

Noise Monitoring Assessment

Austen Quarry, Hartley, NSW
September 2022

Prepared for: RW Corkery & Co Pty Limited
September 2022
MAC170523RP12



Document Information

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Prepared for: RW Corkery & Co Pty Limited (on behalf of Hy-Tec Pty Ltd)



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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by RW Corkery & Co Pty Limited (RWC) on behalf of Hy-Tec Industries Pty Ltd (HT) to complete a Noise Monitoring Assessment (NMA) for Austen Quarry Operations, Hartley, NSW.

The monitoring has been conducted in accordance with the approved Austen Quarry Noise Management Plan and in general accordance with Conditions L4.1 to L4.3 of EPL#12323 (EPL); at three representative monitoring locations.

The assessment was conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence EPL#12323;
- RW Corkery & Co Pty Limited, Austen Quarry Noise Management Plan (NMP); and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

This assessment was completed on Tuesday 6 September 2022 and Wednesday 7 September 2022 and forms part of the noise monitoring program to address conditions of EPL#12323, Austen Quarry Development Consent SSD 6084 (SSD-6084) and the Noise Management Plan.

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 Attended Noise Compliance

Schedule 3, Condition 3 of the Austen Quarry Development Consent (SSD-6084), approved and modified on 15 July 2019, outlines the applicable noise criteria for all privately owned residential receivers surrounding the quarry site. The operating criteria specified in SSD-6084 also aligns with criteria in EPL#12323 for the quarry at all receivers ie 35dB LAeq(15min).

Furthermore, SSD-6084 specifies an LAmax criteria for site operations of 52dBA during the morning shoulder period. **Table 1** presents the criteria for privately owned residential receivers surrounding the quarry, as outlined in SSD-6084 and EPL#12323.

Table 1 Noise Criteria				
Receiver	Day dB LAeq(15min)	Evening dB LAeq(15min)	Morning Shoulder dB LAeq(15min)	Morning Shoulder dB LAmax
All privately owned residences	35	35	35	52

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3 Methodology

3.1 Locality

The quarry is located on Jenolan Caves Road, Hartley, NSW, approximately 10km south of Lithgow, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential. The Great Western Highway is situated to the north east of the site and Jenolan Caves Road to the west of the site.

3.2 Noise Monitoring Locations

Three monitoring locations have been selected as part of the NMA in accordance with the Noise Management Plan (NMP) and are summarised below:

- Location A (residence identifier R24A as per NMP), is located at 200 Jenolan Caves Road, Hartley, NSW, approximately 2.5km north of the project;
- Location B (residence identifier R31 as per NMP), is located at 781 Jenolan Caves Road, Good Forest, NSW, approximately 1km south west of the project site; and
- Location C (residential identifier R48 as per NMP) is located at 64 Carroll Drive, Hartley, NSW, approximately 2.5km north east of the quarry.

The monitoring locations with respect to quarry are presented in the locality plan shown in **Figure 1**.

3.3 Attended Monitoring Methodology

The attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and EPL#12323. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Tuesday 6 September 2022 and Wednesday 7 September 2022. The acoustic instrumentation used carries current NATA calibration and complies with AS 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 dB(A).

Noise measurements were of 15 minutes in duration and where possible, throughout each survey, the operator quantified the contribution of each significant noise source. One measurement was conducted at each of the monitoring locations during the day, evening and morning shoulder monitoring periods to quantify the noise sources in the ambient noise environment.

3.4 Unattended Monitoring Methodology

The unattended noise survey, completed at Location B - 781 Jenolan Caves Road, was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise". The measurements were carried out using a Svantek Type 1, 977 noise analyser. Monitoring was conducted between Tuesday 6 September 2022 and Tuesday 20 September 2022. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672:2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed $\pm 0.5\text{dBA}$. Data affected by adverse meteorological conditions (ie winds greater than 10m/s at 10m elevation and rain periods) have been excluded from the results.

3.5 Operational Logs

Operational logs for the primary and secondary crushers have been provided by Austen Quarry management. It is noted that processing equipment commences at 6am. Daily pre-shift meetings and safety checks often delay commencement of onsite operations until closer to 7am. It is also noted that on 7 September 2022 the secondary crusher paused operations on several occasions due to blockages and other issues on the conveyer belt. The survey was undertaken to ensure maintenance operations also complied with the applicable noise criteria for the quarry. Morning shoulder measurements were conducted from 6am to 7am on Wednesday 7 September 2022 to capture the onsite operations at the nominated monitoring locations.

It is also noted that the primary crusher ceased activities at approximately 4.30pm daily for the past several months, with no evening time crushing undertaken during this period. This is due to the reduced product demand during the COVID19 shutdown. **Table 2** presents a summary of the hours of operation of the primary and secondary crushers with the quarry operational logs which are reproduced **Appendix B**.

Table 2 Primary and Secondary Crushers Hours of Operation				
Date	Primary Crusher		Secondary Crusher	
	Commenced Crushing (hrs)	Ceased Crushing (hrs)	Commenced Crushing (hrs)	Ceased Crushing (hrs)
06/09/2022	07:00	16:35	N/A	N/A
07/09/2022	07:10	16:40	06:17	20:00



FIGURE 1
LOCALITY PLAN
REF: MAC170523



KEY	
	MONITORING LOCATION
	SITE LOCATION



*Imagery Source: reamaps

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4 Results

4.1 Assessment Results - Location A

Operational attended noise monitoring was completed in each assessment period at Location A, 200 Jenolan Caves Road on Tuesday 6 September 2022 and Wednesday 7 September 2022. **Table 3** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 3 Operator-Attended Noise Survey Results – Location A

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA						
		L _{Amax}	L _{Aeq}	L _{A90}								
06/09/2022	16:18 (Day)	80	60	44	WD: NE WS: 0.1m/s Rain: Nil	Birds 43-49						
						Traffic 44-80						
						Creek flow 43-44						
						Aircraft 43-52						
						Quarry inaudible						
Austen Quarry Contribution ¹						<34dB L _{Aeq} (15min)						
06/09/2022	18:30 (Evening)	79	59	45	WD: N WS: 0.2m/s Rain: Nil	Traffic 45-79						
						Creek flow 44-47						
						Quarry inaudible						
						Austen Quarry Contribution ¹						<35dB L _{Aeq} (15min)
						07/09/2022	06:21 (Morning Shoulder)	85	61	43	WD: N WS: 0.1m/s Rain: Nil	Dogs barking 49-58
Birds 43-56												
Creek flow 43-45												
Traffic 44-85												
Quarry inaudible												
Austen Quarry Contribution ¹						<33dB L _{Aeq} (15min)						
						<33dB L _{Amax}						

Note 1: Estimated quarry noise contribution.

4.2 Assessment Results - Location B

Operational attended noise monitoring was completed in each assessment period at Location B, 781 Jenolan Caves Road on Tuesday 6 September 2022 and Wednesday 7 September 2022. **Table 4** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 4 Operator-Attended Noise Survey Results – Location B						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
06/09/2022	15:50 (Day)	59	35	31	WD: NE	Birds 31-51
					WS: 0.1m/s	Aircraft 32-59
					Rain: Nil	Quarry mobile plant 30-32
Austen Quarry Contribution ¹						31dB L _{Aeq} (15min)
06/09/2022	18:00 (Evening)	50	33	25	WD: N	Traffic 23-26
					WS: 0.5m/s	Birds 24-50
					Rain: Nil	Livestock 23-29
Austen Quarry Contribution ¹						Quarry inaudible
						<20dB L _{Aeq} (15min)
07/09/2022	06:45 (Morning Shoulder)	60	39	26	WD: N	Birds 23-60
					WS: 0.1m/s	Traffic 23-26
					Rain: Nil	Quarry inaudible
Austen Quarry Contribution ¹						<20dB L _{Aeq} (15min)
						<20dB L _{Amax}

Note 1: Estimated quarry noise contribution.

4.3 Assessment Results - Location C

Operational attended noise monitoring was completed in each assessment period at Location C, 64 Carroll Drive on Tuesday 6 September 2022 and Wednesday 7 September 2022. Table 5 presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 5 Operator-Attended Noise Survey Results – Location C						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
06/09/2022	16:43 (Day)	71	46	39	WD: NW	Traffic 36-44
					WS: 0.1m/s	Birds 37-71
					Rain: Nil	Quarry inaudible
Austen Quarry Contribution ¹						<29dB L _{Aeq} (15min)
06/09/2022	18:53 (Evening)	59	42	35	WD: N	Insects 31-33
					WS: 0.2m/s	Aircraft 39-44
					Rain: Nil	Traffic 31-59
Austen Quarry Contribution ¹						<25dB L _{Aeq} (15min)
07/09/2022	06:00 (Morning Shoulder)	64	47	37	WD: N	Birds 30-64
					WS: 0.1m/s	Traffic 30-52
					Rain: Nil	Quarry inaudible
Austen Quarry Contribution ¹						<27dB L _{Aeq} (15min)
						<27dB L _{Amax}

Note 1: Estimated quarry noise contribution.

4.4 Unattended Noise Monitoring Results

Unattended noise monitoring was conducted at Location B from Tuesday 6 September 2022 and Wednesday 7 September 2022 while the quarry was operational. A comparison of attended and unattended noise monitoring data has been completed. **Table 6** presents the result of this comparison, focusing on the 15-minute statistics for the corresponding measurement times.

Table 6 Unattended Logging versus Operator-Attended Noise Survey – Location B

Date	Time (hrs)	Attended descriptors (dBA re 20 µPa)			Unattended descriptors (dBA re 20 µPa)		
		dB LA _{max}	dB LA _{eq}	dB LA ₉₀	dB LA _{max}	dB LA _{eq}	dB LA ₉₀
06/09/2022	15:50	59	35	31	64	39	28
06/09/2022	18:00	50	33	25	47	30	25
07/09/2022	06:45	60	39	26	67	39	27

Results of the comparison identify that measured levels are generally consistent. Some variation in the metrics are expected due to the proximity of noise sources to the microphones, the moderate separation between the unattended and attended monitoring positions and the variance in the monitored 15-minute period.

Attended noise monitoring identified that quarry noise was audible only during the day period. Accordingly, it is deemed that the monitored unattended noise levels are not representative of the quarry emissions but rather representative of the ambient local environment. A summary of daily metrics for the assessment period from Tuesday 6 September 2022 and Tuesday 20 September 2022 is presented in Table 7. Appendix C presents the logger charts of the results of the unattended monitoring survey.

Table 7 Unattended Noise Logging Summary – Location B

Date	Unattended descriptors (dBA re 20 µPa)		
	dB LAeq		
	Day	Evening	Night
Tuesday, 6 September 2022	41	34	38
Wednesday, 7 September 2022	40	33	37
Thursday, 8 September 2022	43	33	38
Friday, 9 September 2022	43	44	41
Saturday, 10 September 2022	48	46	46
Sunday, 11 September 2022	44	39	41
Monday, 12 September 2022	44	32	36
Tuesday, 13 September 2022	39	31	36
Wednesday, 14 September 2022	45	35	39
Thursday, 15 September 2022	45	50	43
Friday, 16 September 2022	49	45	48
Saturday, 17 September 2022	50	48	62
Sunday, 18 September 2022	55	40	47
Monday, 19 September 2022	47	32	41
Tuesday, 20 September 2022	41	N/A	N/A

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5 Noise Compliance Assessment

The compliance assessment for the nominated monitoring locations are presented in Table 8 to Table 11 for day, evening and morning shoulder assessment periods.

Table 8 Daytime LAeq(15min) Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	dB LAeq(15min)	dB LAeq(15min)	
A	<34	35	✓
B	31	35	✓
C	<29	35	✓

Table 9 Evening LAeq(15min) Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	dB LAeq(15min)	dB LAeq(15min)	
A	<35	35	✓
B	<20	35	✓
C	<25	35	✓

Table 10 Morning Shoulder LAeq(15min) Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	dB LAeq(15min)	dB LAeq(15min)	
A	<33	35	✓
B	<20	35	✓
C	<27	35	✓

Table 11 Morning Shoulder LAmax Noise Compliance Assessment

Receiver No.	Quarry Noise Contribution	Quarrying Noise Criteria	Compliant
	dB LAmax	dB LAmax	
A	<33	52	✓
B	<20	52	✓
C	<27	52	✓

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6 Discussion

6.1 Discussion of Results - Location A

Monitoring conducted at Location A, 200 Jenolan Caves Road, Hartley, NSW, was dominated by passing traffic. Traffic included trucks from Austen Quarry, adjacent (non-project) quarries and several transport firms. Local light vehicle traffic also contributed to the overall ambient environment. Quarry noise emissions were inaudible during all three monitoring periods for the September 2022 survey. Other extraneous noise sources audible during the three attended surveys included birds, aircraft, creek flowing, birds and dog barking.

The measured quarry day, evening and morning shoulder noise contribution for Location A are consistent with the noise levels predicted in the Noise and Blasting Impact Assessment (NBIA) (Ref: MAC170511RP1, Muller Acoustic Consulting Pty Ltd, 2018) prepared for the Stage 2 extension of the quarry.

6.2 Discussion of Results - Location B

Monitoring results at Location B, 781 Jenolan Caves Road, Good Forest, NSW, identified that the quarry was audible during the day period. Quarry operations were audible during lulls and the estimated quarry noise contribution was measured at 31dB LAeq(15min). The quarry remained inaudible during the morning shoulder and evening periods at this monitoring location. Extraneous noise sources dominated the noise environment which included birds, aircraft, livestock and traffic.

The measured quarry day, evening and morning shoulder noise contribution for Location B are consistent with the noise levels predicted in the NBIA.

6.3 Discussion of Results - Location C

Quarry noise was inaudible during all three survey periods at Location C, 64 Carroll Drive, Hartley, NSW, during the attended noise survey for the period of September 2022. Traffic, birds, insects and aircraft dominated the ambient noise environment.

The measured quarry day, evening and morning shoulder noise contribution for Location C are consistent with the noise levels predicted in the NBIA.

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7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment for RW Corkery & Co Pty Limited on behalf of Hy-Tec Industries Pty Ltd for Austen Quarry, Hartley, NSW. The assessment was completed to assess the quarry's compliance with the relevant criteria outlined in EPL#12323 and SSD-6084 for three nominated residential receivers surrounding the quarry.

Operator attended noise monitoring was undertaken on Tuesday 6 September 2022 and Wednesday 7 September 2022 at the nominated monitoring locations with quarry noise contributions compared against the relevant criteria.

The assessment has identified that noise emissions generated by Austen Quarry comply with relevant noise criteria specified in EPL#12323 and SSD-6084 at all assessed locations for the three relevant assessment periods.

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Appendix A – Glossary of Terms

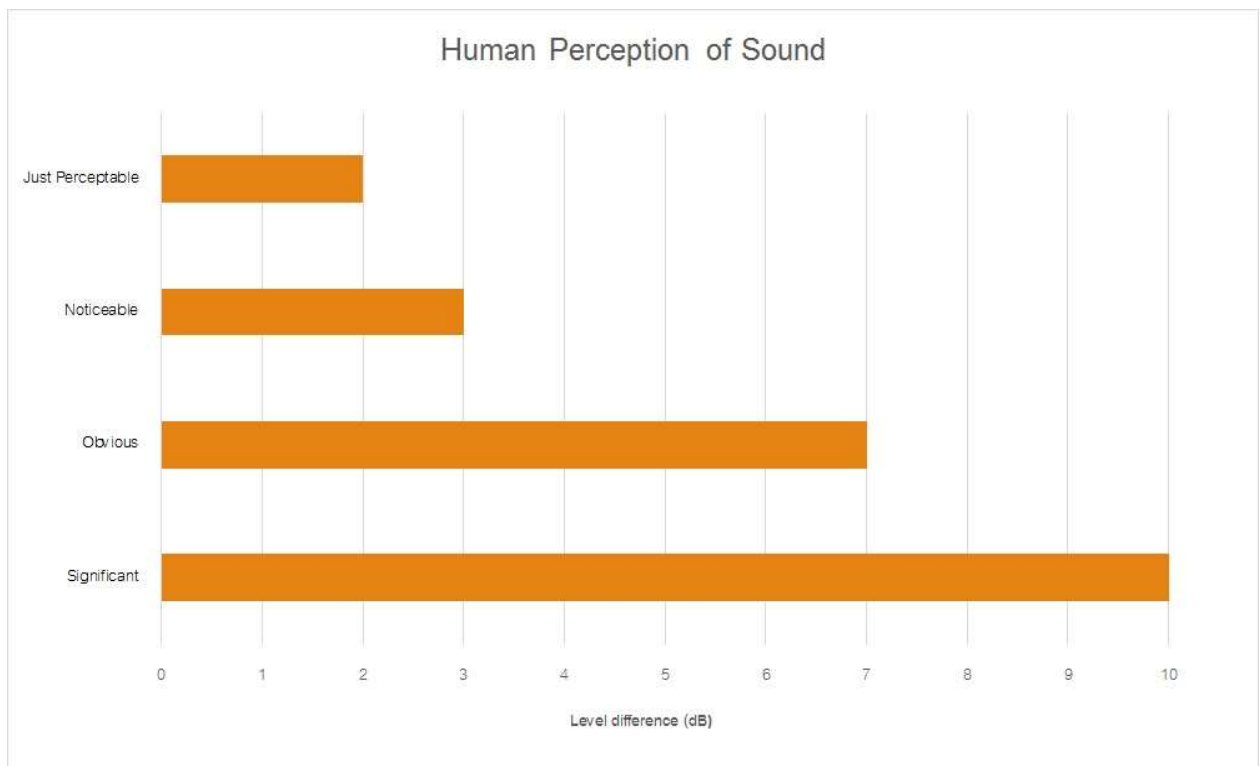
Table A1 provides a number of technical terms have been used in this report.

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 : $= 10 \cdot \log_{10} (W/W_0)$ <p>Where : W is the sound power in watts and W₀ is the sound reference power at 10-12 watts.</p>

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 – Operational Logs



an ADBRI company

DAILY PRODUCTION LOG & CHECKLIST - PRIMARY

Date: 6/9/22 Operator: ARETT

Weather Conditions: FINE Quarry Bench ID: 730

Shift Start Time	<u>6 AM</u>	Shift Finish Time	<u>5 PM</u>
Crusher Start Time	<u>7 AM</u>	End of day Crusher stopped	<u>4:35</u>

Belt Weightometer Reading - Daily

Conveyor 1 Start	Conveyor 1 Finish	Total Tonnes Crushed
		<u>4920</u>

Cartage of Raw Feed from Face to Boot – Number of loads

DT4 Loads to Boot	<u>46</u>	DT1 Loads to Boot	
DT6 Loads to Boot	<u>47 + 8</u>	Loader tonnes to Boot	<u>145 / 380</u>

Stoppages due to Trucks	Stoppages due to Jaw
<u>5454</u>	

Plant Stopped	Plant Started	Downtime (Hrs/Min)	Reason
	<u>4:48</u>		<u>Prestart / check CV1 & CV5 chutes / fool box / check GTV chute</u>
<u>1:00</u>	<u>1:20</u>	<u>20MIN</u>	<u>LUNCI</u>

Pre start checks;

Generator hours: 33563 Generator oil level: ✓

Plant Visual Pilot hours

COMMENTS

CV7 tripped on emergency stop fault on start up

First truck tipped 7:00



an ADBRI company

DAILY PRODUCTION LOG & CHECKLIST - PRIMARY

Date: 7/9/22 Operator: BAETT

Weather Conditions: FOG Quarry Bench ID. 730

Shift Start Time	<u>6 AM</u>	Shift Finish Time	<u>5 PM</u>
Crusher Start Time	<u>7:10</u>	End of day Crusher stopped	<u>4:40</u>

Belt Weightometer Reading - Daily

Conveyor 1 Start	Conveyor 1 Finish	Total Tonnes Crushed

Cartage of Raw Feed from Face to Boot – Number of loads

DT4 Loads to Boot	<u>30</u>	DT1 Loads to Boot	
DT6 Loads to Boot	<u>34</u>	Loader tonnes to Boot	<u>144</u>

Stoppages due to Trucks	Stoppages due to Jaw

Plant Stopped	Plant Started	Downtime (Hrs/Min)	Reason
	<u>5:13</u>		<u>Pre start / check on CV5 chutes / tool box / check GTU chute</u>
<u>11:15</u>	<u>1:30</u>	<u>2:15</u>	

Pre start checks;

Generator hours. 33575 Generator oil level.

Plant Visual Pilot hours

COMMENTS

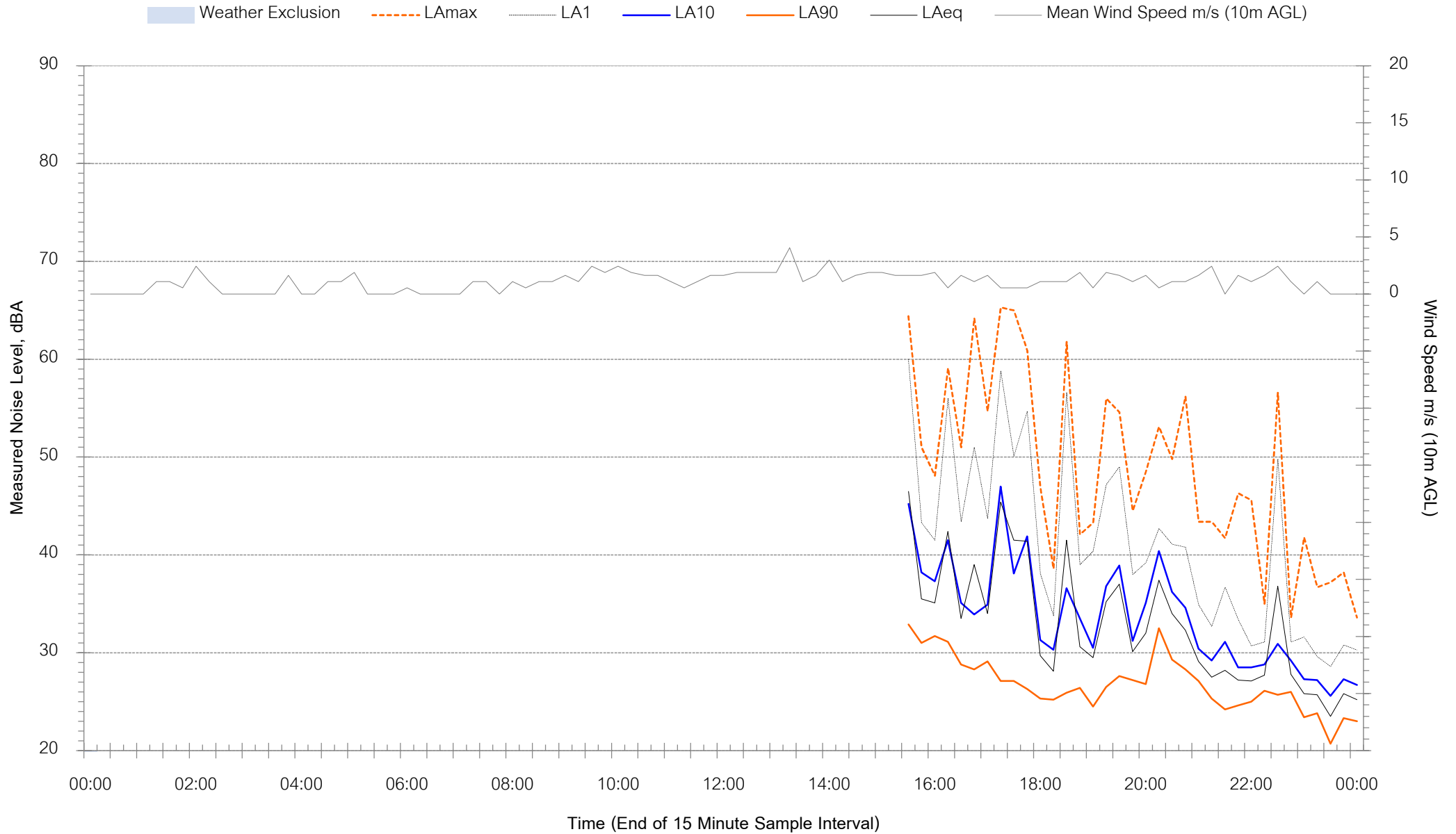
CV7 tripped on emergency stop on start up / CV3 under speed fault before it even starts belt x3

Appendix C – Noise Monitoring Charts



Background Noise Levels

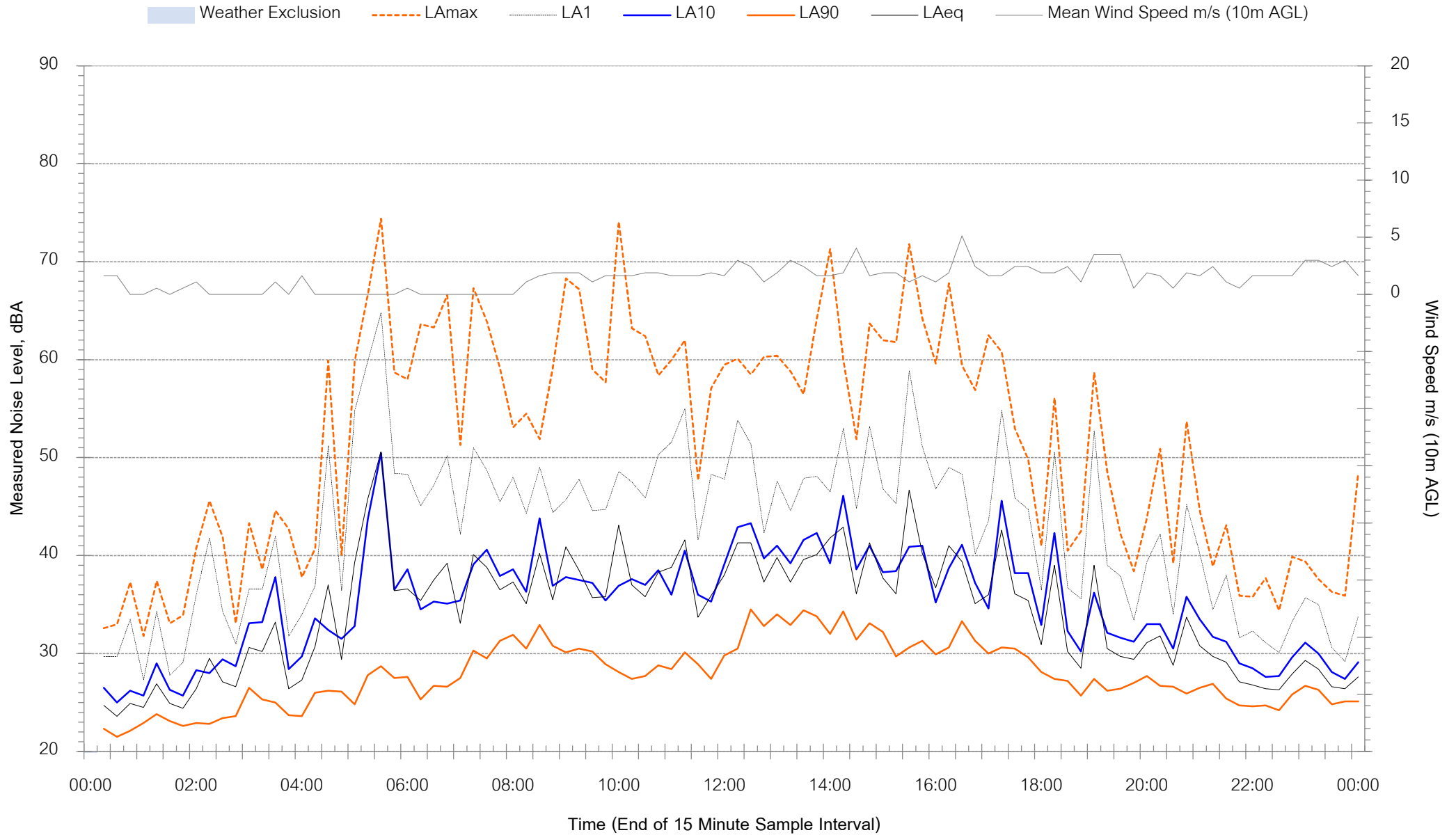
791 Jenolan Caves Road, Good Forest - Tuesday 6 September 2022





Background Noise Levels

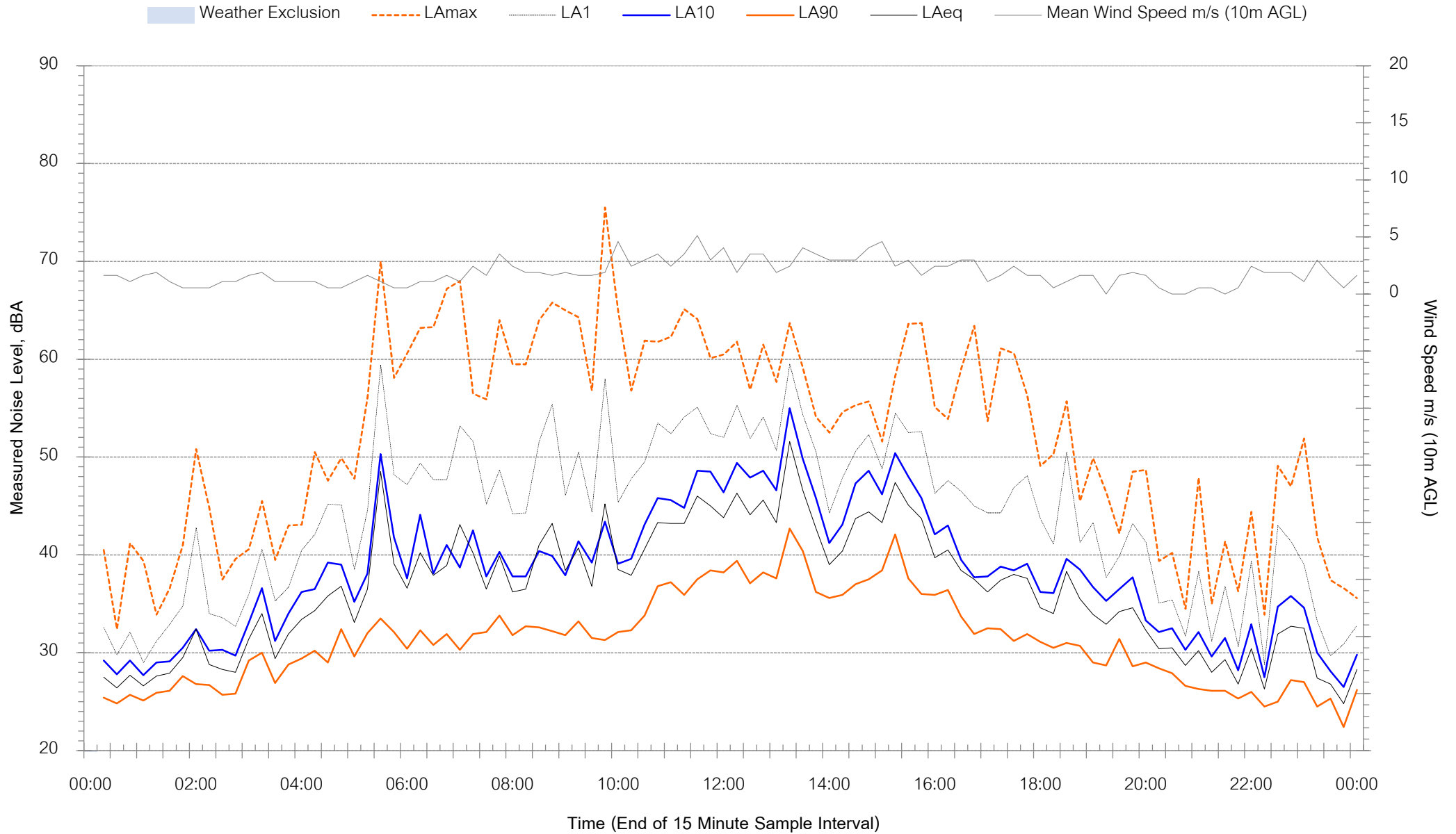
791 Jenolan Caves Road, Good Forest - Wednesday 7 September 2022





Background Noise Levels

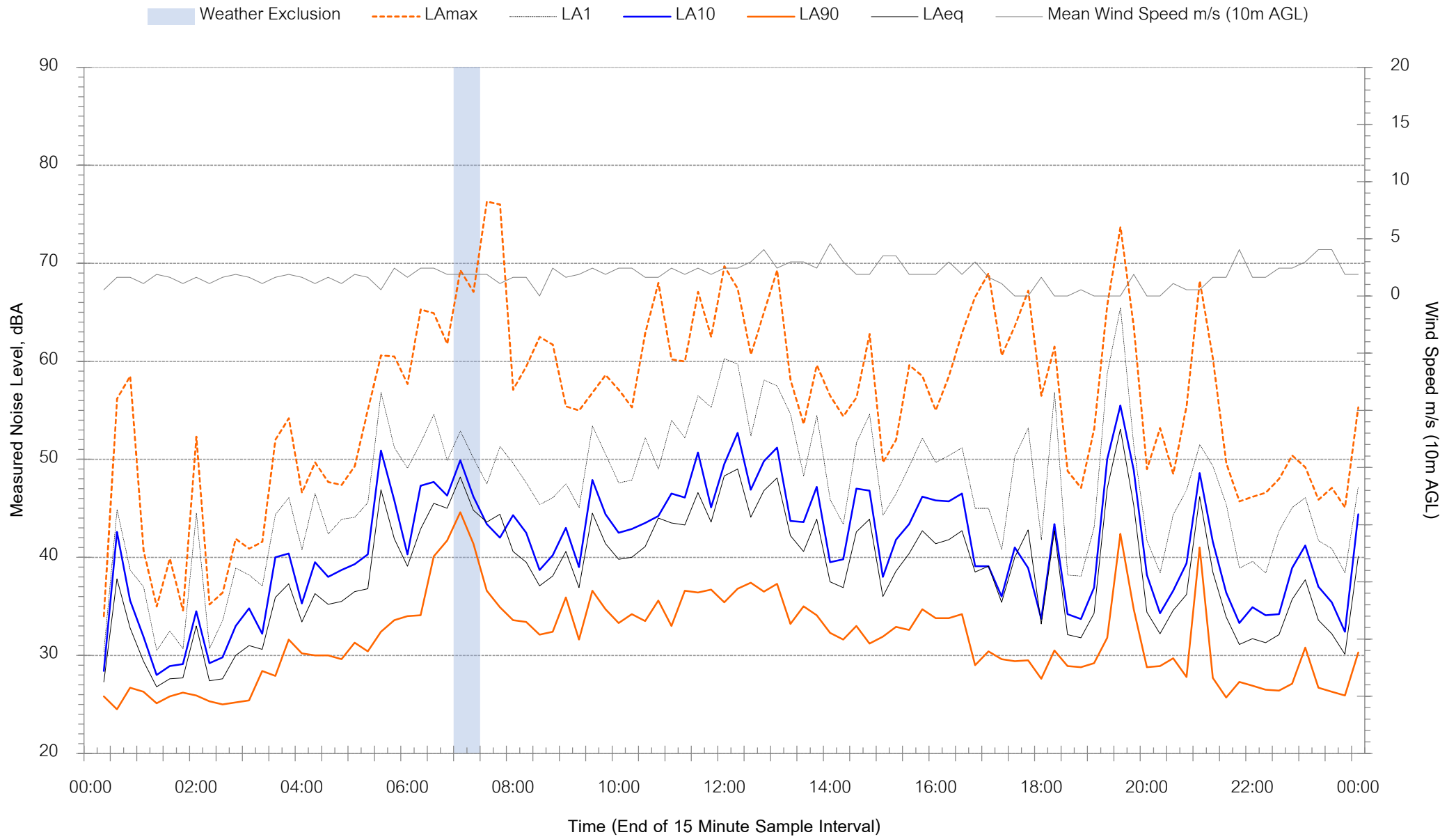
791 Jenolan Caves Road, Good Forest - Thursday 8 September 2022





Background Noise Levels

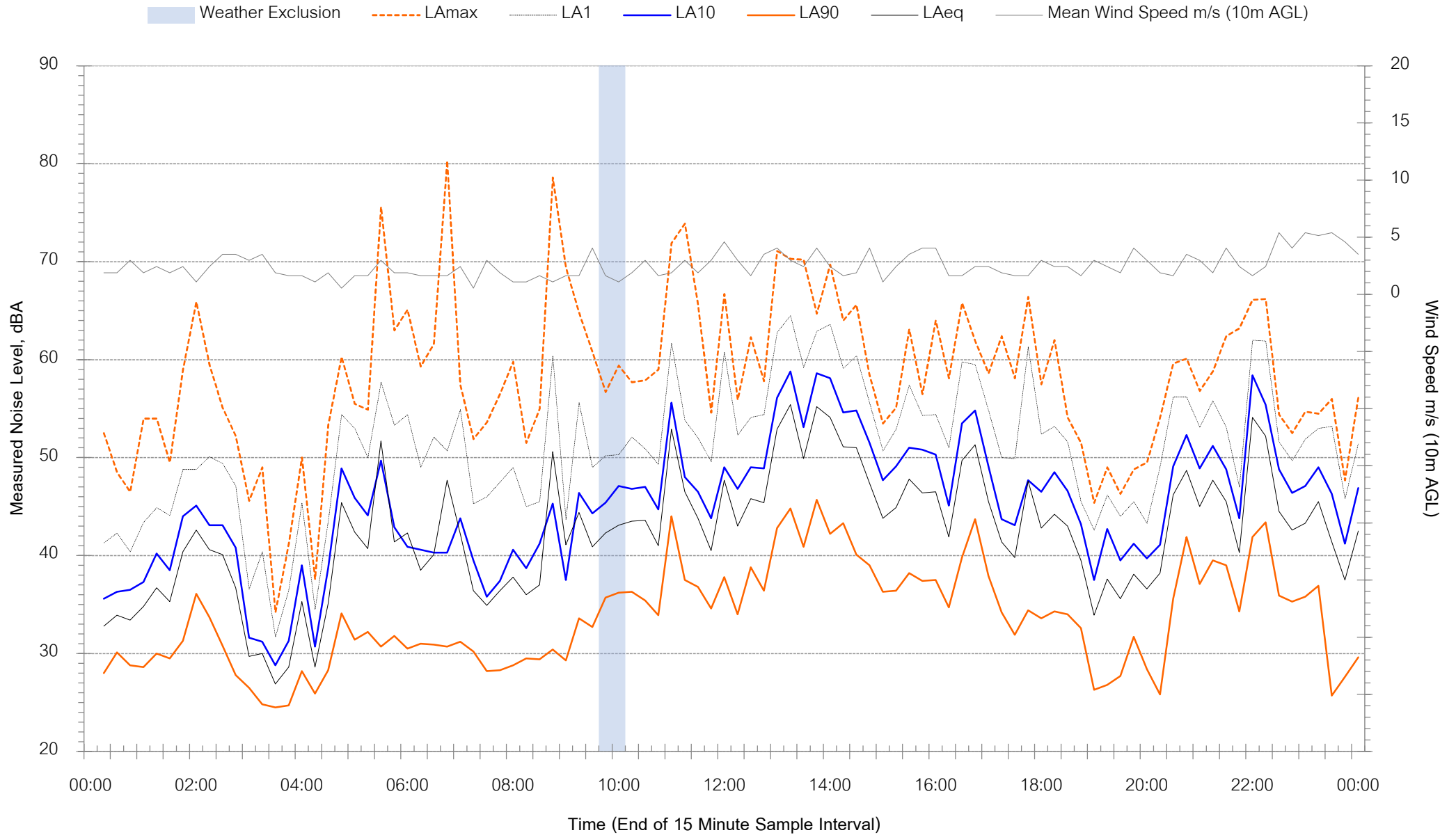
791 Jenolan Caves Road, Good Forest - Friday 9 September 2022





Background Noise Levels

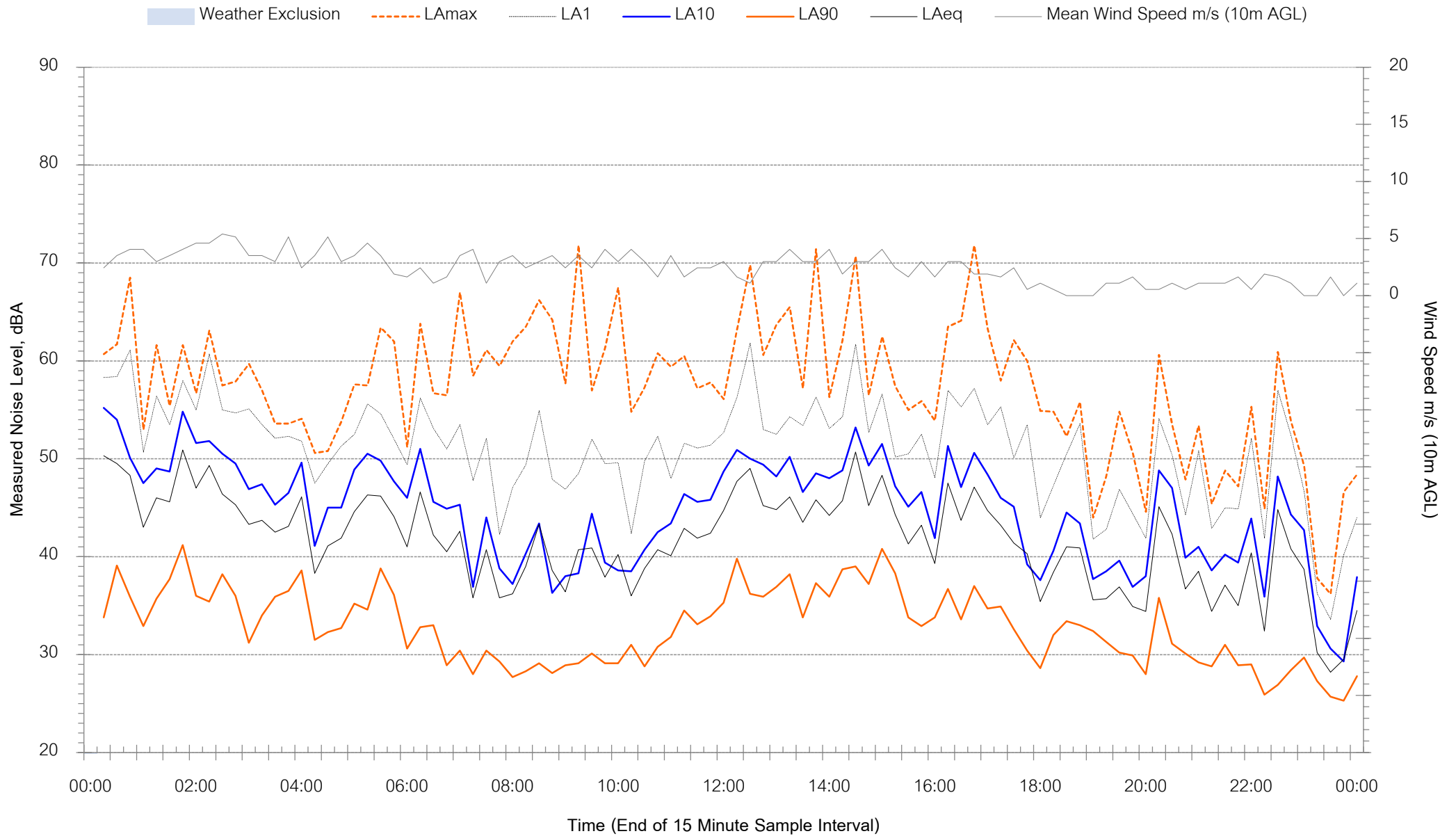
791 Jenolan Caves Road, Good Forest - Saturday 10 September 2022





Background Noise Levels

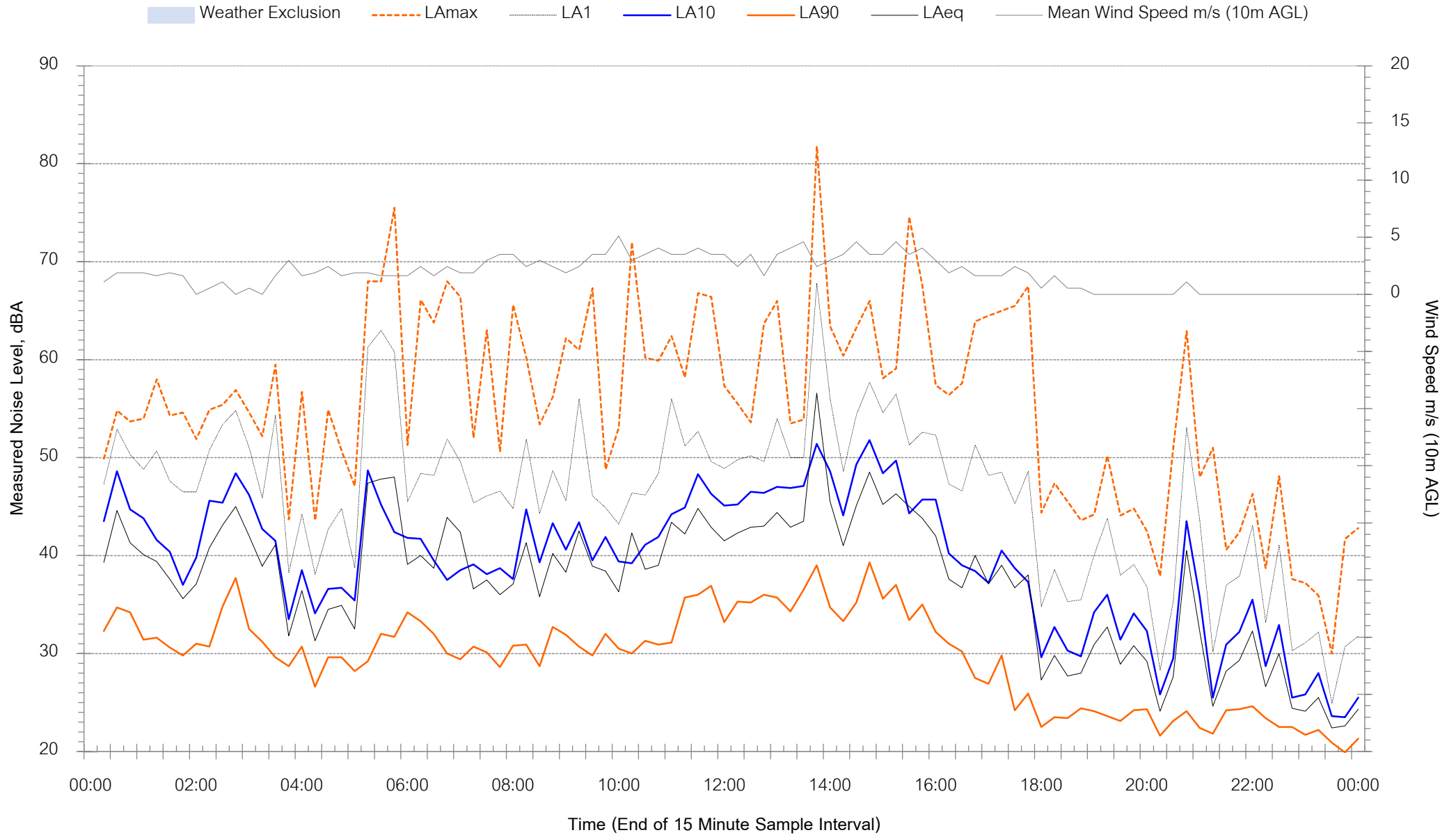
791 Jenolan Caves Road, Good Forest - Sunday 11 September 2022





Background Noise Levels

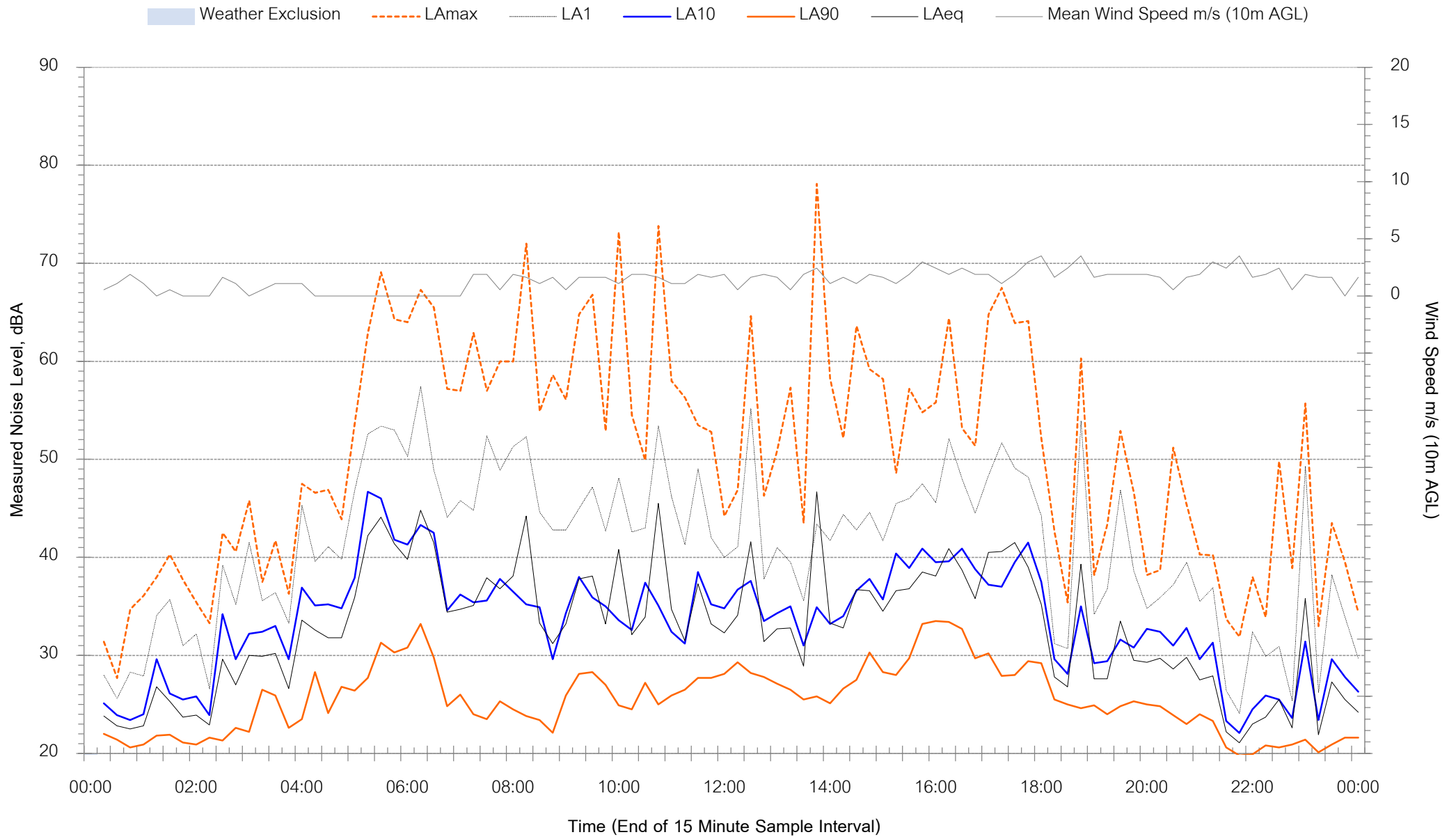
791 Jenolan Caves Road, Good Forest - Monday 12 September 2022





Background Noise Levels

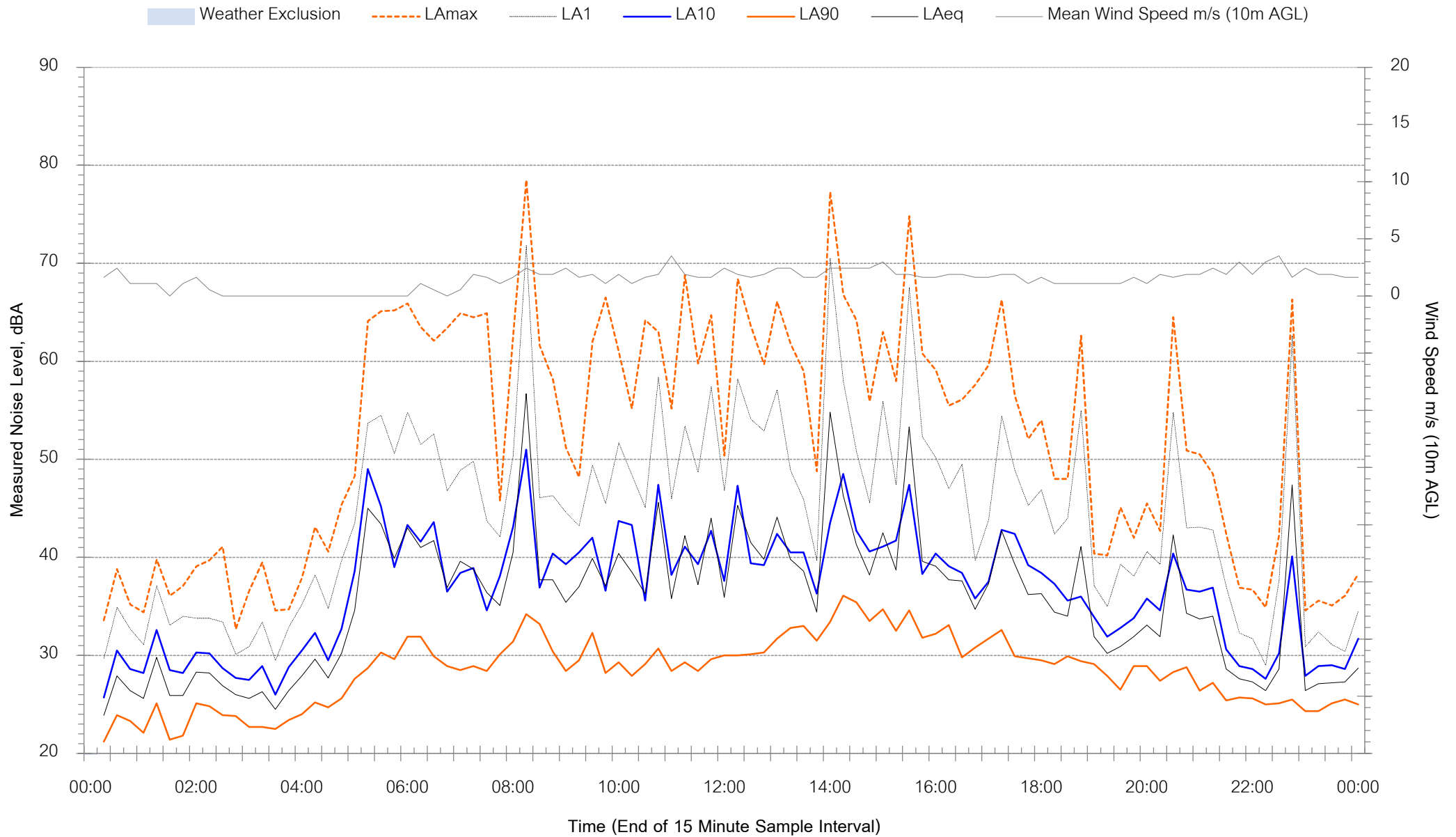
791 Jenolan Caves Road, Good Forest - Tuesday 13 September 2022





Background Noise Levels

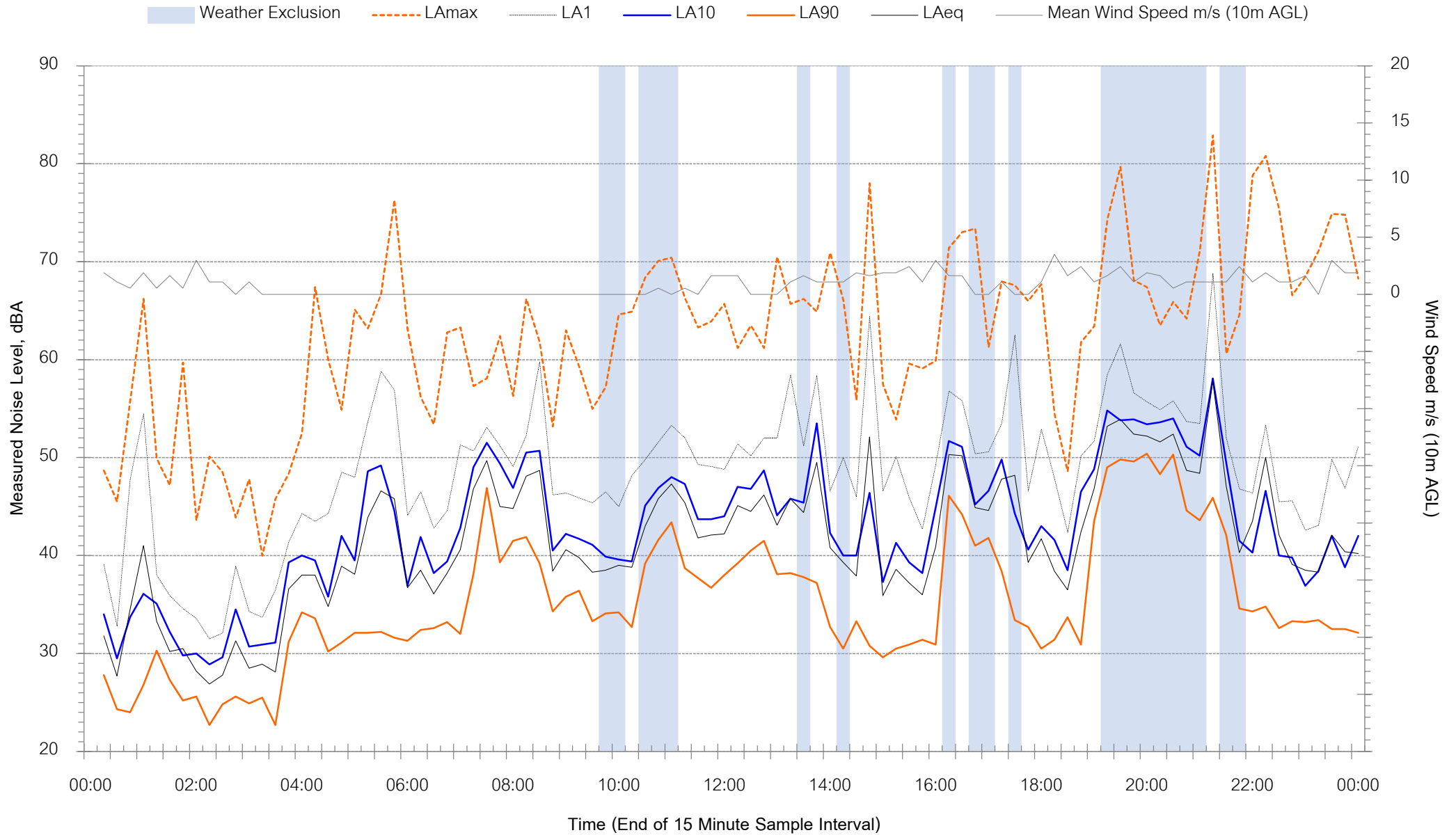
791 Jenolan Caves Road, Good Forest - Wednesday 14 September 2022





Background Noise Levels

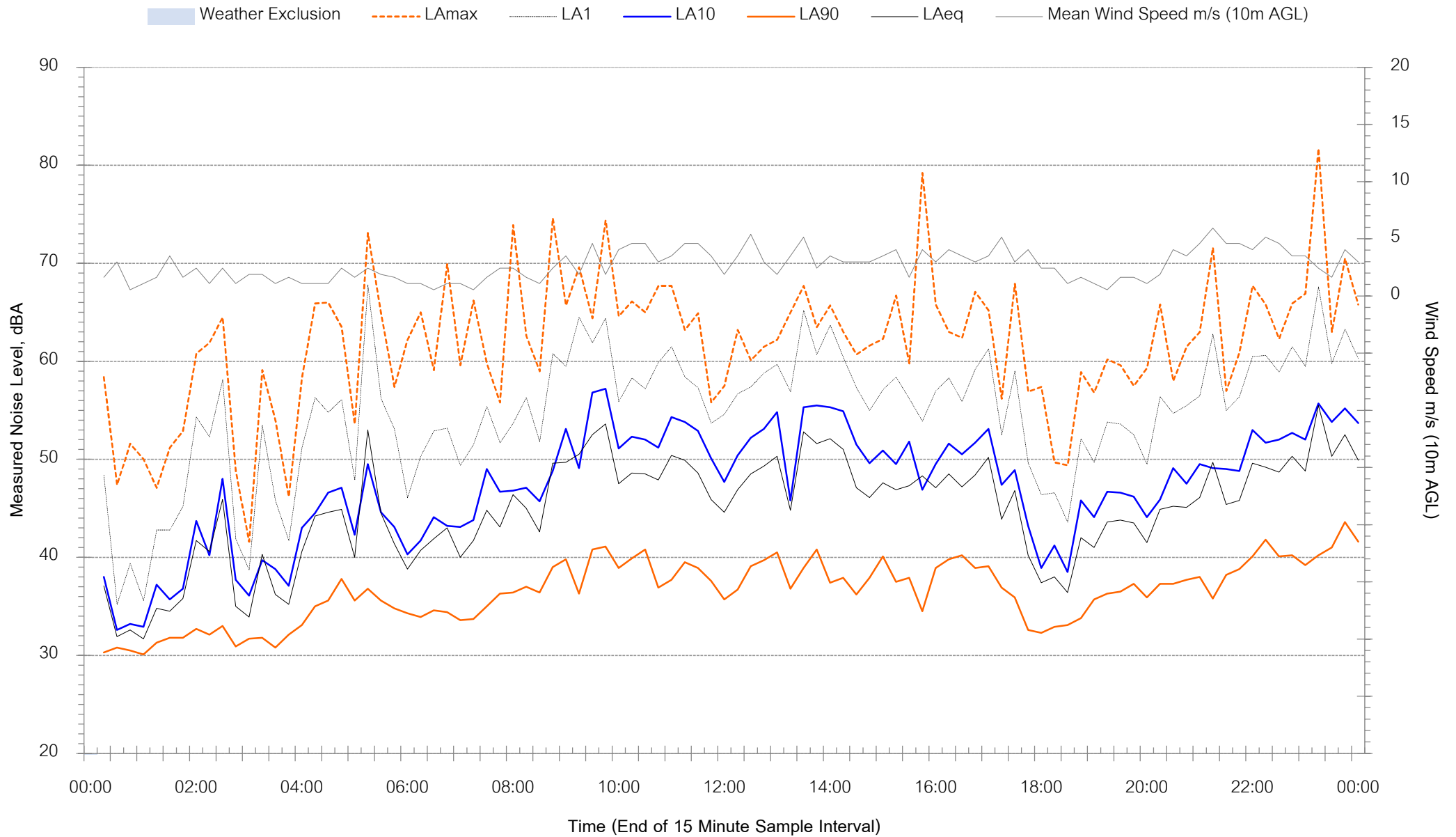
791 Jenolan Caves Road, Good Forest - Thursday 15 September 2022





Background Noise Levels

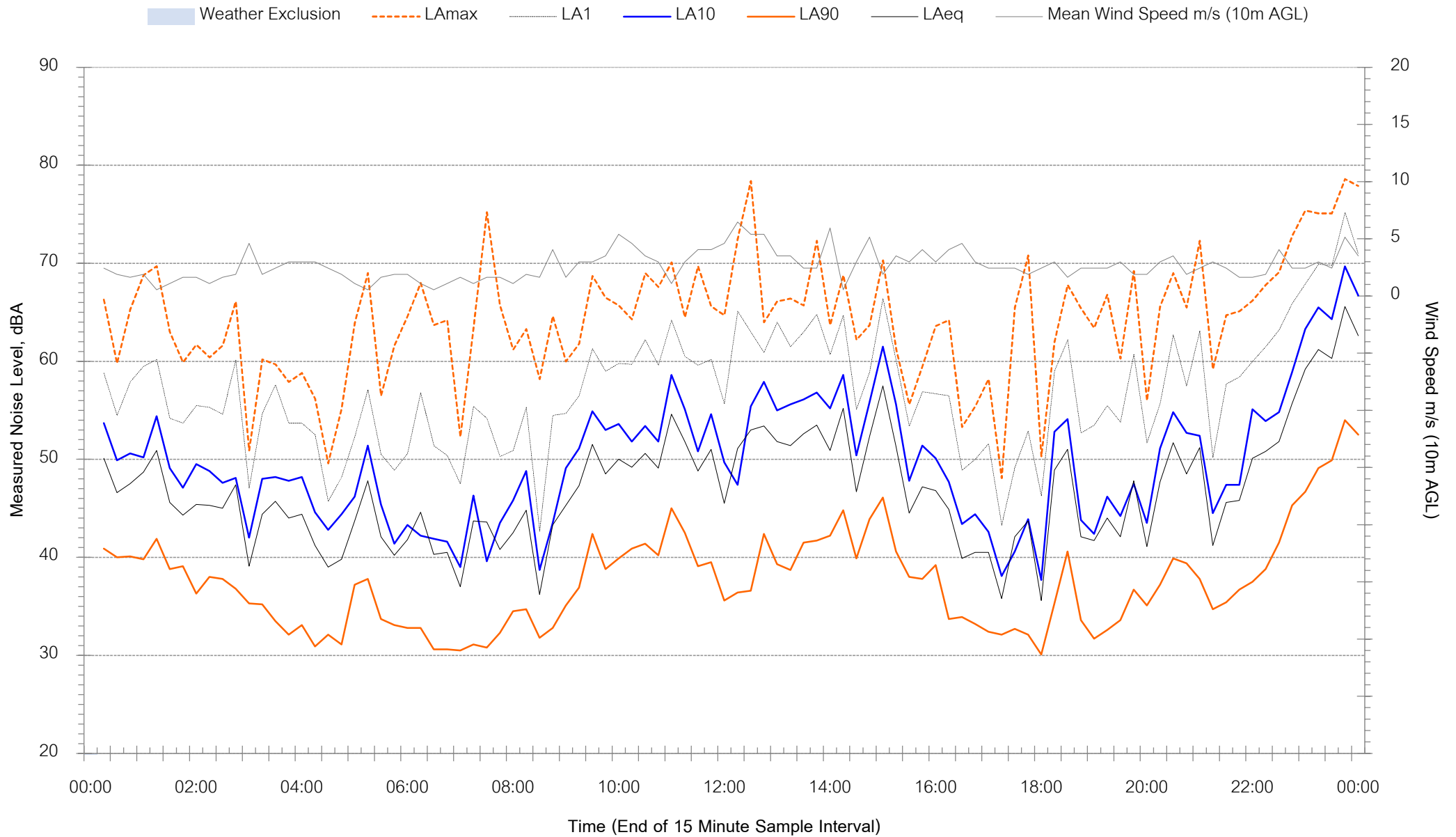
791 Jenolan Caves Road, Good Forest - Friday 16 September 2022





Background Noise Levels

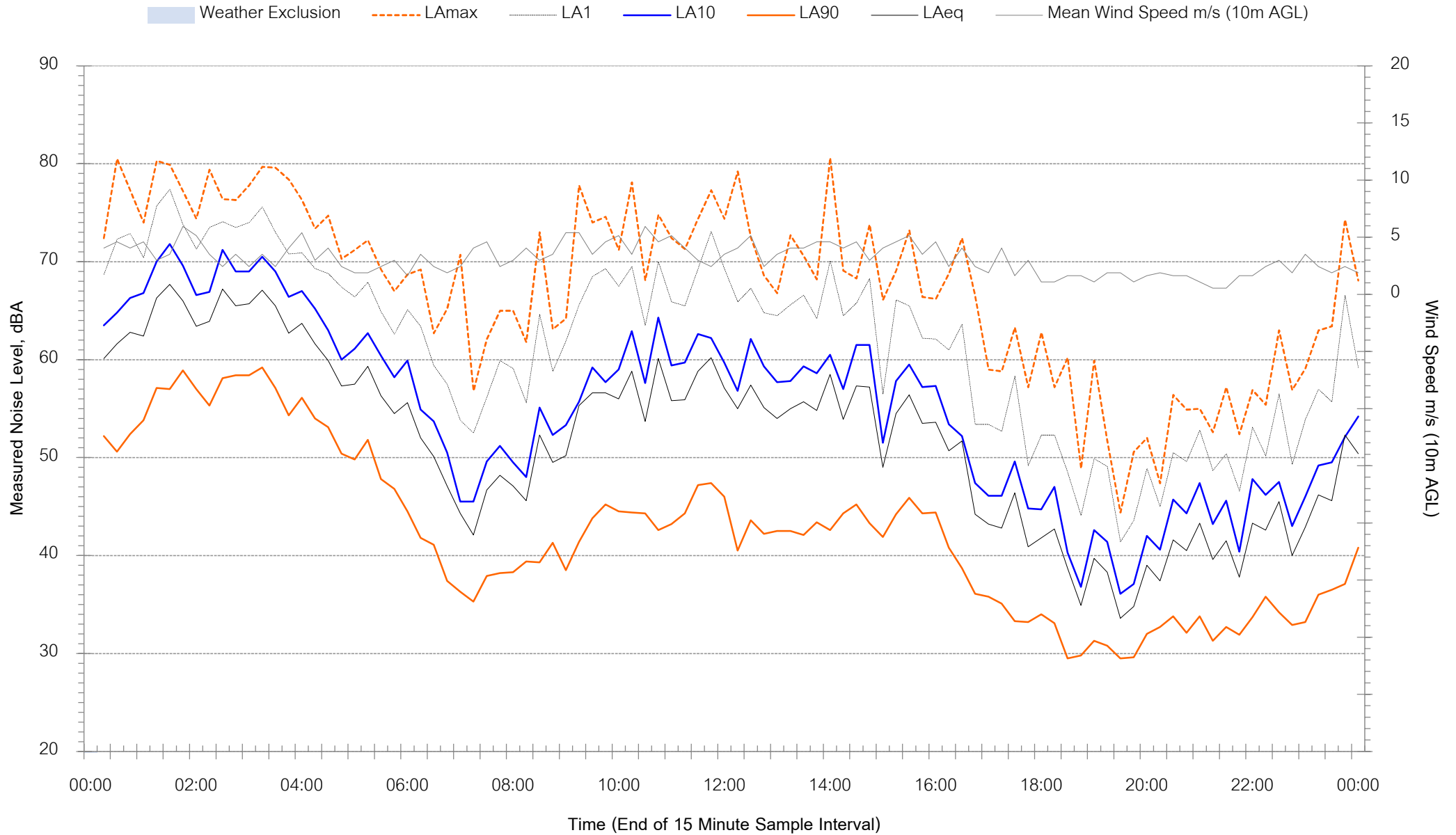
791 Jenolan Caves Road, Good Forest - Saturday 17 September 2022





Background Noise Levels

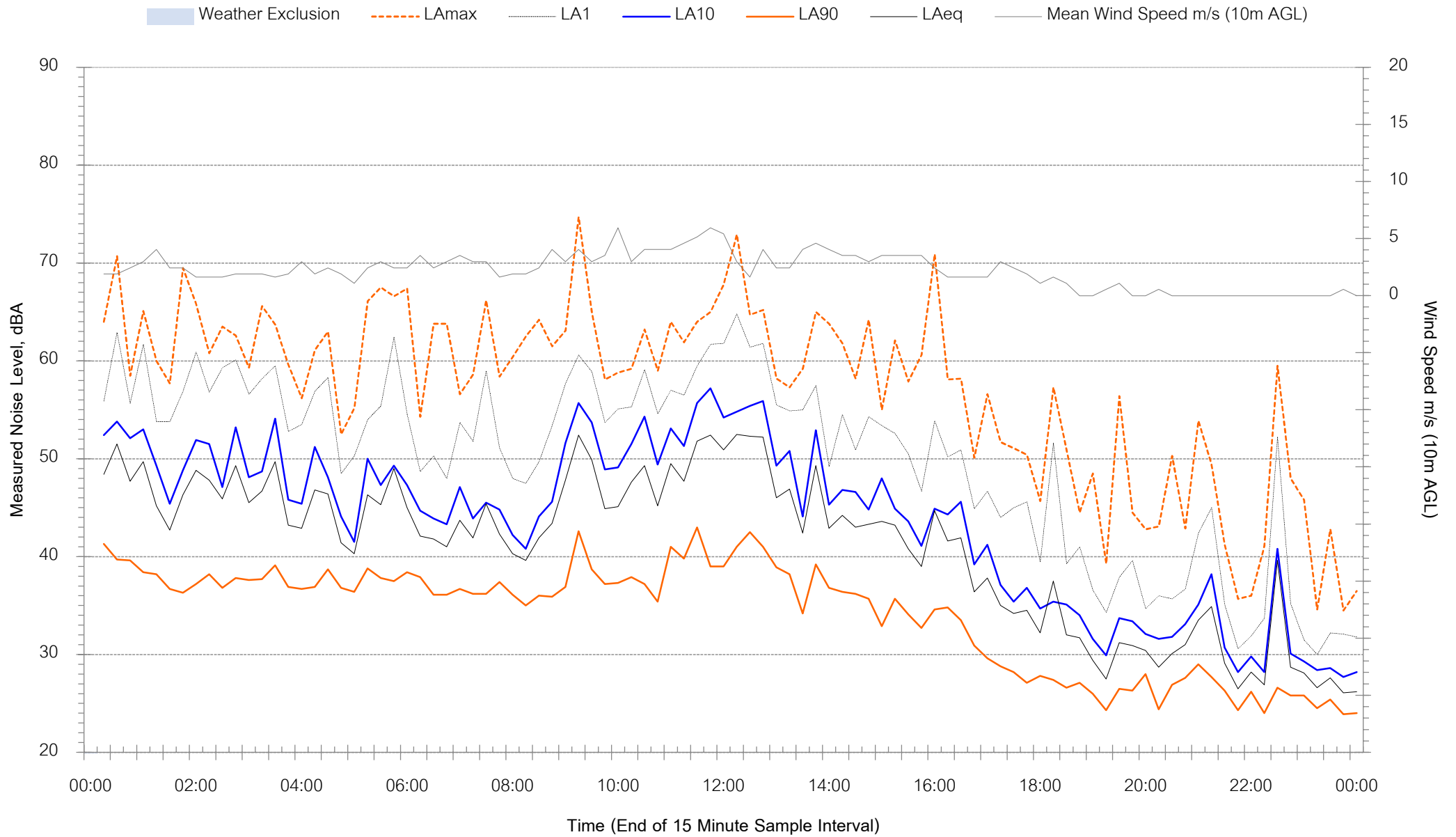
791 Jenolan Caves Road, Good Forest - Sunday 18 September 2022





Background Noise Levels

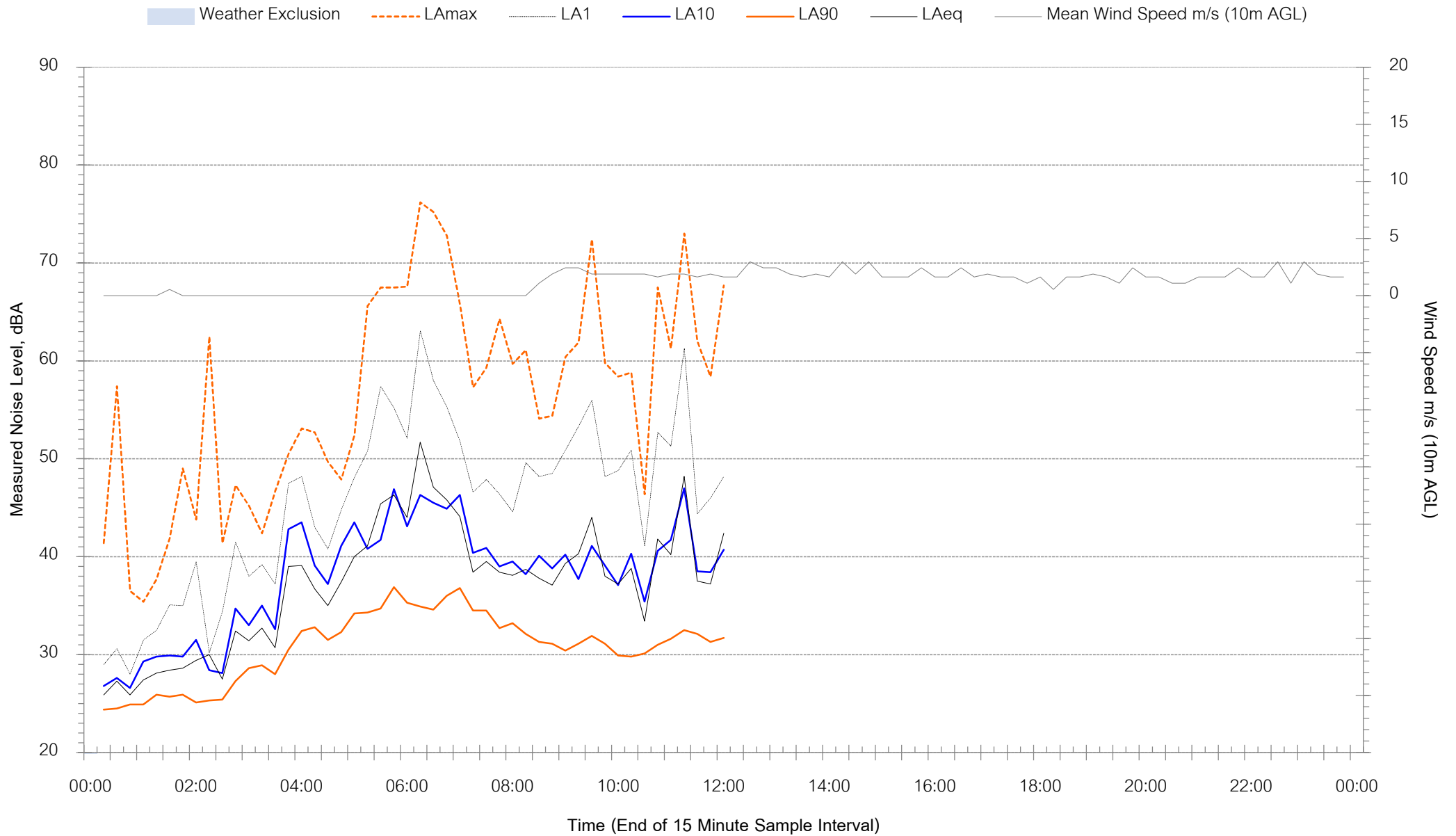
791 Jenolan Caves Road, Good Forest - Monday 19 September 2022





Background Noise Levels

791 Jenolan Caves Road, Good Forest - Tuesday 20 September 2022



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