



Carbon Based Environmental Pty Limited

ABN 74 102 920 285



Calga Quarry

Environmental Monitoring

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

June 2016

A handwritten signature in black ink, appearing to read 'Colin Davies', with a horizontal line underneath.

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 12 July 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 June 2016;
- Surface Water quality results for June 2016;
- Ground Water quality results for June 2016; and
- Meteorological report for June 2016.

The June 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 1 July 2016 at sites A, B, D and F. Site C was inaccessible and unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the 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 June 2016.

Bi-monthly groundwater monitoring is next scheduled for July 2016.

Data for June 2016 shows that rainfall recorded at the Calga Quarry was lower than the Gosford BOM mean rainfall however significantly higher than the Peats Ridge long term rainfall for June.

The rainfall comparison is provided below:

Calga Quarry	160.2 mm
BOM Peats Ridge*	NA
BOM Gosford*	299.2 mm
BOM Peats Ridge Long term mean for June*	99.5 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. Meteorological 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**.

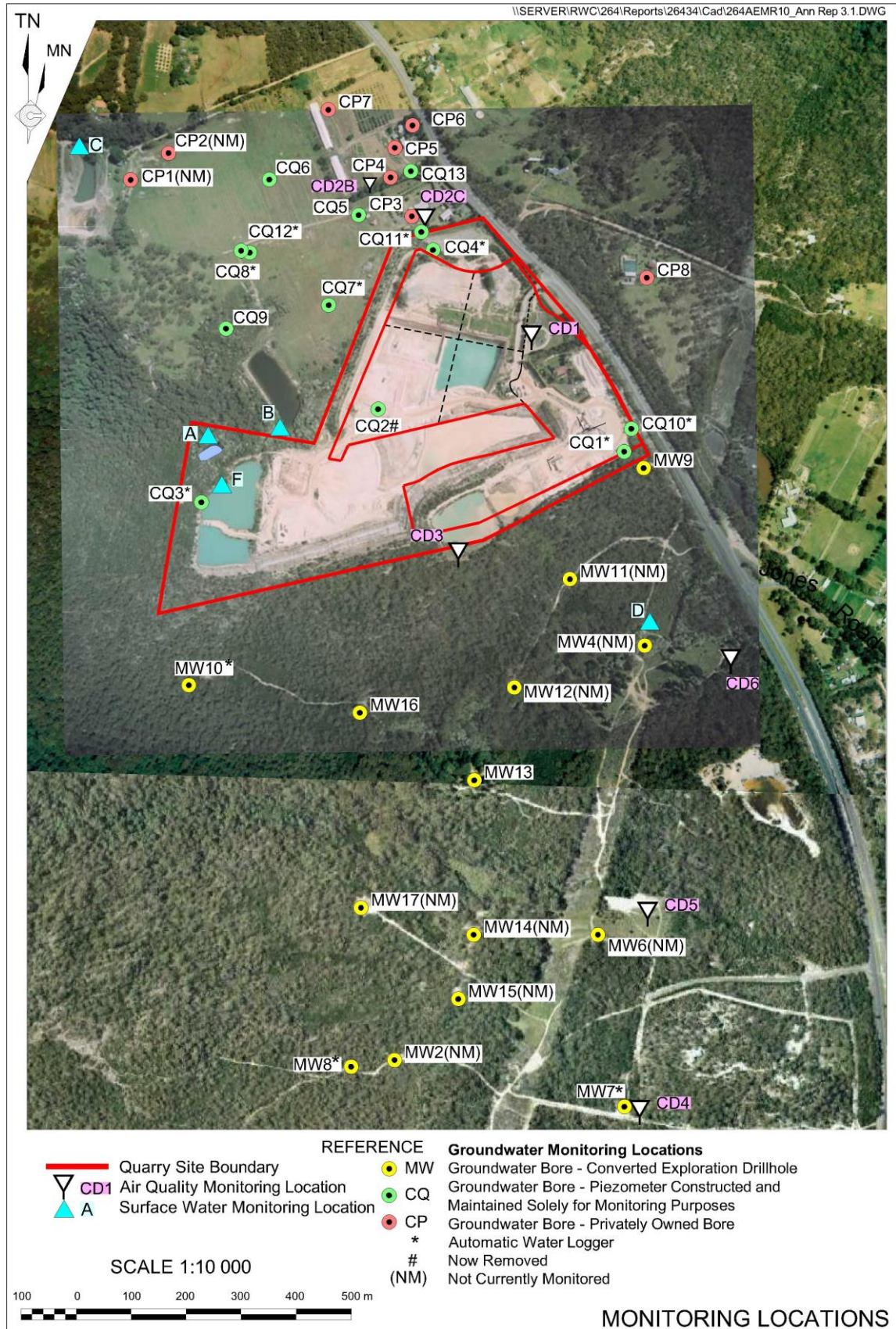


Figure 1: Hanson Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

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

Table 1: Dust Deposition results: 3 June 2016 – 1 July 2016 (28 days)

Site	Monthly Insoluble Solids g/m ² .month	Monthly Ash Residue g/m ² .month	Monthly Combustible Matter g/m ² .month	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids g/m ² .month
CD1	0.7	0.5	0.2	71	1.0
CD2c	0.5	0.1	0.4	20	0.9
CD3	0.6	0.5	0.1	83	0.9
CD4	0.3	0.1	0.2	33	0.6
CD5	0.2	0.1	0.1	50	0.5
CD6	0.7	0.4	0.3	57	0.8

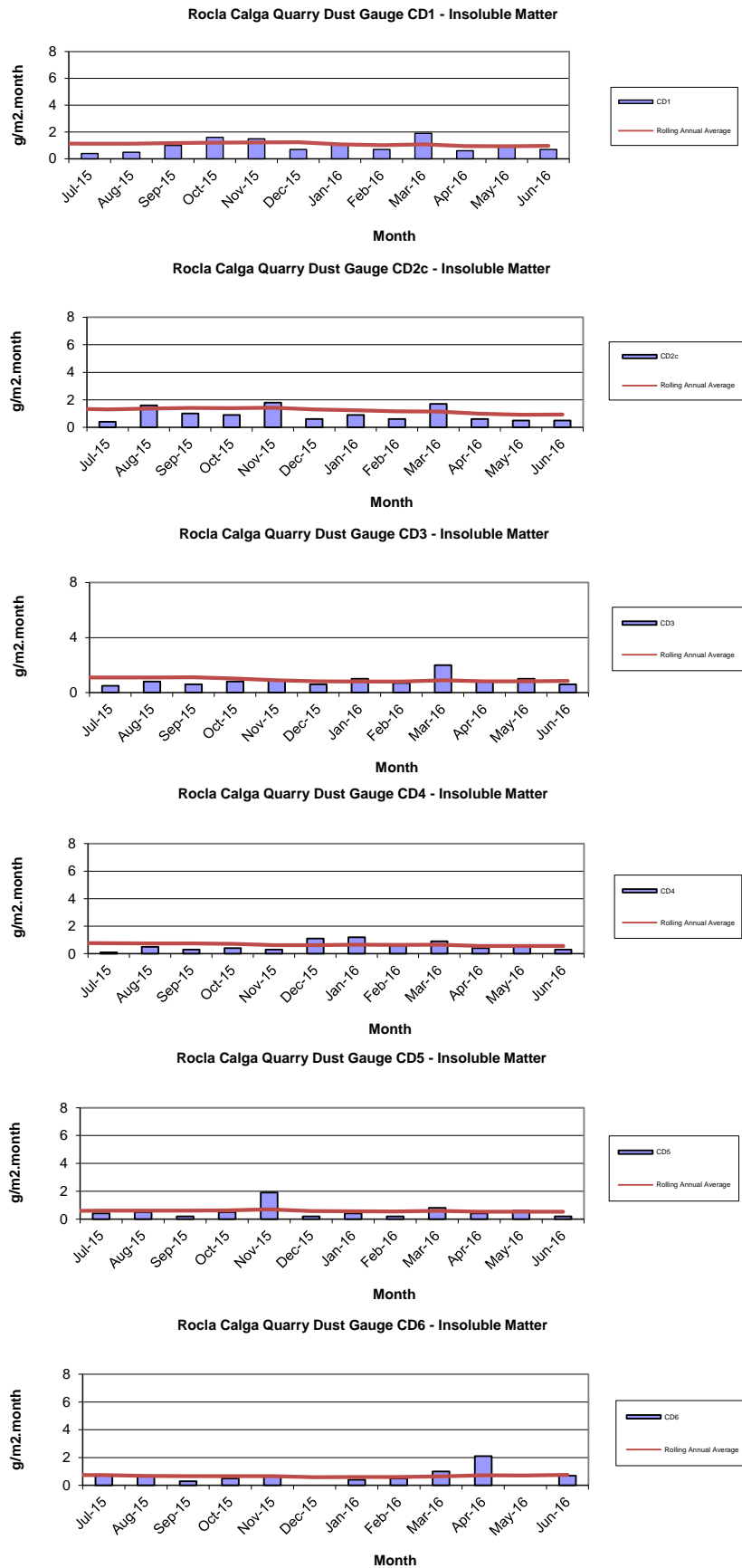
Insoluble Solids marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects. Results in bold indicate insoluble solids levels above 3.7 g/m².month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from July 2015 to June 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 1 July 2016 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

Table 2: Monthly surface water monitoring – June 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	5.31	62	47	10	<5
B	Trickle	Clear	Clear	6.60	79	56	17	<5
C	No Access							
D	Trickle	Clear	Clear	4.73	81	50	8	<5
F	Dam	Clear	Clear	5.14	61	43	19	<5

Samples were collected at sites A, B, D and F. Site C was inaccessible and unable to be sampled this month. The samples were collected and analysed for a monthly sampling event. Results show pH within the 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 June 2016.

2.2.1 Non-Routine Surface Water Sampling

The following non routine sampling was undertaken during June 2016;

- Rainfall event sampled by site on the 9 June 2016.

Laboratory analysis certificates are provided in **Appendix 1**.

2.3 Groundwater Monitoring

Bi-monthly groundwater monitoring is next scheduled for July 2016.

2.4 Meteorological Monitoring

The Calga Quarry weather station data recovery in June 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 June 2016 shows that rainfall recorded at the Calga Quarry was lower than the Gosford BOM mean rainfall however significantly higher than the Peats Ridge long term rainfall for June.

The rainfall comparison is provided below:

Calga Quarry	160.2 mm
BOM Peats Ridge*	NA
BOM Gosford*	299.2 mm
BOM Peats Ridge Long term mean for June*	99.5 mm

NA = Not Available

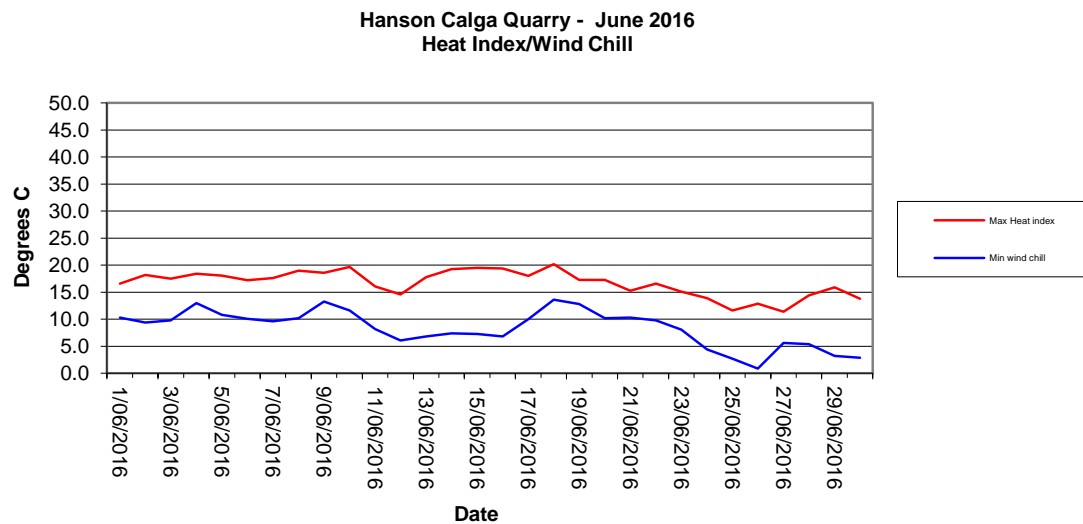
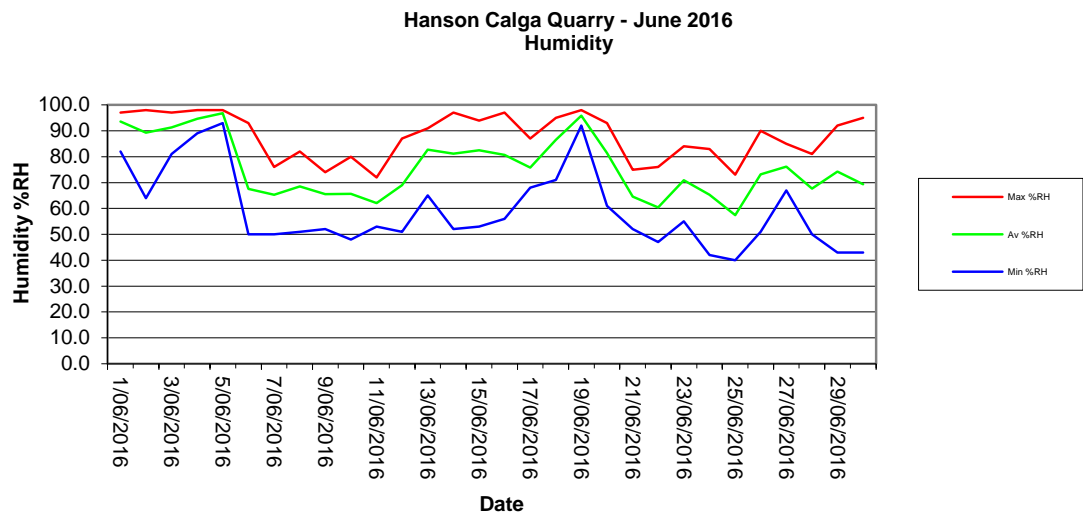
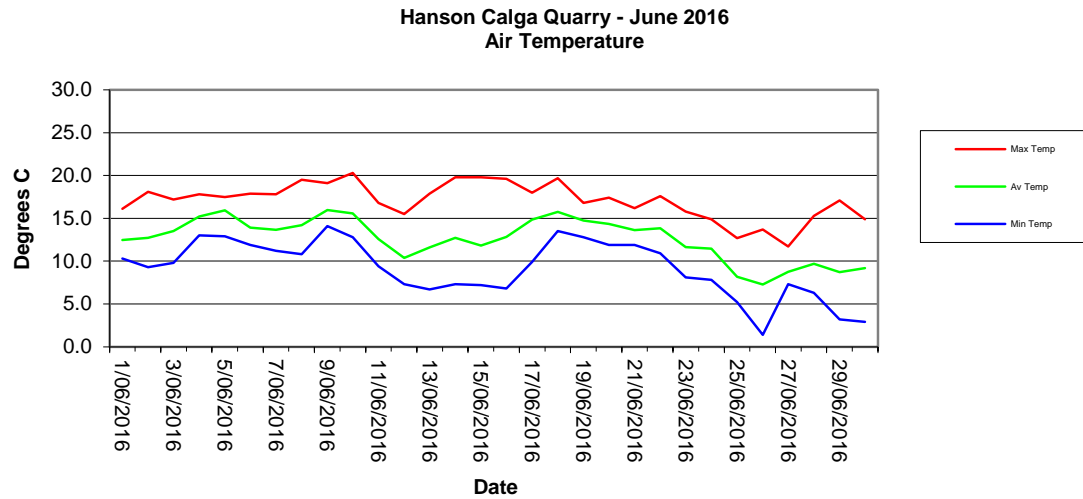
*Data sourced from Bureau of Meteorology (BOM) website (www.bom.gov.au).

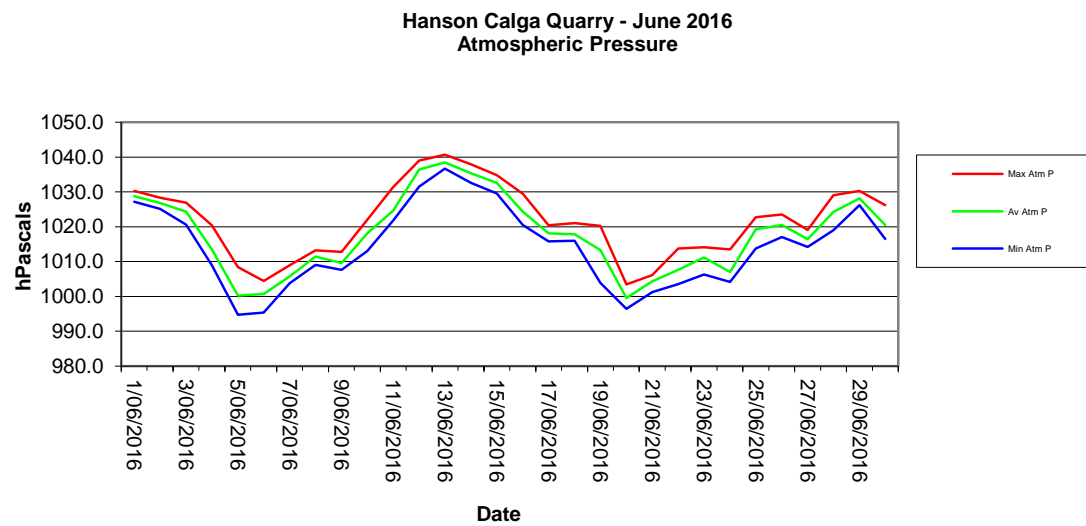
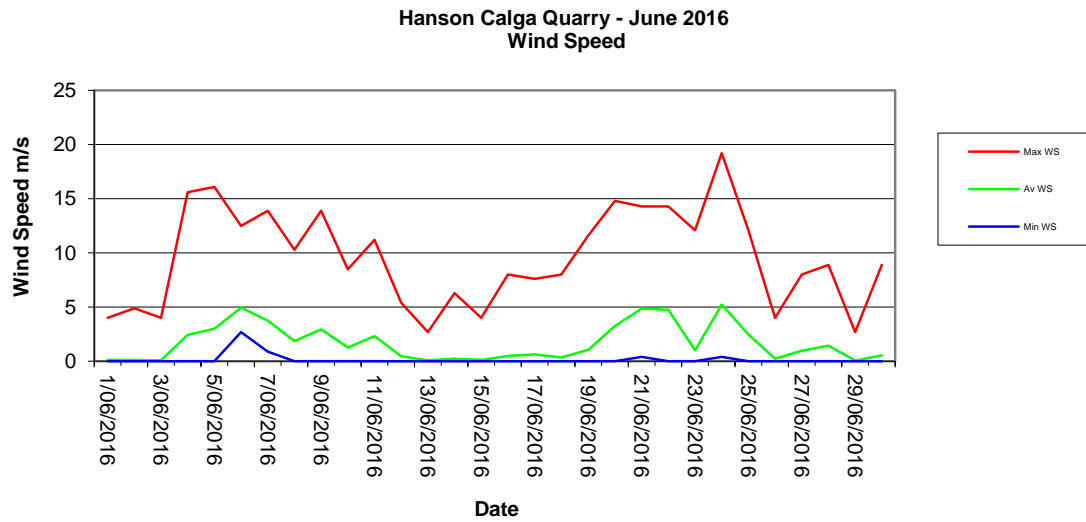
2.4.1 Monthly Meteorological Data Summary

Summary Jun-16 Hanson - Calga

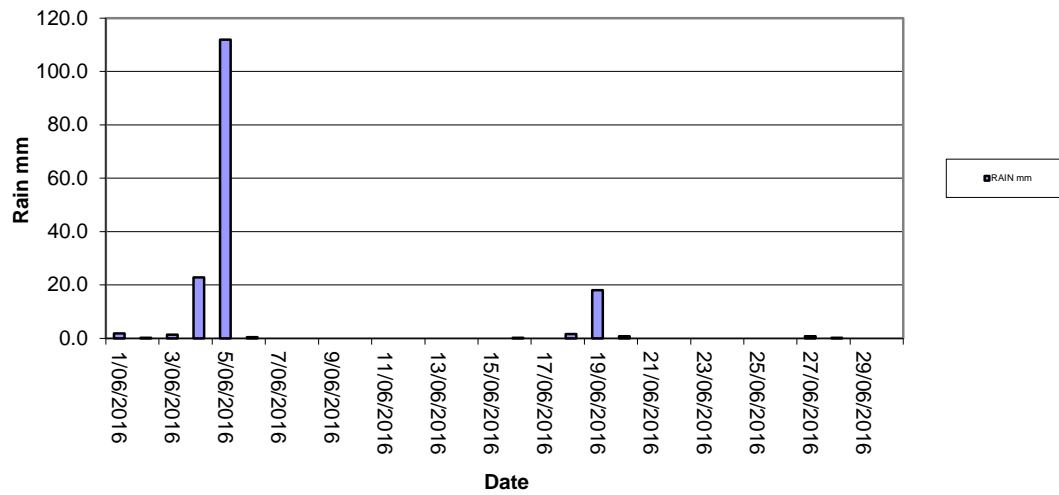
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Data %	Av data %	Max Data %
1/06/2016	10.3	12.5	16.1	82.0	93.5	97.0	1.8	0.0	0.1	4	10.3	16.6	1027.2	1028.7	1030.3	81	96.4	98.0
2/06/2016	9.3	12.7	18.1	64.0	89.3	98.0	0.2	0.0	0.1	4.9	9.4	18.2	1025.1	1026.8	1028.3	68.1	94.1	98.0
3/06/2016	9.8	13.5	17.2	81.0	91.3	97.0	1.4	0.0	0.1	4.0	9.8	17.5	1020.6	1024.3	1026.9	81.9	94.8	98.0
4/06/2016	13.0	15.2	17.8	89.0	94.7	98.0	22.8	0.0	2.4	15.6	13.0	18.4	1008.9	1013.4	1020.4	86.8	94.9	98.0
5/06/2016	12.9	15.9	17.5	93.0	96.8	98.0	112.0	0.0	3.0	16.1	10.8	18.1	994.7	1000.3	1008.4	90.6	96.0	98.0
6/06/2016	11.9	13.9	17.9	50.0	67.5	93.0	0.4	2.7	4.9	12.5	10.1	17.2	995.3	1000.7	1004.4	78.7	94.9	98.0
7/06/2016	11.2	13.6	17.8	50.0	65.3	76.0	0.0	0.9	3.7	13.9	9.6	17.6	1003.8	1005.7	1008.9	45.0	88.6	98.0
8/06/2016	10.8	14.2	19.5	51.0	68.5	82.0	0.0	0.0	1.9	10.3	10.2	19.0	1009.0	1011.4	1013.2	70.5	91.4	98.0
9/06/2016	14.1	16.0	19.1	52.0	65.5	74.0	0.0	0.0	3.0	13.9	13.3	18.6	1007.6	1009.5	1012.8	43.3	93.1	98.0
10/06/2016	12.8	15.6	20.3	48.0	65.6	80.0	0.0	0.0	1.3	8.5	11.6	19.7	1013.0	1018.1	1022.0	80.4	94.4	98.0
11/06/2016	9.4	12.6	16.8	53.0	62.1	72.0	0.0	0.0	2.3	11.2	8.2	16.1	1021.7	1024.6	1031.3	94.2	97.3	98.0
12/06/2016	7.3	10.4	15.5	51.0	69.0	87.0	0.0	0.0	0.5	5.4	6.1	14.6	1031.5	1036.4	1039.0	95.9	97.6	98.0
13/06/2016	6.7	11.6	17.9	65.0	82.7	91.0	0.0	0.0	0.1	2.7	6.8	17.8	1036.7	1038.4	1040.7	96.2	97.7	98.0
14/06/2016	7.3	12.7	19.8	52.0	81.2	97.0	0.0	0.0	0.2	6.3	7.4	19.3	1032.6	1035.3	1037.9	67.5	93.5	98.0
15/06/2016	7.2	11.8	19.8	53.0	82.5	94.0	0.0	0.0	0.1	4.0	7.3	19.5	1029.6	1032.6	1034.8	91.2	97.0	98.0
16/06/2016	6.8	12.8	19.6	56.0	80.7	97.0	0.2	0.0	0.5	8.0	6.8	19.4	1020.5	1024.3	1029.5	87.7	96.0	98.0
17/06/2016	9.9	14.9	18.0	68.0	75.8	87.0	0.0	0.0	0.6	7.6	10.0	18.0	1015.8	1018.1	1020.4	84.2	95.8	98.0
18/06/2016	13.5	15.8	19.7	71.0	86.5	95.0	1.6	0.0	0.4	8.0	13.6	20.2	1016.0	1017.9	1021.0	88.9	97.1	98.0
19/06/2016	12.8	14.7	16.8	92.0	95.9	98.0	18.0	0.0	1.1	11.6	12.8	17.3	1003.9	1013.3	1020.2	93.3	97.2	98.0
20/06/2016	11.9	14.3	17.4	61.0	81.4	93.0	0.8	0.0	3.3	14.8	10.2	17.3	996.4	999.5	1003.4	53.2	87.0	98.0
21/06/2016	11.9	13.6	16.2	52.0	64.5	75.0	0.0	0.4	4.9	14.3	10.3	15.3	1001.2	1004.3	1006.1	53.8	89.3	98.0
22/06/2016	10.9	13.8	17.6	47.0	60.3	76.0	0.0	0.0	4.8	14.3	9.8	16.6	1003.5	1007.6	1013.7	82.7	95.5	98.0
23/06/2016	8.1	11.7	15.8	55.0	70.9	84.0	0.0	0.0	1.0	12.1	8.1	15.1	1006.3	1011.1	1014.1	83.3	94.8	98.0
24/06/2016	7.8	11.4	14.9	42.0	65.3	83.0	0.0	0.4	5.2	19.2	4.4	13.9	1004.1	1007.0	1013.5	17.8	85.3	100.0
25/06/2016	5.2	8.2	12.7	40.0	57.4	73.0	0.0	0.0	2.5	12.1	2.7	11.6	1013.7	1019.2	1022.7	80.4	94.5	100.0
26/06/2016	1.4	7.3	13.7	51.0	73.2	90.0	0.0	0.0	0.2	4.0	0.9	12.9	1017.0	1020.5	1023.5	90.4	97.4	98.0
27/06/2016	7.3	8.8	11.7	67.0	76.2	85.0	0.8	0.0	1.0	8.0	5.6	11.4	1014.2	1016.4	1019.1	61.1	90.7	98.0
28/06/2016	6.3	9.7	15.3	50.0	67.7	81.0	0.2	0.0	1.4	8.9	5.4	14.4	1019.0	1024.2	1029.0	65.8	97.1	100.0
29/06/2016	3.2	8.7	17.1	43.0	74.2	92.0	0.0	0.0	0.1	2.7	3.2	15.9	1026.2	1028.1	1030.3	38.6	83.3	100.0
30/06/2016	2.9	9.2	14.9	43.0	69.4	95.0	0.0	0.0	0.6	8.9	2.9	13.8	1016.5	1020.5	1026.2	39.5	92.8	98.0
Monthly	1.4	12.6	20.3	40	76	98	160.2	0	1.7	19.2	0.9	20.2	994.7	1017.9	1040.7	17.8	93.9	100

2.4.2 Monthly Weather Charts

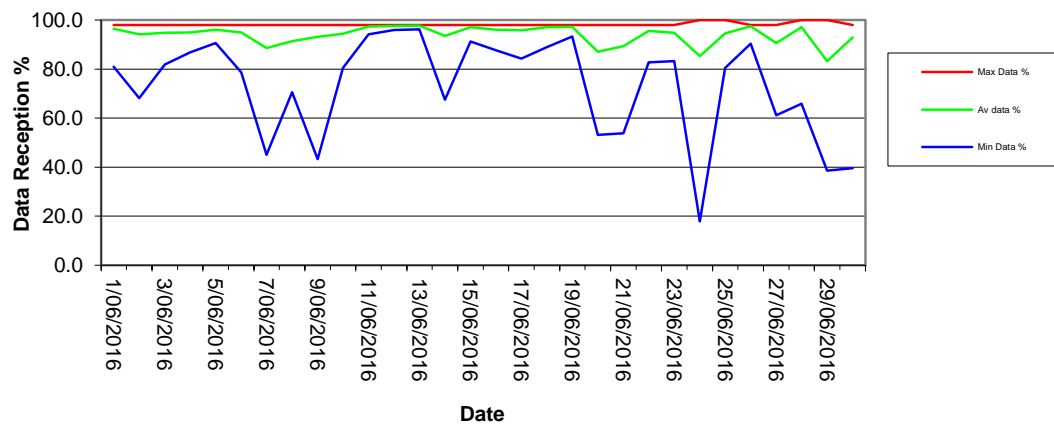




Hanson Calga Quarry - June 2016
Rainfall



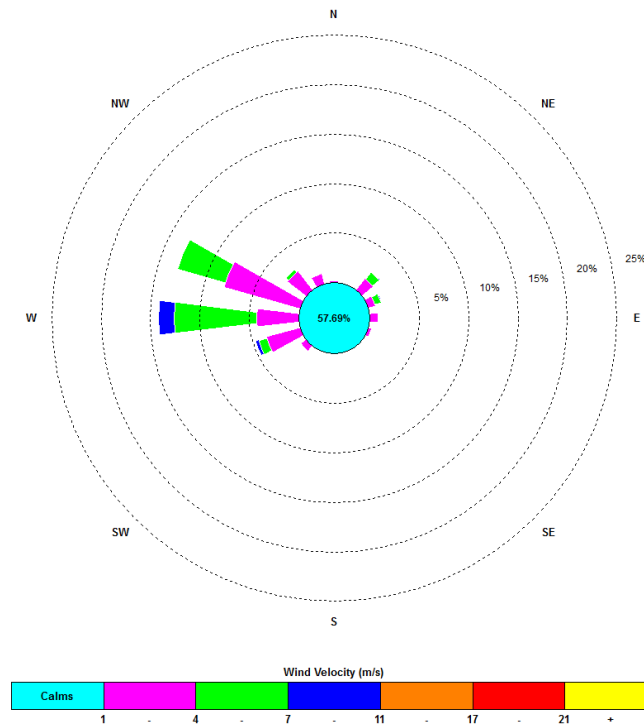
Hanson Calga Quarry - June 2016
Data Reception



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 June 2016 – 23:45, 30 June 2016



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

Appendix 1

Field Sheets

Chain of Custody

Laboratory Certificates



DEPOSITIONAL DUST MONITORING

Client: Rocla Calga Quarry

Date Installed: 3-6-16

Collection Start Time: 11:40

Sampled By: Leesa & Jill

Date Collected: 1-7-16

Collection Stop Time: 12:50

Sampling ID:

[illegible]

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

Colour: C=Clear, O=Orange, Bn=Brown, Gn=Green, Gy = Grey (CIRCLE)

Report broken funnels and replacement diameters

Signed:

[illegible]

Environmental Division
Newcastle
Work Order Reference
EN1602356



Telephone : + 61 2 4014 2500

CERTIFICATE OF ANALYSIS

Work Order : **EN1602356**
Client : **CBASED ENVIRONMENTAL PTY LTD**
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 : **01-Jul-2016 14:20**
Date Analysis Commenced : **01-Jul-2016**
Issue Date : **06-Jul-2016 19:02**

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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.

~ = Indicates an estimated value.

- 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 03/06/16 - 01/07/16	CD2c 03/06/16 - 01/07/16	CD3 03/06/16 - 01/07/16	CD4 03/06/16 - 01/07/16	CD5 03/06/16 - 01/07/16
Client sampling date / time				[01-Jul-2016]	[01-Jul-2016]	[01-Jul-2016]	[01-Jul-2016]	[01-Jul-2016]
Compound	CAS Number	LOR	Unit	EN1602356-001	EN1602356-002	EN1602356-003	EN1602356-004	EN1602356-005
				Result	Result	Result	Result	Result
EA120: Ash Content								
Ash Content	---	0.1	g/m ² .month	0.5	0.1	0.5	0.1	0.1
Ash Content (mg)	---	1	mg	8	2	9	2	1
EA125: Combustible Matter								
Combustible Matter	---	0.1	g/m ² .month	0.2	0.4	0.1	0.2	0.1
Combustible Matter (mg)	---	1	mg	4	6	1	3	2
EA141: Total Insoluble Matter								
Total Insoluble Matter	---	0.1	g/m ² .month	0.7	0.5	0.6	0.3	0.2
Total Insoluble Matter (mg)	---	1	mg	12	8	10	5	3



Analytical Results

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

Client sample ID

				CD6	---	---	---	---
				03/06/16 - 01/07/16	---	---	---	---
Client sampling date / time				[01-Jul-2016]	---	---	---	---
Compound	CAS Number	LOR	Unit	EN1602356-006	-----	-----	-----	-----
				Result	---	---	---	---
EA120: Ash Content								
Ash Content	---	0.1	g/m ² .month	0.4	---	---	---	---
Ash Content (mg)	---	1	mg	6	---	---	---	---
EA125: Combustible Matter								
Combustible Matter	---	0.1	g/m ² .month	0.3	---	---	---	---
Combustible Matter (mg)	---	1	mg	6	---	---	---	---
EA141: Total Insoluble Matter								
Total Insoluble Matter	---	0.1	g/m ² .month	0.7	---	---	---	---
Total Insoluble Matter (mg)	---	1	mg	12	---	---	---	---



Date: 1.7.16

Todays Collection	
Time Start:	10.40
Time Finish:	12.30

Client :
Project :

Rocla Calga

SURFACE WATERS

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	Dam	No	11.15	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
B	Trickle	No	10.40	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
C				1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	No Access
D	Trickle	No	12.30	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
F	Dam	No	11.00	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
					CST	CLOOBG	
					CST	CLOOBG	
					CST	CLOOBG	
					CST	CLOOBG	
					CST	CLOOBG	

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

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

Signed:

Sampled by: Leesa + Jill

[illegible]

Environmental Division
Sydney
Work Order Reference
ES1614303



Telephone : + 61-2-8784 8555

CERTIFICATE OF ANALYSIS

Work Order	: ES1614303	Page	: 1 of 2
Client	: CBASED ENVIRONMENTAL PTY LTD	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	: 01-Jul-2016 14:20
Order number	: ----	Date Analysis Commenced	: 01-Jul-2016
C-O-C number	: ----	Issue Date	: 07-Jul-2016 10:52
Sampler	: ----		
Site	:		
Quote number	: ----		
No. of samples received	: 4		
No. of samples analysed	: 4		

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
Merrin Avery	Supervisor - Inorganic	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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.
 ~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				A	B	D	F	---
Client sampling date / time				01-Jul-2016 11:15	01-Jul-2016 10:40	01-Jul-2016 12:30	01-Jul-2016 11:00	---
Compound	CAS Number	LOR	Unit	ES1614303-001	ES1614303-002	ES1614303-003	ES1614303-004	-----
				Result	Result	Result	Result	---
EA005: pH								
pH Value	---	0.01	pH Unit	5.31	6.60	4.73	5.14	---
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	---	1	µS/cm	62	79	81	61	---
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	---	10	mg/L	47	56	50	43	---
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	---	5	mg/L	10	17	8	19	---
EP020: Oil and Grease (O&G)								
Oil & Grease	---	5	mg/L	<5	<5	<5	<5	---



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: ES1612487	Page	: 1 of 2
Client	: CARBON BASED ENVIRONMENTAL	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL SLOUGH	Contact	:
Address	: 47 BOOMERANG ST CESSNOCK NSW, AUSTRALIA 2325	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ---	Telephone	: +61-2-8784 8555
Project	: HANSON CALGA WATERS	Date Samples Received	: 09-Jun-2016 15:00
Order number	: ---	Date Analysis Commenced	: 09-Jun-2016
C-O-C number	: ---	Issue Date	: 16-Jun-2016 13:38
Sampler	: ---		
Site	:		
Quote number	: ---		
No. of samples received	: 4		
No. of samples analysed	: 4		



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

WORLD RECOGNISED
ACCREDITATION

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
Alison Graham	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW
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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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.

~ = Indicates an estimated value.

- Sampling time not provided. For operational reasons an assumed date/time (3pm on date of receipt) is used. Sample results may be affected if the analysis falls outside of actual holding time.
- TDS by method EA-015 may bias high for various samples 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	B	D	F	---
Client sampling date / time				[09-Jun-2016]	[09-Jun-2016]	[09-Jun-2016]	[09-Jun-2016]	---
Compound	CAS Number	LOR	Unit	ES1612487-001	ES1612487-002	ES1612487-003	ES1612487-004	-----
				Result	Result	Result	Result	---
EA005: pH								
pH Value	---	0.01	pH Unit	4.89	6.51	5.32	5.25	---
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	---	1	µS/cm	70	87	82	56	---
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	---	10	mg/L	68	84	70	56	---
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	---	5	mg/L	52	214	<5	374	---
EP020: Oil and Grease (O&G)								
Oil & Grease	---	5	mg/L	<5	<5	<5	<5	---