

Noise Assessment

Manufactured Home Estate Subdivision
29 Metford Road
Tenambit, NSW

Prepared for: HDB Town Planning & Design
April 2024
MAC231986-01RP1V2



Document Information

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Maitland NSW 2320

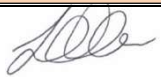

Prepared by: Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

P: +61 2 4920 1833

www.mulleracoustic.com

DOCUMENT ID	DATE	PREPARED	SIGNED	REVIEWED	SIGNED
MAC231986-01RP1V2	18 April 2024	Louis Abell		Oliver Muller	

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CONTENTS

1	INTRODUCTION.....	5
1.1	PROJECT BACKGROUND.....	6
1.2	ASSESSMENT REQUIREMENTS.....	6
1.2.1	RECEIVER REVIEW.....	6
1.3	PROPOSED ACTIVITIES & OPERATING HOURS.....	6
2	NOISE POLICY AND GUIDELINES.....	9
2.1	NOISE POLICY FOR INDUSTRY.....	9
2.1.1	PROJECT NOISE TRIGGER LEVELS (PNTL).....	10
2.1.2	RATING BACKGROUND LEVEL (RBL).....	10
2.1.3	PROJECT INTRUSIVENESS NOISE LEVEL (PINL).....	10
2.1.4	PROJECT AMENITY NOISE LEVEL (PANL).....	11
2.2	LICENCED PREMISES.....	13
2.2.1	24-HOUR ECONOMY LEGISLATION (VIBRANCY REFORMS) AMENDMENT ACT, 2023.....	13
2.3	AS2107 INTERNAL DESIGN SOUND LEVELS.....	14
2.3.1	AS2107 INTERNAL DESIGN SOUND LEVELS.....	14
3	EXISTING ENVIRONMENT.....	15
3.1	UNATTENDED NOISE MONITORING.....	15
3.2	ATTENDED NOISE MONITORING.....	16
3.3	NPI RECEIVER TYPE.....	17
4	ASSESSMENT CRITERIA.....	19
4.1	OPERATIONAL NOISE TRIGGER LEVELS (CRITERIA).....	19
4.1.1	INTRUSIVENESS NOISE LEVELS.....	19
4.1.2	AMENITY NOISE LEVELS AND PROJECT AMENITY NOISE LEVELS.....	19
4.1.3	PROJECT NOISE TRIGGER LEVELS.....	20
4.2	RESIDUAL NOISE ASSESSMENT.....	20
5	ASSESSMENT METHODOLOGY.....	21
5.1	POLICY ASSESSMENT METHODOLOGY.....	21
5.1.1	FIXED NOISE SOURCES - NPI ASSESSMENT.....	21

5.2	RESIDUAL NOISE ASSESSMENT METHODOLOGY	21
6	MODELLING METHODOLOGY	23
6.1	SOUND POWER LEVELS	24
7	NOISE ASSESSMENT RESULTS	25
7.1	NPI OPERATIONAL NOISE ASSESSMENT.....	25
7.2	RESIDUAL NOISE ASSESSMENT RESULTS	27
8	DISCUSSION AND RECOMMENDATIONS.....	29
8.1	INTERNAL NOISE LEVELS.....	29
8.1.1	NPI OPERATIONAL NOISE	29
8.1.2	CUMULATIVE WHOLE PREMISES ACTIVITIES	29
8.2	NOISE TREATMENT OPTIONS	29
8.2.1	BARRIER CONSTRUCTION.....	29
8.2.2	WINDOW TREATMENT	30
8.2.3	NOTIFICATION TO PROSPECTIVE BUYERS	30
9	CONCLUSION	33
	APPENDIX A – GLOSSARY OF TERMS	
	APPENDIX B – SITE PLANS	
	APPENDIX C – NOISE MONITORING CHARTS	
	APPENDIX D – ACOUSTIC TREATMENT OF RESIDENCES – WINDOWS	

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by HDB Town Planning & Design (HDB) to prepare a Noise Assessment (NA) for the proposed 101 Lot, Manufactured Home Estate Subdivision, (the project) located at 29 Metford Road, Tenambit, NSW.

The NA has quantified potential operational noise emissions from nearby operations and recommends reasonable and feasible noise controls where required.

This assessment has been undertaken in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Environment Protection Authority (EPA), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022;
- The Independent Liquor and Gaming Authority (ILGA) criteria related to licensed premises;
- Standards Australia AS/NZS 2107:2016 (AS2107) – Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors; 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**.

1.1 Project Background

The project involves the development of a Manufactured Home Estate (MHE) located at 29 Metford Road, Tenambit, NSW on Lots 7 and 8, DP810442, and Lot 11, DP597659. The MHE will consist of 101 single-storey housing units, internal roads, and utilities and services.

The project is located on land zoned as RU2 – Rural Landscape. Adjoining residential dwellings to the south and north of the project are also zoned RU2, with dwellings to the west residing on R1 – General Residential zoned land. The Regal Inn is also neighbouring the project to the north.

A concept design outlining the position and layout of the MHE is presented in **Appendix B**.

1.2 Assessment Requirements

The NA is required to assess potential noise impacts from The Regal Inn which is located north of the project. This NA will supplement a Development Application (DA) that is being prepared for submission to Maitland City Council (MCC) for approval.

1.2.1 Receiver Review

The position and layout of the MHE in relation to The Regal Inn is presented in **Figure 1**.

1.3 Proposed Activities & Operating Hours

There are several key activities associated with The Regal Inn that have the potential to generate acoustic impacts on nearby receivers.

Table 1 provides a summary of project noise sources and the assessment period in which they propose to occur.

Table 1 Project Noise Sources	
Activity/Operation	Period ¹
Consumable Goods Deliveries	Day/Evening/Night
Vehicles in Car Park	Day/Evening/Night
Amplified Music and Patron Noise	Day/Evening/Night
Mechanical Plant	Day/Evening/Night

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.

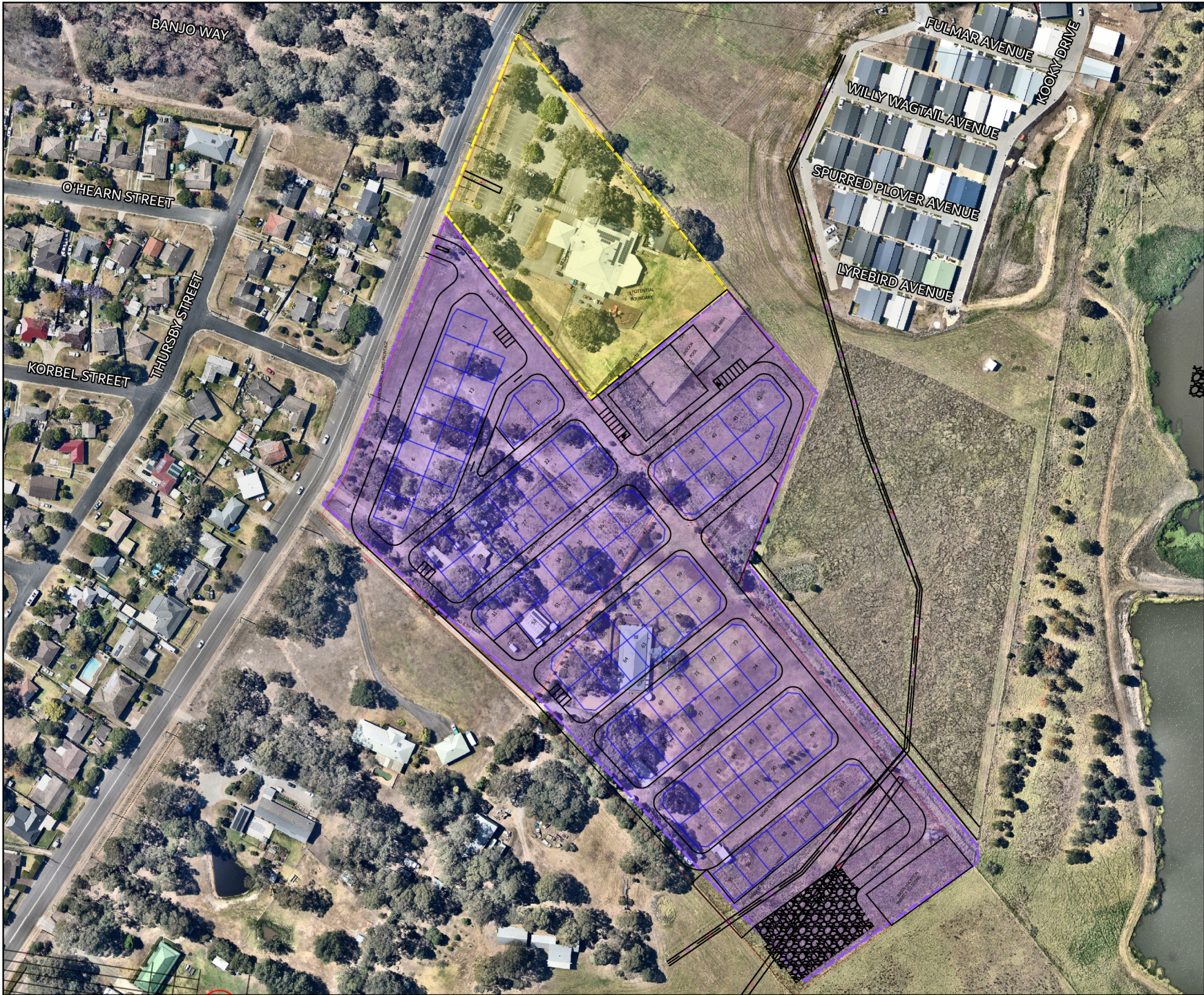



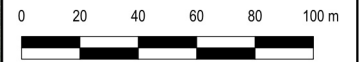


FIGURE 1
Locality Plan
MAC231986-01
29 Metford Road
Tenambit
NSW

KEY

-  Unattended Noise Monitoring
-  MHE
-  Regal Inn Site Boundary



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2 Noise Policy and Guidelines

2.1 Noise Policy for Industry

The EPA released the Noise Policy for Industry (NPI) in October 2017 which provides a process for establishing noise criteria for consents and licenses enabling the EPA to regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997.

The objectives of the NPI are to:

- provide noise criteria that is used to assess the change in both short term and long-term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management involving the following key steps:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels (criteria), above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.
2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.
3. Compare the predicted or measured noise level with the PNTL, assessing impacts and the need for noise mitigation and management measures.

4. Consider residual noise impacts - that is, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.
5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.
6. Monitor and report environmental noise levels from the development.

2.1.1 Project Noise Trigger Levels (PNTL)

The policy sets out the procedure to determine the PNTLs relevant to an industrial development. The PNTL is the lower (ie, the more stringent) of the **Project Intrusiveness Noise Level (PINL)** and **Project Amenity Noise Level (PANL)** determined in accordance with Section 2.3 and Section 2.4 of the NPI.

2.1.2 Rating Background Level (RBL)

The Rating Background Level (RBL) is a parameter determined from noise monitoring and is used for assessment purposes. As per the NPI, the RBL is an overall single figure background level representing each assessment period (day, evening and night) over the noise monitoring period. The measured RBLs relevant to the project are contained in **Section 3**.

For low noise environments, such as rural environments, minimum assumed RBLs apply within the NPI can be adopted in lieu of completing background noise measurements. This is considered the most conservative method for establishing noise criteria for a project. The minimum assumed RBLs are as follows:

- Minimum Day RBL = 35dBA;
- Minimum Evening RBL = 30dBA; and
- Minimum Night RBL = 30dBA.

2.1.3 Project Intrusiveness Noise Level (PINL)

The PINL (LA_{eq,15min}) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. Hence, when assessing intrusiveness, background noise levels need to be measured.

2.1.4 Project Amenity Noise Level (PANL)

The PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended Amenity Noise Levels specified in Table 2.2 (of the NPI). The NPI defines two categories of Amenity Noise Levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area; and
- **Project Amenity Noise Level (PANL)** – is the recommended level for a receiver area, specifically focusing the project being assessed.

Additionally, Section 2.4 of the NPI states: “to ensure that industrial noise levels (existing plus new) remain within the recommended Amenity Noise Levels for an area, a Project Amenity Noise Level applies for each new source of industrial noise as follows”:

PANL for new industrial developments = recommended **ANL** minus 5dBA.

The following exceptions apply when deriving the PANL:

- areas with high traffic noise levels;
- proposed developments in major industrial clusters;
- existing industrial noise and cumulative industrial noise effects; and
- greenfield sites.

Where relevant this assessment has considered influences of traffic with respect to Amenity Noise Levels (ie areas where existing traffic noise levels are 10dB greater than the recommended ANL).

Furthermore, Section 2.4 of the NPI states “*where the project amenity noise level applies and it can be met, no additional consideration of cumulative industrial noise is required.*”

The recommended Amenity Noise Levels as per Table 2.2 of the NPI are reproduced in **Table 2**.

Table 2 Amenity Noise Levels			
Receiver Type	Noise Amenity Area	Time of day ¹	Recommended Amenity Noise Level dB LAeq(period)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks.	See column 4	See column 4	5dB above the recommended Amenity Noise Level for a residence for the relevant noise amenity area and time of day
School Classroom	All	Noisiest 1-hour period when in use	35 (internal) 45 (external)
Hospital ward			
- internal	All	Noisiest 1-hour	35
- external	All	Noisiest 1-hour	50
Place of worship			
- internal	All	When in use	40
Passive Recreation	All	When in use	50
Active Recreation	All	When in use	55
Commercial premises	All	When in use	65
Industrial	All	When in use	70

Notes: The recommended Amenity Noise Levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7 of the NPI.

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.

2.2 Licenced Premises

2.2.1 24-Hour Economy Legislation (Vibrancy Reforms) Amendment Act, 2023

The 24-Hour Economy Legislation (Vibrancy Reforms) Amendment Act, 2023, introduced by the New South Wales (NSW) Government (Liquor and Gaming), seeks to streamline and simplify regulations pertaining to noise, planning, and liquor licensing.

The Vibrancy Reforms designate Liquor and Gaming NSW (L&G) as the lead regulator of entertainment sound-related complaints for all licensed premises under the Liquor Act, 2007. Consequently, noise-related conditions specified in development consents and 'offensive noise pollution' laws will no longer be applicable when regulated by the Liquor Act, 2007. To facilitate the effective execution of these reforms, L&G will undergo amendments to the following relevant legislation:

- Gaming and Liquor Administration Act, 2007, No. 91;
- Liquor Act, 2007, No. 90;
- Liquor Regulation Act, 2018;
- Environmental Planning and Assessment Act, 1979, No. 203 (EP&A Act);
- Environmental Planning and Assessment Regulation, 2021 (EP&A Regulations);
- Local Government Act, 1993, No. 30; and
- Protection of the Environment Operations (General) Regulation, 2022 (POEO Regulation).

In consideration of the amendments, conditions relating to noise emitted from licensed premises are no longer effective in Development Consent Conditions, as local councils are no longer the Appropriate Regulatory Authority (ARA) relating to matters of noise emitted from a licensed premises. This is affirmed in the NGLG which states “*The Liquor, Gaming and Racing Division of the Department of Customer Service administers the operation of liquor-licensed premises under the Liquor Act 2007, including handling noise complaints and setting noise conditions on licenses.*”

L&G has a role in managing noise from licensed premises such as pubs, clubs, and hotels (for loud music or patron noise). Following disturbance complaints, L&G can impose noise conditions on licences to reduce noise impacts. L&G is required to investigate and respond to complaints about music and patron noise emitted from licensed premises under the Liquor Act, 2007.

For local government, the most relevant amendments are those in the EP&A Act; EP&A Regulation; and the POEO Regulation, which rescinds Development Consent Conditions relating to noise generated from licensed premises and trading hours of licenced premises.

2.3 AS2107 Internal Design Sound Levels

Standards Australia AS 2107:2016, recommends design criteria for conditions affecting the acoustic environment within building interiors to ensure a healthy, comfortable, and productive environment for the occupants and the users. The background sound levels recommended take into account the function of the area(s) and apply to the sound level measured within the space unoccupied but ready for occupancy.

2.3.1 AS2107 Internal Design Sound Levels

Design criteria for the acoustic environment within occupied spaces are prescribed in Standards Australia AS2107. The relevant design sound levels for a residential dwelling are reproduced in **Table 3**.

Table 3 AS/NZS 2107:2016 Recommended Design Sound Levels for Different Areas of Occupancy in Buildings	
Type of Occupancy / Activity	Design sound level, range LAeq, t dB(A)
Houses and apartments in suburban areas or near minor roads	
Living areas	35 to 40
Sleeping areas (night-time)	30 to 35

3 Existing Environment

3.1 Unattended Noise Monitoring

To quantify the existing background noise environment of the area, unattended noise monitoring was conducted at one location representative of the ambient environment surrounding the project site. The selected monitoring location is shown in **Figure 1** and is considered representative of surrounding residential receivers as per Fact Sheet B1.1 of the NPI.

The unattended noise survey was conducted in general accordance with the procedures described in Standards Australia AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise".

The measurements were carried out using one Svantek 977 noise analyser from Monday 12 February 2024 to Wednesday 21 February 2024. All 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 dB.

The results of long-term unattended noise monitoring are provided in **Table 4**. The noise monitoring charts for the background monitoring assessment are provided in **Appendix C**. Data affected by adverse meteorological conditions have been excluded from the results in accordance with methodologies provided in Fact Sheet A4 of the NPI.

Table 4 Background Noise Monitoring Summary¹

Location	Measured Background Noise Level (LA90) dB ABL ²			Measured Ambient Noise Level dB LAeq(period)		
	Day	Evening	Night	Day	Evening	Night
	L1	39	39	31	52	49

Note 1: 4kHz frequency band was removed due to interference from insect noise.

Note 2: Assessment background level (ABL) – the single-figure background level representing each assessment period day, evening and night as per NPI Fact Sheet A.

Note: Excludes periods of wind or rain affected data. Meteorological data obtained from the Paterson Bureau of Meteorology weather station (32.6296°S 151.5919°E 30m AMSL)

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.

3.2 Attended Noise Monitoring

To supplement the unattended noise assessment and to quantify the changes in ambient noise in the community surrounding the operation, one 15-minute attended measurement was completed.

The attended noise survey was conducted in general accordance with the procedures described in Standards Australia AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise".

All 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.

The attended noise monitoring was conducted using one Svantek 971 noise analyser at the unattended noise logger location (L1 - see **Figure 1**) on Monday 12 February 2024 to quantify ambient background noise levels.

The attended measurement was completed during calm and clear meteorological conditions and confirmed that ambient traffic and commercial noise dominated the surrounding environment. The results of the short-term noise measurement and observations are summarised in **Table 5**.

Table 5 Operator-Attended Noise Survey Results					
Date/Time (hrs)	Noise Descriptor (dB re 20 μ Pa)			Meteorology	Description and SPL, dBA
	L _{Amax}	L _{Aeq}	L _{A90}		
Location L1					
12/02/2024	67	55	49	WD: NE	Insects 47-62
14:32				WS: 1.5m/s	Traffic 45-64
				28°C	Birds 45-62

3.3 NPI Receiver Type

Classification of residential receivers in the surrounding area have been determined by review of the measured RBLs and a tally of the features for each category described in Table 2.3 of the NPI. The features and classifications are provided in **Table 6**.

Table 6 NPI Residential Receiver Category Classification			
Receiver	Land-use Zoning	Existing background noise levels	Residential Receiver Description
MHE Subdivision	RU2 – Rural Landscape	Daytime RBL < 45dB(A) Evening RBL < 40dB(A) Night RBL < 40dB(A)	Local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. Evening ambient noise levels defined by the natural environment and human activity.

Table 7 provides an overall tally of classification. This classification is used in conjunction with the intrusiveness criteria to determine the limiting criteria.

Table 7 Determination of NPI Residential Receiver Category			
Parameter	Rural	Suburban	Urban
Zoning category	1		
Typical existing background noise levels		1	
Description		1	
Total	1	2	0

Observations in the surrounding locality support the assessment of the receiver categories as suburban.

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4 Assessment Criteria

4.1 Operational Noise Trigger Levels (Criteria)

This section outlines the determination of PNTLs and Maximum Noise Assessment Trigger Levels in accordance with NPI methodology.

4.1.1 Intrusiveness Noise Levels

The PINL are presented in **Table 8** and have been determined based on the RBL +5dBA and only apply to residential receivers.

Table 8 Project Intrusiveness Noise Levels

Location	Receiver Type	Period ¹	Measured RBL	Adopted RBL	PINL
			dB LA90	dB LA90	dB LAeq(15min)
MHE	Residential	Day	39	39	44
		Evening	39	39	44
		Night	31	31	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.

4.1.2 Amenity Noise Levels and Project Amenity Noise Levels

The PANL for residential receivers and other receiver types (ie non-residential) potentially affected by the project are presented in **Table 9**.

Table 9 Amenity Noise Levels and Project Amenity Noise Levels

Receiver Type	Noise Amenity Area	Assessment Period ¹	NPI Recommended	ANL	PANL
			ANL dB LAeq(period)	dB LAeq(period) ²	dB LAeq(15min) ³
Residential	Suburban	Day	55	50	53
		Evening	45	40	43
		Night	40	35	38

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.

Note 2: Project Amenity Noise Level equals the Amenity Noise Level -5dB as there is other industry in the area.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

4.1.3 Project Noise Trigger Levels

The PNTL are the lower of either the PINL or the PANL. **Table 10** presents the derivation of the PNTLs in accordance with the methodologies outlined in the NPI.

Table 10 Project Noise Trigger Levels					
Receiver	Noise Amenity	Assessment	PINL	PANL	PNTL
Type	Area	Period ¹	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)
Residential	Suburban	Day	44	53	44
		Evening	44	43	44
		Night	36	38	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.

4.2 Residual Noise Assessment

In accordance with Section 79A of the Vibrance Reforms, a liquor licence does not authorise business to be conducted on licensed premises in a way that unduly disturbs, or unreasonably and seriously disturbs, the quiet and good order of the neighbourhood in which the licensed premises are located. In lieu of these amendments, to assess potential disturbance on a community, a residual noise impact assessment of all noise sources (mechanical plant, onsite vehicles, patrons and entertainment) at the licensed premises will be conducted which will be assessed against the measured existing ambient noise levels (LAeq,15min) in place of formalised criteria to provide an indication of the potential for disturbance. The measured existing ambient noise levels (LAeq,15min) are provided in **Table 11**.

Table 11 Background Noise Monitoring Summary		
Measured Ambient Noise Level		
dB LAeq(period)		
Day	Evening	Night
52	49	44

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.

5 Assessment Methodology

5.1 Policy Assessment Methodology

5.1.1 Fixed Noise Sources - NPI Assessment

An assessment of potential noise emissions associated with the operational activities within the scope of the NPI has been completed. The assessment has identified several noise sources that may contribute to potential acoustic impacts at surrounding MHE including mechanical plant, delivery trucks and onsite customer vehicles. The assessment has been completed in accordance with the NPI and aims to protect the acoustic amenity of the surrounding area by implementing mitigation measures including best practice design of a project site, use of noise control strategies and project operational hours planning.

5.2 Residual Noise Assessment Methodology

An assessment of potential residual noise emissions associated with all activities (combined operational and entertainment noise) has been completed. The assessment has identified several noise sources that may contribute to potential acoustic impacts at surrounding MHE including mechanical plant, delivery trucks, onsite customer vehicles, patron noise and amplified music. In lieu of the Vibrance Reforms, a residual noise impact assessment of these noise sources at the licensed premises will be conducted which will be assessed against the measured existing ambient noise levels ($LA_{eq,15min}$) in place of formalised criteria to provide an indication of the potential for disturbance.

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6 Modelling Methodology

A computer model was developed to quantify project noise emissions to neighbouring receivers using DGMR (iNoise, Version 2024) noise modelling software. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613:1 and ISO 9613:2 including corrections for meteorological conditions using CONCAWE¹. The ISO 9613 standards are the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

¹ Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

6.1 Sound Power Levels

Table 12 presents the sound power level for each noise source modelled in this assessment. It is noted that sound power levels were sourced from manufacturer's specifications or from in-field measurements at similar project sites.

Table 12 Acoustically Significant Sources - Sound Power Levels dBA (re 10⁻¹² Watts)			
Item and number modelled per 15 minutes	Individual Sound Power Level	Modelled Sound Power Level dB LAeq(15min)	Source Height ¹
NPI Operational Assessment			
Exhaust Fan (x1)	77	77	0.5m
Light Vehicle idle, start up and drive off (x15) ²	73	85	0.5m
Truck Delivery	82	82	0.75m
Vibrancy Reforms Residual Noise Assessment			
Exhaust Fan (x1)	77	77	0.5m
Light Vehicle idle, start up and drive off (x15) ²	73	85	0.5m
Truck Delivery	82	82	0.75m
50 Patrons Outdoors (x2) ³	79	82	1.5m
Amplified Music (Inside) (x1)	97	97	1.5m

Note 1: Height above the relative ground or building below source.

Note 2: Includes a duration adjustment assuming vehicles operate for three (3) minutes continuously within a period of 15-minutes.

Note 3: Assumes 1 in 4 Patrons speaking simultaneously with raised vocal effort. Data obtained from the AAC Licenced Premises Guideline.

7 Noise Assessment Results

This assessment has quantified operational noise levels at the nearest receivers.

7.1 NPI Operational Noise Assessment

The coincidence of all plant and patron sources occurring onsite simultaneously for an entire 15-minute period is unlikely. However, it is probable that several sources may be audible simultaneously on occasion for a limited duration.

Noise Contours from all operational sources (mechanical plant and onsite vehicles) have been generated in **Figure 2**. Contours have been modelled at 44dBA and 36dBA to correspond with the NPI criteria during the day (44dBA), evening (44dBA) and night (36dBA) periods.

Results indicate that during the day and evening periods, proposed lots within the MHE are not expected to experience noise levels above the NPI criteria. During the night period, Lots 1, 2, 13, 14 and 15 may experience noise levels above the NPI criteria. Recommendations to reduce this potential exceedance are provided in **Section 8**.

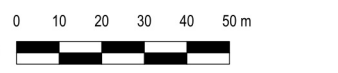


FIGURE 2
 NPI Operational Assessment
 MAC231986-01
 29 Metford Road
 Tenambit NSW

KEY

Noise Contours

- 36-44dBA
- >44dBA
- MHE



7.2 Residual Noise Assessment Results

In lieu of the amendments outlined in the Vibrancy Reforms, to assess potential disturbance to community, a residual noise impact assessment of all noise sources at the premises has been completed. Noise Contours from all sources (mechanical plant, onsite vehicles, patron noise and amplified music) have been generated in **Figure 3**. contours have been modelled at 52dBA, 49dBA and 44dBA to correspond with the measured existing ambient noise levels during the day (52dBA), evening (49dBA) and night (44dBA).

Results indicate that during the day, evening, and night periods, proposed lots within the MHE are not expected to experience noise levels above the measured existing ambient noise levels.

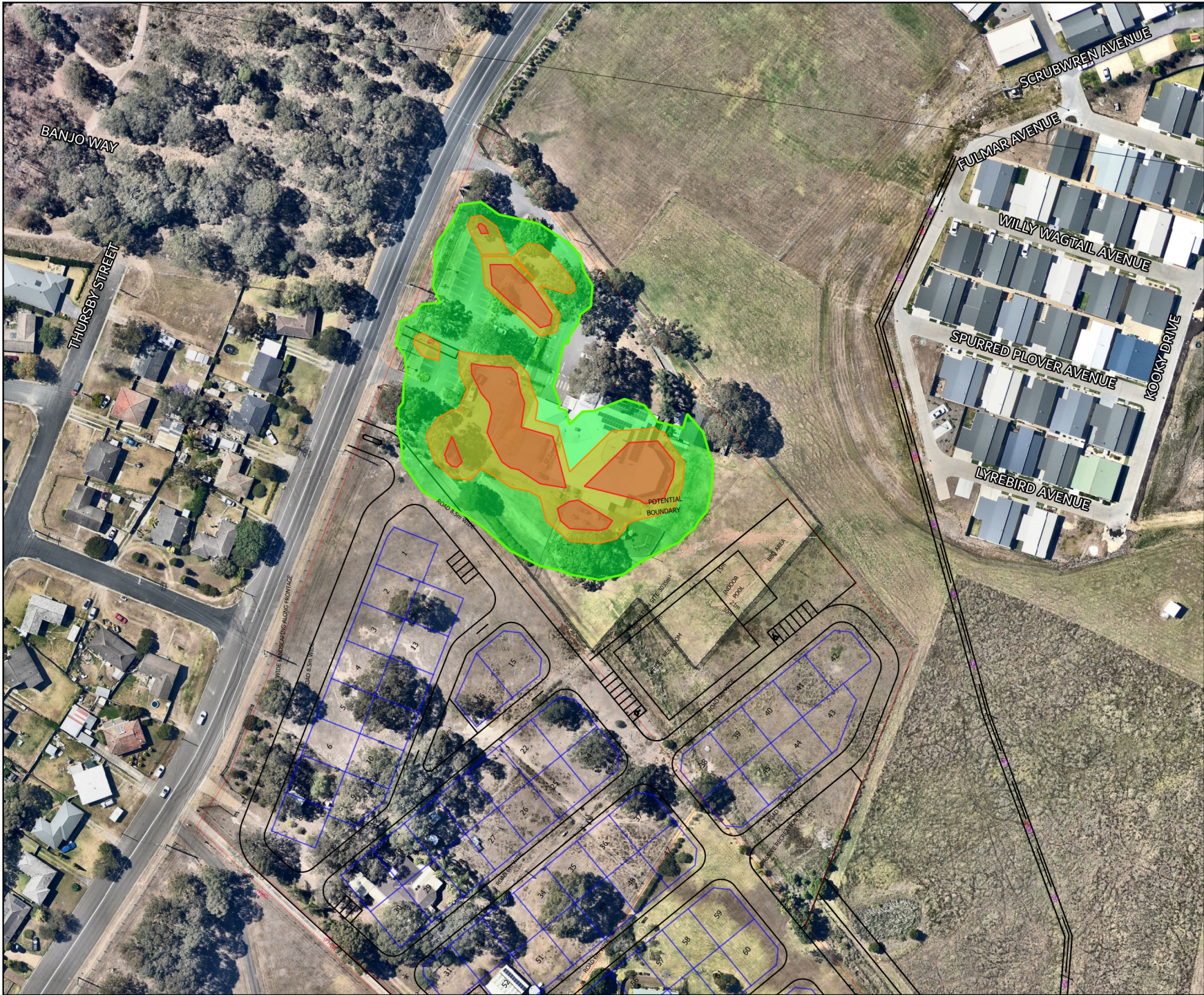
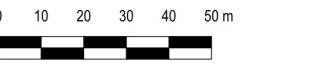


FIGURE 3
Cumulative Whole Premises
Assessment
MAC231986-01
29 Metford Road
Tenambit NSW

KEY

Noise Contours

- 44 - 49dBA
- 49 - 52dBA
- > 52dBA
- MHE



8 Discussion and Recommendations

8.1 Internal Noise Levels

8.1.1 NPI Operational Noise

Results indicate that during the day and evening periods, proposed Lots within the MHE are not expected to experience noise levels above the NPI criteria. During the night period, Lots 1, 2, 13, 14 and 15 may experience noise levels up to 37dBA to 38dBA, which is above the criteria of 36dBA.

It is anticipated that open windows will reduce noise by 10dB, resulting in internal noise levels of up to 28dBA. This internal level is deemed acceptable for sleeping areas of houses and apartments in suburban areas or near minor roads, as per AS2107.

8.1.2 Cumulative Whole Premises Activities

Results indicate that proposed Lots within the MHE are not expected to encounter noise levels exceeding the measured existing ambient noise levels from The Regal Inn (including mechanical plant, onsite vehicles, patron noise, and amplified music) during the day, evening, and night periods.

It is anticipated that internal noise levels will meet the criteria for sleeping areas of houses and apartments in suburban areas or near minor roads, in accordance with AS2107.

8.2 Noise Treatment Options

The following is a summary of the noise options that could be considered to ameliorate noise levels:

8.2.1 Barrier Construction

The installation of a 1.8m barrier fence (see **Figure 4**) along the southwestern and southeastern boundaries of The Regal Inn is predicted to reduce noise levels from the premises by up to 4dB at the closest residing Lots. This treatment option may aid in achieving the NPI night period criteria at Lots 1, 2, 13, 14 and 15. The construction of the barrier fence consist of materials with a surface density of at least 10kg/m², and not contain any gaps (ie lapped and capped timber or equivalent).

8.2.2 Window Treatment

Appendix C of the DoP's Development near Rail Corridors and Busy Roads – Interim Guidelines (2008) (See **Appendix D**) 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.

This document outlines that Category 2 noise control treatments to windows/sliding doors would result in an expected 27dB attenuation, whereas Category 3 noise control treatments to windows/sliding doors would result in an expected 32dB attenuation.

Category 2 treatment to windows would encompass openable windows with minimum 6mm monolithic glass and full perimeter acoustic seals. Category 3 treatment to windows would encompass openable windows with minimum 6.38mm laminated glass and full perimeter acoustic seals.

Both Category 2 and 3 treatments to windows are considered viable options are predicted to meet the recommended internal noise criteria.

8.2.3 Notification to Prospective Buyers

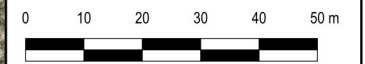
For transparency and to facilitate an informed decision-making process for prospective buyers, it is suggested that disclosure or notification regarding the presence of the nearby licensed premises and the potential noise considerations associated with it may be of benefit for this project.



FIGURE 4
Noise Treatment Option
MAC231986-01
29 Metford Road
Tenambit
NSW

KEY

- - - 1.8m Barrier Fence
- MHE



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9 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Assessment to quantify noise impacts on the proposed 101 Lot, Manufactured Home Estate Subdivision, located at 29 Metford Road, Tenambit, NSW.

The assessment has quantified potential operation emissions pertaining to both operation NPI related noise including vehicles and mechanical plant and noise from patrons and amplified music.

The results of the Noise Assessment demonstrate that during the day and evening periods, proposed Lots within the MHE are not expected to experience noise levels above the NPI criteria. During the night period, Lots 1, 2, 13, 14 and 15 may experience noise levels up to 37dBA to 38dBA, which surpasses the criteria of 36dBA.

It is anticipated that open windows will reduce noise by 10dB, resulting in internal noise levels of up to 28dBA. This internal level is deemed acceptable for sleeping areas of houses and apartments in suburban areas or near minor roads, as per AS2107.

Results indicate that proposed Lots within the MHE are not expected to encounter noise levels exceeding the measured existing ambient noise levels from The Regal Inn (including mechanical plant, onsite vehicles, patron noise, and amplified music) during the day, evening, and night periods.

It is anticipated that internal noise levels will meet the criteria for sleeping areas of houses and apartments in suburban areas or near minor roads, in accordance with AS2107.

Noise treatment recommendations have been outlined in **Section 8.2** to reduce noise impacts during the night period at the Lots closest to The Regal Inn.

In summary, the Noise Assessment supports the Development Application for the project.

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Appendix A – Glossary of Terms

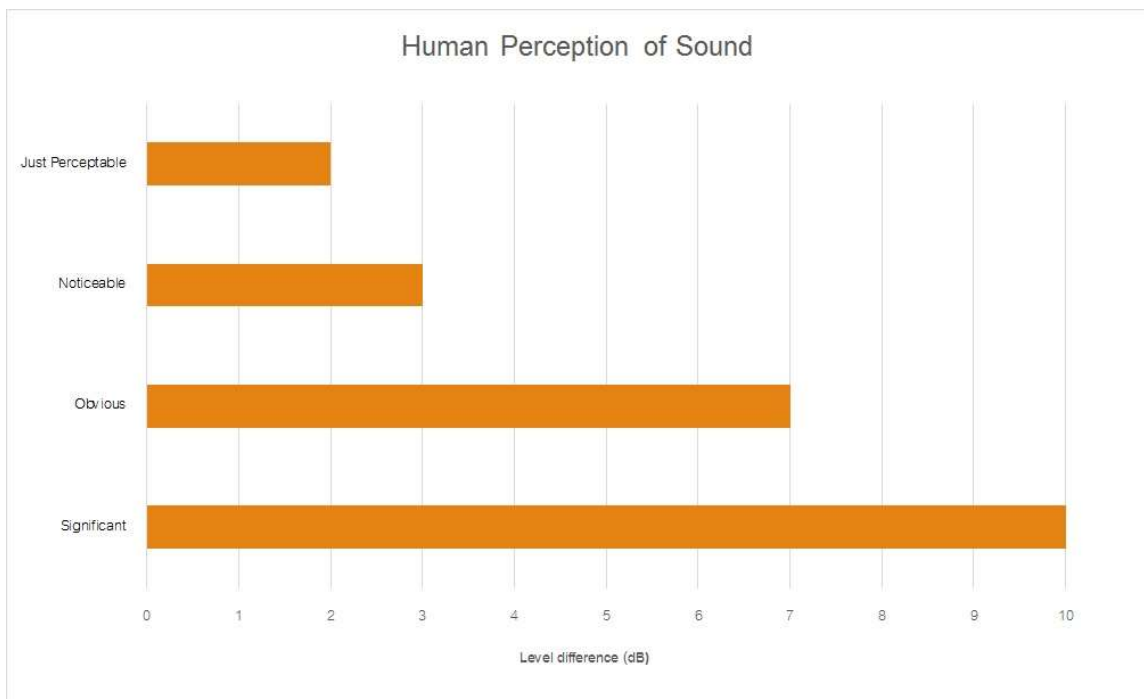
A number of technical terms have been used in this report and are explained in **Table A1**.

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.
LAm _{ax}	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 (L _w 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 (L _p or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from L _w 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

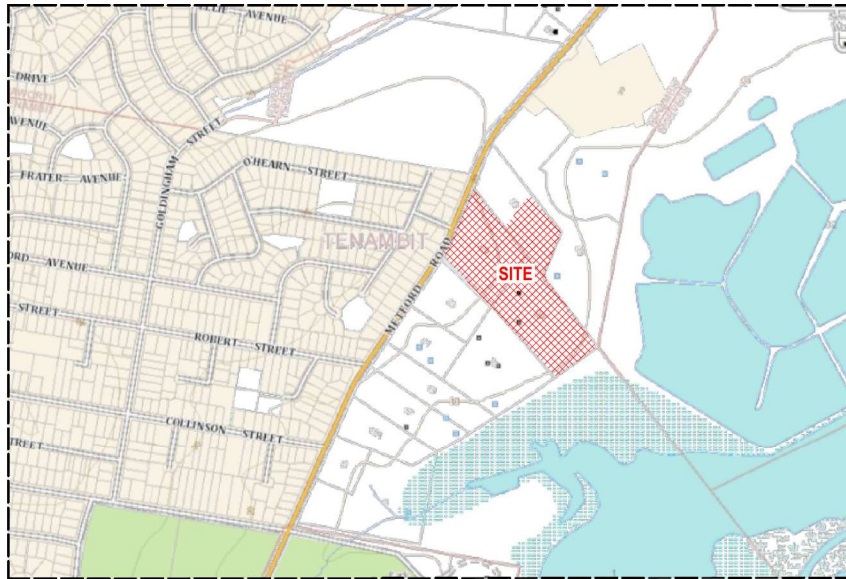
Figure A1 – Human Perception of Sound



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Appendix B – Site Plans

CONCEPT LOW COST HOUSING DEVELOPMENT No.29 METFORD ROAD TENAMBIT



LOCALITY PLAN

DRAWING SCHEDULE	
NUMBER	TITLE
1	COVER SHEET
2	EXISTING SITE
3	OVERALL DEVELOPMENT WITH EXISTING FEATURES
4	OVERALL DEVELOPMENT WITH SURVEYED FEATURES
5	OVERALL DEVELOPMENT WITH CONSTRAINTS
6	OVERALL DEVELOPMENT
7	OVERALL DEVELOPMENT WITH ADJOINING DEVELOPMENT
8	OVERALL DEVELOPMENT WITH ADJOINING DEVELOPMENT & FEATURES

REV	DATE	DESCRIPTION	INITIAL	APPR
B	11.04.24	DRAFT PLAN FOR CONSULTANTS	R.F.	R.F.
A	20.02.24	PRELIMINARY INVESTIGATION	J.S.	R.F.



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1st Floor, 44 Church Street, PO Box 40, Maitland NSW 2320

P: (02) 4933 6682 F: (02) 4933 6683
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ABN 95 078 017 308

SURVEY BY: PSS	
DATUM: AHD	
REDUCED LEVEL: 24.513	
ORIGIN OF LEVELS: PM 30947	
CONTOUR INTERVAL: 0.25	
DESIGNED: R.F.	DRAWN: R.F.
CHECKED: -	APPROVED: -

CLIENT REGAL HUNTER PROPERTIES	
PLAN:	N/A
LONGITUDINAL SECTION:	HORIZ: N/A VERT: N/A
CROSS SECTION:	HORIZ: N/A VERT: N/A

PROJECT
PRELIMINARY DEVELOPMENT PLAN FOR LOT 11 DP 597659
AND LOTS 7 & 8 DP 810442
NOS 27-33 METFORD ROAD TENAMBIT

DRAWING TITLE
COVER SHEET

SHEET 1 OF 8 SHEETS

HDB Job No 23117	REVISION B
DWS No 23117(PD)	
DRAFT INVESTIGATION	



REV	DATE	DESCRIPTION	INITIAL	APPR
B	11.04.24	DRAFT PLAN FOR CONSULTANTS	R.F.	R.F.
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SURVEY BY: PSS	CLIENT: REGAL HUNTER PROPERTIES
DATUM: AHD	REDUCED LEVEL: 24513
ORIGIN OF LEVELS: PM 30947	CONTOUR INTERVAL: 0.25
DESIGNED: R.F.	DRAWN: R.F.
CHECKED: -	APPROVED: -

PLAN: 1:1000 (A1) / 1:2000 (A3)	LONGITUDINAL SECTION: HORIZ: N/A, VERT: N/A	CROSS SECTION: HORIZ: N/A, VERT: N/A
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PROJECT: PRELIMINARY DEVELOPMENT PLAN FOR LOT 11 DP 597659 AND LOTS 7 & 8 DP 810442 NOS 27-33 METFORD ROAD TENAMBIT

CLIENT: REGAL HUNTER PROPERTIES

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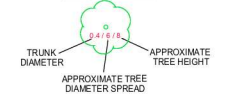
SHEET 3 OF 8 SHEETS

HDB Job No: 23117	REVISION: B
DWG No: 23117(PD)	
1:1000 (A1) / 1:2000 (A3)	



- (A) - EASEMENT FOR WATER 3.05 WIDE (VIDE L903428)
- (B) - EASEMENT FOR SEWER 2.415 WIDE (VIDE FP 430280 & D44605)
- (C) - EASEMENT TO DRAIN WATER 5.0 WIDE (VIDE DP597659)
- (D) - EASEMENT TO DRAIN WATER 3.0 WIDE (VIDE DP597659)
- (E) - RIGHT OF WAY 10.058 WIDE (VIDE DP103298)
- (CREATED BY TRANSFER A703637)
- (WE NOTE THE RIGHT OF WAY IS NOT SHOWN ON THE CURRENT TITLE & THERE IS NO EVIDENCE THAT IT HAS BEEN EXTINGUISHED. IT IS OUR OPINION THIS SHOULD BE FURTHER INVESTIGATED TO DETERMINE IF THERE IS A DEFECT IN TITLE)
- (F) RIGHT OF WAY 3.5 WIDE (VIDE DP810442)
- (G) EASEMENT FOR SERVICES 3.5 WIDE (VIDE DP810442)

TREE DIAGRAM



LEGEND

12	CONTOUR	PHOTO LOCATION & DIRECTION	
---	FENCING	WM	WATER METER
---	GATE	TP	TELEPHONE SINGLE CONCRETE PIT
SLH	SEWER LAMPHOLE	SV	STOP VALVE
SM	SEWER MANHOLE	WH	WATER HYDRANT
MB	MAIL BOX	WT	WATER TAP
LS	LARGE SIGN	TCM	TELEPHONE CABLE MARKER
US	UNIDENTIFIED SERVICE	TPC	TELEPHONE TWIN CONCRETE PIT
SP	SIGN POST	TOP	TOP OF BANK
		BOT	BOTTOM OF BANK

UNDERGROUND SERVICES
 NOT LOCATED BY SURVEY - APPROXIMATE LOCATION ONLY
 SOURCE: DIAL BEFORE YOU DIG

W	APPROXIMATE WATER MAIN LOCATION
N	APPROXIMATE LOCATION OF UNDERGROUND NBN / TELSTRA CABLES
S	APPROXIMATE SEWER MAIN LOCATION
G	APPROXIMATE GAS MAIN LOCATION
B	APPROXIMATE ABANDON SEWER MAIN
U	APPROXIMATE UTILITY LOCATION

B	11.04.24	DRAFT PLAN FOR CONSULTANTS	R.F.	R.F.
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REV	DATE	DESCRIPTION	INITIAL	APPR

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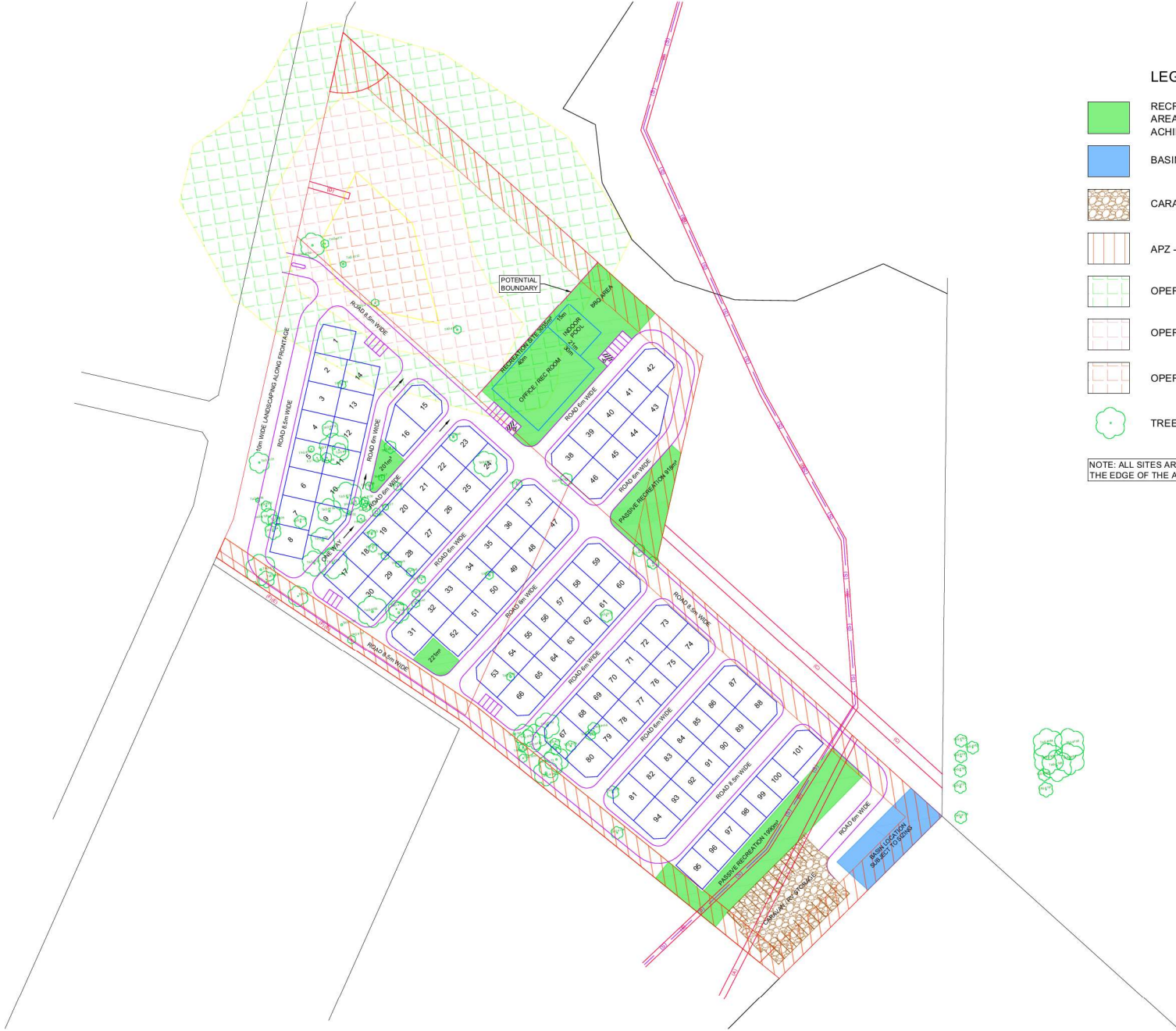
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ORIGIN OF LEVELS: PM 30947		CROSS SECTION: HORIZ: N/A VERT: N/A	
CONTOUR INTERVAL: 0.25			
DESIGNED: R.F.	DRAWN: R.F.		
CHECKED: -	APPROVED: -		

PROJECT: PRELIMINARY DEVELOPMENT PLAN FOR LOT 11 DP 597659 AND LOTS 7 & 8 DP 810442 NOS 27-33 METFORD ROAD TENAMBIT

DRAWING TITLE: **OVERALL DEVELOPMENT WITH SURVEYED FEATURES**

SHEET 4 OF 8 SHEETS

HDB Job No	23117	REVISION	B
DWG No	23117(PD)		
1:1000 (A1) / 1:2000 (A3)			



LEGEND

- RECREATION - TOTAL SITE AREA 54,064m²
AREA REQUIRED, 10% OF SITE, 5,406m²
ACHIEVED 6,365m²
- BASIN LOCATION
- CARAVAN / RV STORAGE
- APZ - 10m SOUTH & 12m NORTH & EAST
- OPERATIONAL SOUND SOURCE FROM HOTEL - 35 - 40 dB(A)
- OPERATIONAL SOUND SOURCE FROM HOTEL - 40 - 45 dB(A)
- OPERATIONAL SOUND SOURCE FROM HOTEL - 45 - 50 dB(A)
- TREE

NOTE: ALL SITES ARE SET BACK 2m FROM THE EDGE OF THE ACCESS ROAD.

B	11.04.24	DRAFT PLAN FOR CONSULTANTS	R.F.	R.F.
A	20.02.24	PRELIMINARY INVESTIGATION	J.S.	R.F.
REV	DATE	DESCRIPTION	INITIAL	APPR

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E: admin@hdb.com.au W: www.hdb.com.au
ABN 95 078 017 308

SURVEY BY: PSS	CLIENT: REGAL HUNTER PROPERTIES
DATUM: AHD	
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PROJECT: PRELIMINARY DEVELOPMENT PLAN FOR LOT 11 DP 597659 AND LOTS 7 & 8 DP 810442 NOS 27-33 METFORD ROAD TENAMBIT

DRAWING TITLE: OVERALL DEVELOPMENT WITH CONSTRAINTS

SHEET 5 OF 8 SHEETS

HDB Job No: 23117	REVISION: B
DWG No: 23117(PD)	
 1:500 (A1) / 1:1000 (A3)	



LEGEND

- RECREATION - TOTAL SITE AREA 54,064m²
AREA REQUIRED, 10% OF SITE, 5,406m²
ACHIEVED 6,365m²
- BASIN LOCATION
- CARAVAN / RV STORAGE

NOTE: ALL SITES ARE SET BACK 2m FROM THE EDGE OF THE ACCESS ROAD.

REV	DATE	DESCRIPTION	INITIAL	APPR
B	11.04.24	DRAFT PLAN FOR CONSULTANTS	R.F.	R.F.
A	20.02.24	PRELIMINARY INVESTIGATION	J.S.	R.F.



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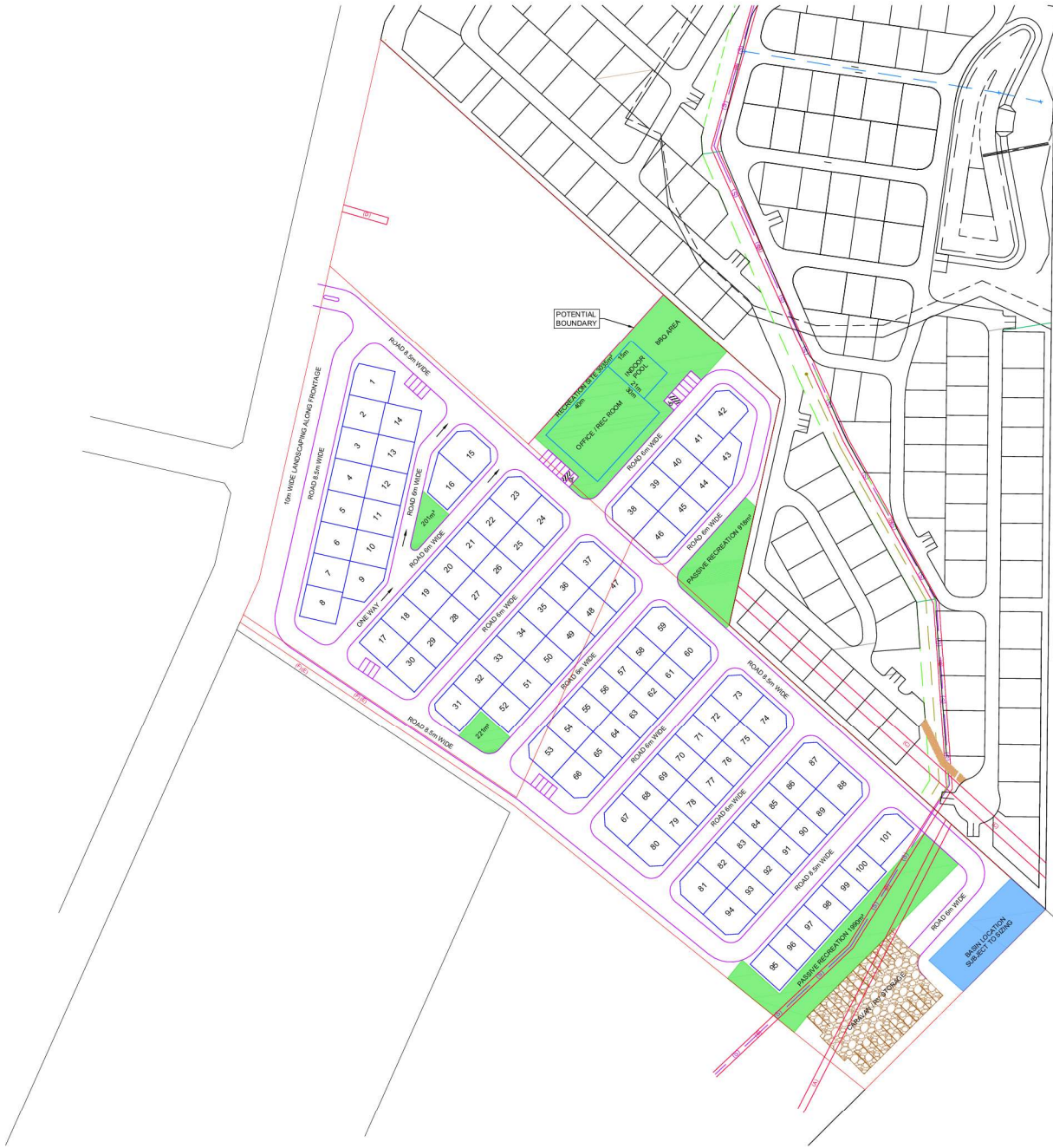
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DATUM: AHD
REDUCED LEVEL: 24.513
ORIGIN OF LEVELS: PM 30947
CONTOUR INTERVAL: 0.25
DESIGNED: R.F. DRAWN: R.F.
CHECKED: - APPROVED: -

CLIENT
REGAL HUNTER PROPERTIES
PLAN: 1:500 (A1) / 1:1000 (A3)
LONGITUDINAL SECTION:
HORIZ: N/A
VERT: N/A



PROJECT
PRELIMINARY DEVELOPMENT PLAN FOR LOT 11 DP 597659
AND LOTS 7 & 8 DP 810442
NOS 27-33 METFORD ROAD TENAMBIT
DRAWING TITLE
OVERALL DEVELOPMENT
SHEET 6 OF 8 SHEETS

HDB Job No **23117** REVISION **B**
DWG No **23117(PD)**
DRAFT INVESTIGATION
10 5 0 10 20 30
1:500 (A1) / 1:1000 (A3)



LEGEND

- RECREATION - TOTAL SITE AREA 54,064m²
AREA REQUIRED, 10% OF SITE, 5,406m²
ACHIEVED 6,365m²
- BASIN LOCATION
- CARAVAN / RV STORAGE

NOTE: ALL SITES ARE SET BACK 2m FROM THE EDGE OF THE ACCESS ROAD.

<p style="font-size: 8px; margin: 0;">TownPlanning & Design 1st Floor, 44 Church Street, PO Box 40, MAITLAND NSW 2320 P: (02) 4933 6682 F: (02) 4933 6683 E: admin@hdb.com.au W: www.hdb.com.au ABN 95 078 017 308</p>					
B	11.04.24	DRAFT PLAN FOR CONSULTANTS	R.F.	R.F.	
A	20.02.24	PRELIMINARY INVESTIGATION	J.S.	R.F.	
REV	DATE	DESCRIPTION	INITIAL	APPR	

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PROJECT: PRELIMINARY DEVELOPMENT PLAN FOR LOT 11 DP 597659 AND LOTS 7 & 8 DP 810442 NOS 27-33 METFORD ROAD TENAMBIT	HDB Job No 23117	REVISION B
DRAWING TITLE OVERALL DEVELOPMENT WITH ADJOINING DEVELOPMENT	DWG No 23117(PD)	
SHEET 7 OF 8 SHEETS	1:500 (A1) / 1:1000 (A3)	

PROJECT: PRELIMINARY DEVELOPMENT PLAN FOR LOT 11 DP 597659 AND LOTS 7 & 8 DP 810442 NOS 27-33 METFORD ROAD TENAMBIT
 HDB Job No: 23117
 REVISION: B
 DWG No: 23117(PD)
 DRAWING TITLE: OVERALL DEVELOPMENT WITH ADJOINING DEVELOPMENT
 SHEET 7 OF 8 SHEETS
 1:500 (A1) / 1:1000 (A3)



LEGEND

- RECREATION - TOTAL SITE AREA 54,064m²
AREA REQUIRED, 10% OF SITE, 5,406m²
ACHIEVED 6,365m²
- BASIN LOCATION
- CARAVAN / RV STORAGE

NOTE: ALL SITES ARE SET BACK 2m FROM THE EDGE OF THE ACCESS ROAD.

B	11.04.24	DRAFT PLAN FOR CONSULTANTS	R.F.	R.F.
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REV	DATE	DESCRIPTION	INITIAL	APPR



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ABN 95 078 017 308

SURVEY BY: PSS	CLIENT: REGAL HUNTER PROPERTIES
DATUM: AHD	REDUCED LEVEL: 24513
ORIGIN OF LEVELS: PM 30947	CONTOUR INTERVAL: 0.25
DESIGNED: R.F.	DRAWN: R.F.
CHECKED: -	APPROVED: -

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--------------------------------	--	-------------------------------------



PROJECT: PRELIMINARY DEVELOPMENT PLAN FOR LOT 11 DP 597659 AND LOTS 7 & 8 DP 810442 NOS 27-33 METFORD ROAD TENAMBIT
DRAWING TITLE: OVERALL DEVELOPMENT WITH ADJOINING DEVELOPMENT & FEATURES
SHEET 8 OF 8 SHEETS

HDB Job No: 23117
REVISION: B
DWS No: 23117(PD)
DRAFT
1:500 (A1) / 1:1000 (A3)
J:\2023\23117 - RUSSELL RICHARDSON, PREPARATION OF DA, 27 & 29 METFORD ROAD, TENAMBIT, DESIGN, URBAN DESIGN, 23117(PD) REV B.DWG

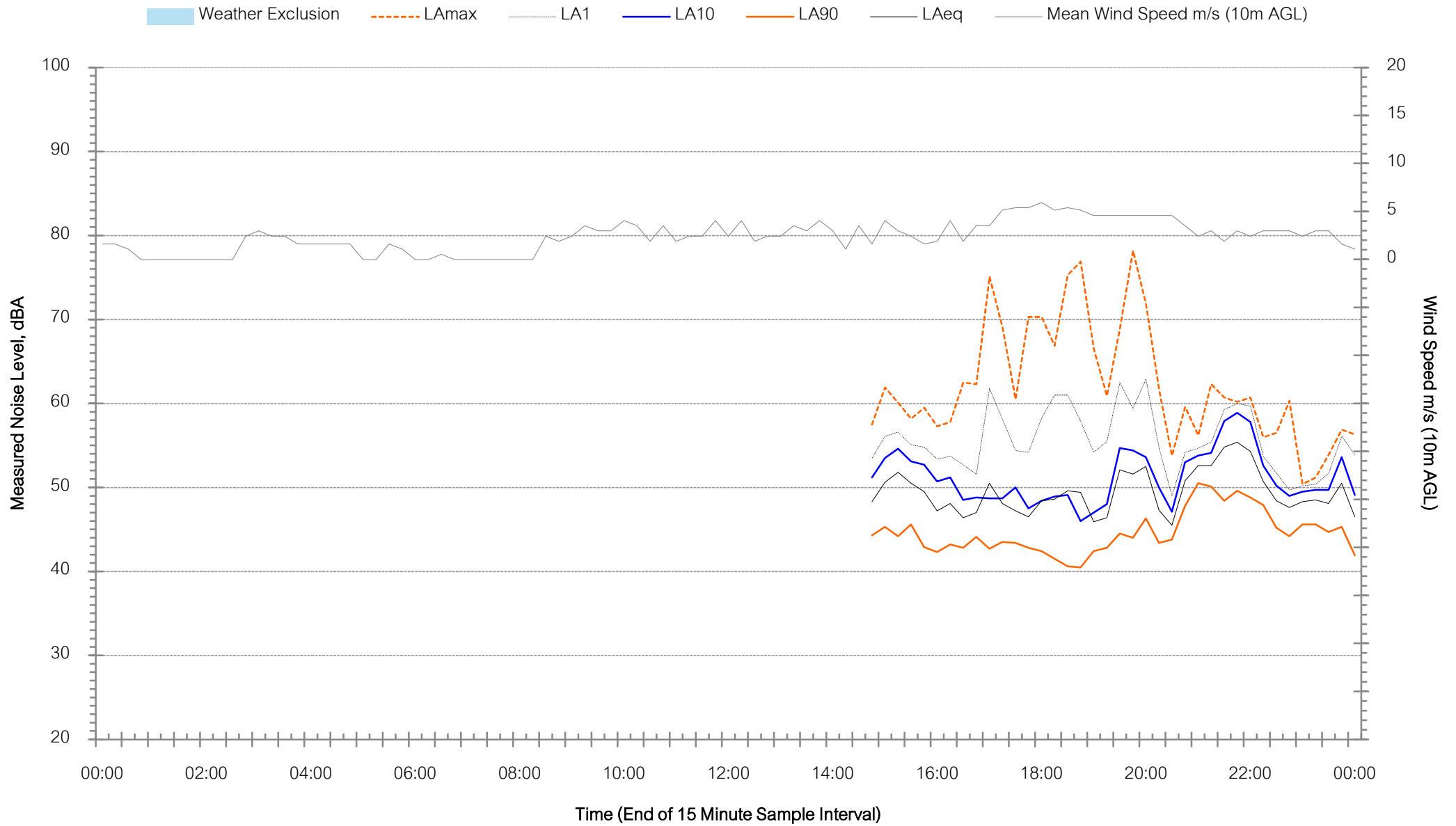
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Appendix C – Noise Monitoring Charts



Background Noise Levels

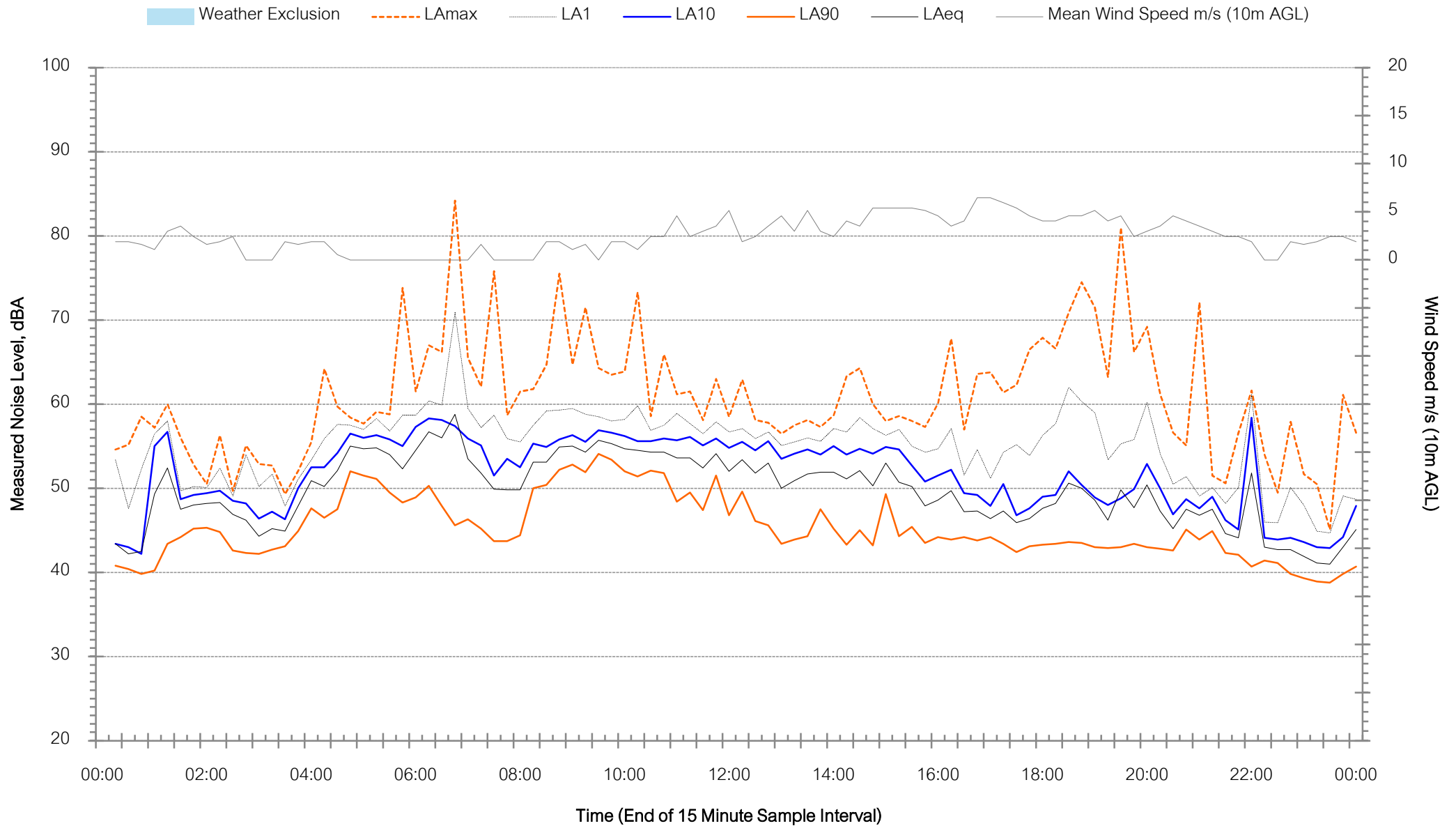
The Regal Inn, 33 Metford Road, Tenambit - Monday 12 February 2024





Background Noise Levels

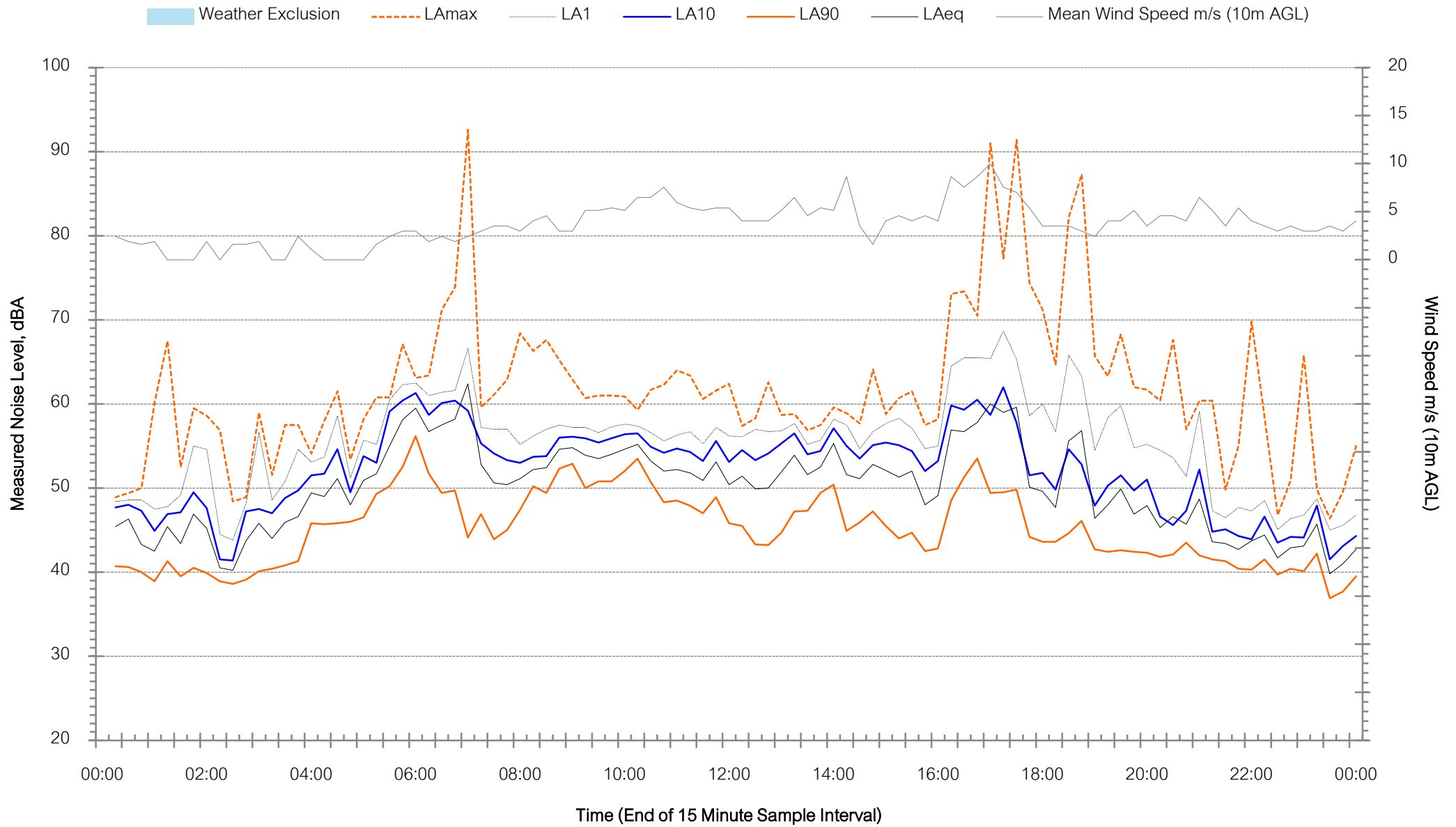
The Regal Inn, 33 Metford Road, Tenambit - Tuesday 13 February 2024





Background Noise Levels

The Regal Inn, 33 Metford Road, Tenambit - Wednesday 14 February 2024





Background Noise Levels

The Regal Inn, 33 Metford Road, Tenambit - Thursday 15 February 2024

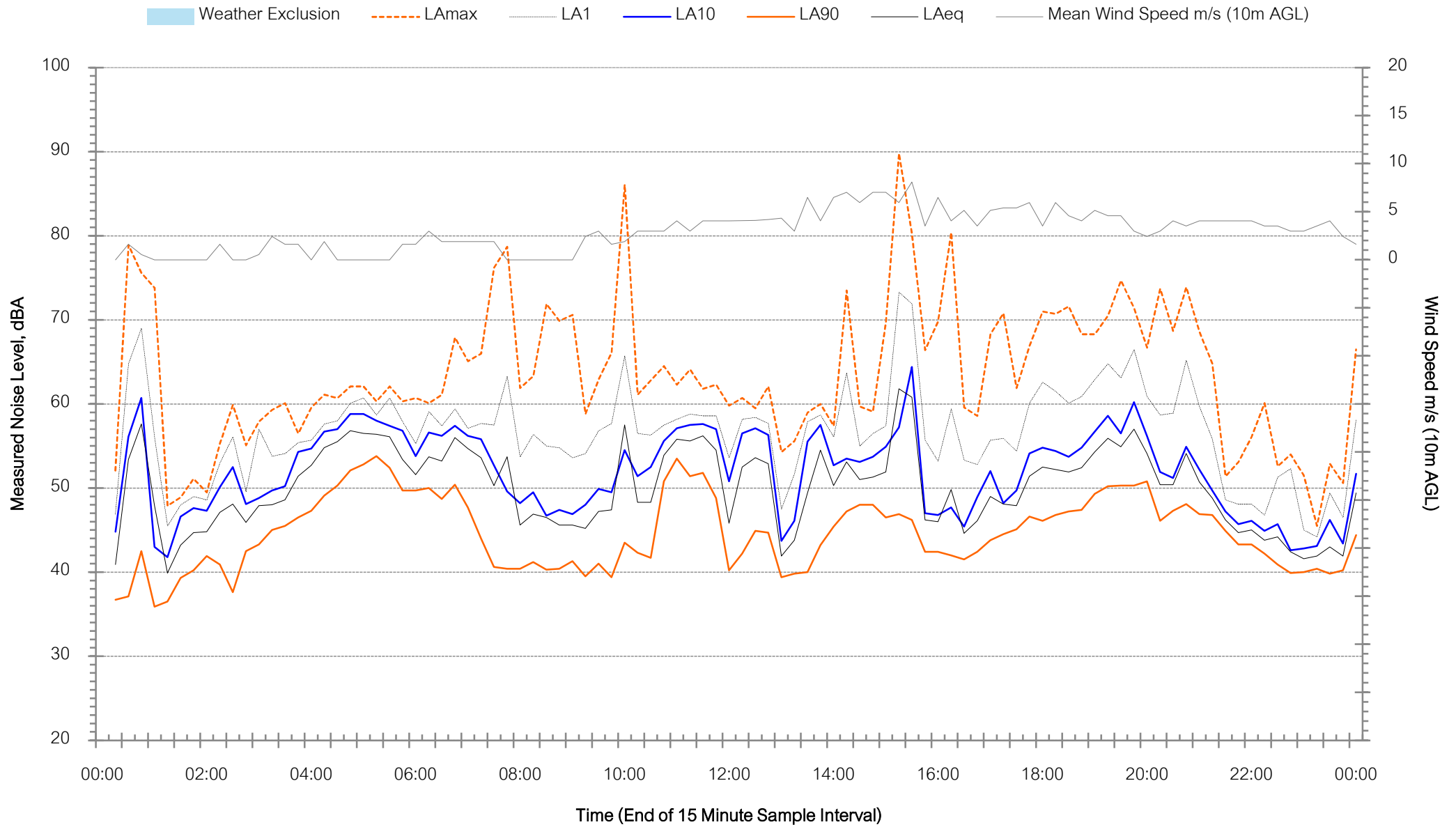
Weather Exclusion LAmix LA1 LA10 LA90 LAeq Mean Wind Speed m/s (10m AGL)





Background Noise Levels

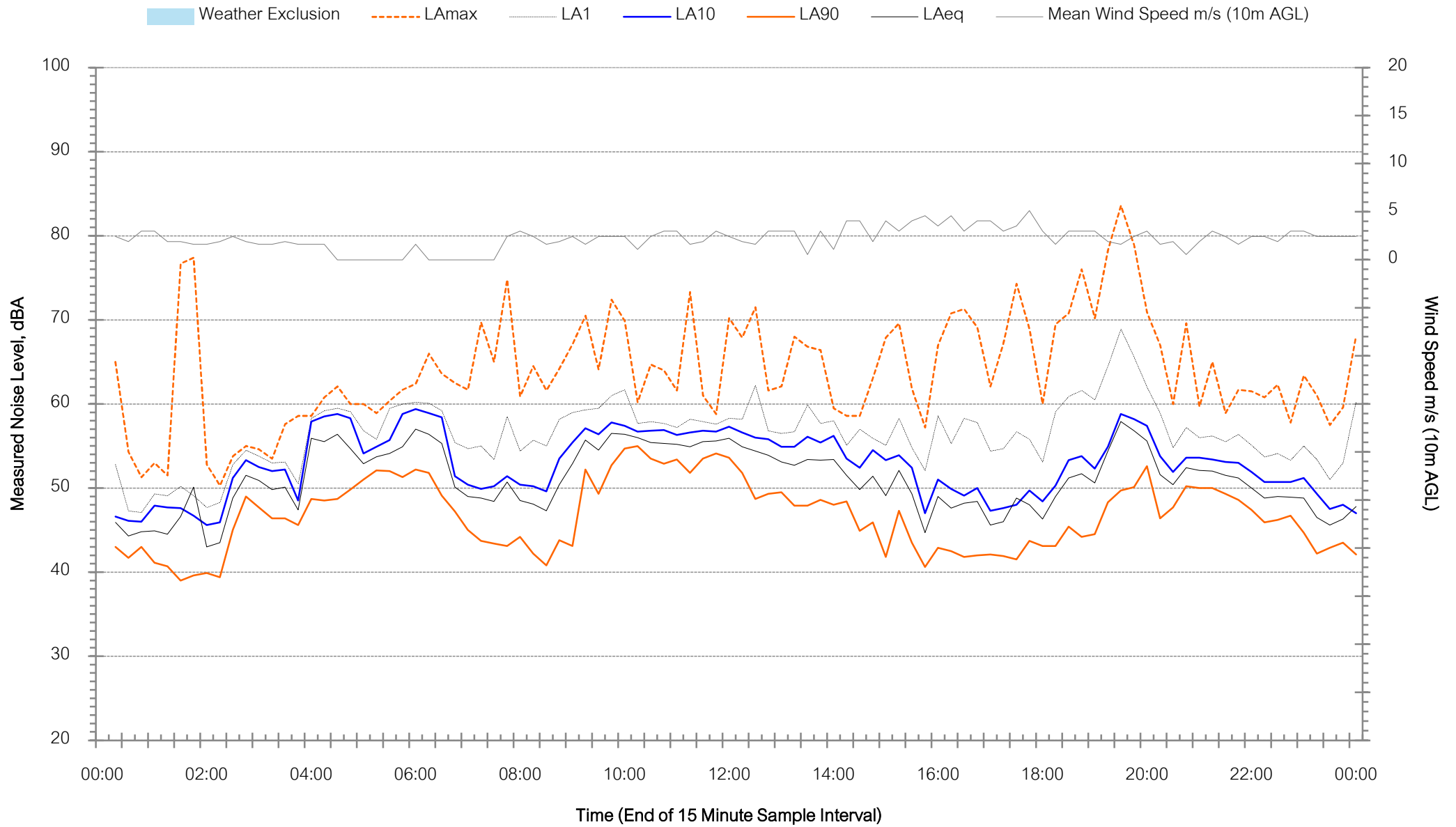
The Regal Inn, 33 Metford Road, Tenambit - Friday 16 February 2024





Background Noise Levels

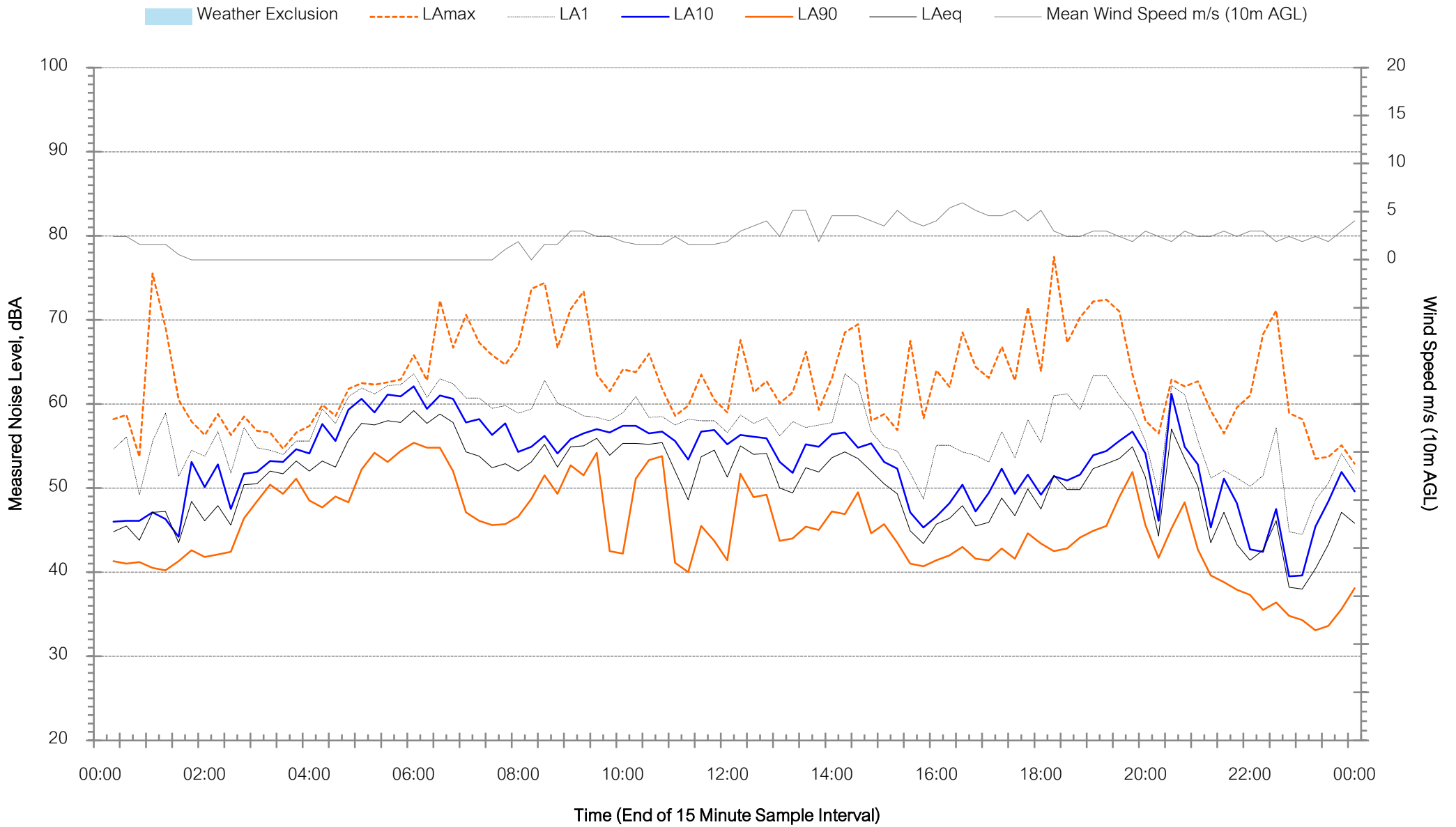
The Regal Inn, 33 Metford Road, Tenambit - Saturday 17 February 2024





Background Noise Levels

The Regal Inn, 33 Metford Road, Tenambit - Sunday 18 February 2024





Background Noise Levels

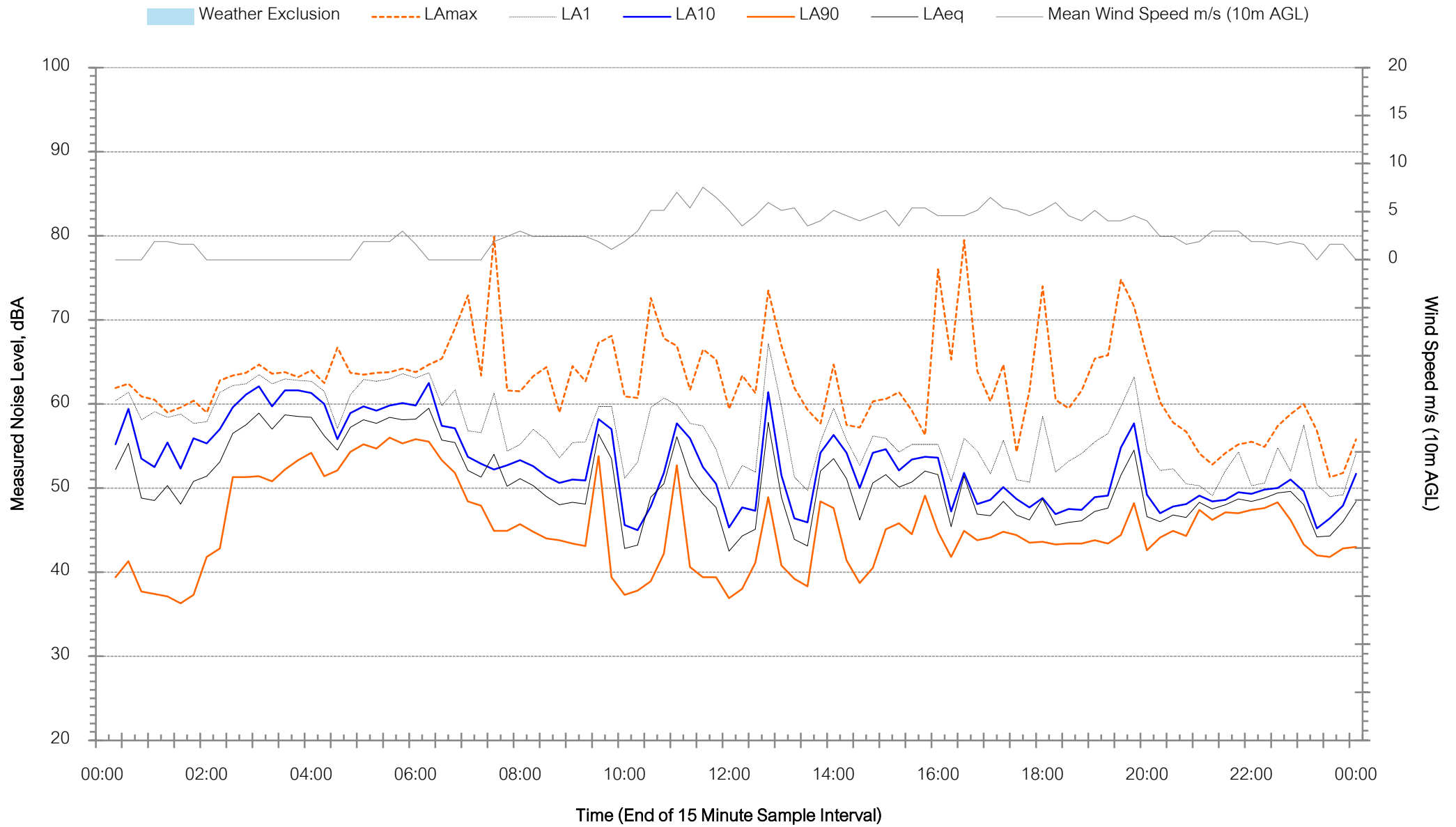
The Regal Inn, 33 Metford Road, Tenambit - Monday 19 February 2024





Background Noise Levels

The Regal Inn, 33 Metford Road, Tenambit - Tuesday 20 February 2024

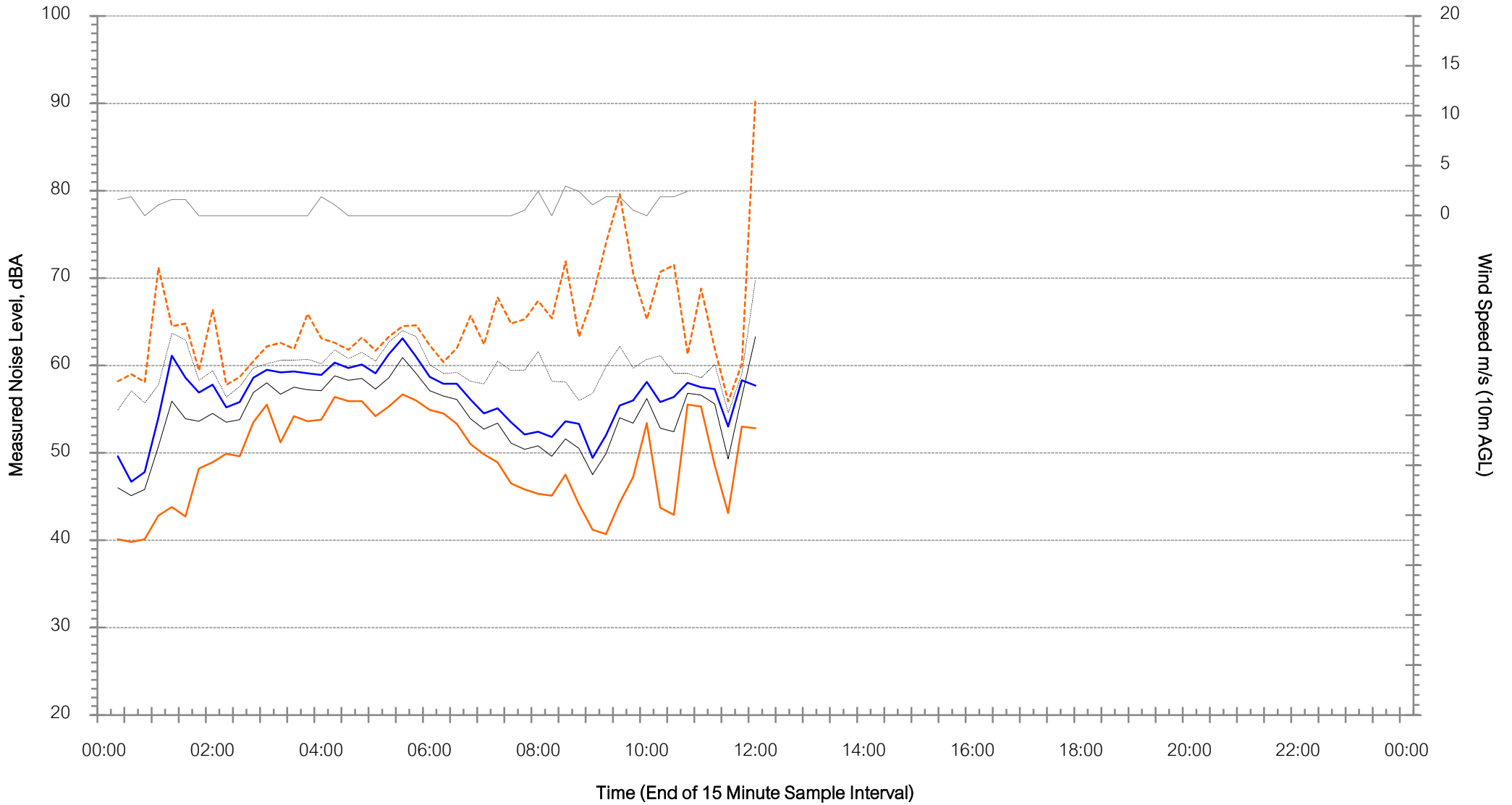




Background Noise Levels

The Regal Inn, 33 Metford Road, Tenambit - Wednesday 21 February 2024

Weather Exclusion LAmax LA1 LA10 LA90 LAeq Mean Wind Speed m/s (10m AGL)



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Appendix D – Acoustic Treatment of Residences – Windows

Appendix C – Acoustic Treatment of Residences



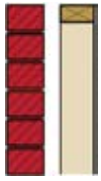

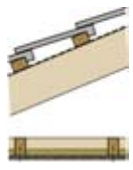

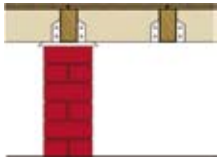

The following table sets out standard (or deemed-to-satisfy) constructions for each category of noise control treatment for the sleeping areas and other habitable areas of single / dual occupancy residential developments only. The assumptions made in the noise modelling are as follows:


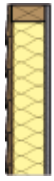


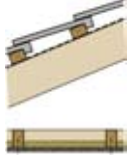

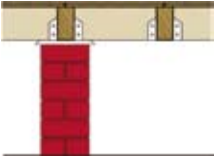

- Typical layout of a modern dwelling taken from a recent large residential development in an outer Sydney suburb
- Bedrooms and other habitable rooms are exposed to road noise


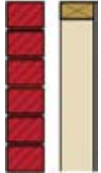

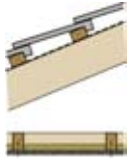


ACOUSTIC PERFORMANCE OF BUILDING ELEMENTS




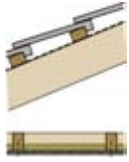


The acoustic performances assumed of each building element in deriving the Standard Constructions for each category of noise control treatment presented in the preceding Table, are presented below in terms of Weighted Sound Reduction Index (R_w) values, which can be used to find alternatives to the standard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



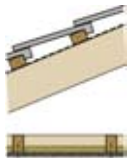

Category of Noise Control Treatment	R_w of Building Elements (minimum assumed)				
	Windows/Sliding Doors	Frontage Facade	Roof	Entry Door	Floor
Category 1	24	38	40	28	29
Category 2	27	45	43	30	29
Category 3	32	52	48	33	50
Category 4	35	55	52	33	50
Category 5	43	55	55	40	50

Category No.	Building Element	Standard Constructions	sample
1	Windows/Sliding Doors	Openable with minimum 4mm monolithic glass and standard weather seals	
	Frontage Facade	Timber Frame or Cladding: 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally	
		Brick Veneer: 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally	
		Double Brick Cavity: 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, R1.5 insulation batts in roof cavity.	
	Entry Door	35mm 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
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	

Category No.	Building Element	Standard Constructions	sample
4	Windows/Sliding Doors	Openable with minimum 10.38mm 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, R2 insulation batts in wall cavity, 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, 2 layers of 10mm 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	

Category No.	Building Element	Standard Constructions	sample
5	Windows/Sliding Doors	Openable Double Glazing with separate panes: 5mm monolithic glass, 100mm air gap, 5mm monolithic glass with full perimeter acoustic seals.	
	Frontage Facade	Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap with cement render to the external face of the wall and cement render or 13mm plasterboard direct fixed to internal faces of the wall.	
	Roof	Pitched concrete or terracotta tile or sheet metal roof with sarking, 2 layers of 10mm sound-rated plasterboard fixed to ceiling joist using resilient mounts, R2 insulation batts in roof cavity	
	Entry Door	Special high performance acoustic door required - Consult an Acoustic Engineer	<i>Door to acoustic consultant's specifications</i>
	Floor	Concrete slab floor on ground	
6	All	Consult an Acoustic Engineer	

Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

Ph: +61 2 4920 1833

www.mulleracoustic.com

