



**CBased Environmental
Pty Limited**
ABN 62 611 924 264



Calga Quarry

Environmental Monitoring

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

February 2019

Colin Davies BSc MEIA CENVP
Environmental Scientist
Date: 20 March 2019

Executive Summary

CBased 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 CBased Environmental and includes the following;

- Dust Deposition results for February 2019;
- Surface Water quality results for February 2019; and
- Meteorological report for February 2019.

The February 2019 dust deposition results for insoluble solids were generally decreased when compared to January 2019. There were no excessively contaminated dust gauges this month. 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.

Monthly surface water samples were collected at sites A, C2 and F. Sites B and D were dry at the time of sampling and C1 was too muddy to access water level. 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 sites in February 2019.

Bi-monthly groundwater monitoring is next scheduled for March 2019.

The Calga Quarry weather station data recovery in February 2019 was approximately 68%. No data was available between the 1 February 2019 at 10:15am and 11 February 2019 at 07:15am. Please note after a machine outage on the 14/12/2018 the wind direction was locked on in a north direction. Therefore, no wind rose data will be provided for February 2019. Data for February 2019 shows that rainfall recorded at the Calga Quarry was below the Gosford BOM mean rainfall and well below the Peats Ridge long term rainfall for February.

The rainfall comparison is provided below:

Calga Quarry	39.0 mm [^]
BOM Peats Ridge*	NA
BOM Gosford*	109.0 mm
BOM Peats Ridge Long term mean for February*	154.3 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.

[^]Rain data not based on a full set of data.

Sampling Program

Hanson Calga Quarry conducts environmental monitoring in accordance to Development Consent, OEH (EPA) licence and Environmental Management Plans. CBased Environmental are contracted to undertake dust deposition gauge, surface and groundwater and meteorological monitoring for the project. CBased 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

CBased 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 February 2019 and the project 12-month rolling average. Results are in $\text{g/m}^2\cdot\text{month}$.

Table 1: Dust Deposition results: 1 February – 1 March 2019 (28 days)

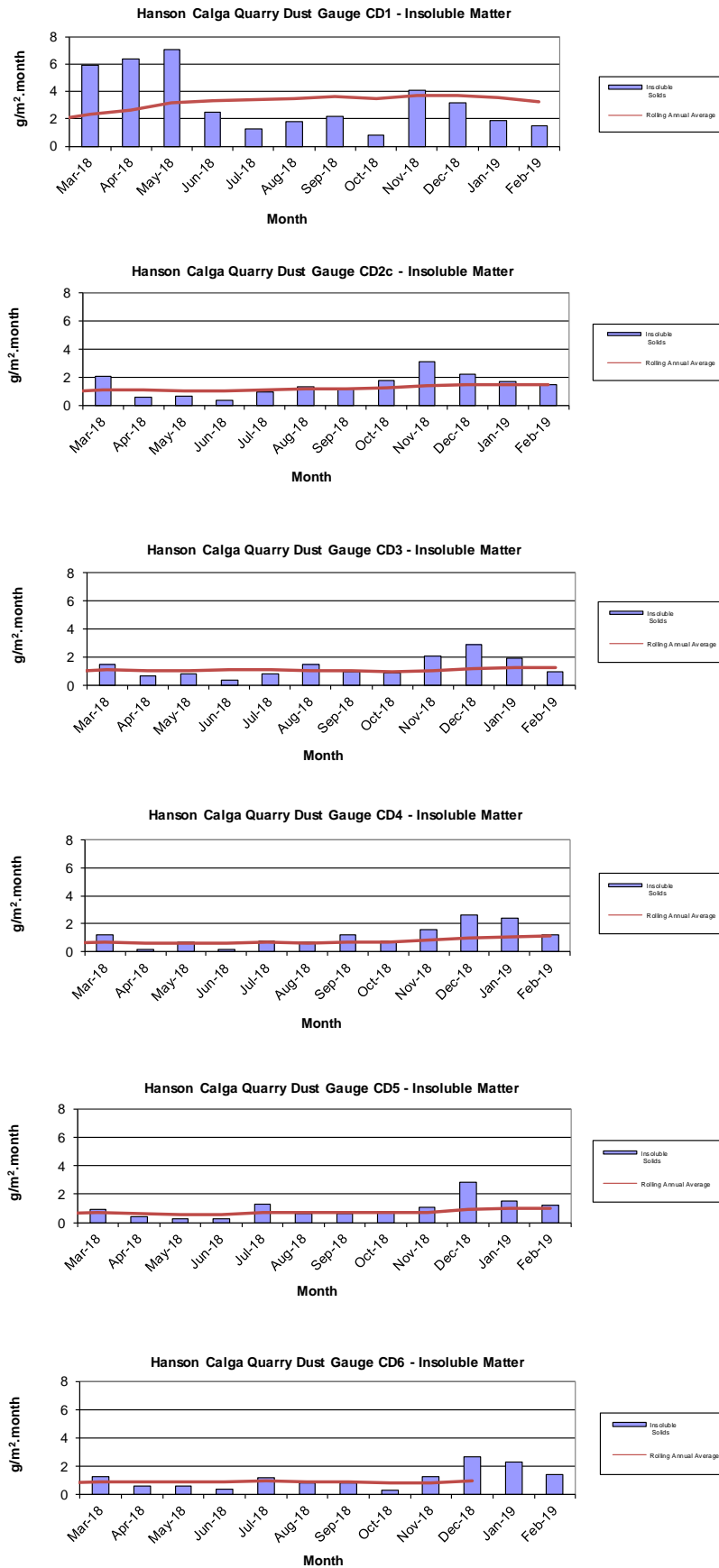
Site	Monthly Insoluble Solids ($\text{g/m}^2\cdot\text{month}$)	Monthly Ash Residue ($\text{g/m}^2\cdot\text{month}$)	Monthly Combustible Matter ($\text{g/m}^2\cdot\text{month}$)	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids ($\text{g/m}^2\cdot\text{month}$)
CD1	1.5	1.1	0.4	73	3.2
CD2c	1.5	1.0	0.5	67	1.5
CD3	1.0	0.5	0.5	50	1.3
CD4	1.2	0.8	0.4	67	1.1
CD5	1.2	0.9	0.3	75	1.0
CD6	1.4	0.9	0.5	64	1.1

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 $3.7 \text{ g/m}^2\cdot\text{month}$; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from March 2018 to February 2019.

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 March 2019 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

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

Site	Observed Flow Rate	Water Colour	Turbidity	pH	EC ($\mu\text{S}/\text{cm}$)	TDS (mg/L)	TSS (mg/L)	Oil and Grease (mg/L)
A	Dam	Clear	Brown	6.09	87	107	6	<5
B	Dry							
C1	Dry – dam has been too muddy to reach pool of water							
C2	Trickle	Clear	Clear	6.33	80	94	122	<5
D	Dry							
F	Dam	Clear	Clear	4.91	76	92	<5	<5

Samples were collected at sites A, C2 and F. Sites B and D were dry at the time of sampling and C1 was too muddy to access water level. 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 sites in February 2019.

2.2.1 Non-Routine Surface Water Sampling

Nil non-routine water sampling was undertaken during February 2019.

2.3 Groundwater Monitoring

Bi-monthly groundwater monitoring is next scheduled for March 2019.

2.4 Meteorological Monitoring

The Calga Quarry weather station data recovery in February 2019 was approximately 68%. No data was available between the 1 February 2019 at 10:15am and 11 February 2019 at 07:15am. Please note after a machine outage on the 14/12/2018 the wind direction was locked on in a north direction. Therefore, no wind rose data will be provided for February 2019.

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).

An annual calibration was undertaken on the weather station during September 2018 and is next due in September 2019.

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 February 2019 shows that rainfall recorded at the Calga Quarry was below the Gosford BOM mean rainfall and well below the Peats Ridge long term rainfall for February.

The rainfall comparison is provided below:

Calga Quarry	39.0 mm [^]
BOM Peats Ridge*	NA
BOM Gosford*	57.0 mm
BOM Peats Ridge Long term mean for February*	113.3 mm

NA = Not Available

[^]Rain data not based on a full set of data.

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

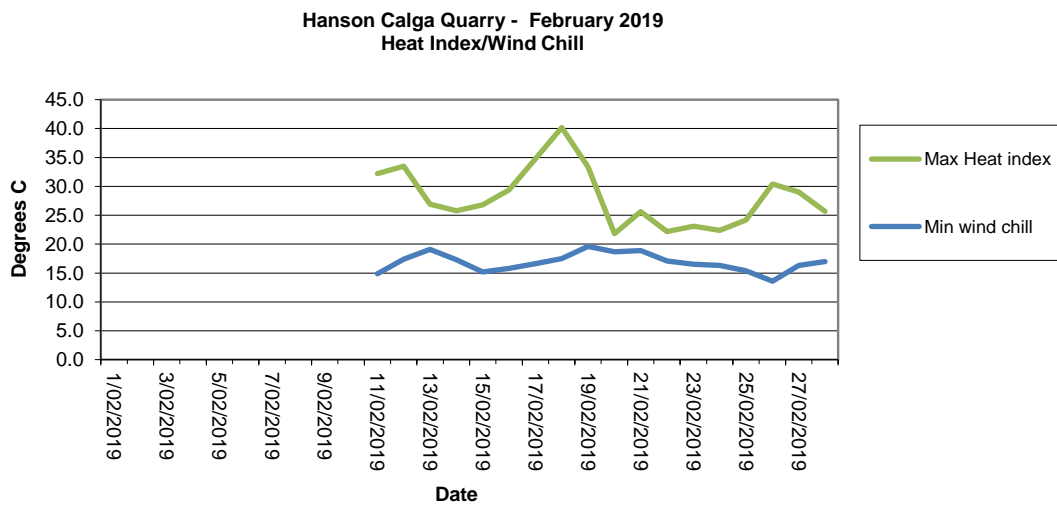
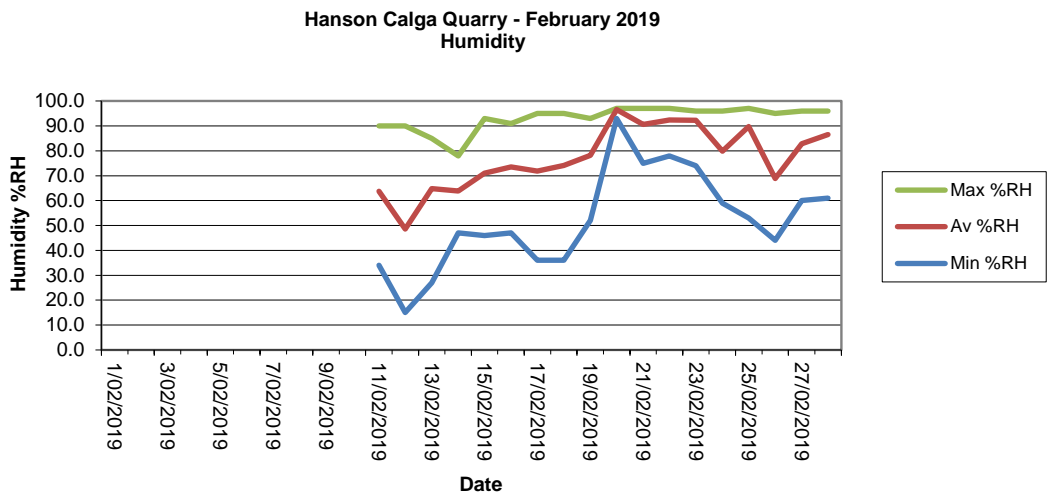
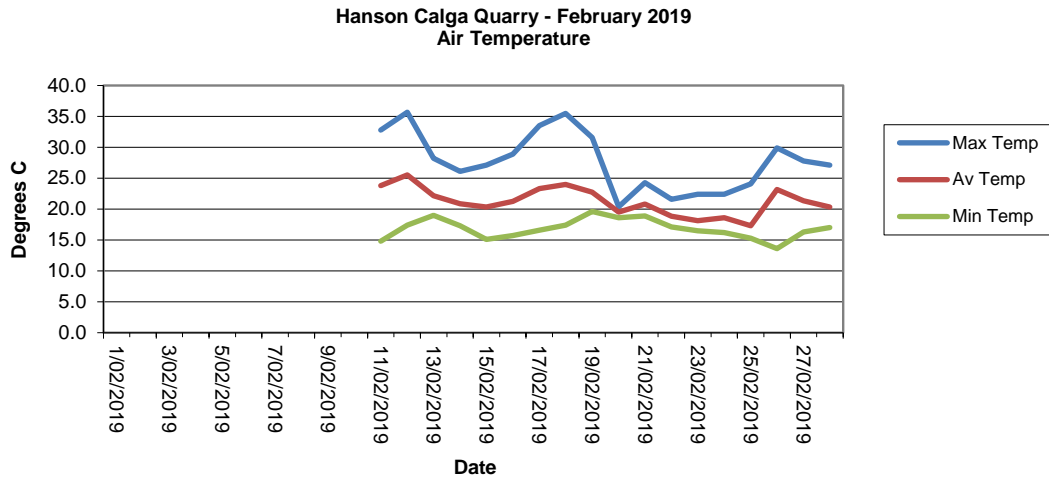
2.4.1 Monthly Meteorological Data Summary

Summary Feb-19 Hanson - Calga

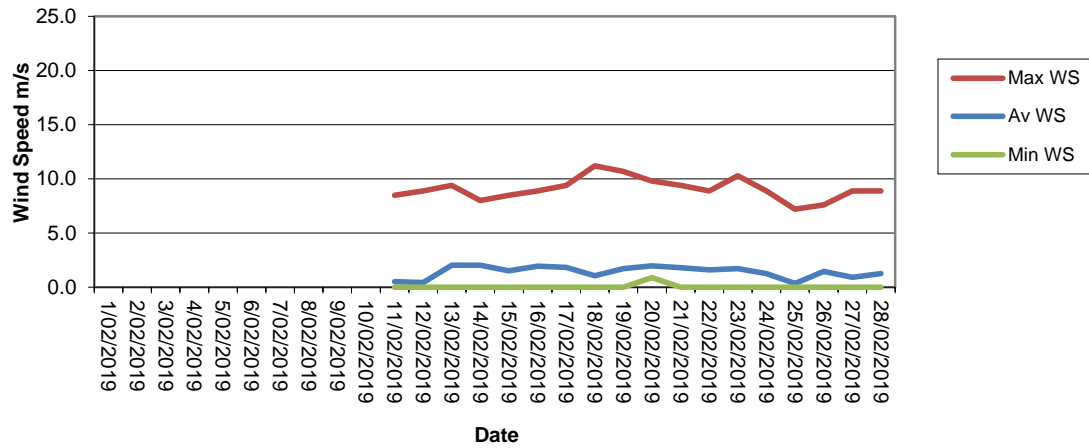
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Data %	Av data %	Max Data %
1/02/2019	17.4	18.0	19.4	87.0	94.2	96.0	1.6	1.3	2.4	8.5	17.4	19.9	1017.8	1019.5	1021.8	37.2	67.3	88.9
2/02/2019	18.8		26.0				21.2			8.6								
3/02/2019	19.1		29.6				0.2			11.4								
4/02/2019	18.9		30.8				0.0			5.6								
5/02/2019	22.6		28.9				0.0			8.3								
6/02/2019	20.4		29.0				0.0			9.2								
7/02/2019	19.4		29.2				0.0			12.2								
8/02/2019	20.0		30.6				0.2			10.8								
9/02/2019	20.3		34.3				25.6			12.2								
10/02/2019	15.7		24.1				0.0			9.2								
11/02/2019	14.8	23.8	32.8	34.0	63.8	90.0	0.0	0.0	0.5	8.5	14.9	32.2	998.0	1000.7	1005.2	0.0	12.2	59.6
12/02/2019	17.4	25.5	35.7	15.0	48.5	90.0	0.0	0.0	0.4	8.9	17.4	33.5	992.6	996.7	999.9	0.0	4.9	32.5
13/02/2019	19.0	22.2	28.2	27.0	64.8	85.0	0.0	0.0	2.0	9.4	19.1	26.9	994.6	1002.6	1011.5	0.0	22.4	57.1
14/02/2019	17.3	20.9	26.1	47.0	63.8	78.0	0.0	0.0	2.0	8.0	17.3	25.8	1011.5	1015.1	1018.7	0.0	30.1	59.3
15/02/2019	15.1	20.3	27.1	46.0	71.0	93.0	0.0	0.0	1.5	8.5	15.2	26.8	1018.5	1019.7	1021.3	0.0	36.5	84.5
16/02/2019	15.7	21.3	28.9	47.0	73.5	91.0	0.0	0.0	2.0	8.9	15.8	29.4	1013.6	1016.6	1020.1	0.0	43.2	76.7
17/02/2019	16.6	23.3	33.5	36.0	71.9	95.0	0.0	0.0	1.8	9.4	16.6	34.8	1006.9	1009.8	1013.4	0.0	31.1	48.6
18/02/2019	17.4	24.0	35.5	36.0	74.2	95.0	0.2	0.0	1.1	11.2	17.5	40.2	1001.4	1004.9	1008.5	0.0	22.6	60.3
19/02/2019	19.6	22.7	31.6	52.0	78.2	93.0	0.2	0.0	1.7	10.7	19.6	33.4	1001.6	1004.0	1009.7	0.0	33.1	66.2
20/02/2019	18.6	19.5	20.4	93.0	96.6	97.0	9.4	0.9	2.0	9.8	18.7	21.8	1006.4	1008.0	1009.6	14.2	49.3	85.2
21/02/2019	18.9	20.8	24.3	75.0	90.6	97.0	14.2	0.0	1.8	9.4	18.9	25.6	1009.2	1012.3	1015.9	0.0	41.7	67.5
22/02/2019	17.1	18.8	21.6	78.0	92.4	97.0	4.6	0.0	1.6	8.9	17.1	22.2	1014.7	1016.7	1018.5	0.0	35.7	73.2
23/02/2019	16.5	18.1	22.4	74.0	92.3	96.0	6.4	0.0	1.7	10.3	16.5	23.1	1016.1	1018.9	1021.9	0.0	29.6	71.3
24/02/2019	16.2	18.6	22.4	59.0	79.8	96.0	1.4	0.0	1.3	8.9	16.3	22.4	1021.3	1023.7	1025.4	0.0	20.3	44.5
25/02/2019	15.3	17.3	24.1	53.0	89.7	97.0	0.8	0.0	0.4	7.2	15.4	24.2	1021.5	1023.6	1025.3	0.0	14.8	56.8
26/02/2019	13.6	23.2	29.9	44.0	68.8	95.0	0.0	0.0	1.5	7.6	13.6	30.4	1014.7	1018.1	1022.3	0.0	32.8	88.6
27/02/2019	16.3	21.3	27.8	60.0	82.8	96.0	0.2	0.0	0.9	8.9	16.3	29.0	1016.3	1018.9	1020.8	0.0	46.7	100.0
28/02/2019	17.0	20.3	27.1	61.0	86.5	96.0	0.0	0.0	1.3	8.9	17.0	25.7	1018.7	1020.1	1021.8	0.0	25.1	96.2
Monthly	13.6	21.1	35.7	15	78	97	86.2	0	1.5	12.2	13.6	40.2	992.6	1013.1	1025.4	0	31.6	100

No data was available at 1 February 2019 at 10:15am and 11 February 2019 at 07:15am. Please note after a machine outage on the 14/12/2018 the wind direction was locked on in a north direction. Therefore, no wind rose data will be provided for February 2019. Where available data has been substituted with data from Gosford BOM station.

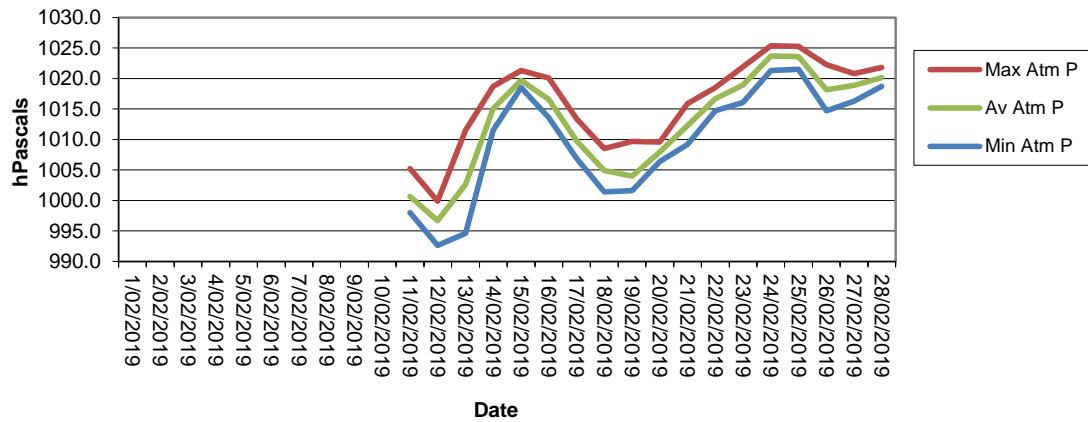
2.4.2 Monthly Weather Charts



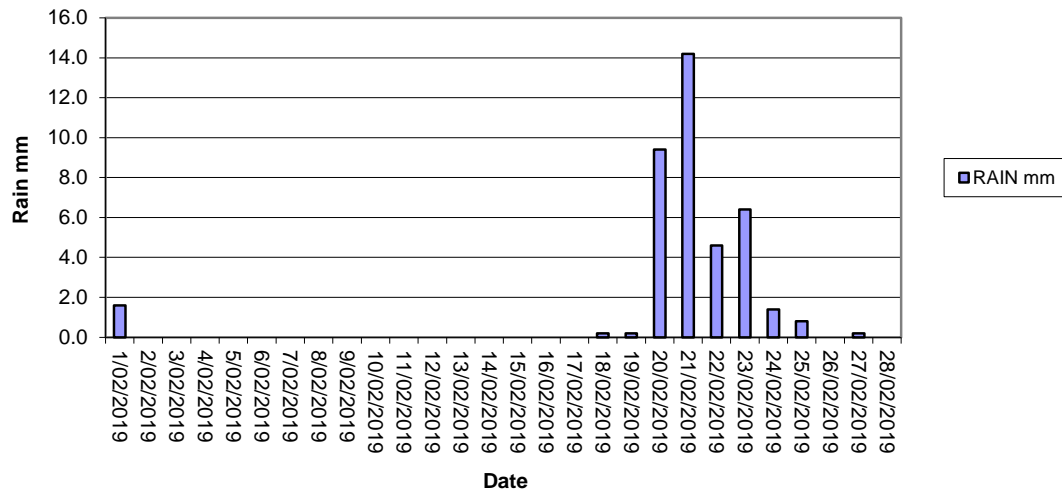
Hanson Calga Quarry - February 2019
Wind Speed



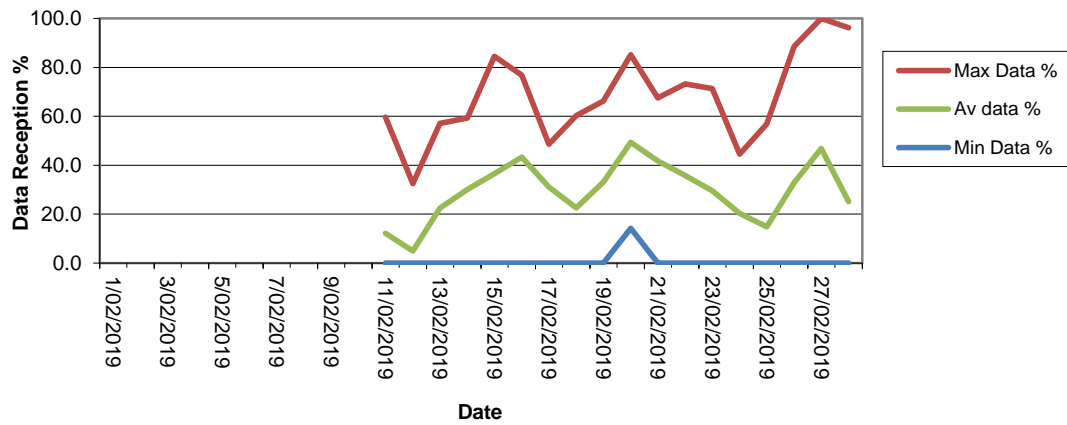
Hanson Calga Quarry - February 2019
Atmospheric Pressure



Hanson Calga Quarry - February 2019
Rainfall



Hanson Calga Quarry - February 2019
Data Reception



Appendix 1

Field Sheets

Chain of Custody

Laboratory Certificates

DEPOSITIONAL DUST MONITORING

Client: **Hanson Calga Quarry**

Date Installed: 1-2-19

Collection Start Time: 9-15

Sampled By: Leesa + Jones

Date Collected: 1-3-19

Collection Stop Time: 10:30

Sampling ID:

[illegible]

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

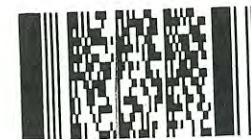
Colour: C=Clear, O=Orange, Bn=Brown, Gn=Green, Gy = Grey (CIRCLE)

Report broken funnels and replacement diameters

Signed: Lkj

[illegible]

Environmental Division
Newcastle
Work Order Reference
EN1901435



Telephone : + 611 2 4014 2500

CERTIFICATE OF ANALYSIS

Work Order : **EN1901435**
Client : **CBASED ENVIRONMENTAL PTY LTD**
Contact : All Deliverables
Address : Unit 3 2 Enterprise Cres
 Singleton NSW 2330
Telephone : +61 02 6571 3334
Project : Hanson Calga Dusts
Order number : ----
C-O-C number : ----
Sampler : CARBON BASED ENVIRONMENTAL PTY LTD
Site :
Quote number : SYBQ/222/16 and PLANNED EVENTS
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-Mar-2019 12:00
Date Analysis Commenced : 04-Mar-2019
Issue Date : 08-Mar-2019 13:53



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

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>
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 AS3580.10.1-2016. 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 01/02/19 - 01/03/19	CD2c 01/02/19 - 01/03/19	CD3 01/02/19 - 01/03/19	CD4 01/02/19 - 01/03/19	CD5 01/02/19 - 01/03/19
Client sampling date / time				01-Mar-2019 00:00	01-Mar-2019 00:00	01-Mar-2019 00:00	01-Mar-2019 00:00	01-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	EN1901435-001	EN1901435-002	EN1901435-003	EN1901435-004	EN1901435-005
				Result	Result	Result	Result	Result
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	1.1	1.0	0.5	0.8	0.9
Ash Content (mg)	----	1	mg	18	17	9	13	15
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.4	0.5	0.5	0.4	0.3
Combustible Matter (mg)	----	1	mg	6	8	7	6	4
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	1.5	1.5	1.0	1.2	1.2
Total Insoluble Matter (mg)	----	1	mg	24	25	16	19	19



Analytical Results

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

Client sample ID

				CD6				
				01/02/19 - 01/03/19				
Client sampling date / time				01-Mar-2019 00:00				
Compound	CAS Number	LOR	Unit	EN1901435-006				
Result								
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	0.9	----	----	----	----
Ash Content (mg)	----	1	mg	15	----	----	----	----
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.5	----	----	----	----
Combustible Matter (mg)	----	1	mg	8	----	----	----	----
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	1.4	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	23	----	----	----	----



Date: 1-3-19

Todays Collection	
Time Start:	8-50
Time Finish:	10-10

Client :
Project :

Hanson Calga

SURFACE WATERS

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	DAM	NO	8-50	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
B				1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
C1				1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
C2	Trickle	NO	10-10	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
D				1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
F	DAM	NO	9-00	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: dy

Sampled by: Leesa + Jones

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: CBased Environmental Pty Ltd				LABORATORY BATCH NO.:				Australian Laboratory Services Pty Ltd				
POSTAL ADDRESS: PO Box 245 CESSNOCK NSW 2325				SAMPLERS: CBased Environmental Pty Ltd								
SEND REPORT TO: monitoringresults@cbased.com.au				SEND INVOICE TO: renae.mikka@cbased.com.au				PHONE: 0265713334 E-MAIL: monitoringresults@cbased.com.au				
DATA NEEDED BY: 5 working days				REPORT NEEDED BY: 5 working days				REPORT FORMAT: HARD: Yes FAX: DISK: BULLETIN BOARD: E-MAIL: Yes				
PROJECT ID: Hanson Quarry SW				QUOTE NO.: SYBQ-222-16				QC LEVEL: QCS1: QCS2: QCS3: Yes QCS4:				
P.O. NO.:				COMMENTS/SPECIAL HANDLING/STORAGE OR DIPOSAL:				ANALYSIS REQUIRED				
FOR LAB USE ONLY												
COOLER SEAL												
Yes 28.9 No Intact				Total unless specified								
COOLER TEMP: deg.C												
SAMPLE DATA				CONTAINER DATA								
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.							
A	Water	1-3-19	8-50	1x 250mlGP, 1x 500mLGP, 1xPG		x	x	x	x	x		
B	Water			1x 250mlGP, 1x 500mLGP, 1xPG		x	x	x	x	x		
C1	Water			1x 250mlGP, 1x 500mLGP, 1xPG		x	x	x	x	x		
C2	Water		10-20	1x 250mlGP, 1x 500mLGP, 1xPG		x	x	x	x	x		
D	Water			1x 250mlGP, 1x 500mLGP, 1xPG		x	x	x	x	x		
F	Water		9-00	1x 250mlGP, 1x 500mLGP, 1xPG		x	x	x	x	x		
TOTAL BOTTLES:												
RELINQUISHED BY: Leesa King				RECEIVED BY: [Signature]				METHOD OF SHIPMENT				
DATE: 1-3-19				DATE: 1/3/19				CONSIGNMENT NOTE NO.				
TIME: 12-00				TIME: 12:00								
NAME: [Signature]				NAME: [Signature]				TRANSPORT CO. NAME.				
OF: CBased Environmental				OF: [Signature]								
DATE:				DATE:								
TIME:				TIME:								

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

AUSTRALIAN LABORATORY SERVICES P/L

Environmental Division
Sydney
Work Order Reference
ES1906337



Telephone : + 61-2-8784 8555

CERTIFICATE OF ANALYSIS

Work Order : **ES1906337**
Client : **CBASED ENVIRONMENTAL PTY LTD**
Contact : All Deliverables
Address : Unit 3 2 Enterprise Cres
Singleton NSW 2330
Telephone : +61 02 6571 3334
Project : HANSON QUARRY SW
Order number : ----
C-O-C number : ----
Sampler : CARBON BASED ENVIRONMENTAL PTY LTD
Site :
Quote number : SYBQ/222/16 and PLANNED EVENTS
No. of samples received : 3
No. of samples analysed : 3

Page : 1 of 2
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 01-Mar-2019 11:57
Date Analysis Commenced : 01-Mar-2019
Issue Date : 07-Mar-2019 12:05



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

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
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle 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.

- 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	C2	F	----	----
Client sampling date / time				01-Mar-2019 08:50	01-Mar-2019 10:25	01-Mar-2019 09:00	----	----
Compound	CAS Number	LOR	Unit	ES1906337-001	ES1906337-002	ES1906337-003	-----	-----
				Result	Result	Result	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	6.09	6.33	4.91	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	87	80	76	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	107	94	92	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	6	122	<5	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	<5	----	----