Road Noise Assessment

259 Averys Lane
Buchanan, NSW

Prepared for: Complete Planning Solutions Pty Ltd
November 2021
MAC211453-01RP1

Muller Acoustic Consulting

Document Information

Road Noise Assessment

259 Averys Lane

Buchanan, NSW

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DOCUMENT ID	STATUS	DATE	PREPARED BY	SIGNED	REVIEWED BY	SIGNED
MAC211453-01RP1	Final	29 November 2021	Louis Abell		Oliver Muller	

CONTENTS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Complete Planning Solutions Pty Ltd to conduct a Road Noise Assessment (RNA) for the proposed two lot subdivision located at Lot 10 DP 1085485, 259 Averys Lane, Buchanan, NSW (the 'project'). The project involves subdividing Lot 10 DP 1085485 into Lot 10A and Lot 10B. Lot 10A is proposed to be rezoned as R2 (low density residential), whereas the zoning on Lot 10B is to remain as a mix of RU2 (rural landscape) and E2 (environmental conservation).

This report presents the results, findings and recommendations of the RNA and has been prepared to accompany the project's Development Application (DA) being prepared for submission to Cessnock City Council (CCC).

The assessment has been undertaken in general accordance with the following policies and guidelines:

- NSW Department of Planning – Development Near Rail Corridors and Busy Roads – Interim Guideline, 2008;
- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Department of Environment, Climate Change and Water (DECCW) – NSW Road Noise Policy (RNP), 2011;
- Department of Environment and Climate Change (DECC), Interim Construction Noise Guideline (ICNG), 2009;
- 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**.

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2 Noise Policy and Guidelines

2.1 Development Near Rail Corridors and Busy Roads – Interim Guidelines

Guidance for the specification of internal noise levels of habitable rooms is prescribed in Department of Planning's (DoP) Development near Rail Corridors and Busy Roads – Interim Guidelines (2008) ('the guideline').

The guideline outlines internal criterion levels for Clause 102 (Road) of the State Environmental Planning Policy (SEPP) for Infrastructure (Infrastructure SEPP):

"If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:

- *in any bedroom in the building: 35dBA at any time 10pm–7am; and*
- *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dBA at any time."*

Table 3.1 of the guideline clarifies that the above noise criteria are to be determined as an $LA_{eq(15hr)}$ for the daytime and $LA_{eq(9hr)}$ for the night time period.

The guideline assists in the planning, design and assessment of development in, or adjacent to, rail corridors and busy roads and supports the Infrastructure SEPP. The guidelines are mandatory for residential developments proposed adjacent to busy roads with an Annual Average Daily Traffic (AADT) of greater than 40,000 vehicles or for projects where traffic noise impacts are anticipated.

Traffic volumes for the M15 Hunter Express Way were referenced from Roads and Maritime Traffic counts for station ID: HEXBUCHW-PR for 2021. The AADT for Hunter Express Way is approximately 30,414 vehicles per day.

2.1.1 Road Noise Screening Test

Section 5.3.2 of the guideline provides screening tests for single and dual occupancy dwellings. The screening tests provide varying categories of noise control treatments for dwellings taking into consideration distance to the road and amount of traffic. The guideline presents two screen tests for a 60/70 km/hr zone and 100/110 km/hr zone that are reproduced in Figure 1 and Figure 2 respectively. The screening tests have been adopted in this assessment to provide guidance on building categories for the project.

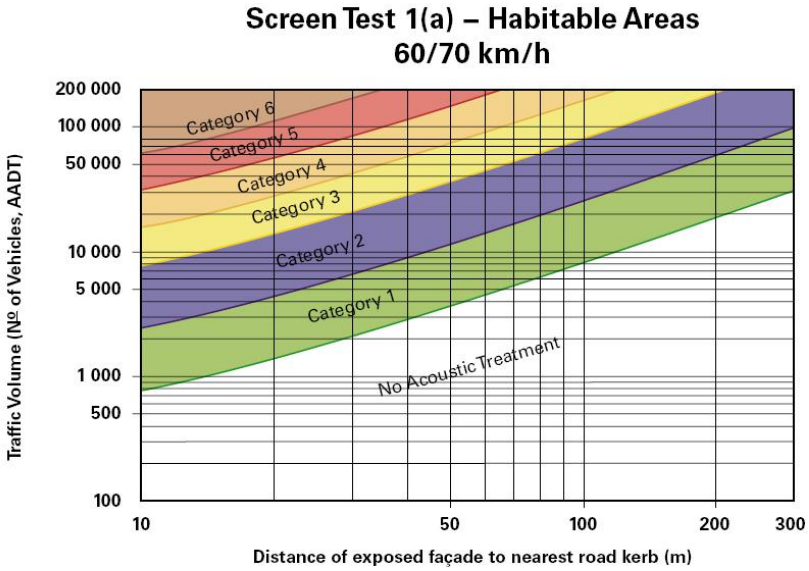

Figure 1 Screen test for habitable areas of single/dual occupancy dwellings adjacent to 60/70 km/hr zones.

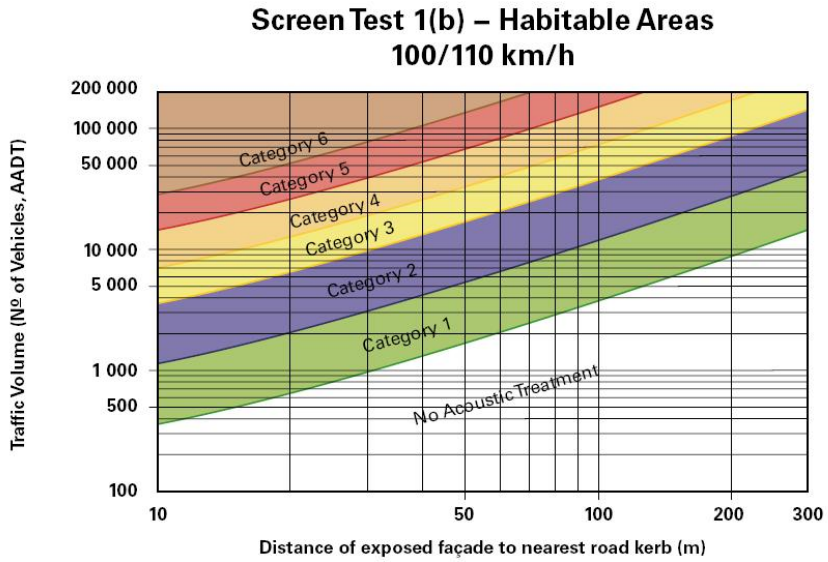

Figure 2 Screen test for habitable areas of single/dual occupancy dwellings adjacent to 100/110 km/hr zones.

2.2 Road Noise Policy

The EPA's RNP (EPA, 2011) has been reviewed and is designed to quantify the noise intrusion from the road network on existing receptors. As this project is related to the construction of new dwellings, the RNP is not applicable to this assessment.

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3 Existing Environment

One unattended noise monitor was installed at 259 Averys Lane, Buchanan, NSW to quantify road noise levels. The monitor location and locality plan showing the proposed dwellings with respect to the Pacific Highway is presented in **Figure 3**, and this location is considered representative of surrounding residential receivers as per Fact Sheet B1.1 of the NPI. The logger location was selected considering security, and exposure to road traffic. Data from the logger was used to calibrate the noise model.

The unattended noise survey 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 977 noise analyser (L1) from Monday 15 November 2021 to Wednesday 24 November 2021. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Observations on-site identified the surrounding locality was typical of a suburban environment, with traffic sources audible.

Data affected by adverse meteorological conditions have been excluded from the results in accordance with methodologies provided in Fact Sheet A4 of the NPI. The results of long-term unattended noise monitoring are provided in **Table 1**. The noise monitoring charts for the background monitoring assessment are provided in **Appendix B**.

Table 1 Background Noise Monitoring Summary[1]

Location	Measured background noise level, RBL, dBA			Measured LA_{eq} Noise Level, dBA		
	Day 7am to 6pm	Evening 6pm to 10pm	Night 10pm to 7am	Day 7am to 6pm	Evening 6pm to 10pm	Night 10pm to 7am
L1	54	49	37	63	61	59

Note: Excludes periods of wind or rain affected data. Meteorological data obtained from the Bureau of Meteorology weather station Maitland Airport -32.7023°S 151.4881°E 28m AMSL.

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.

FIGURE 3

Locality Plan

MAC211453

Averys Lane Subdivision

KEY

DP 1085485

Unattended Noise Monitoring

0 50 100 150 m

N

MAC

4 Noise Assessment Methodology

4.1 Calculation of Road Traffic Noise

A theoretical assessment of road traffic noise was carried out to predict levels at each façade of the proposed dwellings using the Calculation of Road Traffic Noise (CORTN) algorithm, as developed by the UK Department of Transport. This method incorporates consideration of traffic flow volume, average speed, percentage of heavy vehicles, and road gradient and includes attenuation via spherical spreading (or cylindrical in the case of a line source such as a road), soft ground, atmospheric absorption and screening from buildings or barriers. **Table 2** summarises the calculation parameters adopted for this assessment.

Table 2 Calculation Parameters

Road Name	Assessment Period	Traffic Volume	% Heavy Vehicles	Speed Limit (km/hr)
M15 Express Way, Buchanan[1]	Day	25,763	13	110
	Night	4,651	22	110

Note 1: Base data sourced from Roads and Maritime traffic counting station ID: HEXBUCHW-PR for 2021 for M15 Express Way.

4.2 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 3**, 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 may be required.

Table 3 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.

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5 Results & Discussion

5.1 Road Noise Assessment Validation

Road noise predictions for Hunter Express Way were compared to measured levels at monitoring location (L1). This is considered a good practice technique to validate the assumptions made in the assessment. Results of the validation are presented in **Table 4**. Noise predictions demonstrate a consistent correlation (±<2dB tolerance) when compared against measured levels.

Table 4 Noise Assessment Validation Results[1]

Measurement Location	Predicted level, dB LA_{eq}		Measured dB LA_{eq}		Difference, dB	
	Day	Night	Day	Night	Day	Night
M15 Express Way, Buchanan[1]	63.4	58.2	62.0	58.5	1.4	-0.3

Note 1: Free field measurement.

5.2 Road Noise Prediction Results

A review of proposed plans (Complete Planning Solutions, 2021) (**Appendix C**) for indicative dwellings that may be constructed on Lot 10A has been completed as part of the assessment, although it is noted that there are no current plans to construct additional dwellings on either lot.

Noise predictions identify that standard glazing (such as 3mm or 4mm monolithic glass) would be adequate to attenuate internal levels to satisfy relevant criteria for all areas (sleeping and living rooms) at a setback of approximately 150m from the Hunter Express Way. This setback is representative of the southernmost boundary of the proposed Lot 10A. It is predicted that any proposed dwellings constructed within the boundary of Lot 10A would require standard glazing (such as 3mm or 4mm monolithic glass) to attenuate internal levels to satisfy relevant criteria. However, a detailed assessment would need to be conducted for individual dwellings prior to construction to assess appropriate acoustic treatments required, taking into consideration parameters such as building height, room arrangement and dwelling position. **Figure 4** provides contours displaying the predicted treatment categories in relation to the setback from the M15 Hunter Express Way. As there are not currently plans for the construction of dwellings, these contours are provided as an indicative screening criteria only. **Appendix D** presents the acoustic treatment construction categories.

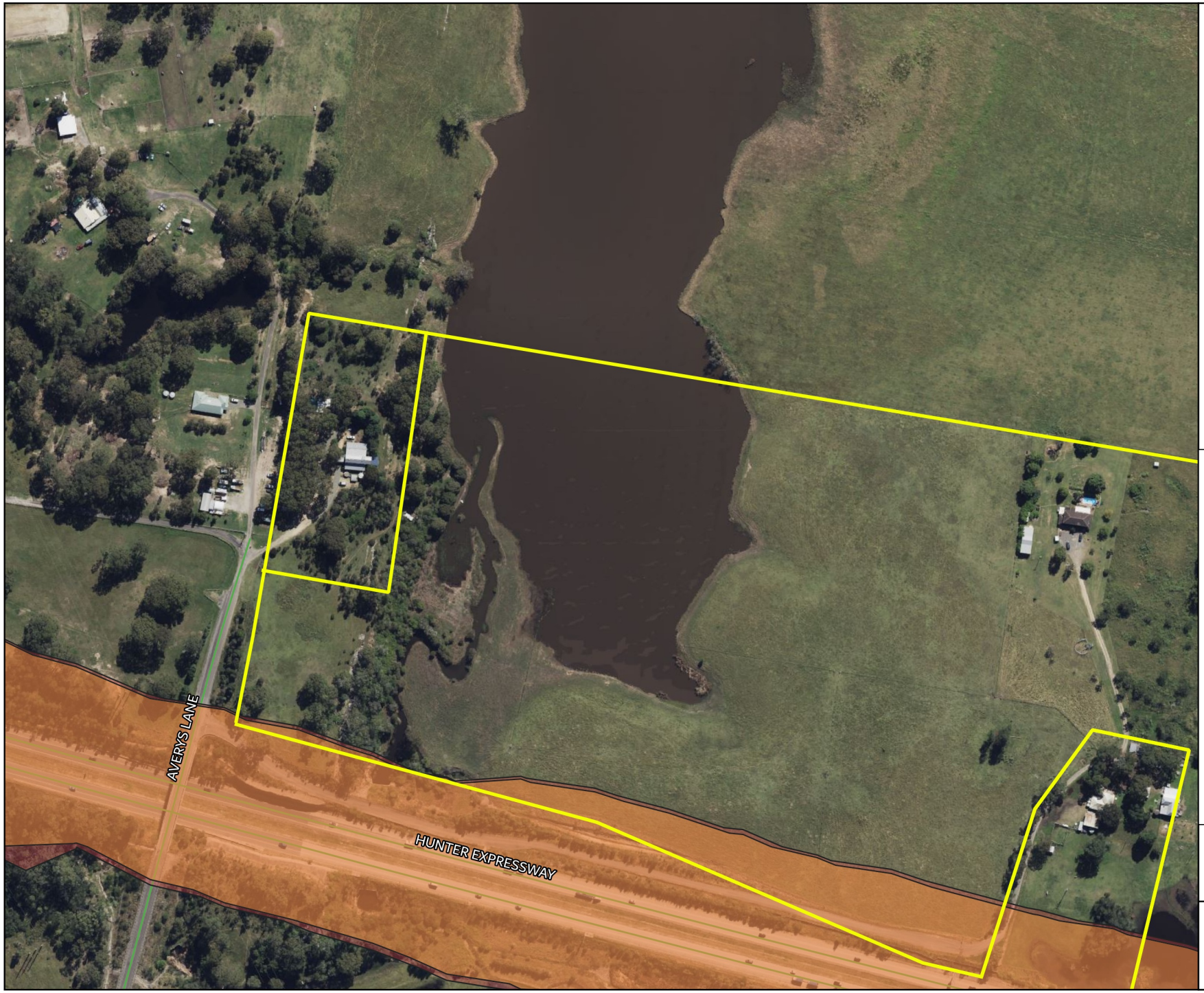

FIGURE 4

Acoustic Treatment Contours

MAC211453

Averys Lane Subdivision

KEY

DP 1085485

Category 1 Treatment (Living Areas)

Category 1 Treament (Sleeping Areas)

Notes:
Acoustic Treatment contours for Living areas based on traffic volumes during the day period.

Acoustic Treatment contours for sleeping areas based on traffic volumes during the night period.

0 40 80 120 m

N

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed an assessment of potential road traffic noise impacts for the proposed two lot subdivision to be established at 259 Averys Lane, Buchanan, NSW.

The assessment has qualified the existing ambient environment with respect to road noise, using measured levels to calibrate predictions. Noise predictions identified approximate setback distances required for acoustic treatment to dwellings.

The results of the assessment demonstrate that required road traffic noise reduction for each room type is achievable, with offsets of 150m requiring standard glazing, which is the approximate boundary of Lot 10A. However, a detailed assessment is recommended for individual dwellings prior to construction to assess appropriate acoustic treatments required, taking into consideration parameters such as building height, room arrangement and dwelling position.

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Appendix A – Glossary of Terms

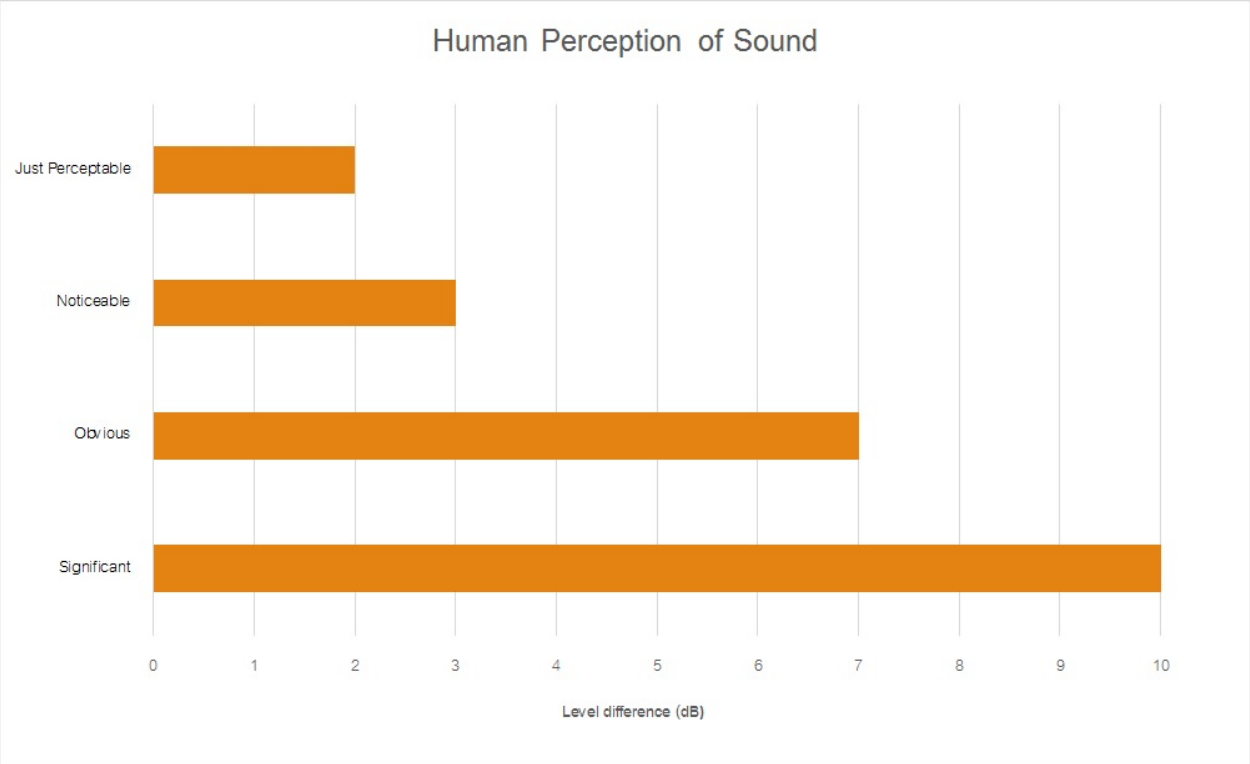
Table A1 provides a number of technical terms have been used in this report.

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. In some cases the overall change in noise level is described in dB rather than dBA, or dBZ which relates to the weighted scale.
dB(Z)	Linear Z-weighted decibels.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

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

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

Figure A1 – Human Perception of Sound



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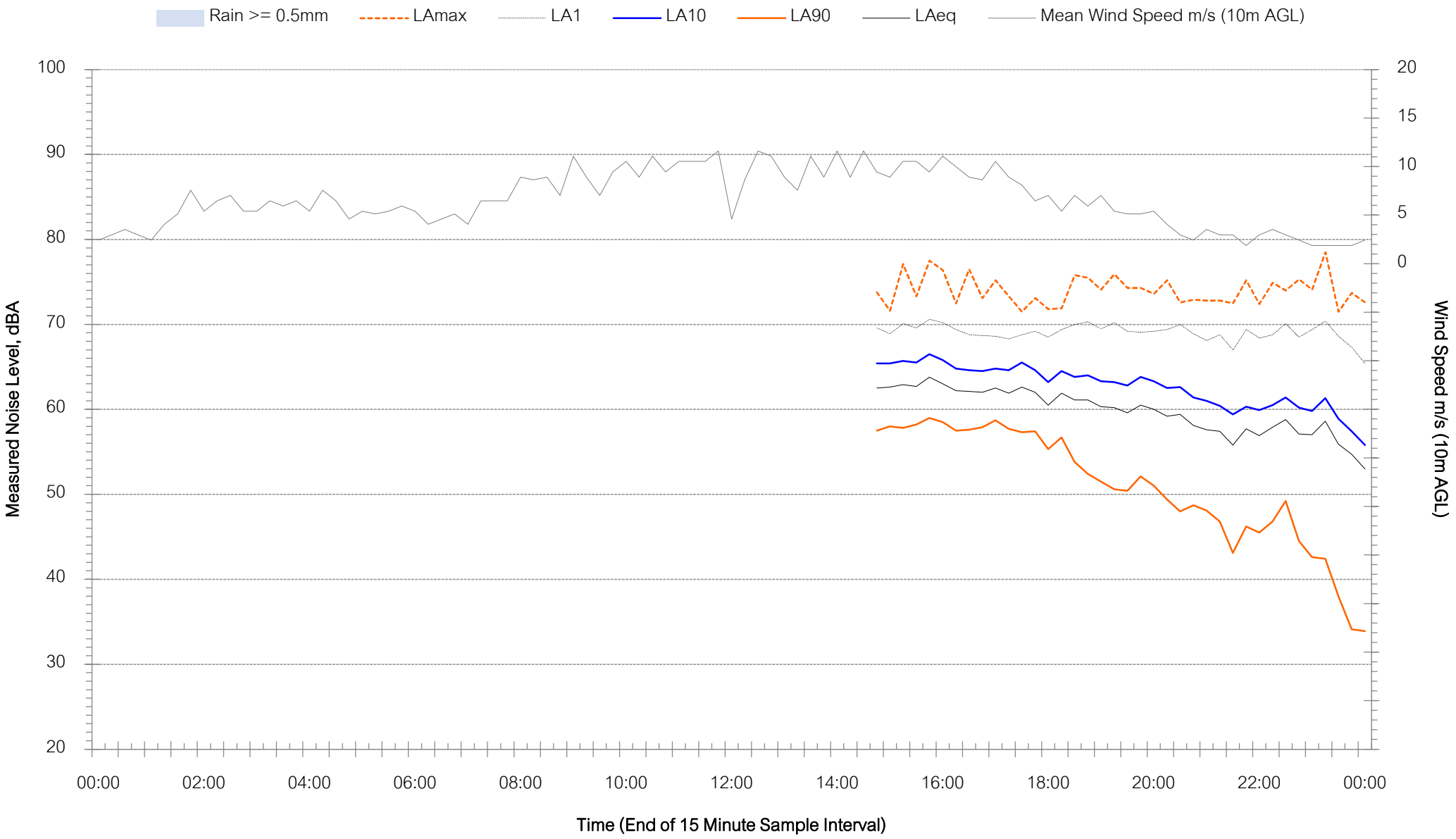
Appendix B – Noise Logging Data

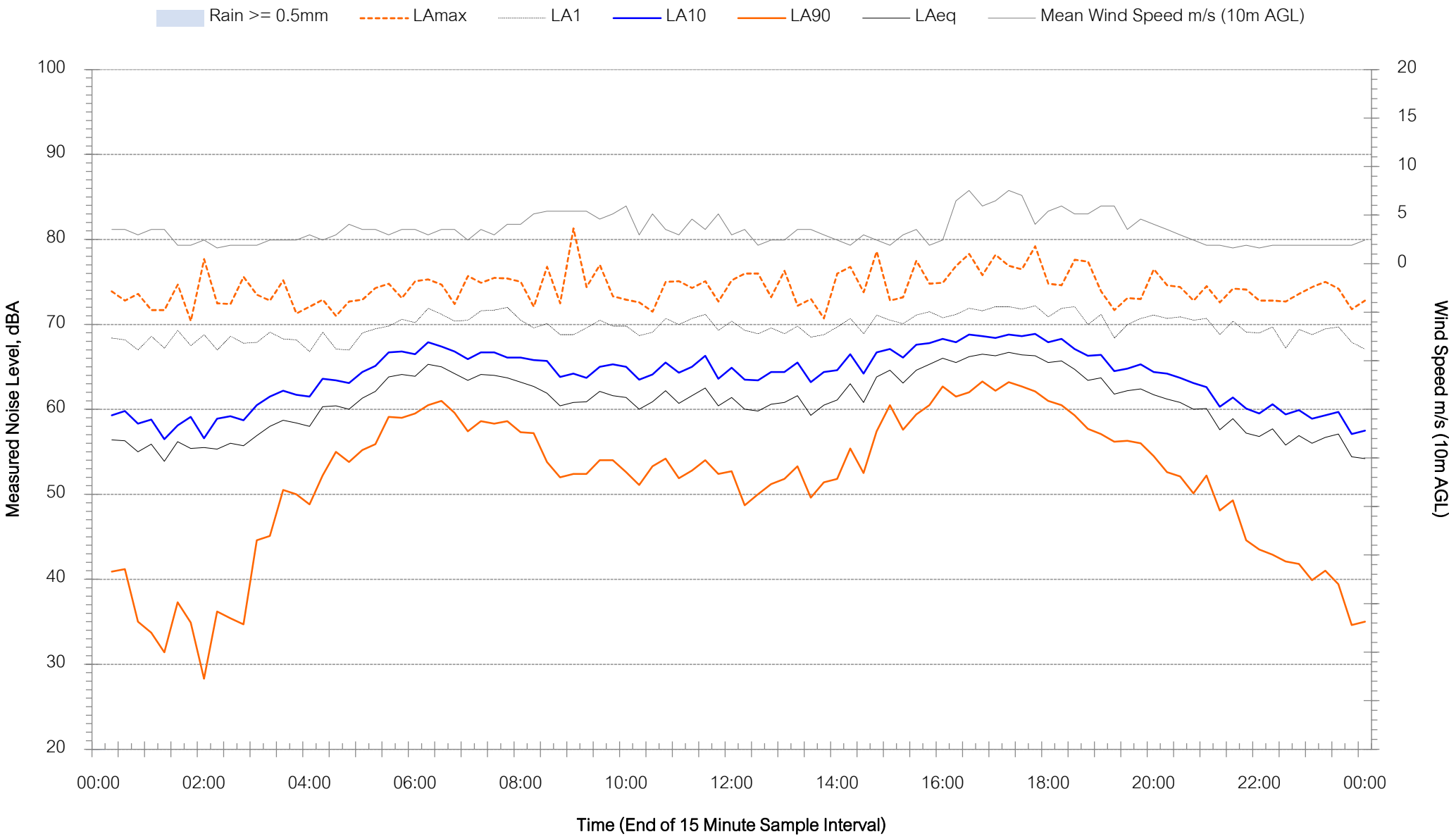
Background Noise Levels

Averys Lane, Buchanan - Monday 15 November 2021



Background Noise Levels

Averys Lane, Buchanan - Tuesday 16 November 2021

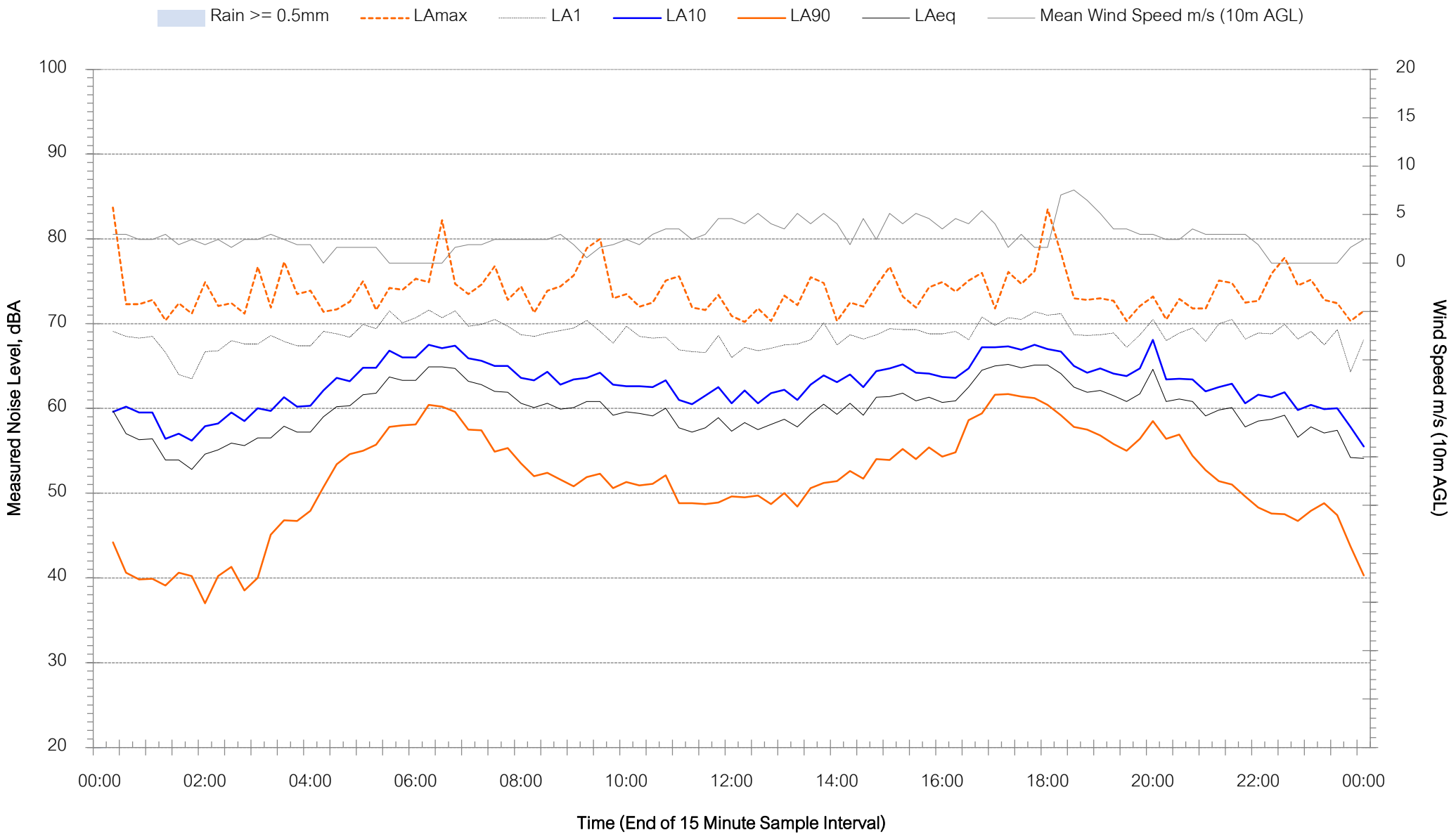


Background Noise Levels

Averys Lane, Buchanan - Wednesday 17 November 2021

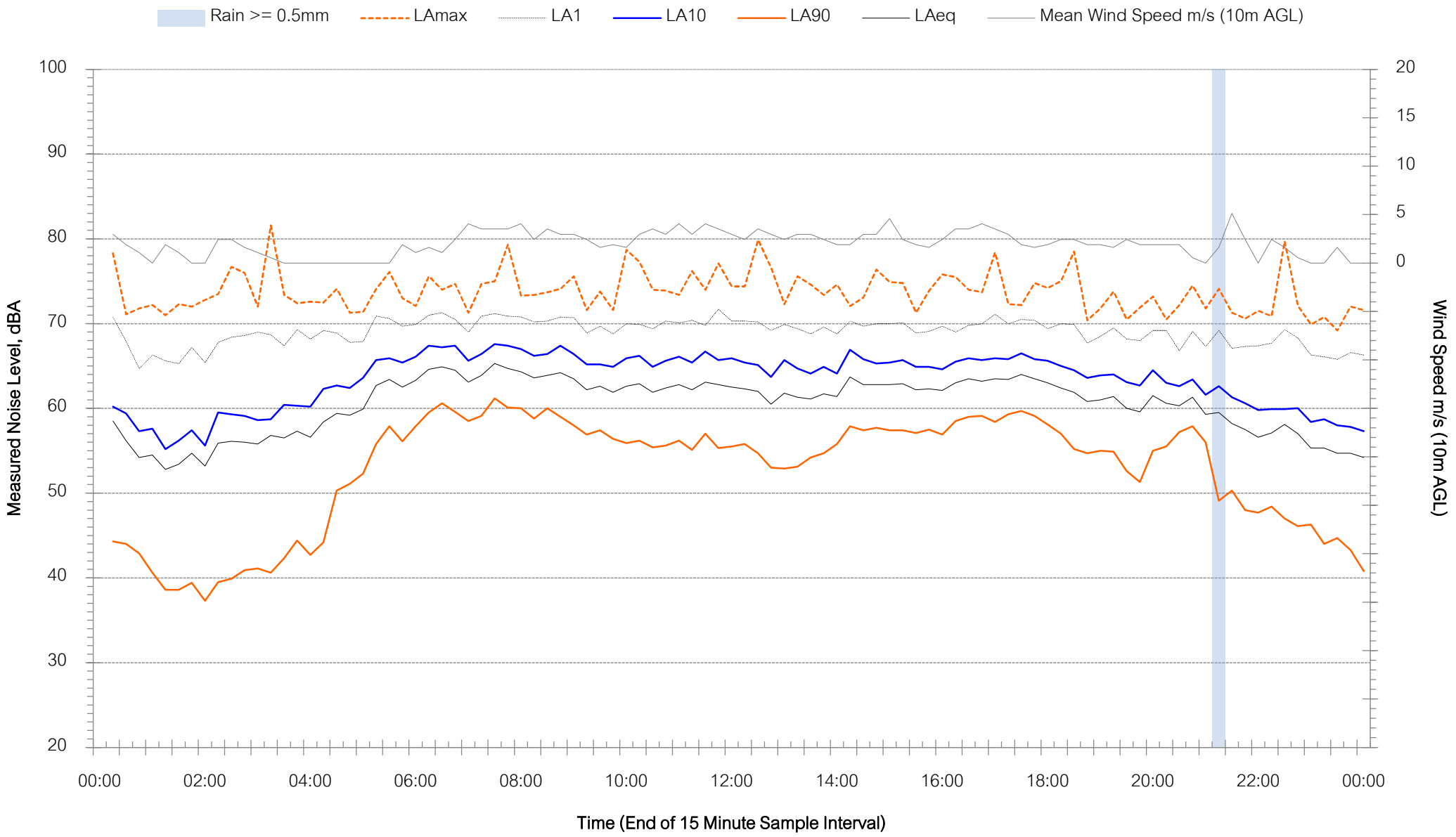
Background Noise Levels

Averys Lane, Buchanan - Thursday 18 November 2021



Background Noise Levels

Averys Lane, Buchanan - Friday 19 November 2021

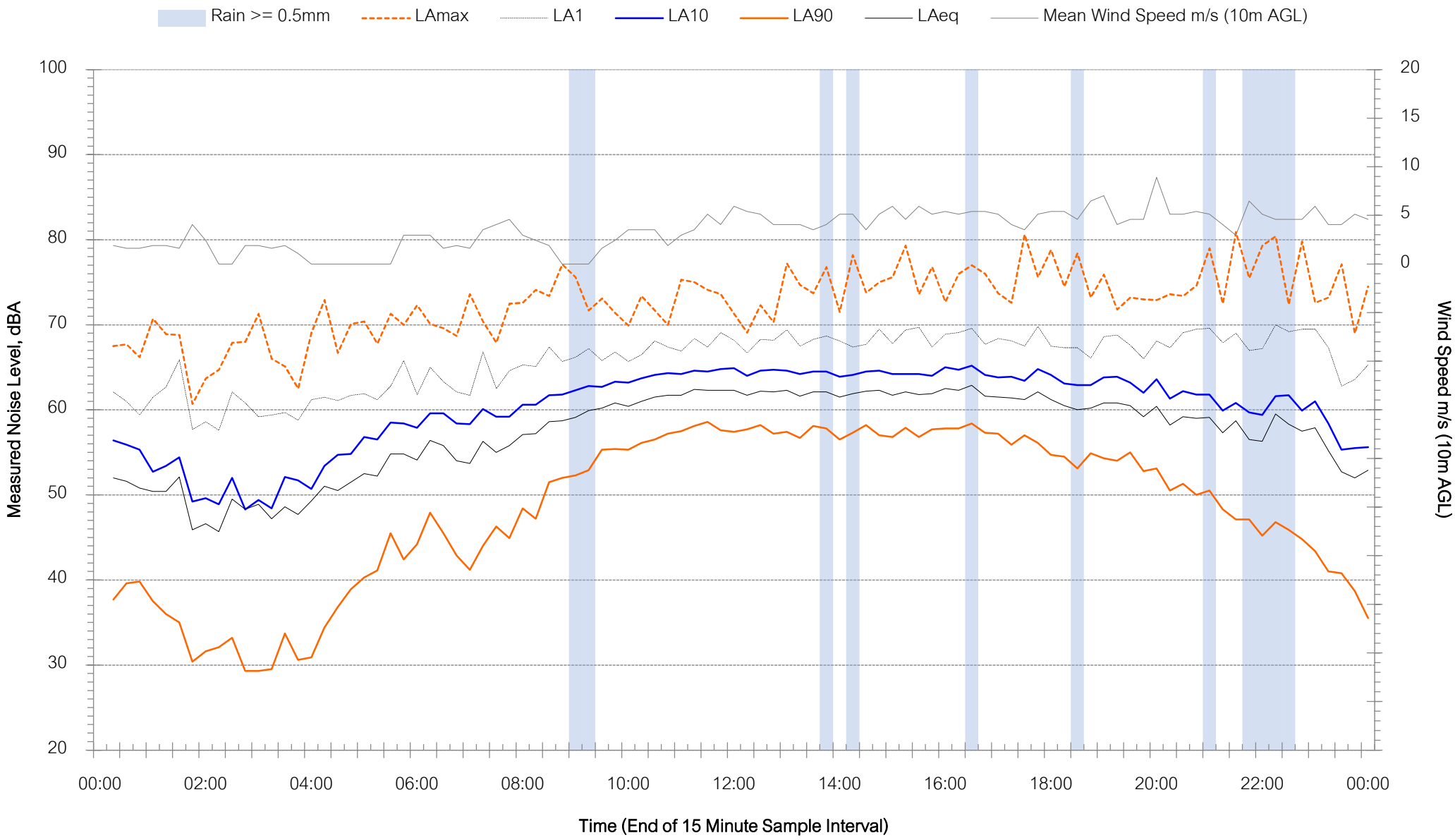


Background Noise Levels

Averys Lane, Buchanan - Saturday 20 November 2021

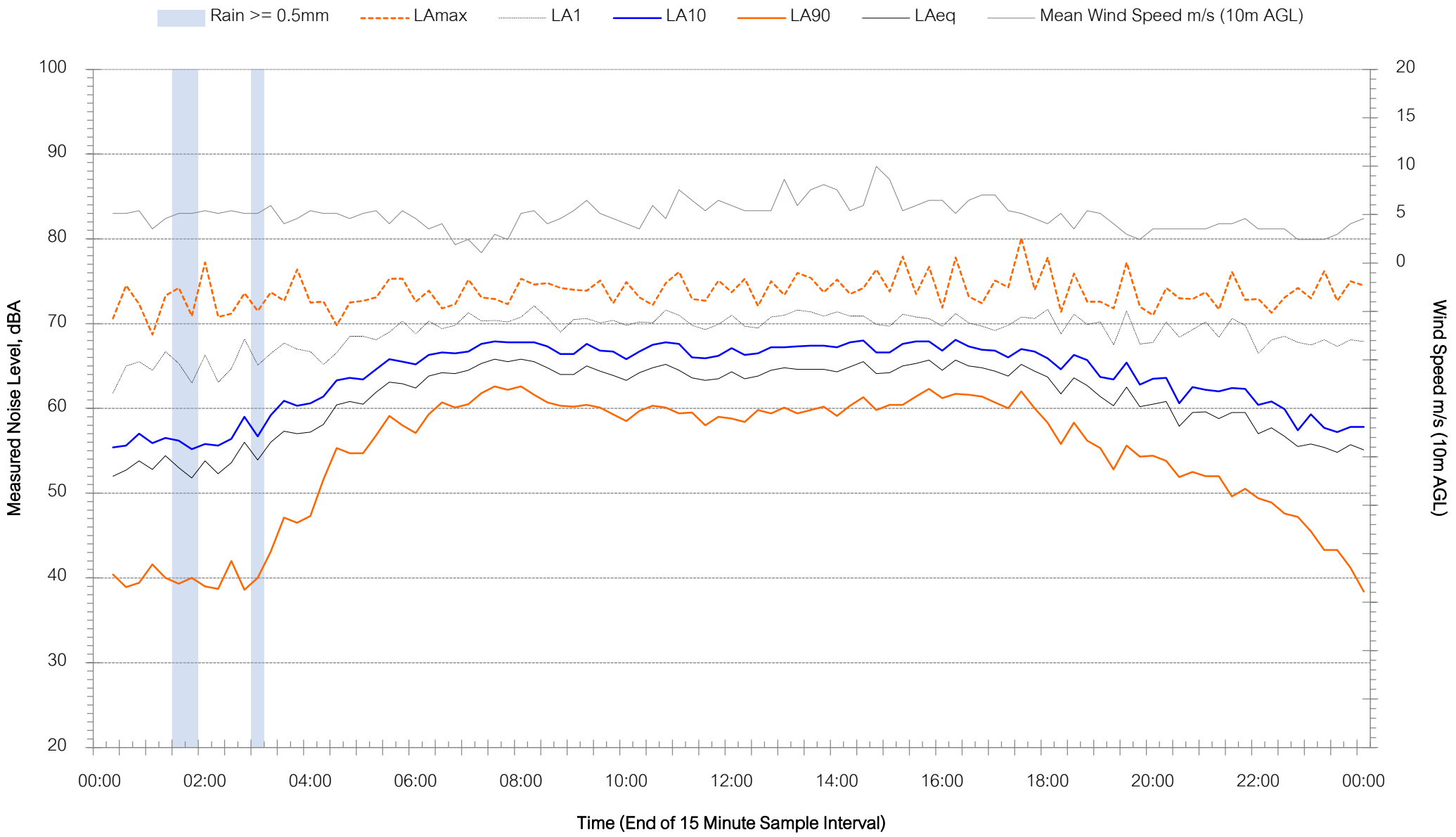
Background Noise Levels

Averys Lane, Buchanan - Sunday 21 November 2021



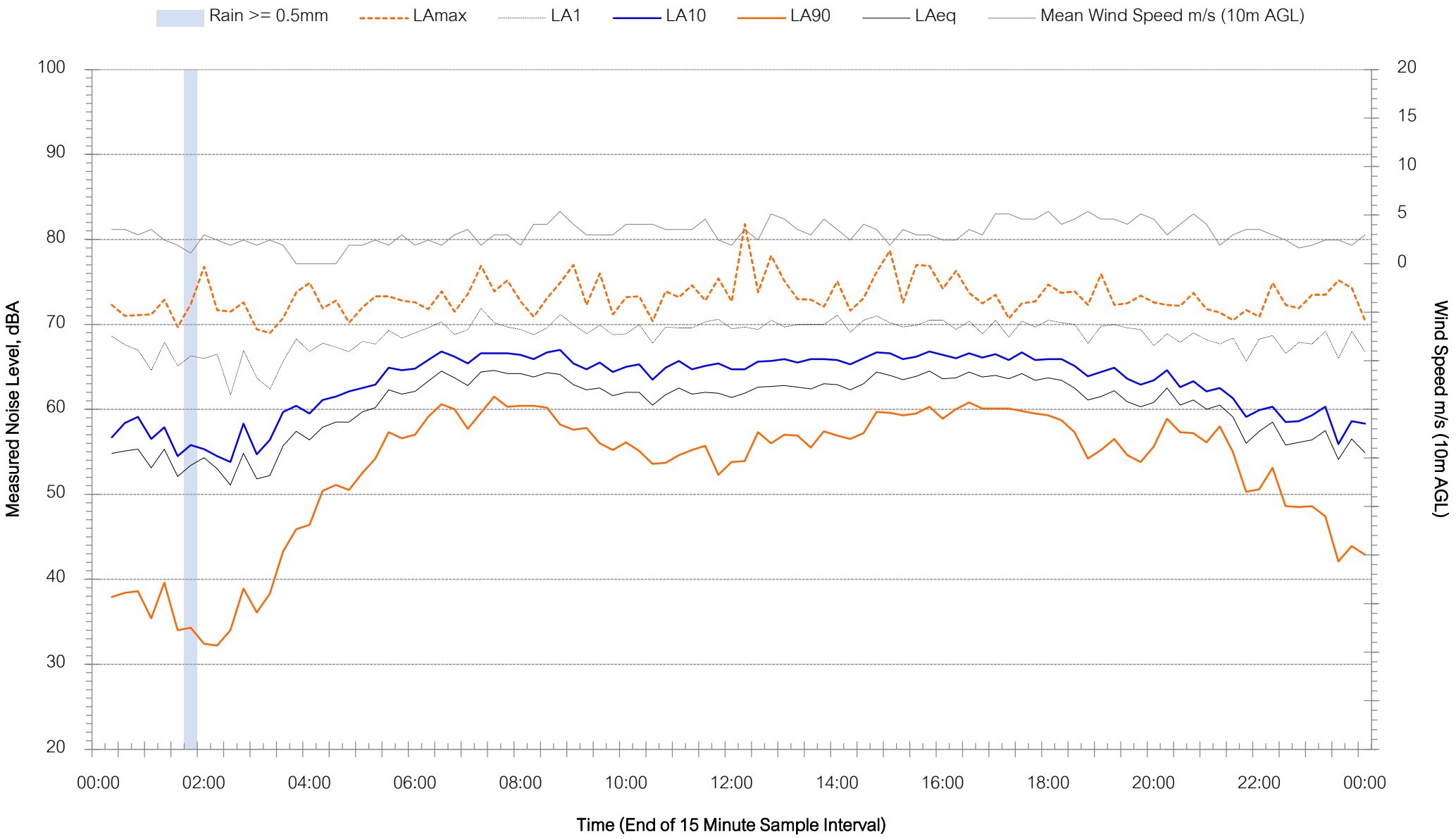
Background Noise Levels

Averys Lane, Buchanan - Monday 22 November 2021



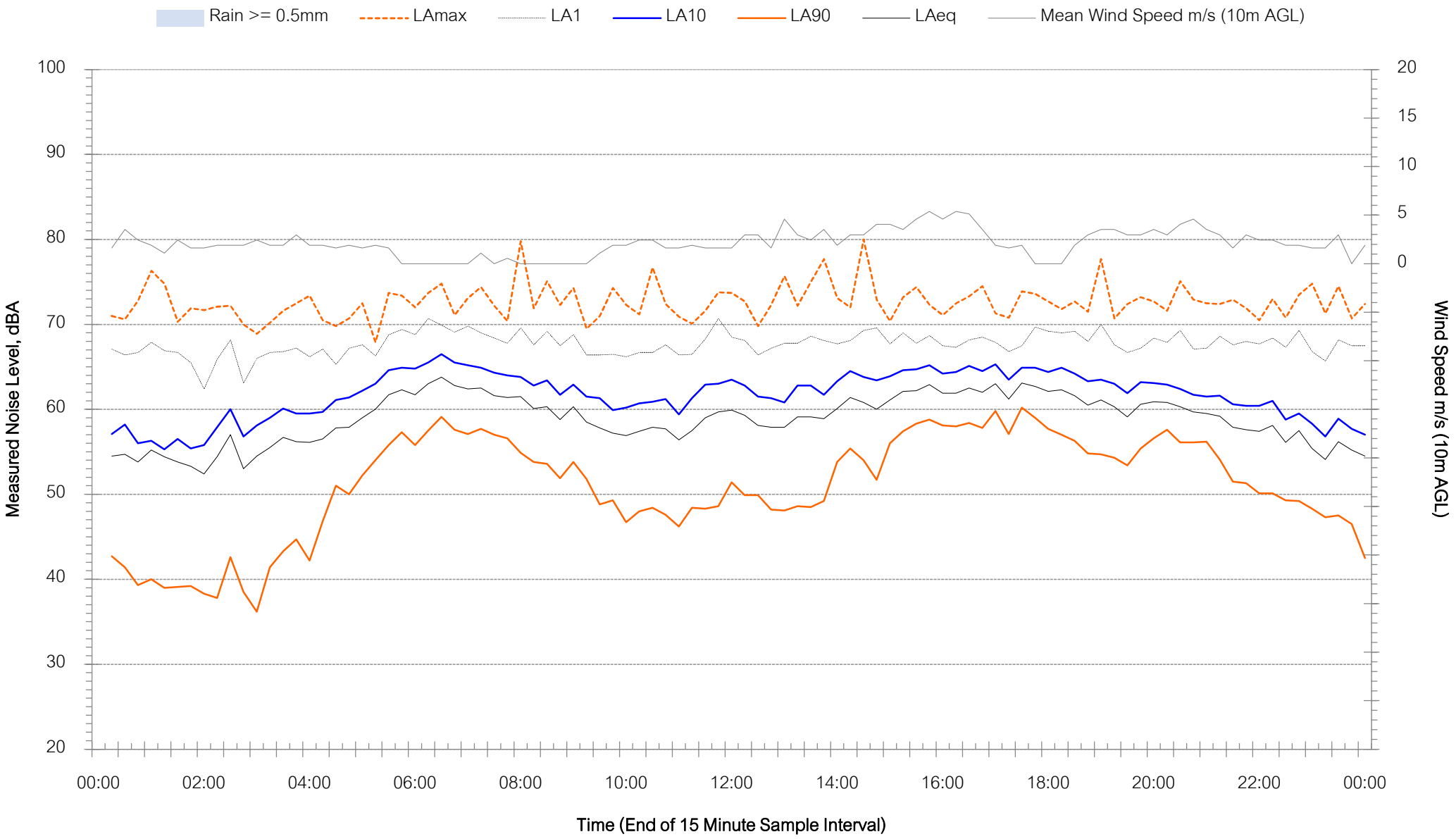
Background Noise Levels

Averys Lane, Buchanan - Tuesday 23 November 2021



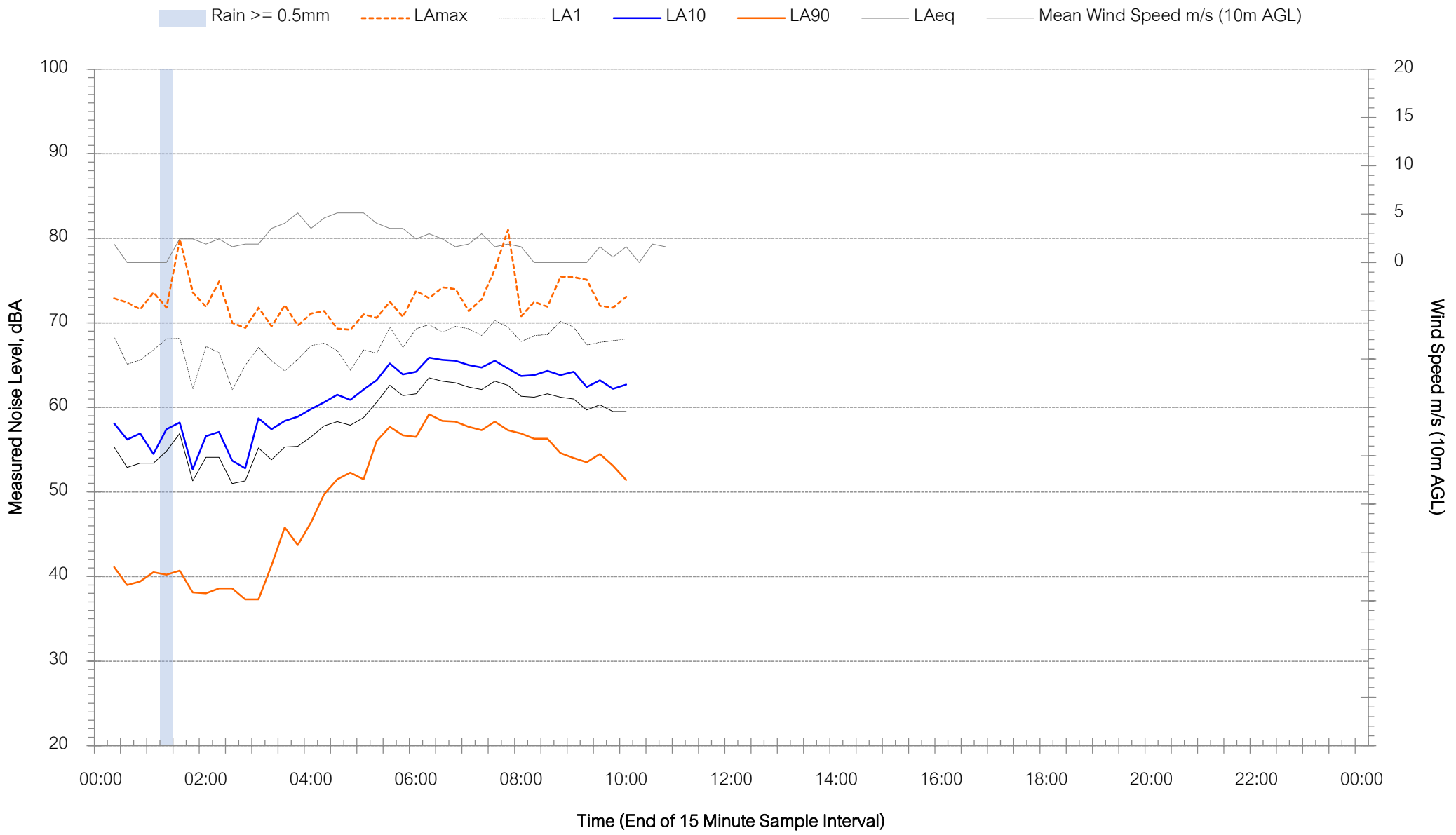
Background Noise Levels

Averys Lane, Buchanan - Wednesday 24 November 2021



Background Noise Levels

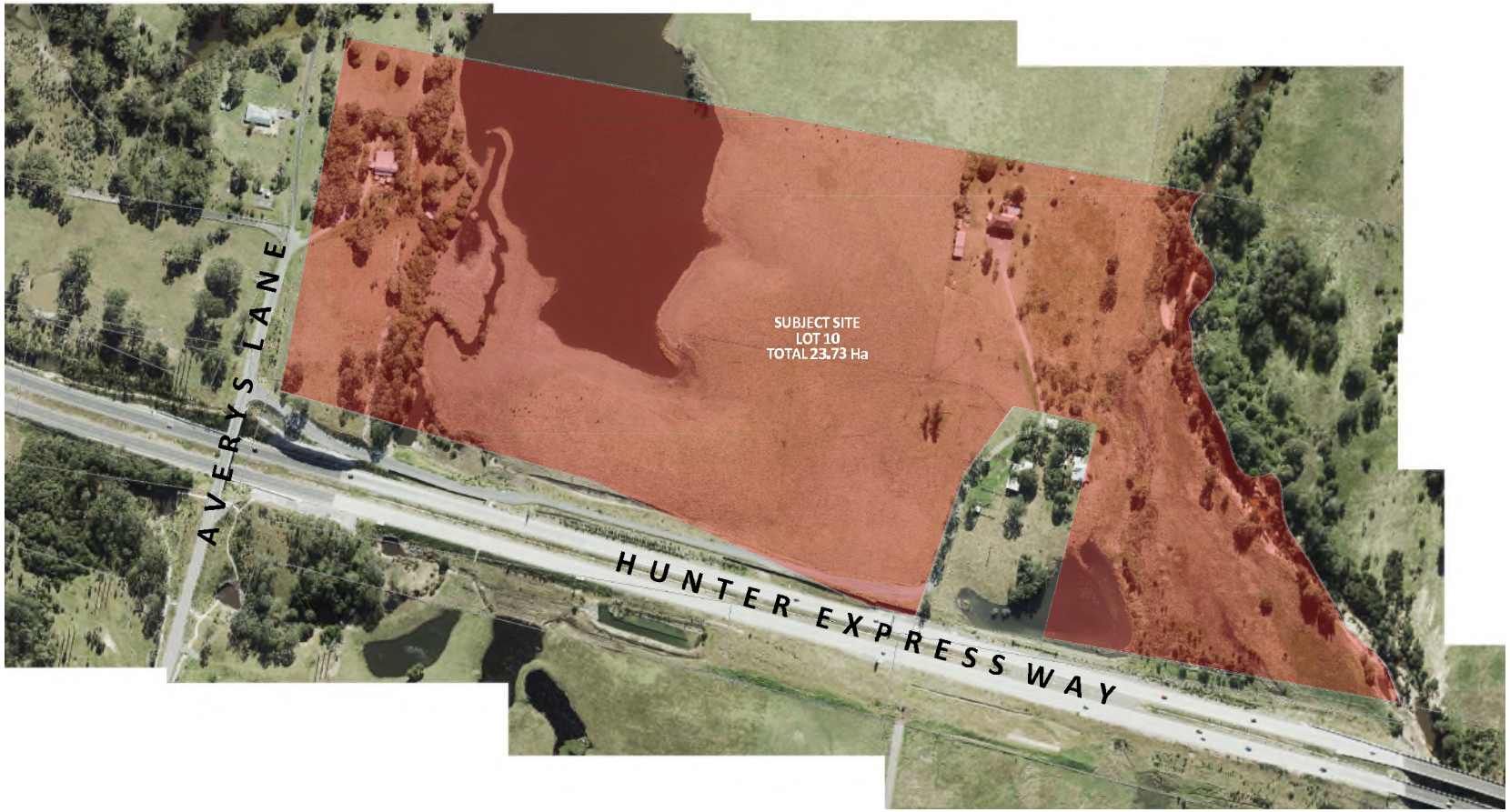
Averys Lane, Buchanan - Thursday 25 November 2021



Appendix C – Site Plans

PROPOSED 1 into 2 LOT SUBDIVISION

LOT 10 DP 1085485 (259) AVERYS LANE , BUCHANAN, NSW, 2323



01 PLAN - LOCATION
HISTORICAL PHOTO

APPROX.

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B	BML	CLIENT INFORMATION	20/07/20
C	BML	CLIENT APPROVAL	21/07/20
D	BML	CLIENT APPROVAL	25/09/20

Complete Planning Solutions
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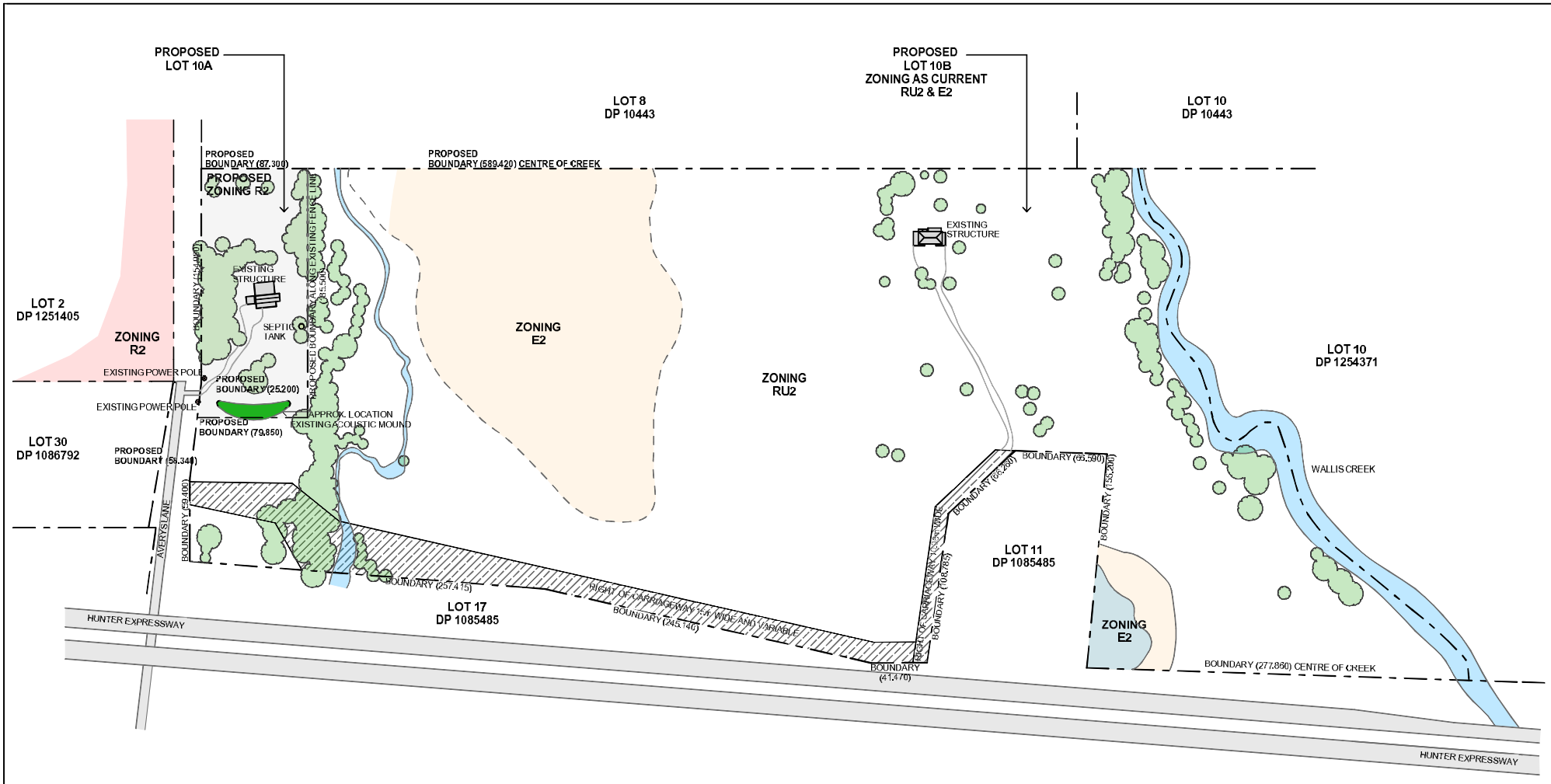
Xarbe DESIGN

PO Box 286, Maitland NSW 2320
p: 02 4046 3191 e: admin@xarbecm.au

CLIENT: Mrs A Shearman
PROJECT: 1 into 2 Subdivision
LOT 10 SEC -- DP 1085485
DRAWING TITLE: COVER SHEET
SCALE: 1:4.03 @A3
DATE: 25/09/2020
LOCATION: 259 Averys Lane, Buchanan, NSW, 2323

REVISION: D
DRAWING: DA-00
SHEET 1 OF 3
PROJECT: 200113



01 PLAN - Site
NEW WORKS

NOT FOR CONSTRUCTION

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B	BML	CLIENT INFORMATION	20/07/20
C	BML	CLIENT APPROVAL	21/07/20
D	BML	CLIENT APPROVAL	25/09/20

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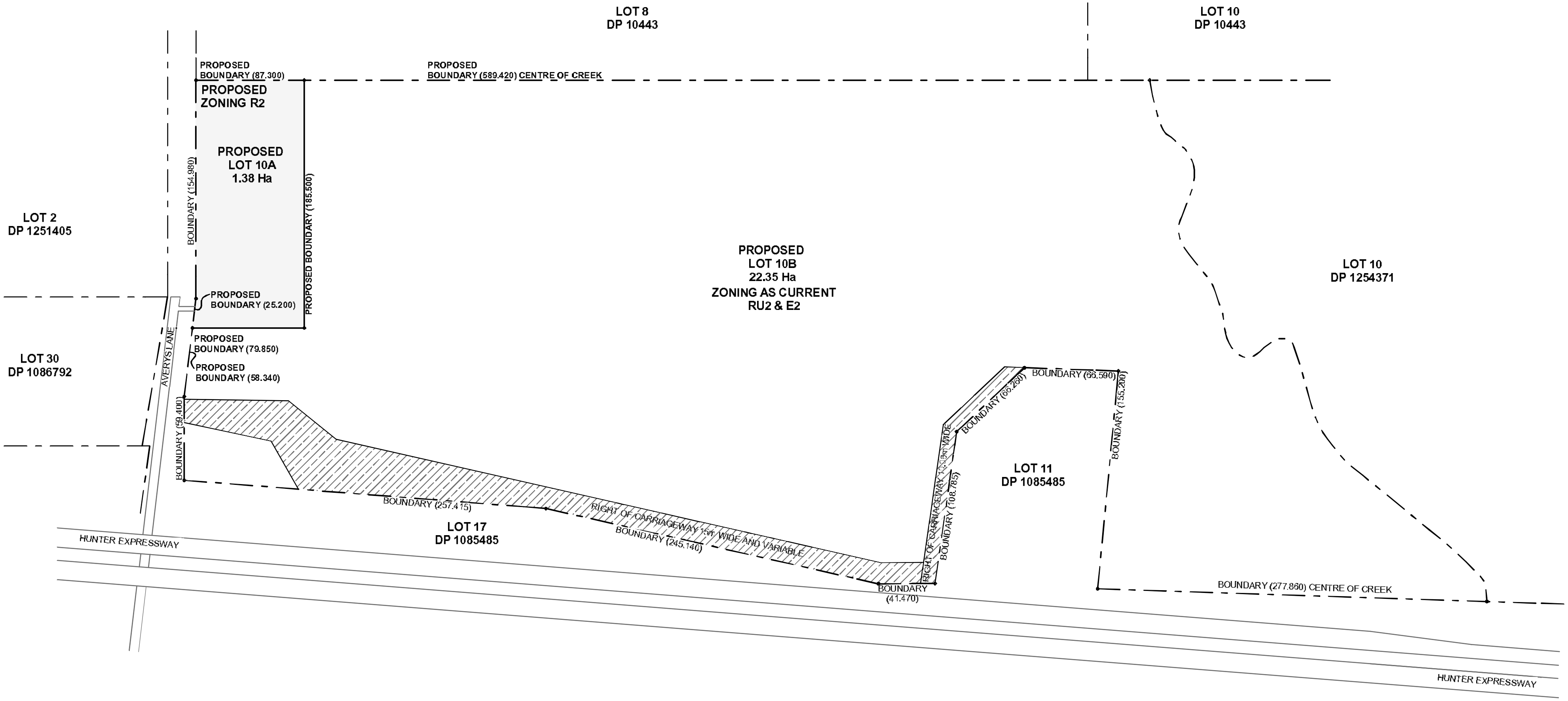
Xarbe DESIGN
PO Box 286, Maitland NSW 2320
p: 02 4046 3191 e: admin@xarbe.com.au

DRAWING TITLE: PLAN - SITE
SCALE: 1:3000 @A3
PRINT DATE: 25/09/2020
LOCATION: 259 Averys Lane, Buchanan, NSW, 2323
CLIENT: Mrs A Shearman
PROJECT: 1 into 2 Subdivision
LOT 10 SEC -- DP 1085485

REVISION. D

DRAWING DA-01
SHEET 2 OF 3

PROJECT 200113



01 PLAN - CONCEPT SUBDIVISION
NEW WORKS

NOT FOR CONSTRUCTION

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B	BML	CLIENT INFORMATION	20/07/20
C	BML	CLIENT APPROVAL	21/07/20
D	BML	CLIENT APPROVAL	25/09/20

REVISION LOG

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Xarbe.DESIGN
PO Box 261, Maitland, N.S.W., 2320
p: 02 4040 3191 e: admin@xarbe.com.au

DRAWING TITLE
SUBDIVISION

SCALE
1:3000 @A3

PRINT DATE
25/09/2020

LOCATION
259 Averys Lane, Buchanan, NSW, 2323

CLIENT
Mrs A Shearman

PROJECT
1 into 2 Subdivision

LOT 10 SEC -- DP 1085485

REVISION.
D

DRAWING
DA-02
SHEET 3 OF 3

PROJECT
200113

Appendix D – Acoustic Treatment

Construction Categories

Appendix C – Acoustic Treatment of Residences

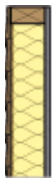
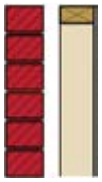
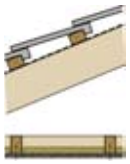
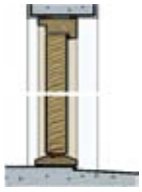
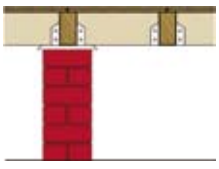
The following table sets out standard (or deemed-to-satisfy) constructions for each category of noise control treatment for the sleeping areas and other habitable areas of single / dual occupancy residential developments only. The assumptions made in the noise modelling are as follows:

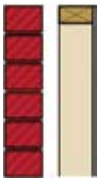
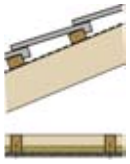
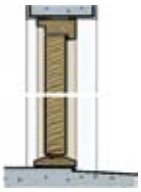
- Typical layout of a modern dwelling taken from a recent large residential development in an outer Sydney suburb
- Bedrooms and other habitable rooms are exposed to road noise

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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