MACHEnergy

Mount Pleasant Operation

Monthly Environmental Monitoring Report

May 2021

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 May 2021
Reporting Period End Date	31 May 2021
Date All Data Received[1]	7 July 2021

Notes:
[1] - timing of reporting in accordance with Section 3.4 of Requirements for Publishing Pollution Monitoring Data (EPA, 2013)

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-20850-23-April-2021.pdf

https://machenergyaustralia.com.au/wp-content/uploads/2018-MOD4-Consolidated-Consent.pdf

2. Monitoring Requirements

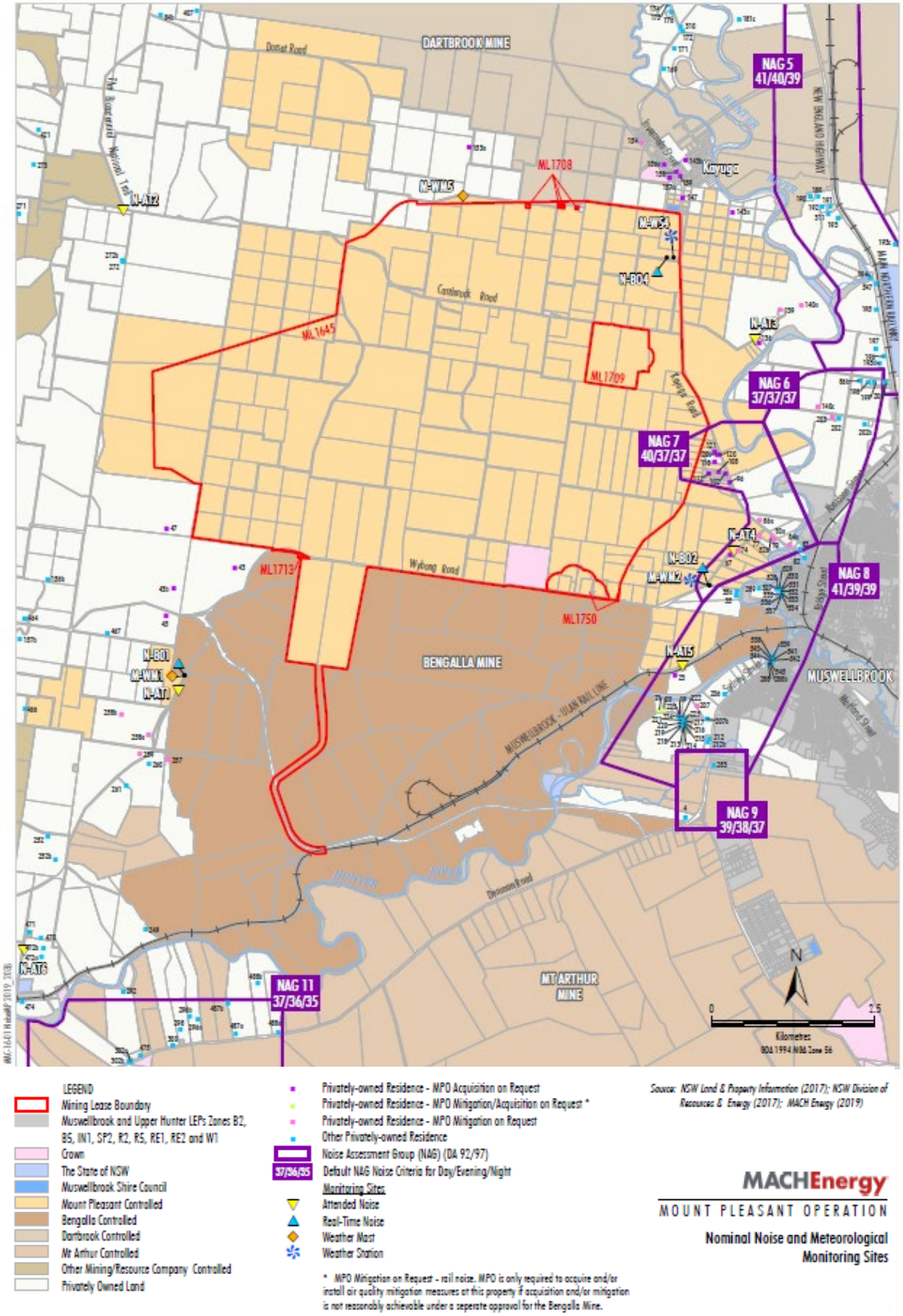
The MPO EPL 20850 specifically requires the monitoring of:

- 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 locations and Noise Assessment Groups (NAGs);
- **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.



LEGEND
Mining Lease Boundary
Muswellbrook and Upper Hunter LEPs Zones B2, B5, IN1, SP2, R2, R5, RE1, RE2 and W1
Crown
The State of NSW
Muswellbrook Shire Council
Mount Pleasant Controlled
Bengalla Controlled
Dartbrook Controlled
Mt Arthur Controlled
Other Mining/Resource Company Controlled
Privately Owned Land

Privately-owned Residence - MPO Acquisition on Request
Privately-owned Residence - MPO Mitigation/Acquisition on Request *
Privately-owned Residence - MPO Mitigation on Request
Other Privately-owned Residence
Noise Assessment Group (NAG) (DA 92/97)
37/36/35 Default NAG Noise Criteria for Day/Evening/Night

Monitoring Sites
Attended Noise
Real-Time Noise
Weather Mast
Weather Station

* MPO Mitigation on Request - rail noise. MPO is only required to acquire and/or install air quality mitigation measures at this property if acquisition and/or mitigation is not reasonably achievable under a seperate approval for the Bengalla Mine.

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2017); MACH Energy (2019)

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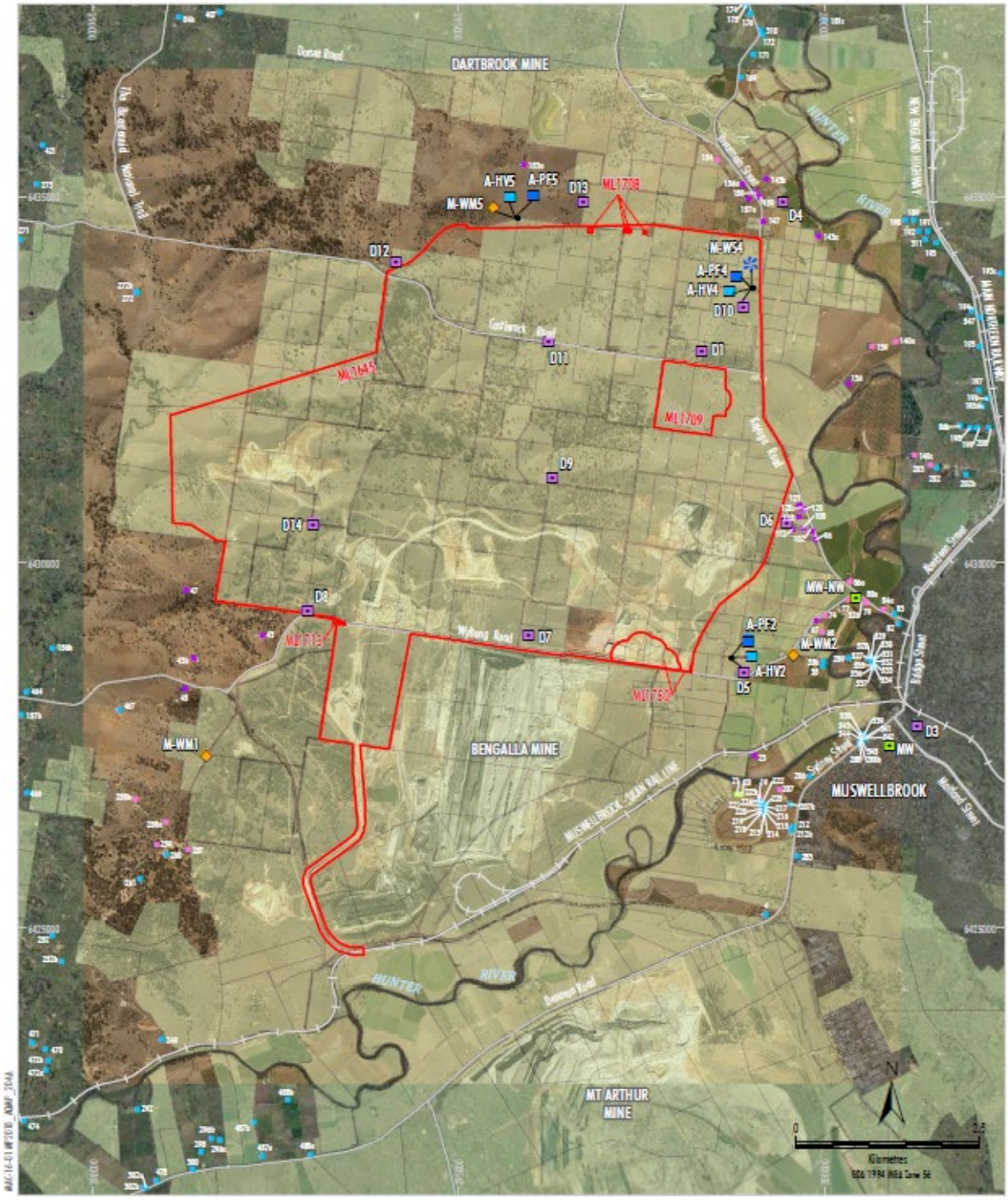
MOUNT PLEASANT OPERATION
Nominal Noise and Meteorological Monitoring Sites

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



LEGEND

Mining Lease Boundary
Mine Owned
Privately-owned Residence - MPO Acquisition on Request
Privately-owned Residence - MPO Mitigation/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

* MPO Mitigation on Request - rail noise. MPO is only required to acquire and/or install air quality mitigation measures at this property if acquisition and/or mitigation is not reasonably achievable under a seperate approval for the Bengalla Mine.

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2017); MACH Energy (2019) Orthophoto: MACH Energy (July 2018); NSW Department of Finance & Innovation (2018)

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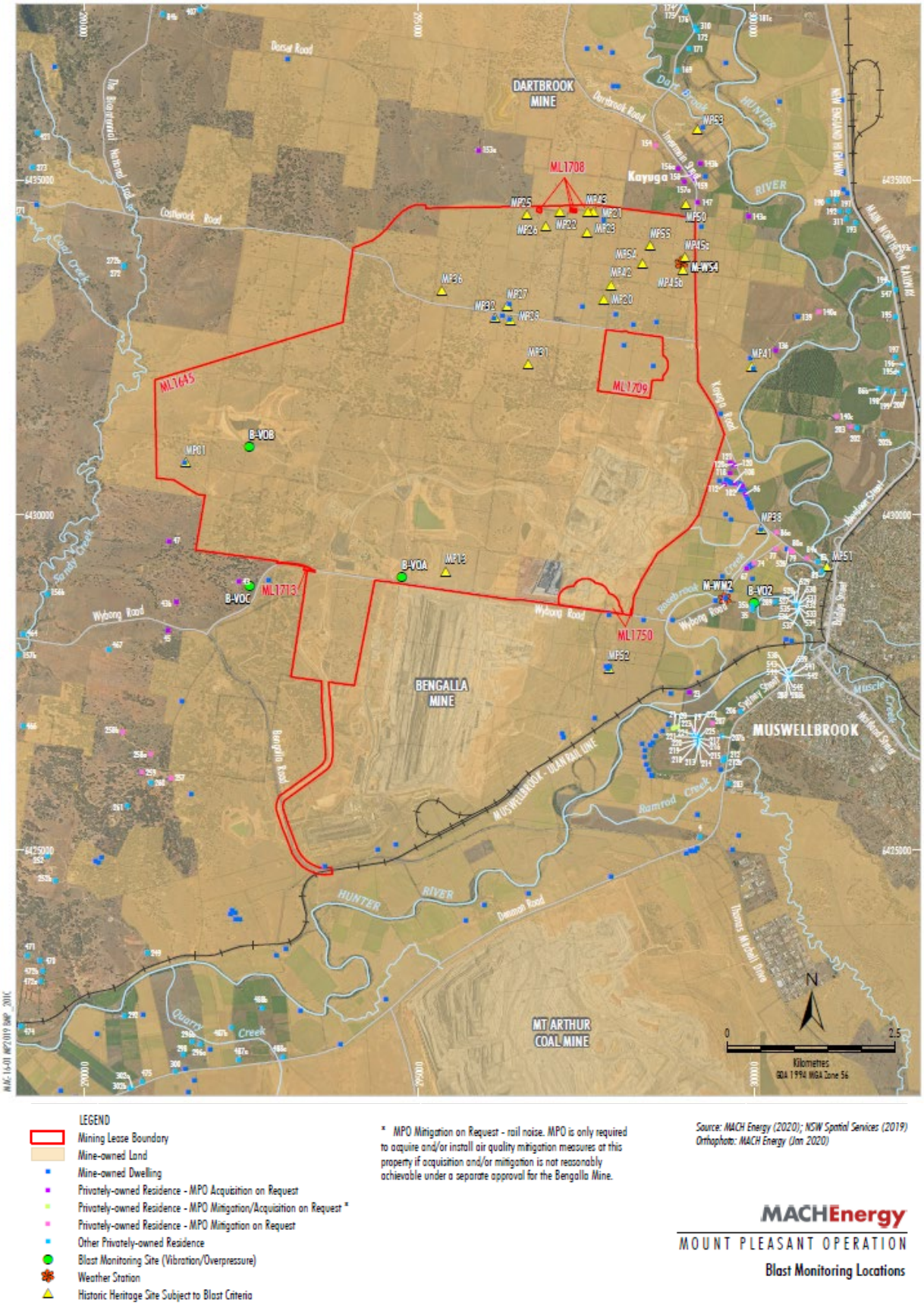
MOUNT PLEASANT OPERATION
Air Quality and Meteorological Monitoring Sites

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



LEGEND
- Mining Lease Boundary
- Mine-owned Land
- Mine-owned Dwelling
- Privately-owned Residence - MPO Acquisition on Request
- Privately-owned Residence - MPO Mitigation/Acquisition on Request *
- Privately-owned Residence - MPO Mitigation on Request
- Other Privately-owned Residence
- Blast Monitoring Site (Vibration/Overpressure)
- Weather Station
- Historic Heritage Site Subject to Blast Criteria

* MPO Mitigation on Request - rail noise. MPO is only required to acquire and/or install air quality mitigation measures at this property if acquisition and/or mitigation is not reasonably achievable under a separate approval for the Bengalla Mine.

Source: MACH Energy (2020); NSW Spatial Services (2019)
Orthophoto: MACH Energy (Jan 2020)

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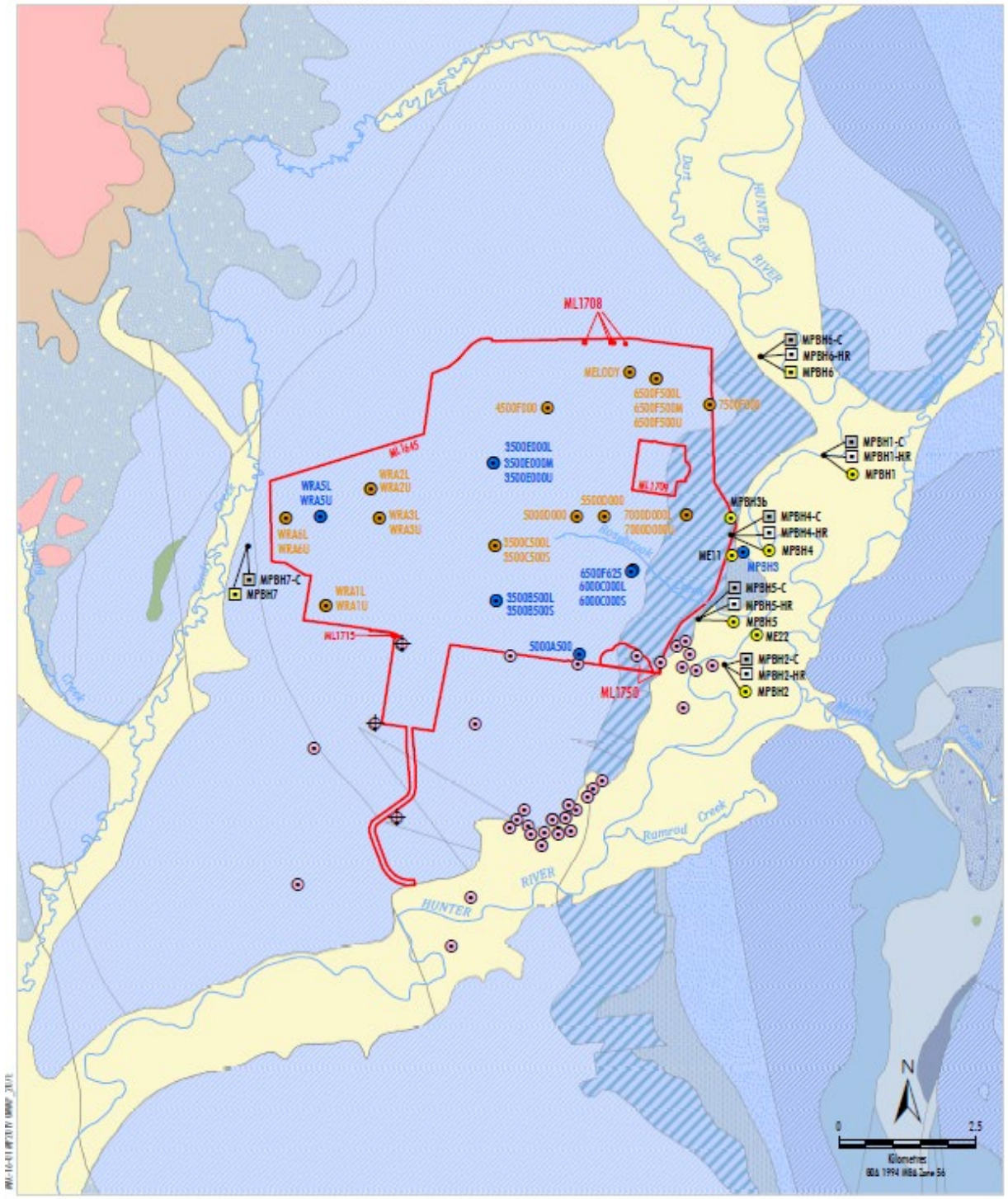
Blast Monitoring Locations

Figure 2-3 – MPO Blast Monitoring Locations



LEGEND

Mining Lease Boundary

Mount Pleasant Monitoring

- Standpipe
- Standpipe - Alluvium
- Standpipe - Historical

Planned Mount Pleasant Monitoring

- Standpipe - Coal Seam
- Standpipe - Interburden
- Standpipe - Alluvium

Bengalla Monitoring

- 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

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MOUNT PLEASANT OPERATION

Augmentations to the Groundwater Monitoring Network

Figure 2-4 – MPO Groundwater Monitoring Network

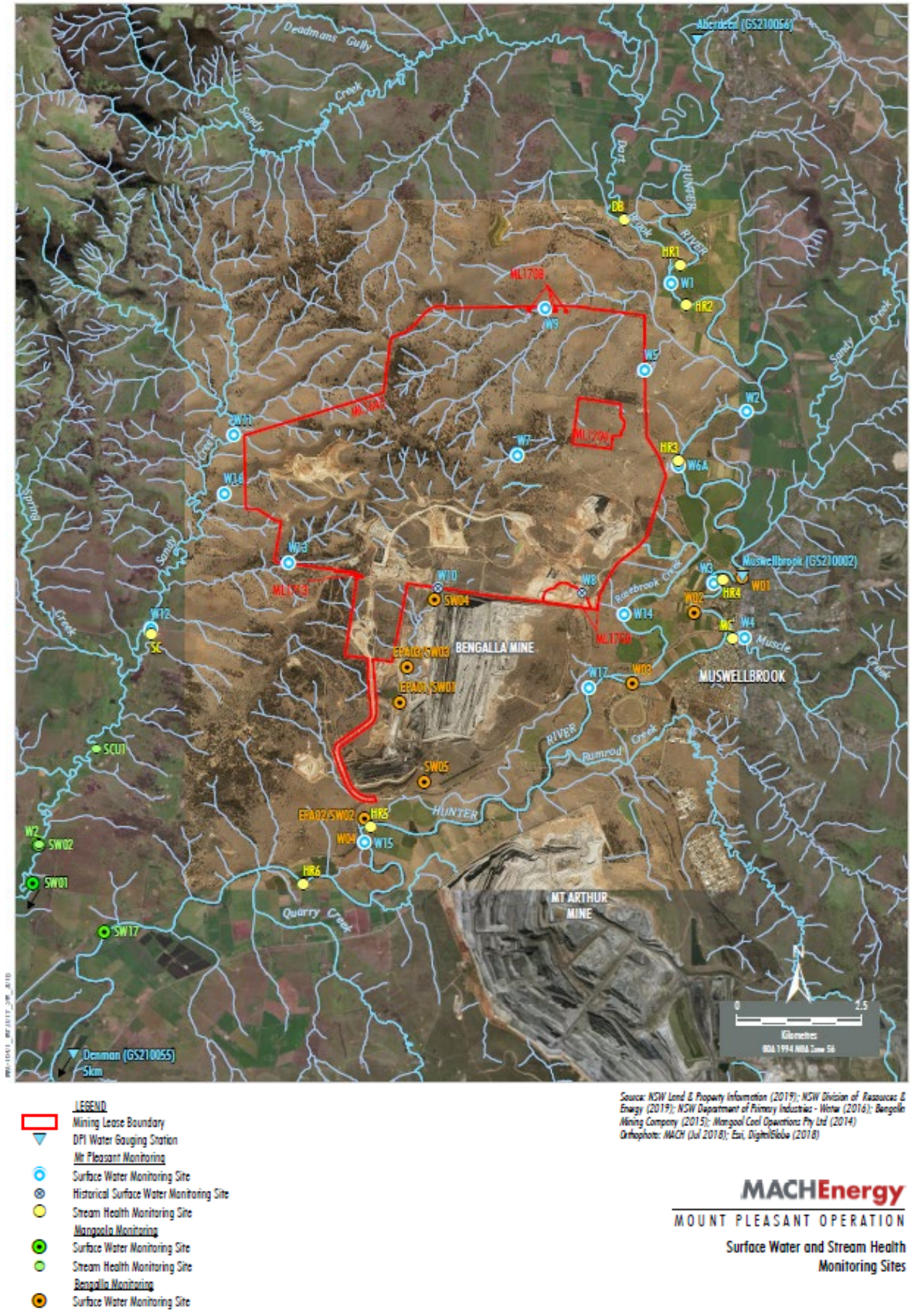

Figure 2-5 – MPO Surface Water Monitoring Network

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

The majority of meteorological data was captured at M-WS2 (>85.8%) during May 2021 (the monitoring period), with the exception of solar radiation (82.6%) and temperature (at 10m) (0%). The majority of meteorological data was captured at M-WS4 (97.9%) during the monitoring period.

Throughout May 2021, there was 19.0mm and 14.8mm 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 16 April 2021. Sample collection was undertaken on 17 May 2021 by AECOM with sample analysis performed by SRT, a NATA accredited laboratory. Results are summarised in **Table 4-1**. Annual rolling averages for May 2021 have been provided as an indication of performance between May 2020 – May 2021 and does not represent annual average results for 2021 as per Schedule 3, Condition 20 of DA 92/97.

Table 4-1: Dust Depositional Results – May 2021

Location	YTD Insoluble Solids (g/m^2.month)	Insoluble Solids Annual Rolling Average (g/m^2.month)
D1	2.3	2.3
D3a	1.3	2.0
D4	1.8	2.4
D5	2.6	2.7
D6	2.4	2.8
D7b[1]	5.7	***
D8	4.3	4.1
D9a	1.9	***
D10	1.2	1.3
D11	2.1	2.4
D12	0.8	1.4
D13	2.0	2.2
D14	3.3	2.9
Criterion	-	4

Notes:
*Results in **bold** indicate an elevated measurement of adopted assessment criteria*
***Indicates result unavailable due to contaminated depositional dust gauges for YTD*
**** annual rolling average not available as new site location*
[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*

Contaminated results, as described in Section 4.1, are not included in the 12 month rolling average. 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 May 2021 sampling event noted that all the gauges contained insects, four contained organic matter (bird droppings and vegetation).

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

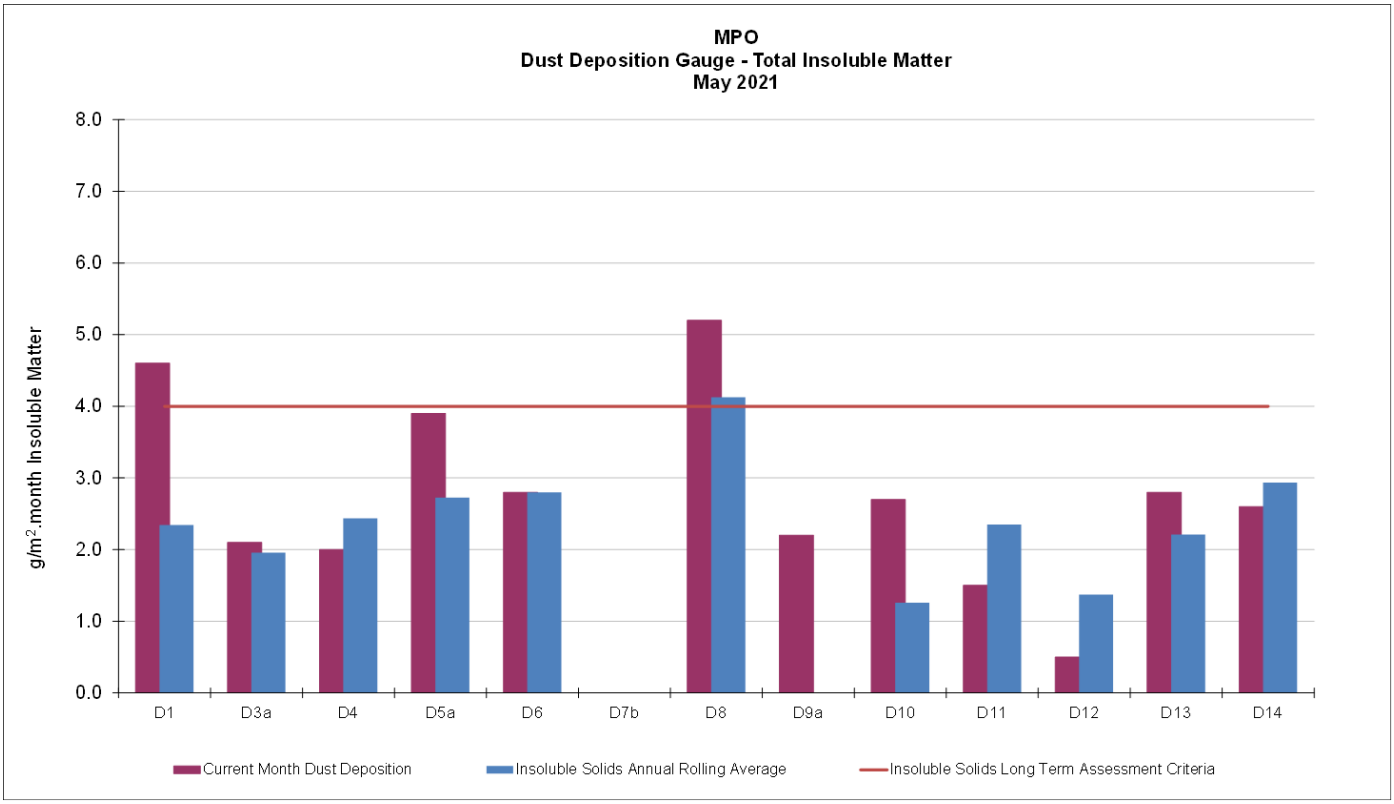

Figure 4-1: MPO Dust Deposition Monthly Results and Annual Rolling Average – May 2021

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 µg/m^3.

5.2 Results

In May 2021 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 May 2021 have been provided as an indication of performance between May 2020 – May 2021 and do not represent annual average results for 2021 as per Schedule 3, Condition 20 of DA 92/97.

Table 5-2 Total Suspended Particulate Monitoring Data – May 2021

Run Date	Assessment Criterion	TSP µg/m^3		
		HVAS A-PF2	HVAS M-WS4	HVAS A-PF5
3/05/2021	-	62.9	26.8	12.8
9/05/2021	-	36.1	77.1	23.5
15/05/2021	-	94.4	13.6	13.8
21/05/2021	-	32.5	30.6	36.0
27/05/2021		66.7	4.7	3.5
Monthly Mean	-	59	31	18
Annual Rolling Average	90	53	32	32

*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/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 ($PM_{2.5}$) monitoring was conducted by three Palas Fidas units (one utilised for management only) at MPO during May 2021.

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 $PM_{2.5}$ 12-month rolling averages for May 2021 have been provided in Section 6.2 and 6.4 respectively, as an indication of performance between May 2020 – May 2021 and do not represent annual average results for 2021 as per Schedule 3, Condition 20 of DA 92/97.

6.1 PM_{10} Results – 24 hour rolling average

There were no elevated PM_{10} measurements reported throughout May 2021. The Muswellbrook NW monitor was operational during all days of May 2021, with the exception of 26 and 27 May (A-PF5/EPA ID 2). Real time PM_{10} 24 hour rolling average results for May 2021 are presented in **Table 6-1.**

Table 6-1: MPO Palas Fidas PM_{10} Data – May 2021

Date	A-PF2/EPA ID 1	A-PF4	A-PF5/EPA ID 2	Muswellbrook NW	Muswellbrook NW 24 Hour Average Limit (µg/m^3)	A-PF2, A-PF4, A-PF5 24 Hour Average Limit (µg/m^3)
	24 hour Average Result					
1/05/2021	18	15	18	15	44	50
2/05/2021	18	17	22	18	44	50
3/05/2021	26	10	9	18	44	50
4/05/2021	14	8	9	12	44	50
5/05/2021	13	13	14	12	44	50
6/05/2021	11	13	9	10	44	50
7/05/2021	13	12	9	11	44	50
8/05/2021	14	9	11	13	44	50
9/05/2021	18	23	16	17	44	50
10/05/2021	16	10	12	14	44	50
11/05/2021	18	9	9	18	44	50
12/05/2021	16	15	19	16	44	50
13/05/2021	24	16	15	18	44	50
14/05/2021	19	8	9	23	44	50
15/05/2021	19	9	9	20	44	50
16/05/2021	13	8	9	15	44	50
17/05/2021	17	11	10	15	44	50
18/05/2021	16	14	13	14	44	50
19/05/2021	23	17	16	22	44	50
20/05/2021	17	10	10	18	44	50
21/05/2021	13	12	15	15	44	50
22/05/2021	15	15	20	16	44	50

23/05/2021	16	12	13	13	44	50
24/05/2021	13	10	12	11	44	50
25/05/2021	20	8	8	10	44	50
26/05/2021	27	8	8	-	44	50
27/05/2021	18	7	7	-	44	50
28/05/2021	15	14	13	18	44	50
29/05/2021	22	17	24	18	44	50
30/05/2021	27	15	18	25	44	50
31/05/2021	22	13	17	18	44	50

Notes:
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 PM_{10} 24 hour rolling average results at MPO air quality monitoring sites May 2021.

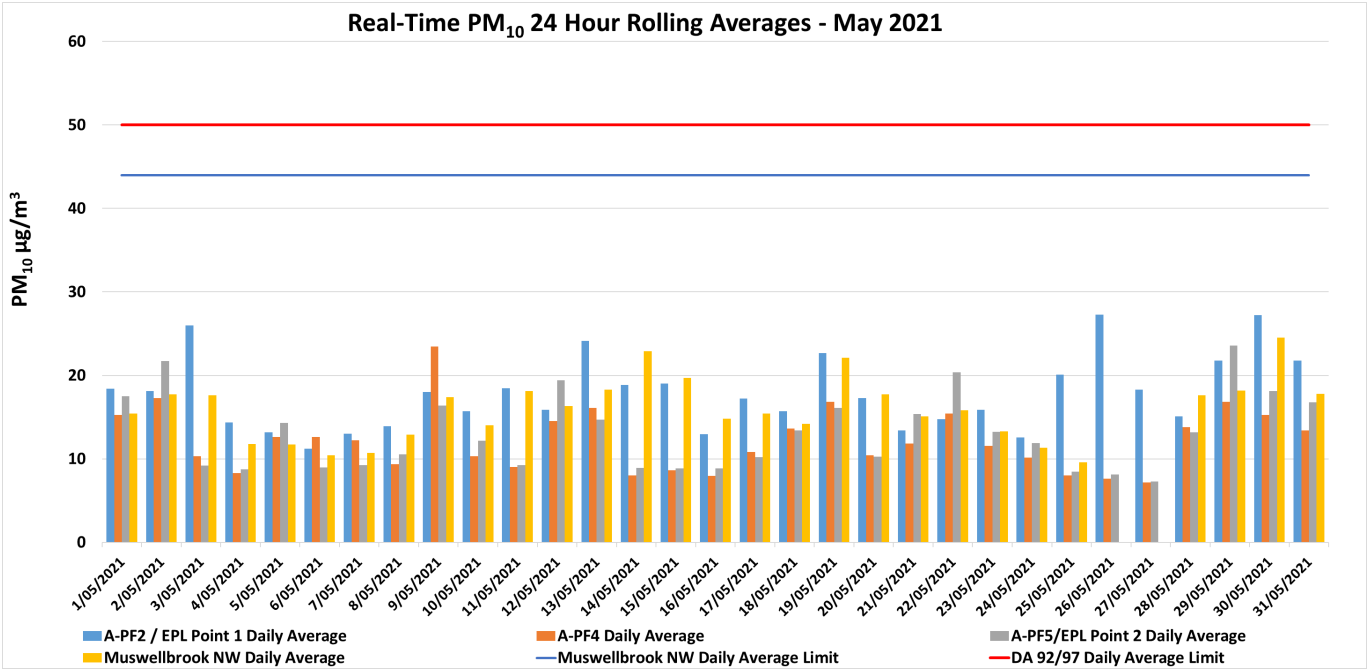

Figure 6-1: Real-time PM_{10} 24 hour rolling average results for May 2021.

6.2 PM_{10} Results – Annual rolling average

There were no elevated PM_{10} measurements reported at MPO for the May 2021 annual rolling average. Real time PM_{10} annual rolling averages for May 2021 are presented in **Figure 6-2** below.

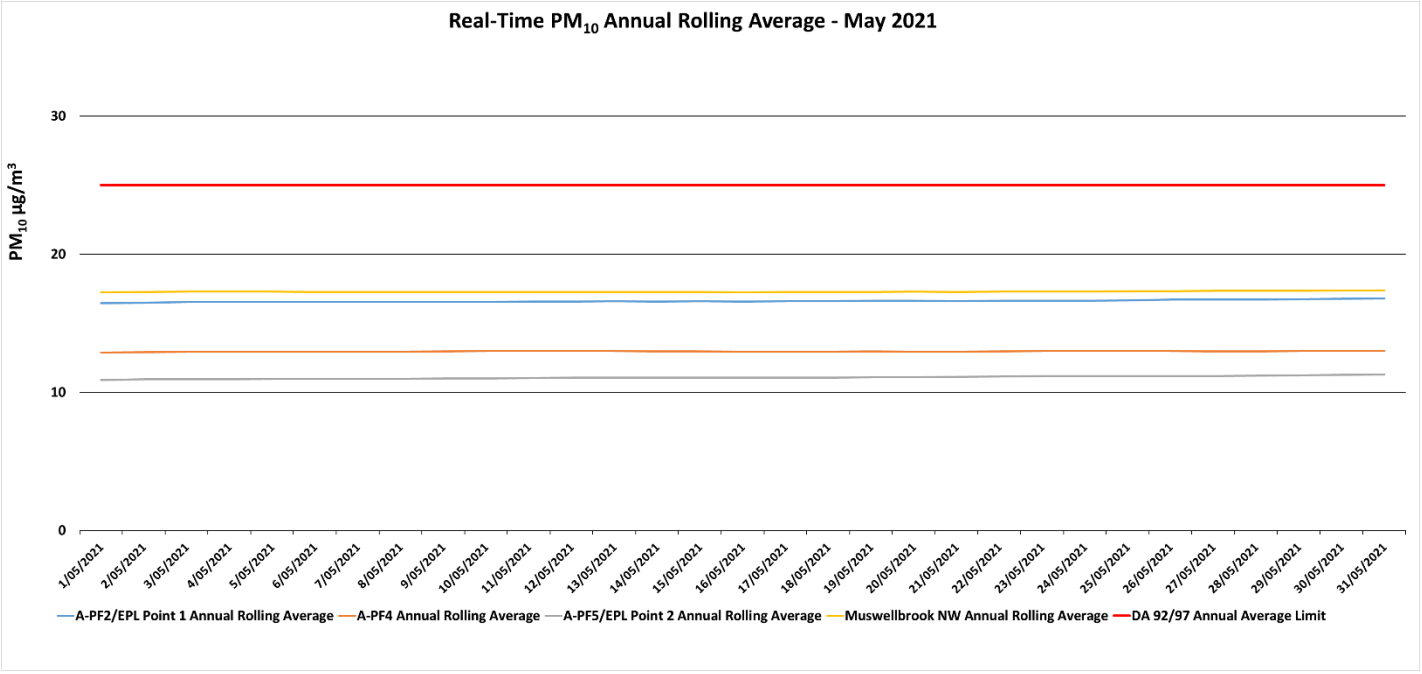

Figure 6-2: Real-time PM_{10} Annual Rolling average results for May 2021.

6.3 $PM_{2.5}$ Results – 24 hour rolling average

There were no elevated $PM_{2.5}$ measurements reported throughout May 2021. Real time $PM_{2.5}$ 24 hour rolling average results for May 2021 are presented in **Table 6-2.**

Table 6-2: MPO Palas Fidas $PM_{2.5}$ Data – May 2021

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			
1/05/2021	7	7	8	25
2/05/2021	5	6	6	25
3/05/2021	6	4	4	25
4/05/2021	5	3	4	25
5/05/2021	5	6	7	25
6/05/2021	4	5	4	25
7/05/2021	4	4	4	25
8/05/2021	5	4	5	25
9/05/2021	7	7	6	25
10/05/2021	5	5	6	25
11/05/2021	5	3	4	25
12/05/2021	6	6	7	25
13/05/2021	8	8	7	25
14/05/2021	4	3	4	25
15/05/2021	4	3	3	25
16/05/2021	4	3	4	25
17/05/2021	5	4	4	25
18/05/2021	4	4	4	25

19/05/2021	5	5	5	25
20/05/2021	5	4	4	25
21/05/2021	5	5	6	25
22/05/2021	6	7	8	25
23/05/2021	7	6	6	25
24/05/2021	5	5	5	25
25/05/2021	6	3	3	25
26/05/2021	6	3	3	25
27/05/2021	4	3	3	25
28/05/2021	4	4	4	25
29/05/2021	7	5	5	25
30/05/2021	6	5	5	25
31/05/2021	6	5	5	25

Notes:
*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 May 2021 are presented in **Figure 6-3** below.

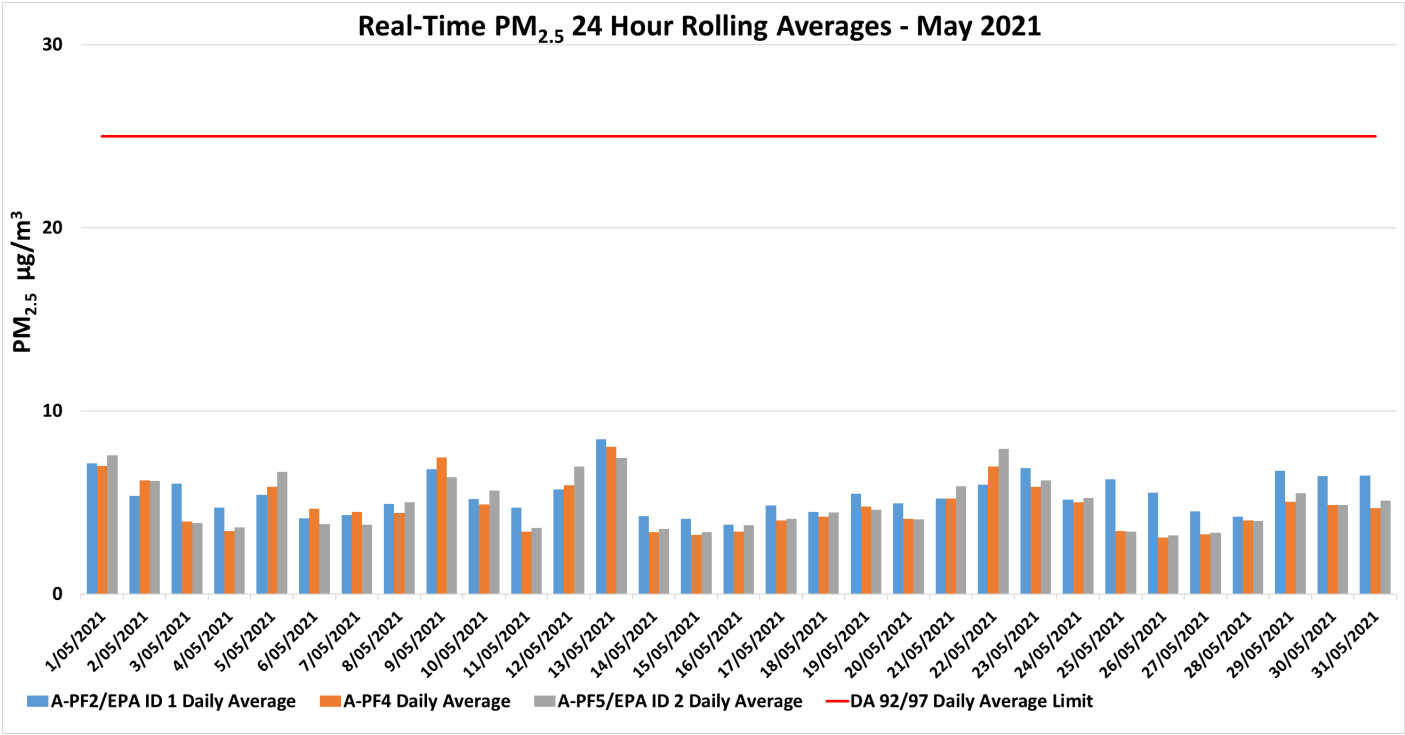

Figure 6-3: Real-time $PM_{2.5}$ 24 hour rolling average results for May 2021.

6.4 $PM_{2.5}$ Results - Annual rolling average

There were no elevated $PM_{2.5}$ measurements reported at MPO for the May 2021 annual rolling average. Real time PM_{10} annual rolling averages for May 2021 are presented in **Figure 6-4** below.

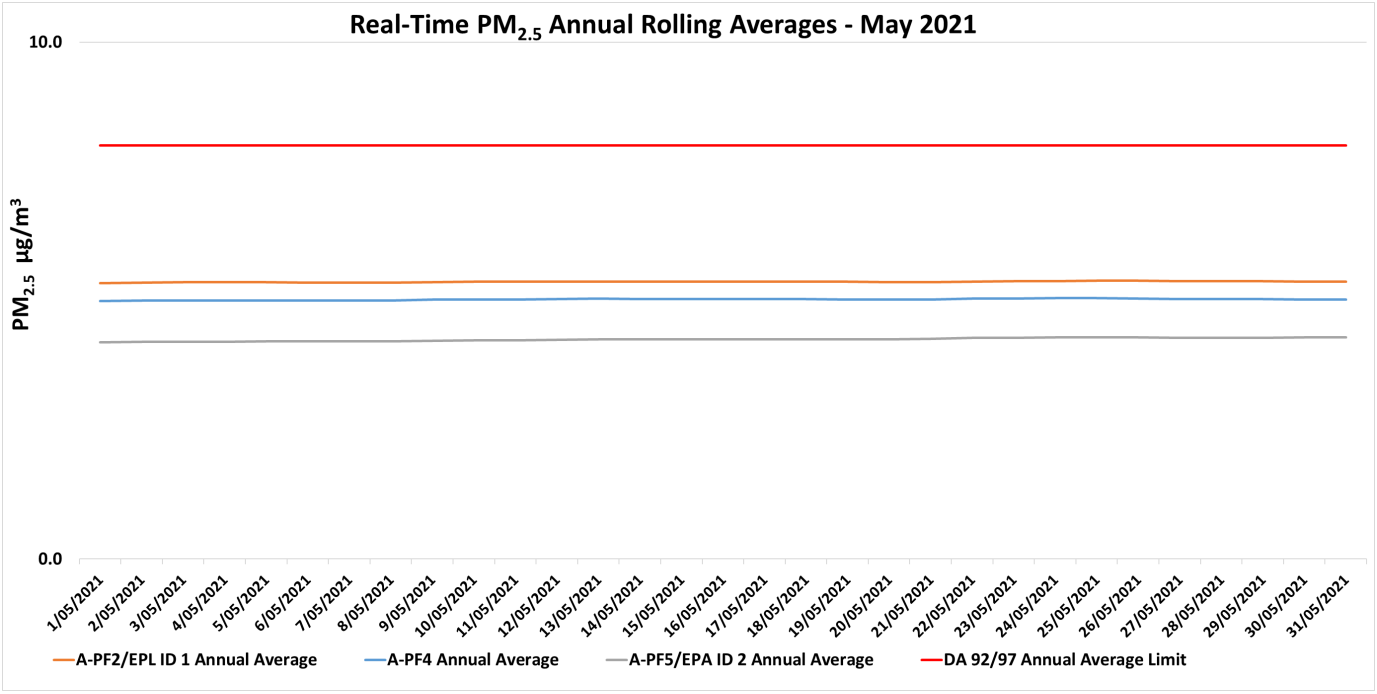

Figure 6-4: Real-time $PM_{2.5}$ Annual Rolling average results for May 2021.

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 27 May 2021. Laboratory analysis was performed by ALS 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 – 27 May 2021

Station	pH	Electrical Conductivity (EC) (µs/cm)[1]	Total Suspended Solids (TSS) (mg/L)	Total Dissolved Solids (TDS) (mg/L)
W1	8.1	640	<5	385
W2	8.1	**750**	<5	447
W3	7.8	790	<5	457
W4	7.8	2100	<5	1310
W5	*	*	*	*
W6A	8.1	**740**	<5	424
W7	*	*	*	*
W9	*	*	*	*
W11	^	^	^	^
W12	7.6	5300	<5	2970
W13	*	*	*	*
W14	*	*	*	*
W15	8.1	870	<5	503
W16	*	*	*	*
W17	8.1	**830**	<5	480

Notes:
*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 27 May 2021. All sites sampled were below or inside the trigger level values with the exception of EC at W6A and W17. An investigation will be triggered if elevated measurements occur for three consecutive sampling events in accordance MPO Water Management Plan (MACH Energy, 2019).

8. Groundwater Monitoring

The quarterly groundwater monitoring was conducted 11, 13, 19, 20, 21 and 24 May 2021. Water level results for the groundwater bores are presented in **Table 8-1**. The quarterly pH and EC results are presented in **Table 8-2** and **Table 8-3**, respectively.

Table 8-1 - MPO Quarterly Groundwater Water Level Results

Monitoring Location/ ID	Water Level Trigger Range		Current Month Water Level (DTW)	Feb 2021 Water Level (DTW)	Nov 2020 Water Level (DTW)	Triggered (Yes/No)
	80th Percentile (DTW)	Trigger				
WRA1L	-	± 0.5m	2.66	3.30	3.72	
WRA1U	-	± 0.5m	*	*	*	
WRA3L	-	± 0.5m	10.82	12.38	13.27	
WRA3U	-	± 0.5m	4.04	4.46	4.36	
WRA5L	-	± 0.5m	0.00	0.00	0.00	
WRA5U	-	± 0.5m	1.00	1.14	1.15	
WRA6L	-	± 0.5m	1.31	1.43	1.49	
WRA6U	-	± 0.5m	2.08	2.56	2.95	
MPBH1	9.71	10.70	9.94	9.95	9.86	No
MPBH2	12.20	14.20	12.56	12.68	12.67	No
MPBH3b	12.00	Dry (0r 14.0m)	11.96	12.12	12.09	No
MPBH4	-	± 0.5m	11.95	12.08	12.13	
MPBH5	-	± 0.5m	8.82	*	*	
MPBH1-C***	-	± 0.5m	10.10	10.10	10.19	
MPBH1-HR***	-	± 0.5m	23.35	26.11	10.15	
MPBH2-C***	-	± 0.5m	12.85	12.94	13.01	
MPBH2-HR**	-	± 0.5m	31.26	27.10	12.90	
MPBH4-C***	-	± 0.5m	11.53	11.66	11.69	
MPBH4-HR***	-	± 0.5m	50.93	50.99	51.10	
MPBH5-C***	-	± 0.5m	12.59	12.43	12.39	
MPBH5-HR***	-	± 0.5m	12.45	12.53	12.50	
MPBH6***	-	± 0.5m	10.23	10.32	10.33	
MPBH6-C***	-	± 0.5m	12.16	12.41	12.62	
MPBH6-HR***	-	± 0.5m	11.13	11.16	11.16	
MPBH7***	-	± 0.5m	7.23	7.33	9.42	
MPBH7-C***	-	± 0.5m	18.86	18.86	18.88	
3500C500 (L)	-	± 0.5m	60.65	60.34	60.62	
3500C500 (S)	-	± 0.5m	25.59	25.67	25.75	
4500F000	-	± 0.5m	29.45	28.88	27.56	
5000D000	-	± 0.5m	114.74	110.04	107.54	
5500D000	-	± 0.5m	41.80	88.98	99.65	

Monitoring Location/ ID	Water Level Trigger Range		Current Month Water Level (DTW)	Feb 2021 Water Level (DTW)	Nov 2020 Water Level (DTW)	Triggered (Yes/No)
	80th Percentile (DTW)	Trigger				
6500F500L	-	± 0.5m	54.80	53.20	53.17	
6500F500M	-	± 0.5m	53.31	54.71	54.71	
6500F500U	-	± 0.5m	*	*	*	
6500F625	-	± 0.5m	22.68	22.29	17.78	
Melody	-	± 0.5m	13.46	13.55	12.66	
7500F000	-	± 0.5m	36.64	36.57		

** Dry/insufficient water to sample*
*** Bore appeared to be blocked*
**** New site – results may not be representative of groundwater conditions at time of sampling due to ongoing well development - Trigger Levels are not applicable due to non-alluvial bore*
***Note**: An investigation is triggered when the water levels in any **alluvial bores** exceed the 80th percentile and/ or trigger level. Results shown in **bold** indicate that the bore has had a change in standing water level of ± 0.5m from the previous measurement.*

Table 8-2 - MPO Quarterly Groundwater pH results

Monitoring Location/ ID	pH Trigger Range		Current Month pH	Feb 2021 pH	Nov 2020 pH	Triggered (Yes/No)
	20th Percentile	80th Percentile				
WRA1I	6.0	8.5	7.2	7.1	7.0	No
WRA1U	6.0	8.5	*	*	*	No
WRA3L	6.0	8.5	6.7	6.9	6.8	No
WRA3U	6.0	8.5	7.4	7.6	7.3	No
WRA5L	6.0	8.5	7.1	7.2	7.1	No
WRA5U	6.0	8.5	7.2	7.2	7.1	No
WRA6L	6.0	8.5	6.9	6.9	6.9	No
WRA6U	6.0	8.5	7.0	7.0	6.8	No
MPBH1	6.0	8.5	7.0	6.9	6.9	No
MPBH2	6.0	8.5	6.8	6.9	6.8	No
MPBH3b	6.0	8.5	7.6	7.7	7.9	No
MPBH4	6.0	8.5	7.0	6.9	6.9	No
MPBH5	6.0	8.5	*	*	*	-
MPBH1-C***	6.0	8.5	8.4	7.5	7.7	No
MPBH1-HR***	6.0	8.5	7.9	7.9	8.4	No
MPBH2-C***	6.0	8.5	7.6	7.3	**10.8**	Yes
MPBH2-HR***	6.0	8.5	8.4	7.6	**8.9**	Yes
MPBH4-C***	6.0	8.5	7.6	7.6	8.3	No
MPBH4-HR***	6.0	8.5	7.4	7.4	7.3	-
MPBH5-C***	6.0	8.5	**10.8**	**11.5**	**11.0**	Yes
MPBH5-HR***	6.0	8.5	7.4	7.4	7.4	No
MPBH6***	6.0	8.5	7.2	7.0	7.0	No

Monitoring Location/ ID	pH Trigger Range		Current Month pH	Feb 2021 pH	Nov 2020 pH	Triggered (Yes/No)
	20th Percentile	80th Percentile				
MPBH6-C***	6.0	8.5	7.9	7.8	8.0	No
MPBH6-HR***	6.0	8.5	7.4	7.2	7.1	No
MPBH7***	6.0	8.5	7.3	7.3	7.3	No
MPBH7-C***	6.0	8.5	7.1	7.8	7.3	No
3500C500 (L)	6.0	8.5	7.5	7.6	7.6	No
3500C500 (S)	6.0	8.5	7.1	7.4	7.2	No
4500F000	6.0	8.5	6.8	6.9	6.9	No
5000D000	6.0	8.5	7.6	7.4	7.2	No
5500D000	6.0	8.5	6.9	7.1	7.2	-
6500F500L	6.0	8.5	7.3	7.4	7.6	No
6500F500M	6.0	8.5	7.3	7.4	7.5	No
6500F500U	6.0	8.5	*	*	*	*
6500F625	6.0	8.5	7.0	7.0	6.9	No
Melody	6.0	8.5	7.2	6.9	7.0	No
7500F000	6.0	8.5	7.7	7.8	7.9	No

** Dry/insufficient water to sample*
*** Bore appeared to be blocked*
**** New site - results may not be representative of groundwater conditions at time of sampling due to ongoing well development - indicated no trigger limit identified*
*An investigation is triggered when pH values are recorded outside the baseline range (20th – 80th percentile) for three consecutive readings. Results outside this range are shown in **bold**.*
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 8-3 - MPO Quarterly Groundwater EC results

Monitoring Location/ ID	EC Trigger Range	Current Month EC	Feb 2021 EC	Nov 2020 EC	Triggered (Yes/No)
	Maximum Beneficial Use Trigger				
WRA1I	7800	3050	3650	3750	No
WRA1U	^	*	*	*	-
WRA3L	22000	16300	16500	15800	No
WRA3U	22000	1950	3350	3050	No
WRA5L	7800	4450	4700	4350	No
WRA5U	7800	4550	4650	4300	No
WRA6L	7800	5900	6750	6650	No
WRA6U	22000	10400	10700	10400	No
MPBH1	800	480	470	470	No
MPBH2	930	740	770	800	No
MPBH3b	7800	4900	4700	4000	No
MPBH4	^	6350	6400	6150	-
MPBH5	^	*	*	*	-

Monitoring Location/ ID	EC Trigger Range Maximum Beneficial Use Trigger	Current Month EC	Feb 2021 EC	Nov 2020 EC	Triggered (Yes/No)
MPBH1-C***	^	1300	530	740	-
MPBH1-HR***	^	1900	1750	1400	-
MPBH2-C***	^	860	880	1350	-
MPBH2-HR***	^	1350	840	980	-
MPBH4-C***	^	3550	3650	3750	-
MPBH4-HR***	^	5850	6200	6100	-
MPBH5-C***	^	780	960	1000	-
MPBH5-HR***	^	780	880	820	-
MPBH6***	^	1150	1200	1200	-
MPBH6-C***	^	7400	7450	6250	-
MPBH6-HR***	^	5700	3800	1900	-
MPBH7***	^	12300	13000	13500	-
MPBH7-C***	^	12100	10500	11000	-
3500C500 (L)	7800	3800	3950	4050	No
3500C500 (S)	7800	1900	5150	4800	No
4500F000	22000	8600	8900	8800	No
5000D000[1]	800	**4250**	**2000**	**1250**	Yes
5500D000	7800	4450	4650	4600	No
6500F500L	7800	3900	3800	3850	No
6500F500M	7800	3000	3000	3050	No
6500F500U	7800	*	*	*	-
6500F625	7800	3700	3750	3550	No
Melody	^	1300	1250	1000	No
7500F000	7800	6300	6300	6350	No

** Dry/insufficient water to sample*
*** Bore appeared to be blocked*
**** New site - results may not be representative of groundwater conditions at time of sampling due to ongoing well development*
^ indicated no trigger limit identified
An investigation is triggered when EC values recorded exceed the beneficial use quality range (as described in the GWMP) for three successive monitoring rounds. Results outside this range are shown in ***bold.***
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).
[1] - Investigation commenced into elevated measurements as per Groundwater Management Plan (MACH Energy, 2019) including suitably qualified hydrogeologist assessment; and amendment to Surface & Groundwater Trigger Response Plan currently in review with DPIE.

The were no elevated measurements during the May 2021 sampling event not previously reported. The next quarterly monitoring event is scheduled for August 2021.

9. Noise Monitoring

Attended noise monitoring was undertaken during the night period of 10 May 2021 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 May 2021 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 – 10 May 2021

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	10/05/2021 23:44	0.7	D	45	Yes	41	Nil
N-AT2	10/05/2021 22:00	1.9	E	45	Yes	IA	Nil
N-AT3	10/05/2021 22:55	1.2	E	45	Yes	44	Nil
N-AT4	10/05/2021 23:59	0.8	D	45	Yes	45	Nil
N-AT5	10/05/2021 23:27	0.4	F	45	Yes	43	Nil
N-AT6	10/05/2021 22:36	0.8	F	45	Yes	IA	Nil

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 $L_{A1,1minute}$ 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; and*
4. *Bold results indicate exceedance of criteria.*
5. *IA indicates inaudible noise attributed to MPO.*

Table 9-2 – $L_{Aeq,15min}$ Generated by MPO: Attended Night Monitoring – 10 May 2021

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	10/05/2021 23:44	0.7	D	43	Yes	28	Nil
N-AT2	10/05/2021 22:00	1.9	E	36	Yes	IA	Nil
N-AT3	10/05/2021 22:55	1.2	E	41	Yes	37	Nil
N-AT4	10/05/2021 23:59	0.8	D	42	Yes	42	Nil
N-AT5	10/05/2021 23:27	0.4	F	40	Yes	38	Nil
N-AT6	10/05/2021 22:36	0.8	F	35	Yes	IA	Nil

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; and*
4. *Bold results indicate exceedance of criteria.*

Table 9-3 – $L_{Aeq,period}$ Cumulative Noise: Attended Night Monitoring – 10 May 2021

Location	Start Date and Time	Cumulative Noise Criterion LAeq dB	Measured Mining Only $L_{Aeq,period}$ dB[1,2]	Exceedance dB
N-AT1	10/05/2021 23:44	40	29	Nil
N-AT2	10/05/2021 22:00	40	Nil	NA
N-AT3	10/05/2021 22:55	40	Nil	NA
N-AT4	10/05/2021 23:59	40	Nil	NA
N-AT5	10/05/2021 23:27	40	Nil	NA
N-AT6	10/05/2021 22:36	40	Nil	NA

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 monitoring period.

10. Blast Monitoring

There were 7 mining blast events during May (a total of 28 blasts YTD). Results for May 2021 are presented in **Table 10-1**. All blast results during the May 2021 monitoring period were below the criteria in Schedule 3, Condition 10 of DA 92/97 and EPL 20850 and therefore compliant.

Table 10-1 – MPO Blast Monitoring Results – May 2021

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
4/05/2021	13:06	0.050	84.5	0.020	74.8	0.090	92	Y
18/05/2021	13:09	2.030	106.1	0.850	97.6	0.740	99.5	Y
12/05/2021	13:08	0.070	92.1	0.060	81.7	0.180	88.9	Y
20/05/2021	13:12	0.140	100.9	0.070	105.9	0.190	96.4	Y
26/05/2021	15:08	0.730	97.1	0.300	103.4	0.360	100.3	Y
26/05/2021	15:08	0.730	97.1	0.300	103.4	0.360	100.3	Y
27/05/2021	13:08	0.220	90.8	0.250	101.1	0.300	95.1	Y