GROUNDWATER, SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-824/0

May 2013

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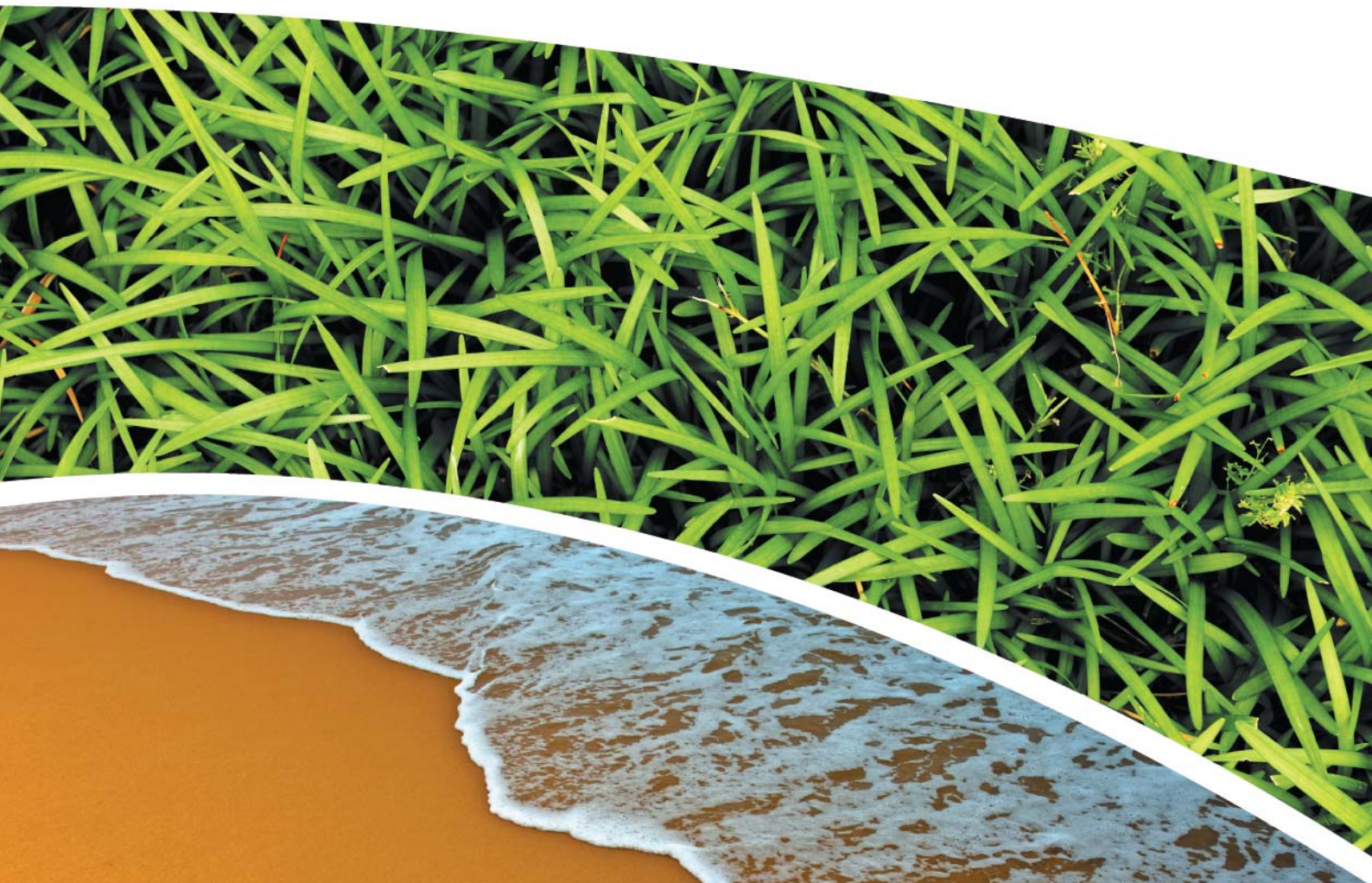
GEOTECHNICAL • ENVIRONMENTAL



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RCA LE ref 6880-824/0

25 June 2013

Pine Dale Mine
PO Box 202
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Attention: Mr Graham Goodwin

REPORT COMPILED FOR

PINE DALE MINE COMMUNITY CONSULTATIVE COMMITTEE

DETAILING GROUND WATER, DEPOSITIONAL DUST HVAS AND METEOROLOGICAL MONITORING

MAY 2013

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1 GENERAL COMMENTS

Job Number: 6880.
Date Samples Received: During the month of May 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). Additional site groundwater bore monitoring results are also presented in this report.

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 ANALYSIS RESULTS

3.1 GROUNDWATER

A total of 5 on-site groundwater samples were collected during the month of May 2013. No sample was collected from groundwater monitoring location P4 as the bore did not contain sufficient water to sample. Water quality analysis results are shown in **Table 2**.

Table 2 *Groundwater Analysis Results*

ANALYSIS	UNITS	P2	P3 P6 P7			P7a
Sample Number		05136880019	05136880020	05136880010	05136880021	05136880022
Date Sampled	-	22/05/2013	22/05/2013	22/05/2013	22/05/2013	22/05/2013
Time Sampled	-	13:20	13:10	11:35	11:55	12:00
Standing Water Level	m	4.39	5.34	25.83	6.78	5.04
Standpipe Height	m	0.95	0.66	0.95	1.00	0.90
Relative Standing Water Level*	m	4.39	5.34	25.83	6.68	5.04
pH	pH unit	5.0	5.0	6.4	7.3	7.2
Conductivity	µS/cm	246	622	1072	762	984

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

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 May 2013 at three surface water sites. Sampling was not required at Points 4, 5 and 13 as the mine was not discharging. Water quality analysis 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	-	05136880043	05136880014	05136880045
Date Sampled	-	22/05/2013	22/05/2013	22/05/2013
Time Sampled	-	14:50	13:30	15:45
Temperature	°C	8.0	8.0	14.0
Flow	-	Slow	Slow	Fast
pH	pH	7.6	7.5	8.7
Conductivity	µS/cm	1607	1611	960
Sulfate	mg/L	725	742	87
Dissolved Iron	mg/L	0.21	1.69	<0.05
Total Suspended Solids	mg/L	<5	9	<5
Turbidity	NTU	1	5	3

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 4**;

PM_{10} Suspended Particulate Matter results are shown in **Table 5**.

Table 4 *Total Suspended Particulates (µg/m³ 0°C 101.3 kPa)*

RUN DATE	TSP ($\mu g/m^3$)	SAMPLE NUMBER	FILTER NUMBER	DATE FILTER OFF	TIME FILTER OFF	FIELD TECH	HOURS RUN
03-May-13	46	05136880046	8698269	07-May-13	10:10	Client	24.00
09-May-13	60	05136880048	8698222	13-May-13	13:02	Client	24.00
15-May-13	13	05136880050	8698224	22-May-13	10:05	Client	24.09
22-May-13	14	05136880052	8698226	23-May-13	10:50	K Hawes	24.00
27-May-13	20	05136880054	8698228	29-May-13	14:25	Client	24.00

Table 5 *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
03-May-13	14	05136880047	8698270	07-May-13	10:10	Client	24.00
09-May-13	18	05136880049	8698223	13-May-13	13:02	Client	24.00
15-May-13	11	05136880051	8698225	22-May-13	10:15	Client	33.43
22-May-13	7	05136880053	8698227	23-May-13	10:50	K Hawes	24.17
27-May-13	10	05136880055	8698229	29-May-13	14:25	Client	24.00

4.1.1 Allowable TSP Limits

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 June 2012 to May 2013) for the TSP unit is 30.6µg/m^3, which is well below the allowable limit of 90µg/m^3.

4.1.2 Allowable PM_{10} Limits

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 12.0µg/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 on any run day during the May 2013 monitoring period.

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 6**.

Table 6 *Depositional Dust Monitoring - Deposited Matter April 2013*

SAMPLE NO	DEPOSIT GAUGE	DATE SAMPLE STARTED	DATE SAMPLE COMPLETED	NO OF DAYS	NOTES	INSOLUBLE SOLIDS (g/m^2/month)	ASH (g/m^2/month)	COMBUSTIBLE MATTER (g/m^2/month)
05136880033	D1	22/04/2013	22/05/2013	30	I	0.9	0.6	0.3
05136880034	D2	22/04/2013	22/05/2013	30	I	0.7	0.4	0.3
05136880035	D3	22/04/2013	22/05/2013	30	I	1.2	0.8	0.4
05136880036	D4	22/04/2013	22/05/2013	30	I	0.7	0.3	0.4
05136880037	D5	22/04/2013	22/05/2013	30	I	0.6	0.4	0.2
05136880038	D6	22/04/2013	22/05/2013	30	I	0.4	0.2	0.2

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 $1.0g/m^2$ 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 May are shown in **Table 7**.

Table 7 *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)
2/05/2013	NA	NA	99.1	0.23	NT	NT
9/05/2013	NA	NA	110.2	0.58	106.9	0.56
16/05/2013	NA	NA	102.5	0.24	108.4	0.25
24/05/2013	NA	NA	102.2	0.40	99.9	0.40
2012- 2013 Year to Date Information						
Minimum	111.30	3.50	91.2	0.08	87.20	0.10
Average	112.9	3.5	106.7	1.1	107.8	1.3
Maximum	114.5	3.57	114.4	2.69	116.30	3.47
% > EPL 95% Compliance Criteria	0.0%	0.0%	0.0%	0.0%	2.6%	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.

NA No monitoring conducted at this location.

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 June 2012 to May 2013.

During May 2013, there were nil exceedances of the EPL conditions for both overpressure and vibration levels. For the rolling annual average, there have been zero blasts which 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 blasting results from overpressure and vibration are presented 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 July 2013 period.

7 OPERATIONAL ACTIVITIES

Pine Dale Mine production rates in May 2013 were achieved, with a slight reduction in workforce due to the Irondale coal seam mined under the current Approval.

Relatively low rainfall was observed throughout the month, 22.6 mm total, which predominantly fell on the 14th and 23rd of the month. Production material targets have been achieved this month as rainfall had little impact upon operations. In total 187,000 tonnes of overburden were excavated and 36,000 tonnes of coal delivered to Mt Piper Power Station. Operations this month were principally undertaken with the use of one excavator and three trucks.

Monitoring of the Purple Copper Butterfly has ceased at present due to the dormant winter period.

8 SUMMARY

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

Quarterly surface water sampling was conducted in May 2013. All required sites were sampled during this monitoring round. EPA Points 4, 5 and 13 were not sampled this month because the site was not discharging.

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. There were zero exceedances of the PM_{10} short term impact assessment criteria of 50µg/m^3 over twenty-four hours during May 2013.

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 May there were nil exceedances of the blasting requirements documented in the Pine Dale Mine EPL. During the previous twelve month reporting period, there were nil non-conformance's based upon the 95% or 100% limits for either overpressure or vibration levels.

Please contact the undersigned if you have any queries.

Yours sincerely

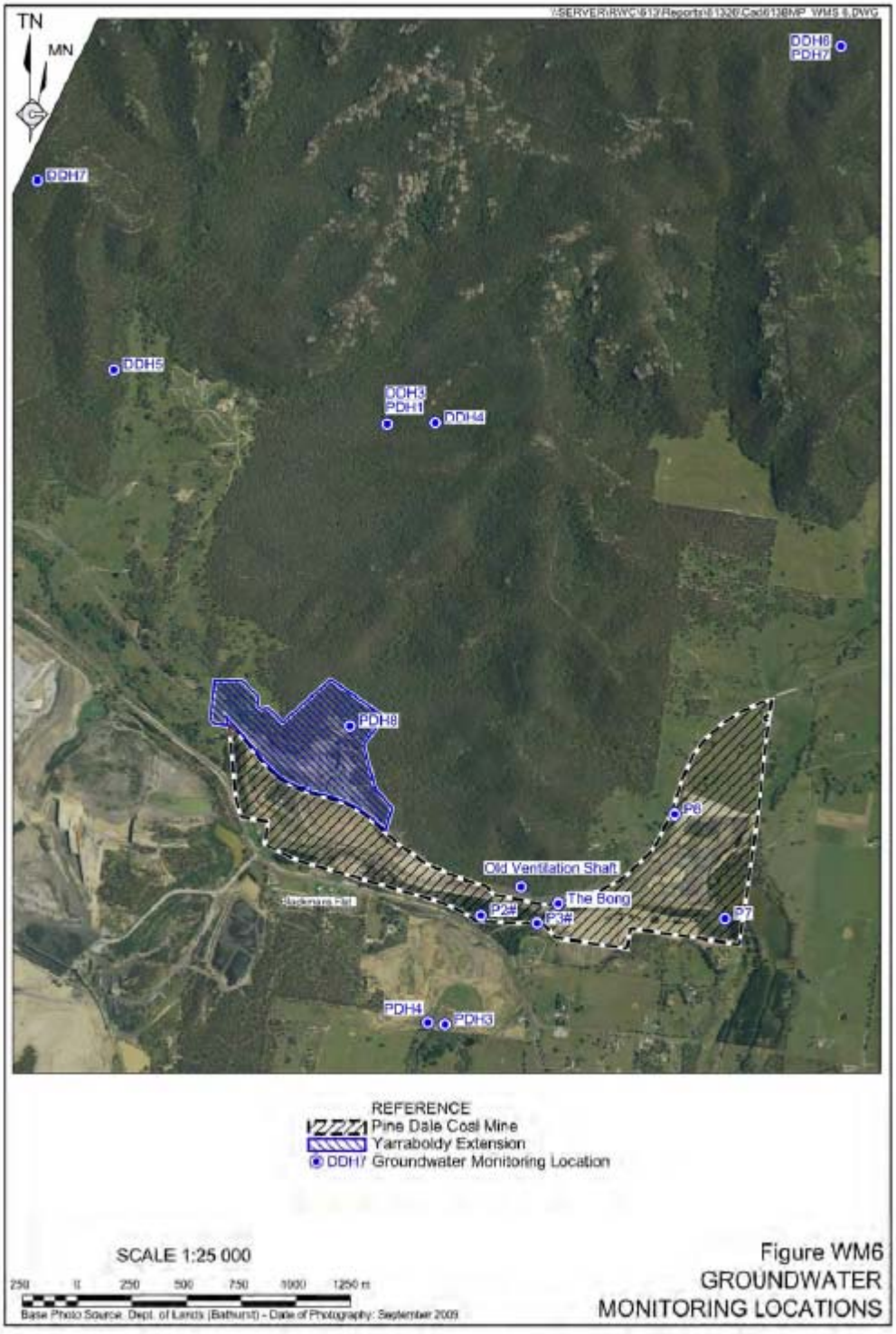
Katy Shaw
Environmental Scientist
RCA Australia Pty Ltd trading as
RCA Laboratories – Environmental

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\WC\613\Reports\61326\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

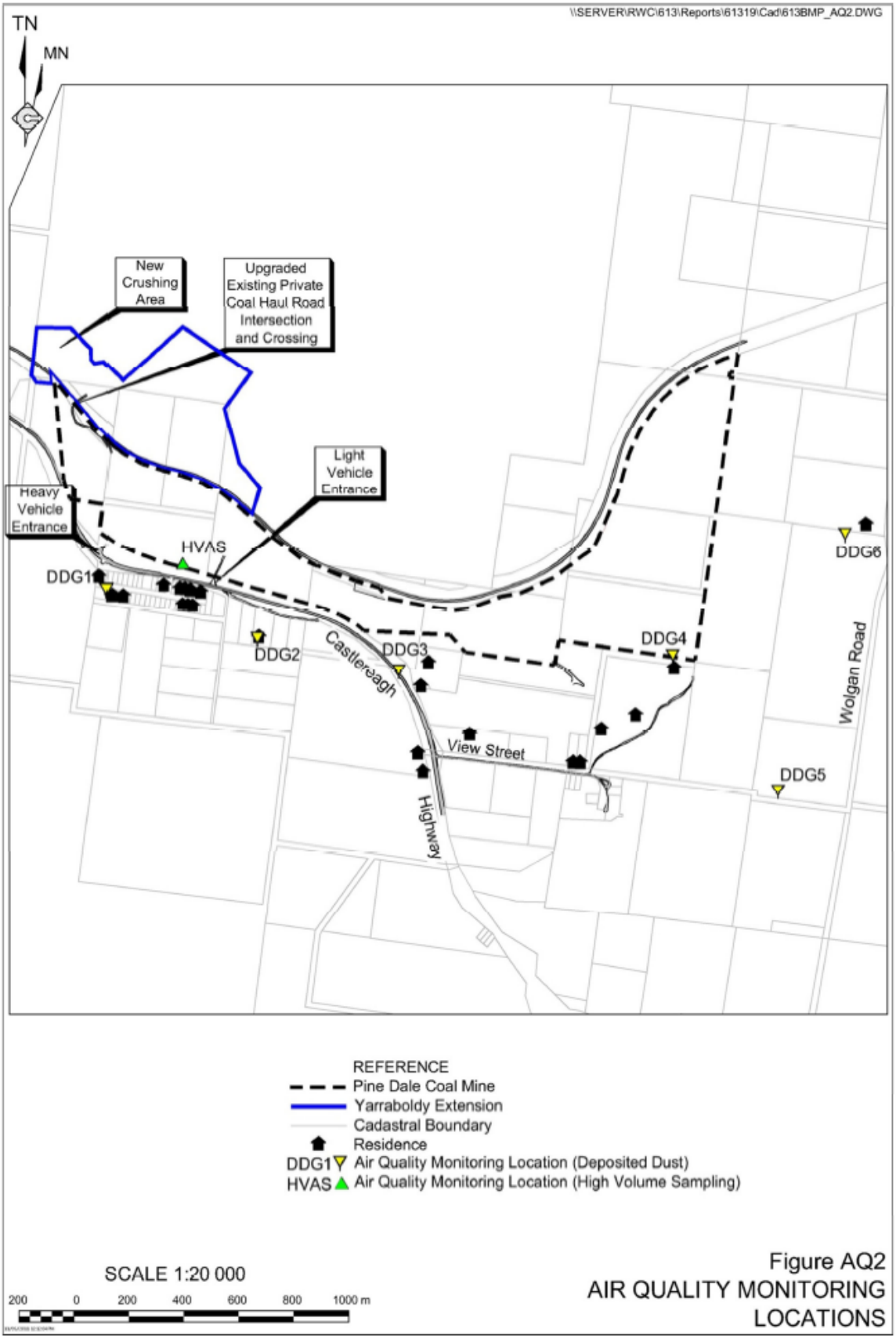
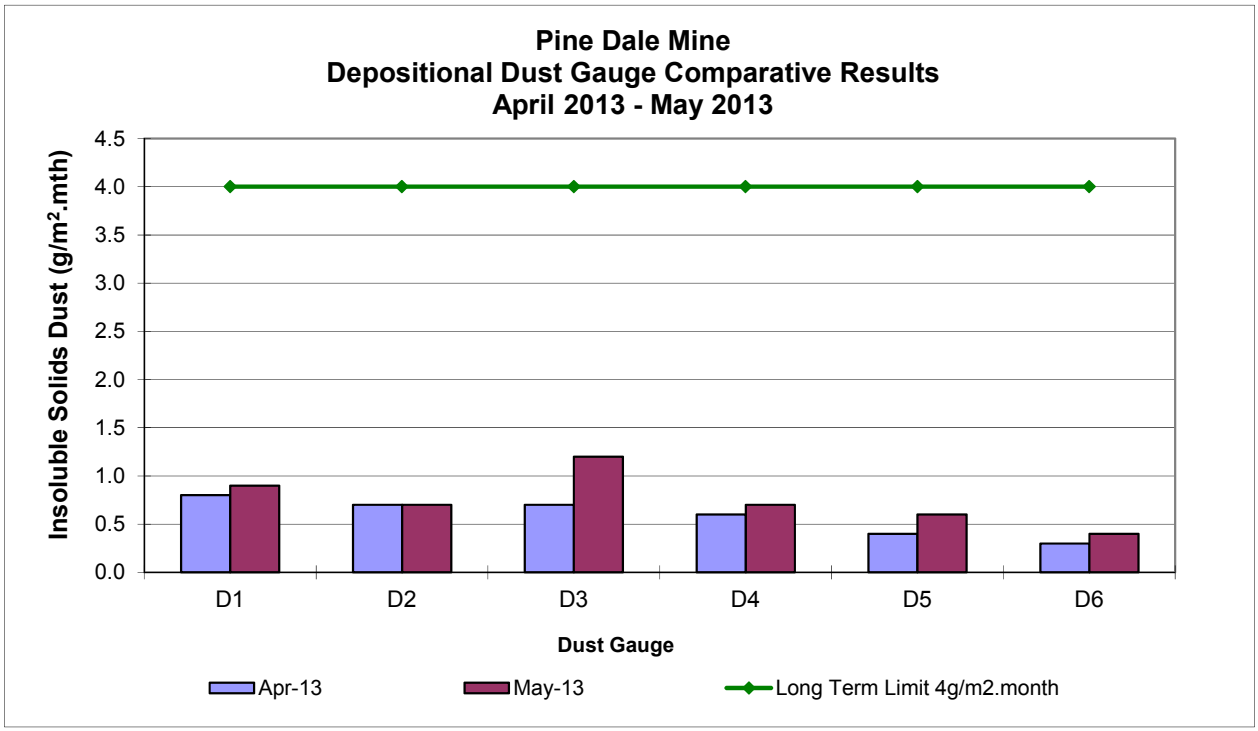
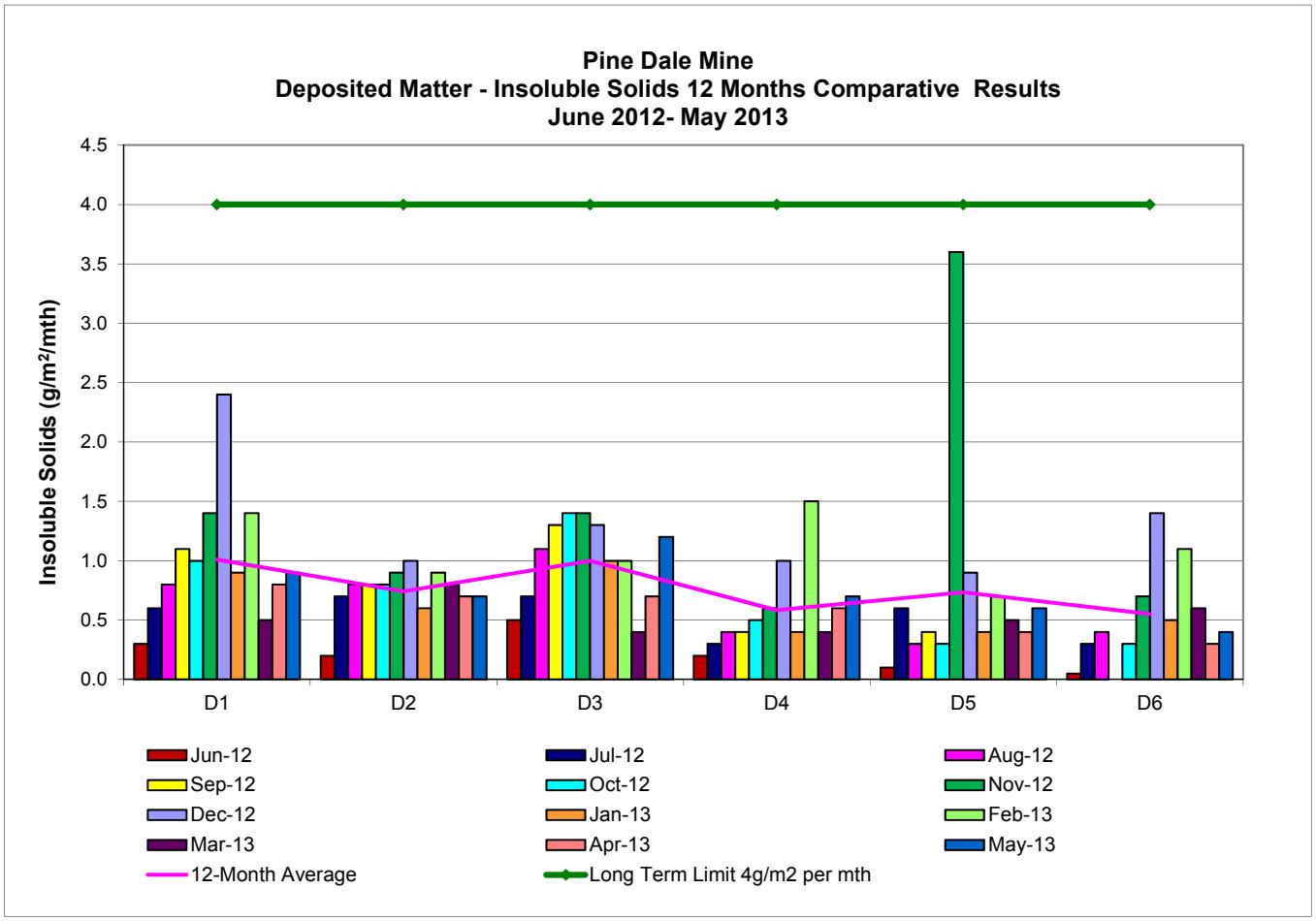


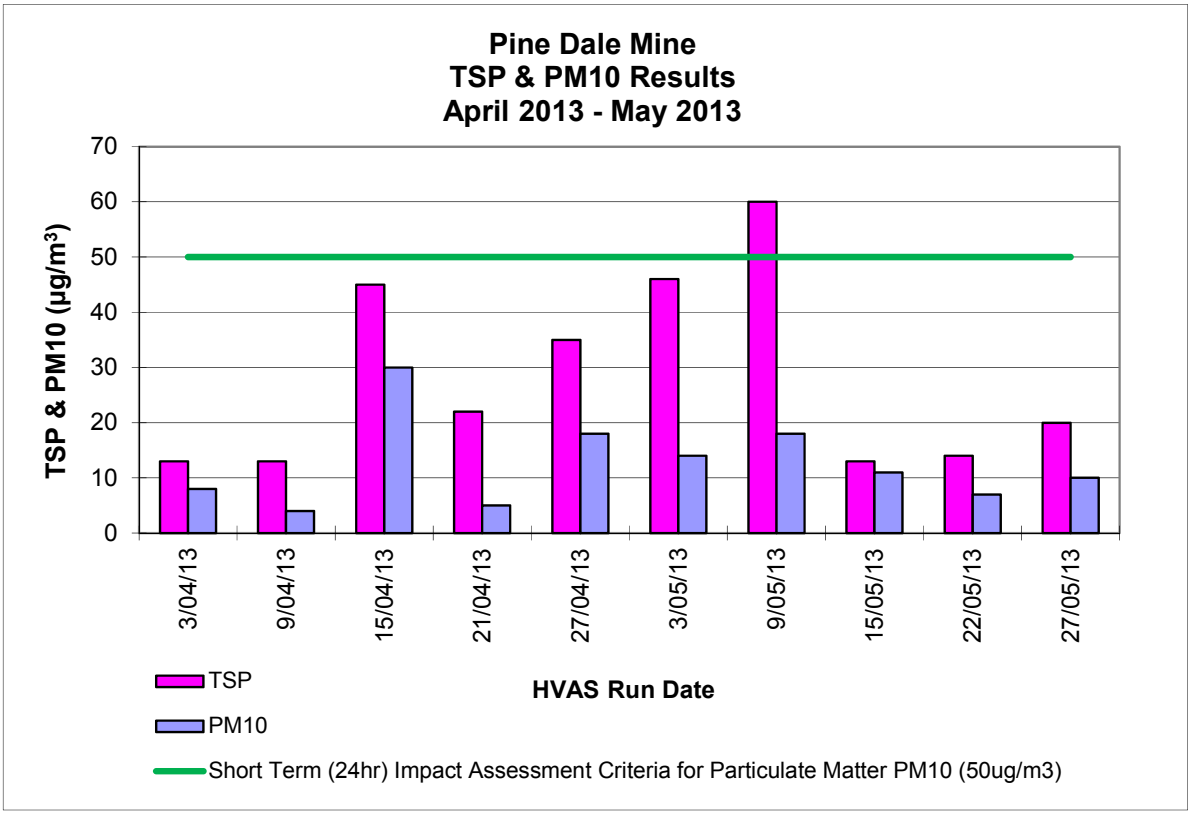
Figure AQ2
AIR QUALITY MONITORING LOCATIONS

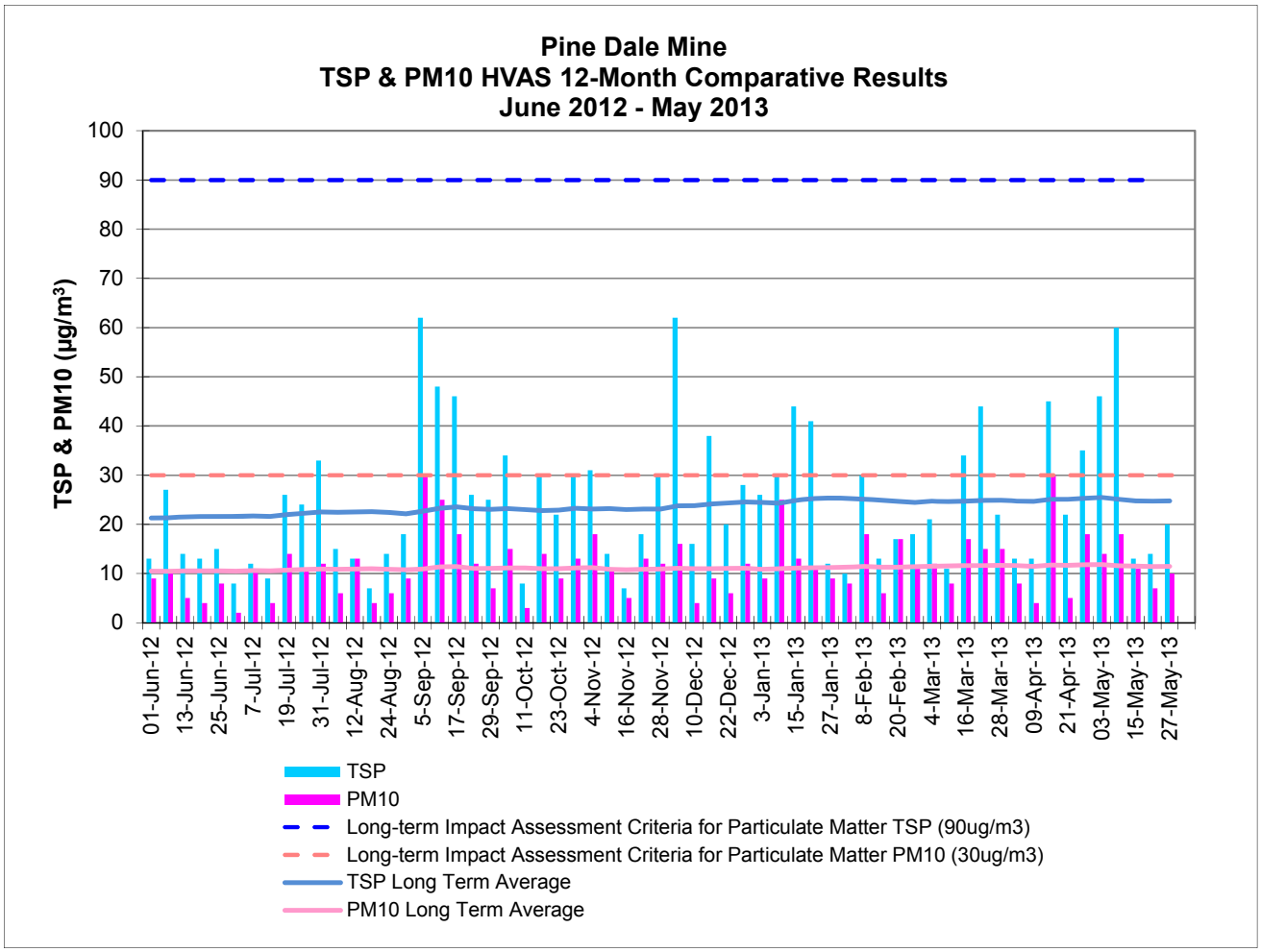
Appendix 2

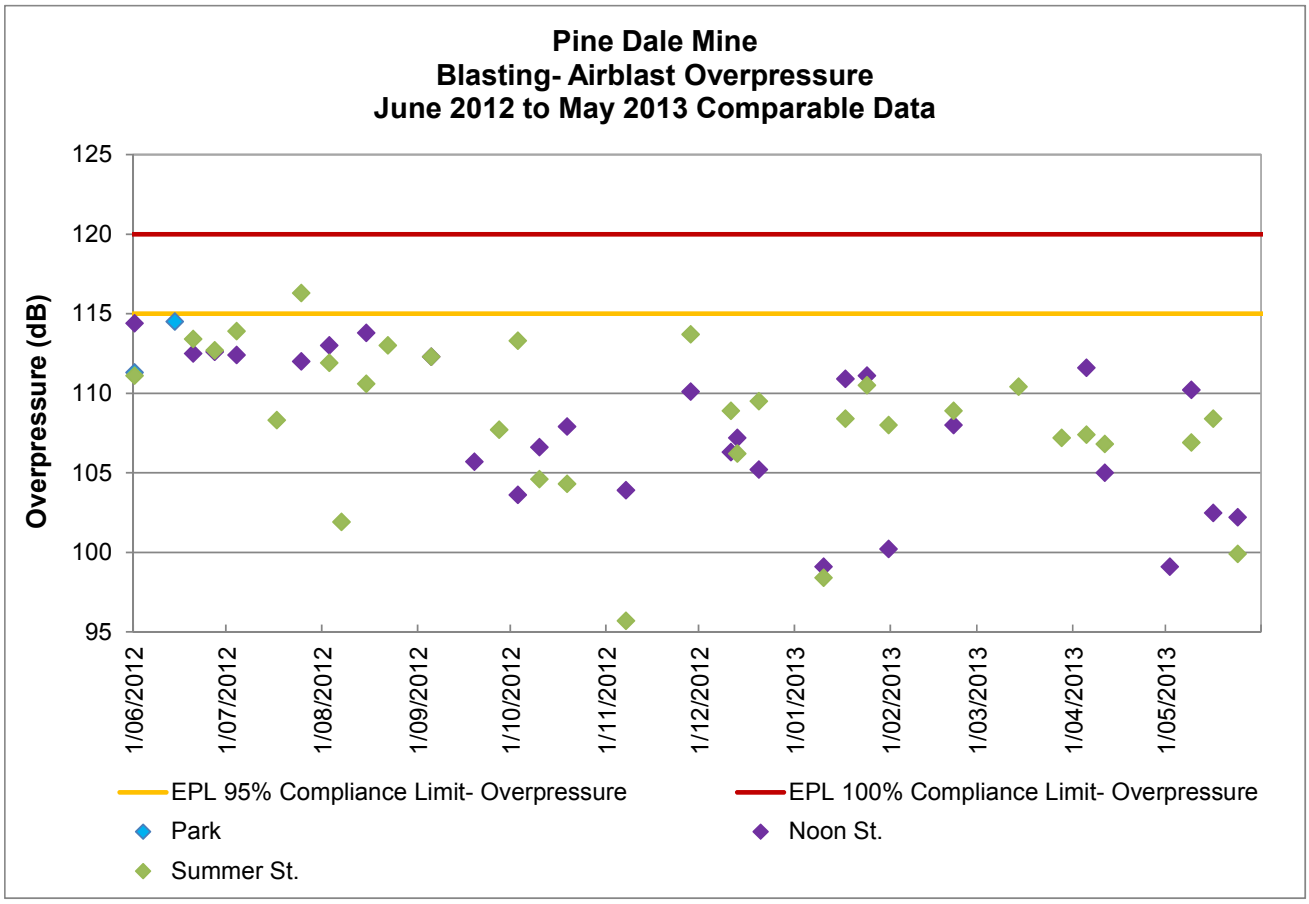
Depositional Dust, HVAS and Blast Result Graphs

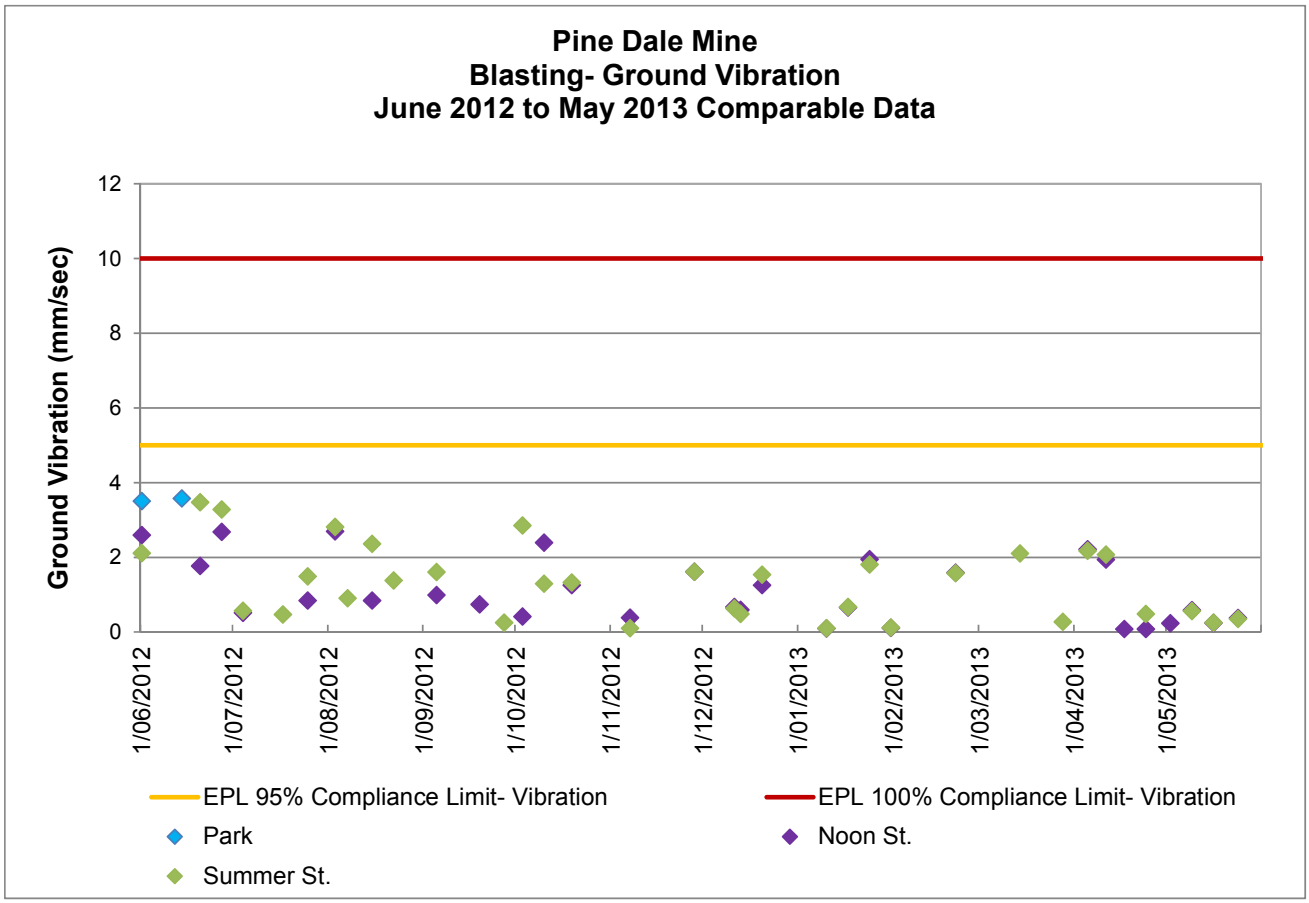

Pine Dale Mine
Depositional Dust Gauge Comparative Results
April 2013 - May 2013
Insoluble Solids Dust (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
Dust Gauge
Apr-13
May-13
Long Term Limit 4g/m2.month


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


Pine Dale Mine
TSP & PM10 Results
April 2013 - May 2013
TSP & PM10 (µg/m³)
70
60
50
40
30
20
10
0
3/04/13
9/04/13
15/04/13
21/04/13
27/04/13
3/05/13
9/05/13
15/05/13
22/05/13
27/05/13
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

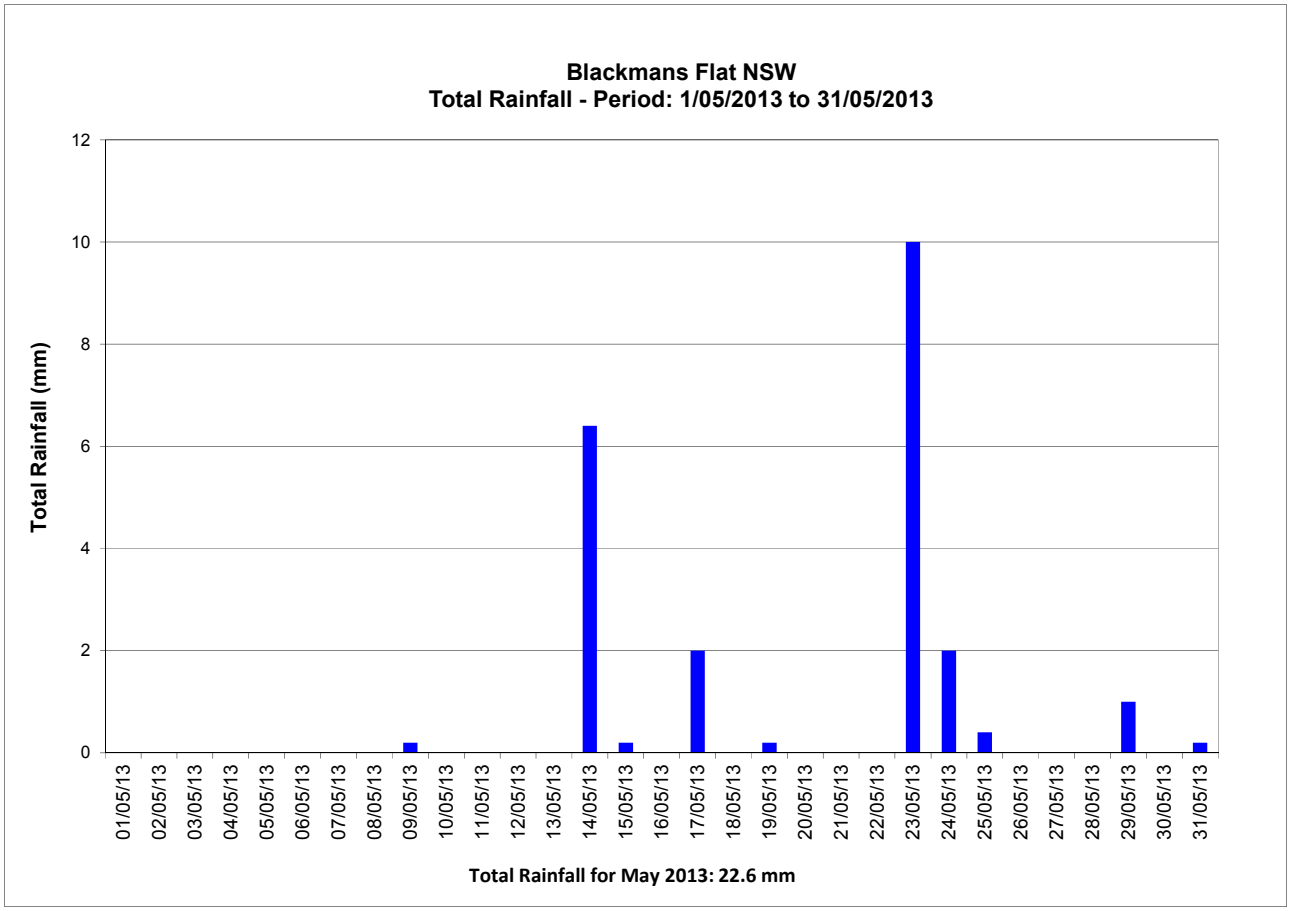

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
June 2012 - May 2013
TSP & PM10 (µg/m³)
100
90
80
70
60
50
40
30
20
10
0
01-Jun-12
13-Jun-12
25-Jun-12
7-Jul-12
19-Jul-12
31-Jul-12
12-Aug-12
24-Aug-12
5-Sep-12
17-Sep-12
29-Sep-12
11-Oct-12
23-Oct-12
4-Nov-12
16-Nov-12
28-Nov-12
10-Dec-12
22-Dec-12
3-Jan-13
15-Jan-13
27-Jan-13
8-Feb-13
20-Feb-13
4-Mar-13
16-Mar-13
28-Mar-13
09-Apr-13
21-Apr-13
03-May-13
15-May-13
27-May-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

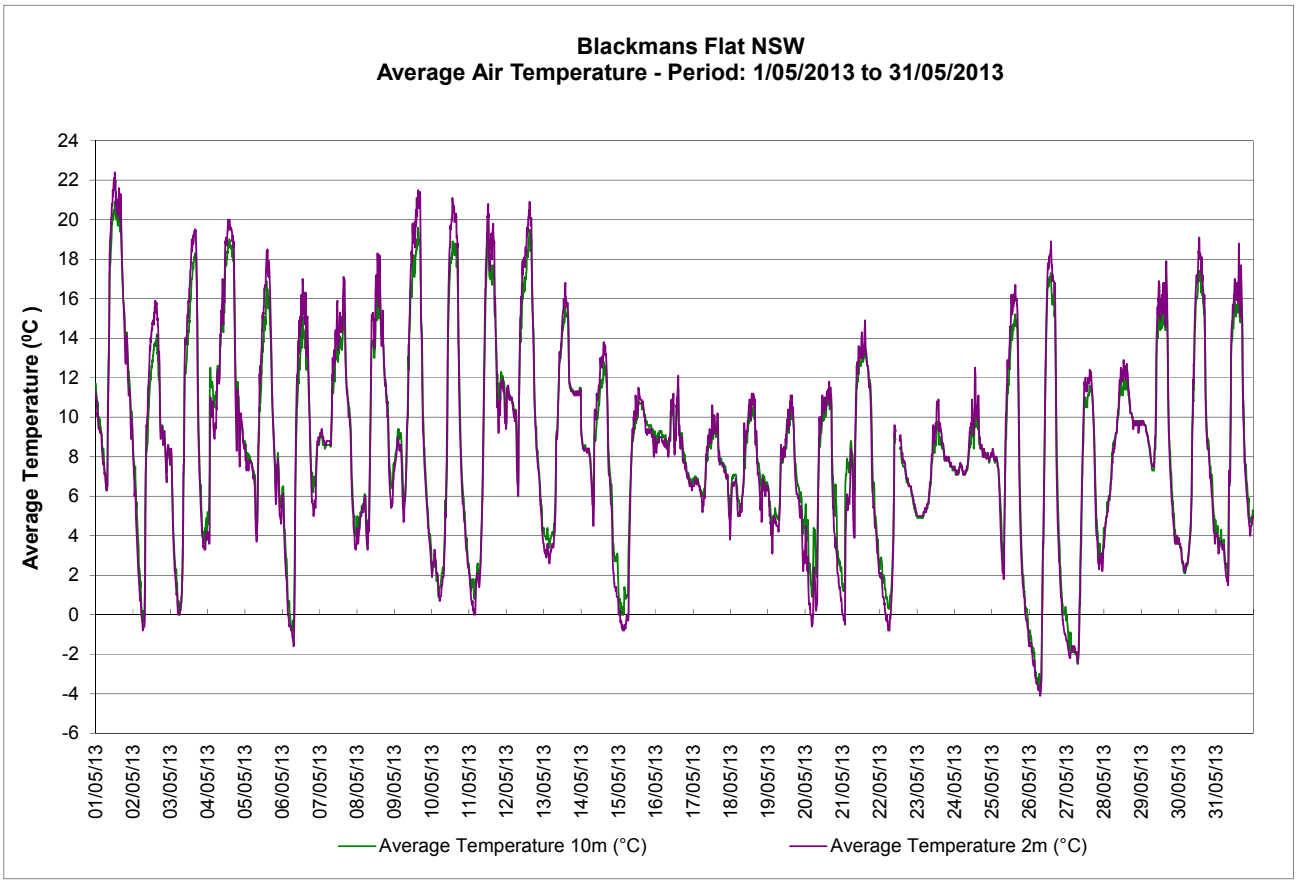

Pine Dale Mine
Blasting- Airblast Overpressure
June 2012 to May 2013 Comparable Data
Overpressure (dB)
125
120
115
110
105
100
95
1/06/2012
1/07/2012
1/08/2012
1/09/2012
1/10/2012
1/11/2012
1/12/2012
1/01/2013
1/02/2013
1/03/2013
1/04/2013
1/05/2013
EPL 95% Compliance Limit- Overpressure
EPL 100% Compliance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

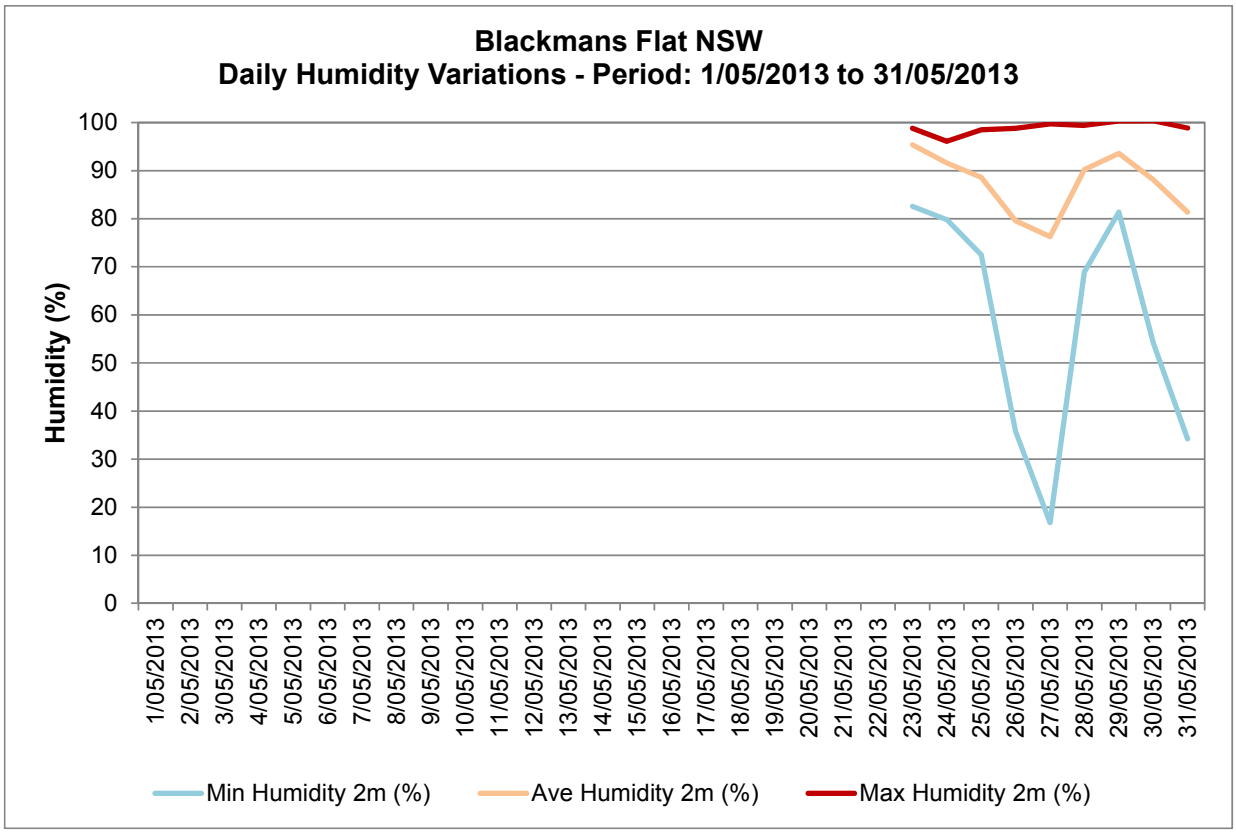

Pine Dale Mine
Blasting- Ground Vibration
June 2012 to May 2013 Comparable Data
Ground Vibration (mm/sec)
12
10
8
6
4
2
0
1/06/2012
1/07/2012
1/08/2012
1/09/2012
1/10/2012
1/11/2012
1/12/2012
1/01/2013
1/02/2013
1/03/2013
1/04/2013
1/05/2013
EPL 95% Compliance Limit- Vibration
EPL 100% Compliance Limit-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

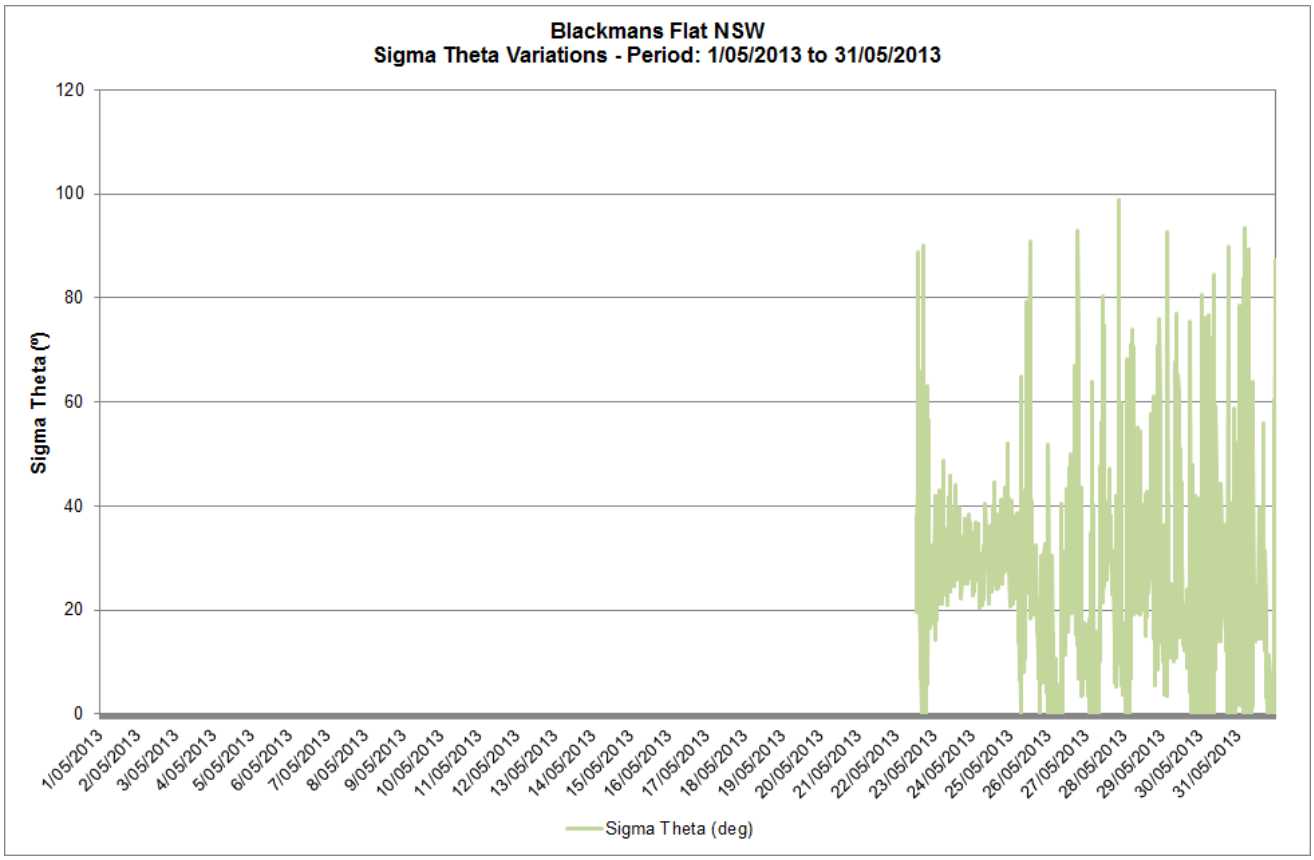
Appendix 3

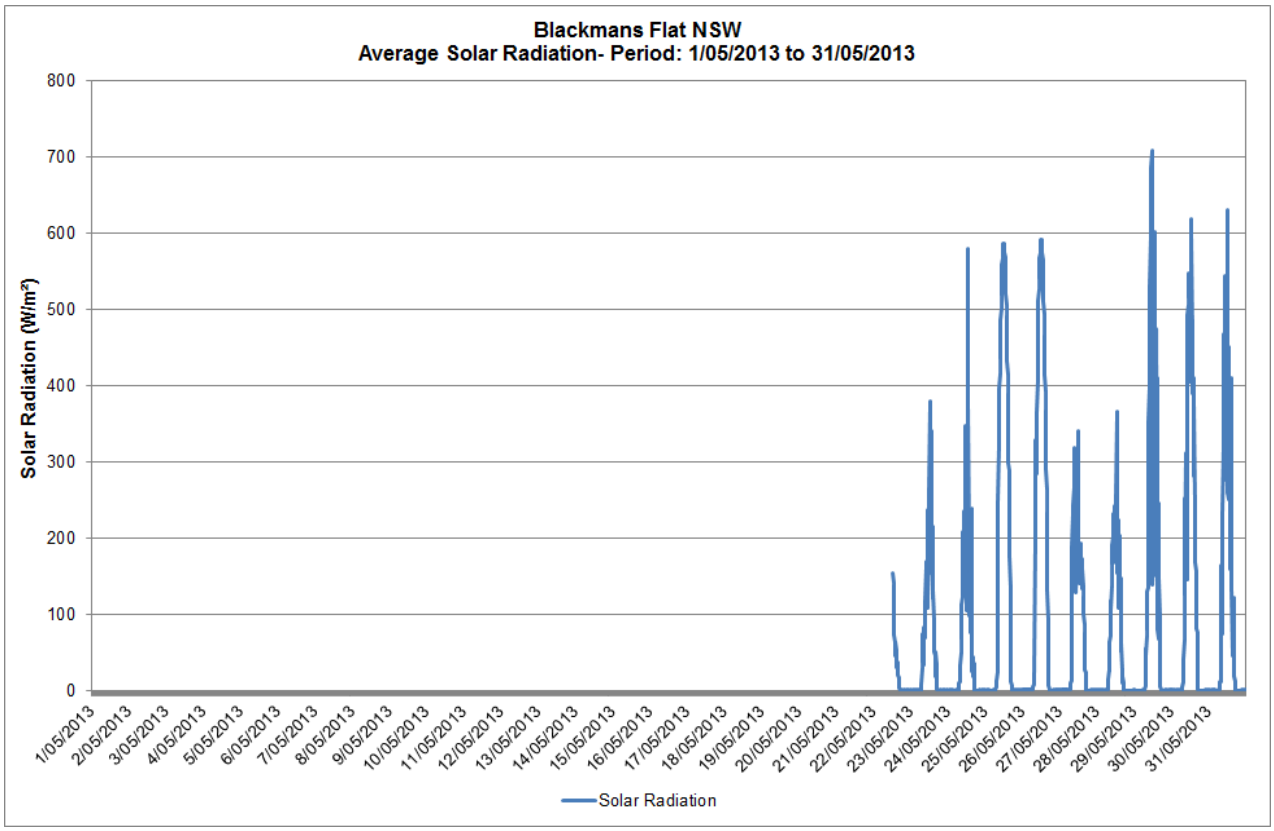
Meteorological Data

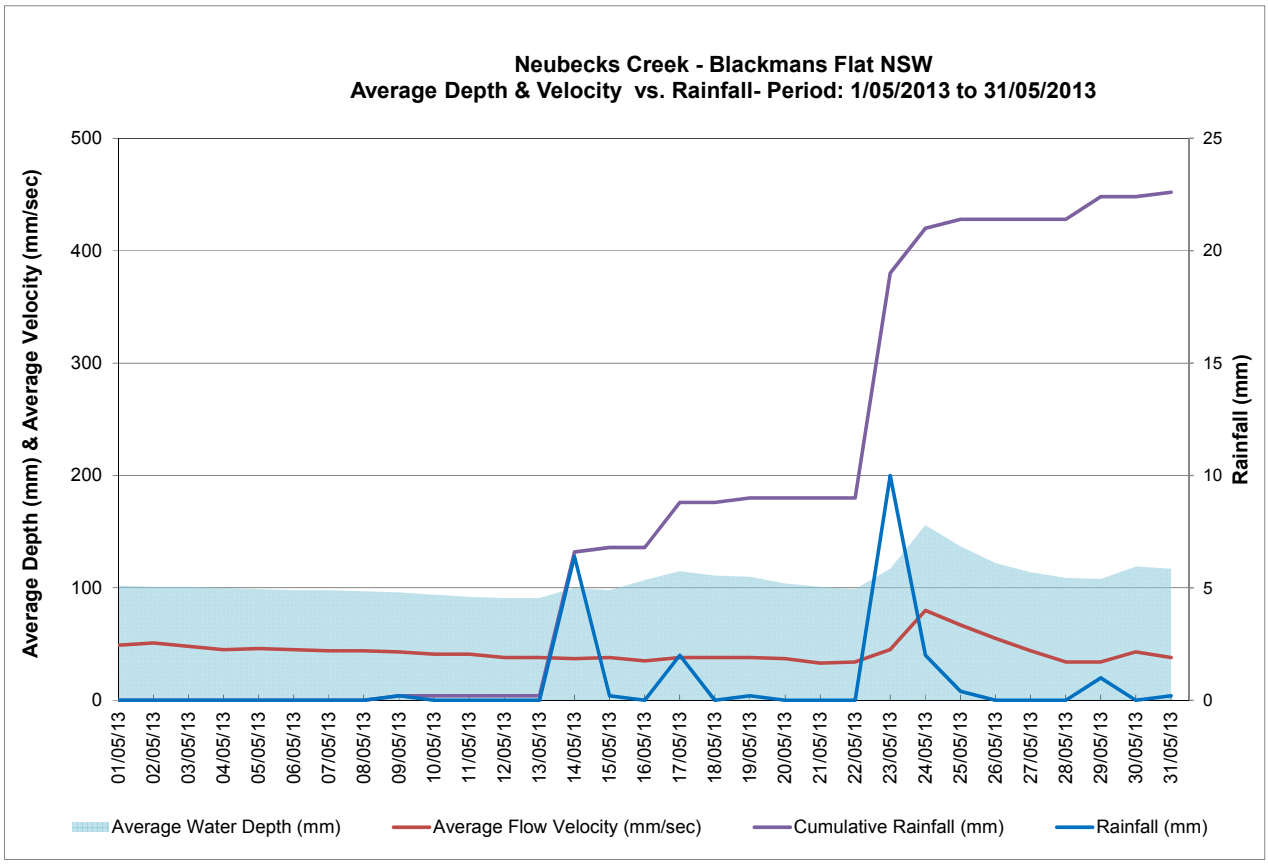

Blackmans Flat NSW
Total Rainfall - Period: 1/05/2013 to 31/05/2013
Total Rainfall (mm)
0
2
4
6
8
10
12
01/05/13
02/05/13
03/05/13
04/05/13
05/05/13
06/05/13
07/05/13
08/05/13
09/05/13
10/05/13
11/05/13
12/05/13
13/05/13
14/05/13
15/05/13
16/05/13
17/05/13
18/05/13
19/05/13
20/05/13
21/05/13
22/05/13
23/05/13
24/05/13
25/05/13
26/05/13
27/05/13
28/05/13
29/05/13
30/05/13
31/05/13
Total Rainfall for May 2013: 22.6 mm

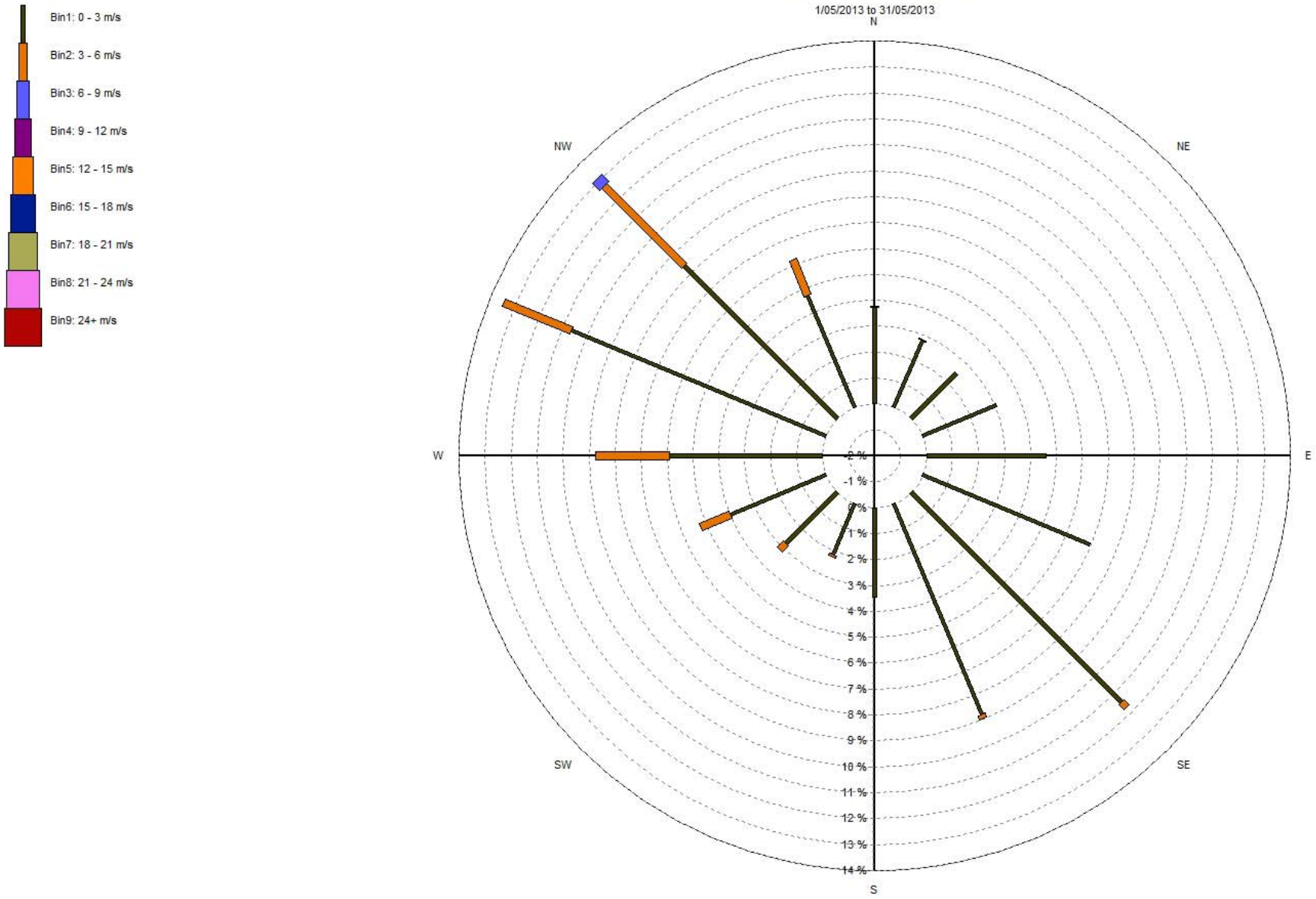

Blackmans Flat NSW
Average Air Temperature - Period: 1/05/2013 to 31/05/2013
Average Temperature (ºC)
-6
-4
-2
0
2
4
6
8
10
12
14
16
18
20
22
24
01/05/13
02/05/13
03/05/13
04/05/13
05/05/13
06/05/13
07/05/13
08/05/13
09/05/13
10/05/13
11/05/13
12/05/13
13/05/13
14/05/13
15/05/13
16/05/13
17/05/13
18/05/13
19/05/13
20/05/13
21/05/13
22/05/13
23/05/13
24/05/13
25/05/13
26/05/13
27/05/13
28/05/13
29/05/13
30/05/13
31/05/13
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/05/2013 to 31/05/2013
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
1/05/2013
2/05/2013
3/05/2013
4/05/2013
5/05/2013
6/05/2013
7/05/2013
8/05/2013
9/05/2013
10/05/2013
11/05/2013
12/05/2013
13/05/2013
14/05/2013
15/05/2013
16/05/2013
17/05/2013
18/05/2013
19/05/2013
20/05/2013
21/05/2013
22/05/2013
23/05/2013
24/05/2013
25/05/2013
26/05/2013
27/05/2013
28/05/2013
29/05/2013
30/05/2013
31/05/2013
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/05/2013 to 31/05/2013
Sigma Theta (°)
120
100
80
60
40
20
0
1/05/2013
2/05/2013
3/05/2013
4/05/2013
5/05/2013
6/05/2013
7/05/2013
8/05/2013
9/05/2013
10/05/2013
11/05/2013
12/05/2013
13/05/2013
14/05/2013
15/05/2013
16/05/2013
17/05/2013
18/05/2013
19/05/2013
20/05/2013
21/05/2013
22/05/2013
23/05/2013
24/05/2013
25/05/2013
26/05/2013
27/05/2013
28/05/2013
29/05/2013
30/05/2013
31/05/2013
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/05/2013 to 31/05/2013
Solar Radiation (W/m²)
800
700
600
500
400
300
200
100
0
1/05/2013
2/05/2013
3/05/2013
4/05/2013
5/05/2013
6/05/2013
7/05/2013
8/05/2013
9/05/2013
10/05/2013
11/05/2013
12/05/2013
13/05/2013
14/05/2013
15/05/2013
16/05/2013
17/05/2013
18/05/2013
19/05/2013
20/05/2013
21/05/2013
22/05/2013
23/05/2013
24/05/2013
25/05/2013
26/05/2013
27/05/2013
28/05/2013
29/05/2013
30/05/2013
31/05/2013
Solar Radiation


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/05/2013 to 31/05/2013
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
500
400
300
200
100
0
25
20
15
10
5
0
01/05/13
02/05/13
03/05/13
04/05/13
05/05/13
06/05/13
07/05/13
08/05/13
09/05/13
10/05/13
11/05/13
12/05/13
13/05/13
14/05/13
15/05/13
16/05/13
17/05/13
18/05/13
19/05/13
20/05/13
21/05/13
22/05/13
23/05/13
24/05/13
25/05/13
26/05/13
27/05/13
28/05/13
29/05/13
30/05/13
31/05/13
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)


Blackman's Flat Windrose
1/05/2013 to 31/05/2013
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
-2 %
-1 %
0 %
1 %
2 %
3 %
4 %
5 %
6 %
7 %
8 %
9 %
10 %
11 %
12 %
13 %
14 %