SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

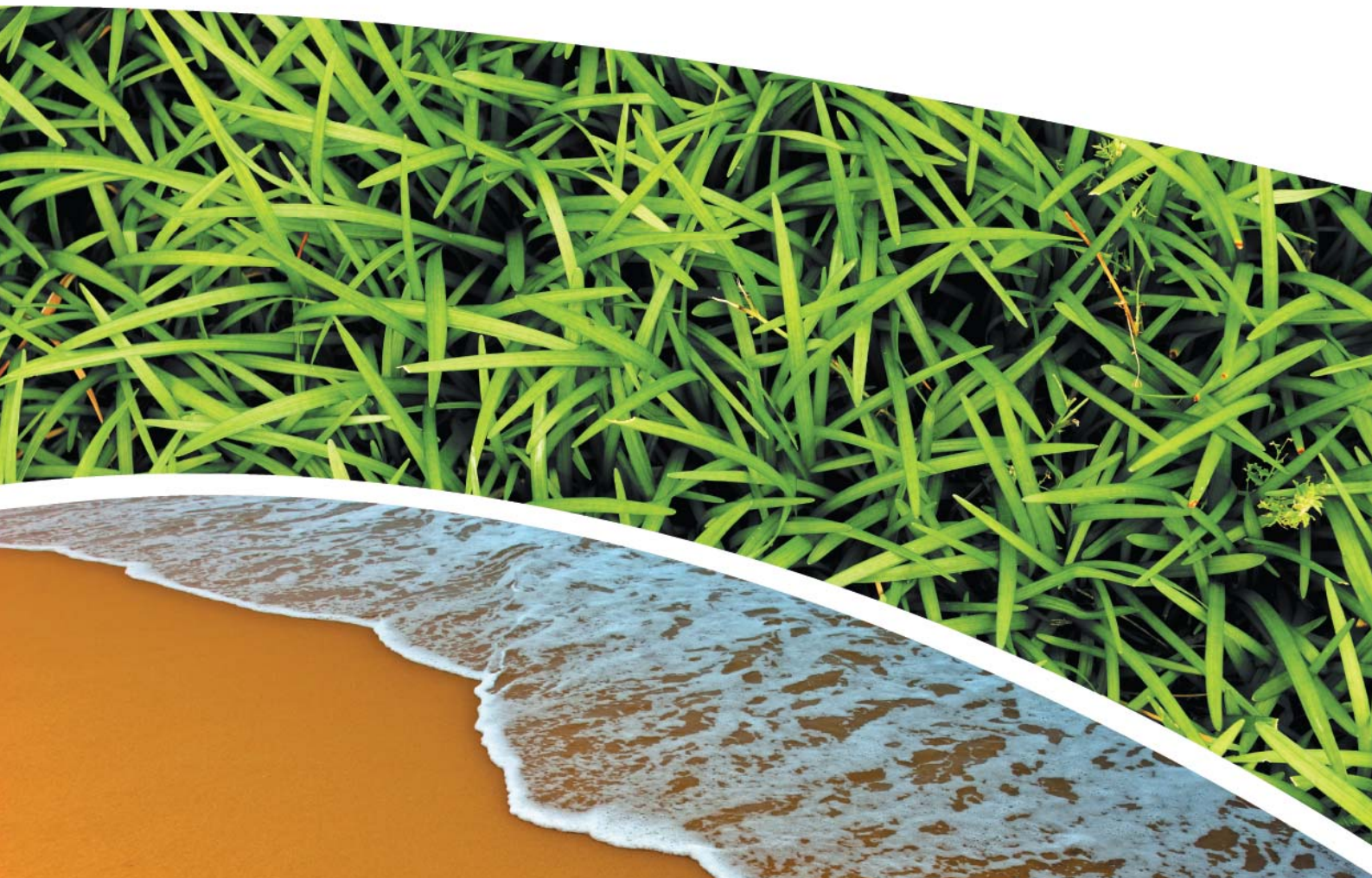
Prepared for Pine Dale Mine Community Consultative Committee

Prepared by RCA Australia

RCA ref 6880-1703/0

January 2016

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

DOCUMENT STATUS						
Rev No	Comment	Author	Reviewer	Approved for Issue (Project Manager)		
				Name	Signature	Date
/0	Final	C Rocher	K Tripp	K Tripp	KT	16.02.16

DOCUMENT DISTRIBUTION				
Rev No	Copies	Format	Issued to	Date
/0	1	Electronic (email)	Pine Dale Mine – Graham Goodwin graham.goodwin@energyaustralia.com.au	16.02.16
/0	1	Electronic (email)	EnergyAustralia- Mark Frewin mark.frewin@energyaustralia.com.au	16.02.16
/0	1	Electronic (email)	Lithgow City Council – Andrew Muir andrew.muir@lithgow.nsw.gov.au	16.02.16
/0	1	Electronic report	RCA – job archive	16.02.16

RCA LE ref 6880-1703/0

16 February 2016

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

JANUARY 2016

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 January 2016.
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 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 MONITORING RESULTS

3.1 GROUNDWATER

A total of 2 on-site groundwater samples were collected during the month of January 2016. 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 (Report No. 613/20). This sampling regime commenced 1 August 2013. Water quality analysis results are shown in **Table 2**.

Table 2 *Groundwater Analysis Results*

ANALYSIS	UNITS	P6	P7
Sample Number	-	01166880009	01166880010
Date Sampled	-	11/01/16	11/01/16
Time Sampled	-	9:48	12:20
Depth to Water from Surface*	m	25.30	6.61
Water Level (AHD)	m	891.65	887.79
Temperature	°C	17.5	17.5
pH	pH	6.36	6.34
Conductivity	µS/cm	*1193*	843
Turbidity	NTU	139	
Dissolved Oxygen	mg/L	5.4	
TSS	mg/L	66	
Oil & Grease	mg/L	<2	
Bicarbonate Alkalinity ($CaCO_3$)	mg/L	39	
Total Alkalinity ($CaCO_3$)	mg/L	39	
Sulfate (as SO_4)	mg/L	626	
Chloride	mg/L	29	
Calcium	mg/L	133	
Magnesium	mg/L	64	
Sodium	mg/L	58	
Potassium	mg/L	20	
Cobalt (dissolved)	mg/L	0.065	
Manganese (dissolved)	mg/L	2.58	
Nickel (dissolved)	mg/L	0.112	
Zinc (dissolved)	mg/L	0.088	
Iron (dissolved)	mg/L	31.5	

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

Indicates analysis was not required

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

3.2 EPA SURFACE WATER MONITORING

Routine quarterly surface waters were not scheduled to be monitored this month. Quarterly surface water monitoring is next scheduled to be undertaken in February 2016.

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 3580.9.6:2003 and AS/NZS 3580.1.1:2007.

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
06-Jan-16	8	01166880029	9157625	11-Jan-16	6:35	Client	24.00
12-Jan-16	37	01166880031	9157627	15-Jan-16	7:15	Client	24.30
18-Jan-16	14	01166880033	9204821	20-Jan-16	7:10	Client	24.00
24-Jan-16	13	01166880035	9204823	27-Jan-16	7:15	Client	24.00
30-Jan-16	20	01166880037	9157580	02-Feb-16	7:50	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
06-Jan-16	3	01166880030	9157626	11-Jan-16	6:40	Client	24.00
12-Jan-16	18	01166880032	9204820	15-Jan-16	7:20	Client	24.18
18-Jan-16	10	01166880034	9204822	20-Jan-16	7:15	Client	24.00
24-Jan-16	9	01166880036	9204824	27-Jan-16	7:20	Client	24.00
30-Jan-16	9	01166880038	9157581	02-Feb-16	8:00	Client	24.00

4.1.1 TSP Summary

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 February 2015 to January 2016) for the TSP unit is 18.1µg/m^3, which is well below the allowable limit of 90µg/m^3.

4.1.2 PM_{10} Summary

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 9.8µg/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 during the month of January 2016

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 5**.

Table 5 *Depositional Dust Monitoring - Deposited Matter – January 2016*

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)
01166880019	D1	10/12/2015	11/01/2016	32	I	0.4	<0.1	0.4
01166880020	D2	10/12/2015	11/01/2016	32	I	0.4	0.1	0.3
01166880021	D3	10/12/2015	11/01/2016	32	I	0.2	<0.1	0.2
01166880022	D4	10/12/2015	11/01/2016	32	I	0.2	<0.1	0.2
01166880023	D5	10/12/2015	11/01/2016	32	B	3.9	1.3	2.6
01166880024	D6	10/12/2015	11/01/2016	32	I	0.7	0.3	0.4

Glossary of Terms Used in Notes:

I Insects (eg, Ants, Spiders) 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 1.6g/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 undertaken this month. Results are presented in RCA Australia Report No. 6880-N136 Pine Dale Mine Operation Attended Noise January 2016.

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 January 2016 all environmental monitoring constituents were found to be in compliance with EPL 4911.

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.

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.

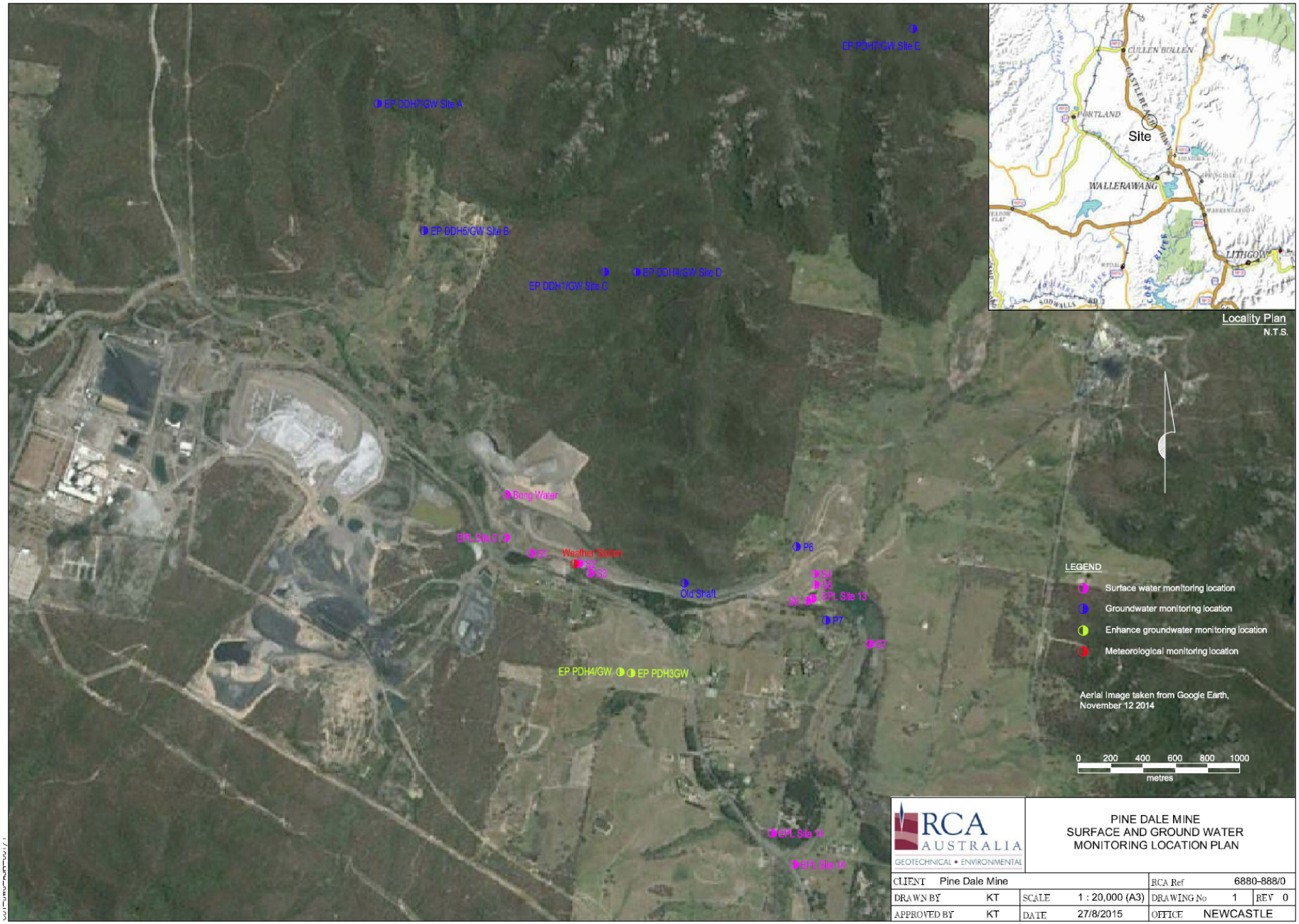
Yours sincerely

Carmen Rocher
Environmental Engineer
RCA Australia Pty Ltd trading as
RCA Laboratories – Environmental

Karen Tripp
Senior Environmental Scientist/Hygienist
RCA Australia Pty Ltd trading as
RCA Laboratories – Environmental

Appendix 1

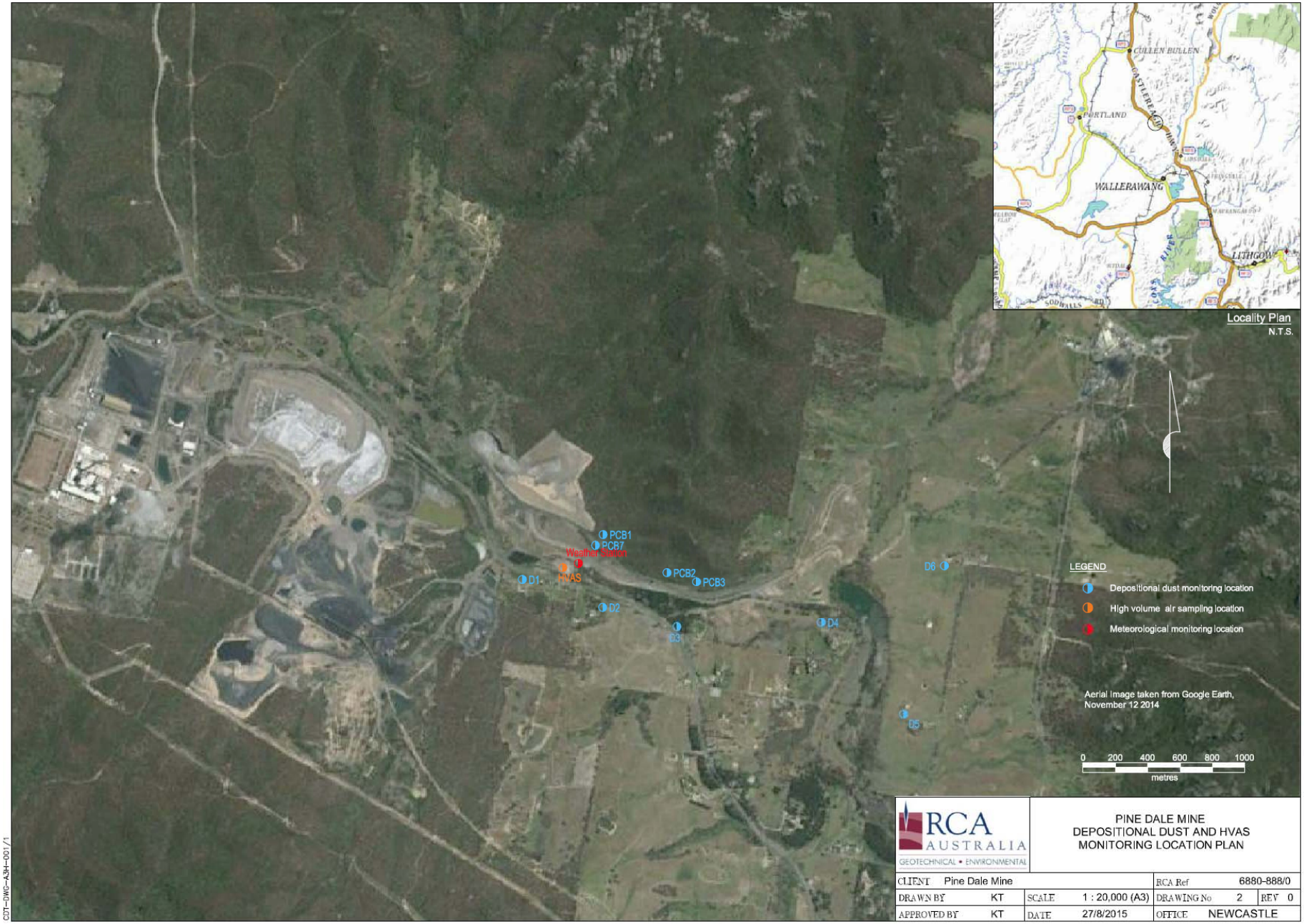
Surface Water Groundwater and Air Quality Monitoring Locations



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

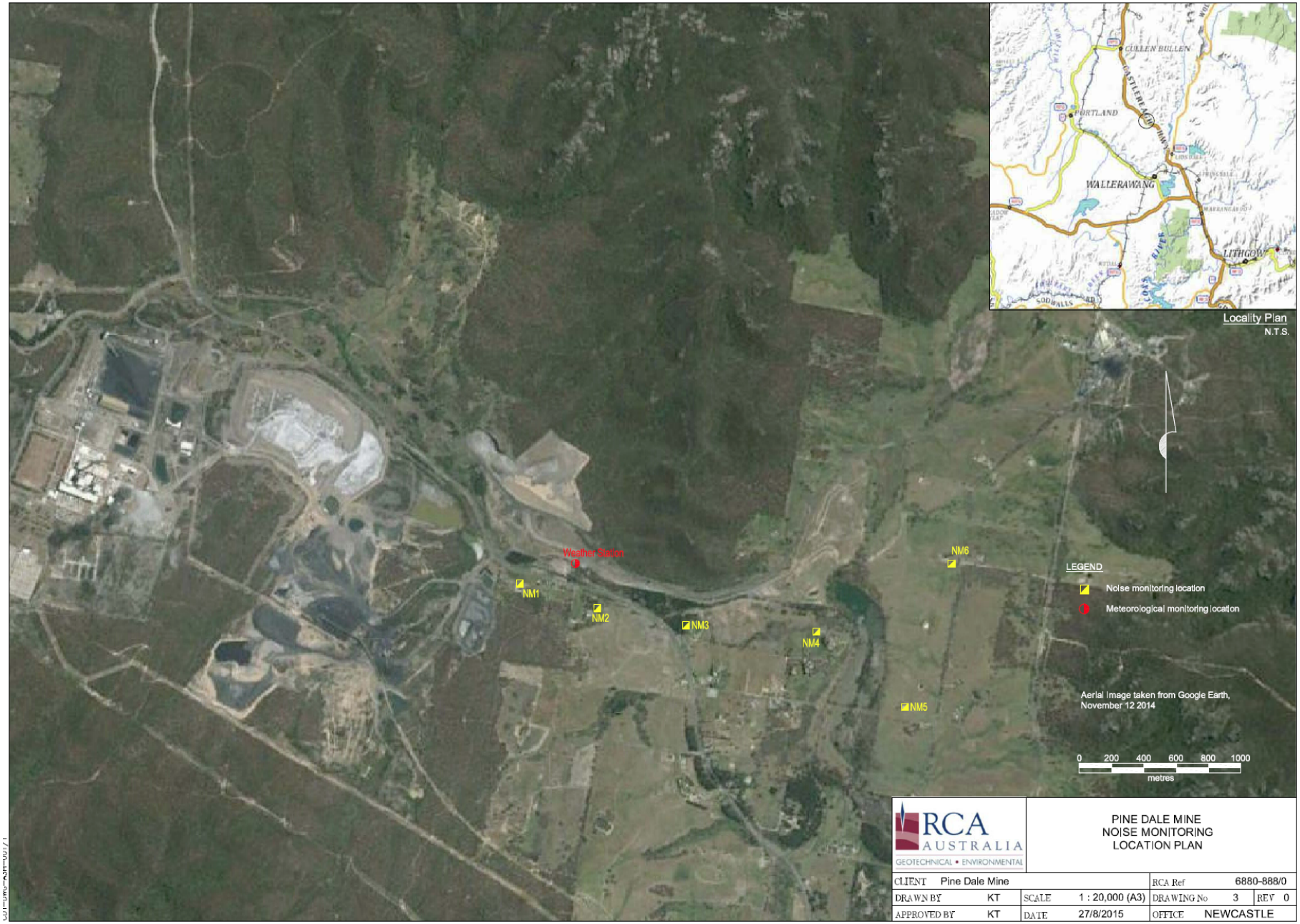


RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

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-A3H-001/1



Locality Plan
N.T.S.

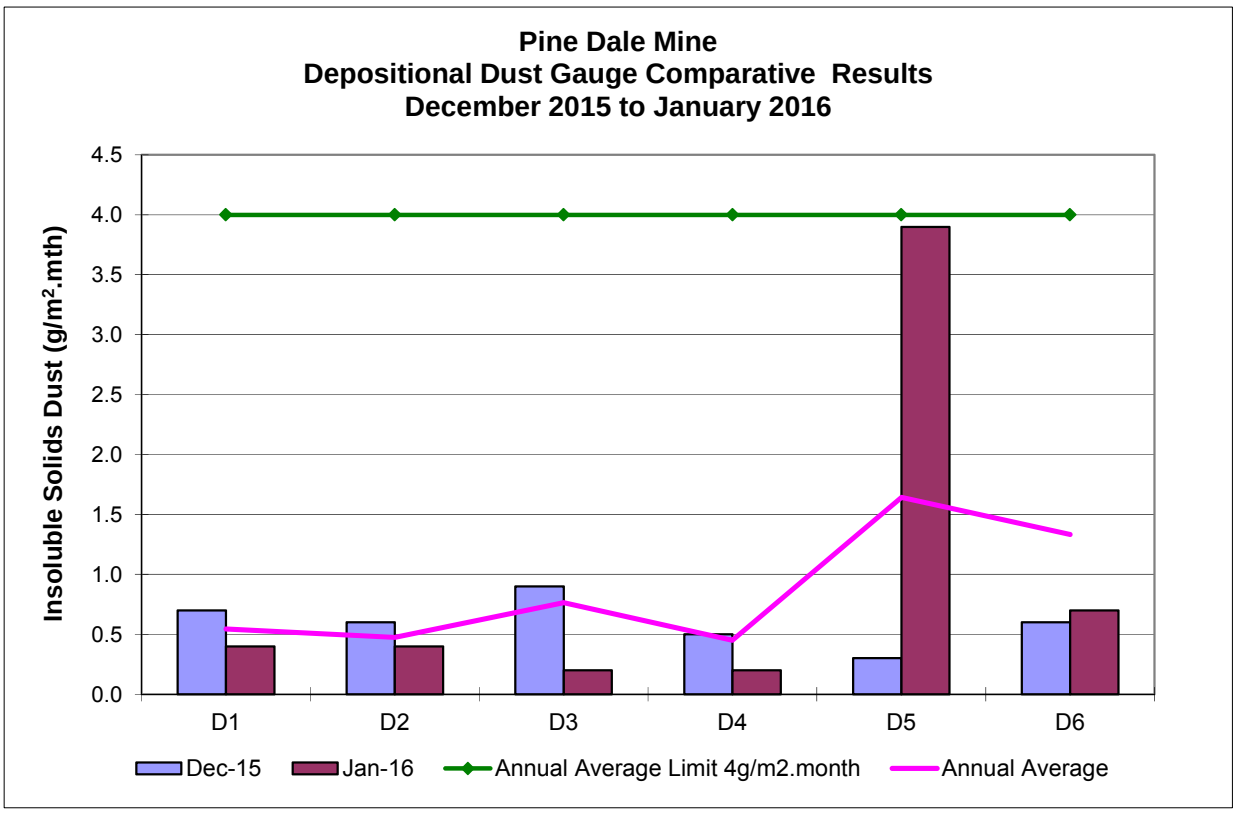
RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

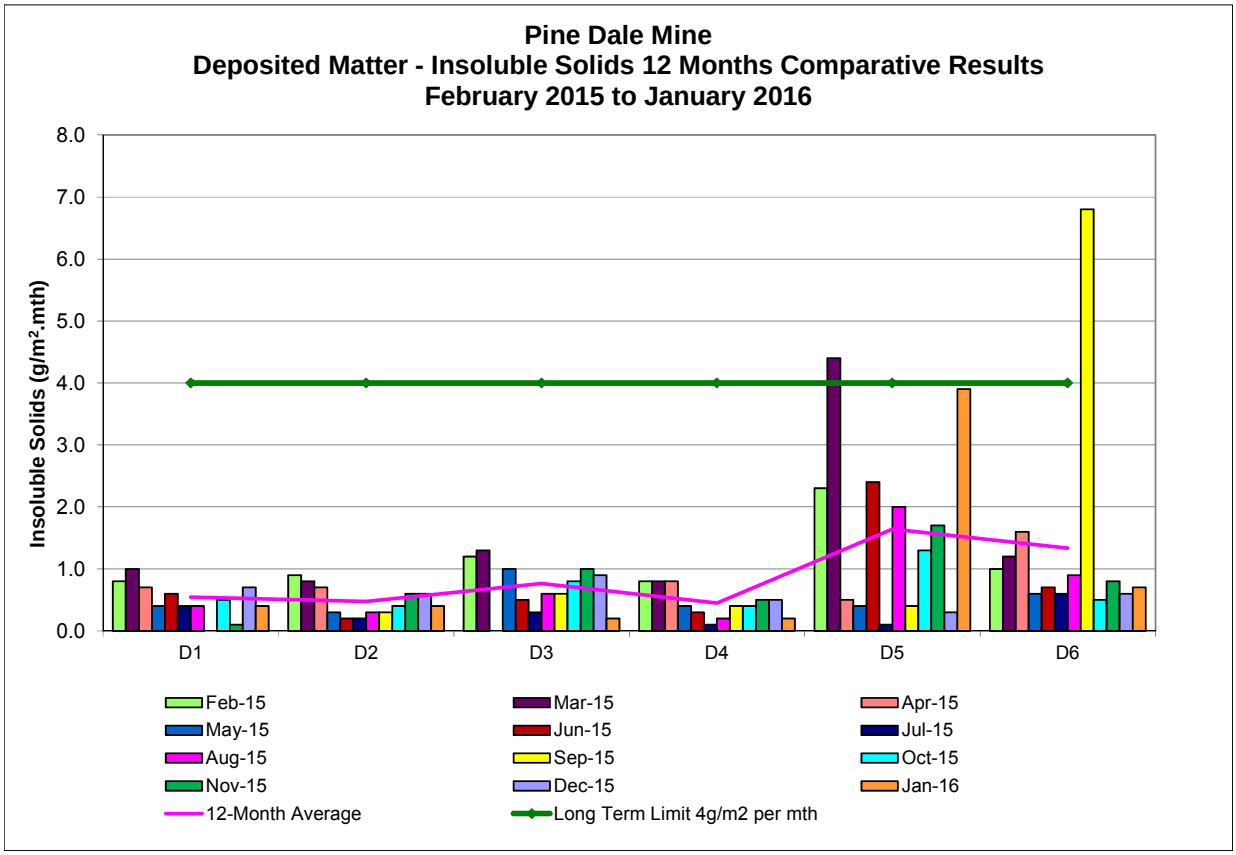
PINE DALE MINE
NOISE MONITORING
LOCATION PLAN

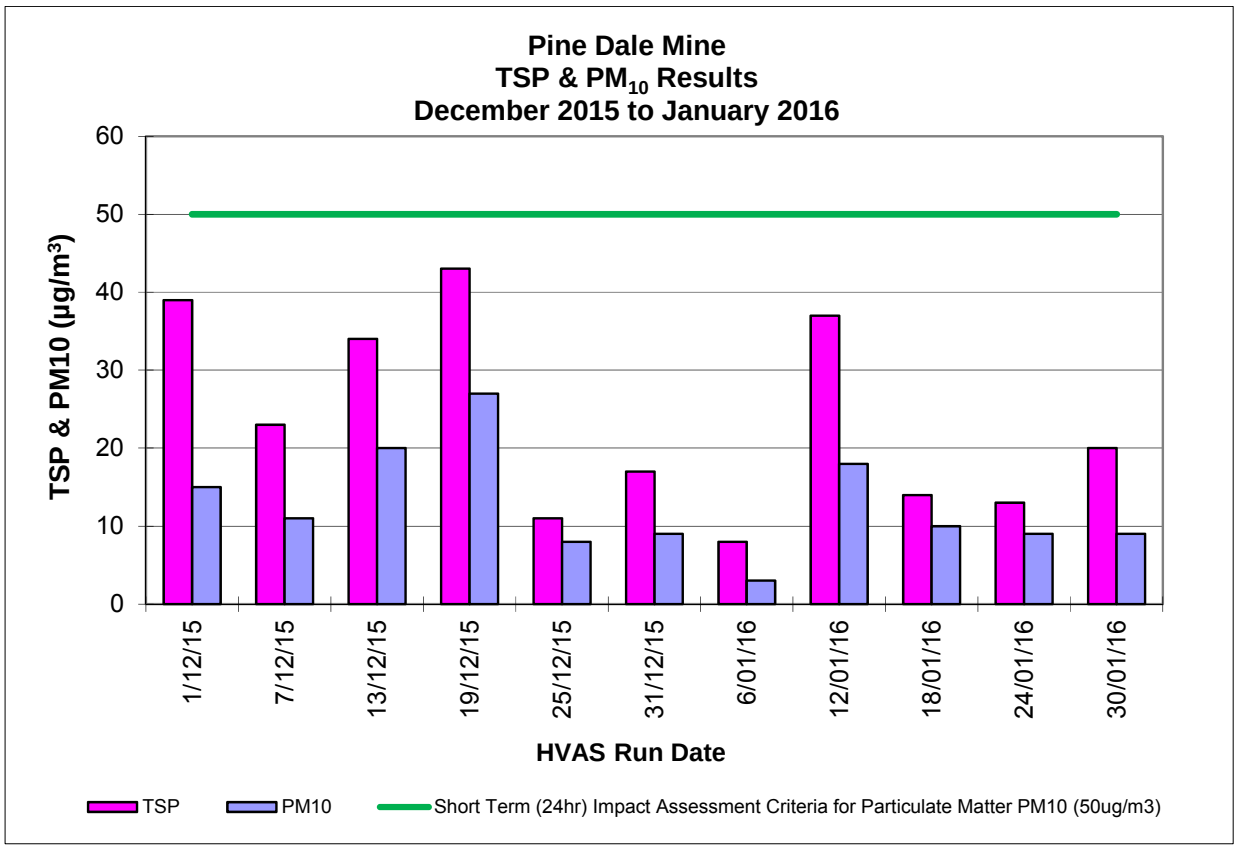
CLIENT	Pine Dale Mine			RCA Ref	6880-888/0
DRAWN BY	KT	SCALE	1 : 20,000 (A3)	DRAWING No 3	REV 0
APPROVED BY	KT	DATE	27/8/2015	OFFICE	NEWCASTLE

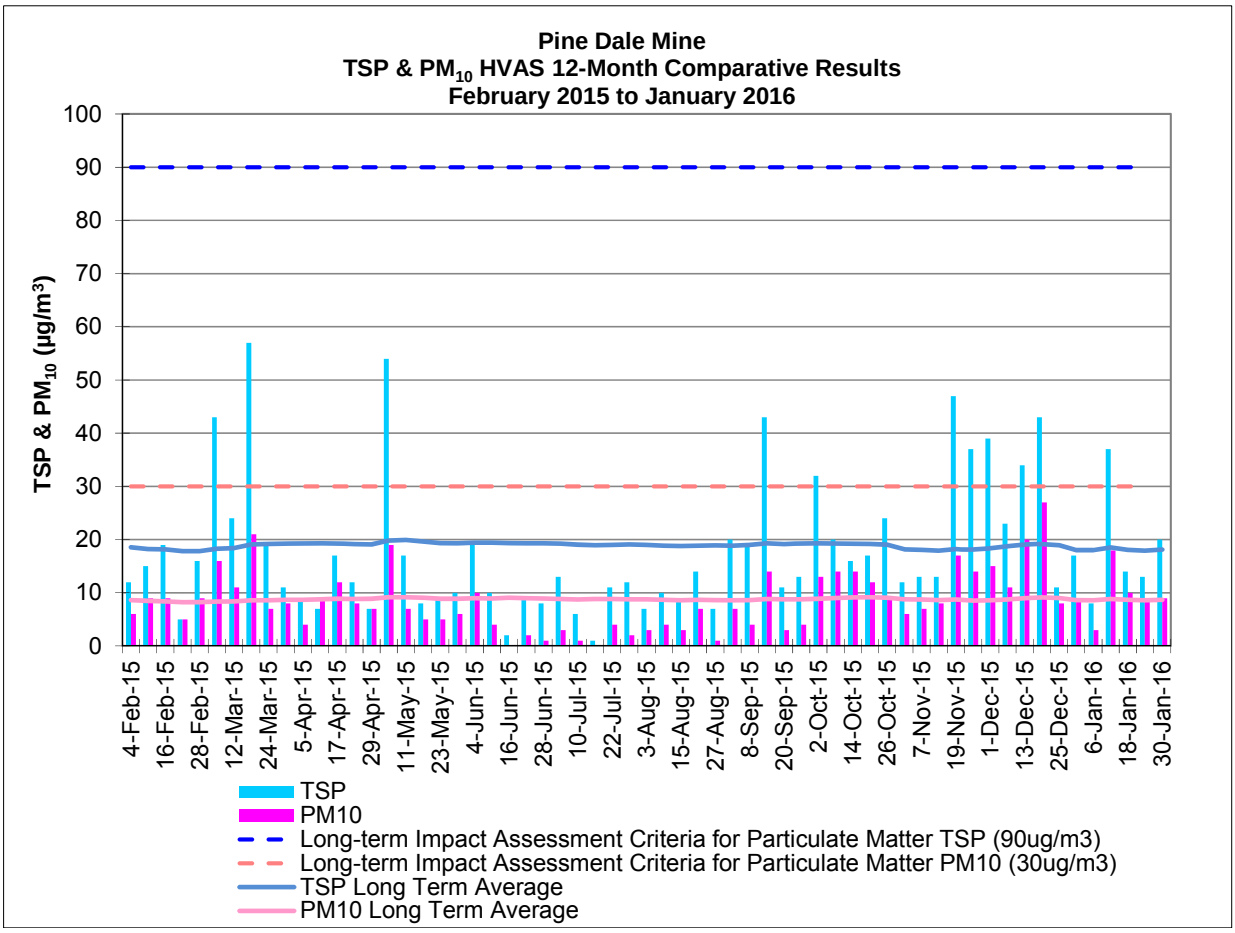
Appendix 2

Depositional Dust and HVAS Graphs


Pine Dale Mine
Depositional Dust Gauge Comparative Results
December 2015 to January 2016
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
Dec-15
Jan-16
Annual Average Limit 4g/m2.month
Annual Average

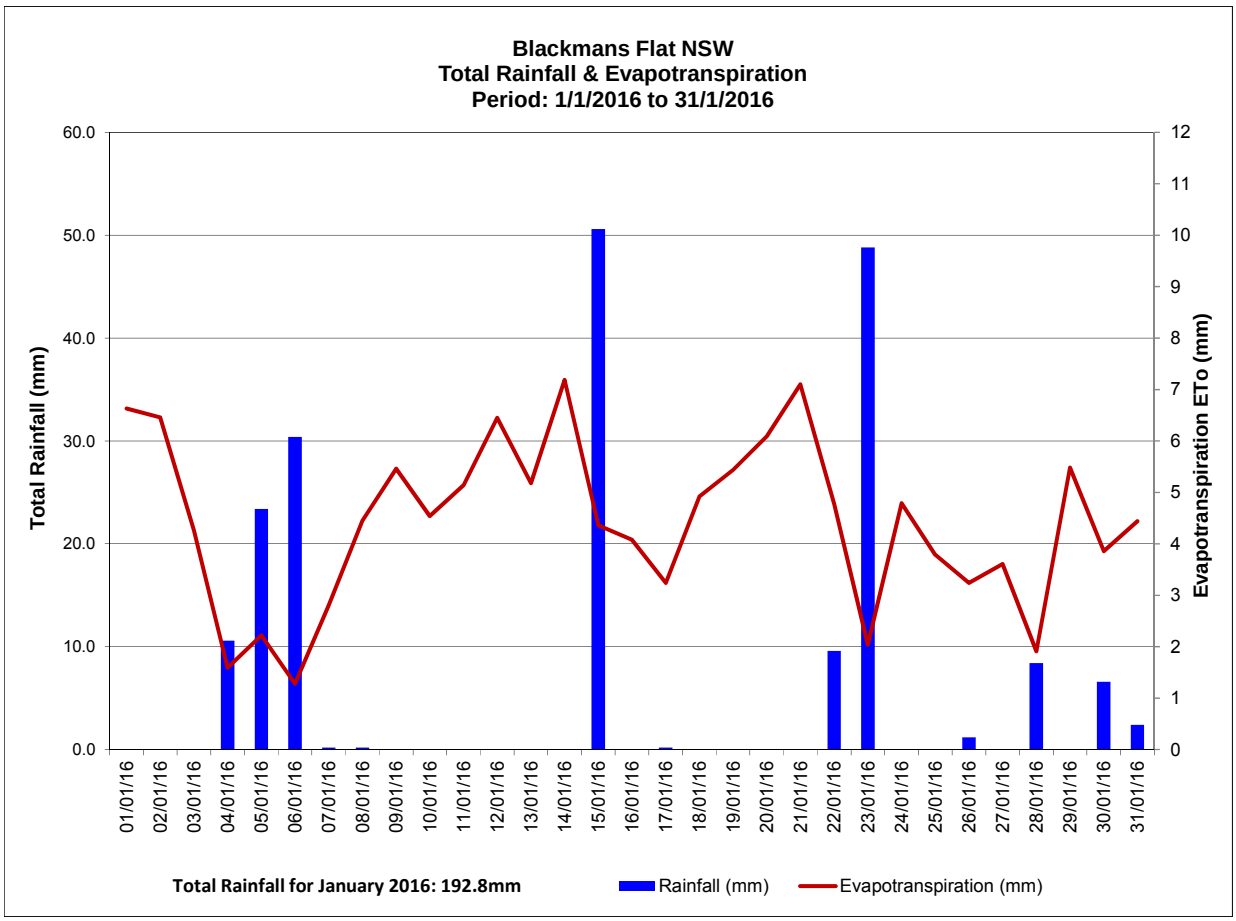

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
February 2015 to January 2016
Insoluble Solids (g/m².mth)
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
D1
D2
D3
D4
D5
D6
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
12-Month Average
Long Term Limit 4g/m2 per mth

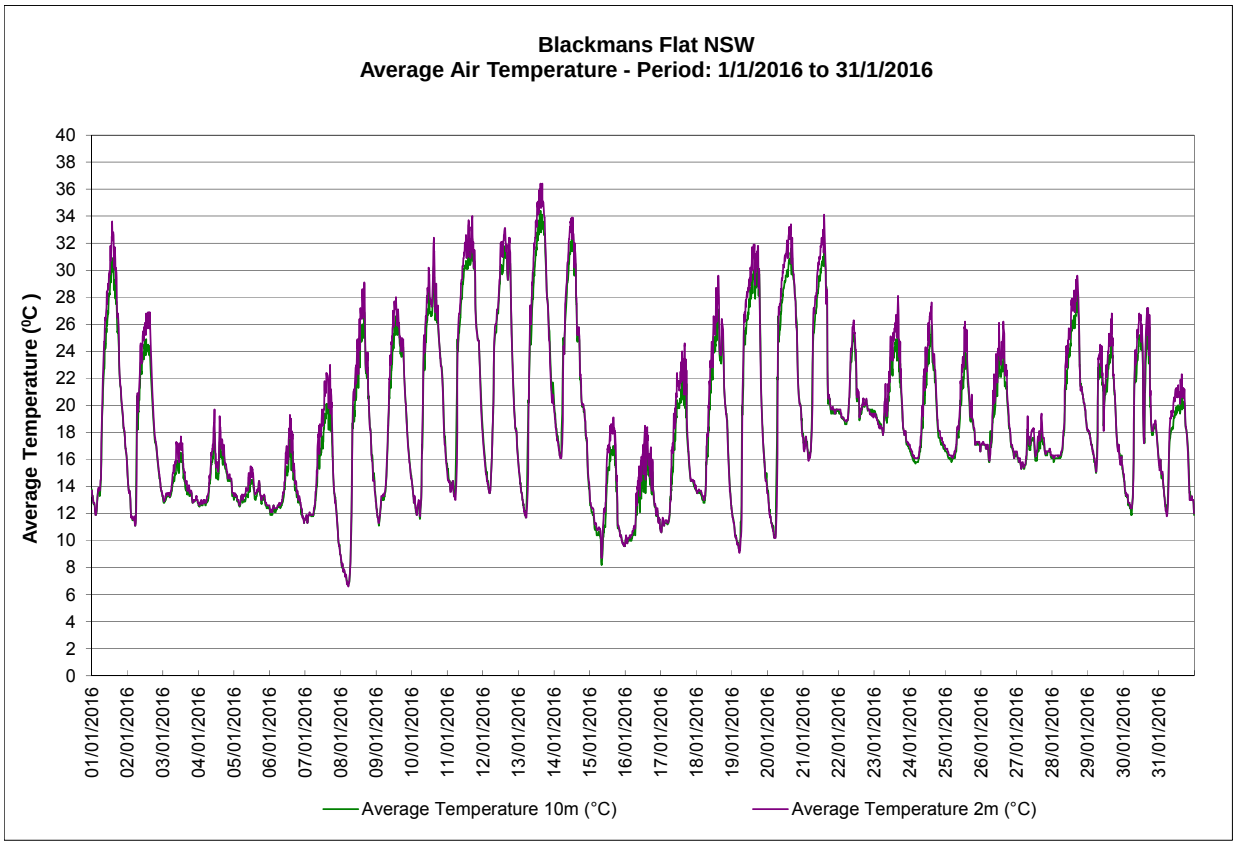

Pine Dale Mine
TSP & PM10 Results
December 2015 to January 2016
TSP & PM10 (µg/m³)
60
50
40
30
20
10
0
1/12/15
7/12/15
13/12/15
19/12/15
25/12/15
31/12/15
6/01/16
12/01/16
18/01/16
24/01/16
30/01/16
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

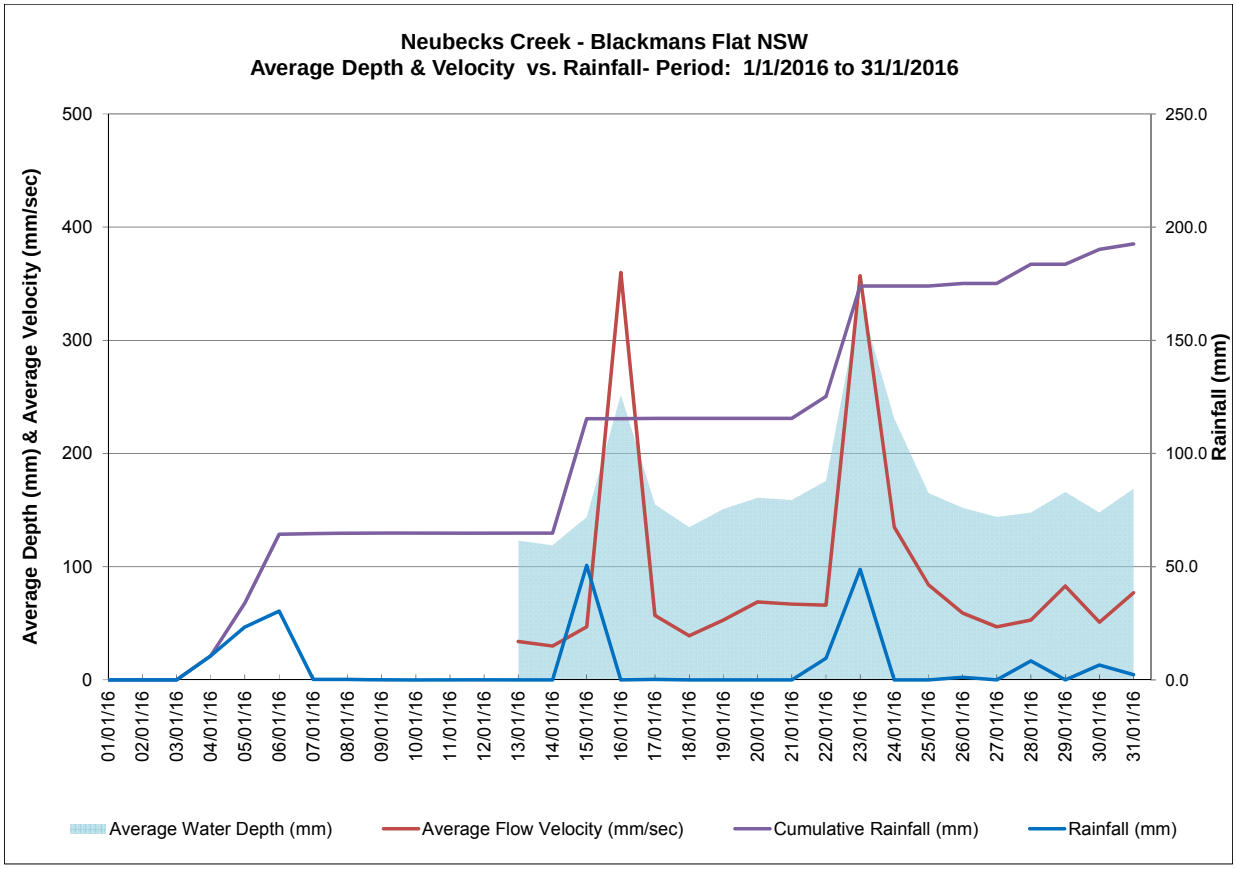

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
February 2015 to January 2016
TSP & PM10 (µg/m³)
100
90
80
70
60
50
40
30
20
10
0
4-Feb-15
16-Feb-15
28-Feb-15
12-Mar-15
24-Mar-15
5-Apr-15
17-Apr-15
29-Apr-15
11-May-15
23-May-15
4-Jun-15
16-Jun-15
28-Jun-15
10-Jul-15
22-Jul-15
3-Aug-15
15-Aug-15
27-Aug-15
8-Sep-15
20-Sep-15
2-Oct-15
14-Oct-15
26-Oct-15
7-Nov-15
19-Nov-15
1-Dec-15
13-Dec-15
25-Dec-15
6-Jan-16
18-Jan-16
30-Jan-16
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

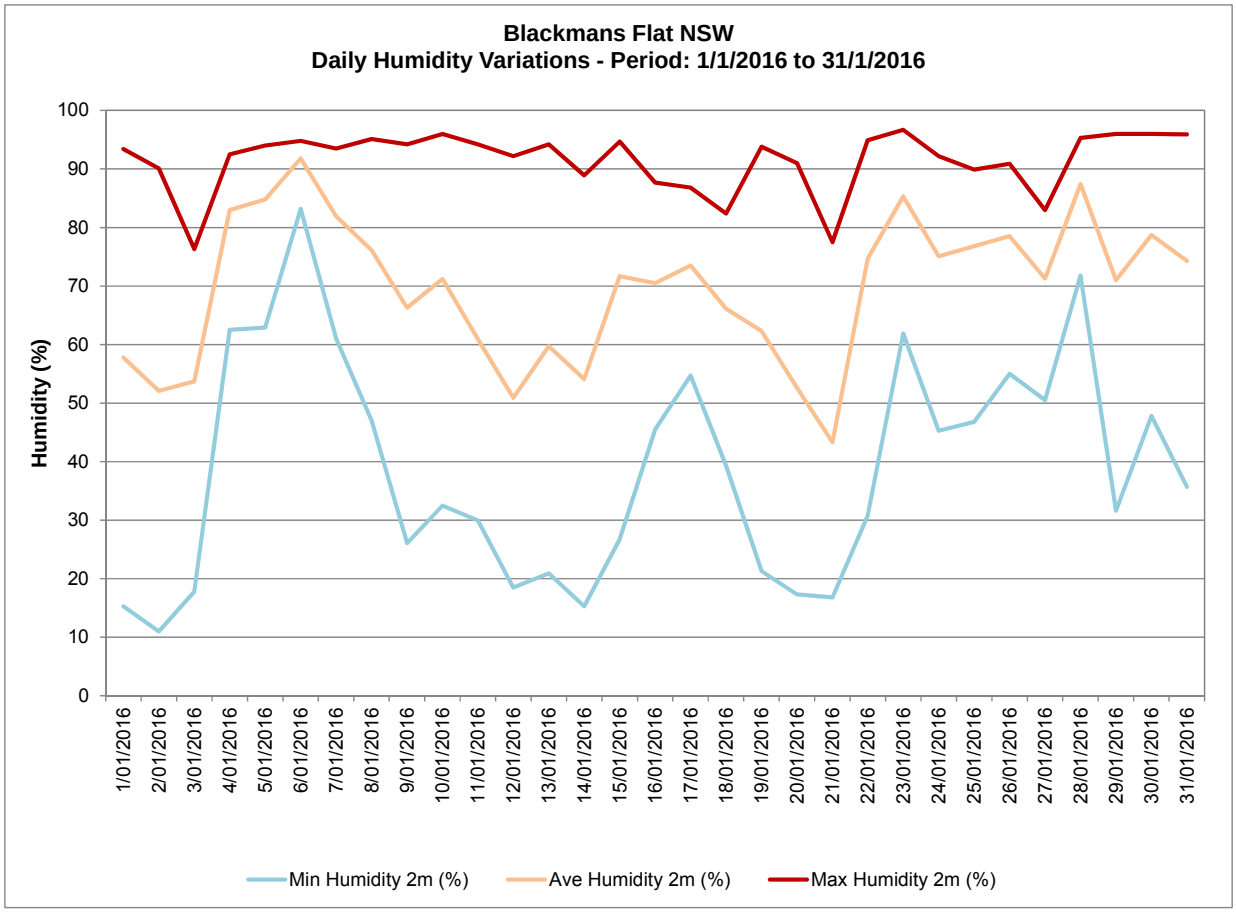
Appendix 3

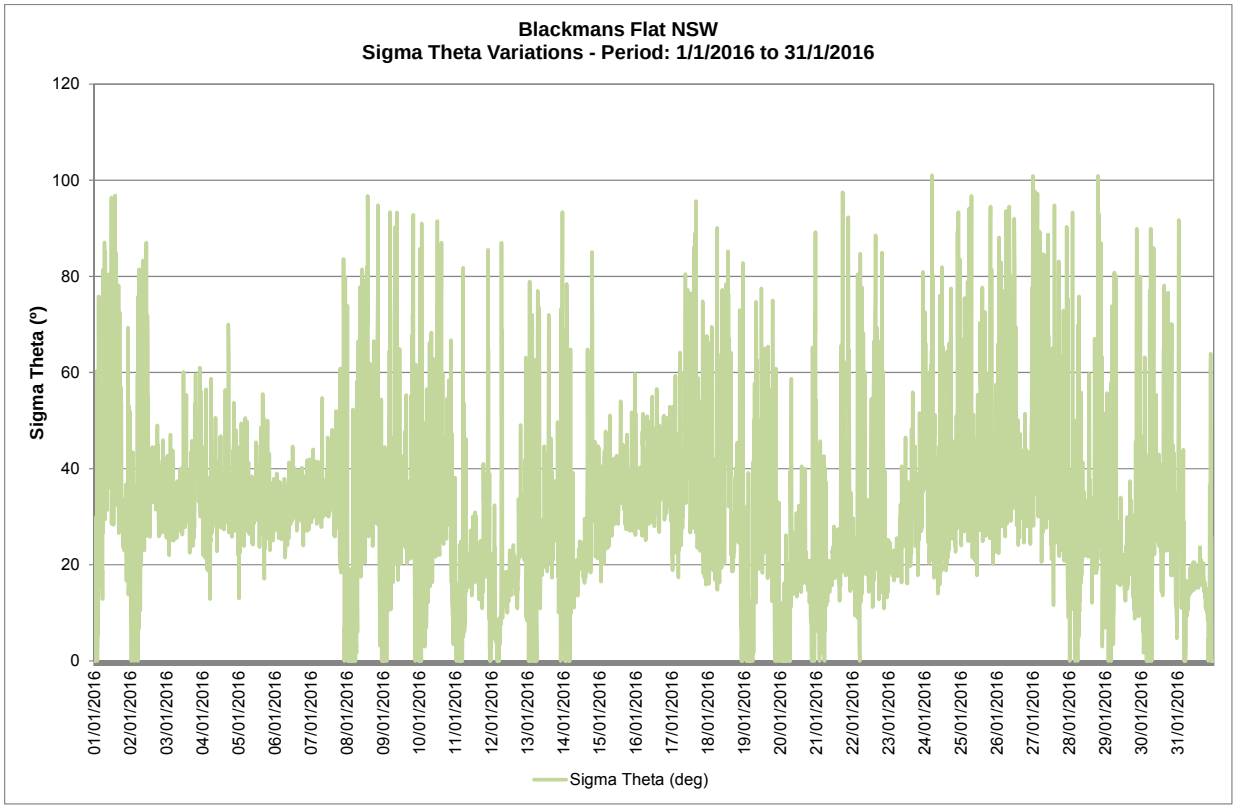
Meteorological Data

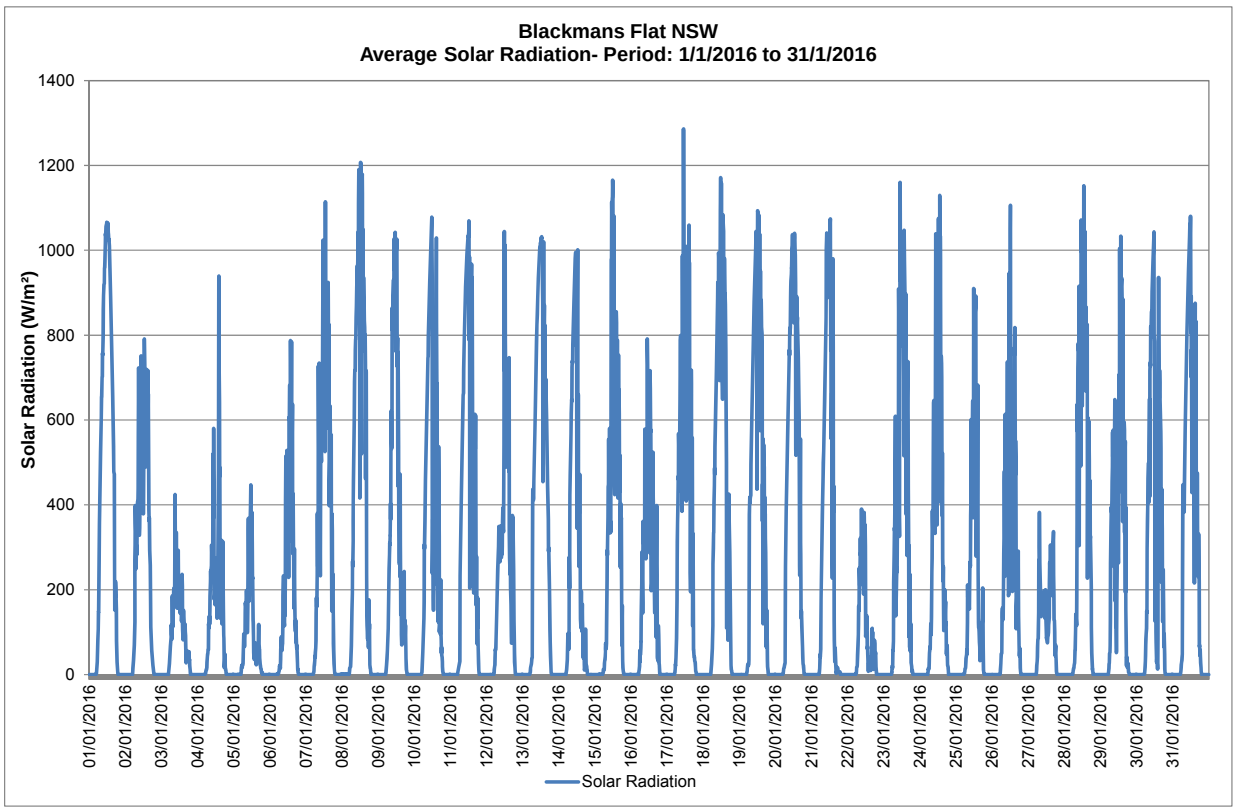

Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/1/2016 to 31/1/2016
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for January 2016: 192.8mm
Rainfall (mm)
Evapotranspiration (mm)

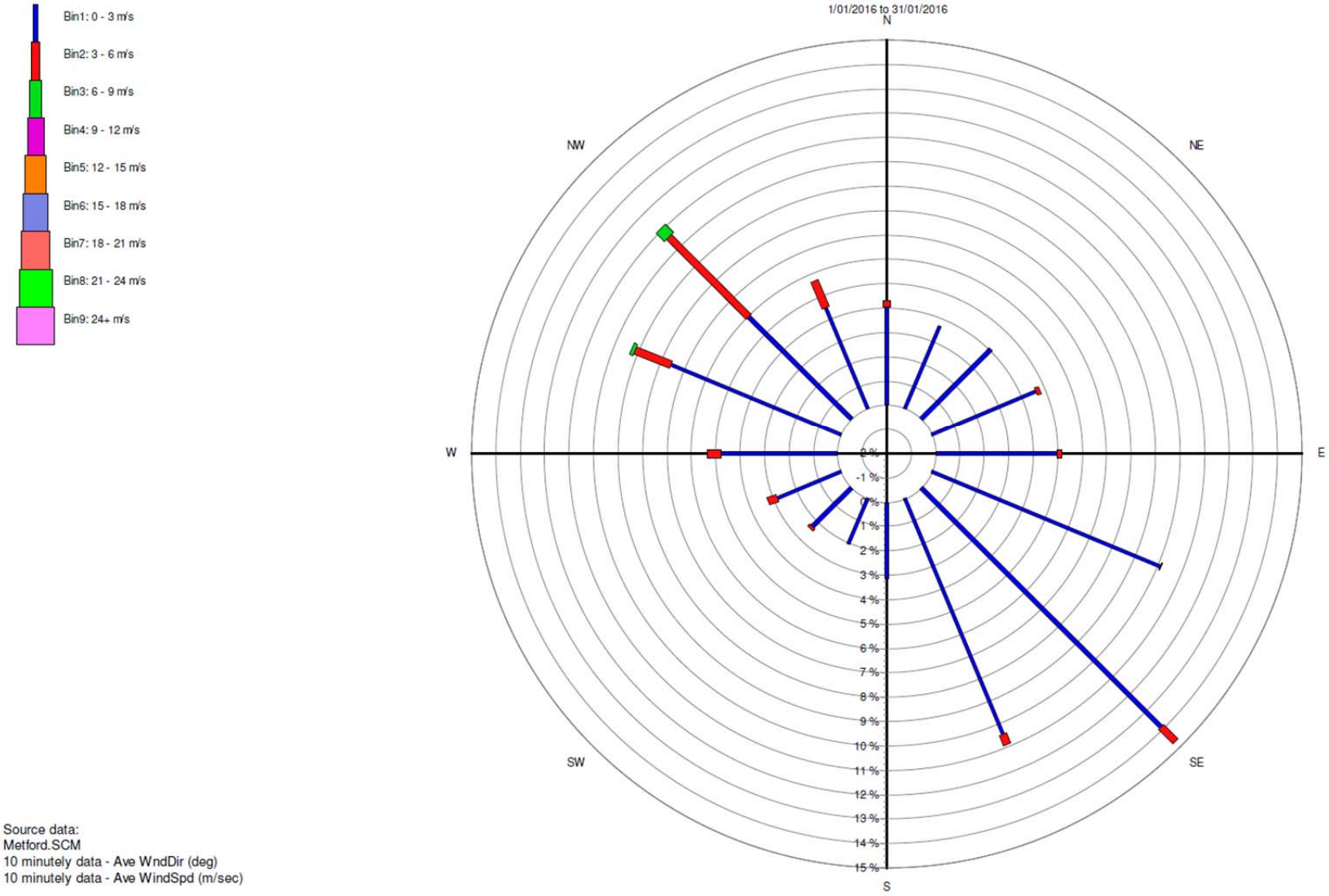

Blackmans Flat NSW
Average Air Temperature - Period: 1/1/2016 to 31/1/2016
Average Temperature (ºC)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/1/2016 to 31/1/2016
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
500
400
300
200
100
0
250.0
200.0
150.0
100.0
50.0
0.0
01/01/16
02/01/16
03/01/16
04/01/16
05/01/16
06/01/16
07/01/16
08/01/16
09/01/16
10/01/16
11/01/16
12/01/16
13/01/16
14/01/16
15/01/16
16/01/16
17/01/16
18/01/16
19/01/16
20/01/16
21/01/16
22/01/16
23/01/16
24/01/16
25/01/16
26/01/16
27/01/16
28/01/16
29/01/16
30/01/16
31/01/16
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/1/2016 to 31/1/2016
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
1/01/2016
2/01/2016
3/01/2016
4/01/2016
5/01/2016
6/01/2016
7/01/2016
8/01/2016
9/01/2016
10/01/2016
11/01/2016
12/01/2016
13/01/2016
14/01/2016
15/01/2016
16/01/2016
17/01/2016
18/01/2016
19/01/2016
20/01/2016
21/01/2016
22/01/2016
23/01/2016
24/01/2016
25/01/2016
26/01/2016
27/01/2016
28/01/2016
29/01/2016
30/01/2016
31/01/2016
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/1/2016 to 31/1/2016
Sigma Theta (°)
120
100
80
60
40
20
0
01/01/2016
02/01/2016
03/01/2016
04/01/2016
05/01/2016
06/01/2016
07/01/2016
08/01/2016
09/01/2016
10/01/2016
11/01/2016
12/01/2016
13/01/2016
14/01/2016
15/01/2016
16/01/2016
17/01/2016
18/01/2016
19/01/2016
20/01/2016
21/01/2016
22/01/2016
23/01/2016
24/01/2016
25/01/2016
26/01/2016
27/01/2016
28/01/2016
29/01/2016
30/01/2016
31/01/2016
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/1/2016 to 31/1/2016
Solar Radiation (W/m²)
1400
1200
1000
800
600
400
200
0
01/01/2016
02/01/2016
03/01/2016
04/01/2016
05/01/2016
06/01/2016
07/01/2016
08/01/2016
09/01/2016
10/01/2016
11/01/2016
12/01/2016
13/01/2016
14/01/2016
15/01/2016
16/01/2016
17/01/2016
18/01/2016
19/01/2016
20/01/2016
21/01/2016
22/01/2016
23/01/2016
24/01/2016
25/01/2016
26/01/2016
27/01/2016
28/01/2016
29/01/2016
30/01/2016
31/01/2016
Solar Radiation



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