

**Mount Pleasant Operation
Monthly Environmental Monitoring Report**

December 2020

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 2020
Reporting Period End Date	31 December 2020
Date All Data Received	22 January 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-20850-20-January-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 assessment groups and monitoring locations;
- **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.

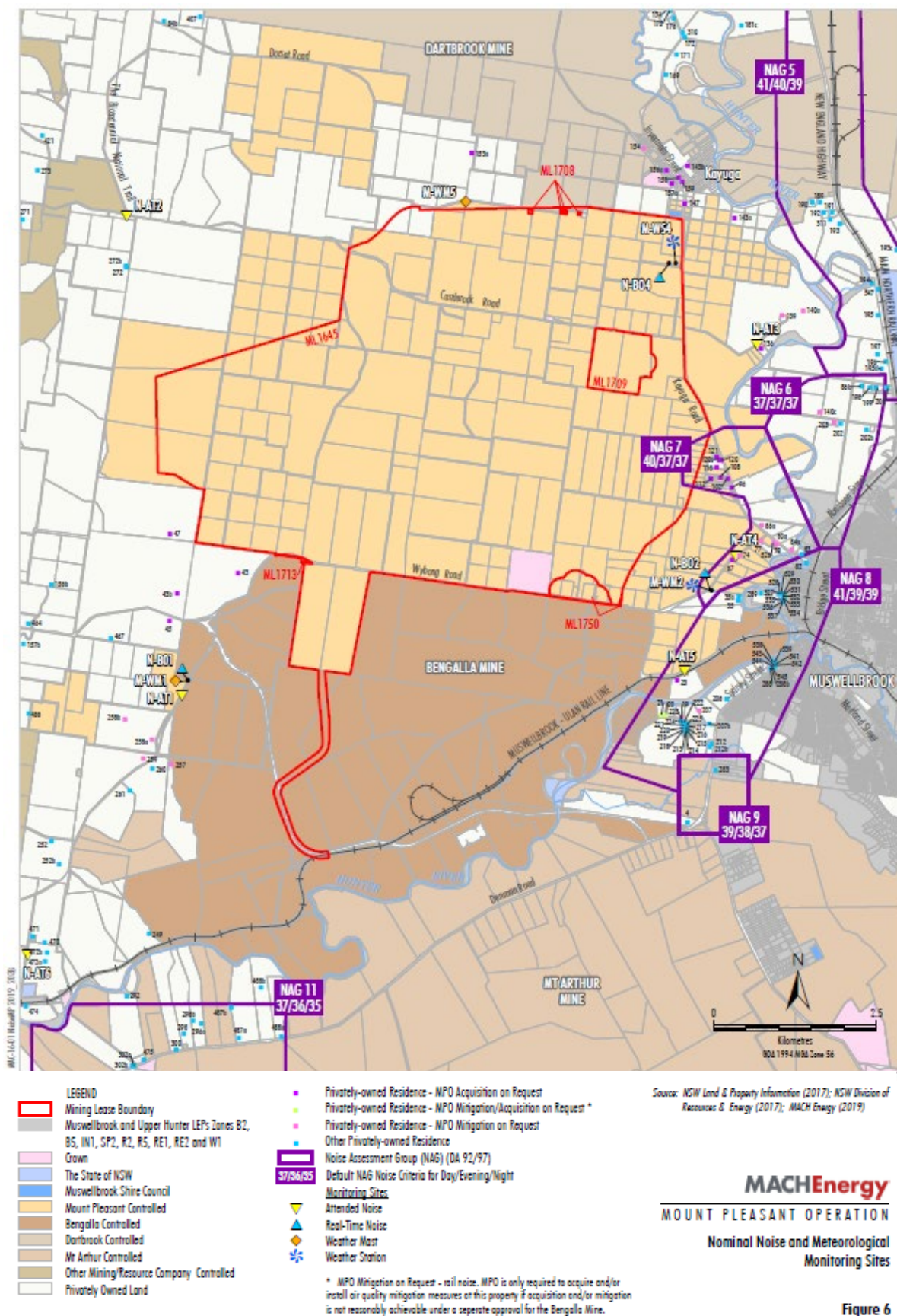


Figure 6

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

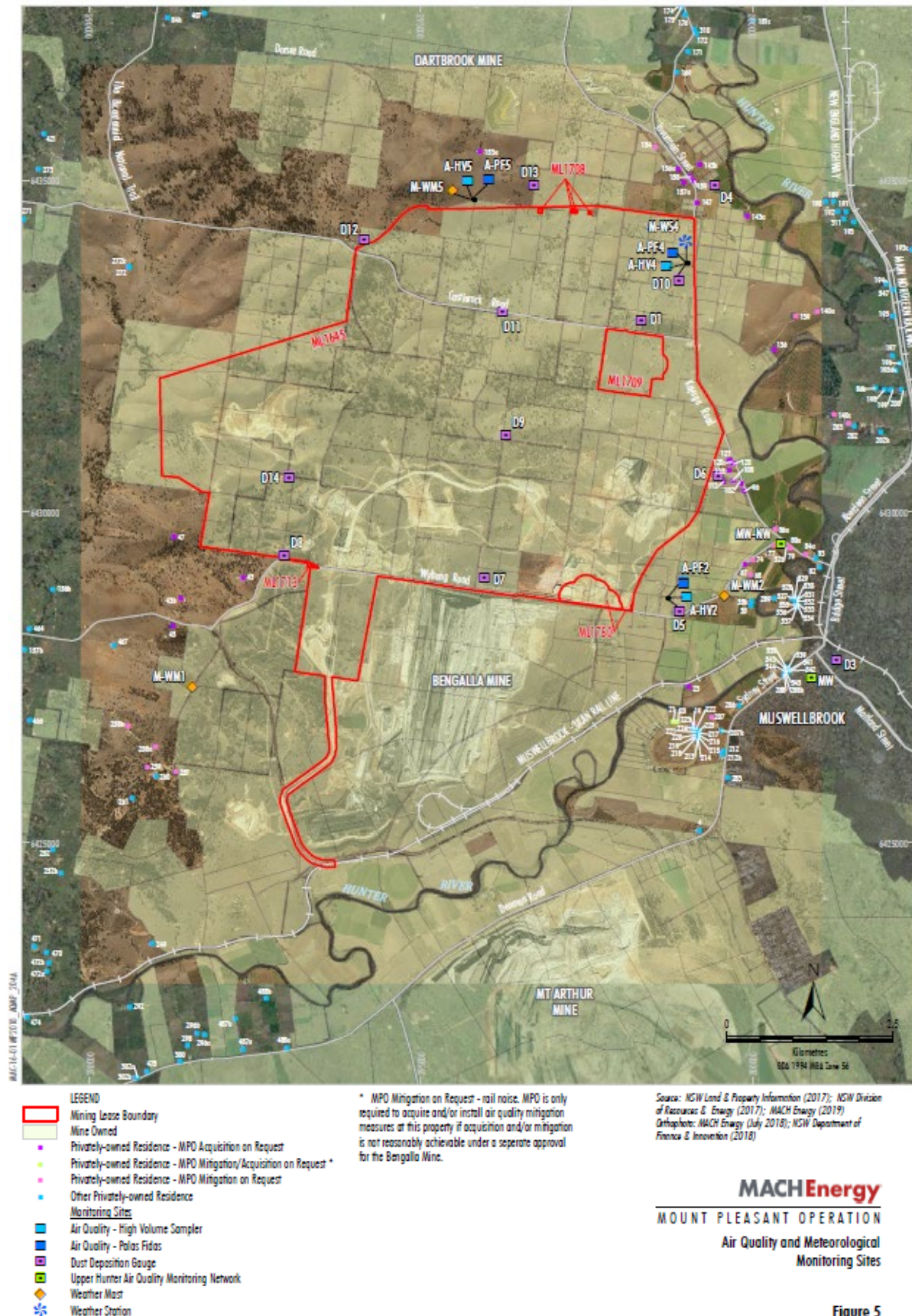


Figure 5

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



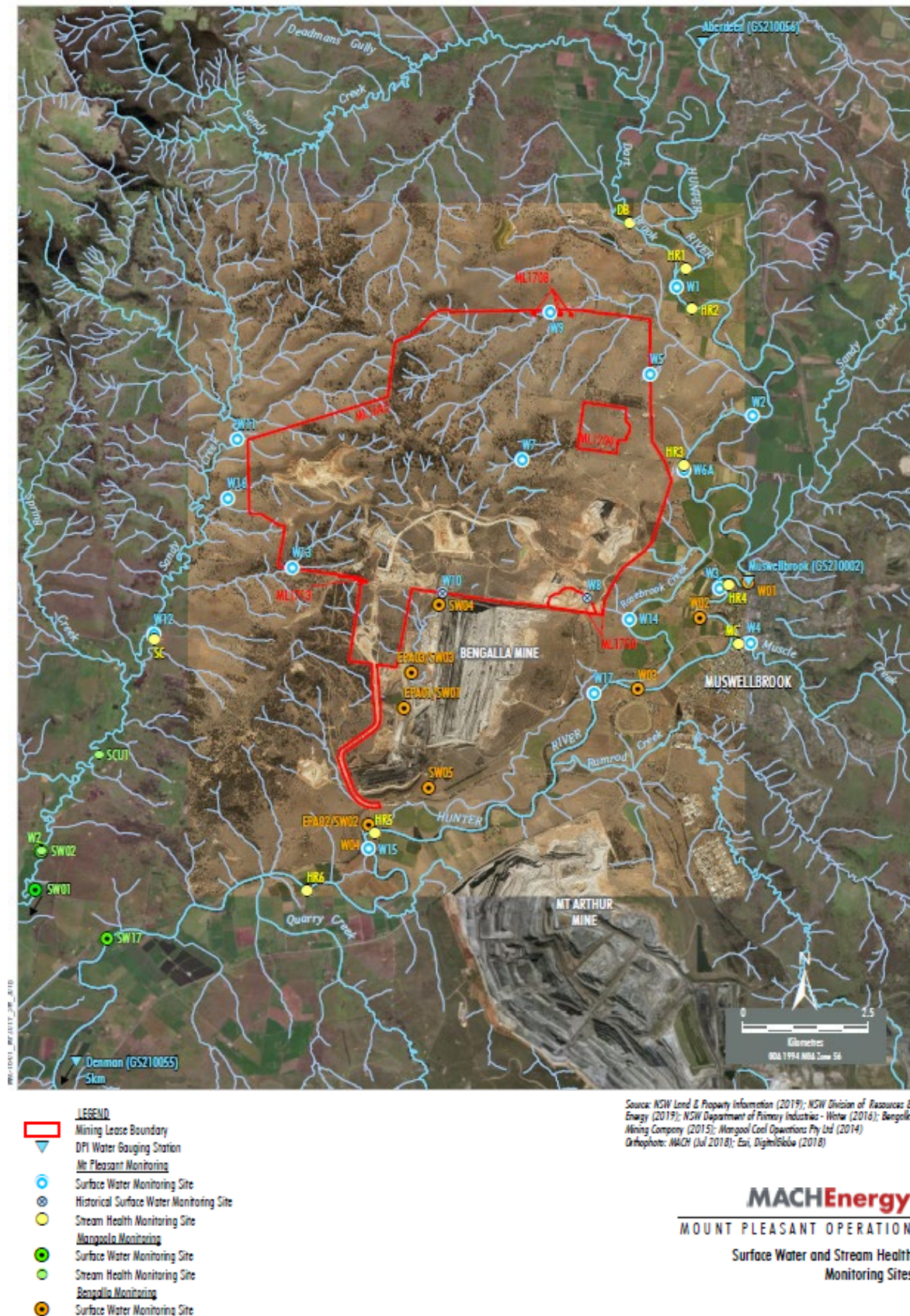


Figure 3

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, temperature (at 2 m and 10 m), solar radiation, relative humidity, rainfall, atmospheric pressure, and sigma theta.

All meteorological data was captured at M-WS2 during the December 2020 monitoring period, with the exception of solar radiation (88.9%). The majority of meteorological data was captured at M-WS4 (>99.7%) during the December 2020 monitoring period, with the exception of PM₁₀ and PM_{2.5} (89.1%).

Throughout December 2020, there was 109.4 and 111.2mm 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 18 November 2020. Sample collection was undertaken on 18 December 2020 by AECOM with sample analysis performed by SRT, a NATA accredited laboratory. Results are summarised in **Table 4-1**. Annual rolling averages for December 2020 have been provided as an indication of performance between December 2019 – December 2020 and does not represent annual average results for 2020 as per Schedule 3, Condition 20 of DA 92/97.

Table 4-1: Dust Depositional Results – December 2020

Location	YTD Insoluble Solids (g/m ² .month)	Insoluble Solids Annual Rolling Average (g/m ² .month)
D1	2.6	2.6
D3a	2.6	***
D4	2.8	2.8
D5	3.1	3.1
D6^	3.3	3.3
D7b ¹	4.7	***
D8	4.7	4.7
D9a	2.5	***
D10	1.7	1.7
D11	3.2	3.2
D12	2.2	2.2
D13	3.6	3.6
D14	3.2	3.2
Criterion	-	4
<p><i>Note: Results in bold indicate an elevated measurement of adopted assessment criteria</i> <i>**Indicates result unavailable due to contaminated depositional dust gauges for YTD</i> <i>*** annual rolling average not available as new site location</i></p>		

Note 1: Site 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

^ Elevated results due to earthworks in the vicinity of D6 commencing 13 January 2020 which are not subject to DA 92/97 or EPL 20850.

Contaminated results are not included in the 12 month rolling average. An elevated reading above the annual average criterion for dust deposition (insoluble solids) was recorded at site D8 (4.7 g/m².month).

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 2020 sampling event noted that all the gauges contained insects.

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

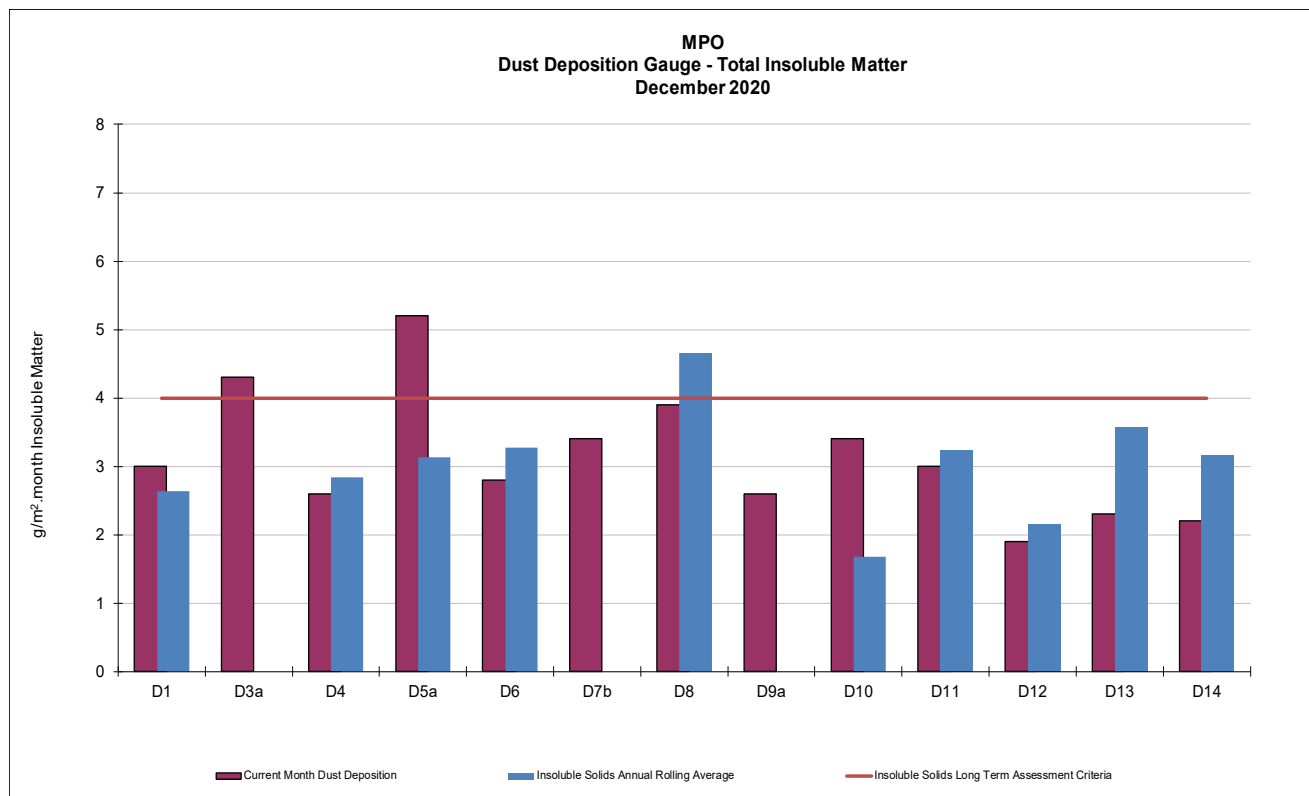


Figure 4-1: MPO Dust Deposition Monthly Results and Annual Rolling Average – December 2020

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 $\mu\text{g}/\text{m}^3$.

5.2 Results

In December 2020 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 December 2020 have been provided as an indication of performance between December 2019 – December 2020 and do not represent annual average results for 2020 as per Schedule 3, Condition 20 of DA 92/97.

Table 5-2 Total Suspended Particulate Monitoring Data – December 2020

Run Date	Assessment Criterion	TSP $\mu\text{g}/\text{m}^3$		
		HVAS A-PF2	HVAS M-WS4	HVAS A-PF5
4/12/2020	-	94	68	67
10/12/2020	-	82	68	88
16/12/2020	-	39	28	31
22/12/2020	-	27	13	16*
28/12/2020	-	55	27	24
Monthly Mean	-	59	41	45
Annual Rolling Average	90	58	38	39

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

* Make-up run completed on 4/1/21 for short run on 22/12/20 due to local power interruption.

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 µm (PM₁₀) and particulate matter less than 2.5 µm (PM_{2.5}) monitoring was conducted by three Palas Fidas (one utilised for management only) units at MPO during December 2020.

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 December 2020 have been provided in Section 6.2 and 6.4 respectively, as an indication of performance between December 2019 – December 2020 and do not represent annual average results for 2020 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 December 2020 with the exception of 1 December. The Muswellbrook NW monitor was operational during all days of December 2020. Real time PM₁₀ 24 hour rolling average results for December 2020 are presented in **Table 6-1**.

Table 6-1: MPO Palas Fidas PM₁₀ Data – December 2020

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					
1/12/2020	34	30	20	45	44	50
2/12/2020	28	26	18	24	44	50
3/12/2020	17	13	12	11	44	50
4/12/2020	30	24	16	28	44	50
5/12/2020	26	23	19	24	44	50
6/12/2020	31	13	14	32	44	50
7/12/2020	32	-	10	34	44	50
8/12/2020	16	-	8	17	44	50
9/12/2020	24	-	18	29	44	50
10/12/2020	26	-	17	34	44	50
11/12/2020	14	12	10	16	44	50
12/12/2020	17	11	10	16	44	50
13/12/2020	12	10	9	13	44	50
14/12/2020	12	10	9	13	44	50
15/12/2020	7	7	7	5	44	50
16/12/2020	12	12	9	10	44	50
17/12/2020	11	10	7	13	44	50
18/12/2020	15	10	7	17	44	50
19/12/2020	13	11	10	15	44	50
20/12/2020	13	12	10	14	44	50
21/12/2020	11	13	9	9	44	50
22/12/2020	10	7	6	12	44	50

23/12/2020	11	10	8	15	44	50
24/12/2020	15	13	10	18	44	50
25/12/2020	15	12	-	17	44	50
26/12/2020	12	10	-	12	44	50
27/12/2020	13	16	-	13	44	50
28/12/2020	15	9	-	15	44	50
29/12/2020	10	10	-	10	44	50
30/12/2020	10	9	-	11	44	50
31/12/2020	12	11	9	13	44	50

Note: 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 2020.

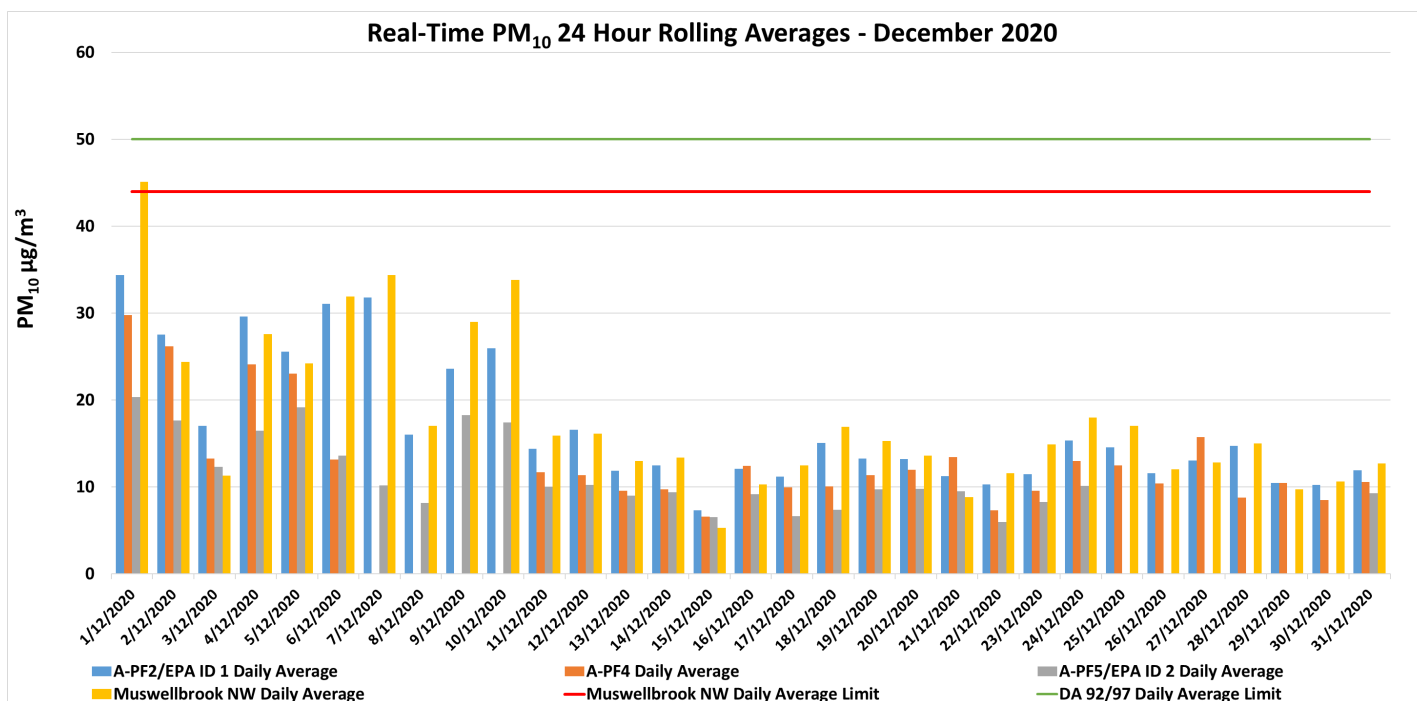


Figure 6-1: Real-time PM₁₀ 24 hour rolling average results for December 2020.

6.2 PM₁₀ Results – Annual rolling average

There were no elevated PM₁₀ measurements reported at MPO for the December 2020 annual rolling average. Real time PM₁₀ annual rolling averages for December 2020 are presented in **Figure 6-2** below.

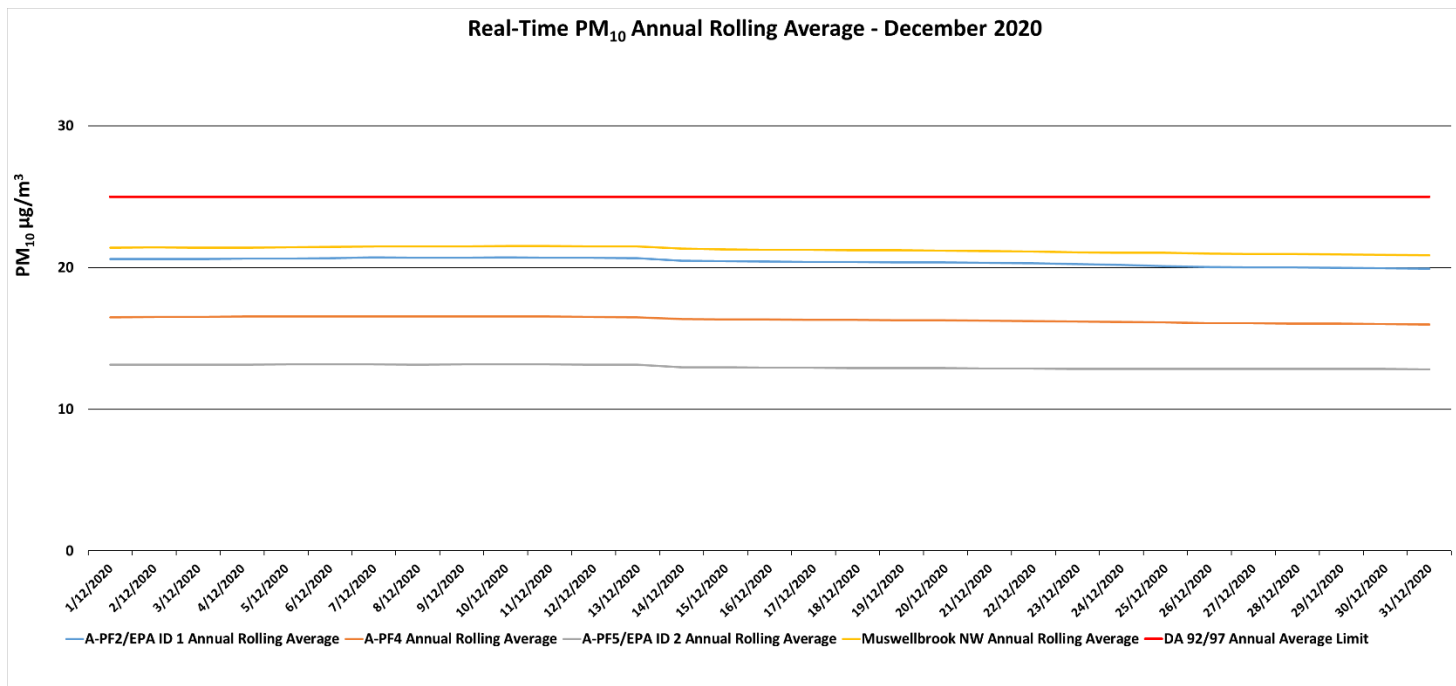


Figure 6-2: Real-time PM₁₀ Annual Rolling average results for December 2020.

6.3 PM_{2.5} Results – 24 hour rolling average

There were no elevated PM_{2.5} measurements reported throughout December 2020. Real time PM_{2.5} 24 hour rolling average results for December 2020 are presented in **Table 6-2**.

Table 6-2: MPO Palas Fidas PM_{2.5} Data – December 2020

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			
1/12/2020	9	9	6	25
2/12/2020	11	11	7	25
3/12/2020	6	6	5	25
4/12/2020	7	7	5	25
5/12/2020	8	7	6	25
6/12/2020	8	7	4	25
7/12/2020	8	-	4	25
8/12/2020	4	-	3	25
9/12/2020	5	-	5	25
10/12/2020	6	-	5	25
11/12/2020	5	5	4	25
12/12/2020	5	4	4	25
13/12/2020	4	4	3	25
14/12/2020	5	4	4	25
15/12/2020	3	3	3	25
16/12/2020	4	5	4	25
17/12/2020	4	4	3	25

18/12/2020	5	4	3	25
19/12/2020	6	5	4	25
20/12/2020	6	6	5	25
21/12/2020	6	7	5	25
22/12/2020	3	3	3	25
23/12/2020	4	3	3	25
24/12/2020	5	5	4	25
25/12/2020	6	6	-	25
26/12/2020	5	5	-	25
27/12/2020	5	6	-	25
28/12/2020	4	4	-	25
29/12/2020	5	5	-	25
30/12/2020	5	4	-	25
31/12/2020	6	5	5	25

Note: 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 2020 are presented in **Figure 6-3** below.

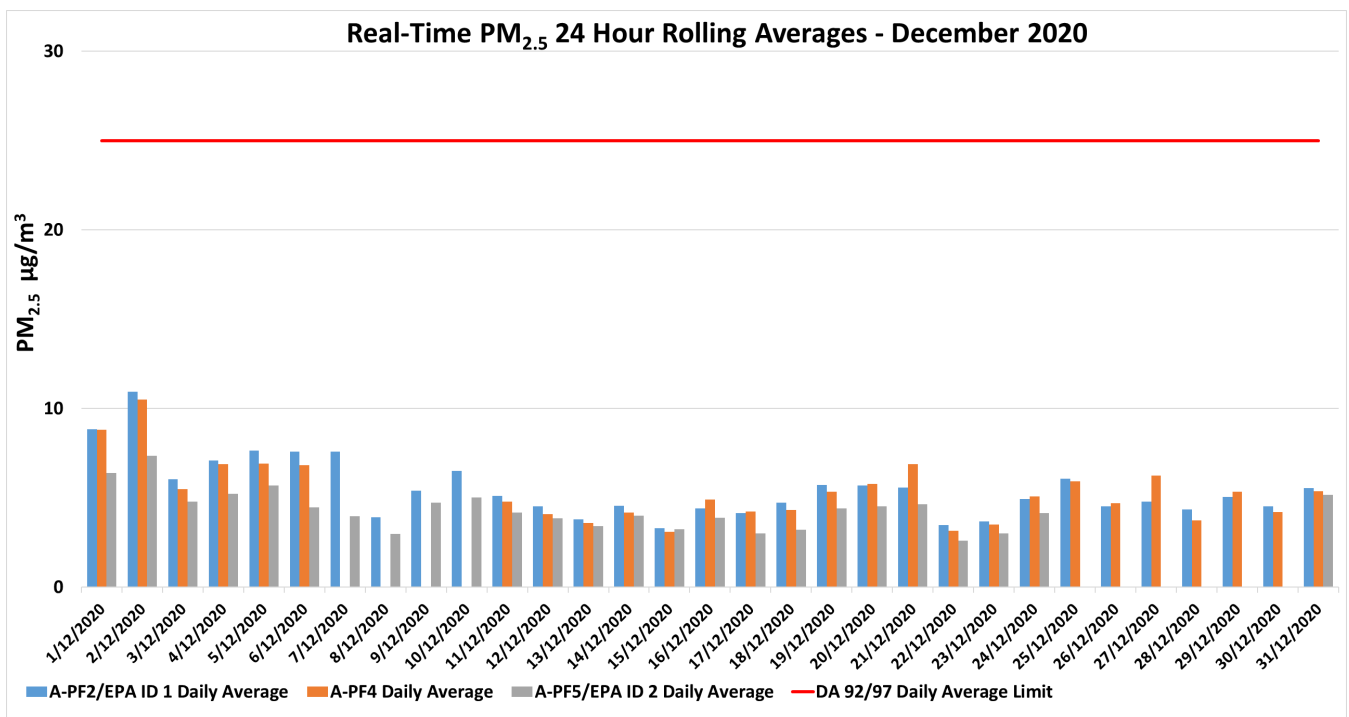


Figure 6-3: Real-time PM_{2.5} 24 hour rolling average results for December 2020.

6.4 PM_{2.5} Results - Annual rolling average

There were no elevated PM_{2.5} measurements reported at MPO for the December 2020 annual rolling average. Real time PM₁₀ annual rolling averages for December 2020 are presented in **Figure 6-4** below.

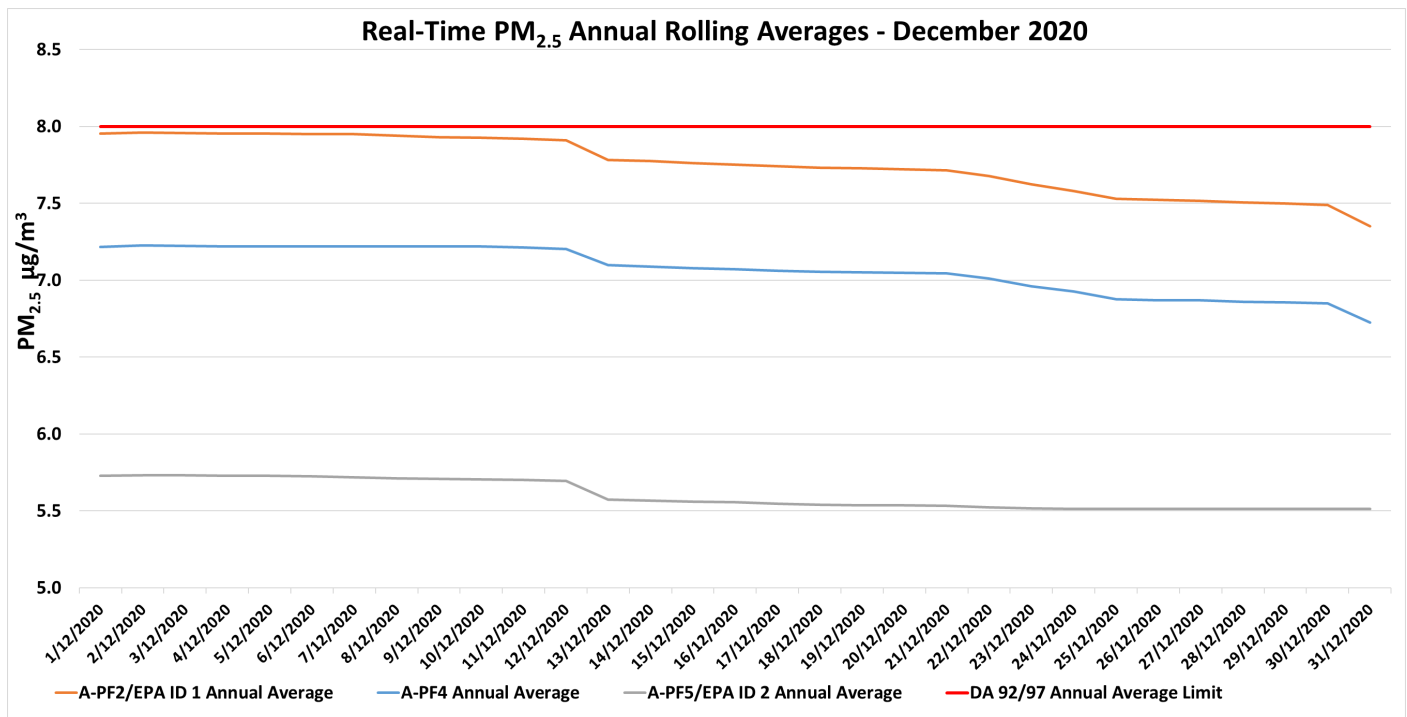


Figure 6-4: Real-time PM_{2.5} Annual Rolling average results for December 2020.

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 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 22 and 29 December 2020. Laboratory analysis was performed by SRT 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 – 22 December 2020

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	8.0	440	20	315
W2	^	^	^	^
W3	7.9	530	36	332
W4	7.5	780	10	531
W5	*	*	*	*
W6A	8.1	480	11	332
W7	^	^	^	^
W9	*	*	*	*
W11	^	^	^	^
W12	7.8	5300	5	3070
W13	*	*	*	*
W14	*	*	*	*
W15	7.9	490	40	320
W16	7.8	280	1510	195**
W17	^	^	^	^

Note: 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-WI3 (pH) and In-house method Q4AN(EV)-332-WI2 (EC).

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

Table 7-1 – MPO Monthly Surface Water Monitoring Results – 29 December 2020

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	7.7	740	17	443
W2	^	^	^	^
W3	7.8	500	46	311
W4	7.4	1100	13	623
W5	*	*	*	*
W6A	7.8	460	38	289
W7	*	*	*	*
W9	*	*	*	*
W11	^	^	^	^

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W12	7.5	5750	9	3460
W13	*	*	*	*
W14	*	*	*	*
W15	7.7	470	52	285
W16	7.9	330	140	226**
W17	^	^	^	^

Note: 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-WI3 (pH) and In-house method Q4AN(EV)-332-WI2 (EC).

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

Eight of the fifteen monitoring locations were found to be dry or were not safely accessible on 22 and 29 December 2020. All sites sampled were below or inside the trigger level values. An investigation into the elevated measurement will be triggered if this occurs for three consecutive sampling events in accordance MPO Water Management Plan (MACH Energy, 2019).

8. Groundwater Monitoring

Quarterly groundwater monitoring was not undertaken during December 2020. The next scheduled monitoring event is in February 2021.

9. Noise Monitoring

Attended noise monitoring was undertaken during the night period of 17 December 2020 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 December 2020 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 – 17 December 2020

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	17/12/20 23:41	0.5	F	45	Yes	IA	Nil
N-AT2	17/12/20 22:00	0.4	F	45	Yes	<20	Nil
N-AT3	17/12/20 23:28	0.9	F	45	Yes	IA	Nil
N-AT4	17/12/20 23:56	0.4	F	45	Yes	40	Nil
N-AT5	18/12/20 00:20	0.8	F	45	Yes	37	Nil
N-AT6	17/12/20 22:37	0.7	F	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.

Table 9-2 – $L_{Aeq,15min}$ Generated by MPO: Attended Night Monitoring – 17 December 2020

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	17/12/20 23:41	0.5	F	43	Yes	IA	Nil
N-AT2	17/12/20 22:00	0.4	F	36	Yes	<20	Nil
N-AT3	17/12/20 23:28	0.9	F	41	Yes	IA	Nil
N-AT4	17/12/20 23:56	0.4	F	42	Yes	40	Nil
N-AT5	18/12/20 00:20	0.8	F	40	Yes	37	Nil
N-AT6	17/12/20 22:37	0.7	F	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;
- 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.

Table 9-3 – $L_{Aeq,period}$ Cumulative Noise: Attended Night Monitoring – 17 December 2020

Location	Start Date and Time	Cumulative Noise Criterion L_{Aeq} dB	Measured Mining Only $L_{Aeq,period}$ dB ^{1,2}	Exceedance dB
N-AT1	17/12/20 23:41	40	Nil	Nil
N-AT2	17/12/20 22:00	40	Nil	Nil
N-AT3	17/12/20 23:28	40	Nil	Nil
N-AT4	17/12/20 23:56	40	36	Nil
N-AT5	18/12/20 00:20	40	<30	Nil
N-AT6	17/12/20 22:37	40	Nil	Nil

Notes:

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
2. 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 December 2020 monitoring period.

10. Blast Monitoring

There were 5 blast events during December (a total of 71 blasts YTD). Results for December 2020 are presented in **Table 10-1**. All blast results during the December 2020 monitoring period were below the criteria in Schedule 3, Condition 10 of DA 92/97 and EPL 20850 and thus the MPO remains compliant in 2020 YTD.

Table 10-1 – MPO Blast Monitoring Results – December 2020

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 09/12/20	13:01	0.89	0.630	97.5	0.530	93.3	1.330	Y
Friday 11/12/20	12:06	104.6	0.17	118.8	0.12	0.12	0.260	Y
Wednesday 16/12/20	12:02	99.4	0.040	95.1	0.020	88.3	0.110	Y
Monday 21/12/20	13:01	90.5	0.380	91.6	0.290	83.6	0.760	Y
Wednesday 23/12/20	13:50	113.9	0.740	113.4	0.310	104.8	0.760	Y