



Operational Noise Emission Assessment  
Bunnings Mudgee  
134 Lions Drive, Mudgee, NSW

Client:  
Bunnings Group Limited



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## GLOSSARY

### NOISE

Noise is produced through rapid variations in air pressure at audible frequencies (20 Hz – 20 kHz). Most noise sources vary with time. The measurement of a variable noise source requires the ability to describe the sound over a particular duration of time. A series of industry standard statistical descriptors have been developed to describe variable noise, as outlined in Section 2 below.

### NOISE DESCRIPTORS

**dB** – Decibels. The fundamental unit of sound, a Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell. Probably the most common usage of the Decibel in reference to sound loudness is dB sound pressure level (SPL), referenced to the nominal threshold of human hearing. For sound in air and other gases, dB(SPL) is relative to 20 micropascals ( $\mu\text{Pa}$ ) =  $2 \times 10^{-5}$  Pa, the quietest sound a human can hear.

**L<sub>Aeq</sub>** – The A-weighted sound pressure level averaged over the measurement period. It can be considered as the equivalent continuous steady-state sound pressure level, which would have the same total acoustic energy as the real fluctuating noise over the same time period. Measured in dB.

**L<sub>Amax</sub>** – The maximum or peak A-weighted noise level that occurs over the measurement period. Measured in dB.

**Indoor Design Level** – The recommended maximum level in dB(A) inside a building from external noise sources.

### A-WEIGHTING

"A-weighting" refers to a prescribed amplitude versus frequency curve used to "weight" noise measurements in order to represent the frequency response of the human ear. Simply, the human ear is less sensitive to noise at some frequencies and more sensitive to noise at other frequencies. The A-weighting is a method to present a measurement or calculation result with a number representing how humans subjectively hear different frequencies at different levels.

### NOISE CHARACTER, NOISE LEVEL AND ANNOYANCE

The perception of a given sound to be deemed annoying or acceptable is greatly influenced by the character of the sound and how it contrasts with the character of the background noise. A noise source may be measured to have only a marginal difference to the background noise level, but may be perceived as annoying due to the character of the noise.

Acoustic Dynamics' analysis of noise considers both the noise level and sound character in the assessment of annoyance and impact on amenity.

## 1. INTRODUCTION

### 1.1 SUMMARY

Acoustic Dynamics is engaged by **Bunnings Group Limited** to assess noise emission resulting from operation of the proposed new Bunnings Mudgee.

This document provides an assessment of noise emission levels at nearby receivers resulting from various noise sources associated with the operation of the new retail development. This assessment is prepared in accordance with the various acoustic assessment requirements of Mid-Western Regional Council, the NSW Environmental Protection Authority (EPA) and relevant Australian Standards.

### 1.2 LOCATION & DESCRIPTION OF SUBJECT SITE

The proposal is for the relocation of the existing Bunnings Mudgee to the corner of Castlereagh Highway and Lions Drive. The subject site is surrounded by a retail/commercial precinct to the north and residential uses to the east and west of the site.

Acoustic Dynamics understands that Council requires an acoustic assessment be undertaken of the proposed operations to confirm that nearby sensitive receivers will not be adversely affected by the operation of the subject site operation.

With regard to acoustical assessment, the nearest sensitive residential receivers are as follows:

- **[R<sub>1</sub>]** – Residential receivers to the east of the site at 18 Castlereagh Highway, directly adjacent to the site boundary; and
- **[R<sub>2</sub>]** – Residential receivers to the west of the site at 104 Lions Drive, approximately 45m from the site boundary.

The subject site and surrounding area are shown in the Location Map, Aerial Image and Site Plan & Mark-up presented within **Appendix A**.

**Operational hours** are proposed to be:

- Monday to Friday – 6:00am-10:00pm; and
- Saturday, Sunday and Public Holidays – 6:00am-7:00pm

### 1.3 SCOPE

Acoustic Dynamics has been engaged to provide an acoustic assessment suitable for submission to Mid-Western Regional Council. The scope of the assessment is to include the following:

- Review legislation, Council criteria and Australian Standards relevant to the internal noise emission at the subject site;
- Travel to site to conduct inspections;
- Conduct noise monitoring to establish background noise levels at the nearest sensitive receivers;
- Examination architectural drawings; and
- Predict likely noise emission associated with the subject site.

## 2. ASSESSMENT CRITERIA AND STANDARDS

Acoustic Dynamics has conducted a review of the local council, state government and federal legislation that is applicable to noise assessment for the subject site. The relevant sections of the legislation are presented below. The most stringent criteria which have been used in the assessment of the subject site are summarised below.

### 2.1 MID-WESTERN REGIONAL COUNCIL CRITERIA

#### 2.1.1 LOCAL ENVIRONMENT PLAN

A review of the *Mid-Western Regional Local Environment Plan (LEP) 2012* was conducted. No relevant acoustic requirements and relevant noise criteria were presented within the LEP.

#### 2.1.2 DEVELOPMENT CONTROL PLANS

A review of the *Mid-Western Regional Development Control Plan (DCP) 2013* was conducted. No relevant acoustic requirements and relevant noise criteria were presented within the DCP.

### 2.2 PROTECTION OF THE ENVIRONMENT OPERATIONS (POEO) ACT

Noise emission from the proposal must also comply with the requirements of the relevant legislation, being the *Protection of the Environment Operations (POEO) Act 1997*. The POEO Act 1997 requires that the proposal must not generate “offensive noise”. Offensive noise is defined as follows:

**“offensive noise”** means noise:

- that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:*

  - is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*
  - interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or*

- that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.”*

Council can enforce the above planning controls under the Environmental Planning and Assessment Act of 1979.

## 2.3 NSW ENVIRONMENT PROTECTION AUTHORITY (EPA)

### 2.3.1 NOISE POLICY FOR INDUSTRY (NPFI)

The EPA, in its Noise Policy for Industry (NPfI) document published in October 2017, outlines and establishes noise criteria for industrial or other noise sources in various zoning areas.

Acoustic Dynamics advise that the following criteria have been applied for the assessment of the operational noise associated with the subject commercial development.

#### ***Project Intrusiveness Noise Level***

The intrusiveness noise level is determined as follows:

<b><math>L_{Aeq, 15min}</math> = rating background noise level + 5 dB</b>	
where:	
<b><math>L_{Aeq, 15min}</math></b>	represents the equivalent continuous (energy average) A-weighted sound pressure level of the source over 15 minutes.
and	
<b>Rating background noise level</b>	represents the background level to be used for assessment purposes, as determined by the method outlined in Fact Sheets A and B.

#### ***Project Amenity Noise Level***

The recommended amenity noise levels represent the objective for **total** industrial noise at a receiver location, whereas the **project amenity noise level** represents the objective for a noise from a **single** industrial development at a receiver location.

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:

<p><b>Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)</b></p>
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The NPfI provides exceptions to the above method to derive the project amenity noise level. Exception 4 states:

*“Where cumulative industrial noise is not a necessary consideration because no other industries are present in the areas, or likely to be introduced into the area in the future. In*

such cases the relevant amenity noise level is assigned as the project amenity noise level for the development.”

The **Project Noise Trigger Level** is the lowest value of Project Intrusiveness Noise Level or Project Amenity Noise Level after conversion to  $L_{Aeq}$  equivalent value.

To establish the acoustic environment at the subject site in accordance with the guidelines of the NSW EPA’s NPfI, an unattended noise logger was deployed on the east boundary of the subject site between Saturday 12 March 2022 and Thursday 24 March 2022. Acoustic Dynamics advises the measurement location was representative of the existing noise environment of the nearest sensitive residential receivers. The prevailing weather conditions during the unattended noise monitoring were generally calm and did not influence the noise measurements taken. Operator-attended background noise measurements were undertaken on site to supplement unattended background noise monitoring data collected.

The results of the unattended noise monitoring are presented graphically in **Appendix B**. Following the general procedures outlined in the EPA’s NPfI, a summary of the established noise environment, and relevant environmental noise criteria is presented in **Table 2.1** below.

Acoustic Dynamics advises that the assessment of the proposed development has been based on the **lowest** background noise levels in the area during typical **maximum** use and operation of the site. Acoustic Dynamics advises that such an assessment is conservative and will ensure no loss of amenity to the nearby residential receivers. A morning shoulder period has been assessed from 6am to 7am as the facility will not operate between 10pm and 6am.

**Table 2.1 Measured Noise Levels and Project Noise Objectives – External Residential Receivers**

Time of Day	Measured RBL ( $L_{A90}$ )	Measured $L_{Aeq}$ Noise Level	Project Intrusive Noise Level $L_{Aeq,15min}$ [dB]	Project Amenity Noise Level $L_{Aeq,15min}$ [dB]	Project Noise Trigger Level $L_{Aeq,15min}$ [dB]
Day (7am to 6pm) <sup>1</sup>	42	53	47	48	<b>47</b>
Evening (6pm to 10pm)	44	53	49	43	<b>43</b>
Morning Shoulder (6am to 7am) <sup>1,2</sup>	37	46	42	38	<b>38</b>

Note: 1) Amenity adjustment based on “Rural” receiver type. The noise emission objective has been modified in accordance with the recommendations detailed within the NPfI Section 2.2, for time period standardising of the intrusiveness and amenity noise levels ( $L_{Aeq,15min}$  will be taken to be equal to the  $L_{Aeq,period} + 3$  decibels (dB)).  
 2) Acoustic Dynamics advises that by achieving compliance with the more stringent morning shoulder criteria, compliance will also be achieved with the less stringent daytime and evening criteria.

Project noise trigger level is the lowest value of project intrusiveness or project amenity noise level after conversion to  $L_{Aeq}$  equivalent value.



The EPA's NPfl specifies additional noise emission level corrections that should be applied when a noise source is determined to include "modifying factors" that can vary the perceived intrusiveness of a noise source. Such modifying factors include tonal, low frequency, or intermittent noise.

Although the NPfl does not apply for the assessment of noise emission from the subject development, Acoustic Dynamics advises that achieving compliance with the NPfl intrusive noise emission objectives applicable at the boundaries of the nearest non-residential premises will adequately protect the acoustic amenity of these receivers.

### 2.3.2 THE EPA'S SLEEP DISTURBANCE CRITERION

Acoustic Dynamics advises that sleep disturbance is a complex issue and the potential for sleep disturbance to occur depends on both the level of noise at a residential receiver and the number of events that occur.

The EPA has in the past investigated overseas and Australian research on sleep disturbance. The method of assessing noise for sleep disturbance relies on the application of a screening that indicates the potential for this to occur. The EPA's Noise Guide for Local Government, provides the following guidance for such a screening test:

*"Currently, there is no definitive guideline to indicate a noise level that causes sleep disturbance and more research is needed to better define this relationship. Where likely disturbance to sleep is being assessed, a screening test can be applied that indicates the potential for this to occur. For example, this could be where the subject noise exceeds the background noise level by more than 15 dB(A). The most appropriate descriptors for a source relating to sleep disturbance would be  $L_{A1(1 \text{ minute})}$  (the level exceeded for 1% of the specified time period of 1 minute) or  $L_{Amax}$  (the maximum level during the specified time period) with measurement outside the bedroom window."*

Additionally, the guidelines of the NSW EPA's NPfl provide the following additional information:

*"Where the subject development/premises night-time noise levels at a residential location exceed:*

- *$L_{Aeq,15min}$  40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *$L_{AFmax}$  52 dB(A) or the prevailing RBL plus 15 dB, whichever is greater*

Further to the above information, the following summarizes the sleep disturbance criterion:

$L_{Aeq,15min} \leq 40 \text{ dB}$  or  $L_{Aeq,15min} \leq (L_{A90} + 5 \text{ dB})$ , whichever is greater

**AND**

$L_{Amax}$  or  $L_{A1(1 \text{ minute})} \leq (L_{A90} + 15 \text{ dB})$  or 52 dB, whichever is greater

In addition to the above, the EPA has previously published the following additional information relating to findings of significant research carried out for sleep disturbance:

“Maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions... One or more noise events per night, with maximum internal noise levels of 65-70 dBA, are not likely to affect health and wellbeing significantly.”

In accordance with the NPfl guidelines detailed above, the following sleep disturbance screening criterion has been determined for this project, for the morning shoulder period:

**Sleep Disturbance Criteria:**  
 $L_{Aeq,15min} \leq \underline{42 \text{ dB}}$   
**AND**  
 $L_{Amax} \text{ or } L_{A1(1 \text{ minute})} \leq \underline{52 \text{ dB}}$

### 2.3.3 THE EPA'S ROAD NOISE POLICY 2011

The NSW Environmental Protection Authority (EPA) presents guidelines for assessment of road traffic noise in its *Road Noise Policy (RNP) 2011*. The document provides road traffic noise criteria for proposed roads as well as other developments with the potential to have an impact in relation to traffic noise generation. **Table 2.2** presents the relevant RNP noise criteria for the subject site.

**Table 2.2 Road Traffic Noise Assessment Criteria for Residential Land Uses**

Road Category	Type of Project / Land use	Assessment Criteria [dB]	
		Day (7am – 10pm)	Night (10pm – 7am)
Freeway/arterial/sub-arterial roads	3. Existing residences affected by <b>additional traffic</b> on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq, (15 \text{ hour})} 60$ (external)	$L_{Aeq, (9 \text{ hour})} 55$ (external)
Local roads	6. Existing residences affected by <b>additional traffic</b> on existing local roads generated by land use developments	$L_{Aeq, (1 \text{ hour})} 55$ (external)	$L_{Aeq, (1 \text{ hour})} 50$ (external)

## 3. INSTRUMENTATION & MEASUREMENT STANDARDS

All measurements were conducted in general accordance with Australian Standard 1055.1-1997, “Acoustics – Description and Measurement of Environmental Noise Part 1: General Procedures”. Acoustic Dynamics’ sound measurements were carried out using precision sound level meters conforming to the requirements of IEC 61672-2002 “Electroacoustics: Sound Level Meters – Part 1: Specifications”. The survey instrumentation used during the survey is set out in **Table 3.1**.

**Table 3.1 Noise Survey Instrumentation**

Type	Serial Number	Instrument Description
2270	2664115	Brüel & Kjaer Modular Precision Sound Level Meter
4189	2385698	Brüel & Kjaer 12.5 mm Prepolarised Condenser Microphone
4230	623588	Brüel & Kjaer Acoustic Calibrator
ARL-EL316	16-207-012	ARL EL-316 Type 1 Noise Logger

The reference sound pressure level was checked prior to and after the measurements using the acoustic calibrator and remained within acceptable limits.

## 4. ASSESSMENT

The following subsections provide an assessment of the proposal against the various noise emission criteria and objectives outlined in **Section 2** above.

### 4.1 MODEL CONFIGURATION

Acoustic modelling was undertaken using computer modelling software (CadnaA™ 2020) to predict operational noise levels generated by the proposed mixed use light industrial park development. CadnaA calculates environmental noise propagation according to the applicable international and ISO standards, including the ISO 9613 algorithm.

Ground absorption, reflection and relevant shielding objects are taken into account in the calculations, while topographical information was obtained and imported directly into the model.

The following assumptions were made with regard to the configuration of the noise model:

- A ground absorption coefficient of 0.5 is used throughout the model;
- All development site buildings and facade have been modelled as a ‘smooth facade/reflective barrier’, and the calculations have been configured to include 3 orders of reflections;
- All source sound power levels are taken from previous measurements; and
- All vehicles entering/leaving the site via Lions Drive are modelled as line sources travelling at 10 km/hr, with multiple lines to represent vehicles using parking spaces.

### 4.2 NOISE SOURCES

Typical noise levels of operations and equipment have been established for assessment purposes. **Table 4.1** details continuous  $L_{Aeq}$  noise levels, while **Table 4.2** details continuous  $L_{Amax}$  noise levels.

**Table 4.1 L<sub>Aeq</sub> Noise Levels of Operation & Events [dB(A)]**

Noise Source	Sound Pressure Level at 7m	Sound Power Level
Truck loading/unloading with forklift	77	95
Forklift	71	89
Truck moving on site	86	104
Carpark (30 arrivals and departures) <sup>1</sup>	78	96
Mechanical plant	62	80

Note: 1) The L<sub>Aeq(15 minute)</sub> noise level associated with one car searching for parking spot movement has been based on a sound power level of 81 dBA per car. This level has been used and multiplied by the number of cars in the period by adding 10xlog(n) where n is the number of cars

**Table 4.2 L<sub>Amax</sub> Noise Levels of Operation & Events [dB(A)]**

Noise Source	Sound Pressure Level at 7m	Sound Power Level
Door slam	69	94
Forklift reversing alarm	59	77
Car starting	65	90
Truck reversing alarm	72	97

### 4.3 RECEIVERS

The cumulative noise impact has been assessed to the potentially most affected point at the adjacent sensitive receiver properties, which are presented in **Table 4.3** below.

**Table 4.3 Nearest Sensitive Receiver Locations**

Source	Location	Direction
<b>Residential Receivers</b>		
R <sub>1</sub>	18 Castlereagh Hwy	East
R <sub>2</sub>	104 Lions Dr	West

## 4.4 MODELLING SCENARIOS

Acoustic Dynamics has conducted modelling of worst-case **15-minute** noise emission scenarios during each of the assessment periods as follows:

### Scenario A - Morning Shoulder (6am to 7am)

- Forklift in loading dock operating;
- 6 x mechanical roof plant operating;
- 1 x delivery truck accessing the loading dock (including reversing, idling and unloading);  
and
- 77 cars per hour accessing the carpark (TTPA predicted 2032 morning traffic peak).

### Scenario B - Day (7am to 6pm)

- Forklift in loading dock operating;
- 2 x mechanical roof plant operating;
- 1 x delivery truck accessing the loading dock (including reversing, idling and unloading);  
and
- 337 cars per hour accessing the carpark (TTPA predicted 2032 weekend midday traffic peak).

### Scenario C - Evening (6pm to 10pm)

- Forklift in loading dock operating;
- 2 x mechanical roof plant operating;
- 1 x delivery truck accessing the loading dock (including reversing, idling and unloading);  
and
- 151 cars per hour accessing the carpark (TTPA predicted 2032 afternoon traffic peak).

**NB:** All listed noise sources and activities assumed to be operating simultaneously and continuously, over any 15-minute period during the assessment period. It is highly unlikely that all equipment would be operating at their maximum sound power levels at any one time and certain types of equipment would be used on site for only brief periods during certain activities. Therefore, the noise modelling predictions are considered conservative.

The predicted noise emission levels presented below in **Table 4.4** include allowances for relevant distance, direction and shielding losses. Acoustic Dynamics advises, although unlikely to occur, the worst-case **cumulative** impact of **all scenarios** is presented within **Table 4.4**, demonstrating compliance with the noise impact criteria and objectives. Such an assessment methodology is conservative and ensures that the amenity of neighbouring properties is protected.

Additionally, note should be made that the predicted noise emission levels presented in **Table 4.4** include the acoustic benefit of the noise mitigation and management measures recommended in **Section 5**.

**Table 4.4 External Predicted Noise Emission Levels & Relevant Criteria – Nearest Residential Receivers**

Residential Receiver Location	Assessment Period <sup>1</sup>	Activity / Noise Source	Calculated Maximum L <sub>Aeq</sub> Noise Level [dB] <sup>2</sup>	EPA NPfI L <sub>Aeq(15minute)</sub> Noise Objective [dB]	Complies?
<b>Scenario A – Morning Shoulder</b>					
[R1] 18 Castlereagh Hwy	Morning Shoulder (6am to 7am) <sup>1,2</sup>	Dock	40	<b>38</b>	<b>Yes<sup>3</sup></b>
		Mechanical plant	26		
		Carpark	22		
		<b>Total</b>	<b>40</b>		
[R2] 104 Lions Dr		Dock	39		<b>Yes<sup>3</sup></b>
		Mechanical plant	30		
		Carpark	25		
		<b>Total</b>	<b>40</b>		
<b>Scenario B – Day</b>					
[R1] 18 Castlereagh Hwy	Day (7am to 6pm) <sup>1</sup>	Dock	40	<b>47</b>	<b>Yes</b>
		Mechanical plant	26		
		Carpark	27		
		<b>Total</b>	<b>40</b>		
[R2] 104 Lions Dr		Dock	39		<b>Yes</b>
		Mechanical plant	30		
		Carpark	31		
		<b>Total</b>	<b>40</b>		
<b>Scenario C – Evening</b>					
[R1] 18 Castlereagh Hwy	Evening (6pm to 10pm)	Dock	40	<b>43</b>	<b>Yes</b>
		Mechanical plant	26		
		Carpark	24		
		<b>Total</b>	<b>40</b>		
[R2] 104 Lions Dr		Dock	39		<b>Yes</b>
		Mechanical plant	30		
		Carpark	28		
		<b>Total</b>	<b>40</b>		

Note 1) Daytime being 7am to 6pm on weekdays and Saturdays and 8am to 6pm on Sundays and public holidays.

2) Includes the benefits of recommendations outlined in **Section 5**

3) Marginal compliance is deemed to be achieved as differences of 1 to 2 points are considered to be acoustically insignificant and are generally not easily discernible to the human ear.

Acoustic Dynamics advises that the above calculated noise emission levels are conservatively based on the maximum source noise levels and capacity operations (i.e., worst-case scenario) at the site. Acoustic Dynamics advises that such a scenario is unlikely to occur for the majority of the time.

#### 4.5 SLEEP DISTURBANCE ASSESSMENT

To assess any potential for sleep disturbance, maximum noise levels due to instantaneous noise events (particularly vehicle door slams and transient noises occurring at the loading dock) were calculated to the nearest sensitive receiver locations.

The predictions indicate that during the morning shoulder assessment period, the potential maximum  $L_{A1(60 \text{ Sec})}$  noise emission would be:

- **40 dB** for receivers located at the eastern side of the site [R1]; and
- **29 dB** for receivers located at the western side of the site [R2].

These levels achieve compliance with the requirement of  $L_{A1(1 \text{ minute})} \leq 52 \text{ dB}$ . The requirement of  $L_{Aeq,15\text{min}} \leq 42 \text{ dB}$  is satisfied through the compliance indicated in **Table 4.4**.

#### 4.6 ROAD TRAFFIC NOISE ASSESSMENT

Vehicles will enter and leave the site via Lions Drive. Vehicles travelling on Lions Drive are assessed with consideration to the daytime  $L_{Aeq,15\text{hr}}$  and night-time  $L_{Aeq,9\text{hr}}$  criteria outlined earlier in **Section 2.4.1**.

The calculated maximum noise emission levels at sensitive residential receivers, due to the vehicles accessing the site via Lions Drive, are presented in **Table 4.5** below.

It is advised that by achieving compliance with the nearest residential locations, compliance will also be achieved at all other residential and receiver locations further away.

**Table 4.5 Modelled Sensitive Receiver Night-time  $L_{eq,1\text{hr}}$  Sound Pressure Level**

Most Affected Receiver	Relevant $L_{Aeq}$ Objective [dB]	Predicted $L_{eq,1\text{hr}}$ Sound Pressure Level [dB] <sup>1</sup>	Complies? (Yes/No)
Receivers located on Lions Drive	$L_{Aeq(15\text{hr})} = 60$ (Daytime)	50 <sup>2</sup>	Yes
	$L_{Aeq(9\text{hr})} = 55$ (Night-time)	49 <sup>3</sup>	Yes

- Note:
- 1) Predicted  $L_{Aeq}$  noise level is the maximum noise level within a 1hr period.
  - 2) Based on an assumed 337 vehicle pass-bys and 4 heavy vehicle pass-bys in a 1-hour daytime period.
  - 3) Based on an assumed 77 vehicle pass-bys and 4 heavy vehicle pass-bys in a 1-hour morning shoulder period.

Based on the above, Acoustic Dynamics advises that the likely **maximum** noise emission due to additional traffic as a result of the activity of the proposed development will achieve compliance with the NSW EPA's Road Noise Policy.

## 5. DISCUSSION

Noise emission has been assessed as worst-case scenario (being maximum capacity operations) occurring during the assessment periods. The predicted maximum noise emission results associated with the proposal (inclusive of the acoustic planning recommendations outlined in **Section 5**) indicate the following:

1. The results of the noise modelling and predictions indicate that the site represents an appropriate location for the proposed works, and the site can be designed to achieve compliance with the relevant criteria;
2. There is low risk of acoustic disturbance for the adjacent residential receivers during the morning shoulder assessment period and during all other assessment periods;
3. In the context of the existing acoustic environment, there is low risk of acoustic disturbance (inclusive of sleep disturbance) to all nearby residential receiver properties during the morning shoulder assessment period; and
4. To ensure the assessment is conducted in a conservative manner, noise emission has been assessed as a **worst-case** scenario (i.e. all noise generating activities and noise sources occurring simultaneously and at maximum capacity). Generally, the noise emission associated with the proposed use and operation of the site would be lower than the predicted results presented in **Table 4.4**.

## 6. RECOMMENDATIONS

The predicted noise emission results indicate that noise emission resulting from the proposal, at all nearby sensitive receivers, can be designed to **comply** with the noise emission requirements of Council and the NSW EPA, provided suitable design recommendations are implemented.

### 6.1.1 MECHANICAL PLANT

Acoustic Dynamics advise that at this stage of the proposal, the selection and location of mechanical plant has not been finalised. To ensure the use of the mechanical plant complies with the *Protection of the Environment Operations (POEO) Act 1997*, the requirements of Council and the EPA, it is advised the following mechanical plant recommendations be implemented in to the design:

1. All items of fixed mechanical plant should be installed on the rooftop;



2. Acoustic Dynamics has modelled the rooftop plant as comprising six (6) mechanical units with Sound Power Level of **80 dB(A)**. Plant installed should be selected on the basis of low noise emission;
3. Mechanical noise from plant areas can be mitigated via acoustic screens or the construction of additional acoustic screening to block line of site the adjacent receivers;
4. Where mechanical items are not located in the proposed plant areas, the proposed installation location should be reviewed prior to construction certification to ensure appropriate attenuation will be achieved;
5. Installation of in-duct silencers and attenuators can be used to control noise levels at end of duct;
6. Ensuring all exposed duct work is lined with a suitably dense acoustic material or wrap;
7. All items of mechanical plant should be isolated from the building structure through the use of resilient mounts, resilient sleeves and/or spring hangers;
8. Reduce mechanical plant vibration through inspection and where necessary maintenance and repair of any fans, motors or ductwork. Inspection and maintenance should include motors, shafts, bearings, belts and tightening of any loose parts or connections; and
9. Once a detailed mechanical schedule and layout has been determined, an acoustic consultant should be engaged to provide a review and recommendations to ensure mechanical noise emission is adequately controlled and compliance with the relevant criteria is achieved.

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### 6.1.2 LOADING DOCK OPERATION SCHEDULE

Acoustic Dynamics' calculations and analysis indicate that noise emission associated with the use and operation of the site can be conditioned to achieve compliance with the various relevant noise emission criteria and objectives.

At this stage of the development, the loading dock activity schedule is yet to be determined. Acoustic Dynamics advises that the following measures are required to be implemented to ensure compliance with the requirements of Council.

#### General Operations

During the morning shoulder period, between 6am to 7am, a maximum of 1 delivery truck per 15 minutes should access the delivery dock, and only one forklift should be in operation to assist with unloading.

## Loading Dock Noise Management Plan

Following development approval, we recommend a Noise Management Plan be developed and implemented through the site-specific operational management plan, implementing measures to protect the acoustic amenity of the surrounding area.

The Noise Management Plan should include the following policies and procedures to ensure noise emission from the site are kept to a minimum:

1. Signage at the entrance of the site advising heavy vehicle drivers restrict the use of air brakes when in close proximity to residential properties (i.e., in the loading dock);
2. The erection of clear signage at all entries and exits advising patrons that they must not generate excessive noise when entering, leaving or on the premises;
3. Where feasible, switching off heavy vehicle engines and refrigeration units during deliveries;
4. Use of broadband reversing alarms on all heavy vehicles;
5. Installation of signage requesting drivers consider the amenity of neighbours;
6. Implementation of an appropriate community liaison and complaint procedure;
7. Training and induction of all staff in appropriate behaviour and use of loading docks and waste collection areas;
8. Staff are to partake in ongoing training and induction as required by the noise management plan or as directed by the site operator;
9. Staff are to be provided with appropriate instruction and training to ensure safe and appropriate vehicle manoeuvring procedures; and
10. All speakers installed on external areas for the broadcast of warnings or communications are to be orientated away from residential receiver properties.

### 6.1.3 ACOUSTIC TREATMENT

To ensure impacts are minimised, Acoustic Dynamics recommends the incorporation of a 4m high acoustic barrier on the eastern boundary of the site, as indicated in **Appendix A**. The barrier should have the following characteristics:

- Extend in height to 4m above the ground;
- Be constructed of a material with a minimum surface density of 15 kg/m<sup>2</sup>, such as:
  - A double layer Colorbond<sup>TM</sup> (Custom Blue Orb<sup>®</sup> or equivalent) barrier(s);
  - A minimum 9mm thick compressed fibre-cement sheeting on a timber or steel stud;

- Masonry (brick or concrete) construction; or
- Should clear upper sections be required, 10mm thick high-density Perspex sheets are acceptable.
- Have no gaps between barrier panels and at the ground (gaps between panels can be adequately sealed using a flexible mastic sealant);
- Be lined internally (side facing mech plant) with a suitably weather resistant and durable outdoor acoustic absorption material (such as “Stratocell Whisper” or equivalent); and
- Where appropriate, materials used are to be certified by a locally recognised (qualified) and accepted professional for suitability (structural, wind loading, mechanical, or other) for the intended use.

Additionally, to limit increased noise emission from noise build-up within the “Goods Inwards” space due to the operation of trucks and forklifts, Acoustic Dynamics recommends the installation of “Stratocell Whisper” to the internal walls and ceiling, such that 50% of the wall and ceiling area is treated. Treatment of this space will ensure noise emission from the unloading of trucks and operation from forklifts is minimised.

## 7. CONCLUSION

Acoustic Dynamics has conducted an assessment of the noise impacts associated with the proposed relocation of the existing Bunnings Mudgee to the corner of Castlereagh Highway and Lions Drive.

A review of applicable noise standards and local authority noise criteria was conducted. Noise levels were assessed in accordance with the requirements of:

- (a) Mid-Western Regional Council; and
- (b) The NSW EPA.

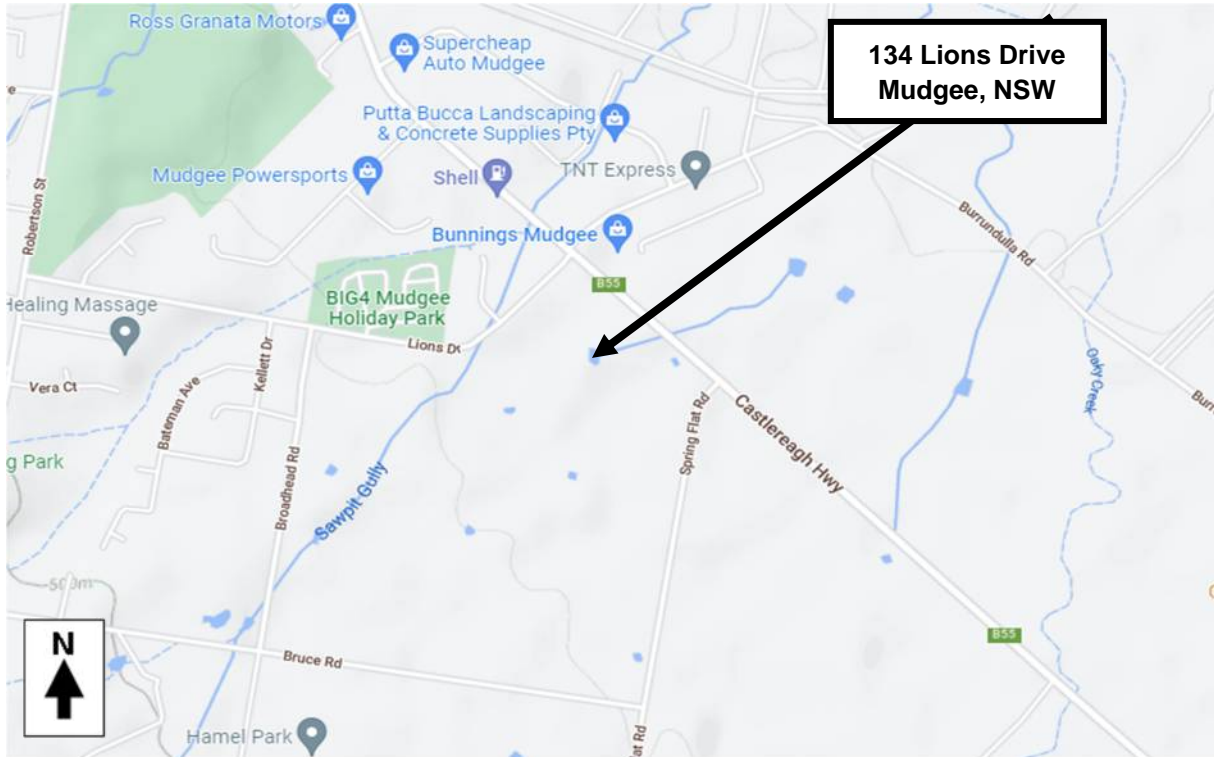
### **Acoustic Opinion**

**Further to the noise monitoring and site survey conducted, our review of the relevant acoustic criteria and acoustic requirements, and our noise modelling, the calculated maximum noise emission associated with the operation of the proposed development can be conditioned to comply with relevant noise emission criteria of Mid-Western Regional Council and the NSW EPA. It is our opinion that the acoustic risks associated with the proposal can be adequately controlled and the amenity of neighbouring properties and residents can be satisfactorily protected.**

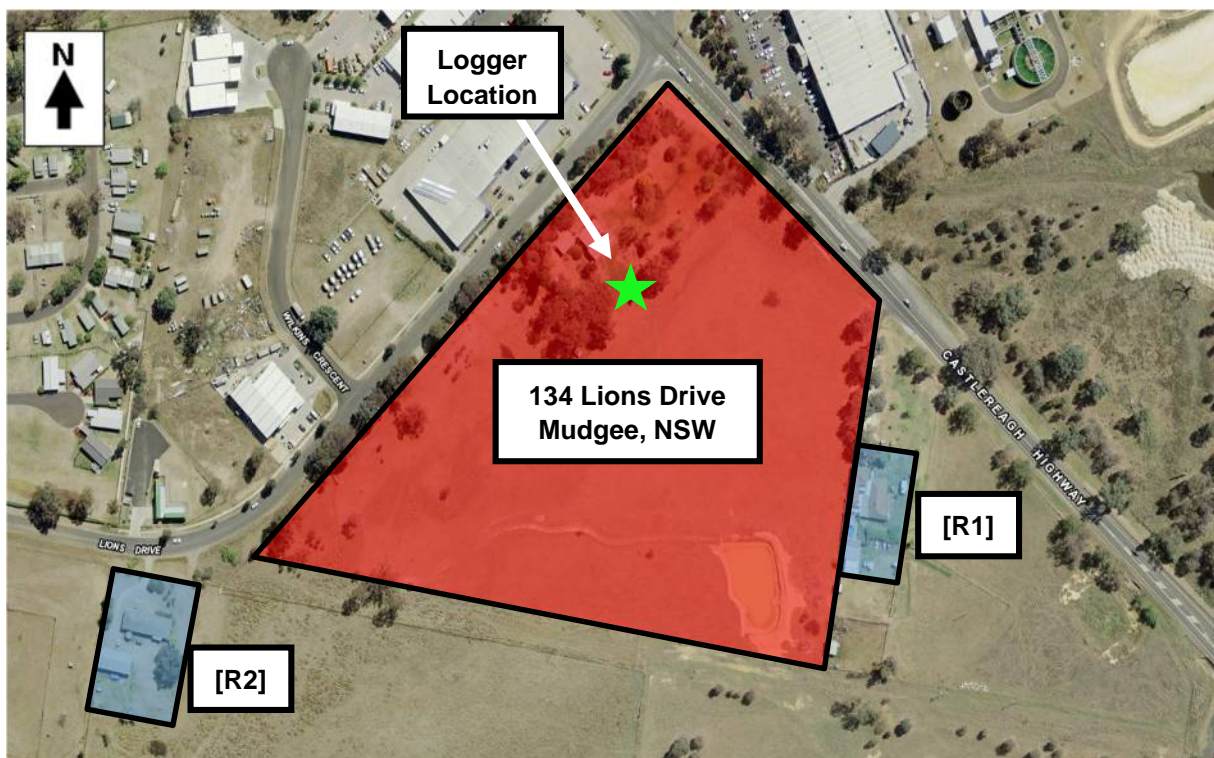
We trust that the above information meets with your requirements and expectations. Please do not hesitate to contact us on 02 9908 1270 should you require more information.

## APPENDIX A – LOCATION MAP, AERIAL IMAGE & SITE PLAN & MARK-UP

### A.1 LOCATION MAP

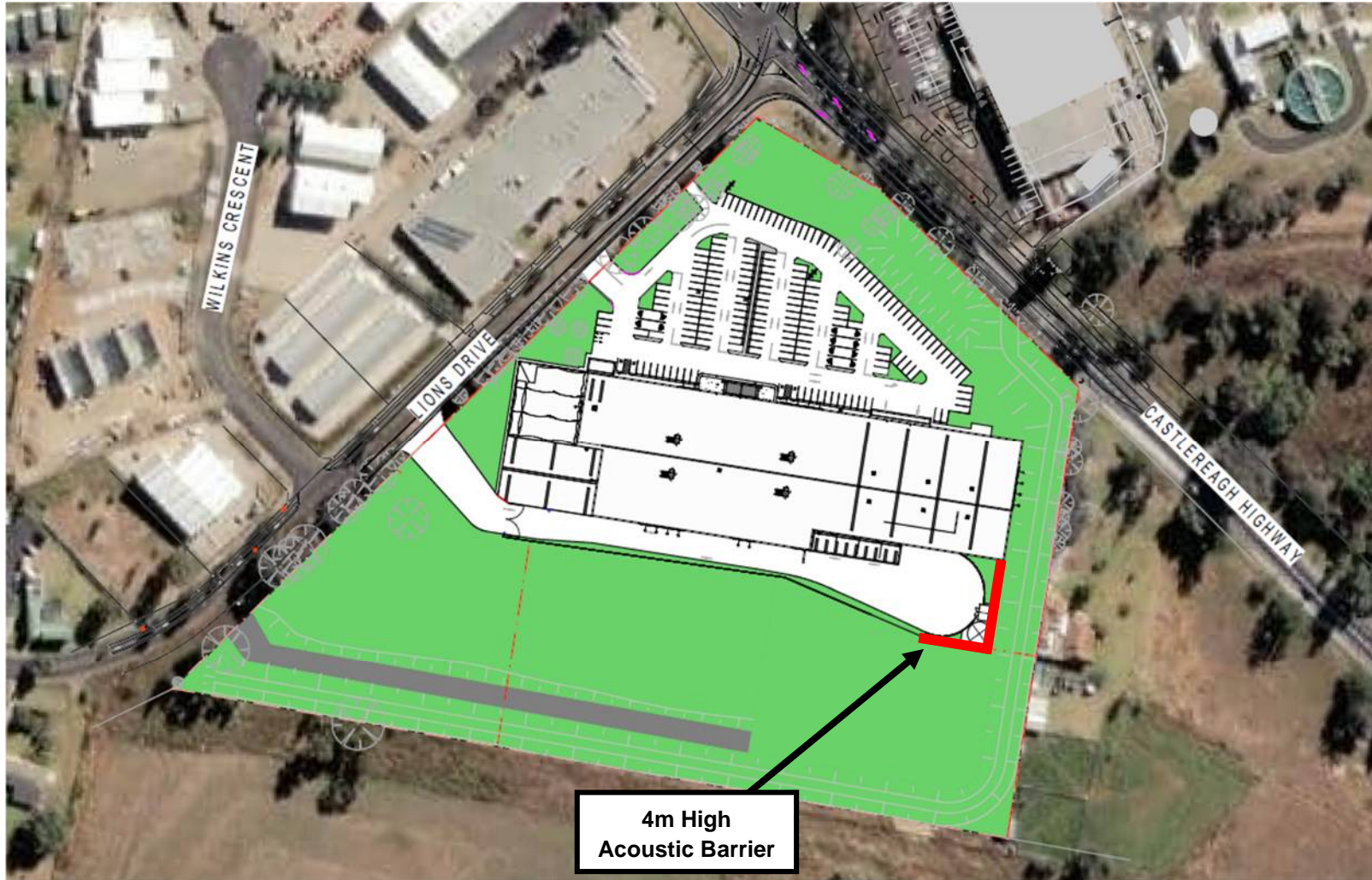


### A.2 AERIAL IMAGE (COURTESY OF SIXMAPS.COM)



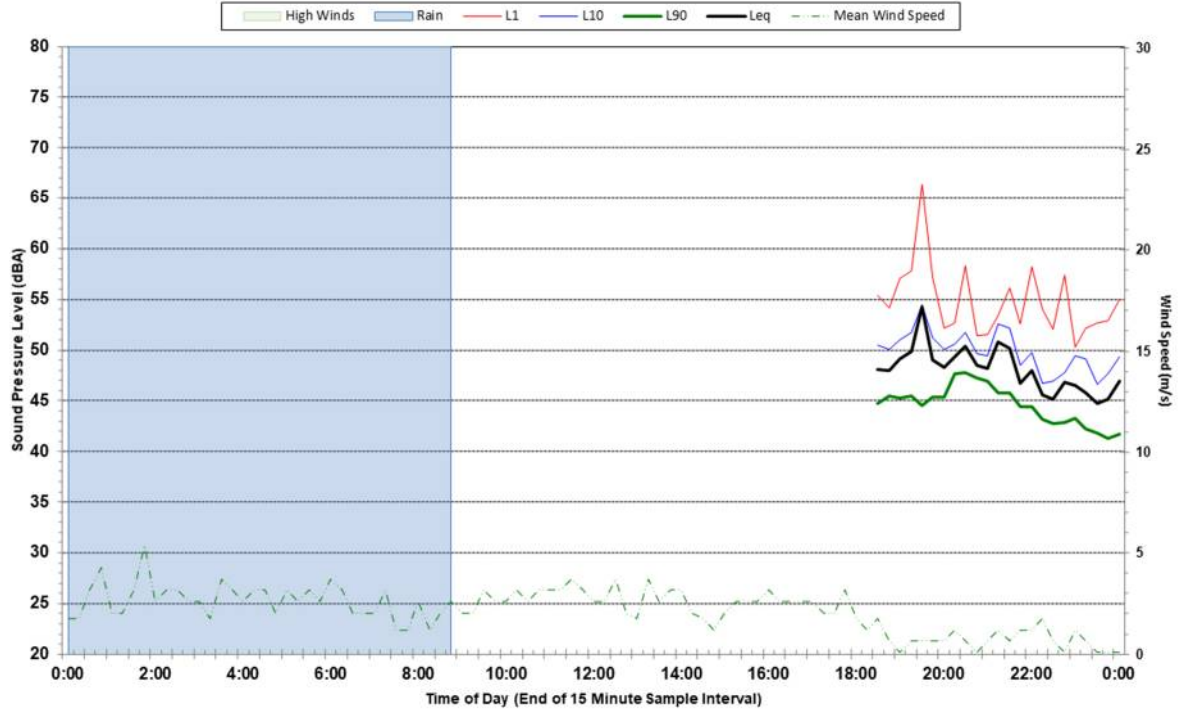


### A.3 SITE PLAN & MARK-UP

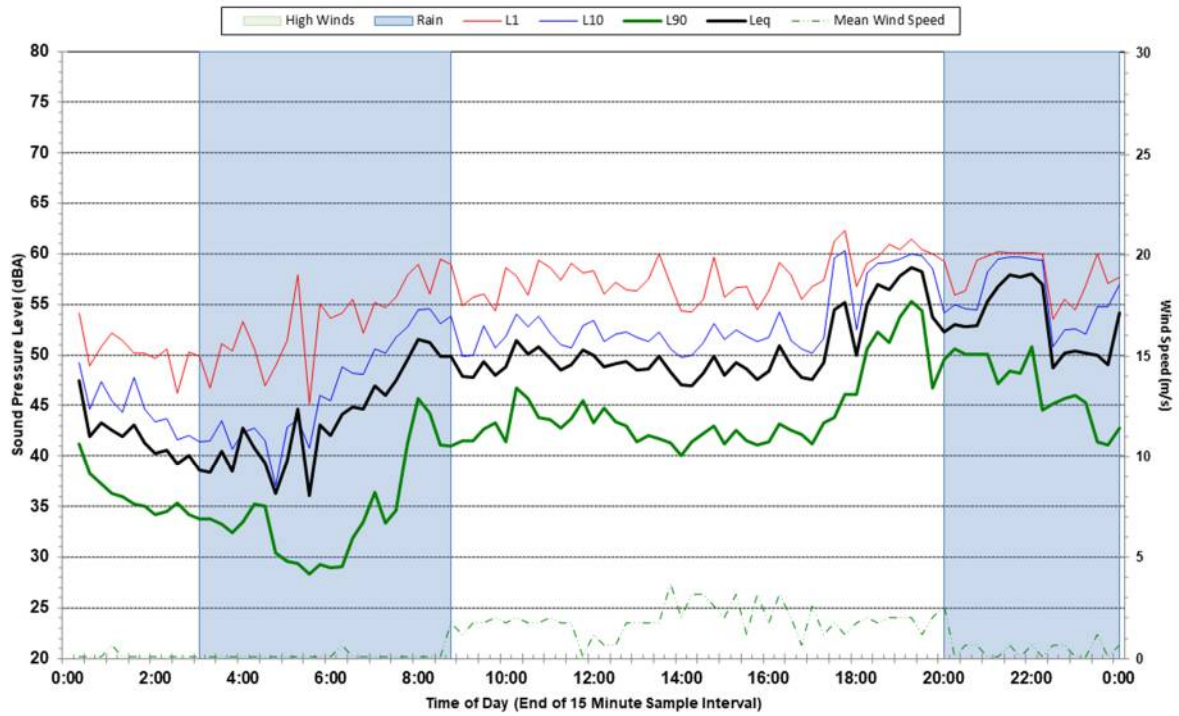


**APPENDIX B – UNATTENDED NOISE LOGGER DATA**

**Statistical Ambient Noise Levels  
Bunnings Mudgee - Saturday 12 March 2022**

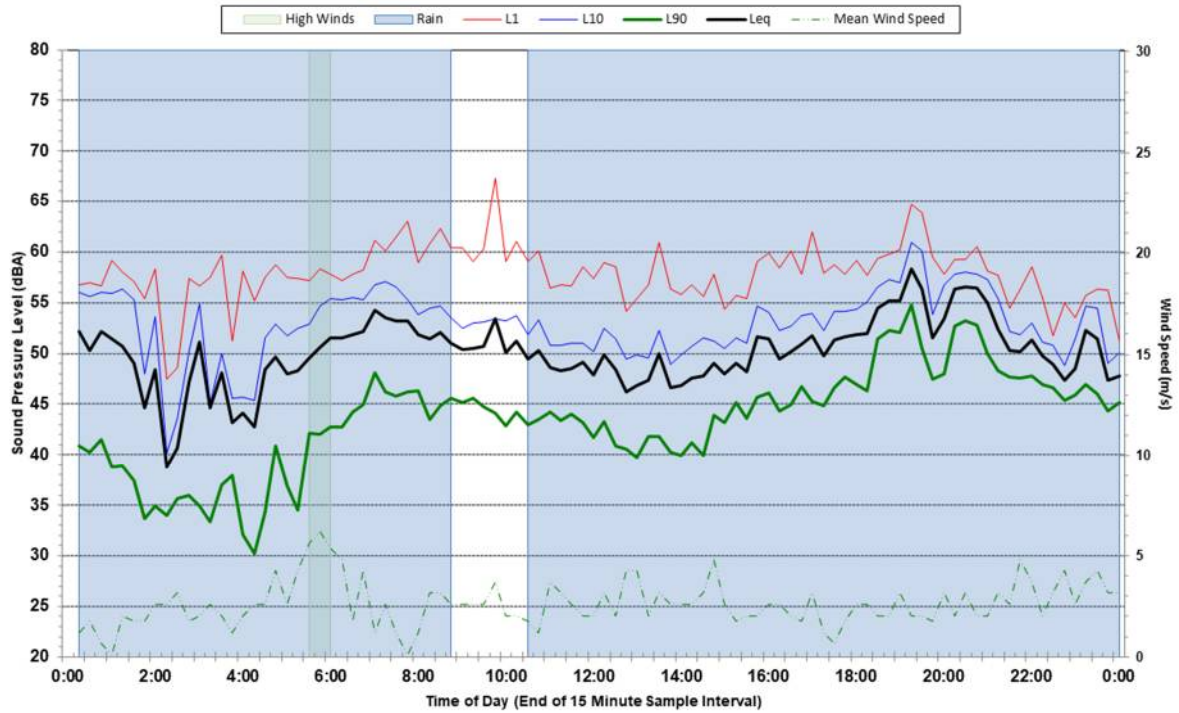


**Statistical Ambient Noise Levels  
Bunnings Mudgee - Sunday 13 March 2022**

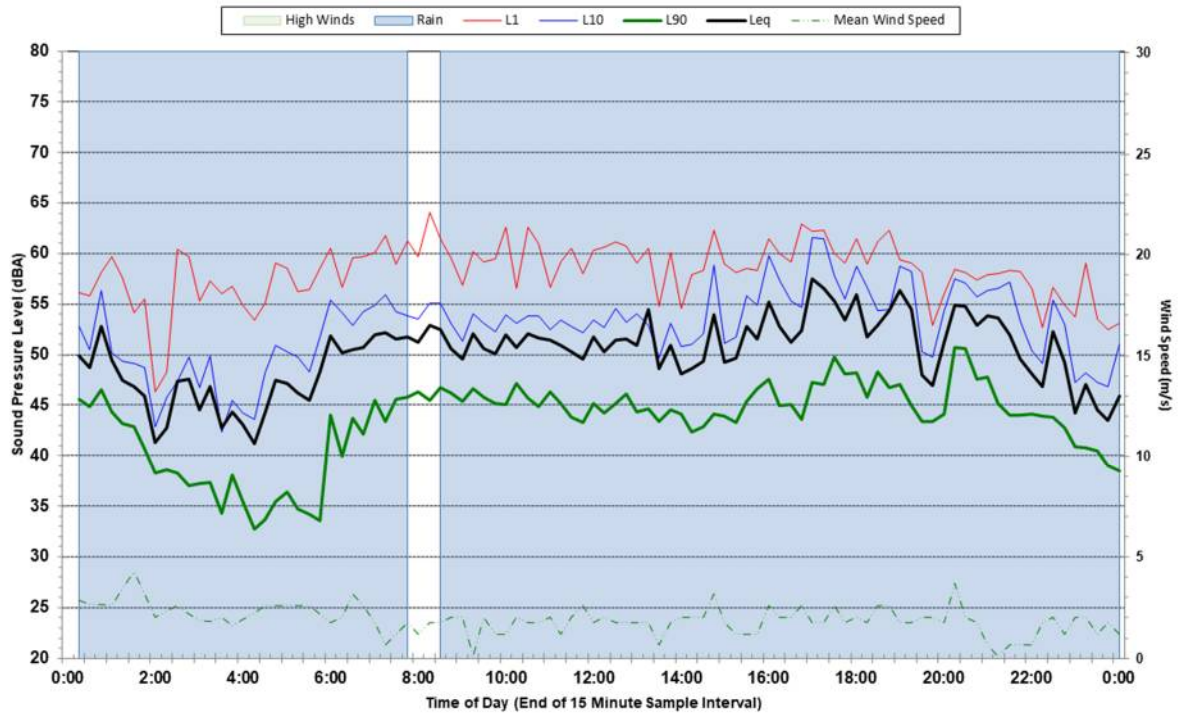




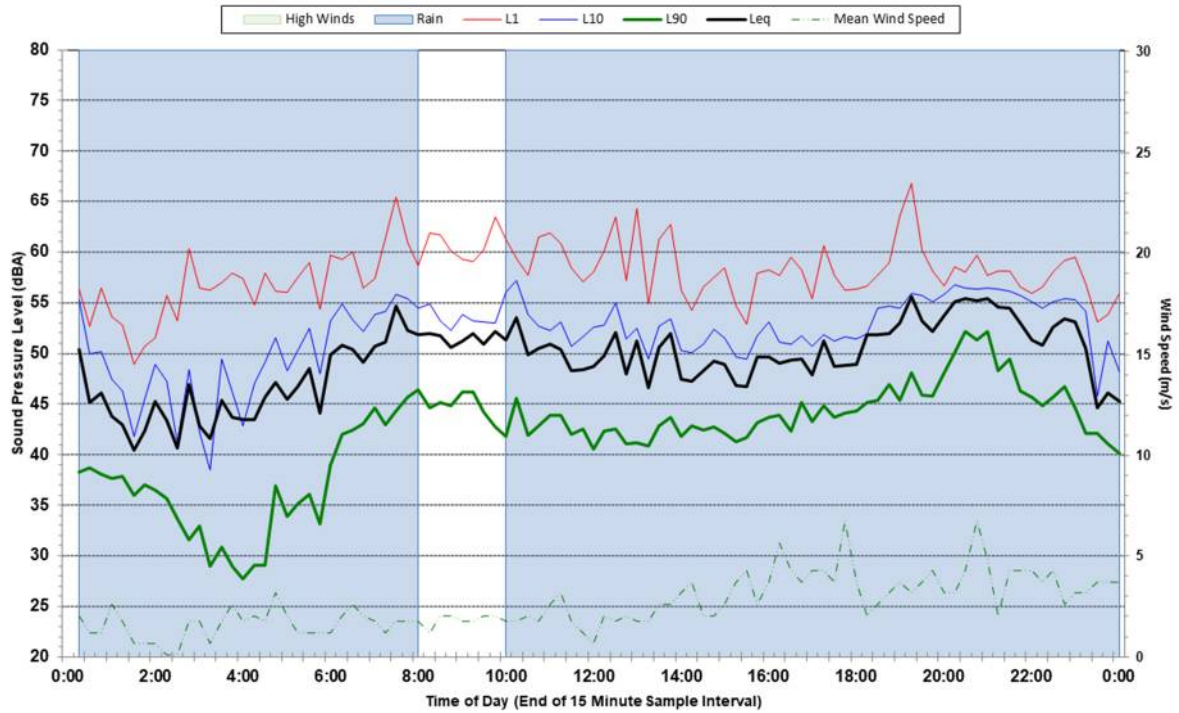
**Statistical Ambient Noise Levels  
Bunnings Mudgee - Monday 14 March 2022**



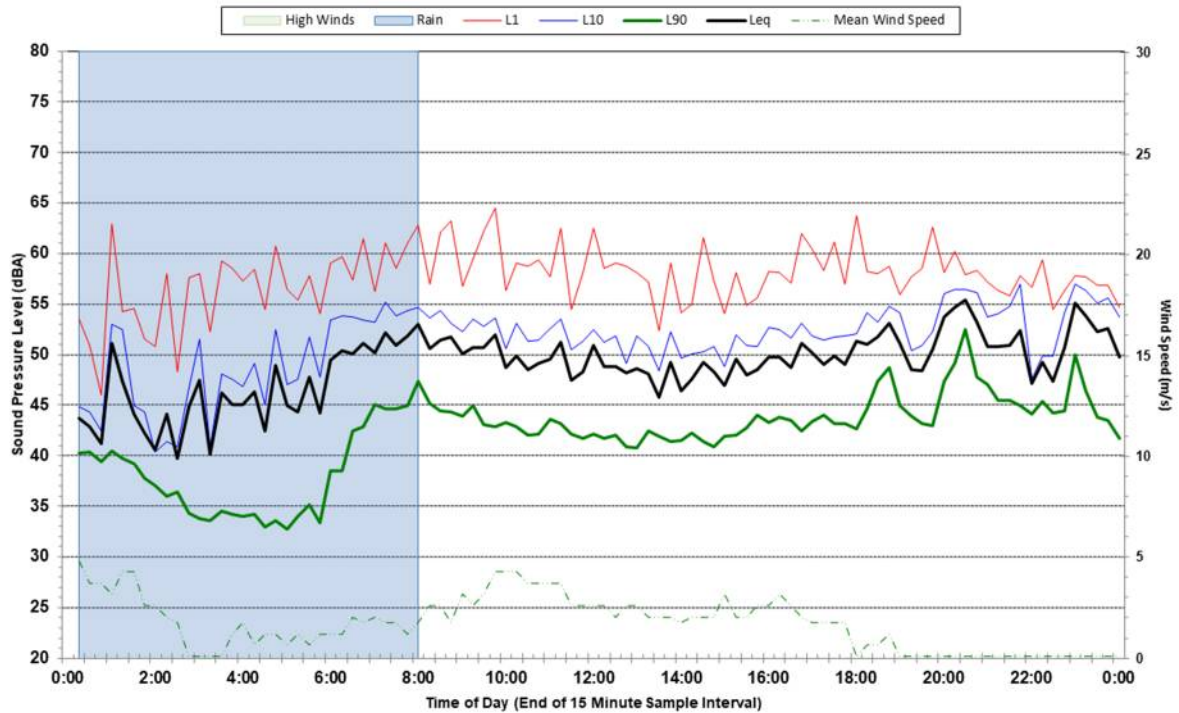
**Statistical Ambient Noise Levels  
Bunnings Mudgee - Tuesday 15 March 2022**



**Statistical Ambient Noise Levels  
Bunnings Mudgee - Wednesday 16 March 2022**

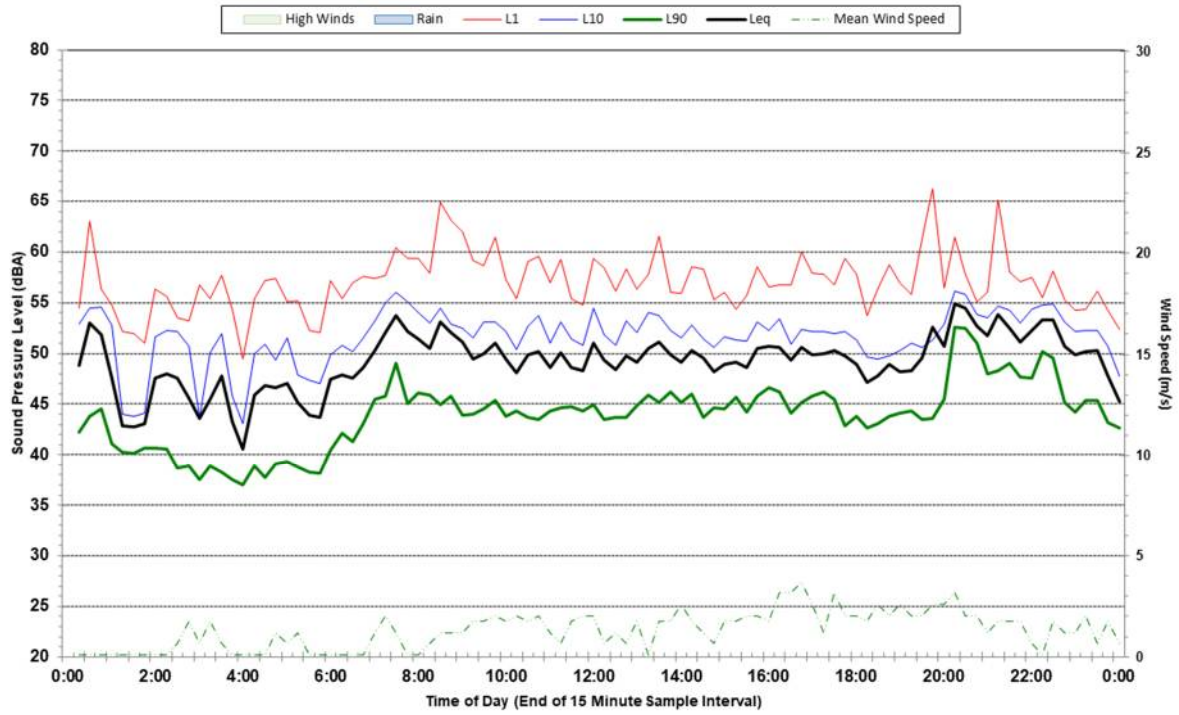


**Statistical Ambient Noise Levels  
Bunnings Mudgee - Thursday 17 March 2022**

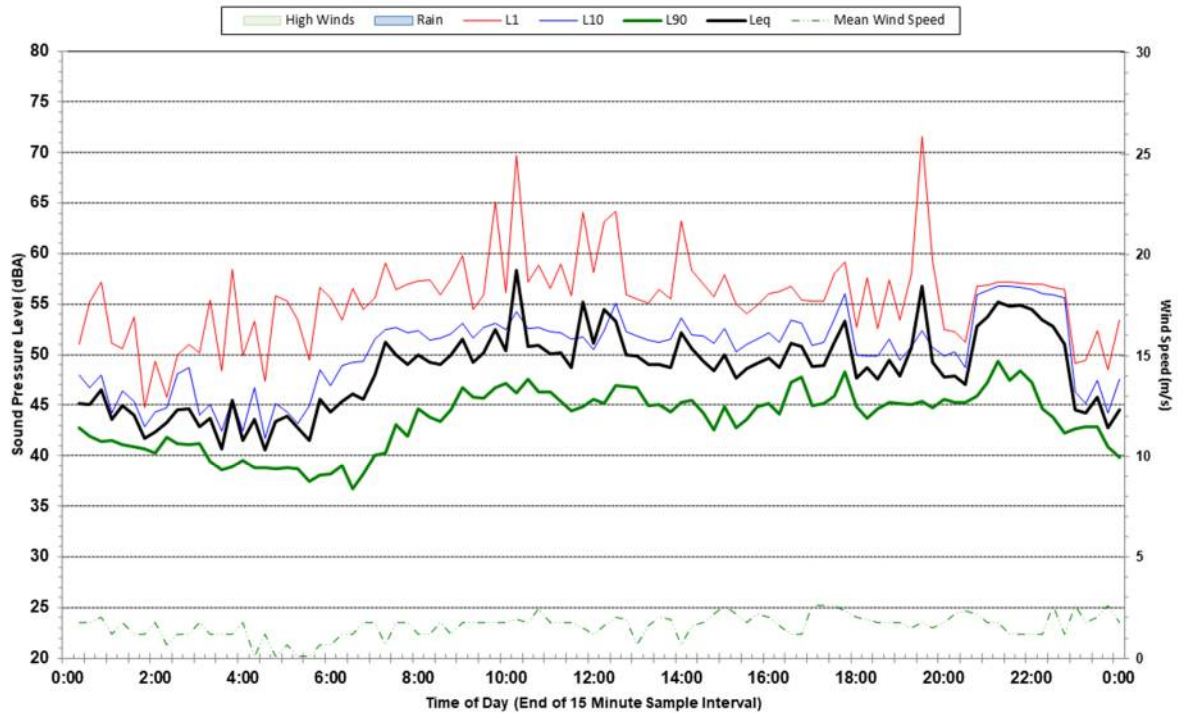




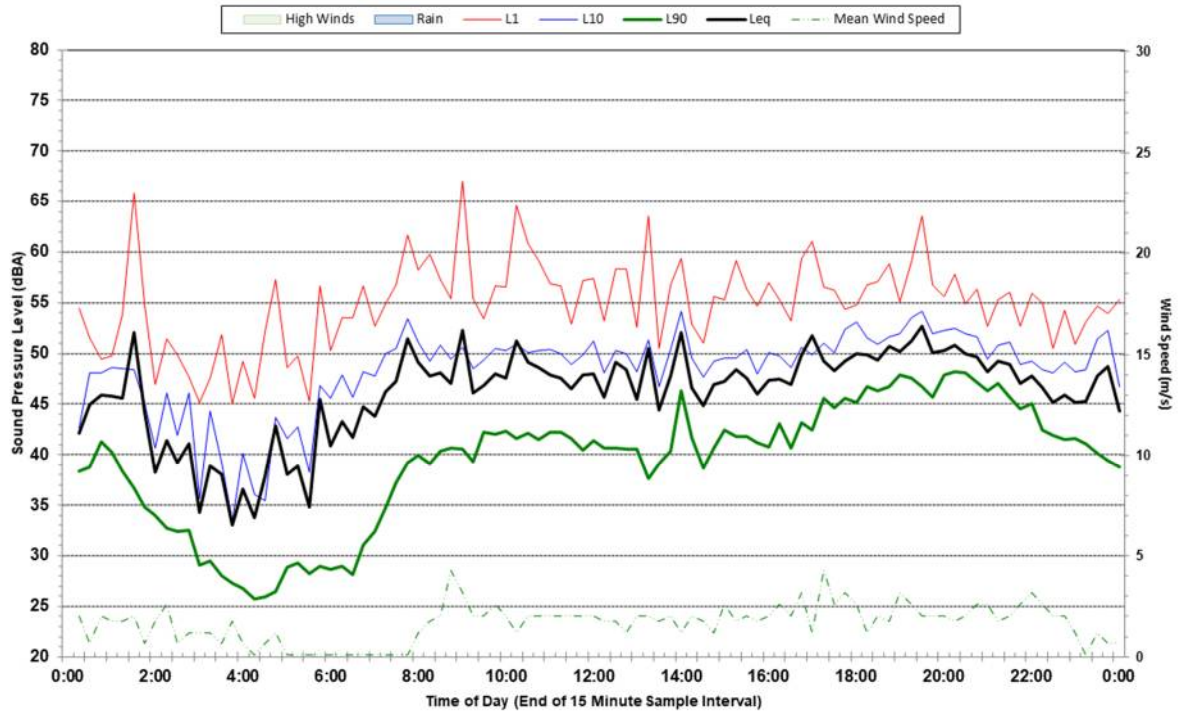
**Statistical Ambient Noise Levels  
Bunnings Mudgee - Friday 18 March 2022**



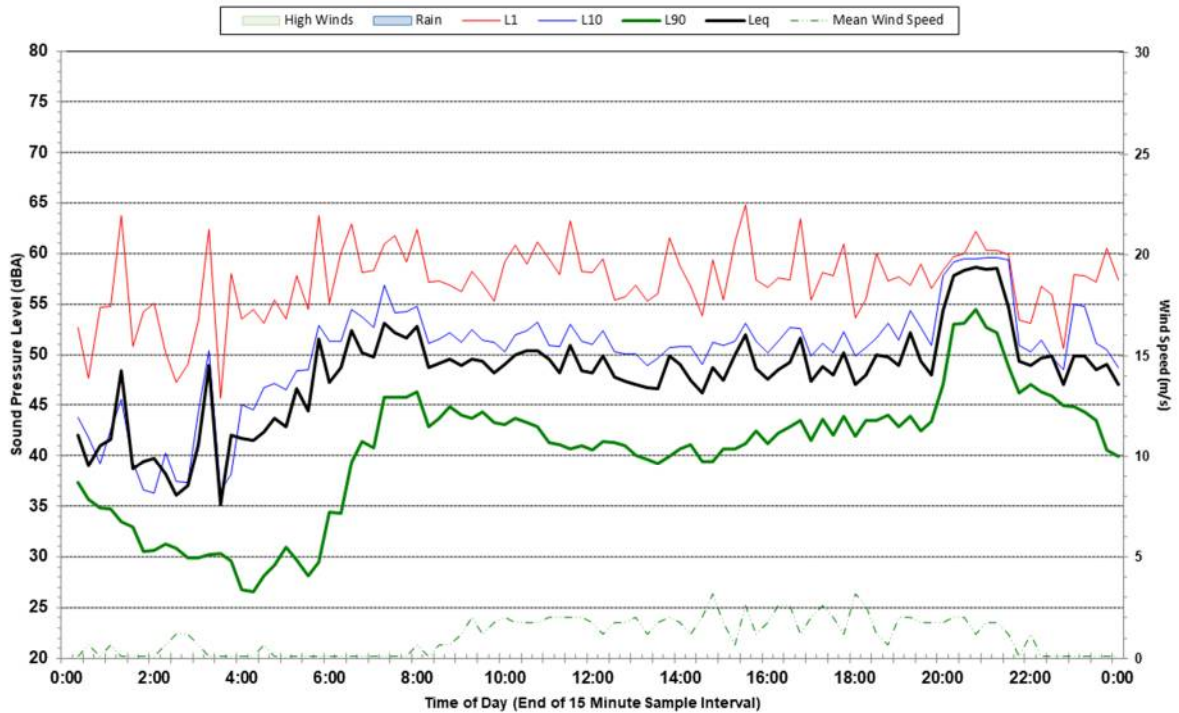
**Statistical Ambient Noise Levels  
Bunnings Mudgee - Saturday 19 March 2022**



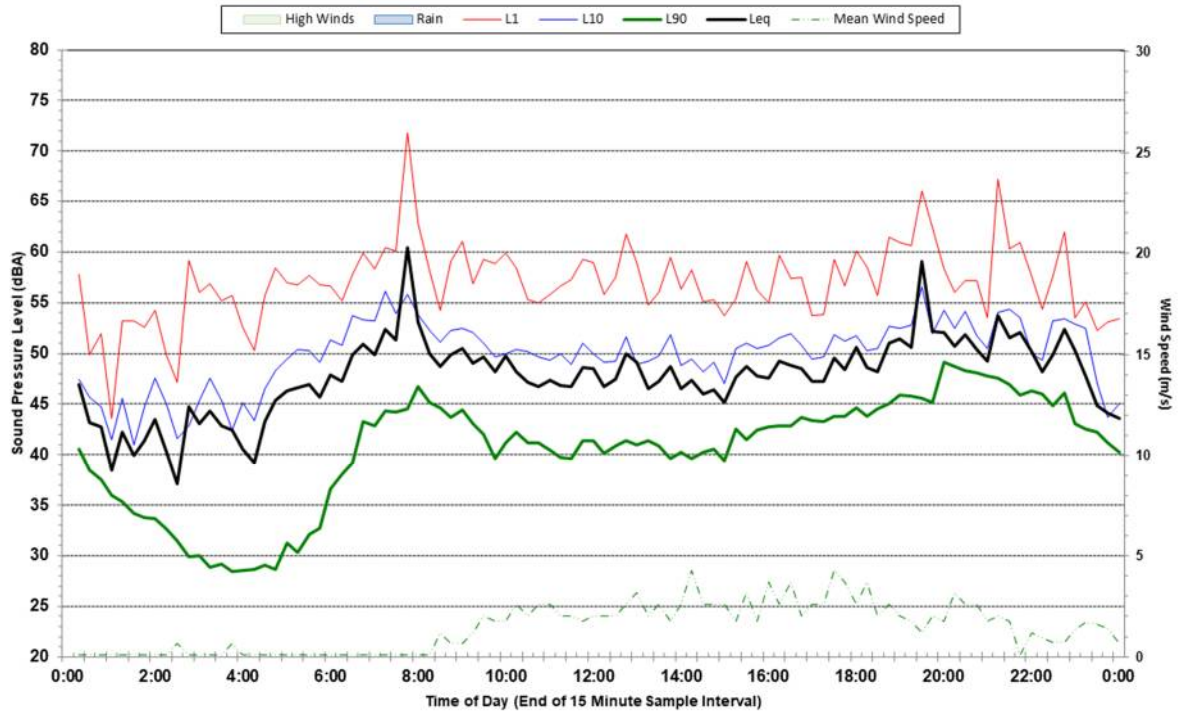
**Statistical Ambient Noise Levels  
Bunnings Mudgee - Sunday 20 March 2022**



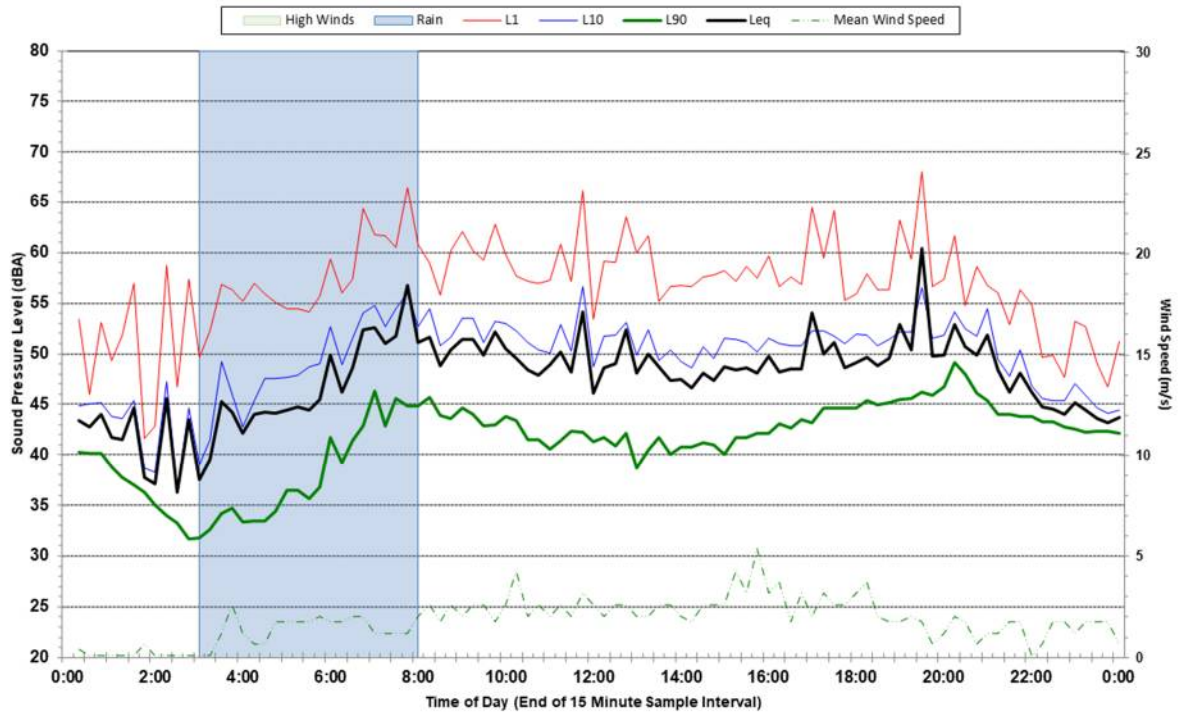
**Statistical Ambient Noise Levels  
Bunnings Mudgee - Monday 21 March 2022**



**Statistical Ambient Noise Levels  
Bunnings Mudgee - Tuesday 22 March 2022**



**Statistical Ambient Noise Levels  
Bunnings Mudgee - Wednesday 23 March 2022**





### Statistical Ambient Noise Levels Bunnings Mudgee - Thursday 24 March 2022

