Noise Monitoring Assessment

Northparkes Mines

Quarter 2, 2019

Prepared for: CMOC Mining Services Pty Ltd
June 2019
MAC190810RP1

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Northparkes Mines

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Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC190810RP1	Final	27 June 2019	Oliver Muller		Rod Linnett	

CONTENTS

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by CMOC Mining Services Pty Limited (CMOC) to complete a Noise Monitoring Assessment (NMA) for Northparkes Mines (NPM), 27km North West of Parkes, NSW. The NMA has been completed to quantify operational noise emissions as per Conditions 1 to 5 of Schedule 3 of the NSW Project Approval Conditions (PA11_110060) and the Northparkes Noise Management Plan (NMP, 2019).

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

- NSW Environment Protection Authority (EPA) 2017, Noise Policy for Industry (NPI); and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures.

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

2 Noise Criteria

2.1 Operational Noise Criteria

This assessment has adopted criteria as per Conditions 1 to 5 of Schedule 3 of the NSW Project Approval Conditions (PA11_110060) and the Northparkes Noise Management Plan (NMP, 2019) (see **Appendix B**) and is summarised below in **Table 1**.

Table 1 Noise Criteria

Location	Criteria			
	Day	Evening	Night	
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{A1(1min)}$
All privately-owned land	35	35	35	45

Additionally, the conditions state:

Operational Noise generated by the project will be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy.

These limits apply under all meteorological conditions except the following:

- *during periods of rain or hail;*
- *average wind speeds at microphone height exceeds 5 m/s;*
- *wind speeds greater than 3 m/s at 10 metres above ground level; or*
- *temperature inversion conditions of up to 3 °C/100m or alternatively a stability class of G.*

Except for wind speed at the microphone height, the data to be used for determining meteorological conditions will be that recorded by the meteorological station located onsite. Operational noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 5 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

These limits do not apply if NPM have an agreement with the relevant owner/s of the residences or land to generate higher noise levels, and NPM has advised the Department in writing of the terms of the agreement.

3 Assessment Methodology

All attended noise monitoring surveys for this assessment were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the NMP.

The acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

3.1 Operational Noise Measurement Methodology

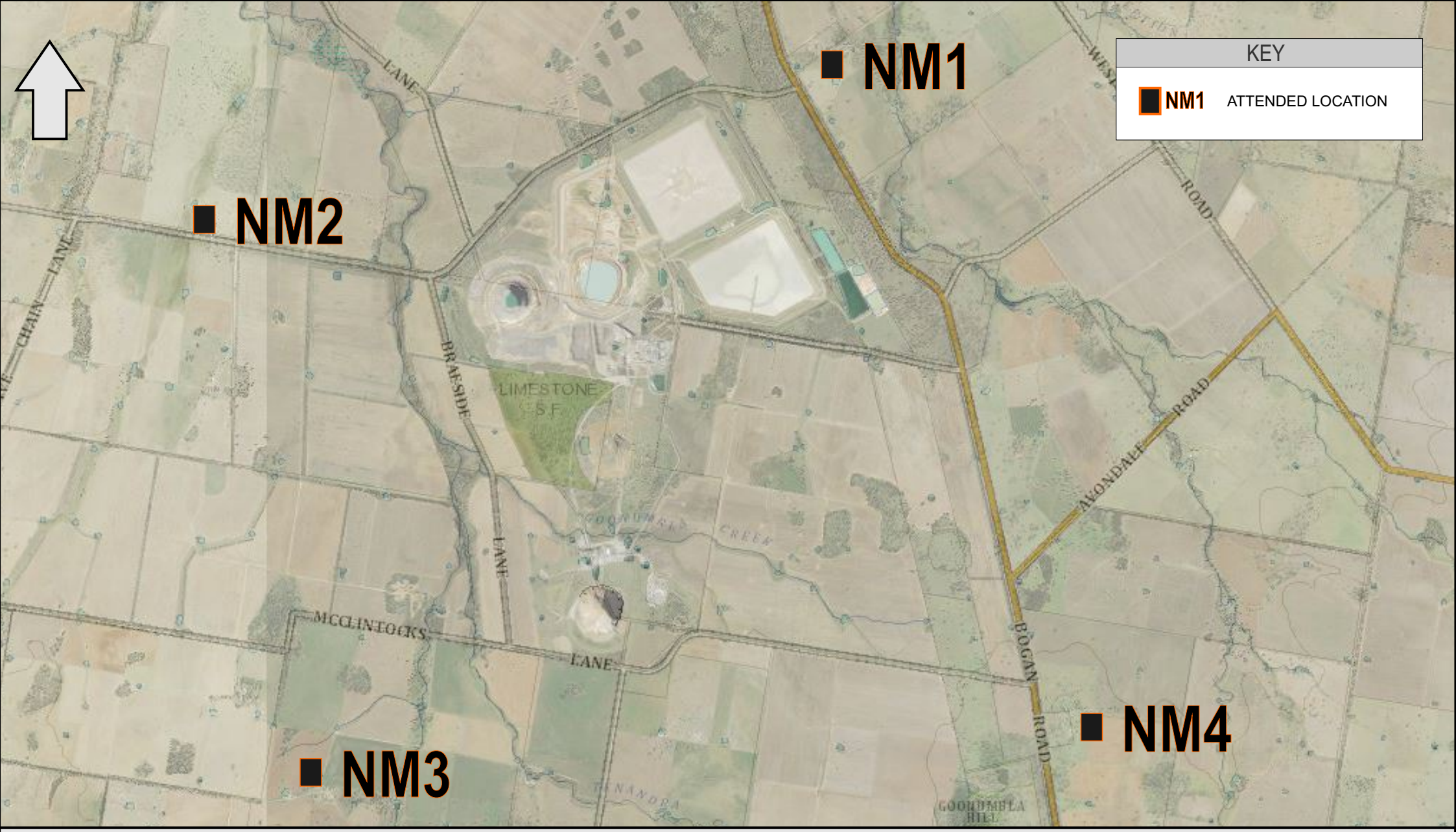
The locality surrounding the mine is primarily rural/residential. In accordance with the NMP, four representative receivers were selected for this assessment and are summarised in **Table 2.**

Table 2 Noise Monitoring Locations

ID	Location	Coordinate Locations, MGA55	
		Easting	Northing
NM1	Hubberstone	600687	6360754
NM2	Lone Pine	593669	6358933
NM3	Milpose	594827	6352971
NM4	Hillview	602993	6353469

Monitoring locations with respect to the mine site are shown graphically in **Figure 1**.

The measurements were carried out using a Svantek Type 1, 977 noise analyser from Wednesday 8 May 2019 to Thursday 9 May 2019. The monitoring regime consisted of day, evening and night measurements at each monitoring location. Where possible throughout each survey, the operator quantified the contribution of any significant noise sources.



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*Imagery Source : sixmaps

FIGURE 1
LOCALITY PLAN
REF: MAC190810

0 2km

4 Results

4.1 Operational Noise Results

The monitoring and assessment results are presented in separate tables for each monitoring location. The results of the overall attended noise measurements for Wednesday 8 May 2019 to Thursday 9 May 2019 for day, evening and night for each location are summarised in **Table 3** to **Table 6** respectively.

Table 3 Operator-Attended Noise Survey Results – Location NM1, Hubberstone					
Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
09/05/2019 13:49 15 min duration	67	41	30	WS: 2m/s WD: W Rain: Nil	Wind 33-36 Birds 32-40 Livestock 35 Mine inaudible
09/05/2019 14:04 15 min duration	66	41	32		
09/05/2019 14:19 15 min duration	73	44	31		
Site $L_{Aeq(15min)}$ Contribution					<20
Site $L_{A1(1min)}$ Contribution					<20
Evening					
09/05/2019 19:06 15 min duration	64	37	23	WS: <0.5m/s WD: NW Rain: Nil	Ambient background Dogs to 36 Mine inaudible
09/05/2019 19:21 15 min duration	60	36	22		
09/05/2019 19:36 15 min duration	65	38	22		
Site $L_{Aeq(15min)}$ Contribution					<20
Site $L_{A1(1min)}$ Contribution					<20
Night					
09/05/2019 01:52 15 min duration	69	41	25	WS: <0.5m/s WD: SSE Rain: Nil	Survey vehicle to 70 Mine hum ~<25
09/05/2019 02:07 15 min duration	62	38	23		
09/05/2019 02:22 15 min duration	70	37	24		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25

Table 4 Operator-Attended Noise Survey Results – Location NM2, Lone Pine					
Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
09/05/2019 14:43 15 min duration	77	48	31	WS: 1m/s WD: WNW Rain: Nil	Road traffic 42-58 Wind 32-38 Birds 36-70 Agriculture 40-44 Mine inaudible
09/05/2019 14:58 15 min duration	69	45	32		
09/05/2019 15:13 15 min duration	70	47	33		
Site $LA_{eq(15min)}$ Contribution					<25
Site $LA_{1(1min)}$ Contribution					<25
Evening					
09/05/2019 20:06 15 min duration	69	42	28	WS: 1m/s WD: NW Rain: Nil	Wind in trees Mine inaudible
09/05/2019 20:21 15 min duration	77	42	27		
09/05/2019 20:36 15 min duration	64	39	31		
Site $LA_{eq(15min)}$ Contribution					<25
Site $LA_{1(1min)}$ Contribution					<25
Night					
08/05/2019 23:07 15 min duration	67	41	35	WS: <0.5m/s WD: ESE Rain: Nil	Survey vehicle to 70 Aircraft 30-36 Insects to 36 Dogs 35-40 Livestock 32-34 Mine hum ~<25
08/05/2019 23:22 15 min duration	70	42	35		
08/05/2019 23:37 15 min duration	89	66	21		
Site $LA_{eq(15min)}$ Contribution					<25
Site $LA_{1(1min)}$ Contribution					<25

Table 5 Operator-Attended Noise Survey Results – Location NM3, Milpose					
Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
09/05/2019 15:49 15 min duration	67	41	29	WS: <0.5m/s WD: NE Rain: Nil	Livestock 20-40 Survey vehicle to 67 Agriculture 20-24 Dogs 20-28 Mine inaudible
09/05/2019 16:04 15 min duration	67	40	29		
09/05/2019 16:19 15 min duration	64	38	28		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25
Evening					
09/05/2019 21:16 15 min duration	68	40	23	WS: 1.5m/s WD: NE Rain: Nil	Livestock to 23 Mine hum<25
09/05/2019 21:31 15 min duration	60	36	23		
09/05/2019 21:46 15 min duration	69	43	25		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25
Night					
09/05/2019 00:34 15 min duration	82	51	28	WS: <0.5m/s WD: NE Rain: Nil	Survey vehicle to 80 Livestock 32-36 Agriculture 20-24 Dogs 20-28 Mine inaudible
09/05/2019 00:49 15 min duration	79	44	17		
09/05/2019 01:04 15 min duration	62	36	17		
Site $L_{Aeq(15min)}$ Contribution					<25
Site $L_{A1(1min)}$ Contribution					<25

Table 6 Operator-Attended Noise Survey Results – Location NM4, Hillview					
Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
Day					
09/05/2019 12:36 15 min duration	73	45	30	WS: 1.5m/s WD: NNW Rain: Nil	Traffic 36-58 Birds 30-38 Wind 30-40 Residential vehicle 36-46 Mine inaudible
09/05/2019 12:51 15 min duration	34	45	33		
09/05/2019 13:06 15 min duration	60	43	31		
Site $LA_{eq(15min)}$ Contribution					<25
Site $LA_{1(1min)}$ Contribution					<25
Evening					
09/05/2019 18:05 15 min duration	64	46	32	WS: 1m/s WD: N Rain: Nil	Road traffic 36-50 Mine hum<25
09/05/2019 18:20 15 min duration	71	46	29		
09/05/2019 18:35 15 min duration	73	47	32		
Site $LA_{eq(15min)}$ Contribution					<25
Site $LA_{1(1min)}$ Contribution					<25
Night					
09/05/2019 02:55 15 min duration	62	36	17	WS: <0.5m/s WD: SSW Rain: Nil	Survey vehicle to 62 Insects 21-24 Road traffic 25-46 Mine inaudible
09/05/2019 03:10 15 min duration	53	35	17		
09/05/2019 03:25 15 min duration	59	38	17		
Site $LA_{eq(15min)}$ Contribution					<20
Site $LA_{1(1min)}$ Contribution					<20

4.2 Road Noise Results

As an additional initiative to operational attended noise monitoring, NPM include two 1-hour attended noise monitoring measurements at the Hillview monitoring location (NM4) to quantify road noise levels attributed to NPM and associated with concentrate trucks movements and shift change traffic flows. **Table 7** presents the results of the road traffic noise measurements with a comparison against the road noise criteria outlined in the NMP which is consistent with the NSW Road Noise Policy (DECCW 2011).

Table 7 Operator-Attended Road Noise Survey Results – Location NM4, Hillview

Time (hrs)	Primary Noise Descriptor (dBA re 20 µPa) LA_{eq}	Meteorology	Criteria, $LA_{eq(1hr)}$	Description and SPL, dBA
Day				
09/05/2019 12:36 60 min duration	44	WS: 1.5m/s WD: NNW Rain: Nil	55	Residential vehicle 36-46 Mine inaudible
09/05/2019 17:50 15 min duration	46	WS: 1.5m/s WD: NNW Rain: Nil	55	Road traffic 36-50 Mine hum<25

Results of the road noise survey identify that the $LA_{eq(1hr)}$ noise contribution at NM4 is between 44 to 46dBA, and hence satisfies the relevant road noise criteria as outlined in the NMP and the RNP.

4.3 Unattended Noise Results

Unattended monitoring stations are installed at all four receiver locations. Data from the unattended monitors provide a real time method for monitoring noise events, although it is noted that the results include all noise sources (ie project noise and extraneous noise sources). The results are used as a management tool for the project site. It is noted for this quarter unattended results for NM1 and NM2 were unavailable due to equipment being repaired or out of order. Averaged results of the $LA_{eq(15min)}$ and $LA_{1(1min)}$ metrics from Monday 6 May 2019 to Sunday 12 May 2019 for NM3 Milpose and NM4 Hillview are summarised in **Table 8**. **Appendix C** presents the unattended results in chart format.

Table 8 Unattended Noise Survey Results

Period	Primary Noise Descriptor (dBA re 20 µPa)	
	Weekly Average $LA_{eq(15min)}$	Weekly Average $LA_{1(1min)}$
Location NM3, Milpose		
Day	52	N/A
Evening	35	N/A
Night	40	41
Location NM4, Hillview		
Day	49	N/A
Evening	43	N/A
Night	41	45

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.

5 Discussion

5.1 Operational Noise Discussion

5.1.1 Discussion of Results – Location NM1, Hubberstone

Attended measurement results for monitoring conducted at NM1, Hubberstone, for the May 2019 noise survey identified that NPM remained generally inaudible during all measurements, with the exception of the night measurement, although remained below the relevant noise criteria. Generally, birds, wind and livestock activities were dominant sources.

In summary, the noise contribution from NPM satisfied the relevant noise criterion for all monitored assessment periods at Location 1.

5.1.2 Discussion of Results – Location NM2, Lone Pine

The results of monitoring conducted at NM2, Lone Pine during the May 2019 noise assessment were influenced primarily by traffic, wildlife and agricultural noise. Noise from the NPM was inaudible throughout day and evening measurements and audible during the night measurement although remained below the relevant criteria at the monitoring location.

In summary, the noise contribution from the mine satisfied the relevant noise criterion for all the attended measurements at NM2.

5.1.3 Discussion of Results – Location NM3, Milpose

Results of monitoring conducted at NM3 for May 2019, Milpose, identified that the NPM was inaudible throughout all measurements with the exception of the evening period, where contributions remained below relevant noise criteria. Noise measurements were influenced primarily by agricultural noise, wildlife and livestock.

5.1.4 Discussion of Results – Location NM4, Hillview

Attended measurement results for monitoring conducted at NM4, Hillview, for the May 2019 noise survey identified that NPM remained generally inaudible during all measurements, with the exception of the evening measurement, although remained below the relevant noise criteria. Generally, birds, wind and road noise were dominant sources.

6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of CMOC Mining Services Pty Limited (CMOC). The assessment was completed to quantify site noise emissions against relevant noise criteria pertaining to NPM operations in accordance with Conditions 1 to 5 of Schedule 3 of the NSW Project Approval Conditions (PA11_110060) and the Northparkes Noise Management Plan (NMP, 2019).

Road noise monitoring identified that concentrate trucks and light vehicle movements associated with shift change generate levels below the relevant road noise criteria specified in the RNP and NMP.

Attended monitoring has identified that operational emissions generated by NPM comply with relevant statutory noise criteria at all monitoring locations for all assessment periods. Furthermore, project related noise emissions generally remain inaudible at monitoring locations and are masked by dominant extraneous non-mine sources such as traffic and localised noise sources such as agriculture and livestock.

Appendix A – Glossary of Terms

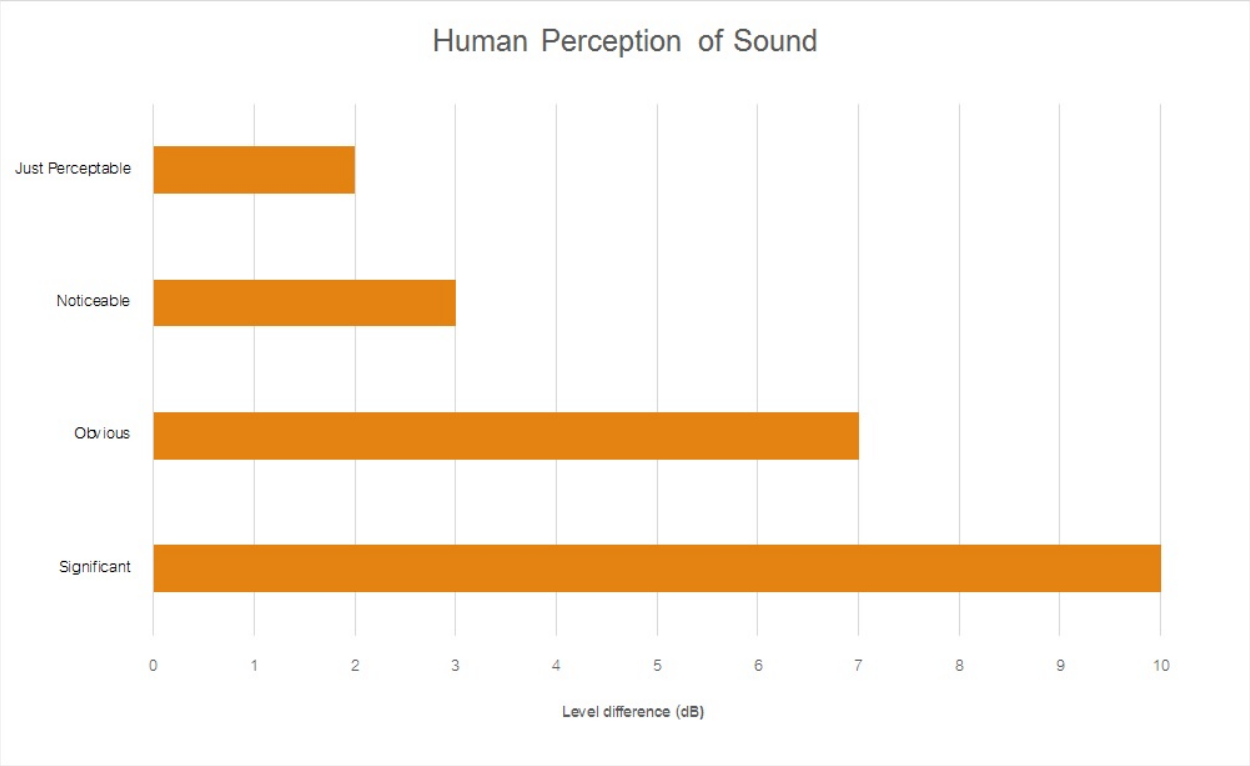
Table A1 provides a number of technical terms have been used in this report.

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.
LAmax	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.log10 (W/Wo) Where : W is the sound power in watts and Wo 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



Appendix B – Regulatory Noise Limits

Table 1 NSW Development Consent Conditions – Schedule 3

<table>
<tr><th>Condition</th><th>Related Section in NMP</th></tr>
<tr><td colspan="2">Noise Criteria</td></tr>
<tr><td>1. The Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 1 at any residence on privately-owned land.

Table 2 Noise impact assessment criteria dB(A)
<table>
<tr><th rowspan="2">Property</th><th>Day</th><th>Evening</th><th colspan="2">Night</th></tr>
<tr><th>$L_{Aeq(15min)}$</th><th>$L_{Aeq(15min)}$</th><th>$L_{Aeq(15min)}$</th><th>$L_{A1(1min)}$</th></tr>
<tr><td>All privately-owned land</td><td>35</td><td>35</td><td>35</td><td>45</td></tr>
</table>
Note: To interpret the land referred to in Table 1, see the applicable figures in Appendix 4.

Operational noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 5 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.</td><td>Section 5.4.1</td></tr>
<tr><td>2. The Proponent shall only carry out the construction works associated with the upgrade of McClintocks Lane, the construction of the McClintocks Lane access road and the upgrade of the intersection of McClintocks Lane and Bogan Road during the day.</td><td>Section 5.4.1</td></tr>
<tr><td>3. During construction of the works referred to in condition 2 of schedule 3, the noise criteria in Table 1 do not apply to the residences located in the vicinity of the works. The Proponent shall implement all reasonable and feasible measures to minimise construction noise impacts on the residences in the vicinity of these works.</td><td>Section 6</td></tr>
<tr><td>4. The Proponent shall:
a) implement best management practice to minimise the construction, operational and road noise of the project;
b) operate a comprehensive noise management system that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning, and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this approval;
c) minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply (see Appendix 5); and
d) carry out regular monitoring to determine whether the project is complying with the relevant conditions of this approval,
To the satisfaction of the Secretary.</td><td>Section 6 & Section 7</td></tr>
<tr><td>5. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:
a) be prepared in consultation with the EPA, and submitted to the Secretary prior to the commencement of construction;
b) describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval;
c) describe the proposed noise management system in detail; and
d) include a monitoring program that:
• evaluates and reports on:
– the effectiveness of the noise management system;
– compliance against the noise criteria in this approval; and
– compliance against the noise operating conditions;
• includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this approval and trigger for further attended monitoring); and
• defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents</td><td>Section 6 & Section 7

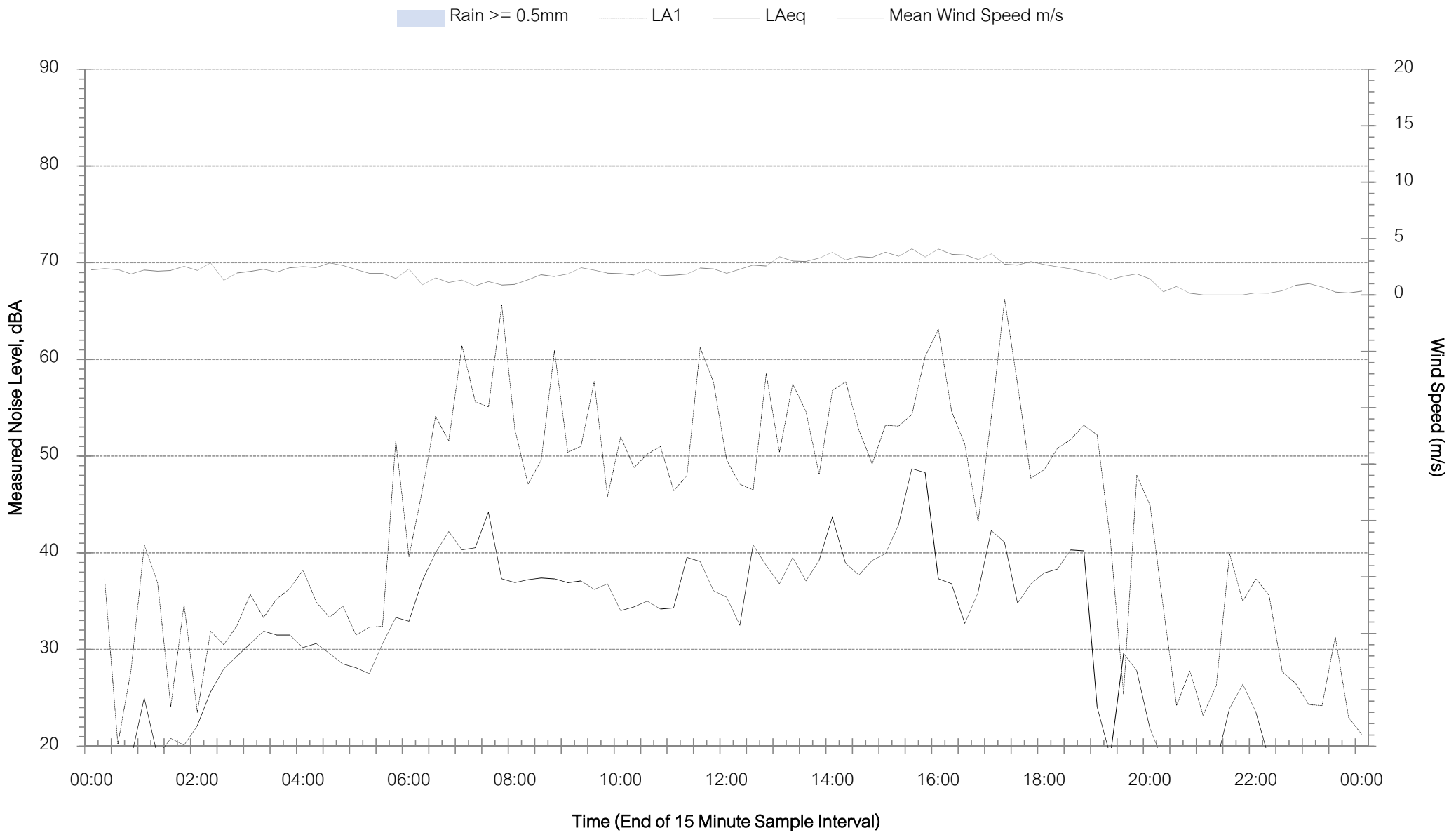
Section 7

Section 7.1</td></tr>
</table>

Appendix C – Unattended Monitoring Charts

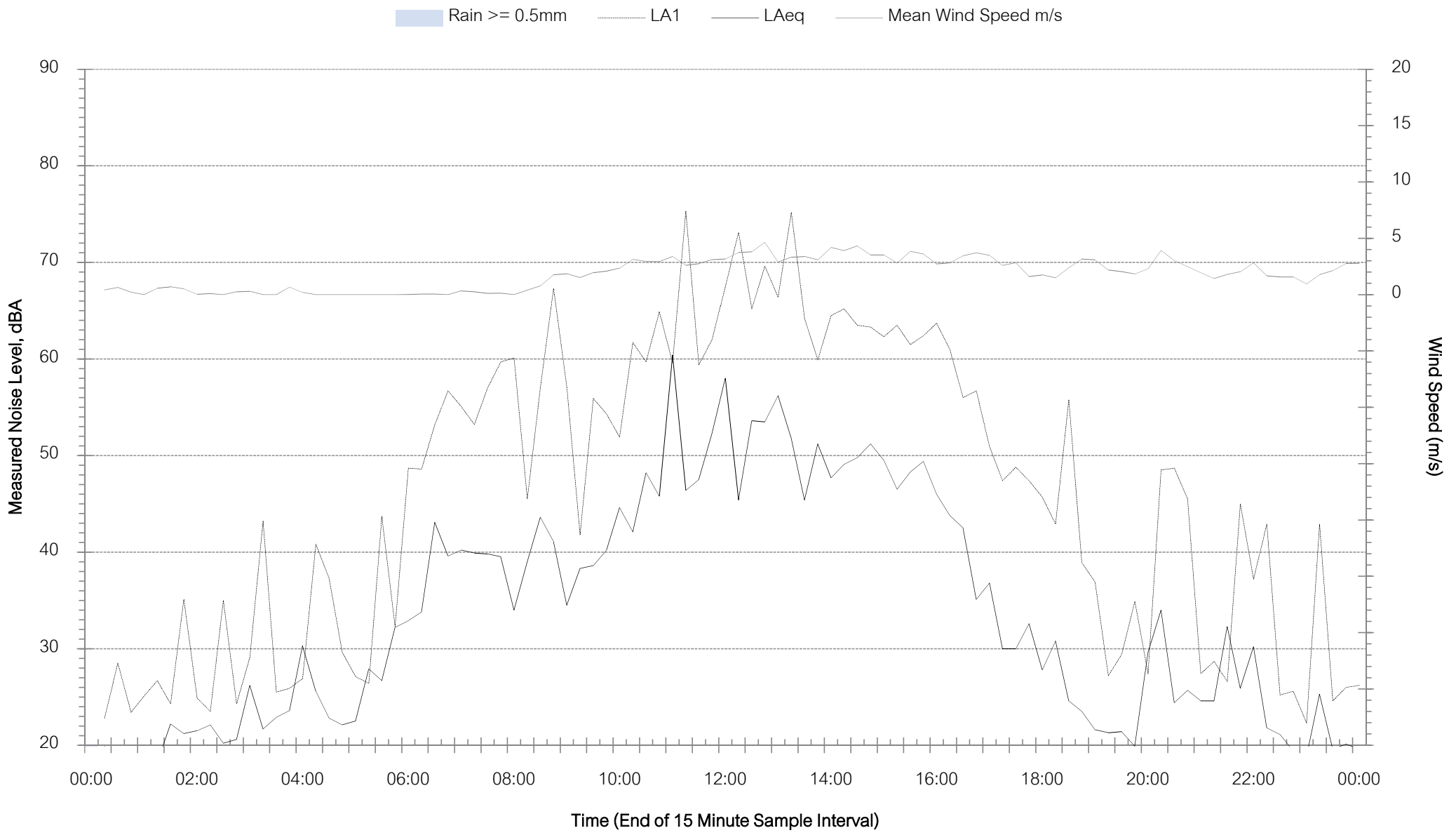
Background Noise Levels

Milpose - Monday 6 May 2019



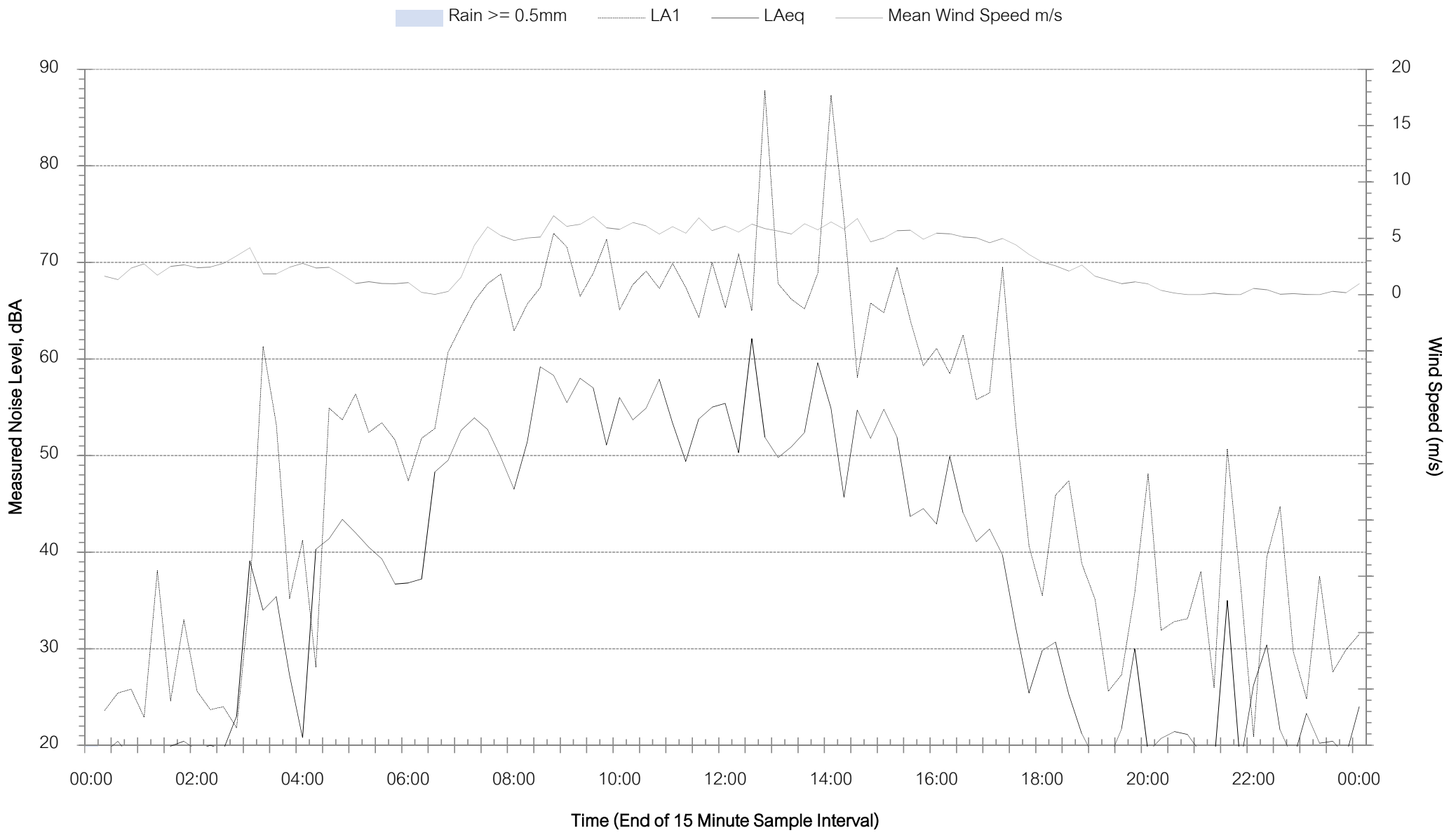
Background Noise Levels

Milpose - Tuesday 7 May 2019



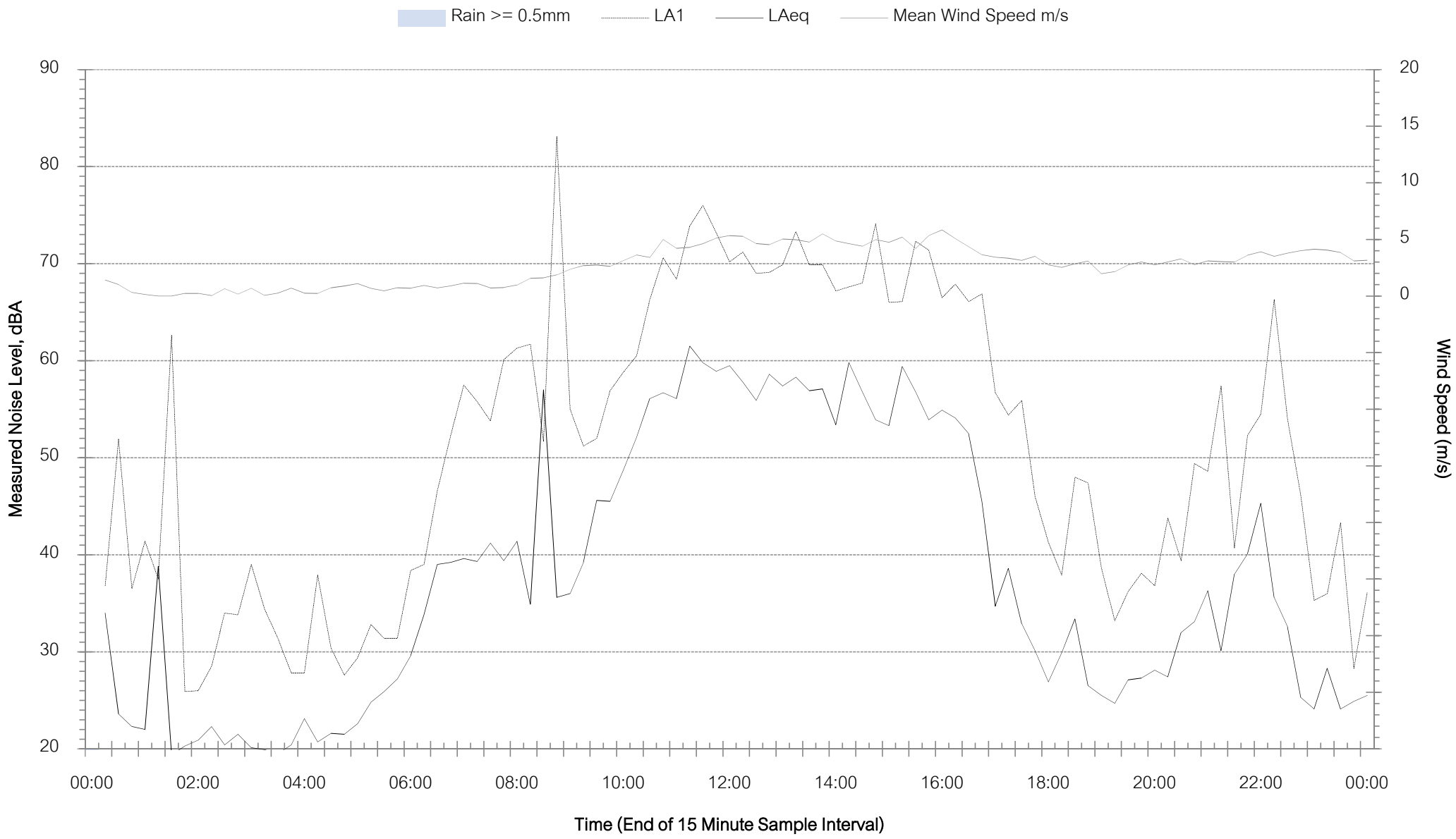
Background Noise Levels

Milpose - Wednesday 8 May 2019



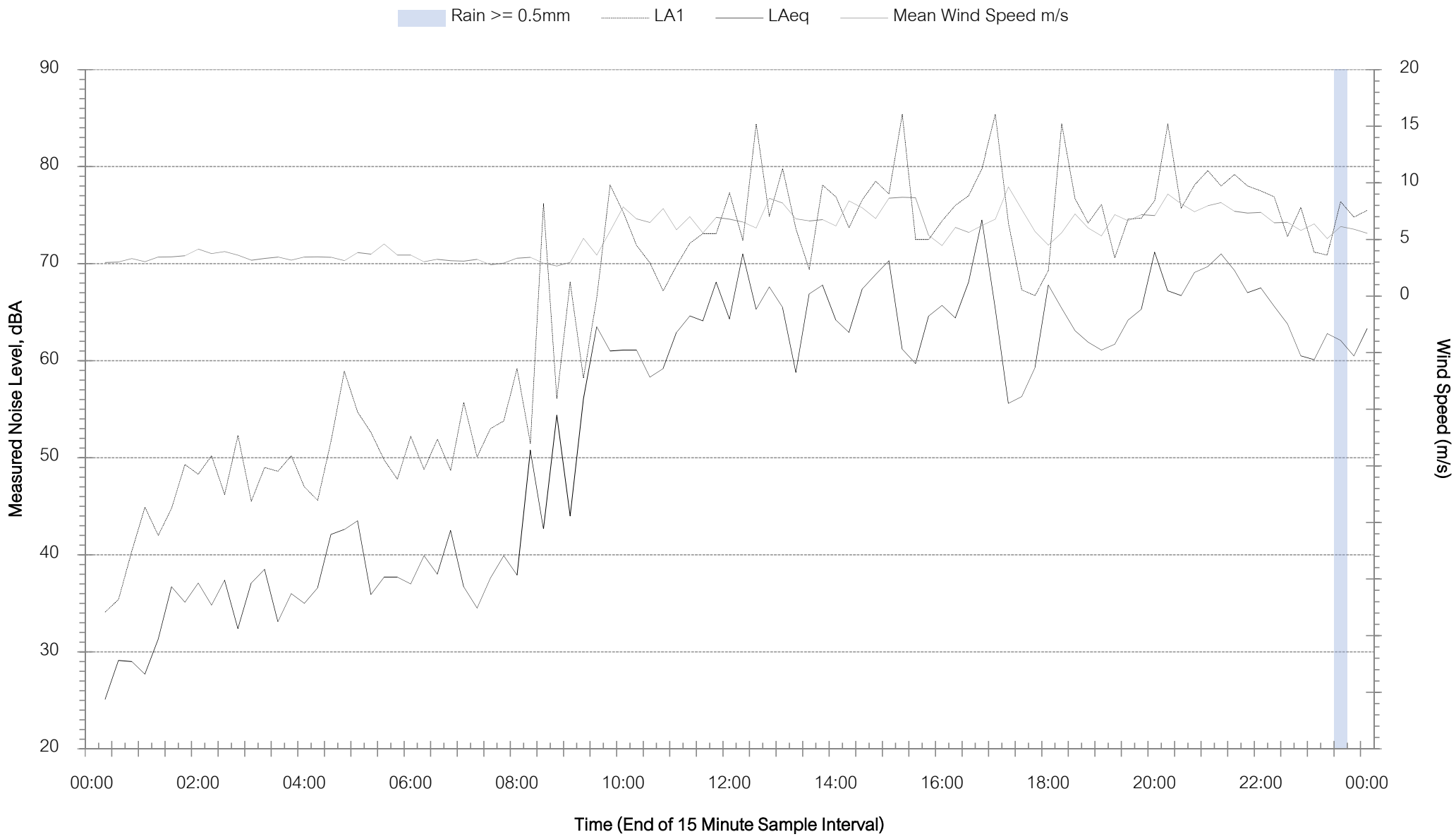
Background Noise Levels

Milpose - Thursday 9 May 2019



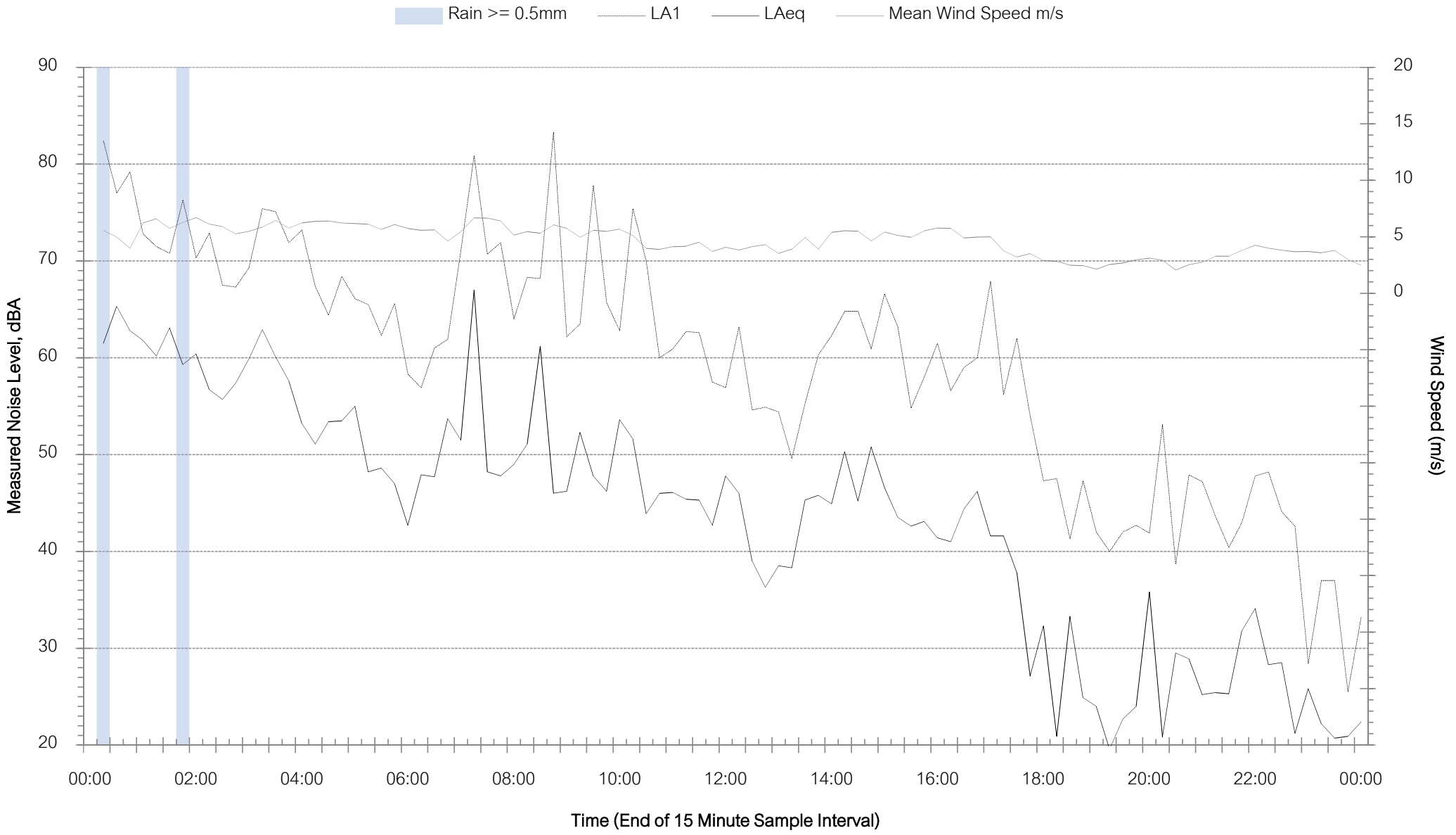
Background Noise Levels

Milpose - Friday 10 May 2019



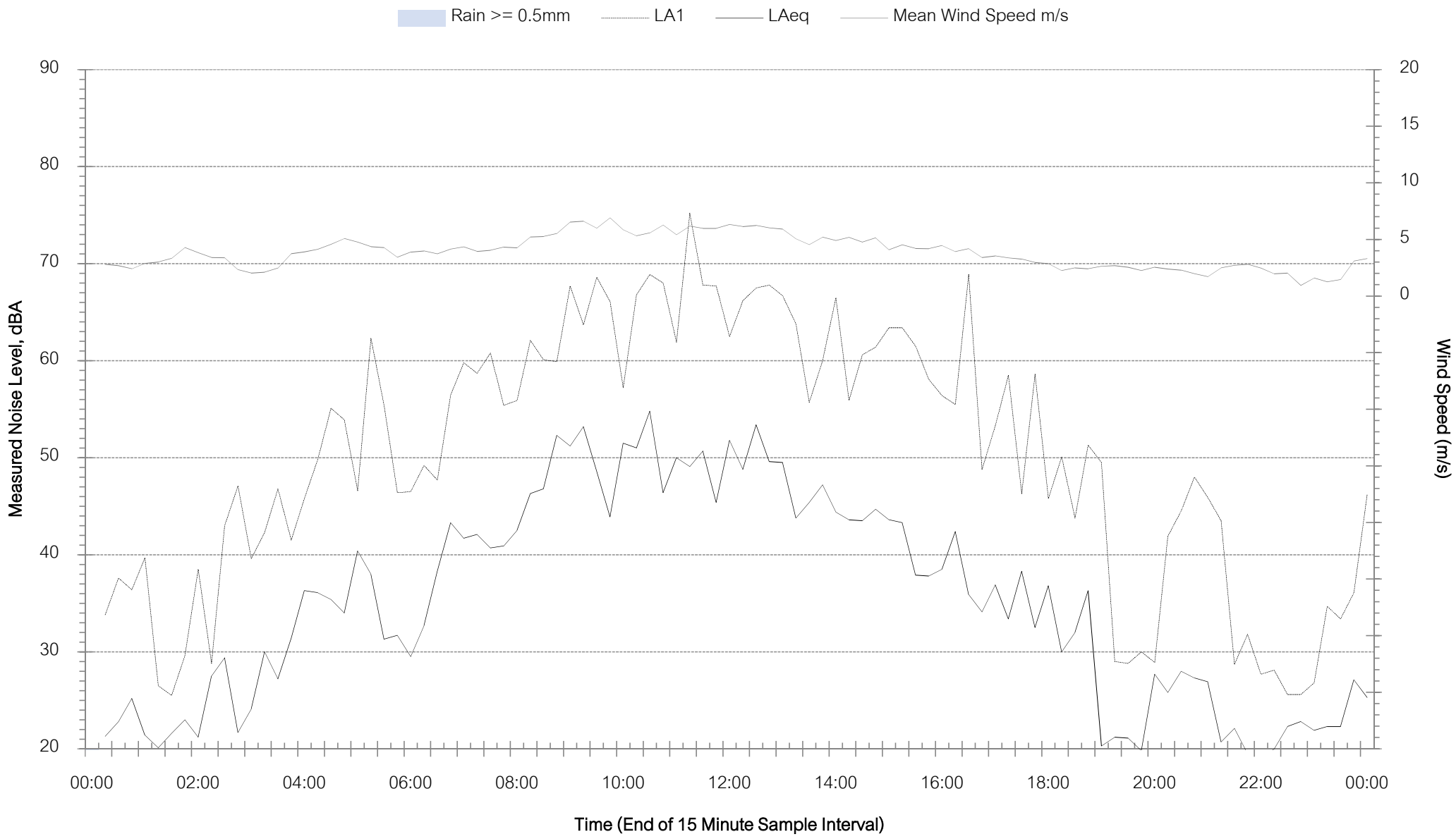
Background Noise Levels

Milpose - Saturday 11 May 2019



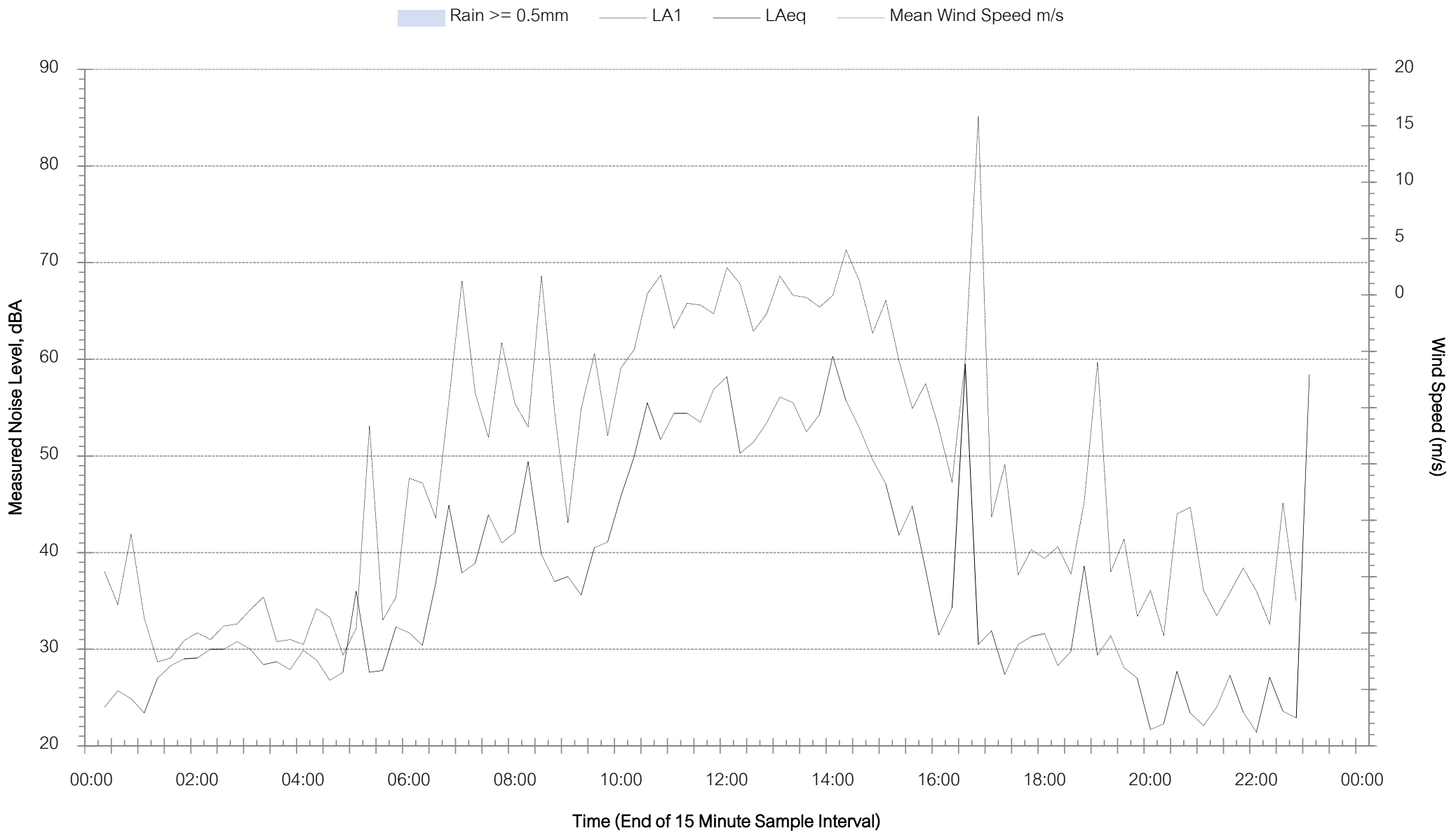
Background Noise Levels

Milpose - Sunday 12 May 2019



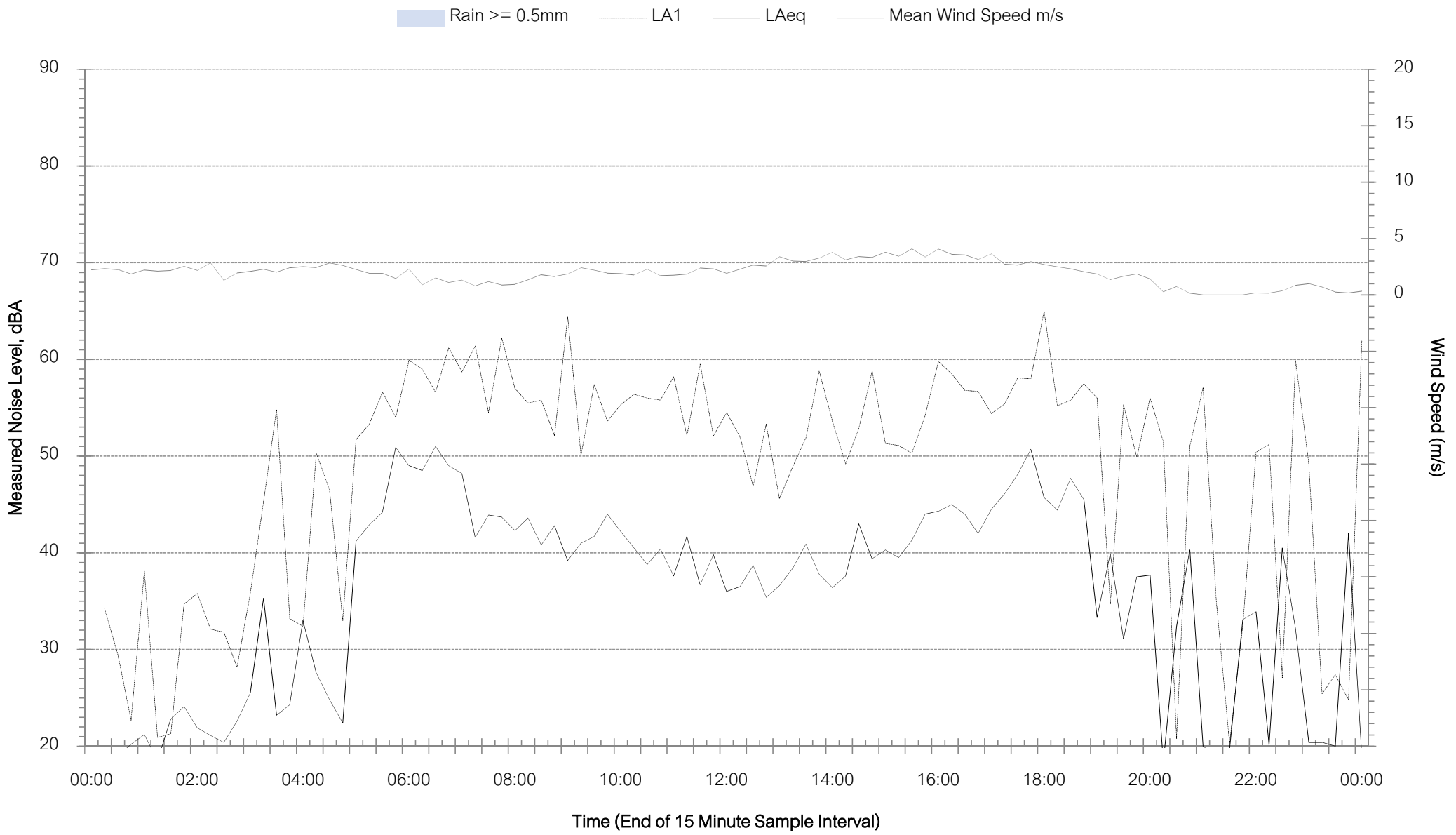
Background Noise Levels

Milpose - Monday 13 May 2019



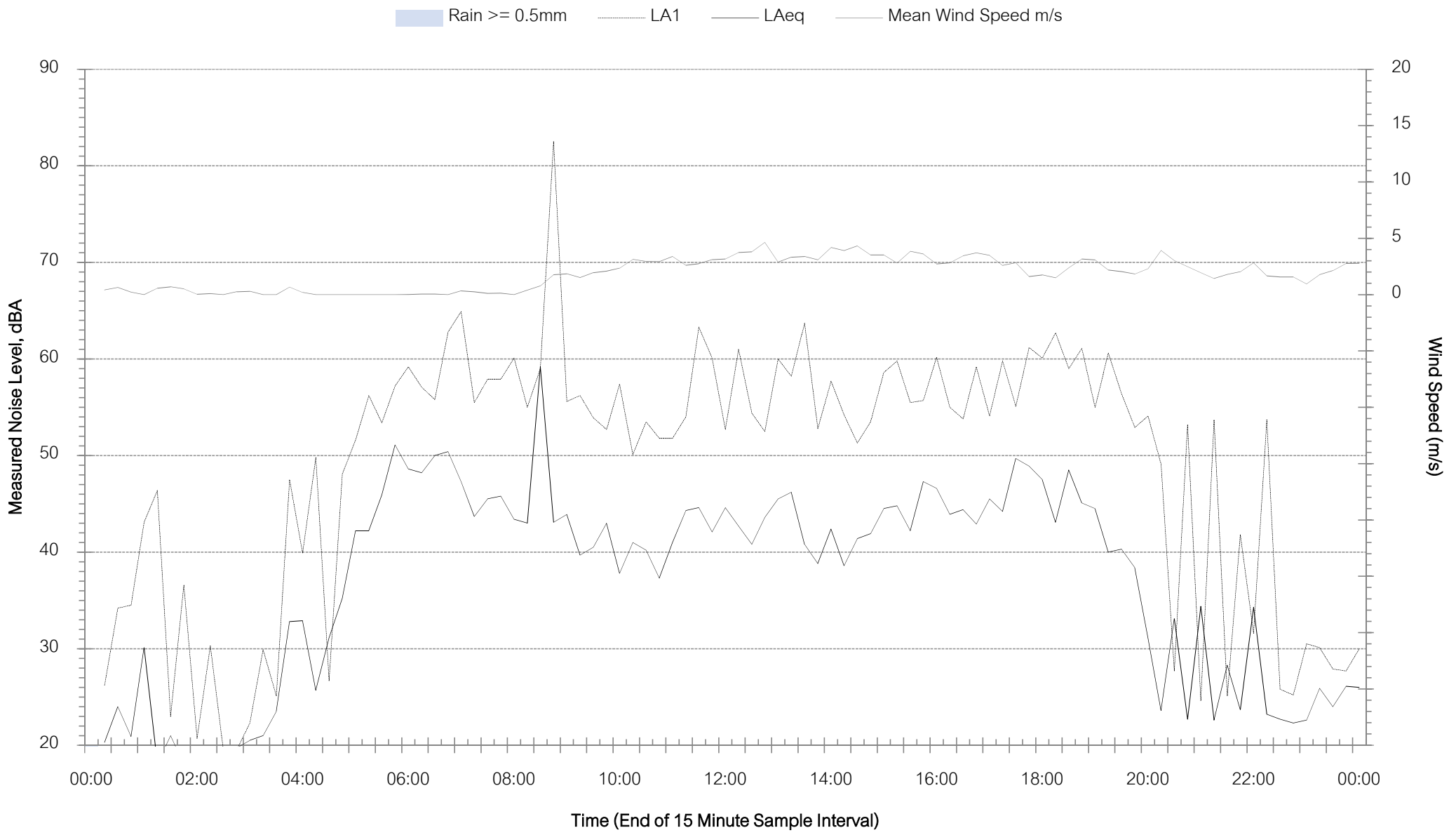
Background Noise Levels

Hillview - Monday 6 May 2019



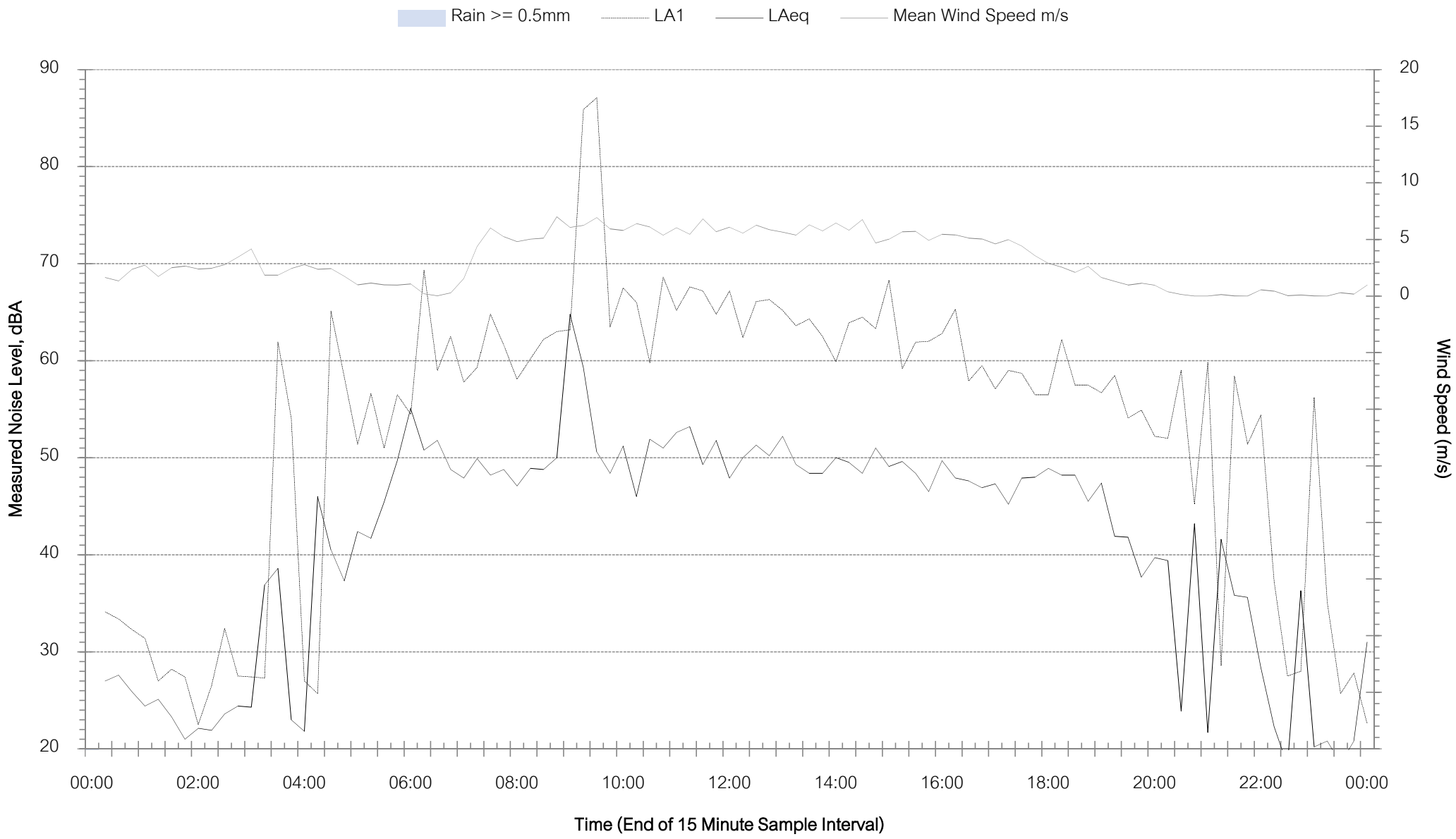
Background Noise Levels

Hillview - Tuesday 7 May 2019



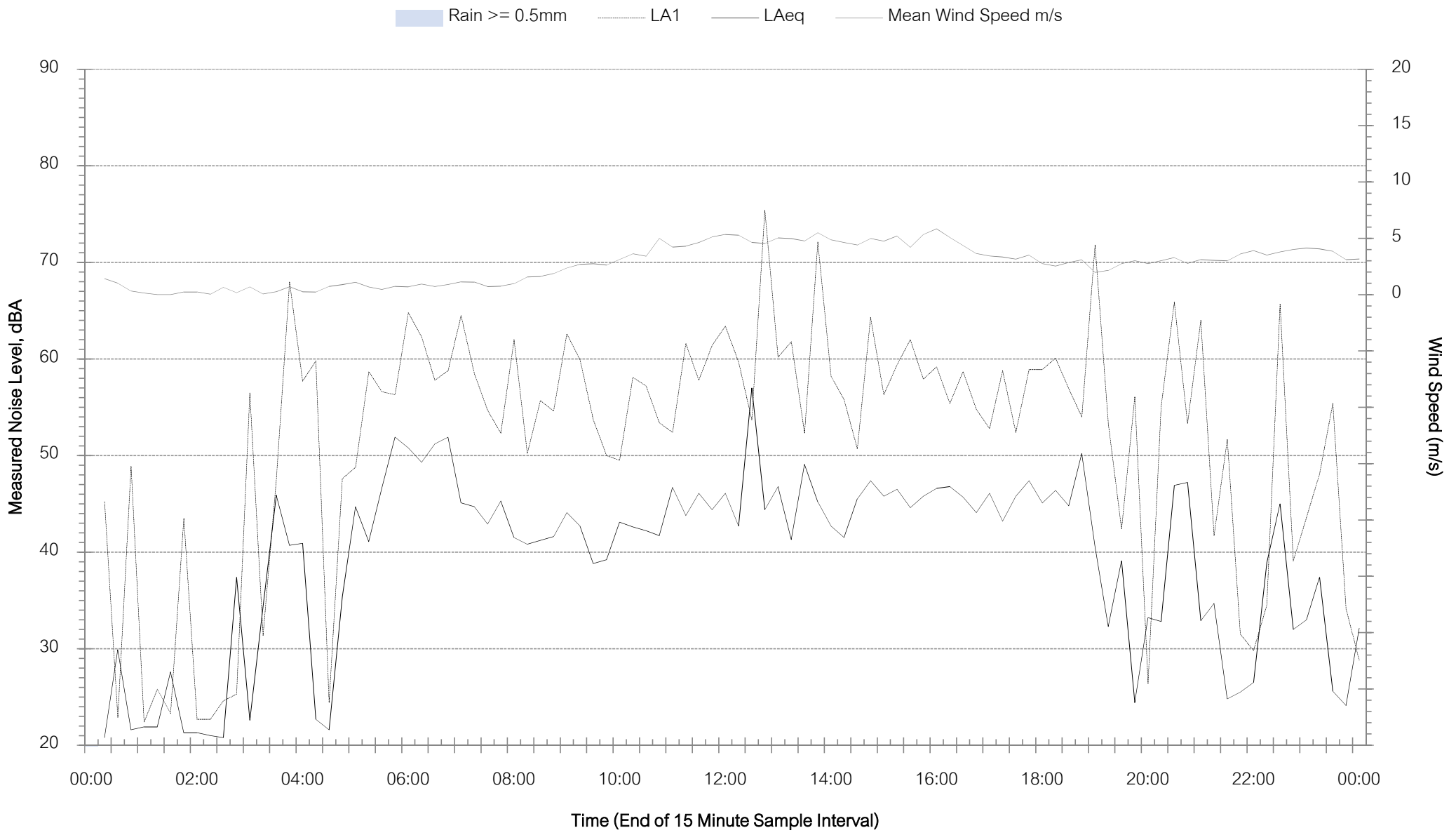
Background Noise Levels

Hillview - Wednesday 8 May 2019



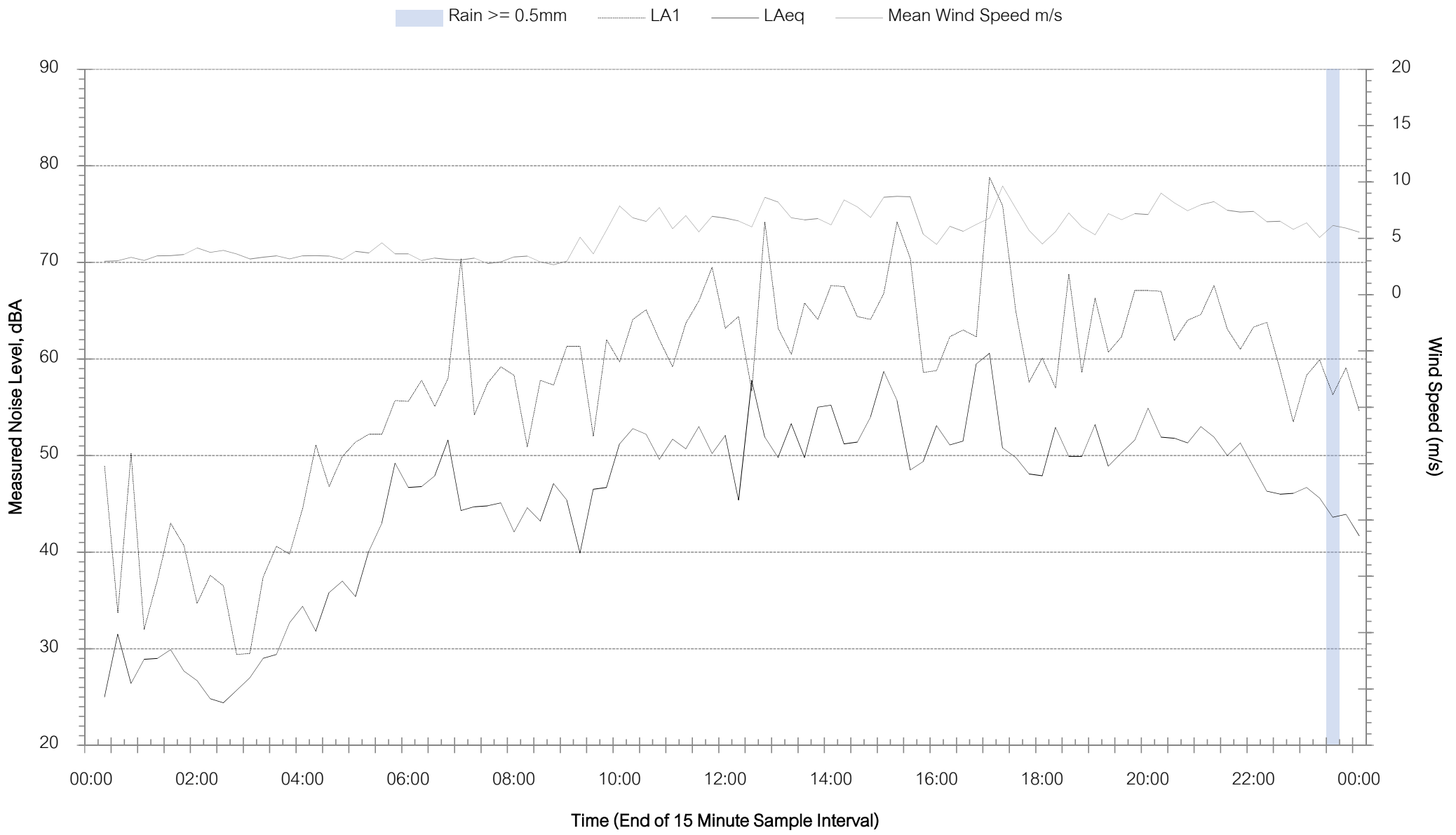
Background Noise Levels

Hillview - Thursday 9 May 2019



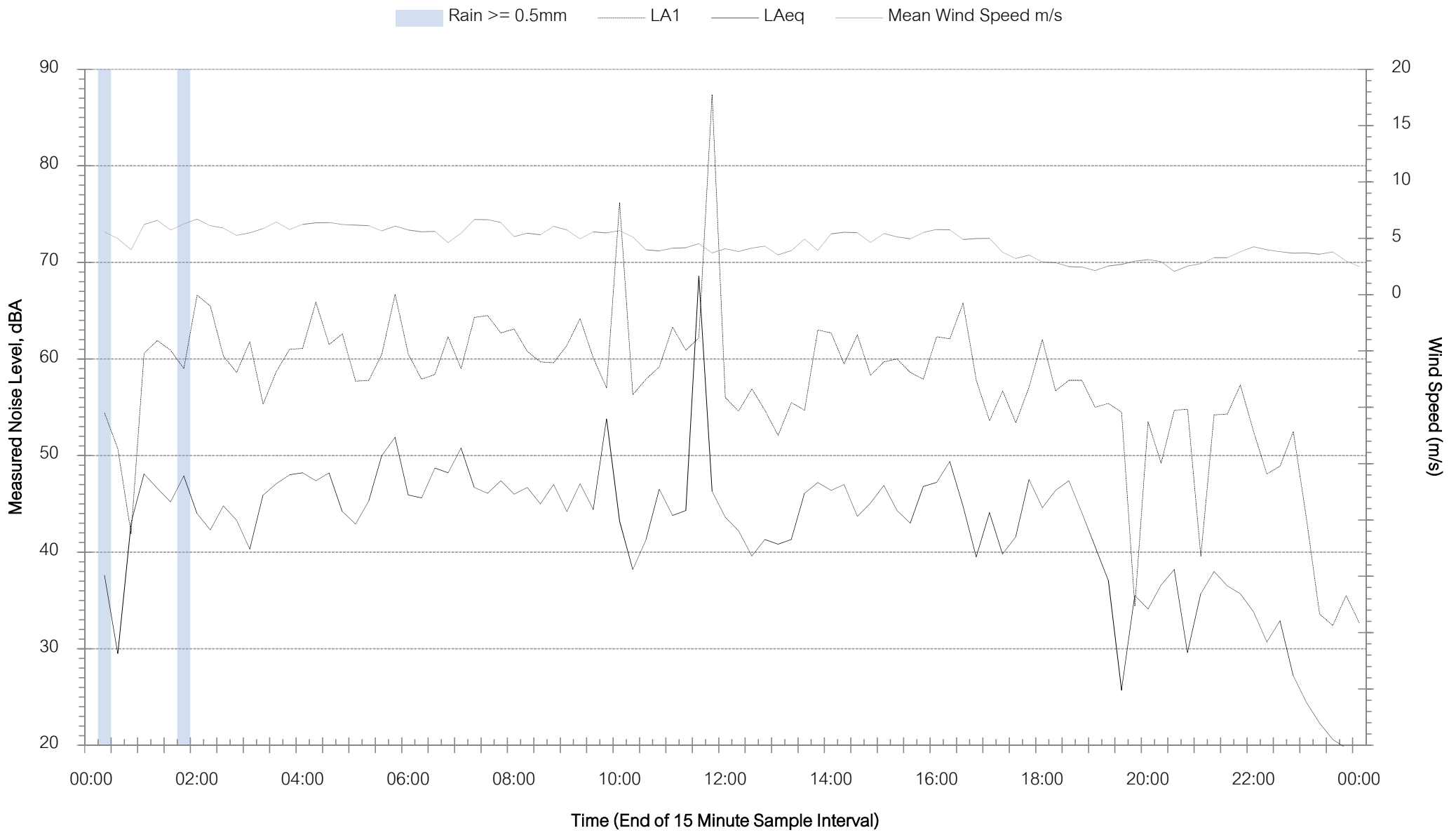
Background Noise Levels

Hillview - Friday 10 May 2019



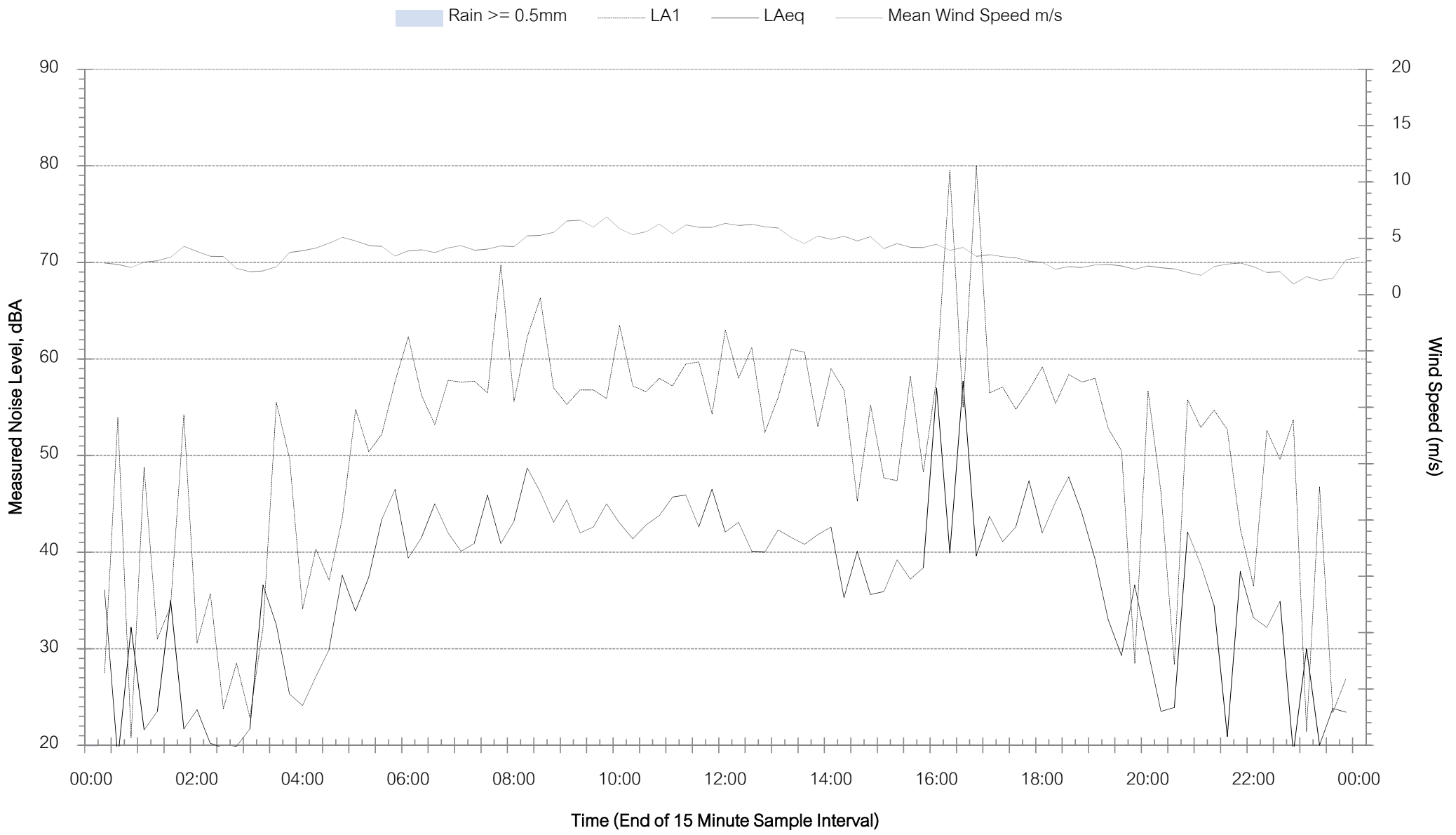
Background Noise Levels

Hillview - Saturday 11 May 2019



Background Noise Levels

Hillview - Sunday 12 May 2019



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