

**Mount Pleasant Operation
Monthly Environmental Monitoring Report**

October 2021

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 October 2021
Reporting Period End Date	31 October 2021
Date All Data Received	14 December 2021

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.

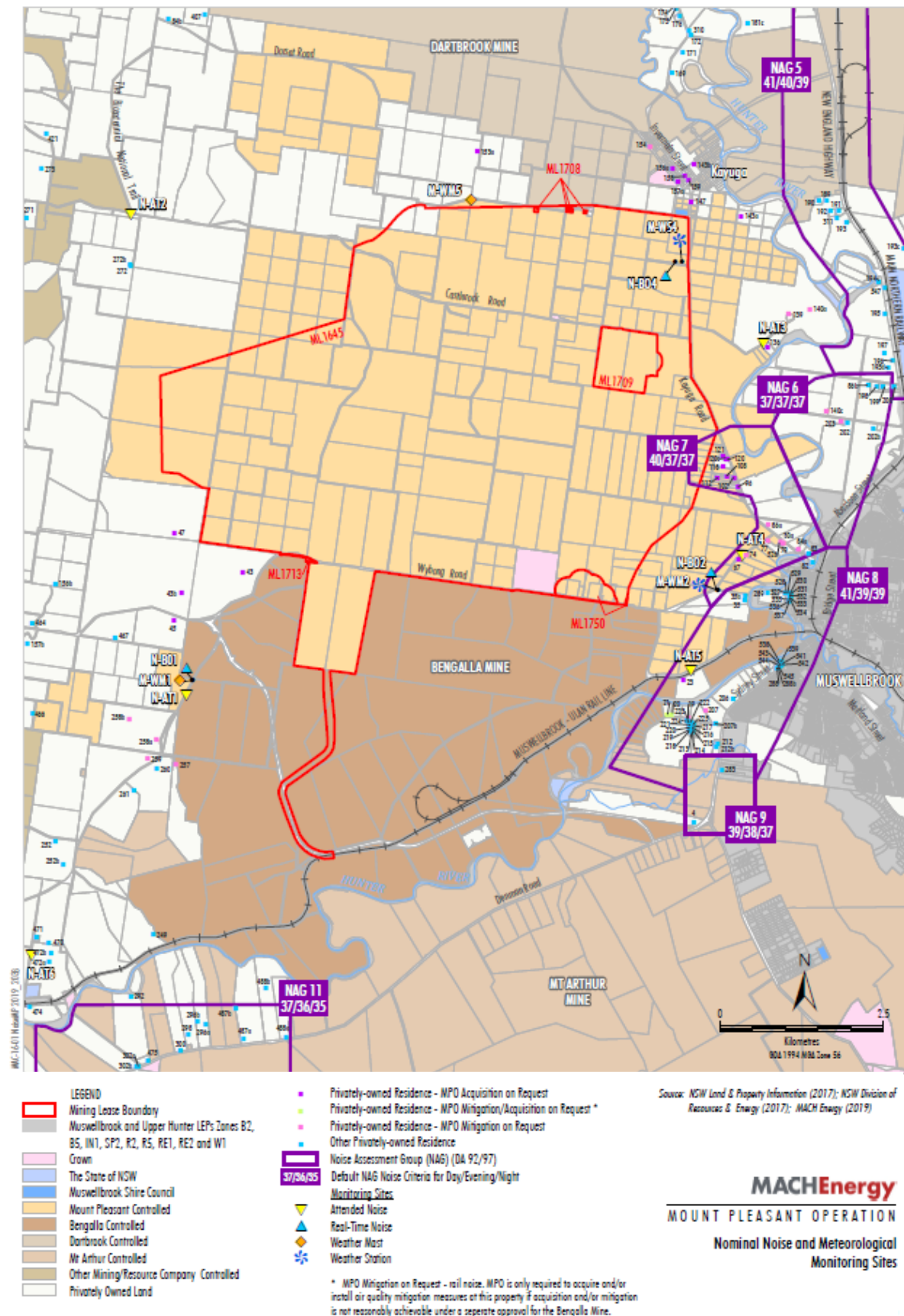


Figure 2-1 – MPO Attended Noise Monitoring Assessment Groups and Locations

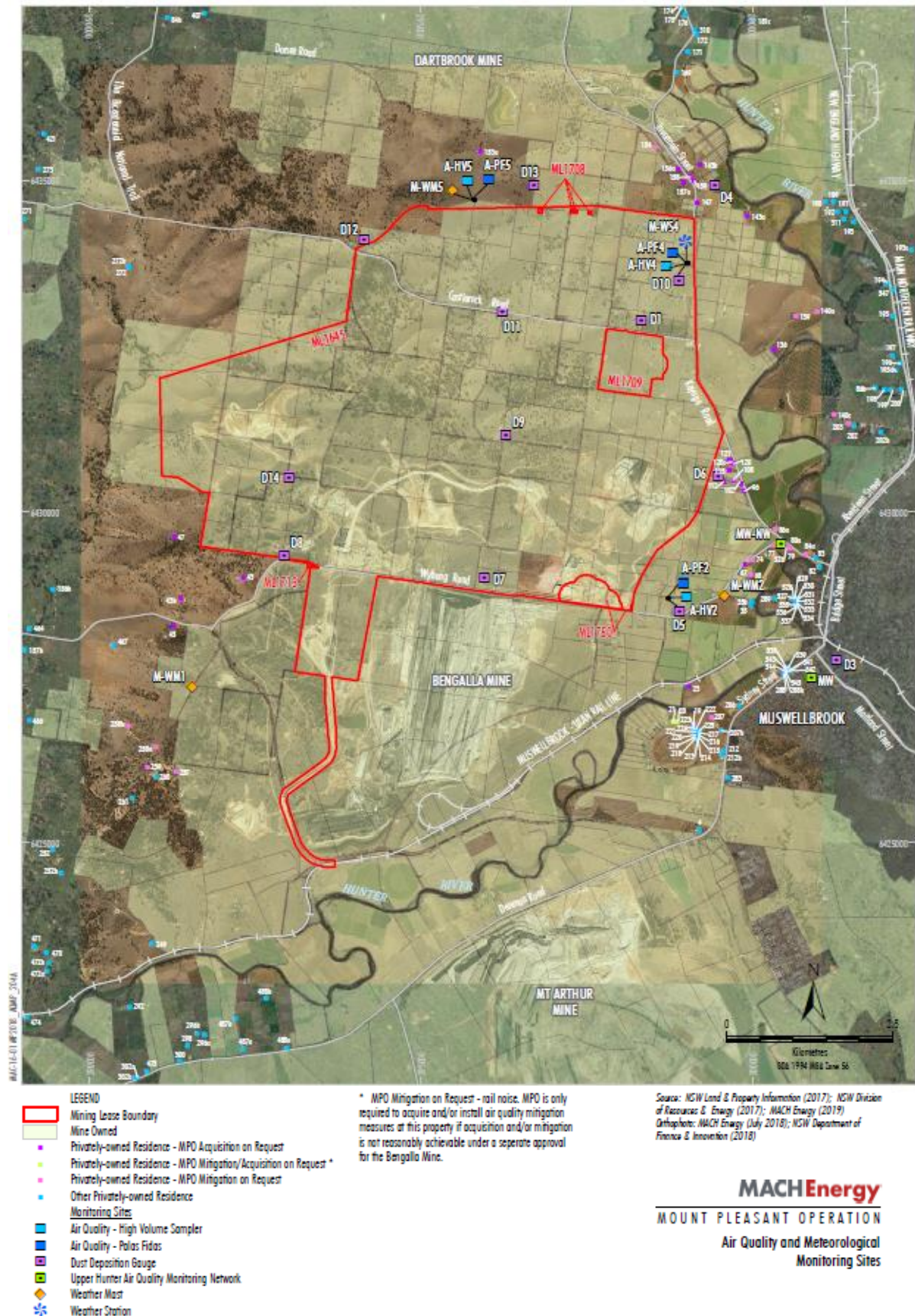
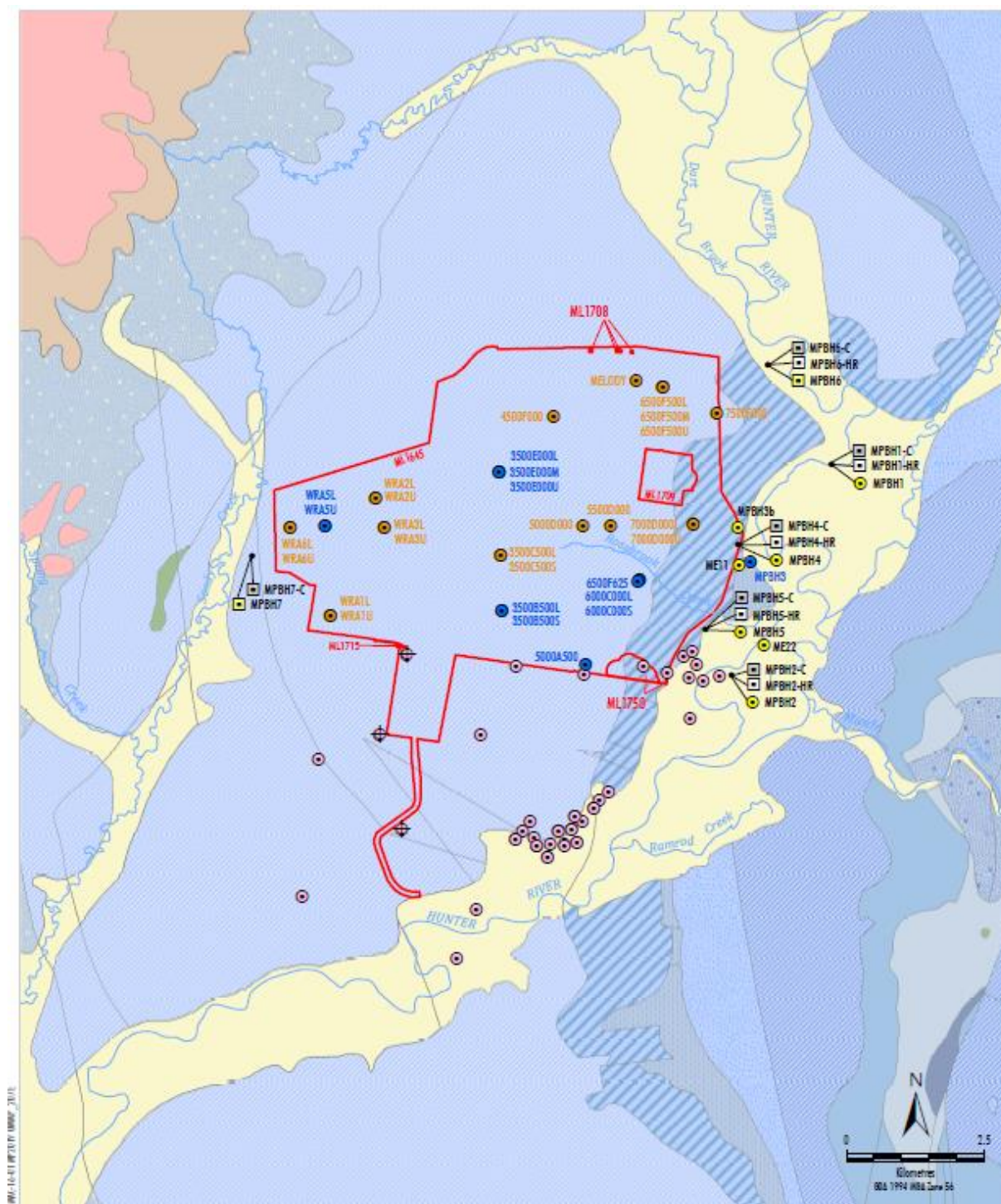


Figure 2-2 – MPO Air Quality and Meteorological Monitoring Network



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

Source: 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, the weather stations measure wind speed and direction (using the sigma theta method), temperature (at 2 m and 10 m), solar radiation, relative humidity, rainfall, atmospheric pressure.

The majority of meteorological data was captured at M-WS2 (100%) during October 2021 (the monitoring period), with the exception of solar radiation (86.8%). The majority of meteorological data was captured at M-WS4 (99.7%) during the monitoring period.

Throughout October 2021, there was 55.4mm and 69.4mm 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 16 September 2021. Sample collection was undertaken on 15 October 2021 by AECOM with sample analysis performed by ALS NATA accredited laboratory. Results are summarised in **Table 4-1**. Annual rolling averages for October 2021 have been provided as an indication of performance between October 2020 – October 2021 and does not represent annual average results for 2021 as per Schedule 3, Condition 20 of DA 92/97.

Table 4-1: Dust Depositional Results – October 2021

Location	YTD Insoluble Solids (g/m ² .month)	Insoluble Solids Annual Rolling Average (g/m ² .month)
D1	2.3	2.3
D3a	1.5	2.0
D4	1.7	2.0
D5	3.1	3.1
D6	2.8	2.8
D7b ¹	8.2	7.3
D8	3.6	3.7
D9a	1.6	1.8
D10	0.9	1.1
D11	1.7	1.8
D12	0.6	0.8
D13	1.5	1.6
D14	2.9	2.9
Criterion	-	4

Notes:

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

**Indicates result unavailable due to contaminated depositional dust gauges for YTD

*** annual rolling average not available as new site location

¹Site D7b is located within close proximity to the northern boundary of a neighbouring mining company's main pit and thus is influenced by activities there. This site will continue to be monitored, however will not be used to assess compliance or to represent residential receivers in the area.

* No data due to dust gauge removed during construction activities

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 October 2021 sampling event noted that all gauges contained insects and two gauges contained bird droppings. Site D3a was unable to be accessed due to a locked

gate for the past three months and was not submitted for analysis. There was insufficient evidence of contamination in all other depositional dust gauges to justify them being deemed contaminated. All October 2021 insoluble solid results were included in the annual rolling average calculations.

Figure 4-1 compares the monthly insoluble solids results to the annual averages for each dust gauge and the assessment criterion.

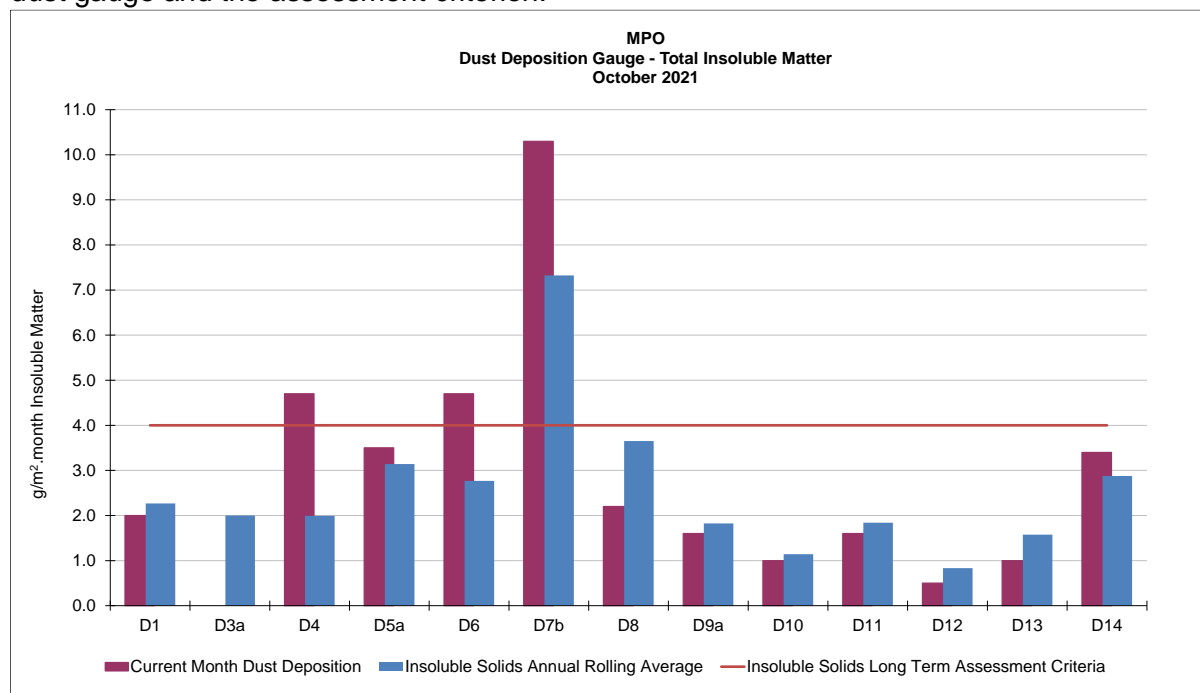


Figure 4-1: MPO Dust Deposition Monthly Results and Annual Rolling Average – October 2021

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 October 2021 sample collection was undertaken by AECOM with sample analysis performed by ALS NATA accredited laboratory. TSP results for the monitoring period are provided in **Table 5-2**. Annual rolling averages for October 2021 have been provided as an indication of performance between October 2020 – October 2021 and do not represent annual average results for 2021 as per Schedule 3, Condition 20 of DA 92/97.

Table 5-2 Total Suspended Particulate Monitoring Data – October 2021

Run Date	Assessment Criterion	TSP µg/m ³		
		HVAS A-PF2	HVAS M-WS4	HVAS A-PF5
6/10/2021	-	106	14.4	20.2
12/10/2021	-	12.2	20.7	11.7
18/10/2021	-	55.6	32.4	27.7
24/10/2021	-	41.9	25.2	29.6
30/10/2021	-	73.8	78.2	57.1
Monthly Mean	-	57.9	34.2	29.3
Annual Rolling Average	90	55	30	29

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 µg/m³.

6. Real Time Air Quality Monitoring

Continuous particulate matter less than 10 µm (PM₁₀) and particulate matter less than 2.5 µm (PM_{2.5}) monitoring was conducted by three Palas Fidas units (one utilised for management only) at MPO during October 2021.

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 PM₁₀ and PM_{2.5} 12-month rolling averages for October 2021 have been provided in Section 6.2 and 6.4 respectively, as an indication of performance between October 2020 – October 2021 and do not represent annual average results for 2021 as per Schedule 3, Condition 20 of DA 92/97.

6.1 PM₁₀ Results – 24 hour rolling average

There were no elevated PM₁₀ measurements reported throughout October 2021. The Muswellbrook NW monitor was operational during all days of October 2021. Real time PM₁₀ 24 hour rolling average results for October 2021 are presented in **Table 6-1**.

Table 6-1: MPO Palas Fidas PM₁₀ Data – October 2021

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					
1/10/2021	12	5	5	10.6	44	50
2/10/2021	12	3	4	9.6	44	50
3/10/2021	12	3	4	10.4	44	50
4/10/2021	18	5	4	23.6	44	50
5/10/2021	28	4	4	28	44	50
6/10/2021	15	5	5	15.8	44	50
7/10/2021	20	4	5	29.2	44	50
8/10/2021	32	9	10	35	44	50
9/10/2021	19	5	7	17	44	50
10/10/2021	26	7	8	25.9	44	50
11/10/2021	8	3	4	5.1	44	50
12/10/2021	8	4	5	7.5	44	50
13/10/2021	7	3	5	6.4	44	50
14/10/2021	14	5	4	11.4	44	50
15/10/2021	19	4	4	20.6	44	50
16/10/2021	12	3	3	13	44	50
17/10/2021	10	3	3	9.4	44	50
18/10/2021	16	4	4	14	44	50
19/10/2021	14	4	4	15.2	44	50
20/10/2021	15	4	5	12.7	44	50
21/10/2021	14	5		14.3	44	50

22/10/2021	19	5		13.3	44	50
23/10/2021	24	6	7	21.5	44	50
24/10/2021	14	4	5	14.4	44	50
25/10/2021	16	5	7	17.8	44	50
26/10/2021	18	5	7	18.9	44	50
27/10/2021	16	5	7	14.7	44	50
28/10/2021	21	4	5	23.9	44	50
29/10/2021	33	5	7	36.5	44	50
30/10/2021	21	5	7	26.9	44	50
31/10/2021	13	4	7	14.6	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 October 2021.

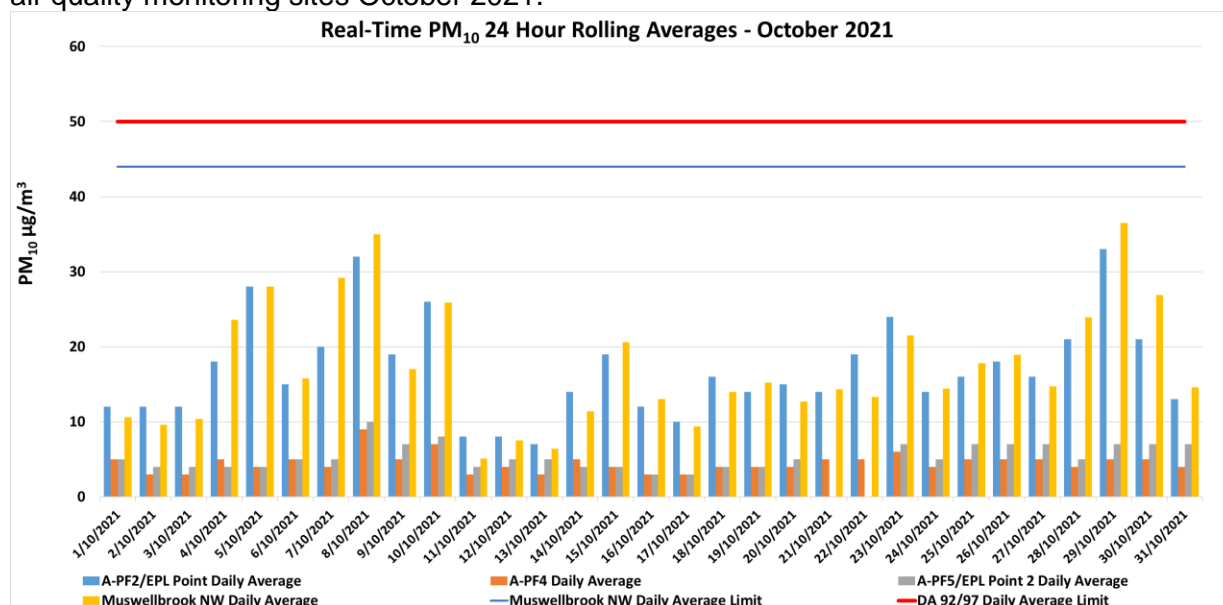


Figure 6-1: Real-time PM₁₀ 24 hour rolling average results for October 2021.

6.2 PM₁₀ Results – Annual rolling average

There were no elevated PM₁₀ measurements reported at MPO for the October 2021 annual rolling average. Real time PM₁₀ annual rolling averages for October 2021 are presented in **Figure 6-2** below.

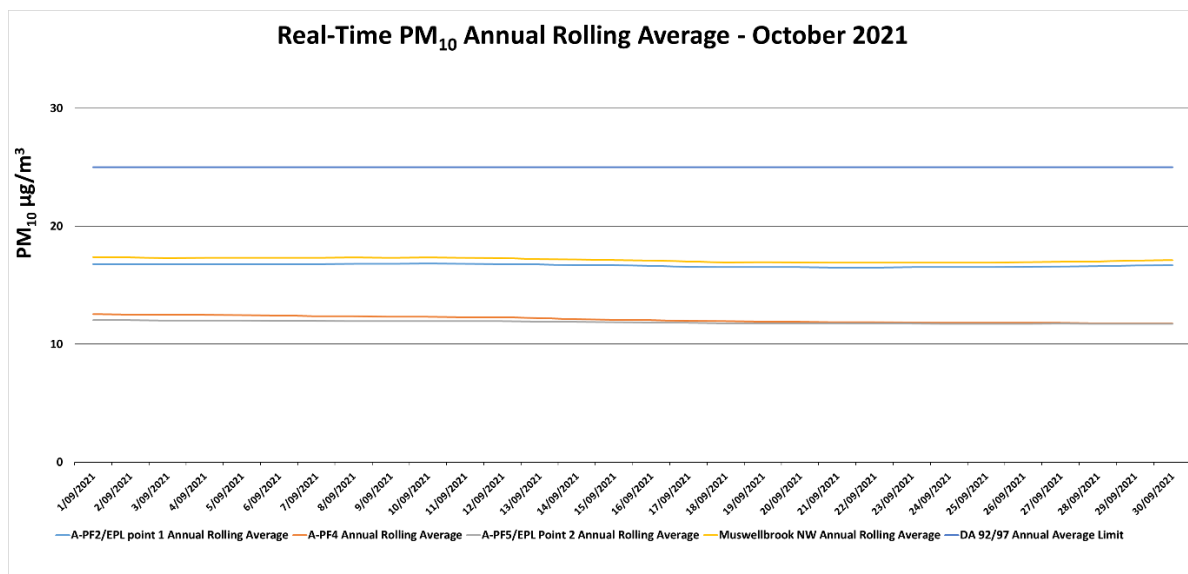


Figure 6-2: Real-time PM₁₀ Annual Rolling average results for October 2021.

6.3 PM_{2.5} Results – 24 hour rolling average

There were no elevated PM_{2.5} measurements reported throughout October 2021. Real time PM_{2.5} 24 hour rolling average results for October 2021 are presented in **Table 6-2**.

Table 6-2: MPO Palas Fidas PM_{2.5} Data – October 2021

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			
1/09/2021	7	6	7	25
2/09/2021	11	10	14	25
3/09/2021	5	4	5	25
4/09/2021	5	4	4	25
5/09/2021	3	3	3	25
6/09/2021	4	4	4	25
7/09/2021	4	4	4	25
8/09/2021	4	4	4	25
9/09/2021	4	4	4	25
10/09/2021	5	4	4	25
11/09/2021	6	5	5	25
12/09/2021	7	6	8	25
13/09/2021	5	4	4	25
14/09/2021	3	3	3	25
15/09/2021	4	4	4	25
16/09/2021	4	5	5	25
17/09/2021	6	5	5	25
18/09/2021	6	4	5	25
19/09/2021	4	4	4	25
20/09/2021	4	3	3	25

21/09/2021	4	3	4	25
22/09/2021	4	4	4	25
23/09/2021	4	3	4	25
24/09/2021	4	3	4	25
25/09/2021	6	5	6	25
26/09/2021	4	4	5	25
27/09/2021	4	4	5	25
28/09/2021	5	5	6	25
29/09/2021	5	4	4	25
30/09/2021	5	4	4	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 October 2021 are presented in **Figure 6-3** below.

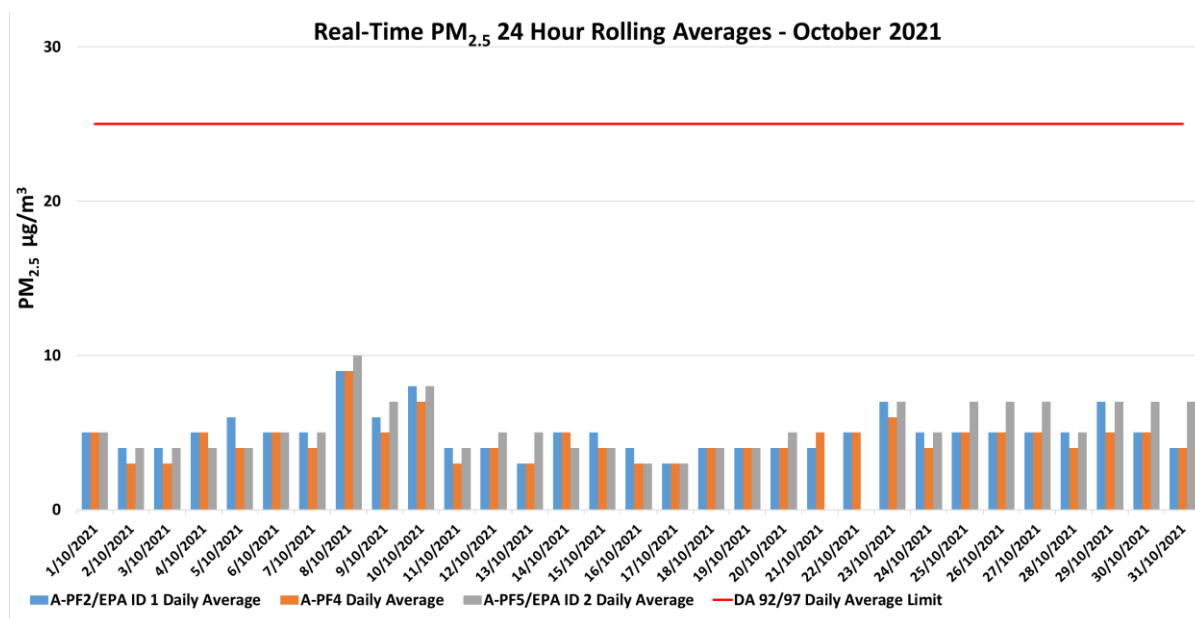


Figure 6-3: Real-time PM_{2.5} 24 hour rolling average results for October 2021.

6.4 PM_{2.5} Results - Annual rolling average

There were no elevated PM_{2.5} measurements reported at MPO for the October 2021 annual rolling average. Real time PM_{2.5} annual rolling averages for October 2021 are presented in **Figure 6-4** below.

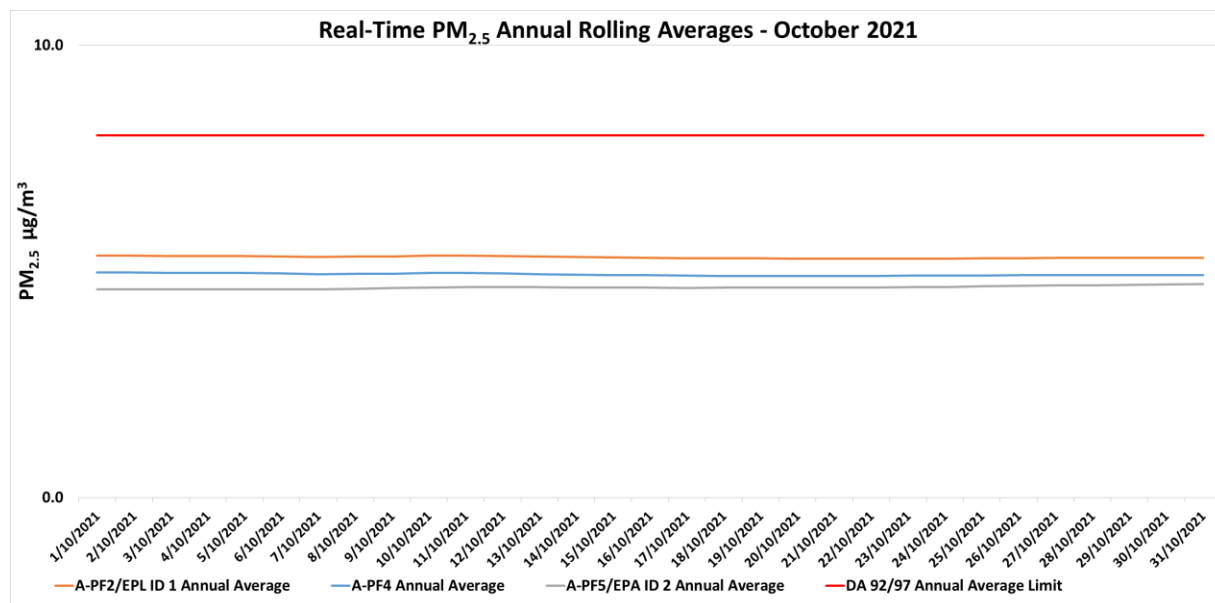


Figure 6-4: Real-time PM_{2.5} Annual Rolling average results for October 2021.

7. Surface Water Monitoring

7.1 Methodology

Surface water quality is monitored at 15 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, 2019) 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

Monthly surface water monitoring was conducted by AECOM on 25 October 2021. 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 – 25 October 2021

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	8.3	580	320	15
W2	8.3	630	336	11
W3	8.2	680	348	18
W4	7.6	1650	924	<5
W5	*	*	*	*
W6A	8.4	630	356	14
W7	*	*	*	*
W9	*	*	*	*
W11	^	^	^	^
W12	7.8	5050	3360	7
W13	*	*	*	*
W14	*	*	*	*
W15	8.1	700	424	20
W16	*	*	*	*
W17	8.2	680	367	31

Notes:

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

*Dry or insufficient water to sample.

** TDS result calculated due to high TSS containing colloidal clay particles which have interfered with the Laboratory TDS result.

^ Indicates no safe access due to wet weather conditions

¹ Results have been rounded in accordance with the In-house method Q4AN(EV)-332-W13 (pH) and In-house method Q4AN(EV)-332-W12 (EC).

** Calculated result due to interference from colloidal material interfering with laboratory result.

During the October 2021 monitoring event, nine of the eighteen monitoring location were found to be dry or contain insufficient water to sample. Site W2, W6A and W17 exceeded their respective EC trigger levels. An investigation will be triggered if elevated measurements occur for three consecutive sampling events in accordance MPO Water Management Plan (MACH Energy, 2019). All other sites were below or inside the assessment trigger ranges.

8. Groundwater Monitoring

Quarterly groundwater monitoring was not undertaken during October 2021. The next scheduled monitoring event is in November 2021.

9. Noise Monitoring

Attended noise monitoring was undertaken during the night period of 18/19 October 2021 at 6 monitoring locations as per the MPO Noise Management Plan (MACH Energy, 2019) 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 October 2021 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 – 18/19 October 2021

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 ^{3,4}
N-AT1	18/10/2021 23:43	1.3	E	45	Yes	40	Nil
N-AT2	18/10/2021 22:10	2.0	E	45	Yes	IA	Nil
N-AT3	18/10/2021 22:41	3.1	D	45	No	52	NA
N-AT4	19/10/2021 00:50	1.9	G	45	No	45	NA
N-AT5	19/10/2021 00:28	1.5	D	45	Yes	38	Nil
N-AT6	19/10/2021 22:34	1.8	E	45	Yes	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; and
- Bold results indicate exceedance of criteria.
- IA indicates inaudible noise attributed to MPO.
- Remeasure

Table 9-2 – $L_{Aeq,15min}$ Generated by MPO: Attended Night Monitoring – 18/19 October 2021

Location	Start Date and Time	Wind Speed m/s	Stability Class	Criterion dB	Criterion Applies ¹	MPO Only L_{Aeq} dB ^{2,4}	Exceedance dB ^{3,4}
N-AT1	18/10/2021 23:43	1.3	E	43	Yes	28	Nil
N-AT2	18/10/2021 22:10	2.0	E	36	Yes	IA	Nil
N-AT3	18/10/2021 22:41	3.1	D	41	No	44	NA
N-AT4	19/10/2021 00:50	1.9	G	42	No	35	NA
N-AT5	19/10/2021 00:28	1.5	D	40	Yes	35	Nil
N-AT6	19/10/2021 22:34	1.8	E	43	Yes	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;
- NA in exceedance column means meteorological conditions outside those specified in Condition L2.3 of EPL 20850 and thus criterion is not applicable; and
- Bold results indicate exceedance of criteria.
- Remeasure

Table 9-3 – $L_{Aeq,period}$ Cumulative Noise: Attended Night Monitoring – 18/19 October 2021

Location	Start Date and Time	Cumulative Noise Criterion L_{Aeq} dB	Measured Mining Only $L_{Aeq,period}$ dB ^{1,2}	Exceedance dB
N-AT1	18/10/2021 23:43	40	Nil	Nil
N-AT2	18/10/2021 22:10	40	Nil	Nil
N-AT3	18/10/2021 22:41	40	Nil	NA
N-AT4	19/10/2021 00:50	40	38	NA
N-AT5	19/10/2021 00:28	40	39	Nil
N-AT6	19/10/2021 22:34	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, 2019). Noise levels from MPO complied with noise limits at all monitoring locations during the monitoring period.

10. Blast Monitoring

There were 5 blast events during October (a total of 64 blasts YTD). Results for October 2021 are presented in **Table 10-1**. All blast results during the October 2021 monitoring period were below the criteria in Schedule 3, Condition 10 of DA 92/97 and EPL 20850 and therefore compliant.

Table 10-1 – MPO Blast Monitoring Results – October 2021

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
Wednesday 6/10/2021	13:02	0.180	101.4	0.150	94.9	0.510	95.9	Y
Saturday 9/10/2021	13:36	0.050	95.3	0.020	102.1	0.070	99.5	Y
Tuesday 19/10/2021	13:15	0.030	87.3	0.030	94.2	0.160	85.9	Y
Friday 22/10/2021	14:02	0.350	92.8	0.260	95.1	0.560	92.1	Y
Friday 29/10/2021	09:14	0.280	108.5	0.100	105.2	0.240	115.7	Y

END OF REPORT