES1223400-015
EA005: pH								
pH Value	----	0.01	pH Unit	4.97	4.66	4.97	4.94	5.29
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	170	151	223	170	185
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	3
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	3
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	36	30	1	25	23
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	18	18	35	25	33
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	3
Magnesium	7439-95-4	1	mg/L	4	6	8	3	4
Sodium	7440-23-5	1	mg/L	17	11	25	21	20
Potassium	7440-09-7	1	mg/L	1	<1	<1	2	3
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	1.43	1.03	0.99	0.51	0.20
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.004
Copper	7440-50-8	0.001	mg/L	0.004	0.002	0.005	0.172	0.015
Lead	7439-92-1	0.001	mg/L	0.020	0.002	0.024	0.009	0.019
Manganese	7439-96-5	0.001	mg/L	0.022	0.002	0.010	0.013	0.046
Nickel	7440-02-0	0.001	mg/L	0.002	<0.001	0.002	0.001	0.095
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.204	0.019	0.084	0.138	1.02
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	0.06	<0.05
Iron	7439-89-6	0.05	mg/L	0.32	0.09	0.15	1.91	1.55
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER				Client sample ID	CQ11d	CQ12	CQ13	CP3	CP4
				Client sampling date / time	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]
Compound	CAS Number	LOR	Unit		ES1223400-011	ES1223400-012	ES1223400-013	ES1223400-014	ES1223400-015
EK057G: Nitrite as N by Discrete Analyser - Continued									
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.02	0.58	10.3	2.02	0.20
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.02	0.58	10.3	2.02	0.20
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		1.26	1.13	----	1.23	1.47
Total Anions	----	0.01	meq/L		----	----	1.75	----	----
Total Cations	----	0.01	meq/L		1.09	0.97	1.75	1.21	1.43

Analytical Results

Sub-Matrix: WATER				Client sample ID	CP5	CP6	CP7	CP8	MW7
				Client sampling date / time	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]
Compound	CAS Number	LOR	Unit		ES1223400-016	ES1223400-017	ES1223400-018	ES1223400-019	ES1223400-020
EA005: pH									
pH Value	----	0.01	pH Unit		4.54	4.54	4.68	4.59	4.75
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		252	219	242	164	126
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2	4	26	7	4
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		22	24	16	31	28
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		2	<1	13	<1	<1
Magnesium	7439-95-4	1	mg/L		14	10	7	3	2
Sodium	7440-23-5	1	mg/L		13	16	8	19	15
Potassium	7440-09-7	1	mg/L		2	<1	13	<1	<1
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		1.07	0.91	0.46	0.93	0.42
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		0.001	<0.001	0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		0.002	0.011	<0.001	0.002	0.002
Lead	7439-92-1	0.001	mg/L		0.001	0.004	<0.001	0.001	0.002
Manganese	7439-96-5	0.001	mg/L		0.002	0.002	0.028	0.006	0.007
Nickel	7440-02-0	0.001	mg/L		0.002	0.002	0.002	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	0.056	0.029	0.062	0.042
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	0.32	0.27	0.19
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER				Client sample ID	CP5	CP6	CP7	CP8	MW7
				Client sampling date / time	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]
Compound	CAS Number	LOR	Unit		ES1223400-016	ES1223400-017	ES1223400-018	ES1223400-019	ES1223400-020
EK057G: Nitrite as N by Discrete Analyser - Continued									
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		18.3	12.6	13.8	2.03	0.10
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		18.3	12.6	13.8	2.03	0.10
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		----	----	----	1.02	0.87
Total Anions	----	0.01	meq/L		1.97	1.66	1.98	----	----
Total Cations	----	0.01	meq/L		1.87	1.52	1.91	1.07	0.82

Analytical Results

Sub-Matrix: WATER

Compound	CAS Number	LOR	Unit	Client sample ID: MW8	MW9	MW10	MW13	MW16
				Client sampling date / time: [02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]
				ES1223400-021	ES1223400-022	ES1223400-023	ES1223400-024	ES1223400-025
EA005: pH								
pH Value	----	0.01	pH Unit	5.25	5.11	4.76	5.47	5.02
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	101	101	141	108	126
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	3	5	3	3
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	23	23	27	22	28
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L	2	1	2	2	2
Sodium	7440-23-5	1	mg/L	12	12	14	12	16
Potassium	7440-09-7	1	mg/L	<1	<1	<1	<1	<1
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.38	0.22	1.04	0.22	0.23
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	<0.0001	0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.005	0.002	0.003	0.004	0.003
Lead	7439-92-1	0.001	mg/L	0.002	<0.001	0.003	0.001	0.002
Manganese	7439-96-5	0.001	mg/L	0.013	0.007	0.010	0.044	0.012
Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	<0.001	0.002	0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.053	0.012	0.059	0.052	0.040
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	0.14	<0.05	<0.05	0.12	<0.05
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER				Client sample ID	MW8	MW9	MW10	MW13	MW16
				Client sampling date / time	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]	[02-OCT-2012]
Compound	CAS Number	LOR	Unit		ES1223400-021	ES1223400-022	ES1223400-023	ES1223400-024	ES1223400-025
EK057G: Nitrite as N by Discrete Analyser - Continued									
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.07	0.18	0.22	0.31	0.12
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.07	0.18	0.22	0.31	0.12
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		0.77	0.71	0.87	0.68	0.85
Total Cations	----	0.01	meq/L		0.69	0.60	0.77	0.69	0.86

Appendix 2

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

Peats Ridge, New South Wales
September 2012 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	Sa																				
2	Su																				
3	Mo																				
4	Tu																				
5	We																				
6	Th																				
7	Fr																				
8	Sa																				
9	Su																				
10	Mo																				
11	Tu																				
12	We																				
13	Th			0	3.8																
14	Fr			7.2	3.0																
15	Sa			0	2.8																
16	Su			0	2.6																
17	Mo			0	2.8																
18	Tu			12.2	0.4																
19	We			6.0	2.6																
20	Th			0	2.8																
21	Fr			0	4.6																
22	Sa			0	3.0																
23	Su			0	3.8																
24	Mo			0	4.8																
25	Tu			0	4.0																
26	We			0	2.2																
27	Th			0																	
28	Fr			0	4.0																
29	Sa			2.2	5.8																
30	Su			0																	
Statistics for September 2012																					
Mean					3.3																
Lowest					0.4																
Highest				12.2	5.8																
Total				27.6	53.0																

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.

IDCJDW2110.201209 Prepared at 13:01 UTC on 14 Oct 2012

Gosford, New South Wales
September 2012 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	Sa	4.1	16.7	2.6			S	33	16:46	11.0	48		WNW	9		15.4	46		SE	9	
2	Su	6.7	19.8	0			NW	24	02:53	13.7	53		SSE	9		19.6	29		E	6	
3	Mo	2.3	22.3	0			ESE	22	14:32	15.1	64		NNE	4		20.1	39		SE	11	
4	Tu	3.4	24.4	0			SE	22	10:43	15.1	79			Calm		22.4	30		ESE	11	
5	We	4.4	26.8	0			NNW	48	21:18	19.4	38		NNE	6		26.1	17		N	15	
6	Th	17.0	27.6	0			NNW	43	14:18	22.2	32		NNW	17		26.9	12		NW	13	
7	Fr	4.6	23.6	0			NNW	37	12:23	21.0	25		NNW	13		18.2	26		W	9	
8	Sa	5.7	21.1	0			N	35	09:43	15.8	40		NW	9		20.7	30		WNW	11	
9	Su	3.7	20.6	0			ESE	22	11:12	17.0	48		SE	7		19.6	42		ESE	11	
10	Mo	3.8	24.3	0			N	24	11:18	16.1	78		SSW	2		21.1	47		NE	11	
11	Tu	7.4	21.2	0			ESE	26	12:44	17.1	86		ESE	7		20.0	50		SE	11	
12	We	6.8	22.7	0			E	24	12:04	17.3	98			Calm		21.2	70		NNE	9	
13	Th	7.7	25.9	0.2			S	33	14:31	20.5	48		N	15		16.5	98		SE	13	
14	Fr	4.4	18.7	8.0			S	24	10:48	13.4	48		SSW	9		17.8	30		SE	9	
15	Sa	2.8	18.8	0			SSE	28	11:43	16.1	62		SSE	6		17.5	53		SE	15	
16	Su	4.9	20.4	0			E	24	15:16	15.8	64		N	9		18.7	64		ENE	9	
17	Mo	8.9	19.6	0			SE	24	14:01	15.9	98		SSE	4		17.7	94		SE	13	
18	Tu	7.6	22.9	21.6			NNW	28	17:58	16.9	98		E	2		19.0	60		ENE	7	
19	We	10.1	22.8	5.6			SSE	20	12:06	18.0	63		E	4		19.0	52		ESE	9	
20	Th	8.1	22.3	0			NNW	24	13:02	17.8	81			Calm		20.5	64		ENE	9	
21	Fr	10.1	27.0	0			SSW	22	13:22	18.6	99			Calm		21.3	53		SE	9	
22	Sa	7.6	22.8	0			ESE	24	13:40	18.8	73		NE	6		19.7	51		SE	11	
23	Su	6.8	27.6	0.2			N	24	16:01	18.8	74		NNE	7		27.2	30		NNE	7	
24	Mo	8.7	22.8	0			S	31	12:09	18.1	34		SE	9		22.3	26		SW	9	
25	Tu	8.2	18.9	0			ESE	19	16:13	15.1	59		SW	2		17.2	65		E	7	
26	We	10.3	21.4	0.2			NNE	28	16:11	18.5	69		N	11		19.6	67		NE	9	
27	Th	8.0	26.4	0			NNW	22	21:20	18.2	98			Calm		22.8	62		ENE	7	
28	Fr	12.1	32.3	0			NNW	39	14:15	26.3	36		N	15		30.9	29		NNW	17	
29	Sa	16.5	23.9	1.6			W	41	13:35	21.2	64		NW	11		22.2	26		W	13	
30	Su	2.2	21.4	0			WNW	31	09:07	15.8	35		NW	7		20.8	23		S	9	
Statistics for September 2012																					
	Mean	7.2	22.9							17.5	63			6		20.7	46			10	
	Lowest	2.2	16.7							11.0	25			Calm		15.4	12		E	6	
	Highest	17.0	32.3	21.6			NNW	48		26.3	99		NNW	17		30.9	98		NNW	17	
	Total			40.0																	

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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