COAL & ALLIED

Managed by Rio Tinto Coal Australia

Mount Thorley Warkworth

Monthly Environmental Report

May 2017

Coal & Allied Operations Pty Ltd

ABN 16 000 023 656

Lemington Road, Ravensworth via Singleton NSW 2330 Australia

PO Box 315 Singleton NSW 2330 Australia

Telephone +61 2 6570 0300 Facsimile +61 2 6570 0399

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environmental Graduate**	**Draft**	**23/06/2017**
1.1	**Environmental Specialist**	**Final**	**29/06/2017**

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 May to 31st May 2017.

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

2017	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
May	18.8	243.0

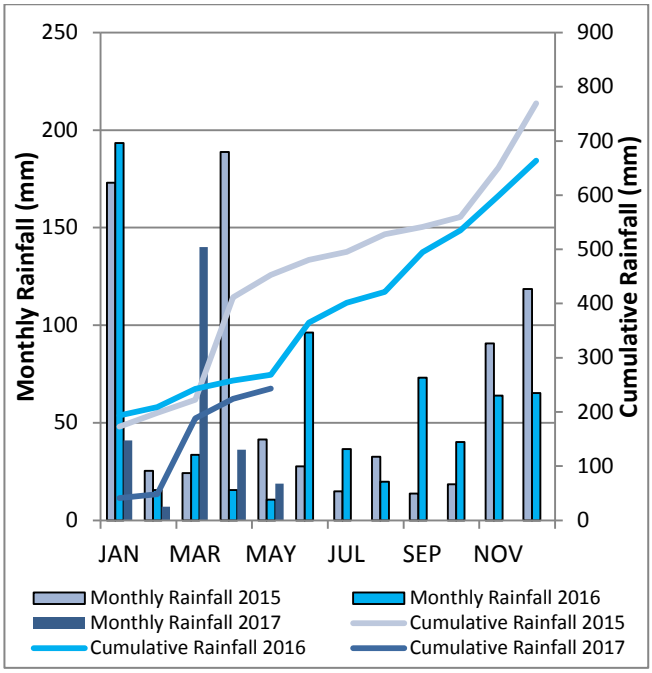

Figure 1: Rainfall Trend YTD

2.1.2 Wind Speed and Direction

Winds from the South and North West were dominant throughout the reporting period as shown in Figure 2.

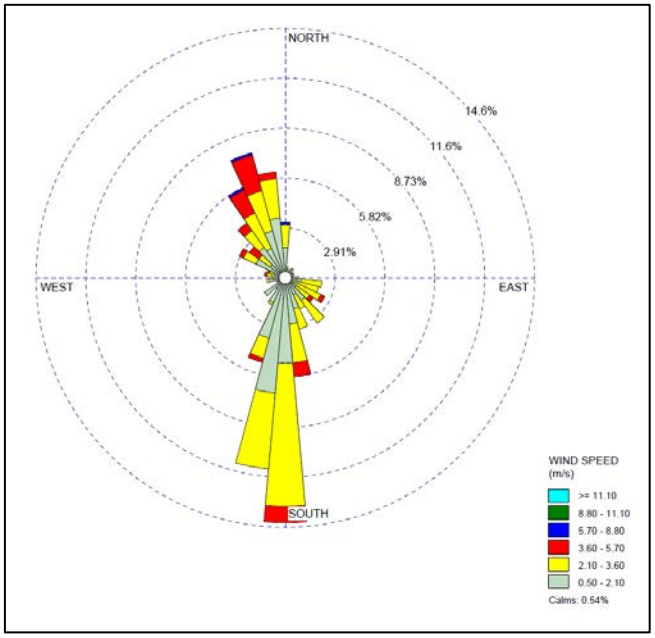

Figure 2: Charlton Ridge Wind Rose – May 2017

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 DW14, D124 and Warkworth monitors 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 vegetation. As such the results are considered contaminated and will be excluded from calculation of the annual average. There is no evidence to suggest that the Dw14 and Warkworth results were contaminated. Accordingly, this result will be included in the annual average calculation.

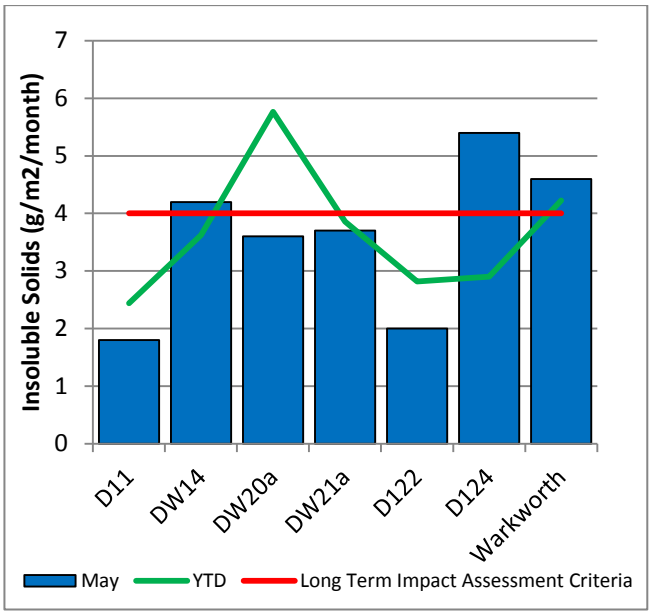

Figure 4: Depositional Dust – May 2017

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.

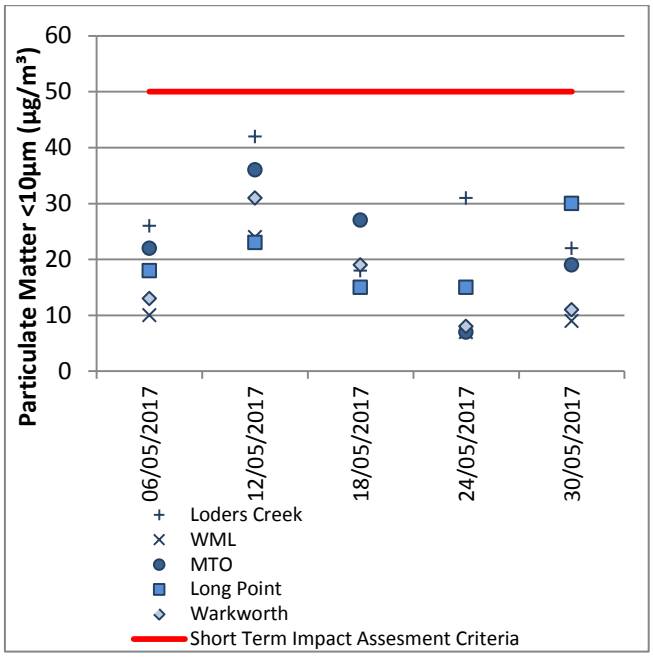

Figure 5: Individual PM_{10} Results – May 2017

Figure 6 shows the annual average PM_{10} results against the long term impact assessment criteria.

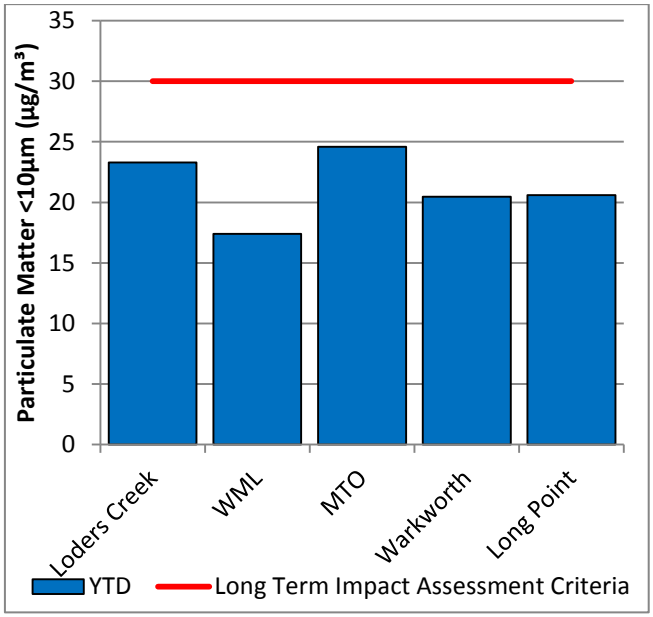

Figure 6: Annual Average PM_{10} – May 2017

2.3.2 TSP Results

Figure 7 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m³.

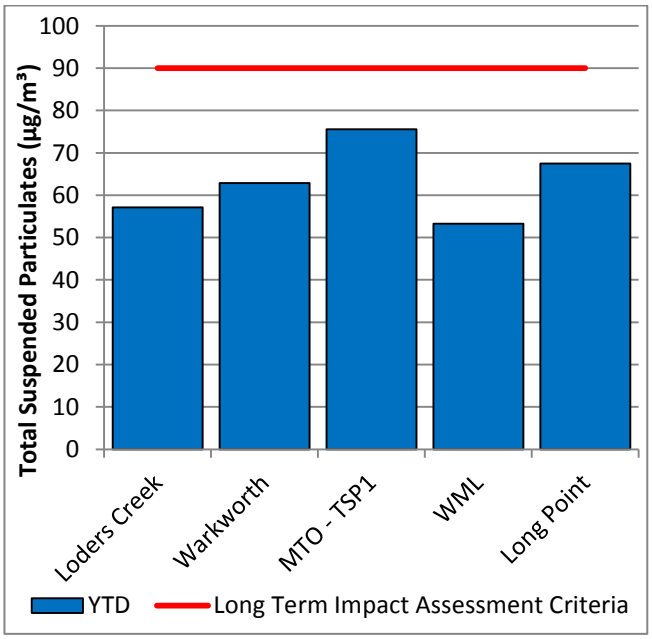

Figure 7: Annual Average Total Suspended Particulates – May 2017

2.3.3 Real Time PM_{10} Results

Mount Thorley Warkworth 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.

2.3.4 Real Time Alarms for Air Quality

During May, the real time monitoring system generated 46 automated air quality related alerts for elevated PM_{10} levels.

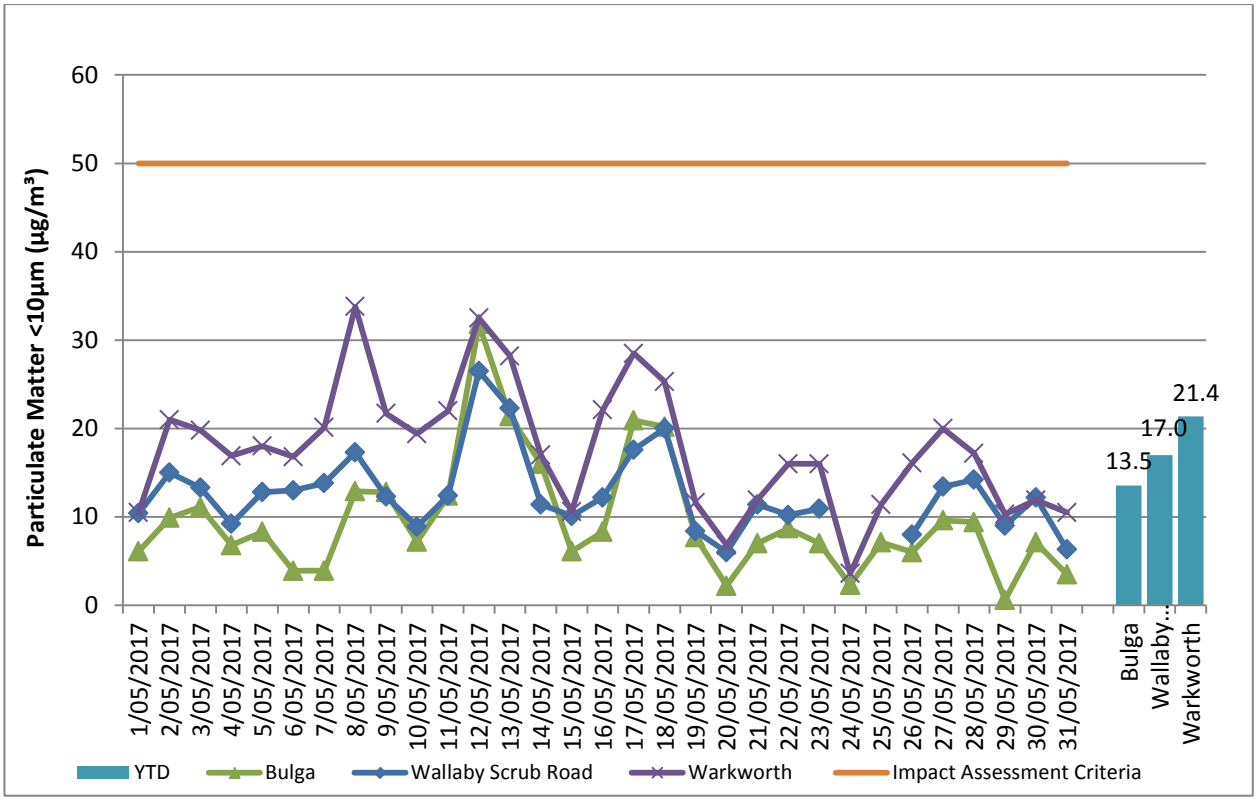

Figure 8: Real Time PM_{10} daily 24hr average and annual average – May 2017

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 2017 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 2017 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 May 2017, 30 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 no blasts exceeded the 115 dB(L) 5% threshold for airblast overpressure or 5mm/s 5% threshold for ground vibration.

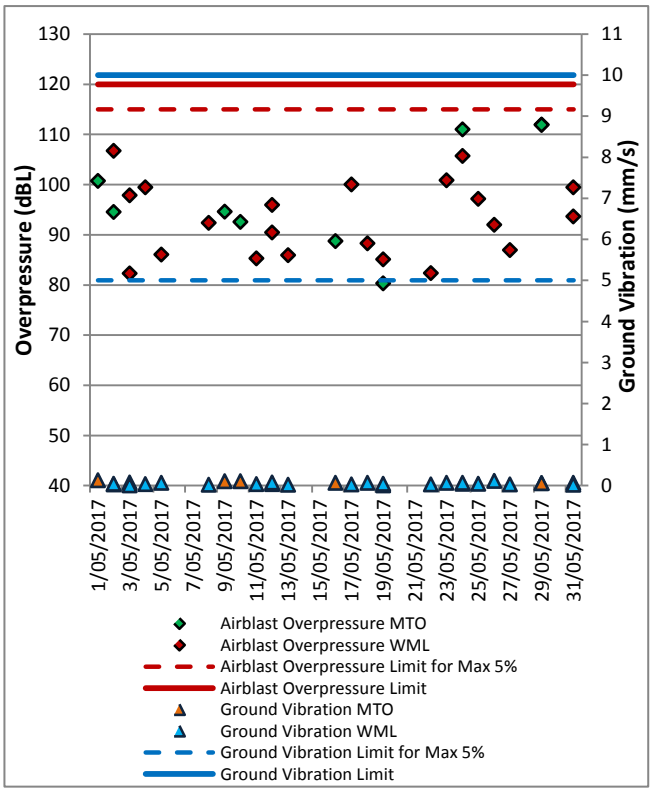

Figure 9: Abbey Green Blast Monitoring Results – May 2017

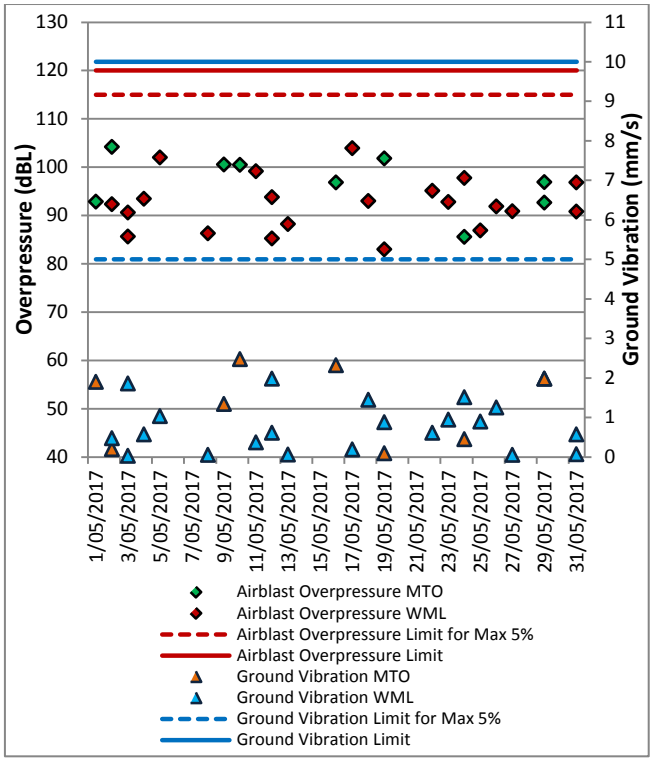

Figure 10: Bulga Village Blast Monitoring Results – May 2017

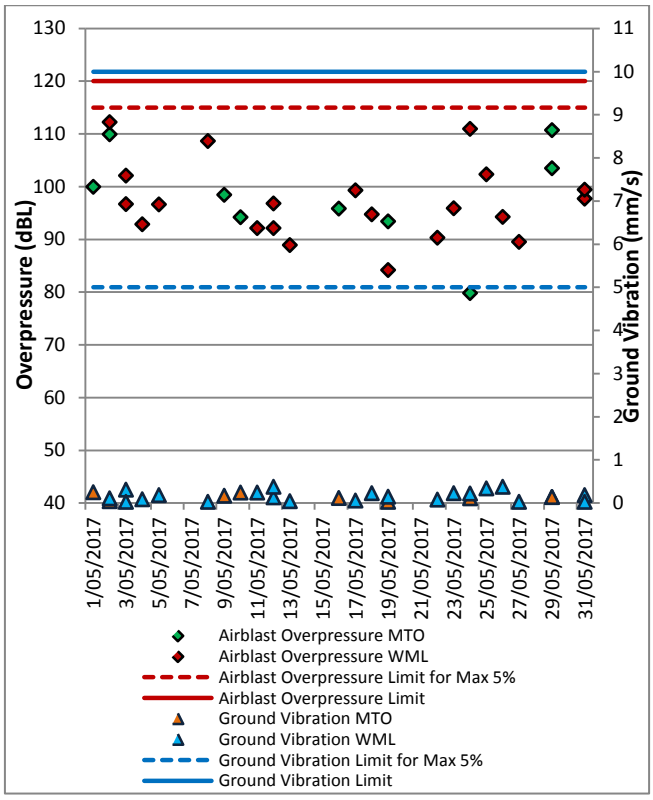

Figure 11: MTIE Blast Monitoring Results – May 2017

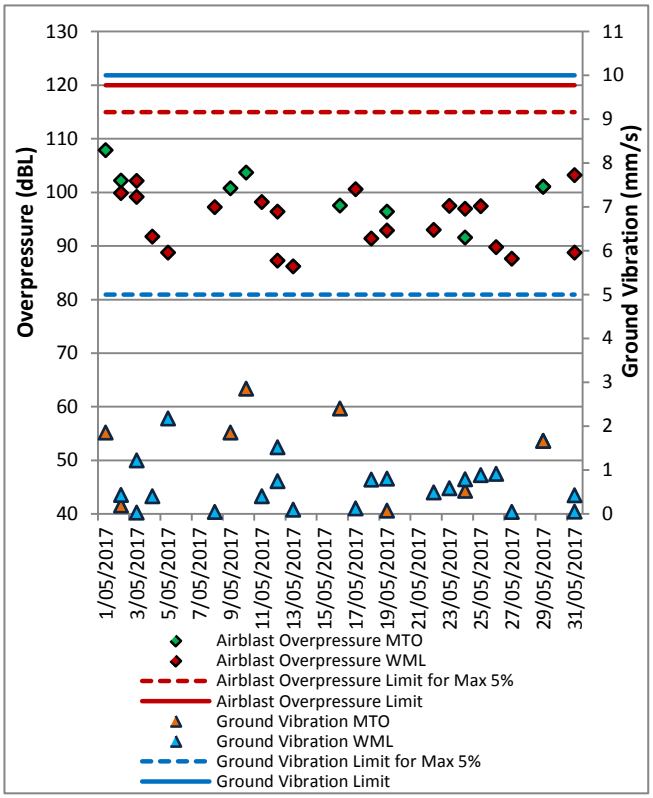

Figure 12: Wollemi Peak Road Blast Monitoring Results - May 2017

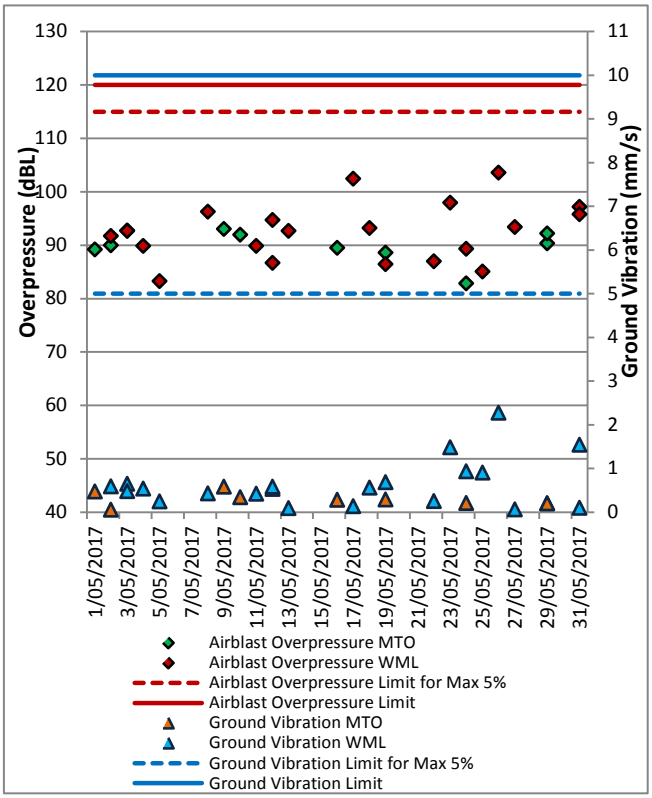

Figure 14: Warkworth Blast Monitoring Results - May 2017

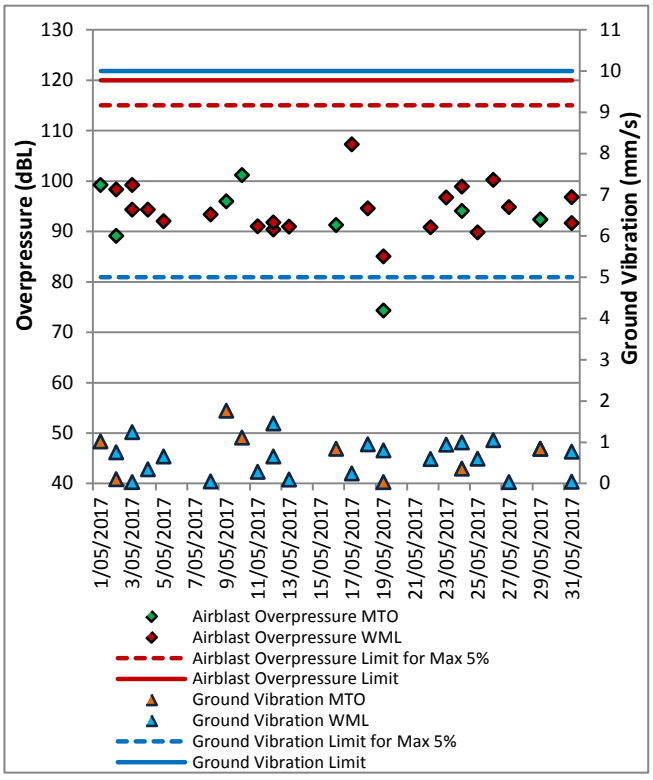

Figure 13: Wambo Road Blast Monitoring Results - May 2017

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 nine 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 18th and 19th May 2017. 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 –May 2017

Location	Date and Time	Wind Speed (m/s)[5]	Stability Class	Criterion (dB(A))	Criterion Applies?[1,6]	WML L_{Aeq} dB[2,4]	Exceedance[3]	Total $L_{Ceq} - L_{Aeq}$	Revised WML L_{Aeq}[5,6]
Bulga RFS	19/05/2017 0:14	2.1	E	37	Yes	34	Nil	20	39
Bulga Village	18/05/2017 22:02	3.3	E	38	No	39	NA	21	44
Bulga Village (remeasure)	18/05/2017 23:16	2.2	F	38	No	36	NA	20	41
Gouldsville	18/05/2017 21:30	3.4	D	38	No	IA	NA	21	IA
Inlet Rd	18/05/2017 21:35	3.4	D	37	No	37	NA	20	41
Inlet Rd West	18/05/2017 21:10	3.5	D	35	No	29	NA	22	34
Long Point	18/05/2017 21:02	3.6	D	35	No	IA	NA	18	IA
South Bulga	19/05/2017 1:17	2	F	35	Yes	29	Nil	19	34
Wambo Road	18/05/2017 23:42	2.2	F	38	No	36	NA	22	40

Table 4: $L_{A1,\ 1\ minute}$ Warkworth - Impact Assessment Criteria – May 2017

Location	Date and Time	Wind Speed (m/s)[5]	Stability Class	Criterion dB	Criterion Applies?[1,6]	WML $L_{A1,\ 1min}$ dB[2,4]	Exceedance[3]
Bulga RFS	19/05/2017 0:14	2.1	E	47	Yes	44	Nil
Bulga Village	18/05/2017 22:02	3.3	E	48	No	43	NA
Bulga Village (remeasure)	18/05/2017 23:16	2.2	F	48	No	38	NA
Gouldsville	18/05/2017 21:30	3.4	D	48	No	IA	NA
Inlet Rd	18/05/2017 21:35	3.4	D	47	No	40	NA
Inlet Rd West	18/05/2017 21:10	3.5	D	45	No	34	NA
Long Point	18/05/2017 21:02	3.6	D	45	No	IA	NA
South Bulga	19/05/2017 1:17	2	F	45	Yes	NM	Nil
Wambo Road	18/05/2017 23:42	2.2	F	48	No	39	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;
2. Estimated or measured LA1,1minute attributed to Warkworth mine (WML);
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;
4. Bolded results in red are possible exceedances of relevant criteria; and
5. Criterion may or may not apply due to rounding of meteorological data values.

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 – May 2017

Location	Date and Time	Wind Speed (m/s)[5]	Stability Class	Criterion dB	Criterion Applies?[1,6]	MTO L_{Aeq} dB[2,4]	Exceedance[3]	Total $L_{Ceq} - L_{Aeq}$[7]	Revised MTO L_{Aeq}[5,6]
Bulga RFS	19/05/2017 0:14	2.1	E	37	Yes	36	Nil	20	41
Bulga Village	18/05/2017 22:02	3.3	E	38	No	NM	NA	21	NA
Bulga Village (remeasure)	18/05/2017 23:16	2.2	F	38	No	NM	NA	20	NA
Gouldsville	18/05/2017 21:30	3.4	D	35	No	IA	NA	21	NA
Inlet Rd	18/05/2017 21:35	3.4	D	37	No	IA	NA	20	NA
Inlet Rd West	18/05/2017 21:10	3.5	D	35	No	IA	NA	22	NA
Long Point	18/05/2017 21:02	3.6	D	35	No	IA	NA	18	NA
South Bulga	19/05/2017 1:17	2	F	36	Yes	29	Nil	19	34
Wambo Road	18/05/2017 23:42	2.2	F	38	No	NM	NA	22	NA

Table 6: $L_{A1,\ 1Minute}$ Mount Thorley - Impact Assessment Criteria – May 2017

Location	Date and Time	Wind Speed (m/s)[5]	Stability Class	Criterion dB	Criterion Applies?[1,6]	MTO $L_{A1,\ 1min}$ dB[2,4]	Exceedance[3]
Bulga RFS	19/05/2017 0:14	2.1	E	47	Yes	44	Nil
Bulga Village	18/05/2017 22:02	3.3	E	48	No	NM	NA
Bulga Village (remeasure)	18/05/2017 23:16	2.2	F	48	No	NM	NA
Gouldsville	18/05/2017 21:30	3.4	D	45	No	IA	NA
Inlet Rd	18/05/2017 21:35	3.4	D	47	No	IA	NA
Inlet Rd West	18/05/2017 21:10	3.5	D	45	No	IA	NA
Long Point	18/05/2017 21:02	3.6	D	45	No	IA	NA
South Bulga	19/05/2017 1:17	2	F	46	Yes	34	Nil
Wambo Road	18/05/2017 23:42	2.2	F	48	No	NM	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;
2. Estimated or measured LA1,1minute 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;
4. Bolded results in red are possible exceedances of relevant criteria; and
5. Criterion may or may not apply due to rounding of meteorological data values.

5.1.4 INP Low Frequency

In accordance with the requirements of the NSW Industrial Noise Policy (INP), the low frequency modification factor has been applied where appropriate. It should be noted that the Industrial Noise Policy does not give guidance on the application of the penalty where more than one target noise source is audible. The L_{Ceq} levels reported above are "Total", or "Total mine noise" at best, and cannot be attributed accurately to a single mine. Accordingly, where the INP criteria for the application of the Low Frequency modification factor is triggered, the penalty has been applied to the dominant mine noise source (either of WML or MTO).

Resulting LAeq noise levels exceed the WML and MTO impact assessment criteria at Bulga RFS by 2 dB and 4 dB respectively due to in the application of a 5 dB penalty to the site only $L_{Aeq.}$

MTW reports these measurements so as to ensure full disclosure, however it remains MTW's position that the prescribed methodology is unsuitable when applied to receptors at large distances from mine noise sources due to the nature of noise attenuation. Excess attenuation of noise with distance is greater for high frequency noise than it is for low frequency noise. At significant distance from a noise source (such as private residences from the MTW complex) this often results in large differentials between L_{Aeq} and L_{Ceq}. The NSW Industrial Noise Policy requires the penalty to be applied in these instances, irrespective of actual low frequency affectation. As such, MTW does not consider these instances to constitute non-compliance with the conditions of approval.

The results have been reported to the Department of Planning and Environment.

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:

- Replacement of non-attenuated equipment with sound attenuated equipment;
- 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.

Table 7: Supplementary Attended Noise Monitoring Data – May 2017

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
567	4	3	0.7

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

6.0 OPERATIONAL DOWNTIME

During May, a total of 123.5.0 hours of equipment downtime were logged in response to environmental events such as dust, noise and adverse meteorological conditions. Operational downtime by equipment type is shown in Figure 17.

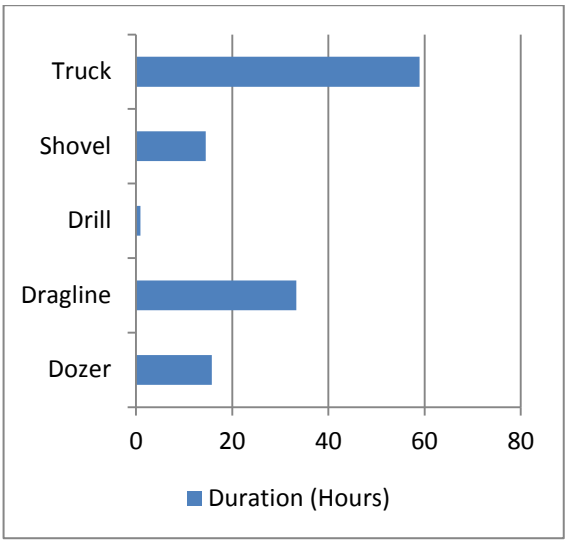

Figure 17: Operational Downtime by Equipment Type – May 2017

7.0 REHABILITATION

During May, 2.5 Ha of land was released, 6.7 Ha of land was bulk shaped, 5.5 Ha of land was topsoiled, 8.0 Ha of land was composted and 12.2 Ha of land was rehabilitated.

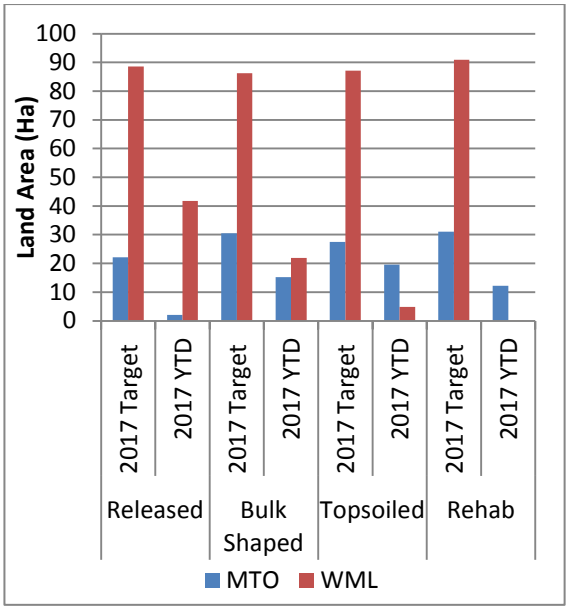

Figure 18: Rehabilitation YTD - May 2017

8.0 ENVIRONMENTAL INCIDENTS

During the reporting period MTW there were no reportable environmental incidents.

9.0 COMPLAINTS

During the reporting period 42 complaints were received, details of these complaints are shown in Figure 19 below.

	Noise	Dust	Blast	Lighting	Other	Total
January	5	6	3	1	0	15
February	25	3	10	3	0	41
March	14	1	1	2	0	18
April	27	1	7	2	0	37
May	18	4	7	10	3	42
June	-	-	-	-	-	-
July	-	-	-	-	-	-
August	-	-	-	-	-	-
September	-	-	-	-	-	-
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	89	15	28	18	3	153

Figure 19: Complaints Summary – YTD May 2017

Appendix A: Meteorological Data

Table 8: Meteorological Data – Charlton Ridge Meteorological Station –May 2017

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)
1/05/2017	23.4	8.5	93.3	47.4	170.7	1.7	0.0
2/05/2017	24.5	8.1	98.1	44.4	235.1	2.1	0.0
3/05/2017	26.4	9.2	89.6	29.1	238.1	2.4	0.0
4/05/2017	18.7	12.4	76.9	57.8	170.5	3.3	0.0
5/05/2017	20.0	10.5	87.1	55.1	165.8	2.7	0.0
6/05/2017	22.2	6.8	95.5	39.3	150.0	1.6	0.0
7/05/2017	24.2	6.5	95.8	36.3	249.3	2.0	0.0
8/05/2017	23.3	8.3	84.5	25.9	196.0	2.0	0.0
9/05/2017	20.3	6.8	72.2	38.7	166.7	2.4	0.0
10/05/2017	21.2	6.3	80.6	35.7	164.2	2.3	0.0
11/05/2017	21.1	6.5	92.8	38.9	192.9	1.5	0.0
12/05/2017	21.6	5.9	94.0	35.3	212.1	1.6	0.0
13/05/2017	18.4	9.1	91.5	67.7	183.8	2.3	0.4
14/05/2017	20.9	9.0	97.0	58.2	167.3	1.5	0.2
15/05/2017	20.7	10.0	92.3	61.6	183.2	2.0	1.4
16/05/2017	20.6	9.4	86.3	46.8	204.0	1.7	0.0
17/05/2017	21.0	6.2	93.2	39.5	213.9	1.9	0.0
18/05/2017	21.4	5.3	92.3	40.8	177.6	1.7	0.0
19/05/2017	21.9	8.4	94.3	51.4	159.5	2.2	0.0
20/05/2017	18.8	12.7	97.2	73.4	126.7	2.2	12.4
21/05/2017	22.8	12.4	97.8	62.0	204.7	1.5	4.0
22/05/2017	23.3	11.0	98.1	54.7	173.4	1.6	0.0
23/05/2017	22.4	12.7	88.5	57.2	151.2	2.1	0.0
24/05/2017	22.5	11.3	96.2	55.5	250.9	2.1	0.0
25/05/2017	-	-	-	-	-	-	-
26/05/2017	22.0	5.7	94.7	38.9	252.6	2.2	0.0
27/05/2017	20.0	5.2	92.2	42.1	225.7	1.7	0.0
28/05/2017	20.8	5.5	96.0	49.3	190.8	1.7	0.2
29/05/2017	21.5	5.6	97.3	49.1	276.5	2.7	0.0
30/05/2017	18.4	4.9	74.6	28.2	275.0	3.0	0.0
31/05/2017	16.8	1.1	84.7	37.5	302.5	3.1	0.0

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