



Wongawilli Colliery

Quarterly Air Quality and Noise Monitoring Report (July to September 2018)

19 November 2019

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WONGAWILLI COLLIERY

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Wongawilli Colliery

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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 third quarter, July to September 2018. 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

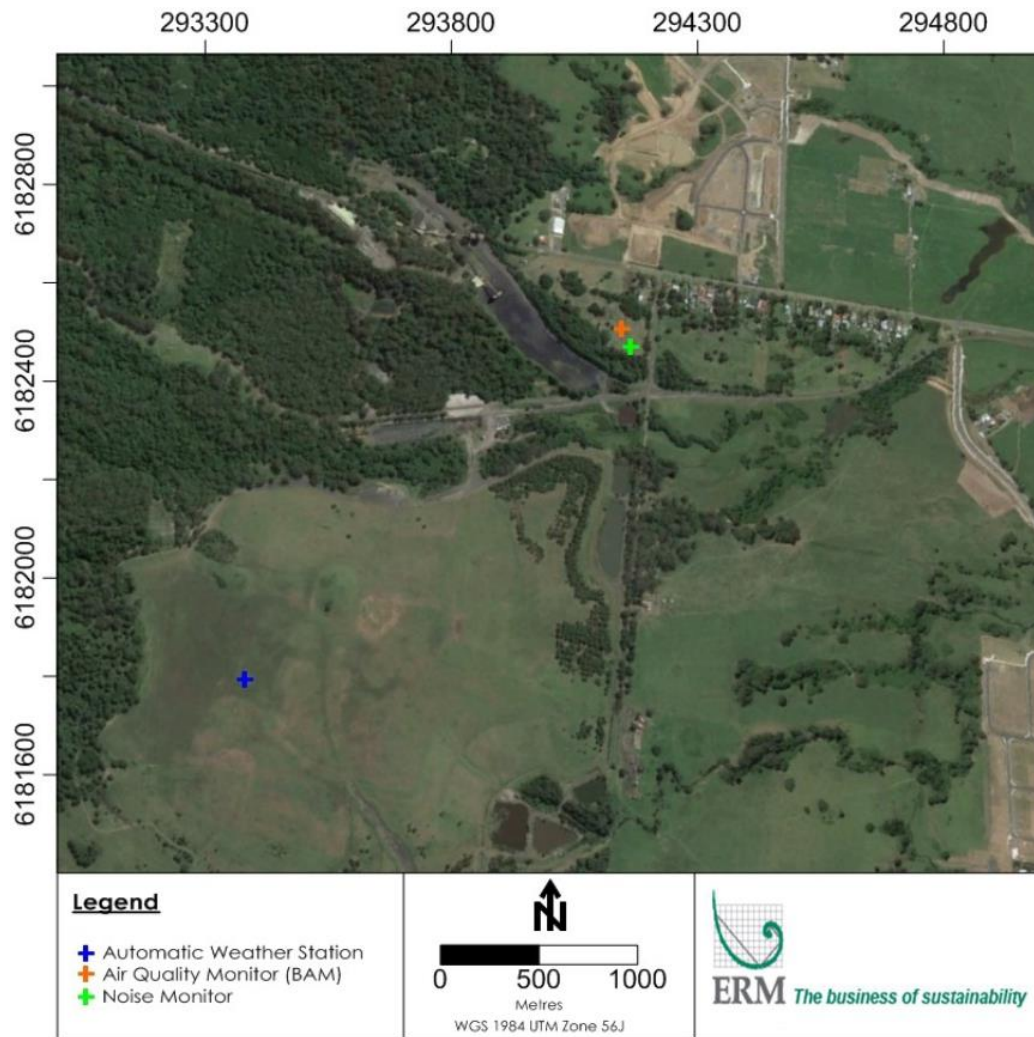


Figure 1.1: Monitoring Locations

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 third quarter of 2018 is provided in the following sections. The valid data recovery rate was 17% for all parameters (refer **Table 3.1**).

Table 3.1: Valid Data Recovery Rates - AWS

Parameter	Valid Data Recovery Rate %
Wind Speed	17%
Wind Direction	17%
Temperature – 2 m	17%
Temperature – 10 m	17%
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	3.5
Temperature (°C) – 10m		13.2
Temperature (°C) – 2m		11.8
Barometric pressure (hPa)		1007.7
Wind Speed (m/s)	Median	2.9
Temperature (°C) – 10m		12.9
Temperature (°C) – 2m		11.5
Barometric pressure (hPa)		1007.3
Wind Speed (m/s)	Standard Deviation	2.6
Temperature (°C) – 10m		3.4
Temperature (°C) – 2m		4.0
Barometric pressure (hPa)		7.3
Rainfall (mm)	Quarterly Total	18.4
Calms	%	4

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 3.5 m/s and the percentage occurrence of calm wind conditions (less than or equal to 0.5 m/s) was approximately 4%.

3.2 Temperature

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

The daily average temperature at 2m was 11.8°C, and a maximum daily average of 30.5°C was recorded on 28 September 2018.

3.3 Rainfall

A plot of the daily average rainfall is shown in **Figure 3.3**. The station recorded 18.4 mm of rain for the quarter.

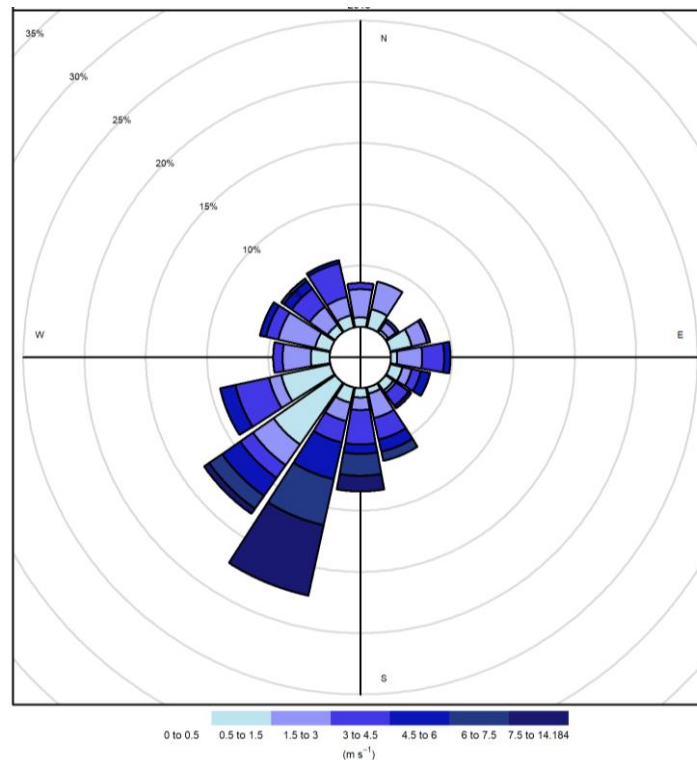


Figure 3.1: Windrose for Wongawilli Colliery July to September 2018

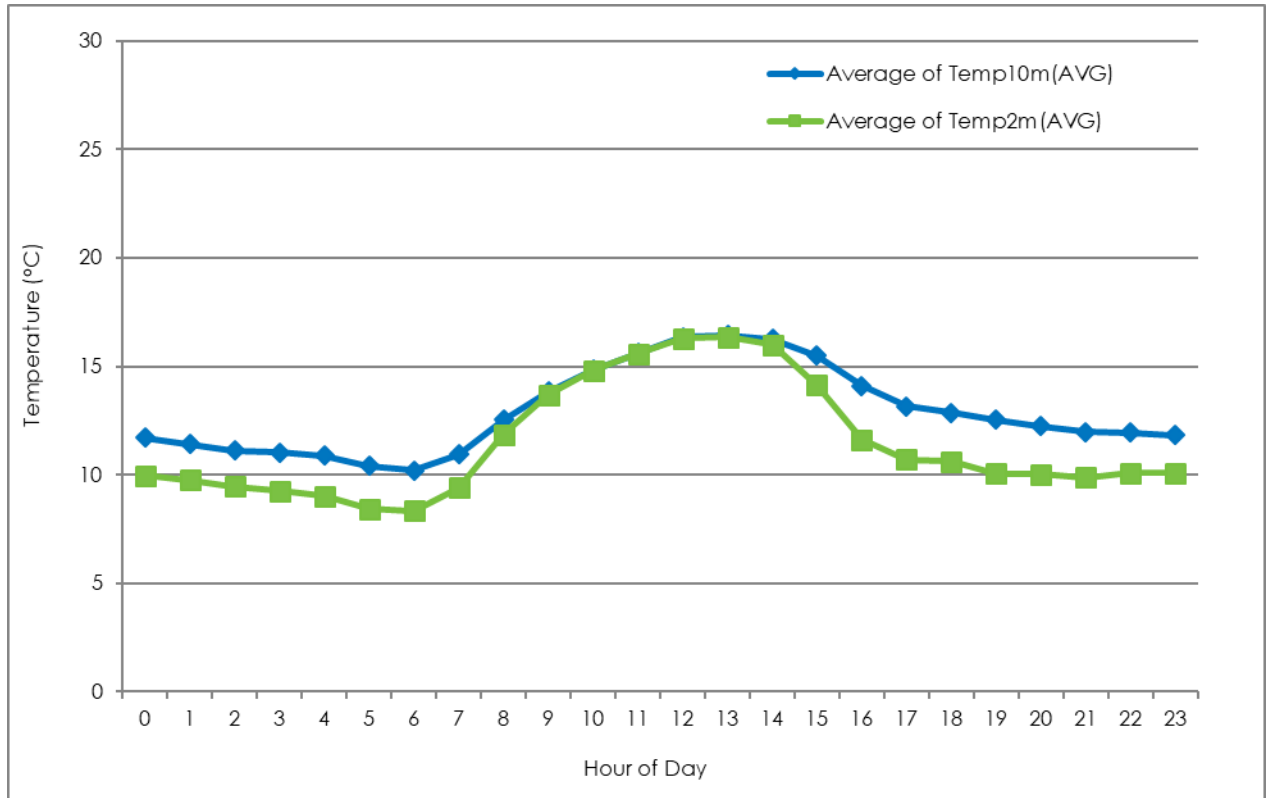


Figure 3.2: Hourly Average Temperature at 2m and 10m

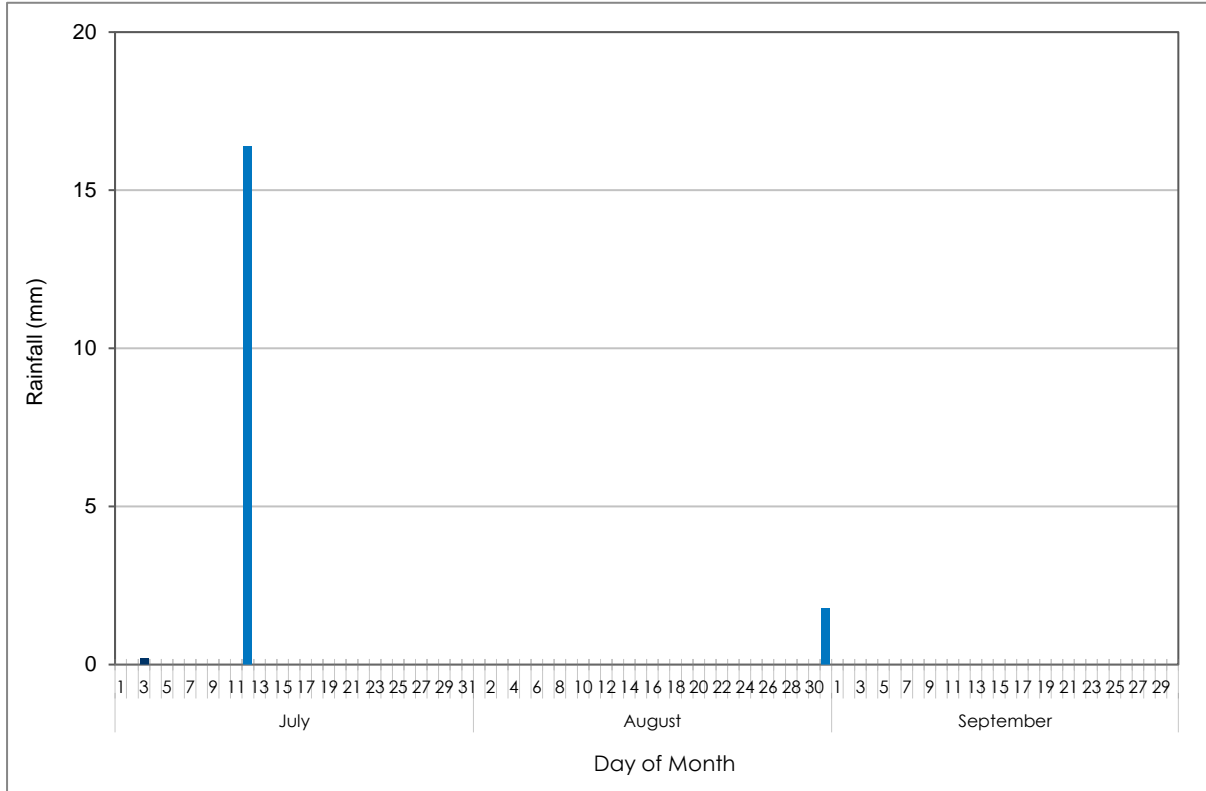


Figure 3.3: Daily Rainfall

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 third quarter of 2018 is provided in **Table 4.1**. The data recovery rate (for 24-hour average) was 100%. The 24-hour PM₁₀ concentrations are presented in **Figure 4.1** for the BAM. Peaks in PM₁₀ concentrations above 50µg/m³ were observed on the 30th of July and 7th, 13th, 15th, 19th and 21st of August. These peaks did not correlated directly with peaks measured at Office of Environment and Heritage (OEH) data collected at Kembbla Grange and Wollongong monitoring stations, suggesting local sources influencing air quality in the region during elevated wind speed events in the area.

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

Statistical measure	July	August	September	Q3
Mean	16.1	22.0	13.0	17.0
Standard Deviation	18.3	19.2	6.3	16.2
Median	10.4	12.6	11.7	12.0
Minimum	1.1	5.7	3.4	1.1
Maximum	103.5	78.8	25.8	103.5
Days over the criteria	1	5	0	6

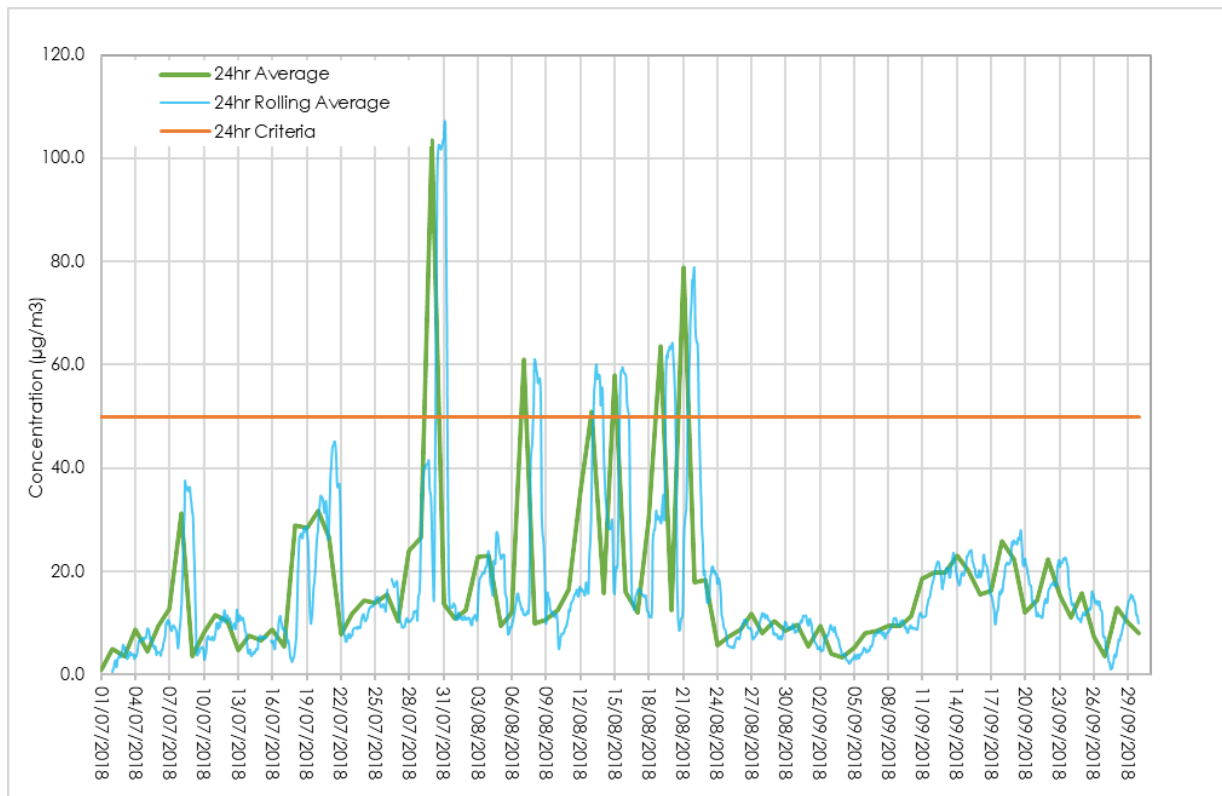


Figure 4.1: PM₁₀ Monitoring Data

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 third quarter of 2018 recovered 76% 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: Third 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
July	-	-	-	-	-	-	-	-	-
August	44	50	39	46	50	39	48	53	37
September	47	50	38	47	48	38	47	48	36

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_{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 5.3** to **Figure 5.4**.

Table 5.2: July- September 2018 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 (%)
July	-	-	-
August	79	47	14
September	77	48	30

The noise limits at the site apply for wind speeds less than 3 m/s. **Table 5.3** and **Figure 5.5** 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 July - September 2018

WTX	Exceedances (%)
July	47
August	40
September	72

Table 5.4: NMT3 Daily Noise Monitoring Results – August 2018

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
1/08/2017	-	-	-	-	-	-	-	-	-
2/08/2017	-	-	-	-	-	-	-	-	-
3/08/2017	-	-	-	-	-	-	-	-	-
4/08/2017	-	-	-	-	-	-	-	-	-
5/08/2017	-	-	-	-	-	-	-	-	-
6/08/2017	-	-	-	-	-	-	-	-	-
7/08/2017	-	-	-	-	-	-	-	-	-
8/08/2017	-	-	-	-	-	-	-	-	-
9/08/2017	-	-	-	-	-	-	-	-	-
10/08/2017	-	-	-	-	-	-	-	-	-
11/08/2017	-	-	-	-	-	-	-	-	-
12/08/2017	-	-	-	-	-	-	-	-	-
13/08/2017	-	-	-	-	-	-	-	-	-
14/08/2017	-	-	-	-	-	-	-	-	-
15/08/2017	-	-	-	-	-	-	-	-	-
16/08/2017	-	-	-	-	-	-	-	-	-
17/08/2017	-	-	-	-	-	-	-	-	-
18/08/2017	-	-	-	-	-	-	-	-	-
19/08/2017	-	-	-	-	-	-	-	-	-
20/08/2017	-	-	-	-	-	-	-	-	-
21/08/2017	-	-	-	-	-	-	-	-	-
22/08/2017	48	50	45	49	50	48	49	50	47
23/08/2017	45	49	42	47	47	45	45	47	43
24/08/2017	44	47	41	46	47	43	46	47	43
25/08/2017	45	47	41	45	46	42	46	47	44
26/08/2017	45	49	42	46	46	43	45	46	43
27/08/2017	41	47	40	41	42	36	40	43	38
28/08/2017	45	48	36	45	45	43	44	46	42
29/08/2017	45	47	39	44	45	40	43	45	41
30/08/2017	43	46	39	42	42	40	42	45	38
31/08/2017	47	50	42	47	50	39	40	41	36
Log Avg	44	50	39	46	50	42	48	53	43
Median	45	48	41	45	46	42	45	46	43
Max	48	50	45	49	50	48	49	50	47
Min	41	46	36	41	42	36	40	41	36

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 – September 2018

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
1/09/2017	50	53	41	49	52	41	43	46	37
2/09/2017	39	44	37	41	42	40	41	44	39
3/09/2017	48	51	40	40	41	38	41	44	38
4/09/2017	43	47	38	41	42	39	40	44	34
5/09/2017	47	50	39	41	42	40	41	43	37
6/09/2017	47	50	42	43	45	42	45	48	40
7/09/2017	49	51	44	45	47	42	45	47	41
8/09/2017	44	47	42	47	48	44	49	50	44
9/09/2017	49	51	45	55	58	53	51	52	47
10/09/2017	44	47	42	42	43	41	41	44	39
11/09/2017	44	48	41	40	41	38	44	47	39
12/09/2017	47	50	40	41	43	38	41	44	37
13/09/2017	48	51	39	36	38	32	38	43	28
14/09/2017	45	51	37	36	39	34	36	41	31
15/09/2017	46	49	40	45	46	39	49	51	39
16/09/2017	48	50	38	47	48	43	53	53	46
17/09/2017	48	51	44	51	51	49	51	51	47
18/09/2017	48	50	43	50	51	49	49	50	47
19/09/2017	51	52	45	49	49	46	49	50	46
20/09/2017	47	50	41	52	52	51	51	52	49
21/09/2017	45	48	42	51	51	49	50	50	44
22/09/2017	47	49	40	48	49	45	48	49	43
23/09/2017	43	46	38	45	45	42	46	47	45
24/09/2017	46	49	44	48	48	46	50	50	48
25/09/2017	47	50	40	50	50	49	48	49	43
26/09/2017	48	51	44	49	50	44	45	47	41
27/09/2017	48	51	42	44	45	40	44	46	40
28/09/2017	51	53	41	43	44	37	48	49	39
29/09/2017	47	50	39	44	45	40	43	45	41
30/09/2017	40	44		46	46		42	43	40
Log Avg	47	50	41	47	48	44	47	48	43
Median	47	50	41	45	46	42	45	47	41
Max	51	53	45	55	58	53	53	53	49
Min	39	44	37	36	38	32	36	41	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

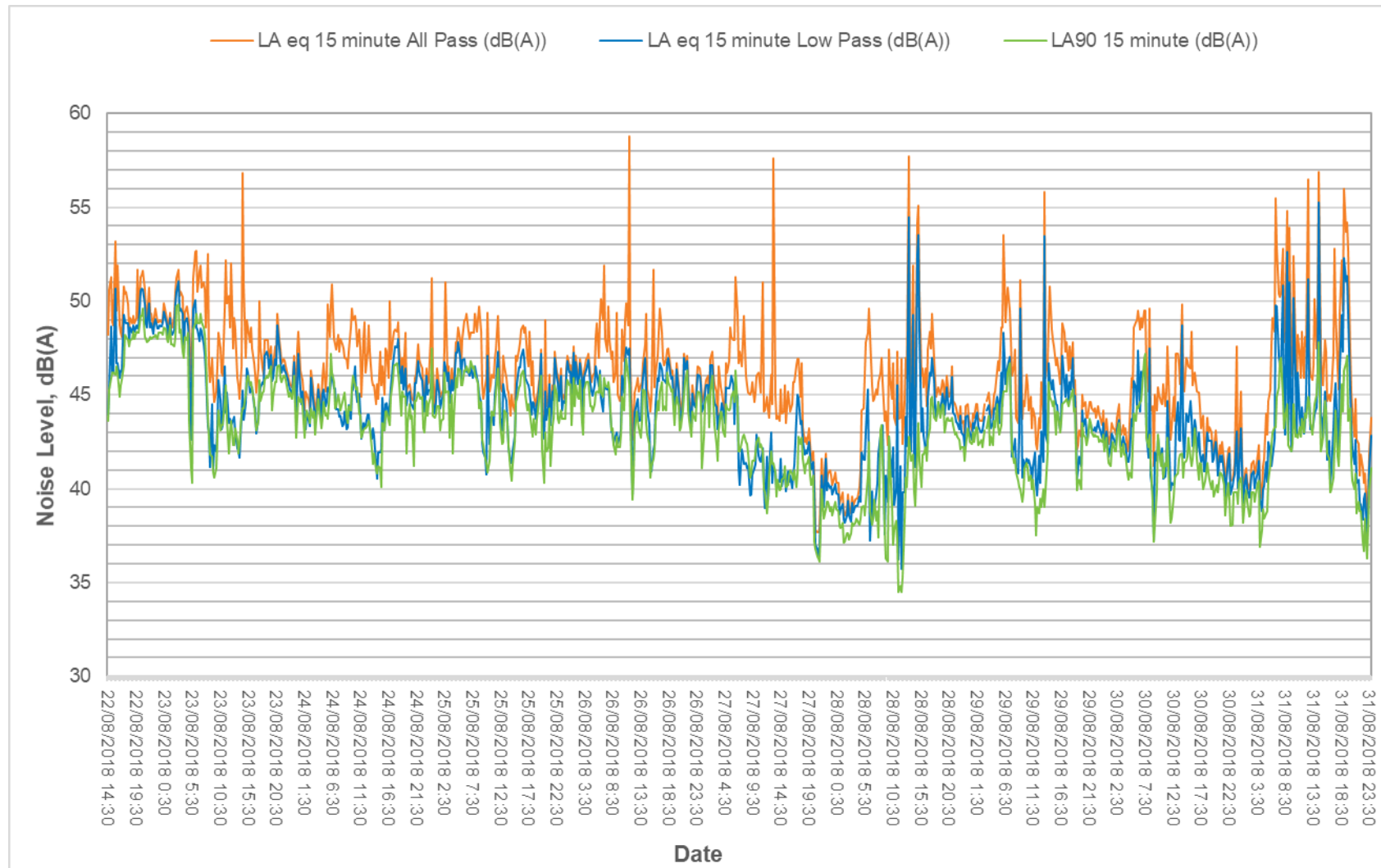


Figure 5.1: NMT3 Noise Monitoring Results – August 2018

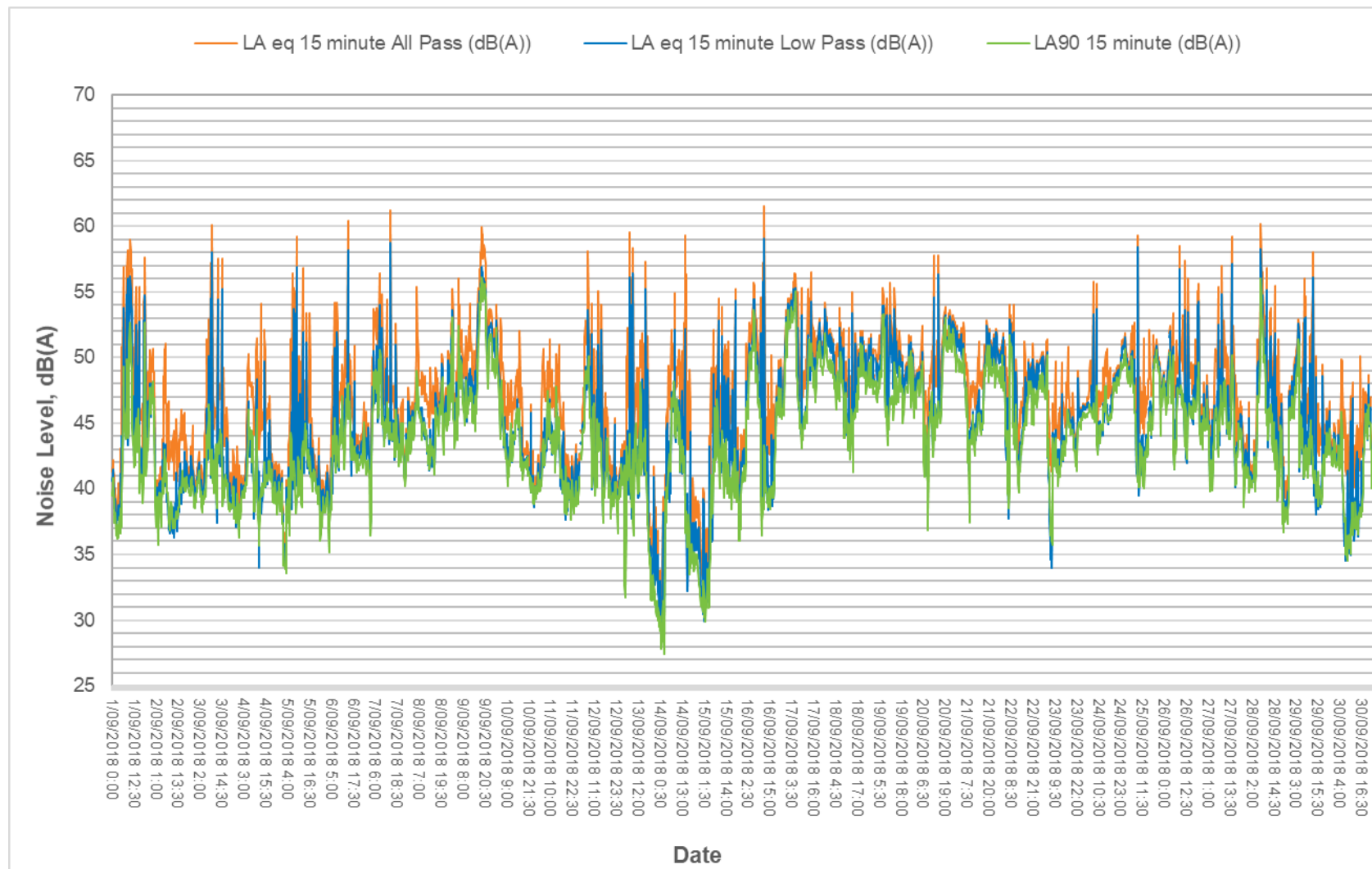


Figure 5.2: NMT3 Noise Monitoring Results – September 2018

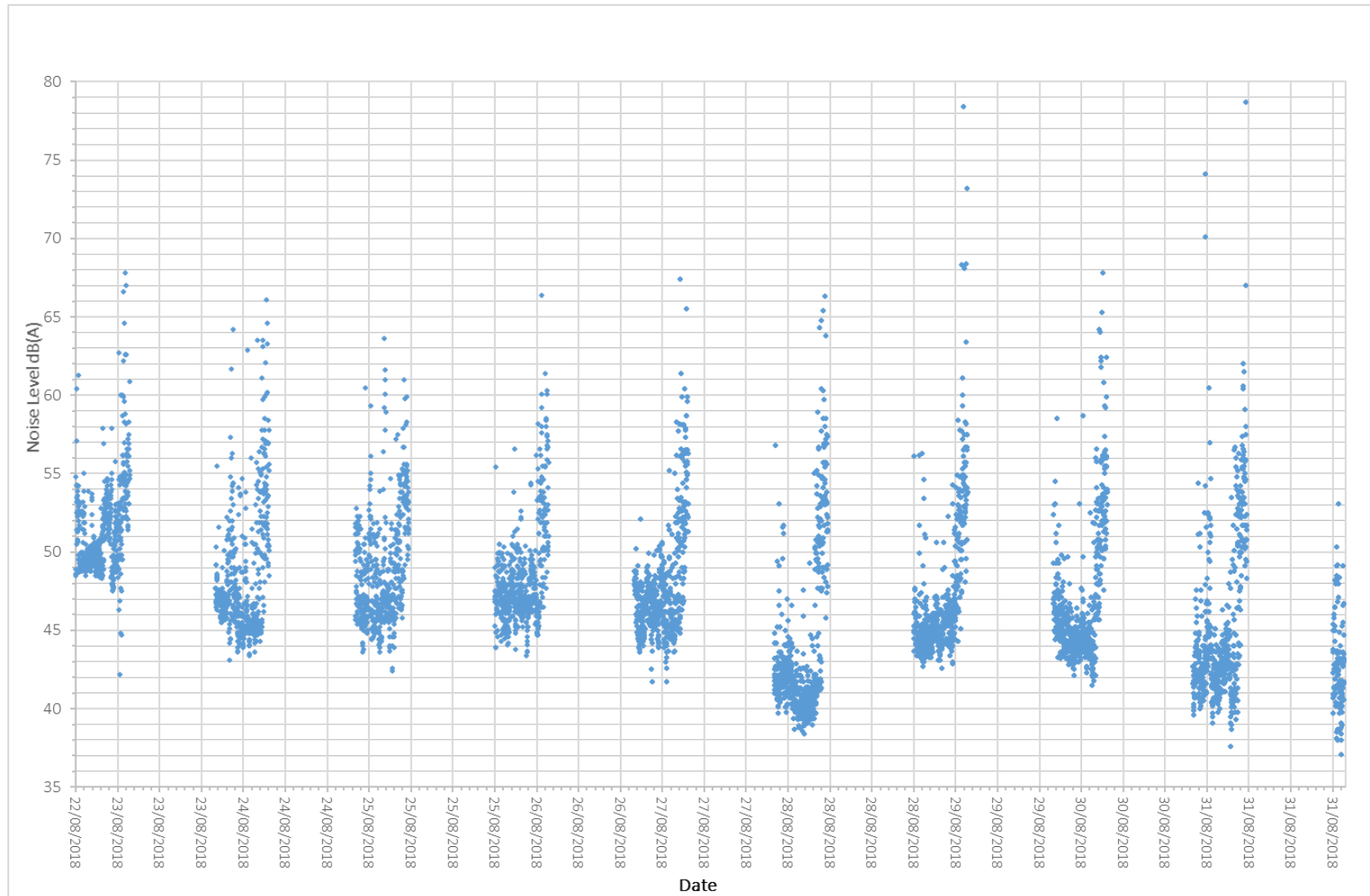


Figure 5.3: L_{1,15minute} (night time only) NMT3 Noise Monitoring Results – August 2018

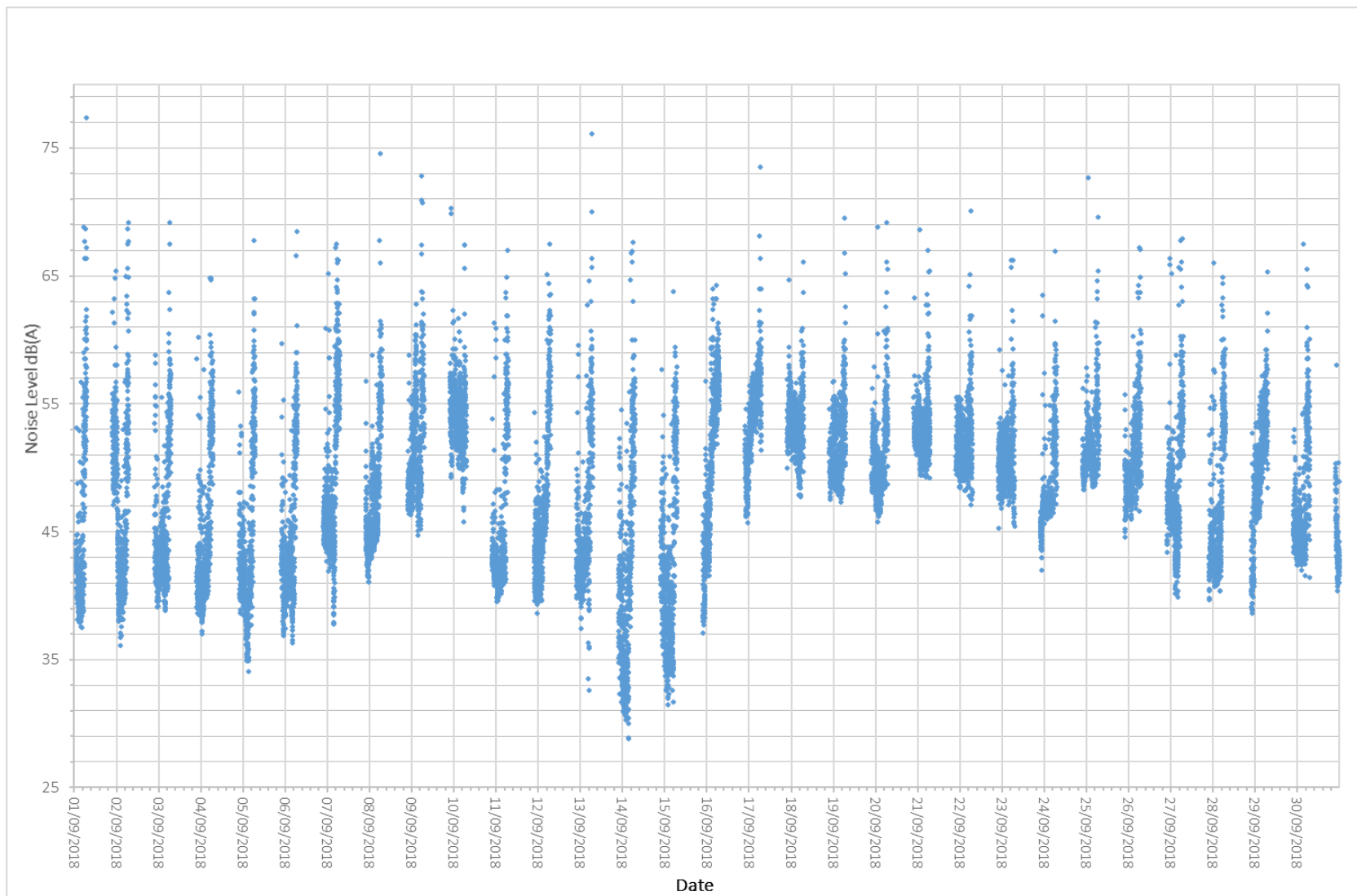


Figure 5.4: L_{1,15minute} (night time only) NMT3 Noise Monitoring Results – September 2018

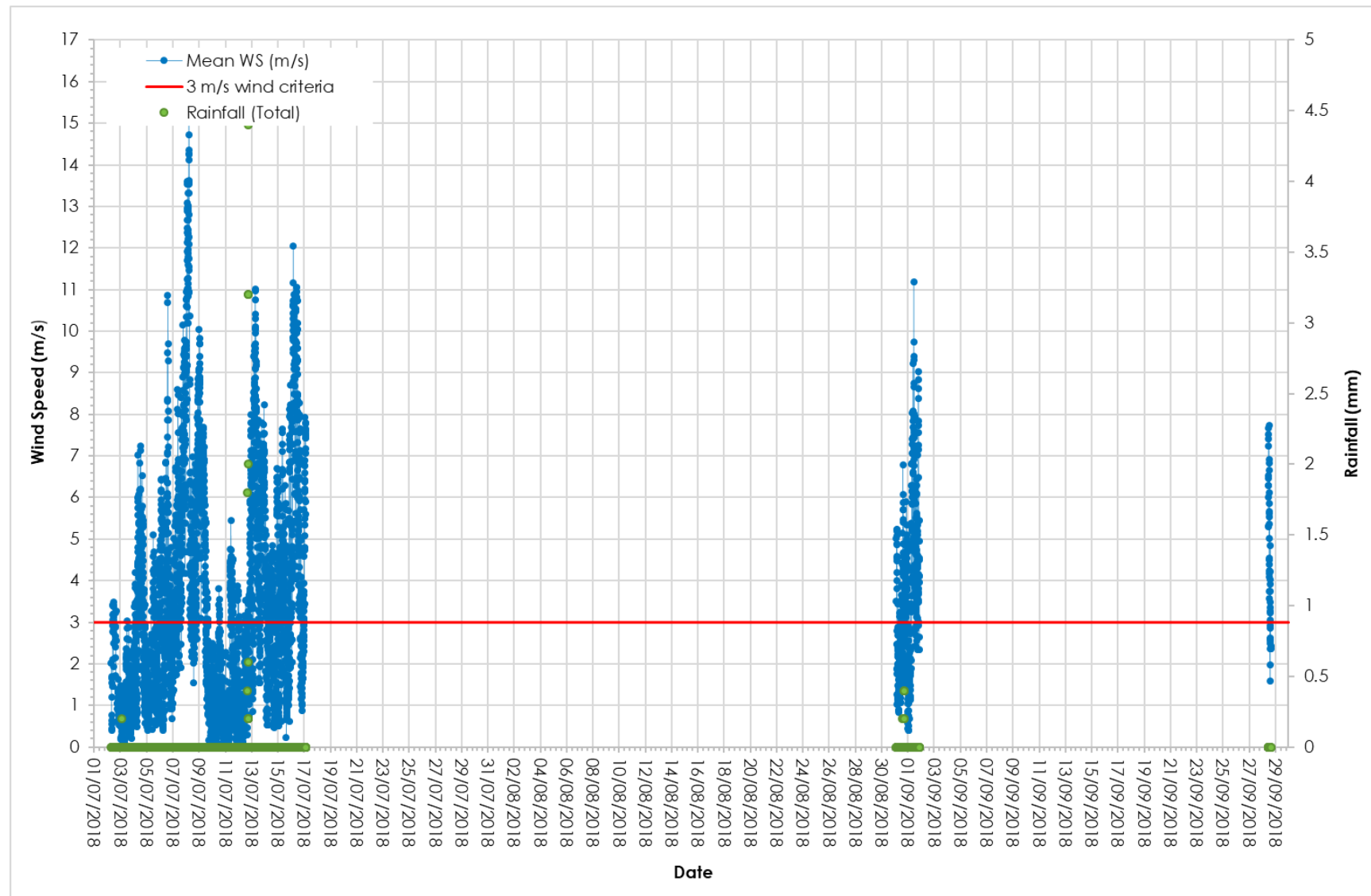


Figure 5.5: Wind Speed and Rainfall Monitoring Data

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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