SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-1750/0

September 2017

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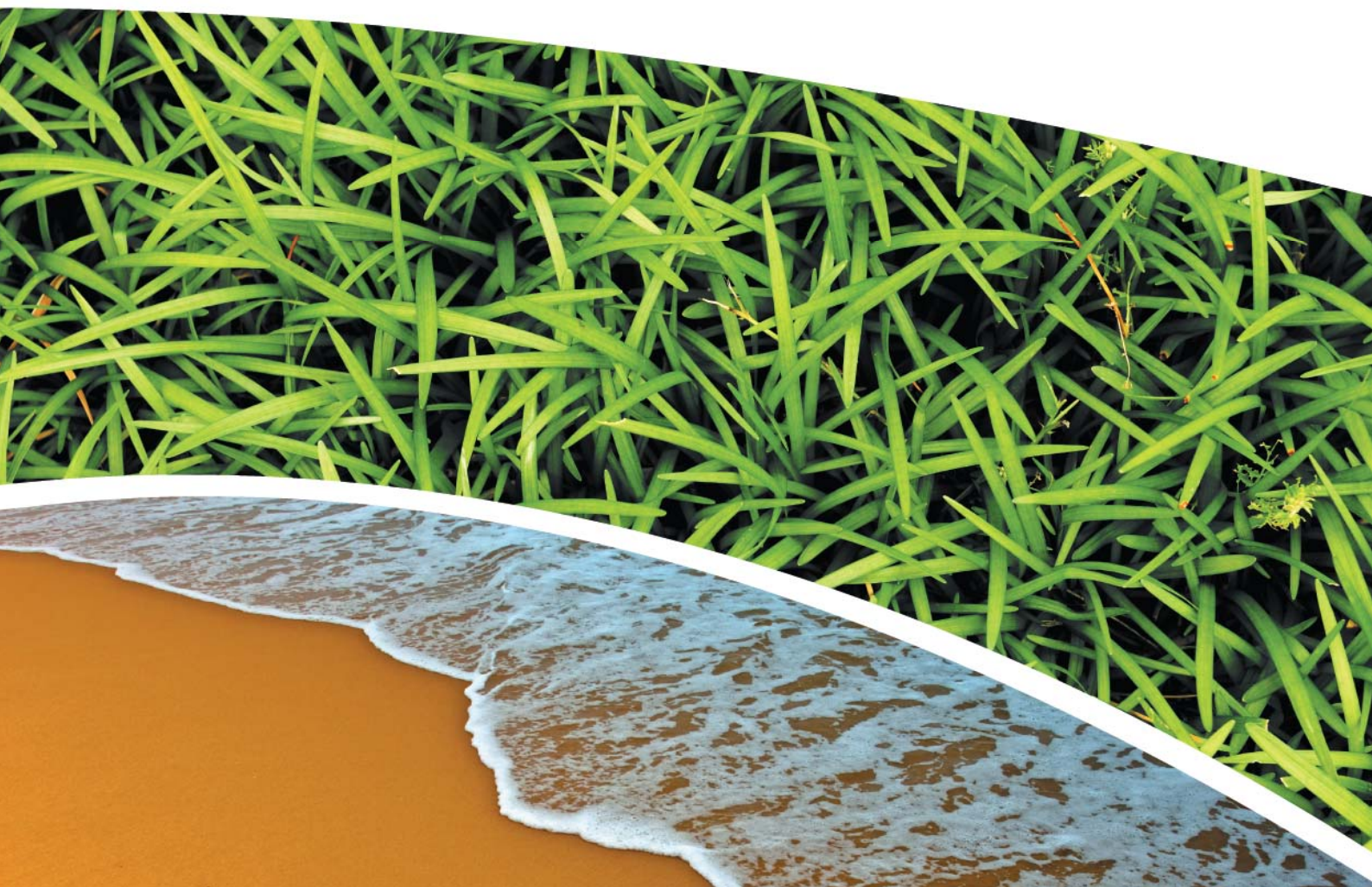

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16 October 2017

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

SEPTEMBER 2017

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1 GENERAL COMMENTS

Job Number: 6880.

Date Samples Received: During the month of September 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 September 2017. Water quality analysis results are shown in **Table 2**.

Table 2 *Groundwater Analysis Results – Monthly Monitoring*

ANALYSIS	UNITS	P6	P7
Sample Number	-	09176880009	09176880010
Date Sampled	-	08/09/17	08/09/17
Time Sampled	-	9:08	11:18
Depth to Water from Surface	m	24.79	6.96
Water Level (AHD)	m	892.16	887.44
Temperature	°C	14.0	14.5
pH	pH	***6.13***	6.29
Conductivity	µS/cm	***1330***	842
Turbidity	NTU	96	
Dissolved Oxygen	mg/L	2.7	
TSS	mg/L	89	
Oil and Grease	mg/L	<5	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	86	
Total Alkalinity ($CaCO_3$)	mg/L	86	
Sulfate (as SO_4)	mg/L	497	
Chloride	mg/L	30	
Calcium	mg/L	124	
Magnesium	mg/L	56	
Sodium	mg/L	52	
Potassium	mg/L	20	
Cobalt (dissolved)	mg/L	0.076	
Manganese (dissolved)	mg/L	2.6	
Nickel (dissolved)	mg/L	0.113	
Zinc (dissolved)	mg/L	0.035	
Iron (dissolved)	mg/L	34.2	
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 during September 2017. The next round of quarterly surface water monitoring is scheduled to be undertaken in November 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
03-Sep-17	27	09176880029	9410967	05-Sep-17	11:00	Client	24.00
09-Sep-17	16	09176880031	9410968	14-Sep-17	14:50	Client	24.12
15-Sep-17	20	09176880033	9410970	18-Sep-17	12:20	Client	24.00
21-Sep-17	28	09176880035	9410972	26-Sep-17	15:50	Client	24.00
27-Sep-17	30	09176880037	9410471	28-Sep-17	6:50	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
03-Sep-17	9	09176880030	9410986	05-Sep-17	11:05	Client	24.00
09-Sep-17	1	09176880032	9410969	14-Sep-17	14:55	Client	24.09
15-Sep-17	5	09176880034	9410971	18-Sep-17	12:25	Client	24.00
21-Sep-17	7	09176880036	9410973	26-Sep-17	15:55	Client	24.00
27-Sep-17	16	09176880038	9410974	28-Sep-17	6:55	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 October 2016 to September 2017) for the TSP unit is 20.2µg/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 9.6µg/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 September 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 – September 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)
09176880019	D1	10/08/2017	7/09/2017	28	I	0.6	0.3	0.3
09176880020	D2	10/08/2017	7/09/2017	28	I	0.5	0.2	0.3
09176880021	D3	10/08/2017	7/09/2017	28	I	0.2	<0.1	0.2
09176880022	D4	10/08/2017	7/09/2017	28	I	0.3	0.1	0.2
09176880023	D5	10/08/2017	7/09/2017	28	I	0.5	0.3	0.2
09176880024	D6	10/08/2017	7/09/2017	28	IT	0.6	0.4	0.2

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 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 not required to be undertaken in September 2017. The next round of quarterly noise monitoring is scheduled to be undertaken during October 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 September 2017 environmental monitoring constituents were found to be generally in compliance with EPL 4911 with the exception of the pH and electrical conductivity results in groundwater sample P6.

Standing water levels within the site groundwater bores were compliant with their respective trigger levels. The pH at bore P6 was below the lower pH trigger level criterion. The electrical conductivity level at bore P6 also exceeded the trigger level. The pH and electrical conductivity at bore P7 was compliant with all 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.

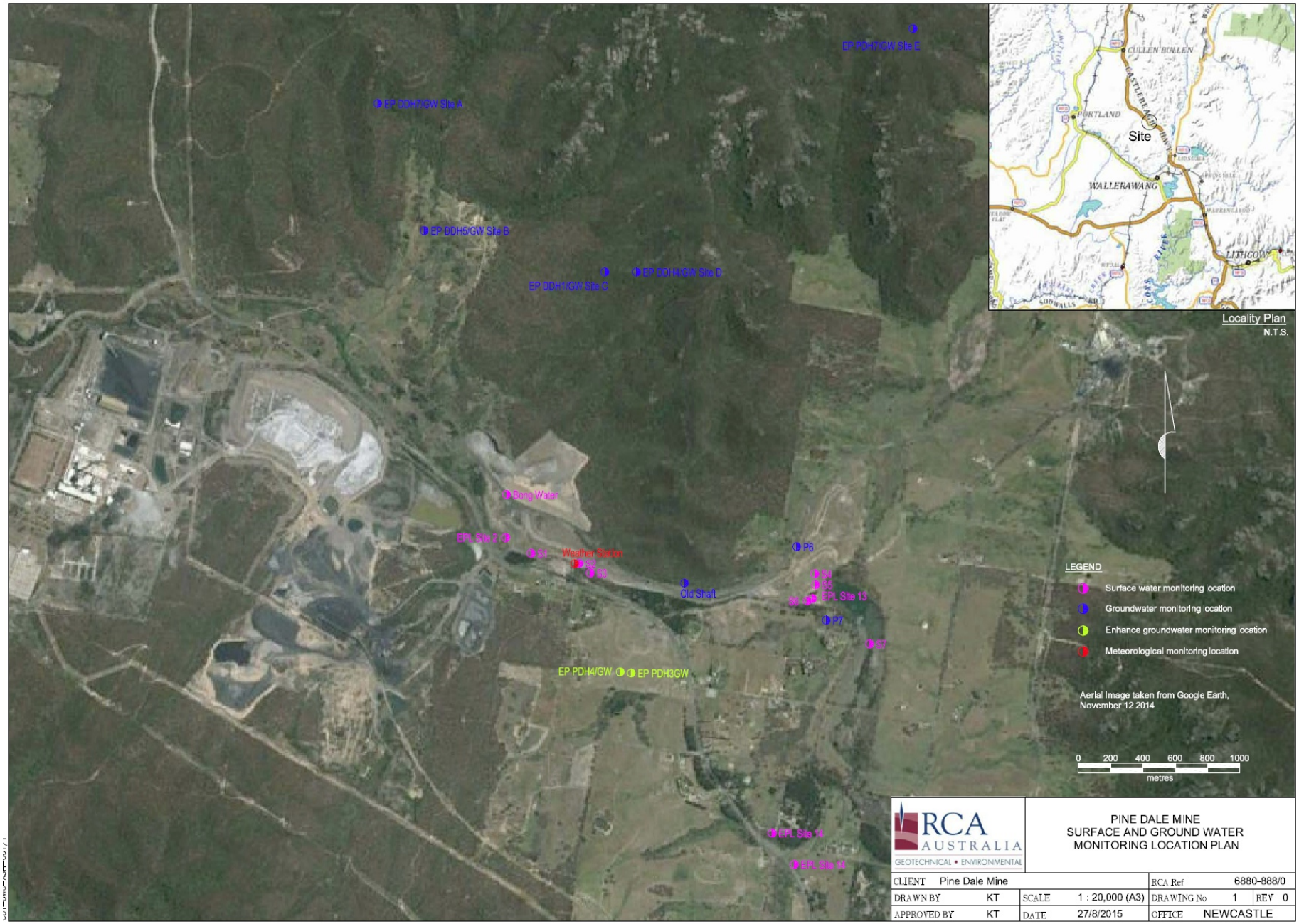
Yours sincerely

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



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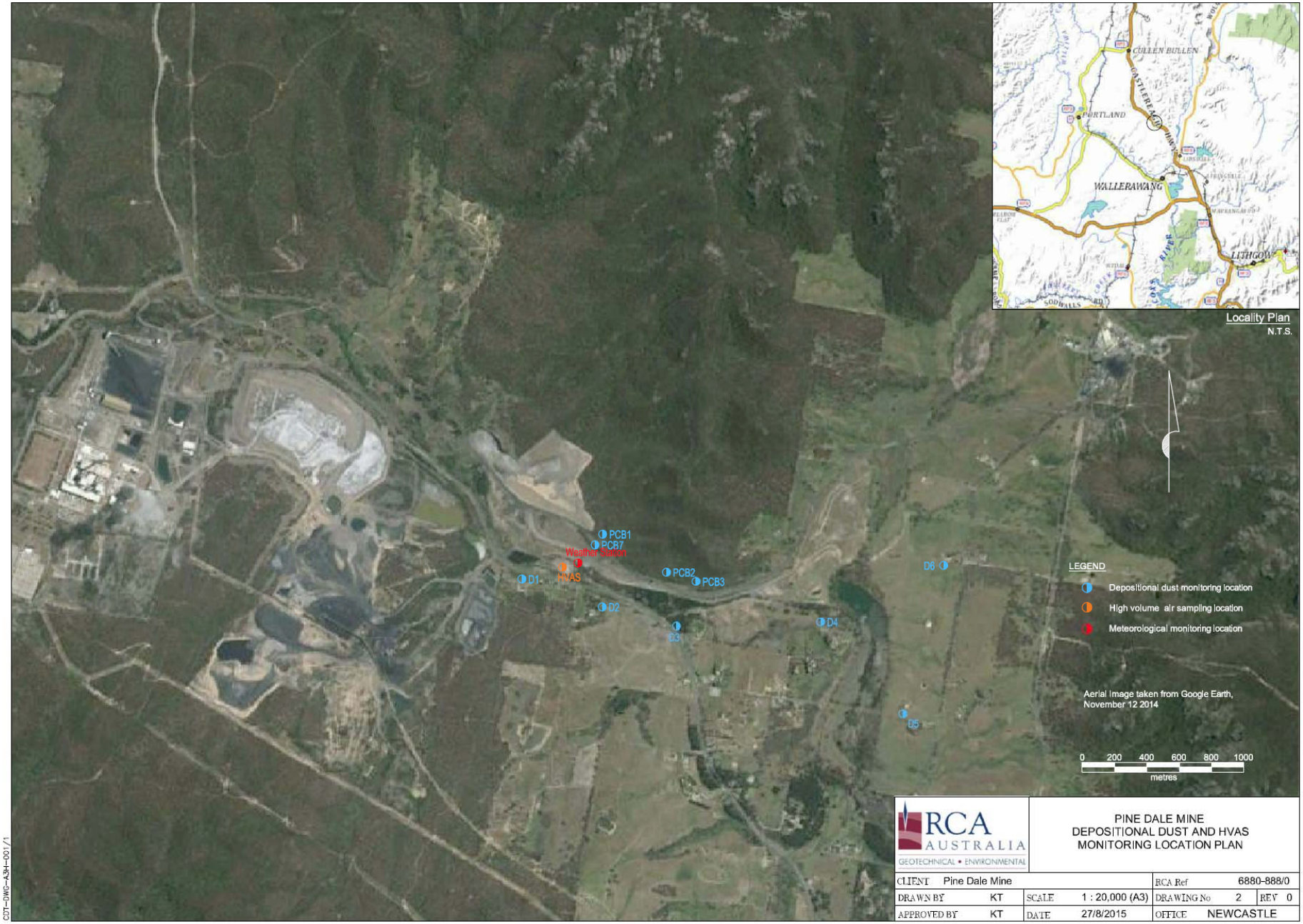
PINE DALE MINE
SURFACE AND GROUND WATER MONITORING LOCATION PLAN

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



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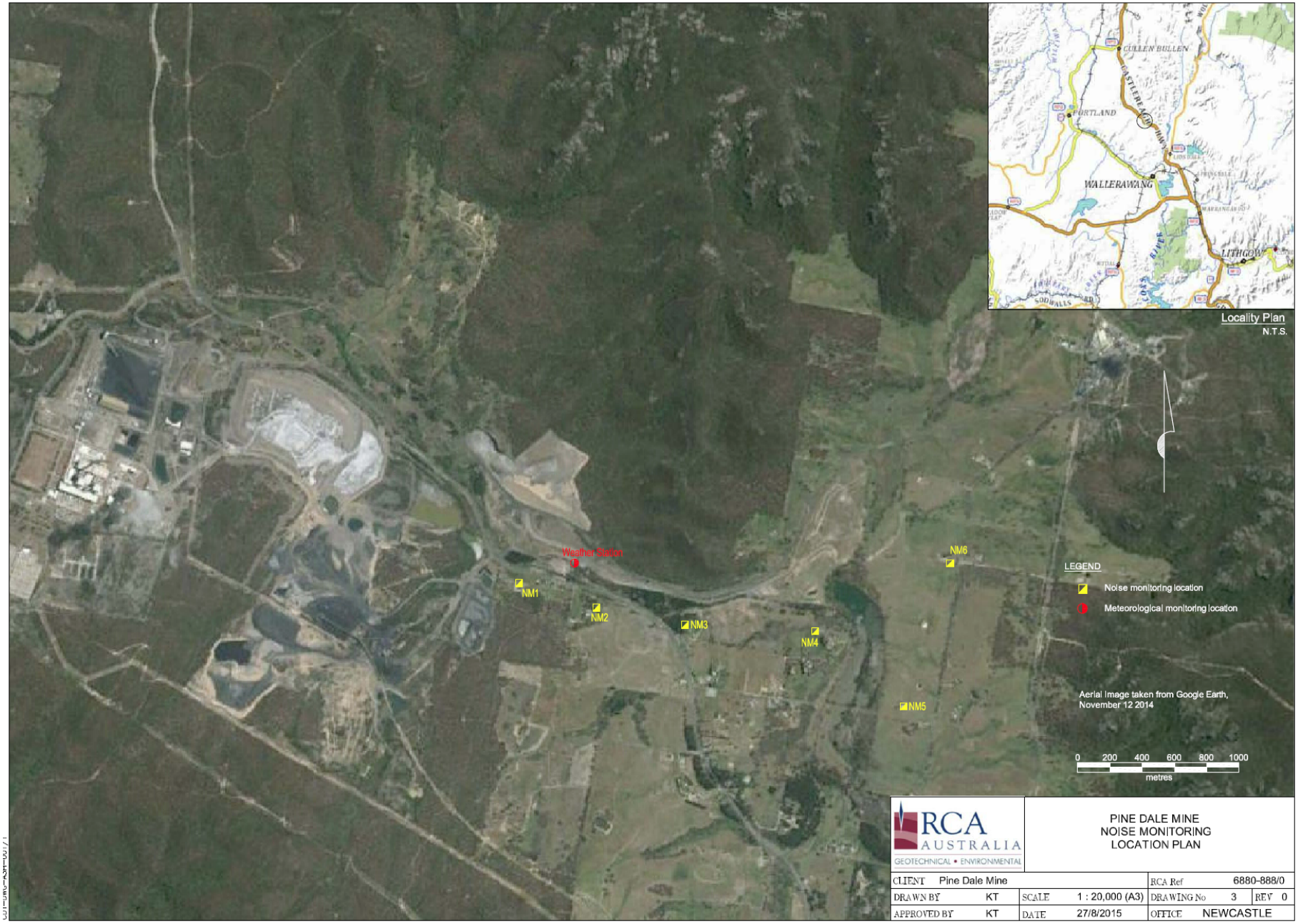
PINE DALE MINE
DEPOSITIONAL DUST AND HVAS
MONITORING LOCATION PLAN

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-A3H-001/1



Locality Plan
N.T.S.

RCA AUSTRALIA
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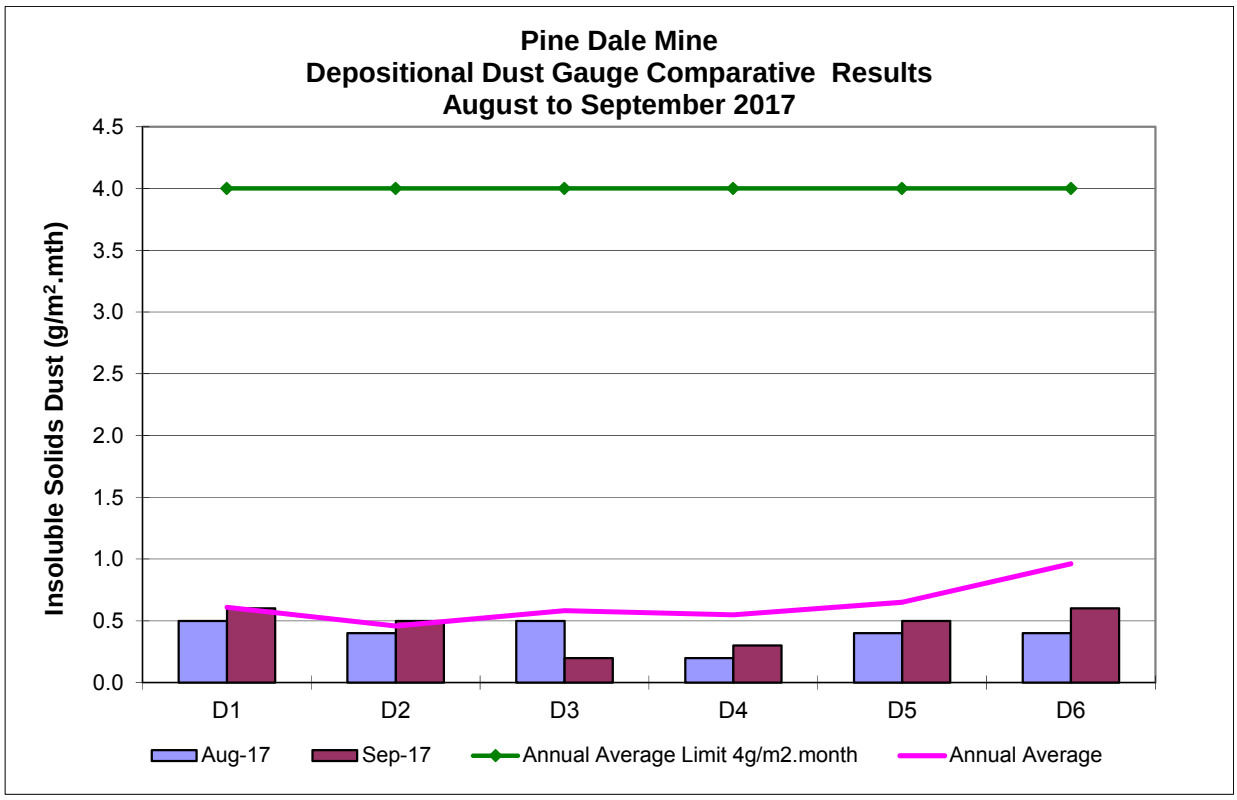
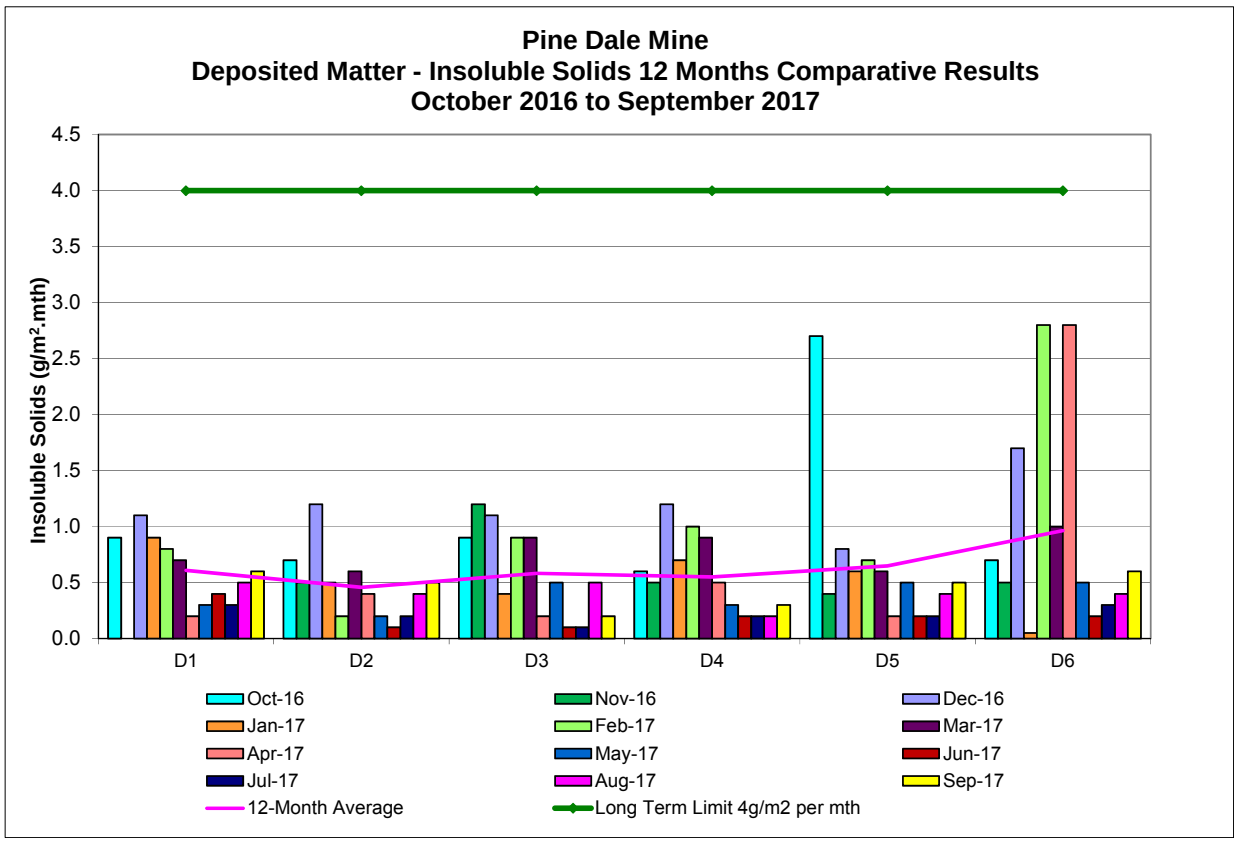
PINE DALE MINE
NOISE MONITORING
LOCATION PLAN

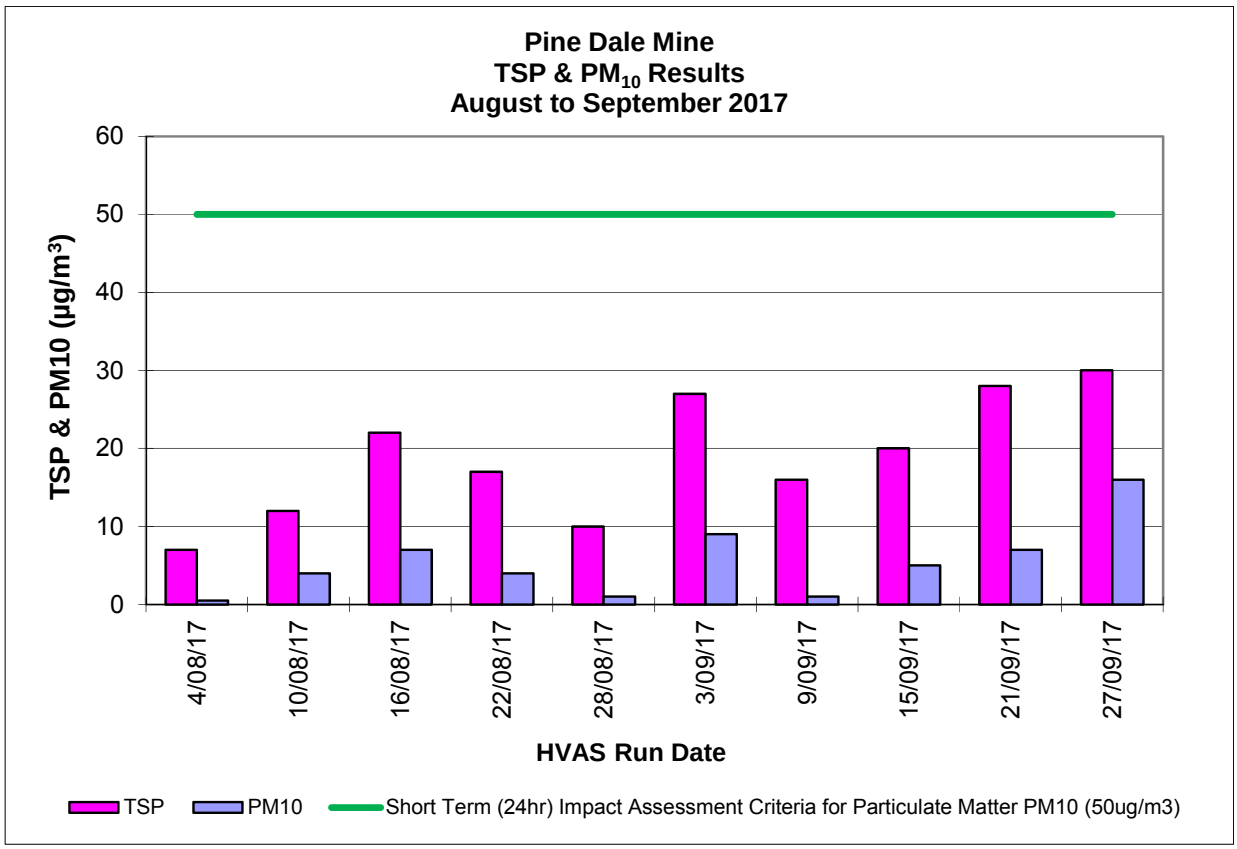
CLIENT	Pine Dale Mine			RCA Ref	6880-888/0
DRAWN BY	KT	SCALE	1 : 20,000 (A3)	DRAWING No 3	REV 0
APPROVED BY	KT	DATE	27/8/2015	OFFICE	NEWCASTLE

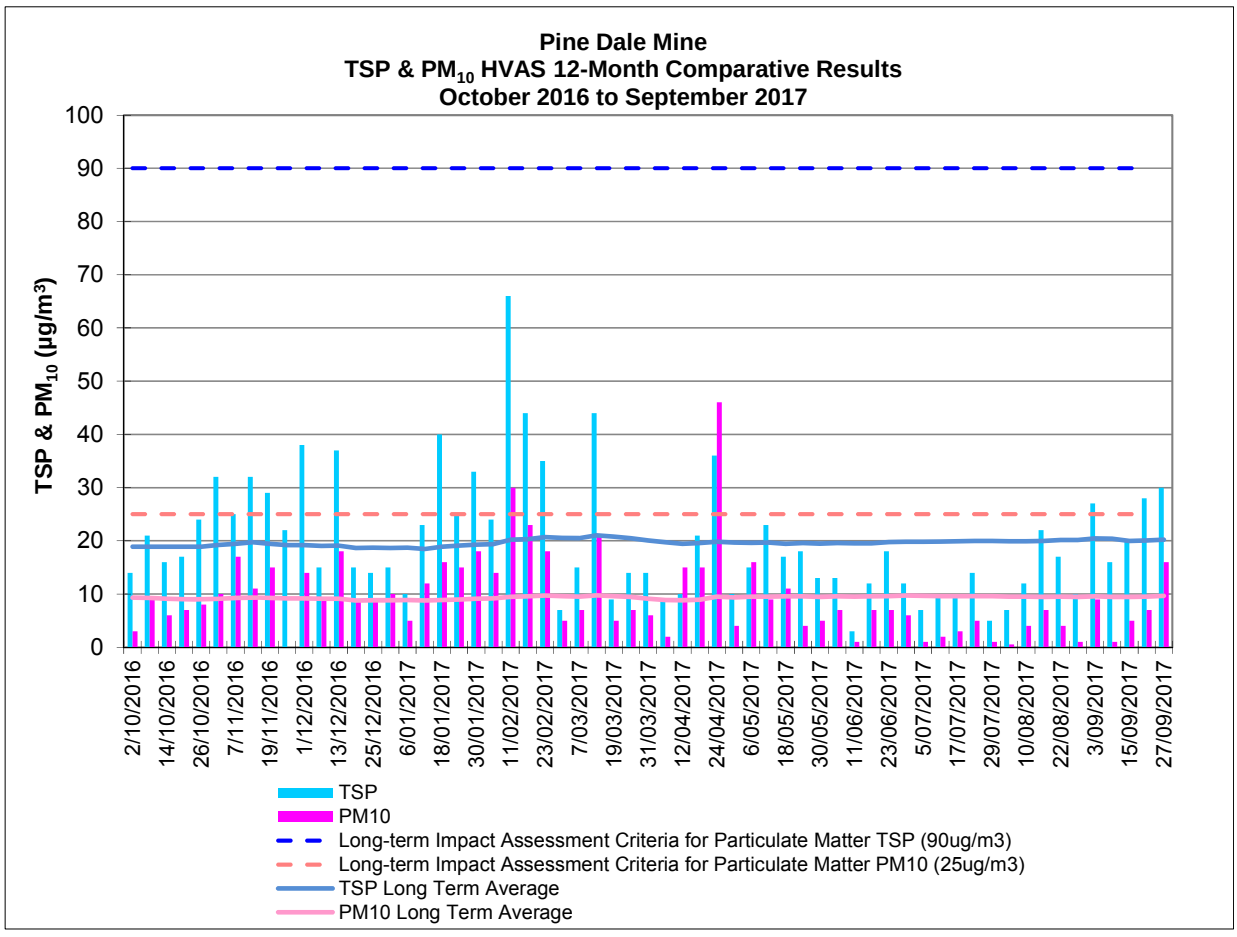
Appendix 2

Depositional Dust and HVAS Graphs


Pine Dale Mine
Depositional Dust Gauge Comparative Results
August to September 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
Aug-17
Sep-17
Annual Average Limit 4g/m2.month
Annual Average

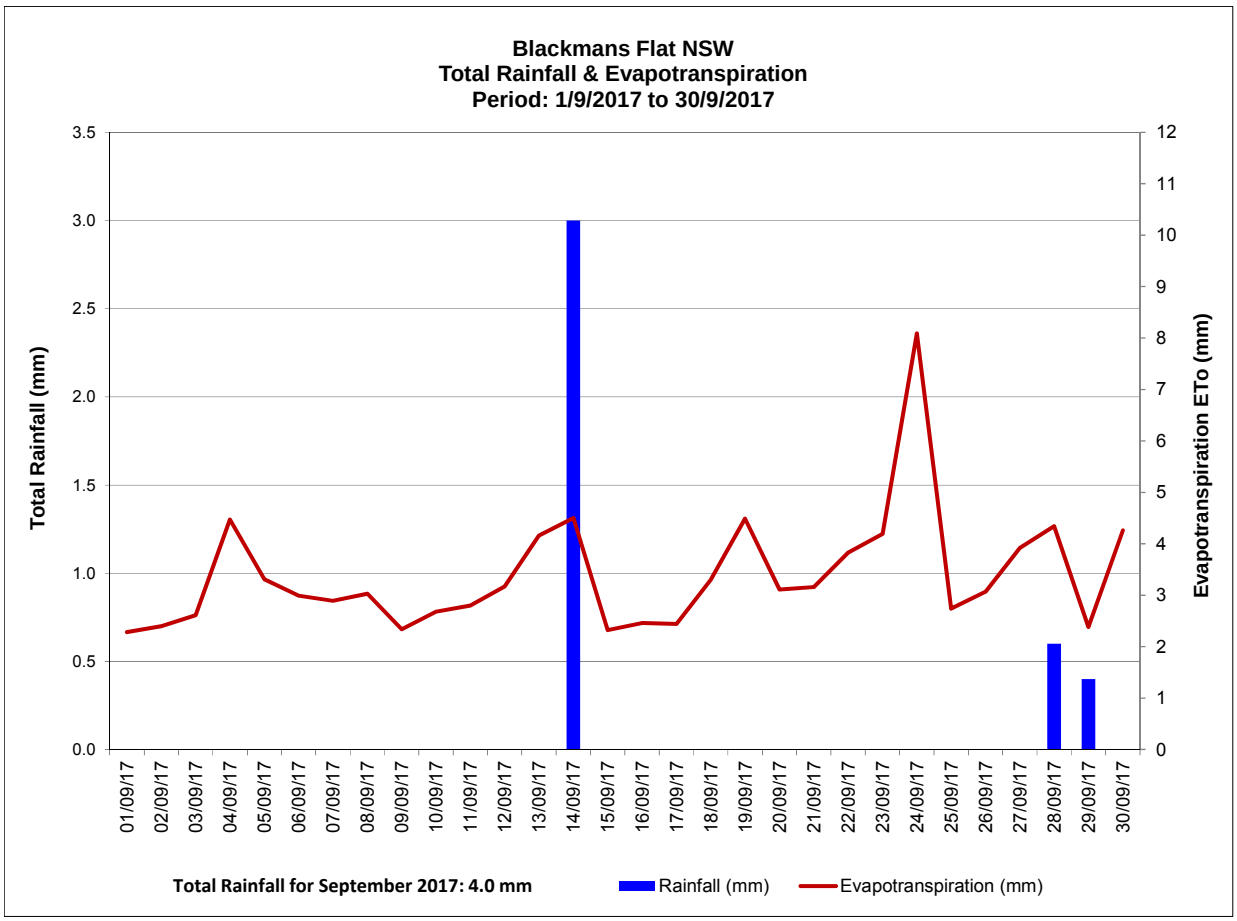

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
October 2016 to September 2017
Insoluble Solids (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
12-Month Average
Long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

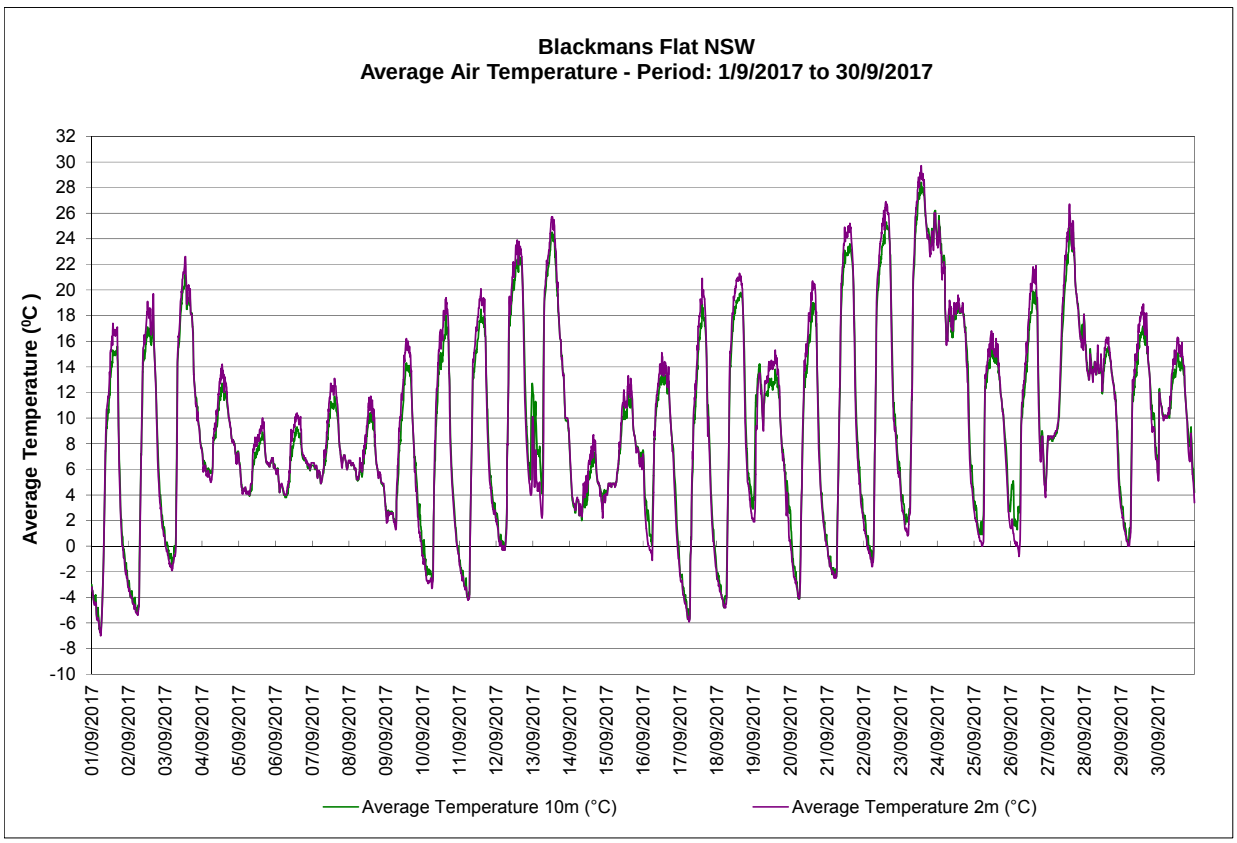

Pine Dale Mine
TSP & PM10 Results
August to September 2017
TSP & PM10 (µg/m³)
60
50
40
30
20
10
0
4/08/17
10/08/17
16/08/17
22/08/17
28/08/17
3/09/17
9/09/17
15/09/17
21/09/17
27/09/17
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

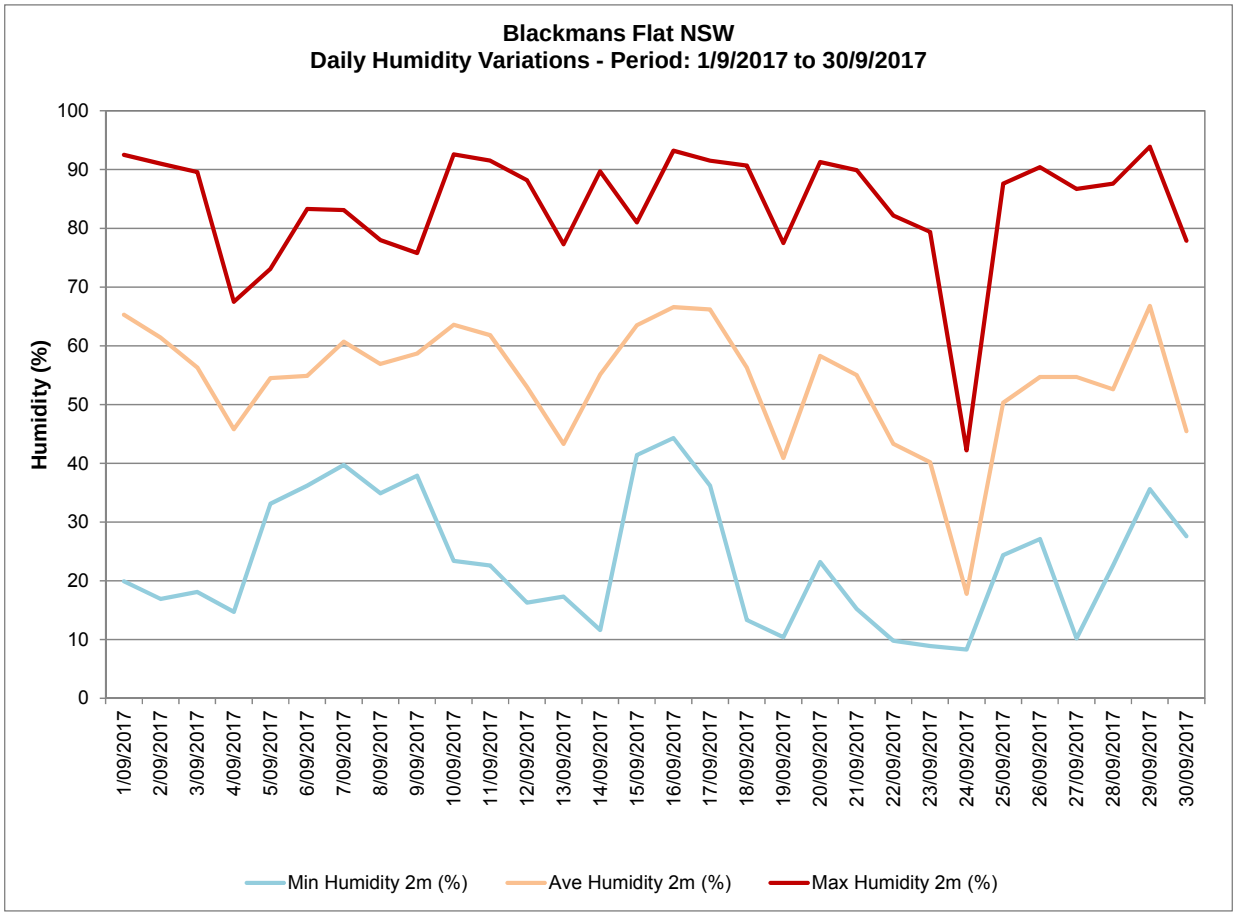

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
October 2016 to September 2017
TSP & PM10 (µg/m³)
100
90
80
70
60
50
40
30
20
10
0
2/10/2016
14/10/2016
26/10/2016
7/11/2016
19/11/2016
1/12/2016
13/12/2016
25/12/2016
6/01/2017
18/01/2017
30/01/2017
11/02/2017
23/02/2017
7/03/2017
19/03/2017
31/03/2017
12/04/2017
24/04/2017
6/05/2017
18/05/2017
30/05/2017
11/06/2017
23/06/2017
5/07/2017
17/07/2017
29/07/2017
10/08/2017
22/08/2017
3/09/2017
15/09/2017
27/09/2017
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

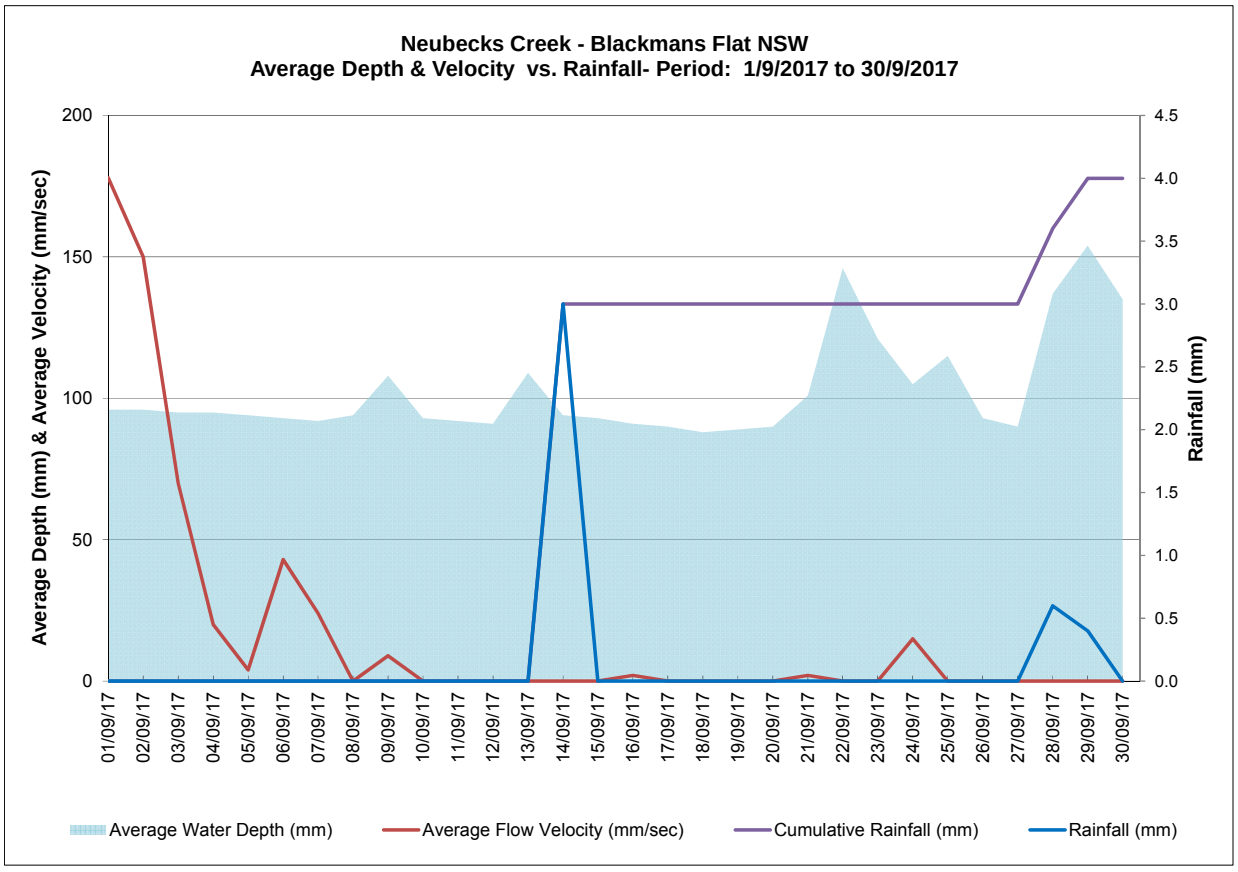
Appendix 3

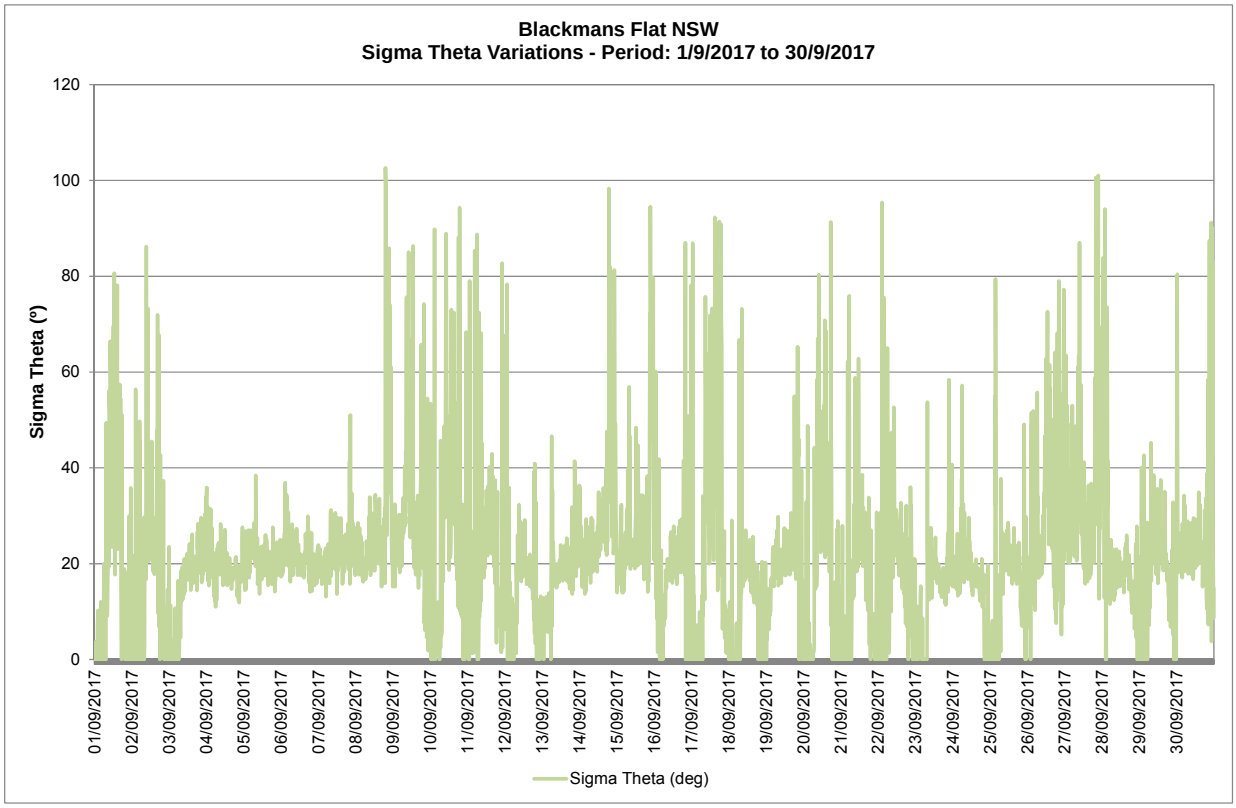
Meteorological Data


Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/9/2017 to 30/9/2017
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for September 2017: 4.0 mm
Rainfall (mm)
Evapotranspiration (mm)


Blackmans Flat NSW
Average Air Temperature - Period: 1/9/2017 to 30/9/2017
Average Temperature (ºC)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/9/2017 to 30/9/2017
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
1/09/2017
2/09/2017
3/09/2017
4/09/2017
5/09/2017
6/09/2017
7/09/2017
8/09/2017
9/09/2017
10/09/2017
11/09/2017
12/09/2017
13/09/2017
14/09/2017
15/09/2017
16/09/2017
17/09/2017
18/09/2017
19/09/2017
20/09/2017
21/09/2017
22/09/2017
23/09/2017
24/09/2017
25/09/2017
26/09/2017
27/09/2017
28/09/2017
29/09/2017
30/09/2017
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/9/2017 to 30/9/2017
Average Depth (mm) & Average Velocity (mm/sec)
200
150
100
50
0
Rainfall (mm)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
01/09/17
02/09/17
03/09/17
04/09/17
05/09/17
06/09/17
07/09/17
08/09/17
09/09/17
10/09/17
11/09/17
12/09/17
13/09/17
14/09/17
15/09/17
16/09/17
17/09/17
18/09/17
19/09/17
20/09/17
21/09/17
22/09/17
23/09/17
24/09/17
25/09/17
26/09/17
27/09/17
28/09/17
29/09/17
30/09/17
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/9/2017 to 30/9/2017
Sigma Theta (°)
120
100
80
60
40
20
0
01/09/2017
02/09/2017
03/09/2017
04/09/2017
05/09/2017
06/09/2017
07/09/2017
08/09/2017
09/09/2017
10/09/2017
11/09/2017
12/09/2017
13/09/2017
14/09/2017
15/09/2017
16/09/2017
17/09/2017
18/09/2017
19/09/2017
20/09/2017
21/09/2017
22/09/2017
23/09/2017
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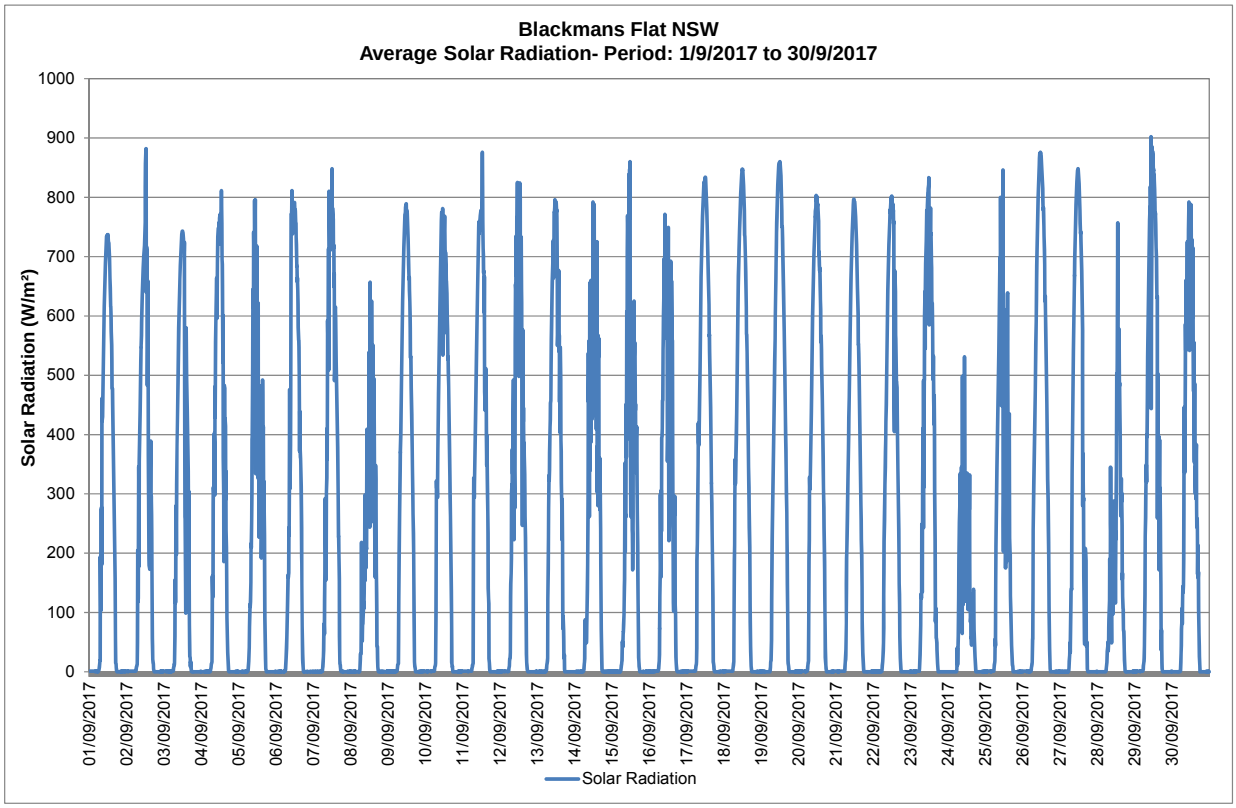
28/09/2017
29/09/2017
30/09/2017
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/9/2017 to 30/9/2017
Solar Radiation (W/m²)
1000
900
800
700
600
500
400
300
200
100
0
01/09/2017
02/09/2017
03/09/2017
04/09/2017
05/09/2017
06/09/2017
07/09/2017
08/09/2017
09/09/2017
10/09/2017
11/09/2017
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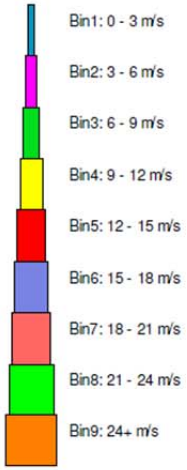
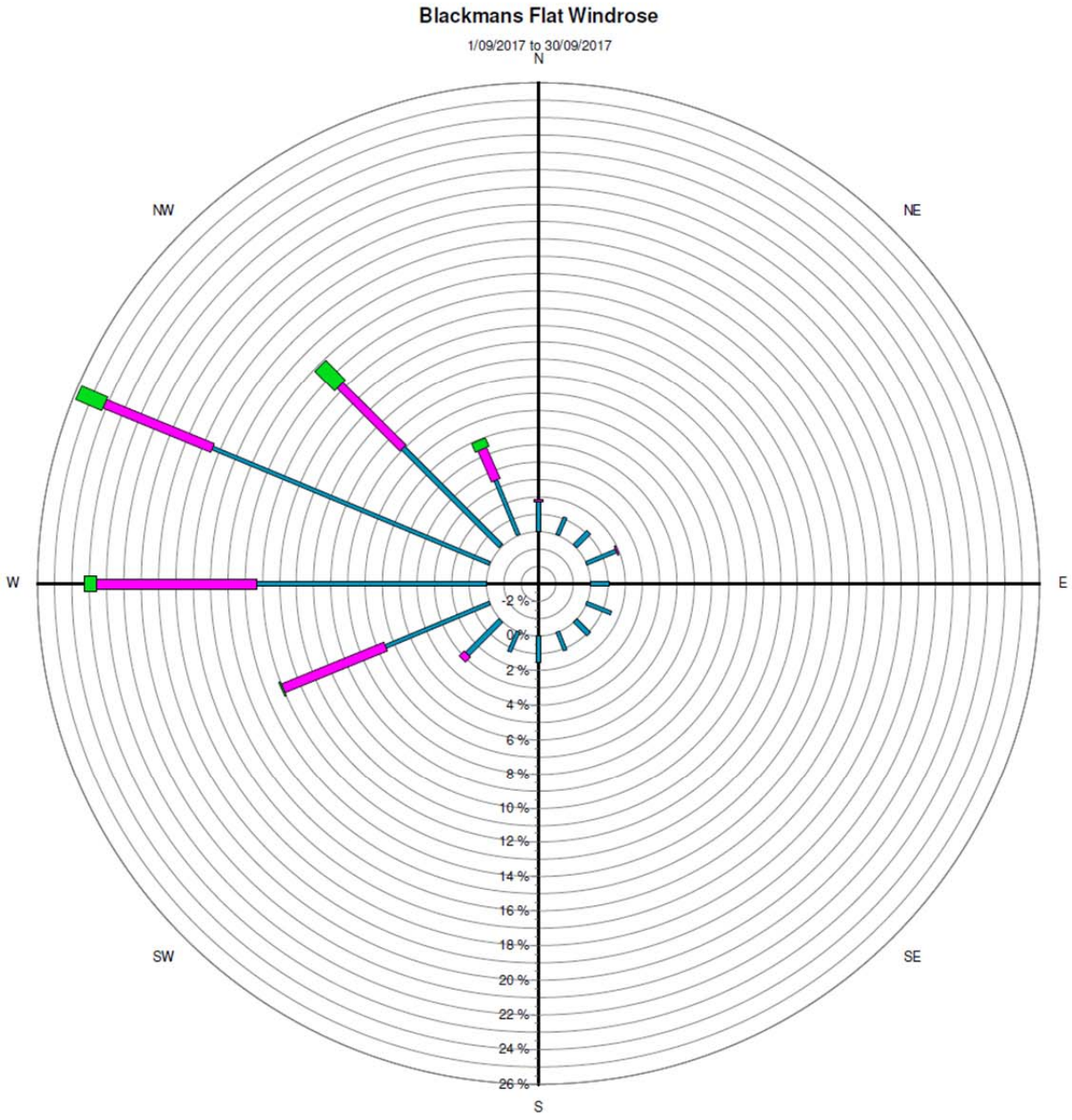
30/09/2017
Solar Radiation





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