



Carbon Based Environmental Pty Limited

ABN 74 102 920 285



Calga Quarry

Environmental Monitoring

**Dust Deposition Gauges, Surface and Ground
Waters and Meteorological Station**

March 2016

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

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 27 April 2016

Executive Summary

Carbon Based Environmental is contracted by Hanson 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 March 2016;
- Surface Water quality results for March 2016;
- Ground Water quality results for March 2016; and
- Meteorological report for March 2016.

The March 2016 dust deposition results for insoluble solids were generally low and free of major contamination. All sites, on a rolling annual average basis, are currently below the Air Quality Management Plan exceedance level of 3.7g/m².month. Results were found to be representative of dust levels as determined by the Australian Standard.

Surface water samples were collected on 4 April 2016 at sites A, D and F. Sites B and C were inaccessible and unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the slightly acidic range, low Electrical Conductivity, low Total Dissolved Solids and low Total Suspended Solids. Oil and Grease was detected at site A and D in March 2016.

Bi-monthly groundwater were collected on 4 April 2016 and bimonthly groundwater is next due for sampling in May 2016. Groundwater depth generally increased compared to January 2016, indicating water moving away from the surface. pH at all sites is in the acidic to neutral range and generally remained similar when compared to the previous results. EC levels were similar or slightly increased at a majority of groundwater sites when compared to the results obtained in January 2016.

Data for March 2016 shows that rainfall recorded at the Calga Quarry was lower than the Gosford BOM mean rainfall and the Peats Ridge long term rainfall for March.

Calga Quarry	72.4 mm
BOM Peats Ridge*	NA
BOM Gosford*	150.4 mm
BOM Peats Ridge Long term mean for March*	135.9 mm

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

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

Sampling Program

Hanson 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. Determination of particulates- deposited matter- gravimetric Method". Sampling is undertaken every 30 +/- 2 days and each gauge is analysed for insoluble solids and ash residue. The results are reported as g/m².month.

Surface waters are sampled in accordance with Australian Standards [AS5667.1](#) "Guidance on the design of sample programs, sampling techniques and the preservation and handling of samples", [AS5667.6](#) "Water quality sampling—guidance on sampling of rivers and streams" and [AS5667.4](#) "Water quality sampling—guidance on sampling from lakes, natural and man-made". Surface water monitoring sites include local streams and dams. Basic analysis including pH, Electrical Conductivity, Total Suspended Solids, Total Dissolved Solids and Total Oil and Grease is conducted monthly at Sites A and F (dams) and when Sites B, C and D are flowing. Additional samples are collected when daily rainfall exceeds 50mm.

Groundwaters are sampled in accordance with Australian Standards [AS5667.1](#) "Guidance on the design of sample programs, sampling techniques and the preservation and handling of samples" and [AS5667.11](#) "Water quality sampling—guidance on sampling of ground waters". Groundwater monitoring sites are sampled bi-monthly for depth and water quality. 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. Metrological parameters are measured according to Australian Standard [AS3580.14](#) "Methods for sampling and analysis of ambient air. Meteorological monitoring for ambient air quality monitoring 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**.

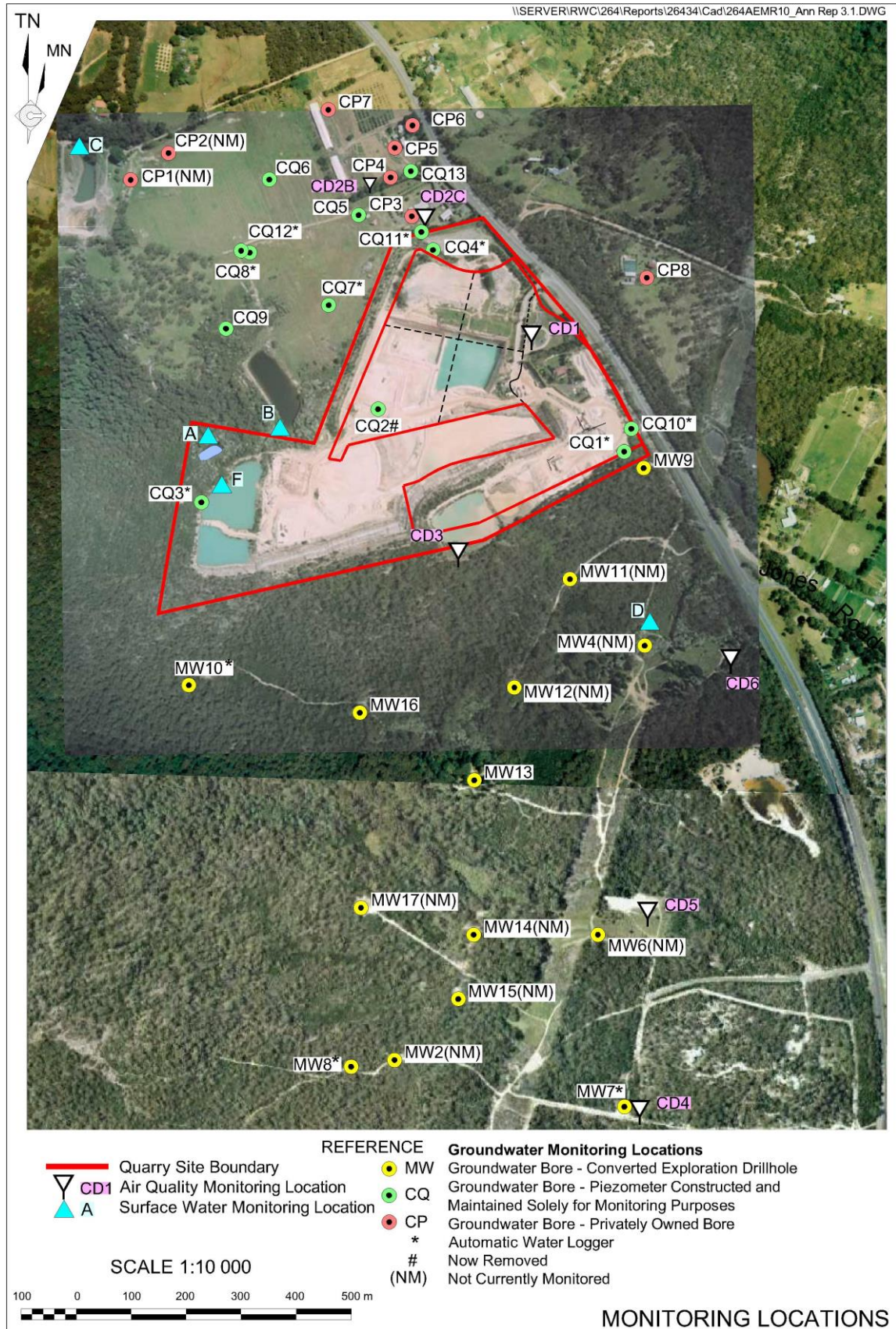


Figure 1: Hanson Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for March 2016 and the project 12 month rolling average. Results are in g/m².month.

Table 1: Dust Deposition results: 3 March 2016 – 4 April 2016 (32 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	1.9	1.1	0.8	58	1.1
CD2c	1.7	1.0	0.7	59	1.2
CD3	2.0	1.2	0.8	60	0.9
CD4	0.9	0.4	0.5	44	0.7
CD5	0.8	0.3	0.5	38	0.6
CD6	1.0	0.4	0.6	40	0.6

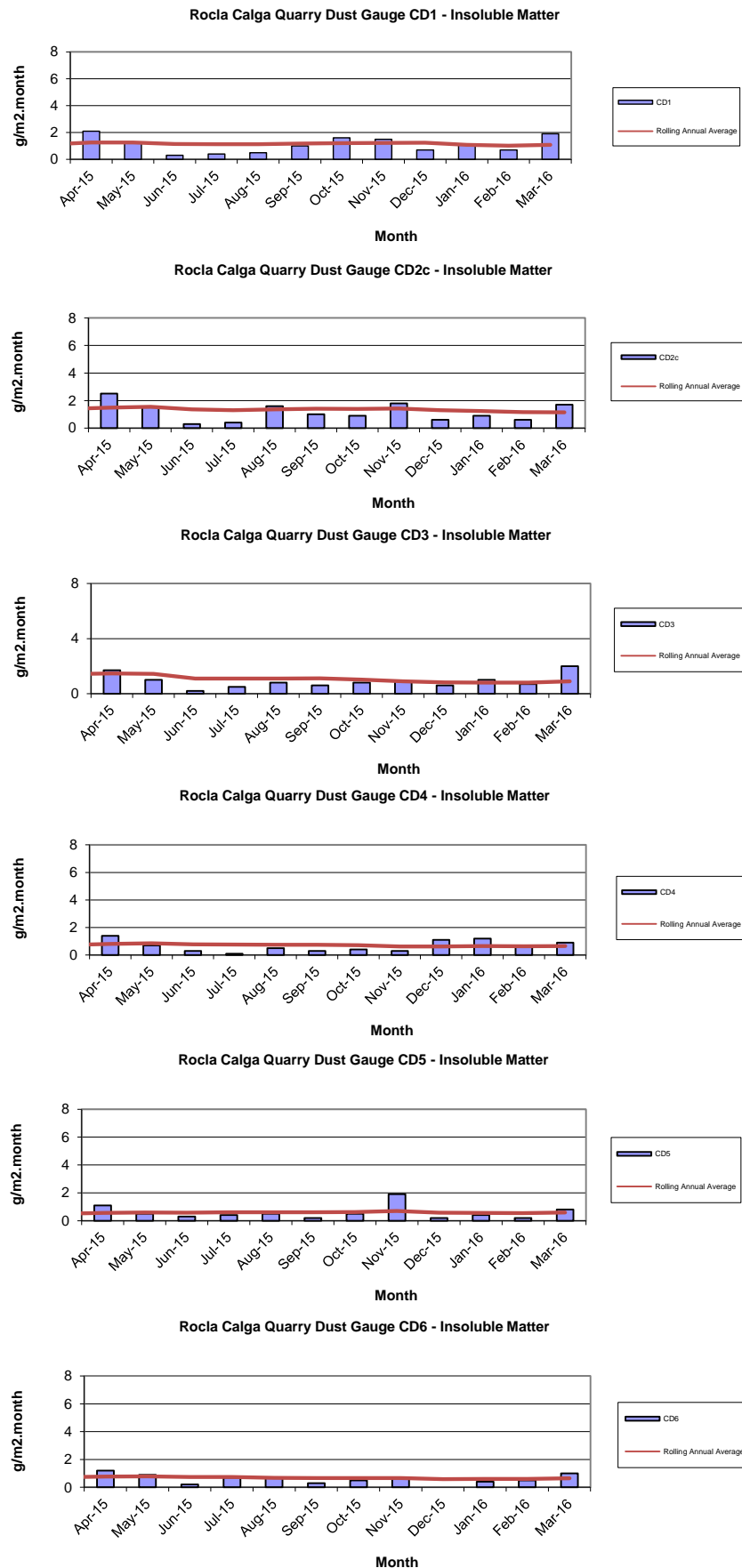
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m².month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from April 2015 to March 2016.

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 4 April 2016 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

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

Site	Observed Flow Rate	Water Colour	Turbidity	pH	EC (µS/cm)	TDS (mg/L)	TSS (mg/L)	Oil and Grease (mg/L)
A	Still	Brown	Clear	6.15	59	90	13	8
B	No access							
C	No Access							
D	Still	Brown	Slight	5.10	96	123	48	16
F	Still	Clear	Clear	4.76	74	58	6	<5

Samples were collected at sites A, D and F. Sites B and C were inaccessible and unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the slightly acidic range, low Electrical Conductivity, low Total Dissolved Solids and low Total Suspended Solids. Oil and Grease was detected at site A and D in March 2016.

2.2.1 Non-Routine Surface Water Sampling

No non routine sampling was undertaken during March 2016.

2.3 Groundwater Monitoring

Bi- monthly groundwaters were sampled on 4 April 2016. 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 compared to January 2016, indicating water moving away from the surface. pH at all sites is in the acidic to neutral range and generally remained similar when compared to the previous results. EC levels were similar or slightly increased at a majority of groundwater sites when compared to the results obtained in January 2016.

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	Removed		
CQ3	Voutos	* Monitor	10.53	10.57	6.6	155
CQ4	Voutos	* Monitor	8.78	10.65	4.7	93
CQ5	Gazzana	DIP Only	8.69	6.65	4.0	136
CQ6	Gazzana	DIP Only	16.00	Removed		
CQ7	Gazzana	* Monitor	6.89	6.17	4.5	80
CQ8	Gazzana	* Monitor	11.03	5.79	4.2	104
CQ9	Gazzana	DIP Only	10.10	Unable to sample- pipe bent		
CQ10	Voutos	* Monitor	NI	24.78	5.0	117
CQ11S	Gazzana	* Monitor	NI	10.18	4.7	118
CQ11D	Gazzana	* Monitor	NI	11.34	4.7	129
CQ12	Gazzana	* Monitor	NI	4.13	4.8	95
CQ13	Kashouli	* Monitor	NI	12.99	4.2	161
CP3	Gazzana	Domestic	10.40	Destroyed		
CP4	Kashouli	Domestic	13.63	9.02	NM	
CP5	Kashouli	Domestic	16.61	7.24	4.2	164
CP6	Kashouli	Domestic	16.27	9.29	4.2	140
CP7	Kashouli	Production	8.56	2.55	5.1	88
CP8	Rozmanec	Domestic	22.17	20.29	4.3	125
MW7	Rocla Bore	* Monitor	15.76	15.39	4.4	88
MW8	Rocla Bore	* Monitor	9.82	7.22	4.4	61
MW9	Rocla Bore	* Monitor	22.44	23.63	4.4	71
MW10	Rocla Bore	* Monitor	15.41	No Access- track eroded		
MW13	Rocla Bore	DIP Only	NI	No Access- track eroded		
MW16	Rocla Bore	DIP Only	NI	No Access- tree across track		
MW17	Rocla Bore	DIP Only		No Access- tree across track		

Notes:

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

NM = Not Monitored – unable to sample water due to non-operational pump.

NR = Not Required by resident.

* = Logger Installed.

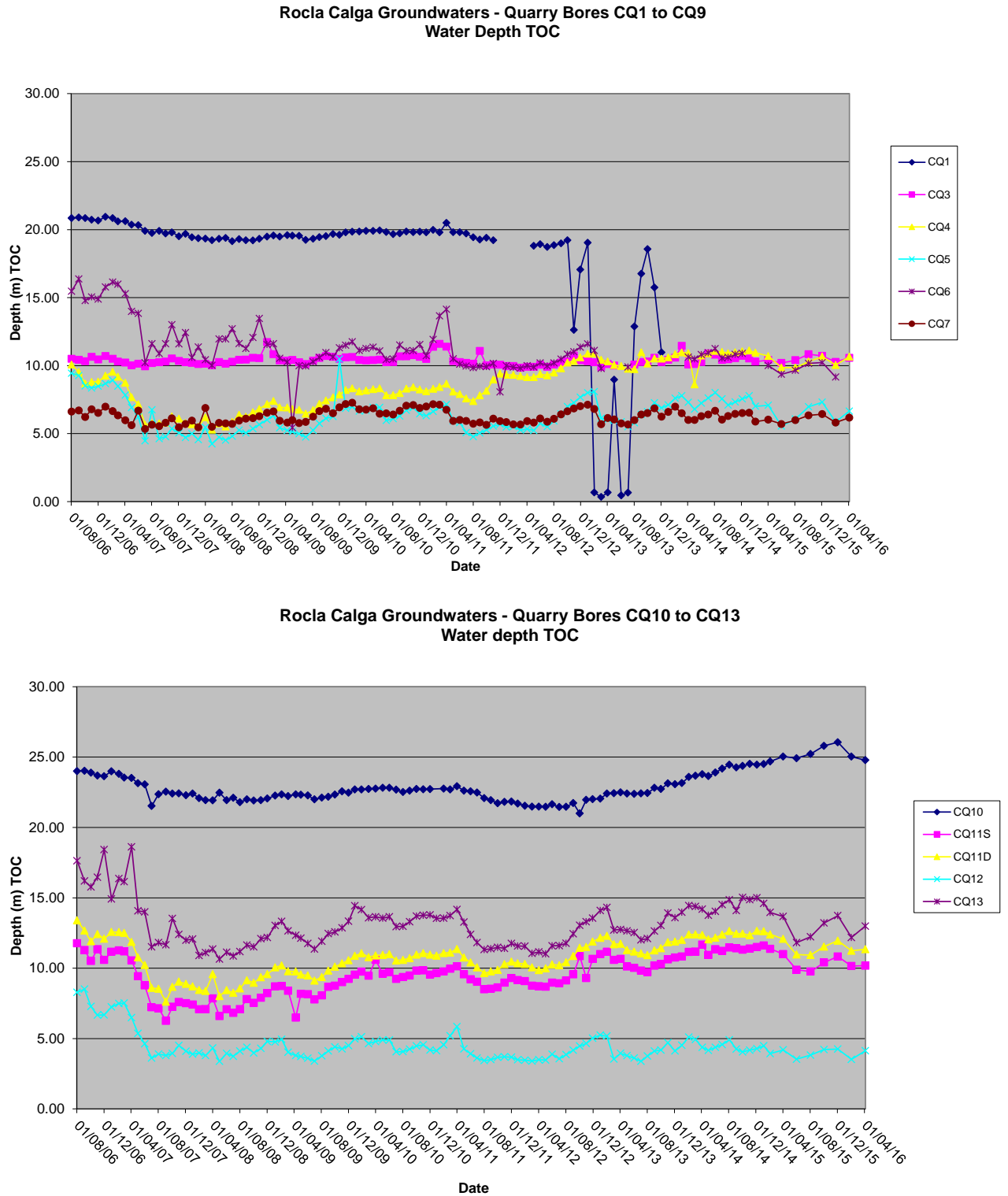
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements taken by Carbon Based Environmental Pty Limited.

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

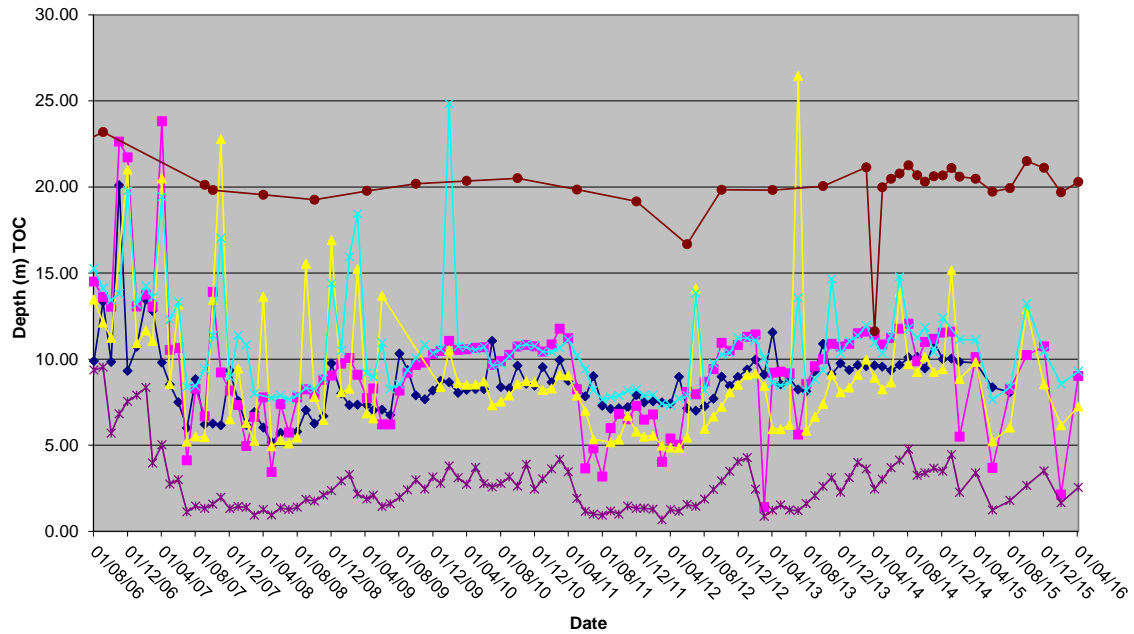
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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

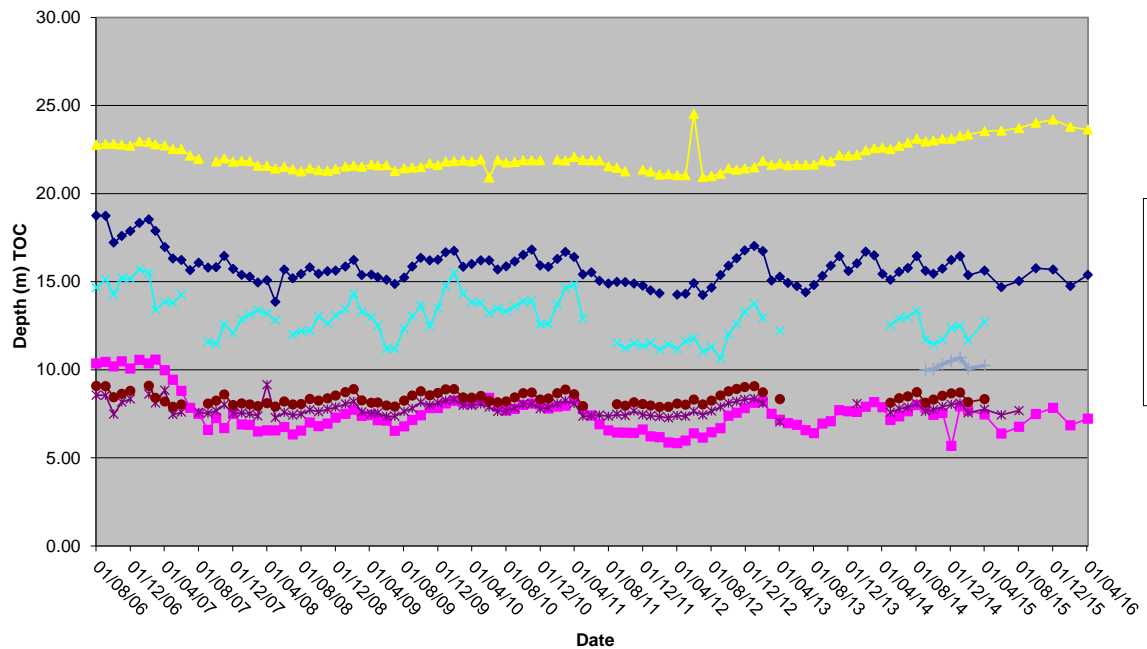
Figures 3 to 6: Groundwater Depth Charts.



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



Rocla Calga Groundwaters - Quarry Bores MW7 to MW17
Water Depth TOC



2.4 Meteorological Monitoring

The Calga Quarry weather station data recovery in March 2016 was approximately 100%.

The weather station data follows and includes;

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

Monthly weather statistics from the nearby Bureau of Meteorology (BOM) at Peats Ridge station are no longer available. However, the long term rainfall mean is available via a link on the Gosford BOM Daily Weather Observation page.

Data for March 2016 shows that rainfall recorded at the Calga Quarry was lower than the Gosford BOM mean rainfall and the Peats Ridge long term rainfall for March.

The rainfall comparison is provided below:

Calga Quarry	72.4 mm
BOM Peats Ridge*	NA
BOM Gosford*	150.4 mm
BOM Peats Ridge Long term mean for March*	135.9 mm

NA = Not Available

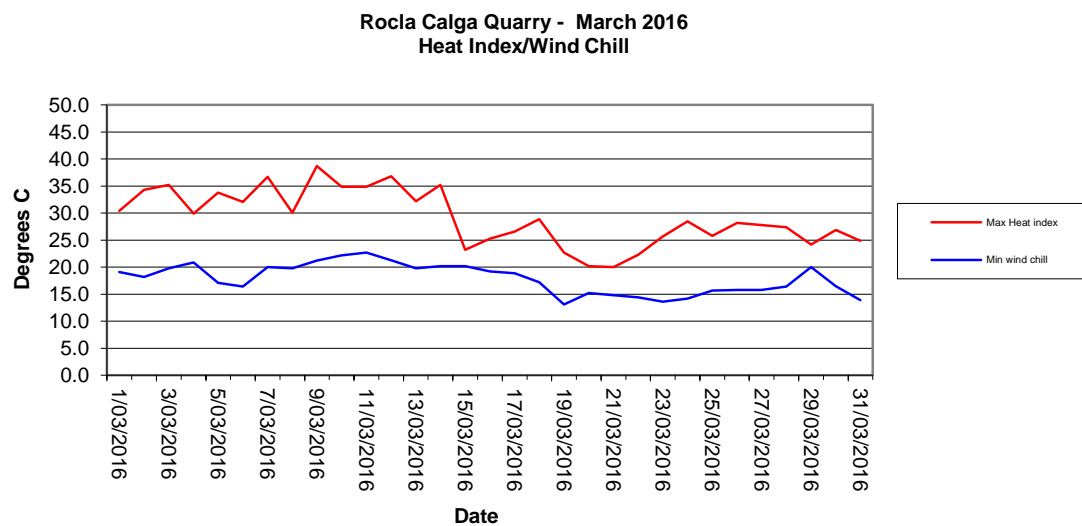
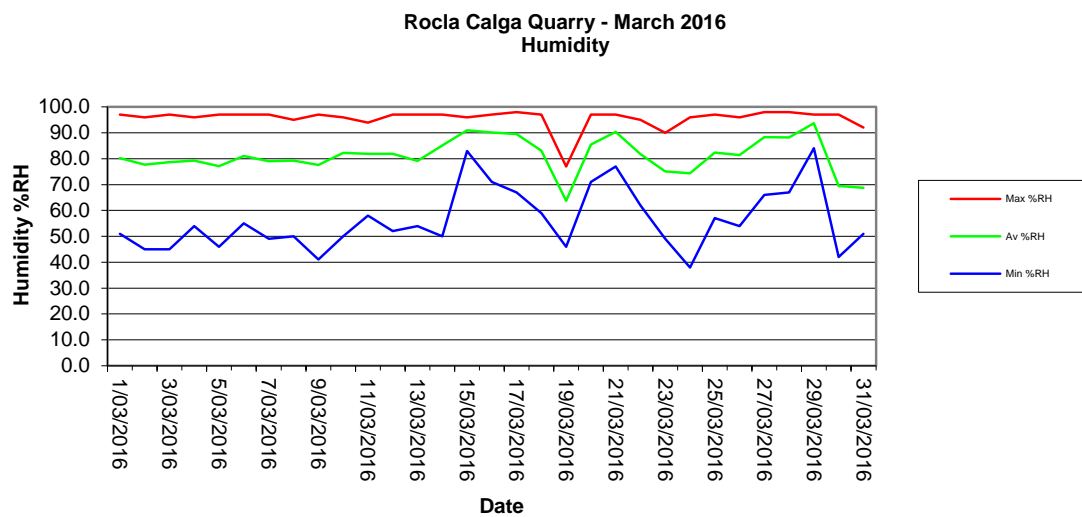
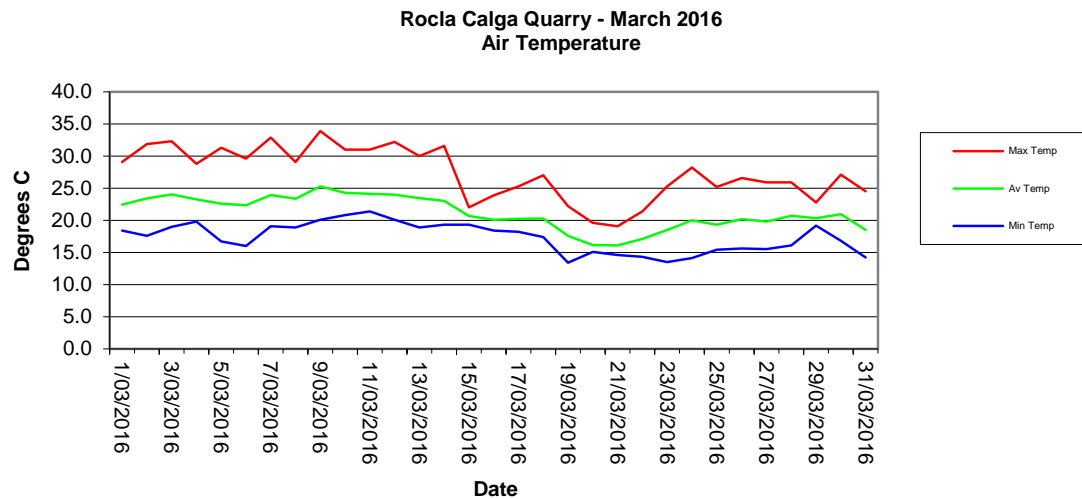
*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au).

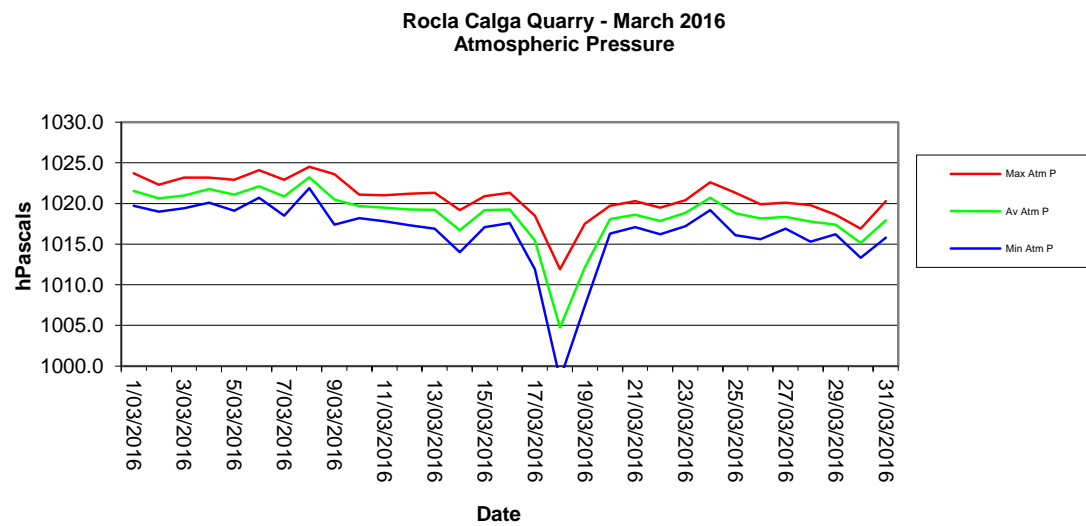
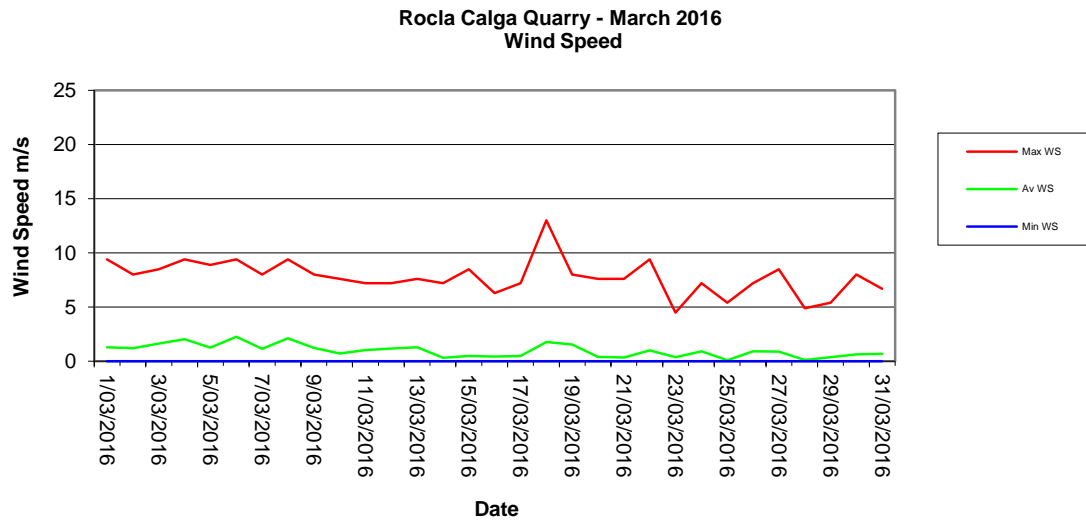
2.4.1 Monthly Meteorological Data Summary

Summary Mar-16 Rocla - Calga

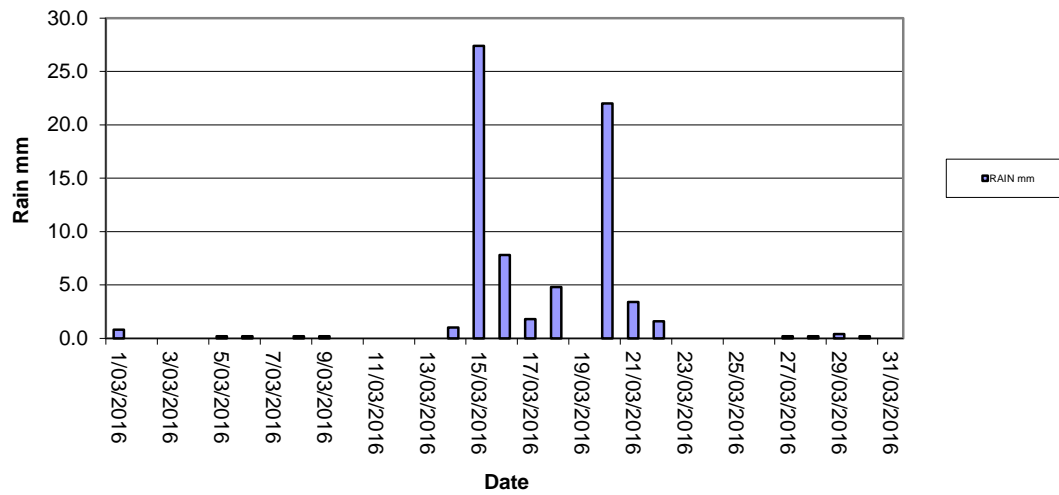
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Data %	Av data %	Max Data %
1/03/2016	18.4	22.5	29.1	51.0	80.2	97.0	0.8	0.0	1.3	9.4	18.4	30.6	1019.7	1021.5	1023.7	81.9	95.0	98.0
2/03/2016	17.6	23.4	31.9	45.0	77.7	96.0	0.0	0.0	1.2	8.0	17.7	34.3	1019.0	1020.6	1022.3	55.0	88.7	98.0
3/03/2016	19.0	24.0	32.3	45.0	78.6	97.0	0.0	0.0	1.6	8.5	19.0	35.2	1019.4	1021.0	1023.2	71.6	91.9	98.0
4/03/2016	19.8	23.3	28.8	54.0	79.2	96.0	0.0	0.0	2.0	9.4	19.9	30.3	1020.1	1021.8	1023.2	54.4	93.6	98.0
5/03/2016	16.7	22.6	31.3	46.0	77.1	97.0	0.2	0.0	1.3	8.9	16.7	33.8	1019.1	1021.1	1022.9	73.1	94.9	98.0
6/03/2016	16.0	22.3	29.6	55.0	81.0	97.0	0.2	0.0	2.3	9.4	16.1	32.1	1020.7	1022.1	1024.1	89.5	93.8	98.0
7/03/2016	19.1	24.0	32.9	49.0	79.1	97.0	0.0	0.0	1.2	8.0	19.2	36.7	1018.5	1020.9	1022.9	86.0	94.6	98.0
8/03/2016	18.9	23.3	29.1	50.0	79.2	95.0	0.2	0.0	2.1	9.4	19.0	30.4	1021.9	1023.2	1024.5	76.6	93.8	98.0
9/03/2016	20.1	25.3	33.9	41.0	77.5	97.0	0.2	0.0	1.2	8.0	20.1	38.7	1017.4	1020.5	1023.6	66.7	91.7	98.0
10/03/2016	20.8	24.3	31.0	50.0	82.2	96.0	0.0	0.0	0.7	7.6	20.8	34.9	1018.2	1019.7	1021.1	0.0	78.6	98.0
11/03/2016	21.4	24.1	31.0	58.0	81.9	94.0	0.0	0.0	1.0	7.2	21.4	34.9	1017.8	1019.5	1021.0	22.5	83.7	98.0
12/03/2016	20.1	24.0	32.2	52.0	81.8	97.0	0.0	0.0	1.2	7.2	20.2	36.8	1017.3	1019.3	1021.2	89.2	96.2	98.0
13/03/2016	18.9	23.4	30.0	54.0	79.1	97.0	0.0	0.0	1.3	7.6	19.0	32.2	1016.9	1019.2	1021.3	94.7	96.7	98.0
14/03/2016	19.3	23.0	31.6	50.0	85.2	97.0	1.0	0.0	0.3	7.2	19.3	35.2	1014.0	1016.7	1019.2	87.4	97.5	100.0
15/03/2016	19.3	20.7	22.0	83.0	91.0	96.0	27.4	0.0	0.5	8.5	19.3	23.2	1017.1	1019.2	1020.9	67.3	89.9	98.0
16/03/2016	18.4	20.1	23.9	71.0	90.2	97.0	7.8	0.0	0.4	6.3	18.4	25.3	1017.6	1019.3	1021.3	54.7	83.3	96.5
17/03/2016	18.2	20.2	25.3	67.0	89.5	98.0	1.8	0.0	0.5	7.2	18.2	26.6	1011.9	1015.5	1018.5	39.2	84.4	97.7
18/03/2016	17.4	20.3	27.0	59.0	83.0	97.0	4.8	0.0	1.8	13.0	17.4	28.9	998.4	1004.8	1011.9	38.6	82.1	97.7
19/03/2016	13.4	17.6	22.2	46.0	63.7	77.0	0.0	0.0	1.5	8.0	13.0	22.7	1007.4	1012.1	1017.5	55.0	79.5	88.6
20/03/2016	15.1	16.2	19.6	71.0	85.4	97.0	22.0	0.0	0.4	7.6	15.1	20.2	1016.3	1018.1	1019.7	61.4	84.8	94.4
21/03/2016	14.6	16.1	19.1	77.0	90.3	97.0	3.4	0.0	0.3	7.6	14.6	20.0	1017.1	1018.6	1020.3	75.7	90.1	98.0
22/03/2016	14.3	17.1	21.4	62.0	81.8	95.0	1.6	0.0	1.0	9.4	14.3	22.3	1016.2	1017.9	1019.5	71.7	93.1	100.0
23/03/2016	13.5	18.5	25.3	49.0	75.1	90.0	0.0	0.0	0.4	4.5	13.6	25.7	1017.2	1018.8	1020.4	76.6	96.0	100.0
24/03/2016	14.1	20.0	28.2	38.0	74.3	96.0	0.0	0.0	0.9	7.2	14.1	28.5	1019.2	1020.7	1022.6	40.6	92.4	98.0
25/03/2016	15.4	19.3	25.2	57.0	82.4	97.0	0.0	0.0	0.1	5.4	15.4	25.8	1016.1	1018.8	1021.3	94.7	96.9	98.0
26/03/2016	15.6	20.2	26.6	54.0	81.4	96.0	0.0	0.0	0.9	7.2	15.6	28.2	1015.6	1018.2	1019.9	91.8	96.9	98.0
27/03/2016	15.5	19.8	25.9	66.0	88.3	98.0	0.2	0.0	0.9	8.5	15.5	27.8	1016.9	1018.3	1020.1	94.2	97.8	98.0
28/03/2016	16.1	20.7	25.9	67.0	88.2	98.0	0.2	0.0	0.1	4.9	16.1	27.4	1015.3	1017.8	1019.8	91.5	97.1	98.0
29/03/2016	19.2	20.3	22.8	84.0	93.7	97.0	0.4	0.0	0.4	5.4	19.2	24.2	1016.2	1017.4	1018.6	83.0	94.3	98.0
30/03/2016	16.8	20.9	27.1	42.0	69.4	97.0	0.2	0.0	0.6	8.0	16.9	26.9	1013.3	1015.1	1016.9	63.5	93.2	98.0
31/03/2016	14.2	18.5	24.5	51.0	68.7	92.0	0.0	0.0	0.7	6.7	14.2	24.9	1015.8	1017.9	1020.3	85.1	95.2	98.0
Monthly	13.4	21.2	33.9	38	81	98	72.4	0	1.0	13	13.0	38.7	998.4	1018.6	1024.5	0	91.5	100

2.4.2 Monthly Weather Charts

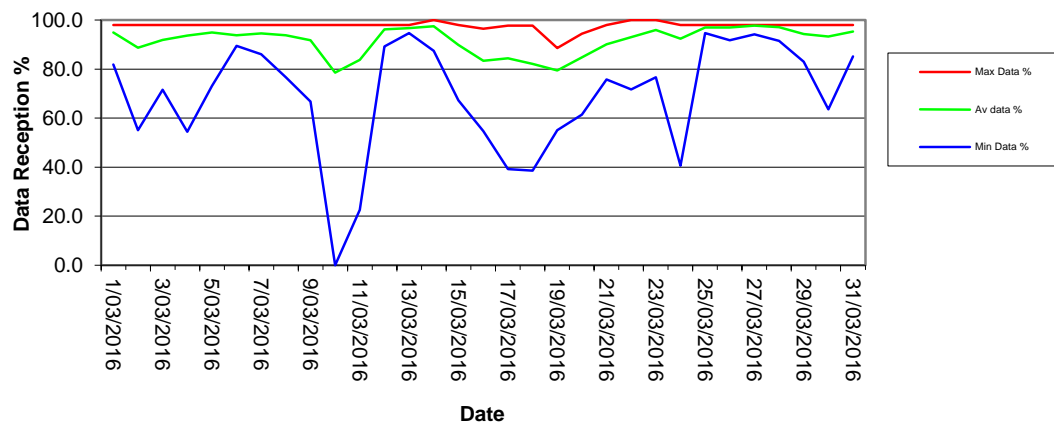




Rocla Calga Quarry - March 2016
Rainfall



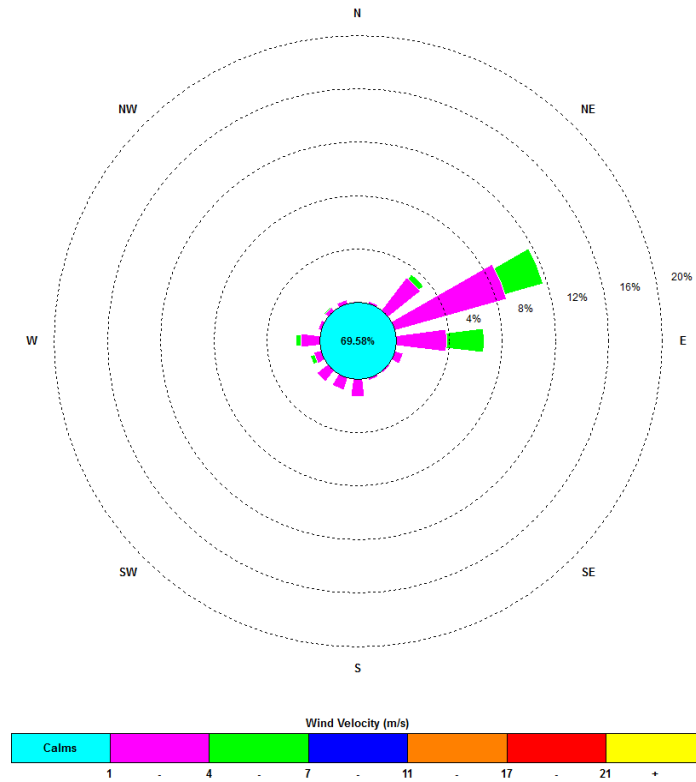
Rocla Calga Quarry - March 2016
Data Reception



2.4.3 Monthly Windrose Plot

Frequency plot of the average wind speed and average direction over each 15 minute sampling period. Wind is considered to be calm when less than a 15 minute average of 1m/s.

00:15, 1 March 2016 – 23:45, 31 March 2016



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

Appendix 1

Laboratory Certificates



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **EN1601280**
Client : **CARBON BASED ENVIRONMENTAL**
Contact : **MR COLIN DAVIES (cbased)**
Address : **47 BOOMERANG ST**
CESSNOCK NSW, AUSTRALIA 2325
Telephone : **+61 49904443**
Project : **Rocla Calga Dusts**
Order number : **---**
C-O-C number : **---**
Sampler : **---**
Site : **---**
Quote number : **---**
No. of samples received : **6**
No. of samples analysed : **6**

Page : **1 of 4**
Laboratory : **Environmental Division Newcastle**
Contact : **---**
Address : **5/585 Maitland Road Mayfield West NSW Australia 2304**
Telephone : **+61 2 4014 2500**
Date Samples Received : **05-Apr-2016 12:02**
Date Analysis Commenced : **05-Apr-2016**
Issue Date : **08-Apr-2016 18:29**



NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

Signatories

Position

Accreditation Category

Dianne Blane

Laboratory Coordinator (2IC)

Newcastle - Inorganics, Mayfield West, NSW



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

∅ = ALS is not NATA accredited for these tests.

- 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: **DEPOSITIONAL DUST**
 (Matrix: **AIR**)

Client sample ID

				CD1 03/03/16 - 04/04/16	CD2c 03/03/16 - 04/04/16	CD3 03/03/16 - 04/04/16	CD4 03/03/16 - 04/04/16	CD5 03/03/16 - 04/04/16
Client sampling date / time				[04-Apr-2016]	[04-Apr-2016]	[04-Apr-2016]	[04-Apr-2016]	[04-Apr-2016]
Compound	CAS Number	LOR	Unit	EN1601280-001	EN1601280-002	EN1601280-003	EN1601280-004	EN1601280-005
				Result	Result	Result	Result	Result
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	1.1	1.0	1.2	0.4	0.3
Ash Content (mg)	----	1	mg	20	18	22	7	6
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.8	0.7	0.8	0.5	0.5
Combustible Matter (mg)	----	1	mg	14	13	15	9	8
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	1.9	1.7	2.0	0.9	0.8
Total Insoluble Matter (mg)	----	1	mg	34	31	37	16	14

Page : 4 of 4
 Work Order : EN1601280
 Client : CARBON BASED ENVIRONMENTAL
 Project : Rocla Calga Dusts



Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST**
 (Matrix: **AIR**)

Client sample ID

				CD6	----	----	----	----
				03/03/16 - 04/04/16	----	----	----	----
				[04-Apr-2016]	----	----	----	----
<i>Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	EN1601280-006	-----	-----	-----	-----
				Result	Result	Result	Result	Result
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	0.4	----	----	----	----
Ash Content (mg)	----	1	mg	8	----	----	----	----
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.6	----	----	----	----
Combustible Matter (mg)	----	1	mg	11	----	----	----	----
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	1.0	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	19	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order	: ES1607246	Page	: 1 of 2
Client	: CARBON BASED ENVIRONMENTAL	Laboratory	: Environmental Division Sydney
Contact	: MS RENAE MIKKA	Contact	:
Address	: 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 49904443	Telephone	: +61-2-8784 8555
Project	: ROCLA QUARRY	Date Samples Received	: 05-Apr-2016 12:01
Order number	: ---	Date Analysis Commenced	: 05-Apr-2016
C-O-C number	: ---	Issue Date	: 08-Apr-2016 15:34
Sampler	: ---		
Site	:		
Quote number	: ---		
No. of samples received	: 3		
No. of samples analysed	: 3		

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW



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
 ø = ALS is not NATA accredited for these tests.

- TDS by method EA-015 may bias high for samples 1 and 2 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				[04-Apr-2016]	[04-Apr-2016]	[04-Apr-2016]	---	---
Compound	CAS Number	LOR	Unit	ES1607246-001	ES1607246-002	ES1607246-003	-----	-----
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	---	0.01	pH Unit	6.15	5.10	4.76	---	---
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	---	1	µS/cm	59	96	74	---	---
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	---	10	mg/L	90	123	58	---	---
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	---	5	mg/L	13	48	6	---	---
EP020: Oil and Grease (O&G)								
Oil & Grease	---	5	mg/L	8	16	<5	---	---

Today's Collection	
Time Start:	845
Time Finish:	1330

Date: 4.4.16

Client : Rocla Calga

Project :

GROUNDWATERS

Site	DEPTH	Odour	Water Turbidity	Water Colour	1		2		Bottles (Apr/Oct)	Downloaded Logger? (Y/N)
					pH	EC	pH	EC		
CQ3	10-57	Y	CST	CLOO B G	6.71	189.05	6.63	155.405	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ4	10-65	N	CST	CLOO B G	4.69	95.305	4.69	93.005	1x 250ml GP, 1x 500mL GP, 1RP	
CQ5	6-65	N	CST	CLOO B G	4-11	124.805	3.95	136.205	1x 250ml GP, 1x 500mL GP, 1RP	
CQ6	REMOVED FROM FIELD		CST	CLOO B G					1x 250ml GP, 1x 500mL GP, 1RP	
CQ7	6-17	N	CST	CLOO B G	4.39	79.705	4.45	79.505	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ8	5-79	N	CST	CLOO B G	4.19	103.405	4.22	103.805	1x 250ml GP, 1x 500mL GP, 1RP	
CQ9	DESTROYED - BENT OVER		CST	CLOO B G					1x 250ml GP, 1x 500mL GP, 1RP	
CQ10	24.78	N	CST	CLOO B G	5-14	122.305	4.95	116.905	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ11S	10-18	N	CST	CLOO B G	4.74	123.105	4.67	118.105	1x 250ml GP, 1x 500mL GP, 1RP	FAILED TO CONNECT
CQ11D	11-34	N	CST	CLOO B G	4.66	128.705	4.66	128.805	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ12	4-13	N	CST	CLOO B G	4.81	93.705	4.80	94.605	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ13	12-99	N	CST	CLOO B G	4.20	159.405	4.20	161.105	1x 250ml GP, 1x 500mL GP, 1RP	
CP3	PUMP SHED REMOVED		CST	CLOO B G					1x 250ml GP, 1x 500mL GP, 1RP	
CP4	9.02		CST	CLOO B G					1x 250ml GP, 1x 500mL GP, 1RP	
CP5	7.24	N	CST	CLOO B G	4.21	160.2	4.16	164.05	1x 250ml GP, 1x 500mL GP, 1RP	
CP6	9.29	N	CST	CLOO B G	4.25	138.2	4.21	139.505	1x 250ml GP, 1x 500mL GP, 1RP	
CP7	2.55	N	CST	CLOO B G	5-14	89.005	5.09	88.05	1x 250ml GP, 1x 500mL GP, 1RP	
CP8	20.29	N	CST	CLOO B G	4.24	107.805	4.30	125.205	1x 250ml GP, 1x 500mL GP, 1RP	
MW7	15.39	N	CST	CLOO B G	4.35	95.505	4.38	87.905	1x 250ml GP, 1x 500mL GP, 1RP	Y 147805
MW8	7.22	N	CST	CLOO B G	4.44	62.305	4.41	61.105	1x 250ml GP, 1x 500mL GP, 1RP	UNABLE TO CONNECT
MW9	23.63	N	CST	CLOO B G	4.43	72.905	4.44	70.905	1x 250ml GP, 1x 500mL GP, 1RP	N - AUTS TEST UNABLE TO CONNECT
MW10			CST	CLOO B G	NO ACCESS				1x 250ml GP, 1x 500mL GP, 1RP	
MW13			CST	CLOO B G	PATHS BLOCKED BY TREES				1x 250ml GP, 1x 500mL GP, 1RP	
MW16			CST	CLOO B G	WASHED OUT				1x 250ml GP, 1x 500mL GP, 1RP	
MW17			CST	CLOO B G					1x 250ml GP, 1x 500mL 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 #: 4

Signed: 

Sampled by: A Smith

W. Young