Monthly Environmental Monitoring Report

Yancoal Mount Thorley Warkworth

April 2019

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Revision History

Version No.	Version Details	Document Status	Date
1.0	**Environmental Advisor**	**Final**	**24/06/2019**

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 April to 30 April 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 trend and historical trend are shown in **Figure 1**.

Table 1: Monthly Rainfall MTW

2019	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
April	2.8	204.8

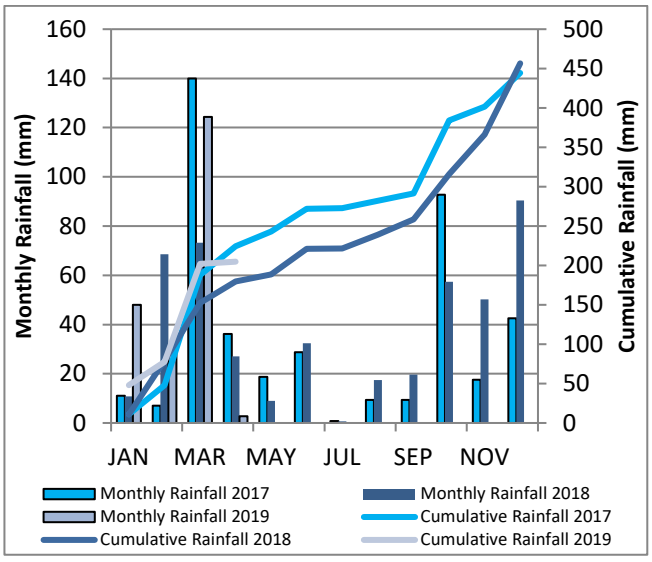

Figure 1: Rainfall Trend YTD

2.1.2 Wind Speed and Direction

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

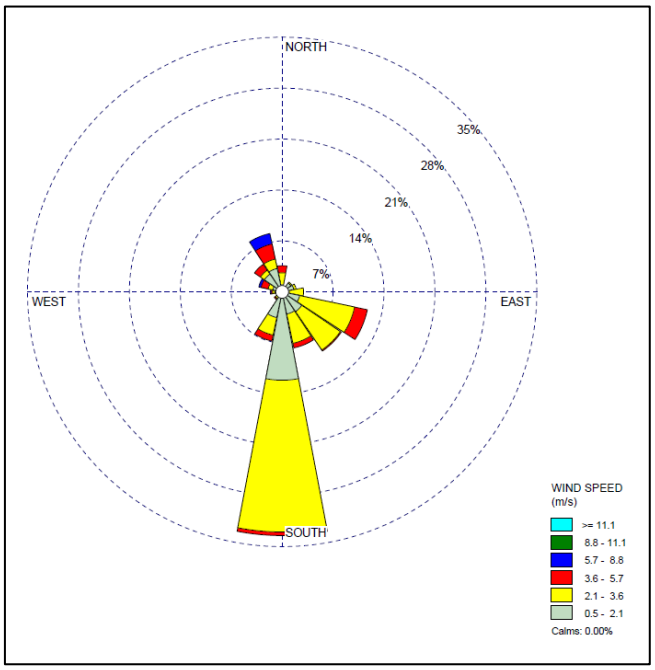

Figure 2: Charlton Ridge Wind Rose – April 2019

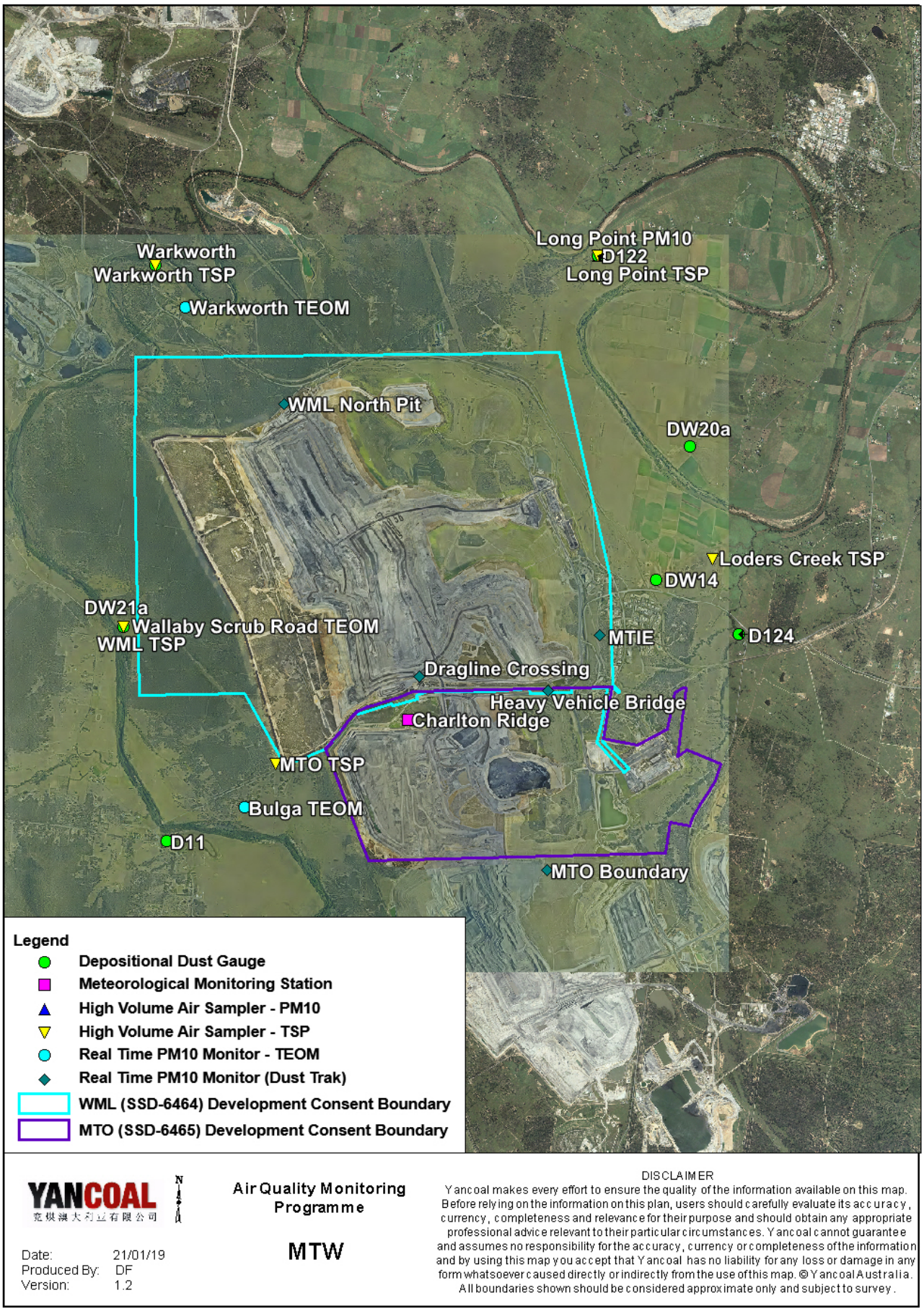

Figure 3: Air Quality Monitoring Locations

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 D124 monitor recorded a monthly result above the long-term impact assessment criteria of 4.0 g/m^2 per month. Field notes associated with D124 confirm the presence of insects and bird droppings. As such the result is considered contaminated and will be excluded from calculation of the annual average.

No result is available for the Warkworth monitor, for the reporting period, because the sample jar was broken.

An annual assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2019 Annual Review Report.

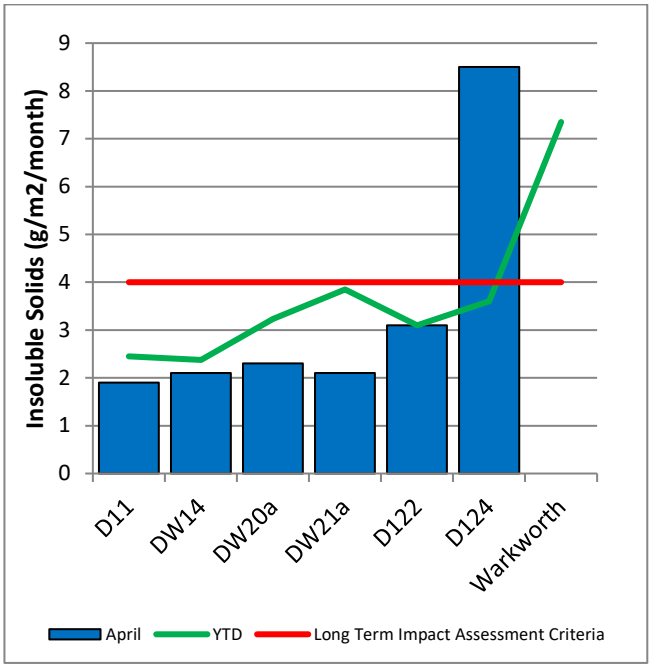

Figure 4: Depositional Dust – April 2019

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.

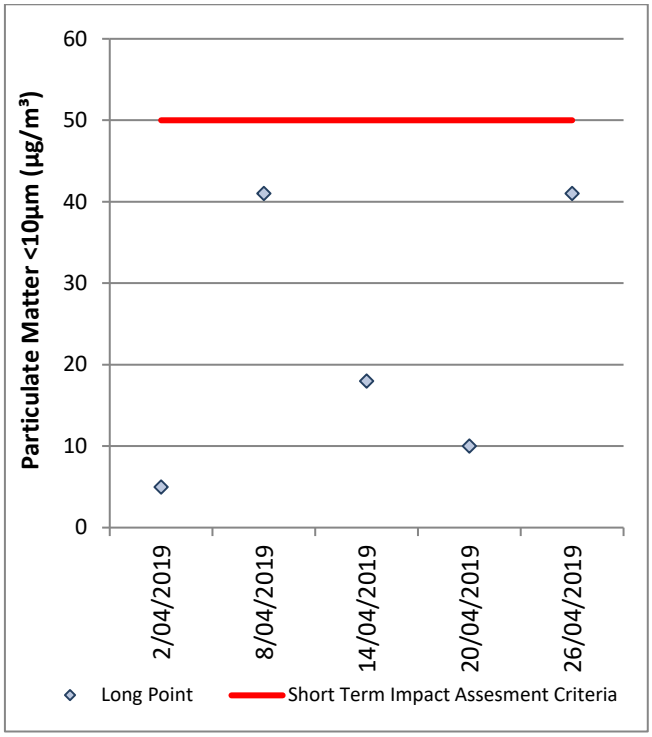

Figure 5: Individual PM10 Results – April 2019

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.

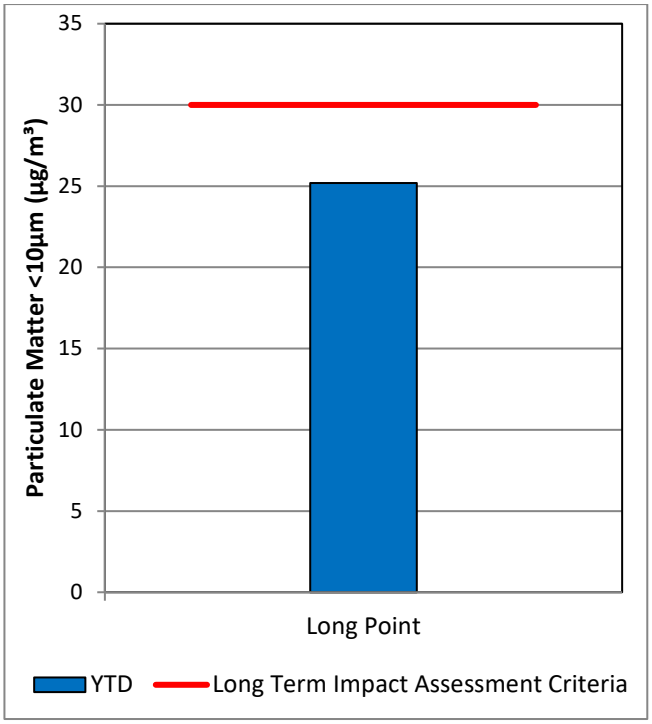

Figure 6: Annual Average PM_{10} – April 2019

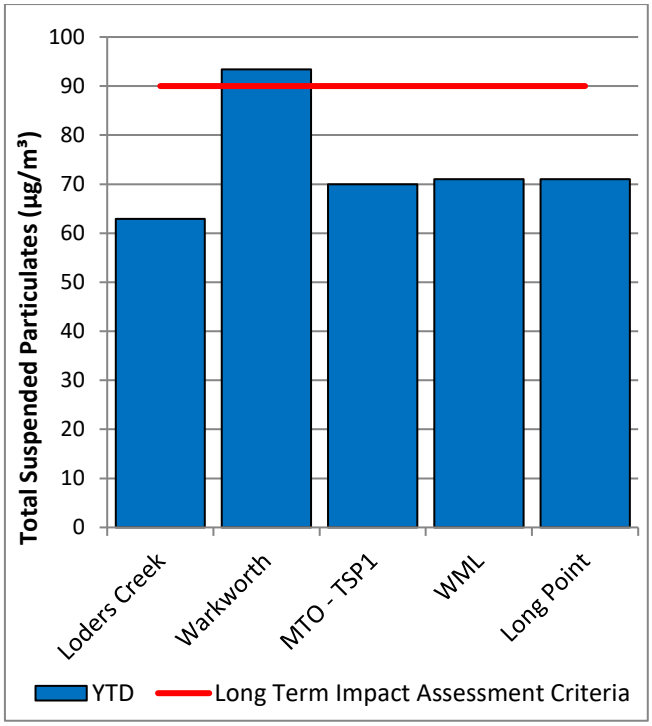

Figure 7: Annual Average Total Suspended Particulates – April 2019

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 2019 Annual Review Report.

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.

2.3.4 Real Time Alarms for Air Quality

During April, the real time monitoring system generated 95 automated air quality related alerts, including 2 alerts for adverse meteorological conditions and 93 alerts for elevated PM_{10} levels.

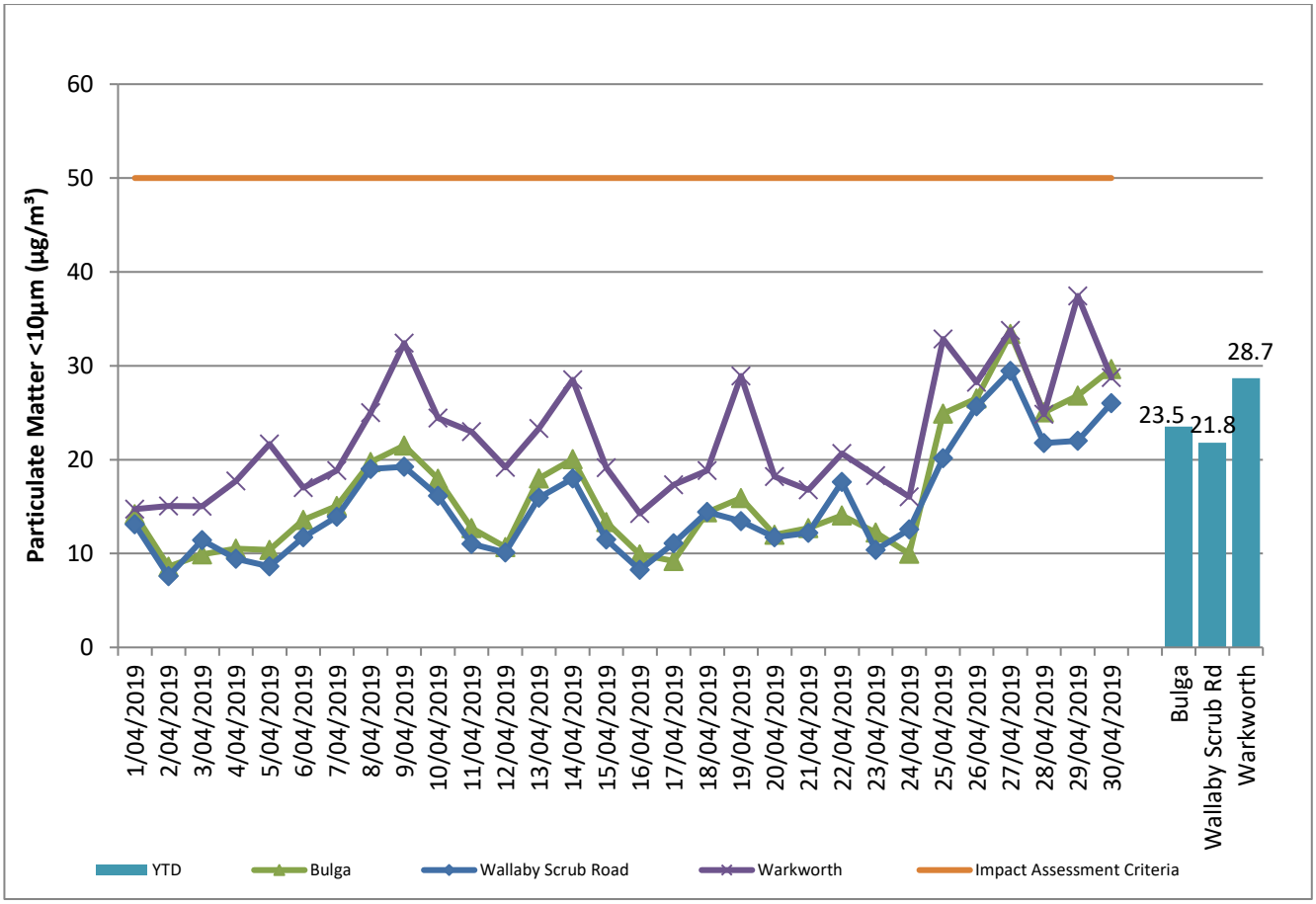

Figure 8: Real Time PM_{10} daily 24hr average (line graphs) and YTD annual average (column graphs) – April 2019

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 June 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 June 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 April 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**
5	5% of the total number of blasts in a 12 month period
10	0%

During the reporting period one blast exceeded the 120 dB(L) threshold for airblast overpressure at the Warkworth monitoring location and was reported to the Department of Planning and Environment and the Environment Protection Authority on 5 April 2019, and investigated (refer to section 8.0 below). One blast also exceeded the 115dB(L) threshold for airblast overpressure at the MTIE monitoring location. No blast exceeded the 5mm/s criteria for ground vibration.

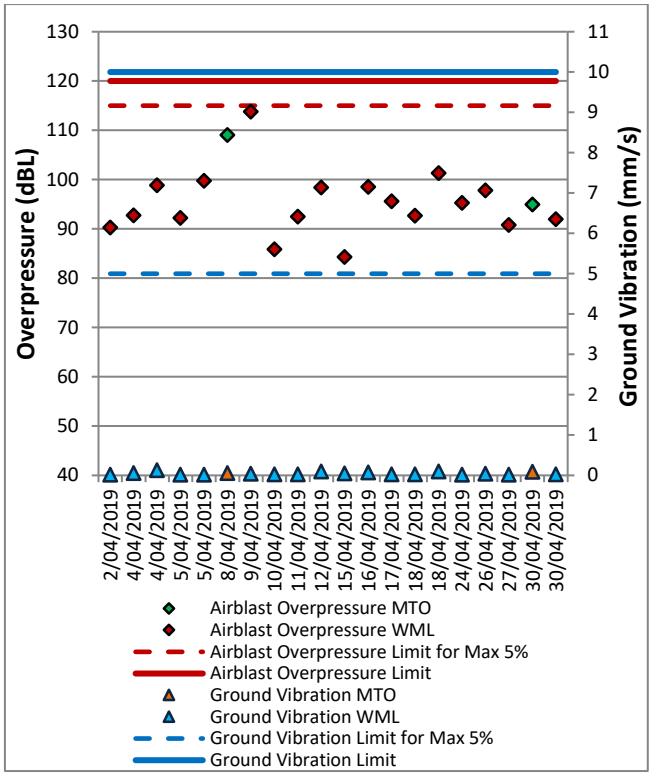

Figure 9: Abbey Green Blast Monitoring Results – April 2019

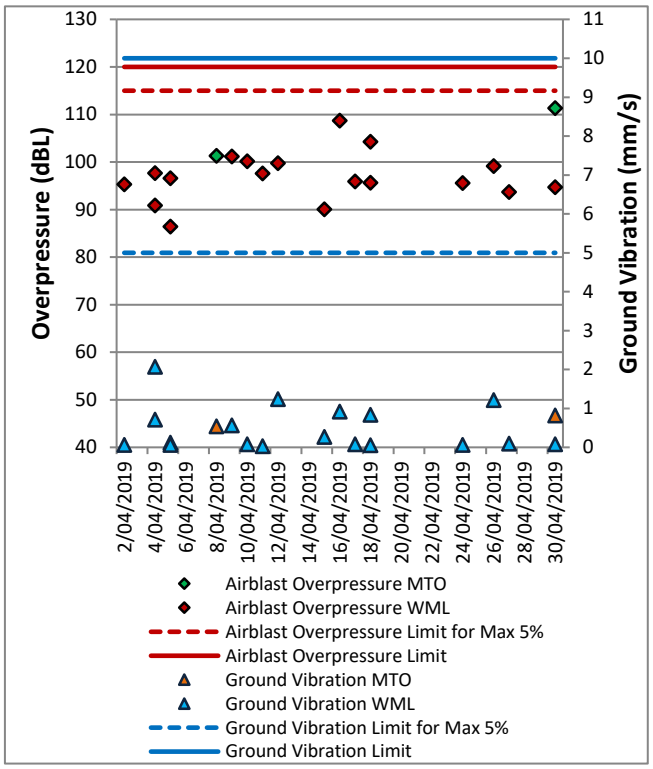

Figure 10: Bulga Village Blast Monitoring Results – April 2019

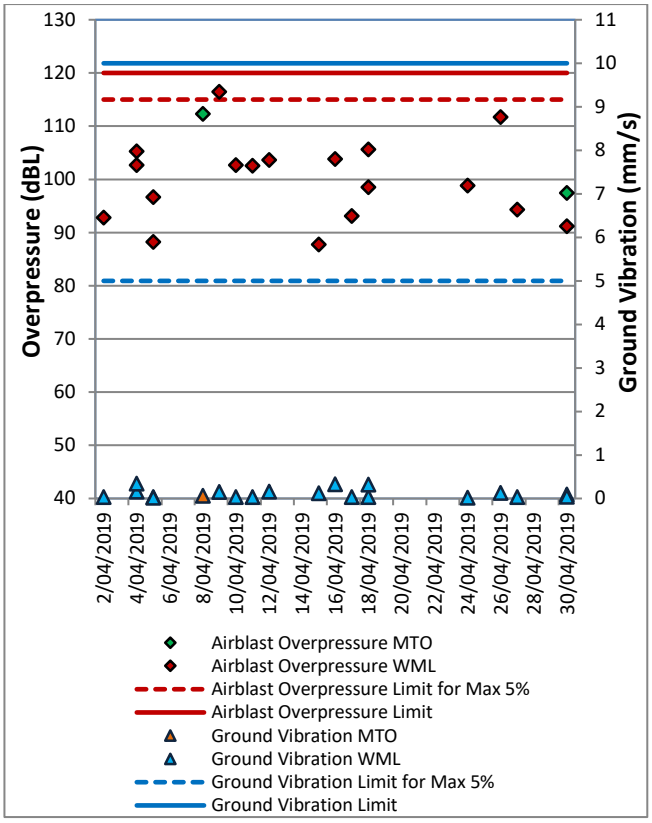

Figure 11: MTIE Blast Monitoring Results – April 2019

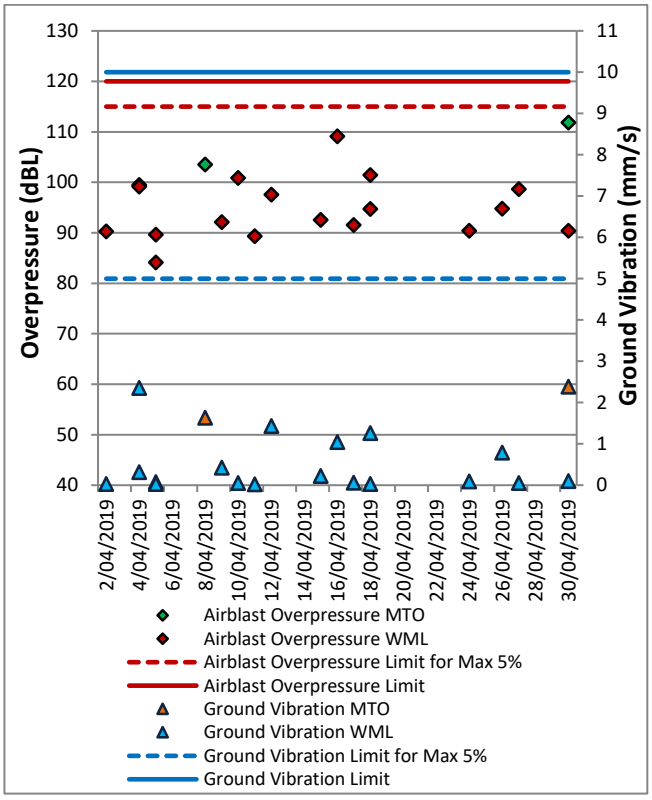

Figure 12: Wollemi Peak Road Blast Monitoring Results – April 2019

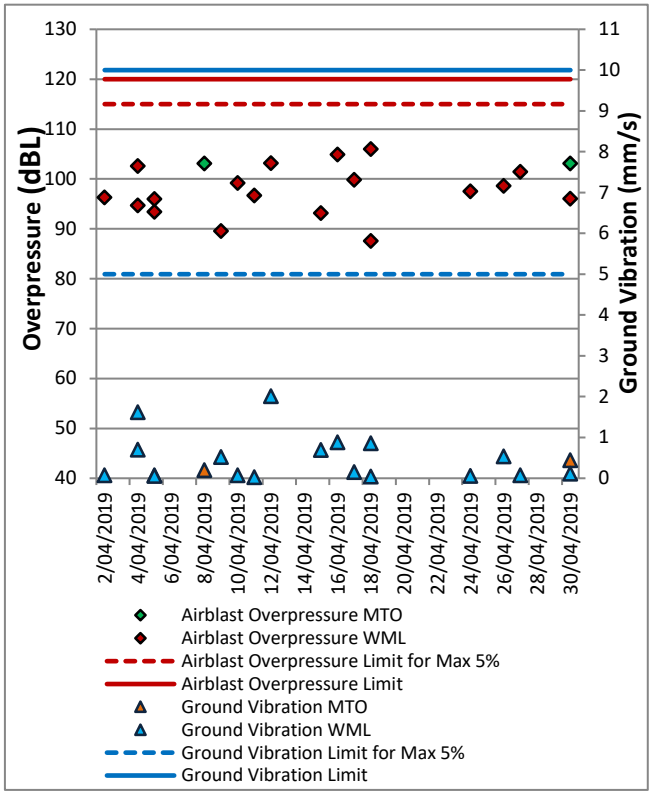

Figure 13: Wambo Road Blast Monitoring Results – April 2019

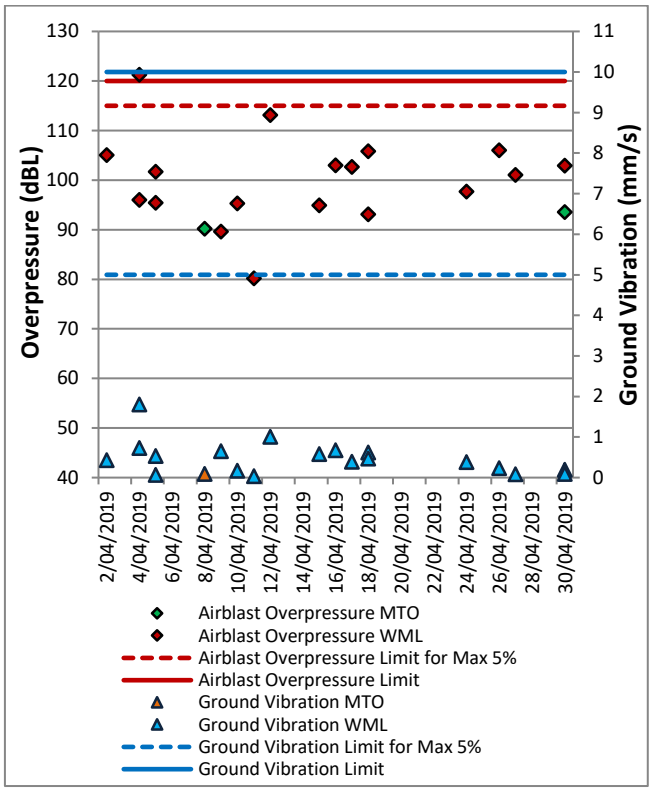

Figure 14: Warkworth Blast Monitoring Results – April 2019

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 4 April 2019. All measurements complied with the relevant criteria. Results are detailed in **Table 3 to Table 6.**

5.1 Attended Noise Monitoring Results

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 – April 2019

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	4/04/2019 21:06	2.3	E	37	Yes	IA	Nil
Bulga Village	4/04/2018 23:38	3.0	D	38	Yes	IA	Nil
Gouldsville	4/04/2019 21:23	3.5	D	38	No	<30	NA
Inlet Rd	4/04/2018 22:02	3.3	D	37	No	IA	NA
Inlet Rd West	4/04/2018 21:38	3.0	D	35	Yes	IA	Nil
Long Point	4/04/2019 21:00	2.3	E	35	Yes	IA	Nil
South Bulga	4/04/2019 21:29	3.5	D	35	No	IA	NA
Wambo Road	4/04/2018 23:16	3.4	D	38	No	IA	NA

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 LAeq,15minute 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.

Table 4: $L_{A1,\ 1\ minute}$ Warkworth - Impact Assessment Criteria – April 2019

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	4/04/2019 21:06	2.3	E	47	Yes	IA	Nil
Bulga Village	4/04/2018 23:38	3.0	D	48	Yes	IA	Nil
Gouldsville	4/04/2019 21:23	3.5	D	48	No	38	NA
Inlet Rd	4/04/2018 22:02	3.3	D	47	No	IA	NA
Inlet Rd West	4/04/2018 21:38	3.0	D	45	Yes	IA	Nil
Long Point	4/04/2019 21:00	2.3	E	45	Yes	IA	Nil
South Bulga	4/04/2019 21:29	3.5	D	45	No	IA	NA
Wambo Road	4/04/2018 23:16	3.4	D	48	No	IA	NA

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**.

Table 5: $L_{Aeq,\ 15minute}$ Mount Thorley - Impact Assessment Criteria – April 2019

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	4/04/2019 21:06	2.3	E	37	Yes	IA	Nil
Bulga Village	4/04/2018 23:38	3	D	38	Yes	<30	Nil
Gouldsville	4/04/2019 21:23	3.5	D	35	No	IA	NA
Inlet Rd	4/04/2018 22:02	3.3	D	37	No	IA	NA
Inlet Rd West	4/04/2018 21:38	3	D	35	Yes	IA	Nil
Long Point	4/04/2019 21:00	2.3	E	35	Yes	IA	Nil
South Bulga	4/04/2019 21:29	3.5	D	36	No	IA	NA
Wambo Road	4/04/2018 23:16	3.4	D	38	No	33	NA

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 LAeq,15minute attributed to MTO;
3. Bold results in red are possible exceedances of relevant criteria; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in project approval and so criterion is not applicable.

Table 6: $L_{A1,\ 1Minute}$ Mount Thorley - Impact Assessment Criteria – April 2019

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	4/04/2019 21:06	2.3	E	47	Yes	IA	Nil
Bulga Village	4/04/2018 23:38	3	D	48	Yes	<30	Nil
Gouldsville	4/04/2019 21:23	3.5	D	45	No	IA	NA
Inlet Rd	4/04/2018 22:02	3.3	D	47	No	IA	NA
Inlet Rd West	4/04/2018 21:38	3	D	45	Yes	IA	Nil
Long Point	4/04/2019 21:00	2.3	E	45	Yes	IA	Nil
South Bulga	4/04/2019 21:29	3.5	D	46	No	IA	NA
Wambo Road	4/04/2018 23:16	3.4	D	48	No	35	NA

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 MTO;
3. Bold results in red are possible exceedances of relevant criteria; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in project approval and so criterion is 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 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**.

Table 7: Low Frequency Noise Modifying Factor Assessment – April 2019

Location	Date and Time	Measured Site Only LA_{eq} dB (WML/MTO)	Site Only L_{Ceq} dB[1] (WML/MTO)	Site Only LCeq – LAeq dB[1,2] (WML/MTO)	Result Max exceedance of ref spectrum dB (WML/MTO) [1,3]	Penalty dB(A)[1]	Exceedance
Bulga RFS	4/04/2019 21:06	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Bulga Village	4/04/2018 23:38	IA/<30	NA/NA	NA/NA	NA/NA	NA/NA	NA
Gouldsville	4/04/2019 21:23	<30/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Inlet Rd	4/04/2018 22:02	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Inlet Rd West	4/04/2018 21:38	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Long Point	4/04/2019 21:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
South Bulga	4/04/2019 21:29	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Wambo Road	4/04/2018 23:16	IA/33	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 NPfI, if LCeq – LAeq ≥ 15 dB further assessment of low-frequency noise required; and

3. As per NPfI, compare measured spectrum against reference spectrum to determine if the low-frequency modifying factor is triggered and application of penalty is required.

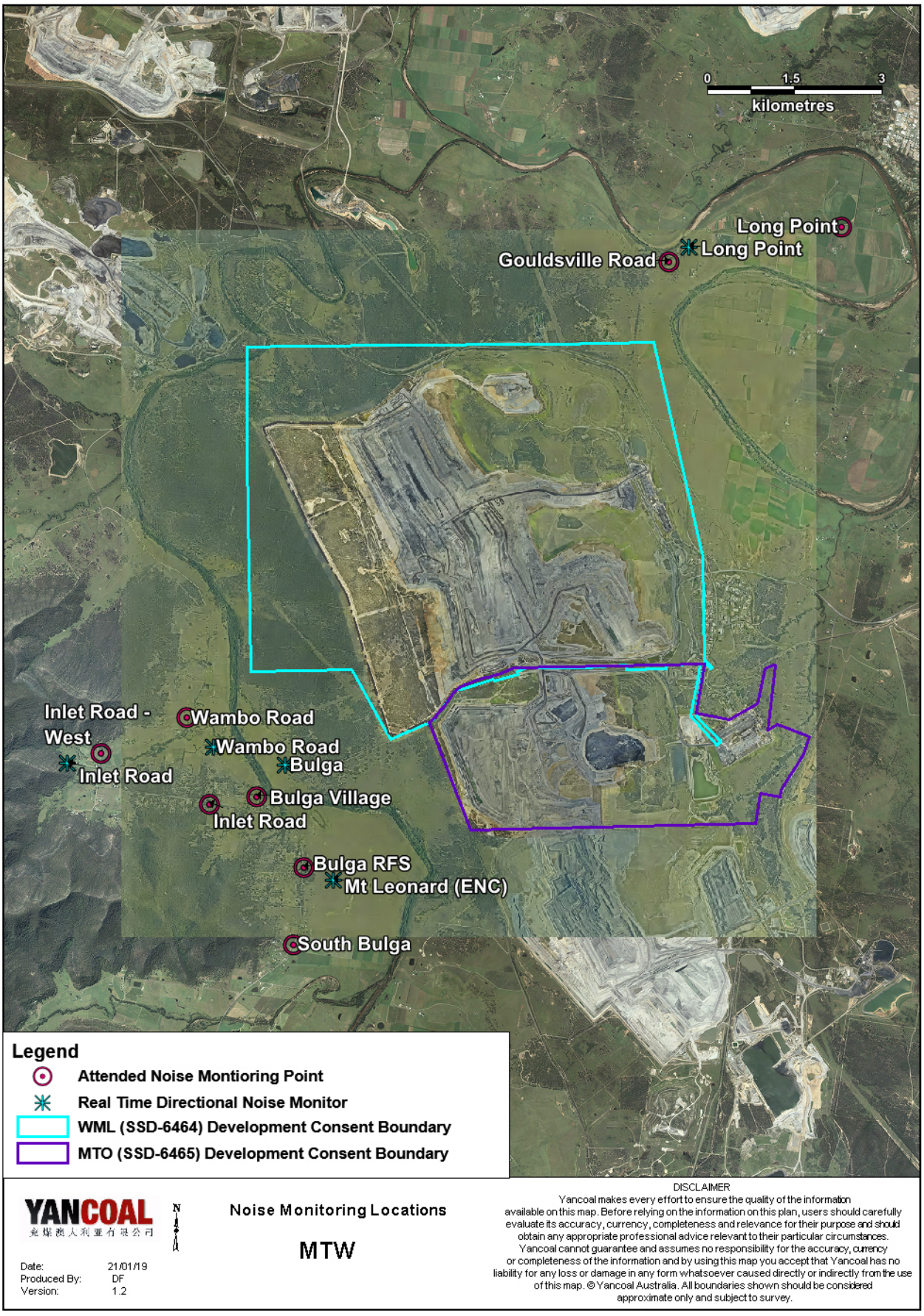

Figure 16: Noise Monitoring Location Plan

5.2 Noise Management Measures

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

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Table 8: Supplementary Attended Noise Monitoring Data – April 2019

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
400	1	1	0.25

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

6.0 OPERATIONAL DOWNTIME

During April, a total of 276 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**.

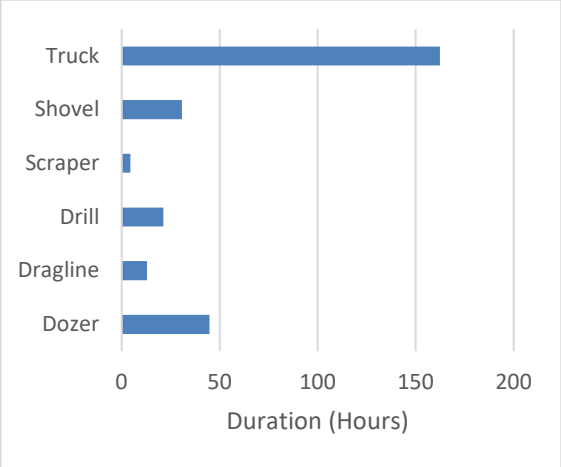

Figure 17: Operational Downtime by Equipment Type – April 2019

7.0 REHABILITATION

During April 2019, 0.7 Ha of land was released, 1.0 Ha of land was bulk shaped, 10.5 Ha of land was topsoiled and 4.7 Ha of land was composted.

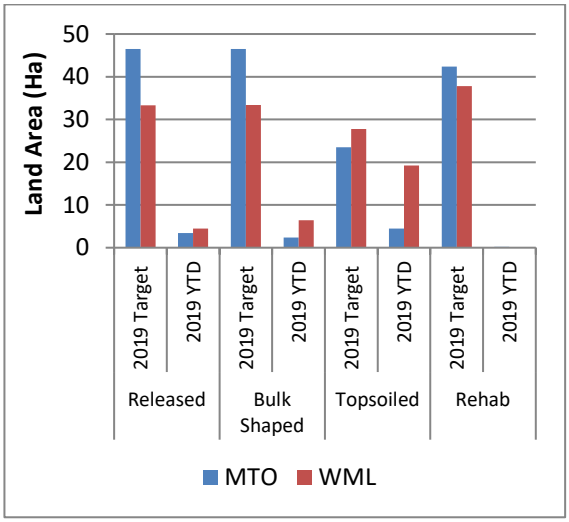

Figure 18: Rehabilitation YTD – April 2019

8.0 ENVIRONMENTAL INCIDENTS

There was one environmental incident recorded during the reporting period.

On 4 April 2019, one blast exceeded the 120dB(L) threshold for airblast overpressure at the Warkworth blast monitor. The exceedance was reported to the Department of Planning and Environment (DP&E) and to the Environment Protection Authority (EPA) on 5 April 2019. A written report was also provided to DP&E and to the EPA for this blast which noted that the reason that the airblast overpressure level that resulted at the Warkworth monitoring station was greater than predicted was due to the fact that the actual meteorological data, and hence the actual effects of meteorology, were different from that predicted. No blasts exceeded the 5mm/s threshold for ground vibration.

9.0 COMPLAINTS

During the reporting period 29 complaints were received. Details of these complaints are shown in **Table 9** below.

Table 9: Complaints Summary YTD

	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
May						
June						
July						
August						
September						
October						
November						
December						
Total	56	35	27	13	0	131

Appendix A: Meteorological Data

Table 10: Meteorological Data – Charlton Ridge Meteorological Station – April 2019

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)
1/04/2019	19	14	95	69	159	2.9	1.0
2/04/2019	23	13	97	60	154	2.4	0.2
3/04/2019	26	12	96	37	151	2.1	0.2
4/04/2019	25	12	90	47	167	2.8	0.0
5/04/2019	23	15	92	61	175	2.0	0.8
6/04/2019	30	14	96	35	242	2.4	0.0
7/04/2019	33	14	84	20	256	2.5	0.0
8/04/2019	33	15	69	15	273	2.8	0.0
9/04/2019	32	14	67	18	256	3.5	0.0
10/04/2019	23	11	77	35	156	2.9	0.0
11/04/2019	24	9	83	39	160	2.7	0.0
12/04/2019	24	12	90	41	153	2.3	0.0
13/04/2019	26	11	98	29	189	1.8	0.0
14/04/2019	24	13	86	33	174	2.4	0.0
15/04/2019	24	11	90	37	171	2.3	0.6
16/04/2019	24	13	88	46	166	2.6	0.0
17/04/2019	25	12	94	38	152	2.2	0.0
18/04/2019	26	12	94	38	169	1.9	0.0
19/04/2019	26	14	92	49	151	2.5	0.0
20/04/2019	27	13	94	47	144	2.6	0.0
21/04/2019	27	14	94	42	151	2.0	0.0
22/04/2019	26	14	95	42	149	2.0	0.0
23/04/2019	27	13	94	38	145	2.7	0.0
24/04/2019	26	13	92	34	149	2.0	0.0
25/04/2019	28	12	93	32	208	1.6	0.0
26/04/2019	29	13	82	26	261	3.2	0.0
27/04/2019	21	10	84	39	151	2.1	0.0
28/04/2019	25	7	91	19	246	3.2	0.0
29/04/2019	23	10	80	43	149	2.8	0.0
30/04/2019	22	10	93	49	157	1.5	0.0

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