SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-1763/0

February 2018

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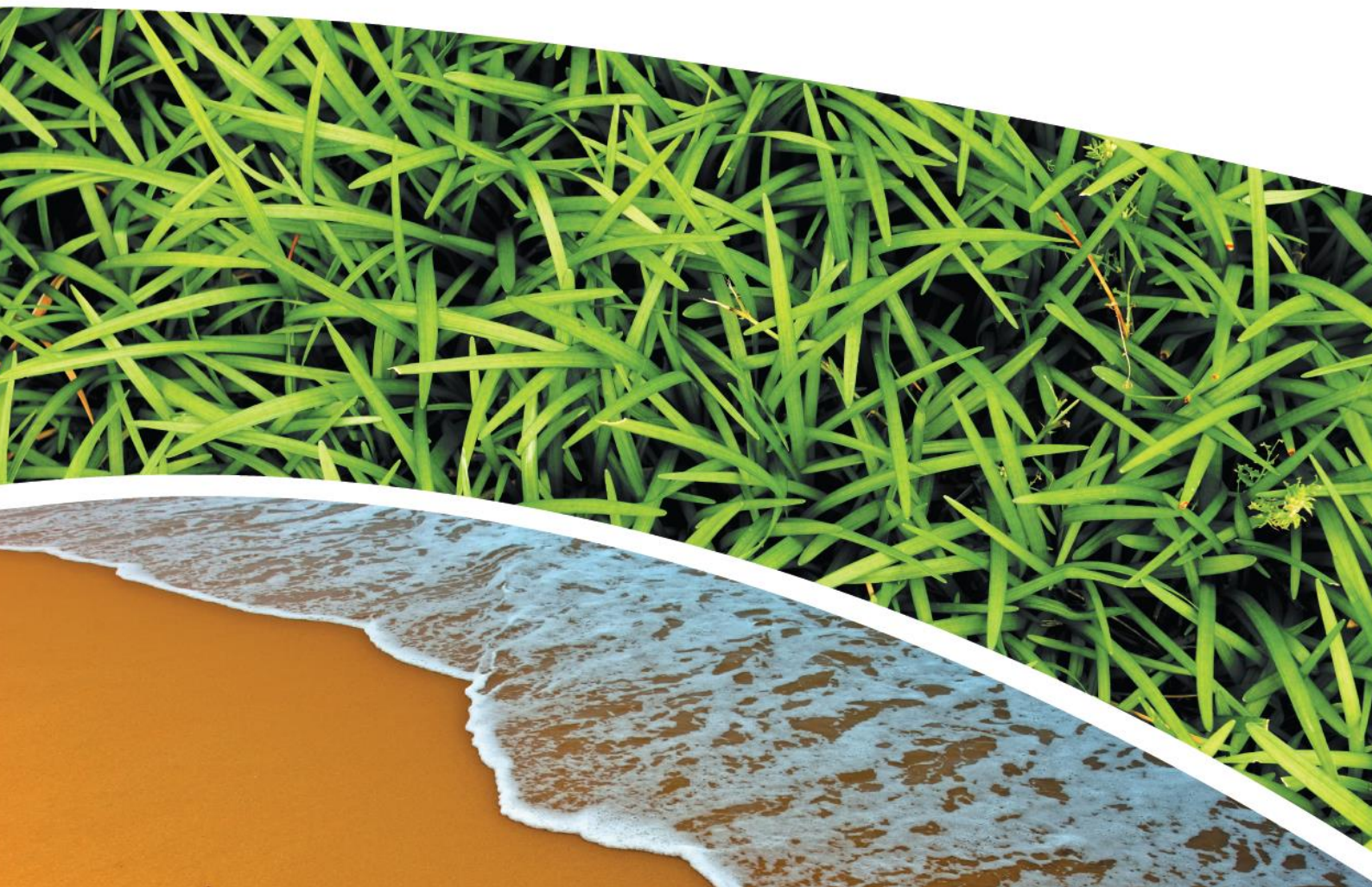

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16 March 2018

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

FEBRUARY 2018

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1 GENERAL COMMENTS

Job Number: 6880.

Date Samples Received: During the month of February 2018.

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 (NATA Accreditation number 9811) are based on established internationally recognised procedures such as APHA and Australian Standards. Analytical test methods are detailed in **Table 1**. ALS Environmental has been used to obtain analysis of anions, cations and dissolved metals (NATA Accreditation number 825).

Table 1 *Analytical Test Methods*

ANALYSIS	METHOD	UNITS	ANALYSING LABORATORY	NATA / NON-NATA
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 MONITORING RESULTS

3.1 GROUNDWATER

A total of 2 on-site groundwater samples were collected during the month of February 2018. Water quality analysis results are shown in **Table 2**.

Table 2 *Groundwater Analysis Results – Monthly Monitoring*

ANALYSIS	UNITS	P6	P7
Sample Number	-	02186880011	02186880012
Date Sampled	-	12/02/18	12/02/18
Time Sampled	-	14:36	16:06
Depth to Water from Surface	m	25.15	6.91
Water Level (AHD)	m	891.80	887.49
Temperature	°C	19.0	17.8
pH	pH	***6.07***	6.64
Conductivity	µS/cm	***1540***	***871***
Turbidity	NTU	59	
Dissolved Oxygen	mg/L	<2	
TSS	mg/L	60	
Oil and Grease	mg/L	<5	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	68	228
Total Alkalinity ($CaCO_3$)	mg/L	68	228
Sulfate (as SO_4)	mg/L	590	62
Chloride	mg/L	36	107
Calcium	mg/L	136	44
Magnesium	mg/L	62	47
Sodium	mg/L	57	50
Potassium	mg/L	20	7
Cobalt (dissolved)	mg/L	0.073	
Manganese (dissolved)	mg/L	2.76	
Nickel (dissolved)	mg/L	0.125	
Zinc (dissolved)	mg/L	0.056	
Iron (dissolved)	mg/L	30.7	<0.05
Trigger Levels*			
pH trigger level	pH	6.2 – 8.0	6.2 – 8.0
Conductivity trigger level	µS/cm	1201	852
Water Level (AHD) #	m	882.25	882.31

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

Indicates analysis was not required

Results shown in ***italics*** indicates exceedance of trigger level

* Trigger levels for the water monitoring parameters were revised in September 2017 and were submitted to the Department of Primary Industries Water (DPI Water). A response has not yet been provided to Enhance Place Pty Ltd. These revised trigger values are assumed to be accepted and are implemented into this report.

Groundwater monitoring locations are shown in **Appendix 1**.

3.2 EPA SURFACE WATER MONITORING

Routine quarterly surface water monitoring was undertaken during February 2018 at three surface water sites, EPA Points 2, 3 and 14. Water quality analysis results are shown in **Table 3**.

Table 3 *EPA Surface Water Analysis Results*

ANALYSIS	UNITS	EPA Point 2 Neubecks Ck Upstream	EPA Point 3 Neubecks Ck Downstream	EPA Point 14 Coxs River Downstream
Sample Number	-	02186880009	0218688004	02186880010
Date Sampled	-	12/02/2018	12/02/2018	12/02/2018
Time Sampled	-	14:27	12:13	10:52
Temperature	°C	20.5	23.3	22.7
pH	pH	***6.76***	6.94	***8.70***
Conductivity	µS/cm	1820	902	***1350***
Sulfate	NTU	668	326	44
Dissolved Iron	mg/L	0.15	0.73	<0.05
Total Suspended Solids	mg/L	9	<5	<5
Turbidity	mg/L	21	3	7
Trigger Levels*				
pH	pH	6.9 – 8.0	6.4 – 8.0	7.5 – 8.0
Conductivity	µS/cm	2398	2454	1207
Total Suspended Solids	mg/L	30	30	30

Results shown in ***italics*** indicates exceedance of trigger level

****** In a review of the Pine Dale Coal Mine water trigger levels (approved by the NSW Department of Primary Industries and Environmental Protection Authority) trigger levels for pH, conductivity and total suspended solids have been developed for EPL Point 2, 3 & 14. However, these triggers are not stipulated as part of EPL 4911. These trigger levels have been revised in September 2017; however, and the revised trigger levels are presented in **Table 3**. These trigger levels are assumed to be accepted.

4 AIR QUALITY MONITORING RESULTS

4.1 HIGH VOLUME AIR SAMPLERS (HVAS)

HVAS at this facility conform to AS/NZS 3580.9.3:2015, AS/NZS 3580.9.6:2015 and AS/NZS 3580.1.1:2016.

The AS NZS 3580.9.6 stipulates that for one-in-six-day sampling sequences the sampling period shall be 24 ±1 hours. The TSP high volume air sampling unit ran for less than 24 ± 1 hours on 6 February and greater than 24 ± 1 hours on the 12 February. Therefore, these dates do not conform to the run time requirements detailed in AS/NZS 2580.9.6.

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
06-Feb-18	22	02186880031	9518515	11-Feb-18	11:45	Client	19.00
12-Feb-18	33	02186880033	9518517	13-Feb-18	10:10	Client	29.01
18-Feb-18	48	02186880035	9518519	19-Feb-18	16:00	Client	24.00
24-Feb-18	16	02186880037	9410493	26-Feb-18	9:05	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
06-Feb-18	5	02186880032	9518516	11-Feb-18	11:50	Client	24.00
12-Feb-18	21	02186880034	9518518	13-Feb-18	10:15	Client	24.00
18-Feb-18	27	02186880036	9518520	19-Feb-18	16:03	Client	24.00
24-Feb-18	9	02186880038	9518521	26-Feb-18	9:15	Client	24.00

4.1.1 TSP Summary

The NSW 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 2017 to February 2018) for the TSP unit is 19.2µg/m^3, which is well below the allowable limit of 90µg/m^3.

4.1.2 PM_{10} Summary

The NSW EPA 24h Maximum PM_{10} allowable limit is 50µg/m^3. The EPA Annual Mean PM_{10} allowable limit is 25µg/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 9.4µg/m^3, which is below the allowable limit of 25µg/m^3. The 24 hour maximum allowable limit of 50µg/m^3 was not exceeded during the month of February 2018.

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 3580.10.1:2016 and AS/NZS 3580.1.1:2016. Depositional Dust monitoring results are shown in **Table 6**.

Table 6 *Depositional Dust Monitoring - Deposited Matter – February 2018*

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)
02186880021	D1	11/01/2018	12/02/2018	32	IT	1.2	0.6	0.6
02186880022	D2	11/01/2018	12/02/2018	32	I	0.7	0.4	0.3
02186880023	D3	11/01/2018	12/02/2018	32	I	0.9	0.6	0.3
02186880024	D4	11/01/2018	12/02/2018	32	I	1.0	0.4	0.6
02186880025	D5	11/01/2018	12/02/2018	32	I	0.6	0.3	0.3
02186880026	D6	11/01/2018	12/02/2018	32	I	1.0	0.5	0.5

Glossary of Terms Used in Notes:

I Insects (eg, Ants, Spiders) IT Insects and tree litter

4.2.1 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 0.7g/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 this month as mining operations have ceased since the end of March 2014.

6 NOISE MONITORING RESULTS

Routine quarterly noise monitoring was not required to be undertaken during February 2018.

7 OPERATIONAL ACTIVITIES

All of the approved minable reserves at the Pine Dale Mine have now been exhausted. Operational mining and the last coal sales ceased as of the end of March 2014.

All former operators have been made redundant; however some statutory positions still remain. Pine Dale Mine has been placed in care and maintenance since April 2014.

8 SUMMARY

During the month of February 2018 environmental monitoring constituents were found to be generally in compliance with EPL 4911.

The pH was outside the trigger level range for groundwater bore P6, surface water monitoring Point 2 and Point 14. The electrical conductivity exceeded the site specific trigger level range at bore P6 and P7, and surface water monitoring Point 14.

Standing water levels at the site groundwater bores were compliant with their respective trigger levels.

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 25µg/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 no blasting occurred at the site.

Please contact the undersigned if you have any queries.

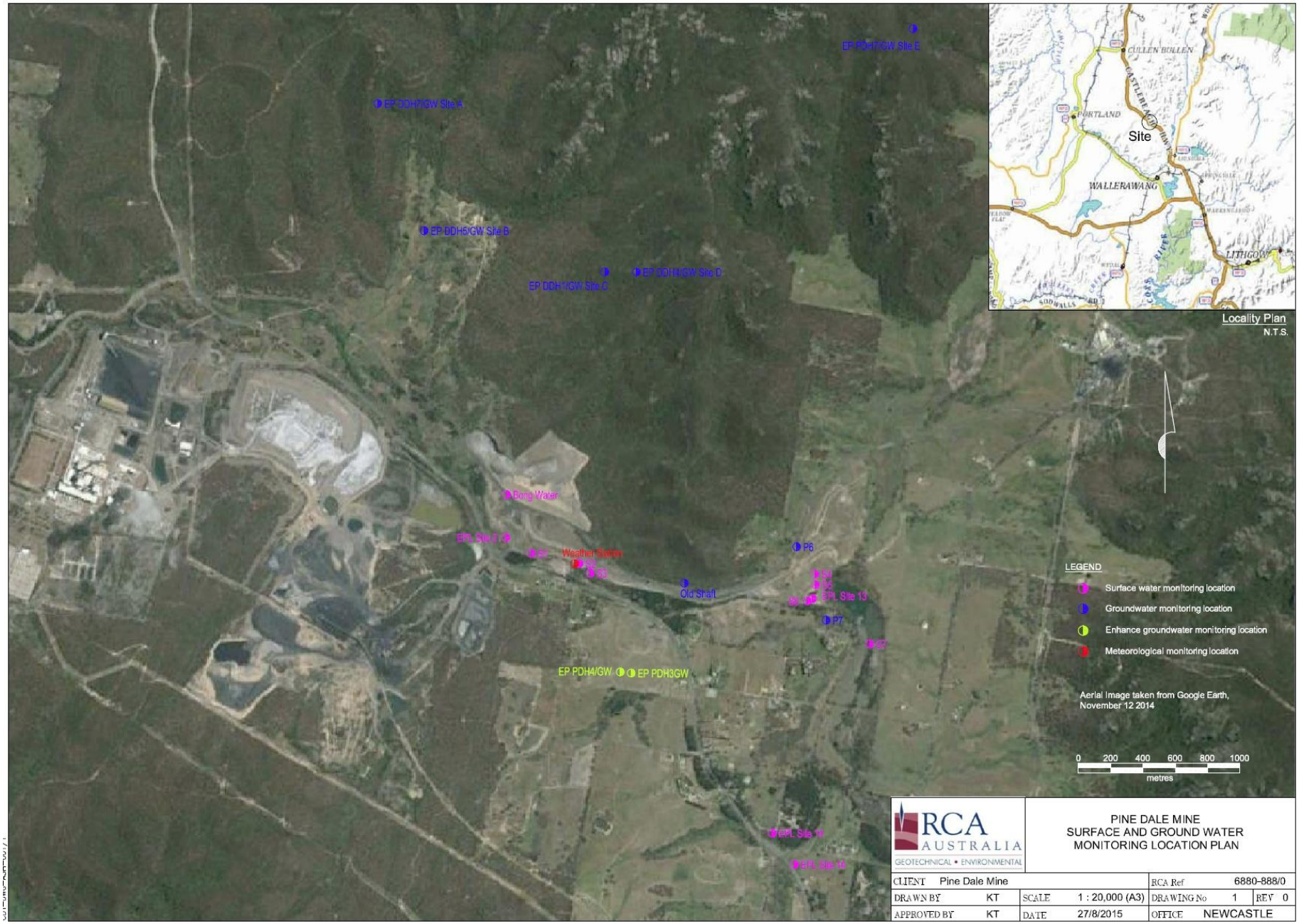
Yours sincerely

Katy Shaw
Environmental Scientist
RCA Australia Pty Ltd

Carmen Rocher
Environmental Engineer
RCA Australia Pty Ltd

Appendix 1

Surface Water Groundwater and Air Quality Monitoring Locations



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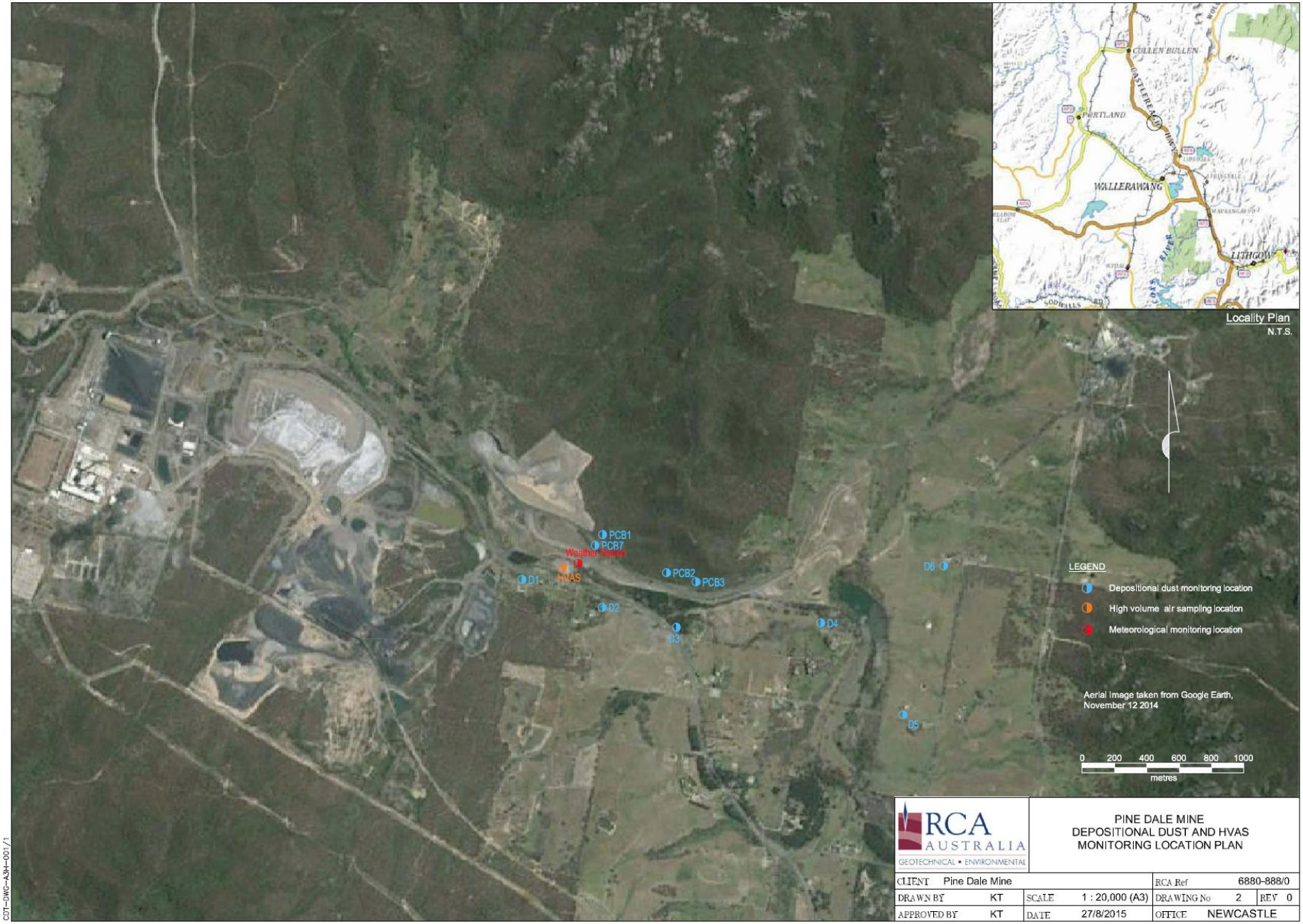
PINE DALE MINE
SURFACE AND GROUND WATER MONITORING LOCATION PLAN

CLIENT	Pine Dale Mine			RCA Ref	6880-888/0
DRAWN BY	KT	SCALE	1 : 20,000 (A3)	DRAWING No	1 REV 0
APPROVED BY	KT	DATE	27/8/2015	OFFICE	NEWCASTLE



Locality Plan
N.T.S.

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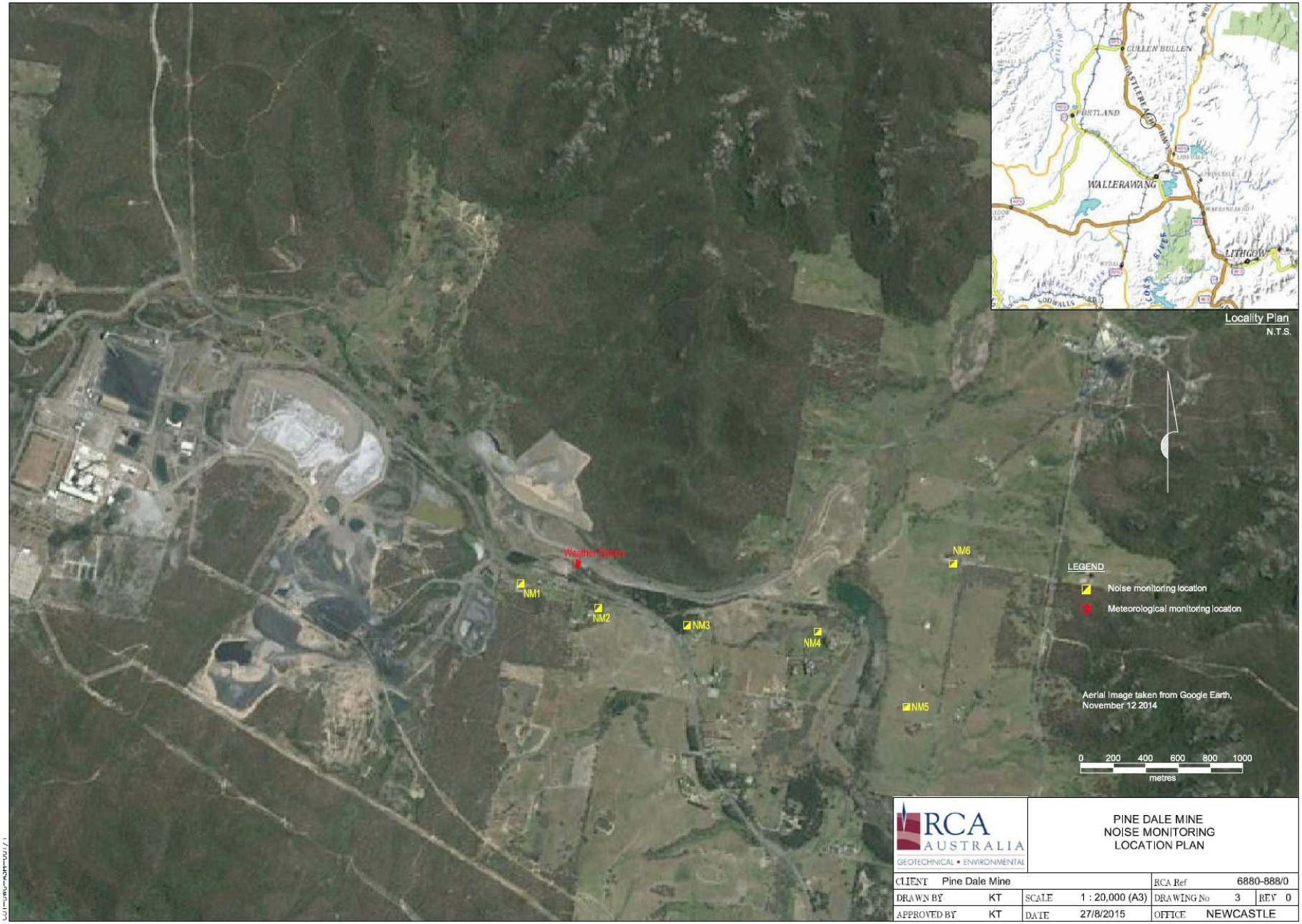
PINE DALE MINE
DEPOSITIONAL DUST AND HVAS MONITORING LOCATION PLAN

CLIENT	Pine Dale Mine			RCA Ref	6880-888/0
DRAWN BY	KT	SCALE	1 : 20,000 (A3)	DRAWING No	2 REV 0
APPROVED BY	KT	DATE	27/8/2015	OFFICE	NEWCASTLE

CDT-DWG-ASH-001/1



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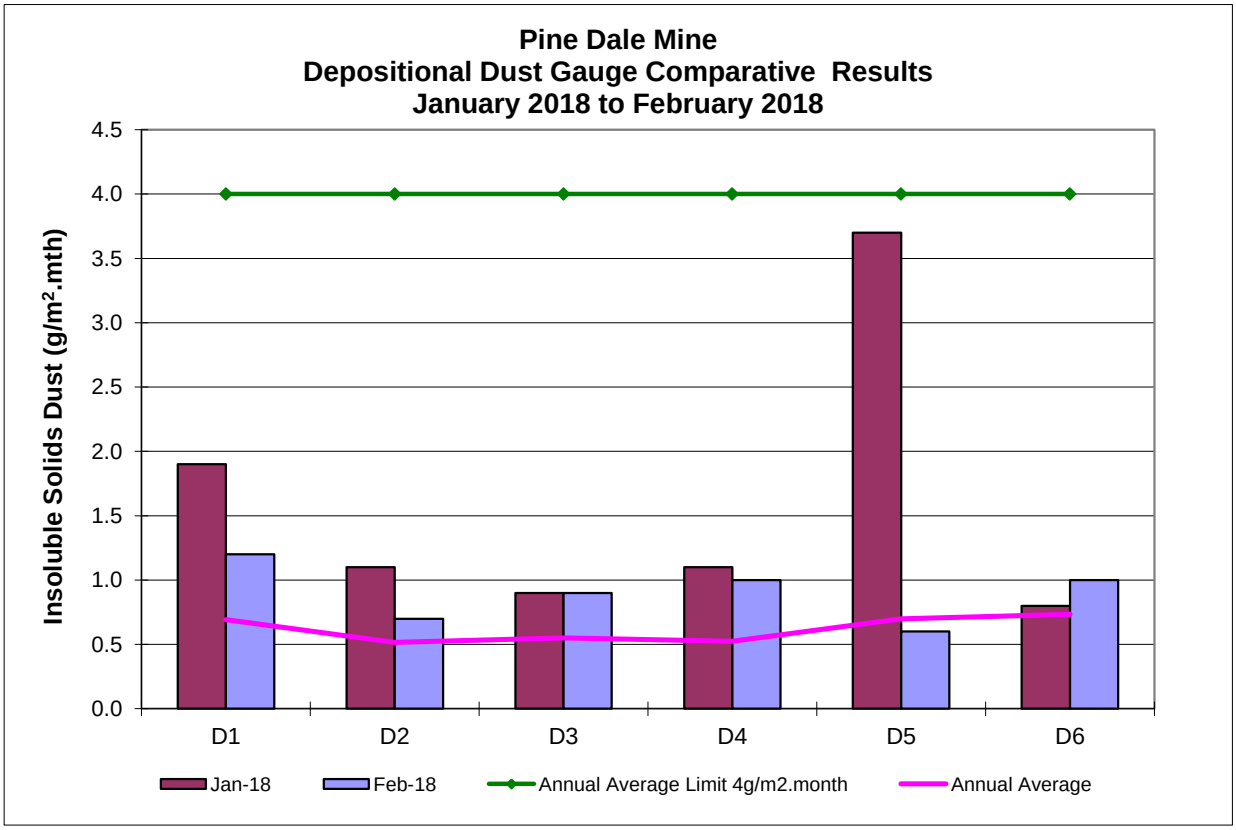
GEOTECHNICAL • ENVIRONMENTAL

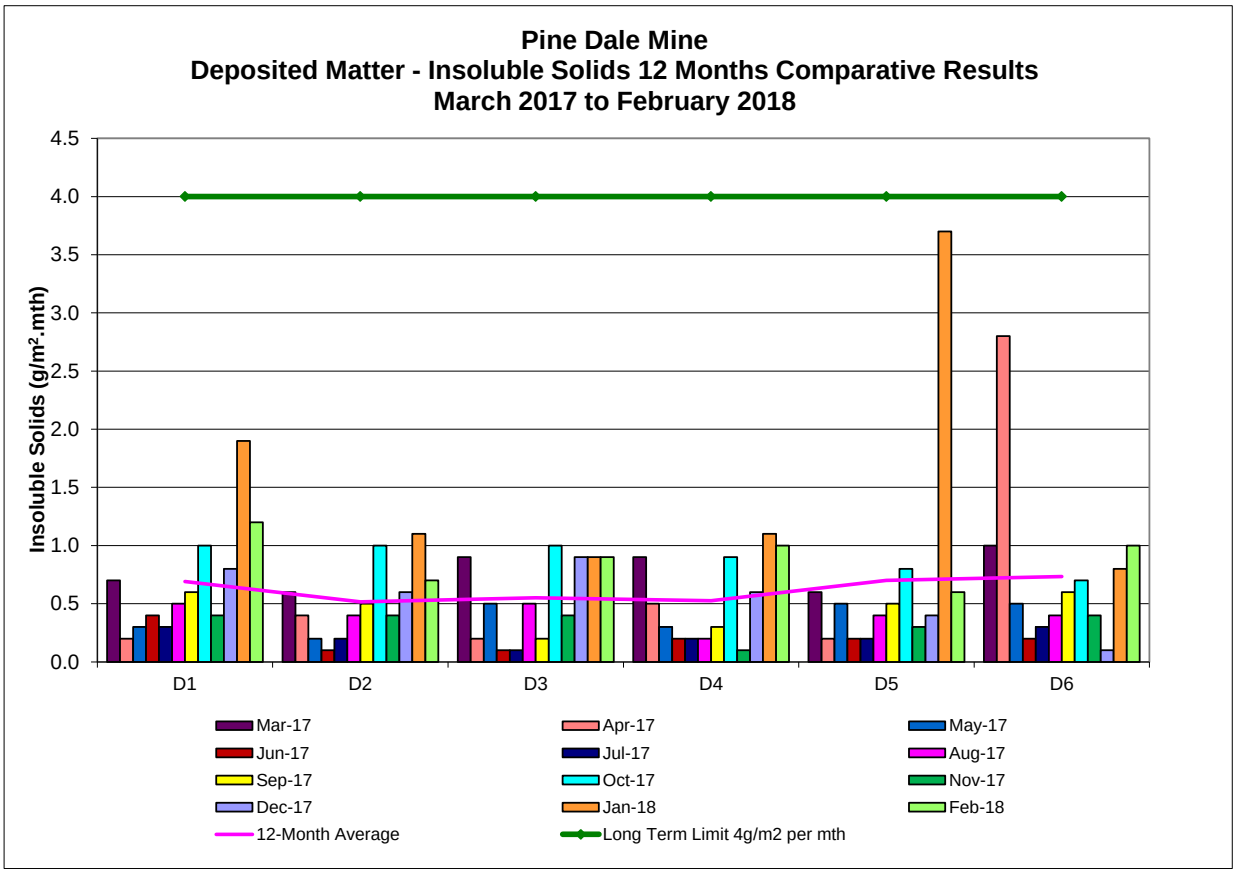
PINE DALE MINE
NOISE MONITORING
LOCATION PLAN

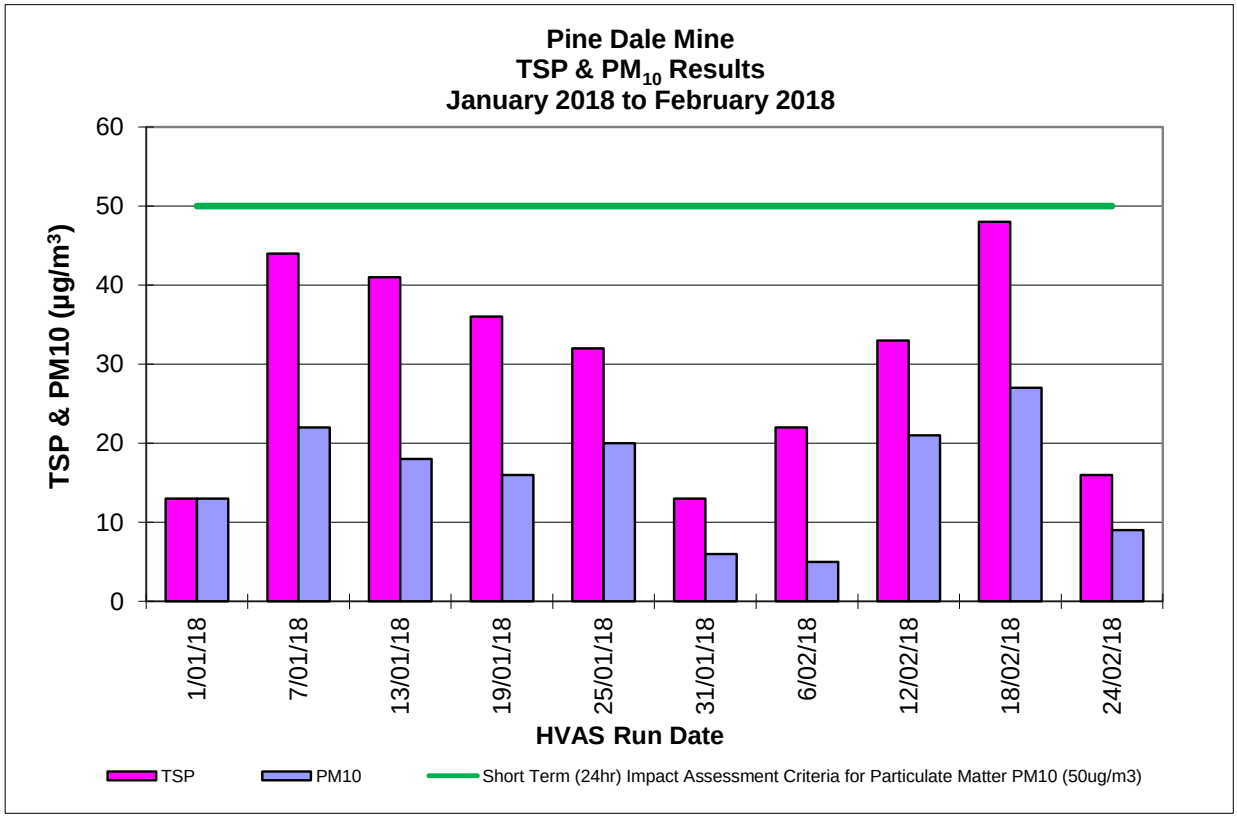
CLIENT	Pine Dale Mine			RCA Ref	6880-888/0
DRAWN BY	KT	SCALE	1 : 20,000 (A3)	DRAWING No	3 REV 0
APPROVED BY	KT	DATE	27/8/2015	OFFICE	NEWCASTLE

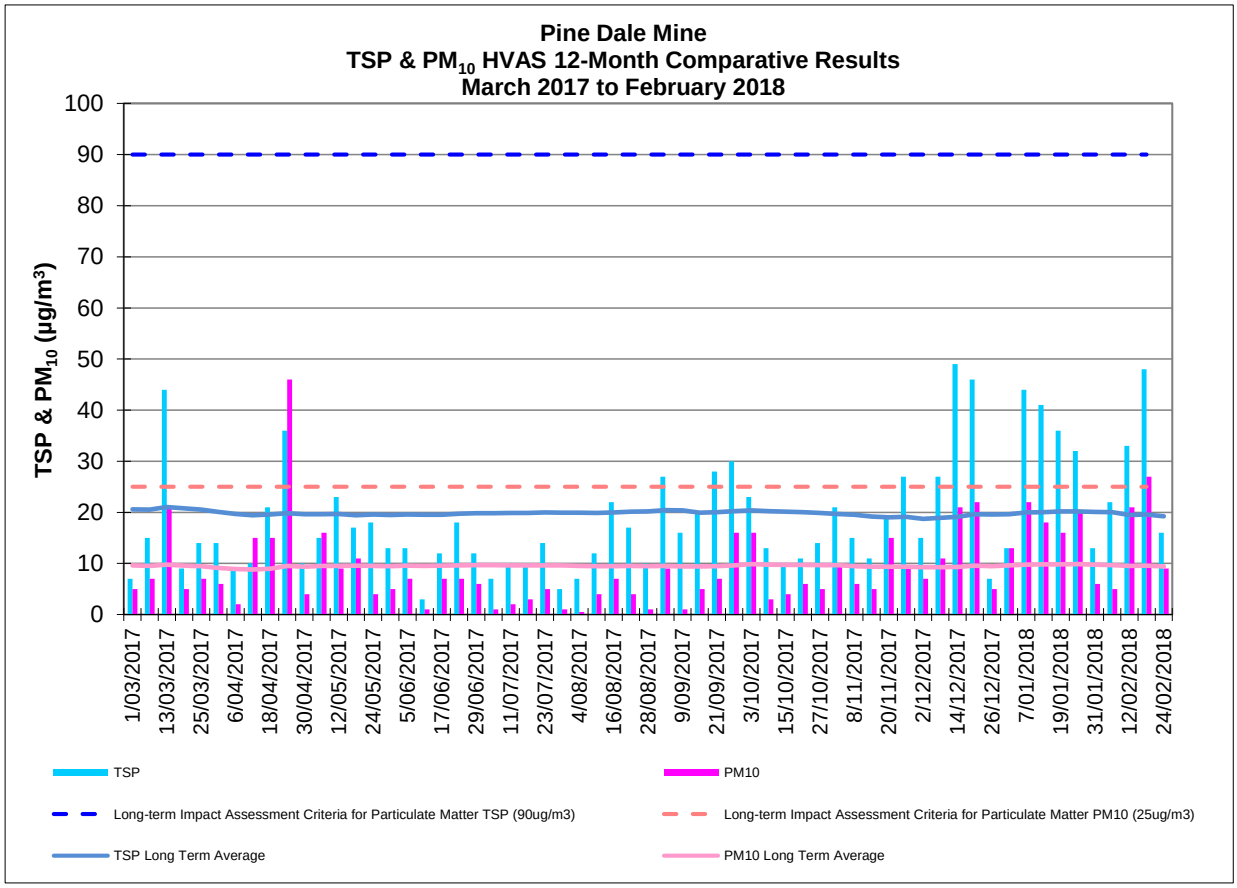
Appendix 2

Depositional Dust and HVAS Graphs


Pine Dale Mine
Depositional Dust Gauge Comparative Results
January 2018 to February 2018
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
Jan-18
Feb-18
Annual Average Limit 4g/m2.month
Annual Average

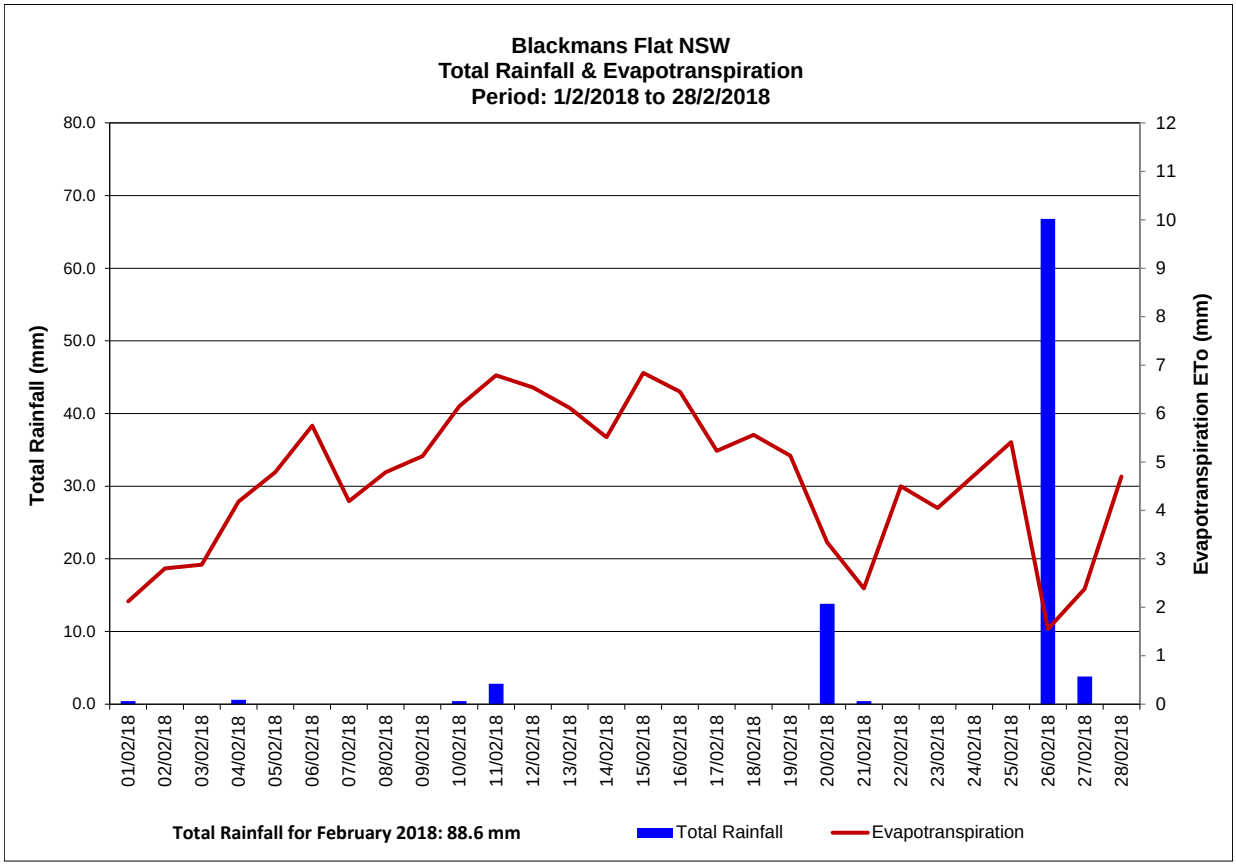

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
March 2017 to February 2018
Insoluble Solids (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
12-Month Average
Long Term Limit 4g/m2 per mth

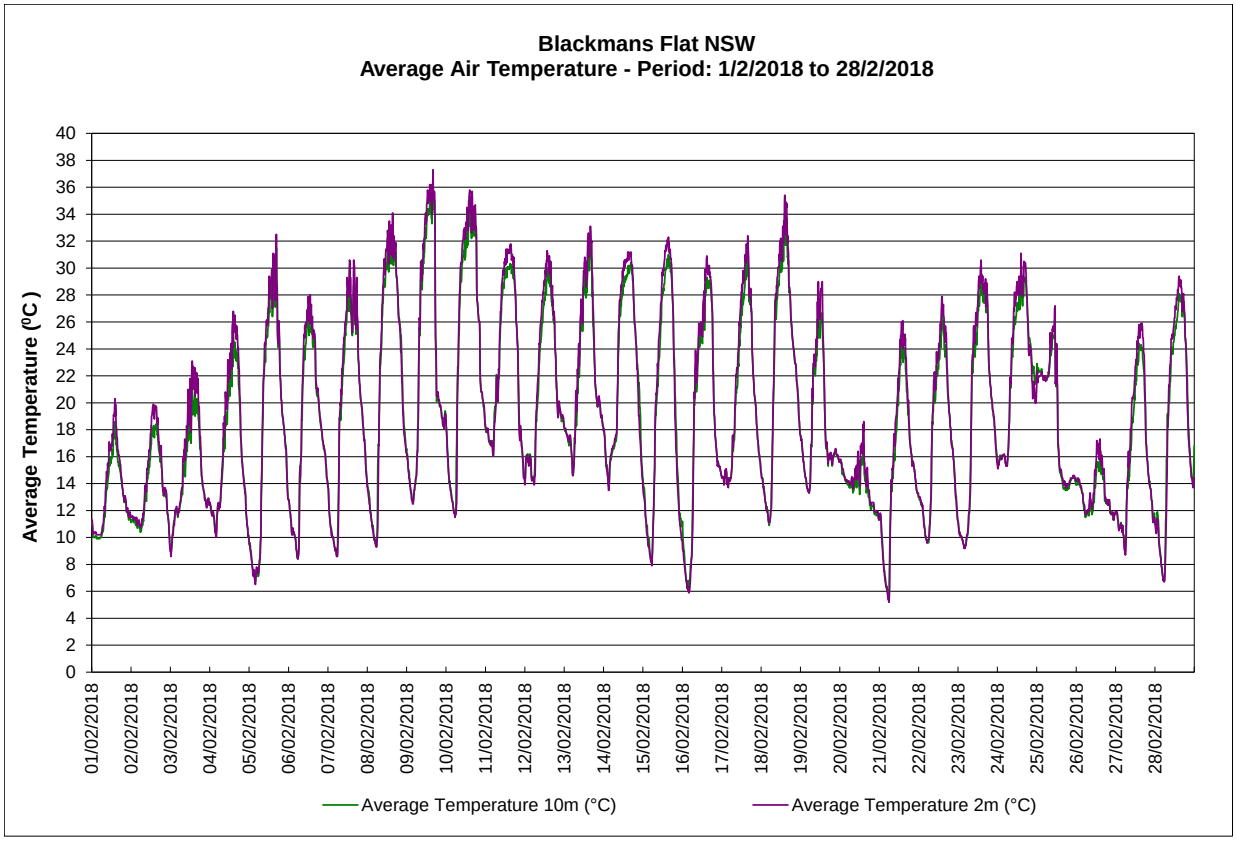

Pine Dale Mine
TSP & PM10 Results
January 2018 to February 2018
TSP & PM10 (µg/m³)
60
50
40
30
20
10
0
1/01/18
7/01/18
13/01/18
19/01/18
25/01/18
31/01/18
6/02/18
12/02/18
18/02/18
24/02/18
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

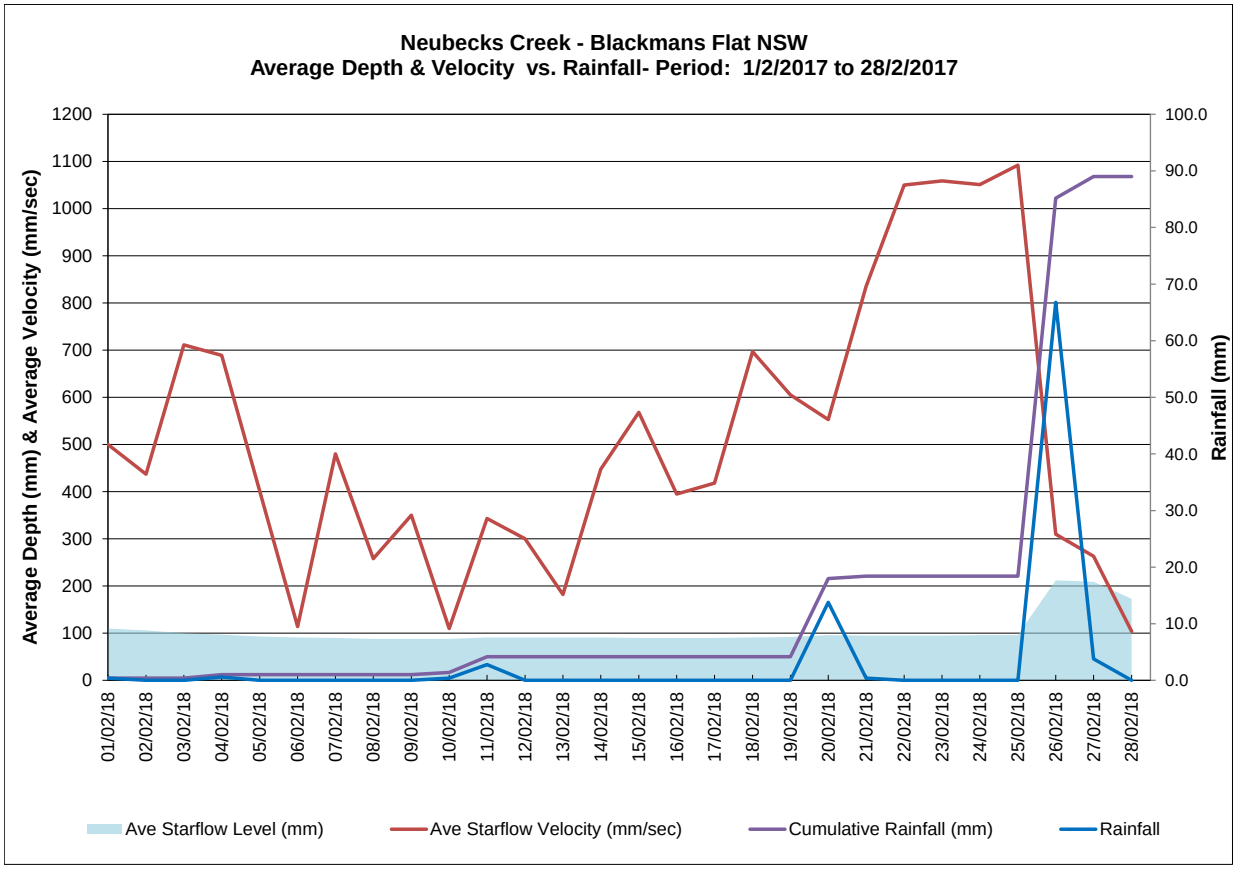

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
March 2017 to February 2018
TSP & PM10 (µg/m³)
100
90
80
70
60
50
40
30
20
10
0
1/03/2017
13/03/2017
25/03/2017
6/04/2017
18/04/2017
30/04/2017
12/05/2017
24/05/2017
5/06/2017
17/06/2017
29/06/2017
11/07/2017
23/07/2017
4/08/2017
16/08/2017
28/08/2017
9/09/2017
21/09/2017
3/10/2017
15/10/2017
27/10/2017
8/11/2017
20/11/2017
2/12/2017
14/12/2017
26/12/2017
7/01/2018
19/01/2018
31/01/2018
12/02/2018
24/02/2018
TSP
PM10
Long-term Impact Assessment Criteria for Particulate Matter TSP (90ug/m3)
Long-term Impact Assessment Criteria for Particulate Matter PM10 (25ug/m3)
TSP Long Term Average
PM10 Long Term Average

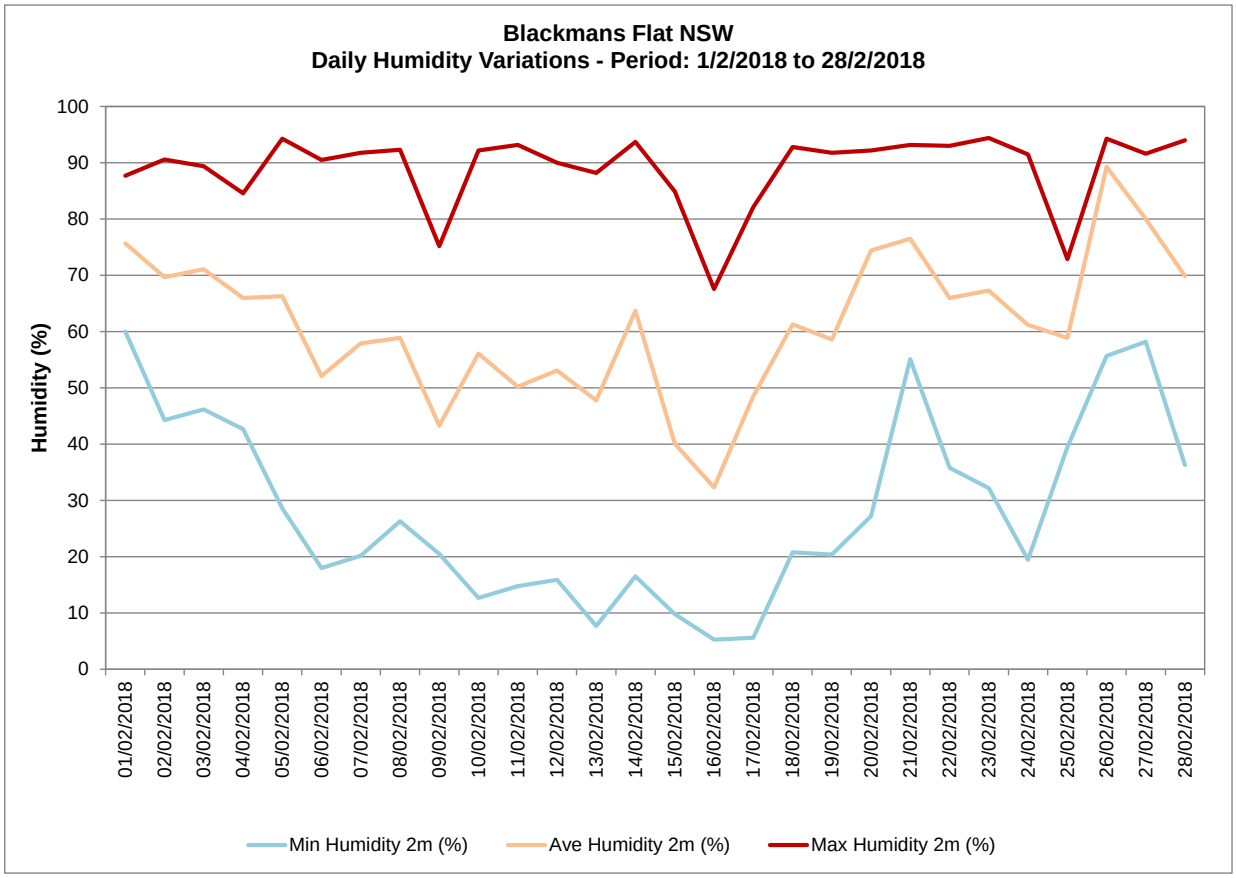
Appendix 3

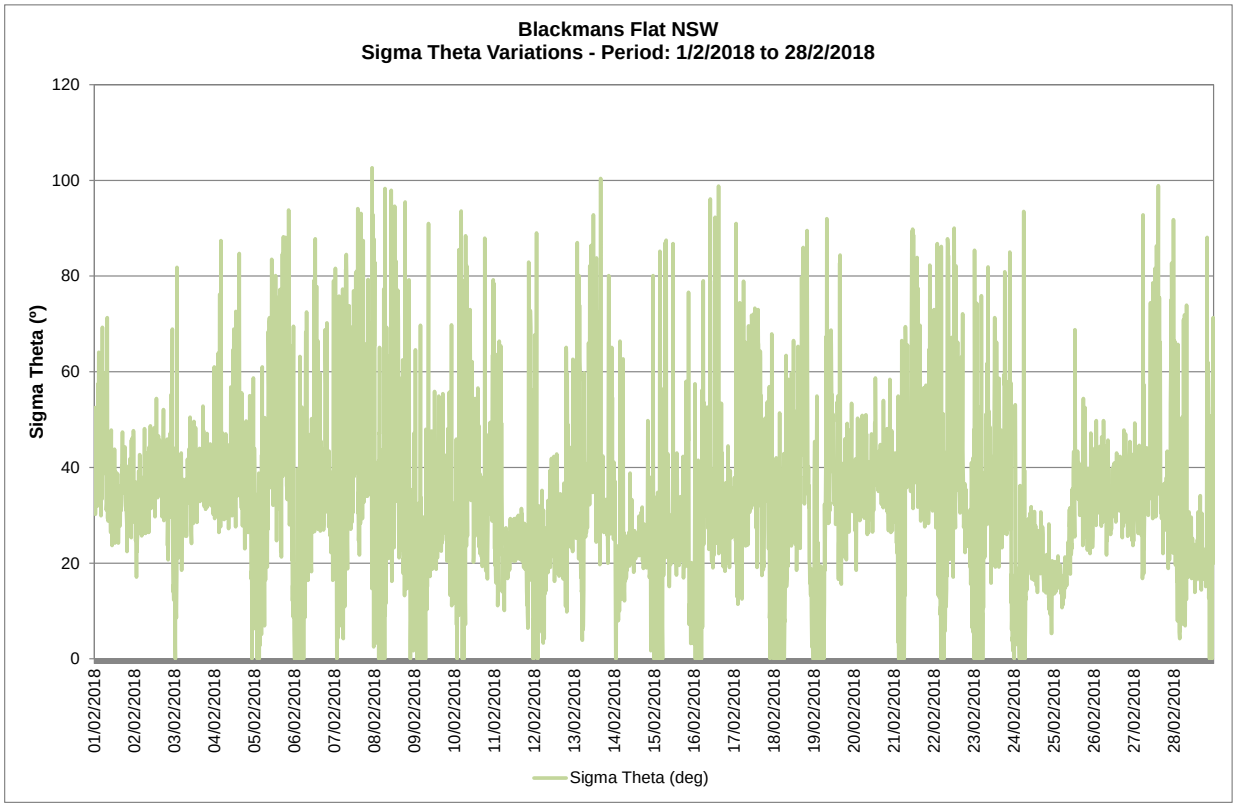
Meteorological Data


Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/2/2018 to 28/2/2018
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for February 2018: 88.6 mm
Total Rainfall
Evapotranspiration


Blackmans Flat NSW
Average Air Temperature - Period: 1/2/2018 to 28/2/2018
Average Temperature (ºC)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/2/2017 to 28/2/2017
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
Ave Starflow Level (mm)
Ave Starflow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/2/2018 to 28/2/2018
Humidity (%)
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/2/2018 to 28/2/2018
Sigma Theta (°)
120
100
80
60
40
20
0
01/02/2018
02/02/2018
03/02/2018
04/02/2018
05/02/2018
06/02/2018
07/02/2018
08/02/2018
09/02/2018
10/02/2018
11/02/2018
12/02/2018
13/02/2018
14/02/2018
15/02/2018
16/02/2018
17/02/2018
18/02/2018
19/02/2018
20/02/2018
21/02/2018
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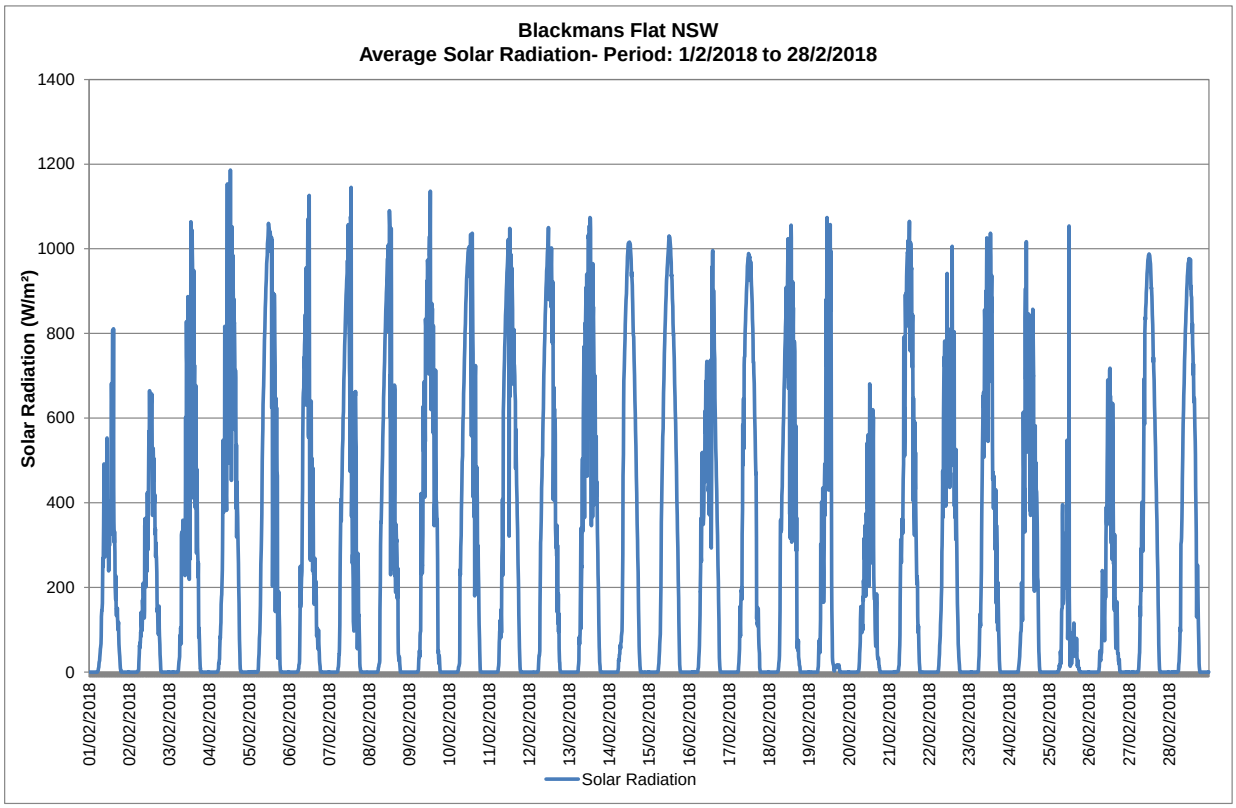
26/02/2018
27/02/2018
28/02/2018
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/2/2018 to 28/2/2018
Solar Radiation (W/m²)
1400
1200
1000
800
600
400
200
0
01/02/2018
02/02/2018
03/02/2018
04/02/2018
05/02/2018
06/02/2018
07/02/2018
08/02/2018
09/02/2018
10/02/2018
11/02/2018
12/02/2018
13/02/2018
14/02/2018
15/02/2018
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20/02/2018
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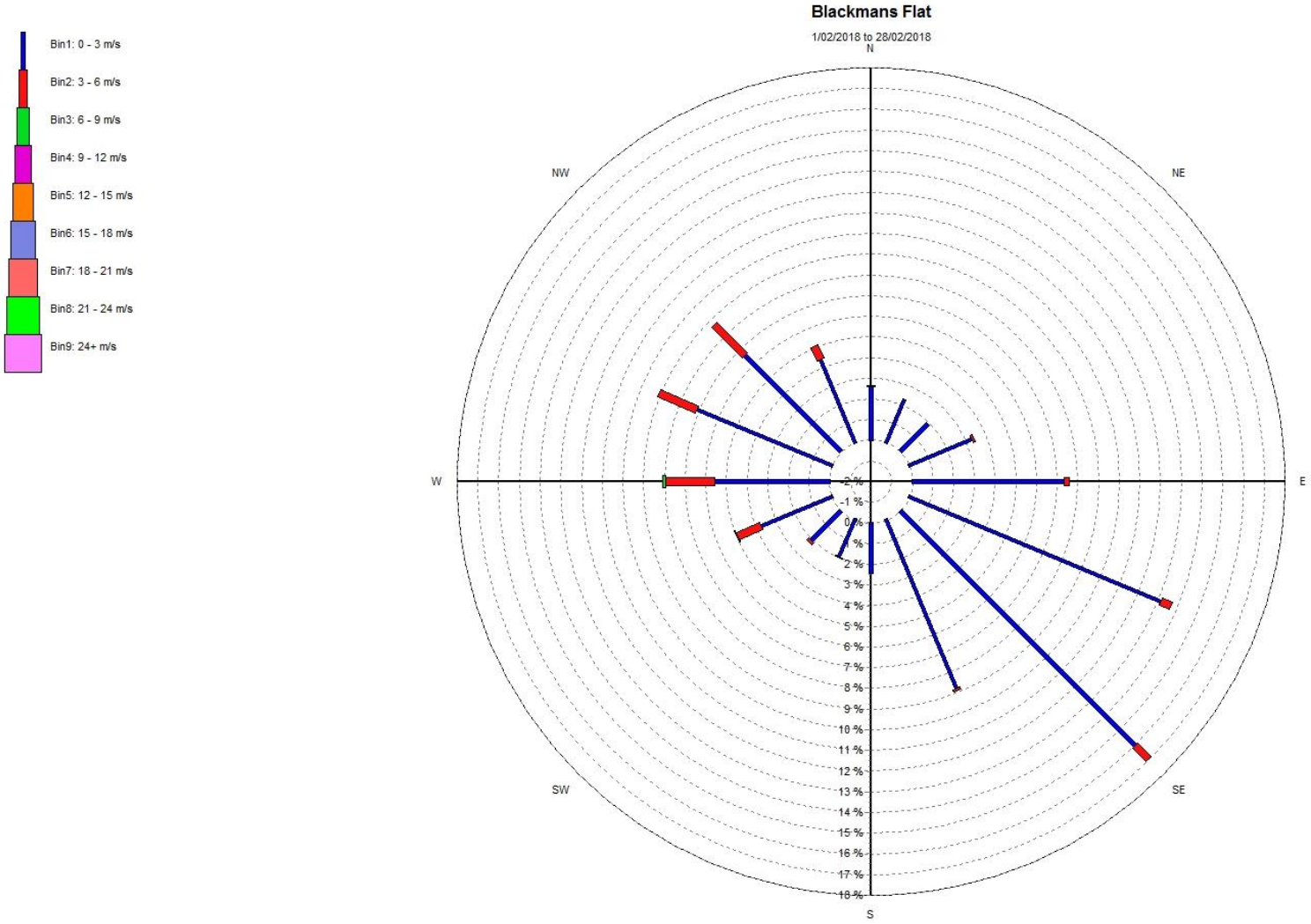
28/02/2018
Solar Radiation


Blackmans Flat
1/02/2018 to 28/02/2018
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 %
15 %
16 %
17 %
18 %