

Noise Monitoring Assessment

Northparkes Mines
Quarter 4, 2023



Document Information

Noise Monitoring Assessment

Northparkes Mines

Quarter 4, 2023

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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 (Northparkes), 27km Northwest of Parkes, NSW. The NMA has been completed to quantify operational noise emissions as per Conditions 1 to 5 of Schedule 3 of the Project Approval Conditions (PA #11_0060) 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);
- NSW Environment Protection Authority (EPA's), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022; and
- Standards Australia 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**.

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2 Noise Criteria

2.1 Operational Noise Criteria

This assessment has adopted criteria as per Conditions 1 to 5 of Schedule 3 of PA #11_0060 and the NMP, 2019 (see **Appendix B**) and is summarised below in **Table 1**.

Table 1 Noise Criteria				
Location	Day	Evening	Night	
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LA1(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.

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3 Assessment Methodology

All attended noise monitoring surveys for this assessment were conducted in general accordance with the procedures described in Standards Australia 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 with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) 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 ± 0.5 dBA.

3.1 Operational Noise Measurement Methodology

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

Table 2 Noise Monitoring Locations			
ID	Location	Coordinate Locations, MGA55	
		Easting (m)	Northing (m)
NM1	Hubberstone	600687	6360754
NM2	Lone Pine	593669	6358933
NM3	Milpose	594827	6352971
NM4	Hillview	602993	6353469
NM5	Adavale	593568	6356920

Note: NM5 is an additional monitoring initiative by NPM.

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

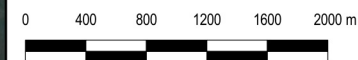
Measurements were carried out using a Svantek Type 1, 971 noise analyser from Wednesday 6 December 2023 to Thursday 7 December 2023. The monitoring regime consisted of three 15-minute measurements during the daytime, evening and night-time periods at each monitoring location. Throughout each survey, the operator quantified the contribution of significant noise sources where possible.



FIGURE 1
Locality Plan
MAC190810
Northparkes Mine

KEY

● Monitoring Locations



4 Results

4.1 Operational Noise Results

The monitoring assessment results for each location are presented in **Table 3** to **Table 7**. Each table contains results for each of the three 15-minute measurements for daytime, evening and night-time periods for each location including wind direction, wind speed and atmospheric stability class.

Table 3 Operator-Attended Noise Survey Results – Location NM1, Hubberstone

Time(hrs)/Date Duration 15min	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L _A max	L _A eq	L _A 90		
Day					
17:03 07/12/2023	69	50	42	WD: SW WS: 2.5m/s Stab Class: D	Wind 36-65
17:18 07/12/2023	73	49	42		Birds 35 -69
17:33 07/12/2023	71	48	41		MAC Operator 71-73
					NPM Inaudible
Site L _A eq(15min) Contribution					<35
Evening					
20:06 06/12/2023	57	39	34	WD: SE WS: 1.0m/s Stab Class: E	Birds 30-57
20:21 06/12/2023	53	38	35		Insects 31-44
20:36 06/12/2023	55	39	35		Dogs Barking 30-38
					NPM Inaudible
Site L _A eq(15min) Contribution					<35
Night					
00:58 07/12/2023	59	41	35	WD: SE WS: 0.1m/s Stab Class: D	Traffic 30-59
01:13 07/12/2023	44	37	34		Insects 32-45
01:28 07/12/2023	43	37	34		NPM – Processing Hum 25-30 (barely to just audible throughout)
Site L _A eq(15min) Contribution					<35
Site L _A 1(1min) Contribution					<45

Note: NPM denotes Northparkes Mines.

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.

Table 4 Operator-Attended Noise Survey Results – Location NM2, Lone Pine

Time(hrs)/Date Duration 15min	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L _A max	L _A eq	L _A 90		
Day					
16:05 07/12/2023	66	49	44	WD: S WS: 2.5m/s Stab Class: D	Wind 40-66 Birds 35-66 Traffic 35-55 Residential Noise 40-59 NPM Inaudible
16:20 07/12/2023	62	49	45		
16:35 07/12/2023	66	51	48		
Site L _A eq(15min) Contribution			<35		
Evening					
21:06 06/12/2023	58	51	42	WD: SE WS: 0.5m/s Stab Class: E	Insects 35-58 Aircraft <35-45 Agricultural Noise <35-41 NPM Inaudible
21:21 06/12/2023	48	43	41		
21:36 06/12/2023	47	41	39		
Site L _A eq(15min) Contribution			<35		
Night					
22:00 06/12/2023	54	42	40	WD: SE WS: 0.5m/s Stab Class: F	Insects 37-54 Aircraft 35-54 Agricultural Noise <35-40 NPM Inaudible
22:15 06/12/2023	45	42	40		
22:30 06/12/2023	46	41	39		
Site L _A eq(15min) Contribution			<35		
Site L _A 1(1min) Contribution			<45		

Note: NPM denotes Northparkes Mines.

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.

Table 5 Operator-Attended Noise Survey Results – Location NM3, Milpose

Time(hrs)/Date Duration 15min	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L _A max	L _A eq	L _A 90		
Day					
14:13 07/12/2023	61	41	33	WD: S WS: 2.0m/s Stab Class: D	Wind 29-62 Birds 25-53
14:28 07/12/2023	72	46	34		Aircraft 30-44
14:43 07/12/2023	62	44	38		MAC Operator 72 NPM Inaudible
Site L _A eq(15min) Contribution			<35		
Evening					
21:27 07/12/2023	53	43	37	WD: S WS: 1.0m/s Stab Class: E	Insects 35-54 Wind 30-46
21:42 07/12/2023	49	41	38		Birds 35-45
21:57 07/12/2023	54	45	39		NPM Inaudible
Site L _A eq(15min) Contribution			<35		
Night					
23:53 06/12/2023	50	44	41	WD: SE WS: 0.1m/s Stab Class: E	Insects 37-50 Traffic 35-43
00:08 07/12/2023	47	42	40		NPM – Exhaust Fan/Hum <30
00:23 07/12/2023	50	43	40		(barely audible throughout)
Site L _A eq(15min) Contribution			<35		
Site L _A 1(1min) Contribution			<45		

Note: NPM denotes Northparkes Mines.

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.

Table 6 Operator-Attended Noise Survey Results – Location NM4, Hillview

Time(hrs)/Date Duration 15min	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L _A max	L _A eq	L _A 90		
Day					
13:00 07/12/2023	78	51	32	WD: SW WS: 1.5m/s Stab Class: C	Residential Noise 30-78
13:15 07/12/2023	78	57	35		Traffic 30-58
13:30 07/12/2023	56	41	34		Wind 25-51
					Birds 25-40
					Agricultural Noise 25-39
					NPM Inaudible
Site L _A eq(15min) Contribution					<35
Evening					
18:00 07/12/2023	79	53	43	WD: S WS: 2.0m/s Stab Class: D	Residential Nosie 35-79
18:15 07/12/2023	68	50	43		Traffic 35-58
18:30 07/12/2023	59	47	42		Wind 39-59
					Aircraft 40-68
					NPM Inaudible
Site L _A eq(15min) Contribution					<35
Night					
01:53 07/12/2023	41	28	26	WD: SE WS: 0.1m/s Stab Class: F	Traffic 30-62
02::08 07/12/2023	62	43	27		Insects 24-36
02:23 07/12/2023	46	28	26		Birds 20-30
					Dogs Barking 20-32
					NPM Inaudible
Site L _A eq(15min) Contribution					<35
Site L _A 1(1min) Contribution					<45

Note: NPM denotes Northparkes Mines.

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.

Table 7 Operator-Attended Noise Survey Results – Location NM5, Adavale

Time(hrs)/Date Duration 15min	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L _A max	L _A eq	L _A 90		
Day					
15:10 07/12/2023	60	54	51	WD: SE WS: 3.0m/s Stab Class: E	Residential Noise 45-64
15:25 07/12/2023	62	54	49		Wind 43-60
15:40 07/12/2023	64	54	43		Birds 40-62
					Insects 40-53
					NPM Inaudible
Site L _A eq(15min) Contribution					<35
Evening					
19:16 07/12/2023	64	43	38	WD: SE WS: 1.5m/s Stab Class: D	Wind 25-60
19:31 07/12/2023	57	36	32		Insects 25-56
19:46 07/12/2023	64	38	32		MAC Operator 64
					NPM Inaudible
Site L _A eq(15min) Contribution					<35
Night					
22:55 06/12/2023	43	38	35	WD: SE WS: 0.1m/s Stab Class: D	Insects 34-44
23:10 06/12/2023	52	37	35		Birds 30-35
23:25 06/12/2023	55	38	36		Aircraft 30-35
					Agricultural Noise 52-55
					NPM – Exhaust Fan <30 (barely to just audible throughout)
Site L _A eq(15min) Contribution					<35
Site L _A 1(1min) Contribution					<45

Note: NPM denotes Northparkes Mines.

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 Road Noise Results

As an additional initiative to operational attended noise monitoring, Northparkes include two 1-hour attended noise monitoring measurements at the Hillview monitoring location (NM4) to quantify Northparkes road noise levels associated concentrate trucks movements (where present) and shift change traffic flows. **Table 8** 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 8 Operator-Attended Road Noise Survey Results – Location NM4, Hillview

Time(hrs)/Date	Measured Noise Level	Meteorology	Criteria	Description and SPL dBA
Duration 1 hour	dB LAeq(1hr)		dB LAeq(1hr)	
13:00 07/12/2023	53	WD: SW WS: 1.5m/s Stab Class: C	55	Residential Noise 30-78
				Traffic 30-58
				Wind 25-51
				Birds 25-40
				Agricultural Noise 25-39
18:00 07/12/2023	49	WD: S WS: 2.0m/s Stab Class: D	55	NPM Concentrate Truck (offsite) 30-56 (2 Passes) (Approx. 18 vehicles Enter/Exit NPM Site)
				Residential Noise 35-79
				Traffic 35-58
				Wind 39-59
				Aircraft 40-68
18:00 07/12/2023	49	WD: S WS: 2.0m/s Stab Class: D	55	NPM Concentrate Truck (offsite) 30-55 (2 Passes) (Approx. 68 vehicles Enter/Exit NPM Site)
				Residential Noise 35-79
				Traffic 35-58
				Wind 39-59
				Aircraft 40-68

Note: NPM denotes Northparkes Mines.

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.

Results of the road noise survey identify that the LAeq(1hr) noise contribution at NM4 is <50dBA for both measurements and hence, satisfy the relevant road noise criteria as outlined in the NMP and the RNP. Observations from MAC operator identified concentrate truck movements during the day, evening and night measurement periods, at a maximum of two movements per hour, which is in line with previous NPM quarterly measurements.

4.3 Unattended Noise Results

Unattended noise monitors are installed at four attended monitoring 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.

Averaged results of the LA90(15min) and LA1(15min) metrics from the seven-day monitoring period from Sunday 3 December 2023 to Saturday 9 December 2023 for NM1, NM3, NM4 and NM5 are summarised in **Table 9**. **Appendix C** presents the unattended results in chart format. Unattended data for NM4, Hillview is unavailable due to technical issues.

Table 9 Unattended Noise Survey Results

Period ¹	Noise Descriptor (dBA re 20 µPa)	
	Weekly Average LA90(15min)	Weekly Average LA1(15min)
Location NM1, Hubberstone		
Day	25	-
Evening	27	-
Night	32	46
Location NM3, Milpose		
Day	24	-
Evening	31	-
Night	40	51
Location NM4, Hillview		
Day	N/A	-
Evening	N/A	-
Night	N/A	N/A
Location NM5, Adavale		
Day	24	-
Evening	25	-
Night	28	36

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.

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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 quarter ending December 2023 noise survey, identified that NPM was inaudible during day and evening measurements and generally just audible throughout night-time measurements.

Contributions from NPM were characterised as general processing hum. External noise sources including wind in trees, birds, traffic, insects, and dogs barking, were audible during the monitoring period.

In summary, the noise contribution from NPM satisfied the relevant noise criteria for all monitored assessment periods at Location NM1.

5.1.2 Discussion of Results – Location NM2, Lone Pine.

Attended measurement results for monitoring conducted at NM2, Lone Pine, for the quarter ending December 2023 noise survey, identified that NPM was inaudible during day, evening and night-time measurements.

External noise sources including, traffic, birds, wind in trees, aircraft, insects, residential and agricultural noise, were all audible during the monitoring periods.

In summary, the noise contribution from NPM satisfied the relevant noise criteria for all monitored assessment periods at Location NM2.

5.1.3 Discussion of Results – Location NM3, Milpose.

Attended measurement results for monitoring conducted at NM3, Milpose, for the quarter ending December 2023 noise survey, identified that NPM was inaudible during the day and evening measurements and generally barely audible throughout night-time measurements.

Contributions from NPM were characterised as general site hum and exhaust fan noise. External noise sources including wind, traffic, birds, insects, and aircraft, were all audible during the monitoring periods.

In summary, the noise contribution from NPM satisfied the relevant noise criteria for all monitored assessment periods at Location NM3.

5.1.4 Discussion of Results – Location NM4, Hillview.

Attended measurement results for monitoring conducted at NM4, Hillview, for the quarter ending December 2023 noise survey, identified that NPM inaudible during day, evening and night-time measurements.

External noise sources including traffic, birds, insects, dogs barking, wind in trees, agricultural and residential noise were all audible during the monitoring period.

In summary, the noise contribution from NPM satisfied the relevant noise criteria for all monitored assessment periods at Location NM4.

5.1.5 Discussion of Results – Location NM5, Adavale.

Attended measurement results for additional monitoring conducted at NM5, Adavale, for the quarter ending December 2023 noise survey, indicated that NPM was inaudible during the day and evening measurements and generally barely to just audible throughout night-time measurements.

Contributions from NPM were characterised as exhaust fan noise. External noise sources including wind in trees, birds, insects, residential and agricultural noise were all audible during the monitoring period.

In summary, the noise contribution from NPM satisfied the relevant noise criteria for all monitored assessment periods at Location NM5.

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 Development Consent Conditions (PA #11_0060) and the Northparkes, Noise Management Plan (NMP, 2019) for Quarter 4, ending December 2023.

Road noise monitoring identified that vehicle movements associated with shift change generated noise 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 noise criteria at all monitoring locations for all assessment periods. Furthermore, project related noise emissions were generally just audible at three monitoring locations during night period. NPM noise sources such as production, exhaust fan and general site hum were audible and extraneous non-mining sources such as wind in trees, traffic, birds, dogs barking, aircrafts, insects, residential noise, and agricultural noise were audible during the monitoring period.

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Appendix A – Glossary of Terms

A number of technical terms have been used in this report and are explained in **Table A1**.

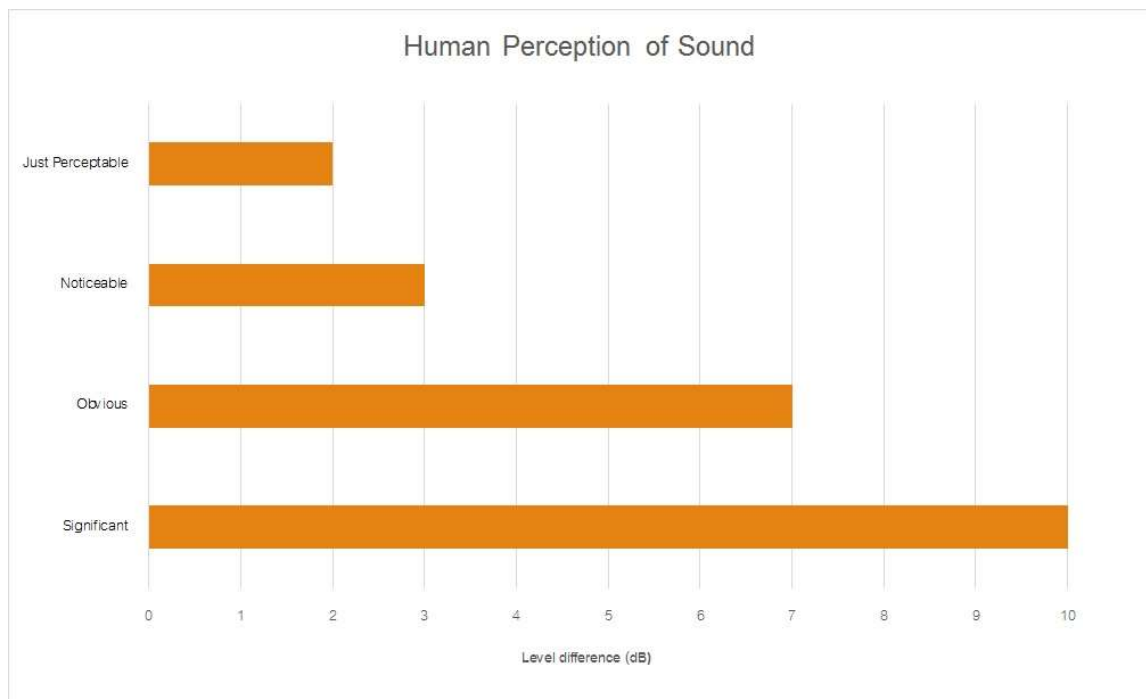
Table A1 Glossary of Acoustical Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The total noise associated with a given environment. Typically, a composite of sounds from all 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 sound.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is usually represented by the LA90 descriptor
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 Z-weighted or decibels Linear (unweighted).
Extraneous Noise	Sound resulting from activities that are not typical of the area.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A sound level which is exceeded 10% of the time.
LA90	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
LAeq	Represents the average noise energy or equivalent sound pressure level over a given period.
LAmx	The maximum sound pressure level received at the microphone during a measuring interval.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
RBL	The Rating Background Level (RBL) as defined in the NPI, is an overall single figure representing the background level for each assessment period over the whole monitoring period. The RBL, as defined is the median of ABL values over the whole monitoring period.
Sound power level (Lw or SWL)	This is a measure of the total power radiated by a source in the form of sound and is given by $10 \cdot \log_{10} (W/W_0)$. Where W is the sound power in watts to the reference level of 10^{-12} watts.
Sound pressure level (Lp or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from Lw in that it is the sound level at a receiver position as opposed to the sound 'intensity' of the source.

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 Pressure 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



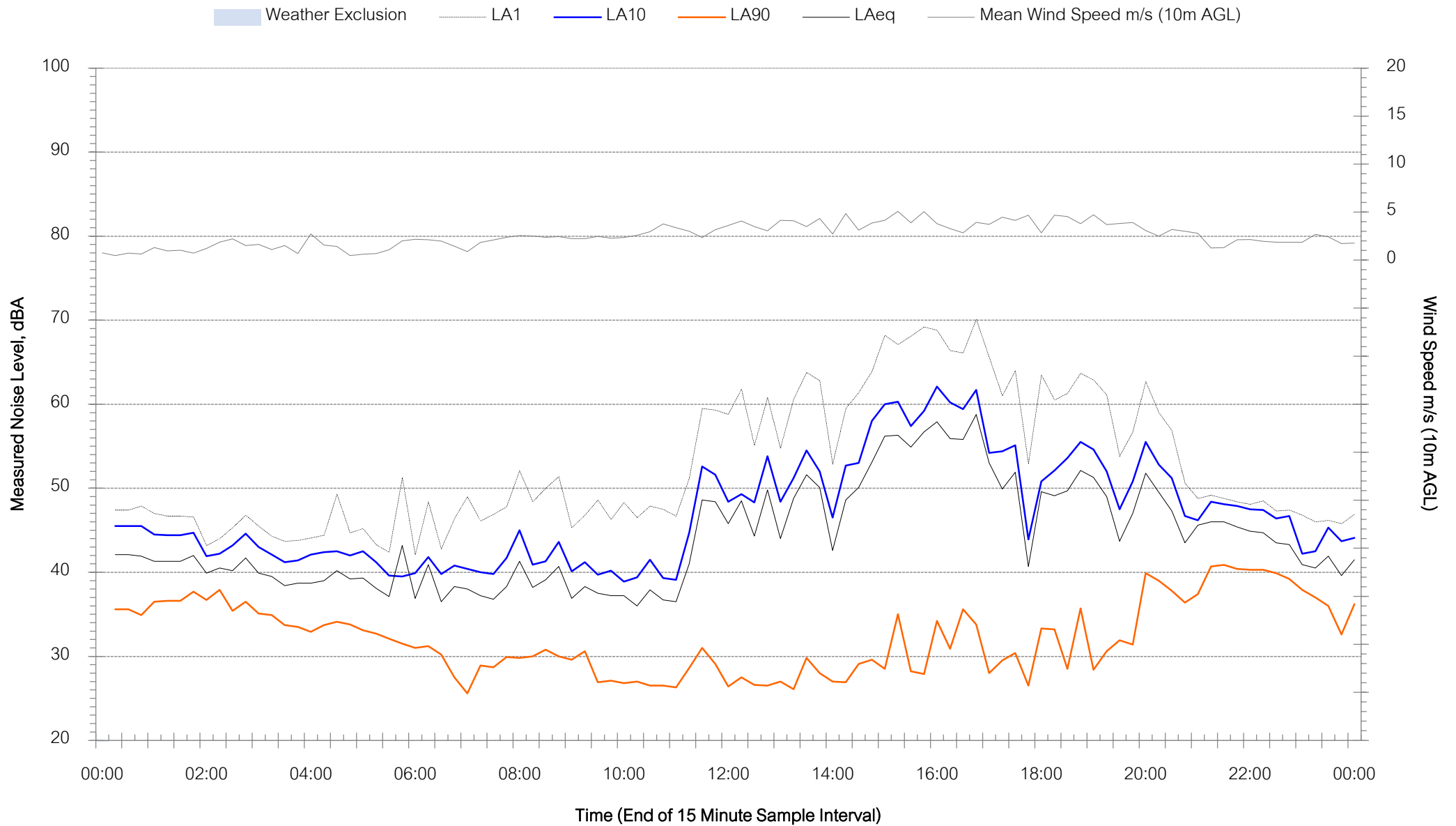
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Appendix B – Regulatory Noise Limits

Appendix C – Noise Monitoring Charts

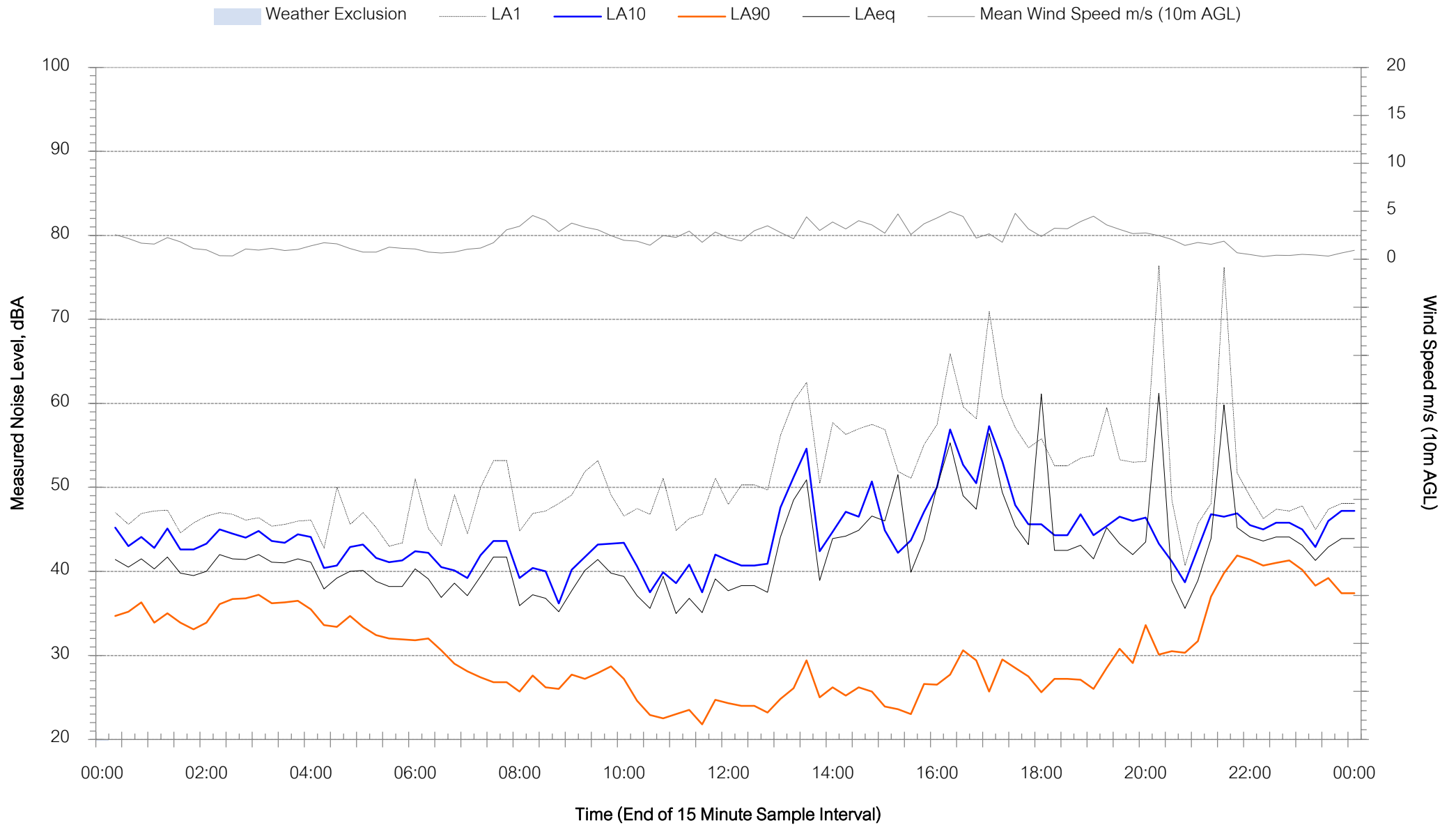
Background Noise Levels

NM1 Hubberstone - Sunday 3 December 2023



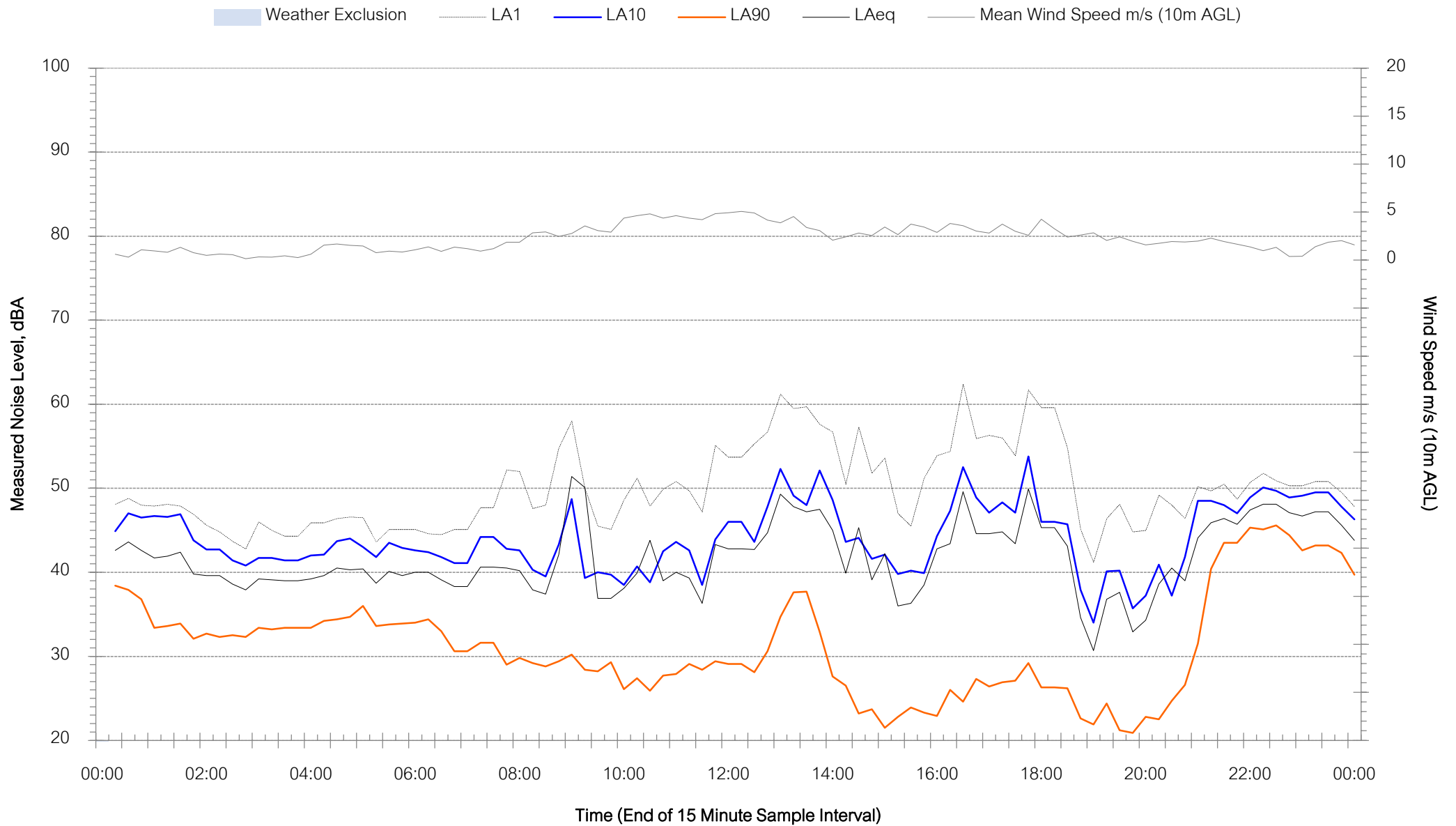
Background Noise Levels

NM1 Hubberstone - Monday 4 December 2023



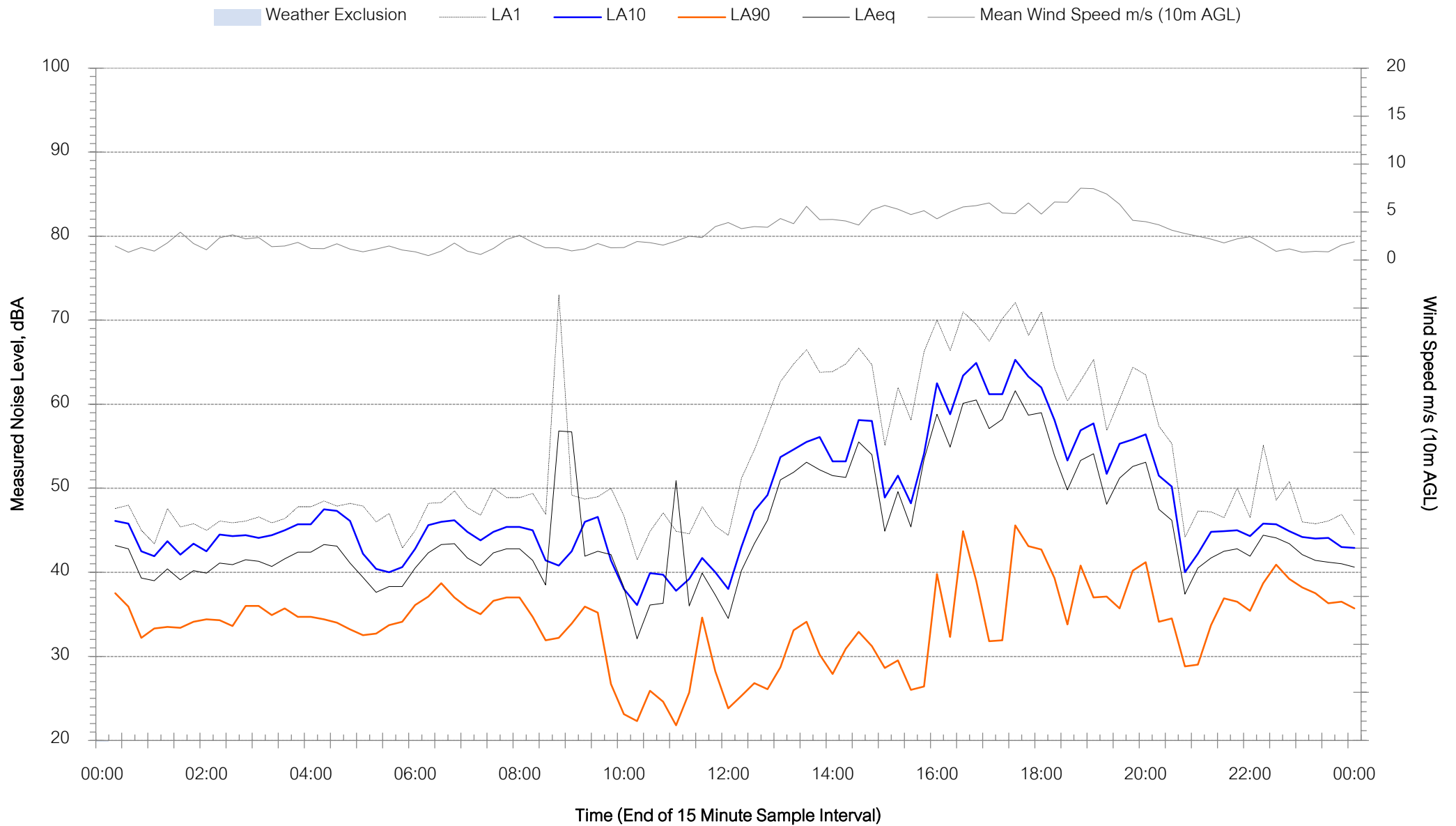
Background Noise Levels

NM1 Hubberstone - Tuesday 5 December 2023



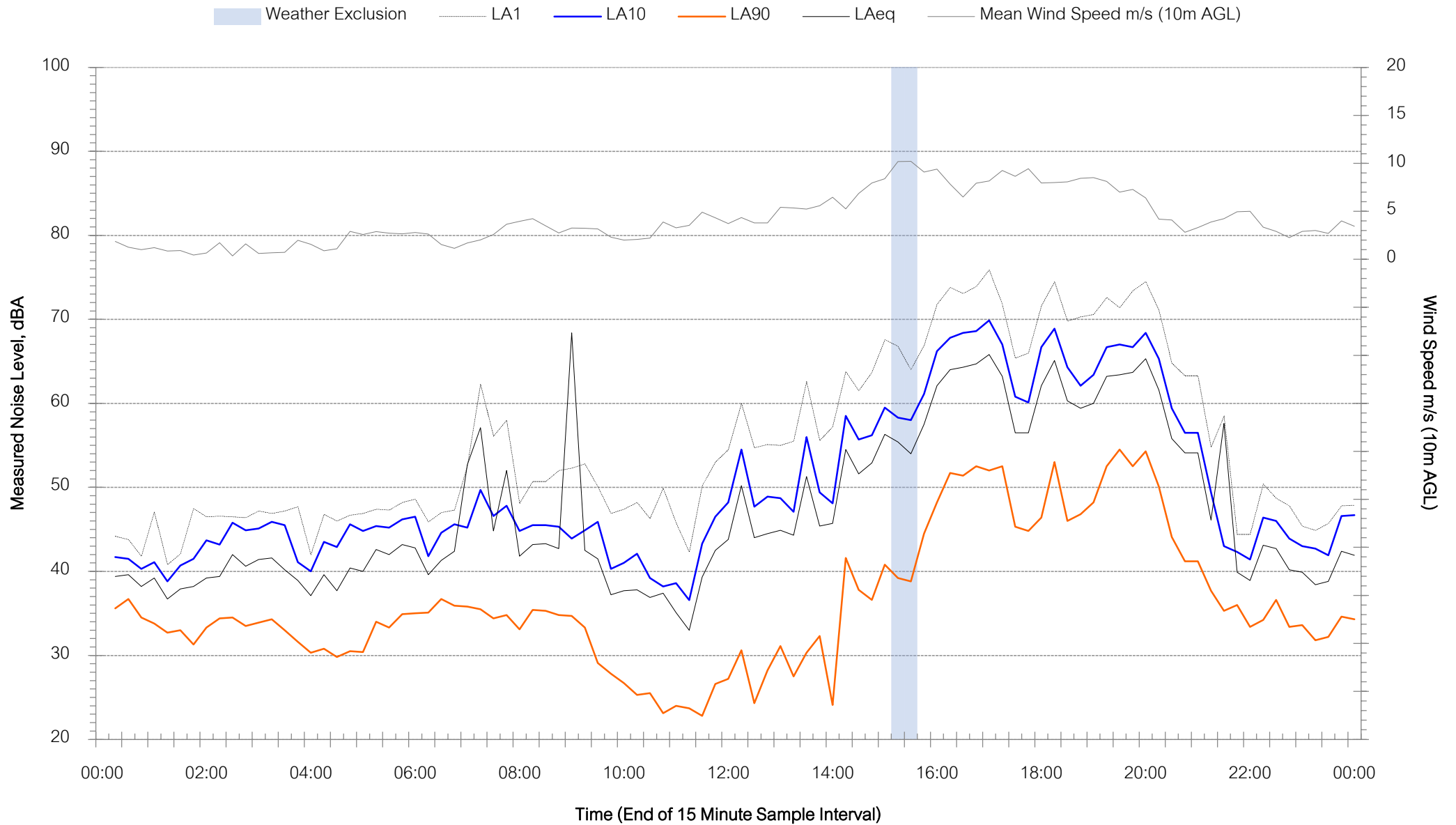
Background Noise Levels

NM1 Hubberstone - Wednesday 6 December 2023



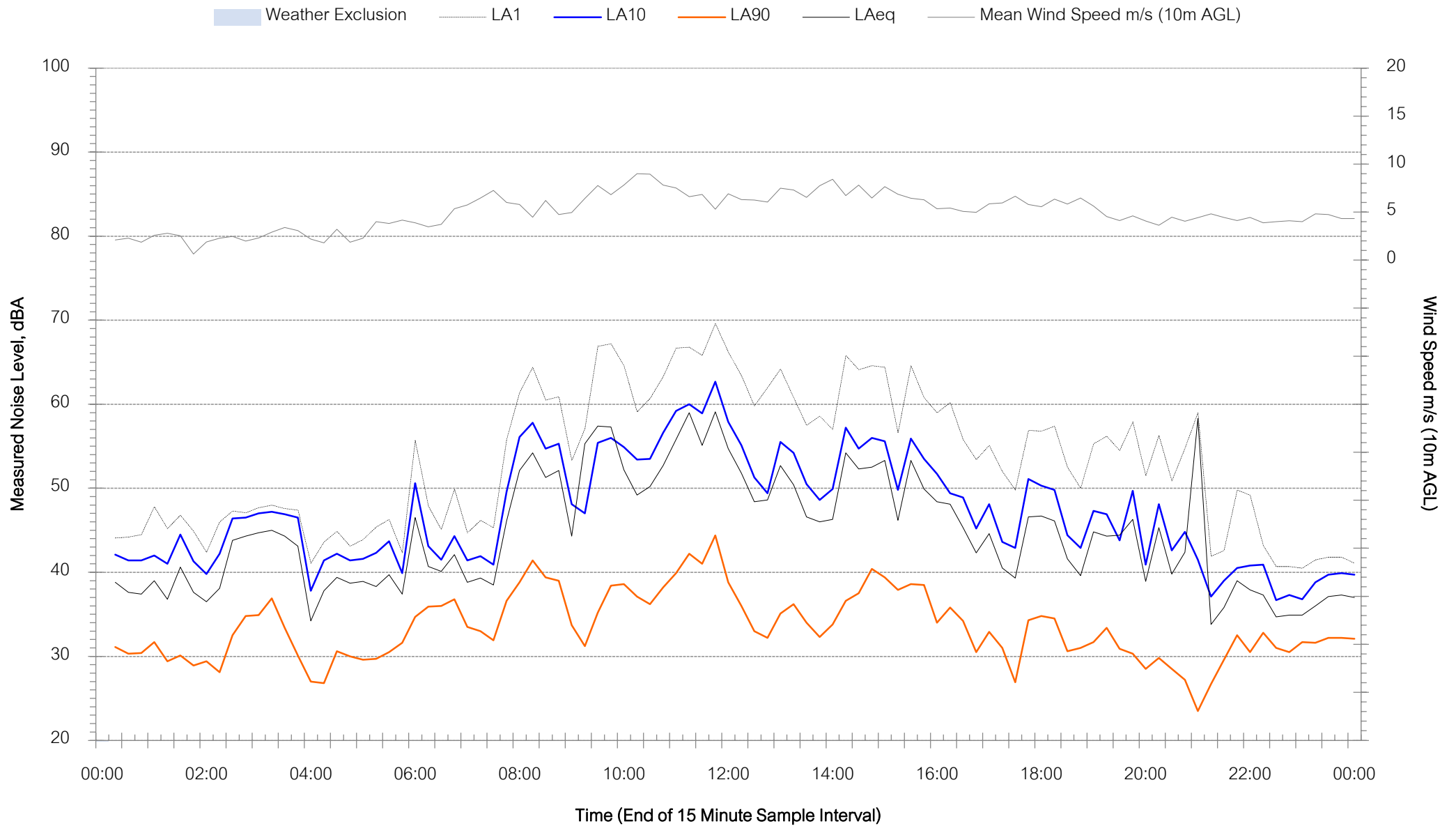
Background Noise Levels

NM1 Hubberstone - Thursday 7 December 2023



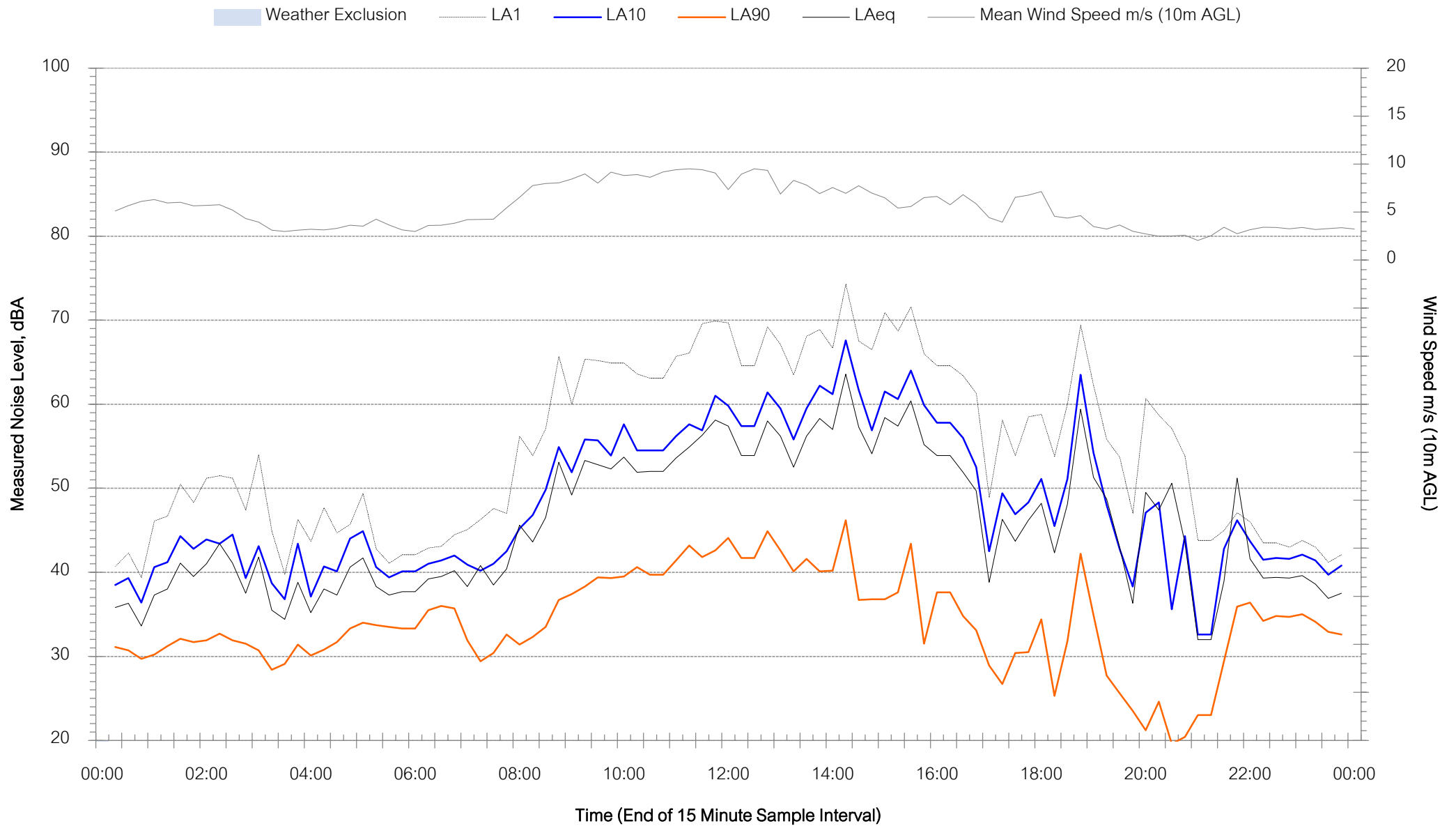
Background Noise Levels

NM1 Hubberstone - Friday 8 December 2023



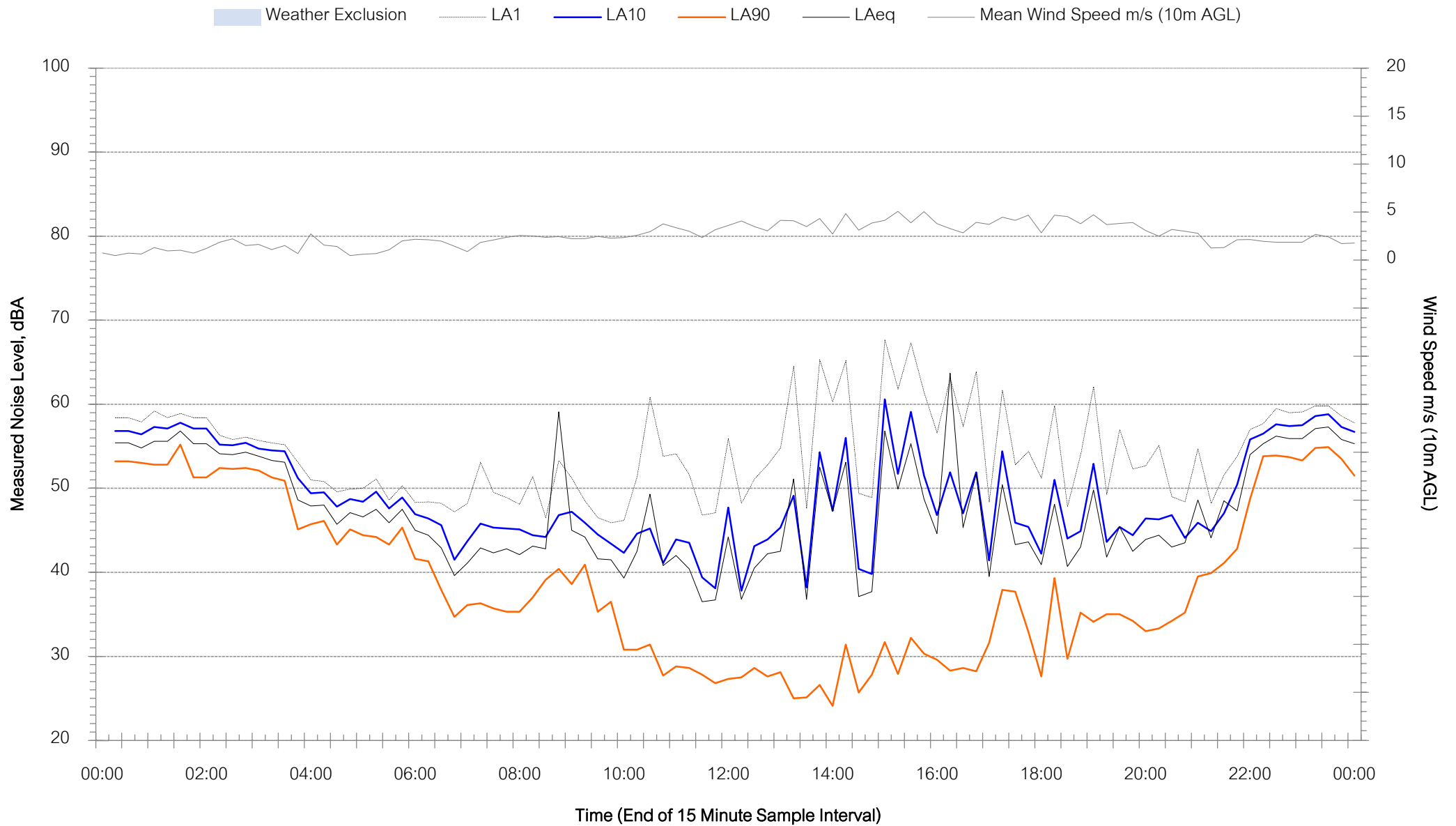
Background Noise Levels

NM1 Hubberstone - Saturday 9 December 2023



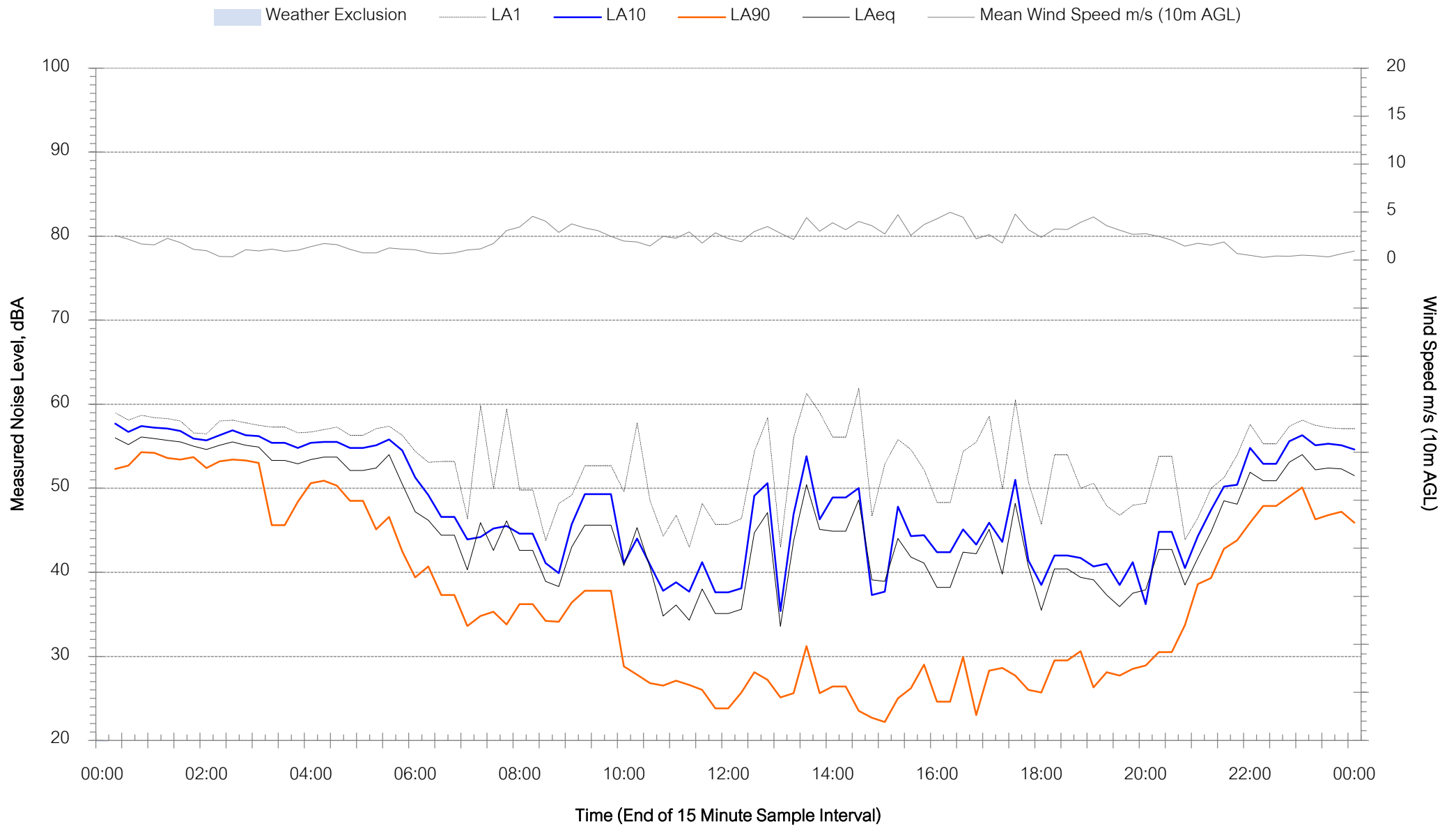
Background Noise Levels

NM3 Milpose - Sunday 3 December 2023



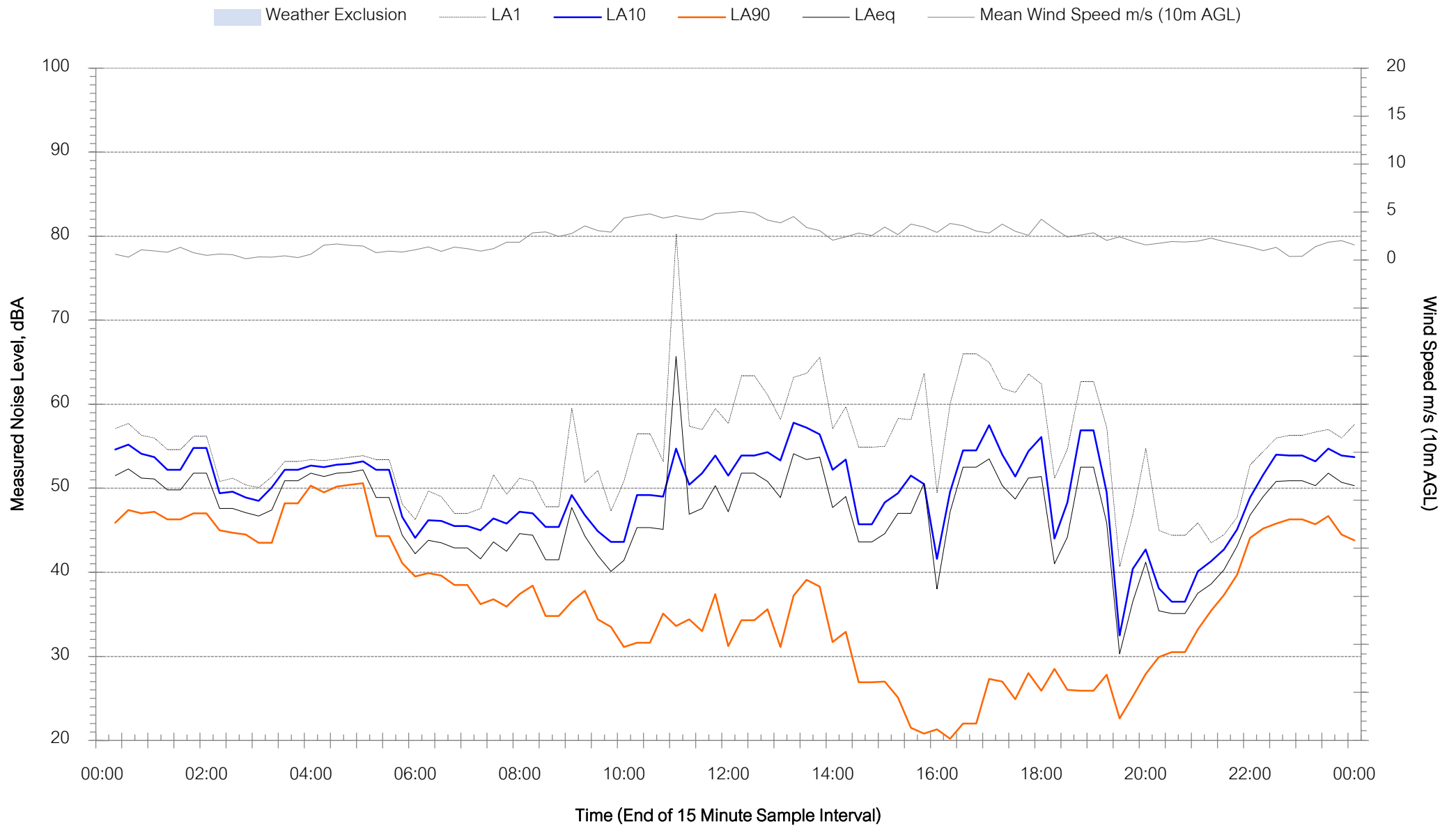
Background Noise Levels

NM3 Milpose - Monday 4 December 2023



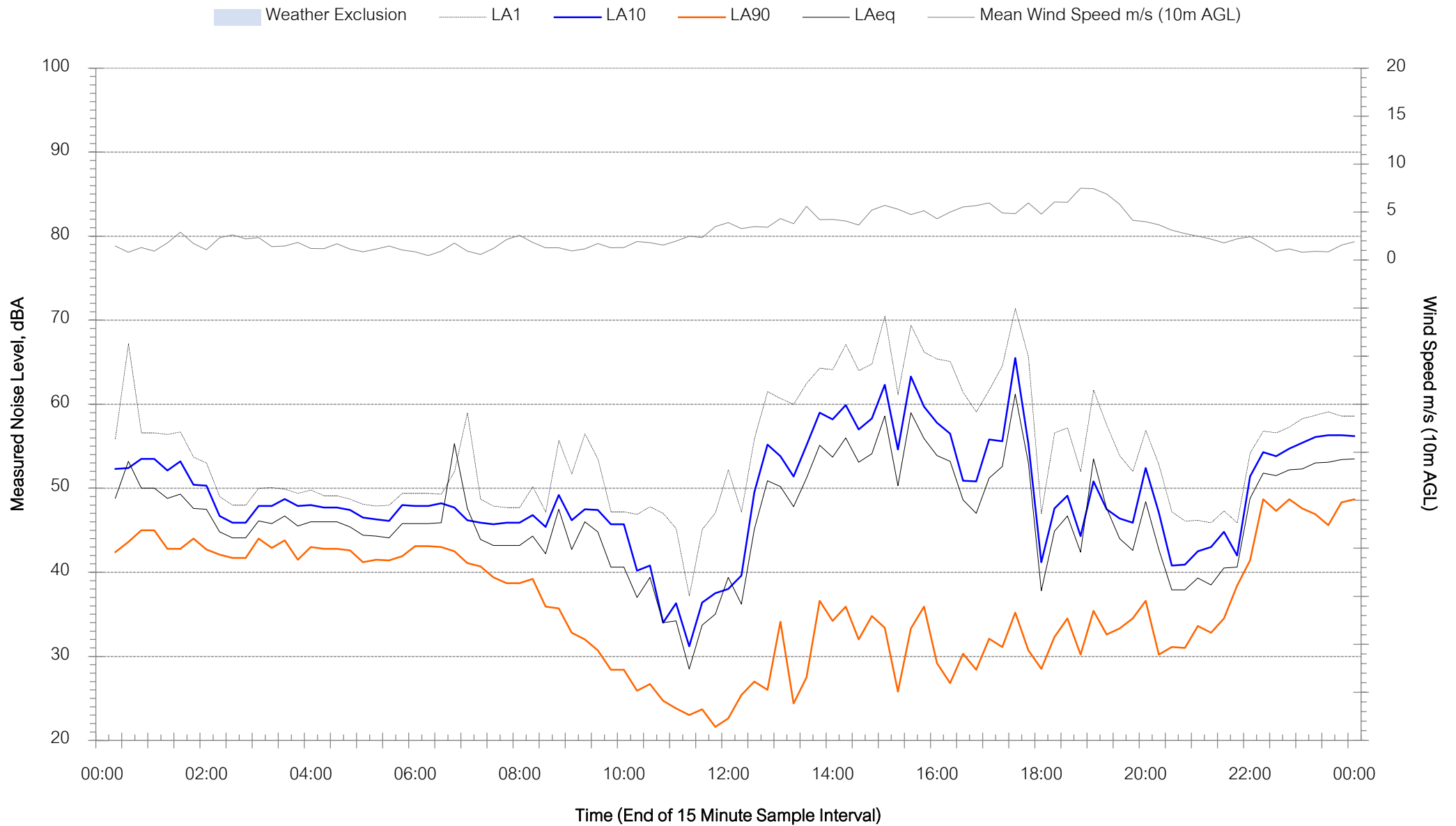
Background Noise Levels

NM3 Milpose - Tuesday 5 December 2023



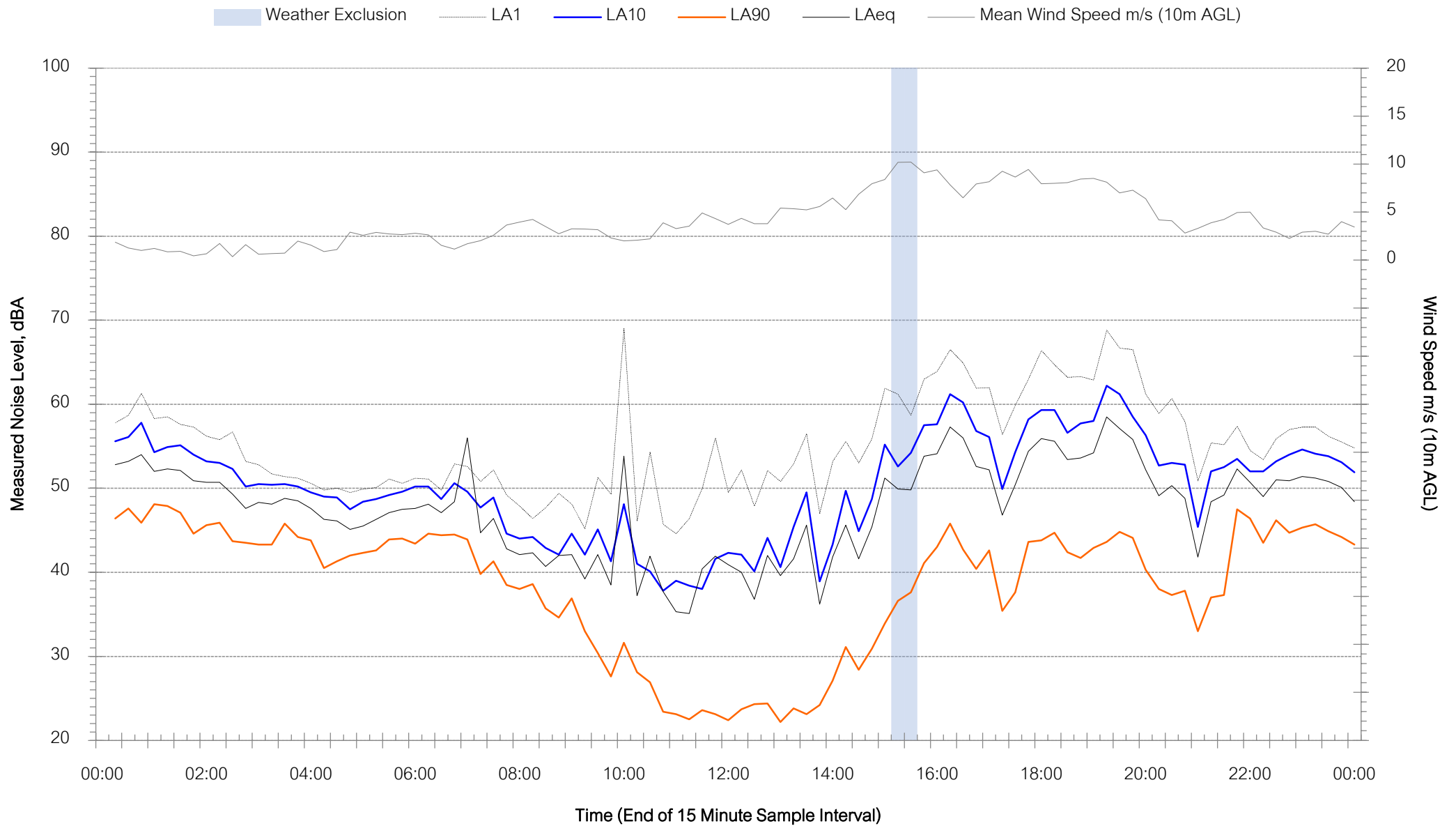
Background Noise Levels

NM3 Milpose - Wednesday 6 December 2023



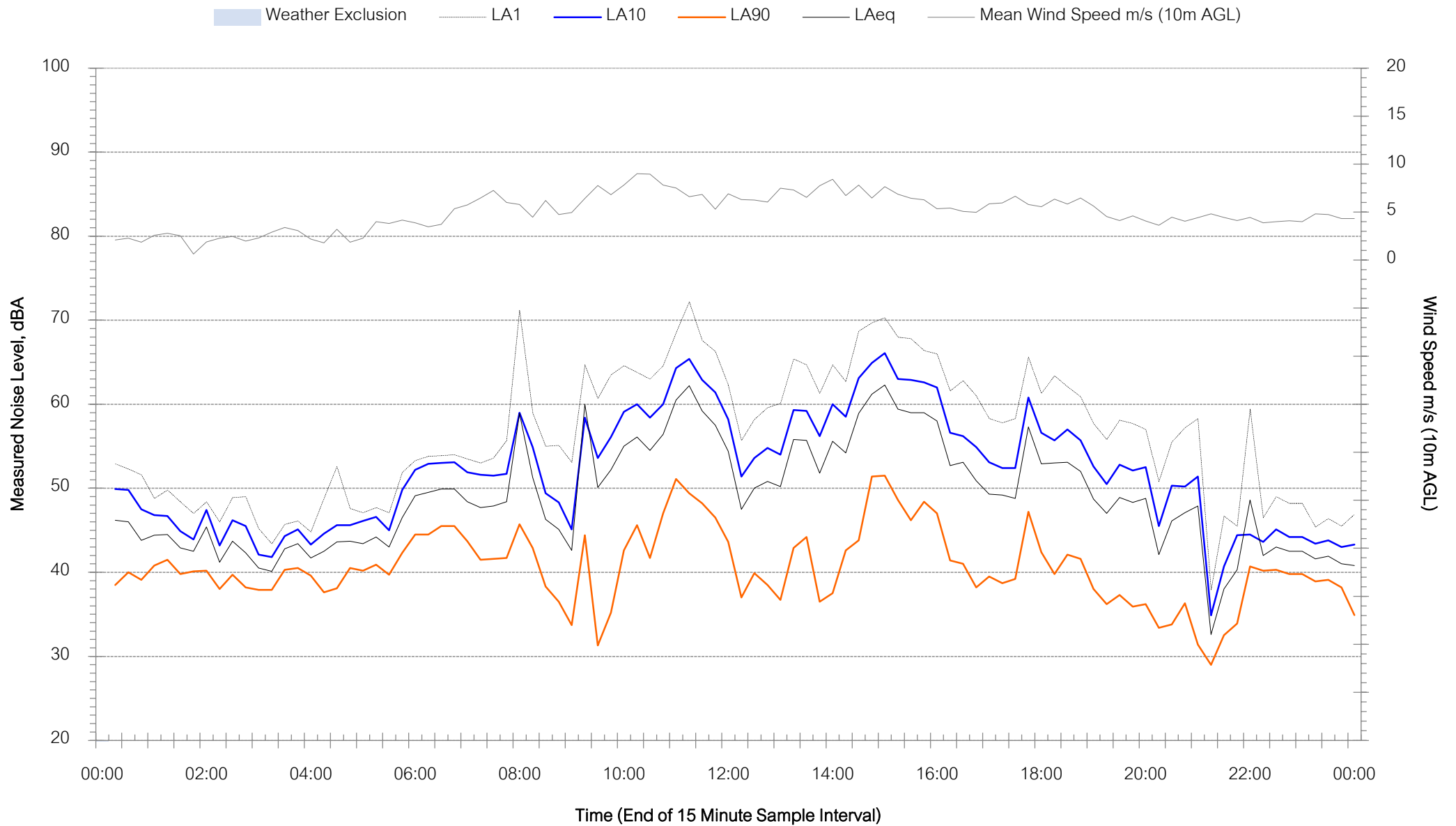
Background Noise Levels

NM3 Milpose - Thursday 7 December 2023



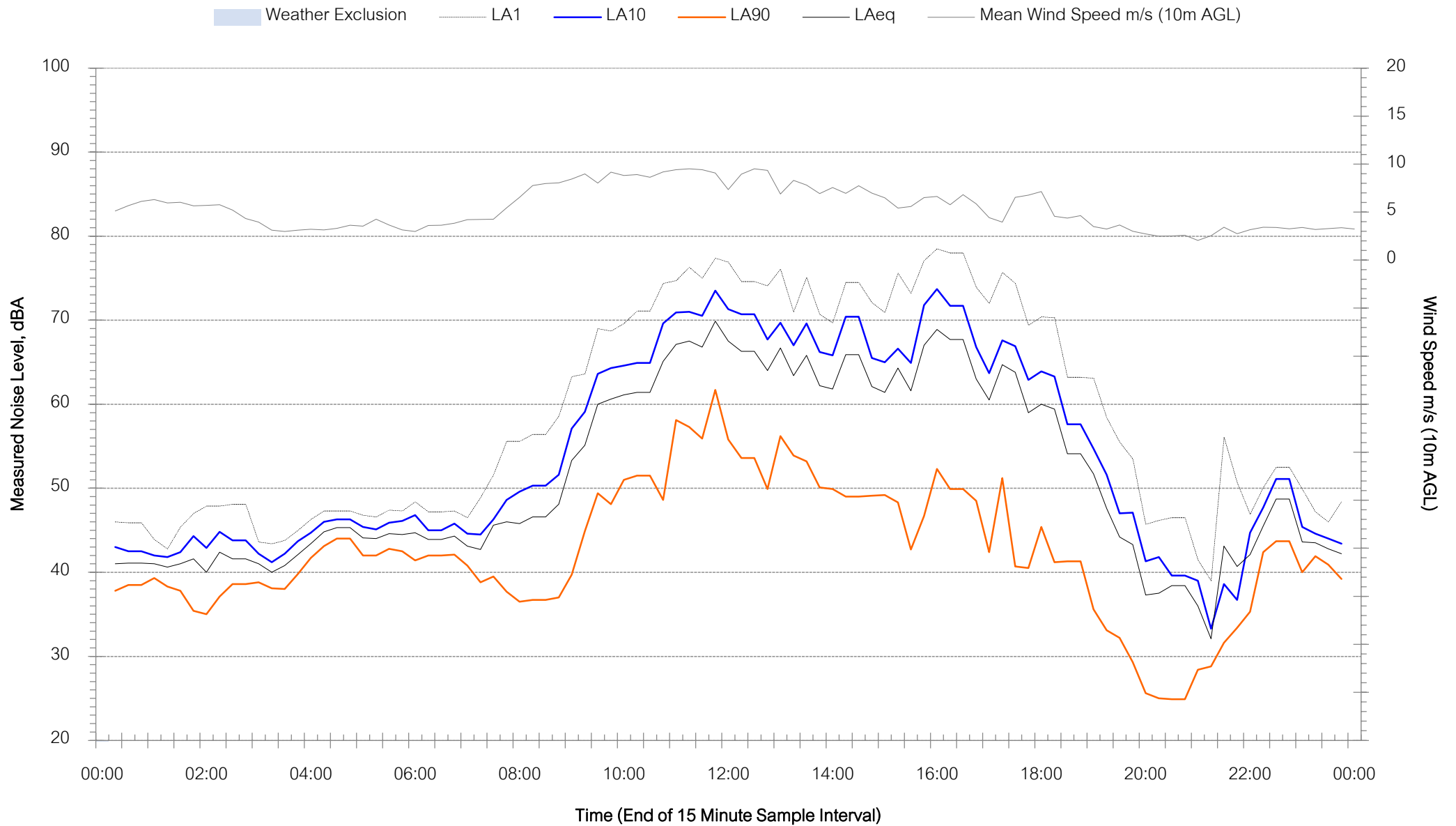
Background Noise Levels

NM3 Milpose - Friday 8 December 2023



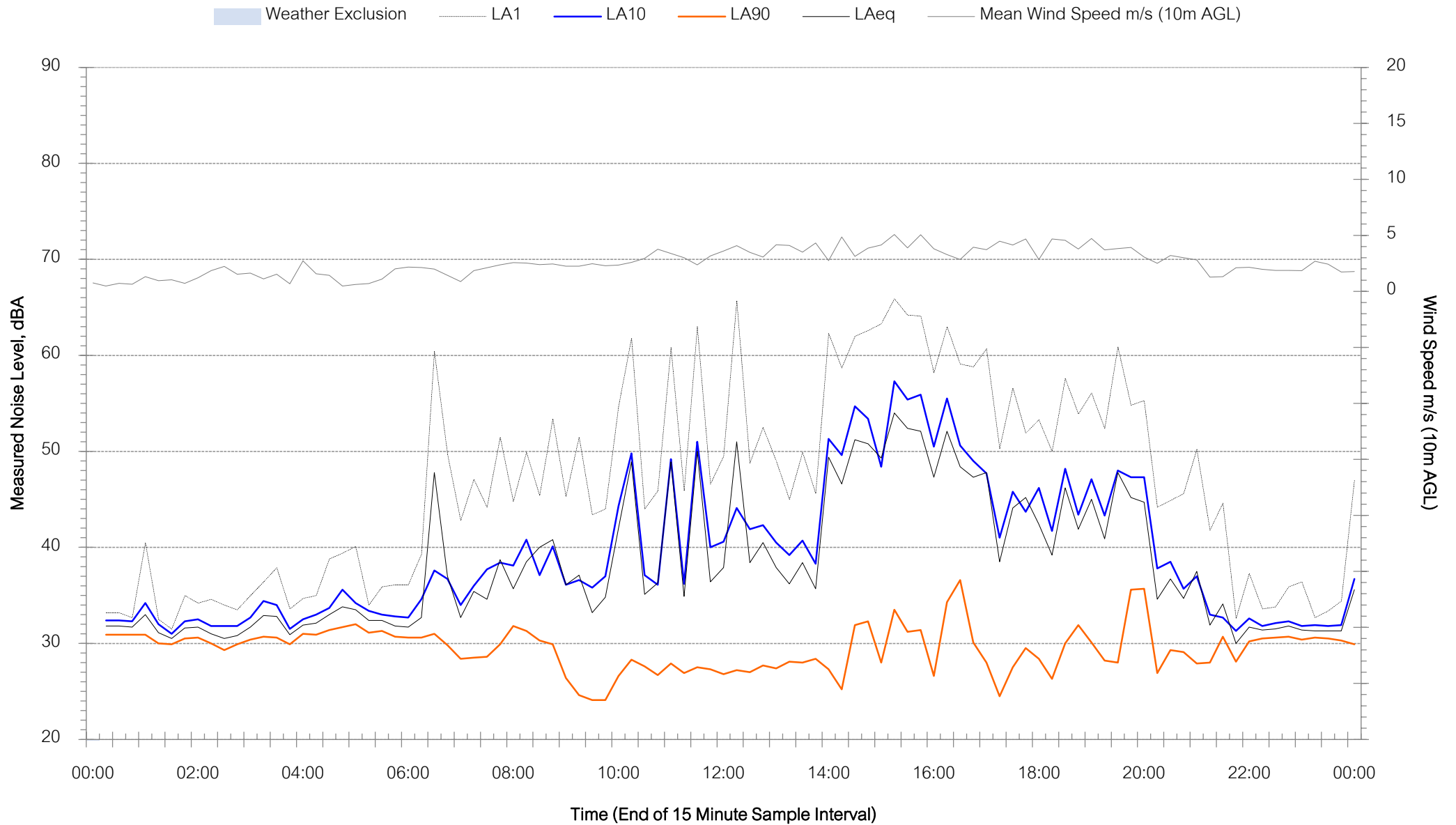
Background Noise Levels

NM3 Milpose - Saturday 9 December 2023



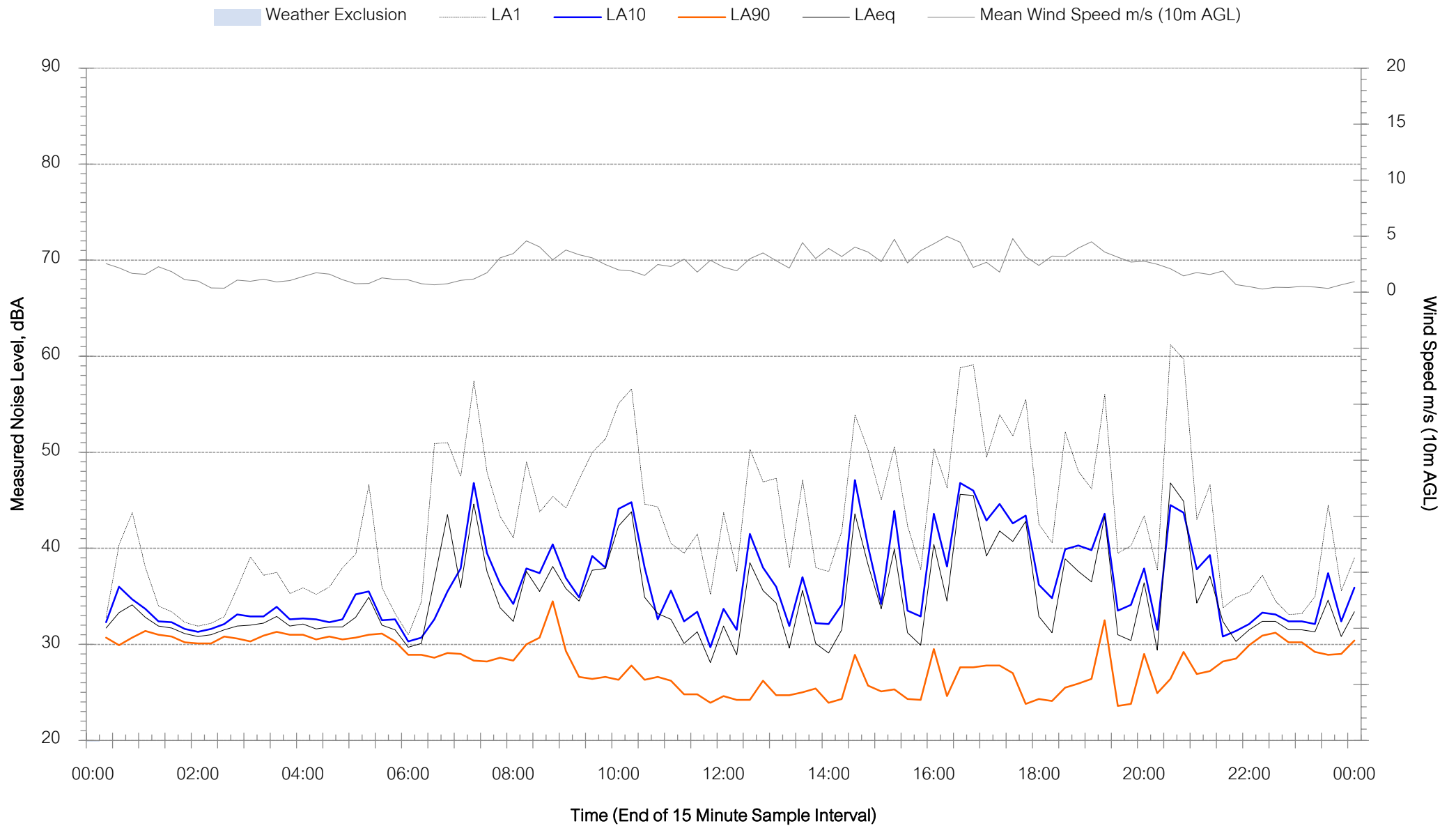
Background Noise Levels

NM5 Adavale - Sunday 3 December 2023



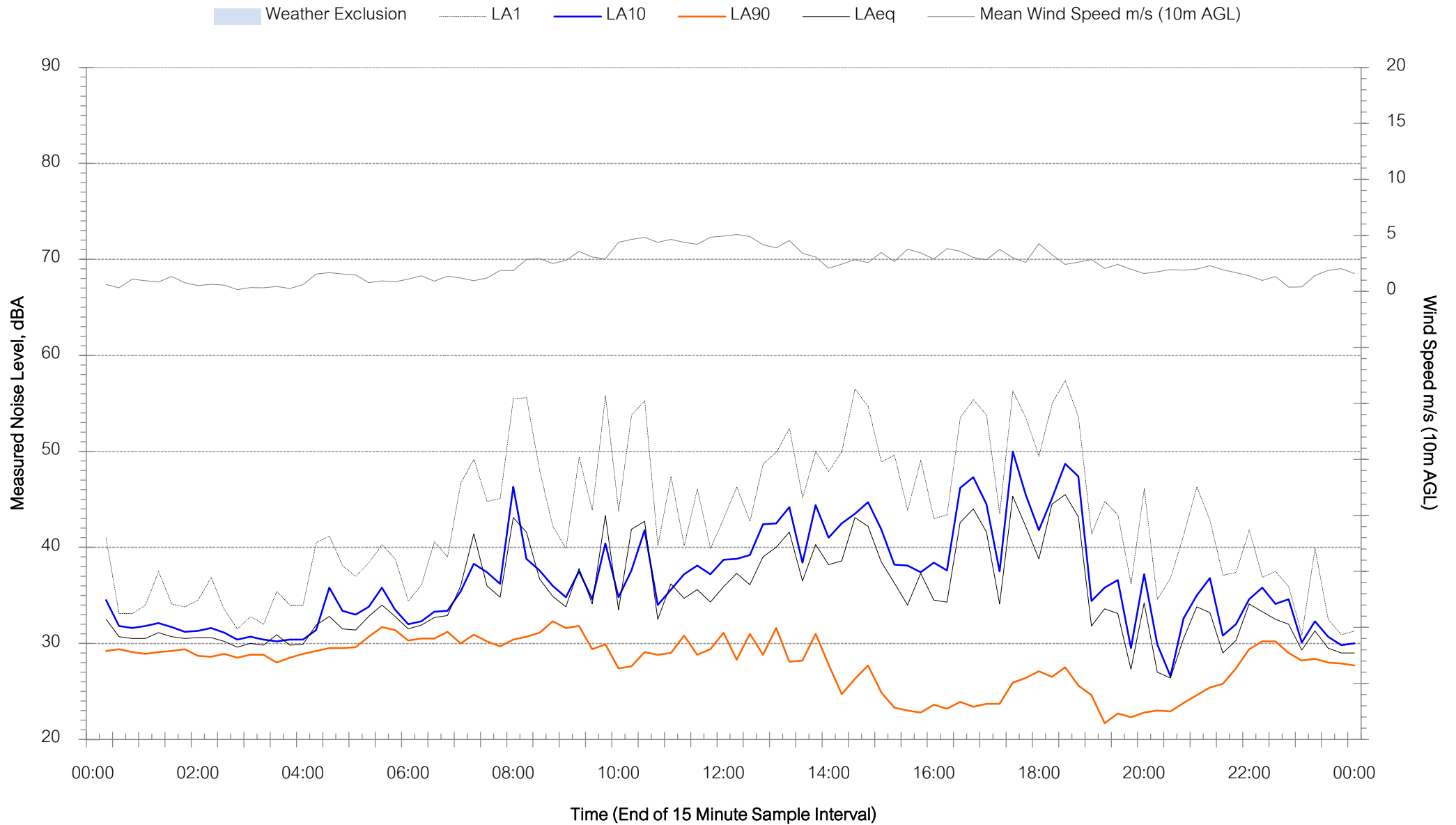
Background Noise Levels

NM5 Adavale - Monday 4 December 2023



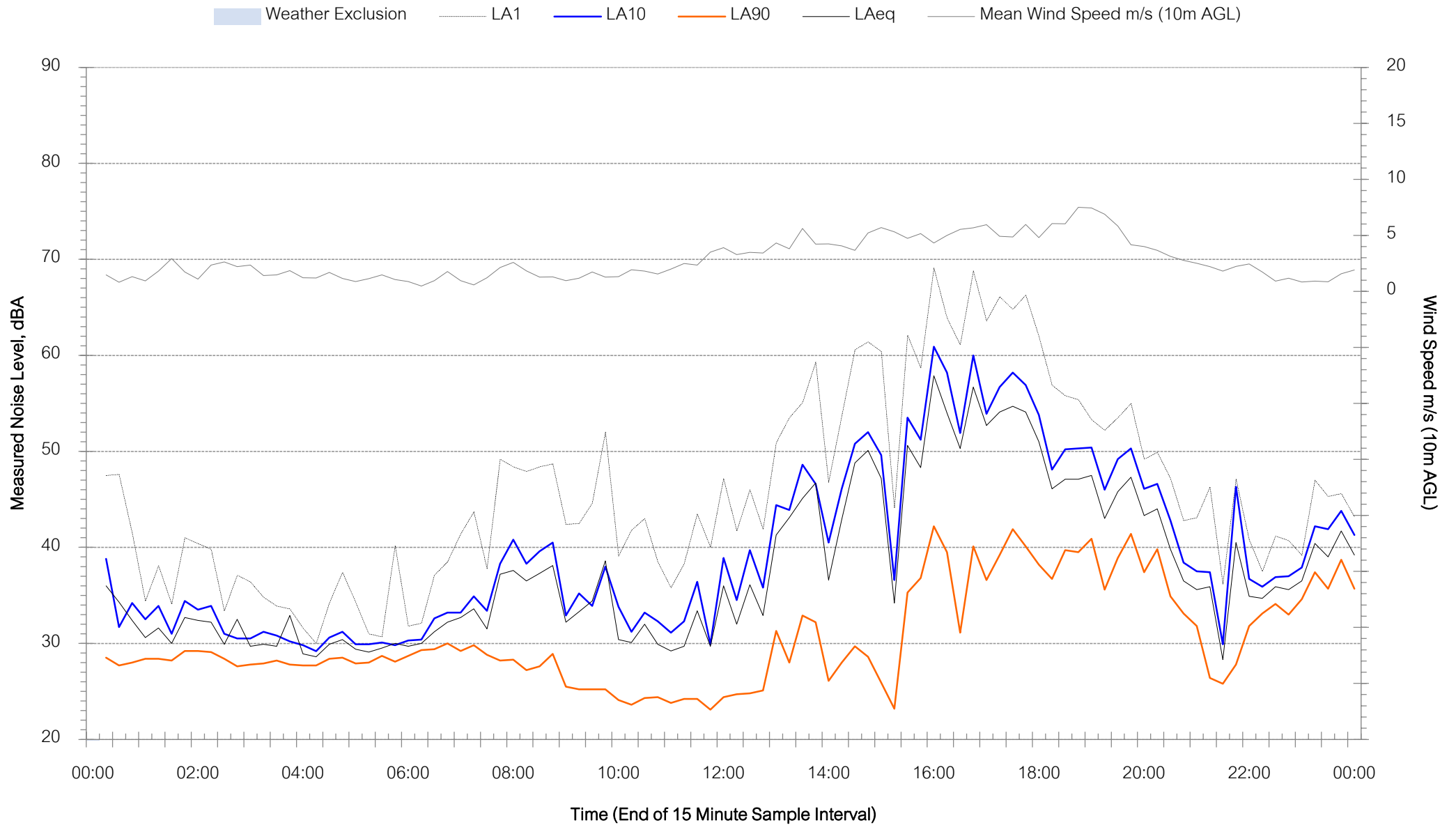
Background Noise Levels

NM5 Adavale - Tuesday 5 December 2023



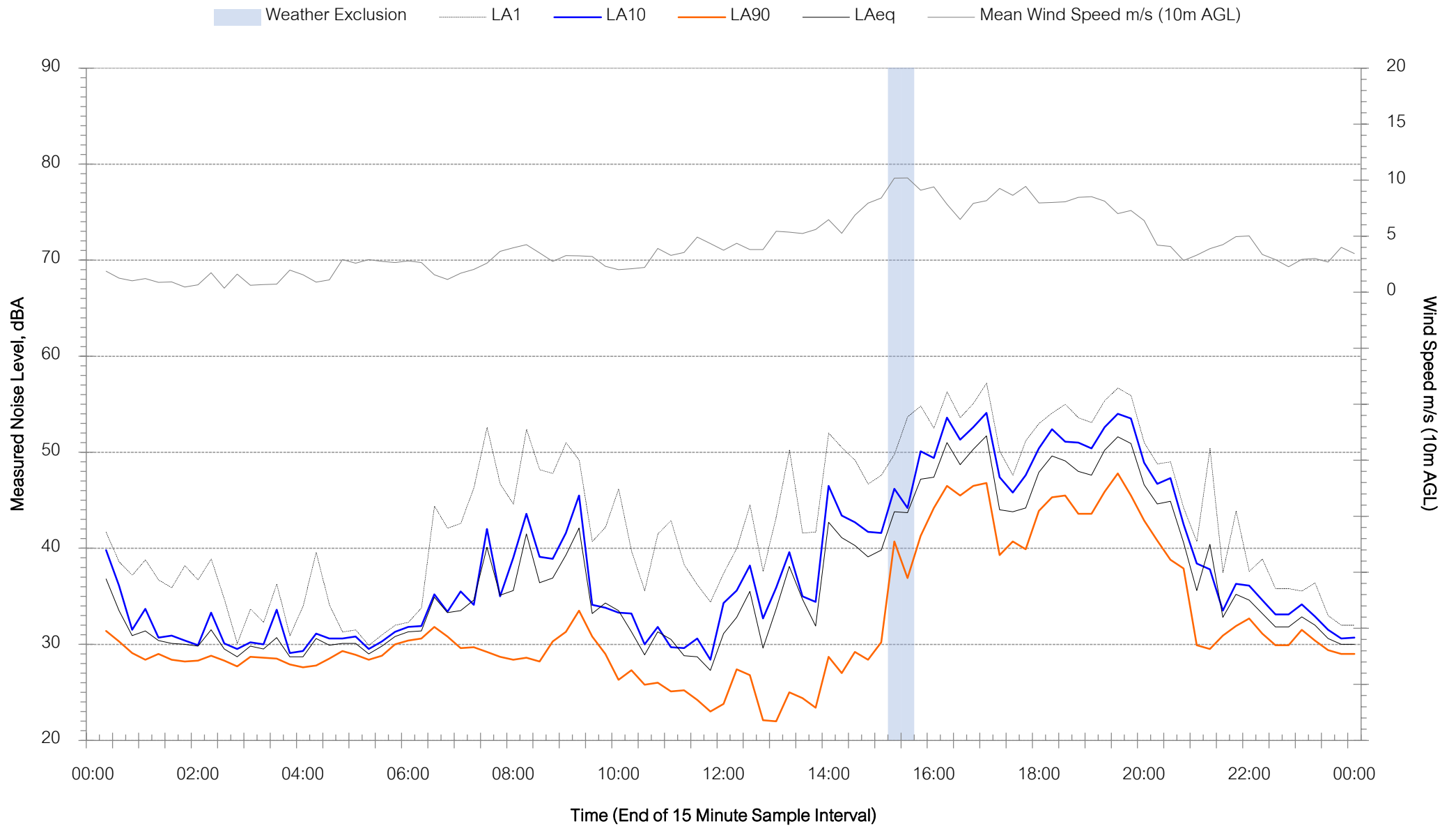
Background Noise Levels

NM5 Adavale - Wednesday 6 December 2023



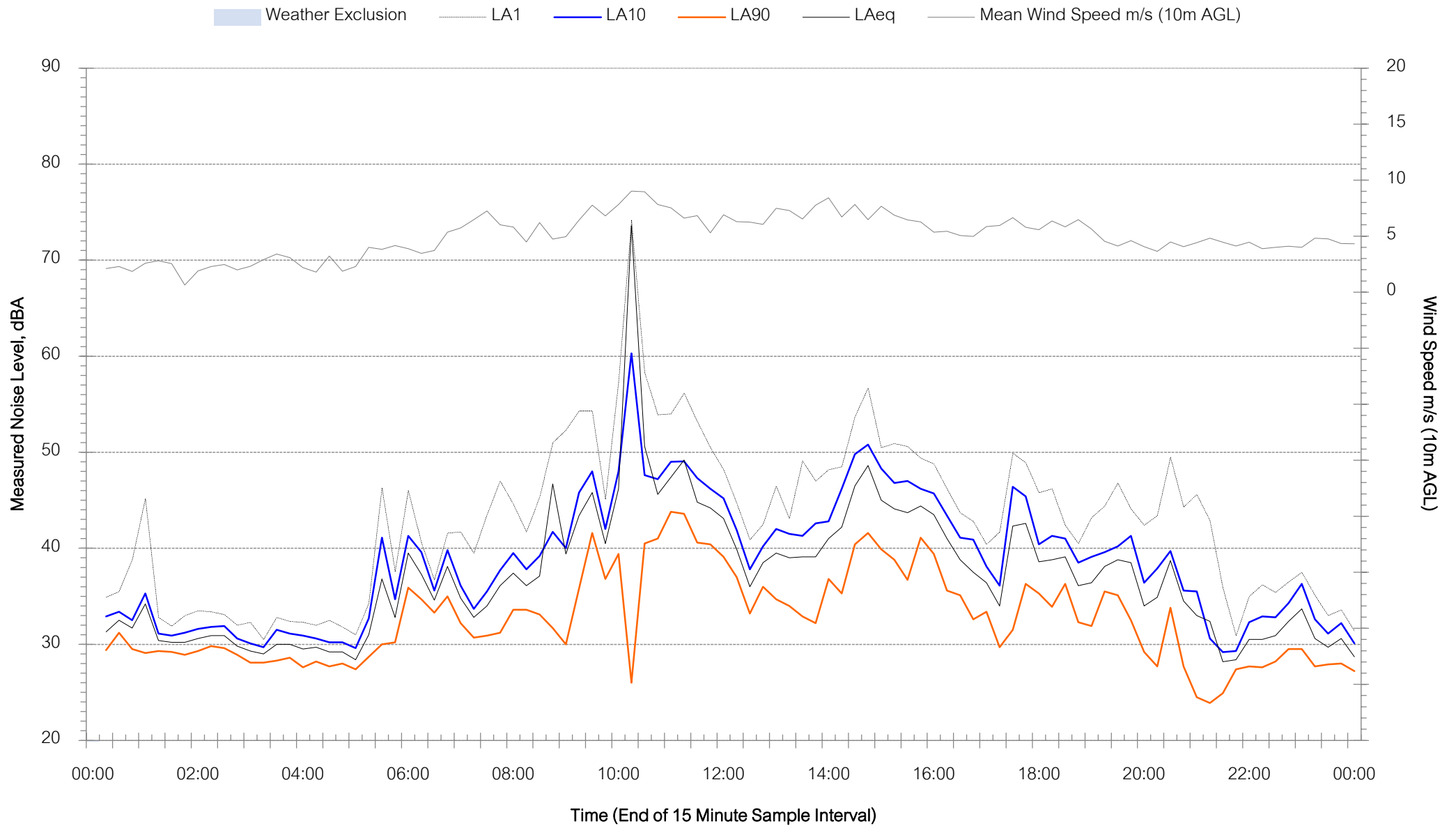
Background Noise Levels

NM5 Adavale - Thursday 7 December 2023



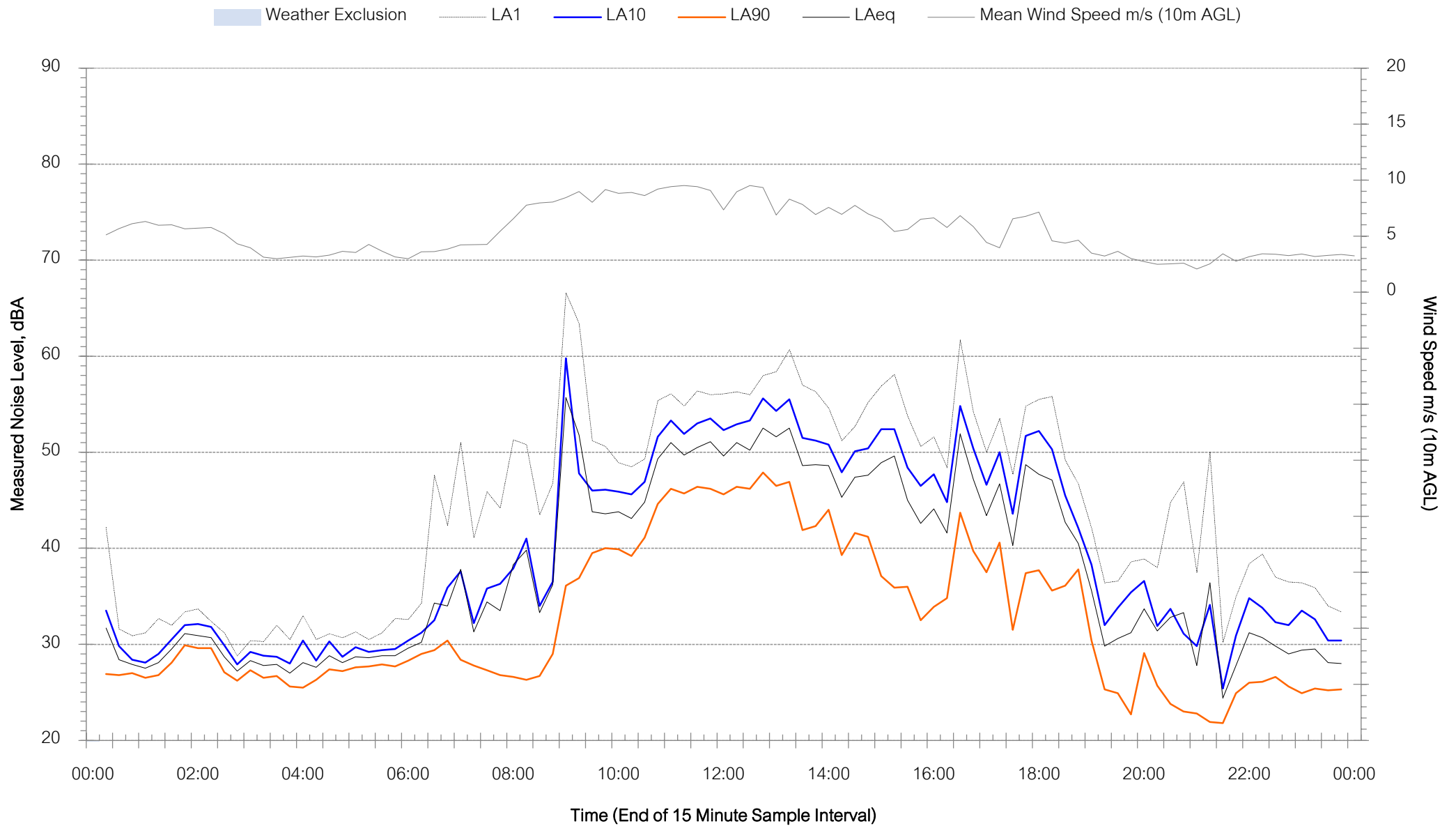
Background Noise Levels

NM5 Adavale - Friday 8 December 2023



Background Noise Levels

NM5 Adavale - Saturday 9 December 2023



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