



Monthly Environmental Monitoring Report

Yancoal Mount Thorley Warkworth
July 2020

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Revision History

Version No.	Version Details	Document Status	Date
1.0	Environmental Advisor	Final	24/09/2020

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 July to 31 July 2020.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

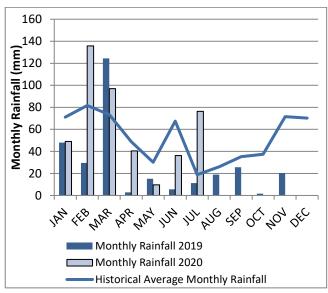
Meteorological data is collected at MTW's 'Charlton Ridge' meteorological station (refer to **Figure 3**: Air Quality Monitoring Locations).

2.1.1 Rainfall

Rainfall for the reporting period is summarised in **Table 1**. The year-to-date monthly rainfall totals, 2020 monthly rainfall totals and historical average monthly rainfall trend are shown in **Figure 1**.

Table 1: Monthly Rainfall MTW

2020	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
July	76.4	444.4



Note: The historical average monthly rainfall is calculated from 2007 to 2019 monthly totals

Figure 1: Rainfall Trend YTD

2.1.2 Wind Speed and Direction

Winds from the northwest and south were dominant during the reporting period as shown in **Figure 2.**

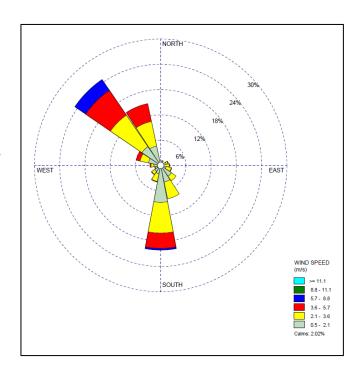


Figure 2: Charlton Ridge Wind Rose – July 2020

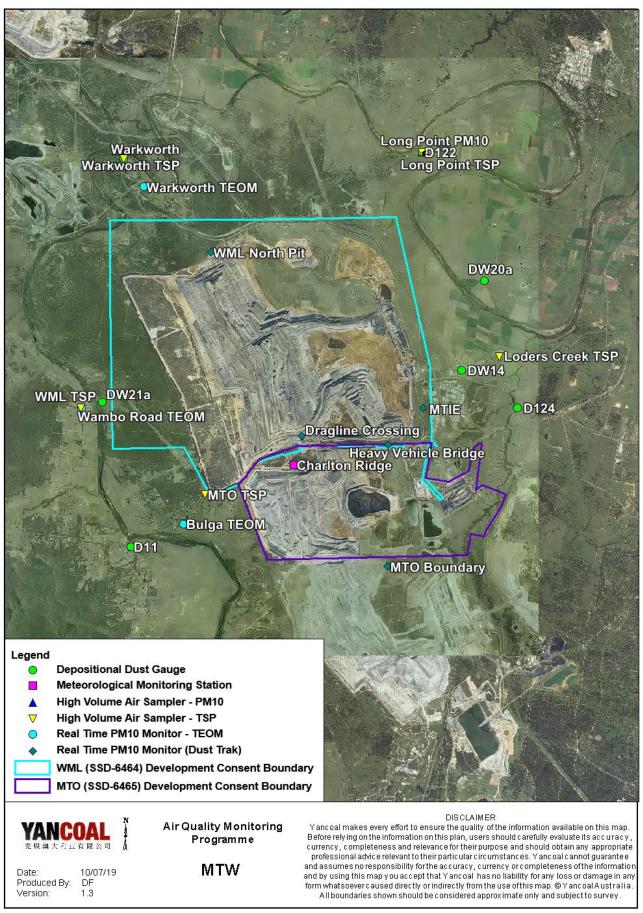


Figure 3: Air Quality Monitoring Locations

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.

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.

During the reporting period the D122 monitor recorded a monthly result above the long-term impact assessment criteria of 4.0 g/m² per month. There is insufficient evidence to confirm that the D122 result is contaminated. Accordingly, the result will be included in the annual average calculation.

An annual assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2020 Annual Review Report.

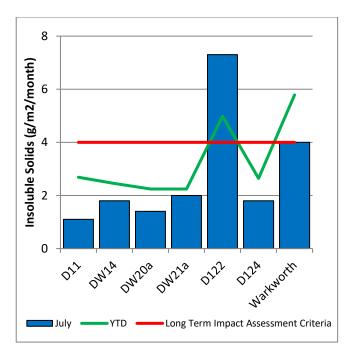


Figure 4: Depositional Dust – July 2020

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 <10 μ m (PM₁₀). 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 PM₁₀ Results

Figure 5 shows the individual PM_{10} results at each monitoring station against the short-term impact assessment criteria of $50\mu g/m^3$.

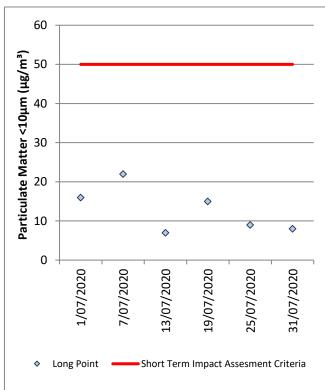


Figure 5: Individual PM10 Results - July 2020

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

An assessment of MTW's contribution to the long term assessment criteria will be reported in the 2020 Annual Review Report.

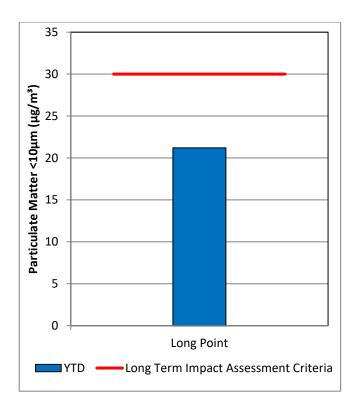


Figure 6: Annual Average PM₁₀ - July 2020

2.3.2 TSP Results

Figure 7 shows the annual average TSP results compared against the long-term impact assessment criteria of $90\mu g/m^3$.

An assessment of MTW's contribution to the long-term assessment criteria will be reported in the 2020 Annual Review Report.

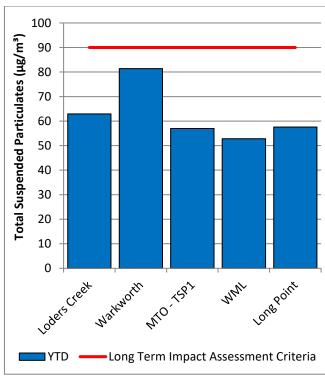


Figure 7: Annual Average Total Suspended Particulates – July 2020

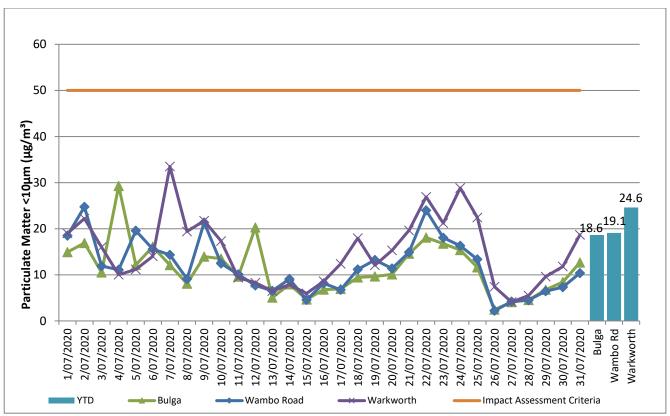
2.3.3 Real Time PM₁₀ Results

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. It should be noted that the PM_{10} monitor previously named the "Wallaby Scrub Road TEOM" has been moved to a representative location west of Wollombi Brook and renamed "Wambo Road TEOM". This change to took effect from 1 February 2020. Please note: the year to date PM_{10} average result for the Wambo Road monitoring location has been calculated using data from the Wallaby Scrub Road TEOM for January 2020 and from the Wambo Road TEOM from February 2020 onwards.

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.

2.3.4 Real Time Alarms for Air Quality

During July, the real time monitoring system generated 127 automated air quality related alerts, including 17 alerts for adverse meteorological conditions and 110 alerts for elevated PM_{10} levels.



Note: The Year to Date (YTD) PM10 average result for the Wambo Road monitoring location has been calculated using data from the former Wallaby Scrub Road TEOM location for January 2020 and from the Wambo Road TEOM from February 2020 onwards.

Figure 8: Real Time PM₁₀ daily 24hr average (line graphs) and YTD annual average (column graphs) - July 2020

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 September 2020 report.

3.2 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 September 2020 report.

3.3 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.

During the reporting period no water was discharged under the HRSTS.

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 July 2020, 28 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
Ground Vibration (mm/s) 5	Comments 5% of the total number of blasts in a 12 month period at WML or MTO

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

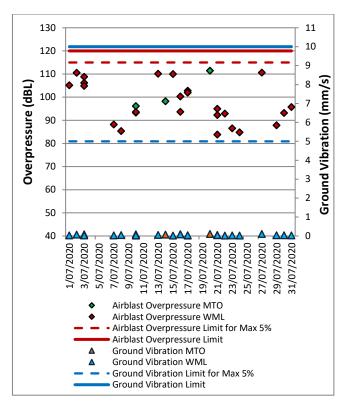


Figure 9: Abbey Green Blast Monitoring Results – July 2020

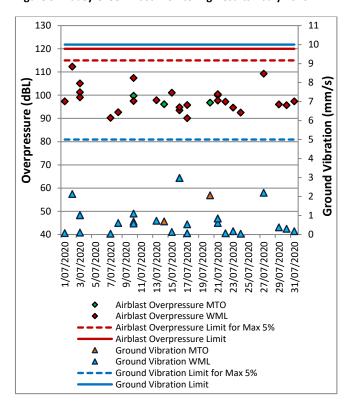
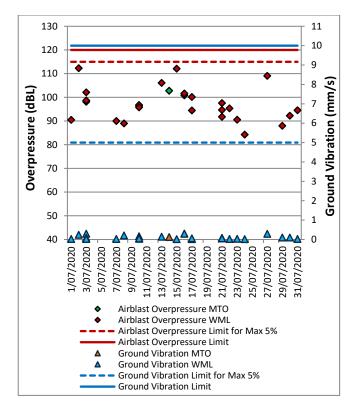


Figure 10: Bulga Village Blast Monitoring Results – July 2020



130 11 120 110 8 Ground Vibration (mm/s) Overpressure (dBL) 100 90 80 4 70 3 60 2 50 1 40 1/07/2020 3/07/2020 5/07/2020 15/07/2020 17/07/2020 19/07/2020 27/07/2020 29/07/2020 31/07/2020 7/07/2020 9/07/2020 11/07/2020 13/07/2020 5/07/2020 21/07/2020 23/07/2020 Airblast Overpressure MTO Airblast Overpressure WML Airblast Overpressure Limit for Max 5% Airblast Overpressure Limit Ground Vibration MTO Ground Vibration WML Ground Vibration Limit for Max 5% **Ground Vibration Limit**

Figure 11: MTIE Blast Monitoring Results - July 2020

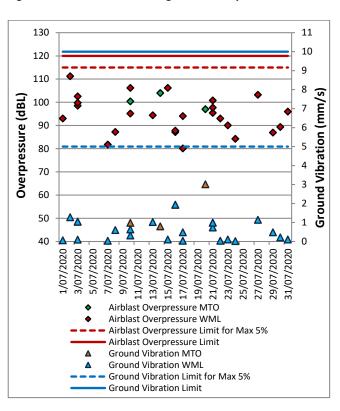


Figure 12: Wollemi Peak Road Blast Monitoring Results – July 2020

Figure 13: Wambo Road Blast Monitoring Results – July 2020

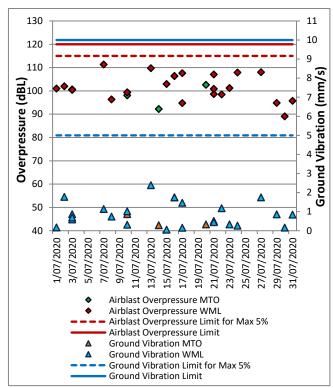


Figure 14: Warkworth Blast Monitoring Results – July 2020

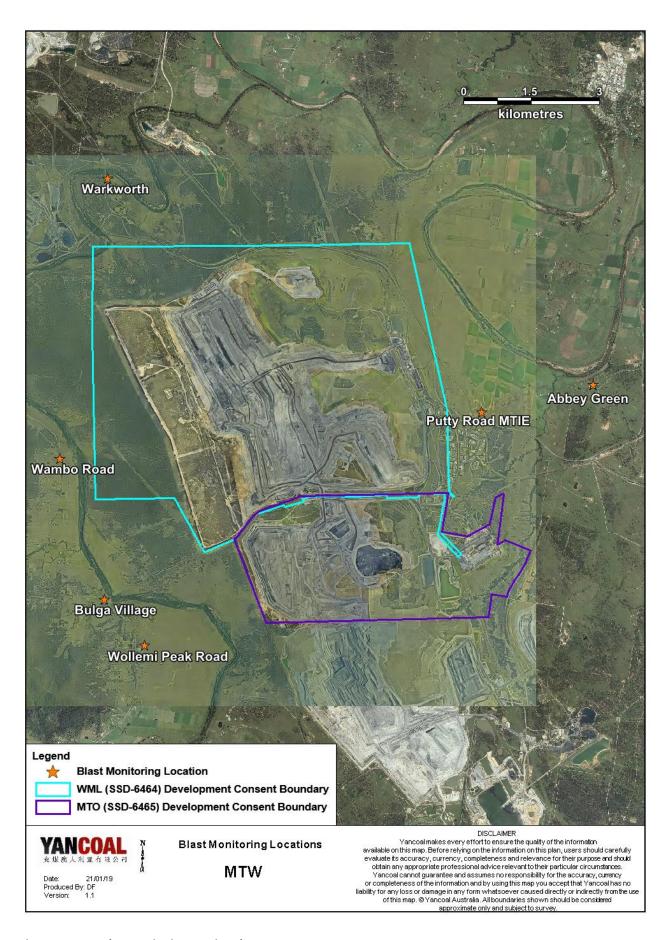


Figure 15: MTW Blast Monitoring Location Plan

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 22 July 2020. All measurements complied with the relevant criteria. Results are detailed in **Table 3 to Table 6.**

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 – July 2020

7104) 25 11111410	•	Wind Speed	Stability	Criterion	Criterion	14/8/41 1	
Location	Date and Time	(m/s)	Class	dB(A)	Applies? ¹	WML L _{Aeq} dB ^{2,3}	Exceedance ^{3,4}
Bulga RFS	22/07/2020 23:13	0.0	E	37	Yes	34	Nil
Bulga Village	22/07/2020 23:36	0.4	D	38	Yes	27	Nil
Gouldsville	22/07/2020 21:25	0.6	D	38	Yes	IA	Nil
Inlet Rd	22/07/2020 21:25	0.6	D	37	Yes	32	Nil
Inlet Rd West	22/07/2020 21:00	0.4	E	35	Yes	<20	Nil
Long Point	22/07/2020 21:00	0.4	E	35	Yes	IA	Nil
South Bulga	23/07/2020 0:04	1.1	E	35	Yes	25	Nil
Wambo Road	22/07/2020 22:11	0.4	E	38	Yes	29	Nil

Notes:

Table 4: La1, 1 minute Warkworth - Impact Assessment Criteria – July 2020

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	22/07/2020 23:13	0.0	Е	47	Yes	38	Nil
Bulga Village	22/07/2020 23:36	0.4	D	48	Yes	28	Nil
Gouldsville	22/07/2020 21:25	0.6	D	48	Yes	IA	Nil
Inlet Rd	22/07/2020 21:25	0.6	D	47	Yes	34	Nil
Inlet Rd West	22/07/2020 21:00	0.4	E	45	Yes	<20	Nil
Long Point	22/07/2020 21:00	0.4	E	45	Yes	IA	Nil
South Bulga	23/07/2020 0:04	1.1	E	45	Yes	30	Nil
Wambo Road	22/07/2020 22:11	0.4	Е	48	Yes	35	Nil

Notes

^{1.} Noise criteria apply during all meteorological conditions except the following: during periods of rain or hail; average wind speed at microphone height exceeds 5 m/s; 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 exceedances of relevant criteria; and

^{4.} NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable.

^{1.} Noise criteria apply during all meteorological conditions except the following: during periods of rain or hail; average wind speed at microphone height exceeds 5 m/s; 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 are possible exceedances of relevant criteria; and

^{4.} NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable.

5.1.3 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 – July 2020

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	22/07/2020 23:13	0.0	E	37	Yes	IA	Nil
Bulga Village	22/07/2020 23:36	0.4	D	38	Yes	IA	Nil
Gouldsville	22/07/2020 21:25	0.6	D	35	Yes	IA	Nil
Inlet Rd	22/07/2020 21:25	0.6	D	37	Yes	IA	Nil
Inlet Rd West	22/07/2020 21:00	0.4	E	35	Yes	IA	Nil
Long Point	22/07/2020 21:00	0.4	Е	35	Yes	IA	Nil
South Bulga	23/07/2020 0:04	1.1	Е	36	Yes	IA	Nil
Wambo Road	22/07/2020 22:11	0.4	Е	38	Yes	IA	Nil

Notes:

Table 6: LA1, 1Minute Mount Thorley - Impact Assessment Criteria - July 2020

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	22/07/2020 23:13	0	Е	47	Yes	IA	Nil
Bulga Village	22/07/2020 23:36	0.4	D	48	Yes	IA	Nil
Gouldsville	22/07/2020 21:25	0.6	D	45	Yes	IA	Nil
Inlet Rd	22/07/2020 21:25	0.6	D	47	Yes	IA	Nil
Inlet Rd West	22/07/2020 21:00	0.4	E	45	Yes	IA	Nil
Long Point	22/07/2020 21:00	0.4	E	45	Yes	IA	Nil
South Bulga	23/07/2020 0:04	1.1	E	46	Yes	IA	Nil
Wambo Road	22/07/2020 22:11	0.4	E	48	Yes	IA	Nil

Notes

^{1.} Noise criteria apply during all meteorological conditions except the following: during periods of rain or hail; average wind speed at microphone height exceeds 5 m/s; 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 exceedances of relevant criteria; and

^{4.} NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

^{1.} Noise criteria apply during all meteorological conditions except the following: during periods of rain or hail; average wind speed at microphone height exceeds 5 m/s; 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;

Site-only LAeq,15minute attributed to MTO;
 Bold results in red indicate exceedances of relevant criteria; and

^{4.} NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

5.1.4 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 Error! Reference source not found. and the MTO assessment for low frequency noise is shown in **Table 8**: Mount Thorley Operations Low Frequency Noise Assessment – July 2020.

Table 7: Warkworth Low Frequency Noise Assessment

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	Exceedance
Bulga RFS	22/07/2020 23:13	34	Yes	No	No	NA	No	NA	Nil	NA
Bulga Village	22/07/2020 23:36	27	Yes	No	No	NA	No	NA	Nil	NA
Gouldsville	22/07/2020 21:25	IA	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd	22/07/2020 21:25	32	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd West	22/07/2020 21:00	<20	Yes	No	No	NA	No	NA	Nil	NA
Long Point	22/07/2020 21:00	IA	Yes	No	No	NA	No	NA	Nil	NA
South Bulga	23/07/2020 0:04	25	Yes	No	No	NA	No	NA	Nil	NA
Wambo Road	22/07/2020 22:11	29	Yes	No	No	NA	No	NA	Nil	NA

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 – July 2020

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	Exceedance
Bulga RFS	22/07/2020 23:13	IA	Yes	No	No	NA	No	NA	Nil	NA
Bulga Village	22/07/2020 23:36	IA	Yes	No	No	NA	No	NA	Nil	NA
Gouldsville	22/07/2020 21:25	IA	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd	22/07/2020 21:25	IA	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd West	22/07/2020 21:00	IA	Yes	No	No	NA	No	NA	Nil	NA
Long Point	22/07/2020 21:00	IA	Yes	No	No	NA	No	NA	Nil	NA
South Bulga	23/07/2020 0:04	IA	Yes	No	No	NA	No	NA	Nil	NA
Wambo Road	22/07/2020 22:11	IA	Yes	No	No	NA	No	NA	Nil	NA

Notes:

^{1.} NA denotes 'not applicable'; and

^{2.} Bold results indicate that application of NPfI modifying factor/s is required.

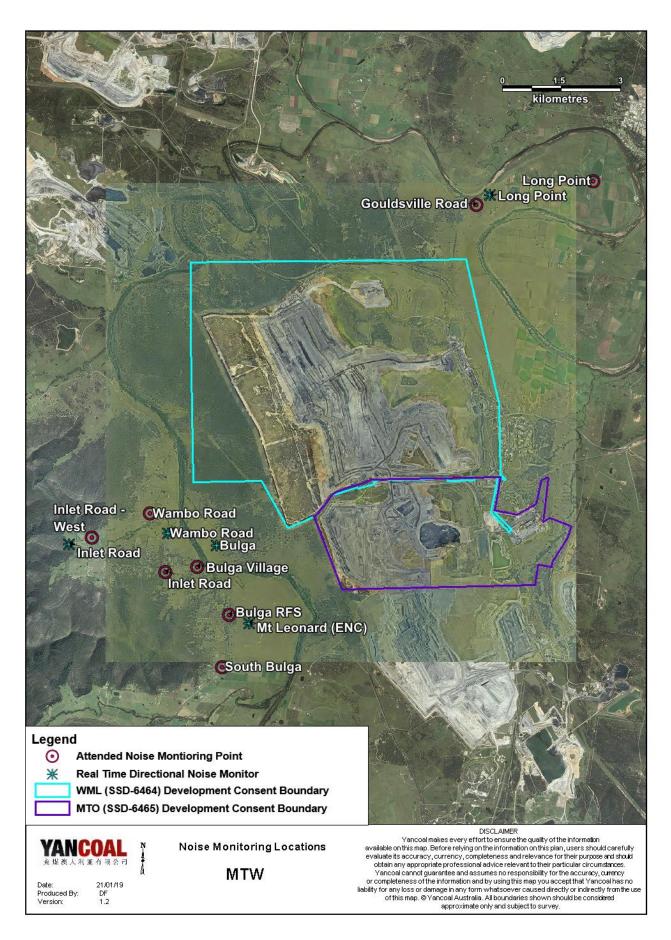


Figure 16: Noise Monitoring Location Plan

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 so as 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 July are provided in **Table 9**.

Table 9: Supplementary Attended Noise Monitoring Data – July 2020

No.	of	No. of	No. of nights	%
assessn	nents ass	essments >	where	greater
		trigger	assessments	than
			> trigger	trigger

Note: Measurements are taken under all meteorological conditions, including conditions under which the consent noise criteria do not apply.

6.0 OPERATIONAL DOWNTIME

During July, a total of 65 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**.

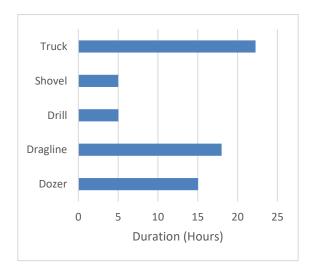


Figure 17: Operational Downtime by Equipment Type – July 2020

7.0 REHABILITATION

During July 2020, 0.4 Ha of land was released, 0.4 Ha of land was bulk shaped, 3.2 Ha of land was topsoiled and 5.7 Ha of land was composted.

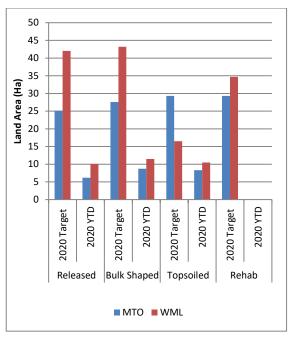


Figure 18: Rehabilitation YTD - July 2020

8.0 ENVIRONMENTAL INCIDENTS

There were no reportable environmental incidents during the reporting period.

9.0 COMPLAINTS

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

Table 10: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	2	4	5	0	0	11
February	6	1	4	2	2 1	
March	13	3	7	0	0	23
April	21	7	1	1	1	31
May	4	4	11	6	1	26
June	8	1	10	7	0	26
July	4	2	12	5	0	23
August						
September						
October						
November						
December						
Total	58	22	50	21	3	154

Appendix A: Meteorological Data

Table 11: Meteorological Data – Charlton Ridge Meteorological Station – July 2020

Date	Air Temperature Maximum (°C)	Air Temperature Minimum (°C)	Relative Humidity Maximum (%)	Relative Humidity Minimum (%)	Wind Direction Average (°)	Wind Speed Average (m/sec)	Rainfall(mm)
1/07/2020	19	3	95	30	302	2.2	0.0
2/07/2020	22	7	79	35	308	3.0	0.0
3/07/2020	19	7	88	26	286	2.7	0.0
4/07/2020	15	5	89	34	294	3.6	0.2
5/07/2020	17	3	80	38	312	3.7	0.0
6/07/2020	17	2	89	40	233	1.7	0.0
7/07/2020	17	4	94	40	202	1.6	0.0
8/07/2020	15	6	93	54	150	1.9	0.0
9/07/2020	18	4	96	47	169	1.5	0.0
10/07/2020	14	7	97	76	210	1.2	1.4
11/07/2020	15	9	100	85	228	1.1	3.8
12/07/2020	18	5	100	39	264	2.1	1.0
13/07/2020	15	3	99	43	300	2.5	0.0
14/07/2020	15	4	96	55	234	4.2	2.0
15/07/2020	16	9	67	40	189	3.9	0.0
16/07/2020	17	4	76	40	238	2.3	0.0
17/07/2020	16	8	80	53	173	2.1	0.0
18/07/2020	18	6	93	46	142	1.5	0.0
19/07/2020	19	3	99	35	303	3.3	0.0
20/07/2020	18	7	74	15	262	3.1	0.0
21/07/2020	16	2	80	36	217	2.1	0.0
22/07/2020	15	3	88	48	202	1.3	0.0
23/07/2020	18	4	93	33	181	1.5	0.0
24/07/2020	17	4	94	54	179	2.1	0.0
25/07/2020	16	7	97	61	147	2.3	3.6
26/07/2020	13	10	100	80	197	3.6	39.8
27/07/2020	17	8	100	58	303	4.7	13.4
28/07/2020	13	8	100	91	319	5.0	11.0
29/07/2020	19	5	100	55	240	1.7	0.2
30/07/2020	18	6	98	41	191	1.8	0.0
31/07/2020	17	5	90	38	153	2.2	0.0

[&]quot;-" Indicates that data was not available due to technical issues.