



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



**Calga Quarry**

**Environmental Monitoring**

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

**July 2017**

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Date: 24 August 2017

## 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 July 2017;
- Surface Water quality results for July 2017;
- Meteorological report for July 2017.

The July 2017 dust deposition results for insoluble solids were generally low and free of major contamination. 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, B C1, C2 and F. Site D was 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 detected at Site B in July 2017.

Bi-monthly groundwaters were sampled on 4 August 2017. Groundwater depth generally decreased compared to May 2017, 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 to or increased slightly at a majority of groundwater sites when compared to the May 2017 results.

The Calga Quarry weather station data recovery in July 2017 was approximately 100%. Data for July 2017 shows that rainfall recorded at the Calga Quarry was significantly lower than the Gosford BOM mean rainfall and the Peats Ridge long term rainfall for July.

The rainfall comparison is provided below:

Calga Quarry	3.4 mm
BOM Peats Ridge*	NA
BOM Gosford*	7.8 mm
BOM Peats Ridge Long term mean for July*	62.7 mm

NA = Not Available

\*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.

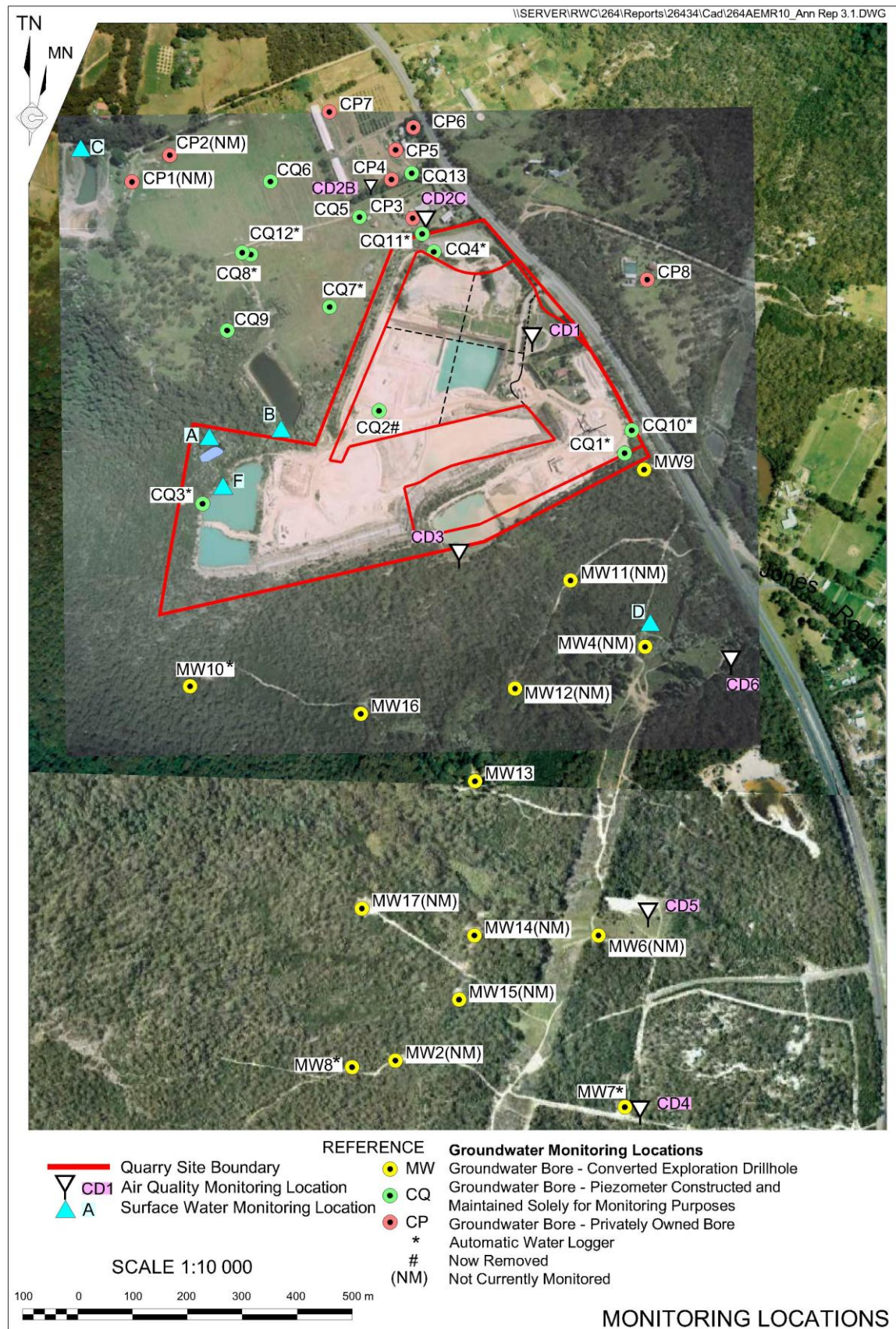
Meteorological monitoring is conducted at the quarry and displayed on the site computer with a real-time display. Metrological parameters are measured according to Australian Standard AS3580.14 *“Methods for sampling and analysis of ambient air. Meteorological monitoring for ambient air quality monitoring 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 July 2017 and the project 12-month rolling average. Results are in g/m<sup>2</sup>.month.

**Table 1: Dust Deposition results: 4 July 2017 – 4 August 2017 (31 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>	0.3	0.3	<0.1	100	3.0
<b>CD2c</b>	0.3	0.3	<0.1	100	1.0
<b>CD3</b>	0.8	0.6	0.2	75	1.1
<b>CD4</b>	0.5	0.2	0.3	40	0.6
<b>CD5</b>	0.3	0.2	0.1	67	0.6
<b>CD6</b>	0.8	0.6	0.2	75	0.7

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 July 2016 to June 2017.

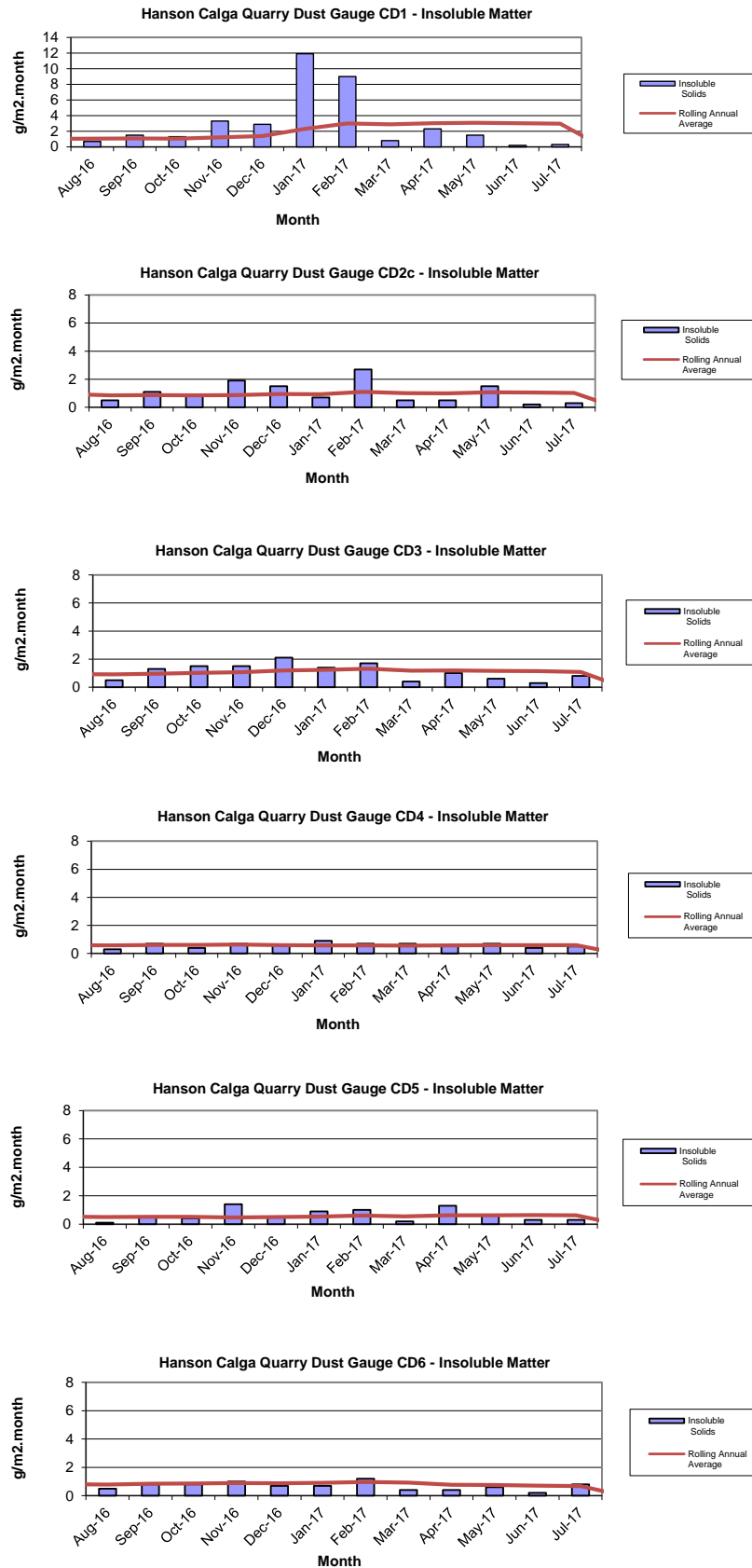
NA= Not Available.

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 4 August 2017 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

**Table 2: Monthly surface water monitoring – July 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	Clear	Clear	5.99	82	71	8	<5
<b>B</b>	Trickle	Brown	Slight	6.59	113	175	14	5
<b>C1</b>	Dam	Clear	Clear	6.77	94	79	12	<5
<b>C2</b>	Slow	Clear	Clear	6.73	102	70	9	<5
<b>D</b>	Dry							
<b>F</b>	Dam	Clear	Clear	5.79	80	78	14	<5

Samples were collected at sites A, B C1, C2 and F. Site D was 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 detected at Site B in July 2017.

### 2.2.1 Non-Routine Surface Water Sampling

No non-routine sampling was undertaken during July 2017.

## 2.3 Groundwater Monitoring

Bi-monthly groundwaters were sampled on 4 August 2017. 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 decreased compared to May 2017, 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 May 2017 results.

Bi-monthly groundwater monitoring is next scheduled for September 2017.

**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 ( $\mu\text{S}/\text{cm}$ ) This report
CQ1	Voutos	* Monitor	20.59	Removed		
CQ3	Voutos	* Monitor	10.53	10.75	6.37	152
CQ4	Voutos	* Monitor	8.78	9.70	5.16	106
CQ5	Gazzana	DIP Only	8.69	6.17	4.37	151
CQ6	Gazzana	DIP Only	16.00	Removed		
CQ7	Gazzana	* Monitor	6.89	6.15	4.37	124
CQ8	Gazzana	* Monitor	11.03	5.80	4.53	127
CQ9	Gazzana	DIP Only	10.10	Unable to sample - pipe bent		
CQ10	Voutos	* Monitor	NI	25.62	4.78	138
CQ11S	Gazzana	* Monitor	NI	9.86	5.27	143
CQ11D	Gazzana	* Monitor	NI	10.99	5.00	152
CQ12	Gazzana	* Monitor	NI	4.10	4.45	122
CQ13	Kashouli	* Monitor	NI	12.41	4.42	179
CP3	Gazzana	Domestic	10.40	Destroyed		
CP4	Kashouli	Domestic	13.63	NM		
CP5	Kashouli	Domestic	16.61	9.07	4.49	170
CP6	Kashouli	Domestic	16.27	8.75	4.54	148
CP7	Kashouli	Production	8.56	2.03	4.98	103
CP8	Rozmanec	Domestic	22.17	20.85	4.62	119
MW7	Rocla Bore	* Monitor	15.76	15.77	4.68	106
MW8	Rocla Bore	* Monitor	9.82	6.88	4.96	65
MW9	Rocla Bore	* Monitor	22.44	23.44	4.78	84
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.

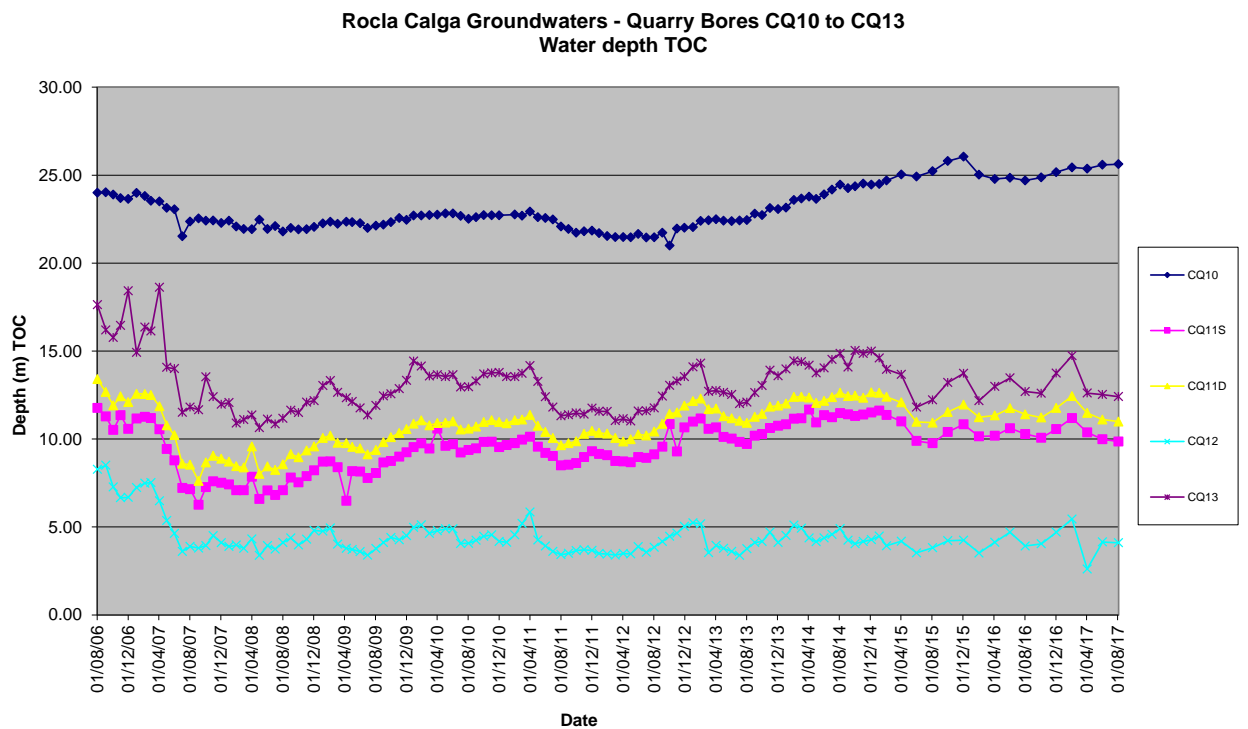
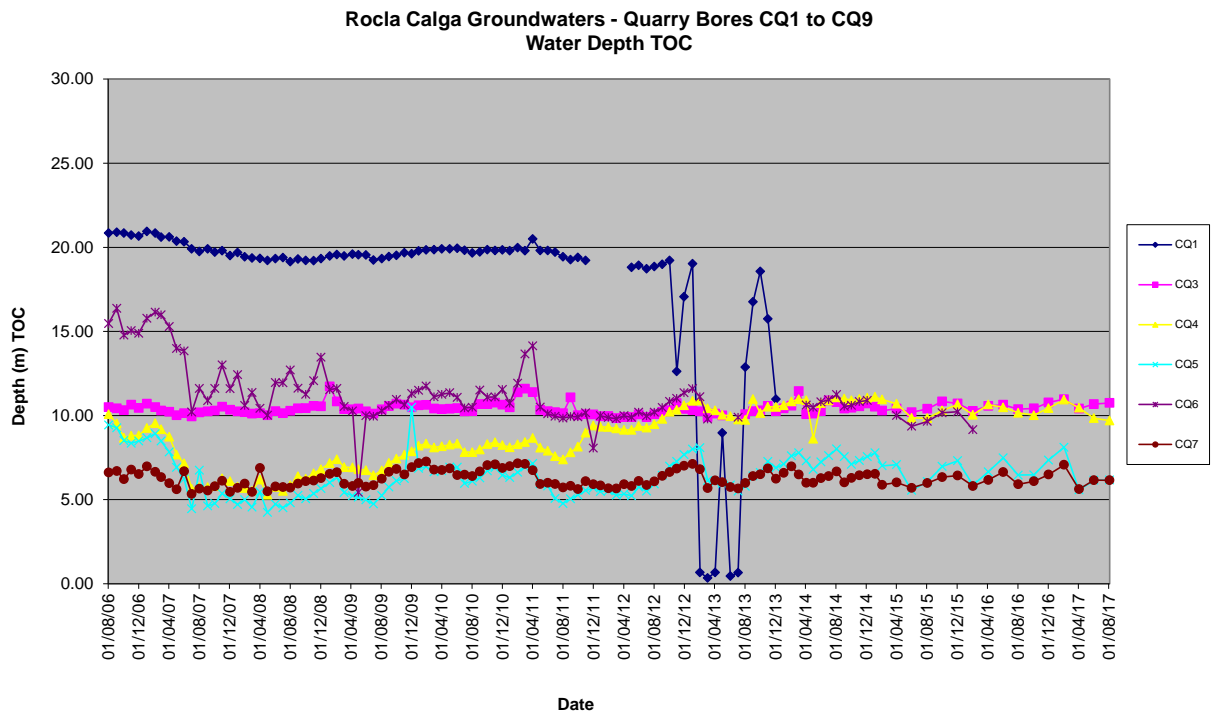
Shading is used to indicate the following trends in water depth (compared to the last reading):

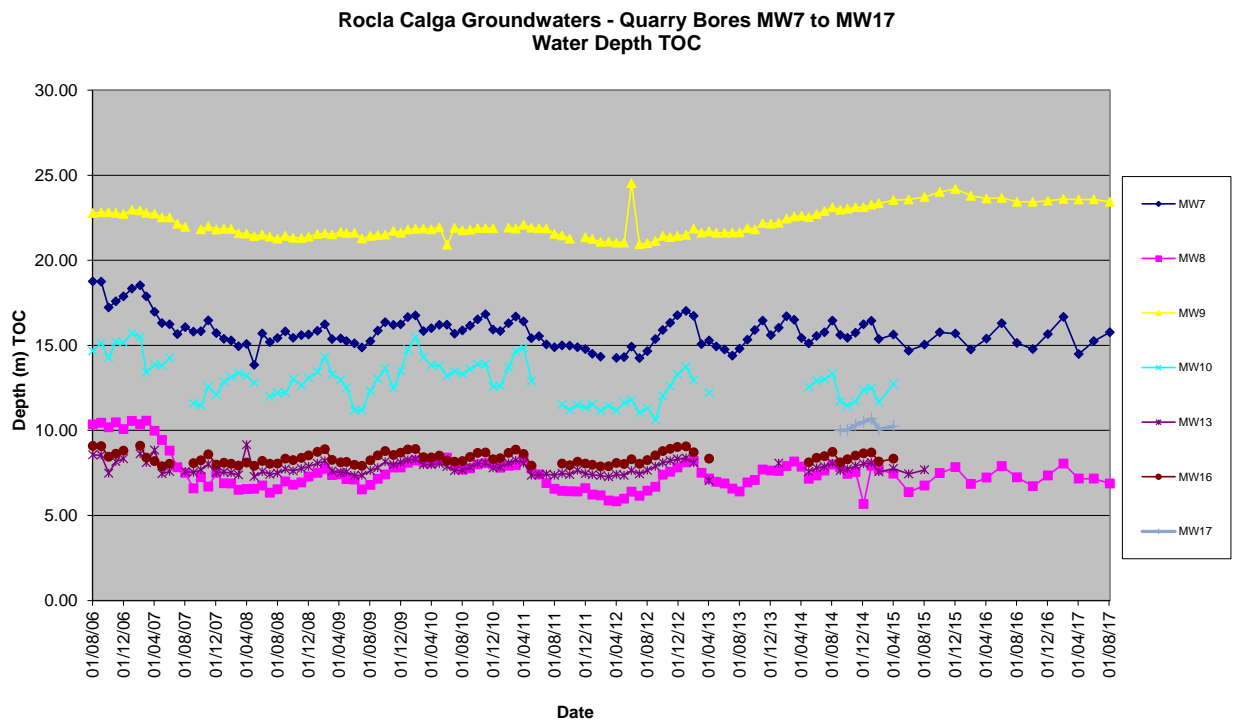
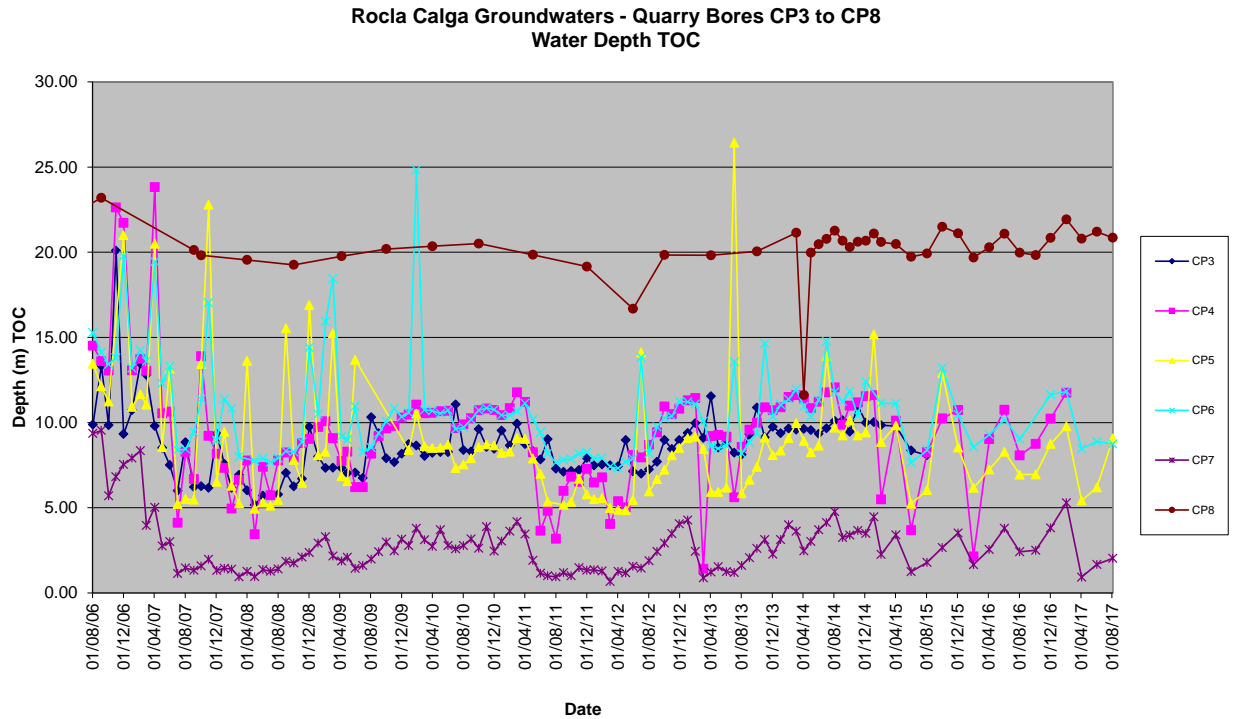
	Increase to ground water depth (water moved away from surface)
	Decrease to ground water depth (water moved towards surface)
	Stable water depth (+/- 0.01m)

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 July 2017 was approximately 100%.

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 July 2017 shows that rainfall recorded at the Calga Quarry was significantly lower than the Gosford BOM mean rainfall and the Peats Ridge long term rainfall for July.

The rainfall comparison is provided below:

Calga Quarry	3.4 mm
BOM Peats Ridge*	NA
BOM Gosford*	7.8 mm
BOM Peats Ridge Long term mean for July*	62.7 mm

NA = Not Available

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

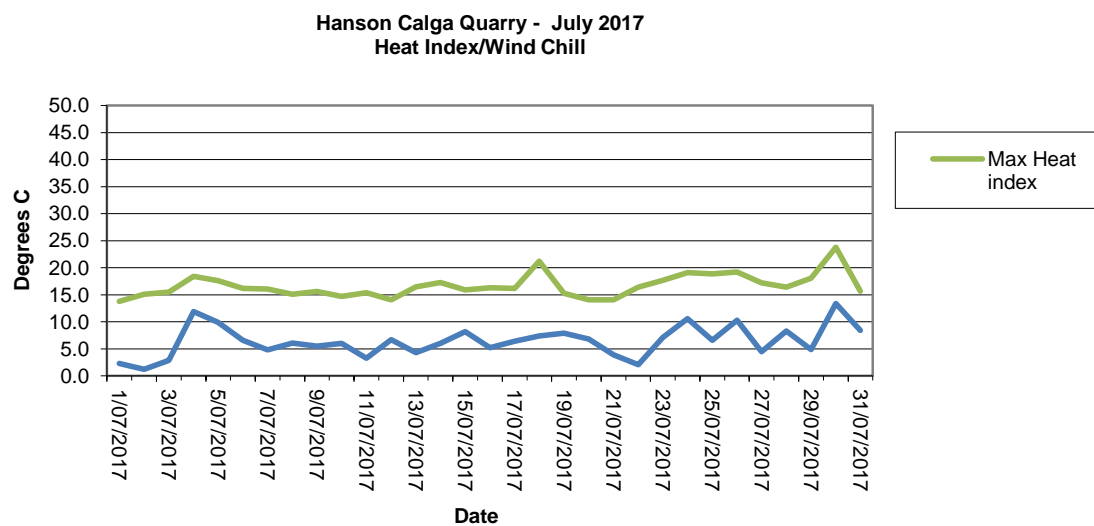
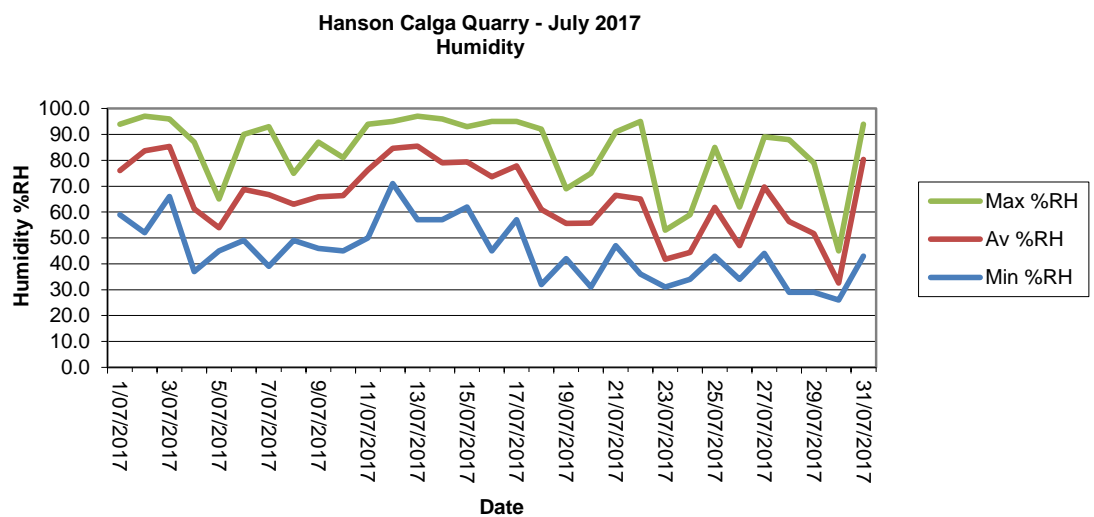
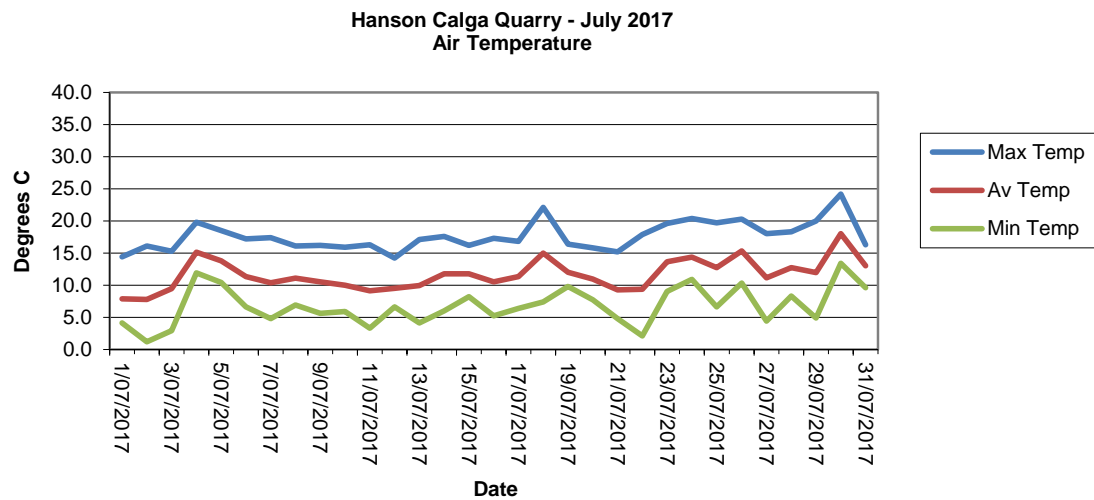
\*Data sourced from Bureau of Meteorology (BOM) website ([www.bom.gov.au](http://www.bom.gov.au)).

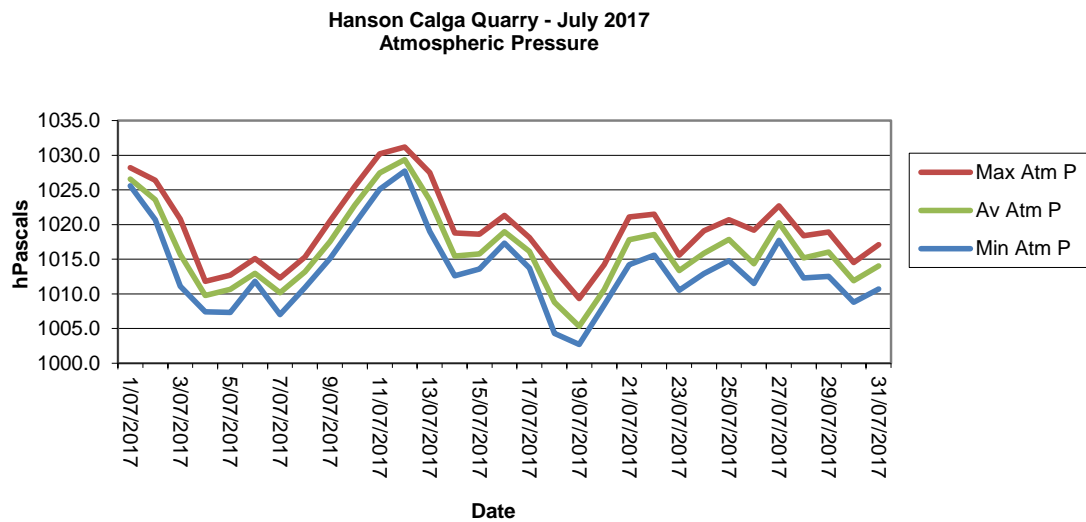
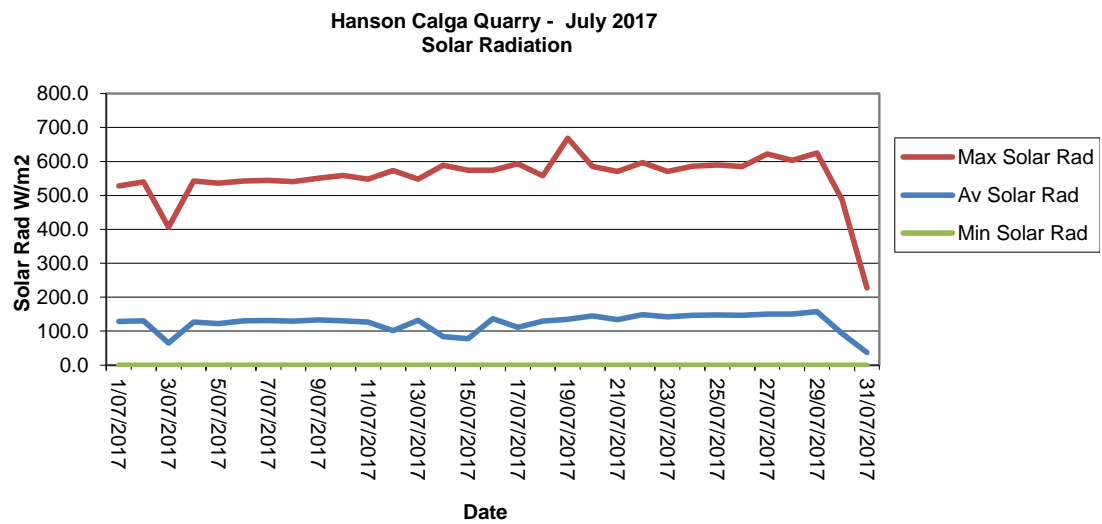
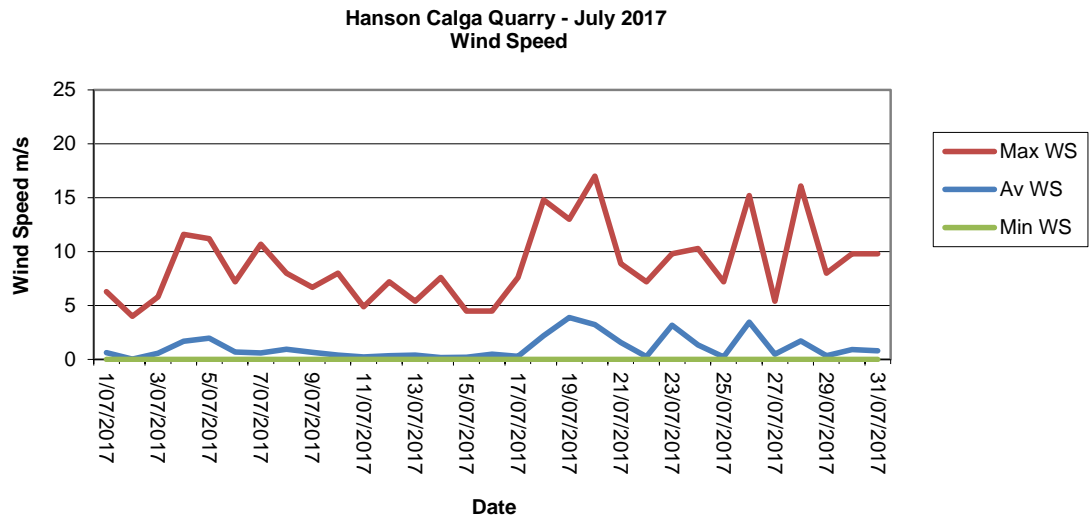
## 2.4.1 Monthly Meteorological Data Summary

Summary Jul-17 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 Atm P	Av Atm P	Max Atm P	Min Solar Rad	Av Solar Rad	Max Solar Rad	Min Data %	Av data %	Max Data %
1/07/2017	4.1	7.9	14.4	59.0	76.0	94.0	0.0	1.8	0.0	0.6	6.3	2.3	13.8	1025.6	1026.5	1028.2	0.0	128.7	528.0	60.6	81.7	100.0
2/07/2017	1.2	7.8	16.1	52.0	83.7	97.0	0.2	1.5	0.0	0.0	4.0	1.2	15.1	1020.7	1023.6	1026.4	0.0	130.3	540.0	81.8	95.7	100.0
3/07/2017	2.9	9.5	15.3	66.0	85.3	96.0	0.4	1.0	0.0	0.6	5.8	2.9	15.5	1011.1	1015.7	1020.8	0.0	64.7	406.0	52.3	90.0	100.0
4/07/2017	11.9	15.1	19.8	37.0	61.3	87.0	0.0	2.9	0.0	1.7	11.6	11.9	18.4	1007.4	1009.8	1011.8	0.0	127.0	542.0	55.7	82.1	100.0
5/07/2017	10.4	13.8	18.5	45.0	53.9	65.0	0.0	2.9	0.0	2.0	11.2	9.9	17.6	1007.3	1010.6	1012.7	0.0	122.4	536.0	45.8	81.9	100.0
6/07/2017	6.6	11.3	17.2	49.0	68.8	90.0	0.0	2.1	0.0	0.7	7.2	6.6	16.2	1011.8	1012.9	1015.1	0.0	130.5	542.0	78.2	96.1	100.0
7/07/2017	4.8	10.4	17.4	39.0	66.7	93.0	0.0	2.1	0.0	0.6	10.7	4.8	16.1	1007.0	1010.2	1012.3	0.0	130.8	544.0	79.4	95.0	100.0
8/07/2017	6.9	11.1	16.1	49.0	63.0	75.0	0.0	2.3	0.0	0.9	8.0	6.1	15.1	1010.9	1013.2	1015.3	0.0	129.8	541.0	78.2	90.7	100.0
9/07/2017	5.6	10.5	16.2	46.0	65.9	87.0	0.0	2.1	0.0	0.7	6.7	5.5	15.6	1015.1	1017.5	1020.5	0.0	133.2	551.0	74.2	86.0	95.1
10/07/2017	5.9	10.0	15.9	45.0	66.4	81.0	0.0	2.0	0.0	0.4	8.0	6.0	14.7	1020.1	1022.8	1025.5	0.0	129.8	559.0	0.0	87.3	100.0
11/07/2017	3.3	9.1	16.3	50.0	76.2	94.0	0.0	1.8	0.0	0.2	4.9	3.3	15.4	1025.1	1027.5	1030.2	0.0	126.4	548.0	67.4	91.3	100.0
12/07/2017	6.6	9.5	14.2	71.0	84.7	95.0	0.0	1.4	0.0	0.4	7.2	6.7	14.1	1027.7	1029.4	1031.2	0.0	101.1	573.0	45.5	79.9	100.0
13/07/2017	4.1	10.0	17.1	57.0	85.5	97.0	0.2	1.7	0.0	0.4	5.4	4.3	16.5	1019.0	1023.5	1027.5	0.0	132.3	548.0	52.0	87.4	100.0
14/07/2017	6.0	11.7	17.6	57.0	79.0	96.0	0.2	1.4	0.0	0.2	7.6	6.0	17.3	1012.6	1015.4	1018.8	0.0	84.3	589.0	42.2	80.7	100.0
15/07/2017	8.2	11.8	16.2	62.0	79.3	93.0	0.0	1.2	0.0	0.2	4.5	8.2	15.9	1013.6	1015.7	1018.6	0.0	77.4	574.0	53.5	75.4	95.4
16/07/2017	5.2	10.5	17.3	45.0	73.6	95.0	0.0	1.9	0.0	0.5	4.5	5.2	16.3	1017.3	1019.0	1021.3	0.0	136.8	574.0	63.4	73.1	86.2
17/07/2017	6.4	11.4	16.8	57.0	77.8	95.0	0.0	1.7	0.0	0.3	7.6	6.4	16.2	1013.7	1016.1	1018.1	0.0	111.6	593.0	21.5	73.3	100.0
18/07/2017	7.4	15.0	22.1	32.0	61.0	92.0	0.0	3.2	0.0	2.2	14.8	7.4	21.2	1004.3	1008.8	1013.5	0.0	129.6	558.0	43.1	80.5	100.0
19/07/2017	9.8	12.0	16.4	42.0	55.6	69.0	0.0	3.6	0.0	3.9	13.0	7.9	15.3	1002.7	1005.3	1009.3	0.0	134.6	669.0	67.1	95.6	100.0
20/07/2017	7.7	10.9	15.8	31.0	55.8	75.0	0.0	3.8	0.0	3.2	17.0	6.8	14.1	1008.4	1010.6	1014.2	0.0	144.6	585.0	86.2	99.8	100.0
21/07/2017	4.8	9.3	15.2	47.0	66.4	91.0	0.0	2.5	0.0	1.6	8.9	3.9	14.1	1014.2	1017.8	1021.1	0.0	133.9	571.0	87.7	99.2	100.0
22/07/2017	2.1	9.3	17.9	36.0	65.0	95.0	0.0	2.1	0.0	0.3	7.2	2.1	16.4	1015.6	1018.6	1021.5	0.0	148.0	597.0	90.5	99.4	100.0
23/07/2017	9.0	13.6	19.6	31.0	41.7	53.0	0.0	4.1	0.0	3.2	9.8	7.1	17.7	1010.5	1013.3	1015.6	0.0	142.1	571.0	93.8	99.6	100.0
24/07/2017	10.9	14.4	20.4	34.0	44.4	59.0	0.0	3.3	0.0	1.4	10.3	10.6	19.1	1012.9	1015.8	1019.1	0.0	146.3	586.0	85.2	98.1	100.0
25/07/2017	6.6	12.7	19.7	43.0	61.8	85.0	0.0	2.4	0.0	0.2	7.2	6.6	18.9	1014.8	1017.8	1020.7	0.0	147.1	590.0	79.7	96.4	100.0
26/07/2017	10.3	15.3	20.3	34.0	47.0	62.0	0.0	4.5	0.0	3.5	15.2	10.3	19.2	1011.5	1014.3	1019.2	0.0	146.6	585.0	93.2	99.2	100.0
27/07/2017	4.4	11.2	18.0	44.0	69.7	89.0	0.0	2.3	0.0	0.5	5.4	4.5	17.2	1017.7	1020.3	1022.7	0.0	150.6	622.0	89.8	99.5	100.0
28/07/2017	8.3	12.7	18.3	29.0	56.3	88.0	0.0	3.5	0.0	1.7	16.1	8.3	16.4	1012.3	1015.2	1018.4	0.0	150.6	603.0	68.9	99.4	100.0
29/07/2017	4.9	12.0	20.0	29.0	51.7	79.0	0.0	2.7	0.0	0.3	8.0	4.9	18.1	1012.5	1016.0	1018.9	0.0	157.8	625.0	99.1	100.0	100.0
30/07/2017	13.4	18.0	24.2	26.0	32.5	45.0	0.0	2.8	0.0	0.9	9.8	13.4	23.8	1008.8	1011.9	1014.5	0.0	92.9	488.0	100.0	100.0	100.0
31/07/2017	9.6	13.0	16.3	43.0	80.4	94.0	2.4	0.9	0.0	0.8	9.8	8.4	15.7	1010.7	1014.0	1017.1	0.0	36.9	227.0	81.8	99.0	100.0
Monthly	1.2	11.6	24.2	26	66	97	3.4	73.8	0	1.1	17	1.2	23.8	1002.7	1016.4	1031.2	0	124.5	669	0	90.8	100

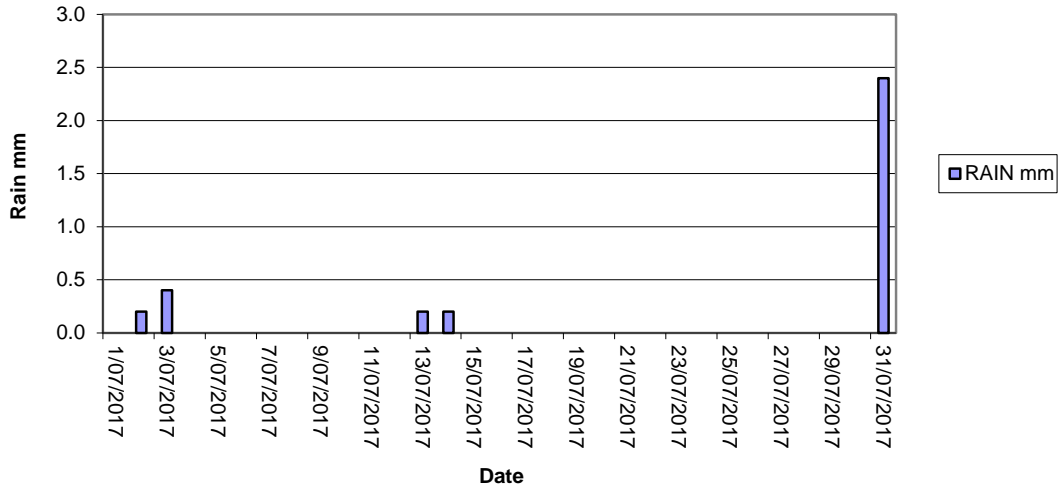
## 2.4.2 Monthly Weather Charts



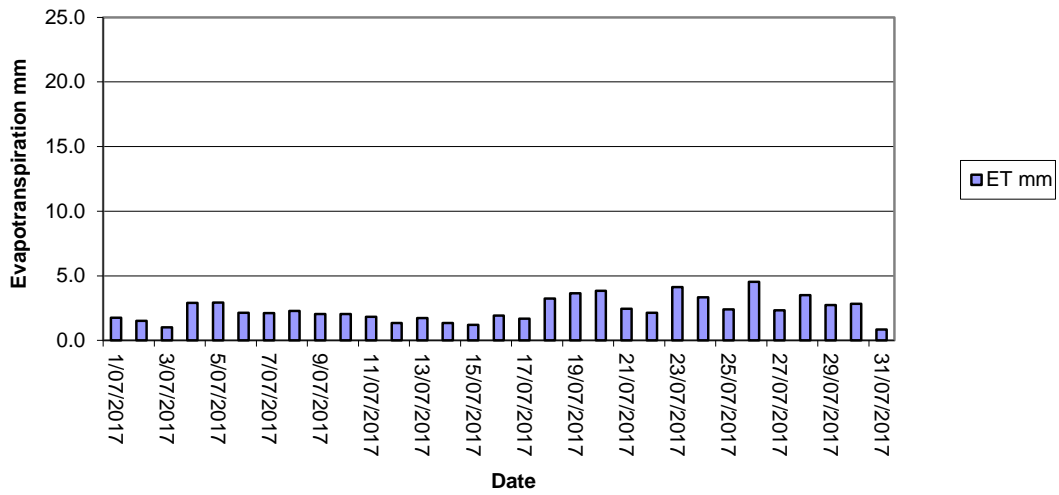




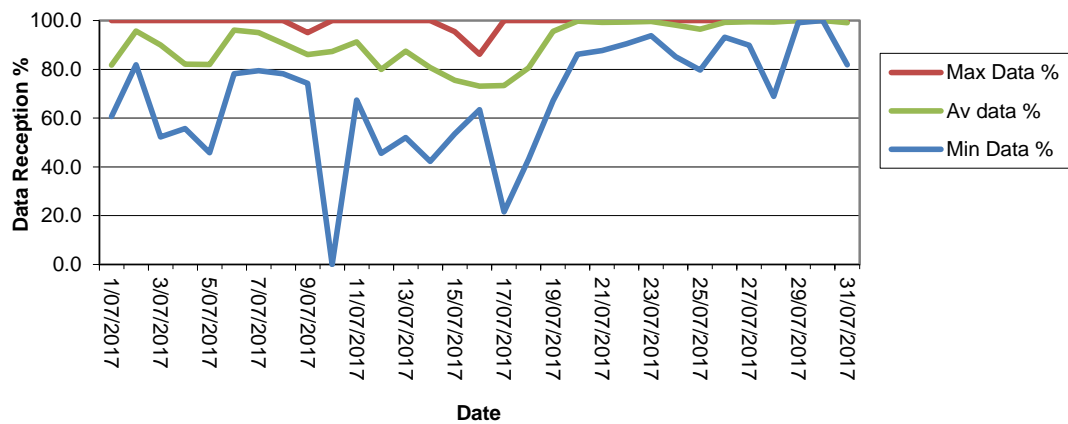
Hanson Calga Quarry - July 2017  
Rainfall



Hanson Calga Quarry - July 2017  
Evapotranspiration



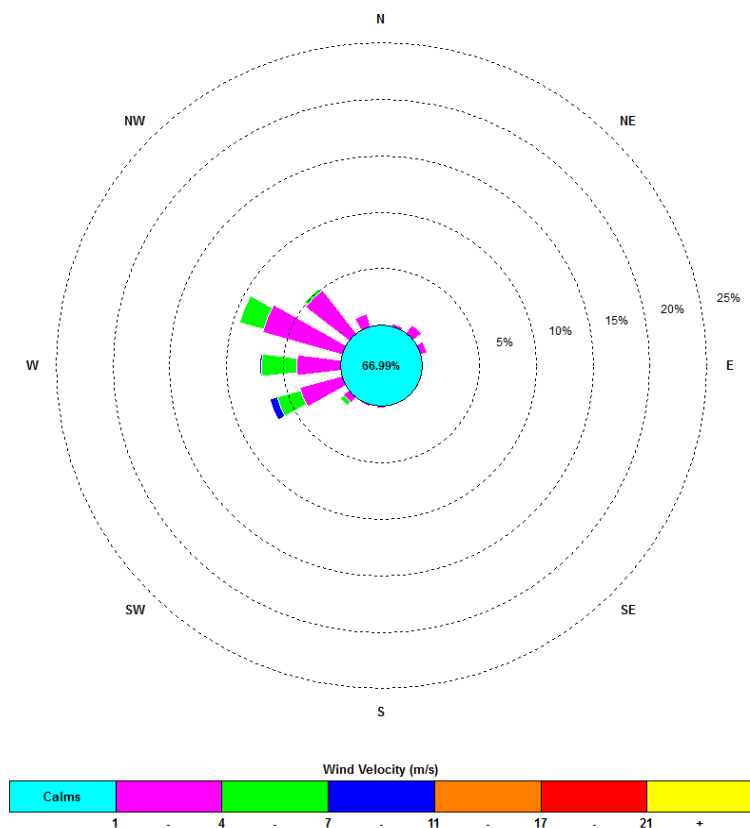
Hanson Calga Quarry - July 2017  
Data Reception



### 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 July 2017 – 23:45, 31 July 2017



The predominant winds were from the WNW, with most frequent, strongest winds also from the WSW. The maximum wind speed was 17 m/s from the WSW.

## **Appendix 1**

Field Sheets

Chain of Custody

Laboratory Certificates

## DEPOSITIONAL DUST MONITORING

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

Date Installed: 4.1.11

Collection Start Time: 8:50

Sampled By: J. HERNANDEZ

Date Collected: 4-8-11

Collection Stop Time: 11:50

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  
**EN1703278**



Telephone : + 61 2 4014 2500



Environmental

## CERTIFICATE OF ANALYSIS

Work Order : **EN1703278**  
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 : 04-Aug-2017 12:47  
Date Analysis Commenced : 08-Aug-2017  
Issue Date : 14-Aug-2017 19:39



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 no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- Analysis as per AS3580.10.1-2003. Samples passed through a 1mm sieve prior to analysis. NATA accreditation is not held for results reported in g/m<sup>2</sup>.month as sampling data has been provided by the client.



## Analytical Results

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

Client sample ID

				CD1 04/07/17 - 04/08/17	CD2c 04/07/17 - 04/08/17	CD3 04/07/17 - 04/08/17	CD4 04/07/17 - 04/08/17	CD5 04/07/17 - 04/08/17
Client sampling date / time				04-Aug-2017 00:00	04-Aug-2017 00:00	04-Aug-2017 00:00	04-Aug-2017 00:00	04-Aug-2017 00:00
				EN1703278-001	EN1703278-002	EN1703278-003	EN1703278-004	EN1703278-005
Compound	CAS Number	LOR	Unit	Result	Result	Result	Result	Result
<b>EA120: Ash Content</b>								
Ash Content	---	0.1	g/m <sup>2</sup> .month	0.3	0.3	0.6	0.2	0.2
Ash Content (mg)	---	1	mg	5	5	11	4	3
<b>EA125: Combustible Matter</b>								
Combustible Matter	---	0.1	g/m <sup>2</sup> .month	<0.1	<0.1	0.2	0.3	0.1
Combustible Matter (mg)	---	1	mg	<1	<1	3	5	2
<b>EA141: Total Insoluble Matter</b>								
Total Insoluble Matter	---	0.1	g/m <sup>2</sup> .month	0.3	0.3	0.8	0.5	0.3
Total Insoluble Matter (mg)	---	1	mg	5	5	14	9	5



## Analytical Results

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

Client sample ID

				<b>CD6</b>				
				<b>04/07/17 - 04/08/17</b>				
Client sampling date / time				04-Aug-2017 00:00				
Compound	CAS Number	LOR	Unit	<b>EN1703278-006</b>				
Result								
<b>EA120: Ash Content</b>								
Ash Content	---	0.1	g/m <sup>2</sup> .month	<b>0.6</b>				
Ash Content (mg)	---	1	mg	<b>11</b>				
<b>EA125: Combustible Matter</b>								
Combustible Matter	---	0.1	g/m <sup>2</sup> .month	<b>0.2</b>				
Combustible Matter (mg)	---	1	mg	<b>4</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>15</b>				





Date: 4.8.17

Todays Collection	
Time Start:	8:30
Time Finish:	11:15

Client :

Hanson Calga

Project :

## SURFACE WATERS

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	DAM	2	8:50	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
B	TRICUE	2	8:35	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
C1	DAM	2	11:05	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
C2	SLOW	2	11:10	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
D				1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	DRY
F	DAM	2	8:40	1x 250ml GP, 1x 500mL GP, 1x PG	CST	CLOOBG	
					CST	CLOOBG	
					CST	CLOOBG	
					CST	CLOOBG	
					CST	CLOOBG	
					CST	CLOOBG	

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

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

Signed:

Sampled by:

L. KING

[illegible]

Environmental Division  
Sydney  
Work Order Reference  
**ES1719322**



Telephone : + 61-2-8784 8556.



## CERTIFICATE OF ANALYSIS

**Work Order** : ES1719322  
**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** : 5  
**No. of samples analysed** : 5

**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** : 04-Aug-2017 12:47  
**Date Analysis Commenced** : 04-Aug-2017  
**Issue Date** : 10-Aug-2017 14:08



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### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW





## General Comments

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Where moisture determination has been performed, results are reported on a dry weight basis.

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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**)

				Client sample ID				
Sub-Matrix: WATER (Matrix: WATER)				A	B	C1	C2	F
Client sampling date / time				04-Aug-2017 08:50	04-Aug-2017 08:35	04-Aug-2017 11:05	04-Aug-2017 11:10	04-Aug-2017 08:40
Compound	CAS Number	LOR	Unit	ES1719322-001	ES1719322-002	ES1719322-003	ES1719322-004	ES1719322-005
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	---	0.01	pH Unit	5.99	6.59	6.77	6.73	5.79
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	---	1	µS/cm	82	113	94	102	80
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	---	10	mg/L	71	175	79	70	78
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	---	5	mg/L	8	14	12	9	14
EP020: Oil and Grease (O&G)								
Oil & Grease	---	5	mg/L	<5	5	<5	<5	<5





Today's Collection	
Time Start:	8:30
Time Finish:	11:50

Date: 4-8-17

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	10.75	Y	CST	CLO O B G	6.39	154.0 uS	6.37	151.9 uS	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ4	9.70	N	CST	CLO O B G	5.10	106.5 uS	5.16	105.5 uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ5	6.17	N	CST	CLO O B G	4.41	149.3 uS	4.37	151.2 uS	1x 250ml GP, 1x 500mL GP, 1RP	
CQ6			CST	CLO O B G	@ Cleanup Level in Paddock ??				1x 250ml GP, 1x 500mL GP, 1RP	
CQ7	6.15	N	CST	CLO O B G	4.41	124.0 uS	4.37	123.8 uS	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ8	5.80	N	CST	CLO O B G	4.49	127.0 uS	4.53	127.1 uS	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ9			CST	CLO O B G	Dampness / Bioactivity				1x 250ml GP, 1x 500mL GP, 1RP	
CQ10	25.62	Y	CST	CLO O B G	4.82	115.4 uS	4.78	117.9 uS	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ11S	9.86	N	CST	CLO O B G	5.19	142.7 uS	5.27	143.1 uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CQ11D	10.99	N	CST	CLO O B G	5.08	151.7 uS	5.00	151.8 uS	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ12	4.10	N	CST	CLO O B G	4.45	120.7 uS	4.45	121.9 uS	1x 250ml GP, 1x 500mL GP, 1RP	Y
CQ13	12.41	N	CST	CLO O B G	4.40	178.2 uS	4.42	179.3 uS	1x 250ml GP, 1x 500mL GP, 1RP	N
CP3			CST	CLO O B G	GONE				1x 250ml GP, 1x 500mL GP, 1RP	
CP4			CST	CLO O B G	SHED Compound				1x 250ml GP, 1x 500mL GP, 1RP	
CP5	9.07	N	CST	CLO O B G	4.51	169.4 uS	4.49	170.1 uS	1x 250ml GP, 1x 500mL GP, 1RP	
CP6	8.75	N	CST	CLO O B G	4.62	150.1 uS	4.54	148.4 uS	1x 250ml GP, 1x 500mL GP, 1RP	
CP7	2.03	N	CST	CLO O B G	4.98	104.9 uS	4.98	103.2 uS	1x 250ml GP, 1x 500mL GP, 1RP	
CP8	20.85	N	CST	CLO O B G	4.60	119.7 uS	4.62	119.2 uS	1x 250ml GP, 1x 500mL GP, 1RP	
MW7	15.77	N	CST	CLO O B G	4.74	105.0 uS	4.68	105.9 uS	1x 250ml GP, 1x 500mL GP, 1RP	Y
MW8	6.88	N	CST	CLO O B G	4.95	66.0 uS	4.96	65.3 uS	1x 250ml GP, 1x 500mL GP, 1RP	N
MW9	23.44	N	CST	CLO O B G	4.79	84.0 uS	4.78	83.7 uS	1x 250ml GP, 1x 500mL GP, 1RP	N
MW10			CST	CLO O B G	No Access - Upstream Tanks				1x 250ml GP, 1x 500mL GP, 1RP	
MW13			CST	CLO O B G	"				1x 250ml GP, 1x 500mL GP, 1RP	
MW16			CST	CLO O B G	"				1x 250ml GP, 1x 500mL GP, 1RP	
MW17			CST	CLO O B G	No Access - TRIPPER OVER TANKS				1x 250ml GP, 1x 500mL GP, 1RP	

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

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

pH/EC meter #: 46628

Signed: 

Sampled by: H. Mawurwo

L. King