



Mount Thorley Warkworth  
Community Consultative Committee

**Business Papers – February 2017**

Materials ahead of meeting of the committee on 13 February 2017

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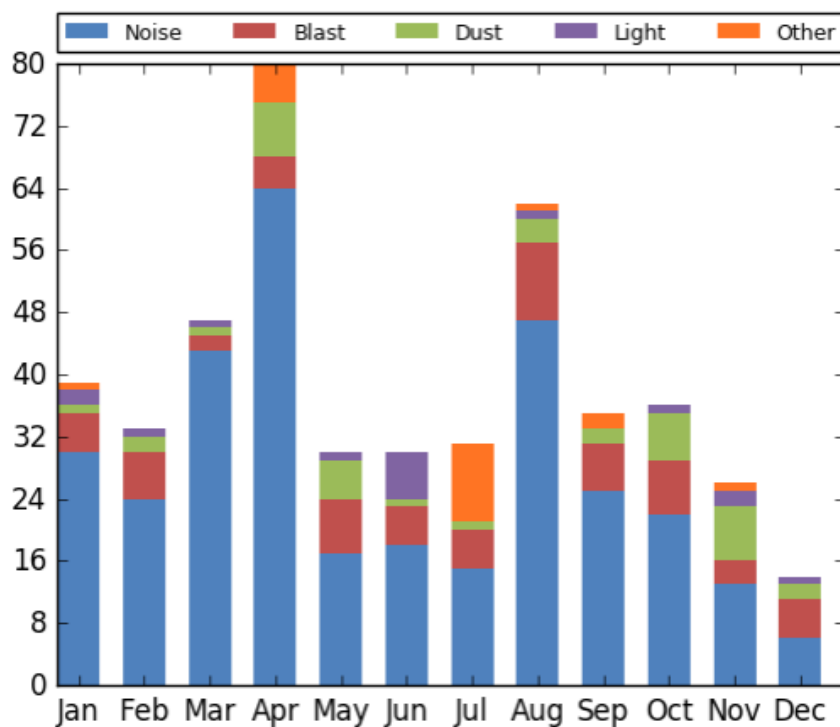
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## 1.0 Complaints

Complaints overview for period 1 October to 31 December 2016

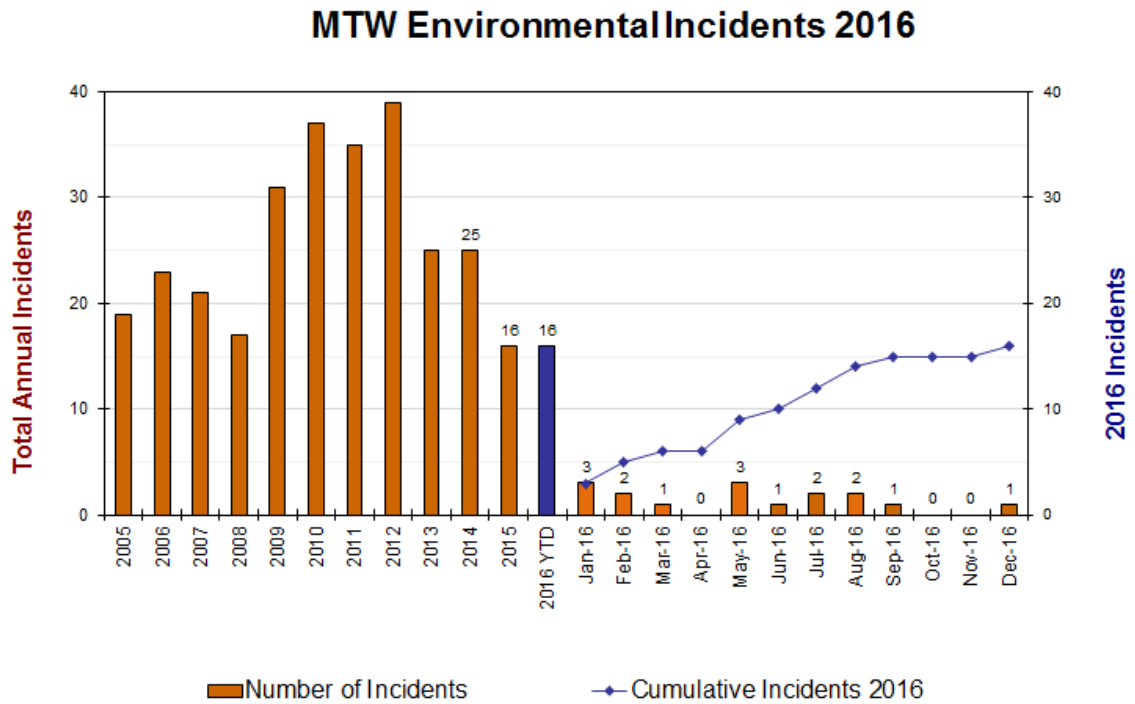
### Mount Thorley Warkworth Monthly Complaints Summary

	Noise	Dust	Blast	Lighting	Other	Total
January	30	1	5	2	1	39
February	24	2	6	1	0	33
March	43	1	2	1	0	47
April	64	7	4	0	5	80
May	17	5	7	1	0	30
June	18	1	5	6	0	30
July	15	1	5	0	10	31
August	47	3	10	1	1	62
September	25	2	6	0	2	35
October	22	6	7	1	0	36
November	13	7	3	2	1	26
December	6	2	5	1	0	14
Total	324	38	65	16	20	463



## 2.0 Incidents

Overview of environmental incidents for period 1 October to 31 December 2016



## Incident summary for the period 1 October to 31 December 2016

Date	Details	Key Actions	Aspect
02-December-2016	<p><b>North Pit Level 3 Fume Event Migrated Offsite</b></p> <p>Visible fume was generated from a blast fired in the North Pit of the Warkworth Mine (WML) at 11:15am. The fume was ranked as a 3 event on the AEISG.</p> <p>An unexpected wind change from a NNW to an E occurred approximately 6 minutes after the blast was initiated causing the fume cloud migrate to the West, passing first over Wallaby Scrub Road through maintained road closure and travelled across lands owned by MTW toward the Putty Road. The plume left the MTW premises, crossing the Putty Road (east of the Bulga Bridge and outside the closed section of road) and Wollombi Brook at elevation, and dissipated on lands owned by MTW to the east of the Putty Road.</p> <p>The incident was notified to the DP&amp;E and NSW EPA.</p>	<p>Incident investigated.</p> <p>The cause of the blast fume was investigated however a precise cause could not be established. The Product Supplier reviewed the blast design and was satisfied it was appropriate for the conditions.</p>	Air

## 3.0 Environmental monitoring

Monthly summaries of environmental monitoring for the period  
1 October 2016 to 31 December 2016

### **October 2016**

Attached as **Appendix A**

### **November 2016**

Attached as **Appendix B**

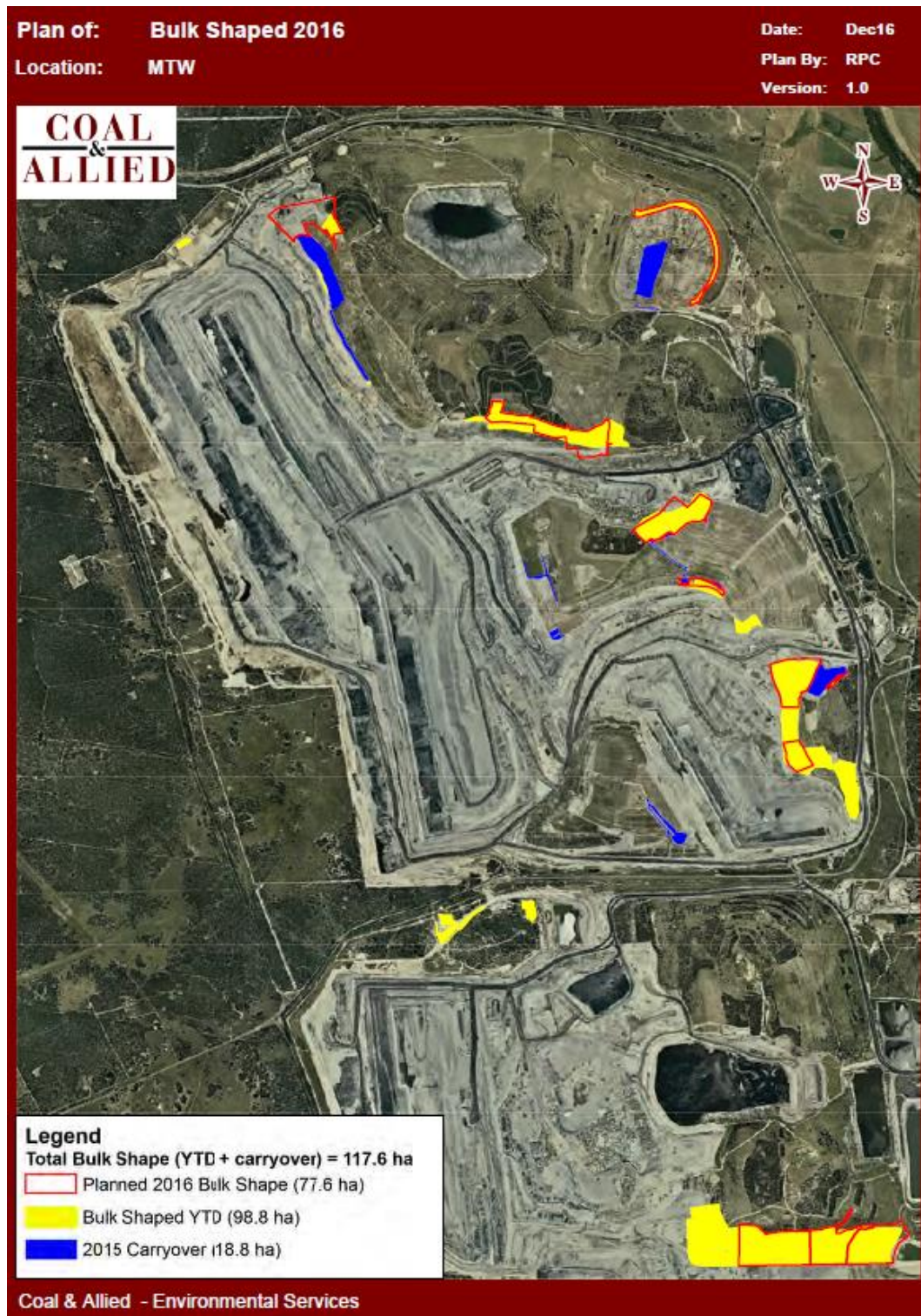
### **December 2016**

Attached as **Appendix C**

## 4.0 Rehabilitation plan

At the end of the December rehabilitation 117.6 ha of the targeted areas bulk shaped, 90.6 ha of topsoiled, 95.9 ha composted and 84.9 ha seeded were completed.

Disturbance was predominantly in Warkworth's West Pit area, for mine advance, and to construct a water management contour along the western extent of the disturbance to manage water off pre-strip activities. A total of 120.2 ha have been disturbed at the end of December.





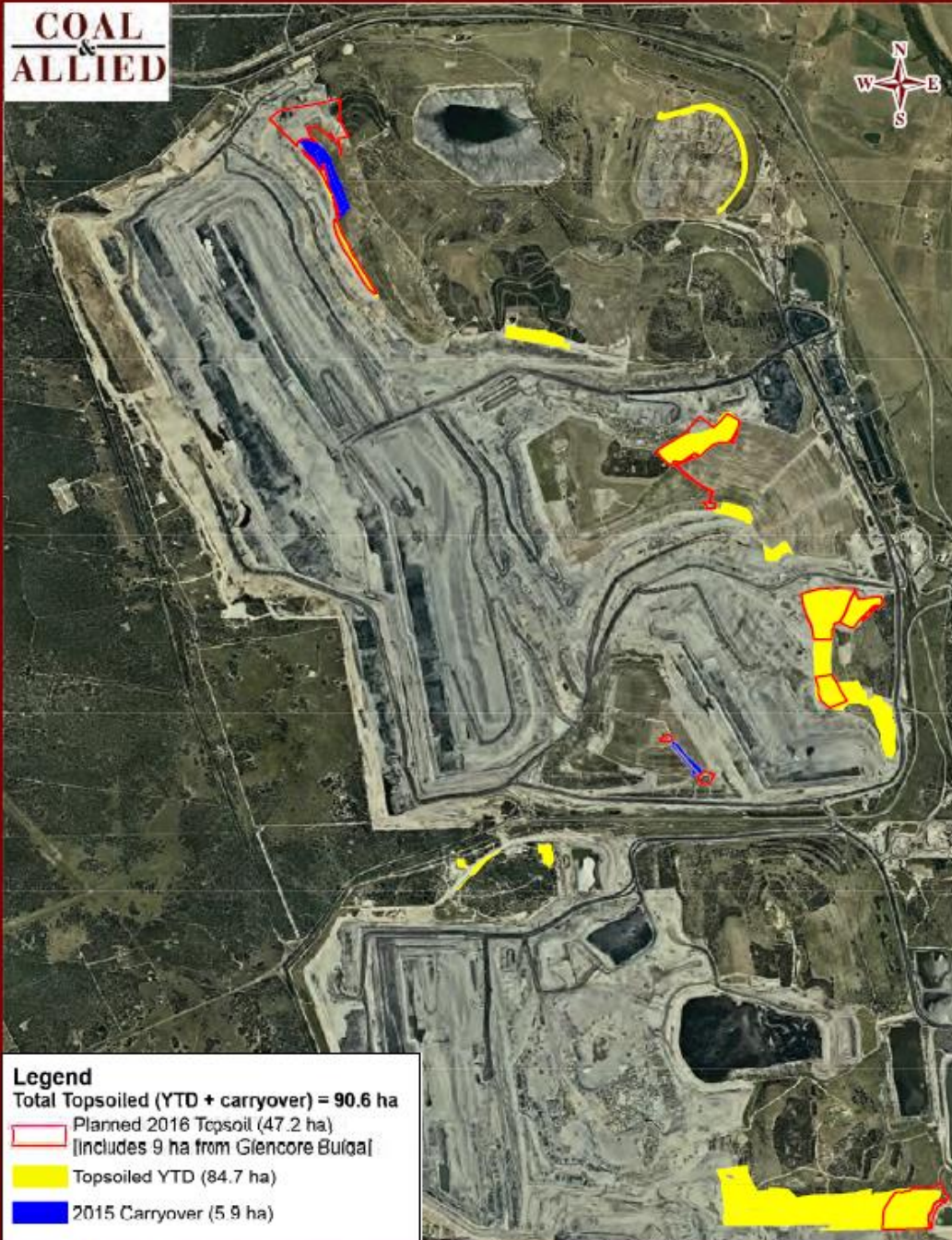
Plan of: **Topsoiled 2016**

Location: **MTW**

Date: **Dec16**

Plan By: **RPC**

Version: **1.0**



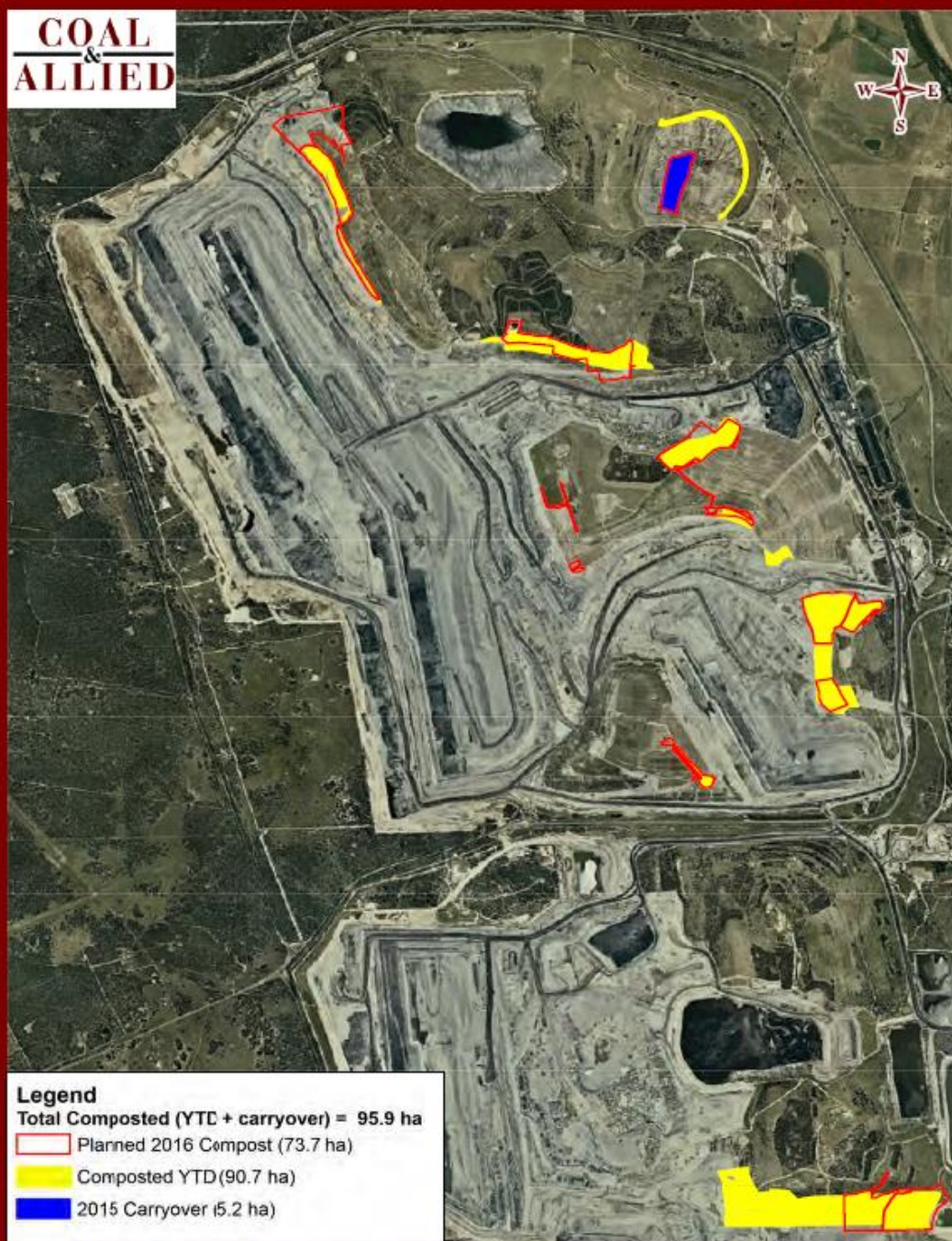
Coal & Allied - Environmental Services



Plan of: **Composted 2016**  
Location: **MTW**

Date: **Dec16**  
Plan By: **RPC**  
Version: **1.0**

**COAL  
&  
ALLIED**



**Coal & Allied - Environmental Services**



Plan of: Seeded 2016

Date: Dec16

Location: MTW

Plan By: RPC

Version: 1.0

**COAL  
&  
ALLIED**



Coal & Allied - Environmental Services



Plan of: Disturbance 2016  
Location: MTW

Date: Dec16  
Plan By: RPC  
Version: 1.0

**COAL  
&  
ALLIED**



Coal & Allied - Environmental Services

## 5.0 Sound Attenuation Update

Extensive work has been undertaken since 2013 to sound attenuate 100% of MTW's Heavy Mobile Equipment (HME) fleet. MTW's current HME fleet consists of the following:

- 76 Haul Trucks
- 7 Water Carts
- 26 Dozers
- 6 Excavators
- 6 Drills.

## 6.0 Acquisition Update

A presentation with a property acquisition update for Mount Thorley Warkworth is included in **Appendix D** of this Business Paper. No updates have been made to the property portfolio since the last CCC meeting.

## 7.0 Website Uploads

The following is a list of all documents uploaded to the MTW library of the Rio Tinto website between the period of 1 October 2016 to 31 December 2016. Uploads have been characterised as Additions, being a new document, or a Change, meaning a new version of an existing document. Please refer to the library page of the website for document contents: <http://www.riotinto.com/copperandcoal/documents-10401.aspx>

**Table 1: Uploaded Documents**

<b>Document Title</b>	<b>Upload type</b>
Mount Thorley Warkworth Noise Management Plan	Change
Mount Thorley Warkworth Environmental Protection Licence 1376 1976 Monthly Meaningful Summary September 2016	Addition
Mount Thorley Warkworth Environmental Protection Licence 1376 1976 Monthly Obtained Data Summary September 2016	Addition
Mount Thorley Warkworth Environmental Monitoring Report September 2016	Addition
Mount Thorley Warkworth Complaints Register 2016	Change



## 8.0 Community investment & support

### Mount Thorley Warkworth (MTW) site donations

The site donations committee provides an opportunity for employees to assess and make recommendations on requests for sponsorship and donations received by MTW.

Funding is provided in the form of sponsorship or a donation to assist local, community-based organisations. The funding criteria for site donations has been updated to reflect MTW's focus on funding projects and initiatives from the Bulga, Milbrodale, Broke and Singleton area.

Application forms can be requested by emailing [CNACommunityRelation@riotinto.com](mailto:CNACommunityRelation@riotinto.com). Alternatively, potential projects and opportunities for support from Coal & Allied can be discussed with Travis Bates – Community Relations Specialist, Singleton.

In 2016, MTW provided \$50,000 to 30 local projects and initiatives, including:

- Singleton Mayoral Scholarships
- Singleton Art Prize
- Invisible Wounds Mental Health workshop – Australian Families of the Military
- 2016 Production of The Wizard of Oz
- Group 21 2015-2017 Sponsorship
- Singleton Relay for Life – Cancer Council
- Beyond Blue community fundraiser
- 2016 Prime Stock competition
- Holes 4 Hospital Charity Golf Day
- Singleton Show
- Salvation Army Children's Christmas Party
- Singleton Hospital – Bed for palliative care room
- Hunter Valley Offroad Racing Association – Come and Try day (CANTEEN fundraiser)
- Cancer Council – Transport for Treatment program

## Coal & Allied Community Development Fund (CDF)

The year 2016 marked 18 years of operation of the CDF, which has invested over \$14.5 million to support over 120 community projects in the Hunter Valley since its establishment in 1999, across the areas of health, education, environment and economic development.

In 2014, Coal & Allied announced that a further \$3 million would be made available to the CDF over a three year period (2015 – 2017) for projects in the Singleton, Muswellbrook and Upper Hunter LGAs. Strategic priority areas were refined for the 2015-2017 funding cycle to enable a more targeted approach to addressing identified community need and to leverage other resources Coal and Allied may be able to offer to strengthen community partnerships.

Priority areas for the 2015-2017 funding cycle include:

- Economic Development: encouraging the diversity and competitiveness of the Upper Hunter economy
- Community Health: Supporting projects which target health, safety and social wellbeing of the community
- Education: Promoting the value of education and building skills within our community
- Environment and Land Management: Supporting projects that can make a difference on a greater scale. i.e. beyond C&A mining operations

In 2016, the CDF contributed almost \$700,000 to 14 programmes aimed at delivering long term benefits for communities in the CDF catchment, which include the Singleton, Muswellbrook and Upper Hunter LGAs. A further \$500,000 is available for allocation in 2017.

**Table 2: Coal & Allied Community Development Fund projects supported in 2016**

Programme	Partner
Enterprise Facilitation	Sirolli Institute
Supporting Children's Developing Social Competence	Early Links Inclusion Support Service
Science and Engineering Challenge, and SMART Program (2015-2017)	University of Newcastle
Upper Hunter Education Fund Scholarships (2015-2017)	Upper Hunter Education Fund
Business Development Officer	Singleton Business Chamber
Singleton High School Agricultural Course	Singleton High School
University of Newcastle Scholarships	University of Newcastle
Youth Leadership Program	Outward Bound Australia
Singleton Economic Development and Funding Coordinator	Singleton Council
Singleton Community College Strategic Plan	Singleton Community College
HSC Study Camps	Upper Hunter Education Fund

Ready 4 School Program	Jerrys Plains Public School
Total Steers Challenge	Total College
Early Learning Program	Milbrodale Public School

## 9.0 Tailings Dam 1 Planting

The following is a list of vegetation species planted on Tailings Dam 1:

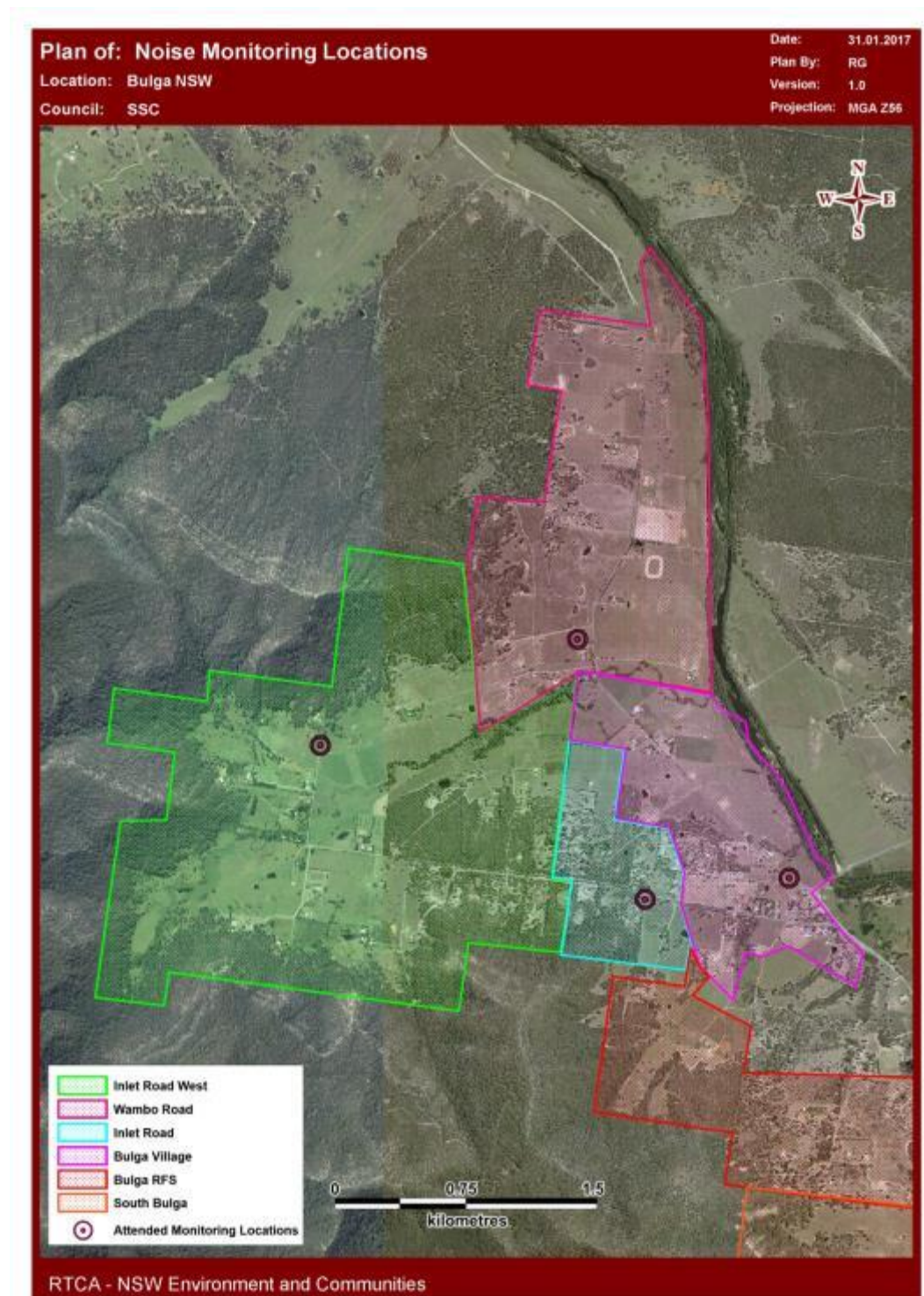
Area	Substrate	Area (ha)	Vegetation Sown
2015 native sowing	spoil / compost	30	MTW Woodland Mix (2013 order) – detailed below.
2015 cover crop	topsoil / compost	10	Spring Summer Rehab Blend (2015) comprising millet, chicory, clover, lucerne and burgundy bean.
2016 native sowing	spoil / compost	5.5	MTW Woodland Mix (2014 order – generally as for 2013 with seasonal variations in accordance with MOP species and genera options).

MTW Woodland Mix (2013 order in accordance with MOP Table 35 – S)			
Category	MOP min. no. species	MOP min. no. genera	Species included in 2013 mix
<b>Trees</b>			
Dominant tall trees	3	3	<i>Eucalyptus crebra</i> , <i>Eucalyptus fibrosa</i> , <i>Eucalyptus moluccana</i> , <i>Corymbia maculata</i>
Sub-dominant tall trees	2	1	<i>Angophora floribunda</i> , <i>Eucalyptus punctata</i> , <i>Eucalyptus tereticornis</i>
Small trees nitrogen fixing	2	1	<i>Acacia implexa</i> , <i>Acacia parvipinnula</i> , <i>Acacia salicina</i>
Small trees non-nitrogen fixing	2	1	<i>Brachychiton populneus</i> , <i>Bursaria spinosa</i> , <i>Callitris endlicheri</i> , <i>Notelaea microcarpa</i>
<b>Shrubs/woody climbers</b>			
Primary colonising and/or short lived Acacias	2	1	<i>Acacia cultriformis</i> , <i>Acacia falcata</i> , <i>Acacia leiocalyx</i>
Long lived and/or understory Acacias	2	2	<i>Acacia amblygona</i> , <i>Acacia decora</i> , <i>Acacia paradoxa</i>
Nitrogen fixing shrubs-non-Acacias ( <i>Fabaceae</i> family)	3	2	<i>Daviesia genistifolia</i> , <i>Daviesia ulicifolia</i> , <i>Hardenbergia violacea</i> , <i>Indigofera australis</i> , <i>Podolobium ilicifolium</i> , <i>Pultenaea spinosa</i>
Non-nitrogen fixing shrubs	4	0	<i>Cassinia arcuata</i> , <i>Cassinia quinquefaria</i> , <i>Clematis glycinoides</i> , <i>Dodonaea viscosa</i> subsp. <i>cuneata</i> , <i>Hakea sericea</i> , <i>Kunzea ambigua</i> , <i>Melaleuca decora</i> , <i>Melaleuca nodosa</i> , <i>Myoporum montanum</i> , <i>Olearia elliptica</i> , <i>Ozothamnus diosmifolius</i> , <i>Senna artemesioides</i> subsp. <i>Zygophylla</i>
<b>Subshrubs</b>			

<b>MTW Woodland Mix</b> (2013 order in accordance with MOP Table 35 – S)			
<b>Category</b>	<b>MOP min. no. species</b>	<b>MOP min. no. genera</b>	<b>Species included in 2013 mix</b>
	3	0	<i>Atriplex semibaccata</i> , <i>Einadia nutans</i> , <i>Einadia trigonos</i> , <i>Enchylaena tomentosa</i>
<b>Forbs</b>			
	6	1	<i>Calocephalus</i> , <i>critreus</i> , <i>Calotis lappulacea</i> , <i>Chrysocephalum apiculatum</i> , <i>Glycine latifolia</i> , <i>Glycine tabacina</i> , <i>Mentha satpureoides</i> , <i>Podolepis neglecta</i> , <i>Swainsona galegifolia</i> , <i>Vittadinia cuneata</i> , <i>Vittadinia sulcata</i> , <i>Wahlenbergia communis</i>
<b>Grasses</b>			
Grasses primary colonising	4	4	<i>Austrostipa densiflora</i> , <i>Austrostipa scabra</i> , <i>Bothriochloa decipiens</i> , <i>Bothriochloa macra</i> , <i>Chloris truncata</i> , <i>Panicum effusum</i>
Grasses long term understorey	5	4	<i>Austrostipa bigeniculata</i> , <i>Capillipedium spicigerum</i> , <i>Dicanthium sericeum</i> , <i>Paspalidium distans</i> , <i>Sporobolus creber</i> , <i>Themeda avenacea</i> , <i>Themeda triandra</i>
Grasses long term understorey shade tolerant	4	1	<i>Austrostipa verticillata</i> , <i>Cymbopogon refractus</i> , <i>Imperata cylindrica</i> , <i>Joycea pallida</i> , <i>Microleana stipoides</i> , <i>Poa labillardieri</i>
<b>Monocots other than grasses</b>			
	4	2	<i>Carex fascicularis</i> , <i>Carex inversa</i> , <i>Fimbristylis dichotoma</i> , <i>Gahnia aspera</i> , <i>Lomandra filiformis</i> , <i>Lomandra longifolia</i> , <i>Lomandra multiflorus</i>

## 10.0 Representation of Private Residences – MTW Noise Monitoring Programme

Below is the representation of private residences and the applicable noise criteria as set out in Schedule 3 of the approvals. :







## Appendix A

Environmental Monitoring  
October 2016



Mount Thorley Warkworth  
Monthly Environmental Report  
October 2016

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## Revision History

Version No.	Person Responsible	Document Status	Date
<b>1.0</b>	<b>Environmental Advisor</b>	<b>Draft</b>	<b>22/11/2016</b>
<b>1.1</b>	<b>Environmental Specialist</b>	<b>Final</b>	<b>01/12/2016</b>

# 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<sup>st</sup> October to 31<sup>st</sup> October 2016.

# 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

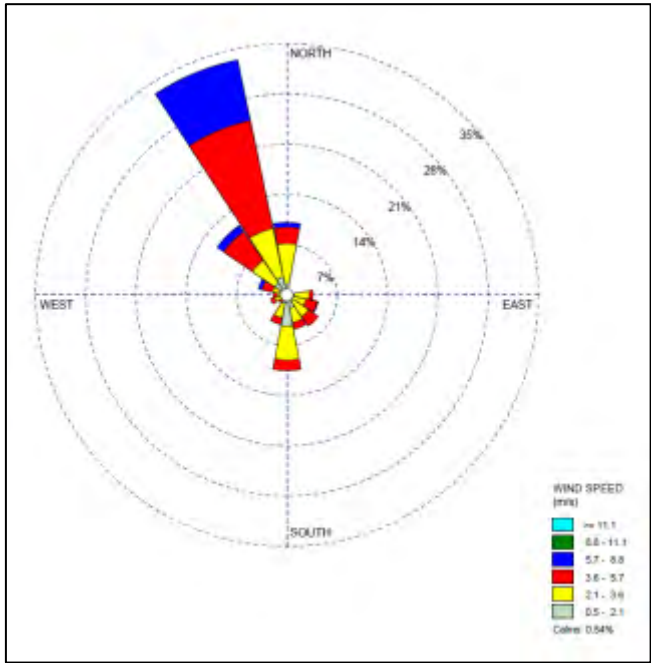
Rainfall for the period is summarised in Table 1, the year-to-date trend and historical trend are shown in **Error! Reference source not found.**

Table 1: Monthly Rainfall MTW

2016	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
October	40.2	534.8

## 2.1.2 Wind Speed and Direction

Winds from the Northwest were dominant throughout the reporting period as shown in **Error! Reference source not found.**





**Mount Thorley Warkworth  
Air Quality Monitoring Programme**

Date: 160622  
Plan By: DF  
Version: 1.3



**Figure 3: Air Quality Monitoring Locations**



## 2.2 Depositional Dust

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

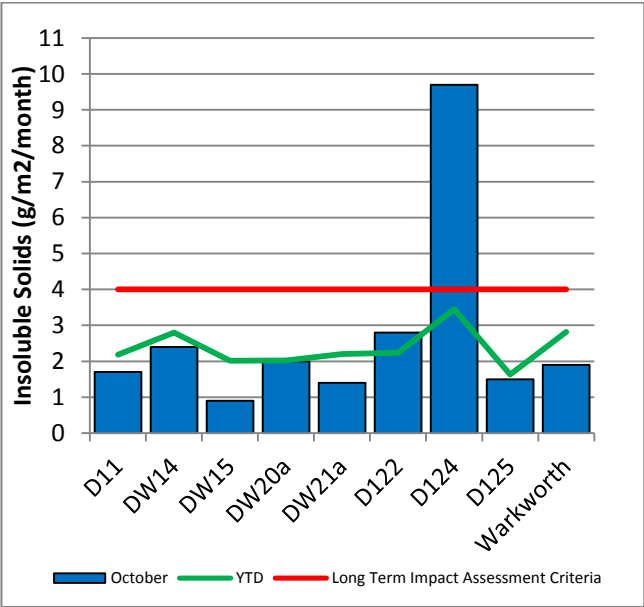


Figure 4 displays Insoluble solids results from depositional dust gauges during the reporting period compared against the year-to-date average and the annual impact assessment criteria.

During the reporting period the D124 monitor recorded a monthly result above the long term impact assessment criteria of 4.0 g/m² 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.

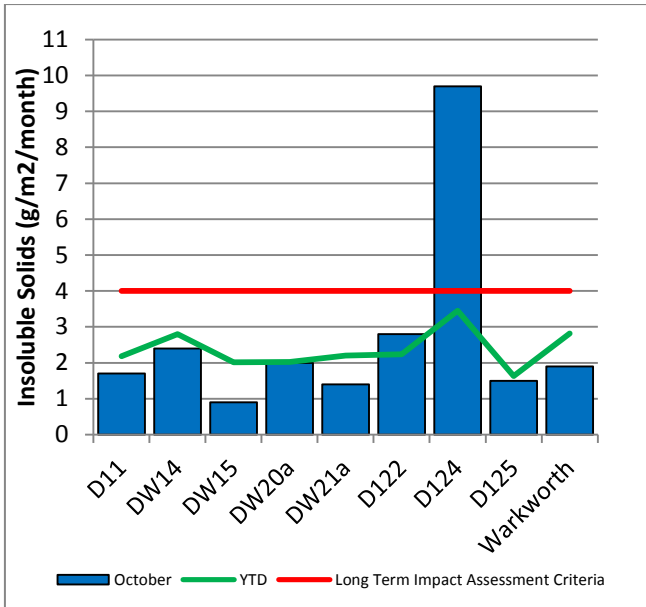


Figure 4: Depositional Dust – October 2016

## 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<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

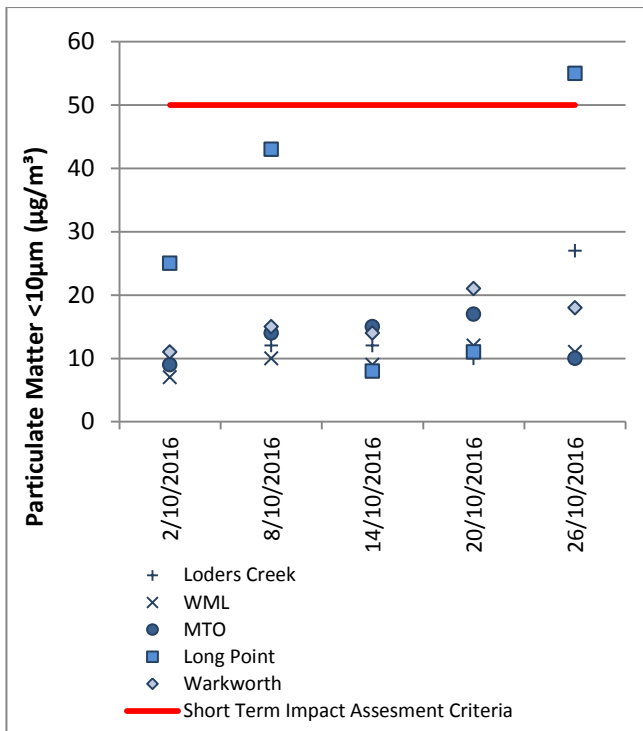
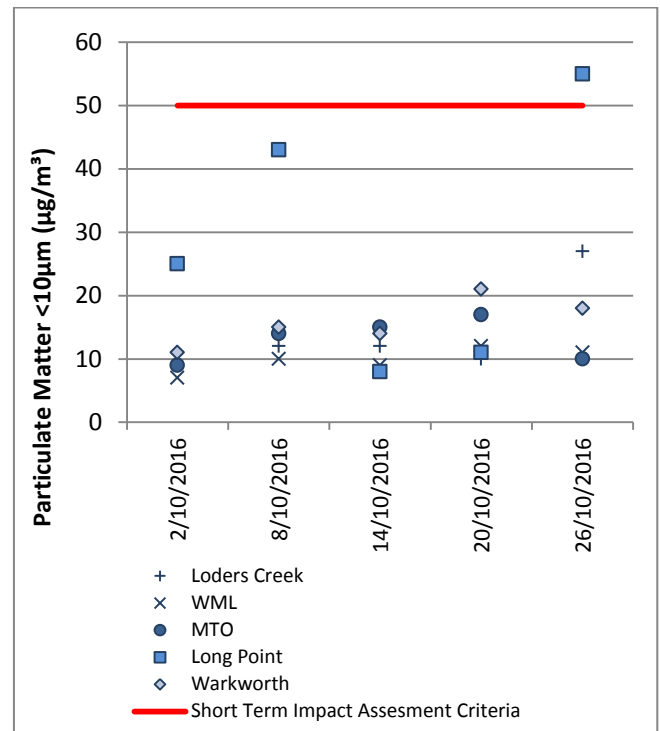


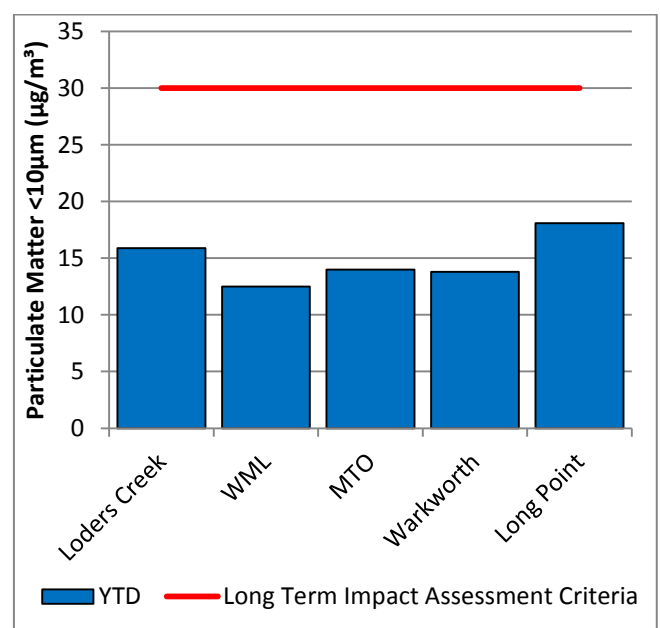
Figure 5 shows the individual PM<sub>10</sub> results at each monitoring station against the short term impact assessment criteria of 50µg/m<sup>3</sup>.

On 26/10/2016 one HVAS PM<sub>10</sub> unit recorded a result greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Long Point (55 µg/m<sup>3</sup>). At the time of preparation of this report, the result is under investigation. Preliminary advice has been provided to the Department of Planning & Environment.



**Figure 5: Individual PM<sub>10</sub> Results – October 2016**

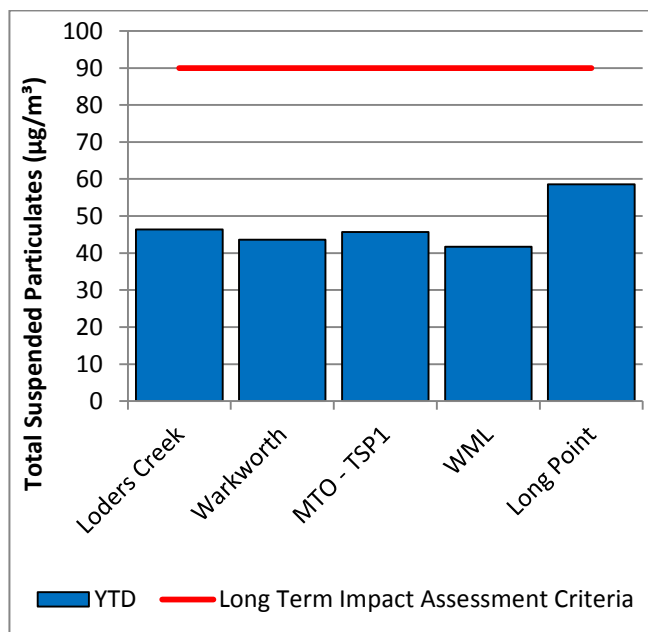
Figure 6 shows the annual average PM<sub>10</sub> results against the long term impact assessment criteria.



**Figure 6: Annual Average PM<sub>10</sub> – October 2016**

### **2.3.2 TSP Results**

Figure 7 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m<sup>3</sup>.



**Figure 7: Annual Average Total Suspended Particulates – October 2016**

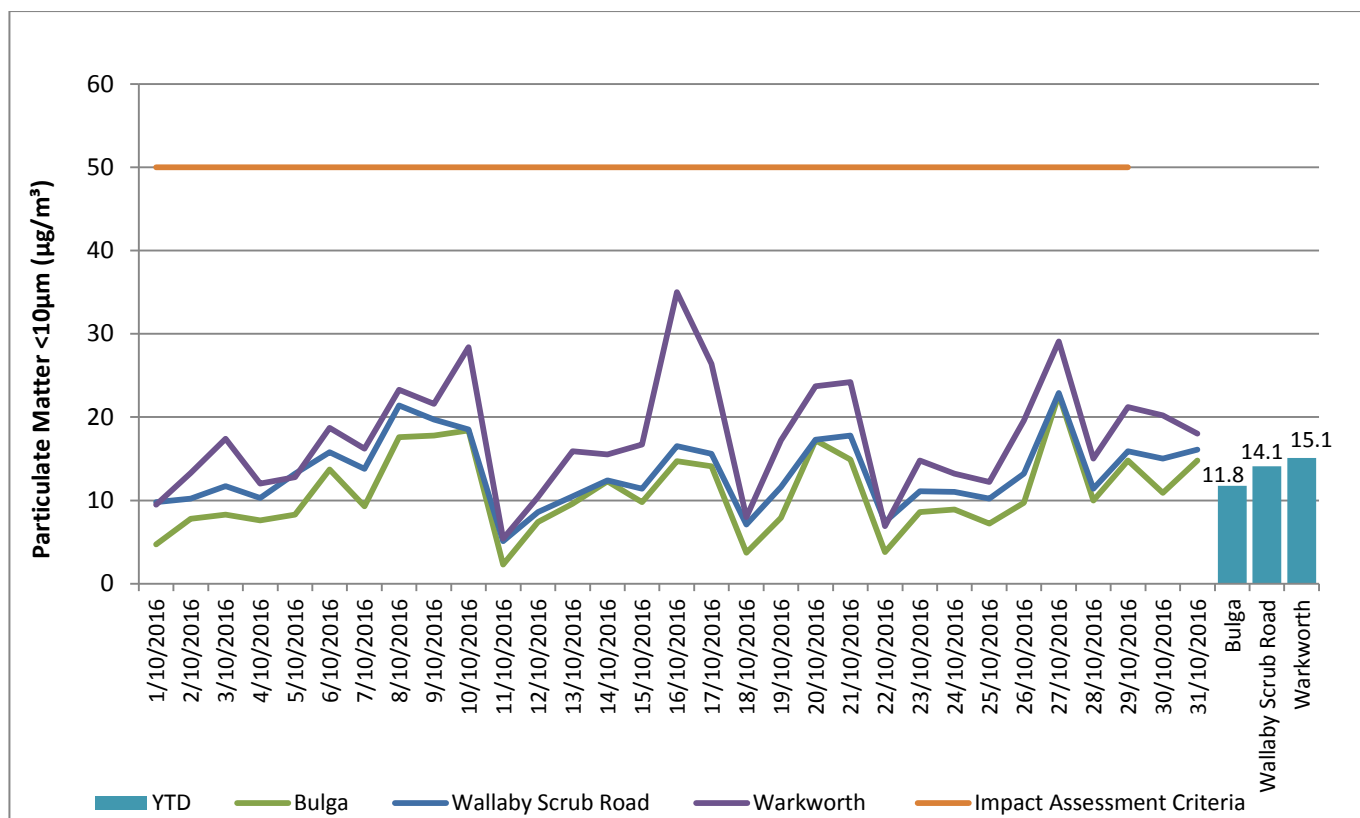
### **2.3.3 Real Time PM<sub>10</sub> Results**

Mount Thorley Warkworth 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 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<sub>10</sub> result and the annual PM<sub>10</sub> average.

### **2.3.4 Real Time Alarms for Air Quality**

During October, the real time monitoring system generated 45 automated air quality related alerts, including 37 alerts for adverse meteorological conditions and 8 alerts for elevated PM<sub>10</sub> levels.



**Figure 8: Real Time PM<sub>10</sub> daily 24hr average and annual average – October 2016**

### 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 December 2016 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 December 2016 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.

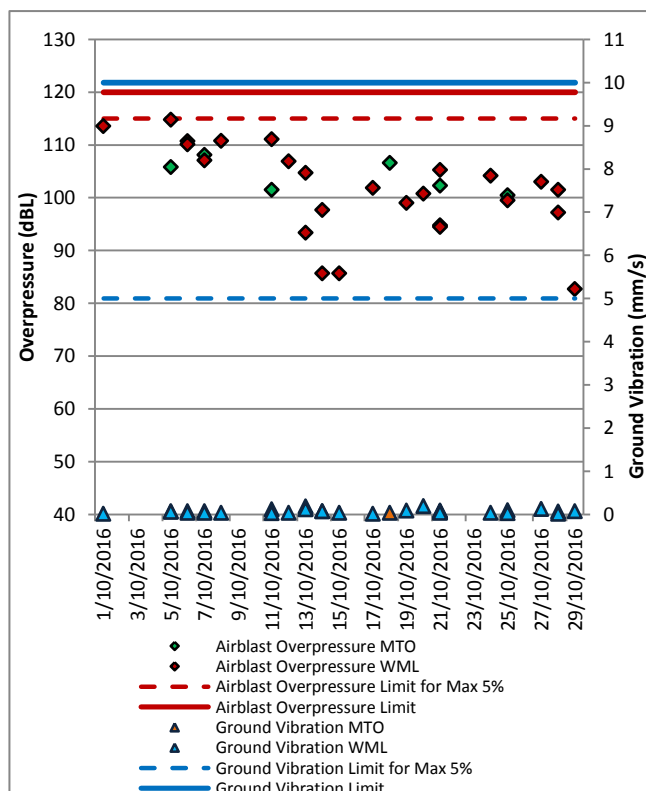
The location of these monitors can be found in **Error! Reference source not found.**

## 4.1 Blast Monitoring Results

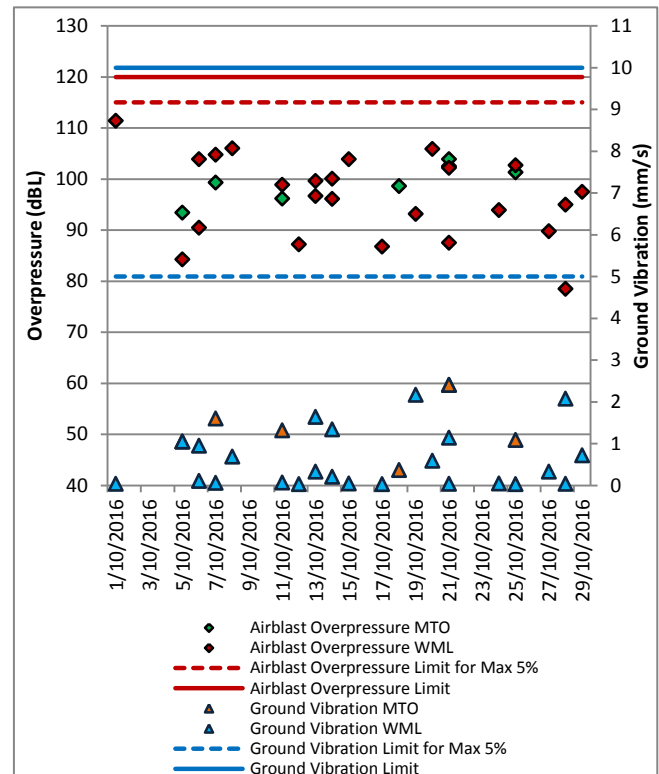
During October 2016, 31 blasts were initiated at MTW. to **Error! Reference source not found.** show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 2.

**Table 2: Blasting Limits**

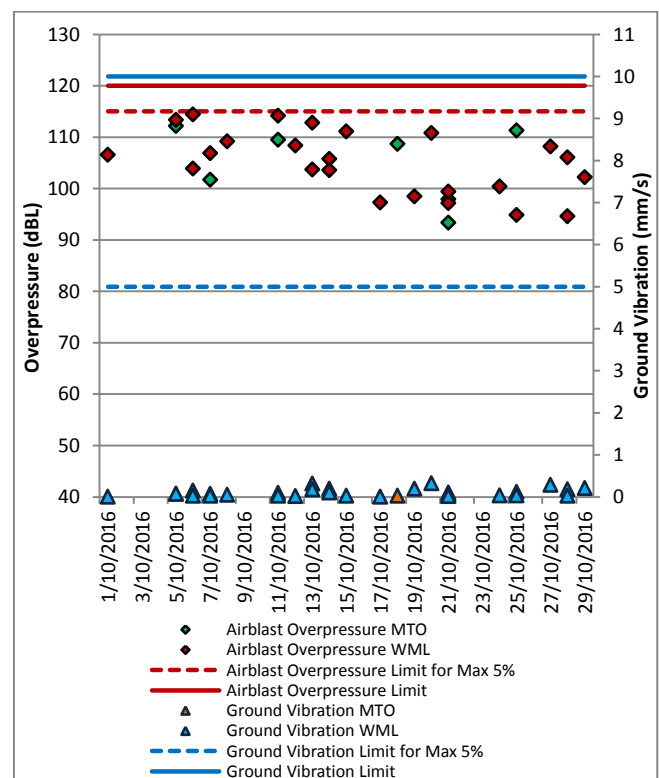
Airblast	
Overpressure (dB(L))	Comments
115	5% of the total number of blasts in a 12 month period
120	0%
Ground Vibration	
(mm/s)	Comments
5	5% of the total number of blasts in a 12 month period
10	0%



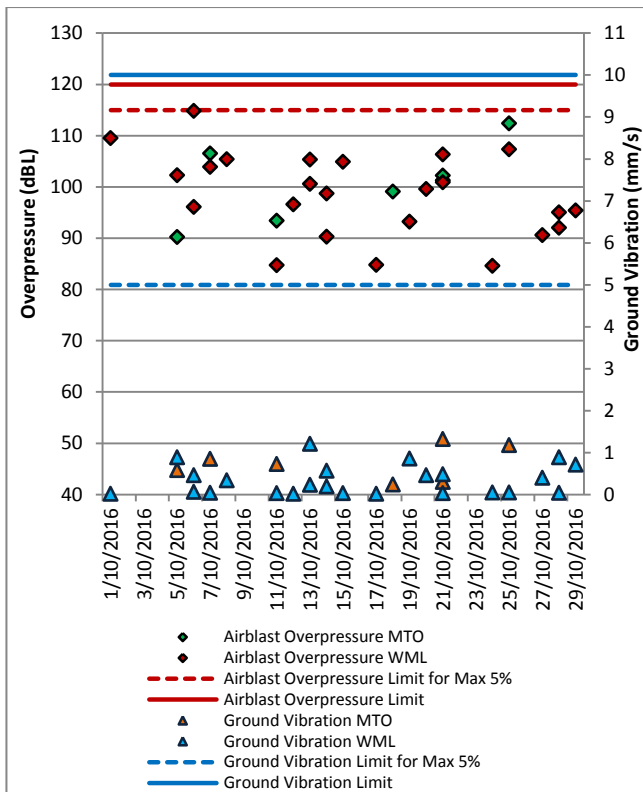
**Figure 9: Abbey Green Blast Monitoring Results – October 2016**



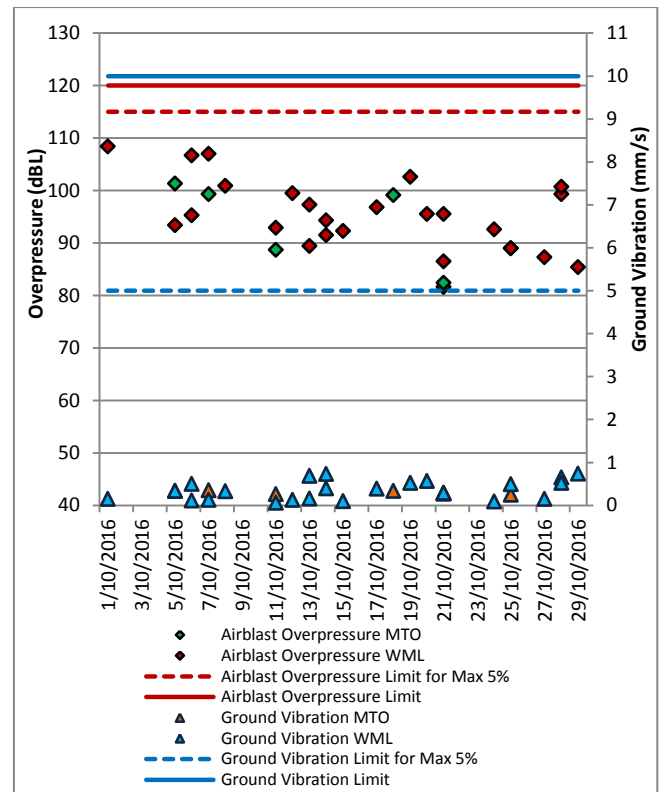
**Figure 10: Bulga Village Blast Monitoring Results – October 2016**



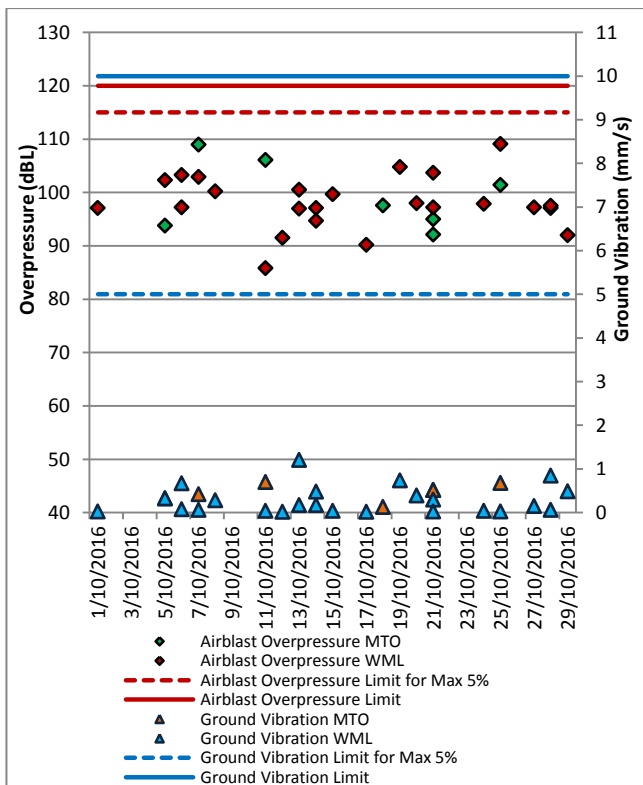
**Figure 11: MTIE Blast Monitoring Results – October 2016**



**Figure 12: Wollemi Peak Road Blast Monitoring Results – October 2016**



**Figure 14: Warkworth Blast Monitoring Results – October 2016**



**Figure 13: Wambo Road Blast Monitoring Results – October 2016**



**Mount Thorley Warkworth  
Blast Monitoring Locations**

Date: 160621  
Plan By: DF  
Version: 4.0



RTCA - NSW Environmental Services

**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 24<sup>th</sup> October 2016. All measurements complied with the relevant criteria. Results are detailed in Table 3 to **Error! Reference source not found.**

#### 5.1.1 WML Noise Assessment

Compliance assessments undertaken against the WML noise criteria are presented in Tables 3 and 4.

**Table 3: L<sub>Aeq</sub>, 15 minute Warkworth Impact Assessment Criteria – October 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion (dB(A))	Criterion Applies? <sup>1,6</sup>	WML L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>	Total L <sub>Ceq</sub> – L <sub>Aeq</sub>	Revised WML L <sub>Aeq</sub> <sup>5,6</sup>
Bulga RFS	24/10/2016 21:02	1.5	F	35	Yes	IA	Nil	19	IA
Bulga Village	24/10/2016 23:36	1.4	E	38	Yes	28	Nil	20	28
Gouldsville	24/10/2016 21:55	1.3	F	37	Yes	IA	Nil	24	IA
Inlet Rd	24/10/2016 22:50	2.1	E	35	Yes	IA	Nil	21	IA
Inlet Rd West	24/10/2016 23:12	1.4	E	35	Yes	25	Nil	23	30
Long Point	24/10/2016 21:08	1.9	F	36	Yes	IA	Nil	25	IA
South Bulga	24/10/2016 21:26	1.4	F	35	Yes	IA	Nil	20	IA

**Table 4: L<sub>Aeq</sub>, 15 minute Warkworth - Land Acquisition Criteria – October 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion (dB(A))	Criterion Applies? <sup>1,6</sup>	WML L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>	Total L <sub>Ceq</sub> – L <sub>Aeq</sub> <sup>7</sup>	Revised WML L <sub>Aeq</sub> <sup>5,6</sup>
Bulga RFS	24/10/2016 21:02	1.5	F	40	Yes	IA	Nil	19	IA
Bulga Village	24/10/2016 23:36	1.4	E	43	Yes	28	Nil	20	28
Gouldsville	24/10/2016 21:55	1.3	F	43	Yes	IA	Nil	24	IA
Inlet Rd	24/10/2016 22:50	2.1	E	40	Yes	IA	Nil	21	IA
Inlet Rd West	24/10/2016 23:12	1.4	E	40	Yes	25	Nil	23	30
Long Point	24/10/2016 21:08	1.9	F	40	Yes	IA	Nil	25	IA
South Bulga	24/10/2016 21:26	1.4	F	40	Yes	IA	Nil	20	IA

#### Notes

- 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;
- Estimated or measured LA1,1minute attributed to Warkworth mine (WML);
- 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;
- Bolded results in red are possible exceedances of relevant criteria; and
- 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<sub>Aeq, 15minute</sub> Mount Thorley - Impact Assessment Criteria – October 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion dB	Criterion Applies? <sup>1,6</sup>	MTO L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>	Total L <sub>Ceq</sub> – L <sub>Aeq</sub> <sup>7</sup>	Revised MTO L <sub>Aeq</sub> <sup>5,6</sup>
Bulga RFS	24/10/2016 21:02	1.5	F	37	Yes	<30	Nil	19	<35
Bulga Village	24/10/2016 23:36	1.4	E	38	Yes	30	Nil	20	35
Gouldsville	24/10/2016 21:55	1.3	F	35	Yes	1A	Nil	24	1A
Inlet Rd	24/10/2016 22:50	2.1	E	37	Yes	29	Nil	21	34
Inlet Rd West	24/10/2016 23:12	1.4	E	35	Yes	<25	Nil	23	<25
Long Point	24/10/2016 21:08	1.9	F	35	Yes	1A	Nil	25	1A
South Bulga	24/10/2016 21:26	1.4	F	36	Yes	<25	Nil	20	<30

**Table 6: L<sub>A1, 1Minute</sub> Mount Thorley - Impact Assessment Criteria – October 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	MTO L <sub>A1, 1min</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Bulga RFS	24/10/2016 21:02	1.5	F	47	Yes	<30	Nil
Bulga Village	24/10/2016 23:36	1.4	E	48	Yes	35	Nil
Gouldsville	24/10/2016 21:55	1.3	F	45	Yes	1A	Nil
Inlet Rd	24/10/2016 22:50	2.1	E	47	Yes	38	Nil
Inlet Rd West	24/10/2016 23:12	1.4	E	45	Yes	28	Nil
Long Point	24/10/2016 21:08	1.9	F	45	Yes	1A	Nil
South Bulga	24/10/2016 21:26	1.4	F	46	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;

2. Estimated or measured L<sub>A1, 1minute</sub> 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<sub>Ceq</sub> 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). There were no exceedances of noise criteria following application of the INP Low Frequency modification factor during October 2016.

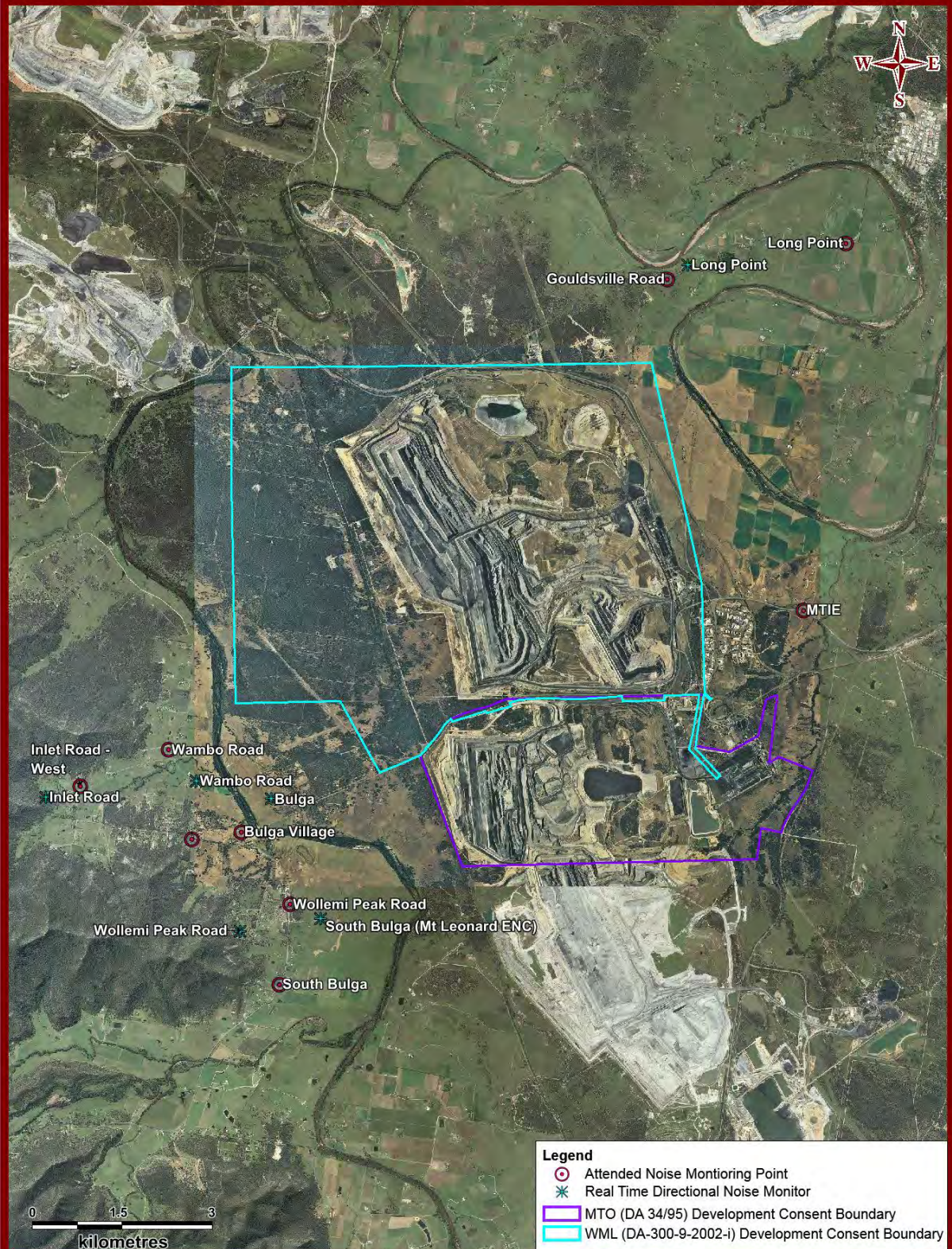


**Mount Thorley Warkworth  
Noise Monitoring Programme**

Date: 160226

Plan By: DF

Version: 2.0



RTCA - NSW Environmental Services

**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.

**A summary of these assessments undertaken during October are provided in**

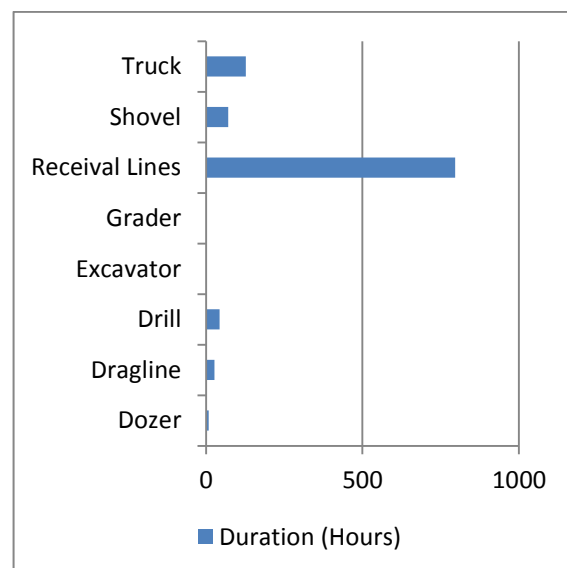
**Table 7: Supplementary Attended Noise Monitoring Data – October 2016**

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
444	3	2	0.68

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

## 6.0 OPERATIONAL DOWNTIME

During October, a total of 1076 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.

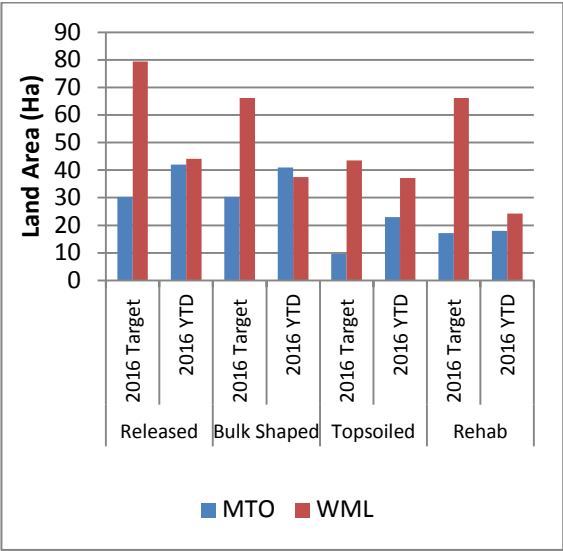


**Figure 17: Operational Downtime by Equipment Type – October 2016**

## 7.0 REHABILITATION



During October, 12.1 Ha of land was released, 17.3 Ha of land was bulk shaped, 15.4 Ha of land was topsoiled, 16.4 Ha of land was composted and 15.4 Ha of land was rehabilitated. Year-to-date progress can be viewed in **Error! Reference source not found.**



**Figure 18: Rehabilitation YTD – October 2016**

## 8.0 ENVIRONMENTAL INCIDENTS

There were no reportable environmental incidents during the reporting period.

## 9.0 COMPLAINTS

During the reporting period 36 complaints were received, details of these complaints are shown in **Error! Reference source not found.** below.

	Noise	Dust	Blast	Lighting	Other	Total
January	29	1	5	2	2	39
February	24	2	6	1	0	33
March	44	1	2	1	0	48
April	67	7	4	0	5	83
May	17	5	7	2	0	31
June	18	1	4	5	2	30
July	15	1	5	0	11	32
August	48	3	10	1	2	64
September	24	2	6	0	3	35
October	22	6	6	1	1	36
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	308	29	55	13	26	431

**Figure 19: Complaints Summary - YTD October 2016**

## **Appendix A: Meteorological Data**

**Table 8: Meteorological Data – Charlton Ridge Meteorological Station – October 2016**

<b>Date</b>	<b>Air Temperature Maximum (°C)</b>	<b>Air Temperature Minimum (°C)</b>	<b>Relative Humidity Maximum (%)</b>	<b>Relative Humidity Minimum (%)</b>	<b>Wind Direction Average (°)</b>	<b>Wind Speed Average (m/sec)</b>	<b>Rainfall(mm)</b>
1/10/2016	21.0	9.9	63.9	35.2	300.5	5.2	0.0
2/10/2016	-	-	-	-	-	-	-
3/10/2016	25.7	8.1	81.4	28.0	282.3	4.2	0.0
4/10/2016	22.3	8.5	62.9	28.8	296.0	6.6	0.0
5/10/2016	22.4	9.1	53.8	18.7	287.1	4.4	0.0
6/10/2016	27.0	9.9	57.8	20.6	301.1	5.5	0.0
7/10/2016	28.9	10.2	76.3	18.0	280.0	3.4	0.0
8/10/2016	27.6	12.9	79.6	29.7	237.9	4.0	0.0
9/10/2016	24.2	12.3	78.9	33.4	129.7	2.2	0.0
10/10/2016	32.0	11.2	93.0	29.9	245.2	3.9	10.2
11/10/2016	20.9	8.9	85.2	18.9	239.3	3.2	1.8
12/10/2016	22.1	3.8	78.5	30.0	236.3	2.9	0.0
13/10/2016	19.6	10.0	74.8	39.6	160.6	3.6	0.0
14/10/2016	22.5	7.0	83.5	30.2	147.0	2.2	0.0
15/10/2016	25.8	5.3	92.7	18.3	216.1	2.3	0.0
16/10/2016	28.5	7.4	75.9	24.3	280.4	3.9	0.0
17/10/2016	21.7	10.2	94.4	33.2	273.8	4.4	7.6
18/10/2016	23.7	6.5	91.0	26.9	291.5	4.1	0.0
19/10/2016	15.4	13.7	68.0	52.9	140.2	2.6	0.0
20/10/2016	24.4	12.2	74.8	38.1	126.3	2.8	0.0
21/10/2016	28.5	8.5	93.3	37.4	223.8	2.6	0.0
22/10/2016	19.6	9.8	96.5	35.5	251.9	4.0	16.0
23/10/2016	21.1	5.5	78.2	24.1	199.9	2.5	0.0
24/10/2016	23.5	5.3	89.8	26.8	194.2	2.4	0.0
25/10/2016	26.6	6.2	89.9	20.2	248.8	3.2	0.0
26/10/2016	29.2	9.4	72.6	17.8	285.9	3.1	0.0
27/10/2016	30.6	13.3	81.8	21.1	180.9	3.0	0.0
28/10/2016	19.2	11.7	95.7	65.6	172.8	2.7	1.6
29/10/2016	28.6	14.1	89.1	40.3	147.9	2.7	0.0
30/10/2016	30.2	13.8	96.5	35.4	242.6	3.5	3.0
31/10/2016	26.5	11.2	87.4	18.3	229.1	3.8	0.0

- Data unavailable due to power outage



## Appendix B

Environmental Monitoring  
November 2016





Mount Thorley Warkworth  
Monthly Environmental Report  
November 2016

Coal & Allied Operations Pty Ltd

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## Revision History

Version No.	Person Responsible	Document Status	Date
<b>1.0</b>	<b>Environmental Advisor</b>	<b>Final</b>	<b>30/12/2016</b>

# 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<sup>st</sup> November to 30<sup>th</sup> November 2016.

# 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 **Error! Reference source not found.**

Table 1: Monthly Rainfall MTW

2016	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
November	64	598.8

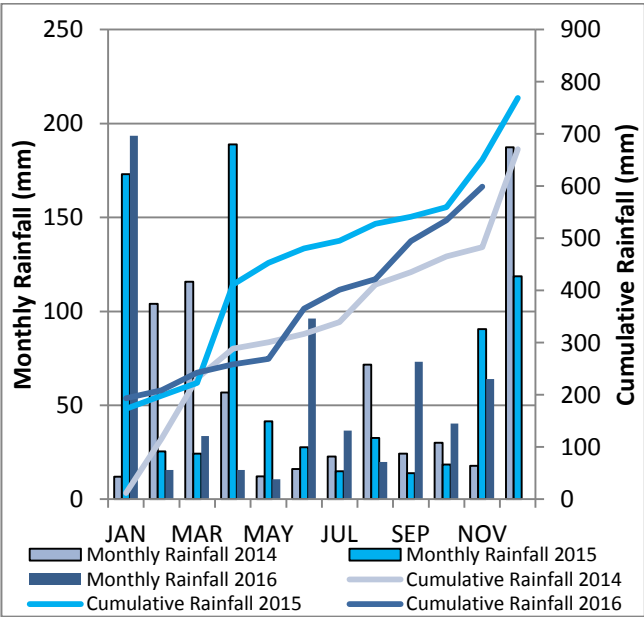


Figure 1: Rainfall Trend YTD

## 2.1.2 Wind Speed and Direction

Winds from the South and Northwest were dominant throughout the reporting period as shown in **Error! Reference source not found.**

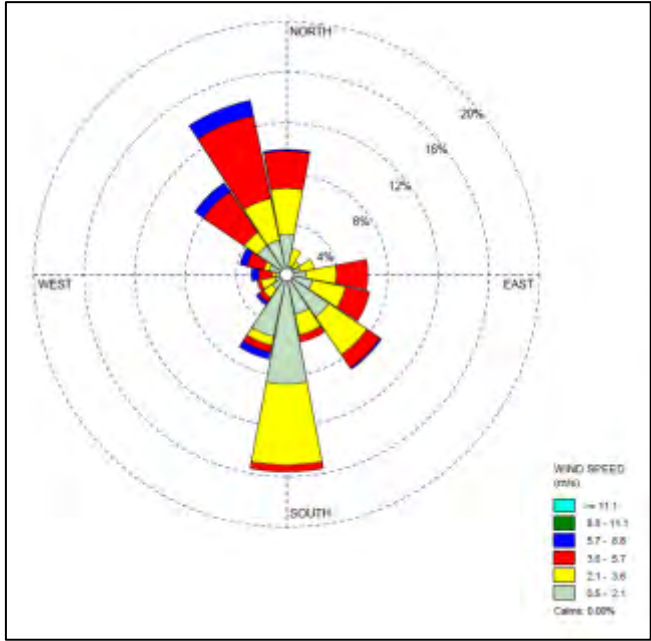


Figure 2: Charlton Ridge Wind Rose – November 2016



**Mount Thorley Warkworth  
Air Quality Monitoring Programme**

Date: 160622  
Plan By: DF  
Version: 1.3



**Figure 3: Air Quality Monitoring Locations**



## 2.2 Depositional Dust

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

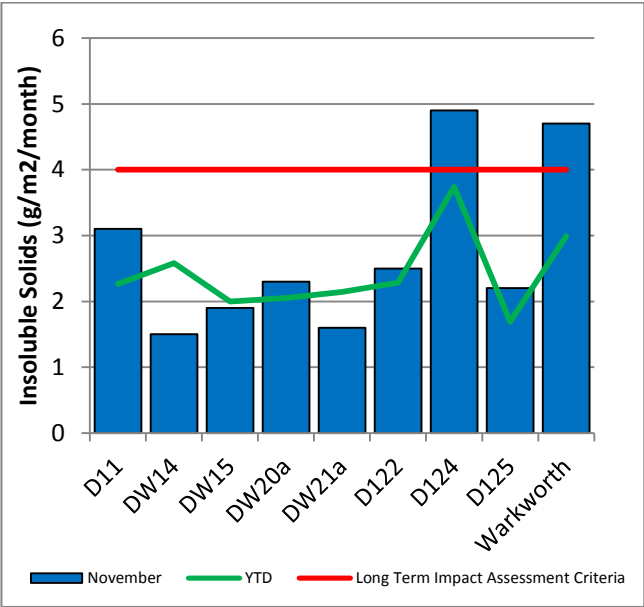


Figure 4 displays Insoluble solids results from depositional dust gauges during the reporting period compared against the year-to-date average and the annual impact assessment criteria.

During the reporting period the D124 and Warkworth monitors recorded monthly results above the long term impact assessment criteria of 4.0 g/m² per month. Field notes associated with Warkworth 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 D124 result is contaminated. Accordingly, this result will be included in the annual average calculation.

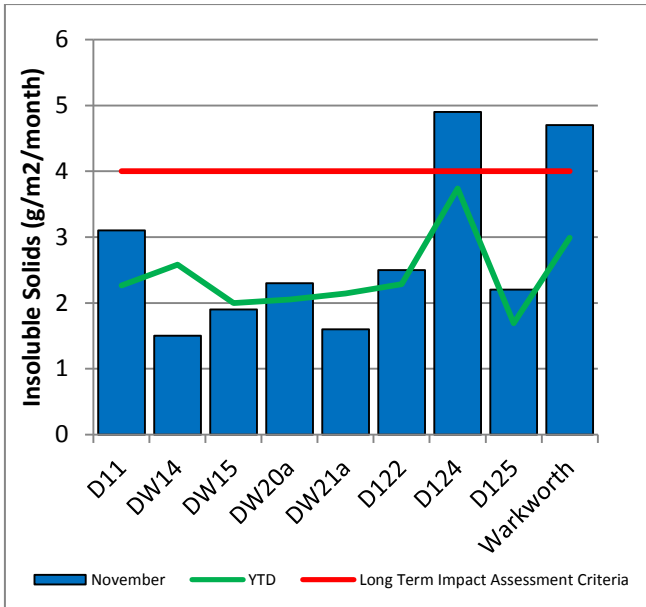


Figure 4: Depositional Dust – November 2016

## 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<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



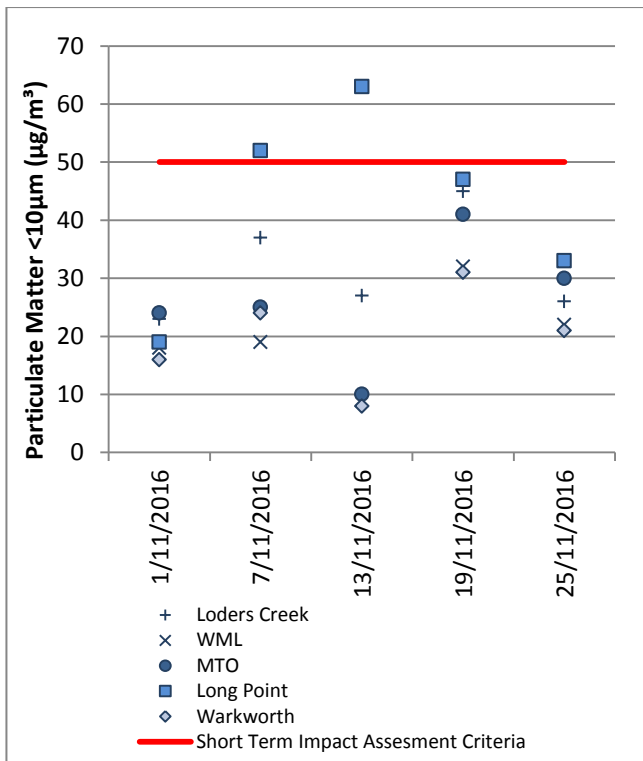
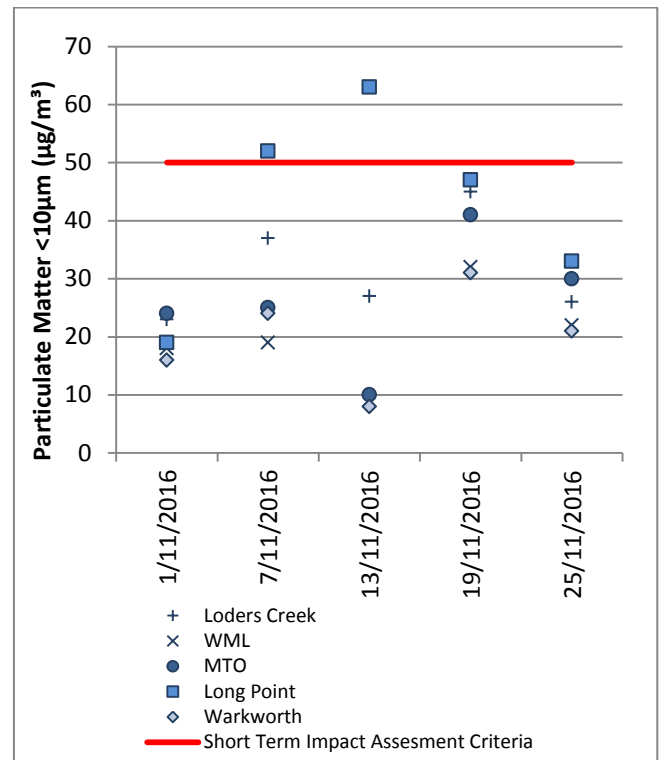


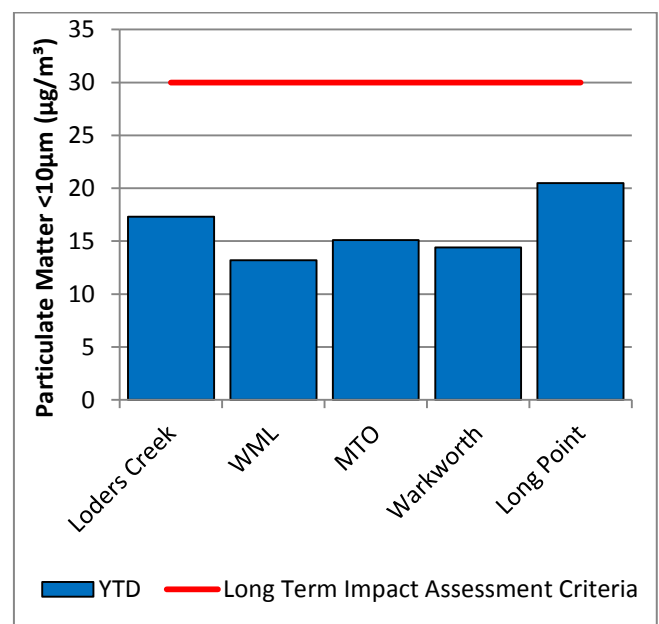
Figure 5 shows the individual PM<sub>10</sub> results at each monitoring station against the short term impact assessment criteria of 50µg/m<sup>3</sup>.

On 7/11/2016 and on 13/11/2016 one HVAS PM<sub>10</sub> unit recorded a result greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Long Point (52 µg/m<sup>3</sup> and 63 µg/m<sup>3</sup> respectively). Preliminary investigation indicates that MTW is not the main contributor to elevated PM<sub>10</sub> levels on these days.



**Figure 5: Individual PM<sub>10</sub> Results – November 2016**

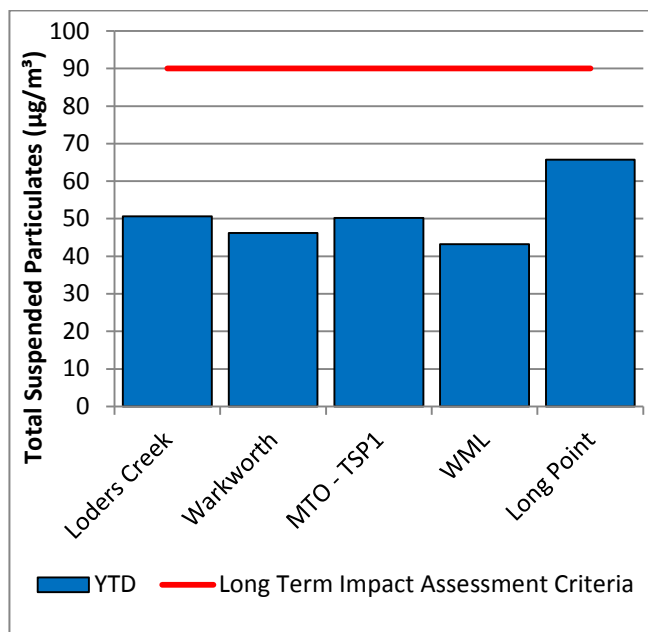
Figure 6 shows the annual average PM<sub>10</sub> results against the long term impact assessment criteria.



**Figure 6: Annual Average PM<sub>10</sub> – November 2016**

### 2.3.2 TSP Results

Figure 7 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m<sup>3</sup>.



**Figure 7: Annual Average Total Suspended Particulates – November 2016**

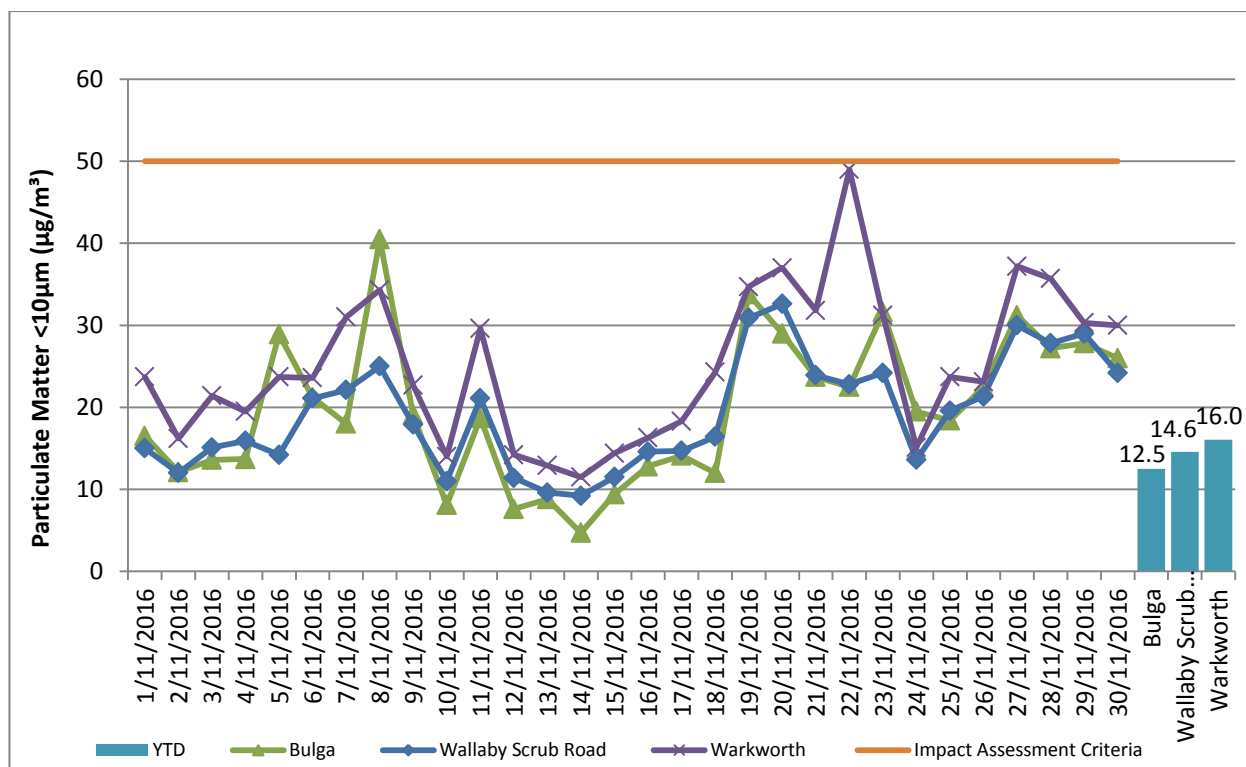
### 2.3.3 Real Time PM<sub>10</sub> Results

Mount Thorley Warkworth 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 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<sub>10</sub> result and the annual PM<sub>10</sub> average.

### 2.3.4 Real Time Alarms for Air Quality

During November, the real time monitoring system generated 56 automated air quality related alerts, including 27 alerts for adverse meteorological conditions and 29 alerts for elevated PM<sub>10</sub> levels.



**Figure 8: Real Time PM<sub>10</sub> daily 24hr average and annual average – November 2016**

### 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 December 2016 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 December 2016 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.

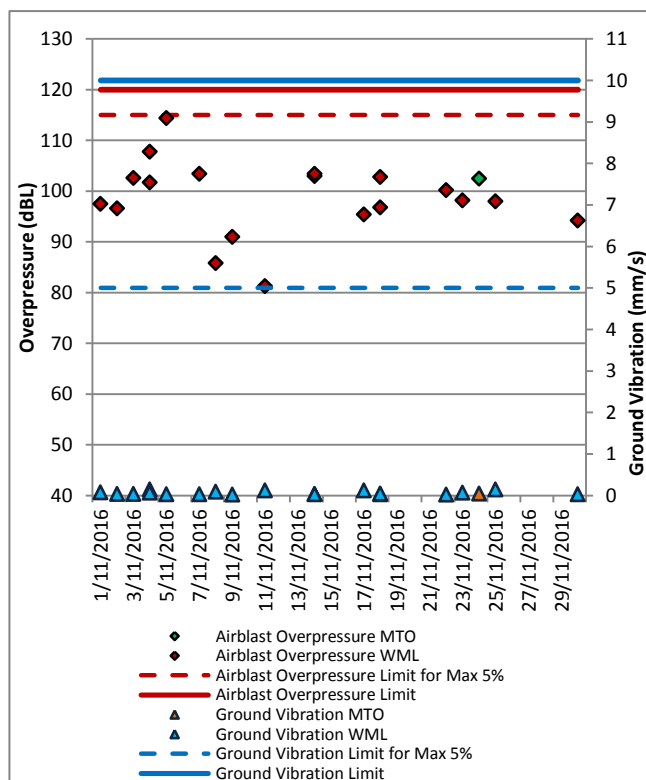
The location of these monitors can be found in **Error! Reference source not found.**

## 4.1 Blast Monitoring Results

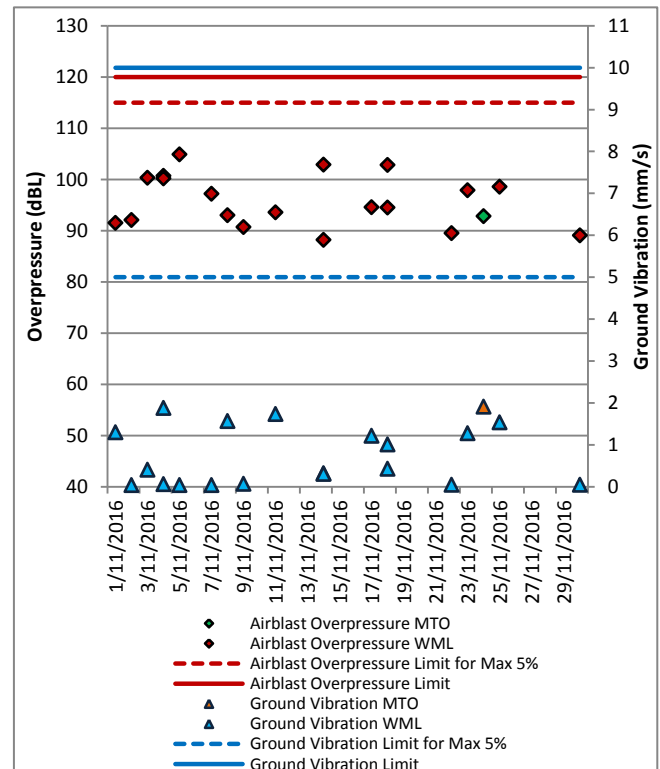
During November 2016, 20 blasts were initiated at MTW. to **Error! Reference source not found.** show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 2.

**Table 2: Blasting Limits**

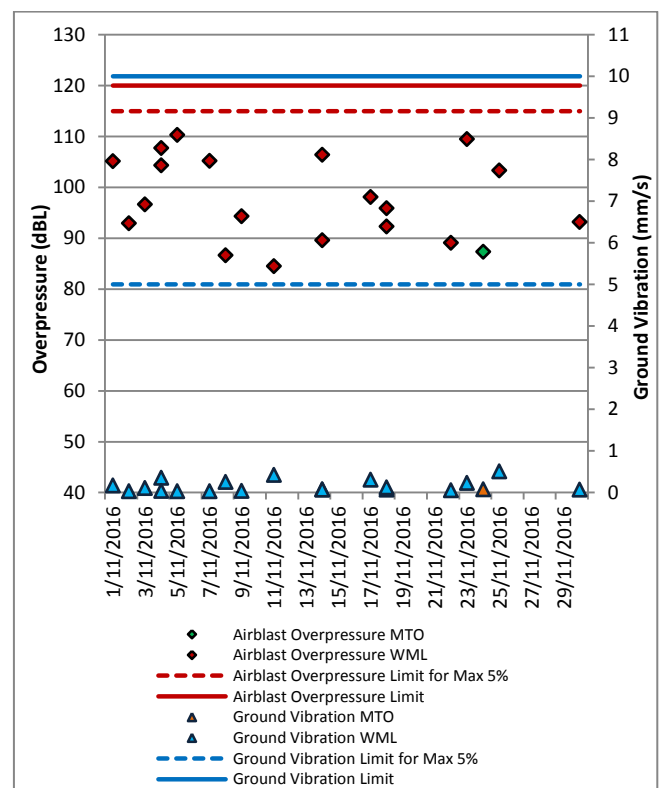
Airblast	
Overpressure (dB(L))	Comments
115	5% of the total number of blasts in a 12 month period
120	0%
Ground Vibration	
(mm/s)	Comments
5	5% of the total number of blasts in a 12 month period
10	0%



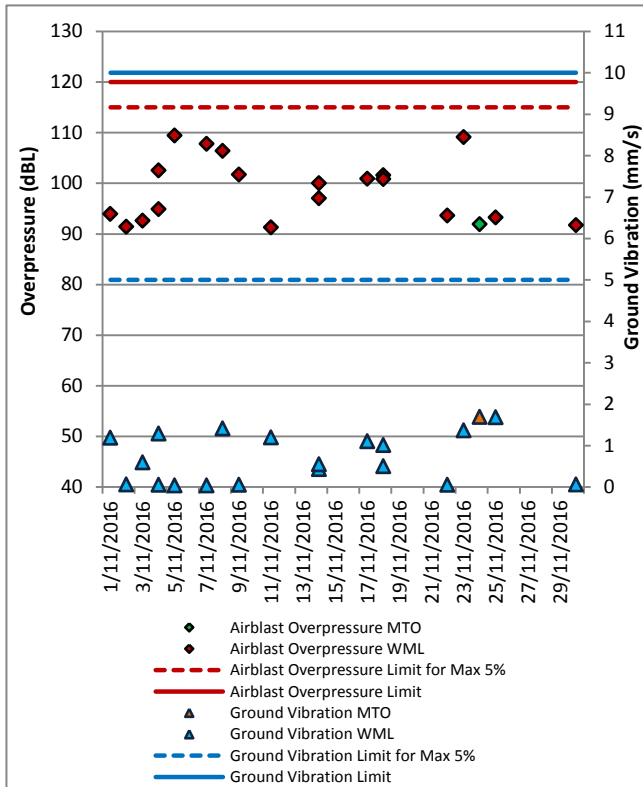
**Figure 9: Abbey Green Blast Monitoring Results – November 2016**



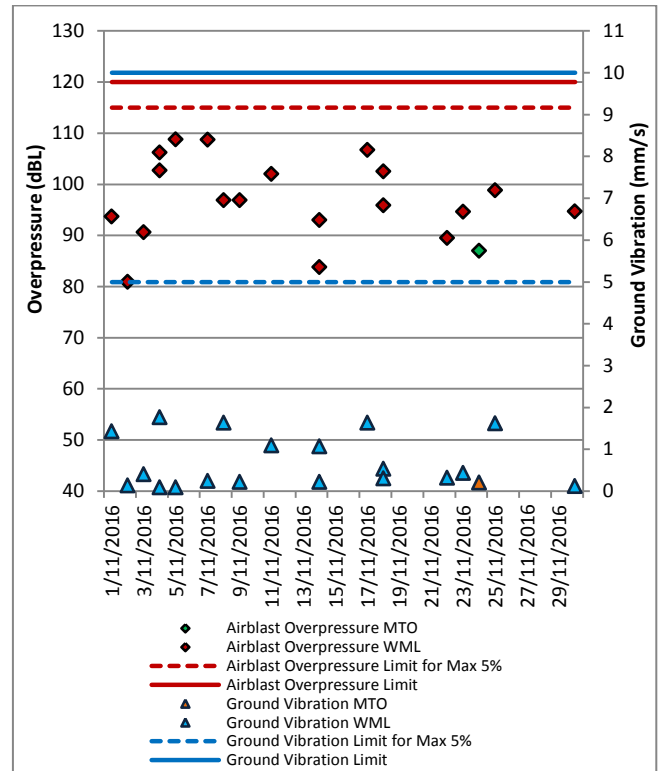
**Figure 10: Bulga Village Blast Monitoring Results – November 2016**



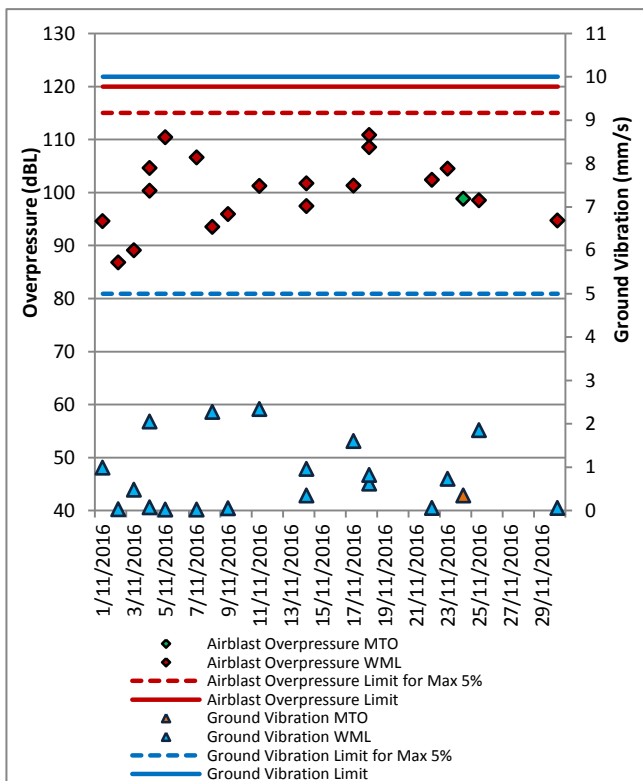
**Figure 11: MTIE Blast Monitoring Results – November 2016**



**Figure 12: Wollemi Peak Road Blast Monitoring Results – November 2016**



**Figure 14: Warkworth Blast Monitoring Results – November 2016**



**Figure 13: Wambo Road Blast Monitoring Results – November 2016**



**Mount Thorley Warkworth  
Blast Monitoring Locations**

Date: 160621  
Plan By: DF  
Version: 4.0



RTCA - NSW Environmental Services

**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 17<sup>th</sup> November 2016. All measurements complied with the relevant criteria. Results are detailed in Table 3 to **Error! Reference source not found.**

#### 5.1.1 WML Noise Assessment

Compliance assessments undertaken against the WML noise criteria are presented in Tables 3 and 4.

**Table 3: L<sub>Aeq</sub>, 15 minute Warkworth Impact Assessment Criteria – November 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion (dB(A))	Criterion Applies? <sup>1,6</sup>	WML L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>	Total L <sub>Ceq</sub> – L <sub>Aeq</sub>	Revised WML L <sub>Aeq</sub> <sup>5,6</sup>
Bulga RFS	17/11/2016 22:50	1.4	F	35	Yes	<30	Nil	14	<30
Bulga Village	17/11/2016 21:00	3.1	E	38	No	28	NA	15	28
Gouldsville	17/11/2016 21:26	1.6	F	37	Yes	1A	Nil	20	1A
Inlet Rd	17/11/2016 21:22	2.4	F	35	No	32	NA	17	37
Inlet Rd West	17/11/2016 21:48	1.7	F	35	Yes	29	Nil	17	34
Long Point	17/11/2016 21:49	1.7	F	36	Yes	1A	Nil	21	1A
South Bulga	17/11/2016 23:42	1.7	E	35	Yes	<30	Nil	9	<30

**Table 4: L<sub>Aeq</sub>, 15 minute Warkworth - Land Acquisition Criteria – November 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion (dB(A))	Criterion Applies? <sup>1,6</sup>	WML L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>	Total L <sub>Ceq</sub> – L <sub>Aeq</sub> <sup>7</sup>	Revised WML L <sub>Aeq</sub> <sup>5,6</sup>
Bulga RFS	17/11/2016 22:50	1.4	F	40	Yes	<30	Nil	14	<30
Bulga Village	17/11/2016 21:00	3.1	E	43	No	28	NA	15	28
Gouldsville	17/11/2016 21:26	1.6	F	43	Yes	1A	Nil	20	1A
Inlet Rd	17/11/2016 21:22	2.4	F	40	No	32	NA	17	37
Inlet Rd West	17/11/2016 21:48	1.7	F	40	Yes	29	Nil	17	34
Long Point	17/11/2016 21:49	1.7	F	40	Yes	1A	Nil	21	1A
South Bulga	17/11/2016 23:42	1.7	E	40	Yes	<30	Nil	9	<30

#### Notes

- 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;
- Estimated or measured LA<sub>1,1minute</sub> attributed to Warkworth mine (WML);
- 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;
- Bolded results in red are possible exceedances of relevant criteria; and
- 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<sub>Aeq, 15minute</sub> Mount Thorley - Impact Assessment Criteria – November 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion dB	Criterion Applies? <sup>1,6</sup>	MTO L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>	Total L <sub>Ceq</sub> – L <sub>Aeq</sub> <sup>7</sup>	Revised MTO L <sub>Aeq</sub> <sup>5,6</sup>
Bulga RFS	17/11/2016 22:50	1.4	F	37	Yes	33	Nil	14	33
Bulga Village	17/11/2016 21:00	3.1	E	38	No	30	NA	15	35
Gouldsville	17/11/2016 21:26	1.6	F	35	Yes	IA	Nil	20	IA
Inlet Rd	17/11/2016 21:22	2.4	F	37	No	32	NA	17	37
Inlet Rd West	17/11/2016 21:48	1.7	F	35	Yes	27	Nil	17	27
Long Point	17/11/2016 21:49	1.7	F	35	Yes	IA	Nil	21	IA
South Bulga	17/11/2016 23:42	1.7	E	36	Yes	30	Nil	9	30

**Table 6: L<sub>A1, 1Minute</sub> Mount Thorley - Impact Assessment Criteria – November 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	MTO L <sub>A1, 1min</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Bulga RFS	17/11/2016 22:50	1.4	F	47	Yes	36	Nil
Bulga Village	17/11/2016 21:00	3.1	E	48	No	32	NA
Gouldsville	17/11/2016 21:26	1.6	F	45	Yes	IA	Nil
Inlet Rd	17/11/2016 21:22	2.4	F	47	No	34	NA
Inlet Rd West	17/11/2016 21:48	1.7	F	45	Yes	33	Nil
Long Point	17/11/2016 21:49	1.7	F	45	Yes	IA	Nil
South Bulga	17/11/2016 23:42	1.7	E	46	Yes	38	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;

2. Estimated or measured L<sub>A1, 1minute</sub> 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<sub>Ceq</sub> 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 L<sub>Aeq</sub> noise levels exceeded the WML impact assessment criteria by 2 dB at Inlet Road, and remained in compliance at all other locations.

These results have been reported in writing to the NSW Department of Planning and Environment.

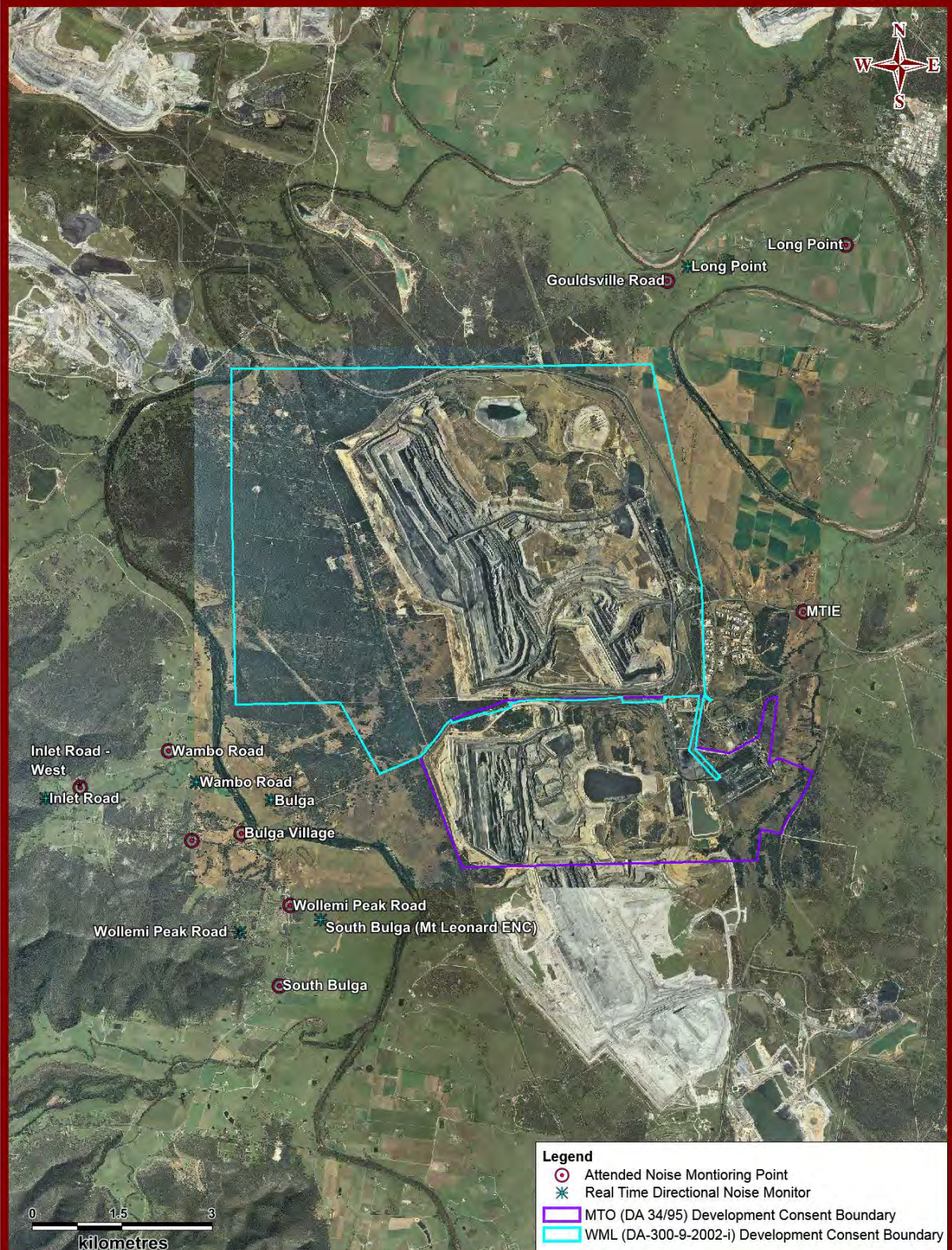


**Mount Thorley Warkworth  
Noise Monitoring Programme**

Date: 160226

Plan By: DF

Version: 2.0



RTCA - NSW Environmental Services

**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.

**A summary of these assessments undertaken during November are provided in**

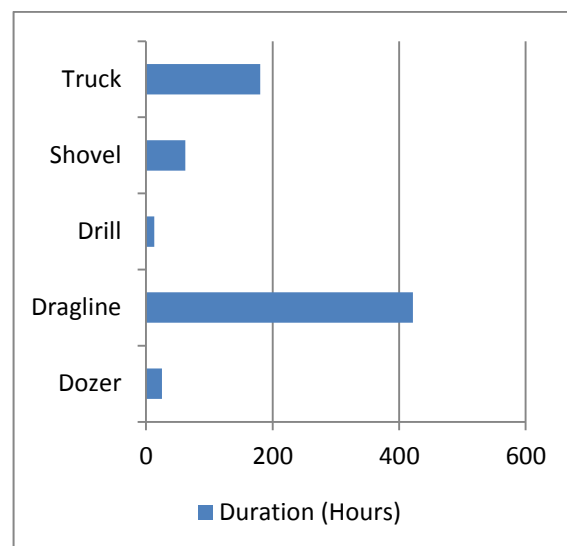
**Table 7: Supplementary Attended Noise Monitoring Data – November 2016**

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
461	2	1	0.43

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

## 6.0 OPERATIONAL DOWNTIME

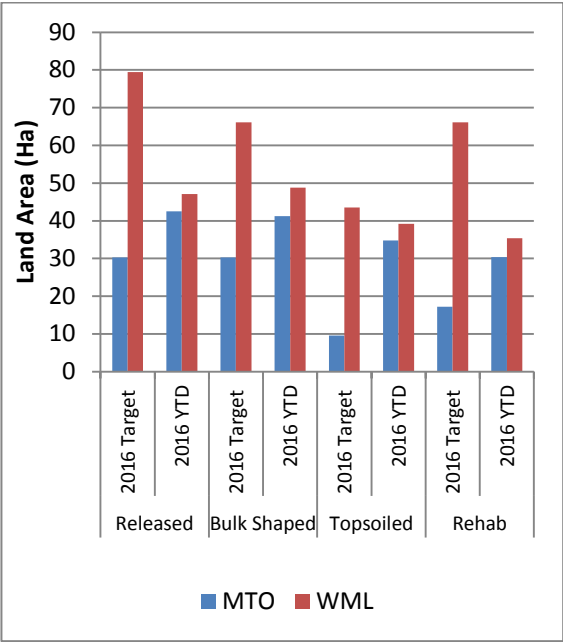
During November, a total of 702.4 hours of equipment downtime was logged in response to environmental events such as dust, noise and adverse meteorological conditions. Operational downtime by equipment type is shown in Figure 17.



**Figure 17: Operational Downtime by Equipment Type – November 2016**

## 7.0 REHABILITATION

During November, 3.4 Ha of land was released, 11.5 Ha of land was bulk shaped, 13.9 Ha of land was topsoiled, 29.9 Ha of land was composted and 23.5 Ha of land was rehabilitated. Year-to-date progress can be viewed in **Error! Reference source not found.**



**Figure 18: Rehabilitation YTD – November 2016**

## 8.0 ENVIRONMENTAL INCIDENTS

There were no reportable environmental incidents during the reporting period.

## 9.0 COMPLAINTS

During the reporting period 26 complaints were received, details of these complaints are shown in **Error! Reference source not found.** below.

	Noise	Dust	Blast	Lighting	Other	Total
January	29	1	5	2	2	39
February	24	2	6	1	0	33
March	44	1	2	1	0	48
April	67	7	4	0	5	83
May	17	5	7	2	0	31
June	18	1	4	5	2	30
July	15	1	5	0	11	32
August	48	3	10	1	2	64
September	24	2	6	0	3	35
October	22	6	6	1	1	36
November	13	7	3	2	1	26
December	-	-	-	-	-	-
Total	321	36	58	15	27	457

**Figure 19: Complaints Summary - YTD November 2016**



## **Appendix A: Meteorological Data**

**Table 8: Meteorological Data – Charlton Ridge Meteorological Station – November 2016**

<b>Date</b>	<b>Air Temperature Maximum (°C)</b>	<b>Air Temperature Minimum (°C)</b>	<b>Relative Humidity Maximum (%)</b>	<b>Relative Humidity Minimum (%)</b>	<b>Wind Direction Average (°)</b>	<b>Wind Speed Average (m/sec)</b>	<b>Rainfall(mm)</b>
1/11/2016	24.4	8.9	70.7	24.7	170.1	2.4	0.0
2/11/2016	26.9	7.9	72.8	18.5	226.0	2.3	0.0
3/11/2016	29.3	8.2	74.1	18.3	212.1	2.4	0.0
4/11/2016	31.3	12.0	80.5	12.1	255.8	3.4	0.0
5/11/2016	29.8	14.6	46.9	2.0	274.3	4.9	0.0
6/11/2016	28.4	12.1	55.8	12.9	257.9	3.8	0.0
7/11/2016	33.5	9.3	71.5	14.3	266.4	3.2	0.0
8/11/2016	36.7	12.8	82.4	10.2	208.5	2.9	2.2
9/11/2016	25.8	15.6	96.5	52.5	158.4	2.3	8.8
10/11/2016	31.1	13.4	96.8	14.7	193.0	2.3	0.0
11/11/2016	30.7	14.3	91.1	29.8	144.3	2.6	0.0
12/11/2016	33.1	15.6	97.5	35.7	251.6	3.9	27.4
13/11/2016	30.9	15.6	81.2	10.9	281.8	4.4	0.0
14/11/2016	25.4	12.2	96.1	29.5	243.9	3.4	24.4
15/11/2016	24.9	11.0	96.3	35.6	186.9	1.8	0.0
16/11/2016	27.7	9.4	94.7	31.3	155.4	2.0	0.0
17/11/2016	27.5	12.0	86.0	31.2	141.7	1.8	0.0
18/11/2016	34.3	11.0	91.7	17.8	211.7	2.7	0.0
19/11/2016	34.1	15.2	80.9	21.8	172.0	2.6	0.0
20/11/2016	30.5	14.8	86.7	35.4	126.2	1.9	0.0
21/11/2016	34.9	17.2	89.1	22.8	192.4	2.7	0.0
22/11/2016	35.8	15.0	86.2	14.3	162.9	2.4	0.0
23/11/2016	35.1	16.4	81.2	15.5	175.3	3.0	0.0
24/11/2016	27.7	13.3	71.9	15.9	171.4	3.0	0.0
25/11/2016	29.5	9.4	88.0	16.2	157.7	2.6	0.0
26/11/2016	31.1	13.3	82.8	15.2	169.1	2.3	0.0
27/11/2016	30.0	17.7	85.4	35.8	144.0	3.3	0.0
28/11/2016	33.9	17.4	89.3	13.3	178.6	2.7	0.0
29/11/2016	34.1	15.3	79.7	12.6	184.5	3.0	0.0
30/11/2016	31.4	15.7	85.6	21.8	148.1	2.4	1.2



## Appendix C

Environmental Monitoring  
December 2016



Mount Thorley Warkworth  
Monthly Environmental Report  
December 2016

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## Revision History

Version No.	Person Responsible	Document Status	Date
<b>1.0</b>	<b>Acting Environmental Specialist</b>	<b>Final</b>	<b>02/02/2017</b>

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 December to 31 December 2016.

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 **Error! Reference source not found.**

Table 1: Monthly Rainfall MTW

2016	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
December	65.2	664

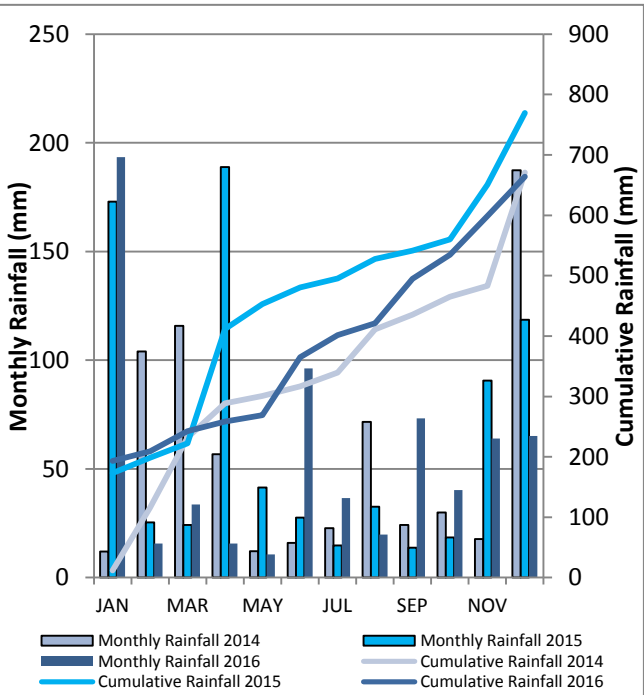


Figure 1: Rainfall Trends YTD

Winds from the Southeast and Northwest were dominant throughout the reporting period as shown in Figure 2.

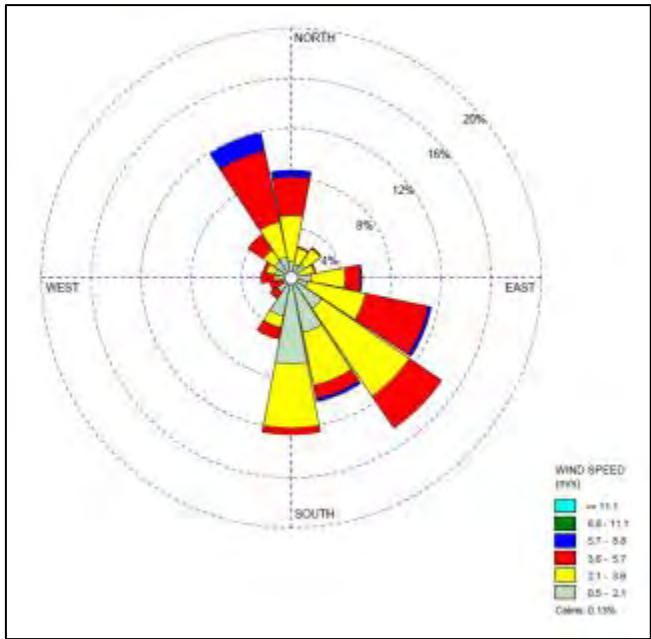


Figure 2: Charlton Ridge Wind Rose – December 2016



**Mount Thorley Warkworth  
Air Quality Monitoring Programme**

Date: 160622  
Plan By: DF  
Version: 1.3



RTCA - NSW Environmental Services

**Figure 3: Air Quality Monitoring Locations**



## 2.2 Depositional Dust

To monitor regional air quality, MTW operates and maintains a network of nine 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. D124, Warkworth included

During the reporting period the DW14, DW20a, DW21a, D124, D125 and Warkworth monitors recorded monthly results above the long term impact assessment criteria of 4.0 g/m<sup>2</sup> per month. Field notes associated with DW14, DW20a, DW21a and D125 confirm the presence of insects and bird droppings. 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 D124 and Warkworth results are contaminated. Accordingly, the results will be included in the annual average calculation.

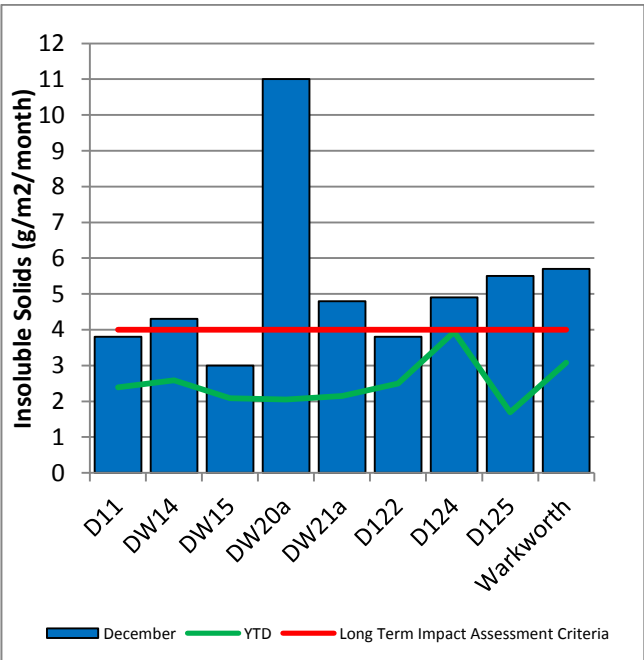


Figure 4: Depositional Dust – December 2016

## 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<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<sub>10</sub> results at each monitoring station against the short term impact assessment criteria of 50µg/m<sup>3</sup>.

On 13/12/2016 one HVAS PM<sub>10</sub> unit recorded a result greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Long Point (53 µg/m<sup>3</sup>). On 31/12/2016 two HVAS PM<sub>10</sub> units recorded results greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Long Point (59 µg/m<sup>3</sup>) and Loders Creek (65 µg/m<sup>3</sup>).

Preliminary investigation indicates that MTW was outside of the main arc of influence for Long Point on the 13<sup>th</sup> December and for Long Point and Loder's Creek on the 31<sup>st</sup> December. Accordingly, no further action is required.

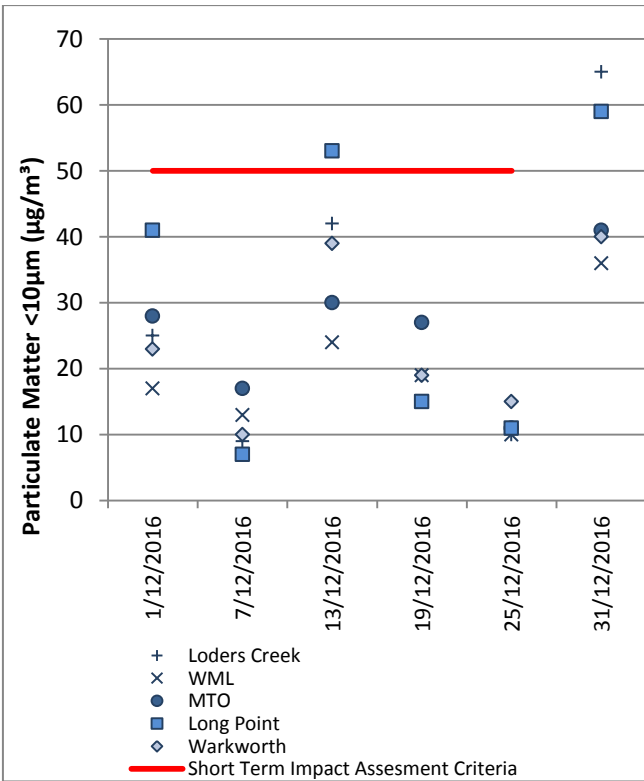


Figure 5: Individual PM<sub>10</sub> Results – December 2016



Figure 6 shows the annual average PM<sub>10</sub> results against the long term impact assessment criteria.

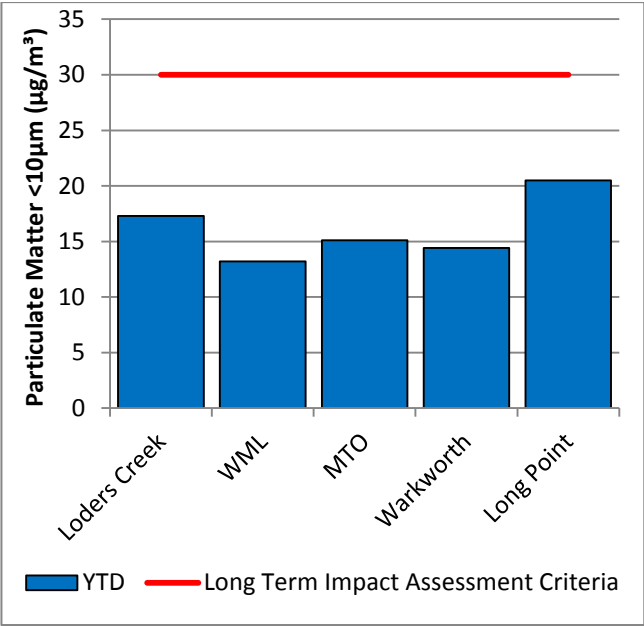


Figure 6: Annual Average PM<sub>10</sub> – December 2016

2.3.2 TSP Results

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

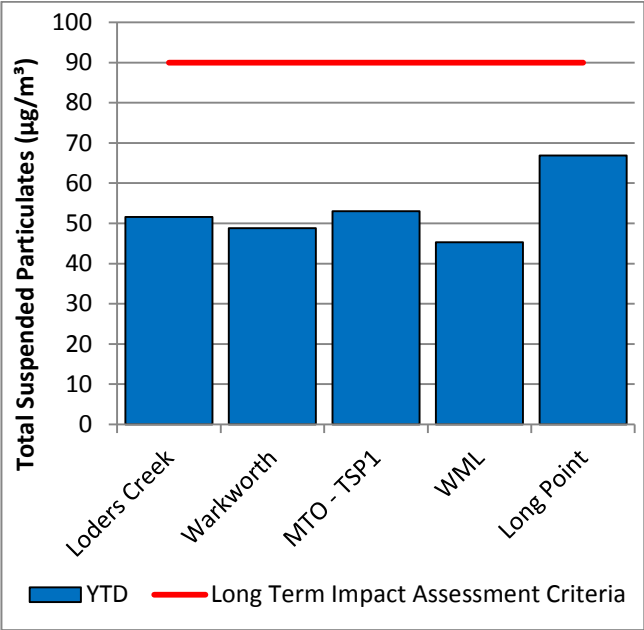


Figure 7: Annual Average Total Suspended Particulates – December 2016

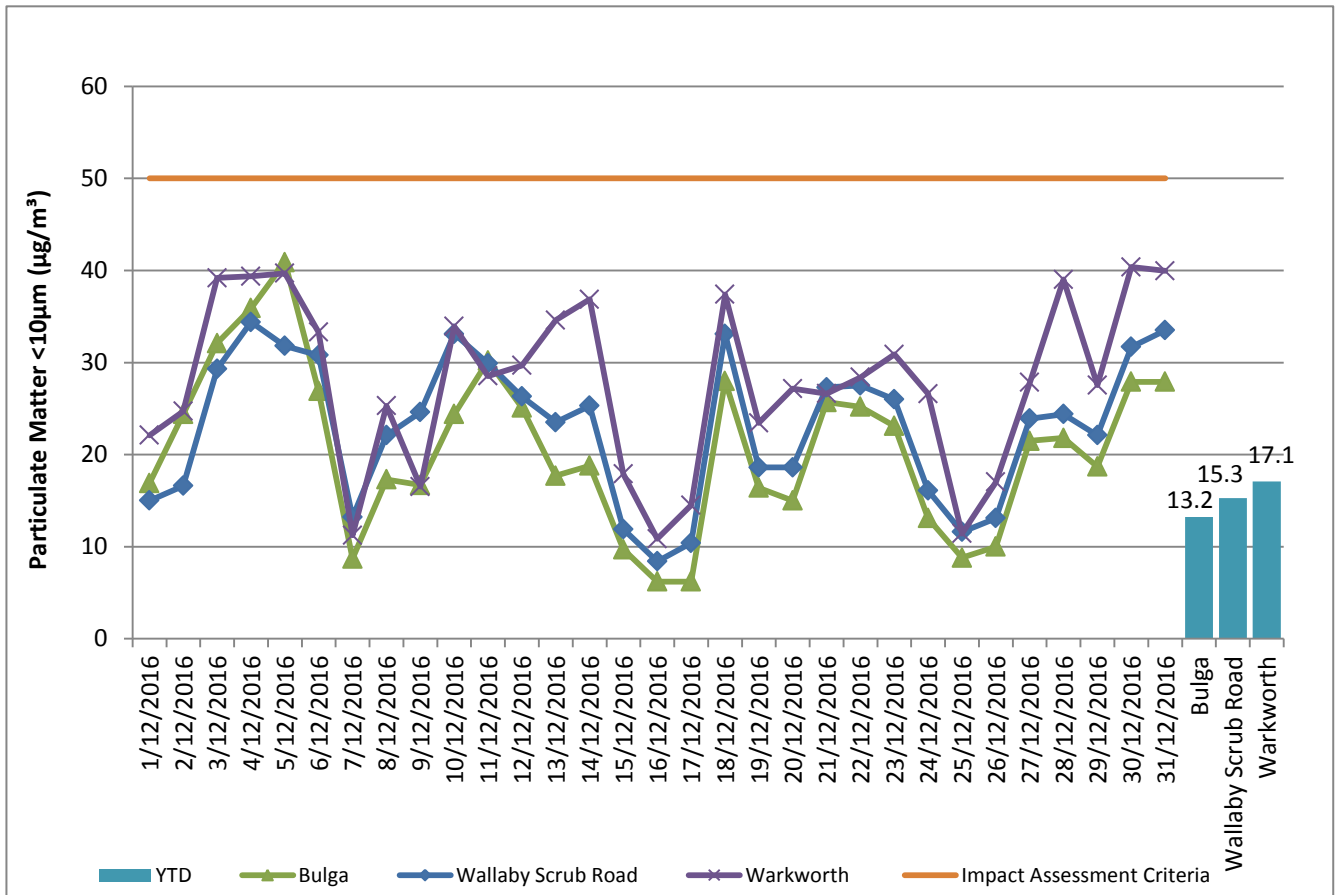
2.3.3 Real Time PM<sub>10</sub> Results

Mount Thorley Warkworth 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 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<sub>10</sub> result and the annual PM<sub>10</sub> average.

2.3.4 Real Time Alarms for Air Quality

During December, the real time monitoring system generated 42 automated air quality related alerts, including 21 alerts for adverse meteorological conditions and 21 alerts for elevated dust levels.



**Figure 8: Real Time PM<sub>10</sub> 24hr average and Year-to-date average – December 2016**

### 3.0 WATER QUALITY

MTW maintains a network of surface water and groundwater monitoring sites.

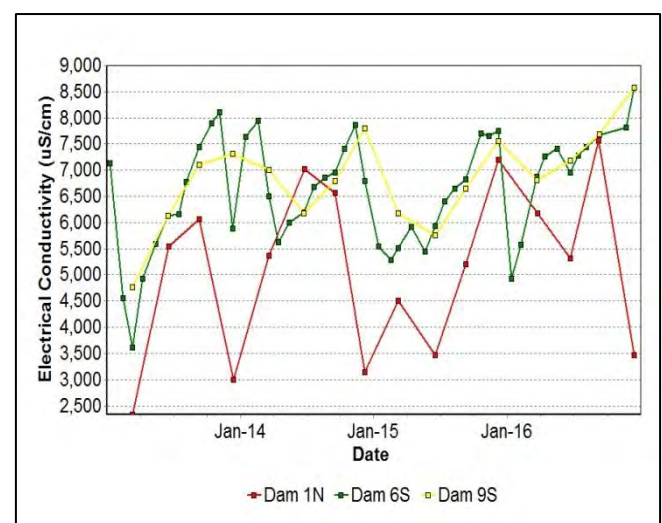
#### 3.1 Surface Water

Monitoring is conducted at mine site dams and surrounding natural watercourses. The surface water monitoring locations are outlined in Figure 15.

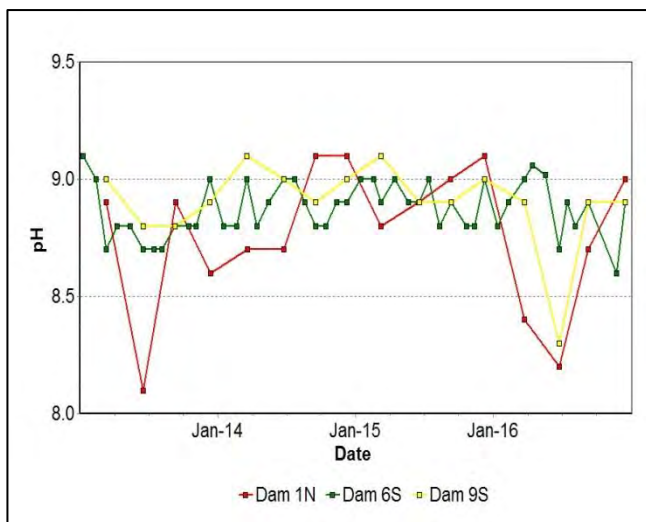
Surface water courses are sampled on a monthly or quarterly sampling regime. Water quality is evaluated through the parameters of pH, Electrical Conductivity (EC) and Total Suspended Solids (TSS). The Hunter River and the Wollombi Brook are sampled both upstream and downstream of mining operations, to monitor the potential impact of mining on the river. Other Hunter River tributaries are also monitored.

##### 3.1.1 Surface Water Monitoring Results

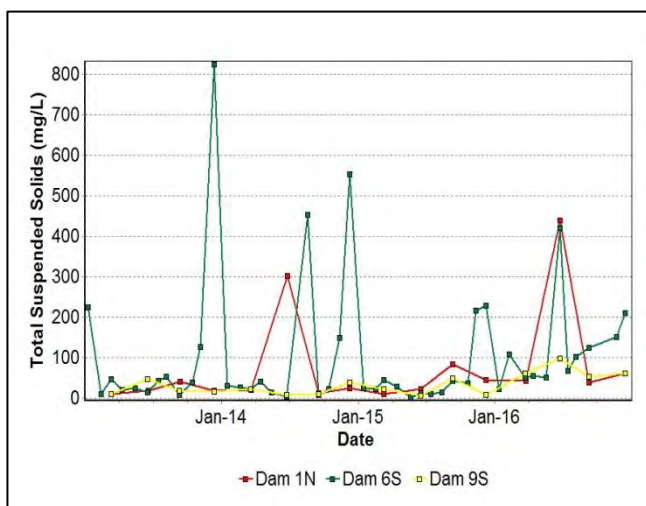
Figure 9 to Figure 11 show the long term surface water trend (2013 – current) within MTW mine dams. Figure 12 to Figure 14 show the long term surface water trend (2013 - current) in surrounding watercourses.



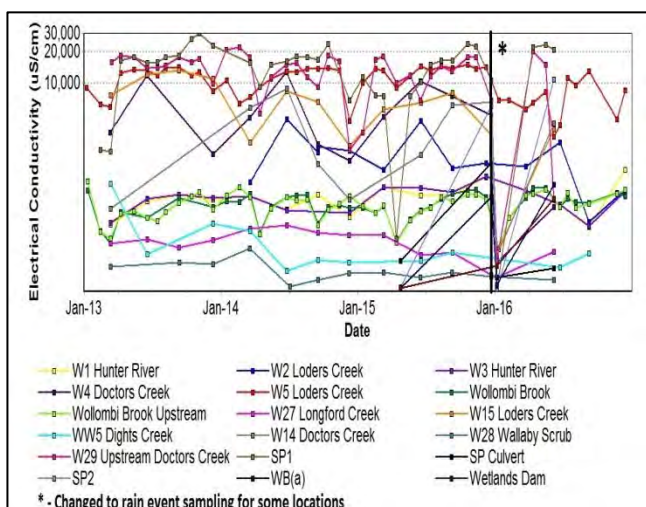
**Figure 9: Site Dams Electrical Conductivity Trend 2013 – Current**



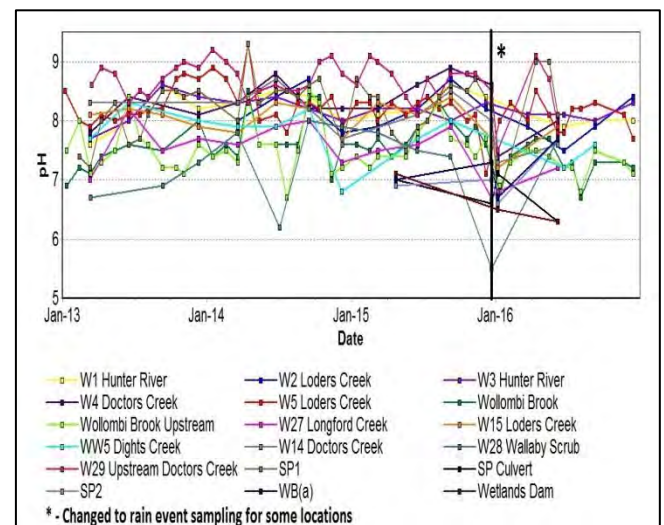
**Figure 10: Site Dams pH Trend 2013 - Current**



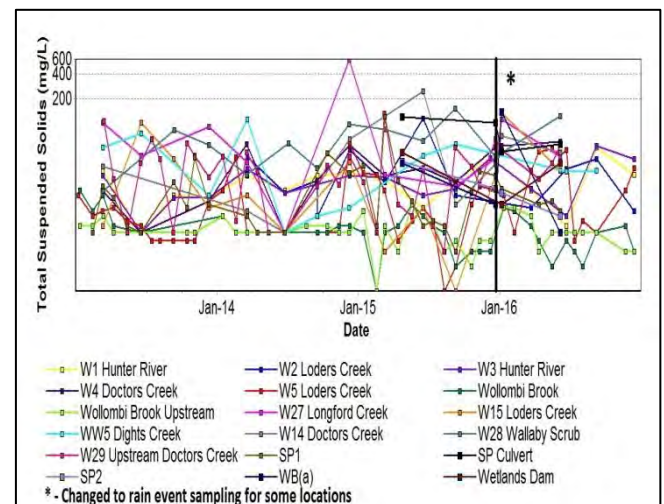
**Figure 11: Site Dams Total Suspended Solids Trend 2013 - Current**



**Figure 12: Watercourse Electrical Conductivity Trend 2013 - Current**



**Figure 13: Watercourse pH Trend 2013 - Current**



**Figure 14: Watercourse Total Suspended Solids Trend 2013 - Current**

### 3.1.2 Surface Water Trigger Tracking

Internal trigger limits have been developed to assess monitoring data on an on-going basis, and to highlight potentially adverse surface water impacts. The process for evaluating monitoring results against the internal triggers and subsequent responses are outlined in the MTW Water Management Plan.

During 2016 19 internal trigger limits were breached, summarised in Table 2.

**Table 2: Surface Water Trigger Tracking - December 2016**

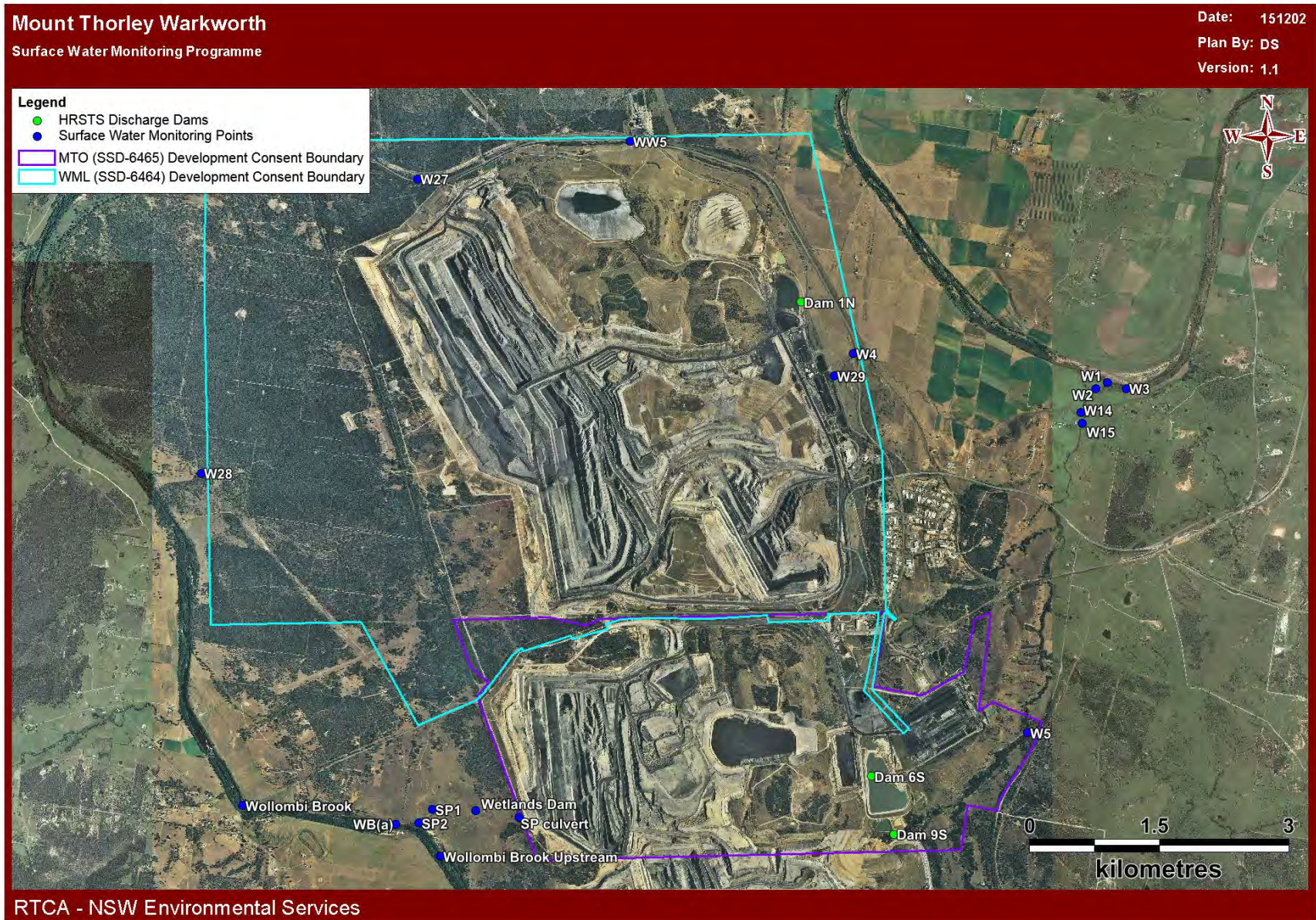
<b>Site</b>	<b>Date</b>	<b>Trigger Limit Breached</b>	<b>Action Taken in Response</b>
W5	08/09/2016	EC –95 <sup>th</sup> Percentile	Watching Brief*
W1	14/12/2016	EC –95 <sup>th</sup> Percentile	Watching Brief*
SP1	06/01/2016	pH –5 <sup>th</sup> Percentile	Watching Brief*
W2	22/06/2016	pH –5 <sup>th</sup> Percentile	Watching Brief*
W4	06/01/2016	pH –5 <sup>th</sup> Percentile	Watching Brief*
W5	14/12/2016	pH –5 <sup>th</sup> Percentile	Watching Brief*
W15	06/01/2016	pH –5 <sup>th</sup> Percentile	Watching Brief*
W27	06/01/2016	pH –5 <sup>th</sup> Percentile	Watching Brief*
W29	06/01/2016	pH –5 <sup>th</sup> Percentile	Watching Brief*
Wollombi Brook	12/01/2016	pH –5 <sup>th</sup> Percentile	Watching Brief*
Wollombi Brook	03/08/2016	pH –5 <sup>th</sup> Percentile	Cyclical low-pH measurements are consistently seen in the historical trend, consistent with upstream reading. September measurement returned to average levels. No follow up required.
Wollombi Brook Upstream	12/01/2016	pH –5 <sup>th</sup> Percentile	Watching Brief*
Wollombi Brook Upstream	03/08/2016	pH –5 <sup>th</sup> Percentile	Cyclical low-pH measurements are consistently seen in the historical trend, consistent with downstream reading. September measurement returned to average levels. No follow up required.
W1	08/09/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with a high-flow event in the river at the time, resulting in mobilisation of sediment. Consistent with nearby W3 measurement. No further action.
W3	08/09/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with a high-flow event in the river at the time, resulting in mobilisation of sediment. Consistent with

nearby W1 measurement. No further action.

W4	06/01/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (106mm of rain recorded from 3/01/2016 to 6/01/2016). Consistent with upstream sample W29; no mine site sources of sediment identified. No follow up required.
W14	06/01/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (106mm of rain recorded 3/01/2016 to 6/01/2016). Upstream sample W29 indicates source of sediment primarily from runoff from downstream farming properties. No follow up required.
W15	06/01/2016	TSS – 50mg/L (ANZECC criteria)	W15: Elevated TSS associated with high runoff due to rainfall event (106mm of rain recorded 3/01/2016 to 6/01/2016). W5 not on revised rain event sampling protocol so unable to determine sediment source. Monitoring programme to be updated to include W5 on rain event sampling protocol.
W27	06/01/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (106mm of rain recorded 3/01/2016 to 6/01/2016). Review of site indicates upstream erosion and sediment controls in place and compliant. No follow up required.

\* = Watching brief established pending outcomes of subsequent monitoring events. No specific actions required.





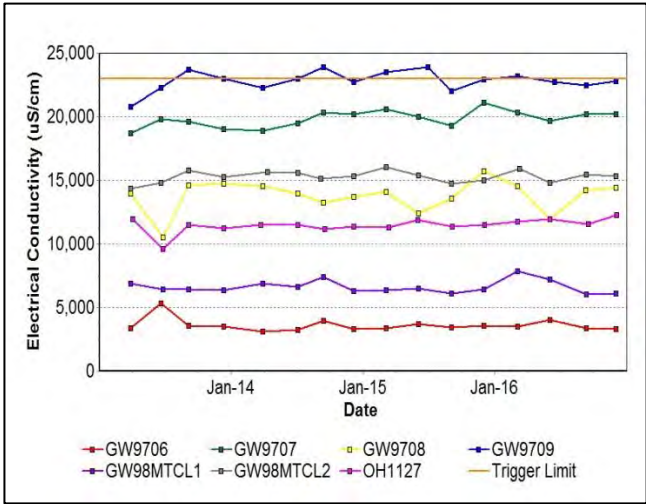
**Figure 15: Surface Water Monitoring Location Plan**



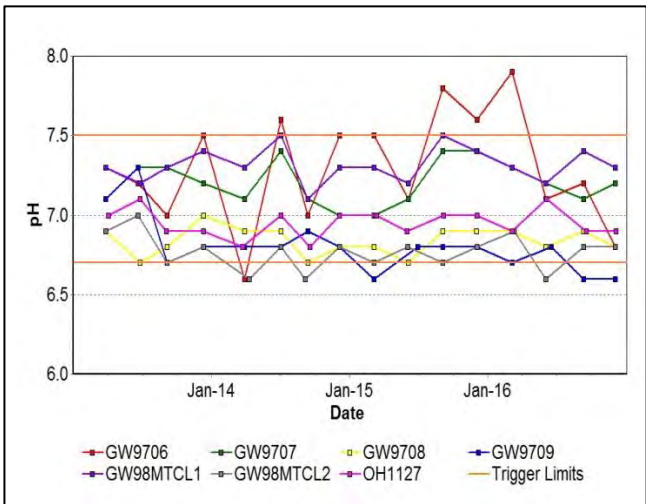
### 3.2 Groundwater Monitoring

Groundwater monitoring is undertaken on a quarterly basis in accordance with the MTW Groundwater Monitoring Programme.

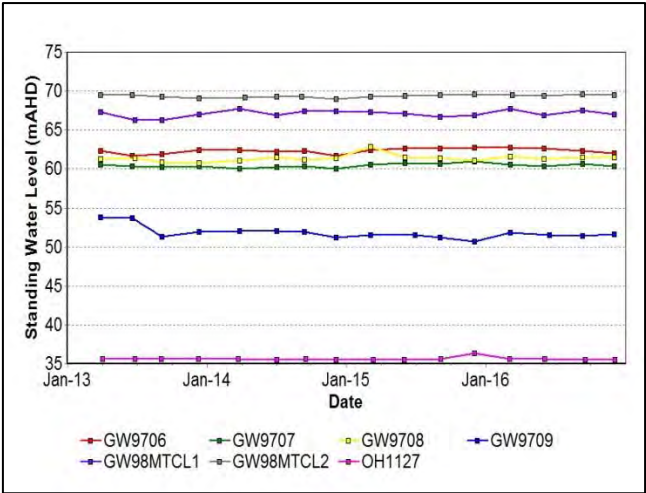
Figures 16 to 58 show the long term water quality trends (2013 – current) for groundwater bores monitored at MTW.



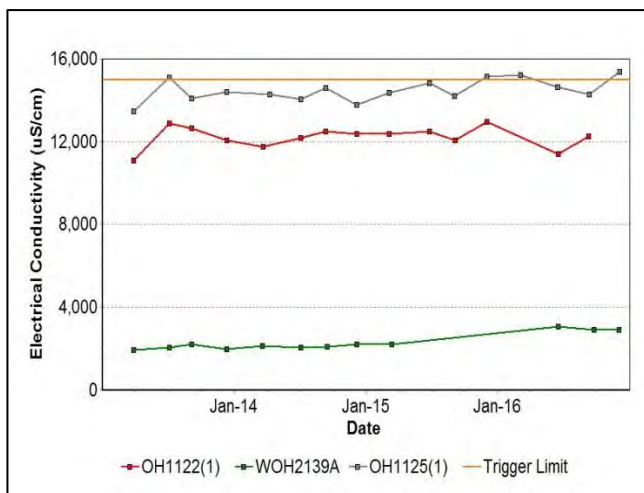
**Figure 16: Bayswater Seam Electrical Conductivity Trend – December 2016**



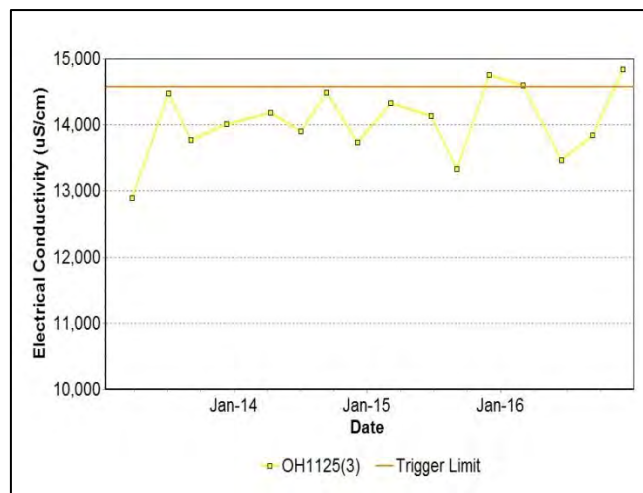
**Figure 17: Bayswater Seam pH Trend – December 2016**



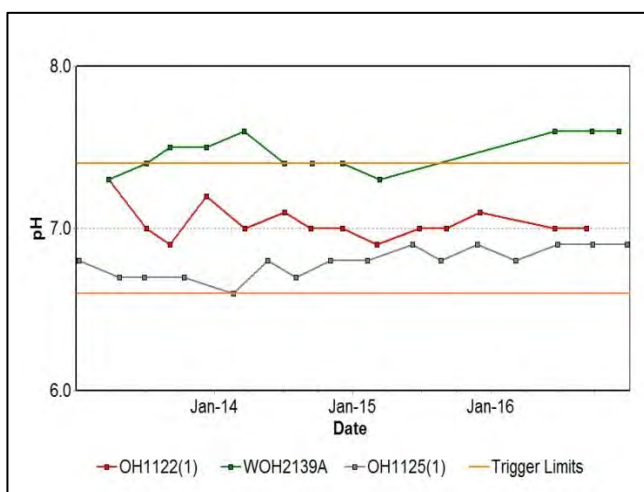
**Figure 18: Bayswater Seam Standing Water Level - December 2016**



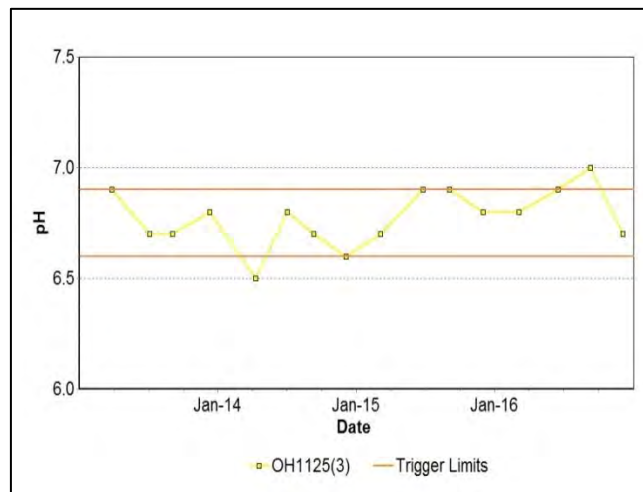
**Figure 19: Blakefield Seam Electrical Conductivity Trend - December 2016**



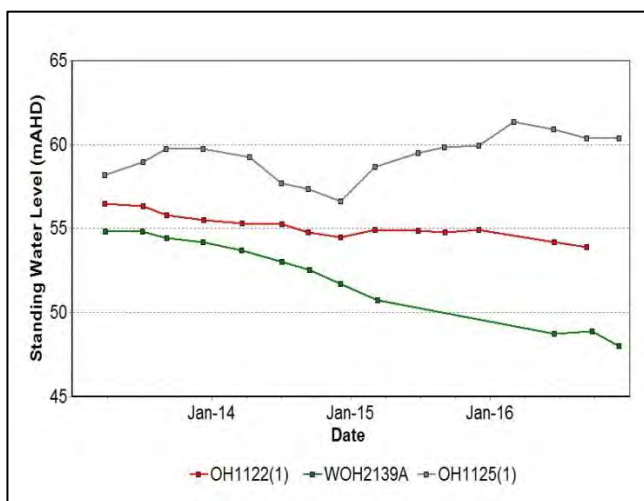
**Figure 22: Bowfield Seam Electrical Conductivity Trend - December 2016**



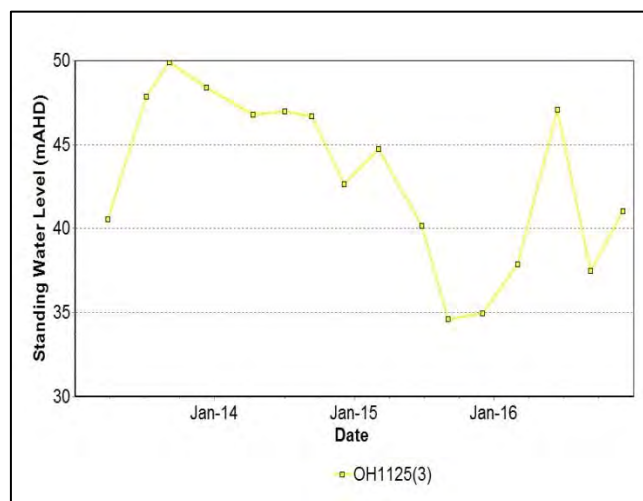
**Figure 20: Blakefield Seam pH Trend - December 2016**



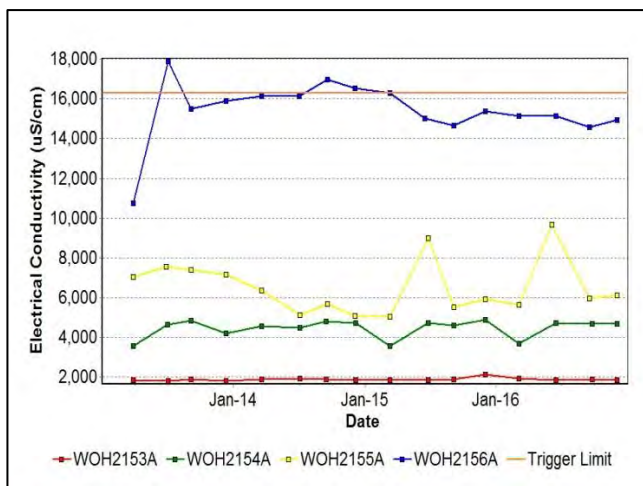
**Figure 23: Bowfield Seam pH Trend - December 2016**



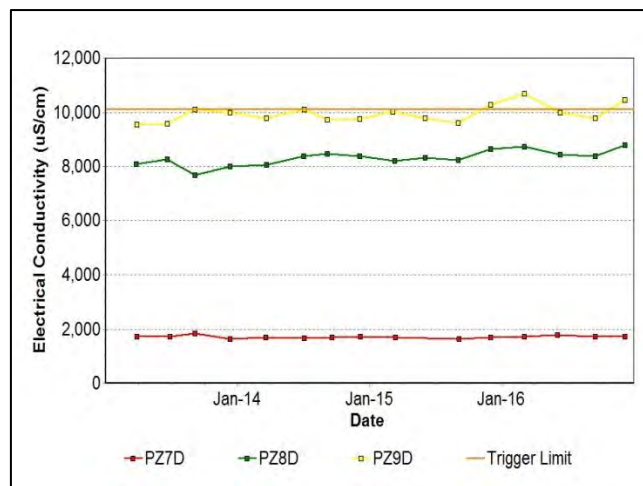
**Figure 21: Blakefield Seam Standing Water Level Trend - December 2016**



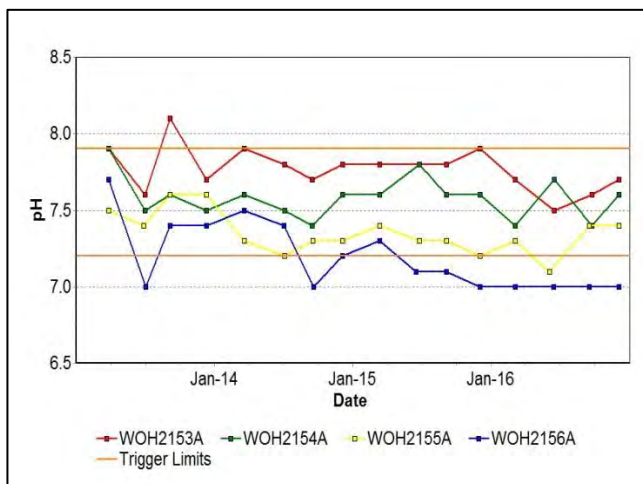
**Figure 24: Bowfield Seam Standing Water Level Trend - December 2016**



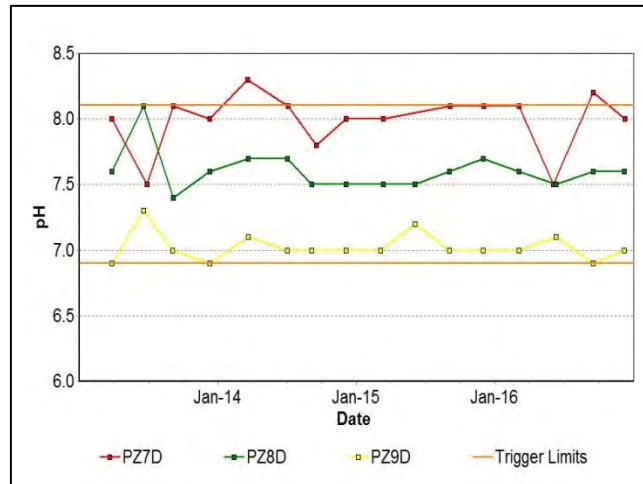
**Figure 25: Redbank Seam Electrical Conductivity Trend - December 2016**



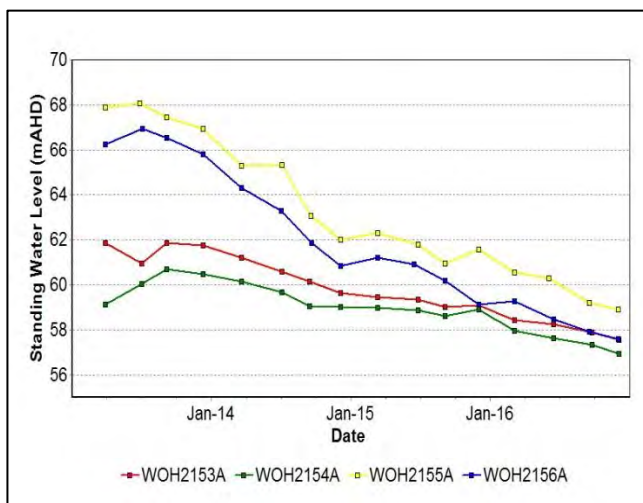
**Figure 28: Shallow Overburden Seam Electrical Conductivity Trend - December 2016**



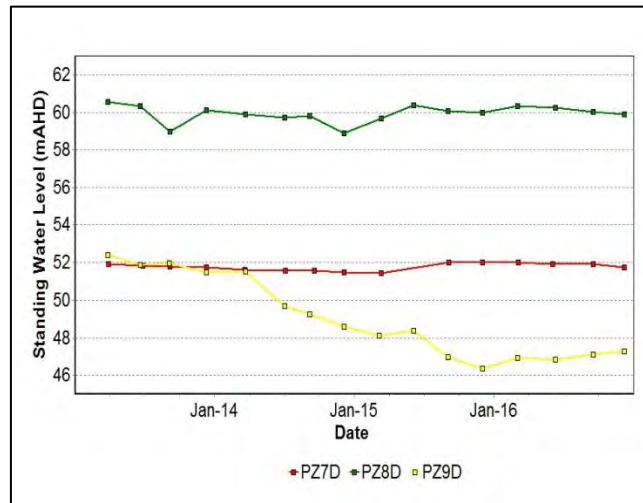
**Figure 26: Redbank Seam pH Trend - December 2016**



**Figure 29: Shallow Overburden Seam pH Trend - December 2016**

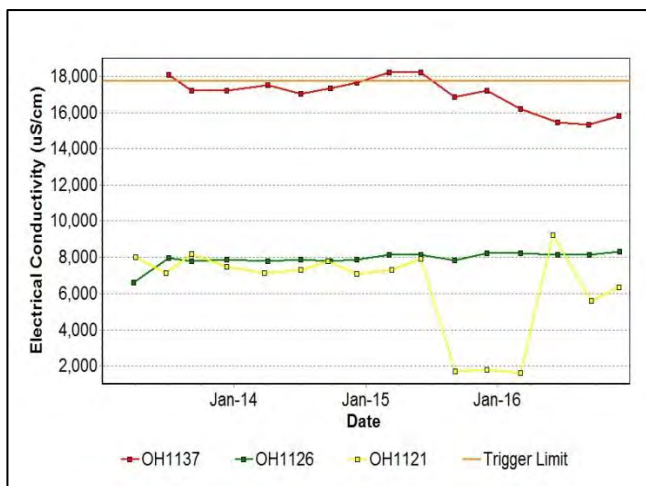


**Figure 27: Redbank Seam Standing Water Level - December 2016**

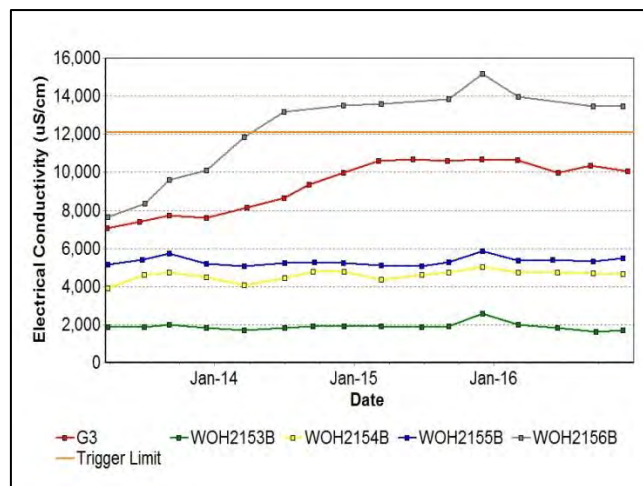


**Figure 30: Shallow Overburden Seam Standing Water Level Trend - December 2016**

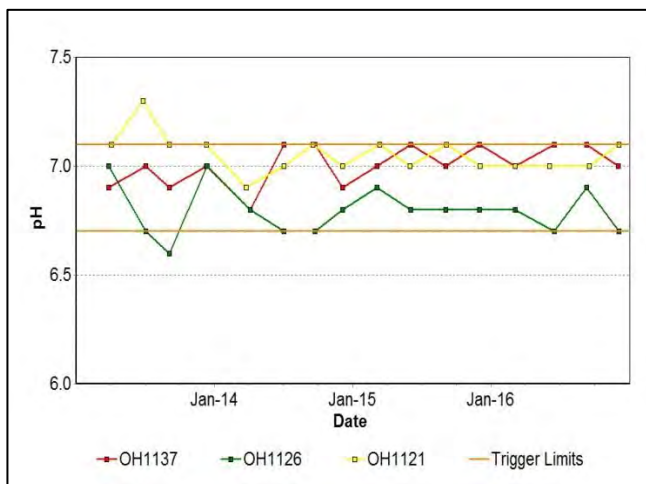




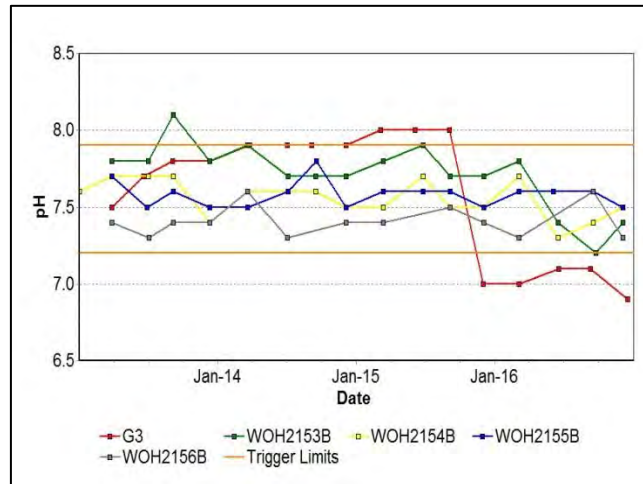
**Figure 31: Vaux Seam Electrical Conductivity Trend - December 2016**



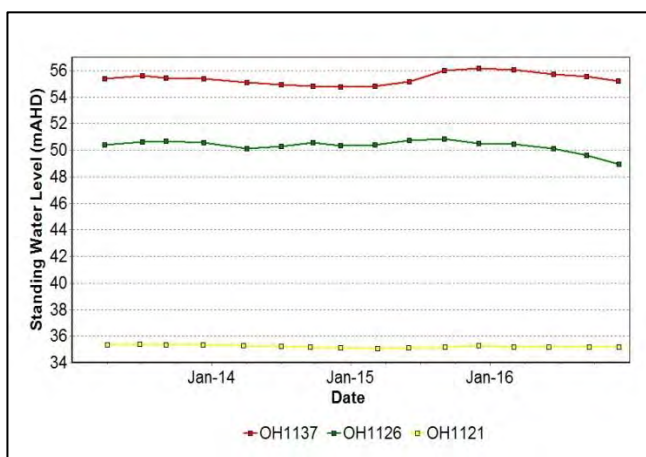
**Figure 34: Wambo Seam Electrical Conductivity Trend - December 2016**



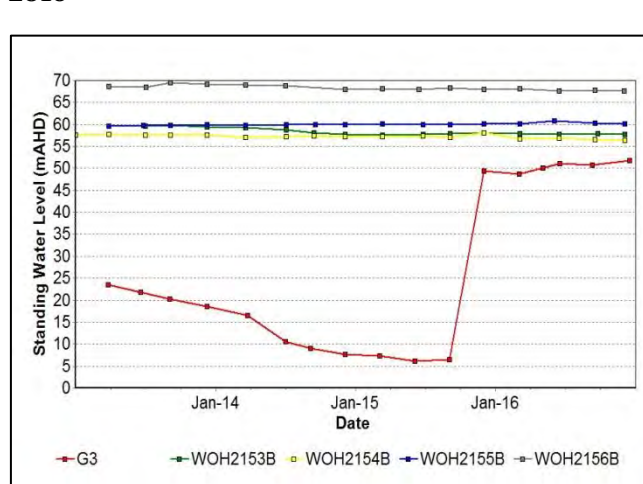
**Figure 32: Vaux Seam pH Trend - December 2016**



**Figure 35: Wambo Seam pH Trend - December 2016**

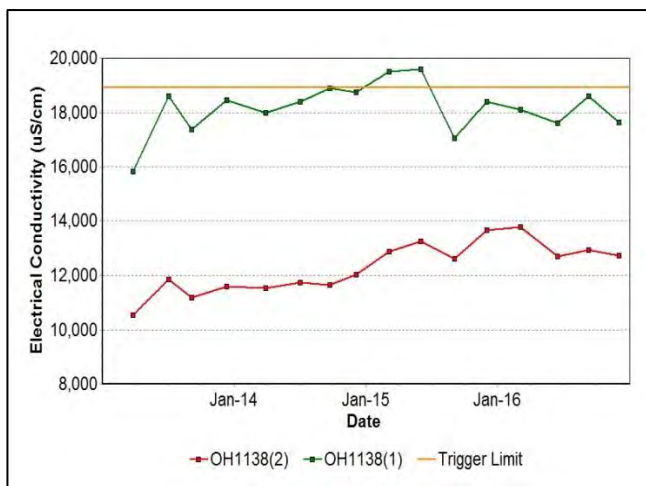


**Figure 33: Vaux Seam Standing Water Level Trend - December 2016**

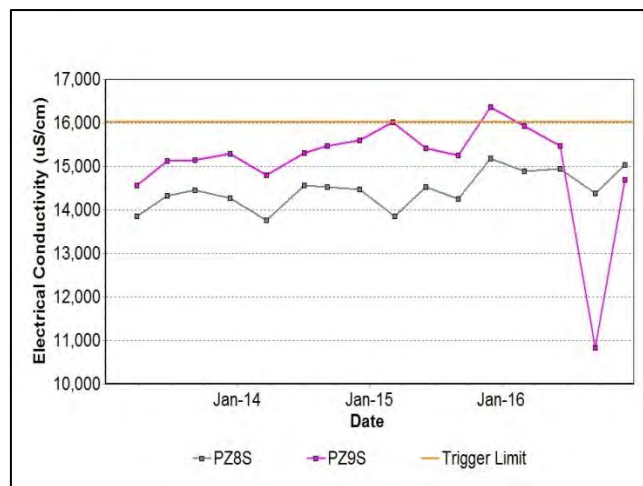


**Figure 36: Wambo Seam Standing Water Level Trend - December 2016**

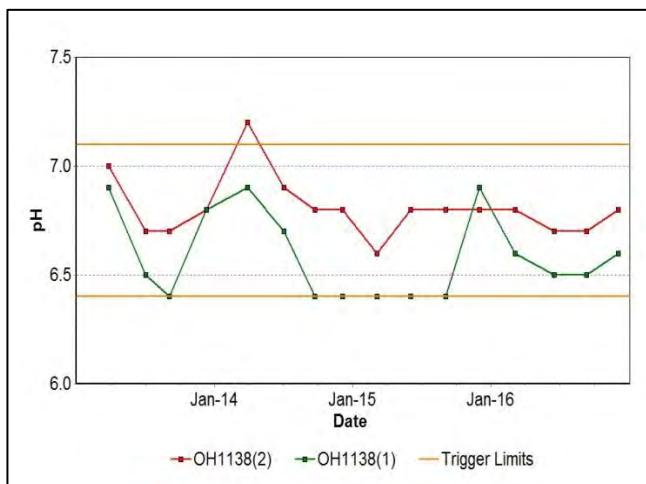




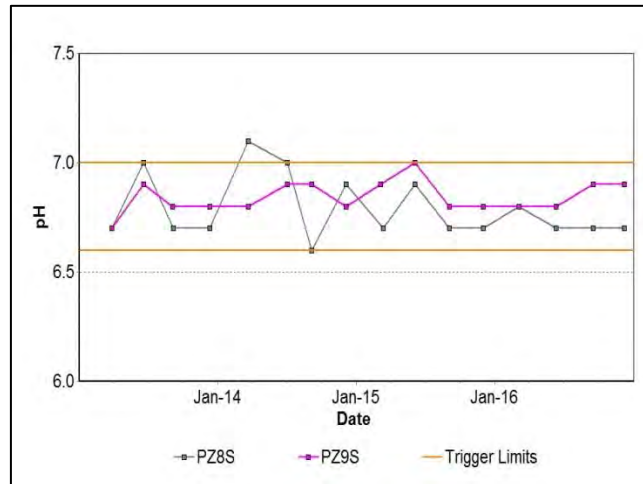
**Figure 37: Warkworth Seam Electrical Conductivity Trend – December 2016**



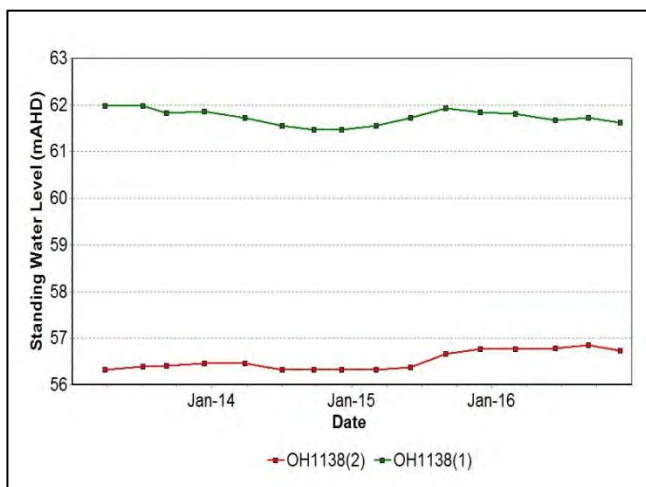
**Figure 40: Wollombi Alluvium Electrical Conductivity Trend - December 2016**



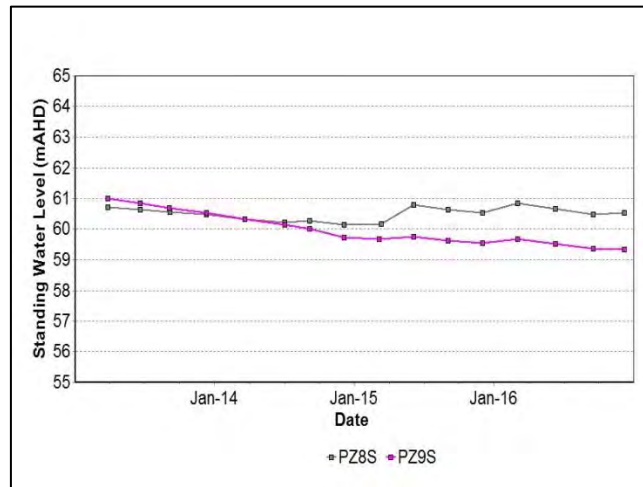
**Figure 38: Warkworth Seam pH Trend - December 2016**



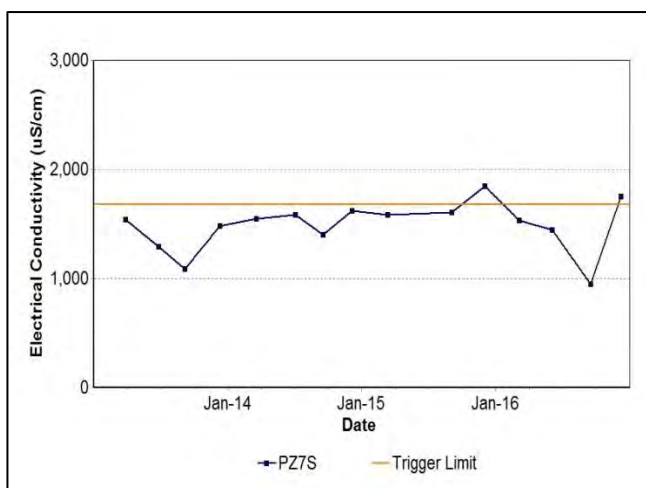
**Figure 41: Wollombi Alluvium pH Trend – December 2016**



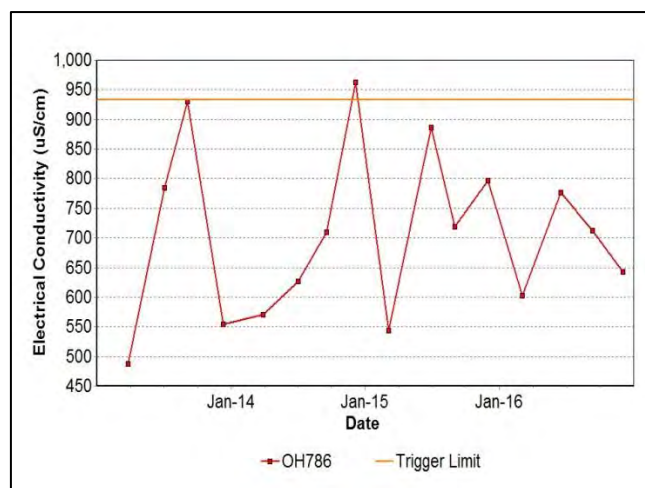
**Figure 39: Warkworth Seam Standing Water Level Trend - December 2016**



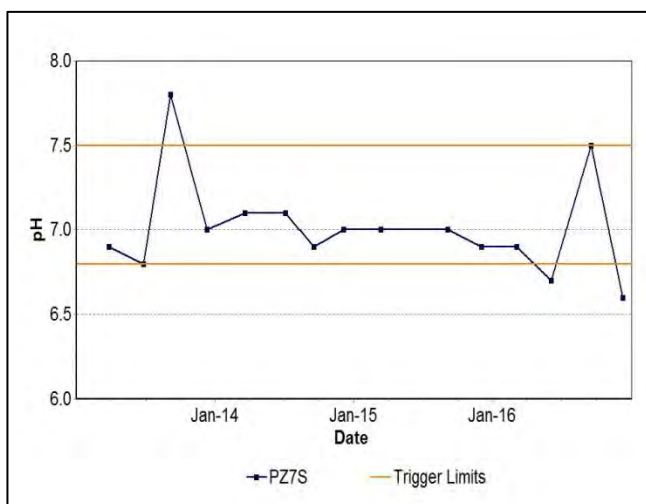
**Figure 42: Wollombi Alluvium Standing Water Level Trend - December 2016**



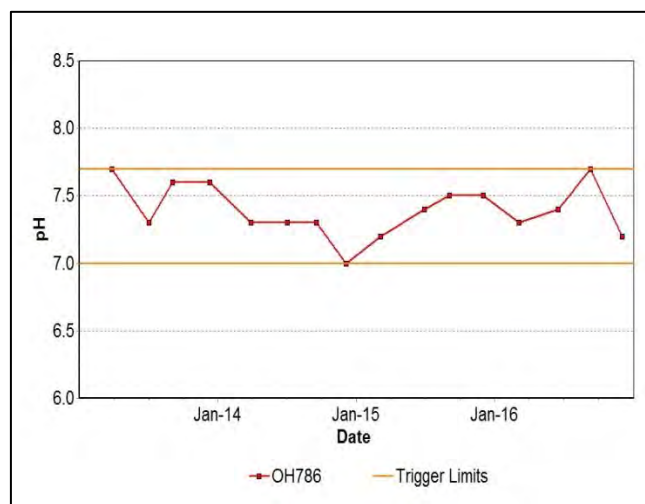
**Figure 43: Aeolian Warkworth Sands Electrical Conductivity Trend – December 2016**



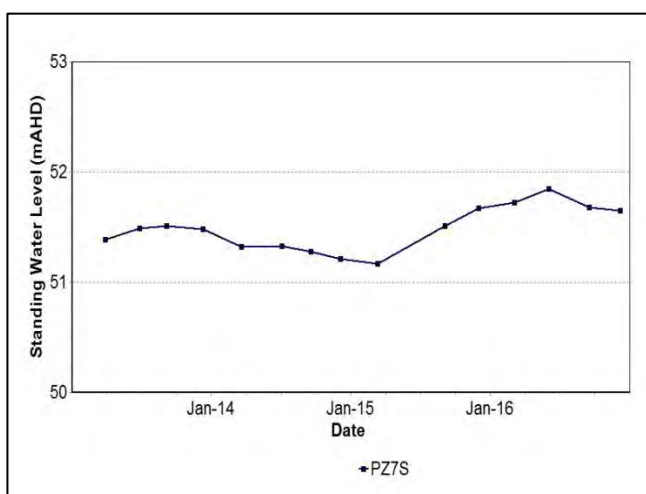
**Figure 46: Hunter River Alluvium 1 Seam Electrical Conductivity - December 2016**



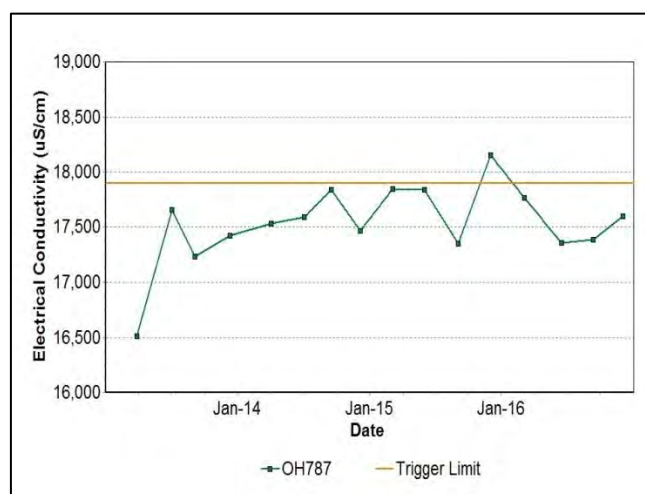
**Figure 44: Aeolian Warkworth Sands pH Trend - December 2016**



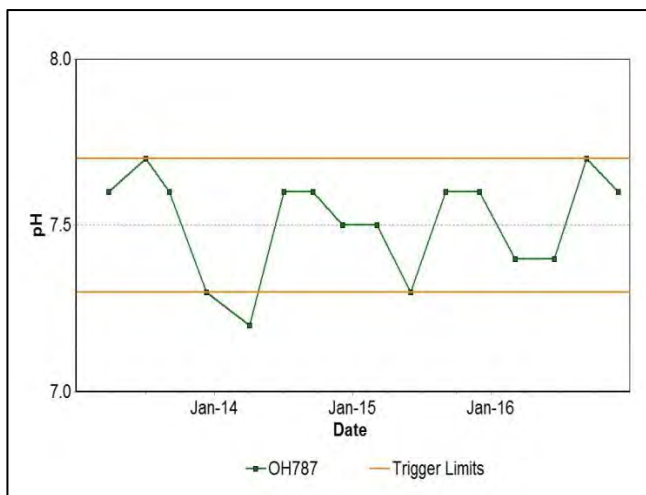
**Figure 47: Hunter River Alluvium 1 Seam pH Trend - December 2016**



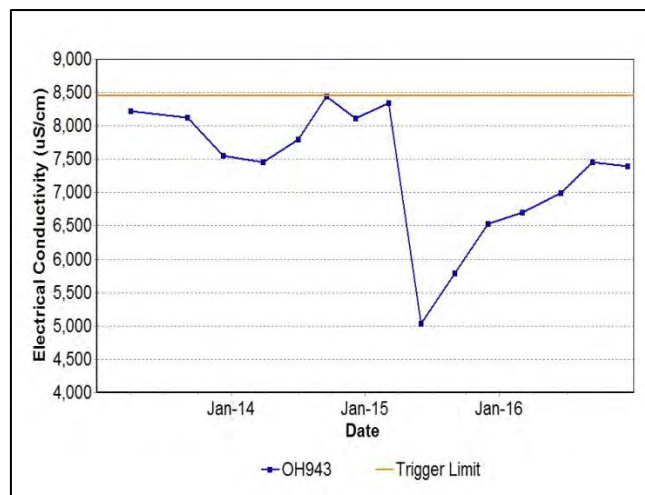
**Figure 45: Aeolian Warkworth Sands Standing Water Level Trend - December 2016**



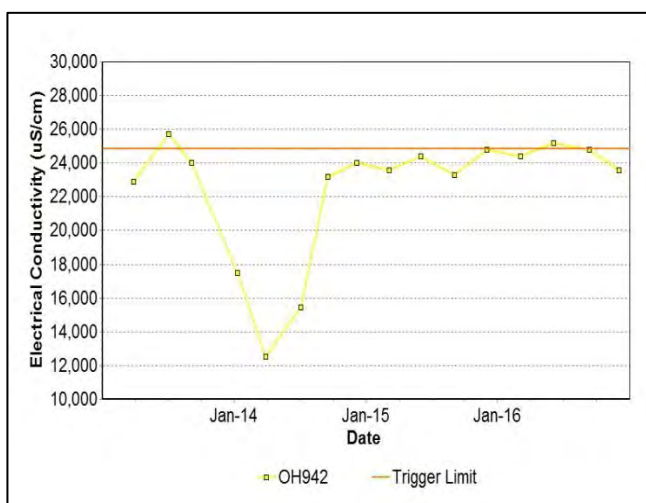
**Figure 48: Hunter River Alluvium 2 Seam Electrical Conductivity - December 2016**



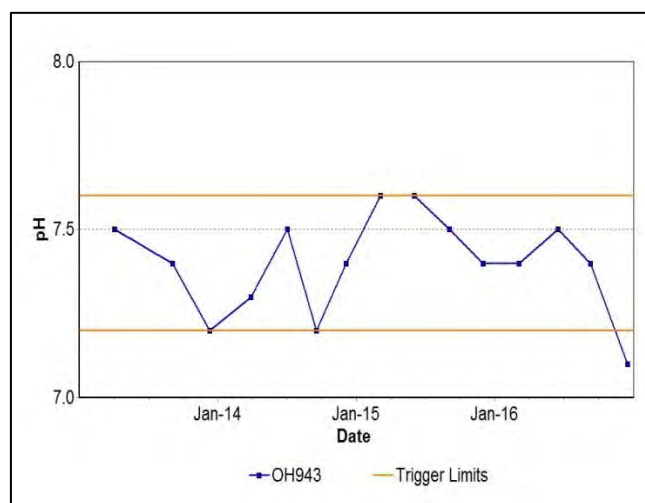
**Figure 49: Hunter River Alluvium 2 Seam pH Trend - December 2016**



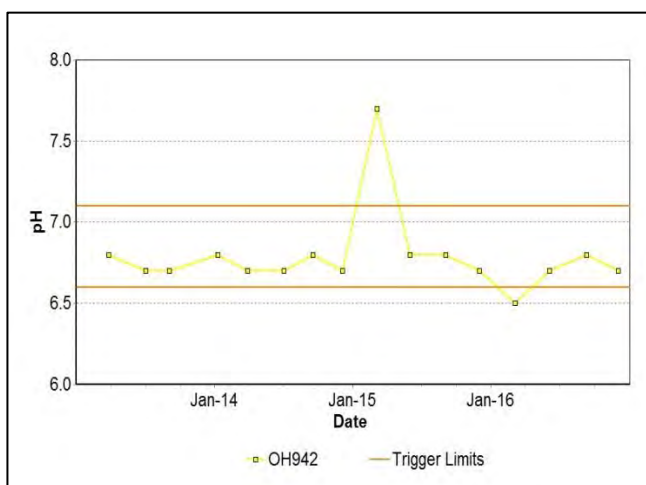
**Figure 52: Hunter River Alluvium 4 Seam Electrical Conductivity - December 2016**



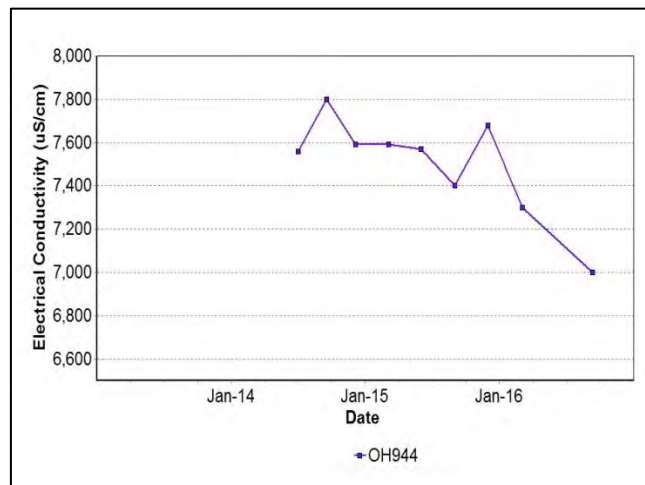
**Figure 50: Hunter River Alluvium 3 Seam Electrical Conductivity - December 2016**



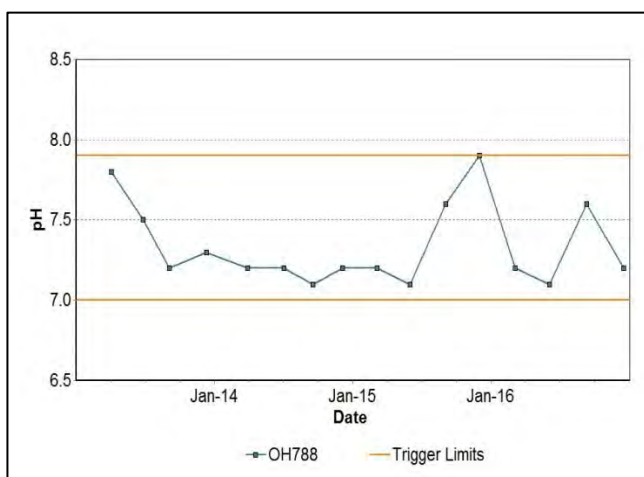
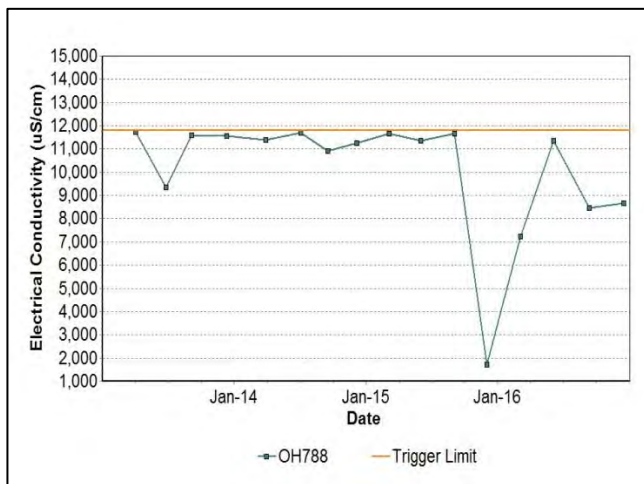
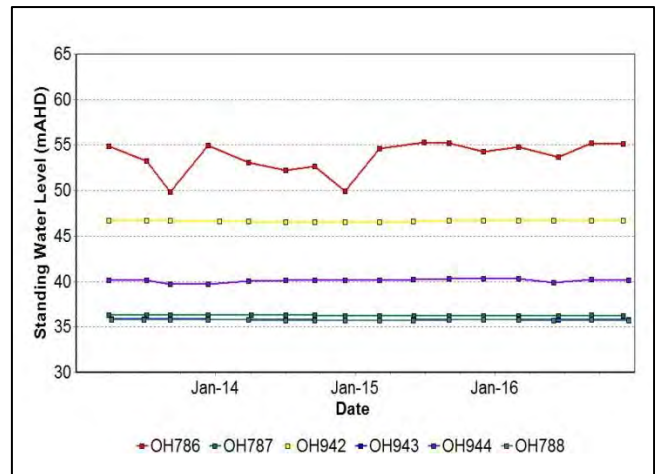
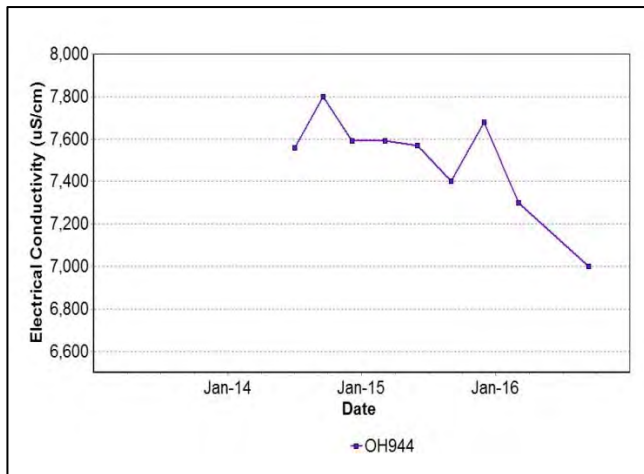
**Figure 53: Hunter River Alluvium 4 Seam pH Trend - December 2016**



**Figure 51: Hunter River Alluvium 3 Seam pH Trend - December 2016**



**Figure 54: Hunter River Alluvium 5 Seam Electrical Conductivity - December 2016**



### 3.2.1 Groundwater Trigger Tracking

During 2016 a number of trigger limits were breached and investigated, summarised in Table 3.



**Table 3: Groundwater Triggers - 2016**

Site	Date	Trigger Limit Breached	Action Taken in Response
GW9709	04/03/2016	EC – 95th Percentile	Watching Brief*
OH1125(3)	03/03/2016	EC – 95th Percentile	Watching Brief*
OH1125(1)	03/03/2016	EC – 95th Percentile	Watching Brief*
OH1125(1)	02/12/2016	EC – 95th Percentile	Watching Brief*
OH1125(3)	02/12/2016	EC – 95th Percentile	Watching Brief*
PZ9D	03/03/2016	EC – 95th Percentile	Watching Brief*
PZ9D	07/12/2016	EC – 95th Percentile	Watching Brief*
PZ7S	07/12/2016	EC – 95th Percentile	Watching Brief*
WOH2156B	04/03/2016	EC – 95th Percentile	Elevated EC is likely the result of coal seam depressurisation, as evidenced by falling water level. This trend is consistent with effects of nearby mining. No further action required.
WOH2156B	16/09/2016	EC – 95th Percentile	EC measurement stable and consistent with historical trend of Wambo Seam bores. Maintain watching brief.
WOH2156B	02/12/2016	EC – 95th Percentile	Results are stable and consistent with historical trend. No further action required.
OH942	02/06/2016	EC – 95th Percentile	Watching Brief*
OH942	03/03/2016	PH –5th Percentile	Watching Brief*
OH943	15/12/2016	PH –5th Percentile	Watching Brief*
OH944	03/03/2016	PH –5th Percentile	Watching Brief*
OH1125(3)	09/09/2016	PH – 95th Percentile	Watching Brief*
PZ7S	03/03/2016	PH –5th Percentile	Watching Brief*
PZ7S	07/12/2016	PH –5th Percentile	Watching Brief*
GW9706	04/03/2016	PH – 95th Percentile	Trend consistent with nearby monitoring bore GW9707. Water level steady and does not indicate impact due to mining. Watching brief to be maintained.
GW9709	09/09/2016	PH –5th Percentile	Watching Brief*
GW9709	09/09/2016	PH –5th Percentile	Watching Brief*

OH1122(1)	15/12/2016		Standpipe damaged, unable to be sampled. Bore will be inspected to determine repairs required.
GW98MTCL2	01/06/2016	PH – 5th Percentile	Watching Brief*
WOH2156A	04/03/2016	PH - 5th Percentile	Low pH is likely the result of coal seam depressurisation, as evidenced by falling water level. This trend is consistent with effects of nearby mining. No further action required.
WOH2156A	14/06/2016	PH - 5th Percentile	Low pH is likely the result of coal seam depressurisation, as evidenced by falling water level. This trend is consistent with effects of nearby mining. No further action required.
WOH2156A	16/09/2016	PH - 5th Percentile	pH stable; maintain watching brief.
WOH2156A	02/12/2016	PH - 5th Percentile	Low pH is likely the result of coal seam depressurisation, as evidenced by falling water level. This trend is consistent with effects of nearby mining. No further action required.
WOH2139A	16/06/2016	PH – 95th Percentile	Watching Brief*
WOH2139A	23/09/2016	PH – 95th Percentile	Watching Brief*
WOH2139A	02/12/2016	PH – 95th Percentile	Results are stable and consistent with historical trend. No further action required.
G3	03/03/2016	PH – 5th Percentile	Watching Brief. Large variance in Standing Water level indicates damage to the piezometer, currently under investigation.
G3	16/06/2016	PH – 5th Percentile	Investigation determined bore has partially collapsed to 65 m depth below ground. Bore will continue to be monitored and data assessed on a routine basis to identify if trend is deleterious.
G3	09/09/2016	PH – 5th Percentile	pH stable; maintain watching brief.
G3	15/12/2016	PH – 5th Percentile	Bore partially collapsed in early 2016 so data may not be representative of aquifer. Removal from monitoring programme has been recommended following review of data from nearby bores.

\* = Watching brief established pending outcomes of subsequent monitoring events. No specific actions required.





Figure 59: Groundwater Monitoring Location Plan



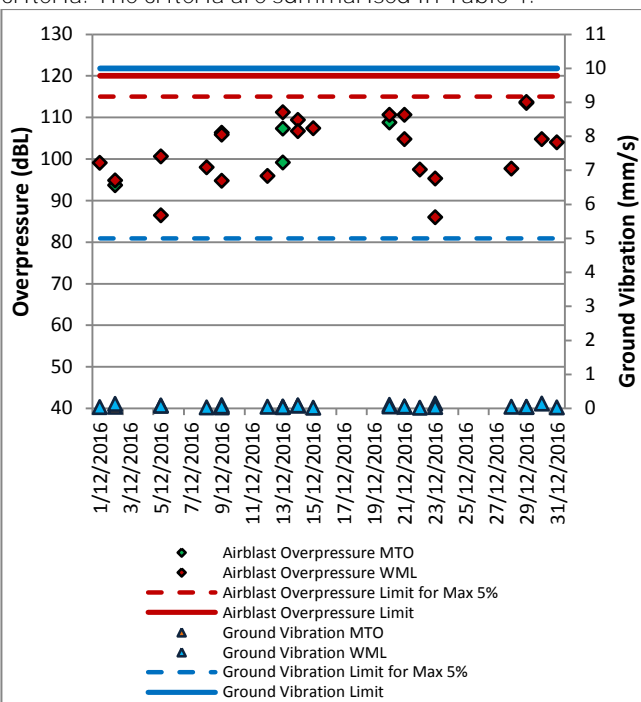
## 4.0 BLAST MONITORING

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 66.

### 4.1 Blast Monitoring Results

During December 2016, 28 blasts were initiated at MTW. Figure 60 to Figure 65 show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 4.



**Figure 60: Abbey Green Blast Monitoring Results - December 2016**

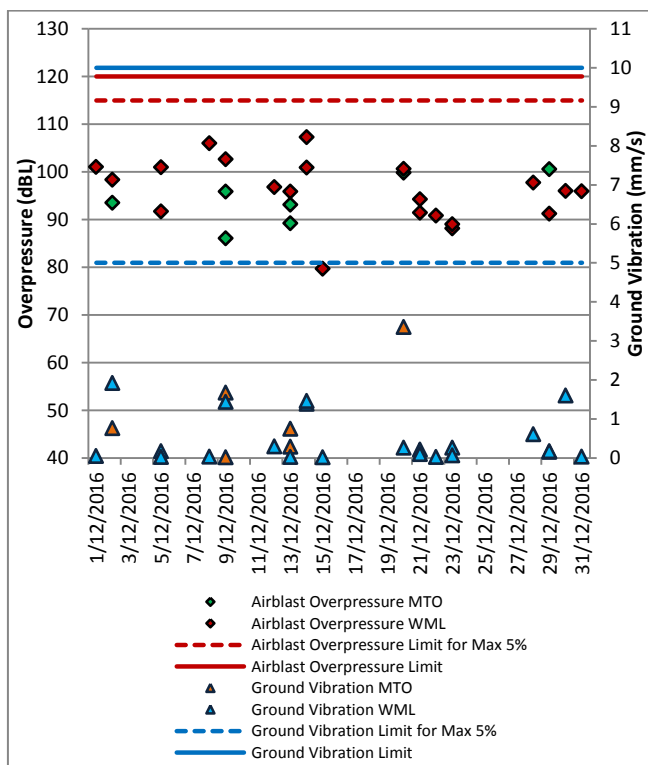
**Table 4: Blasting Limits**

Airblast	
Overpressure (dB(L))	Comments
115	5% of the total number of blasts in a 12 month period
120	0%

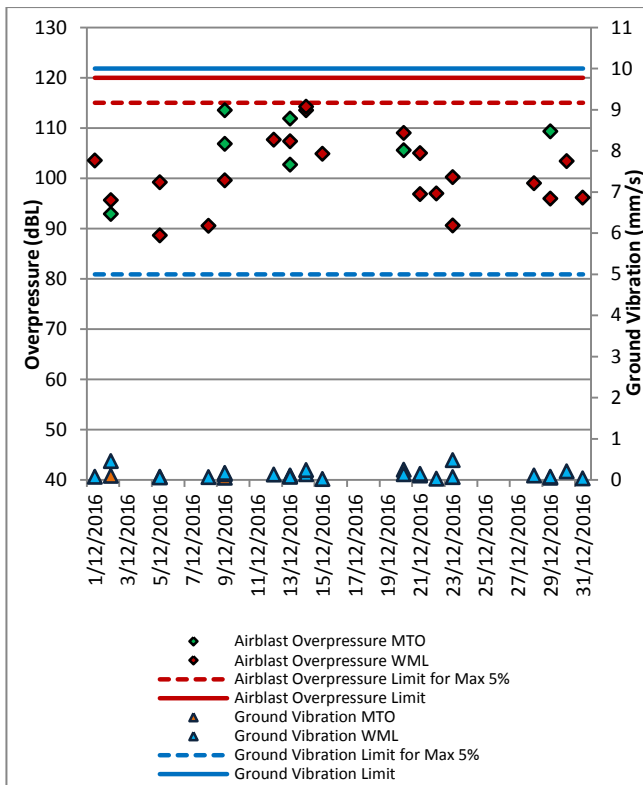
Ground Vibration	
(mm/s)	Comments
5	5% of the total number of blasts in a 12 month period
10	0%

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

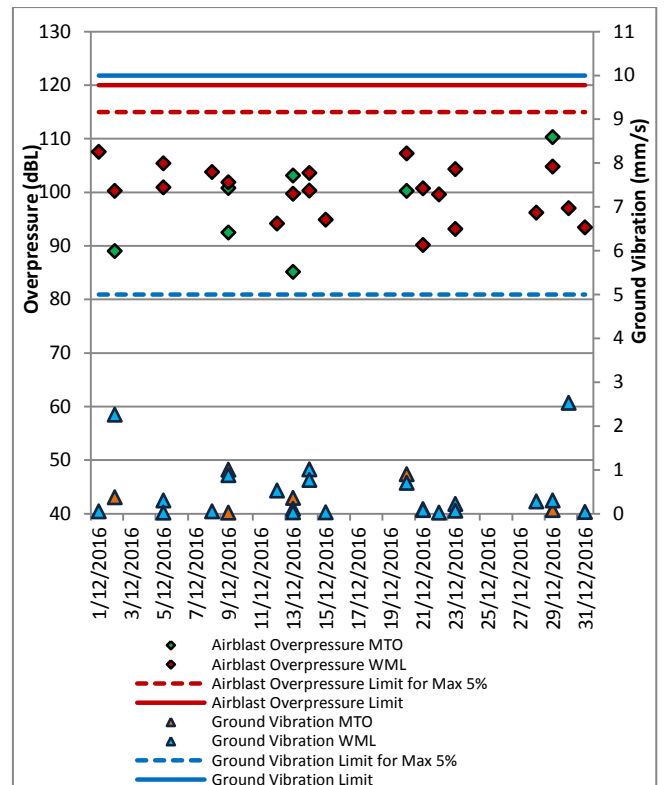


**Figure 61: Bulga Village Blast Monitoring Results - December 2016**

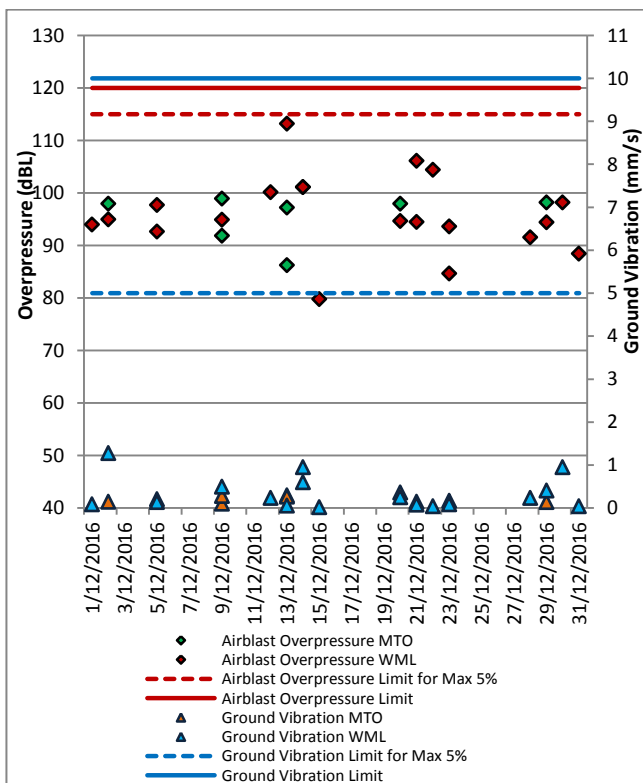




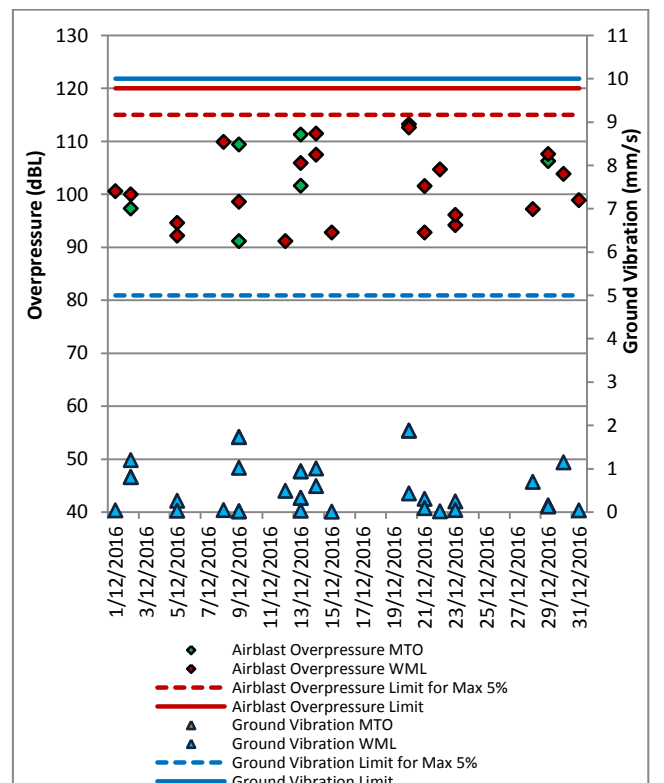
**Figure 62: MTIE Blast Monitoring Results – December 2016**



**Figure 64: Wambo Road Blast Monitoring Results – December 2016**



**Figure 63: Warkworth Blast Monitoring Results – December 2016**



**Figure 65: Wollemi Peak Road Road Blast Monitoring Results – December 2016**



**Mount Thorley Warkworth  
Blast Monitoring Locations**

Date: 160621  
Plan By: DF  
Version: 4.0



RTCA - NSW Environmental Services

**Figure 66: Blast and Vibration 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. Unattended monitoring (real time noise monitoring) also occurs at seven sites surrounding MTW. The attended noise monitoring locations are displayed in Figure 67.

## 5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding MTW on the night of 20 December 2016. All measurements complied with the relevant criteria. Results are detailed in Table 5 to Table 8.

### 5.1.1 WML Noise Assessment

Compliance assessments undertaken against the WML noise criteria are presented in Tables 5 and 6.

**Table 5: LAeq, 15 minute Warkworth Impact Assessment Criteria – December 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion (dB(A))	Criterion Applies? <sup>1,6</sup>	WML LAeq dB <sup>2,4</sup>	Exceedance <sup>3</sup>	Total LCeq – LAeq	Revised WML LAeq <sup>5,6</sup>
Bulga RFS	20/12/2016 22:27	3.4	E	35	No	<25	NA	7	<25
Bulga Village	20/12/2016 21:00	3.9	D	38	No	24	NA	9	24
Gouldsville	20/12/2016 21:28	4.6	D	37	No	1A	NA	5	1A
Inlet Rd	20/12/2016 21:22	3.5	E	35	No	22	NA	5	22
Inlet Rd West	20/12/2016 21:44	4.6	D	35	No	1A	NA	1	1A
Long Point	20/12/2016 21:04	3.9	D	36	No	1A	NA	13	1A
South Bulga	20/12/2016 23:08	4.2	D	35	No	<25	NA	4	<25

**Table 6: LAeq, 15 minute Warkworth - Land Acquisition Criteria – December 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion (dB(A))	Criterion Applies? <sup>1,6</sup>	WML LAeq dB <sup>2,4</sup>	Exceedance <sup>3</sup>	Total LCeq – LAeq <sup>7</sup>	Revised WML LAeq <sup>5,6</sup>
Bulga RFS	20/12/2016 22:27	3.4	E	40	No	<25	NA	7	<25
Bulga Village	20/12/2016 21:00	3.9	D	43	No	24	NA	9	24
Gouldsville	20/12/2016 21:28	4.6	D	43	No	1A	NA	5	1A
Inlet Rd	20/12/2016 21:22	3.5	E	40	No	22	NA	5	22
Inlet Rd West	20/12/2016 21:44	4.6	D	40	No	1A	NA	1	1A
Long Point	20/12/2016 21:04	3.9	D	40	No	1A	NA	13	1A
South Bulga	20/12/2016 23:08	4.2	D	40	No	<25	NA	4	<25
Bulga RFS	20/12/2016 22:27	3.4	E	40	No	<25	NA	7	<25

#### 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.

### 5.1.2 MTO Noise Assessment

Compliance assessments undertaken against the MTO noise criteria are presented in Tables **Error! Reference source not found.**7 and 8.

**Table 7: LAeq, 15minute Mount Thorley - Impact Assessment Criteria – December 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG	Criterion dB	Criterion Applies? <sup>1,6</sup>	MTO LAeq dB <sup>2,4</sup>	Exceedance <sup>3</sup>	Total L <sub>Ceq</sub> – L <sub>Aeq</sub> <sup>7</sup>	Revised MTO LAeq <sup>5,6</sup>
Bulga RFS	20/12/2016 22:27	3.4	E	37	No	IA	NA	7	IA
Bulga Village	20/12/2016 21:00	3.9	D	38	No	IA	NA	9	IA
Gouldsville	20/12/2016 21:28	4.6	D	35	No	IA	NA	5	IA
Inlet Rd	20/12/2016 21:22	3.5	E	37	No	IA	NA	5	IA
Inlet Rd West	20/12/2016 21:44	4.6	D	35	No	IA	NA	1	IA
Long Point	20/12/2016 21:04	3.9	D	35	No	IA	NA	13	IA
South Bulga	20/12/2016 23:08	4.2	D	36	No	IA	NA	4	IA

**Table 8: LA1, 1Minute Mount Thorley - Impact Assessment Criteria – December 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	MTO LA1, 1min dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Bulga RFS	20/12/2016 22:27	3.4	E	47	No	IA	NA
Bulga Village	20/12/2016 21:00	3.9	D	48	No	IA	NA
Gouldsville	20/12/2016 21:28	4.6	D	45	No	IA	NA
Inlet Rd	20/12/2016 21:22	3.5	E	47	No	IA	NA
Inlet Rd West	20/12/2016 21:44	4.6	D	45	No	IA	NA
Long Point	20/12/2016 21:04	3.9	D	45	No	IA	NA
South Bulga	20/12/2016 23:08	4.2	D	46	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;

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

### 5.1.3 INP Low Frequency Assessment

In accordance with the requirements of the Industrial Noise Policy, 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 source is audible. The L<sub>Ceq</sub> 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 penalty is triggered, the penalty has been applied to the dominant mine noise source (either of WML or MTO). There were no exceedances of noise criteria following application of the INP Low Frequency modification factor during December 2016.



**Mount Thorley Warkworth  
Noise Monitoring Programme**

Date: 160226  
Plan By: DF  
Version: 2.0



RTCA - NSW Environmental Services

**Figure 67: 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.
- A summary of these assessments undertaken during December are provided in Table 9.

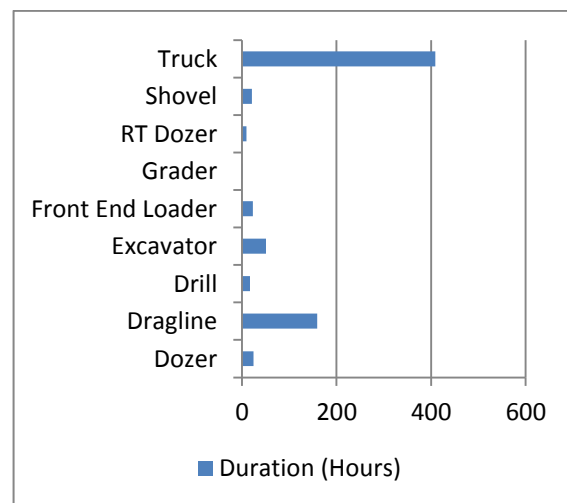
**Table 9: Supplementary Attended Noise Monitoring Data –December 2016**

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
477	2	1	0.42

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

## 6.0 OPERATIONAL DOWNTIME

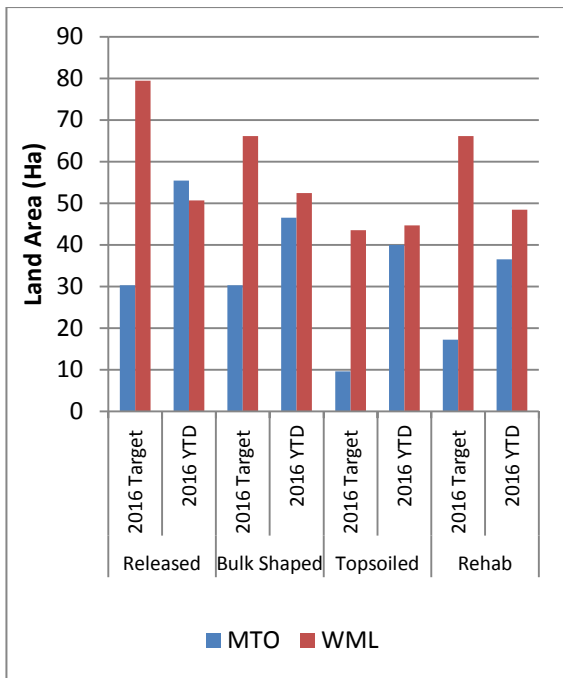
During December a total of 716.3 hours of equipment downtime was logged in response to environmental events such as dust, noise and elevated wind impacts. Operational downtime by equipment type is shown in Figure 68.



**Figure 68: Operational Downtime by Equipment Type – December 2016**

## 7.0 REHABILITATION

During December, 16.52 Ha of land was released, 8.86Ha was bulk shaped, 10.77Ha was topsoiled, 2.02Ha was composted and 19.08Ha was rehabilitated. Year-to-date progress can be viewed in Figure 69.



**Figure 69: Rehabilitation YTD - December 2016**

## 8.0 ENVIRONMENTAL INCIDENTS

During the reporting period MTW recorded one reportable environmental incident.

At 11:15am on the 2 December 2016 a blast identified as N35-GMB-PR7 was fired in the North Pit of the Warkworth Mine (WML).

Visible fume was generated by the blast which was ranked as a Level 3 event on the AEISG scale.

Following blast initiation, the blast plume migrated to the west, passing first through a closed section of Wallaby Scrub Road and travelled across lands owned by Mount Thorley Warkworth (MTW) toward the Putty Road. The plume left the MTW premises, crossing the Putty Road and Wollombi Brook at elevation, and dissipated on lands owned by MTW to the east of the Putty Road.

The incident was reported to the Department of Planning and Environment (DP&E) and Environment Protection Authority (EPA) on the 2<sup>nd</sup> December 2016. An incident report was submitted to DP&E and to the EPA on 9<sup>th</sup> December 2016.

## 9.0 COMPLAINTS

During the reporting period 14 complaints were received, details of these complaints are displayed in Figure 70 below.

	Noise	Dust	Blast	Lighting	Other	Total
January	30	1	5	2	1	39
February	24	2	6	1	0	33
March	43	1	2	1	0	47
April	64	7	4	0	5	80
May	17	5	7	1	0	30
June	18	1	5	6	0	30
July	15	1	5	0	10	31
August	47	3	10	1	1	62
September	25	2	6	0	2	35
October	22	6	7	1	0	36
November	13	7	3	2	1	26
December	6	2	5	1	0	14
Total	324	38	65	16	20	463

**Figure 70: Complaints Summary - YTD December 2016**



## **Appendix A: Meteorological Data**

**Table 10: Meteorological Data – Charlton Ridge Meteorological Station – December 2016**

<b>Date</b>	<b>Air Temperature Maximum (°C)</b>	<b>Air Temperature Minimum (°C)</b>	<b>Relative Humidity Maximum (%)</b>	<b>Relative Humidity Minimum (%)</b>	<b>Solar Radiation Maximum (W/Sq. M)</b>	<b>Wind Direction Average (°)</b>	<b>Wind Speed Average (m/sec)</b>	<b>Rainfall(mm)</b>
1/12/2016	33.7	13.7	82.1	20.03	1225	176.6	2.9	0.2
2/12/2016	38.5	14.0	79.18	11.06	1272	217.3	2.9	0
3/12/2016	30.2	19.1	79.32	29.8	1457	130.1	3.1	0
4/12/2016	34.2	16.6	82.7	29.84	1176	147.2	2.1	0
5/12/2016	41.1	19.6	85.5	17.67	1343	162.1	2.7	3.4
6/12/2016	31.1	18.8	95.5	47.94	1356	143.3	2.3	6.8
7/12/2016	27.9	16.1	96.1	44.76	1520	125.6	2.0	2.8
8/12/2016	35.0	15.1	92.7	34.64	1226	206.9	2.8	0
9/12/2016	28.6	15.8	72.95	11.85	1193	221	4.2	0
10/12/2016	29.0	13.6	81	23.63	1285	124.2	2.6	0
11/12/2016	31.4	13.5	85	31.13	1202	150.2	2.8	5.2
12/12/2016	33.9	15.9	87.7	27.68	1149	158.7	2.1	0
13/12/2016	37.5	16.9	78	15.72	1210	284.9	3.6	0
14/12/2016	39.3	22.6	60.06	10.88	1257	268.1	4.3	0
15/12/2016	24.2	14.4	96.4	58.67	374.1	149.6	2.8	17.8
16/12/2016	23.2	14.1	97.8	75.33	1337	175.3	1.9	23.8
17/12/2016	33.4	17.9	95.7	26.19	1408	248.1	3.4	0
18/12/2016	25.7	16.3	73.68	37.81	1387	133.5	4.0	0
19/12/2016	27.1	14.2	82.3	34.93	1390	124.8	2.8	0
20/12/2016	34.5	11.9	87	28.07	1237	250.9	3.5	0
21/12/2016	36.5	18.6	73.15	13.94	1158	176.5	3.1	0
22/12/2016	26.1	16.9	83.6	48.79	1449	122.5	3.4	0.4
23/12/2016	31.0	15.8	78.95	36.79	1181	134.5	2.8	0
24/12/2016	33.2	16.4	93.1	33.45	1364	193.3	2.4	4.2
25/12/2016	31.6	15.1	94.6	33.45	1336	144.4	2.1	0.2
26/12/2016	35.5	16.2	90.6	24.9	1129	145.9	2.4	0
27/12/2016	36.6	18.2	81.4	24.97	1193	170.3	2.4	0
28/12/2016	37.3	17.4	84.5	21.3	1184	140.7	2.3	0
29/12/2016	40.5	19.6	74.05	11.23	1109	220.8	3.3	0
30/12/2016	42.3	21.8	54.25	11.98	1264	207.6	2.9	0
31/12/2016	41.5	22.5	74.95	17.42	1362	170.5	2.7	0.4



## Appendix D

Acquisition Update - Mount Thorley Warkworth  
Property Portfolio

# Mount Thorley Warkworth property portfolio update

December 2016



# Current property portfolio

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1909 Putty Road, Bulga	910 Putty Road, Mt Thorley
1870 Putty Road, Bulga	129 Wambo Road, Bulga
1758 Putty Road, Bulga	181 Wambo Road, Bulga
1804 Putty Road, Bulga	313 Wambo Road, Bulga
1855 Putty Road, Bulga	317 Wambo Road, Bulga
1893 Putty Road, Bulga	248 Wambo Road, Bulga
1906 Putty Road, Bulga	367 Wambo Road, Bulga
1951 Putty Road, Bulga	
2119 Putty Road, Bulga	
2042 Putty Road, Bulga	
1946 Putty Road, Bulga	
1946 Putty Road, Bulga	
608 Hambledon Hill Road, Singleton	
271 Wallaby Scrub Road, Bulga	
277 Wallaby Scrub Road, Bulga	
896 Putty Road, Mt Thorley	
288 Jerrys Plains Road, Singleton	
11 Inlet Road , Bulga	
36 Inlet Road, Bulga	
1 Wambo Road, Bulga	
89 Wambo Road , Bulga	