SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-848/0

March 2014

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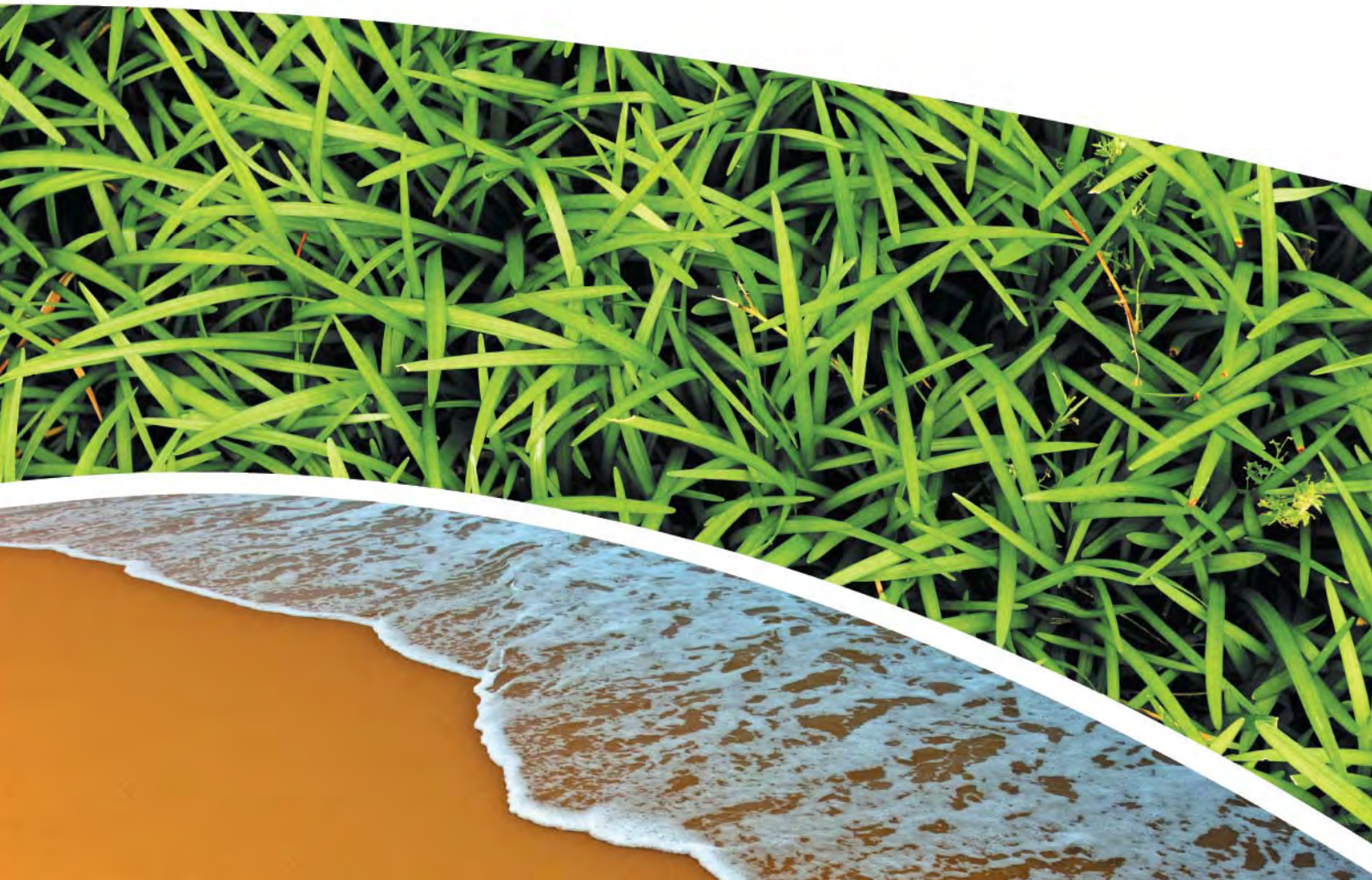

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17 April 2014

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 2014

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1 GENERAL COMMENTS

Job Number: 6880.
Date Samples Received: During the month of March 2014.
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	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
Total Dissolved Solids	ENV-LAB020	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
Dissolved Oxygen	Manufacturer's Instructions	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

*Note that turbidity sampling and analysis is conducted to NATA approved method ENV-LAB037, however as the meter is not owned by RCA Laboratories- Environmental the test cannot be considered NATA accredited.

**Dissolved oxygen measurements are undertaken in the field using the DO Meter owned by PDM.

3 WATER MONITORING RESULTS

3.1 GROUNDWATER

A total of 4 on-site groundwater samples were collected during the month of March 2014. 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	Old Shaft	Old Shaft
Sample Number	-	03146880014	03146880015	03146880001	031416880018
Date Sampled	-	18/03/14	18/03/14	3/03/14	18/03/14
Time Sampled	-	16:02	16:50	13:55	15:27
Depth to Water from Surface	m	26.17	6.66	11.85	11.7
Water Level (AHD)	m	890.78	887.74		
Temperature	°C	16	15.0	16.0	15.0
pH	pH	6.32	6.69	6.37	7.49
Conductivity	µS/cm	1148	850	878	941
Turbidity	NTU	13		15	34
Dissolved Oxygen	mg/L	5			
TSS	mg/L	64			
Oil & Grease	mg/L	<2			
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	50			
Total Alkalinity ($CaCO_3$)	mg/L	50			
Sulfate (as SO_4)	mg/L	428			
Chloride	mg/L	22			
Calcium	mg/L	111			
Magnesium	mg/L	50			
Sodium	mg/L	38			
Potassium	mg/L	19			
Cobalt (dissolved)	mg/L	0.07			
Manganese (dissolved)	mg/L	3.11			
Nickel (dissolved)	mg/L	0.112			
Zinc (dissolved)	mg/L	0.089			
Iron (dissolved)	mg/L	20.7			
Trigger Levels*					
pH trigger level	pH	**	**	**	**
Conductivity trigger level	µS/cm	**	**	**	**
Water level trigger (AHD)[#]	m	--	883.28	--	--

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 May 2014.

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
05-Mar-14	16	03146880034	8885695	10-Mar-14	9:25	Client	24.00
11-Mar-14	14	03146880036	8890655	13-Mar-14	9:25	Client	24.00
17-Mar-14	16	03146880038	8697575	18-Mar-14	11:03	K Hawes	24.18
23-Mar-14	13	03146880040	8697576	25-Mar-14	10:30	Client	24.00
29-Mar-14	8	03146880042	8697578	01-Apr-14	1:10	Client	24.00

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
5-Mar-14	9	03146880035	8885696	10-Mar-14	9:25	Client	24.00
11-Mar-14	7	03146880037	8890656	13-Mar-14	9:25	Client	24.00
17-Mar-14	9	03146880039	8890665	18-Mar-14	11:08	K Hawes	24.12
23-Mar-14	7	03146880041	8697577	25-Mar-14	10:30	Client	24.00
29-Mar-14	4	03146880043	8697579	01-Apr-14	1:10	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 2013 to March 2014) for the TSP unit is 26.3µg/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 12.7µg/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 2014.

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 2014*

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)
03146880024	D1	18/02/2014	18/03/2014	28	I	0.7	0.3	0.4
03146880025	D2	18/02/2014	18/03/2014	28	I	0.4	<0.1	0.4
03146880026	D3	18/02/2014	18/03/2014	28	I	0.5	0.2	0.3
03146880027	D4	18/02/2014	18/03/2014	28	IT	0.6	<0.1	0.6
03146880028	D5	18/02/2014	18/03/2014	28	I	0.4	0.2	0.2
03146880029	D6	18/02/2014	18/03/2014	28	I	0.2	<0.1	0.2

4.2.1 Glossary of Terms Used in Notes

I Insects (eg, Ants, spiders)

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

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 $1.6g/m^2$ 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 the month of March 2014 as mining operations have ceased.

6 NOISE MONITORING RESULTS

Routine quarterly noise monitoring was not required to be undertaken this month.

7 OPERATIONAL ACTIVITIES

Pine Dale Mine ceased operational activities in March 2014.

8 SUMMARY

During the month of March 2014 all environmental monitoring constituents were found to be in compliance with EPL 4911.

Quarterly surface water sampling was not required to be conducted this month, with sampling next scheduled for May 2014.

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 there is no blasting results.

Please contact the undersigned if you have any queries.

Yours sincerely

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

Karen Tripp
Senior Environmental Scientist/Hygienist
RCA Australia Pty Ltd trading as
RCA Laboratories – Environmental

Appendix 1

Surface Water Groundwater and Air Quality Monitoring Locations


TN
MN
\\SERVER\WC\613\Reports\6132\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


\\SERVER\RWC\612\Reports\612(2)\Cad\612BMP_WM6.6.DWG
TN
MN
DDH6
PDH7
DDH7
DDH5
DDH3
PDH1
DDH4
PDH8
P6
Old Ventilation Shaft
The Bong
P2#
P1#
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

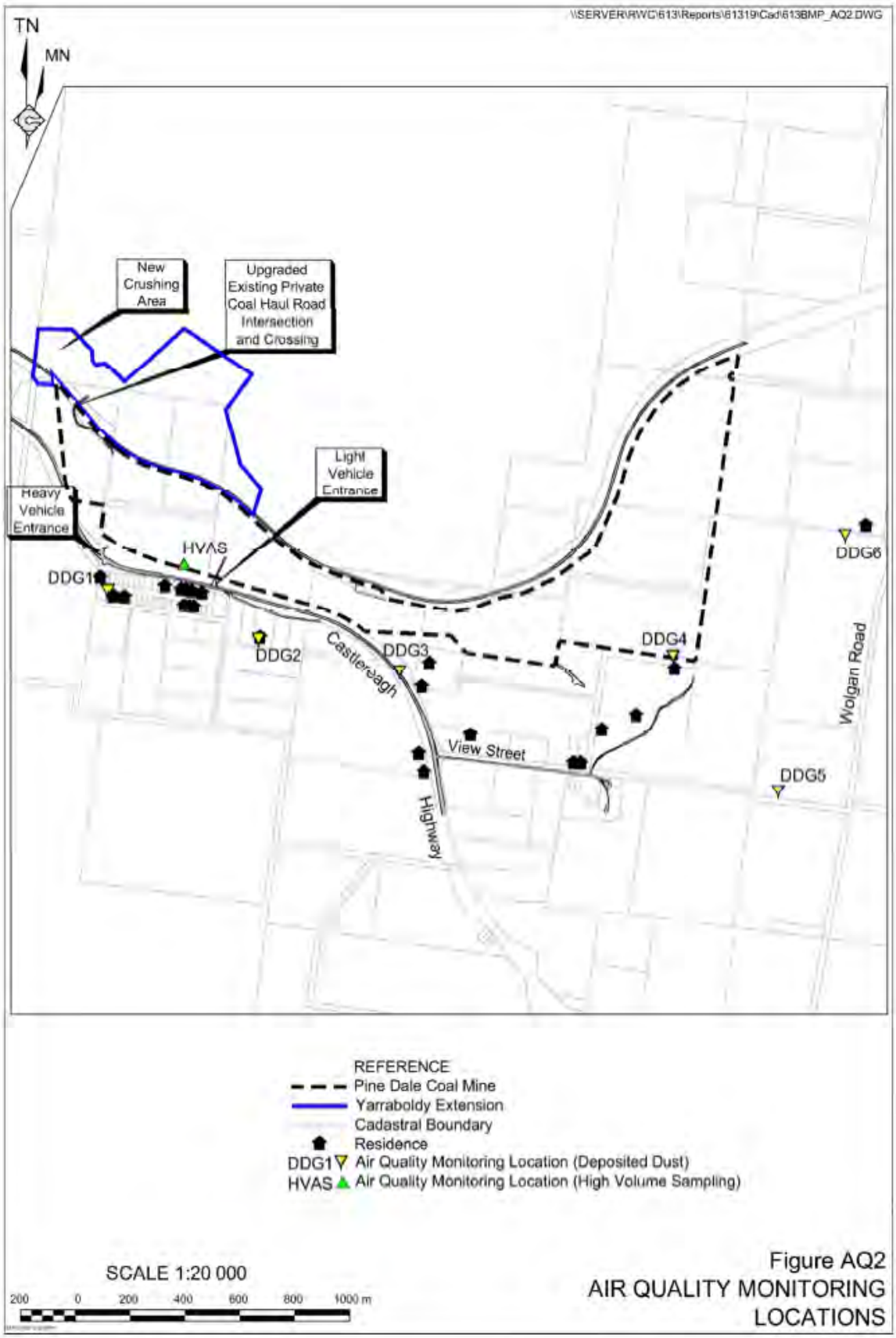
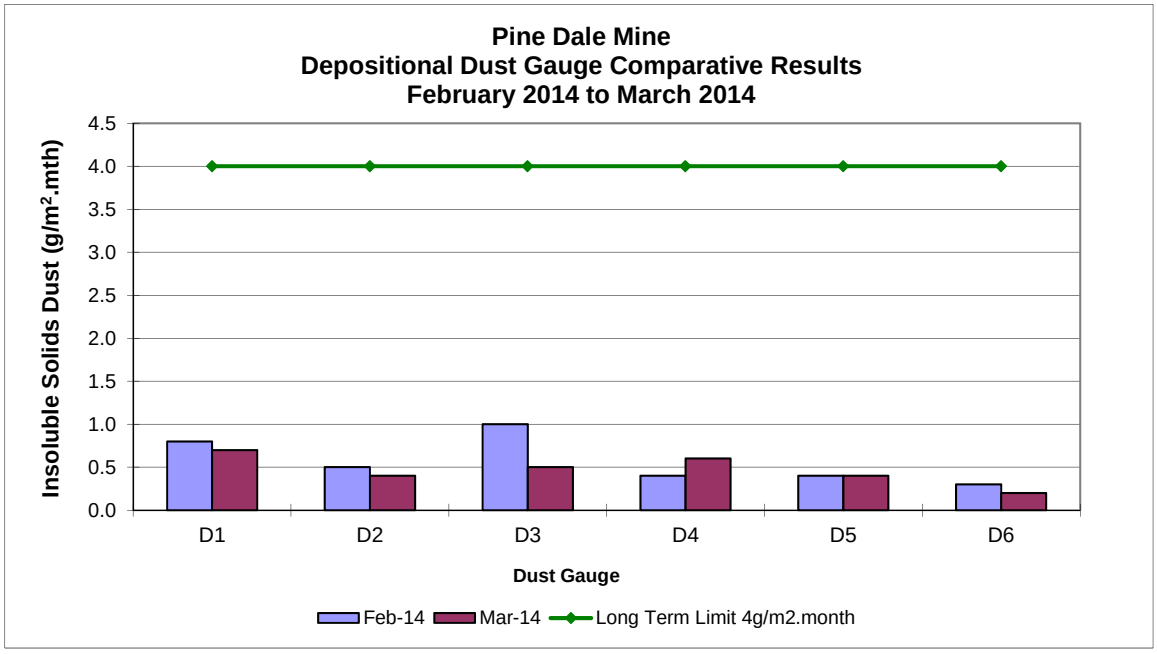
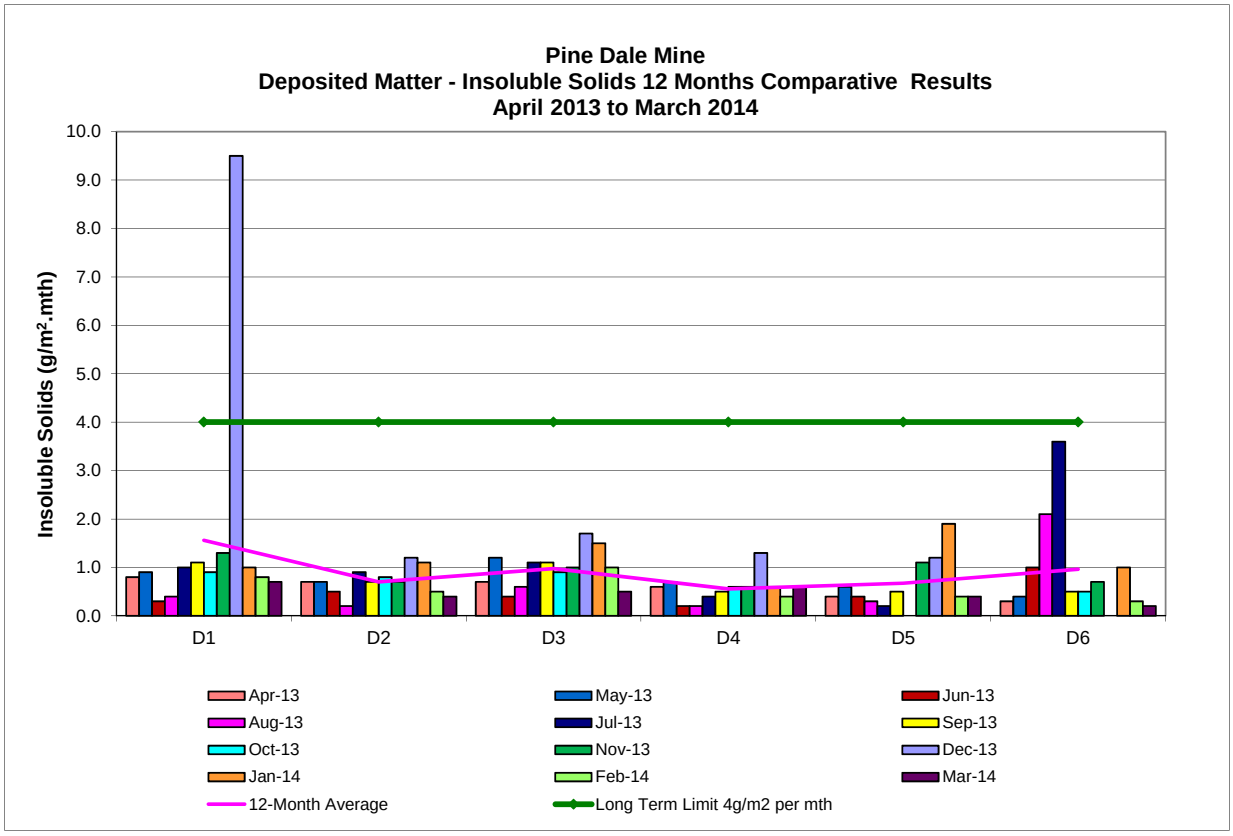


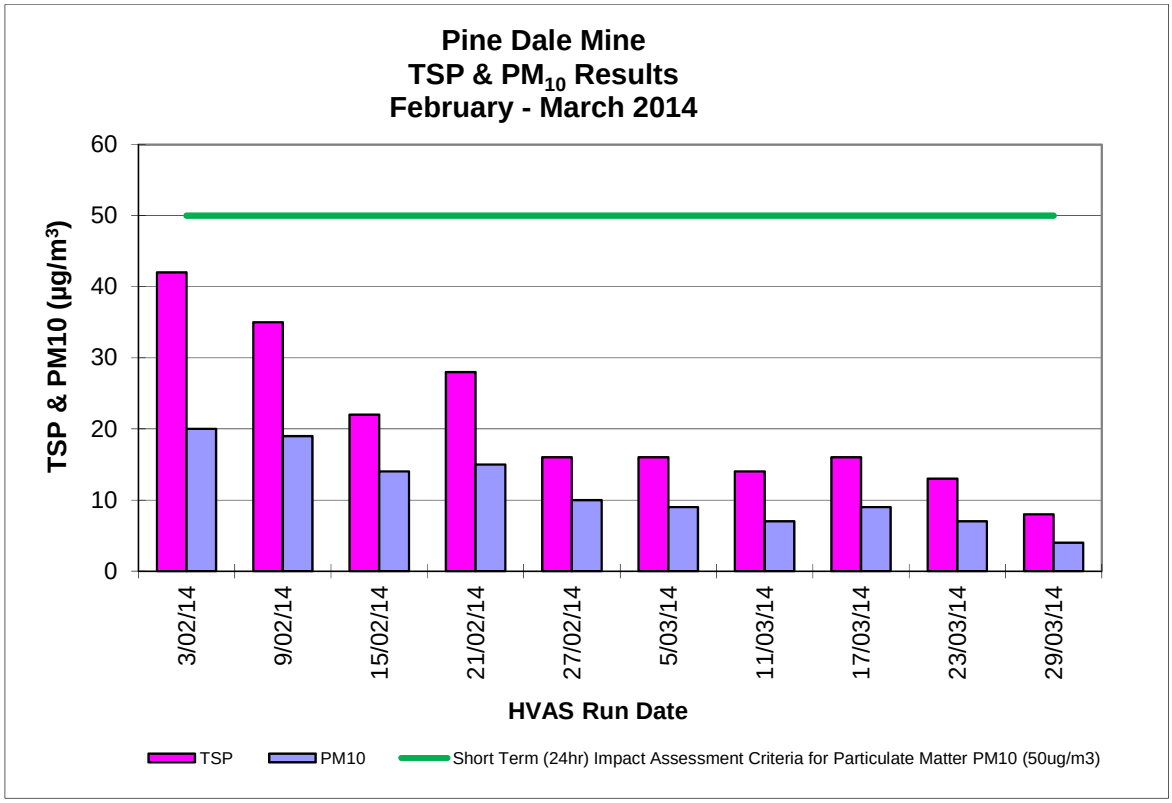
Figure AQ2
AIR QUALITY MONITORING LOCATIONS

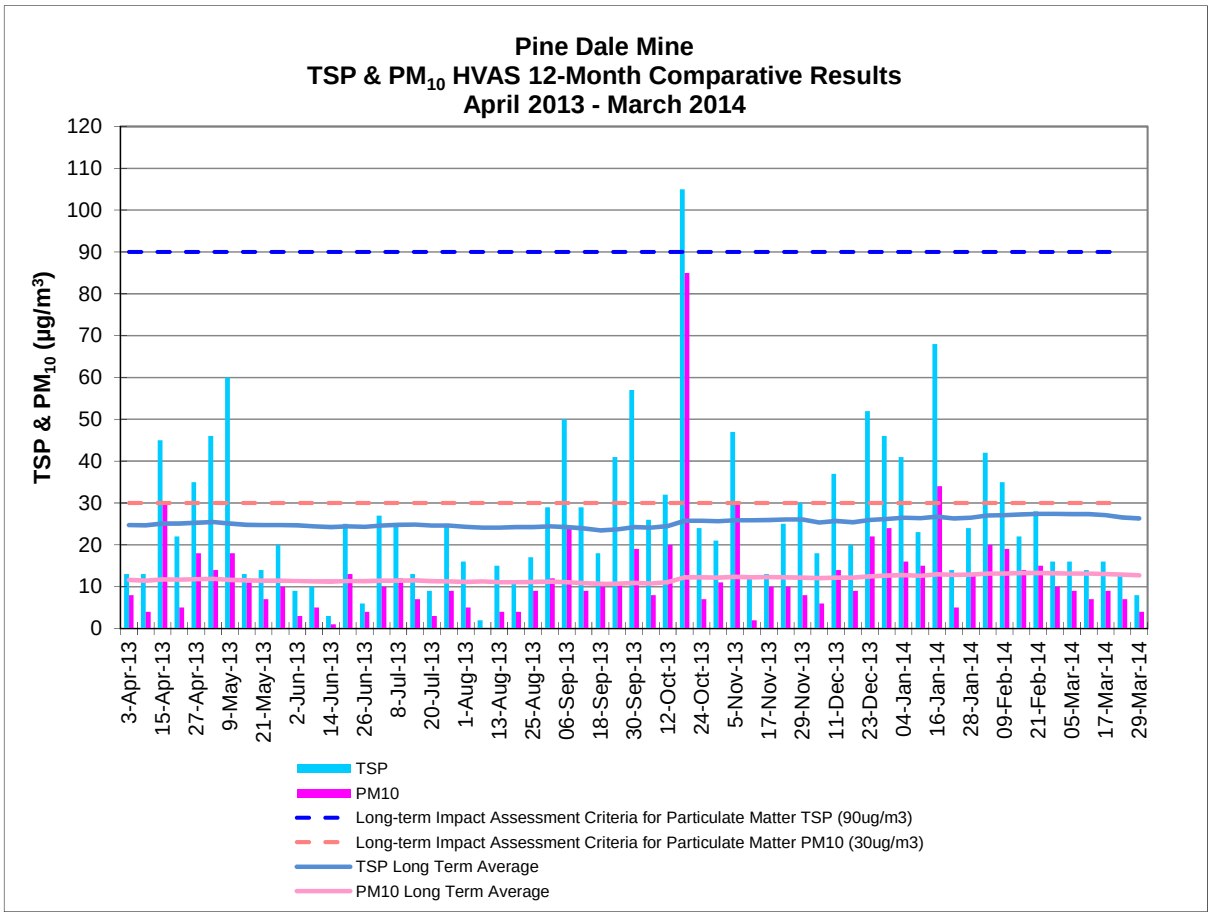
Appendix 2

Depositional Dust, HVAS and Blast Result Graphs


Pine Dale Mine
Depositional Dust Gauge Comparative Results
February 2014 to March 2014
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
Dust Gauge
Feb-14
Mar-14
Long Term Limit 4g/m2.month

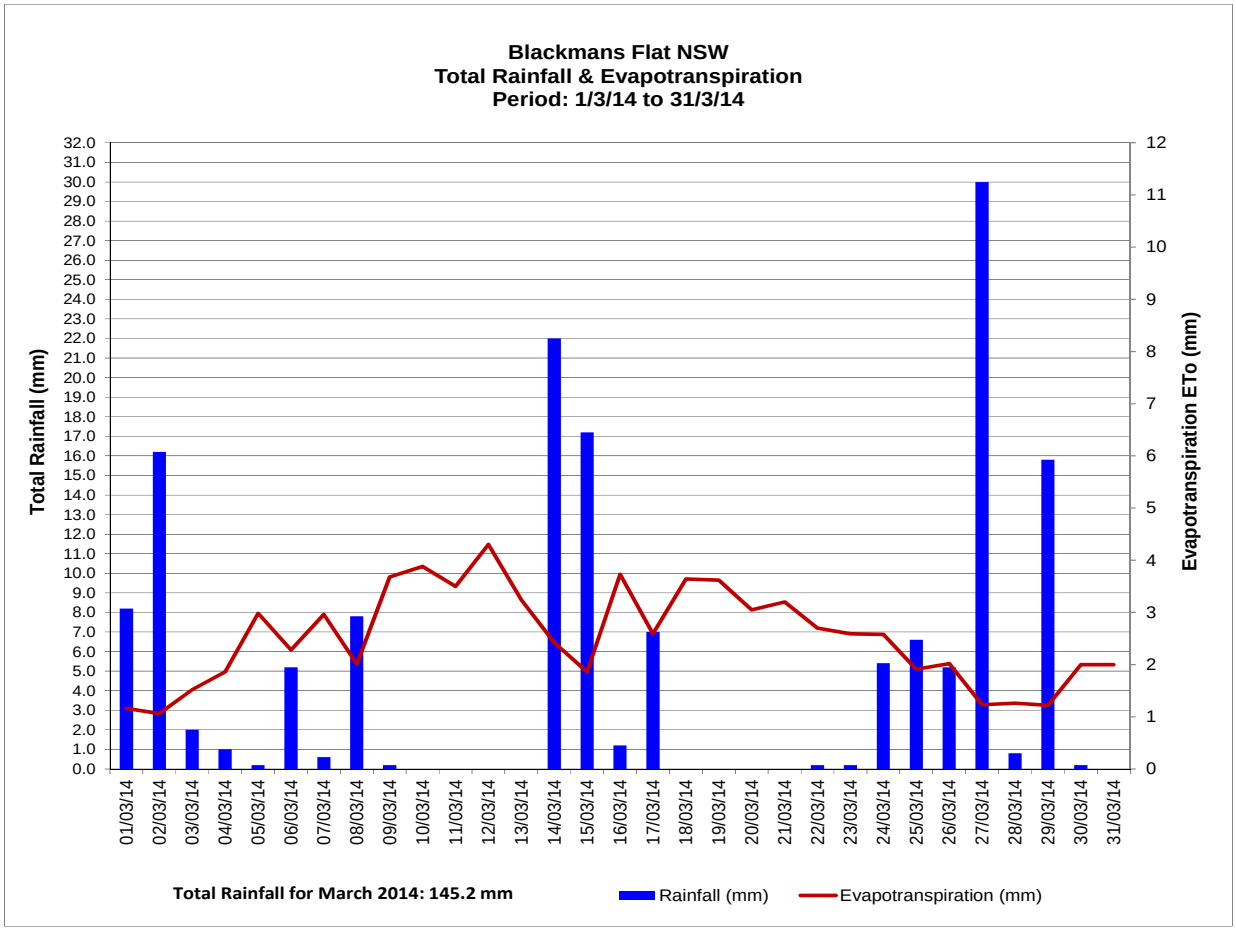

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
April 2013 to March 2014
Insoluble Solids (g/m².mth)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
D1
D2
D3
D4
D5
D6
Apr-13
May-13
Jun-13
Aug-13
Jul-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
12-Month Average
Long Term Limit 4g/m2 per mth

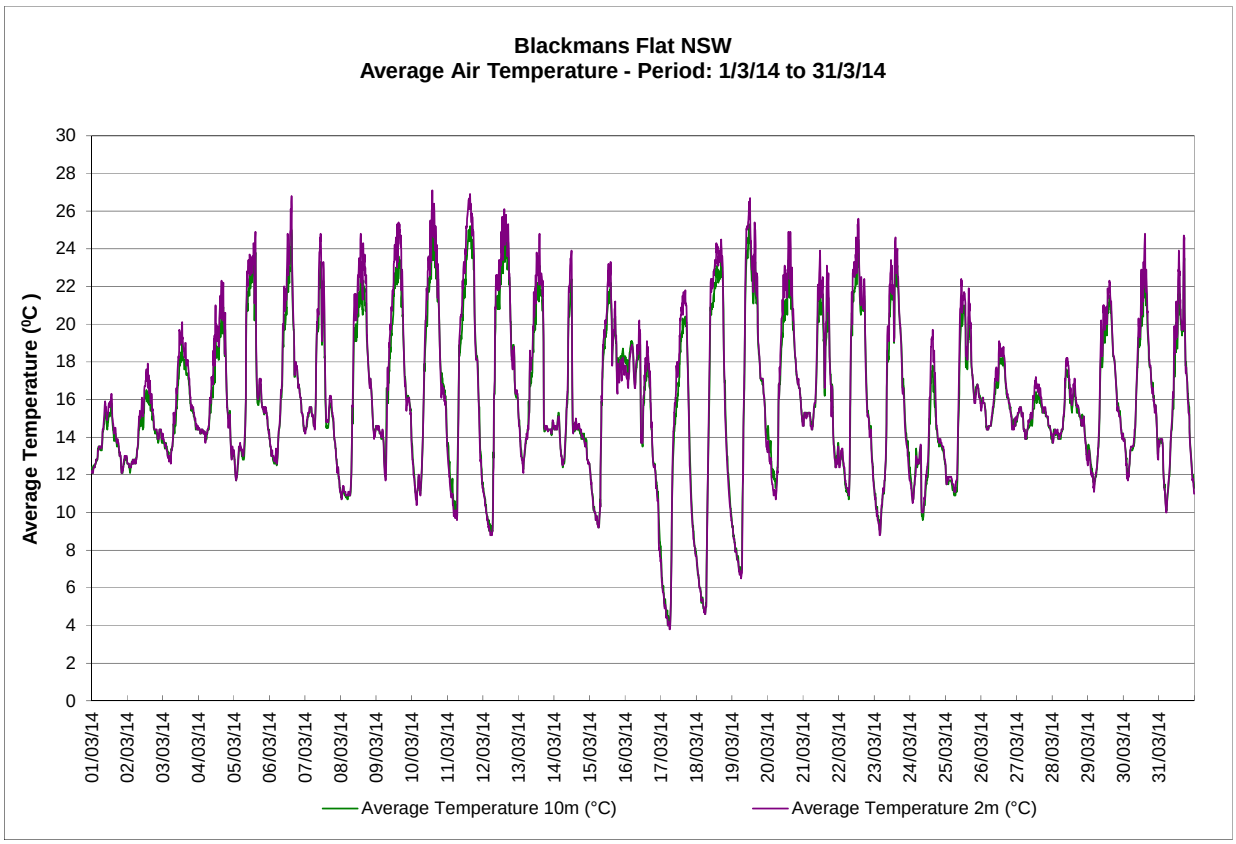

Pine Dale Mine
TSP & PM10 Results
February - March 2014
TSP & PM10 (µg/m³)
60
50
40
30
20
10
0
3/02/14
9/02/14
15/02/14
21/02/14
27/02/14
5/03/14
11/03/14
17/03/14
23/03/14
29/03/14
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

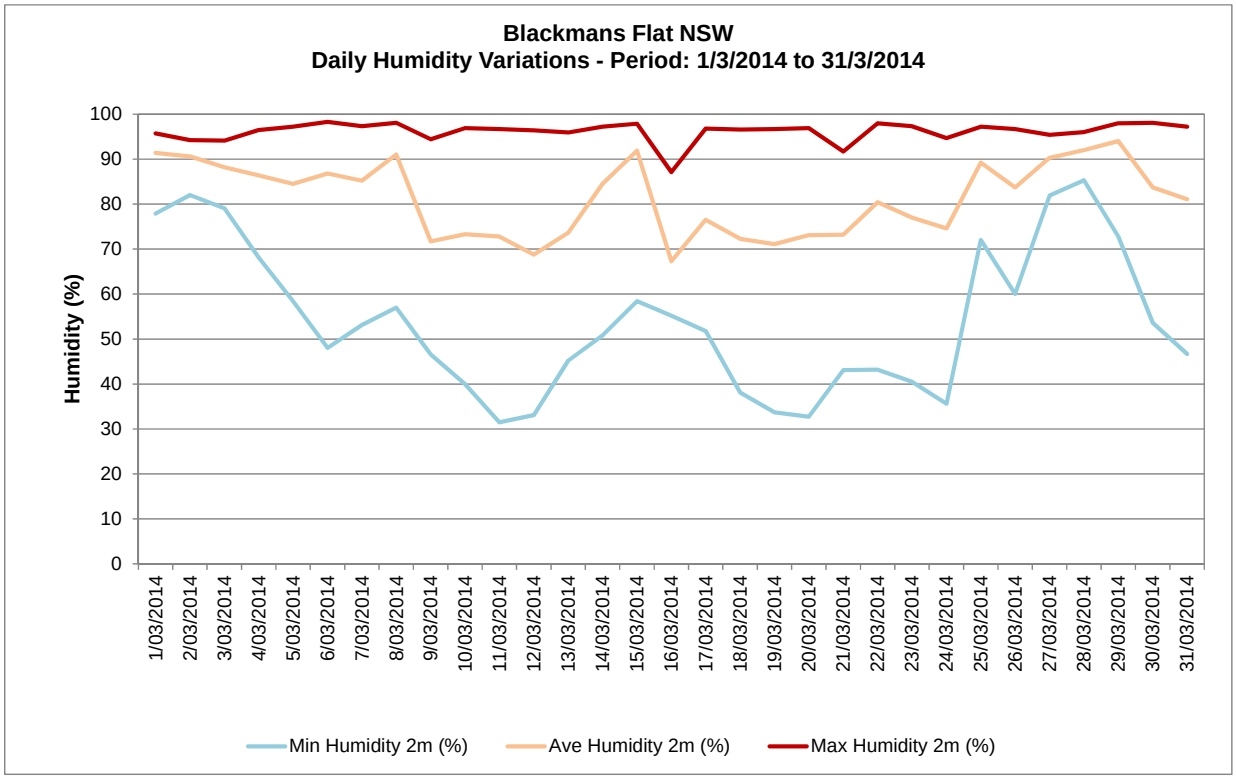

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
April 2013 - March 2014
TSP & PM10 (µg/m³)
120
110
100
90
80
70
60
50
40
30
20
10
0
3-Apr-13
15-Apr-13
27-Apr-13
9-May-13
21-May-13
2-Jun-13
14-Jun-13
26-Jun-13
8-Jul-13
20-Jul-13
1-Aug-13
13-Aug-13
25-Aug-13
06-Sep-13
18-Sep-13
30-Sep-13
12-Oct-13
24-Oct-13
5-Nov-13
17-Nov-13
29-Nov-13
11-Dec-13
23-Dec-13
04-Jan-14
16-Jan-14
28-Jan-14
09-Feb-14
21-Feb-14
05-Mar-14
17-Mar-14
29-Mar-14
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

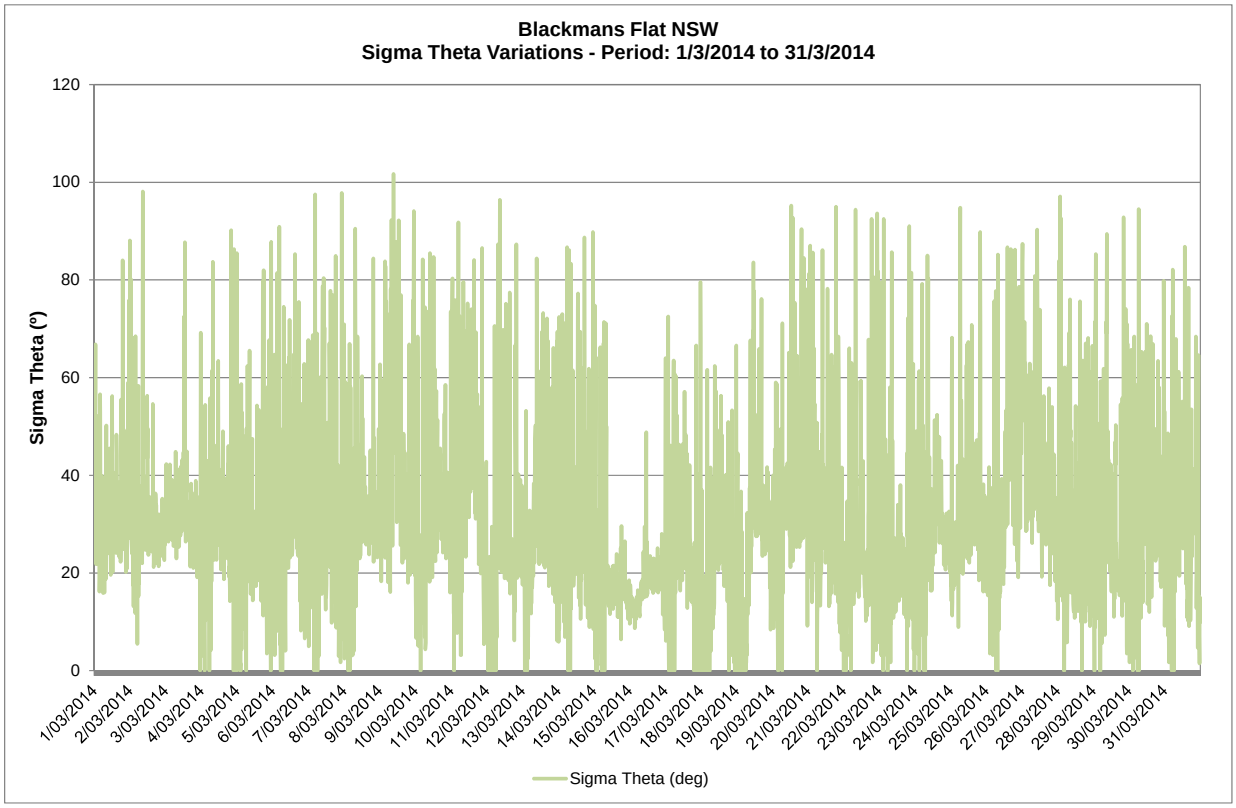
Appendix 3

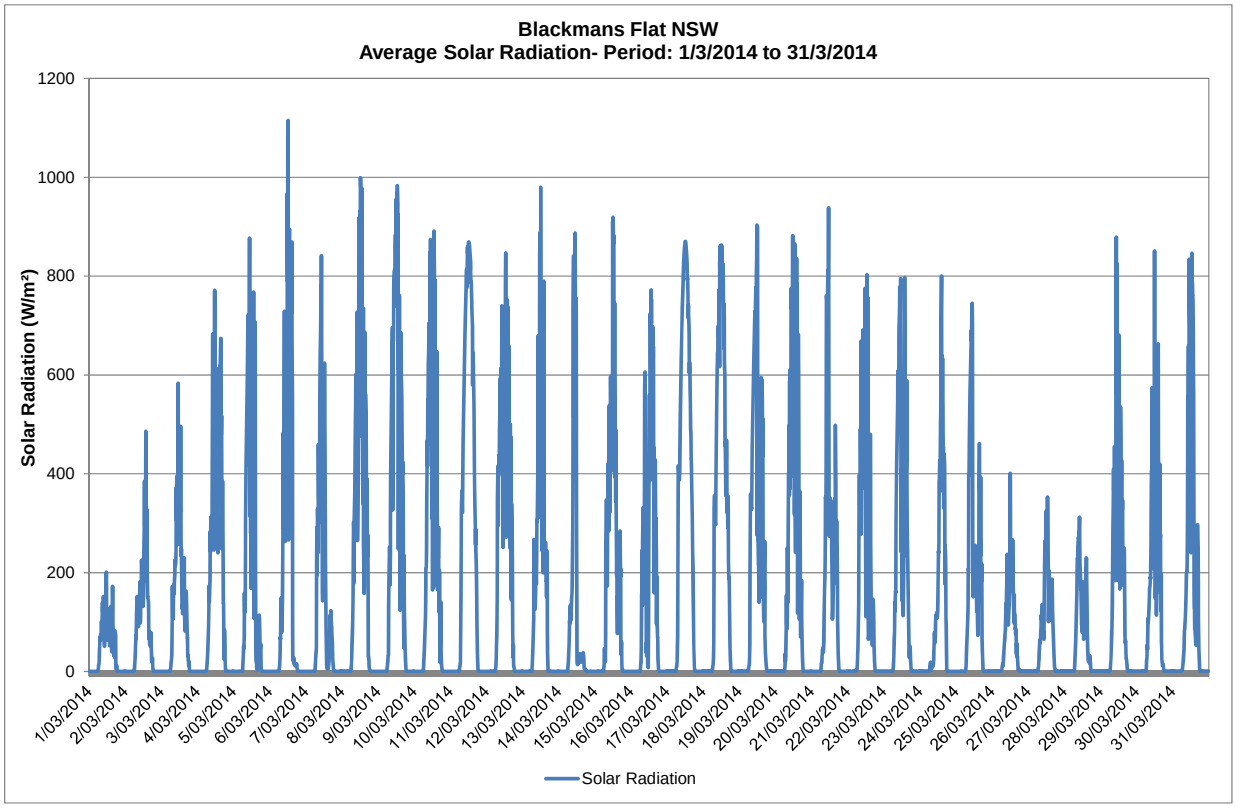
Meteorological Data


Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/3/14 to 31/3/14
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for March 2014: 145.2 mm
Rainfall (mm)
Evapotranspiration (mm)


Blackmans Flat NSW
Average Air Temperature - Period: 1/3/14 to 31/3/14
Average Temperature (ºC)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/3/2014 to 31/3/2014
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
1/03/2014
2/03/2014
3/03/2014
4/03/2014
5/03/2014
6/03/2014
7/03/2014
8/03/2014
9/03/2014
10/03/2014
11/03/2014
12/03/2014
13/03/2014
14/03/2014
15/03/2014
16/03/2014
17/03/2014
18/03/2014
19/03/2014
20/03/2014
21/03/2014
22/03/2014
23/03/2014
24/03/2014
25/03/2014
26/03/2014
27/03/2014
28/03/2014
29/03/2014
30/03/2014
31/03/2014
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/3/2014 to 31/3/2014
Sigma Theta (°)
120
100
80
60
40
20
0
1/03/2014
2/03/2014
3/03/2014
4/03/2014
5/03/2014
6/03/2014
7/03/2014
8/03/2014
9/03/2014
10/03/2014
11/03/2014
12/03/2014
13/03/2014
14/03/2014
15/03/2014
16/03/2014
17/03/2014
18/03/2014
19/03/2014
20/03/2014
21/03/2014
22/03/2014
23/03/2014
24/03/2014
25/03/2014
26/03/2014
27/03/2014
28/03/2014
29/03/2014
30/03/2014
31/03/2014
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/3/2014 to 31/3/2014
Solar Radiation (W/m²)
1200
1000
800
600
400
200
0
1/03/2014
2/03/2014
3/03/2014
4/03/2014
5/03/2014
6/03/2014
7/03/2014
8/03/2014
9/03/2014
10/03/2014
11/03/2014
12/03/2014
13/03/2014
14/03/2014
15/03/2014
16/03/2014
17/03/2014
18/03/2014
19/03/2014
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22/03/2014
23/03/2014
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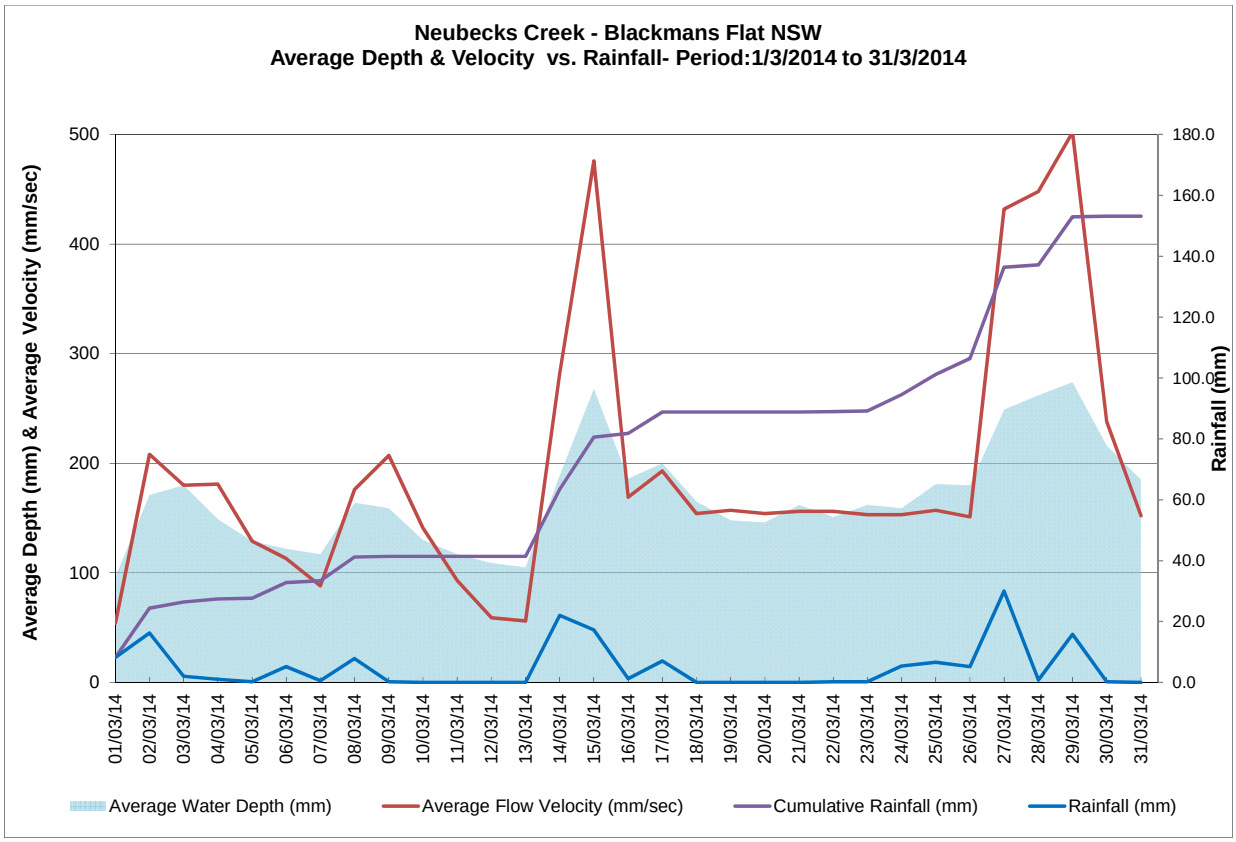
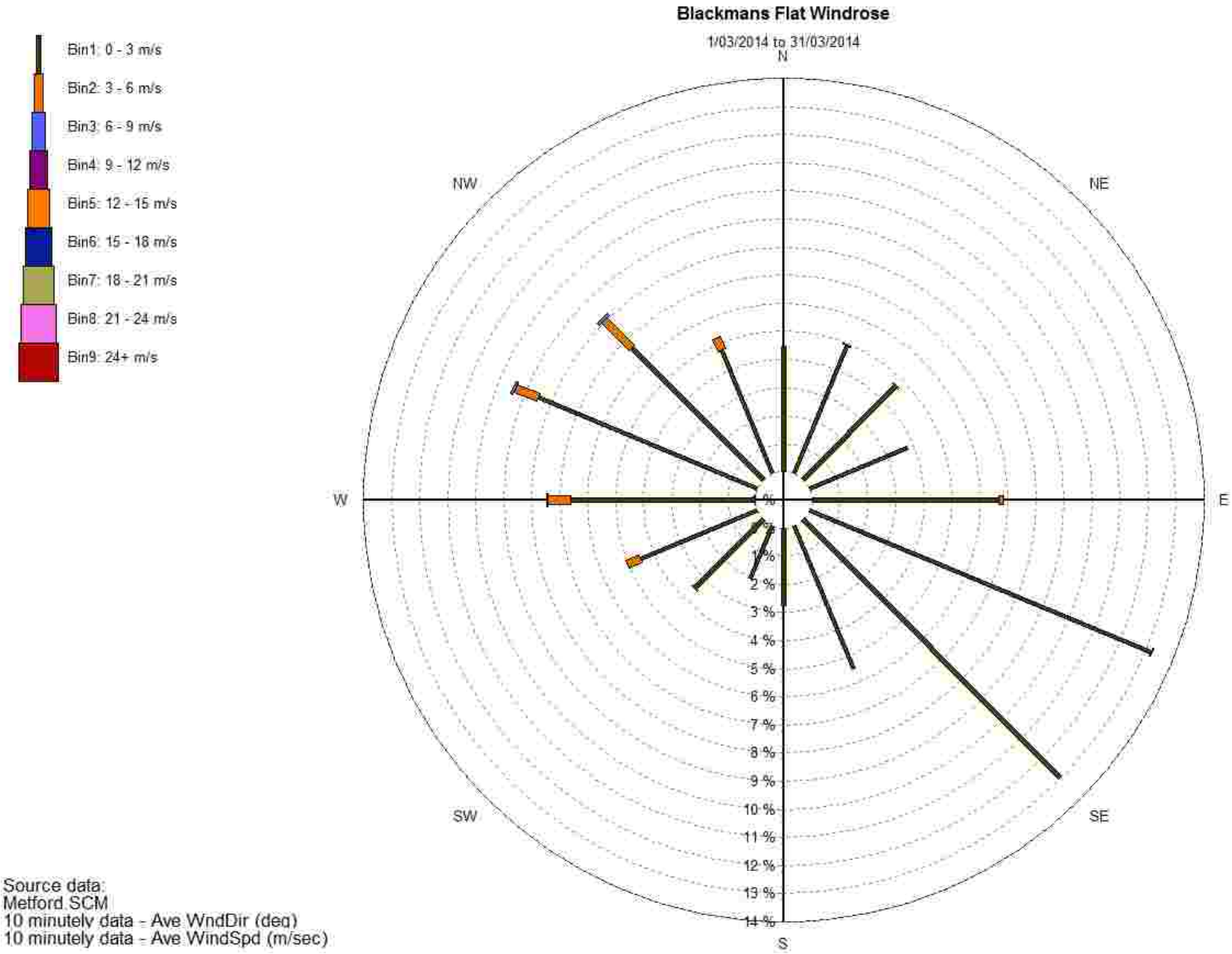
31/03/2014
Solar Radiation


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period:1/3/2014 to 31/3/2014
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
500
400
300
200
100
0
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
01/03/14
02/03/14
03/03/14
04/03/14
05/03/14
06/03/14
07/03/14
08/03/14
09/03/14
10/03/14
11/03/14
12/03/14
13/03/14
14/03/14
15/03/14
16/03/14
17/03/14
18/03/14
19/03/14
20/03/14
21/03/14
22/03/14
23/03/14
24/03/14
25/03/14
26/03/14
27/03/14
28/03/14
29/03/14
30/03/14
31/03/14
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)



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