

2024 Annual Review

Attachment B: Air Quality Monitoring



Table of Contents

1.	High Volume Air Sampler	2
1.1	High Volume Air Sampler – 2024 Monitoring Results.....	5
2.	TEOM PM₁₀	6
2.1	Comparison of PM ₁₀ Results Against EA Predictions	7
2.2	TEOM PM ₁₀ – 2024 Daily Average Results	9
3.	Air Quality Monitoring Locations	11

Figures

Figure 1-1 – 2024 TSP Monitoring Results	3
Figure 1-2 – TSP Monitoring Result Trends.....	4
Figure 2-1 – 2024 TEOM PM ₁₀ Monitoring Results (331 Cope Road)	7
Figure 2-2 PM ₁₀ Monitoring Result Trends.....	8

Tables

Table 1-1 Long and Short Term Impact Assessment Criteria for TSP	2
Table 1-2 2024 TSP Results	2
Table 1-3 Comparison against EA TSP Predictions and Previous Reporting Periods	3
Table 2-1 Long and Short Term Impact Assessment Criteria for PM ₁₀	6
Table 2-2 2024 Cope Road TEOM PM ₁₀ Results.....	6
Table 2-3 PM ₁₀ Levels recorded at SX36 (Moolarben Coal TEOM)	7
Table 2-4 Comparison of Annual Average 24-hour PM ₁₀ Results Against EA Predictions & Previous Reporting Periods	8

1. High Volume Air Sampler

Two High Volume Air Samplers (HVAS) are maintained¹ to monitor Total Suspended Particulate (TSP) concentrations in accordance with *Australian Standards (AS) 3580.9.3:2003*². HVAS units operate for a 24hr period on a six-day cycle. Records of routine equipment calibration and testing are maintained with the original laboratory reports.

Testing is conducted by laboratories with NATA accreditation for TSP analysis. The criterion for TSP at any residence on privately-owned land as specified by EPL 394 and PA08_0184 (i.e. project-specific dust impact assessment criteria) provided in **Table 1-1**.

Table 1-1 Long and Short Term Impact Assessment Criteria for TSP

Pollutant	Averaging Period	^b Criteria
Total suspended particulate (TSP) matter	Annual	^a 90 µg/m ³

Notes: ^a Total Impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to other sources).

^b Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Director-General in consultation with the EPA.

Results of TSP analysis are summarised in **Table 1-2**. The maximum TSP results of 77.0 µg/m³ from HV1 was recorded on 30 March 2024, and the maximum TSP of 68.7 µg/m³ from HV3 was recorded on 7 November 2024.

The Annual Average TSP results of 32.4 µg/m³ at HV1 and 23.3 µg/m³ at HV3, were within the project specific long-term criteria of 90 µg/m³ (**Table 1-1**). There were no individual samples that exceed the 90 µg/m³ during the monitoring period. Results of the monitoring periods sampling are depicted in **Figure 1-1**.

TSP monitoring from the end of the drought in early 2020 (**Figure 1-2**) displays a relatively stable trend for the past four years. Lower annual rainfall years as with 2023 correlate with slightly increasing TSP results.

Table 1-2 2024 TSP Results

	Flannery's (HV1) µg/m ³	Merlene (HV3) µg/m ³
Capture rate	100%	100%
Annual Average	32.4	23.3
Maximum Result	77.0	68.7

¹ In accordance with the AQMP (ULN SD PLN 0059)

² AS/NZS 3580.9.3:2003 *Methods for Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – Total Suspended Particulate matter (TSP) – High Volume Sampler Gravimetric Method*.

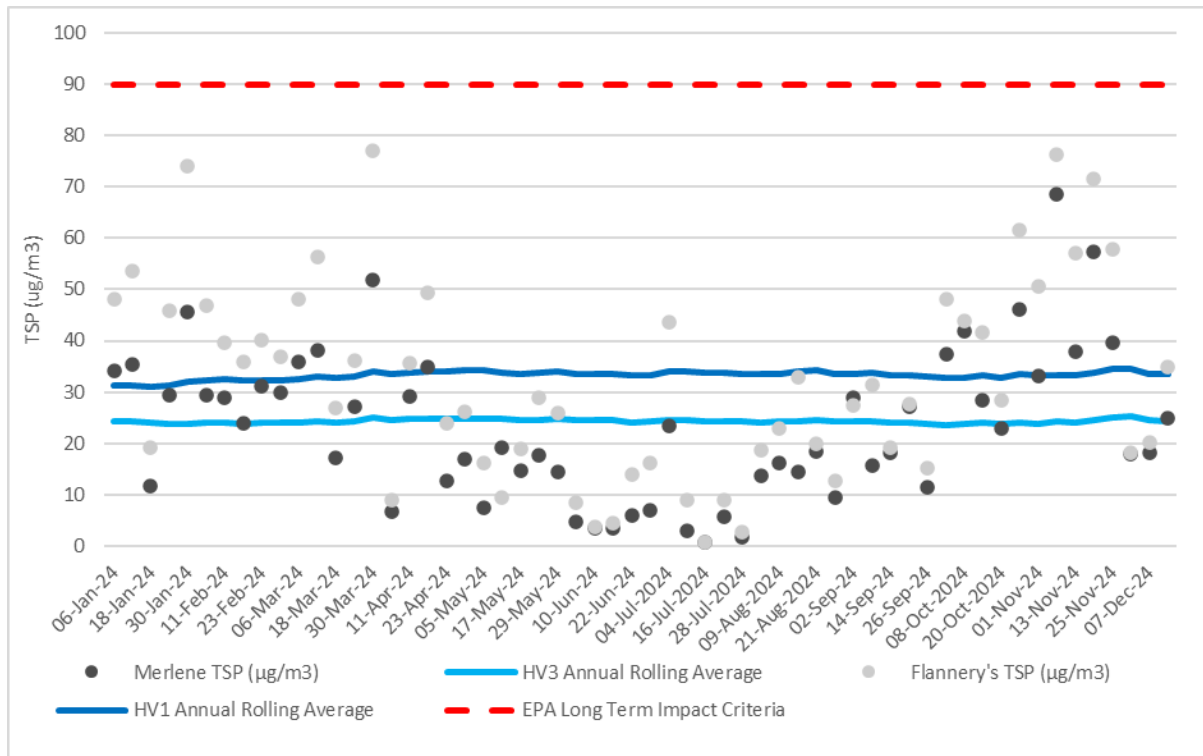


Figure 1-1 – 2024 TSP Monitoring Results

Comparison Against TSP Predictions

Table 1-3 displays the TSP impact from the 2015 EA at each HVA monitor. The TSP results for 2024 were below the Year 12 predictions provided in the air quality assessment from the 2009 *Environmental Assessment*.

The TSP annual averages for HV3 and HV1 in 2024 were comparable with the previous 2023 monitoring period of 24.5 µg/m³ and 31.0 µg/m³ respectively.

Table 1-3 Comparison against EA TSP Predictions and Previous Reporting Periods

HVAS ID	EA Predicted Impact Year 12: Annual Average TSP µg/m ³	Annual Average TSP 2024 µg/m ³	Annual Average TSP 2023 µg/m ³	Annual Average TSP 2022 µg/m ³	Annual Average TSP 2021 µg/m ³	Annual Average TSP 2020 µg/m ³	Annual Average TSP 2019 µg/m ³	Annual Average TSP 2018 µg/m ³	Annual Average TSP 2017 µg/m ³	Annual Average TSP 2016 µg/m ³	Annual Average TSP 2015 µg/m ³
HV1- Flannery's	49 [^]	32.4	31.0	17.6	19.1	24.6	32.8	34.8	26.1	22.3	24.7
HV3- Merlene	33 [^]	23.3	24.5	24.2	24.1	30.6	39.2	40.6	29.9	34.6	31

Notes: [^]Year 12 Project and Other Sources (Moolarben Stage 2) – 2009 EA at Property ID 103 and Property ID 123

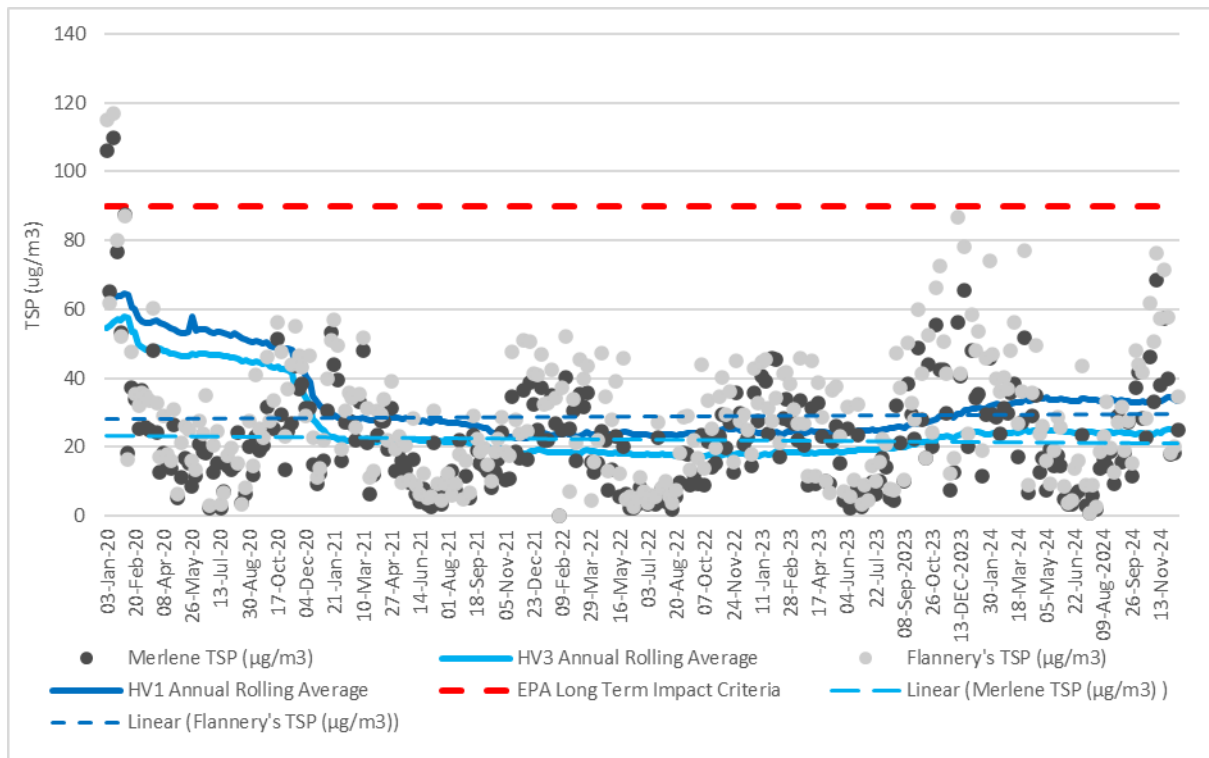


Figure 1-2 – TSP Monitoring Result Trends

1.1 High Volume Air Sampler – 2024 Monitoring Results

Sample Date	Flannery's TSP (µg/m³)	Merlene TSP (µg/m³)	Notes
06-Jan-24	48.1	34.2	
12-Jan-24	53.6	35.3	
18-Jan-24	19.1	11.7	
24-Jan-24	45.8	29.4	
30-Jan-24	74.1	45.7	
05-Feb-24	46.8	29.3	
11-Feb-24	39.7	28.8	
17-Feb-24	36	23.8	
23-Feb-24	40.2	31.2	
29-Feb-24	36.9	29.9	
06-Mar-24	48	35.9	
12-Mar-24	56.4	38.2	
18-Mar-24	26.8	17.3	
24-Mar-24	36.1	27.1	
30-Mar-24	77	51.8	
05-Apr-24	9	6.6	
11-Apr-24	35.7	29.2	
17-Apr-24	49.4	35	
23-Apr-24	24	12.7	
29-Apr-24	26.2	16.9	
05-May-24	16.1	7.4	
11-May-24	9.5	19.2	
17-May-24	18.9	14.7	
23-May-24	28.8	17.6	
29-May-24	25.8	14.5	
04-Jun-24	8.4	4.8	
10-Jun-24	3.8	3.5	
16-Jun-24	4.5	3.5	
22-Jun-24	13.9	6	
28-Jun-24	16.2	7	
04-Jul-2024	43.7	23.4	
10-Jul-2024	9	2.9	
16-Jul-2024	0.8	0.6	
22-Jul-2024	8.9	5.8	
28-Jul-2024	2.7	1.8	
03-Aug-2024	18.6	13.6	
09-Aug-2024	23	16.3	
15-Aug-2024	33	14.5	
21-Aug-2024	19.9	18.5	
27-Aug-24	12.6	9.5	
02-Sep-24	27.3	28.9	
08-Sep-24	31.5	15.7	
14-Sep-24	19.1	18.3	
20-Sep-24	27.7	27.2	
26-Sep-24	15.2	11.4	
02-Oct-24	48.2	37.4	
08-Oct-2024	43.8	41.8	
14-Oct-2024	41.7	28.4	
20-Oct-2024	28.3	22.9	
26-Oct-24	61.7	46.2	
01-Nov-24	50.7	33.2	
07-Nov-24	76.3	68.7	
13-Nov-24	57.2	38	
19-Nov-24	71.5	57.4	
25-Nov-24	57.9	39.7	
01-Dec-24	18.3	17.9	
07-Dec-24	20.3	18.3	
13-Dec-24	34.8	24.8	

2. TEOM PM₁₀

Continuous air quality (PM₁₀) monitoring is undertaken in the receiving environment to the south-west of the operations at 331 Cope Road using a Tapered Element Oscillating Microbalance (TEOM)³. PM₁₀ concentrations (µg/m³) are measured over a 1 hour averaging period, and is reported in real time to:

- Provide an understanding of regional and local episodic dust events;
- Provide an understanding of potential dust episodes resulting from mining activities; and
- To alert when dust levels are approaching criteria⁴ (as indicated in **Table 2-1** below), so that the operation can be adjusted accordingly (if required).

Table 2-1 Long and Short Term Impact Assessment Criteria for PM₁₀

Pollutant	Averaging Period	^b Criteria
Particulate matter < 10 µm (PM ₁₀)	Annual mean	^a 30 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	24 hour maximum	^a 50 µg/m ³

Notes: ^a Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to other sources);
^b Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed to by the Director-General in consultation with EPA.

Nightly seven (97) % of 1-hour average PM₁₀ results were captured during the 2024 monitoring period. Capture rate of the TEOM was impacted by a communications fault with the modem during the 19 to the 23 February 2024. PM₁₀ data for the 20 and 21 February was supplied by the nearby MCO TEOM (**Table 2-3**). A summary of 24-hour average monitoring results for the 2024 assessment period is presented in **Table 2-2** and **Figure 2-1**.

Table 2-2 2024 Cope Road TEOM PM₁₀ Results

Reporting Period	TEOM PM ₁₀ Results	
2024	Capture Rate	97%
	Annual Average	13.0 µg/m ³
	Annual Average excluding extraordinary events*	13.0 µg/m ³
	Maximum (24hr)	38.7 µg/m ³
	Maximum (24hr) excluding extraordinary events*	38.7 µg/m ³

Note: Location of monitor at 331 Cope Road: property owned by UCMPL. * No extraordinary events occurred during the Reporting Period.

The annual average PM₁₀ for 2024 was 13.0 µg/m³, well below the annual average criteria of 30µg/m³ and slightly higher than 12.9 µg/m³ in 2024. TEOM monitoring data shows that the 24-hour average PM₁₀ concentration did exceed the 24hr 50 µg/m³ impact assessment criteria. The maximum of 38.7 µg/m³ during the Reporting Period of was recorded on the 27 March 2024 (**Figure 2-1**). PM₁₀ monitoring from the end of the drought in early 2020 (**Figure 2-2**) displays a relatively stable trend for

³ Australian Standard AS 3580.9.8-2008: Methods for Sampling and Analysis of Ambient Air - Determination of Suspended Particulate Matter - PM₁₀ Continuous Direct Mass Method Using a Tapered Element Oscillating Microbalance Analyser.

⁴ As referenced in EPL394 and PA08_0184 (project-specific dust impact assessment criteria)

the past four years. Lower annual rainfall years as with 2023 correlate with slightly increasing PM₁₀ results.

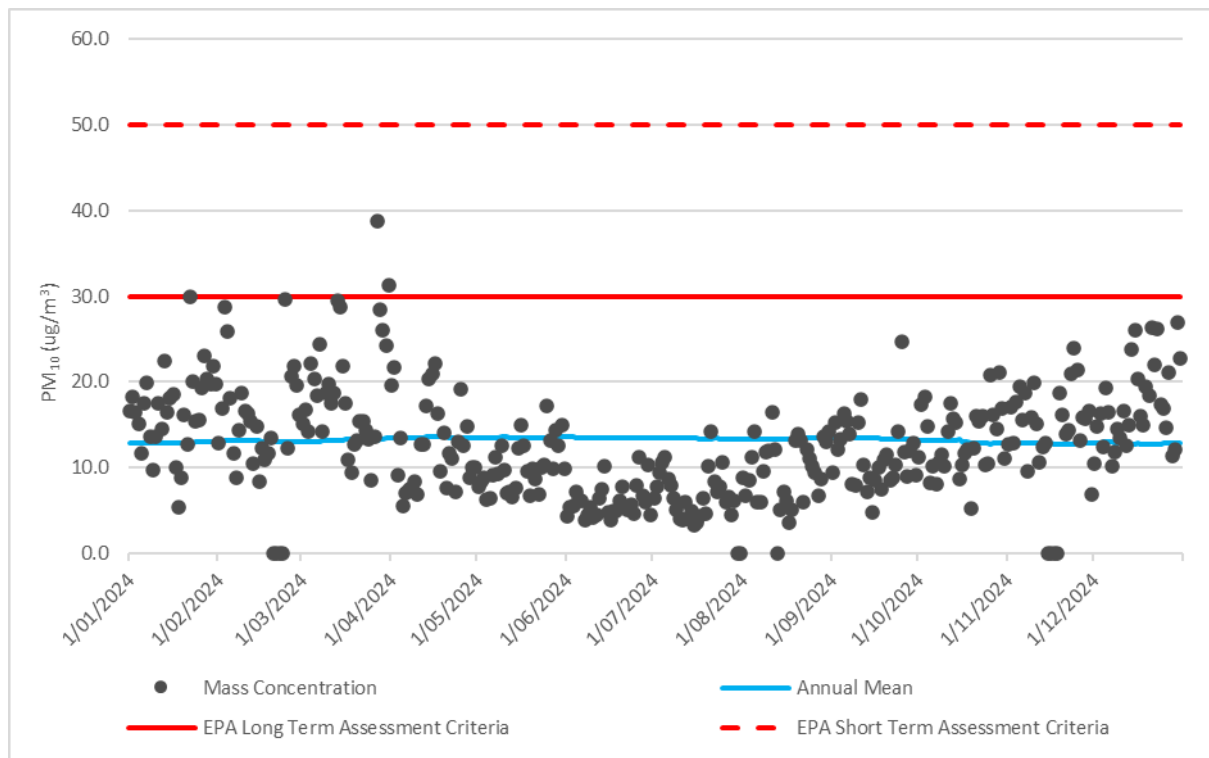


Figure 2-1 – 2024 TEOM PM₁₀ Monitoring Results (331 Cope Road)

Data from the TEOM Unit (SX36 managed by Moolarben Coal) located at Ulan School and situated between EPL Point 30 and the UCMLP Complex has confirmed there were no PM₁₀ ug/m³ exceedances recorded during the time of the outage. The daily PM₁₀ ug/m³ average during the period of the 20 February the 23 February are shown below in **Table 2-3**.

Table 2-3 PM₁₀ Levels recorded at SX36 (Moolarben Coal TEOM)

Day	PM10 Level ug/m ³
Tuesday – 20 th	17.97
Wednesday – 21 st	13.91
Thursday – 22 nd	14.98
Friday – 23 rd	26.29

2.1 Comparison of PM₁₀ Results Against EA Predictions

Table 2-4 provides a comparison of the 2024 results (excluding regional dust events) to the predicted PM₁₀ impact at Year 12 and the results from previous reporting periods. Measured annual average PM₁₀ in 2024 was lower than predicted in the 2009 EA. Measured annual average PM₁₀ in 2024 was slightly higher than in 2021 and 2022 but generally comparable to previous monitoring periods.

Table 2-4 Comparison of Annual Average 24-hour PM₁₀ Results Against EA Predictions & Previous Reporting

EA Predicted Impact Year 12: Annual Ave. PM ₁₀ µg/m ³	TEOM 2024 µg/m ³	TEOM 2023 µg/m ³	TEOM 2022 µg/m ³	TEOM 2021 µg/m ³	TEOM 2020 µg/m ³	TEOM 2019 µg/m ³	TEOM 2018 µg/m ³	TEOM 2017 µg/m ³	TEOM 2016 µg/m ³	TEOM 2015 µg/m ³	TEOM 2014 µg/m ³
26 [^]	13.0	12.6	9.6	11	13.4	18.7	16.4	13.7	13.4	13.3	15

Notes: [^]Year 12 Project and Other Sources (Moolarben Stage 2) – 2009 EA at Property ID 123

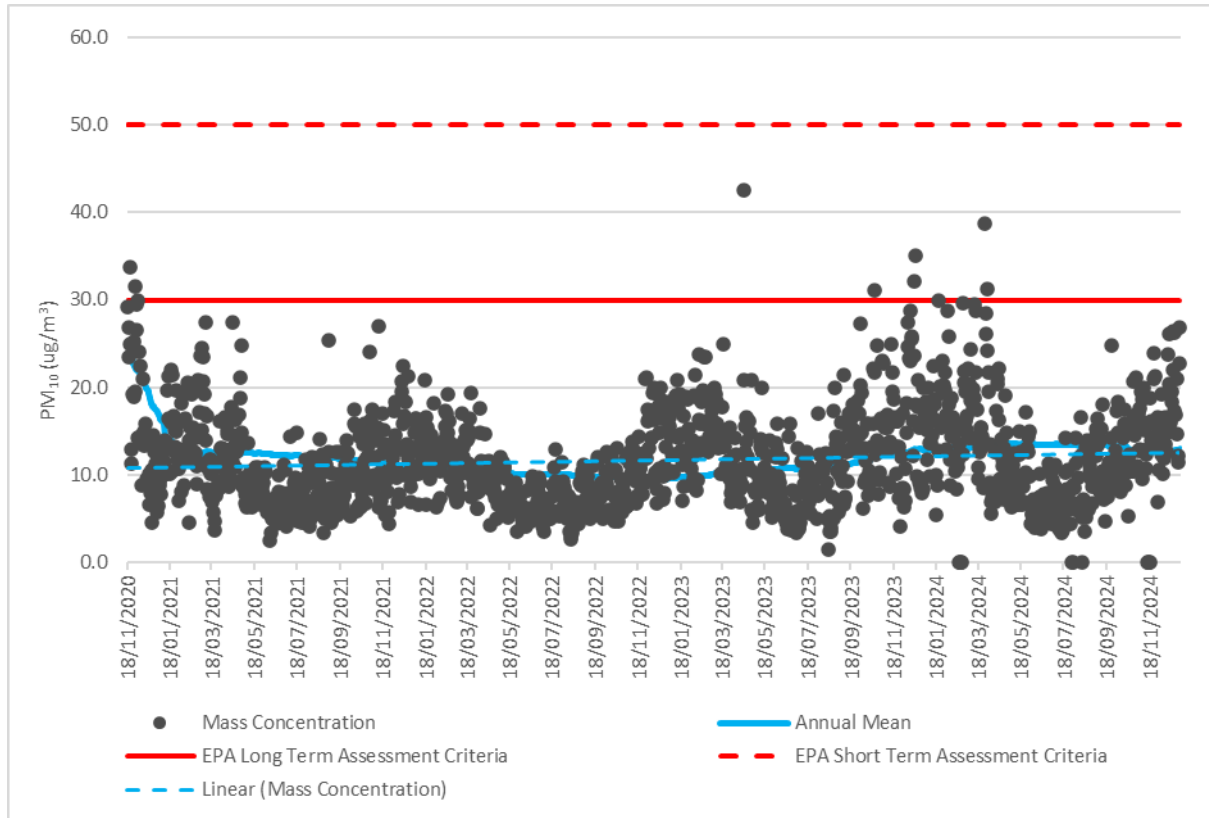


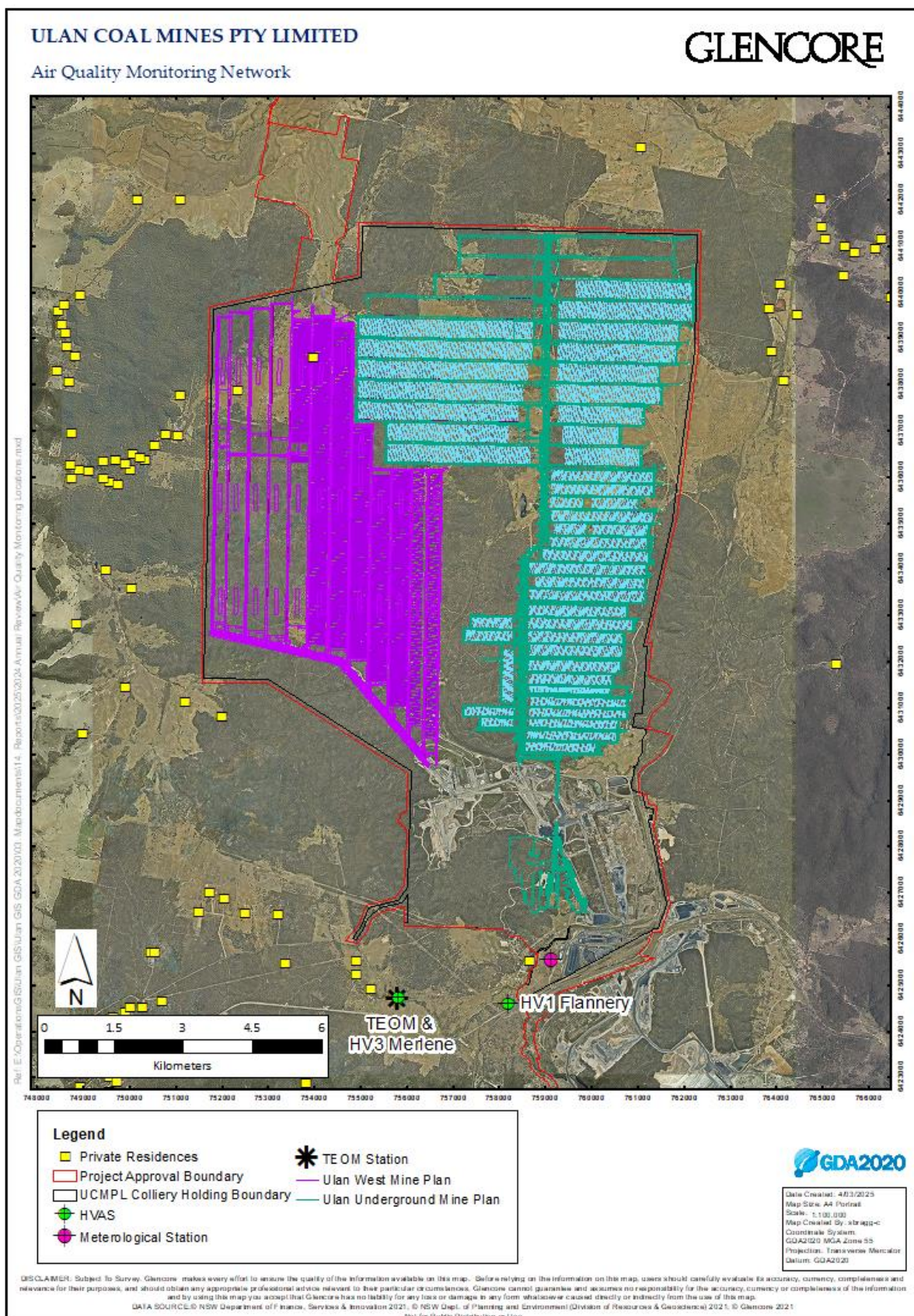
Figure 2-2 PM₁₀ Monitoring Result Trends

2.2 TEOM PM₁₀ – 2024 Daily Average Results

Jan-24		Feb-24		Mar-24		Apr-24		May-24		Jun-24	
Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)
1/01/2024	16.6	1/02/2024	12.9	1/03/2024	15.1	1/04/2024	19.6	1/05/2024	7.9	1/06/2024	4.4
2/01/2024	18.3	2/02/2024	16.9	2/03/2024	16.8	2/04/2024	21.7	2/05/2024	8.5	2/06/2024	5.4
3/01/2024	16.5	3/02/2024	28.7	3/03/2024	14.2	3/04/2024	9.2	3/05/2024	8.8	3/06/2024	5.6
4/01/2024	15.2	4/02/2024	25.9	4/03/2024	22.2	4/04/2024	13.5	4/05/2024	6.3	4/06/2024	7.2
5/01/2024	11.7	5/02/2024	18.1	5/03/2024	20.4	5/04/2024	5.6	5/05/2024	6.5	5/06/2024	6.3
6/01/2024	17.5	6/02/2024	11.7	6/03/2024	18.5	6/04/2024	7.0	6/05/2024	9.1	6/06/2024	6.2
7/01/2024	19.9	7/02/2024	8.9	7/03/2024	24.4	7/04/2024	7.5	7/05/2024	11.2	7/06/2024	3.9
8/01/2024	13.6	8/02/2024	14.4	8/03/2024	14.3	8/04/2024	7.7	8/05/2024	9.3	8/06/2024	4.6
9/01/2024	9.8	9/02/2024	18.8	9/03/2024	18.7	9/04/2024	8.4	9/05/2024	12.5	9/06/2024	5.5
10/01/2024	13.6	10/02/2024	16.6	10/03/2024	19.8	10/04/2024	6.9	10/05/2024	9.8	10/06/2024	4.2
11/01/2024	17.6	11/02/2024	16.3	11/03/2024	17.6	11/04/2024	12.7	11/05/2024	7.1	11/06/2024	4.5
12/01/2024	14.6	12/02/2024	15.4	12/03/2024	18.8	12/04/2024	12.7	12/05/2024	7.3	12/06/2024	6.5
13/01/2024	22.5	13/02/2024	10.5	13/03/2024	29.5	13/04/2024	17.3	13/05/2024	6.7	13/06/2024	7.5
14/01/2024	16.5	14/02/2024	14.8	14/03/2024	28.8	14/04/2024	20.4	14/05/2024	7.7	14/06/2024	10.1
15/01/2024	18.1	15/02/2024	8.4	15/03/2024	21.8	15/04/2024	21.0	15/05/2024	12.3	15/06/2024	4.9
16/01/2024	18.6	16/02/2024	12.3	16/03/2024	17.5	16/04/2024	22.2	16/05/2024	14.9	16/06/2024	3.9
17/01/2024	10.0	17/02/2024	10.9	17/03/2024	10.9	17/04/2024	16.3	17/05/2024	12.6	17/06/2024	5.0
18/01/2024	5.5	18/02/2024	11.7	18/03/2024	9.5	18/04/2024	9.6	18/05/2024	9.6	18/06/2024	5.0
19/01/2024	8.9	19/02/2024	13.5	19/03/2024	12.7	19/04/2024	14.1	19/05/2024	6.7	19/06/2024	6.2
20/01/2024	16.2	20/02/2024	NaN	20/03/2024	13.2	20/04/2024	7.6	20/05/2024	10.0	20/06/2024	7.8
21/01/2024	12.8	21/02/2024	NaN	21/03/2024	15.5	21/04/2024	11.8	21/05/2024	8.7	21/06/2024	5.5
22/01/2024	30.0	22/02/2024	NaN	22/03/2024	15.5	22/04/2024	11.1	22/05/2024	6.9	22/06/2024	5.2
23/01/2024	20.1	23/02/2024	NaN	23/03/2024	14.4	23/04/2024	7.3	23/05/2024	10.1	23/06/2024	5.7
24/01/2024	15.4	24/02/2024	29.7	24/03/2024	13.3	24/04/2024	13.0	24/05/2024	10.3	24/06/2024	4.7
25/01/2024	15.6	25/02/2024	12.3	25/03/2024	8.6	25/04/2024	19.1	25/05/2024	17.2	25/06/2024	8.0
26/01/2024	19.4	26/02/2024	20.6	26/03/2024	13.7	26/04/2024	12.5	26/05/2024	13.1	26/06/2024	11.3
27/01/2024	23.0	27/02/2024	21.9	27/03/2024	38.7	27/04/2024	14.8	27/05/2024	9.9	27/06/2024	6.7
28/01/2024	20.3	28/02/2024	19.6	28/03/2024	28.4	28/04/2024	8.8	28/05/2024	14.4	28/06/2024	6.1
29/01/2024	19.8			29/03/2024	26.1	29/04/2024	10.1	29/05/2024	12.6	29/06/2024	10.3
30/01/2024	21.8			30/03/2024	24.2	30/04/2024	10.0	30/05/2024	14.9	30/06/2024	4.5
31/01/2024	19.7			31/03/2024	31.3			31/05/2024	9.9		

July-24		Aug-24		Sep-24		Oct-24		Nov-24		Dec-24	
Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)	Date	Daily Av (µg/m³)
1/07/2024	6.5	1/08/2024	8.9	1/09/2024	9.4	1/10/2024	11.3	1/11/2024	12.8	1/12/2024	10.6
2/07/2024	7.8	2/08/2024	6.7	2/09/2024	15.2	2/10/2024	17.4	2/11/2024	17.1	2/12/2024	14.8
3/07/2024	9.4	3/08/2024	8.6	3/09/2024	12.2	3/10/2024	18.3	3/11/2024	12.9	3/12/2024	16.3
4/07/2024	10.7	4/08/2024	11.3	4/09/2024	13.4	4/10/2024	14.8	4/11/2024	17.6	4/12/2024	12.4
5/07/2024	11.2	5/08/2024	14.3	5/09/2024	16.4	5/10/2024	8.3	5/11/2024	19.5	5/12/2024	19.3
6/07/2024	8.7	6/08/2024	6.1	6/09/2024	15.4	6/10/2024	10.3	6/11/2024	15.6	6/12/2024	16.5
7/07/2024	8.0	7/08/2024	6.0	7/09/2024	13.9	7/10/2024	8.2	7/11/2024	18.7	7/12/2024	10.2
8/07/2024	6.4	8/08/2024	9.7	8/09/2024	8.1	8/10/2024	10.6	8/11/2024	9.6	8/12/2024	11.9
9/07/2024	5.1	9/08/2024	11.9	9/09/2024	8.0	9/10/2024	11.6	9/11/2024	16.0	9/12/2024	14.6
10/07/2024	4.1	10/08/2024	12.0	10/09/2024	15.3	10/10/2024	10.3	10/11/2024	19.9	10/12/2024	13.5
11/07/2024	3.9	11/08/2024	16.6	11/09/2024	18.0	11/10/2024	14.2	11/11/2024	15.1	11/12/2024	16.7
12/07/2024	6.1	12/08/2024	12.2	12/09/2024	10.4	12/10/2024	17.5	12/11/2024	10.7	12/12/2024	12.6
13/07/2024	4.2	13/08/2024	NaN	13/09/2024	7.2	13/10/2024	15.8	13/11/2024	12.4	13/12/2024	15.1
14/07/2024	5.0	14/08/2024	5.1	14/09/2024	8.8	14/10/2024	15.3	14/11/2024	13.0	14/12/2024	23.8
15/07/2024	3.4	15/08/2024	7.2	15/09/2024	4.8	15/10/2024	8.8	15/11/2024	NaN	15/12/2024	26.1
16/07/2024	3.7	16/08/2024	6.2	16/09/2024	8.6	16/10/2024	10.3	16/11/2024	NaN	16/12/2024	20.3
17/07/2024	4.4	17/08/2024	3.6	17/09/2024	10.1	17/10/2024	11.7	17/11/2024	NaN	17/12/2024	16.0
18/07/2024	6.5	18/08/2024	5.2	18/09/2024	7.5	18/10/2024	12.1	18/11/2024	NaN	18/12/2024	15.0
19/07/2024	4.7	19/08/2024	13.2	19/09/2024	10.9	19/10/2024	5.3	19/11/2024	18.7	19/12/2024	19.5
20/07/2024	10.2	20/08/2024	13.9	20/09/2024	11.5	20/10/2024	12.3	20/11/2024	16.1	20/12/2024	18.4
21/07/2024	14.2	21/08/2024	13.2	21/09/2024	8.5	21/10/2024	16.0	21/11/2024	13.9	21/12/2024	26.4
22/07/2024	8.4	22/08/2024	6.1	22/09/2024	8.8	22/10/2024	15.5	22/11/2024	14.3	22/12/2024	22.1
23/07/2024	7.3	23/08/2024	12.2	23/09/2024	10.4	23/10/2024	16.1	23/11/2024	21.0	23/12/2024	26.3
24/07/2024	7.8	24/08/2024	11.1	24/09/2024	14.2	24/10/2024	10.4	24/11/2024	24.0	24/12/2024	17.4
25/07/2024	10.6	25/08/2024	10.3	25/09/2024	24.7	25/10/2024	10.5	25/11/2024	21.4	25/12/2024	16.9
26/07/2024	6.0	26/08/2024	9.5	26/09/2024	11.9	26/10/2024	20.8	26/11/2024	13.2	26/12/2024	14.8
27/07/2024	6.6	27/08/2024	6.8	27/09/2024	9.0	27/10/2024	16.2	27/11/2024	15.9	27/12/2024	21.1
28/07/2024	4.5	28/08/2024	8.7	28/09/2024	12.0	28/10/2024	14.6	28/11/2024	15.7	28/12/2024	11.4
29/07/2024	6.2	29/08/2024	13.7	29/09/2024	12.8	29/10/2024	21.1	29/11/2024	16.7	29/12/2024	12.2
30/07/2024	NaN	30/08/2024	13.1	30/09/2024	9.1	30/10/2024	16.9	30/11/2024	6.9	30/12/2024	26.9
31/07/2024	NaN	31/08/2024	14.3			31/10/2024	11.1			31/12/2024	22.8

3. Air Quality Monitoring Locations



GLENCORE