RODNEY STEVENS ACOUSTICS
Acoustic Consultants
Member Australian Acoustical Society

REPORT R200541R1

Revision 0

Road Noise and Race Track Impact Assessment
Proposed Residential Development
44 - 48 Rodley Avenue, Penrith

PREPARED FOR:

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16 December 2020

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Road Noise and Race Track Impact Assessment

Proposed Residential Development

44 - 48 Rodley Avenue, Penrith

PREPARED BY:

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
R200541R1	Revision 0	16 December 2020	Desmond Raymond	Rodney Stevens	Rodney Stevens

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1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (here forth referred to as RSA) has been engaged by Morson Group to conduct a Road and Race Track Noise Impact Assessment for Development Application (DA) lodgment of the proposed multi residential development, 44 - 48 Rodley Avenue, Penrith.

This report addresses the road traffic noise impacts from Mulgoa Road and the noise emitted from harness racing at the Penrith Showground on the amenity of the proposed multi-residential development. In addition, mechanical plant noise criteria have been stablished.

This assessment is to form part of the supporting documentation for the DA submission to Penrith City Council.

Specific acoustic terminology is used in this report. An explanation of common acoustic terms is provided in Appendix A

2 PROPOSED DEVELOPMENT

2.1 Site Location

The proposed residential development site is located at 44 - 48 Rodley Avenue, Penrith, it is bounded by residential premises to the north and east, the Penrith Showground to the south and Mulgoa Road to the west. The location of the proposed site and its surroundings is presented in Figure 2-1.

Figure 2-1 Site Location

Aerial image courtesy of Sixmaps © 2020

2.2 Proposed Development

The proposal is to demolish the existing residential dwellings at 44 - 48 Rodley Avenue, Penrith, and build a 5 storey multi-residential building. The architectural plans of the proposed residential development are presented in Appendix D

3 EXISTING ACOUSTIC ENVIRONMENT

3.1 Unattended Noise Monitoring

In order to characterise the existing acoustical environment of the area, unattended noise monitoring was conducted between 8th December and 14th December 2020 at the logging locations shown in Figure 2-1. The first noise logger was located on the front yard of the site overlooking Mulgoa Road. The noise monitoring at this location is representative of the traffic noise the future facades will encounter

The second noise logger was located at the rear yard of the site. The noise monitoring at this location is representative of the acoustic environment at the project site.

Logger locations were selected with consideration to other noise sources, which may influence readings, security issues for noise monitoring equipment and gaining permission for access from other landowners.

Instrumentation for the survey comprised of 2 Rion NL42 environmental noise logger (serial numbers 572542 and 546395) fitted with microphone windshields. Calibration of the logger was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dB(A). All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

3.2 Ambient Noise Level Results

In order to assess the acoustical implications of the proposed development on the levels of noise received at the neighboring residential premises, the measured data was processed according to the NSW Ambient Noise Levels.

Table 3-1 Ambient Noise Results

Noise Level – dBA re 20 µPa					
Day		Evening		Night	
RBL [1]	L_{Aeq} [2]	RBL [1]	L_{Aeq} [2]	RBL [1]	L_{Aeq} [2]
39	49	40	51[3]	36	47

Note 1: The RBL noise level is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

Note 2: The L_{Aeq} is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

Note 3: The data has been filtered to remove excessive events on 13 December 2020

4 NOISE CRITERIA

4.1 Road Noise Criteria

The determination of an acceptable level of road noise affecting the internal residential spaces requires consideration of the activities carried out within the space and the degree to which noise will interfere with those activities.

As sleep is the activity most affected by traffic noise, bedrooms are considered the most sensitive internal living areas. Higher levels of noise are acceptable in living areas without interfering with activities such as reading, listening to the television etc. Noise levels in utility spaces such as kitchens, bathrooms, laundries etc. can be higher.

4.1.1 State Environmental Planning Policy (Infrastructure) 2007

Road Noise Criteria

The NSW Government's State Environmental Planning Policy (Infrastructure) 2007 (SEPP (Infrastructure) 2007) was introduced to facilitate the delivery of infrastructure across the State by improving regulatory certainty and efficiency. In accordance with the SEPP, Table 3.1 of the NSW Department of Planning and Infrastructure's "*Development near Rail Corridors and Busy Roads - Interim Guideline"* (the DP&I Guideline) of December 2008 provides noise criteria for residential and non-residential buildings. These criteria are summarised in Table 4-1.

Table 4-1 DP&I Interim Guideline Noise Criteria

Type of occupancy	Noise Level dB(A)	Applicable time period
Sleeping areas (bedroom)	35	Night 10 pm to 7 am
Other habitable rooms (excl. garages, kitchens, bathrooms & hallways)	40	At any time

Note 1: Airborne noise is calculated as $L_{Aeq(15hour)}$ daytime and $L_{Aeq(9hour)}$ night-time

The following guidance is also provided in the DP&I Guideline:

> *"These criteria apply to all forms of residential buildings as well as aged care and nursing home facilities. For some residential buildings, the applicants may wish to apply more stringent design goals in response to market demand for a higher quality living environment.*
>
> *The night-time "sleeping areas" criterion is 5 dB(A) more stringent than the "living areas" criteria to promote passive acoustic design principles. For example, designing the building such that sleeping areas are less exposed to road or rail noise than living areas may result in less onerous requirements for glazing, wall construction and acoustic seals. If internal noise levels with windows or doors open exceed the criteria by more than 10 dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

The noise criteria presented in Section 4.1.1 and in Table 4-1 apply to a 'windows closed condition'. Standard window glazing of a building will typically attenuate noise ingress by 20 dB(A) with windows closed and 10 dB(A) with windows open (allowing for natural ventilation). Accordingly, the external noise threshold above which a dwelling will require mechanical ventilation is an $L_{Aeq(9hour)}$ of 55 dB(A) for bedrooms and $L_{Aeq(15hour)}$ of 60 dB(A) for other areas.

Where windows must be kept closed, the adopted ventilation systems must meet the requirements of the Building Code of Australia and Australian Standard 1668 – The use of ventilation and air conditioning in buildings.

4.2 Protection of the Environment Operations Act 1997

In accordance with the POEO Act, the proposed development should not cause "Offensive Noise" to the neighbouring residential receivers. The definition of "Offensive Noise" in the POEO Act is 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.

As the POEO Act does not prescribe any numerical criteria to ensure that the development does not cause "Offensive Noise". Hence, appropriate noise guidelines and policies to assess mechanical plant noise have been prescribed in this assessment report to quantify if the operation of the project will cause "Offensive Noise".

4.3 Protection of the Environment Operations (Noise Control) 2008 – Item 52

Air conditioners and heat pump water heaters

1) A person must not cause or permit an air conditioner or heat pump water heater to be used on residential premises in such a manner that it emits noise that can be heard within a habitable room in any other residential premises (regardless of whether any door or window to that room is open):

(a) before 8 am or after 10 pm on any Saturday, Sunday or public holiday, or

(b) before 7 am or after 10 pm on any other day.

4.4 Operational Noise Project Trigger Noise Levels

Responsibility for the control of noise emissions in New South Wales is vested in Local Government and the EPA. The EPA oversees the Noise Policy for Industry (NPfI) October 2017 which provides a framework and process for deriving project trigger noise level. The NPfI project noise levels for industrial noise sources have two (2) components:

- Controlling the intrusive noise impacts for residents and other sensitive receivers in the short term; and
- Maintaining noise level amenity for particular land uses for residents and sensitive receivers in other land uses.

4.4.1 Intrusiveness Noise Levels

For assessing intrusiveness, the background noise generally needs to be measured. The intrusiveness noise level essentially means that the equivalent continuous noise level (LAeq) of the source should not be more than 5 dB(A) above the measured Rated Background Level (RBL), over any 15-minute period.

4.4.2 Amenity Noise Levels

The amenity noise level is based on land use and associated activities (and their sensitivity to noise emission). The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. The

noise levels relate only to other industrial-type noise sources and do not include road, rail or community noise. The existing noise level from industry is measured.

If it approaches the project trigger noise level value, then noise levels from new industrial-type noise sources, (including air-conditioning mechanical plant) need to be designed so that the cumulative effect does not produce total noise levels that would significantly exceed the project trigger noise level.

4.4.3 Area Classification

The NPfI characterises the "Urban" noise environment as an area with an acoustical environment that:

- is dominated by 'urban hum' or industrial source noise,
- where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources
- has through-traffic with characteristically heavy and continuous traffic flows during peak periods
- is near commercial districts or industrial districts
- has any combination of the above.

The area surrounding the proposed development falls under the "Urban" area classification.

4.4.4 Project Specific Trigger Noise Levels

Having defined the area type, the processed results of the attended noise monitoring have been used to determine project specific project trigger noise level. The intrusive and amenity project trigger noise level for nearby residential premises are presented in Table 4-2. These project trigger noise levels are nominated for the purpose of assessing potential noise impacts from the proposed development.

For each assessment period, the lower (i.e. the more stringent) of the amenity or intrusive criteria are adopted. These are shown in bold text in Table 4-2.

Table 4-2 Project Specific Trigger Noise Levels

Receiver	Time of Day	ANL [1] $L_{Aeq(15min)}$	Measured		Project specific Noise Levels	
			RBL [2] $L_{A90(15min)}$	L_{Aeq} Noise Level)	Intrusive $L_{Aeq(15min)}$	Amenity [3] $L_{Aeq(15min)}$
Residential	Day	60	39	49	**44**	63
	Evening	50	40	51	**45**	53
	Night	45	36	47	**41**	48

Note 1: ANL = "Acceptable Noise Level" for residences in Urban Areas.

Note 2: RBL = "Rating Background Level".

Note 3: Assuming existing noise levels are unlikely to decrease in the future

5 NOISE IMPACT ASSESSMENT

5.1 Road Traffic Noise

5.1.1 Road Traffic Noise Intrusion Assessment

In order to ascertain the existing noise levels from the Mulgoa Road, the measured noise logger data was processed in accordance to the NSW Road Noise Policy assessment time periods. Table 5-1 details the traffic noise levels.

Table 5-1 Measured Traffic Noise Levels

Logger Location	Noise Level – dB(A) re 20 µPa	
	$L_{Aeq\ (15hour)}$ 07:00 – 22:00	$L_{Aeq\ (9hour)}$ 22:00 to 07:00
Rodley Avenue	63	48

Traffic noise levels recorded by the noise logger have been corrected to account for the distance from the road to the proposed façade. These are representative of the noise levels the proposed façade will encounter.

5.2 Mechanical Plant Noise Assessment

A specific mechanical plant selection has not been supplied at this stage. It is anticipated that the building will be serviced by typical mechanical ventilation/air conditioning equipment.

It is likely that the criteria set out in Table 4-2 will be met through the use of conventional noise control methods (e.g. selection of equipment on the basis of quiet operation and, where necessary, providing enclosures, localised barriers, silencers and lined ductwork).

An appropriately qualified acoustic consultant should review the mechanical plant associated with the development at the detailed design stage when final plant selections have been made

5.3 Penrith Showground Race Track

In order to ascertain the noise emitted by Penrith Paceway, RSA has relied on attended measurements carried out on Thursday 2nd June 2016 between 6:00pm and 9:00pm at the location shown in Figure 4-2. Harness races take place every Thursday between 6:00 pm and 10:00 pm.

RSA has relied on this data as due to COVID-19 restrictions; the Paceway is operating at a limited capacity. The noise measurements conducted previously is considered an appropriate alternative and have been relied on for the noise impact from the track to the development.

A summary of the different noise sources and resulting noise levels is presented in Table 5-2

Table 5-2 Attended Noise Measurements

Activity	Noise Level – dB(A) re 20 µPa
	L_{Aeq}
PA Announcements	70
Horses Warming Up	74

Horses Lining Up with Gate Car	82
Horses Racing	84
Tractor	81
Truck	78

We note that all activities do not occur at the same time, the noise levels presented above were measured approximately 9 meters from the track's centre line and are representative of each activity pass by.

5.3.1 Paceway Noise Intrusion Assessment

The noise levels presented in Table 5-2 were used to calculate the overall noise emitted by a single race considering the time each activity takes place. Each race consists of the following:

- Horses come out on track and start warm up laps
- Horses line up at start line and wait for gate car
- Horses begins trotting behind gate car
- Races begins
- Race ends and horses exit track
- Tractor or truck combs the racing track

The PA announcements occur before, after and throughout the race. No PA announcements occur while the tractor or truck is smoothing the race track.

The following table shows the calculated noise levels at the facades of the proposed multi residential development.

Table 5-3 Calculated Noise Levels at Proposed Development

Floor	Noise Level – dB(A) re 20 µPa
	L_{Aeq}
Ground	69
Level 1	70
Level 2 - 4	73
Level 5	72

6 RECOMMENDED NOISE CONTROL TREATMENT

The calculation procedure establishes the required noise insulation performance of each surface component such that the internal noise level is achieved whilst an equal contribution of traffic noise energy is distributed across each component. Building envelope components with a greater surface area must therefore offer increased noise insulation performance.

The recommended acoustic treatment is based on the following floor finishes:

- Bedrooms: Carpet and underlay
- Living Room Hard Flooring
- Kitchen/Wet Areas: Tiles

The acoustic requirements shown in this report will increase further where the bedroom floor finishes are tiled or timber.

All recommendations must be checked by others to ensure compliance with other non-acoustic requirements that Council or other authority may impose (e.g. Thermal requirements for BASIX compliance).

6.1 Glazing

The R_w rating required for each window will vary from room to room. Recommendations for windows also apply to any other item of glazing located on the external facade of the building in a habitable room unless otherwise stated.

Note that the R_w rating is required for the complete glazing and frame assembly. The minimum glazing thicknesses will not necessarily meet the required R_w rating without an appropriate frame system. It will be therefore necessary to provide a window glass and frame system having a laboratory tested acoustic performance meeting the requirements acoustic requirements.

The window systems must be tested in accordance with both of the following:

- Australian Window Association Industry Code of Practice Window and Door – Method of Acoustic Testing; and
- AS 1191 Acoustics – Method for laboratory measurement of airborne sound insulation of building elements.

It is necessary to submit such Laboratory certification for the proposed glazing systems (i.e. windows and framing systems) (e.g. NAL or CSIRO) for approval by RSA Acoustics prior to ordering or commitment.

The entire frame associated with the glazing must be sealed into the structural opening using acoustic mastics and backer rods. Normal weather proofing details do not necessarily provide the full acoustic insulation potential of the window system. The manufacturers' installation instructions for the correct acoustic sealing of the frame must be followed.

It is possible that structural demands for wind loading or fire rating or the like may require more substantial glass and framing assemblies than nominated above. Where this is the case the acoustic requirements must clearly be superseded by the structural or fire rating demands.

6.2 Rw Requirements for Glazing

Standard glazing may be installed on the northern and north-east and north-west facades, standard aluminium frames, quality seals (rubber seals) and 6mm glass panes should be installed to maintain a good degree of noise insulation. Other glazing systems may be available but their Rw rating must be reviewed prior to installation. No further acoustic requirements are needed.

Due to noise emissions from the activities carried out at Penrith Paceway, the apartments on the southern façade facing the racing track must be upgraded to maintain a good degree of noise isolation. The following upgrades are required.

The assessment has also considered noise attenuation provided by the multi-storey building on the South west.

Table 6-1 Required Glazing Upgrades

Room	Windows	Glazed Doors
Ground Floor (South, South East & South west)		
Living Room	Rw 33	Rw 35
Bedroom	Rw 33	Rw 35
Levels 1 - 3 (South, South East & South west)		
Living Room	Rw 35	Rw 35
Bedroom	Rw 35	Rw 35
Level 4 (South, South East & South west)		
Living Room	Rw 38	Rw 38
Bedroom	Rw 38	Rw 38
Level 5 (South, South East & South west)		
Living Room	Rw 38	Rw 38
Bedroom	Rw 38	Rw 38

6.3 Mechanical Ventilation

The windows and doors can be opened for natural ventilation throughout the proposed development. If mechanical ventilation is needed it must be approved by Council and it should be implemented in accordance with the relevant regulations such as the National Construction Code (NCC Vol.1, Part 4.5 *Ventilation of rooms*) and AS1668.2-2002 *The use of ventilation and air conditioning* will be required.

7 CONCLUSION

Rodney Stevens Acoustics has conducted a review of the proposed multi-storey residential development at 44 - 48 Rodley Avenue, Penrith. The review has assessed the noise generated by Penrith Paceway on the site as well as traffic noise intrusion and compared it with the noise criteria required by in Penrith City Council and other relevant standards.

Noise emissions criteria for mechanical plant has been stablished in accordance with the EPA's Noise Policy for Industry intrusiveness and amenity. A further noise survey must be carried out once a mechanical plant schedule has been finalised.

Based on the noise impact study conducted, the proposed development is assessed to comply with the SEPP (Infrastructure) 2007 noise criteria with recommendations from this report. It is therefore recommended that planning approval be granted for the proposed development on the basis of acoustics.

Approved: -

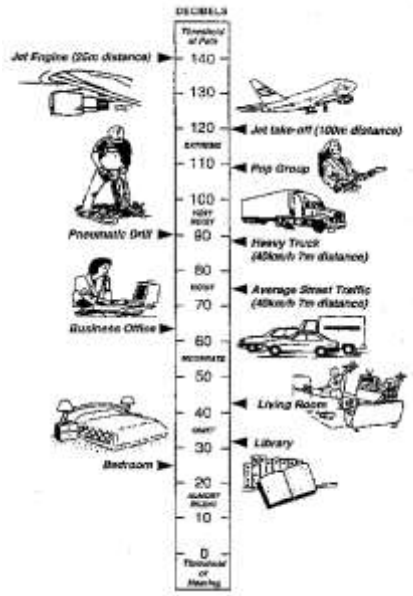
Rodney Stevens

Manager/Principal

Appendix A Acoustic Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic '*A-weighting*' frequency filter is applied to the measured sound level *dB(A)* to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: ▪ character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content) ▪ character of the environment (e.g. very quiet suburban, suburban, urban, near industry) ▪ miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations) ▪ human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: ▪ Noise mitigation benefits (amount of noise reduction provided, number of people protected). ▪ Cost of mitigation (cost of mitigation versus benefit provided). ▪ Community views (aesthetic impacts and community wishes). ▪ Noise levels for affected land uses (existing and future levels, and changes in noise levels).
Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.

Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10^{th} percentile min L_{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa. The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound power Level (SWL)

The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in *dB(A)*.

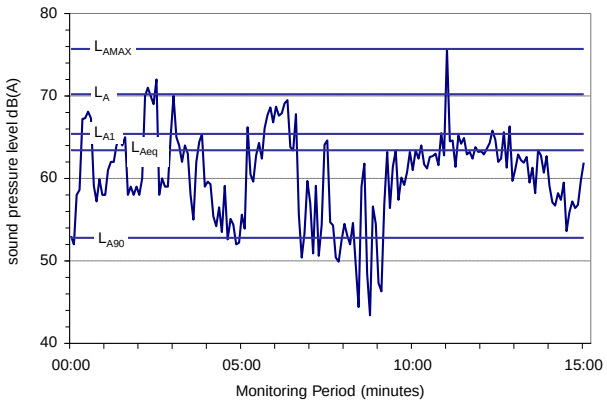
Sound Pressure Level (SPL)

The level of noise, usually expressed as SPL in *dB(A)*, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in *dB(A)* gives a close indication of the subjective loudness of the noise.

Statistic noise levels

Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15-minute measurement period is indicated in the following figure:



Key descriptors:

L_{Amax} Maximum recorded noise level.

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} Noise level present for 10% of the 15-minute interval. Commonly referred to the average maximum noise level.

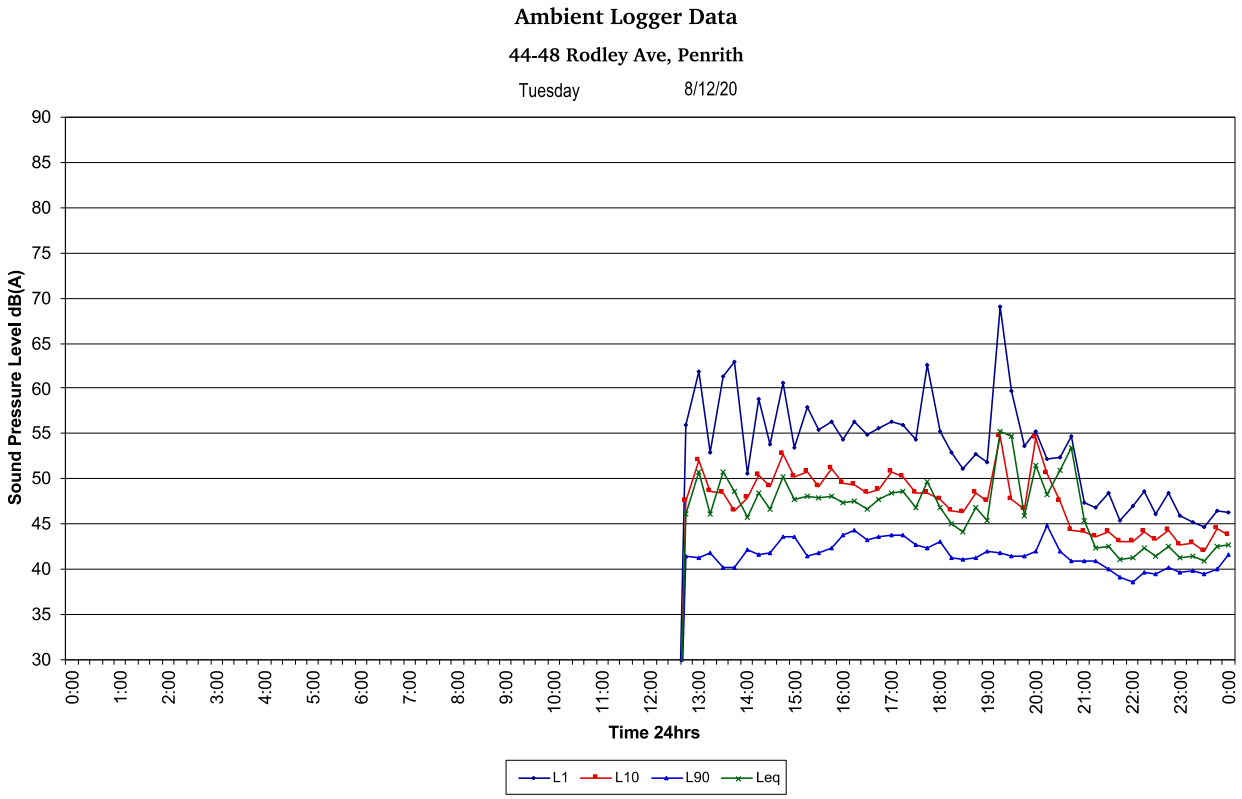
L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

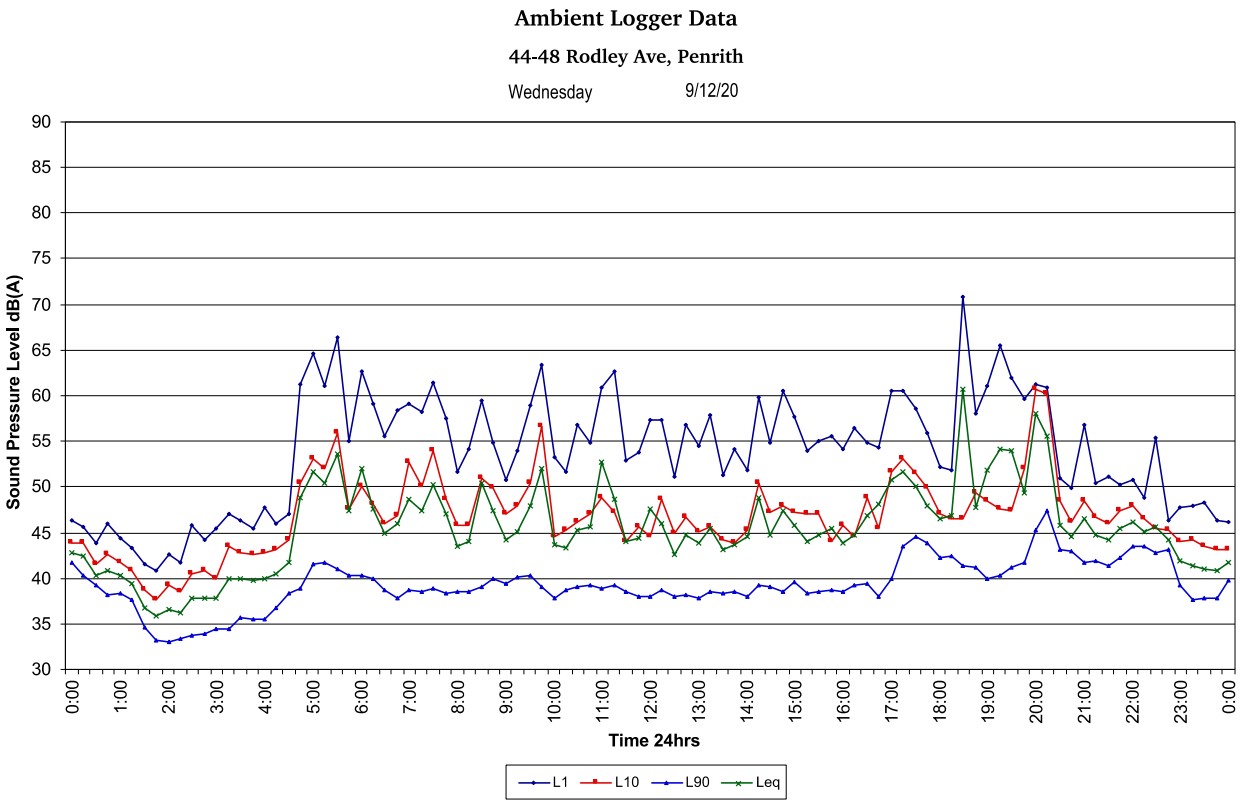
L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

Threshold The lowest sound pressure level that produces a detectable response (in an instrument/person).

Tonality Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

Appendix B Logger Graphs

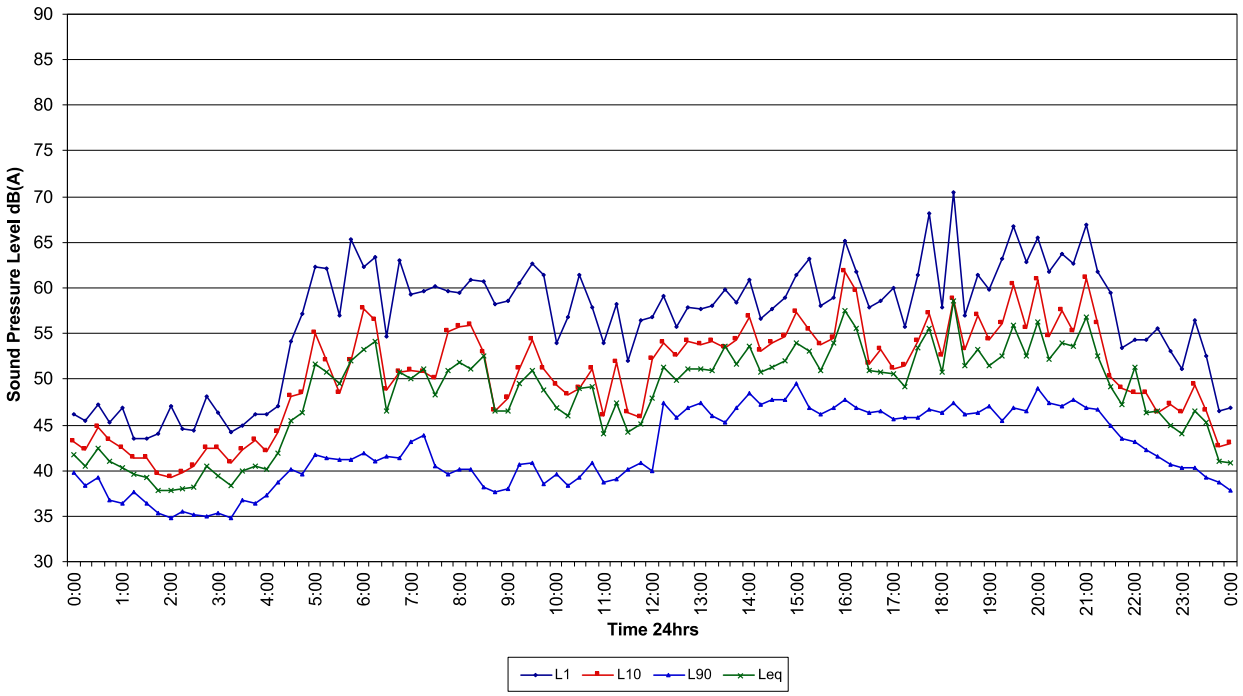




Ambient Logger Data

44-48 Rodley Ave, Penrith

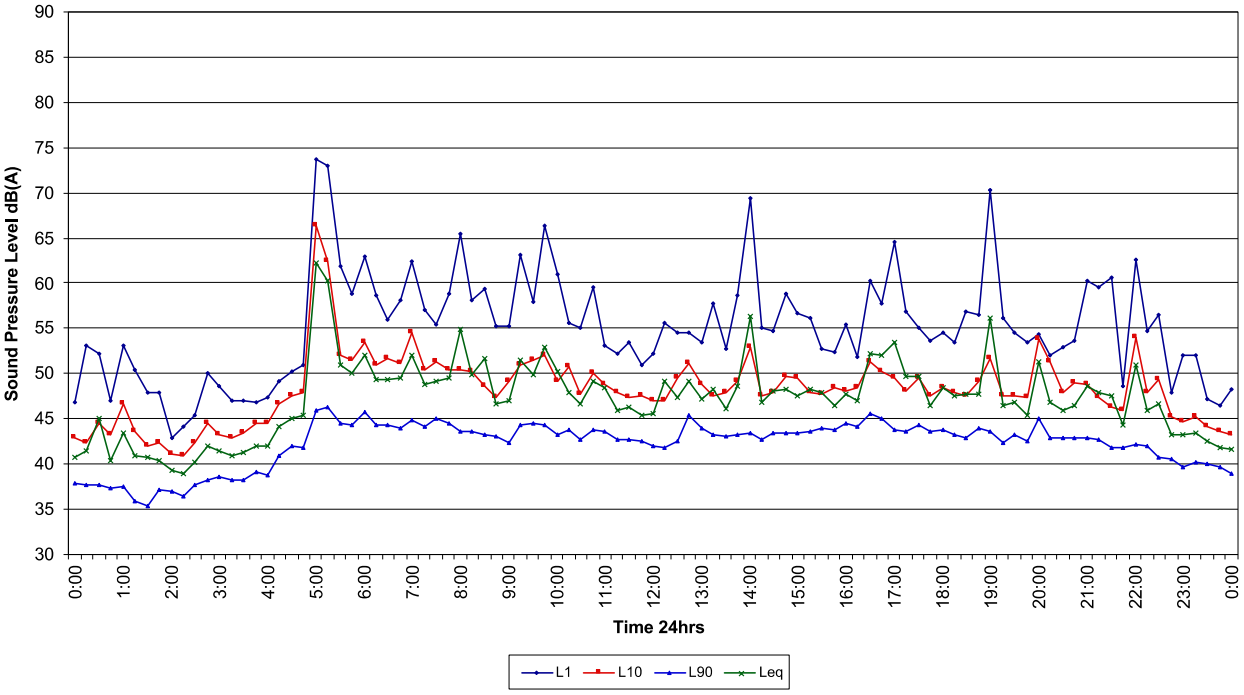
Thursday 10/12/20

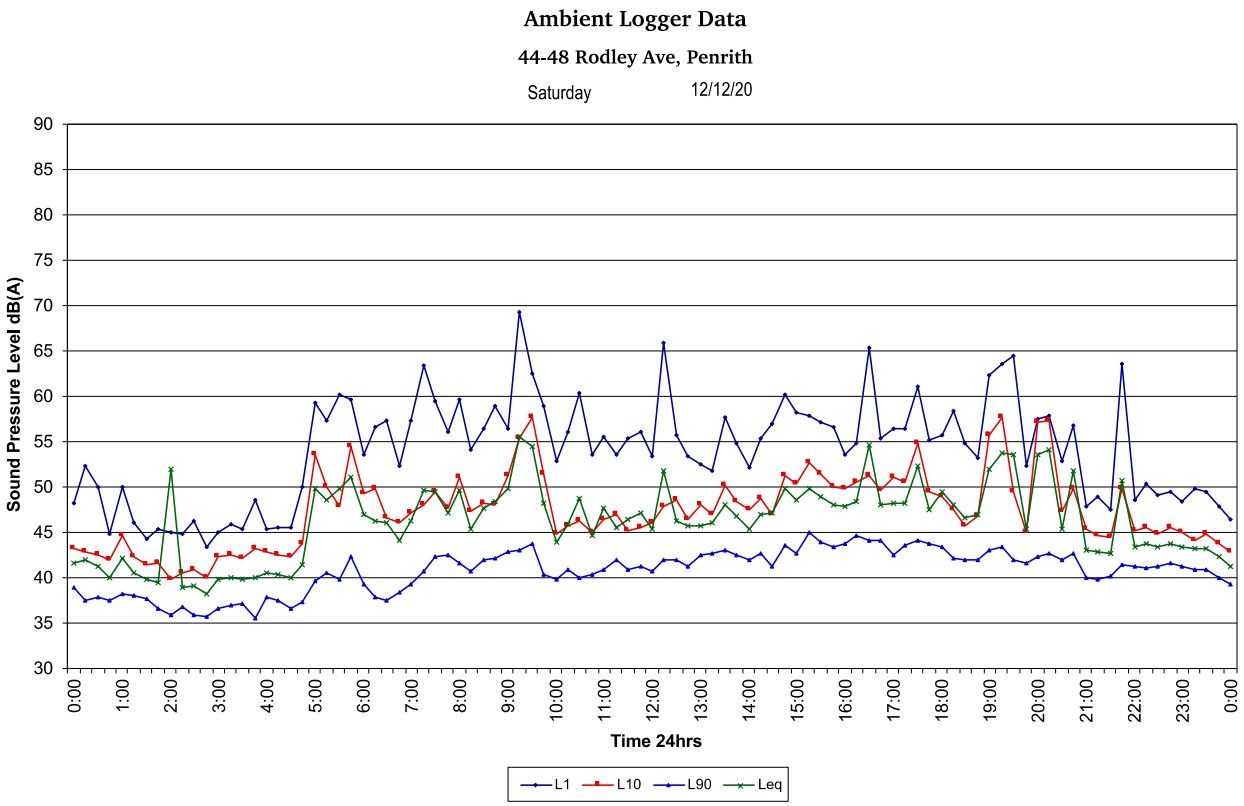


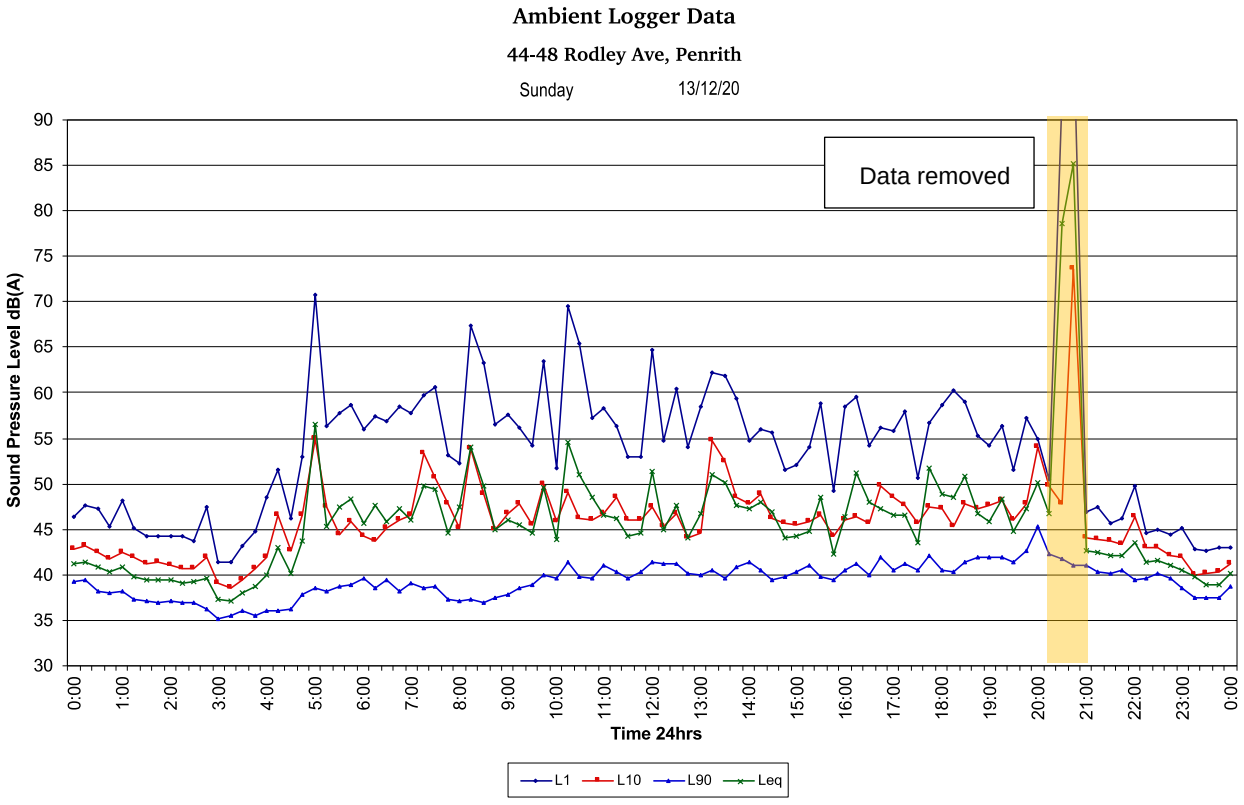
Ambient Logger Data

44-48 Rodley Ave, Penrith

Friday 11/12/20



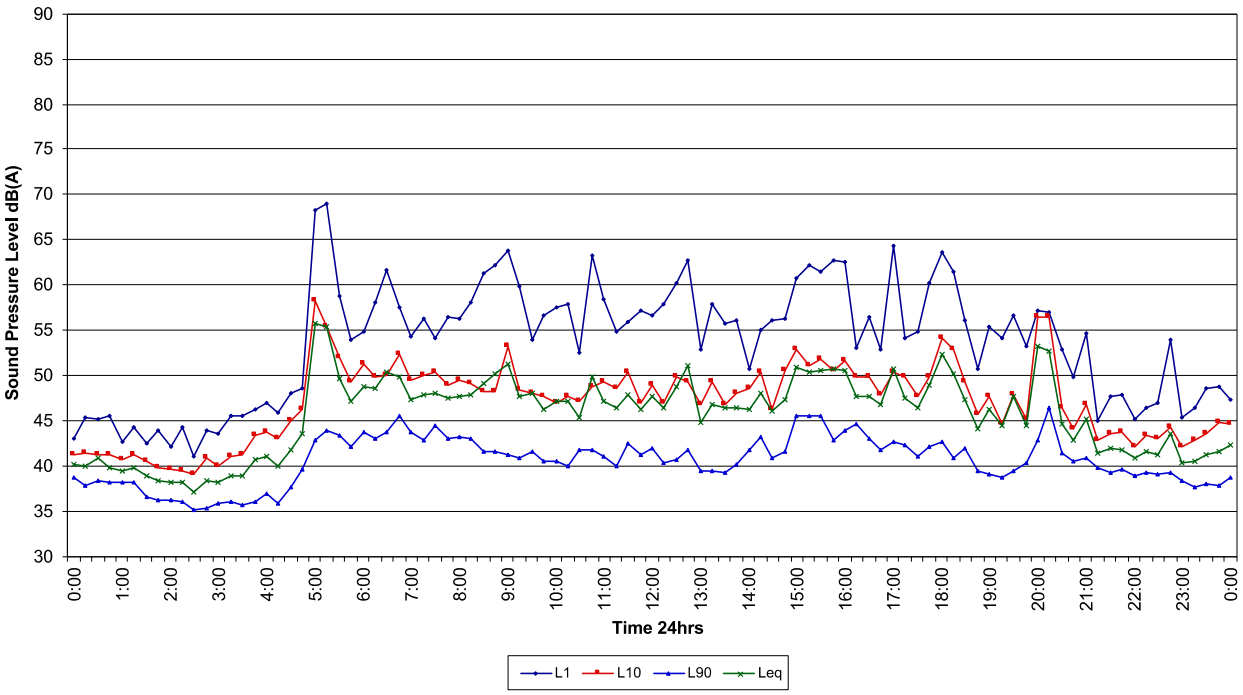




Ambient Logger Data

44-48 Rodley Ave, Penrith

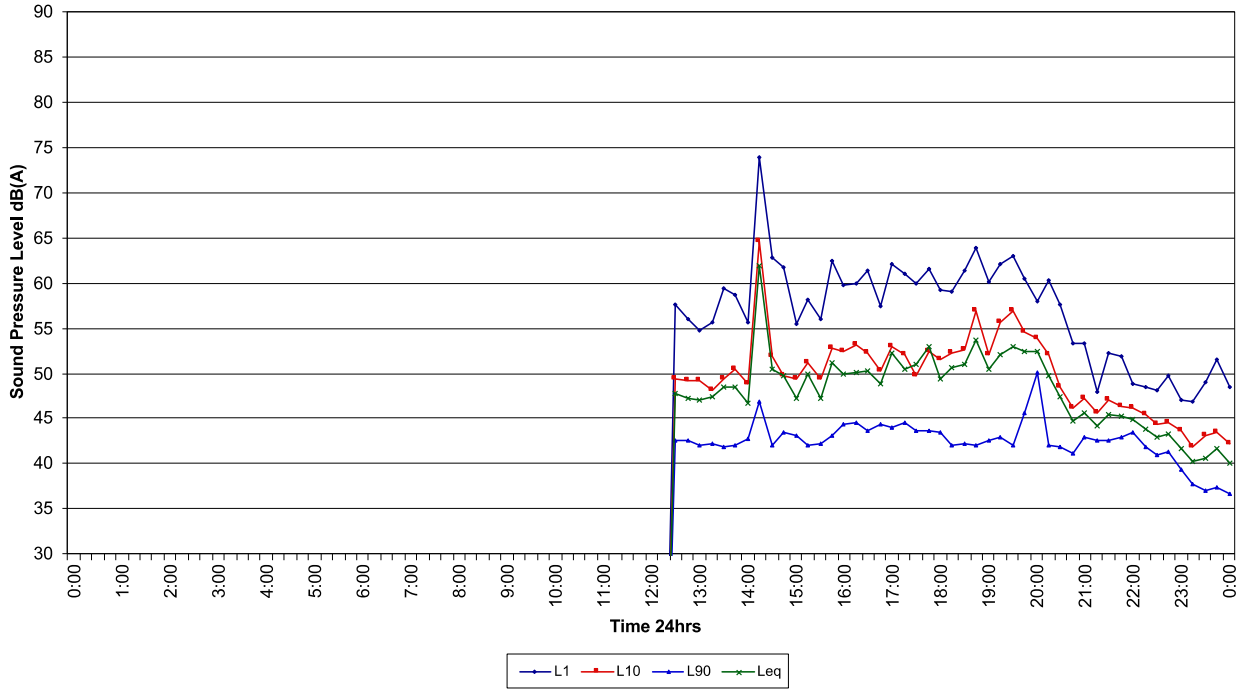
Monday 14/12/20



Traffic Logger Data

44-48 Rodley Ave, Penrith

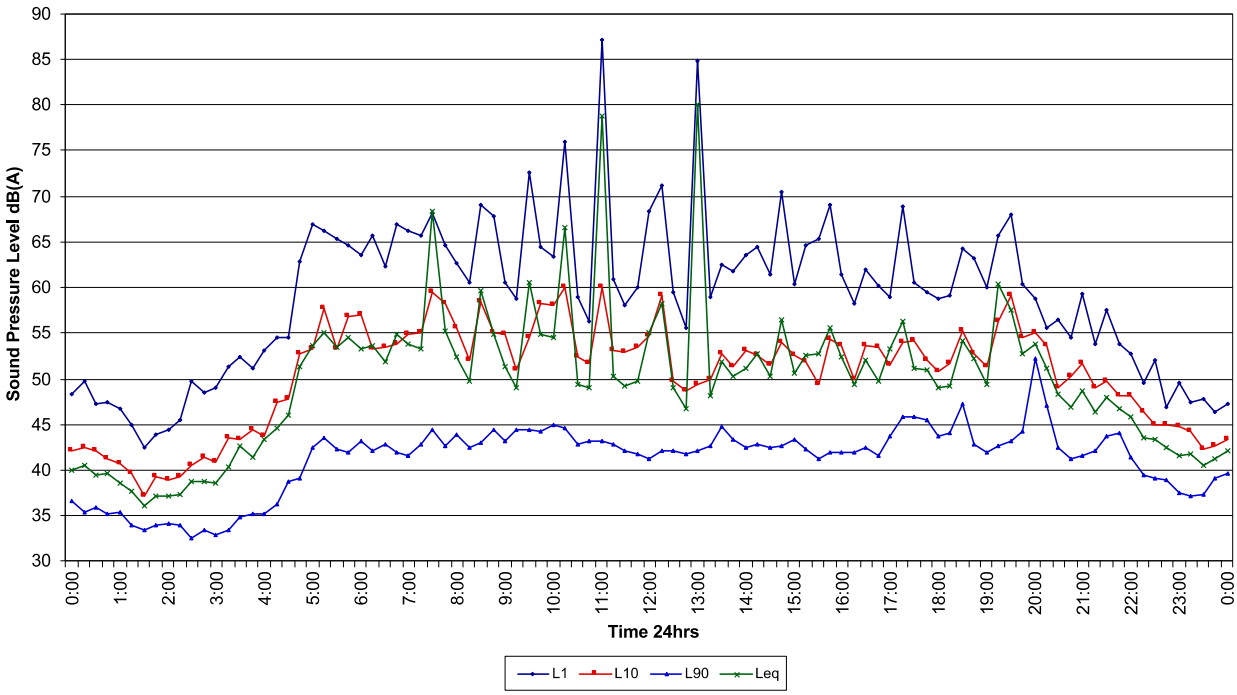
Tuesday 8/12/20



Traffic Logger Data

44-48 Rodley Ave, Penrith

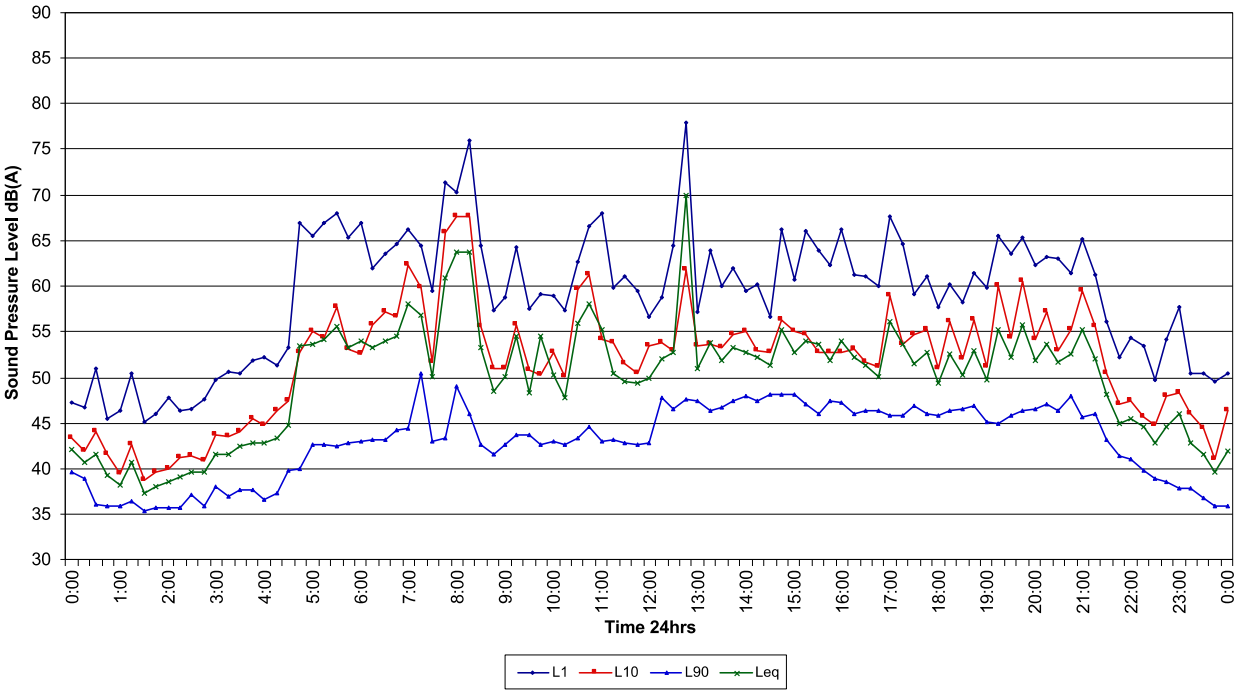
Wednesday 9/12/20

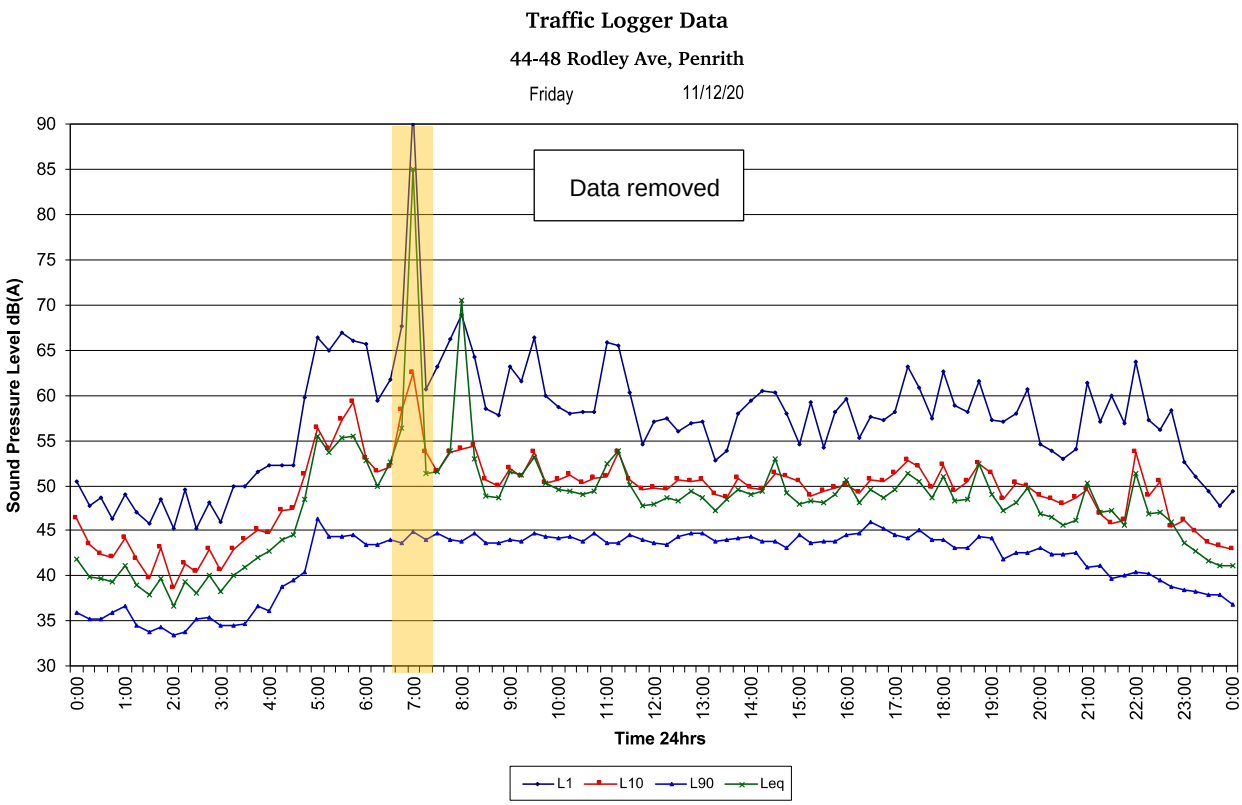


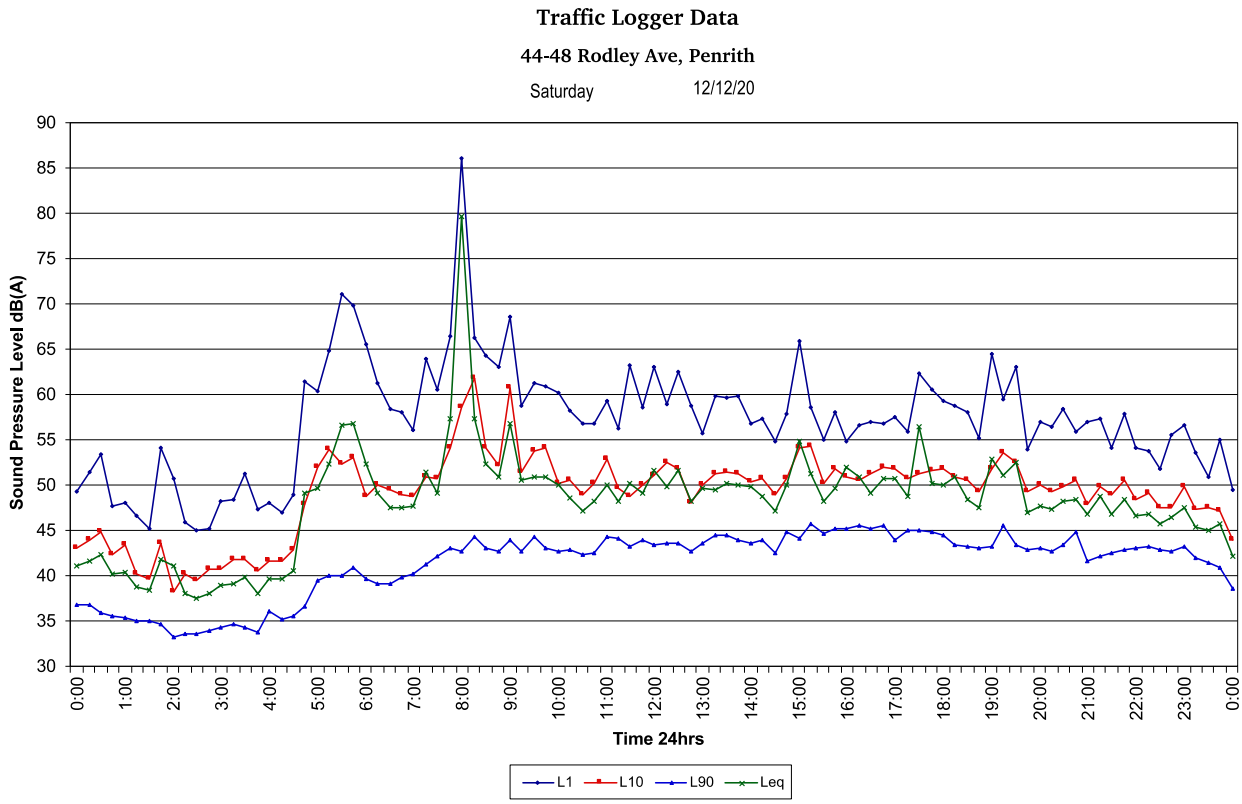
Traffic Logger Data

44-48 Rodley Ave, Penrith

Thursday 10/12/20



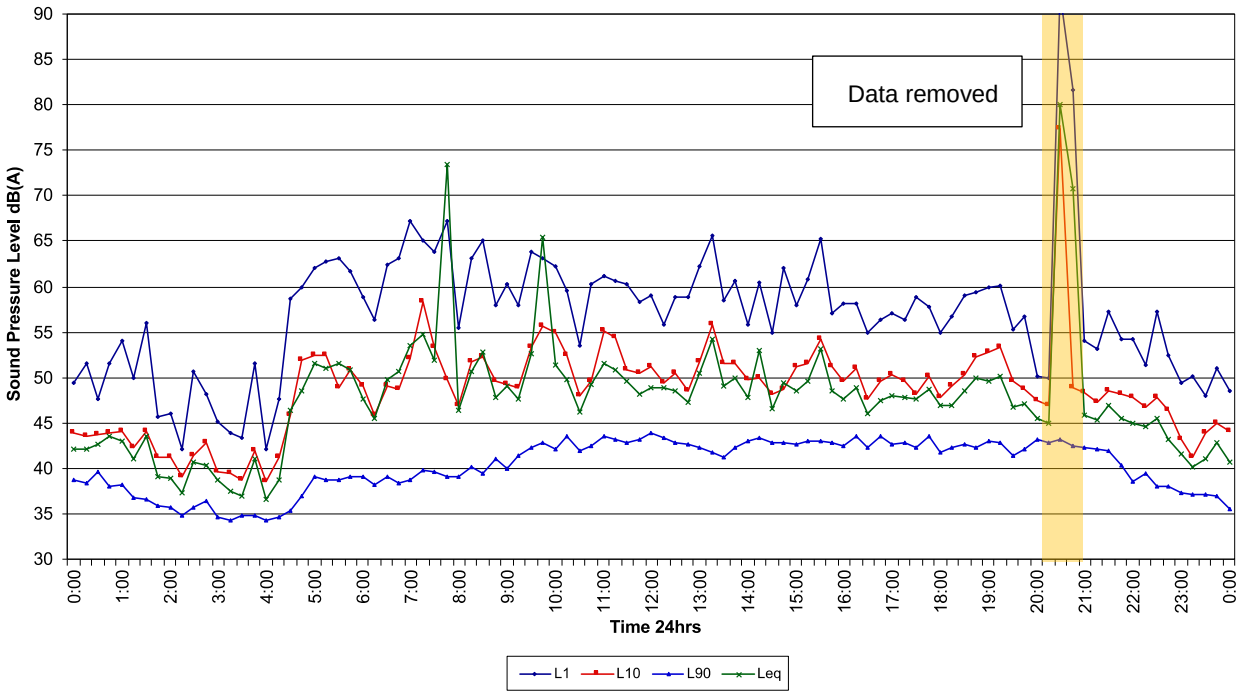




Traffic Logger Data

44-48 Rodley Ave, Penrith

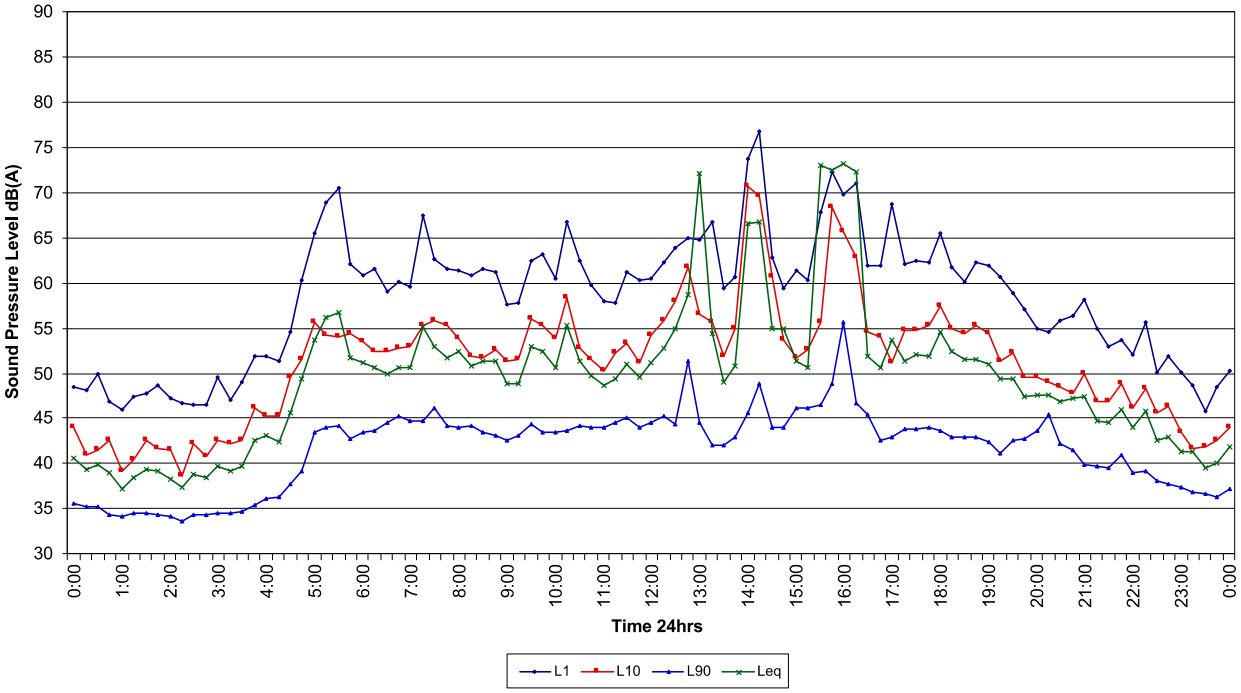
Sunday 13/12/20

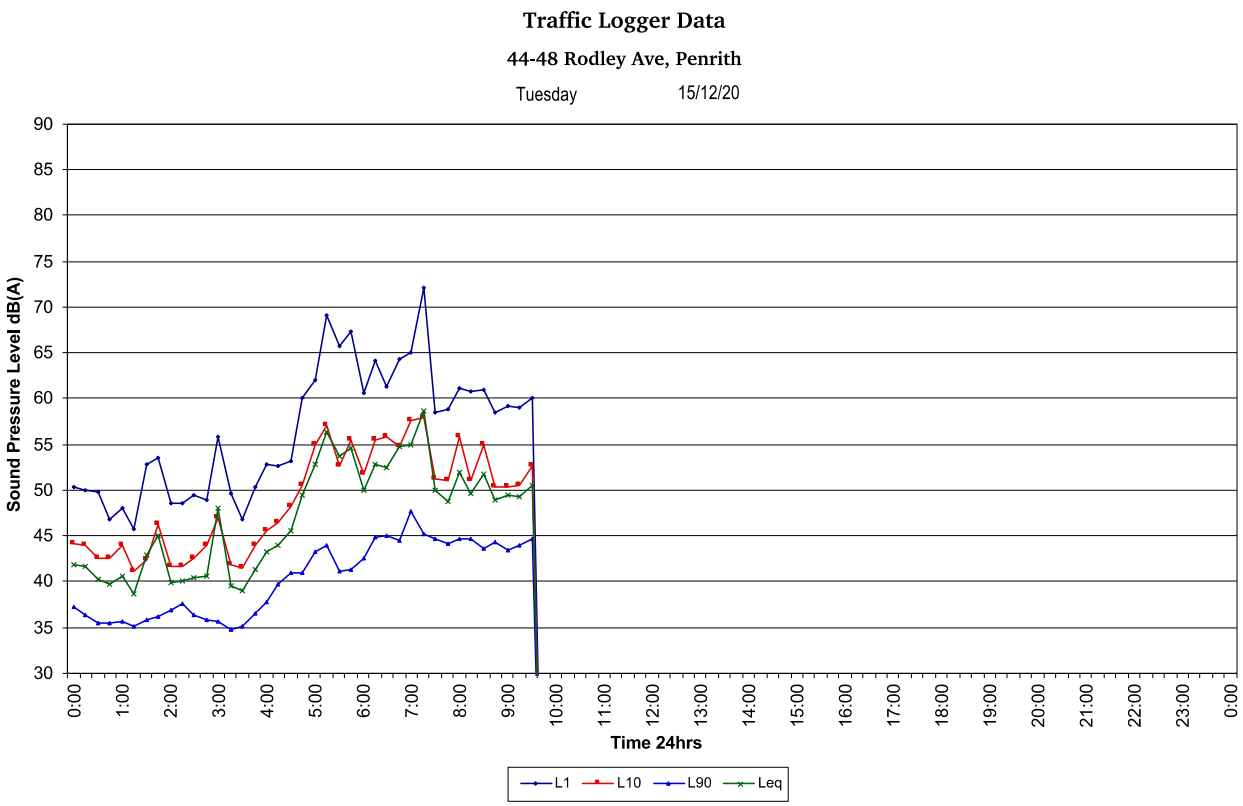


Traffic Logger Data

44-48 Rodley Ave, Penrith

Monday 14/12/20





Appendix C Calibration Certificate

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19006

Client Details	Rodney Stevens Acoustics Pty Ltd 1 Majura Close St Ives NSW 2075
Equipment Tested/ Model Number :	Rion NL-42EX
Instrument Serial Number :	00546395
Microphone Serial Number :	144589
Pre-amplifier Serial Number :	23057

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	22.3°C	**Ambient Temperature :**	23.5°C
Relative Humidity :	54.1%	**Relative Humidity :**	54.2%
Barometric Pressure :	99.64kPa	**Barometric Pressure :**	99.63kPa

Calibration Technician : Vicky Jaiswal **Secondary Check:** Lewis Boorman
Calibration Date : 10 Jan 2019 **Report Issue Date :** 11 Jan 2019
Approved Signatory : [redacted] Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3 2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1 2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1 2013 and because the periodic tests of IEC 61672-3 2013 cover only a limited subset of the specifications in IEC 61672-1 2013.

Least Uncertainties of Measurement :

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.21dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Accredited for compliance with ISO/IEC 17025 - calibration.
Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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Sound Level Meter
IEC 61672-3.2013
Calibration Certificate

Calibration Number C19390

Client Details	Rodney Stevens Acoustics Pty Ltd 1 Majura Close St Ives Chase NSW 2075
Equipment Tested/ Model Number :	Rion NL-42EX
Instrument Serial Number :	00572542
Microphone Serial Number :	170370
Pre-amplifier Serial Number :	72880

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	23.7°C	**Ambient Temperature :**	23.8°C
Relative Humidity :	38.9%	**Relative Humidity :**	38.9%
Barometric Pressure :	101.88kPa	**Barometric Pressure :**	101.88kPa

Calibration Technician : Lucky Jaiswal
Secondary Check: Eloise Burrows
Calibration Date : 3 Jul 2019
Report Issue Date : 8 Jul 2019

Approved Signatory : [redacted] Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	Pass
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	Pass
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

NATA
MUTUAL RECOGNITION ACCREDITATION

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172
Accredited for compliance with ISO/IEC 17025 - calibration

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

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Appendix D Architectural plans