AIR, WATER AND METEOROLOGICAL MONITORING – MAY 2018

PINE DALE MINE, BLACKMANS FLAT

Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-1769/0

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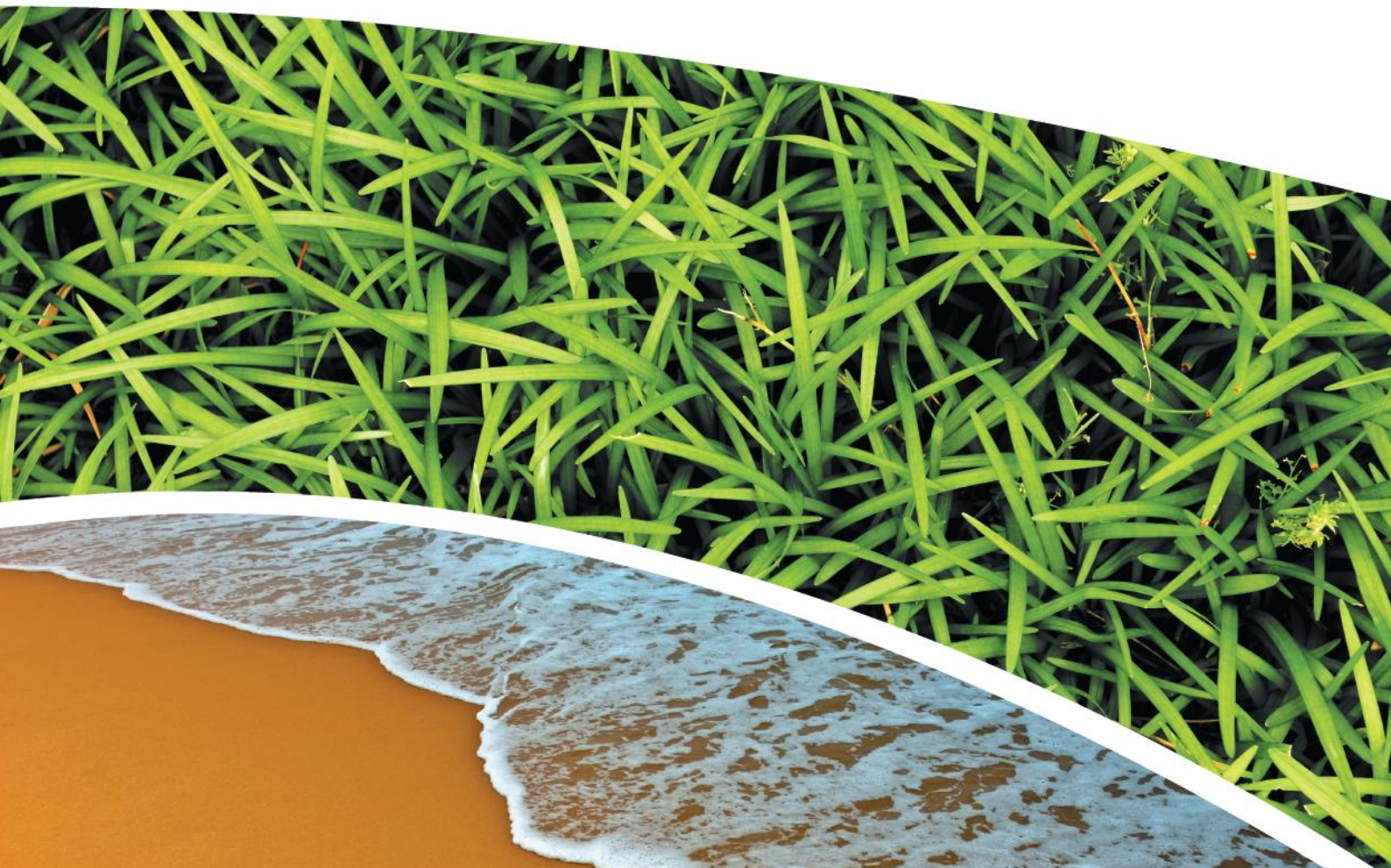
GEOTECHNICAL • ENVIRONMENTAL



RCA AUSTRALIA
ABN 53 063 515 711

92 Hill Street, CARRINGTON NSW 2294

Telephone: +61 2 4902 9200
Facsimile: +61 2 4902 9299
Email: administrator@rca.com.au
Internet: www.rca.com.au

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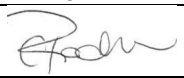
/0	Final	C Rocher	F Brooker	C Rocher		15.06.2018

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/0	1	Electronic (email)	Pine Dale Mine – Graham Goodwin graham.goodwin@energyaustralia.com.au	15.06.2018
/0	1	Electronic (email)	Energy Australia- Mark Frewin mark.frewin@energyaustralia.com.au	15.06.2018
/0	1	Electronic (email)	Lithgow City Council – Andrew Muir andrew.muir@lithgow.nsw.gov.au	15.06.2018
/0	1	Electronic report	RCA – job archive	15.06.2018

bsi. ISO 9001 Quality Management

bsi. AS/NZS 4801 Occupational Health and Safety Management

Contents

RCA ref 6880-1769/0

15 June 2018

Pine Dale Mine
PO Box 202
WALLERWANG NSW 2845

Attention: Mr Graham Goodwin

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

Geotechnical Engineering
Engineering Geology
Environmental Engineering
Hydrogeology
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Occupational Hygiene

REPORT COMPILED FOR COMMUNITY CONSULTATIVE COMMITTEE DETAILING AIR, WATER AND METEOROLOGICAL MONITORING MAY 2018

1 GENERAL COMMENTS

Date Samples Received: During the month of May 2018.

Samples received were sampled by RCA Laboratories – Environmental staff.

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 May 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	-	05186880011	05186880012
Date Sampled	-	10/05/18	10/05/18
Time Sampled	-	14:50	7:13
Depth to Water from Surface	m	25.36	6.88
Water Level (AHD)	m	891.59	887.52
Temperature	°C	12.0	13.0
pH	pH	6.32	6.42
Conductivity	µS/cm	***1580***	851
Turbidity	NTU	46	
Dissolved Oxygen	mg/L	3.8	
TSS	mg/L	37	
Oil and Grease	mg/L	<5	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	83	231
Total Alkalinity ($CaCO_3$)	mg/L	83	231
Sulfate (as SO_4)	mg/L	608	62
Chloride	mg/L	46	128
Calcium	mg/L	141	48
Magnesium	mg/L	64	51
Sodium	mg/L	59	50
Potassium	mg/L	18	10
Cobalt (dissolved)	mg/L	0.073	
Manganese (dissolved)	mg/L	2.69	
Nickel (dissolved)	mg/L	0.124	
Zinc (dissolved)	mg/L	0.022	
Iron (dissolved)	mg/L	36	0.34
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 in accordance with Environmental Protection Licence 4911 was undertaken this month. Water quality results are shown in **Table 3**.

Table 3 *EPA Surface Water Analysis 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	-	05186880009	05186880004	05186880010
Date Sampled	-	10/05/2018	10/05/2018	10/05/2018
Time Sampled	-	16:15	14:50	09:35
Temperature	°C	14:15	14:50	9:35
pH	pH	***6.92***	7.56	***8.67***
Conductivity	µS/cm	***3700***	***6260***	***1300***
Sulfate	NTU	1140	2700	105
Dissolved Iron	mg/L	0.63	0.26	<0.05
Total Suspended Solids	mg/L	<5	<5	12
Turbidity	mg/L	7	4	12
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

Indicates analysis was not required.

^ pH trigger level is exceeded if the pH is outside the nominated range

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

4 AIR QUALITY RESULTS

4.1 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.

HVAS Total Suspended Particulate analysis results are shown in **Table 4**. PM_{10} Suspended Particulate Matter 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*

Run Date	TSP (µg/m^3)	Sample Number	Filter Number	Date Filter Off	Time Filter Off	Field Tech	Hours Run
1-May-18	40	05186880031	9520642	06-May-18	6:29	Client	24.00
7-May-18	34	05186880033	9520645	11-May-18	9:18	K Hawes	24.00
13-May-18	8	05186880035	9520646	18-May-18	17:30	Client	24.00
19-May-18	12	05186880037	9518035	23-May-18	6:40	Client	24.00
25-May-18	19	05186880039	9518038	30-May-18	14:24	Client	24.00
31-May-18	10	05186880041	9518040	01-Jun-18	16:30	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
1-May-18	25	05186880032	9520643	06-May-18	6:33	Client	24.00
7-May-18	20	05186880034	9520644	11-May-18	9:39	K Hawes	24.00
13-May-18	2	05186880036	9518034	18-May-18	17:35	Client	24.00
19-May-18	2	05186880038	9518036	23-May-18	6:45	Client	24.00
25-May-18	12	05186880040	9518039	30-May-18	14:30	Client	24.00
31-May-18	5	05186880042	9518041	01-Jun-18	16:32	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* (June 2017 to May 2018) for the TSP unit is 20.3µg/m^3.

4.1.2 PM_{10} SUMMARY

The NSW EPA twenty four hour maximum PM_{10} allowable limit is 50µg/m^3. The 24 hour maximum allowable limit was not exceeded during the month of May 2018.

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 9.1µg/m^3.

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: 11 April – 10 May 2018*

Sample Number	Deposit Gauge	Number of Days	Notes	Insoluble Solids	Ash	Combustible Matter
05186880021	D1	29	IT	0.7	0.4	0.3
05186880023	D3	29	I	0.6	0.4	0.2
05186880024	D4	29	I	0.8	0.3	0.5
05186880025	D5	29	I	0.6	0.3	0.3
05186880026	D6	29	I	0.6	0.3	0.3

All units are g/m^2/month

I indicates insects noted to be present in sample.

IT indicates insects and tree litter noted in sample.

4.2.1 ALLOWABLE DEPOSITIONAL DUST LIMITS

The EPA long term (annual average) deposited dust limit is 4g/m^2 per month. All rolling annual depositional dust results for the period (June 2017 – May 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 (refer to depositional dust graphs in **Appendix B**). The annual average for dust gauge D2 (June 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 May 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 May 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 May 2018 environmental monitoring results were found to be generally in compliance with EPL 4911:

- Standing water levels within Pine Dale Mine groundwater bores were compliant with their respective trigger levels.
- 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.
- pH in groundwater samples P6 and P7 were within the site specific trigger levels.
- Electrical conductivity in groundwater sample P7 was compliant within the site specific trigger level.

The exception was electrical conductivity in groundwater P6, which was in excess of the site specific trigger level.

Meteorological monitoring was undertaken for the entire month of May with 100% data recovery.

Pine Dale Mine ceased operation in March 2014 and therefore no blasting occurred at the site. Noise monitoring was not required in May.

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Please contact the undersigned if you have any queries.

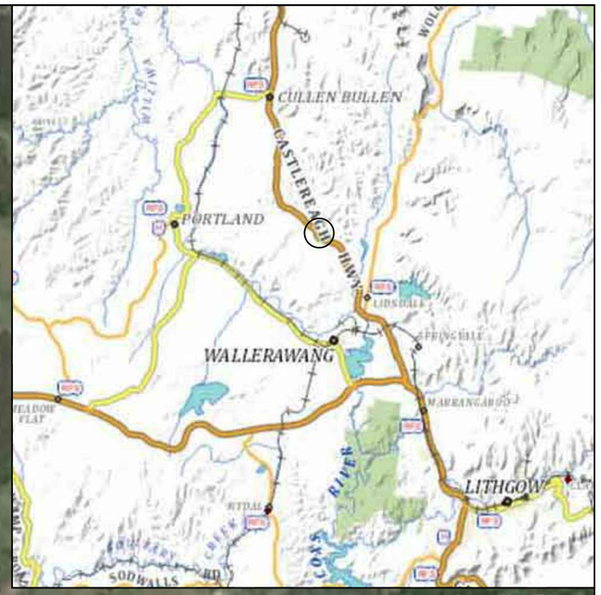
Yours sincerely

Carmen Rocher
Environmental Engineer
RCA Australia

Fiona Brooker
Associate Environmental Engineer
RCA Australia

Appendix A

Monitoring Locations



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

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

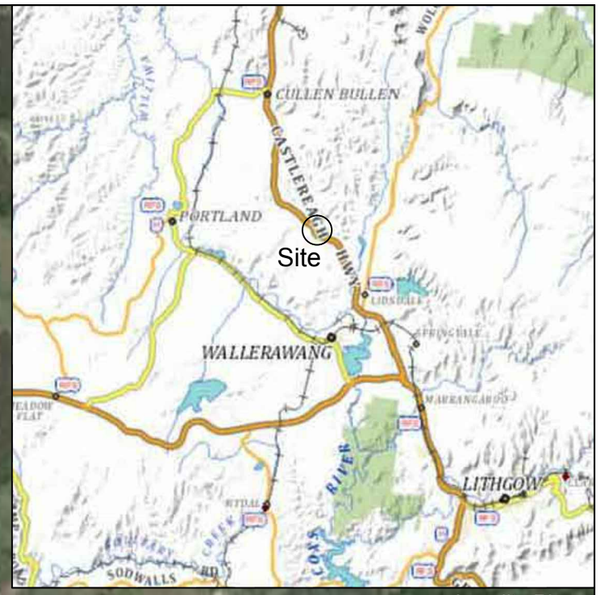
S7

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

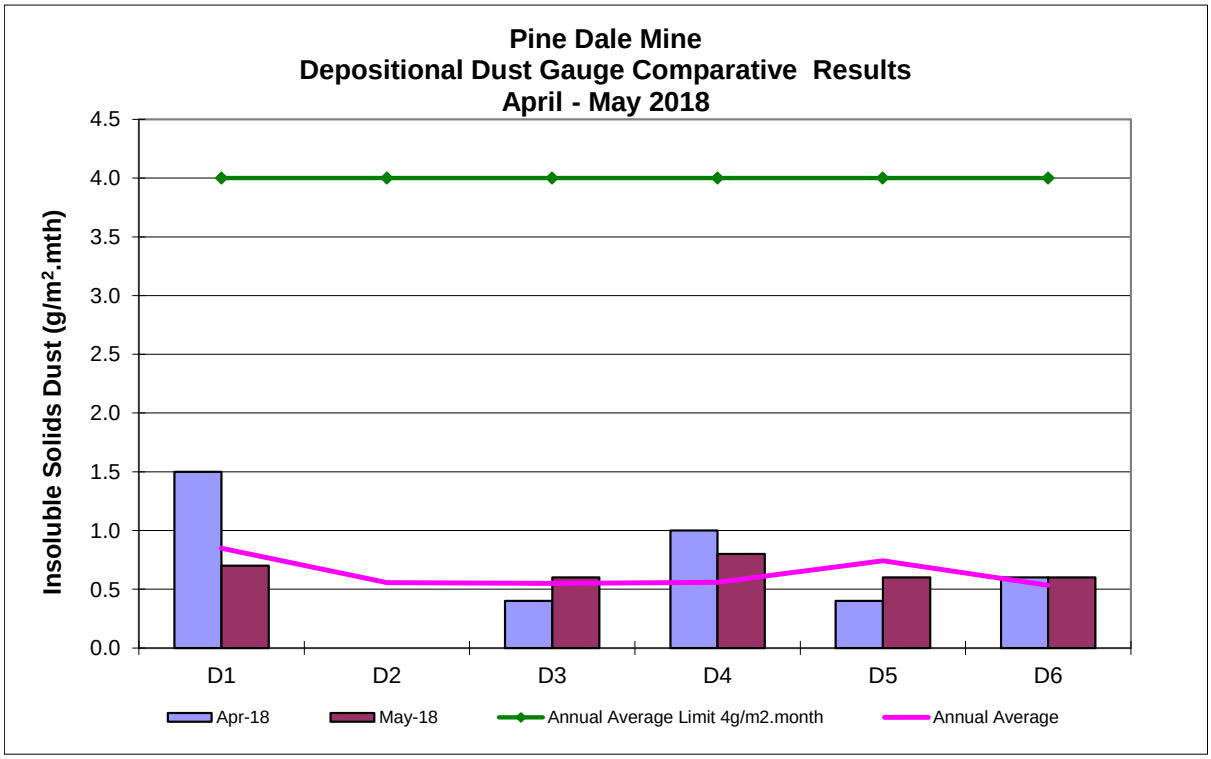
Aerial image taken from Google Earth, November 12 2014

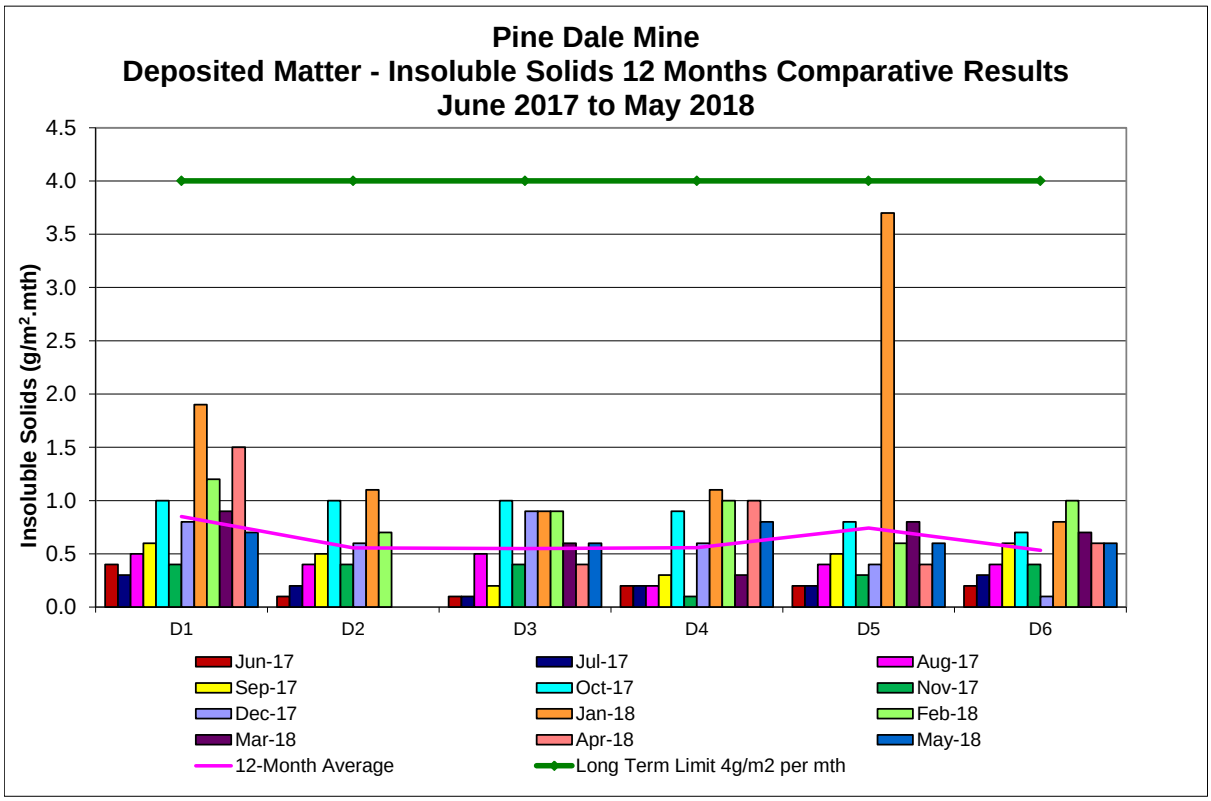
0 200 400 600 800 1000
metres

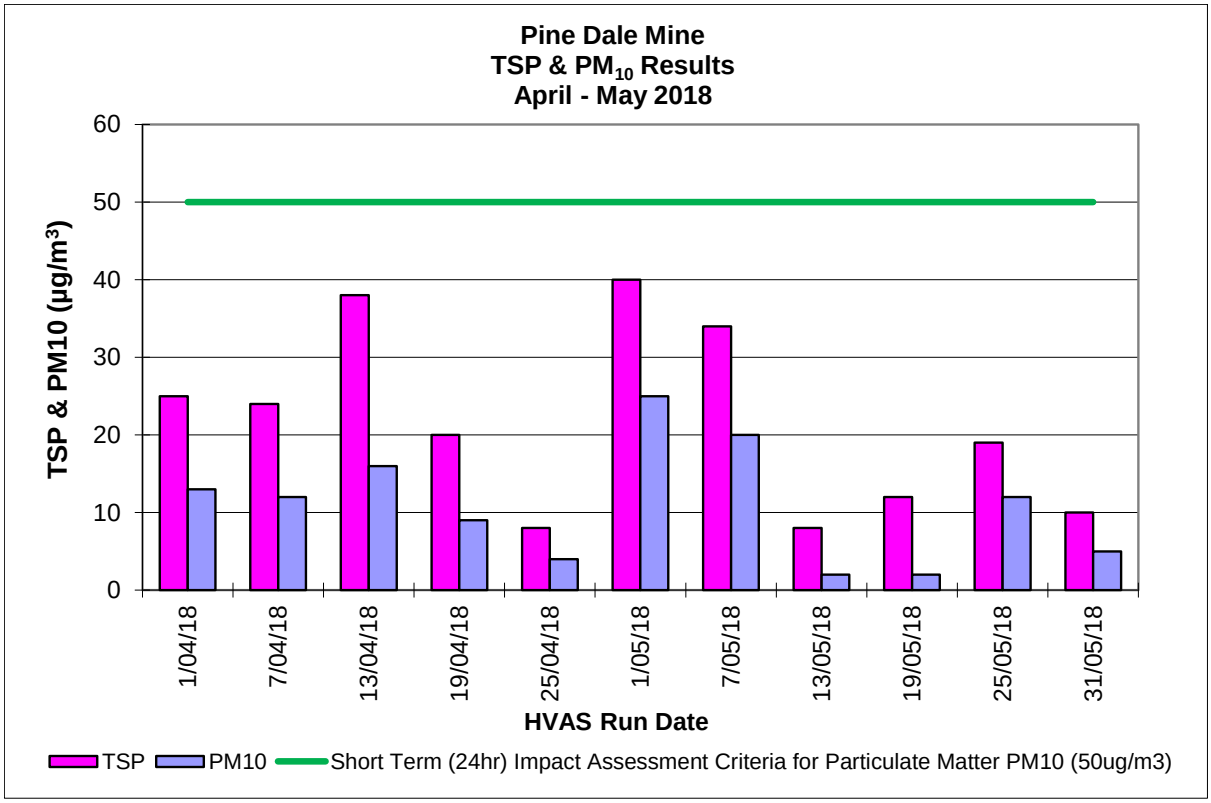
CDT-DWG-A3H-001/1

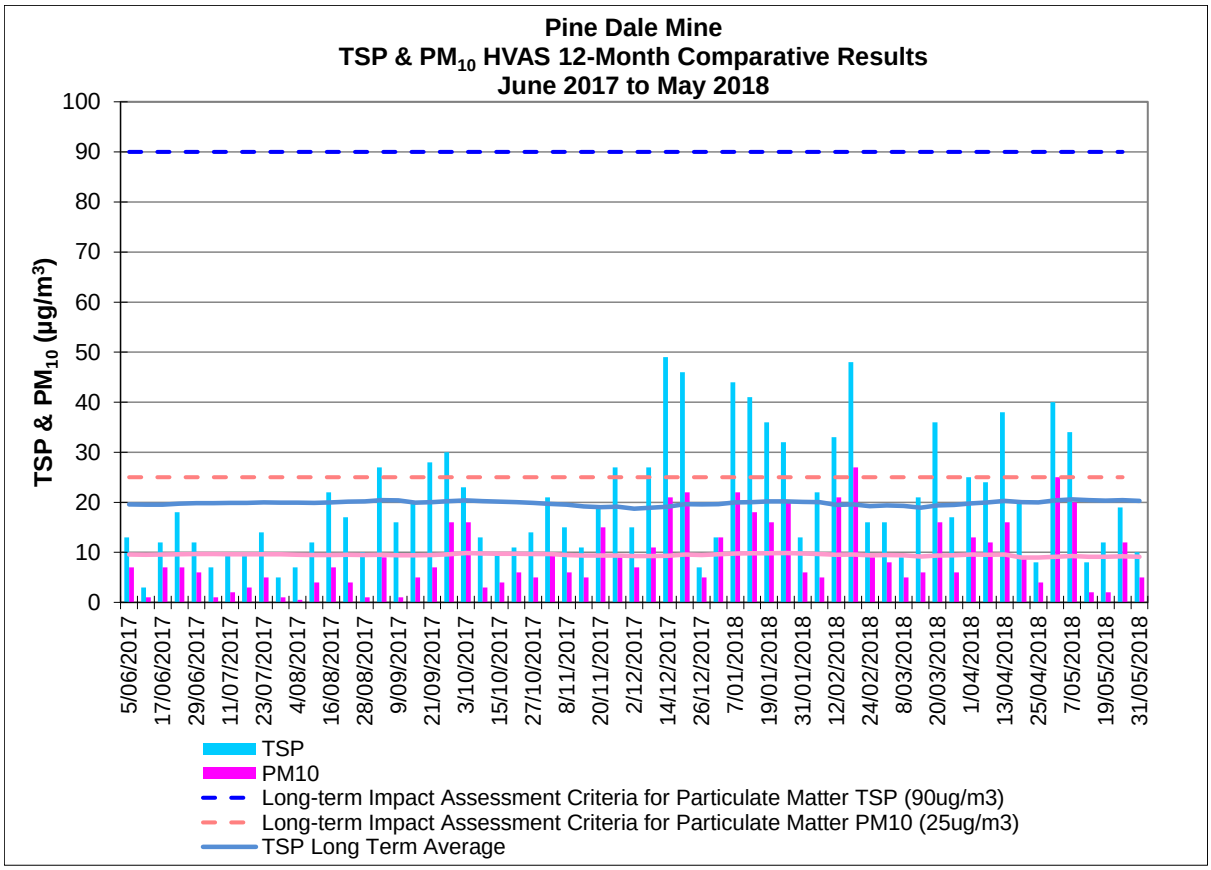
Appendix B

Depositional Dust and HVAS Graphs


Pine Dale Mine
Depositional Dust Gauge Comparative Results
April - May 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
D2
D3
D4
D5
D6
Apr-18
May-18
Annual Average Limit 4g/m2.month
Annual Average

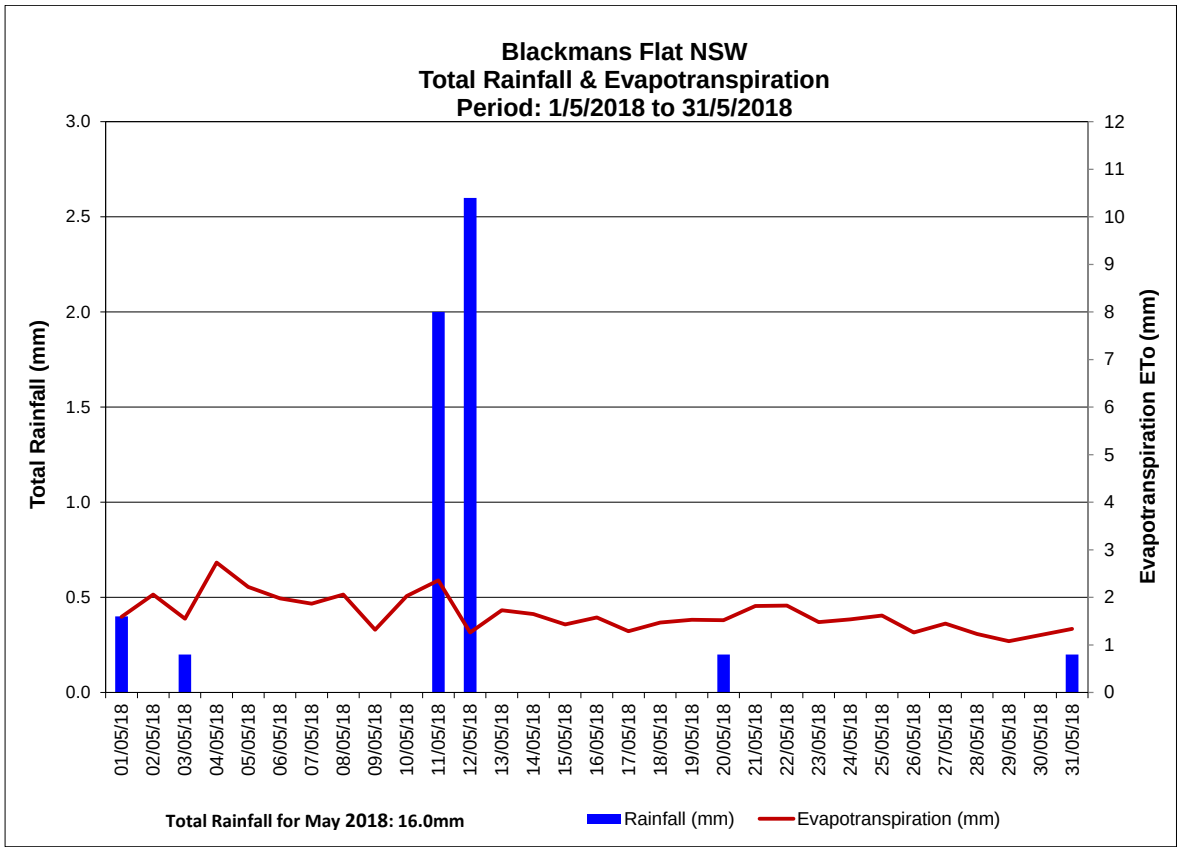

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
June 2017 to May 2018
Insoluble Solids (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
May-18
12-Month Average
Long Term Limit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

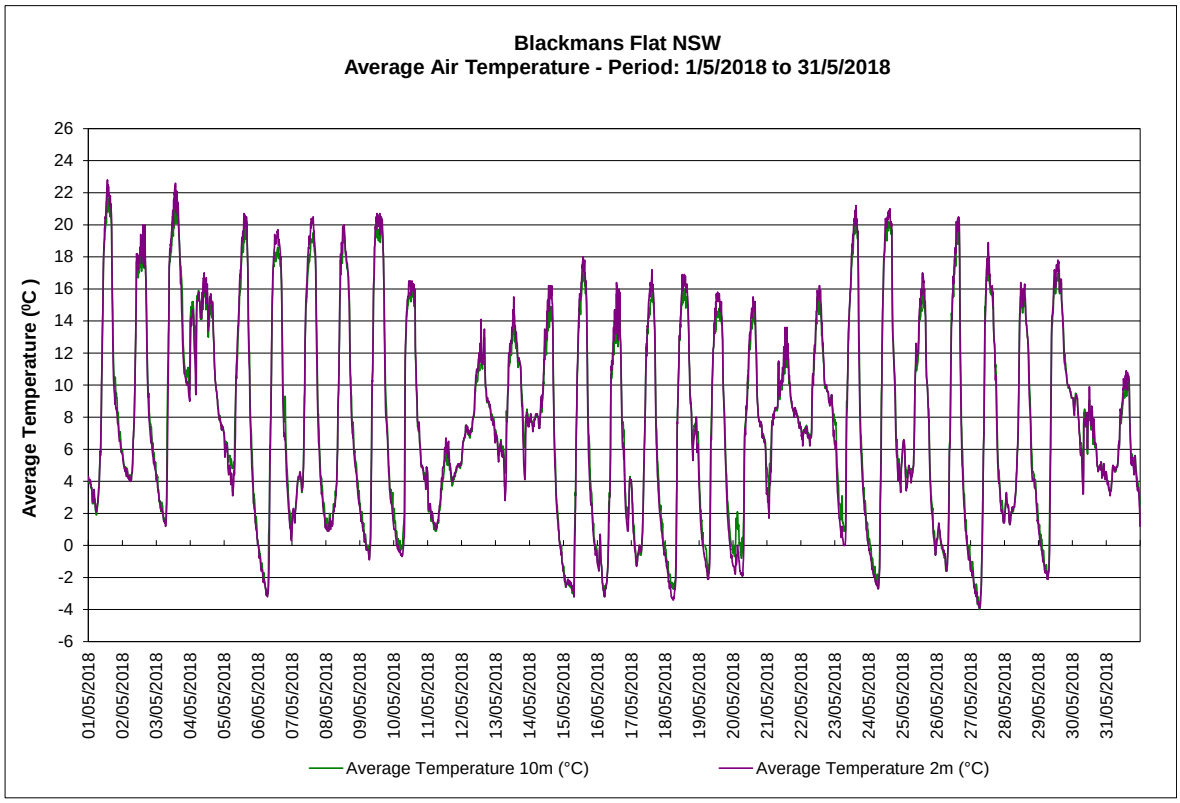

Pine Dale Mine
TSP & PM10 Results
April - May 2018
TSP & PM10 (µg/m³)
60
50
40
30
20
10
0
1/04/18
7/04/18
13/04/18
19/04/18
25/04/18
1/05/18
7/05/18
13/05/18
19/05/18
25/05/18
31/05/18
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

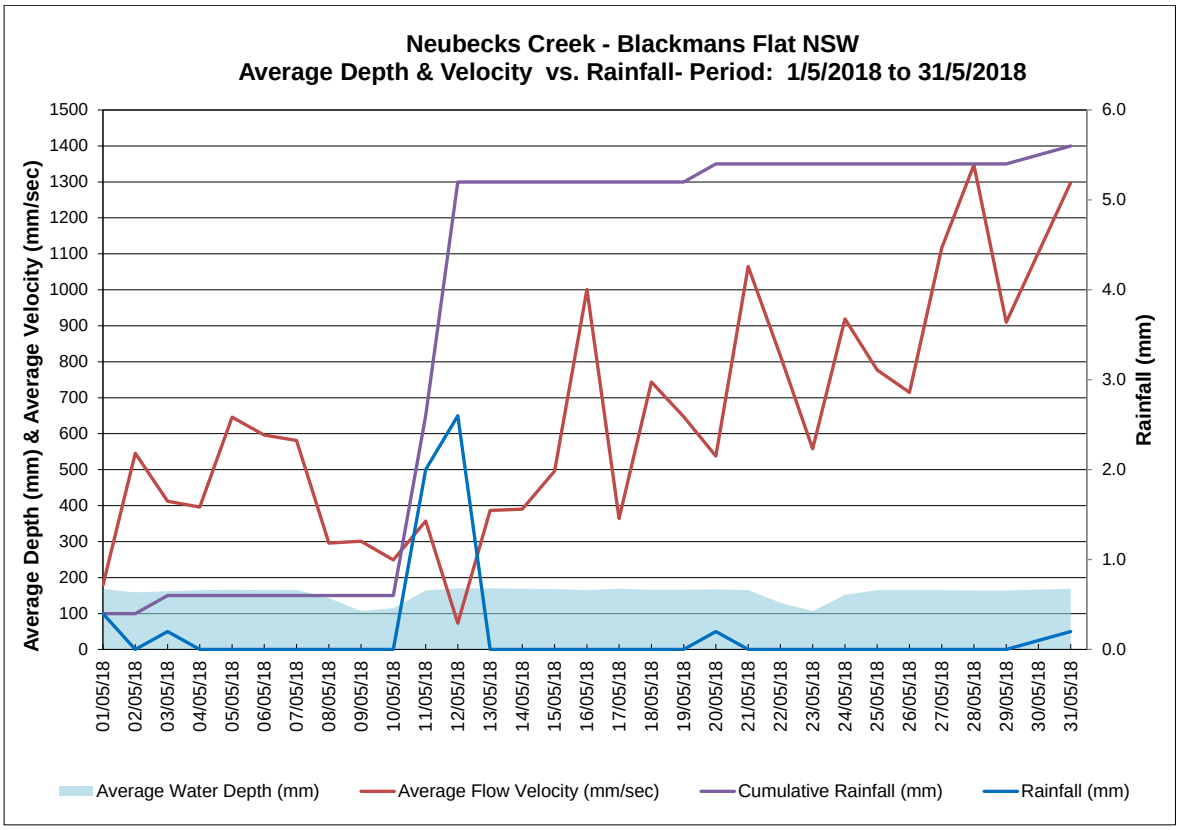

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
June 2017 to May 2018
TSP & PM10 (µg/m³)
100
90
80
70
60
50
40
30
20
10
0
5/06/2017
17/06/2017
29/06/2017
11/07/2017
23/07/2017
4/08/2017
16/08/2017
28/08/2017
9/09/2017
21/09/2017
3/10/2017
15/10/2017
27/10/2017
8/11/2017
20/11/2017
2/12/2017
14/12/2017
26/12/2017
7/01/2018
19/01/2018
31/01/2018
12/02/2018
24/02/2018
8/03/2018
20/03/2018
1/04/2018
13/04/2018
25/04/2018
7/05/2018
19/05/2018
31/05/2018
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

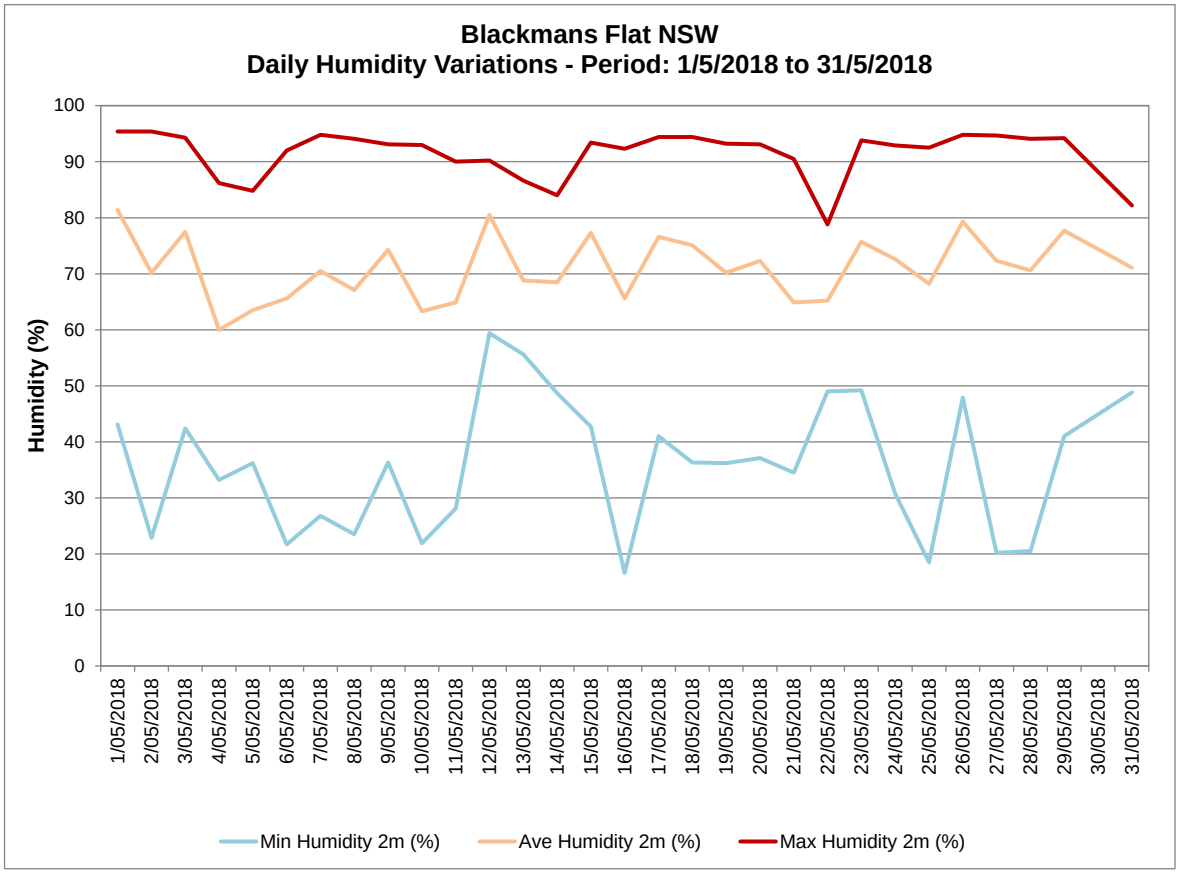
Appendix C

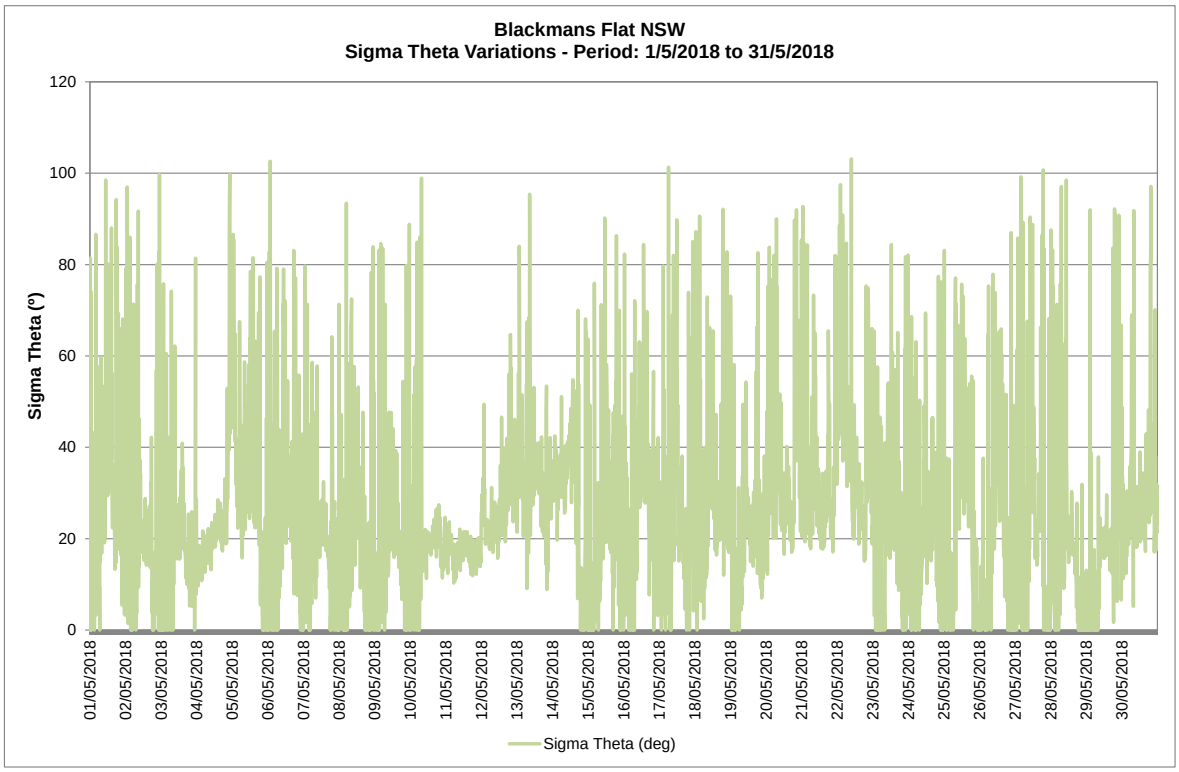
Meteorological Data


Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/5/2018 to 31/5/2018
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for May 2018: 16.0mm
Rainfall (mm)
Evapotranspiration (mm)


Blackmans Flat NSW
Average Air Temperature - Period: 1/5/2018 to 31/5/2018
Average Temperature (ºC)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/5/2018 to 31/5/2018
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/5/2018 to 31/5/2018
Humidity (%)
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/5/2018 to 31/5/2018
Sigma Theta (°)
120
100
80
60
40
20
0
01/05/2018
02/05/2018
03/05/2018
04/05/2018
05/05/2018
06/05/2018
07/05/2018
08/05/2018
09/05/2018
10/05/2018
11/05/2018
12/05/2018
13/05/2018
14/05/2018
15/05/2018
16/05/2018
17/05/2018
18/05/2018
19/05/2018
20/05/2018
21/05/2018
22/05/2018
23/05/2018
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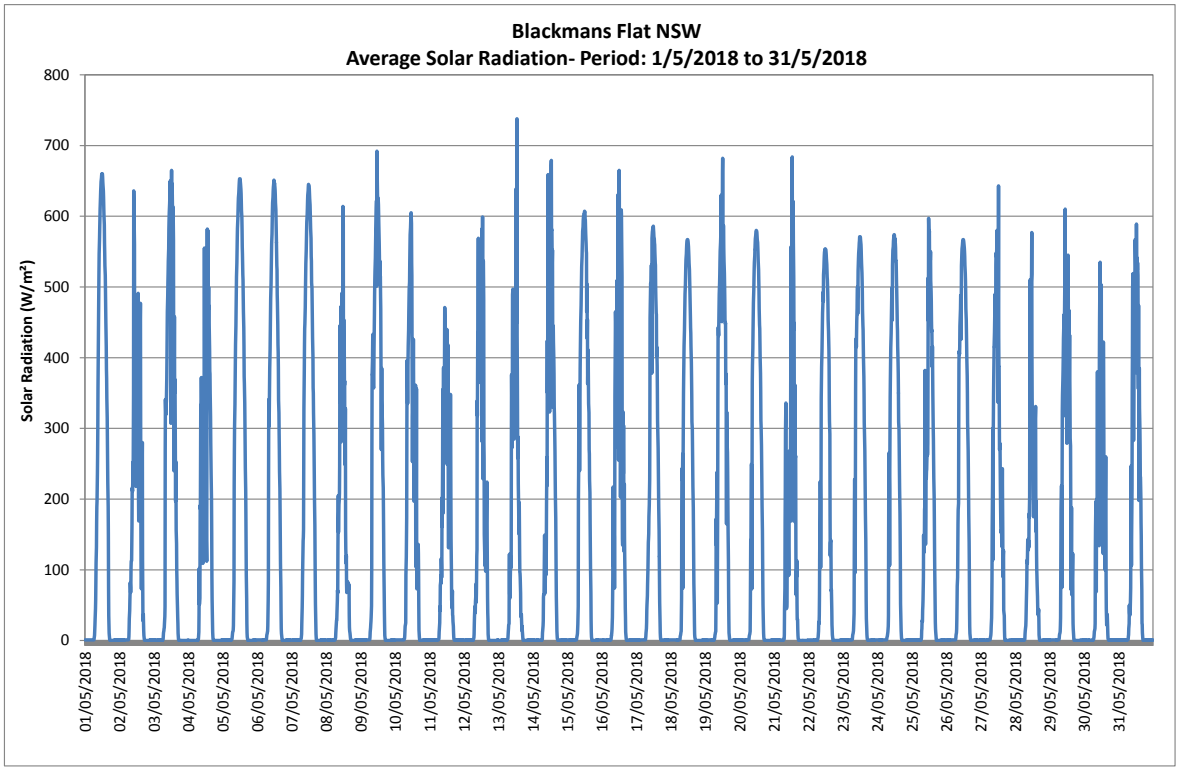
29/05/2018
30/05/2018
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/5/2018 to 31/5/2018
Solar Radiation (W/m²)
800
700
600
500
400
300
200
100
0
01/05/2018
02/05/2018
03/05/2018
04/05/2018
05/05/2018
06/05/2018
07/05/2018
08/05/2018
09/05/2018
10/05/2018
11/05/2018
12/05/2018
13/05/2018
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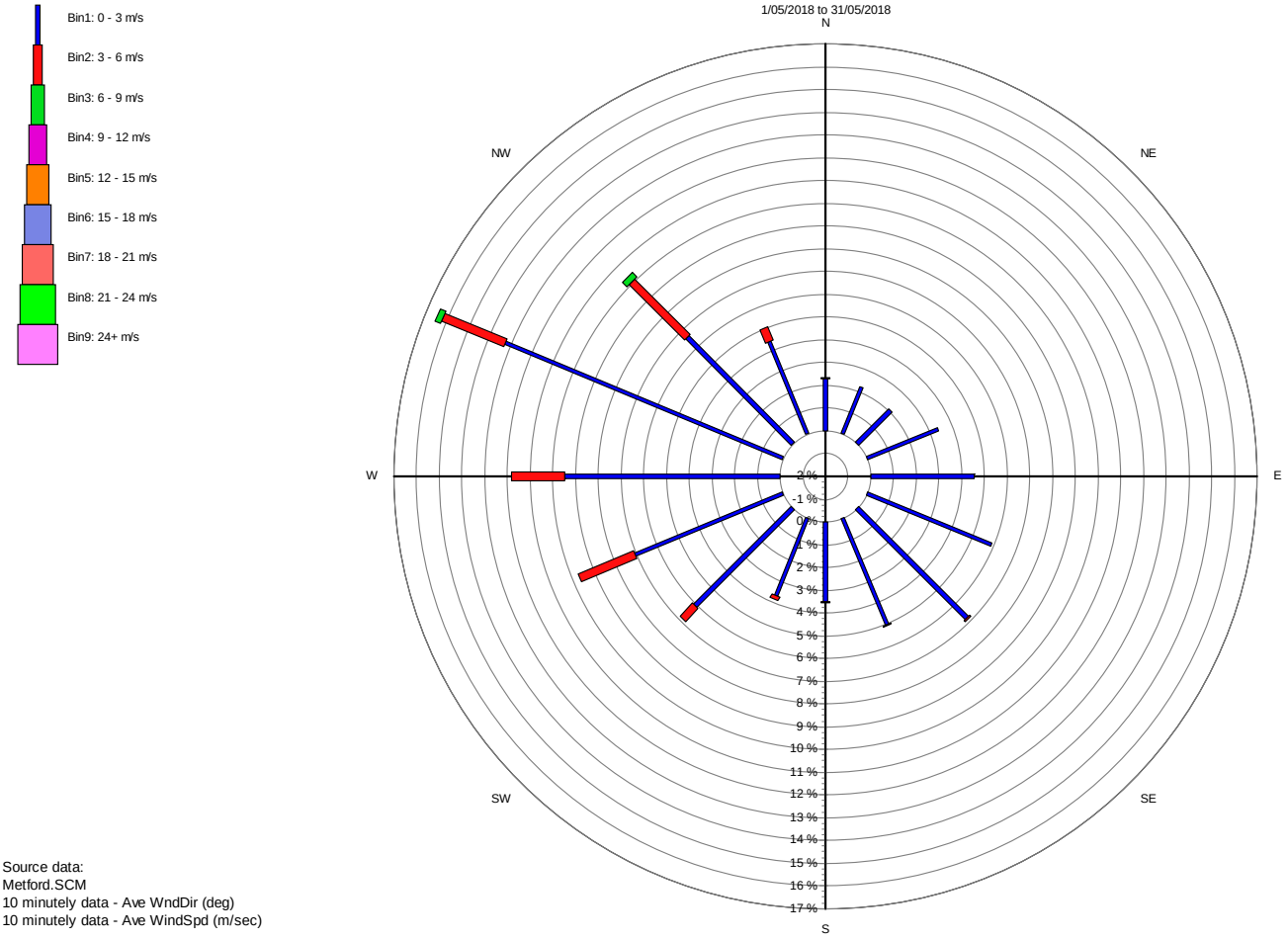
21/05/2018
22/05/2018
23/05/2018
24/05/2018
25/05/2018
26/05/2018
27/05/2018
28/05/2018
29/05/2018
30/05/2018
31/05/2018

Blackmans Flat Windrose

1/05/2018 to 31/05/2018



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