

Rasp Mine  
Monthly Environmental Monitoring Report  
June 2021



## INTRODUCTION

Broken Hill Operations Pty Ltd (BHOP) [a wholly owned subsidiary of CBH Resources Limited (CBH)] owns and operates the Rasp Mine (the Mine), which is located centrally within the City of Broken Hill on Consolidated Mine Lease 7 (CML7).

Mining has been undertaken within CML7 since 1885. The existing operations at the Rasp Mine include underground mining operations, a processing plant producing zinc and lead concentrates and a rail siding for concentrate dispatch. These operations are undertaken in accordance with Project Approval 07\_0018 granted 31 January 2011, under Part3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

As the holder of an Environmental Protection Licence, 12559, BHOP is required, under Section 66(6) of the NSW *Protection of the Environment Operations Act 1997*, to publish pollution monitoring data. In addition BHOP is required to publish data in accordance with its Project Approval 07\_0018 Schedule 4 Condition 9. These documents can be found on the Rasp Mine web site.

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## 1 Air Quality

The following criteria as listed in the Project Approval (DA 07\_0018 MOD7 July 2019) apply to air quality monitoring:

### Long Term Criteria for Particulate Matter

Pollutant	Averaging Period	Criterion
Total solid particles (TSP)	Annual	90 µg/m <sup>3</sup>
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	25 µg/m <sup>3</sup>

### Short Term Criterion for Particulate Matter

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	50 µg/m <sup>3</sup>

### Long Term Criteria for Deposited Dust

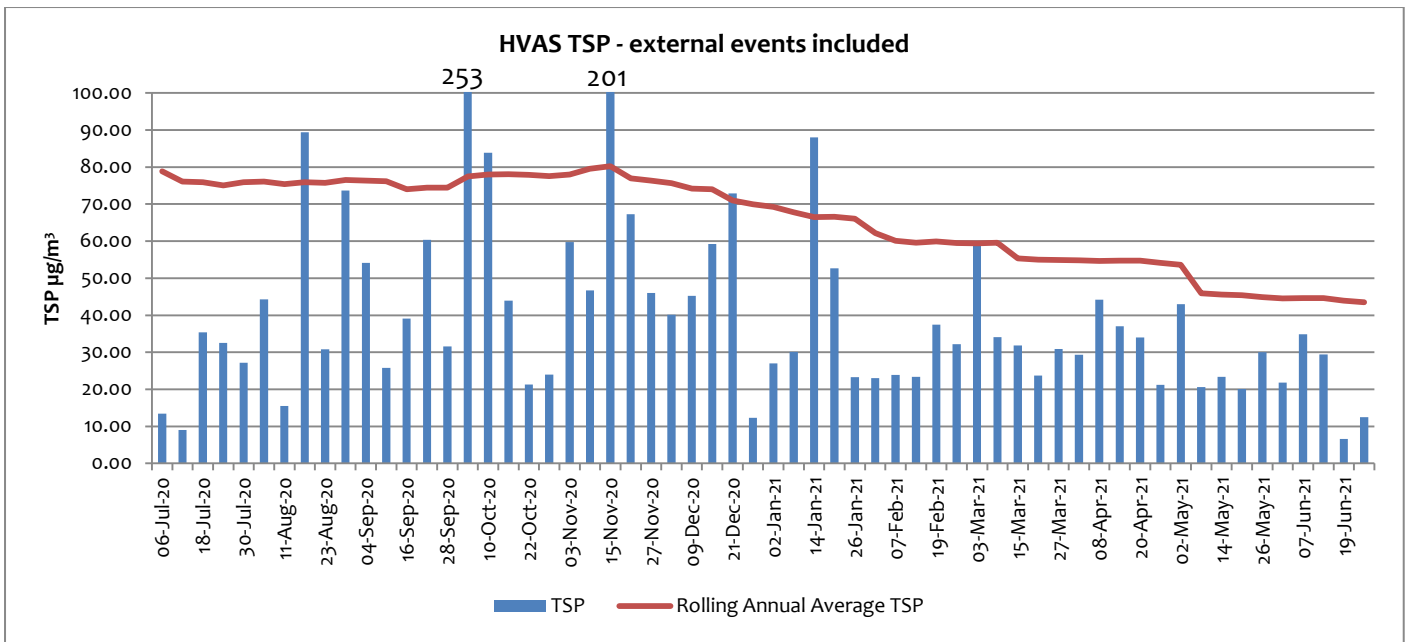
Pollutant	Averaging Period	Maximum Project Contribution	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 g/m <sup>2</sup> /month	4 g/m <sup>2</sup> /month

### 1.1 High Volume Air Samplers

There are four high volume air samplers used to measure ambient air quality at the Rasp Mine – HVAS (EPL10) and HVAS1 (EPL11) are located at the Silver Tank, central and to the south of the mine lease, and HVAS2 (EPL12) and HVAS3 (EPL57) are located adjacent to and north of Blackwood Pit. A map indicating these locations can be found on the Rasp Mine web site. HVAS and HVAS3 sample for total suspended particulates (TSP) and lead dust, and HVAS1 and HVAS2 sample for particulate matter less than 10 microns (PM<sub>10</sub>) and lead dust.

#### ***HVAS (EPL10) - Silver Tank (On Site) Results for June 2021***

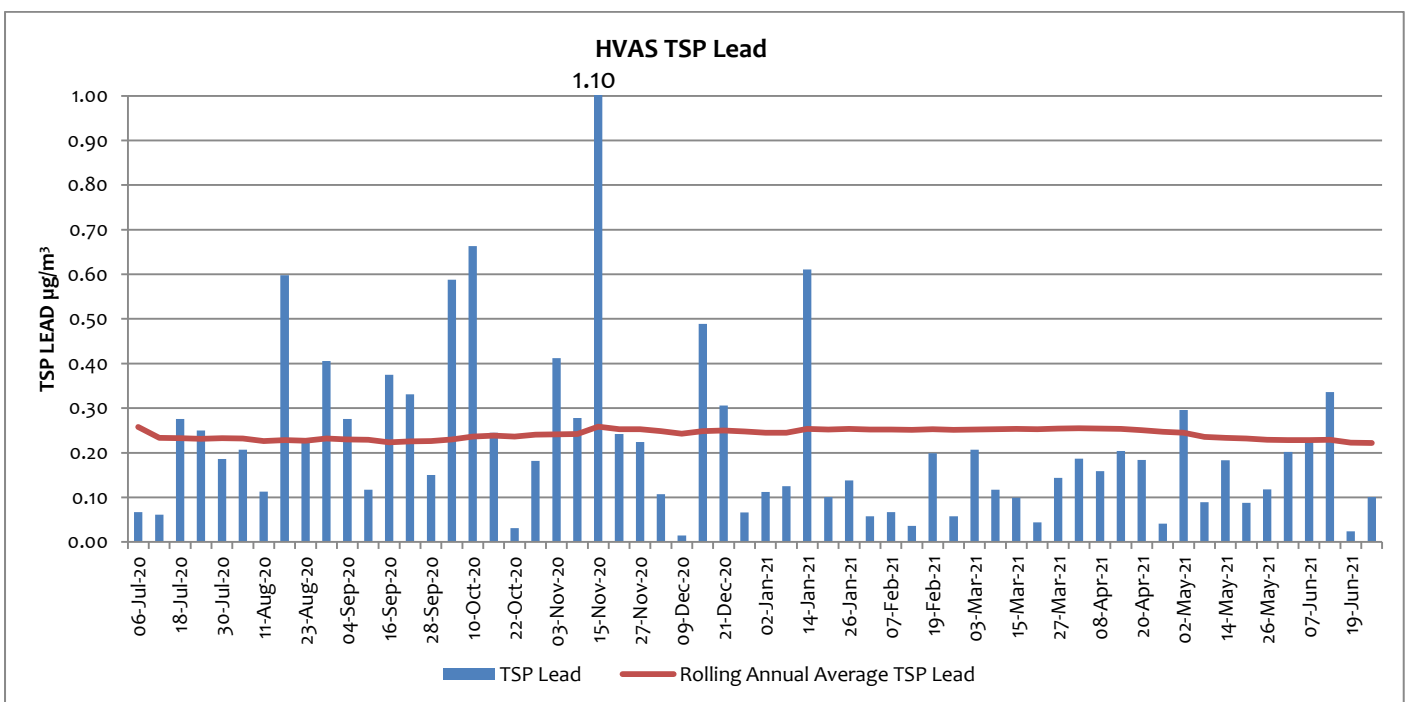
DATE	TSP (µg/m <sup>3</sup> )	Lead (µg/m <sup>3</sup> )
01-June-21	43.00	0.30
07-June-21	20.60	0.09
13-June-21	23.40	0.18
19-June-21	20.10	0.09
25-June-21	30.00	0.12



HVAS (EPL10) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location.

TSP dust results at HVAS were low for the month of June compared to previous months. The annual rolling average for TSP at this location is 43.54 µg/m<sup>3</sup> at the end of June 2021, significantly lower than the average at the beginning of July 2020 which was 78.87 µg/m<sup>3</sup>. Minor rainfall and fewer extreme dust events than the previous year contributed to the low dust levels measured in June.

The annual rolling average for TSP is determined using data with extreme dust events included.





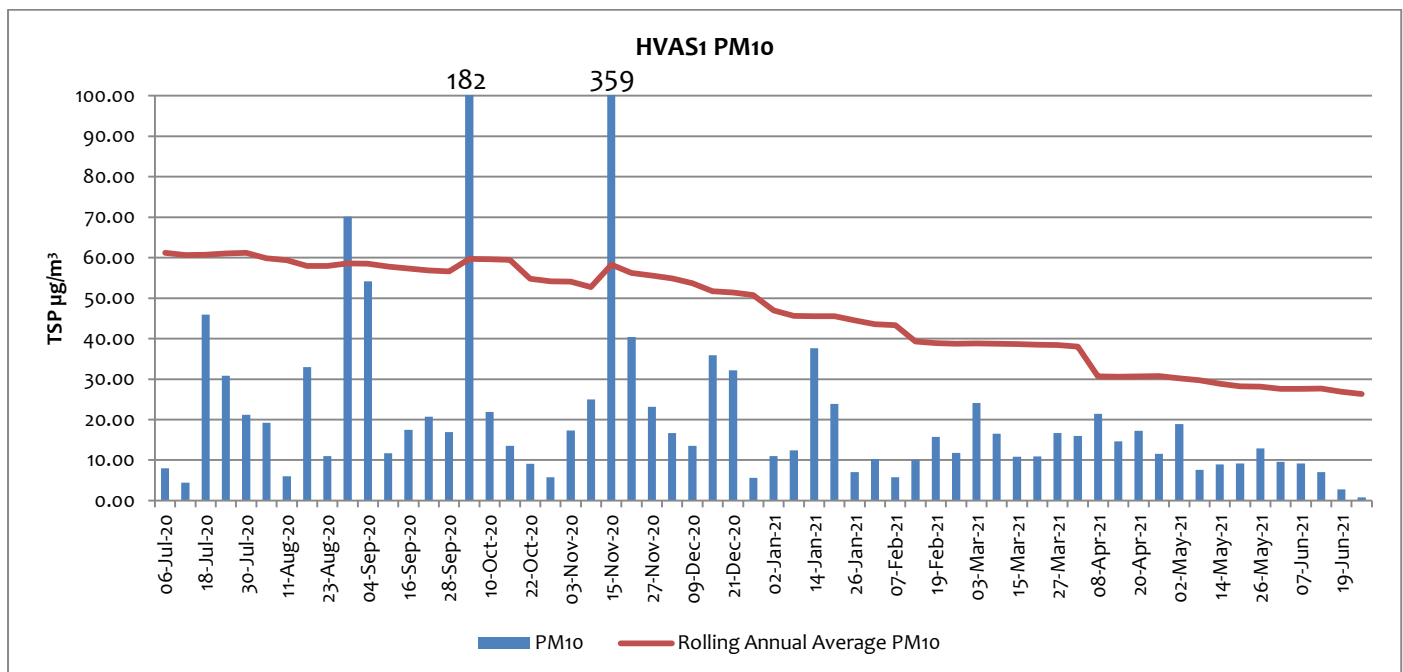
TSP Lead dust results at HVAS were low for the month of June compared to previous months with a slightly elevated result of 0.34  $\mu\text{g}/\text{m}^3$  on 13 June. The predominant wind direction on 13 June was from the NNE which allows for the possibility that lead dust may have come from site activities. The rolling annual average for TSP Lead in June 2021 was 0.22  $\mu\text{g}/\text{m}^3$ , slightly lower than the average of 0.26  $\mu\text{g}/\text{m}^3$  in July 2020.

Dust is controlled on site using the application of dust suppressant on free (unused) areas and side tracks, and from the frequent watering of haul roads.

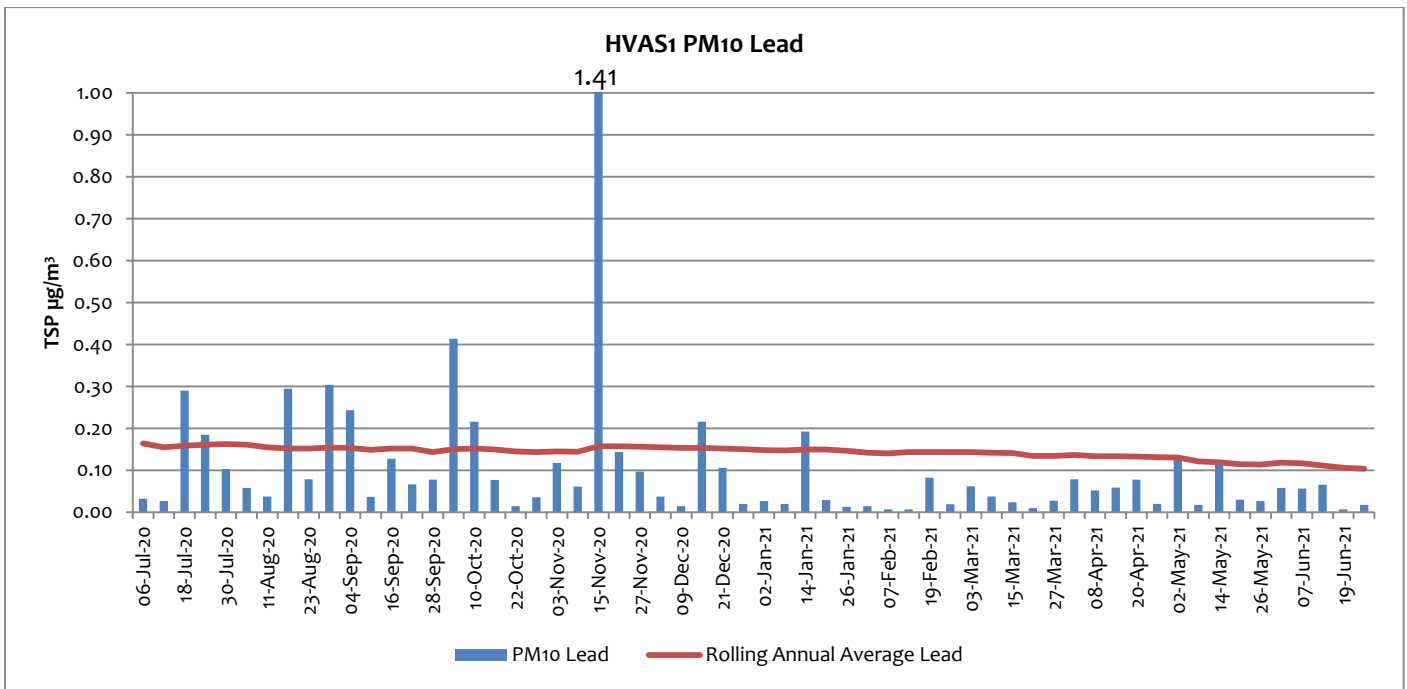
**HVAS1 (EPL11) - Silver Tank (On Site) Results for June 2021**

DATE	PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>10</sub> Lead ( $\mu\text{g}/\text{m}^3$ )
01-June-21	18.90	0.13
07-June-21	7.60	0.02
13-June-21	8.90	0.12
19-June-21	9.20	0.03
25-June-21	12.90	0.03

HVAS1 (EPL11) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location.



PM<sub>10</sub> dust results at HVAS1 were low in the month of June. The annual rolling average for PM<sub>10</sub> dust at this location is 26.3  $\mu\text{g}/\text{m}^3$  at the end of June 2021, significantly lower than the average at the beginning of July 2020 which was 61.2  $\mu\text{g}/\text{m}^3$ . External dust events are recorded in measurements.



PM<sub>10</sub> lead levels were low in June 2021. The rolling annual average for PM<sub>10</sub> Lead in June 2021 was 0.11 µg/m<sup>3</sup>, down from 0.16 µg/m<sup>3</sup> in July 2020.

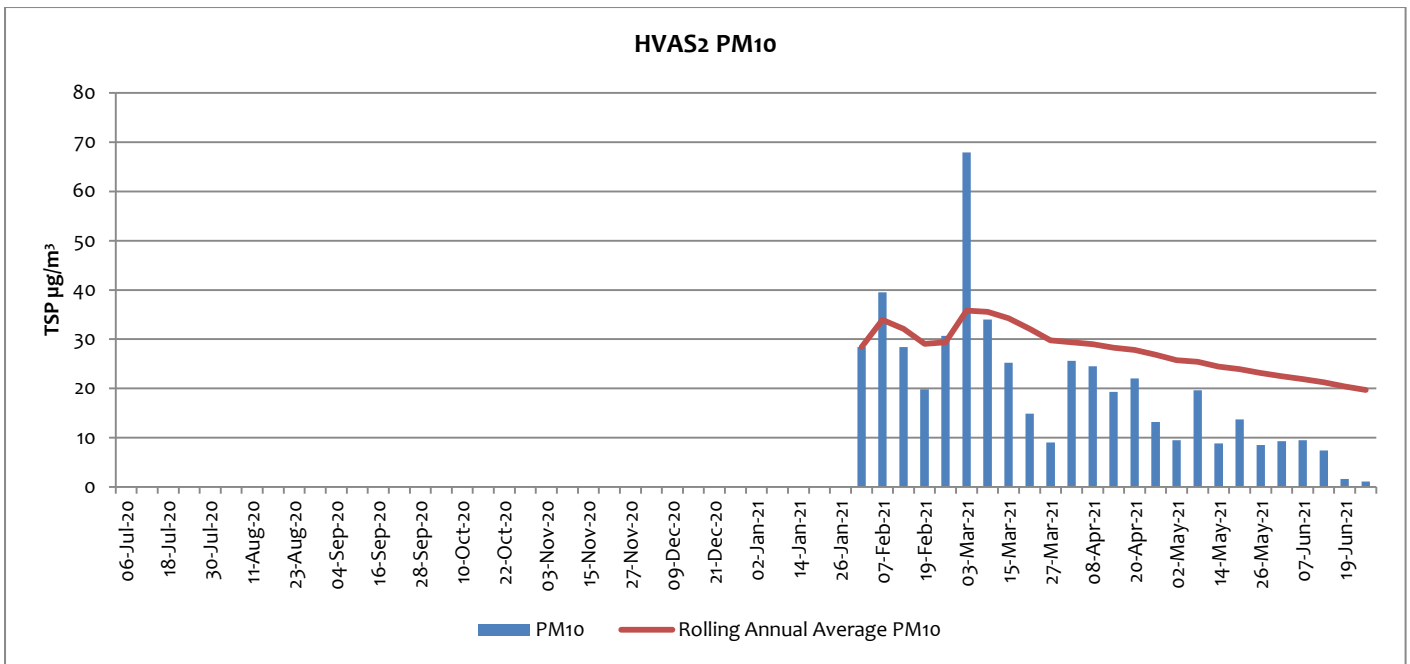
**HVAS 2 (EPL12) - Blackwood Pit (On Site) Results for June 2021**

DATE	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> Lead (µg/m <sup>3</sup> )
01-June-21	9.50	0.02
07-June-21	19.60	0.09
13-June-21	8.80	0.12
19-June-21	13.70	0.13
25-June-21	8.50	0.04

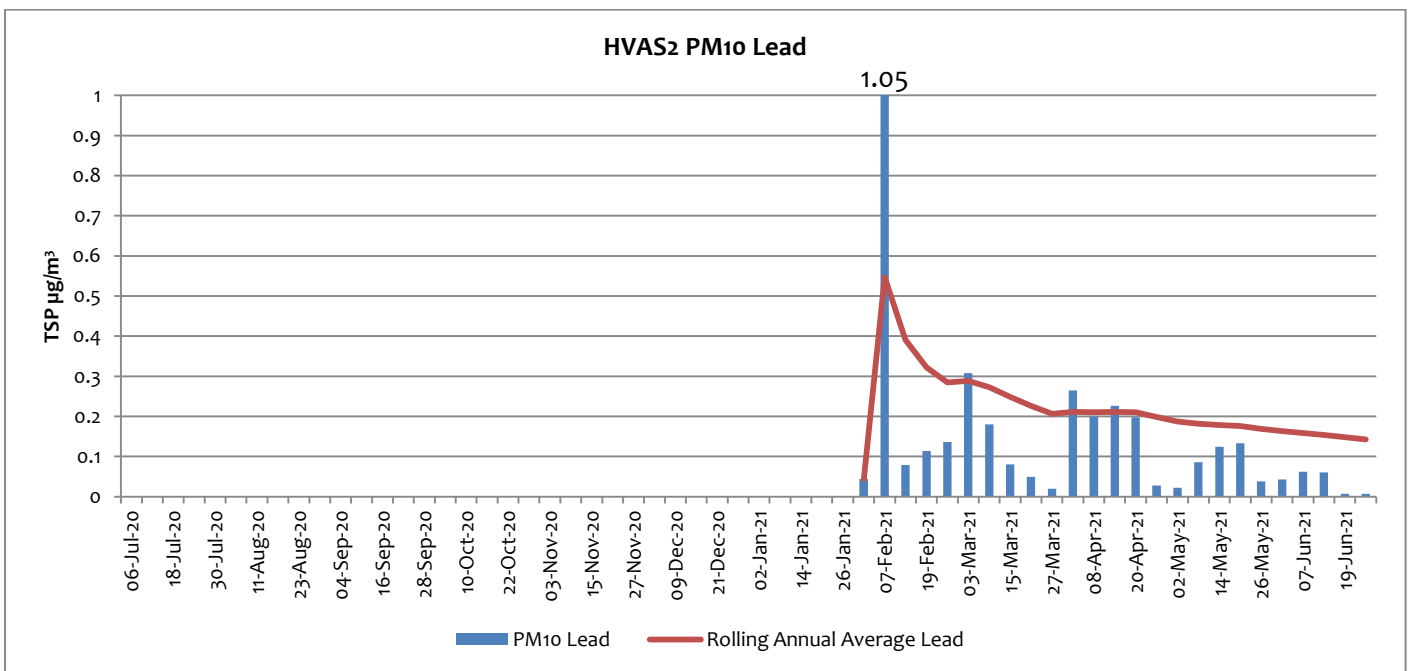
HVAS2 (EPL12) is located on the northern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. HVAS2 was decommissioned in June 2019 while Embankment 2 TSF2 construction works were undertaken and reinstalled in February 2021.

PM<sub>10</sub> levels were lower in June than in May. The annual rolling average for PM<sub>10</sub> dust at this location is 19.66 µg/m<sup>3</sup> at the end of June 2021, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to June 2021 only.

The annual rolling average for PM<sub>10</sub> dust is determined using data with extreme dust events included.



PM<sub>10</sub> lead levels were lower in June than in May. The predominant wind direction in June was from the NW and SW. The rolling annual average for PM<sub>10</sub> Lead in June 2021 was 0.14 µg/m<sup>3</sup>, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to June only.





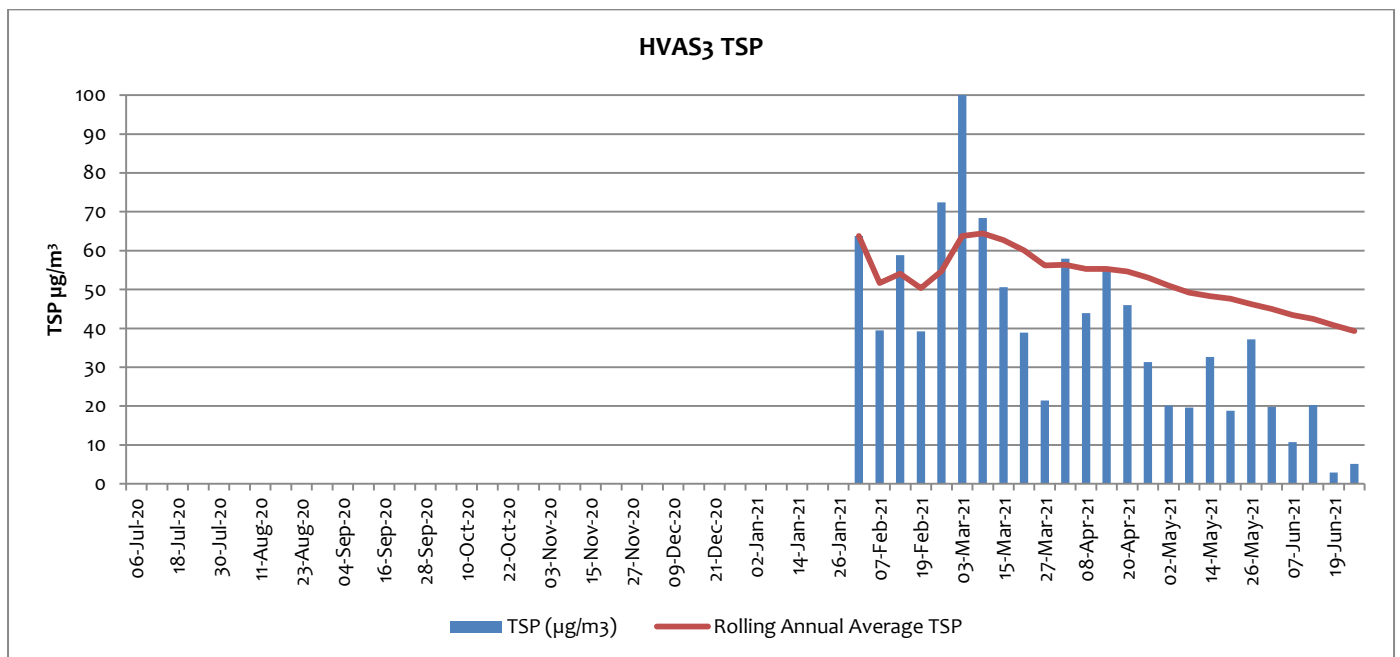
**HVAS 3 (EPL57) - Blackwood Pit (On Site) Results for June 2021**

DATE	TSP ( $\mu\text{g}/\text{m}^3$ )	Lead ( $\mu\text{g}/\text{m}^3$ )
01-June-21	20.1	0.148
07-June-21	19.6	0.086
13-June-21	32.6	0.571
19-June-21	18.8	0.088
25-June-21	37.2	0.476

HVAS3 (EPL57) is located on the northern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. HVAS3 (EPL57) was included in EPL 12559 on 14 March 2019 to provide for monitoring of TSP Dust on the northern boundary of the site at Blackwoods Pit TSF2. HVAS3 was decommissioned in June 2019 while Embankment 2 TSF2 construction works were undertaken and reinstalled in February 2021.

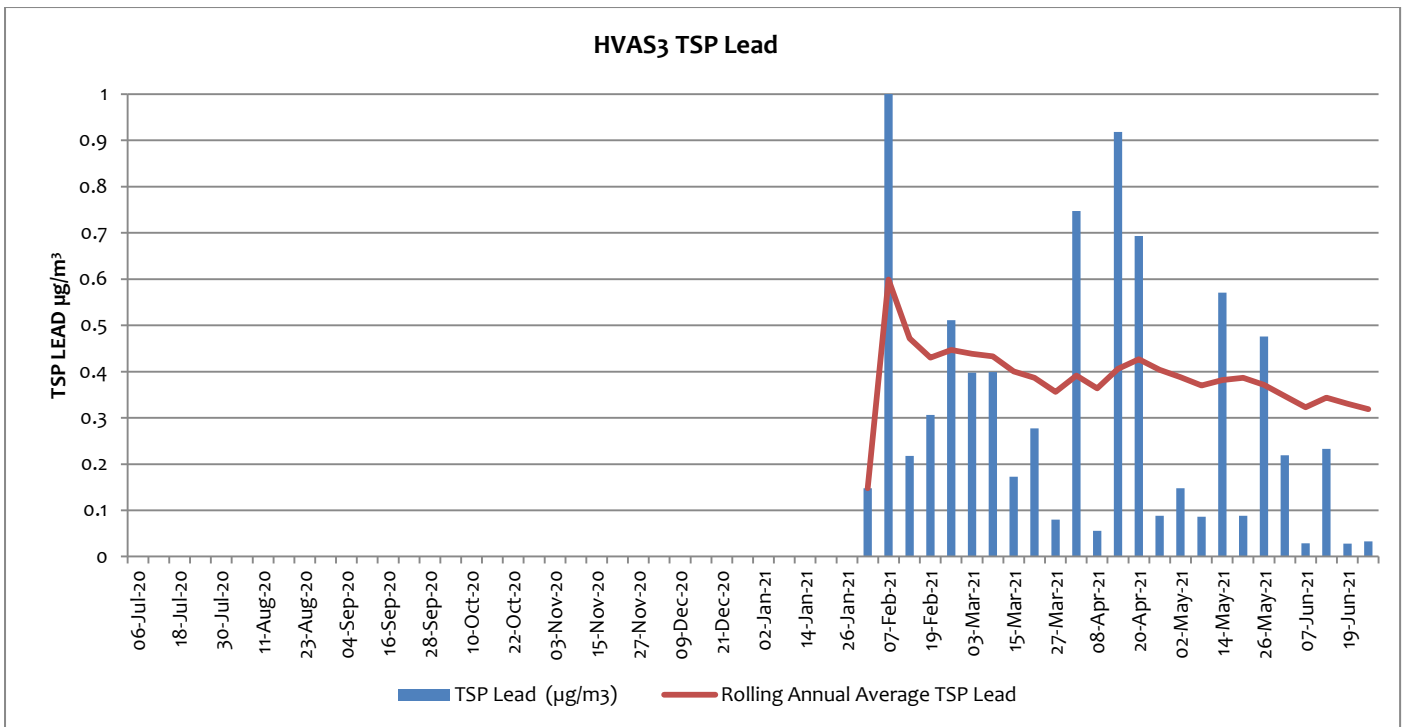
TSP levels were lower in June than in May. The predominant wind direction in June was from the NW and SW. The annual rolling average for TSP dust at this location is  $39.33 \mu\text{g}/\text{m}^3$  at the end of June 2021, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to June 2021 only.

The annual rolling average for TSP is determined using data with extreme dust events included.



The rolling annual average for TSP Lead in June 2021 was  $0.32 \mu\text{g}/\text{m}^3$ , however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to June only.





## 1.2 Tapered Element Oscillating Microbalance Sampling (TEOM)

There are two Tapered Element Oscillating Microbalance (TEOM) sampling units used to measure ambient air quality at the Rasp Mine – TEOM1 (EPL13) is located off-site within the perimeter fence of Essential Water south of the mine lease, and TEOM2 (EPL14) is located on-site adjacent to Blackwood Pit to the north of the mine lease. A map indicating these locations can be found on the Rasp Mine web site. TEOM1 and TEOM2 are designed to operate continuously and sample for particulate matter less than 10 microns ( $\text{PM}_{10}$ ) in size.

TEOM2 was temporarily decommissioned in 19 June 2019 due to Embankment 2 TSF2 construction works. The decommissioning is in accordance with dust management strategies agreed with the EPA which includes the operation of a real-time  $\text{PM}_{10}$  monitor north of the construction works. Both Project Approval and Environment Protection Licence criteria exclude dust storms and other extraordinary events.

Project Approval 07\_0018 criteria apply at TEOM1 and TEOM2, with two criteria listed for  $\text{PM}_{10}$ , a 24 hour average criteria of  $50 \mu\text{g}/\text{m}^3$  and an annual average criteria of  $25 \mu\text{g}/\text{m}^3$ .

TEOM data is validated by third party consultants using Australian Standards and internal procedures, and is used to populate the table of TEOM monthly data provided below.



**TEOM1 (EPL13) (Off Site) and TEOM2 (EPL14) (On Site) Validated Results for June 2021**

Particulate Matter <10 Microns 24Hr Average				
Date	TEOM 1 ( $\mu\text{g}/\text{m}^3$ )	Compliant with 50 $\mu\text{g}/\text{m}^3$ 24hr average?	TEOM 2 ( $\mu\text{g}/\text{m}^3$ )	Compliant with 50 $\mu\text{g}/\text{m}^3$ 24hr average?
1-Jun-21	14.3	Y	8.9	Y
2-Jun-21	6.5	Y	6.0	Y
3-Jun-21	5.5	Y	3.3	Y
4-Jun-21	6.0	Y	3.3	Y
5-Jun-21	9.0	Y	7.2	Y
6-Jun-21	6.1	Y	4.9	Y
7-Jun-21	6.0	Y	2.8	Y
8-Jun-21	6.2	Y	3.3	Y
9-Jun-21	12.0	Y	11.1	Y
10-Jun-21	18.3	Y	16.7	Y
11-Jun-21	12.5	Y	10.4	Y
12-Jun-21	5.3	Y	3.1	Y
13-Jun-21	7.5	Y	5.6	Y
14-Jun-21	8.7	Y	5.5	Y
15-Jun-21	7.1	Y	3.0	Y
16-Jun-21	7.7	Y	3.6	Y
17-Jun-21	6.4	Y	3.5	Y
18-Jun-21	5.7	Y	SC	Y
19-Jun-21	6.6	Y	SC	Y
20-Jun-21	5.3	Y	SC	Y
21-Jun-21	7.0	Y	SC	Y
22-Jun-21	20.3	Y	SC	Y
23-Jun-21	9.2	Y	4.3	Y
24-Jun-21	6.3	Y	6.1	Y
25-Jun-21	5.8	Y	6.0	Y
26-Jun-21	6.3	Y	6.6	Y
27-Jun-21	6.9	Y	7.1	Y
28-Jun-21	6.2	Y	4.6	Y
29-Jun-21	6.0	Y	6.1	Y
30-Jun-21	11.4	Y	6.9	Y

NS – no sample collected. SC – sample collected.

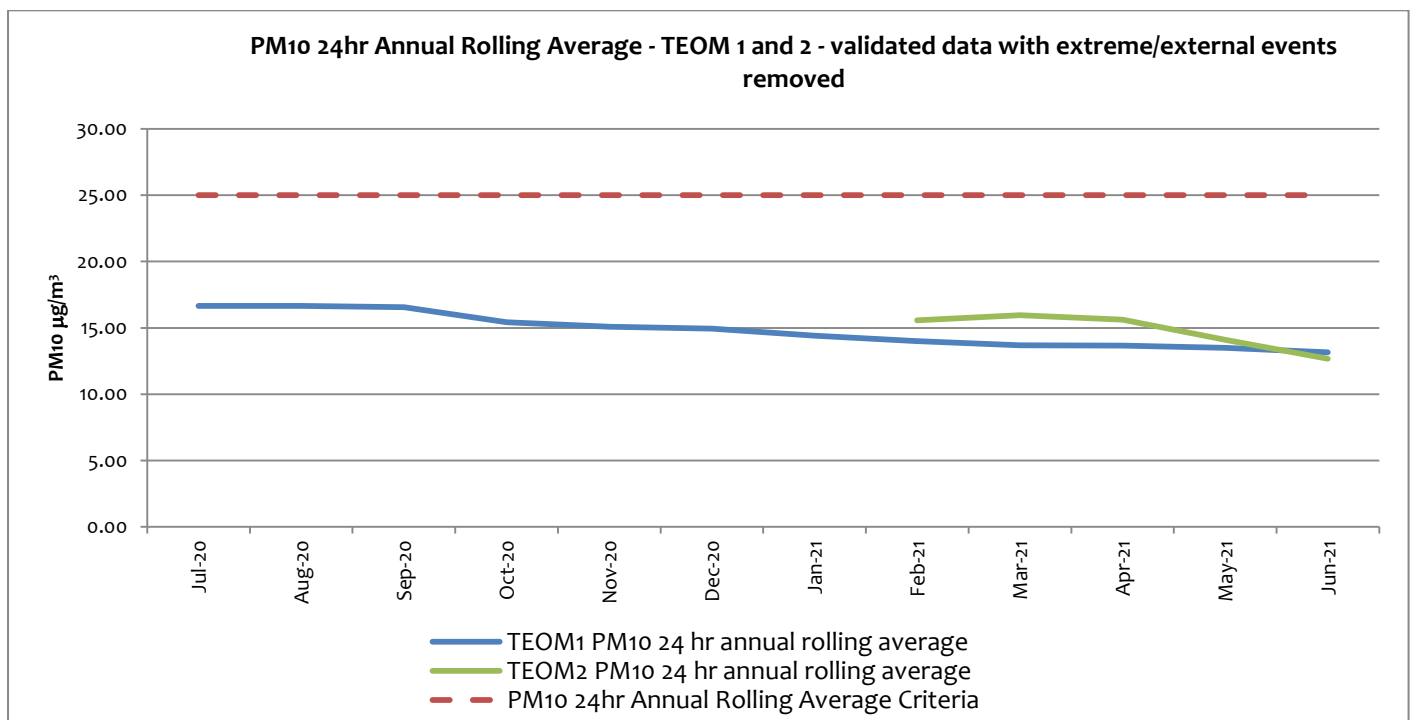
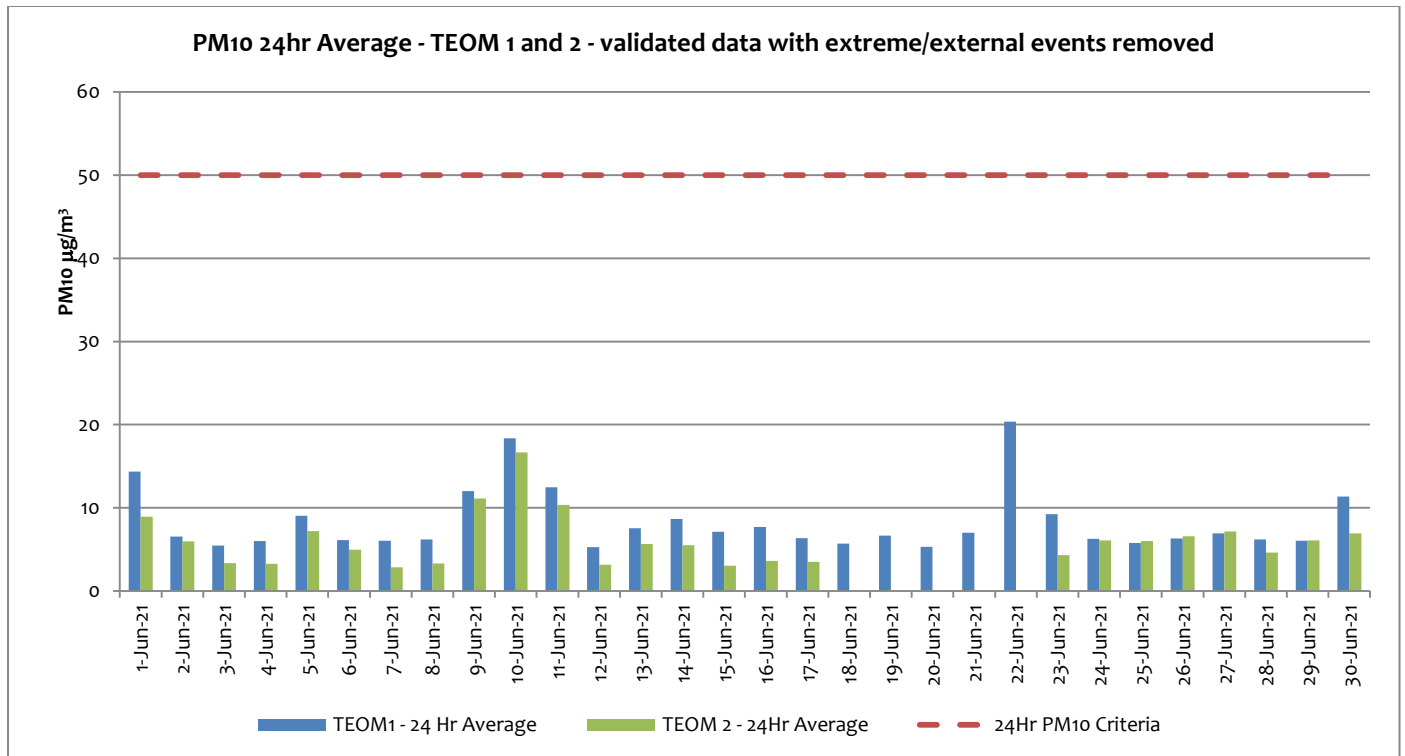
TEOM2 was decommissioned since June 2019 while Embankment 2 TSF2 construction works were undertaken and reinstalled in February 2021. Servicing, calibration and zeroing of both TEOM1 and TEOM2 were undertaken from 1<sup>st</sup> to 3<sup>rd</sup> of February. A portable PM10 monitor was operating adjacent to the TEOM2 location while servicing was being undertaken.

PM<sub>10</sub> dust levels at both TEOM units were low in the month of June. TEOM2 was unable to stabilise following filter changes over five days from 18 to 22 June. A spare TEOM was installed in its place on 22 June and the original unit will be serviced as COVID lockdowns allow. During this period a portable PM-10 monitor was operating adjacent to the TEOM2 location and the highest 24-hour average PM10 level recorded over these days was 1.75  $\mu\text{g}/\text{m}^3$ .



The PM<sub>10</sub> 24-hour rolling annual average for data with external elevated dust events removed at June 2021 is 13.17 µg/m<sup>3</sup> for TEOM1 and 12.67 µg/m<sup>3</sup> for TEOM2.

The PM<sub>10</sub> 24-hour rolling annual average for both TEOM sites remain below the annual average criteria of 25 µg/m<sup>3</sup>.



### 1.3 Dust Deposition Sampling

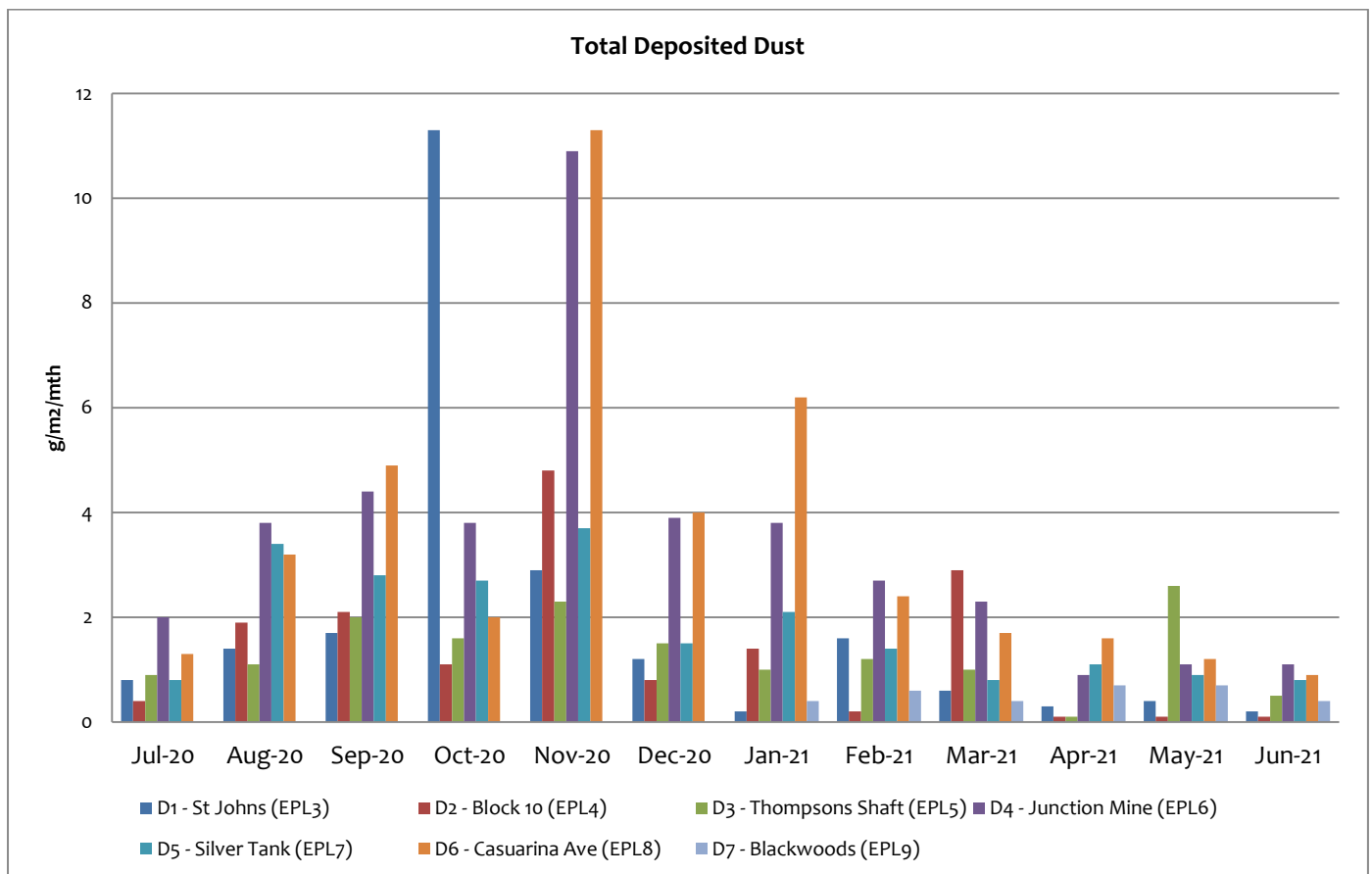


There are seven dust deposition gauges to measure ambient air quality at the Rasp Mine – D1 to D7. D1 and D6 are located off-site, D1 near the St Johns training facility north of the Rasp Mine and D6 in Casuarina Avenue south of the Rasp Mine. D2 to D5 and D7 are located on the mine lease in various locations. A map indicating these locations can be found on the Rasp Mine web site. Dust samples are collected monthly and analysed for total deposited dust and deposited lead dust. DDG7 was decommissioned from June 2019 to January 2021 due to works on TSF Embankment 2.

**Dust Deposition Gauges D1 (EPL3) to D7 (EPL9) – Results for June 2021**

Total Deposited Dust (g/m <sup>2</sup> /Month)							
Sample Period	D1 (off site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off site)	D7 (on site)
June 2021	0.2	0.1	0.5	1.1	0.8	0.9	0.4
Background (2010)	4.0	3.1	4.3	5.7	<sup>-1</sup>	5.8	<sup>-1</sup>
Compliant?	Y	N/A	N/A	N/A	N/A	Y	N/A

Note: “1”= background not available, N/A = not applicable as dust deposition unit is located on site, NS = No sample



The dust levels recorded in Dust Gauges in June 2021 are low compared to the previous months. The highest dust levels were recorded in the D4 Junction Mine gauge. The predominant wind direction for June 2021 was from the NW and SW as shown in the Wind Rose in Section 4. DG1 St Johns and D6 Casuarina Ave were both compliant against the 4 g/m<sup>5</sup>/month maximum total dust deposited per month.

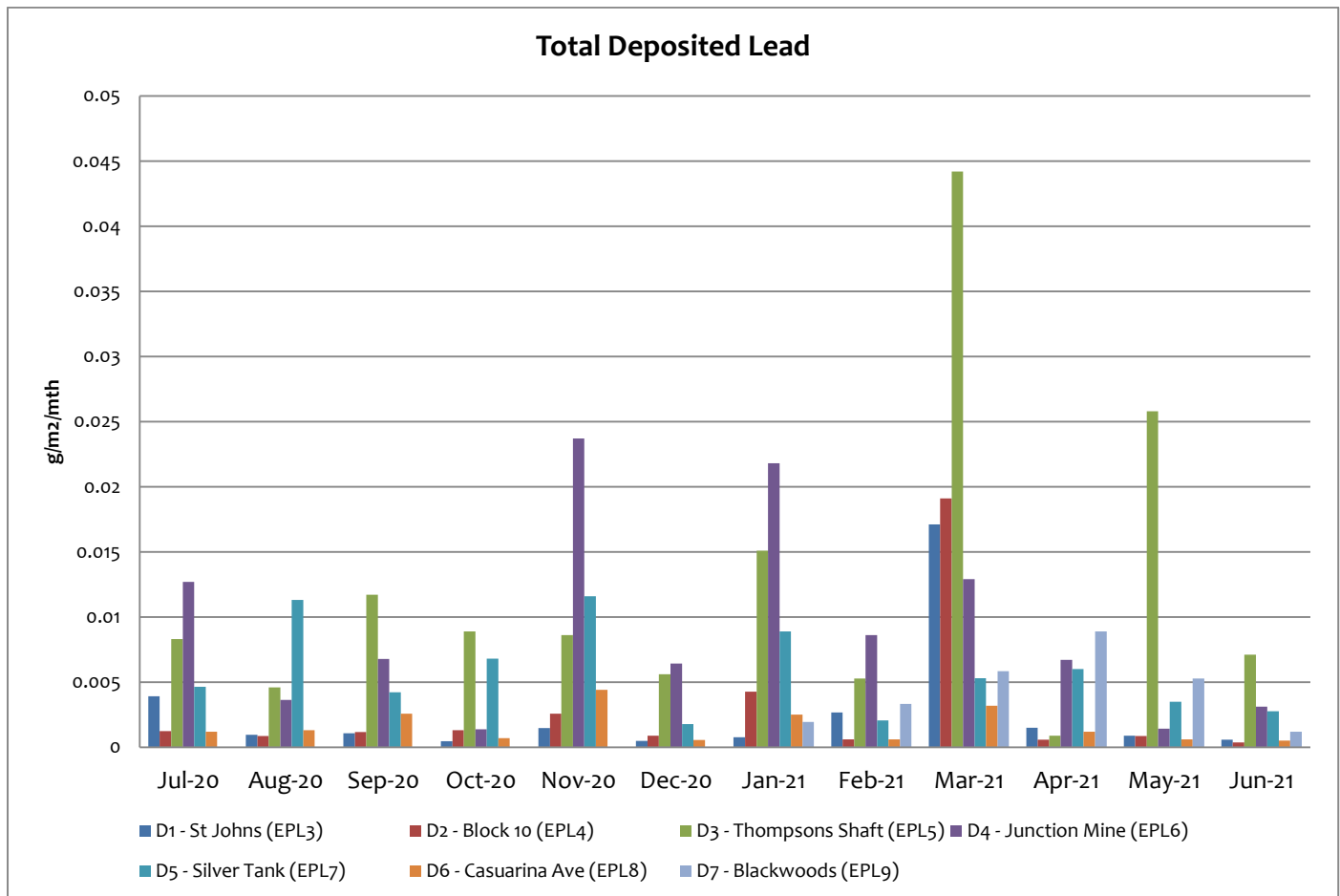


Total Deposited Lead (g/m <sup>2</sup> /Month)							
Sample Period	D1 (off Site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off Site)	D7 (on site)
June 2021	0.00059	0.00037	0.0071	0.003	0.00277	0.00052	0.0012
Background (2010)	0.0034	0.005	0.005	0.006	- <sup>1</sup>	0.004	- <sup>1</sup>

Note: "<sup>1</sup>"= background not available, NS = No sample

There are no guidelines for deposited lead dust. Lead results in June 2021 were highest in the D3 Thompsons Shaft gauge. The predominant wind directions for June 2021 was from the NW and SW as shown in the Wind Rose in Section 4. Site activities around the Rail Loadout area may contribute to elevated Lead levels at D3 Thompsons Shaft, but only minimally as the concentrate containers are loaded with concentrate and their lids are fitted in an enclosed shed. In addition the loading area alongside the train is a concrete pad which is regularly swept and watered. A water cart will also attend to the haul road between the concentrate loading shed at the Mill and the rail loadout area when concentrate containers are being transported on site. Much of the area around the D3 Thompsons Shaft gauges is bare of cover and characterised by historical mining activities.

Dust suppressant is applied to unsealed areas of the site and roads are frequently watered using water carts in an attempt to control dust emissions. The waste dump adjacent to the rail loadout is treated with dust suppressant to capture any loose dust accumulating on the lower batters and on the upper surface.





## 1.4 Ventilation Outlets and Bag House Monitoring

There are two locations to measure pollutants from exhausts or stacks; these include the Primary Ventilation Shaft, measuring pollutants from underground firings, and the Baghouse Stack at the crusher measuring dust. Each are located on site; the Primary Ventilation Shaft is located centrally and to the north of the mine lease and the Primary Crusher Baghouse Stack is located within the area of the processing plant to the east of the lease. Shaft 6 (EPL56) was removed as a monitoring location with the variation of EPL12559 in March 2019 as it became an intake rather than an exhaust in April 2018. A map indicating these locations can be found on the Rasp Mine web site. Samples are collected quarterly and analysed for a number of parameters listed in below. Reference to the item required in the Rasp Mine Environment Protection Licence (EPL) is provided below. Emissions monitoring is conducted quarterly.

The following criteria apply:

### Primary Ventilation Shaft (EPL1)

	Unit	Criteria
<b>Nitrogen Oxides</b>	mg/m <sup>3</sup>	350
<b>Volatile Organic Compounds</b>	mg/m <sup>3</sup>	40

### Primary Ventilation Shaft (EPL1) and Crusher Baghouse (EPL2)

	Unit	Criteria
<b>Total Suspended particles (TSP)</b>	mg/m <sup>3</sup>	20
<b>Type 1 and Type 2<sup>1</sup></b>	mg/m <sup>3</sup>	1

**Note 1:** "Type 1 substance" means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements.

"Type 2 substance" means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements.

### ***Primary Vent Shaft (EPL1) and Crusher Baghouse (EPL2) Results for June 2021***

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Monitoring was conducted at the Primary Vent Shaft (EPL1) and the Crusher Baghouse (EPL2) on 13 April 2021. The monitoring results for the Primary Vent Shaft and the Crusher Baghouse from this monitoring event were below the licence criteria.

The next round of compliance monitoring was scheduled for July 2021.

## 2 Noise

### 2.1 Blasting (Vibration and Overpressure)

There are 5 compliance vibration monitors at various locations measuring for vibration and overpressure from blast firings. These include V1 to V5 which are located on-site and off-site. A map indicating these locations can be found on the Rasp Mine web site. In addition, there are a number of roving monitors which may be used to monitor vibration and overpressure at particular locations as required. Monitors operate continuously and are automatically triggered to record when a blast occurs. The following conditions apply as listed in the PA 07\_0018 and EPL 12559:-



**Blasting Criteria (Western Mineralisation and Main Lodes excluding Block 7)**

Location	Airblast Overpressure (dB(Lin Peak))	Ground Vibration (mm/s)	Allowable Exceedance (for production and development blasts)
Residence on privately owned land (7am-7pm)	115	5	5% of the total number of blasts over a 12-month period <sup>1</sup>
(7am-7pm)	120	10	0%
(7pm-10pm)	105	-	-
(10pm-7am)	95	-	-
Public Infrastructure	-	100	0%

**Note 1:** Does not apply until completion of Pollution Reduction Program on the EPL at the end of 2018. Applies to EPL criteria in the period for the Annual Return 3 Nov to 2 Nov the following year and to DPE criteria in the reporting period 1 Jul to 30 Jun each year.

**Blasting Criteria (Block 7)**

Location	Airblast Overpressure (dB(Lin Peak))	Ground Vibration (mm/s)	Allowable Exceedance (for production and development blasts)
Residence on privately owned land (7am-7pm)	115	3 (interim)	5% of the total number of blasts over a 12-month period <sup>1</sup>
(7am-7pm)	120	10	0%
(7pm-10pm)	105	-	-
(10pm-7am)	95	-	-
Broken Hill Bowling Club, Italio (Bocce) Club, Heritage Items within CML7	-	50	0%
Perilya Southern Operations	-	100	0%
Public Infrastructure	-	100	0%

**Note 1:** Applies to EPL criteria in the period for the Annual Return 3 Nov to 2 Nov the following year and to DPE criteria in the reporting period 1 Jul to 30 Jun each year.

In addition the following conditions also apply:-

- Production blasts may occur between 6.45 am and 7.15 pm on any day
- 1 production blast per day, with 6 per week averaged over a calendar year
- 6 development blasts per day, with 42 per week averaged over a calendar year

**Blasting Data Summary Results for June 2021**

**Total Blasts:**

- 0 production blasts occurred before 6.45 am or after 7.15 pm
- The number of Production blasts averaged 2.21 per week over the previous calendar year
- The number of Development blasts averaged 26.48 per week over the previous calendar year

**Western Mineralisation and Main Lodes (excluding Block 7):**

- 0 Blasts recorded >5 mm/s
- 0 Blasts recorded >10 mm/s
- 0 development blasts recorded an over pressure level over 95 dBL (10pm to 7am)
- 0 development blasts recorded an over pressure level over 105 dBL (7pm to 10pm)



- 0 Blasts recorded an over pressure level over 115dB (7am to 7pm)
- 0 Blasts recorded an over pressure level over or 120 dBL at any time
- Percentage of development blasts over 5 mm/sec for the annual period = 0%
- Percentage of production blasts over 5 mm/sec for the annual period = 2.7%

**Block 7:**

- 0 Blasts recorded >3 mm/s
- 0 Blasts recorded >10 mm/s
- 0 Blasts recorded >50 mm/s at V6
- 0 development blasts recorded an over pressure level over 95 dBL (10pm to 7am)
- 0 development blasts recorded an over pressure level over 105 dBL (7pm to 10pm)
- 0 Blasts recorded an over pressure level over 115 dBL (7am to 7pm)
- 0 Blasts recorded an over pressure level over or 120 dBL at any time
- Percentage of development blasts over 3mm/sec for the annual period = 0%
- Percentage of production blasts over 3mm/sec for the annual period = 60%

The percentage of production blasts in the Western Mineralisation and Main Lodes producing vibration at monitors over 5 mm/sec for the 12-month period is 2.7%.

The percentage of production blasts in Block 7 producing vibration at monitors over 3 mm/sec for the 12-month period is 60%. No complaints have been received about Block 7 blasts.

## 2.2 Noise

Noise monitoring is undertaken as per the NSW Noise Policy for Industry at a frequency of once per annum. Annual noise monitoring was conducted during two consecutive night-time periods from 3 to 5 May 2021.

The monitoring assessment found that site LAeq, 15min noise contributions satisfied the relevant limits during the measurements at all assessment locations.

## 3 Water

### 3.1 Groundwater

There are eighteen sampling locations for groundwater. GW01 (EPL37) to GW16 (EPL52) are piezometers installed at various locations around the mine site and are sampled quarterly. There are also two sampling locations for water pumped from underground mining, Shaft 7 (EPL53) and Kintore Pit (EPL54), which are sampled monthly. A map indicating these locations can be found on the Rasp Mine web site. Groundwater monitoring is scheduled for completion in March, June, September and December. No limits are applied in the EPL to the results from groundwater monitoring.

Results for Kintore Pit/UG in June have shown an increase in Cadmium and Lead over the last two years, however the results for both in June were not the highest recorded. Shaft 7 was not pumping in June so no sample could be taken.

GW4 recorded elevated levels Lead, Manganese and Zinc in June. As no other nearby bores recorded similar levels or changes in chemistry the sample may have been contaminated. GW12 was dry in June which is likely due to impacts from nearby exploration drilling. GW12 will be monitored weekly for recharge.





**Groundwater Monitoring Requirements**

EPA Identification Number	Frequency	Parameters to be analysed
Shaft 7 EPL53	Monthly	alkalinity (calcium carbonate (CaCO <sub>3</sub> )), cadmium (Cd), calcium (Ca), chloride (Cl), electrical conductivity (EC), iron (Fe), lead Pb), magnesium (Mg), manganese (Mn), pH, sodium (Na), sulphate (SO <sub>4</sub> ), total dissolved solids (TDS) and zinc (Zn)
Kintore Pit (U/G dewatering) EPL54	Monthly	
Piezometers EPL37 (GW01) to EPL52 (GW16)	Quarterly	

**Shaft 7 (EPL53) and Kintore Pit (EPL54) Results for June 2021**

Sample Point	pH	EC (µS/cm <sup>2</sup> )	TDS (mg/l)	Alkalinity (CaCO <sub>3</sub> ) (mg/l)	SO <sub>4</sub> (mg/l)	Cl (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	Cd (mg/l)	Pb (mg/l)	Mn (mg/l)	Zn (mg/l)	Fe (mg/l)
Shaft 7 (EPL53)	-No pumping in June-													
Kintore Pit (EPL54)	5.96	12700	14100	5	7020	1620	431	326	1740	5.56	1.98	490	1260	<0.05

**Groundwater Bores (EPL37 - EPL52) Results for June 2021**

Sample Point	pH	EC (µS/cm <sup>2</sup> )	TDS (mg/l)	Alkalinity (CaCO <sub>3</sub> ) (mg/l)	SO <sub>4</sub> (mg/l)	Cl (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	Cd (mg/l)	Pb (mg/l)	Mn (mg/l)	Zn (mg/l)	Fe (mg/l)
GW01 (EPL37)	-Bore Dry-													
GW02 (EPL38)	-Bore Dry-													
GW03 (EPL39)	5.83	13700	11800	7	4740	3000	504	348	2270	1.03	1.9	255	234	<0.05
GW04 (EPL40)	6.05	12200	10500	4	4630	2400	488	390	2050	0.258	2.5	132	65.6	<0.05
GW05 (EPL41)	5.69	15200	14900	83	7090	2710	456	619	2570	0.677	0.235	353	286	<0.05
GW06 (EPL42)	5.78	13800	13400	54	5910	2630	474	475	2260	1.53	0.152	413	274	<0.05
GW07 (EPL43)	5.9	12300	11200	48	4770	2440	494	335	1930	2.19	0.108	259	264	<0.05
GW08 (EPL44)	5.81	13300	13300	35	5680	2650	477	344	2030	1.34	1.16	542	544	<0.05
GW09 (EPL45)	6.2	11400	10800	82	4750	1850	544	527	1570	1.5	0.004	128	167	<0.05
GW10 (EPL46)	6.49	13400	11400	276	4680	2780	534	547	2310	0.176	<0.001	11.1	25.6	<0.05
GW11 (EPL47)	6.66	5620	4780	73	2420	623	299	194	799	0.662	0.037	40.5	67.4	<0.05
GW12 (EPL48)	-Bore Dry-													
GW13 (EPL49)	-Bore Dry-													



Sample Point	pH	EC (µS/cm <sup>2</sup> )	TDS (mg/l)	Alkalinity (CaCO <sub>3</sub> ) (mg/l)	SO <sub>4</sub> (mg/l)	Cl (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	Cd (mg/l)	Pb (mg/l)	Mn (mg/l)	Zn (mg/l)	Fe (mg/l)
GW14 (EPL50)														
GW15 (EPL51)														
GW16 (EPL52)														

### 3.2 Surface Water Sample Record

There are seven sampling locations for surface water, these include surface water basins located on the mine lease to capture and retain rainfall and two locations up and down stream of an ephemeral creek located south of the mine lease boundary. A map indicating these locations can be found on the Rasp Mine web site. Based on historical data, sampling is most likely to be undertaken in October (highest rainfall month as recorded by Bureau of Meteorology) and April.

#### Surface Water Monitoring Requirements

Description	Frequency	Parameters to be Analysed
Federation Way Culvert EPL29/S31-1	2 x per year, six months apart	cadmium (Cd), chloride (Cl), electrical conductivity (EC), lead Pb), manganese (Mn), pH, sodium (Na), sulphate (SO <sub>4</sub> ), total dissolved solids (TDS) and zinc (Zn)
Ryan Street Dam EPL31/S49	2 x per year, six months apart	
Adjacent Olive Grove EPL32/S1A	2 x per year, six months apart	
Adjacent Bowls Club EPL33 /S9-B2	2 x per year, six months apart	
Horwood Dam EPL34/S34	2 x per year, six months apart	
Upstream Bonanza St EPL35	2 x per year, six months apart	
Downstream Sydney Rd EPL36	2 x per year, six months apart	

#### *Surface Water Monitoring Results for June 2021*

No sampling of surface waters was possible in June due to lack of rainfall.

### 4 Weather Data

The weather station continuously monitors the following parameters as per Point 55 of the Environmental Protection Licence.

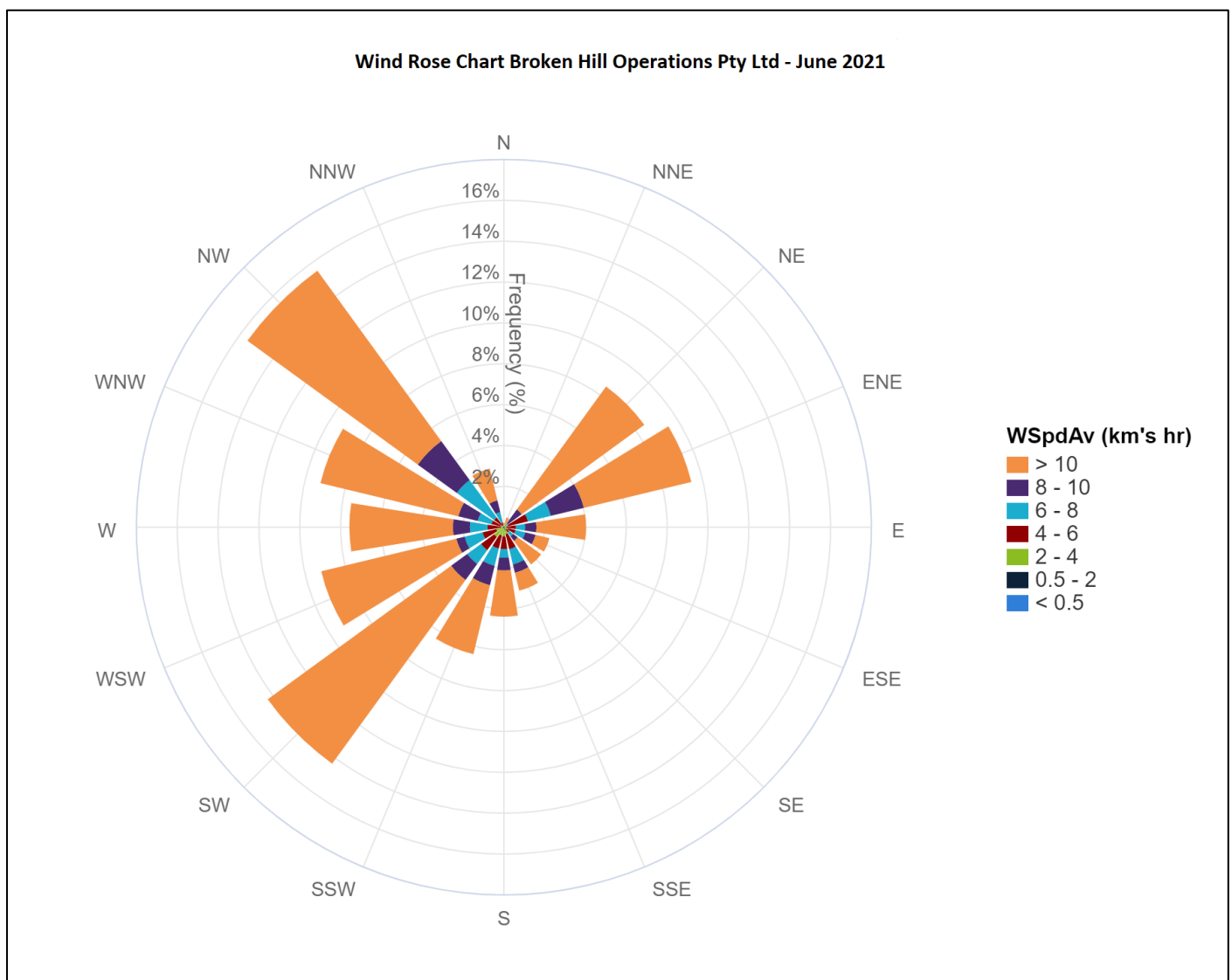
The following parameters are required to be recorded each month as listed in the EPL 12559:



**Rasp Mine Weather Station (EPL55) Monitoring Requirements**

Parameter	Sampling method	Units of measure	Averaging period	Frequency
Temperature at 10 metres	AM-4	degrees Celsius	15 minutes	Continuous
Wind Direction at 10 metres	AM-4	degrees in a clockwise direction from True North	15 minutes	Continuous
Wind Speed at 10 metres	AM-4	metres per second	15 minutes	Continuous
Rainfall	AM-4	millimetres	1 hour	Continuous
Sigma theta	AM-2 & AM-4	degrees	15 minutes	Continuous

The windrose provided below indicates the predominant wind directions for the month of June was from the SW and NW.





*Weather Data Summary for June 2021*

Date	Temperature @ 10m (°C)		Wind Speed @ 10m (km/hr)		Predominant Wind Direction @ 10m		Rainfall (mm)
	Min	Max	Min	Max	Cardinal	Degree	Total
01-Jun-21	11.8	19.6	2.5	25.4	NE	41	0.00
02-Jun-21	11.3	15.2	2.2	23.7	NE	44	7.50
03-Jun-21	9.2	16.1	1.4	21.1	SSW	203	0.00
04-Jun-21	9.6	15.3	0.9	22.5	SW	227	0.00
05-Jun-21	8.4	14.4	1.3	21.8	West	273	0.00
06-Jun-21	10.1	17.6	3.6	22.8	NW	314	0.00
07-Jun-21	10.5	16.9	5.7	39.6	South	179	0.00
08-Jun-21	5.2	12.8	7.3	33.1	SW	226	0.30
09-Jun-21	4.3	11.9	13.3	41.7	SW	223	0.00
10-Jun-21	6.1	13.1	10.1	41.3	SW	222	0.00
11-Jun-21	10.0	12.7	3.2	16.6	SW	224	0.00
12-Jun-21	9.8	13.2	1.1	16.5	NW	313	0.00
13-Jun-21	10.0	17.2	1.9	16.8	NNE	24	0.00
14-Jun-21	10.1	15.4	0.8	24.1	NE	41	0.20
15-Jun-21	9.3	17.0	7.0	30.3	NNE	26	0.00
16-Jun-21	8.4	13.8	3.7	38.8	NW	312	0.00
17-Jun-21	7.1	15.6	6.9	30.2	NW	311	1.20
18-Jun-21	6.0	12.7	8.5	27.0	SW	224	0.00
19-Jun-21	8.2	11.6	5.8	33.5	South	182	0.00
20-Jun-21	5.7	12.9	1.6	27.7	SSE	154	0.00
21-Jun-21	7.2	14.8	1.9	17.7	ENE	65	0.00
22-Jun-21	9.1	16.8	7.9	33.6	NE	40	0.00
23-Jun-21	11.1	15.3	10.3	36.9	South	178	0.20
24-Jun-21	8.7	13.2	6.6	38.9	NW	311	0.00
25-Jun-21	6.4	12.5	4.3	21.4	NW	312	0.00
26-Jun-21	6.1	11.6	1.4	20.9	SW	225	0.00
27-Jun-21	6.6	13.7	1.7	10.6	SW	227	0.00
28-Jun-21	6.5	13.8	2.7	19.4	ENE	64	0.00
29-Jun-21	7.2	15.8	5.1	23.8	ENE	65	0.00
30-Jun-21	9.0	19.0	1.6	18.4	NE	43	0.00

Rainfall of 8.9mm fell in June.



## 5 Data Log

Sample	Result Received
Hi Volume Samples	15-07-2021
TEOM	28-07-2021
Dust Deposition	20-07-2021
Vents & Bag House	11-05-2021
Noise	14-05-2021
Water	13-07-2021
Blast vibration and overpressure	1-07-2021
Weather	1-07-2021
Date posted to web site	08-07-2022

## 6 Correction Log

Dates in table in section 4 updated originally stated as 2018, amended to correct dates.

Total deposited dust for DG1 was incorrectly labelled as non-compliance against the criteria for deposited dust, corrected and analysis of compliance added to discussion in Section 1.3.