



Wongawilli Colliery

Quarterly Air Quality and Noise Monitoring Report (April to June 2019)

13 November 2019

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13 November 2019

Wongawilli Colliery

Quarterly Air Quality and Noise Monitoring Report (April to June 2019)

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CONTENTS

1	INTRODUCTION	1
2	PROJECT ENVIRONMENTAL CONDITIONS.....	2
2.1	Monitoring Requirements.....	2
2.2	Air Quality	3
2.3	Noise	4
3	METEOROLOGICAL MONITORING RESULTS	5
3.1	Wind data.....	5
3.2	Temperature	6
3.3	Rainfall.....	6
4	PM₁₀ MONITORING RESULTS.....	8
4.1	Continuous Air Quality Particulate Monitoring.....	8
5	NOISE MONITORING RESULTS	9
5.1	Unattended Noise Measurements	9
5.2	Unattended Noise Monitoring Graphs.....	14
5.3	Attended Noise Measurements.....	21

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 ₁₀ (µg/m ³)	8
Table 5.1: Second Quarter Noise Monitoring Summary, dB(A)	10
Table 5.2: April- June 2019 L _{A1,15minute} Noise Monitoring Summary, dB(A).....	10
Table 5.3: Wind Speed Exceedances Percentages April - June 2019	10
Table 5.4: NMT3 Daily Noise Monitoring Results – April 2019.....	11
Table 5.5: NMT3 Daily Noise Monitoring Results – May 2019	12
Table 5.6: NMT3 Daily Noise Monitoring Results – June 2019	13

List of Figures

Figure 1.1: Monitoring Locations.....	2
Figure 3.1: Windrose for Wongawilli Colliery April to June 2019	6
Figure 3.2: Hourly Average Temperature at 2m and 10m	7
Figure 3.3: Daily Rainfall.....	7
Figure 4.1: PM ₁₀ Monitoring Data.....	9
Figure 5.1: NMT3 Noise Monitoring Results – April 2019.....	14
Figure 5.2: NMT3 Noise Monitoring Results – May 2019	15
Figure 5.3: NMT3 Noise Monitoring Results – June 2019	16
Figure 5.4: L _{1,15minute} (night time only) NMT3 Noise Monitoring Results – April 2019	17
Figure 5.5: L _{1,15minute} (night time only) NMT3 Noise Monitoring Results – May 2019.....	18
Figure 5.6: L _{1,15minute} (night time only) NMT3 Noise Monitoring Results – June 2019.....	19
Figure 5.7: Wind Speed and Rainfall Monitoring Data.....	20

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 second quarter, April to June 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

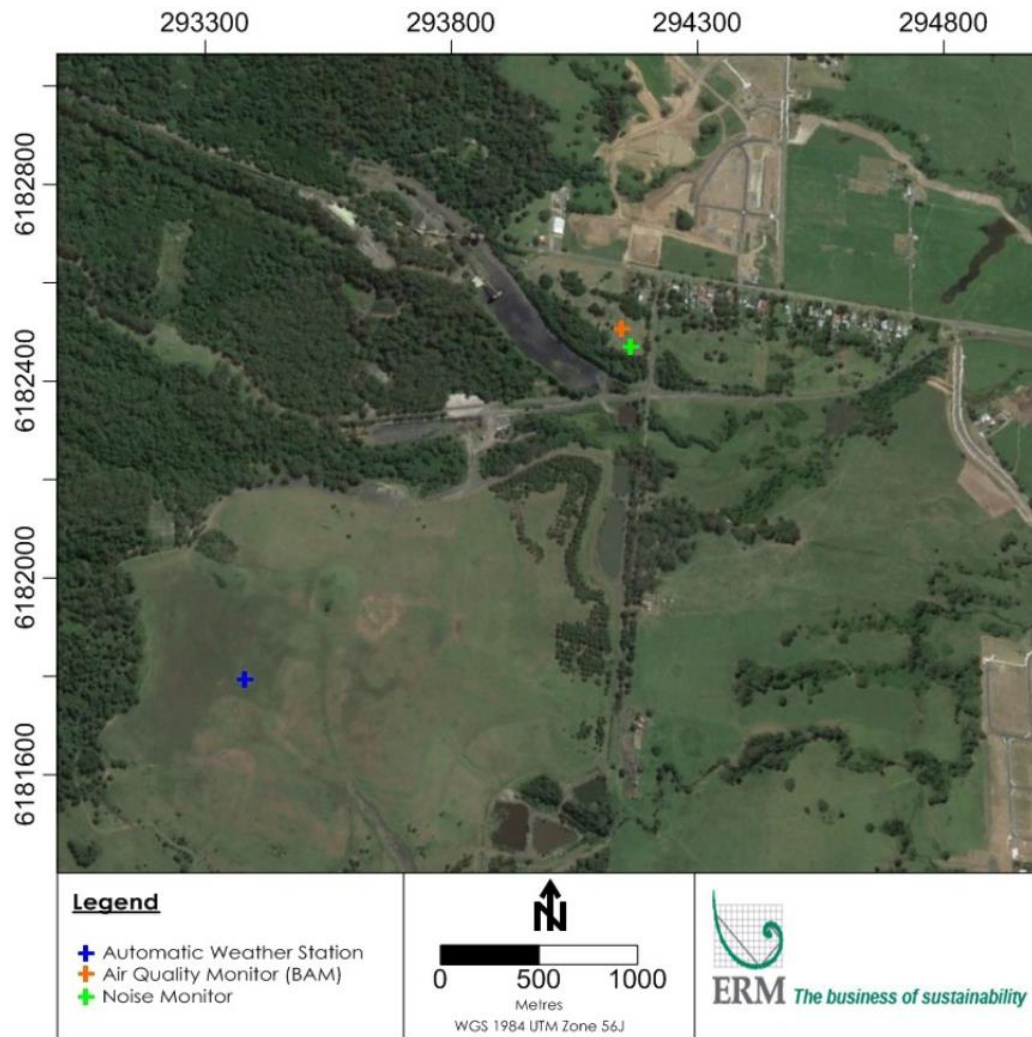


Figure 1.1: Monitoring Locations

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 ₁₀)	µg/m ³	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 ^a
Particulate Matter < 10 µm (PM ₁₀)	Annual	30 µg/m ³ (b)
Particulate Matter < 10 µm (PM ₁₀)	24 hour	50µg/m ³ (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 _{Aeq} (15mins)	L _{Aeq} (15mins)	L _{Aeq} (15mins)	L _{A1} (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 _{Aeq} (11hr)	L _{Aeq} (4hr)	L _{Aeq} (9hr)
All privately-owned land	60	50	45

3 METEOROLOGICAL MONITORING RESULTS

A summary of the data collected during the second quarter of 2019 is provided in the following sections. The valid data recovery rate was 72% for all parameters (refer **Table 3.1**).

Table 3.1: Valid Data Recovery Rates - AWS

Parameter	Valid Data Recovery Rate %
Wind Speed	72%
Wind Direction	72%
Temperature – 2 m	72%
Temperature – 10 m	72%
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	2.5
Temperature (°C) – 10m		17.3
Temperature (°C) – 2m		16.0
Barometric pressure (hPa)		1012.5
Wind Speed (m/s)	Median	1.8
Temperature (°C) – 10m		17.3
Temperature (°C) – 2m		15.9
Barometric pressure (hPa)		1013.7
Wind Speed (m/s)	Standard Deviation	2.2
Temperature (°C) – 10m		3.5
Temperature (°C) – 2m		4.1
Barometric pressure (hPa)		5.8
Rainfall (mm)	Quarterly Total	17.4
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 South South West 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 9%.

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

3.3 Rainfall

Figure 3.1: Windrose for Wongawilli Colliery April to June 2019

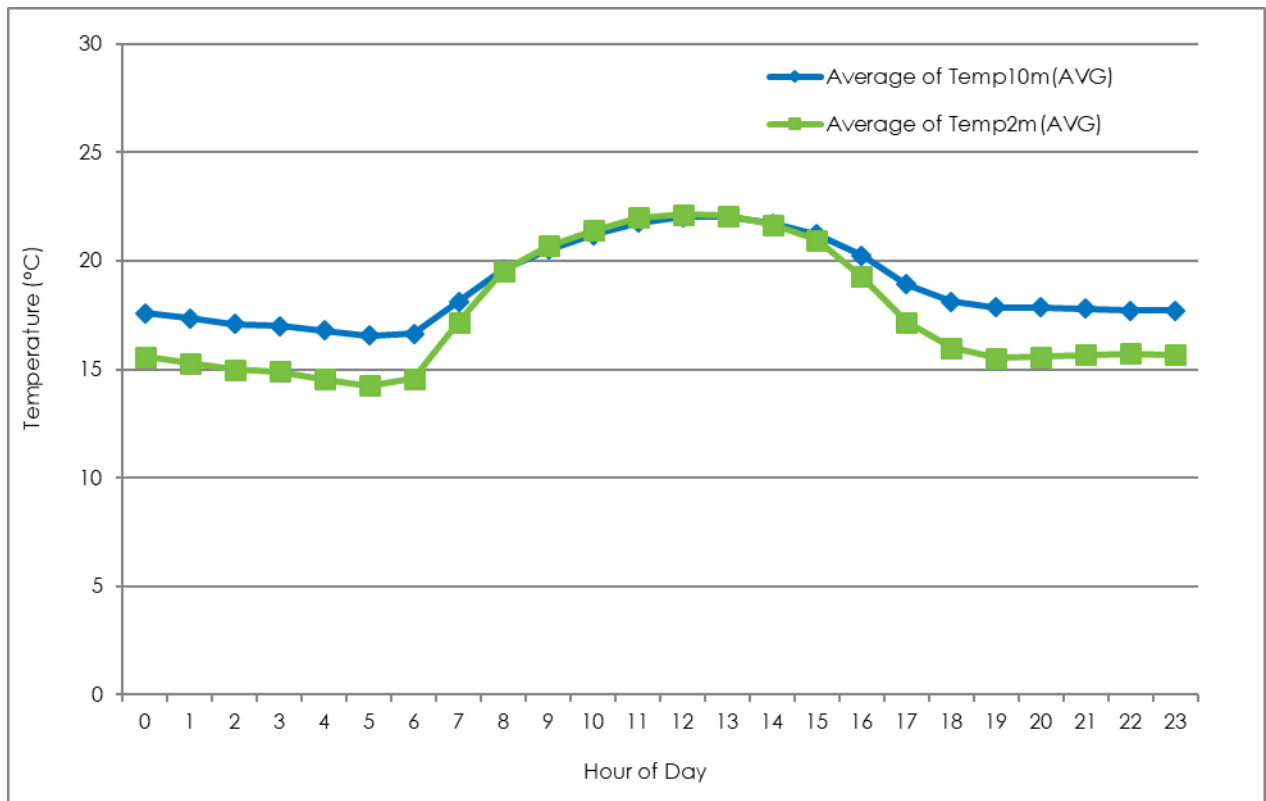
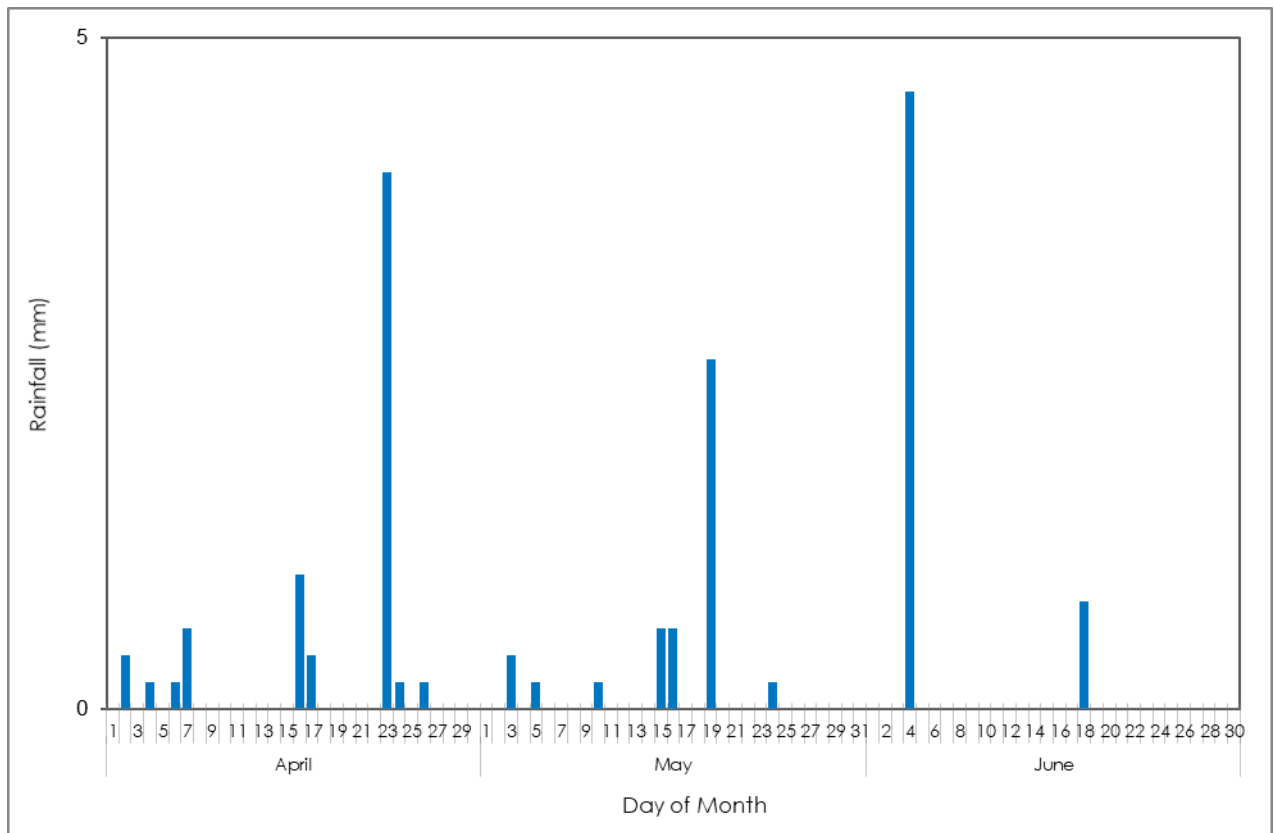


Figure 3.2: Hourly Average Temperature at 2m and 10m



4 PM₁₀ 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**). The monitor continuously measures airborne particulate matter from all sources.

The particle size ranges relevant to this report are described as PM₁₀ 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 second quarter of 2019 is provided in **Table 4.1**. The data recovery rate (for 24-hour average) was 96%. The 24-hour PM₁₀ concentrations are presented in **Figure 4.1** for the BAM. Peaks in PM₁₀ concentrations were observed on the 27th of May and 3rd of June. These peaks correlated with Office of Environment and Heritage (OEH) data collected at Kembla Grange and Wollongong monitoring stations indicating poor regional air quality on these dates.

Table 4.1: Summary Statistics for 24 hour PM₁₀ (µg/m³)

Statistical measure	April	May	June	Q2
Mean	10.2	13.1	11.7	11.6
Standard Deviation	8.7	10.6	3.9	7.5
Median	4.2	12.3	32.2	19.8
Minimum	5.3	1.1	<1	<1
Maximum	23.8	68.6	173.2	173.2
Days over the criteria	0	1	1	2

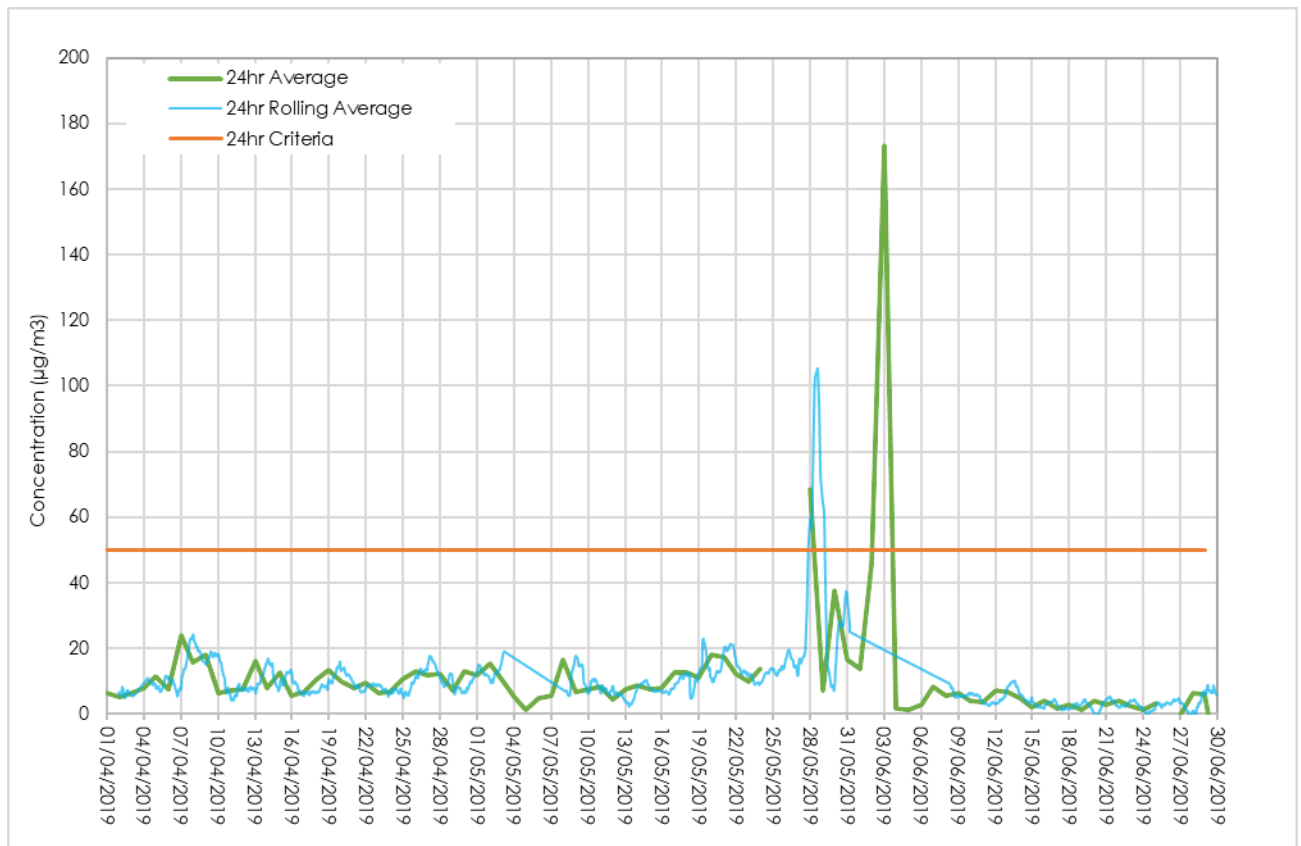


Figure 4.1: PM₁₀ Monitoring Data

5 NOISE MONITORING RESULTS

5.1 Unattended Noise Measurements

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

The unattended noise monitoring during the second quarter of 2019 recovered 75% 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_{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.
- **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.
- **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 L₉₀ measurement for each period (day, evening and night) for the duration of the monitoring. The L₉₀ 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: Second Quarter Noise Monitoring Summary, dB(A)

	Day			Evening			Night		
	Leq LP ¹	Leq AP ²	RBL ³	Leq LP	Leq AP	RBL	Leq LP	Leq AP	RBL
April	40	46	33	37	44	31	35	40	26
May	46	50	33	48	51	30	49	52	26
June	41	46	35	39	42	33	37	41	31

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 5.6** and as graphs in **Figure 5.1** to **Figure 5.3**. 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_{1,1min} levels continuously. The LA_{1,1min} represents short-term peak noise events and is the noise level exceeded for 1% of 1 minute. A summary of the LA_{1,1min} is presented in **Table 5.2** and **Figure 5.4** to **Figure 5.6**.

Table 5.2: April- June 2019 LA_{1,15minute} Noise Monitoring Summary, dB(A)

NMT1	LA _{1,1min} Maximum dB(A)	LA _{1,1min} Average dB(A)	LA _{1,15min} > 52 dB(A) night time (%)
April	76	40	4
May	85	44	24
June	72	40	6

The noise limits at the site apply for wind speeds less than 3 m/s. **Table 5.3** and **Figure 5.7** presents 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 April - June 2019

WTX	Exceedances (%)
April	19
May	46
June	20

Table 5.4: NMT3 Daily Noise Monitoring Results – April 2019

Date	Day			Evening			Night		
	L _{eq,11hr} LP ¹	L _{eq,11hr} AP	ABL ²	L _{eq,4hr} LP	L _{eq,4hr} AP	ABL	L _{eq,9hr} LP	L _{eq,9hr} AP	ABL
1/04/2019	40	46	37	34	41	35	38	41	35
2/04/2019	40	47	38	46	49	37	40	42	36
3/04/2019	40	46	38	33	48	43	35	43	35
4/04/2019	38	44	37	38	47	36	35	39	34
5/04/2019	39	45	37	35	48	38	35	40	35
6/04/2019	38	44	36	39	51	41	34	40	34
7/04/2019	37	45	34	35	49	41	36	40	33
8/04/2019	40	45	33	38	46	41	36	41	37
9/04/2019	42	47	37	37	44	38	36	41	37
10/04/2019	42	47	37	39	41	37	37	40	36
11/04/2019	42	47	36	42	45	34	35	38	31
12/04/2019	-	-	-	-	-	-	-	-	-
13/04/2019	-	-	-	-	-	-	-	-	-
14/04/2019	-	-	-	-	-	-	-	-	-
15/04/2019	-	-	-	-	-	-	-	-	-
16/04/2019	-	-	-	-	-	-	-	-	-
17/04/2019	41	46	36	36	40	33	33	45	34
18/04/2019	40	45	36	33	42	33	30	36	27
19/04/2019	36	41	33	33	38	32	31	36	26
20/04/2019	37	43	35	33	38	33	31	35	31
21/04/2019	36	43	33	32	40	32	29	36	28
22/04/2019	36	45	33	33	37	31	31	36	26
23/04/2019	36	42	35	35	41	32	35	39	29
24/04/2019	43	45	35	35	39	33	32	36	29
25/04/2019	36	47	33	32	35	31	33	37	30
26/04/2019	41	46	35	33	42	29	32	37	26
27/04/2019	39	44	33	34	36	29	33	36	28
28/04/2019	40	49	32	37	38	30	35	39	27
29/04/2019	45	47	34	35	37	31	33	36	27
30/04/2019	41	47	37	35	38	32	32	34	
Log Avg	40	46	35	37	44	37	35	40	33
Median	40	45	35	35	41	33	34	39	31
Max	45	49	38	46	51	43	40	45	37
Min	36	41	32	32	35	29	29	34	

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 – May 2019

Date	Day			Evening			Night		
	L _{eq,11hr} LP ¹	L _{eq,11hr} AP	ABL ²	L _{eq,4hr} LP	L _{eq,4hr} AP	ABL	L _{eq,9hr} LP	L _{eq,9hr} AP	ABL
1/05/2019	41	44	34	37	38	31	31	34	0
2/05/2019	39	51	34	35	42	32	34	36	26
3/05/2019	43	46	35	36	40	30	30	36	25
4/05/2019	43	45	32	30	33	27	32	35	26
5/05/2019	42	47	36	38	42	31	34	38	29
6/05/2019	40	46	34	36	38	32	36	40	29
7/05/2019	39	46	34	35	37	29	38	42	28
8/05/2019	53	56	39	55	59	53	46	50	31
9/05/2019	41	45	33	40	41	31	34	37	27
10/05/2019	40	44	33	37	40	30	52	55	30
11/05/2019	47	51	33	45	49	40	40	43	35
12/05/2019									
13/05/2019									
14/05/2019									
15/05/2019									
16/05/2019									
17/05/2019									
18/05/2019									
19/05/2019									
20/05/2019									
21/05/2019									
22/05/2019	39	45	38	37	39	35	35	40	32
23/05/2019	43	47	37	40	42	34	35	41	32
24/05/2019	42	48	36	36	39	33	35	38	32
25/05/2019	40	46	36	34	37	34	37	41	35
26/05/2019	38	45	35	34	37	34	49	52	35
27/05/2019	51	54	40	57	61	48	59	62	51
28/05/2019	53	56	40	51	54	37	43	47	34
29/05/2019	44	47	37	38	40	36	55	58	40
30/05/2019	45	49	37	54	57	53	50	54	39
31/05/2019	46	50	38	37	39	33	34	37	28
Log Avg	46	50	36	48	51	44	49	52	39
Median	42	47	36	37	40	33	36	41	31
Max	53	56	40	57	61	53	59	62	51
Min	38	44	32	30	33	27	30	34	0

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 5.6: NMT3 Daily Noise Monitoring Results – June 2019

Date	Day			Evening			Night		
	L _{eq,11hr} LP ¹	L _{eq,11hr} AP	ABL ²	L _{eq,4hr} LP	L _{eq,4hr} AP	ABL	L _{eq,9hr} LP	L _{eq,9hr} AP	ABL
1/06/2019	43	37	36	40	37	35	37	33	32
2/06/2019	44	37	35	38	35	32	37	33	31
3/06/2019	46	42	35	49	46	39	51	46	34
4/06/2019	52	48	42	44	40	38	44	40	37
5/06/2019	45	40	36	40	37	35	44	41	35
6/06/2019	46	41	37	40	37	34	39	35	32
7/06/2019	47	40	36	41	39	34	36	32	31
8/06/2019	46	43	35	41	39	33	41	37	30
9/06/2019	43	38	33	40	37	35	38	33	34
10/06/2019	45	39	36	38	35	33	38	33	32
11/06/2019	48	41	37	39	36	36	39	36	34
12/06/2019	47	41	37	37	34	33	39	37	33
13/06/2019	46	41	36	37	35	33	45	42	33
14/06/2019	48	41	35	44	41	34	40	35	32
15/06/2019	45	37	35	40	36	35	37	32	33
16/06/2019	49	38	35	40	38	34	36	33	32
17/06/2019	46	40	36	42	40	36	40	36	34
18/06/2019	45	40	35	40	37	34	41	38	34
19/06/2019	45	40	36	41	39	36	40	36	34
20/06/2019	45	42	35	39	37	35	37	33	32
21/06/2019	44	40	36	39	37	34	40	35	34
22/06/2019	45	39	35	40	38	33	38	34	32
23/06/2019	43	38	35	41	39	34	37	34	33
24/06/2019	44	39	36	40	38	35	40	35	33
25/06/2019	44	39	36	39	37	34	39	36	33
26/06/2019	46	41	37	39	37	33	39	34	31
27/06/2019	45	41	35	40	37	36	37	34	32
28/06/2019	47	42	38	39	36	33	38	34	32
29/06/2019	45	40	38	44	40	34	41	37	32
30/06/2019	49	45	34	48	45	36	39	38	35
Log Avg	46	41	36	42	39	35	41	37	33
Median	45	40	36	40	37	34	39	35	33
Max	52	48	42	49	46	39	51	46	37
Min	43	37	33	37	34	32	36	32	30

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

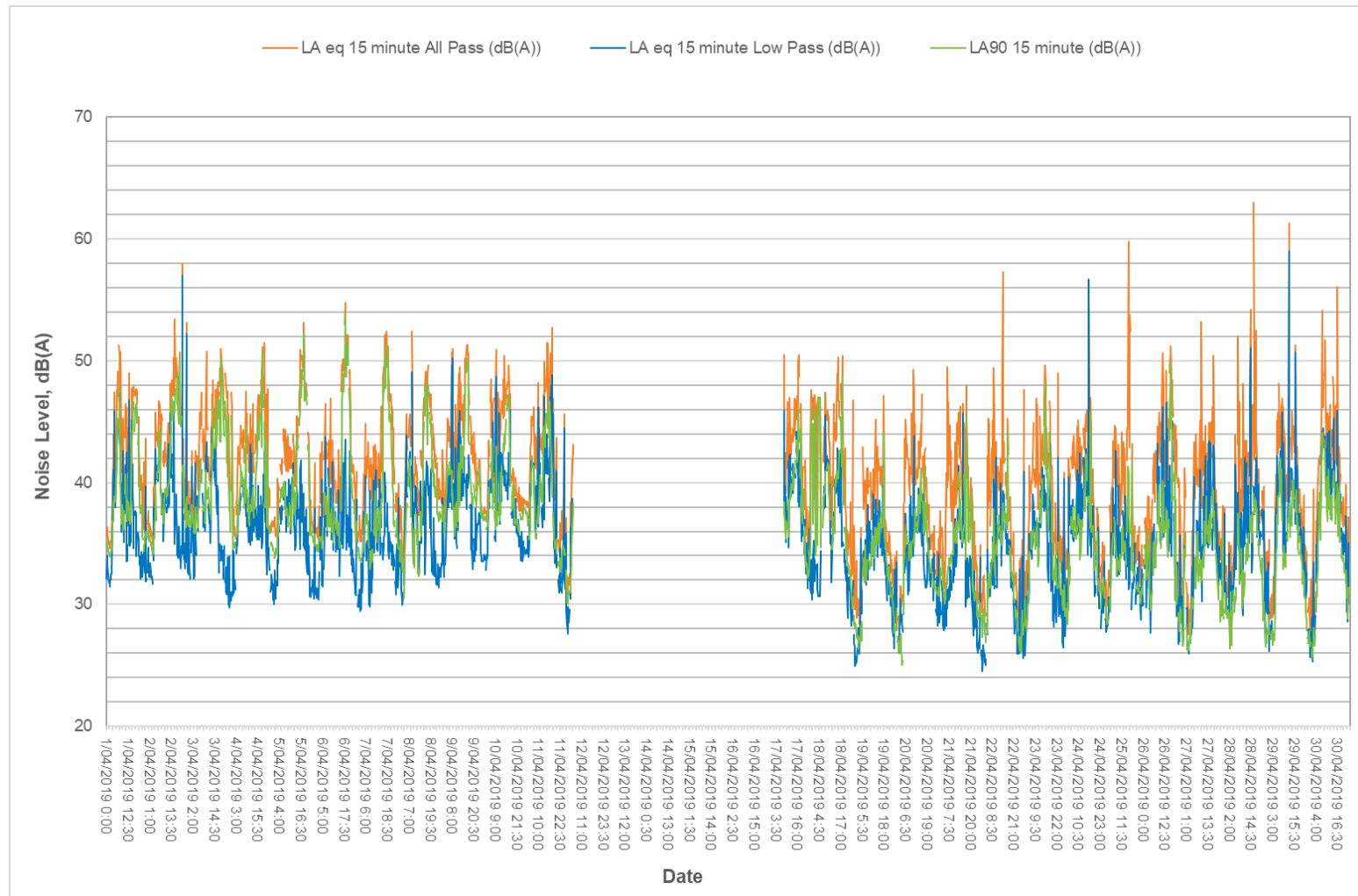


Figure 5.1: NMT3 Noise Monitoring Results – April 2019

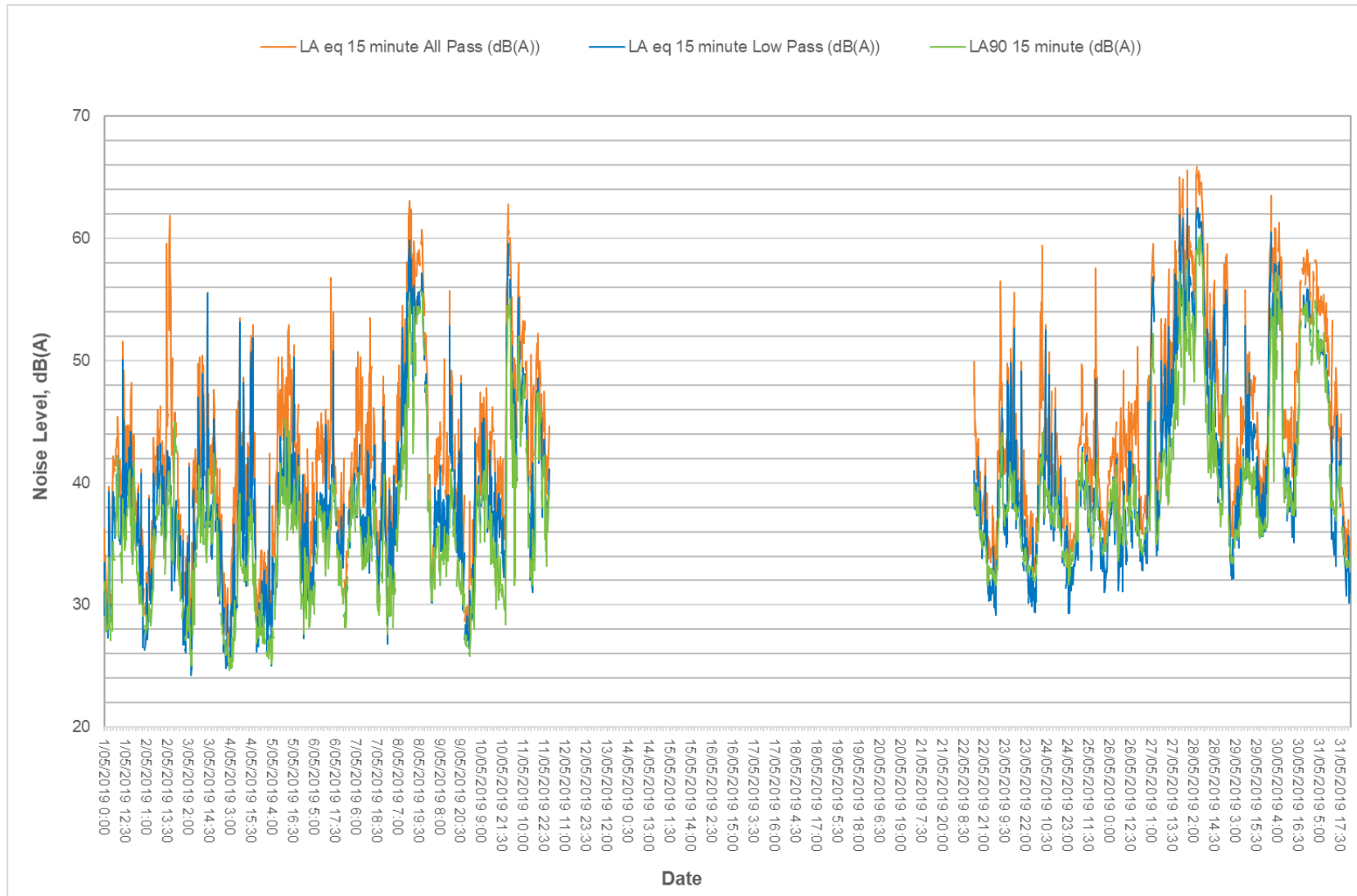


Figure 5.2: NMT3 Noise Monitoring Results – May 2019

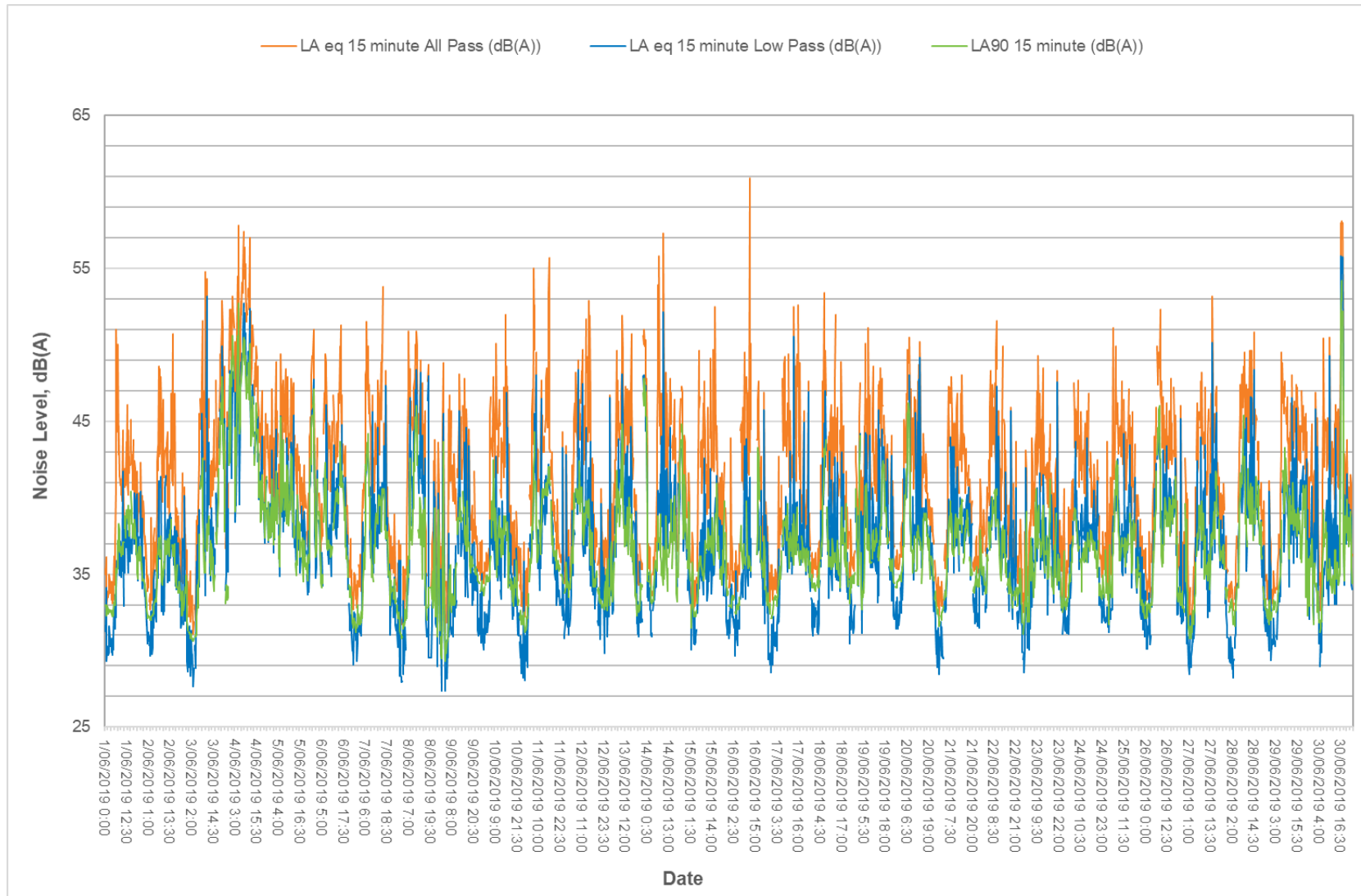


Figure 5.3: NMT3 Noise Monitoring Results – June 2019

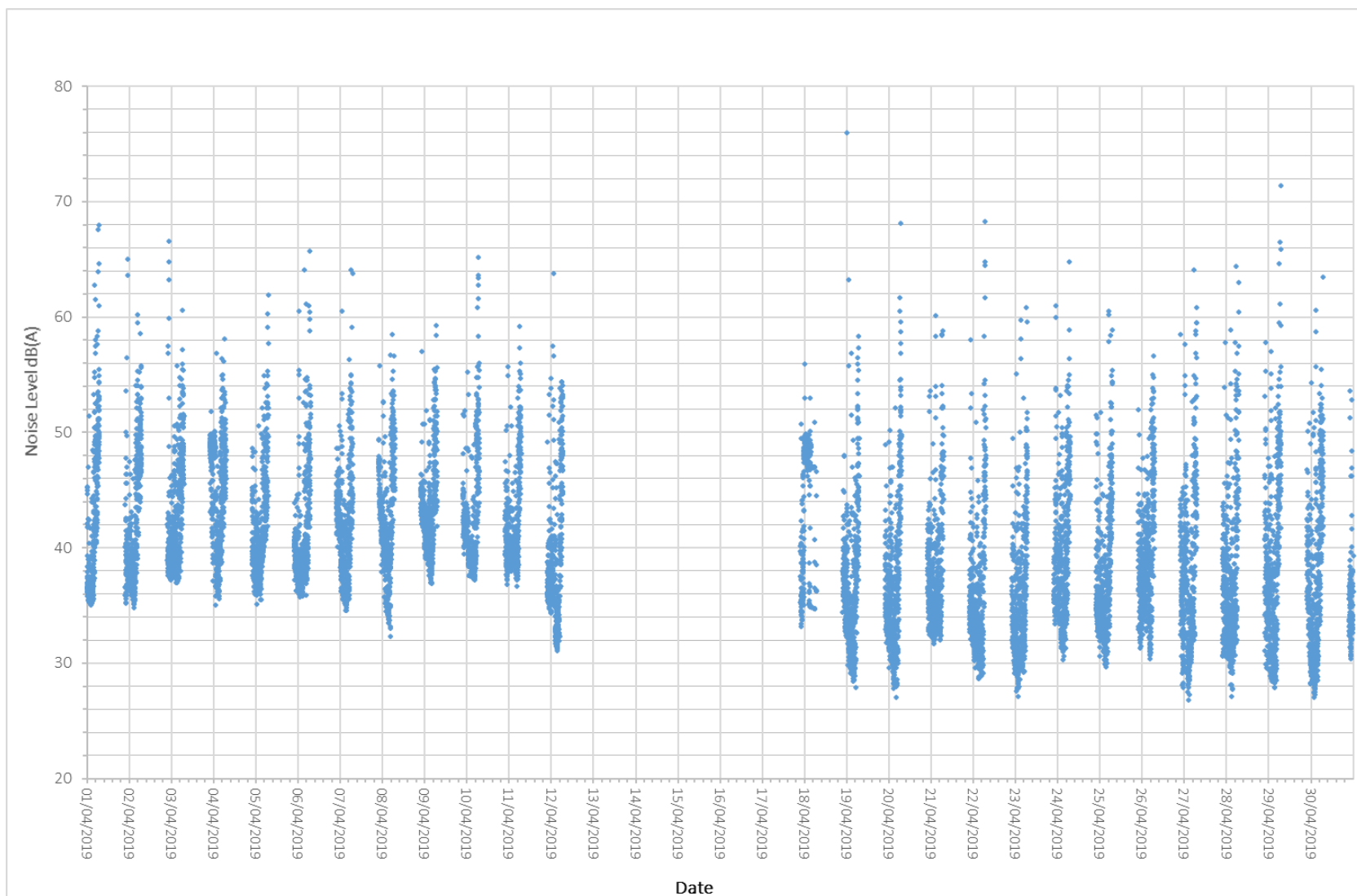


Figure 5.4: L_{1,15minute} (night time only) NMT3 Noise Monitoring Results – April 2019

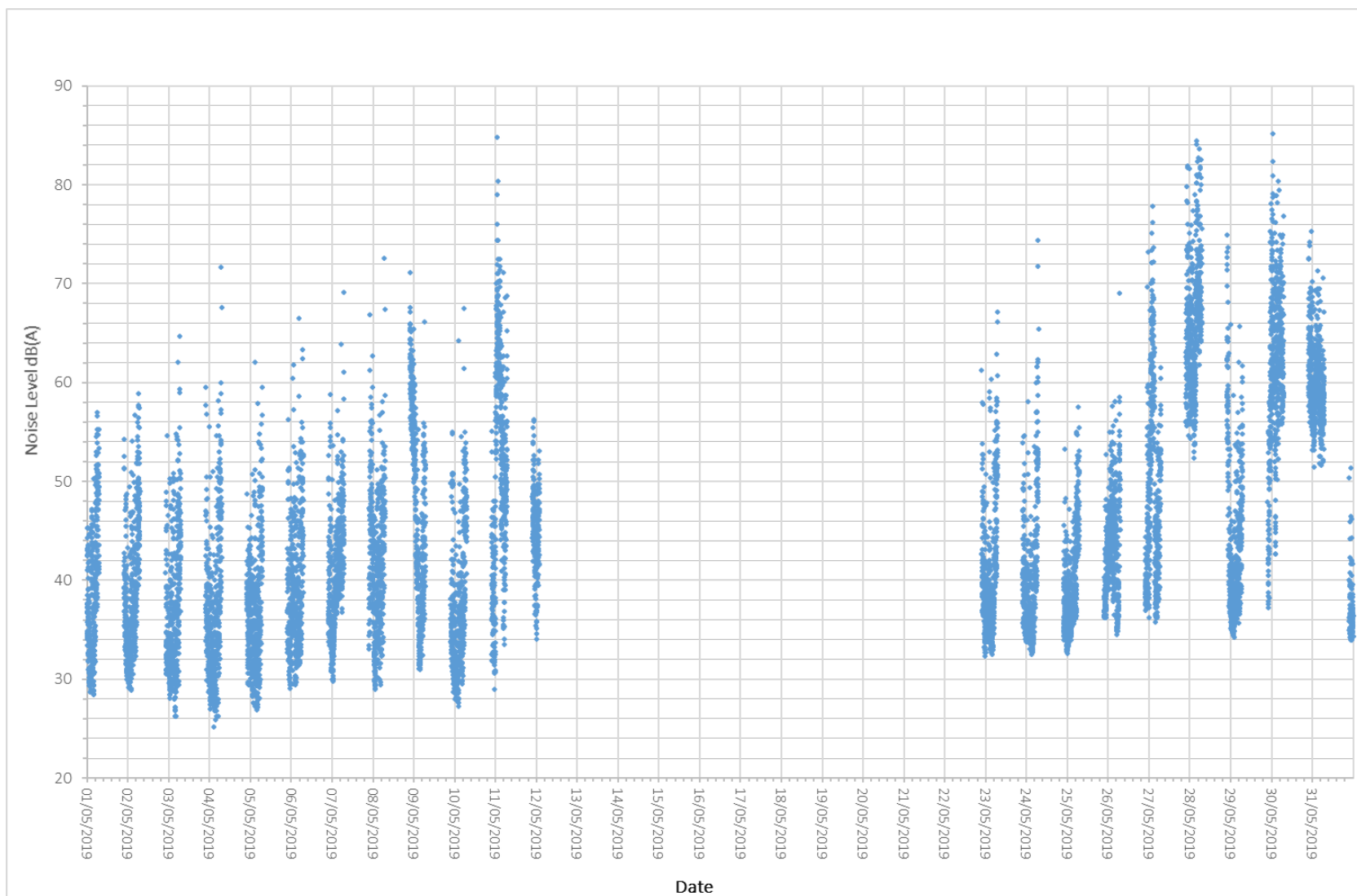


Figure 5.5: L_{1,15minute} (night time only) NMT3 Noise Monitoring Results – May 2019

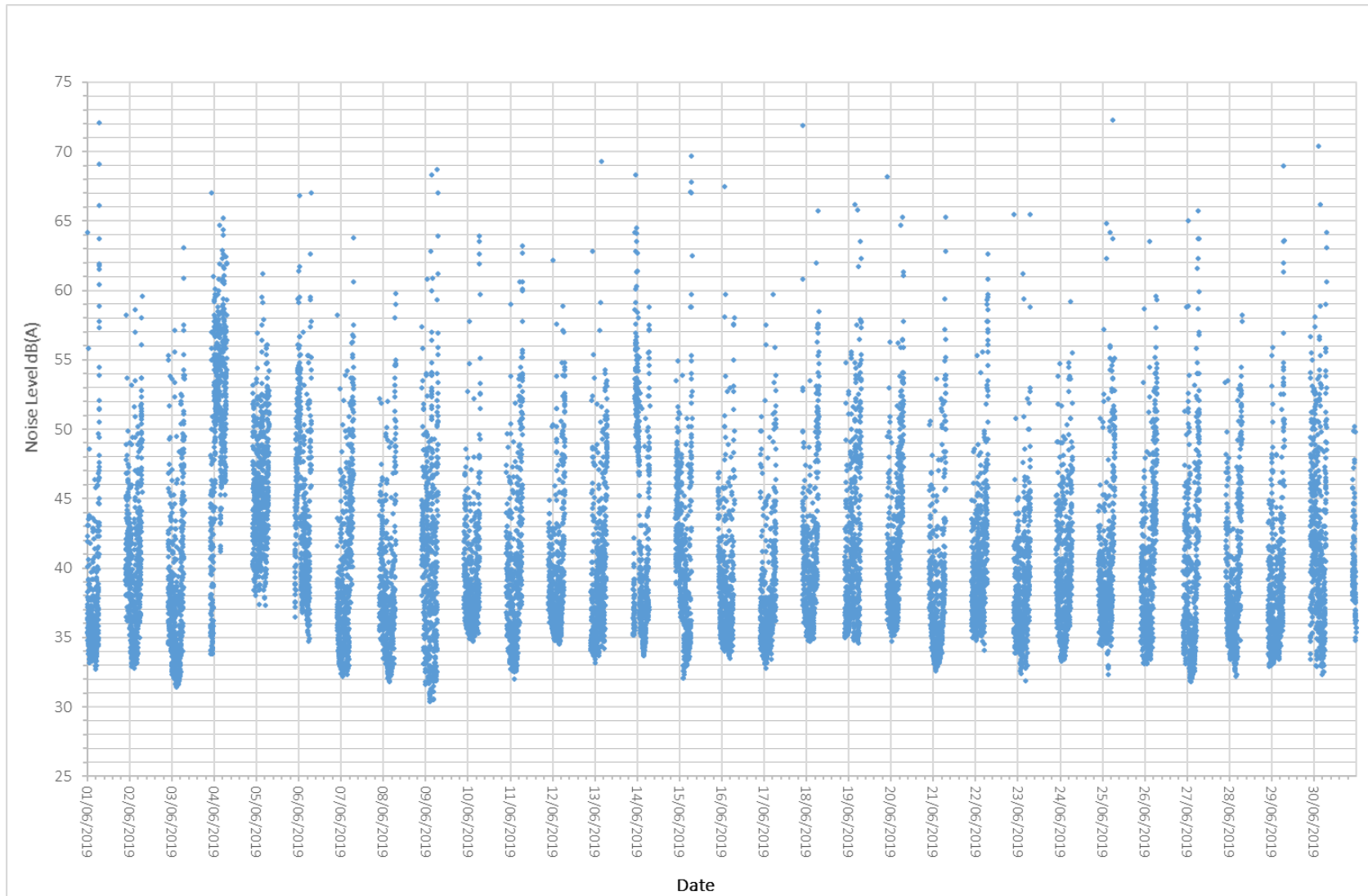


Figure 5.6: L_{1,15minute} (night time only) NMT3 Noise Monitoring Results – June 2019

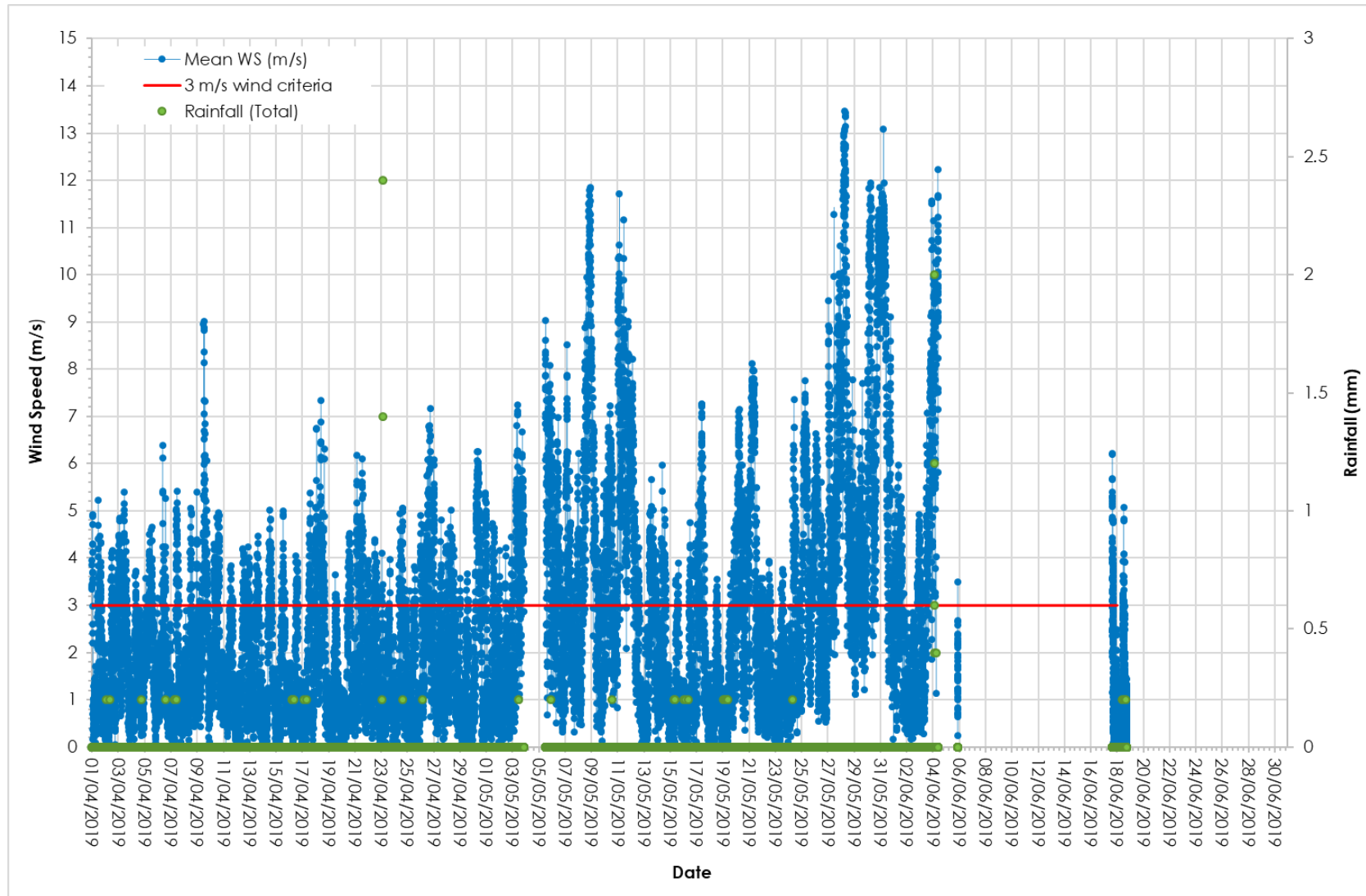


Figure 5.7: Wind Speed and Rainfall Monitoring Data

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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