

Mount Pleasant Operation Monthly Environmental Monitoring Report

June 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 June 2021
Reporting Period End Date	30 June 2021
Date All Data Received	30 July 2021

The MPO EPL 20850 and DA 92/97 can be read in full by clicking the links below:

https://machenergyaustralia.com.au/wp-content/uploads/EPL-20850-23-April-2021.pdf

https://machenergyaustralia.com.au/wp-content/uploads/2018-MOD4-Consolidated-Consent.pdf

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.

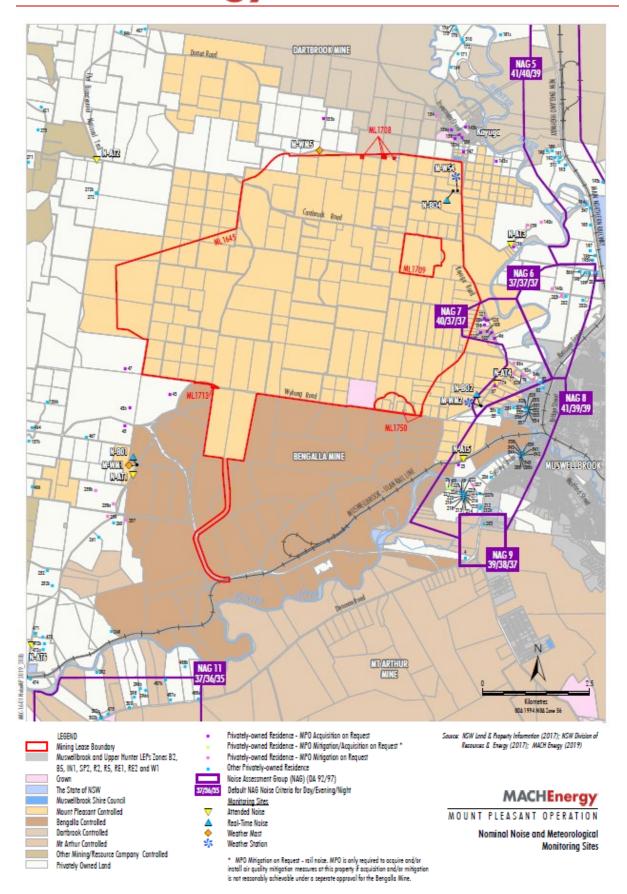


Figure 2-1 – MPO Attended Noise Monitoring Assessment Groups and Locations

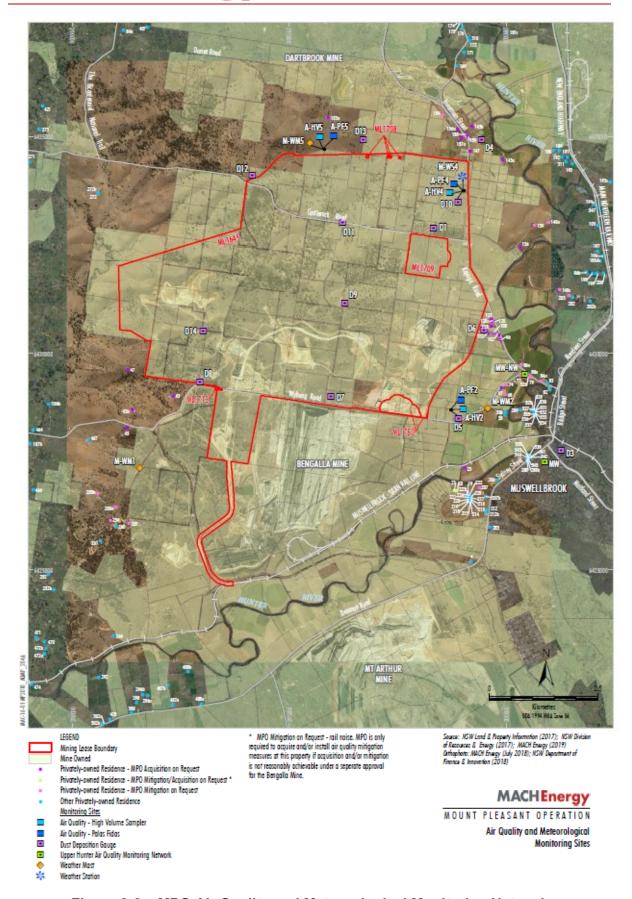


Figure 2-2 – MPO Air Quality and Meteorological Monitoring Network

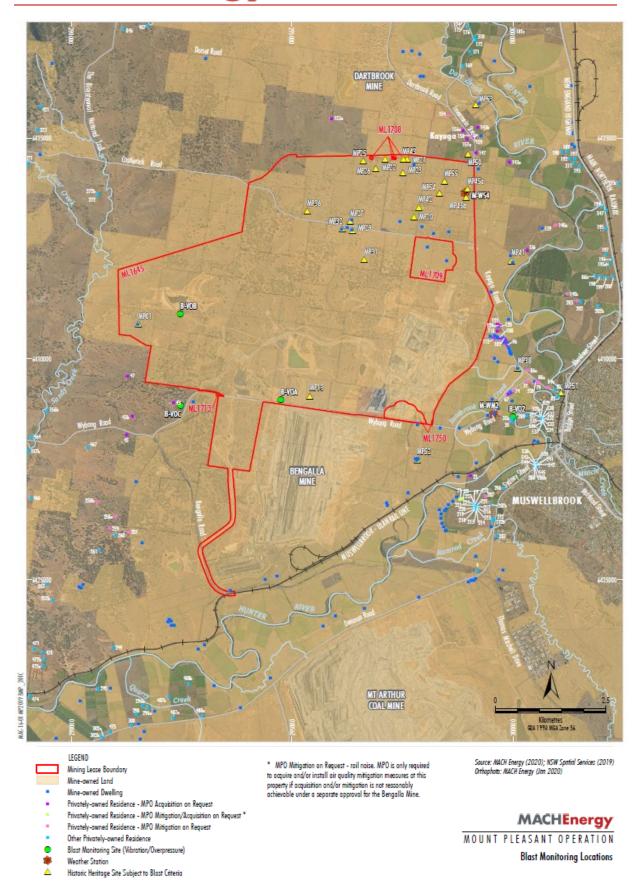


Figure 2-3 – MPO Blast Monitoring Locations

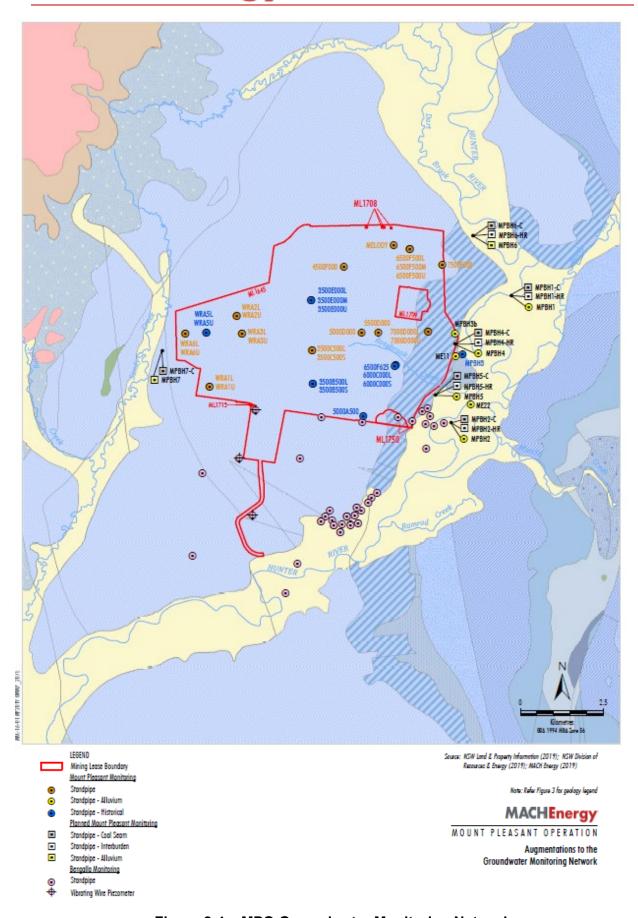


Figure 2-4 – MPO Groundwater Monitoring Network

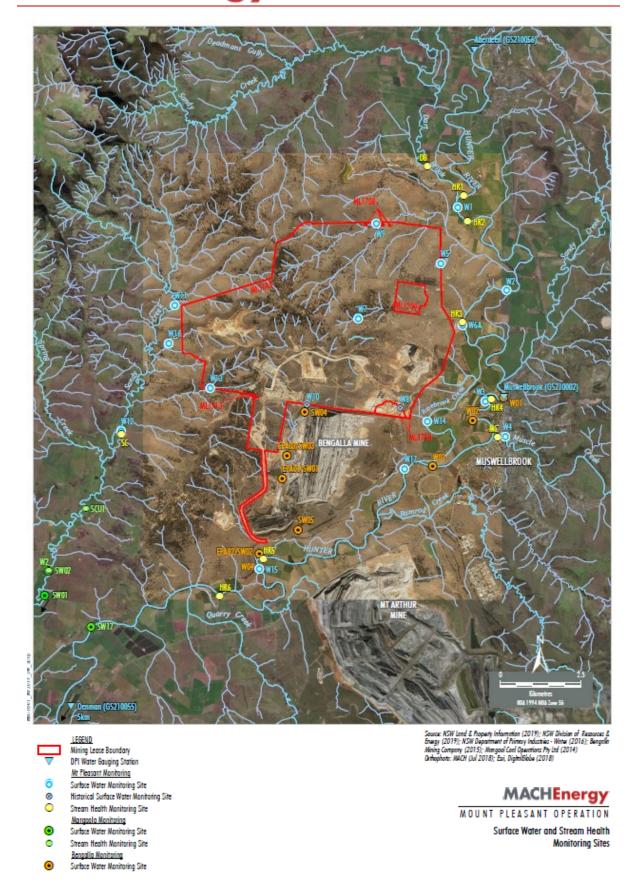


Figure 2-5 – MPO Surface Water Monitoring Network



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 (>99.9%) during June 2021 (the monitoring period), with the exception of solar radiation (90.3%) and temperature at 10m due to sensor failure (0%). The majority of meteorological data was captured at M-WS4 (97.7%) during the monitoring period, with the exception of temperature at 2m (93.1%) and 10m (93.4%).

Throughout June 2021, there was 68.8mm and 62.8mm 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 all gauges commenced on 17 May 2021. Sample collection was undertaken on 16 June 2021 by AECOM with sample analysis performed by SRT, a NATA accredited laboratory. Results are summarised in **Table 4-1**. Annual rolling averages for June 2021 have been provided as an indication of performance between June 2020 – June 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 - June 2021

Location	YTD Insoluble Solids (g/m².month)	Insoluble Solids Annual Rolling Average (g/m².month)
D1	2.3	2.3
D3a	1.5	2.0
D4	1.7	2.3
D5	2.8	2.9
D6	2.5	2.8
D7b¹	5.7	***
D8	4.3	4.1
D9a	1.8	***
D10	1.1	1.3
D11	2.0	2.2
D12	0.7	1.2
D13	1.9	2.1
D14	3.1	2.8
Criterion	-	4

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

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 June 2021 sampling event noted that all the gauges contained insects and three contained vegetation.

^{**}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



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

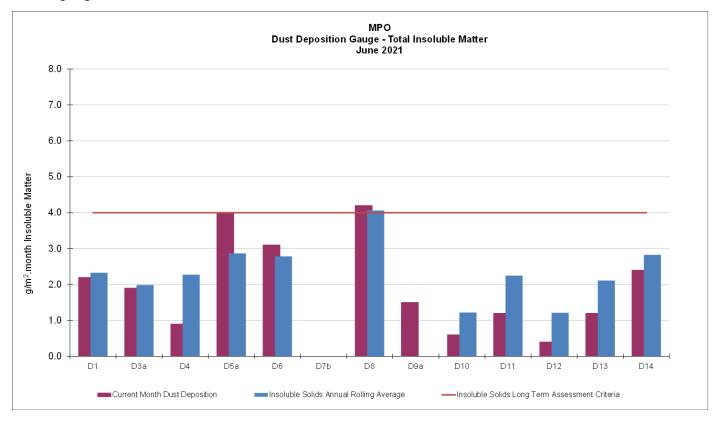


Figure 4-1: MPO Dust Deposition Monthly Results and Annual Rolling Average – June 2021

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 $90 \mu g/m^3$.

5.2 Results

In June 2021 sample collection was undertaken by AECOM with sample analysis performed by Steel River Testing (SRT), a NATA accredited laboratory. TSP results for the monitoring period are provided in **Table 5-2**. Annual rolling averages for June 2021 have been provided as an indication of performance between June 2020 – June 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 – June 2021

Bun Data	Assessment	TSP μg/m³			
Run Date	Criterion	HVAS A-PF2	HVAS M-WS4	HVAS A-PF5	
2/06/2021	-	48.5	18.7	12.9	
8/06/2021	-	49.7	18.8	10.9	
14/06/2021	-	25.0	3.1	1.9	
20/06/2021	-	32.1	37.8	34.3	
26/06/2021	-	55.3	11.7	3.1	
Monthly Mean	-	42.1	18.0	12.6	
Annual Rolling Average	90	53	31	31	

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 μ m (PM₁₀) and particulate matter less than 2.5 μ m (PM_{2.5}) monitoring was conducted by three Palas Fidas units (one utilised for management only) at MPO during June 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 PM_{10} and $PM_{2.5}$ 12-month rolling averages for June 2021 have been provided in Section 6.2 and 6.4 respectively, as an indication of performance between June 2020 – June 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 PM_{10} measurements reported throughout June 2021. The Muswellbrook NW monitor was operational during all days of June 2021. Real time PM_{10} 24 hour rolling average results for June 2021 are presented in **Table 6-1**.

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

	A-PF2/EPA ID 1	A-PF4	A-PF5/EPA ID 2	Muswellbrook NW	Muswellbrook NW 24 Hour	A-PF2, A-PF4, A-PF5 24 Hour
Date		24 hou	r Average Res	ult	Average Limit (μg/m³)	Average Limit (µg/m³)
1/06/2021	21	12	12	23	44	50
2/06/2021	21	11	12	19	44	50
3/06/2021	20	18	11	22	44	50
4/06/2021	12	7	7	12	44	50
5/06/2021	11	12	9	11	44	50
6/06/2021	12	10	13	11	44	50
7/06/2021	15	8	8	13	44	50
8/06/2021	17	11	9	15	44	50
9/06/2021	7	5	5	4	44	50
10/06/2021	5	4	4	4	44	50
11/06/2021	7	5	5	7	44	50
12/06/2021	12	5	5	10	44	50
13/06/2021	11	6	5	9	44	50
14/06/2021	9	6	6	9	44	50
15/06/2021	16	9	8	14	44	50
16/06/2021	17	15	18	19	44	50
17/06/2021	11	6	6	11	44	50
18/06/2021	9	5	5	13	44	50
19/06/2021	7	6	7	10	44	50
20/06/2021	9	9	14	10	44	50
21/06/2021	16	14	14	14	44	50
22/06/2021	12	11	14	11	44	50
23/06/2021	21	21	17	17	44	50



24/06/2021	17	7	7	13	44	50
25/06/2021	10	5	6	8	44	50
26/06/2021	13	7	5	10	44	50
27/06/2021	10	6	6	8	44	50
28/06/2021	10	7	12	10	44	50
29/06/2021	13	11	15	13	44	50
30/06/2021	14	13	15	10	44	50

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 June 2021.

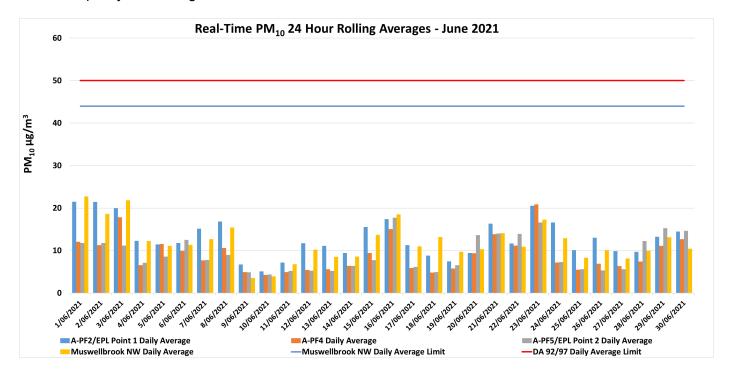


Figure 6-1: Real-time PM₁₀ 24 hour rolling average results for June 2021.

6.2 PM₁₀ Results – Annual rolling average

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



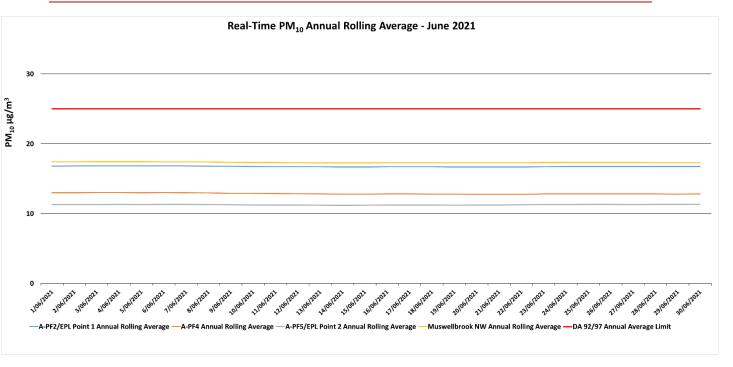


Figure 6-2: Real-time PM₁₀ Annual Rolling average results for June 2021.

6.3 PM_{2.5} Results – 24 hour rolling average

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

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

Date	A-PF2/EPA ID 1	A-PF4	A-PF5/EPA ID 2	A-PF2, A-PF4, A-PF5 24 Hour
Date	24	esult	Average Limit (μg/m³)	
1/06/2021	5	4	4	25
2/06/2021	6	4	4	25
3/06/2021	7	7	5	25
4/06/2021	4	3	4	25
5/06/2021	5	5	4	25
6/06/2021	5	4	5	25
7/06/2021	5	4	4	25
8/06/2021	6	5	4	25
9/06/2021	3	2	2	25
10/06/2021	2	2	2	25
11/06/2021	3	3	3	25
12/06/2021	5	3	3	25
13/06/2021	4	3	3	25
14/06/2021	4	3	3	25
15/06/2021	5	4	4	25
16/06/2021	6	5	5	25
17/06/2021	4	3	3	25



18/06/2021	3	2	2	25
19/06/2021	3	3	3	25
20/06/2021	4	4	4	25
21/06/2021	5	5	5	25
22/06/2021	5	5	6	25
23/06/2021	8	7	6	25
24/06/2021	5	3	3	25
25/06/2021	4	3	3	25
26/06/2021	5	3	3	25
27/06/2021	4	3	3	25
28/06/2021	4	4	5	25
29/06/2021	6	6	7	25
30/06/2021	7	7	7	25

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 June 2021 are presented in **Figure 6-3** below.

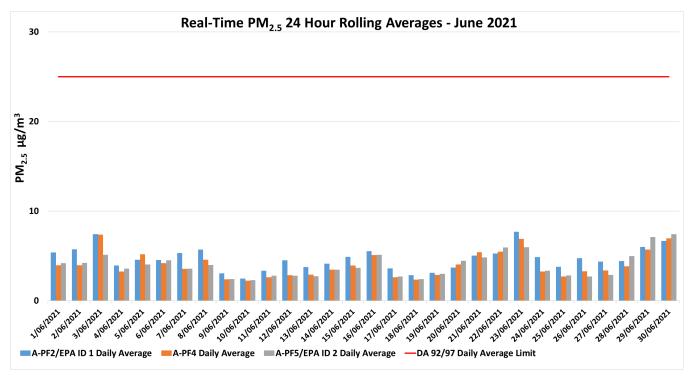


Figure 6-3: Real-time PM_{2.5} 24 hour rolling average results for June 2021.

6.4 PM_{2.5} Results - Annual rolling average

There were no elevated PM_{2.5} measurements reported at MPO for the June 2021 annual rolling average. Real time PM₁₀ annual rolling averages for June 2021 are presented in **Figure 6-4** below.



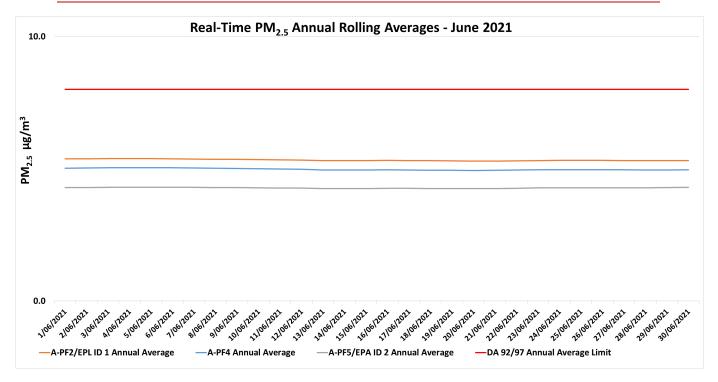


Figure 6-4: Real-time PM_{2.5} Annual Rolling average results for June 2021.

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 and rain event surface water monitoring was conducted by AECOM on 4 and 9 June 2021, respectively. Laboratory analysis was performed by ALS which is a NATA accredited laboratory. Monthly monitoring results for pH, EC, TSS and TDS are presented in **Table 7-1**.



Table 7-1 - MPO Monthly Surface Water Monitoring Results - 4 June 2021

Station	рН	Electrical Conductivity (EC) (μs/cm)¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	8.0	650	7	365
W2	7.9	800	6	421
W3	7.9	860	8	466
W4	7.8	1900	10	1110
W5	*	*	*	*
W6A	8.1	790	8	441
W7	*	*	*	*
W9	*	*	*	*
W11	۸	۸	۸	۸
W12	7.6	5000	21	2370
W13	*	*	*	*
W14	*	*	*	*
W15	7.9	920	10	496
W16	*	*	*	*
W17	7.8	1000	8	569

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

Table 7-2 – MPO Monthly Surface Water Monitoring Results – 9 June 2021

Station	рН	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	8.2	620	6	351
W2	۸	۸	۸	٨
W3	8.0	780	12	412
W4	7.7	1400	10	816
W5	*	*	*	*
W6A	8.2	720	5	400
W7	*	*	*	*
W9	*	*	*	*
W11	۸	۸	۸	۸
W12	7.5	5300	<5	2840

^{*}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-WI3 (pH) and In-house method Q4AN(EV)-332-WI2 (EC).

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



Station	рН	Electrical Conductivity (EC) (μs/cm)¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W13	*	*	*	*
W14	*	*	*	*
W15	8.1	820	14	464
W16	7.6	160	222	120**
W17	8.0	820	16	457

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

Seven of the fifteen monitoring locations were found to be dry or were not safely accessible on 4 and 9 June 2021. All sites sampled were below or inside the trigger level values with the exception of EC at W6A and W17. An investigation will be triggered if elevated measurements occur for three consecutive sampling events in accordance MPO Water Management Plan (MACH Energy, 2019).

8. Groundwater Monitoring

Quarterly groundwater monitoring was not undertaken during June 2021. The next scheduled monitoring event is in August 2021.

9. Noise Monitoring

Attended noise monitoring was undertaken during the night period of 7 June 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 June 2021 against noise criteria is shown in **Table 9-1**; **Table 9-2**; and **Table 9-3**.

^{*}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-WI3 (pH) and In-house method Q4AN(EV)-332-WI2 (EC).

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



Table 9-1 – L_{A1,1min} Generated by MPO: Attended Night Monitoring – 7 June 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	07/06/2021 22:24	1.8	D	45	Yes	IA	Nil
N-AT2	07/06/2021 22:06	2.2	D	45	Yes	<25	Nil
N-AT3	07/06/2021 23:04	1.0	D	45	Yes	33	Nil
N-AT4	08/06/2021 00:12	1.4	D	45	Yes	45	Nil
N-AT5	07/06/2021 23:41	1.5	E	45	Yes	43	Nil
N-AT6	07/06/2021 23:00	1.1	D	45	Yes	IA	Nil

- 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;
- 2. Estimated or measured L_{A1,1minute} attributed to MPO;
- 3. NA in exceedance column means meteorological conditions outside those specified in Condition L2.3 of EPL 20850 and thus criterion is not applicable; and
- 4. Bold results indicate exceedance of criteria.
- 5. IA indicates inaudible noise attributed to MPO.

Table 9-2 – L_{Aeq,15min} Generated by MPO: Attended Night Monitoring – 7 June 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	07/06/2021 22:24	1.8	D	43	Yes	IA	Nil
N-AT2	07/06/2021 22:06	2.2	D	36	Yes	<25	Nil
N-AT3	07/06/2021 23:04	1.0	D	41	Yes	NM	Nil
N-AT4	08/06/2021 00:12	1.4	D	42	Yes	40	Nil
N-AT5	07/06/2021 23:41	1.5	E	40	Yes	36	Nil
N-AT6	07/06/2021 23:00	1.1	D	35	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;
- 3. NA in exceedance column means meteorological conditions outside those specified in Condition L2.3 of EPL 20850 and thus criterion is not applicable; and
- 4. Bold results indicate exceedance of criteria.



Table 9-3 - L_{Aeq,period} Cumulative Noise: Attended Night Monitoring - 7 June 2021

Location	Start Date and Time	Cumulative Noise Criterion LAeq dB	Measured Mining Only L _{Aeq,period} dB ^{1,2}	Exceedance dB
N-AT1	07/06/2021 22:24	40	Nil	Nil
N-AT2	07/06/2021 22:06	40	Nil	Nil
N-AT3	07/06/2021 23:04	40	Nil	Nil
N-AT4	08/06/2021 00:12	40	Nil	Nil
N-AT5	07/06/2021 23:41	40	39	Nil
N-AT6	07/06/2021 23:00	40	Nil	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 8 blast events during June (a total of 36 blasts YTD). Results for June 2021 are presented in **Table 10-1**. All blast results during the June 2021 monitoring period were below the criteria in Schedule 3, Condition 10 of DA 92/97 and EPL 20850 and therefore compliant.

^{1.} 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'.



Table 10-1 - MPO Blast Monitoring Results - June 2021

Day & Date Fired	Time Fired	Vibration (mm/s) BVOA	Overpressure (dBL) BVOA	Vibration (mm/s)	Overpressure (dBL) BVOC	Vibration (mm/s) BVO2	Overpressure (dBL) BVO2	Blast Fume Compliant
Wednesday 2/06/2021	13:04	0.420	96.8	0.290	86.3	0.210	89.8	Y
Saturday 5/06/2021	10:12	0.790	107.6	0.460	102.2	1.000	103.3	Y
Wednesday 9/06/2021	9:32	0.070	92.9	0.060	94.9	0.150	106.2	Y
Friday 18/06/2021	12:07	0.920	107.0	0.420	110.2	1.230	111.3	Y
Wednesday 23/06/2021	12:59	0.870	101.5	0.440	99.8	0.620	99.5	Y
Thursday 24/06/2021	13:05	0.490	105.1	0.220	105.8	0.500	102.6	Y
Friday 25/06/2021	11:46	0.200	91.1	0.070	98.5	0.260	96.6	Y
Wednesday 30/06/2021	13:11	0.100	93.9	0.080	90.6	0.250	92.7	Y