



# Wongawilli Colliery

## Quarterly Air Quality and Noise Monitoring Report (January to March 2019)

13 November 2019

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13 November 2019

# Wongawilli Colliery

## Quarterly Air Quality and Noise Monitoring Report (January to March 2019)

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## CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
<b>2</b>	<b>PROJECT ENVIRONMENTAL CONDITIONS.....</b>	<b>2</b>
2.1	Monitoring Requirements.....	2
2.2	Air Quality .....	3
2.3	Noise .....	3
<b>3</b>	<b>METEOROLOGICAL MONITORING RESULTS .....</b>	<b>5</b>
3.1	Wind data.....	5
3.2	Temperature .....	6
3.3	Rainfall.....	6
<b>4</b>	<b>PM<sub>10</sub> MONITORING RESULTS.....</b>	<b>8</b>
4.1	Continuous Air Quality Particulate Monitoring.....	8
<b>5</b>	<b>NOISE MONITORING RESULTS .....</b>	<b>9</b>
5.1	Unattended Noise Measurements .....	9
5.2	Unattended Noise Monitoring Graphs.....	13
5.3	Attended Noise Measurements.....	18

## List of Tables

Table 1.1: Monitoring Network .....	1
Table 2.1: Monitoring Summary .....	3
Table 2.2: Project Air Quality Criteria.....	3
Table 2.3: Noise Criteria dB(A) – Medium term intrusive noise limits.....	4
Table 2.4: Noise Criteria dB(A) – Amenity Noise Limits .....	4
Table 3.1: Valid Data Recovery Rates - AWS .....	5
Table 3.2: Summary Statistics .....	5
Table 4.1: Summary Statistics for 24 hour PM <sub>10</sub> (µg/m <sup>3</sup> ) .....	8
Table 5.1: First Quarter Noise Monitoring Summary, dB(A) .....	10
Table 5.2: January- March 2019 L <sub>A1,15minute</sub> Noise Monitoring Summary, dB(A) .....	10
Table 5.3: Wind Speed Exceedances Percentages January - March 2019 .....	10
Table 5.4: NMT3 Daily Noise Monitoring Results – February 2019.....	11
Table 5.5: NMT3 Daily Noise Monitoring Results – March 2019 .....	12

## List of Figures

Figure 1.1: Monitoring Locations .....	2
Figure 3.1: Windrose for Wongawilli Colliery January to March 2019 .....	6
Figure 3.2: Hourly Average Temperature at 2m and 10m .....	7
Figure 3.3: Daily Rainfall .....	7
Figure 4.1: PM <sub>10</sub> Monitoring Data .....	9
Figure 5.1: NMT3 Noise Monitoring Results – February 2019 .....	13
Figure 5.2: NMT3 Noise Monitoring Results – March 2019 .....	14
Figure 5.3: L <sub>1,15minute</sub> (night time only) NMT3 Noise Monitoring Results – February 2019 .....	15
Figure 5.4: L <sub>1,15minute</sub> (night time only) NMT3 Noise Monitoring Results – March 2019 .....	16
Figure 5.5: Wind Speed and Rainfall Monitoring Data.....	17

## 1 INTRODUCTION

Environmental Resource Management (ERM) provides air quality and noise monitoring data analysis and reporting for the Wollongong Coal (WCL) Wongawilli Colliery, in Wongawilli, NSW.

The following report provides a summary of the data collected during the first quarter, January to March 2019. The monitoring network comprises one continuous ambient air quality particulate monitor, one continuous ambient noise monitor and one continuous automatic weather station.

The monitoring network is summarised in **Table 1.1** and presented in **Figure 1.1**.

**Table 1.1: Monitoring Network**

Description	Site	Address / Location	MGA 56 Easting (m)	MGA 56 Northing (m)
Continuous PM10 Monitor	BAM	Jersey Farm Road	294129	6182474
Meteorological Station	AWS	SW of Rail Loading Area	293360	6181777
Continuous Noise Monitor	NMT 3	Jersey Farm Road	294137	6182448

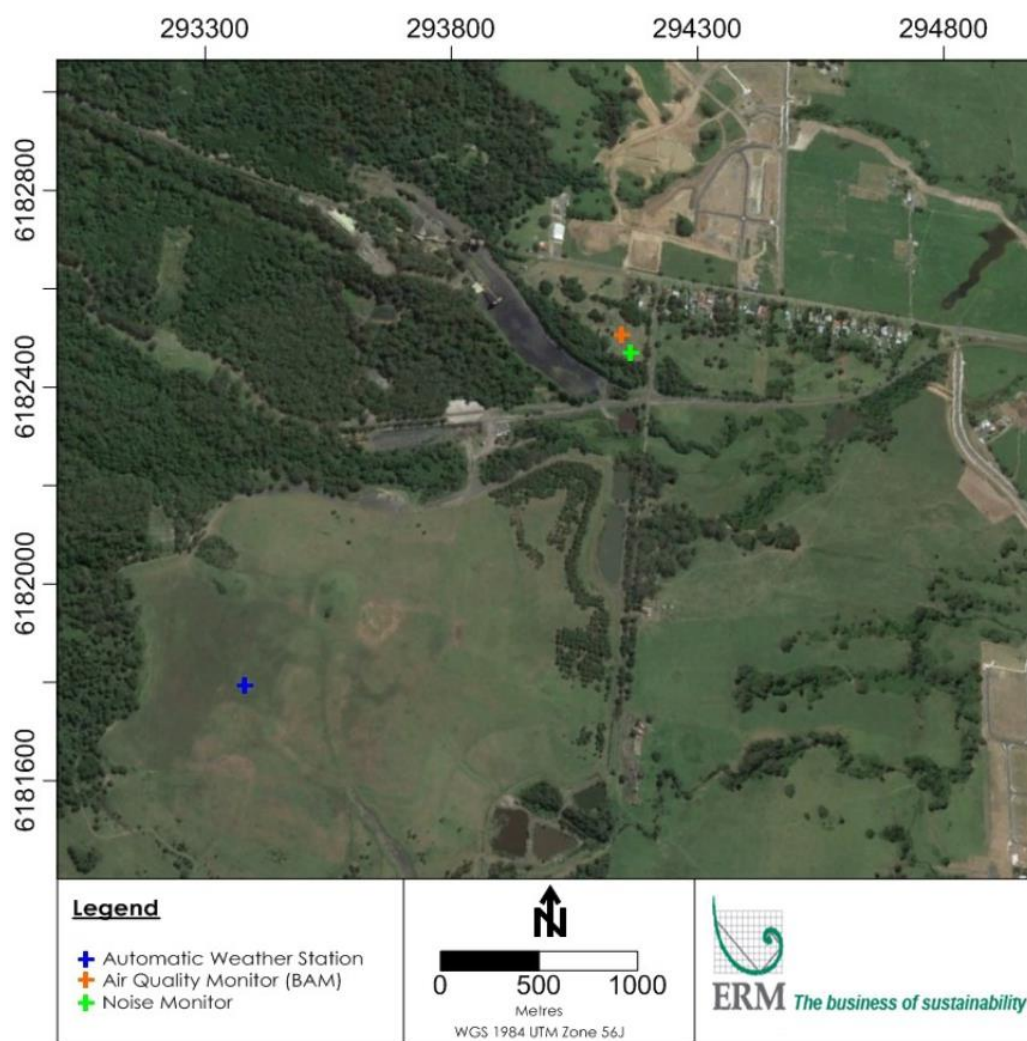


Figure 1.1: Monitoring Locations

## 2 PROJECT ENVIRONMENTAL CONDITIONS

### 2.1 Monitoring Requirements

In accordance with Project Approval (09\_0161), air quality, meteorology and noise parameters are monitored as summarised in **Table 2.1**.

**Table 2.1: Monitoring Summary**

Item	Quantity Measured	Unit	Monitoring Frequency
Air Quality	Particulate Matter < 10 µm (PM <sub>10</sub> )	µg/m <sup>3</sup>	24 h
Meteorology	Temperature at 10m	°C	Real Time
	Temperature at 2m	°C	
	Wind Speed at 10m	m/s	
	Wind Direction	°	
	Standard Deviation of Wind Speed (sigma theta)	-	
	Barometric Pressure	hPa	
	Rainfall	mm	
Noise	15 minute ambient continuous equivalent energy average noise level	LAeq,15min dB(A)	15 min
	1 minute LA1 noise level	LA1,1min dB(A)	1 min
	Period ambient continuous equivalent energy average noise level	LAeq, period dB(A)	Day, evening, night

## 2.2 Air Quality

The project is subject to environmental conditions as part of the Approval. For air quality these are summarised in **Table 2.2**.

**Table 2.2: Project Air Quality Criteria**

Pollutant	Averaging Period	Criterion <sup>a</sup>
Particulate Matter < 10 µm (PM <sub>10</sub> )	Annual	30 µg/m <sup>3</sup> (b)
Particulate Matter < 10 µm (PM <sub>10</sub> )	24 hour	50µg/m <sup>3</sup> (b)

- a) Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Director-General in consultation with OEH.
- b) Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to all other sources)

## 2.3 Noise

The Project Approval states both an amenity and intrusive noise criteria. The intrusive criteria are assessed over a 15 minute period and the amenity criteria are assessed over the relevant period (day, evening and night).



The intrusive criteria are both lower and assessed over a shorter time period, they represent the most onerous criteria and are therefore the limiting criteria.

These criteria are reproduced in **Table 2.3** and **Table 2.4**.

**Table 2.3: Noise Criteria dB(A) – Medium term intrusive noise limits**

Location		Day	Evening	Night	
Area	Receiver Number	L <sub>Aeq</sub> (15mins)	L <sub>Aeq</sub> (15mins)	L <sub>Aeq</sub> (15mins)	L <sub>A1</sub> (15mins)
Lot 2410 Smiths Lane	RA1	43	43	43	59
120/130 Smiths Lane					
18 Wongawilli Road	RA2	44	43	43	60
1 Wongawilli Road					
Jersey Farm road	RA3	40	40	38	48
Horsley (closest receiver)					
All other privately owned land		40	40	38	48

Note: Day is defined as 7.00am to 6.00pm, evening as 6.00pm to 10.00pm and night as 10.00pm to 7.00am

**Table 2.4: Noise Criteria dB(A) – Amenity Noise Limits**

Receiver Area	Day	Evening	Night
	L <sub>Aeq</sub> (11hr)	L <sub>Aeq</sub> (4hr)	L <sub>Aeq</sub> (9hr)
All privately-owned land	60	50	45



### 3 METEOROLOGICAL MONITORING RESULTS

A summary of the data collected during the first quarter of 2019 is provided in the following sections. The valid data recovery rate was 87% for all parameters (refer **Table 3.1**).

**Table 3.1: Valid Data Recovery Rates - AWS**

Parameter	Valid Data Recovery Rate %
Wind Speed	87%
Wind Direction	87%
Temperature – 2 m	87%
Temperature – 10 m	87%
Relative Humidity	No data available
Pressure	
Solar Radiation	

A summary of statistics for the data collected during the reporting period are shown in **Table 3.2**.

**Table 3.2: Summary Statistics**

Parameter (units)	Statistical measure	Value
Wind Speed (m/s)	Mean	2.3
Temperature (°C) – 10m		22.1
Temperature (°C) – 2m		21.4
Barometric pressure (hPa)		1006.1
Wind Speed (m/s)	Median	1.8
Temperature (°C) – 10m		21.7
Temperature (°C) – 2m		20.8
Barometric pressure (hPa)		1006.3
Wind Speed (m/s)	Standard Deviation	1.8
Temperature (°C) – 10m		3.6
Temperature (°C) – 2m		4.2
Barometric pressure (hPa)		6.1
Rainfall (mm)	Quarterly Total	108
Calms	%	9

#### 3.1 Wind data

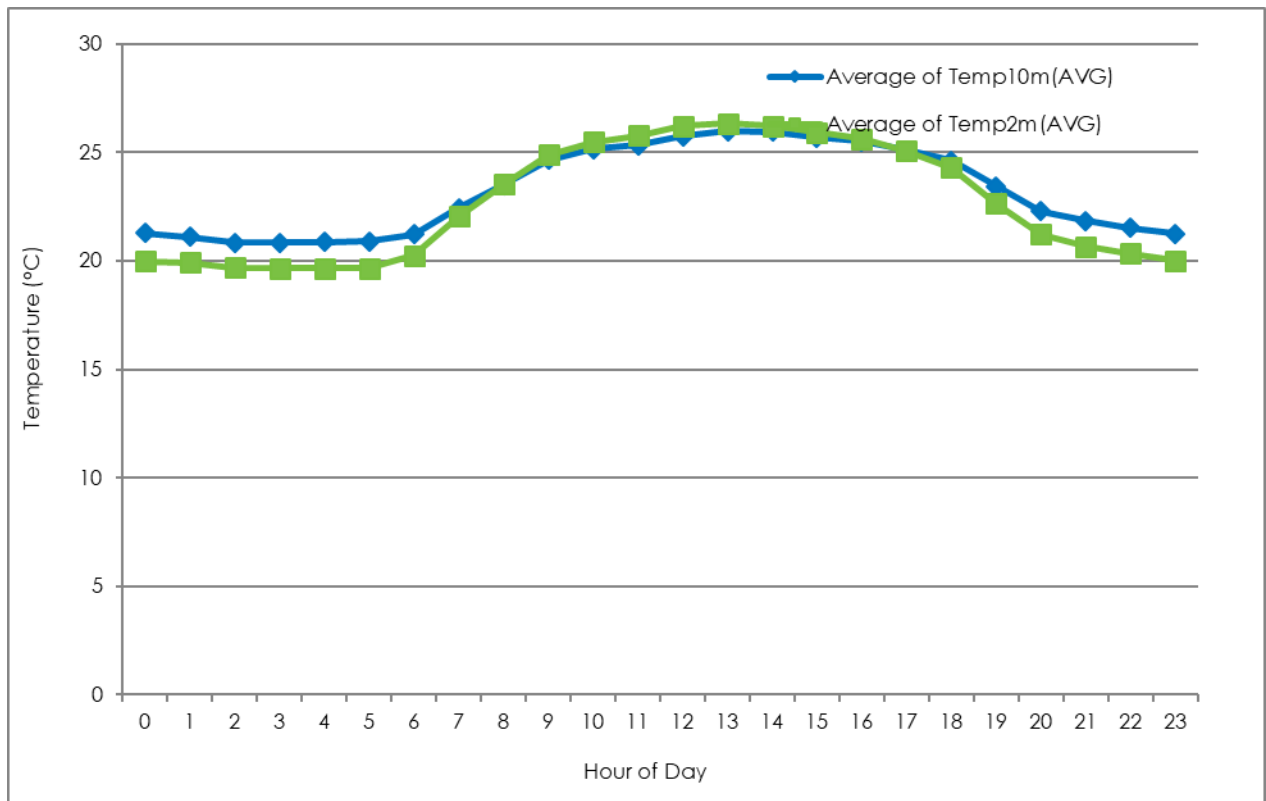
A windrose for the quarter is presented in **Figure 3.1**. The windrose indicates that for the period of monitoring, winds from the West South West were dominant.

The average wind speed for the period was 2.3 m/s and the percentage occurrence of calm wind conditions (less than or equal to 0.5 m/s) was approximately 9%.

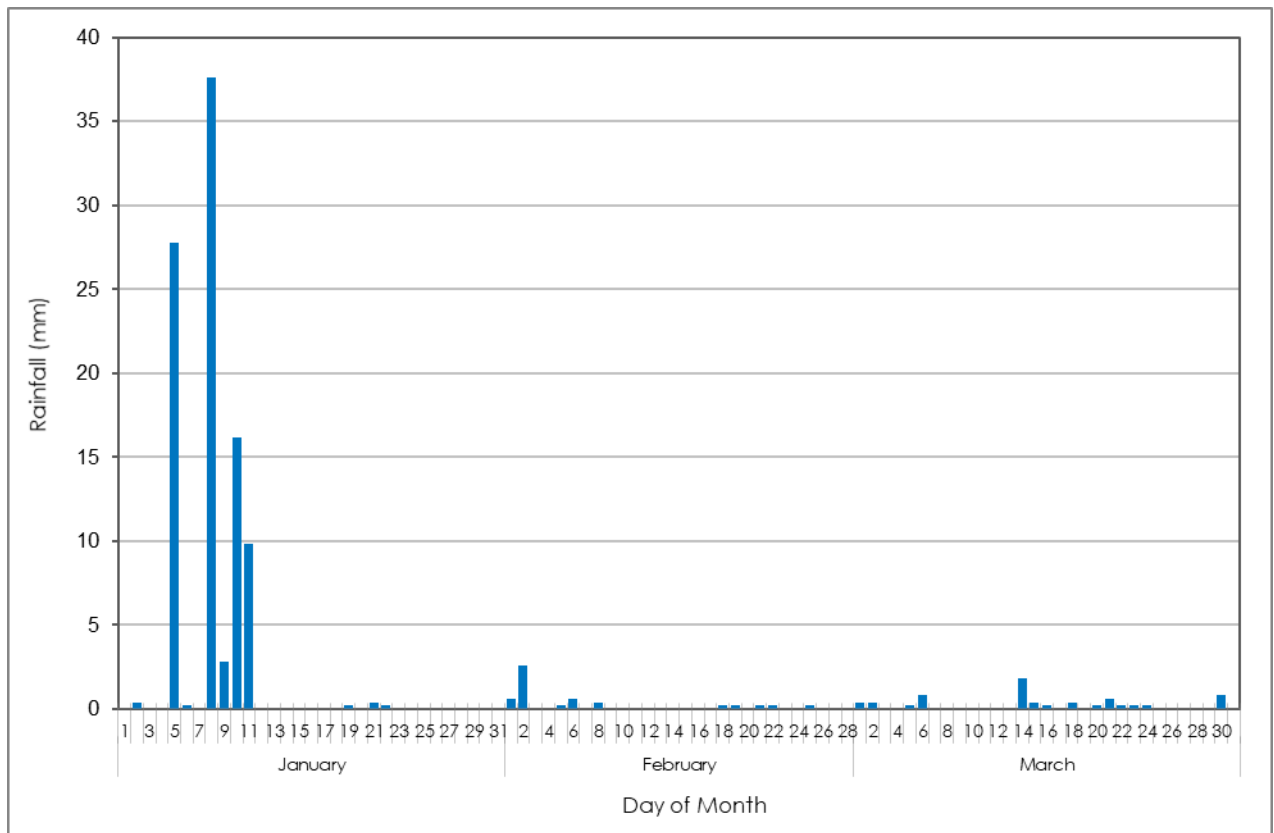
A plot of the hourly average temperature, recorded at 2m and 10m, is shown in **Figure 3.2**.

### 3.3 Rainfall

**Figure 3.1: Windrose for Wongawilli Colliery January to March 2019**



**Figure 3.2: Hourly Average Temperature at 2m and 10m**



**Figure 3.3: Daily Rainfall**

## 4 PM<sub>10</sub> MONITORING RESULTS

### 4.1 Continuous Air Quality Particulate Monitoring

Continuous air quality particulate monitoring is carried out at a BAM monitoring station located near the site boundary (**Figure 1.1**). This station continuously measures airborne particulate matter from all sources.

The particle size ranges relevant to this report are described as PM<sub>10</sub> which refers to all particles with equivalent aerodynamic diameters of less than 10 µm, that is, all particles that behave aerodynamically in the same way as spherical particles with a unit density.

A statistical summary of the monitoring data collected during the first quarter of 2019 is provided in **Table 4.1**. The data recovery rate (for 24-hour average) was 48%. The 24-hour PM<sub>10</sub> concentrations are presented in **Figure 4.1** for the BAM.

**Table 4.1: Summary Statistics for 24 hour PM<sub>10</sub> (µg/m<sup>3</sup>)**

Statistical measure	January	February	March	Q1
Mean	-	9.3	7.1	5.2
Standard Deviation	-	9.9	7.4	3.0
Median	-	9.6	5.5	7.5
Minimum	-	<1	<1	<1
Maximum	-	46.9	25.2	46.9
Days over the criteria	-	0	0	0

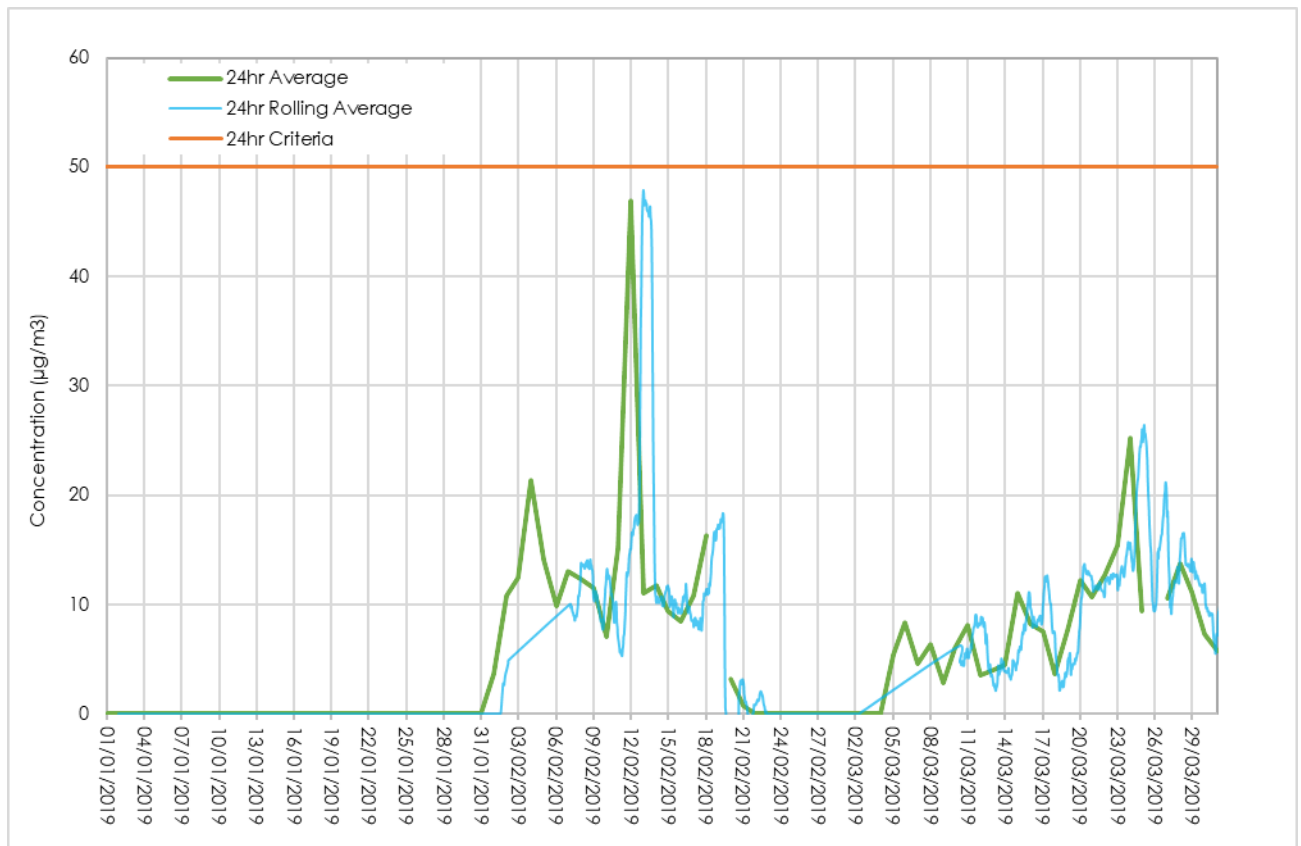


Figure 4.1: PM<sub>10</sub> Monitoring Data

## 5 NOISE MONITORING RESULTS

### 5.1 Unattended Noise Measurements

One permanent ambient noise monitor continuously monitors noise levels from all sources.

The unattended noise monitoring during the first quarter of 2019 recovered 51% of data at NMT3.

A summary of the unattended noise monitoring is presented in **Table 5.1**. Noise monitoring is expressed in three descriptors as follows:

- **L<sub>eq</sub> AP** - The all-pass equivalent continuous energy average noise level. This descriptor represents the same energy as the actual fluctuating noise level over the measurement period.
- **L<sub>eq</sub> LP** - The low-pass equivalent continuous energy average noise level. This is the same as the L<sub>eq</sub> AP except that a frequency filter has been applied and excludes noise above the 800Hz third octave frequency band.
- **RBL** – The rating background level (RBL) as defined within the Industrial Noise Policy. The RBL is defined as the median of each assessment background level (ABL). The ABL is the lowest tenth percentile L<sub>90</sub> measurement for each period (day, evening and night) for the duration of the monitoring. The L<sub>90</sub> is the noise level exceeded for 90% of the measurement period.

The results in are presented in the following time periods:

- Day - 7.00am to 6.00pm;
- Evening - 6.00pm to 10.00pm; and
- Night - 10.00pm to 7.00am.

**Table 5.1: First Quarter Noise Monitoring Summary, dB(A)**

	Day			Evening			Night		
	Leq LP <sup>1</sup>	Leq AP <sup>2</sup>	RBL <sup>3</sup>	Leq LP	Leq AP	RBL	Leq LP	Leq AP	RBL
January	-	-	-	-	-	-	-	-	-
February	46	57	38	43	51	38	44	49	31
March	45	49	35	41	49	37	43	47	29

Note: 1. Leq LP is the Leq with a low pass filter applied at the 800Hz third octave band.  
2. Leq AP is Leq All Pass with no frequency filter applied.  
3. RBL is the rating background level according to the Industrial Noise Policy.

The daily noise monitoring results for NMT 3 are presented in **Table 5.4** to **Table 5.5** and as graphs in **Figure 5.1** to **Figure 5.2**. The daily noise monitoring results are expressed as a logarithmic average of each measured Leq,15min during each period and the ABL.

The unattended noise monitor also records LA<sub>1,1min</sub> levels continuously. The LA<sub>1,1min</sub> represents short-term peak noise events and is the noise level exceeded for 1% of 1 minute. A summary of the LA<sub>1,1min</sub> results are presented in **Table 5.2** and **Figure 5.3** to **Figure 5.4**.

**Table 5.2: January- March 2019 LA<sub>1,15minute</sub> Noise Monitoring Summary, dB(A)**

NMT1	LA <sub>1,1min</sub> Maximum dB(A)	LA <sub>1,1min</sub> Average dB(A)	LA <sub>1,15min</sub> > 52 dB(A) night time (%)
January	-	-	-
February	81	48	11
March	90	46	9

The noise limits at the site apply for wind speeds less than 3 m/s. **Table 5.3** and **Figure 5.5** present monthly percentages that wind speeds more than 3 m/s occurred from WTX monitoring data during this quarterly period.

**Table 5.3: Wind Speed Exceedances Percentages January - March 2019**

WTX	Exceedances (%)
January	18
February	35
March	35

**Table 5.4: NMT3 Daily Noise Monitoring Results – February 2019**

Date	Day			Evening			Night		
	L <sub>eq,11hr</sub> LP <sup>1</sup>	L <sub>eq,11hr</sub> AP	ABL <sup>2</sup>	L <sub>eq,4hr</sub> LP	L <sub>eq,4hr</sub> AP	ABL	L <sub>eq,9hr</sub> LP	L <sub>eq,9hr</sub> AP	ABL
1/02/2019	-	-	-	-	-	-	-	-	-
2/02/2019	-	-	-	-	-	-	-	-	-
3/02/2019	-	-	-	-	-	-	-	-	-
4/02/2019	-	-	-	-	-	-	-	-	-
5/02/2019	-	-	-	-	-	-	-	-	-
6/02/2019	-	-	-	-	-	-	-	-	-
7/02/2019	46	61	45	33	57	49	31	58	43
8/02/2019	57	66	45	41	49	43	42	54	38
9/02/2019	43	62	47	46	53	46	44	45	31
10/02/2019	38	58	39	35	44	39	44	45	30
11/02/2019	46	58	47	47	53	48	49	51	44
12/02/2019	42	56	42	34	54	42	39	46	37
13/02/2019	44	54	43	45	50	45	47	47	45
14/02/2019									
15/02/2019	42	52	43	40	53	47	40	46	40
16/02/2019	42	53	39	47	51	48	46	48	43
17/02/2019	44	56	43	46	52	46	48	49	46
18/02/2019	45	55	40	39	50	43	38	48	41
19/02/2019	40	53	40	31	47	37	35	43	32
20/02/2019	41	46	36	33	45	33	34	41	32
21/02/2019	42	51	35	38	45	40	41	45	39
22/02/2019	42	49	40	39	46	38	41	43	38
23/02/2019	44	49	43	45	48	45	45	47	44
24/02/2019	44	48	43	45	49	45	47	48	45
25/02/2019	44	49	39	40	47	43	41	43	39
26/02/2019	42	48	40	39	50	43	41	46	41
27/02/2019	41	46	39	39	48	39	39	44	38
28/02/2019	41	46	38	44	49	45	46	47	0
Log Avg	38	46	35	31	44	33	31	41	30
Median	46	61	45	33	57	49	31	58	43
Max	57	66	45	41	49	43	42	54	38
Min	43	62	47	46	53	46	44	45	31

Note: 1. LP=Low Pass, AP= All Pass  
2. ABL is the Assessment Background Level and represents the lowest tenth percentile L90 measured during the period



**Table 5.5: NMT3 Daily Noise Monitoring Results – March 2019**

Date	Day			Evening			Night		
	L <sub>eq,11hr</sub> LP <sup>1</sup>	L <sub>eq,11hr</sub> AP	ABL <sup>2</sup>	L <sub>eq,4hr</sub> LP	L <sub>eq,4hr</sub> AP	ABL	L <sub>eq,9hr</sub> LP	L <sub>eq,9hr</sub> AP	ABL
1/03/2019	44	49	40	37	45	38	39	44	39
2/03/2019	41	46	40	39	49	42	33	41	33
3/03/2019	41	47	37	38	45	42	40	44	40
4/03/2019	44	47	40	38	46	43	38	44	39
5/03/2019	54	58	39	40	49	45	42	49	43
6/03/2019	45	49	37	38	49	41	40	42	39
7/03/2019	40	47	38	40	49	39	41	43	40
8/03/2019	45	48	39	34	47	40	33	44	39
9/03/2019	38	44	37	39	45	40	38	43	40
10/03/2019	39	43	37	38	44	39	46	48	40
11/03/2019	43	47	39	33	45	37	42	46	38
12/03/2019	45	48	35	38	45	40	39	45	40
13/03/2019	43	46	37	34	44	36	38	44	32
14/03/2019	53	54	38	47	50	41	42	47	40
15/03/2019	46	50	39	35	47	41	35	46	38
16/03/2019	40	48	42	38	49	43	33	44	36
17/03/2019	39	48	39	35	47	34	37	42	32
18/03/2019	39	45	33	36	47	39	40	48	36
19/03/2019	40	48	36	35	51	42	36	42	35
20/03/2019	41	46	39	38	50	44	34	44	36
21/03/2019	40	47	35	33	51	47	36	43	35
22/03/2019	45	48	36	34	46	40	32	42	37
23/03/2019	40	45	36	34	47	41	43	49	40
24/03/2019	37	43	34	34	48	39	36	46	41
25/03/2019	42	47	40	33	45	38	44	46	29
26/03/2019	41	48	36	36	45	36	36	39	28
27/03/2019	42	48	37	36	45	38	36	40	29
28/03/2019	41	48	36	34	48	41	35	42	36
29/03/2019	42	47	36	34	49	44	35	45	40
30/03/2019	47	52	35	53	57	46	56	59	43
31/03/2019	49	52	37	43	47	38	34	37	
Log Avg	45	49	38	41	49	41	43	47	39
Median	42	48	37	36	47	40	38	44	39
Max	54	58	42	53	57	47	56	59	43
Min	37	43	33	33	44	34	32	37	28

Note: 1. LP=Low Pass, AP= All Pass

2. ABL is the Assessment Background Level and represents the lowest tenth percentile L90 measured during the period

## 5.2 Unattended Noise Monitoring Graphs

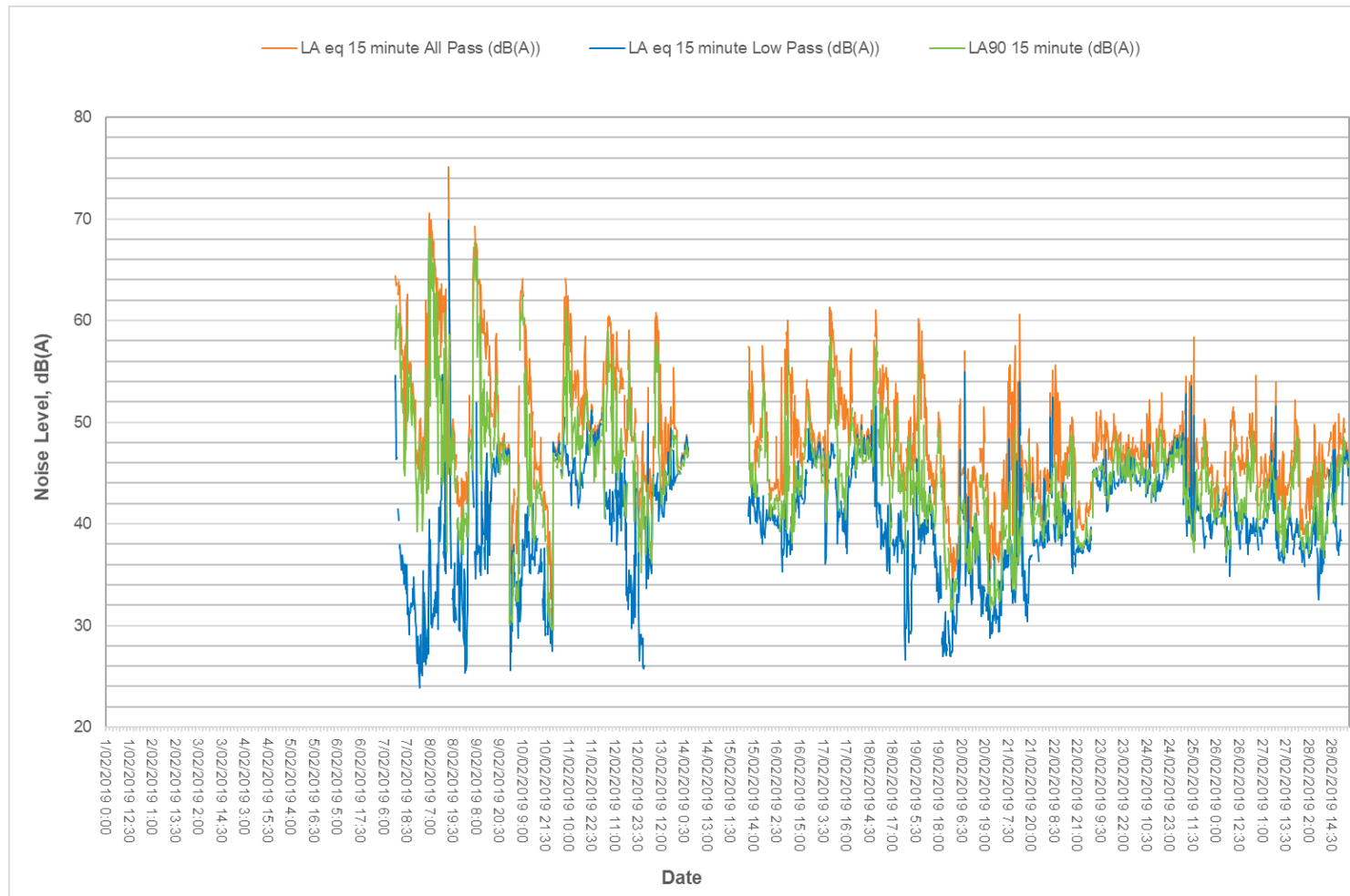
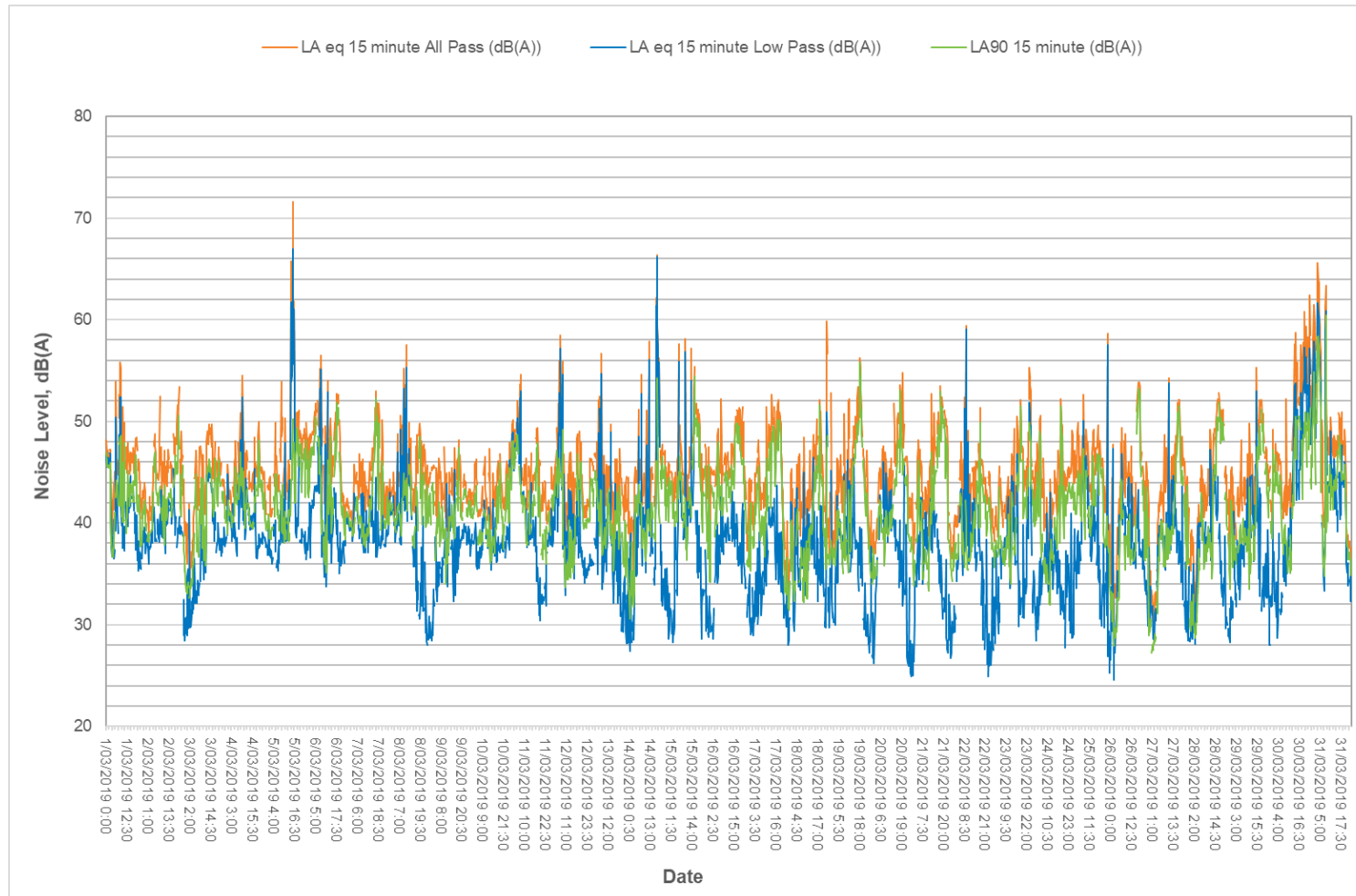
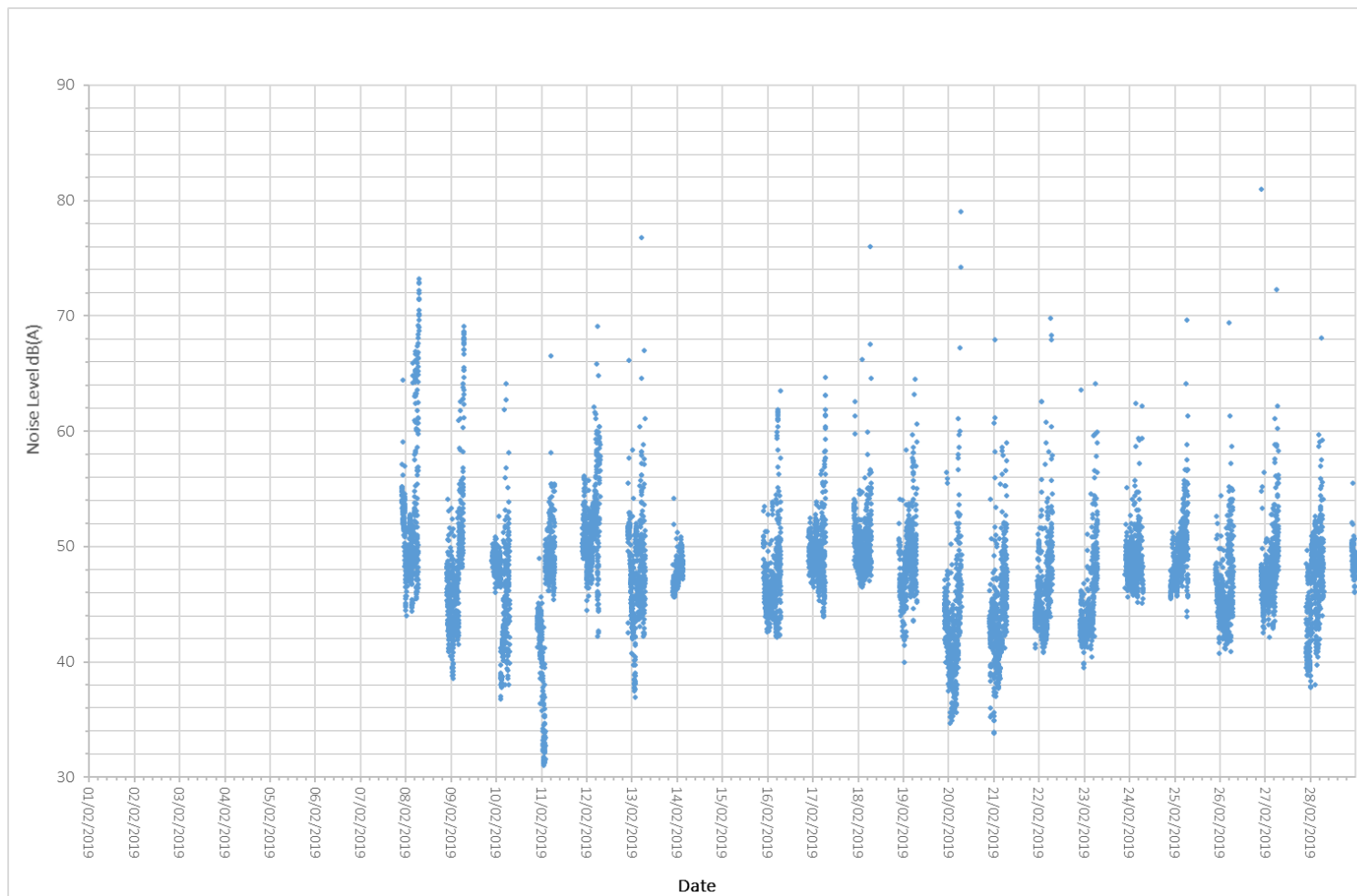


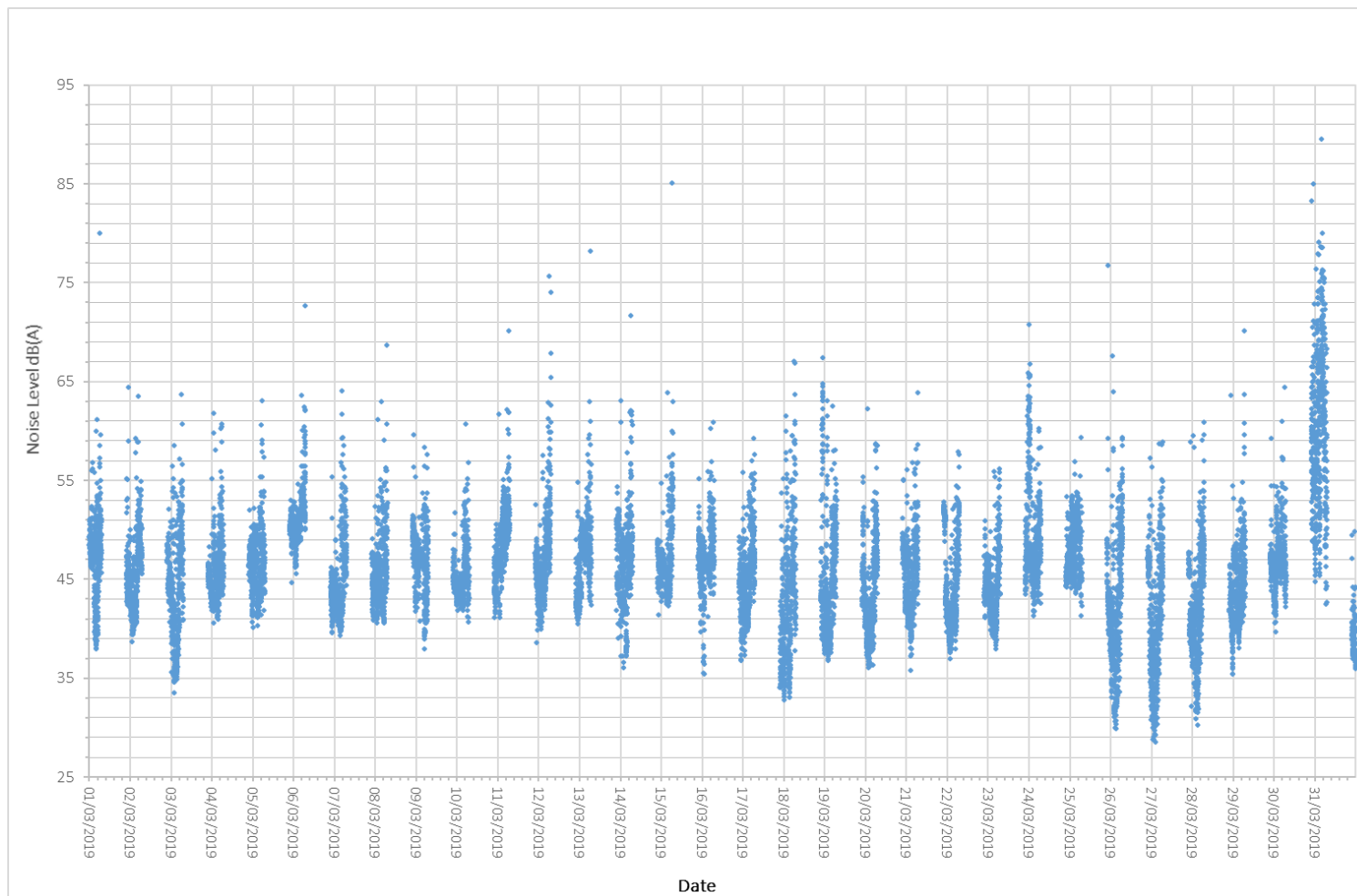
Figure 5.1: NMT3 Noise Monitoring Results – February 2019



**Figure 5.2: NMT3 Noise Monitoring Results – March 2019**



**Figure 5.3: L<sub>1,15minute</sub> (night time only) NMT3 Noise Monitoring Results – February 2019**



**Figure 5.4:  $L_{1,15\text{minute}}$  (night time only) NMT3 Noise Monitoring Results – March 2019**

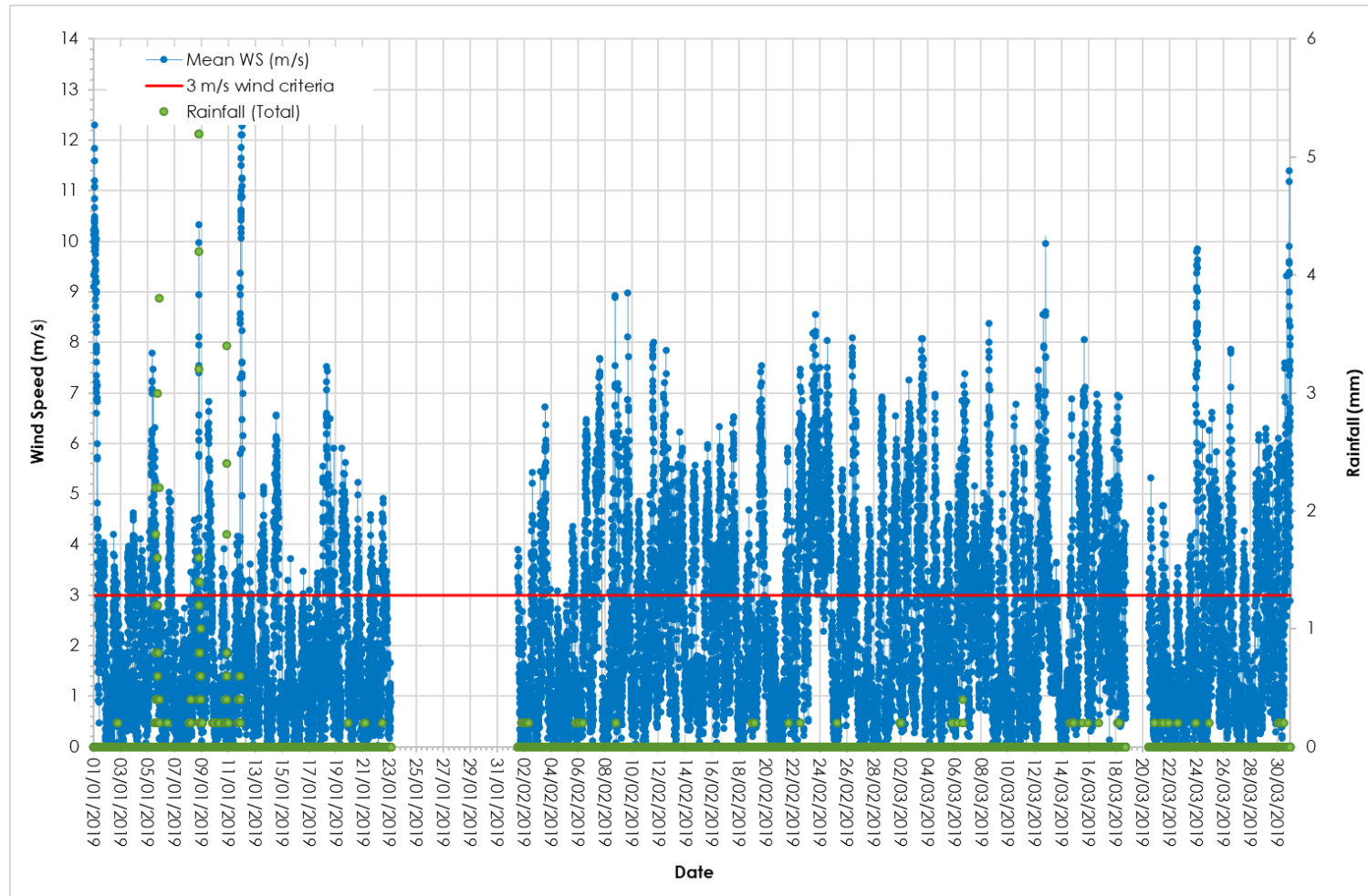


Figure 5.5: Wind Speed and Rainfall Monitoring Data

### 5.3 Attended Noise Measurements

Whilst operational, attended noise measurements are carried out once every three months to establish compliance with the site's noise limits at up to six compliance locations surrounding the site during the day, evening and night and rail noise monitoring on the Wongawilli Rail Spur

Attended noise compliance monitoring was undertaken during this quarter.



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