



# CBased Environmental Pty Limited

ABN 62 611 924 264



**Calga Quarry**

Environmental Monitoring

Dust Deposition Gauges, Surface and Ground  
Waters and Meteorological Station

**January 2018**

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Environmental Scientist  
Date: 20 February 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 January 2018;
- Surface Water quality results for January 2018;
- Ground Water quality results for January 2018; and
- Meteorological report for January 2018.

The January 2018 dust deposition results for insoluble solids were generally low. 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<sup>2</sup>.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 January 2018.

Groundwater depth generally increased compared to December 2017, indicating water moving away from the surface. pH at all sites is in the acidic range and generally slightly decreased when compared to the previous results. EC levels were similar or increased slightly at a majority of groundwater sites when compared to the December 2017 results.

Data for January 2018 shows that rainfall recorded at the Calga Quarry was lower than the Gosford BOM mean rainfall and the Peats Ridge long term rainfall for December.

The rainfall comparison is provided below:

Calga Quarry	12.6 mm <sup>^</sup>
BOM Peats Ridge*	NA
BOM Gosford*	61.8 mm
BOM Peats Ridge Long term mean for December*	92.4 mm

NA = Not Available

<sup>^</sup>Rain data not based on a full set of data.

\*Data sourced from Bureau of Meteorology (BOM) website ([www.bom.gov.au](http://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<sup>2</sup>.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.

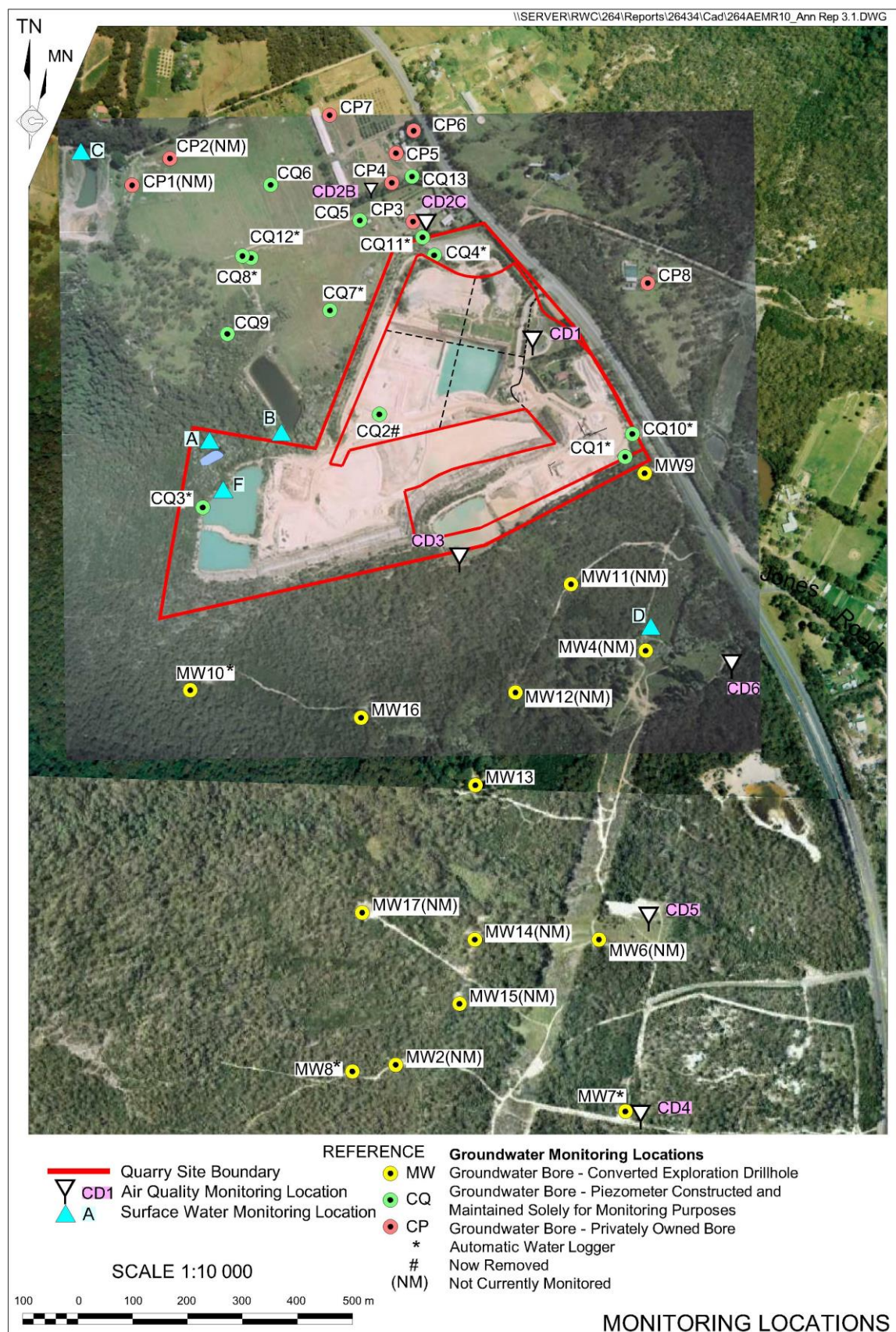
Meteorological monitoring is conducted at the quarry and displayed on the site computer with a real-time display. Metrological parameters are measured according to Australian Standard AS3580.14 *“Methods for sampling and analysis of ambient air. Meteorological monitoring for ambient air quality monitoring 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 January 2018 and the project 12-month rolling average. Results are in g/m<sup>2</sup>.month.

**Table 1: Dust Deposition results: 1 January 2018 – 1 February 2018 (30 days)**

Site	Monthly Insoluble Solids (g/m <sup>2</sup> .month)	Monthly Ash Residue (g/m <sup>2</sup> .month)	Monthly Combustible Matter (g/m <sup>2</sup> .month)	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids (g/m <sup>2</sup> .month)
<b>CD1</b>	3.8	3.5	0.3	92	2.2
<b>CD2c</b>	2.0	1.5	0.5	75	1.1
<b>CD3</b>	1.1	0.3	0.8	27	1.1
<b>CD4</b>	1.1	0.3	0.8	27	0.6
<b>CD5</b>	0.6	0.4	0.2	67	0.6
<b>CD6</b>	0.8	0.5	0.3	63	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<sup>2</sup>.month; the Development Consent's annual average amenity criteria at residential locations. The current rolling annual average is calculated from February 2017 to January 2018.

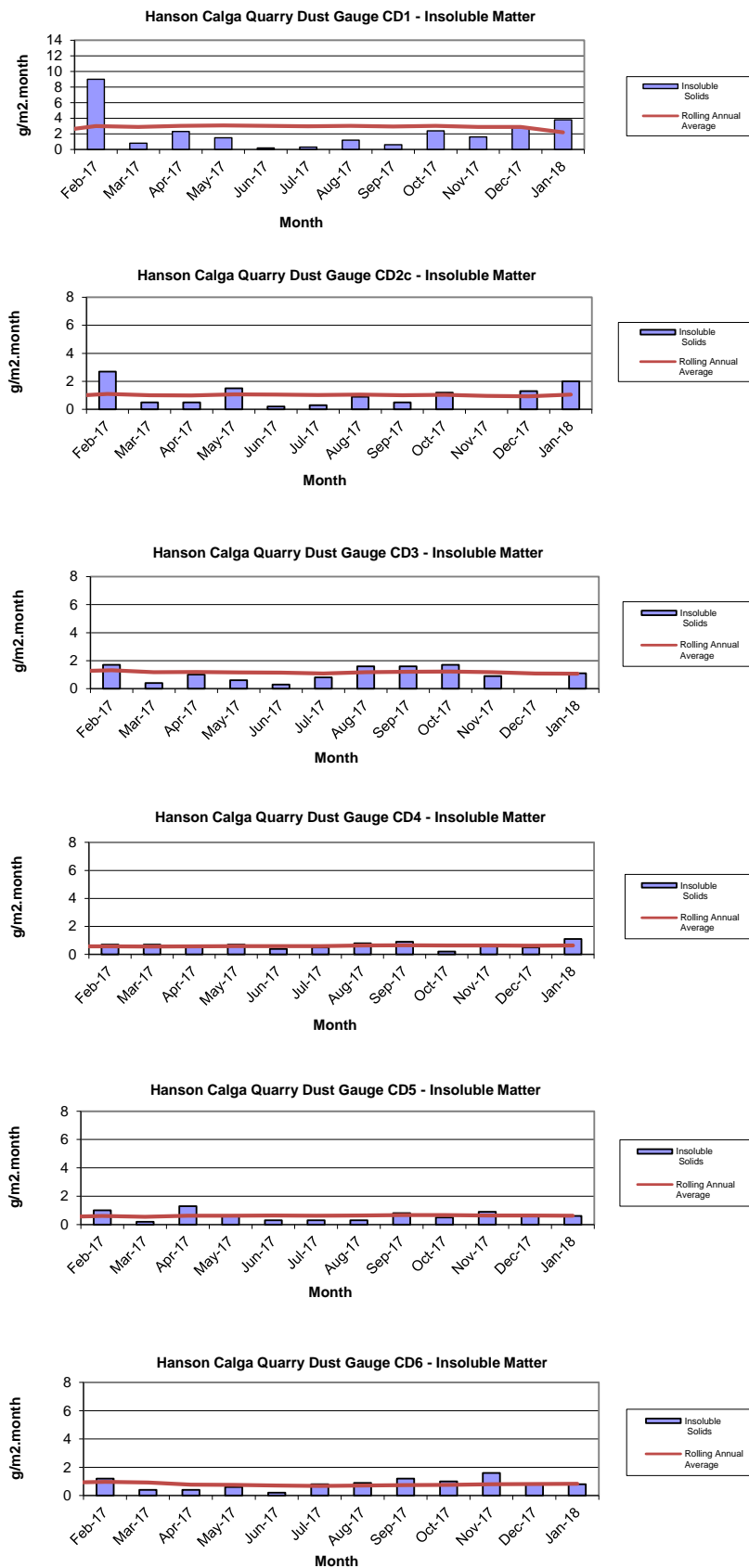
NA= Not Available.

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

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



**Figure 2: Dust Deposition Charts**



## 2.2 Surface Water Monitoring

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

**Table 2: Monthly surface water monitoring – January 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)
<b>A</b>	Dam	Brown	Clear	6.3	130	100	24	<5
<b>B</b>	Dry							
<b>C1</b>	Dam	Brown	Clear	6.76	116	86	17	<5
<b>C2</b>	Trickle	Clear	Clear	6.58	116	76	7	<5
<b>D</b>	Dry							
<b>F</b>	Dam	Clear	Clear	5.15	131	93	6	<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 January 2018.

### 2.2.1 Non-Routine Surface Water Sampling

No non-routine sampling was undertaken during January 2018.

## 2.3 Groundwater Monitoring

Bi-monthly groundwaters were sampled on 1 February 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 ( $\pm 0.1$  pH units) and Electrical Conductivity ( $\pm 5\%$ ) was obtained between samples. Data is displayed in **Table 3** and **Figures 3 to 6**.

Groundwater depth generally increased compared to December 2017, indicating water moving away from the surface. pH at all sites is in the acidic range and generally slightly decreased when compared to the previous results. EC levels were similar or increased slightly at a majority of groundwater sites when compared to the December 2017 results.

Bi-monthly groundwater monitoring is next scheduled for March 2018.

**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 ( $\mu\text{S/cm}$ ) This report
CQ1	Voutos	* Monitor	20.59	Removed		
CQ3	Voutos	* Monitor	10.53	12.62	6.27	119
CQ4	Voutos	* Monitor	8.78	11.45	5.14	111
CQ5	Gazzana	DIP Only	8.69			
CQ6	Gazzana	DIP Only	16.00	Removed		
CQ7	Gazzana	* Monitor	6.89	No access- gate locked by owner		
CQ8	Gazzana	* Monitor	11.03	No access- gate locked by owner		
CQ9	Gazzana	DIP Only	10.10	Unable to sample - pipe bent		
CQ10	Voutos	* Monitor	NI	27.12	4.41	131
CQ11S	Gazzana	* Monitor	NI	11.90	4.99	144
CQ11D	Gazzana	* Monitor	NI	13.20	4.62	140
CQ12	Gazzana	* Monitor	NI	No access- gate locked by owner		
CQ13	Kashouli	* Monitor	NI	15.60	4.23	168
CP3	Gazzana	Domestic	10.40	Destroyed		
CP4	Kashouli	Domestic	13.63	NM		
CP5	Kashouli	Domestic	16.61	10.50	4.13	135
CP6	Kashouli	Domestic	16.27	12.68	4.11	161
CP7	Kashouli	Production	8.56	7.80	4.28	83
CP8	Rozmanec	Domestic	22.17	22.81	Unable to sample- bailer does not fit	
MW7	Rocla Bore	* Monitor	15.76	17.65	4.46	104
MW8	Rocla Bore	* Monitor	9.82	8.73	4.40	73
MW9	Rocla Bore	* Monitor	22.44	24.30	5.12	83
MW10	Rocla Bore	* Monitor	15.41	No Access - track eroded		
MW13	Rocla Bore	DIP Only	NI	No Access - track eroded		
MW16	Rocla Bore	DIP Only	NI	No Access - tree across track		
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.

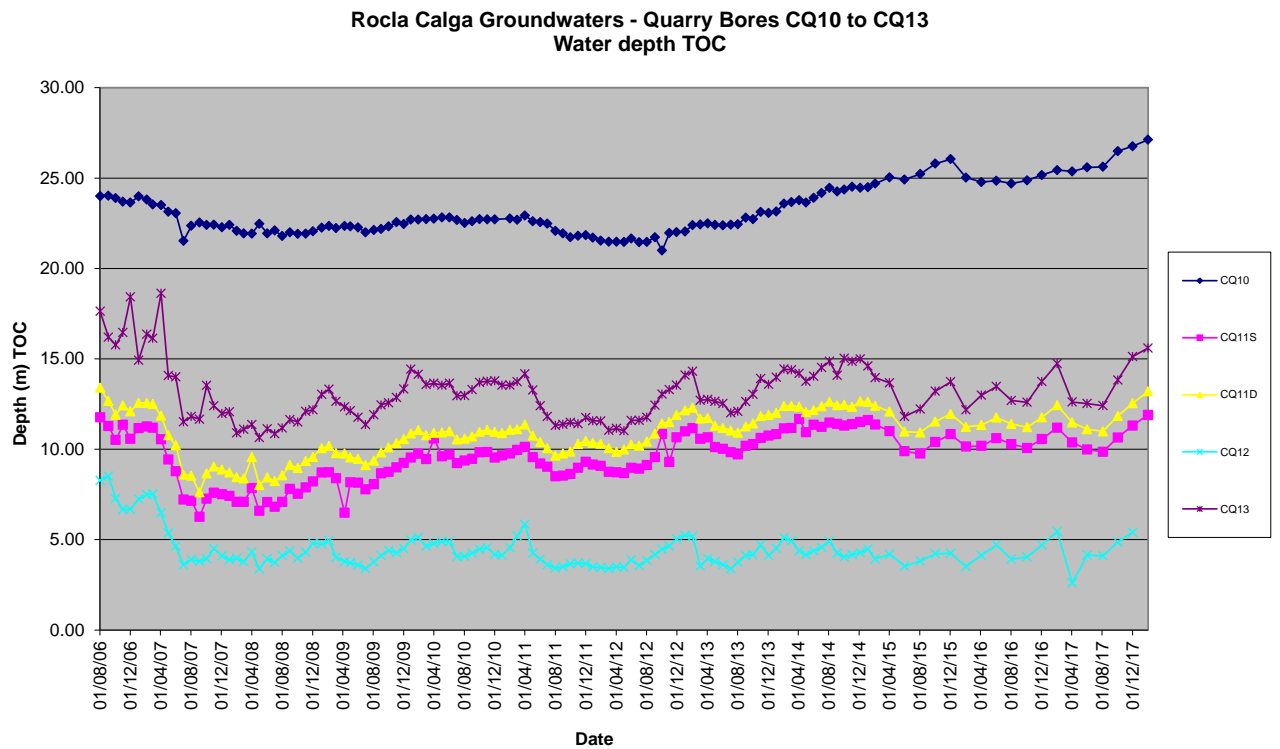
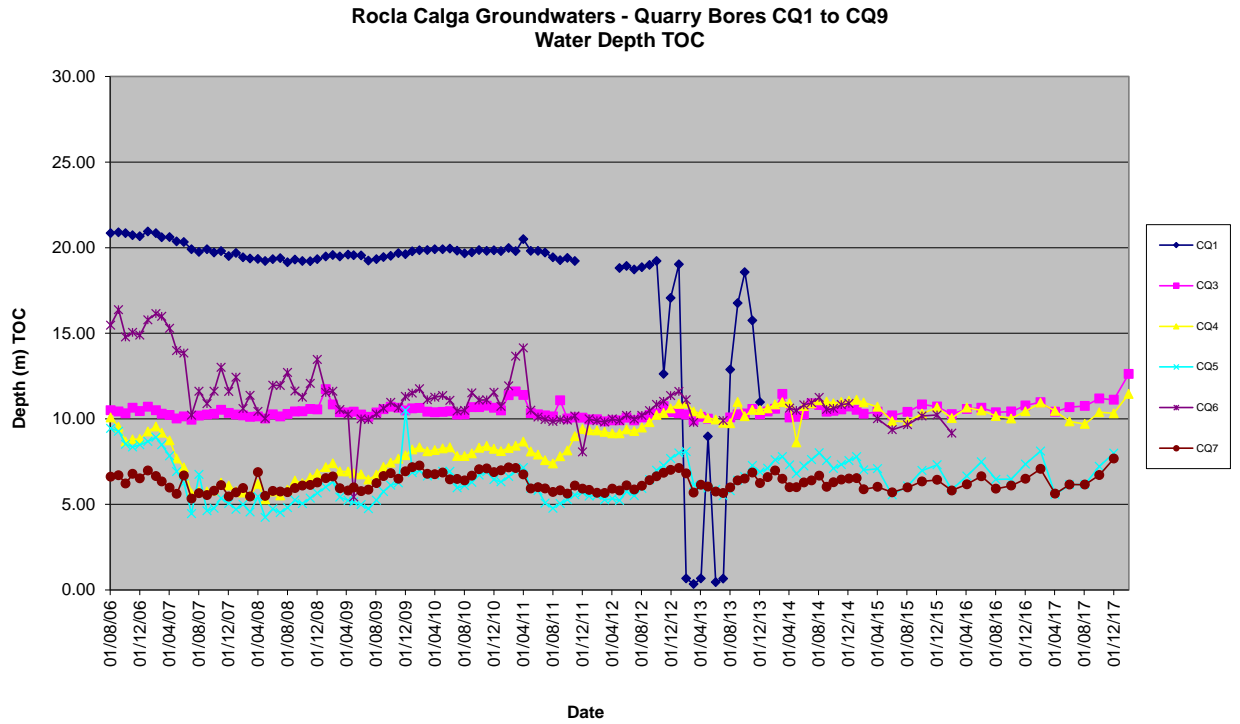
Shading is used to indicate the following trends in water depth (compared to the last reading):

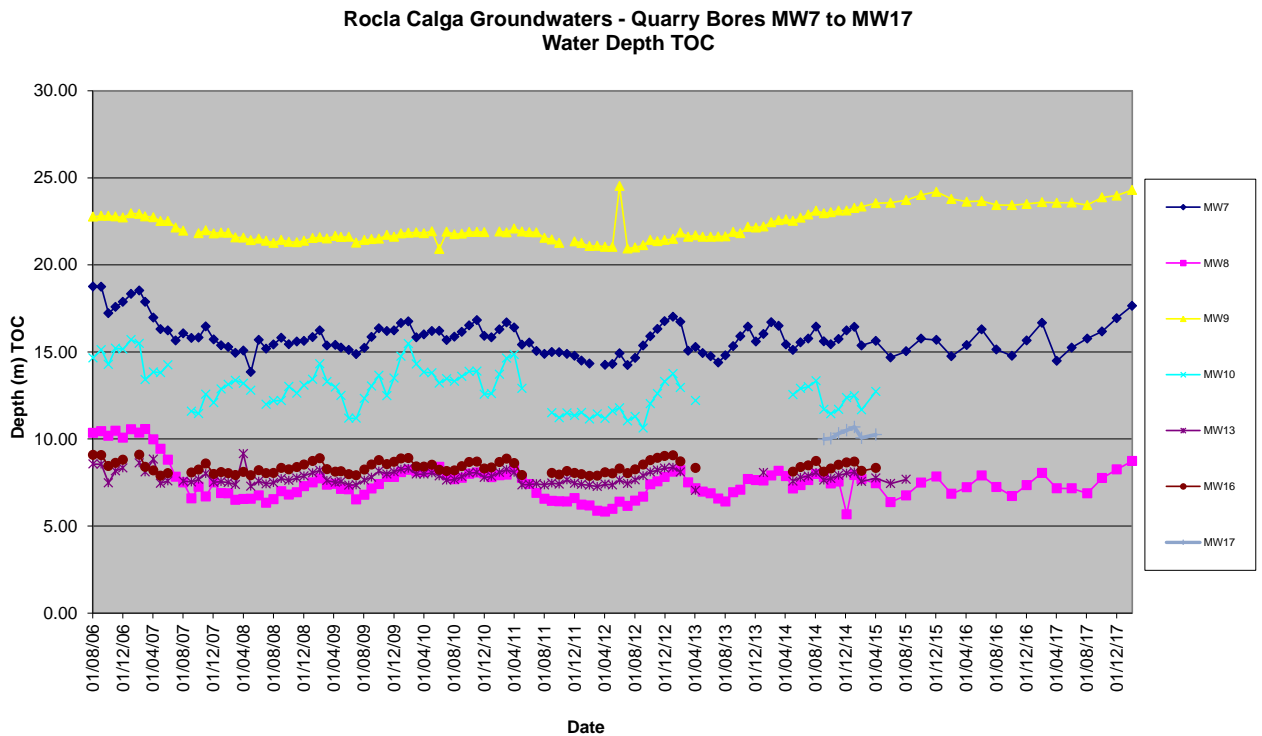
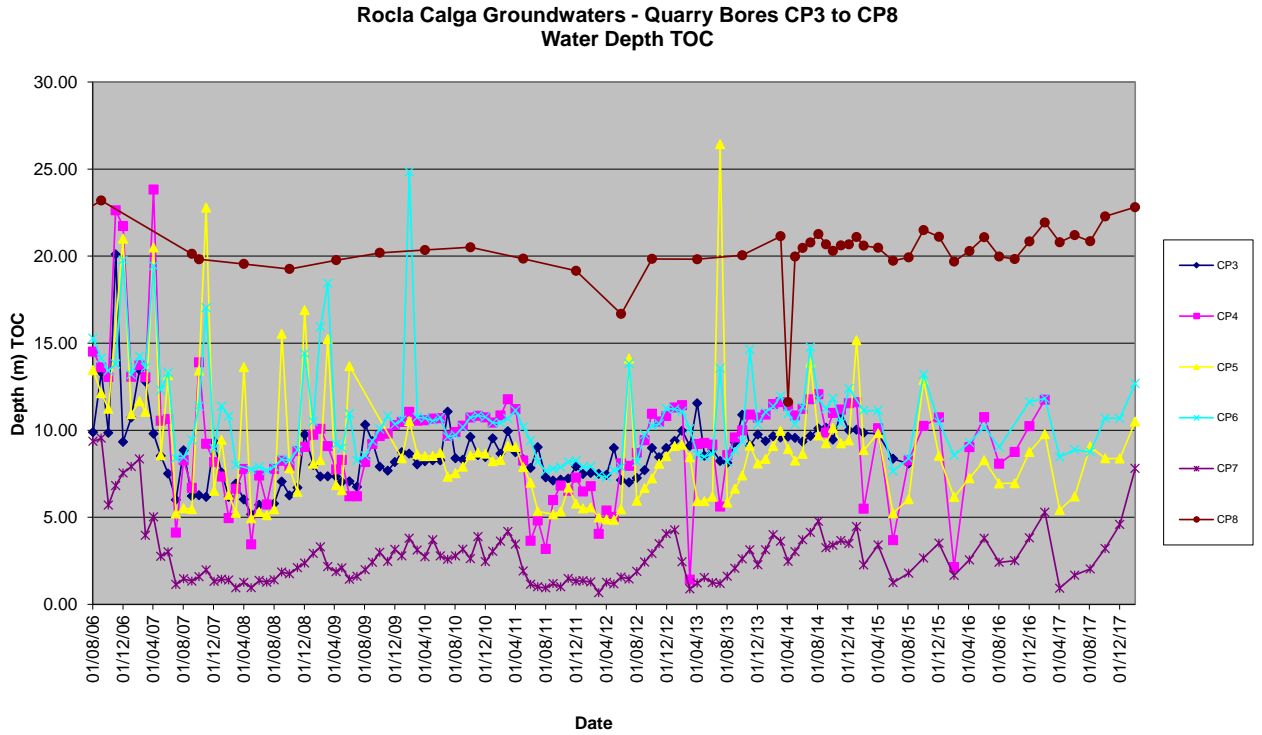
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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



Figures 3 to 6: Groundwater Depth Charts.





## 2.4 Meteorological Monitoring

The Calga Quarry weather station data recovery in January 2018 was approximately 63%. No data was available from 20 – 31 January 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).

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 January 2018 shows that rainfall recorded at the Calga Quarry was lower than the Gosford BOM mean rainfall and the Peats Ridge long term rainfall for January.

The rainfall comparison is provided below:

Calga Quarry	17.6 mm <sup>^</sup>
BOM Peats Ridge*	NA
BOM Gosford*	26.6 mm
BOM Peats Ridge Long term mean for January*	113.3 mm

NA = Not Available

<sup>^</sup>Rain data not based on a full set of data.

\*Data sourced from Bureau of Meteorology (BOM) website ([www.bom.gov.au](http://www.bom.gov.au)).

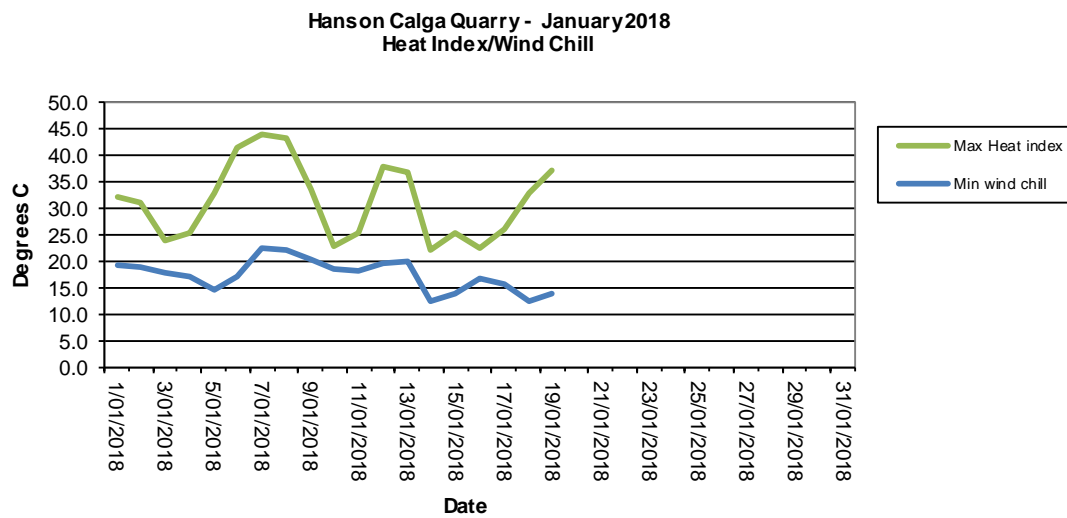
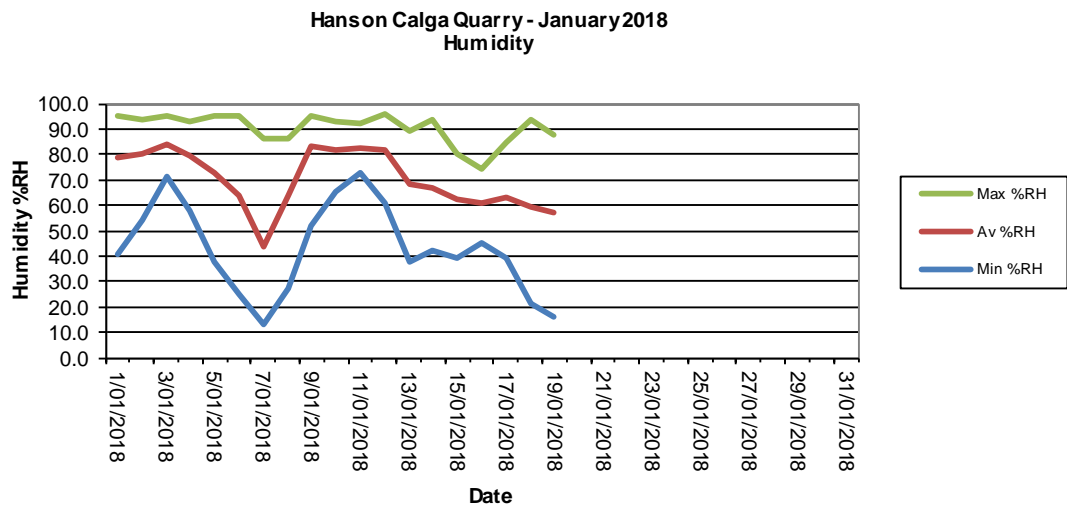
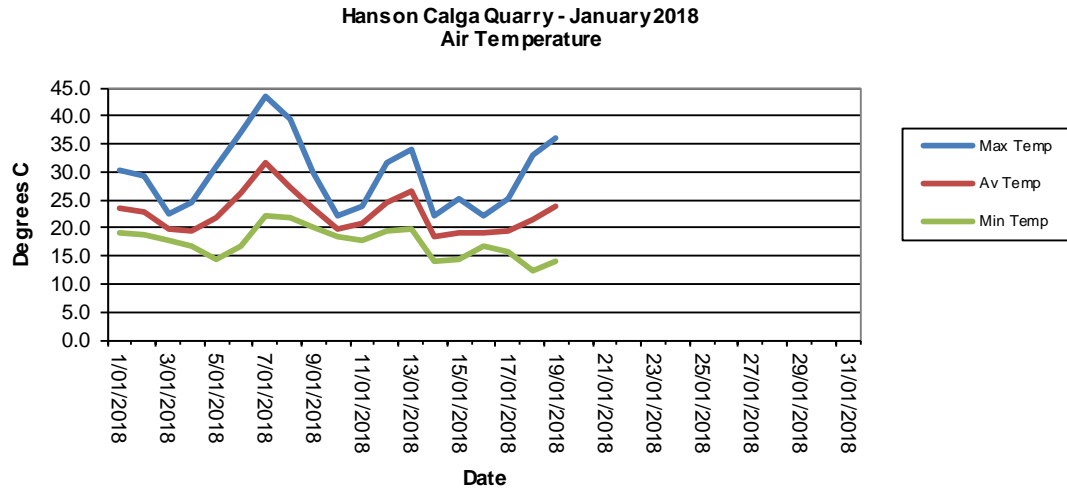
## 2.4.1 Monthly Meteorological Data Summary

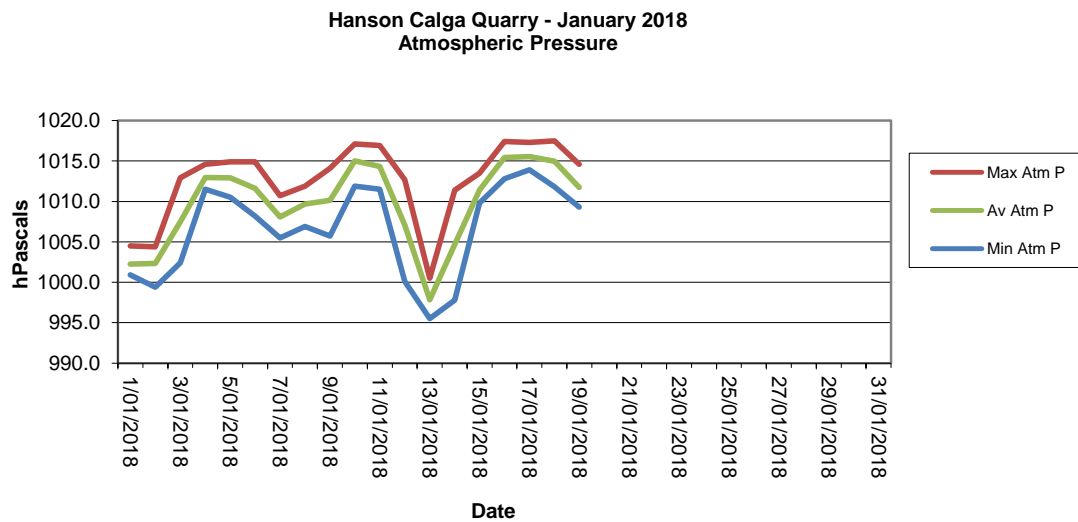
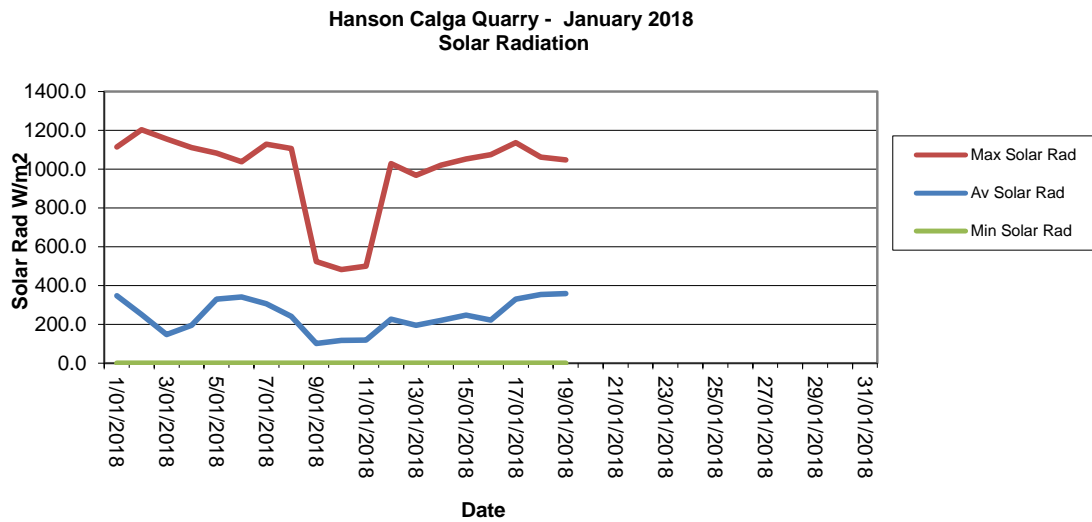
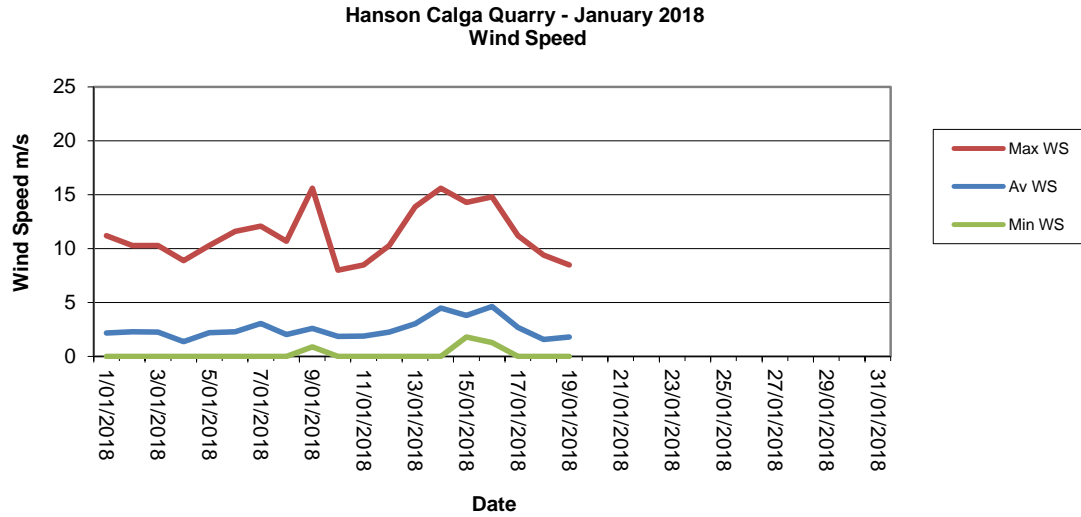
Summary Jan-18 Hanson - Calga

Date	Min Temp	Av Temp	Max Temp	Min %RH	Av %RH	Max %RH	RAIN mm	ET mm	Min WS	Av WS	Max WS	Min wind chill	Max Heat index	Min Atrn P	Av Atrn P	Max Atrn P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/01/2018	19.2	23.4	30.4	41.0	78.6	95.0	0.0	6.1	0.0	2.2	11.2	19.2	32.0	1000.9	1002.3	1004.5	0.0	346.9	1114.0	93.8	99.9	100.0
2/01/2018	18.7	22.7	29.2	54.0	79.9	94.0	0.0	4.8	0.0	2.3	10.3	18.8	31.0	999.4	1002.3	1004.4	0.0	250.4	1203.0	98.8	100.0	100.0
3/01/2018	17.7	20.0	22.4	71.0	83.9	95.0	3.4	2.9	0.0	2.3	10.3	17.7	23.8	1002.4	1007.5	1012.9	0.0	146.7	1156.0	98.2	100.0	100.0
4/01/2018	16.9	19.5	24.6	58.0	79.7	93.0	1.0	3.5	0.0	1.4	8.9	16.9	25.3	1011.5	1013.0	1014.6	0.0	194.7	1111.0	95.1	99.9	100.0
5/01/2018	14.3	21.7	31.0	38.0	72.4	95.0	0.0	6.4	0.0	2.2	10.3	14.3	32.7	1010.5	1012.9	1014.9	0.0	330.3	1083.0	97.8	99.9	100.0
6/01/2018	16.9	26.1	37.1	25.0	64.1	95.0	0.0	7.6	0.0	2.3	11.6	16.9	41.2	1008.2	1011.6	1014.9	0.0	340.6	1038.0	99.1	100.0	100.0
7/01/2018	22.3	31.7	43.5	13.0	43.8	86.0	0.0	9.0	0.0	3.1	12.1	22.3	43.9	1005.5	1008.1	1010.7	0.0	306.0	1128.0	99.4	100.0	100.0
8/01/2018	21.8	27.4	39.4	27.0	63.8	86.0	2.0	5.5	0.0	2.0	10.7	21.8	42.9	1006.9	1009.7	1011.9	0.0	240.6	1107.0	83.7	99.3	100.0
9/01/2018	20.3	23.4	29.8	52.0	83.2	95.0	7.8	2.4	0.9	2.6	15.6	20.3	33.4	1005.7	1010.1	1014.1	0.0	101.7	523.0	94.8	99.6	100.0
10/01/2018	18.3	19.9	22.2	65.0	81.7	93.0	2.8	2.3	0.0	1.9	8.0	18.3	22.7	1011.9	1015.0	1017.1	0.0	116.7	482.0	85.5	98.9	100.0
11/01/2018	17.9	20.7	23.9	73.0	82.8	92.0	0.0	2.4	0.0	1.9	8.5	17.9	25.2	1011.5	1014.3	1016.9	0.0	118.5	500.0	43.4	94.0	100.0
12/01/2018	19.6	24.6	31.8	61.0	81.5	96.0	0.0	4.6	0.0	2.3	10.3	19.6	37.7	1000.1	1007.1	1012.7	0.0	226.6	1029.0	83.7	98.9	100.0
13/01/2018	19.9	26.5	34.1	38.0	68.3	89.0	0.0	5.6	0.0	3.0	13.9	20.0	36.7	995.5	997.8	1000.5	0.0	194.2	968.0	59.4	98.4	100.0
14/01/2018	13.9	18.5	22.1	42.0	66.9	94.0	0.4	5.4	0.0	4.5	15.6	12.4	22.1	997.8	1004.7	1011.4	0.0	219.8	1021.0	96.9	99.9	100.0
15/01/2018	14.3	19.2	25.3	39.0	62.0	80.0	0.0	5.6	1.8	3.8	14.3	13.9	25.2	1009.8	1011.4	1013.5	0.0	247.7	1052.0	91.4	99.3	100.0
16/01/2018	16.8	19.0	22.1	45.0	60.7	74.0	0.0	5.5	1.3	4.6	14.8	16.6	22.5	1012.8	1015.4	1017.4	0.0	221.0	1074.0	94.5	99.7	100.0
17/01/2018	15.6	19.6	25.2	39.0	63.1	85.0	0.0	6.4	0.0	2.7	11.2	15.6	25.8	1013.9	1015.5	1017.3	0.0	330.2	1137.0	95.7	99.8	100.0
18/01/2018	12.2	21.4	33.1	21.0	59.3	94.0	0.2	7.1	0.0	1.6	9.4	12.2	32.8	1011.8	1015.0	1017.5	0.0	353.5	1062.0	75.1	98.7	100.0
19/01/2018	13.9	23.8	35.9	16.0	57.2	88.0	0.0	7.7	0.0	1.8	8.5	13.9	36.9	1009.3	1011.7	1014.6	0.0	358.8	1047.0	96.6	99.9	100.0
20/01/2018																						
21/01/2018																						
22/01/2018																						
23/01/2018																						
24/01/2018																						
25/01/2018																						
26/01/2018																						
27/01/2018																						
28/01/2018																						
29/01/2018																						
30/01/2018																						
31/01/2018																						
Monthly	12.2	22.6	43.5	13	70	96	17.6	100.7	0	2.5	15.6	12.2	43.9	995.5	1009.8	1017.5	0	244.5	1203	43.4	99.3	100

No data

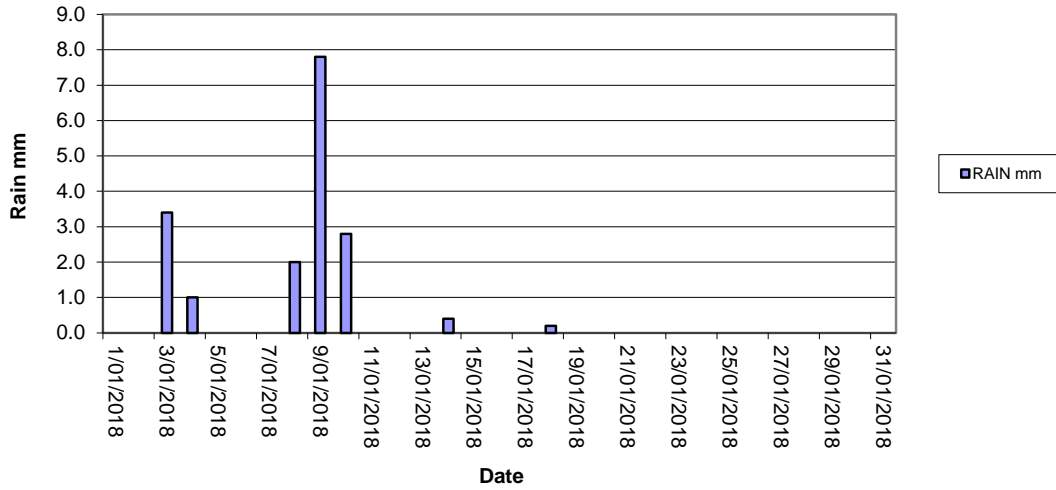
## 2.4.2 Monthly Weather Charts



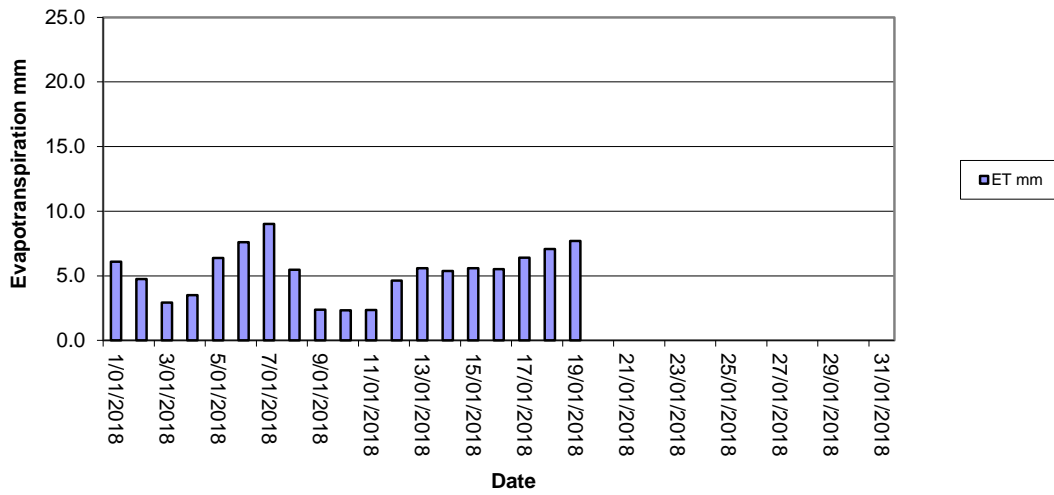




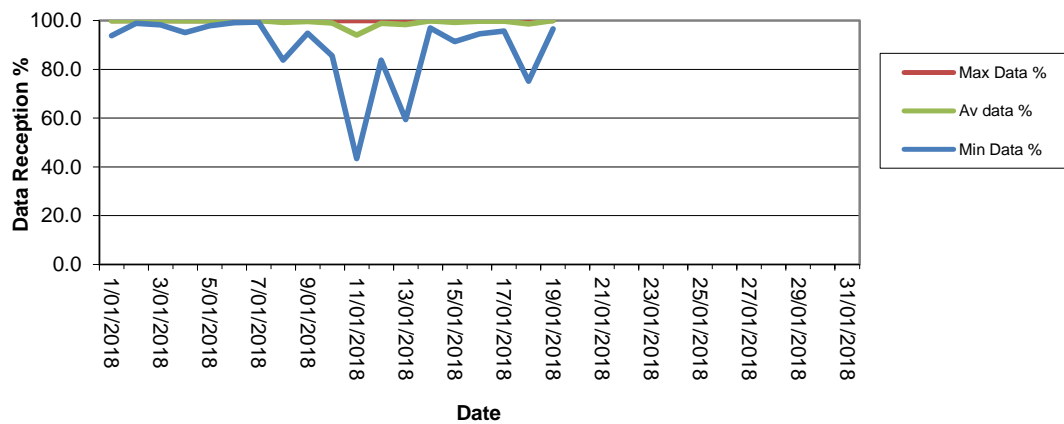
Hanson Calga Quarry - January 2018  
Rainfall



Hanson Calga Quarry - January 2018  
Evapotranspiration



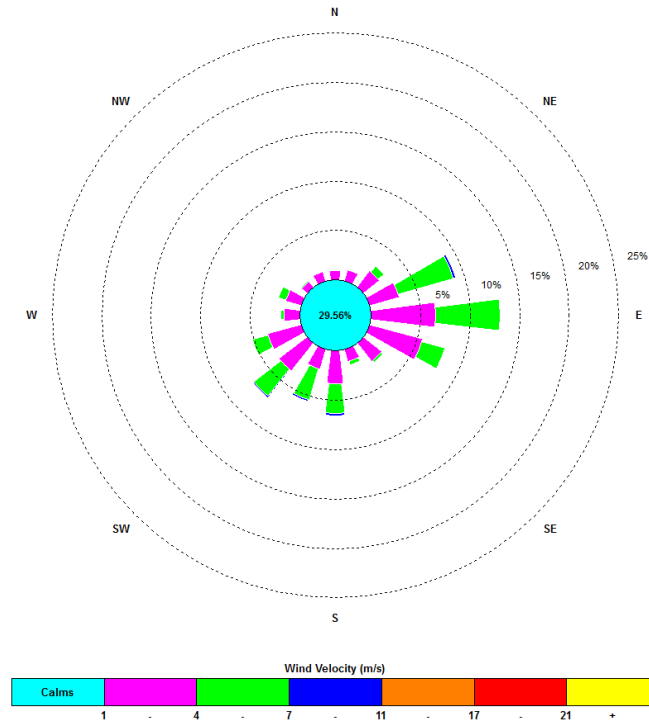
Hanson Calga Quarry - January 2018  
Data Reception



### 2.4.3 Monthly Windrose Plot

Frequency plot of the average wind speed and average direction over each 15-minute sampling period. Wind is considered to be calm when at less than a 15-minute average of 1m/s.

00:15, 1 December 2017 – 09:00, 19 December 2017



The predominant and most frequent, strongest winds also from the E and ENE. The maximum wind speed was 15.6 m/s from the WSW and SSW.

## **Appendix 1**

Field Sheets

Chain of Custody

Laboratory Certificates

## DEPOSITIONAL DUST MONITORING

Client: ..... **Hanson Calga Quarry** .....

Date Installed: 2.12.18

Collection Start Time: 10:20

Sampled By: Leesa + Jonis

Date Collected: 1.2.18

Collection Stop Time: .....1.35.....

Sampling ID: .....

[illegible]

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

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

### Report broken funnels and replacement diameters

Signed:



[illegible]

Environmental Division  
Newcastle  
Work Order Reference  
**EN1801415**



Telephone : + 61 2 4014 2500

## CERTIFICATE OF ANALYSIS

**Work Order** : **EN1801415**  
**Client** : **CBASED ENVIRONMENTAL PTY LTD**  
**Contact** : All Deliverables  
**Address** : 47 BOOMERANG ST  
                   CESSNOCK NSW, AUSTRALIA 2325  
**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-Feb-2018 15:10  
**Date Analysis Commenced** : 05-Feb-2018  
**Issue Date** : 09-Feb-2018 17:21



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/m<sup>2</sup>.mth as sampling data was provided by the client.



## Analytical Results

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

Client sample ID

				CD1 2/01/18 - 1/02/18	CD2c 2/01/18 - 1/02/18	CD3 2/01/18 - 1/02/18	CD4 2/01/18 - 1/02/18	CD5 2/01/18 - 1/02/18
Client sampling date / time				01-Feb-2018 00:00	01-Feb-2018 00:00	01-Feb-2018 00:00	01-Feb-2018 00:00	01-Feb-2018 00:00
Compound	CAS Number	LOR	Unit	EN1801415-001	EN1801415-002	EN1801415-003	EN1801415-004	EN1801415-005
				Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>								
Ash Content	----	0.1	g/m <sup>2</sup> .month	3.5	1.5	0.3	0.3	0.4
Ash Content (mg)	----	1	mg	61	26	6	6	7
<b>EA125: Combustible Matter</b>								
Combustible Matter	----	0.1	g/m <sup>2</sup> .month	0.3	0.5	0.8	0.8	0.2
Combustible Matter (mg)	----	1	mg	7	9	14	14	3
<b>EA141: Total Insoluble Matter</b>								
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month	3.8	2.0	1.1	1.1	0.6
Total Insoluble Matter (mg)	----	1	mg	68	35	20	20	10



## Analytical Results

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

Client sample ID

				<b>CD6</b>	----	----	----	----
				<b>2/01/18 - 1/02/18</b>				
Client sampling date / time				01-Feb-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	<b>EN1801415-006</b>	-----	-----	-----	-----
Result					----	----	----	----
<b>EA120: Ash Content</b>								
Ash Content	----	0.1	g/m <sup>2</sup> .month	<b>0.5</b>	----	----	----	----
Ash Content (mg)	----	1	mg	<b>9</b>	----	----	----	----
<b>EA125: Combustible Matter</b>								
Combustible Matter	----	0.1	g/m <sup>2</sup> .month	<b>0.3</b>	----	----	----	----
Combustible Matter (mg)	----	1	mg	<b>5</b>	----	----	----	----
<b>EA141: Total Insoluble Matter</b>								
Total Insoluble Matter	----	0.1	g/m <sup>2</sup> .month	<b>0.8</b>	----	----	----	----
Total Insoluble Matter (mg)	----	1	mg	<b>14</b>	----	----	----	----



Date: 1.2.18

Todays Collection	
Time Start:	9.30
Time Finish:	1.00

Client :  
Project :

Hanson Calga

## SURFACE WATERS

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	DAM	No	9.45	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
B	dry		9.30	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	dry
C1	DAM	No	1.00	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
C2	Trickle	No	12.50	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
D	dry		11.50	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	dry
F	DAM	No	9.35	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: LK

Sampled by: Leesa + Jonis



[illegible]

Environmental Division  
Sydney  
Work Order Reference  
**ES1803605**



Telephone : + 61-2-8784 8555

## CERTIFICATE OF ANALYSIS

**Work Order** : **ES1803605**  
**Client** : **CBASED ENVIRONMENTAL PTY LTD**  
**Contact** : All Deliverables  
**Address** : 47 BOOMERANG ST  
 CESSNOCK NSW, AUSTRALIA 2325  
**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** : 01-Feb-2018 15:14  
**Date Analysis Commenced** : 01-Feb-2018  
**Issue Date** : 07-Feb-2018 16:20



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.

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 LOR = Limit of reporting  
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 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				01-Feb-2018 09:45	01-Feb-2018 13:00	01-Feb-2018 12:50	01-Feb-2018 09:35	----
Compound	CAS Number	LOR	Unit	ES1803605-001	ES1803605-002	ES1803605-003	ES1803605-004	-----
				Result	Result	Result	Result	----
<b>EA005: pH</b>								
pH Value	----	0.01	pH Unit	6.30	6.76	6.58	5.15	----
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	130	116	116	131	----
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>								
Total Dissolved Solids @180°C	----	10	mg/L	100	86	76	93	----
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>								
Suspended Solids (SS)	----	5	mg/L	24	17	7	6	----
<b>EP020: Oil and Grease (O&amp;G)</b>								
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	----



Today's Collection	
Time Start:	9.2.18
Time Finish:	

Date: 1-2-18

\* There was no access to CQ5, CQ7, CQ8 as the owner has locked all gates spoke to Hanson they will contact the owner about a key.

Client : Hanson Calga

Project :

## GROUNDWATERS

Site	DEPTH	Odour	Water Turbidity	Water Colour	1		2		Bottles (Apr/Oct)	Downloaded Logger? (Y/N)*
					pH	EC	pH	EC		
CQ3	12.62		CST	CLOOBG	6.40	119.8us	6.27	118.7us	1x 250ml GP, 1x 500ml GP, 1RP	yes
CQ4	11.45		CST	CLOOBG	5.24	114.3us	5.14	111.3us	1x 250ml GP, 1x 500ml GP, 1RP	Wait Connect
CQ5			CST	CLOOBG	no access owner locked gate		locked gate		1x 250ml GP, 1x 500ml GP, 1RP	
CQ6			CST	CLOOBG	covered over in paddock				1x 250ml GP, 1x 500ml GP, 1RP	
CQ7			CST	CLOOBG	no access owner locked gate				1x 250ml GP, 1x 500ml GP, 1RP	
CQ8			CST	CLOOBG	no access owner locked gate				1x 250ml GP, 1x 500ml GP, 1RP	
CQ9			CST	CLOOBG	Blocked / Damaged				1x 250ml GP, 1x 500ml GP, 1RP	
CQ10	27.12		CST	CLOOBG	4.60	128.2us	4.41	130.9us	1x 250ml GP, 1x 500ml GP, 1RP	yes
CQ11S	11.90		CST	CLOOBG	4.97	144.6us	4.99	143.8us	1x 250ml GP, 1x 500ml GP, 1RP	Wait Connect
CQ11D	13.20		CST	CLOOBG	4.64	139.9us	4.62	140.1us	1x 250ml GP, 1x 500ml GP, 1RP	yes
CQ12			CST	CLOOBG					1x 250ml GP, 1x 500ml GP, 1RP	
CQ13	15.60		CST	CLOOBG	4.29	165.6us	4.23	167.9us	1x 250ml GP, 1x 500ml GP, 1RP	Wait Connect
CP3			CST	CLOOBG	NONE				1x 250ml GP, 1x 500ml GP, 1RP	
CP4			CST	CLOOBG	no access		Shield over Bore		1x 250ml GP, 1x 500ml GP, 1RP	
CP5	10.50		CST	CLOOBG	4.14	172.7us	4.13	135.2us	1x 250ml GP, 1x 500ml GP, 1RP	
CP6	12.68		CST	CLOOBG	4.11	161.4us	4.11	160.6us	1x 250ml GP, 1x 500ml GP, 1RP	
CP7	7.80		CST	CLOOBG	4.28	83.4us	4.28	83.0us	1x 250ml GP, 1x 500ml GP, 1RP	
CP8	22.81		CST	CLOOBG	Can't fit bailer down hole				1x 250ml GP, 1x 500ml GP, 1RP	
MW7	17.65		CST	CLOOBG	4.48	103.9us	4.46	104.1us	1x 250ml GP, 1x 500ml GP, 1RP	yes
MW8	8.73		CST	CLOOBG	4.47	68.4us	4.40	72.7us	1x 250ml GP, 1x 500ml GP, 1RP	Wait Connect
MW9	29.30		CST	CLOOBG	5.30	80.1us	5.12	82.7us	1x 250ml GP, 1x 500ml GP, 1RP	Wait Connect
MW10			CST	CLOOBG	no access track unsafe				1x 250ml GP, 1x 500ml GP, 1RP	
MW13			CST	CLOOBG	/	/	/	/	1x 250ml GP, 1x 500ml GP, 1RP	
MW16			CST	CLOOBG	/	/	/	/	1x 250ml GP, 1x 500ml GP, 1RP	
MW17			CST	CLOOBG	/	/	/	/	1x 250ml GP, 1x 500ml GP, 1RP	

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

Signed: dkj

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

Sampled by: Leesa + Jonas

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