

**Mount Pleasant Operation
Monthly Environmental Monitoring Report**

December 2022

1. Introduction

The Mount Pleasant Operation (MPO) is located in the Upper Hunter Valley of New South Wales, approximately three kilometres (km) north-west of Muswellbrook and approximately 50 km north-west of Singleton. The villages of Aberdeen and Kayuga are located 12 km north-northeast and 3 km north of the operations, respectively.

The purpose of this report is to provide a monthly update of monitoring data in accordance with the requirements of NSW Environmental Protection Licence (EPL) 20850, Section 66(6) of the *Protection of the Environment Operations Act 1997 (POEO Act)* and the MPO Development Approval (DA 92/97).

Table 1-1 – Mount Pleasant Operation

Name of Operation	Mount Pleasant Operation
Name of Licensee	MACH Energy Australia Pty Ltd
Environmental Protection Licence	20850
Project Approval	DA 92/97
Reporting Period Start Date	1 December 2022
Reporting Period End Date	31 December 2022
Date All Data Received	30 January 2023

Links to two key regulatory documents are provided here:

- [MACH Energy Environment Protection Licence EPL 20850; and](#)
- [Mount Pleasant Operation Development Application Approval DA 92/97.](#)

2. Monitoring Requirements

The MPO EPL 20850 specifically requires the monitoring of:

- 2 x Palas Fidas Air Quality Monitoring sites;
- Noise monitoring;
- Blast monitoring; and
- Meteorological monitoring.

Monitoring of sites not required by the EPL are carried out in accordance with *MPO Environmental Monitoring Program (EMP)* and Project Approval (DA 92/97).

All monitoring is undertaken by suitably qualified and experienced person(s).

The MPO Environmental Monitoring Network is shown in the following figures:

- **Figure 2-1** shows MPO attended noise monitoring locations and Noise Assessment Groups (NAGs);
- **Figure 2-2** shows the MPO Air Quality Monitoring network;
- **Figure 2-3** shows the MPO Blast Monitoring Locations;
- **Figure 2-4** shows the MPO Groundwater Monitoring network; and
- **Figure 2-5** shows the MPO Surface Water Monitoring network.

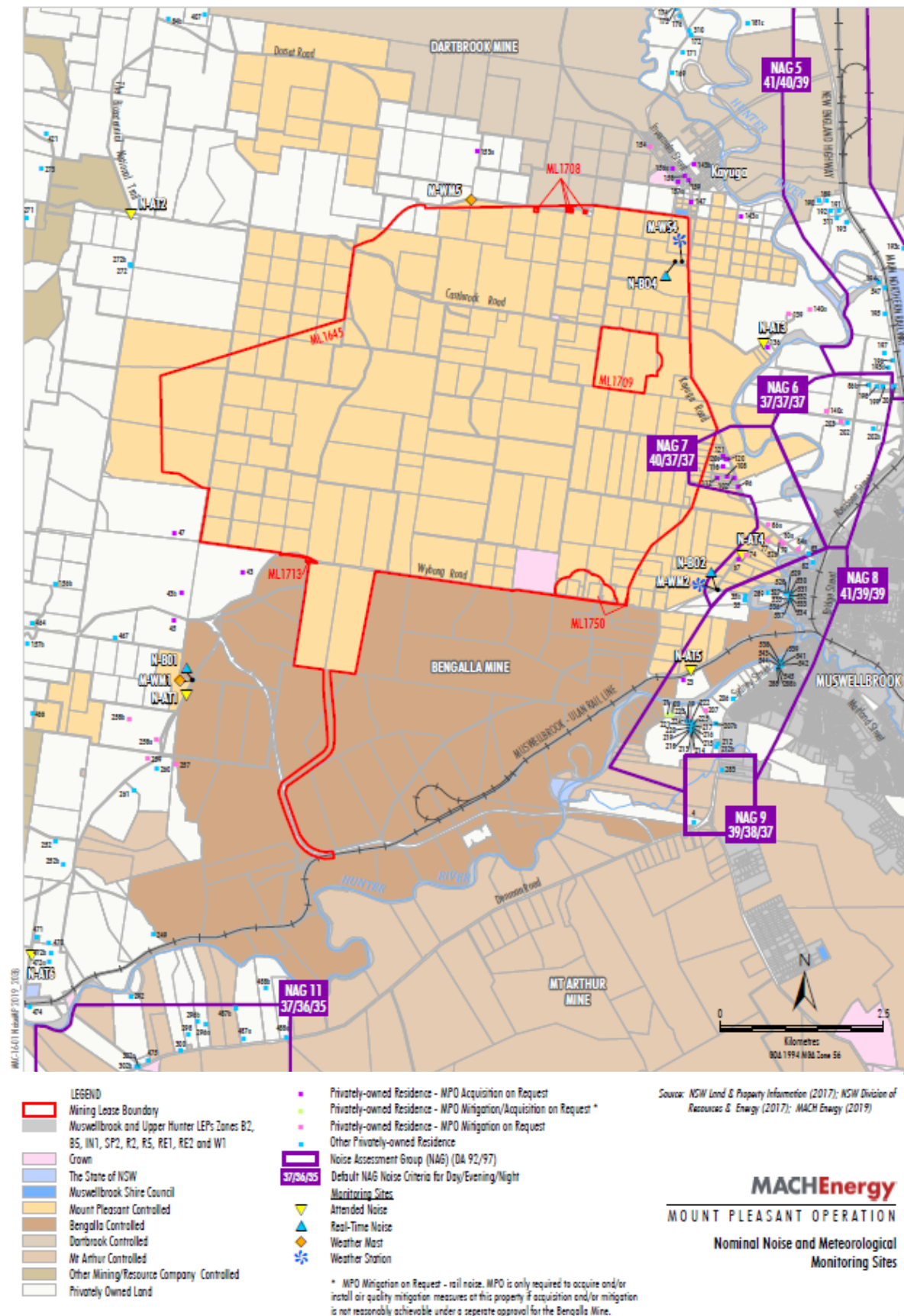


Figure 2-1 – MPO Attended Noise Monitoring Assessment Groups and Locations

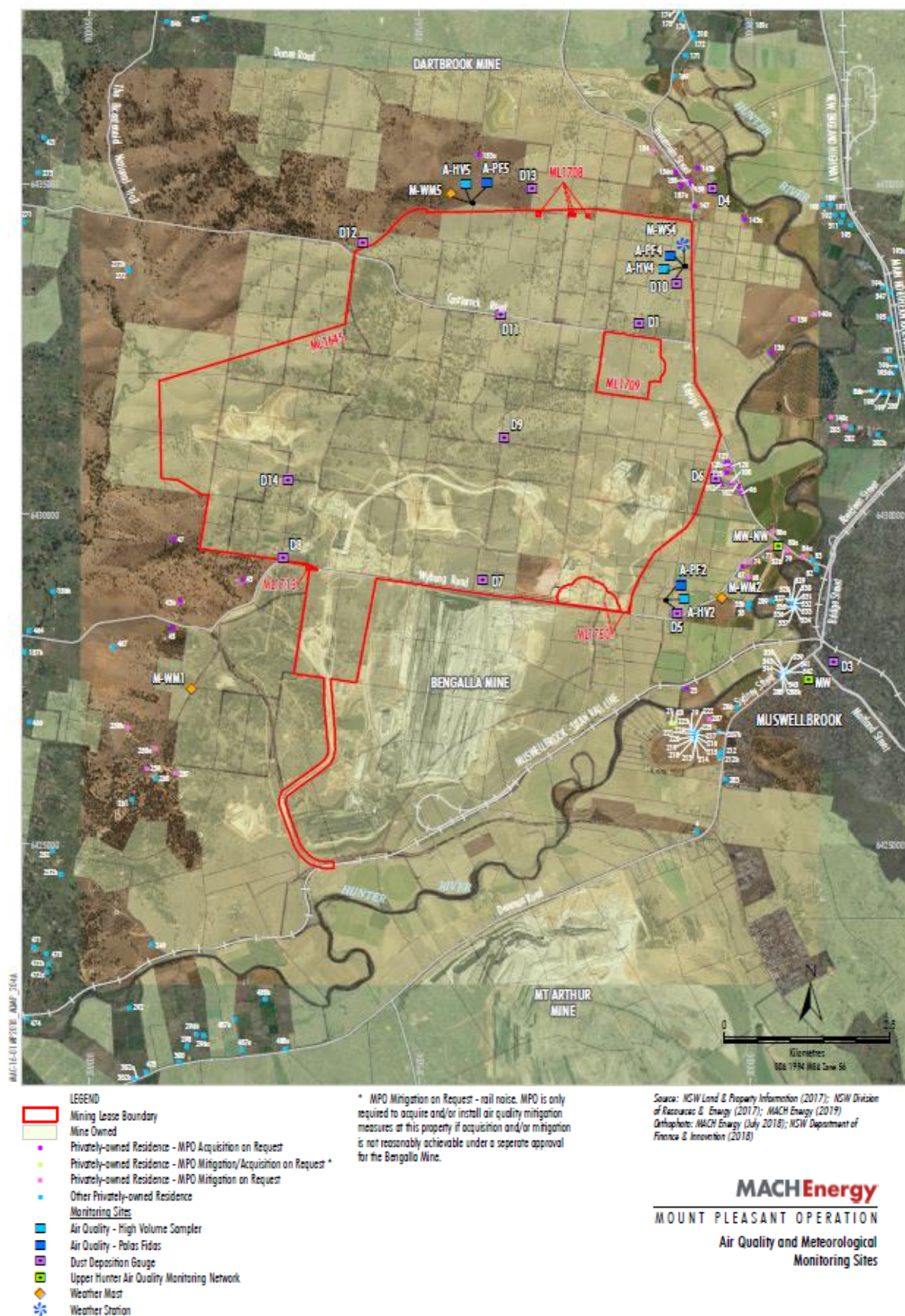
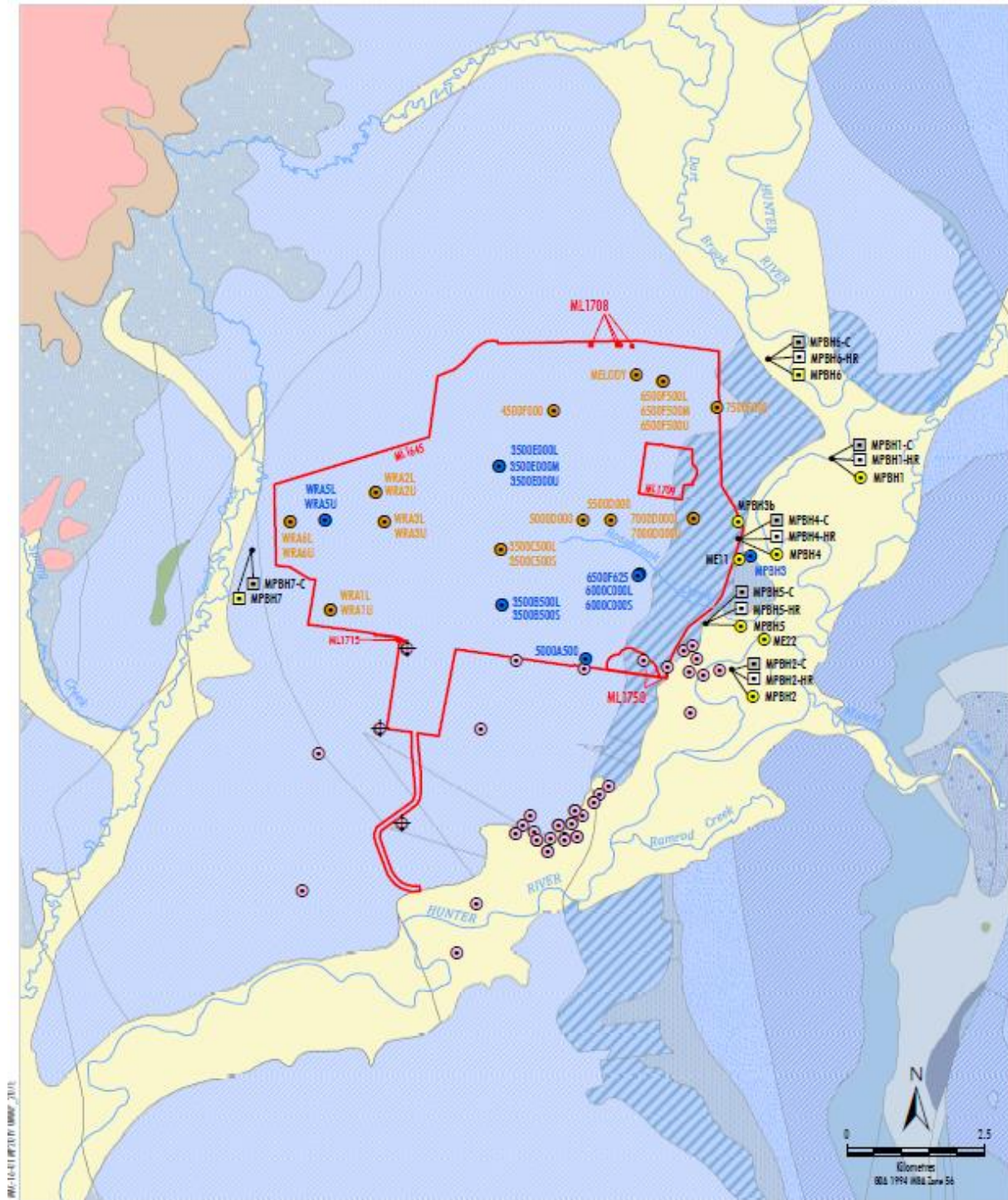


Figure 2-2 – MPO Air Quality and Meteorological Monitoring Network



- LEGEND**
- Mining Lease Boundary
 - Mount Pleasant Monitoring
 - Standpipe
 - Standpipe - Alluvium
 - Standpipe - Historical
 - Planned Mount Pleasant Monitoring
 - Standpipe - Coal Seam
 - Standpipe - Interburden
 - Standpipe - Alluvium
 - Borehole Monitoring
 - ⊕ Standpipe
 - ⊕ Vibrating Wire Piezometer

Sources: NSW Land & Property Information (2019); NSW Division of Resources & Energy (2019); MACH Energy (2019)

Note: Refer Figure 3 for geology legend

MACHEnergy
MOUNT PLEASANT OPERATION
Augmentations to the
Groundwater Monitoring Network

Figure 2-4 – MPO Groundwater Monitoring Network

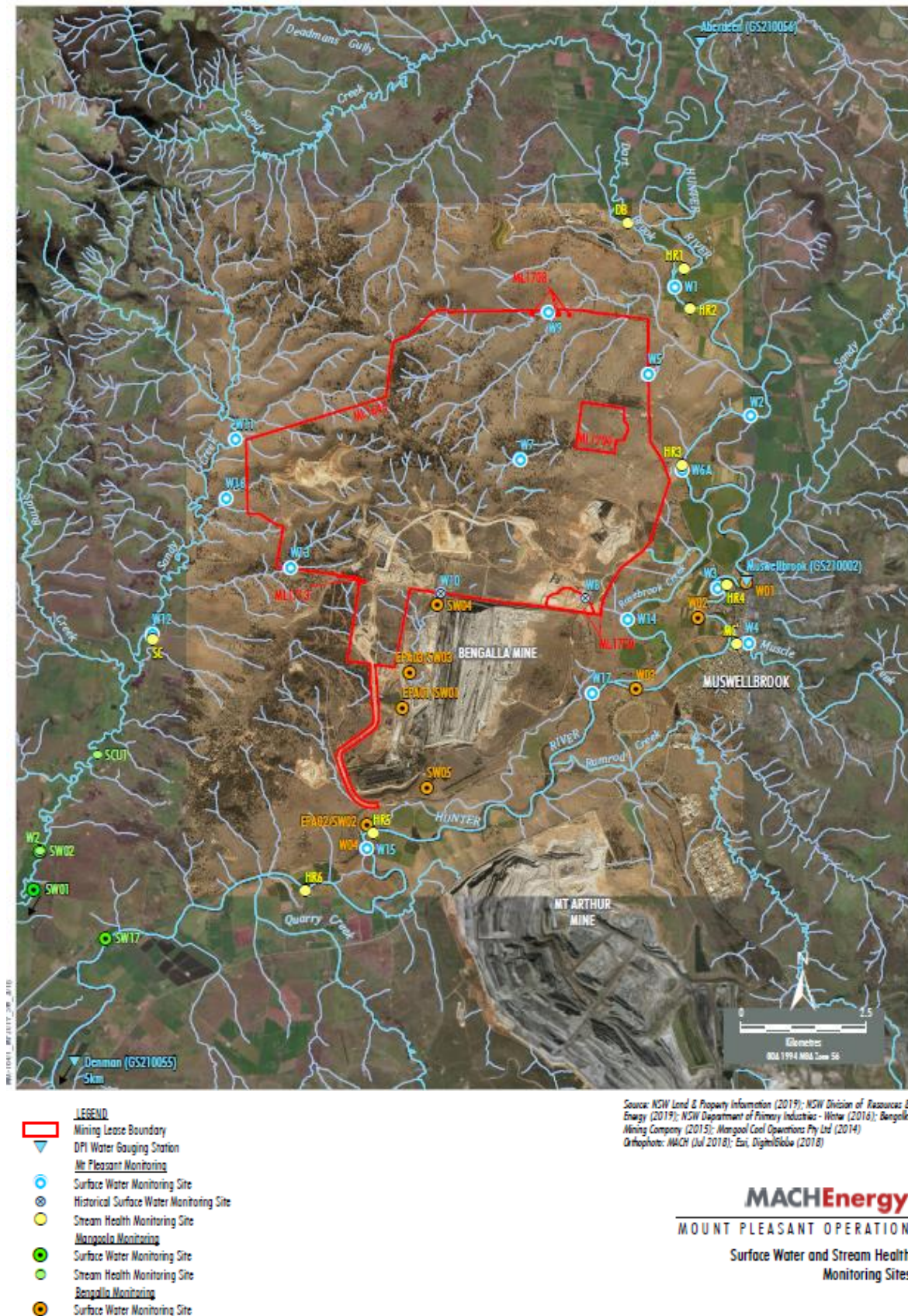


Figure 2-5 – MPO Surface Water Monitoring Network

3. Meteorological Monitoring

Weather data is measured continuously at the Kayuga Road (M-WS4) and the Wybong Road (M-WS2) meteorological stations. In addition to air quality parameters (PM₁₀ and PM_{2.5}), the weather stations measure wind speed and direction, temperature (at 2 metres (m) and 10m), temperature inversion (using the sigma theta method), solar radiation, relative humidity, rainfall and atmospheric pressure.

The majority of meteorological data was captured at M-WS2 (100%) during December 2022 (the monitoring period), with the exception of solar radiation parameters (94.1%). The majority of data for this meteorological parameter was captured at M-WS4 (96.1%) during the monitoring period.

Throughout December 2022, there was 13mm and 13.4mm of rainfall recorded at M-WS2 and M-WS4, respectively.

4. Dust Depositional Monitoring

4.1 Methodology

Dust deposition was monitored according to the OEH's *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (DECC 2007), which references *Australian Standard (AS)/New Zealand Standard (NZS) 3580.10.1:2016 Methods for Sampling and Analysis of Ambient Air: Determination of particulate matter – Deposited matter – Gravimetric Method*. The dust deposition monitoring network comprises of 13 dust deposition gauges (DDG). Details of the monitoring locations are shown in **Figure 2-2**.

DDG samples can be contaminated by a variety of means, notably by the presence of insects and bird droppings. Results for contaminated gauges were not included in the calculation of the annual averages as this would result in skewed or misleading results for the purpose of dust deposition assessment. The Australian Standard does not provide criteria for the determination of contamination of a DDG. A gauge sample is determined by AECOM to be contaminated only after reference to field observation sheets, historical monitoring location data, laboratory notes and results, prevailing atmospheric conditions and feedback from field technicians. For example, a gauge sample with a statistically abnormally high insoluble solids result, a low ash residue result (indicating a high level of organic matter) and field notation that bird droppings or insects were present is likely to be considered contaminated.

4.2 Results

The dust deposition exposure period for gauges commenced on 17 November 2022. Sample collection was undertaken on 15 December 2022 (with the exception of dust gauge D7b which was collected on 19 December 2022) by AECOM with sample analysis performed by ALS, a National Accreditation and Testing Authority (NATA) accredited laboratory. Results are summarised in **Table 4-1**. Annual rolling averages for December 2022 have been provided as an indication of performance between December 2021 – December 2022 and does not represent annual average results for 2022 as per Schedule 3, Condition 20 of DA 92/97.

Table 4-1: Dust Depositional Results – December 2022

Location	YTD Insoluble Solids (g/m ² .month)	Insoluble Solids Annual Rolling Average (g/m ² .month)
D1	2.3	2.3
D3*	-	-
D4	1.0	1.0
D5a	2.2	2.2
D6	1.6	1.6
D7b	6.2	6.2
D8	3.2	3.2
D9a	2.4	2.4
D10	0.9	0.9
D11	1.9	1.9
D12	0.6	0.6
D13	1.1	1.1
D14	2.8	2.8
<i>Criterion</i>	-	4

Notes:

Results in **bold** indicate an elevated measurement of adopted assessment criteria

* not in service.

Contaminated results, as described in Section 4.1, are not included in the 12-month rolling average. Site D7b is located within close proximity to the northern boundary of a neighbouring mining operation and thus can be influenced by this site. D7b will continue to be monitored, however will not be used to assess compliance or to represent residential receivers in the area. Furthermore, there are no privately-owned receivers in the vicinity of D8 and D14. Whilst these sites do not represent residence(s) on privately-owned land, they will continue to be monitored in accordance with the *MPO Air Quality and Greenhouse Gas Management Plan* (MACH Energy, 2019).

Field notes from the December sampling event noted that all the gauges contained insects with one gauge also containing bird droppings. **Figure 4-1** compares the monthly insoluble solids results to the annual averages for each dust gauge and the assessment criterion.

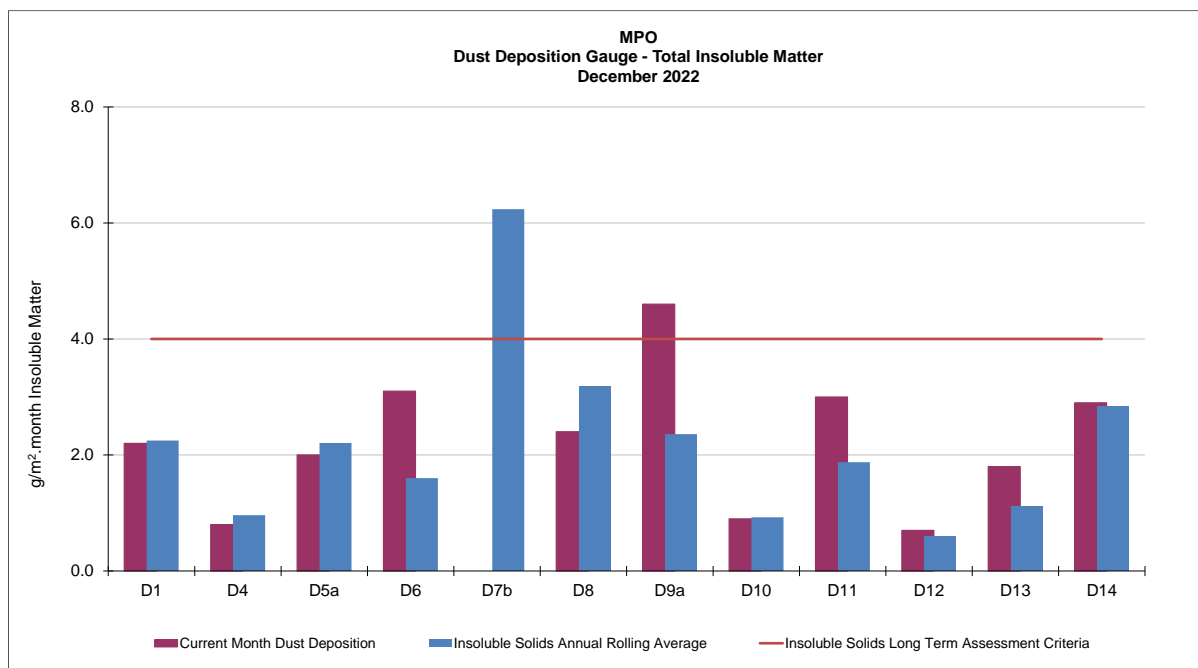


Figure 4-1: MPO Dust Deposition Monthly Results and Annual Rolling Average – December 2022

5. Total Suspended Particulates

All High Volume Air Samplers (HVAS) are run for 24 hours every six days in accordance with *AM-15 of Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (DECC, 2007), referencing *AS/NZS 3580.9.3:2015 Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – Total suspended particulate matter (TSP) - High volume sampler gravimetric method*, for the monitoring of TSP.

Three TSP HVAS units are included in the MPO air quality monitoring network and are displayed in **Table 5-1** below. These units were commissioned in March 2017.

Table 5-1 Total Suspended Particulate Monitoring Sites

ID	Description
A-PF2	Reilly's
M-WS4	Kayuga Road Met Station
A-PF5	Athlone

5.1 Assessment Criteria

TSP is assessed against the guidelines defined in the *EPA Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2016) and Project Approval DA 92/97. The DA 92/97 specifies an annual average project contribution plus background criterion of 90 µg/m³.

5.2 Results

In December 2022, sample collection was undertaken by AECOM with sample analysis performed by ALS, a NATA accredited laboratory. TSP results for the monitoring period are provided in **Table 5-2**. Annual rolling averages for December 2022 have been provided as an

indication of performance between December 2021 – December 2022 and do not represent annual average results for 2022 as per Schedule 3, Condition 20 of DA 92/97.

Table 5-2 Total Suspended Particulate Monitoring Data – December 2022

Run Date	Assessment Criterion	TSP $\mu\text{g}/\text{m}^3$		
		HVAS A-PF2	HVAS M-WS4	HVAS A-PF5
6/12/2022	-	114	61.7	40.9
12/12/2022	-	88.6	34.5	36.7
18/12/2022	-	31.1	42.2	26.0
24/12/2022	-	33.4	34.2	37.7
30/12/2022	-	54.2	67.4	34.8
Monthly Mean	-	64.3	48.0	35.2
Annual Rolling Average	90	39	30	27

Note: Results in **bold** indicate an elevated reading

5.3 Discussion

For the reporting period, the annual rolling average TSP data at all sites was below the annual average criterion of $90 \mu\text{g}/\text{m}^3$.

6. Real Time Air Quality Monitoring

Continuous particulate matter less than $10 \mu\text{m}$ (PM_{10}) and particulate matter less than $2.5 \mu\text{m}$ ($\text{PM}_{2.5}$) monitoring was conducted by three Palas Fidas units (one utilised for management only) at MPO during December 2022.

The EPA identification numbers 1 and 2 refer to Palas Fidas units installed on Wybong Road (A-PF2) and Dorset Road (A-PF5), respectively. In addition, a third unit (A-PF4) is installed on Kayuga Road with data used for management purposes only.

Real time PM_{10} and $\text{PM}_{2.5}$ 12-month rolling averages for December 2022 have been provided in Section 6.2 and 6.4 respectively, as an indication of performance during 2022 as per Schedule 3, Condition 20 of DA 92/97.

6.1 PM_{10} Results – 24 Hour Rolling Average

In accordance with the DA 92/97 limit of $50 \mu\text{g}/\text{m}^3$ for the 24 hour rolling average, there was one elevated reading measured on December 12th 2022. Real time PM_{10} 24 hour rolling average results for December 2022 are presented in **Table 6-1**.

Table 6-1: MPO Palas Fidas PM₁₀ Data – December 2022

Date	A-PF2/EPA ID 1	A-PF4	A-PF5/EPA ID 2	Muswellbrook NW	Muswellbrook NW 24 Hour Average Limit (µg/m³)	A-PF2, A-PF4, A-PF5 24 Hour Average Limit (µg/m³)
	24 hour Average Result					
1/12/2022	15	-	-	18.4	44	50
2/12/2022	13	11	-	15	44	50
3/12/2022	11	10	-	12.1	44	50
4/12/2022	10	11	-	12.5	44	50
5/12/2022	25	12	-	25.8	44	50
6/12/2022	24	14	-	27.5	44	50
7/12/2022	25	11	-	27.8	44	50
8/12/2022	17	10	-	18.4	44	50
9/12/2022	16	16	-	25.3	44	50
10/12/2022	13	11	-	17.7	44	50
11/12/2022	19	14	-	18.4	44	50
12/12/2022	23	11	-	55.5	44	50
13/12/2022	21	8	-	21.9	44	50
14/12/2022	15	8	9	25.2	44	50
15/12/2022	13	8	9	18.3	44	50
16/12/2022	12	11	14	16.6	44	50
17/12/2022	12	11	18	15.7	44	50
18/12/2022	8	8	13	9.5	44	50
19/12/2022	14	13	18	18.3	44	50
20/12/2022	13	14	23	16.8	44	50
21/12/2022	13	12	25	20	44	50
22/12/2022	15	19	28	21.1	44	50
23/12/2022	18	17	17	20.5	44	50
24/12/2022	14	11	12	13.8	44	50
25/12/2022	14	11	12	14.4	44	50
26/12/2022	14	11	15	10.6	44	50
27/12/2022	14	14	25	16.3	44	50
28/12/2022	21	19	23	23.9	44	50
29/12/2022	27	19	35	35.3	44	50
30/12/2022	19	12	18	19.1	44	50
31/12/2022	16	11	19	17.2	44	50

Notes:

Results in bold indicate elevated readings during adverse weather conditions.

Results with "-" indicate dates where data was affected by maintenance or servicing (scheduled and unscheduled)

Figure 6-1 below shows the results of real-time PM₁₀ 24 hour rolling average results at MPO air quality monitoring sites December 2022.

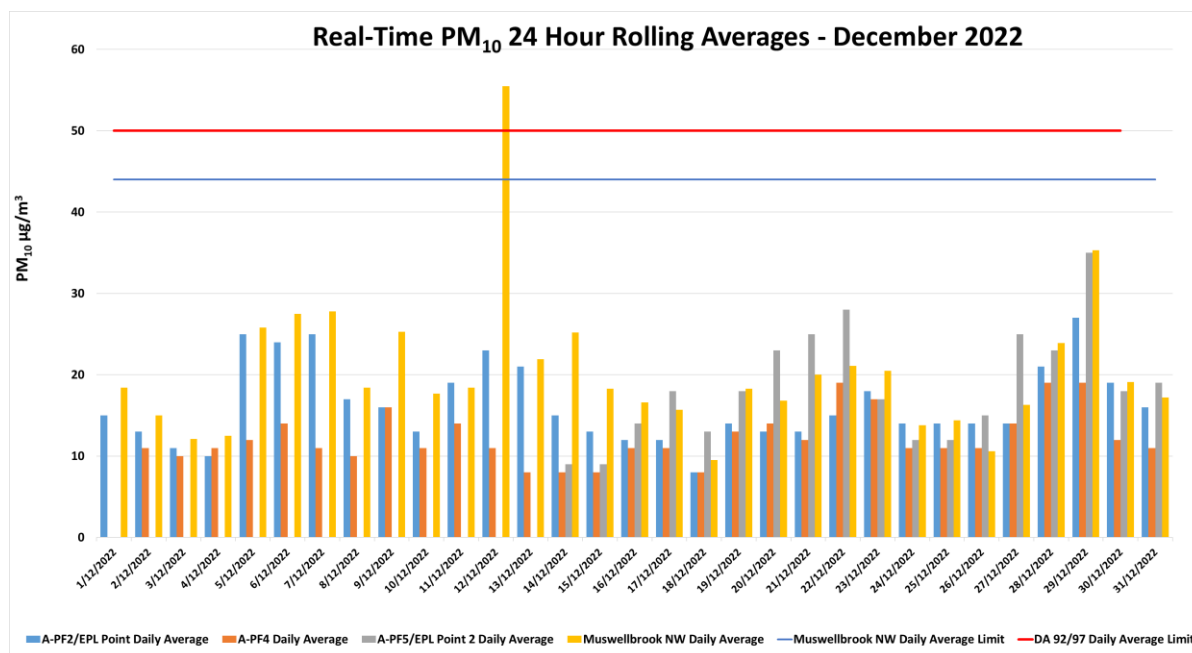


Figure 6-1: Real-time PM₁₀ 24 Rolling Average Results for December 2022.

6.2 PM₁₀ Results – Annual Rolling Average

There were no exceedance of the PM₁₀ annual rolling average reported at MPO during December 2022. Real time PM₁₀ annual rolling averages for December 2022 are presented in **Figure 6-2** below.

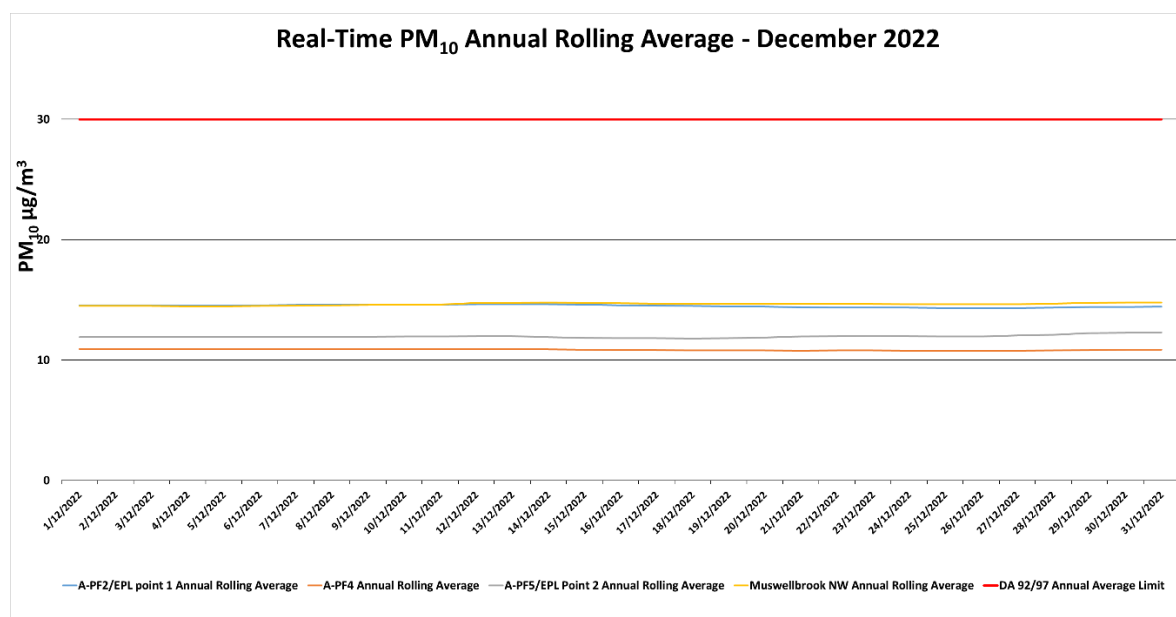


Figure 6-2: Real-time PM₁₀ Annual Rolling Average Results for December 2022.

6.3 PM_{2.5} Results – 24 Hour Rolling Average

There was no exceedance of the PM_{2.5} annual rolling average reported at MPO during December 2022. Real time PM_{2.5} 24 hour rolling average results for December 2022 are presented in **Table 6-2**.

Table 6-2: MPO Palas Fidas PM_{2.5} Data – December 2022

Date	A-PF2/EPA ID 1	A-PF4	A-PF5/EPA ID 2	A-PF2, A-PF4, A-PF5 24 Hour Average Limit (µg/m³)
	24-hour Average Result			
1/12/2022	6	-	-	25
2/12/2022	5	5	-	25
3/12/2022	4	4	-	25
4/12/2022	4	4	-	25
5/12/2022	5	4	-	25
6/12/2022	6	5	-	25
7/12/2022	5	4	-	25
8/12/2022	4	4	-	25
9/12/2022	5	5	-	25
10/12/2022	5	4	-	25
11/12/2022	6	5	-	25
12/12/2022	5	4	-	25
13/12/2022	4	3	-	25
14/12/2022	4	3	3	25
15/12/2022	4	3	3	25
16/12/2022	4	4	5	25
17/12/2022	5	4	5	25
18/12/2022	4	3	4	25
19/12/2022	6	5	6	25
20/12/2022	5	5	6	25
21/12/2022	4	4	6	25
22/12/2022	5	5	6	25
23/12/2022	7	6	6	25
24/12/2022	7	5	5	25
25/12/2022	8	5	6	25
26/12/2022	6	5	5	25
27/12/2022	6	5	6	25
28/12/2022	8	7	7	25
29/12/2022	10	7	9	25
30/12/2022	8	6	7	25

Notes:

Results in **bold** indicate elevated readings during adverse weather conditions.

Results with “-” indicate dates where data was affected by maintenance or servicing (scheduled and unscheduled)

Real time PM_{2.5} 24-hour average results for December 2022 are presented in **Figure 6-3** below.

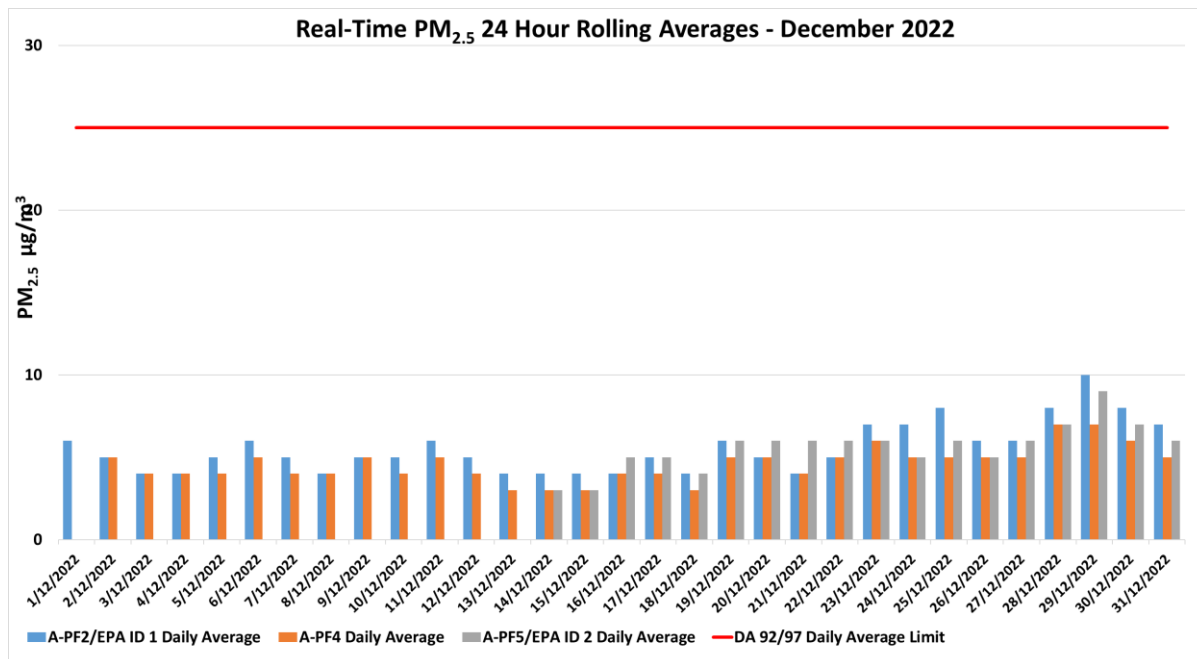


Figure 6-3: Real-time PM_{2.5} 24 hour Rolling Average Results for December 2022.

6.4 PM_{2.5} Results - Annual Rolling Average

There was no exceedance of the PM_{2.5} annual rolling average reported at MPO during December 2022. Real time PM_{2.5} annual rolling averages for December 2022 are presented in **Figure 6-4** below.

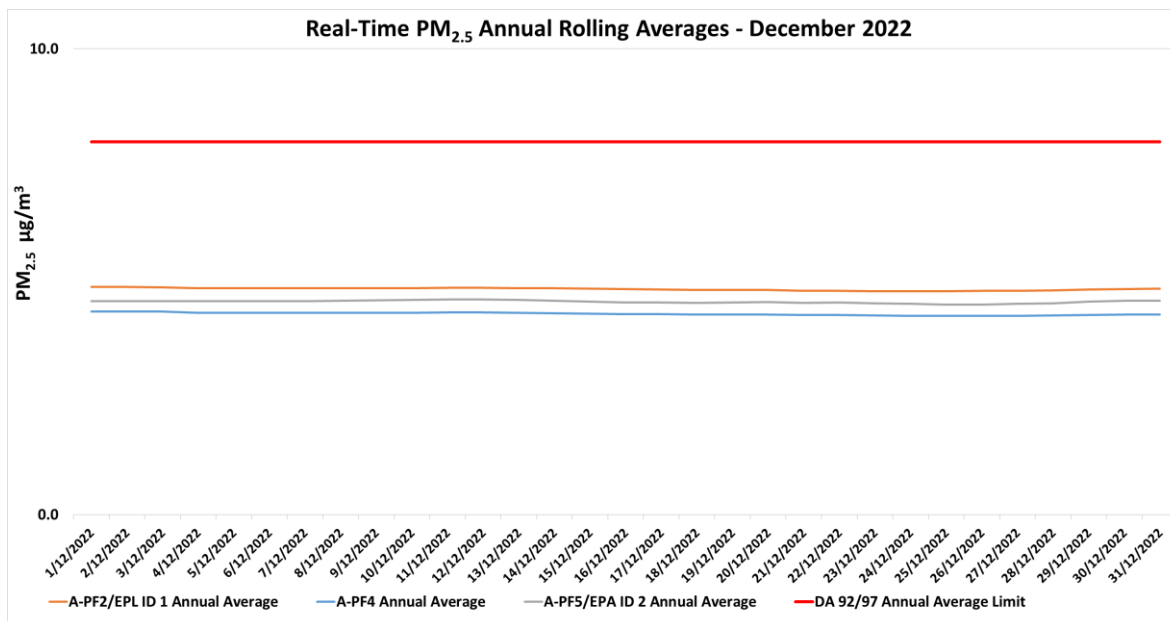


Figure 6-4: Real-time PM_{2.5} Annual Rolling Average Results for December 2022.

7. Surface Water Monitoring

7.1 Methodology

Surface water quality is monitored at 14 sites on a monthly basis, with additional monitoring conducted if triggered by a rain event. A more comprehensive suite of analysis is performed at these sites on a quarterly basis.

7.2 Assessment Criteria

Surface waters were assessed as per the *MPO Water Management Plan* (MACH Energy, 2022) in accordance with site specific trigger values that have been developed using the ANZECC (2000) guidelines for sites that contain a minimum of two years of monthly data. Sites with insufficient data are assessed on default trigger values adopted from ANZECC (2000) guidelines.

7.3 Results

Surface water event monitoring was conducted by AECOM on 21 December 2022. Laboratory analysis was performed by ALS NATA accredited laboratory. Monthly monitoring results for pH, EC, TSS and Total Dissolved Solids (TDS) are presented in **Table 7-1**.

Table 7-1 – MPO Monthly Surface Water Monitoring Results – 21 December 2022

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Dissolved Solids (TDS) (mg/L)	Total Suspended Solids (TSS) (mg/L)
W1	8.2	580	313	9
W2	8.0	640	360	7
W3	8.2	690	377	11
W4	8.0	2400	1440	17
W5	*	*	*	*
W6A	8.2	640	362	7
W9	*	*	*	*
W11	8.0	2900	1520	<5
W12	8.2	3600	1850	6
W13	8.3	3700	1890	8
W14	*	*	*	*
W15	8.1	700	405	16
W16	8.2	7650	4600	7
W17	8.0	690	404	15

Notes:

Results in **bold** indicate elevated reading of adopted assessment criteria.

*Dry or insufficient water to sample.

During the December monthly monitoring, three (3) sites were dry or contained insufficient water to sample. All sites were within their respective pH and TSS levels. Three (3) sites – W5, W9 and W14 - exceeded their EC trigger values. All other sites were within or below their EC respective trigger levels during the monitoring event.

An investigation is triggered if elevated measurements occur for three consecutive sampling events in accordance MPO Water Management Plan (MACH Energy, 2022).

8. Groundwater Monitoring

Quarterly groundwater monitoring was not undertaken in December. The next quarterly monitoring event is scheduled for February 2023.

9. Noise Monitoring

Attended noise monitoring was undertaken during the night period of 5/6 December 2022 at six (6) monitoring locations as per the *MPO Noise Management Plan* (MACH Energy, 2021) in accordance with DA 92/97 and EPL 20850.

9.1 Results

The results for night time attended noise monitoring for noise generated by MPO in December 2022 against noise criteria is shown in **Table 9-1**; **Table 9-2**; and **Table 9-3**.

Table 9-1 – $L_{A1,1min}$ Generated by MPO: Attended Night Monitoring – 5/6 December 2022

Location	Start Date and Time	Wind Speed m/s	Stability Class	Criterion dB	Criterion Applies ¹	MPO Only $L_{A1,1min}$ dB ^{2,4}	Exceedance dB ³
N-AT1	5/12/2022 23:45	3.1	D	45	No	IA	NA
N-AT2	5/12/2022 22:00	3.2	D	45	No	IA	NA
N-AT3	5/12/2022 22:30	1.5	E	45	Yes	40	Nil
N-AT4	5/12/2022 22:55	1.7	F	45	Yes	45	Nil
N-AT5	5/12/2022 23:24	3.1	D	45	No	37	NA
N-AT6	5/12/2022 23:20	3.1	D	45	No	IA	Nil

Notes:

- As per Condition L2.3 of EPL 20850, noise emission limits do not apply during wind speeds greater than 3m/s at 10m above ground level, or stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level, or stability category G temperature inversion conditions;
- Estimated or measured $L_{A1,1minute}$ attributed to MPO;
- NA in exceedance column means meteorological conditions outside those specified in Condition L2.3 of EPL 20850 and thus criterion is not applicable;
- IA = inaudible; and
- Bold results indicate exceedance of criteria.

Table 9-2 – $L_{Aeq,15min}$ Generated by MPO: Attended Night Monitoring – 5/6 December 2022

Location	Start Date and Time	Wind Speed m/s	Stability Class	Criterion dB	Criterion Applies ¹	MPO Only L_{Aeq} dB ^{2,3}	Exceedance dB
N-AT1	5/12/2022 23:45	3.1	D	43	No	IA	NA
N-AT2	5/12/2022 22:00	3.2	D	36	No	IA	NA
N-AT3	5/12/2022 22:30	1.5	E	41	Yes	35	Nil
N-AT4	5/12/2022 22:55	1.7	F	42	Yes	39	Nil
N-AT5	5/12/2022 23:24	3.1	D	40	No	34	NA
N-AT6	5/12/2022 23:20	3.1	D	35	No	IA	Nil

Notes:

- As per Condition L2.3 of EPL 20850, noise emission limits do not apply during wind speeds greater than 3m/s at 10m above ground level, or stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level, or stability category G temperature inversion conditions;
- Estimated or measured $L_{Aeq,15minute}$ attributed to MPO;
- IA = inaudible; and
- Bold results indicate exceedance of criteria.

Table 9-3 – $L_{Aeq,period}$ Cumulative Noise: Attended Night Monitoring – 5/6 December 2022

Location	Start Date and Time	Cumulative Noise Criterion L_{Aeq} dB	Measured Mining Only $L_{Aeq,period}$ dB ^{1,2}	Exceedance dB
N-AT1	5/12/2022 23:45	40	Nil	Nil
N-AT2	5/12/2022 22:00	40	Nil	Nil
N-AT3	5/12/2022 22:30	40	Nil	Nil
N-AT4	5/12/2022 22:55	40	Nil	Nil
N-AT5	5/12/2022 23:24	40	35	Nil
N-AT6	5/12/2022 23:20	40	Nil	Nil

Notes:

- These are the results for MPO and all other mining sources. 15-minute measurements have been assumed to apply across the entire night period as a conservative measure and to represent "worst case" results; and
- By definition, cumulative noise refers to two or more noise sources. If only one other source of mining is audible, or if MPO is inaudible, the measured cumulative noise defined here is 'Nil'.

The purpose of the noise monitoring is to quantify and describe the existing acoustic environment around the mining operation and compare results with relevant limits as per the *MPO Noise Management Plan* (MACH Energy, 2021). Noise levels from MPO complied with noise limits at all monitoring locations during the monitoring period.

10. Blast Monitoring

There were 8 blast events during December (a total of 93 blasts YTD). Results for December 2022 are presented in **Table 10-1**. All blast results during the December 2022 monitoring period were below the criteria in Schedule 3, Condition 10 of DA 92/97 and EPL 20850.

Table 10-1 – MPO Blast Monitoring Results – December 2022

Day & Date Fired	Time Fired	Vibration (mm/s) BVOA	Overpressure (dBL) BVOA	Vibration (mm/s) BVOC	Overpressure (dBL) BVOC	Vibration (mm/s) BVO2	Overpressure (dBL) BVO2	Blast Fume Compliant
2/12/2022 Friday	12:15	0.020	91.7	0.010	95.5	0.000	102.9	Y
6/12/2022 Tuesday	16:48	1.240	101	0.510	100.6	0.460	100.0	Y
8/12/2022 Wednesday	13:29	0.430	109	0.330	105.4	0.280	101.8	Y
15/12/2022 Thursday	16:35	1.26	100.0	0.63	94.2	0.66	97.1	Y
16/12/2022 Friday	14:34	0.95	98.1	0.52	96.1	0.87	101.4	Y
21/12/2022 Wednesday	11:14	0.89	106.6	0.42	96.5	0.40	103.5	Y
22/12/2022 Thursday	13:07	0.68	98.7	0.55	91.8	0.68	99.5	Y
23/12/2022 Friday	12:06	0.94	102.8	0.46	94.0	0.77	98.7	Y

END OF REPORT