AIR, WATER AND METEOROLOGICAL MONITORING – AUGUST 2018

PINE DALE MINE, BLACKMANS FLAT

Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-1775/0

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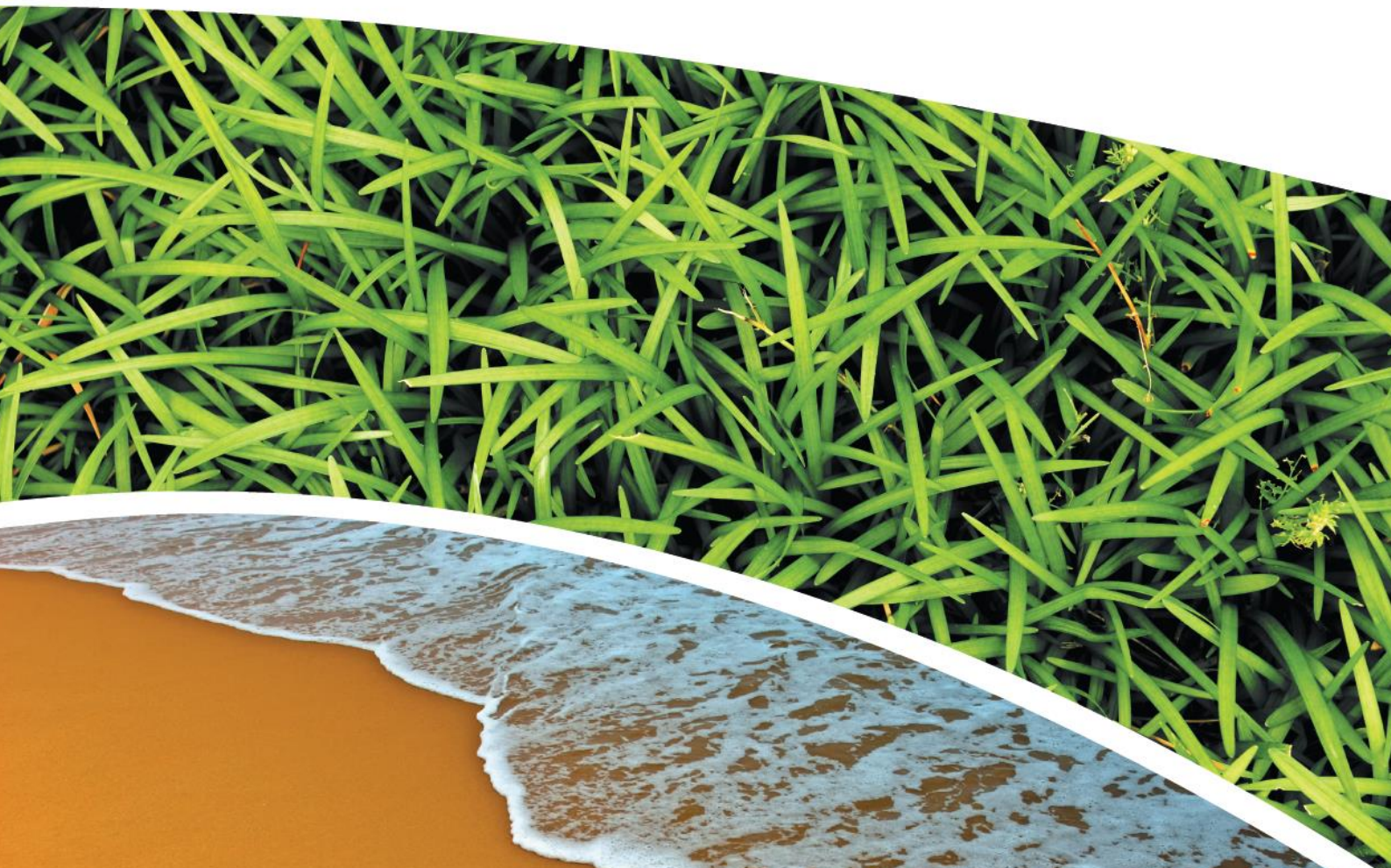

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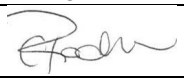
/0	Final	C Rocher	K Shaw	C Rocher		17.09.2018

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RCA ref 6880-1775/0

17 September 2018

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Attention: Mr Graham Goodwin

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

AUGUST 2018

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 2018.

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.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 2018. 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	-	08186880011	08186880012
Date Sampled	-	07/08/18	07/08/18
Time Sampled	-	9:50	10:45
Depth to Water from Surface	m	25.75	7.36
Water Level (AHD)	m	891.20	887.04
Temperature	°C	12.6	12.7
pH	pH	***6.06***	***6.18***
Conductivity	µS/cm	***1560***	746
Turbidity	NTU	68	
Dissolved Oxygen	mg/L	2.0	
Total Suspended Solids	mg/L	48	
Oil and Grease	mg/L	<5	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	104	218
Total Alkalinity ($CaCO_3$)	mg/L	104	218
Sulphate (as SO_4)	mg/L	722	44
Chloride	mg/L	38	111
Calcium	mg/L	156	43
Magnesium	mg/L	66	41
Sodium	mg/L	62	47
Potassium	mg/L	24	9
Cobalt (dissolved)	mg/L	0.054	
Manganese (dissolved)	mg/L	2.74	
Nickel (dissolved)	mg/L	0.078	
Zinc (dissolved)	mg/L	0.01	
Iron (dissolved)	mg/L	35.3	<0.05
Trigger Levels			
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 level 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 EPA SURFACE WATER MONITORING

Routine quarterly surface water monitoring was undertaken during the August 2018 monitoring event at three surface water sites (EPA Point 2, 3 and 14). Water quality analysis results are shown in **Table 3**.

Table 3 *EPA Surface Water Analysis Results*

ANALYSIS	UNITS	EPA Point 2 Neubecks Ck Upstream	EPA Point 3 Neubecks Ck Downstream	EPA Point 14 Coxs River Downstream
Sample Number	-	08186880009	08186880004	08186880010
Date Sampled	-	7/08/2018	7/08/2018	6/08/2018
Time Sampled	-	07:29	07:48	16:20
Temperature	°C	4.8	5.2	15.2
pH	pH	***6.53***	6.97	***8.21***
Conductivity	µS/cm	1090	1310	***1340***
Sulfate	NTU	373	526	144
Dissolved Iron	mg/L	0.06	0.34	<0.05
Total Suspended Solids	mg/L	<5	6	5
Turbidity	mg/L	<1	2	22
Trigger Levels				
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 ***italics*** indicates exceedance of trigger level

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 locations of these 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**.

RCA has noted from the field sheets that the TSP HVAS run on the 29 August ran for less than 24 ± 1 hours; these runs do not conform to AS/NZS 3580.9.3:2015. Similarly, the PM_{10} HVAS run on the 5 August ran for greater than 24 ± 1 hours and does not conform to AS/NZS 3580.9.6:2015.

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
5-Aug-18	15	08186880033	9521230	09-Aug-18	16:45	Client	23.99
11-Aug-18	21	08186880035	9519740	16-Aug-18	13:35	Client	24.00
17-Aug-18	16	08186880037	9521226	18-Aug-18	7:28	Client	24.00
23-Aug-18	19	08186880039	9519753	28-Aug-18	16:00	Client	24.00
29-Aug-18	20	08186880041	9519751	03-Sep-18	17:20	Client	16.00

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
5-Aug-18	20	08186880034	9521228	09-Aug-18	14:50	Client	33.20
11-Aug-18	8	08186880036	9519741	16-Aug-18	13:40	Client	24.10
17-Aug-18	7	08186880038	9521227	18-Aug-18	7:32	Client	24.00
23-Aug-18	7	08186880040	9521225	28-Aug-18	16:05	Client	24.00
29-Aug-18	9	08186880042	9519752	03-Sep-18	17:25	Client	24.00

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 2017 to August 2018) for the TSP unit is 21.8µg/m^3. The twelve monthly graph is provided in **Appendix B**.

4.1.2 PM_{10} SUMMARY

The NSW EPA twenty four 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 9.9µg/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 during any run during the month of August 2018.

4.2 DEPOSITIONAL DUST MONITORING

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**.

Depositional dust gauge D2 is situated on private property; this gauge was removed at the request of the property owner in March 2018 and monitoring has therefore ceased at this location.

Table 6 *Depositional Dust Monitoring: 5 July – 6 August 2018*

Deposit Gauge	Number of Days	Notes	Insoluble Solids	Ash	Combustible Matter
D1	32	I	0.5	0.3	0.2
D3	32	N	0.6	0.4	0.2
D4	32	I	0.6	0.4	0.2
D5	32	I	2.1	1.6	0.5
D6	32	I	0.6	<0.1	0.6

All units are g/m^2/month

I indicates insects noted to be present in sample.
N No foreign material present.

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 2017 – August 2018) 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 $0.9g/m^2$ per month. The depositional dust gauge graphs are provided in **Appendix B**. The average for dust gauge D2 for the period September 2017 – February 2018 is also below the annual average long term limit.

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 2018 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 was not required to be undertaken during August 2018.

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 2018 environmental monitoring results were found to be generally in compliance with EPL 4911 with the exception of:

- pH in both P6 and P7 groundwaters were found to be outside of the site specific trigger levels.
- Electrical conductivity in groundwater sample P6 was in excess of the of the site specific trigger level.
- EPA surface water monitoring locations Point 14 was above the upper site specific pH trigger level criterion and in excess of the site specific electrical conductivity trigger level.
- EPA surface water monitoring location Point 2 pH was below the lower site specific pH trigger level criterion.

Rolling annual averages from both the TSP and PM_{10} High Volume Air Samplers are currently well 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.

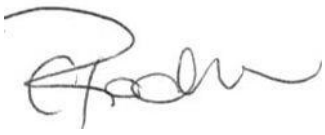
Pine Dale Mine ceased operation in March 2014 and therefore no blasting occurred at the site. Noise monitoring was not required to be undertaken this month.

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.

Yours faithfully

RCA AUSTRALIA



Carmen Rocher
Environmental Engineer

Katy Shaw
Senior Environmental Scientist

Appendix A

Monitoring Locations

EP PDH7/GW Site E

EP DDH7/GW Site A

EP DDH5/GW Site B

EP DDH1/GW Site C

EP DDH4/GW Site D

Bong Water

EPL Site 2

S1

Weather Station

S2

S3

Old Shaft

P6

S4

S5

S6

EPL Site 13

P7

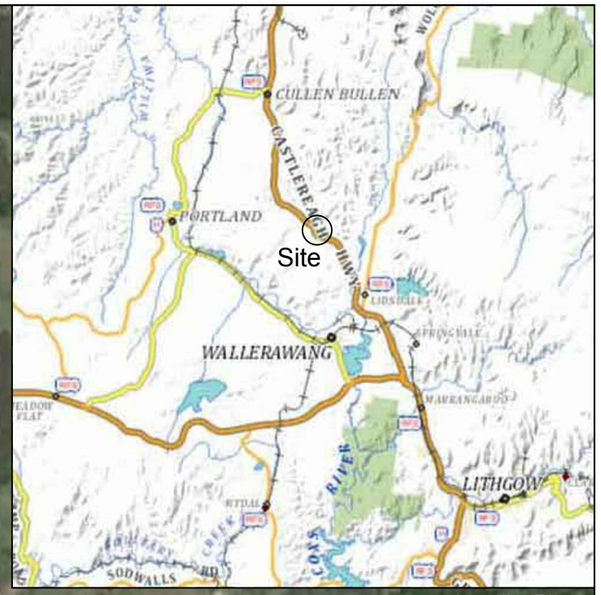
S7

EP PDH4/GW

EP PDH3GW

EPL Site 14

EPL Site 14



Locality Plan
N.T.S.

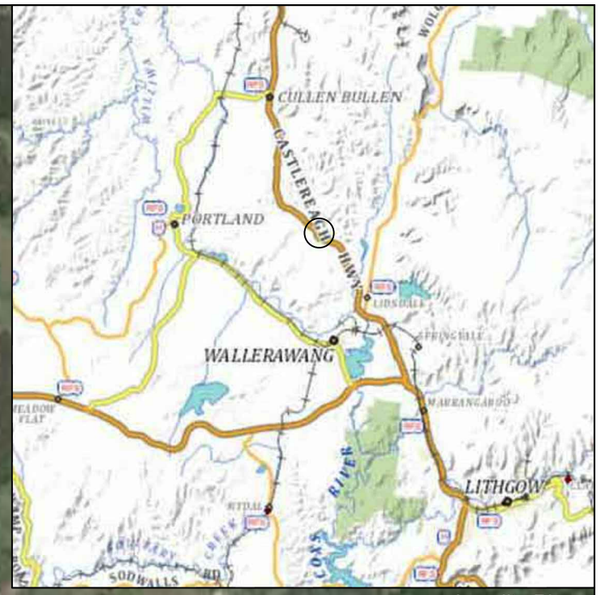
LEGEND

- Surface water monitoring location
- Groundwater monitoring location
- Enhance groundwater monitoring location
- Meteorological monitoring location

Aerial image taken from Google Earth, November 12 2014

0 200 400 600 800 1000
metres

CDT-DWG-A3H-001/1



Locality Plan
N.T.S.

PCB1
PCB7
Weather Station
HVAS
D1
PCB2
PCB3
D2
D3
D4
D5
D6

LEGEND

- Depositional dust monitoring location
- High volume air sampling location
- Meteorological monitoring location

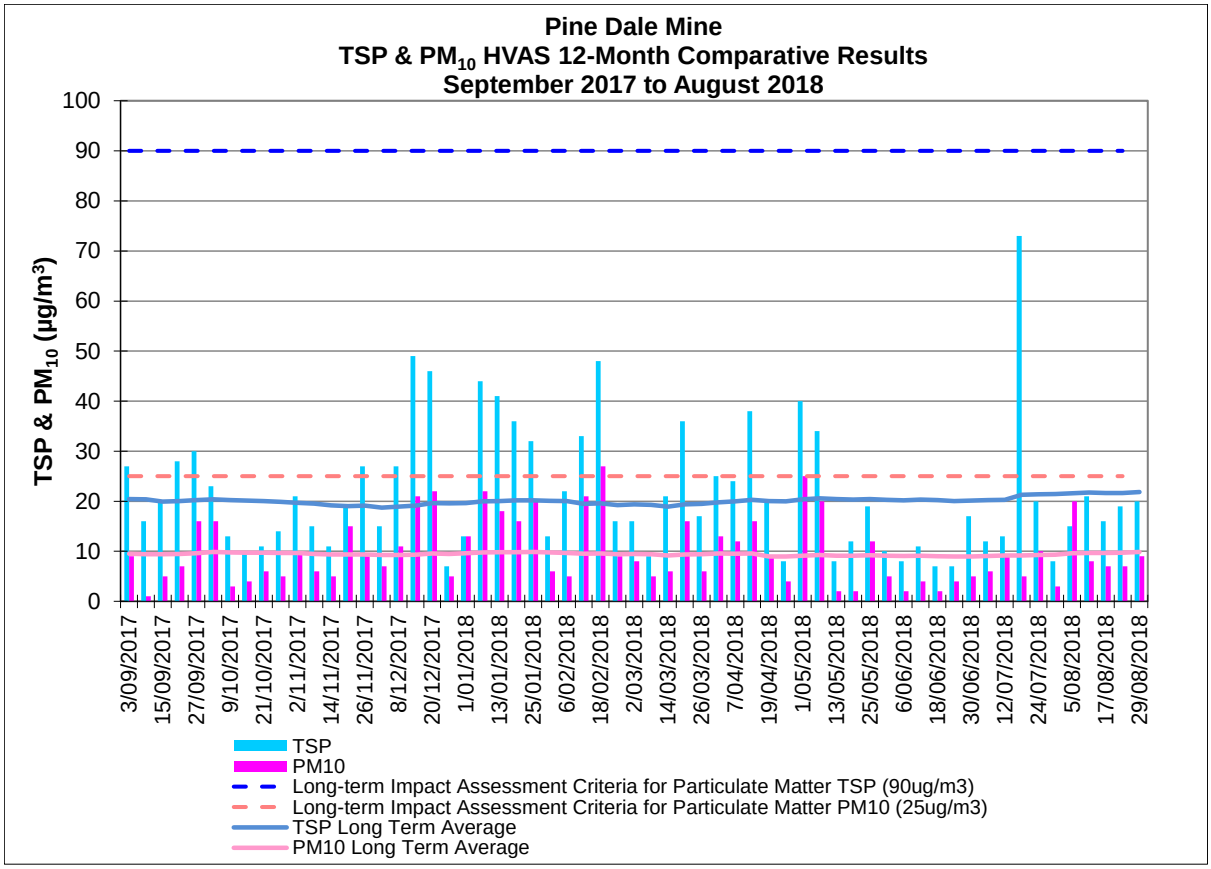
Aerial image taken from Google Earth, November 12 2014

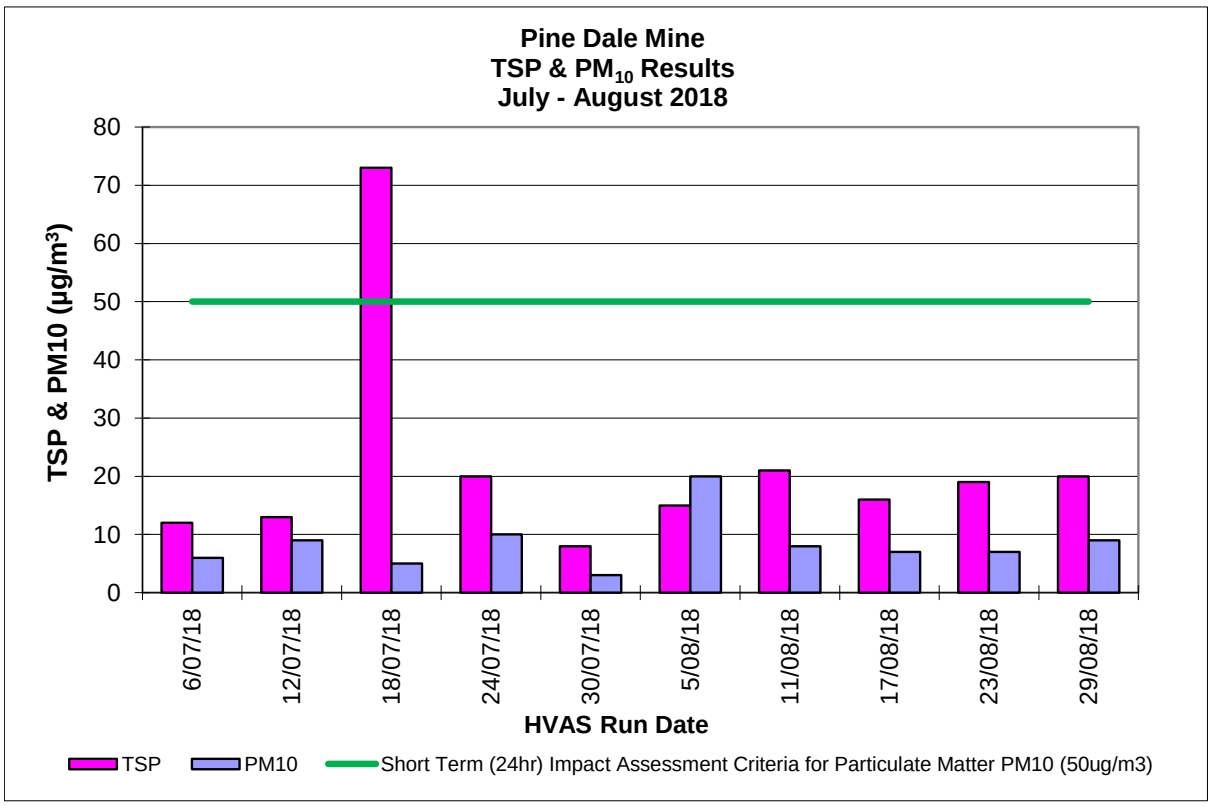
0 200 400 600 800 1000
metres

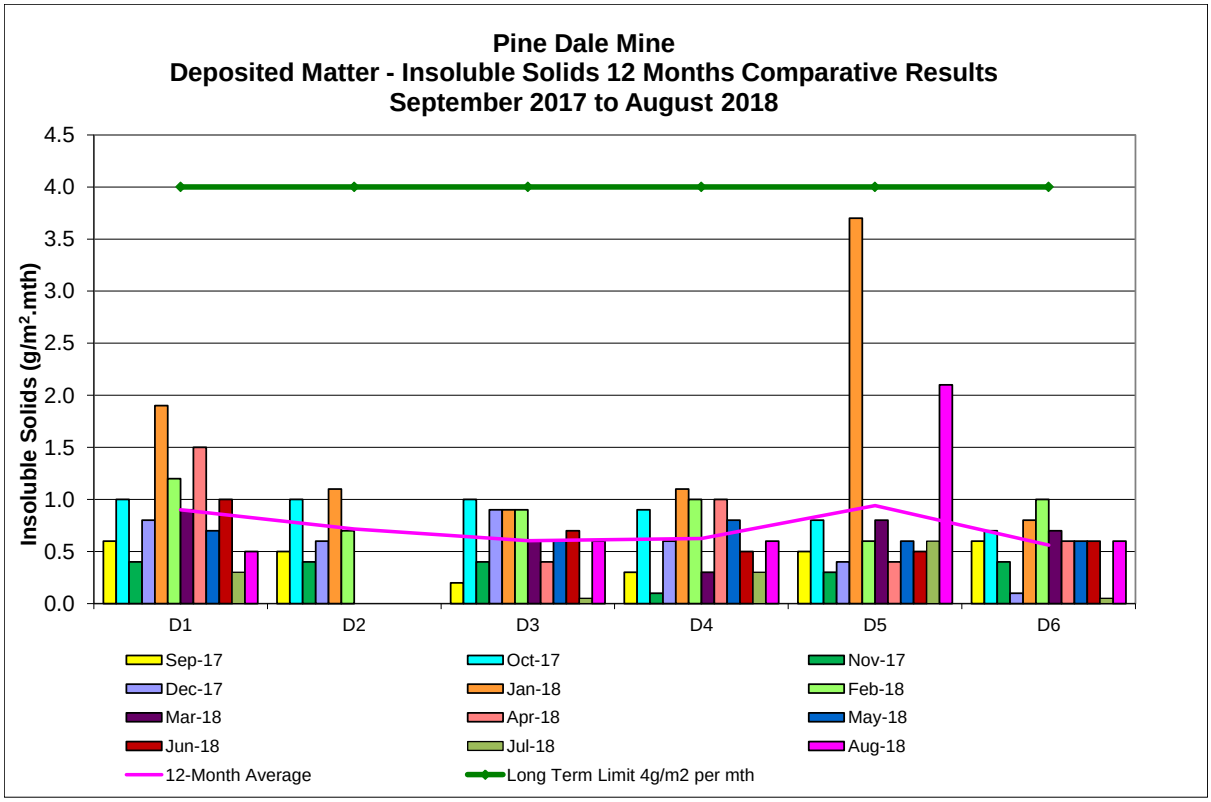
CDT-DWG-A3H-001/1

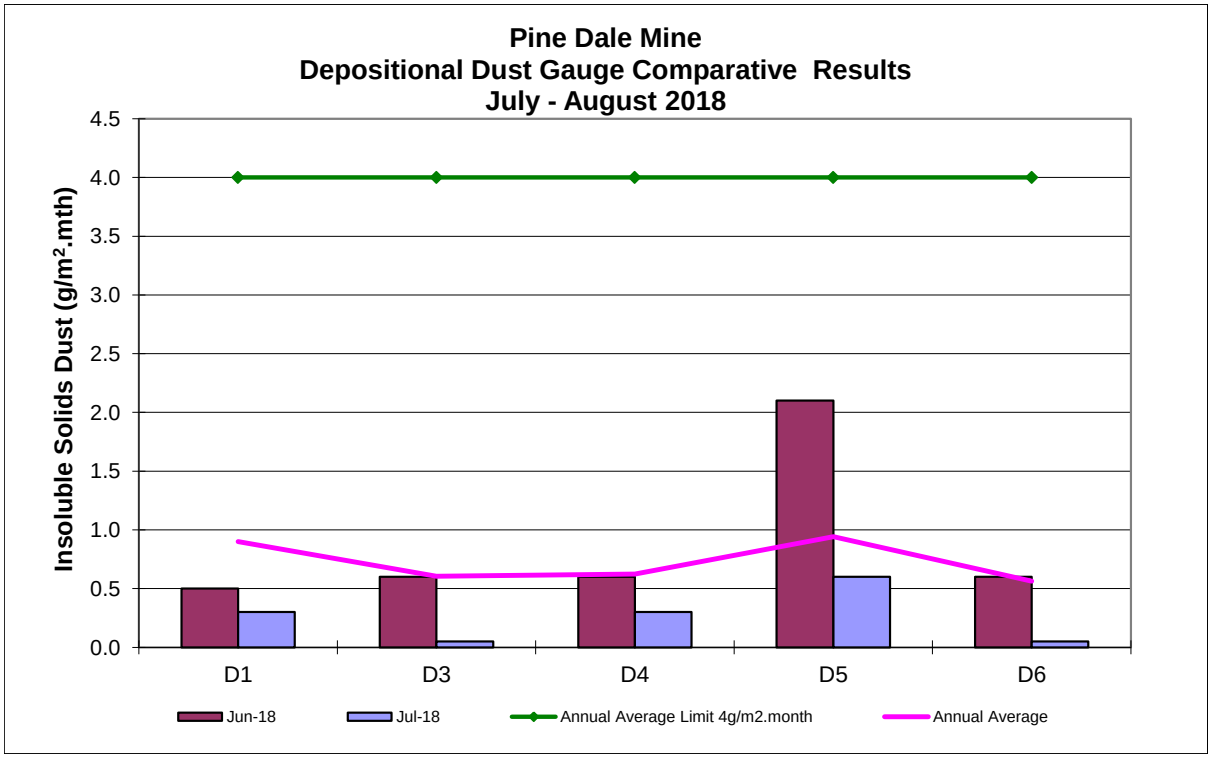
Appendix B

Depositional Dust and HVAS Graphs


Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
September 2017 to August 2018
TSP & PM10 (µg/m3)
100
90
80
70
60
50
40
30
20
10
0
3/09/2017
15/09/2017
27/09/2017
9/10/2017
21/10/2017
2/11/2017
14/11/2017
26/11/2017
8/12/2017
20/12/2017
1/01/2018
13/01/2018
25/01/2018
6/02/2018
18/02/2018
2/03/2018
14/03/2018
26/03/2018
7/04/2018
19/04/2018
1/05/2018
13/05/2018
25/05/2018
6/06/2018
18/06/2018
30/06/2018
12/07/2018
24/07/2018
5/08/2018
17/08/2018
29/08/2018
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

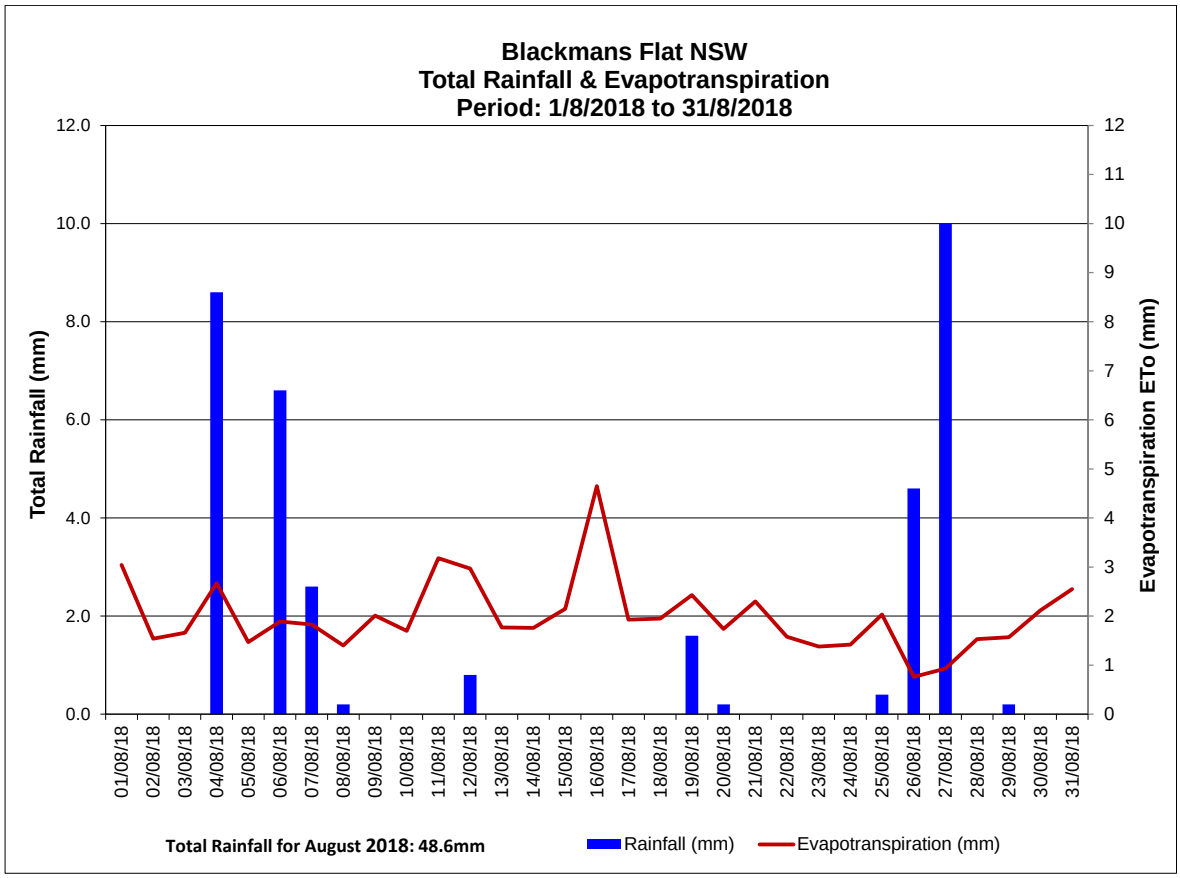

Pine Dale Mine
TSP & PM10 Results
July - August 2018
TSP & PM10 (µg/m3)
80
70
60
50
40
30
20
10
0
6/07/18
12/07/18
18/07/18
24/07/18
30/07/18
5/08/18
11/08/18
17/08/18
23/08/18
29/08/18
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

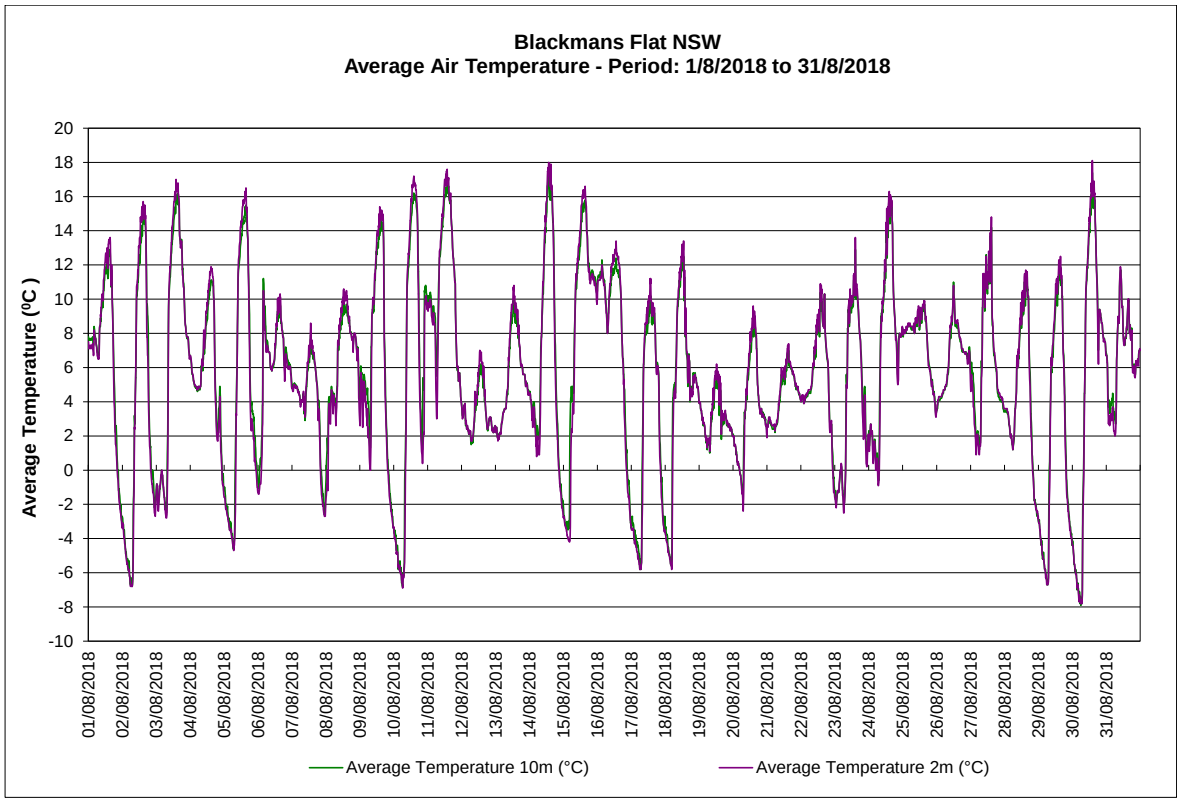

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
September 2017 to August 2018
Insoluble Solids (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
May-18
Jun-18
Jul-18
Aug-18
12-Month Average
Long Term Limit 4g/m2 per mth

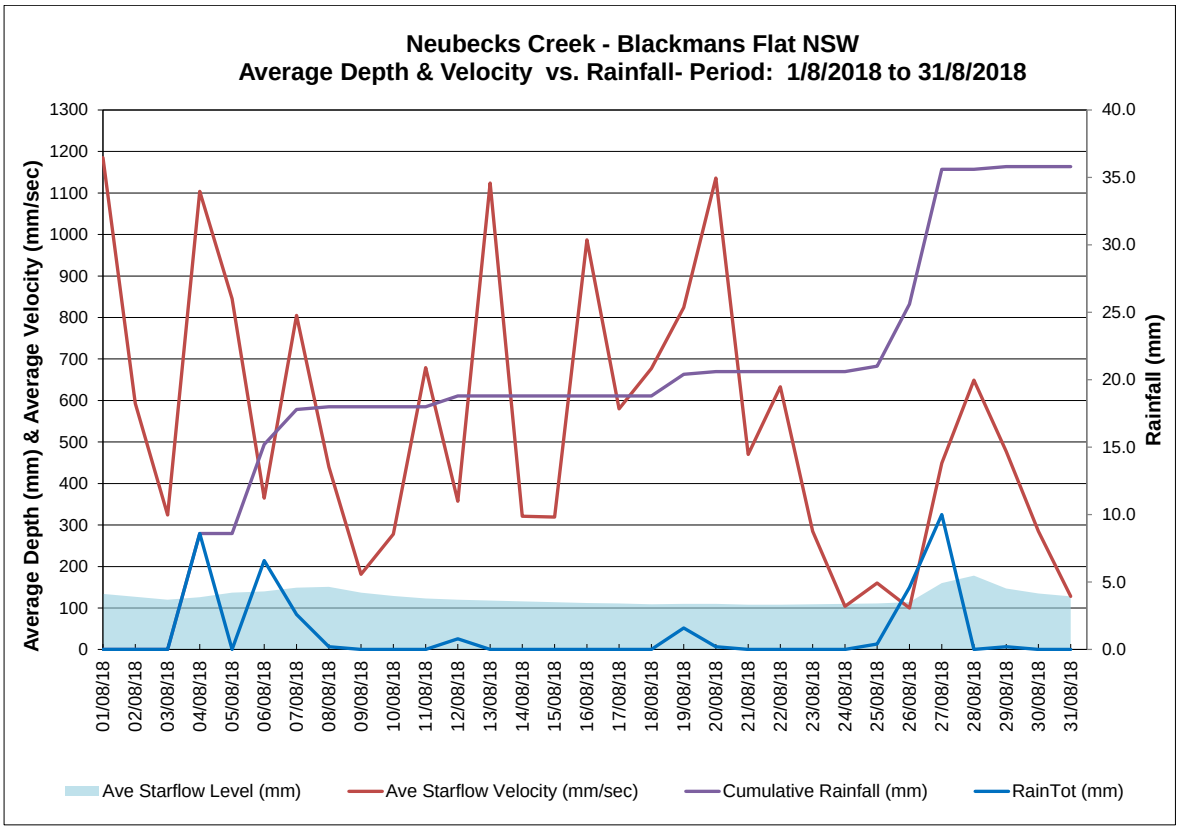

Pine Dale Mine
Depositional Dust Gauge Comparative Results
July - August 2018
Insoluble Solids Dust (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D3
D4
D5
D6
Jun-18
Jul-18
Annual Average Limit 4g/m2.month
Annual Average

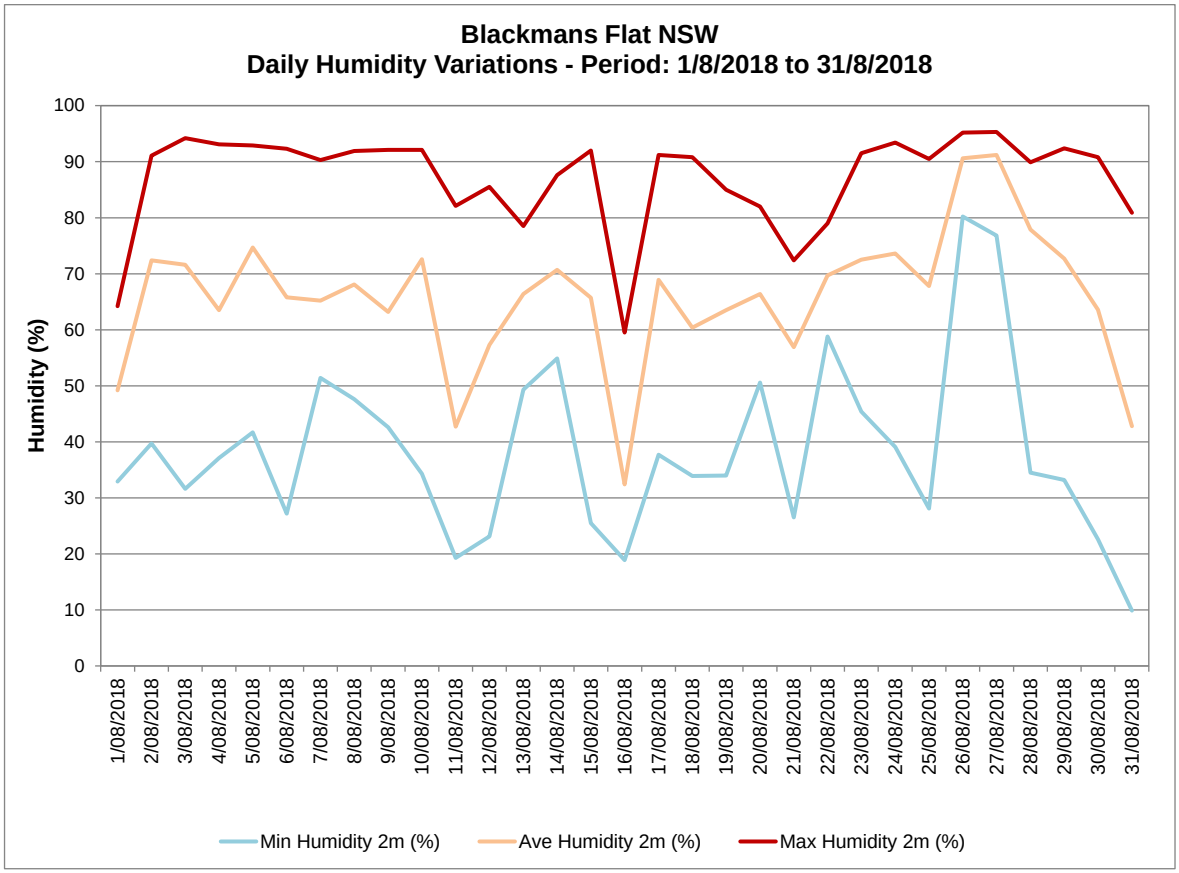
Appendix C

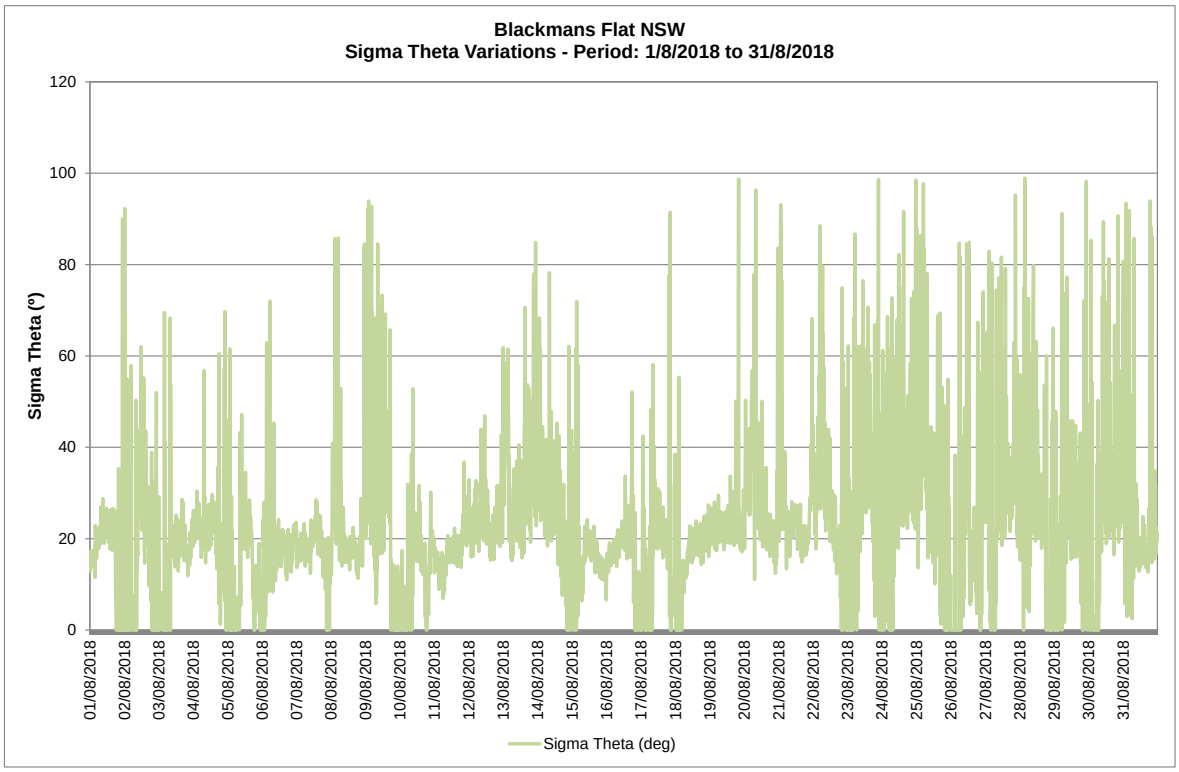
Meteorological Data


Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/8/2018 to 31/8/2018
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for August 2018: 48.6mm
Rainfall (mm)
Evapotranspiration (mm)


Blackmans Flat NSW
Average Air Temperature - Period: 1/8/2018 to 31/8/2018
Average Temperature (ºC)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/8/2018 to 31/8/2018
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
Ave Starflow Level (mm)
Ave Starflow Velocity (mm/sec)
Cumulative Rainfall (mm)
RainTot (mm)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/8/2018 to 31/8/2018
Humidity (%)
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/8/2018 to 31/8/2018
Sigma Theta (°)
120
100
80
60
40
20
0
01/08/2018
02/08/2018
03/08/2018
04/08/2018
05/08/2018
06/08/2018
07/08/2018
08/08/2018
09/08/2018
10/08/2018
11/08/2018
12/08/2018
13/08/2018
14/08/2018
15/08/2018
16/08/2018
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24/08/2018
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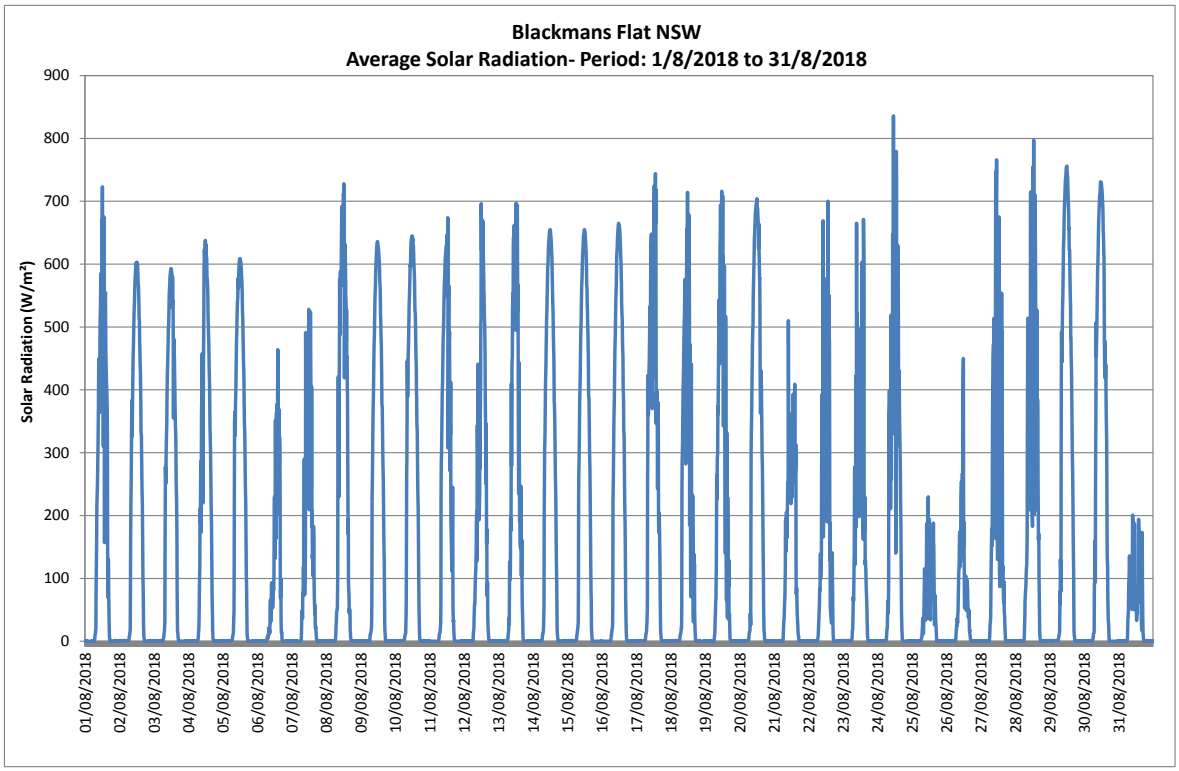
31/08/2018
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/8/2018 to 31/8/2018
Solar Radiation (W/m²)
900
800
700
600
500
400
300
200
100
0
01/08/2018
02/08/2018
03/08/2018
04/08/2018
05/08/2018
06/08/2018
07/08/2018
08/08/2018
09/08/2018
10/08/2018
11/08/2018
12/08/2018
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14/08/2018
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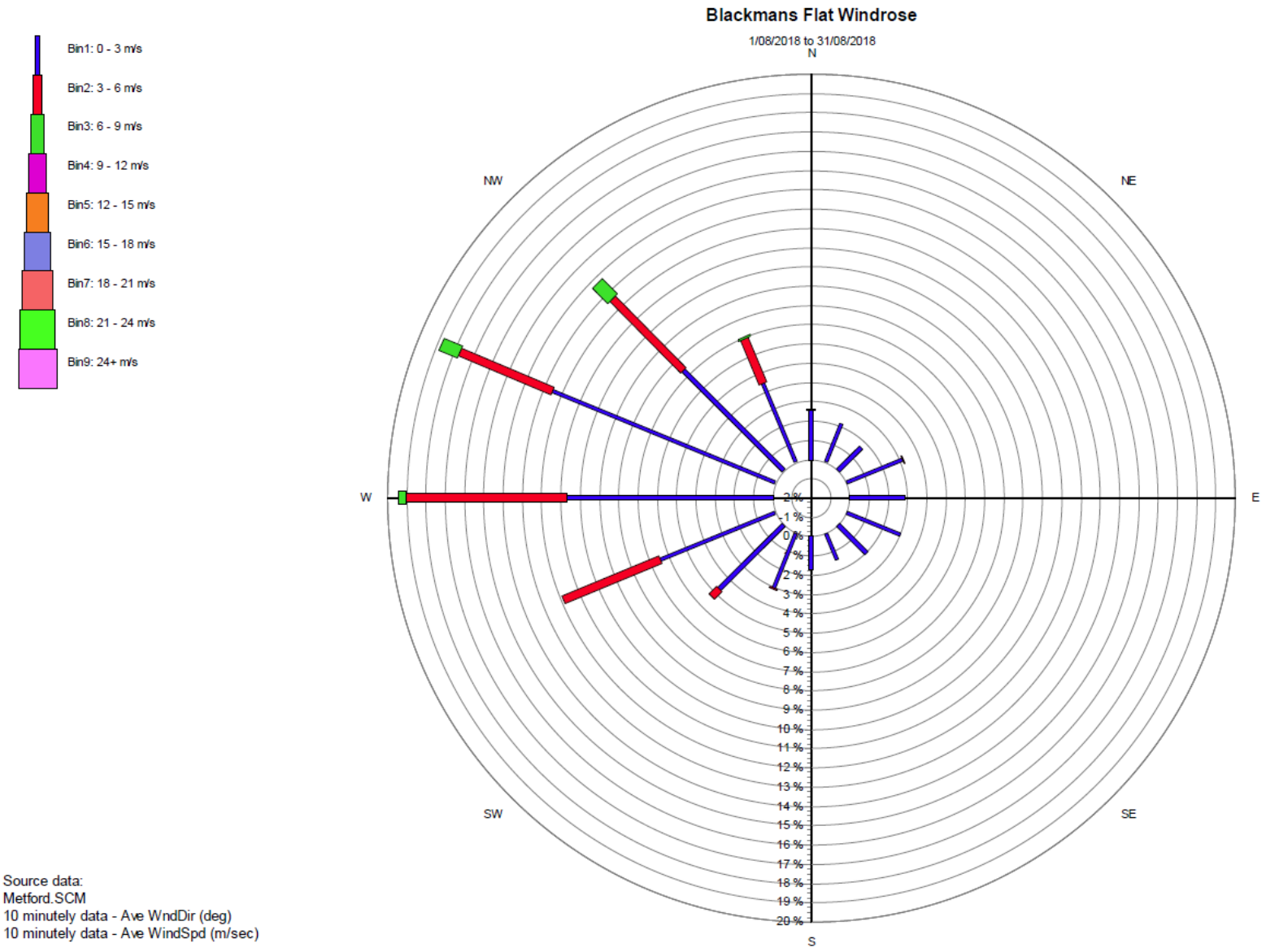
30/08/2018
31/08/2018



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