CBased Environmental Pty Limited
ABN 62 611 924 264

Calga Quarry

Environmental Monitoring

Dust Deposition, Surface Water, Groundwater and Meteorological Data

January 2020

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Date: 24 February 2020

Executive Summary

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

The monitoring includes:

- Dust deposition;
- Surface water;
- Groundwater; and
- A meteorological data.

This report was prepared by CBased Environmental and includes the following results for January 2020:

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

The January 2020 dust deposition results for insoluble solids generally increased when compared to December 2019. There was nil excessively contaminated dust gauge 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, D and F. B 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 were not detected at any sites in January 2020.

Bi-monthly groundwater monitoring was undertaken and generally showed:

- Depth to have remained steady when compared to December 2019 depths;
- pH remaining within the acidic range, but slightly neutralized compared to December 2019 results; and
- Similar, but slightly increased, EC levels when compared to December 2019 results

Dataloggers were also downloaded and data emailed to separately to this report.

The Calga Quarry weather station data recovery in January 2020 was approximately 100%. A summary of rainfall comparison is provided below.

Location	Rainfall (mm)
Calga Quarry	227.8mm
BOM Peats Ridge*	NA
BOM Gosford*	125.6mm
BOM Peats Ridge long-term mean for January*	113.3mm

Notes: *NA = Not Available*
**Data sourced from Bureau of Meteorology (BOM) website: www.bom.gov.au*
BOM stations report rainfall at 9am
Calga Quarry station reports rainfall at midnight.

1.0 Sampling Programme

Hanson Calga Quarry conducts environmental monitoring in accordance to Development Consent, OEH (EPA) licence and Environmental Management Plans. CBased Environmental are contracted to undertake dust deposition gauge, surface water, groundwater and meteorological monitoring for the project. CBased Environmental commenced monitoring from the April 2006 monitoring period.

Dust deposition gauges are operated to the Australian Standard AS3580.10.1 "*Methods for sampling and analysis of ambient air method. Determination of particulates- deposited matter- gravimetric method*". Sampling is undertaken every 30 +/- 2 days and each gauge is analysed for insoluble solids and ash residue. The results are reported as g/m^2.month.

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

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

Dust gauge CD2a was discontinued at the start of August 2006 due to quarry operations "mining out" the site of the gauge. The replacement gauge, CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air Quality Management Plan. CD2b was discontinued at the end of January 2010 due to contamination of the gauge by non-quarry related vehicle movements on a track adjacent to the gauge. CD2b was replacement by dust gauge CD2c.

Surface water is sampled in accordance with Australian Standards:

- AS5667.1 "*Guidance on the design of sample programs, sampling techniques and the preservation and handling of samples*";
- AS5667.6 "*Water quality sampling—guidance on sampling of rivers and streams*"; and
- AS5667.4 "*Water quality sampling—guidance on sampling from lakes, natural and man-made*".

Surface water monitoring sites include local streams and dams. Laboratory analysis includes pH, electrical conductivity, total suspended solids, total dissolved solids and total oil and grease. Monitoring is conducted monthly at Sites A and F (dams) and

when Sites B, C and D are flowing. Additional samples are collected when daily rainfall exceeds 50mm.

Groundwater is sampled in accordance with Australian Standards:

- AS5667.1 "*Guidance on the design of sample programs, sampling techniques and the preservation and handling of samples*"; and
- AS5667.11 "*Water quality sampling—guidance on sampling of ground waters*".

Groundwater monitoring sites are sampled bi-monthly for depth and water quality. Groundwater monitoring loggers continuously record water levels in a selection of bores.

Meteorological monitoring is conducted at the quarry and displayed on the site computer with a real-time display. Metrological parameters are measured according to Australian Standard AS3580.14 "*Methods for sampling and analysis of ambient air. Meteorological monitoring for ambient air quality monitoring applications*"

The weather station has the following sensor configuration:

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

CBased Environmental continued to operate the monitoring equipment and utilise site collections at their existing locations.

The locations of monitoring points are provided in **Figure 1**.

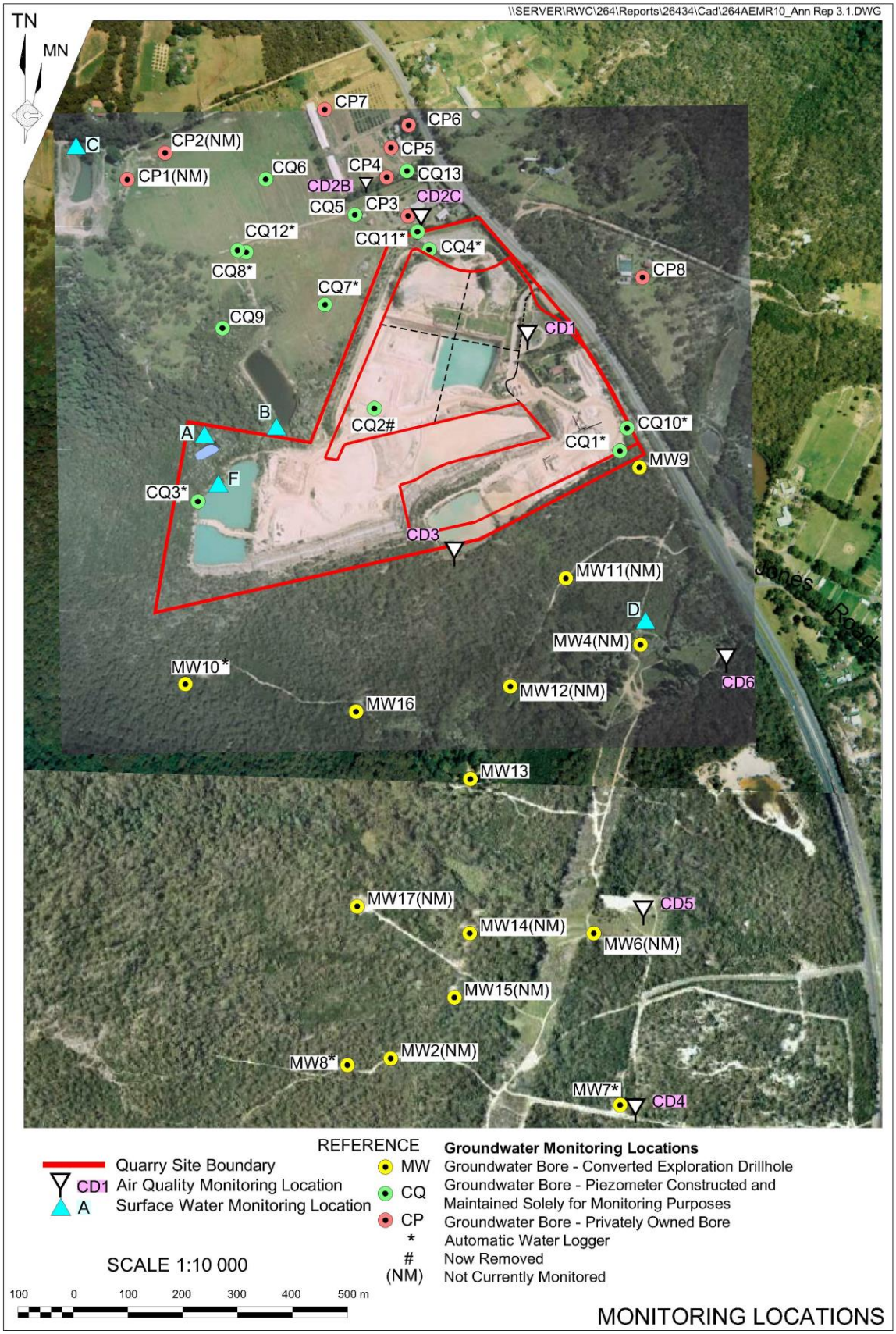


Figure 1: *Hanson Calga Quarry Environmental Monitoring Locations*

2.0 Monthly Results

2.1 Dust Deposition

The results for January 2020 and the project 12-month rolling average are provided **Table 1**.

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

Table 1: Dust Deposition Results: 3 January – 3 February 2020 (31 days)

Site	Monthly Insoluble Solids	Monthly Ash Residue	Monthly Combustible Matter	Monthly Ash Residue/ Insoluble Solids %	Rolling Annual Average Insoluble Solids
CD1	**5.9**	4.9	1.0	83	2.5
CD2c	**4.5**	3.7	0.8	82	1.8
CD3	**7.6**	4.9	2.7	64	2.0
CD4	**4.5**	3.4	1.1	76	1.6
CD5	**5.5**	4.5	1.0	82	1.6
CD6	**5.8**	4.8	1.0	83	1.8

Notes:
Units in g/m^2.month unless indicated
*Insoluble solid results marked with an * indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen and seeds) and insects.*
*Results in **bold** indicate insoluble solids levels above 3.7g/m^2.month; the Development Consent's annual average amenity criteria at residential locations.*
The current rolling annual average is calculated from February 2019 to January 2020.

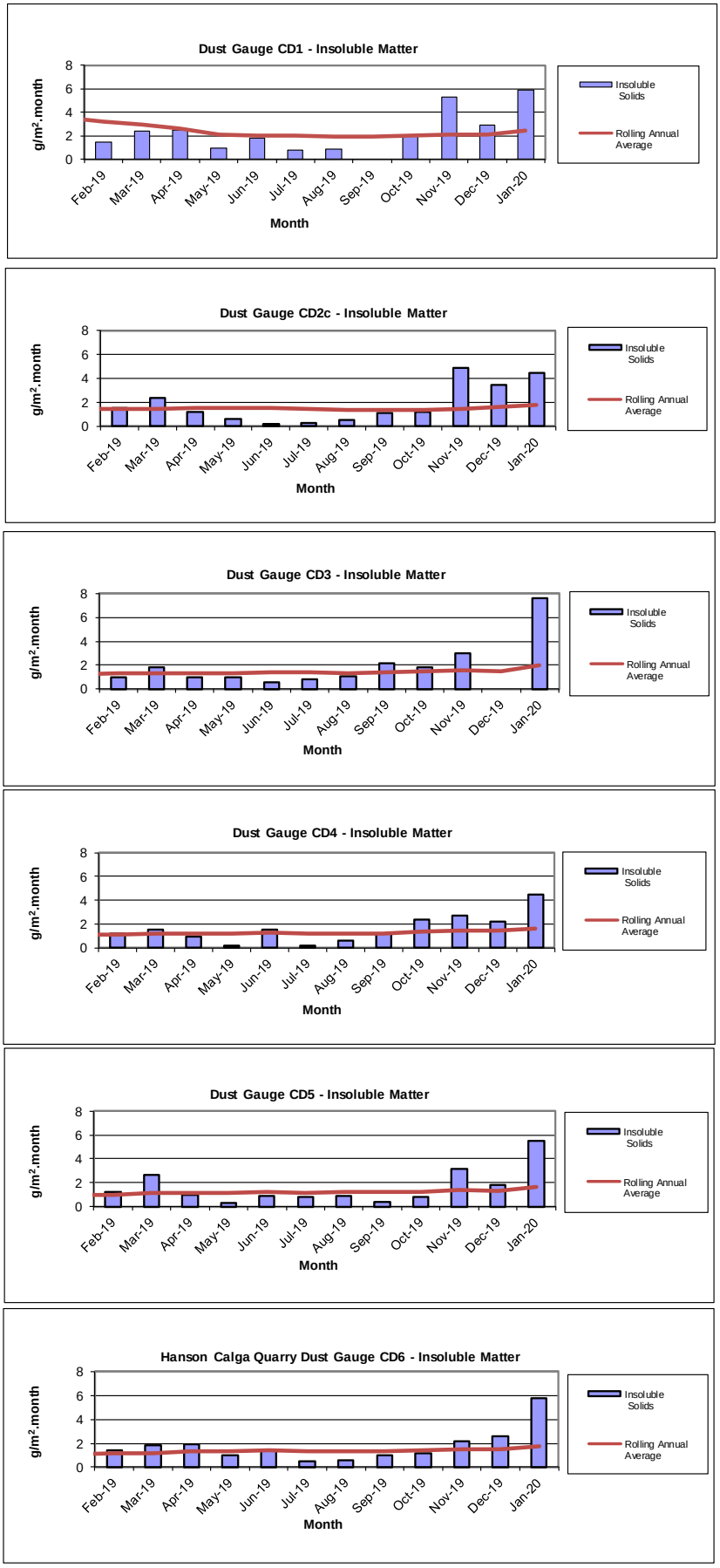


Figure 2: *Summary Monthly/Annual Dust Deposition Results for Insoluble Solids*

2.2 Surface Water Monitoring (Monthly)

Monthly surface water monitoring was conducted on 3 January 2020 and results are provided in **Table 2**. The field sheet, chain of custody documentation and laboratory analysis certificates are provided in **Appendix 1.**

Samples were collected at sites A, C1, C2, D and F. B was dry at the time of sampling. In summary, groundwater monitoring results showed:

- pH within the slightly acidic range;
- Low electrical conductivity;
- Low total dissolved solids;
- Low total suspended solids and
- Non-detectable traces of oil and grease.

Table 2: Monthly Surface Water Monitoring Results – January 2020

Site	Observed Flow Rate* *(visual)*	Water Colour* *(visual)*	Turbidity* *(visual)*	pH	EC *(µS/cm)*	TDS *(mg/L)*	TSS *(mg/L)*	Oil and Grease *(mg/L)*
A	Dam	Clear	Clear	5.76	104	66	11	<5
B	Dry							
C1	Dam	Clear	Clear	6.59	142	82	<5	<5
C2	Steady	Clear	Pale brown	6.15	130	88	7	<5
D	Trickle	Clear	Clear	5.42	106	84	<5	<5
F	Dam	Clear	Clear	4.78	84	98	<5	<5

** Indicates field measurements. All other results are laboratory analysed*

2.2.1 Non-Routine Surface Water Sampling

A discharge sampling event was undertaken on 17 January 2020. The chain of custody documentation and laboratory analysis certificates are provided in **Appendix 1.**

2.3 Groundwater Monitoring (Bi-monthly)

Groundwater was sampled on 3 January 2020. Data is displayed in **Table 3** and **Figures 3 – 6.** The field sheet, chain of custody documentation and laboratory analysis certificates are provided in **Appendix 1.**

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.

In summary, groundwater monitoring results showed:

- Depth generally remained steady when compared to December 2019 depths;

- pH at all sites is in the acidic range but slightly neutralized compared to December 2019 results; and
- EC levels were similar, but slightly increased when compared to December 2019 results

Dataloggers were also downloaded and data emailed to separately to this report.

Table 3: Groundwater Quality Data

Site	Bore	Type	Depth to Water April 2006	Depth to Water (this report)	pH (this report)	Electrical Conductivity (this report)
CQ3	Voutos	* Monitor	10.53	11.59	6.28	124
CQ4	Voutos	* Monitor	8.78	11.58	5.50	132
CQ5	Gazzana	Dip only	8.69	7.37	4.58	202
CQ6	Gazzana	Dip only	16.00	*No longer accessible due to damage*		
CQ7	Gazzana	* Monitor	6.89	6.56	4.96	105
CQ8	Gazzana	* Monitor	11.03	6.21	4.26	124
CQ9	Gazzana	Dip only	10.10	*No longer accessible due to damage*		
CQ10	Voutos	* Monitor	NI	25.30	4.62	135
CQ11S	Gazzana	* Monitor	NI	12.20	5.19	147
CQ11D	Gazzana	* Monitor	NI	13.25	4.99	146
CQ12	Gazzana	* Monitor	NI	4.35	4.21	126
CQ13	Kashouli	* Monitor	NI	14.08	4.21	147
CP3	Gazzana	Domestic	10.40	*No longer accessible due to damage*		
CP4	Kashouli	Domestic	13.63	5.92	*Blocked*	
CP5	Kashouli	Domestic	16.61	7.35	5.57	122
CP6	Kashouli	Domestic	16.27	10.84	4.05	148
CP7	Kashouli	Production	8.56	2.60	6.10	151
CP8	Rozmanec	Domestic	22.17	22.42	4.56	112
CP13	W P White	Domestic		12.48	4.48	147
CP15	32 Polins Road, Calga	Domestic		3.04	3.98	159
MW7	Rocla Bore	* Monitor	15.76	15.44	5.89	25
MW8	Rocla Bore	* Monitor	9.82	7.53	5.25	60
MW9	Rocla Bore	* Monitor	22.44	23.89	4.68	85
MW10	Rocla Bore	* Monitor	15.41	No access		
MW13	Rocla Bore	Dip only	NI	No access		
MW16	Rocla Bore	Dip only	NI	No access		
MW17	Rocla Bore	Dip only		No access		

Notes:
Water level measured from top of bore case (TOC) to water
pH measured in pH units / electrical conductivity measured in µS/cm
Blank cells = no data available
** = Logger Installed*
NI = Bores installed after April 2006. April 2006 was the first set of measurements taken by CBased Environmental Pty Limited
Yellow shading indicates increase to groundwater depth (water moved away from surface) since last sampling event
Green shading indicates decrease to groundwater depth (water moved towards surface) since last sampling event
Pink shading indicates stable groundwater depth (+/- 0.01m) since last sampling event

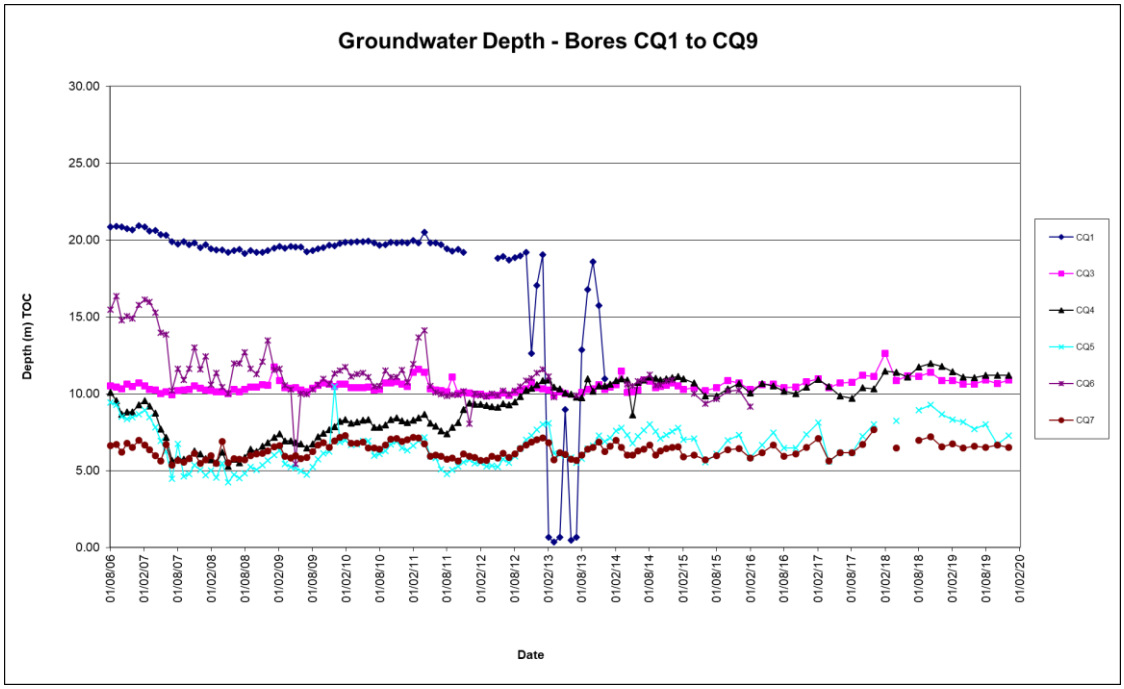


Figure 3: *Groundwater Depth – Bores CQ1 to CQ9*

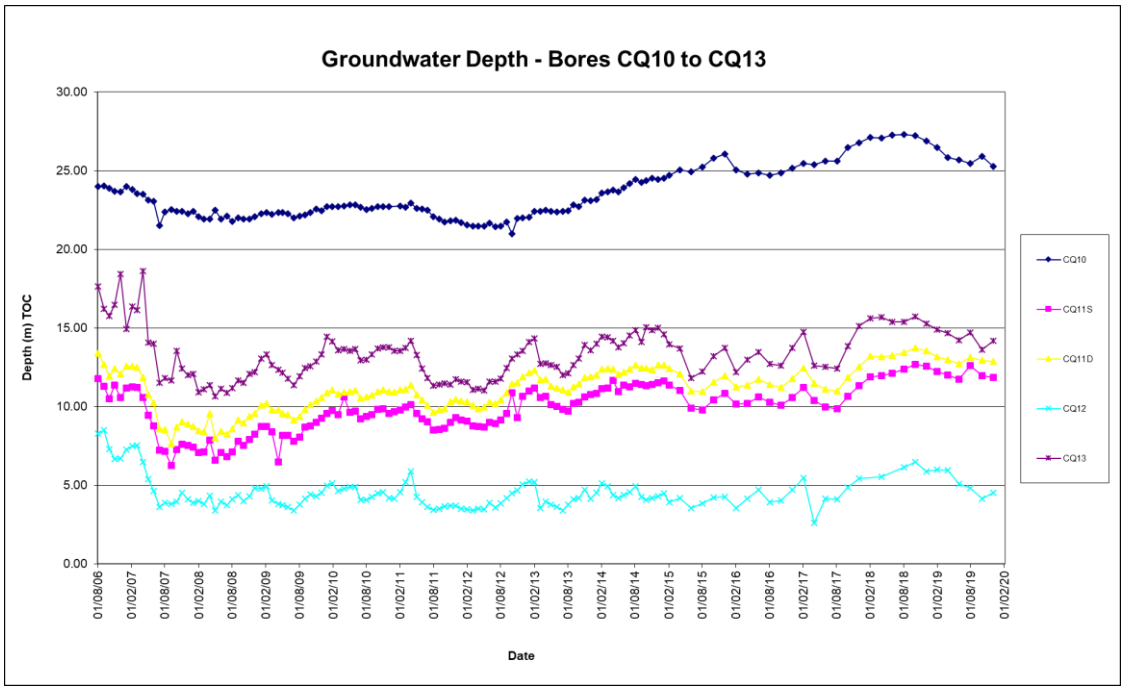


Figure 4: *Groundwater Depth – Bores CQ10 to CQ13*

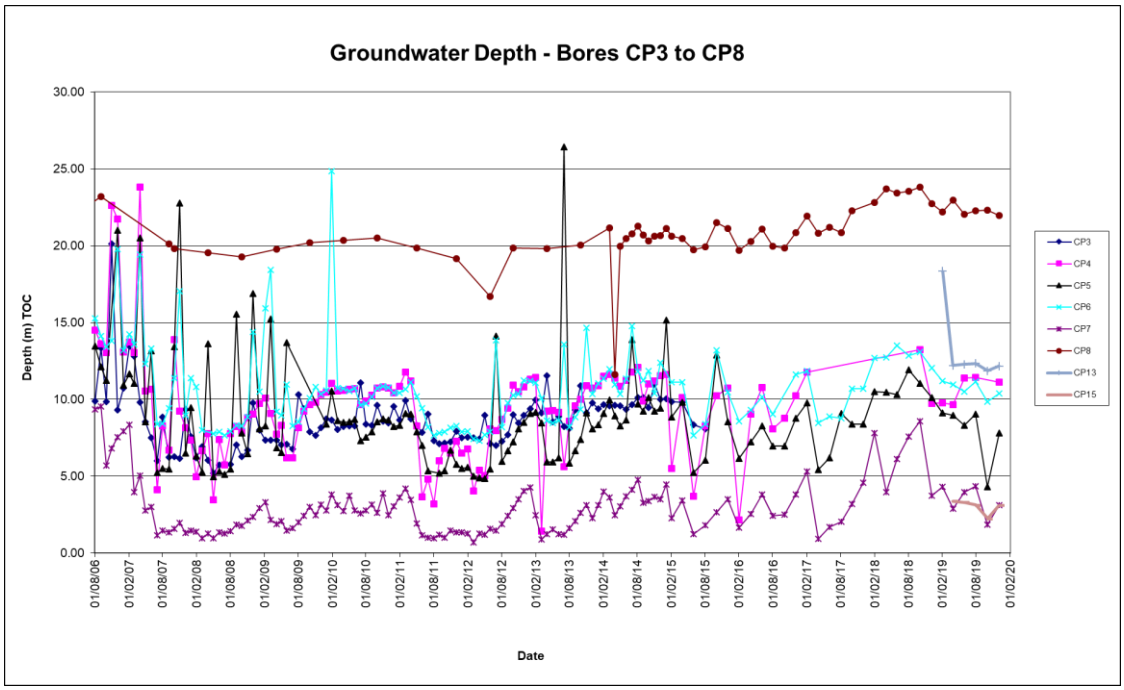


Figure 5: *Groundwater Depth – Bores CP3 to CP8*

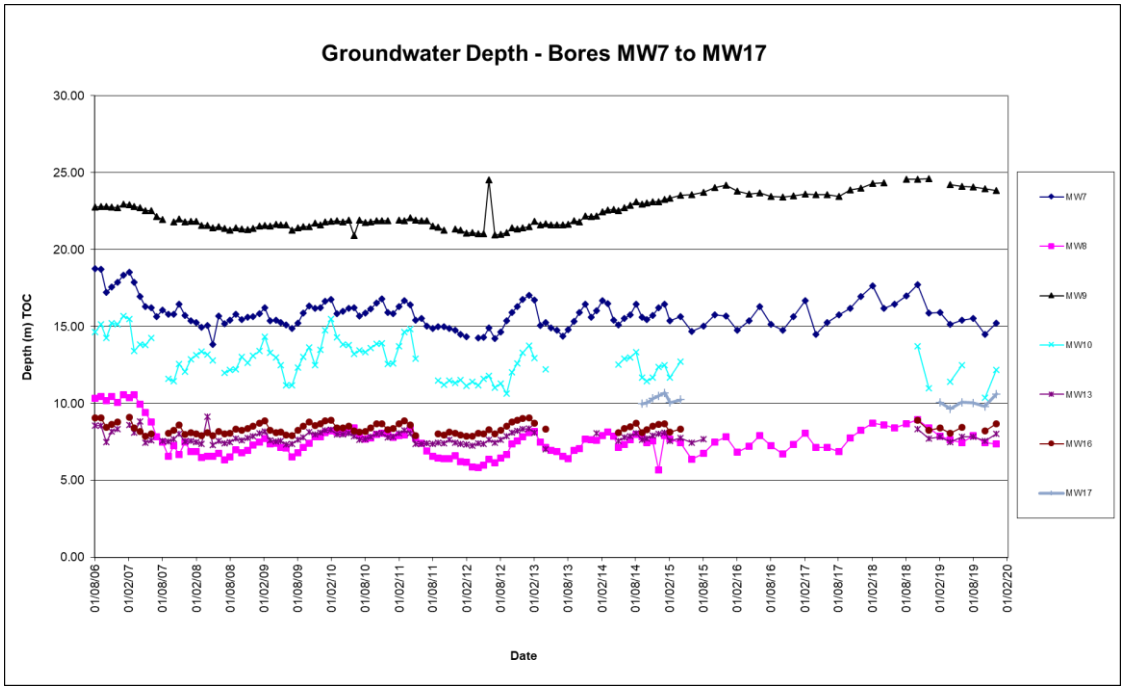


Figure 6: *Groundwater Depth – Bores MW7 to MW17*

2.4 Meteorological Monitoring

The Calga Quarry weather station data recovery for January 2020 was approximately 100%.

The weather station data follows and includes:

- Monthly data summary. Refer to **Table 4**;
- Weather charts of air temperature, humidity, heat index and wind chill, atmospheric pressure, solar radiation, evapotranspiration, rain, wind speed and data reception. Refer to **Figures 7 – 9**; and
- Wind rose (frequency distribution diagram of wind speed and direction). Refer to **Figure 10**.

Data for January 2020 shows that rainfall recorded at the Calga Quarry was well above the Gosford BOM mean rainfall and slightly over double the Peats Ridge long term rainfall for January. A summary of rainfall comparison is provided in **Table 4**.

Table 4: Comparison of Local Rainfall

Location	Rainfall (mm)
Calga Quarry	227.8mm
BOM Peats Ridge*	NA
BOM Gosford*	125.6mm
BOM Peats Ridge long-term mean for January*	113.3mm

Notes: *NA = Not Available*
**Data sourced from Bureau of Meteorology (BOM) website: www.bom.gov.au*
BOM stations report rainfall at 9am
Calga Quarry station reports rainfall at midnight.

An annual calibration was undertaken on the weather station during March 2019 and is next due in March 2020.

Table 4 Monthly Meteorological Data Summary

Date	Temperature Min	Temperature Avg	Temperature Max	Relative Humidity Min	Relative Humidity Avg	Relative Humidity Max	Rain	Evapotranspiration	Wind Speed Min	Wind Speed Avg	Wind Speed Max	Wind Chill Min	Heat Index Max	Atmospheric Pressure Min	Atmospheric Pressure Avg	Atmospheric Pressure Max	Solar Radiation Min	Solar Radiation Avg	Solar Radiation Max	Data Min	Data Avg	Data Max
1/01/2020	18.6	21.9	29.4	48.0	73.5	92.0	0.0	5.3	0.0	2.7	12.5	18.3	30.1	1008.2	1010.3	1014.5	0.0	279.2	976.0	90.5	97.6	100.0
2/01/2020	17.7	21.4	27.7	55.0	82.5	96.0	2.6	3.7	0.0	1.8	8.9	17.8	28.2	1012.2	1014.5	1016.5	0.0	205.1	845.0	84.5	95.8	100.0
3/01/2020	20.2	24.3	32.8	53.0	80.6	97.0	0.8	4.8	0.0	2.3	11.2	20.2	37.0	1006.9	1011.0	1015.1	0.0	233.6	1010.0	91.2	96.9	100.0
4/01/2020	19.9	32.1	45.1	13.0	52.2	95.0	0.0	8.2	0.0	2.4	11.2	20.1	44.8	999.8	1004.4	1008.1	0.0	299.3	984.0	87.1	95.3	99.4
5/01/2020	19.8	22.6	27.2	47.0	61.3	71.0	0.0	5.8	1.3	3.1	11.6	19.8	27.4	1006.6	1013.8	1019.8	0.0	281.0	995.0	93.7	97.1	99.7
6/01/2020	18.2	19.5	20.8	70.0	87.0	97.0	6.6	0.9	0.0	0.6	6.3	18.2	21.9	1013.5	1016.2	1018.9	0.0	44.4	179.0	95.6	98.7	100.0
7/01/2020	19.6	23.8	30.9	63.0	84.6	98.0	1.0	2.9	0.0	2.0	8.9	19.3	35.6	1005.9	1010.4	1015.3	0.0	142.6	883.0	92.1	98.3	100.0
8/01/2020	21.1	23.0	27.2	70.0	86.0	96.0	2.0	2.8	0.0	1.7	10.7	21.1	29.0	1008.2	1011.1	1014.4	0.0	149.9	742.0	95.6	99.0	100.0
9/01/2020	19.7	21.5	24.4	76.0	86.3	96.0	2.0	1.6	0.0	1.3	6.7	19.8	25.5	1012.0	1013.3	1014.8	0.0	79.0	323.0	89.6	96.7	100.0
10/01/2020	20.1	26.7	34.1	50.0	74.8	97.0	0.0	6.3	0.0	2.8	10.7	20.2	39.9	998.4	1005.9	1012.5	0.0	296.3	964.0	68.8	90.5	97.8
11/01/2020	17.2	21.1	32.8	44.0	76.0	93.0	0.6	1.9	0.0	2.3	10.3	17.1	34.4	998.0	1008.0	1013.7	0.0	63.8	408.0	86.1	97.2	100.0
12/01/2020	17.2	18.9	22.9	58.0	78.6	94.0	1.0	1.9	0.0	1.7	7.6	17.3	22.9	1012.6	1014.8	1017.1	0.0	86.7	690.0	94.6	98.4	100.0
13/01/2020	17.3	21.0	26.3	54.0	75.9	93.0	0.0	4.6	0.0	2.2	9.8	17.3	26.4	1013.0	1015.1	1016.7	0.0	238.9	947.0	78.5	96.4	100.0
14/01/2020	17.2	22.2	28.7	56.0	78.5	96.0	0.0	4.5	0.0	2.1	9.8	17.2	29.7	1011.1	1013.2	1014.7	0.0	225.4	1027.0	63.1	90.3	100.0
15/01/2020	17.1	22.5	29.0	57.0	81.7	97.0	0.0	4.0	0.0	1.8	9.4	17.2	30.6	1004.9	1008.7	1012.6	0.0	212.9	894.0	59.9	84.4	100.0
16/01/2020	20.3	23.7	28.1	54.0	79.3	97.0	0.0	2.3	0.0	1.2	7.2	20.3	28.8	1000.8	1003.7	1005.2	0.0	115.4	408.0	75.4	88.8	100.0
17/01/2020	18.3	19.4	21.2	88.0	94.9	98.0	151.6	0.5	0.4	1.7	7.6	18.3	22.4	1002.8	1005.2	1007.4	0.0	22.4	151.0	80.1	90.6	97.2
18/01/2020	18.7	19.5	20.6	93.0	96.2	97.0	22.0	1.0	0.0	1.6	7.2	18.7	21.9	1004.4	1005.8	1007.3	0.0	69.3	237.0	68.5	91.1	97.2
19/01/2020	17.9	20.3	23.4	84.0	94.0	98.0	2.2	1.6	0.0	0.6	4.5	18.0	24.6	1001.1	1003.8	1006.4	0.0	102.5	442.0	89.6	92.7	97.2
20/01/2020	19.0	23.7	31.5	62.0	84.6	98.0	9.4	4.8	0.0	1.7	12.5	19.0	36.4	994.0	999.0	1002.5	0.0	270.0	1028.0	73.8	89.9	100.0
21/01/2020	18.3	24.0	32.1	34.0	66.3	90.0	0.0	6.7	0.0	1.9	9.4	18.3	31.6	1000.3	1003.6	1007.8	0.0	335.0	1029.0	83.0	93.3	99.4
22/01/2020	18.2	25.5	32.7	45.0	70.3	96.0	0.0	6.9	0.0	3.2	13.9	18.3	36.7	1001.5	1005.2	1008.4	0.0	312.7	1068.0	71.6	91.5	100.0
23/01/2020	21.8	32.0	41.0	19.0	42.0	89.0	7.0	8.9	0.0	3.4	21.0	21.8	41.1	994.6	998.7	1002.3	0.0	294.5	1014.0	64.4	89.0	99.1
24/01/2020	23.2	25.5	28.6	59.0	73.9	87.0	0.0	4.1	0.0	2.7	10.7	23.0	30.2	998.8	1005.0	1010.3	0.0	180.3	697.0	43.5	87.6	100.0
25/01/2020	22.3	24.3	27.7	73.0	87.1	94.0	0.0	2.2	0.0	1.5	5.4	22.4	30.6	1007.6	1009.7	1011.5	0.0	113.3	821.0	77.6	88.7	94.0
26/01/2020	22.9	27.2	36.6	41.0	78.1	97.0	3.0	4.8	0.0	1.8	11.2	23.0	42.7	1004.6	1007.3	1009.4	0.0	252.5	1030.0	76.7	86.7	93.1
27/01/2020	22.7	25.2	30.6	68.0	83.1	91.0	0.0	3.7	0.0	2.0	7.6	22.7	36.2	1006.8	1009.1	1011.2	0.0	182.3	873.0	79.5	84.2	90.9
28/01/2020	21.3	25.8	35.6	54.0	84.4	97.0	16.0	4.3	0.0	1.5	13.4	21.3	45.8	1004.5	1008.0	1010.7	0.0	233.1	1034.0	68.1	90.2	99.4
29/01/2020	21.4	23.9	27.5	71.0	83.3	94.0	0.0	3.4	0.0	2.0	8.5	21.4	29.9	1010.1	1012.4	1015.0	0.0	181.1	914.0	56.5	84.3	99.4
30/01/2020	18.3	23.9	30.8	59.0	82.7	98.0	0.0	4.8	0.0	2.0	9.8	18.3	34.4	1009.8	1012.7	1015.1	0.0	259.5	958.0	51.4	89.0	100.0
31/01/2020	21.8	28.0	36.7	53.0	77.0	97.0	0.0	6.3	0.0	2.3	9.8	21.8	46.8	1006.8	1009.7	1012.7	0.0	314.1	980.0	28.7	73.1	92.4
Monthly	17.1	23.7	45.1	13	79	98	227.8	125.5	0	2.0	21	17.1	46.8	994.0	1008.7	1019.8	0	196.0	1068	28.7	91.7	100
Unit	*Degrees Celcius (°C)*			*Percentage Relative Humidity*			*mm*	*mm*	*Metres per second (m/s)*			*°C*	*°C*	*Hector Pascals (hPa)*			*Watts per square metre (W/m²)*			*Percentage (%)*		

No data

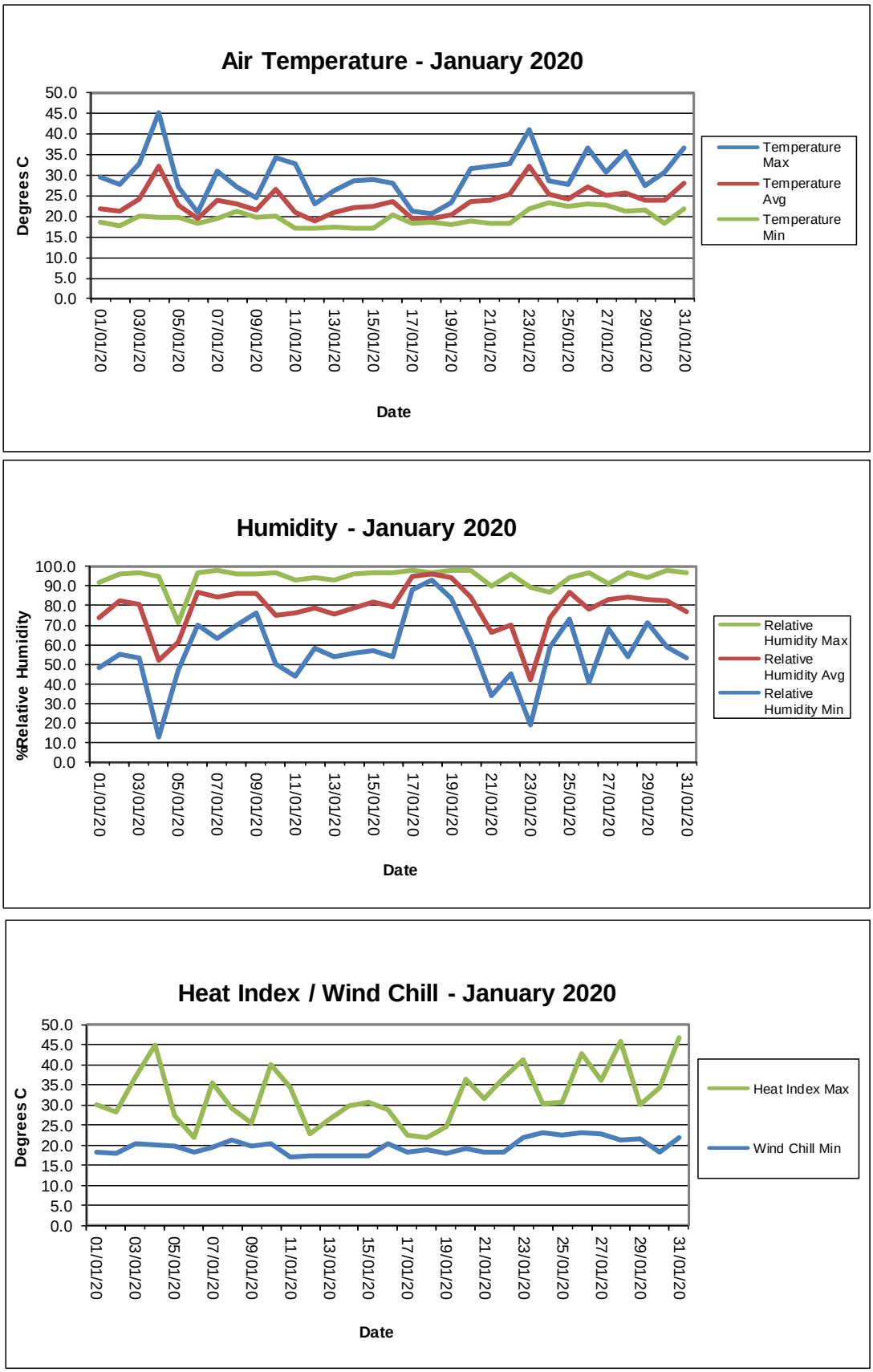
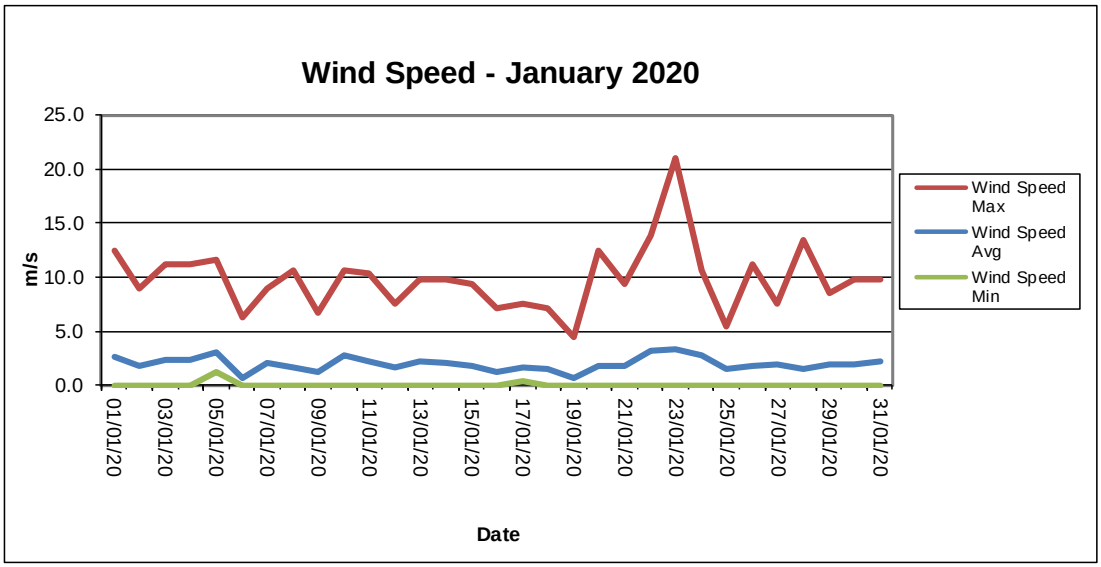
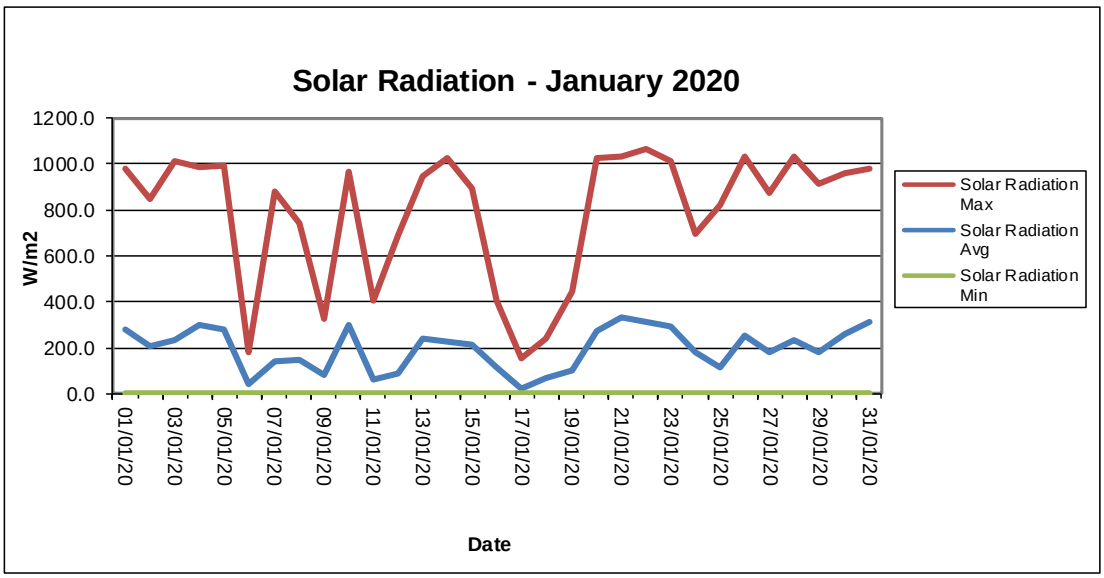


Figure 7 *Summary of Monthly Temperature, Humidity and Heat Index Results*





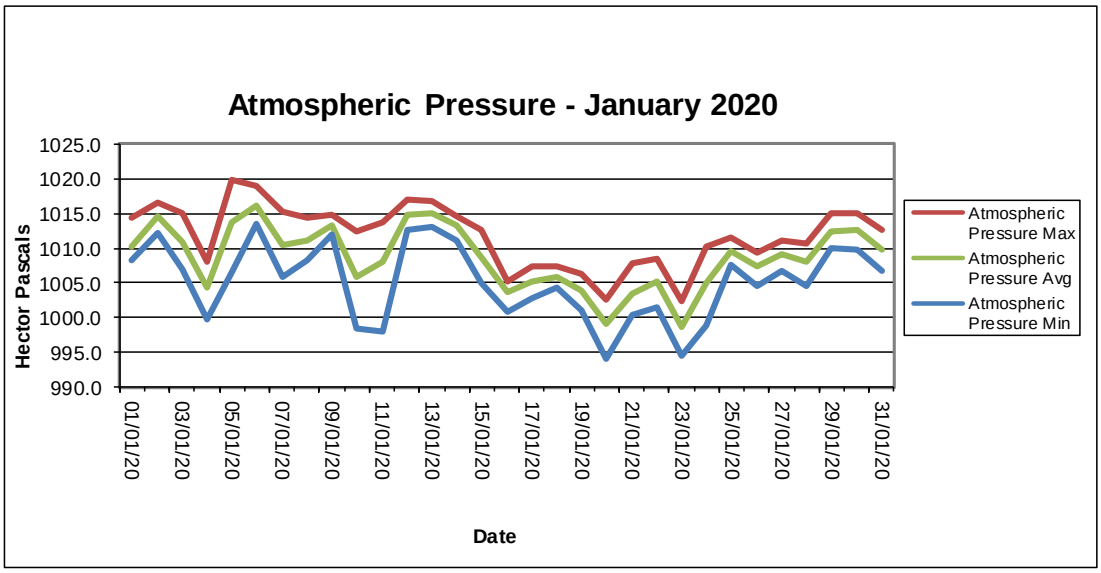
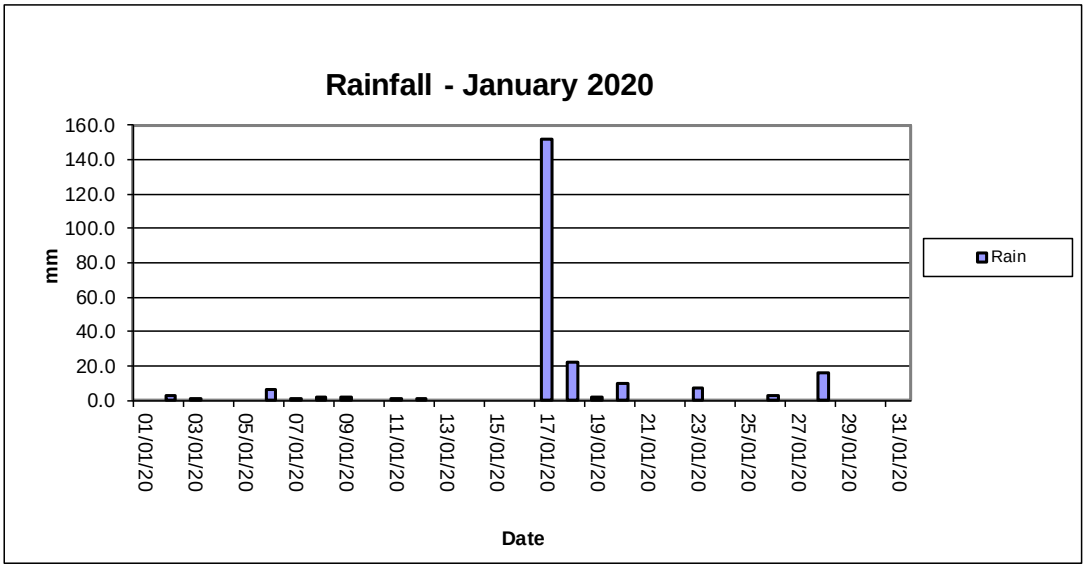
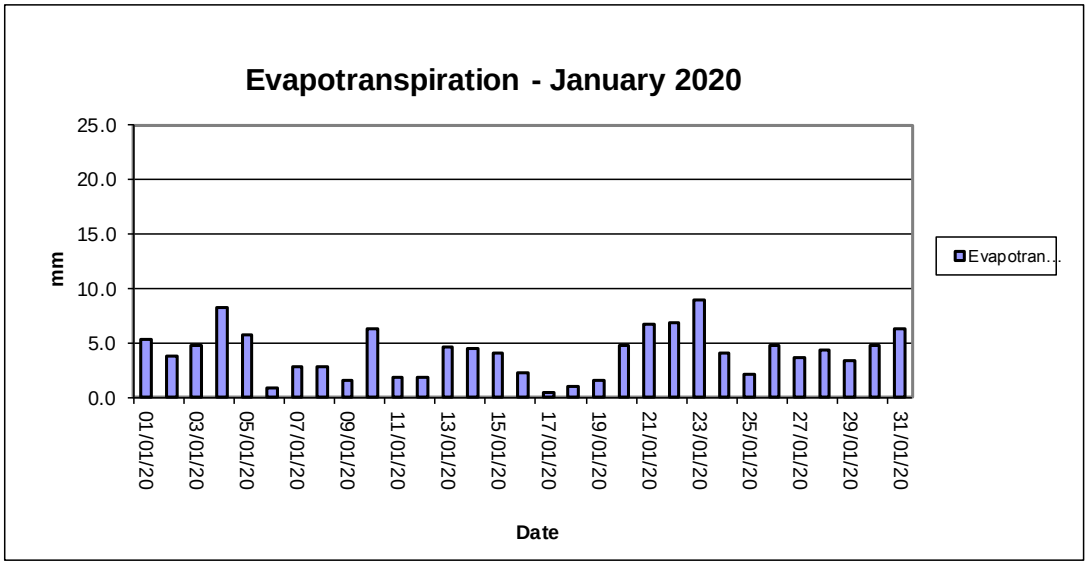


Figure 8 *Summary of Monthly Wind Speed, Solar Radiation and Atmospheric Pressure Results*





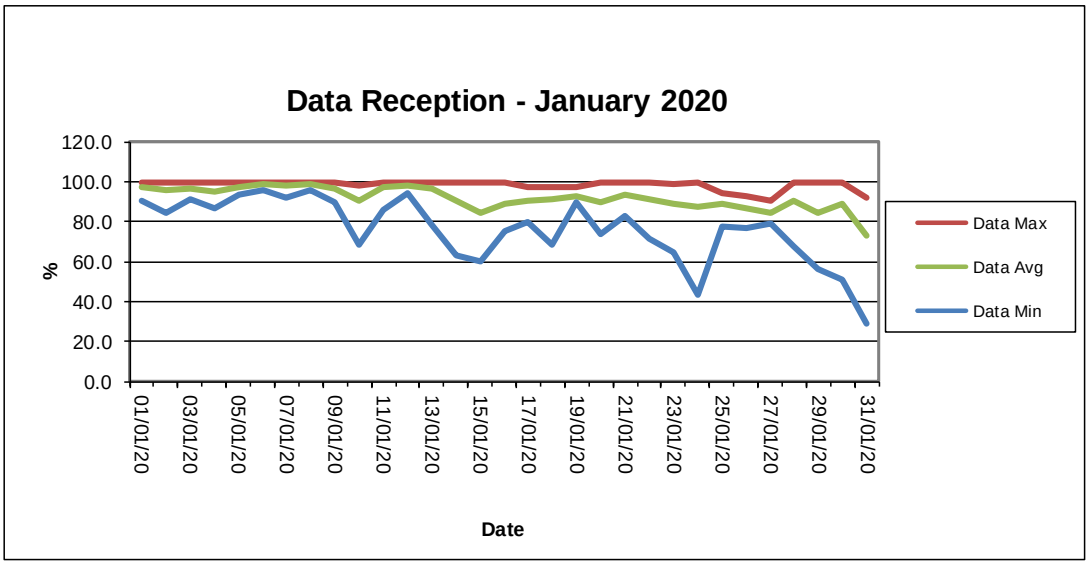


Figure 9 *Summary of Monthly Rainfall, Evapotranspiration and Data Reception Results*

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.

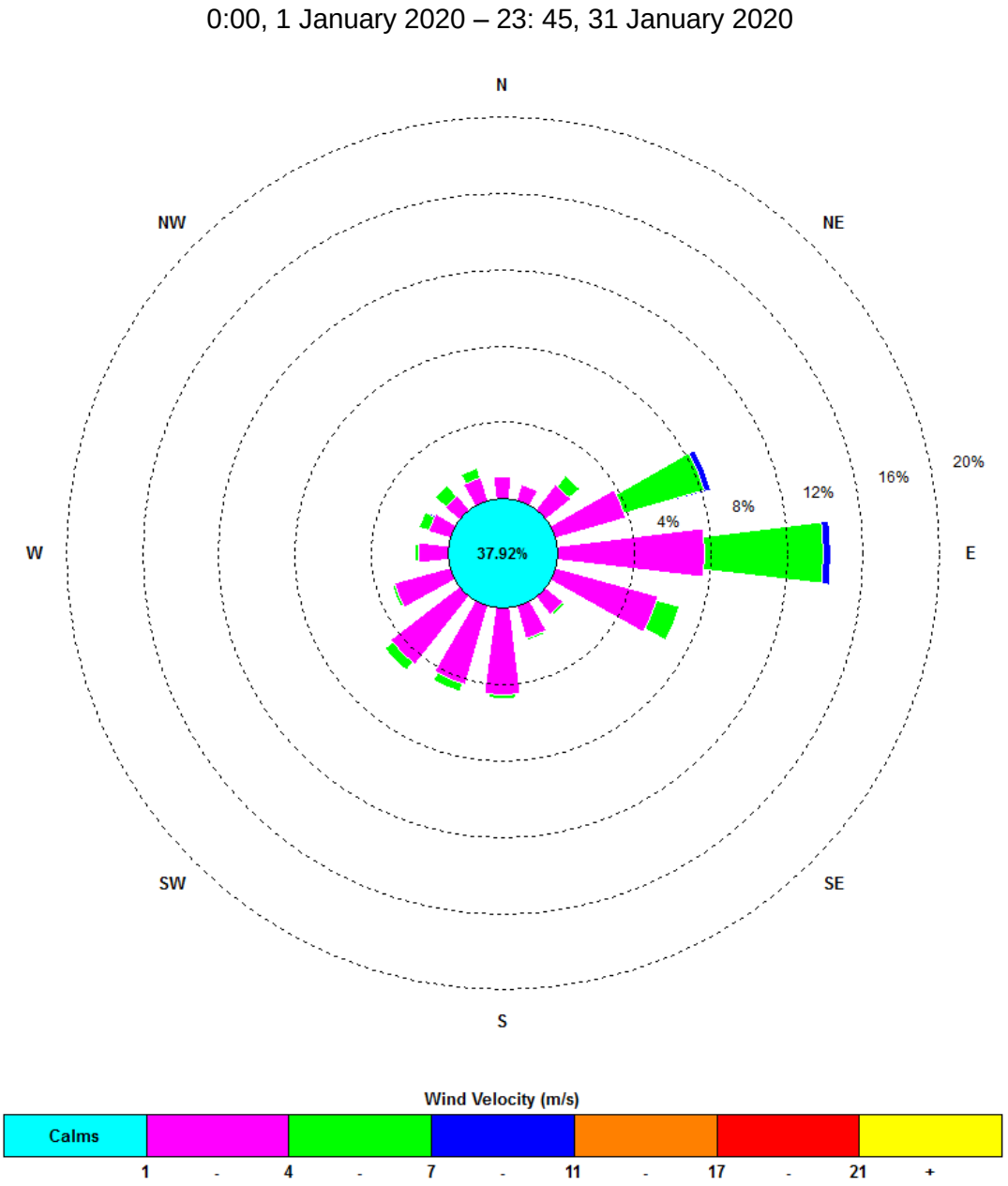


Figure 10 *Monthly Windrose Plot – January 2020*

The predominant wind for January was from the east, with most frequent, strongest winds also from the East. The maximum wind speed was 21.0m/s from the west.

Appendix 1

Field Sheets

Chain of Custody Documentation

Laboratory Analysis Certificates

DEPOSITIONAL DUST MONITORING

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

Date Installed: 3-1-20

Date Collected: 3-2-20

Sampled By: Leesa + Maddie

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	2:15	1999	✓			✓	(C) S T	(C) O Bn Gn Gy	Y	Y		
CD2C	1:10	1999	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	Y	Y		
CD3	10:50	1999	✓		✓	✓	C S T	(C) O Bn Gn (Gy)	Y	Y	—	
CD4	11:35	1999	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	Y	Y	—	
CD5	12:00	1999	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	Y	Y	—	
CD6	11:45	1999	✓		✓	✓	(C) S T	(C) O Bn Gn Gy	Y	Y	—	

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

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

Report broken funnels and replacement diameters

Signed: _____

CHAIN OF CUSTODY DOCUMENTATION

Australian Laboratory Services Pty Ltd

CLIENT: CBased Environmental Pty Ltd

POSTAL ADDRESS: 47 Boomerang St CESSNOCK NSW 2325

SAMPLERS: Leesa & Maddie

SEND REPORT TO: monitoringresults@cbased.com.au

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

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

DATA NEEDED BY: 7 working days REPORT NEEDED BY: 7 working days

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

PROJECT ID: Hanson Calga Dusts QUOTE NO.: SYBQ 403-18

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

P.O. NO.: COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

Total unless specified

ANALYSIS REQUIRED

	SAMPLE ID	MATRIX	DATE ON	DATE OFF	TYPE & PRESERVATIVE	NO.	Insoluble Solids	Ash Residue	Combustable Matter	NOTES
1	CD1	Dust	3.1.20	3.2.20			x	x	x	
2	CD2o	Dust	"	"			x	x	x	
3	CD3	Dust	"	"			x	x	x	
4	CD4	Dust	"	"			x	x	x	
5	CD5	Dust	"	"			x	x	x	
6	CD6	Dust	"	"			x	x	x	

Environmental Division Newcastle
Work Order Reference
EN2000701

Telephone : +61 2 4014 2500

RELINQUISHED BY:

NAME: Leesa King DATE: 3.2.19

OF: CBased Environmental TIME:

NAME: DATE:

OF: TIME:

RECEIVED BY

NAME: AL DATE: 4/2/2020

OF: ALS TIME: 4:04pm

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 Rinsed Jar; S = Solvent Washed Acid Rinsed 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	: **EN2000701**	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	: 04-Feb-2020 16:04
Order number	: ----	Date Analysis Commenced	: 06-Feb-2020
C-O-C number	: ----	Issue Date	: 12-Feb-2020 08:42
Sampler	: Leesa & Maddie		
Site	:		
Quote number	: SYBQ/222/16 and PLANNED EVENTS		
No. of samples received	: 6		
No. of samples analysed	: 6		

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*
Jennifer Targett	Laboratory Technician	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 03/01/20 - 03/02/20	CD2c 03/01/20 - 03/02/20	CD3 03/01/20 - 03/02/20	CD4 03/01/20 - 03/02/20	CD5 03/01/20 - 03/02/20
				Client sampling date / time	03-Feb-2020 00:00	03-Feb-2020 00:00	03-Feb-2020 00:00	03-Feb-2020 00:00	03-Feb-2020 00:00
					EN2000701-001	EN2000701-002	EN2000701-003	EN2000701-004	EN2000701-005
					Result	Result	Result	Result	Result
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		**4.9**	**3.7**	**4.9**	**3.4**	**4.5**
Ash Content (mg)	----	1	mg		**89**	**68**	**90**	**62**	**83**
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		**1.0**	**0.8**	**2.7**	**1.1**	**1.0**
Combustible Matter (mg)	----	1	mg		**18**	**14**	**49**	**20**	**18**
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		**5.9**	**4.5**	**7.6**	**4.5**	**5.5**
Total Insoluble Matter (mg)	----	1	mg		**107**	**82**	**139**	**82**	**101**

Analytical Results

Sub-Matrix: **DEPOSITIONAL DUST** (Matrix: **AIR**)				Client sample ID	**CD6 03/01/20 - 03/02/20**	**----**	**----**	**----**	**----**
				Client sampling date / time	03-Feb-2020 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EN2000701-006**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
EA120: Ash Content									
Ash Content	----	0.1	g/m².month		**4.8**	**----**	**----**	**----**	**----**
Ash Content (mg)	----	1	mg		**87**	**----**	**----**	**----**	**----**
EA125: Combustible Matter									
Combustible Matter	----	0.1	g/m².month		**1.0**	**----**	**----**	**----**	**----**
Combustible Matter (mg)	----	1	mg		**19**	**----**	**----**	**----**	**----**
EA141: Total Insoluble Matter									
Total Insoluble Matter	----	0.1	g/m².month		**5.8**	**----**	**----**	**----**	**----**
Total Insoluble Matter (mg)	----	1	mg		**106**	**----**	**----**	**----**	**----**

CBASED ENVIRONMENTAL PTY LIMITED

Date: 3-2-20

Client : Hanson Calga

Project :

SURFACE WATERS

Site	Flow Rate	Odour	Sampling Time	Bottles	Water Turbidity	Water Colour	Comments
A	DAM	NO	10:15		(C) S T	(C) LO O B G	
B	DRY				C S T	C LO O B G	
C1	DAM	NO	3:00		(C) S T	(C) LO O B G	
C2	Steady Trickle	NO	3:15		(C) S T	C LO O (B) G	light Brown
D		NO	11:50		(C) S T	(C) LO O B G	
F	DAM	NO	10:00		(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: [signature]

Sampled by: Leesa + Maddie

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2001420**	Page	: 1 of 2
Client	: **HANSON CONSTRUCTION MATERIALS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR SHANE PESCUD	Contact	: Customer Services ES
Address	:	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 4375 1151	Telephone	: +61-2-8784 8555
Project	: Hanson Calga Surafce Water Monitoring	Date Samples Received	: 17-Jan-2020 12:00
Order number	: 4502673996	Date Analysis Commenced	: 17-Jan-2020
C-O-C number	: ----	Issue Date	: 24-Jan-2020 16:05
Sampler	: SHANE PESCUD		
Site	: ----		
Quote number	: EN/333		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

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Signatories

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Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, 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	**Dam 1 (A)**	**DAM 7B/C**	**DAM 13(B)**	**POINT D CREEK**	**POINT C SPILLWAY**
			Client sampling date / time	17-Jan-2020 07:30	17-Jan-2020 07:40	17-Jan-2020 07:55	17-Jan-2020 08:15	17-Jan-2020 08:35
Compound	*CAS Number*	*LOR*	*Unit*	**ES2001420-001**	**ES2001420-002**	**ES2001420-003**	**ES2001420-004**	**ES2001420-005**
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.49**	**6.45**	**6.38**	**5.92**	**5.99**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**93**	**92**	**47**	**60**	**92**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**48**	**52**	**102**	**93**	**85**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**6**	<5	**604**	**50**	<5
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	<5	<5	<5	<5

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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

OFFICE:

PROJECT: Hanson Calga Quarry, Site Water Discharge Dam 1 (A)

ORDER NUMBER: 4502673996

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 invoice 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): pH priority 17/01/2020

ALS QUOTE NO.: SYBQ 222-19

COC SEQUENCE NUMBER (Circle)

COC: 1

OF: 1

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Brad Seaman			
DATE/TIME: 17/01/2020	DATE/TIME:	DATE/TIME:	DATE/TIME:

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	Discharge Dam 1 (A) 17012020	17/01/2020 9:15am	W	1x P, 1x O&G	2	1	1	1	1	1				
					TOTAL 2	1	1							

HT TAT

Environmental Division Sydney
Work Order Reference
ES2001418

Telephone : + 61-2-8784 8555

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	: **ES2001418**	Page	: 1 of 2
Client	: **HANSON CONSTRUCTION MATERIALS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR SHANE PESCUD	Contact	: Customer Services ES
Address	:	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 4375 1151	Telephone	: +61-2-8784 8555
Project	: HANSON CALGA QUARRY, SITE WATER DISCHARGE DAM 1 (A)	Date Samples Received	: 17-Jan-2020 12:00
Order number	: 4502673996	Date Analysis Commenced	: 17-Jan-2020
C-O-C number	: ----	Issue Date	: 24-Jan-2020 16:05
Sampler	: SHANE PESCUD		
Site	: ----		
Quote number	: EN/333		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

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Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

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LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

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

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**Discharge Dam 1 (A) 17012020**	----	----	----	----
			Client sampling date / time	17-Jan-2020 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES2001418-001**	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.84**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**92**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**92**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**7**	----	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	<5	----	----	----	----

C BASED ENVIRONMENTAL PTY LIMITED

Date: 3·2·20

Client: Hanson Calga
Project: Bi-Monthly Bores

GROUNDWATERS

Site	Time	DEPTH	Typical Depth (m)	Odour	Water Turbidity	Water Colour	1 pH	1 EC	2 pH	2 EC	Downloaded Logger (Y/N)*	Comments
CQ3	10·15	11·59	10.74	NO	CST	CLOOBG	6·36	124·1ms	6·28	123·6ms	Y	
CQ4	1·00	11·58	11.13	NO	CST	CLOOBG	5·55	130·2ms	5·50	131·9ms	Y	
CQ5	1·20	7·37	8.04	NO	CST	CLOOBG	4·65	198·7ms	4·58	202·3ms		
CQ7	1·35	6·56	6.61	NO	CST	CLOOBG	4·96	108·3ms	4·96	104·8ms	Y	
CQ8	1·40	6·31	6.85	NO	CST	CLOOBG	4·27	128·8ms	4·26	124·3ms	Y	
CQ10	11·10	25·30	25.80	NO	CST	CLOOBG	4·65	139·0ms	4·62	135·6ms	Y	
CQ11S	12:45	12:20	12.4	NO	CST	CLOOBG	5·23	154·4ms	5·19	146·9ms	Y	
CQ11D	12:50	13:25	13.80	YES	CST	CLOOBG	4·97	146ms	4·99	146·4ms	Y	
CQ12	1·50	2·35	6.46	NO	CST	CLOOBG	4·25	129·8ms	4·21	126·1ms	Y	
CQ13	2·00	14·08	14.42	NO	CST	CLOOBG	4·20	144·5ms	4·21	146·6ms	Y	
CP4	2·10	5·92	10.56		CST	CLOOBG						Blocked
CP5	2·35	7·35	7.95	NO	CST	CLOOBG	5·53	122·4ms	5·57	121·6ms		
CP6	2·25	10·84	11.79	NO	CST	CLOOBG	4·02	146·2ms	4·05	147·8ms		
CP7	2·45	2·60	3.47	Dd	CST	CLOOBG	6·09	149·2ms	6·10	150·9ms		
CP8	3·50	22·42	22.38	NO	CST	CLOOBG	4·64	115·2ms	4·56	112·3ms		
CP13	3·25	12·48	13.4	NO	CST	CLOOBG	4·52	151·4ms	4·48	147·2ms		
CP15	3·10	3·04	3.01	NO	CST	CLOOBG	3·82	165·5ms	3·98	159·6ms		
MW7	11·30	15·44	15.5	NO	CST	CLOOBG	5·88	24·5ms	5·89	24·5ms	Y	
MW8	12·35	7·53	7.66	NO	CST	CLOOBG	5·25	60·4ms	5·25	60·1ms	Y	
MW9	11·00	23·89	24.09	NO	CST	CLOOBG	4·75	85·7ms	4·68	85·0ms	Y	
MW10			3.44		CST	CLOOBG						
MW13			3.54		CST	CLOOBG						
MW16			8.50		CST	CLOOBG						
MW17	12·25		9.03		CST	CLOOBG						NO Access - tree across track

Turbidity: C=Clear, S= Slight, T=Turbid (CIRCLE)
pH/EC mater #: V3473

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

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

Signed: [signature]

Sampled by: Leesa King
Maddie Brown

MW10, MW13, MW16 } no access as track is to bad
Shane is aware and will let us no when fixed.