Noise Impact Assessment

33A Lee Street
Maitland, NSW

Prepared for: Architects Becerra
August 2021
MAC211362-01RP1

Muller Acoustic Consulting

Document Information

Noise Impact Assessment

33A Lee Street

Maitland, NSW

Prepared for: Architects Becerra

1 Layton Street

Camperdown NSW 2050

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MAC211362-01RP1	Final	23 August 2021	Louis Abell		Oliver Muller	

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Architects Becerra to prepare a Noise Impact Assessment (NIA) for the proposed construction of a residential development located at 33A Lee Street, Maitland, NSW (the 'project').

The NIA has assessed noise impacts from nearby commercial premises in accordance with the pre-lodgement advice received from Maitland City Council (MCC) (December, 2020) which is reproduced below:

> *Due to the close proximity of existing noise generating sources, an acoustic assessment will be required as part of the application and specific building design outcomes may need to be used.*

This report presents the results, findings and recommendations of the NIA, and has been prepared to accompany the project's Development Application (DA) for submission to MCC. The assessment has been undertaken in accordance with the following documents:

- Association of Australasian Acoustical Consultants (AAAC) – Licensed Premises Noise Assessment Technical Guideline, 2019;
- The Independent Liquor and Gaming Authority (ILGA) criteria related to licensed premises;
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures; and
- Australian Standard AS 2107:2016 - Acoustics - Recommended design sound levels and reverberation times for building interiors.

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

1.1 Objectives

Desktop review indicates that the Annual Average Daily Traffic (AADT) of the surrounding roads (Lee Street and High Street) are below the threshold of 1,000 vehicles per day. The angle of incidence from the project and setback from High Street, combined with low traffic volumes indicate that road traffic noise will not be a significant noise source compared to mechanical plant from existing commercial premises adjacent to the proposed development site. As there are potential noise impacts from the surrounding commercial complexes such as licenced venues and buildings utilising mechanical plant, the assessment has considered noise impacts in accordance with the Independent Liquor and Gaming Association noise criteria and internal noise levels assessed against the Australian Standard AS 2107:2016 - Acoustics - Recommended design sound levels and reverberation times for building interiors.

2 Noise Policy and Criteria

2.1 Independent Liquor and Gaming Authority (ILGA)

The NSW EPA's Noise Guide for Local Government (NGFLG) (2013) provides criteria related to amplified music and patron noise at licensed premises which is not assessable under the NPI. The ILGA criteria are reproduced from NGFLG below and have been adopted as criteria for this assessment:

> *'The LA10 noise level emitted from the licensed premises shall not exceed the background noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) by more than 5dB between 7:00am and 12:00midnight at the boundary of any affected residence.*
>
> *The LA10 noise level emitted from the licensed premises shall not exceed the background noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between 12:00midnight and 7:00am at the boundary of any affected residence.*
>
> *Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12:00 midnight and 7:00am.'*

2.2 Internal Noise Criteria

It is noted that the project involves the construction of four two-storey residential units. **Table 1** reproduces the design sound levels adopted for receivers for the project. It is noted that internal criteria for residential receivers outlined in the guideline are consistent with AS2107.

Table 1 Design Sound Levels – Residential Receivers

Type of Occupancy	Design Sound Level $L_{Aeq,t}$ (range)	
	Day	Night
Residential	40	35[1]

Note 1: Applicable to bedrooms only between 10pm–7am.

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3 Existing Environment

3.1 Background Noise Environment

3.1.1 Unattended Noise Monitoring

One unattended noise monitor was installed at the south eastern boundary of 33A Lees Street, Maitland, NSW from Tuesday 15 June 2021 to Thursday 24 June 2021 to quantify ambient background noise levels. The monitor location and locality plan showing the proposed dwelling with respect to Lee Street is presented in **Figure 1**. The monitoring location was selected considering worst case exposure to nearby commercial noise sources.

Instrumentation used was a SVANTEK 971 Type 1 octave sound analyser and was programmed to collect samples at 15-minute intervals with 'Fast' time weighting and 'A' frequency weighting. The analyser was calibrated before and after the monitoring period with no drift in calibration noted. Monitoring was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018 (AS 1055) – Description and Measurement of Environmental Noise. Data affected by adverse meteorological conditions has been excluded from the results in accordance with methodologies provided in the NPI.

The results of long-term unattended monitoring are provided in **Table 2**. **Appendix B** presents the noise monitoring charts for the assessment period.

Table 2 Background Noise Monitoring Summary[1]

Location	Measured Background Noise Level RBL dBA			Measured Noise Level dB $L_{Aeq(period)}$		
	Day	Evening	Night	Day	Evening	Night
L1	45	42	33	56	51	55

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.

3.1.2 Attended Noise Monitoring

To validate background noise levels, two attended noise monitoring assessments were completed at the project site. One measurement was completed in the vicinity of the proposed eastern corner of the project building (A1) fronting Lee Street to quantify noise levels at the east of the project site. The second measurement was completed in the vicinity of the southern corner of the project building (A2) to quantify noise levels at the south of the project site. **Figure 1** presents the locations of the monitoring locations with respect to the project.

The monitored noise level contributions and observed meteorological conditions for the measurements are presented in **Table 3**. Attended noise monitoring at locations A1 and A2 found that the dominant noise source in the locality is mechanical plant, local traffic noise and domestic noise at both locations.

Table 3 Operator-Attended Noise Survey Results

Location	Date / Time	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L_{Amax}	L_{Aeq}	L_{A90}		
A1	15/06/2021 15:32	80	58	47	WD: E WS: 1.5m/s 20°C	Distant Traffic 45-50 Local Traffic 55-70 Birds 38-48 Mechanical plant 35-40 Domestic (People) 35-38 Operator 80
A2	24/06/2021 13:46	66	49	44	WD: SE WS: 1.0 m/s 22°C	Distant Traffic 38-46 Local Traffic 43-66 Mechanical plant 33-45 Birds 35-43 Domestic (People) to 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.

FIGURE 1

Locality Plan

MAC211362-01

33A Lee Street

Maitland, NSW

KEY

Site

Attended Noise Logging

Unattended Noise Logging

0 10 20 m

N

MAC
Muller Acoustic Consulting

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4 Noise Assessment Results

4.1 Noise Intrusion Results

A review of floor plans (Architects Becerra, 2020) (**Appendix C**) for the project have been completed as part of the assessment. The project will consist of four residential units arranged with bedrooms opening to a balcony on first floor of the south eastern façade facing Lee Street. The kitchen areas on the first floor also contain windows facing Lee Street. It is therefore considered that the proposed residential units would be exposed to noise associated with patrons and mechanical plant at the venue adjacent the development. The first floor of the units on north western façade are arranged with living areas opening to a balcony and a second bedroom with windows facing to the adjoining commercial property (cinema complex). It is considered that the north western façade will have less exposure to noise associated with patrons and mechanical plant at the venue adjacent the development in comparison to the south eastern facade.

4.1.1 Indicative Attenuation Levels

The Environmental Noise Management Manual (ENMM) (2001) provides a summary of indicative attenuation from standard building types. The indicative attenuation levels are summarised in **Table 4**, which provides typical performance of buildings with respect to noise reduction. A light frame residence with single glazing would be expected to provide a reduction of 20dBA from external to internal with windows closed. Where windows are closed, the fresh air requirements outlined in the Building Code of Australia are to be satisfied.

Table 4 Indicative Building Noise Attenuation

Building Type	Windows	Internal noise reduction, dBA
All	Open	10
Light frame	Single glazed (closed)	20
Masonry	Single glazed (closed)	25
	Double glazed (closed)	30

Note: Sourced from ENMM, 2001.

Table 5 presents a comparison of measured noise from surrounding developments against the respective day and night internal criteria of the façade for the building with exposure to noise. This monitoring location was chosen as it is fronting the nearest commercial receiver and is expected to be the most impacted location of the project. It is expected that were compliance can be achieved at this location, the subsequent facades will also achieve compliance.

To account for the internal criteria, internal transmission into receivers was assumed via the weakest path (glass doors/windows on veranda or facade). The calculations made allowances for a closed light frame single glazed window system, resulting in a reduction of 20dBA (as indicated in **Table 4**).

Table 5 Noise Intrusion Results

Location	Predicted Noise Level (internal), dBA[1]		AS2107:2016 Internal Criteria, dBA	
	Day 7am to 10pm	Night 10pm to 7am	Day 7am to 6pm	Night 10pm to 7am
L1	37	35	40	35[2]

Note 1: Allowances for a closed light frame single glazed window system, resulting in a reduction of 20dBA.

Note 2: Applicable to bedrooms only between 10pm–7am.

Results of the noise assessment demonstrate that internal noise criteria for 'sleeping areas' and 'other inhabitable spaces' would be satisfied at the worst affected location. As the predicted noise levels for sleeping areas approaches criteria, it is recommended that Category 1 glazing treatments are considered for the windows and glass doors for all units, to ensure the amenity of occupants.

4.2 ILGA Results

Unattended monitoring was conducted between Tuesday 15 June 2021 to Thursday 24 June 2021, to quantify background noise levels in the octave band centre frequencies 31.5Hz – 8kHz for the project. It has been confirmed that during the monitoring period on Saturday 19 June 2021, live music was held at the Pourhouse between 8pm and 12am. This licensed premises is located approximately 15m from the unattended monitoring location which is considered representative of the worst affected façade of the future development. To assess the contributions from live music to the project in accordance with the ILGA criteria, the L_{A10} of the period of this event was assessed against L_{A90}+5dBA of the residual monitoring days for the same period (8pm to 12am). **Table 6** presents this analysis.

Table 6 OLGR Noise Assessment Results – Live music

	L_{A10} Noise Criteria, Octave Band Centre Frequency (Hz), dBA								
	31.5	63	125	250	500	1 k	2 k	4 k	8 k
	8pm to 12am								
Live music event, L_{A10}	25	38	45	46	48	49	45	35	24
Background L_{A90}+5dBA[1]	24	33	37	37	39	42	36	25	14
Exceedance	**1**	**5**	**8**	**9**	**8**	**7**	**9**	**9**	**10**

Note 1: Assessed period 8pm to 12am from Tuesday 15 June 2021 to Thursday 24 June 2021. Data was excluded for Saturday 19 June 2021 as live music was held at the Pourhouse between 8pm and 12am.

Although the L_{A10} during a live music event at the nearby licenced premises is above the ILGA criteria of the ambient environment L_{A90}+5dB, comparison with the subsequent measurements for the same period taken throughout the monitoring campaign (without live music) shows little variability between the L_{A10} taken from the live music event and the existing noise environment. **Table 7** below presents the comparison of the L_{A10} during the live music event and average L_{A10} for the subsequent monitoring period between 8pm and 12am. Although the external levels are above the ILGA criteria, it is anticipated that upgrading of the glazing systems for the proposed development would attenuate residual noise and would satisfy the internal noise criteria.

Table 7 L_{A10} Noise Assessment - Tuesday 15 June 2021 to Thursday 24 June 2021

	L_{A10} Noise Criteria, Octave Band Centre Frequency (Hz), dBA								
	31.5	63	125	250	500	1 k	2 k	4 k	8 k
	8pm to 12am								
Live music event, L_{A10}	25	38	45	46	48	49	45	35	24
Weekly average L_{A10}[1] (excluding live music)	26	38	43	42	44	47	45	37	29
Comparison	-1	0	2	4	4	2	0	-2	-5

Note 1: Assessed period 8pm to 12am from Tuesday 15 June 2021 to Thursday 24 June 2021. Data was excluded Saturday 19 June 2021 as live music was held at the Pourhouse between 8pm and 12am.

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5 Discussion and Summary of Recommendations

5.1 Noise Control Recommendations

Standard domestic glass is usually inadequate acoustically and can reduce the acoustic attenuation performance of the overall building facade. Upgrade options include thicker laminated glass or double-glazed laminated windows with an air gap between panels. The frames and air gaps should be adequately sealed to optimise noise reduction. As windows must remain closed for effective noise reduction, alternative means of internal ventilation (eg air conditioning or wall ventilators) must be considered to allow windows to remain fully closed (refer to BCA requirements). **Table 8** provides the recommended minimal building categories as per the guideline (see **Appendix D**) for each element within the development.

Table 8 Noise Attenuation Recommendations

Facade	Minimum Guideline Category for Glazing Treatments[1]
Unit 1	
South Eastern Façade – Bedroom 1	Category 1
North Western Façade – Bedroom 2	Category 1
North Western Façade – Living room	Category 1
Unit 2	
South Eastern Façade – Bedroom 1	Category 1
North Western Façade – Bedroom 2	Category 1
North Western Façade – Living room	Category 1
Unit 3	
South Eastern Façade – Bedroom 1	Category 1
North Western Façade – Bedroom 2	Category 1
North Western Façade – Living room	Category 1
Unit 4	
South Eastern Façade – Bedroom 1	Category 1
North Western Façade – Bedroom 2	Category 1
North Western Façade – Living room	Category 1

Note 1: Category 1 glazing requirements include – Windows/Sliding Doors: Openable with minimum 4mm monolithic glass and standard seals.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed an assessment of potential noise impacts for the proposed apartment building located at 33A Lee Street, Maitland, NSW.

The assessment has directly quantified the existing ambient environment with respect to surrounding commercial noise emissions using measured levels. Noise measurements identified that Category 1 glazing would be suitable for attenuating noise levels for Unit 1 to Unit 4 and would be required to attenuate residual noise levels to satisfy internal criteria

Based on the noise assessment results, it is recommended Council approve the project based on the noise attenuation requirements (and attached proposed plans) provided in this report.

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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

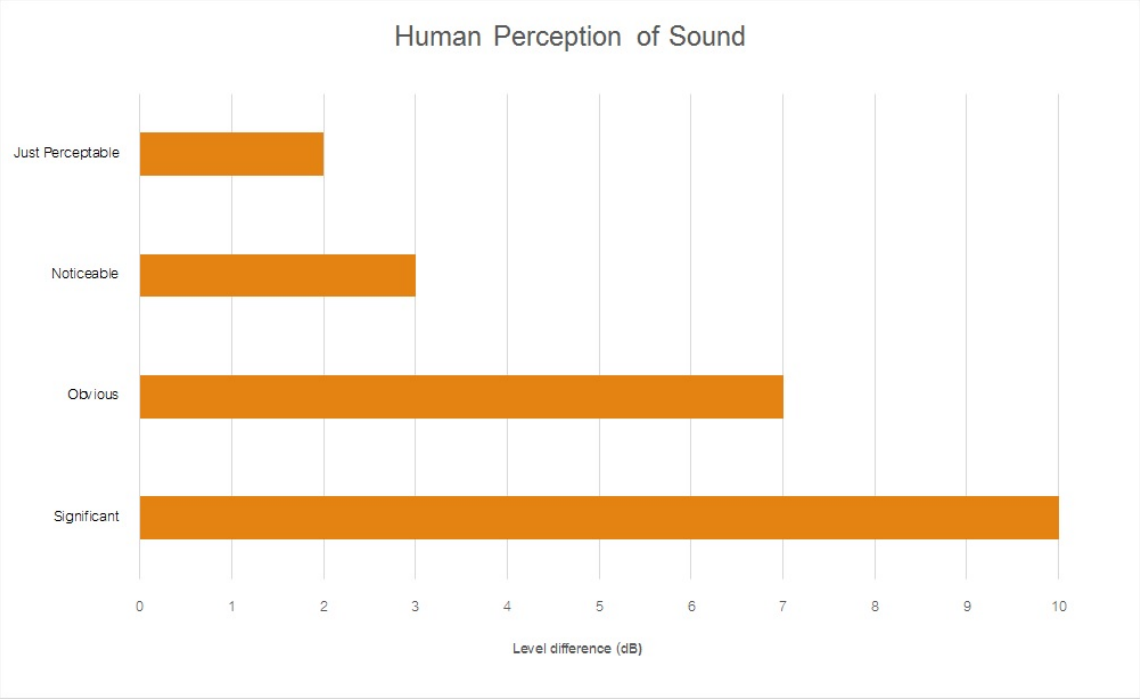
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for 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.
LAmax	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.log10 (W/Wo). 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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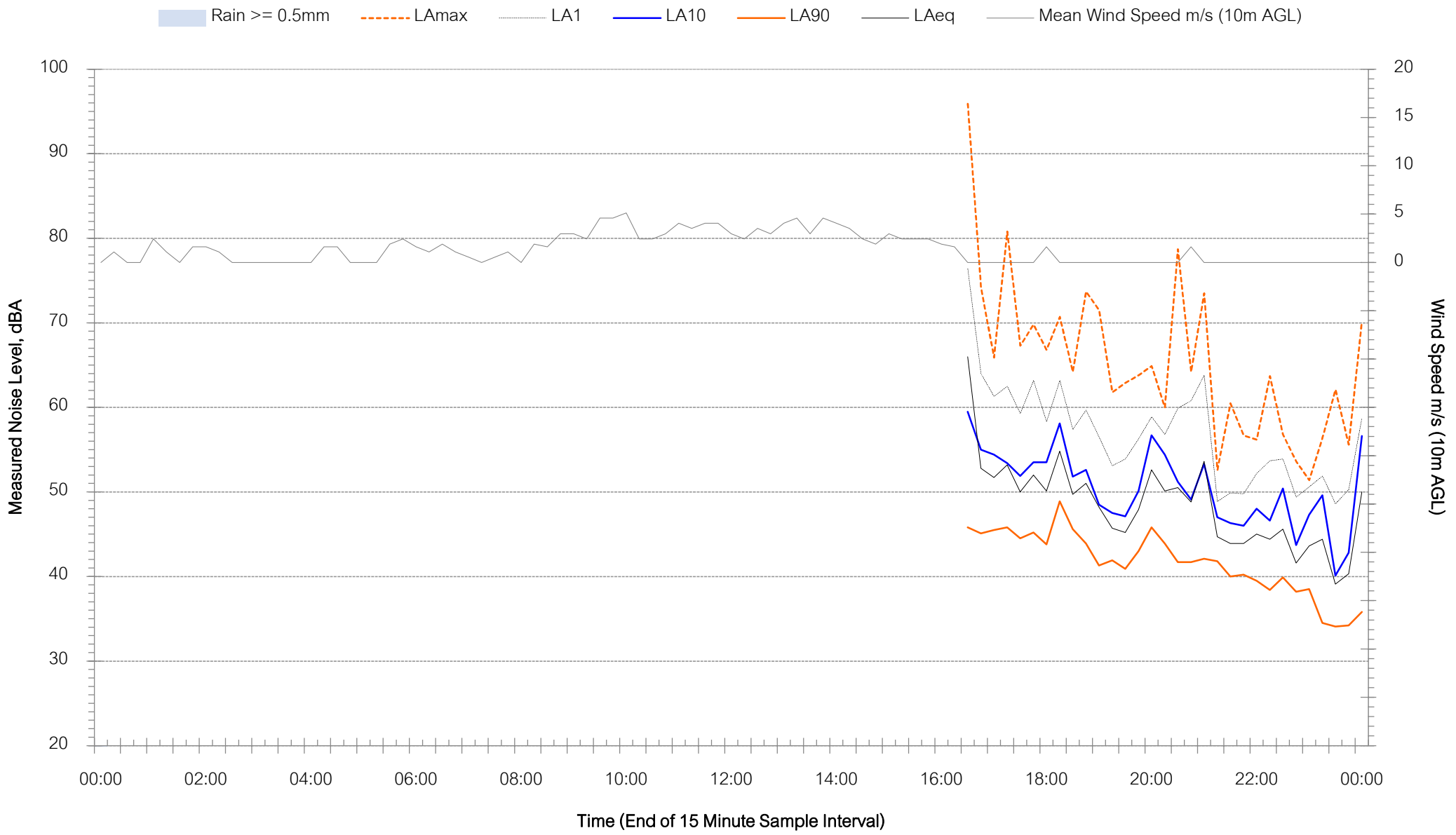
Appendix B – Noise Monitoring Data

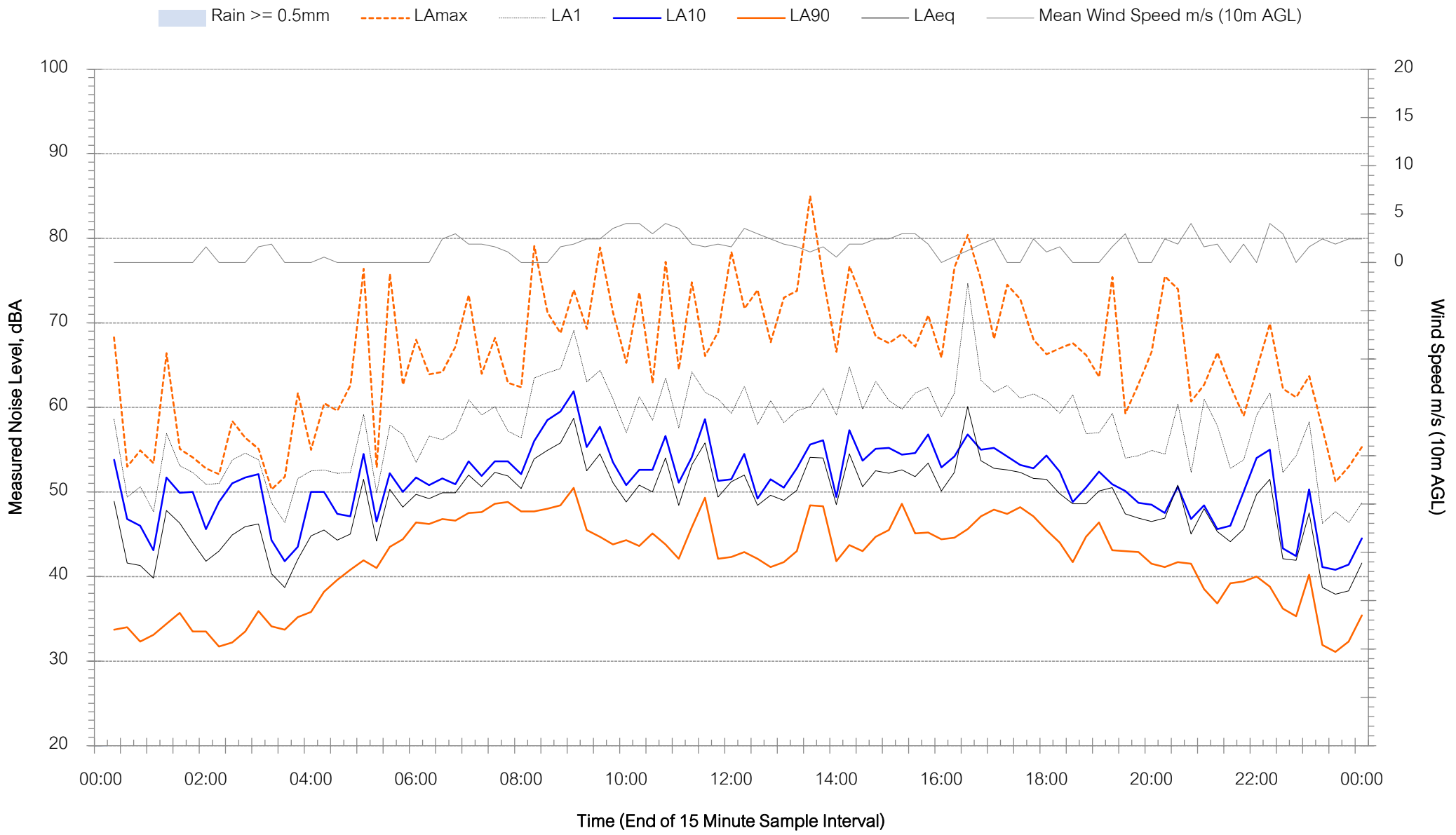
Background Noise Levels

33 Lee Street, Maitland - Tuesday 15 June 2021



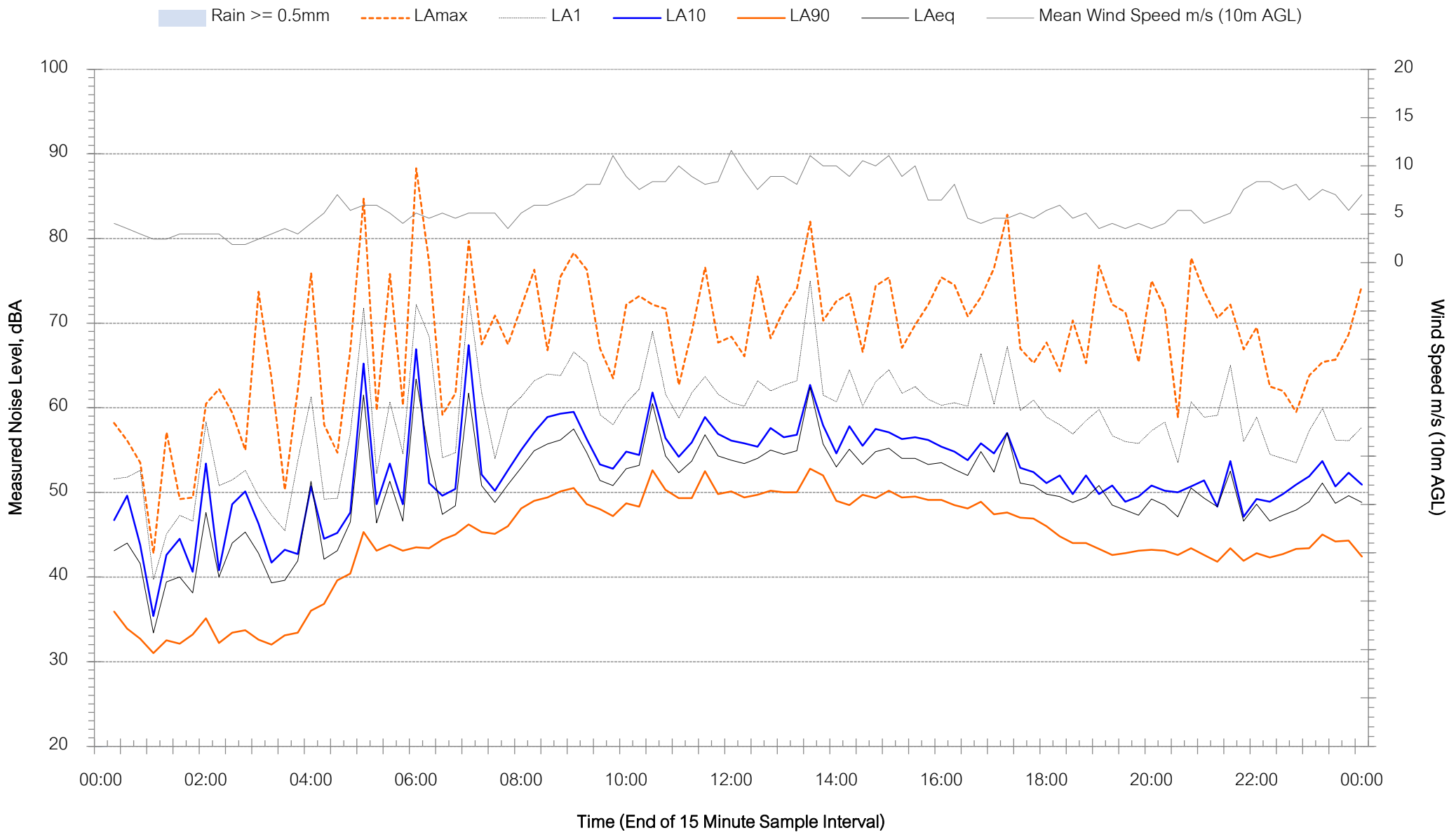
Background Noise Levels

33 Lee Street, Maitland - Wednesday 16 June 2021



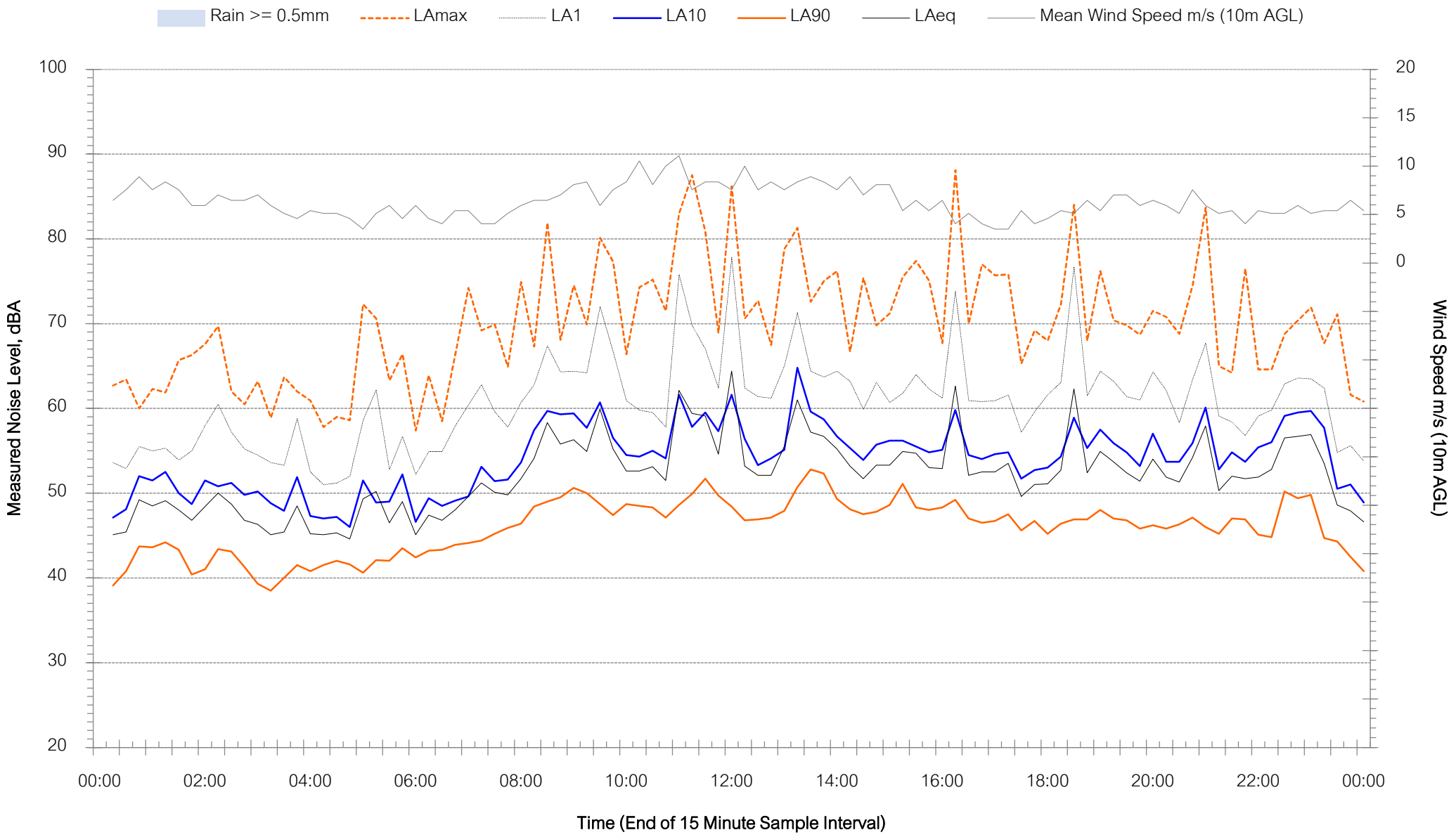
Background Noise Levels

33 Lee Street, Maitland - Thursday 17 June 2021



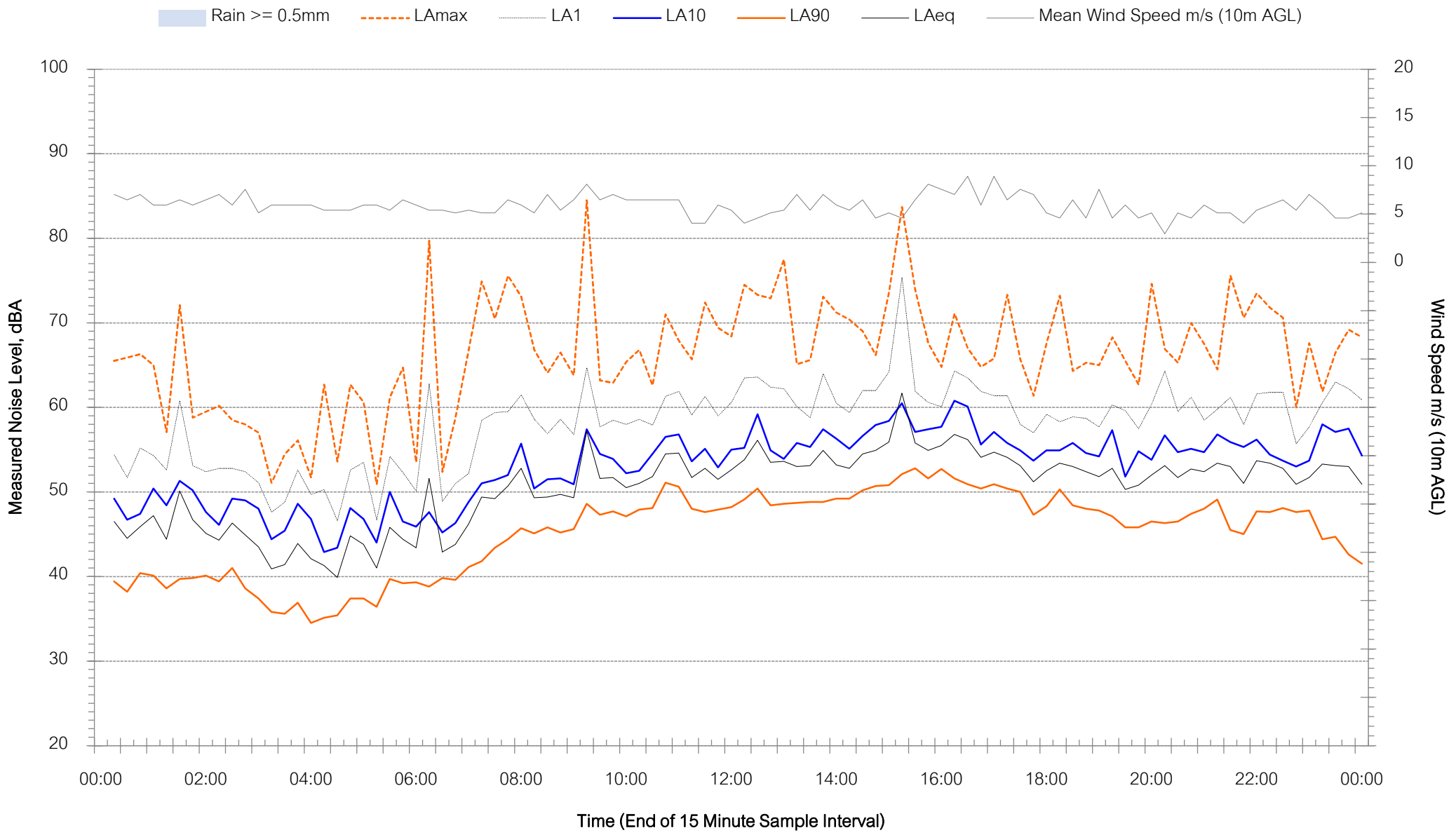
Background Noise Levels

33 Lee Street, Maitland - Friday 18 June 2021



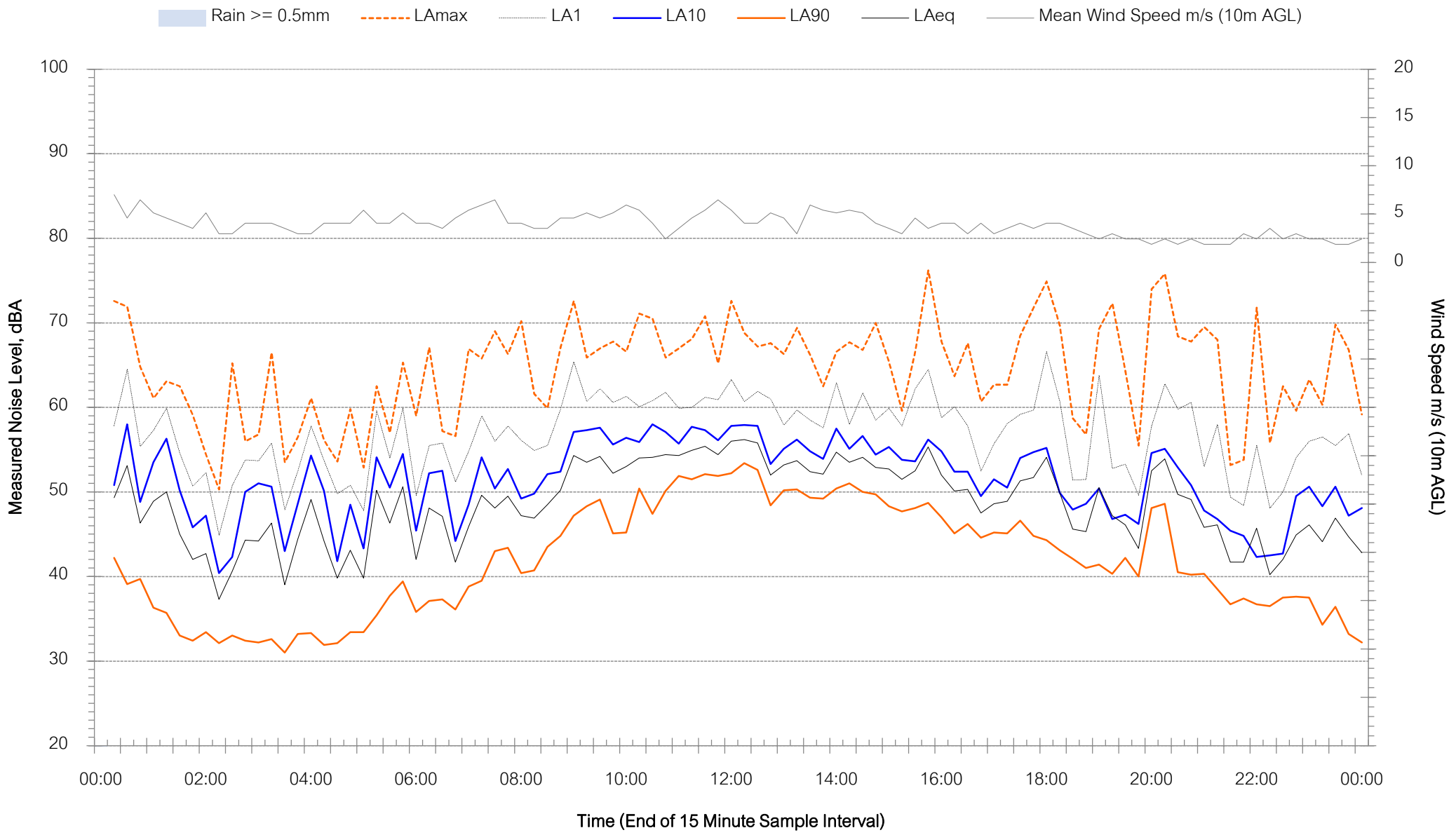
Background Noise Levels

33 Lee Street, Maitland - Saturday 19 June 2021



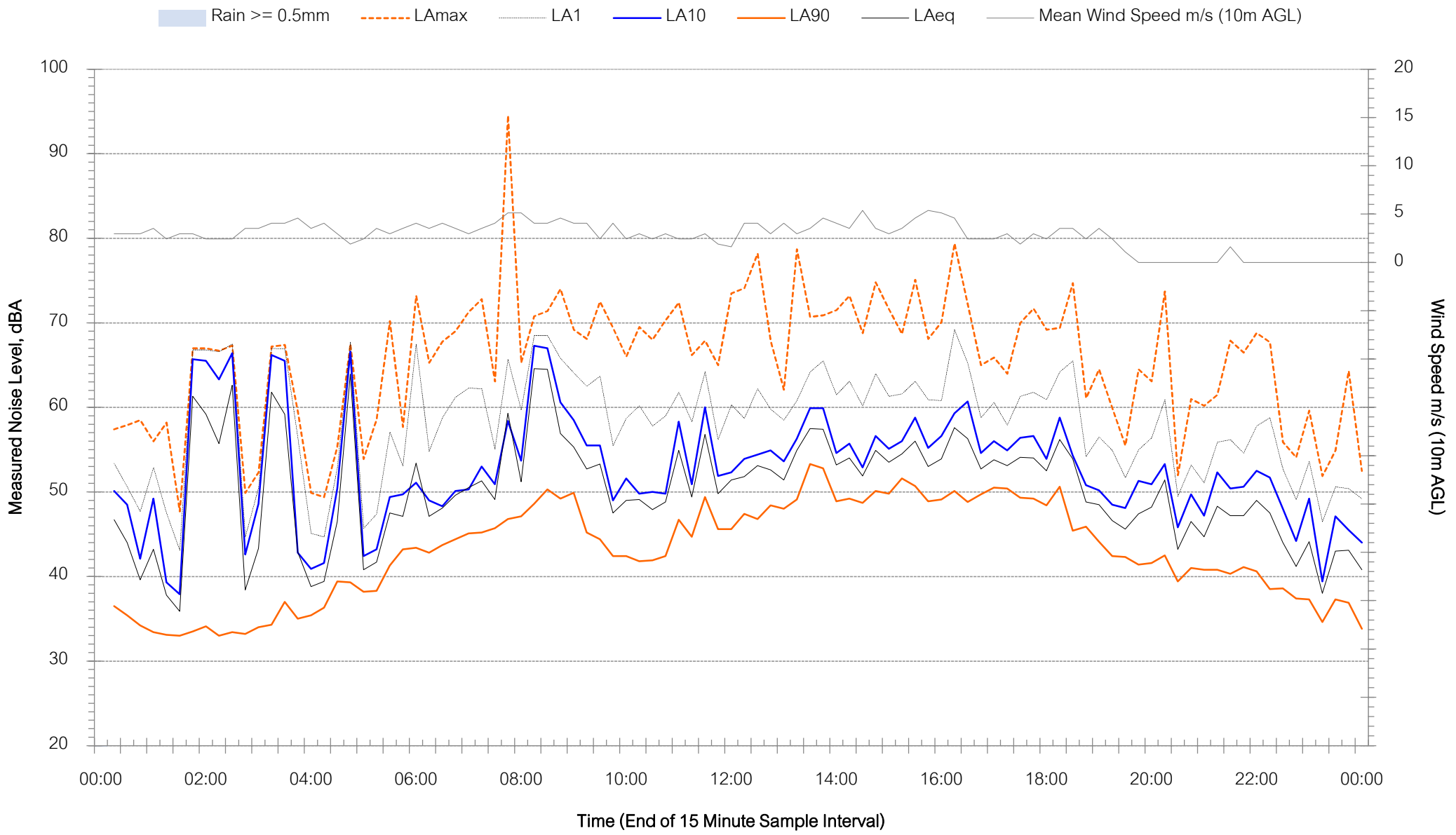
Background Noise Levels

33 Lee Street, Maitland - Sunday 20 June 2021



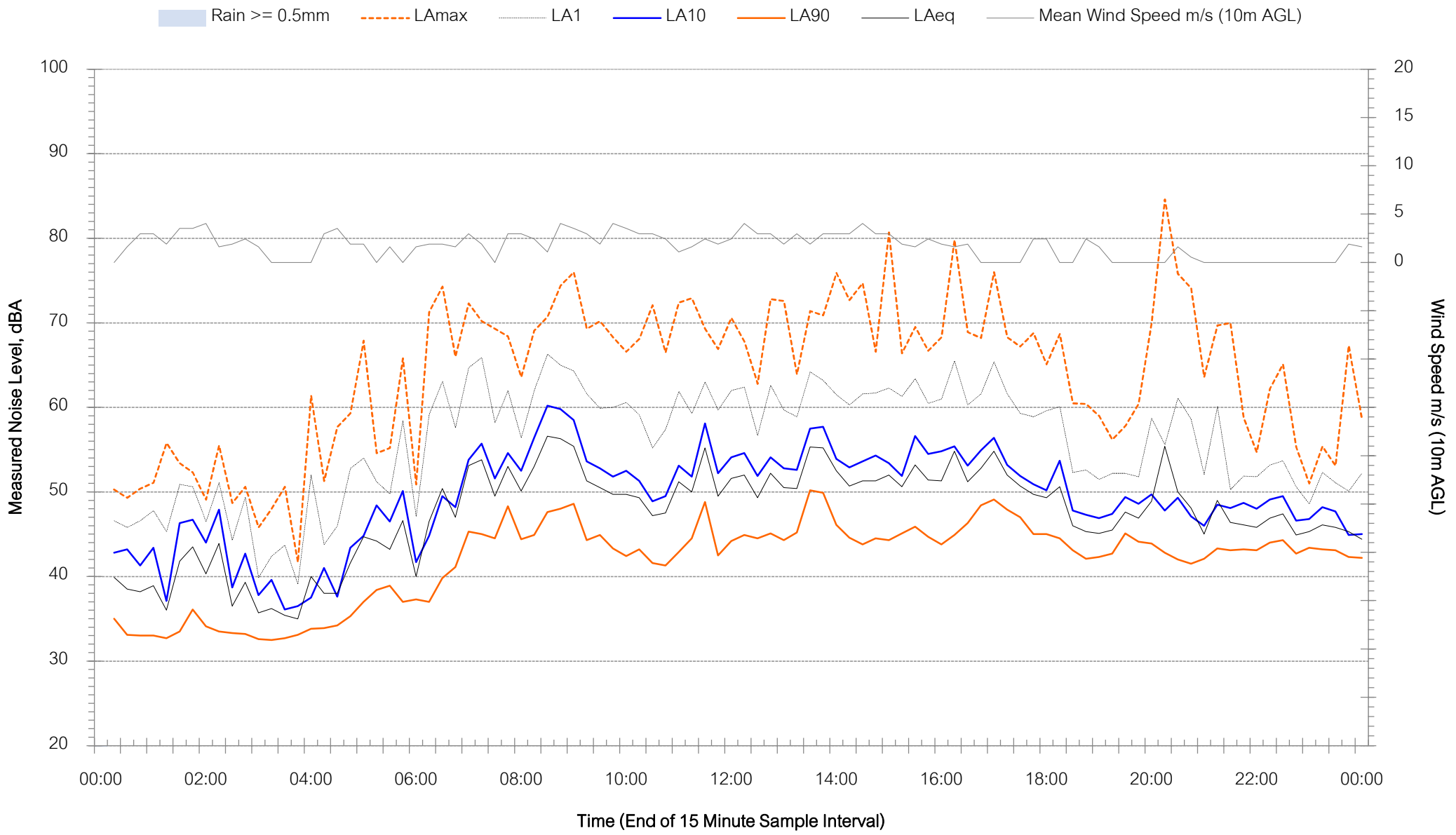
Background Noise Levels

33 Lee Street, Maitland - Monday 21 June 2021



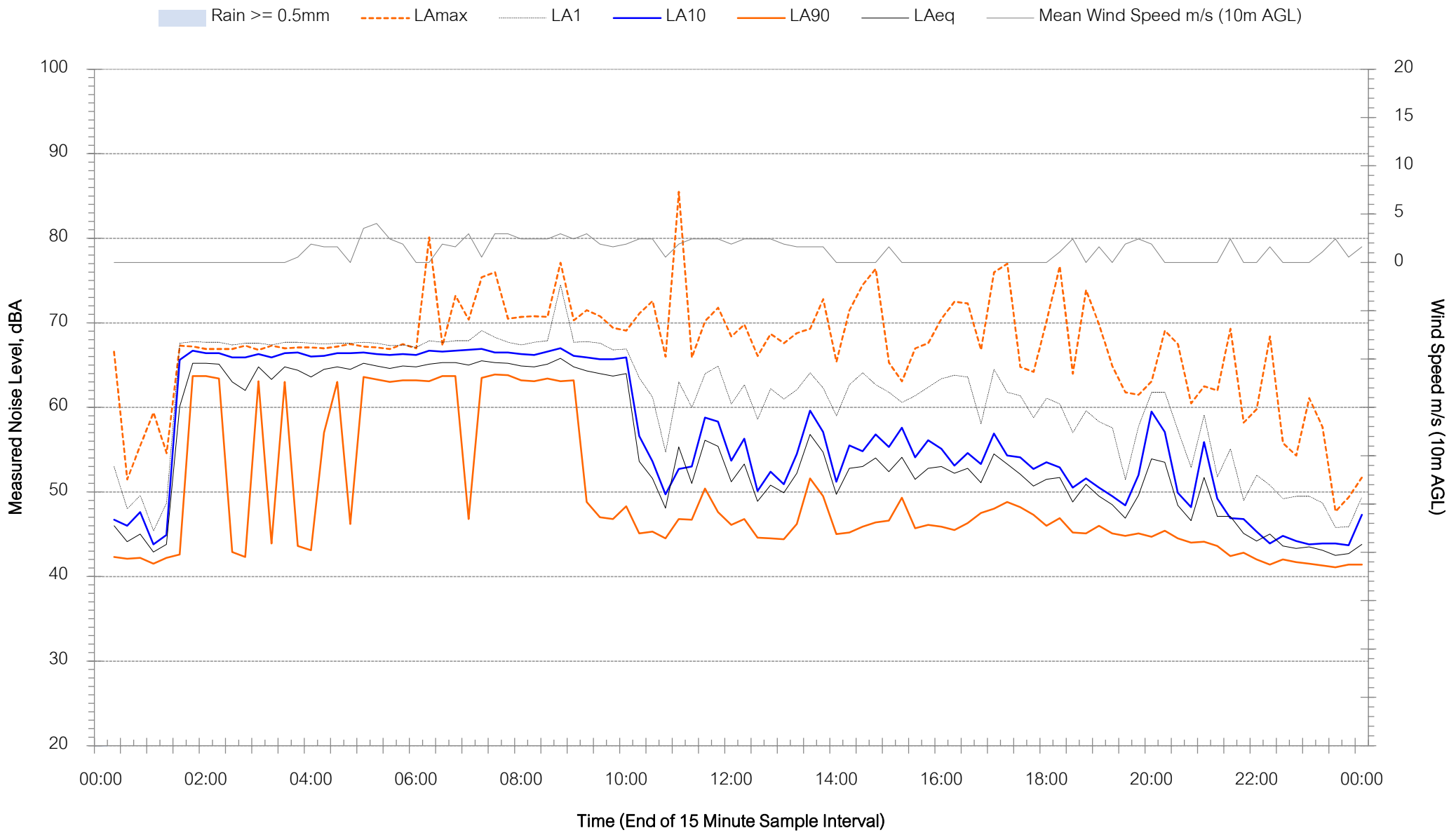
Background Noise Levels

33 Lee Street, Maitland - Tuesday 22 June 2021



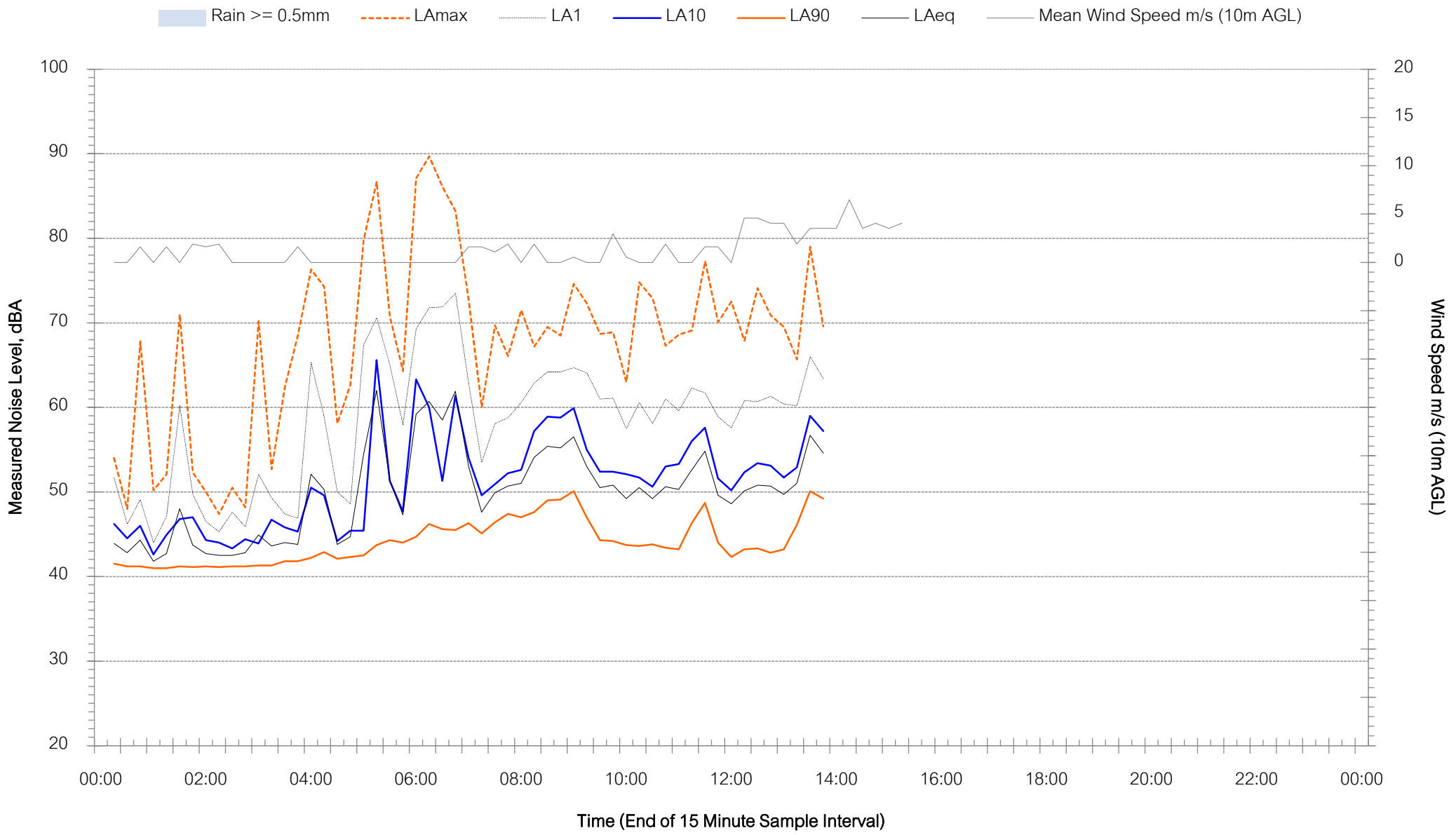
Background Noise Levels

33 Lee Street, Maitland - Wednesday 23 June 2021



Background Noise Levels

33 Lee Street, Maitland - Thursday 24 June 2021



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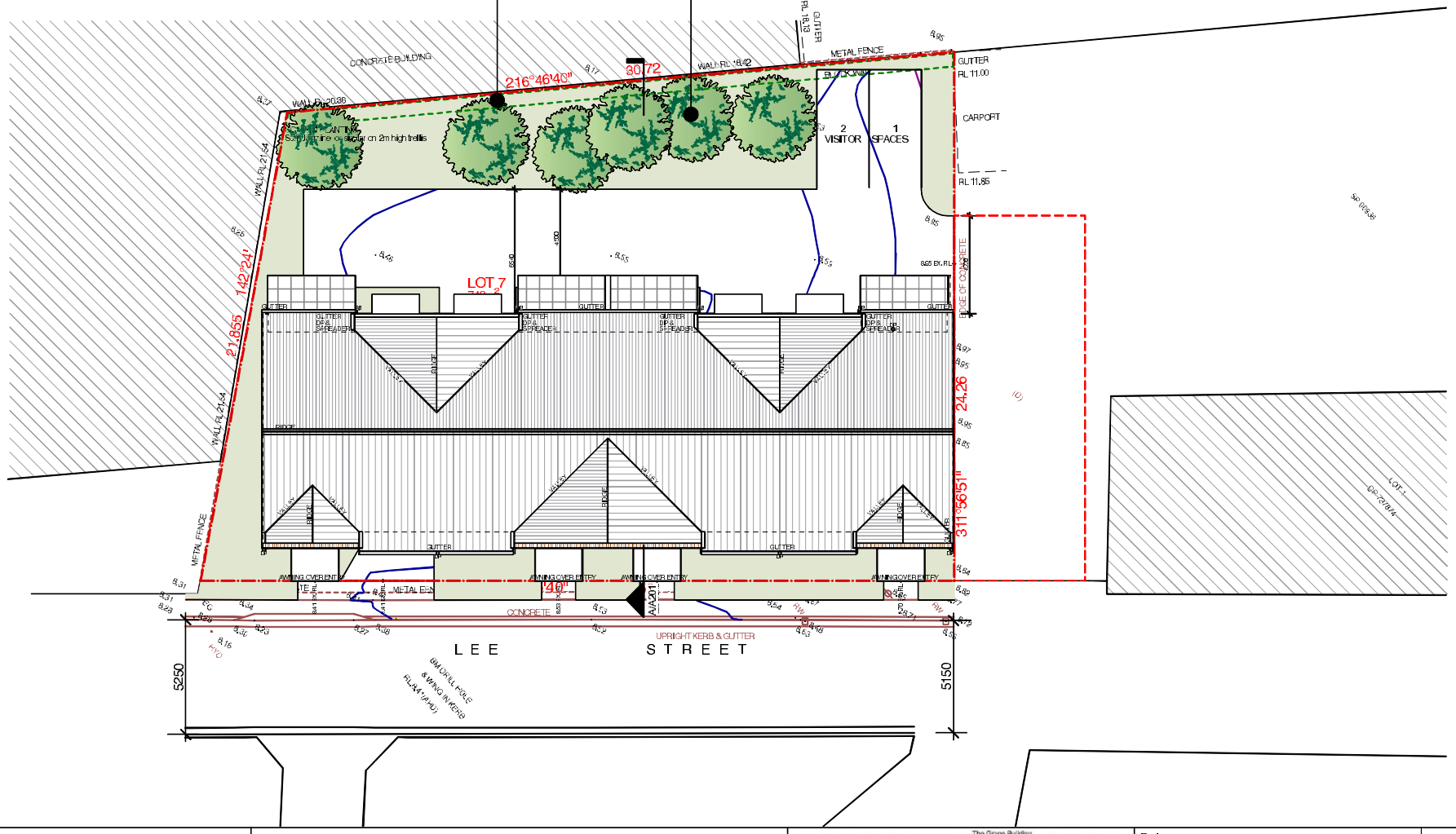
Appendix C – Site Plans

SCREEN PLANTING
Star Jasmine or similar on 2m high trellis

SCREEN TREES
Paper bark tea tree or similar



G	Issued for DA	BC	17/8/21	0 5 10 M	architects becerra	The Grace Building 601, 1 Layton Street Camperdown NSW 2050 Cnr Pyrmont Bridge Road & Mallett Street t 02 9557 2288 f 02 9557 2287 w www.archb.com.au Registered Architect 5387 ABN 87 123 916 807	Project	New Attached Dwellings 33A Lee Street Maitland	Drawn By: PB	Dwg Date: March 2020	Project No. 2016
Revision	Amendment	By	Date				Client	Koonoona Pty Ltd	Checked By: AB	Scale: 1:200@A3	Drawing No. A100 Rev G
							Title	SITE / ROOF PLAN			

SOUTH EAST ELEVATION

1:100

NORTH WEST ELEVATION

1:100

G	Issued for DA	BC	17/8/21
Revision	Amendment	By	Date

architects cecerra
The Grace Building
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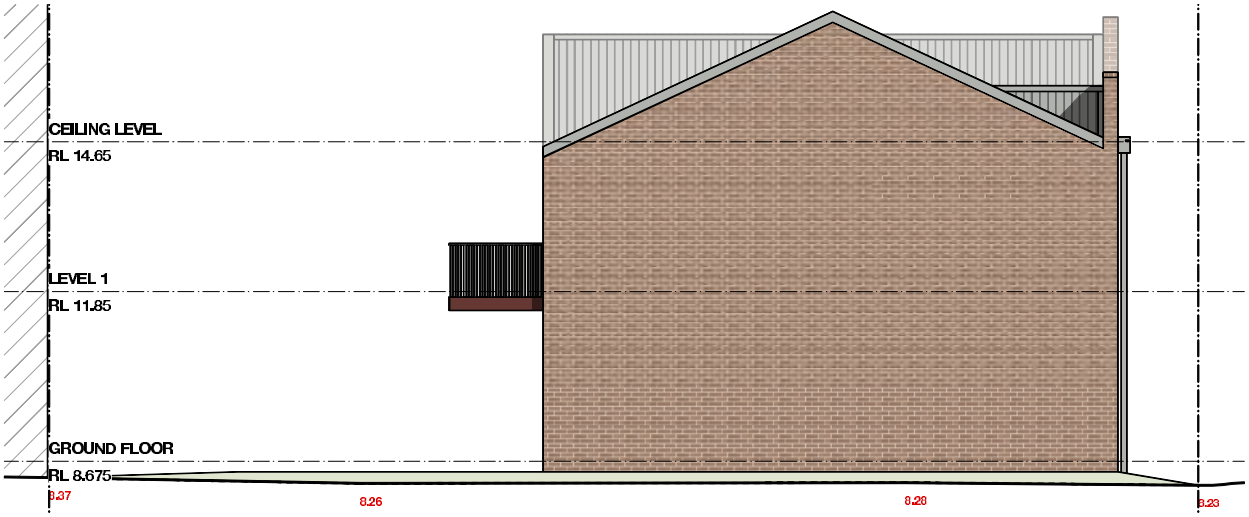
Registered Architect 5387
ABN 87 123 916 607

Project	New Attached Dwellings 33A Lee Street Maitland	Drawn By	PB	Dwg Date:	May2020	Project No.	2016
Client	Koonoona Pty Ltd	Checked By	AB	Scale	1:100@A3	Drawing No.	A200 G
Title	ELEVATIONS						



SOUTH WEST ELEVATION

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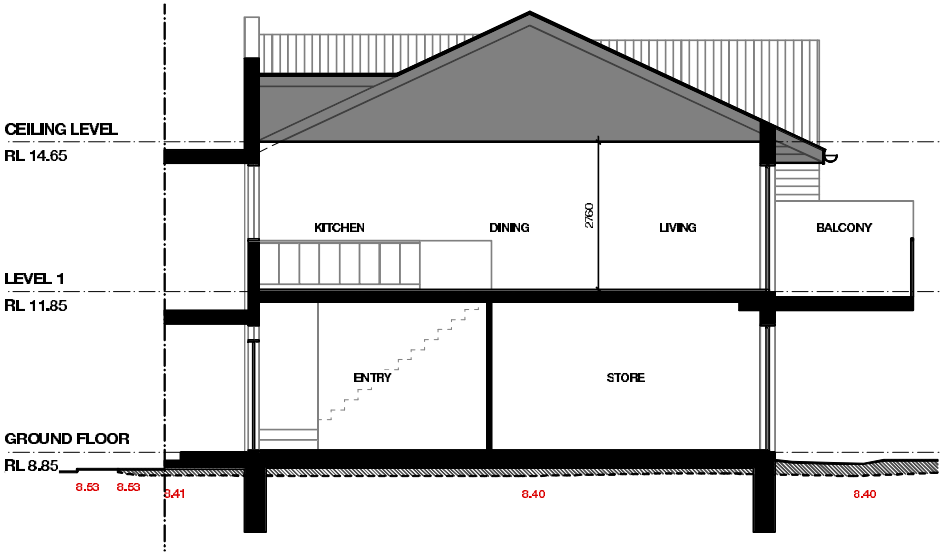

SECTION A

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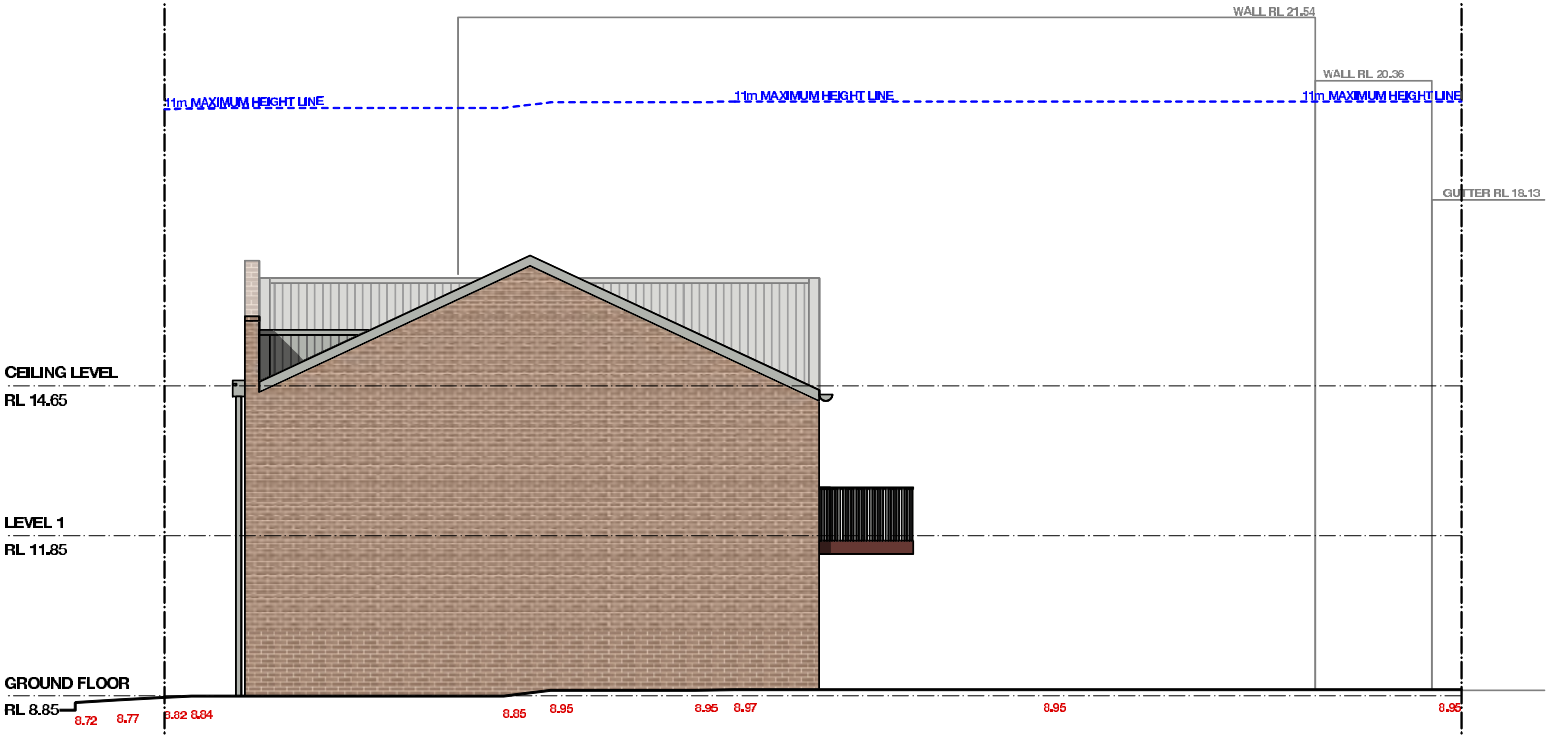

NORTH EAST ELEVATION

1:100

G Revision	Issued for DA Amendment	BC By	17/8/21 Date

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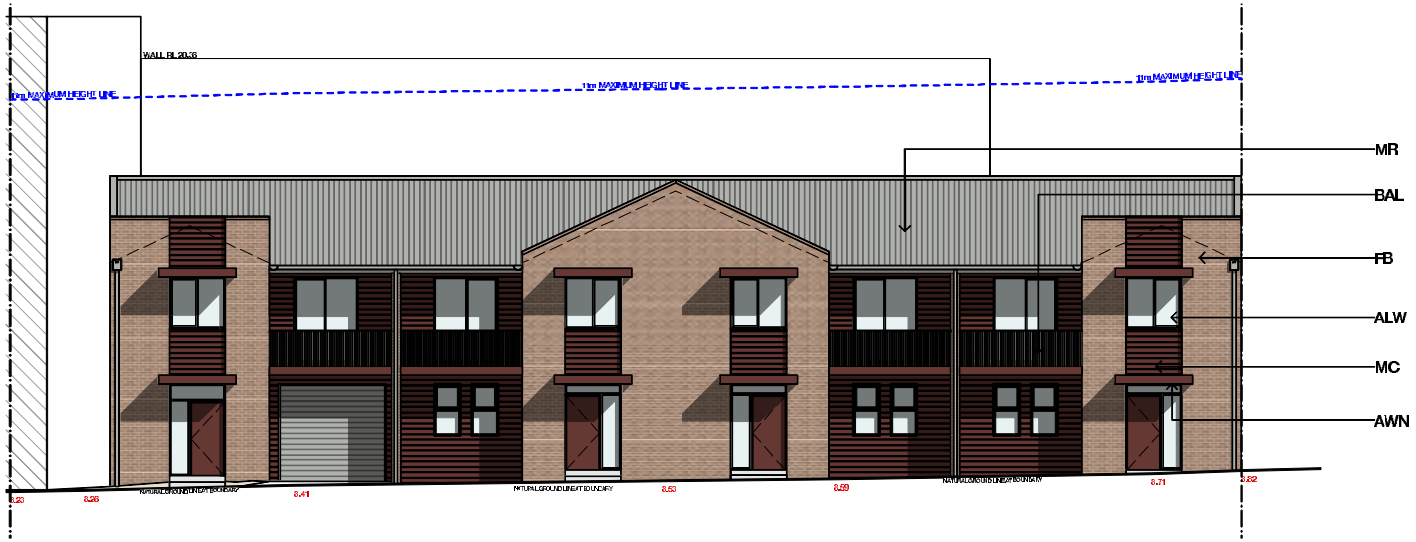
Registered Architect 5387
ABN 87 123 916 607

Project	New Attached Dwellings 33A Lee Street Maitland	Drawn By	PB	Dwg Date:	May2020	Project No.	2016
Client	Koonoona Pty Ltd	Checked By	AB	Scale	1:100@A3	Drawing No.	A201 G
Title	ELEVATIONS & SECTION					Rev	



SOUTH ELEVATION | LEE STREET

1:150

PROPOSED FINISHES

FB FACE BRICK IN *BOWRAL BRICKS "MURRAY GREY* OR SIMILAR APPROVED

MC METAL SHEET CLADDING IN *DULUX "MANOR RED"* OR SIMILAR APPROVED

MR ZINCALUME METAL ROOF SHEETING, GUTTERS & DOWNPIPES

BAL STEEL BALUSTRADE IN *DULUX "SHALE GREY"* OR SIMILAR APPROVED

ALW ALUMINIUM FRAME WINDOWS IN *DULUX "SHALE GREY"* OR SIMILAR APPROVED

AWN STEEL FRAMED AWNINGS IN *DULUX "MANOR RED"* OR SIMILAR APPROVED

Revision	Amendment	By	Date
C	Issued for DA	BC	17/8/21

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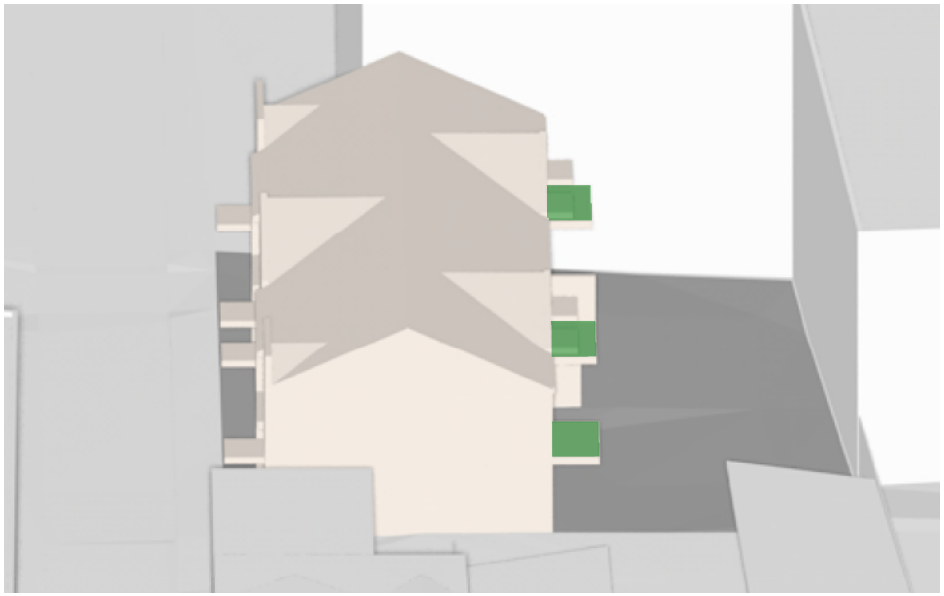
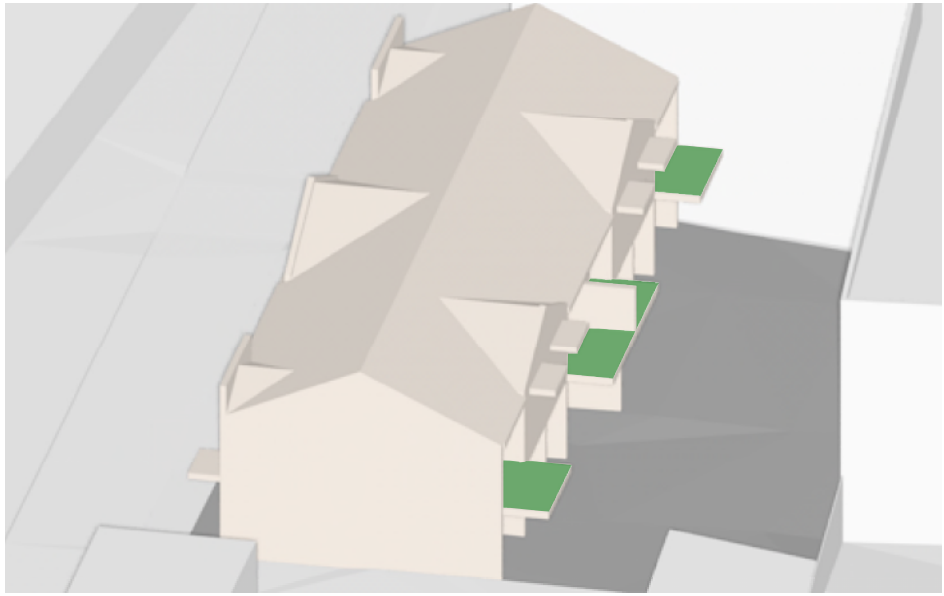
Project	New Attached Dwellings 33A Lee Street Maitland	Drawn By PB	Dwg Date: May2020	Project No. 2016
Client	Koonoona Pty Ltd	Checked By AB	Scale 1:100@A3	Drawing No. Rev A801 C
Title	PROPOSED FINISHES			



9 AM

VIEW FROM SUN | JUNE 21



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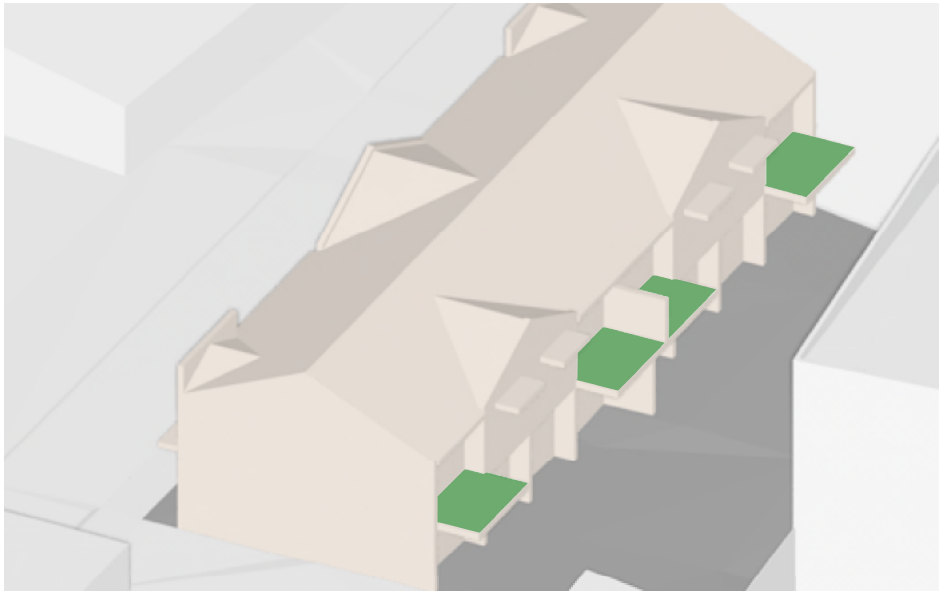

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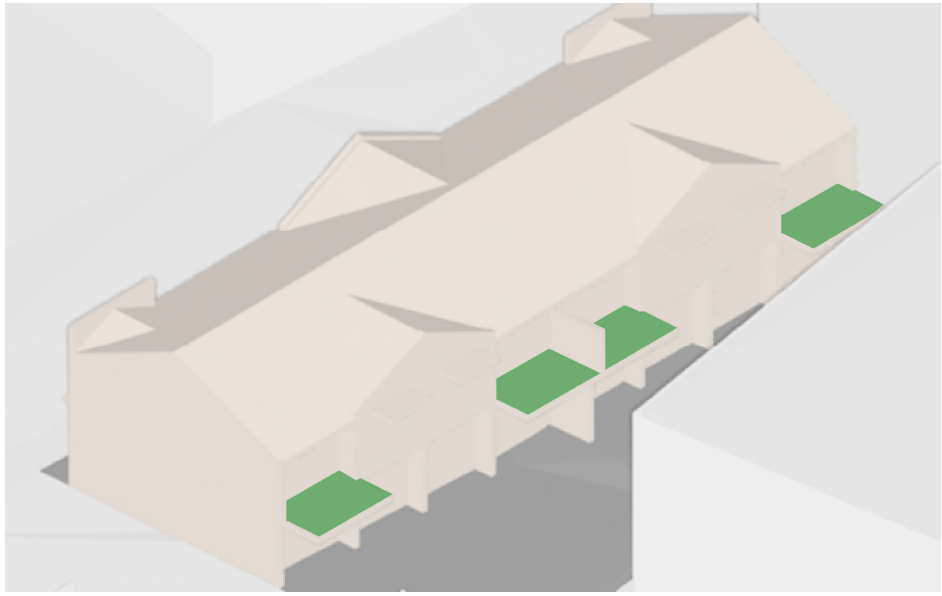
VIEW FROM SUN | JUNE 21



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VIEW FROM SUN | JUNE 21

Revision	Amendment	By	Date
D	Issued for DA	BC	17/8/21

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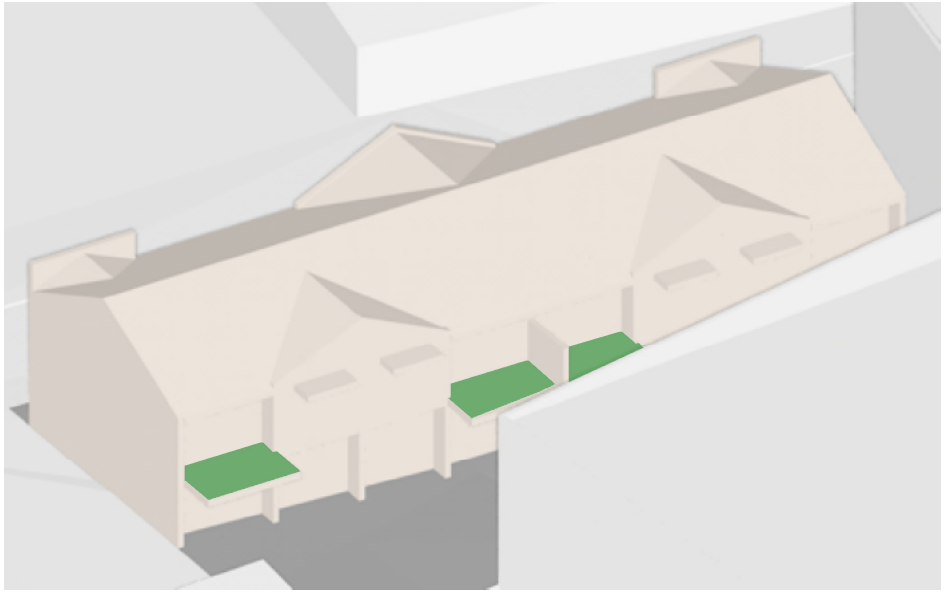
Project	New Attached Dwellings 33A Lee Street Maitland	Drawn By	AB	Dwg Date:	March 2020	Project No.	2016
Client	Koonoona Pty Ltd	Checked By	AB	Scale	1:500@A3	Drawing No.	A823 D
Title	SHADOW ANALYSIS						



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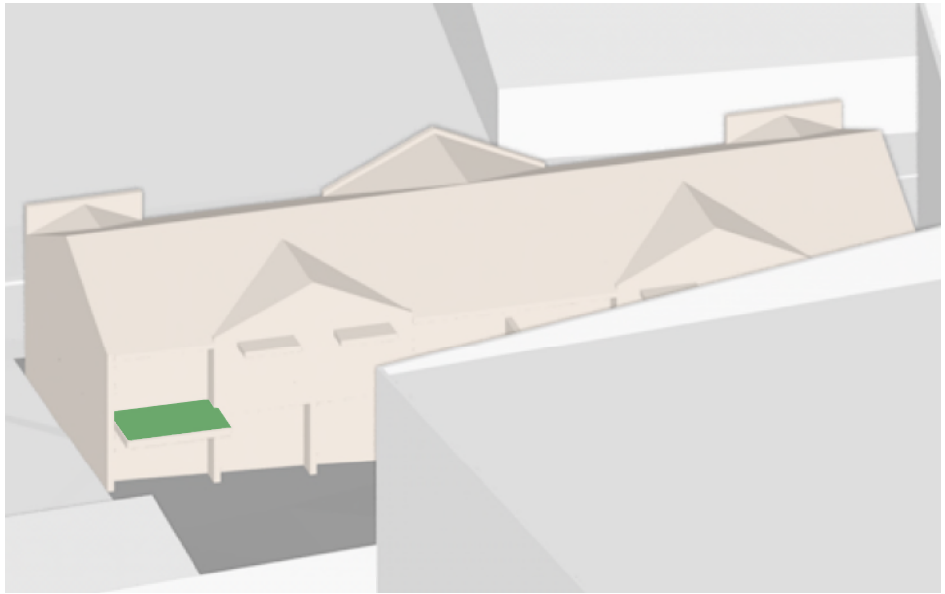

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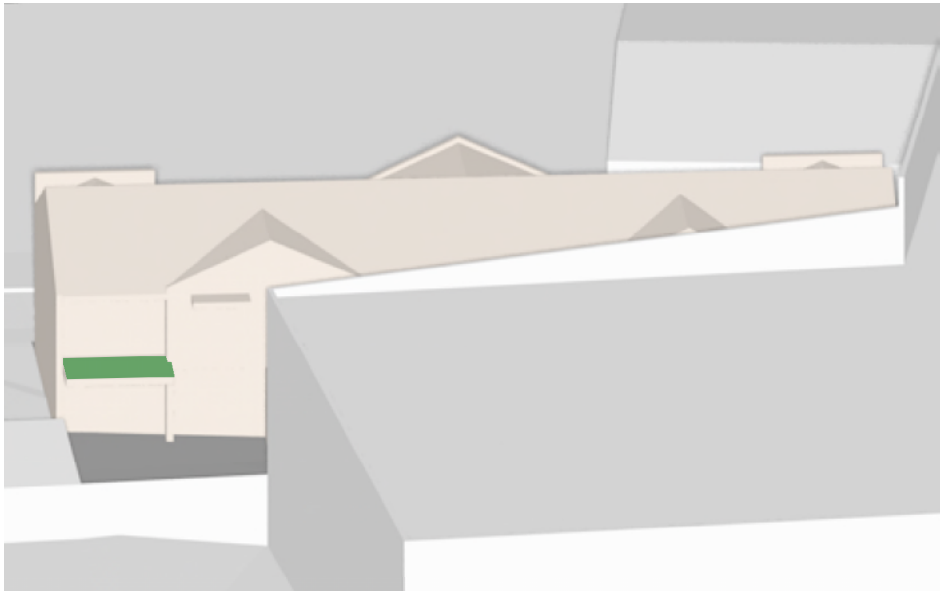

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VIEW FROM SUN | JUNE 21

SOLAR ACCESS TO PRIVATE OPEN SPACE

	9:00 am	10:00 am	11:00 am	12:00 pm	1:00 pm	2:00 pm	3:00 pm	TOTAL
UNIT 1	Y	Y	Y	Y	N	N	N	3H
UNIT 2	N	Y	Y	Y	Y	N	N	3H
UNIT 3	Y	Y	Y	Y	Y	N	N	4H
UNIT 4	Y	Y	Y	Y	Y	Y	Y	6H

Revision		By	Date
D	Issued for DA	BC	17/8/21
	Amendment	By	Date

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Project	New Attached Dwellings 33A Lee Street Maitland	Drawn By	AB	Dwg Date:	March 2020	Project No.	2016
Client	Koonoona Pty Ltd	Checked By	AB	Scale	1:500@A3	Drawing No.	A824 D
Title	SHADOW ANALYSIS						

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Appendix D – Building Treatment Categories

Appendix C – Acoustic Treatment of Residences

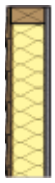
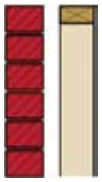
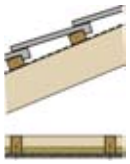
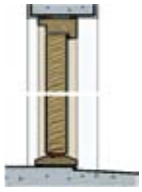
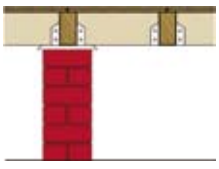
The following table sets out standard (or deemed-to-satisfy) constructions for each category of noise control treatment for the sleeping areas and other habitable areas of single / dual occupancy residential developments only. The assumptions made in the noise modelling are as follows:

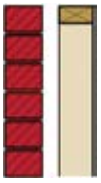
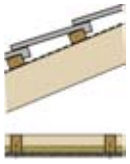
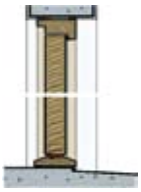
- Typical layout of a modern dwelling taken from a recent large residential development in an outer Sydney suburb
- Bedrooms and other habitable rooms are exposed to road noise

ACOUSTIC PERFORMANCE OF BUILDING ELEMENTS

The acoustic performances assumed of each building element in deriving the Standard Constructions for each category of noise control treatment presented in the preceding Table, are presented below in terms of Weighted Sound Reduction Index (Rw) values, which can be used to find alternatives to the standard constructions presented in this Appendix:

Category of Noise Control Treatment	R_w of Building Elements (minimum assumed)				
	Windows/Sliding Doors	Frontage Facade	Roof	Entry Door	Floor
Category 1	24	38	40	28	29
Category 2	27	45	43	30	29
Category 3	32	52	48	33	50
Category 4	35	55	52	33	50
Category 5	43	55	55	40	50

Category No.	Building Element	Standard Constructions	sample
2	**Windows/Sliding Doors**	Openable with minimum 6mm monolithic glass and full perimeter acoustic seals	
	Frontage Facade	**Timber Frame or Cladding Construction:** 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally with R2 insulation in wall cavity.	
		Brick Veneer Construction: 110mm brick, 90mm timber stud frame or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	40mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground	

Category No.	Building Element	Standard Constructions	sample
3	**Windows/Sliding Doors**	Openable with minimum 6.38mm laminated glass and full perimeter acoustic seals	
	Frontage Facade	**Brick Veneer Construction:** 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or sheet metal roof with sarking, 1 layer of 13mm sound-rated plasterboard fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	45mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	Concrete slab floor on ground	

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