



# Monthly Environmental Monitoring Report Yancoal Mount Thorley Warkworth August 2019

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# **Revision History**

Version No.	Version Details	Document Status	Date
1.0	Environmental Advisor	Final	30/09/2019

#### **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 2019.

# 2.0 AIR QUALITY

#### 2.1 Meteorological Monitoring

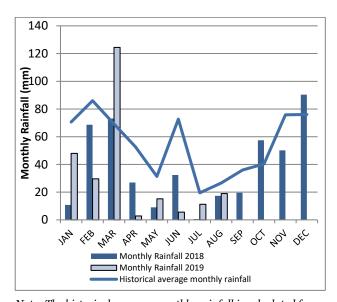
Meteorological data is collected at MTW's 'Charlton Ridge' meteorological station (refer to **Figure 3**: Air Quality Monitoring Locations).

#### 2.1.1 Rainfall

Rainfall for the reporting period is summarised in **Table 1**, the year-to-date monthly rainfall totals, 2019 monthly rainfall totals and historical average monthly rainfall trend are shown in **Figure 1**.

#### Table 1: Monthly Rainfall MTW

August 19 255.8	2019	Monthly Rainfall (mm)	Cumulative Rainfall (mm)		
	August	19	255.8		



Note: The historical average monthly rainfall is calculated from 2007 to 2018 monthly totals

Figure 1: Rainfall Trend YTD

#### 2.1.2 Wind Speed and Direction

Winds from the north-west and south were dominant throughout the reporting period as shown in **Figure 2**.

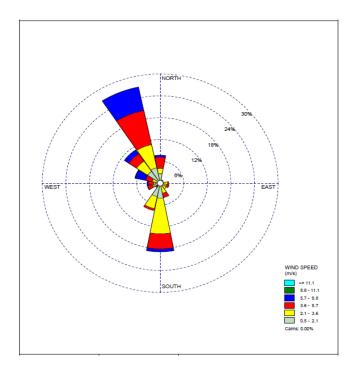


Figure 2: Charlton Ridge Wind Rose - August 2019

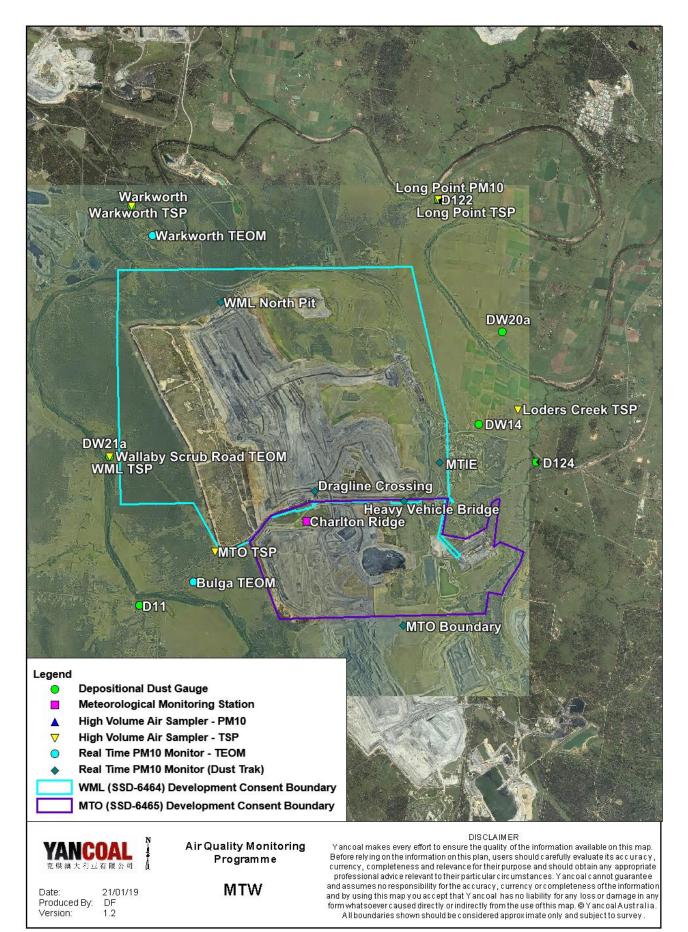


Figure 3: Air Quality Monitoring Locations

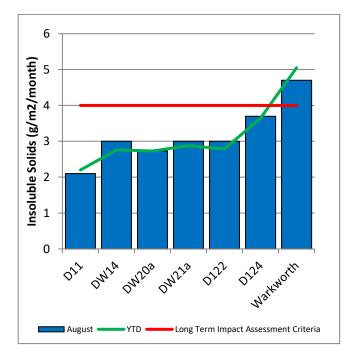
#### 2.2 Depositional Dust

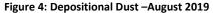
To monitor air quality, MTW operates and maintains a network of seven depositional dust gauges, situated on private and mine owned land surrounding MTW.

**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 Warkworth monitor recorded monthly results above the long-term impact assessment criteria of 4.0 g/m<sup>2</sup>per month. There is no evidence to suggest that the Warkworth 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 2019 Annual Review Report.





#### 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  $<10\mu$ m (PM<sub>10</sub>). 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<sub>10</sub> Results

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

On 24 August 2019 the Long Point HVAS  $PM_{10}$  unit recorded a result of 54  $\mu$ g/m<sup>3</sup>, which is greater than the short term (24hr)  $PM_{10}$  impact assessment criteria.

Investigation determined that the wind direction was generally not from MTW's angle of influence and that the likely MTW contribution to the results is less than 75%. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

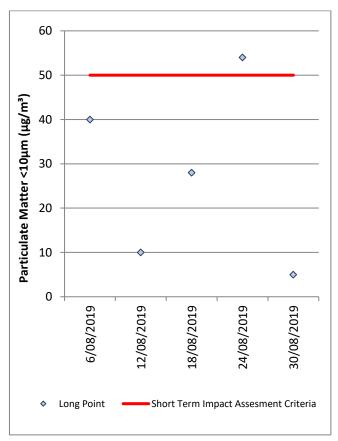
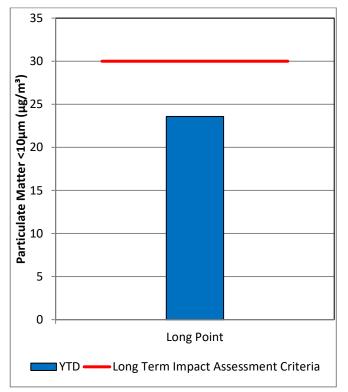


Figure 5: Individual PM10 Results -August 2019

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

An assessment of MTW's contribution to the long term assessment criteria will be reported in the 2019 Annual Review Report.





#### 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 2019 Annual Review Report.

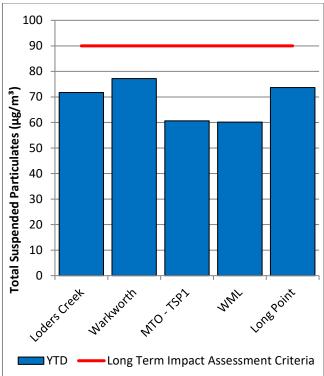


Figure 7: Annual Average Total Suspended Particulates – August 2019

#### 2.3.3 Real Time PM<sub>10</sub> Results

MTW maintains a network of real time PM<sub>10</sub> 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<sub>10</sub> monitor named the "Wallaby Scrub Road TEOM" is planned to be moved to a representative location west of Wollombi Brook and be renamed "Wambo Road TEOM". This change was submitted to DPIE on 31 July 2019 during an update to the MTW Air Quality Management Plan and was subsequently approved by DPIE on 28 August 2019. Figures in the MEMR will be updated once the monitor has moved to the new location.

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 9 August 2019, the Warkworth OEH TEOM (55.5  $\mu$ g/m<sup>3</sup>) 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 222 automated air quality related alerts, including 22 alerts for adverse meteorological conditions and 200 alerts for elevated  $PM_{10}$  levels.

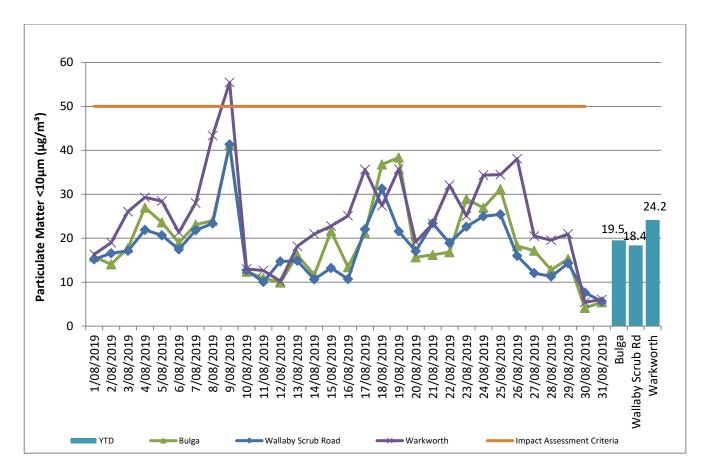


Figure 8: Real Time PM<sub>10</sub> daily 24hr average (line graphs) and YTD annual average (column graphs) –August 2019

# 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 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 2019 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 2019 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 2019, 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
120	0%
Ground Vibration (mm/s)	Comments
Ground Vibration (mm/s)	<b>Comments</b> 5% of the total number of blasts in a 12 month period

During the reporting period two blasts exceeded the 115 dB(L) threshold for airblast overpressure at the MTIE blast monitoring location. No blast exceeded the 5mm/s criteria for ground vibration.

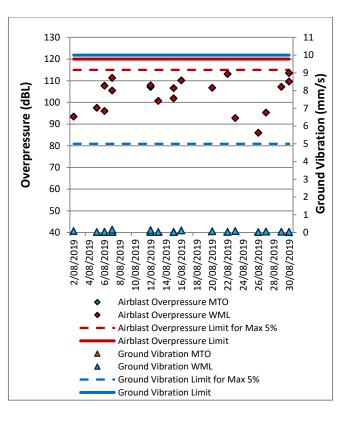


Figure 9: Abbey Green Blast Monitoring Results – August 2019

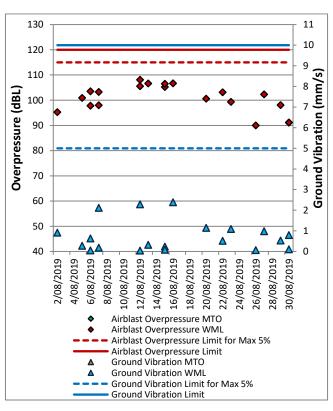


Figure 10: Bulga Village Blast Monitoring Results -August 2019

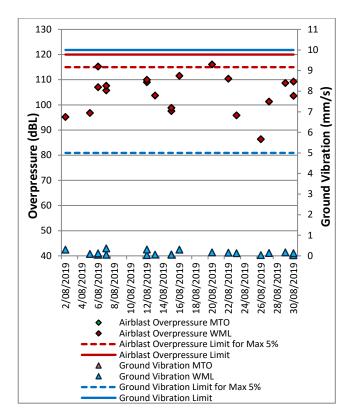


Figure 11: MTIE Blast Monitoring Results –August 2019

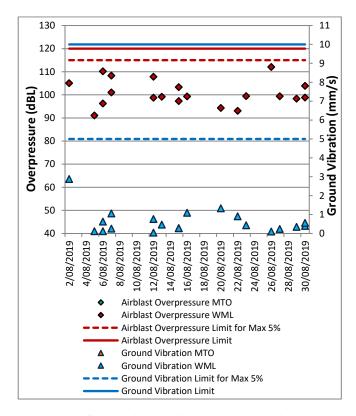


Figure 12: Wollemi Peak Road Blast Monitoring Results –August 2019

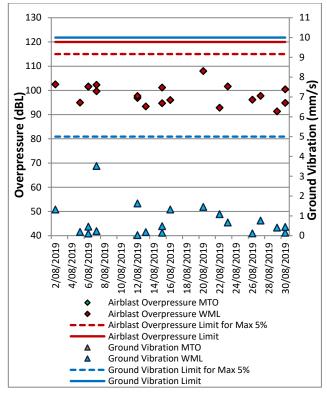


Figure 13: Wambo Road Blast Monitoring Results – August 2019

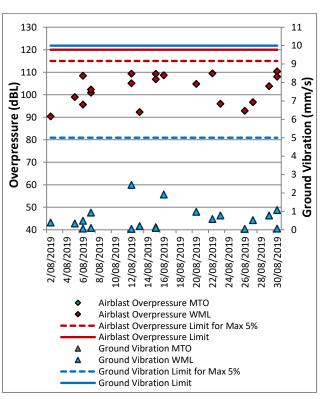


Figure 14: Warkworth Blast Monitoring Results – August 2019

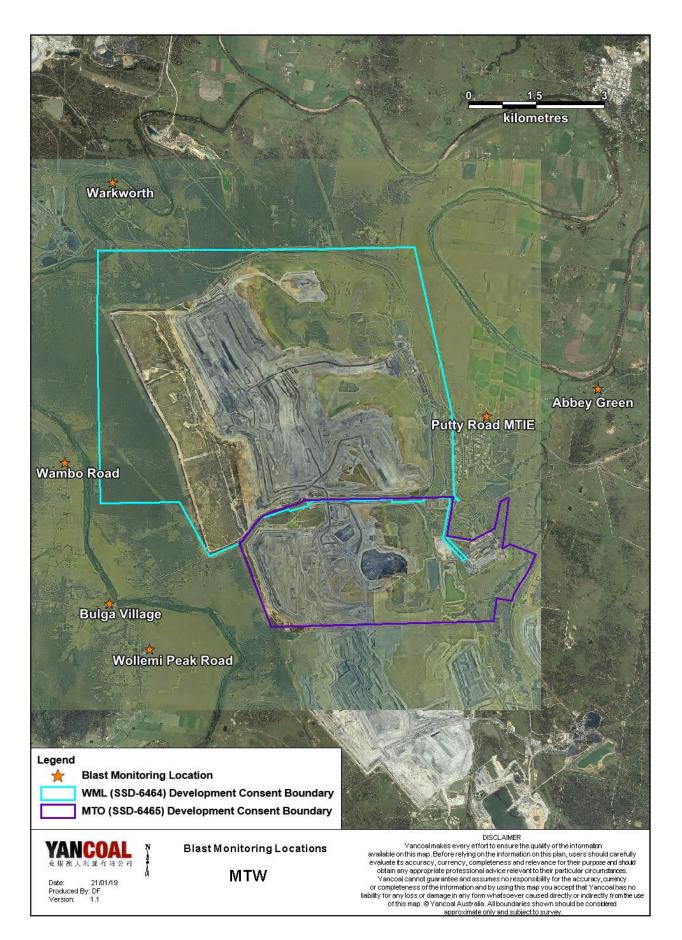


Figure 15: MTW Blast Monitoring Location Plan

#### 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**. Attended monitoring was conducted at receiver locations surrounding MTW on the night of 5 August 2019. 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**.

#### **5.1 Attended Noise Monitoring Results**

#### Table 3: LAeq, 15 minute Warkworth Impact Assessment Criteria –August 2019

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB(A)	Criterion Applies? <sup>1</sup>	WML L <sub>Aeq</sub> dB <sup>2,3</sup>	Exceedance <sup>3,4</sup>
Bulga RFS	5/08/2019 23:14	2.0	E	37	Yes	34	Nil
Bulga Village	5/08/2019 23:48	1.7	D	38	Yes	<30	Nil
Gouldsville	5/08/2019 21:25	1.6	E	38	Yes	29	Nil
Inlet Rd	5/08/2019 21:24	1.6	E	37	Yes	<30	Nil
Inlet Rd West	5/08/2019 21:00	2.2	E	35	Yes	IA	Nil
Long Point	5/08/2019 21:01	2.2	E	35	Yes	IA	Nil
South Bulga	5/08/2019 00:05	1.8	E	35	Yes	IA	Nil
Wambo Road	5/08/2019 21:49	1.7	E	38	Yes	<25	Nil

Notes:

1. Noise emission limits 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;

Estimated or measured 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: LA1, 1 minute Warkworth - Impact Assessment Criteria – August 2019

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB(A)	Criterion Applies? <sup>1</sup>	WML L <sub>A1, 1min</sub> dB <sup>2,3</sup>	Exceedance <sup>3,4</sup>
Bulga RFS	5/08/2019 23:14	2	E	47	Yes	37	Nil
Bulga Village	5/08/2019 23:48	1.7	D	48	Yes	<30	Nil
Gouldsville	5/08/2019 21:25	1.6	E	48	Yes	37	Nil
Inlet Rd	5/08/2019 21:24	1.6	E	47	Yes	33	Nil
Inlet Rd West	5/08/2019 21:00	2.2	E	45	Yes	IA	Nil
Long Point	5/08/2019 21:01	2.2	E	45	Yes	IA	Nil
South Bulga	5/08/2019 0:05	1.8	E	45	Yes	IA	Nil
Wambo Road	5/08/2019 21:49	1.7	E	48	Yes	30	Nil

Notes:

1. Noise emission limits 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. Estimated or measured 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.

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB	Criterion Applies? <sup>1</sup>	MTO L <sub>Aeq</sub> dB <sup>2,3</sup>	Exceedance <sup>3,4</sup>
Bulga RFS	5/08/2019 23:14	2	E	37	Yes	NM	Nil
Bulga Village	5/08/2019 23:48	1.7	D	38	Yes	<25	Nil
Gouldsville	5/08/2019 21:25	1.6	E	35	Yes	NM	Nil
Inlet Rd	5/08/2019 21:24	1.6	E	37	Yes	IA	Nil
Inlet Rd West	5/08/2019 21:00	2.2	E	35	Yes	<25	Nil
Long Point	5/08/2019 21:01	2.2	E	35	Yes	IA	Nil
South Bulga	5/08/2019 0:05	1.8	E	36	Yes	IA	Nil
Wambo Road	5/08/2019 21:49	1.7	E	38	Yes	IA	Nil

#### Table 5: LAeg. 15minute Mount Thorley - Impact Assessment Criteria – August 2019

1. Noise emission limits 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. NM refers to not measurable, this means some noise from the source of interest was audible at low-levels, but could not be quantified.

#### Table 6: LA1, 1Minute Mount Thorley - Impact Assessment Criteria –August 2019

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB	Criterion Applies? <sup>1</sup>	MTO L <sub>A1, 1min</sub> dB <sup>2,3</sup>	Exceedance <sup>3,4</sup>
Bulga RFS	5/08/2019 23:14	2	E	47	Yes	NM	Nil
Bulga Village	5/08/2019 23:48	1.7	D	48	Yes	<25	Nil
Gouldsville	5/08/2019 21:25	1.6	E	45	Yes	NM	Nil
Inlet Rd	5/08/2019 21:24	1.6	E	47	Yes	IA	Nil
Inlet Rd West	5/08/2019 21:00	2.2	E	45	Yes	<25	Nil
Long Point	5/08/2019 21:01	2.2	E	45	Yes	IA	Nil
South Bulga	5/08/2019 0:05	1.8	E	46	Yes	IA	Nil
Wambo Road	5/08/2019 21:49	1.7	E	48	Yes	IA	Nil

Notes

1. Noise emission limits 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. NM refers to not measurable, this means some noise from the source of interest was audible at low-levels, but could not be quantified.

#### 5.1.4 NPfl Low Frequency Assessment

modification penalty has been assessed. There were no noise measurements taken during the reporting period which required the penalty to be applied. The assessment for low frequency noise is shown in **Table 7**.

In accordance with the requirements of the EPA's Noise Policy for Industry (NPfI), the applicability of the low frequency

#### Table 7: Low Frequency Noise Modifying Factor Assessment –August 2019

Location	Date and Time	Measured Site Only LA <sub>eq</sub> dB (WML/MTO)	Site Only L <sub>Ceq</sub> dB <sup>1</sup> (WML/MTO)	Site Only LCeq – LAeq dB <sup>1,2</sup> (WML/MTO)	Result Max exceedance of ref spectrum dB (WML/MTO) <sup>1,3</sup>	Penalty dB(A) <sup>1</sup>	Exceedance
Bulga RFS	5/08/2019 23:14	34/NM	NA/NA	NA/NA	NA/NA	NA/NA	NA
Bulga Village	5/08/2019 23:48	<30/<25	NA/NA	NA/NA	NA/NA	NA/NA	NA
Gouldsville	5/08/2019 21:25	29/NM	NA/NA	NA/NA	NA/NA	NA/NA	NA
Inlet Rd	5/08/2019 21:24	<30/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Inlet Rd West	5/08/2019 21:00	IA/<25	NA/NA	NA/NA	NA/NA	NA/NA	NA
Long Point	5/08/2019 21:01	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
South Bulga	5/08/2019 0:05	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Wambo Road	5/08/2019 21:49	<25/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA

Notes:
1. Where it is not possible to determine the site-only result due to the presence of other low-frequency noise sources occurring during the measurement, or where criteria were not applicable due to meteorological conditions, this is noted as NA (not available) and no further assessment has been undertaken;
2. As per NPfl, if LCeq – LAeq ≥ 15 dB further assessment of low-frequency noise required; and
3. As per NPfl, compare measured spectrum against reference spectrum to determine if the low-frequency modifying factor is triggered and application of penalty is required.

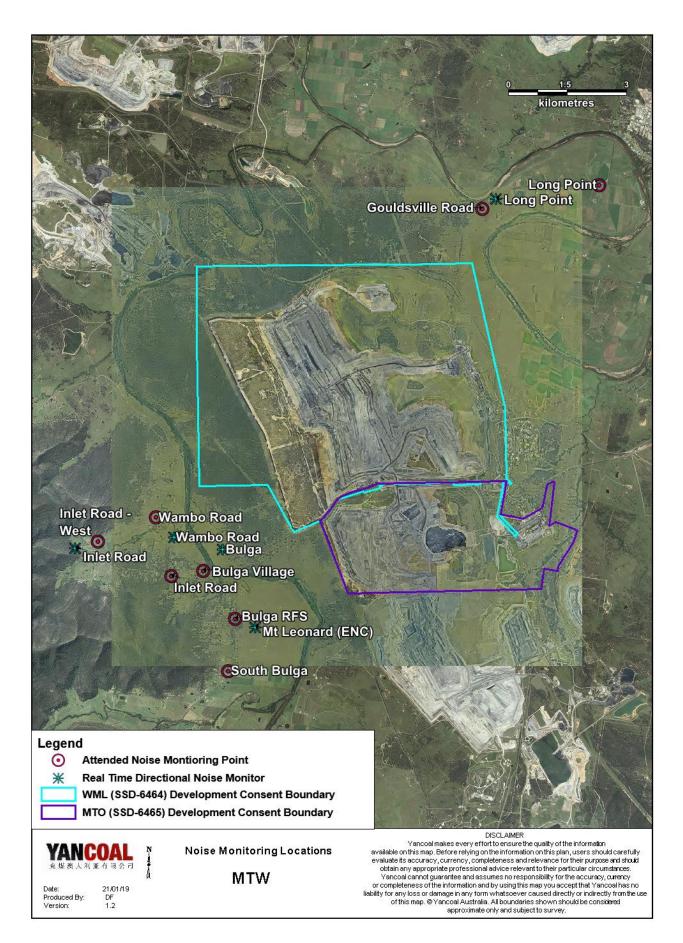


Figure 16: Noise Monitoring Location Plan

#### 5.2 Noise Management Measures

A program of targeted supplementary attended noise monitoring is in place at MTW, supported by the realtime 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 8**.

Table 8: Supplementary Attended Noise MonitoringData – August 2019

	No. of	No. of	No. of nights	%
	assessments	assessments >	where	greater
		trigger	assessments	than
			> trigger	trigger
_	730	9	5	1.2

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 1603 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**.

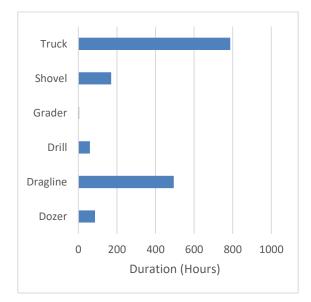
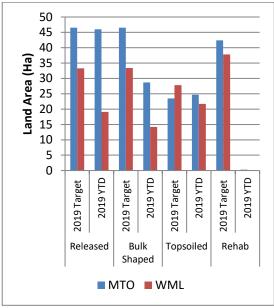


Figure 17: Operational Downtime by Equipment Type – August 2019

# **7.0 REHABILITATION**

During August 2019, 5.7 Ha of land was bulk shaped, 4.4 Ha of land was top soiled, 11.2 Ha of land was composted and 0.1 Ha of land was rehabilitated.



#### Figure 18: Rehabilitation YTD – August 2019

# Table 9: Complaints Summary YTD

# **8.0 ENVIRONMENTAL INCIDENTS**

There was one reportable environmental incident for the month, which occurred on 7 August 2019. The incident related to a blast event at Warkworth Mining Limited (WML) in which the resulting blast dust plume travelled over land associated with Warkworth Coal Mine, Putty Road and the Mount Thorley Industrial Estate before dissipating over farmland east of the mine. The EPA requested an R3 report in relation to the incident on 13 August 2019. WML submitted the requested R3 report to the EPA on 2 September 2019.

## **9.0 COMPLAINTS**

During the month of August 45 complaints were received. Details of these complaints are shown in **Table 9** below.

	Noise	Dust	Blast	Lighting	Other	Total
January	7	6	9	3	0	25
February	14	16	11	2	0	43
March	20	8	4	2	0	34
April	15	5	3	6	0	29
Мау	15	8	6	3	0	32
June	13	17	5	0	1	36
July	10	16	3	0	3	32
August	1	32	8	4	0	45
September						
October						
November						
December						
Total	95	108	49	20	4	276

Appendix A: Meteorological Data

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)
1/08/2019	20	7	89	35	159	1.8	0.0
2/08/2019	19	5	92	45	170	1.9	0.0
3/08/2019	22	3	96	18	259	3.0	0.0
4/08/2019	20	4	83	18	192	1.7	0.0
5/08/2019	21	6	92	15	248	2.3	0.0
6/08/2019	22	1	63	8	286	2.9	0.0
7/08/2019	23	4	42	10	291	2.9	0.0
8/08/2019	21	5	61	15	273	4.0	0.0
9/08/2019	18	8	59	30	299	6.4	0.0
10/08/2019	14	4	81	28	307	5.7	0.6
11/08/2019	13	3	78	38	302	6.1	0.0
12/08/2019	17	2	76	34	288	4.2	0.0
13/08/2019	19	1	78	13	250	2.6	0.0
14/08/2019	20	1	66	8	237	2.4	0.0
15/08/2019	21	0	51	12	281	2.6	0.0
16/08/2019	24	3	53	6	295	3.2	0.0
17/08/2019	22	6	73	16	187	2.5	0.0
18/08/2019	23	4	89	24	155	1.7	0.0
19/08/2019	19	7	47	15	264	4.1	0.0
20/08/2019	21	3	55	12	298	4.5	0.0
21/08/2019	21	7	59	21	305	5.6	0.0
22/08/2019	20	7	57	21	239	4.1	0.0
23/08/2019	19	4	61	23	163	1.8	0.0
24/08/2019	24	2	69	16	279	3.1	0.0
25/08/2019	25	9	74	7	226	3.1	0.0
26/08/2019	20	10	78	46	173	3.3	0.0
27/08/2019	21	10	83	33	163	2.7	0.0
28/08/2019	23	9	78	18	209	2.5	0.0
29/08/2019	18	7	78	36	190	3.6	0.0
30/08/2019	14	7	95	68	185	3.9	16.4
31/08/2019	-	-	95	-	179	3.6	2.0

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Indicates that data was not available due to technical issues.