# SURFACE WATER, DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING

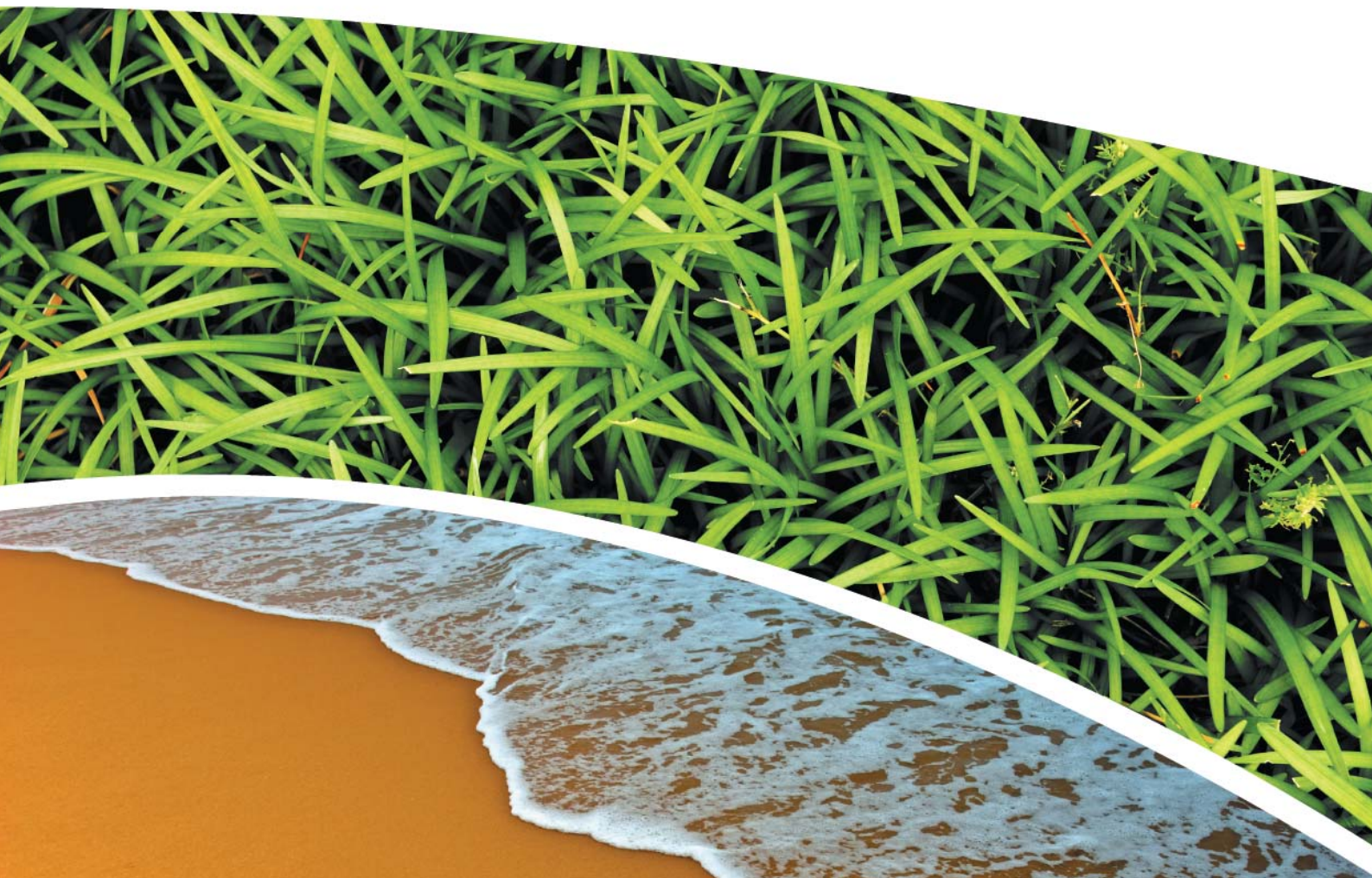
**Prepared for Pine Dale Mine Community Consultative Committee**

**Prepared by RCA Australia**

**RCA ref 6880-851/0**

**April 2014**

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL



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RCA LE ref 6880-851/0

6 May 2014

Pine Dale Mine
PO Box 202
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Attention: Mr Graham Goodwin

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**REPORT COMPILED FOR**
**PINE DALE MINE COMMUNITY CONSULTATIVE COMMITTEE**
**DETAILING SURFACE WATER, GROUNDWATER DEPOSITIONAL DUST, HVAS AND METEOROLOGICAL MONITORING**
**APRIL 2014**

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## 1 GENERAL COMMENTS

Job Number: 6880.
Date Samples Received: During the month of April 2014.
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 | µg/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 |
| Total Dissolved Solids | ENV-LAB020 | 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 |
| Dissolved Oxygen | Manufacturer's Instructions | 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 |

*Note that turbidity sampling and analysis is conducted to NATA approved method ENV-LAB037, however as the meter is not owned by RCA Laboratories- Environmental the test cannot be considered NATA accredited.

**Dissolved oxygen measurements are undertaken in the field using the DO Meter owned by PDM.

# 3 WATER MONITORING RESULTS

## 3.1 GROUNDWATER

A total of 4 on-site groundwater samples were collected during the month of April 2014. 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). The new sampling regime commenced 1 August 2013. Water quality analysis results are shown in **Table 2**.

**Table 2** *Groundwater Analysis Results*

| ANALYSIS | UNITS | P6 | P7 | Old Shaft | Old Shaft |
|---|---|---|---|---|---|
| Sample Number | - | 04146880009 | 04146880010 | 04146880029 | 04146880013 |
| Date Sampled | - | 15/04/14 | 15/04/14 | 2/04/2014 | 15/04/2014 |
| Time Sampled | - | 12:03 | 11:02 | 9:15 | 14:20 |
| Depth to Water from Surface | m | 25.73 | 6.55 | 11.64 | 11.34 |
| Water Level (AHD) | m | 891.22 | 887.85 | | |
| Temperature | °C | 16 | 15.00 | 16.8 | 16 |
| pH | pH | 7.7 | 7.7 | 6.50 | 7.46 |
| Conductivity | µS/cm | 1111 | 813 | 903 | 884 |
| Turbidity | NTU | 40 | | 24 | 3 |
| Dissolved Oxygen | mg/L | 7 | | | |
| TSS | mg/L | 50 | | | |
| Oil & Grease | mg/L | < 2 | | | |
| Bicarbonate Alkalinity ($CaCO_3$) | mg/L | 38 | | | |
| Total Alkalinity ($CaCO_3$) | mg/L | 38 | | | |
| Sulfate (as $SO_4$) | mg/L | 502 | | | |
| Chloride | mg/L | 20 | | | |
| Calcium | mg/L | 116 | | | |
| Magnesium | mg/L | 51 | | | |
| Sodium | mg/L | 40 | | | |
| Potassium | mg/L | 20 | | | |
| Cobalt (dissolved) | mg/L | 0.07 | | | |
| Manganese (dissolved) | mg/L | 2.86 | | | |
| Nickel (dissolved) | mg/L | 0.106 | | | |
| Zinc (dissolved) | mg/L | 0.48 | | | |
| Iron (dissolved) | mg/L | < 0.05 | | | |
| ***Trigger Levels**** | | | | | |
| pH trigger level | pH | ** | ** | ** | ** |
| Conductivity trigger level | µS/cm | ** | ** | ** | ** |
| Water level trigger (AHD)# | m | -- | 883.28 | -- | -- |

**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 next month (May 2014).

## 4 AIR QUALITY MONITORING RESULTS

### 4.1 HIGH VOLUME AIR SAMPLERS (HVAS)

HVAS at this facility conform to AS/NZS 3580.9.3:2003, 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 |
|---|---|---|---|---|---|---|---|
| 04-Apr-14 | 5 | 04146880034 | 8697580 | 07-Apr-14 | 11:40 | Client | 24.00 |
| 10-Apr-14 | 12 | 04146880036 | 8697582 | 14-Apr-14 | 10:05 | Client | 24.00 |
| 16-Apr-14 | 13 | 04146880038 | 8697584 | 17-Apr-14 | 9:50 | Client | 24.00 |
| 22-Apr-14 | 22 | 04146880040 | 8897153 | 23-Apr-14 | 10:35 | Client | 24.00 |
| 28-Apr-14 | 8 | 04146880042 | 8897155 | 29-Apr-14 | 11:42 | K Tripp | 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 | HOUR S RUN |
|---|---|---|---|---|---|---|---|
| 04-Apr-14 | 2 | 04146880035 | 8697581 | 07-Apr-14 | 11:40 | Client | 24.00 |
| 10-Apr-14 | 5 | 04146880037 | 8697583 | 14-Apr-14 | 10:05 | Client | 24.00 |
| 16-Apr-14 | 6 | 04146880039 | 8697585 | 17-Apr-14 | 9:50 | Client | 24.00 |
| 22-Apr-14 | 10 | 04146880041 | 8897154 | 23-Apr-14 | 10:35 | Client | 24.00 |
| 28-Apr-14 | 3 | 04146880043 | 8897156 | 29-Apr-14 | 11:46 | C South | 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 May 2013 to April 2014) for the TSP unit is 25.2µg/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* (from May 2013 to April 2014) for the $PM_{10}$ unit is 12.1µg/$m^3$, 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 April 2014.

### *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 April 2014*

| 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) |
|---|---|---|---|---|---|---|---|---|
| 04146880019 | D1 | 18/03/2014 | 15/04/2014 | 28 | I | 0.6 | 0.3 | 0.3 |
| 04146880020 | D2 | 18/03/2014 | 15/04/2014 | 28 | I | 0.3 | <0.1 | 0.3 |
| 04146880021 | D3 | 18/03/2014 | 15/04/2014 | 28 | I | 0.1 | <0.1 | 0.1 |
| 04146880022 | D4 | 18/03/2014 | 15/04/2014 | 28 | I | 0.6 | <0.1 | 0.6 |
| 04146880023 | D5 | 18/03/2014 | 15/04/2014 | 28 | I | 0.4 | 0.1 | 0.3 |
| 04146880024 | D6 | 18/03/2014 | 15/04/2014 | 28 | I | 0.4 | 0.1 | 0.3 |

#### *4.2.1 Glossary of Terms Used in Notes*

I Insects (eg, Ants, spiders)

IT Insects (eg, Ants, spiders) and Tree litter

#### *4.2.2 Allowable Depositional Dust Limits*

The EPA Long Term (Annual Average) Dust Limit is $4g/m^2$ per month. All Depositional Dust results recorded 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 $1.5g/m^2$ 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-N129 Pine Dale Mine Operation Attended Noise April 2014.

## 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 will be placed in care and maintenance from May 2014 pending a new Project Approval.

## 8 SUMMARY

During the month of April 2014 all environmental monitoring constituents were found to be in compliance with EPL 4911.

Quarterly surface water sampling was not required to be conducted this month, with sampling next scheduled for May 2014.

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

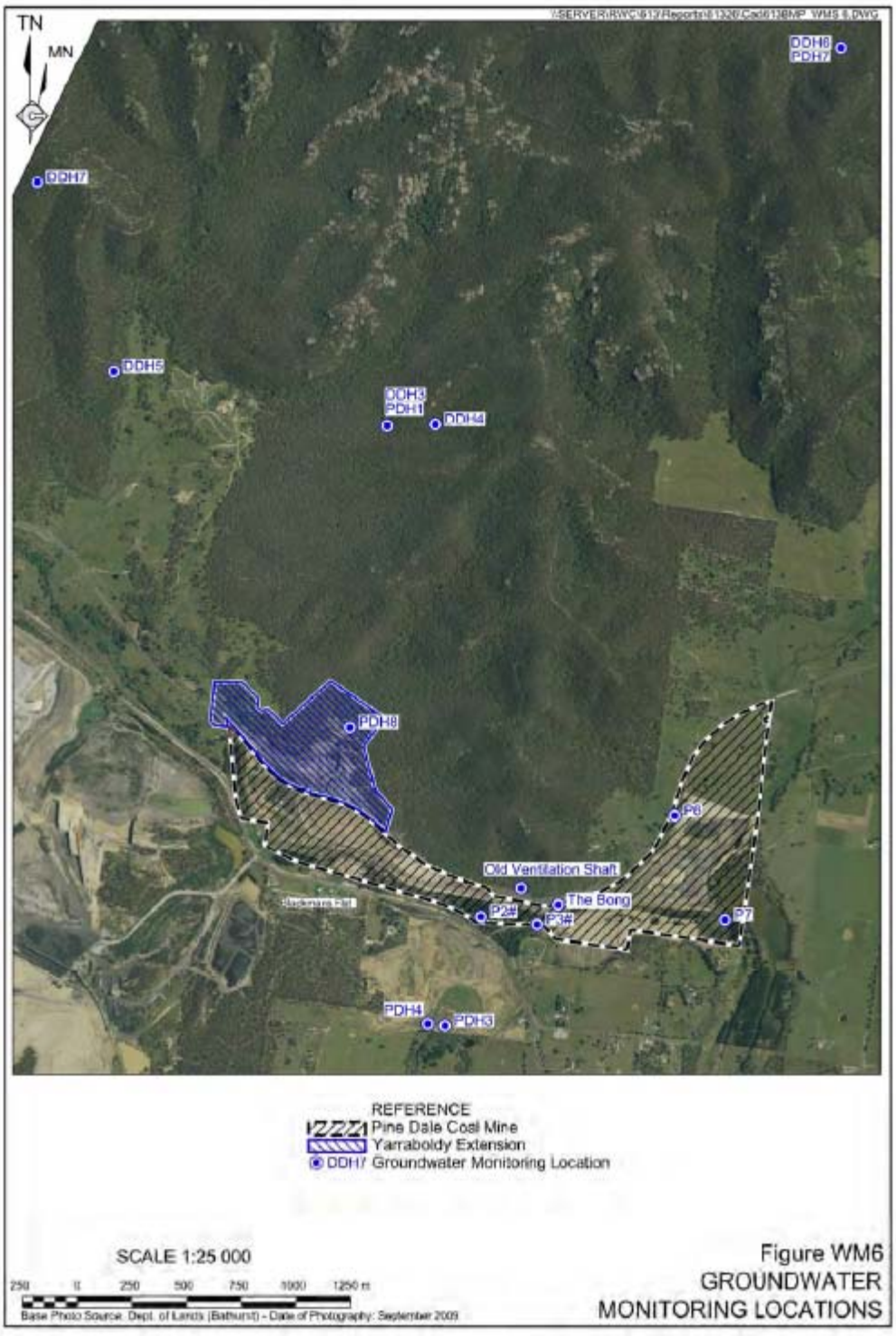
Carmen Rocher
Environmental Engineer
RCA Australia Pty Ltd trading as
RCA Laboratories – Environmental

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


TN
MN
\\SERVER\WC613\Reports\61320\Cad\613BMP_WM 5.DWG
CR U/S
EPA 2
LG D/S
EPA 4
NC Bridge
BL U/S
EPA 13
NC D/S
CR D/S
EPA 14
REFERENCE
Pine Dale Coal Mine
Yarraboldy Extension
EPA 14 Surface Water Monitoring Location
SCALE 1:25 000
Base Photo Source: Dept. of Lands (Bathurst) – Date of Photography: September 2009
Figure WM5
SURFACE WATER
MONITORING LOCATIONS


\\SERVER\RWC\613\Reports\613Cad\613BMP_WM5.8.DWG
TN
MN
DDH6
PDH7
DDH7
DDH5
DDH3
PDH1
DDH4
PDH8
P6
Old Ventilation Shaft
The Bong
P2#
P3#
P7
PDH4
PDH3
REFERENCE
Pine Dale Coal Mine
Yarraboldy Extension
DDH7 Groundwater Monitoring Location
SCALE 1:25 000
250 0 250 500 750 1000 1250 m
Base Photo Source: Dept. of Lands (Bathurst) - Date of Photography: September 2009
Figure WM6
GROUNDWATER
MONITORING LOCATIONS

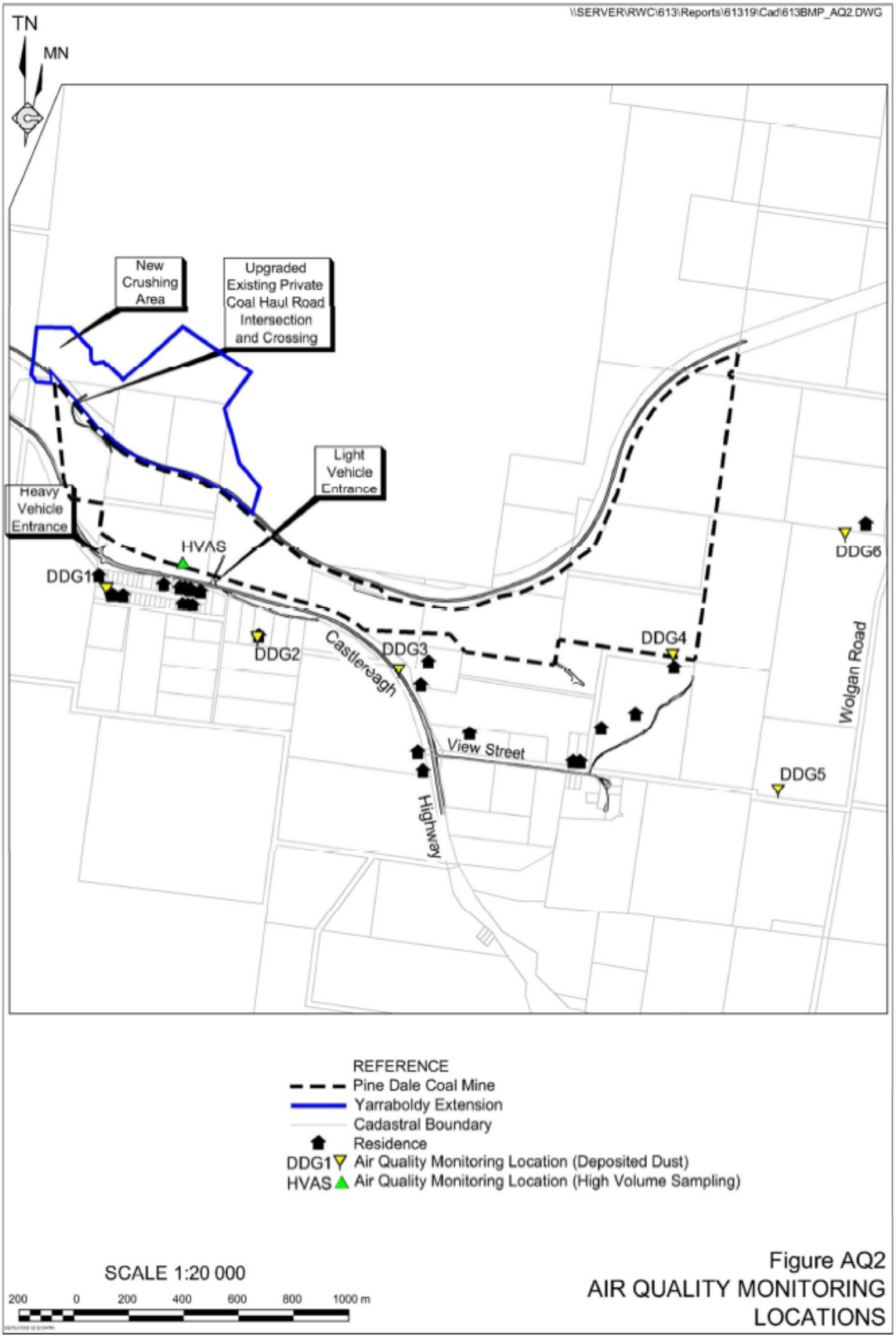
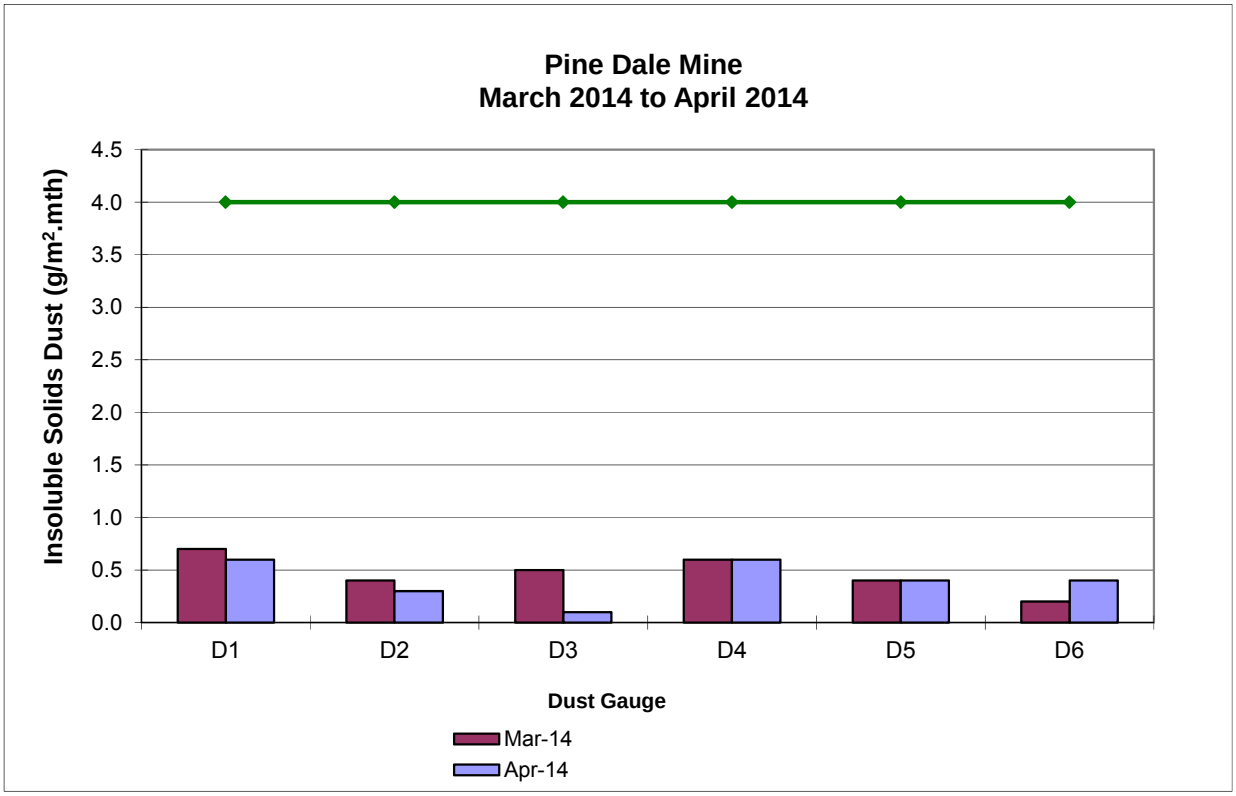
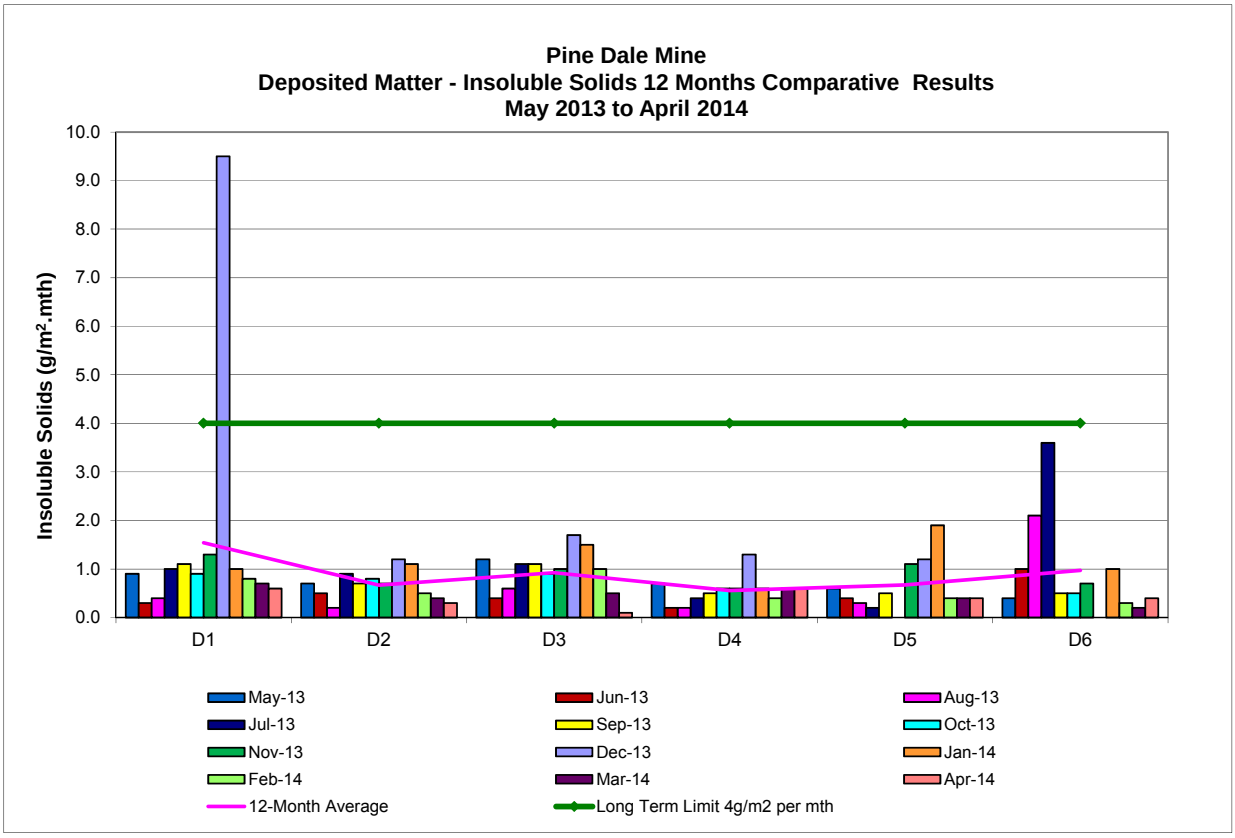


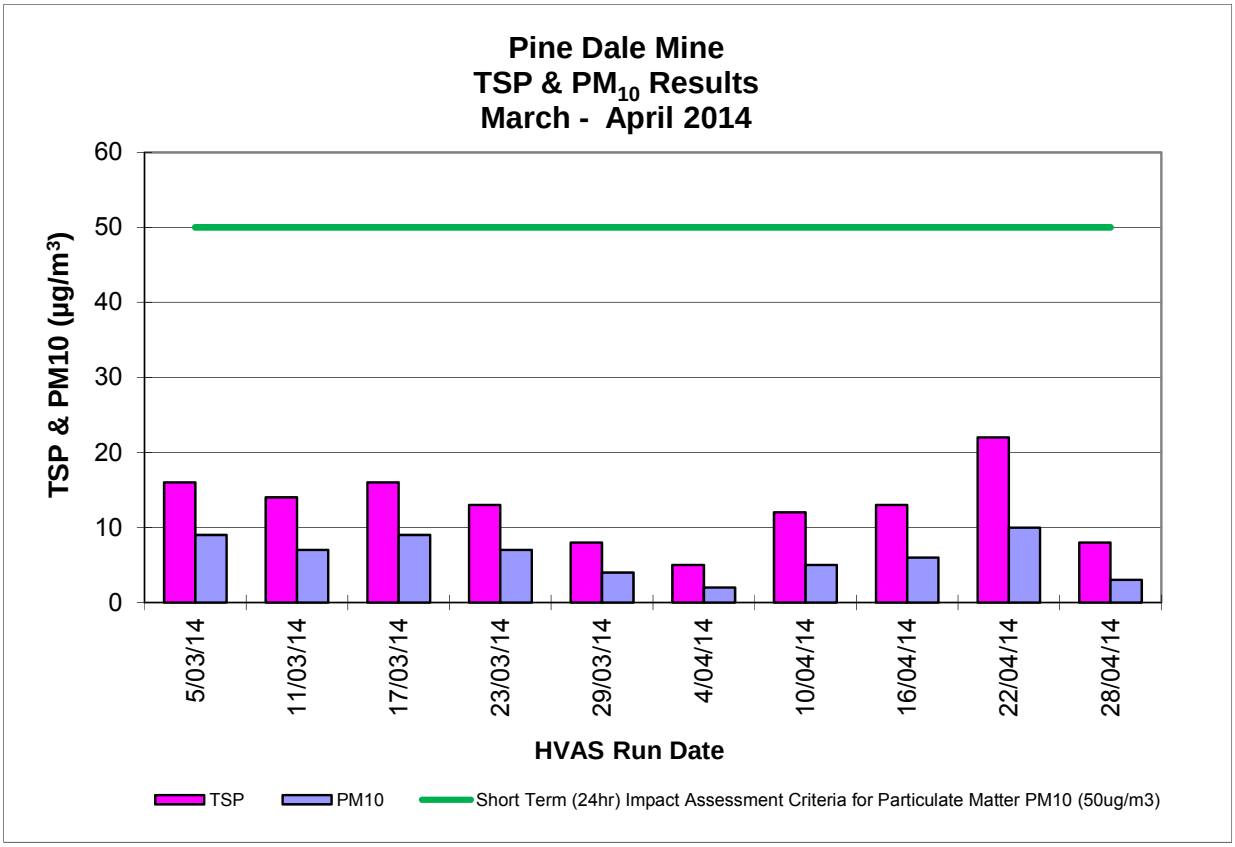

Figure AQ2
AIR QUALITY MONITORING LOCATIONS

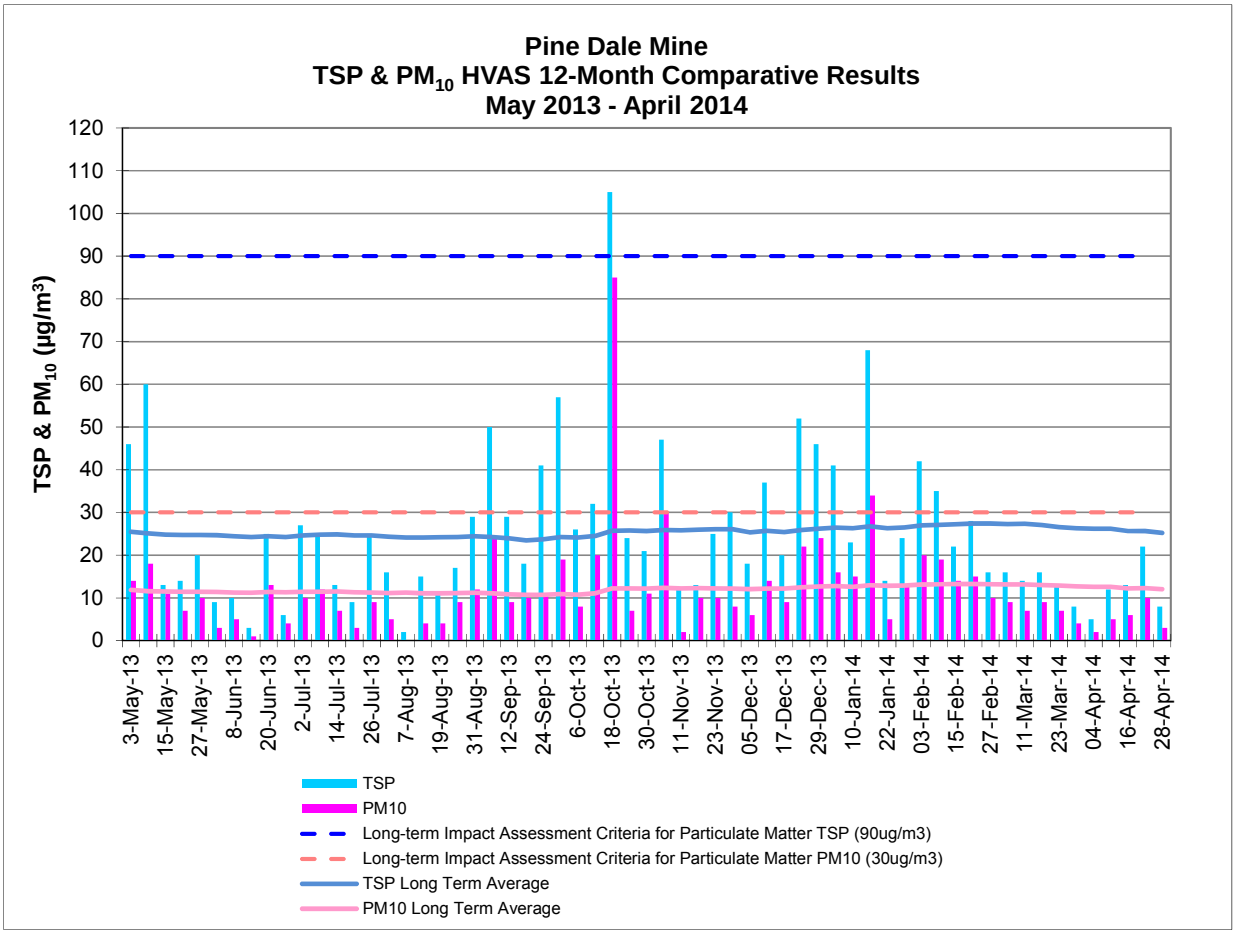
# Appendix 2

## Depositional Dust and HVAS Graphs


Pine Dale Mine
March 2014 to April 2014
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
Dust Gauge
Mar-14
Apr-14

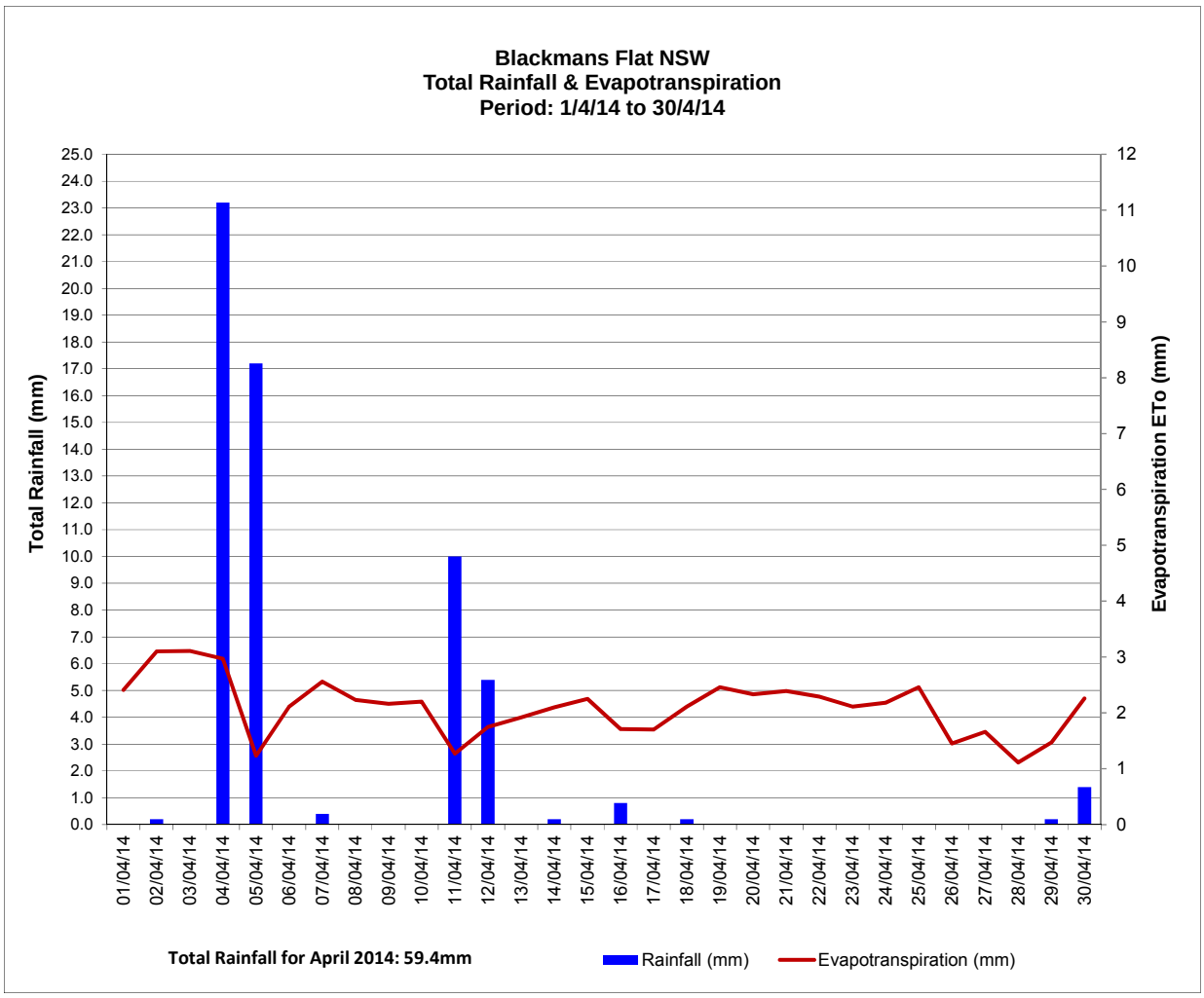

Pine Dale Mine
Deposited Matter - Insoluble Solids 12 Months Comparative Results
May 2013 to April 2014
Insoluble Solids (g/m².mth)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
D1
D2
D3
D4
D5
D6
May-13
Jun-13
Aug-13
Jul-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
12-Month Average
Long Term Limit 4g/m2 per mth

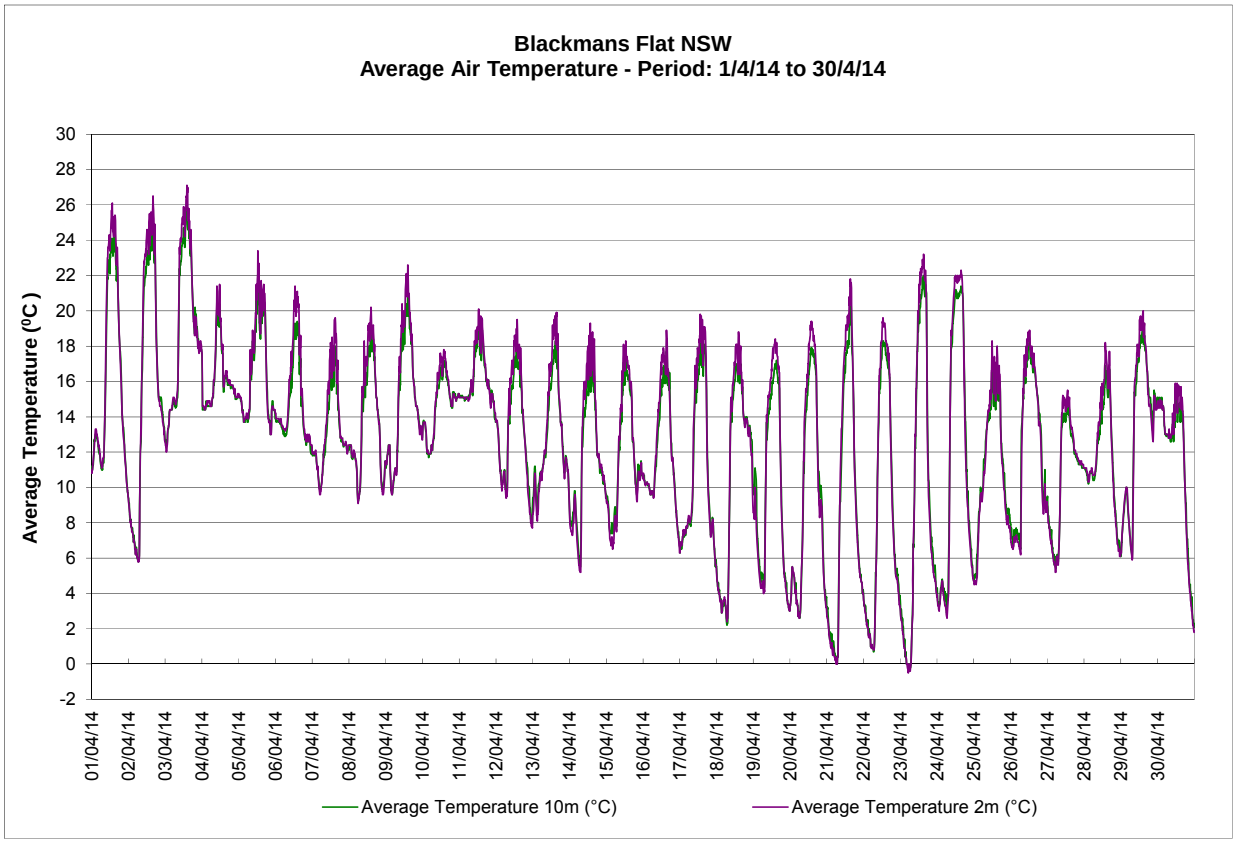

Pine Dale Mine
TSP & PM10 Results
March - April 2014
TSP & PM10 (µg/m³)
60
50
40
30
20
10
0
5/03/14
11/03/14
17/03/14
23/03/14
29/03/14
4/04/14
10/04/14
16/04/14
22/04/14
28/04/14
HVAS Run Date
TSP
PM10
Short Term (24hr) Impact Assessment Criteria for Particulate Matter PM10 (50ug/m3)

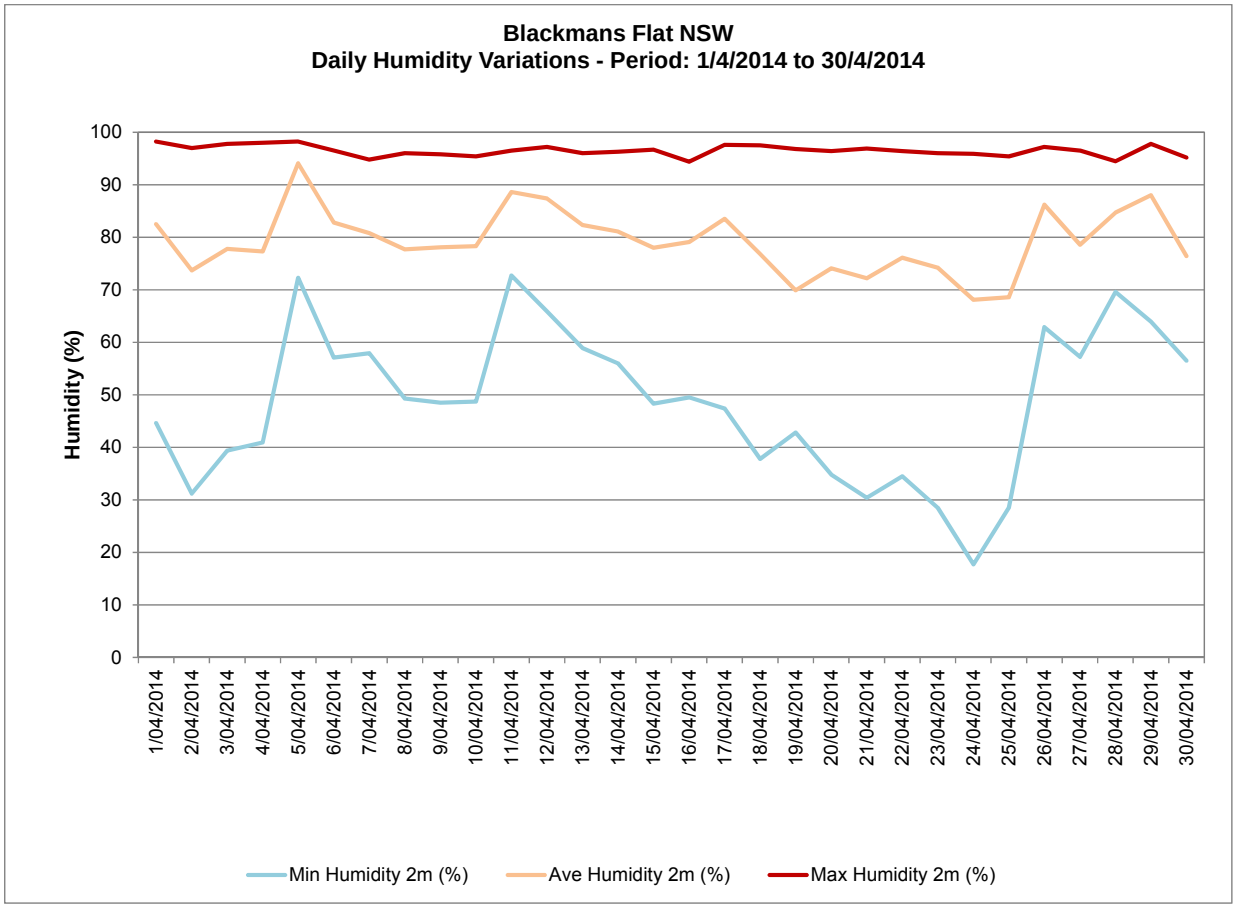

Pine Dale Mine
TSP & PM10 HVAS 12-Month Comparative Results
May 2013 - April 2014
TSP & PM10 (µg/m³)
120
110
100
90
80
70
60
50
40
30
20
10
0
3-May-13
15-May-13
27-May-13
8-Jun-13
20-Jun-13
2-Jul-13
14-Jul-13
26-Jul-13
7-Aug-13
19-Aug-13
31-Aug-13
12-Sep-13
24-Sep-13
6-Oct-13
18-Oct-13
30-Oct-13
11-Nov-13
23-Nov-13
05-Dec-13
17-Dec-13
29-Dec-13
10-Jan-14
22-Jan-14
03-Feb-14
15-Feb-14
27-Feb-14
11-Mar-14
23-Mar-14
04-Apr-14
16-Apr-14
28-Apr-14
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

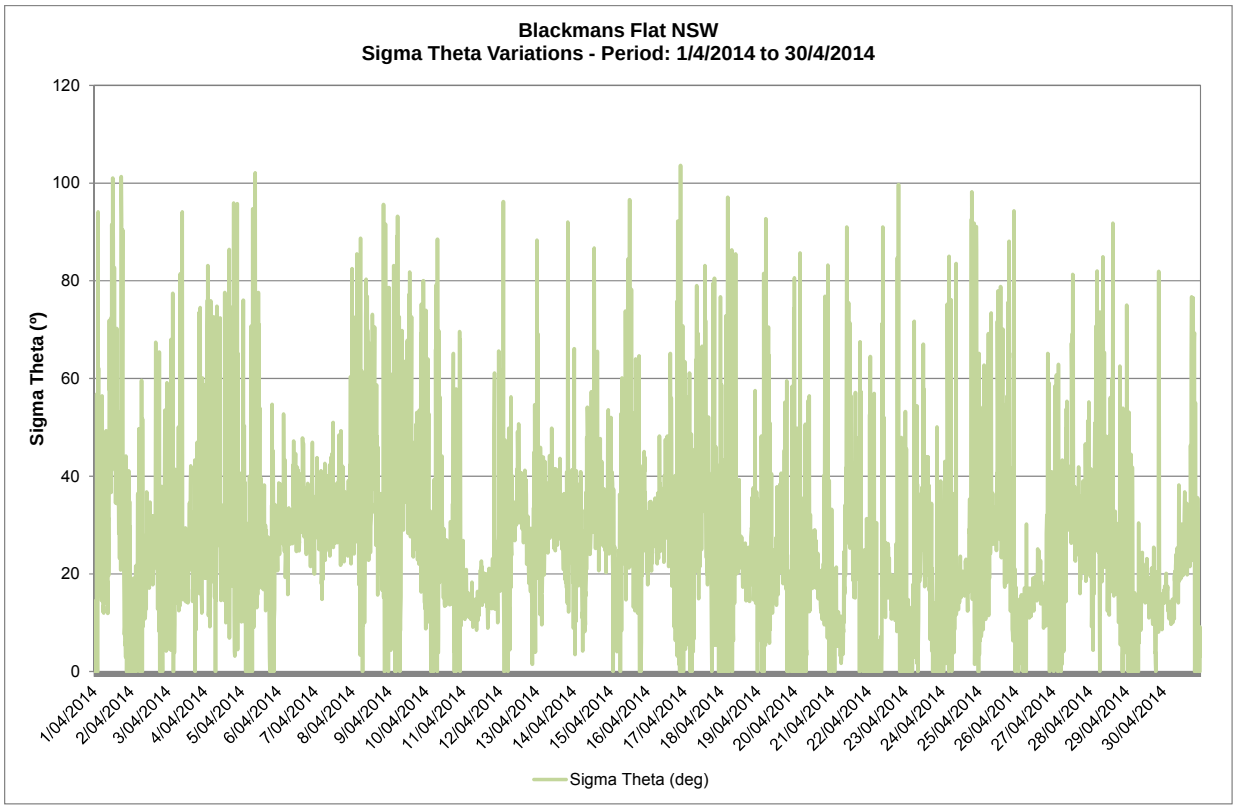
# Appendix 3

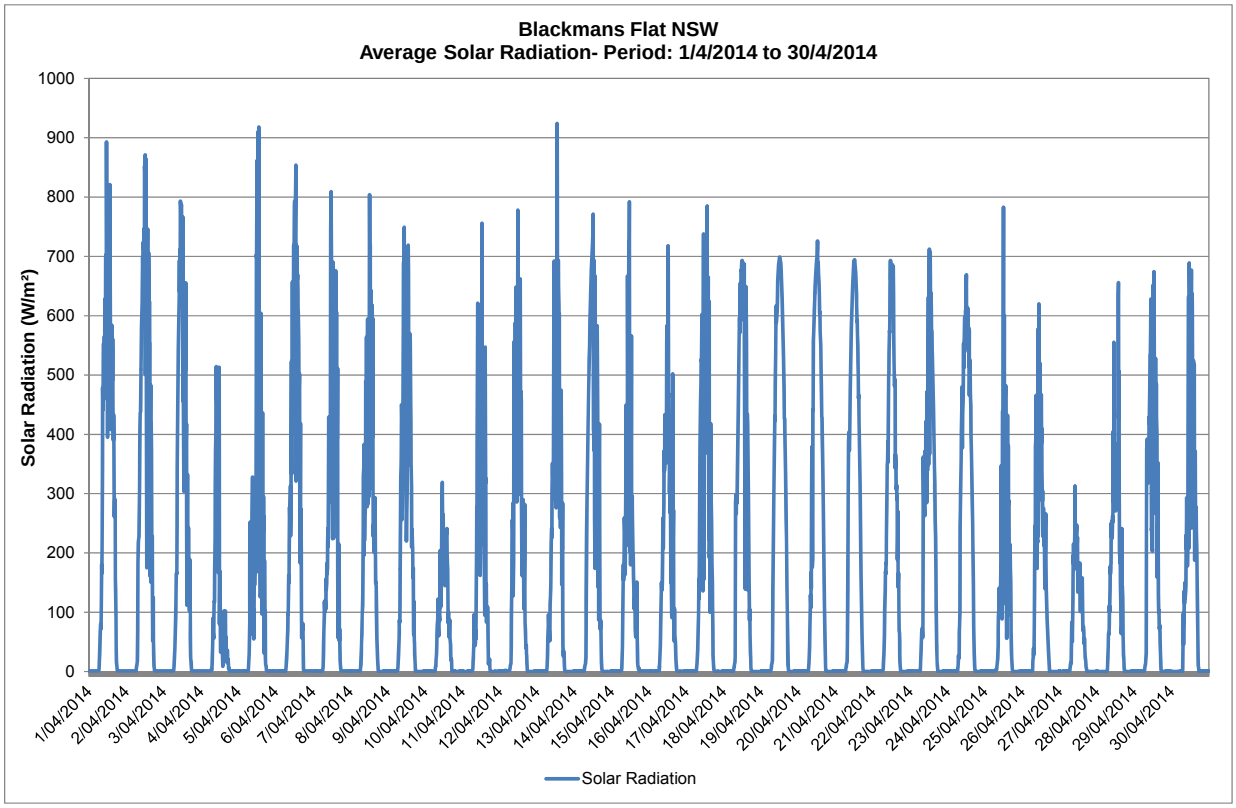
Meteorological Data


Blackmans Flat NSW
Total Rainfall & Evapotranspiration
Period: 1/4/14 to 30/4/14
Total Rainfall (mm)
Evapotranspiration ETo (mm)
Total Rainfall for April 2014: 59.4mm
Rainfall (mm)
Evapotranspiration (mm)


Blackmans Flat NSW
Average Air Temperature - Period: 1/4/14 to 30/4/14
Average Temperature (°C)
Average Temperature 10m (°C)
Average Temperature 2m (°C)


Blackmans Flat NSW
Daily Humidity Variations - Period: 1/4/2014 to 30/4/2014
Humidity (%)
100
90
80
70
60
50
40
30
20
10
0
1/04/2014
2/04/2014
3/04/2014
4/04/2014
5/04/2014
6/04/2014
7/04/2014
8/04/2014
9/04/2014
10/04/2014
11/04/2014
12/04/2014
13/04/2014
14/04/2014
15/04/2014
16/04/2014
17/04/2014
18/04/2014
19/04/2014
20/04/2014
21/04/2014
22/04/2014
23/04/2014
24/04/2014
25/04/2014
26/04/2014
27/04/2014
28/04/2014
29/04/2014
30/04/2014
Min Humidity 2m (%)
Ave Humidity 2m (%)
Max Humidity 2m (%)


Blackmans Flat NSW
Sigma Theta Variations - Period: 1/4/2014 to 30/4/2014
Sigma Theta (°)
120
100
80
60
40
20
0
1/04/2014
2/04/2014
3/04/2014
4/04/2014
5/04/2014
6/04/2014
7/04/2014
8/04/2014
9/04/2014
10/04/2014
11/04/2014
12/04/2014
13/04/2014
14/04/2014
15/04/2014
16/04/2014
17/04/2014
18/04/2014
19/04/2014
20/04/2014
21/04/2014
22/04/2014
23/04/2014
24/04/2014
25/04/2014
26/04/2014
27/04/2014
28/04/2014
29/04/2014
30/04/2014
Sigma Theta (deg)


Blackmans Flat NSW
Average Solar Radiation- Period: 1/4/2014 to 30/4/2014
Solar Radiation (W/m²)
1000
900
800
700
600
500
400
300
200
100
0
1/04/2014
2/04/2014
3/04/2014
4/04/2014
5/04/2014
6/04/2014
7/04/2014
8/04/2014
9/04/2014
10/04/2014
11/04/2014
12/04/2014
13/04/2014
14/04/2014
15/04/2014
16/04/2014
17/04/2014
18/04/2014
19/04/2014
20/04/2014
21/04/2014
22/04/2014
23/04/2014
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25/04/2014
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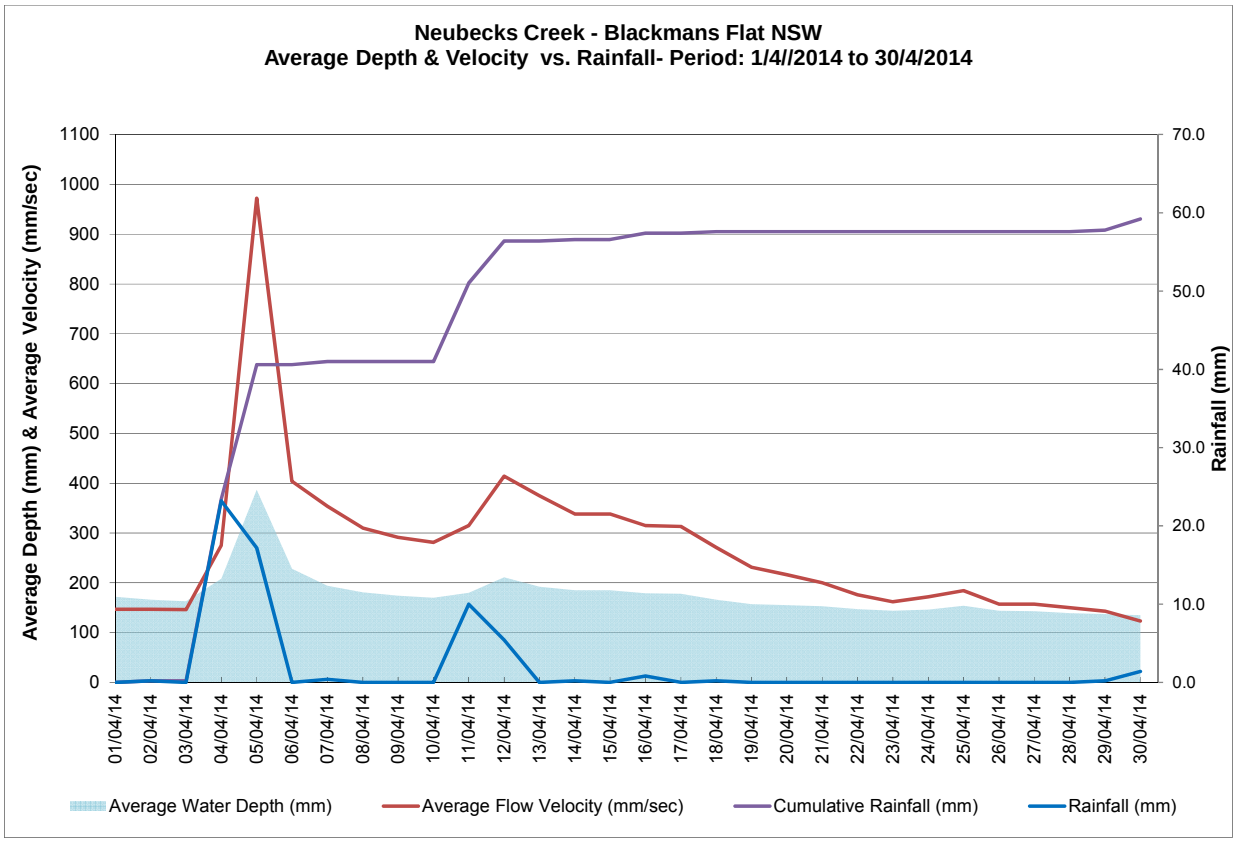
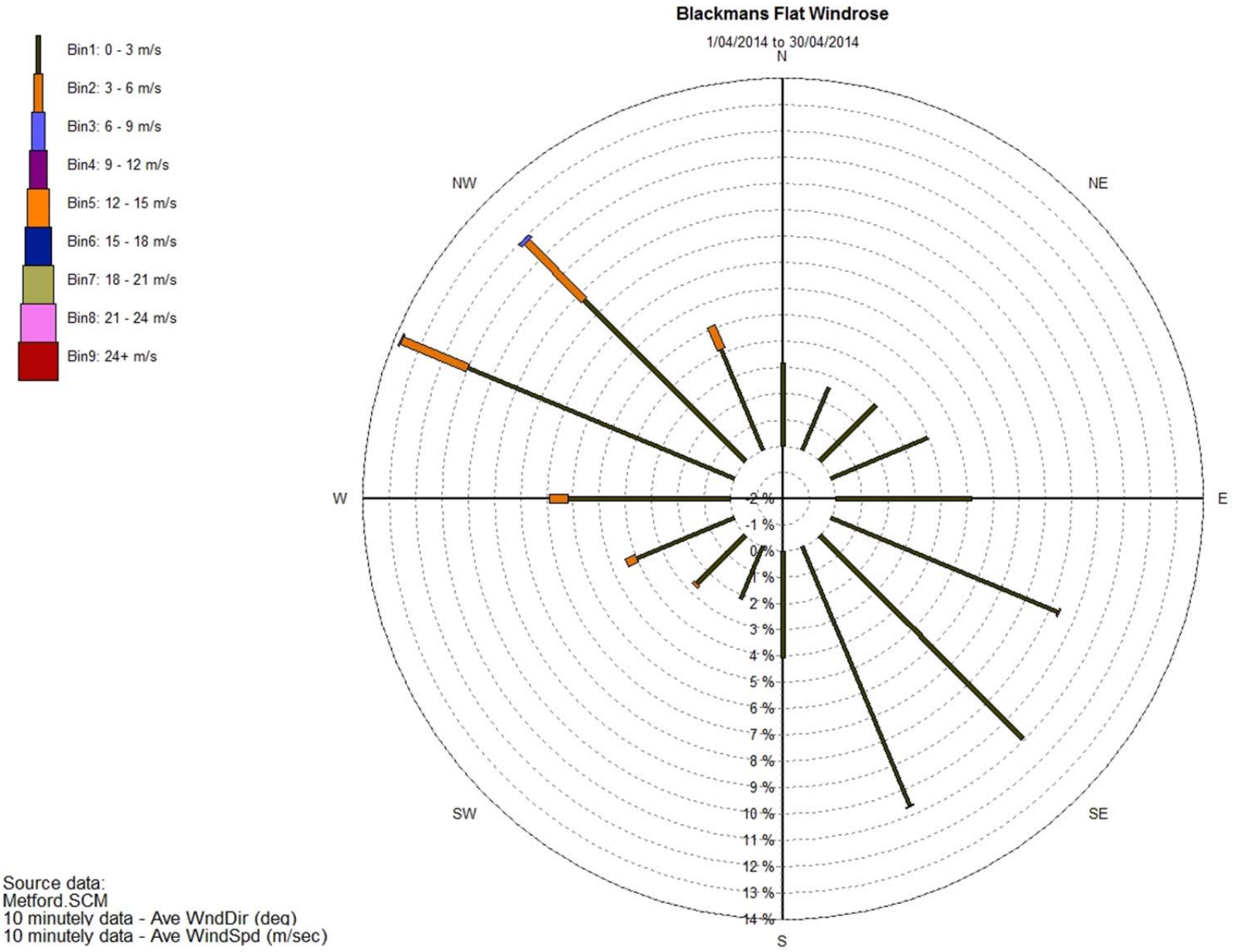
30/04/2014
Solar Radiation


Neubecks Creek - Blackmans Flat NSW
Average Depth & Velocity vs. Rainfall- Period: 1/4//2014 to 30/4/2014
Average Depth (mm) & Average Velocity (mm/sec)
Rainfall (mm)
1100
1000
900
800
700
600
500
400
300
200
100
0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
01/04/14
02/04/14
03/04/14
04/04/14
05/04/14
06/04/14
07/04/14
08/04/14
09/04/14
10/04/14
11/04/14
12/04/14
13/04/14
14/04/14
15/04/14
16/04/14
17/04/14
18/04/14
19/04/14
20/04/14
21/04/14
22/04/14
23/04/14
24/04/14
25/04/14
26/04/14
27/04/14
28/04/14
29/04/14
30/04/14
Average Water Depth (mm)
Average Flow Velocity (mm/sec)
Cumulative Rainfall (mm)
Rainfall (mm)




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