



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



Calga Quarry

Environmental Monitoring

**Dust Deposition, Surface Water,
Groundwater and Meteorological Data**

September 2022

Colin Davies BSc MEIA CEnvP
Environmental Scientist
Date: 20 October 2022

Executive Summary

CBased Environmental is contracted by Hanson Quarry Products to conduct environmental monitoring at the Calga Sand Quarry.

The monitoring includes:

- Dust deposition;
- Surface water;
- Ground water and
- Meteorological data.

This report was prepared by CBased Environmental and includes the following results for September 2022:

- Dust deposition;
- Surface water quality; and
- Meteorological parameters;

The September 2022 dust deposition results for insoluble solids showed:

- Similar levels when compared to August 2022.
- Rolling annual averages below the Air Quality Management Plan criteria of 3.7g/m².month.

Monthly surface water samples were collected at sites A, C1, C2, D and F. Surface water site B was too low at the time of sampling. The samples that were collected were 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 were not detected at sites A, C1, C2, D and F in September 2022.

The Calga Quarry weather station data recovery in September 2022 was approximately 0% due to site outages. A summary of rainfall comparison is provided below.

Location	Rainfall (mm)
Calga Quarry	No Data
BOM Gosford*	149.4mm

Notes: NA = Not Available

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

BOM stations report rainfall at 9am

Calga Quarry station reports rainfall at midnight.

1.0 Sampling Programme

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

Six (6) dust deposition gauges are monitored as follows:

- CD1 – installed 1 May 2006. Gauges air quality impacts to the east of site operations;
- CD2c – located on a rehabilitated section of land between the extraction area and adjacent resident. Gauges air quality impacts to the north of site operations. Replaces former gauges CD2a and CD2b;
- CD3 – installed prior to May 2006. Gauges air quality impacts to the south of site operations;
- CD4 – installed 3 October 2006. Gauges air quality impacts to the south of site operations;
- CD5 – installed 14 December 2006. Gauges air quality impacts to the south of site operations; and
- CD6 installed 14 December 2006. Gauges air quality impacts to the south of the operations.

Dust gauge CD2a was discontinued at the start of August 2006 due to quarry operations “mining out” the site of the gauge. The replacement gauge, 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. 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. CD2b was replacement by dust gauge CD2c.

Surface water is 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. Laboratory analysis includes pH, electrical conductivity, total suspended solids, total dissolved solids and total oil and grease. Monitoring 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.

Groundwater is 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 station has the following sensor configuration:

- Air temperature;
- Humidity;
- Rainfall;
- Atmospheric pressure;
- Evaporation;
- Solar radiation;
- Wind speed; and
- 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**.

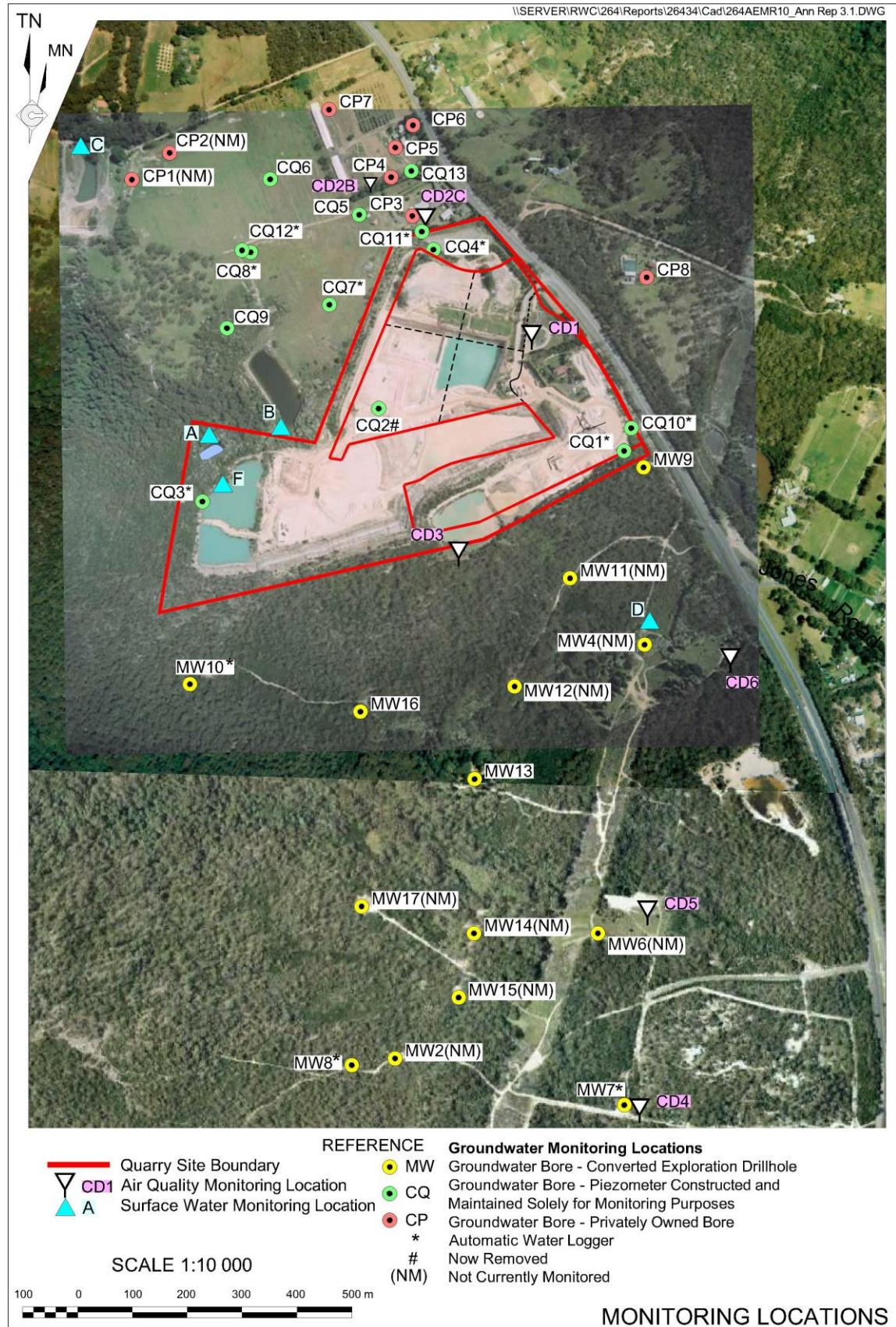


Figure 1: Hanson Calga Quarry Environmental Monitoring Locations

2.0 Results

2.1 Dust Deposition

The results for September 2022 and the project 12-month rolling average are provided **Table 1**.

Dust deposition charts for all dust gauge sites appear in **Figure 2** below. The field sheet, Chain of Custody documentation and laboratory analysis certificates are provided in **Appendix 1**.

Table 1: Dust Deposition Results: 01 September 2022 – 30 September 2022 (29 days)

Site	Monthly Insoluble Solids	Monthly Ash Residue	Monthly Combustible Matter	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids
CD1	1.2	0.4	0.8	33	2.1
CD2c	1.2	0.2	1.0	17	1.0
CD3	1.4	0.2	1.2	14	1.4
CD4	0.7	0.3	0.4	43	0.8
CD5	0.1	0.1	<0.1	100	0.6
CD6	0.4	0.2	0.2	50	0.5

Notes:

Units in g/m².month unless indicated

Insoluble solid results 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 3.7g/m².month; the Development Consent's annual average amenity criteria at residential locations

The current rolling annual average is calculated from October 2021 to September 2022

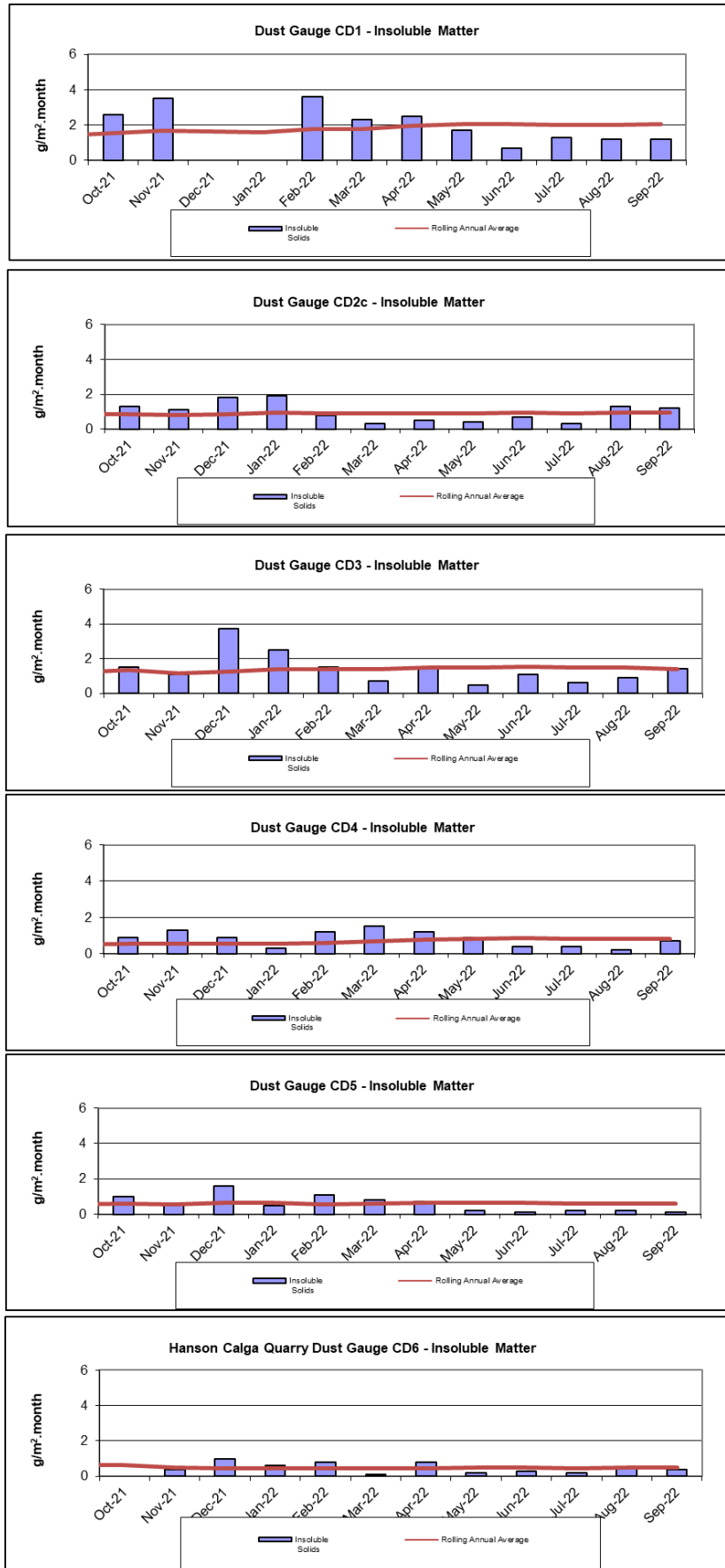


Figure 2: Summary Monthly/Annual Dust Deposition Results for Insoluble Solids

2.2 Surface Water (Monthly)

Monthly surface water monitoring was conducted on 01 September 2022 and results are provided in **Table 2**. The field sheet, chain of custody documentation and laboratory analysis certificates are provided in **Appendix 1**.

Samples were collected at sites A, C1, C2, D and F.

Table 2: Monthly Surface Water Monitoring Results – September 2022

Site	Observed Flow Rate* (visual)	Water Colour* (visual)	Turbidity* (visual)	pH	EC (μ S/cm)	TDS (mg/L)	TSS (mg/L)	Oil and Grease (mg/L)
A	Trickle	Colourless	Clear	6.15	52	64	<5	<5
B	Too Low To Sample							
C1	Dam	Brown	Clear	7.52	67	75	14	<5
C2	Moderate	Brown	Clear	6.70	89	53	8	<5
D	Trickle	Brown	Clear	5.75	84	58	7	<5
F	Dam	Colourless	Slight	6.07	55	46	20	<5

* Indicates field measurements. All other results are laboratory analysed

EC = Electrical conductivity

TDS = Total dissolved solids

TSS = Total suspended solids

2.2.1 Non-Routine Surface Water Sampling

No non-routine surface water sampling was completed in September 2022.

2.3 Meteorological Data

The Calga Quarry weather station data recovery for September 2022 was approximately 0% due to site issues.

Appendix 1

Field Sheets

Chain of Custody Documentation

Laboratory Analysis Certificates



Sampled By: Leesa + Steve

Signed:

*Record new funnel diameter whenever funnel is replaced and update on COC

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

[illegible]

Environmental Division
Newcastle
Work Order Reference
EN2209586



Telephone : + 61 2 4014 2500

CERTIFICATE OF ANALYSIS

Work Order : **EN2209586**
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 : SM LK
Site :
Quote number : SYBQ/403/21 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 : 04-Oct-2022 12:57
Date Analysis Commenced : 06-Oct-2022
Issue Date : 13-Oct-2022 14:18



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. 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
Thomas Regan	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the 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 Contract 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.
- The dust gauges for all samples were full when received by the laboratory. They may have overflowed in the field. Results for these gauges are thus reported on an 'as received' basis.
- For dust analysis, the Limit of Reporting (LOR) referenced in the reports for deposited matter parameters represents the reporting increment rather than reporting limit.



Analytical Results

Sub-Matrix: DEPOSITIONAL DUST
 (Matrix: AIR)

Sample ID

				CD1 01/09/22 - 30/09/22	CD2c 01/09/22 - 30/09/22	CD3 01/09/22 - 30/09/22	CD4 01/09/22 - 30/09/22	CD5 01/09/22 - 30/09/22
Sampling date / time				30-Sep-2022 00:00	30-Sep-2022 00:00	30-Sep-2022 00:00	30-Sep-2022 00:00	30-Sep-2022 00:00
Compound	CAS Number	LOR	Unit	EN2209586-001	EN2209586-002	EN2209586-003	EN2209586-004	EN2209586-005
				Result	Result	Result	Result	Result
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	0.4	0.2	0.2	0.3	0.1
Ash Content (mg)	----	2	mg	7	4	3	5	<2
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.8	1.0	1.2	0.4	<0.1
Combustible Matter (mg)	----	2	mg	13	16	21	7	<2
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	1.2	1.2	1.4	0.7	0.1
Total Insoluble Matter (mg)	----	2	mg	20	20	24	12	<2



Analytical Results

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

Sample ID

				CD6				
				01/09/22 - 30/09/22				
Sampling date / time				30-Sep-2022 00:00				
Compound	CAS Number	LOR	Unit	EN2209586-006				
Result								
EA120: Ash Content								
Ash Content	----	0.1	g/m ² .month	0.2	----	----	----	----
Ash Content (mg)	----	2	mg	3	----	----	----	----
EA125: Combustible Matter								
Combustible Matter	----	0.1	g/m ² .month	0.2	----	----	----	----
Combustible Matter (mg)	----	2	mg	4	----	----	----	----
EA141: Total Insoluble Matter								
Total Insoluble Matter	----	0.1	g/m ² .month	0.4	----	----	----	----
Total Insoluble Matter (mg)	----	2	mg	7	----	----	----	----



CBASED ENVIRONMENTAL PTY LIMITED

Date: 1-9-22

Client :
Project :

Hanson Calga

SURFACE WATERS

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	Trickle	N	0940	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLO O B G	
B	Trickle	N	0950	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLO O B G	Too low to sample
C1	Dam	N	1150	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLO O B G	
C2	Moderate	N	1200	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLO O B G	
D	Trickle	N	1110	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLO O B G	
F	Dam	N	0930	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLO O B G	

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

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

Signed:

Sampled by: AL + SO

[illegible]

Environmental Division
Sydney
Work Order Reference
ES2231291



Telephone : + 61-2-8784 8555

AUSTRALIAN LABORATORY SERVICES P/L

CERTIFICATE OF ANALYSIS

Work Order : **ES2231291**
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 : AL + SD, Cbased Environmental Pty Ltd
Site :
Quote number : SYBQ/403/18
No. of samples received : 6
No. of samples analysed : 5

Page : 1 of 2
Laboratory : Environmental Division Sydney
Contact : Helen Simpson
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61 2 8784 8555
Date Samples Received : 01-Sep-2022 14:46
Date Analysis Commenced : 01-Sep-2022
Issue Date : 08-Sep-2022 13:16



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<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ruby Buller	Laboratory Technician	Chemistry, Newcastle West, NSW



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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.

- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.

Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID				A	C1	C2	D	F
Sampling date / time				01-Sep-2022 09:40	01-Sep-2022 11:50	01-Sep-2022 12:00	01-Sep-2022 11:10	01-Sep-2022 09:30
Compound	CAS Number	LOR	Unit	ES2231291-001	ES2231291-003	ES2231291-004	ES2231291-005	ES2231291-006
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	6.15	7.52	6.70	5.75	6.07
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	52	67	89	84	55
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	64	75	53	58	46
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	14	8	7	20
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	<5

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle - Water, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(WATER) EA005: pH