

# WOLLONGONG COAL WONGAWILLI

## QUARTERLY AIR QUALITY AND NOISE MONITORING REPORT

### JANUARY TO MARCH 2017

## 1 INTRODUCTION

Pacific Environment provides air quality and noise monitoring at the Wollongong Coal (WCL) Wongawilli Colliery, Wongawilli, NSW using the Envirosuite system.

This report provides a summary of the data collected during the first quarter, January to March 2017. 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 PM <sub>10</sub> Monitor	BAM	Jersey Farm Road	294129	6182474
Meteorological Station	AWS	south of coal handling and rail loading area	293358	6181778
Continuous Noise Monitor	NMT 3	Jersey Farm Road	294137	6182448

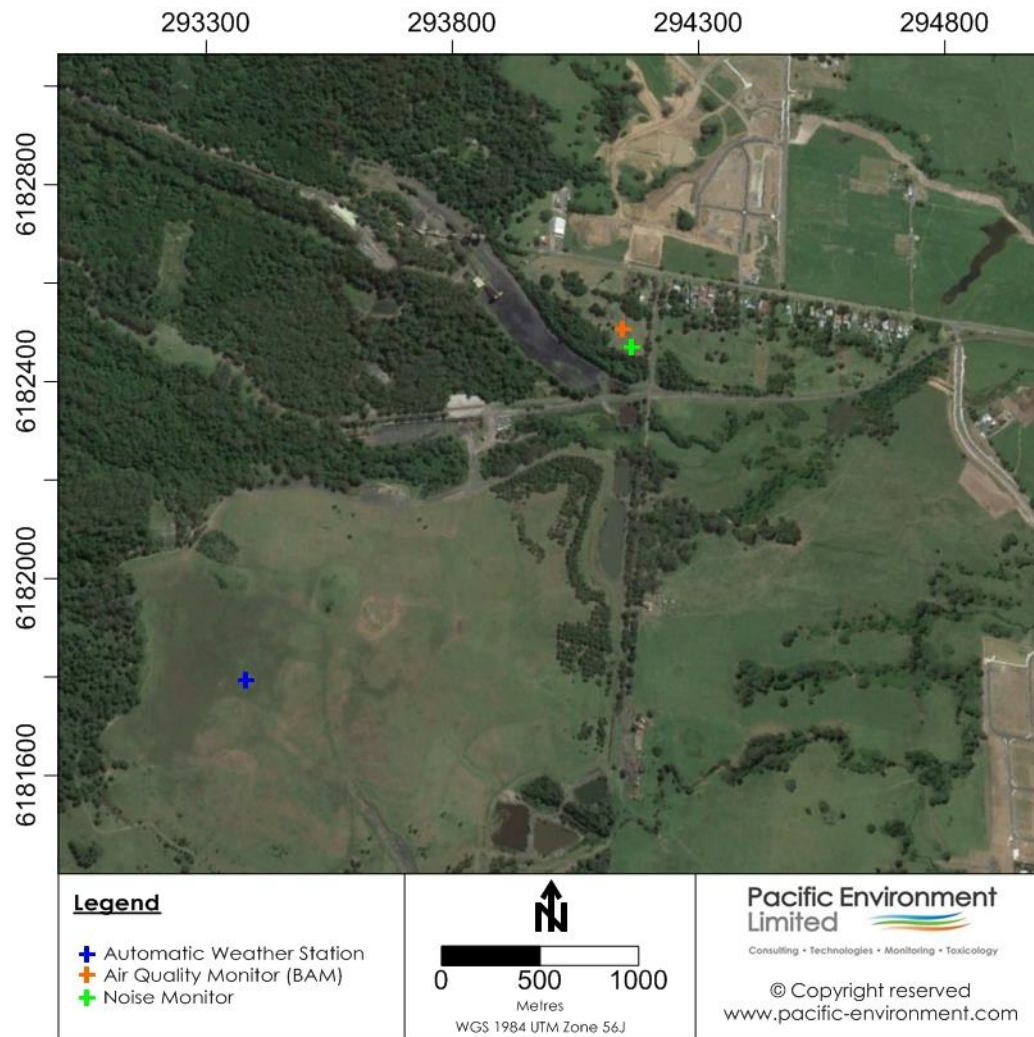


Figure 1-1: Monitoring Locations

## 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	L <sub>Aeq,15min</sub> dB(A)	15 min
	1 minute L <sub>A1</sub> noise level	L <sub>A1,1min</sub> dB(A)	1 min
	Period ambient continuous equivalent energy average noise level	L <sub>Aeq, period</sub> 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> <sup>(b)</sup>
Particulate Matter < 10 µm (PM <sub>10</sub> )	24 hour	50µg/m <sup>3</sup> <sup>(b)</sup>

- 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 as defined in Table 4.3 of the Noise Management Plan**

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 as defined in Table 4 of the Project Approval**

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 quarter is provided in the following sections. The valid data recovery rate was 86% for all parameters (refer **Table 3-1**).

**Table 3-1: Valid data recovery rates - AWS**

Parameter	Valid Data Recovery Rate %
Wind Speed	86%
Wind Direction	86%
Temperature – 2 m	86%
Temperature – 10 m	86%
Pressure	86%

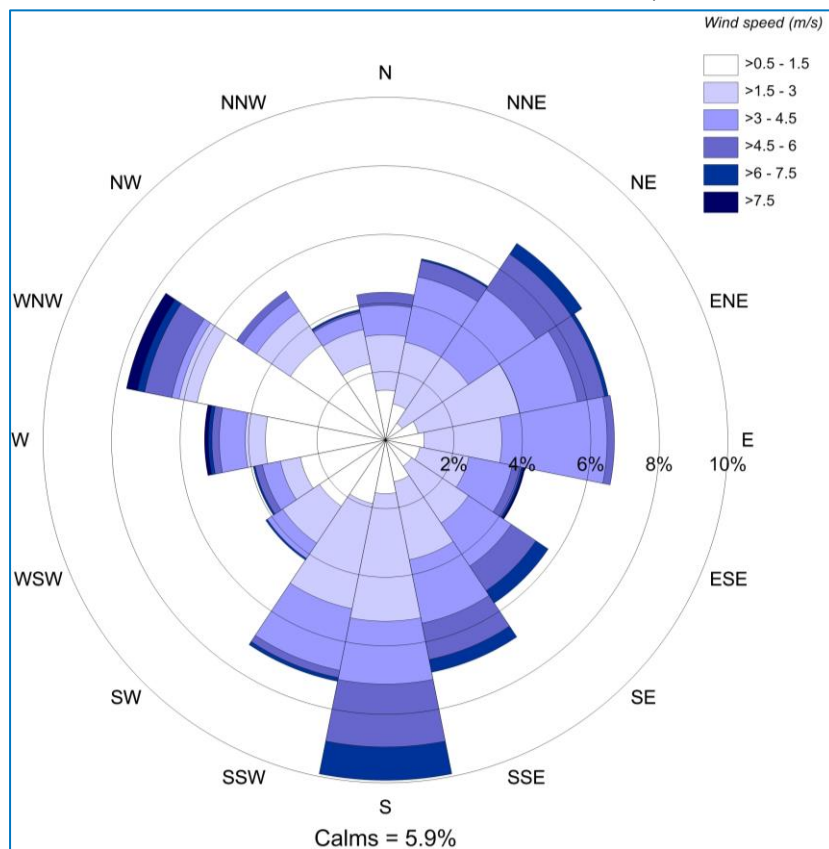
A summary of statistics for the data collected during January to March 2017 are shown in **Table 3-2**.

**Table 3-2: Meteorology Summary Statistics**

Parameter (units)	Statistical measure	Value
Wind Speed (m/s)	Mean	2.5
Temperature (°C) – 10m		22.4
Temperature (°C) – 2m		21.6
Barometric pressure (hPa)		1004.2
Wind Speed (m/s)	Median	2.2
Temperature (°C) – 10m		21.4
Temperature (°C) – 2m		20.6
Barometric pressure (hPa)		1004.9
Wind Speed (m/s)	Standard Deviation	1.8
Temperature (°C) – 10m		3.9
Temperature (°C) – 2m		4.3
Barometric pressure (hPa)		5.5
Rainfall (mm)	Quarterly Total	666.4
Calms	%	5.9

### 3.1.1 Wind data

A windrose for the quarter is presented in

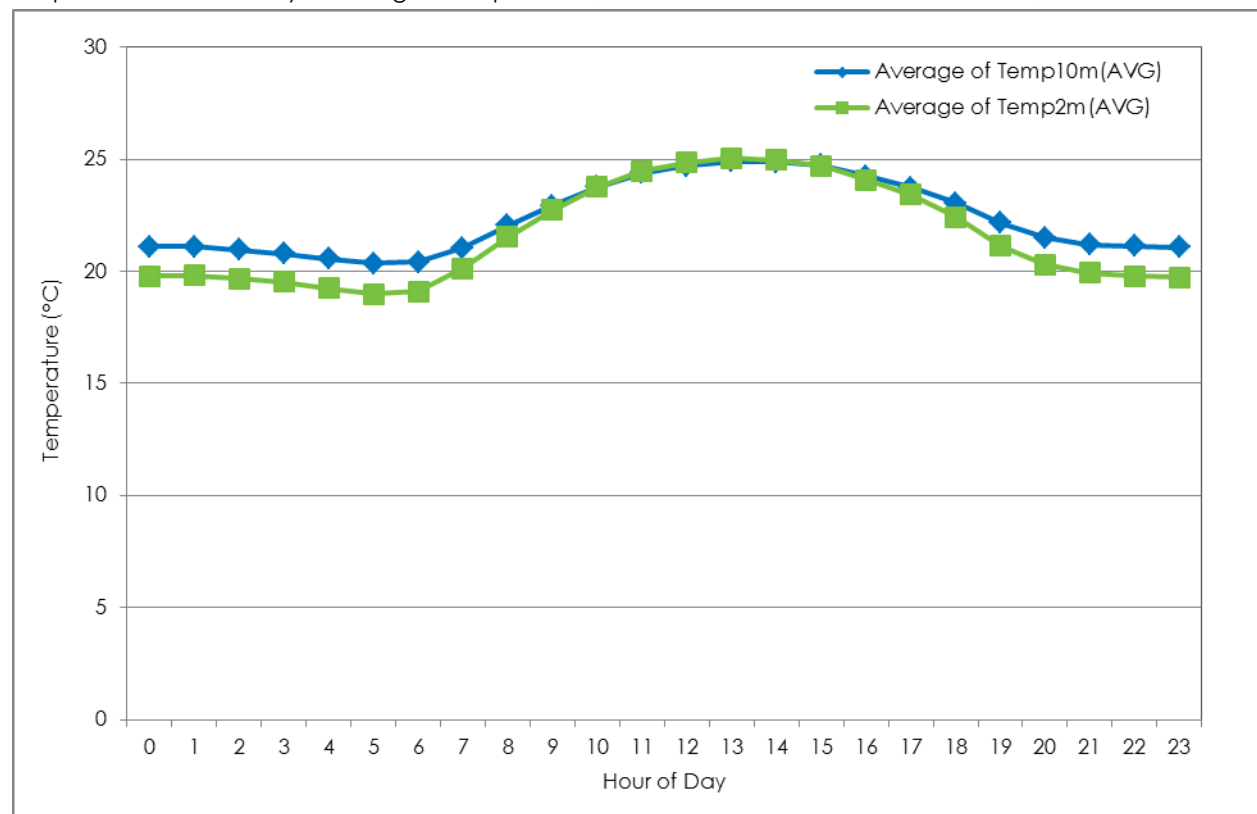


**Figure 3-1.** The windrose indicates that for the period of monitoring winds from the south south west through to the south south east were dominant.

The average wind speed for the period was 2.5 m/s and the percentage occurrence of calm wind conditions (less than or equal to 0.5 m/s) was approximately 5.9%.

### 3.1.2 Temperature

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



**Figure 3-2.** The daily average temperature at 2 m was 21.6°C. The lowest temperature was 11.2°C degrees recorded on 20 February and a maximum of 43°C was recorded 30 January.

### 3.1.3 Rainfall

A plot of the daily rainfall over the three months period is shown in **Figure 3-3**. The station recorded 666 mm of rain in the quarter. The nearest Bureau of Meteorology site at Wollongong - Albion Park recorded 645 mm during the quarter. The highest rainfall recorded on site was on 16 March where 184 mm of rain was reported.

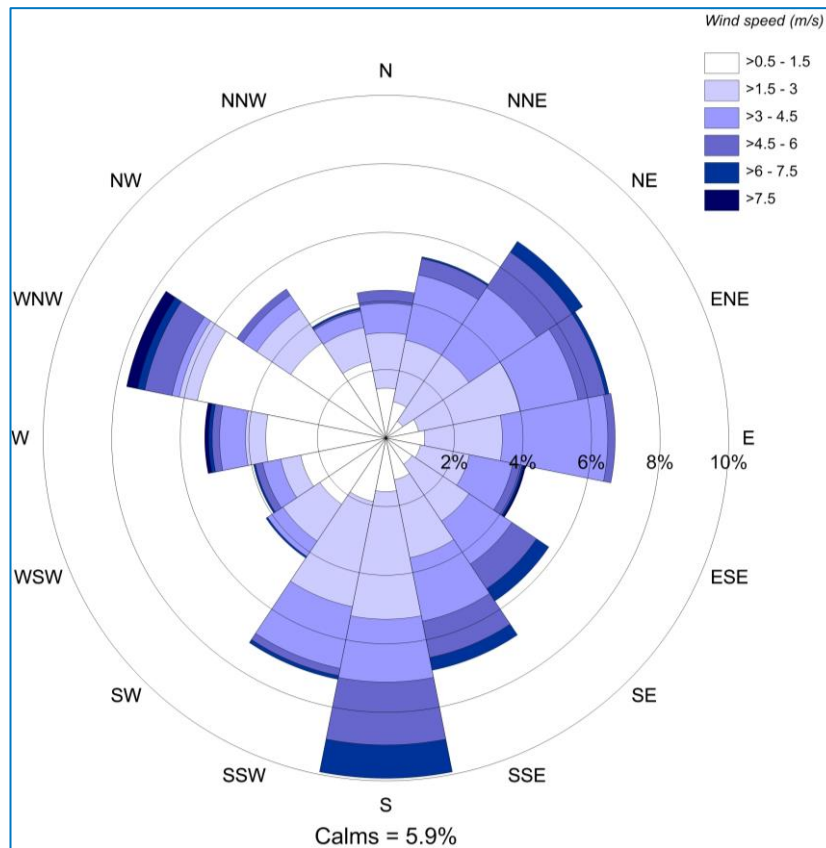


Figure 3-1: Windrose for Wongawilli Colliery – January to March 2017



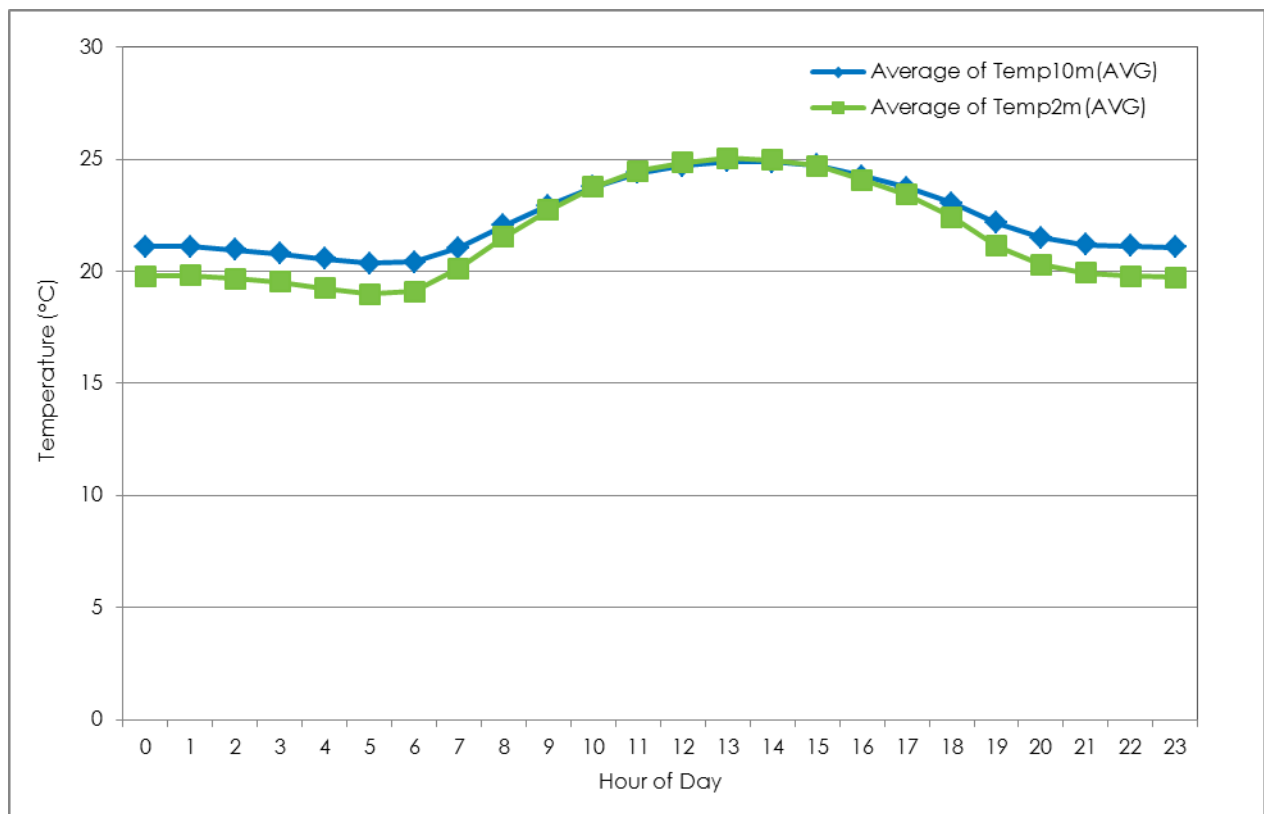


Figure 3-2: Hourly Average Temperature – January to March 2017

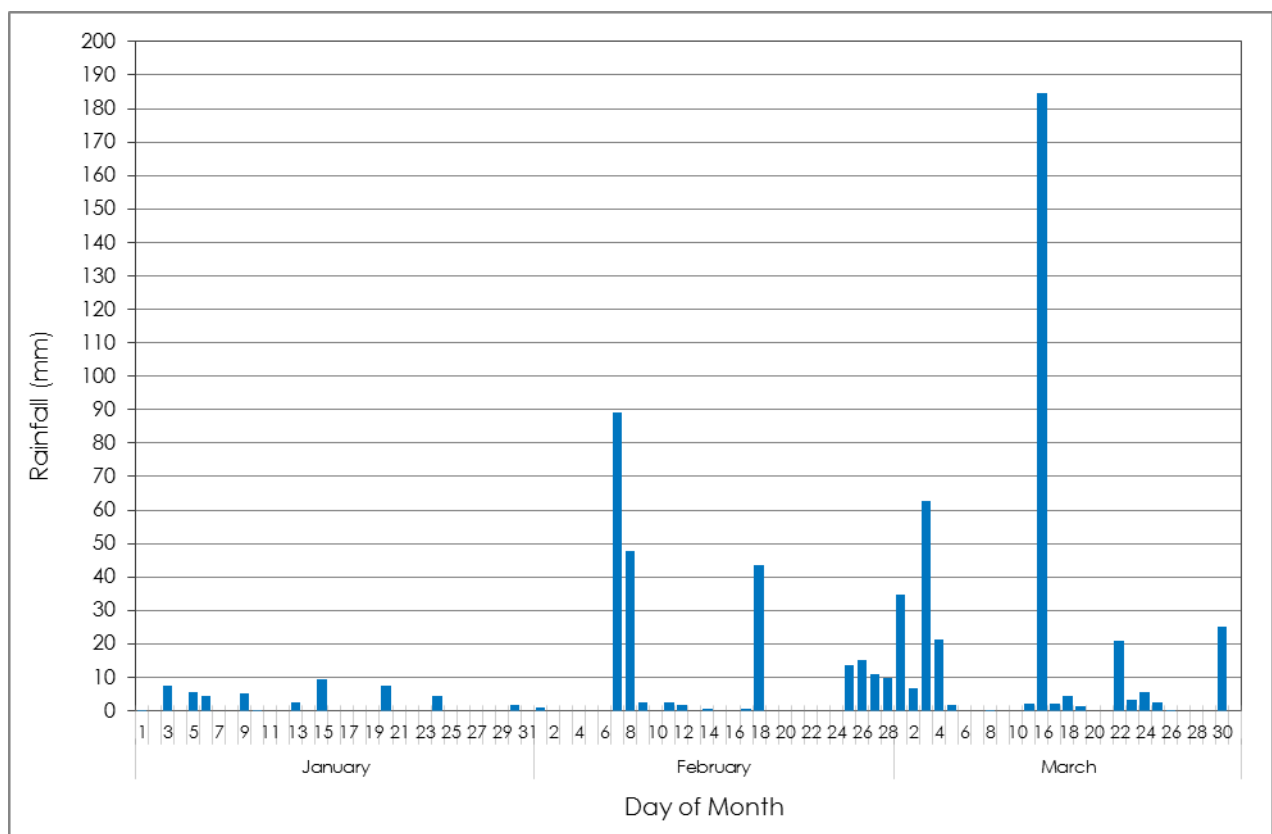


Figure 3-3: Daily Rainfall – January to March 2017

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

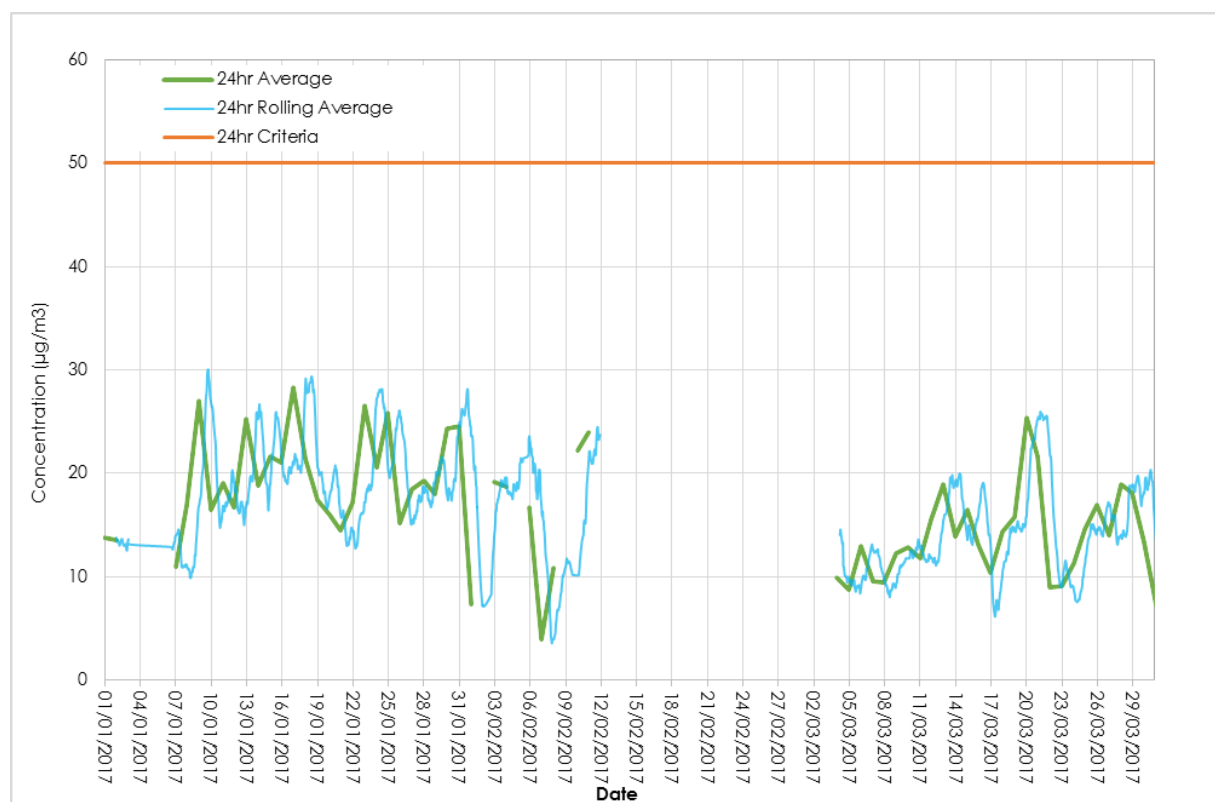
Continuous air quality particulate monitoring is carried out at the BAM monitoring station located near the site boundary (**Figure 1-1**). The monitor continuously measure airborne particulate matter from all sources.

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.

A statistical summary of the 24- hour average monitoring data collected during January to March is provided in **Table 4-1**. The data recovery rate was 66%. There were no days over the criteria in the quarter.

**Table 4-1: Summary Statistics for 24 hour average PM<sub>10</sub> (µg/m<sup>3</sup>)**

Statistical measure	January 2017	February 2017	March 2017	Quarter 1 2017
Mean	19.6	15.3	13.8	16.6
Standard Deviation	4.5	6.8	4.1	5.5
Median	16.4	0.0	0.0	16.4
Minimum	10.9	3.9	8.7	3.9
Maximum	28.3	24.0	25.3	28.3
Days over the criteria	0	0	0	0



**Figure 3-1: PM<sub>10</sub> Monitoring Data**

## 5 NOISE MONITORING RESULTS

Noise is monitored using continuous unattended ambient noise monitoring and attended compliance noise monitoring.

Noise monitoring for compliance was carried out by Pacific Environment during this quarter, details of attended compliance monitoring and rail noise monitoring are included in a separate February noise compliance report.

### 5.1 Unattended Noise Measurements

One permanent ambient noise monitor continuously monitors noise levels from all sources at the location shown in **Figure 1-1** near the site boundary.

**Table 5-1** presents NMT3 recovery data percentages for this quarterly period.

**Table 5-1: NMT3  $L_{A1,15\text{ min}}$  Recovery Data Percentages January – March 2017**

NMT3	Recovery Data (%)
January	33
February	51
March	73

A summary of the unattended noise monitoring is presented in **Table 5-2**. Noise monitoring is expressed in three descriptors as follows:

- c)  $L_{eq\ AP}$  - 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.
- d)  $L_{eq\ LP}$  - The low-pass equivalent continuous energy average noise level. This is the same as the  $L_{eq\ AP}$  except that a frequency filter has been applied and excludes noise above the 800Hz third octave frequency band.
- e) 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  $L_{90}$  measurement for each period (day, evening and night) for the duration of the monitoring. The  $L_{90}$  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 5-2: January – March 2017 Noise Monitoring Average Summary, dB(A)**

NMT1	Day			Evening			Night		
	$L_{eq\ LP}^1$	$L_{eq\ AP}^2$	RBL <sup>3</sup>	$L_{eq\ LP}$	$L_{eq\ AP}$	RBL	$L_{eq\ LP}$	$L_{eq\ AP}$	RBL
January	50	52	43	46	49	38	38	39	31
February	50	59	45	43	55	42	45	52	44
March	47	54	45	44	53	47	42	51	45

Note: 1.  $L_{eq\ LP}$  is the  $L_{eq}$  with a low pass filter applied at the 800Hz third octave band.  
 2.  $L_{eq\ AP}$  is  $L_{eq}$  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 5-5**, **Table 5-6** and **Table 5-7**. The daily noise monitoring results are expressed as a logarithmic average of each measured  $L_{eq,15min}$  during each period and the ABL.

The unattended noise monitors also record  $L_{A1,1min}$  levels continuously at both locations. The  $L_{A1,1min}$  represents short term peak noise events and is the noise level exceeded for 1% of the time. A summary of the  $L_{A1,1min}$  levels is presented in **Table 5-3**.

**Table 5-3: January – March 2017  $L_{A1,15minute}$  Noise Monitoring Summary, dB(A)**

NMT1	$L_{A1,1min}$ Maximum dB(A)	$L_{A1,1min}$ Average dB(A)	$L_{A1,15min} > 52$ dB(A) night time (%)
January	76	47	3
February	84	53	36
March	91	51	35

The noise limits at the site apply for wind speeds less than 3 m/s. **Table 5-4** presents monthly percentages that wind speeds more than 3 m/s occurred from WTX monitoring data during this quarterly period.

**Table 5-4: Wind Speed Exceedances Percentages January – March 2017**

WTX	Exceedances (%)
April	37
May	32
June	36

Table 5-5: NMT3 January Daily Noise Monitoring Results

Date	Day			Evening			Night		
	Leq,11hr LP <sup>1</sup>	Leq,11hr AP	ABL <sup>2</sup>	Leq,4hr LP	Leq,4hr AP	ABL	Leq,9hr LP	Leq,9hr AP	ABL
1/01/2017	-	-	-	-	-	-	-	-	-
2/01/2017	-	-	-	-	-	-	-	-	-
3/01/2017	-	-	-	-	-	-	-	-	-
4/01/2017	-	-	-	-	-	-	-	-	-
5/01/2017	-	-	-	-	-	-	-	-	-
6/01/2017	-	-	-	-	-	-	-	-	-
7/01/2017	-	-	-	-	-	-	-	-	-
8/01/2017	-	-	-	-	-	-	-	-	-
9/01/2017	58	61	46	46	52	36	39	39	31
10/01/2017	50	55	44	42	43	37	38	38	31
11/01/2017	46	47	44	44	47	36	38	38	30
12/01/2017	47	48	44	43	44	37	39	39	31
13/01/2017	47	47	44	45	48	36	37	38	31
14/01/2017	41	42	37	40	41	37	36	37	31
15/01/2017	40	41	35	40	41	36	38	39	29
16/01/2017	49	50	44	46	48	39	39	39	32
17/01/2017	47	49	44	49	50	38	38	39	33
18/01/2017	47	48	44	46	48	37	38	39	32
19/01/2017	46	47	43	44	45	39	39	40	32
20/01/2017	47	48	43	52	55	43	-	-	-
21/01/2017	-	-	-	-	-	-	-	-	-
22/01/2017	-	-	-	-	-	-	-	-	-
23/01/2017	-	-	-	-	-	-	-	-	-
24/01/2017	-	-	-	-	-	-	-	-	-
25/01/2017	-	-	-	-	-	-	-	-	-
26/01/2017	-	-	-	-	-	-	-	-	-
27/01/2017	-	-	-	-	-	-	-	-	-
28/01/2017	-	-	-	-	-	-	-	-	-
29/01/2017	-	-	-	-	-	-	-	-	-
30/01/2017	-	-	-	-	-	-	-	-	-
31/01/2017	-	-	-	-	-	-	-	-	-
Log Avg	50	52	43	46	49	38	38	39	31
Median	47	48	44	44	47	37	38	39	31
Max	58	61	46	52	55	43	39	40	33
Min	40	41	35	40	41	36	36	37	29

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

2. ABL is the Assessment Background Level and represents the lowest tenth percentile L<sub>90</sub> measured during the period.

Table 5-6: NMT3 February Daily Noise Monitoring Results

Date	Day			Evening			Night		
	Leq,11hr LP <sup>1</sup>	Leq,11hr AP	ABL <sup>2</sup>	Leq,4hr LP	Leq,4hr AP	ABL	Leq,9hr LP	Leq,9hr AP	ABL
1/02/2017	-	-	-	-	-	-	-	-	-
2/02/2017	52	61	38	43	60	38	40	53	40
3/02/2017	48	62	48	39	60	40	39	52	44
4/02/2017	47	64	48	39	61	38	49	58	48
5/02/2017	38	63	50	41	57	39	47	53	48
6/02/2017	46	63	44	40	52	39	36	46	37
7/02/2017	47	53	45	48	55	41	43	52	43
8/02/2017	46	52	43	44	53	44	41	50	45
9/02/2017	47	58	48	42	55	39	42	51	45
10/02/2017	47	57	43	40	47	41	-	-	-
11/02/2017	-	-	-	-	-	-	-	-	-
12/02/2017	-	-	-	-	-	-	-	-	-
13/02/2017	-	-	-	-	-	-	-	-	-
14/02/2017	42	46	40	38	45	40	36	44	33
15/02/2017	44	52	40	40	50	41	37	46	41
16/02/2017	47	54	44	38	48	38	36	50	43
17/02/2017	47	53	44	42	48	40	50	55	49
18/02/2017	59	64	43	47	52	44	39	48	44
19/02/2017	39	48	40	43	51	44	46	52	45
20/02/2017	-	-	-	-	-	-	-	-	-
21/02/2017	42	47	43	42	51	44	46	49	43
22/02/2017	48	52	45	-	-	-	49	53	44
23/02/2017	48	53	48	-	-	-	-	-	-
24/02/2017	-	-	-	-	-	-	-	-	-
25/02/2017	-	-	-	-	-	-	-	-	-
26/02/2017	-	-	-	-	-	-	-	-	-
27/02/2017	-	-	-	40	53	47	48	51	48
28/02/2017	47	55	45	42	53	47	42	51	41
Log Avg	50	59	45	43	55	42	45	52	45
Median	47	54	44	41	52	40	42	51	44
Max	59	64	50	48	61	47	50	58	49
Min	38	46	38	38	45	38	36	44	33

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

2. ABL is the Assessment Background Level and represents the lowest tenth percentile L<sub>90</sub> measured during the period.

3. - Monitor offline due to instrument problems.

Table 5-7: NMT3 March Daily Noise Monitoring Results

Date	Day			Evening			Night		
	Leq,11hr LP <sup>1</sup>	Leq,11hr AP	ABL <sup>2</sup>	Leq,4hr LP	Leq,4hr AP	ABL	Leq,9hr LP	Leq,9hr AP	ABL
1/03/2017	48	56	43	44	53	46	43	50	44
2/03/2017	47	55	41	42	54	47	41	52	41
3/03/2017	49	56	46	42	50	43	41	53	43
4/03/2017	45	51	42	42	53	44	40	48	42
5/03/2017	43	50	43	43	53	46	47	52	49
6/03/2017	51	58	48	40	55	54	38	43	42
7/03/2017	49	55	46	38	52	45	38	50	40
8/03/2017	46	53	44	44	53	41	42	47	41
9/03/2017	48	52	45	42	52	47	43	49	42
10/03/2017	49	55	46	42	53	48	43	48	44
11/03/2017	44	49	40	42	51	45	43	49	45
12/03/2017	40	48	40	43	51	42	42	49	45
13/03/2017	52	57	47	46	53	44	36	50	41
14/03/2017	48	55	43	-	-	-	-	-	-
15/03/2017	-	-	-	-	-	-	-	-	-
16/03/2017	-	-	-	-	-	-	-	-	-
17/03/2017	42	49	43	41	52	45	40	49	45
18/03/2017	42	48	43	42	51	46	38	49	43
19/03/2017	42	48	44	40	52	44	40	51	44
20/03/2017	44	49	43	39	55	42	40	57	52
21/03/2017	45	50	45	52	54	43	46	55	44
22/03/2017	50	55	46	44	55	47	43	57	47
23/03/2017	47	54	44	46	53	46	43	52	46
24/03/2017	48	54	44	49	55	47	43	49	43
25/03/2017	42	52	47	42	56	50	-	-	-
26/03/2017	-	-	-	-	-	-	-	-	-
27/03/2017	46	49	43	-	-	-	-	-	-
28/03/2017	-	-	-	-	-	-	41	53	41
29/03/2017	-	-	-	46	55	46	44	51	47
30/03/2017	48	55	47	41	48	43	43	47	43
31/03/2017	47	53	44	44	56	51	45	50	48
Log Avg	47	54	45	44	53	47	42	51	45
Median	47	53	44	42	53	46	42	50	44
Max	52	58	48	52	56	54	47	57	52
Min	40	48	40	38	48	41	36	43	40

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

2. ABL is the Assessment Background Level and represents the lowest tenth percentile L<sub>90</sub> measured during the period.

3. - Monitor offline due to instrument problems.

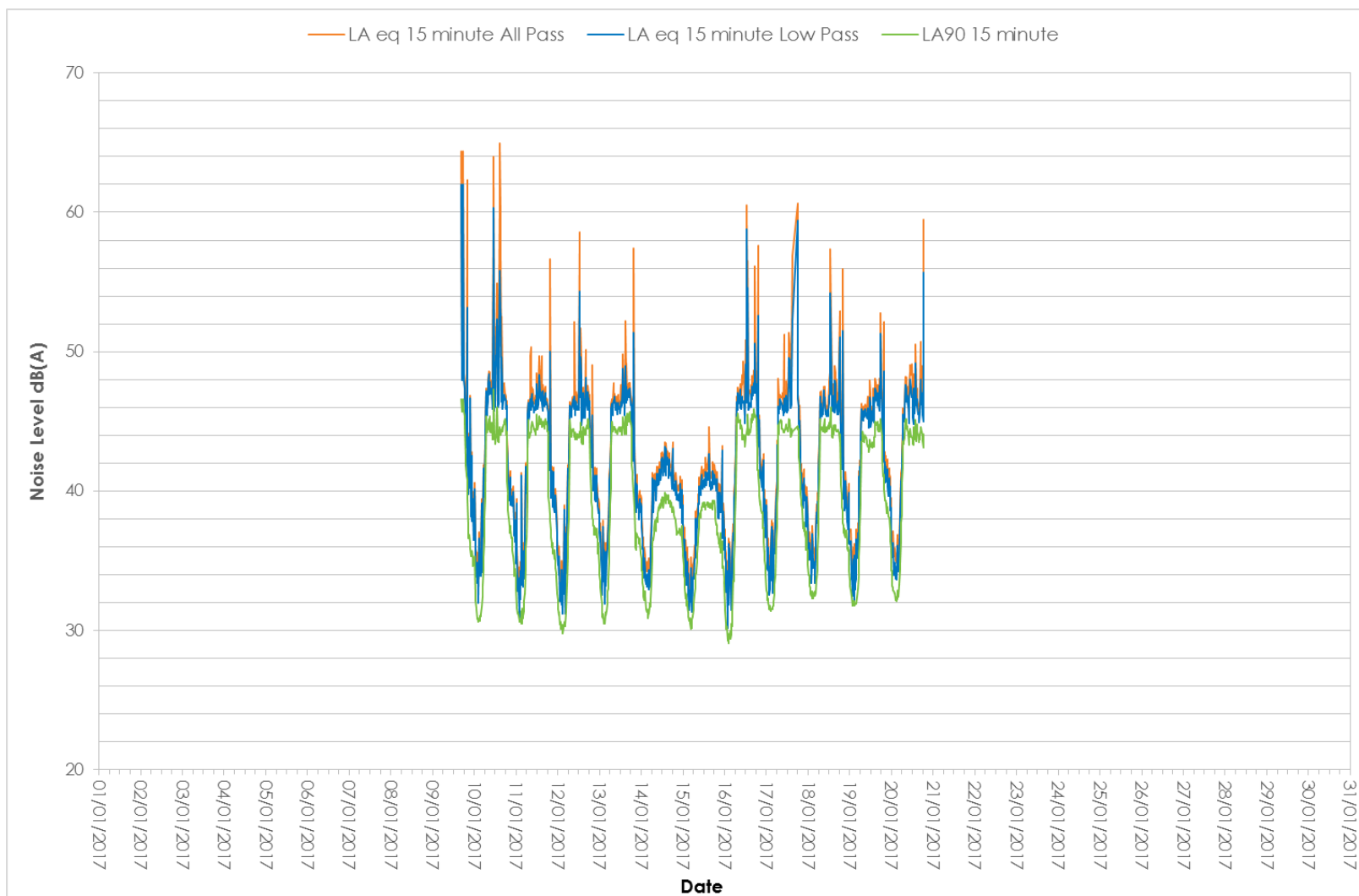


Figure 5-1: NMT3 Noise Monitoring Results – January 2017



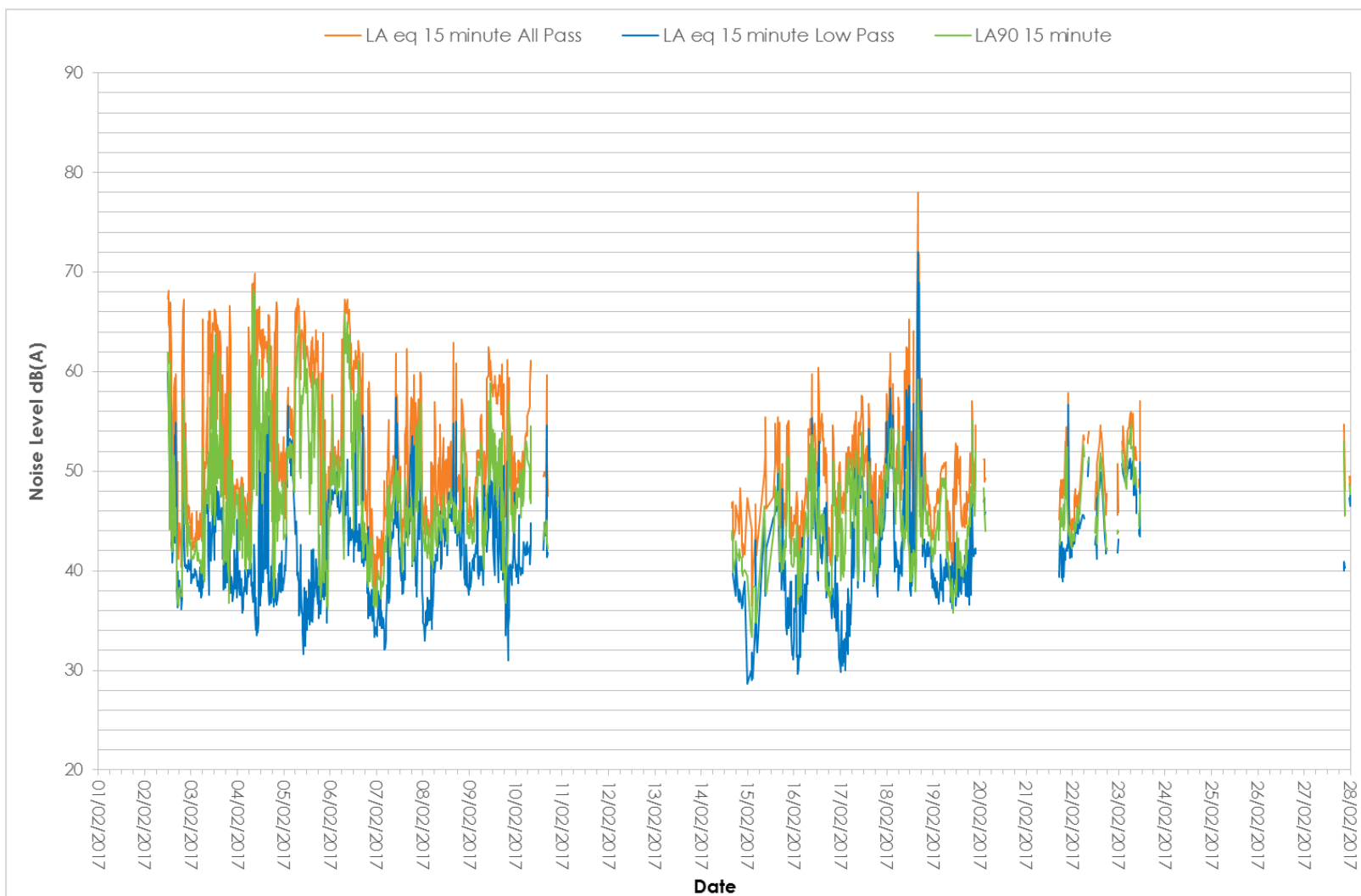


Figure 5-2: NMT3 Noise Monitoring Results – February 2017

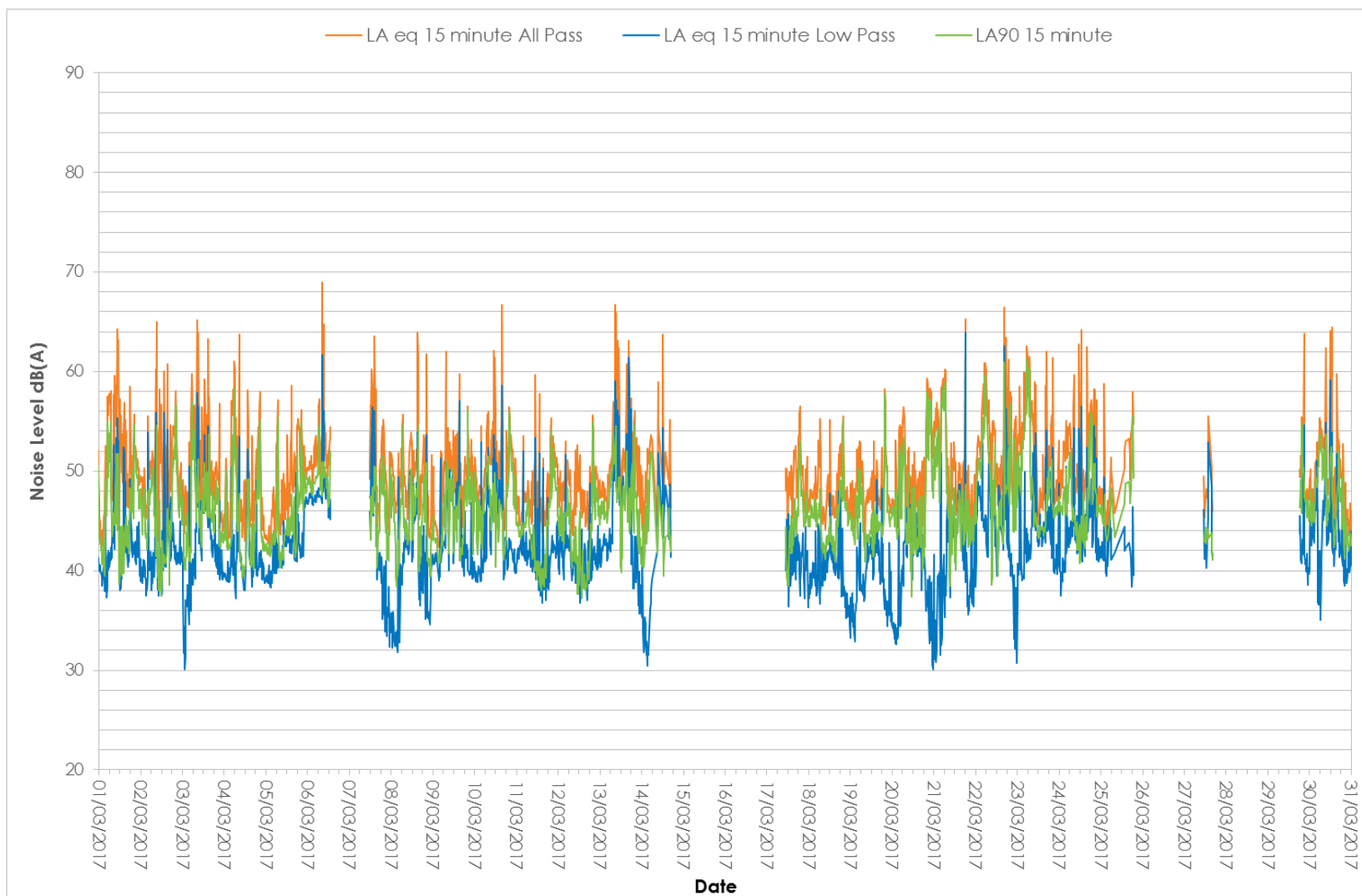
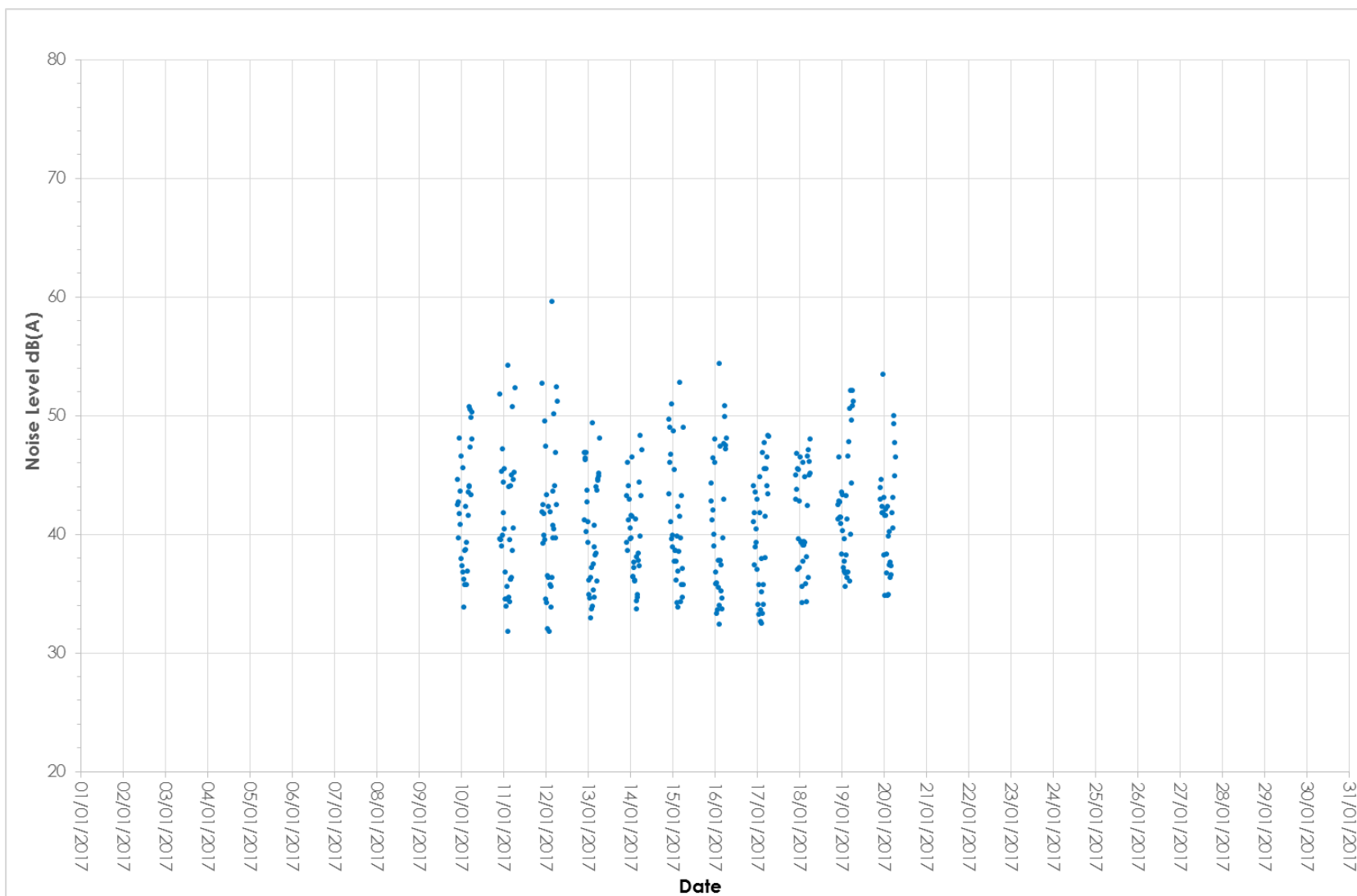
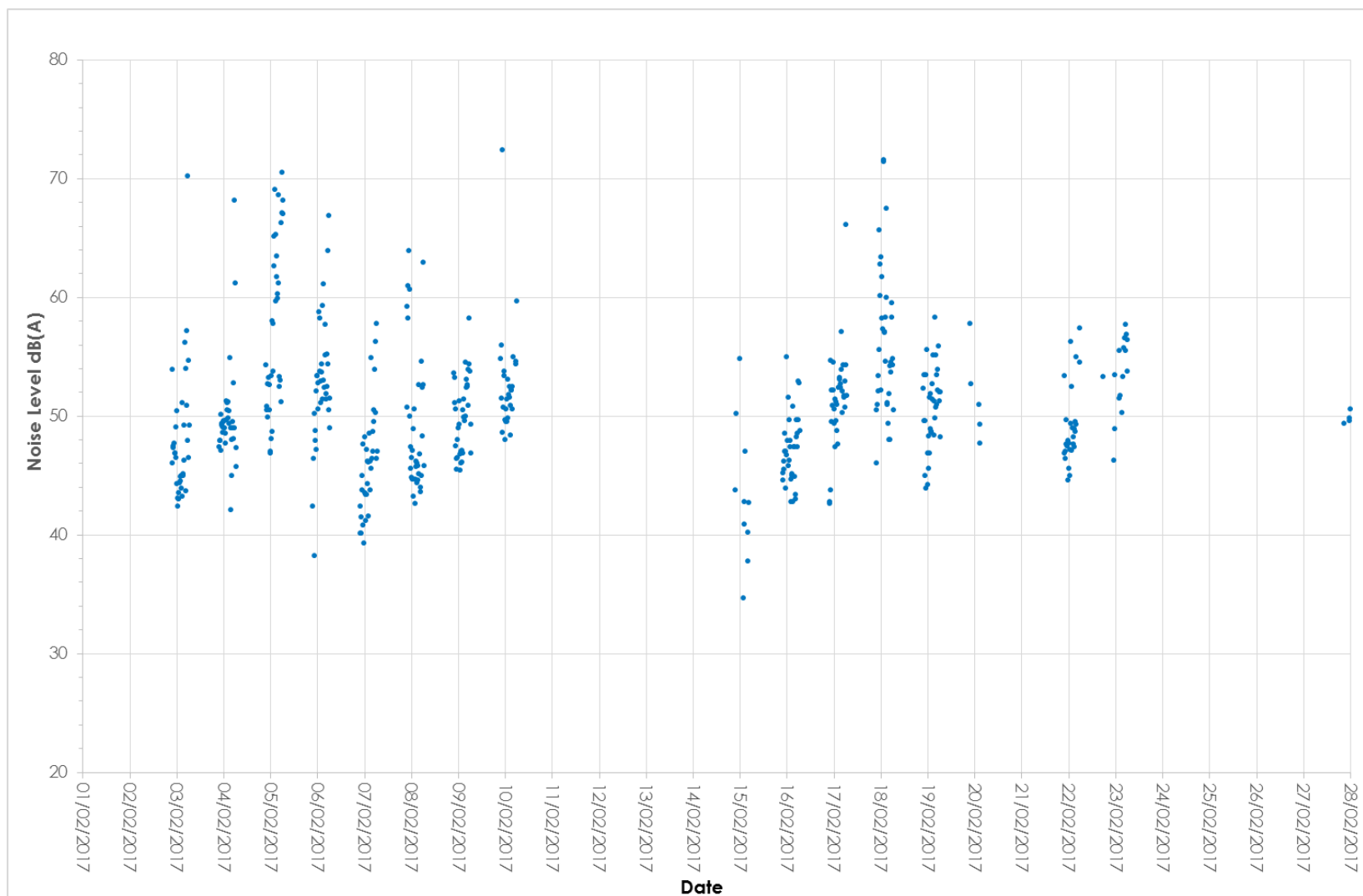


Figure 5-3: NMT3 Noise Monitoring Results – March 2017



**Figure 5-4: L<sub>1,15minute</sub> (night time only) NMT3 Noise Monitoring Results – January 2017**



**Figure 5-5: L<sub>1,15minute</sub> (night time only) NMT3 Noise Monitoring Results – February 2017**

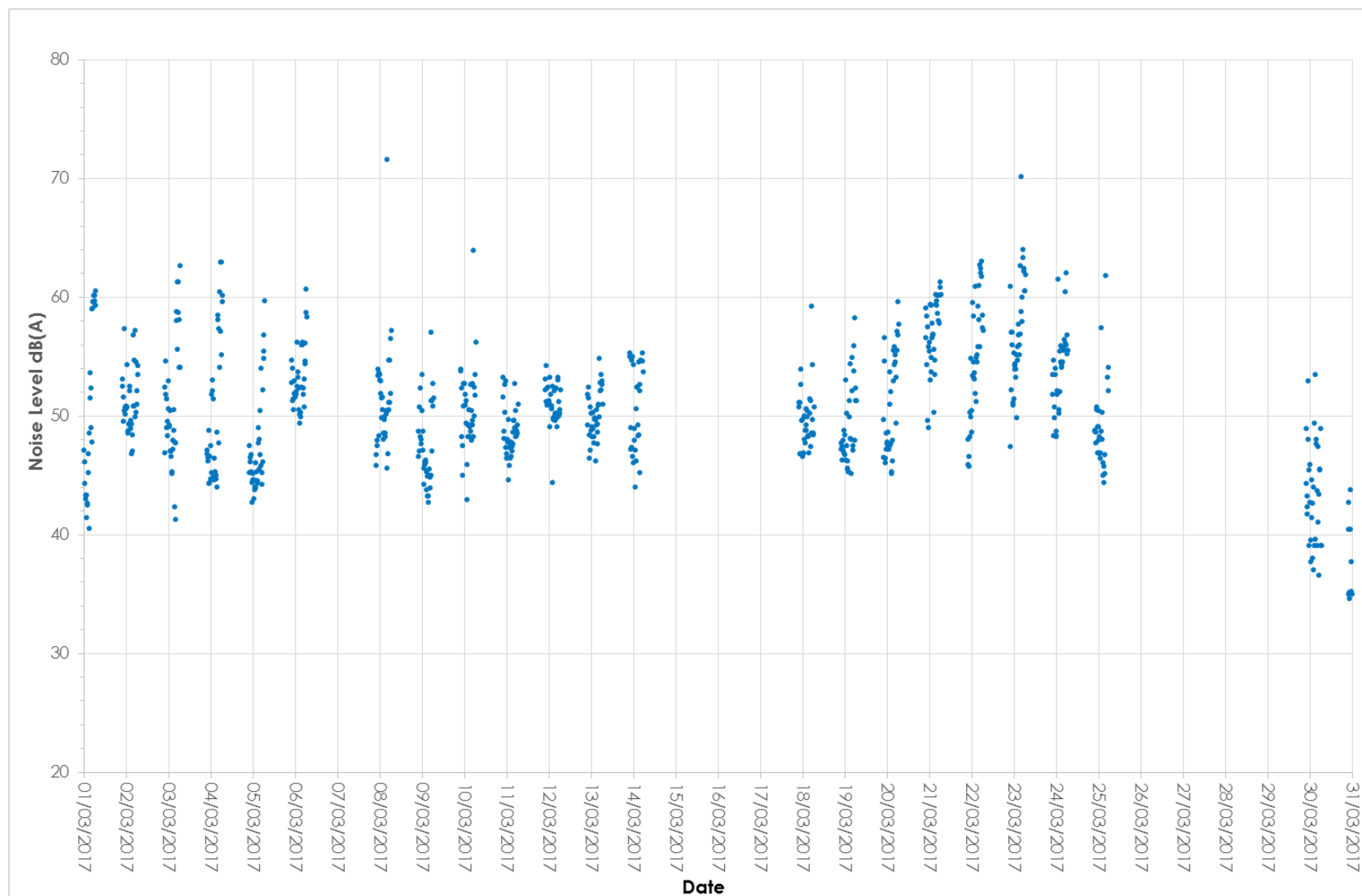


Figure 5-6: L<sub>1,15minute</sub> (night time only) NMT3 Noise Monitoring Results – March 2017

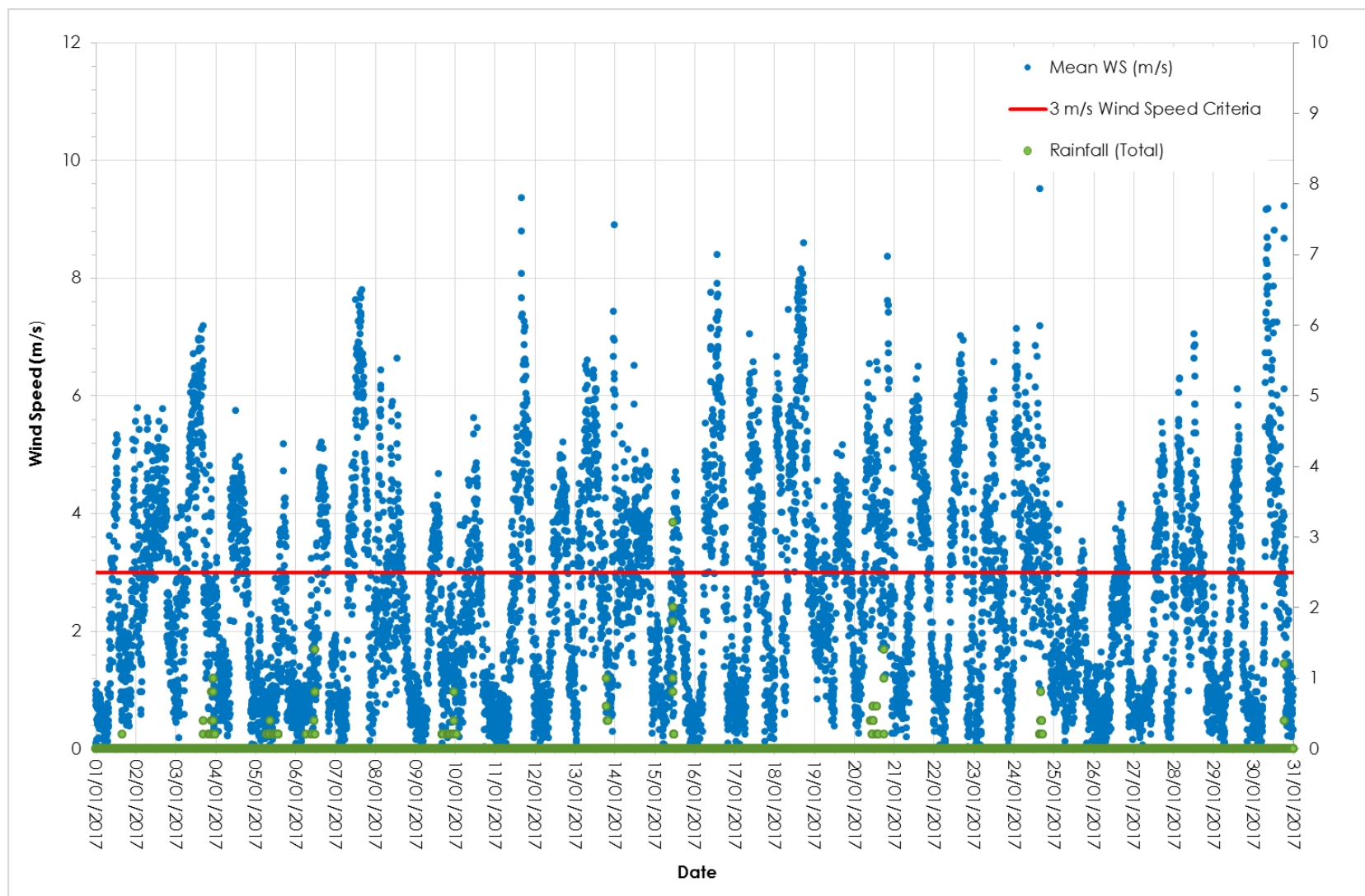


Figure 5-7: Wind Speed and Rainfall Monitoring Data – January 2017

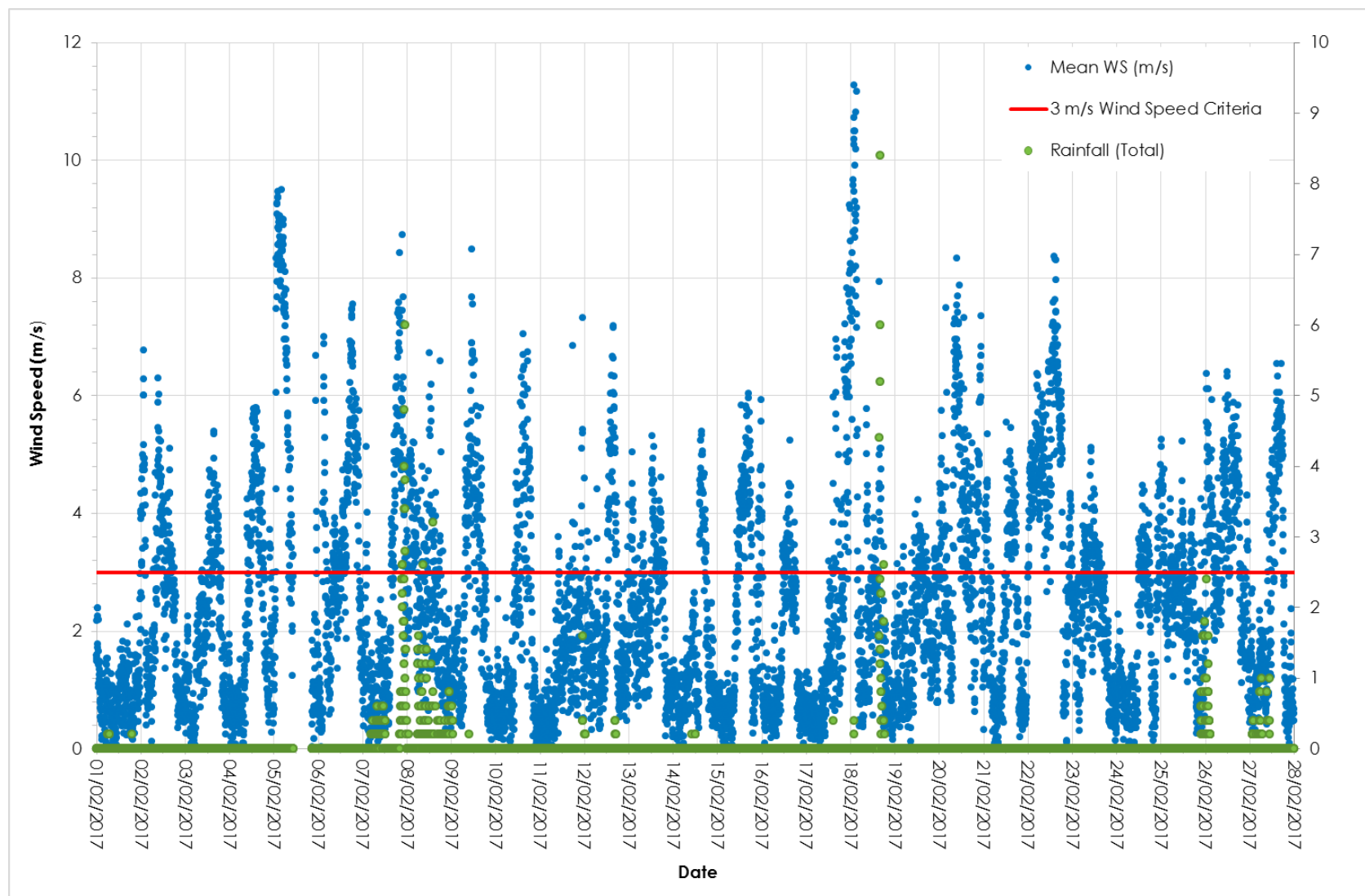


Figure 5-8: Wind Speed and Rainfall Monitoring Data – February 2017

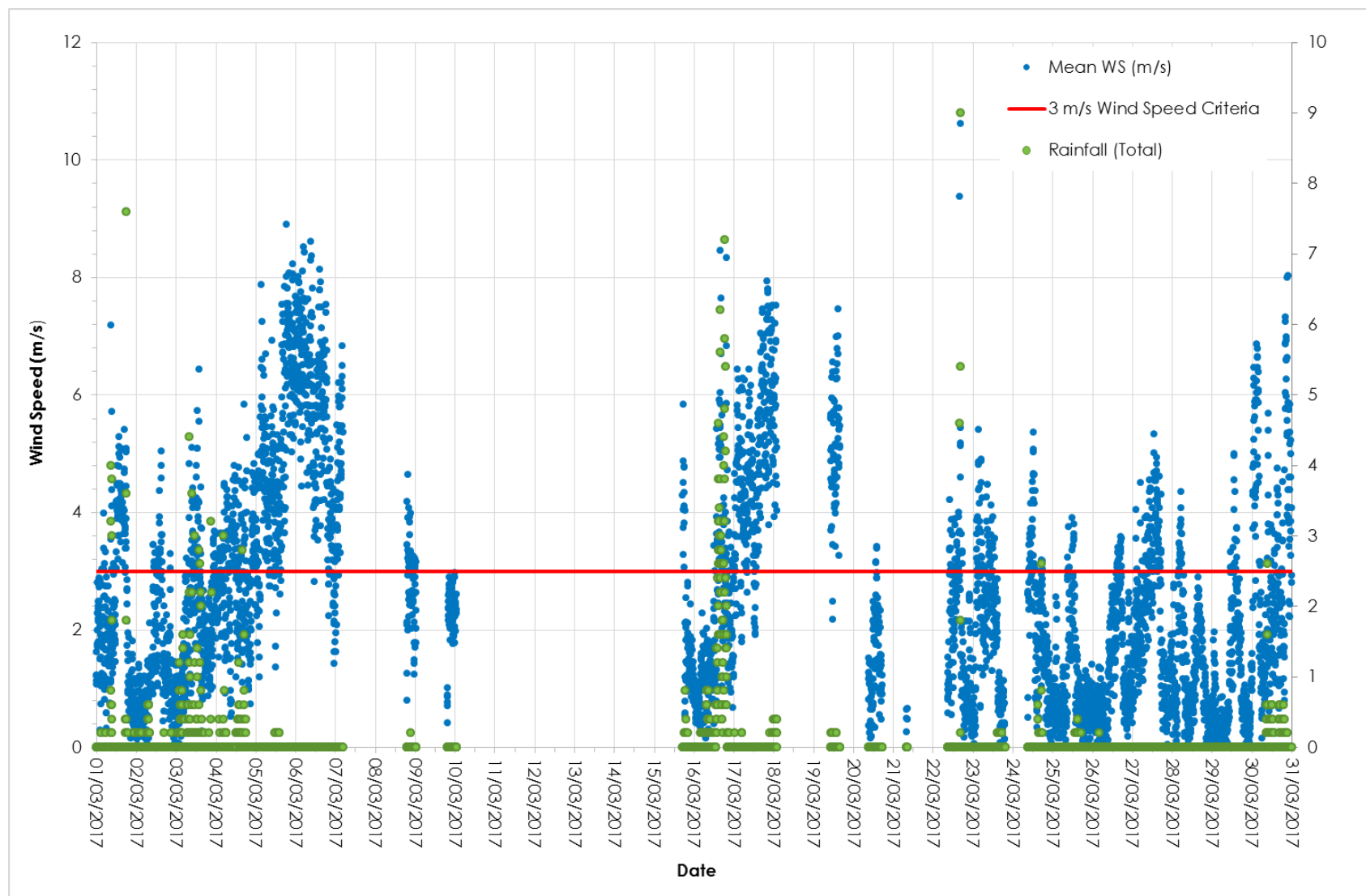


Figure 5-9: Wind Speed and Rainfall Monitoring Data – March 2017



## **5.2 Attended Noise Measurements and Rail Spur Noise**

Whilst operational, attended noise measurements are carried out once every three months to establish compliance with the site's noise limits at compliance locations surrounding the site and adjacent the rail spur during the day, evening and night.

Attended noise monitoring was carried out in February 2017, results of this monitoring are included in a separate noise compliance report.