

Noise Monitoring Assessment

Rooty Hill Distribution Centre, Rooty Hill, NSW
Quarter 3 Ending September 2019.

Document Information

Noise Monitoring Assessment

Rooty Hill Distribution Centre, Rooty Hill, NSW

Quarter 3 Ending September 2019

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for the Holcim Regional Distribution Centre (RDC), at Rooty Hill, NSW.

This assessment has been undertaken at four representative monitoring locations for the Quarterly period ending September 2019 as part of the Noise Monitoring Program (NMP) to address conditions outlined in the Development Consent.

The assessment has been conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Rooty Hill RDC Operational Noise Management Plan (NMP), 2015;
- Rooty Hill, Consolidated Consent, 2017 (Mod 2);
- Australian Standard AS 1055:2018 - Acoustics - Description and Measurement of Environmental Noise; and
- Australian Standard AS/NZS IEC 61672.1:2019 (AS 61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring;

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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2 Noise Criteria

The noise criteria for each receiver location are outlined in the NMP and consolidated consent for the RDC are presented in **Table 1**.

Table 1 Noise Criteria, dBA						
Location	Monitoring Location	Morning Shoulder ^{1,2}	Day ^{1,2}	Evening ^{1,2}	Night ^{1,2}	
		LAeq(15min)	LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
Any residences in Station Street	N1	39	44	44	39	53
Any residences in Coughlan Crescent	N2	40	40	39	39	53
Any residences in Mavis Street	N1/N4	35	35	35	35	53
Nurragingy Reserve	N3	When Reserve is in use – 50dB, LAeq				
Colebee Centre	N3	When the Centre is in use – 50dB, LAeq				
Blacktown Olympic Park (Active recreation areas)	N4	When active recreational areas of the Park are in use – 55dB, LAeq				

Note 1: Noise criteria adopted from NMP.

Note 2: Morning shoulder 6am-7am Monday to Saturday and 6am-8am Sundays and public holidays; Day 7am-6pm Monday to Saturday and 8am-6pm Sundays and public holidays; Evening 6pm-10pm Monday to Sunday; Night 10pm-7am Monday to Saturday and 10pm-8am Sunday.

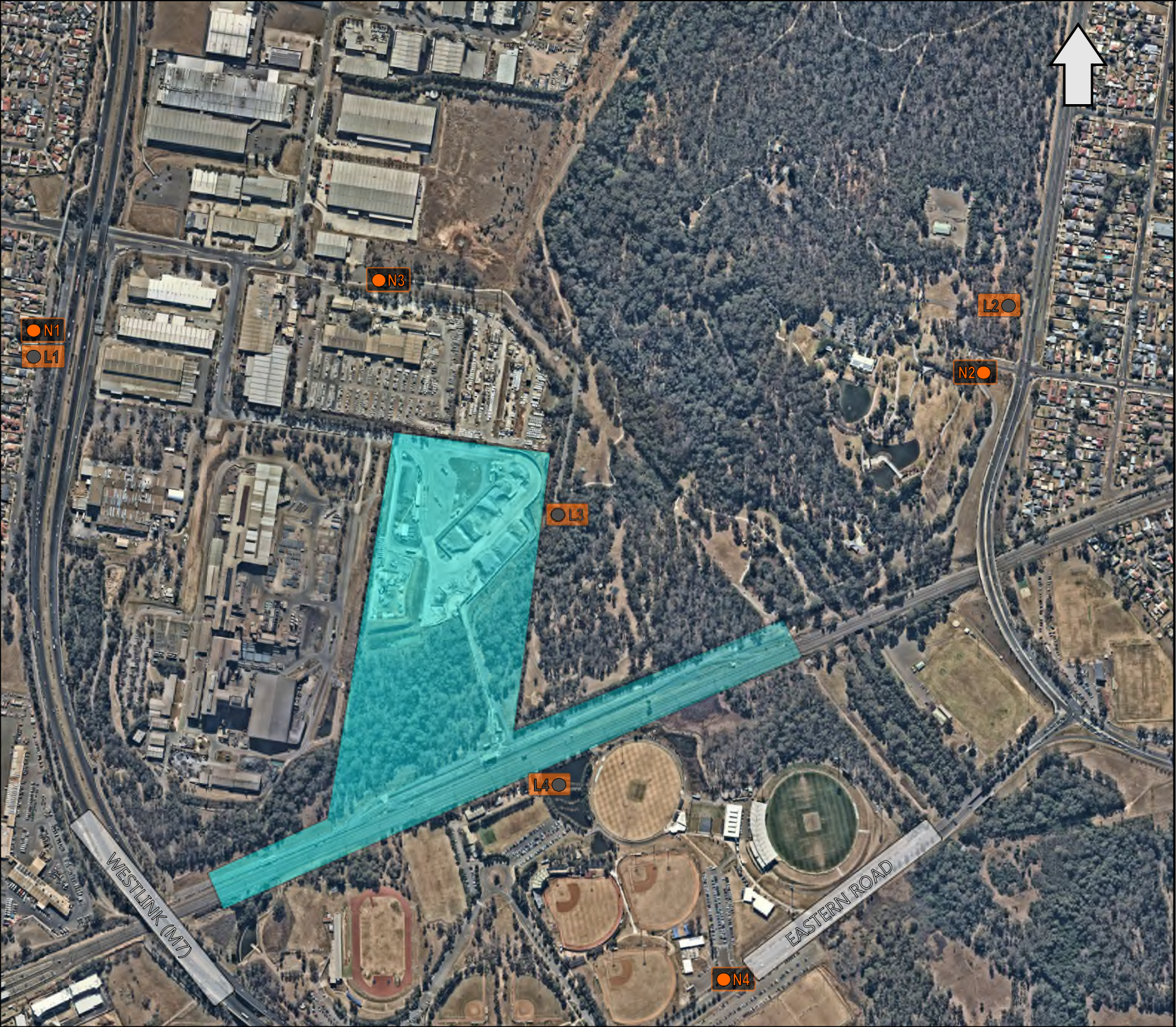
The RDC is located at Rooty Hill, NSW approximately 1km east of the railway station and town centre. Receivers in the locality surrounding the RDC are primarily industrial, recreational and urban residential. The RDC is bounded by the railway line to the south, industry to the west and recreational areas to the east. The residential areas potentially affected by noise from the operation are to the east, beyond the Nurragingy Reserve in Doonside, NSW (Crawford Street and Knox Road); and to the west, beyond industrial zones and the M7 Motorway in Station Street, Rooty Hill, NSW. Road traffic from the M7 Motorway is a dominant noise source in the area along with urban hum and railway noise.

Monitoring locations were selected in accordance with the NMP and are representative of the nearest noise sensitive receivers to the RDC.

The operational compliance monitoring locations with respect to the RDC are presented in the locality plan shown in **Figure 1** and **Table 1** along with the relevant noise criteria for each location.

FIGURE 1

LOCALITY PLAN
REF: MAC180611-01



KEY

- MONITORING LOCATION
- LOGGER LOCATION
- SITE LOCATION



3 Methodology

Noise monitoring consisted of attended and unattended monitoring during the daytime, evening and night time periods.

3.1 Attended Noise Monitoring

Attended noise monitoring was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018 and the RDC Consolidated Consent. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Tuesday 9 July 2019 and Wednesday 10 July 2019. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1:2019 Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA.

Attended noise monitoring was conducted for 15 minutes in duration during the daytime, evening and night time periods over one day. Where possible, throughout each measurement the operator(s) quantified the contribution of each significant noise source.

Extraneous noise sources were excluded from the analysis to determine the $L_{Aeq}(15min)$ RDC noise contribution for comparison against the relevant criteria. Where the RDC was inaudible, the RDC contribution is estimated to be at least 10dB below the ambient noise level.

3.2 Unattended Noise Monitoring

The unattended noise monitoring was conducted at locations N1 – N4 for more than seven days in general accordance with the procedures described AS 1055:2018 and the RDC Consolidated Consent. Noise measurements were carried out using Svantek Type 1, 977 and 957 noise analysers from Tuesday 9 July 2019 to Friday 19 July 2019. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1.2019. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA. **Appendix B** presents the noise monitoring charts for the assessment period.

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4 Results

4.1 Attended Noise Monitoring Results

4.1.1 Attended Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N1 for the NMA are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location N1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
09/07/2019	16:53 (Day)	74	59	54	WD: SW	Traffic 50-74
					WS: 1.0m/s	Birds 53-59
					Rain: Nil	Dogs Barking 54-56
						Aircraft 50-54
RDC Inaudible						
RDC L _{Aeq} (15min) Contribution						<44
09/07/2019	21:44 (Evening)	69	53	48	WD: W	Traffic 40 -58
					WS: 0.1m/s	Car Tyre Squeal 65-69
					Rain: Nil	RDC Inaudible
					RDC L _{Aeq} (15min) Contribution	
09/07/2019	23:22 (Night)	61	49	45	WD: SW	Traffic 46-52
					WS: 0.1m/s	Truck Brakes 55-61
					Rain: Nil	Sirens 45-54
					RDC Inaudible	
RDC L _{Aeq} (15min) Contribution						<35
RDC L _{A1} (1min) Contribution						<40

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.1.2 Attended Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N2 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N2						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
10/07/2019	07:50 (Day)	69	59	55	WD: W	Birds 59-69
					WS: 0.1 m/s	Traffic 58-64
					Rain: Nil	RDC Inaudible
					RDC L _{Aeq} (15min) Contribution	
09/07/2019	21:06 (Evening)	71	55	51	WD: W	Traffic 52-64
					WS: 0.1m/s	Car Exhaust 71
					Rain: Nil	Aircraft 53
					RDC L _{Aeq} (15min) Contribution	
09/07/2019	22:39 (Night)	62	52	49	WD: W	Traffic 50-62
					WS: 0.1m/s	Truck Reverse Alarms 48-49
					Rain: Nil	RDC Inaudible
					RDC L _{Aeq} (15min) Contribution	
RDC L _{A1} (1min) Contribution			<45			

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.1.3 Attended Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N3 for the NMA are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N3							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA	
		L _{Amax}	L _{Aeq}	L _{A90}			
10/07/2019	08:18 (Day)	83	62	54	WD: W WS: 0.1m/s Rain: Nil	Passing Trucks 75-83	
						Council Works in Park 55-57	
						Birds 54-60	
						RDC Inaudible	
		RDC L _{Aeq} (15min) Contribution					<44
09/07/2019	21:25 (Evening)	64	54	51	WD: SW WS: 0.1m/s Rain: Nil	Other Industrial Noise 40-64	
						Traffic 46-50	
						Sirens 40	
						RDC Inaudible	
		RDC L _{Aeq} (15min) Contribution					<41
09/07/2019	23:01 (Night)	68	57	52	WD: SW WS: 0.1m/s Rain: Nil	Other Industrial Noise 52-68	
						Aircraft 54-64	
						Insects 43-46	
						RDC Inaudible	
		RDC L _{Aeq} (15min) Contribution					<42

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.1.4 Attended Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N4 for the NMA are presented in **Table 5**.

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
09/07/2019	17:31 (Day)	64	54	52	WD: W WS: 0.1m/s Rain: Nil	Commuter Trains 58-64
						Traffic 50-55
						Birds 59
						RDC Loader 40-48
RDC L _{Aeq} (15min) Contribution						<42
09/07/2019	20:40 (Evening)	64	54	51	WD: SE WS: 1m/s Rain: Nil	Steel Mill 52-55
						Birds 60-64
						Traffic 52-55
						Commuter Trains 54-58
						General Sports Noise 56
						RDC Reverse alarms 45
RDC L _{Aeq} (15min) Contribution						<41
09/07/2019	22:17 (Night)	77	64	53	WD: W WS: 0.1m/s Rain: Nil	Passing traffic 65-77
						Other Industrial Noise 52-55
						Commuter Train 59-61
						RDC Inaudible
RDC L _{Aeq} (15min) Contribution						<43

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.2 Unattended Noise Monitoring Results

The summary (RBL and overall LAeq), noise levels recorded during unattended noise monitoring are presented in **Table 6**.

Table 6 Unattended Noise Monitoring Summary			
Monitoring Location	Period ¹	Measured dB LAeq(period) ²	Measured Background Noise Level (LA90) dB RBL ²
L1 (N1 Station Street)	Day	57	50
	Evening	53	45
	Night	53	41
L2 (N2 Knox Road)	Day	59	50
	Evening	57	49
	Night	56	41
L3 (N3 Nurragingy Reserve)	Day	57	49
	Evening	50	45
	Night	52	44
L4 (N4 Olympic Park)	Day	62	48
	Evening	62	48
	Night	62	47

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Calculated from one week of monitoring data and determined using the long term methodology for each period as per Fact Sheet A of the NPI (2017).

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5 Noise Compliance Assessment

The compliance assessment summary for each monitoring location N1 to N4 are presented in **Table 7** to **Table 9** for each assessment period.

Table 7 Daytime Noise Compliance Assessment

Receiver No.	RDC Noise Contribution		RDC Noise Criteria		Compliant
	dB LAeq(15min)		dB LAeq(15min)		
N1	<44		44		✓
N2	<40		40		✓
N3	<44		50 (When in use)		✓
N4	<42		55 (When in use)		✓

Note: Day - the period from 7am to 6pm Monday to Saturday, or 8am to 6pm on Sundays and public holidays.

Table 8 Evening Noise Compliance Assessment

Receiver No.	RDC Noise Contribution		RDC Noise Criteria		Compliant
	dB LAeq(15min)		dB LAeq(15min)		
N1	<38		44		✓
N2	<39		39		✓
N3	<41		50 (When in use)		✓
N4	<41		55 (When in use)		✓

Note: Evening - the period from 6pm to 10pm.

Table 9 Night Time Noise Compliance Assessment

Receiver No.	RDC Noise Contribution		RDC Noise Criteria		Compliant
	dB LAeq(15min)	dB LA1(1min)	dB LAeq(15min)	dB LA1(1min)	
N1	<35	<40	39	53	✓
N2	<39	<45	39	53	✓
N3	<42	N/A	50 (When in use)	N/A	✓
N4	<43	N/A	55 (When in use)	N/A	✓

Note: Night - the period from 10pm to 7am Monday to Saturday, or 10pm to 8am on Sundays and public holidays.

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6 Discussion

6.1 Discussion of Results - Location N1

RDC noise emissions were inaudible during all three attended measurements conducted on Tuesday 9 July 2019, satisfying the relevant noise limits. Extraneous noise sources included traffic, local residential noise, and aircraft noise.

6.2 Discussion of Results - Location N2

RDC noise emissions were inaudible during the day, evening and night attended measurements conducted on Tuesday 9 July 2019 and Wednesday 10 July 2019, satisfying the relevant noise limits for this location. Extraneous sources measured include traffic birds and aircraft noise.

6.3 Discussion of Results - Location N3

Attended measurements on Tuesday 9 July 2019 and Wednesday 10 July 2019 identified that RDC noise was inaudible during the daytime, evening and night measurements, which satisfied the relevant noise criteria for this location. Extraneous sources audible during the attended surveys included traffic, aircraft noise, birds and other industrial noise which generally masked RDC noise. For the evening and night assessment periods, it is noted the receiver was not "in use", hence criteria are referenced for completeness.

6.4 Discussion of Results - Location N4

RDC noise emissions were audible during the day, evening measurements on Tuesday 9 July 2019, however remained below the applicable noise criteria. Night time measurements remained inaudible at the N4 monitoring location on Tuesday 9 July 2019. It is noted that the sports centre was not in use during the night period and criteria are referenced for completeness. Extraneous noise sources included birds, traffic, train pass-bys, other industrial noise and aircraft noise all audible throughout attended measurements at this location.

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7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Holcim (Australia) Pty Ltd for the Regional Distribution Centre (RDC), at Rooty Hill, NSW. The assessment was completed to assess compliance against relevant noise criteria for Quarter 3, ending September 2019.

Unattended noise monitoring was completed between Tuesday 9 July 2019 and Friday 19 July 2019 at four representative monitoring locations.

Attended noise monitoring was conducted on Tuesday 9 July 2019 and Wednesday 10 July 2019. The assessment has identified that noise emissions generated by RDC were generally inaudible throughout the attended monitoring, with all measurements satisfying the relevant noise criteria at all assessed residential receivers.

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Appendix A – Glossary of Terms

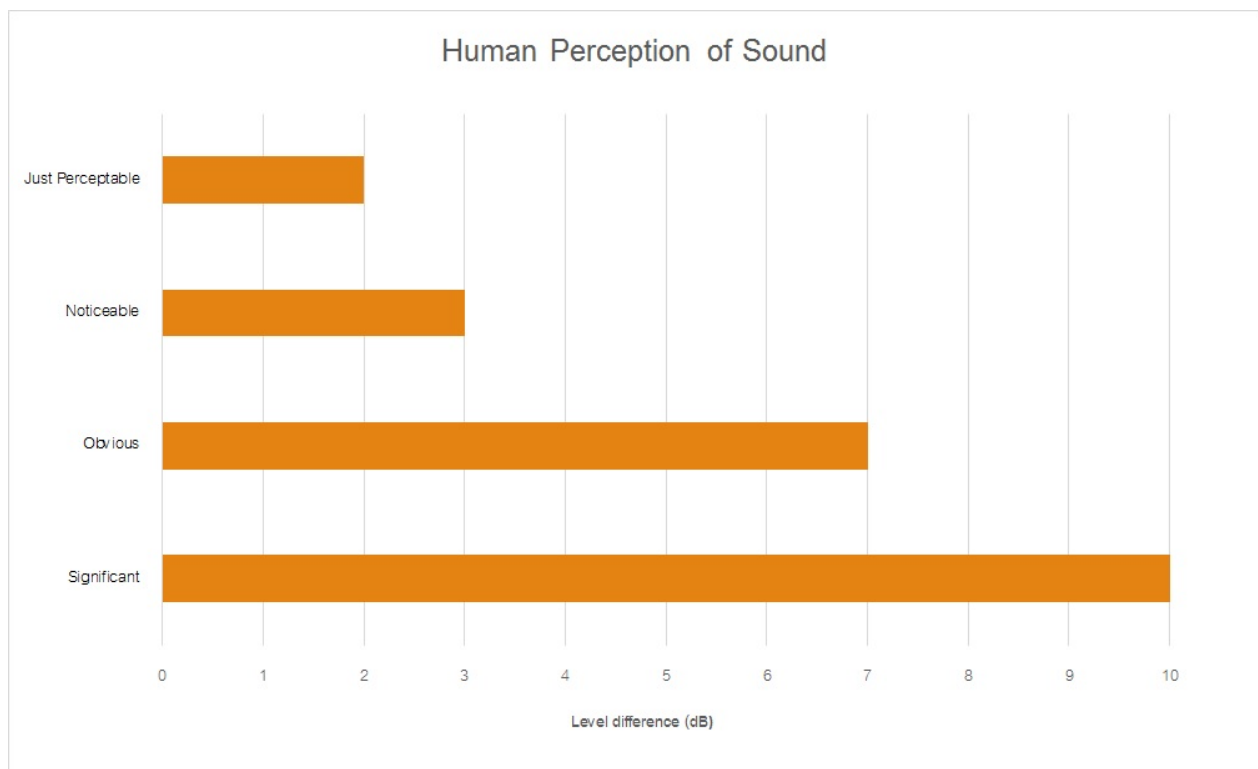
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAm _{ax}	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by: $= 10 \cdot \log_{10} (W/W_0)$ Where: W is the sound power in watts and W ₀ is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



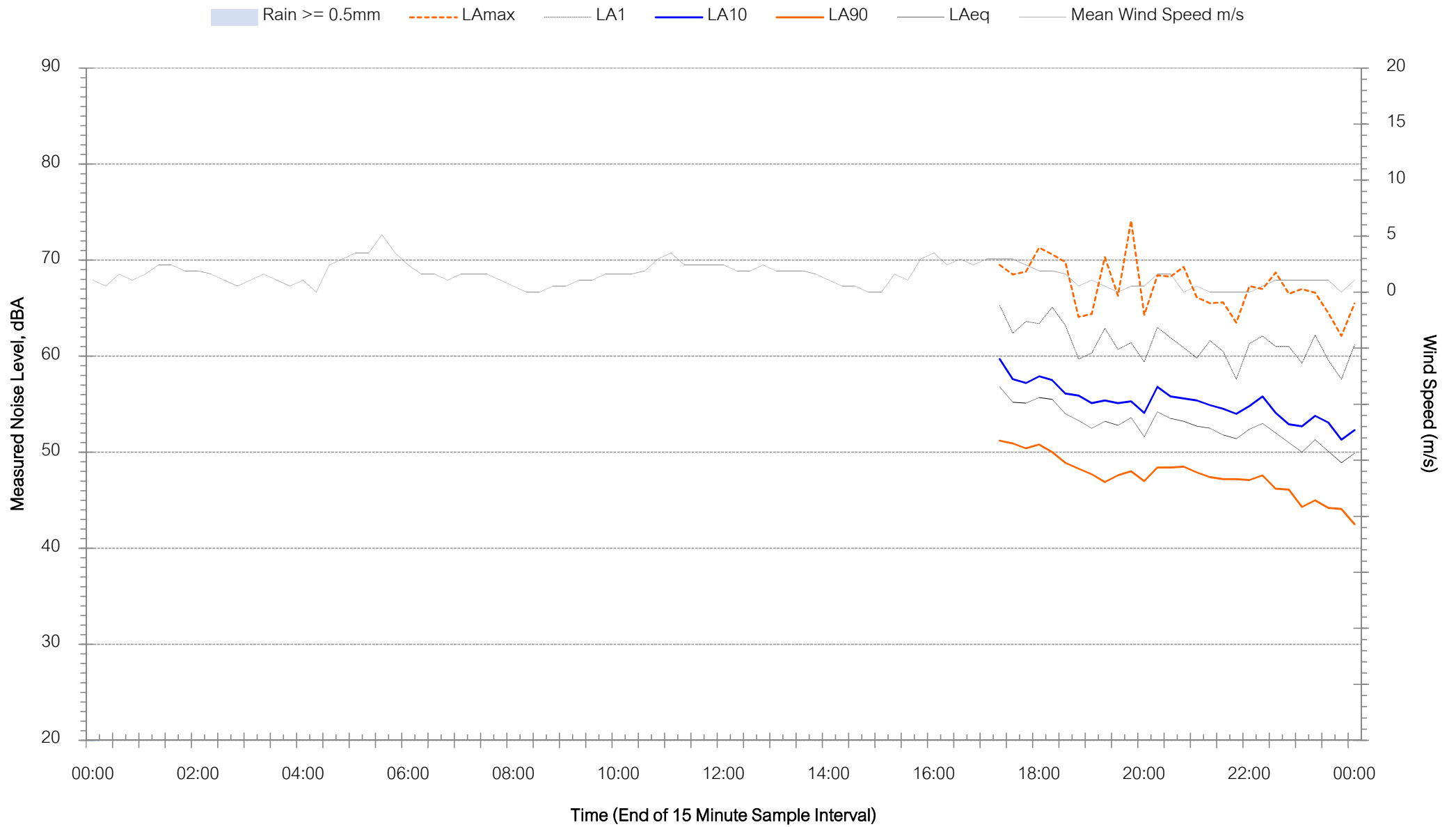
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Appendix B – Unattended Noise Monitoring Charts



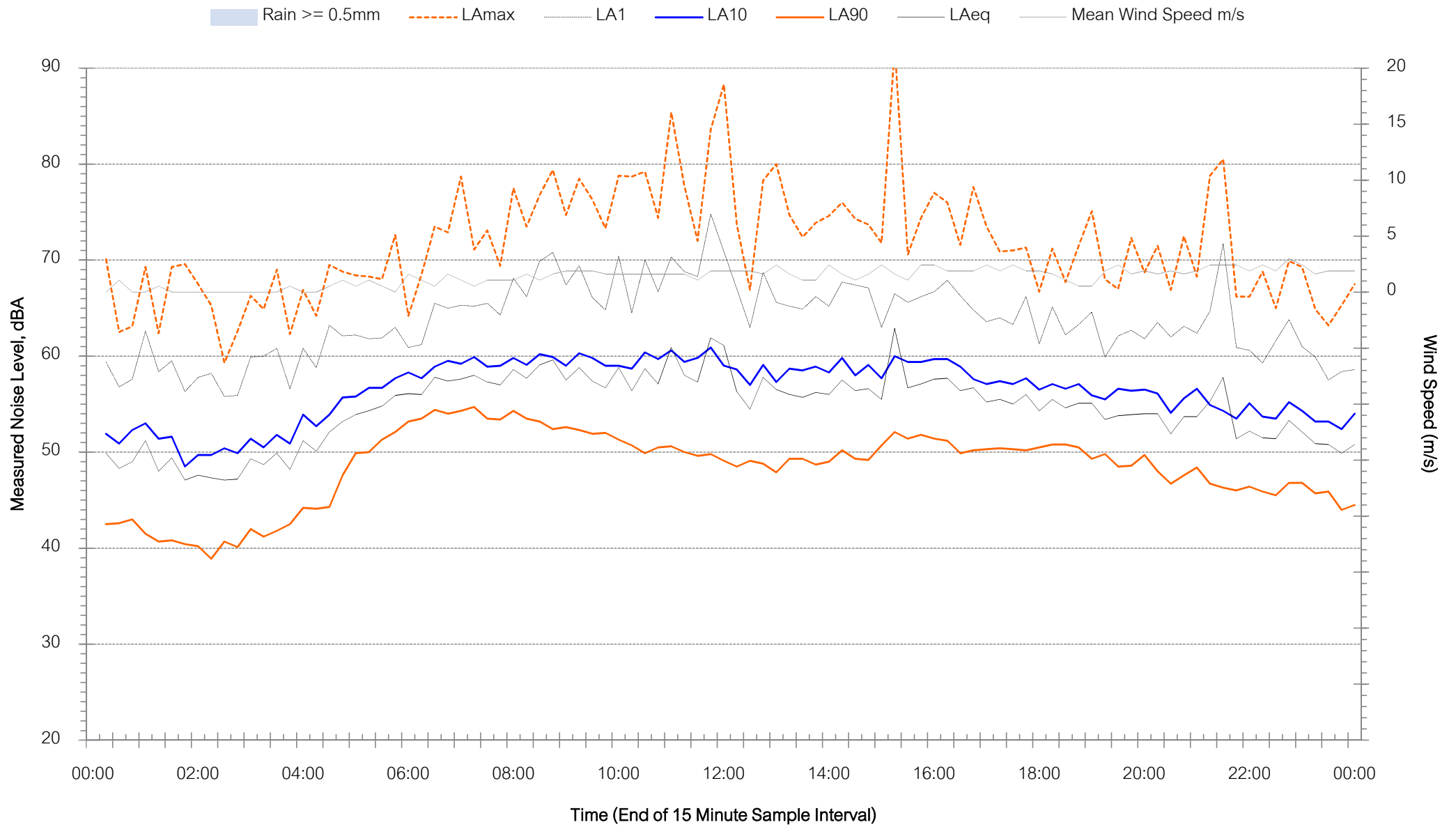
Background Noise Levels

Location N1 - Tuesday 9 July 2019



Background Noise Levels

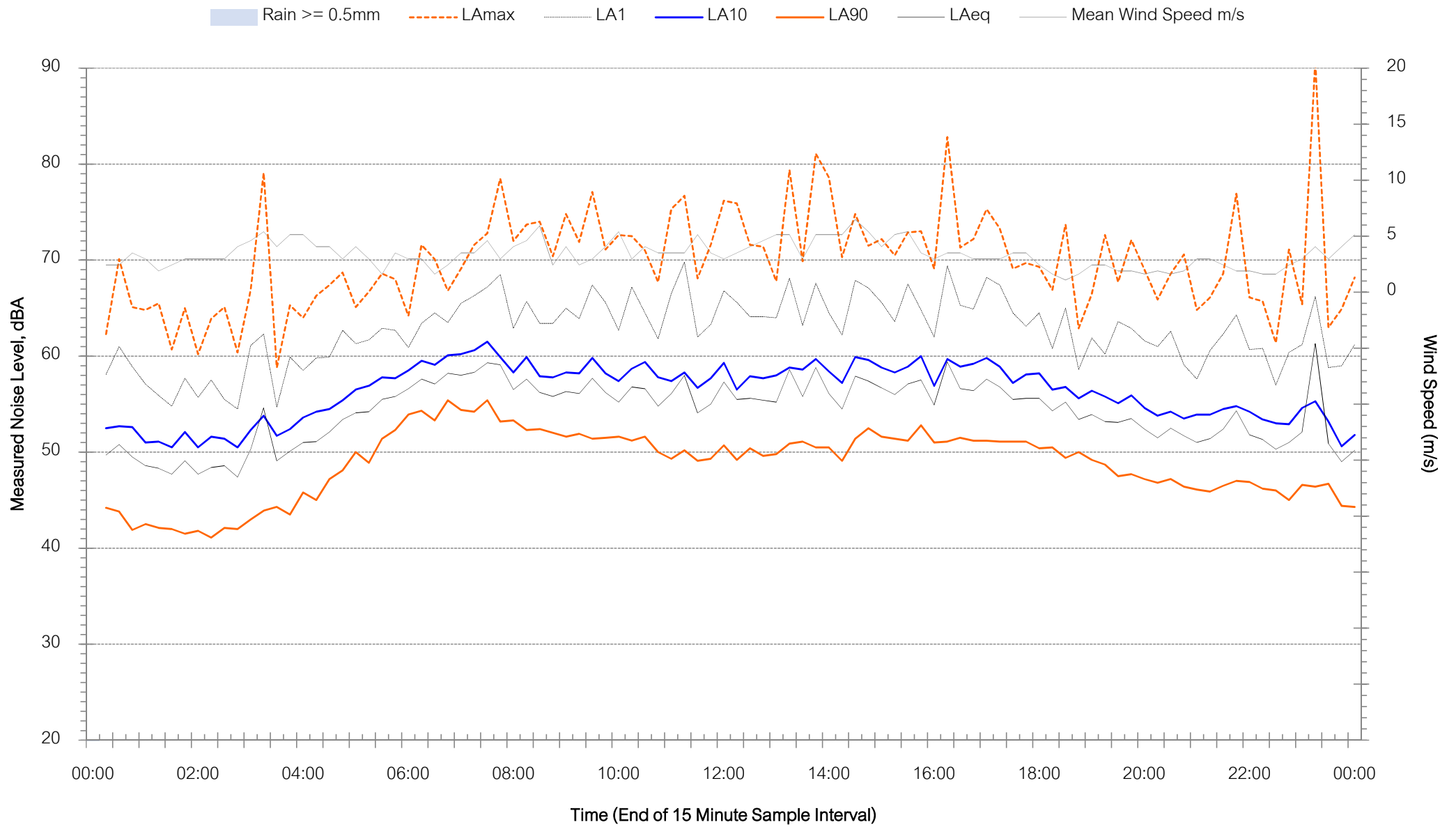
Location N1 - Wednesday 10 July 2019





Background Noise Levels

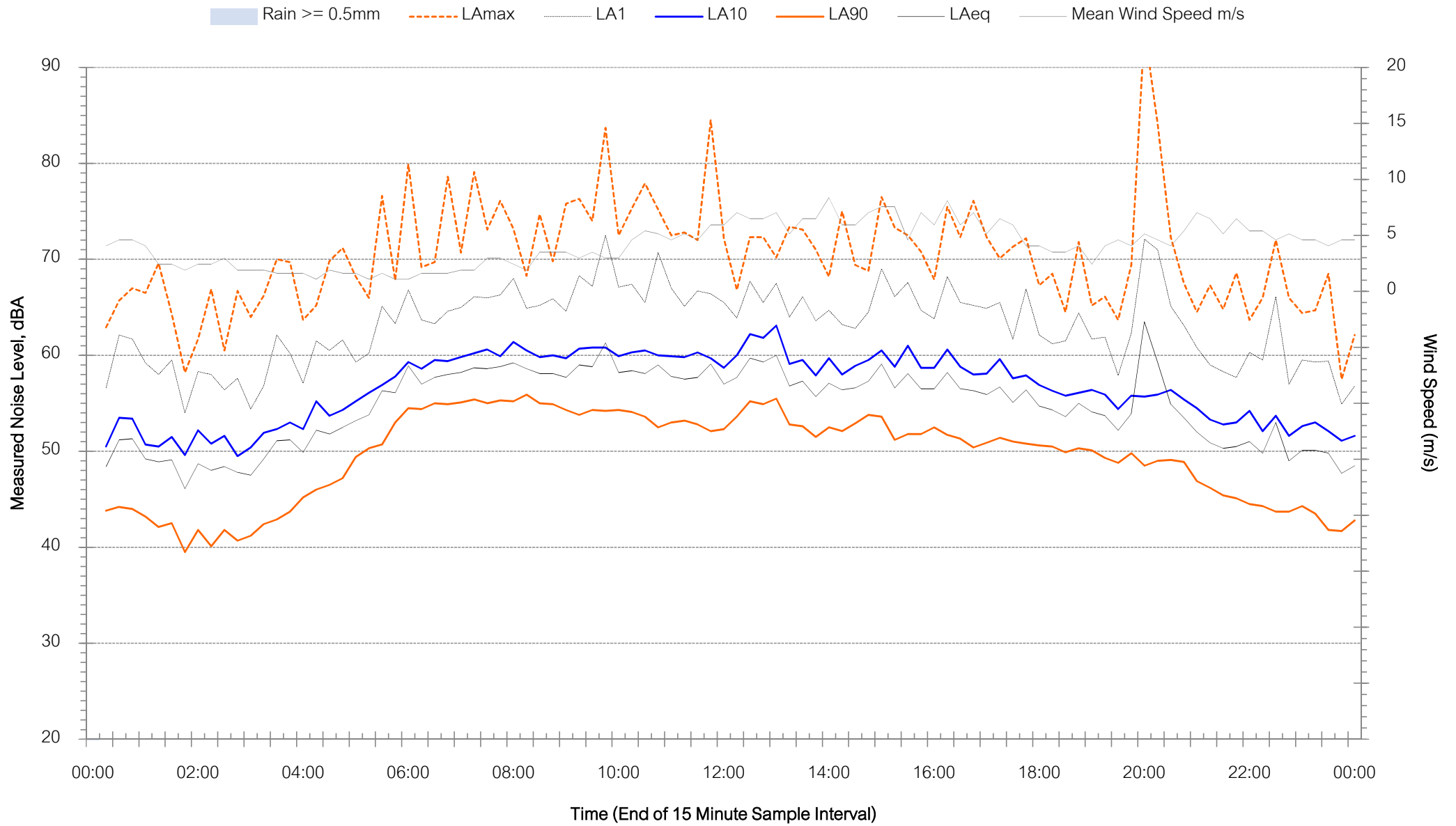
Location N1 - Thursday 11 July 2019





Background Noise Levels

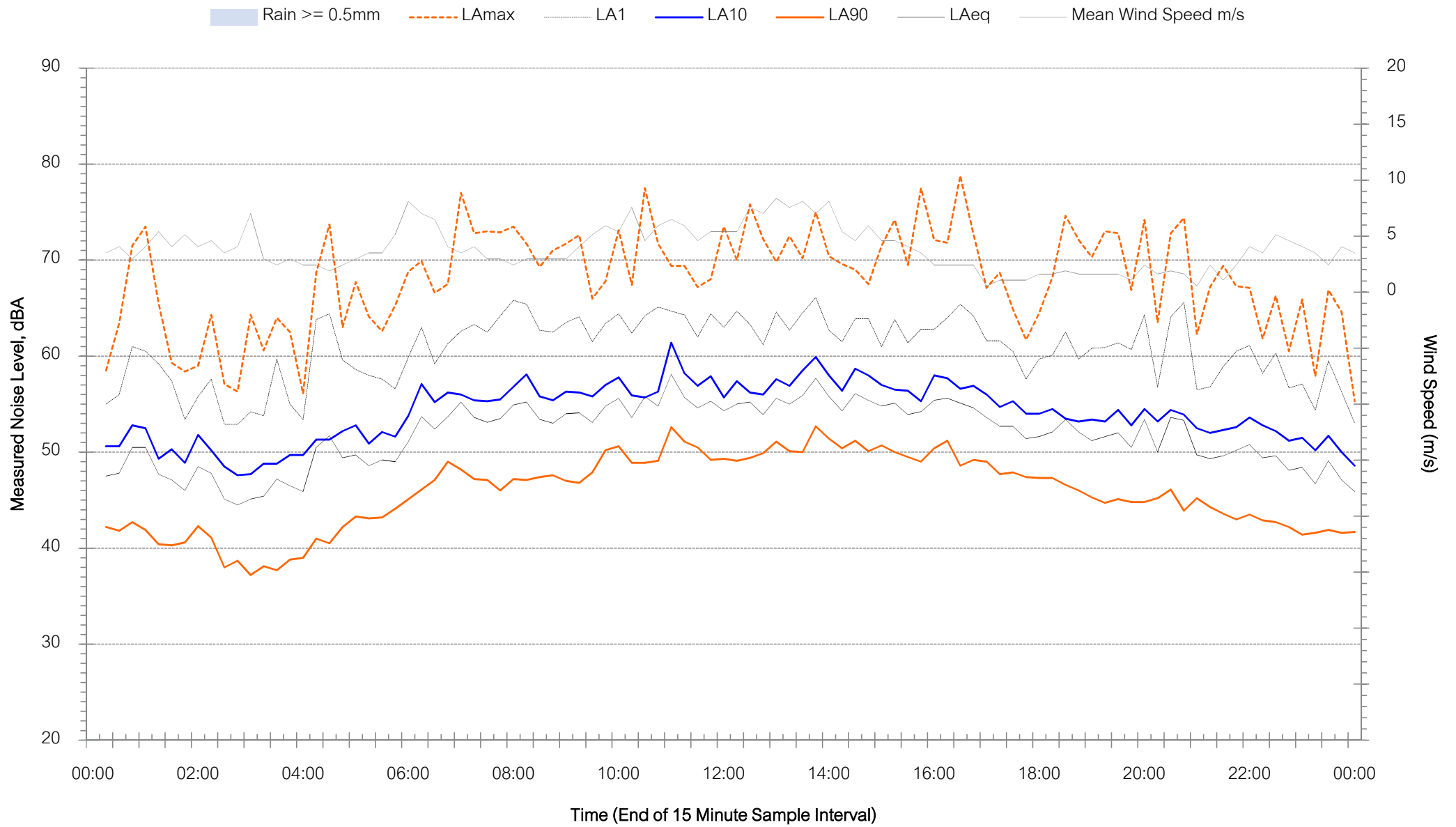
Location N1 - Friday 12 July 2019





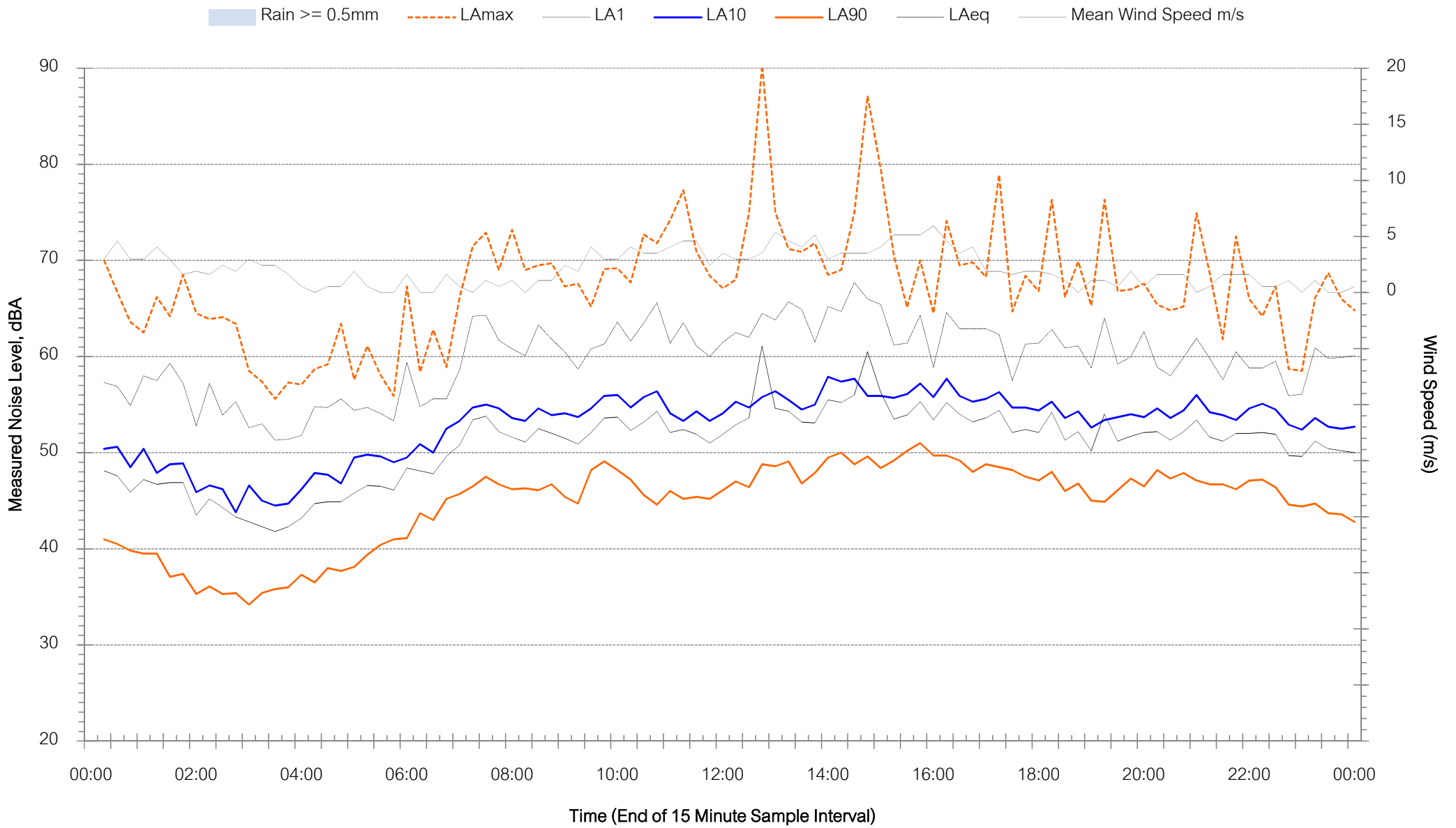
Background Noise Levels

Location N1 - Saturday 13 July 2019



Background Noise Levels

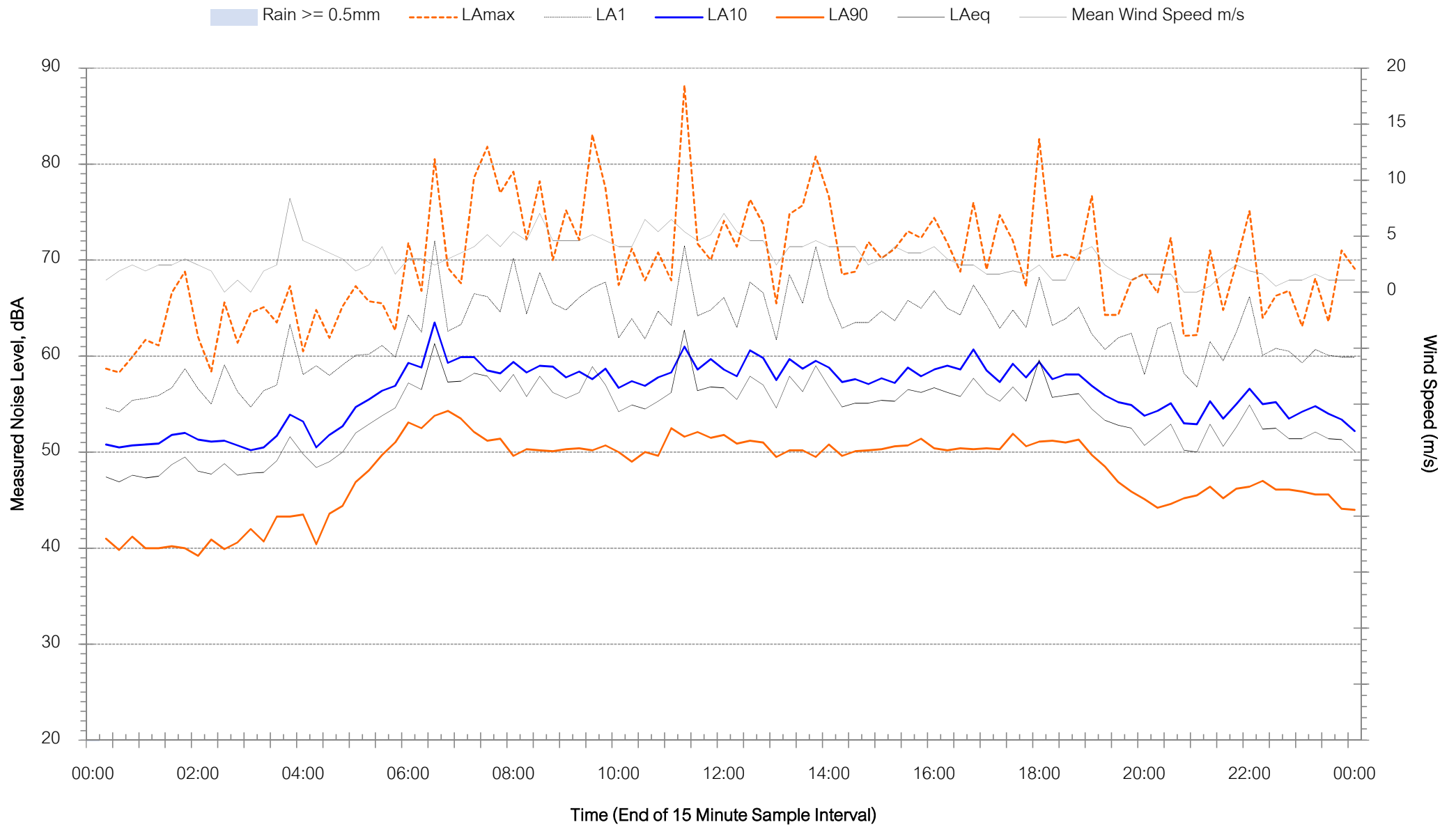
Location N1 - Sunday 14 July 2019





Background Noise Levels

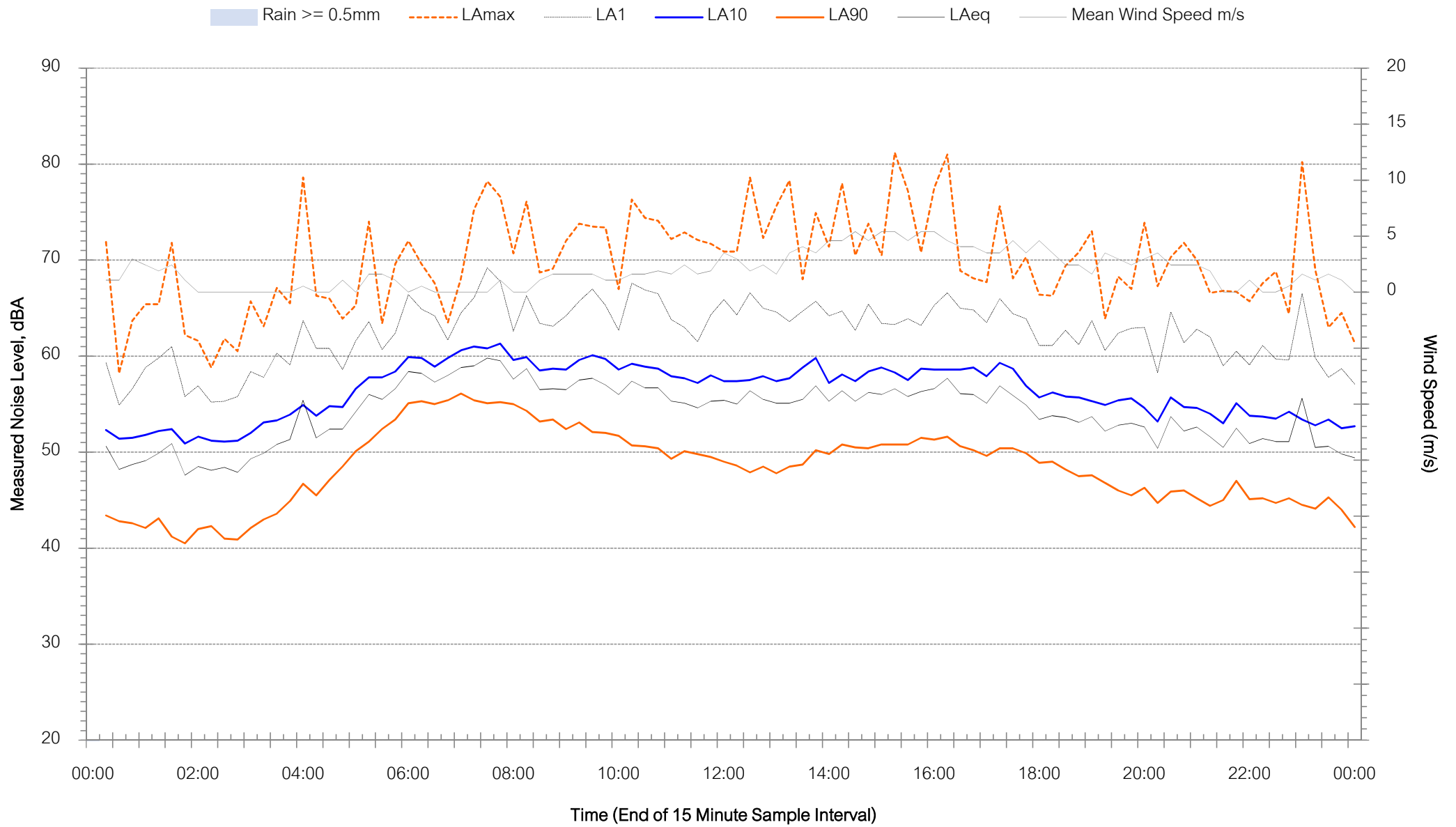
Location N1 - Monday 15 July 2019





Background Noise Levels

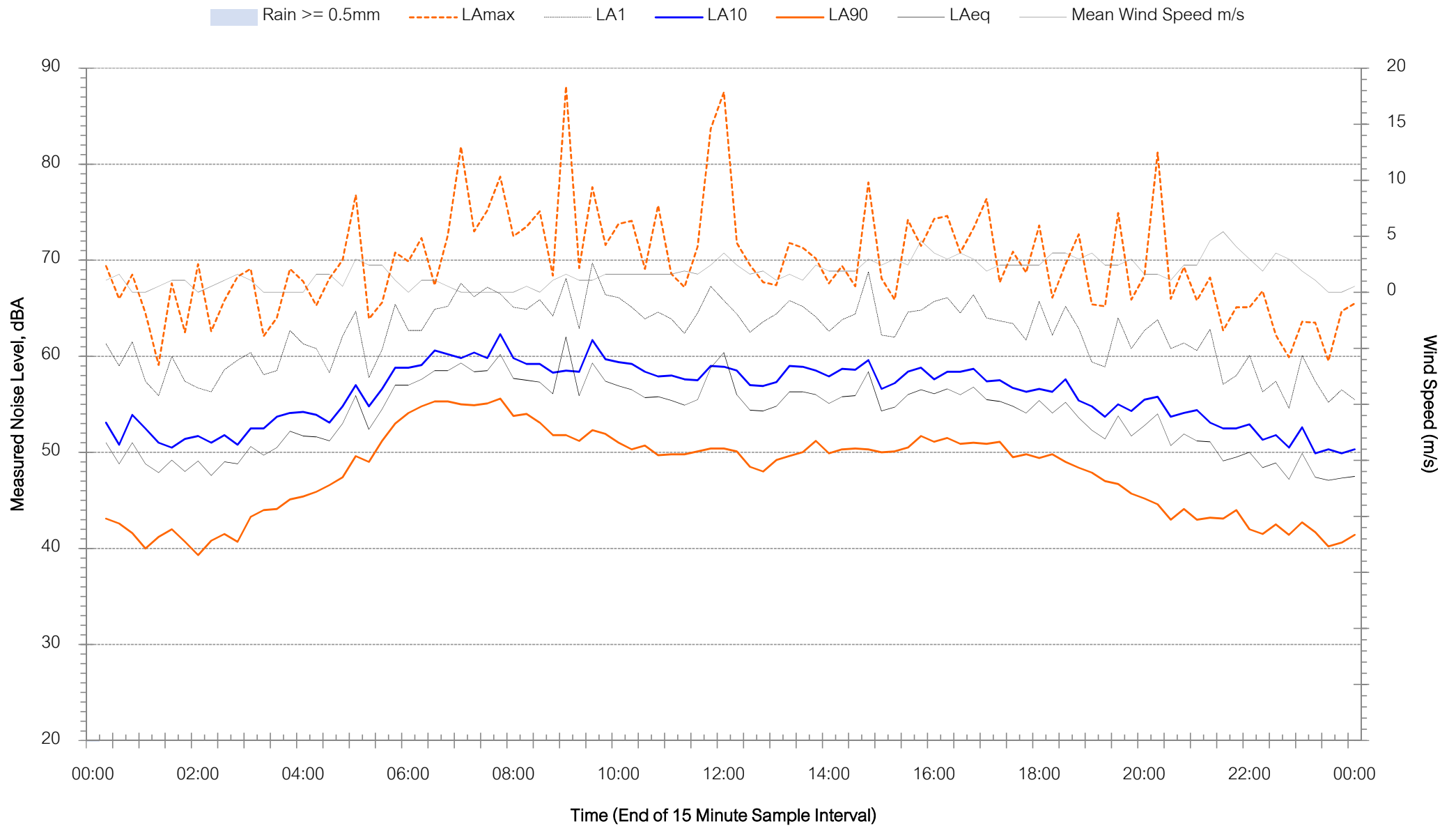
Location N1 - Tuesday 16 July 2019





Background Noise Levels

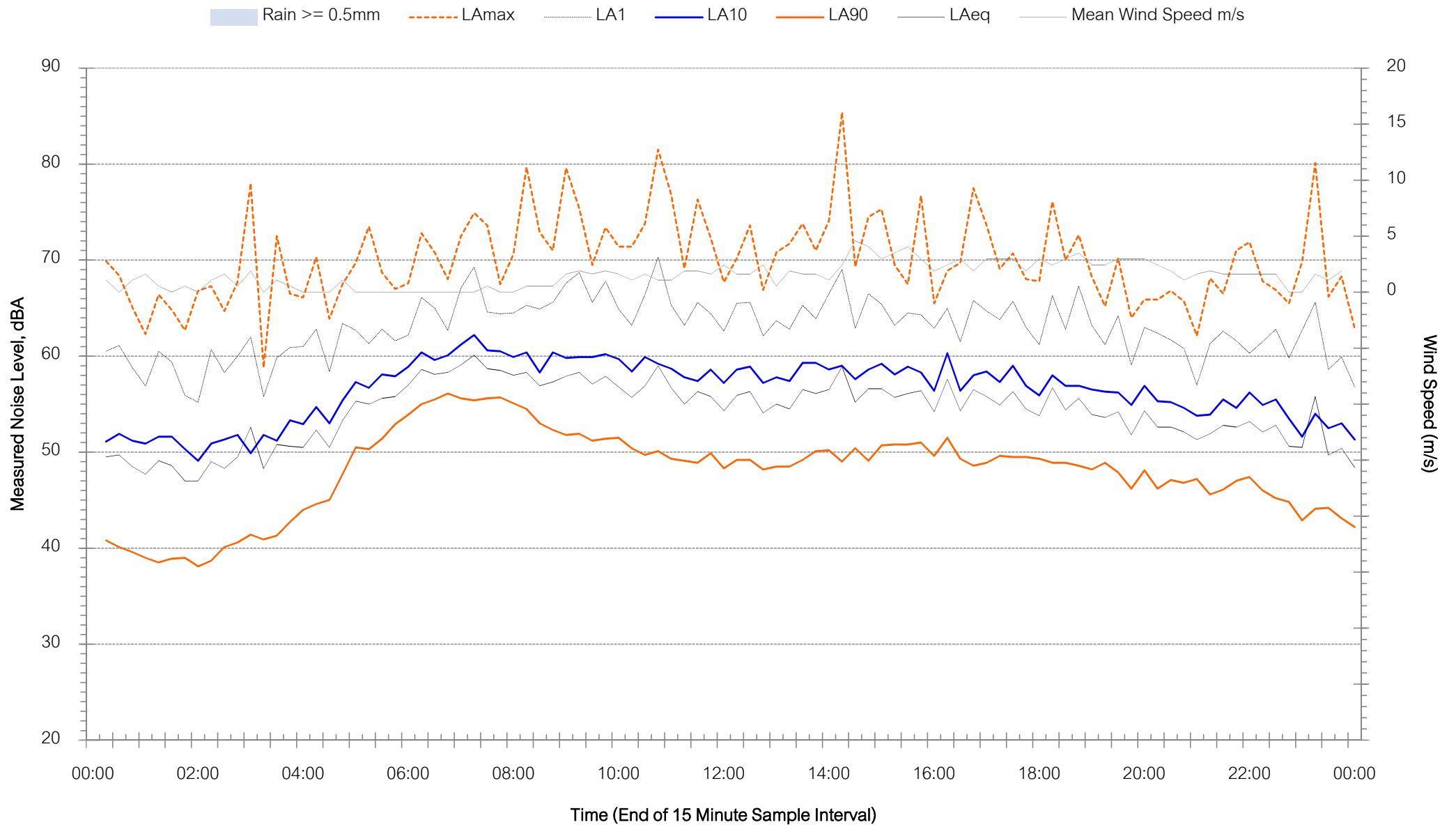
Location N1 - Wednesday 17 July 2019





Background Noise Levels

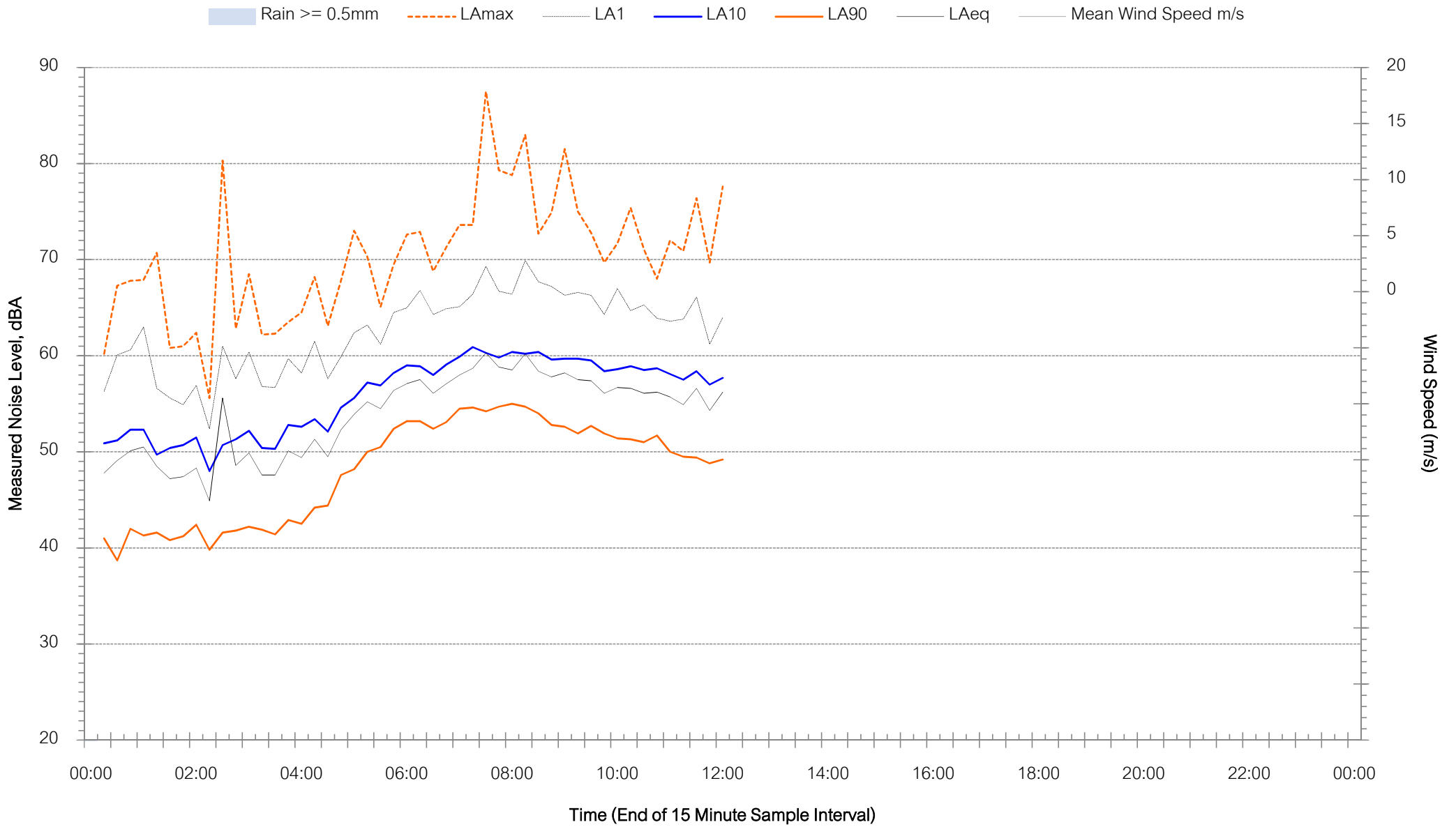
Location N1 - Thursday 18 July 2019





Background Noise Levels

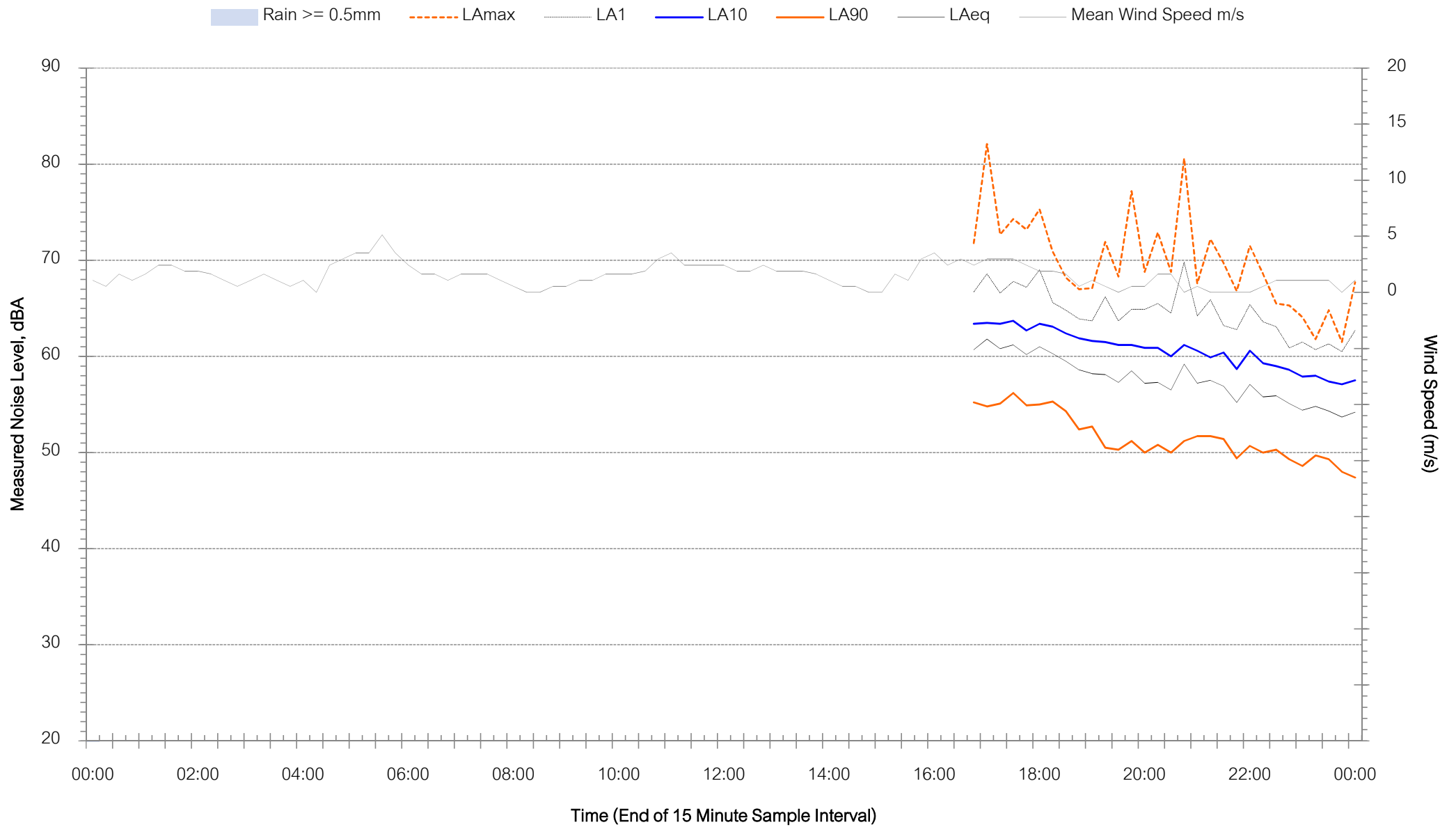
Location N1 - Friday 19 July 2019





Background Noise Levels

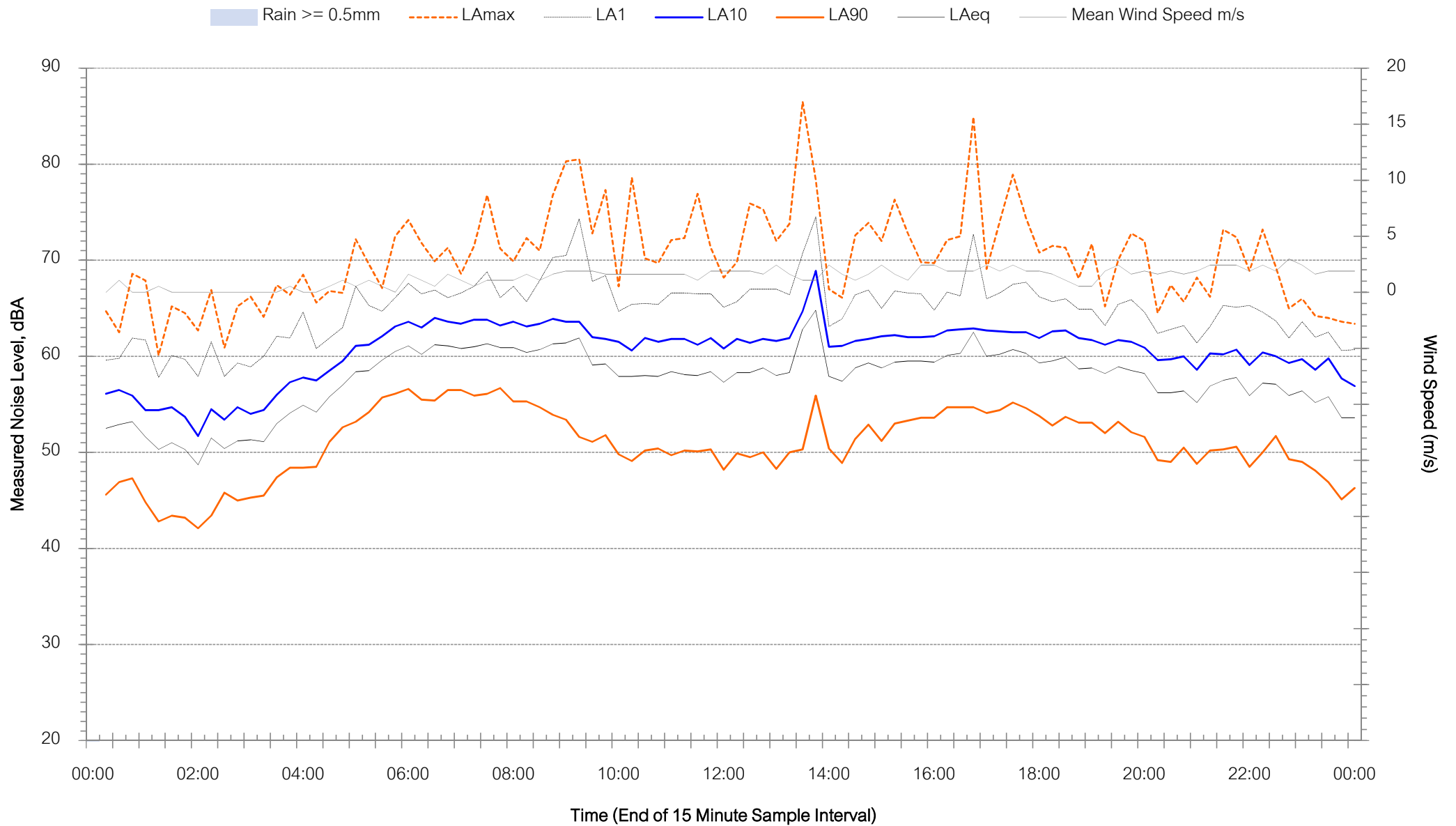
Location N2 - Tuesday 9 July 2019





Background Noise Levels

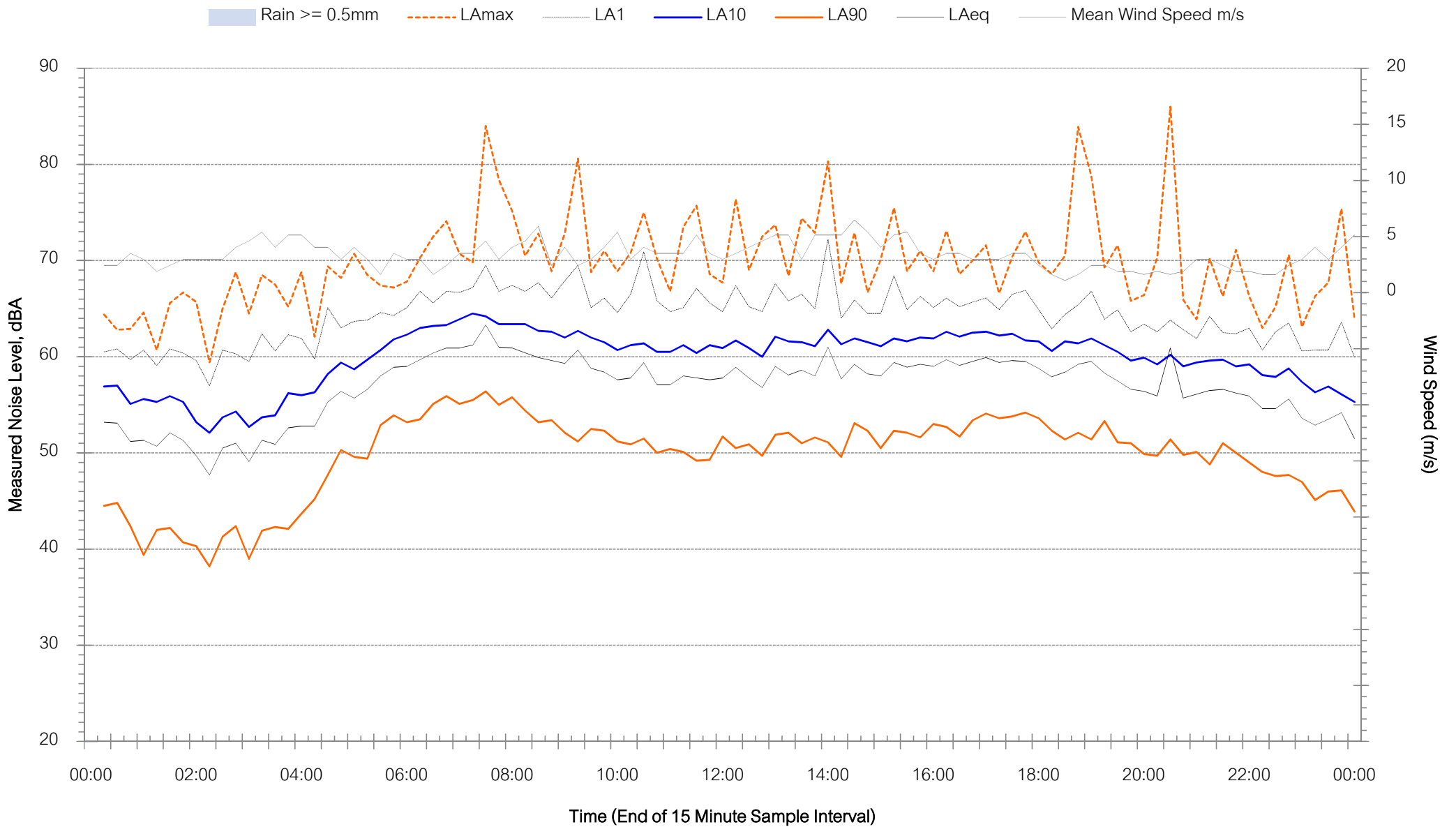
Location N2 - Wednesday 10 July 2019





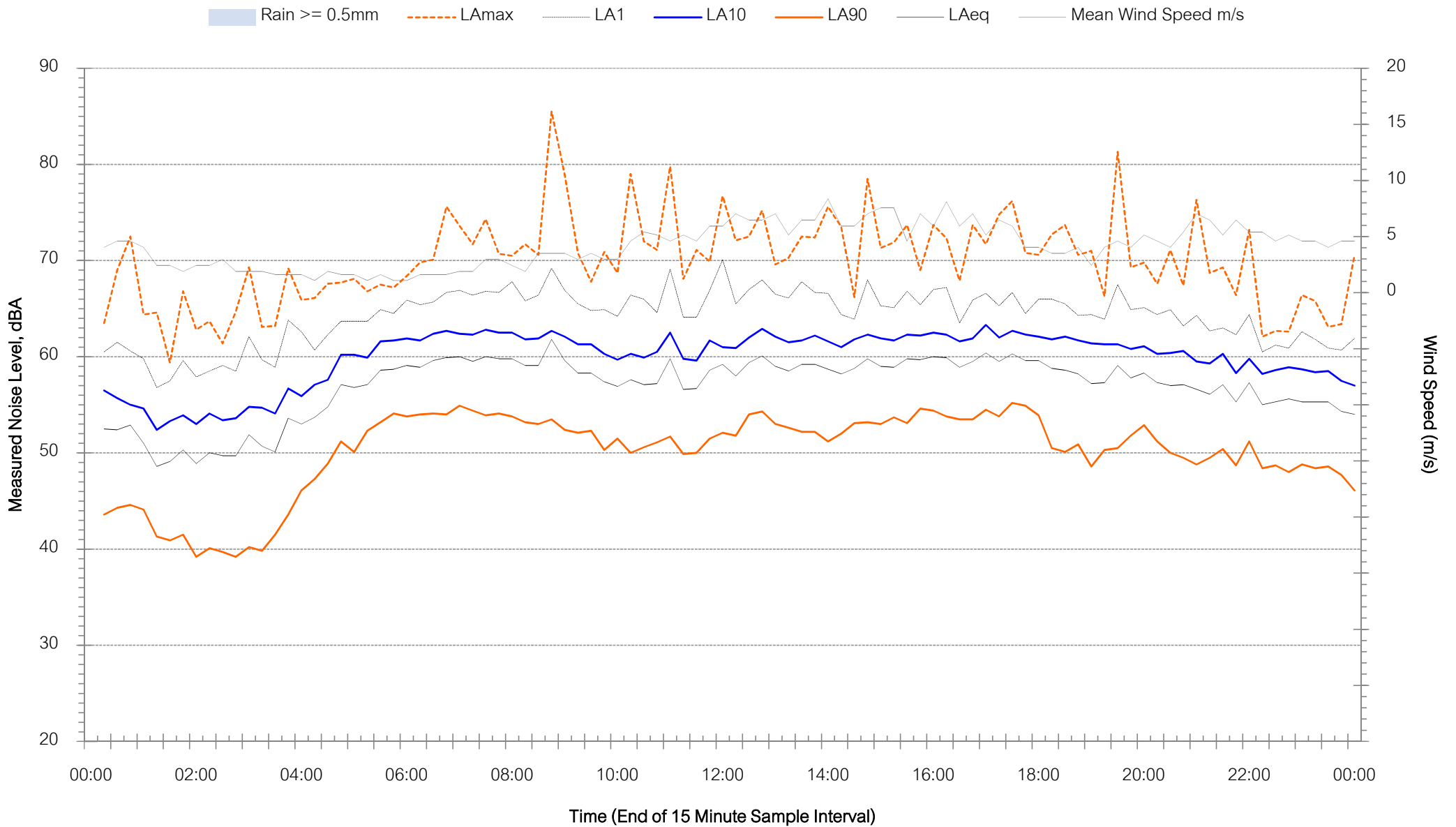
Background Noise Levels

Location N2 - Thursday 11 July 2019



Background Noise Levels

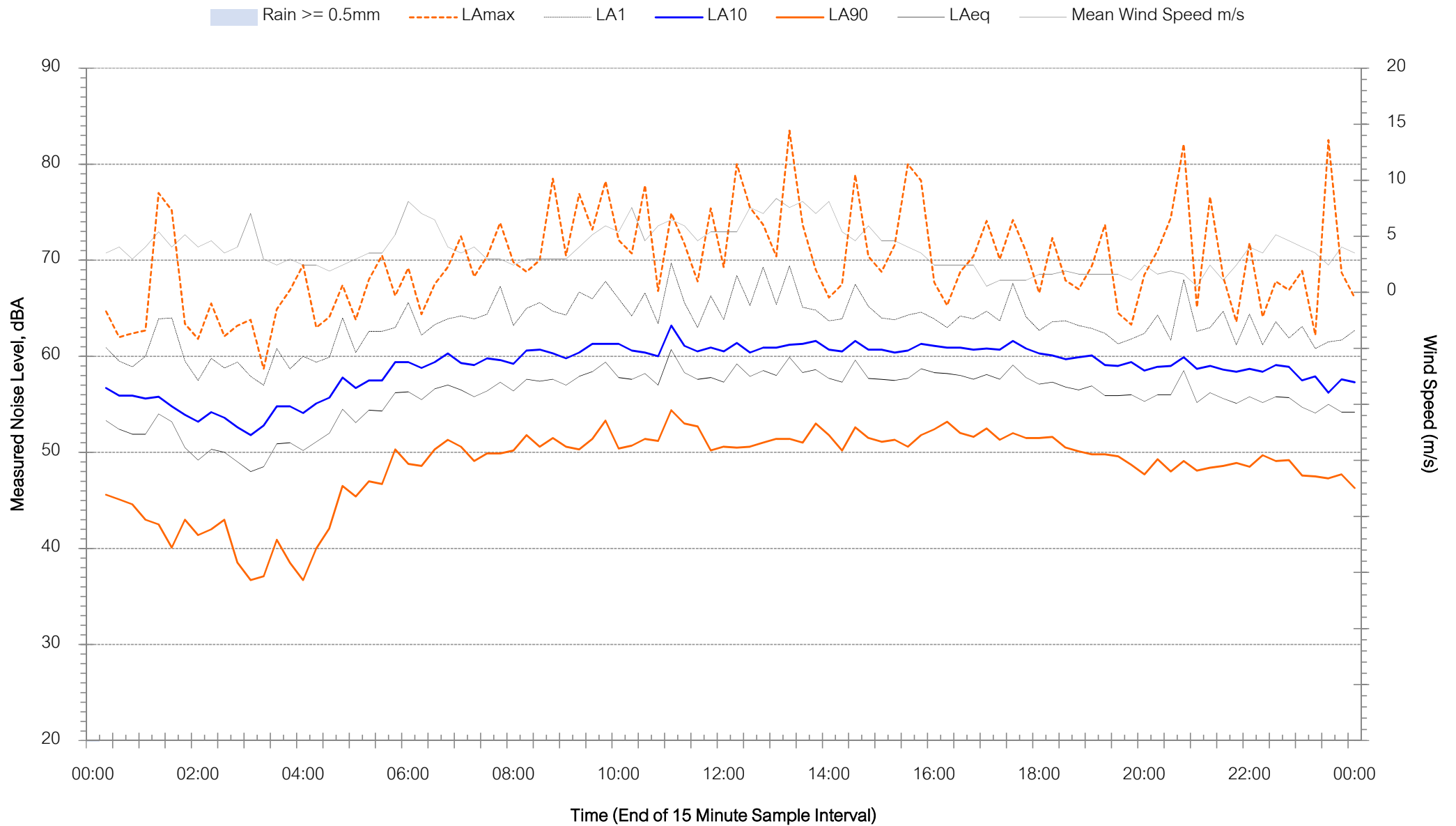
Location N2 - Friday 12 July 2019





Background Noise Levels

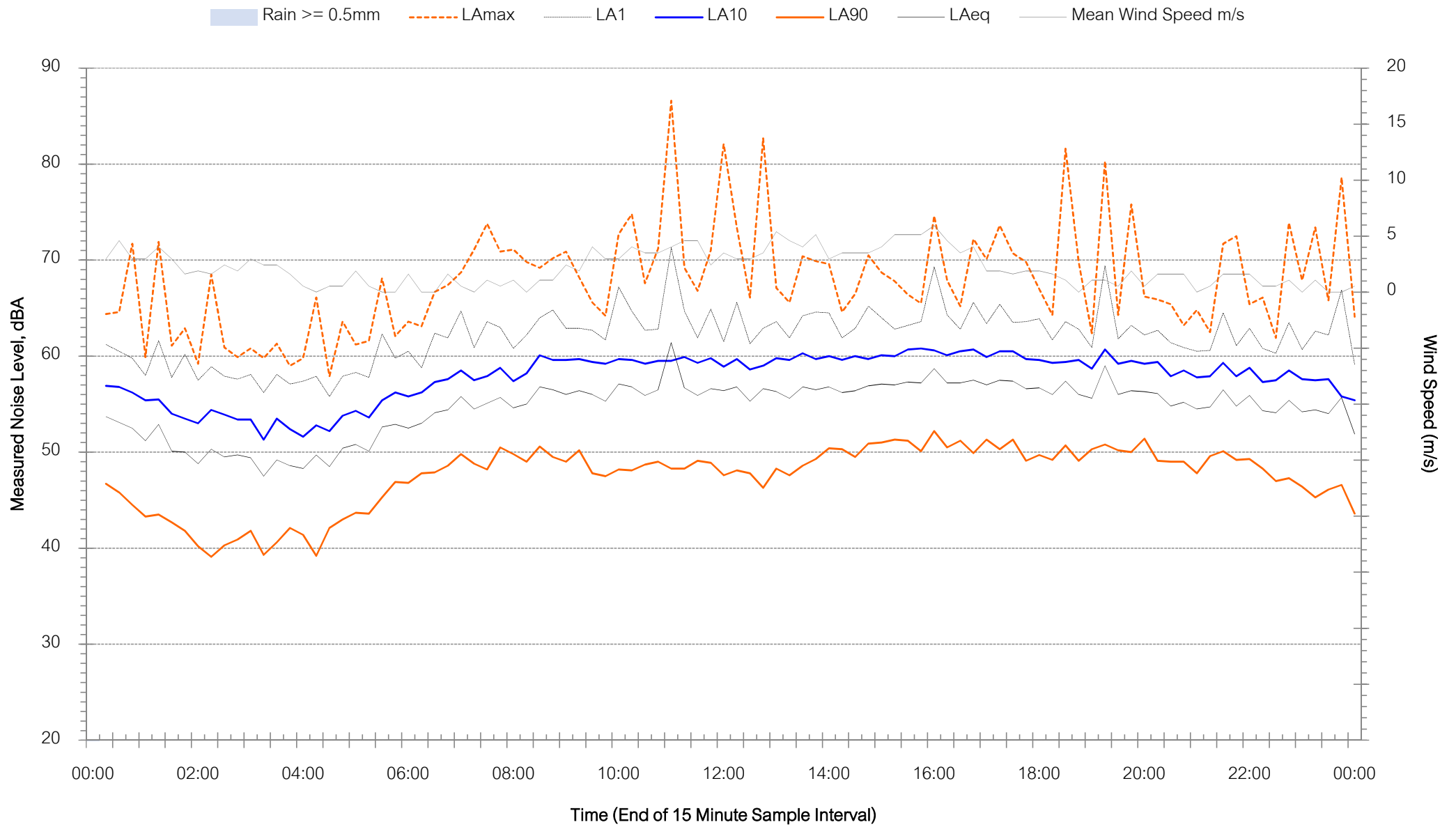
Location N2 - Saturday 13 July 2019





Background Noise Levels

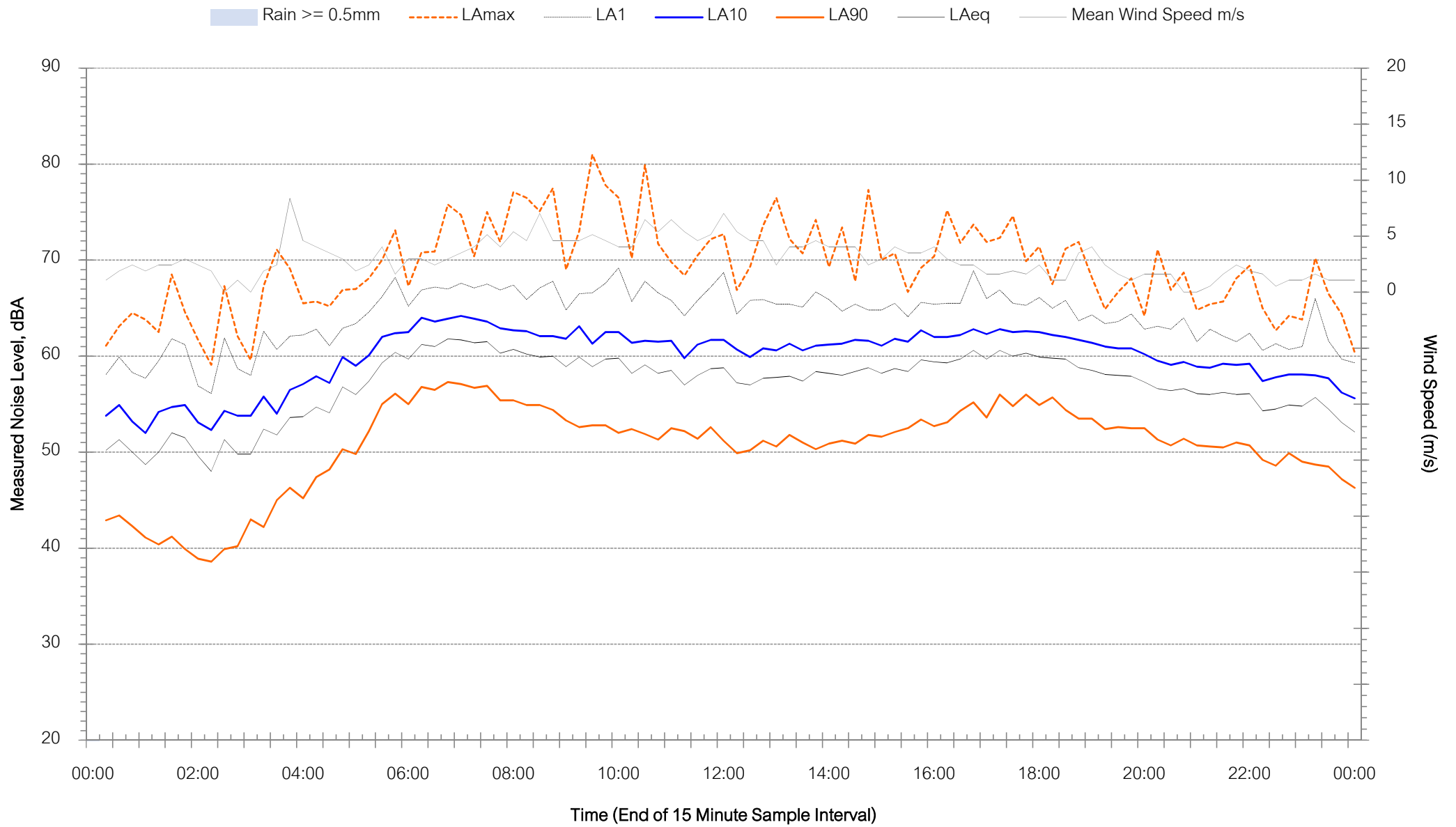
Location N2 - Sunday 14 July 2019





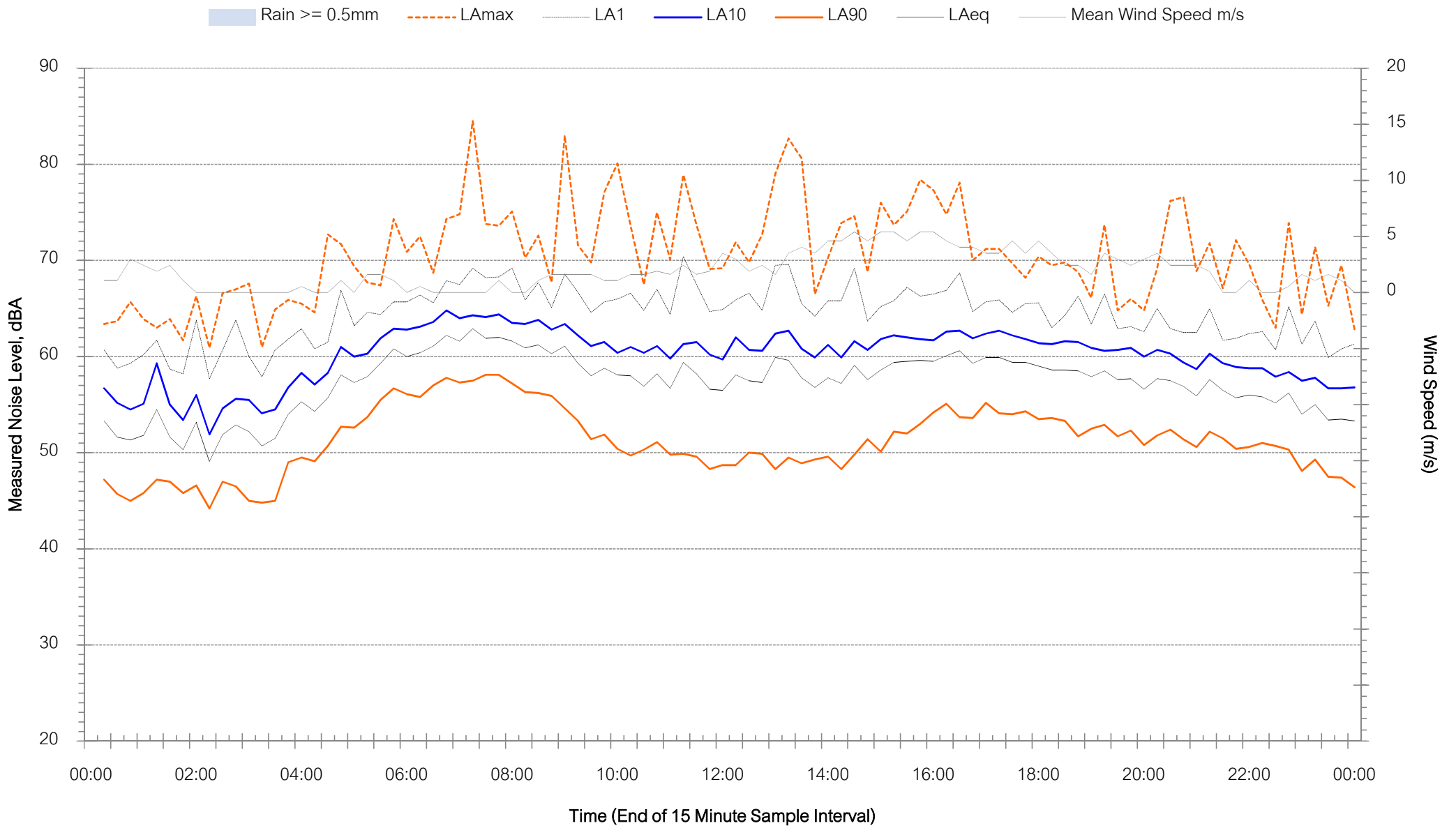
Background Noise Levels

Location N2 - Monday 15 July 2019



Background Noise Levels

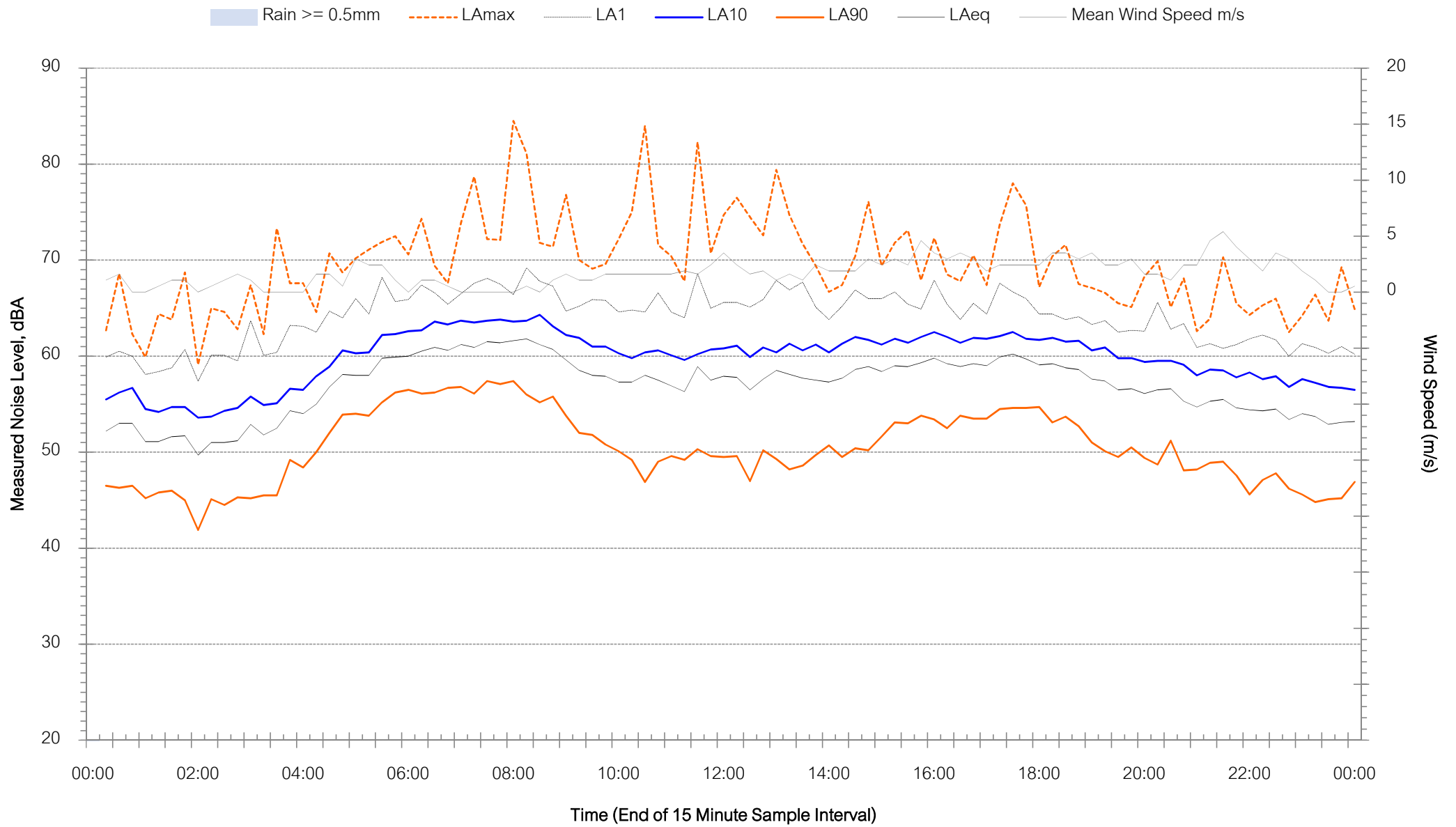
Location N2 - Tuesday 16 July 2019





Background Noise Levels

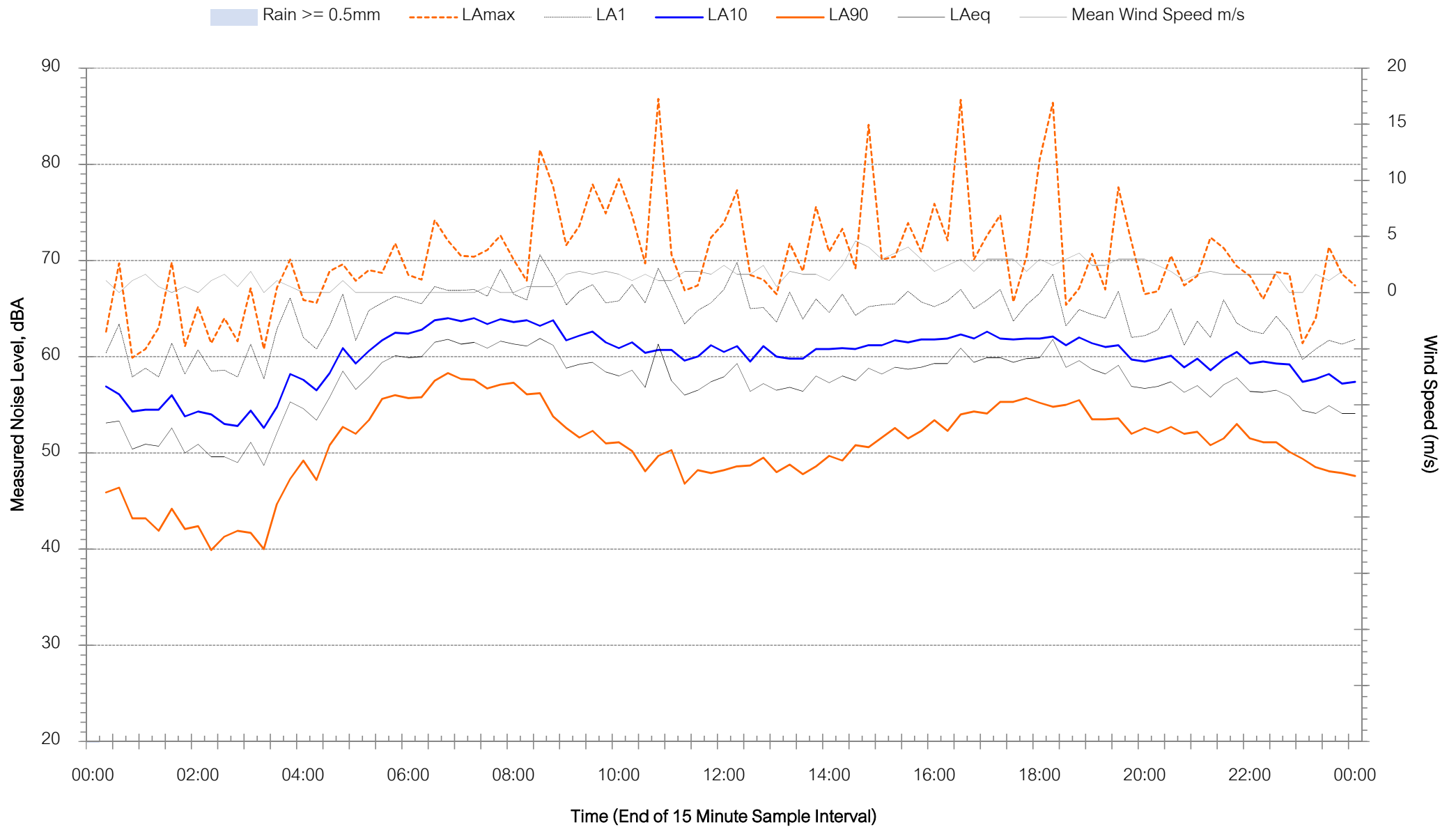
Location N2 - Wednesday 17 July 2019





Background Noise Levels

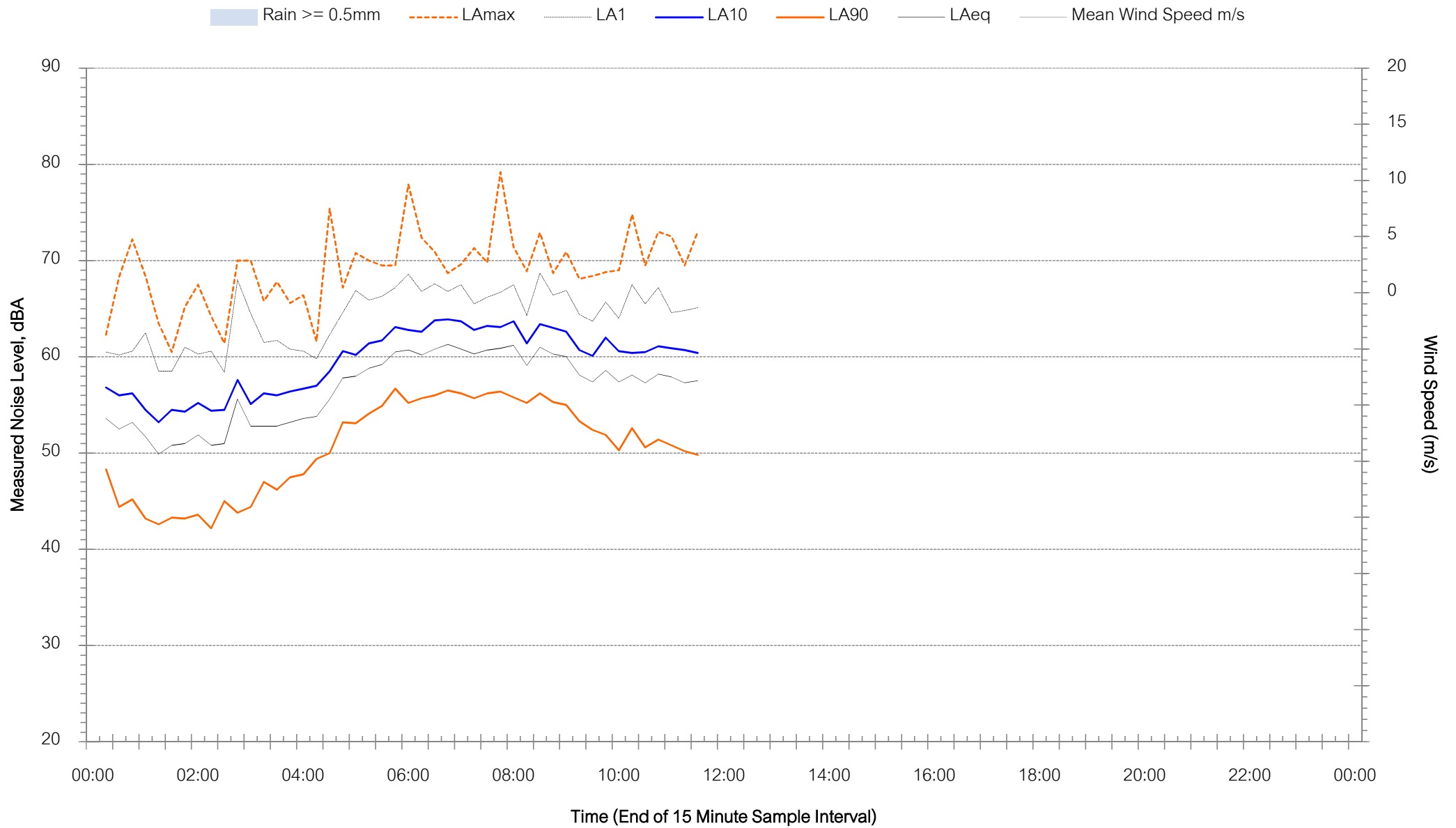
Location N2 - Thursday 18 July 2019





Background Noise Levels

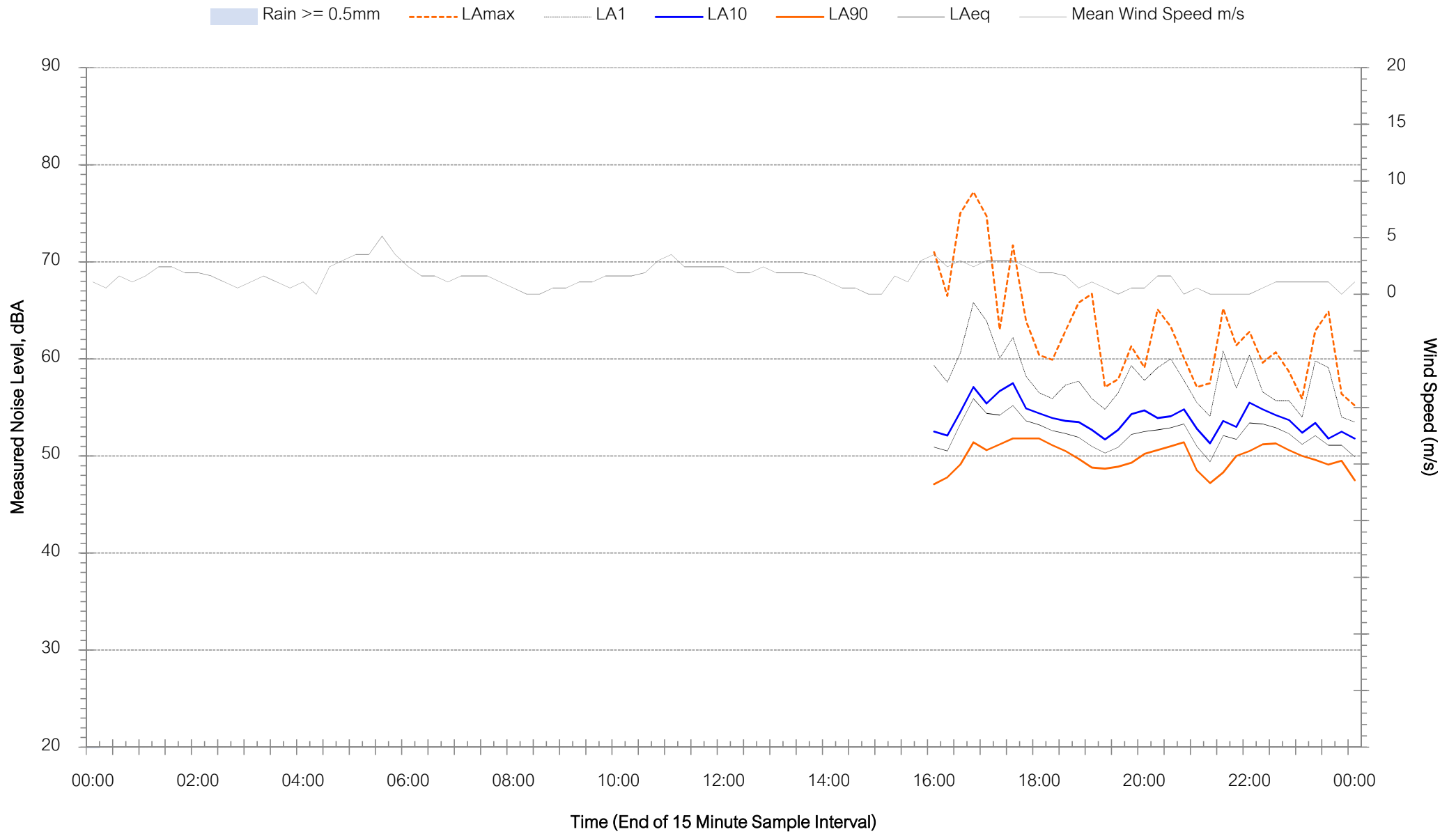
Location N2 - Friday 19 July 2019





Background Noise Levels

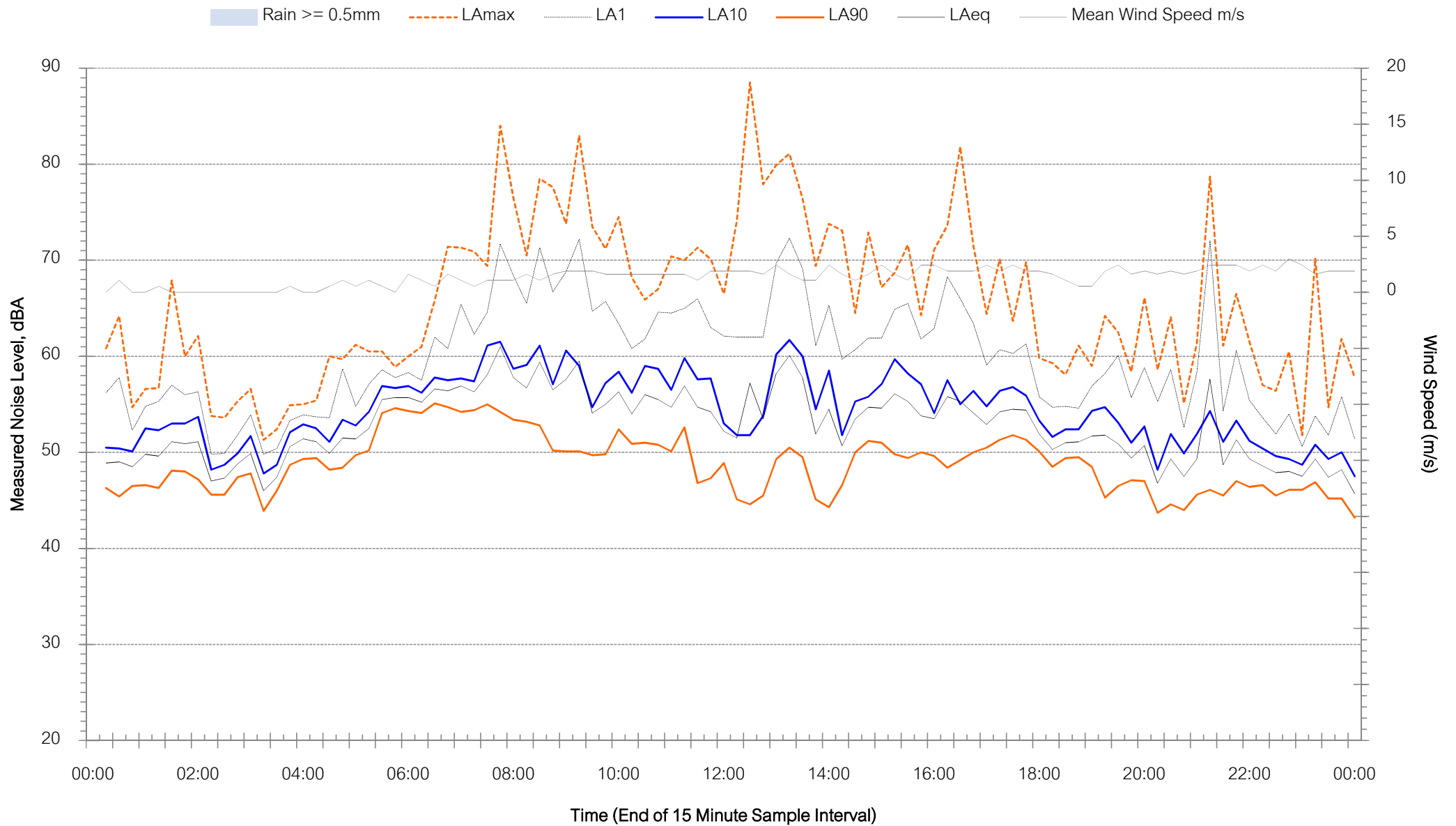
Location - N3 - Tuesday 9 July 2019





Background Noise Levels

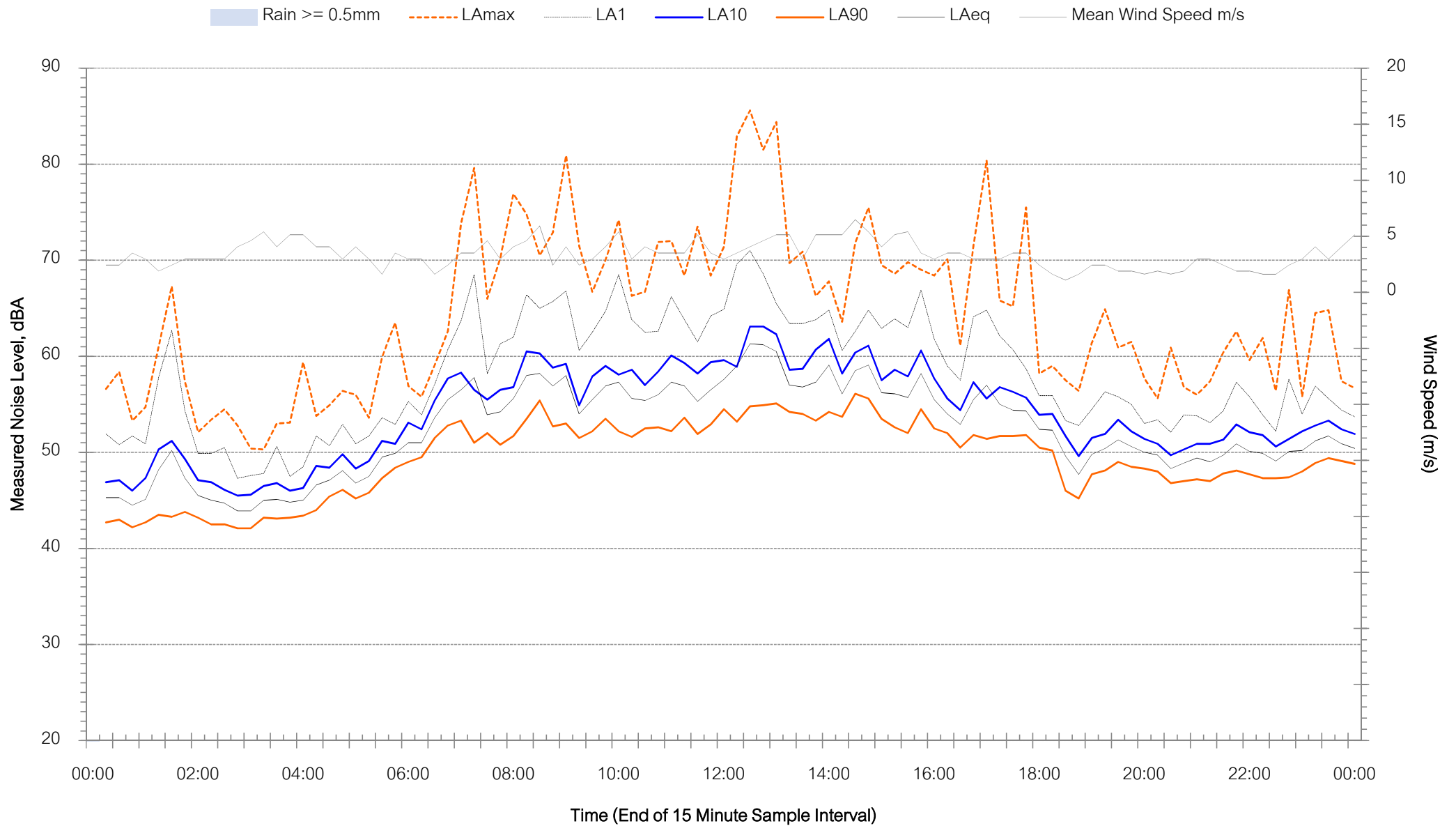
Location - N3 - Wednesday 10 July 2019





Background Noise Levels

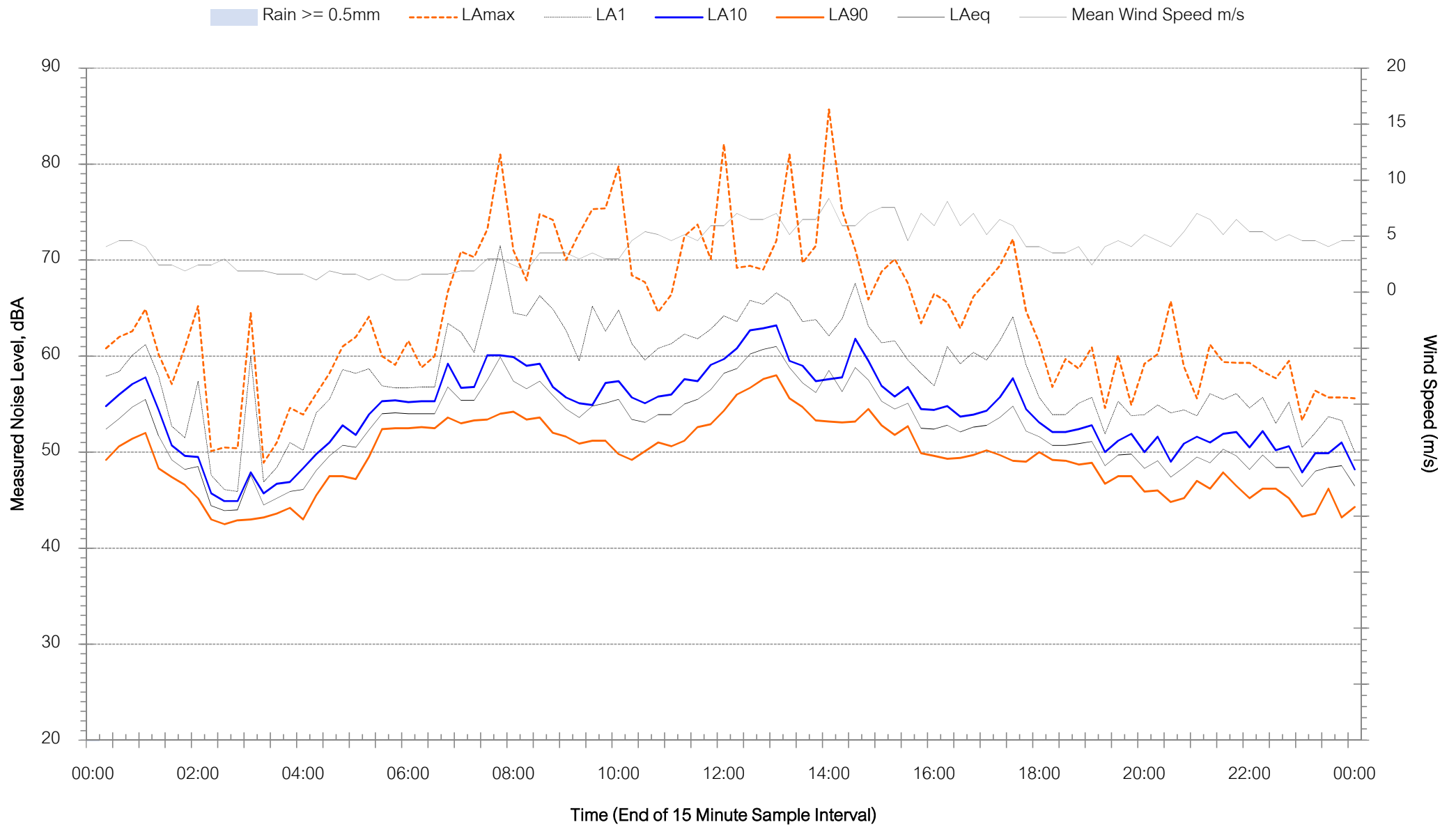
Location - N3 - Thursday 11 July 2019





Background Noise Levels

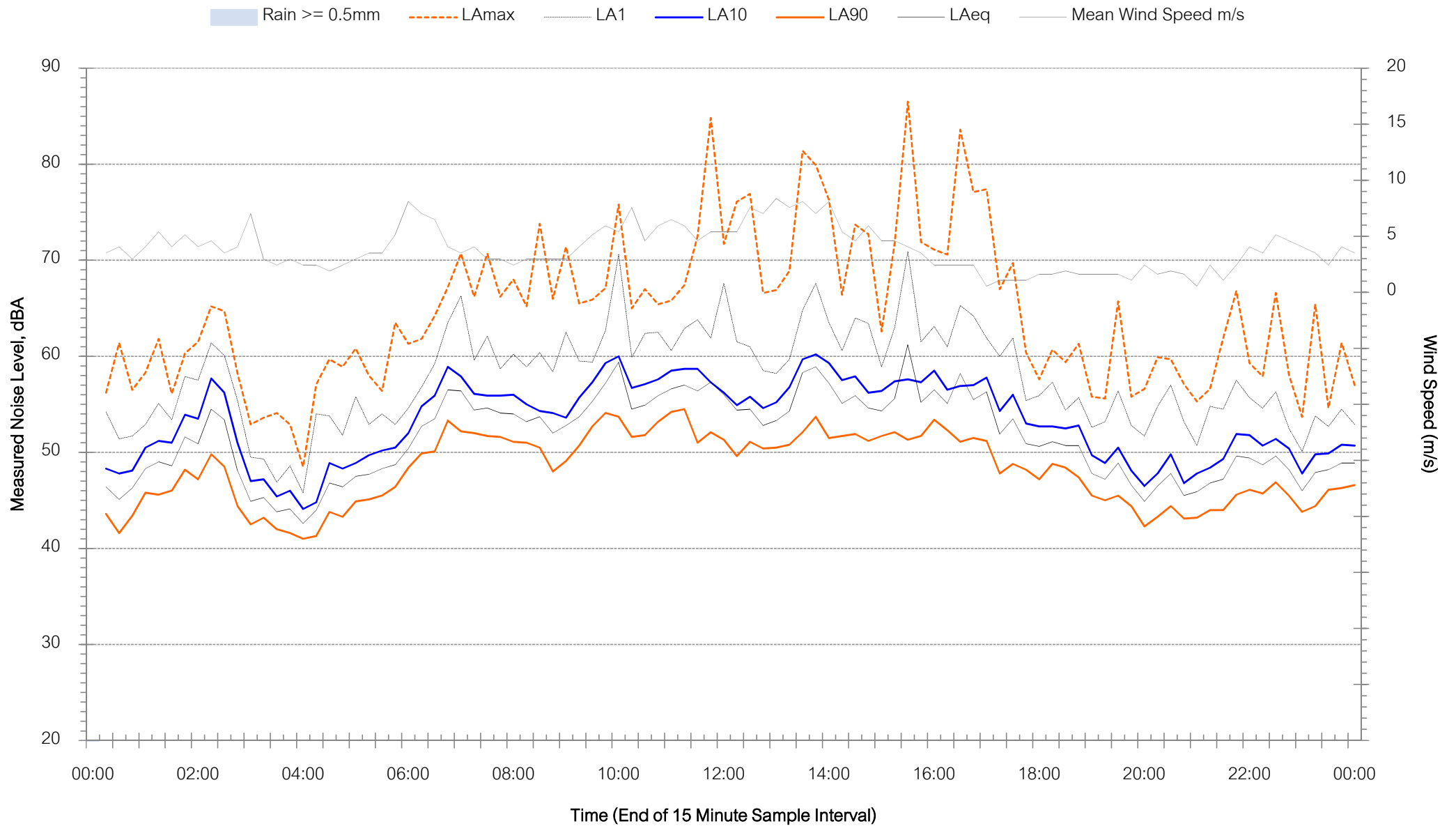
Location - N3 - Friday 12 July 2019





Background Noise Levels

Location - N3 - Saturday 13 July 2019

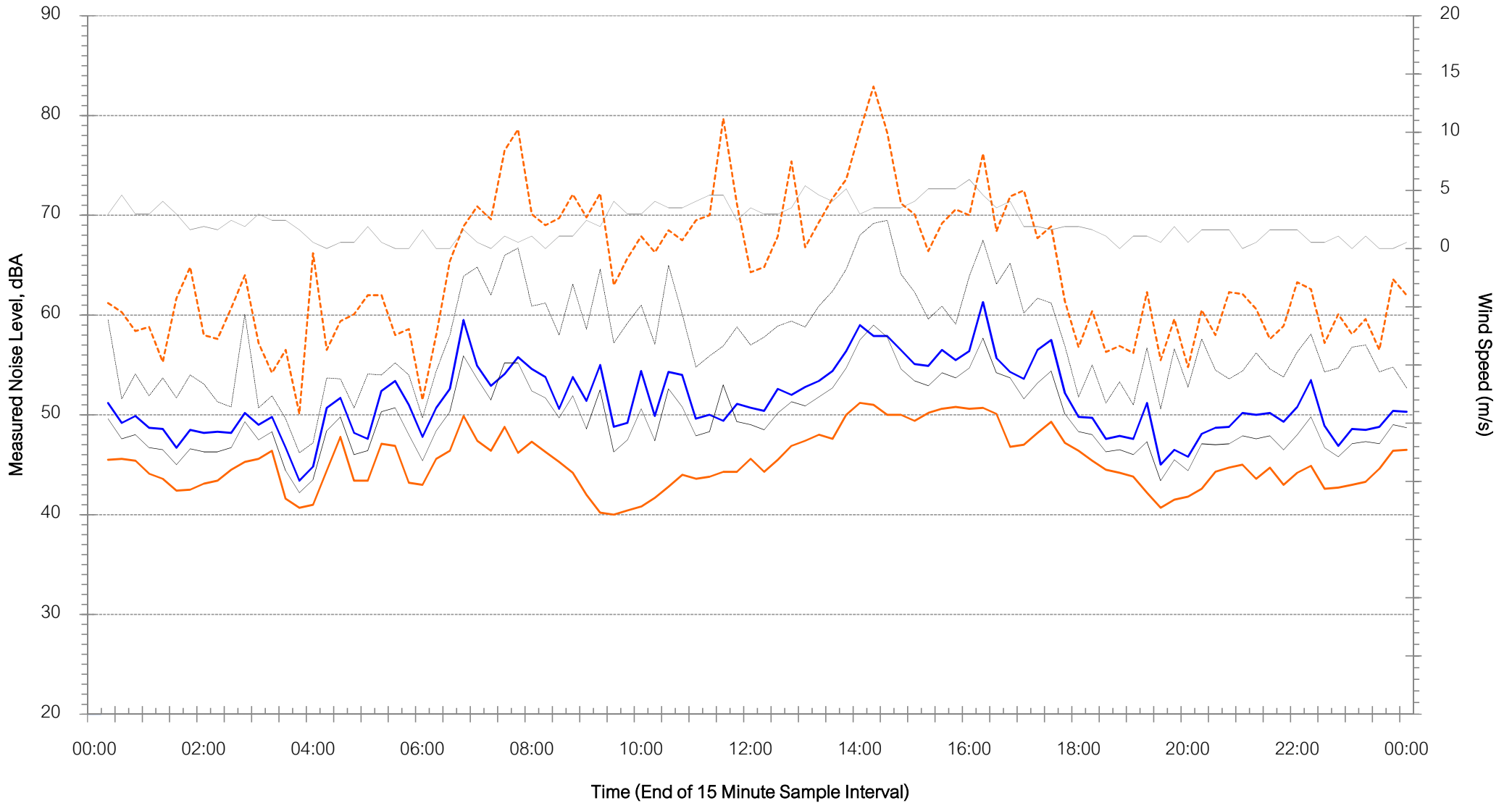




Background Noise Levels

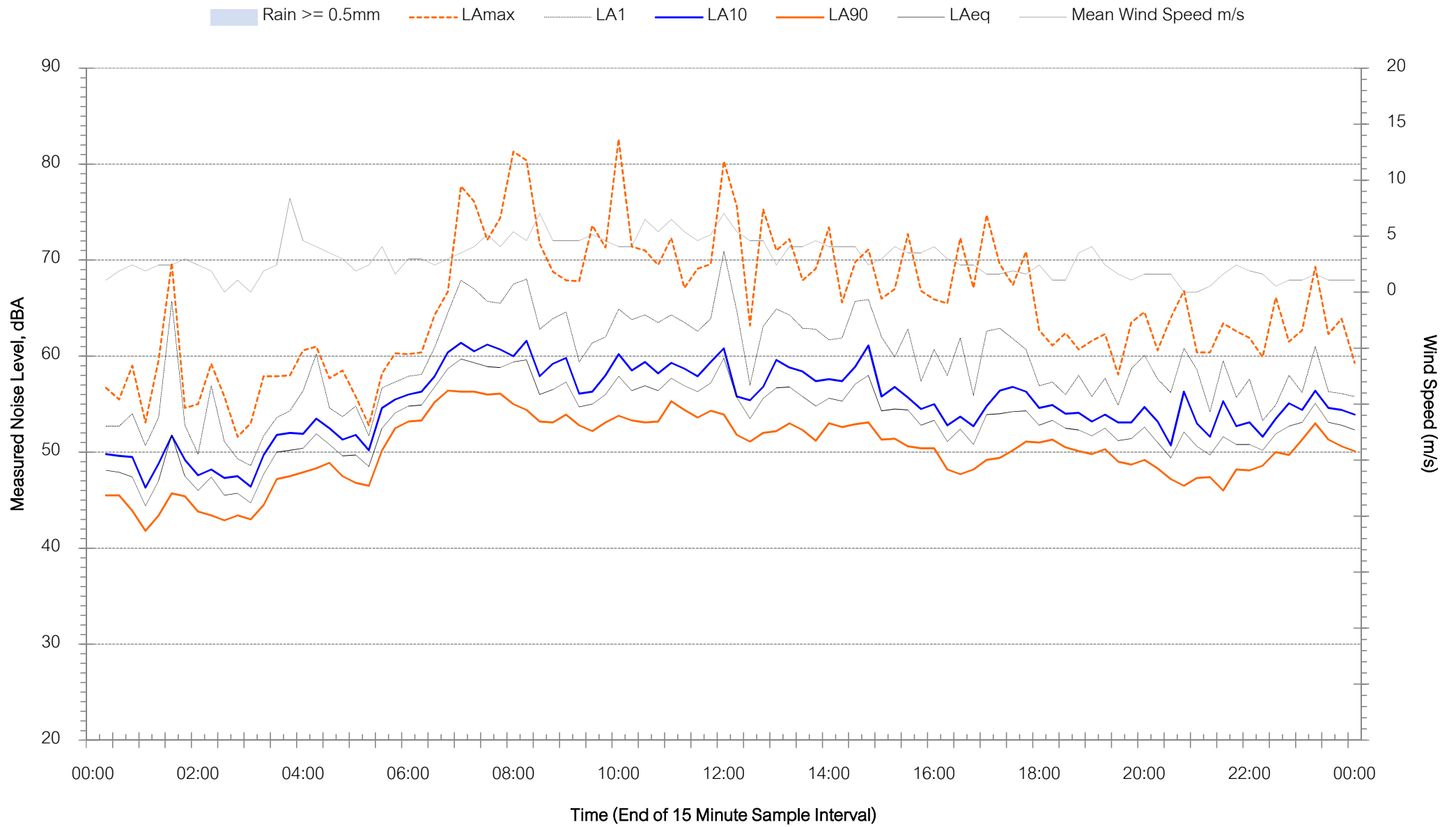
Location - N3 - Sunday 14 July 2019

Rain >= 0.5mm LAmax LA1 LA10 LA90 LAeq Mean Wind Speed m/s



Background Noise Levels

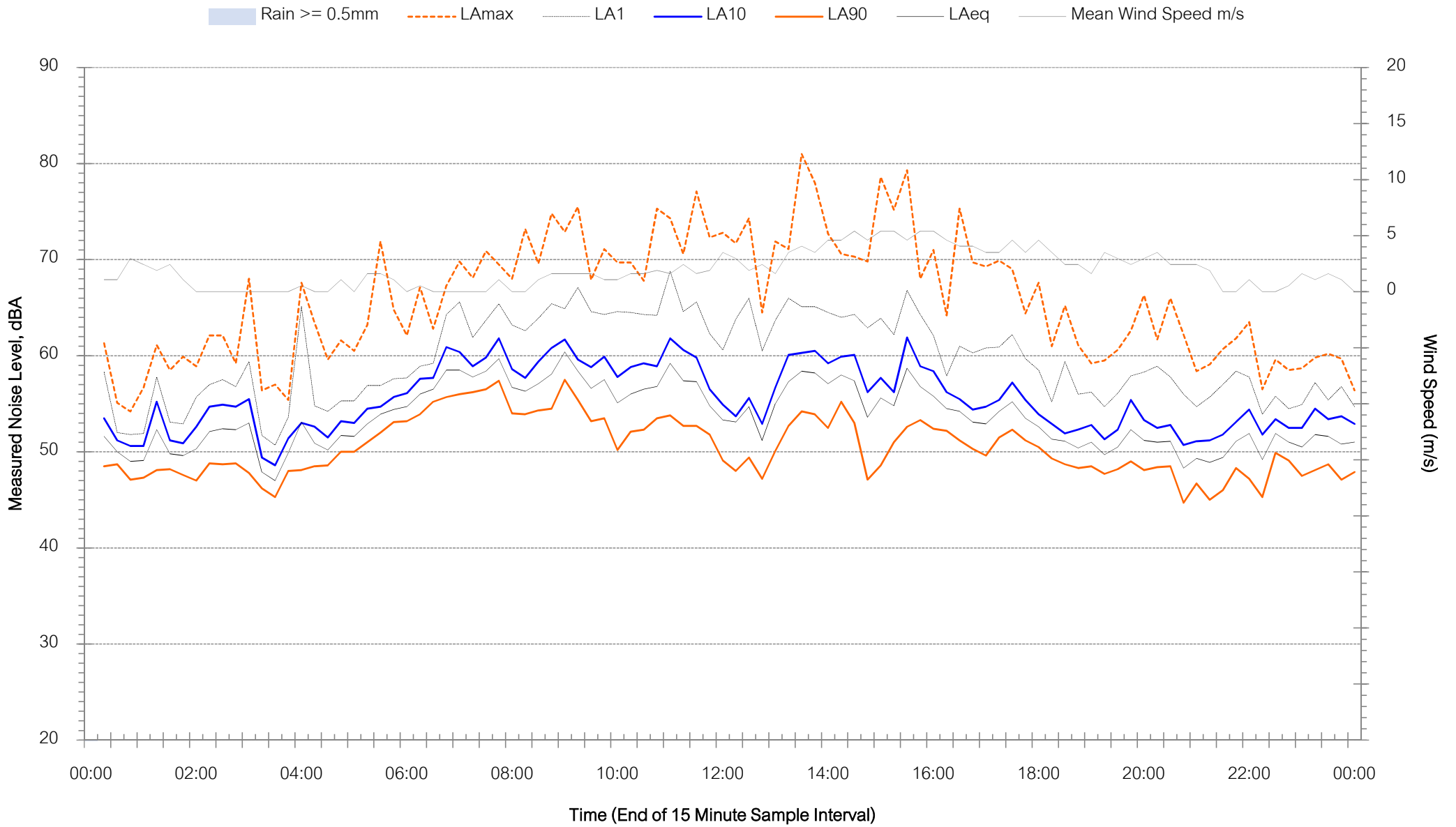
Location - N3 - Monday 15 July 2019





Background Noise Levels

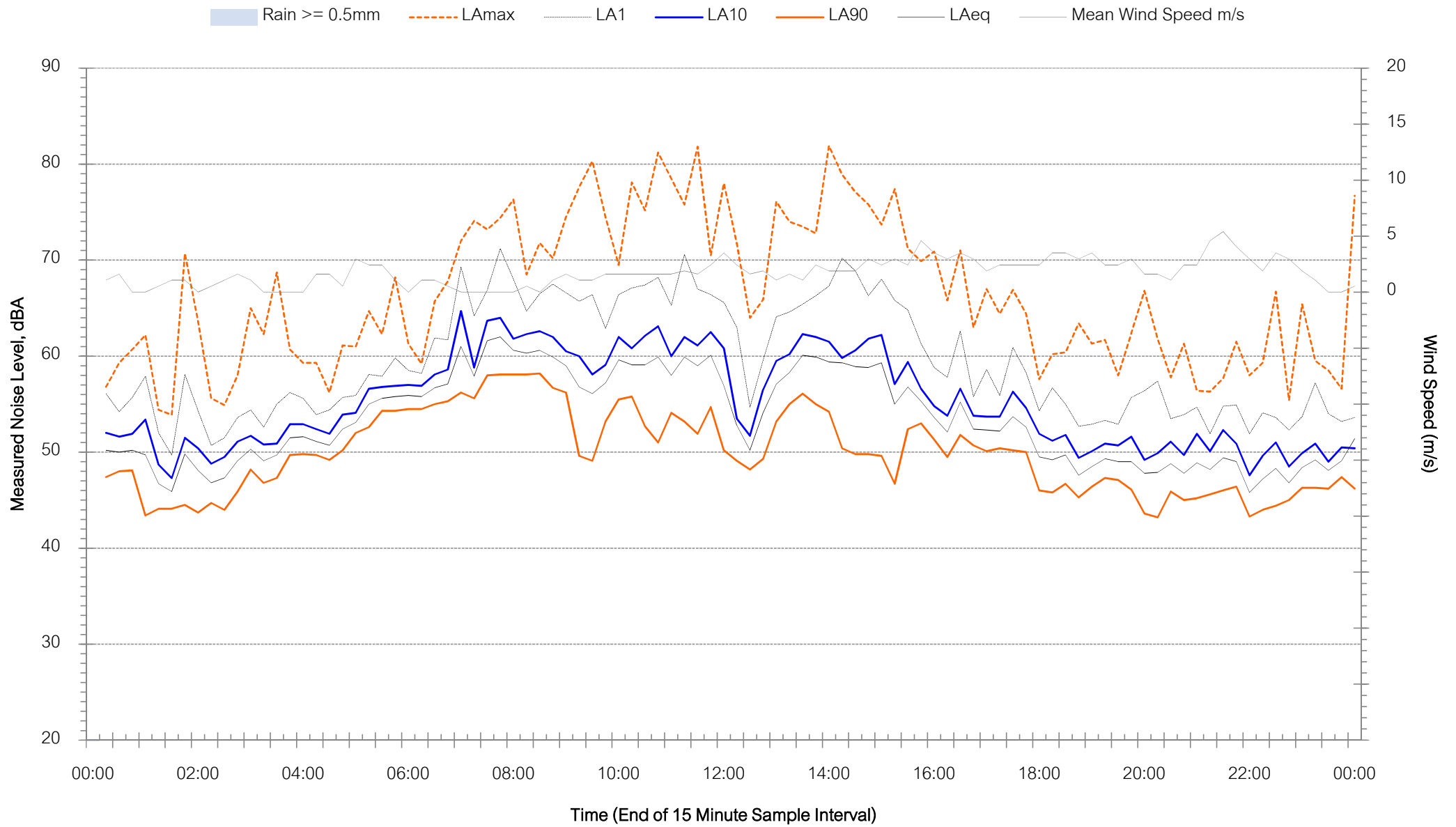
Location - N3 - Tuesday 16 July 2019





Background Noise Levels

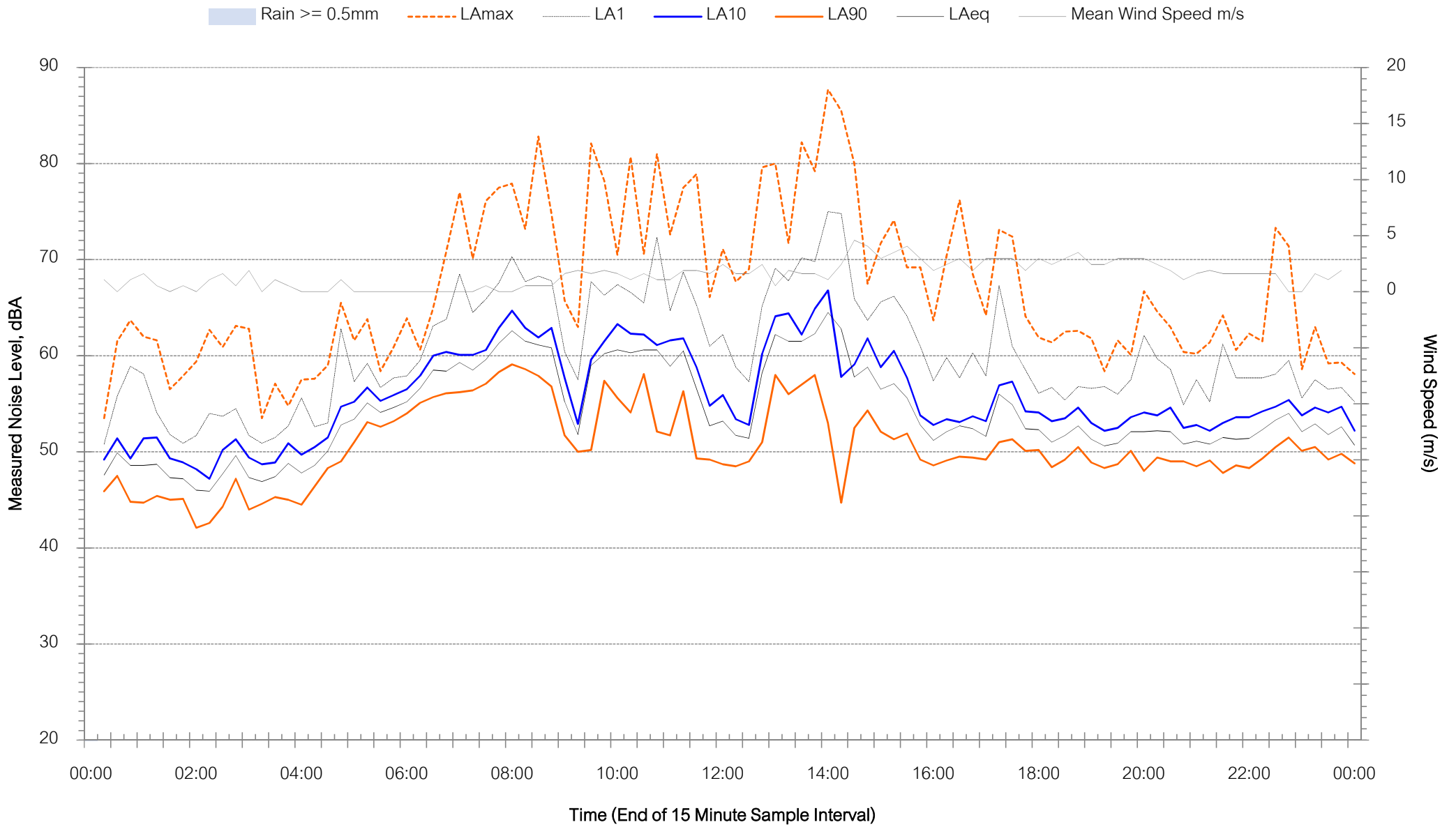
Location - N3 - Wednesday 17 July 2019





Background Noise Levels

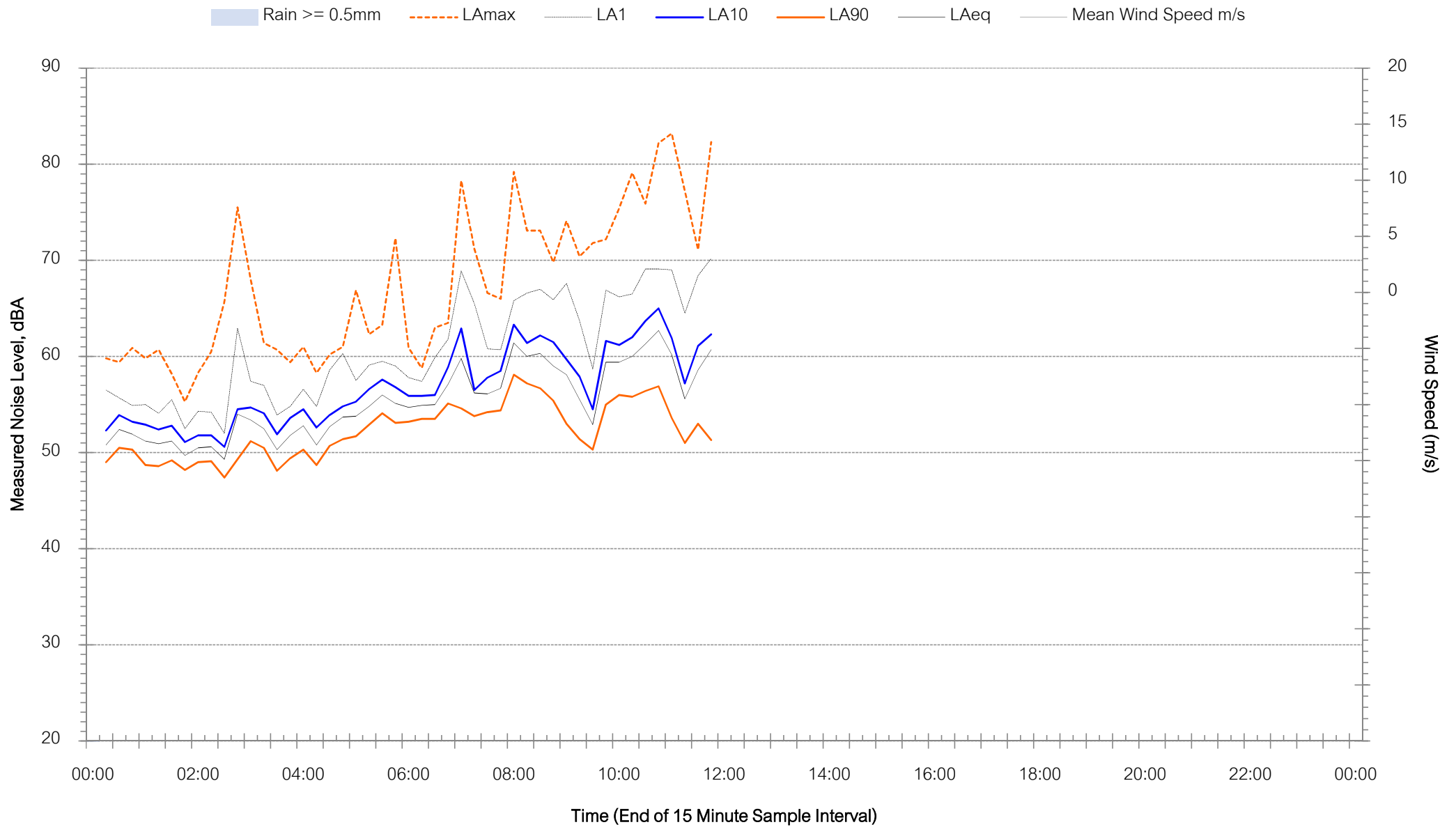
Location - N3 - Thursday 18 July 2019





Background Noise Levels

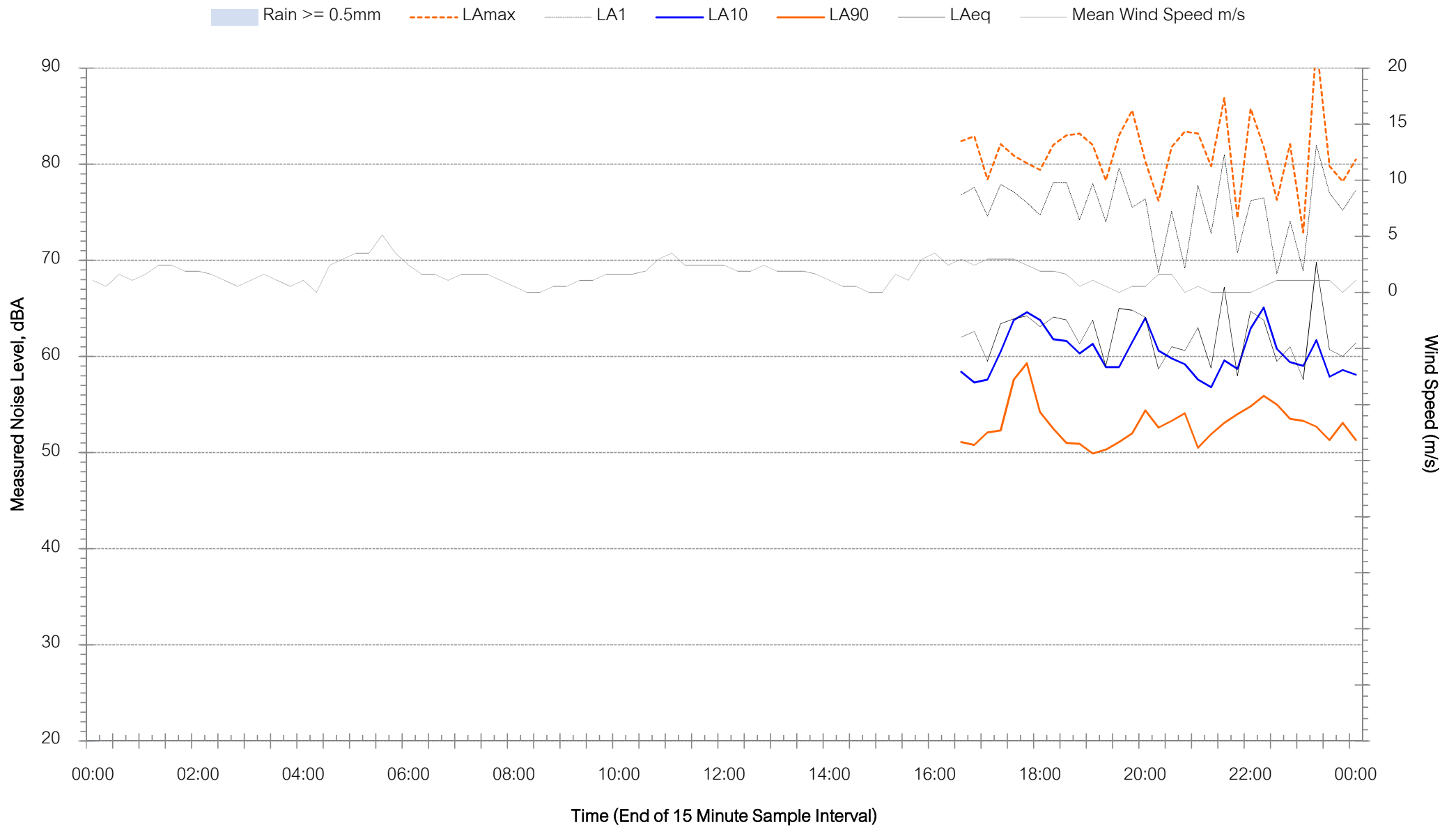
Location - N3 - Friday 19 July 2019





Background Noise Levels

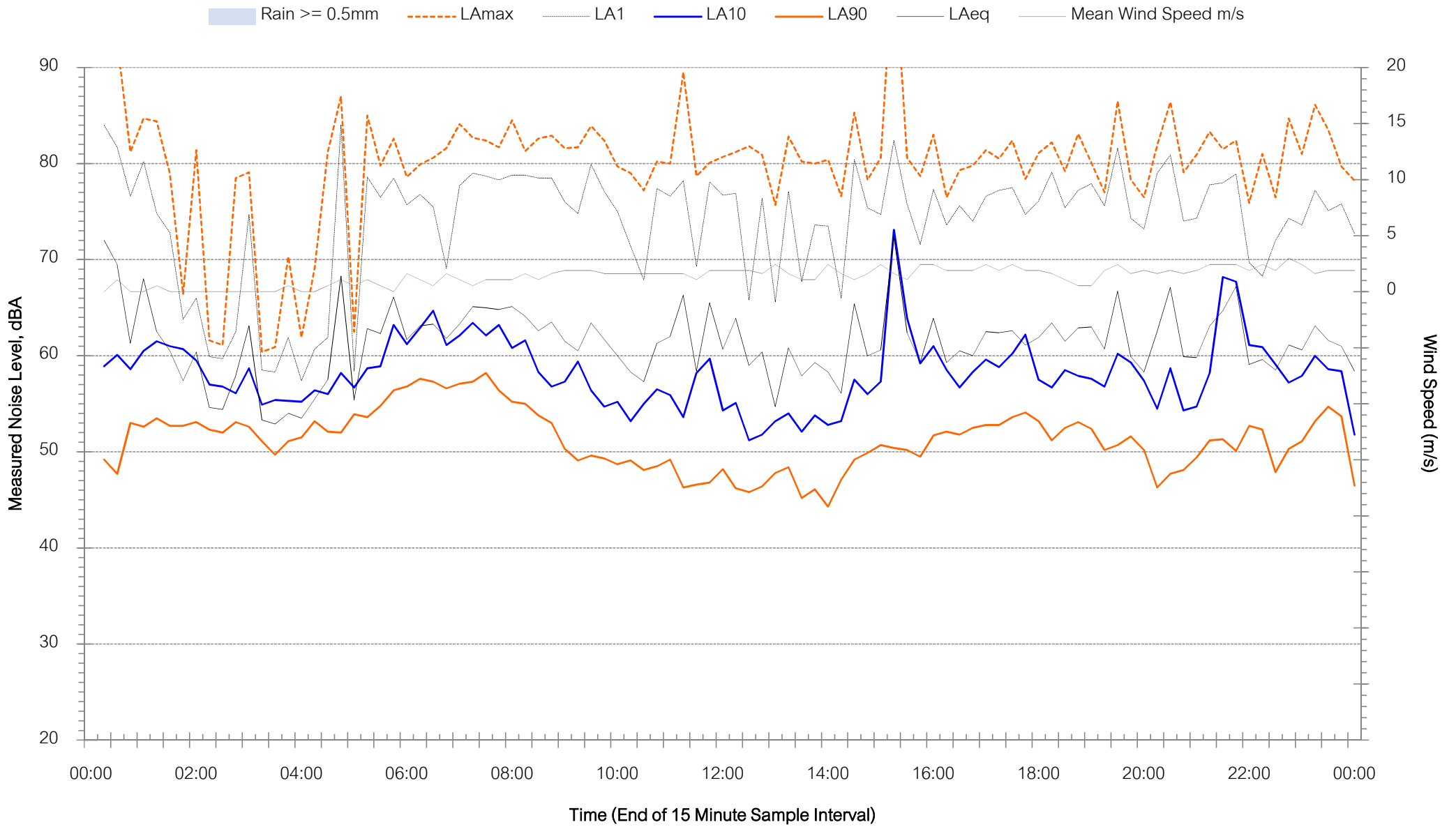
Location N4 - Tuesday 9 July 2019





Background Noise Levels

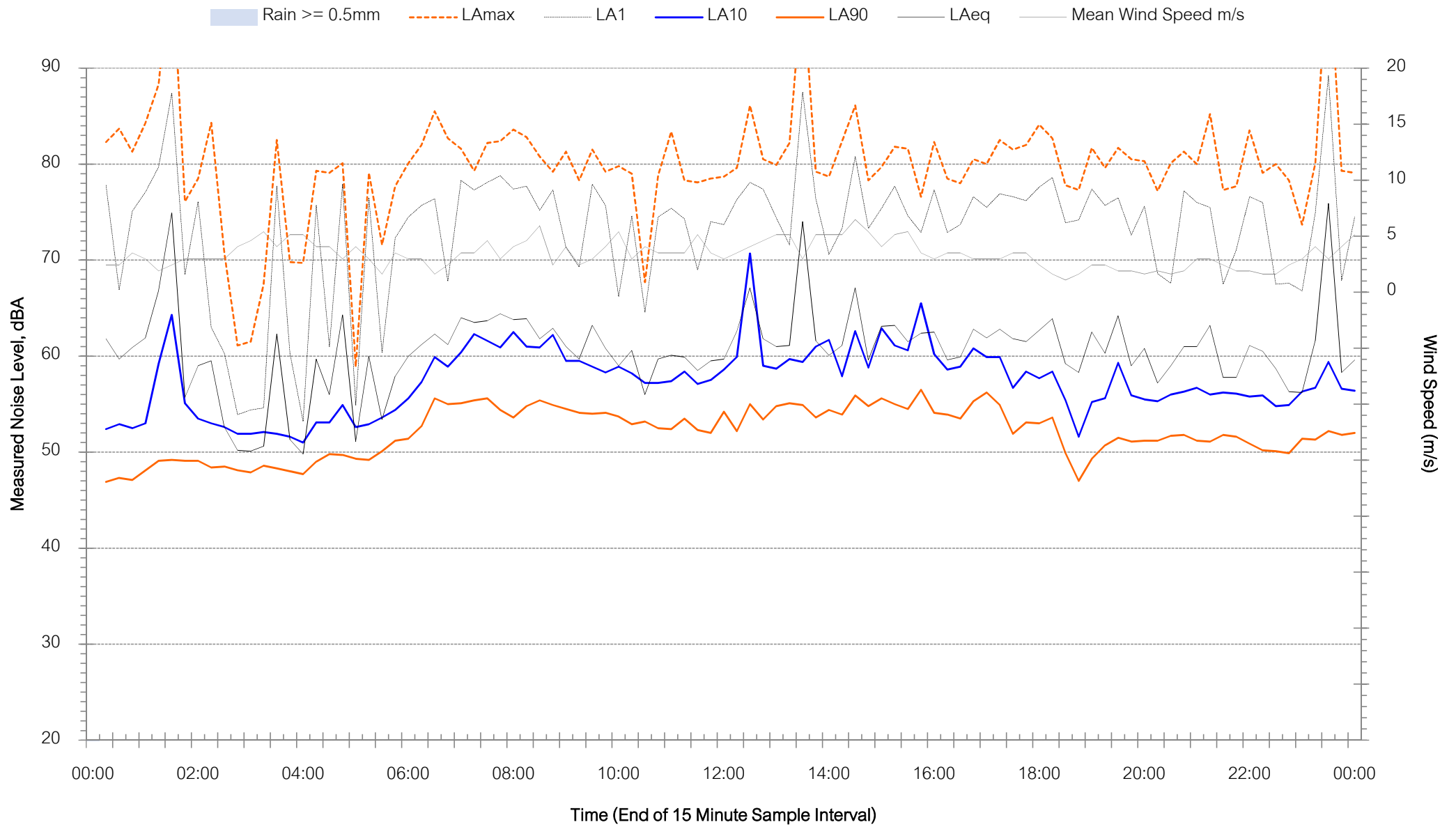
Location N4 - Wednesday 10 July 2019





Background Noise Levels

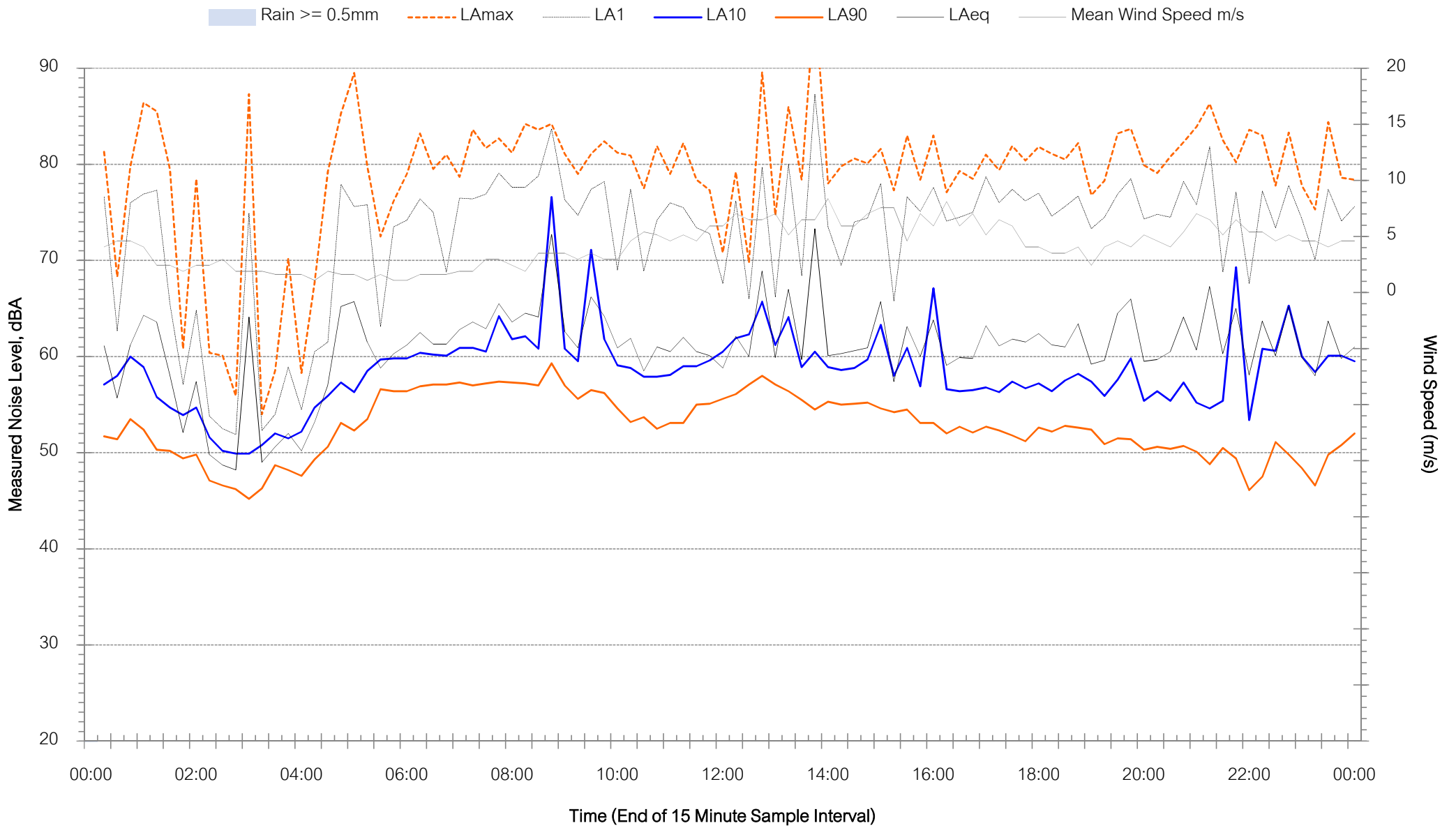
Location N4 - Thursday 11 July 2019





Background Noise Levels

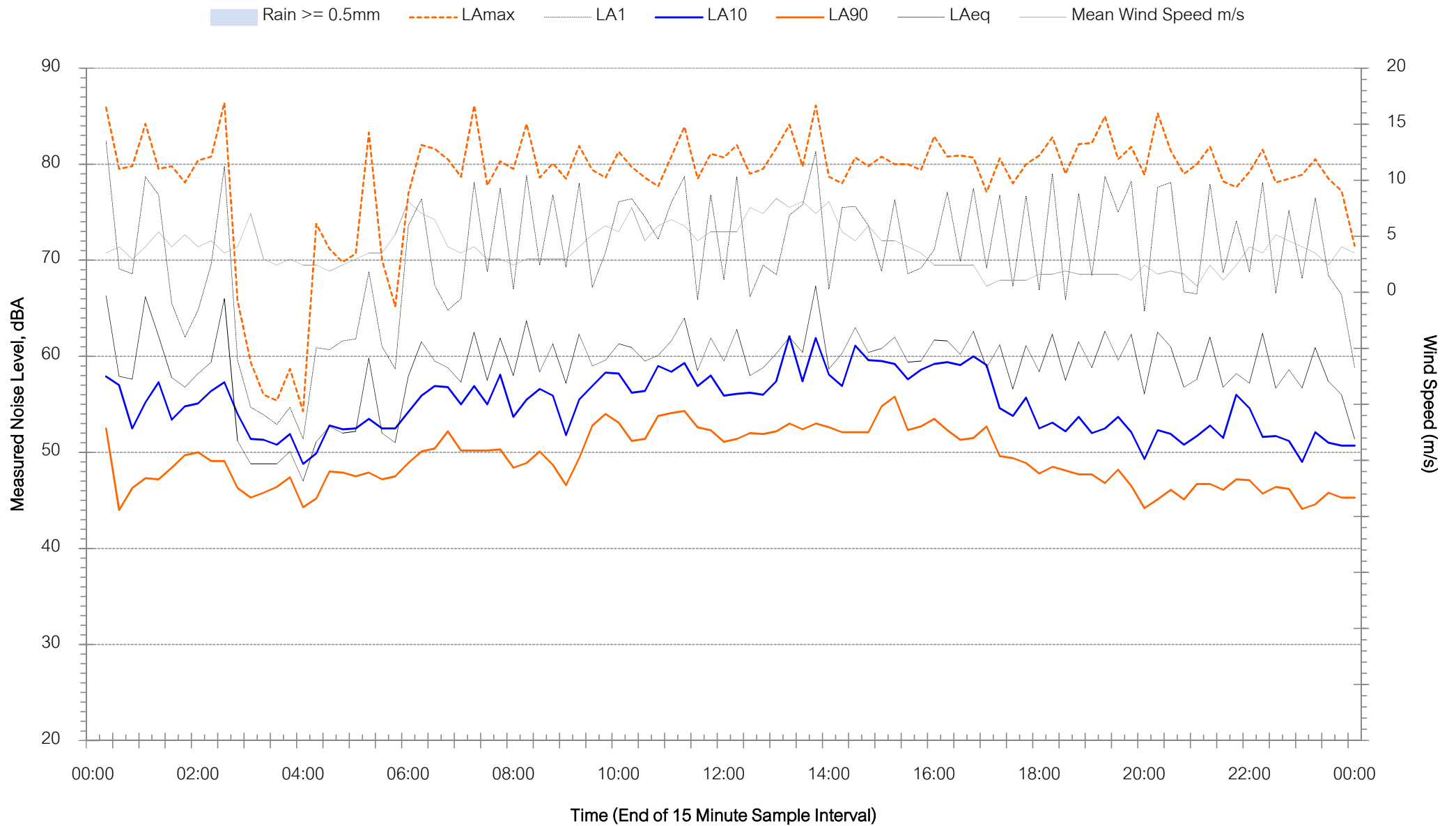
Location N4 - Friday 12 July 2019





Background Noise Levels

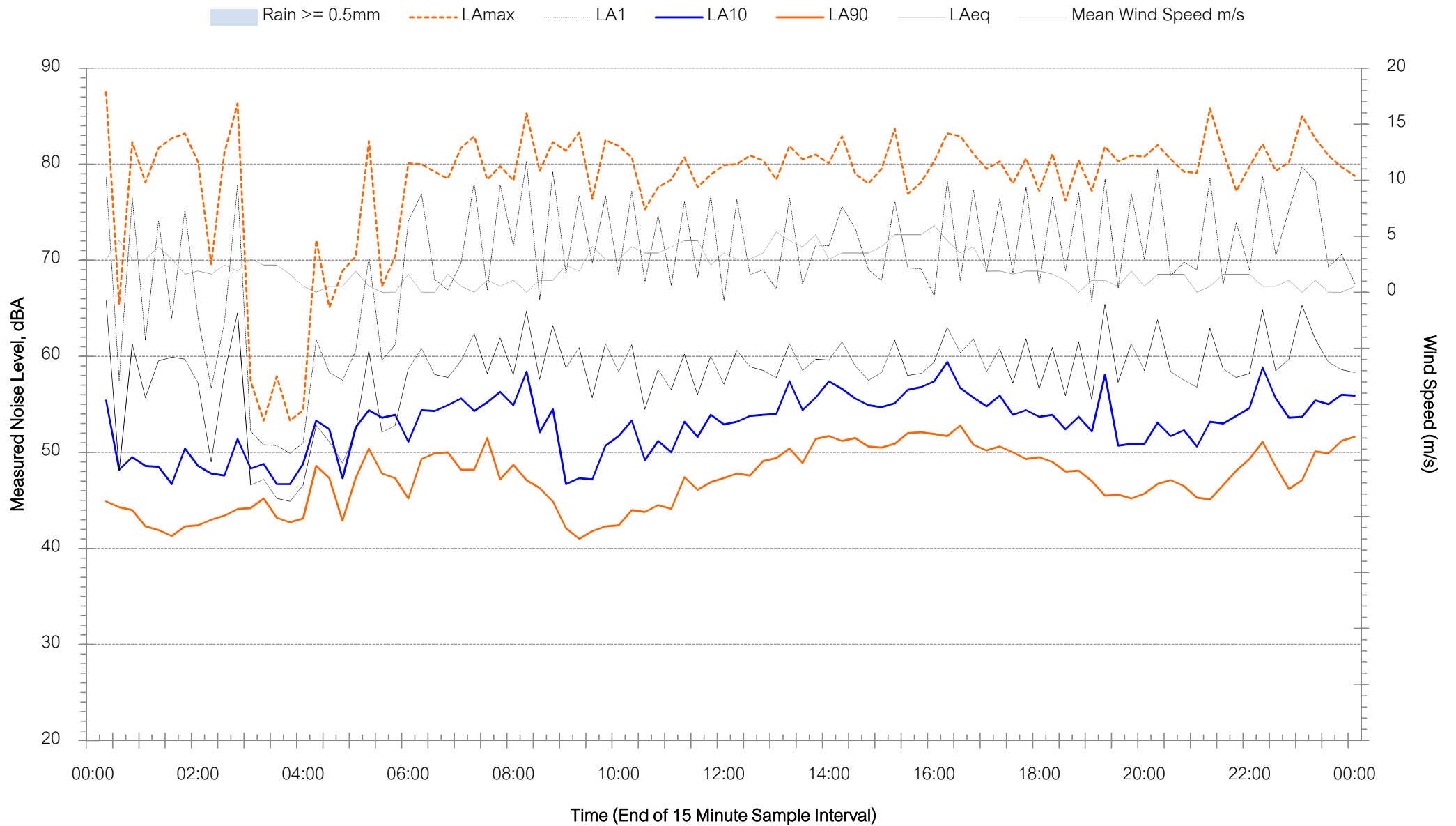
Location N4 - Saturday 13 July 2019





Background Noise Levels

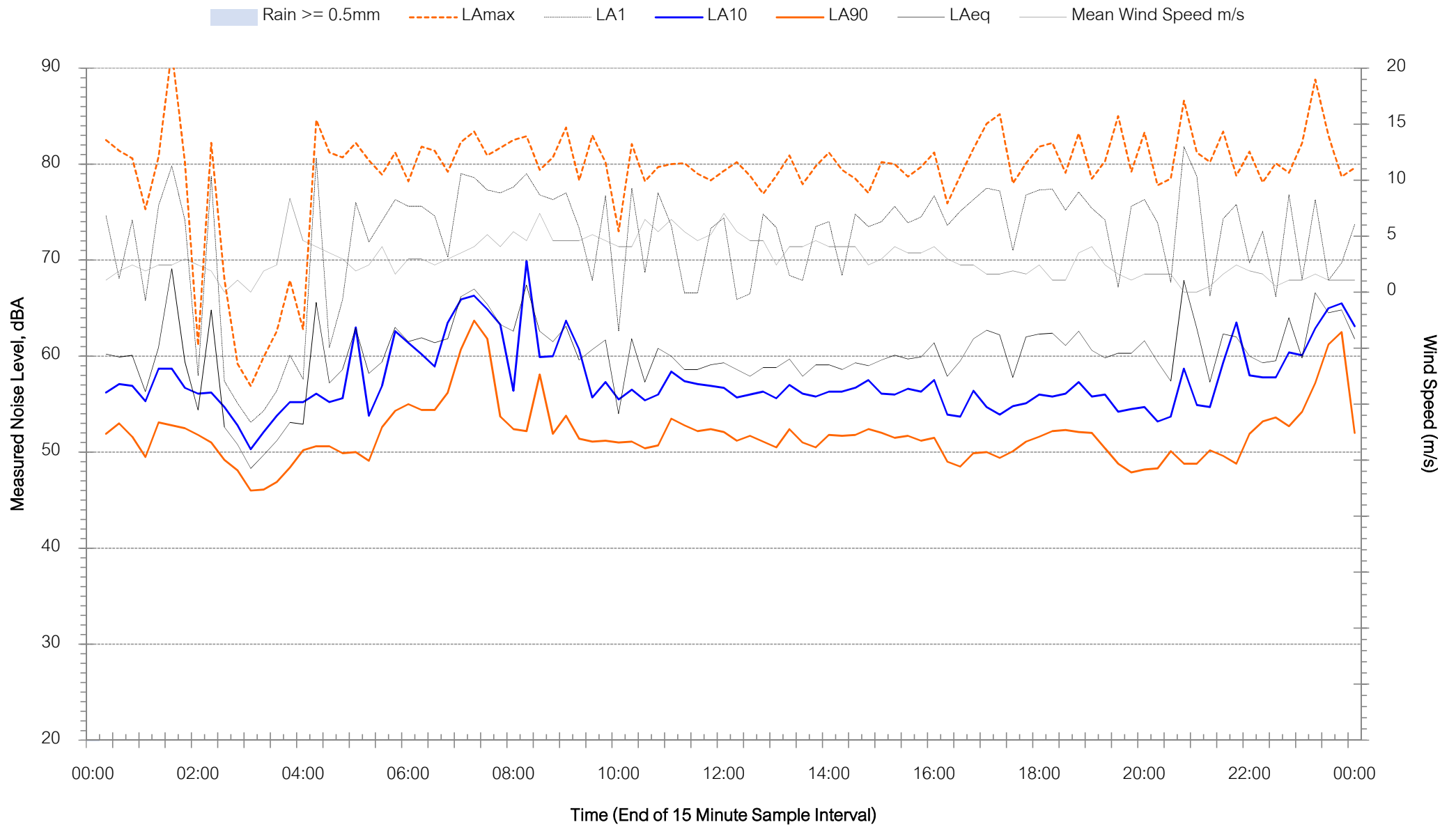
Location N4 - Sunday 14 July 2019





Background Noise Levels

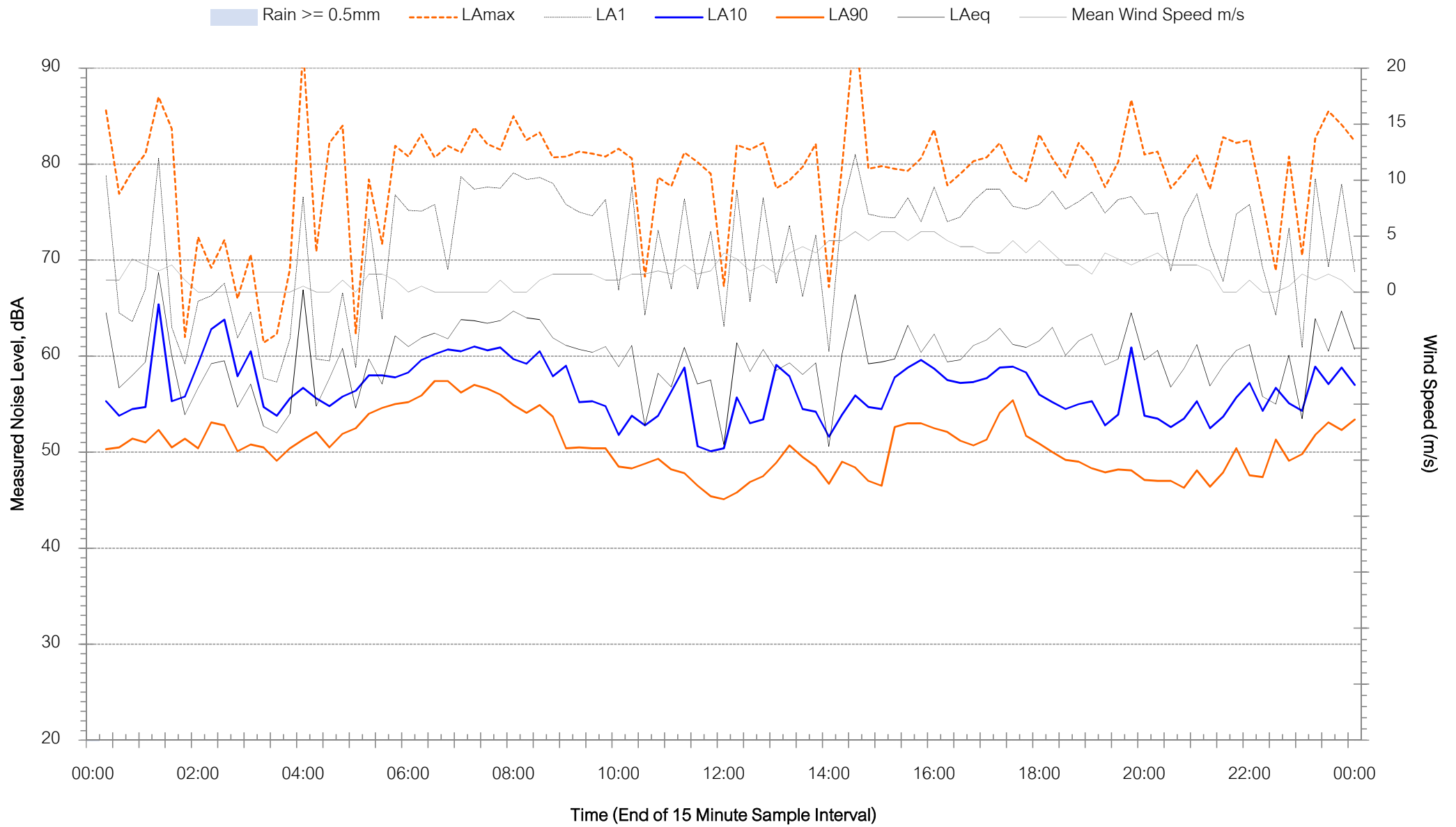
Location N4 - Monday 15 July 2019





Background Noise Levels

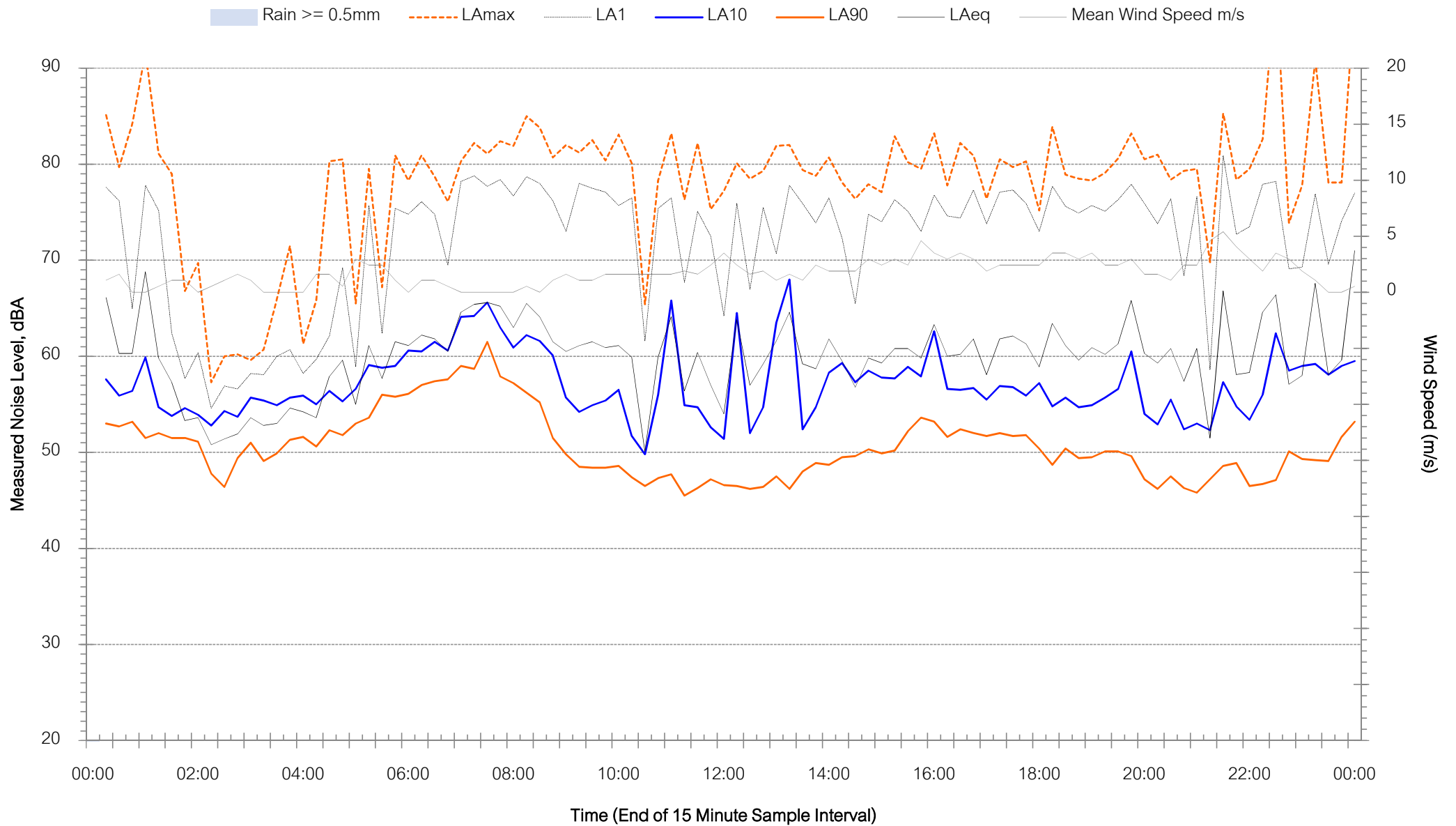
Location N4 - Tuesday 16 July 2019





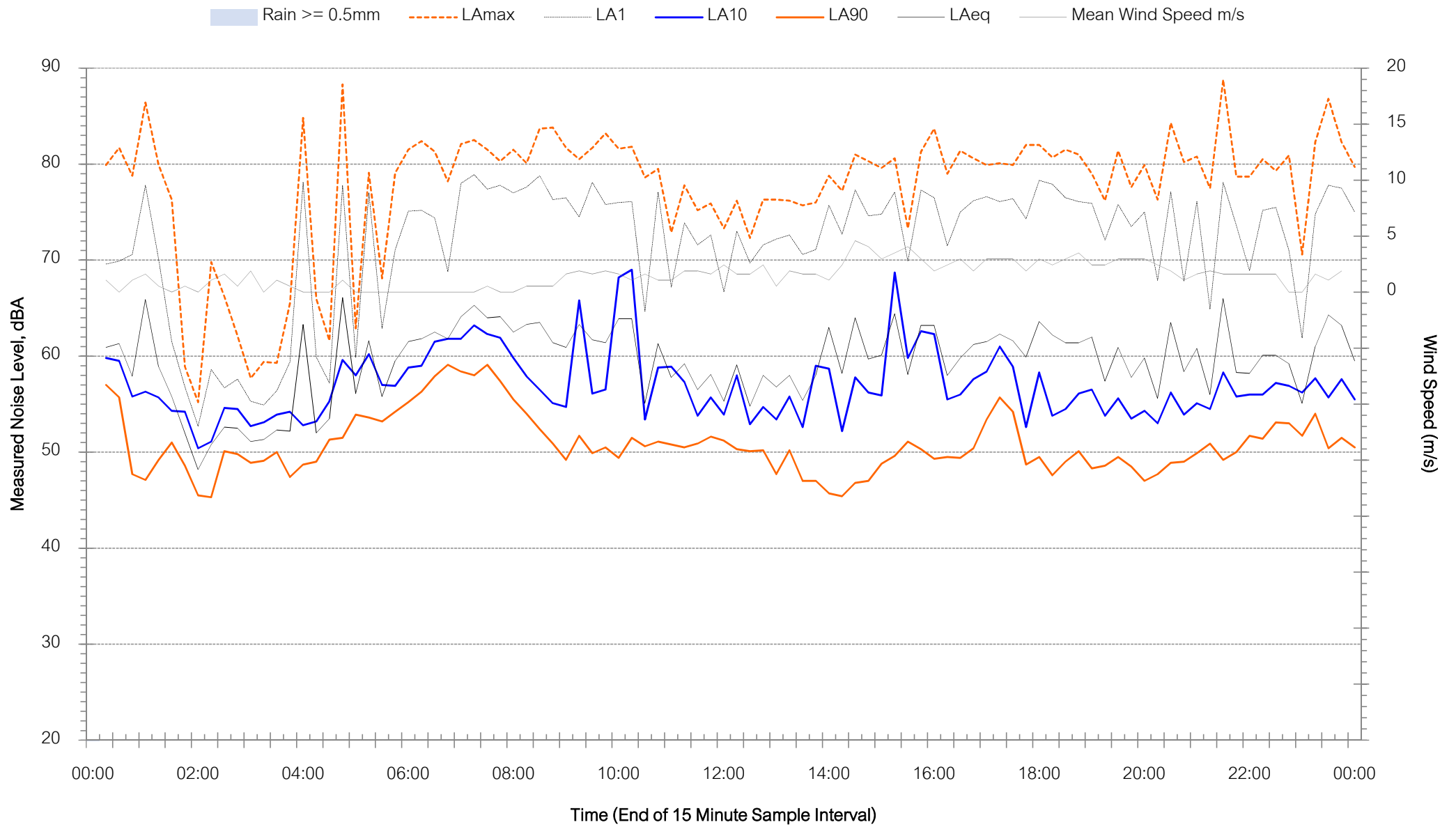
Background Noise Levels

Location N4 - Wednesday 17 July 2019



Background Noise Levels

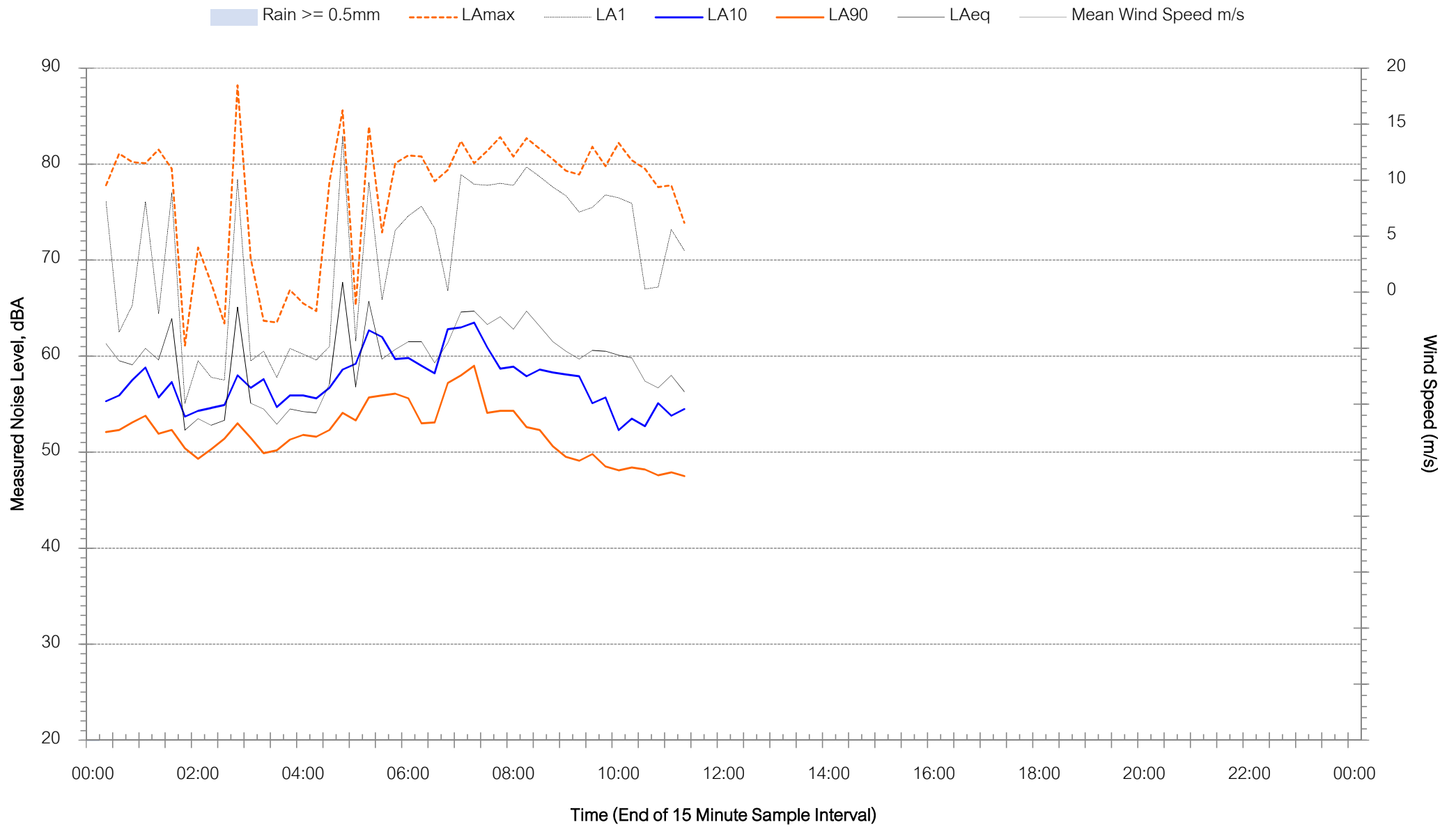
Location N4 - Thursday 18 July 2019





Background Noise Levels

Location N4 - Friday 19 July 2019



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