AIR, WATER AND METEOROLOGICAL MONITORING – AUGUST 2019

PINE DALE MINE, BLACKMANS FLAT

Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-1805/0

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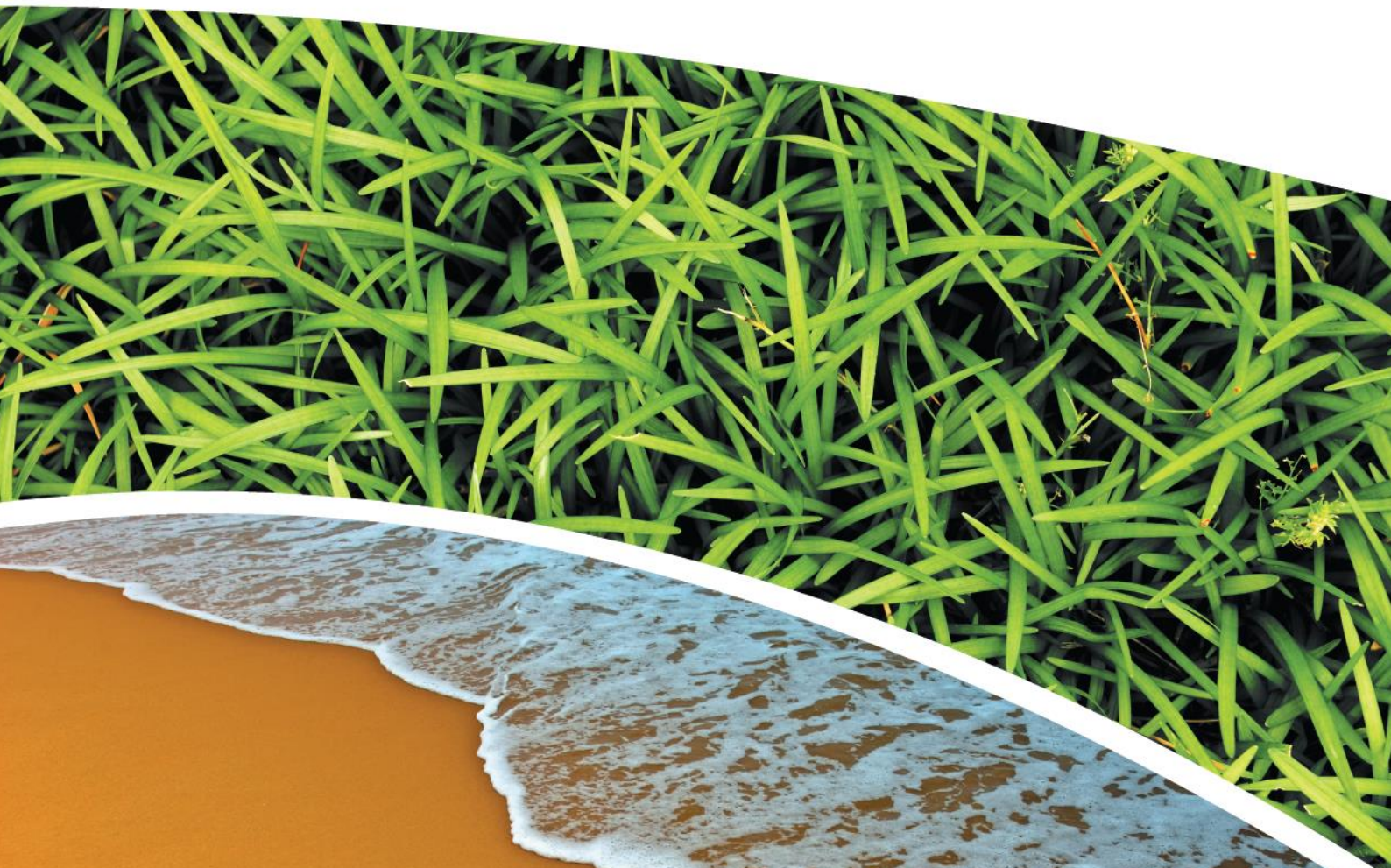

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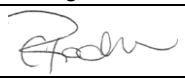
DOCUMENT STATUS					
Rev No	**Comment**	**Author**	**Approved for Issue (Project Manager)**		
			Name	**Signature**	**Date**
/0	Final	C Rocher	C Rocher		12.09.2019

DOCUMENT DISTRIBUTION				
Rev No	**Copies**	**Format**	**Issued to**	**Date**
/0	1	Electronic (email)	Pine Dale Mine – Graham Goodwin graham.goodwin@energyaustralia.com.au	12.09.2019
/0	1	Electronic (email)	Energy Australia- Mark Frewin mark.frewin@energyaustralia.com.au	12.09.2019
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RCA ref 6880-1805/0

12 September 2019

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REPORT COMPILED FOR COMMUNITY CONSULTATIVE COMMITTEE DETAILING AIR, WATER AND METEOROLOGICAL MONITORING AT PINE DALE AUGUST 2019

1 INTRODUCTION

This report presents the results of air, water and meteorological monitoring undertaken at Pine Dale Mine, Blackmans Flat during the month of August 2019.

Air and water samples were collected by RCA Laboratories – Environmental staff. Meteorological data was obtained from the site weather station.

This report satisfies the requirements to monitor environmental parameters as presented in the Pine Dale Mine Environmental Protection Licence (EPL 4911).

2 ANALYTICAL PROCEDURES

The analytical procedures used by RCA Laboratories – Environmental (NATA Accreditation number 9811) are based on established internationally recognised procedures such as APHA and Australian Standards. Analytical test methods are detailed in **Table 1**.

Table 1 *Analytical Test Methods*

Analysis	Method	Units	Analysing Laboratory	NATA Accreditation Status
Determination of Suspended Particulate Matter	ENV-LAB003	µg/m^3	RCA Laboratories – Environmental	NATA Analysis
Determination of Particulate Matter – Deposited Matter	ENV-LAB004	g/m^2 per month	RCA Laboratories – Environmental	NATA Analysis
pH	ENV-LAB006	pH	RCA Laboratories – Environmental	NATA Analysis
Conductivity	ENV-LAB010	µS/cm	RCA Laboratories – Environmental	NATA Analysis
Total Suspended Solids	ENV-LAB009	mg/L	RCA Laboratories – Environmental	NATA Analysis
Turbidity	ENV-LAB037	NTU	RCA Laboratories - Environmental	NATA Analysis
Oil and Grease	ENV-LAB022	mg/L	RCA Laboratories - Environmental	Non-NATA Analysis
Major Anions (Alkalinity, Cl, SO_4)	ED037, ED041, ED045	mg/L	ALS	NATA Analysis
Major Cations (Ca, Mg, Na, K)	ED093	mg/L	ALS	NATA Analysis
Dissolved Metals	EG020F	mg/L	ALS	NATA Analysis

ALS Environmental has been used to obtain analysis of anions, cations and dissolved metals (NATA Accreditation number 825).

3 WATER MONITORING RESULTS

3.1 GROUNDWATER

A total of two (2) groundwater samples were collected from within the Pine Dale Mine site during August 2019. Water quality analysis results are shown in **Table 2**. Groundwater monitoring locations are shown in **Appendix A**.

Table 2 *Groundwater Analysis Results*

ANALYSIS	UNITS	P6	P7
Sample Number	-	08196880011	08196880012
Date Sampled	-	01/08/19	01/08/19
Time Sampled	-	12:21	13:17
Depth to Water from Surface	m	25.88	8.06
Water Level (AHD)	m	891.07	886.34
Temperature	°C	15.9	15.4
pH	pH	***6.07***	***6.19***
Conductivity	µS/cm	***1950***	***948***
Turbidity	NTU	21	
Dissolved Oxygen	mg/L	1.0	
Total Suspended Solids	mg/L	29	
Oil and Grease	mg/L	<5	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	76	179
Total Alkalinity ($CaCO_3$)	mg/L	76	179
Sulphate (as SO_4)	mg/L	774	42
Chloride	mg/L	51	126
Calcium	mg/L	174	45
Magnesium	mg/L	76	42
Sodium	mg/L	75	47
Potassium	mg/L	21	8
Cobalt (dissolved)	mg/L	0.065	
Manganese (dissolved)	mg/L	3.17	
Nickel (dissolved)	mg/L	0.121	
Zinc (dissolved)	mg/L	0.013	
Iron (dissolved)	mg/L	43.4	<0.05
Trigger Values			
pH trigger level^	pH	6.2 – 8.0	6.3 – 8.0
Conductivity trigger level	µS/cm	1180	852
Water Level (AHD) #	m	887.90	883.28

Indicates analysis was not required.

^ pH trigger value is exceeded if the pH is outside the nominated range.

Water Level trigger is exceeded if the AHD water level drops below the nominated trigger level.

Results shown in ***bold italics*** indicates exceedance of trigger level.

3.2 SURFACE WATER MONITORING

Quarterly surface water monitoring was undertaken in August 2019. Results are shown in **Table 3**.

Table 3 *EPA Surface water results*

ANALYSIS	UNITS	EPA Point 2 Neubeck's Ck Upstream	EPA Point 3 Neubeck's Ck Downstream	EPA Point 14 Cox's River Downstream
Sample Number	-	08196880009	08196880004	08196880010
Date Sampled	-	1/08/2019	1/08/2019	1/08/2019
Time Sampled	-	10:35	13:36	09:50
Temperature	°C	7.7	12.4	7.3
pH	pH	7.15	7.41	7.44
Conductivity	µS/cm	1830	1940	807
Sulfate	NTU	599	715	147
Dissolved Iron	mg/L	<0.05	0.58	0.07
Total Suspended Solids	mg/L	<5	7	<5
Turbidity	mg/L	<1	<1	<1
Trigger Values				
pH	pH	7.1 – 8.0	6.4 – 8.0	7.5 – 8.0
Conductivity	µS/cm	2055	2223	1166
Total Suspended Solids	mg/L	30	30	30

Results shown in ***bold italics*** indicates exceedance of trigger value

4 AIR QUALITY RESULTS

4.1 HIGH VOLUME AIR SAMPLERS (HVAS)

Monitoring of particulate matter less than 10 micrometres (PM_{10}) and total suspended particulates (TSP) is undertaken at Pine Dale Mine using High Volume Air Samplers (HVAS). HVAS at this facility conform to AS/NZS 3580.9.3:2015, AS/NZS 3580.9.6:2015 and AS/NZS 3580.1.1:2016. The HVAS run on a one in six-day cycle, as stipulated in the *Air Quality and Greenhouse Gas Management Plan for the Pine Dale Coal Mine.* The locations of the HVAS units are shown in **Appendix A**.

HVAS Total Suspended Particulate results are shown in **Table 4**. PM_{10} results are shown in **Table 5**. HVAS Monitoring locations are shown in **Appendix A**. Graphical HVAS result presentations are shown in **Appendix B**.

Table 4 *Total Suspended Particulates (TSP)*

Run Date	TSP (µg/m3)	Sample Number	Filter Number	Date Filter Off	Time Filter Off	Field Tech	Hours Run
12-Aug-19	8	08196880035	9711492	17-Aug-19	18:37	Client	24.00
20-Aug-19^	21	08196880033	9719651	23-Aug-19	6:28	Client	24.00
26-Aug-19^	14	08196880037	9719646	27-Aug-19	17:40	Client	24.00
28-Aug-19^	13	08196880039	9719645	29-Aug-19	17:59	Client	24.00
30-Aug-19	5	08196880041	9719644	31-Aug-19	16:30	Client	24.01
12-Aug-19	8	08196880035	9711492	17-Aug-19	18:37	Client	24.00

Table 5 *Suspended Particulate Matter <10 µm (PM_{10})*

Run Date	PM_{10} (µg/m^3)	Sample Number	Filter Number	Date Filter Off	Time Filter Off	Field Tech	Hours Run
6-Aug-19	4	08196880034	9711491	11-Aug-19	12:40	Client	24.00
12-Aug-19	4	08196880036	9719653	17-Aug-19	18:41	Client	24.00
18-Aug-19	9	08196880038	9719650	19-Aug-19	7:15	Client	24.00
24-Aug-19	13	08196880040	9719652	25-Aug-19	13:50	Client	24.00
30-Aug-19	1	08196880042	9719647	31-Aug-19	18:00	Client	24.21
6-Aug-19	4	08196880034	9711491	11-Aug-19	12:40	Client	24.00

^The TSP HVAS run events scheduled for the 6, 18 and 24 August 2019 did not complete the 24 ± 1 hours run time as described in AS/NZS 3580.9.6:2015. These runs were re-scheduled and undertaken on the 20, 26 and 28 August. The issue associated with the TSP HVAS unit during August is suspected to be due to a malfunction with the timer. This HVAS unit has been removed from site and has been sent for repairs. A hire unit has been installed in the interim.

4.1.1 TSP SUMMARY

The NSW EPA Annual Mean TSP allowable limit is 90µg/m^3. All TSP HVAS results recorded during this monitoring period are in compliance with consent conditions, as the *current rolling annual mean* (September 2018 to August 2019) for TSP is 28.3µg/m^3, which is below the allowable limit of 90µg/m^3.

The twelve-monthly graph is provided in **Appendix B**.

4.1.2 PM_{10} SUMMARY

The NSW EPA 24-hour maximum PM_{10} allowable limit is 50µg/m^3. The EPA annual mean PM_{10} allowable limit is 25µg/m^3. All PM_{10} HVAS results recorded during this monitoring period conform to consent conditions, as the *current rolling annual mean* for the PM_{10} unit is 11.8µg/m^3, which is below the allowable annual limit (refer **Appendix B**). The 24-hour maximum allowable limit of 50µg/m^3 was not exceeded on any sampling event during the month of August 2019.

4.2 DEPOSITIONAL DUST MONITORING

The depositional dust monitoring exposure period for August 2019 was 3 July – 1 August 2019. Depositional dust gauges at this facility conform to AS/NZS 3580.10.1:2016 and AS/NZS 3580.1.1:2016. Depositional dust monitoring results are shown in **Table 6**. Depositional dust monitoring locations are shown in **Appendix A**.

Dust gauge D2 has been removed from EPL 4911 and monitoring is no longer required at this location.

Table 6 *Depositional Dust Monitoring*

Deposit Gauge	Number of Days	Notes	Insoluble Solids	Ash	Combustible Matter
D1	29	I	0.3	0.2	0.1
D3	29	I	0.4	0.2	0.2
D4	29	I	0.2	<0.1	0.2
D5	29	I	0.4	0.2	0.2
D6	29	I	0.4	0.2	0.2

All units are g/m^2/month

I indicates insects noted to be present in sample.

4.2.1 ALLOWABLE DEPOSITIONAL DUST LIMITS

The EPA long term (annual average) deposited dust limit is $4g/m^2$ per month. The rolling annual depositional dust results for all sites within the period (September 2018 – August 2019) are in compliance with consent conditions. The annual average for dust gauges D1, D3, D4, D5 and D6 are all less than or equal to $1.5g/m^2$ per month. Annual averages are shown in the depositional dust gauge graphs provided in **Appendix B**.

5 METEOROLOGICAL MONITORING

Pine Dale Mine records meteorological data continuously via an onsite weather station. Details of the weather data recorded during the period 1 to 31 August 2019 are shown in **Appendix C**.

Data availability during this period was 100%.

6 BLASTING RESULTS

No blasting was undertaken during this month as mining operations have ceased since the end of March 2014.

7 NOISE MONITORING RESULTS

Quarterly noise monitoring is required to be undertaken on a quarterly basis and was not required to be undertaken during August 2019.

8 OPERATIONAL ACTIVITIES

All of the approved minable reserves at the Pine Dale Mine have now been exhausted. Operational mining and the last coal sales ceased as of the end of March 2014.

All former operators have been made redundant; however, some statutory positions still remain. Pine Dale Mine has been placed in care and maintenance since April 2014.

9 SUMMARY

During the month of August 2019 environmental monitoring results were found to be generally in compliance with EPL 4911 with the exception of:

- Electrical conductivity in groundwater samples P6 and P7 were in excess of the of the site-specific trigger value.
- pH in groundwater samples P6 and P7 were in excess of the lower level pH trigger value.

Rolling annual averages from both the TSP and PM_{10} High Volume Air Samplers are currently below the EPA Annual Mean TSP and PM_{10} criterion of 90µg/m^3 and 25µg/m^3 respectively. Currently there are no depositional dust gauge results which are greater than the EPA Long Term (annual average) criteria of 4g/m^2.month based upon a rolling average of the past 12 months.

Meteorological monitoring was undertaken for the entire month of August with 100% data capture.

Pine Dale Mine ceased operation in March 2014 and therefore no blasting occurred at the site.

10 LIMITATIONS

This report has been prepared for Enhance Place Pty Ltd in accordance with an agreement with RCA Australia (RCA). The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the sole use of Enhance Place. The report may not contain sufficient information for purposes of other uses or for parties other than Enhance Place. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without written permission from RCA Australia.

The information in this report is considered accurate at the date of issue with regard to the current conditions of the site. Conditions can vary across any site that cannot be explicitly defined by investigation.

Environmental conditions including contaminant concentrations can change in a limited period of time. This should be considered if the report is used following a significant period of time after the date of issue.

Yours faithfully

RCA AUSTRALIA

Carmen Rocher
Environmental Engineer

Appendix A

Monitoring Locations

EP PDH7/GW Site E
EP DDH7/GW Site A
EP DDH5/GW Site B
EP PDH1/GW Site C
EP DDH4/GW Site D
Water Cart Dam (The Bong sample location)
PCB1
PCB7
EPL Site 2
S1
S2
HVAS
PCB2
PCB3
NM1
DI
EPL Site 3 (S3)
The Bong
Old Shaft
NM2
D3
NM3
P6
S4
S5
S6
EPL Site 13
P7
D4
NM4
S7
NM6
D6
Blue Lake
Pine Dale Mine
D5
NM5
EPL Site 14

LEGEND

- Noise Monitoring Location
- Depositional Dust Monitoring Location
- Groundwater Monitoring Location
- High Volume Air Sampling Location
- Metorological Monitoring Location
- Surface Water Monitoring Location

0 175 350 700 1,050 1,400
metres

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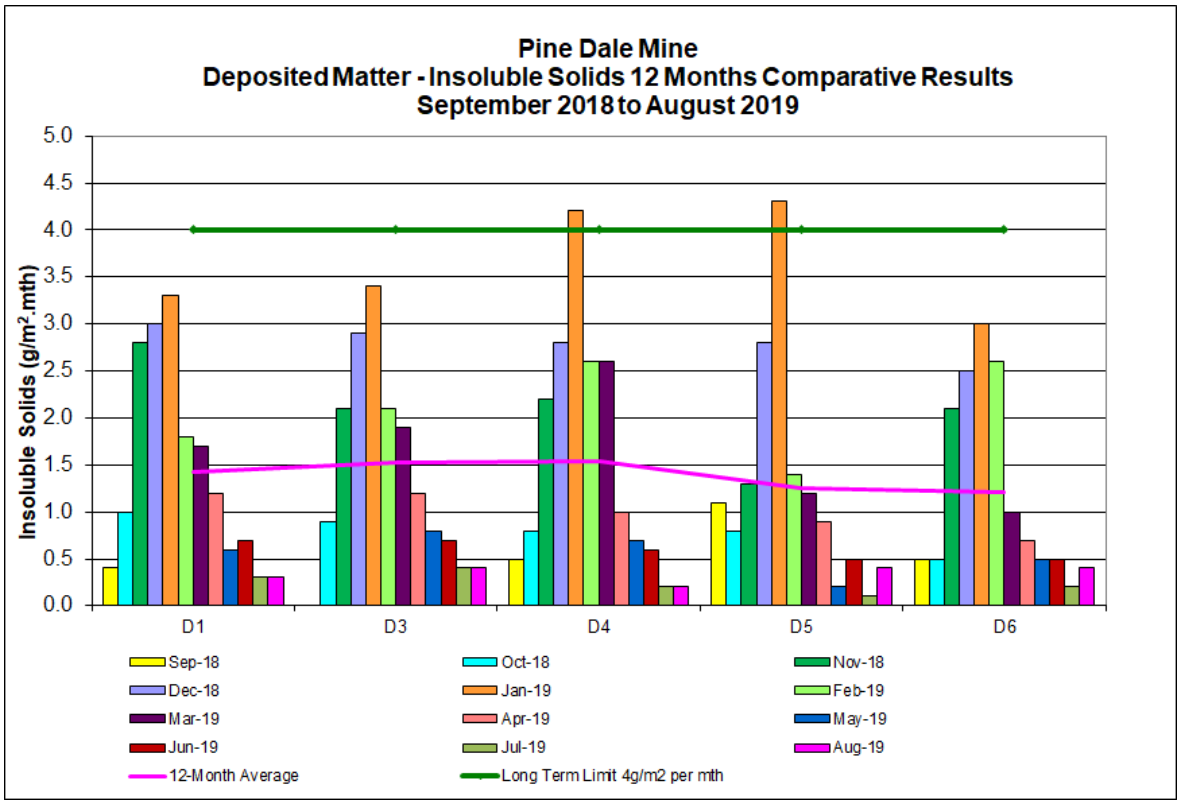
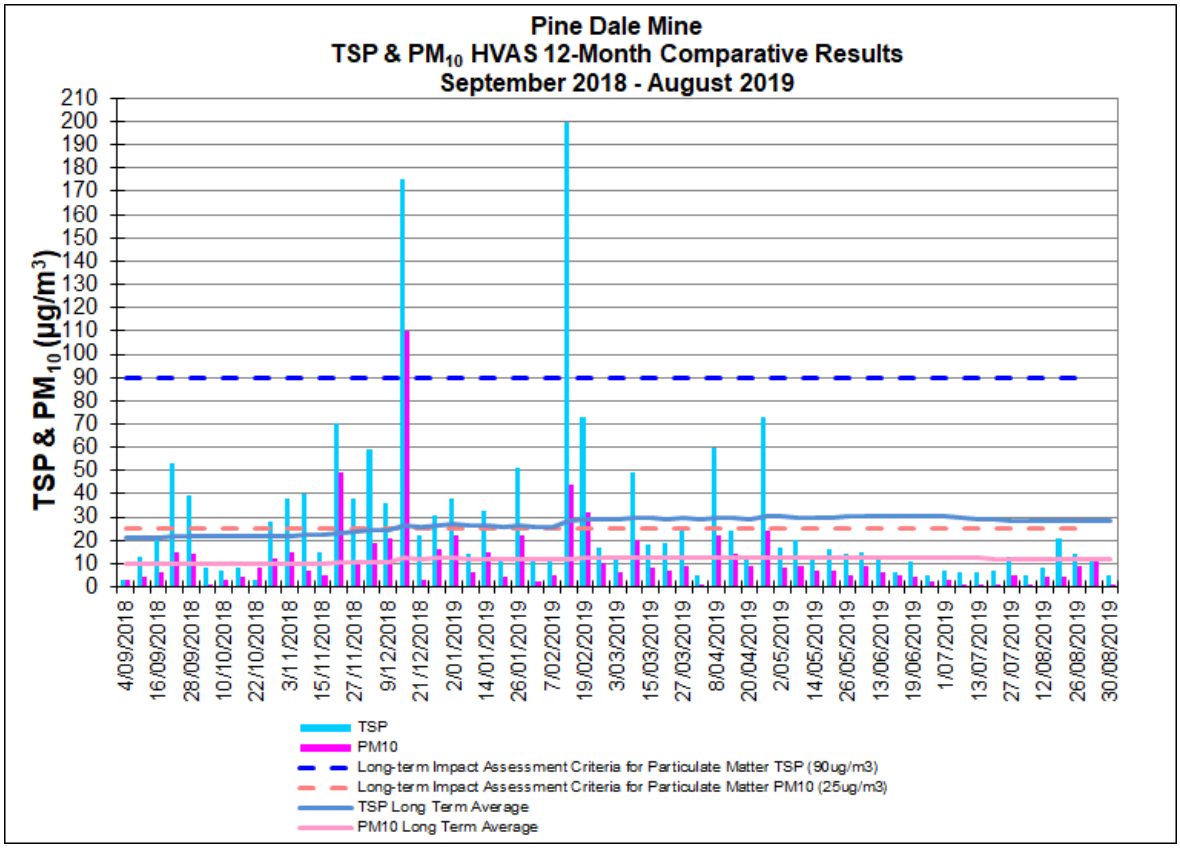
PINE DALE MINE ENVIRONMENTAL MONITORING LOCATION PLAN

Appendix B

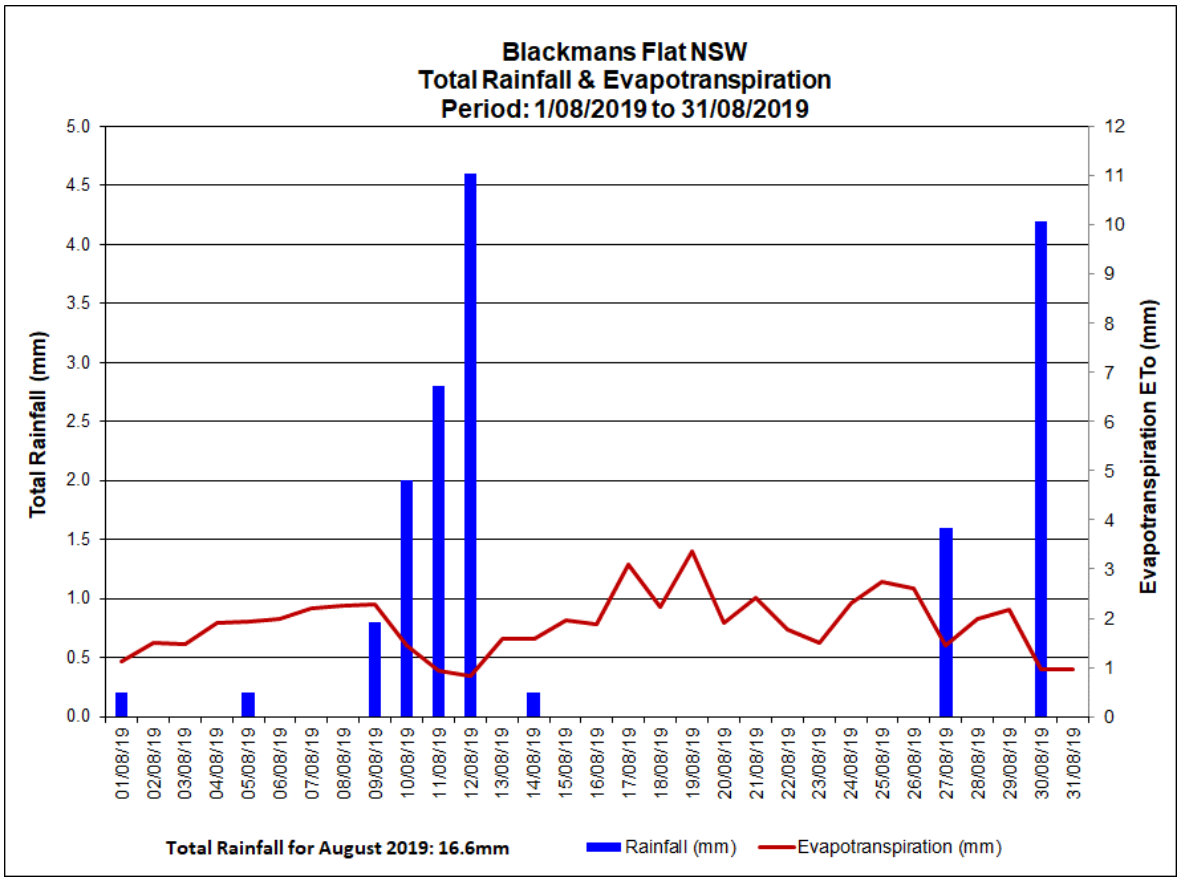
Depositional Dust and HVAS Graphs

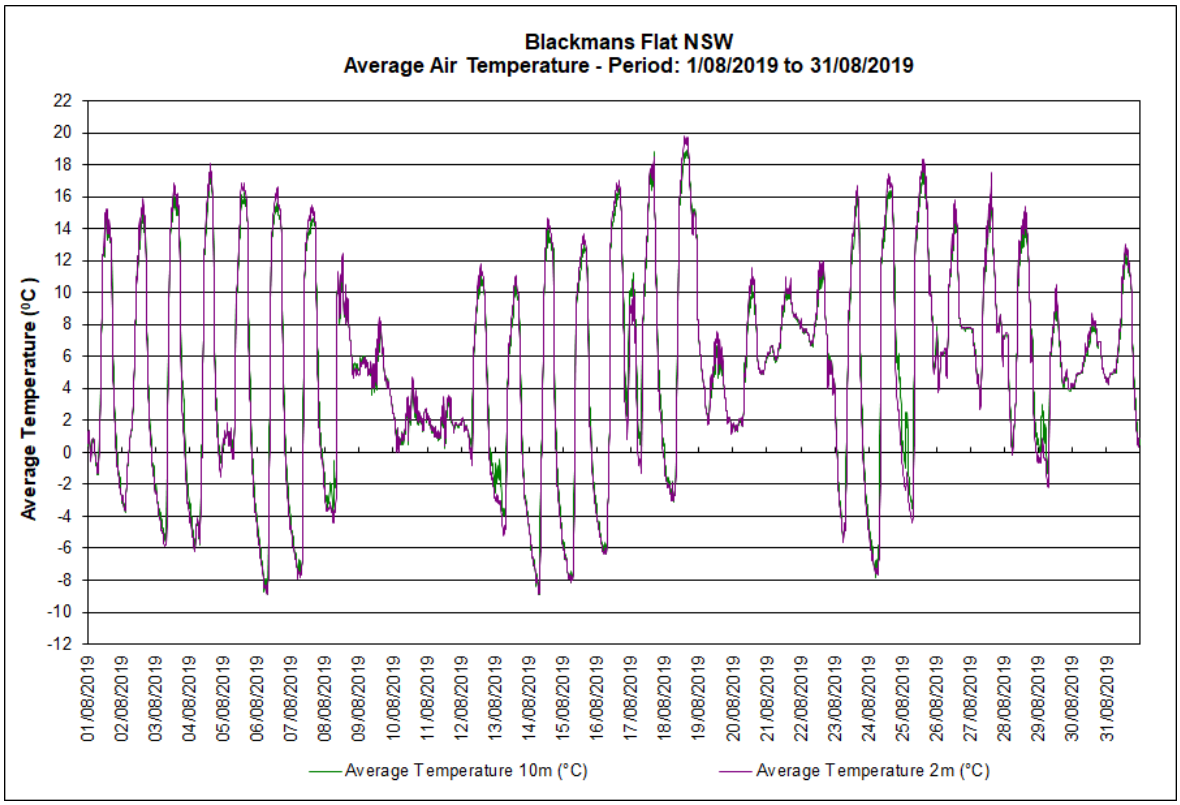

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
September 2018 to August 2019
Insoluble Solids (g/m².mth)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D3
D4
D5
D6
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
Jul-19
Aug-19
12-Month Average
Long Term Limit 4g/m2 per mth

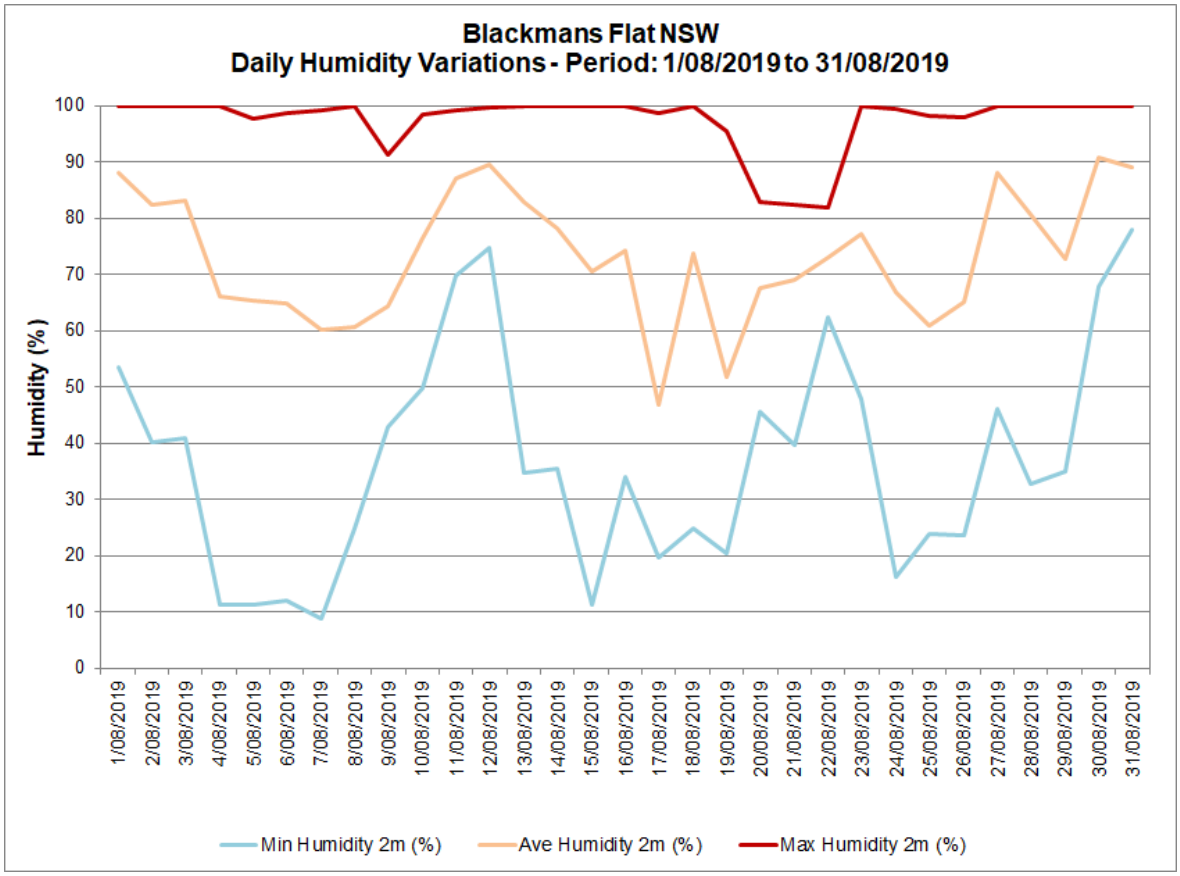

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
September 2018 - August 2019
TSP & PM10 (µg/m³)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
4/09/2018
16/09/2018
28/09/2018
10/10/2018
22/10/2018
3/11/2018
15/11/2018
27/11/2018
9/12/2018
21/12/2018
2/01/2019
14/01/2019
26/01/2019
7/02/2019
19/02/2019
3/03/2019
15/03/2019
27/03/2019
8/04/2019
20/04/2019
2/05/2019
14/05/2019
26/05/2019
13/06/2019
19/06/2019
1/07/2019
13/07/2019
27/07/2019
12/08/2019
26/08/2019
30/08/2019
TSP
PM10
Long-term Impact Assessment Criteria for Particulate Matter TSP (90ug/m3)
Long-term Impact Assessment Criteria for Particulate Matter PM10 (25ug/m3)
TSP Long Term Average
PM10 Long Term Average

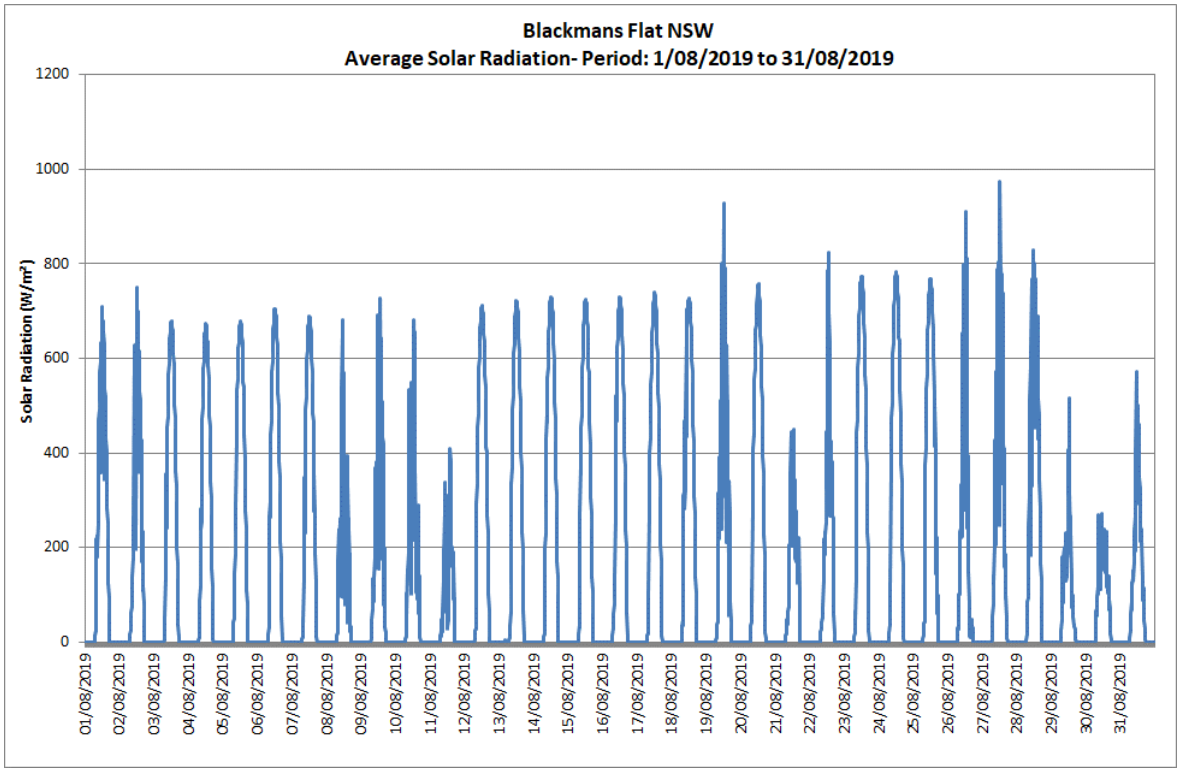
Appendix C

Meteorological Data


Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/08/2019 to 31/08/2019
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for August 2019: 16.6mm
Rainfall (mm)
Evapotranspiration (mm)


Blackmans Flat NSW
Average Air Temperature - Period: 1/08/2019 to 31/08/2019
Average Temperature (°C)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/08/2019 to 31/08/2019
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
1/08/2019
2/08/2019
3/08/2019
4/08/2019
5/08/2019
6/08/2019
7/08/2019
8/08/2019
9/08/2019
10/08/2019
11/08/2019
12/08/2019
13/08/2019
14/08/2019
15/08/2019
16/08/2019
17/08/2019
18/08/2019
19/08/2019
20/08/2019
21/08/2019
22/08/2019
23/08/2019
24/08/2019
25/08/2019
26/08/2019
27/08/2019
28/08/2019
29/08/2019
30/08/2019
31/08/2019
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/08/2019 to 31/08/2019
Solar Radiation (W/m²)
1200
1000
800
600
400
200
0
01/08/2019
02/08/2019
03/08/2019
04/08/2019
05/08/2019
06/08/2019
07/08/2019
08/08/2019
09/08/2019
10/08/2019
11/08/2019
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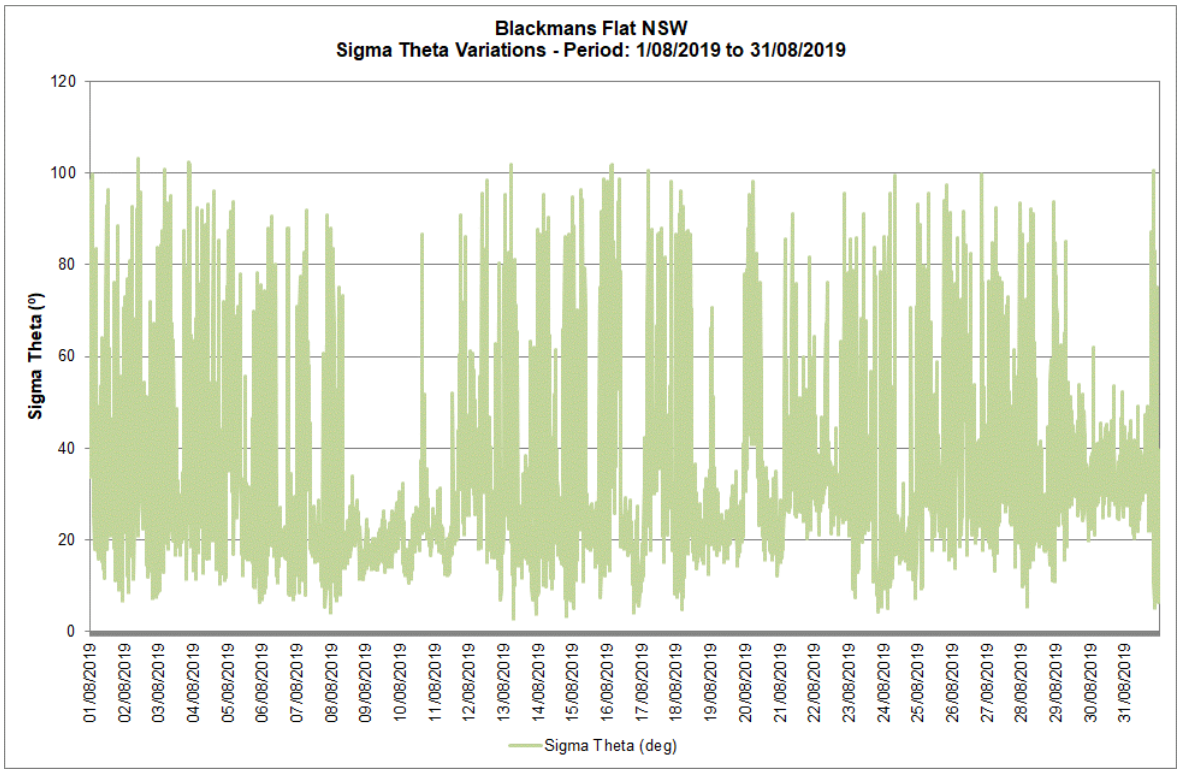
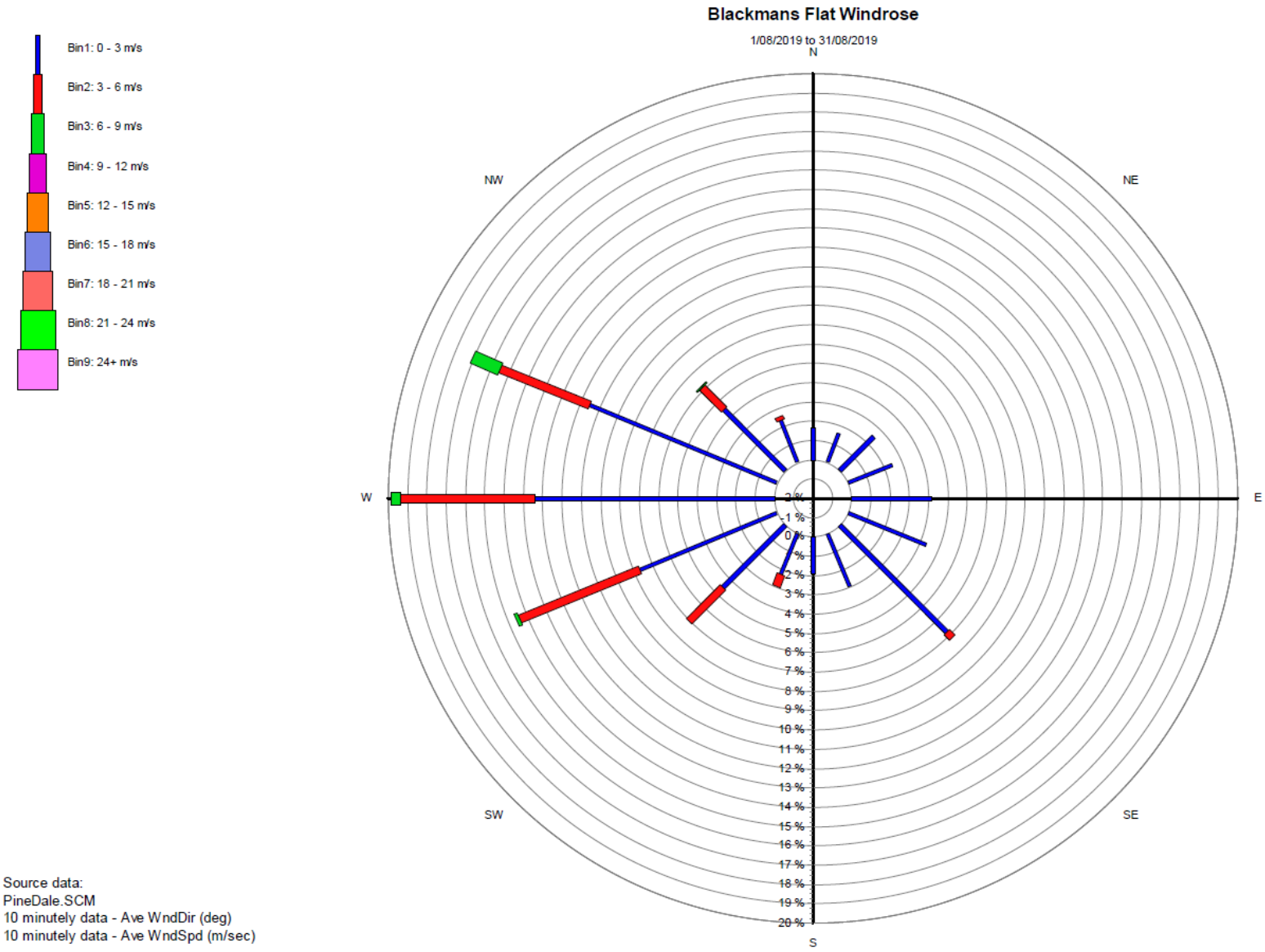
29/08/2019
30/08/2019
31/08/2019


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/08/2019 to 31/08/2019
Sigma Theta (°)
120
100
80
60
40
20
0
01/08/2019
02/08/2019
03/08/2019
04/08/2019
05/08/2019
06/08/2019
07/08/2019
08/08/2019
09/08/2019
10/08/2019
11/08/2019
12/08/2019
13/08/2019
14/08/2019
15/08/2019
16/08/2019
17/08/2019
18/08/2019
19/08/2019
20/08/2019
21/08/2019
22/08/2019
23/08/2019
24/08/2019
25/08/2019
26/08/2019
27/08/2019
28/08/2019
29/08/2019
30/08/2019
31/08/2019
Sigma Theta (deg)



Source data:
PineDale.SCM
10 minutely data - Ave WndDir (deg)
10 minutely data - Ave WndSpd (m/sec)