



**CBased Environmental
Pty Limited**

ABN 62 611 924 264



Calga Quarry

Environmental Monitoring

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

August 2018

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Environmental Scientist
Date: 20 September 2018

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 August 2018;
- Surface Water quality results for August 2018; and
- Meteorological report for August 2018.

The August 2018 dust deposition results for insoluble solids were generally slightly higher when compared to July 2018. 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, C1, C2 and F. Sites B and D were dry at the time of sampling. 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 August 2018

Bimonthly groundwater monitoring is next scheduled for September 2018.

Nil Calga Quarry weather station data was available in August 2018 due to a computer system update.

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**.

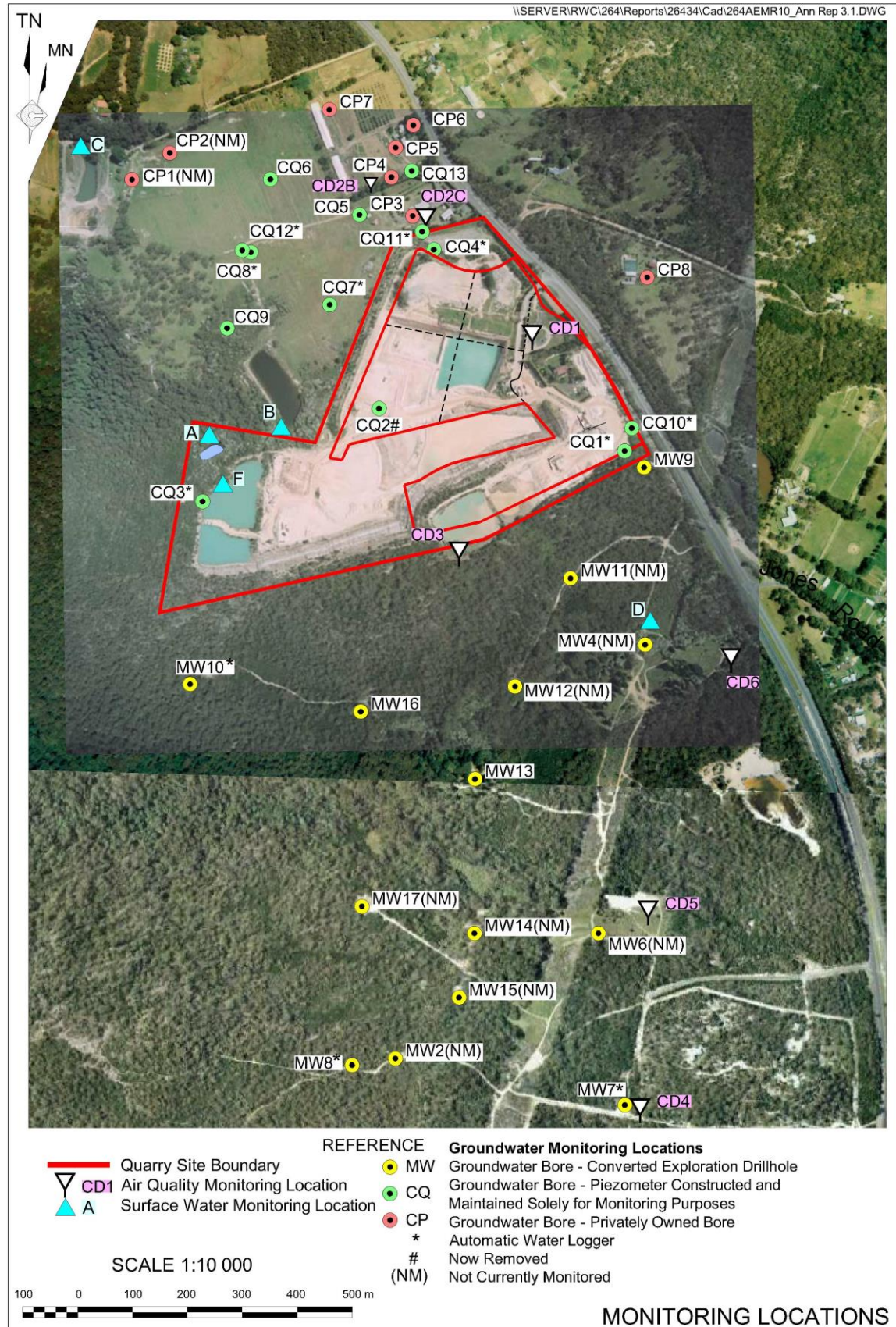


Figure 1: Hanson Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for August 2018 and the project 12-month rolling average. Results are in g/m².month.

Table 1: Dust Deposition results: 2 August 2018 – 3 September 2018 (32 days)

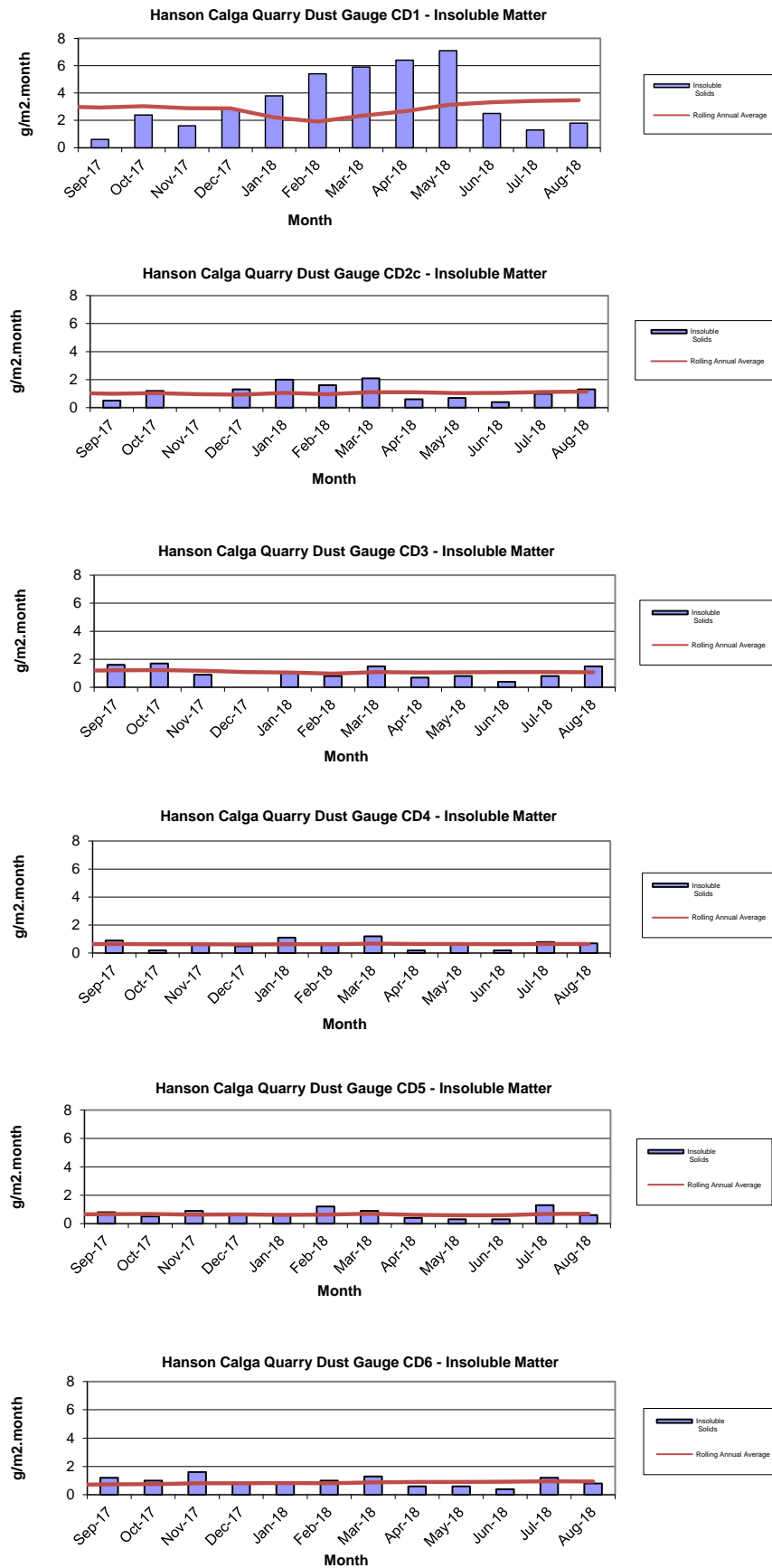
Site	Monthly Insoluble Solids (g/m ² .month)	Monthly Ash Residue (g/m ² .month)	Monthly Combustible Matter (g/m ² .month)	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids (g/m ² .month)
CD1	1.8	1.5	0.3	83	3.5
CD2c	1.3	0.8	0.5	62	1.2
CD3	1.5	1.2	0.3	80	1.1
CD4	0.7	0.3	0.4	43	0.7
CD5	0.6	0.3	0.3	50	0.7
CD6	0.8	0.5	0.3	63	0.9

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 August 2017 to July 2018.

CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air Quality Management Plan. CD4 was installed on 3 October 2006, to gauge air quality impacts to the south of the site operations, as were CD5 and CD6 which were installed on the 14 December 2006. CD2b was discontinued at the end of January 2010 due to contamination of the gauge by non-quarry related vehicle movements on a track adjacent to the gauge. The replacement gauge, CD2c, was located on a rehabilitated section of land between the extraction area and adjacent resident.

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

Figure 2: Dust Deposition Charts



2.2 Surface Water Monitoring

Monthly surface water monitoring was conducted on the 3 September 2018 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

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

Site	Observed Flow Rate	Water Colour	Turbidity	pH	EC ($\mu\text{S/cm}$)	TDS (mg/L)	TSS (mg/L)	Oil and Grease (mg/L)
A	Dam	Clear	Clear	5.74	167	86	<5	<5
B	Dry							
C1	Dam	Clear	Clear	7.14	122	70	8	<5
C2	Slow	Clear	Clear	6.64	124	85	<5	<5
D	Dry							
F	Dam	Clear	Clear	4.93	120	89	<5	<5

Samples were collected at sites A, C1, C2 and F. Sites B and D were dry at the time of sampling. 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 August 2018

2.2.1 Non-Routine Surface Water Sampling

No non-routine sampling was undertaken during August 2018.

2.3 Groundwater Monitoring

Bi-monthly groundwaters were sampled in July 2018. Bi-monthly groundwater monitoring is next scheduled for September 2018.

2.4 Meteorological Monitoring

Nil Calga Quarry weather station data was available in August 2018 due to a computer system update.

Appendix 1

Field Sheets

Chain of Custody

Laboratory Certificates

DEPOSITIONAL DUST MONITORING

Client: **Hanson Calga Quarry**

Date Installed: 2.8.18

Date Collected: 3.9.18

Collection Start Time: 12.10

Collection Stop Time: 13.15

Sampled By: Leesg + Jones

Sampling ID: Hanson

[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:

Signed: *[Signature]*

**Australian Laboratory
Services Pty Ltd**

LABORATORY BATCH NO.

SAMPLERS: CBased Environmental Pty Ltd

E-MAIL: monitoringresults@cbased.com.au

E-MAIL: Yes

QCS4:

ANALYSIS REQUIRED

NOTES

Intact

* CONTAINER DATA

EN1805610



Telephone : + 61 2 4014 2500

RECEIVED BY

METHOD OF SHIPMENT

CONSIGNMENT NOTE NO.	
----------------------	--

TRANSPORT CO. NAME

OF:	TIME
-----	------

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;

Q = Other.

AUSTRALIAN LABORATORY SERVICES P/L

CERTIFICATE OF ANALYSIS

Work Order : **EN1805610**
Client : **CBASED ENVIRONMENTAL PTY LTD**
Contact : MS RENAE MIKKA
Address : Unit 3 2 Enterprise Cres
 Singleton NSW 2330
Telephone : 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 : 31-Aug-2018 14:41
Date Analysis Commenced : 04-Sep-2018
Issue Date : 10-Sep-2018 12:58



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.

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 AS3580.10.1-2016. 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 02/08/18-03/09/18	CD2c 02/08/18-03/09/18	CD3 02/08/18-03/09/18	CD4 02/08/18-03/09/18	CD5 02/08/18-03/09/18
Client sampling date / time				03-Sep-2018 00:00	31-Aug-2018 00:00	31-Aug-2018 00:00	31-Aug-2018 00:00	31-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	EN1805610-001	EN1805610-002	EN1805610-003	EN1805610-004	EN1805610-005
				Result	Result	Result	Result	Result
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	1.5	0.8	1.2	0.3	0.3
Ash Content (mg)	----	1	mg	29	16	23	5	6
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.3	0.5	0.3	0.4	0.3
Combustible Matter (mg)	----	1	mg	4	8	6	8	5
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	1.8	1.3	1.5	0.7	0.6
Total Insoluble Matter (mg)	----	1	mg	33	24	29	13	11



Analytical Results

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

Client sample ID

				CD6	----	----	----	----
				02/08/18-03/09/18				
Client sampling date / time				03-Sep-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EN1805610-006	-----	-----	-----	-----
Result					----	----	----	----
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	0.5	----	----	----	----
Ash Content (mg)	----	1	mg	10	----	----	----	----
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	0.8	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	16	----	----	----	----



Date: 3-9-18

Todays Collection	
Time Start:	12-00
Time Finish:	13.05

Client :
Project :


Hanson Calga

SURFACE WATERS

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	DAM	NO	12.00	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
B	NO			1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	DRY
C1	Dam	NO	12.40	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
C2	slow	NO	12.50	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
D	NO			1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	DRY
F	DAM	NO	12.10	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: 

[illegible]**AUSTRALIAN LABORATORY SERVICES P/L**

CERTIFICATE OF ANALYSIS

Work Order : **ES1825911**
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 : 4
No. of samples analysed : 4

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 : 03-Sep-2018 14:47
Date Analysis Commenced : 03-Sep-2018
Issue Date : 06-Sep-2018 14:16



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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>
Dian Dao		Sydney Inorganics, Smithfield, NSW
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW



General Comments

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 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	C1	C2	F	----
Client sampling date / time				03-Sep-2018 12:20	03-Sep-2018 12:15	03-Sep-2018 12:50	03-Sep-2018 13:10	----
Compound	CAS Number	LOR	Unit	ES1825911-001	ES1825911-002	ES1825911-003	ES1825911-004	-----
				Result	Result	Result	Result	----
EA005: pH								
pH Value	----	0.01	pH Unit	5.74	7.14	6.64	4.93	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	167	122	124	120	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	86	70	85	89	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	8	<5	<5	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	----