



Operational Noise Emission Assessment

Bunnings Lithgow
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Lithgow NSW 2790



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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 (μPa) = 2×10^{-5} Pa, the quietest sound a human can hear.

L_{Aeq} – 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_{Amax} – 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 Project Innovations Pty Ltd on behalf of **Ceedive Pty Ltd AFT Connor Family Trust** to assess noise emission resulting from operation of the proposed new Lithgow Bunnings small format store.

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 Lithgow City Council, the NSW Environmental Protection Authority (EPA) and relevant Australian Standards.

1.2 LOCATION & DESCRIPTION OF SUBJECT SITE

The site, located on Valley Drive, is an unsubdivided portion of Lot 26 DP 1244557 (known as 21 Willowbank Avenue, Sheedys Gully) and has an approximate area of 1.48 ha. The site is surrounded by retail / commercial area to the north and residential uses to the east and west of the site.

This DA seeks approval for the development and construction of new bulky goods premises for Bunnings with on grade car parking and loading docks.

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:

- **R1** – Residential receivers to the west of the site on Silock Street approximately 35m from the site boundary; and
- **R2** – Residential receivers to the east of the site on Hassans Wall Drive approximately 120m from the site boundary.

The subject site and surrounding area are shown in the Aerial Photo, Site Plan and Elevations 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 Lithgow City Council. The scope of the assessment is to include the following:

- Review of legislation, Council criteria and Australian Standards relevant to the internal noise emission at the subject site;
- Travel to site to conduct inspections and testing;
- Conduct noise monitoring to establish background noise levels within the subject site;
- Examination of architectural drawings; and
- Prediction of 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 LITHGOW COUNCIL CRITERIA

2.1.1 LOCAL ENVIRONMENT PLAN

A review of the Lithgow Local Environment Plan (LEP) 2014 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 Lithgow Development Control Plan 2021 (DCP) was conducted. The following relevant references to noise emission and acoustic are made:

“2.10 Amenity / Buffers for Sensitive Uses

1. Lodgement Requirement:

An application for development that is likely to:

- a) Generate significant noise and/or vibration (particularly during night-time) that may impact on an existing sensitive land use in reasonable proximity to the development site; or*
- b) Be significantly impacted by potential noise and/or vibration from an existing (or future expanded) development or infrastructure (including a state/regional road or railway line),*

is supported by a Noise (and/or Vibration) Assessment (prepared by a suitably qualified acoustic consultant) that demonstrates how the proposed development has been located, designed, and/or managed to avoid, minimise and/or mitigate those impacts to/from the proposed development in accordance with the relevant guidelines (see list below).

A Noise (and/or Vibration) Assessment may not be necessary where, in the opinion of Council, it is unwarranted due to the scale, nature and/or location of the development.

2) Design:

The design or construction of building(s) or areas for activities that may emit significant noise considers (where relevant):

- a. Location, proximity, and buffers to protect sensitive land uses;
- b. Hours of operation, intensity and intervals of noisy or vibrating activities;
- c. Terrain and amplification/direction of noise;
- d. Background noise levels and community acceptability of noise in that location;
- e. Enclosure of noisy area(s) and suitable acoustic insulation (and ways to manage opening(s) to those area(s) that may direct noise to a sensitive land use);
- f. Any other factor that would exacerbate likely noise or vibration.

3) Noise Levels: Noise levels are not designed to exceed the recommended background planning noise level by more than 5dBA at the most affected point of the land use receiver area and/or set out in the following guidelines:

- a. For development near an existing state or regional road or railway line:
 - i. Noise level in any bedroom of 35dB(A) between 10pm-7am; and
 - ii. Noise level in other parts of the building (other than a kitchen, garage, bathroom or hallway) of 40dB(A) at any time; or as set out in:
 - iii. State Environmental Planning Policy (Infrastructure) 2007;
 - iv. NSW Department of Planning (2008) Development near Rail Corridors and Busy Roads – Interim Guideline.
- b) For a noise source set out in the Protection of the Environment Operations Act 1997 - the requirements (where relevant) of:
 - i. the NSW Industrial Noise Policy (2017 – as amended) (see <https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise>);
 - ii. EPA (2013) Noise Guide for Local Government;
 - iii. For vibrations - Assessing Vibration: a technical guideline (2006).

4) Rail Corridors: Development that:

- a) Is on land immediately adjacent to a rail corridor; and/or
- b) Involves penetration of the ground to a depth of more than 2m within 25m of a rail corridor,
- c) may require referral to Transport for NSW and may need to address the requirements of the Rail Authority.

5) Plant/Equipment: If in a residential area or adjacent to existing dwellings, any electrical, mechanical, hydraulic and air conditioning equipment is housed so that it

does not create an ‘offensive noise’ as defined in the *Protection of the Environment Operations Act 1997* either within or at the boundaries of any property at any time of the day.

6) Economics: Any Noise (and/or Vibration) Assessment relating to an industrial land use (particularly an existing industrial use) within an Industrial Zone or a business use in a Business Zone considers the economic importance of facilitating industrial and business development in the applicable zone(s).

2.1.3 PROTECTION OF THE ENVIRONMENT OPERATIONS (POEO) ACT

In accordance with the noise emission requirements of Lithgow City Council, we advise that 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:

- (a) *that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:*
 - (i) *is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*
 - (ii) *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*
- (b) *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.

2.2 NSW ENVIRONMENT PROTECTION AUTHORITY (EPA)

2.2.1 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:

$L_{Aeq, 15min} = \text{rating background noise level} + 5 \text{ dB}$	
where:	
$L_{Aeq, 15min}$	represents the equivalent continuous (energy average) A-weighted sound pressure level of the source over 15 minutes.
and	
Rating background noise level	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:

Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)
--

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 at the nearest residences to the east at 27 Silock Street between Saturday 12th March 2022 and Friday 25th 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 2.2.1.1** 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 night-time shoulder period has been used from 5:00am to 7:00am as the facility will not operate between 10:00 pm and 7:00am.

The table also included noise criteria for commercial and school receivers.

Table 2.2.1.1 Measured Noise Levels and Project Noise Objectives – External Residential Receiver

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 6 pm) ¹	35	49	40	53	40
Evening (6pm to 10 pm)	37	52	42	43	42
Night (10pm to 7am)	32	47	37	38	37
Morning Shoulder (6am to 7 am) ^{1,2}	32	44	37	38	37

- Note:
- 1) Amenity adjustment based on “Suburban” 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.
 - 3) Daytime trigger level has been adopted for the evening period.

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

2.2.2 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 test 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:

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

In addition to the above, the EPA has 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.”

It is noted that $L_{A90} + 15 \text{ dB}$ is less than 52 dB(A) therefore the sleep disturbance screening criterion based on the morning shoulder period was determined:

Sleep Disturbance Criterion = 52 dB

2.3 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 2.3.1**.

Table 2.3.1 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	15-203-501	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.

3. ASSESSMENT

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

3.1 OPERATIONAL NOISE EMISSION TO RECEIVERS

Based on the site visit, previous experience and the drawings and information provided by the proponent, Acoustic Dynamics has conservatively undertaken modelling and calculations to predict the likely **resultant** noise levels at the nearest residential and commercial receivers resulting from the following noise sources and activities:

- Carpark Noise
- Mechanical Services Noise ; and
- Loading Dock Noise;

Site related noise emissions were modelled using the CadnaA noise prediction software. To complete this, a representative 3-D model within the software was constructed of the site and surrounding residences. Factors that are addressed in the modelling are:

- Equipment sound level emissions and locations;
- Screening effects from buildings;
- Receiver locations;

- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

3.1.1 NOISE SOURCES

Typical noise levels of operations and equipment have been established for assessment purposes. **Table 3.1.1.1** details these continuous L_{Aeq} noise levels.

Table 3.1.1.1 L_{Aeq} Noise Levels of Operation & Events [dB(A)]

Noise Source	Sound Pressure Level at 7m	Sound Power Level
Truck loading / unloading with Fork Lift	77	95
Fork Lift working	71	89
Truck moving on site	86	104
Carpark (30 arrivals and departures)*	78	96
Roof Plant	69	87
Exhaust Fan	67	85

Note: The $L_{Aeq(15\text{ minute})}$ 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 $10 \times \log(n)$ where n is the number of cars

Table 3.1.1.2 details these continuous L_{Amax} noise levels.

Table 3.1.1.2 L_{Amax} Noise Levels of Operation & Events [dB(A)]

Noise Source	Sound Pressure Level at 7m	Sound Power Level
Door Closing	69	94
Fork Lift reversing alarm	59	77
Car Starting	65	90
Truck Reversing Alarm	72	97

3.1.2 MODELLING SCENARIOS

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

Early Morning (6am to 7am)

- Forklift in garden yard operating
- 4 Roof Exhaust fans operating;
- 2 Roof Plant operating
- 1 x delivery truck accessing the outbound staging dock (including reversing, idling and loading stock);
- 30 cars per hour accessing the carpark.

Day (7am to 6pm)

- Forklift in garden yard operating
- 4 Roof Exhaust fans operating;
- 2 Roof Plant operating
- 1 x delivery truck accessing the dock (including reversing, idling and loading stock);
- 167 cars per hour accessing the carpark (weekday peak hour).

Evening (6pm to 10pm)

- Forklift in garden yard operating;
- 4 Roof Exhaust fans operating;
- 2 Roof Plant operating;
- 1 x delivery truck accessing the outbound staging dock (including reversing, idling and loading stock);
- 80 cars per hour accessing the carpark.

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.

3.1.3 CONTINUOUS NOISE PREDICTIONS

Initial calculations have determined that the following is required to comply with site specific noise criteria.

- Roof fans and plant areas to be acoustically treated so that combined noise levels from fans and plant at residences do not exceed 27 dB(A);
- A 3m fence / noise barrier is required on the eastern side of the site for a distance of 150 m.

Based on the above noise control measures being implemented the following noise levels are predicted and are presented in **Table 3.1.2.1**.

Table 3.1.2.1 External Predicted Noise Emission Levels & Relevant Criteria – Nearest Residential Receivers

Residential Receiver Location	Assessment Period ¹	Activity / Noise Source ²	Calculated Maximum L _{Aeq} Noise Level [dB]	EPA NPfI L _{Aeq(15minute)} Noise Objective [dB]	Complies?
Early Morning					
R1 - Silock Street	Early Morning 6am to 7am	Dock	36	37	Yes
		Mechanical plant	27		
		Carpark	21		
		Total	36		
R2 - Hassans Wall Drive	Early Morning 6am to 7am	Dock	31	37	Yes
		Mechanical plant	27		
		Carpark	32		
		Total	35		
Day					
R1 - Silock Street	Day 7am to 6pm	Dock	36	40	Yes
		Mechanical plant	27		
		Carpark	28		
		Total	37		
R2 - Hassans Wall Drive	Day 7am to 6pm	Dock	31	40	Yes
		Mechanical plant	27		
		Carpark	39		
		Total	40		
Evening					
R1 - Silock Street	Evening 6pm to 10pm	Dock	36	40	Yes
		Mechanical plant	27		
		Carpark	25		
		Total	37		
R2 - Hassans Wall Drive	Evening 6pm to 10pm	Dock	31	40	Yes
		Mechanical plant	27		
		Carpark	36		
		Total	38		

Note 1) Daytime being 7:00am to 6:00pm on weekdays and Saturdays and 8:00am to 6:00pm on Sundays and public holidays. Compliance with the more stringent night time criteria ensure compliance during the day and evening periods.

2) The description of the activities and noise sources for the scenario is detailed in **Section 3.1.2**.

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.

Based on the results of Acoustic Dynamics' noise modelling and calculations, we advise that the predicted maximum noise emission associated with the use and operation of the proposed development is **likely** to comply with the relevant noise emission criteria. It is noted that noise control measures are required and are detailed in recommendations.

3.2 SLEEP DISTURBANCE ASSESSMENT

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

The predictions indicate that during the night-time assessment period 10:00pm to 7:00am, the potential maximum $L_{A1(60 \text{ Sec})}$ noise emission would be:

- **36 dB** for receivers located at the southern side of the site (R1); and
- **36 dB** for receivers located at the eastern side of the site (R2).

Maximum noise levels at eastern residences would be dominated by the outbound delivery trucks accessing the site during the night time (early morning) period (6:00am to 7:00am).

In the case of western residences (R2) maximum noise levels at these residences would be dominated by the carpark operations such as door slams and engine start in the night time (early morning) period (6:00am to 7:00am).

These early morning events are predicted to comply with the external sleep disturbance screening criterion.

4. 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 demonstrate that the site represents an appropriate location for the proposed works;
2. There is low risk of acoustic disturbance for the adjacent residential receivers during the night time assessment period and during all other assessment periods;
3. Noise emission has been assessed as a worst-case scenario (i.e., maximum number of vehicle movements per hour), however Acoustic Dynamics understands that vehicle numbers are likely to be lower than those used in the assessment of noise emission;

4. 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 early morning assessment period; and
5. 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 3.1.2.1**.

5. 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.

5.1.1 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 in the proposed plant areas (see locations in **Appendix A**). Mechanical noise from plant areas can be mitigated via existing acoustic screens or the construction of additional acoustic screening to block line of site the adjacent receivers;
2. 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;
3. Mechanical plant should be selected on the basis of low noise emissions. The cumulative mechanical plant noise emission level, when measured anywhere along the boundary of the site, should not exceed the background noise level;
4. Installation of in-duct silencers and attenuators can be used to control noise levels at end of duct;
5. Ensuring all exposed duct work is lined with a suitably dense acoustic material or wrap;

6. All items of mechanical plant should be isolated from the building structure through the use of resilient mounts, resilient sleeves and or spring hangers;
7. 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
8. 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 so as not to exceed 27 dBA at identified residences.

5.1.2 LOADING DOCKS SCHEDULE

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

General Operations

1. During the morning shoulder period, between 6:00am to 7:00am:
 - i. A maximum of 1 delivery truck per 15 minutes should access the delivery dock;
 - ii. Delivery drivers are to switch off engines whilst in the loading dock area.

Loading Dock Noise Management

To ensure the use of the loading docks does not cause unreasonable disturbance, the following practicable operational noise management measures should be implemented by the site operator. Suitable controls would include:

1. Signage at the entrance of the site advising drivers switch off engines during deliveries/collections;
2. Drivers trained and instructed to adhere to a conditioned driving procedure including:
 - i. Adhering speed limits whilst on site;
 - ii. No unnecessary revving of engines;
 - iii. No unnecessary honking of horns;
 - iv. No waiting and idling adjacent to residential properties.

5.1.3 ACOUSTIC FENCE / NOISE BARRIER

To ensure impacts are minimised, Acoustic Dynamics recommends the incorporation of a 3m noise barrier on the western boundary of the site as follows;

1. The barrier should be along the eastern boundary and extend from the north eastern corner of the site for a distance of 150m;

2. The barrier should be a minimum of 3m in height above the hardstand and loading access driveway;
3. The barrier / fence should achieve a minimum acoustic rating of Rw25. Suitable materials are metal fencing (2 x 0.8 mm layers), concrete or aerated concrete panel, lapped and capped fencing. Should clear upper sections be required 10mm thick Perspex sheets are acceptable; and
4. The barrier should be continuous and no gaps in its construction.

6. CONCLUSION

Acoustic Dynamics has conducted an assessment of the noise impacts associated with the proposed modifications to the Bunnings small format store, Valley Drive, Lithgow.

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

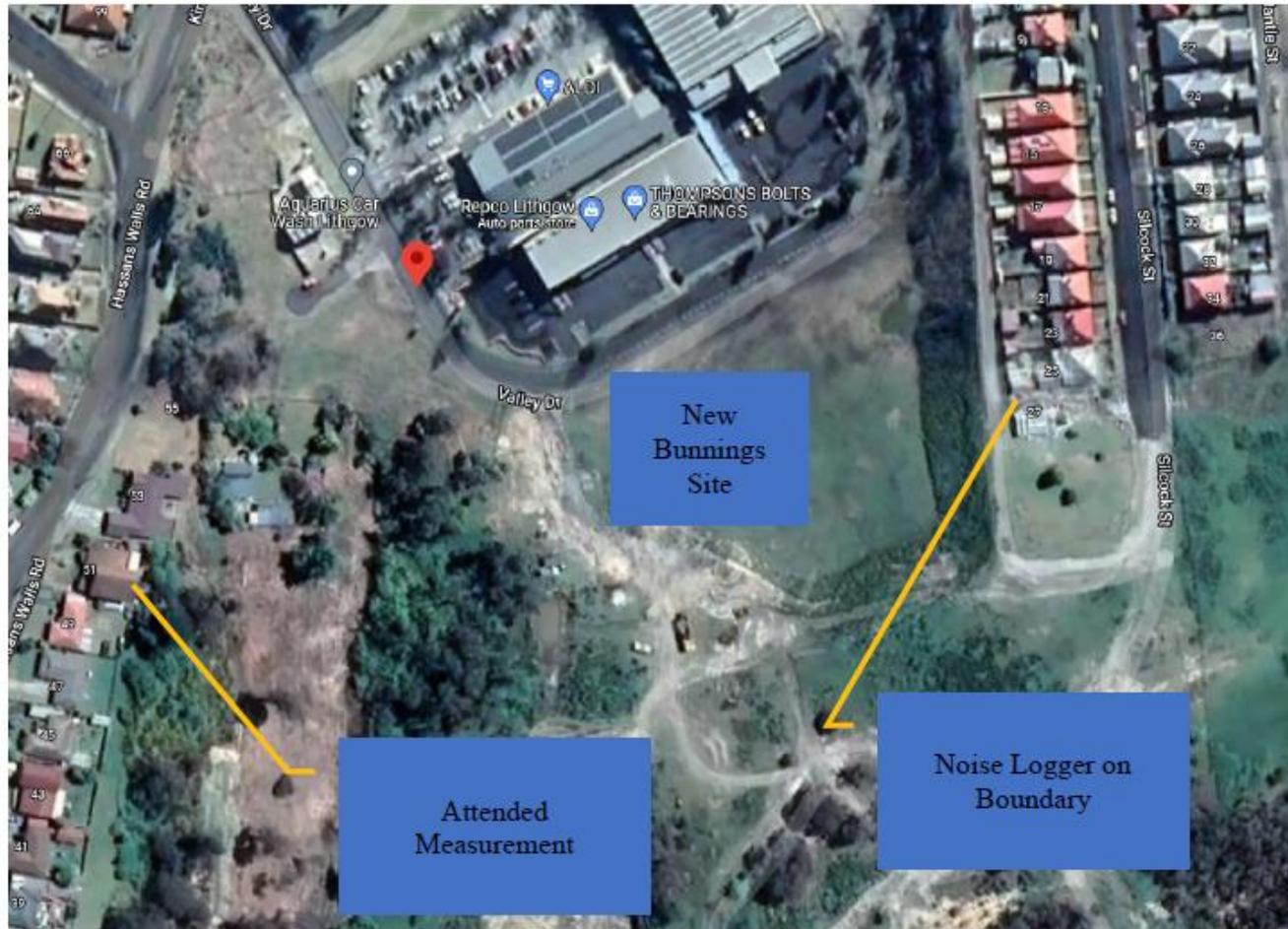
- (a) Lithgow Council;
- (b) The NSW EPA;
- (c) The NSW Department of Planning, Industry and Environment ;and
- (d) Australian Standards.

Acoustic Dynamics advises that noise emission associated with the proposal can be designed to comply with relevant noise emission criteria of Lithgow Council and the NSW EPA, subsequent to the incorporation of the recommendations outlined within **Section 5**.

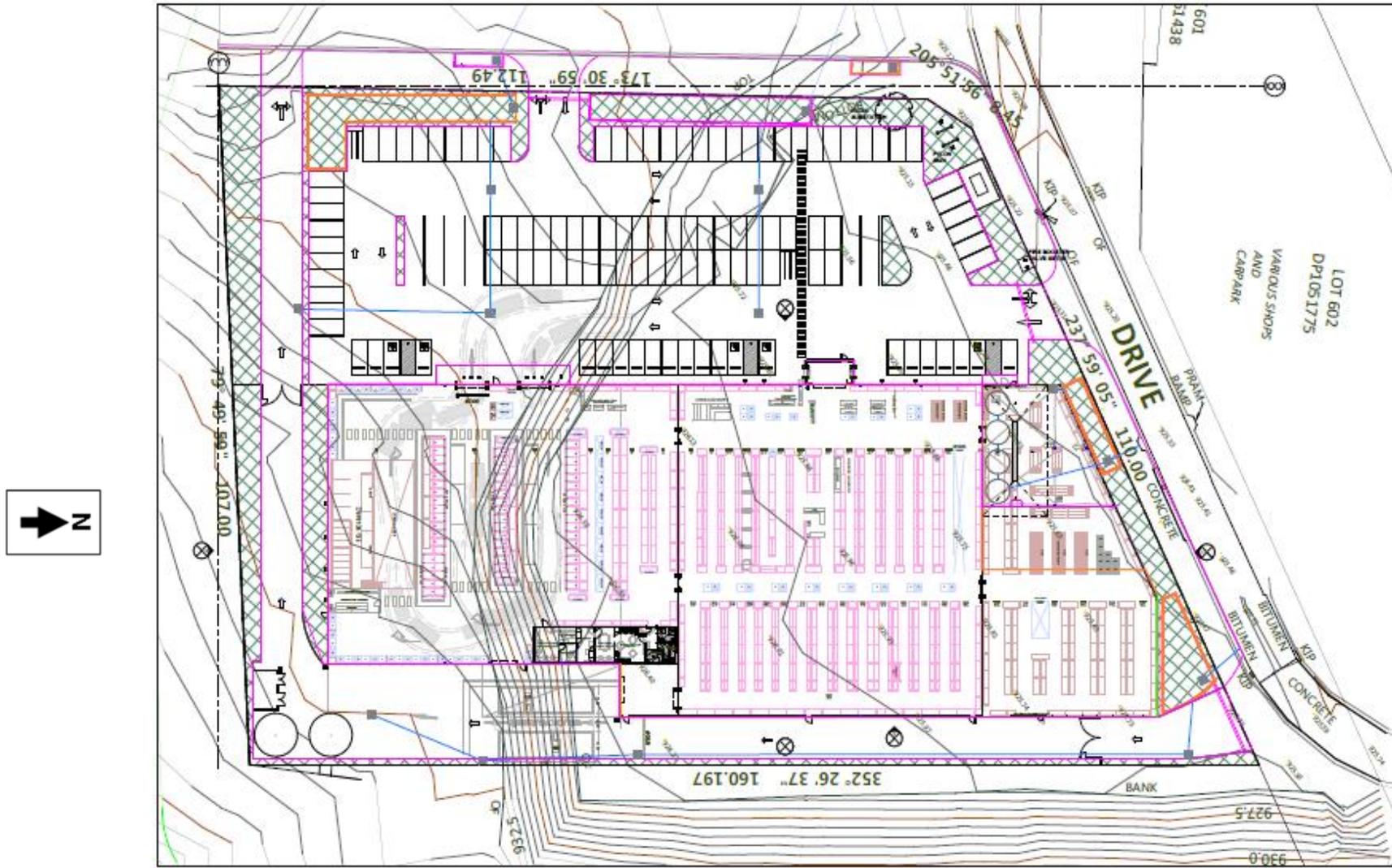
We trust that the above information meets with your requirements and expectations. Please do not hesitate to contact us on 02 9908 1270 should you require more information.

APPENDIX A – AERIAL PHOTO, SITE PLAN & ELEVATIONS

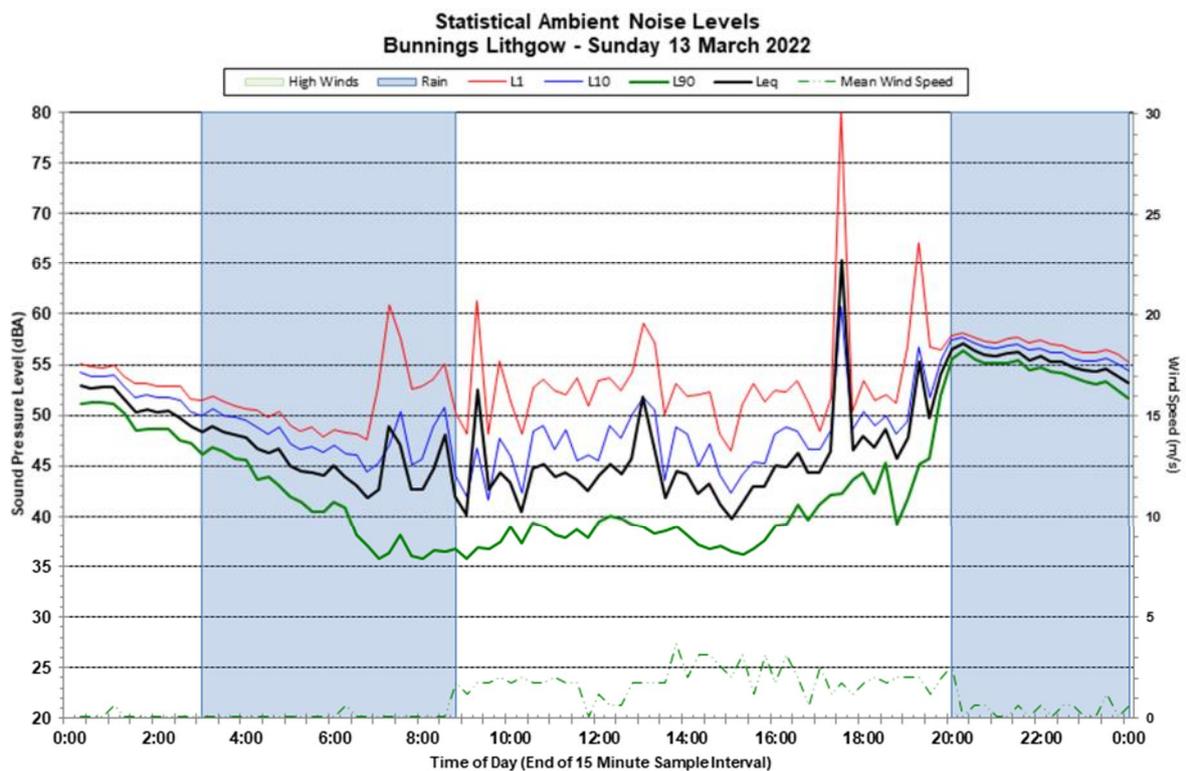
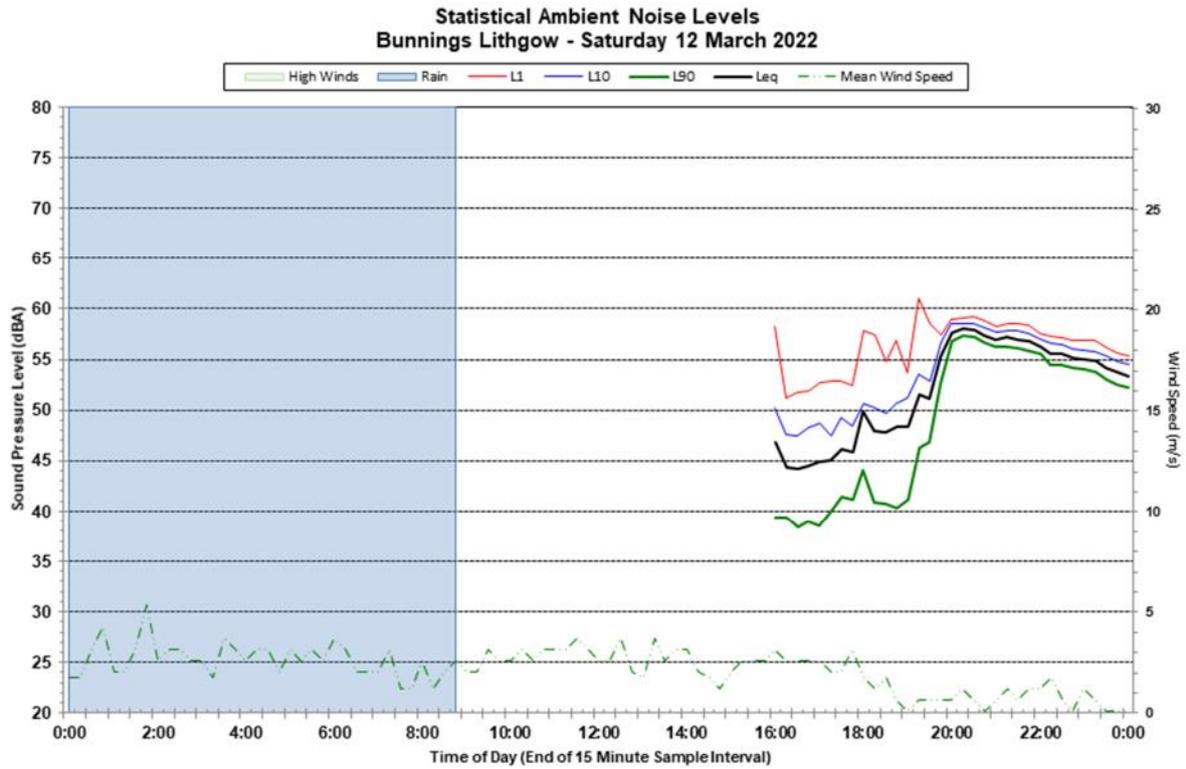
A1 AERIAL PHOTOGRAPH



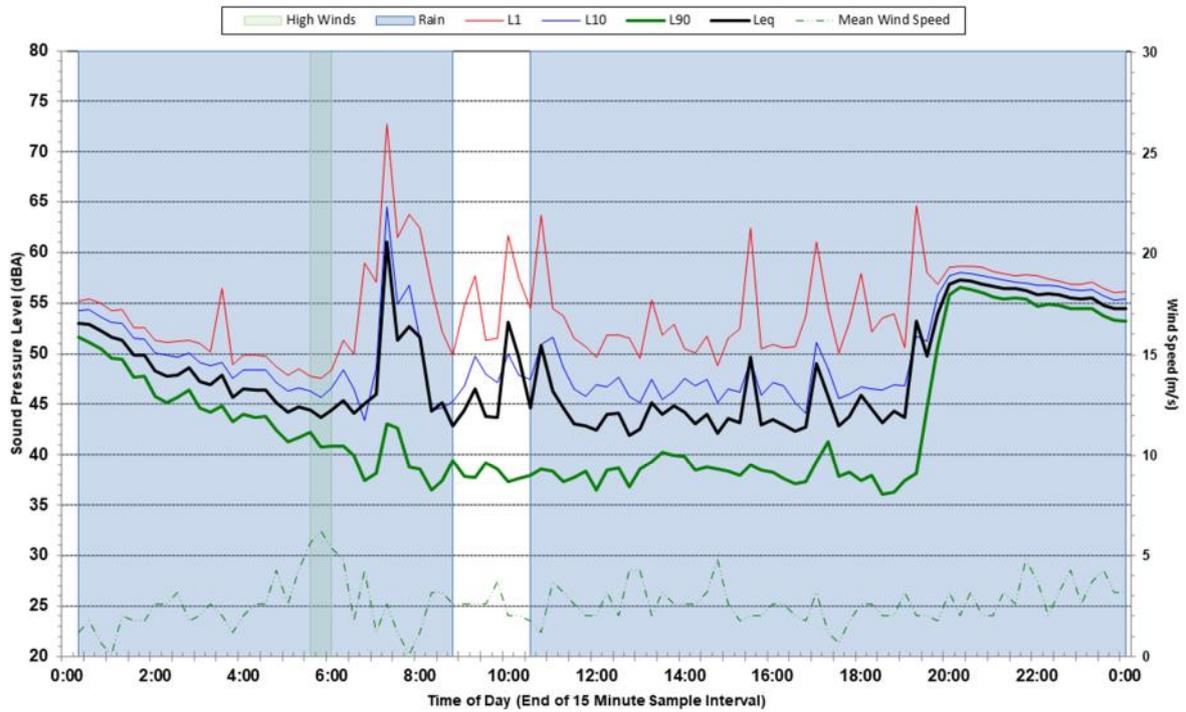
A2 SITE PLAN



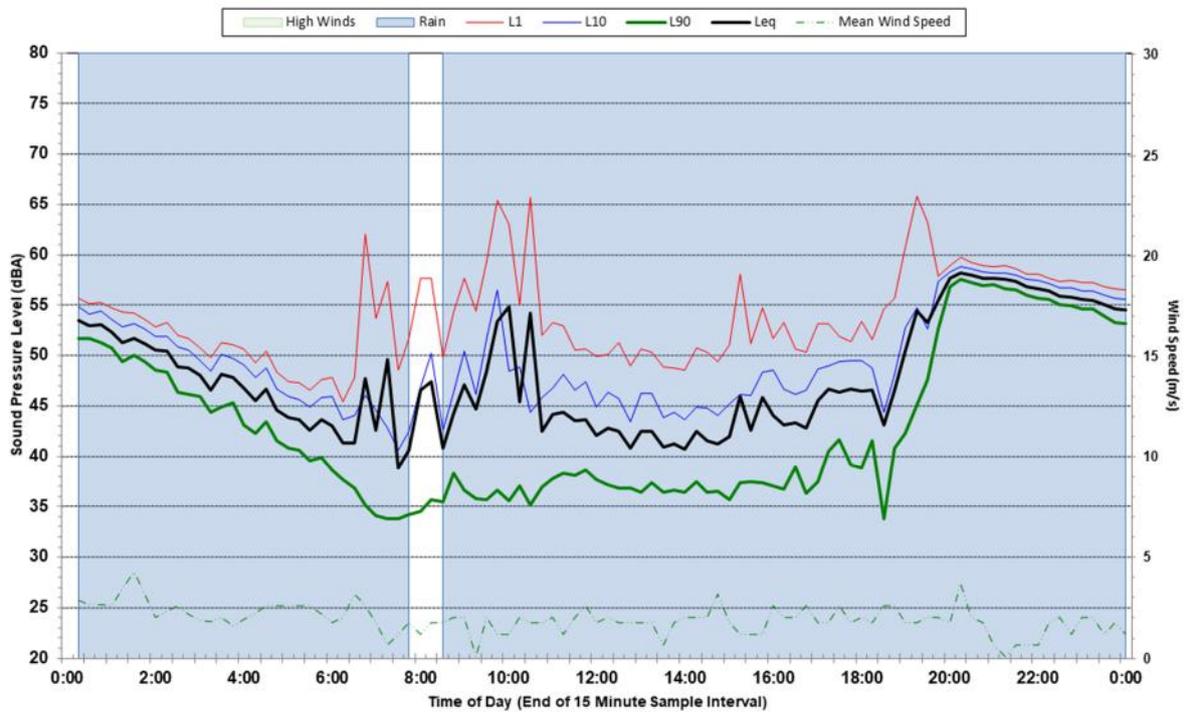
APPENDIX B – UNATTENDED NOISE LOGGER DATA



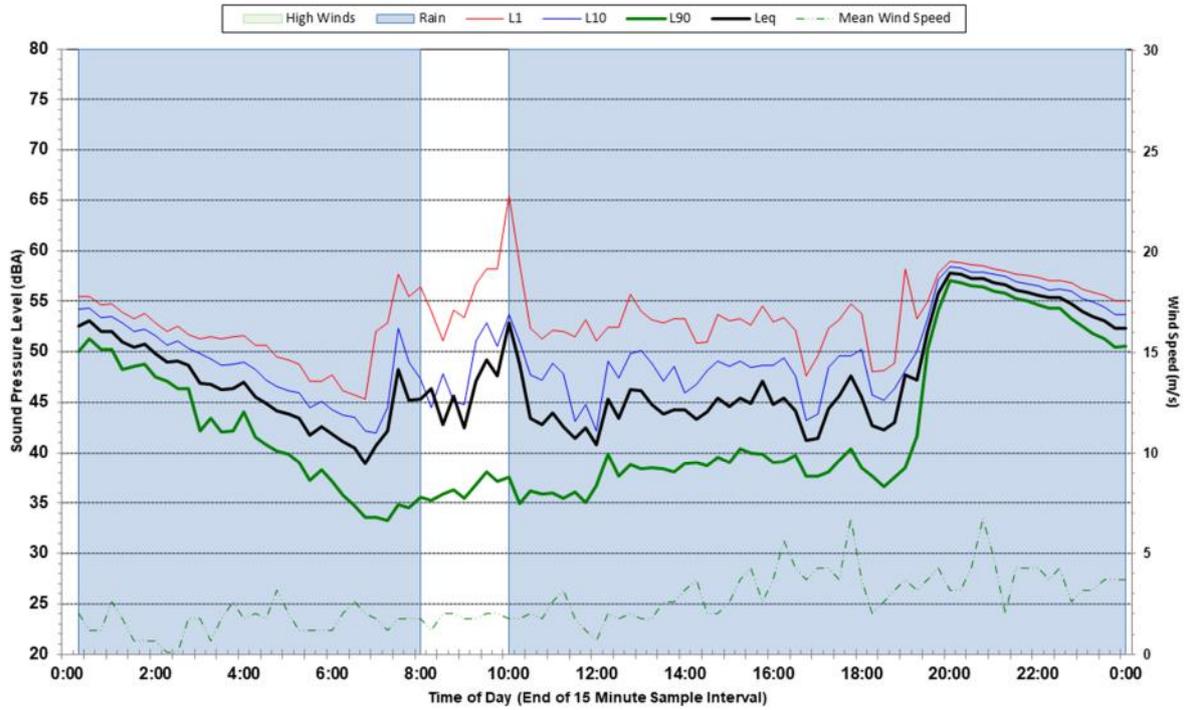
**Statistical Ambient Noise Levels
Bunnings Lithgow - Monday 14 March 2022**



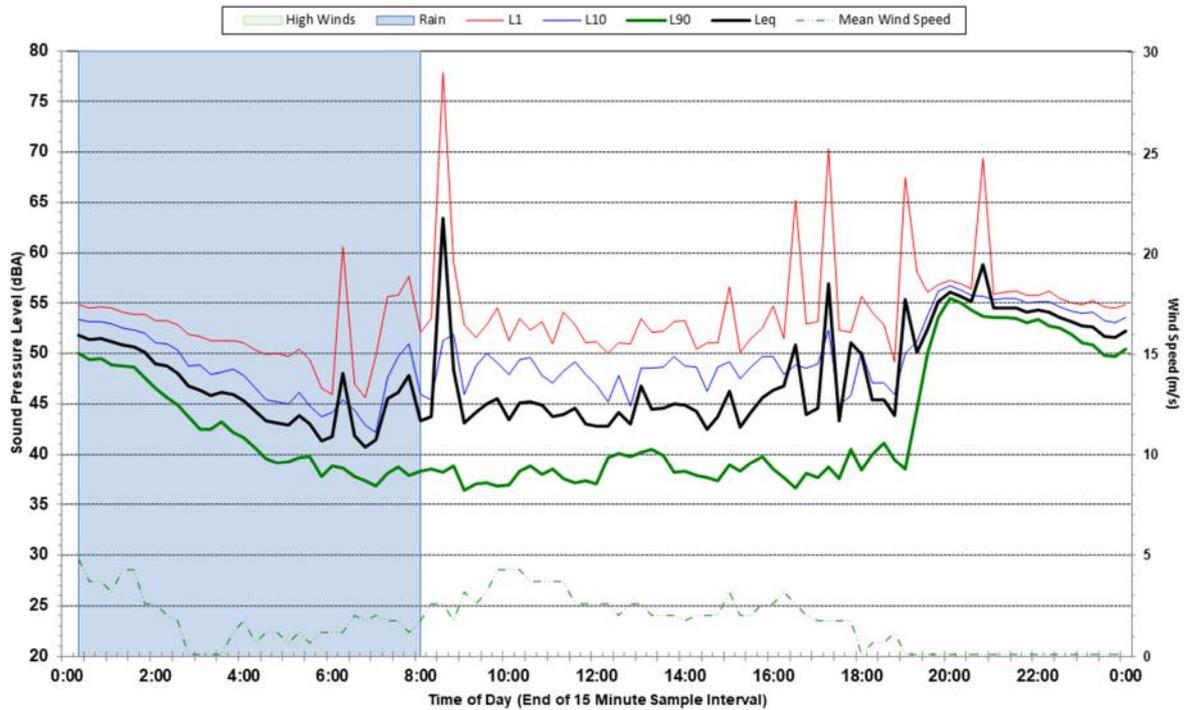
**Statistical Ambient Noise Levels
Bunnings Lithgow - Tuesday 15 March 2022**



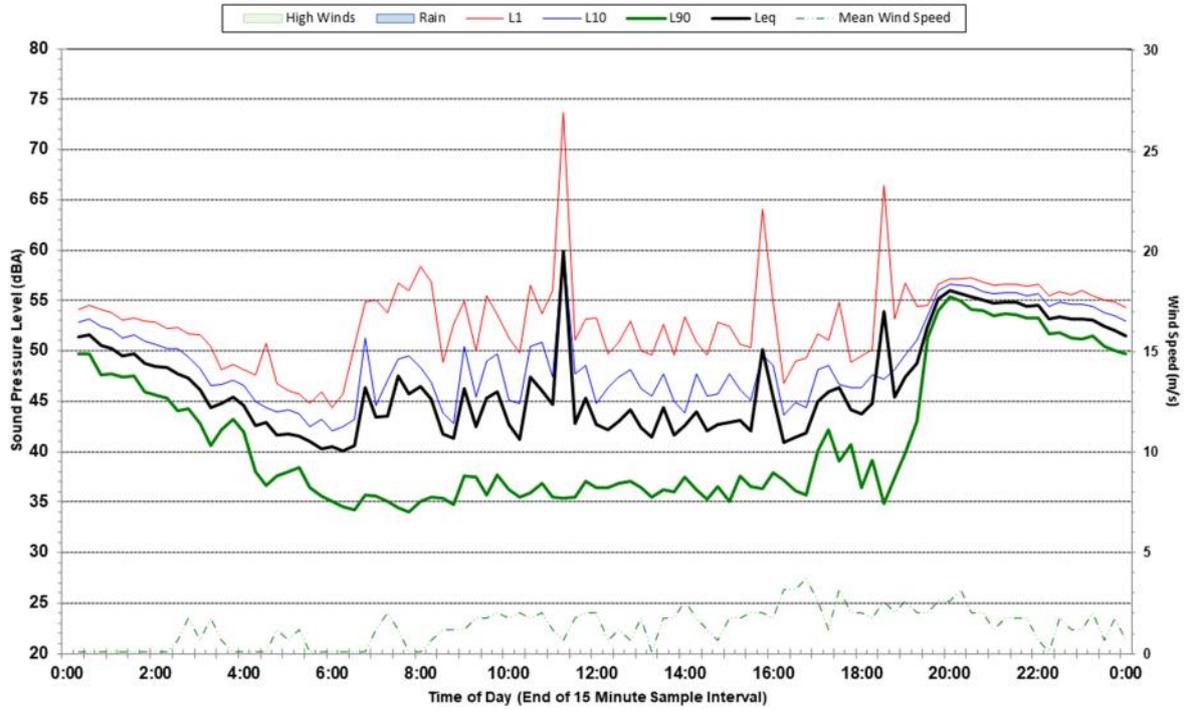
**Statistical Ambient Noise Levels
Bunnings Lithgow - Wednesday 16 March 2022**



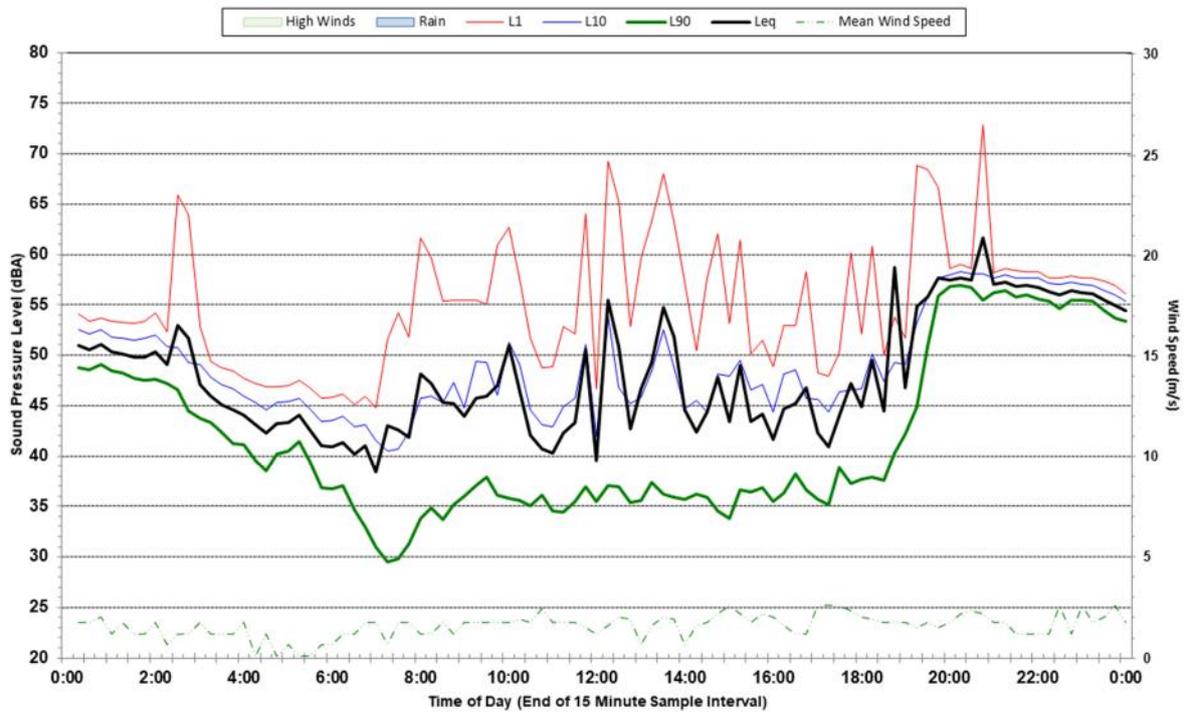
**Statistical Ambient Noise Levels
Bunnings Lithgow - Thursday 17 March 2022**



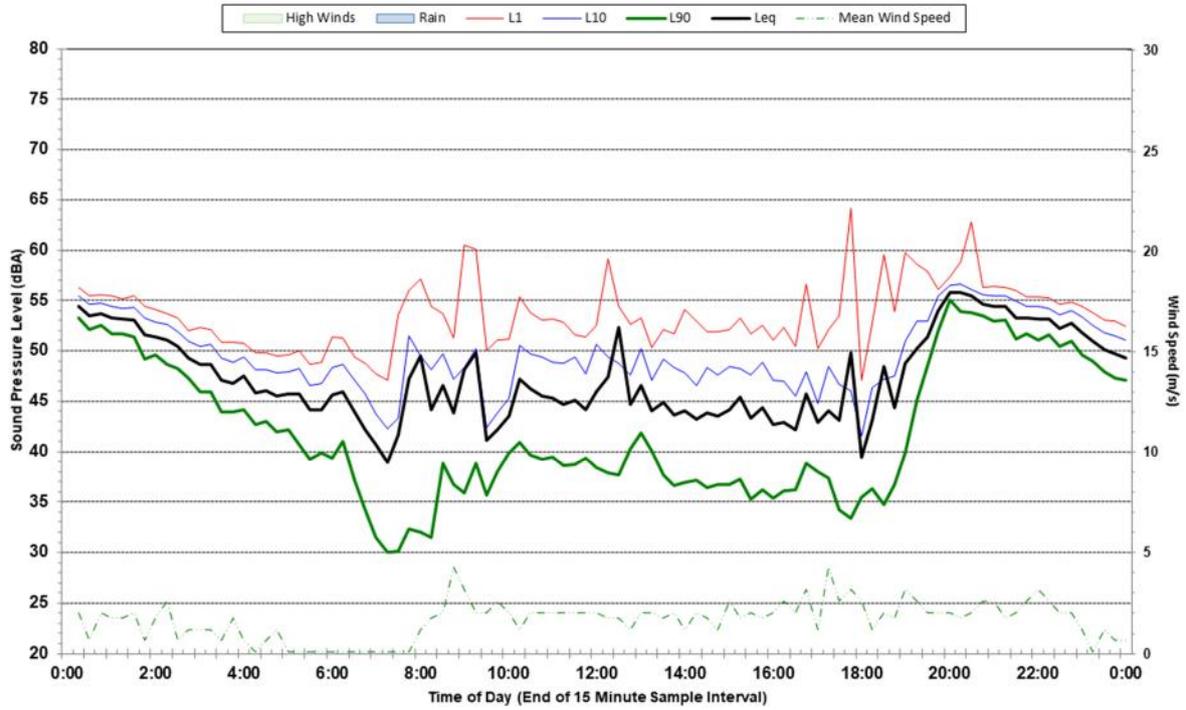
Statistical Ambient Noise Levels Bunnings Lithgow - Friday 18 March 2022



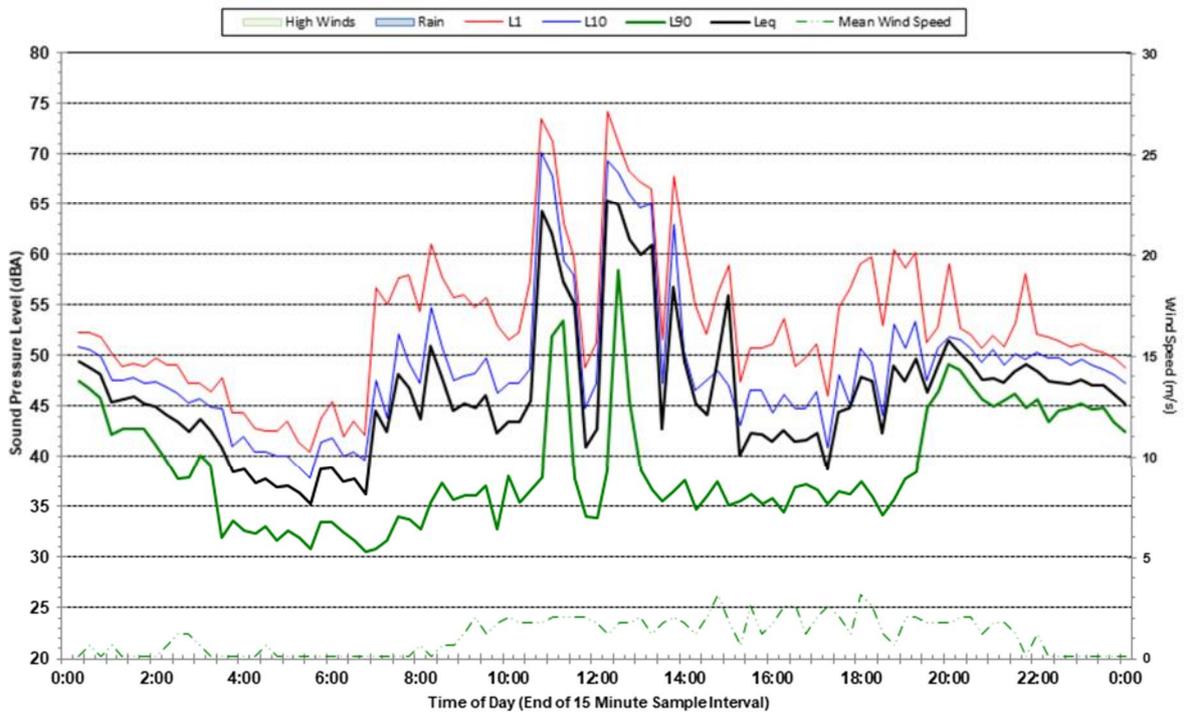
Statistical Ambient Noise Levels Bunnings Lithgow - Saturday 19 March 2022



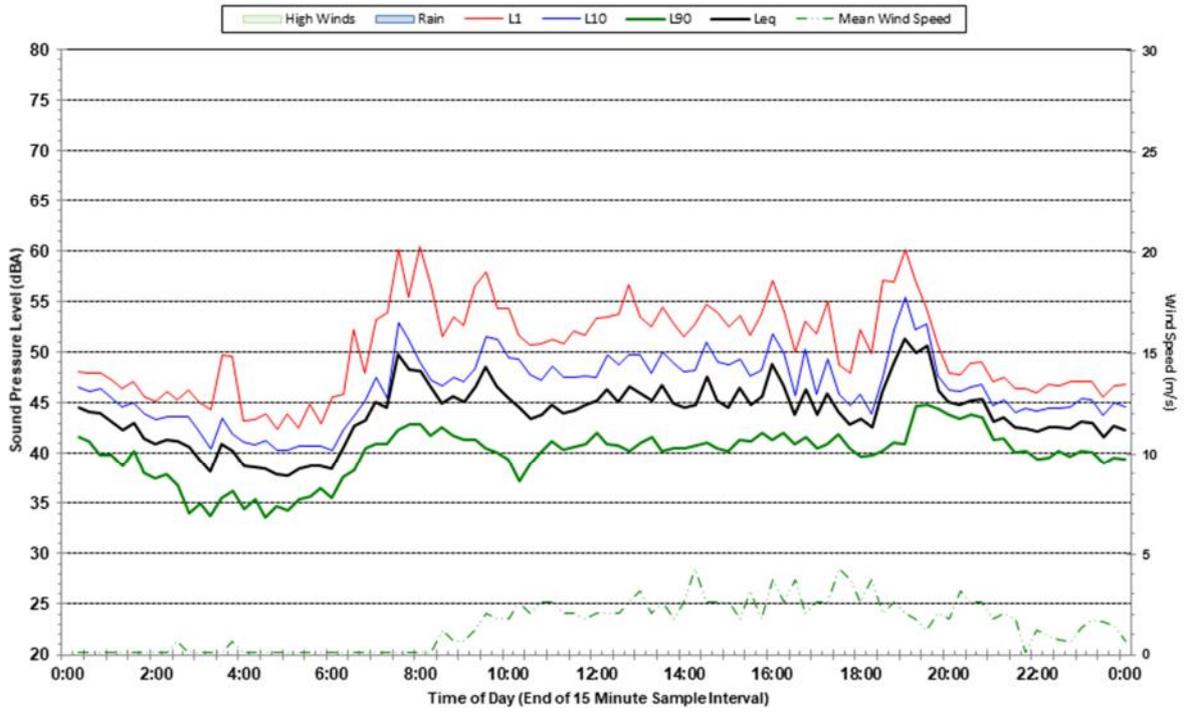
**Statistical Ambient Noise Levels
Bunnings Lithgow - Sunday 20 March 2022**



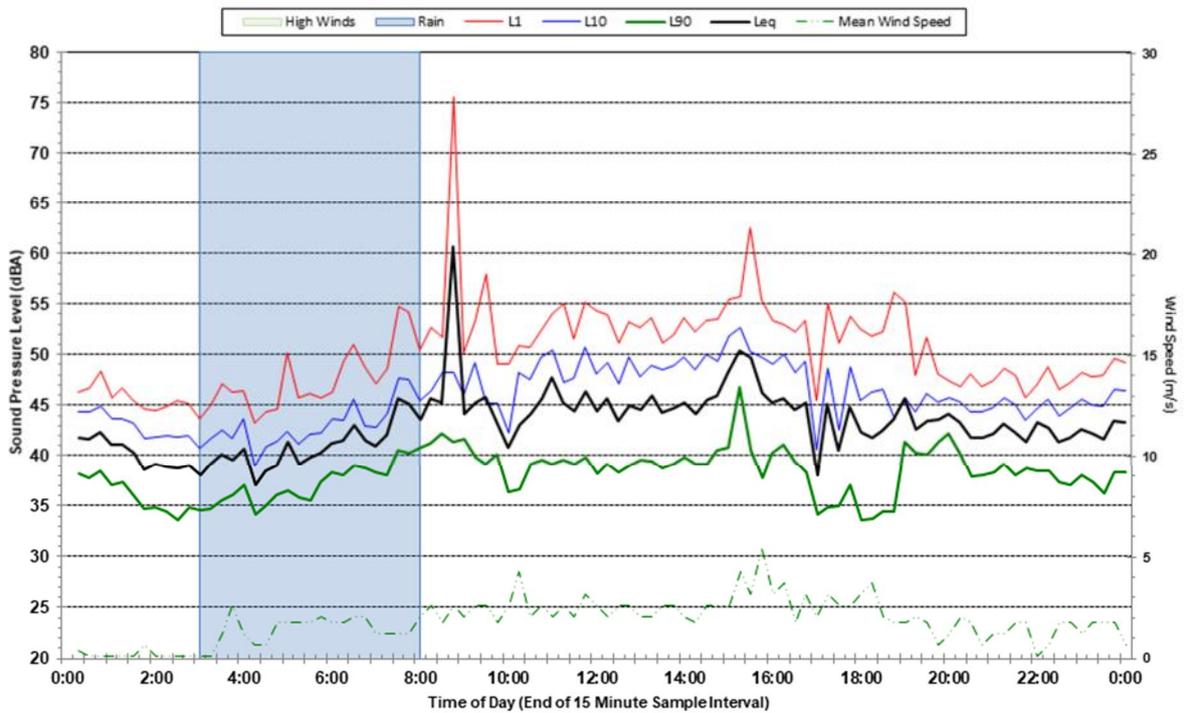
**Statistical Ambient Noise Levels
Bunnings Lithgow - Monday 21 March 2022**



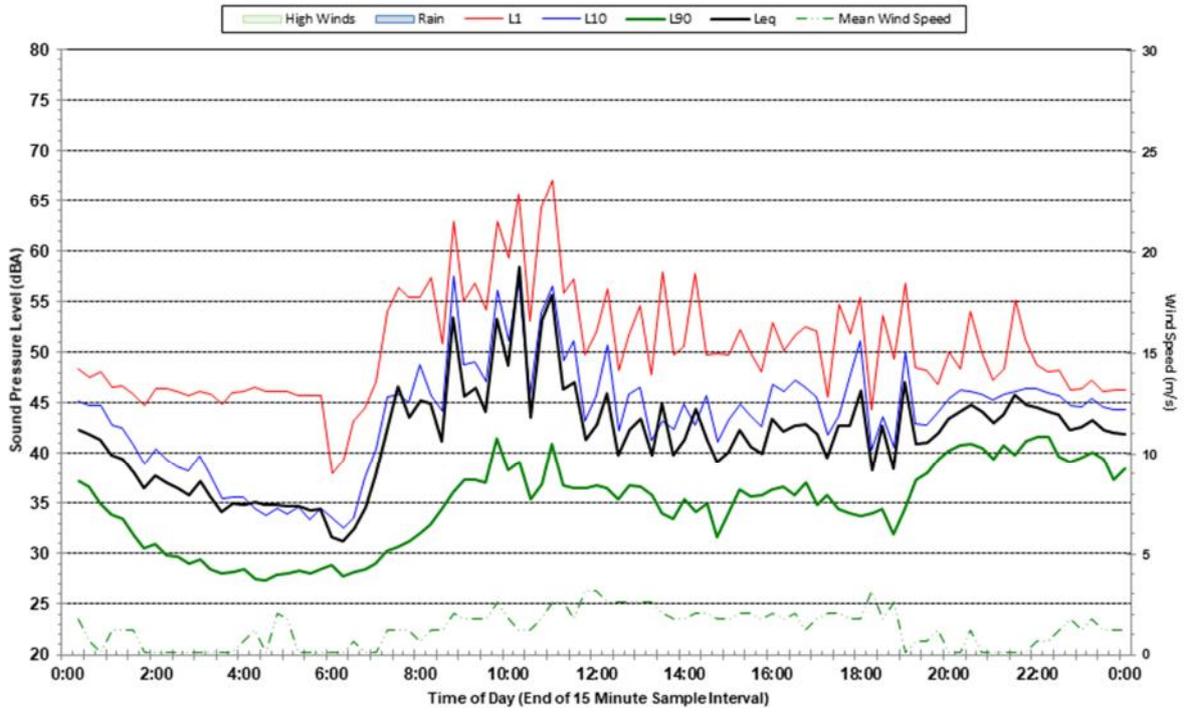
**Statistical Ambient Noise Levels
Bunnings Lithgow - Tuesday 22 March 2022**



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



**Statistical Ambient Noise Levels
Bunnings Lithgow - Thursday 24 March 2022**



**Statistical Ambient Noise Levels
Bunnings Lithgow - Friday 25 March 2022**

