

Monthly Environmental Monitoring Report

April 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 Environmental Protection Licence (EPL) 20850, Section 66(6) of the *Planning of the Environment Operations Act 1997* (POEO Act) and the MPO Project 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
Reporting Period Start Date	1 April 2019
Reporting Period End Date	30 April 2019
Date Data Received	22 May 2019

To view MPO EPL 20850 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 or TEOM Particulate Monitor PM10 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 a suitability qualified and experienced person.

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 ground water monitoring network. **Figure 2-4** shows the MPO surface water monitoring network.

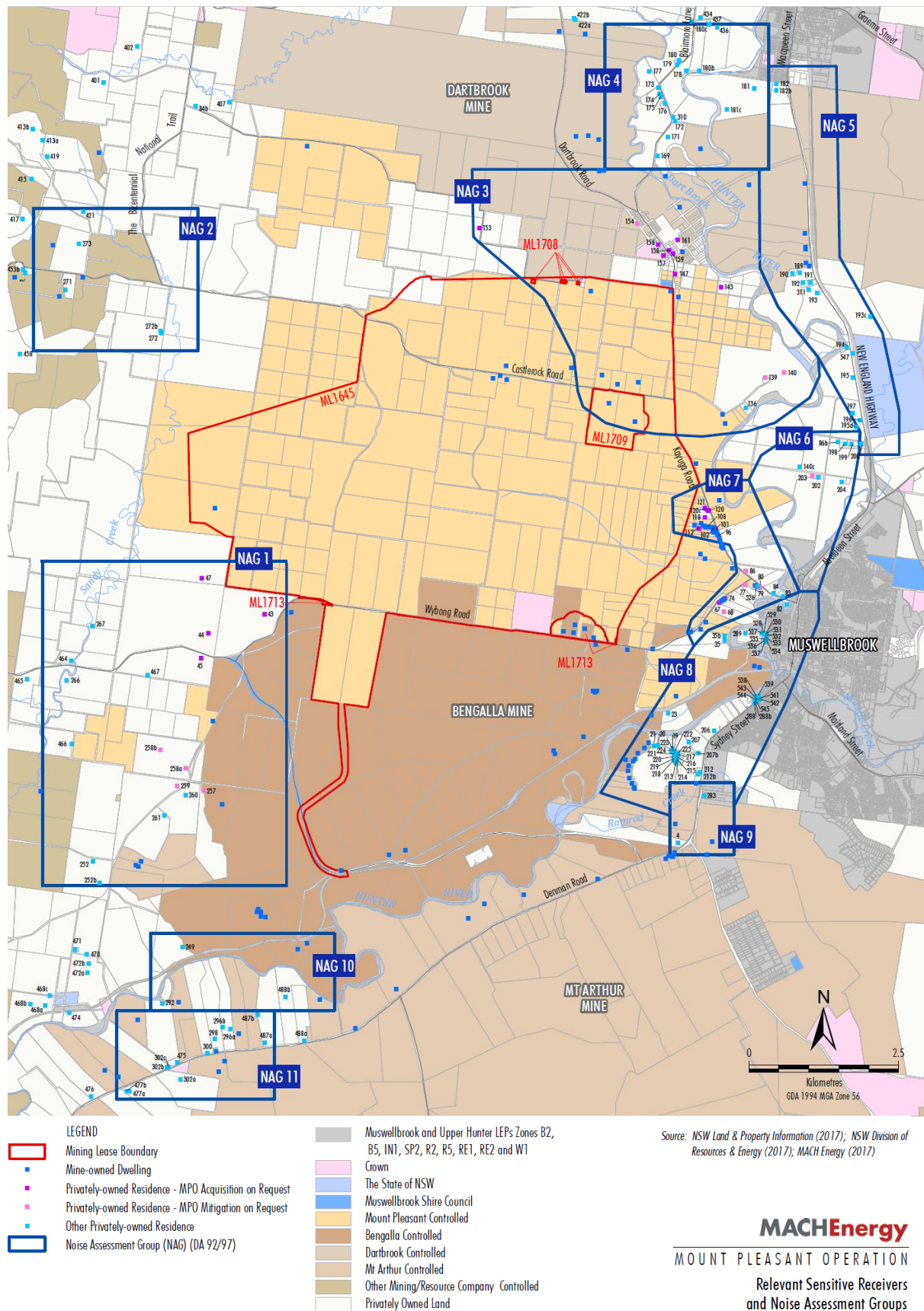


Figure 2-1 – MPO Attended Noise Monitoring Assessment Groups



- 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)

MACHEnergy
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

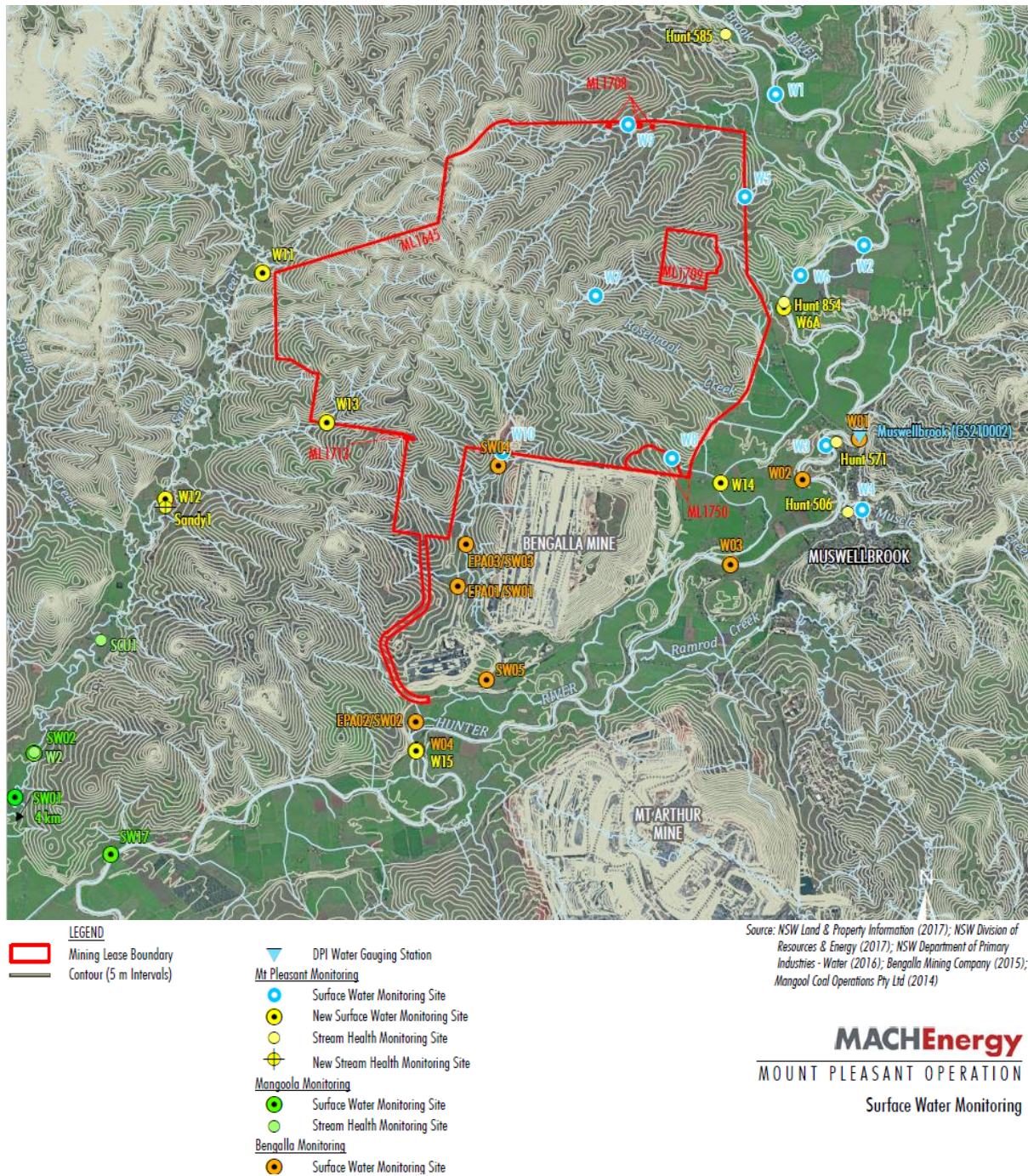


Figure 2-4 – MPO Surface Water Monitoring Network

3. Dust Depositional Monitoring

3.1 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.

3.2 Results

The dust deposition exposure period for all gauges commenced on 19 March 2019. Sample collection was undertaken on 16 April 2019 by AECOM with sample analysis performed by SRT, a NATA accredited laboratory. Results are summarised in **Table 3-1**.

Table 3-1: Dust Depositional Results – April 2019

Location	YTD Insoluble Solids (g/m ² .month)	Insoluble Solids Annual Rolling Average (g/m ² .month)
D1	2.3	1.9
D3	4.3	3.2
D4	2.0	1.8
D5	2.3	2.4
D6	3.9	3.2
D7 ¹	6.2	7.4
D8	4.8	4.2
D9	4.5	2.6

Location	YTD Insoluble Solids (g/m ² .month)	Insoluble Solids Annual Rolling Average (g/m ² .month)
D10	1.9	1.5
D11	3.0	2.4
D12	1.7	1.7
D13	2.6	2.8
D14	4.5	4.1
Criterion	-	4
<i>Note: Results in bold indicate elevated reading of adopted assessment criteria</i> <i>**Indicates result unavailable due to contaminated depositional dust gauges for YTD</i>		

Note ¹: Site D7 is located within close proximity to the northern boundary of Bengalla Mine main pit and is heavily influenced by Bengalla Mine operations. 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 EPA annual average criterion for dust deposition (insoluble solids) was recorded at site D7a (7.4 g/m².month), D8 (4.2 g/m².month), and D14 (4.1 g/m².month). Site D7 is located within close proximity to the northern boundary of a neighboring mining operation 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. Sites D8 and D14 are located within close proximity to the MPO mining operations and are influenced by activities within this area.

Field notes from the April sampling event noted that all the gauges contained insects.

Figure 3-1 compares the monthly insoluble solids results to the annual averages for each dust gauge and the assessment criterion.

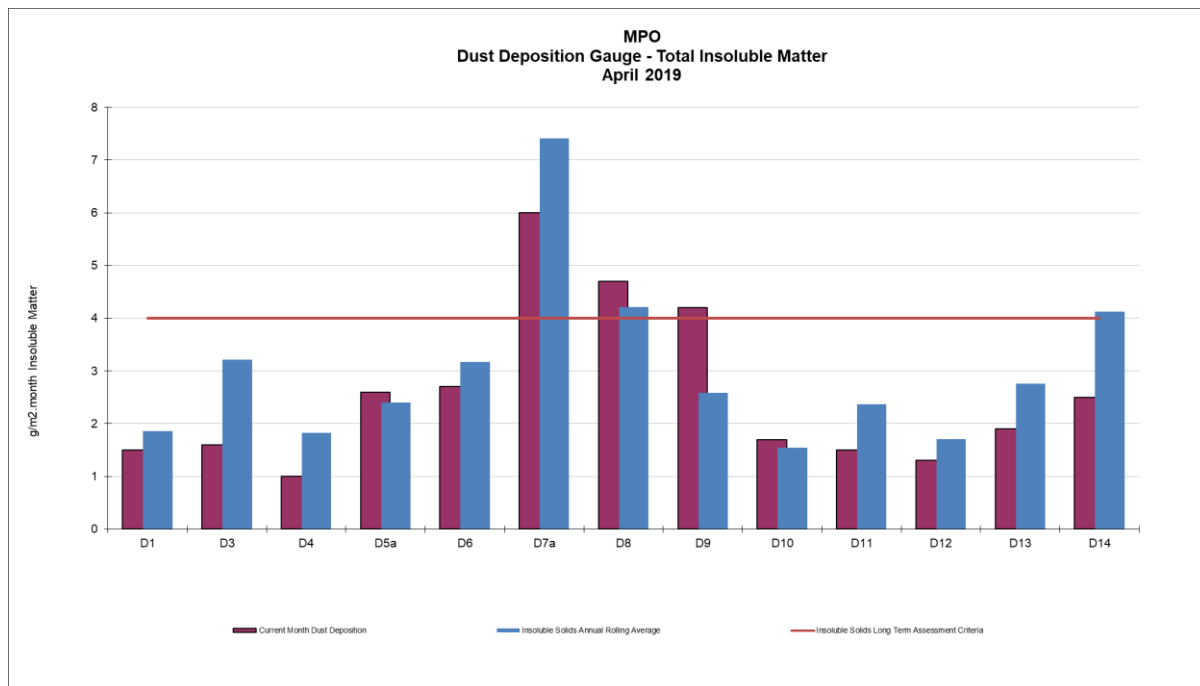


Figure 3-1: MPO Dust Deposition Monthly Result and Annual Rolling Average – April 2019

The results from **Figure 3-1** show an elevated reading of dust deposition annual rolling averages at sites D7a, D8, , and D14 for April 2019. These results are due to the location of these monitors. Figure 2-2 shows these sites are in close proximity of a neighboring mining operation and Mt Pleasant operations, and do not represent residential receptors. The dust deposition monitoring program is currently under review and will potentially be updated based on this review.

4. 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 4-1 Total suspended Particulate Monitoring Sites

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

4.1 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 EPA specifies an annual average criterion of 90 µg/m³.

4.2 Results

In April 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 4-2 Total Suspended Particulate Monitoring Data – April 2019

Run Date	Assessment Criterion	TSP µg/m ³		
		HVAS A-PF2	HVAS M-WS4	HVAS A-PF5
02/04/2019	-	30	25	27
08/04/2019	-	137	43	35
14/04/2019	-	116	53	60
20/04/2019	-	53	37	52
26/04/2019	-	172	42	41
Monthly Mean	-	102	40	43
Annual Rolling Average	90	91	45	47

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

4.3 Discussion

For the reporting period, the annual rolling average TSP data at all sites were below the annual average criterion of 90 µg/m³, with the exception of HVAS A-PF2, which was observed to be 91 µg/m³. Records indicate dust shutdowns were executed by MPO on the 26th April 2019 and 27th April 2019 because of adverse air quality conditions over these days. Dust shutdowns resulted in over 29 hours of machinery shutdown hours during this period. In accordance with Schedule 3, Condition 20 (Air Quality Criteria) of Development Consent 92/97, this non-compliance was reported to the Department of Planning and Environment on 31 May 2019.

5. Real Time PM₁₀ Monitoring

Continuous particulate matter less than 10 µm (PM₁₀) monitoring was conducted by three Palas Fidas (one utilised for management only) units at MPO during April 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. The third unit at A-PF4 is currently under maintenance, and has been temporarily replaced by a TEOM unit for the April 2019 monitoring period.

5.1 Results

On 8 and 9 April 2019, monitoring location A-PF2 resulted in elevated readings in accordance with the EPL condition limit of 50 $\mu\text{g}/\text{m}^3$ for the 24 hour rolling average. On 9, 26 and 27 April 2019, the Muswellbrook NW monitor also resulted in elevated readings. These high PM₁₀ levels on the mentioned dates were associated with wider regional air quality events and adverse weather conditions (dry and windy) and were not directly related to mining activities at MPO.

Real time PM₁₀ daily average results and annual rolling averages for April 2019 are presented in **Figure 5-1** below.

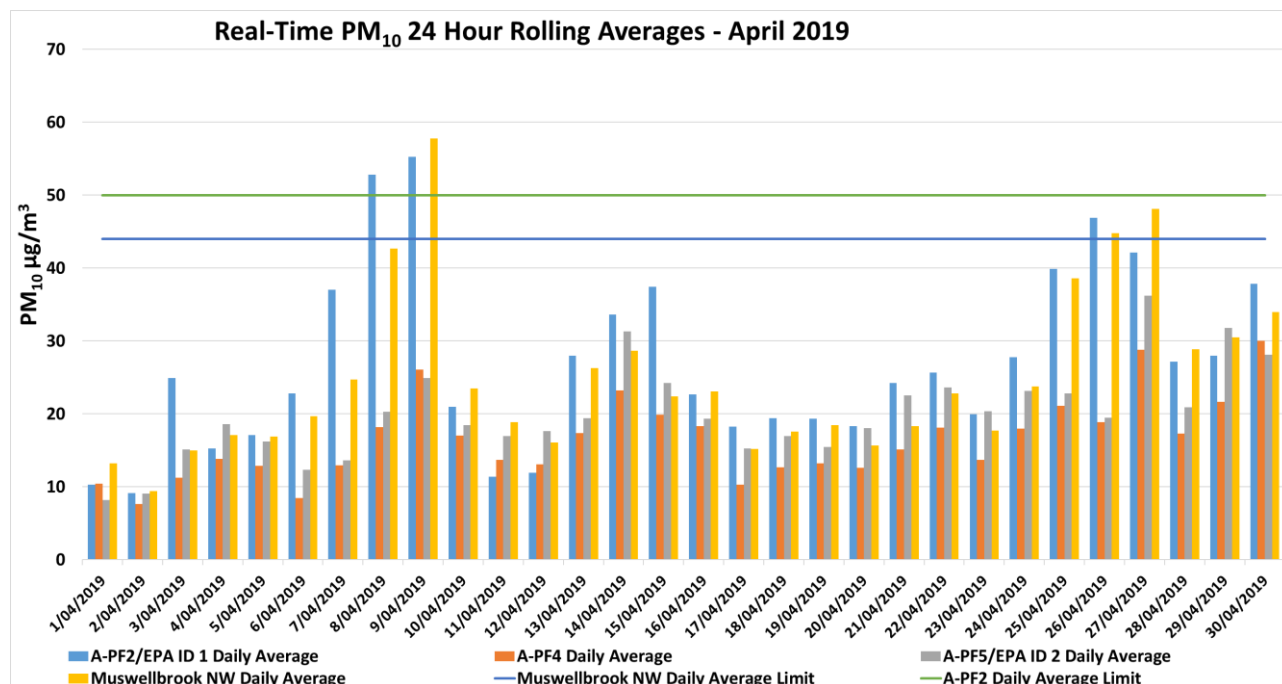


Figure 5-1: Real-time PM₁₀ 24 Hour Rolling average results for April 2019.

Figure 5-1 shows the results of real-time PM₁₀ 24 hour rolling average results at MPO air quality monitoring sites for April 2019. Dust shutdowns were executed by MPO on 9, 26 and 27 April as a result of adverse air quality conditions over these days. For example, the total time of machinery shutdown hours for 9, 26 and 27 April were 22.4, 4.4, and 25.3 hours respectively. Watercarts are in use each day during both day and night shifts at MPO, and continue to run during shutdown events.

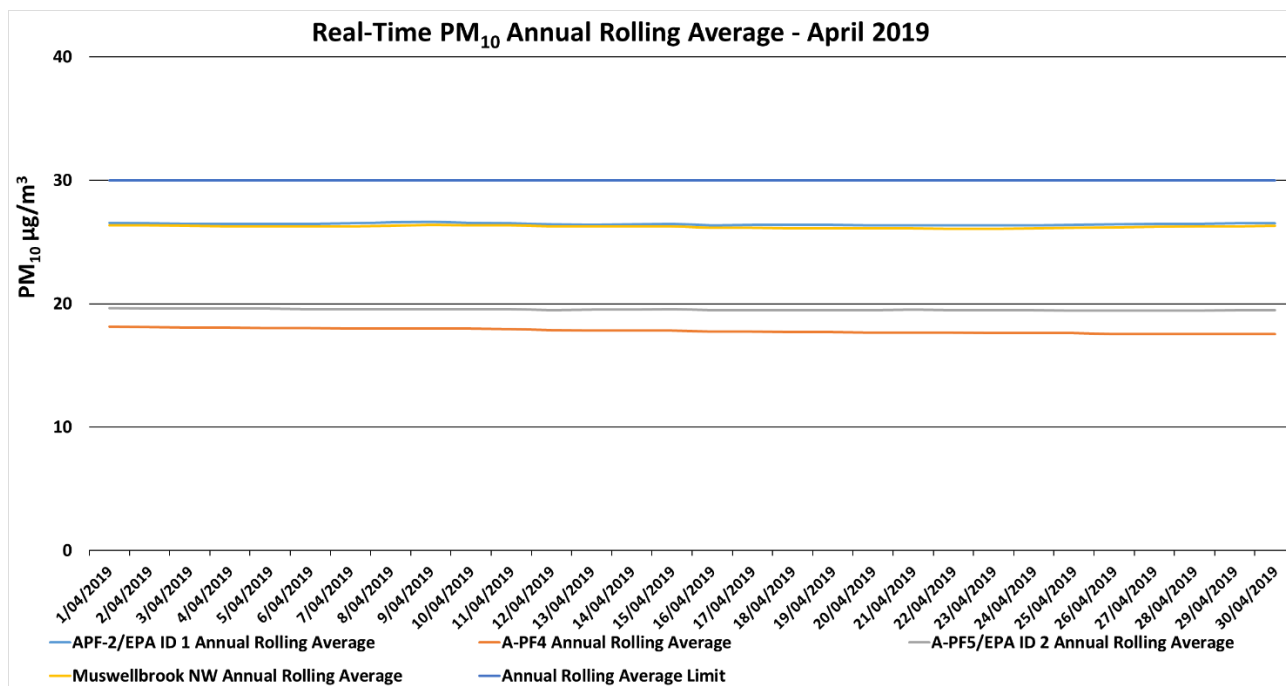


Figure 5-2: Real-time PM₁₀ Annual Rolling average results for April 2019.

Real time PM₁₀ daily average results for April 2019 are presented in **Table 5- 1**.

Table 5-1: MPO Palas Fidas Data – April 2019

Date	A-PF2/EPA ID 1	A-PF4	A-PF5/EPA ID 2	Muswellbrook NW	A-PF2 24 Hour Average Limit (µg/m³)	Muswellbrook NW 24 Hour Average Limit (µg/m³)
	24 hour Average Result					
1/04/2019	10	10	8	13	50	44
2/04/2019	9	8	9	9	50	44
3/04/2019	25	11	15	15	50	44
4/04/2019	15	14	19	17	50	44
5/04/2019	17	13	16	17	50	44
6/04/2019	23	8	12	20	50	44
7/04/2019	37	13	14	25	50	44
8/04/2019	53	18	20	43	50	44
9/04/2019	55	26	25	58	50	44
10/04/2019	21	17	18	24	50	44
11/04/2019	11	14	17	19	50	44
12/04/2019	12	13	18	16	50	44
13/04/2019	28	17	19	26	50	44
14/04/2019	34	23	31	29	50	44
15/04/2019	37	20	24	22	50	44
16/04/2019	23	18	19	23	50	44
17/04/2019	18	10	15	15	50	44
18/04/2019	19	13	17	18	50	44
19/04/2019	19	13	15	19	50	44

20/04/2019	18	13	18	16	50	44
21/04/2019	24	15	23	18	50	44
22/04/2019	26	18	24	23	50	44
23/04/2019	20	14	20	18	50	44
24/04/2019	28	18	23	24	50	44
25/04/2019	40	21	23	39	50	44
26/04/2019	47	19	19	45	50	44
27/04/2019	42	29	36	48	50	44
28/04/2019	27	17	21	29	50	44
29/04/2019	28	22	32	31	50	44
30/04/2019	38	30	28	34	50	44

Note: Results in bold indicate elevated readings during adverse weather conditions. As a result, MPO executed dust delays/shutdowns of operations and a halt to dust generating activities on 9, 26 and 27 April 2019.

6. Surface Water Monitoring

6.1 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.

6.2 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.

6.3 Results

Monthly and rain event (if required) surface water monitoring was conducted by AECOM on 26 April 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 6-1**.

Table 6-1 – MPO Monthly Surface Water Monitoring Results – 26 April 2019

Station	pH	Electrical Conductivity (EC) ($\mu\text{S}/\text{cm}$) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	8.1	350	27	280
W2	8.1	360	15	189
W3	8.1	350	22	209
W4	7.4	1250	3	765
W5	*	*	*	*
W6	8.1	350	10	226
W7	*	*	*	*

Station	pH	Electrical Conductivity (EC) ($\mu\text{S}/\text{cm}$) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W9	*	*	*	*
W11	7.4	4650	6	2870
W12	7.7	3400	2	2050
W13	*	*	*	*
W14	*	*	*	*
W15	8.0	370	26	223

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 26 April 2019. All sites sampled were below or inside the trigger level values.

7. Groundwater Monitoring

Groundwater monitoring did not occur in April 2019. The next quarterly monitoring event is scheduled for May 2019.

8. Noise Monitoring

Attended noise monitoring was undertaken during the night period of 17 April 2019 at seven monitoring locations in accordance with the EPL and MPO Noise Management Plan.

8.1 Results

The results for night time attended noise monitoring for noise generated by MPO in April 2019 against noise criteria is shown in **Table 8-1**.

Table 8-1 – $L_{Aeq,15min}$ Generated by MPO Night-Time Monitoring – 17 April 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	17/04/19 23:43	0.1	F	40	Yes	Inaudible	Nil
N-AT2	17/04/19 22:00	2.5	D	36	Yes	Not measurable	Nil
N-AT3	17/04/19 22:51	1.5	D	35	Yes	Inaudible	Nil
N-AT4	17/04/19 23:43	0.1	F	42	Yes	Inaudible	Nil
N-AT5	17/04/19 23:19	1.5	D	40	Yes	Inaudible	Nil
N-AT6	17/04/19 22:35	1.8	D	35	Yes	Inaudible	Nil

N-AT7	17/04/19 22:28	2.0	D	40	Yes	Inaudible	Nil
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Notes:

1. 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 atmospheric conditions outside those specified in the project approval and so criterion is not applicable; and
4. Bold results in red indicate exceedance of criteria.

The survey purpose is to quantify and describe the existing acoustic environment around the mine project and compare results with relevant limits. Noise levels from MTP complied with noise limits at all monitoring locations during the April 2019 monitoring period.

9. Blast Monitoring

Results for April 2019 are presented in **Table 9-1**.

Table 9-1 – MPO Blast Monitoring Results – April 2019

Date Fired	Time Fired	Vibration BVOA	Overpressure BVOA	Vibration BVOC	Overpressure BVOC	Vibration BVO2	Overpressure BV02
4/1/19	13:28	0.900 mm/s	90.9 DBL	0.280 mm/s	98.9 DBL	0.390 mm/s	99 DBL
9/1/19	15:15	0.730 mm/s	97.4 DBL	0.420 mm/s	92.6 DBL	0.510 mm/s	100.9 DBL
10/1/19	14:30	0.07 mm/s	107.9 DBL	0.03 mm/s	102.9 DBL	0.51 mm/s	99.3 DBL
16/1/19	14:30	2.660 mm/s	100.3 DBL	1.480 mm/s	93 DBL	1.860 mm/s	102.9 DBL
18/1/19	10:15	3.700 mm/s	101.4 DBL	2.480 mm/s	99.2 DBL	0.280 mm/s	85.5 DBL
23/1/19	13:52	0.670 mm/s	99.3 DBL	0.380 mm/s	103.6 DBL	0.880 mm/s	107.9 DBL
01/02/19	13:14	1.350 mm/s	106 DBL	0.970 mm/s	114.9 DBL	1.190 mm/s	105.1 DBL
07/02/19	13:00	0.600 mm/s	97.4 DBL	0.320 mm/s	87.5 DBL	0.630 mm/s	105 DBL
13/02/19	13:01	1.590 mm/s	100.5 DBL	0.550 mm/s	90.9 DBL	1.910 mm/s	103.5 DBL

21/02/19	15:01	0.390 mm/s	105.2 DBL	0.440 mm/s	96.9 DBL	1.020 mm/s	105.8 DBL
28/02/19	15:21	1.270 mm/s	98.1 DBL	0.800 mm/s	97.6 DBL	2.050 mm/s	104.0 DBL
8/03/2019	10:13	0.920 mm/s	101.2 DBL	0.460 mm/s	94.6 DBL	0.580 mm/s	110.2 DBL
15/03/19	13:16	1.240 mm/s	108 DBL	0.760 mm/s	99.2 DBL	1.510 mm/s	111.3 DBL
20/03/19	13:06	1.100 mm/s	99 DBL	0.320 mm/s	95.2 DBL	0.700 mm/s	104.5 DBL
22/03/19	12:48	0.950 mm/s	92.7 DBL	0.650 mm/s	91.4 DBL	0.890 mm/s	101 DBL
29/03/19	09:36	0.340 mm/s	96.5 DBL	0.140 mm/s	95.5 DBL	0.710 mm/s	106.3 DBL
29/03/19	09:36	0.340 mm/s	96.5 DBL	0.140 mm/s	95.5 DBL	0.710 mm/s	106.3 DBL
4/04/2019	13:00	0.320 mm/s	107.6 DBL	0.110 mm/s	104.8 DBL	0.360 mm/s	109 DBL
11/04/2019	13:01	0.460 mm/s	99.6 DBL	0.290 mm/s	99.4 DBL	0.820 mm/s	100.5 DBL
17/04/2019	13:06	0.780 mm/s	96.5 DBL	0.800 mm/s	92.9 DBL	3.820 mm/s	107 DBL

Blast results complied with all criteria at each monitoring site in April 2019.

10. Meteorological Monitoring

Weather data is measured continuously at the Kayuga Road meteorological station (M-WS4). In addition to air quality parameters, the weather station also measures wind speed and direction, temperature (at 2 m and 10 m), solar radiation, relative humidity, rainfall, atmospheric pressure, and sigma theta. All data was captured during April 2019.