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

Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-817/0

February 2013

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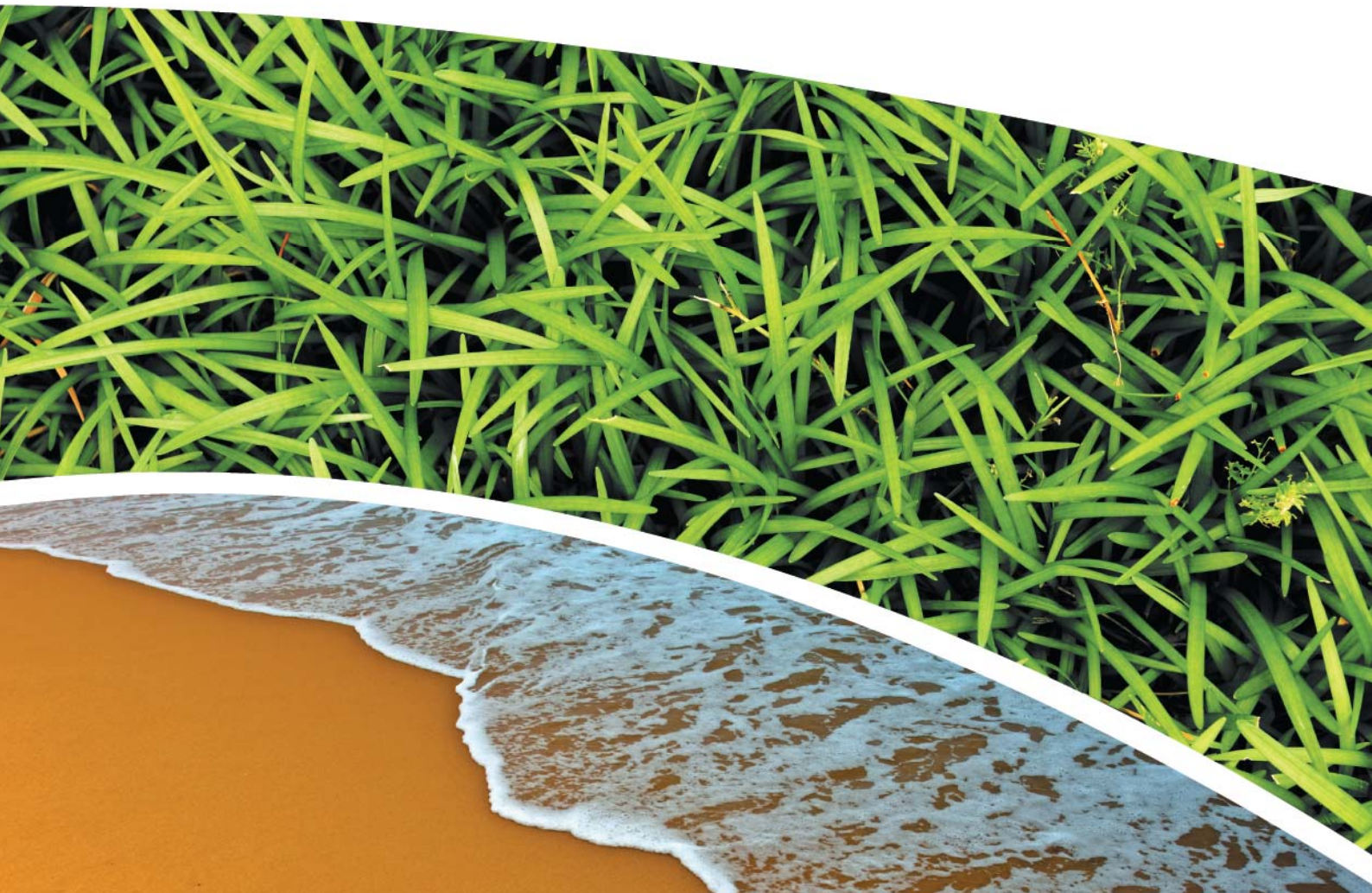
GEOTECHNICAL • ENVIRONMENTAL



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/0	1	Bound report	Pine Dale Mine – Michael Cunnion PO Box 202, Wallerawang NSW 2845	08.04.13
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8 April 2013

Pine Dale Mine
PO Box 202
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Attention: Mr Michael Cunnion

REPORT COMPILED FOR

PINE DALE MINE COMMUNITY CONSULTATIVE COMMITTEE

DETAILING GROUND WATER, DEPOSITIONAL DUST HVAS AND METEOROLOGICAL MONITORING

FEBRUARY 2013

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1 GENERAL COMMENTS

Job Number: 6880.
Date Samples Received: During the month of February 2013.
Samples received were sampled by RCA Laboratories – Environmental staff.

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/m3	RCA Laboratories - Environmental	NATA Analysis
Determination of Particulate Matter – Deposited Matter	ENV-LAB004	g/m2/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
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 February 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		02136880019	02136880020	02136880010	02136880021	02136880022
Date Sampled	-	20/02/13	20/02/13	20/02/13	20/02/13	20/02/13
Time Sampled	-	15:42	15:37	14:33	14:45	14:50
Standing Water Level	m	5.15	5.72	26.81	7.96	6.06
Standpipe Height	m	0.95	0.66	0.95	1.00	0.90
Relative Standing Water Level*	m	4.20	5.06	25.86	6.96	5.16
pH	pH unit	4.8	4.5	6.6	7.1	6.8
Conductivity	µS/cm	262	433	992	717	773
Dissolved Iron	mg/L	0.125	0.79	1.64	<0.05	3.74

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 February 2013 at three surface water sites. 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	-	02136880046	02136880014	02136880047
Date Sampled	-	20/02/2013	20/02/2013	20/02/2013
Time Sampled	-	14:18	15:50	17:16
Temperature	°C	21.3	15.0	19.0
Flow	-	Still	Fast	Fast
pH	pH	7.4	6.9	7.8
Conductivity	µS/cm	685	2460	1204
Sulfate	mg/L	249	1440	78
Dissolved Iron	mg/L	0.12	0.15	0.13
Total Suspended Solids	mg/L	<5	<5	<5
Turbidity	NTU	3	2	4

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 (µg/m^3)	SAMPLE NUMBER	FILTER NUMBER	DATE FILTER OFF	TIME FILTER OFF	FIELD TECH	HOURS RUN
02-Feb-13	10	02136880048	8580228	06-Feb-13	10:50	Client	24.00
08-Feb-13	30	02136880050	8606008	11-Feb-13	13:10	Client	24.00
14-Feb-13	13	02136880052	8606006	19-Feb-13	10:35	Client	24.00
20-Feb-13	17	02136880054	8606004	22-Feb-13	10:50	Client	24.00
26-Feb-13	18	02136880056	8697683	28-Feb-13	9:30	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
02-Feb-13	8	02136880049	8580229	06-Feb-13	10:50	Client	24.00
08-Feb-13	18	02136880051	8606009	11-Feb-13	13:10	Client	24.00
14-Feb-13	6	02136880053	8606007	19-Feb-13	10:35	Client	24.00
20-Feb-13	17	02136880055	8606005	22-Feb-13	10:50	Client	24.00
26-Feb-13	11	02136880057	8697684	28-Feb-13	9:30	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 March 2012 to February 2013) for the TSP unit is 24.4µg/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 11.4µg/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 February 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 February 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)
02136880033	D1	22/01/2013	20/02/2013	29	I	1.4	0.7	0.7
02136880034	D2	22/01/2013	20/02/2013	29	T	0.9	0.4	0.5
02136880035	D3	22/01/2013	20/02/2013	29	I	1.0	0.6	0.4
02136880036	D4	22/01/2013	20/02/2013	29	N	1.5	0.8	0.7
02136880037	D5	22/01/2013	20/02/2013	29	I	0.7	0.4	0.3
02136880038	D6	22/01/2013	20/02/2013	29	I	1.1	0.5	0.6

4.2.1 Glossary of Terms Used in Notes

I Insects (eg, ants, spiders)
T Tree litter (e.g. Twigs, leaves, gumnuts)
N No foreign matter

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 1.1g/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**.

4.3 BLASTING

Blasting results for the month of November 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)
21/02/2013	NT	NT	108.9	1.57	108.0	1.59
27/02/2013	NT	NT	NT	NT	NT	NT
2012- 2013 Year to Date Information						
Minimum	103.9	0.32	99.1	0.09	95.7	0.10
Average	110.1	2.00	109.5	1.20	108.8	1.50
Maximum	114.6	3.87	114.4	2.69	116.3	4.58
% > EPL 95% Compliance Criteria	0%	0%	0%	0%	3%	0%
% > EPL 100% Compliance Criteria	0	0	0%	0%	0%	0%

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

N/A Not Applicable. No blasts have been triggered at this site thus far in the reporting period.

4.3.1 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 March 2012 to February 2013.

During February 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**.

5 SUMMARY

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

Quarterly surface water sampling was conducted in February 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 February 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 February there were nil exceedances of the blasting requirements documented in the Pine Dale Mine EPL. During the 2012-2013 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

Groundwater and Air Quality Monitoring Locations

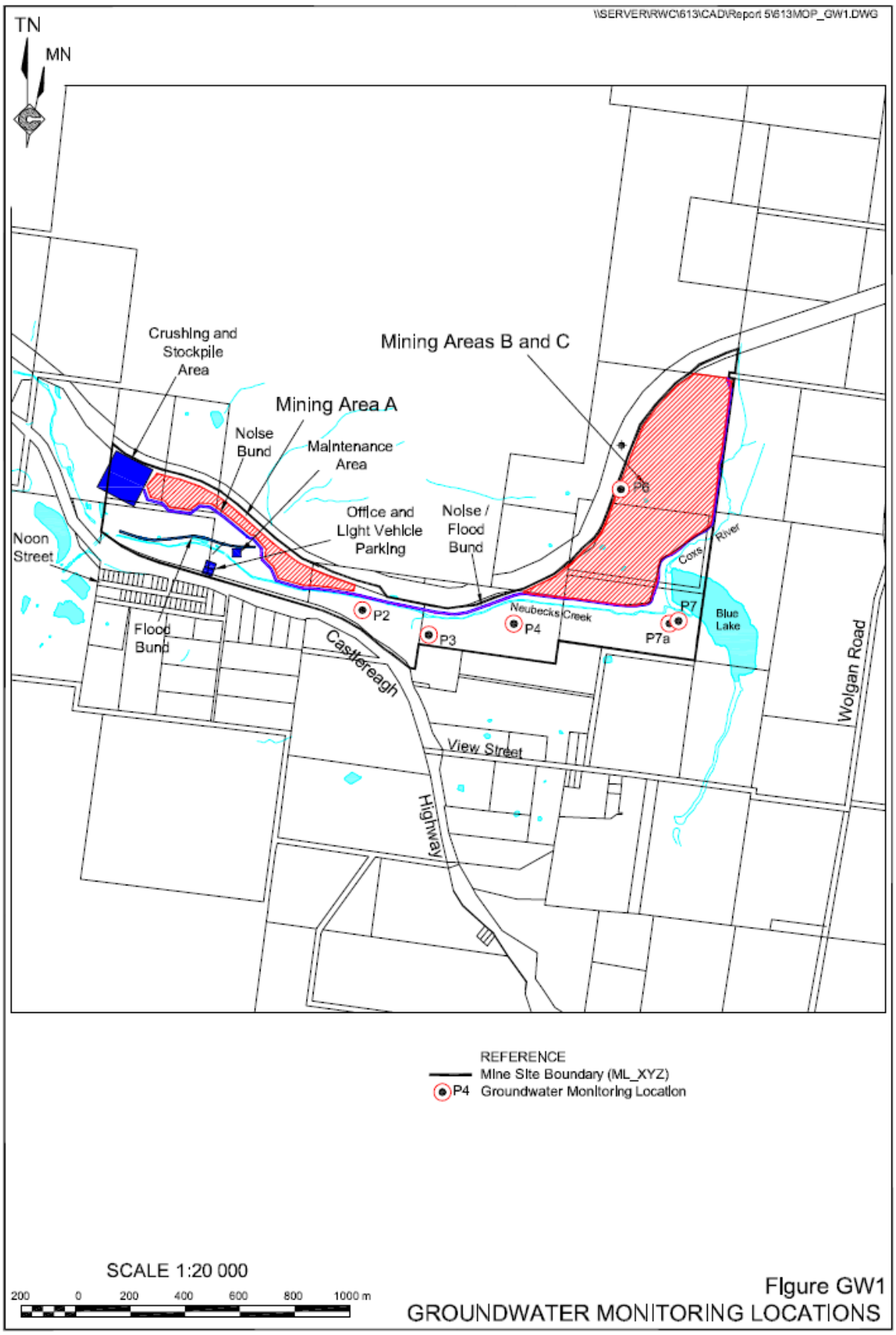

Figure GW1
GROUNDWATER MONITORING LOCATIONS

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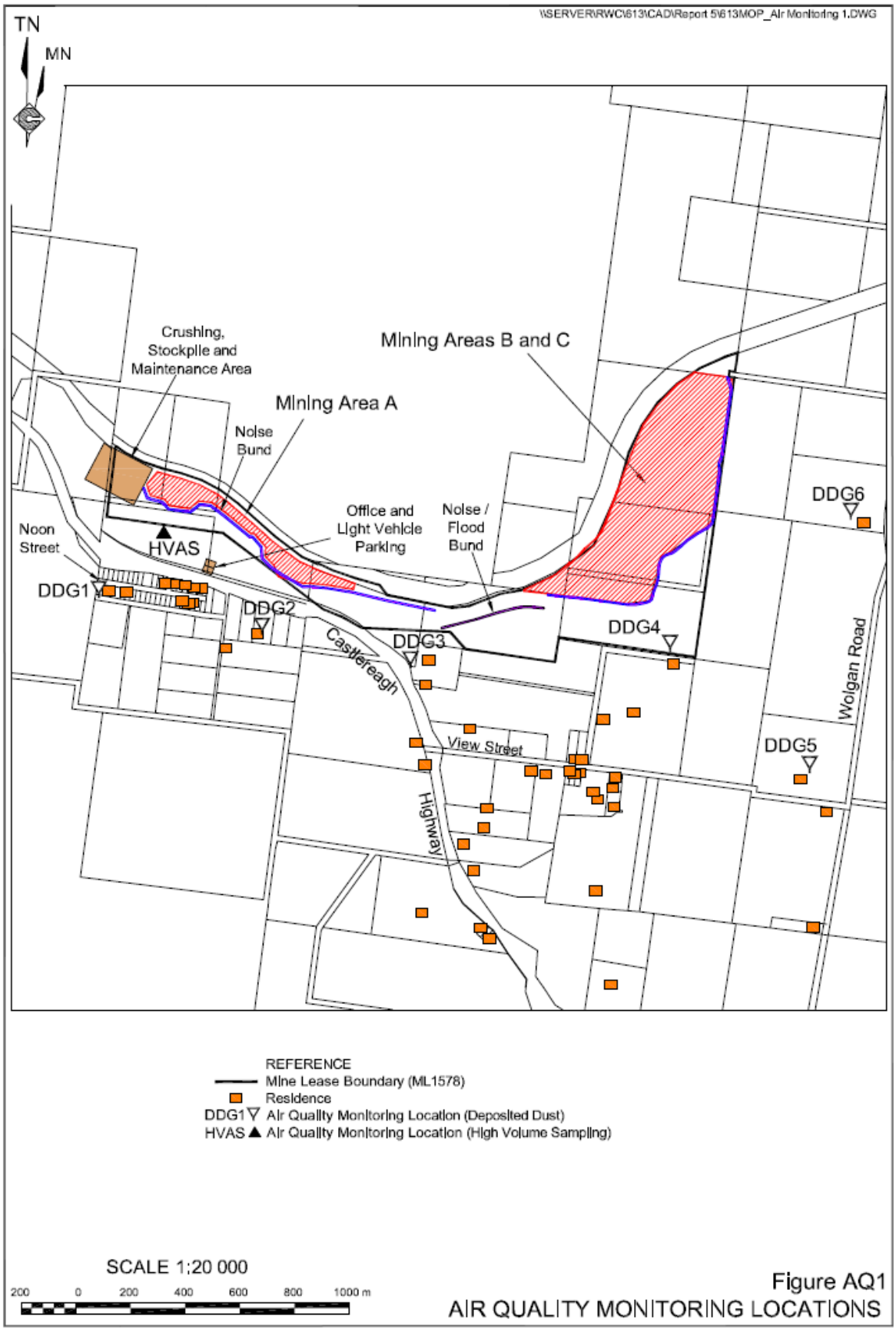
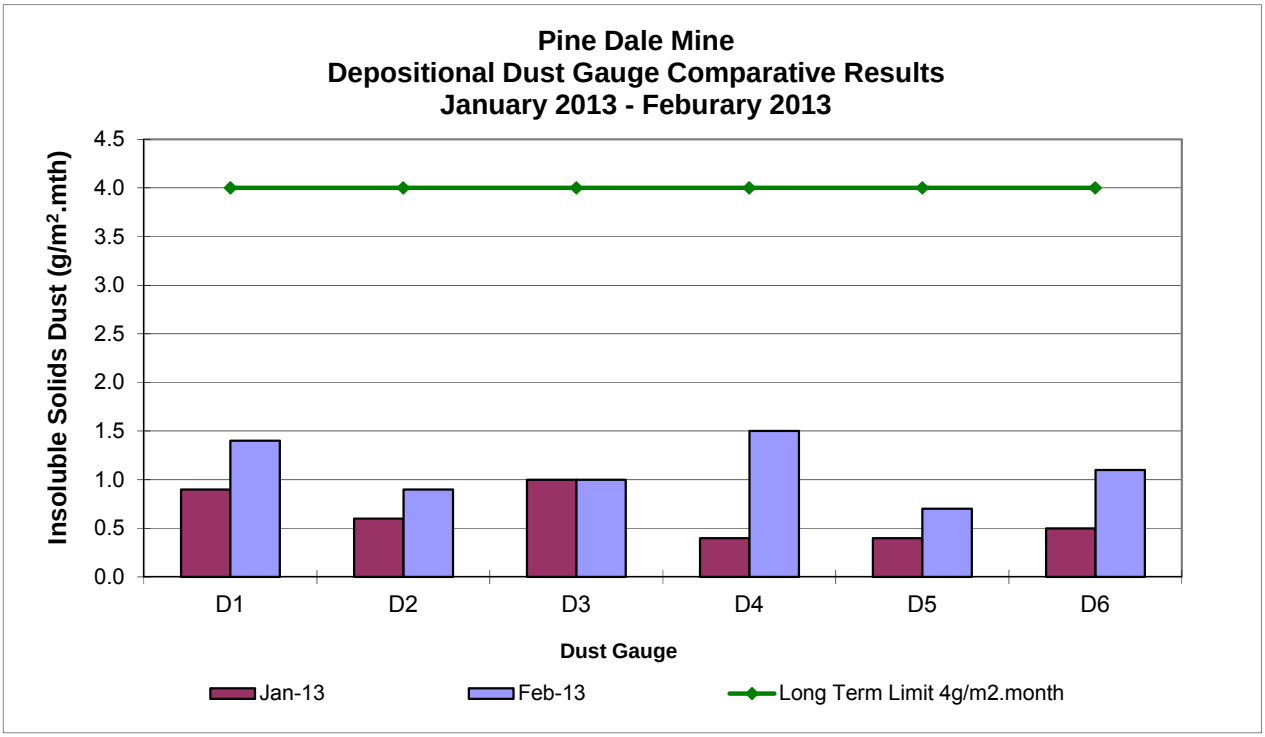
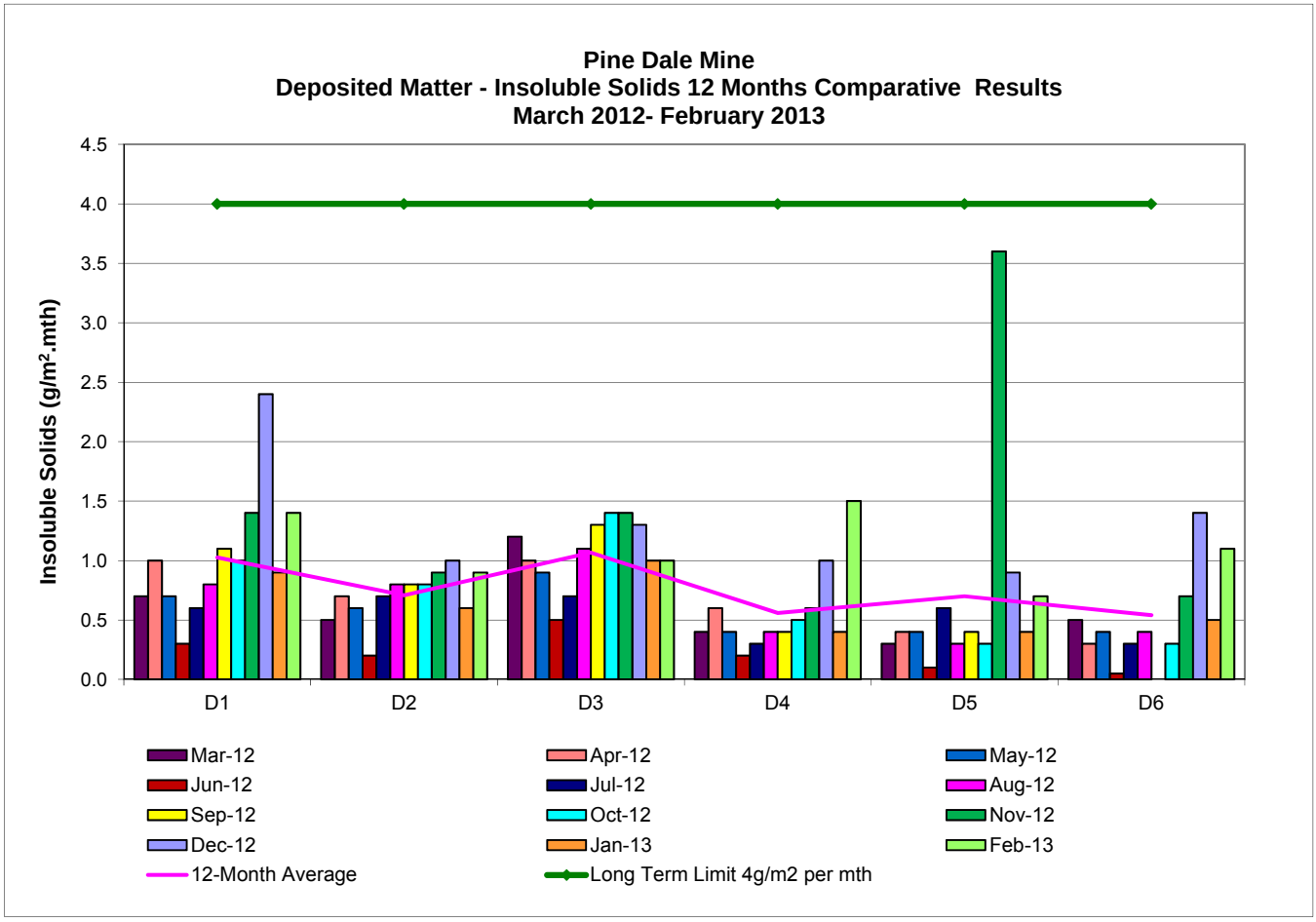


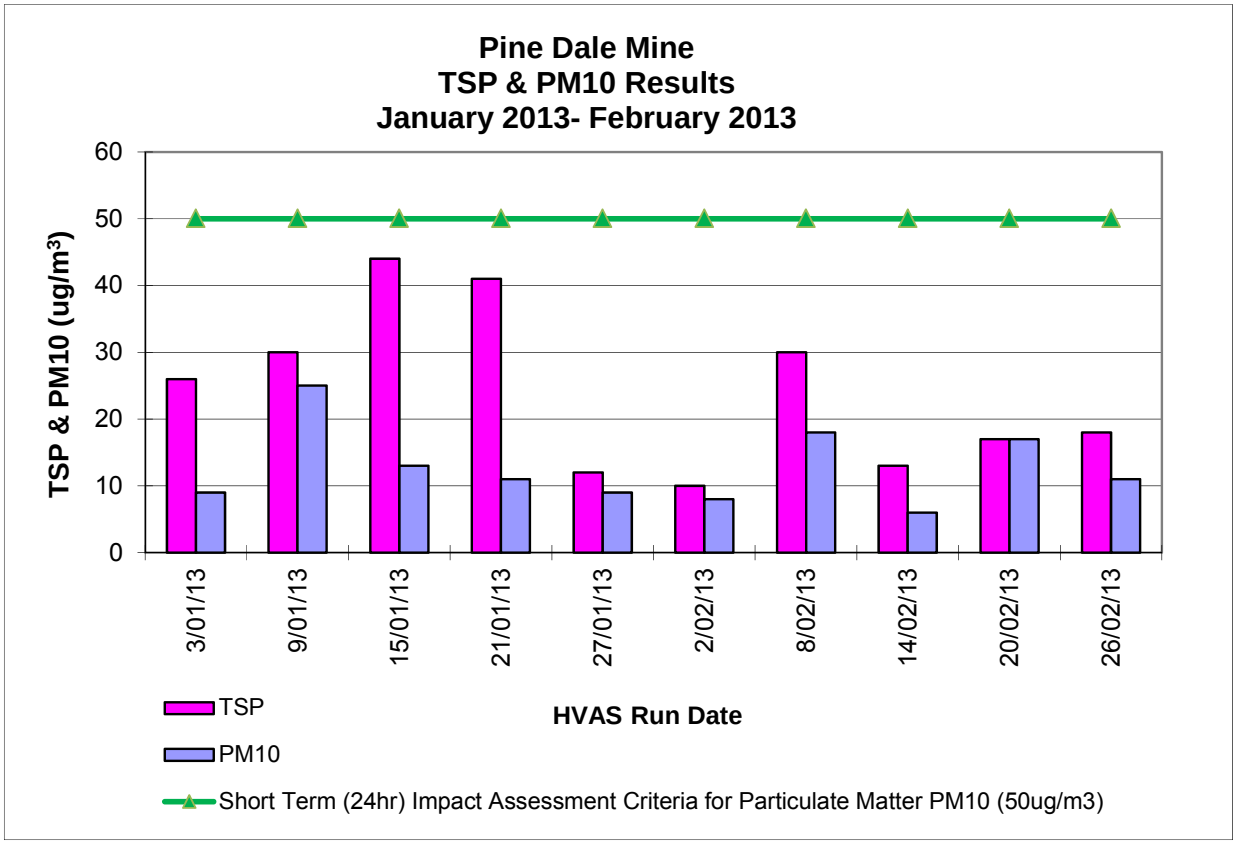
Figure AQ1
AIR QUALITY MONITORING LOCATIONS

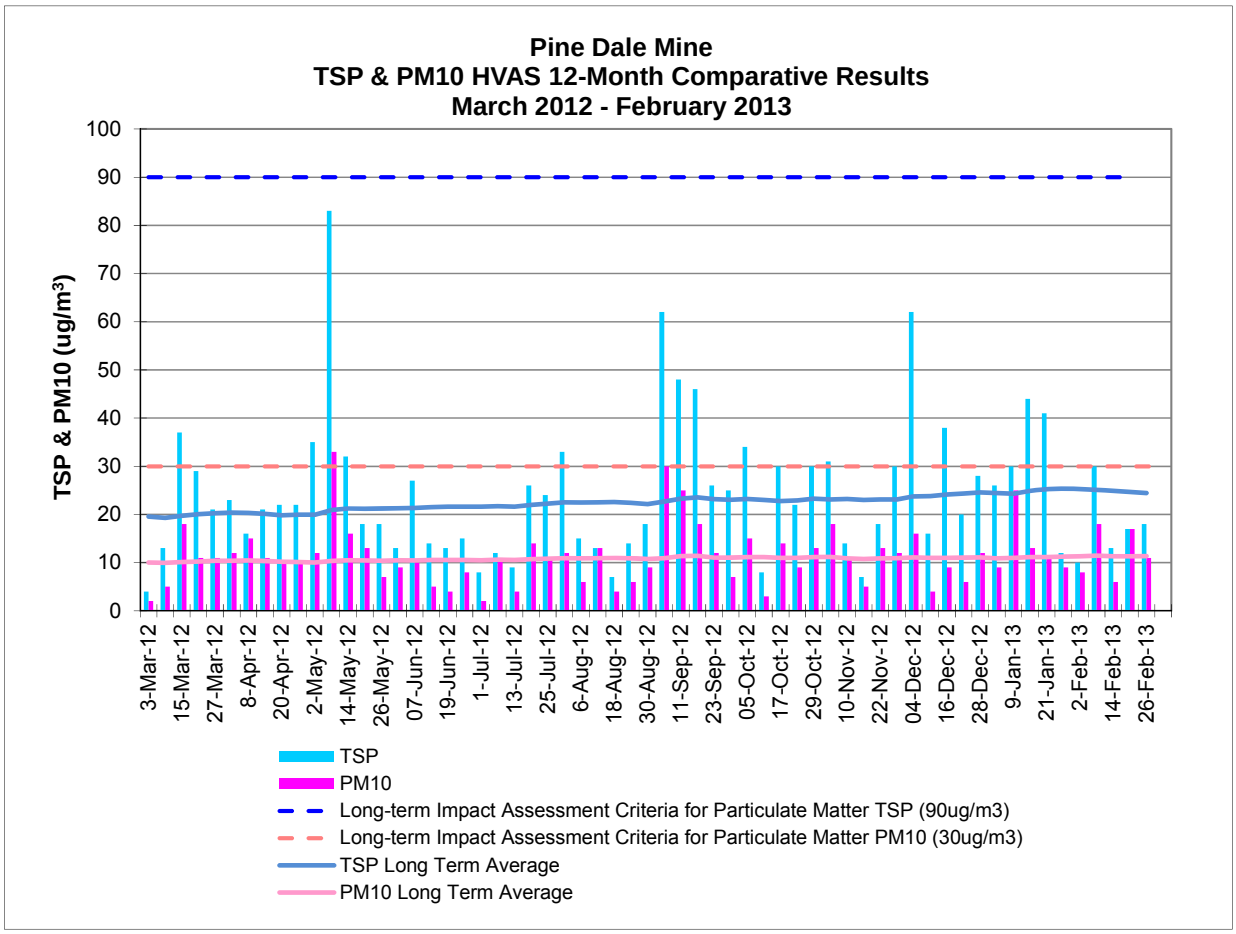
Appendix 2

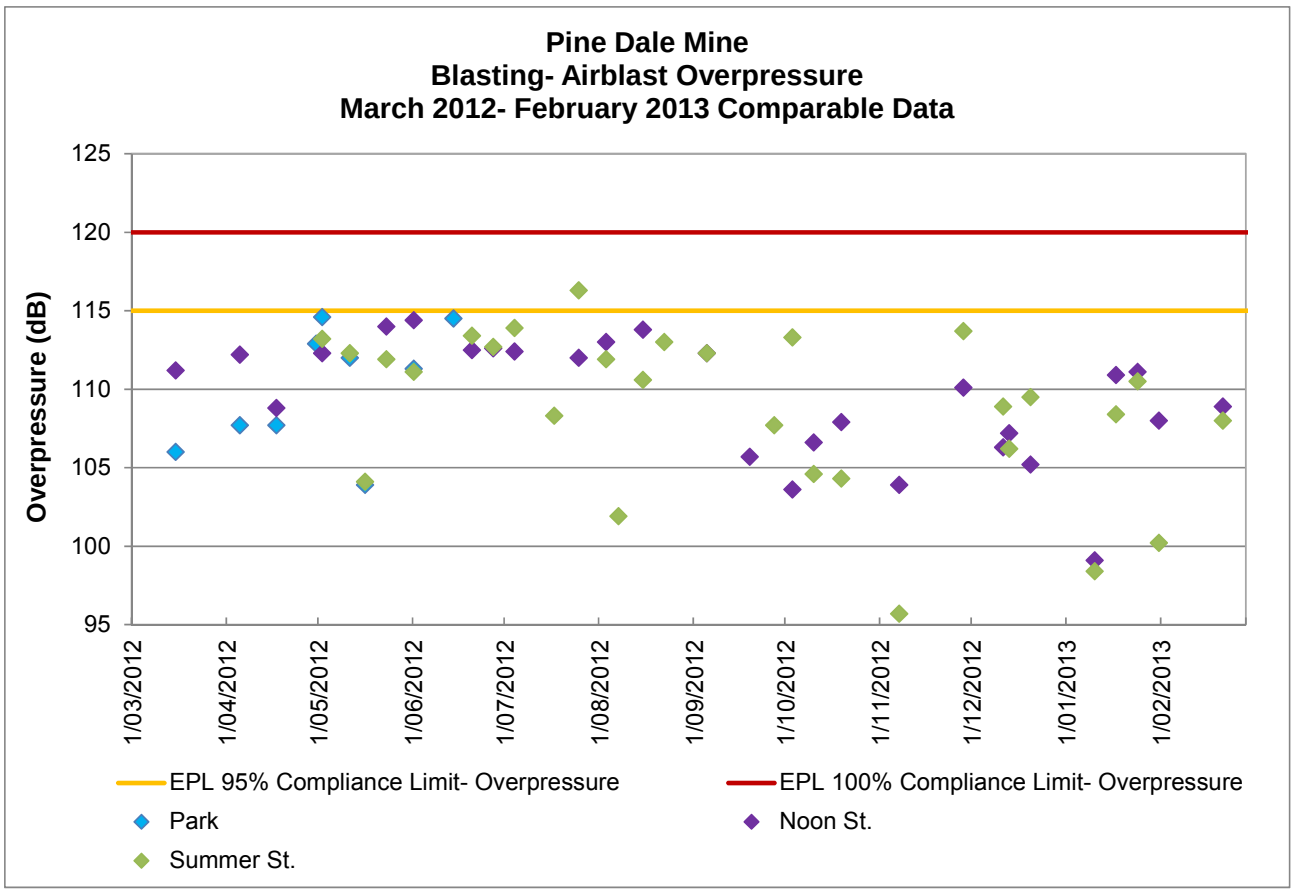
Depositional Dust, HVAS and Blast Result Graphs

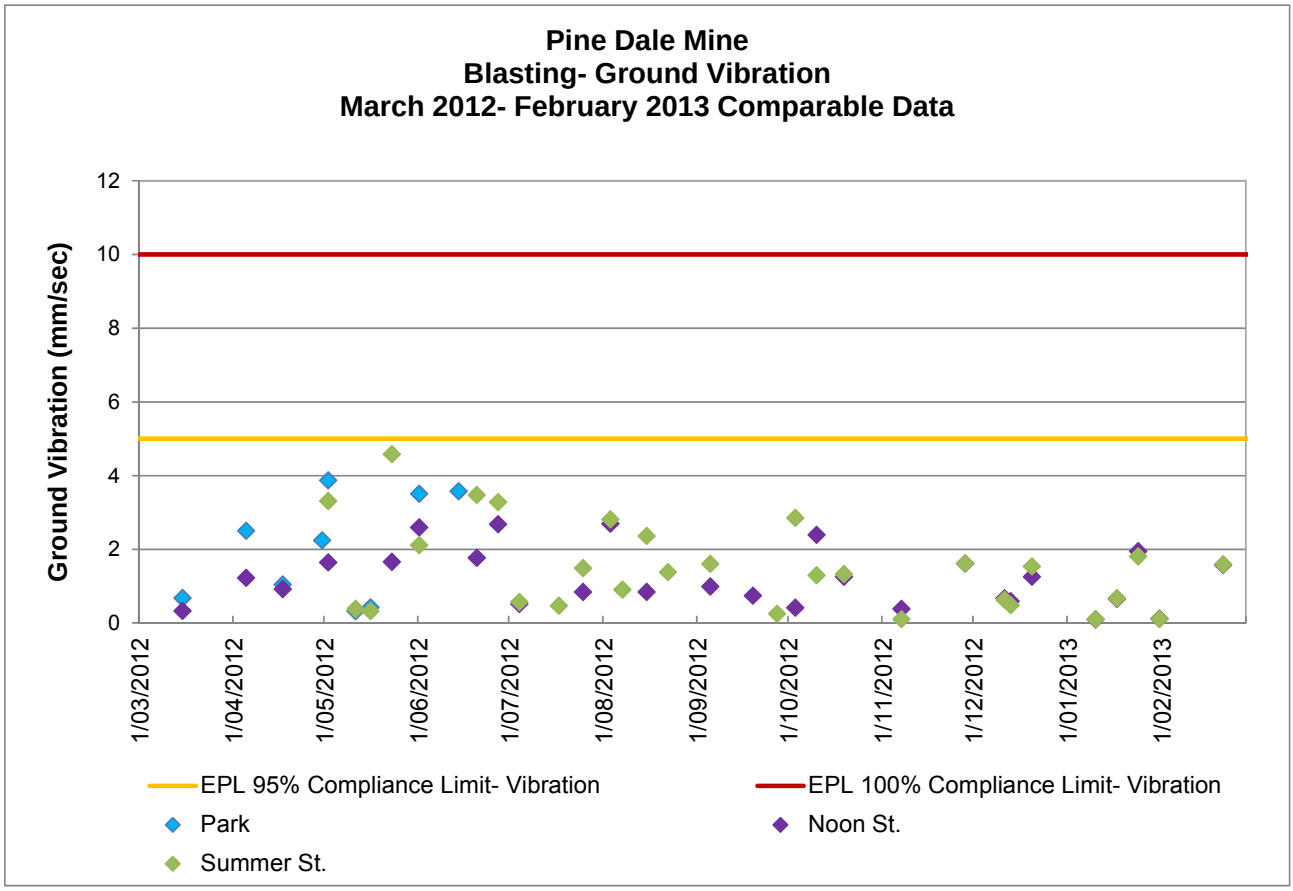

Pine Dale Mine
Depositional Dust Gauge Comparative Results
January 2013 - Feburary 2013
Insoluble Solids Dust (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
Dust Gauge
Jan-13
Feb-13
Long Term Limit 4g/m2.month


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


Pine Dale Mine
TSP & PM10 Results
January 2013- February 2013
TSP & PM10 (ug/m³)
60
50
40
30
20
10
0
3/01/13
9/01/13
15/01/13
21/01/13
27/01/13
2/02/13
8/02/13
14/02/13
20/02/13
26/02/13
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

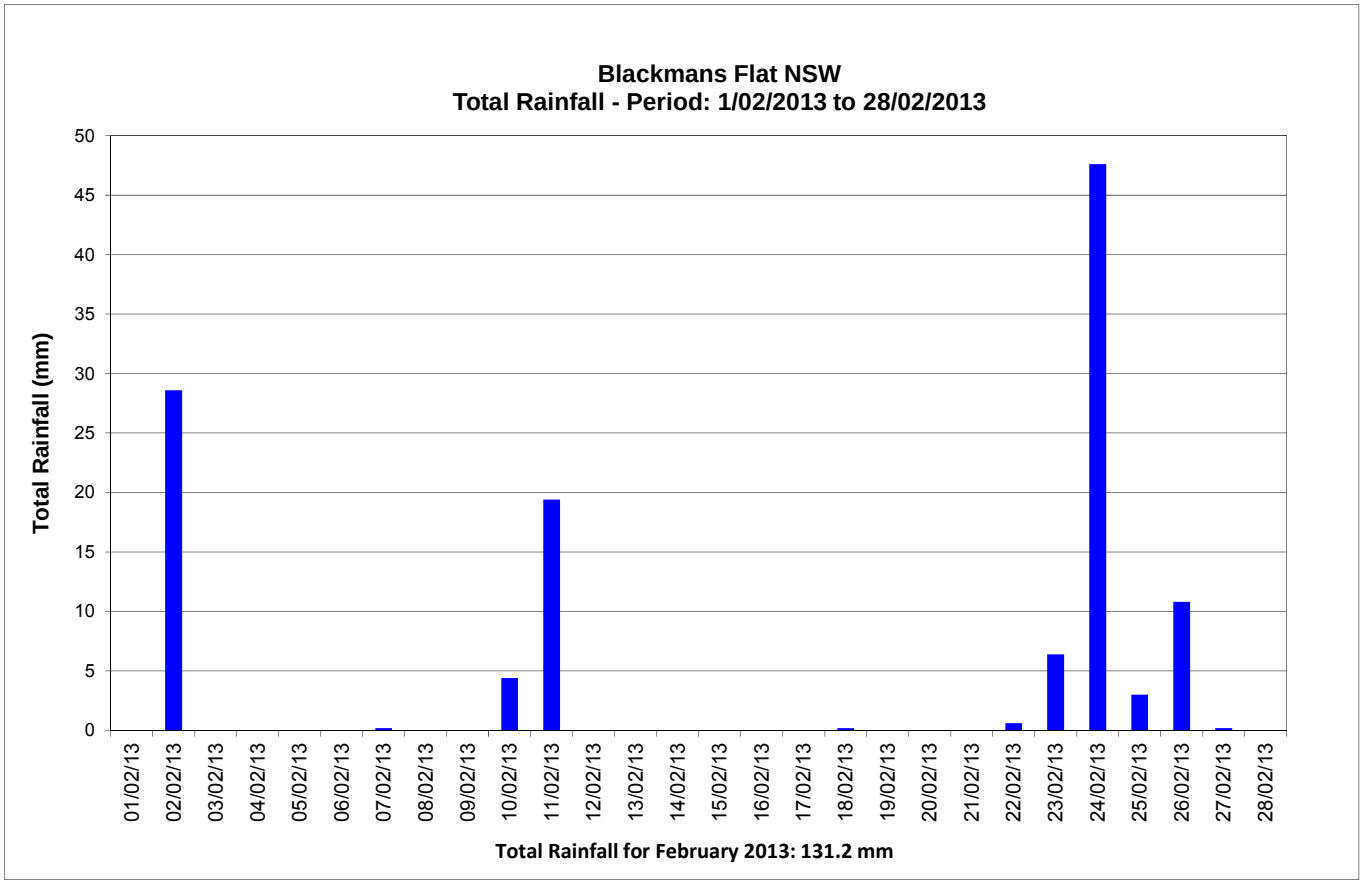

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
March 2012 - February 2013
TSP & PM10 (ug/m³)
100
90
80
70
60
50
40
30
20
10
0
3-Mar-12
15-Mar-12
27-Mar-12
8-Apr-12
20-Apr-12
2-May-12
14-May-12
26-May-12
07-Jun-12
19-Jun-12
1-Jul-12
13-Jul-12
25-Jul-12
6-Aug-12
18-Aug-12
30-Aug-12
11-Sep-12
23-Sep-12
05-Oct-12
17-Oct-12
29-Oct-12
10-Nov-12
22-Nov-12
04-Dec-12
16-Dec-12
28-Dec-12
9-Jan-13
21-Jan-13
2-Feb-13
14-Feb-13
26-Feb-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

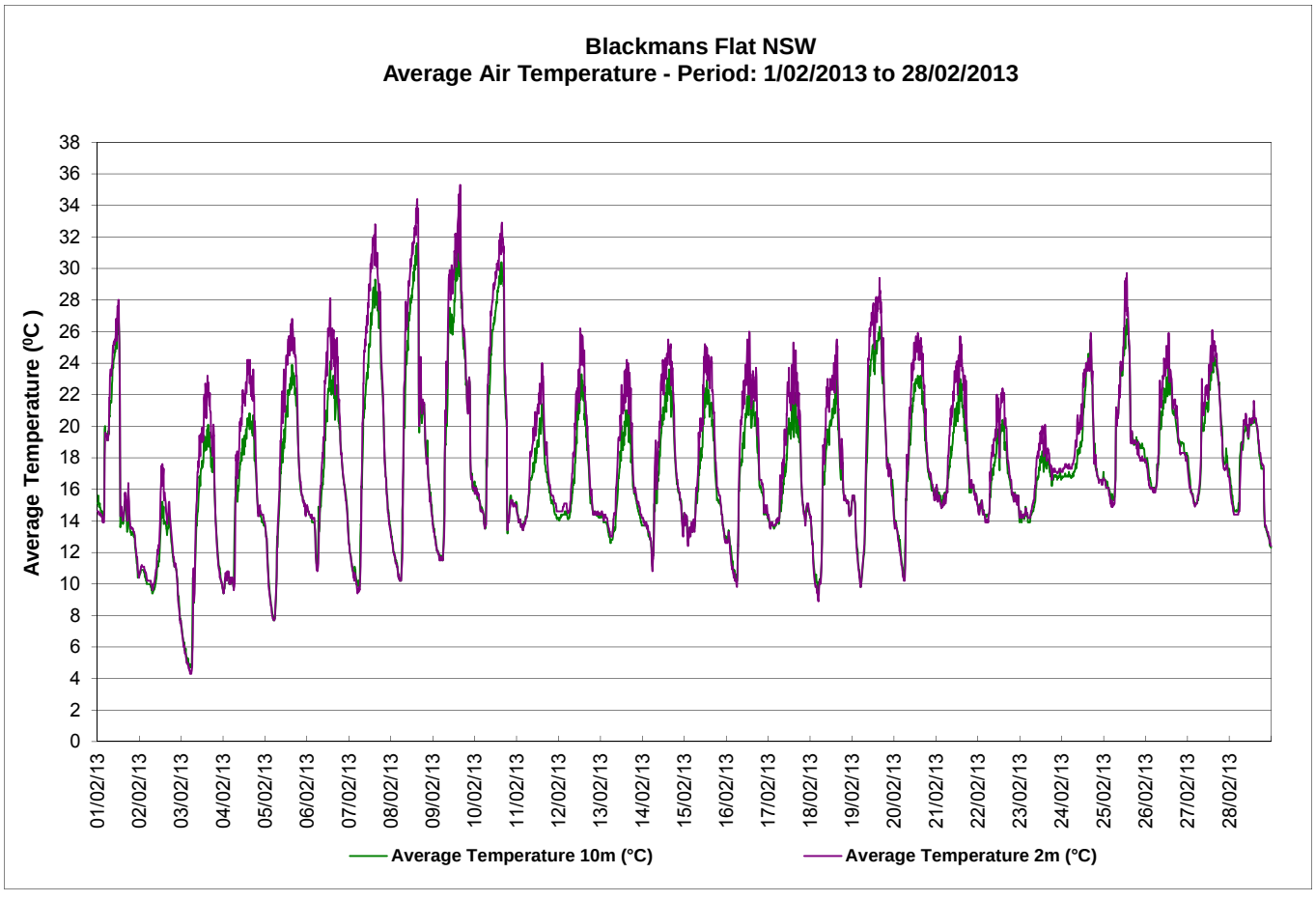

Pine Dale Mine
Blasting- Airblast Overpressure
March 2012- February 2013 Comparable Data
Overpressure (dB)
125
120
115
110
105
100
95
1/03/2012
1/04/2012
1/05/2012
1/06/2012
1/07/2012
1/08/2012
1/09/2012
1/10/2012
1/11/2012
1/12/2012
1/01/2013
1/02/2013
EPL 95% Compliance Limit- Overpressure
EPL 100%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

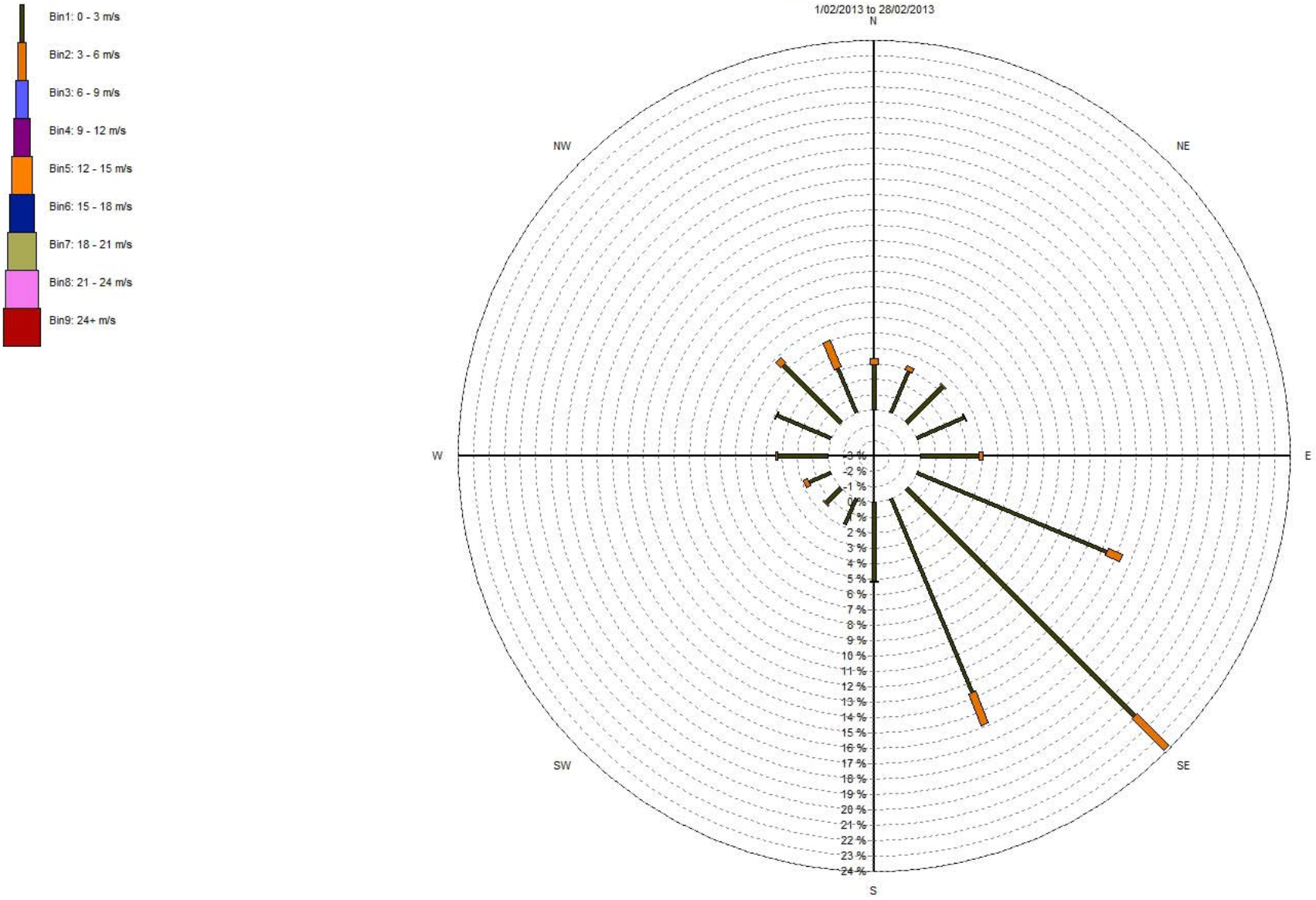

Pine Dale Mine
Blasting- Ground Vibration
March 2012- February 2013 Comparable Data
Ground Vibration (mm/sec)
12
10
8
6
4
2
0
1/03/2012
1/04/2012
1/05/2012
1/06/2012
1/07/2012
1/08/2012
1/09/2012
1/10/2012
1/11/2012
1/12/2012
1/01/2013
1/02/2013
EPL 95% Compliance Limit- Vibration
EPL 100% Compliance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

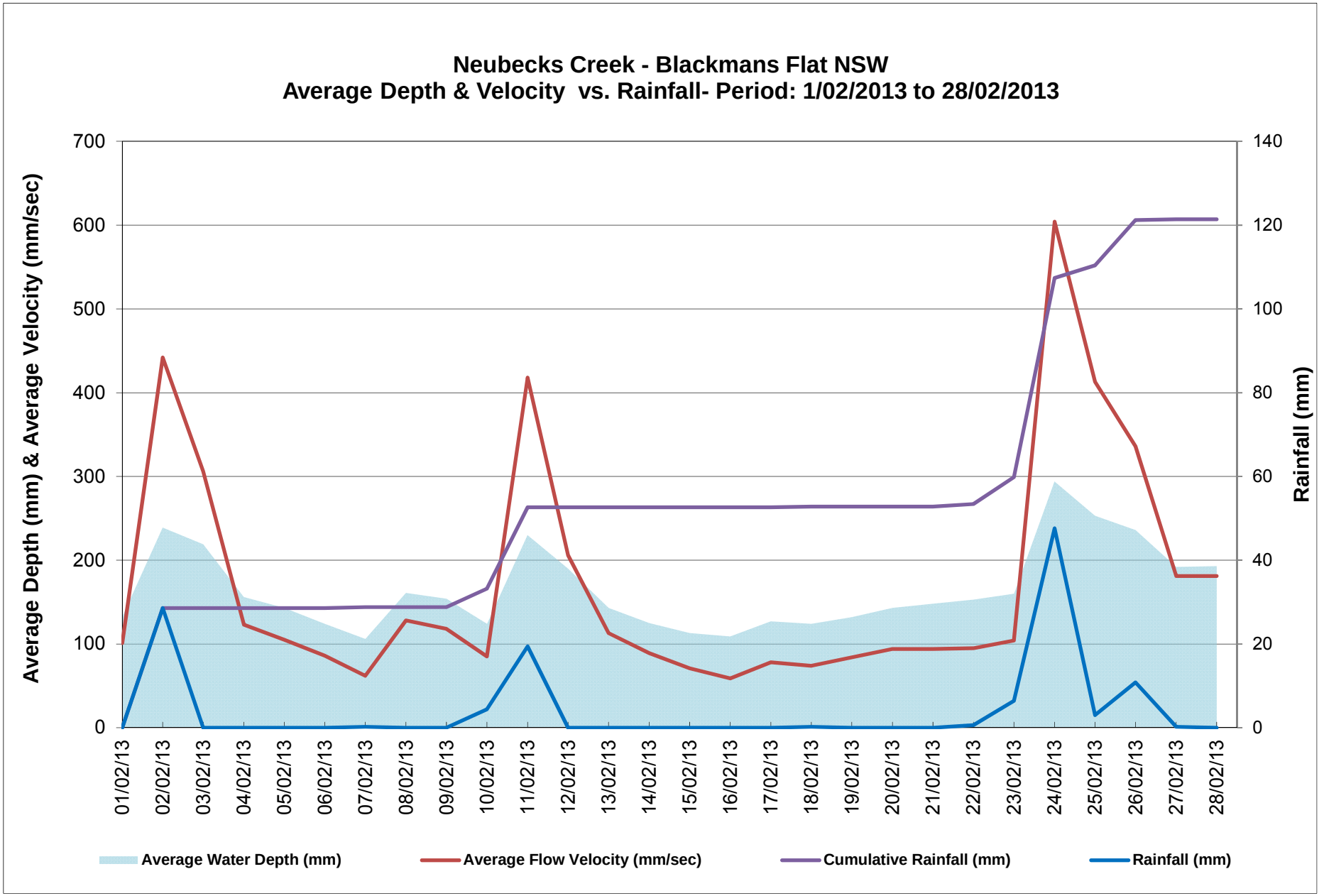
Appendix 3

Meteorological Data


Blackmans Flat NSW
Total Rainfall - Period: 1/02/2013 to 28/02/2013
Total Rainfall (mm)
0
5
10
15
20
25
30
35
40
45
50
01/02/13
02/02/13
03/02/13
04/02/13
05/02/13
06/02/13
07/02/13
08/02/13
09/02/13
10/02/13
11/02/13
12/02/13
13/02/13
14/02/13
15/02/13
16/02/13
17/02/13
18/02/13
19/02/13
20/02/13
21/02/13
22/02/13
23/02/13
24/02/13
25/02/13
26/02/13
27/02/13
28/02/13
Total Rainfall for February 2013: 131.2 mm


Blackmans Flat NSW
Average Air Temperature - Period: 1/02/2013 to 28/02/2013
Average Temperature (ºC)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
01/02/13
02/02/13
03/02/13
04/02/13
05/02/13
06/02/13
07/02/13
08/02/13
09/02/13
10/02/13
11/02/13
12/02/13
13/02/13
14/02/13
15/02/13
16/02/13
17/02/13
18/02/13
19/02/13
20/02/13
21/02/13
22/02/13
23/02/13
24/02/13
25/02/13
26/02/13
27/02/13
28/02/13
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Blackman's Flat Windrose
1/02/2013 to 28/02/2013
N
NE
E
SE
S
SW
W
NW
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
1 %
2 %
3 %
4 %
5 %
6 %
7 %
8 %
9 %
10 %
11 %
12 %
13 %
14 %
15 %
16 %
17 %
18 %
19 %
20 %
21 %
22 %
23 %
24 %


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/02/2013 to 28/02/2013
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
700
600
500
400
300
200
100
0
140
120
100
80
60
40
20
0
01/02/13
02/02/13
03/02/13
04/02/13
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22/02/13
23/02/13
24/02/13
25/02/13
26/02/13
27/02/13
28/02/13
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)