Monthly Environmental Monitoring Report

Yancoal Mount Thorley Warkworth

August 2020

CONTENTS

Figures

Tables

Revision History

Version No.	Version Details	Document Status	Date
1.0	**Environment and Community Coordinator**	**Final**	**11/11/2020**

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 August to 31 August 2020.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

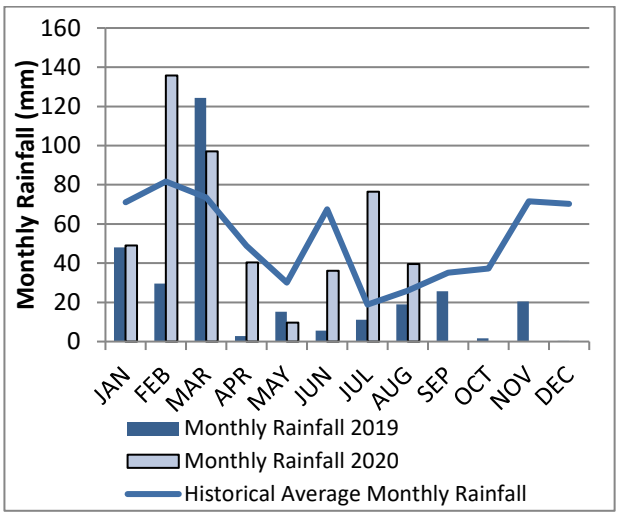
Meteorological data is collected at MTW's 'Charlton Ridge' meteorological station (refer to **Figure 3**: Air Quality Monitoring Locations).

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)
August	39.6	484.0



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

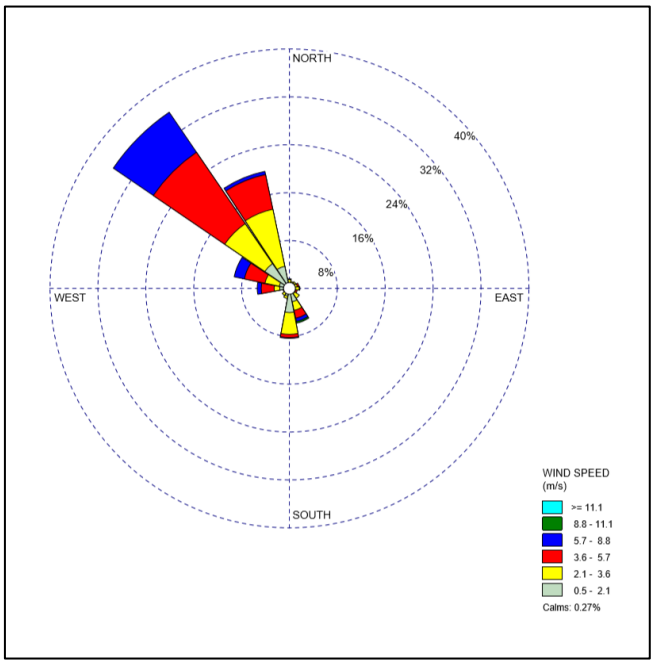


Figure 2: Charlton Ridge Wind Rose – August 2020

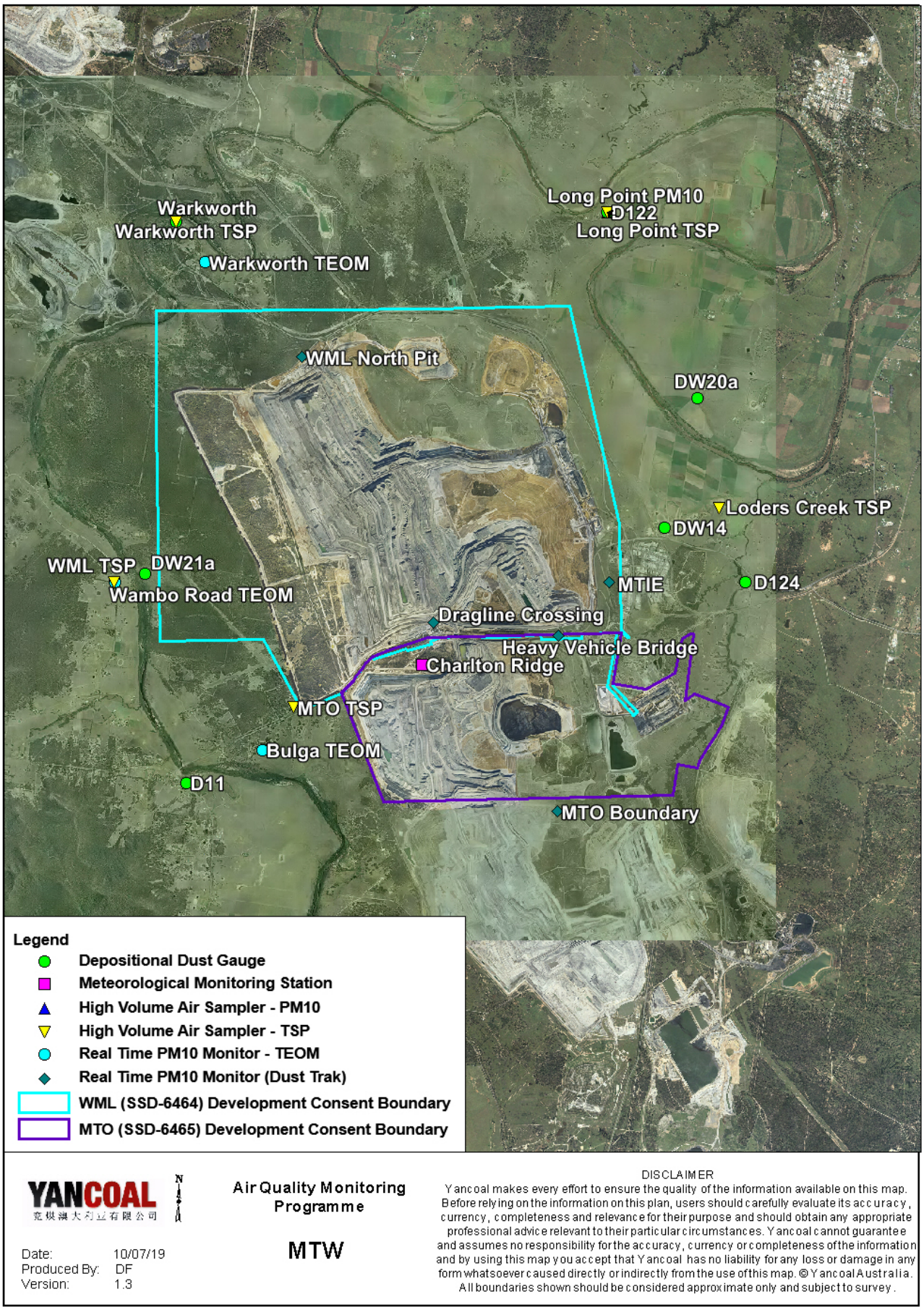


Figure 3: Air Quality Monitoring Locations

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.

During the reporting period no monitors recorded a monthly result above the long-term impact assessment criteria of 4.0 g/m^2 per month.

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 2020 Annual Review Report.

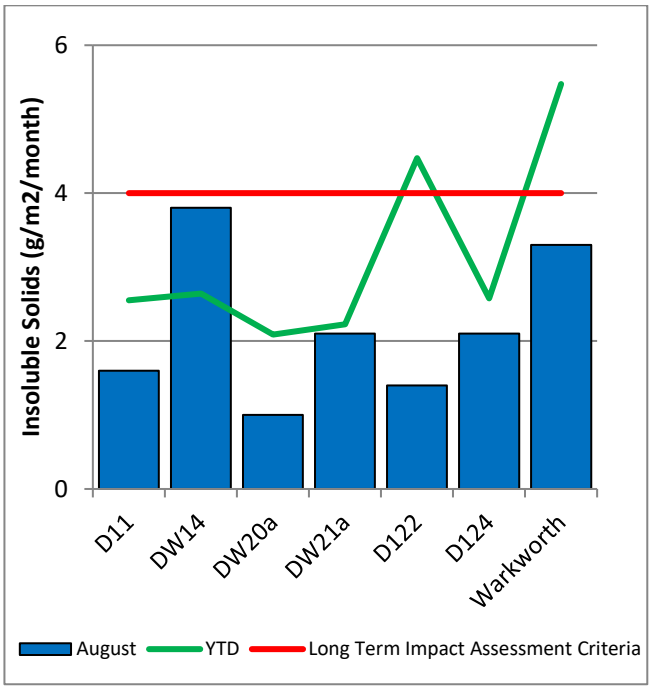


Figure 4: Depositional Dust – August 2020

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 <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/m^3.

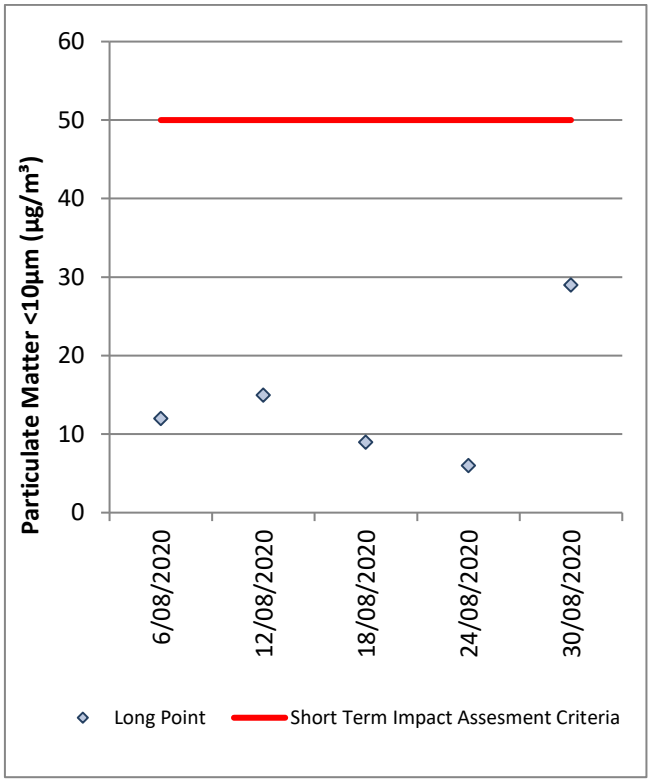


Figure 5: Individual PM10 Results – August 2020

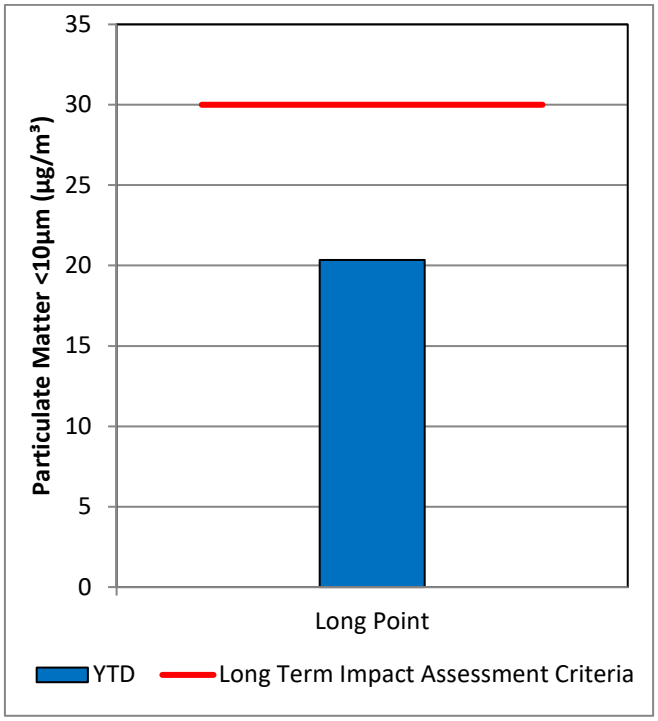


Figure 6 shows the annual average PM10 result against the long term impact assessment criteria.

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

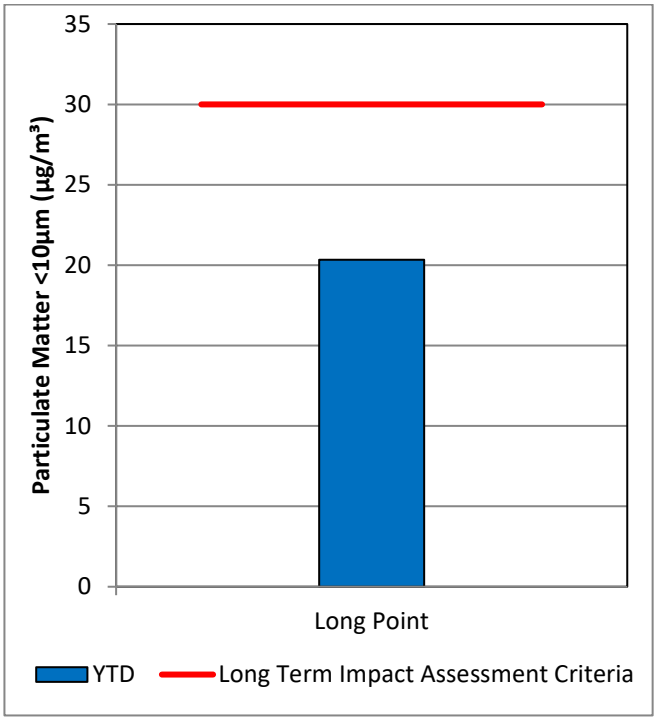


Figure 6: Annual Average PM_{10} – August 2020

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 contribution to the long-term assessment criteria will be reported in the 2020 Annual Review Report.

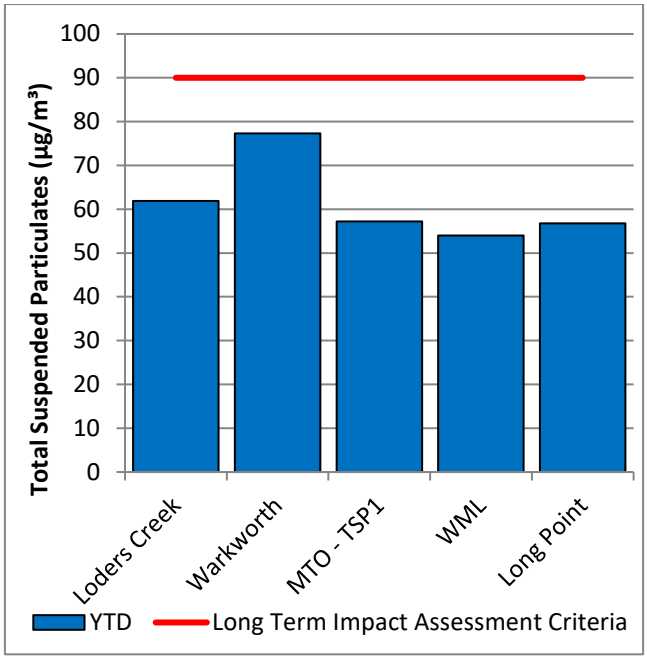


Figure 7: Annual Average Total Suspended Particulates –August 2020

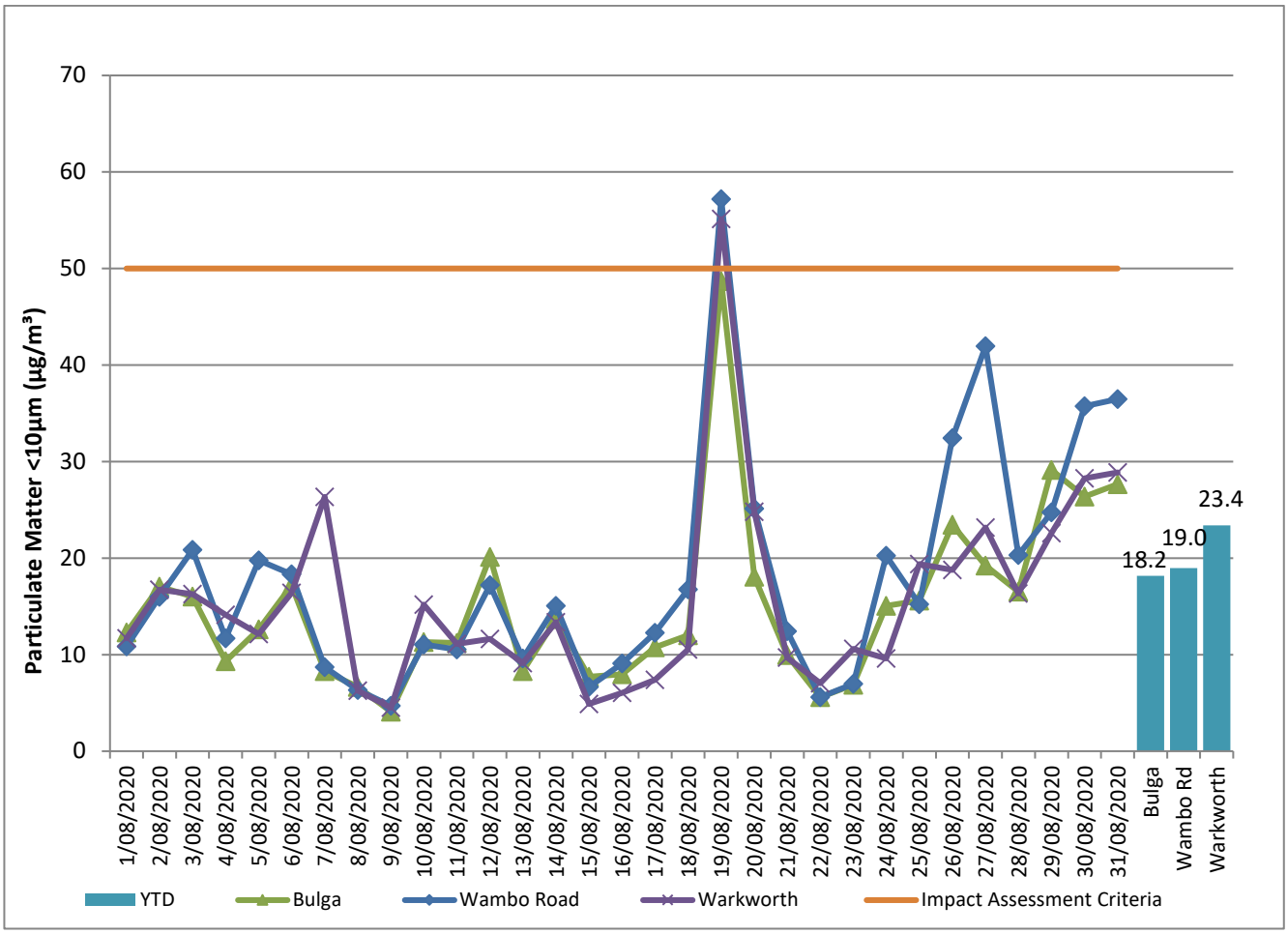
2.3.3 Real Time PM_{10} Results

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. 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. On 19 August 2020, the Wambo Road TEOM (57.2µg/m³) and the Warkworth OEH TEOM (55.1µg/m³) exceeded the short term (24hr) criteria. Investigation determined that the wind direction was not from MTW's angle of influence. Accordingly, no further action is required.

2.3.4 Real Time Alarms for Air Quality

During August, the real time monitoring system generated 166 automated air quality related alerts, including 56 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 PM_{10} daily 24hr average (line graphs) and YTD annual average (column graphs) – August 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 August 2020, 18 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 115 dB(L) 5% threshold for airblast overpressure or 5mm/s 5% threshold for ground vibration.

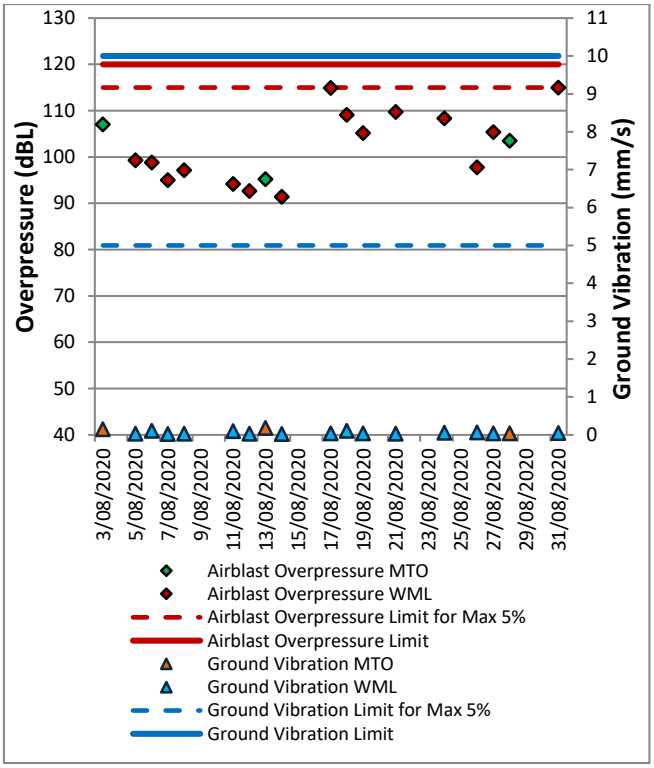


Figure 9: Abbey Green Blast Monitoring Results – August 2020

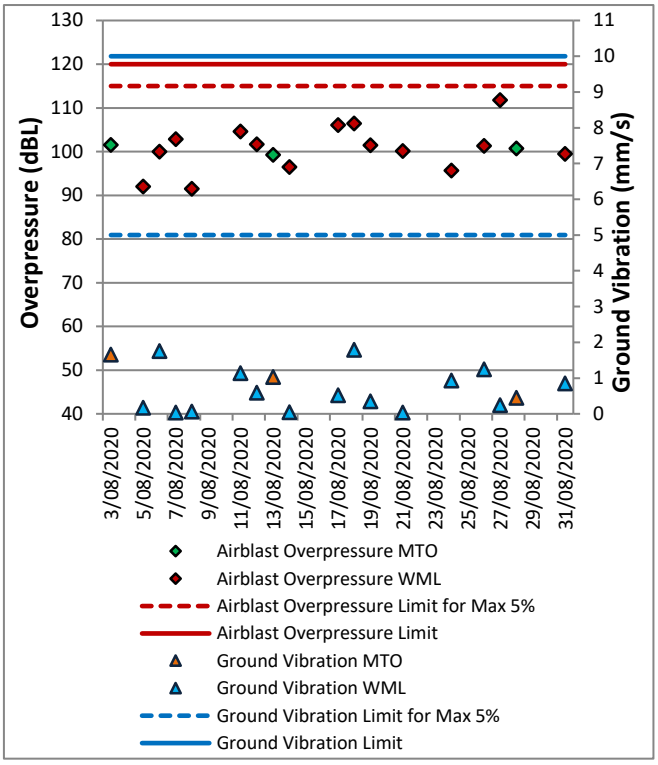


Figure 10: Bulga Village Blast Monitoring Results – August 2020

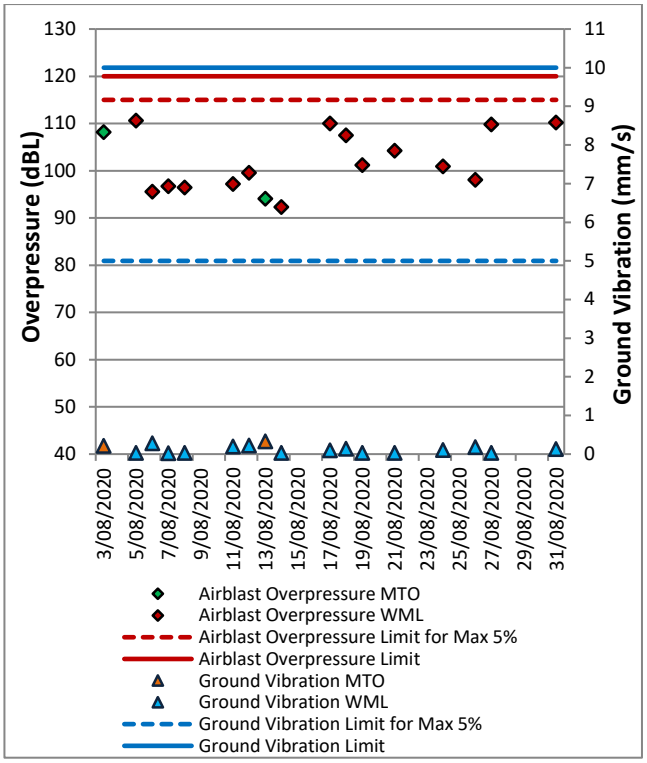


Figure 11: MTIE Blast Monitoring Results – August 2020

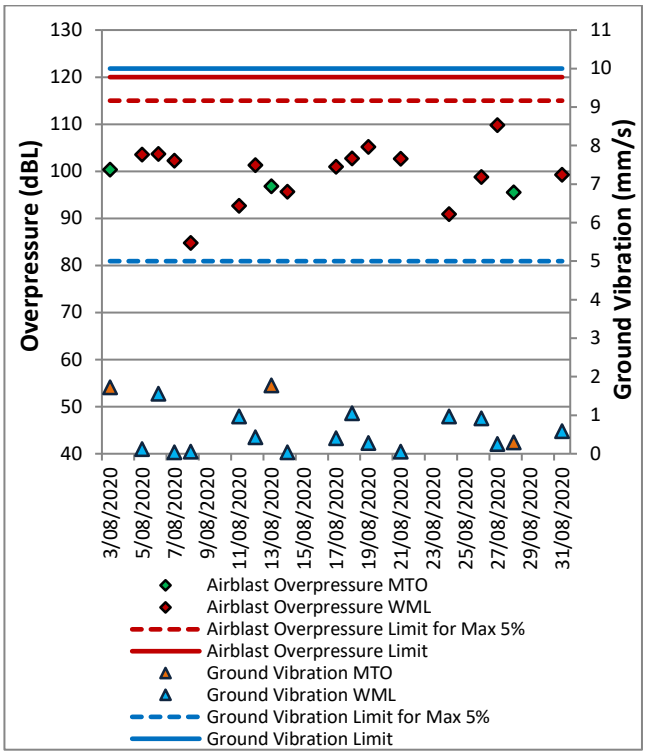


Figure 12: Wollemi Peak Road Blast Monitoring Results – August 2020

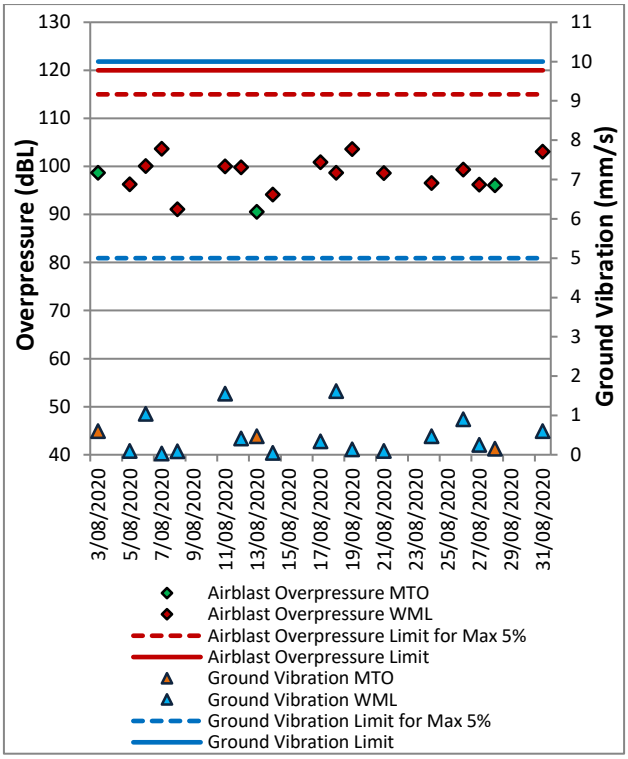


Figure 13: Wambo Road Blast Monitoring Results – August 2020

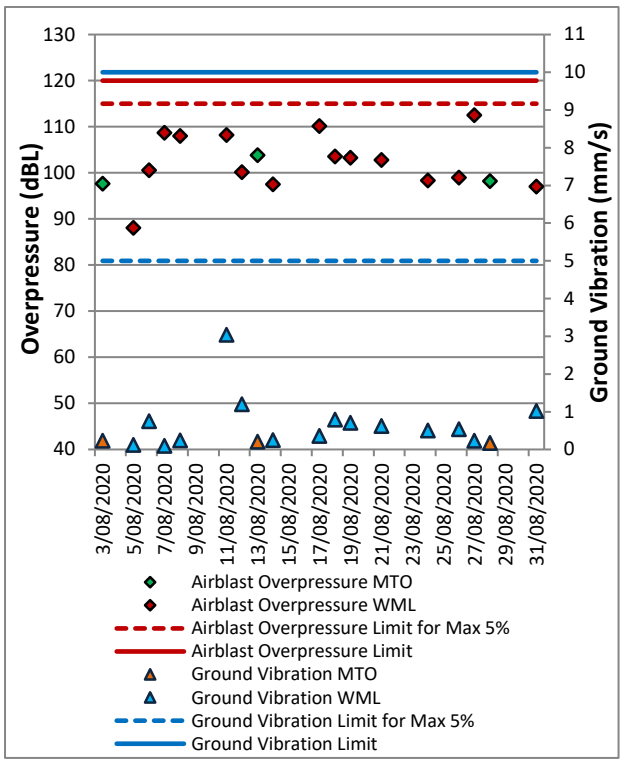


Figure 14: Warkworth Blast Monitoring Results – August 2020

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 24 August 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 –August 2020

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	24/08/2020 23:09	1.5	E	37	Yes	IA	Nil
Bulga Village	24/08/2020 23:13	1.5	E	38	Yes	<20	Nil
Gouldsville	24/08/2020 23:31	1.7	E	38	Yes	35	Nil
Inlet Rd	24/08/2020 21:31	1.7	E	37	Yes	IA	Nil
Inlet Rd West	24/08/2020 21:26	0.9	F	35	Yes	IA	Nil
Long Point	24/08/2020 21:00	0.9	F	35	Yes	25	Nil
South Bulga	24/08/2020 23:48	1.7	E	35	Yes	IA	Nil
Wambo Road	24/08/2020 21:51	2.3	D	38	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 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.

Table 4: $L_{A1,\ 1\ minute}$ Warkworth - Impact Assessment Criteria – August 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	24/08/2020 23:09	1.5	E	47	Yes	IA	Nil
Bulga Village	24/08/2020 23:13	1.5	E	48	Yes	40	Nil
Gouldsville	24/08/2020 23:31	1.7	E	48	Yes	41	Nil
Inlet Rd	24/08/2020 21:31	1.7	E	47	Yes	IA	Nil
Inlet Rd West	24/08/2020 21:26	0.9	F	45	Yes	IA	Nil
Long Point	24/08/2020 21:00	0.9	F	45	Yes	31	Nil
South Bulga	24/08/2020 23:48	1.7	E	45	Yes	IA	Nil
Wambo Road	24/08/2020 21:51	2.3	D	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 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 – August 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	24/08/2020 23:09	1.5	E	37	Yes	IA	Nil
Bulga Village	24/08/2020 23:13	1.5	E	38	Yes	IA	Nil
Gouldsville	24/08/2020 23:31	1.7	E	35	Yes	IA	Nil
Inlet Rd	24/08/2020 21:31	1.7	E	37	Yes	IA	Nil
Inlet Rd West	24/08/2020 21:26	0.9	F	35	Yes	IA	Nil
Long Point	24/08/2020 21:00	0.9	F	35	Yes	IA	Nil
South Bulga	24/08/2020 23:48	1.7	E	36	Yes	IA	Nil
Wambo Road	24/08/2020 21:51	2.3	D	38	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.

Table 6: $L_{A1, 1Minute}$ Mount Thorley - Impact Assessment Criteria – August 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	24/08/2020 23:09	1.5	E	47	Yes	IA	Nil
Bulga Village	24/08/2020 23:13	1.5	E	48	Yes	IA	Nil
Gouldsville	24/08/2020 23:31	1.7	E	45	Yes	IA	Nil
Inlet Rd	24/08/2020 21:31	1.7	E	47	Yes	IA	Nil
Inlet Rd West	24/08/2020 21:26	0.9	F	45	Yes	IA	Nil
Long Point	24/08/2020 21:00	0.9	F	45	Yes	IA	Nil
South Bulga	24/08/2020 23:48	1.7	E	46	Yes	IA	Nil
Wambo Road	24/08/2020 21:51	2.3	D	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;
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.

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 **Table 7**and the MTO assessment for low frequency noise is shown in **Table 8**: Mount Thorley Operations Low Frequency Noise Assessment –August 2020.

Table 7: Warkworth Low Frequency Noise Assessment – August 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	24/08/2020 23:09	IA	Yes	No	No	NA	No	NA	Nil	NA
Bulga Village	24/08/2020 23:13	<20	Yes	No	No	NA	No	NA	Nil	NA
Gouldsville	24/08/2020 23:31	35	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd	24/08/2020 21:31	IA	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd West	24/08/2020 21:26	IA	Yes	No	No	NA	No	NA	Nil	NA
Long Point	24/08/2020 21:00	25	Yes	No	No	NA	No	NA	Nil	NA
South Bulga	24/08/2020 23:48	IA	Yes	No	No	NA	No	NA	Nil	NA
Wambo Road	24/08/2020 21:51	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.

Table 8: Mount Thorley Operations Low Frequency Noise Assessment –August 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	24/08/2020 23:09	IA	Yes	No	No	NA	No	NA	Nil	NA
Bulga Village	24/08/2020 23:13	IA	Yes	No	No	NA	No	NA	Nil	NA
Gouldsville	24/08/2020 23:31	IA	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd	24/08/2020 21:31	IA	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd West	24/08/2020 21:26	IA	Yes	No	No	NA	No	NA	Nil	NA
Long Point	24/08/2020 21:00	IA	Yes	No	No	NA	No	NA	Nil	NA
South Bulga	24/08/2020 23:48	IA	Yes	No	No	NA	No	NA	Nil	NA
Wambo Road	24/08/2020 21:51	IA	Yes	No	No	NA	No	NA	Nil	NA

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

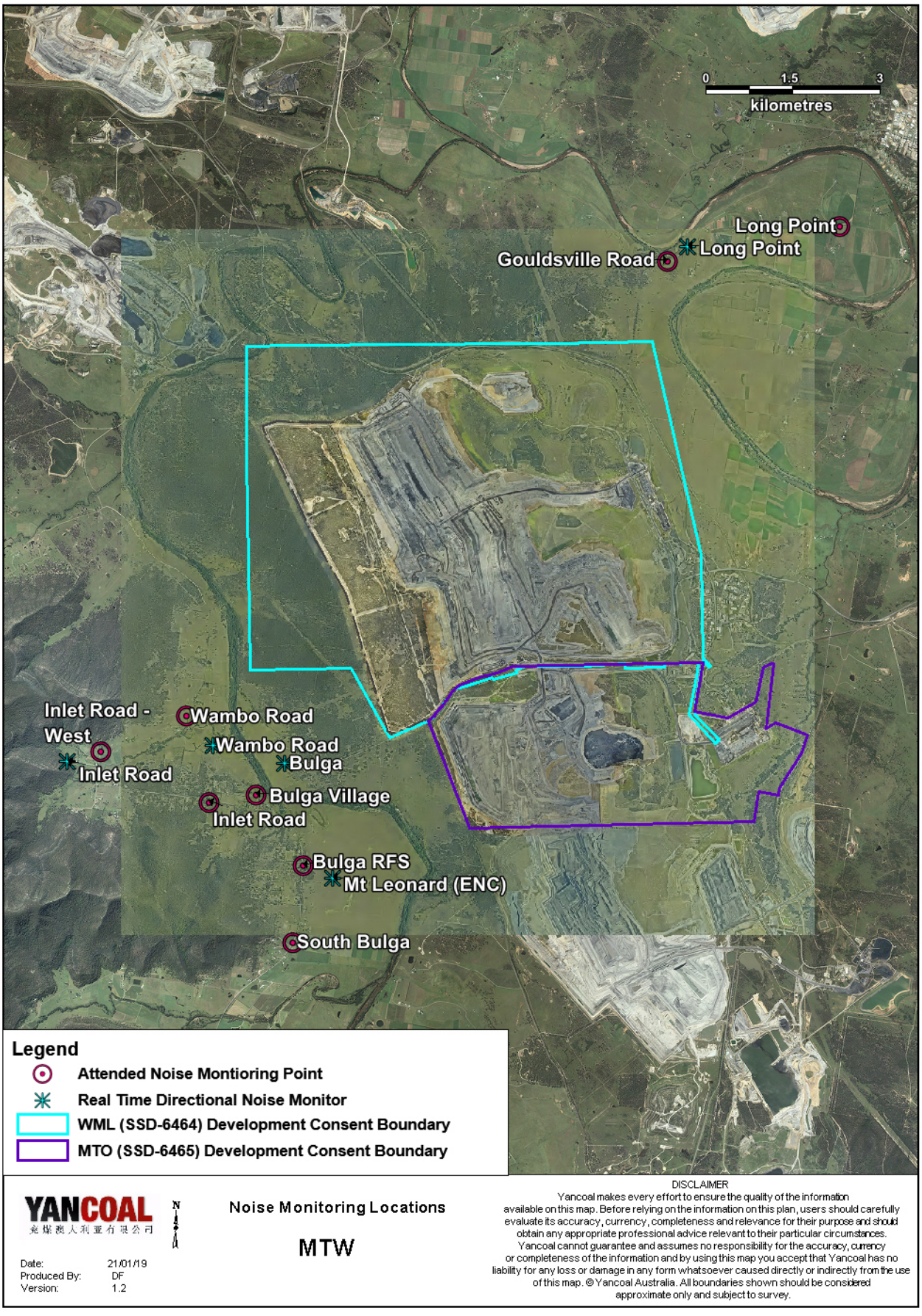


Figure 16: Noise Monitoring Location Plan

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 August are provided in **Table 9**.

Table 9: Supplementary Attended Noise Monitoring Data – August 2020

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
595	2	2	0.3

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

6.0 OPERATIONAL DOWNTIME

During August, a total of 571 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**.

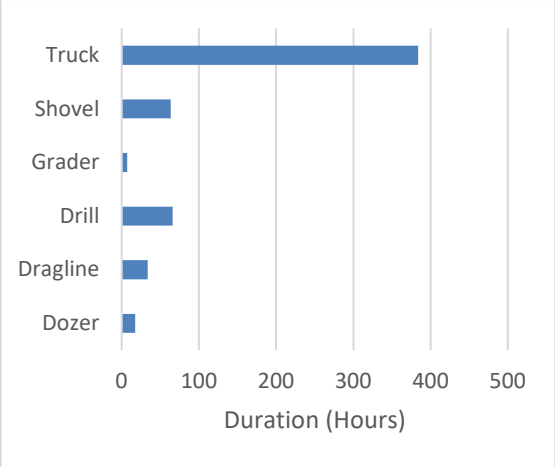


Figure 17: Operational Downtime by Equipment Type – August 2020

7.0 REHABILITATION

During August 2020, 3.1 Ha of land was released, 2.8 Ha of land was bulk shaped, 2.8 Ha of land was topsoiled and 5.9 Ha of land was composted.

The total rehab target for 2020 was reforecast in August from 64 Ha to a new target of 44 Ha. This change is reflective of current landform and pit progression.

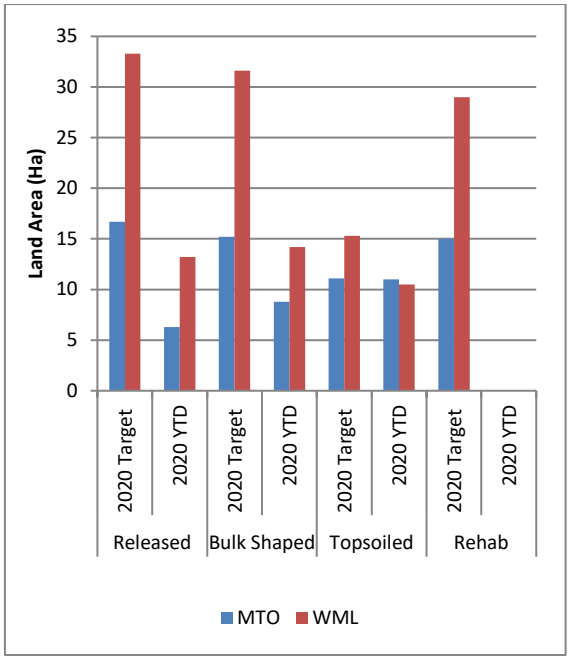


Figure 18: Rehabilitation YTD – August 2020

A piezometer borehole commenced on incorrect land parcel was identified on 3 August 2020. A location review identified the partially completed borehole was commenced on Crown Land (borehole <1m from MTW boundary), instead of MTW owned Land. Work immediately ceased. The drill rig was demobilised from the incorrect site. Landowner agreement to rehabilitate lands was secured and all relevant government agencies were notified in writing on 8 September 2020. MTW Ground Disturbance Permit processes have been updated to prevent reoccurrence.

9.0 COMPLAINTS

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

8.0 ENVIRONMENTAL INCIDENTS

There was one reportable environmental incident during the reporting period.

Table 10: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	2	4	5	0	0	11
February	6	1	4	2	1	14
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	6	4	3	6	0	19
September						
October						
November						
December						
Total	58	22	50	21	3	173

Appendix A: Meteorological Data

Table 11: Meteorological Data – Charlton Ridge Meteorological Station – August 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)
1/08/2020	18	2	98	39	256	2.0	0.2
2/08/2020	20	1	91	27	228	2.0	0.0
3/08/2020	20	4	92	29	303	2.7	0.0
4/08/2020	22	5	81	24	298	3.6	0.0
5/08/2020	15	3	70	26	292	3.7	0.0
6/08/2020	16	1	80	25	239	2.8	0.0
7/08/2020	10	6	97	59	150	3.0	6.2
8/08/2020	16	4	100	56	276	2.7	1.6
9/08/2020	14	4	96	48	302	4.6	6.4
10/08/2020	15	5	100	53	199	4.6	16.6
11/08/2020	17	8	88	44	150	2.1	0.0
12/08/2020	18	6	96	55	173	1.5	3.2
13/08/2020	23	5	98	34	249	2.5	0.6
14/08/2020	15	4	98	65	222	1.5	4.8
15/08/2020	18	5	100	48	289	3.9	0.0
16/08/2020	19	6	82	34	304	5.3	0.0
17/08/2020	18	7	83	41	316	5.4	0.0
18/08/2020	19	4	71	42	308	3.5	0.0
19/08/2020	21	4	78	20	301	5.5	0.0
20/08/2020	17	5	70	37	299	4.7	0.0
21/08/2020	18	3	76	33	303	4.7	0.0
22/08/2020	14	5	75	40	298	4.9	0.0
23/08/2020	16	3	69	31	291	4.7	0.0
24/08/2020	17	4	75	27	300	4.4	0.0
25/08/2020	15	1	81	35	253	2.1	0.0
26/08/2020	18	-1	85	27	223	1.9	0.0
27/08/2020	21	1	85	12	306	3.2	0.0
28/08/2020	20	5	69	15	216	3.2	0.0
29/08/2020	21	2	83	20	188	1.7	0.0
30/08/2020	24	1	82	28	299	3.1	0.0
31/08/2020	24	7	70	23	252	4.0	0.0

"-" Indicates that data was not available due to technical issues.