



*Managed by Rio Tinto Coal Australia*

Mount Thorley Warkworth  
Monthly Environmental Report  
January 2017

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## Revision History

Version No.	Person Responsible	Document Status	Date
<b>1.0</b>	<b>Environmental Graduate</b>	<b>Draft</b>	<b>01/03/2017</b>
<b>1.1</b>	<b>Acting Environmental Specialist</b>	<b>Final</b>	<b>01/03/2017</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<sup>st</sup> January to 31<sup>st</sup> January 2017.

## 2.0 AIR QUALITY

### 2.1 Meteorological Monitoring

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

#### 2.1.1 Rainfall

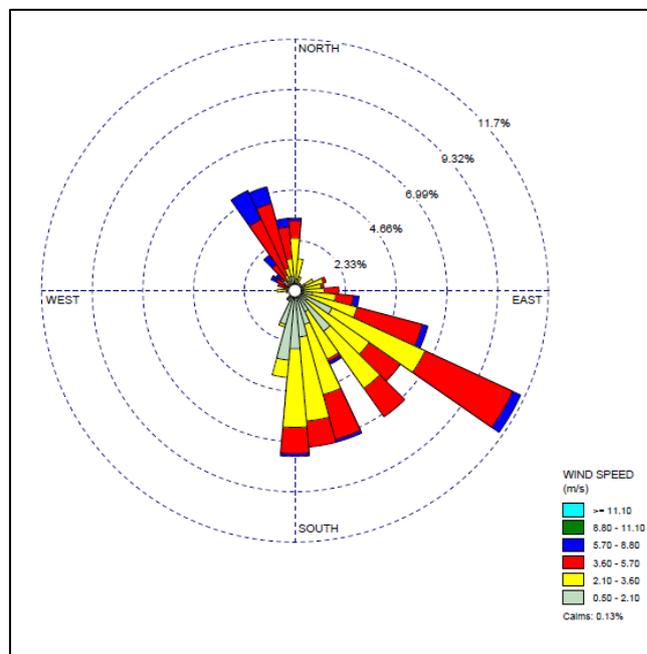
Rainfall for the period is summarised in Table 1, the year-to-date trend and historical trend are shown in Figure 1.

**Table 1: Monthly Rainfall MTW**

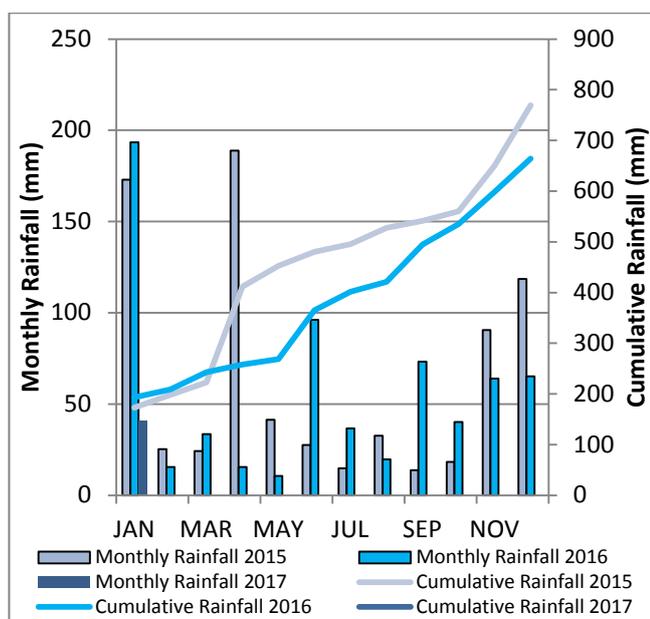
2017	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
January	41.0	41.0

### 2.1.2 Wind Speed and Direction

Winds from the South-East were dominant throughout the reporting period as shown in Figure 2.



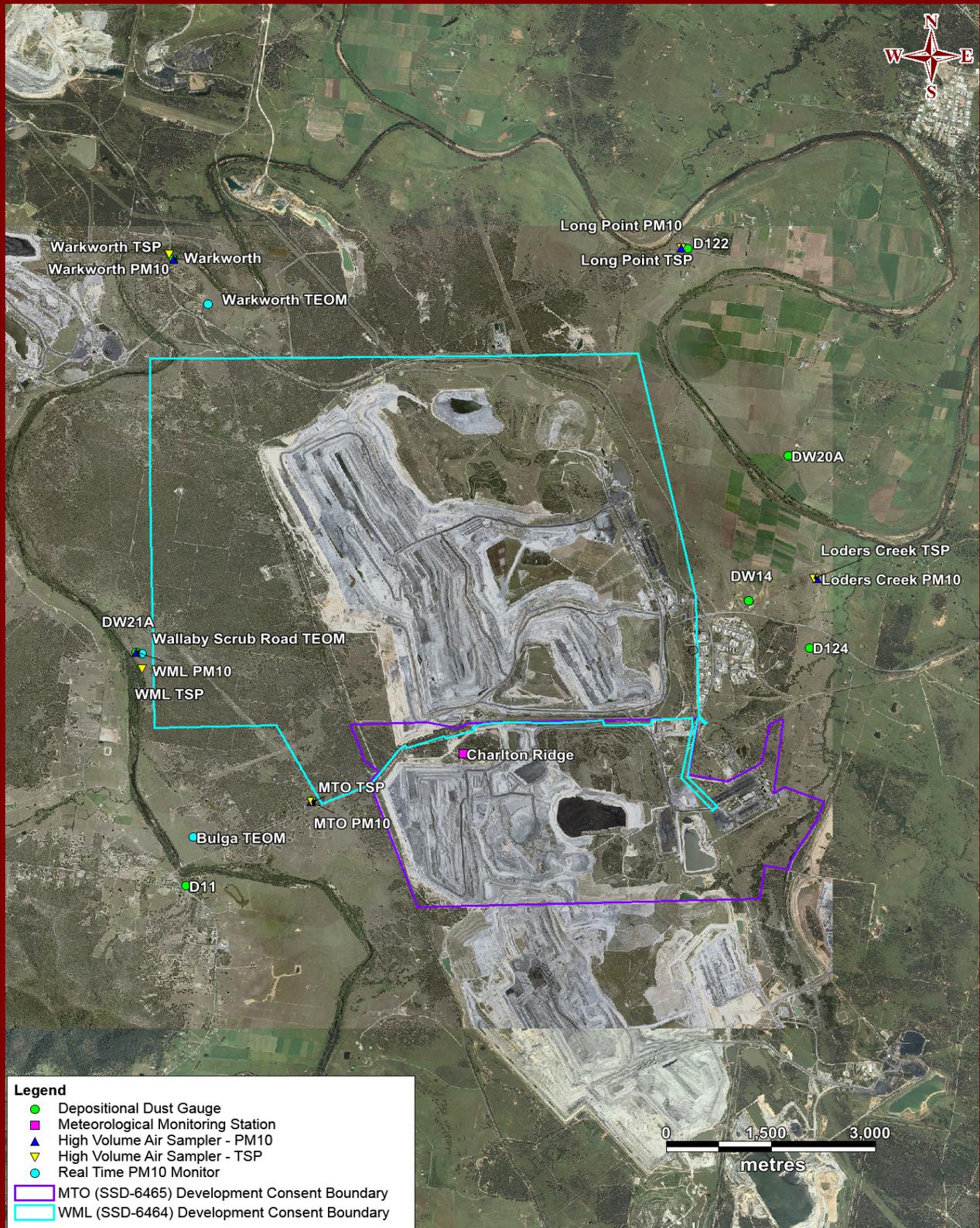
**Figure 2: Charlton Ridge Wind Rose – January 2017**



**Figure 1: Rainfall Trend YTD**

**Mount Thorley Warkworth  
Air Quality Monitoring Programme**

Date: 170301  
Plan By: DF  
Version: 1.3



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**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 DW14, DW20a, DW21a, D124 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 DW20a, D124 and Warkworth 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 Dw21a result is contaminated. Accordingly, this result will be included in the annual average calculation.

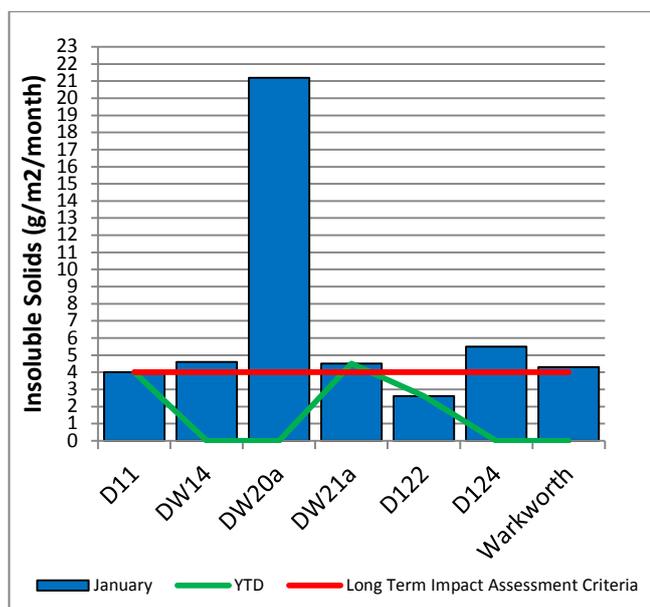


Figure 4: Depositional Dust – January 2017

## 2.3 Suspended Particulates

Suspended particulates are measured by a network of High Volume Air Samplers (HVAS) measuring Total Suspended Particulates (TSP) and Particulate Matter <10µm (PM<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 18/01/2017 and on 24/01/2017, 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 (135 µg/m<sup>3</sup>) and Long Point (89 µg/m<sup>3</sup>) respectively.

Investigation indicates that the Long Point HVAS failed to collect valid samples on the 18<sup>th</sup> and 24<sup>th</sup> January due to local livestock impacting the monitor. The proximity of the monitor to livestock is being increased, through the relocation of a nearby chook yard and also a demountable horse yard away from the monitor.

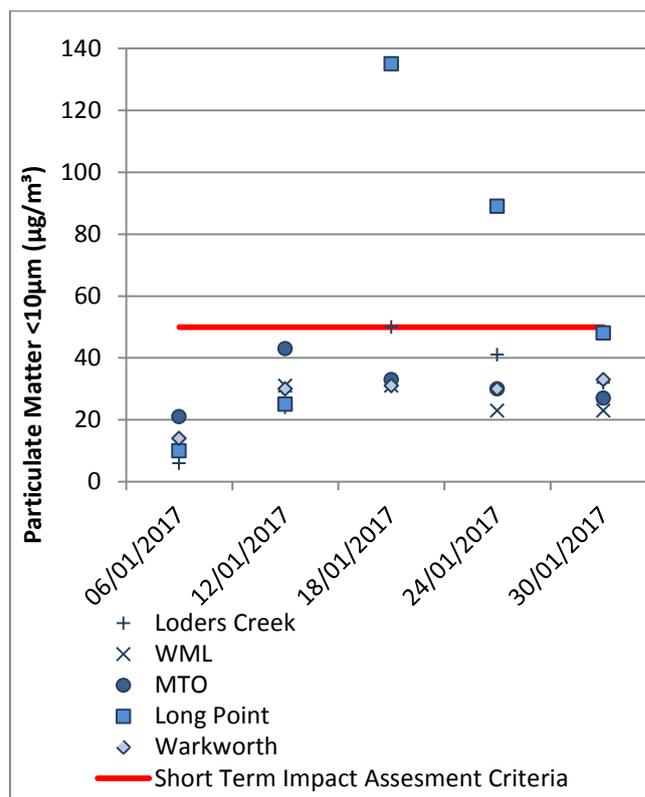
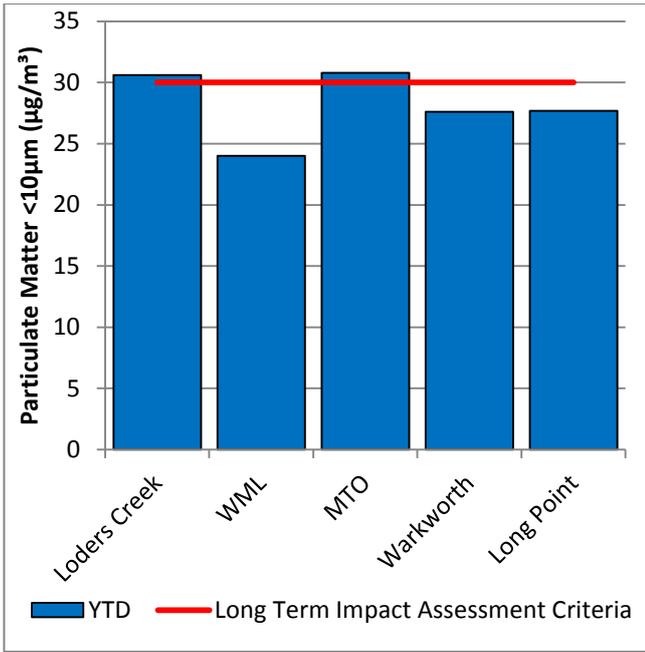


Figure 5: Individual PM<sub>10</sub> Results – January 2017

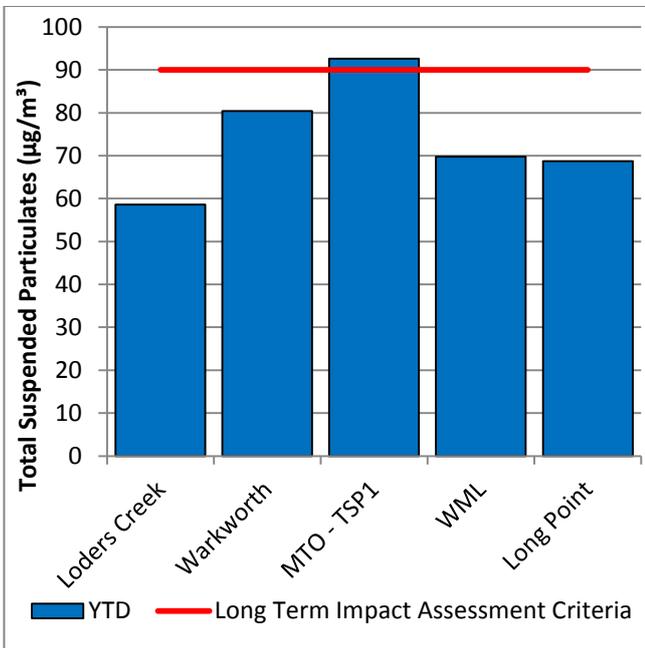
Figure 6 shows the annual average PM<sub>10</sub> results against the long term impact assessment criteria.



**Figure 6: Annual Average PM<sub>10</sub> – January 2017**

### 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 – January 2017**

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

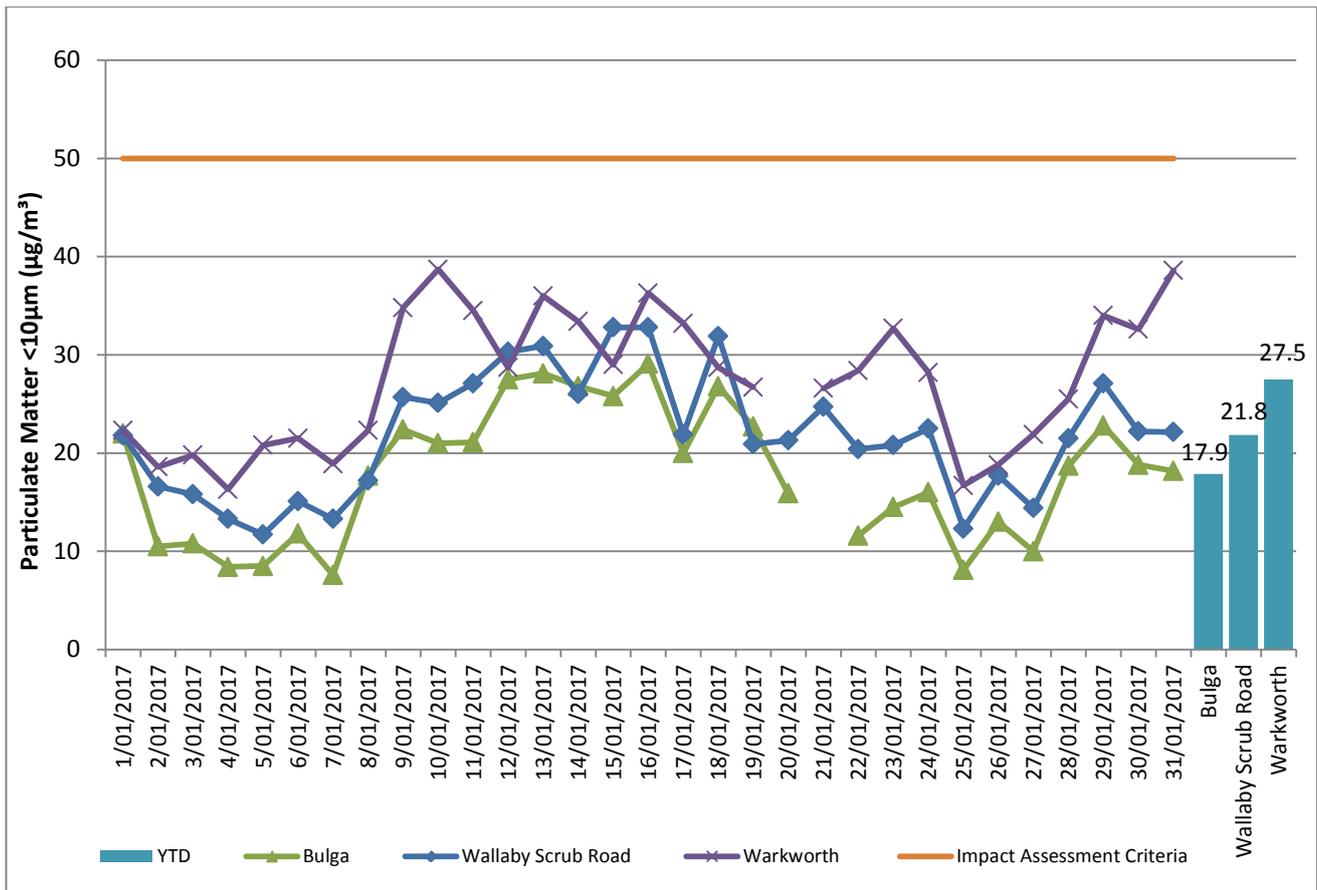
Mount Thorley Warkworth maintains a network of real time PM<sub>10</sub> monitors. The real time air quality monitoring stations continuously log information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger limits.

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.

Data was not available on the 20<sup>th</sup> January (Warkworth) or on 21<sup>st</sup> January (Bulga) due to technical issues.

### 2.3.4 Real Time Alarms for Air Quality

During January, the real time monitoring system generated 76 automated air quality related alerts, including 14 alerts for adverse meteorological conditions and 62 alerts for elevated PM<sub>10</sub> levels.



**Figure 8: Real Time PM<sub>10</sub> daily 24hr average and annual average – January 2017**

### 3.0 WATER QUALITY

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

#### 3.1 Surface Water

Monitoring is conducted at mine site dams and surrounding natural watercourses.

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

Results of monitoring are reported quarterly, next available in the March 2017 report.

#### 3.2 Groundwater Monitoring

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

Groundwater results are reported quarterly, next available in the March 2017 report.

#### 3.3 HRSTS Discharge

MTW participates in the Hunter River Salinity Trading Scheme (HRSTS), allowing discharge from licensed discharge points Dam 1N and Dam 9S. Discharges can only take place subject to HRSTS regulations.

During the reporting period no water was discharged under the HRSTS.

### 4.0 BLAST MONITORING

MTW have a network of six blast monitoring units. These are located at nearby privately owned residences and function as regulatory compliance monitors.

The location of these monitors can be found in Figure 15.

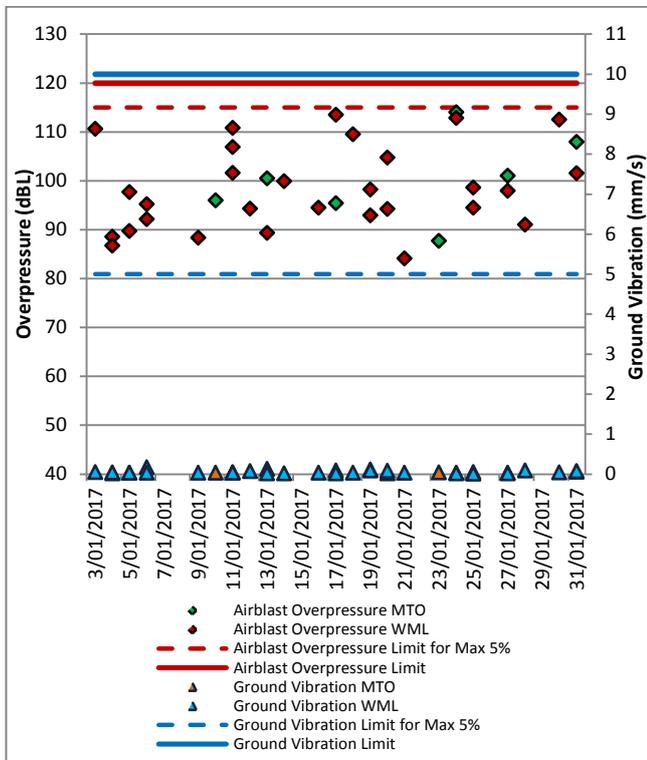
### 4.1 Blast Monitoring Results

During January 2017, 36 blasts were initiated at MTW. Figure 9 to Figure 14 show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 2.

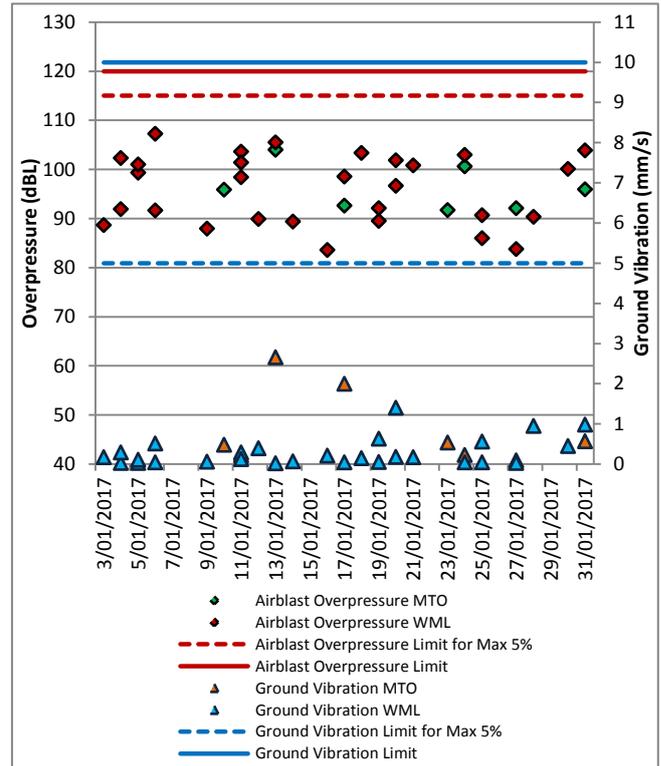
**Table 2: Blasting Limits**

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

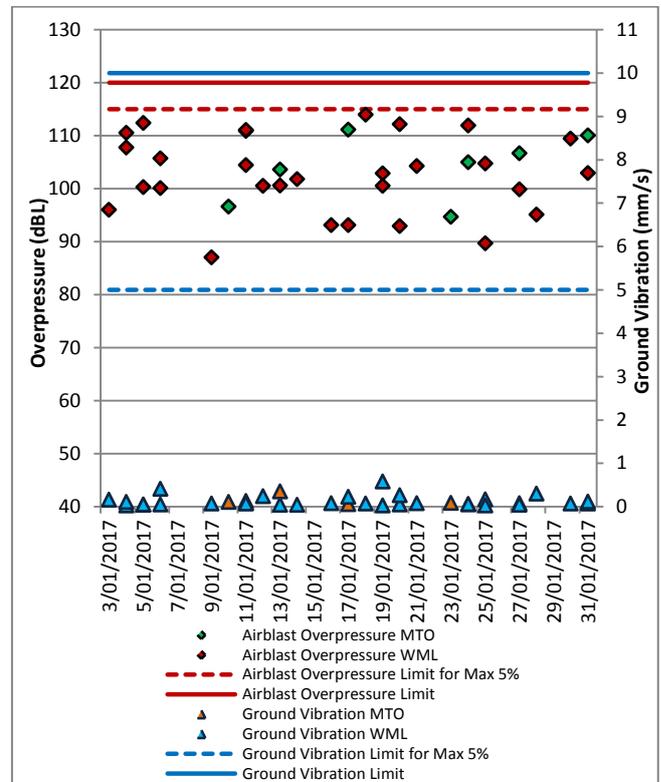
During the reporting period no blasts exceeded the 115 dB(L) 5% threshold for airblast overpressure or 5mm/s 5% threshold for ground vibration



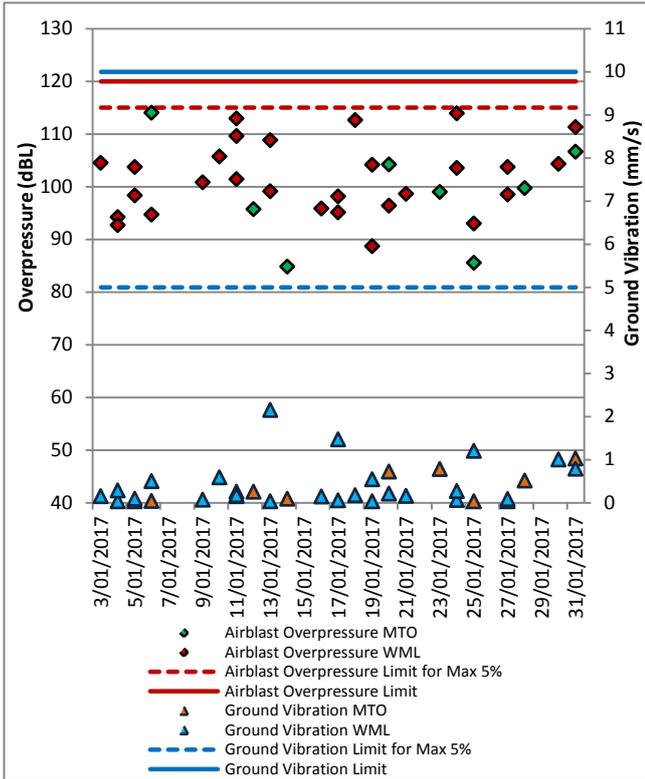
**Figure 9: Abbey Green Blast Monitoring Results – January 2017**



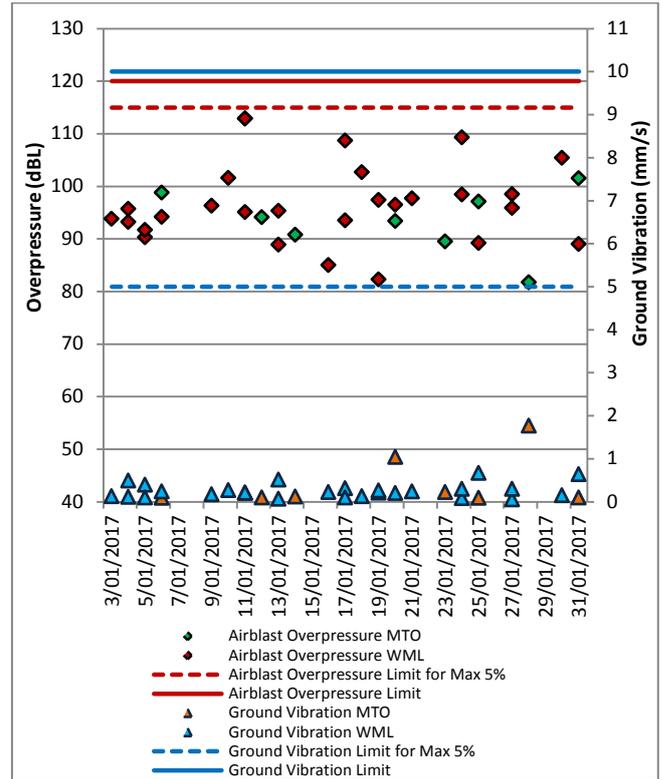
**Figure 10: Bulga Village Blast Monitoring Results – January 2017**



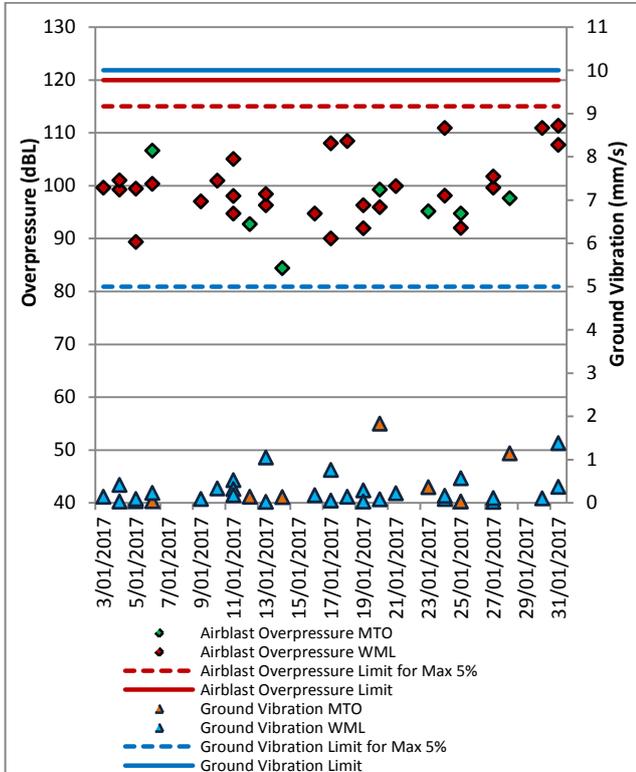
**Figure 11: MTIE Blast Monitoring Results – January 2017**



**Figure 12: Wollemi Peak Road Blast Monitoring Results – January 2017**



**Figure 14: Warkworth Blast Monitoring Results – January 2017**



**Figure 13: Wambo Road Blast Monitoring Results – January 2017**



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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 9<sup>th</sup> January 2017. All measurements complied with the relevant criteria. Results are detailed in Table 3 to Table 6.

#### 5.1.1 WML Noise Assessment

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

**Table 3: L<sub>Aeq</sub>, 15 minute Warkworth Impact Assessment Criteria – January 2017**

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	9/01/2017 23:16	4.8	D	37	No	IA	NA	13	IA
Bulga Village	9/01/2017 22:00	3.1	D	38	No	IA	NA	8	IA
Gouldsville	9/01/2017 21:25	3.3	D	38	No	IA	NA	6	IA
Inlet Rd	9/01/2017 21:14	3.5	D	37	No	33	NA	16	38
Inlet Rd West	9/01/2017 21:35	3.3	D	35	No	25	NA	6	25
Long Point	9/01/2017 21:00	3.5	D	35	No	IA	NA	16	IA
South Bulga	9/01/2017 23:45	3.8	D	35	No	IA	NA	7	IA

**Table 4: L<sub>A1</sub>, 1 minute Warkworth -**

**Impact Assessment Criteria – January 2017**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion dB	Criterion Applies? <sup>1,6</sup>	WML L <sub>A1</sub> , 1min dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Bulga RFS	9/01/2017 23:16	4.8	D	47	No	IA	NA
Bulga Village	9/01/2017 22:00	3.1	D	48	No	IA	NA
Gouldsville	9/01/2017 21:25	3.3	D	45	No	IA	NA
Inlet Rd	9/01/2017 21:14	3.5	D	47	No	41	NA
Inlet Rd West	9/01/2017 21:35	3.3	D	45	No	32	NA
Long Point	9/01/2017 21:00	3.5	D	45	No	IA	NA
South Bulga	9/01/2017 23:45	3.8	D	46	No	IA	NA

**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 Tables 5 and 6.

**Table 5: L<sub>Aeq, 15minute</sub> Mount Thorley - Impact Assessment Criteria – January 2017**

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	9/01/2017 23:16	4.8	D	37	No	IA	NA	13	IA
Bulga Village	9/01/2017 22:00	3.1	D	38	No	NM	NA	8	NM
Gouldsville	9/01/2017 21:25	3.3	D	35	No	IA	NA	6	IA
Inlet Rd	9/01/2017 21:14	3.5	D	37	No	NM	NA	16	NM
Inlet Rd West	9/01/2017 21:35	3.3	D	35	No	IA	NA	6	IA
Long Point	9/01/2017 21:00	3.5	D	35	No	IA	NA	16	IA
South Bulga	9/01/2017 23:45	3.8	D	36	No	IA	NA	7	IA

**Table 6: LA<sub>1, 1Minute</sub> Mount Thorley - Impact Assessment Criteria – January 2017**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	Stability Class	Criterion dB	Criterion Applies? <sup>1,6</sup>	MTO LA <sub>1, 1min</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Bulga RFS	9/01/2017 23:16	4.8	D	47	No	IA	NA
Bulga Village	9/01/2017 22:00	3.1	D	48	No	22	NA
Gouldsville	9/01/2017 21:25	3.3	D	45	No	IA	NA
Inlet Rd	9/01/2017 21:14	3.5	D	47	No	NM	NA
Inlet Rd West	9/01/2017 21:35	3.3	D	45	No	IA	NA
Long Point	9/01/2017 21:00	3.5	D	45	No	IA	NA
South Bulga	9/01/2017 23:45	3.8	D	46	No	IA	NA

### 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 Mt Thorley Operations (MTO);
- 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.

## 5.1.4 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 1 dB at Inlet Road, and remained in compliance at all other locations.

This result has been reported in writing to the NSW Department of Planning and Environment.



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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 January are provided in Table 7.

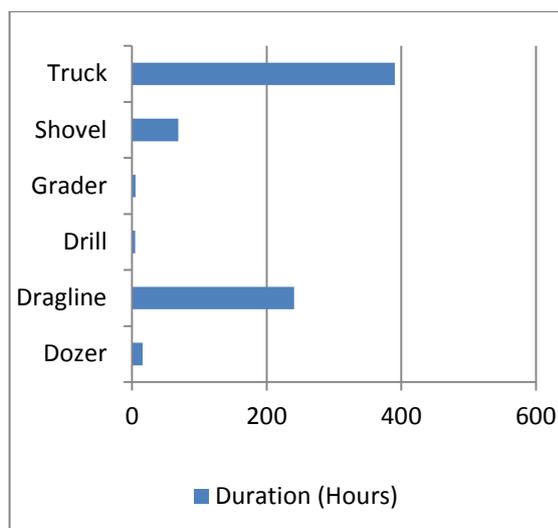
**Table 7: Supplementary Attended Noise Monitoring Data – January 2017**

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
526	0	0	0

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

## 6.0 OPERATIONAL DOWNTIME

During January, a total of 726.1 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 – January 2017**

## 7.0 REHABILITATION

During January, 32.5 Ha of land was released, 8.8 Ha of land was bulk shaped, 2.6 Ha of land was topsoiled and 3.0 Ha of land was composted.

## **8.0 ENVIRONMENTAL INCIDENTS**

There were no reportable environmental incidents during the reporting period.

## **9.0 COMPLAINTS**

During the reporting period 15 complaints were received, details of these complaints are shown in Figure 19 below.

	Noise	Dust	Blast	Lighting	Other	Total
January	5	6	3	1	0	15
February	-	-	-	-	-	-
March	-	-	-	-	-	-
April	-	-	-	-	-	-
May	-	-	-	-	-	-
June	-	-	-	-	-	-
July	-	-	-	-	-	-
August	-	-	-	-	-	-
September	-	-	-	-	-	-
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	5	6	3	1	0	15

**Figure 18: Complaints Summary - YTD January 2017**

## **Appendix A: Meteorological Data**

**Table 8: Meteorological Data – Charlton Ridge Meteorological Station – January 2017**

<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>
1/01/2017	28.3	19.5	94.4	59.6	132.4	2.1	9.0
2/01/2017	28.4	18.6	97.0	50.4	161.3	3.0	17.8
3/01/2017	28.2	17.0	85.8	41.7	146.2	3.2	0.0
4/01/2017	26.4	16.6	82.0	42.4	125.5	3.0	0.0
5/01/2017	30.0	16.8	90.7	42.9	139.1	3.1	0.0
6/01/2017	30.3	16.9	87.7	39.5	137.3	3.5	0.0
7/01/2017	31.3	16.1	79.8	33.4	124.7	2.9	0.0
8/01/2017	35.6	14.2	90.0	21.6	140.2	2.1	0.0
9/01/2017	39.3	17.9	73.3	15.2	142.9	2.4	0.0
10/01/2017	39.1	21.6	73.7	13.2	198.9	2.8	0.0
11/01/2017	39.1	23.0	71.3	15.3	241	3.3	0.0
12/01/2017	32.4	21.6	81.0	42.5	120.5	3.5	0.0
13/01/2017	43.4	20.3	78.3	14.1	219.3	3.8	0.0
14/01/2017	39.5	24.0	75.2	24.5	221.6	3.2	0.0
15/01/2017	26.9	18.9	93.8	45.7	114.9	3.1	0.2
16/01/2017	36.1	17.2	86.3	23.4	147.2	2.3	0.0
17/01/2017	41.3	17.6	88.7	20.3	247.6	3.4	0.0
18/01/2017	43.4	20.0	84.6	15.5	235.5	5.1	0.0
19/01/2017	26.2	16.3	93.2	55.1	141	3.3	0.4
20/01/2017	30.4	16.8	93.1	53.4	225	2.8	9.6
21/01/2017	28.4	18.6	91.8	38.3	133.4	2.7	0.0
22/01/2017	32.1	15.1	82.9	29.3	136.6	2.8	0.0
23/01/2017	38.2	15.4	89.0	21.1	149.8	2.2	0.0
24/01/2017	40.5	20.2	89.8	23.2	241	4.2	1.0
25/01/2017	23.2	17.2	94.7	65.4	153.9	3.1	1.2
26/01/2017	26.5	17.1	96.6	64.8	154.6	2.0	0.6
27/01/2017	30.7	18.1	95.5	46.3	153.7	3.2	0.8
28/01/2017	38.0	15.7	93.9	20.4	152	2.1	0.0
29/01/2017	39.1	20.0	81.5	25.6	158	1.9	0.0
30/01/2017	40.8	19.9	90.0	19.0	252.5	3.5	0.4
31/01/2017	44.1	22.6	78.9	10.8	256.2	4.4	0.0