CBased Environmental Pty Limited
ABN 62 611 924 264

Calga Quarry

Environmental Monitoring

Dust Deposition Gauges, Surface and Ground Waters and Meteorological Station

November 2018

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Environmental Scientist
Date: 20 December 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 November 2018;
- Surface Water quality results for November 2018; and
- Meteorological report for November 2018.

The November 2018 dust deposition results for insoluble solids were generally increased when compared to October 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/m^2.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 November 2018.

Groundwater depth generally decreased compared to September 2018, indicating water moving towards the surface. pH at all sites is in the acidic range and generally slightly increased when compared to the previous results. EC levels were similar or increased slightly at a majority of groundwater sites when compared to the September 2018 results.

Data for November 2018 shows that rainfall recorded at the Calga Quarry was above the Gosford BOM mean rainfall however below the Peats Ridge long term rainfall for November.

The rainfall comparison is provided below:

Calga Quarry	77.2 mm
BOM Peats Ridge*	NA
BOM Gosford*	41.2 mm
BOM Peats Ridge Long term mean for November*	100.7 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. 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/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. 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**.

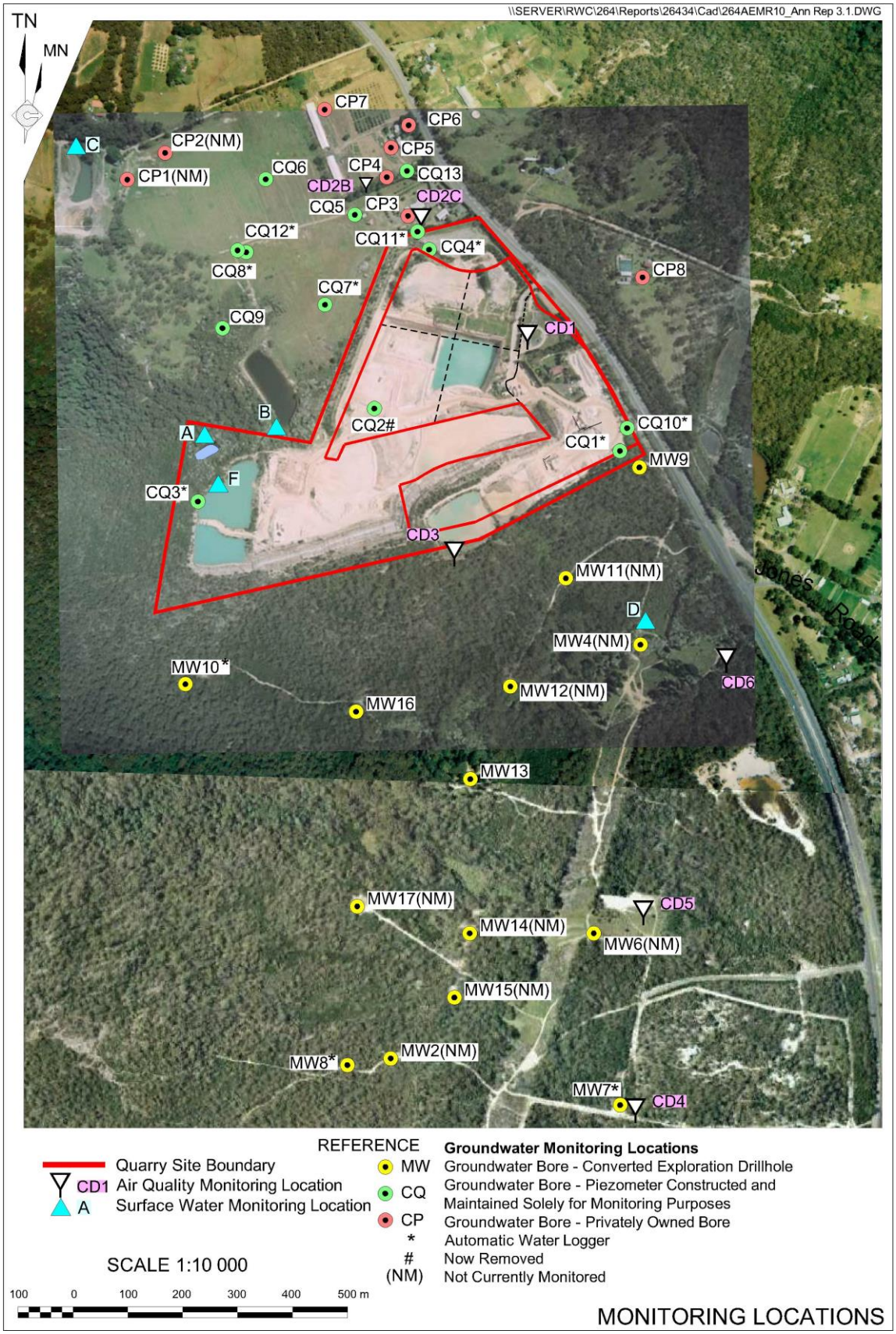


Figure 1: Hanson Calga Quarry environmental monitoring locations

2.0 Monthly Results

2.1 Dust Deposition Gauges

Table 1 displays the results for November 2018 and the project 12-month rolling average. Results are in g/m^2.month.

Table 1: Dust Deposition results: 2 November 2018 – 4 December 2018 (32 days)

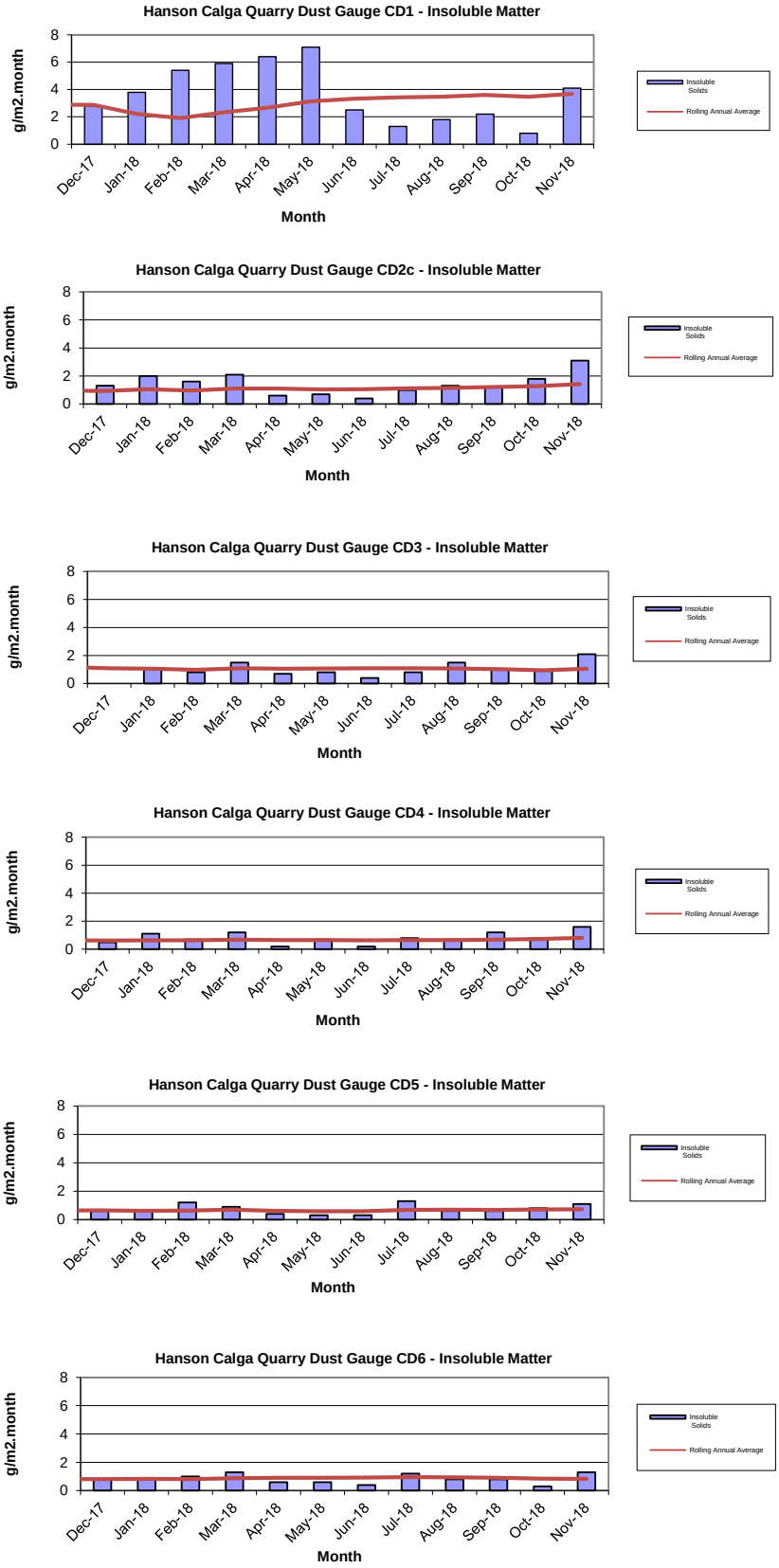
Site	Monthly Insoluble Solids *(g/m^2.month)*	Monthly Ash Residue *(g/m^2.month)*	Monthly Combustible Matter *(g/m^2.month)*	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids *(g/m^2.month)*
CD1	4.1	3.5	0.6	85	3.7
CD2c	3.1	1.4	1.7	45	1.4
CD3	2.1	1.7	0.4	81	1.1
CD4	1.6	0.8	0.8	50	0.8
CD5	1.1	0.7	0.4	64	0.7
CD6	1.3	0.9	0.4	69	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 December 2017 to November 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 4 December 2018 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1.**

Table 2: Monthly surface water monitoring – November 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	6.60	133	104	<5	<5
B	Dry							
C1	Dam	Clear	Clear	6.83	112	75	<5	<5
C2	Trickle	Clear	Clear	6.73	111	76	5	<5
D	Dry							
F	Dam	Clear	Clear	5.08	107	84	<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 November 2018.

2.2.1 Non-Routine Surface Water Sampling

Additional non-routine water sampling was undertaken at the following sites during November 2018;

- Site A, Site B, Site C, Site D and Site F sampled on the **27 November 2018**.

Results are provided in **Appendix 1**.

2.3 Groundwater Monitoring

Bi-monthly groundwaters were sampled on 4 December 2018. Water quality tests for pH and electrical conductivity were conducted by CBased 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 September 2018, indicating water moving towards the surface. pH at all sites is in the acidic range and generally slightly increased when compared to the previous results. EC levels were similar or increased slightly at a majority of groundwater sites when compared to the September 2018 results.

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

Table 3: Groundwater Quality Data

Reference	Bore	Type	Depth to water TOC *(m)* April 2006	Depth to water TOC *(m)* This report	pH This report	Electrical Conductivity *(µS/cm)* This report
CQ3	Voutos	* Monitor	10.53	10.87	6.25	154
CQ4	Voutos	* Monitor	8.78	11.76	5.80	209
CQ5	Gazzana	DIP Only	8.69	8.65	4.28	229
CQ6	Gazzana	DIP Only	16.00	Covered over in paddock		
CQ7	Gazzana	* Monitor	6.89	6.54	4.51	164
CQ8	Gazzana	* Monitor	11.03	7.52	4.20	210
CQ9	Gazzana	DIP Only	10.10	Blocked / Damaged		
CQ10	Voutos	* Monitor	NI	26.90	4.39	195
CQ11S	Gazzana	* Monitor	NI	12.56	5.35	202
CQ11D	Gazzana	* Monitor	NI	13.52	4.65	204
CQ12	Gazzana	* Monitor	NI	5.85	4.30	187
CQ13	Kashouli	* Monitor	NI	15.26	4.20	239
CP3	Gazzana	Domestic	10.40	Destroyed		
CP4	Kashouli	Domestic	13.63	9.74	Blocked/ unable to collect water	
CP5	Kashouli	Domestic	16.61	10.10	4.54	196
CP6	Kashouli	Domestic	16.27	12.02	4.20	211
CP7	Kashouli	Production	8.56	3.73	4.68	140
CP8	Rozmanec	Domestic	22.17	22.74	4.35	180
MW7	Rocla Bore	* Monitor	15.76	15.87	4.49	177
MW8	Rocla Bore	* Monitor	9.82	8.41	4.53	139
MW9	Rocla Bore	* Monitor	22.44	24.61	4.74	153
MW10	Rocla Bore	* Monitor	15.41	10.99	4.3	183
MW13	Rocla Bore	DIP Only	NI	7.73	4.14	175
MW16	Rocla Bore	DIP Only	NI	8.26	4.46	168
MW17	Rocla Bore	DIP Only		No Access - tree across track		

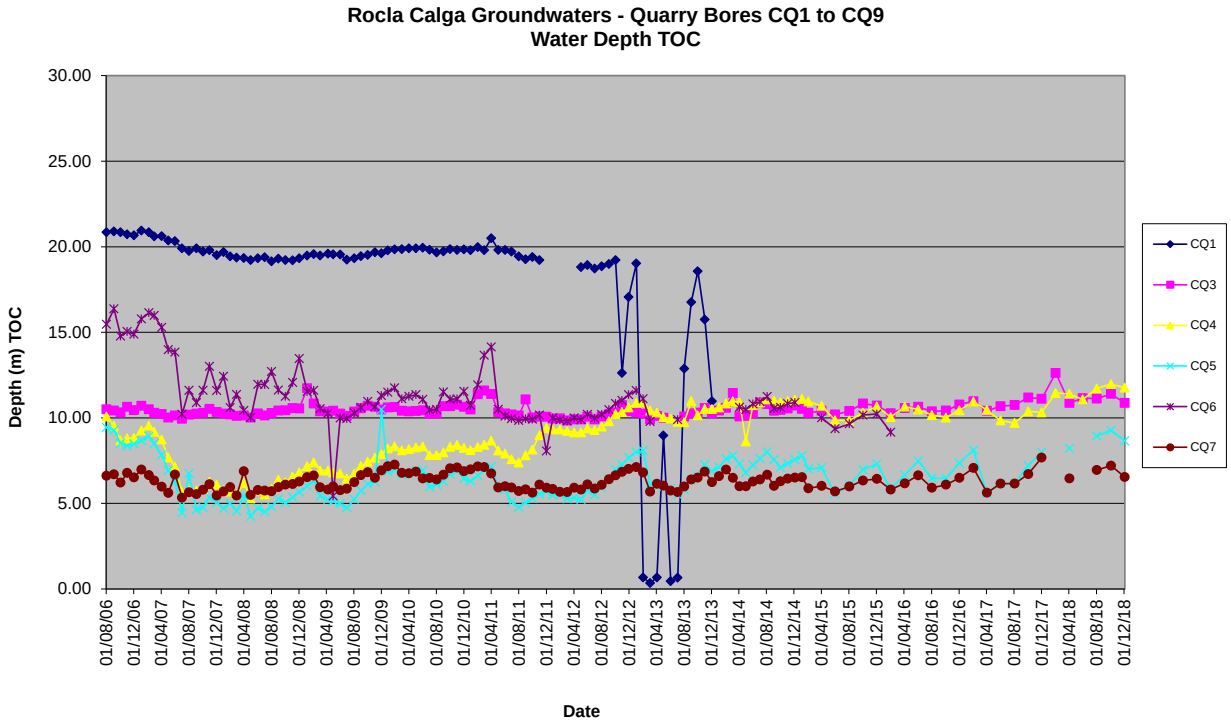
Notes:
TOC = Water level measured from top of bore case to water.
NM = Not Monitored – unable to sample water due to non-operational pump.
NR = Not Required by resident.
* = Logger Installed.
NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements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

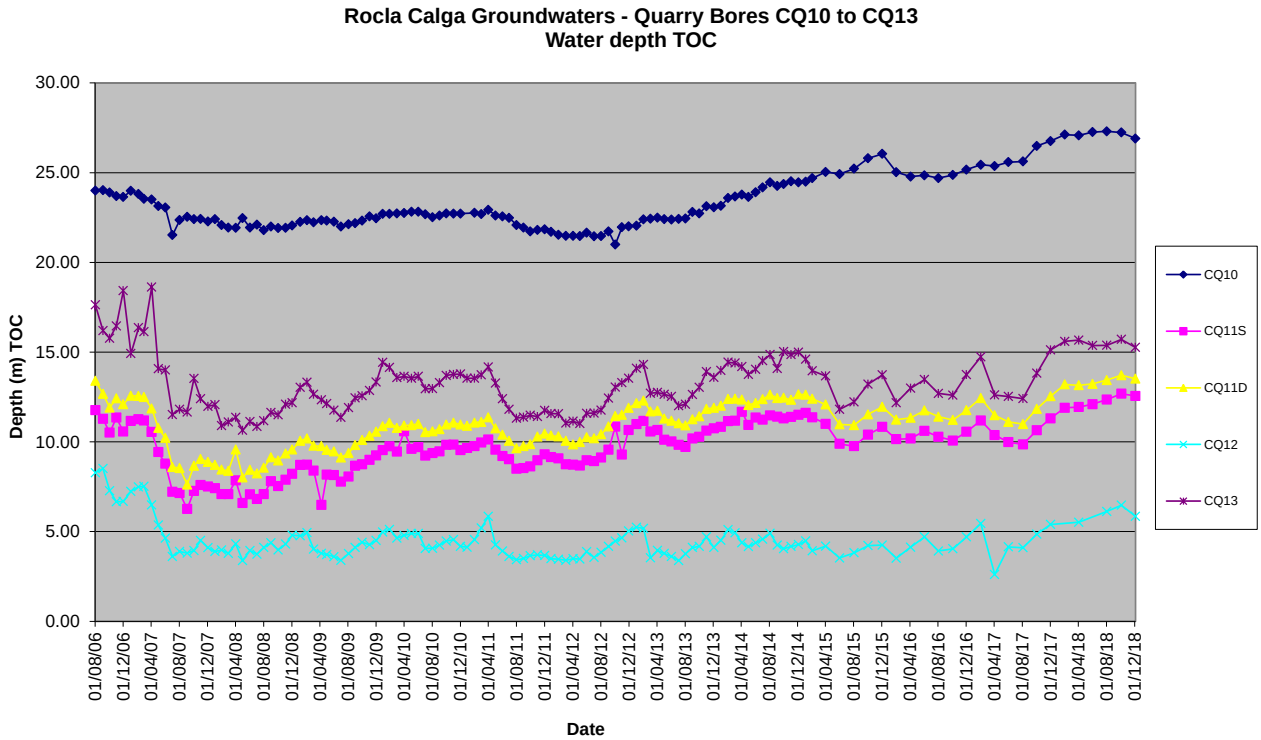
Shading is used to indicate the following trends in water depth (compared to the last reading):

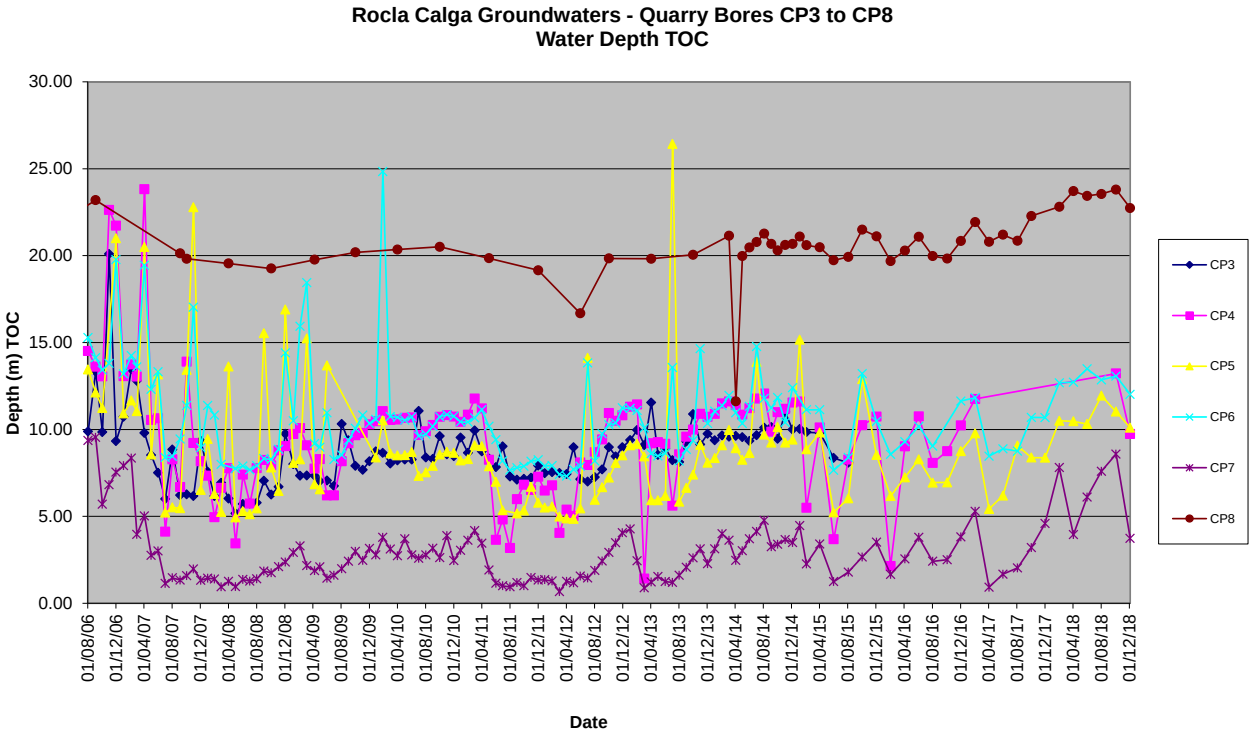
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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

Figures 3 to 6: Groundwater Depth Charts.






Rocla Calga Groundwaters - Quarry Bores CP3 to CP8
Water Depth TOC
Depth (m) TOC
30.00
25.00
20.00
15.00
10.00
5.00
0.00
01/08/06
01/12/06
01/04/07
01/08/07
01/12/07
01/04/08
01/08/08
01/12/08
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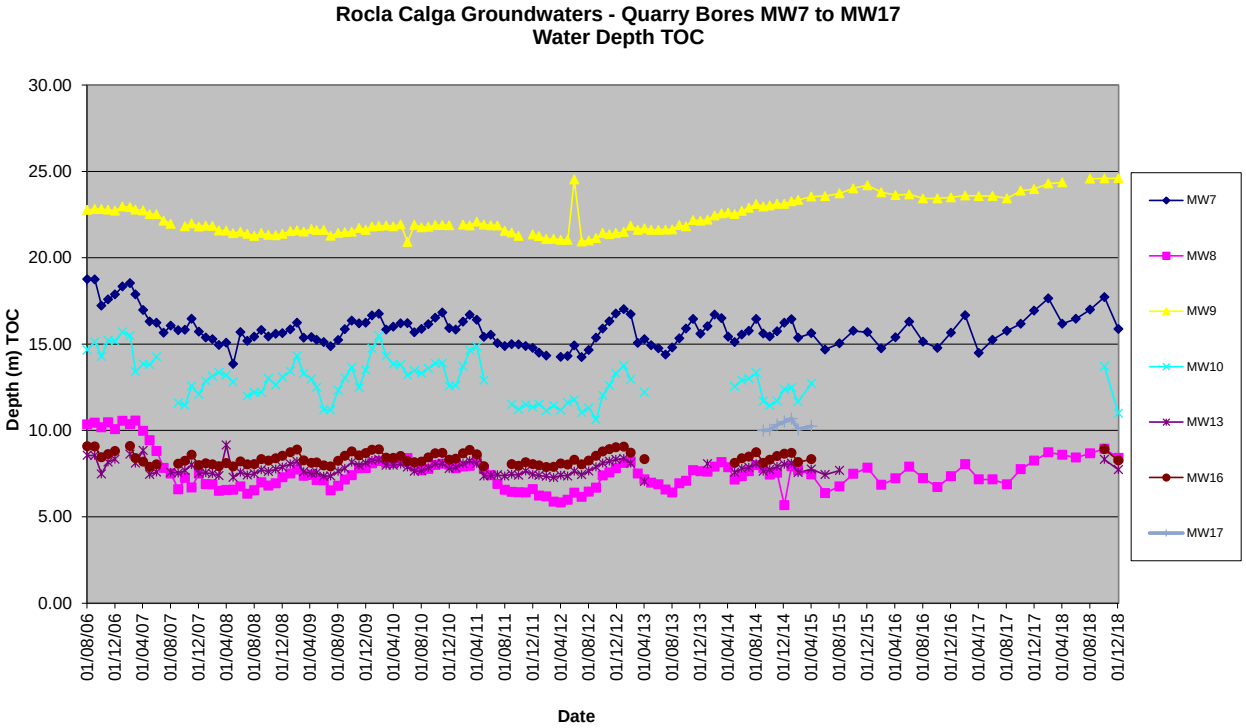
Date
CP3
CP4
CP5
CP6
CP7
CP8


Rocla Calga Groundwaters - Quarry Bores MW7 to MW17
Water Depth TOC
Depth (m) TOC
30.00
25.00
20.00
15.00
10.00
5.00
0.00
01/08/06
01/12/06
01/04/07
01/08/07
01/12/07
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01/12/18
Date
MW7
MW8
MW9
MW10
MW13
MW16
MW17

2.4 Meteorological Monitoring

The Calga Quarry weather station data recovery in November 2018 was approximately 87.5%. No data was available at the station on the 7 and 8 November 2018.

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 November 2018 shows that rainfall recorded at the Calga Quarry was above the Gosford BOM mean rainfall however below the Peats Ridge long term rainfall for November.

The rainfall comparison is provided below:

Calga Quarry	77.2 mm
BOM Peats Ridge*	NA
BOM Gosford*	41.2 mm
BOM Peats Ridge Long term mean for November*	100.7 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).

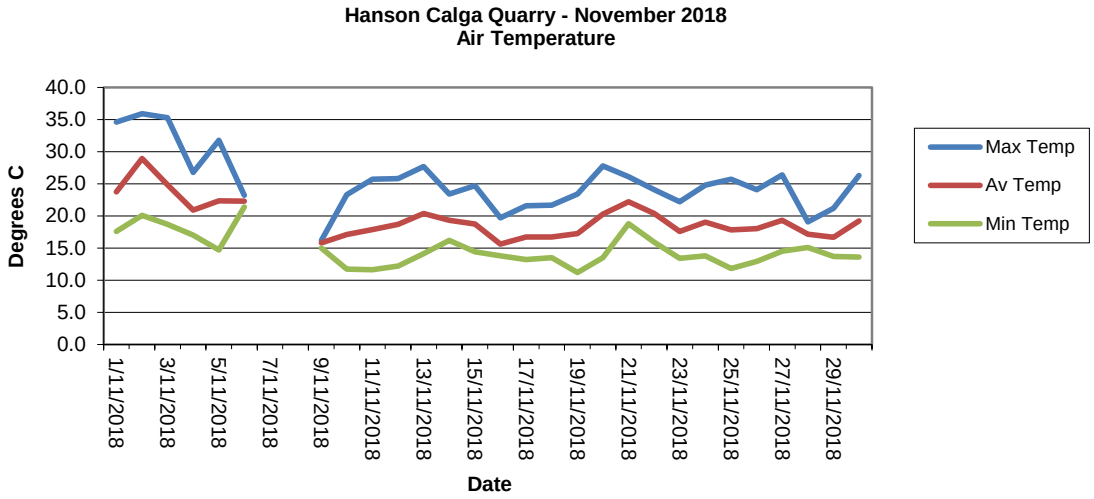
2.4.1 Monthly Meteorological Data Summary

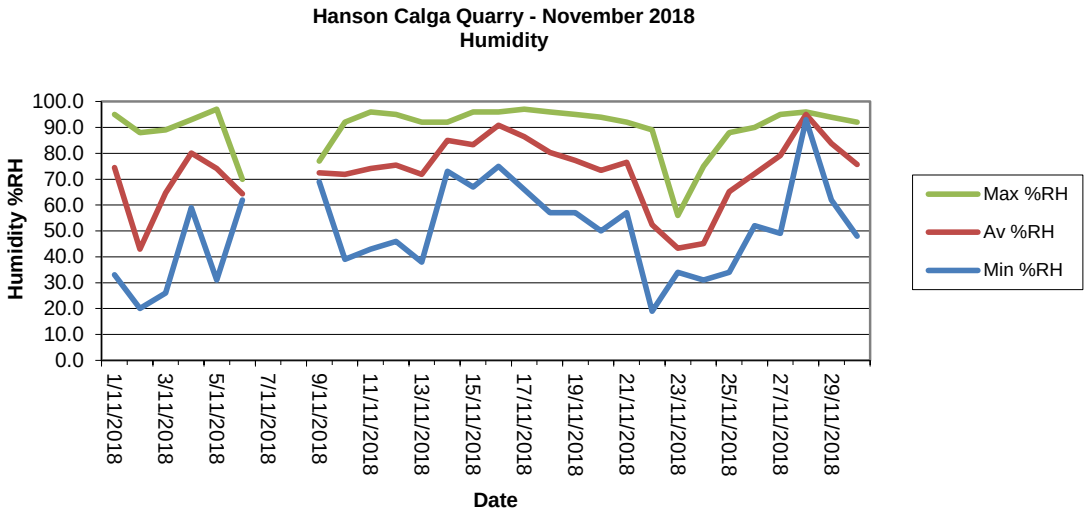
Summary **Nov-18** **Hanson - Calga**

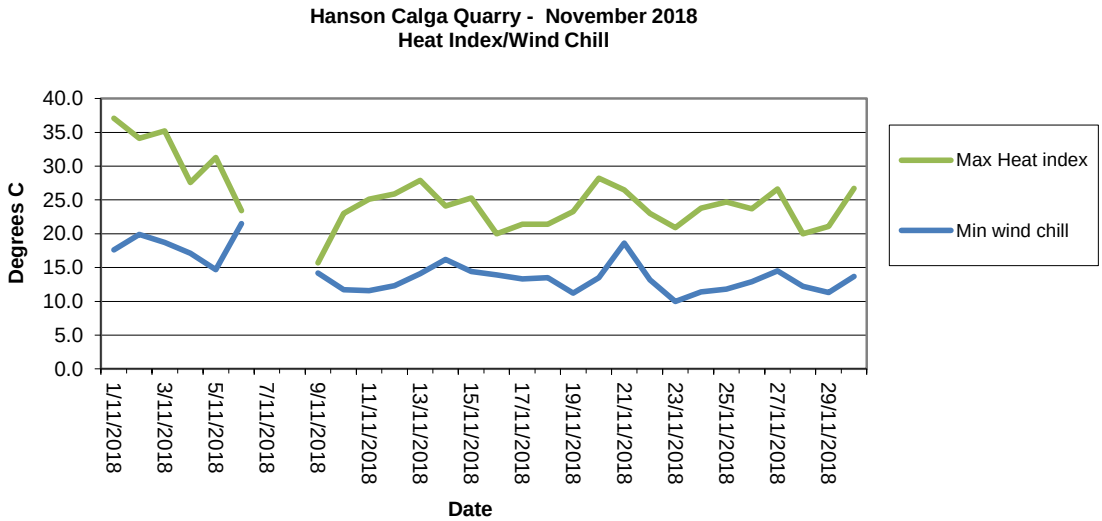
Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atm P	Av Atm P	Max Atm P	Min Data %	Av data %	Max Data %
1/11/2018	17.6	23.7	34.6	33.0	74.5	95.0	0.0	0.0	2.0	8.5	17.6	37.1	1016.3	1019.7	1023.2	44.9	76.2	94.8
2/11/2018	20.1	28.9	35.9	20.0	43.0	88.0	1.4	0.0	3.6	16.1	19.9	34.1	1008.9	1014.4	1017.6	64.0	77.8	91.1
3/11/2018	18.7	24.8	35.3	26.0	64.6	89.0	0.0	0.9	3.8	13.9	18.7	35.2	1009.1	1012.0	1016.7	71.7	88.1	94.2
4/11/2018	17.0	20.9	26.8	59.0	80.1	93.0	0.0	0.0	2.7	9.8	17.1	27.6	1009.6	1013.4	1016.8	80.0	87.4	92.6
5/11/2018	14.7	22.3	31.8	31.0	74.1	97.0	0.2	0.0	1.2	6.3	14.7	31.3	1008.9	1010.2	1011.3	50.8	83.0	97.5
6/11/2018	21.4	22.3	23.2	62.0	64.4	70.0	0.0	0.4	1.1	4.5	21.5	23.4	1008.2	1009.0	1011.0	90.2	93.5	97.5
7/11/2018																		
8/11/2018																		
9/11/2018	15.0	15.8	16.2	69.0	72.5	77.0	0.0	0.0	2.0	8.5	14.2	15.7	1018.4	1018.9	1019.2	68.0	73.4	79.1
10/11/2018	11.7	17.1	23.3	39.0	71.9	92.0	0.0	0.0	1.8	9.4	11.7	23.0	1017.3	1018.6	1020.6	71.1	85.7	97.5
11/11/2018	11.6	17.9	25.7	43.0	74.1	96.0	0.2	0.0	2.2	10.7	11.6	25.1	1019.2	1020.8	1022.9	70.8	84.3	92.0
12/11/2018	12.2	18.7	25.8	46.0	75.4	95.0	0.0	0.0	2.3	9.8	12.3	25.9	1019.8	1022.0	1024.0	60.9	83.9	100.0
13/11/2018	14.1	20.4	27.7	38.0	71.9	92.0	0.0	0.0	3.4	10.3	14.1	27.9	1015.2	1018.0	1020.9	69.2	86.2	100.0
14/11/2018	16.2	19.3	23.4	73.0	85.0	92.0	0.0	0.0	1.3	7.6	16.2	24.1	1014.1	1015.6	1017.3	71.7	88.0	100.0
15/11/2018	14.4	18.7	24.7	67.0	83.3	96.0	9.0	0.0	1.8	9.4	14.4	25.3	1014.6	1018.5	1023.2	66.5	88.8	100.0
16/11/2018	13.8	15.6	19.7	75.0	90.8	96.0	0.4	0.0	1.4	6.7	13.9	20.0	1018.4	1020.6	1022.6	44.3	83.6	99.4
17/11/2018	13.2	16.7	21.6	66.0	86.4	97.0	2.2	0.0	1.5	8.9	13.3	21.4	1017.3	1019.9	1023.1	66.2	83.4	99.4
18/11/2018	13.5	16.7	21.7	57.0	80.3	96.0	1.8	0.0	2.0	10.3	13.5	21.4	1021.9	1023.2	1024.4	73.8	82.5	89.8
19/11/2018	11.2	17.2	23.4	57.0	77.2	95.0	0.0	0.0	2.2	9.8	11.2	23.3	1017.1	1020.2	1023.3	73.5	90.0	99.1
20/11/2018	13.5	20.3	27.8	50.0	73.4	94.0	0.2	0.0	2.5	11.6	13.5	28.2	1005.6	1011.6	1017.9	52.3	88.0	100.0
21/11/2018	18.8	22.2	26.1	57.0	76.5	92.0	1.2	0.9	2.6	10.7	18.6	26.5	998.9	1001.7	1006.0	45.5	79.0	100.0
22/11/2018	15.9	20.4	24.1	19.0	52.4	89.0	0.2	0.4	4.8	19.2	13.2	23.0	997.8	999.4	1003.1	52.9	78.6	93.5
23/11/2018	13.4	17.6	22.2	34.0	43.3	56.0	0.0	3.6	7.6	19.2	10.0	20.9	999.2	1001.2	1003.4	60.9	80.1	95.7
24/11/2018	13.8	19.0	24.8	31.0	45.1	75.0	0.0	0.0	4.7	13.4	11.4	23.8	1000.9	1002.3	1003.8	63.4	88.6	98.5
25/11/2018	11.8	17.8	25.7	34.0	65.2	88.0	0.0	0.0	1.8	10.7	11.8	24.7	998.5	1001.5	1003.8	78.8	86.5	94.8
26/11/2018	12.9	18.0	24.1	52.0	72.1	90.0	0.0	0.0	2.1	10.7	12.9	23.7	1002.5	1005.4	1008.8	44.9	78.3	96.3
27/11/2018	14.5	19.3	26.4	49.0	79.1	95.0	6.0	0.0	2.9	11.6	14.5	26.6	1003.5	1005.9	1008.1	61.8	85.0	98.5
28/11/2018	15.1	17.2	19.1	93.0	95.0	96.0	53.4	0.4	4.0	13.4	12.2	20.0	996.0	1000.3	1006.4	56.9	79.0	95.7
29/11/2018	13.7	16.7	21.2	62.0	83.7	94.0	1.0	0.9	3.8	14.8	11.3	21.1	1005.8	1009.1	1012.7	69.2	84.2	100.0
30/11/2018	13.6	19.2	26.3	48.0	75.7	92.0	0.0	0.0	2.0	8.9	13.7	26.7	1008.0	1010.8	1013.1	42.5	78.2	98.5
Monthly	11.2	19.5	35.9	19	73	97	77.2	0	2.7	19.2	10.0	37.1	996.0	1012.3	1024.4	42.5	83.6	100

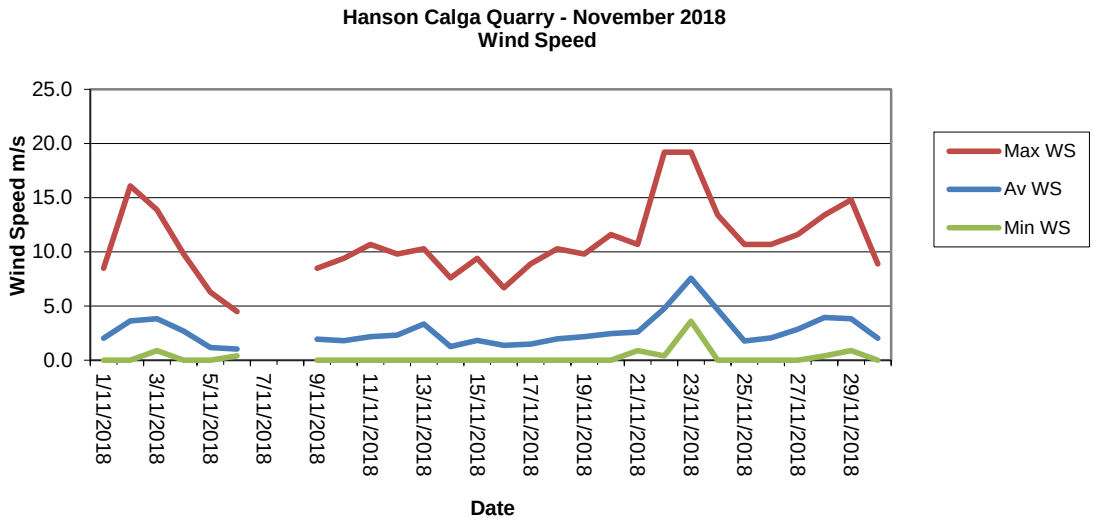
No data

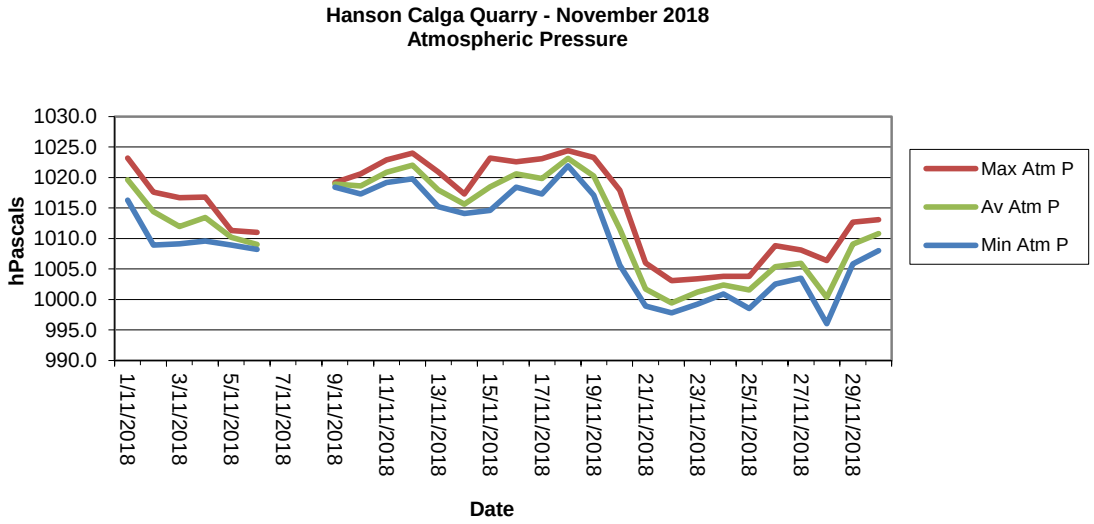
2.4.2 Monthly Weather Charts

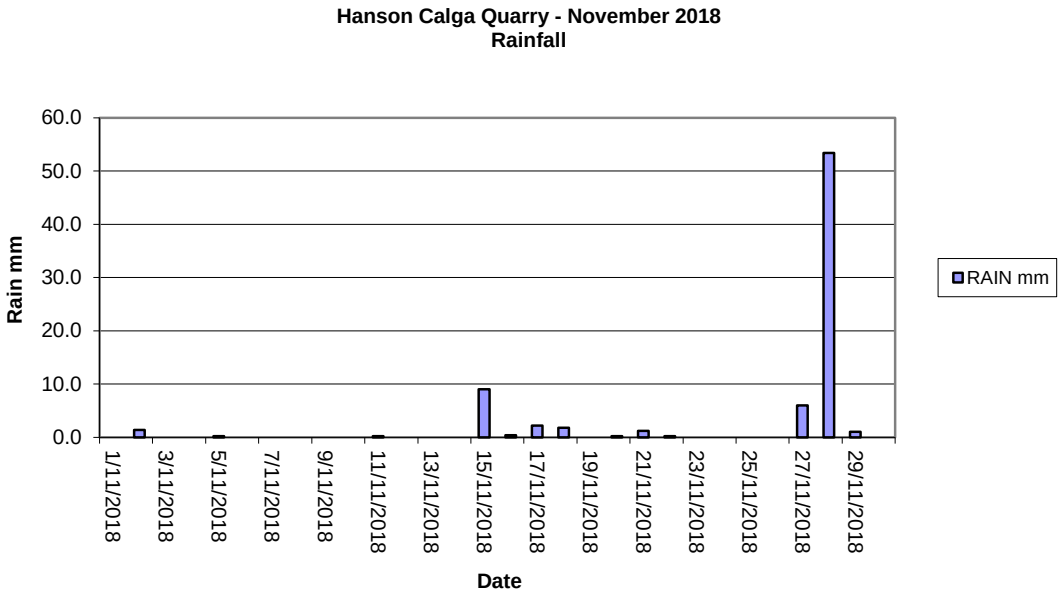


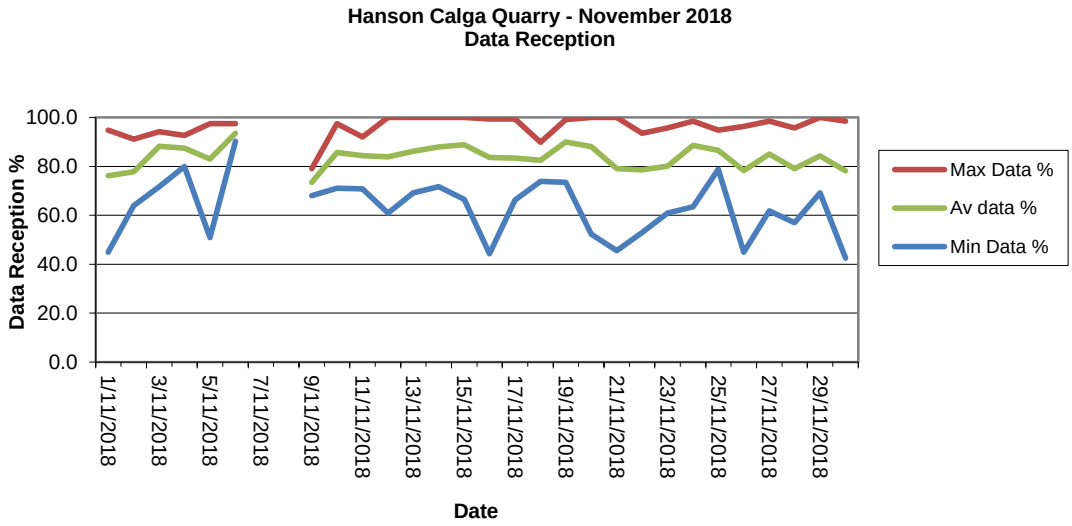





Hanson Calga Quarry - November 2018
Wind Speed
Wind Speed m/s
25.0
20.0
15.0
10.0
5.0
0.0
1/11/2018
3/11/2018
5/11/2018
7/11/2018
9/11/2018
11/11/2018
13/11/2018
15/11/2018
17/11/2018
19/11/2018
21/11/2018
23/11/2018
25/11/2018
27/11/2018
29/11/2018
Date
Max WS
Av WS
Min WS


Hanson Calga Quarry - November 2018
Atmospheric Pressure
hPascals
1030.0
1025.0
1020.0
1015.0
1010.0
1005.0
1000.0
995.0
990.0
1/11/2018
3/11/2018
5/11/2018
7/11/2018
9/11/2018
11/11/2018
13/11/2018
15/11/2018
17/11/2018
19/11/2018
21/11/2018
23/11/2018
25/11/2018
27/11/2018
29/11/2018
Date
Max Atm P
Av Atm P
Min Atm P

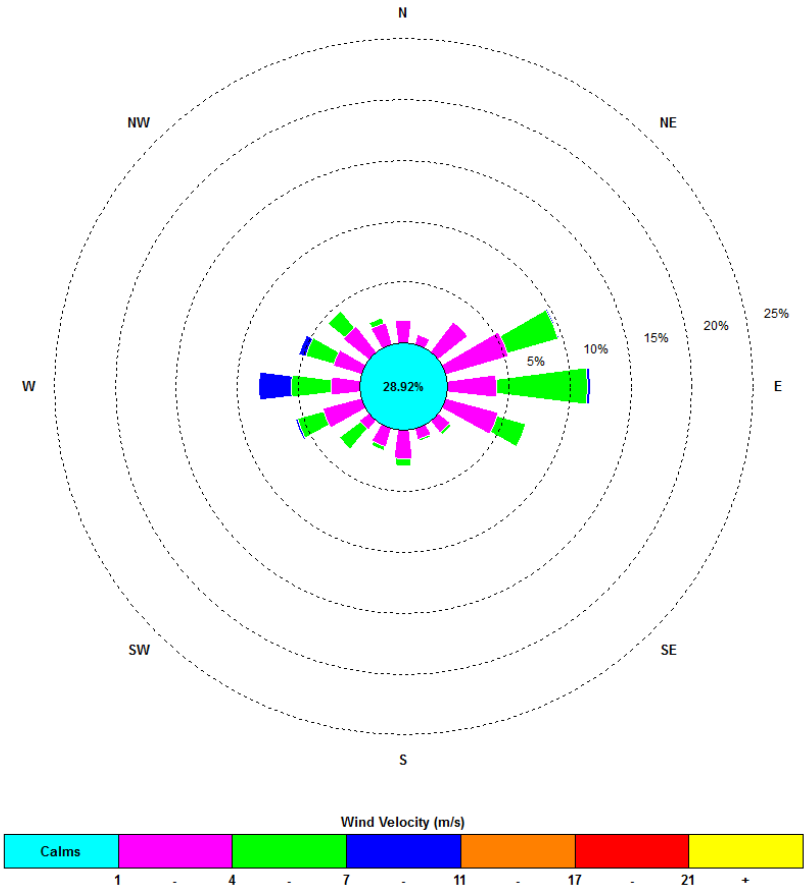

Hanson Calga Quarry - November 2018
Rainfall
Rain mm
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1/11/2018
3/11/2018
5/11/2018
7/11/2018
9/11/2018
11/11/2018
13/11/2018
15/11/2018
17/11/2018
19/11/2018
21/11/2018
23/11/2018
25/11/2018
27/11/2018
29/11/2018
Date
RAIN mm


Hanson Calga Quarry - November 2018
Data Reception
Data Reception %
100.0
80.0
60.0
40.0
20.0
0.0
1/11/2018
3/11/2018
5/11/2018
7/11/2018
9/11/2018
11/11/2018
13/11/2018
15/11/2018
17/11/2018
19/11/2018
21/11/2018
23/11/2018
25/11/2018
27/11/2018
29/11/2018
Date
Max Data %
Av data %
Min Data %

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 at less than a 15-minute average of 1m/s.

0:00, 1 November 2018 – 23: 45, 30 November 2018



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

Appendix 1

Field Sheets

Chain of Custody

Laboratory Certificates

DEPOSITIONAL DUST MONITORING

Client: ..... **Hanson Calga Quarry** ..... Date Installed: 2.11.18 Collection Start Time: 9.00 Sampled By: Leesa + Jonas

Date Collected: 4.12.18 Collection Stop Time: 13.20 Sampling ID: Hanson

Site	Time Collected	Water Level (mL)	Insoluble Material (✓ = slight, ✓ ✓ = mod etc)				Water Turbidity	Water Colour	Stand Level (Y/N)	Funnel Level (Y/N)	New Funnel Diameter (mm)	Comments
			Insects	Bird droppings	Vegetation	Dust						
CD1	13.05	1600	✓		✓	✓	C S T	C O Bn Gn Gy	Y	Y	—	
CD2C	11.30	1900	✓		✓	✓	C S T	C O Bn Gn Gy	Y	Y	—	
CD3	9.20	1999	✓		✓✓	✓	C S T	C O Bn Gn Gy	Y	Y	—	
CD4	10.15	1999	✓		✓✓	✓	C S T	C O Bn Gn Gy	Y	Y	—	
CD5	10.35	1998			✓	✓	C S T	C O Bn Gn Gy	Y	Y	—	
CD6	11.00	1999	✓		✓	✓	C S T	C O Bn Gn Gy	Y	Y	—	
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				
							C S T	C O Bn Gn Gy				

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: _____

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: CBased Environmental Pty Ltd

POSTAL ADDRESS: 47 Boomerang St CESSNOCK NSW 2325

SEND REPORT TO: monitoringresults@cbased.com.au

SEND INVOICE TO: admin@cbased.com.au, renae.mikka@cbased.com.au

DATA NEEDED BY: 7 working days

REPORT NEEDED BY: 7 working days

PROJECT ID: Hanson Calga Dusts

QUOTE NO.: SYBQ 222-16

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DIPOSAL:

Total unless specified

FOR LAB USE ONLY
COOLER SEAL
Yes ..... No .....
Broken ..... Intact .....
COOLER TEMP: deg.C

LABORATORY BATCH NO.:

SAMPLERS: CBased Environmental Pty Ltd

Australian Laboratory Services Pty Ltd

PHONE: 0265713334 E-MAIL: monitoringresults@cbased.com.au

REPORT FORMAT: HARD: Yes FAX: DISK: BULLETIN BOARD: E-MAIL: Yes

QC LEVEL: QCS1: QCS2: QCS3: Yes QCS4:

ANALYSIS REQUIRED

SAMPLE DATA: SAMPLE ID	MATRIX	DATE ON	DATE OFF	CONTAINER DATA: TYPE & PRESERVATIVE	NO.	Insoluable Soldis	Ash Residue	Combustable Matte	NOTES
CD1	Dust	2·11·18	4·12·18			x	x	x	
CD2c	Dust					x	x	x	
CD3	Dust					x	x	x	
CD4	Dust					x	x	x	
CD5	Dust					x	x	x	
CD6	Dust					x	x	x	

Environmental Division
Newcastle
Work Order Reference
EN1808189

Telephone: +61 2 4014 2500

RELINQUISHED BY:

NAME: [signature] King DATE: 5-12-18

OF: CBased Environmental TIME: 2:50.

NAME: DATE:

OF: TIME:

RECEIVED BY

NAME: [signature] DATE: 5/12/18

OF: 2-50pm TIME:

NAME: DATE:

OF: TIME:

METHOD OF SHIPMENT

CONSIGNMENT NOTE NO.

TRANSPORT CO. NAME.

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced 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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1808189**	Page	: 1 of 4
Client	: **CBASED ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Newcastle
Contact	: All Deliverables	Contact	:
Address	: Unit 3 2 Enterprise Cres Singleton NSW 2330	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
Telephone	: +61 02 6571 3334	Telephone	: +61 2 4014 2500
Project	: Hanson Calga Dusts	Date Samples Received	: 05-Dec-2018 14:50
Order number	: ----	Date Analysis Commenced	: 07-Dec-2018
C-O-C number	: ----	Issue Date	: 13-Dec-2018 15:31
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		

ilac-MRA NATA
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. 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**)

Compound	CAS Number	LOR	Unit	Client sample ID	CD1 02/11/18 - 04/12/18	CD2c 02/11/18 - 04/12/18	CD3 02/11/18 - 04/12/18	CD4 02/11/18 - 04/12/18	CD5 02/11/18 - 04/12/18
				Client sampling date / time	04-Dec-2018 00:00	04-Dec-2018 00:00	04-Dec-2018 00:00	04-Dec-2018 00:00	04-Dec-2018 00:00
					EN1808189-001	EN1808189-002	EN1808189-003	EN1808189-004	EN1808189-005
					Result	Result	Result	Result	Result
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		**3.5**	**1.4**	**1.7**	**0.8**	**0.7**
Ash Content (mg)	----	1	mg		**66**	**27**	**32**	**16**	**13**
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		**0.6**	**1.7**	**0.4**	**0.8**	**0.4**
Combustible Matter (mg)	----	1	mg		**11**	**32**	**8**	**15**	**7**
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		**4.1**	**3.1**	**2.1**	**1.6**	**1.1**
Total Insoluble Matter (mg)	----	1	mg		**77**	**59**	**40**	**31**	**20**

Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST** (Matrix: **AIR**)				Client sample ID	**CD6 02/11/18 - 04/12/18**	**----**	**----**	**----**	**----**
				Client sampling date / time	04-Dec-2018 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EN1808189-006**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		**0.9**	**----**	**----**	**----**	**----**
Ash Content (mg)	----	1	mg		**17**	**----**	**----**	**----**	**----**
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		**0.4**	**----**	**----**	**----**	**----**
Combustible Matter (mg)	----	1	mg		**8**	**----**	**----**	**----**	**----**
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		**1.3**	**----**	**----**	**----**	**----**
Total Insoluble Matter (mg)	----	1	mg		**25**	**----**	**----**	**----**	**----**

CBased Environmental Pty Limited

Date: 4.12.18

Todays Collection	
Time Start:	8.30
Time Finish:	12.45

SURFACE WATERS

Client : Hanson Calga

Project :

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	Dam	N	9.10	1x 250ml GP, 1x 500mL GP, 1x PG	C S T	C LO O B G	
B	DRY	~~N~~	9.15	~~1x 250ml GP, 1x 500mL GP, 1x PG~~	~~C S T~~	~~C LO O B G~~	
C1	Dam	N	12.20	1x 250ml GP, 1x 500mL GP, 1x PG	C S T	C LO O B G	
C2	trickle	N	12.30	1x 250ml GP, 1x 500mL GP, 1x PG	C S T	C LO O B G	
D	still	~~N~~	~~9.00~~	~~1x 250ml GP, 1x 500mL GP, 1x PG~~	~~C S T~~	~~C LO O B G~~	Not flowing
F	Dam	N	9.00	1x 250ml GP, 1x 500mL GP, 1x PG	C S T	C LO O B G	
					C S T	C LO O B G	
					C S T	C LO O B G	
					C S T	C LO O B G	
					C S T	C LO O B G	
					C S T	C LO 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: JM

Sampled by: Leesa + Jonas

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: CBased Environmental Pty Ltd

POSTAL ADDRESS: PO Box 245 CESSNOCK NSW 2325

SEND REPORT TO: monitoringresults@cbased.com.au

SEND INVOICE TO: renae.mikka@cbased.com.au

DATA NEEDED BY: 5 working days

REPORT NEEDED BY: 5 working days

PROJECT ID: Hanson Quarry SW

QUOTE NO.: SYBQ-222-16

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DIPOSAL:

Total unless specified

FOR LAB USE ONLY
COOLER SEAL
Yes ..... No .....
Broken ..... Intact .....
COOLER TEMP deg.C 21.1

LABORATORY BATCH NO.:

SAMPLERS: CBased Environmental Pty Ltd

PHONE: 0265713334 E-MAIL: monitoringresults@cbased.com.au

REPORT FORMAT: HARD: Yes FAX: DISK: BULLETIN BOARD: E-MAIL: Yes

QC LEVEL: QCS1: QCS2: QCS3: Yes QCS4:

Australian Laboratory Services Pty Ltd

ANALYSIS REQUIRED

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	Ph	EC	TSS	TDS	O + G	NOTES
A	Water	4.12.18	9.10	1x 250mlGP,1x 500mLGP,1xPG		x	x	x	x	x	
~~B~~	~~Water~~			~~1x 250mlGP,1x 500mLGP,1xPG~~		~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	
C1	Water		12.20	1x 250mlGP,1x 500mLGP,1xPG		x	x	x	x	x	
C2	Water		12.30	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:							

Environmental Division
Sydney
Work Order Reference
ES1836485
Telephone: + 61-2-8784 8555

RELINQUISHED BY:
NAME: Leesa King DATE: 5-12-18
OF: CBased Environmental TIME: 2:50
NAME: DATE:
OF: TIME:

RECEIVED BY
NAME: 2.50pm DATE: 5/12/18
OF: TIME:
NAME: DATE:
OF: TIME:

METHOD OF SHIPMENT

CONSIGNMENT NOTE NO.

TRANSPORT CO. NAME.

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced 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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1836485**	Page	: 1 of 2
Client	: **CBASED ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: All Deliverables	Contact	: Customer Services ES
Address	: Unit 3 2 Enterprise Cres Singleton NSW 2330	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6571 3334	Telephone	: +61-2-8784 8555
Project	: HANSON QUARRY SW	Date Samples Received	: 05-Dec-2018 14:52
Order number	: ----	Date Analysis Commenced	: 06-Dec-2018
C-O-C number	: ----	Issue Date	: 11-Dec-2018 13:47
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		

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. 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*
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.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**A**	**C1**	**C2**	**F**	**----**
			Client sampling date / time	04-Dec-2018 09:10	04-Dec-2018 12:20	04-Dec-2018 12:30	04-Dec-2018 09:00	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1836485-001**	**ES1836485-002**	**ES1836485-003**	**ES1836485-004**	**--------**
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.60**	**6.83**	**6.73**	**5.08**	**----**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**133**	**112**	**111**	**107**	**----**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**104**	**75**	**76**	**84**	**----**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	**5**	<5	**----**
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	**----**

C Based Environmental Pty Limited

Todays Collection	
Time Start:	8.30
Time Finish:	13.20

Date: 4.12.18

GROUNDWATERS

Client : Hanson Calga
Project :

Site	DEPTH	Typical Depth (m)	Odour	Water Turbidity	Water Colour	1		2		Bottles (Apr/Oct)	Downloaded Logger? (Y/N)*	
						pH	EC	pH	EC			
CQ3	10.87	10.94	No	C S T	C LO O B G	6.37	175.2uS	6.25	1538uS	1x 250ml GP, 1x 500mL GP, 1RP	Yes	
CQ4	11.76	10.52	Yes	C S T	C LO O B G	5.81	202uS	5.80	209uS	1x 250ml GP, 1x 500mL GP, 1RP	No logger	
CQ5	8.65	7.06	No	C S T	C LO O B G	4.28	228uS	4.28	229uS	1x 250ml GP, 1x 500mL GP, 1RP		
CQ6				C S T	C LO O B G					1x 250ml GP, 1x 500mL GP, 1RP		Covered in paddock
CQ7	6.54	6.46	No	C S T	C LO O B G	4.50	162.5uS	4.51	163.8uS	1x 250ml GP, 1x 500mL GP, 1RP	No logger	
CQ8	7.52	6.24	No	C S T	C LO O B G	4.20	209.uS	4.20	210.uS	1x 250ml GP, 1x 500mL GP, 1RP	Yes	
CQ9				C S T	C LO O B G					1x 250ml GP, 1x 500mL GP, 1RP		Blocked
CQ10	26.90	26.41	No	C S T	C LO O B G	4.42	193.9uS	4.39	194.8uS	1x 250ml GP, 1x 500mL GP, 1RP	Yes	
CQ11S	12.56	11.02	Yes	C S T	C LO O B G	5.22	207uS	5.35	202uS	1x 250ml GP, 1x 500mL GP, 1RP	No logger	
CQ11D	13.58	12.19	No	C S T	C LO O B G	4.72	206uS	4.65	204uS	1x 250ml GP, 1x 500mL GP, 1RP	Yes	
CQ12	5.85	4.44	No	C S T	C LO O B G	4.31	186uS	4.30	186.5uS	1x 250ml GP, 1x 500mL GP, 1RP	No logger	
CQ13	15.26	14.14	No	C S T	C LO O B G	4.19	238uS	4.20	239uS	1x 250ml GP, 1x 500mL GP, 1RP	No logger	
CP3				C S T	C LO O B G					1x 250ml GP, 1x 500mL GP, 1RP		Removed
CP4	9.74			C S T	C LO O B G	Large bailer don't fit. small one gets				1x 250ml GP, 1x 500mL GP, 1RP		no water. Could be blocked.
CP5	10.10	8.59	NO	C S T	C LO O B G	4.68	193.4uS	4.54	195.1uS	1x 250ml GP, 1x 500mL GP, 1RP		
CP6	12.02	10.79	NO	C S T	C LO O B G	4.13	213.uS	4.20	211.uS	1x 250ml GP, 1x 500mL GP, 1RP		
CP7	3.73	3.78	NO	C S T	C LO O B G	4.71	141.7uS	4.68	140.1uS	1x 250ml GP, 1x 500mL GP, 1RP		
CP8	22.74	22.15	NO	C S T	C LO O B G	4.31	182uS	4.35	179.7uS	1x 250ml GP, 1x 500mL GP, 1RP		
MW7	15.87	16.11	No	C S T	C LO O B G	4.48	178.1uS	4.49	177.1uS	1x 250ml GP, 1x 500mL GP, 1RP	Yes	
MW8	8.41	7.86	No	C S T	C LO O B G	4.57	139.6uS	4.53	138.6uS	1x 250ml GP, 1x 500mL GP, 1RP	No logger	
MW9	24.61	23.87	No	C S T	C LO O B G	4.98	151.1uS	4.74	152.5uS	1x 250ml GP, 1x 500mL GP, 1RP	No logger	
MW10	10.99		NO	C S T	C LO O B G	4.28	181.1uS	4.30	182.9uS	1x 250ml GP, 1x 500mL GP, 1RP	No logger	
MW13	7.73		NO	C S T	C LO O B G	4.15	173.3uS	4.14	175.4uS	1x 250ml GP, 1x 500mL GP, 1RP		
MW16	8.26		NO	C S T	C LO O B G	4.42	166.9uS	4.46	168uS	1x 250ml GP, 1x 500mL GP, 1RP		
MW17				C S T	C LO O B G					1x 250ml GP, 1x 500mL GP, 1RP		Wrong Look we don't have key

*If unable to download logger please provide comment/ explanation above

Turbidity: C=Clear, S= Slight, T=Turbid (CIRCLE)
pH/EC meter #: W1157

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

Signed:

Sampled by: Leesa + Jonas

Due: 5/12/2018

ALS ENVIRONMENTAL

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: Hanson Calga Quarry - 151 Peats Ridge Rd Calga NSW 2250

OFFICE:

PROJECT: Hanson Calga Surface Water Monitoring

ORDER NUMBER: 4502500368

PROJECT MANAGER: Shane Pescud — CONTACT PH: (02) 4375 1151

SAMPLER: Shane Pescud — SAMPLER MOBILE: 0425 290 692

COC emailed to ALS? Provided on reciept of samples — EDD FORMAT (or default):

Email Reports to: shane.pescud@hanson.com.au & monitoringresults@cbased.com.au

Email invoive to: nsw.accounts@hanson.com.au & chanae.delany@hanson.com.au

TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)

☑ Standard TAT (List due date):

☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SYBQ 222-16

COC SEQUENCE NUMBER (Circle) — COC: 1 — OF: 1

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A (circled)
Free ice / frozen ice bricks present upon receipt? Yes No (circled) N/A
Random Sample Temperature on Receipt: 18.6
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Cain Bush			Sangeeta
DATE/TIME: 29/11/18 2pm	DATE/TIME:	DATE/TIME:	DATE/TIME: 29/11/2018 2:00p

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	pH	EC	TSS	TDS	Oil & Grease				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	Site A	29/11/2018 8:15am	W	1x P, 1x O&G	2	1	1	1	1	1				
2	Site B	29/11/2018 9:30am	W	1x P, 1x O&G	2	1	1	1	1	1				
3	Site C	29/11/2018 10:50am	W	1x P, 1x O&G	2	1	1	1	1	1				
4	Site D	29/11/2018 10:20am	W	1x P, 1x O&G	2	1	1	1	1	1				
5	Site F (Point 1) - Note: no discharge, sample only	29/11/2018 8:30am	W	1x P, 1x O&G	2	1	1	1	1	1				
				TOTAL	10	5	5	5	5	5				

Environmental Division
Sydney
Work Order Reference
ES1835737

Telephone: + 61-2-8784 8555

URGENT

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1835737**	Page	: 1 of 2
Client	: **CBASED ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: All Deliverables	Contact	: Customer Services ES
Address	: Unit 3 2 Enterprise Cres Singleton NSW 2330	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6571 3334	Telephone	: +61-2-8784 8555
Project	: Hanson Calga Quarry-151 Peats Ridge Rd Calga NSW 2250	Date Samples Received	: 29-Nov-2018 14:00
Order number	: 4502500368	Date Analysis Commenced	: 29-Nov-2018
C-O-C number	: ----	Issue Date	: 05-Dec-2018 15:38
Sampler	: Shane Pescud		
Site	:		
Quote number	: SYBQ/222/16 and PLANNED EVENTS		
No. of samples received	: 5		
No. of samples analysed	: 5		

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. 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*
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.

- 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	**Site A**	**Site B**	**Site C**	**Site D**	**Site F (Point 1) No discharge, Sample Only**
			Client sampling date / time	29-Nov-2018 08:15	29-Nov-2018 09:30	29-Nov-2018 10:50	29-Nov-2018 10:20	29-Nov-2018 08:30
Compound	*CAS Number*	*LOR*	*Unit*	**ES1835737-001**	**ES1835737-002**	**ES1835737-003**	**ES1835737-004**	**ES1835737-005**
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.39**	**7.07**	**6.58**	**5.53**	**5.05**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**132**	**158**	**100**	**89**	**106**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**83**	**81**	**45**	**78**	**84**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	**13**	**13**	<5	**14**
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	<5