Monthly Environmental Monitoring Report

Yancoal Mount Thorley Warkworth

January 2024

CONTENTS

Figures

Tables

Revision History

Version No.	Version Details	Date
1.0	**Final**	**17/05/2024**

1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Mount Thorley Warkworth (MTW). This report includes all monitoring data collected for the period 1 January to 31 January 2024.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

Meteorological data is collected at MTW's 'Charlton Ridge' meteorological station (refer to **Figure 3**).

2.1.1 Rainfall

Rainfall for the reporting period is summarised in **Table 1**. The year-to-date monthly rainfall totals, 2024 monthly rainfall totals and historical average monthly rainfall trend are shown in **Figure 1**.

Table 1: Monthly Rainfall MTW

2024	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
January	38.2	38.2

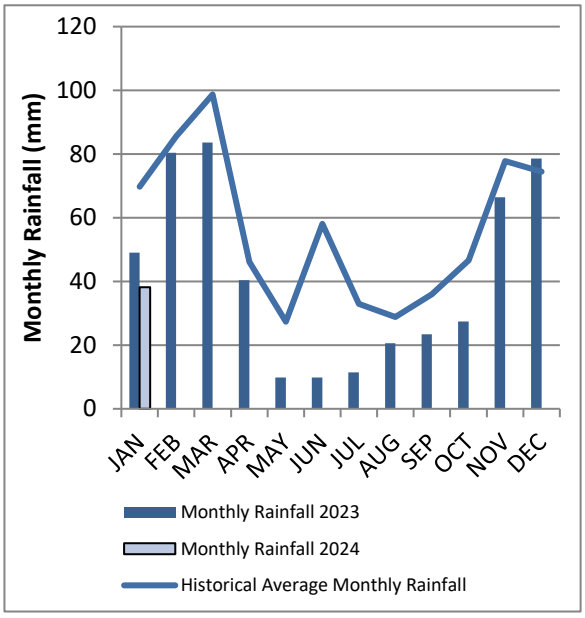


Figure 1: Rainfall Trend YTD

Note: The historical average monthly rainfall is calculated from 2007 to 2023 monthly totals.

2.1.2 Wind Speed and Direction

Winds from the Southeast were dominant during the reporting period as shown in **Figure 2.**

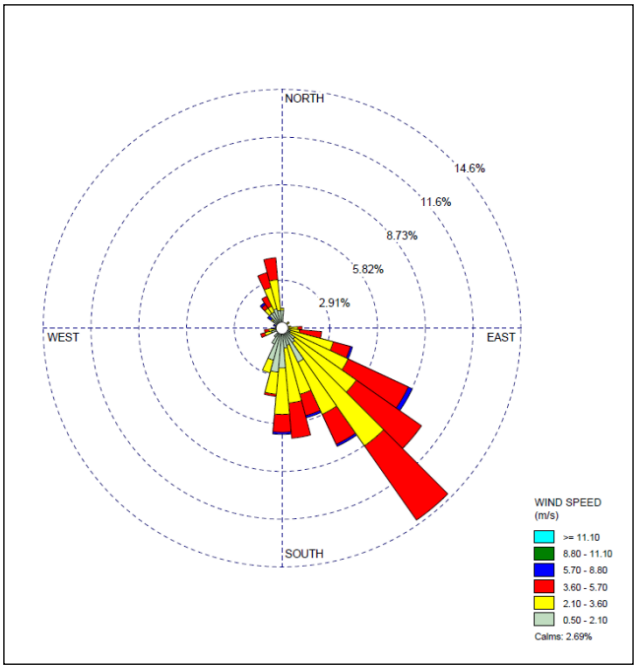


Figure 2: Charlton Ridge Wind Rose – January 2024

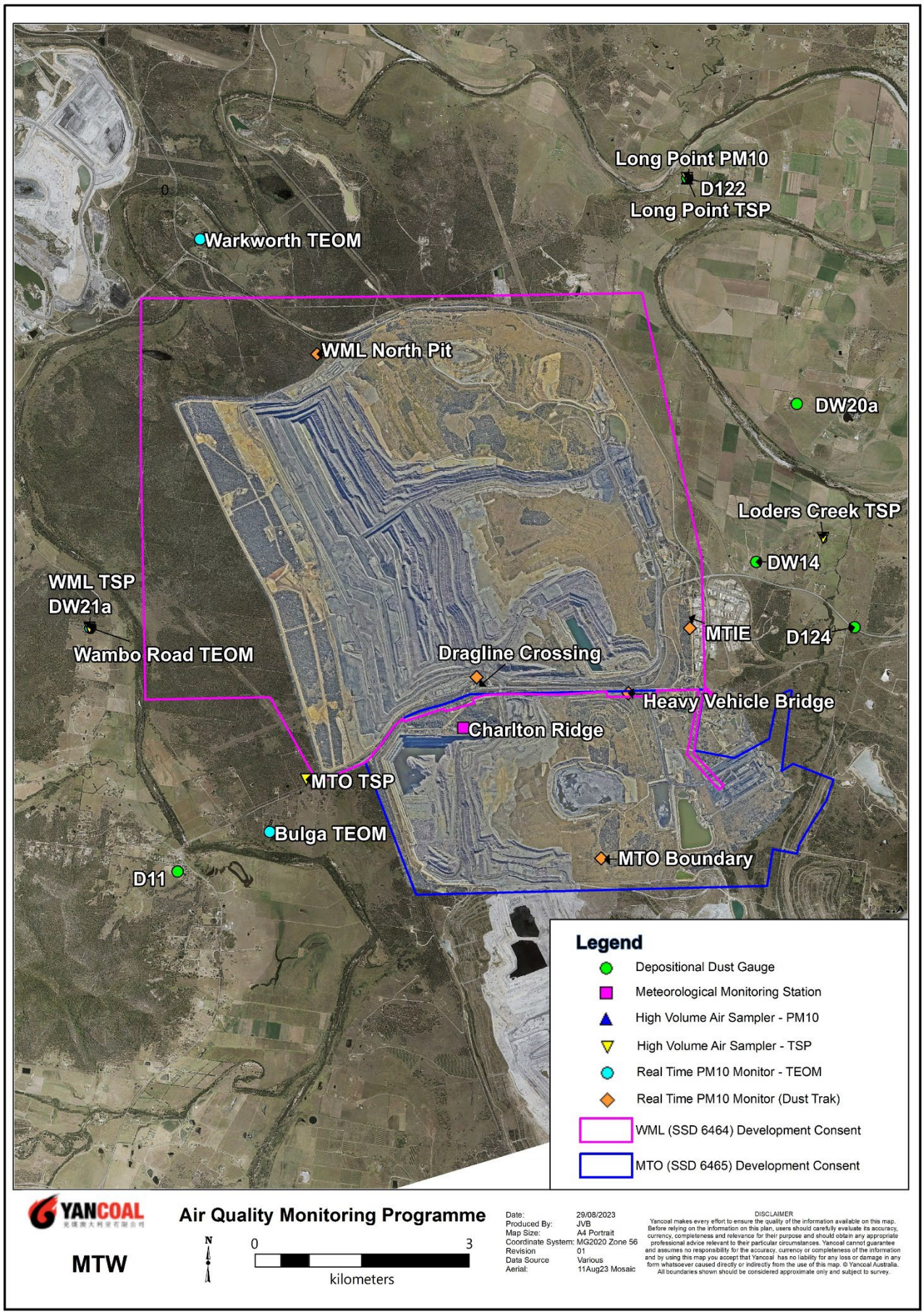


Figure 3: Air Quality Monitoring Locations

2.2 Depositional Dust

To monitor air quality, MTW operates and maintains a network of seven depositional dust gauges, situated on private and mine owned land surrounding MTW.

During the reporting period the Warkworth monitor recorded a monthly result above the long-term impact assessment criteria of 4.0 g/m2 per month. There is no evidence to suggest that the result is contaminated. Accordingly, the result will be included in the annual average calculation.

Figure 4 displays insoluble solids results from depositional dust gauges during the reporting period compared against the year-to-date average and the annual impact assessment criteria.

An annual assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2024 Annual Review Report.

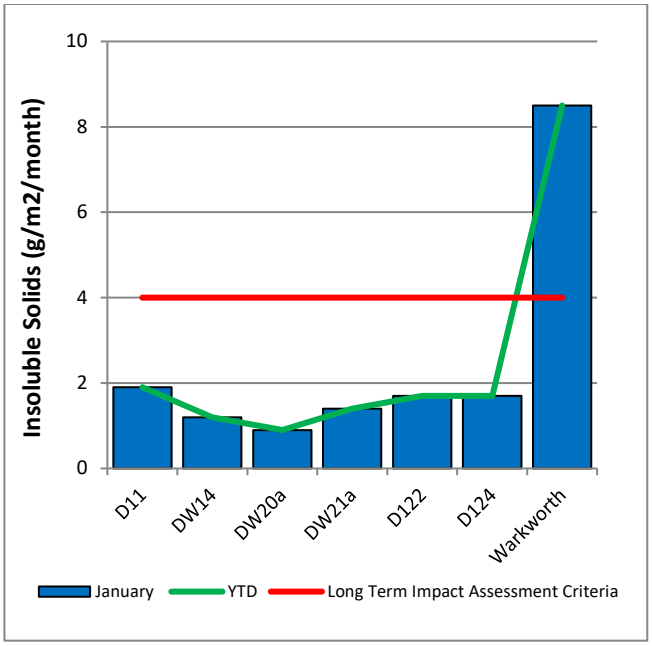


Figure 4: Depositional Dust – January 2024

2.3 Suspended Particulates

Suspended particulates are measured by a network of High Volume Air Samplers (HVAS) measuring Total Suspended Particulates (TSP) and Particulate Matter <10µm (PM_{10}). The location of these monitors can be found in **Figure 3**. Each HVAS was run for 24 hours on a six-day cycle in accordance with EPA requirements.

2.3.1 HVAS PM_{10} Results

Figure 5 shows the individual PM_{10} results at each monitoring station against the short-term impact assessment criteria of 50µg/m³.

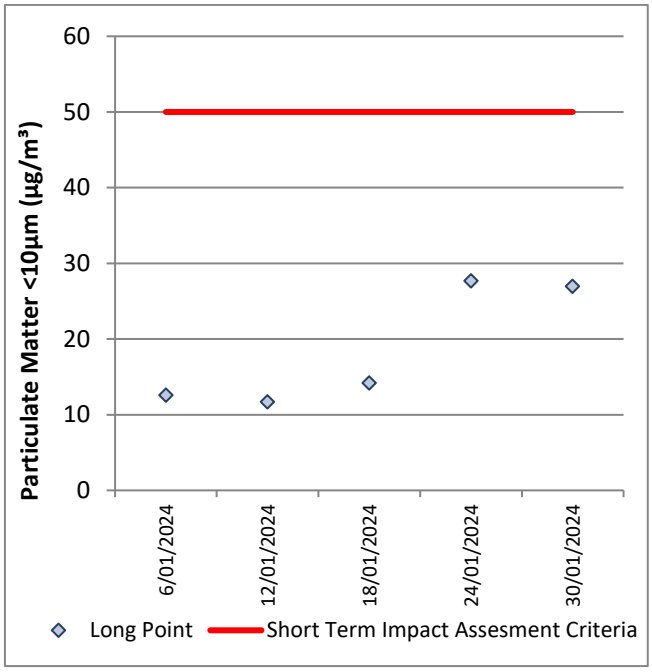


Figure 5: Individual PM10 Results – January 2024

Figure 6 shows the annual average PM10 result against the long-term impact assessment criteria.

An assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2024 Annual Review Report.

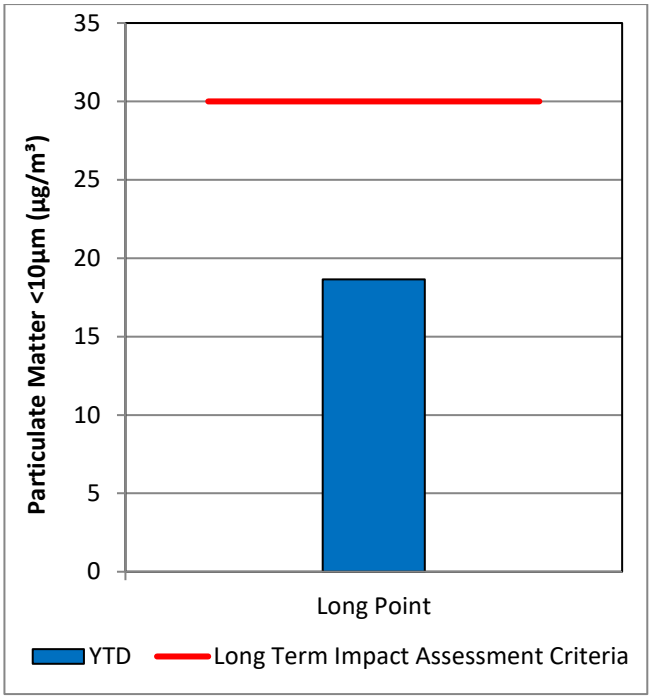


Figure 6: Annual Average PM_{10} – January 2024

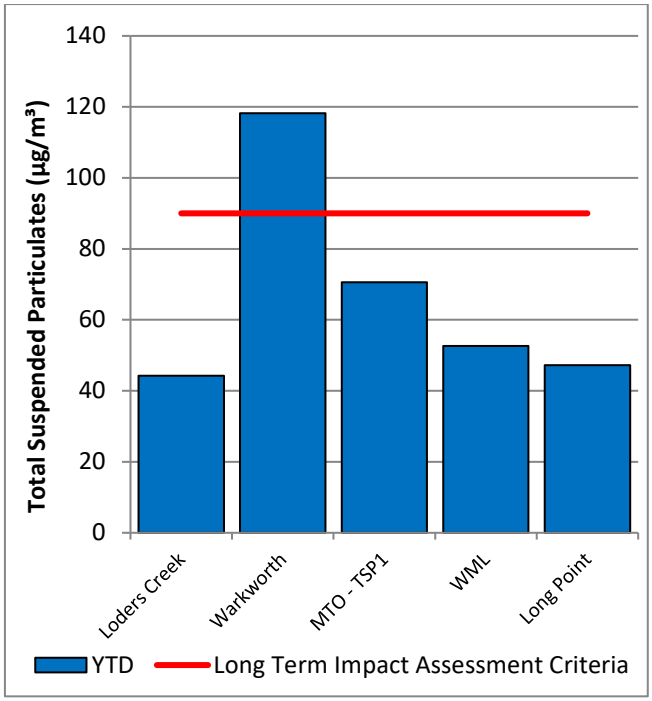


Figure 7: Annual Average Total Suspended Particulates – January 2024

2.3.2 TSP Results

Figure 7 shows the annual average TSP results compared against the long-term impact assessment criteria of 90µg/m³.

An assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2024 Annual Review Report.

Data was not available on 18 January 2024 from the WML Monitor due to equipment issues.

2.3.3 Real Time PM_{10} Results

MTW maintains a network of real time PM_{10} monitors. The real time air quality monitoring stations continuously log information and transmit data to a central database, generating internal alerts when particulate matter levels exceed internal trigger limits.

Results for real time dust sampling are shown in **Figure 8**, including the daily 24-hour average PM_{10} result and the annual PM_{10} average.

On 22 January 2024, the Warkworth TEOM (60.3 µg/m³) exceeded the short term (24hr) criteria. The measurement was assessed for MTW's potential contribution based on meteorological conditions and background PM_{10} levels on this day resulting in a maximum estimated contribution of 28.3 µg/m³, less than a 47% contribution to the result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 26 January 2024, the Warkworth TEOM (61.5 µg/m³) exceeded the short term (24hr) criteria. The measurement was assessed for MTW's potential contribution based on meteorological conditions on this day resulting in a maximum estimated contribution of 6.3 µg/m³, less than a 11%

contribution to the result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

Data was not available on 23 and 24 January from the Bulga monitor due to equipment issues.

2.3.4 Real Time Alarms for Air Quality

During January, the real time monitoring system generated 59 automated air quality related alerts, including 11 alerts for adverse meteorological conditions and 48 alerts for elevated PM_{10} levels

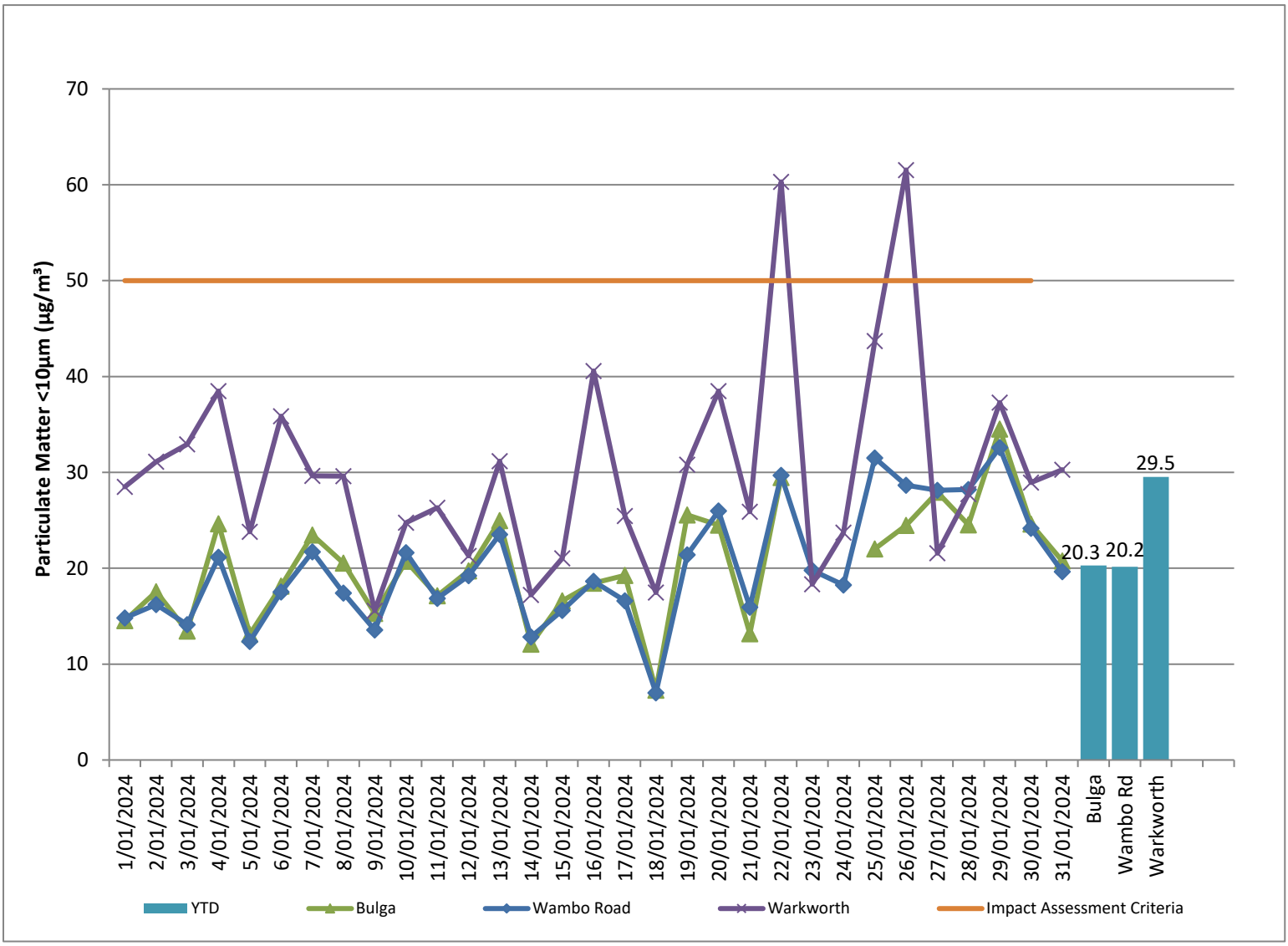


Figure 8: Real Time PM_{10} daily 24hr average (line graphs) and YTD annual average (column graphs) – January 2024

3.0 WATER QUALITY

MTW maintains a network of surface water and groundwater monitoring sites.

3.1 Surface Water

Monitoring is conducted at mine site dams and surrounding natural watercourses.

Surface water courses are sampled on a monthly or quarterly sampling regime. Water quality is evaluated through the parameters of pH, Electrical Conductivity (EC) and Total Suspended Solids (TSS). The Hunter River and the Wollombi Brook are sampled both upstream and downstream of mining operations, to record background water quality and to monitor the potential impact of mining on the river system. Other Hunter River tributaries are also monitored.

Results of monitoring are reported quarterly, next available in the March 2024 report.

3.2 HRSTS Discharge

MTW participates in the Hunter River Salinity Trading Scheme (HRSTS), allowing discharge from licensed discharge points located at Dam 1N and Dam 9S. Discharges can only take place subject to HRSTS regulations.

MTW did not undertake any HRSTS discharges in the reporting period.

3.3 Groundwater Monitoring

Groundwater monitoring is undertaken on a quarterly basis in accordance with the MTW Groundwater Monitoring Programme.

Groundwater results are reported quarterly, next available in the March 2024 report.

4.0 BLAST MONITORING

MTW have a network of six blast monitoring units. These are located at nearby privately owned residences and function as regulatory compliance monitors.

The location of these monitors can be found in **Figure 15**.

4.1 Blast Monitoring Results

During January 2024, 20 blasts were initiated at MTW. **Figure 9** to **Figure 14** show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in **Table 2**.

Table 2: Blasting Limits

Airblast Overpressure (dB(L))	Comments
115	5% of the total number of blasts in a 12 month period at WML or MTO
120	0%
Ground Vibration (mm/s)	**Comments**
5	5% of the total number of blasts in a 12 month period at WML or MTO
10	0%

During the reporting period no blasts exceeded the 5mm/s criteria for ground vibration, or the 115dB(L) threshold for airblast overpressure.

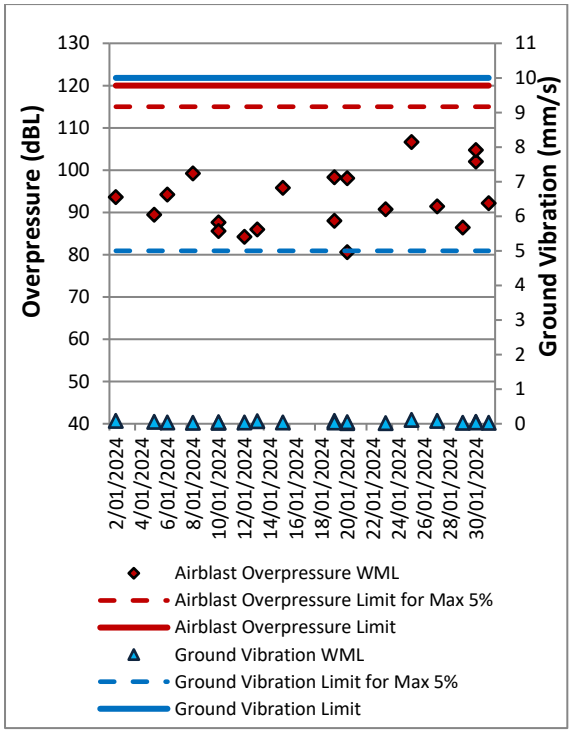


Figure 9: Abbey Green Blast Monitoring Results – January 2024

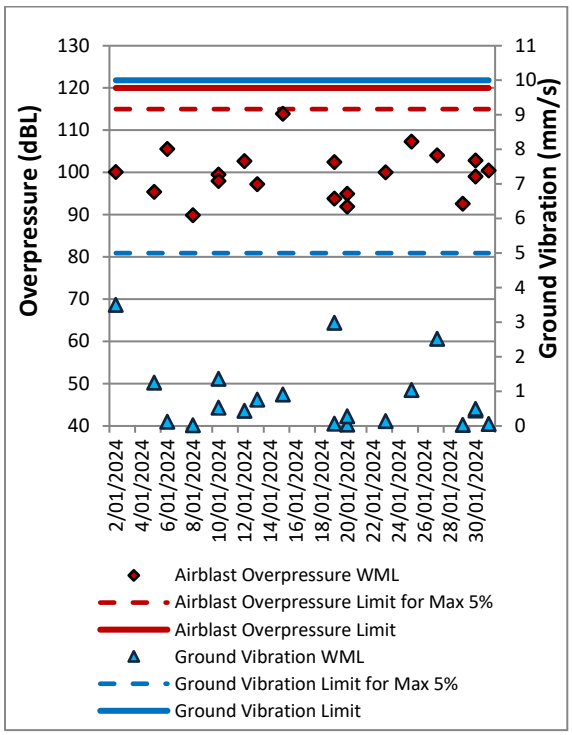


Figure 10: Bulga Village Blast Monitoring Results – January 2024

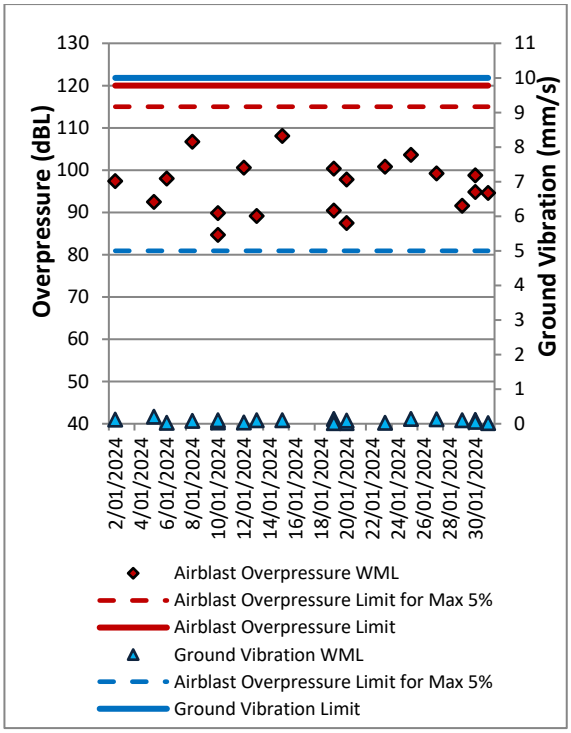


Figure 11: MTIE Blast Monitoring Results – January 2024

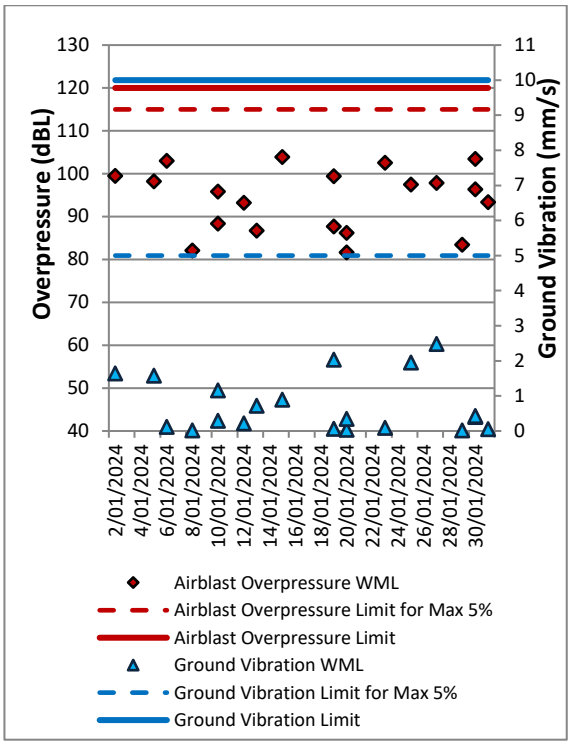


Figure 12: Wollemi Peak Road Blast Monitoring Results – January 2024

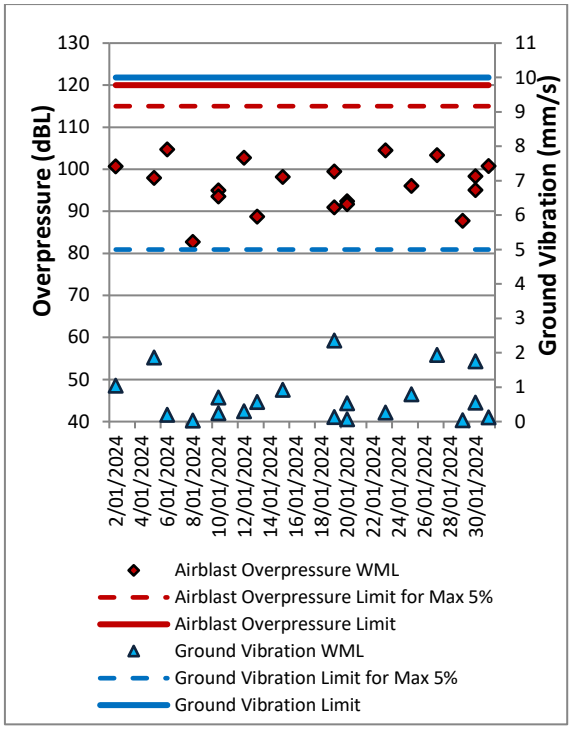


Figure 13: Wambo Road Blast Monitoring Results – January 2024

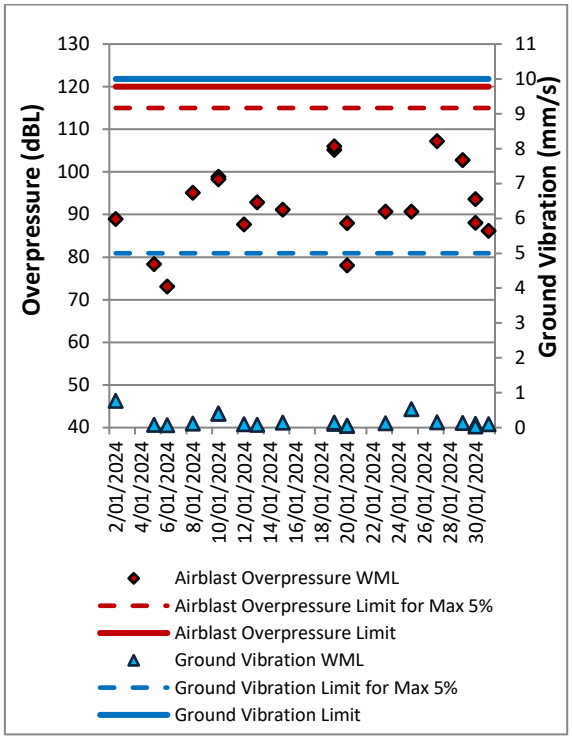


Figure 14: Warkworth Blast Monitoring Results – January 2024

Figure 15: MTW Blast Monitoring Location Plan

5.0 NOISE

Routine attended noise monitoring is carried out in accordance with the MTW Noise Management Plan. A review against EIS predictions will be reported in the Annual Review. The purpose of the noise surveys is to quantify and describe the acoustic environment around the site and compare results with specified limits. Real time noise monitoring also occurs at five sites surrounding MTW. Noise monitoring locations are displayed in **Figure 16**.

5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding MTW on the night of 18 January 2024. Measurements complied with the relevant criteria.

5.1.1 WML Noise Assessment

Compliance assessments undertaken against the WML noise criteria are presented in **Tables 3** and **4**.

Table 3: $L_{Aeq,\ 15\ minute}$ Warkworth Impact Assessment Criteria – January 2024

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB(A)	Criterion Applies?[1]	WML L_{Aeq} dB[2,3]	Exceedance[3,4]
Bulga RFS	18/01/2024 23:22	1.9	F	37	Yes	IA	Nil
Bulga Village	18/01/2024 22:08	1.4	F	38	Yes	IA	Nil
Gouldsville	18/01/2024 21:20	1.9	F	38	Yes	<25	Nil
Inlet Rd	18/01/2024 21:25	1.8	F	37	Yes	IA	Nil
Inlet Rd West	18/01/2024 21:05	1.8	E	35	Yes	IA	Nil
Long Point	18/01/2024 21:00	1.8	E	35	Yes	IA	Nil
South Bulga	18/01/2024 23:03	1.7	F	35	Yes	IA	Nil
Wambo Road	18/01/2024 21:47	1.5	F	38	Yes	20	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: wind speeds greater than 3 m/s measured at 10 metres above ground level; 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. Criterion may or may not apply due to rounding of meteorological data values;
2. Site-only LAeq,15minute attributed to WML, including modifying factors if applicable;
3. Bold results in red indicate exceedance of relevant criterion; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

Table 4: $L_{A1,\ 1\ minute}$ Warkworth - Impact Assessment Criteria – January 2024

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB(A)	Criterion Applies?[1]	WML $L_{A1,\ 1min}$ dB[2,3]	Exceedance[3,4]
Bulga RFS	18/01/2024 23:22	1.9	F	47	Yes	IA	Nil
Bulga Village	18/01/2024 22:08	1.4	F	48	Yes	IA	Nil
Gouldsville	18/01/2024 21:20	1.9	F	48	Yes	<25	Nil
Inlet Rd	18/01/2024 21:25	1.8	F	47	Yes	IA	Nil
Inlet Rd West	18/01/2024 21:05	1.8	E	45	Yes	IA	Nil
Long Point	18/01/2024 21:00	1.8	E	45	Yes	IA	Nil
South Bulga	18/01/2024 23:03	1.7	F	45	Yes	IA	Nil
Wambo Road	18/01/2024 21:47	1.5	F	38	Yes	25	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: wind speeds greater than 3 m/s measured at 10 metres above ground level; 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. Criterion may or may not apply due to rounding of meteorological data values;
2. Site-only LA1,1minute attributed to WML;
3. Bold results in red indicate exceedance of relevant criterion; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

5.1.2 MTO Noise Assessment

Compliance assessments undertaken against the MTO noise criteria are presented in **Table 5** and **6**.

Table 5: $L_{Aeq,\ 15minute}$ Mount Thorley - Impact Assessment Criteria – January 2024

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB	Criterion Applies?[1]	MTO L_{Aeq} dB[2,3]	Exceedance[3,4]
Bulga RFS	18/01/2024 23:22	1.9	F	37	Yes	IA	Nil
Bulga Village	18/01/2024 22:08	1.4	F	38	Yes	IA	Nil
Gouldsville	18/01/2024 21:20	1.9	F	35	Yes	IA	Nil
Inlet Rd	18/01/2024 21:25	1.8	F	37	Yes	IA	Nil
Inlet Rd West	18/01/2024 21:05	1.8	E	35	Yes	IA	Nil
Long Point	18/01/2024 21:00	1.8	E	35	Yes	IA	Nil
South Bulga	18/01/2024 23:03	1.7	F	36	Yes	IA	Nil
Wambo Road	18/01/2024 21:47	1.5	F	38	Yes	IA	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: wind speeds greater than 3 m/s measured at 10 metres above ground level; 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. Criterion may or may not apply due to rounding of meteorological data values;
2. Site-only LAeq,15minute attributed to MTO, including modifying factors if applicable;
3. Bold results in red indicate exceedance of relevant criterion; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

Table 6: $L_{A1,\ 1Minute}$ Mount Thorley - Impact Assessment Criteria – January 2024

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB	Criterion Applies?[1]	MTO $L_{A1,\ 1min}$ dB[2,3]	Exceedance[3,4]
Bulga RFS	18/01/2024 23:22	1.9	F	47	Yes	IA	Nil
Bulga Village	18/01/2024 22:08	1.4	F	48	Yes	IA	Nil
Gouldsville	18/01/2024 21:20	1.9	F	45	Yes	IA	Nil
Inlet Rd	18/01/2024 21:25	1.8	F	47	Yes	IA	Nil
Inlet Rd West	18/01/2024 21:05	1.8	E	45	Yes	IA	Nil
Long Point	18/01/2024 21:00	1.8	E	45	Yes	IA	Nil
South Bulga	18/01/2024 23:03	1.7	F	46	Yes	IA	Nil
Wambo Road	18/01/2024 21:47	1.5	F	48	Yes	IA	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: wind speeds greater than 3 m/s measured at 10 metres above ground level; 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. Criterion may or may not apply due to rounding of meteorological data values;
2. Site-only LA1,1minute attributed to MTO;
3. Bold results in red indicate exceedance of relevant criterion; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

5.1.3 NPfI Low Frequency Assessment

In accordance with the requirements of the EPA's Noise Policy for Industry (NPfI), the applicability of the low frequency modification factor corrections has been assessed. There were no noise measurements taken during the reporting period which required the penalty to be applied. The WML assessment for low frequency noise is shown in **Table 7** and the MTO assessment for low frequency noise is shown in **Table 8**.

Table 7: Warkworth Low Frequency Noise Assessment – January 2024

Location	Date and Time	Measured WML LAeq dB	Criterion Applies?	Intermittency Modifying Factor?	Tonality Modifying Factor?	Frequency of Tonality [1]	Low-frequency Modifying Factor?	Maximum Exceedance of Reference Spectrum [1,2]	Penalty dB [2]
Bulga RFS	18/01/2024 23:22	IA	Yes	No	No	NA	No	NA	Nil
Bulga Village	18/01/2024 22:08	IA	Yes	No	No	NA	No	NA	Nil
Gouldsville	18/01/2024 21:20	<25	Yes	No	No	NA	No	NA	Nil
Inlet Rd	18/01/2024 21:25	IA	Yes	No	No	NA	No	NA	Nil
Inlet Rd West	18/01/2024 21:05	IA	Yes	No	No	NA	No	NA	Nil
Long Point	18/01/2024 21:00	IA	Yes	No	No	NA	No	NA	Nil
South Bulga	18/01/2024 23:03	IA	Yes	No	No	NA	No	NA	Nil
Wambo Road	18/01/2024 21:47	20	Yes	No	No	NA	No	NA	Nil

Notes:
1. NA denotes 'not applicable'; and
2. Bold results indicate that application of NPfI modifying factor/s is required.

Table 8: Mount Thorley Operations Low Frequency Noise Assessment – January 2024

Location	Date and Time	Measured MTO LAeq dB	Criterion Applies?	Intermittency Modifying Factor?	Tonality Modifying Factor?	Frequency of Tonality[1]	Low-frequency Modifying Factor?	Maximum Exceedance of Reference Spectrum [1,2]	Penalty dB[2]
Bulga RFS	18/01/2024 23:22	IA	Yes	No	No	NA	No	NA	Nil
Bulga Village	18/01/2024 22:08	IA	Yes	No	No	NA	No	NA	Nil
Gouldsville	18/01/2024 21:20	IA	Yes	No	No	NA	No	NA	Nil
Inlet Rd	18/01/2024 21:25	IA	Yes	No	No	NA	No	NA	Nil
Inlet Rd West	18/01/2024 21:05	IA	Yes	No	No	NA	No	NA	Nil
Long Point	18/01/2024 21:00	IA	Yes	No	No	NA	No	NA	Nil
South Bulga	18/01/2024 23:03	IA	Yes	No	No	NA	No	NA	Nil
Wambo Road	18/01/2024 21:47	IA	Yes	No	No	NA	No	NA	Nil

Notes:
1. NA denotes 'not applicable'; and
2. Bold results indicate that application of NPfI modifying factor/s is required.

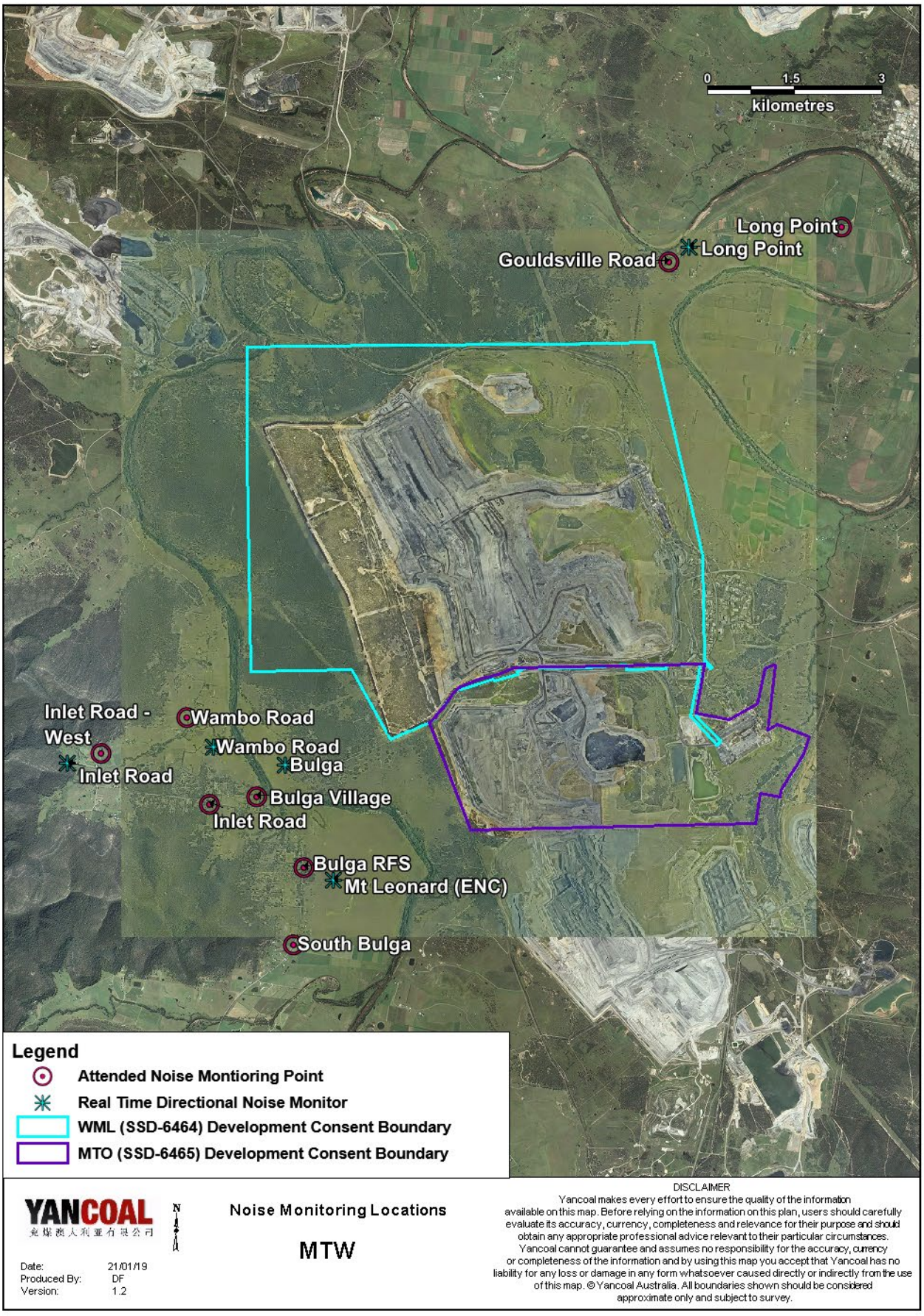


Figure 16: Noise Monitoring Location Plan

5.2 Noise Management Measures

A program of targeted supplementary attended noise monitoring is in place at MTW, supported by the real-time directional monitoring network and ensuring the highest level of noise management is maintained. The supplementary program is undertaken by MTW personnel and involves:

- Routine inspections from both inside and outside the mine boundary;
- Routine and as-required handheld noise assessments (undertaken in response to noise alarm and/or community complaint), comparing measured levels against consent noise limits; and
- Validation monitoring following operational modifications to assess the adequacy of the modifications.

Where a noise assessment identifies noise emissions which are exceeding the relevant noise limit(s) for any particular residence, modifications will be made to ensure that the noise event is resolved within 75 minutes of identification. The actions taken are commensurate with the nature and severity of the noise event, but can include:

- Changing the haul route to a less noise sensitive haul;
- Changing dump locations (in-pit or less exposed dump option);
- Reducing equipment numbers;
- Shut down of task; or
- Site shut down.

A summary of these assessments undertaken during January are provided in **Table 9**.

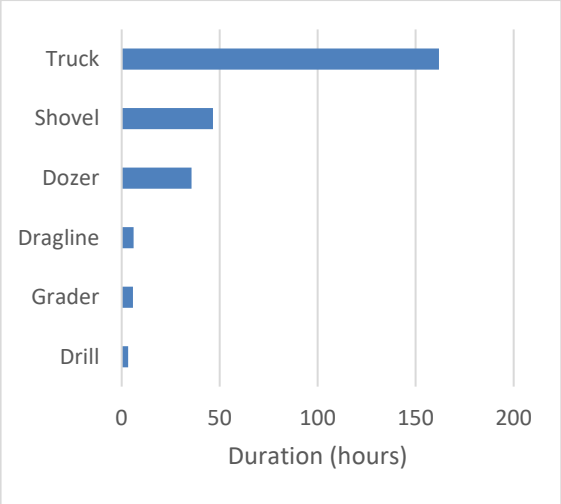
Table 9: Supplementary Attended Noise Monitoring Data – January 2024

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
577	1	1	0.2

6.0 OPERATIONAL DOWNTIME

During January, a total of 259.3 hours of equipment downtime was logged in response to environmental events such as dust, noise and adverse meteorological conditions. Operational downtime by equipment type is shown in **Figure 17**.

Figure 17: Operational Downtime by Equipment Type – January 2024



7.0 REHABILITATION

During January 2024, 4.94 Ha of land was released and 2.59 Ha was bulk shaped.

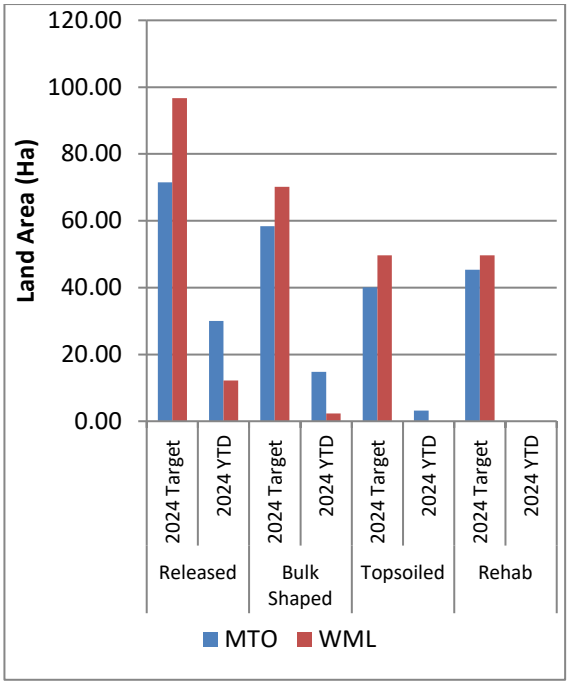


Figure 18: Rehabilitation YTD – January 2024

8.0 ENVIRONMENTAL INCIDENTS

There were no reportable environmental incidents during the reporting period.

9.0 COMPLAINTS

11 complaints were received during the reporting period. Details of these complaints are shown in **Table 10**.

Table 10: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	1	3	5	2	0	11
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						
Total	1	3	5	2	0	11

Appendix A: Meteorological Data

Table 11: Meteorological Data – Charlton Ridge Meteorological Station – January 2024

Date	Air Temperature		Relative Humidity		Wind Direction	Wind Speed	Rainfall
	Maximum (°C)	Minimum (°C)	Maximum (%)	Minimum (%)	Average (°)	Average (m/sec)	total (mm)
1/01/2024	29	18	85	51	132	3.3	0.0
2/01/2024	33	17	96	39	152	2.9	0.0
3/01/2024	33	17	94	31	164	2.6	0.0
4/01/2024	34	18	100	36	180	2.5	10.4
5/01/2024	22	17	83	64	141	3.3	0.0
6/01/2024	28	15	85	37	143	3.5	0.0
7/01/2024	31	15	91	35	142	1.8	0.0
8/01/2024	26	18	100	53	210	1.8	1.0
9/01/2024	32	18	100	49	166	3.3	6.2
10/01/2024	33	18	99	47	160	1.9	0.0
11/01/2024	34	20	97	43	151	3.3	0.0
12/01/2024	33	20	97	36	128	3.5	0.0
13/01/2024	35	18	95	29	160	2.8	0.0
14/01/2024	25	18	100	66	150	3.6	4.0
15/01/2024	23	17	100	73	140	3.8	1.8
16/01/2024	26	19	97	62	136	3.0	0.2
17/01/2024	32	17	100	43	195	1.6	14.2
18/01/2024	34	20	100	28	265	2.6	0.0
19/01/2024	34	14	81	18	194	2.6	0.0
20/01/2024	33	18	93	37	139	3.0	0.0
21/01/2024	40	18	95	13	246	2.5	0.0
22/01/2024	30	18	88	34	145	3.9	0.0
23/01/2024	29	17	100	42	124	3.1	0.4
24/01/2024	38	14	93	23	194	1.4	0.0
25/01/2024	42	22	74	19	218	1.8	0.0
26/01/2024	41	21	83	21	247	4.0	0.0
27/01/2024	25	20	87	65	124	2.7	0.0
28/01/2024	28	19	88	56	148	2.7	0.0
29/01/2024	38	19	90	29	159	2.7	0.0
30/01/2024	36	21	89	40	145	3.8	0.0
31/01/2024	33	20	96	40	153	2.6	0.0