

# Monthly Environmental Monitoring Report

Yancoal Mount Thorley Warkworth

April 2018

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# Revision History

Version No.	Person Responsible	Document Status	Date
1.0	Environmental Advisor	Draft	24/05/2018
1.1	Environment & Community Manager	Final	04/06/2018

#### 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 1st April to 30th April 2018.

# 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 period is summarised in **Table 1**, the year-to-date trend and historical trend are shown in **Figure 1**.

Table 1: Monthly Rainfall MTW

2018	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
April	27	115.5

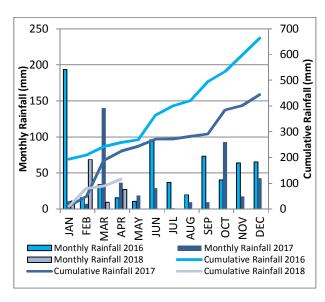


Figure 1: Rainfall Trend YTD

#### 2.1.2 Wind Speed and Direction

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

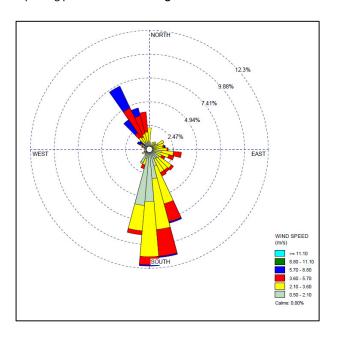


Figure 2: Charlton Ridge Wind Rose - April 2018

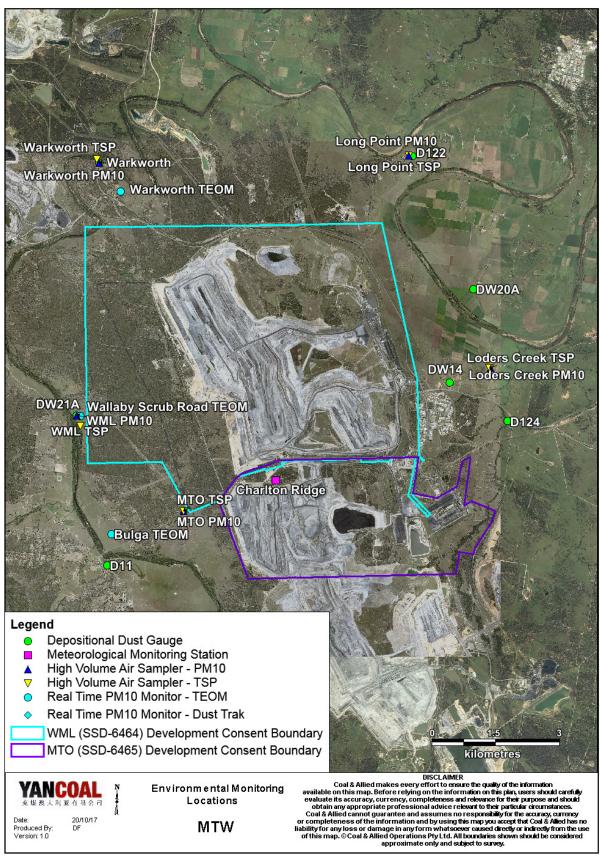


Figure 3: Air Quality Monitoring Locations

#### 2.2 Depositional Dust

To monitor regional 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 and DW21a monitors recorded monthly results above the long term impact assessment criteria of 4.0 g/m² per month. Field notes associated with D122 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. There is no evidence to suggest that the DW21a result is contaminated. Accordingly, the result will be included in the annual average calculation.

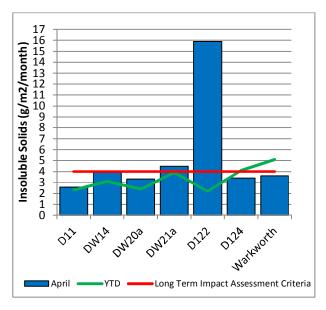


Figure 4: Depositional Dust – April 2018

#### 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  $50\mu g/m^3$ .

Data was not available on 1<sup>st</sup>, 19<sup>th</sup> or 25<sup>th</sup> April 2018 at the Long Point HVAS due to power related issues.

On  $13^{th}$  April 2018 the Long Point HVAS PM<sub>10</sub> unit recorded a result of 105  $\mu$ g/m<sup>3</sup>, which is greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria.

An Investigation determined that the wind direction was generally not from MTW's angle of influence at Long Point on the 13<sup>th</sup> April. Accordingly, no further action is required.

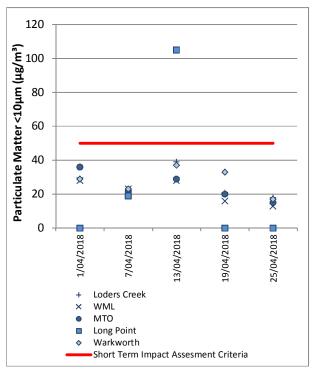


Figure 5: Individual PM10 Results – April 2018

**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 2018 Annual Review Report.

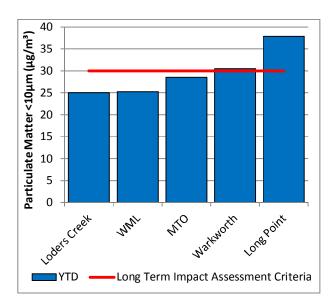


Figure 6: Annual Average PM<sub>10</sub> - April 2018

#### 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 2018 Annual Review Report.

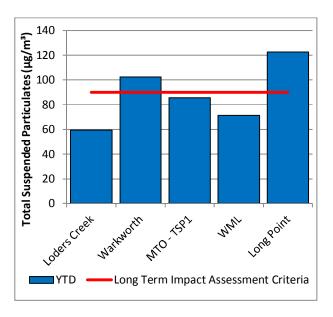


Figure 7: Annual Average Total Suspended Particulates – April 2018

#### 2.3.3 Real Time PM<sub>10</sub> 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 alarms when particulate matter levels exceed internal trigger limits.

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

On  $15^{th}$  April 2018, the Bulga OEH ( $58.9 \, \mu g/m^3$ ), Wallaby Scrub Road ( $62.3 \, \mu g/m^3$ ) and Warkworth ( $57.3 \, \mu g/m^3$ ) TEOM results exceeded the short term (24hr) criteria. An analysis of meteorological data has determined that the Bulga OEH, Wallaby Scrub Road and Warkworth monitoring locations were all generally upwind of MTW throughout the day (for more than 98% of the day). Therefore, it is unlikely that MTW operations was a significant contributor to the results and thus estimations of contribution have not been calculated.

## 2.3.4 Real Time Alarms for Air Quality

During April, the real time monitoring system generated 113 automated air quality related alerts, including 14 alerts for adverse meteorological conditions and 99 alerts for elevated  $PM_{10}$  levels.

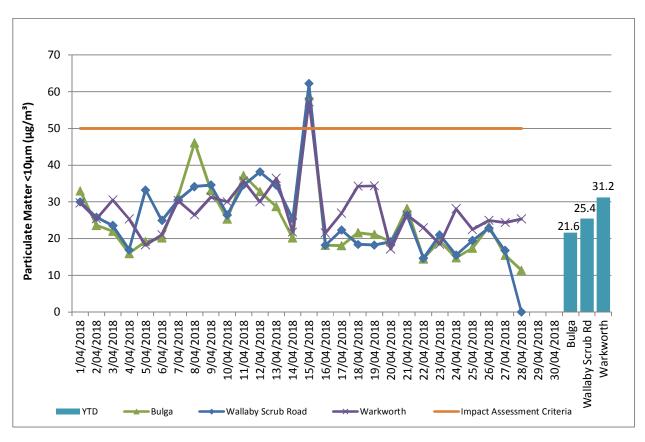


Figure 8: Real Time PM<sub>10</sub> daily 24hr average (line graphs) and YTD annual average (column graphs) – April 2018

# 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. Other Hunter River tributaries are also monitored.

Results of monitoring are reported quarterly, next available in the June 2018 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 2018 report.

#### 3.3 HRSTS Discharge

MTW participates in the Hunter River Salinity Trading Scheme (HRSTS), allowing discharge from licensed discharge points 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 2018, 25 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)	Comments  5% of the total number of blasts in a 12 month period		

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

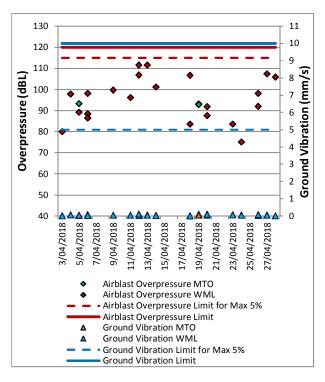


Figure 9: Abbey Green Blast Monitoring Results - April 2018

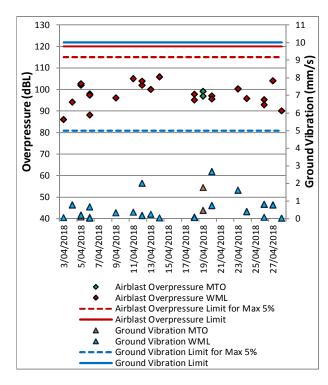


Figure 10: Bulga Village Blast Monitoring Results - April 2018

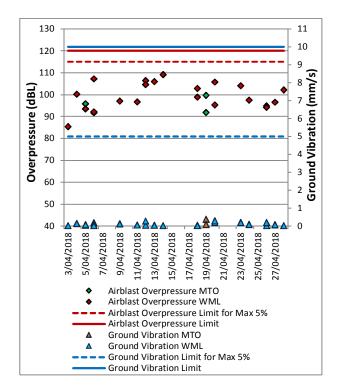


Figure 11: MTIE Blast Monitoring Results – April 2018

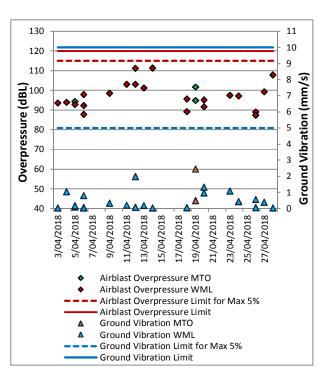


Figure 12: Wollemi Peak Road Blast Monitoring Results – April 2018

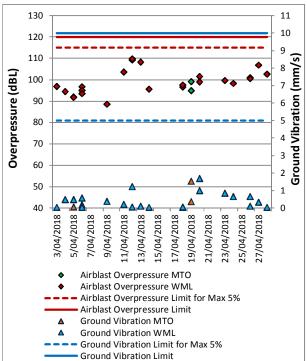


Figure 13: Wambo Road Blast Monitoring Results – April 2018

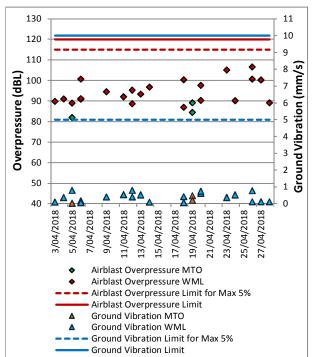


Figure 14: Warkworth Blast Monitoring Results – April 2018

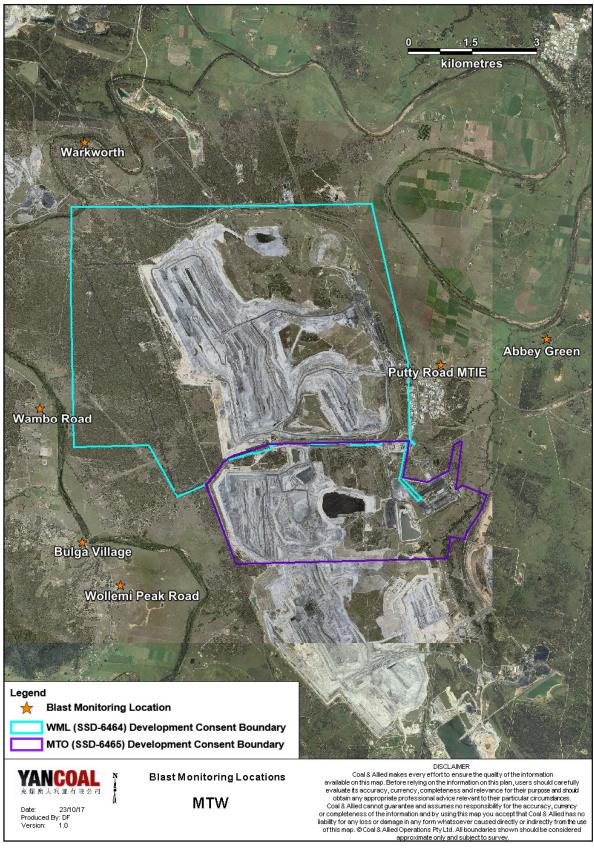


Figure 15: MTW Blast Monitoring Location Plan

#### 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 Report. 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 5 April 2018. 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: LAeq. 15 minute Warkworth Impact Assessment Criteria – April 2018

Location	Date and Time	Wind Speed (m/s)⁵	Stability Class	Criterion dB(A)	Criterion Applies? <sup>1,5</sup>	WML L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Bulga RFS	5/04/2018 21:00	1.5	F	37	Yes	32	Nil
Bulga Village	5/04/2018 22:56	2.4	D	38	Yes	NM	Nil
Gouldsville	5/04/2018 21:03	1.5	F	35	Yes	IA	Nil
Inlet Rd	5/04/2018 21:30	2.3	E	37	Yes	32	Nil
Inlet Rd West	5/04/2018 21:05	1.5	F	35	Yes	31	Nil
Long Point	5/04/2018 21:28	2.3	E	35	Yes	IA	Nil
South Bulga	5/04/2018 21:34	2.3	E	36	Yes	<30	Nil
Wambo Road	5/04/2018 23:22	2.5	D	38	Yes	26	Nil

#### Notes:

<sup>1.</sup> 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:

<sup>2.</sup> Estimated or measured LAeq,15minute attributed to WML;

<sup>3.</sup> NA means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;

<sup>4.</sup> Bolded results in red are possible exceedances of relevant criteria; and

<sup>5.</sup> Criterion may or may not apply due to rounding of meteorological data values.

Table 4: L<sub>A1,1 minute</sub> Warkworth - Impact Assessment Criteria – April 2018

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion dB(A)	Criterion Applies? <sup>1,5</sup>	WML L <sub>A1, 1min</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Bulga RFS	5/04/2018 21:00	1.5	F	47	Yes	37	Nil
Bulga Village	5/04/2018 22:56	2.4	D	48	Yes	NM	Nil
Gouldsville	5/04/2018 21:03	1.5	F	48	Yes	IA	Nil
Inlet Rd	5/04/2018 21:30	2.3	E	47	Yes	NM	Nil
Inlet Rd West	5/04/2018 21:05	1.5	F	45	Yes	40	Nil
Long Point	5/04/2018 21:28	2.3	E	45	Yes	IA	Nil
South Bulga	5/04/2018 21:34	2.3	E	45	Yes	32	Nil
Wambo Road	5/04/2018 23:22	2.5	D	48	Yes	31	Nil

#### 5.1.3 MTO Noise Assessment

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

Table 5: L<sub>Aeq, 15minute</sub> Mount Thorley - Impact Assessment Criteria – April 2018

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion dB	Criterion Applies? <sup>1,5</sup>	MTO L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Bulga RFS	5/04/2018 21:00	1.5	F	37	Yes	<30	Nil
Bulga Village	5/04/2018 22:56	2.4	D	38	Yes	IA	Nil
Gouldsville	5/04/2018 21:03	1.5	F	35	Yes	IA	Nil
Inlet Rd	5/04/2018 21:30	2.3	E	37	Yes	IA	Nil
Inlet Rd West	5/04/2018 21:05	1.5	F	35	Yes	IA	Nil
Long Point	5/04/2018 21:28	2.3	E	35	Yes	IA	Nil
South Bulga	5/04/2018 21:34	2.3	E	36	Yes	<30	Nil
Wambo Road	5/04/2018 23:22	2.5	D	38	Yes	IA	Nil

#### Notes:

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:

<sup>2.</sup> Estimated or measured LA1,1minute attributed to Warkworth mine (WML);

<sup>3.</sup> NA in exceedance column means atmospheric conditions outside conditions specified in project approval and so criterion is not applicable. NA (not applicable) in criterion column means criterion not specified for this location;

<sup>4.</sup> Bolded results in red are possible exceedances of relevant criteria; and

<sup>5.</sup> Criterion may or may not apply due to rounding of meteorological data values.

<sup>1.</sup> 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;

 $<sup>{\</sup>it 2. Estimated or measured LAeq, 15 minute attributed to MTO;}\\$ 

<sup>3.</sup> NA means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;

<sup>4.</sup> Bolded results in red are possible exceedances of relevant criteria; and

<sup>5.</sup> Criterion may or may not apply due to rounding of meteorological data values.

Table 6: LA1, 1 Minute Mount Thorley - Impact Assessment Criteria - April 2018

Location	Date and Time	Wind Speed (m/s)⁵	Stability Class	Criterion dB	Criterion Applies? <sup>1,5</sup>	MTO L <sub>A1, 1min</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Bulga RFS	5/04/2018 21:00	1.5	F	47	Yes	32	Nil
Bulga Village	5/04/2018 22:56	2.4	D	48	Yes	IA	Nil
Gouldsville	5/04/2018 21:03	1.5	F	45	Yes	IA	Nil
Inlet Rd	5/04/2018 21:30	2.3	E	47	Yes	IA	Nil
Inlet Rd West	5/04/2018 21:05	1.5	F	45	Yes	IA	Nil
Long Point	5/04/2018 21:28	2.3	E	45	Yes	IA	Nil
South Bulga	5/04/2018 21:34	2.3	E	46	Yes	<30	Nil
Wambo Road	5/04/2018 23:22	2.5	D	48	Yes	IA	Nil

#### Notes

# 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. During April 2018 no measurements 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 2018

Location	Date and Time	Measured Site Only LA <sub>eq</sub> dB (WML/MTO)	Site Only L <sub>Ceq</sub> dB <sup>4</sup> (WML/MTO)	Site Only LCeq – LAeq dB <sup>1,4</sup> (WML/MTO)	Result Max exceedance of ref spectrum dB (WML/MTO) 2,3,4	Penalty dB(A)	Exceedance
Bulga RFS	5/04/2018 21:00	32/<30	NA/NA	NA/NA	NA/NA	NA/NA	NA
Bulga Village	5/04/2018 22:56	NM/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Gouldsville	5/04/2018 21:03	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Inlet Rd	5/04/2018 21:30	32/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Inlet Rd West	5/04/2018 21:05	31/IA	51/NA	20/NA	0/NA	Nil/NA	NA
Long Point	5/04/2018 21:28	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
South Bulga	5/04/2018 21:34	<30/<30	NA/NA	NA/NA	NA/NA	NA/NA	NA
Wambo Road	5/04/2018 23:22	26/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
·	·	·		·			·

<sup>1.</sup> 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

<sup>2.</sup> Estimated or measured LA1, 1 minute attributed to Mt Thorley Operations (MTO);
3. NA in exceedance column means atmospheric conditions outside conditions specified in project approval and so criterion is not applicable. NA (not applicable) in criterion column means criterion not specified for this location;

<sup>4.</sup> Bolded results in red are possible exceedances of relevant criteria; and

<sup>5.</sup> Criterion may or may not apply due to rounding of meteorological data values.

<sup>1.</sup> As per NPfl, if LCeq – LAeq >= 15 dB further assessment of low frequency noise required.

<sup>2.</sup> 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; 3. Bold results and penalties in red are where the relevant modifying factor trigger was exceeded; and

<sup>4.</sup> 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.

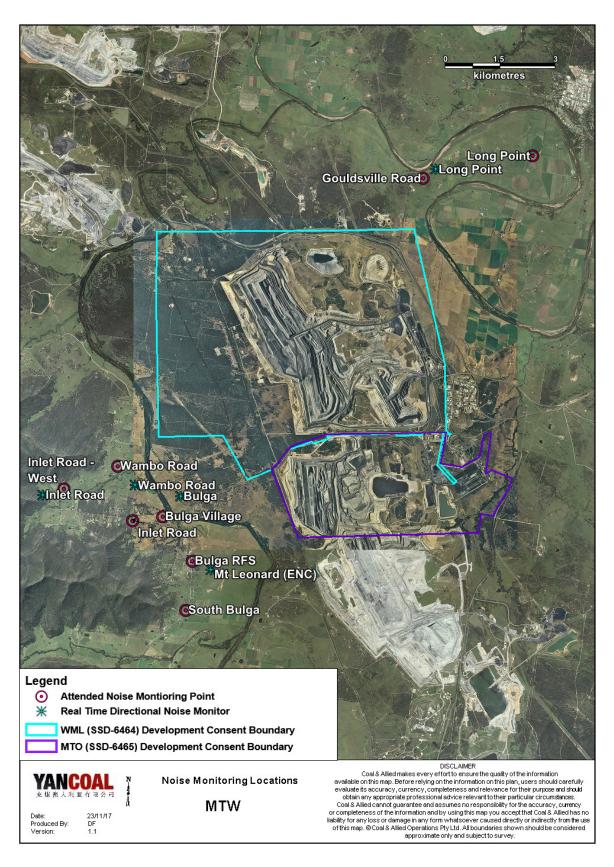


Figure 16: Noise Monitoring Location Plan

# **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.

Table 8: Supplementary Attended Noise Monitoring Data – April 2018

No. of	No. of	No. of nights	%
assessments	assessments >	where	greater
	trigger	assessments	than
		> trigger	trigger
498	1	1	0.2

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

# 6.0 OPERATIONAL DOWNTIME

During April, a total of 168 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**.

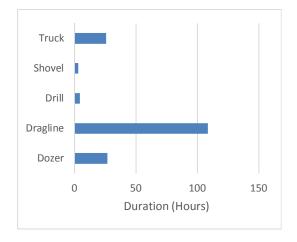


Figure 17: Operational Downtime by Equipment Type – April 2018

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# 7.0 REHABILITATION

During April 2018, 8.1 Ha of land was released, 0.9 Ha of land was bulk shaped, 6.2 Ha of land was topsoiled, 4.6 Ha of land was composted and 7.0 Ha of land was rehabilitated.

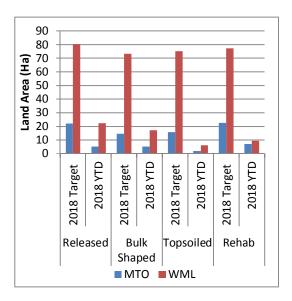


Figure 18: Rehabilitation YTD - April 2018

# **Table 9: Complaints Summary YTD**

	Noise	Dust	Blast	Lighting	Other	Total
January	9	6	14	0	1	30
February	8	5	1	3	1	18
March	22	0	0	2	0	24
April	8	4	9	6	0	27
May	-	-	-	-	-	-
June	-	-	-	-	-	-
July	-	-	-	-	-	-
August	-	-	-	-	-	-
September	-	-	-	-	-	-
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	47	15	24	11	2	99

# **8.0 ENVIRONMENTAL INCIDENTS**

During the reporting period there were no reportable environmental incidents.

## 9.0 COMPLAINTS

During the reporting period 27 complaints were received. Details of these complaints are shown in **Table 9** below.

Appendix A: Meteorological Data

Table 10: Meteorological Data – Charlton Ridge Meteorological Station – April 2018

Date	Air Temperature Maximum (°C)	Air Temperature Minimum (°C)	Relative Humidity Maximum (%)	Relative Humidity Minimum (%)	Solar Radiation Maximum (W/Sq. M)	Wind Direction Average (°)	Wind Speed Average (m/sec)	Rainfall(mm)
1/04/2018	32	17	96	29	843	169	1.7	0.0
2/04/2018	33	16	87	28	1201	230	2.4	13.2
3/04/2018	26	18	87	52	1102	145	2.8	0.0
4/04/2018	27	17	84	46	1165	151	2.9	0.0
5/04/2018	28	16	92	38	998	147	1.9	0.0
6/04/2018	30	14	92	35	838	165	1.8	0.0
7/04/2018	29	17	88	35	817	159	2.0	0.0
8/04/2018	32	14	87	21	809	166	1.5	0.0
9/04/2018	34	14	79	14	836	202	3.0	0.0
10/04/2018	27	16	79	41	1005	137	2.6	0.0
11/04/2018	30	14	90	33	798	155	1.9	0.0
12/04/2018	31	15	86	27	823	290	3.7	0.0
13/04/2018	31	19	43	26	815	299	5.1	0.0
14/04/2018	30	17	82	35	991	300	5.3	2.6
15/04/2018	24	15	54	32	883	310	5.7	0.0
16/04/2018	29	18	53	30	680	290	4.1	0.0
17/04/2018	24	14	77	39	1005	153	2.7	0.0
18/04/2018	23	14	73	41	1132	141	2.5	0.0
19/04/2018	28	11	92	37	783	188	2.3	9.0
20/04/2018	26	12	96	43	775	162	1.7	0.0
21/04/2018	24	15	91	53	968	141	2.4	0.6
22/04/2018	24	12	94	47	1085	154	2.0	0.0
23/04/2018	25	12	95	41	823	165	1.7	0.0
24/04/2018	25	12	94	31	771	161	2.0	0.0
25/04/2018	21	12	94	64	912	186	2.3	1.4
26/04/2018	27	13	98	29	727	214	2.5	0.2
27/04/2018	21	14	83	48	1016	168	3.6	0.0
28/04/2018	21	12	82	47	855	166	4.0	0.0
29/04/2018	20	11	84	49	1086	153	2.5	0.0
30/04/2018	21	9	86	47	1000	166	2.8	0.0

<sup>&</sup>quot;-" Indicates that data was not available due to technical issues.