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

May 2015

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 1 July 2015

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 May 2015;
- Surface Water quality results for May 2015;
- Bi monthly groundwater depth and quality results for May 2015; and
- Meteorological report for May 2015.

The May 2015 dust deposition results for insoluble solids were generally low and free of major contamination this month. 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 on 1 June 2015 at sites A, B D and F. Site C was inaccessible and was unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the slightly acidic to neutral range, low Electrical Conductivity, low Total Dissolved Solids and low Total Suspended Solids. Oil and Grease was not detected at any site in May 2015.

Bi-monthly groundwaters were sampled on 1 June 2015 and are next scheduled for August 2015. Groundwater depth generally decreased across the sampled groundwater bores when compared to March. The exception was groundwater MW9 which slightly increased in depth. Groundwater pH was varied and EC levels decreased across the majority of bores when compared to previous monitoring.

Data for May 2015 shows that rainfall recorded at the Rocla Calga Quarry was lower than the Gosford BOM however higher the Peats Ridge long term, mean rainfall for May 2015.The rainfall comparison is provided below:

Rocla Calga Quarry	119.0 mm
BOM Peats Ridge*	NA
BOM Gosford*	180.8 mm
BOM Peats Ridge Long term mean for May*	89.7 mm

*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au). No data was available from the BOM Peats Ridge station for May 2015

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.

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 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. 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 May 2015 and the project 12 month rolling average. Results are in g/m^2.month.

Table 1: Dust Deposition results: 2 May 2015 – 1 June 2015 (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	1.2	0.6	0.6	50	1.3
CD2c	1.5	0.7	0.8	47	1.6
CD3	1.0	0.5	0.5	50	1.4
CD4	0.7	0.3	0.4	43	0.9
CD5	0.5	0.2	0.3	40	0.6
CD6	0.9	0.3	0.6	33	0.8

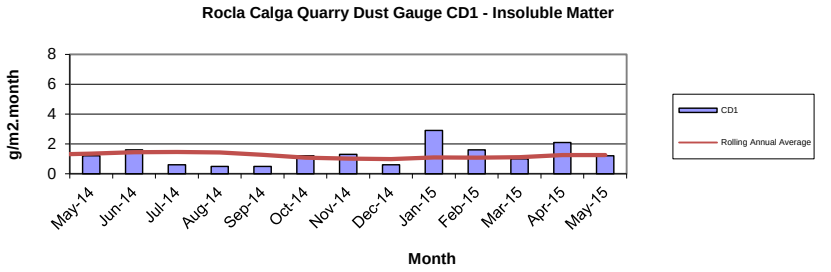
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m^2.month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from May 2014 to April 2015.

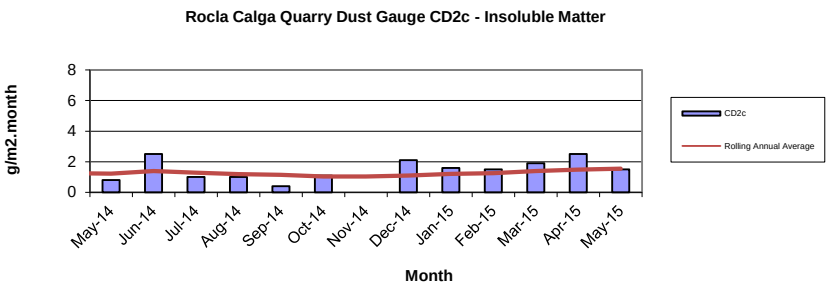
NA= Not Available.

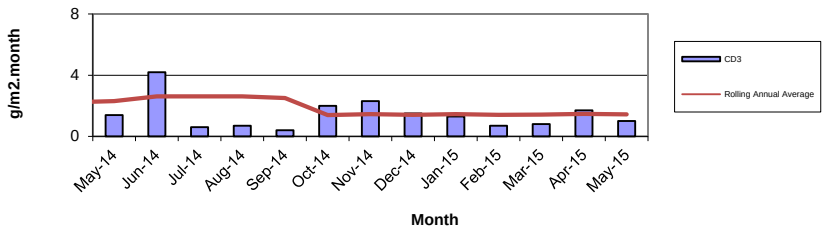
CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air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

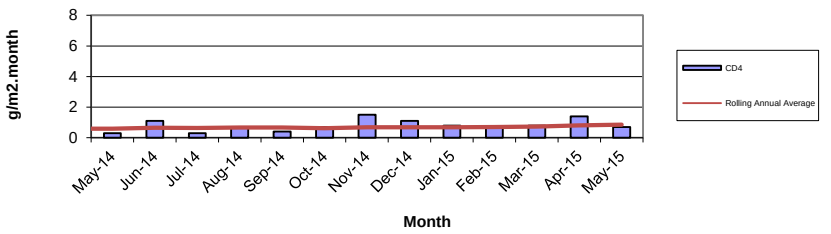
Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The laboratory analysis is provided in **Appendix 1.**

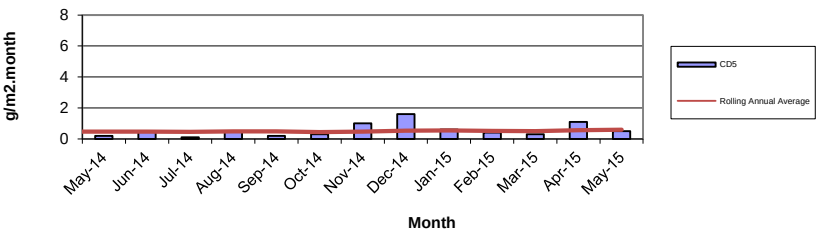
Figure 2: Dust Deposition Charts

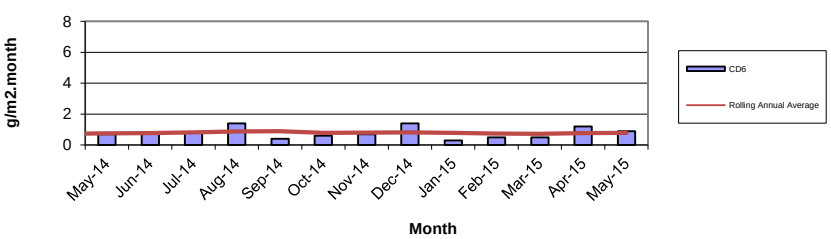












2.2 Surface Water Monitoring

Monthly surface water monitoring was conducted on the 1 June 2015 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1.**

Table 2: Monthly surface water monitoring – May 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	Dam	Clear	Clear	5.22	54	43	10	<5
B	Trickle	Clear	Clear	6.34	78	58	5	<5
C	No access							
D	Trickle	Clear	Clear	5.27	82	48	12	<5
F	Dam	Clear	Clear	5.22	52	41	13	<5

Samples were collected at sites A, B, D and F. Site C was inaccessible and was 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 not detected at any site in May 2015.

2.2.1 Non-Routine Surface Water Sampling

No non routine sampling was undertaken during May 2015.

2.3 Groundwater Monitoring

Bi- monthly groundwaters were sampled on 1 June 2015. 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 decreased compared to March, indicating water moving towards the surface. The exception was groundwater MW9 which slightly increased in depth.

pH at all sites is in the acidic to neutral range and generally varied when compared to the previous results. EC levels decreased at most sites when compared to the results obtained in March.

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	10.19	7.1	186
CQ4	Voutos	* Monitor	8.78	9.86	4.6	128
CQ5	Gazzana	DIP Only	8.69	5.55	3.7	162
CQ6	Gazzana	DIP Only	16.00	9.36	3.9	147
CQ7	Gazzana	* Monitor	6.89	5.70	4.4	119
CQ8	Gazzana	* Monitor	11.03	5.18	4.2	142
CQ9	Gazzana	DIP Only	10.10	8.46	4.6	118
CQ10	Voutos	* Monitor	NI	24.92	4.3	179
CQ11S	Gazzana	* Monitor	NI	9.89	4.5	163
CQ11D	Gazzana	* Monitor	NI	10.97	4.7	178
CQ12	Gazzana	* Monitor	NI	3.53	3.9	143
CQ13	Kashouli	* Monitor	NI	11.81	4.0	222
CP3	Gazzana	Domestic	10.40	8.36	4.6	150
CP4	Kashouli	Domestic	13.63	3.68	NM	
CP5	Kashouli	Domestic	16.61	5.23	4.1	151
CP6	Kashouli	Domestic	16.27	7.65	4.0	190
CP7	Kashouli	Production	8.56	1.24	4.5	125
CP8	Rozmanec	Domestic	22.17	19.73	4.1	149
MW7	Rocla Bore	* Monitor	15.76	14.68	4.5	120
MW8	Rocla Bore	* Monitor	9.82	6.37	4.6	89
MW9	Rocla Bore	* Monitor	22.44	23.57	4.4	95
MW10	Rocla Bore	* Monitor	15.41	No Access		
MW13	Rocla Bore	DIP Only	NI	7.44	5.1	109
MW16	Rocla Bore	DIP Only	NI	No Access		
MW17	Rocla Bore	DIP Only		No Access		

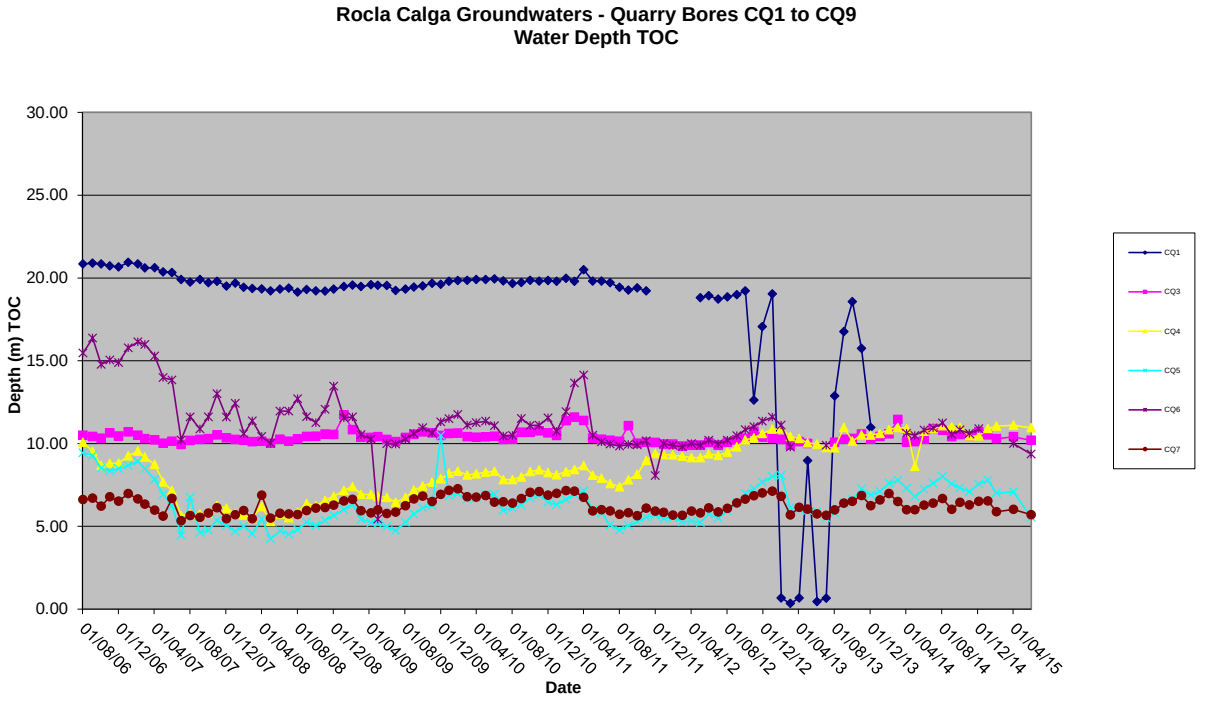
Notes:
TOC = Water level measured from top of bore case to water.
NM = Not Monitored – unable to sample water due to non-operational pump.
NR = Not Required by resident.
* = Logger Installed.
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements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

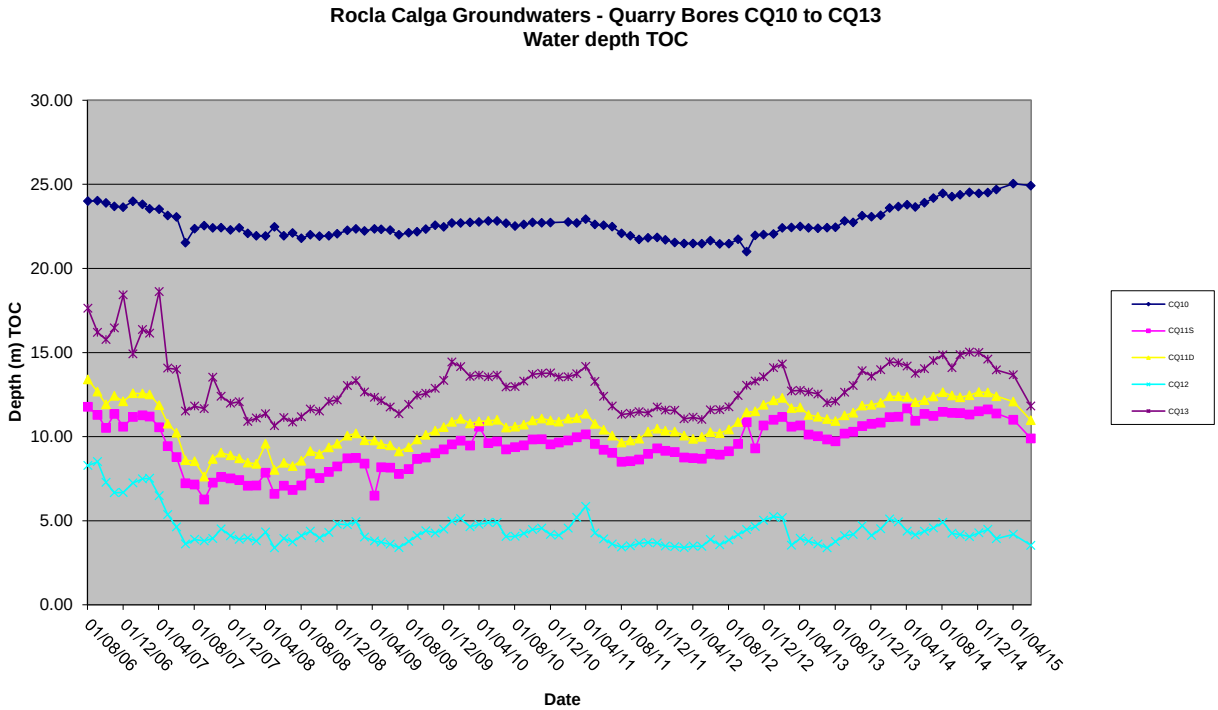
Shading is used to indicate the following trends in water depth (compared to the last reading):

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

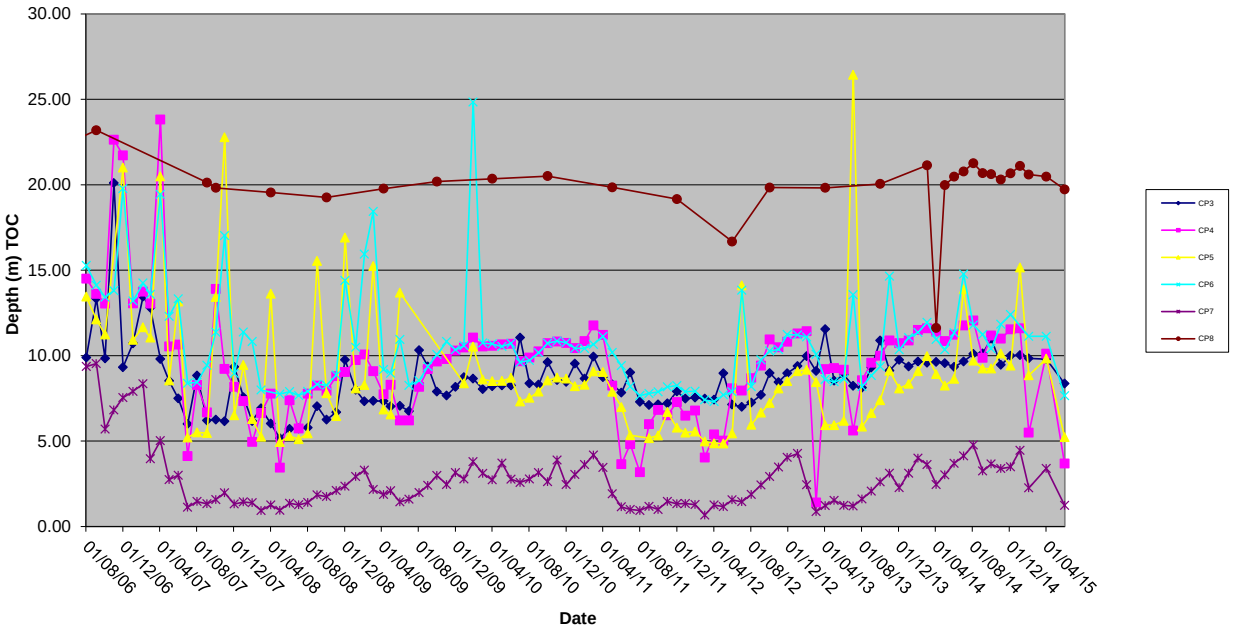
Available groundwater loggers were downloaded and will be forwarded to the Rocla Calga Quarry groundwater consultant.

Figures 3 to 6: Groundwater Depth Charts.

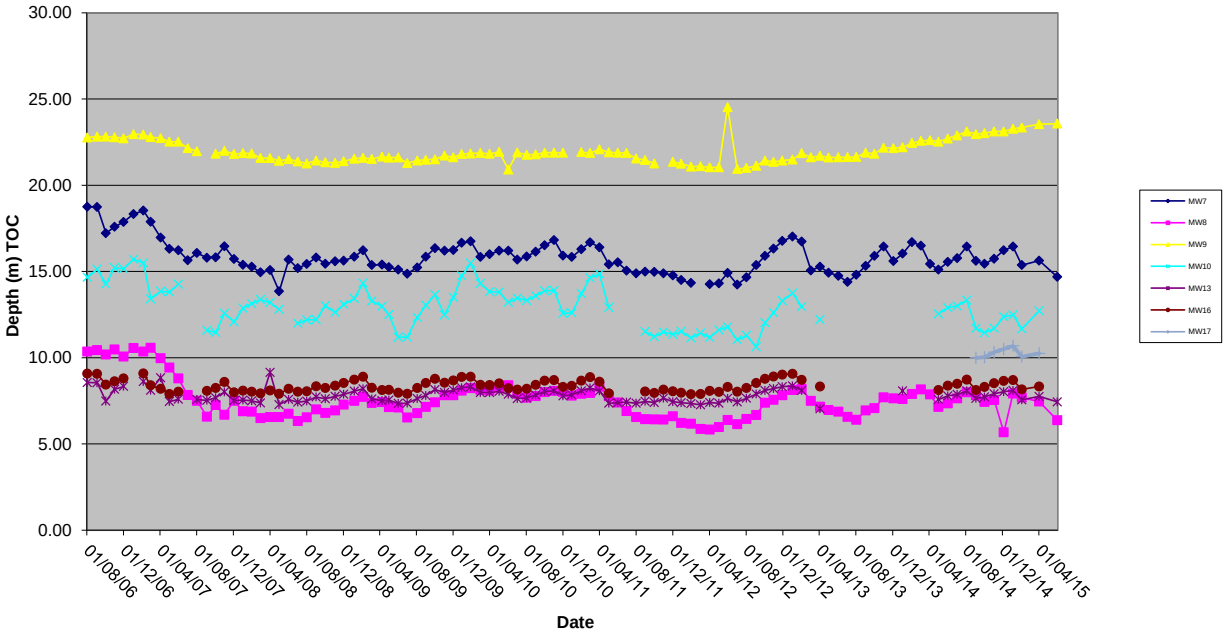




Rocla Calga Groundwaters - Quarry Bores CP3 to CP8
Water Depth TOC



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



2.4 Meteorological Monitoring

The Rocla Calga Quarry weather station data recovery in May 2015 was approximately 13% as no data was recorded after the relocation of the weather station. From the 5 May 2015 minimum and maximum temperature, rain and maximum wind data was substituted with data from the Gosford BOM.

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 May 2015 shows that rainfall recorded at the Rocla Calga Quarry was lower than the Gosford BOM however higher the Peats Ridge long term, mean rainfall for May 2015.

The rainfall comparison is provided below:

Rocla Calga Quarry	119.0 mm
BOM Peats Ridge*	NA
BOM Gosford*	180.8 mm
BOM Peats Ridge Long term mean for May*	89.7 mm

NA = Not Available
*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au).

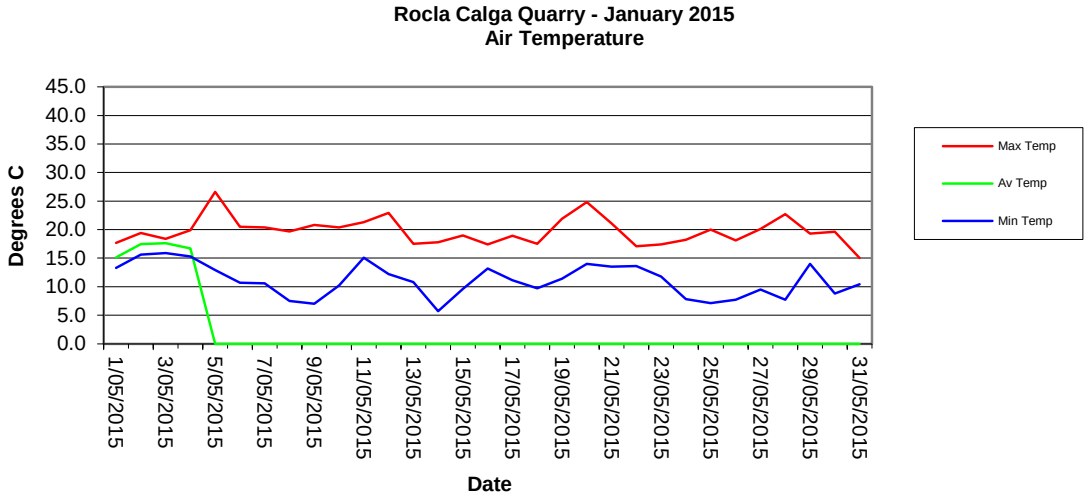
Results are displayed in the following table and figures

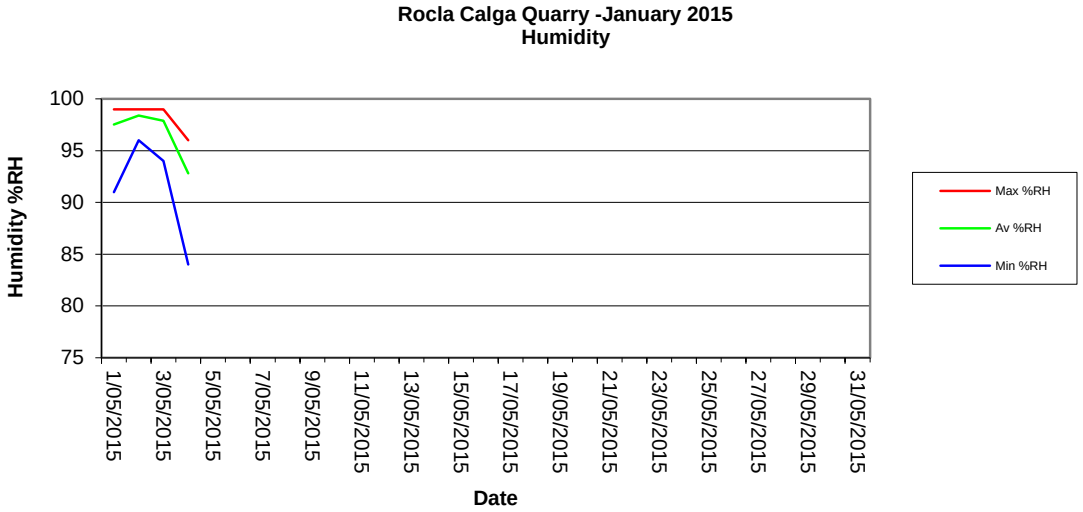
2.4.1 Monthly Meteorological Data Summary

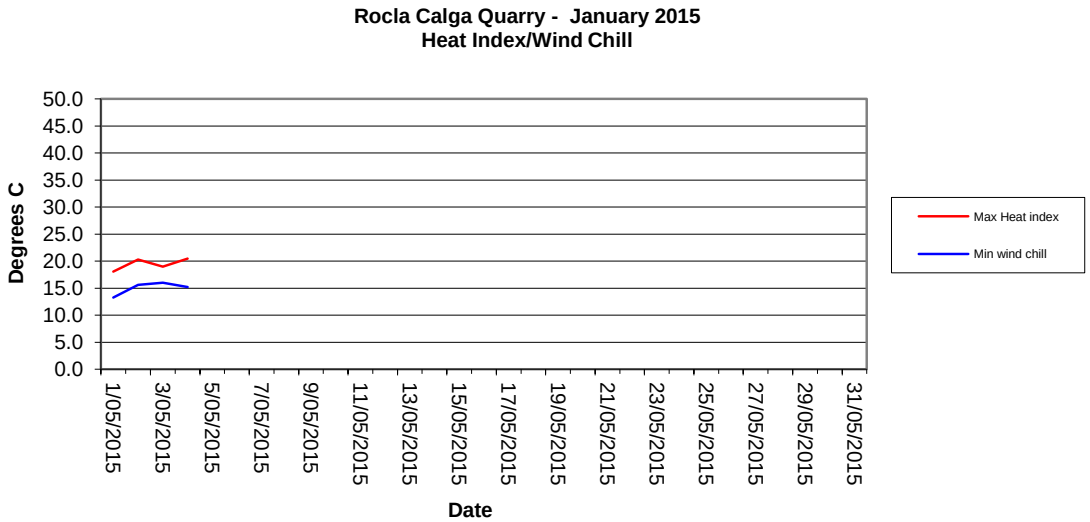
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/05/2015	13.3	15.1	17.7	91	98	99	20.5	0.7	0	1.1	6.7	13.3	18.1	1020.5	1024.3	1027.3	0	48.8	367	97.1	99.4	100
2/05/2015	15.6	17.5	19.4	96	98	99	13.4	0.5	0	1.0	7.2	15.6	20.3	1013.2	1016.5	1020.4	0	35.3	181	94.5	99.7	100
3/05/2015	15.9	17.6	18.4	94	98	99	13.3	0.3	0.4	1.6	7.2	16.0	19.0	1011.4	1012.7	1014.5	0	18.6	93	92.6	99.1	100
4/05/2015	15.3	16.7	19.9	84	93	96	6.8	0.4	0	1.1	7.2	15.2	20.5	1011.6	1013.4	1015.1	0	64.7	187	0	60.0	100
5/05/2015	12.9	-	26.6				0.4				10.3											
6/05/2015	10.7	-	20.5				0.0				8.6											
7/05/2015	10.6	-	20.4				0.0				11.4											
8/05/2015	7.5	-	19.7				0.0				7.2											
9/05/2015	7.0	-	20.8				0.0				6.7											
10/05/2015	10.2	-	20.4				0.0				16.4											
11/05/2015	15.1	-	21.3				0.0				19.2											
12/05/2015	12.2	-	22.9				0.0				11.4											
13/05/2015	10.8	-	17.5				0.0				13.3											
14/05/2015	5.7	-	17.8				0.4				8.6											
15/05/2015	9.6	-	19.0				0.0				9.7											
16/05/2015	13.2	-	17.4				8.2				7.8											
17/05/2015	11.1	-	18.9				3.6				5.6											
18/05/2015	9.7	-	17.5				0.4				3.1											
19/05/2015	11.4	-	21.9				0.0				4.2											
20/05/2015	14.0	-	24.8				0.4				8.6											
21/05/2015	13.5	-	21.1				1.4				7.2											
22/05/2015	13.6	-	17.1				2.8				16.4											
23/05/2015	11.8	-	17.4				47.2				7.8											
24/05/2015	7.8	-	18.2				0.2				5.3											
25/05/2015	7.1	-	20.0				0.0				4.2											
26/05/2015	7.7	-	18.1				0.0				4.2											
27/05/2015	9.5	-	20.1				0.0				4.2											
28/05/2015	7.7	-	22.7				0.0				4.7											
29/05/2015	14.0	-	19.3				0.0				4.7											
30/05/2015	8.8	-	19.6				0.0				5.3											
31/05/2015	10.4	-	15.0				0.6				6.7											
Monthly	5.7	16.7	26.6	84	97	99	119.6	1.9	0	1.2	19.2	13.3	20.5	1011.4	1016.7	1027.3	0	41.8	367	0	89.6	100

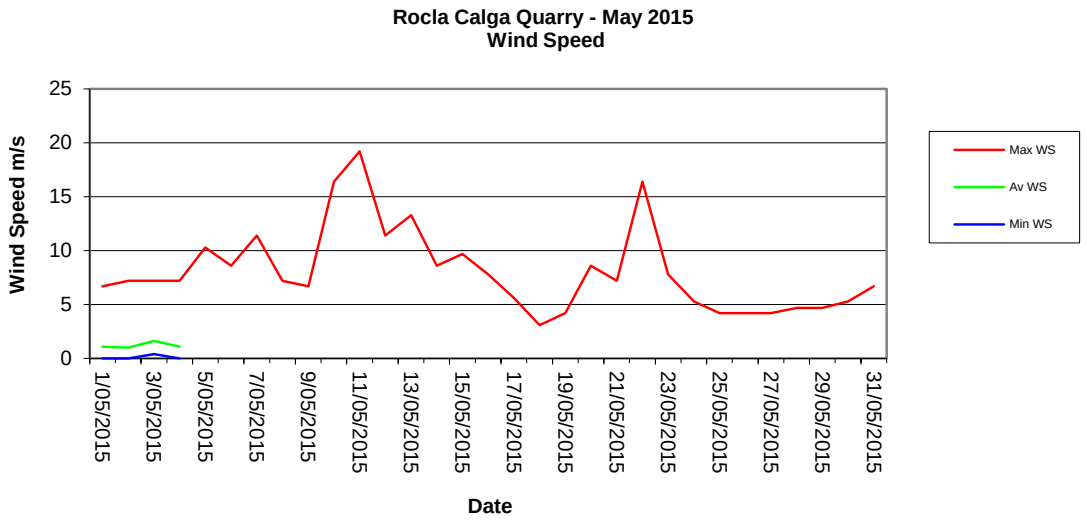
Data unavailable due to the relocation of the weather station. Where available weather data was subsituted with data from the Gosford BOM from the 5 May 2015.

2.4.2 Monthly Weather Charts








Rocla Calga Quarry - May 2015
Wind Speed
Wind Speed m/s
25
20
15
10
5
0
1/05/2015
3/05/2015
5/05/2015
7/05/2015
9/05/2015
11/05/2015
13/05/2015
15/05/2015
17/05/2015
19/05/2015
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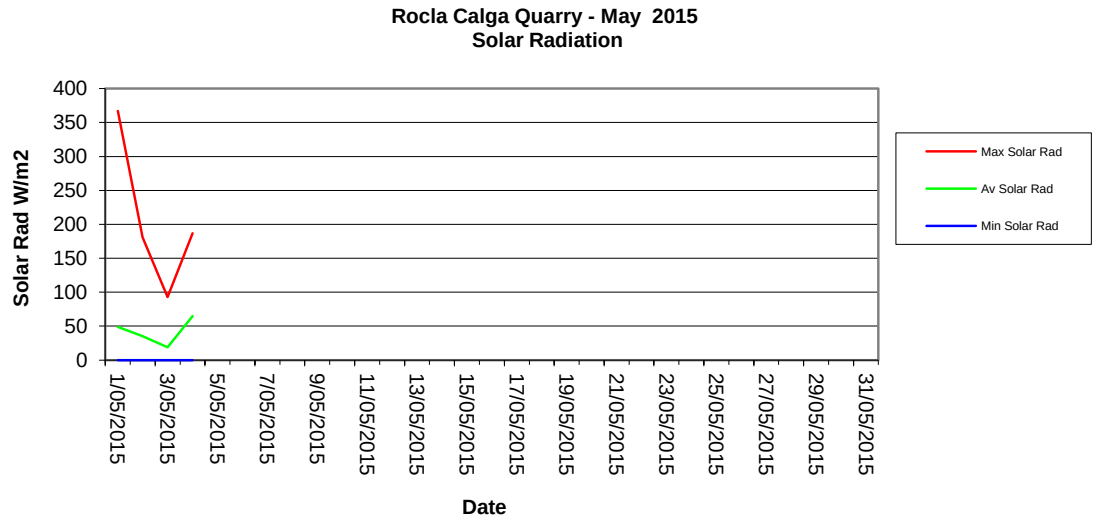
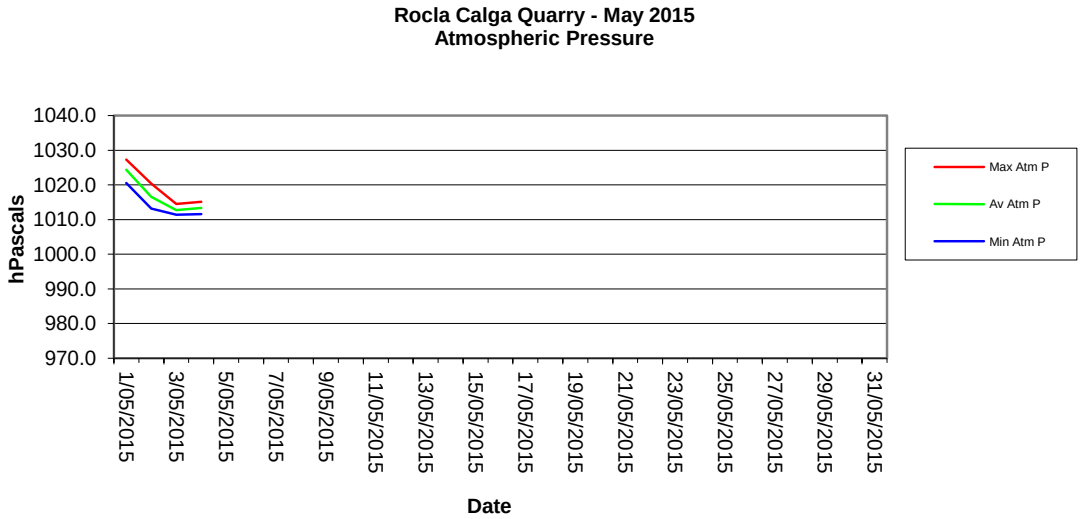
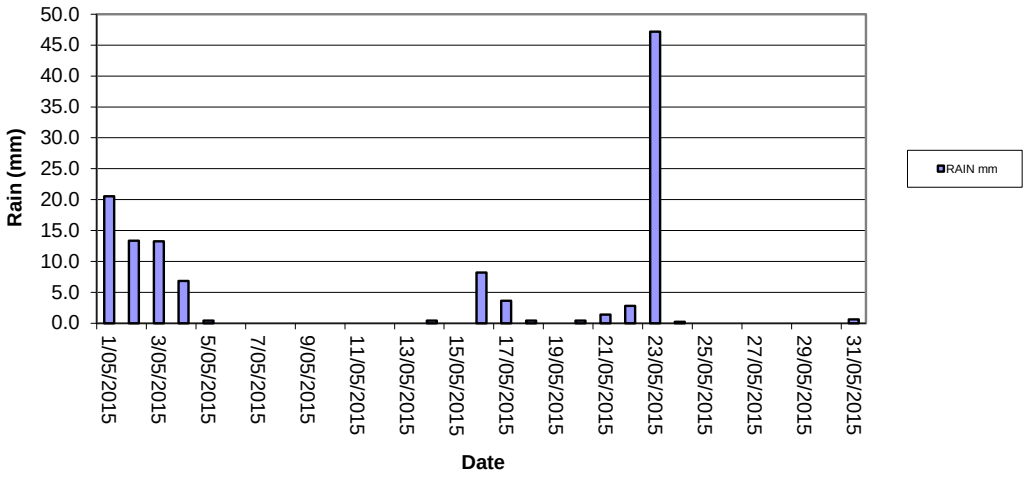
29/05/2015
31/05/2015
Date
Max WS
Av WS
Min WS

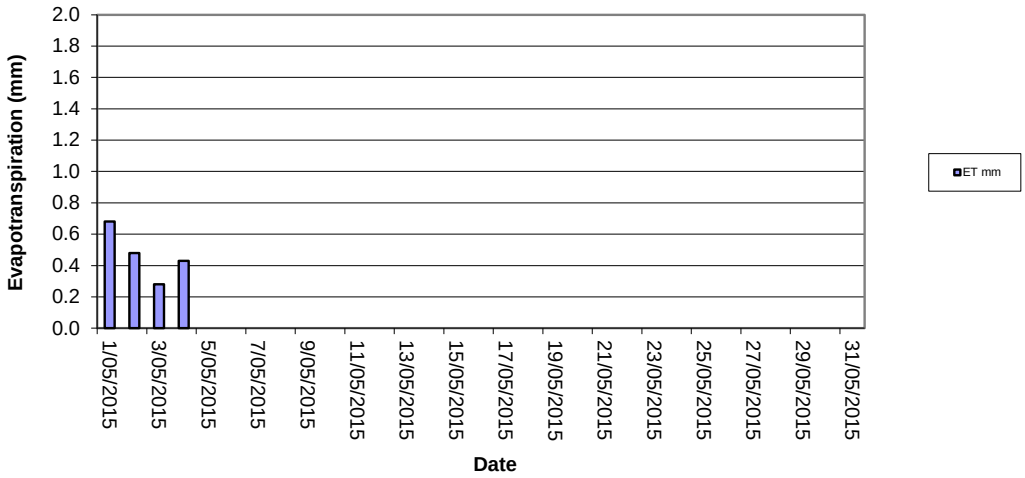

Rocla Calga Quarry - May 2015
Solar Radiation
Solar Rad W/m2
400
350
300
250
200
150
100
50
0
1/05/2015
3/05/2015
5/05/2015
7/05/2015
9/05/2015
11/05/2015
13/05/2015
15/05/2015
17/05/2015
19/05/2015
21/05/2015
23/05/2015
25/05/2015
27/05/2015
29/05/2015
31/05/2015
Date
Max Solar Rad
Av Solar Rad
Min Solar Rad


Rocla Calga Quarry - May 2015
Atmospheric Pressure
hPascals
1040.0
1030.0
1020.0
1010.0
1000.0
990.0
980.0
970.0
1/05/2015
3/05/2015
5/05/2015
7/05/2015
9/05/2015
11/05/2015
13/05/2015
15/05/2015
17/05/2015
19/05/2015
21/05/2015
23/05/2015
25/05/2015
27/05/2015
29/05/2015
31/05/2015
Date
Max Atm P
Av Atm P
Min Atm P

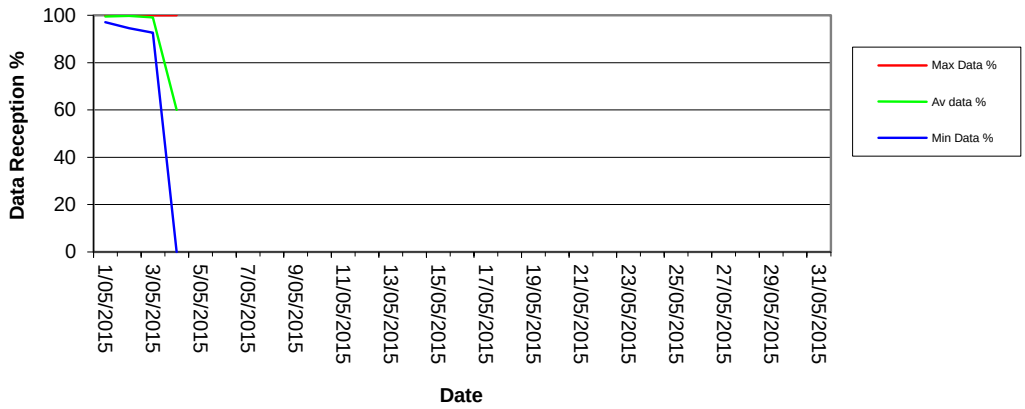
Rocla Calga Quarry - May 2015
Rainfall



Rocla Calga Quarry - May 2015
Evapotranspiration



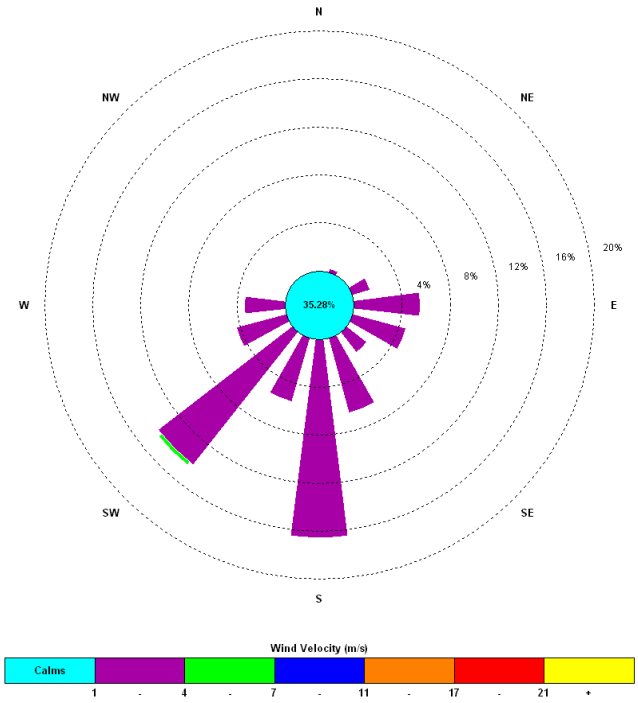
Rocla Calga Quarry - May 2015
Data Reception



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 May 2015 – 13:00, 4 May 2015



The predominant winds were from the S-SW, with most frequent, strongest winds from the SW. The maximum wind speed was 19.2 m/s from the WNW.

Please note: Wind data used for the wind rose is based on an incomplete set of data as data was unavailable from the 5 May 2015.

Appendix 1

Laboratory Certificates

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1511847**	Page	: 1 of 4
Client	: **CARBON BASED ENVIRONMENTAL**	Laboratory	: Environmental Division Newcastle
Contact	: MR COLIN DAVIES (cbased)	Contact	: Peter Keyte
Address	: 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: cbased@bigpond.com	E-mail	: peter.keyte@alsglobal.com
Telephone	: +61 49904443	Telephone	: +61 2 4014 2500
Facsimile	: +61 02 49904442	Facsimile	: +61 2 4967 7382
Project	: Rocla Calga Dusts	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 01-Jun-2015 13:38
C-O-C number	: ----	Date Analysis Commenced	: 01-Jun-2015
Sampler	: ----	Issue Date	: 05-Jun-2015 16:32
Site	: ----		
		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.

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*
Barbara Coupland	Quality Officer	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.

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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
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ø = 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**)

Compound	CAS Number	LOR	Unit	Client sample ID	CD1 01/05/15 - 01/06/15	CD2c 01/05/15 - 01/06/15	CD3 01/05/15 - 01/06/15	CD4 01/05/15 - 01/06/15	CD5 01/05/15 - 01/06/15
				Client sampling date / time	[01-Jun-2015]	[01-Jun-2015]	[01-Jun-2015]	[01-Jun-2015]	[01-Jun-2015]
					EN1511847-001	EN1511847-002	EN1511847-003	EN1511847-004	EN1511847-005
					Result	Result	Result	Result	Result
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		**0.6**	**0.7**	**0.5**	**0.3**	**0.2**
Ash Content (mg)	----	1	mg		**11**	**13**	**10**	**5**	**4**
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		**0.6**	**0.8**	**0.5**	**0.4**	**0.3**
Combustible Matter (mg)	----	1	mg		**11**	**14**	**8**	**8**	**6**
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		**1.2**	**1.5**	**1.0**	**0.7**	**0.5**
Total Insoluble Matter (mg)	----	1	mg		**22**	**27**	**18**	**13**	**10**

Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST** (Matrix: **AIR**)				Client sample ID	**CD6 01/05/15 - 01/06/15**	----	----	----	----
				Client sampling date / time	[01-Jun-2015]	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EN1511847-006**	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		**0.3**	----	----	----	----
Ash Content (mg)	----	1	mg		**6**	----	----	----	----
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		**0.6**	----	----	----	----
Combustible Matter (mg)	----	1	mg		**11**	----	----	----	----
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		**0.9**	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg		**17**	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1523044**	Page	: 1 of 2
Client	: **CARBON BASED ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: MR COLIN DAVIES (cbased)	Contact	:
Address	: 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: cbased@bigpond.com	E-mail	:
Telephone	: +61 49904443	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 49904442	Facsimile	: +61-2-8784 8500
Project	: ROCLA QUARRY	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 01-Jun-2015 13:38
C-O-C number	: ----	Date Analysis Commenced	: 01-Jun-2015
Sampler	: CBASED 1 UNKNOWN	Issue Date	: 05-Jun-2015 14:47
Site	: ----		
		No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 4

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WORLD RECOGNISED ACCREDITATION

Signatories

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Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	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.

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- EA005: conducted by ALS Water Chemistry, NATA accreditation no. 825, site no 3619.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**A**	**B**	**D**	**F**	**----**
			Client sampling date / time	[01-Jun-2015]	[01-Jun-2015]	[01-Jun-2015]	[01-Jun-2015]	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1523044-001**	**ES1523044-002**	**ES1523044-003**	**ES1523044-004**	**--------**
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	**5.22**	**6.34**	**5.27**	**5.22**	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**54**	**78**	**82**	**52**	----
EA015: Total Dissolved Solids								
^ **Total Dissolved Solids @180°C**	----	10	mg/L	**43**	**58**	**48**	**41**	----
EA025: Suspended Solids								
^ **Suspended Solids (SS)**	----	5	mg/L	**10**	**5**	**12**	**13**	----
EP020: Oil and Grease (O&G)								
^ **Oil & Grease**	----	5	mg/L	<5	<5	<5	<5	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1523045**	Page	: 1 of 2
Client	: **CARBON BASED ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: MR COLIN DAVIES (cbased)	Contact	:
Address	: 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: cbased@bigpond.com	E-mail	:
Telephone	: +61 49904443	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 49904442	Facsimile	: +61-2-8784 8500
Project	: ROCLA QUARRY	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 01-Jun-2015 13:38
C-O-C number	: ----	Date Analysis Commenced	: 01-Jun-2015
Sampler	: CBASED 1 UNKNOWN	Issue Date	: 05-Jun-2015 14:47
Site	: ----		
		No. of samples received	: 1
Quote number	: ----	No. of samples analysed	: 1

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Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics

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- EA005: conducted by ALS Water Chemistry, NATA accreditation no. 825, site no 3619.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**CABBAGE TREE CREEK**	----	----	----	----
			Client sampling date / time	[01-Jun-2015]	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1523045-001**	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	**6.19**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**52**	----	----	----	----
EA015: Total Dissolved Solids								
^ **Total Dissolved Solids @180°C**	----	10	mg/L	**40**	----	----	----	----
EA025: Suspended Solids								
^ **Suspended Solids (SS)**	----	5	mg/L	<5	----	----	----	----
EP020: Oil and Grease (O&G)								
^ **Oil & Grease**	----	5	mg/L	<5	----	----	----	----

Carbon Based Environmental Pty Limited

Todays Collection	
Time Start:	9-00
Time Finish:	12-35

Date: 1-6-15

Client : Rocla Calga

Project :

GROUNDWATERS

Site	DEPTH	Odour	Water Turbidity	Water Colour	1 pH	1 EC	2 pH	2 EC	Bottles (Apr/Oct)	Downloaded Logger? (Y/N)
CQ3	10.19	Yes	(C) S T	(C) LO O B G	7.22	206.1 us	7.14	185.9us	1x 250ml GP, 1x 500mL GP, 1RP	Yes
CQ4	9.86	N	(C) S T	(C) LO O B G	4.60	128.5 uS	4.63	127.8 uS.	1x 250ml GP, 1x 500mL GP, 1RP	No
CQ5	5.55	N	(C) S T	(C) LO O B G	3.66	160.4uS.	3.67	161.8 uS.	1x 250ml GP, 1x 500mL GP, 1RP	
CQ6	9.36	N	(C) S T	(C) LO O B G	3.91	148.4.uS	3.86	147.1 uS	1x 250ml GP, 1x 500mL GP, 1RP	
CQ7	5.70	N	(C) S T	(C) LO O B G	4.41	118.5us	4.38	119.3us	1x 250ml GP, 1x 500mL GP, 1RP	No logger
CQ8	5.18	N	C S T	(C) LO O B G	4.16	143.3 uS	4.15	142.4 uS.	1x 250ml GP, 1x 500mL GP, 1RP	No LOGGER
CQ9	8.46	N	C S T	(C) LO O B G	4.62	119.9 uS	4.60	118.1 uS	1x 250ml GP, 1x 500mL GP, 1RP	
CQ10	24.92	Y	(C) S T	(C) LO O B G	4.47	176.1 uS	4.32	178.8 uS	1x 250ml GP, 1x 500mL GP, 1RP	No Logger.
CQ11S	9.89	N	(C) S T	(C) LO O B G	4.54	161.9 uS	4.53	163.0 uS.	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ11D	10.97	Y	C S T	(C) LO O B G	4.70	178.0 uS	4.71	178.1 uS	1x 250ml GP, 1x 500mL GP, 1RP	No Logger.
CQ12	3.53	N	(C) S T	(C) LO O B G	3.98	141.9uS	3.92	143.1 uS	1x 250ml GP, 1x 500mL GP, 1RP	Yes
CQ13	11.81	N	(C) S T	(C) LO O B G	4.06	221.3uS	4.04	221.6uS	1x 250ml GP, 1x 500mL GP, 1RP	No logger
CP3	8.36	N	(C) S T	(C) LO O B G	4.63	149.7uS	4.61	149.8uS	1x 250ml GP, 1x 500mL GP, 1RP	
CP4	3.68		C S T	C LO O B G					1x 250ml GP, 1x 500mL GP, 1RP	
CP5	5.23	N	(C) S T	(C) LO O B G	4.11	150.8uS	4.07	151.0uS	1x 250ml GP, 1x 500mL GP, 1RP	
CP6	7.65	N	(C) S T	(C) LO O B G	4.03	192.7uS	3.96	190.1uS.	1x 250ml GP, 1x 500mL GP, 1RP	
CP7	1.24	N	(C) S T	(C) LO O B G	4.45	124.9uS	4.47	124.7uS	1x 250ml GP, 1x 500mL GP, 1RP	
CP8	19.73	No	(C) S T	(C) LO O B G	4.09	148.6uS	4.06	149.1uS	1x 250ml GP, 1x 500mL GP, 1RP	
MW7	14.68	N	(C) S T	(C) LO O B G	4.48	116.8uS	4.45	120.3uS	1x 250ml GP, 1x 500mL GP, 1RP	No
MW8	6.37	N	(C) S T	(C) LO O B G	4.60	90.1uS	4.59	89.3uS	1x 250ml GP, 1x 500mL GP, 1RP	No
MW9	23.57	N	(C) S T	(C) LO O B G	4.37	92.2 uS	4.40	94.5uS	1x 250ml GP, 1x 500mL GP, 1RP	No
MW10			C S T	C LO O B G					1x 250ml GP, 1x 500mL GP, 1RP	No Access — TRACK UNSAFE
MW13	7.44	N	C (S) T	(C) LO O B G	5.12	110.3uS	5.07	109.3 uS	1x 250ml GP, 1x 500mL GP, 1RP	
MW16			C S T	C LO O B G					1x 250ml GP, 1x 500mL GP, 1RP	No Access — TRACK UNSAFE
MW17			C S T	C LO O 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: Leesa & Hamish

STAND PIPE BROKEN OFF. NEW MEASURE 0.96 BELOW PREVIOUS READINGS

PLANTS. PLANTS.

Pump Broke

NO TRACK LOOSE PLANTS.

-TREES ACROSS TRACK