SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

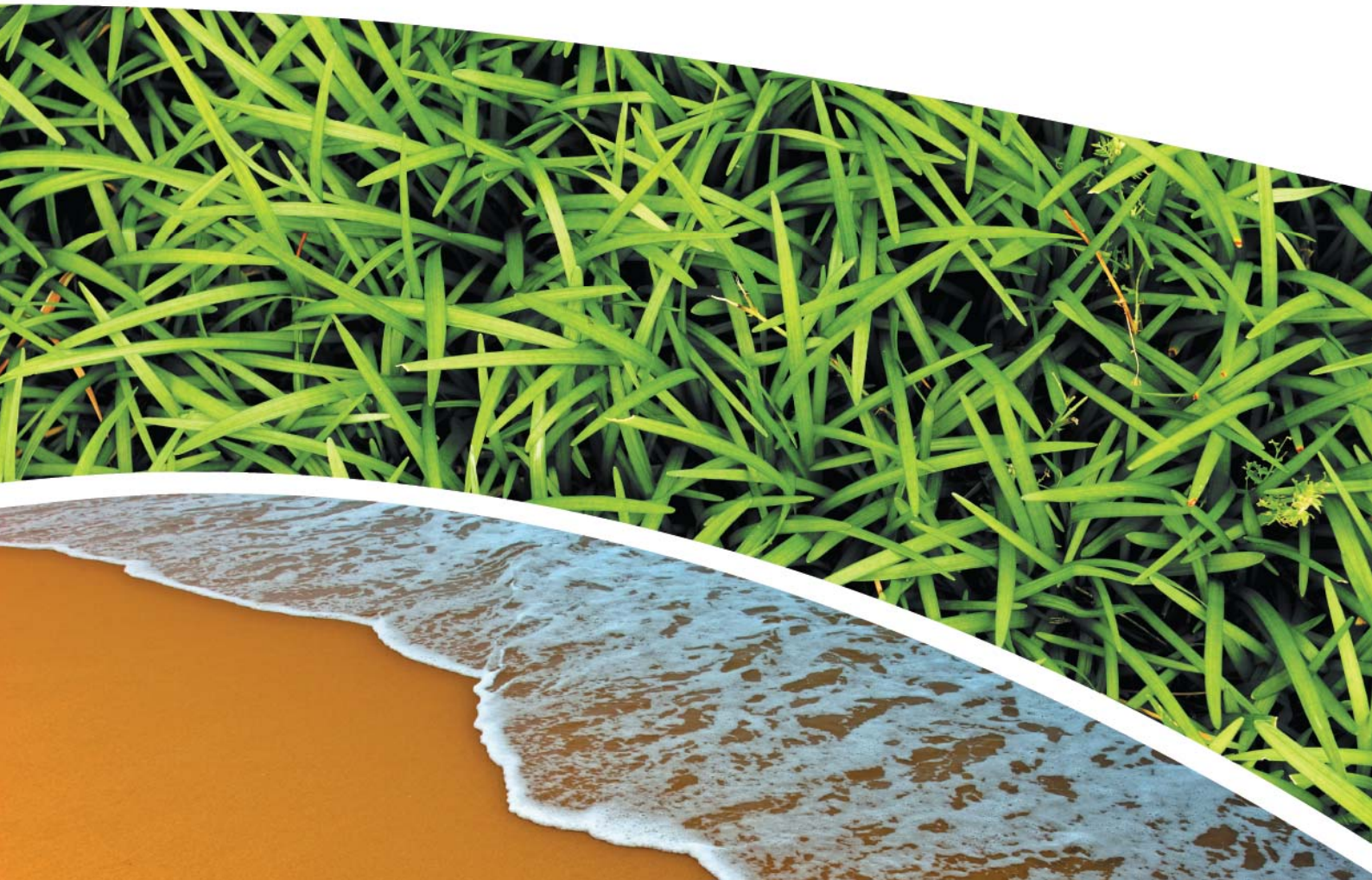
Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-837/0

November 2013

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL



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16 December 2013

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

NOVEMBER 2013

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1 GENERAL COMMENTS

Job Number: 6880.
Date Samples Received: During the month of November 2013.
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	Non-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

*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.

3 WATER MONITORING RESULTS

3.1 GROUNDWATER

A total of 2 on-site groundwater samples were collected during the month of November 2013. 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	-	11136880016	11136880017
Date Sampled	-	20/11/2013	20/11/13
Time Sampled	-	15:53	16:48
Depth to Water from Surface*	m	26.09	6.55
Water Level (AHD)	m	890.86	887.85
Temperature	°C	16	14
pH	pH	6.74	7.59
Conductivity	µS/cm	1161	822
Turbidity	NTU	21	
Dissolved Oxygen	mg/L	5.4	
TSS	mg/L	50	
Oil & Grease	mg/L	<2	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	52	211
Total Alkalinity ($CaCO_3$)	mg/L	52	211
Sulfate (as SO_4)	mg/L	493	76
Chloride	mg/L	30	95
Calcium	mg/L	117	45
Magnesium	mg/L	53	47
Sodium	mg/L	43	49
Potassium	mg/L	22	9
Cobalt (dissolved)	mg/L	0.082	
Manganese (dissolved)	mg/L	2.98	
Nickel (dissolved)	mg/L	0.125	
Zinc (dissolved)	mg/L	0.270	
Iron (dissolved)	mg/L	19.7	4.18

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 water monitoring was undertaken during the month of November 2013 at three surface water sites, EPA points 2, 3 and 14. Water quality analysis results are shown in **Table 3**. No samples were obtained from Points 4, 5 and 13 as there was no discharge occurring at these locations.

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	-	11136880014	11136880009	11136880015
Date Sampled	-	20/11/13	20/11/13	20/11/13
Time Sampled	-	11:50	17:14	12:07
Temperature	°C	16.5	22.0	20.5
pH	pH	7.01	7.25	7.34
Conductivity	µS/cm	1826	1854	1114
Sulfate	mg/L	782	832	81
Dissolved Iron	mg/L	0.13	0.21	0.07
Total Suspended Solids	mg/L	4	10	6
Turbidity	NTU	1	<2	<2

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-Nov-13	47	11136880036	8885644	06-Nov-13	10:05	Client	24.04
11-Nov-13	12	11136880038	8885646	13-Nov-13	10:20	Client	24.00
17-Nov-13	13	11136880040	8885648	20-Nov-13	10:30	K Hawes	24.00
23-Nov-13	25	11136880042	8885650	26-Nov-13	10:05	Client	24.00
29-Nov-13	30	11136880044	8885652	02-Dec-13	10:50	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
05-Nov-13	30	11136880037	8885645	06-Nov-13	10:05	Client	24.00
11-Nov-13	2	11136880039	8885647	13-Nov-13	10:20	Client	24.00
17-Nov-13	10	11136880041	8885649	20-Nov-13	10:32	K Hawes	24.00
23-Nov-13	10	11136880043	8885651	26-Nov-13	10:05	Client	24.00
29-Nov-13	8	11136880045	8885653	02-Dec-13	10:50	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 December 2012 to November 2013) for the TSP unit is 26.1µg/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 12.2µg/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 November 2013.

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**. The depositional dust exposure period for November (20 and 21 days) is outside of the typical exposure period of 30 ±2 days nominated in AS/NZS 3580.10.1:2003 due to the occurrence of bushfires within the area which impacted the health and safety risk of undertaking dust monitoring. However, as results are based on a 30-day month, the additional exposure has been factored into the equation during calculation allowing the results for November to be considered accurate and reliable.

Table 5 *Depositional Dust Monitoring - Deposited Matter November 2013*

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)
11136880026	D1	30/10/2013	20/11/2013	21*	I	1.3	0.6	0.7
11136880027	D2	30/10/2013	20/11/2013	21*	I	0.7	0.3	0.4
11136880028	D3	30/10/2013	20/11/2013	21*	I	1.0	0.6	0.4
11136880029	D4	30/10/2013	20/11/2013	21*	I	0.6	0.2	0.4
11136880030	D5	31/10/2013	20/11/2013	20*	I	1.1	0.6	0.5
11136880031	D6	31/10/2013	20/11/2013	20*	I	0.7	0.4	0.3

*Please note that insoluble solids, ash residue and combustible matter are calculated based on a 30 day month as per Australian Standard 3580.10.1. Exposure days are taken into consideration as a variable when conducting this calculation and producing results in g/m².month.

4.2.1 Glossary of Terms Used in Notes

I Insects (e.g. 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 1.1g/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

Blasting results for the month of November are shown in **Table 6**.

Table 6 *Blasting Results- Airblast Overpressure (dB) and Ground Vibration (mm/sec)*

Date	***Park***		***Noon St.***		***Summer St.***	
	Overpressure (dB)	Vibration (mm/sec)	Overpressure (dB)	Vibration (mm/sec)	Overpressure (dB)	Vibration (mm/sec)
29/11/13	NT	NT	106.9	0.22	108.2	0.08
2012- 2013 Year to Date Information						
Minimum	96.9	0.38	78.3	0.08	87.2	0.08
Average	96.9	0.38	104.3	0.85	106.2	1.04
Maximum	96.9	0.38	113.5	2.21	113.3	2.17
% > EPL 95% Compliance Criteria	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% > EPL 100% Compliance Criteria	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Notes: NT - No Trigger. Blast monitoring unit was not triggered during the blast.

5.1.1 Allowable Blasting Limits

Conditions of EPL 4911 state that in relation to airblast overpressure levels a result of greater than 115dB must not be observed at any noise sensitive location for more than 5% of the total number of blasts over each annual reporting period. All blasts within the annual reporting period (100% of blasts) are not to exceed the compliance criteria of 120dB. Ground vibration peak velocity levels must not exceed 5mm/sec for 95% of blasts, whilst an intensity of 10mm/sec must not be exceeded by any blast during the reporting period. The reporting period runs as a rolling 12-month average from December 2012 to November 2013.

During November 2013, there was no exceedance of the EPL conditions for both overpressure and vibration levels. In terms of the rolling annual average, no blasts have exceeded the 100% compliance conditions of 120dB and 10mm/sec for overpressure and vibration respectively. The overpressure and vibration criteria of 115dB and 5mm/sec, respectively, have not been exceeded for more than 5% of the blasts during the reporting period.

Graphical presentation of the blasting results from overpressure and vibration are shown in **Appendix 2**.

6 NOISE MONITORING RESULTS

Routine quarterly noise monitoring was not required to be undertaken this month. Quarterly noise monitoring is next scheduled to be undertaken during the January 2014 period.

7 OPERATIONAL ACTIVITIES

Pine Dale Mine production rates in November 2013 were good, with no major issues recorded. There were 21 production days available with no weekend work undertaken during the month. Only one blast was shot throughout the month.

Relatively low rainfall was observed throughout the month, 15.0mm in total, of which the majority fell on the 23rd and 31st October. The overburden target was on budget this month, however the run of mine (ROM) coal from the mine to the raw coal crusher pad; and delivered coal tonnes to the MPPS were down due to timing issues and low crusher availability. Waste production was slightly below target this month, with approximately 116,000 tonnes of overburden excavated. Delivery of coal to Mt Piper was below budget with a total of 21,389 tonnes of coal delivered to Mt Piper Power Station.

8 SUMMARY

During the month of November 2013 all environmental monitoring constituents were found to be in compliance with EPL 4911.

Quarterly surface water sampling was undertaken this month, with all required sites sampled.

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.

During November the blasting limits documented in the Pine Dale Mine EPL were not exceeded. During the previous twelve-month reporting period, there have been zero non-conformance's based upon the 95% or 100% limits for either overpressure or vibration levels.

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Please contact the undersigned if you have any queries.

Yours sincerely

Katy Shaw
Environmental Scientist
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\RWC\613\Reports\61328\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

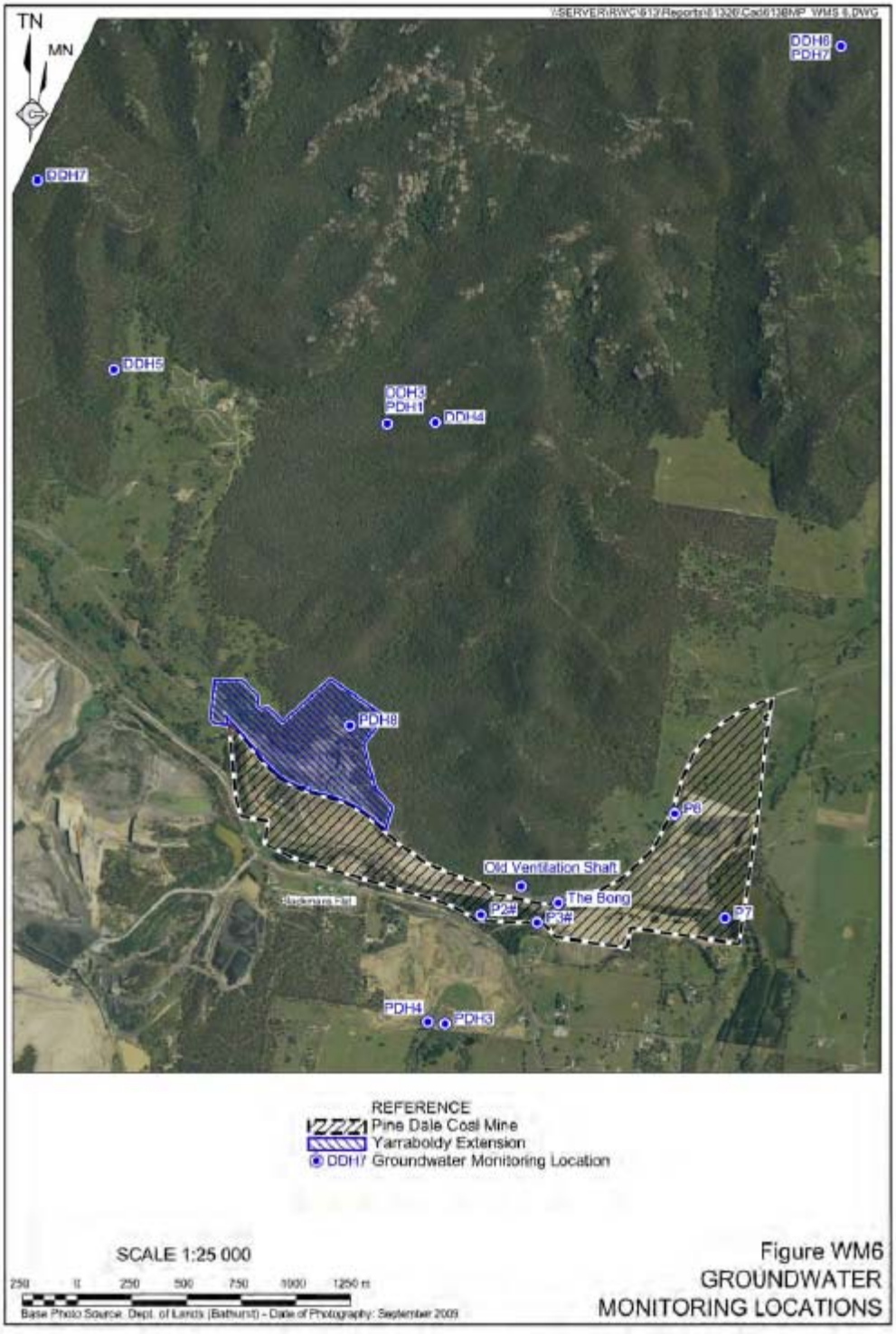


Figure WM6
GROUNDWATER
MONITORING LOCATIONS

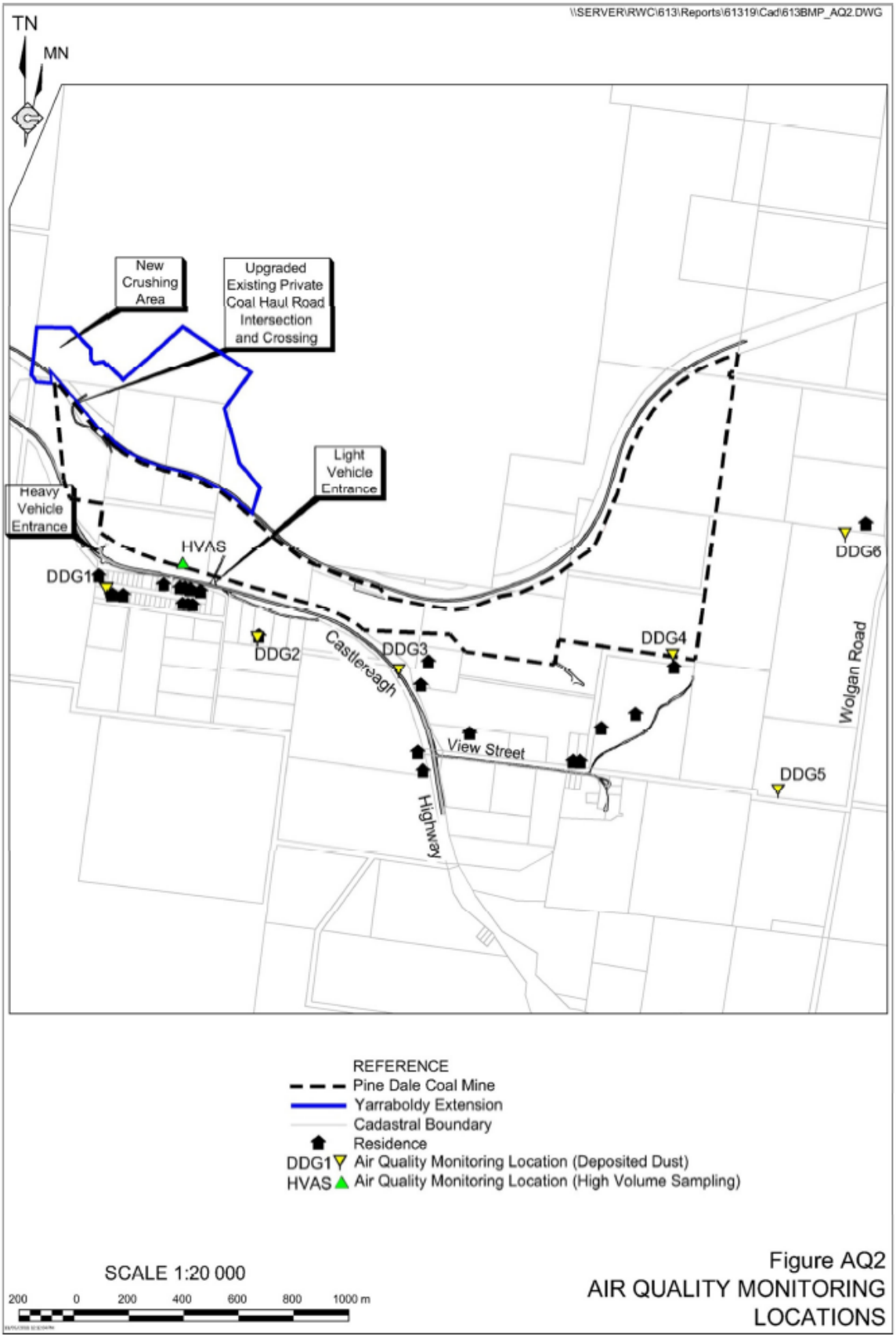
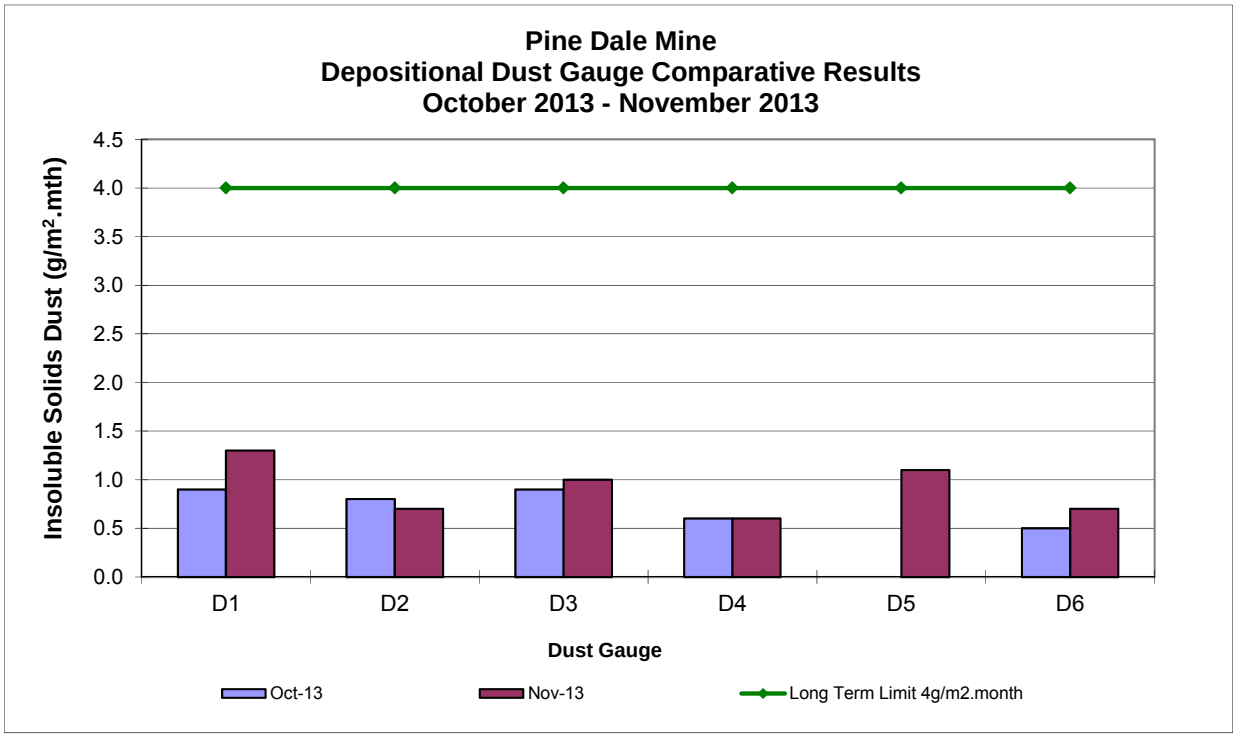
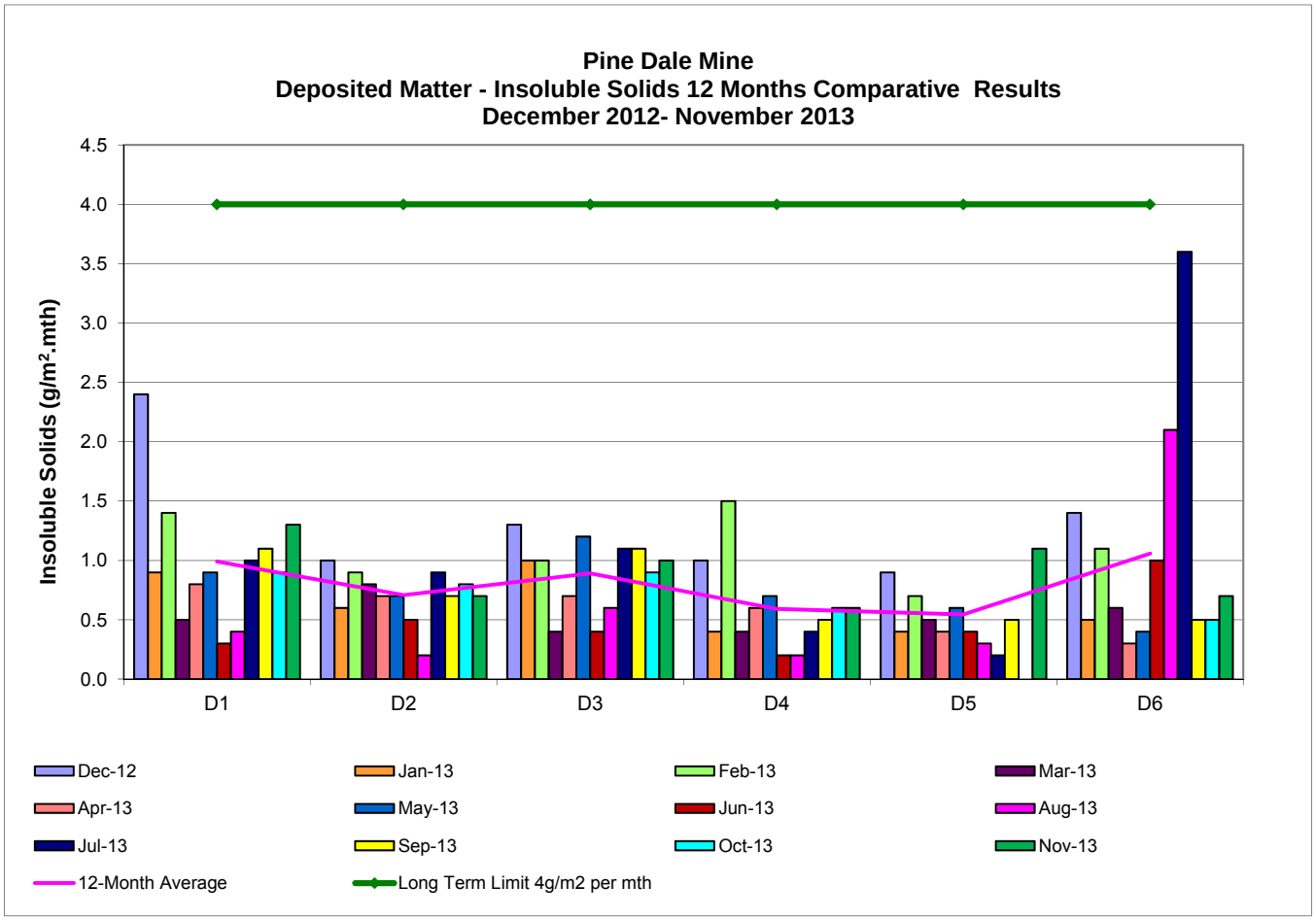


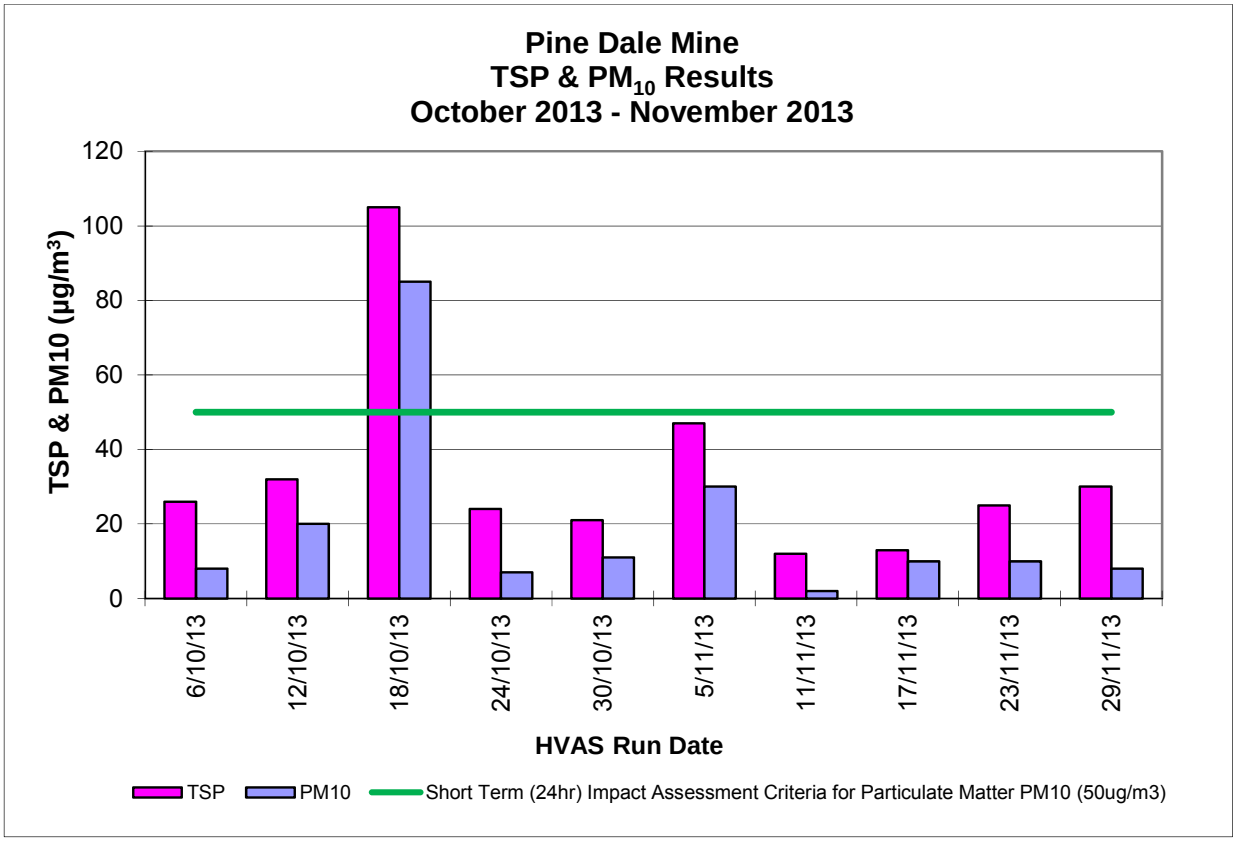
Figure AQ2
AIR QUALITY MONITORING LOCATIONS

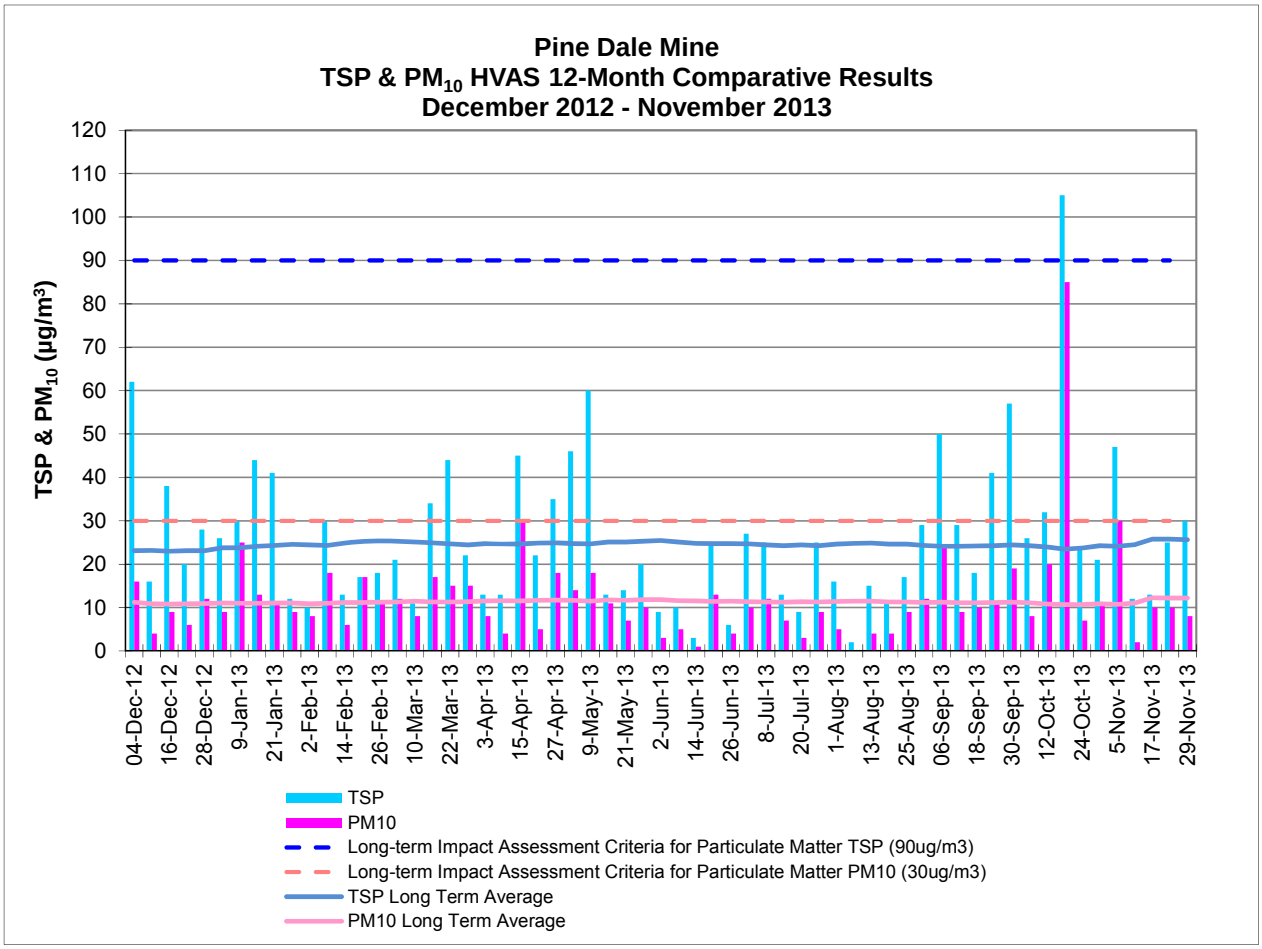
Appendix 2

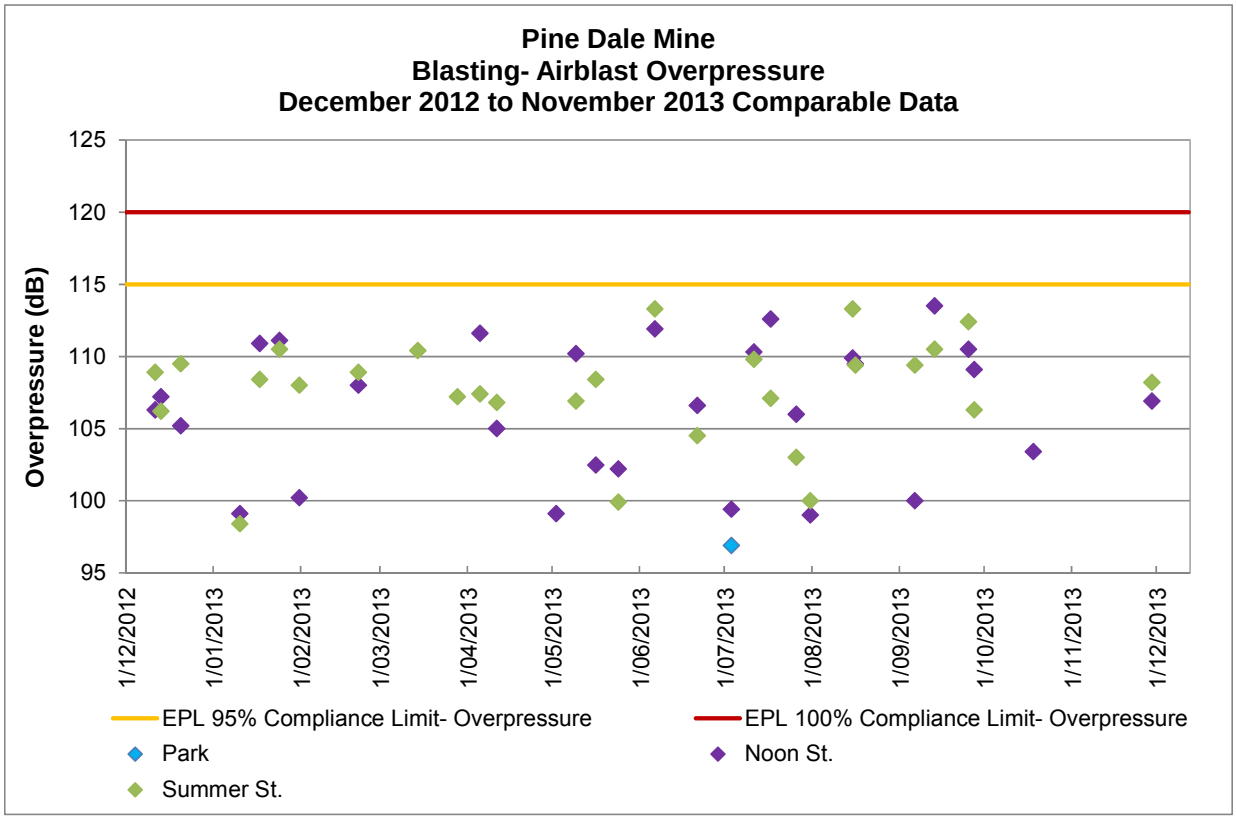
Depositional Dust, HVAS and Blast Result Graphs

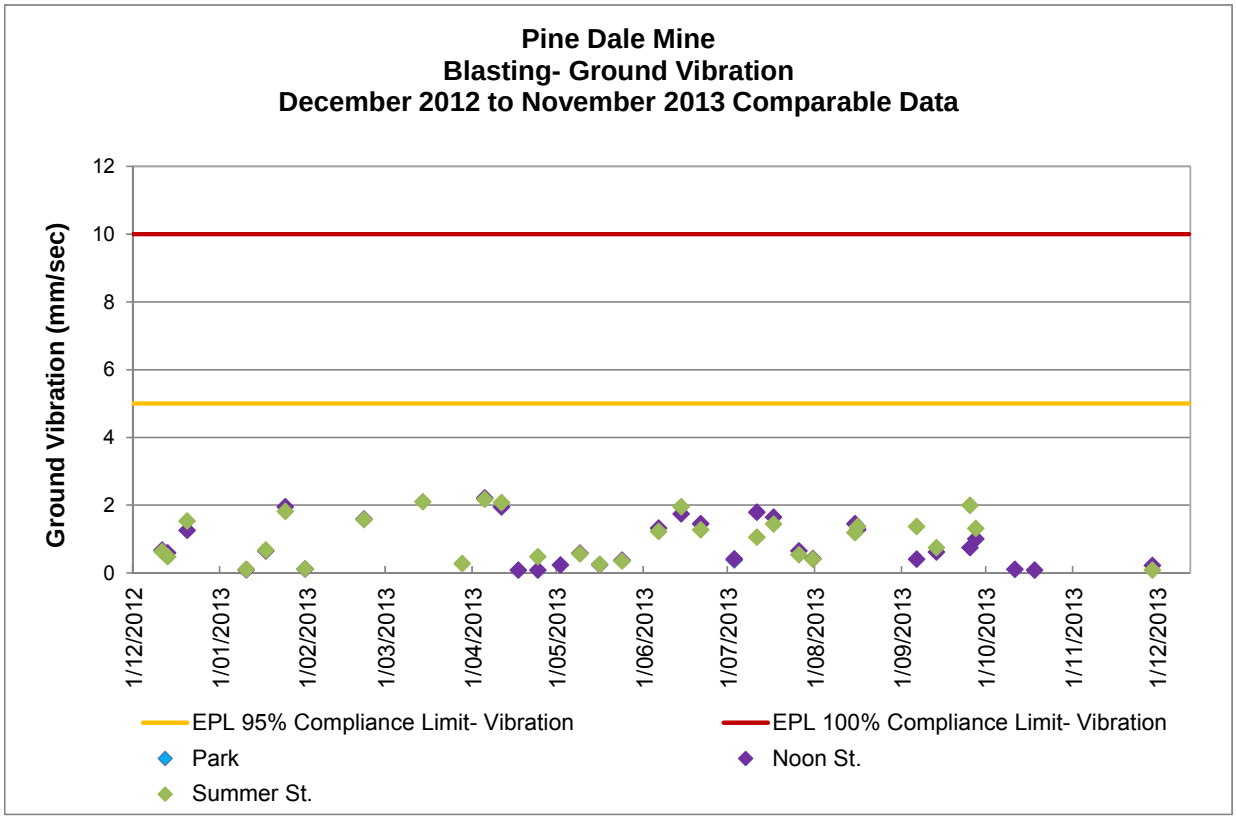

Pine Dale Mine
Depositional Dust Gauge Comparative Results
October 2013 - November 2013
Insoluble Solids Dust (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
Dust Gauge
Oct-13
Nov-13
Long Term Limit 4g/m2.month


Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
December 2012- November 2013
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
Dec-12
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Aug-13
Jul-13
Sep-13
Oct-13
Nov-13
12-Month Average
Long Term Limit 4g/m2 per mth


Pine Dale Mine
TSP & PM10 Results
October 2013 - November 2013
TSP & PM10 (µg/m³)
120
100
80
60
40
20
0
6/10/13
12/10/13
18/10/13
24/10/13
30/10/13
5/11/13
11/11/13
17/11/13
23/11/13
29/11/13
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

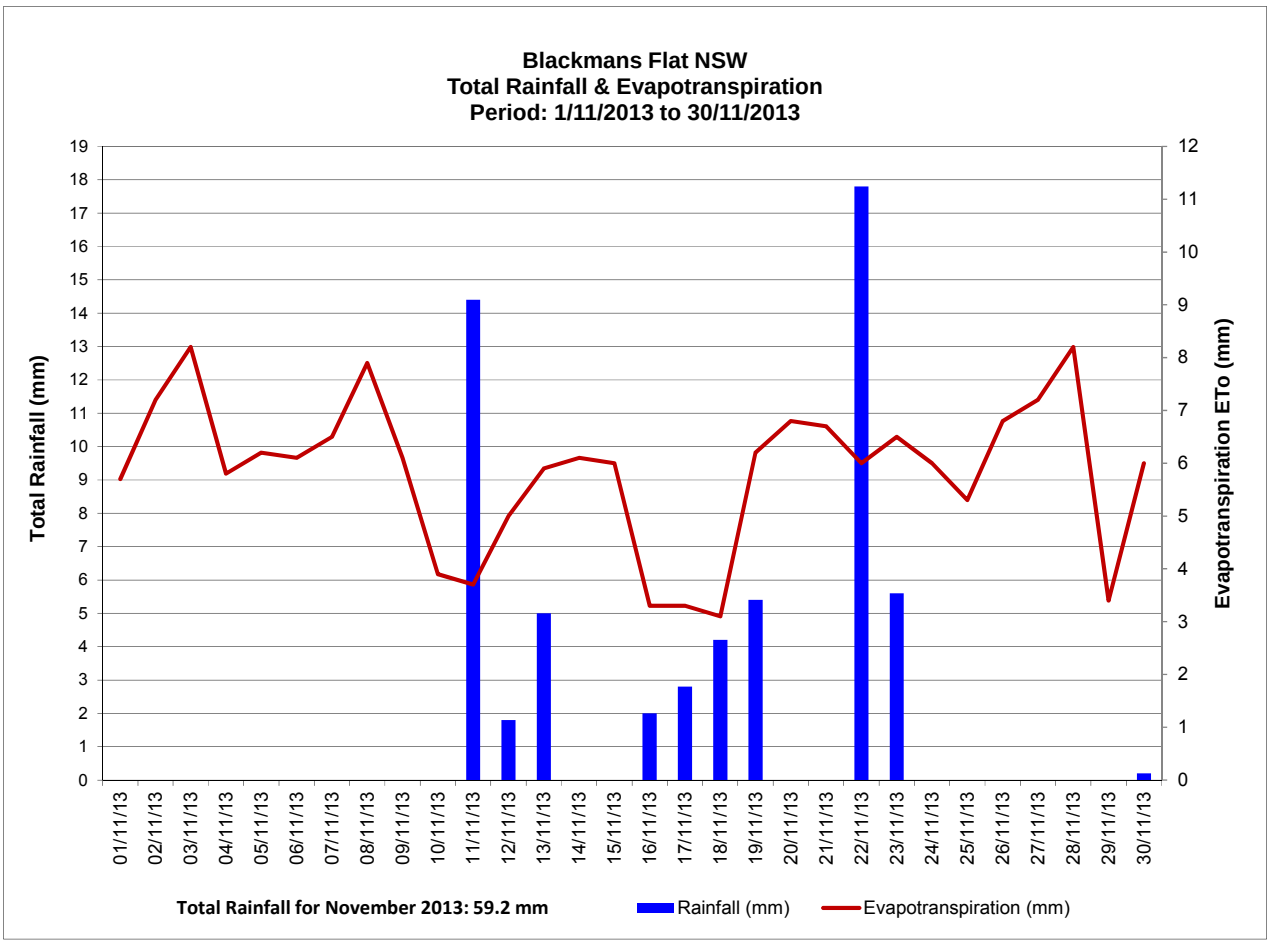

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
December 2012 - November 2013
TSP & PM10 (µg/m³)
120
110
100
90
80
70
60
50
40
30
20
10
0
04-Dec-12
16-Dec-12
28-Dec-12
9-Jan-13
21-Jan-13
2-Feb-13
14-Feb-13
26-Feb-13
10-Mar-13
22-Mar-13
3-Apr-13
15-Apr-13
27-Apr-13
9-May-13
21-May-13
2-Jun-13
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
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

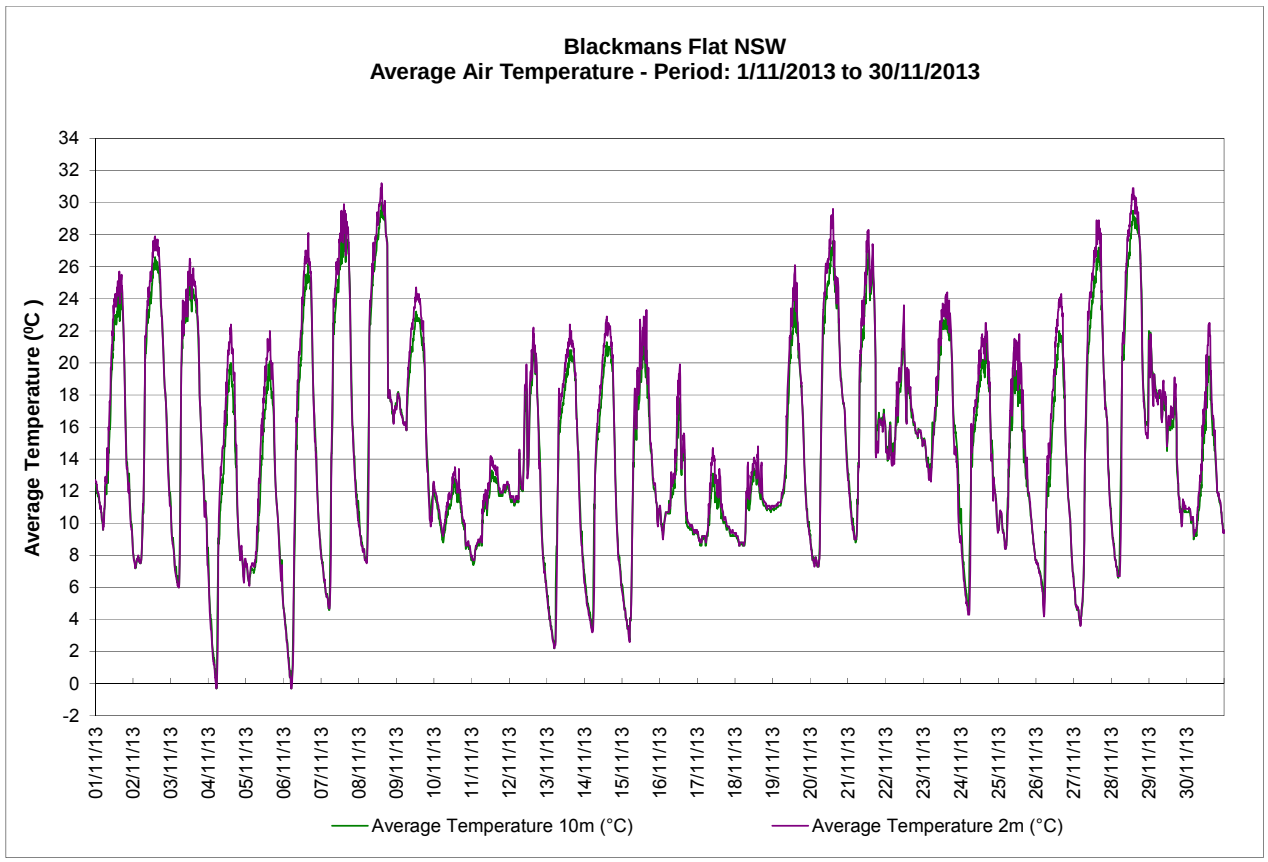

Pine Dale Mine
Blasting- Airblast Overpressure
December 2012 to November 2013 Comparable Data
Overpressure (dB)
125
120
115
110
105
100
95
1/12/2012
1/01/2013
1/02/2013
1/03/2013
1/04/2013
1/05/2013
1/06/2013
1/07/2013
1/08/2013
1/09/2013
1/10/2013
1/11/2013
1/12/2013
EPL 95% Compliance Limit- Overpressure
EPL 100% Compliance Limit- Overpressure
Park
Noon St.
Summer St.

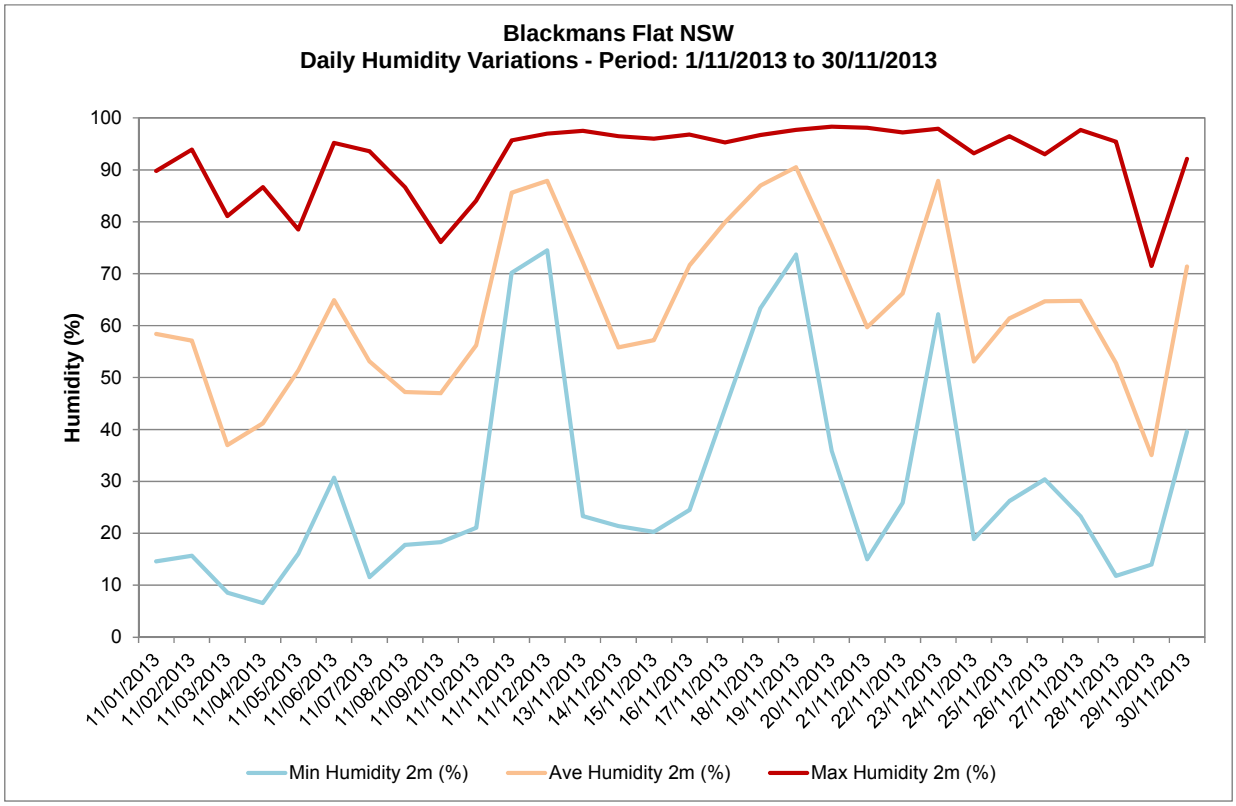

Pine Dale Mine
Blasting- Ground Vibration
December 2012 to November 2013 Comparable Data
Ground Vibration (mm/sec)
12
10
8
6
4
2
0
1/12/2012
1/01/2013
1/02/2013
1/03/2013
1/04/2013
1/05/2013
1/06/2013
1/07/2013
1/08/2013
1/09/2013
1/10/2013
1/11/2013
1/12/2013
EPL 95% Compliance Limit- Vibration
EPL 100% Compliance Limit- Vibration
Park
Noon St.
Summer St.

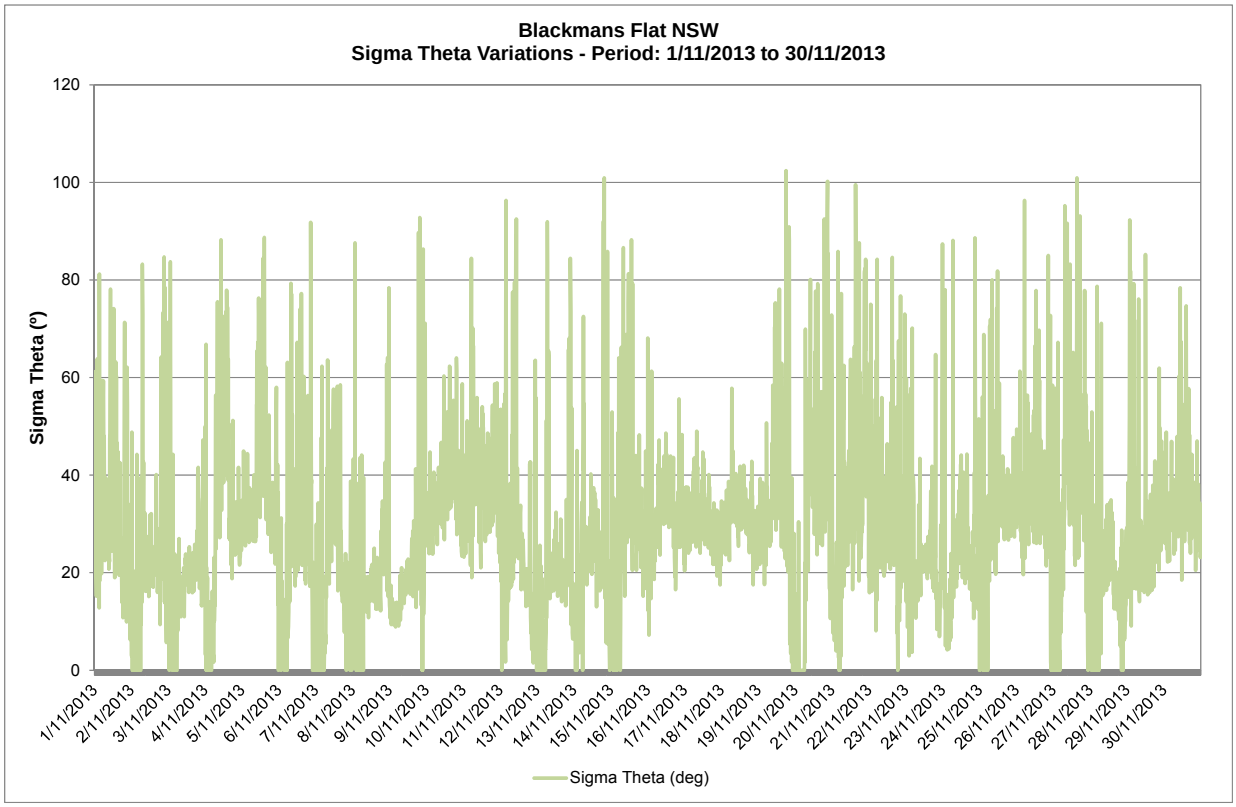
Appendix 3

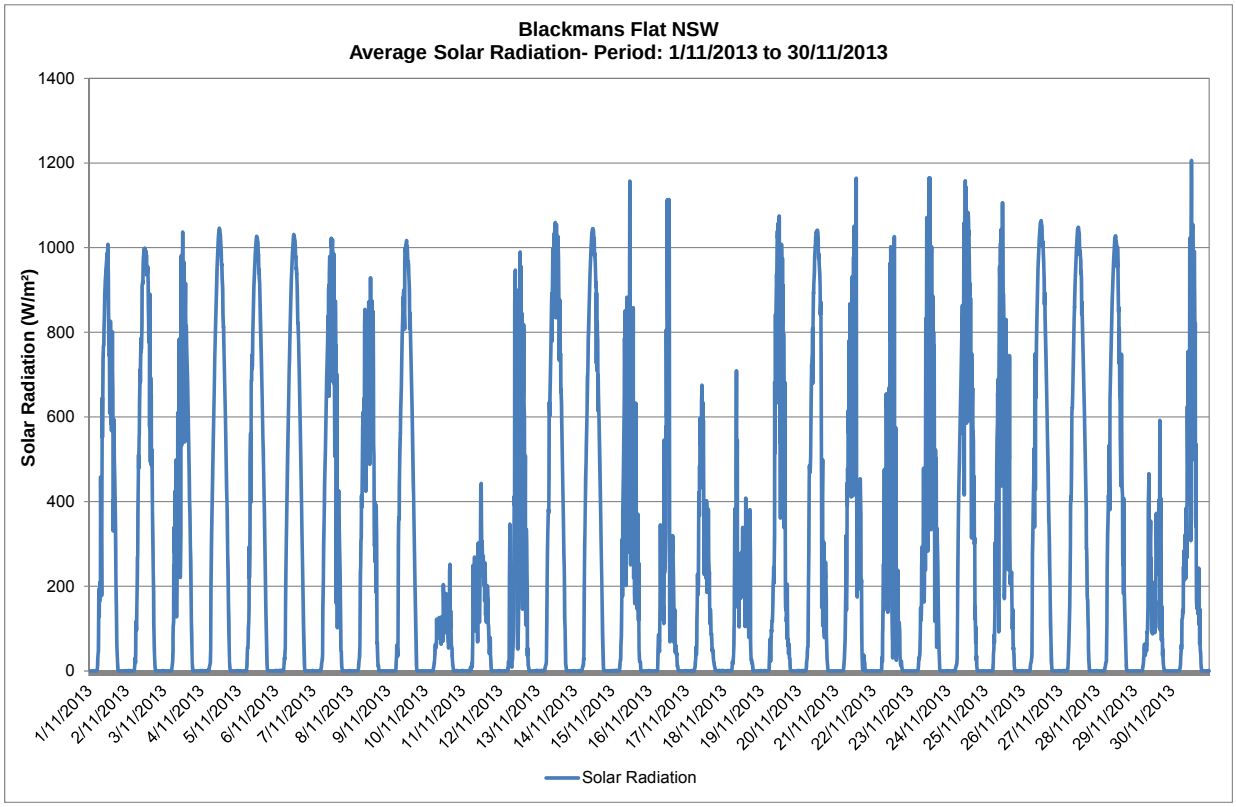
Meteorological Data

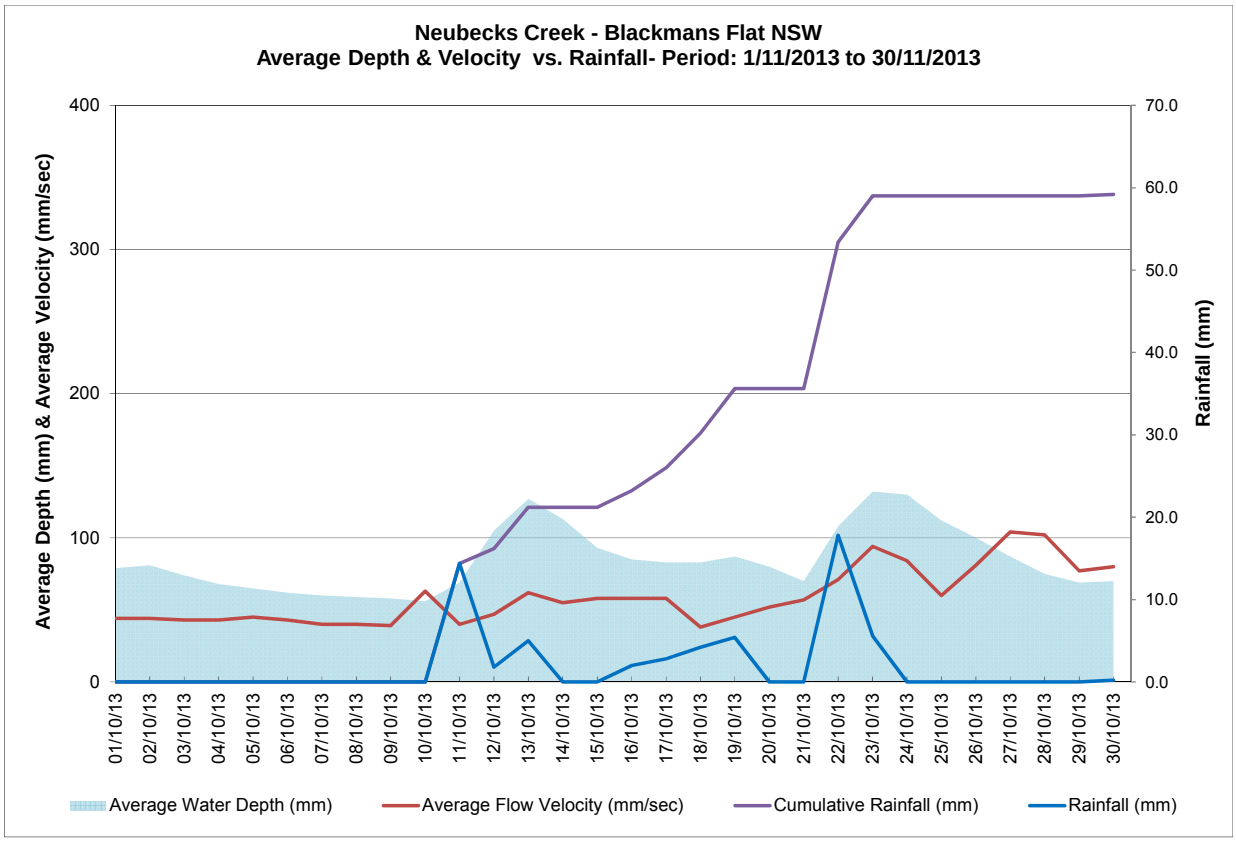

Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/11/2013 to 30/11/2013
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for November 2013: 59.2 mm
Rainfall (mm)
Evapotranspiration (mm)

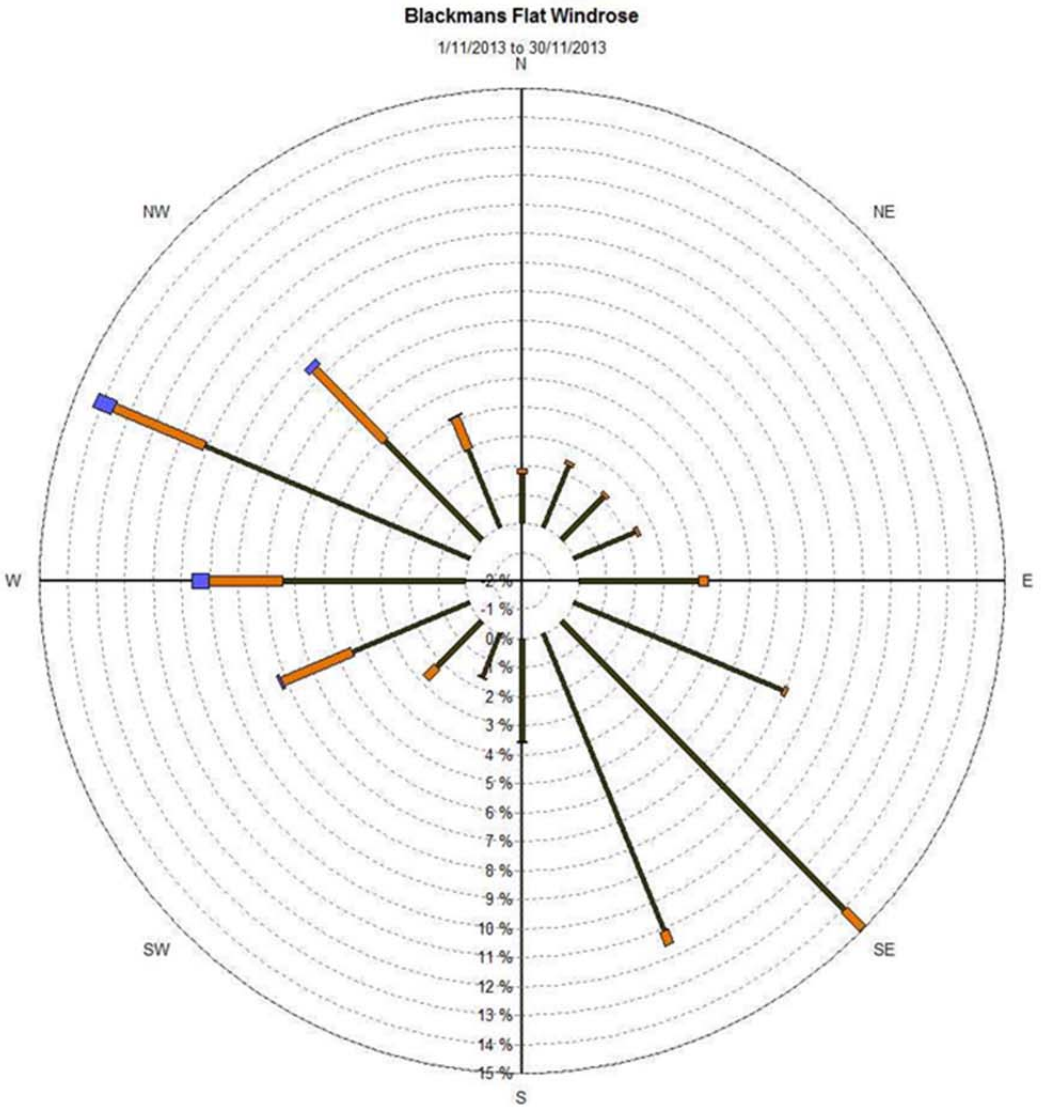

Blackmans Flat NSW
Average Air Temperature - Period: 1/11/2013 to 30/11/2013
Average Temperature (ºC)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/11/2013 to 30/11/2013
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
11/01/2013
11/02/2013
11/03/2013
11/04/2013
11/05/2013
11/06/2013
11/07/2013
11/08/2013
11/09/2013
11/10/2013
11/11/2013
11/12/2013
13/11/2013
14/11/2013
15/11/2013
16/11/2013
17/11/2013
18/11/2013
19/11/2013
20/11/2013
21/11/2013
22/11/2013
23/11/2013
24/11/2013
25/11/2013
26/11/2013
27/11/2013
28/11/2013
29/11/2013
30/11/2013
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/11/2013 to 30/11/2013
Sigma Theta (°)
120
100
80
60
40
20
0
1/11/2013
2/11/2013
3/11/2013
4/11/2013
5/11/2013
6/11/2013
7/11/2013
8/11/2013
9/11/2013
10/11/2013
11/11/2013
12/11/2013
13/11/2013
14/11/2013
15/11/2013
16/11/2013
17/11/2013
18/11/2013
19/11/2013
20/11/2013
21/11/2013
22/11/2013
23/11/2013
24/11/2013
25/11/2013
26/11/2013
27/11/2013
28/11/2013
29/11/2013
30/11/2013
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/11/2013 to 30/11/2013
Solar Radiation (W/m²)
1400
1200
1000
800
600
400
200
0
1/11/2013
2/11/2013
3/11/2013
4/11/2013
5/11/2013
6/11/2013
7/11/2013
8/11/2013
9/11/2013
10/11/2013
11/11/2013
12/11/2013
13/11/2013
14/11/2013
15/11/2013
16/11/2013
17/11/2013
18/11/2013
19/11/2013
20/11/2013
21/11/2013
22/11/2013
23/11/2013
24/11/2013
25/11/2013
26/11/2013
27/11/2013
28/11/2013
29/11/2013
30/11/2013
Solar Radiation


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/11/2013 to 30/11/2013
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
400
300
200
100
0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
01/10/13
02/10/13
03/10/13
04/10/13
05/10/13
06/10/13
07/10/13
08/10/13
09/10/13
10/10/13
11/10/13
12/10/13
13/10/13
14/10/13
15/10/13
16/10/13
17/10/13
18/10/13
19/10/13
20/10/13
21/10/13
22/10/13
23/10/13
24/10/13
25/10/13
26/10/13
27/10/13
28/10/13
29/10/13
30/10/13
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)