SURFACE WATER, DEPOSITIONAL DUST HVAS AND METEOROLOGICAL MONITORING

Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-878/0

March 2015

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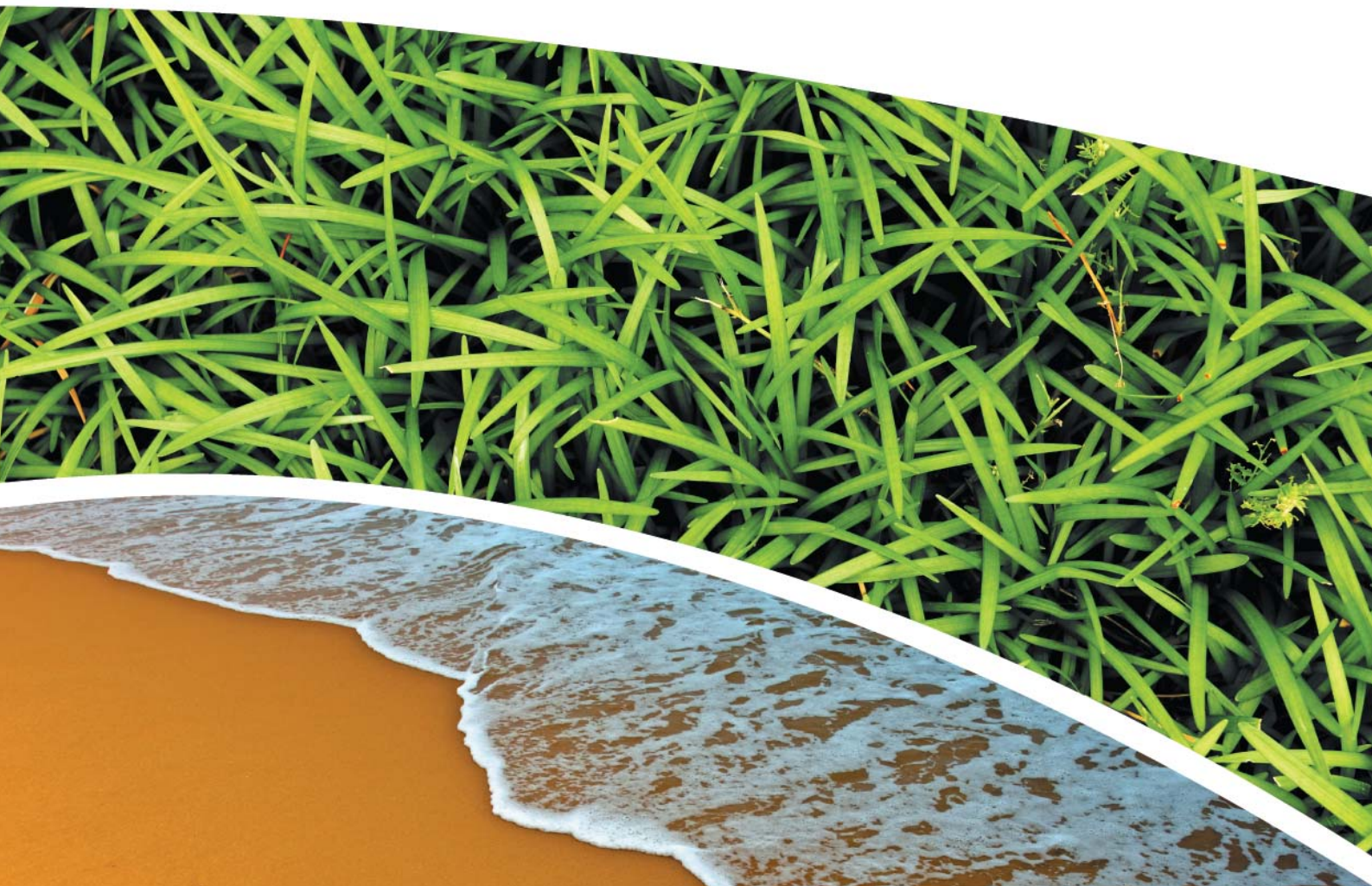
GEOTECHNICAL • ENVIRONMENTAL



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RCA LE ref 6880-878/0

16 April 2015

Pine Dale Mine
PO Box 202
WALLERAWANG NSW 2845

Attention: Mr Graham Goodwin

REPORT COMPILED FOR
PINE DALE MINE COMMUNITY CONSULTATIVE COMMITTEE
DETAILING SURFACE WATER, GROUNDWATER DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING
MARCH 2015

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1 GENERAL COMMENTS

Job Number: 6880.
Date Samples Received: During the month of March 2015.
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 are based on established internationally recognised procedures such as APHA and Australian Standards. Analytical test methods are detailed in **Table 1**. When an external testing laboratory is used to obtain the analysis of samples which become a part of this report, then the details of that laboratory's official report will be attached in an appendix.

Table 1 *Analytical Test Methods*

ANALYSIS	METHOD	UNITS	ANALYSING LABORATORY	NATA / NON-NATA ANALYSIS
Determination of Suspended Particulate Matter	ENV-LAB003	$\mu g/m^3$	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

3 WATER MONITORING RESULTS

3.1 GROUNDWATER

A total of 2 on-site groundwater samples were collected during the month of March 2015. Sampling at Bores P2, P3 and P7a are no longer required under the new sampling regime undertaken in accordance with Project Approval (PA 10_0041) and the Pine Dale Mine Water Management Plan (Report No. 613/20). The new sampling regime commenced 1 August 2013. Water quality analysis results are shown in **Table 2**.

Table 2 *Groundwater Analysis Results*

ANALYSIS	UNITS	P6	P7
Sample Number	-	03156880009	03156880010
Date Sampled	-	11/03/15	11/03/15
Time Sampled	-	13:20	13:40
Depth to Water from Surface*	m	25.46	6.41
Water Level (AHD)	m	891.49	887.99
Temperature	°C	17.0	15.0
pH	pH	6.14	6.28
Conductivity	µS/cm	1147	788
Turbidity	NTU	14	
Dissolved Oxygen	mg/L	5.0	
TSS	mg/L	28	
Oil & Grease	mg/L	<2	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	61	
Total Alkalinity ($CaCO_3$)	mg/L	61	
Sulfate (as SO_4)	mg/L	644	
Chloride	mg/L	35	
Calcium	mg/L	130	
Magnesium	mg/L	63	
Sodium	mg/L	51	
Potassium	mg/L	18	
Cobalt (dissolved)	mg/L	0.066	
Manganese (dissolved)	mg/L	2.8	
Nickel (dissolved)	mg/L	0.106	
Zinc (dissolved)	mg/L	0.072	
Iron (dissolved)	mg/L	29.7	

NOTES: *Depth relative to ground level (not standpipe height).

Indicates analysis was not required

Groundwater monitoring locations are shown in **Appendix 1**.

3.2 EPA SURFACE WATER MONITORING

Routine quarterly surface waters were not scheduled to be monitored this month. Quarterly surface water monitoring is next scheduled to be undertaken in March 2015.

4 AIR QUALITY MONITORING RESULTS

4.1 HIGH VOLUME AIR SAMPLERS (HVAS)

HVAS at this facility conform to AS/NZS 3580.9.3:2003, AS/NZS 3580.9.6:2003 and AS/NZS 3580.1.1:2007.

HVAS Total Suspended Particulate analysis results are shown in **Table 3**.

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

Table 3 *Total Suspended Particulates (µg/m³ 0°C 101.3 kPa)*

RUN DATE	TSP (µg/m^3)	SAMPLE NUMBER	FILTER NUMBER	DATE FILTER OFF	TIME FILTER OFF	FIELD TECH	HOURS RUN
06-Mar-15	43	03156880029	8890641	10-Mar-15	12:25	Client	24.00
12-Mar-15	24	03156880031	8901756	16-Mar-15	13:20	Client	24.29
18-Mar-15	57	03156880033	8901758	23-Mar-15	10:35	Client	24.00
24-Mar-15	19	03156880035	8901799	29-Mar-15	12:14	Client	24.00
30-Mar-15	11	03156880037	8900102	31-Mar-15	8:50	Client	24.02

Table 4 *Suspended Particulate Matter PM_{10} (µg/m^3 0^{o}C 101.3 kPa)*

RUN DATE	PM_{10} (µg/m^3)	SAMPLE NUMBER	FILTER NUMBER	DATE FILTER OFF	TIME FILTER OFF	FIELD TECH	HOURS RUN
06-Mar-15	16	03156880030	8901755	10-Mar-15	12:30	Client	24.00
12-Mar-15	11	03156880032	8901757	16-Mar-15	13:22	Client	24.24
18-Mar-15	21	03156880034	8901798	23-Mar-15	10:37	Client	24.00
24-Mar-15	7	03156880036	8901800	29-Mar-15	12:15	Client	24.00
30-Mar-15	8	03156880038	8900101	31-Mar-15	8:52	Client	24.00

4.1.1 TSP Summary

The 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* (from April 2014 to March 2015) for the TSP unit is 19.2µg/m^3, which is well below the allowable limit of 90µg/m^3.

4.1.2 PM_{10} Summary

The EPA 24h Maximum PM_{10} allowable limit is 50µg/m^3. The EPA Annual Mean PM_{10} allowable limit is 30µg/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 8.7µg/m^3, which is below the allowable limit of 30µg/m^3. The 24 hour maximum allowable limit of 50µg/m^3 was not exceeded during the month of March 2015.

4.1.3 Comments

HVAS monitoring locations are shown in **Appendix 1**.

Graphical HVAS results presentations are shown in **Appendix 2**.

4.2 DEPOSITIONAL DUST

Depositional Dust Gauges at this facility conform to AS/NZS 3580.10.1:2003 and AS/NZS 3580.1.1:2007. Depositional Dust monitoring results are shown in **Table 5.**

Table 5 *Depositional Dust Monitoring - Deposited Matter March 2015*

SAMPLE NUMBER	DEPOSIT GAUGE	DATE SAMPLE STARTED	DATE SAMPLE COMPLETED	NUMBER OF DAYS	NOTES	INSOLUBLE SOLIDS (g/m^2.month)	ASH (g/m^2.month)	COMBUSTIBLE MATTER (g/m^2.month)
03156880019	D1	11/02/2015	11/03/2015	28	IT	1.0	0.4	0.6
03156880020	D2	11/02/2015	11/03/2015	28	I	0.8	0.3	0.5
03156880021	D3	11/02/2015	11/03/2015	28	I	1.3	0.7	0.6
03156880022	D4	11/02/2015	11/03/2015	28	I	0.8	0.3	0.5
03156880023	D5	11/02/2015	11/03/2015	28	BI	4.4	1.9	2.5
03156880024	D6	11/02/2015	11/03/2015	28	I	1.2	0.6	0.6

4.2.1 Glossary of Terms Used in Notes

I Insects (eg, Ants, spiders)

IT Insects (eg, Ants, spiders) and Tree litter

BI Bird droppings and Insects (eg, Ants, spiders)

4.2.2 Allowable Depositional Dust Limits

The EPA Long Term (Annual Average) Dust Limit is $4g/m^2$ per month. All Depositional Dust results during this monitoring period are in compliance with consent conditions. The Annual Average for Dust Gauges D1, D2, D3, D4, D5 and D6 are all less than or equal to $1.2g/m^2$ per month, which is below the allowable Annual Average Long Term Limit of $4g/m^2$ per month.

Depositional Dust monitoring locations are shown in **Appendix 1**. Graphical Depositional Dust results are shown in **Appendix 2**.

5 BLASTING RESULTS

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

6 NOISE MONITORING RESULTS

Routine quarterly noise monitoring was undertaken this month. Results are presented in RCA Australia Report No. 6880-N132 Pine Dale Mine Operation Attended Noise March 2015.

7 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 May 2014.

8 SUMMARY

During the month of March 2015 all environmental monitoring constituents were found to be in compliance with EPL 4911.

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 30µg/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.

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

Please contact the undersigned if you have any queries.

Yours sincerely

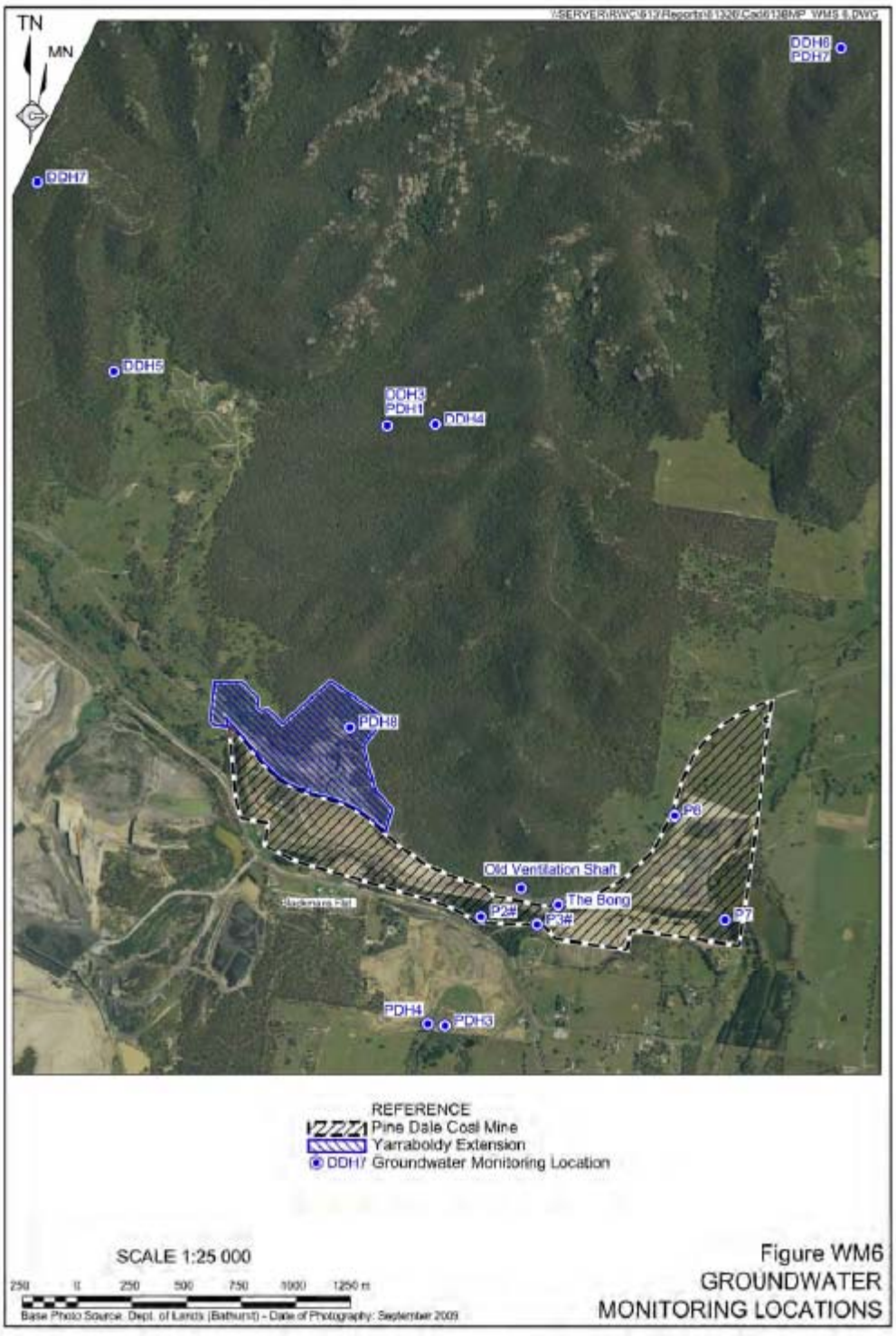
Carmen Rocher
Environmental Engineer
RCA Australia Pty Ltd trading as
RCA Laboratories – Environmental

Laura Schofield
Environmental Laboratory Manager
RCA Australia Pty Ltd trading as
RCA Laboratories – Environmental

Appendix 1

Surface Water Groundwater and Air Quality Monitoring Locations


TN
MN
\\SERVER\WC613\Reports\61320\Cad\613BMP_WM 5.DWG
CR U/S
EPA 2
LG D/S
EPA 4
NC Bridge
BL U/S
EPA 13
NC D/S
CR D/S
EPA 14
REFERENCE
Pine Dale Coal Mine
Yarraboldy Extension
EPA 14 Surface Water Monitoring Location
SCALE 1:25 000
Base Photo Source: Dept. of Lands (Bathurst) – Date of Photography: September 2009
Figure WM5
SURFACE WATER
MONITORING LOCATIONS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TN
MN
DDH6
PDH7
DDH7
DDH5
DDH3
PDH1
DDH4
PDH8
P6
Old Ventilation Shaft
The Bong
P2#
P3#
P7
PDH4
PDH3
REFERENCE
Pine Dale Coal Mine
Yarraboldy Extension
DDH7 Groundwater Monitoring Location
SCALE 1:25 000
250 0 250 500 750 1000 1250 m
Base Photo Source: Dept. of Lands (Bathurst) - Date of Photography: September 2009
Figure WM6
GROUNDWATER
MONITORING LOCATIONS

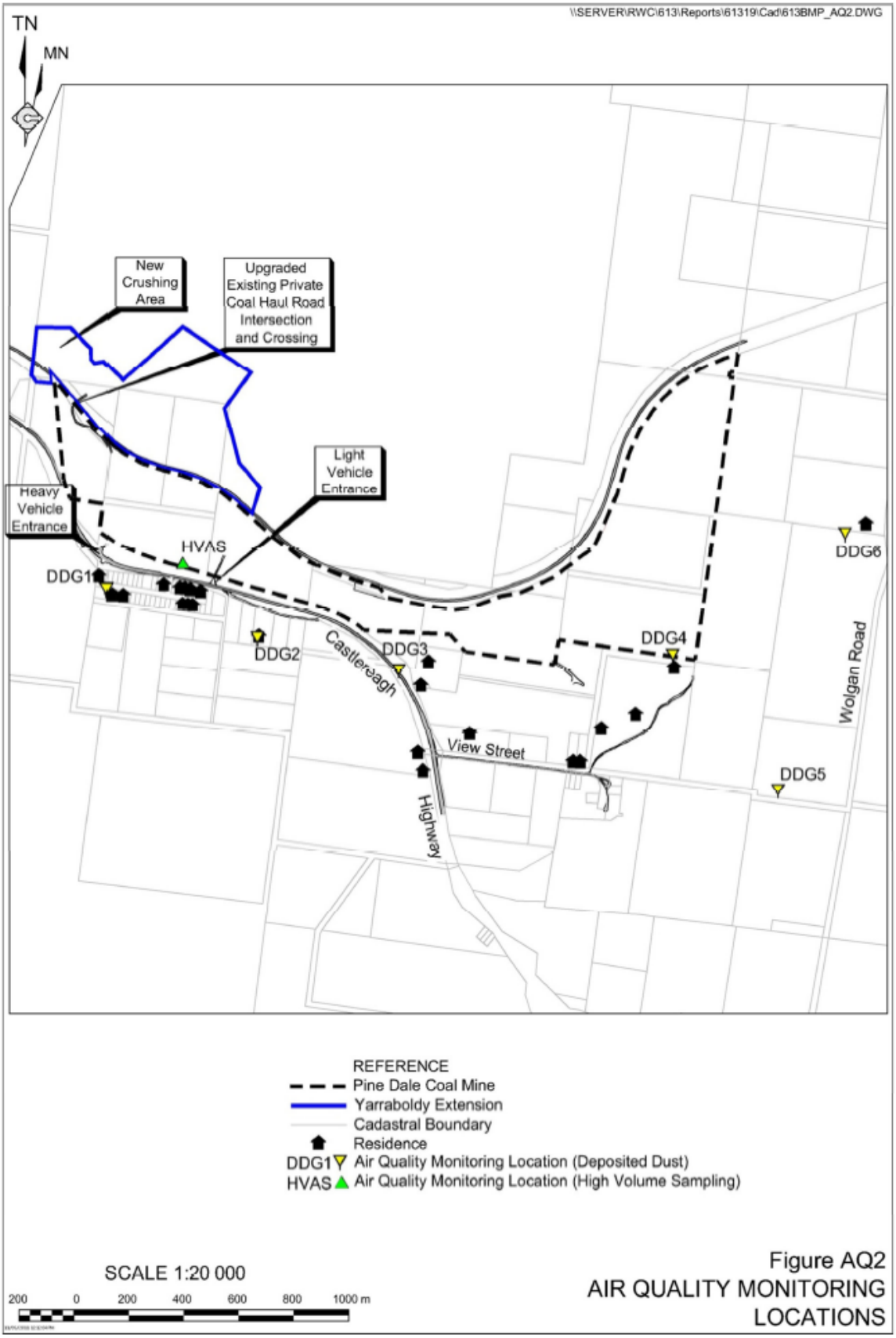
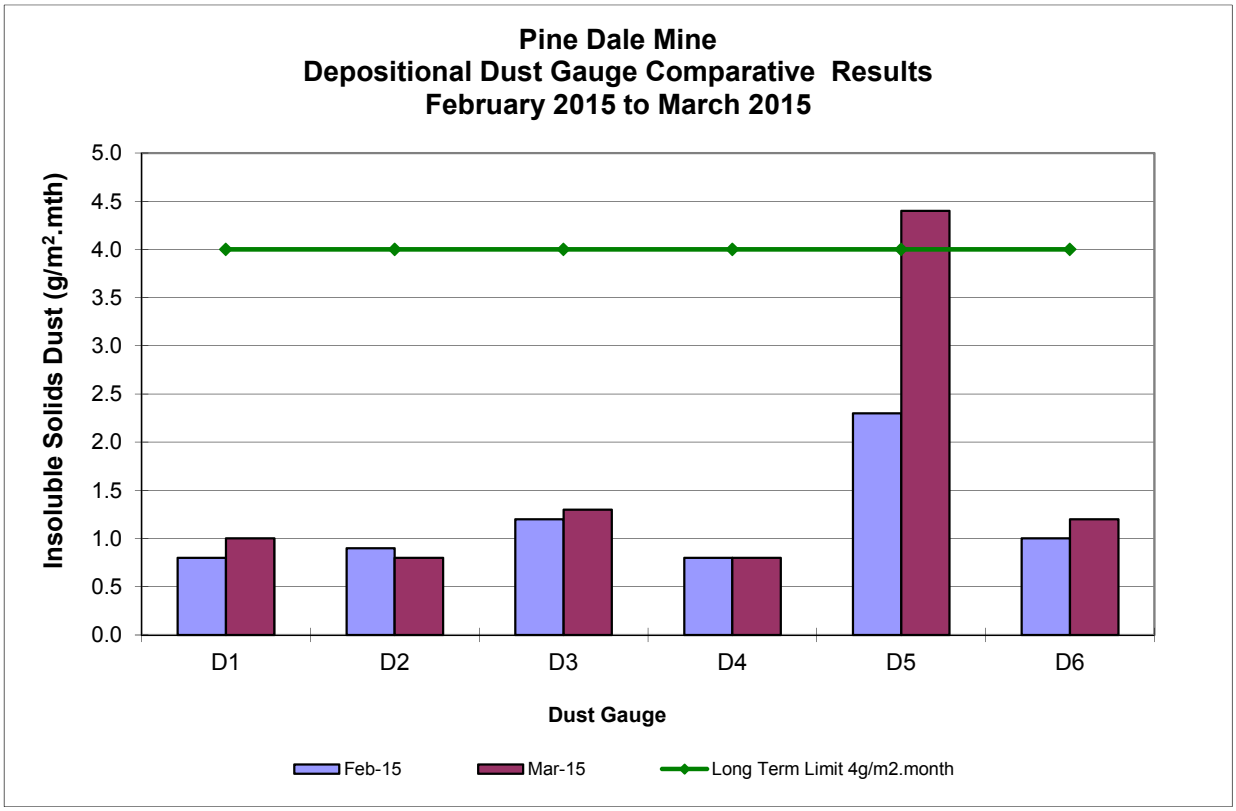
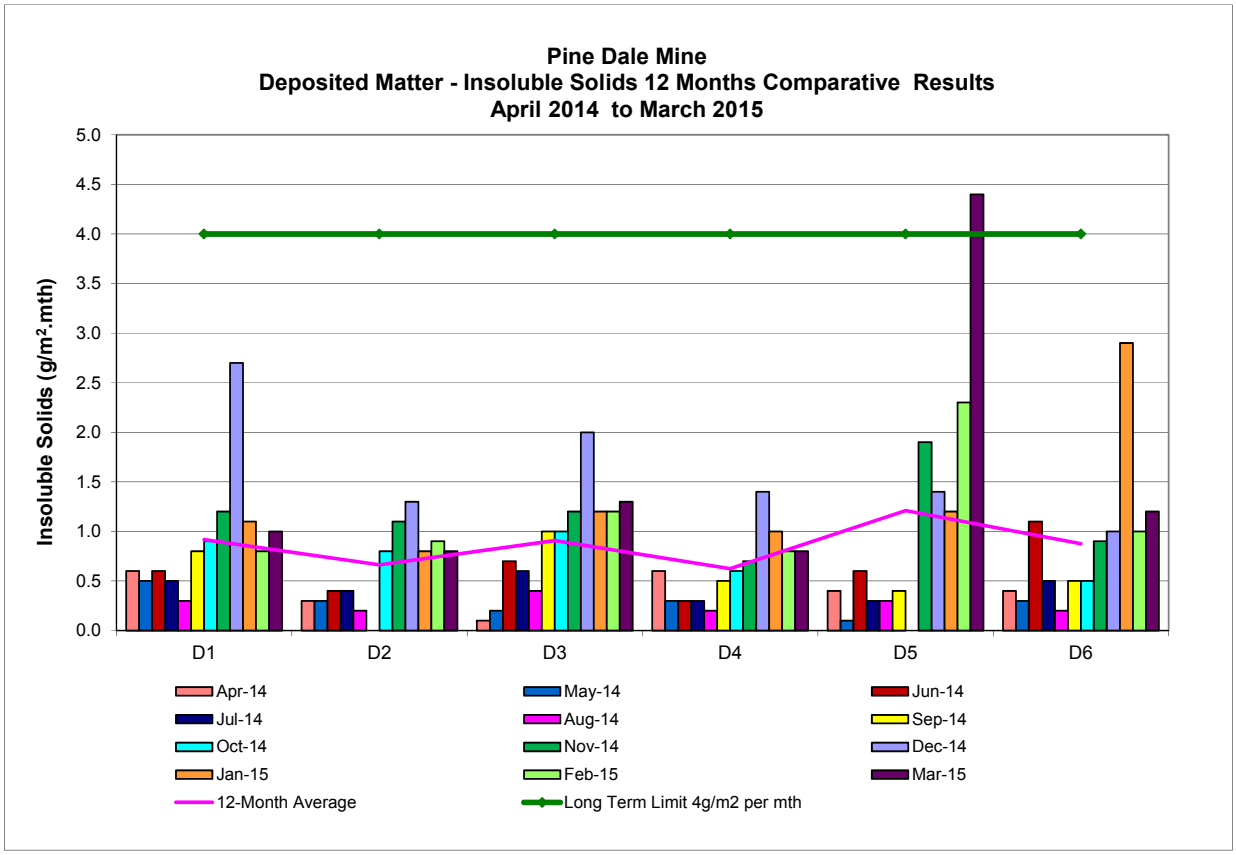


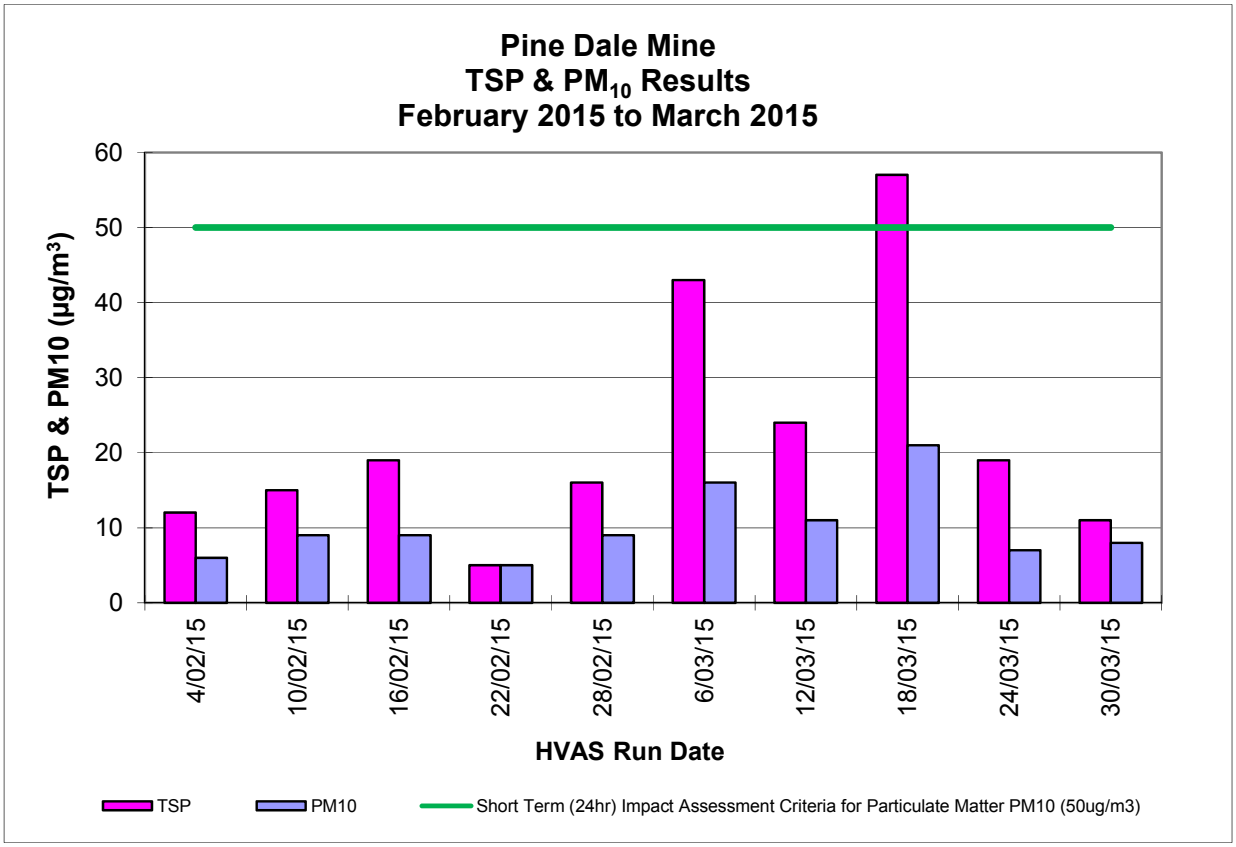
Figure AQ2
AIR QUALITY MONITORING LOCATIONS

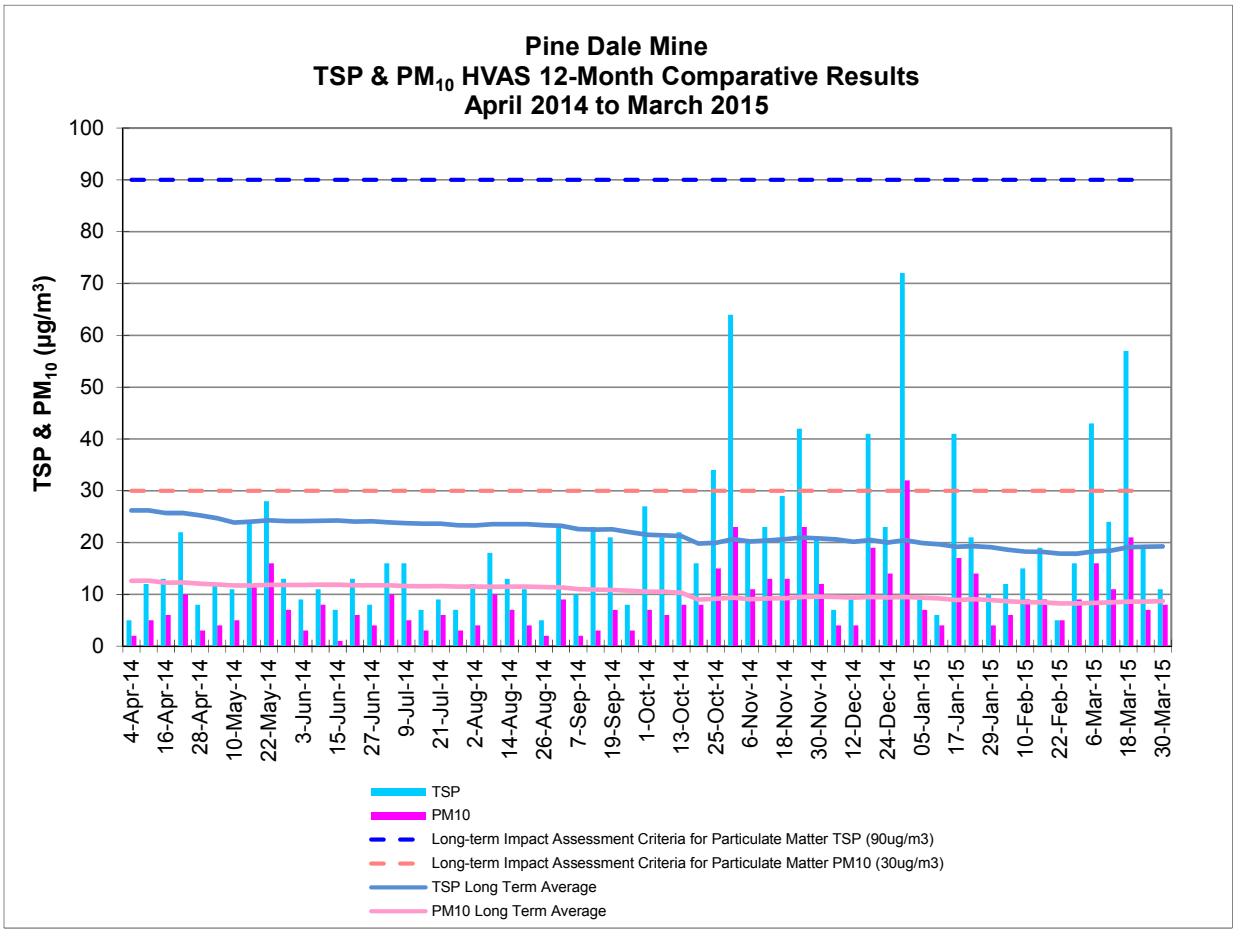
Appendix 2

Depositional Dust and HVAS Graphs


Pine Dale Mine
Depositional Dust Gauge Comparative Results
February 2015 to March 2015
Insoluble Solids Dust (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
D2
D3
D4
D5
D6
Dust Gauge
Feb-15
Mar-15
Long Term Limit 4g/m2.month

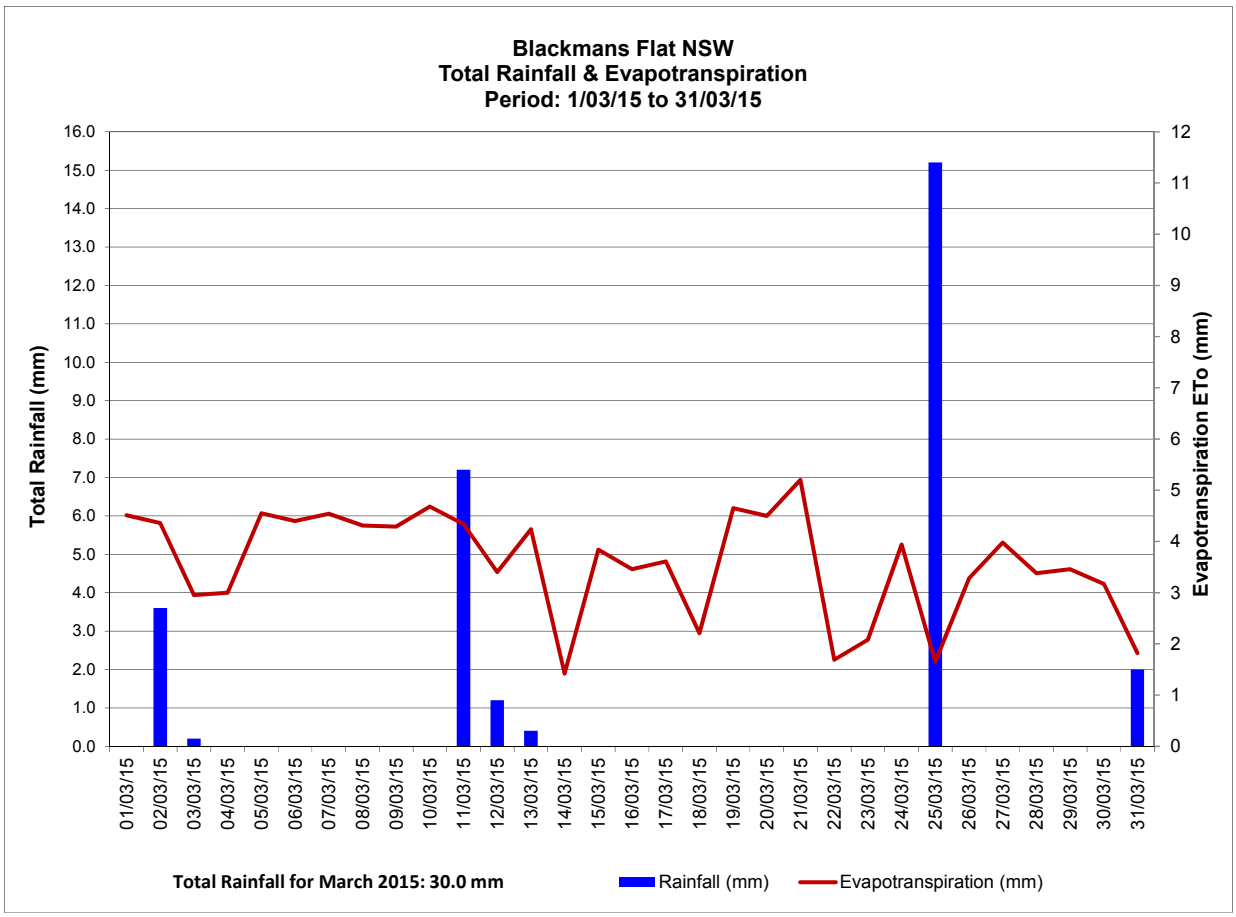

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
April 2014 to March 2015
Insoluble Solids (g/m².mth)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
12-Month Average
Long Term Limit 4g/m2 per mth

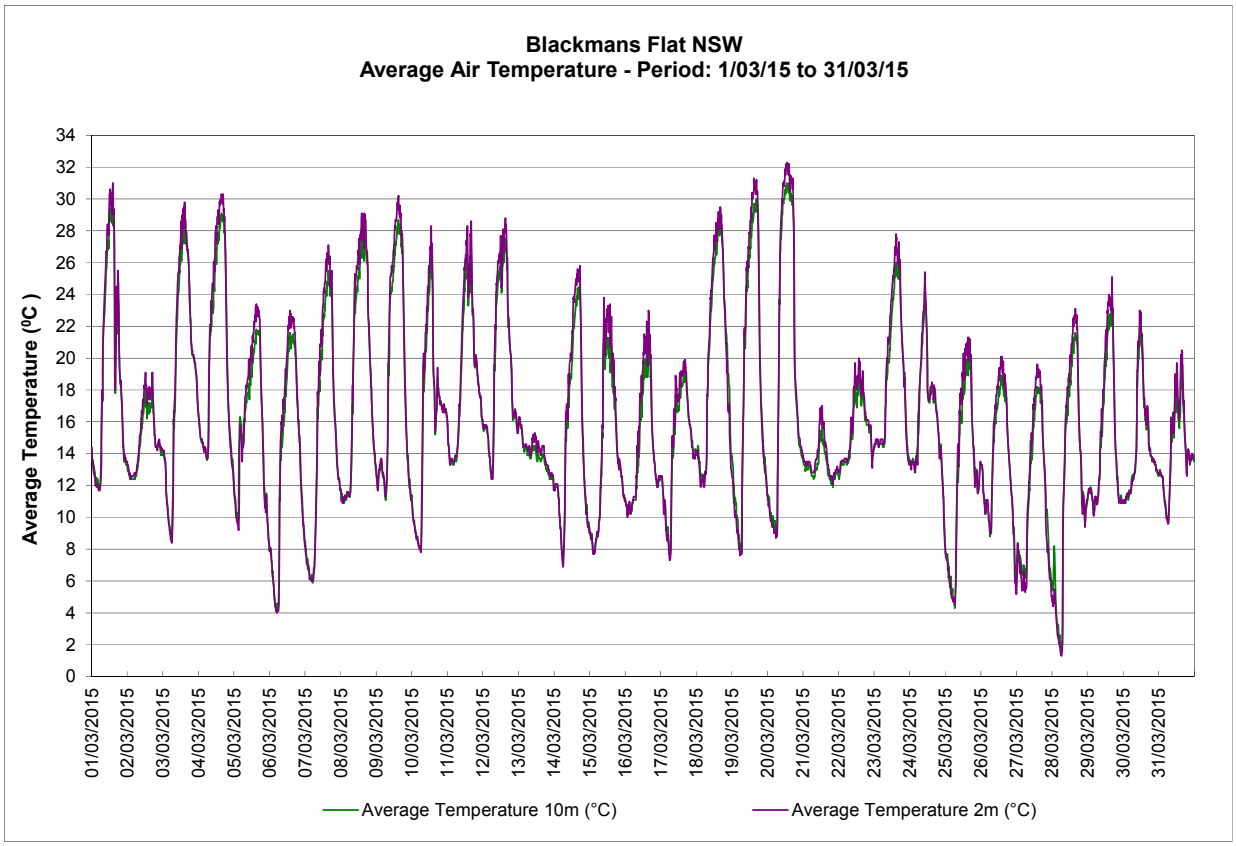

Pine Dale Mine
TSP & PM10 Results
February 2015 to March 2015
TSP & PM10 (µg/m³)
60
50
40
30
20
10
0
4/02/15
10/02/15
16/02/15
22/02/15
28/02/15
6/03/15
12/03/15
18/03/15
24/03/15
30/03/15
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

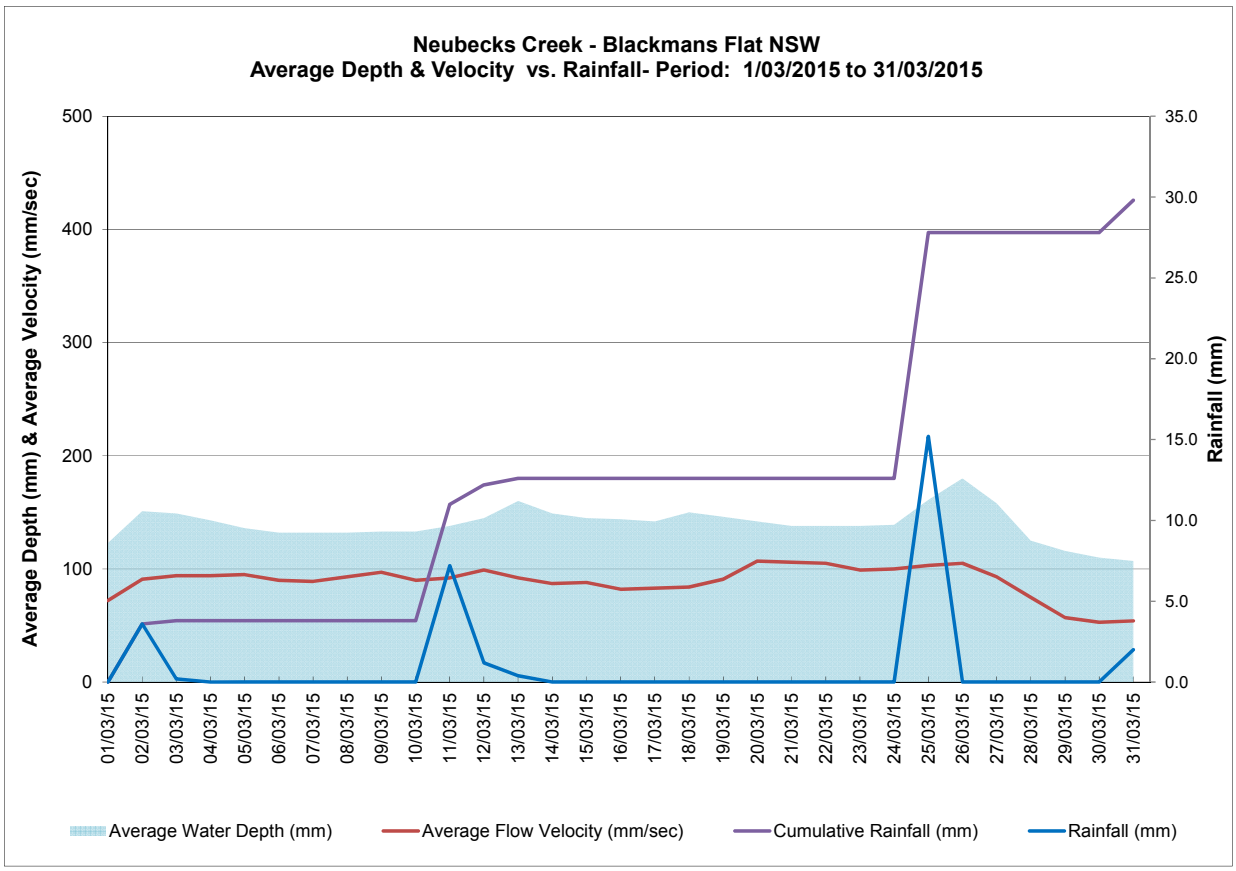

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
April 2014 to March 2015
TSP & PM10 (µg/m³)
100
90
80
70
60
50
40
30
20
10
0
4-Apr-14
16-Apr-14
28-Apr-14
10-May-14
22-May-14
3-Jun-14
15-Jun-14
27-Jun-14
9-Jul-14
21-Jul-14
2-Aug-14
14-Aug-14
26-Aug-14
7-Sep-14
19-Sep-14
1-Oct-14
13-Oct-14
25-Oct-14
6-Nov-14
18-Nov-14
30-Nov-14
12-Dec-14
24-Dec-14
05-Jan-15
17-Jan-15
29-Jan-15
10-Feb-15
22-Feb-15
6-Mar-15
18-Mar-15
30-Mar-15
TSP
PM10
Long-term Impact Assessment Criteria for Particulate Matter TSP (90ug/m3)
Long-term Impact Assessment Criteria for Particulate Matter PM10 (30ug/m3)
TSP Long Term Average
PM10 Long Term Average

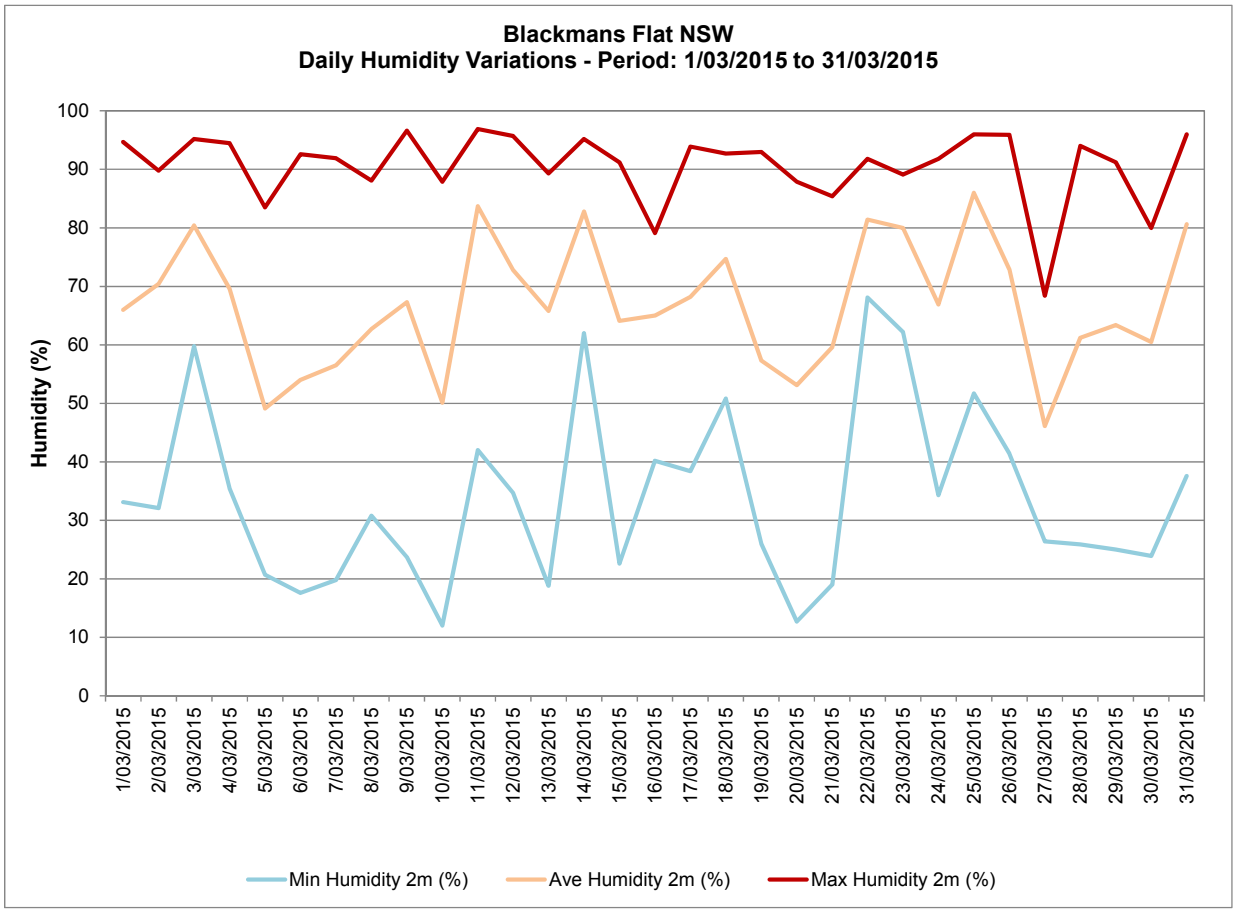
Appendix 3

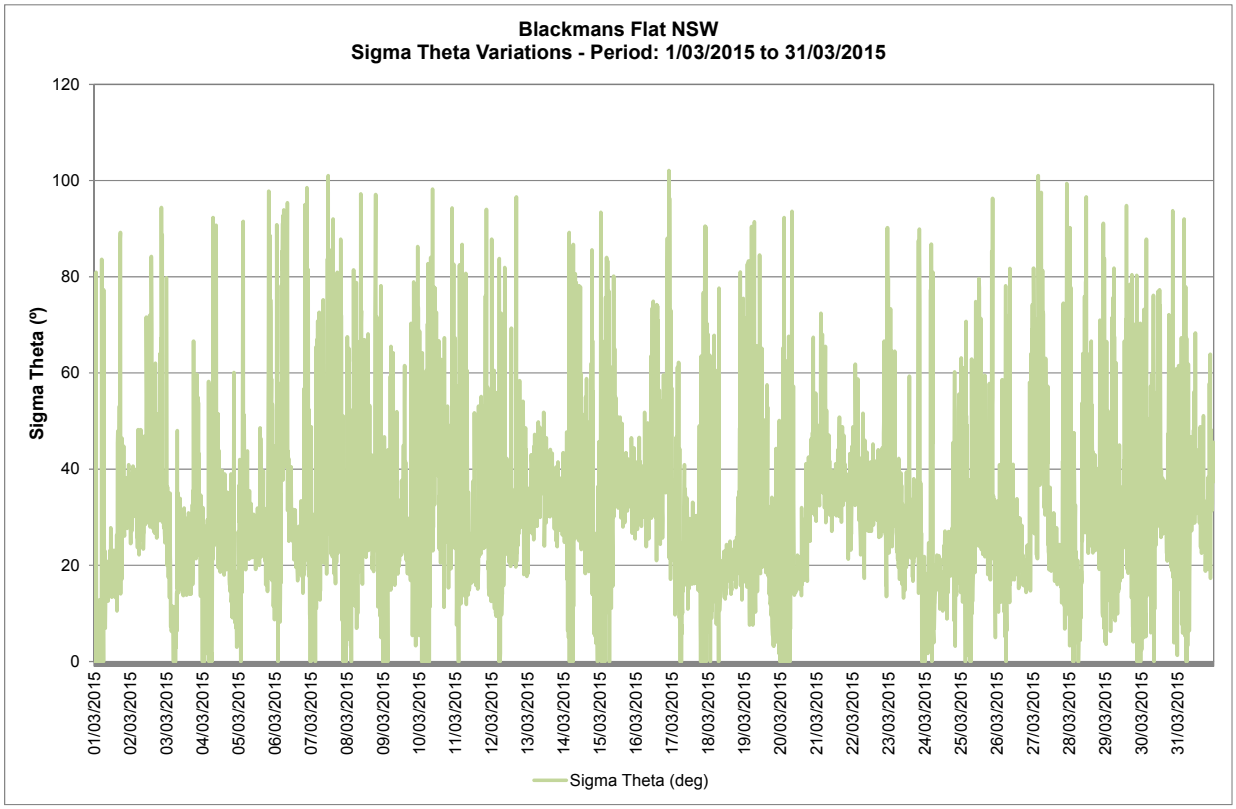
Meteorological Data

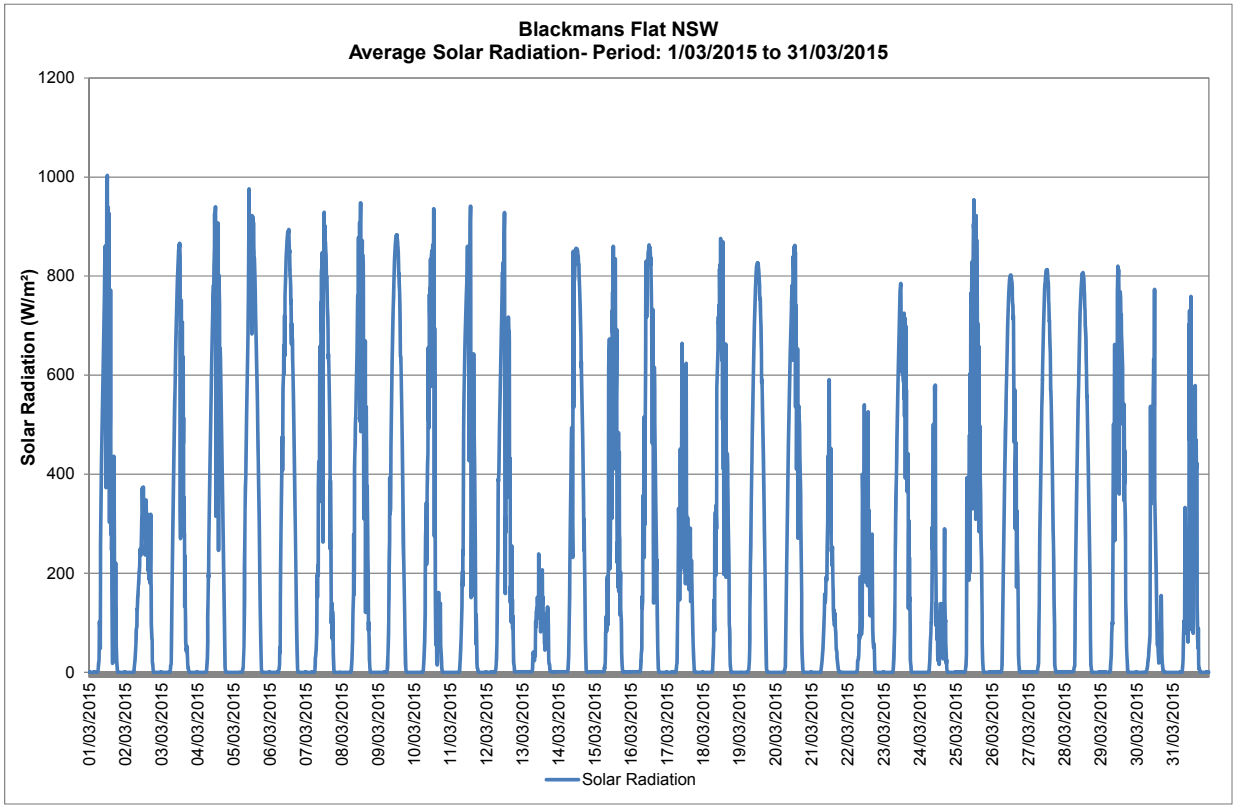

Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/03/15 to 31/03/15
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for March 2015: 30.0 mm
Rainfall (mm)
Evapotranspiration (mm)


Blackmans Flat NSW
Average Air Temperature - Period: 1/03/15 to 31/03/15
Average Temperature (ºC)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/03/2015 to 31/03/2015
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
500
400
300
200
100
0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
01/03/15
02/03/15
03/03/15
04/03/15
05/03/15
06/03/15
07/03/15
08/03/15
09/03/15
10/03/15
11/03/15
12/03/15
13/03/15
14/03/15
15/03/15
16/03/15
17/03/15
18/03/15
19/03/15
20/03/15
21/03/15
22/03/15
23/03/15
24/03/15
25/03/15
26/03/15
27/03/15
28/03/15
29/03/15
30/03/15
31/03/15
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/03/2015 to 31/03/2015
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
1/03/2015
2/03/2015
3/03/2015
4/03/2015
5/03/2015
6/03/2015
7/03/2015
8/03/2015
9/03/2015
10/03/2015
11/03/2015
12/03/2015
13/03/2015
14/03/2015
15/03/2015
16/03/2015
17/03/2015
18/03/2015
19/03/2015
20/03/2015
21/03/2015
22/03/2015
23/03/2015
24/03/2015
25/03/2015
26/03/2015
27/03/2015
28/03/2015
29/03/2015
30/03/2015
31/03/2015
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/03/2015 to 31/03/2015
Sigma Theta (°)
120
100
80
60
40
20
0
01/03/2015
02/03/2015
03/03/2015
04/03/2015
05/03/2015
06/03/2015
07/03/2015
08/03/2015
09/03/2015
10/03/2015
11/03/2015
12/03/2015
13/03/2015
14/03/2015
15/03/2015
16/03/2015
17/03/2015
18/03/2015
19/03/2015
20/03/2015
21/03/2015
22/03/2015
23/03/2015
24/03/2015
25/03/2015
26/03/2015
27/03/2015
28/03/2015
29/03/2015
30/03/2015
31/03/2015
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/03/2015 to 31/03/2015
Solar Radiation (W/m²)
1200
1000
800
600
400
200
0
01/03/2015
02/03/2015
03/03/2015
04/03/2015
05/03/2015
06/03/2015
07/03/2015
08/03/2015
09/03/2015
10/03/2015
11/03/2015
12/03/2015
13/03/2015
14/03/2015
15/03/2015
16/03/2015
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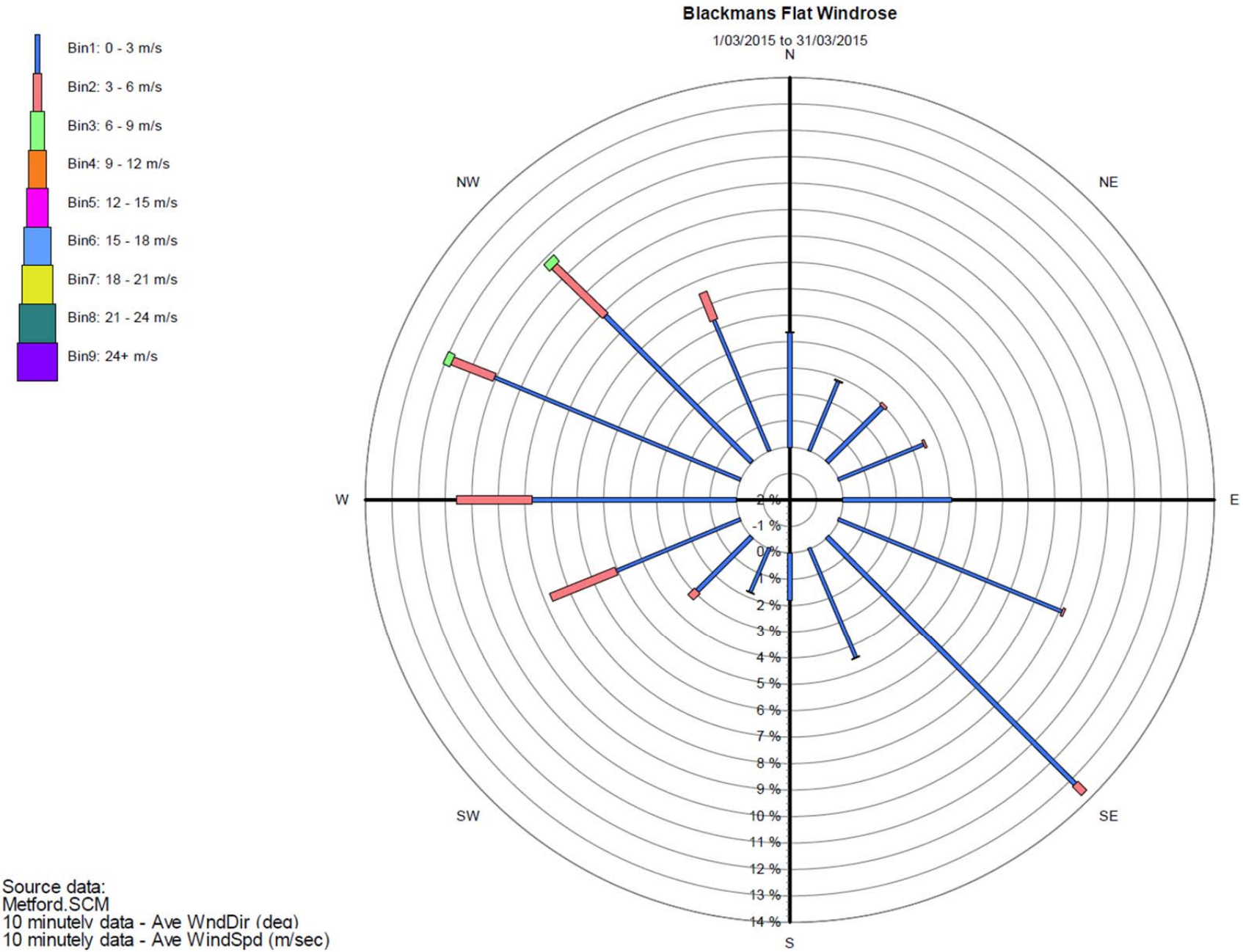
30/03/2015
31/03/2015
Solar Radiation



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