# SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

**Prepared for Pine Dale Mine Community Consultative Committee**

**Prepared by RCA Australia**

**RCA ref 6880-1759/0**

**January 2018**

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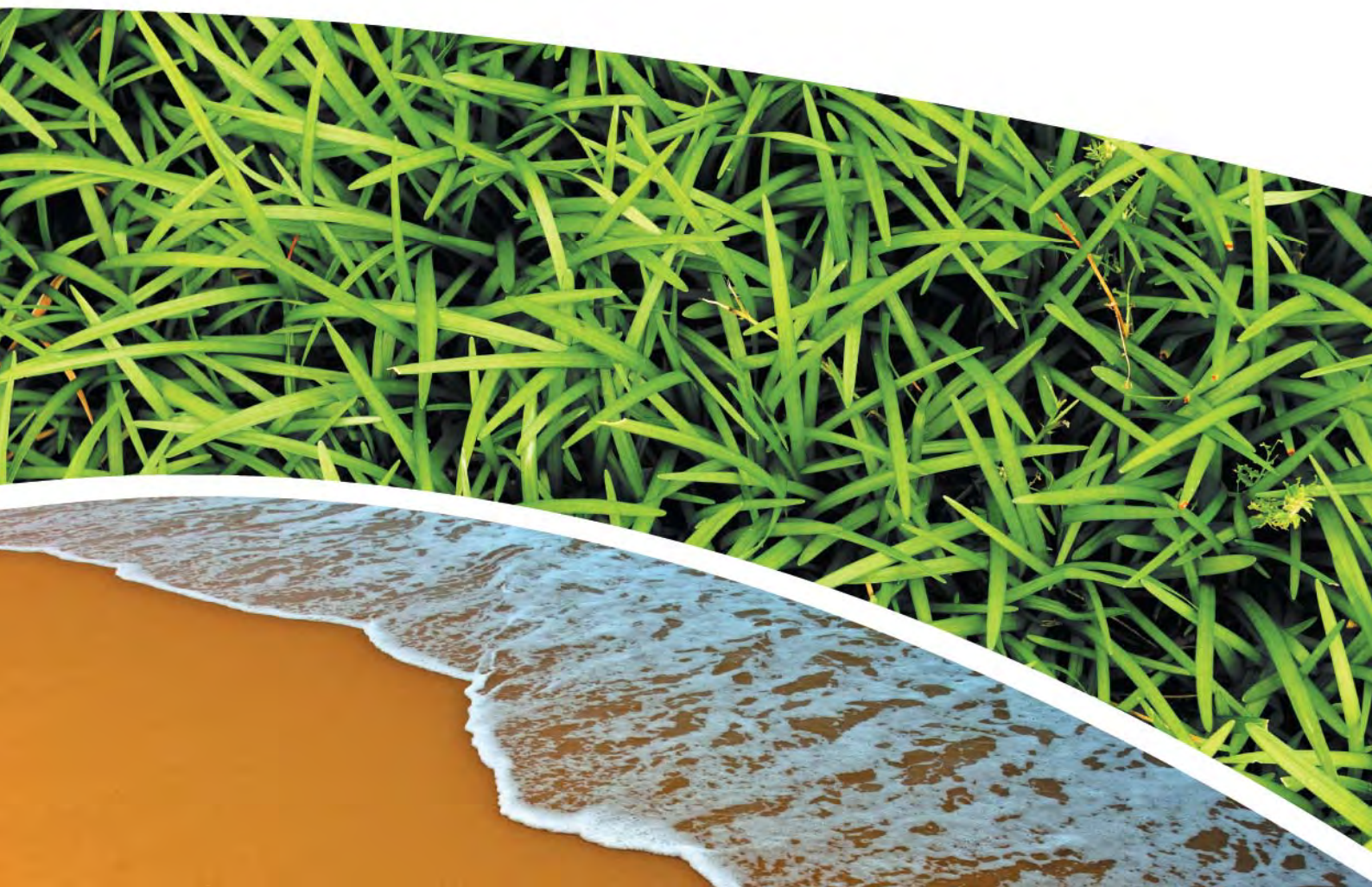
GEOTECHNICAL • ENVIRONMENTAL



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RCA LE ref 6880-1757/0

16 February 2018

Pine Dale Mine
PO Box 202
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Attention Mr Graham Goodwin

**REPORT COMPILED FOR**

**PINE DALE MINE COMMUNITY CONSULTATIVE COMMITTEE**

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

**JANUARY 2018**

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## 1 GENERAL COMMENTS

Job Number: 6880.

Date Samples Received: During the month of January 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 January 2018. Water quality analysis results are shown in **Table 2**.

**Table 2** *Groundwater Analysis Results – Monthly Monitoring*

| ANALYSIS | UNITS | P6 | P7 |
|---|---|---|---|
| Sample Number | - | 01186880009 | 01186880010 |
| Date Sampled | - | 12/01/2018 | 12/01/2018 |
| Time Sampled | - | 9:58 | 10:42 |
| Depth to Water from Surface | m | 25.02 | 7.00 |
| Water Level (AHD) | m | 891.93 | 887.40 |
| Temperature | °C | 18.0 | 17.5 |
| pH | pH | 6.57 | 6.78 |
| Conductivity | µS/cm | ***1370*** | 830 |
| Turbidity | NTU | 62 | |
| Dissolved Oxygen | mg/L | <2 | |
| TSS | mg/L | 52 | |
| Oil and Grease | mg/L | <5 | |
| Bicarbonate Alkalinity ($CaCO_3$) | mg/L | 81 | |
| Total Alkalinity ($CaCO_3$) | mg/L | 81 | |
| Sulfate (as $SO_4$) | mg/L | 629 | |
| Chloride | mg/L | 36 | |
| Calcium | mg/L | 133 | |
| Magnesium | mg/L | 58 | |
| Sodium | mg/L | 56 | |
| Potassium | mg/L | 18 | |
| Cobalt (dissolved) | mg/L | 0.074 | |
| Manganese (dissolved) | mg/L | 2.62 | |
| Nickel (dissolved) | mg/L | 0.122 | |
| Zinc (dissolved) | mg/L | 0.068 | |
| Iron (dissolved) | mg/L | 30.1 | |
| ***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

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 January 2018. The next round of quarterly surface water monitoring is scheduled to be undertaken in February 2018.

## 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 4**. $PM_{10}$ Suspended Particulate Matter results are shown in **Table 5**.

**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 |
|---|---|---|---|---|---|---|---|
| 01-Jan-18 | 13 | 01186880029 | 9520038 | 03-Jan-18 | 7:00 | Client | 24.00 |
| 07-Jan-18 | 44 | 01186880031 | 9520040 | 08-Jan-18 | 6:30 | Client | 24.00 |
| 13-Jan-18 | 41 | 01186880033 | 9520042 | 15-Jan-18 | 6:20 | Client | 24.31 |
| 19-Jan-18 | 36 | 01186880035 | 9520044 | 23-Jan-18 | 6:35 | Client | 24.00 |
| 25-Jan-18 | 32 | 01186880037 | 9518512 | 26-Jan-18 | 10:35 | Client | 24.00 |
| 31-Jan-18 | 13 | 01186880039 | 9518513 | 01-Feb-18 | 6:30 | 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 |
|---|---|---|---|---|---|---|---|
| 01-Jan-18 | 13 | 01186880030 | 9520039 | 03-Jan-18 | 7:05 | Client | 24.00 |
| 07-Jan-18 | 22 | 01186880032 | 9520041 | 08-Jan-18 | 6:35 | Client | 24.00 |
| 13-Jan-18 | 18 | 01186880034 | 9520043 | 15-Jan-18 | 6:25 | Client | 24.15 |
| 19-Jan-18 | 16 | 01186880036 | 9520045 | 23-Jan-18 | 6:40 | Client | 24.00 |
| 25-Jan-18 | 20 | 01186880038 | 9520046 | 26-Jan-18 | 10:40 | Client | 24.00 |
| 31-Jan-18 | 6 | 01186880040 | 9518514 | 01-Feb-18 | 6:35 | 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 February 2017 – January 2018) for the TSP unit is 20.1µg/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 9.8µg/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 January 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 5**.

**Table 5** *Depositional Dust Monitoring - Deposited Matter – January 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) |
|---|---|---|---|---|---|---|---|---|
| 01186880019 | D1 | 11/12/2017 | 11/01/2018 | 31 | IT | 1.9 | 1.0 | 0.9 |
| 01186880020 | D2 | 11/12/2017 | 11/01/2018 | 31 | I | 1.1 | 0.6 | 0.5 |
| 01186880021 | D3 | 11/12/2017 | 11/01/2018 | 31 | IT | 0.9 | 0.6 | 0.3 |
| 01186880022 | D4 | 11/12/2017 | 11/01/2018 | 31 | I | 1.1 | 0.5 | 0.6 |
| 01186880023 | D5 | 11/12/2017 | 11/01/2018 | 31 | ITB | 3.7 | 1.0 | 2.7 |
| 01186880024 | D6 | 11/12/2017 | 11/01/2018 | 31 | I | 0.8 | 0.5 | 0.3 |

Glossary of Terms Used in Notes:

I Insects (eg, Ants, Spiders) IT Insects and tree litter ITB Insects, tree litter and 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 0.9g/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 noise monitoring is undertaken on a quarterly basis. Noise monitoring for the January – March 2018 quarter is scheduled to be undertaken during March 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 January 2018 environmental monitoring constituents were found to be generally in compliance with EPL 4911 with the exception of electrical conductivity in groundwater sample P6.

Standing water levels within the site groundwater bores were compliant with their respective trigger levels. All parameters in P7 were compliant with the site specific trigger levels. Groundwater bore P6 exceeded the electrical conductivity site specific trigger level. The pH at bore P6 was compliant with the site specific trigger level.

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.

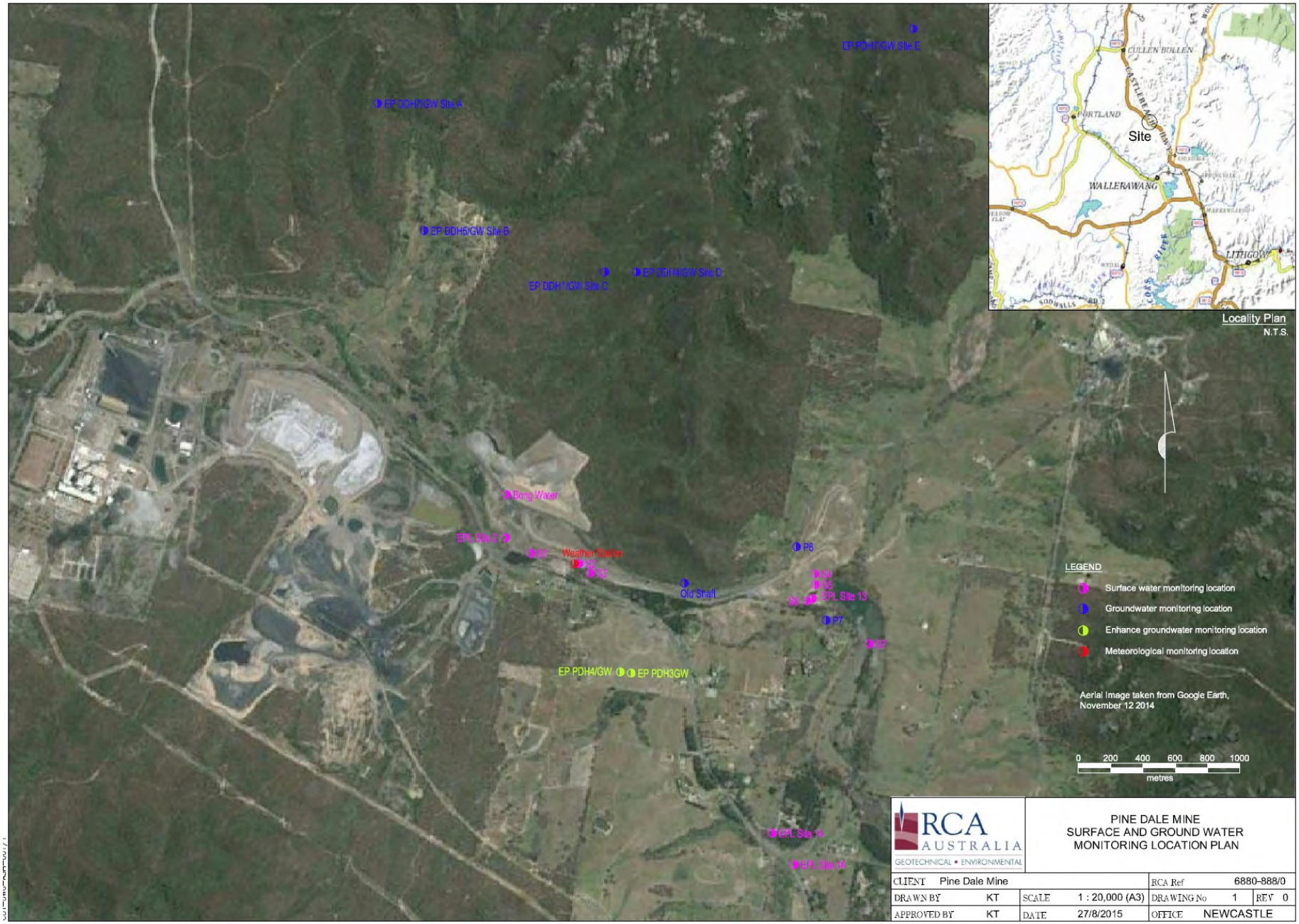
Yours sincerely

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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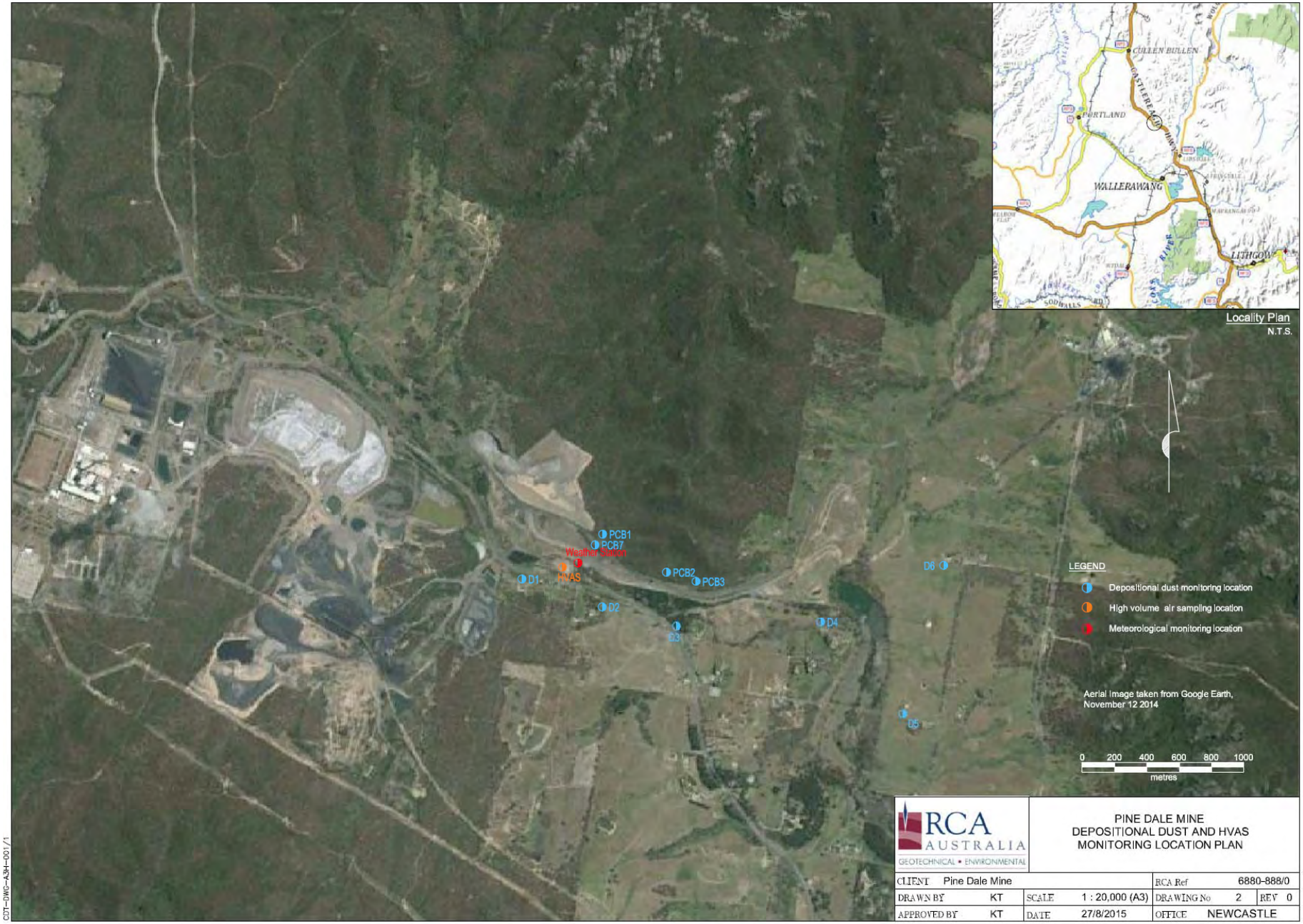
# PINE DALE MINE
# SURFACE AND GROUND WATER MONITORING LOCATION PLAN

| | | | | | |
|---|---|---|---|---|---|
| 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 |




Locality Plan
N.T.S.

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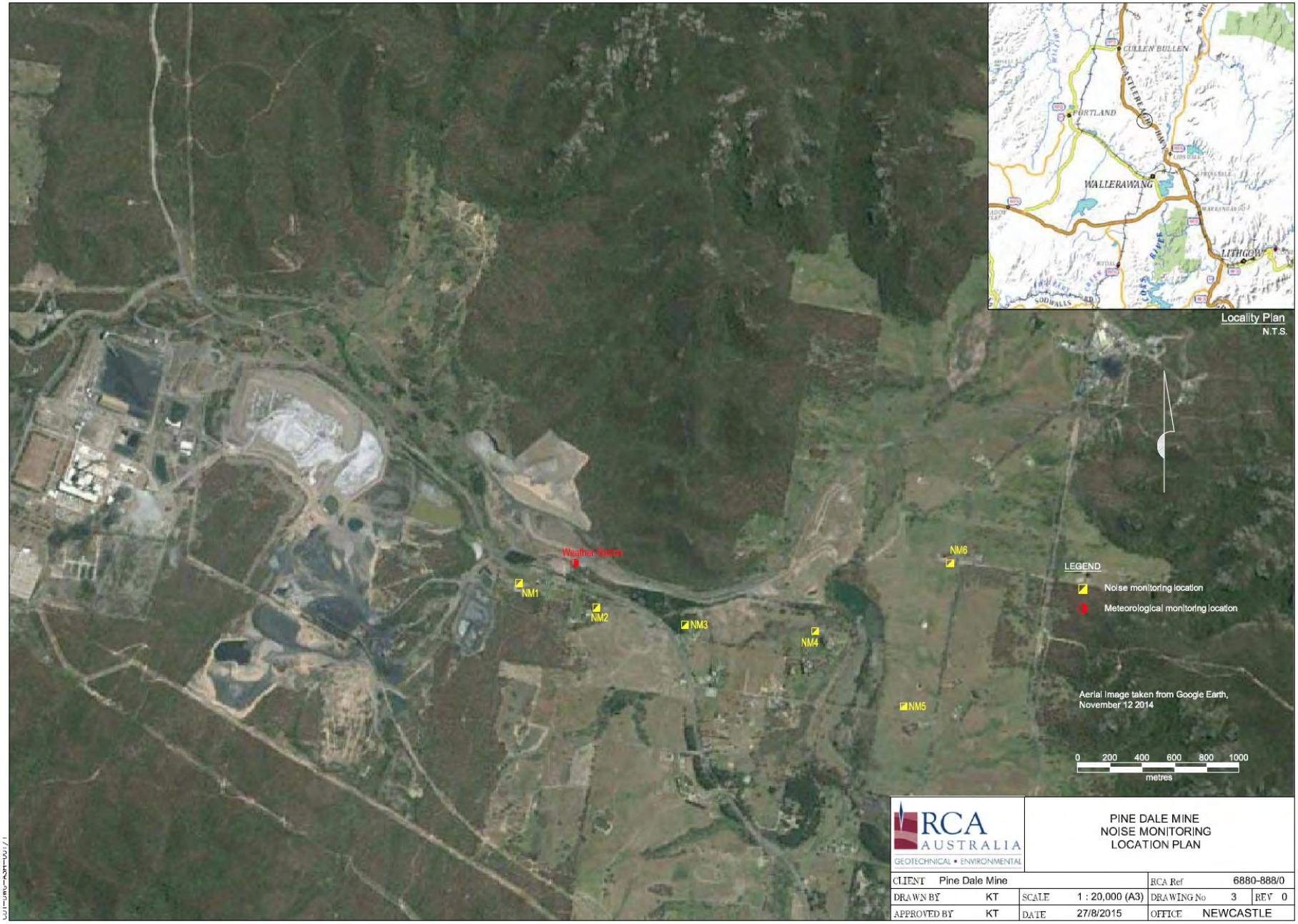
PINE DALE MINE
DEPOSITIONAL DUST AND HVAS
MONITORING LOCATION PLAN

| | | | | | |
|---|---|---|---|---|---|
| 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-A3H-001/1

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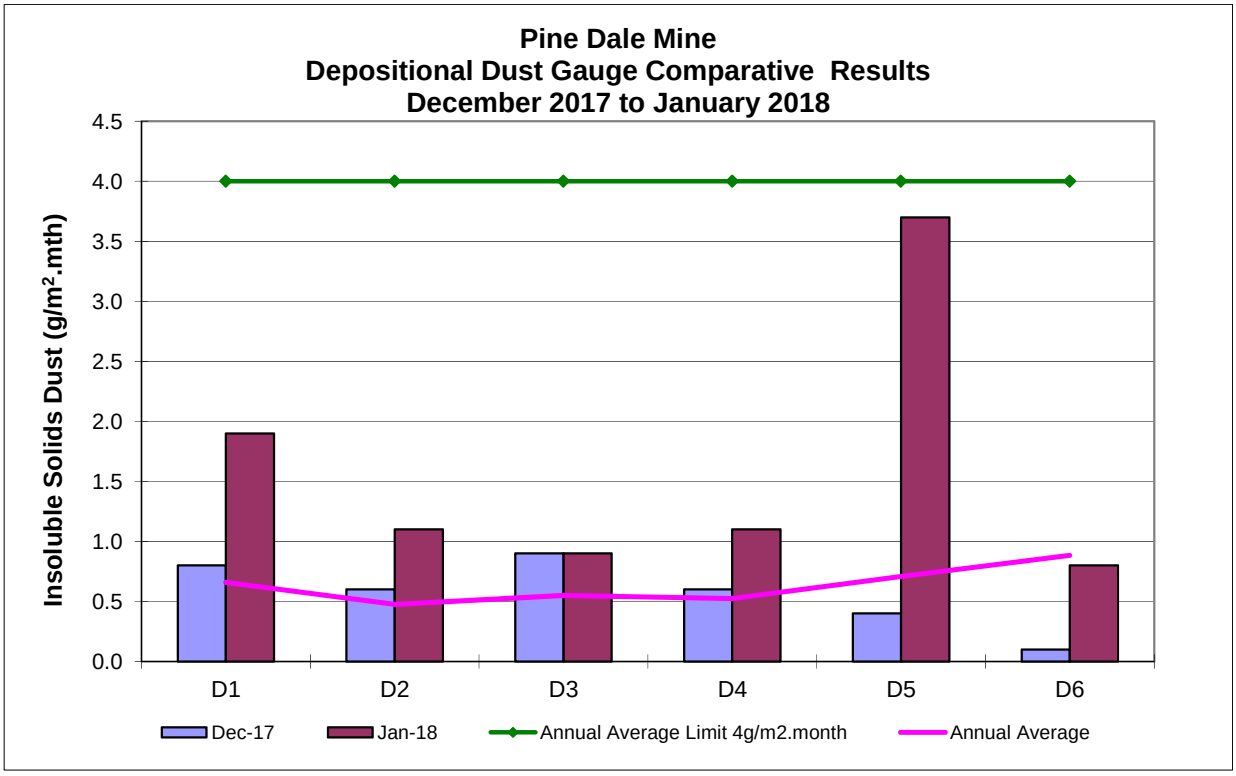
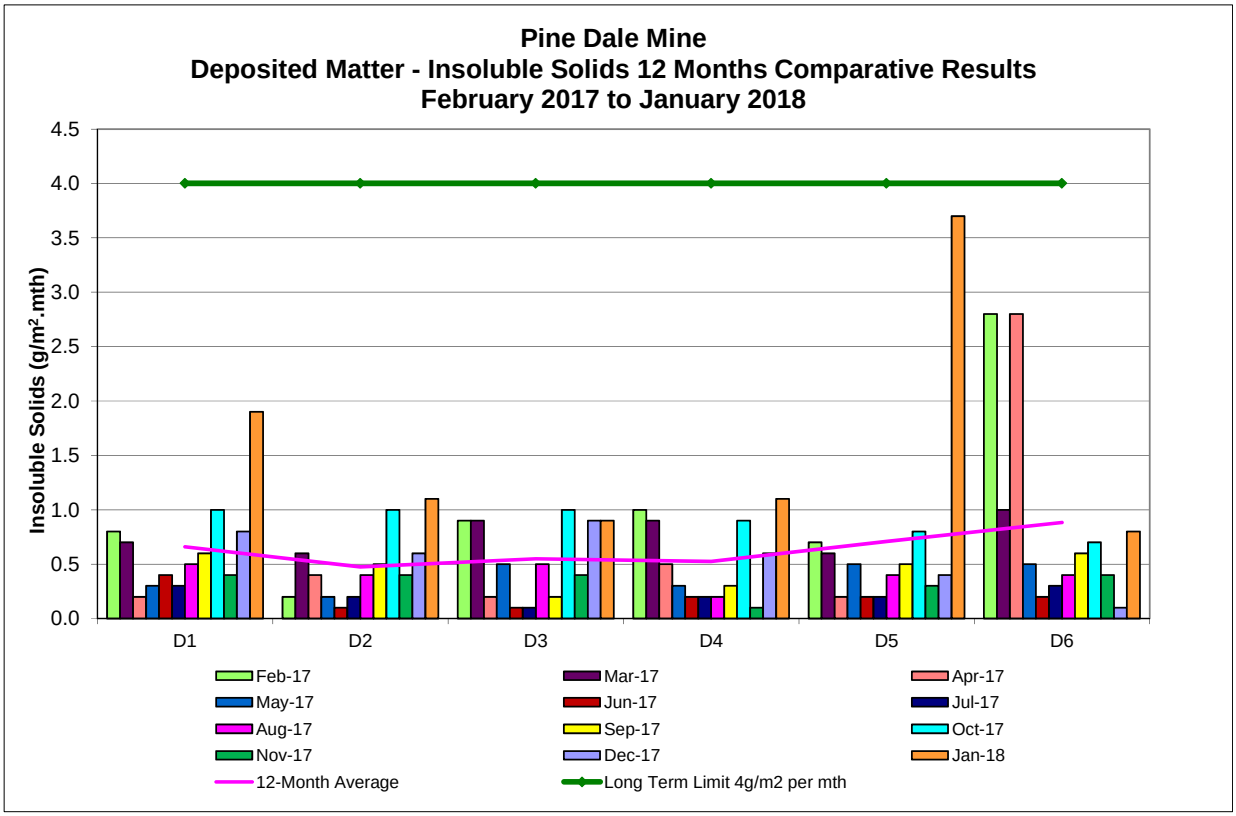
# PINE DALE MINE
# NOISE MONITORING
# LOCATION PLAN

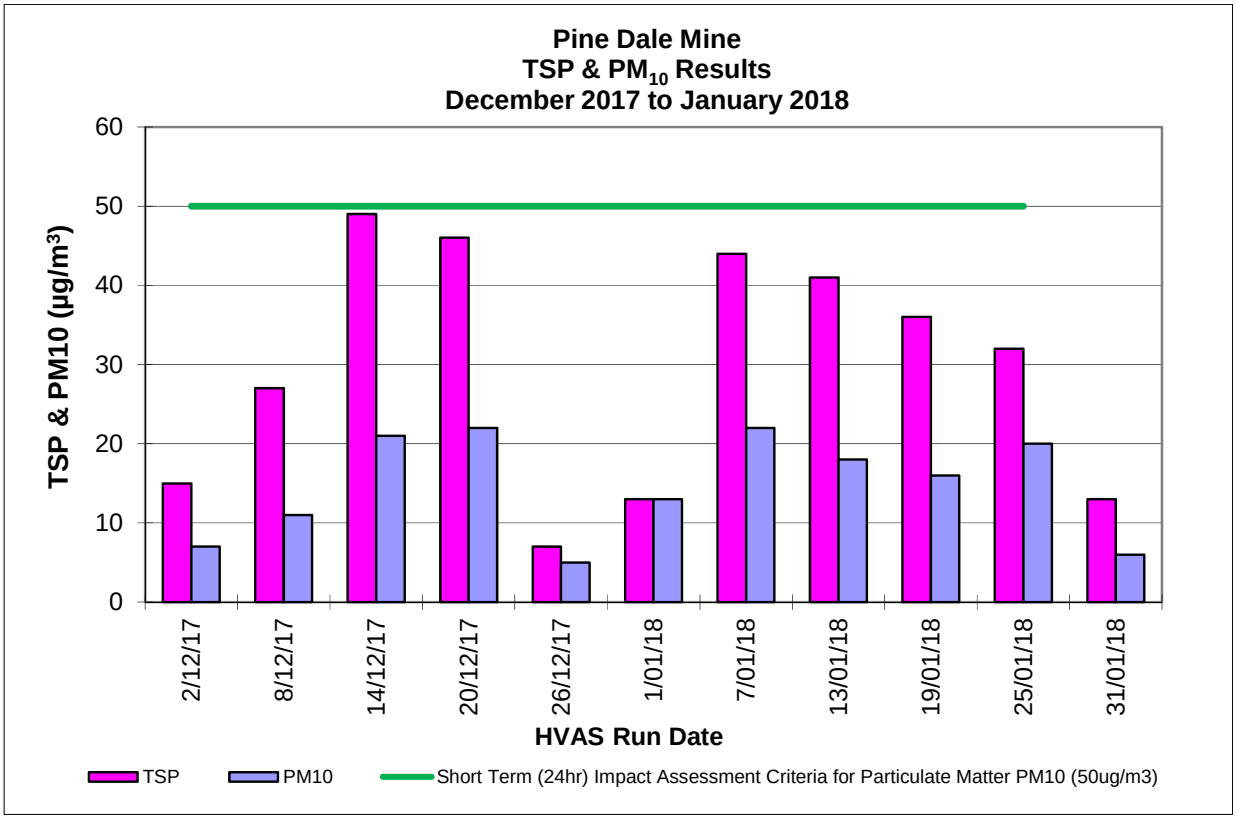
| | | | | | |
|---|---|---|---|---|---|
| CLIENT | Pine Dale Mine | | | RCA Ref | 6880-888/0 |
| DRAWN BY | KT | SCALE | 1 : 20,000 (A3) | DRAWING No 3 | REV 0 |
| APPROVED BY | KT | DATE | 27/8/2015 | OFFICE | NEWCASTLE |

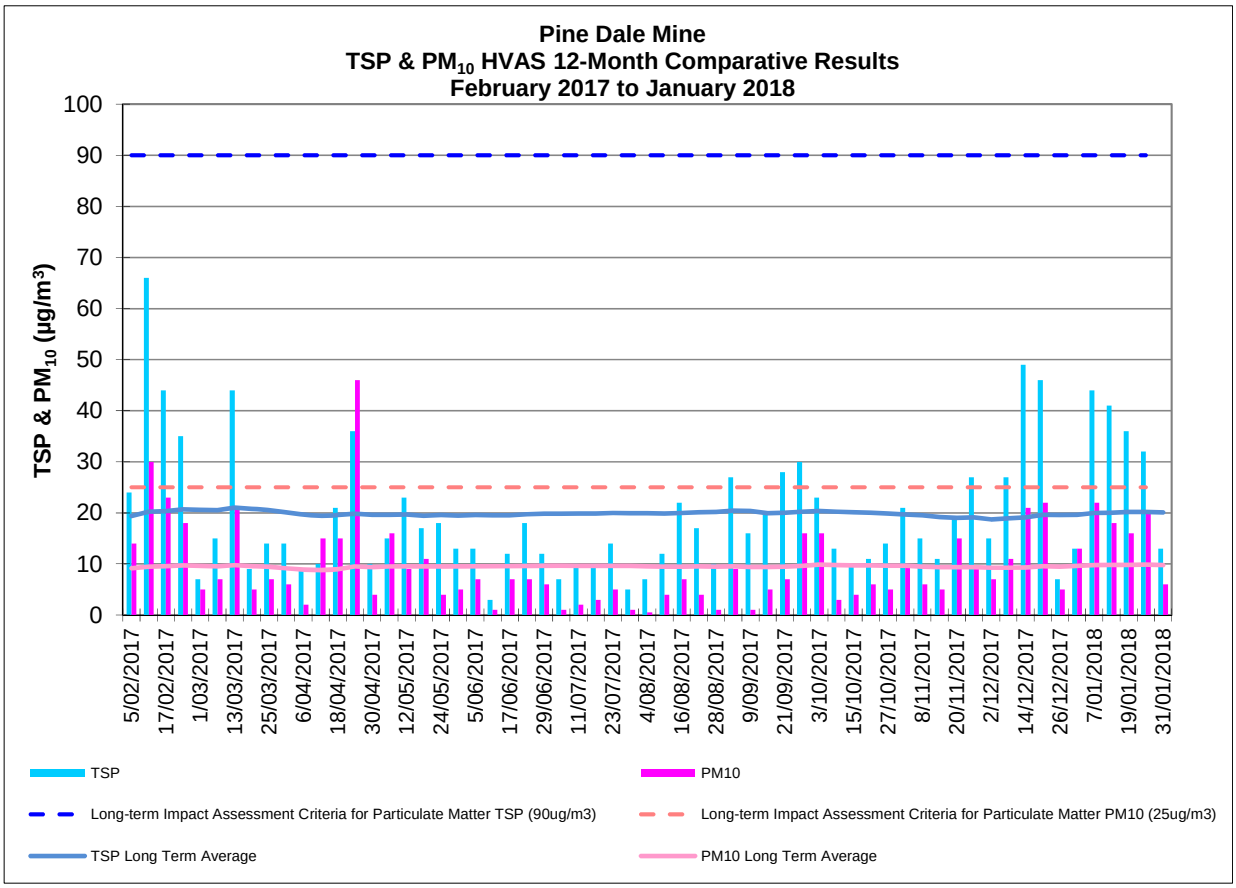
# Appendix 2

## Depositional Dust and HVAS Graphs


Pine Dale Mine
Depositional Dust Gauge Comparative Results
December 2017 to January 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
Dec-17
Jan-18
Annual Average Limit 4g/m2.month
Annual Average

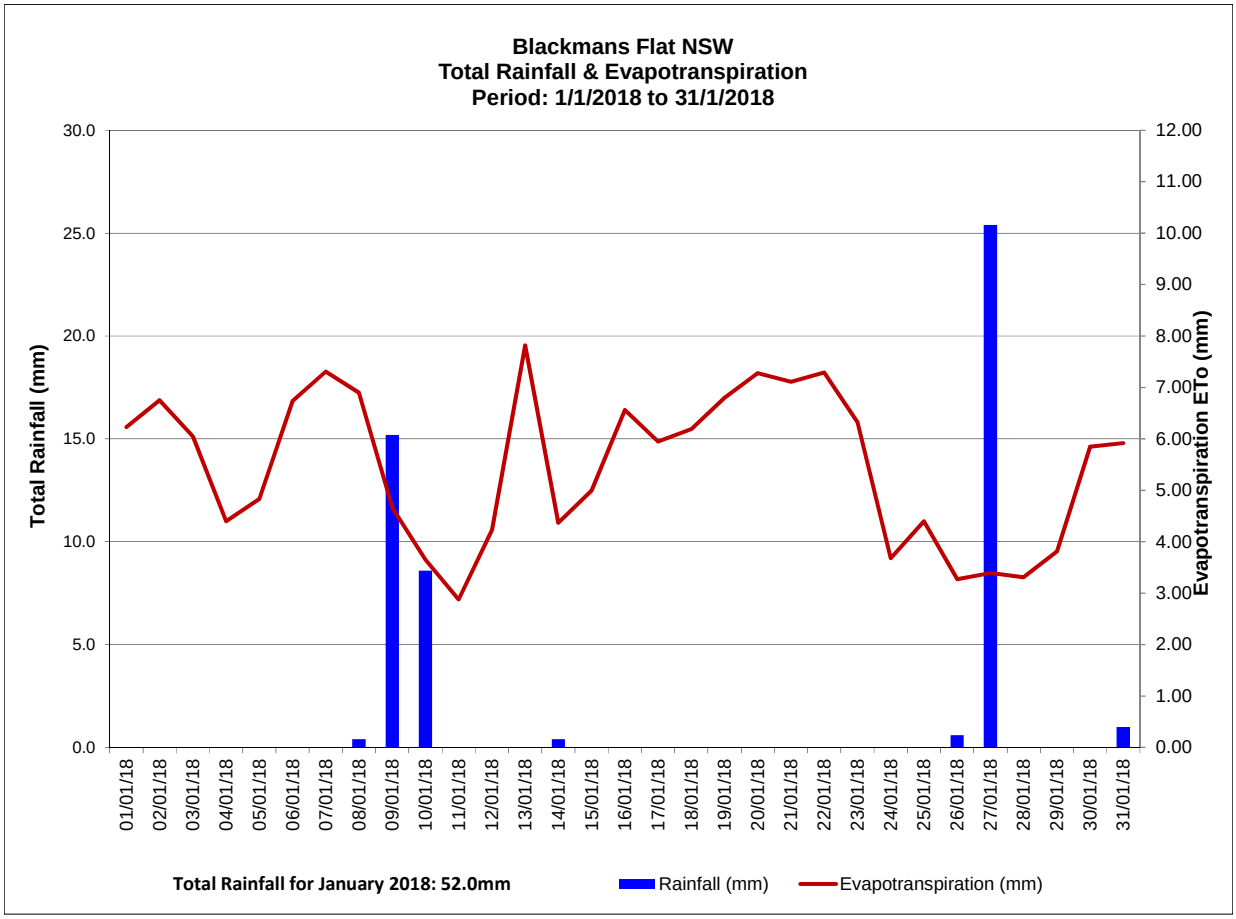

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
February 2017 to January 2018
Insoluble Solids (g/m².mth)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
D1
D2
D3
D4
D5
D6
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
12-Month Average
Long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

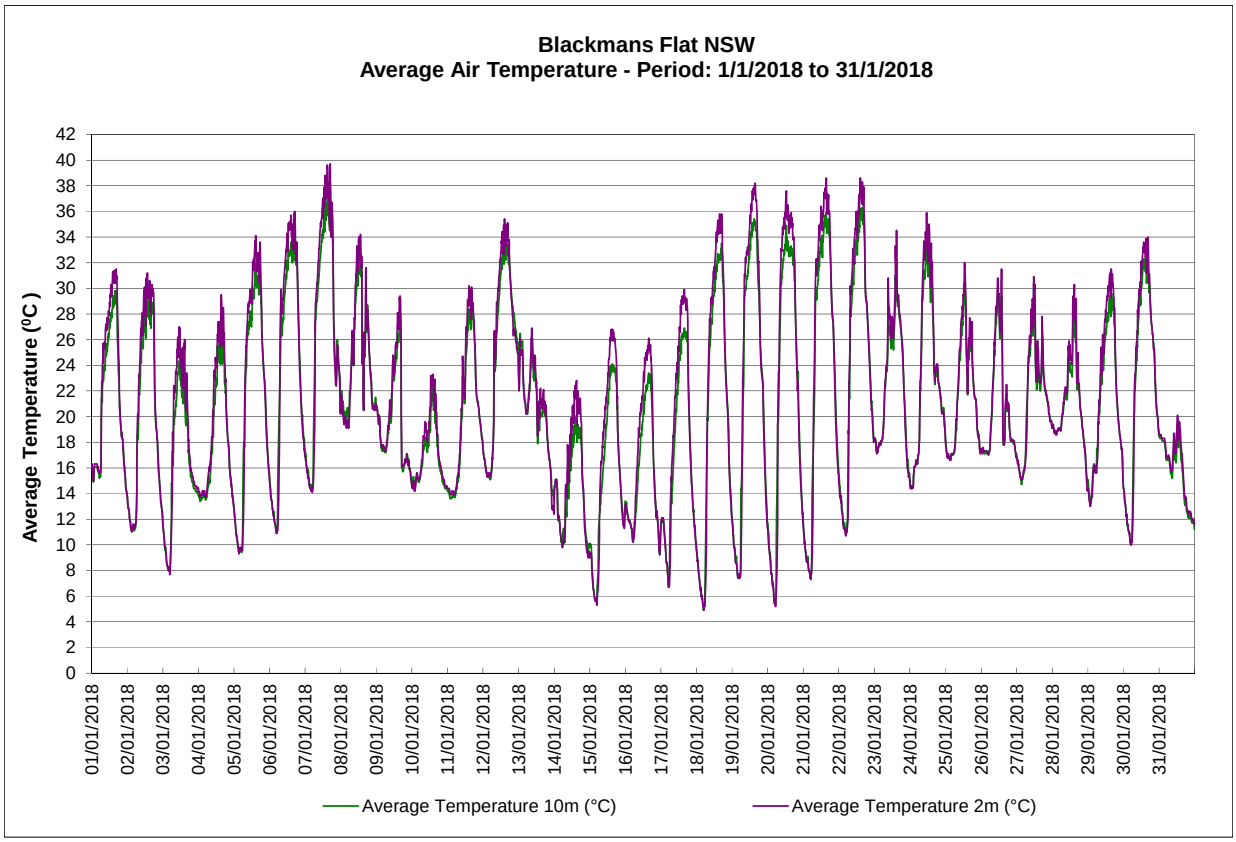

Pine Dale Mine
TSP & PM10 Results
December 2017 to January 2018
TSP & PM10 (µg/m³)
60
50
40
30
20
10
0
2/12/17
8/12/17
14/12/17
20/12/17
26/12/17
1/01/18
7/01/18
13/01/18
19/01/18
25/01/18
31/01/18
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

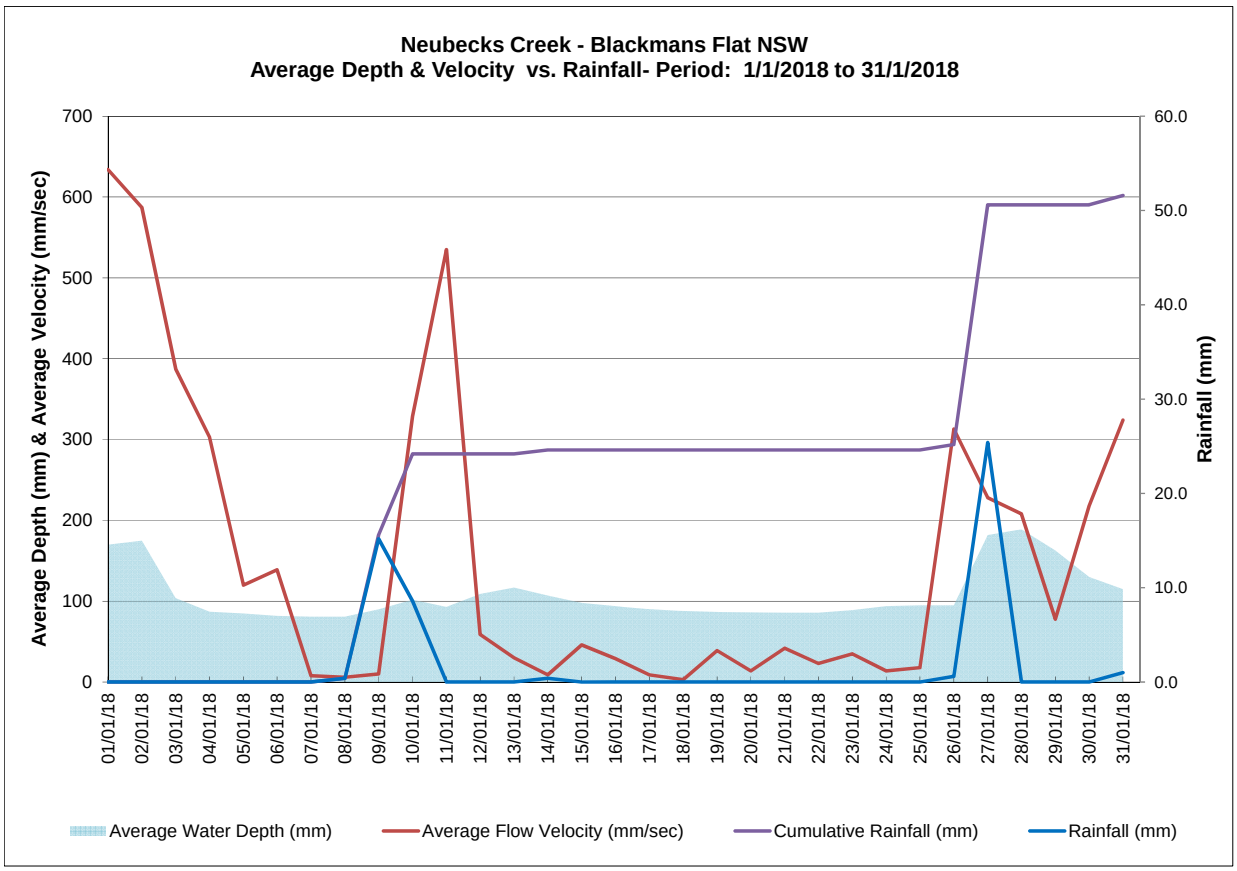

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
February 2017 to January 2018
TSP & PM10 (µg/m³)
100
90
80
70
60
50
40
30
20
10
0
5/02/2017
17/02/2017
1/03/2017
13/03/2017
25/03/2017
6/04/2017
18/04/2017
30/04/2017
12/05/2017
24/05/2017
5/06/2017
17/06/2017
29/06/2017
11/07/2017
23/07/2017
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
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

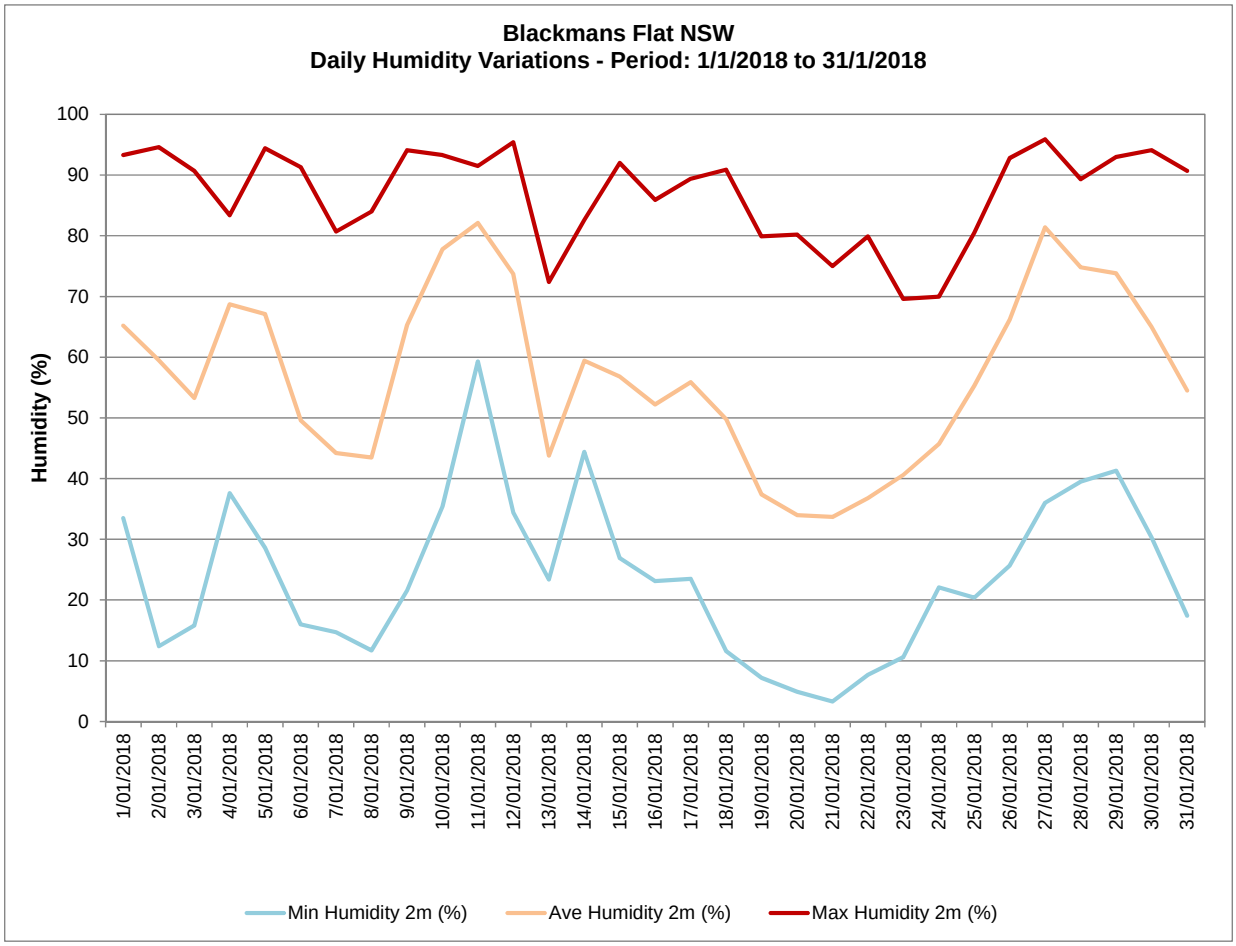
# Appendix 3

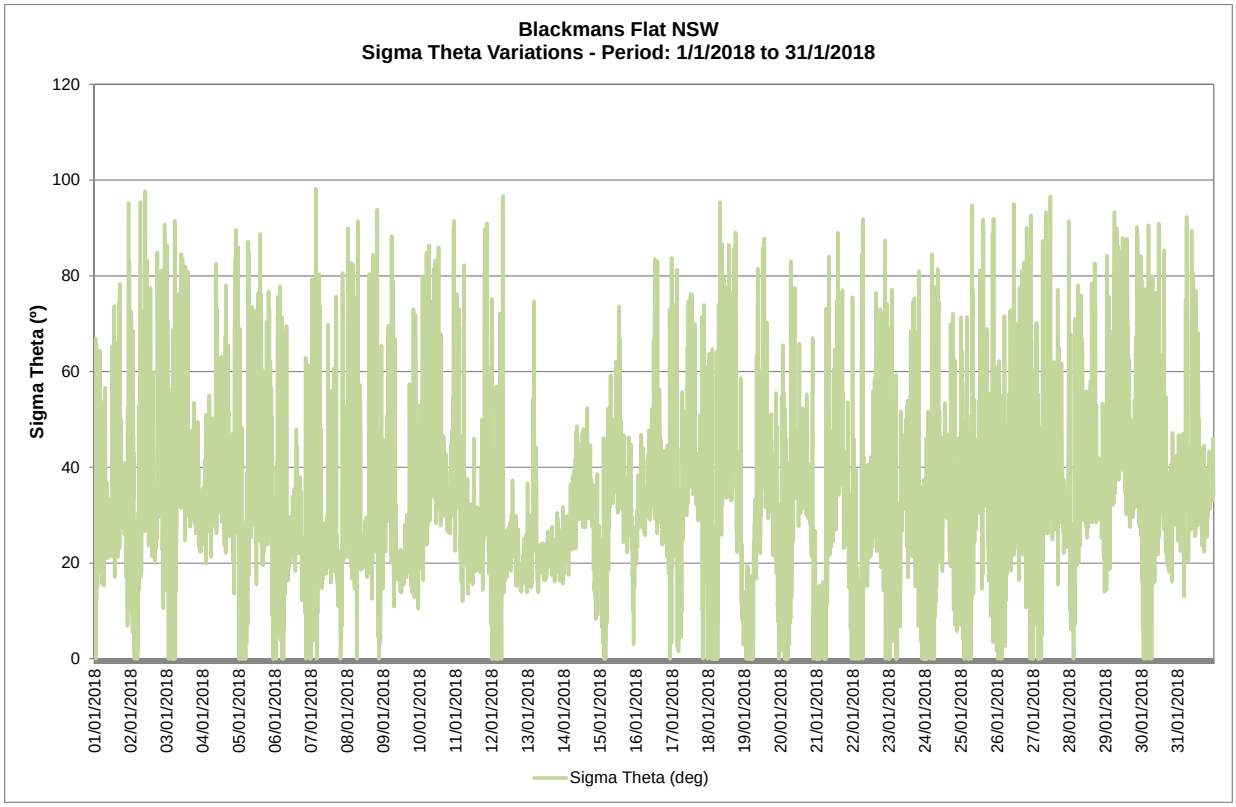
Meteorological Data


Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/1/2018 to 31/1/2018
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for January 2018: 52.0mm
Rainfall (mm)
Evapotranspiration (mm)


Blackmans Flat NSW
Average Air Temperature - Period: 1/1/2018 to 31/1/2018
Average Temperature (°C)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/1/2018 to 31/1/2018
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/1/2018 to 31/1/2018
Humidity (%)
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/1/2018 to 31/1/2018
Sigma Theta (°)
120
100
80
60
40
20
0
01/01/2018
02/01/2018
03/01/2018
04/01/2018
05/01/2018
06/01/2018
07/01/2018
08/01/2018
09/01/2018
10/01/2018
11/01/2018
12/01/2018
13/01/2018
14/01/2018
15/01/2018
16/01/2018
17/01/2018
18/01/2018
19/01/2018
20/01/2018
21/01/2018
22/01/2018
23/01/2018
24/01/2018
25/01/2018
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28/01/2018
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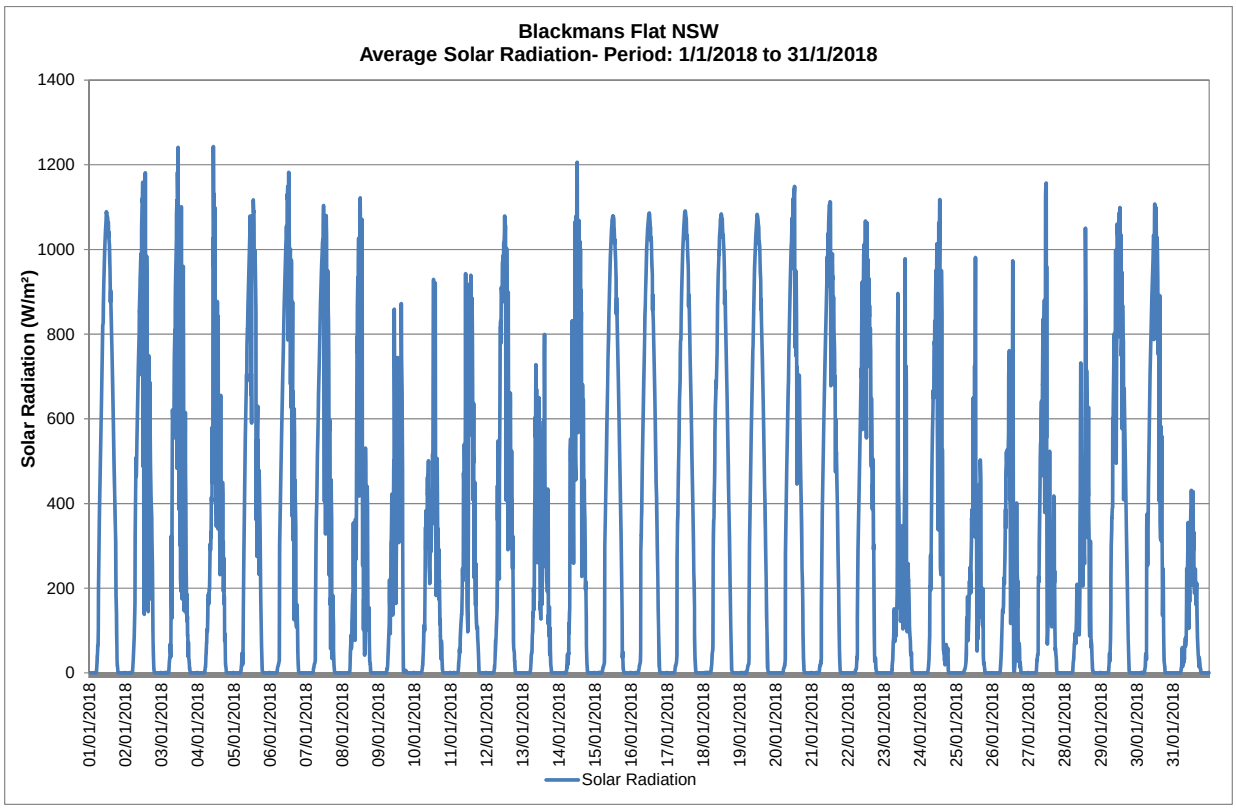
30/01/2018
31/01/2018
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/1/2018 to 31/1/2018
Solar Radiation (W/m²)
1400
1200
1000
800
600
400
200
0
01/01/2018
02/01/2018
03/01/2018
04/01/2018
05/01/2018
06/01/2018
07/01/2018
08/01/2018
09/01/2018
10/01/2018
11/01/2018
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15/01/2018
16/01/2018
17/01/2018
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21/01/2018
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23/01/2018
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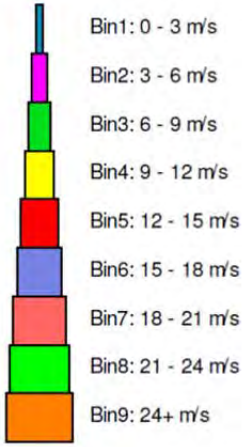
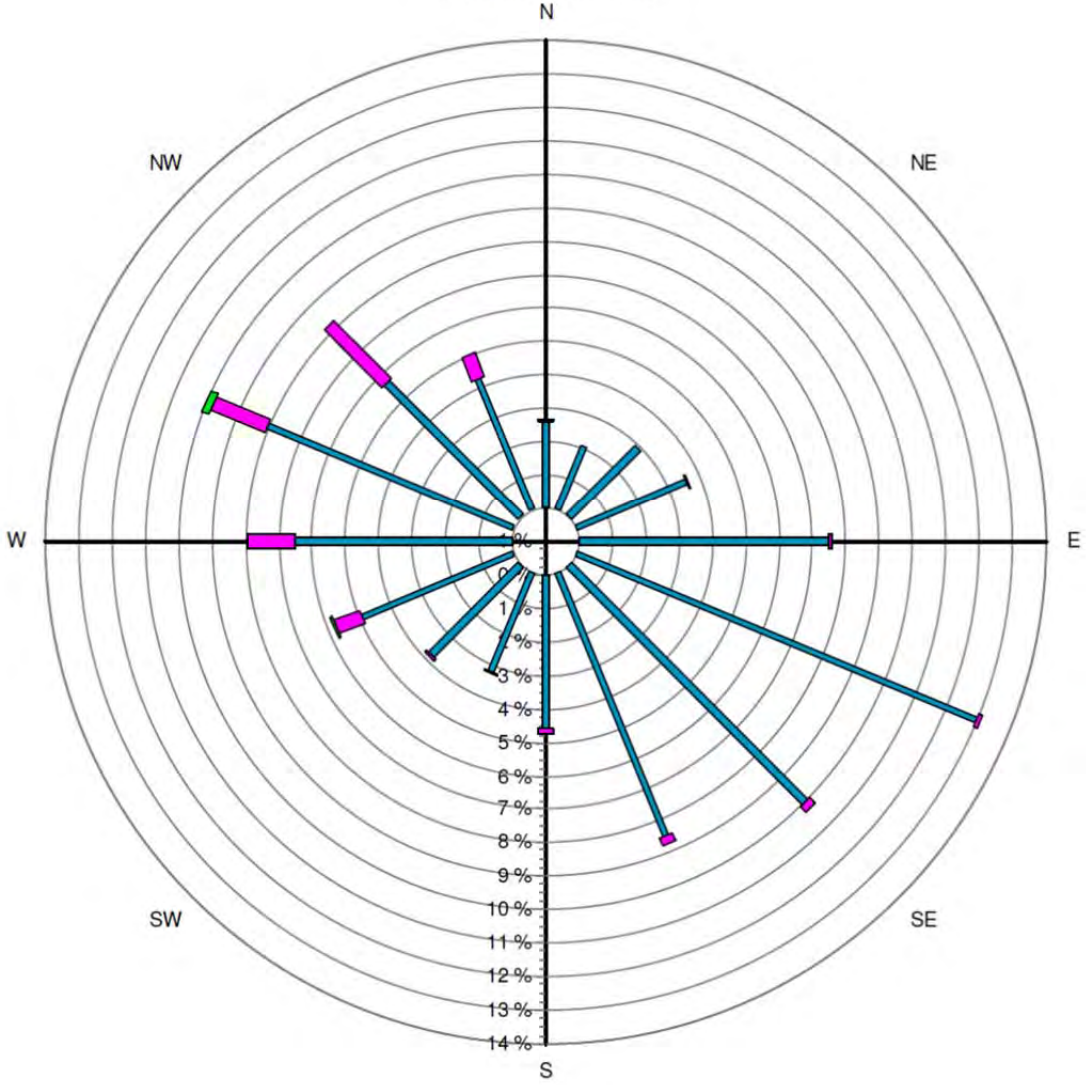
26/01/2018
27/01/2018
28/01/2018
29/01/2018
30/01/2018
31/01/2018
Solar Radiation




## Blackmans Flat Windrose

1/01/2018 to 31/01/2018




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