

**Mount Pleasant Operation
Monthly Environmental Monitoring Report**

October 2019

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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 2019
Reporting Period End Date	31 October 2019
Date Data Received	29 November 2019

To view MPO EPL 20850 or DA 92/97 in full please refer to the link below.

<https://machenergyaustralia.com.au/mount-pleasant/documentation/>

2. Monitoring Requirements

The MPO EPL 20850 specifically requires the monitoring of:

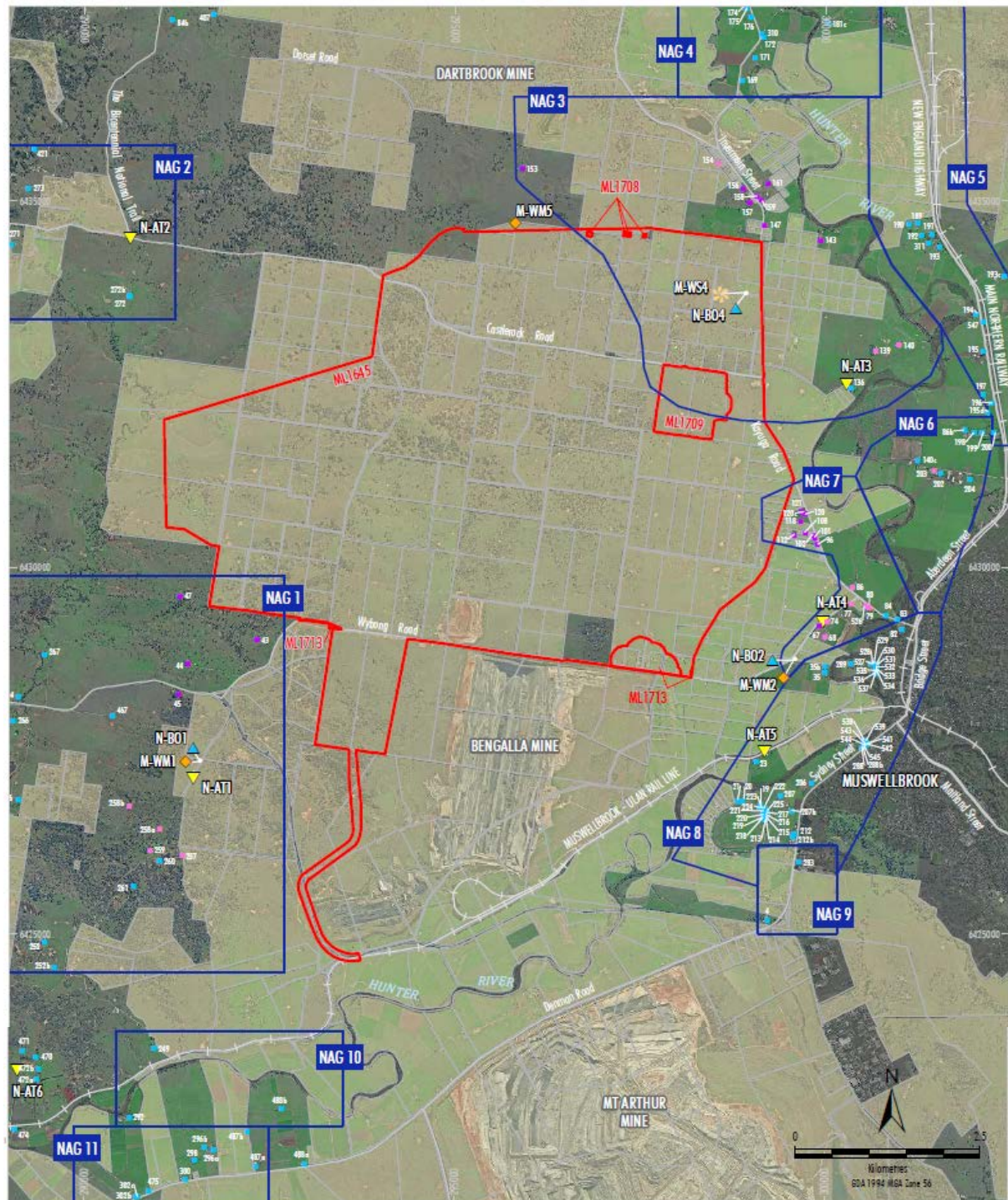
- 2 x Palas Fidas sites;
- Noise monitoring;
- Blast monitoring; and
- Meteorological monitoring.

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 suitability qualified and experienced person(s).

The MPO Environmental Monitoring Network is shown in **Figure 2-1, Figure 2-2, Figure 2-3 and Figure 2-4.**

Figure 2-1 shows MPO attended noise monitoring assessment groups. **Figure 2-2** shows the MPO air quality monitoring network. **Figure 2-3** shows the MPO groundwater monitoring network. **Figure 2-4** shows the MPO surface water monitoring network.



- LEGEND**
- Mining Lease Boundary
 - Mine Owned
 - Privately-owned Residence - MPO Acquisition on Request
 - Privately-owned Residence - MPO Mitigation on Request
 - Other Privately-owned Residence
 - Noise Assessment Group (NAG) (DA 92/97)
 - ▲ Monitoring Site
 - ▲ Attended Noise
 - ▲ Real-Time Noise
 - ◆ Weather Mast
 - ★ Weather Station

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2017); MACH Energy (2017)
Orthophoto: MACH Energy (August 2016)

MACHEnergy
MOUNT PLEASANT OPERATION
Nominal Noise and Meteorological
Monitoring Sites

Figure 2-1 – MPO Attended Noise Monitoring Assessment Groups



- LEGEND**
- Mining Lease Boundary
 - Mine Owned
 - Privately-owned Residence - MPO Acquisition on Request
 - Privately-owned Residence - MPO Mitigation on Request
 - Other Privately-owned Residence
 - Monitoring Sites**
 - Air Quality - High Volume Sampler
 - Air Quality - Palas Fidas
 - Dust Deposition Gauge
 - Upper Hunter Air Quality Monitoring Network
 - Weather Mast
 - ✱ Weather Station

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2017); MACH Energy (2017)
Orthophoto: MACH Energy (Aug 2016)

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MOUNT PLEASANT OPERATION
Air Quality and Meteorological
Monitoring Sites

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

Note: Refer Figure 3 for geology legend

MOUNT PLEASANT OPERATION

Augmentations to the Groundwater Monitoring Network

Figure 2-3 – MPO Groundwater Monitoring Network

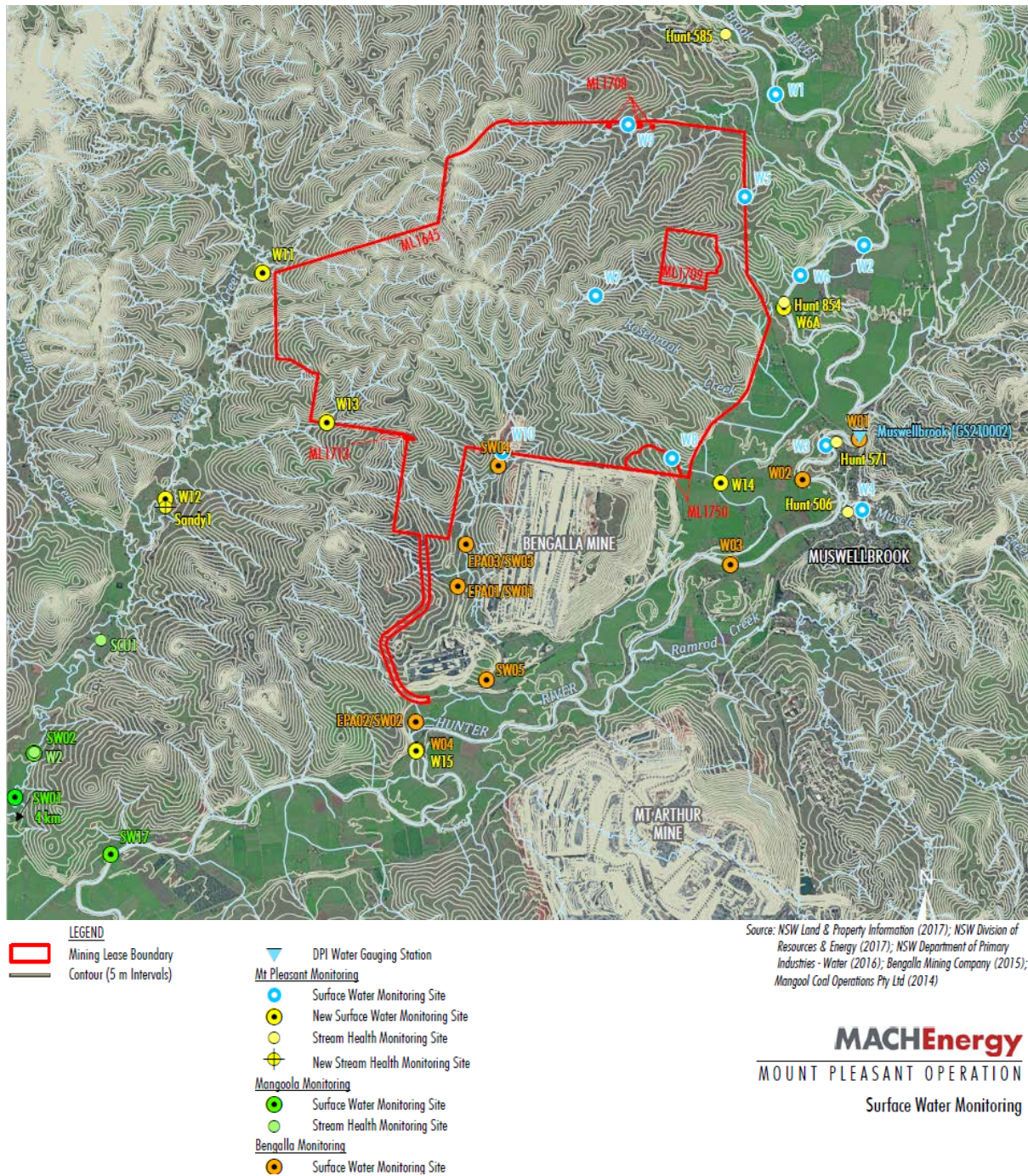


Figure 2-4 – MPO Surface Water Monitoring Network

3. Meteorological Monitoring

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

The majority of meteorological data was captured at M-WS2 (>99.4%) during the October 2019 monitoring period, with the exception of solar radiation data loss (91.4%) due to maintenance. The majority of meteorological data was captured at M-WS4 (>99.6%) during the October 2019 monitoring period.

There was 11.4mm of rainfall recorded at MPO during October 2019 (M-WS4).

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 September 2019. Sample collection was undertaken on 17 October 2019 by AECOM with sample analysis performed by SRT, a NATA accredited laboratory. Results are summarised in **Table 4-1**. Annual rolling averages for October 2019 have been provided as an indication of annual performance between October 2018 – October 2019 and do not represent annual average results for 2019 as per Schedule 3, Condition 20 of DA 92/97.

Table 4-1: Dust Depositional Results – October 2019

Location	YTD Insoluble Solids (g/m ² .month)	Insoluble Solids Annual Rolling Average (g/m ² .month)
D1	2.2	2.1
D3	3.0	3.0
D4	2.4	2.4
D5	3.1	3.1
D6	6.2	5.7
D7 ¹	8.2	7.7
D8	5.3	5.0
D9	4.2	3.8
D10	1.6	1.6
D11	2.7	2.8
D12	1.5	1.6
D13	2.5	3.2
D14	4.5	4.5
Criterion	-	4.0
<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></p>		

Note 1: Site D7 is located within close proximity to the northern boundary of a neighbouring mining company's main pit and thus is heavily influenced by this. This site will continue to be monitored, however will not be used to assess compliance or to represent residential receivers in the area.

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 D6 (5.7); D7a (7.7 g/m².month); D8 (4.6 g/m².month) and D14 (4.5 g/m².month).

Site D7 is located within close proximity to the northern boundary of a neighbouring mining operation and thus can be influenced by this site. D7a 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 site does not represent residence(s) on privately-owned land, it will continue to be monitored in accordance with the MPO Air Quality and Greenhouse Gas Management Plan (MACH Energy, 2019). An elevated annual rolling average reading was measured at D6 (5.7 g/m².month) during October 2019.

Field notes from the October sampling event noted that all the gauges contained insects; 2 contained vegetation; and 1 contained bird droppings.

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

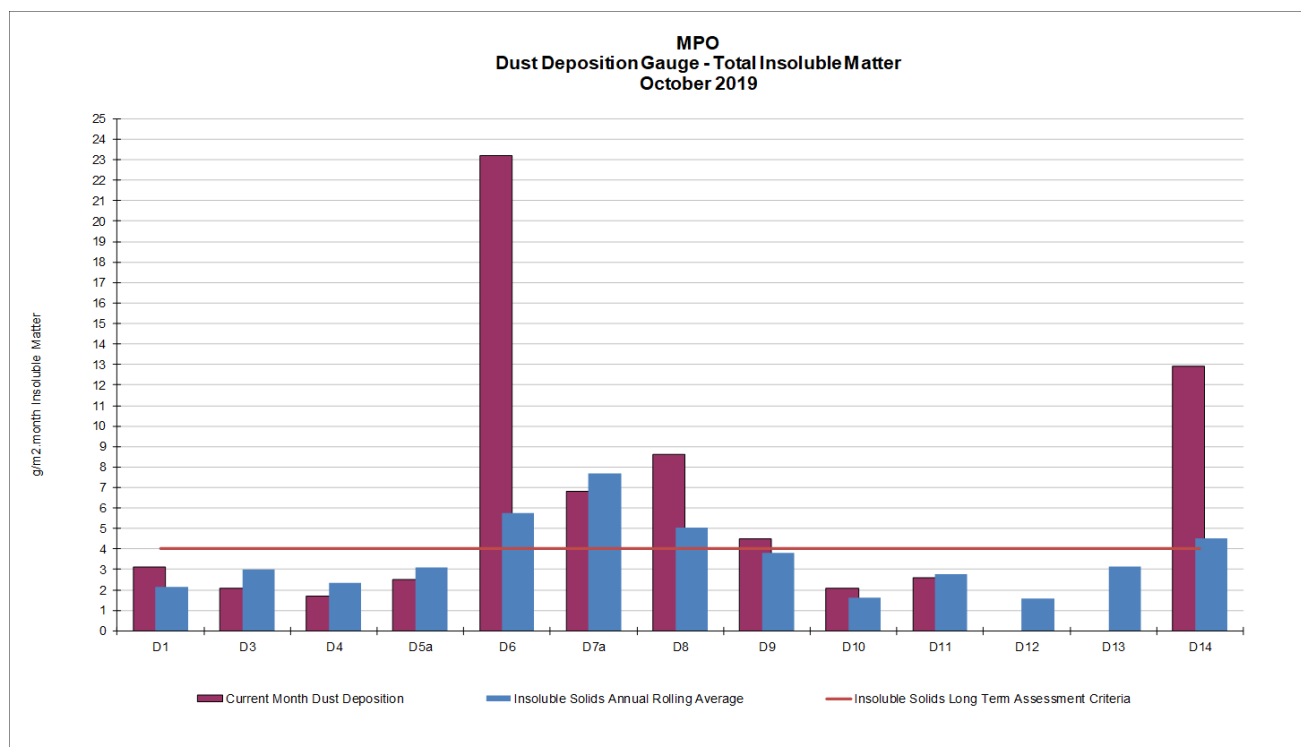


Figure 4-1: MPO Dust Deposition Monthly Result and Annual Rolling Average – October 2019

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 4-1** 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 criterion of 90 µg/m³.

5.2 Results

In October 2019 sample collection was undertaken by AECOM with sample analysis performed by SRT, a NATA accredited laboratory. TSP results for the monitoring period are provided in **Table 4-2**.

Table 5-2 Total Suspended Particulate Monitoring Data – October 2019

Run Date	Assessment Criterion	TSP µg/m ³		
		HVAS A-PF2	HVAS M-WS4	HVAS A-PF5
5/10/2019	-	72	49	77
11/10/2019	-	46	29	50
17/10/2019	-	160	129	137
23/10/2019	-	87	60	73
29/10/2019	-	149	118	134
Monthly Mean	-	103	77	94
Annual Rolling Average	90	85	50	51

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 (one utilised for management only) units at MPO during October 2019.

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} annual rolling averages for October 2019 have been provided in Section 6.2 and 6.4 respectively, as an indication of annual performance between October 2018 – October 2019 and do not represent annual average results for 2019 as per Schedule 3, Condition 20 of DA 92/97.

6.1 PM₁₀ Results – 24 hour rolling average

In accordance with the DA 92/97 limit of 50 µg/m³ for the 24 hour rolling average, there were elevated readings measured throughout October 2019. These high PM₁₀ levels on the

aforementioned dates were associated with wider regional air quality events and are not suspected to be an incremental increase as a result of mining operations at MPO.

There were elevated readings measured at the Muswellbrook NW monitor in accordance with EPL 20850 for 'adverse dust conditions' ($44 \mu\text{g}/\text{m}^3$) for the 24 hour rolling average throughout October 2019. The Muswellbrook NW monitor was operational during all days of October 2019. During this period, approximately 358 total mining machinery hours were lost due to dust delays / shutdowns executed at MPO.

Real time PM_{10} 24 hour rolling average results for October 2019 are presented in **Table 6-1**.

Table 6-1: MPO Palas Fidas PM_{10} Data – October 2019

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					
1/10/2019	24	20	23	23	44	50
2/10/2019	28	25	23	23	44	50
3/10/2019	35	24	20	34	44	50
4/10/2019	49	26	30	56	44	50
5/10/2019	20	18	21	21	44	50
6/10/2019	26	24	24	23	44	50
7/10/2019	70	67	59	78	44	50
8/10/2019	50	33	33	56	44	50
9/10/2019	19	13	15	24	44	50
10/10/2019	24	21	26	26	44	50
11/10/2019	16	13	15	16	44	50
12/10/2019	9	7	8	8	44	50
13/10/2019	13	13	15	23	44	50
14/10/2019	21	20	23	22	44	50
15/10/2019	36	38	54	35	44	50
16/10/2019	38	30	32	38	44	50
17/10/2019	56	37	43	57	44	50
18/10/2019	29	15	14	30	44	50
19/10/2019	47	34	26	48	44	50
20/10/2019	29	32	31	32	44	50
21/10/2019	33	25	32	30	44	50
22/10/2019	28	23	29	31	44	50
23/10/2019	38	31	32	36	44	50
24/10/2019	47	39	44	44	44	50
25/10/2019	48	36	37	50	44	50
26/10/2019	82	64	65	138	44	50
27/10/2019	55	46	50	62	44	50
28/10/2019	59	60	73	59	44	50
29/10/2019	71	69	78	56	44	50
30/10/2019	86	73	77	71	44	50
31/10/2019	69	63	67	59	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 for October 2019.

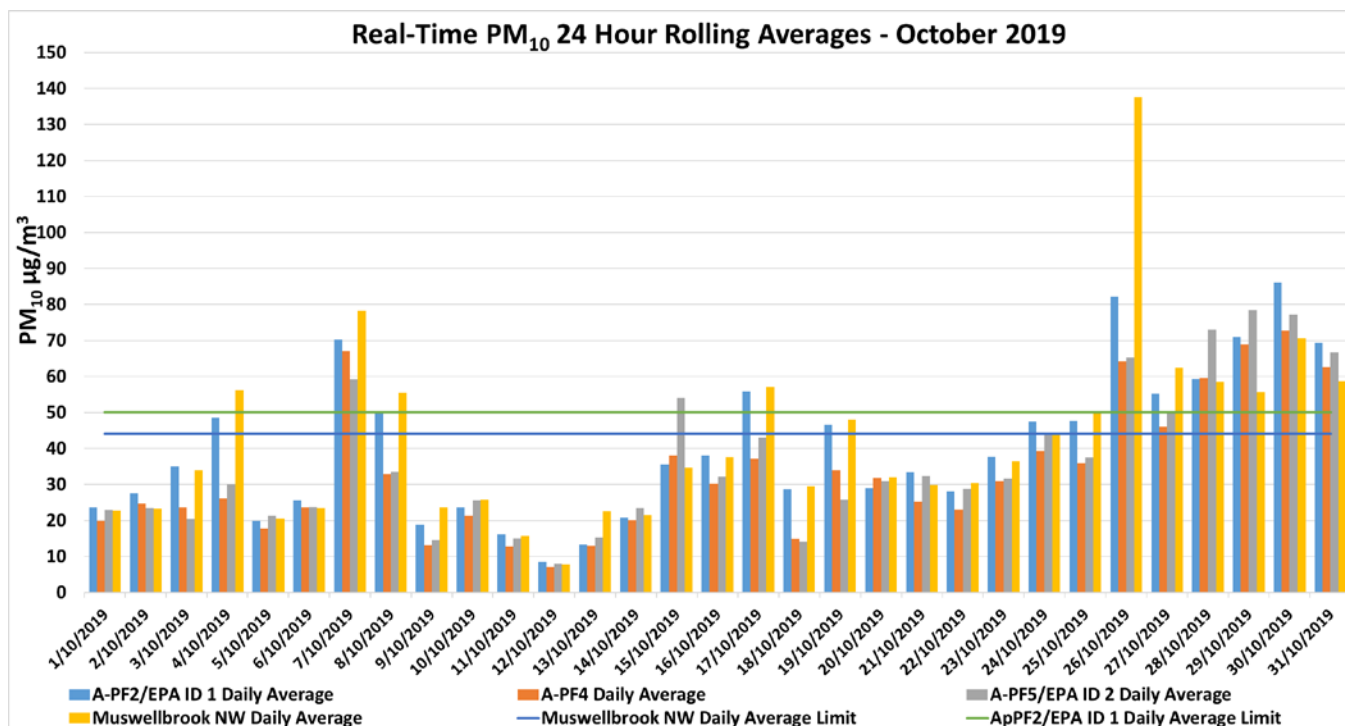


Figure 6-1: Real-time PM₁₀ 24 hour rolling average results for October 2019.

6.2 PM₁₀ Results – Annual rolling average

Elevated readings have been measured for the annual rolling average of PM₁₀ data collected since the amendment of the limit from 30 µg/m³ to 25 µg/m³ during approval of Modification 3 (MOD 3) of DA 92/97, dated 24 August 2018. MPO is currently in the process of undergoing a validation and compliance review of this data, the findings of which will be reported following the completion of all data collection for the 2019 annual reporting period.

Real time PM₁₀ annual rolling averages for October 2019 are presented in **Figure 6-2** below.

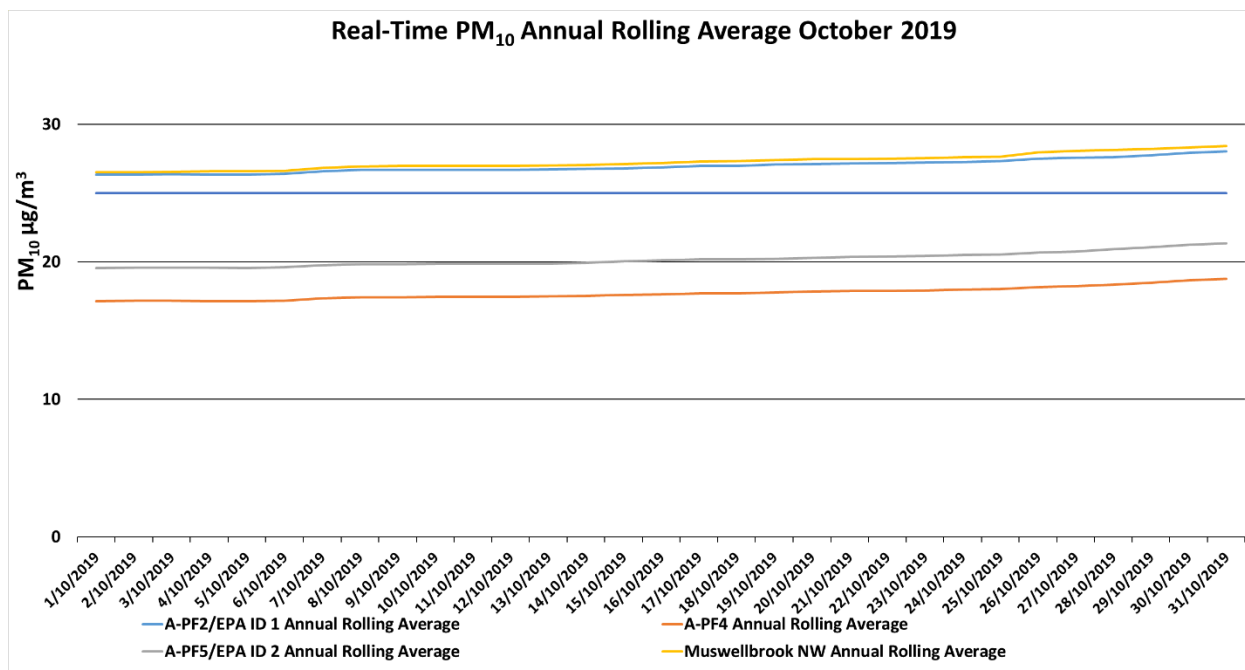


Figure 6-2: Real-time PM₁₀ Annual Rolling average results for October 2019.

6.3 PM_{2.5} Results – 24 hour rolling average

During the October 2019 monitoring period there were no elevated readings measured in accordance with the DA 92/97 limit of 25 µg/m³ for the 24 hour rolling average.

Real time PM_{2.5} 24 hour rolling average results for October 2019 are presented in **Table 6-2**.

Table 6-2: MPO Palas Fidas PM_{2.5} Data – October 2019

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			
1/10/2019	9	9	10	25
2/10/2019	10	10	9	25
3/10/2019	11	9	9	25
4/10/2019	14	11	12	25
5/10/2019	12	12	12	25
6/10/2019	12	12	12	25
7/10/2019	19	20	18	25
8/10/2019	16	13	13	25
9/10/2019	6	6	6	25
10/10/2019	8	8	9	25
11/10/2019	7	7	7	25
12/10/2019	5	5	5	25
13/10/2019	6	7	7	25
14/10/2019	8	8	9	25
15/10/2019	10	11	13	25
16/10/2019	13	12	13	25

17/10/2019	16	14	15	25
18/10/2019	7	6	5	25
19/10/2019	10	9	8	25
20/10/2019	8	9	9	25
21/10/2019	12	11	12	25
22/10/2019	11	11	11	25
23/10/2019	18	20	21	25
24/10/2019	27	29	33	25
25/10/2019	19	25	28	25
26/10/2019	22	22	21	25
27/10/2019	13	12	12	25
28/10/2019	33	35	39	25
29/10/2019	44	47	51	25
30/10/2019	40	43	45	25
31/10/2019	39	39	37	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 October 2019 are presented in **Figure 6-3** below.

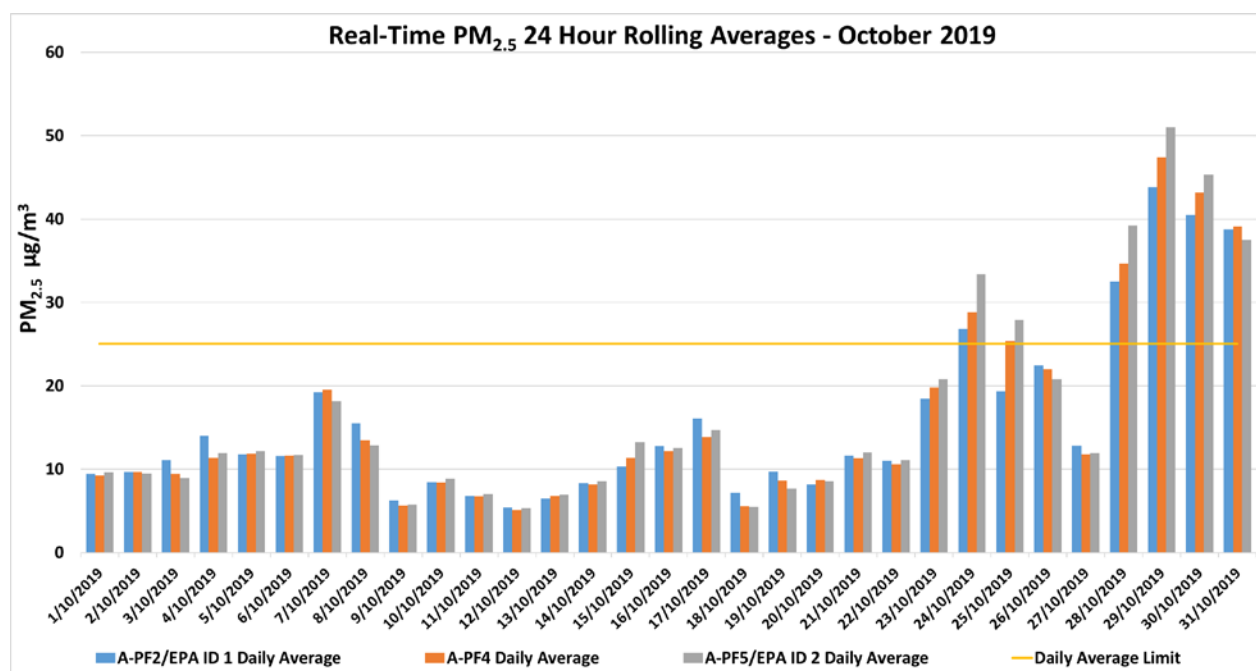


Figure 6-3: Real-time PM_{2.5} 24 hour rolling average results for October 2019.

6.4 PM_{2.5} Results - Annual rolling average

The requirement of annual rolling average of PM_{2.5} data was incepted during MOD 3 of DA 92/97, dated 24 August 2018. MPO is currently in the process of undergoing a validation and compliance review of this data, the findings of which will be reported following the completion of all data collection for the 2019 annual reporting period.

Real time PM_{2.5} annual rolling averages for October 2019 are presented in **Figure 6-4** below.

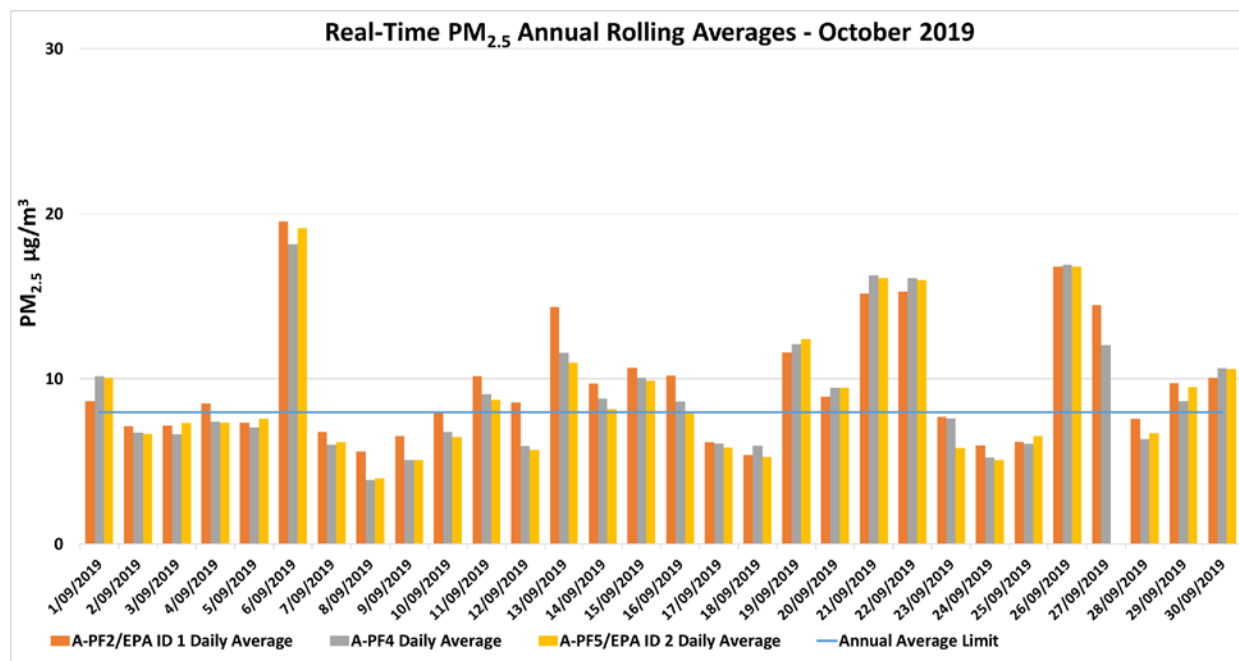


Figure 6-4: Real-time PM_{2.5} Annual Rolling average results for October 2019.

7. Surface Water Monitoring

7.1 Methodology

Surface water quality is monitored at 13 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 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 29 October 2019. Laboratory analysis was performed by SRT and SGS, both NATA accredited laboratories. Monthly monitoring results for pH, EC, TSS and TDS are presented in **Table 7-1**.

Table 7-1 – MPO Monthly Surface Water Monitoring Results – 29 October 2019

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	8.3	360	12	226
W2	8.2	360	12	198
W3	8.2	360	23	229

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W4	7.7	1250	10	714
W5	*	*	*	*
W6	8.3	360	8	218
W7	*	*	*	*
W9	*	*	*	*
W11	7.7	7600	13	4270
W12	8.0	7250	27	4080
W13	*	*	*	*
W14	*	*	*	*
W15	8.1	370	16	264

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

*Dry or insufficient water to sample.

^ 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).

Five of the thirteen monitoring locations were found to be dry on 29 October 2019. All sites sampled were below or inside the trigger level values. An investigation will be triggered if this occurs for three consecutive sampling events in accordance MPO Water Management Plan (MACH Energy, 2018).

8. Groundwater Monitoring

Groundwater monitoring was not undertaken during October 2019. The next groundwater monitoring event is scheduled for November 2019.

9. Noise Monitoring

Attended noise monitoring was undertaken during the night period of 21 October 2019 at 7 monitoring locations as per the MPO Noise Management Plan (MACH Energy, 2018) 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 2019 against noise criteria is shown in **Table 9-1**.

Table 9-1 – L_{Aeq,15min} Generated by MPO Night-Time Monitoring – 21 October 2019

Location	Start Date and Time	Wind Speed m/s	Stability Class	Criterion dB	Criterion Applies ¹	MPO Only L _{Aeq} dB ^{2,4,5}	Exceedance dB ^{3,4}
N-AT1	21/10/19 23:59	3.7	D	43	No	NM	NA
N-AT2	21/10/19 22:00	4.3	E	36	No	<20	NA
N-AT3	21/10/19 22:52	2.3	D	35	Yes	Inaudible	Nil

N-AT4	21/10/19 23:42	3.3	D	42	No	Inaudible	NA
N-AT5	21/10/19 23:42	3.3	D	40	No	Inaudible	NA
N-AT6	21/10/19 22:40	2.6	D	35	Yes	Inaudible	Nil
N-AT7 ⁵	21/10/19 22:28	3.1	D	40	No	Inaudible	NA

Notes:

1. 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 $L_{Aeq,15\text{minute}}$ 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;
4. Bold results indicate exceedance of criteria;
5. Temporary monitoring at N-AT7 commenced in January 2019 in order to better represent receptors north of the site. This location is not required in accordance with the approved MPO Noise Management Plan (MACH Energy, 2018) and is used for management purposes only.

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 Noise Management Plan (MACH Energy, 2018). Noise levels from MPO complied with noise limits at all monitoring locations during the October 2019 monitoring period.

10. Blast Monitoring

There were 8 blasts during October (a total of 56 blasts YTD). Results for October 2019 are presented in **Table 10-1**. All blast results during the October 2019 monitoring period and YTD are compliant with EPL 20850 and DA 92/97.

Table 10-1 – MPO Blast Monitoring Results – October 2019

Date Fired	Time Fired	Vibration BVOA	Overpressure BVOA	Vibration BVOC	Overpressure BVOC	Vibration BVO2	Overpressure BV02
03/10/19	12:05	0.660 mm/s	96.3 DBL	0.280 mm/s	93 DBL	0.860 mm/s	112 DBL
04/10/19	09:03	0.400 mm/s	88.6 DBL	0.240 mm/s	81.7 DBL	0.500 mm/s	97.6 DBL
11/10/19	12:10	0.210 mm/s	106.3 DBL	0.240 mm/s	95.1 DBL	0.400 mm/s	90.6 DBL
15/10/19	15:06	0.330 mm/s	95.5 DBL	0.180 mm/s	89.6 DBL	0.750 mm/s	105.2 DBL
21/10/19	12:04	1.000 mm/s	104 DBL	0.370 mm/s	99.2 DBL	1.830 mm/s	124.5 DBL

24/10/19	11:04	1.850 mm/s	96.7 DBL	0.730 mm/s	99.6 DBL	3.850 mm/s	109 DBL
25/10/19	11:18	0.170 mm/s	103 DBL	0.070 mm/s	105.6 DBL	0.400 mm/s	102.8 DBL
29/10/19	14:04	0.280 mm/s	100.9 DBL	0.060 mm/s	93.9 DBL	0.220 mm/s	111.2 DBL