

**Mount Pleasant Operation
Monthly Environmental Monitoring Report**

December 2019

Table of Contents

1. Introduction	2
2. Monitoring Requirements	2
3. Meteorological Monitoring	8
4. Dust Depositional Monitoring	8
4.1 Methodology	8
4.2 Results	8
5. Total Suspended Particulates	10
5.1 Assessment Criteria	11
5.2 Results	11
5.3 Discussion	11
6. Real Time Air Quality Monitoring	11
6.1 PM ₁₀ Results – 24 hour rolling average	12
6.2 PM ₁₀ Results – Annual rolling average	13
6.3 PM _{2.5} Results – 24 hour rolling average	14
6.4 PM _{2.5} Results - Annual rolling average	15
7. Surface Water Monitoring	16
7.1 Methodology	16
7.2 Assessment Criteria	16
7.3 Results	16
8. Groundwater Monitoring	17
9. Noise Monitoring	17
9.1 Results	17
10. Blast Monitoring	18

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 2019
Reporting Period End Date	31 December 2019
Date Data Received	21 January 2020

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; Figure 2-4; and Figure 2-5.**

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. **Figure 2-5** shows the MPO surface water monitoring network.

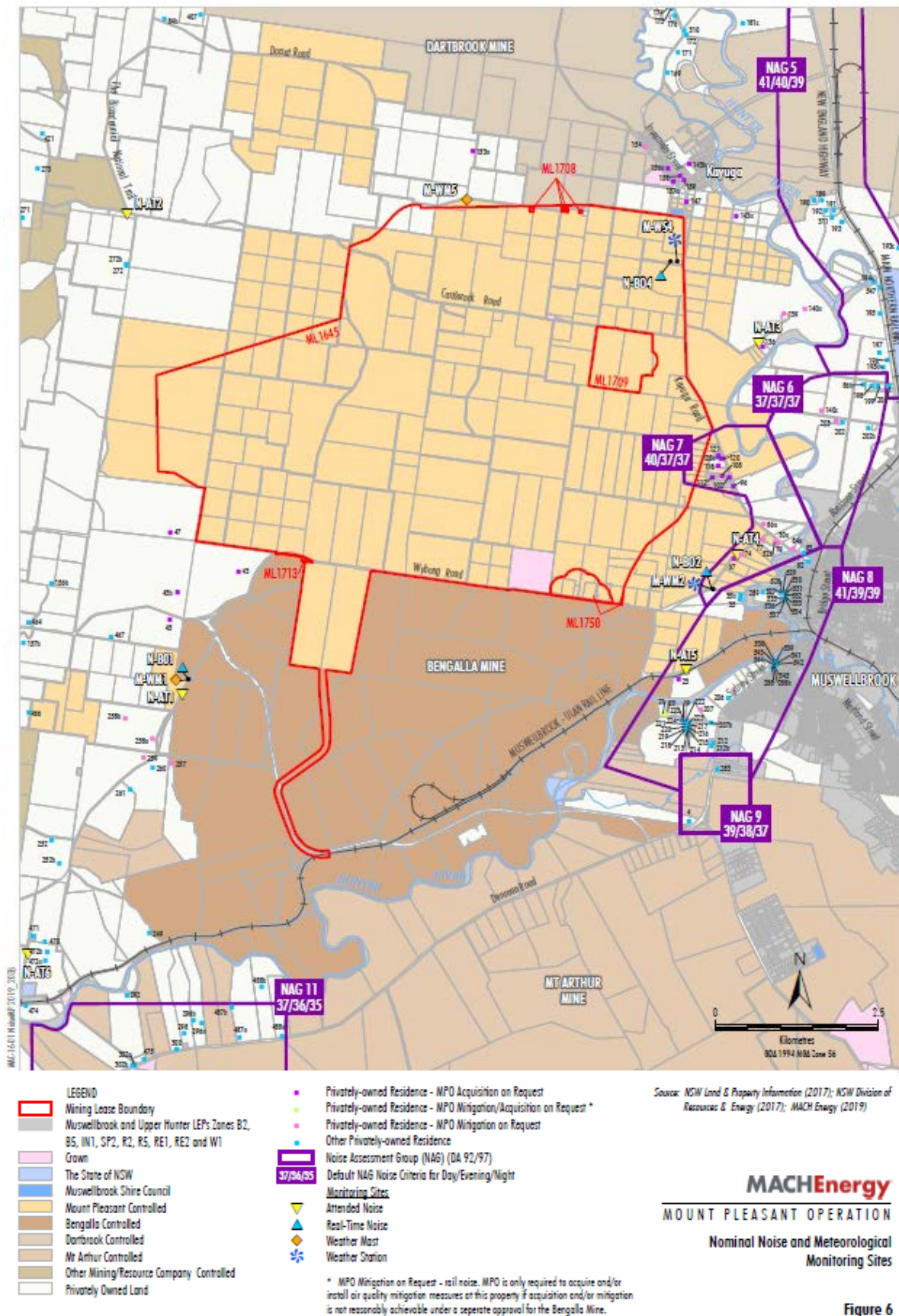


Figure 6

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

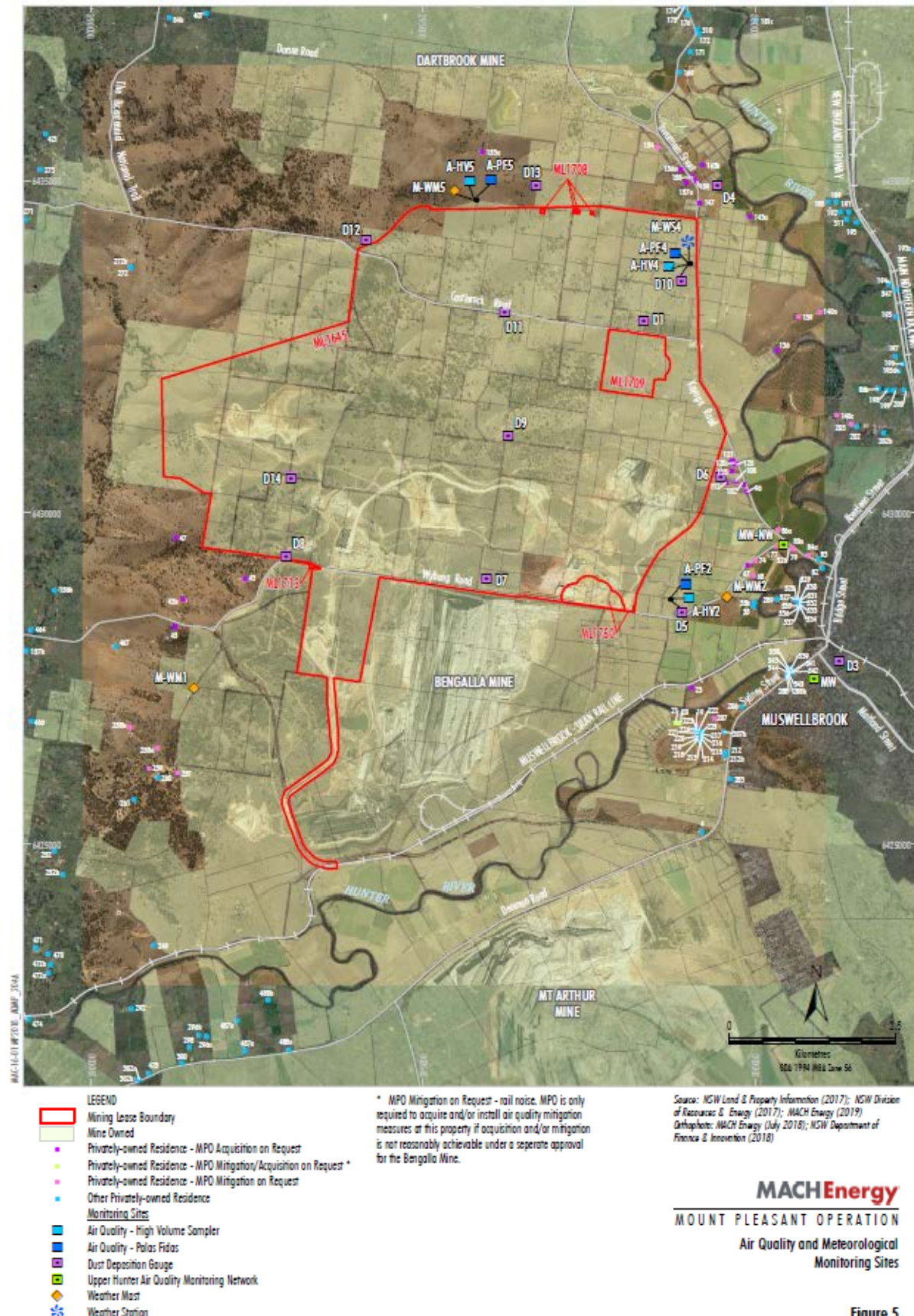


Figure 5

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

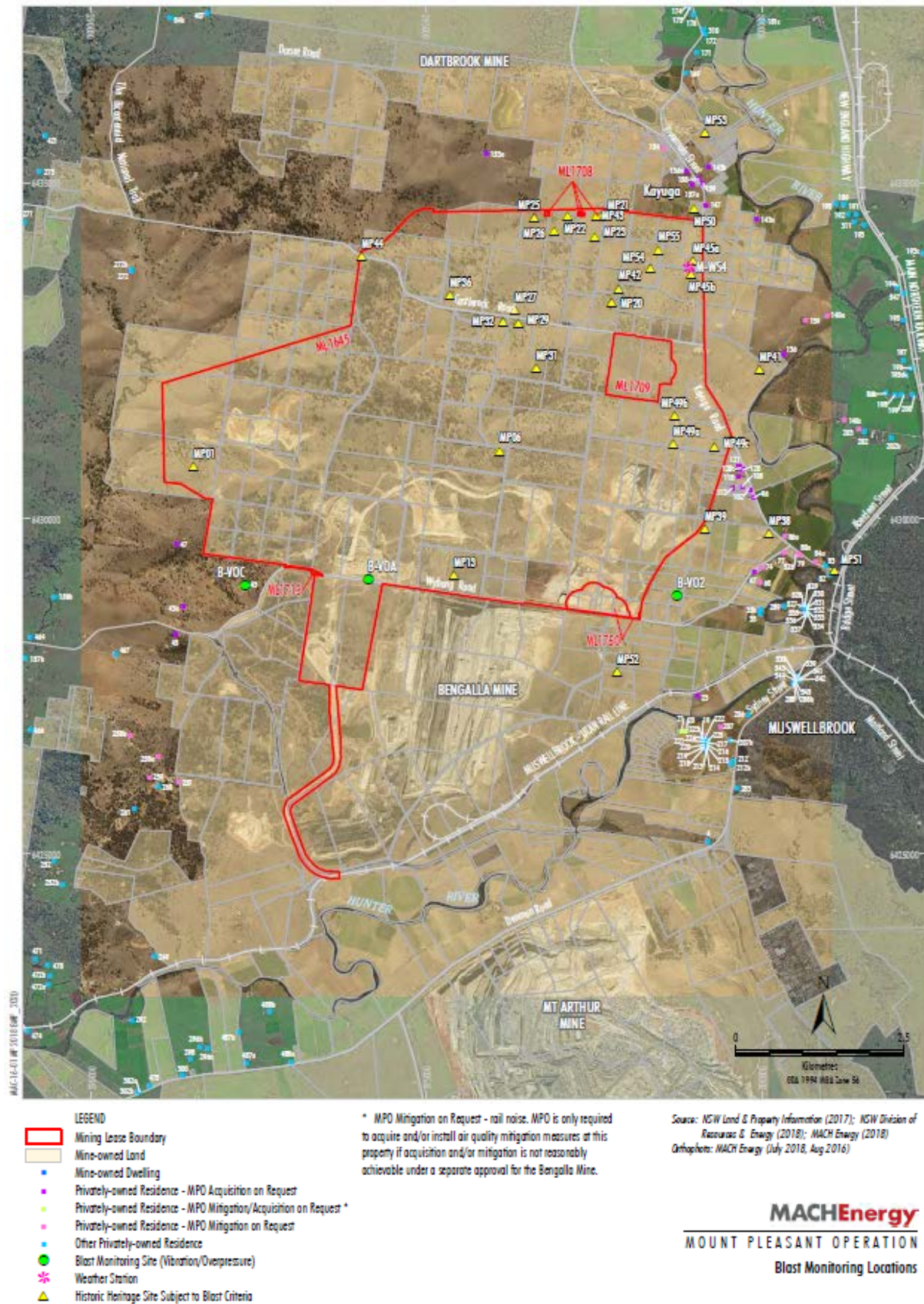
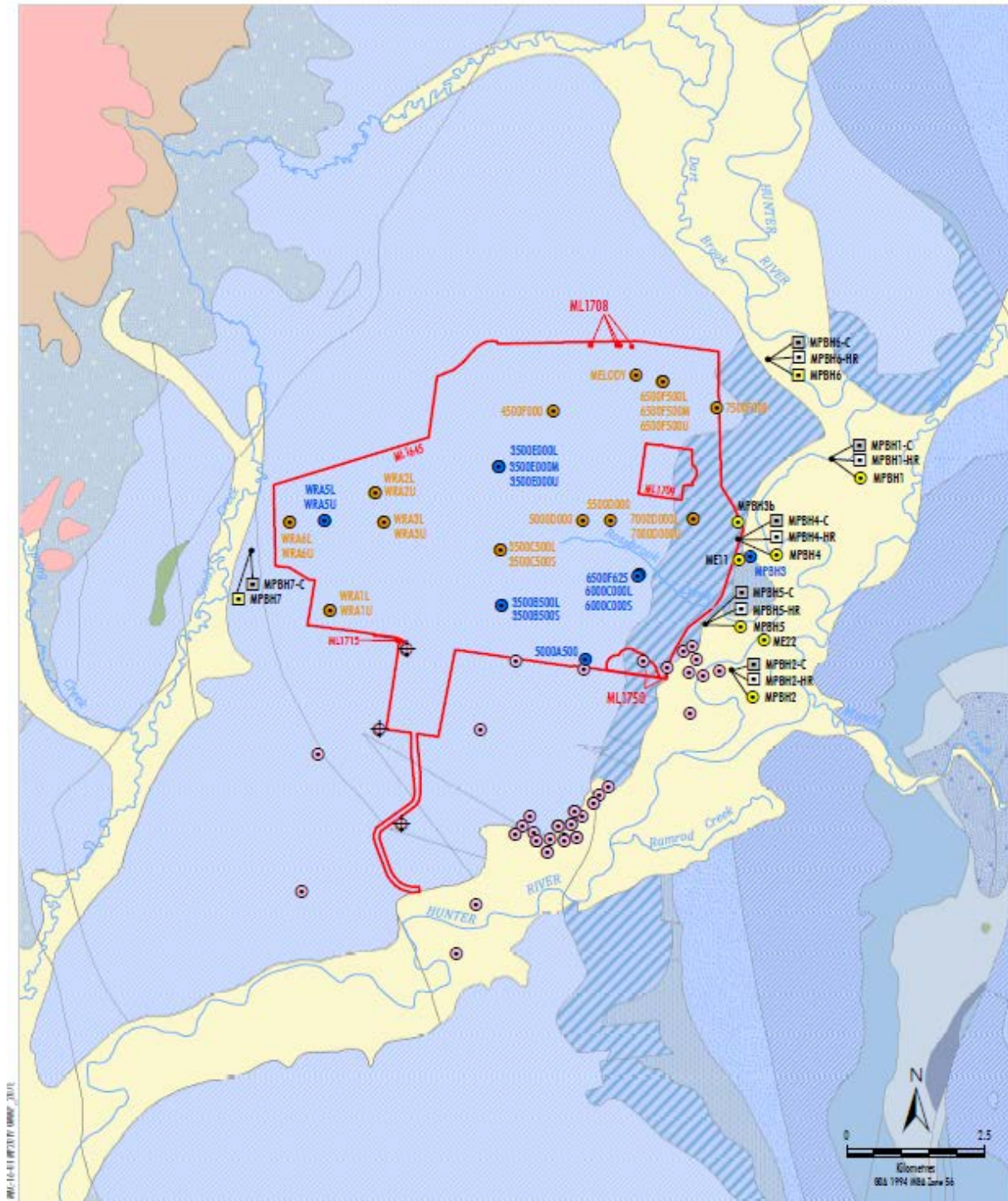


Figure 2-3 – MPO Blast Monitoring Locations

Figure 2



- LEGEND**
- Mining Lease Boundary
 - Mount Pleasant Monitoring
 - Standpipe
 - Standpipe - Alluvium
 - Standpipe - Historical
 - Planned Mount Pleasant Monitoring
 - Standpipe - Coal Seam
 - Standpipe - Interburden
 - Standpipe - Alluvium
 - Standpipe
 - Standpipe
 - + Vibrating Wire Piezometer

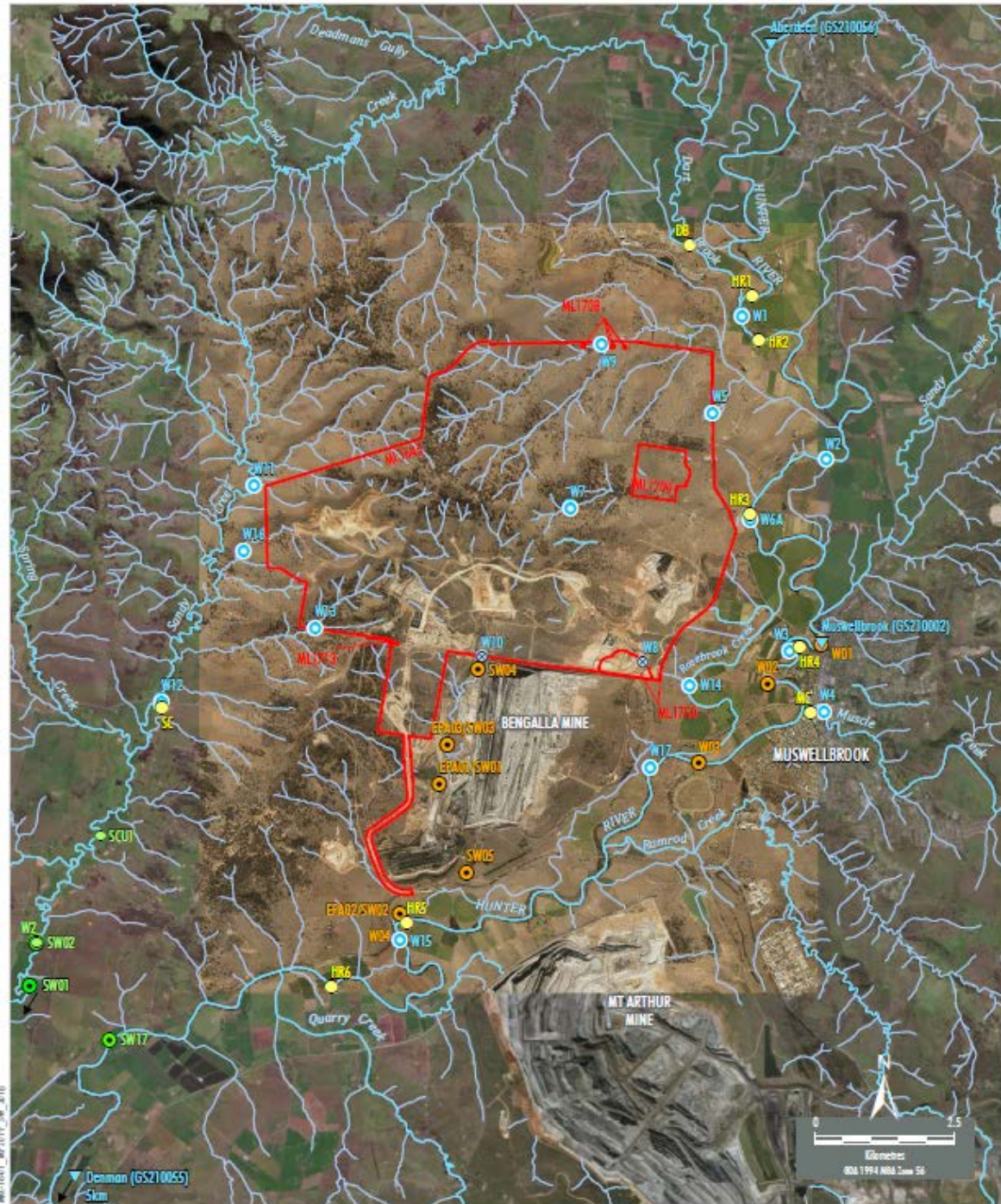
Source: NSW Land & Property Information (2019); NSW Division of Resources & Energy (2019); MACH Energy (2019)

Note: Refer Figure 3 for geology legend

MACHEnergy
MOUNT PLEASANT OPERATION
Augmentations to the
Groundwater Monitoring Network

Figure 9

Figure 2-4 – MPO Groundwater Monitoring Network



- LEGEND**
- Mining Lease Boundary
 - ▲ DPI Water Gauging Station
 - Mt Pleasant Monitoring
 - Surface Water Monitoring Site
 - ⊗ Historical Surface Water Monitoring Site
 - Stream Health Monitoring Site
 - Mangoola Monitoring
 - Surface Water Monitoring Site
 - Stream Health Monitoring Site
 - Bengalla Monitoring
 - Surface Water Monitoring Site

Source: NSW Land & Property Information (2019); NSW Division of Resources & Energy (2019); NSW Department of Primary Industries - Water (2016); Bengalla Mining Company (2015); Mangool Coal Operations Pty Ltd (2014)
Orthophoto: MACH (Jul 2018); Esri, DigitalGlobe (2018)

MACHEnergy
MOUNT PLEASANT OPERATION
Surface Water and Stream Health
Monitoring Sites

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 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 (>99.9%) during the December 2019 monitoring period, with the exception of solar radiation data loss (90.3%) due to maintenance. The majority of meteorological data was captured at M-WS4 (>99.8%) during the December 2019 monitoring period.

There was 18.2mm of rainfall recorded at MPO during December 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 15 November 2019. Sample collection was undertaken on 16 December 2019 by AECOM with sample analysis performed by SRT, a NATA accredited laboratory. Results are summarised in **Table 4-1**. Annual rolling averages for December 2019 have been provided as an indication of annual performance between December 2018 – December 2019. A data validation and compliance assessment has been initiated as per Section 10.3 of the Air Quality and Greenhouse Gas Management Plan (MACH Energy, 2019) to calculate annual average results for 2019 in accordance Schedule 3, Condition 20 of DA 92/97.

Table 4-1: Dust Depositional Results – December 2019

Location	YTD Insoluble Solids (g/m ² .month)	Insoluble Solids Annual Rolling Average (g/m ² .month)
D1	2.4	2.4
D3	3.6	3.6
D4	2.5	2.5
D5	3.3	3.3
D6	6.4	6.4
D7a ¹	7.6	7.6
D8	5.0	5.0
D9	4.3	4.3
D10	1.8	1.8
D11	3.0	3.0
D12	1.5	1.5
D13	2.9	2.9
D14	4.3	4.3
Criterion	-	4.0
<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>		

Note 1: Site D7a 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 (6.4); D7a (7.6 g/m².month); D8 (5.0 g/m².month) and D14 (4.3 g/m².month).

Site D7a 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 sites do 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 (6.4 g/m².month) during December 2019.

Field notes from the December sampling event noted that all the gauges contained insects; 5 contained vegetation; and 3 contained bird droppings.

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

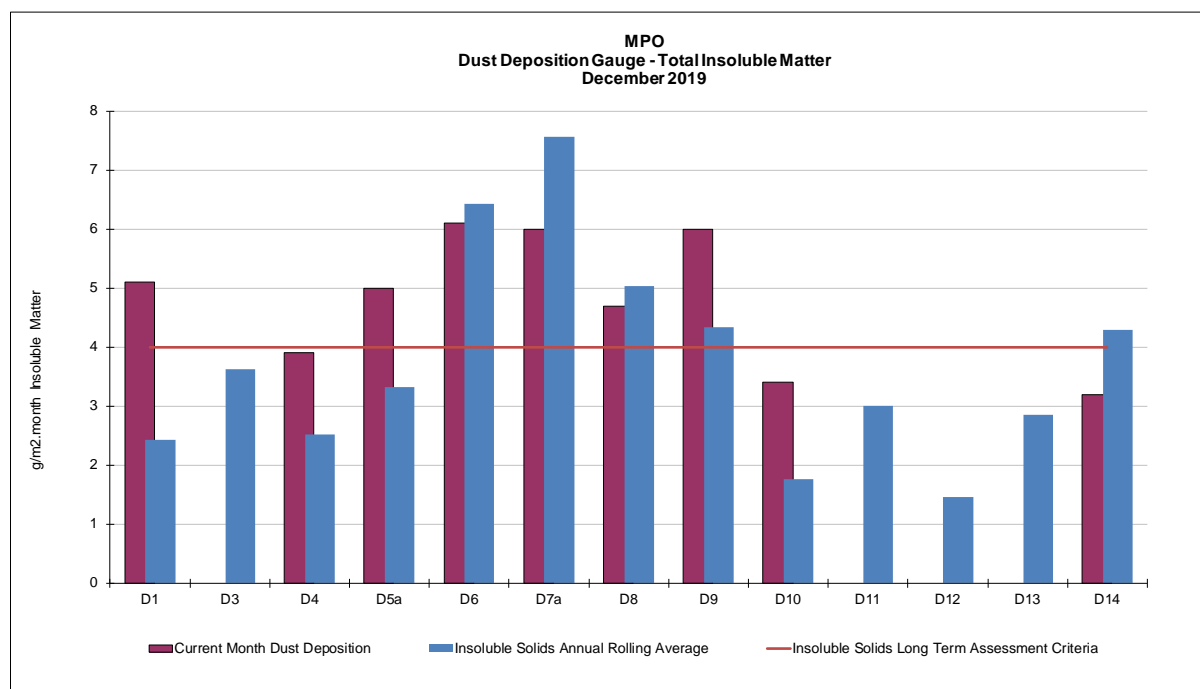


Figure 4-1: MPO Dust Deposition Monthly Result and Annual Rolling Average – December 2019

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 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 criterion of 90 $\mu\text{g}/\text{m}^3$.

5.2 Results

In December 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 5-2**. Annual rolling averages for December 2019 have been provided as an indication of annual performance between December 2018 – December 2019. A data validation and compliance assessment has been initiated as per Section 10.3 of the Air Quality and Greenhouse Gas Management Plan (MACH Energy, 2019) to calculate annual average results for 2019 in accordance Schedule 3, Condition 20 of DA 92/97.

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

Run Date	Assessment Criterion	TSP $\mu\text{g}/\text{m}^3$		
		HVAS A-PF2	HVAS M-WS4	HVAS A-PF5
4/12/2019	-	221	90	87
10/12/2019	-	206	156	177
16/12/2019	-	201	153	179
22/12/2019	-	153	108	167
28/12/2019	-	165	121	124
Monthly Mean	-	189	125	146
Annual Rolling Average	90	100	62	67

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 $\mu\text{g}/\text{m}^3$, with the exception of A-PF2 (100 $\mu\text{g}/\text{m}^3$).

6. Real Time Air Quality Monitoring

Continuous particulate matter less than 10 μm (PM_{10}) and particulate matter less than 2.5 μm ($\text{PM}_{2.5}$) monitoring was conducted by three Palas Fidas (one utilised for management only) units at MPO during December 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 PM_{10} and $\text{PM}_{2.5}$ annual rolling averages for December 2019 have been provided in Section 6.2 and 6.4 respectively, as an indication of annual performance between December 2018 – December 2019. A data validation and compliance assessment has been initiated as per Section 10.3 of the Air Quality and Greenhouse Gas Management Plan (MACH Energy,

2019) to calculate annual average results for 2019 in accordance Schedule 3, Condition 20 of DA 92/97.

6.1 PM₁₀ Results – 24 hour rolling average

There were elevated PM₁₀ measurements reported throughout December 2019. Wider regional air quality events, including dust storms and bushfires, have contributed to elevated PM₁₀ levels.

There were elevated measurements reported at the Muswellbrook NW monitor in accordance with EPL 20850 for 'adverse dust conditions' (44 µg/m³) for the 24 hour rolling average throughout December 2019. The Muswellbrook NW monitor was operational during all days of December 2019. During this period, approximately 482 total mining machinery hours were lost due to dust delays / shutdowns executed at MPO.

Real time PM₁₀ 24 hour rolling average results for December 2019 are presented in **Table 6-1**.

Table 6-1: MPO Palas Fidas PM₁₀ Data – December 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					
1/12/2019	68	55	57	71.4	44	50
2/12/2019	70	53	54	102	44	50
3/12/2019	39	24	23	50.2	44	50
4/12/2019	73	31	29	70.6	44	50
5/12/2019	62	33	34	60	44	50
6/12/2019	95	43	50	84.6	44	50
7/12/2019	163	184	214	118	44	50
8/12/2019	67	60	73	57.5	44	50
9/12/2019	129	122	144	98.5	44	50
10/12/2019	139	118	134	109.4	44	50
11/12/2019	130	105	124	96.9	44	50
12/12/2019	66	55	65	59.7	44	50
13/12/2019	30	25	29	27.9	44	50
14/12/2019	70	54	66	60.8	44	50
15/12/2019	81	45	53	60.7	44	50
16/12/2019	100	84	95	91.5	44	50
17/12/2019	33	21	26	31.2	44	50
18/12/2019	53	41	54	43.1	44	50
19/12/2019	165	130	155	121.5	44	50
20/12/2019	52	42	58	52.7	44	50
21/12/2019	119	92	-	111.2	44	50
22/12/2019	48	36	-	55.5	44	50
23/12/2019	32	24	-	33.1	44	50
24/12/2019	34	29	-	29	44	50
25/12/2019	42	21	-	20.7	44	50
26/12/2019	39	30	-	29.6	44	50

27/12/2019	38	26	-	33.4	44	50
28/12/2019	69	57	-	44.1	44	50
29/12/2019	81	72	-	60.8	44	50
30/12/2019	124	120	-	84.7	44	50
31/12/2019	83	61	57	73.1	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 2019.

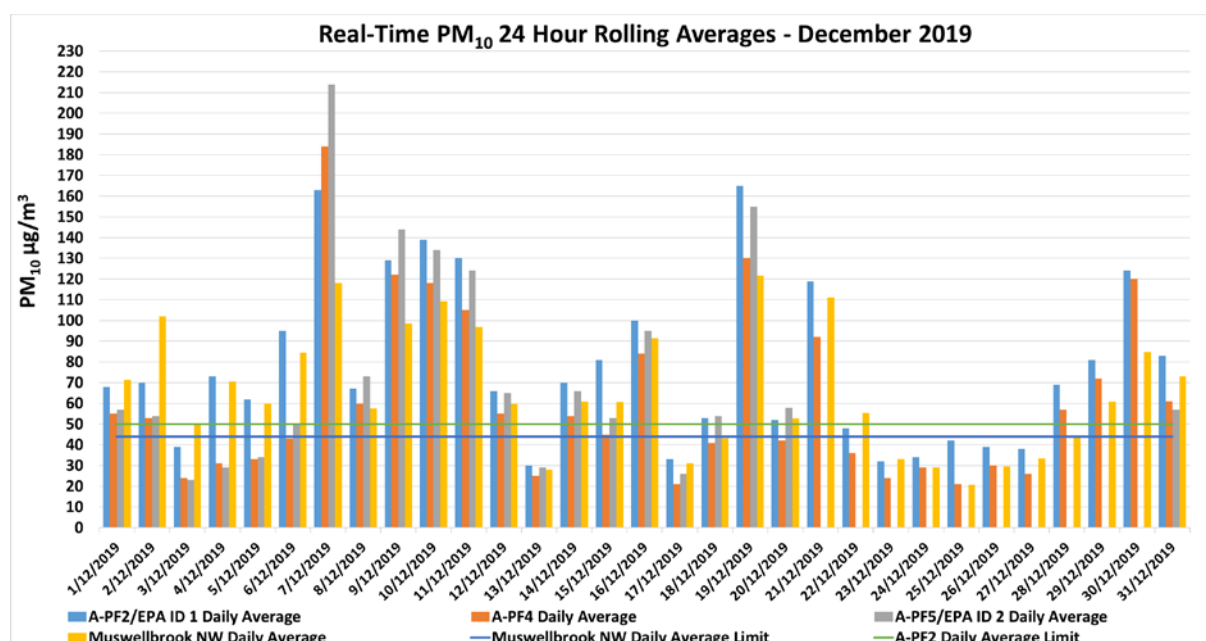


Figure 6-1: Real-time PM₁₀ 24 hour rolling average results for December 2019.

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. Wider regional air quality events, including dust storms and bushfires, have contributed to elevated PM₁₀ levels.

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

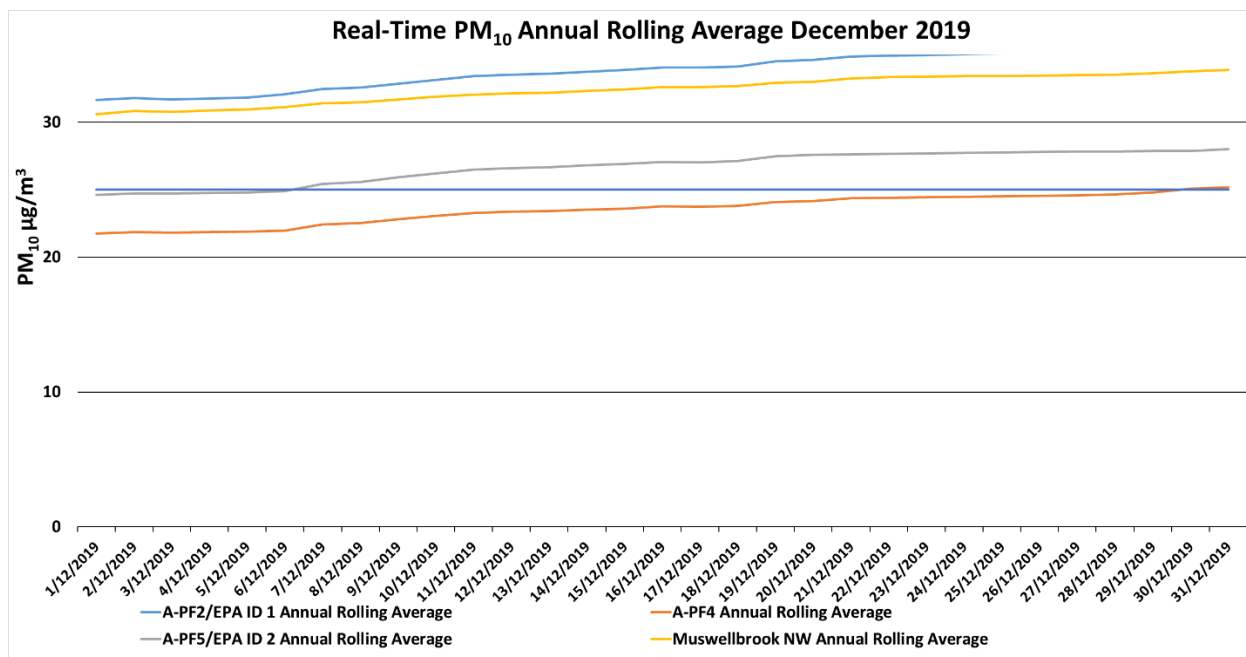


Figure 6-2: Real-time PM₁₀ Annual Rolling average results for December 2019.

6.3 PM_{2.5} Results – 24 hour rolling average

There were elevated PM_{2.5} measurements reported throughout December 2019. Wider regional air quality events, including dust storms and bushfires, have contributed to elevated PM_{2.5} levels.

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

Table 6-2: MPO Palas Fidas PM_{2.5} Data – December 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			
1/12/2019	26	26	26	25
2/12/2019	17	15	15	25
3/12/2019	12	9	9	25
4/12/2019	32	17	17	25
5/12/2019	25	16	16	25
6/12/2019	33	18	20	25
7/12/2019	133	161	187	25
8/12/2019	47	47	55	25
9/12/2019	99	99	114	25
10/12/2019	93	89	103	25
11/12/2019	107	91	103	25
12/12/2019	46	43	47	25
13/12/2019	18	18	18	25
14/12/2019	47	40	45	25
15/12/2019	42	32	39	25

16/12/2019	59	60	69	25
17/12/2019	11	10	10	25
18/12/2019	21	18	21	25
19/12/2019	95	91	110	25
20/12/2019	26	25	28	25
21/12/2019	63	59	-	25
22/12/2019	26	23	-	25
23/12/2019	17	15	-	25
24/12/2019	22	22	-	25
25/12/2019	20	17	-	25
26/12/2019	24	23	-	25
27/12/2019	17	14	-	25
28/12/2019	32	28	-	25
29/12/2019	31	53	-	25
30/12/2019	70	78	-	25
31/12/2019	47	38	-	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 2019 are presented in **Figure 6-3** below.

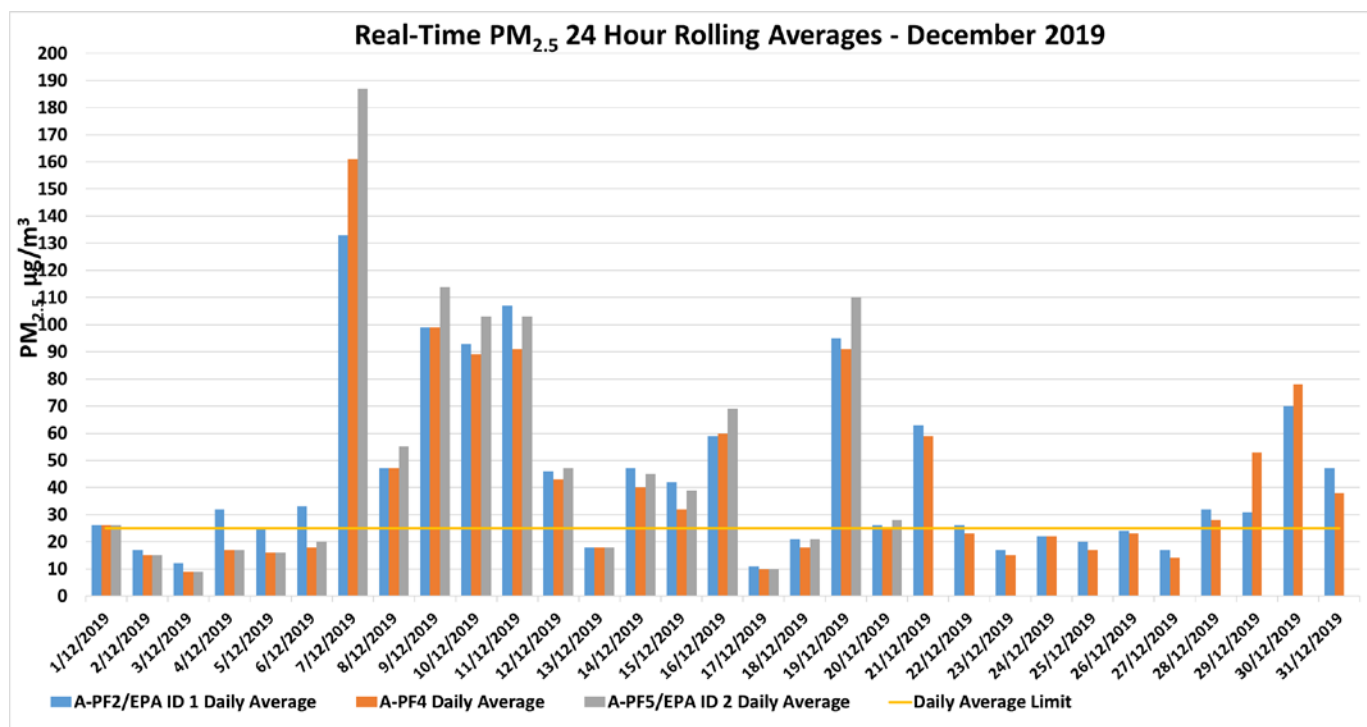


Figure 6-3: Real-time PM_{2.5} 24 hour rolling average results for December 2019.

6.4 PM_{2.5} Results - Annual rolling average

The requirement of annual rolling average of PM_{2.5} data was inceptioned during MOD 3 of DA 92/97, dated 24 August 2018. Elevated readings have been measured for the annual

rolling average of PM_{2.5} data collected during December 2019. Wider regional air quality events, including dust storms and bushfires, have contributed to elevated PM_{2.5} levels.

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

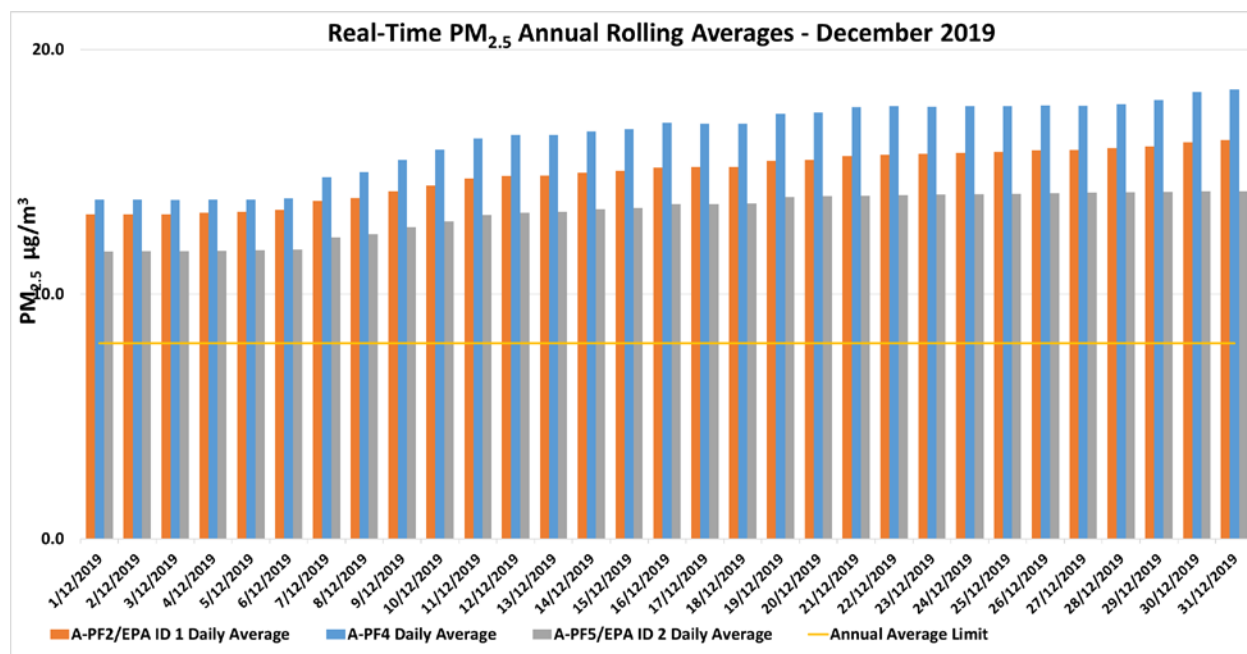


Figure 6-4: Real-time PM_{2.5} Annual Rolling average results for December 2019.

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 24 December 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 – 24 December 2019

Station	pH	Electrical Conductivity (EC) (µs/cm) ¹	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	8.2	380	4	226
W2	8.1	410	4	235
W3	8.1	490	15	228
W4	7.7	1100	4	634
W5	*	*	*	*
W6A	8.1	390	3	220
W7	*	*	*	*
W9	*	*	*	*
W11	7.7	7600	10	4330
W12	8.1	7900	30	4480
W13	*	*	*	*
W14	*	*	*	*
W15	8.0	410	28	260

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 24 December 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, 2019).

8. Groundwater Monitoring

Groundwater monitoring was not undertaken during December 2019. The next groundwater monitoring event is scheduled for February 2020.

9. Noise Monitoring

Attended noise monitoring was undertaken during the night period of 18 December 2019 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 2019 against noise criteria is shown in **Table 9-1**.

Table 9-1 – $L_{Aeq,15min}$ Generated by MPO Night-Time Monitoring – 18 December 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	18/12/19 23:31	1.7	G	43	No	NM	NA
N-AT2	18/12/19 22:00	1.6	E	36	Yes	<20	Nil
N-AT3	18/12/19 22:56	1.3	G	41	No	NM	NA
N-AT4	18/12/19 23:23	1.9	G	42	No	<30	NA
N-AT5	18/12/19 23:47	1.2	G	40	No	NM	NA
N-AT6	18/12/19 22:49	1.6	G	35	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 $L_{Aeq,15minute}$ 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;
4. Bold results indicate exceedance of criteria;

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, 2019). Noise levels from MPO complied with noise limits at all monitoring locations during the December 2019 monitoring period.

10. Blast Monitoring

There were 5 blasts during December (a total of 69 blasts YTD). Results for December 2019 are presented in **Table 10-1**. All blast results during the December 2019 monitoring period and YTD are compliant with EPL 20850 and DA 92/97.

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

Date Fired	Time Fired	Vibration BVOA	Overpressure BVOA	Vibration BVOC	Overpressure BVOC	Vibration BVO2	Overpressure BV02
4/12/19	09:15	0.230 mm/s	94.2 DBL	0.080 mm/s	101.5 DBL	0.610 mm/s	100.7 DBL
9/12/19	13:01	0.680 mm/s	94 DBL	0.180 mm/s	90.4 DBL	1.040 mm/s	98.7 DBL
13/12/19	12:12	0.410 mm/s	100.5 DBL	0.330 mm/s	93.8 DBL	1.070 mm/s	105.2 DBL

18/12/19	01:05	0.520 mm/s	93.7 DBL	0.200 mm/s	86.5 DBL	0.610 mm/s	97.6 DBL
19/12/19	09:38	0.170 mm/s	91.8 DBL	0.110 mm/s	83.2 DBL	0.330 mm/s	96.5 DBL