SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

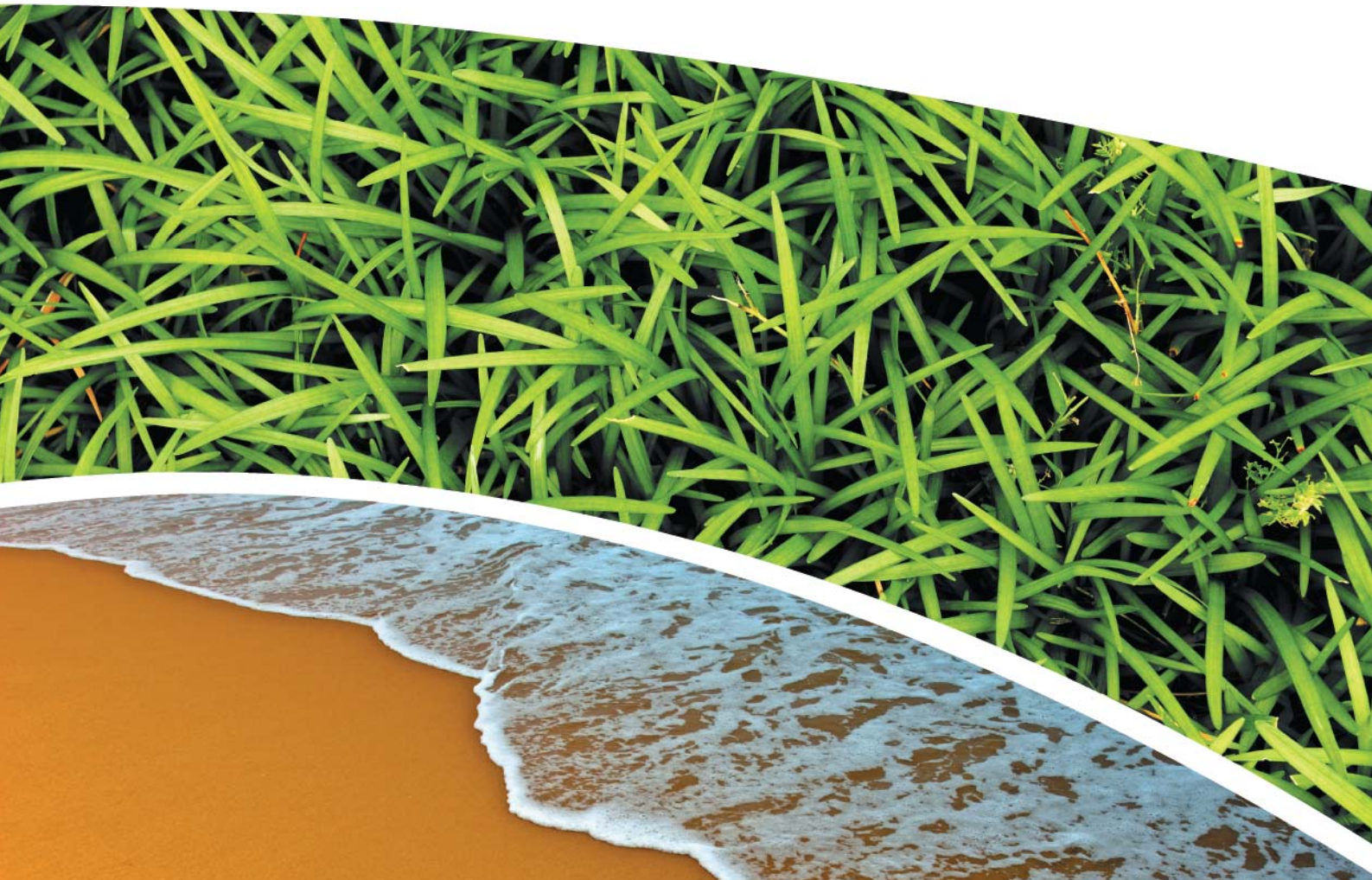
Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-839/0

December 2013

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL



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/0	1	Electronic (email)	EnergyAustralia- Mark Frewin mark.frewin@energyaustralia.com.au	16.01.14
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16 January 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
DECEMBER 2013

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1 GENERAL COMMENTS

Job Number: 6880.
Date Samples Received: During the month of December 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
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 2 on-site groundwater samples were collected during the month of December 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	-	12136880014	12136880015
Date Sampled	-	18/12/13	18/12/13
Time Sampled	-	14:50	16:05
Depth to Water from Surface*	m	26.25	6.60
Water Level (AHD)	m	890.70	887.80
Temperature	°C	15.0	15.0
pH	pH	6.34	7.26
Conductivity	µS/cm	1183	902
Turbidity	NTU	5	
Dissolved Oxygen	mg/L	5	
TSS	mg/L	16	
Oil & Grease	mg/L	<2	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	44	
Total Alkalinity ($CaCO_3$)	mg/L	44	
Sulfate (as SO_4)	mg/L	560	
Chloride	mg/L	24	
Calcium	mg/L	106	
Magnesium	mg/L	51	
Sodium	mg/L	40	
Potassium	mg/L	21	
Cobalt (dissolved)	mg/L	0.051	
Manganese (dissolved)	mg/L	2.05	
Nickel (dissolved)	mg/L	0.072	
Zinc (dissolved)	mg/L	0.008	
Iron (dissolved)	mg/L	19.2	

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 February 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-Dec-13	18	12136880034	8725919	09-Dec-13	14:50	Client	24.00
11-Dec-13	37	12136880036	8725921	12-Dec-13	13:40	Client	24.00
17-Dec-13	20	12136880038	8725923	18-Dec-13	13:40	Client	24.00
23-Dec-13	52	12136880040	8725925	27-Dec-13	10:50	Client	24.00
29-Dec-13	46	12136880042	8885680	02-Jan-14	10:03	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-Dec-13	6	12136880035	8725920	09-Dec-13	14:50	Client	24.00
11-Dec-13	14	12136880037	8725922	12-Dec-13	13:40	Client	24.00
17-Dec-13	9	12136880039	8725924	18-Dec-13	13:40	Client	24.00
23-Dec-13	22	12136880041	8885679	27-Dec-13	10:50	Client	24.00
29-Dec-13	24	12136880043	8885681	02-Jan-14	10:03	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 January to December 2013) for the TSP unit is 26.2µg/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 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 December 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**.

Table 5 *Depositional Dust Monitoring - Deposited Matter December 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)
12136880024	D1	20/11/2013	19/12/2013	29	I	9.5	1.2	8.3
12136880025	D2	20/11/2013	19/12/2013	29	I	1.2	0.6	0.6
12136880026	D3	20/11/2013	19/12/2013	29	I	1.7	0.9	0.8
12136880027	D4	20/11/2013	19/12/2013	29	IG	1.3	0.4	0.9
12136880028	D5	20/11/2013	19/12/2013	29	I	1.2	0.6	0.6
12136880029	D6	20/11/2013	19/12/2013	29	BF	--	--	--

4.2.1 Glossary of Terms Used in Notes

I	Insects (eg, Ants, spiders)	IT	Insects (eg, Ants, spiders) and Tree litter
IG	Insects (eg. Ants, spiders) and Grass	BF	Invalid Sample: Broken Funnel

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. An elevated result was noted at dust monitoring location D1 this month (9.5 g/m^2 per month); however field notes indicate that insects were present in the sample. The ash and combustible matter results indicate that organic material (i.e. insects) contributed to 87% of the sample and therefore only a very small portion of the sample consisted of deposited dust. 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

Blasting results for the month of December 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)
12/12/2013	NT	NT	NT	NT	NT	NT
2012- 2013 Year to Date Information						
Minimum	96.9	0.38	78.3	0.08	87.2	0.08
Average	96.9	0.38	104.1	0.85	106.0	1.05
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 January 2013 to December 2013.

During December 2013, none of the blast monitors were triggered during the single blasting event during the month, and therefore there was no exceedance of the EPL conditions for either overpressure or 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 December 2013 were good, with no major issues recorded. There were 15 production days available due to the Christmas break and no weekend work was undertaken during the month. Only one blast was shot throughout the month.

Relatively low rainfall was observed throughout the working month, with the majority (25.4mm) falling on the 26 December, which did not have an impact upon mine operations due to the mine's closure over the Christmas break. The overburden target was on budget this month, whilst the run of mine (ROM) coal from the mine to the raw coal crusher pad were above budget due to the timing of coal recovery that overran from last month. Waste production was slightly below target this month, with approximately 76,000 tonnes of overburden excavated. Delivery of coal to Mt Piper was below budget with a total of 17,013 tonnes of coal delivered to Mt Piper Power Station.

8 SUMMARY

During the month of December 2013 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 February 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. A high result was observed at D1 this month, however, upon investigation this is likely to be caused from organic contamination with inorganic material contributing to only 13% of the sample. The annual average at D1 still remains relatively low with a level of 1.6 g/m^2.month currently being observed. The rest of the EPL dust gauges have annual average results less 1.0 g/m^2.month, and are all in compliance with consent conditions.

During December 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.

Quarterly noise monitoring was not conducted this month, and is scheduled to be conducted in January 2014.

Please contact the undersigned if you have any queries.

Yours sincerely

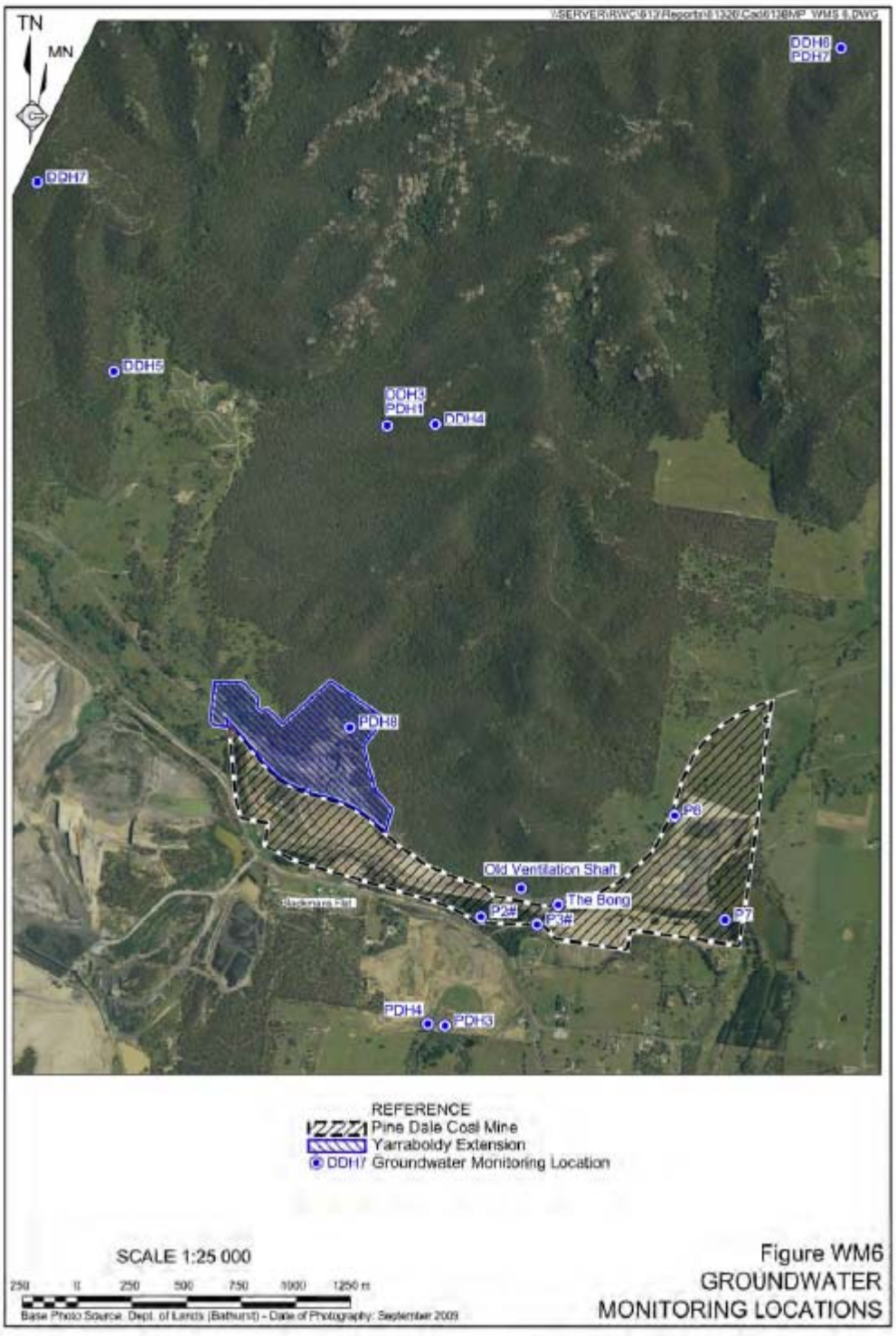
Katy Shaw
Environmental Scientist
RCA Australia Pty Ltd trading as
RCA Laboratories – Environmental

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\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


\\SERVER\RWC\613\Reports\613Cad\613BMP_WM5.8.DWG
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

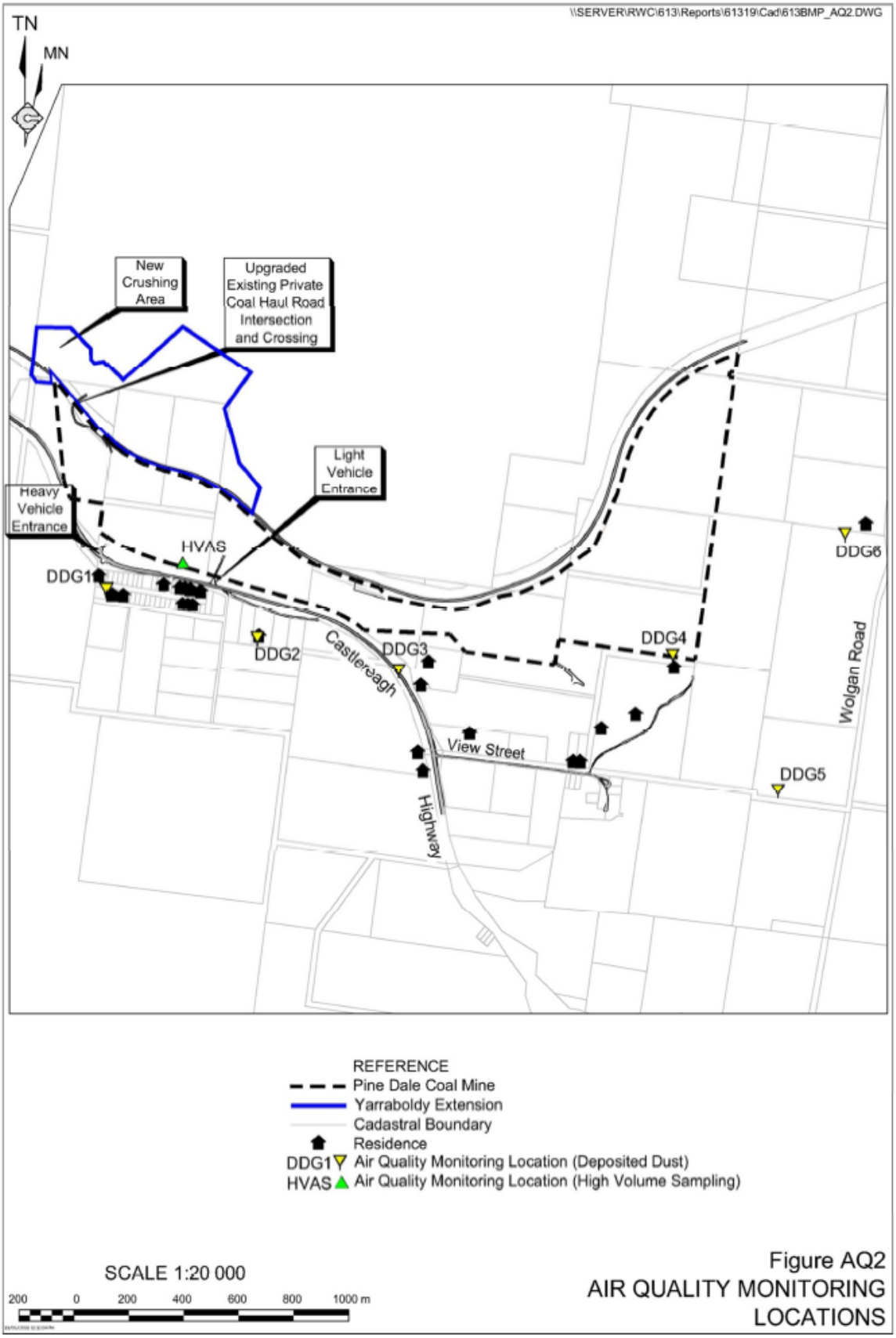
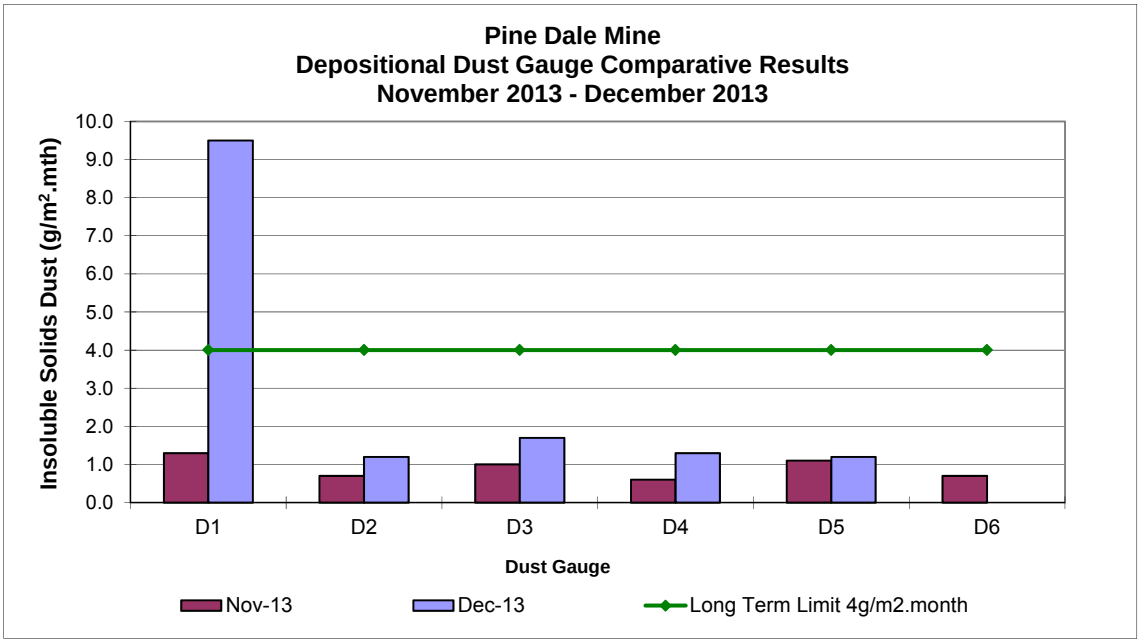
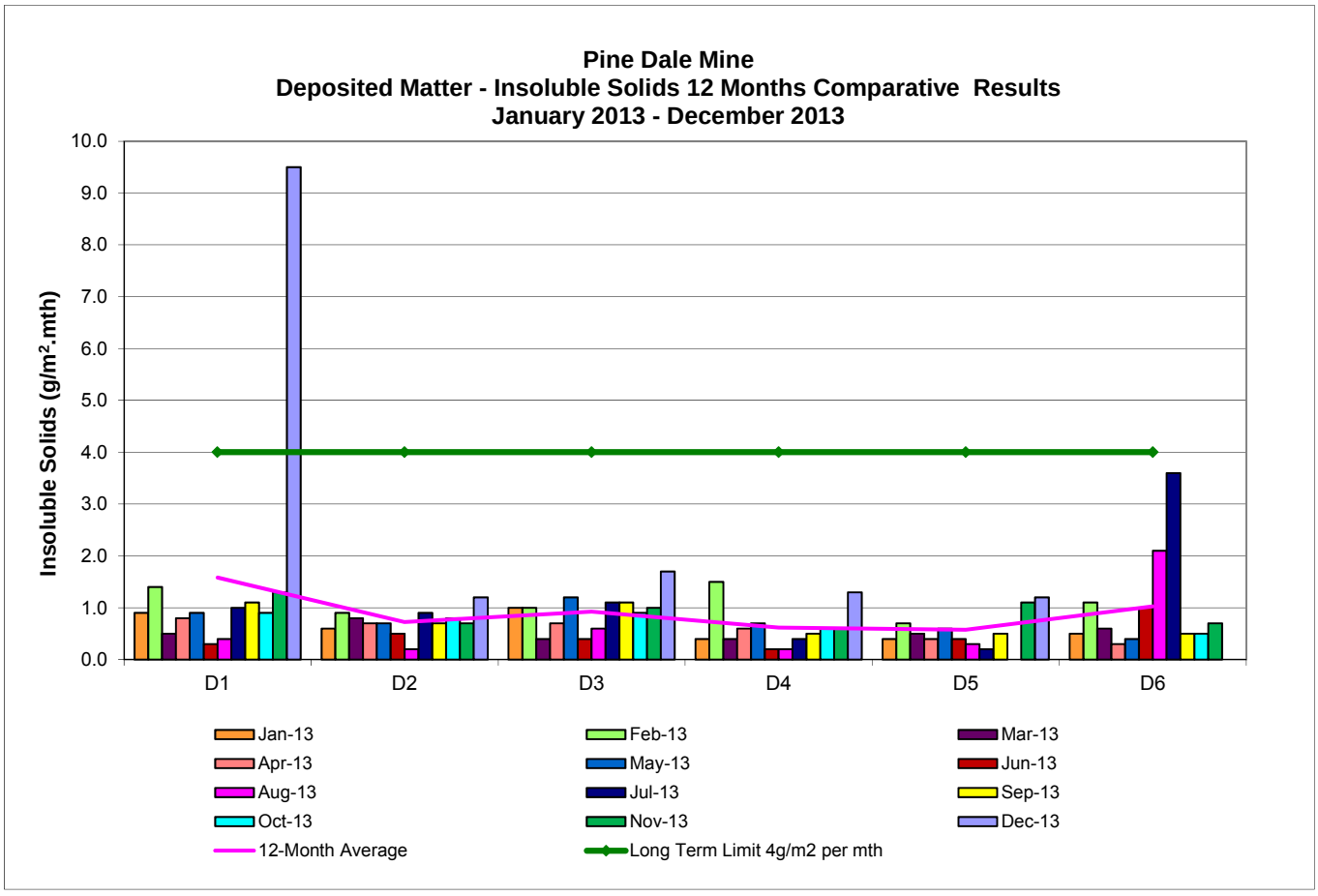


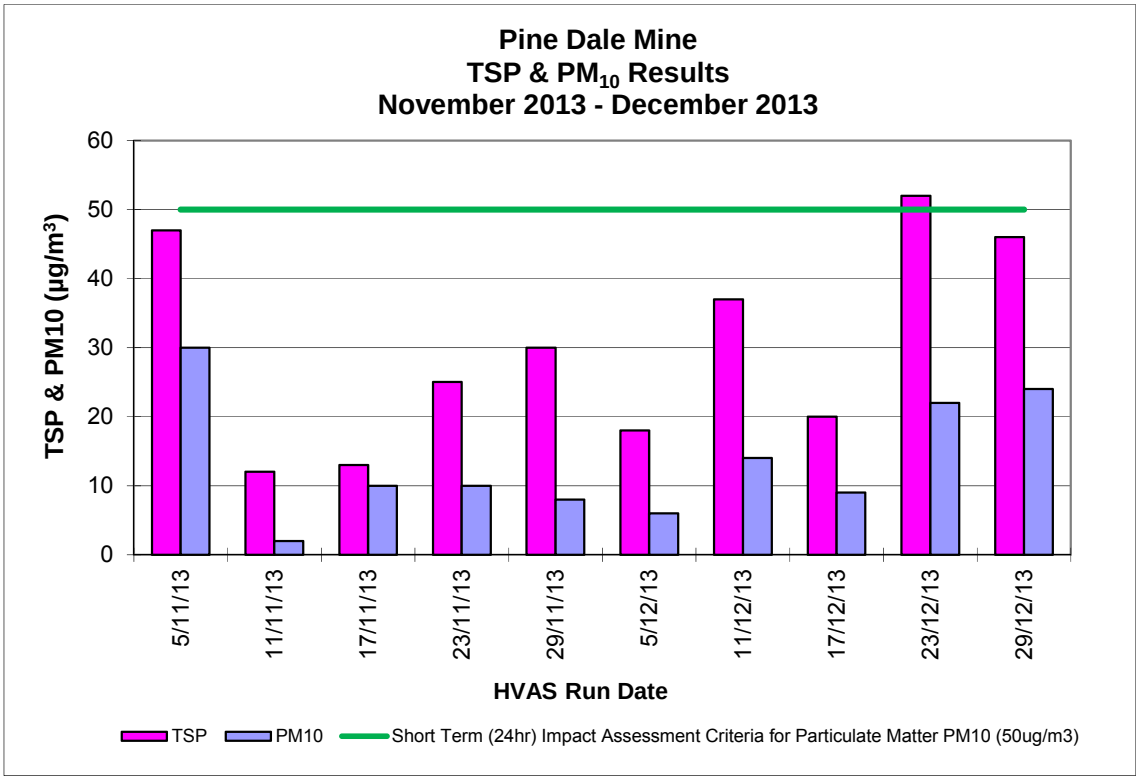
Figure AQ2
AIR QUALITY MONITORING LOCATIONS

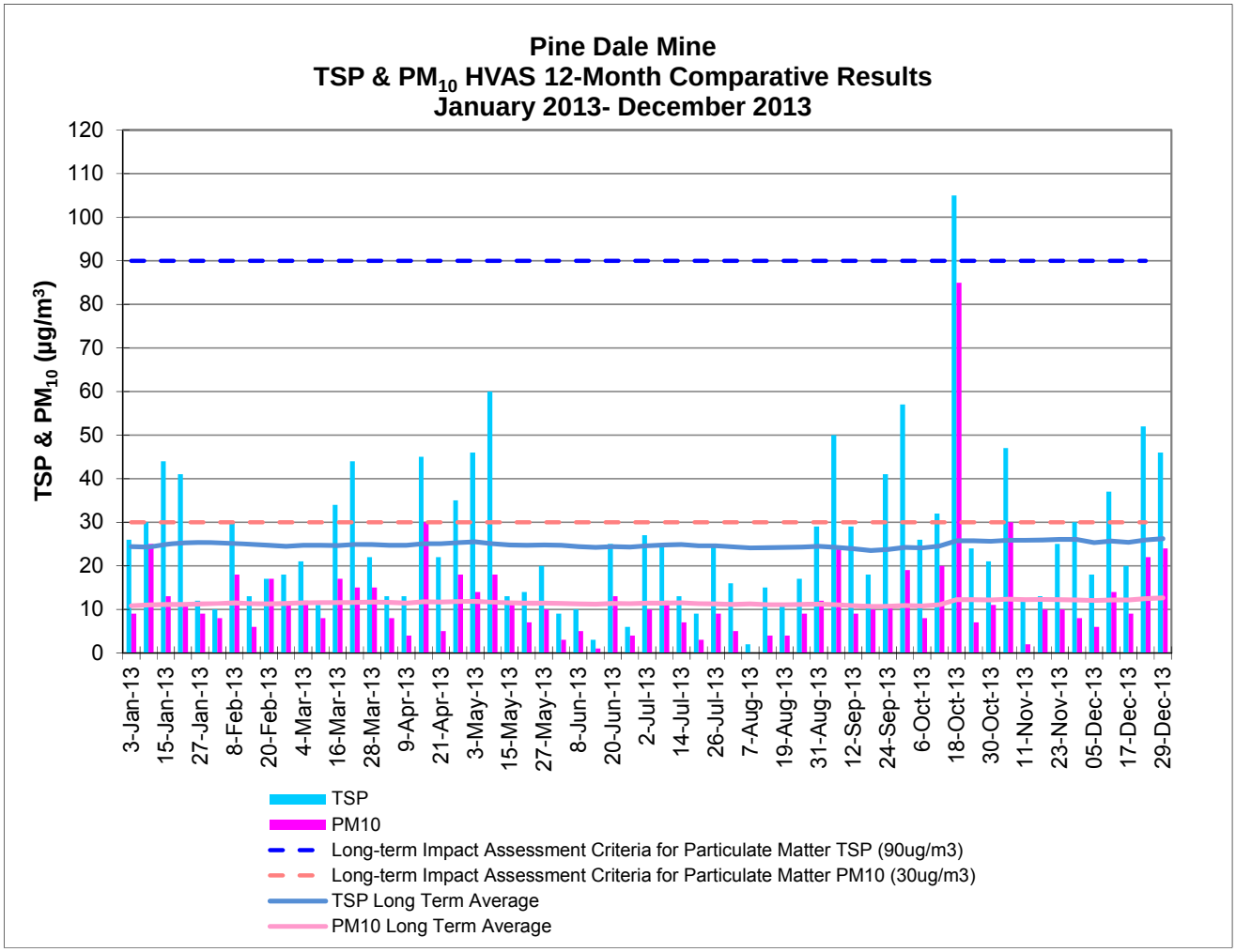
Appendix 2

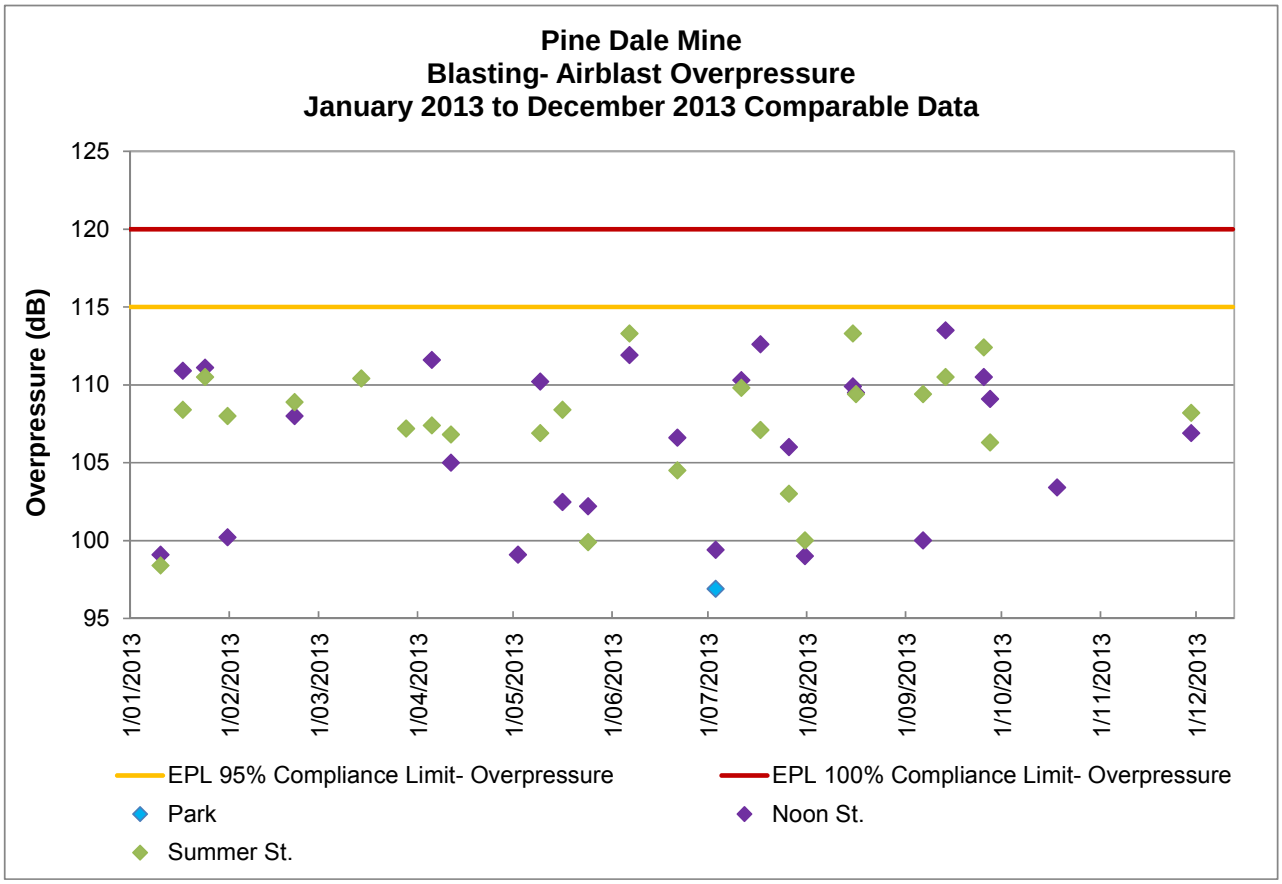
Depositional Dust, HVAS and Blast Result Graphs

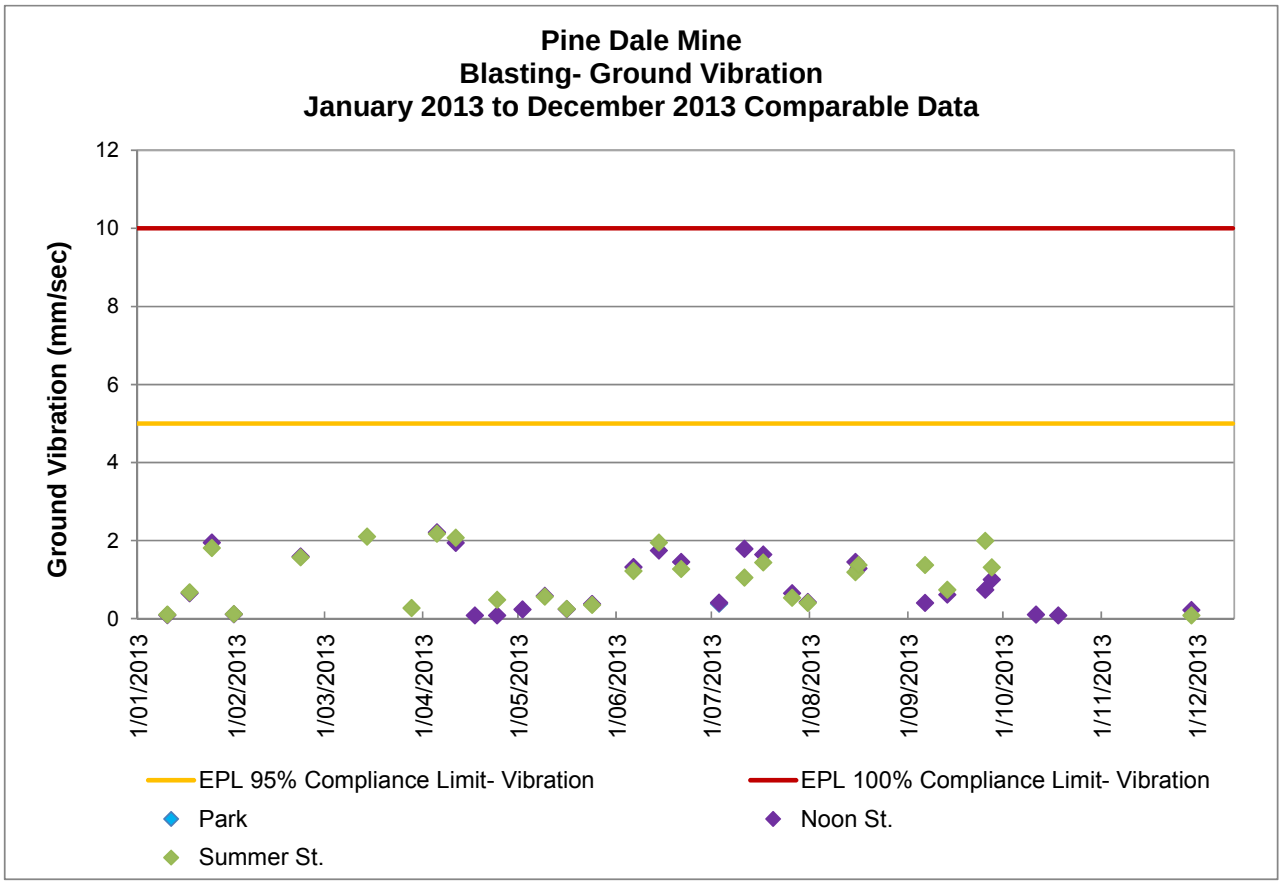

Pine Dale Mine
Depositional Dust Gauge Comparative Results
November 2013 - December 2013
Insoluble Solids Dust (g/m².mth)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
D1
D2
D3
D4
D5
D6
Dust Gauge
Nov-13
Dec-13
Long Term Limit 4g/m2.month


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


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

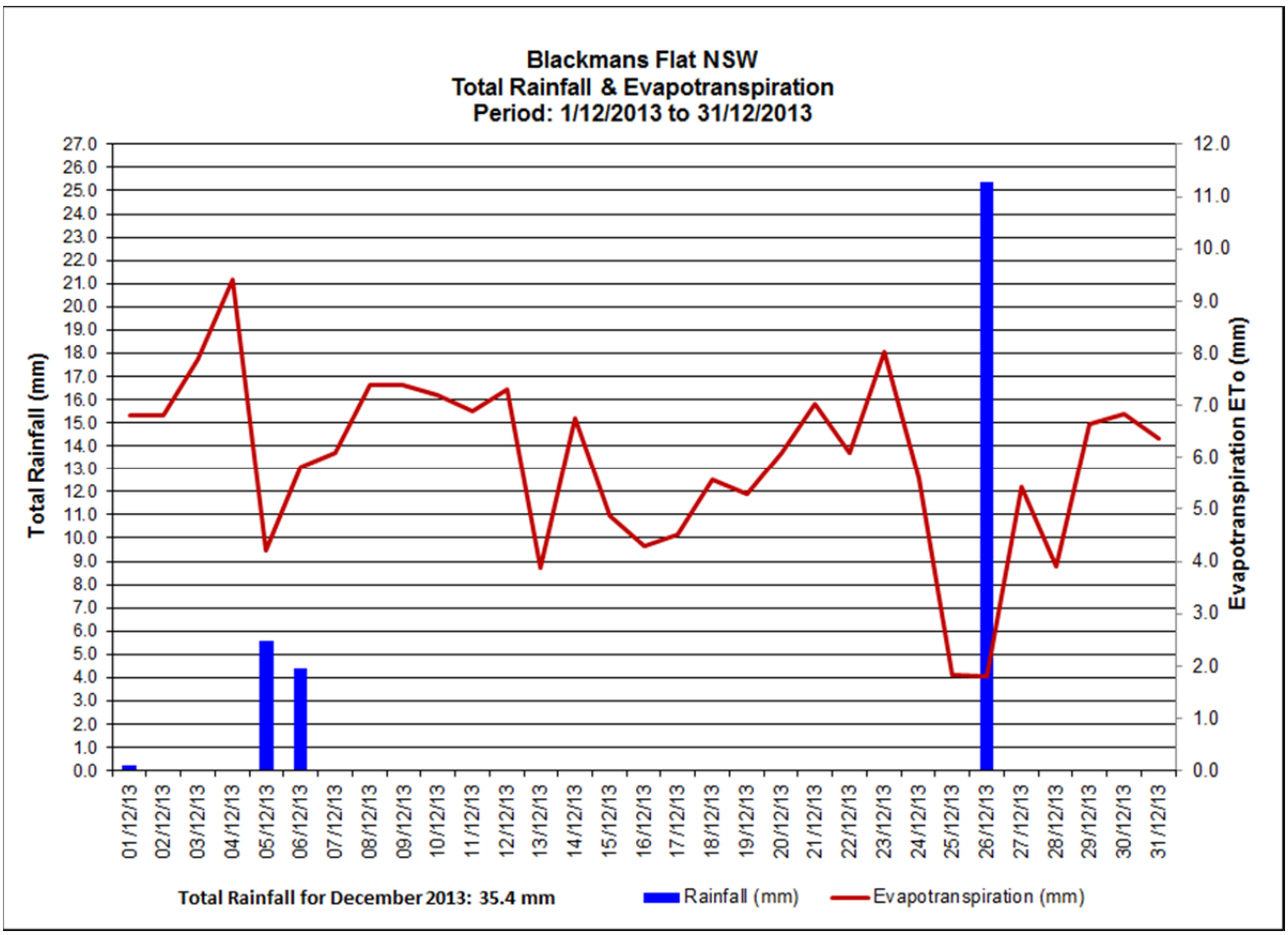

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
January 2013- December 2013
TSP & PM10 (µg/m³)
120
110
100
90
80
70
60
50
40
30
20
10
0
3-Jan-13
15-Jan-13
27-Jan-13
8-Feb-13
20-Feb-13
4-Mar-13
16-Mar-13
28-Mar-13
9-Apr-13
21-Apr-13
3-May-13
15-May-13
27-May-13
8-Jun-13
20-Jun-13
2-Jul-13
14-Jul-13
26-Jul-13
7-Aug-13
19-Aug-13
31-Aug-13
12-Sep-13
24-Sep-13
6-Oct-13
18-Oct-13
30-Oct-13
11-Nov-13
23-Nov-13
05-Dec-13
17-Dec-13
29-Dec-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

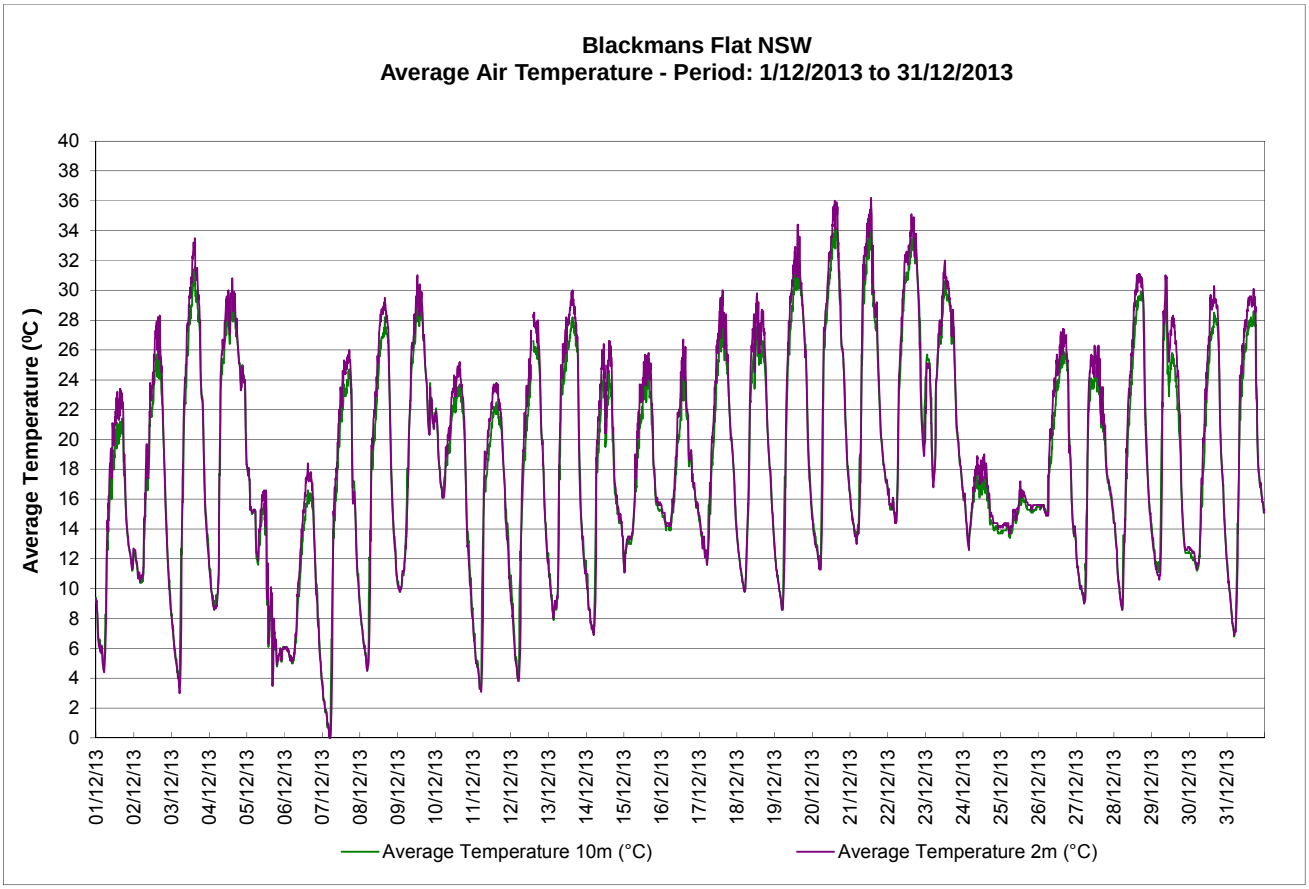

Pine Dale Mine
Blasting- Airblast Overpressure
January 2013 to December 2013 Comparable Data
Overpressure (dB)
125
120
115
110
105
100
95
1/01/2013
1/02/2013
1/03/2013
1/04/2013
1/05/2013
1/06/2013
1/07/2013
1/08/2013
1/09/2013
1/10/2013
1/11/2013
1/12/2013
EPL 95% Compliance Limit- Overpressure
EPL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

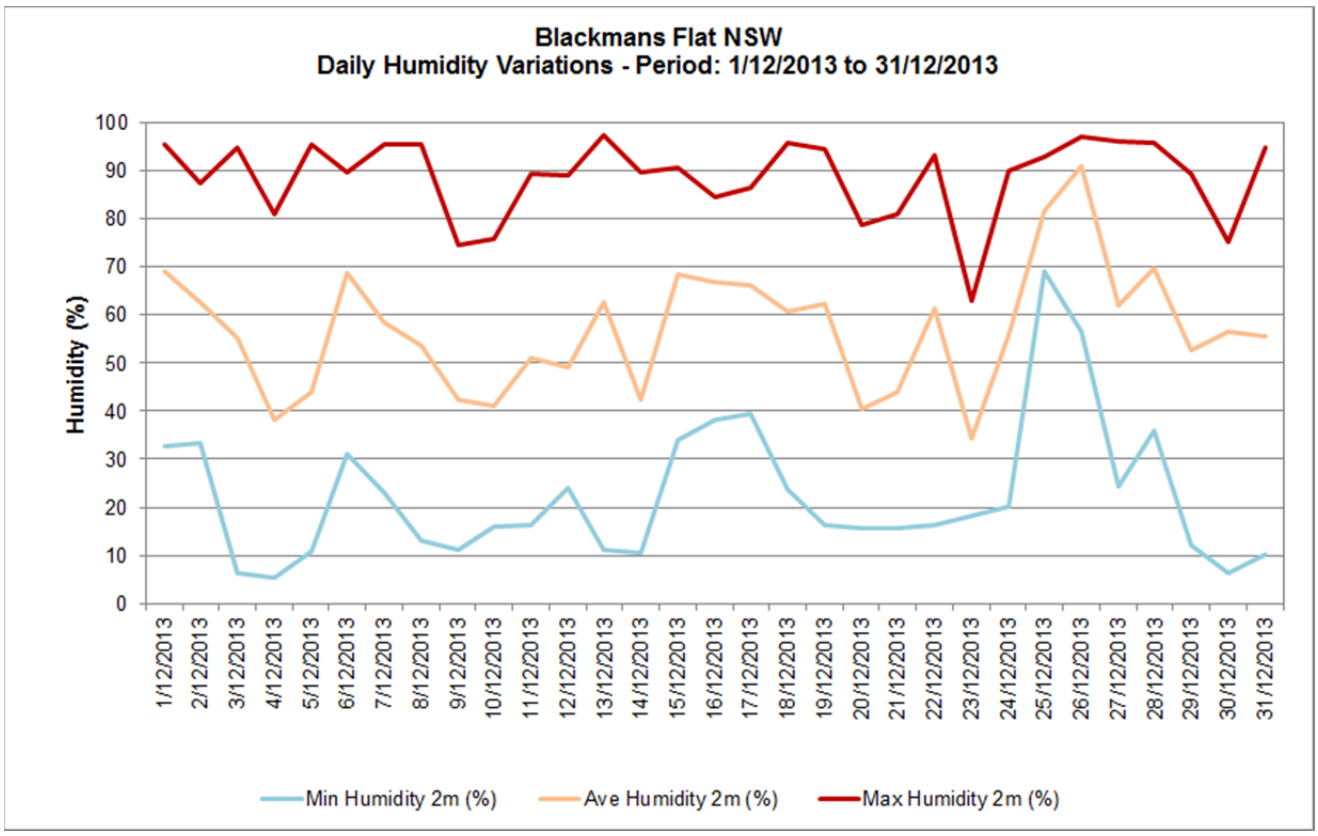

Pine Dale Mine
Blasting- Ground Vibration
January 2013 to December 2013 Comparable Data
Ground Vibration (mm/sec)
12
10
8
6
4
2
0
1/01/2013
1/02/2013
1/03/2013
1/04/2013
1/05/2013
1/06/2013
1/07/2013
1/08/2013
1/09/2013
1/10/2013
1/11/2013
1/12/2013
EPL 95% Compliance Limit- Vibration
EPL 100% Compliance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

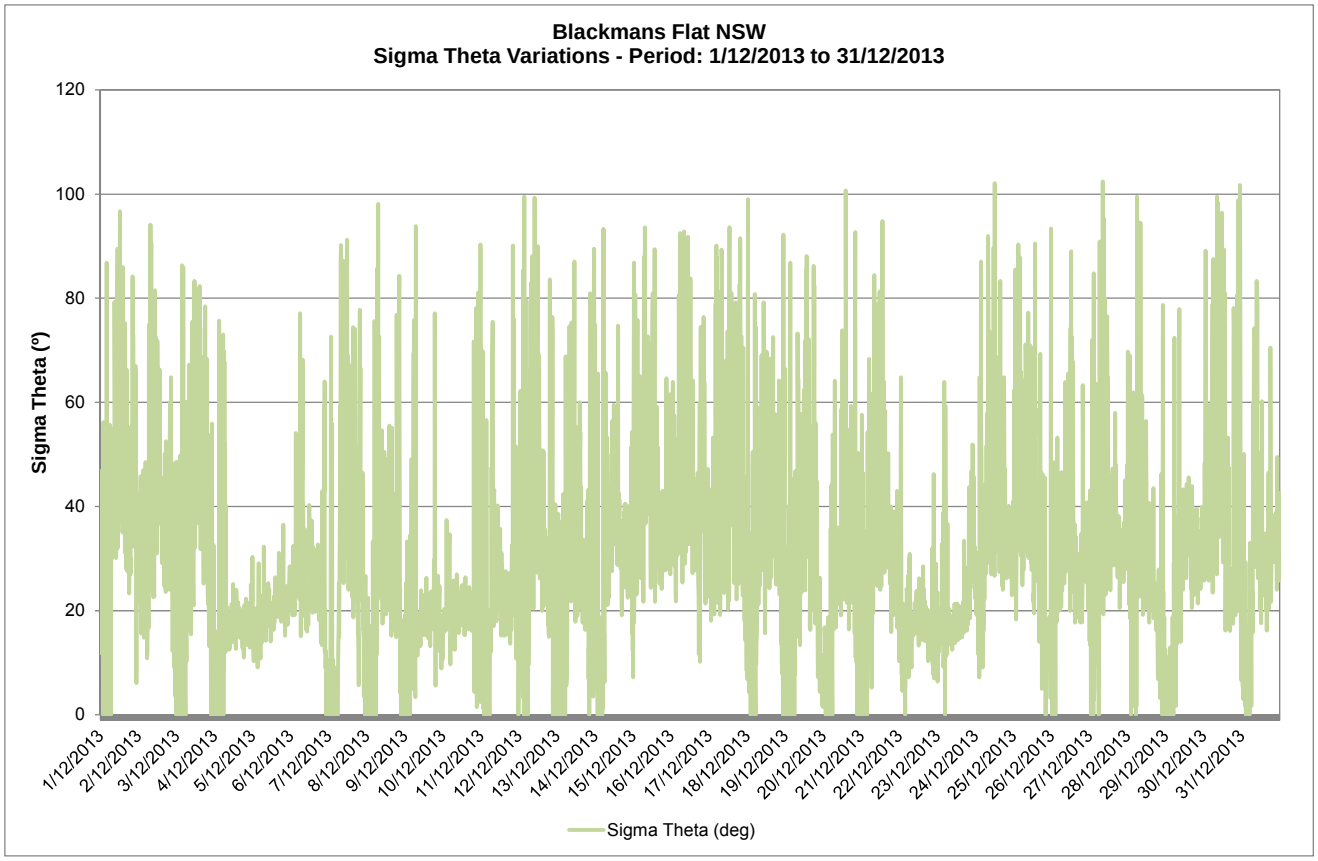
Appendix 3

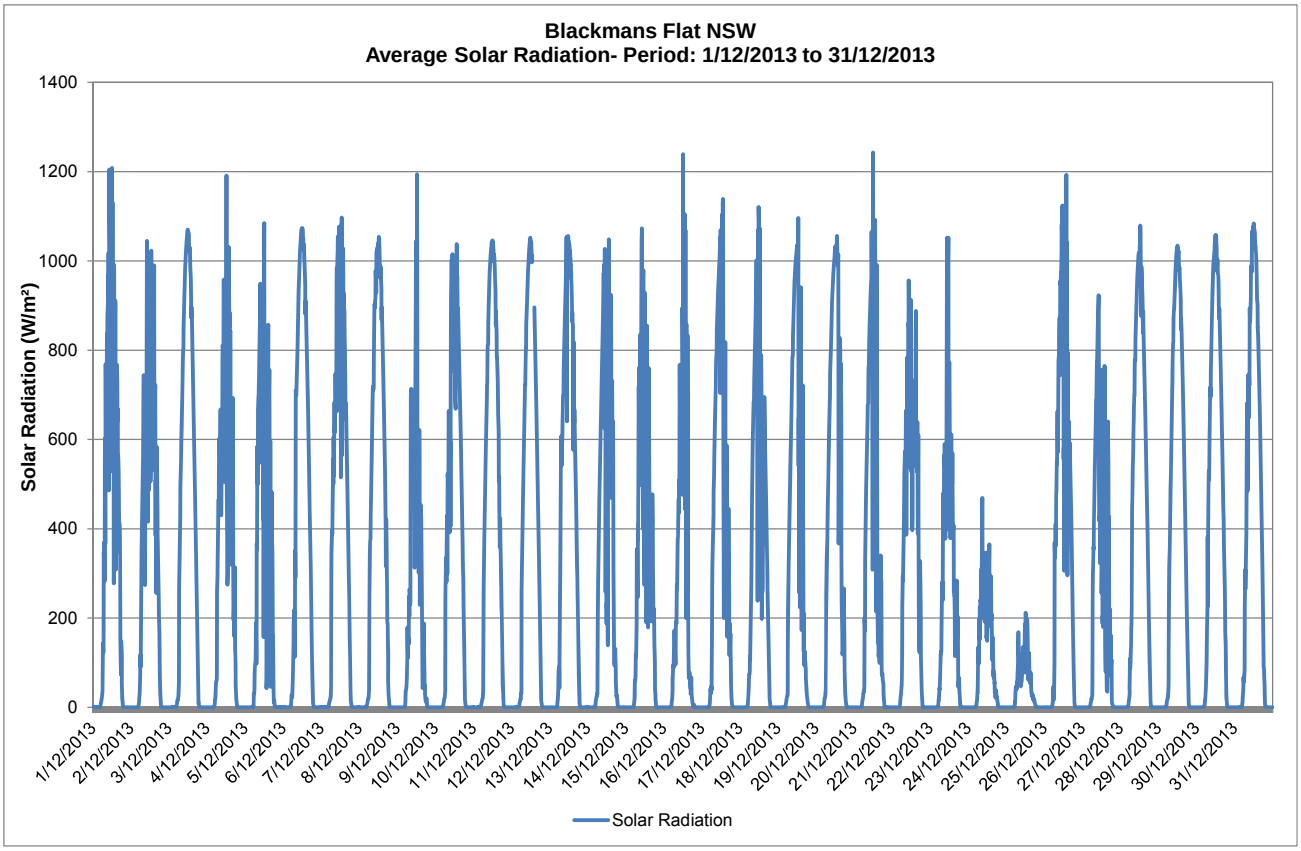
Meteorological Data

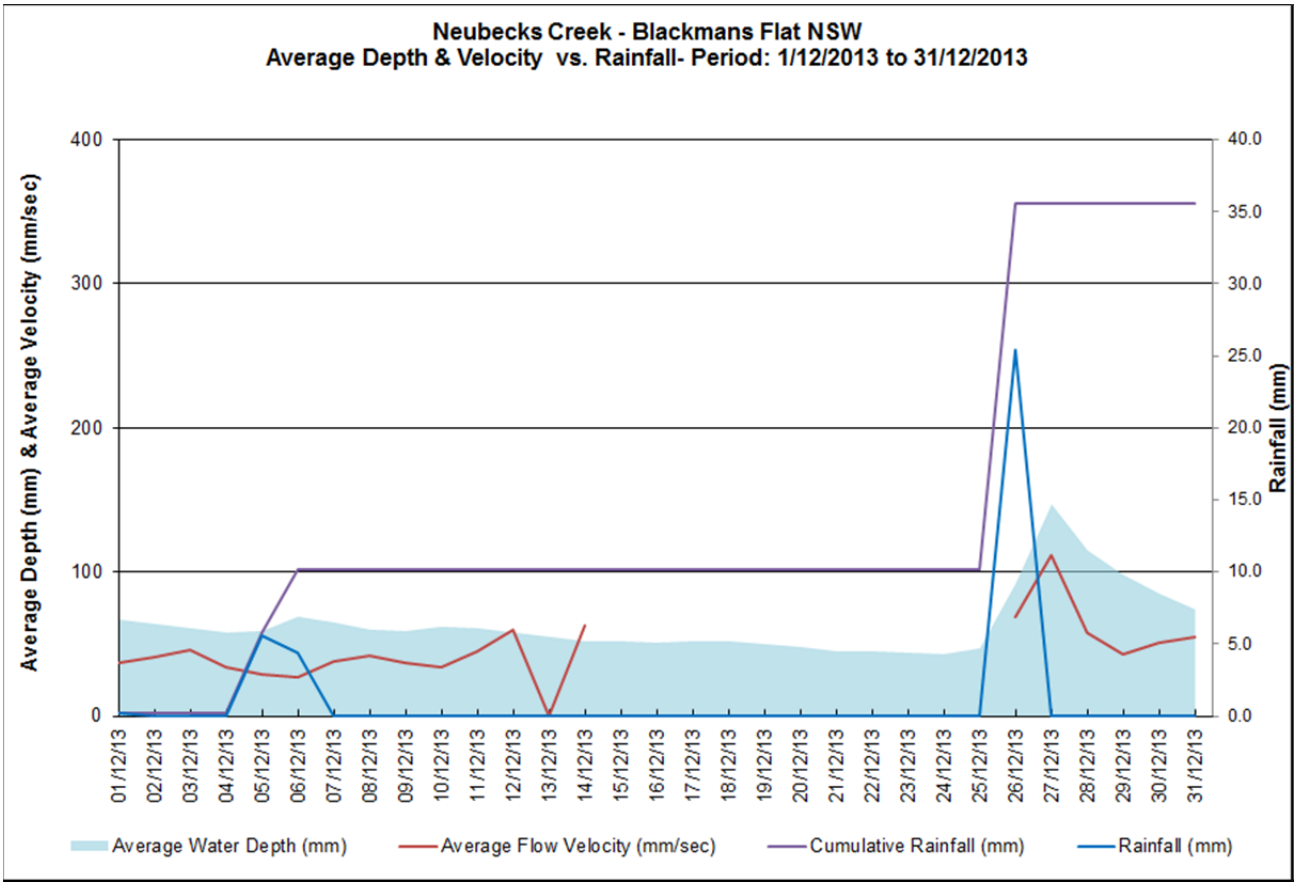

Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/12/2013 to 31/12/2013
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for December 2013: 35.4 mm
Rainfall (mm)
Evapotranspiration (mm)

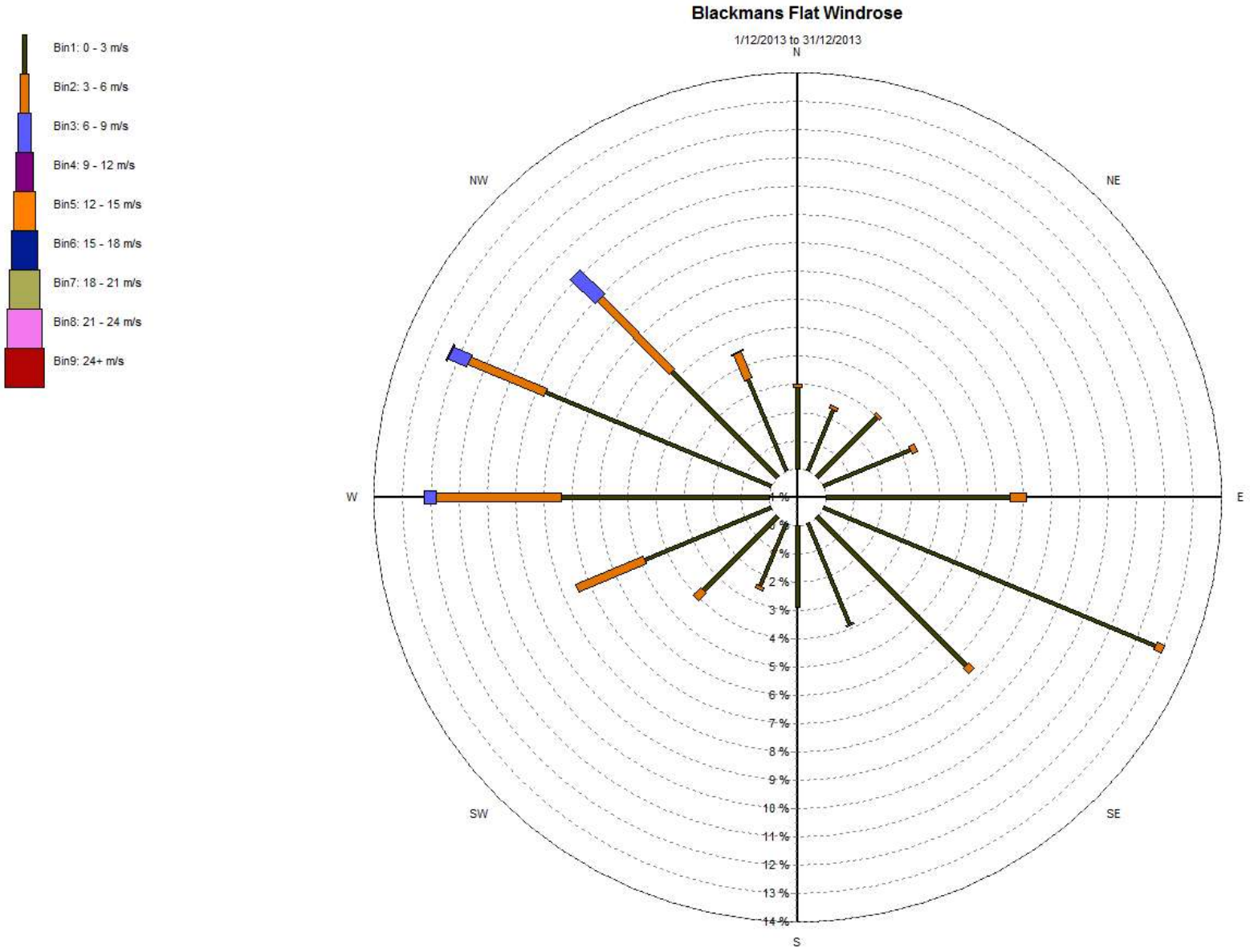

Blackmans Flat NSW
Average Air Temperature - Period: 1/12/2013 to 31/12/2013
Average Temperature (°C)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/12/2013 to 31/12/2013
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
1/12/2013
2/12/2013
3/12/2013
4/12/2013
5/12/2013
6/12/2013
7/12/2013
8/12/2013
9/12/2013
10/12/2013
11/12/2013
12/12/2013
13/12/2013
14/12/2013
15/12/2013
16/12/2013
17/12/2013
18/12/2013
19/12/2013
20/12/2013
21/12/2013
22/12/2013
23/12/2013
24/12/2013
25/12/2013
26/12/2013
27/12/2013
28/12/2013
29/12/2013
30/12/2013
31/12/2013
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/12/2013 to 31/12/2013
Sigma Theta (°)
120
100
80
60
40
20
0
1/12/2013
2/12/2013
3/12/2013
4/12/2013
5/12/2013
6/12/2013
7/12/2013
8/12/2013
9/12/2013
10/12/2013
11/12/2013
12/12/2013
13/12/2013
14/12/2013
15/12/2013
16/12/2013
17/12/2013
18/12/2013
19/12/2013
20/12/2013
21/12/2013
22/12/2013
23/12/2013
24/12/2013
25/12/2013
26/12/2013
27/12/2013
28/12/2013
29/12/2013
30/12/2013
31/12/2013
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/12/2013 to 31/12/2013
Solar Radiation (W/m²)
1400
1200
1000
800
600
400
200
0
1/12/2013
2/12/2013
3/12/2013
4/12/2013
5/12/2013
6/12/2013
7/12/2013
8/12/2013
9/12/2013
10/12/2013
11/12/2013
12/12/2013
13/12/2013
14/12/2013
15/12/2013
16/12/2013
17/12/2013
18/12/2013
19/12/2013
20/12/2013
21/12/2013
22/12/2013
23/12/2013
24/12/2013
25/12/2013
26/12/2013
27/12/2013
28/12/2013
29/12/2013
30/12/2013
31/12/2013
Solar Radiation


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/12/2013 to 31/12/2013
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
400
300
200
100
0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
01/12/13
02/12/13
03/12/13
04/12/13
05/12/13
06/12/13
07/12/13
08/12/13
09/12/13
10/12/13
11/12/13
12/12/13
13/12/13
14/12/13
15/12/13
16/12/13
17/12/13
18/12/13
19/12/13
20/12/13
21/12/13
22/12/13
23/12/13
24/12/13
25/12/13
26/12/13
27/12/13
28/12/13
29/12/13
30/12/13
31/12/13
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)


Blackmans Flat Windrose
1/12/2013 to 31/12/2013
Bin1: 0 - 3 m/s
Bin2: 3 - 6 m/s
Bin3: 6 - 9 m/s
Bin4: 9 - 12 m/s
Bin5: 12 - 15 m/s
Bin6: 15 - 18 m/s
Bin7: 18 - 21 m/s
Bin8: 21 - 24 m/s
Bin9: 24+ m/s
N
NE
E
SE
S
SW
W
NW
1 %
2 %
3 %
4 %
5 %
6 %
7 %
8 %
9 %
10 %
11 %
12 %
13 %
14 %