

Monthly Environmental Monitoring Report

March 2019

Table of Contents

1. Introduction	2
2. Monitoring Requirements	2
3. Dust Depositional Monitoring	7
3.1 Methodology	7
3.2 Results	7
4. Total Suspended Particulates	9
4.1 Assessment Criteria	10
4.2 Results	10
4.3 Discussion	10
5. Real Time PM₁₀ Monitoring	10
5.1 Results	10
6. Surface Water Monitoring	13
6.1 Methodology	13
6.2 Assessment Criteria	13
6.3 Results	13
7. Groundwater Monitoring	15
8. Noise Monitoring	15
8.1 Results	15
9. Blast Monitoring	16
10. Meteorological Monitoring	17

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 Approval 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 March 2019
Reporting Period End Date	31 March 2019
Date Data Received	23 April 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.

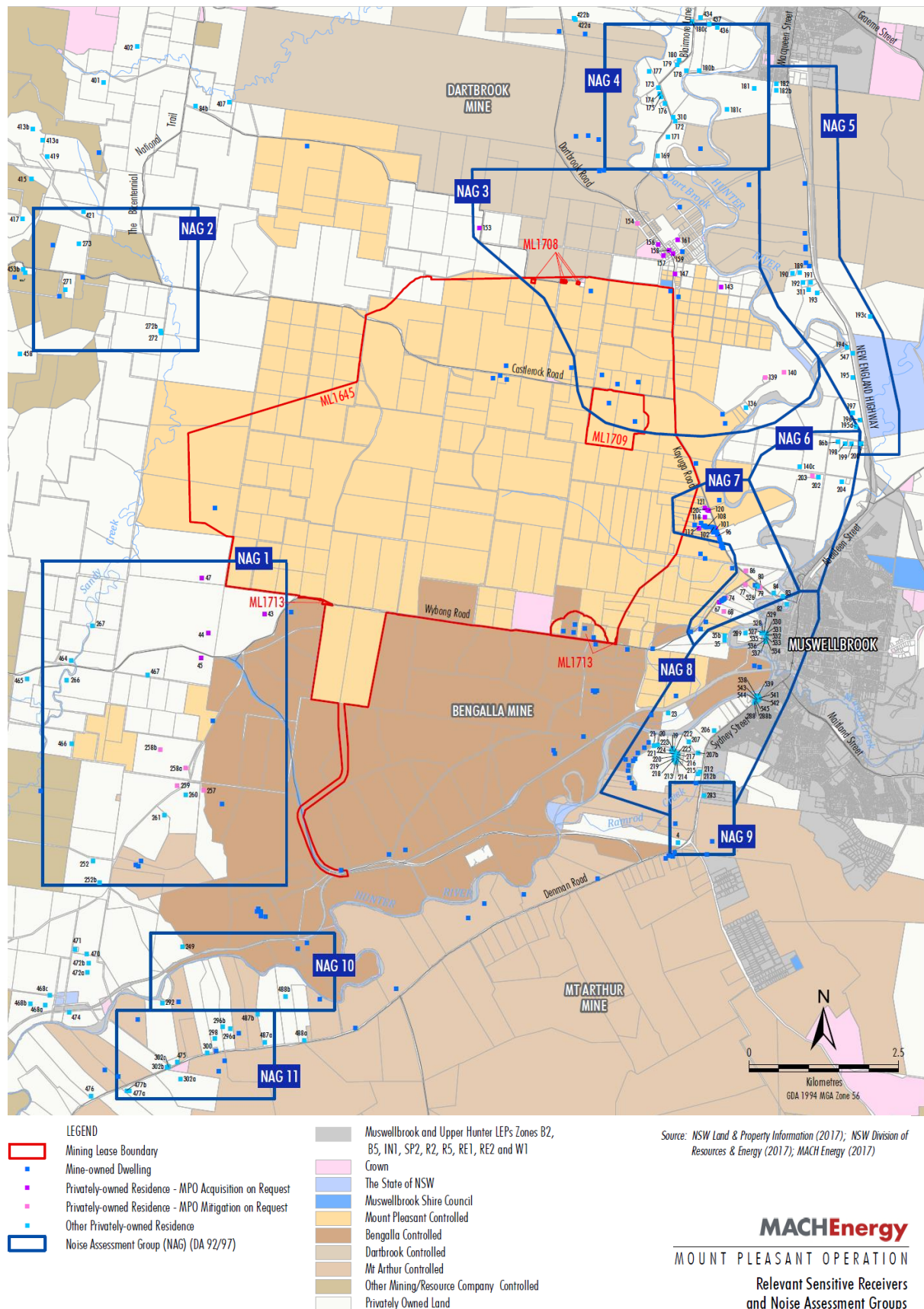


Figure 2-1 – MPO Attended Noise Monitoring Assessment Groups



- 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

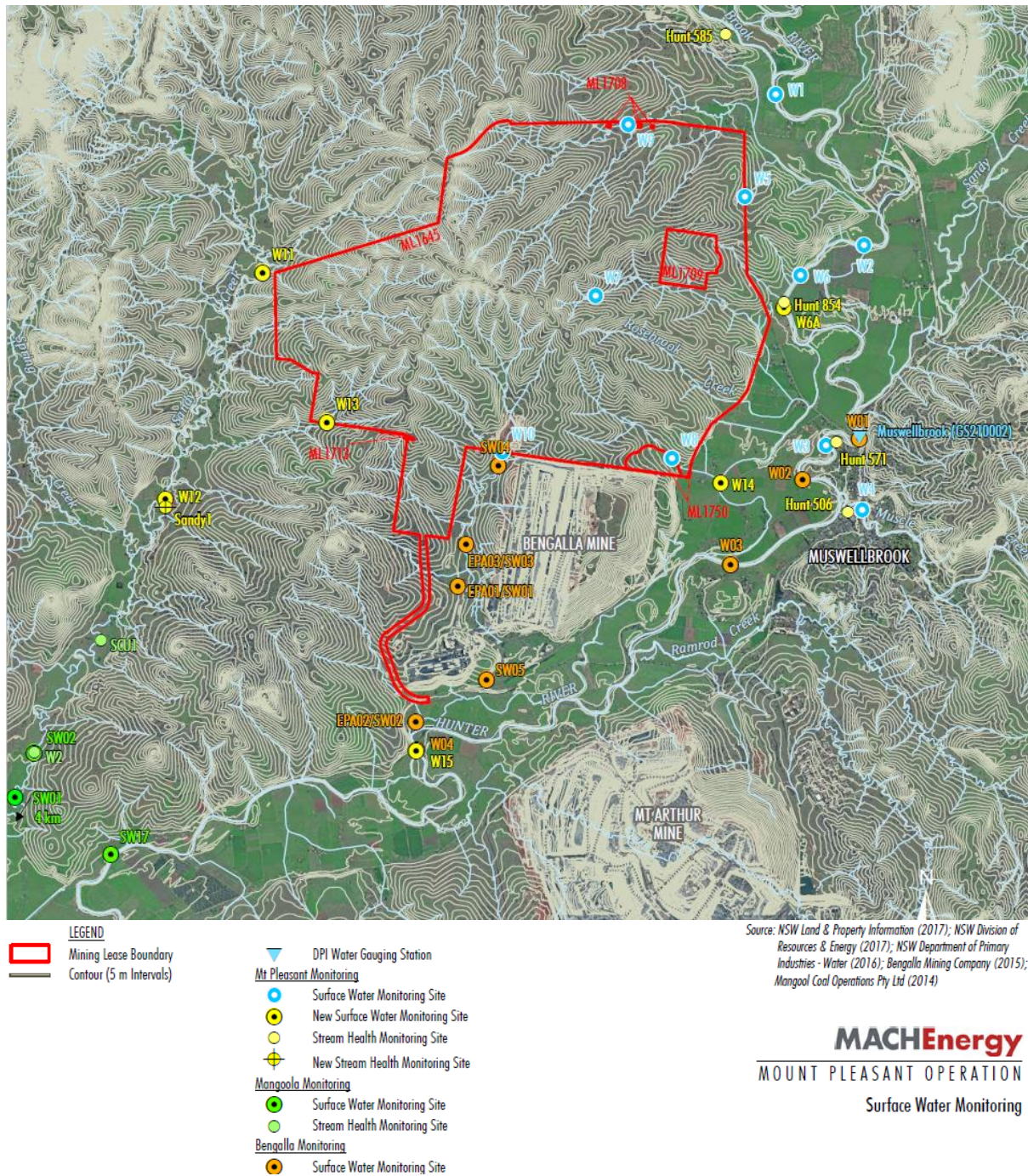


Figure 2-4 – MPO Surface Water Monitoring Network

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 15 February 2019. Sample collection was undertaken on 19 March 2019 by AECOM with sample analysis performed by SRT NATA accredited laboratory. Results are summarised in **Table 3-1**.

Table 3-1: Dust Depositional Results – March 2019

Location	YTD Insoluble Solids (g/m ² .month)	Insoluble Solids Annual Rolling Average (g/m ² .month)
D1	2.6	1.9
D3	5.2	3.3
D4	2.4	1.9
D5	2.2	2.4
D6	4.3	3.2
D7 ¹	6.3	7.6
D8	4.8	4.1
D9	4.7	2.3

Location	YTD Insoluble Solids (g/m ² .month)	Insoluble Solids Annual Rolling Average (g/m ² .month)
D10	2.0	1.6
D11	3.5	2.4
D12	1.8	1.7
D13	2.8	2.8
D14	5.2	4.3
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 (7.5 g/m².month), D8 (4.1 g/m².month), and D14 (4.3 g/m².month). Site D7 is located within close proximity to the northern boundary of Bengalla Coal 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. 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 March sampling event noted that all the gauges contained insects, with three also containing vegetation.

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

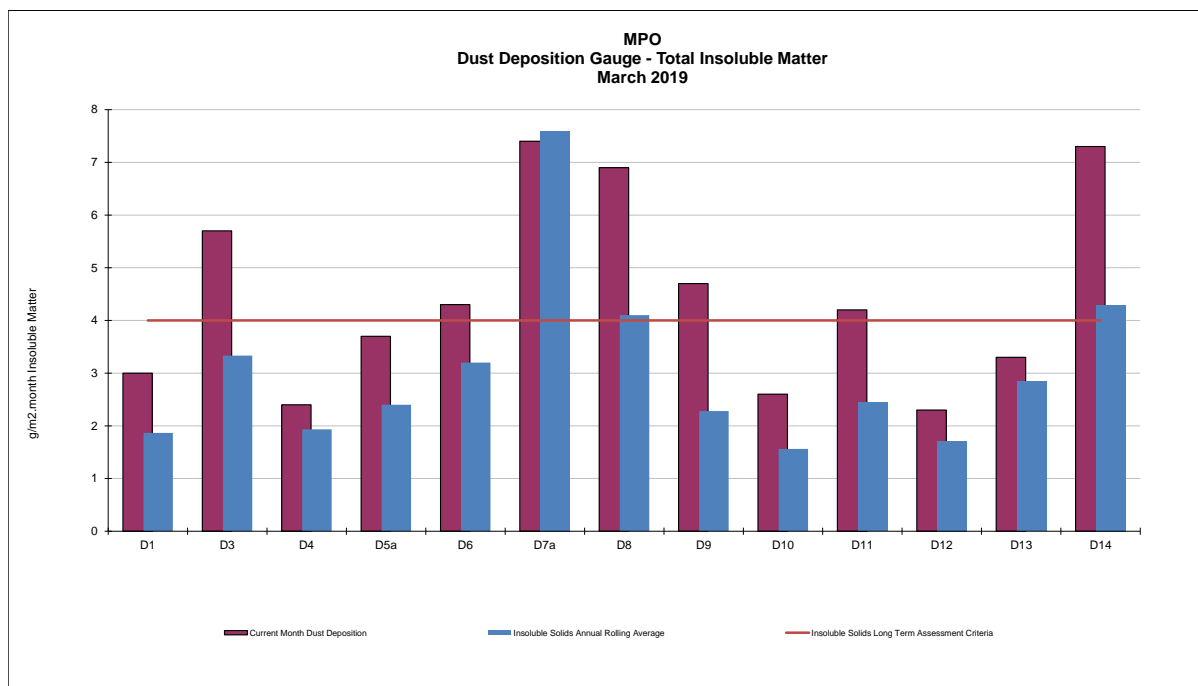


Figure 3-1: MPO Dust Deposition Monthly Result and Annual Rolling Average – March 2019

The results from **Figure 3-1** show an elevated reading of dust deposition at sites D3, D9, and D11 for March 2019. This is likely a result of the high number of days that the region experienced adverse regional air quality events such as hot, dry weather in much of March 2019. However, the annual average criterion has not been exceeded.

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

Table 4-2 Total Suspended Particulate Monitoring Data – March 2019

Run Date	Assessment Criterion	TSP µg/m ³		
		HVAS A-PF2	HVAS M-WS4	HVAS A-PF5
03/03/2019	-	115	59	63
09/03/2019	-	114	55	38
15/03/2019	-	87	53	70
21/03/2019	-	47	44	55
27/03/2019	-	49	38	43
Monthly Mean	-	82	50	54
Annual Rolling Average	90	88	47	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.

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 March 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 March 2019 monitoring period.

5.1 Results

On 6 March 2019, monitoring location A-PF2, A-PF5 and the Muswellbrook NW monitor resulted in elevated readings in line with the EPL condition limit of 50 µg/m³ for the 24 hour rolling average. The Muswellbrook NW monitor also resulted in elevated readings on 31 March 2019. 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 March 2019 are presented in **Figure 5-1** below.

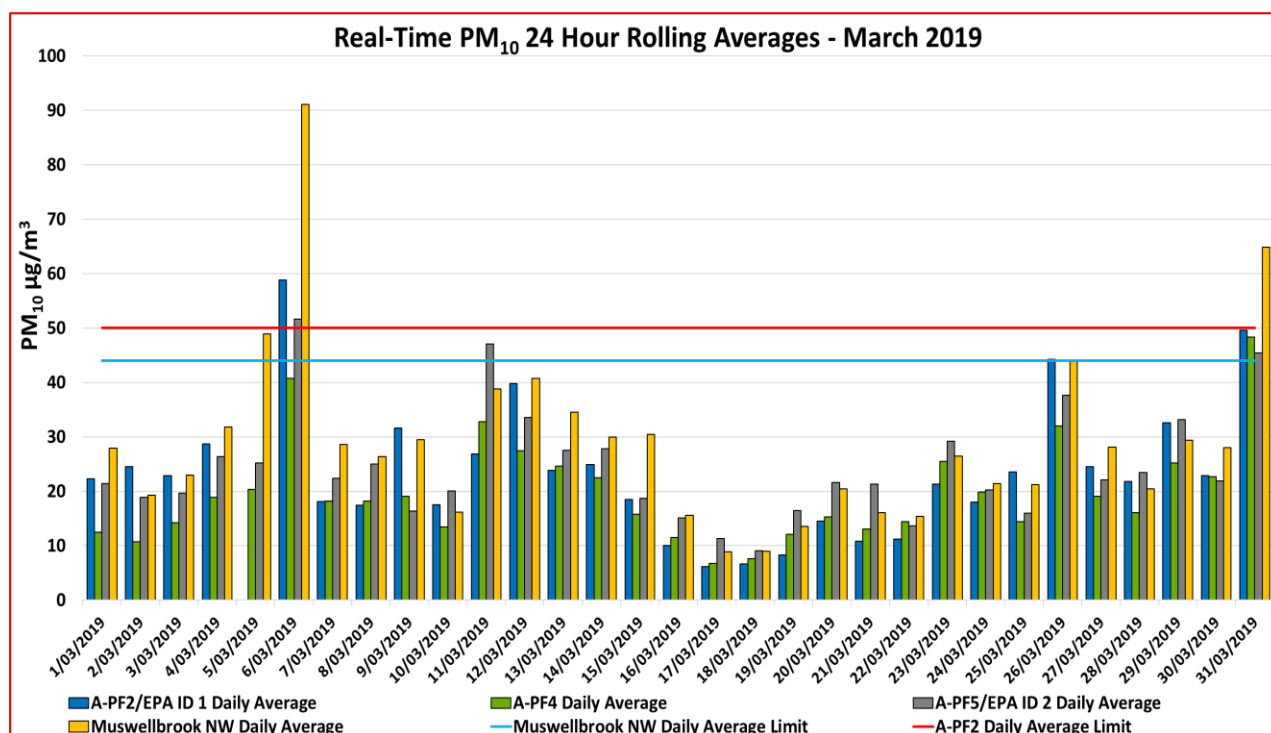


Figure 5-1: Real-time PM₁₀ 24 Hour Rolling average results for March 2019.

Figure 5-1 shows the results of real-time PM₁₀ 24 hour rolling average results at MPO air quality monitoring sites for March 2019. Dust shutdowns were executed by MPO on 6 and 31 March as a result of adverse air quality conditions over these days. For example, the total time of machinery shutdown hours for 6 and 31 March were 65.7, and 84.4 hours respectively. Watercarts are in use each day during both day and night shifts at MPO, and continue to run during shutdown events.

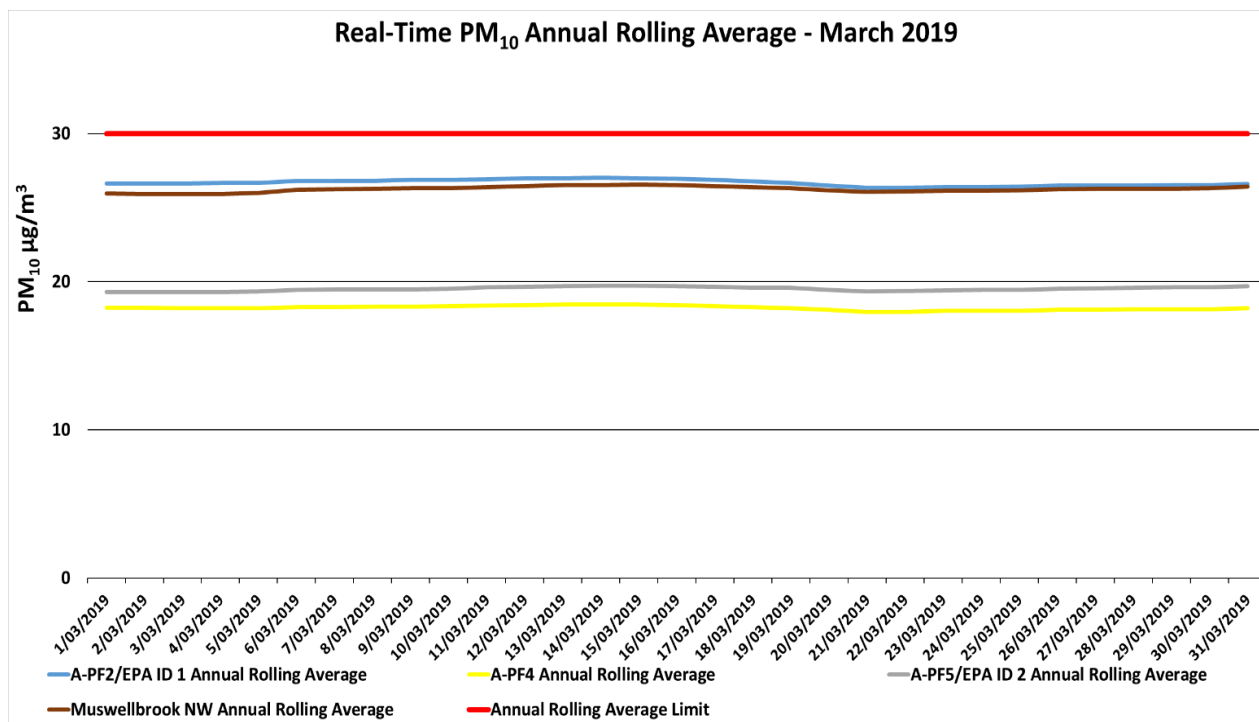


Figure 5-1: Real-time PM₁₀ Annual Rolling average results for March 2019.

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

Table 5-1: MPO Palas Fidas Data – March 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					
1/03/2019	22	12	21	28	50	44
2/03/2019	25	11	19	19	50	44
3/03/2019	23	14	20	23	50	44
4/03/2019	29	19	26	32	50	44
5/03/2019	-	20	25	49	50	44
6/03/2019	59	41	52	91	50	44
7/03/2019	18	18	22	29	50	44
8/03/2019	17	18	25	26	50	44
9/03/2019	32	19	16	30	50	44
10/03/2019	18	13	20	16	50	44
11/03/2019	27	33	47	39	50	44
12/03/2019	40	27	34	41	50	44
13/03/2019	24	25	28	35	50	44
14/03/2019	25	23	28	30	50	44
15/03/2019	19	16	19	31	50	44
16/03/2019	10	12	15	16	50	44
17/03/2019	6	7	11	9	50	44
18/03/2019	7	8	9	9	50	44

19/03/2019	8	12	16	14	50	44
20/03/2019	15	15	22	20	50	44
21/03/2019	11	13	21	16	50	44
22/03/2019	11	14	14	15	50	44
23/03/2019	21	25	29	27	50	44
24/03/2019	18	20	20	21	50	44
25/03/2019	24	14	16	21	50	44
26/03/2019	44	32	38	44	50	44
27/03/2019	25	19	22	28	50	44
28/03/2019	22	16	23	20	50	44
29/03/2019	33	25	33	29	50	44
30/03/2019	23	23	22	28	50	44
31/03/2019	50	48	45	65	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 6 and 31 March 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 surface water monitoring was conducted by AECOM on 20 and 30 (sampling conducted 1 April 2019) March 2019 following significant rainfall events. Laboratory analysis was performed by SRT and SGS 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 – 20 March 2019

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	8.2	340	27	245
W2	8.2	370	28	206
W3	8.1	350	28	226
W4	7.5	1550	6	896
W5	*	*	*	*

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W6	8.1	340	16	214
W7	*	*	*	*
W9	*	*	*	*
W11	7.4	2100	18	1120
W12	8.2	5750	5	3320
W13	*	*	*	*
W14	*	*	*	*
W15	7.9	430	23	286

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).

**Table 6-2 – MPO Monthly Surface Water Monitoring Results – 30 March 2019
(Sampling conducted 1 April 2019)**

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	7.7	410	141	242
W2	7.6	400	180	252
W3	7.6	390	229	239
W4	7.3	900	39	547
W5	*	*	*	*
W6	7.5	410	198	219
W7	*	*	*	*
W9	*	*	*	*
W11	**	**	**	**
W12	7.5	980	58	543
W13	*	*	*	*
W14	*	*	*	*
W15	7.5	390	271	261

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 20 March 2019. Site W2 exceeded the surface water quality 80th percentile trigger value for TSS. All other sites sampled were below or inside the trigger level values.

Four of the thirteen monitoring locations were found to be dry on 30 March 2019 (sampled 1 April 2019). Sites W2 and W6a exceeded the surface water quality 20th percentile trigger values for pH and the surface water quality 80th percentile trigger value for TSS. All other sites sampled were below or inside the trigger level values during March 2019.

7. Groundwater Monitoring

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

8. Noise Monitoring

Attended noise monitoring was undertaken during the night period of 26/27 March 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 March 2019 against noise criteria is shown in **Table 8-1**.

Table 8-1 – $L_{Aeq,15min}$ Generated by MPO Night-Time Monitoring – 26/27 March 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	26/03/19 23:16	3.7	E	40	No	Inaudible	NA
N-AT2	26/03/19 22:00	5.5	D	36	No	Inaudible	NA
N-AT3	26/03/19 22:55	3.9	D	35	No	Inaudible	NA
N-AT4	26/03/19 23:16	3.4	D	42	No	Inaudible	NA
N-AT5	26/03/19 23:23	3.9	D	40	No	Inaudible	N/A
N-AT6	26/03/19 22:39	4.9	E	35	No	Inaudible	N/A
N-AT7	26/03/19 22:27	4.9	E	40	No	Inaudible	N/A

Notes:

- 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 atmospheric conditions outside those specified in the project approval and so criterion is not applicable; and
- 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 March 2019 monitoring period.

9. Blast Monitoring

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

Table 9-1 – MPO Blast Monitoring Results – March 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	10:13:00	0.920 mm/s	101.2 DBL	0.460 mm/s	94.6 DBL	0.580 mm/s	110.2 DBL
15/03/19	13:16:00	1.240 mm/s	108 DBL	0.760 mm/s	99.2 DBL	1.510 mm/s	111.3 DBL
20/03/19	13:06:00	1.100 mm/s	99 DBL	0.320 mm/s	95.2 DBL	0.700 mm/s	104.5 DBL
22/03/19	12:48:00	0.950 mm/s	92.7 DBL	0.650 mm/s	91.4 DBL	0.890 mm/s	101 DBL

29/03/19	09:36:00	0.340 mm/s	96.5 DBL	0.140 mm/s	95.5 DBL	0.710 mm/s	106.3 DBL
29/03/19	09:36:00	0.340 mm/s	96.5 DBL	0.140 mm/s	95.5 DBL	0.710 mm/s	106.3 DBL

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