SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

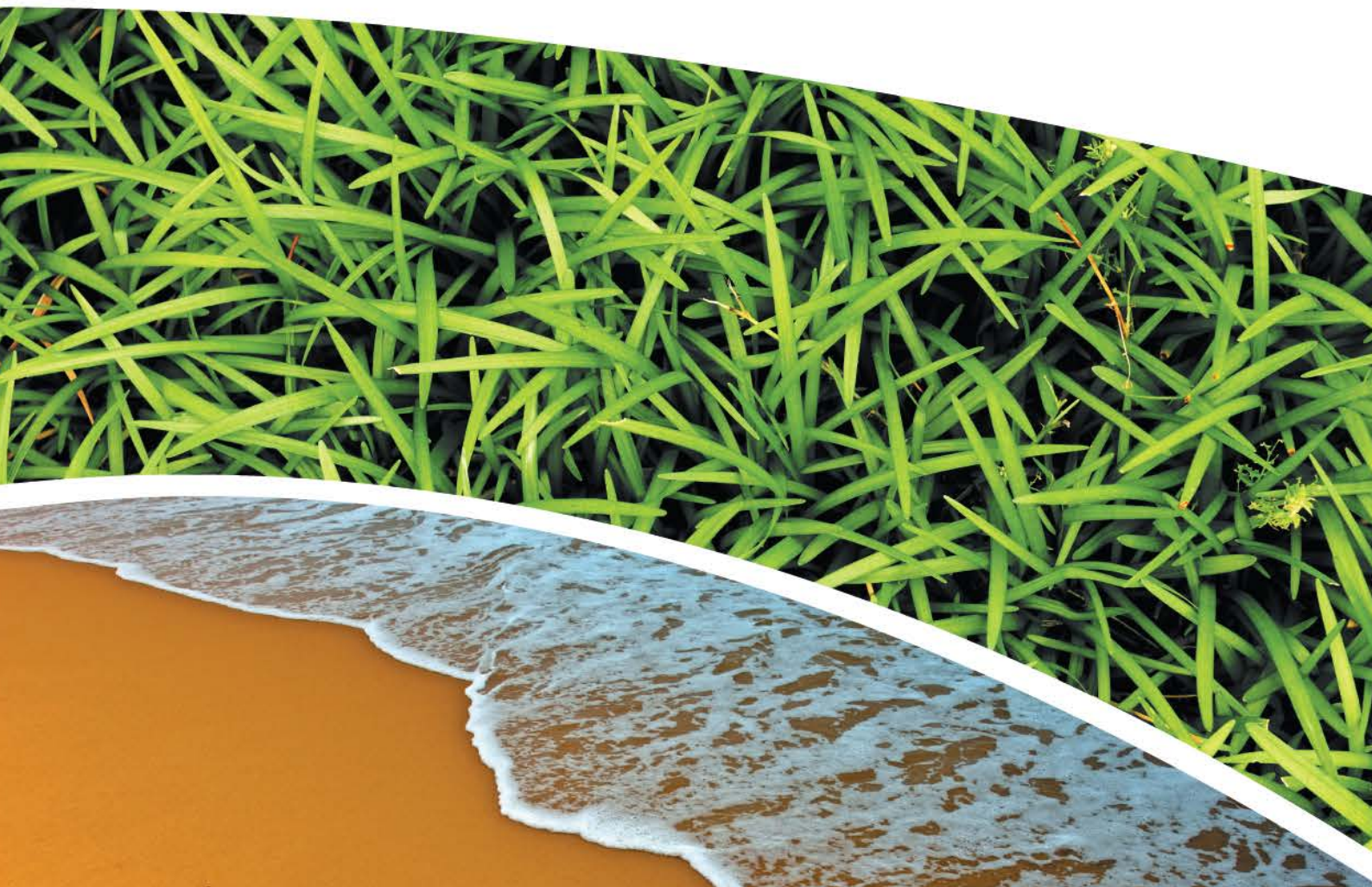
Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-1739/1

April 2017

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL



RCA AUSTRALIA
ABN 53 063 515 711
92 Hill Street, CARRINGTON NSW 2294
Telephone: +61 2 4902 9200
Facsimile: +61 2 4902 9299
Email: administrator@rca.com.au
Internet: www.rca.com.au

This document is and shall remain the property of RCA Australia. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission supplied at the time of proposal. Unauthorised use of this document in any form whatsoever is prohibited.

DOCUMENT STATUS						
Rev No	Comment	Author	Reviewer	Approved for Issue (Project Manager)		
				Name	Signature	Date
/0	Final	C Rocher	K Tripp	K Tripp		16.06.17

DOCUMENT DISTRIBUTION				
Rev No	Copies	Format	Issued to	Date
/0	1	Electronic (email)	Pine Dale Mine – Graham Goodwin graham.goodwin@energyaustralia.com.au	16.06.17
/0	1	Electronic (email)	EnergyAustralia- Mark Frewin mark.frewin@energyaustralia.com.au	16.06.17
/0	1	Electronic (email)	Lithgow City Council – Andrew Muir andrew.muir@lithgow.nsw.gov.au	16.06.17
/0	1	Electronic report	RCA – job archive	16.06.17

bsi. ISO 9001 Quality Management

bsi. AS/NZS 4801 Occupational Health and Safety Management

RCA LE ref 6880-1739/1

16 June 2017

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
APRIL 2017

Robert Carr & Associates Pty Ltd
T/A RCA Australia ABN 53 063 515 711
92 Hill St, PO Box 175 Carrington NSW 2294
Ph 02 **4902 9200 Fax** 02 **4902 9299**
Email administrator@rca.com.au
Web www.rca.com.au

1 GENERAL COMMENTS

Job Number: 6880.

Date Samples Received: During the month of April 2017.

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 April 2017. 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 (August 2015). This sampling regime commenced 1 August 2013. Water quality analysis results are shown in **Table 2**.

Table 2 *Groundwater Analysis Results – Monthly Monitoring*

ANALYSIS	UNITS	P6	P7
Sample Number	-	04176880009	04176880010
Date Sampled	-	10/04/17	10/04/17
Time Sampled	-	12:52	13:42
Depth to Water from Surface	m	23.76	6.67
Water Level (AHD)	m	893.19	887.73
Temperature	°C	15.0	15.5
pH	pH	6.68	6.67
Conductivity	µS/cm	***1270***	***857***
Turbidity	NTU	28	
Dissolved Oxygen	mg/L	3.9	
TSS	mg/L	54	
Oil and Grease	mg/L	<5	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	82	
Total Alkalinity ($CaCO_3$)	mg/L	82	
Sulfate (as SO_4)	mg/L	483	
Chloride	mg/L	33	
Calcium	mg/L	118	
Magnesium	mg/L	55	
Sodium	mg/L	49	
Potassium	mg/L	18	
Cobalt (dissolved)	mg/L	0.058	
Manganese (dissolved)	mg/L	2.40	
Nickel (dissolved)	mg/L	0.086	
Zinc (dissolved)	mg/L	0.15	
Iron (dissolved)	mg/L	25.9	
Trigger Levels			
pH trigger level	pH	6.2 – 8.0	6.3 – 8.0
Conductivity trigger level	µS/cm	1180	852
Water Level (AHD) #	m	887.90	883.28

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

Indicates analysis was not required

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

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

3.2 EPA SURFACE WATER MONITORING

Routine quarterly surface water monitoring was not required to be undertaken this month. The next quarterly EPA surface water monitoring round is scheduled to be undertaken in May 2017.

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.

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
6-Apr-17	9	04176880029	9417096	10-Apr-17	17:40	Client	24.00
12-Apr-17	10	04176880031	9417098	16-Apr-17	18:23	Client	24.00
18-Apr-17	21	04176880033	9417100	23-Apr-17	13:40	Client	24.00
24-Apr-17	36	04176880035	9417037	29-Apr-17	17:05	Client	24.00
30-Apr-17	10	04176880037	9417040	04-May-17	6:47	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
6-Apr-17	2	04176880030	9417097	10-Apr-17	17:50	Client	44.00^
12-Apr-17	15	04176880032	9417099	16-Apr-17	18:27	Client	4.00^
18-Apr-17	15	04176880034	9417001	23-Apr-17	13:50	Client	24.00
24-Apr-17	46	04176880036	9417038	29-Apr-17	17:15	Client	24.00
30-Apr-17	4	04176880038	9417039	04-May-17	6:52	Client	24.00

^The HVAS PM_{10} run dates on the 6 and 12 April did not run for 24 ± 1 hours and therefore do not conform to AS 3580.9.6:2015.

The TSP result recorded on 12 April was shown to be less than the corresponding PM_{10} result. The total suspended particulate concentration (which includes particulates less than and greater than 10µm) is usually found to be greater than the PM_{10} fraction of suspended particulates which are less than 10µm in size. It was noted in *RCA HVAS Laboratory Report 6880-1738/0* that the TSP filter paper (filter number 9417098) for 12 April was received with a corner piece of the filter missing. It is possible the reduction in filter weight from the missing piece of the filter has caused the TSP result to be lower than the PM_{10}.

The TSP result recorded on the 24 April was less than the corresponding PM_{10} result. It was noted in *RCA HVAS Laboratory Report 6880-1738/0* that a visual inspection of both the TSP and PM10 filters indicates there appears to a greater particulate load on the PM10 filter (filter number 9417038). The reason for the difference in filter loading is unclear.

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 May 2016 to April 2017) for the TSP unit is 19.7µg/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 April 2017.

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 5**.

Table 5 *Depositional Dust Monitoring - Deposited Matter – April 2017*

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)
04176880019	D1	9/03/2017	10/04/2017	32	I	0.2	<0.1	0.2
04176880020	D2	9/03/2017	10/04/2017	32	I	0.4	0.1	0.3
04176880021	D3	9/03/2017	10/04/2017	32	I	0.2	<0.1	0.2
04176880022	D4	9/03/2017	10/04/2017	32	T	0.5	0.1	0.4
04176880023	D5	9/03/2017	10/04/2017	32	G	0.2	<0.1	0.2
04176880024	D6	9/03/2017	10/04/2017	32	B	2.8	0.7	2.1

Glossary of Terms Used in Notes:

I Insects (eg, Ants, Spiders) T Tree Litter (e.g. Twigs, leaves. Gumnuts

G Grass and grass seeds B Bird Droppings

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 $1.0g/m^2$ 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

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 scheduled to be undertaken this month, however due to poor weather conditions it was re-scheduled for May 2017.

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 April 2017 environmental monitoring constituents were found to be in compliance with EPL 4911 with the exception of electrical conductivity in the groundwater samples.

Standing water levels within the site groundwater bores were compliant with their respective trigger levels. The pH recorded at both site bores was compliant with each of their respective trigger levels however the electrical conductivity recorded at both site bores was in excess of their respective trigger levels.

The EPA quarterly surface water monitoring was not required to be undertaken during April 2017. The next scheduled quarterly monitoring round is due in May 2017.

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.

This report must not be reproduced except in full. Results or figures from this report must not be used without acknowledgment.

Please contact the undersigned if you have any queries.

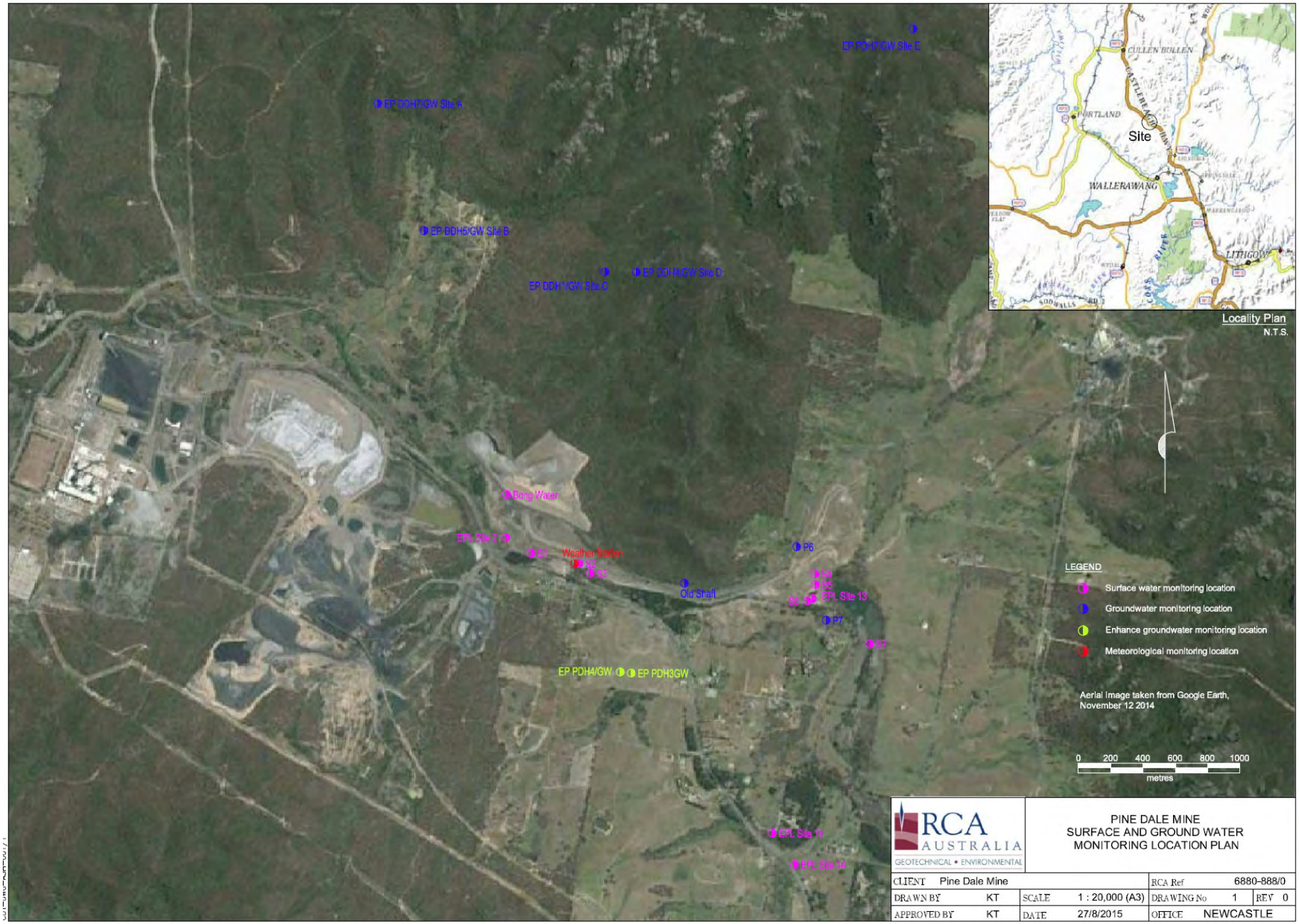
Yours sincerely

Carmen Rocher
Environmental Engineer
RCA Australia Pty Ltd

Karen Tripp
Senior Environmental Scientist/Hygienist
RCA Australia Pty Ltd

Appendix 1

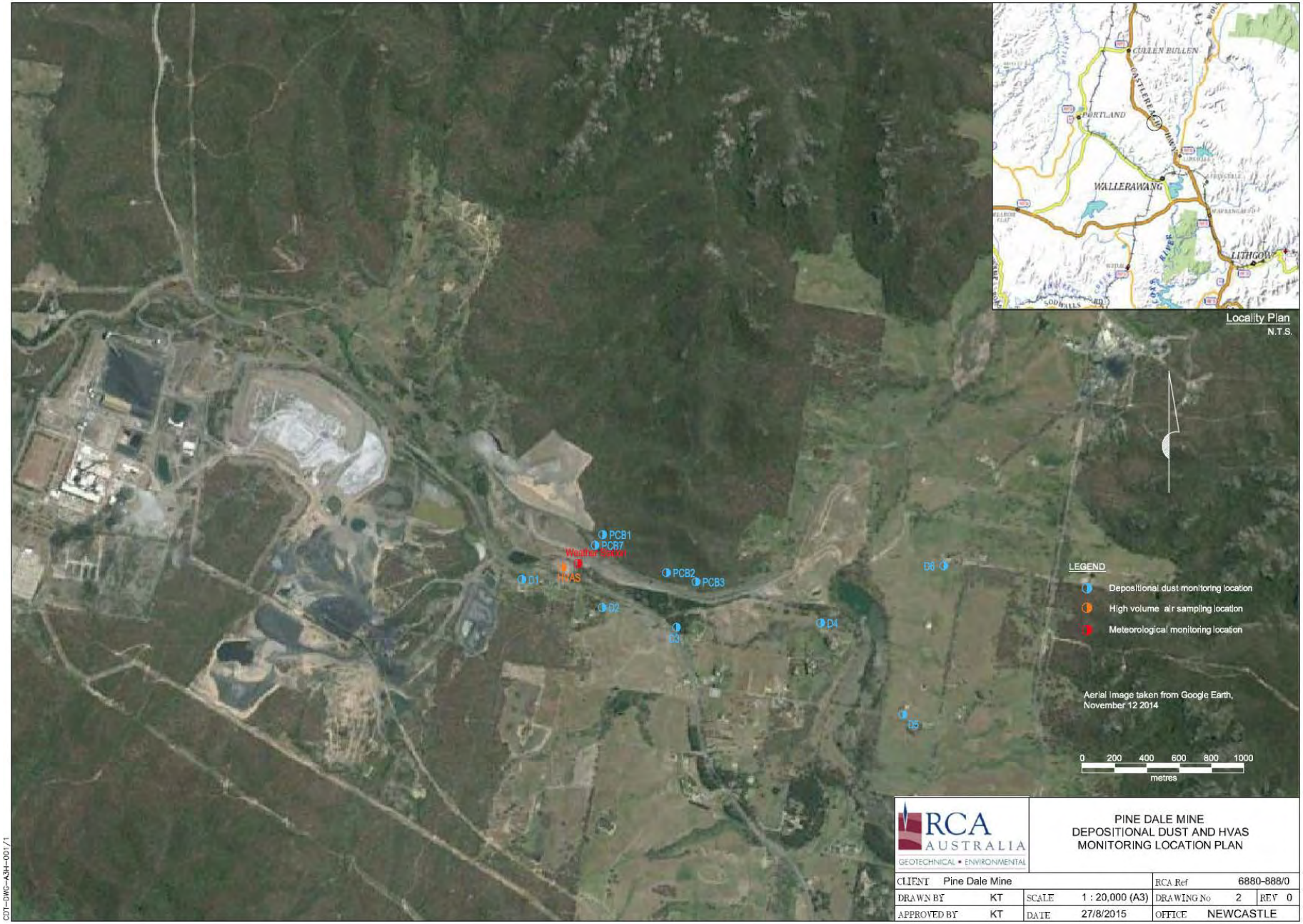
Surface Water Groundwater and Air Quality Monitoring Locations



RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

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



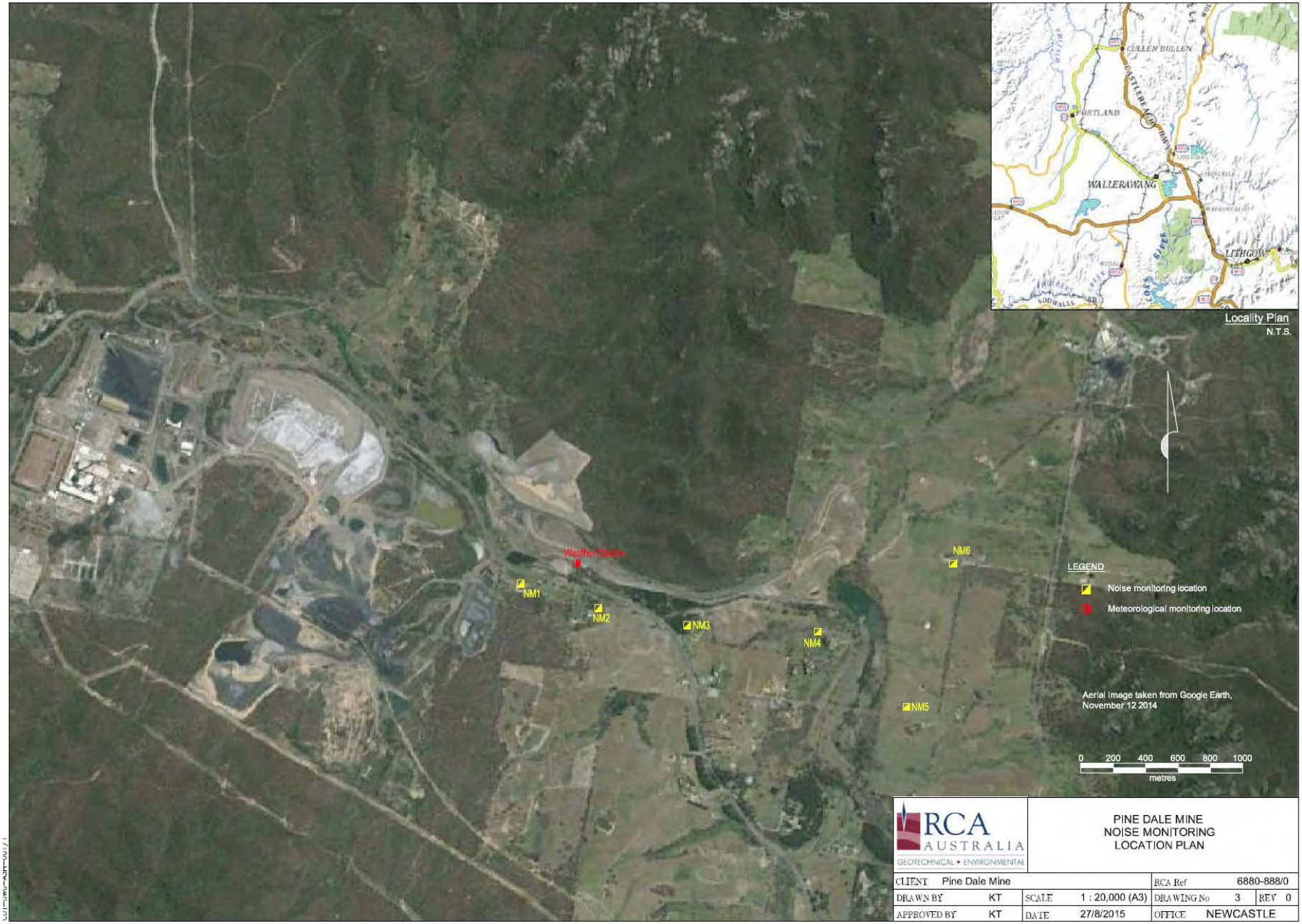
Locality Plan
N.T.S.

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

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



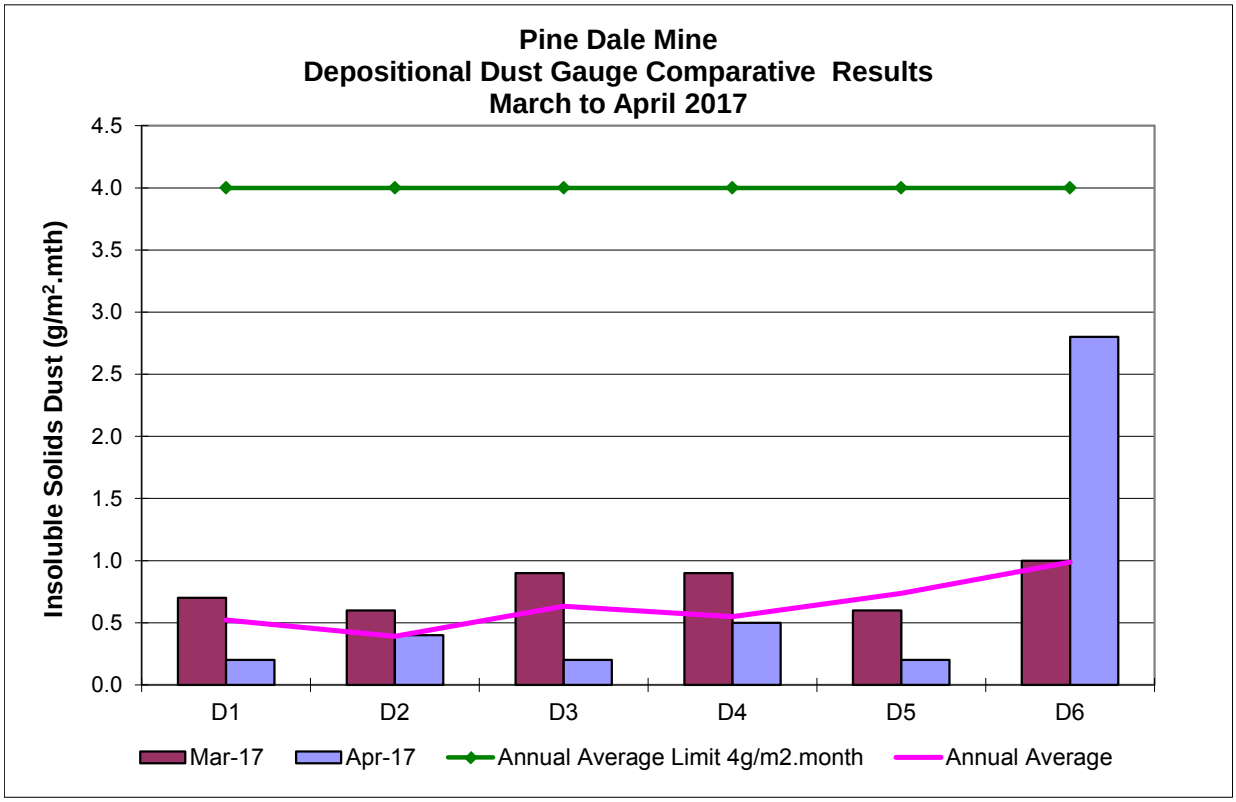
RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

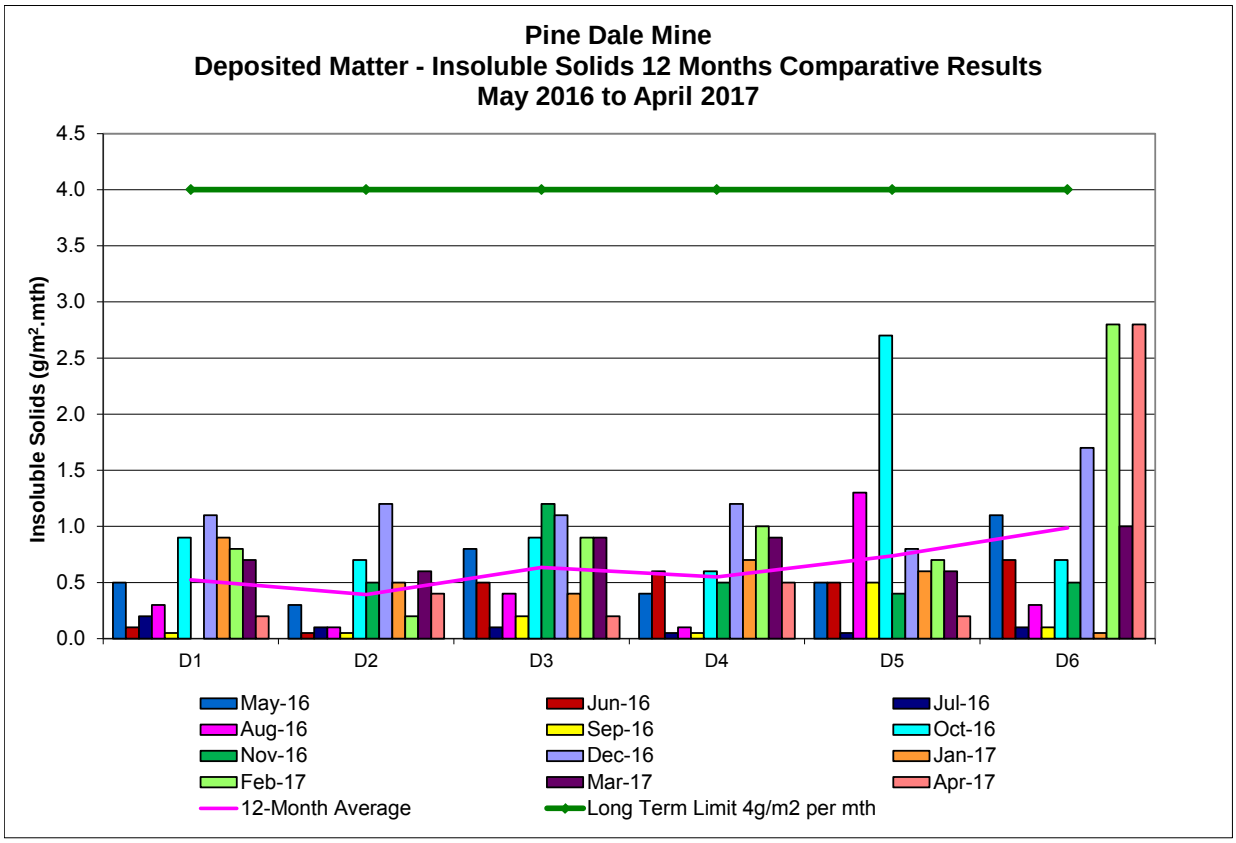
PINE DALE MINE
NOISE MONITORING
LOCATION PLAN

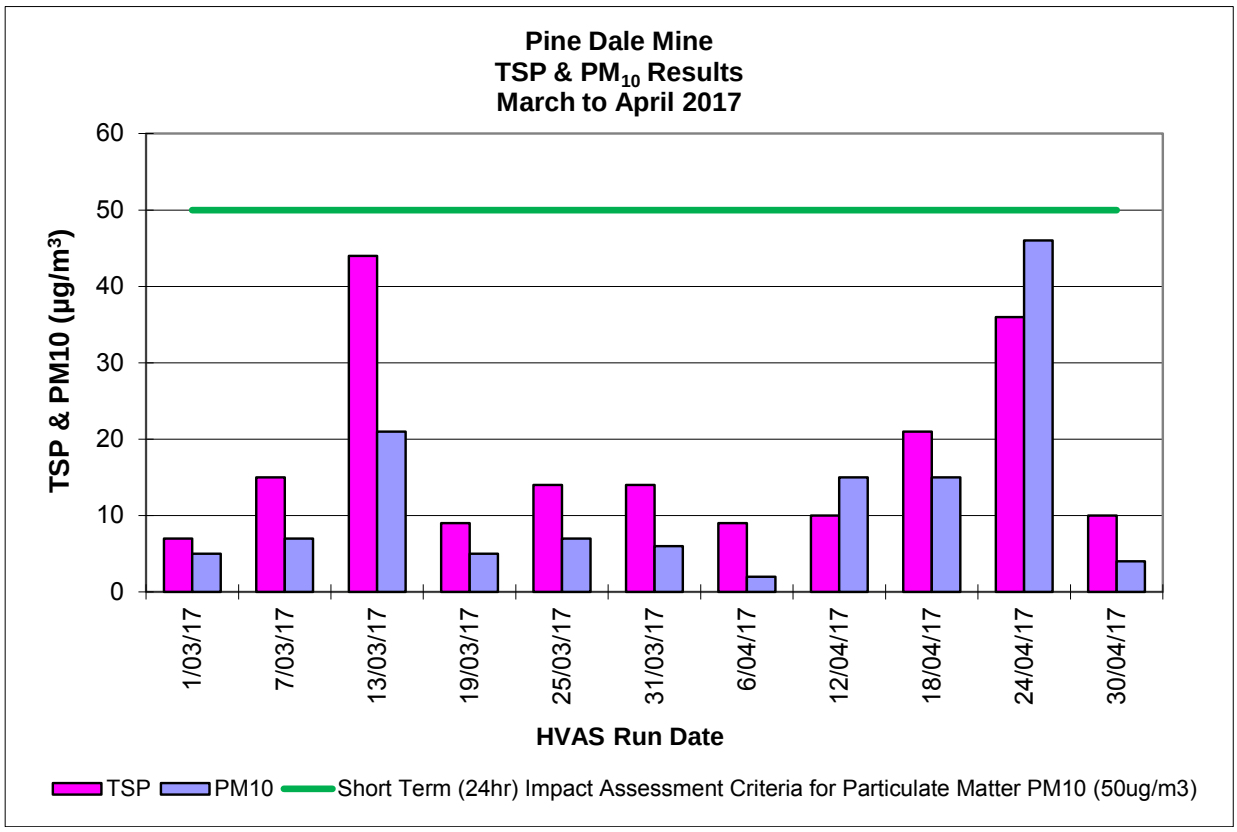
CLIENT	Pine Dale Mine			RCA Ref	6880-888/0
DRAWN BY	KT	SCALE	1 : 20,000 (A3)	DRAWING No	3 REV 0
APPROVED BY	KT	DATE	27/8/2015	OFFICE	NEWCASTLE

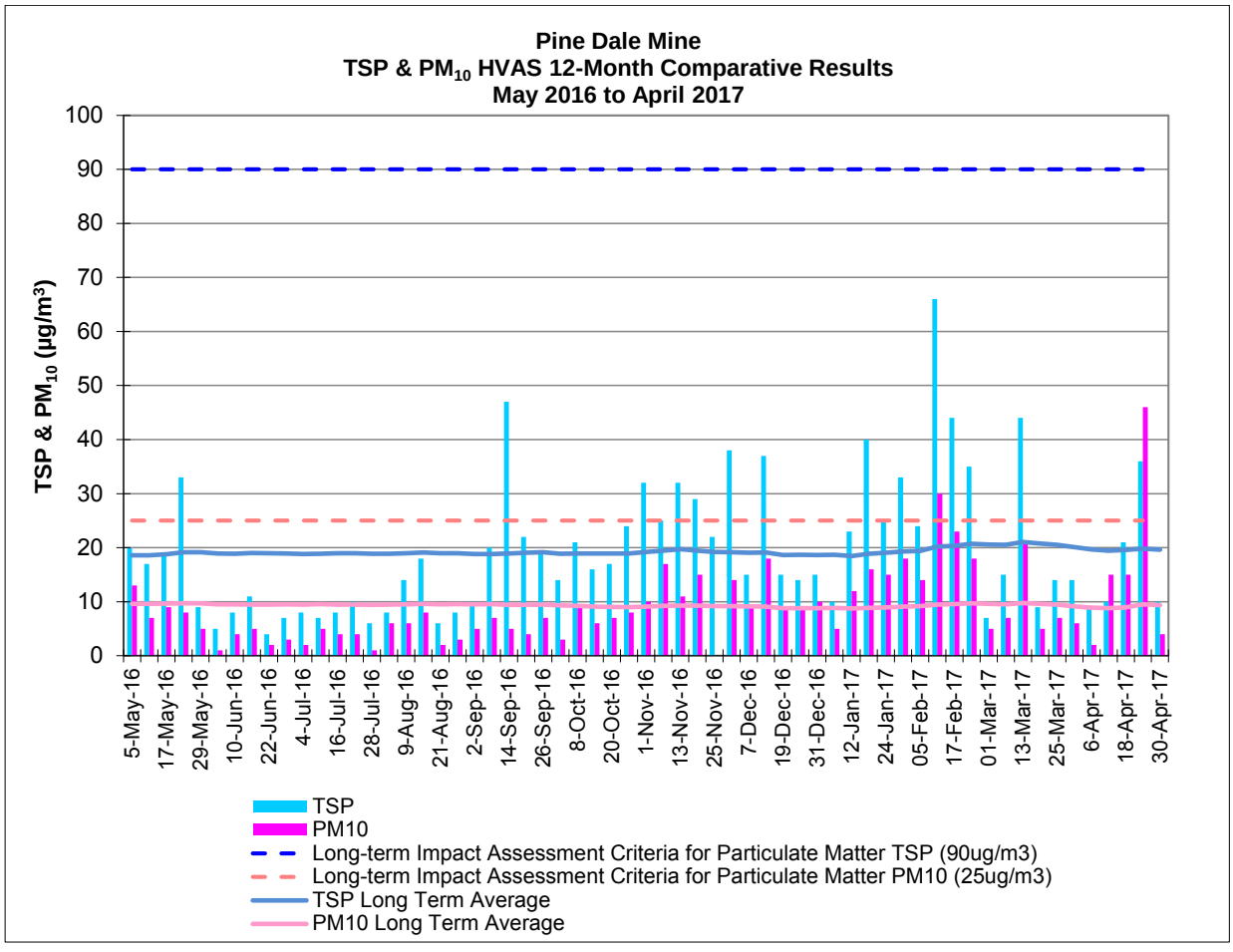
Appendix 2

Depositional Dust and HVAS Graphs


Pine Dale Mine
Depositional Dust Gauge Comparative Results
March to April 2017
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
Mar-17
Apr-17
Annual Average Limit 4g/m2.month
Annual Average

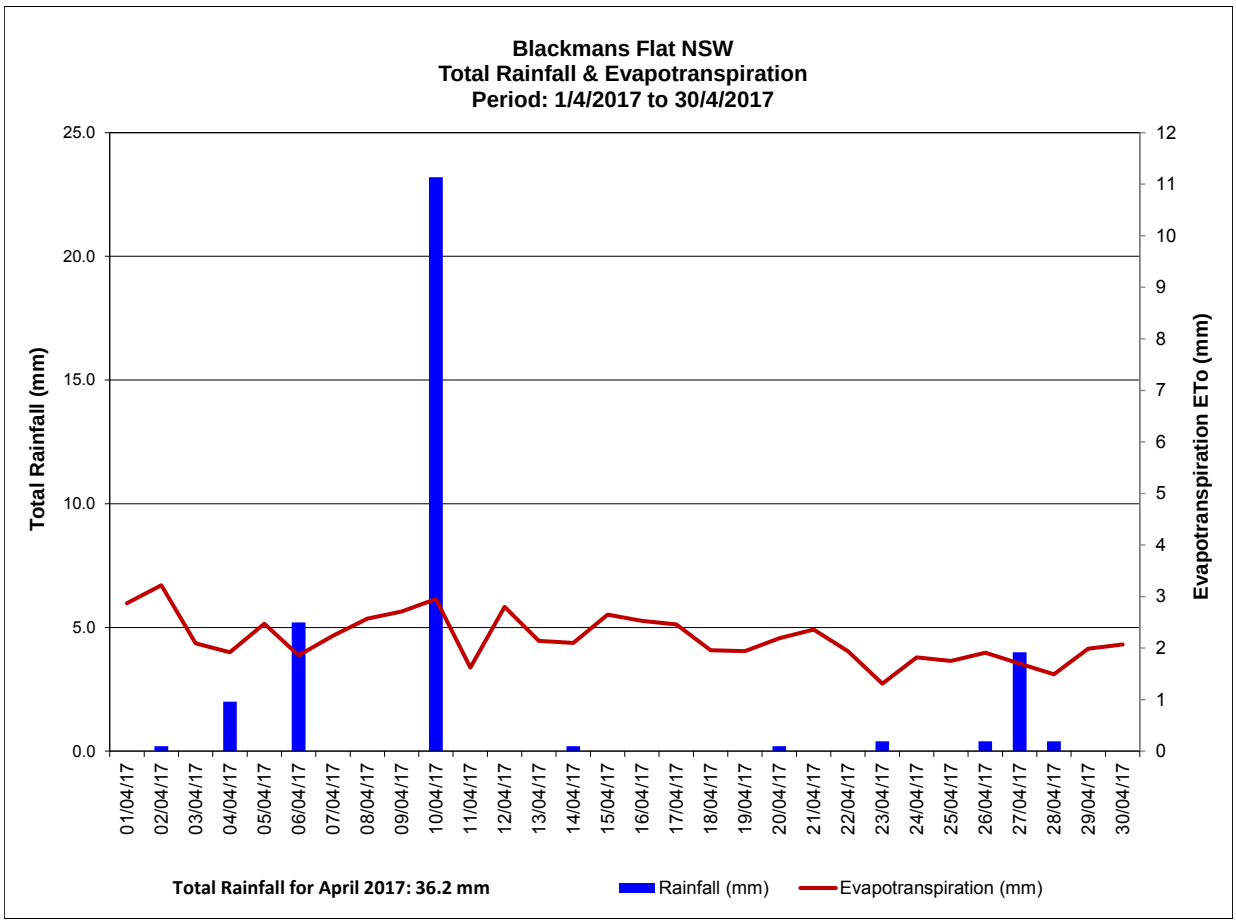

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
May 2016 to April 2017
Insoluble Solids (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
May-16
Jun-16
Jul-16
Aug-16
Sep-16
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
12-Month Average
Long Term Limit 4g/m2 per mth

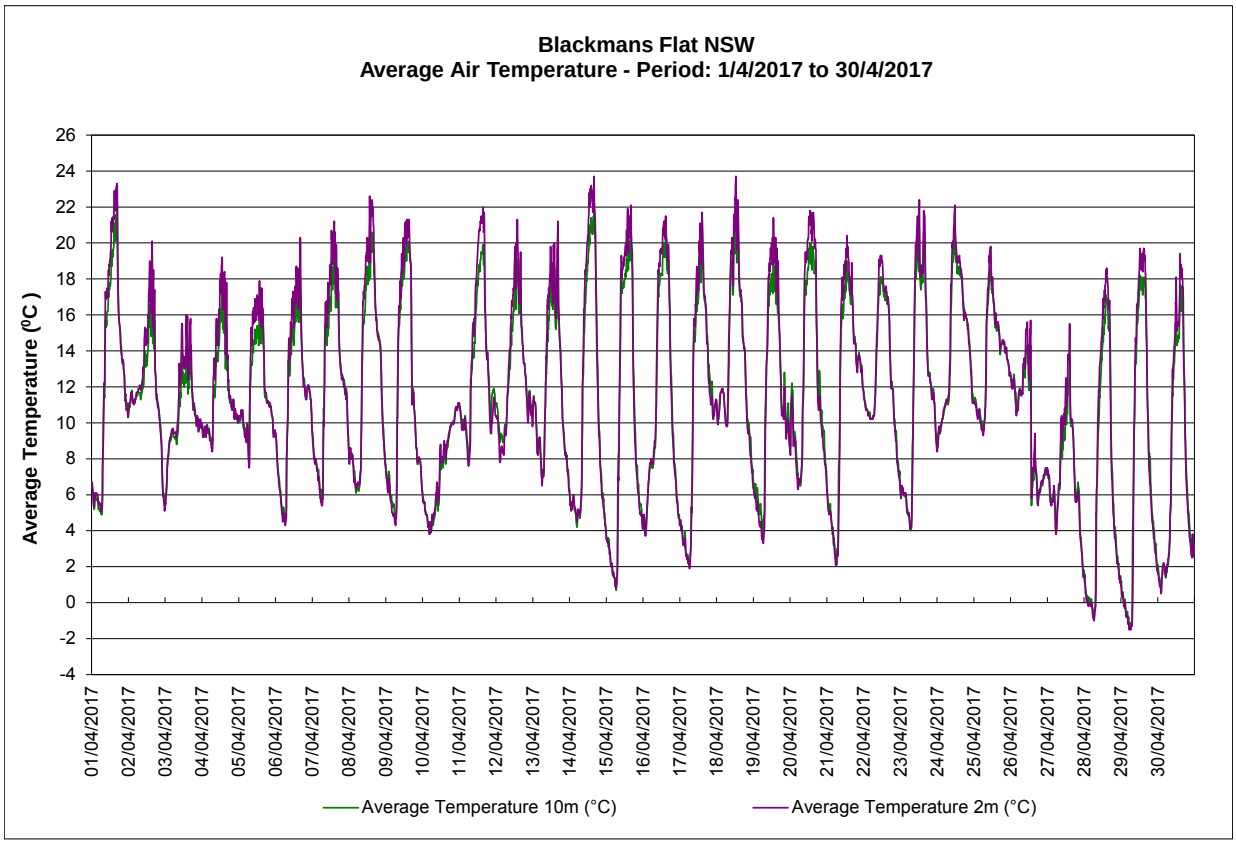

Pine Dale Mine
TSP & PM10 Results
March to April 2017
TSP & PM10 (µg/m³)
60
50
40
30
20
10
0
1/03/17
7/03/17
13/03/17
19/03/17
25/03/17
31/03/17
6/04/17
12/04/17
18/04/17
24/04/17
30/04/17
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

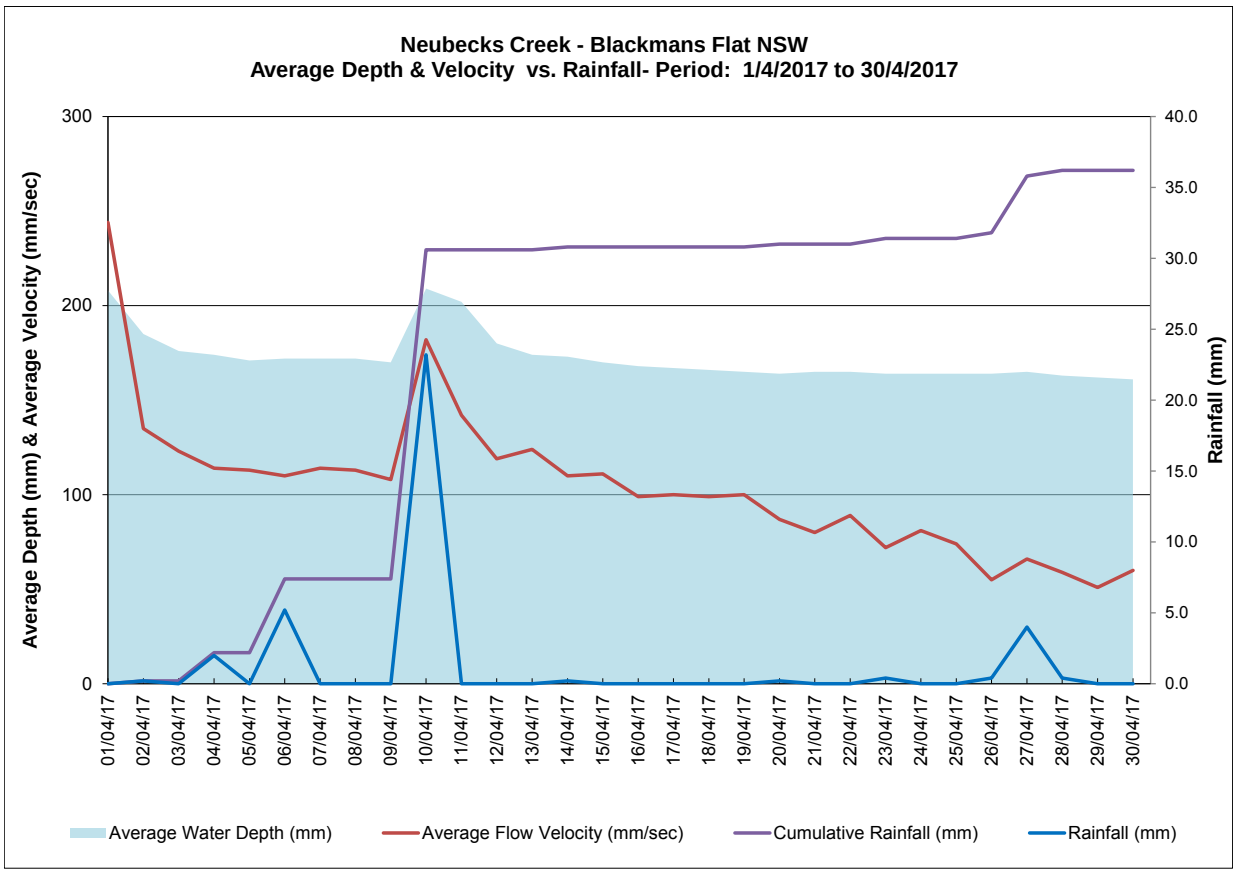

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
May 2016 to April 2017
TSP & PM10 (µg/m³)
100
90
80
70
60
50
40
30
20
10
0
5-May-16
17-May-16
29-May-16
10-Jun-16
22-Jun-16
4-Jul-16
16-Jul-16
28-Jul-16
9-Aug-16
21-Aug-16
2-Sep-16
14-Sep-16
26-Sep-16
8-Oct-16
20-Oct-16
1-Nov-16
13-Nov-16
25-Nov-16
7-Dec-16
19-Dec-16
31-Dec-16
12-Jan-17
24-Jan-17
05-Feb-17
17-Feb-17
01-Mar-17
13-Mar-17
25-Mar-17
6-Apr-17
18-Apr-17
30-Apr-17
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

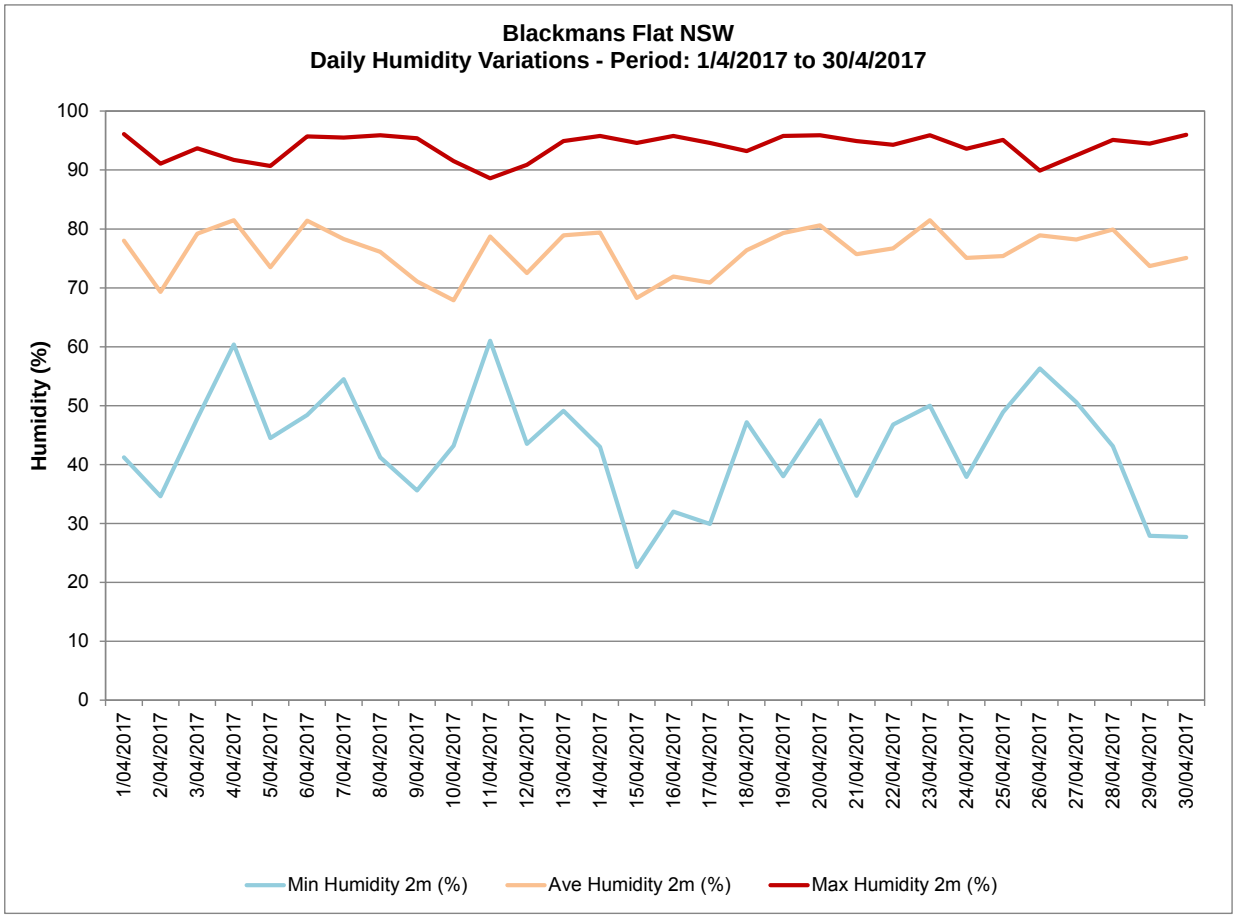
Appendix 3

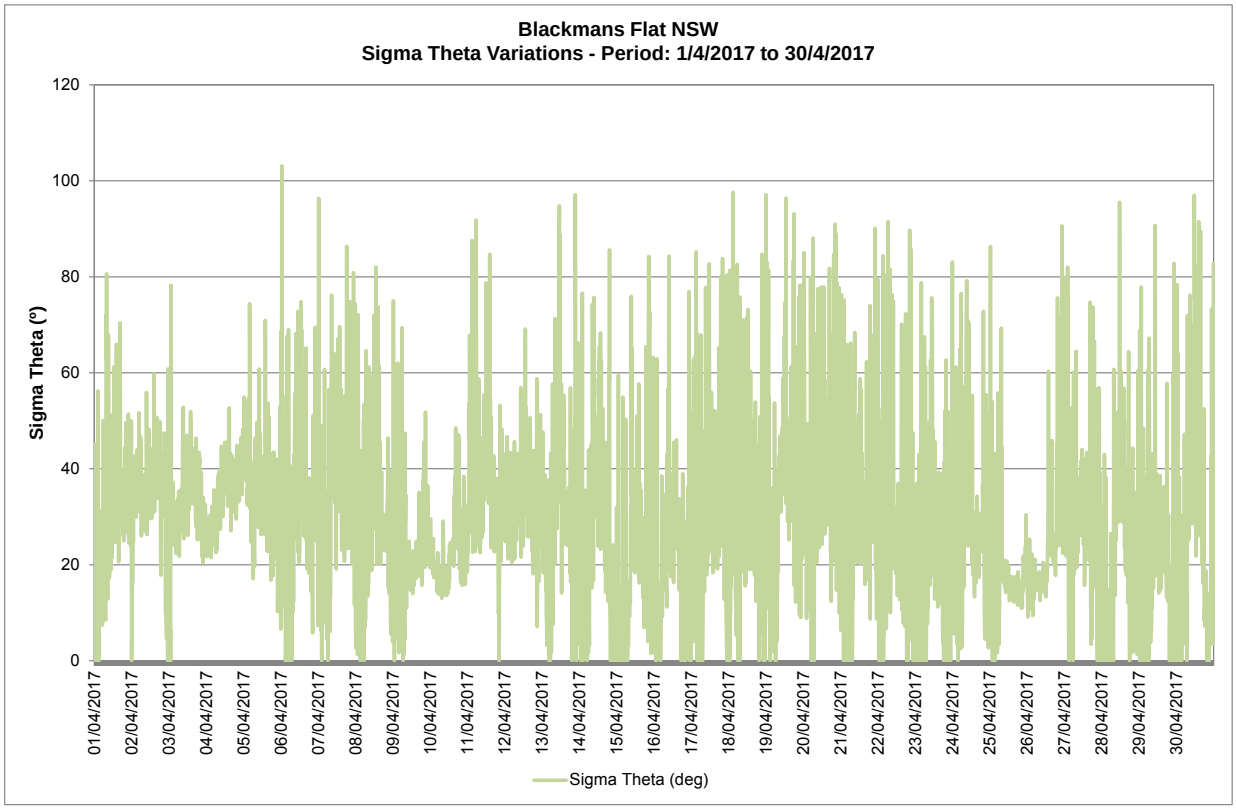
Meteorological Data

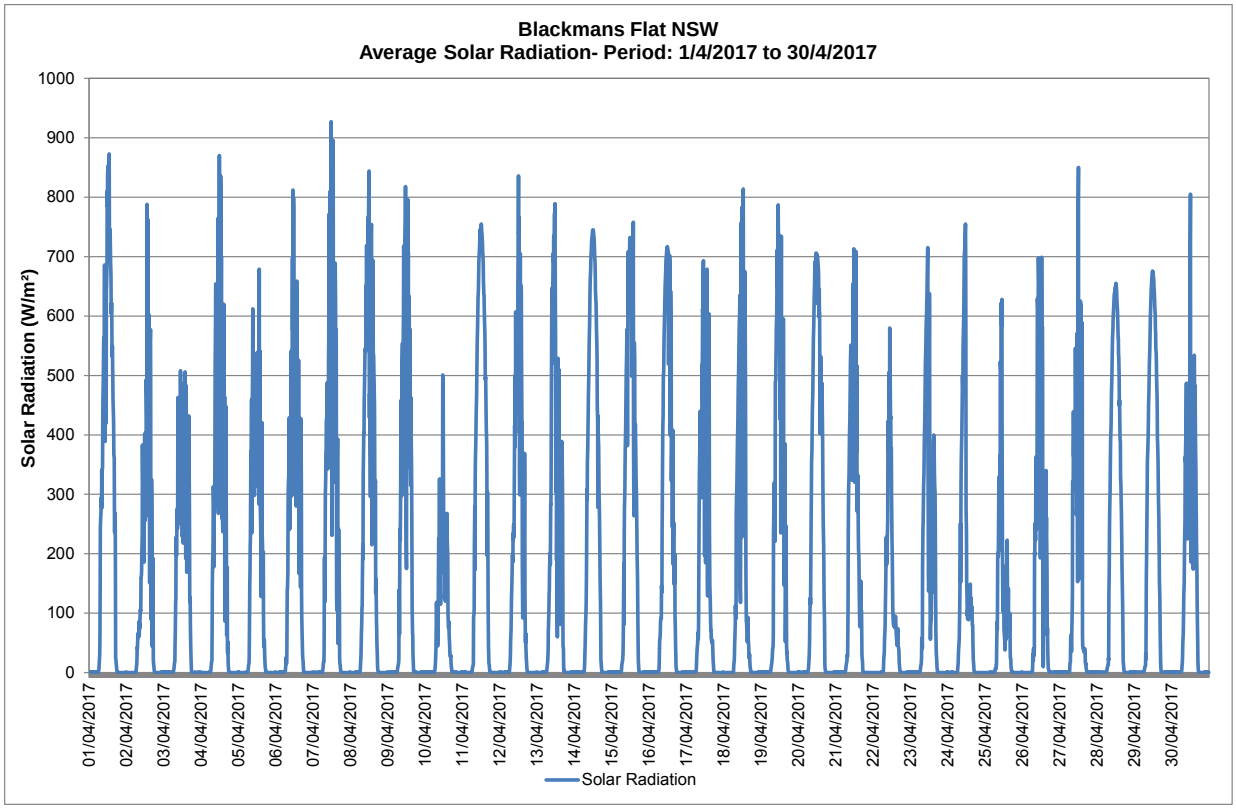

Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/4/2017 to 30/4/2017
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for April 2017: 36.2 mm
Rainfall (mm)
Evapotranspiration (mm)

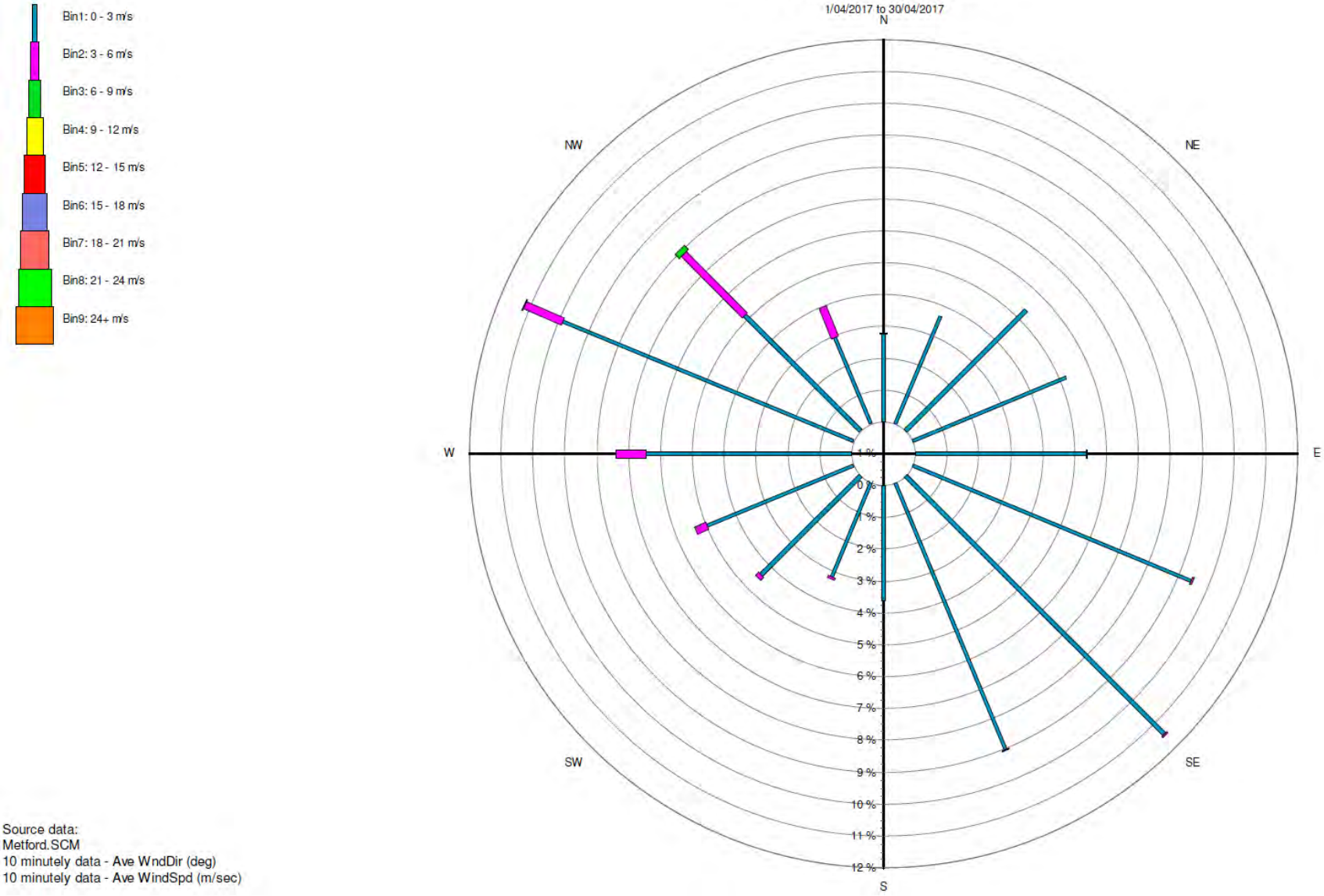

Blackmans Flat NSW
Average Air Temperature - Period: 1/4/2017 to 30/4/2017
Average Temperature (ºC)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/4/2017 to 30/4/2017
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
300
200
100
0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
01/04/17
02/04/17
03/04/17
04/04/17
05/04/17
06/04/17
07/04/17
08/04/17
09/04/17
10/04/17
11/04/17
12/04/17
13/04/17
14/04/17
15/04/17
16/04/17
17/04/17
18/04/17
19/04/17
20/04/17
21/04/17
22/04/17
23/04/17
24/04/17
25/04/17
26/04/17
27/04/17
28/04/17
29/04/17
30/04/17
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/4/2017 to 30/4/2017
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
1/04/2017
2/04/2017
3/04/2017
4/04/2017
5/04/2017
6/04/2017
7/04/2017
8/04/2017
9/04/2017
10/04/2017
11/04/2017
12/04/2017
13/04/2017
14/04/2017
15/04/2017
16/04/2017
17/04/2017
18/04/2017
19/04/2017
20/04/2017
21/04/2017
22/04/2017
23/04/2017
24/04/2017
25/04/2017
26/04/2017
27/04/2017
28/04/2017
29/04/2017
30/04/2017
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/4/2017 to 30/4/2017
Sigma Theta (°)
120
100
80
60
40
20
0
01/04/2017
02/04/2017
03/04/2017
04/04/2017
05/04/2017
06/04/2017
07/04/2017
08/04/2017
09/04/2017
10/04/2017
11/04/2017
12/04/2017
13/04/2017
14/04/2017
15/04/2017
16/04/2017
17/04/2017
18/04/2017
19/04/2017
20/04/2017
21/04/2017
22/04/2017
23/04/2017
24/04/2017
25/04/2017
26/04/2017
27/04/2017
28/04/2017
29/04/2017
30/04/2017
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/4/2017 to 30/4/2017
Solar Radiation (W/m²)
1000
900
800
700
600
500
400
300
200
100
0
01/04/2017
02/04/2017
03/04/2017
04/04/2017
05/04/2017
06/04/2017
07/04/2017
08/04/2017
09/04/2017
10/04/2017
11/04/2017
12/04/2017
13/04/2017
14/04/2017
15/04/2017
16/04/2017
17/04/2017
18/04/2017
19/04/2017
20/04/2017
21/04/2017
22/04/2017
23/04/2017
24/04/2017
25/04/2017
26/04/2017
27/04/2017
28/04/2017
29/04/2017
30/04/2017
Solar Radiation



Source data:
Metford.SCM
10 minutely data - Ave WndDir (deg)
10 minutely data - Ave WindSpd (m/sec)