RODNEY STEVENS ACOUSTICS
Acoustic Consultants
Member Australian Acoustical Society

REPORT R160627R1

Revision 3

Noise Impact Assessment
Proposed Place of Worship
53 Dwyer Road, Bringelly

PREPARED FOR:

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15 November 2018

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Noise Impact Assessment

Proposed Place of Worship

53 Dwyer Road, Bringelly

PREPARED BY:

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
R160627R1	Revision 0	28 November 2016	Camilo Castillo	Desmond Raymond	Rodney Stevens
R160627R1	Revision 1	14 September 2017	Camilo Castillo	Desmond Raymond	Rodney Stevens
R160627R1	Revision 2	14 November 2018	Camilo Castillo	Desmond Raymond	Rodney Stevens
R160627R1	Revision 3	14 November 2018	Camilo Castillo	Desmond Raymond	Rodney Stevens

TABLE OF CONTENTS

1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by VT Architects Pty Ltd to prepare a Noise Impact Assessment for the proposed Place of Worship located at 53 Dwyer Road, Bringelly. This assessment forms part of the supporting documentation for the Development Application stage of the project to Liverpool City Council.

The purpose of this report is to determine possible noise impacts on nearby receivers and if necessary provide acoustic control recommendations so that the proposed place of worship may operate in an acoustically compliant manner in accordance with Liverpool City Council's requirements.

This report presents RSA's methodology, assessment criteria and recommendations regarding noise breakout from the proposed building as well as the proposed carpark. Noise emission from mechanical plant does not form part of this assessment.

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 Description

The proposed development consists of a number of single storey buildings with an adjoining carpark. The proposed layouts are presented in Figure 2-1.

The nearest residential dwellings most affected by the operation of development are located next to the site. This assessment will focus on potential noise impact to these identified residences. Figure 2-1 shows an aerial image of the location of the proposed building, the surrounding environment and the noise monitoring location.

2.2 Proposed Development

The proposal is to build a place of worship behind the existing dwelling on site, a carpark will be constructed on the adjoining lot. The proposed development will consist a main shrine, as well as amenities.

The activities in places of worship of this nature are expected to be carried out in a quiet manner. The patronage expected during normal weeks is presented in Table 2-1. The major festivals throughout the year will see an increase of patronage. We note that most activities will be carried out in the main shrine and the pagoda.

Table 2-1 Expected Patronage

Day	Average Attendance
Monday - Friday	6
Saturday - Sunday	10 - 25
Special Events	45 - 95

2.3 Hours of operation

The following table presents the proposed hours of operation for the place of worship

Table 2-2 Proposed Hours of operation

Location	Start Time	End Time
Temple	9:00 am	4:00 pm
Dining Area (Kitchen)	It is open after prayer gatherings only	
Special Events	9:00 am	3:00 pm

This information is based on the plan of management provided by VT Architects Pty Ltd

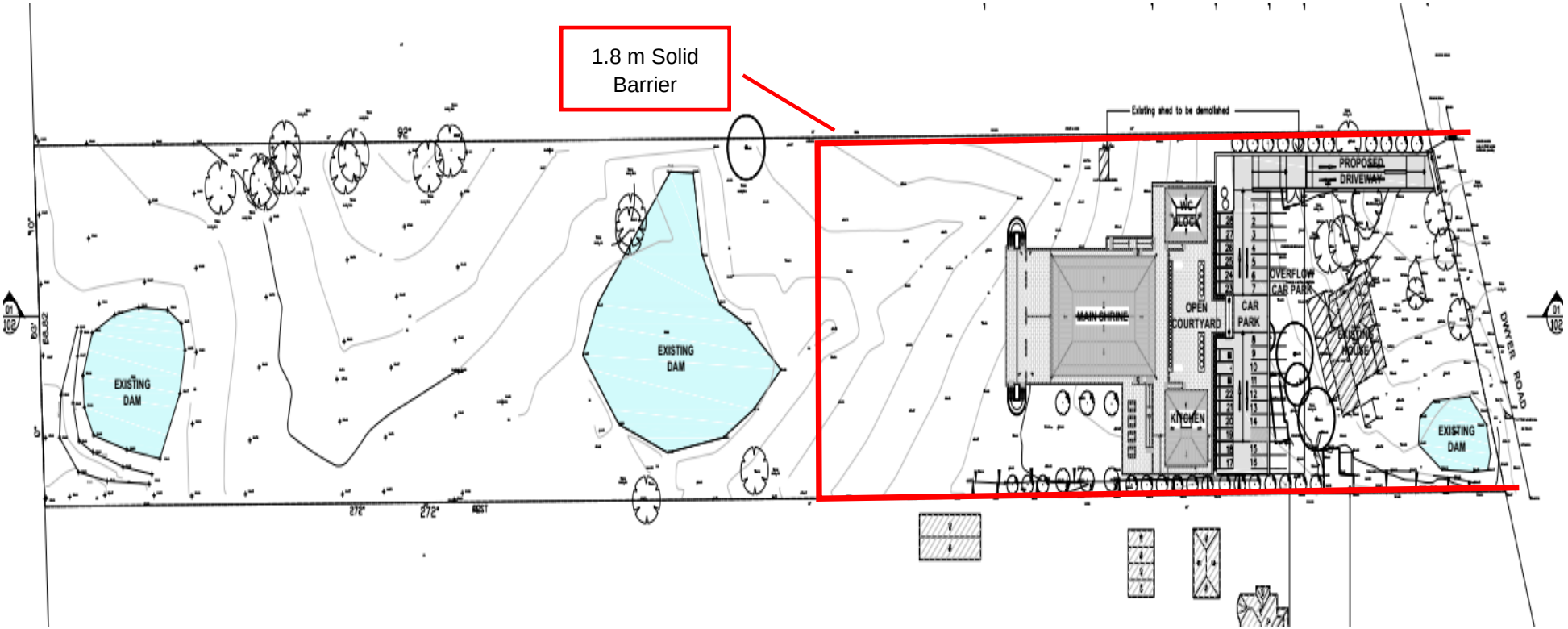
2.4 Site Location

The site is bounded by residential dwellings to the east, north and south and empty lots to the west, the following figure shows the site and its surroundings

Figure 2-1 Site Location

Image Courtesy of Near Maps © 2016.

Figure 2-2 Proposed Site Layout



3 BASELINE NOISE SURVEY

3.1 Unattended Noise Monitoring

In order to characterise the existing acoustical environment of the area unattended noise monitoring was conducted between Friday 18th November and Friday 25th November 2016. The logger was located on the southern boundary of the site as shown in Figure 2.1

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

Instrumentation for the survey comprised of a Rion NL-42 Environmental Noise Logger, (serial number 810779) fitted with microphone windshield. Calibration of the loggers 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.

Measured data has been filtered to remove data measured during adverse weather conditions upon consultation with historical weather reports provided by the Bureau of Meteorology (BOM).

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10}, L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary for definitions in Appendix A).

Detailed results at the monitoring location are presented in graphical format in Appendix B. The graphs show measured values of L_{A1}, L_{A10}, L_{A90} and L_{Aeq} for each 15-minute monitoring period.

3.2 Data Processing

In order to assess future noise emissions from the proposed operation of the development, the data obtained from the noise logger has been processed in accordance with the procedures contained in the NSW Environmental Protection Authority's (EPA) *Industrial Noise Policy* (INP, 2000) to establish representative noise levels that can be expected in the residential vicinity of the site. The monitored baseline noise levels are detailed in Table 3-1.

Table 3-1 Measured Baseline Noise Levels Corresponding to Defined INP Periods

Location	Measurement Descriptor	Measured Noise Level – dB(A) re 20 µPa		
		Daytime 07.00 am - 6.00 pm	Evening 6.00 pm – 10.00 pm	Night-time 10.00 pm - 7.00 am
53 Dwyer Road	L_{Aeq}[2]	45	44	41
	RBL (L_{90}) [3]	28	33	27

Notes 1: All values expressed as dB(A) and rounded to nearest 1 dB(A);

Note 2: 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.

Note 3: L_{A90} Noise level present for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

4 NOISE CRITERIA

Liverpool City Council in letter reference PL-71/2015, dated 13th July 2016 requires the following.

> *The noise assessment report prepared by Alan Parks Consulting dated November 2014 was restricted to monitoring undertaken at the site on Tuesday 15 November 2014. The NSW EPA's Industrial Noise Policy requires sufficient monitoring of background noise to allow instrusive noise to be assessed adequately. Typically, one week of valid data covering the days and times of operation of the proposed development is required to meaningfully determine the existing noise environment. Consequently, additional noise monitoring is required.*
>
> *The acoustic report must also assess the cumulative noise impact of the proposed development and assign project-specific noise goals according to the most stringent of the intrusive or amenity criteria. As predicted noise measurements were not included in the report, the noise impact of the proposed development is unknown. Therefore, a comprehensive acoustic assessment is required of the development in accordance with the NSW EPA's Industril Noise Policy.*

4.1 Industrial Noise Policy (INP)

The noise emission from any mechanical plant associated with the proposed development, such as air-conditioning condensers, should be controlled to avoid impacting upon the acoustic amenity of nearby receivers. Responsibility for the control of noise emission in New South Wales is vested in Local Government and the EPA.

The EPA oversees the INP, released in January 2000 which provides a framework and process for deriving noise criteria. The INP criteria for industrial noise sources (eg mechanical plant) have two 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.

4.1.1 Assessing Intrusiveness

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

4.1.2 Assessing Amenity

The amenity criterion 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 criteria 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 criterion, then noise levels from new industrial-type noise sources, (including air-conditioning plant) need to be designed so that the cumulative effect does not produce total noise levels that would significantly exceed the criterion. For areas of high road traffic, there are further considerations that influence the selection of the noise criterion.

4.1.3 Area Classification

The INP characterises the "Rural" noise environment as an area with an acoustical environment that:

- Is dominated by natural sounds, having little or no traffic. Such areas may include
- An agricultural area, except those used for intensive agricultural activities
- A rural recreational area, such as resort areas
- A wilderness area or national park
- An area generally charactirised by low background noise levels (except in the immediate vicinity of industrial noise sources)

Subsequent to assessing the noise environment at the site, RSA has deemed this area to fall under the "Rural" area classification.

4.1.4 Project Specific Criteria

Having defined the area type, the processed results of the unattended noise monitoring have been used to generate project specific noise criteria in accordance with INP principles. The project specific noise levels are the most stringent of the Intrusive and Amenity criteria and are shown in bold in Table 4-1.

Table 4-1 Criteria for Mechanical Noise Emissions to Residential Receivers

Time of Day	Noise Level dB(A) re 20 µPa				
				INP Criteria	
	ANL[1] (period)	Measured RBL $L_{A90(15minute)}$[2]	Measured $L_{Aeq(15minute)}$	Intrusive	Amenity
				$L_{Aeq(15minute)}$ Criterion for New Sources	$L_{Aeq(Period)}$ Criterion for New Sources[3]
Day	50	28	45	**35**	48
Evening	45	33	44	**38**	39
Night	40	27	41	**35**	**32**

Note 1: ANL Acceptable Noise Level for a suburban area; Note 2: RBL Rating Background Level
Note 3: Assuming existing noise levels unlikely to decrease; Note 4: Project Specific Criteria are shown in bold

The project specific noise emission criterion established in accordance with the INP for this site is **35 dB(A)**.for the day time, **38 dBA** for the evening and **35 dBA** for the night time period. This criteria will apply to noise emission from any proposed use as measured at the boundary of any nearby residential receivers.

The RBL has been set to 30 dB(A) in accordance with Section 3.1.2 of the Industrial Noise Policy 2000. Where the rating background level is found to be less than 30 dB(A), then it is set to 30 dB(A)

5 NOISE IMPACT ASSESSMENT

5.1 General Activity Noise Emissions

The following sections summarise the results of patron and carpark noise emissions and predicted levels at nearby residential receivers as a result of the operation of the proposed Place of Worship.

Calculations of the amount of noise transmitted to these receivers from the proposed Place of Worship have been based on voice levels as referenced in the Handbook of Acoustical Measurements and Noise Control by Cyril M. Harris. This handbook provides voice spectrums for males and females as well as different vocal efforts. The spectrum is given in Table 5-1.

The spectra have been scaled based upon the overall amount of patrons expected to be in the different areas at any given time (Refer to Section 2.2)

Table 5-1 Speech Spectrums - Handbook of Acoustical Measurements and Noise Control.

Type	Noise Level (dB) at Octave Band Centre Frequency (Hz)							Overall dB(A)
	125	250	500	1 k	2 k	4 k	8 k	
Male (Raised)	53	59	64	58	54	49	43	64
Female (Raised)	35	55	60	58	54	49	43	62

5.1.1 Patron Sound Power Levels

Based on the maximum number of patrons as presented in Table 2-1, the following worst-case operational scenarios have also been assumed for our assessment:

- All 95 patrons will be chanting and singing inside the main Shrine (worst case scenario)
- All windows and doors are closed.
- Noise generating activities will occur within the main buildings, the noise from patrons outside will be minimal as they will be walking from building to building and only general chatter will be expected.

Appropriate speech sound power levels have been calculated for the varying number and distribution of patrons.

5.1.2 Predicted Noise Impacts

Predictive resultant noise spectrums have been calculated for all proposed activities. Noise emissions at the nearest residential receivers are presented in the table below. The predicted noise calculations take into account the following:

- Heights of receivers are assumed to be 1.5 m above ground level.
- All 95 patrons may engage in chanting and singing inside the main shrine (worst case scenario).
- People walking outside will do so in a quite manner.
- All doors and windows will be closed during operation of the buildings (During Festivals).
- No amplified music is played within any building

5.2 Place of Worship Noise Emissions

The nearest residential receivers are adjoining the site to the east, north and south. The following figure shows the proposed development in relation to the most affected receivers

Figure 5-1 Receiver Locations

The resulting noise levels from the operation of the proposed Place of Worship are presented in the table below, we have assumed the worst case scenario were the main shrine is operating at full capacity.

The resulting noise levels from the operation of the proposed Place of Worship into the adjoining residential premises are presented in the table below:

Table 5-2 Predicted Noise Impact Levels at Nearby Receivers

Receiver	Time	Calculated Noise Level	Criteria	Compliance
R1	Day	32	35	Yes
R2	Day	<20	35	Yes
R3	Day	33	35	Yes
R4	Day	<20	35	Yes

The calculated noise levels presented in the table above assume that all 95 patrons will be using the main shrine and will be engaging in singing/chanting (worst case scenario). We note that events where the church hall will be at full capacity are likely to occur during specific festivals throughout the year. Most activities that involve noise are usually carried out inside the buildings.

The patron attendance during normal weekdays and weekends is expected to be in accordance with Table 2-2.

We have assumed that all external glazing is laminated glass and will have a minimum thickness of 6.38mm. The church hall windows on the western façade will need to be upgraded (Refer to Section 5.3)

5.3 Carpark Noise Assessment

Calculations of noise from the carpark have been based on a traffic repot prepared by ML Traffic Engineers, report number A1413964N 1b dated August 2017, we have also included typical noise generating events within a carpark such as, door slams and engine starts. We have assumed the worst case where a special event takes place. We have used the traffic generation conditions from Sections 4.1 and 5.1 of the traffic report.

We note that the special events will end at 3:00pm and will cater for 95 people as per plan of management Section 5

The calculated noise levels from the activities carried out within the carpark are presented in the table below:

Table 5-3 Calculated Carpark Noise Levels – Commercial Receivers

Receiver	Predicted Carpark Activity Noise– dB(A)	Criteria	Compliance
R1	36	35	Yes*
R2	31	35	Yes
R3	36	35	Yes*
R4	20	35	Yes

* An exceedance of 1dB(A) is generally considered to be acoustically insignificant

6 NOISE CONTROL RECOMMENDATION

The noise emissions from the proposed Place of Worship has been assessed to comply with the project specific noise criteria with the implementation of the following noise controls:

- The external glazing is to have a minimum thickness of 6.38mm. 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.
- A solid barrier should be erected around the proposed development to maintain the amenity to the surrounding receivers (Refer to Figure 2-2 for height details and location).
- All patrons must be advised to leave the facility in a quiet manner
- Patrons are not to congregate outside, temple assistants and/or event organisers guards must direct patrons into their vehicles and ensure that all patrons leave in an orderly manner
- Signs must be erected in the carpark advising patron not to cause unnecessary noise
- Children are to be supervised at all times. We note the temple does not provide playground areas

7 CONCLUSION

A noise impact assessment has been conducted in relation to the operation of the proposed Place of Worship located at 53 Dwyer Road, Bringelly.

This assessment has been conducted and appropriate noise emission criteria have been established in accordance with Liverpool City Council's letter reference PL-71/2015, dated 13th July 2016.

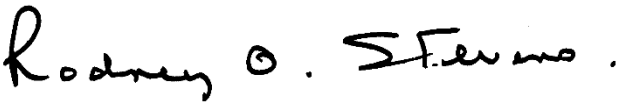
This report shows that under the most conservative operating scenarios and the implement of the recommendations, operational noise emission from the proposed Place of Worship will achieve the established noise criteria at neighbouring residences.

Criteria for noise emissions from mechanical plant have been established, a further acoustic survey by a qualified acoustic consultant may be required once mechanical plant schedules have been selected.

Criteria for noise emissions from carpark have been established, a further acoustic survey by a qualified acoustic consultant may be required once plans for the carpark have been finalized.

It is therefore recommended that planning approval be granted for the proposed development on the basis of acoustics.

Approved:-



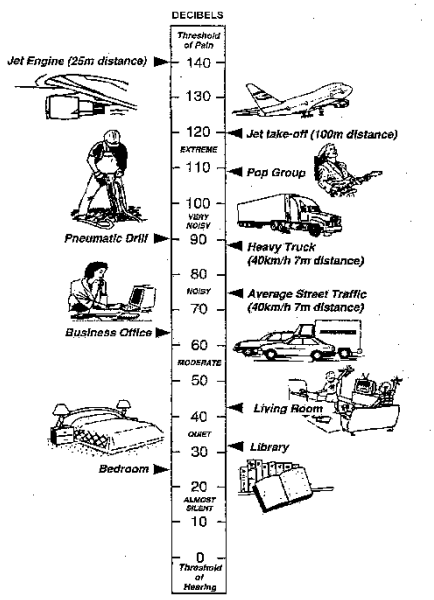
Rodney Stevens

Managing Director

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)*.

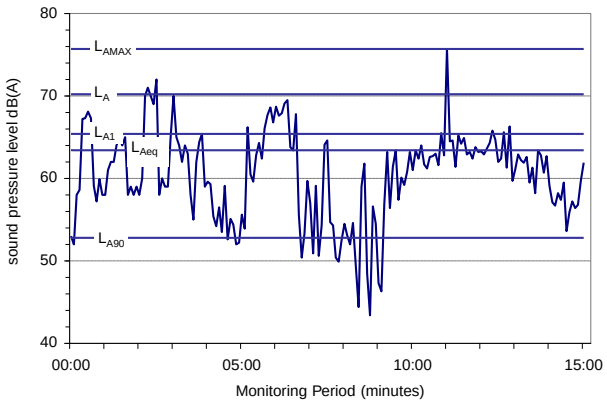
Sound Pressure Level (SPL)

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.

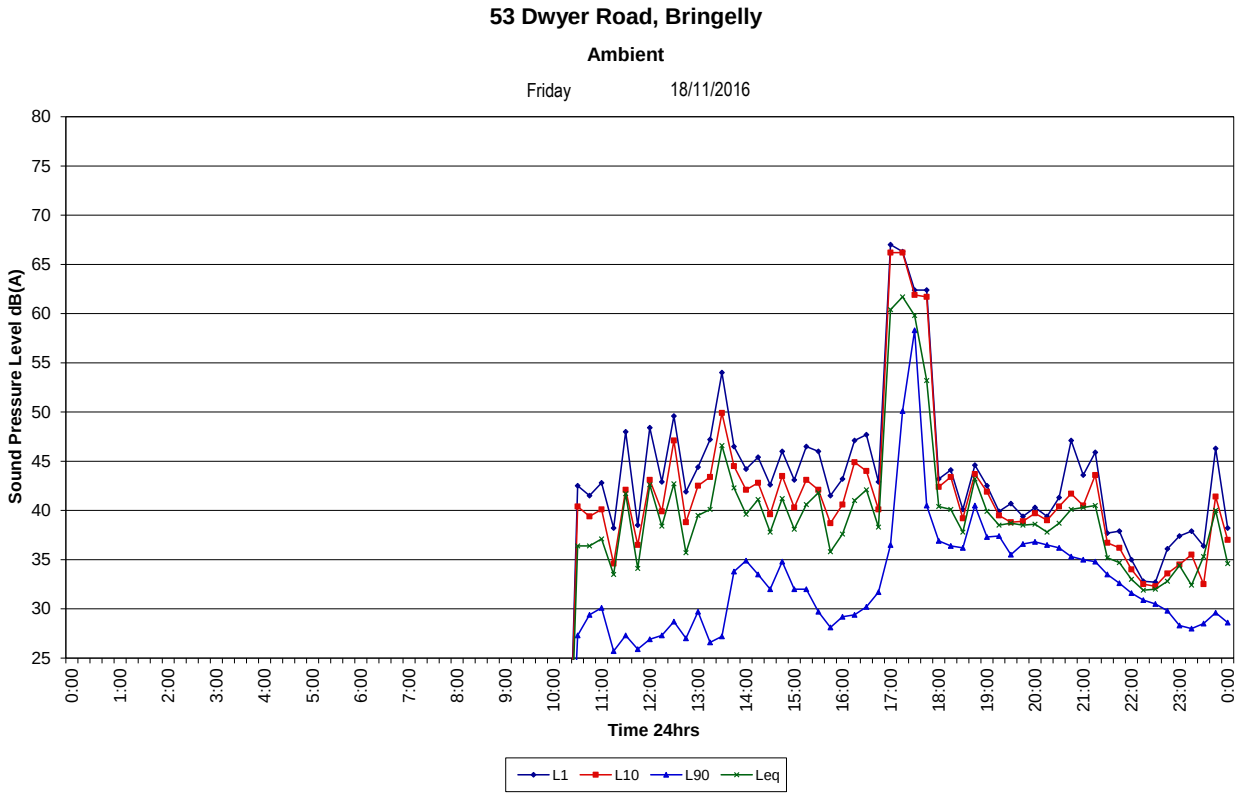
L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

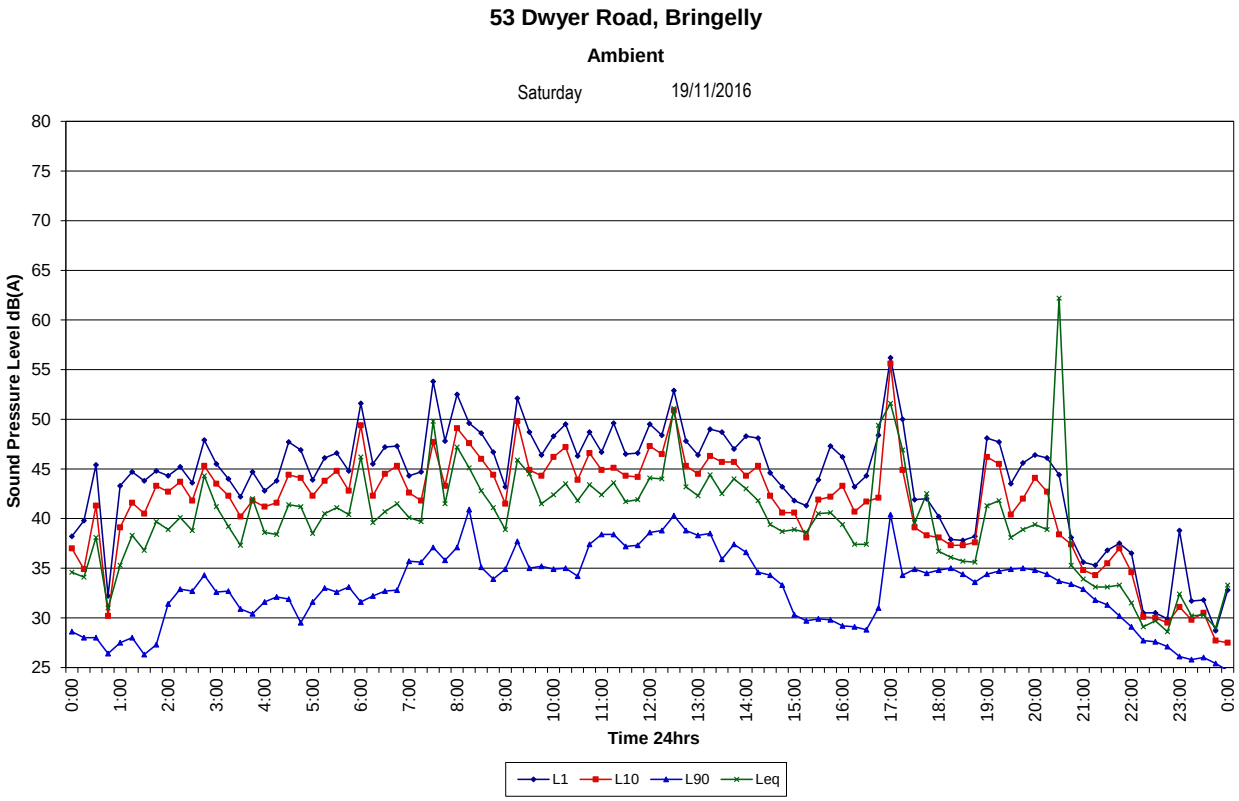
L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

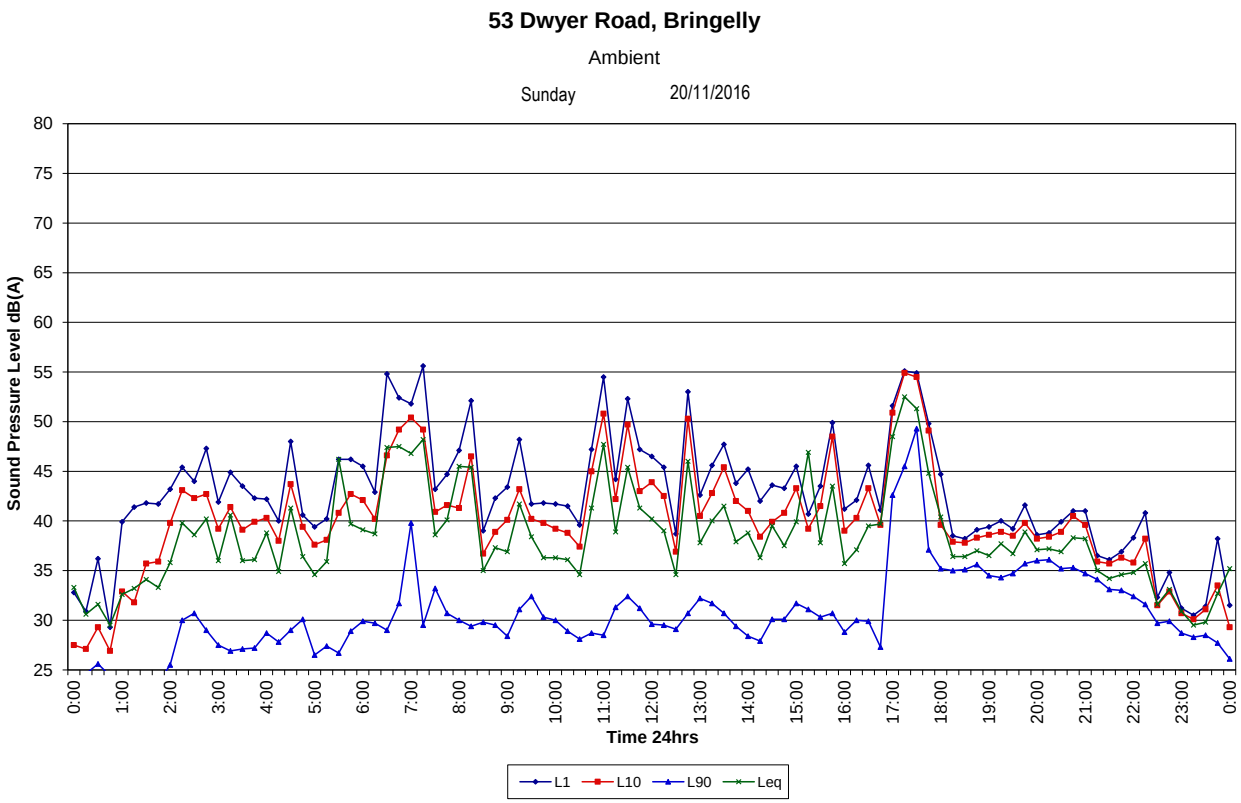
Threshold The lowest sound pressure level that produces a detectable response (in an instrument/person).

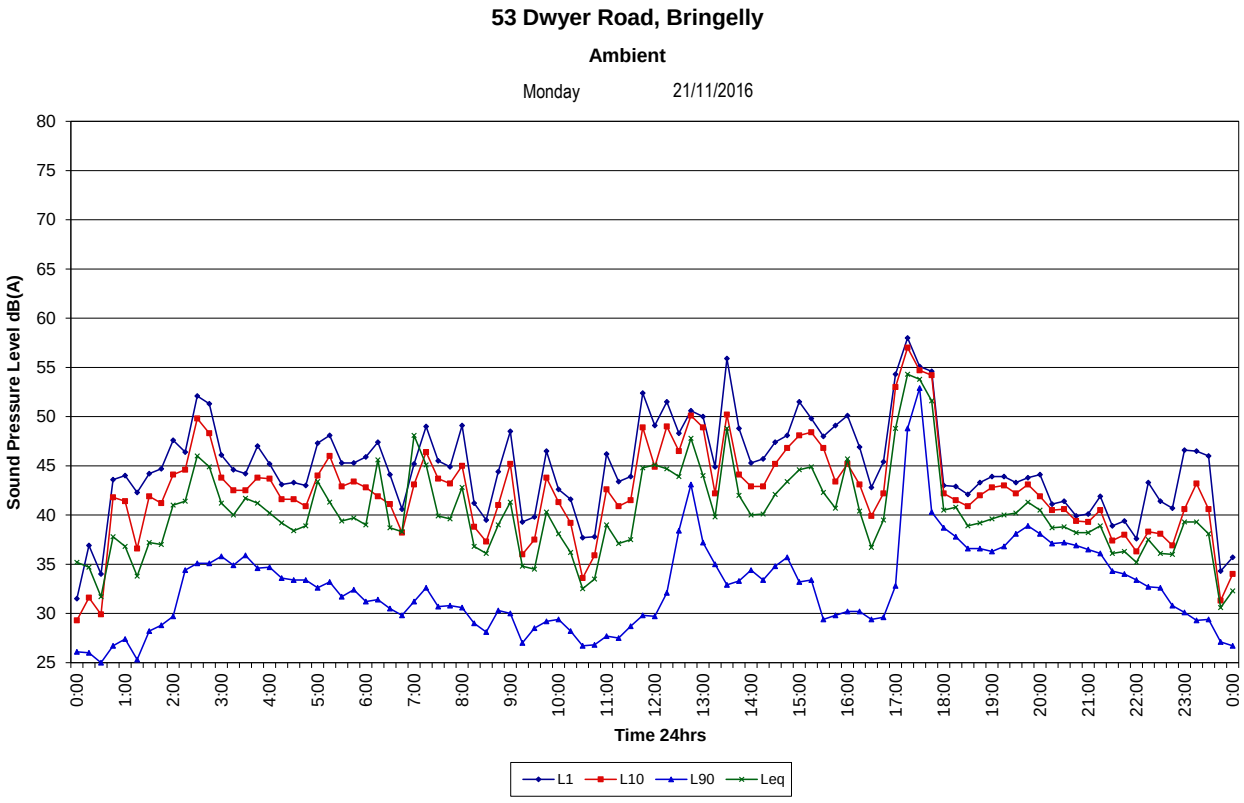
Tonality Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

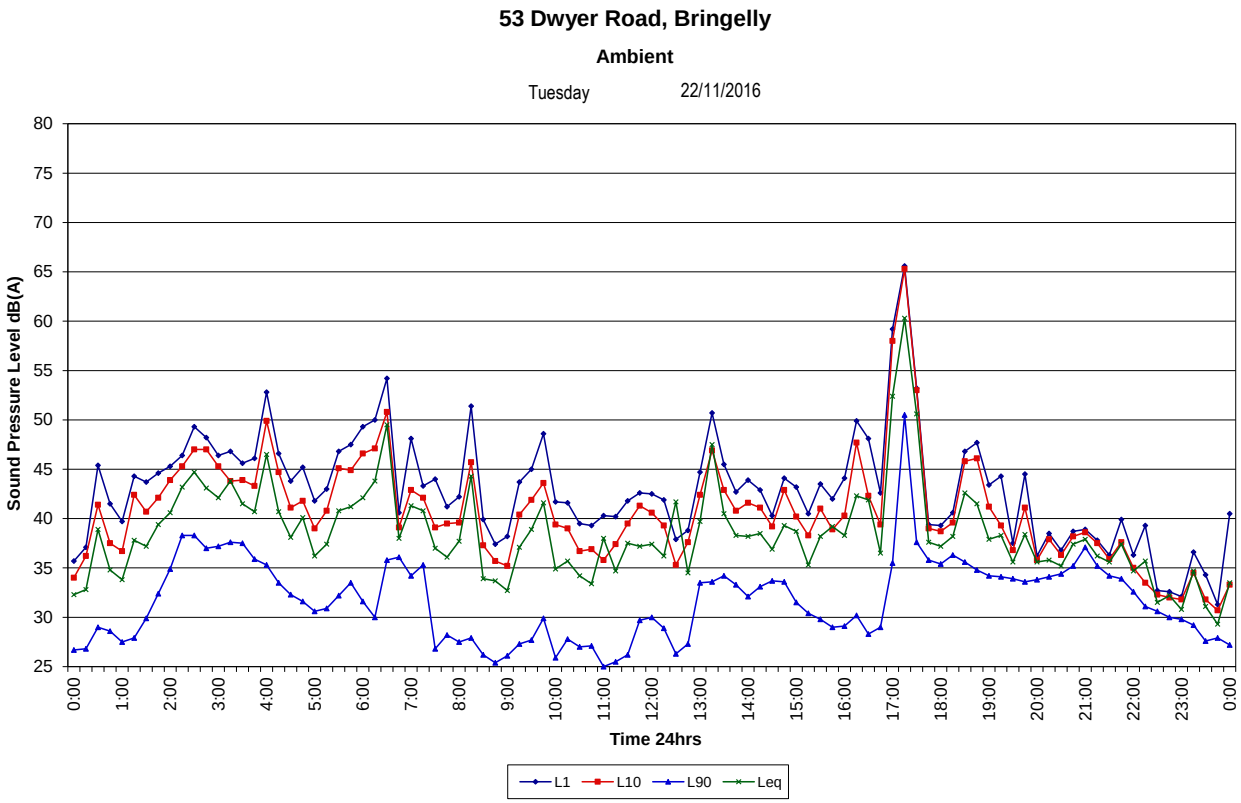
Appendix B – Baseline Noise Survey Graphs

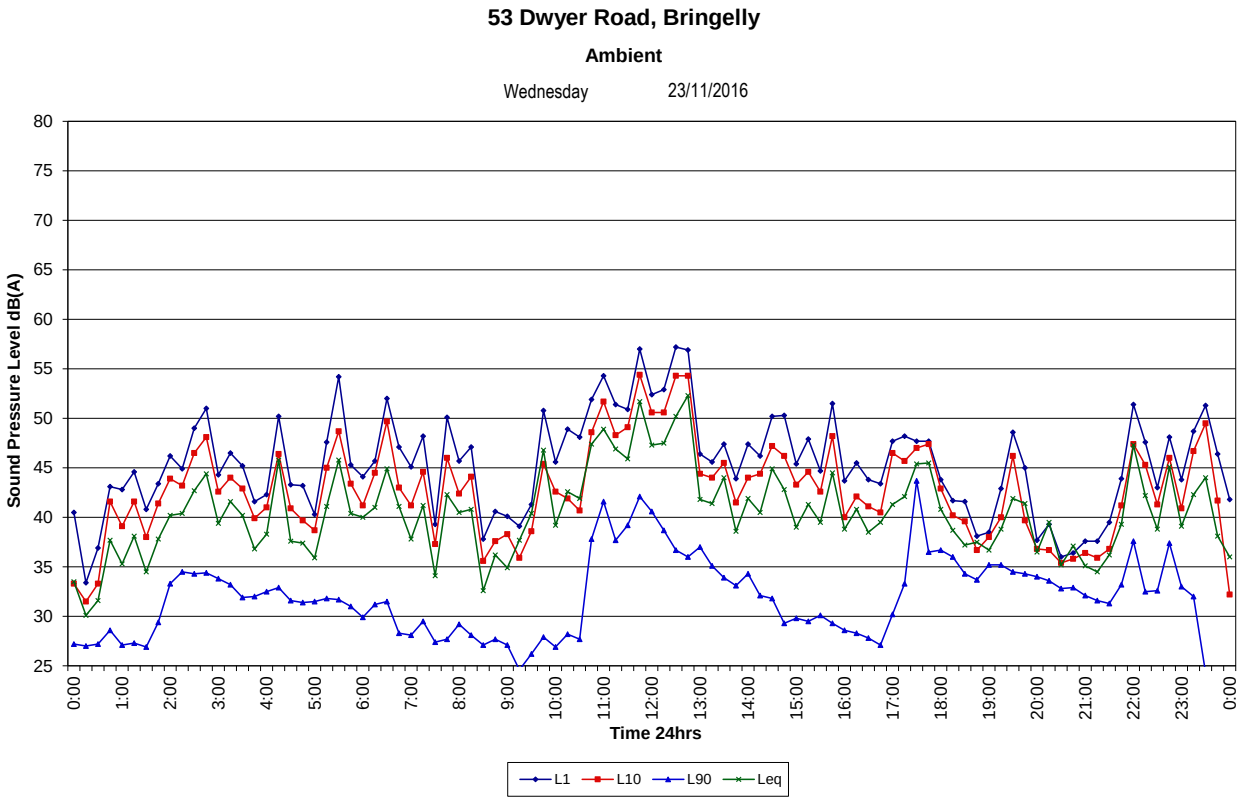


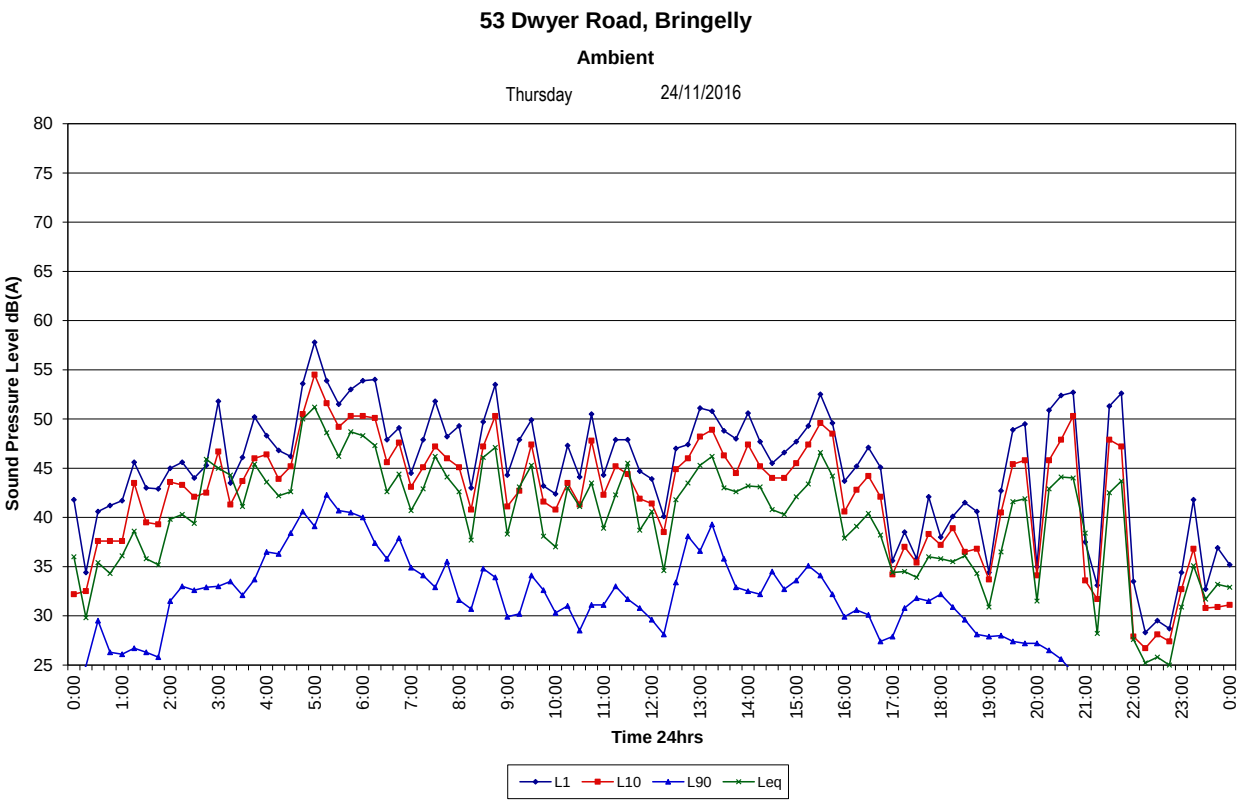



53 Dwyer Road, Bringelly
Ambient
Sunday 20/11/2016
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


53 Dwyer Road, Bringelly
Ambient
Monday 21/11/2016
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


53 Dwyer Road, Bringelly
Ambient
Tuesday 22/11/2016
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


53 Dwyer Road, Bringelly
Ambient
Wednesday 23/11/2016
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq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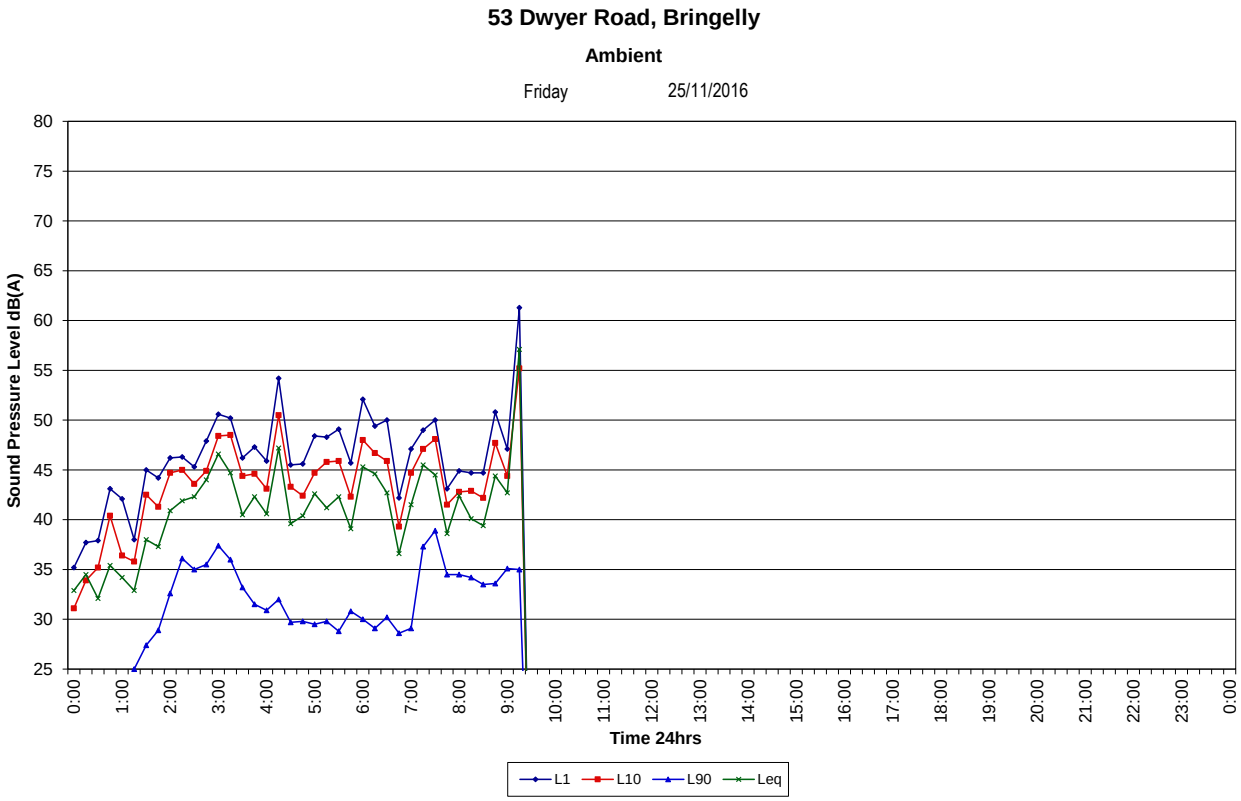
Ambient
Thursday 24/11/2016
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


53 Dwyer Road, Bringelly
Ambient
Friday 25/11/2016
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq

Appendix C – Instrument 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 61672-3.2006

Calibration Certificate

Calibration Number C15557

Client Details Rodney Stevens Acoustics Pty Ltd
1 Majura Close
St Ives Chase NSW 2075

Equipment Tested/ Model Number : Rion NL-42
Instrument Serial Number : 00810779
Microphone Serial Number : 148338
Pre-amplifier Serial Number : 22257

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	20.8°C	**Ambient Temperature :**	20.7°C
Relative Humidity :	51.4%	**Relative Humidity :**	51.4%
Barometric Pressure :	99.85kPa	**Barometric Pressure :**	99.81kPa

Calibration Technician : Dennis Kim
Calibration Date : 20/10/2015
Secondary Check: Kate Alchin
Report Issue Date : 20/10/2015

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	*Pass*	14: Level linearity on the reference level range	*Pass*
11: Acoustical tests of a frequency weighting	*Pass*	15: Level linearity incl. the level range control	*Pass*
12: Electrical tests of frequency weightings	*Pass*	16: Toneburst response	*Pass*
13: Frequency and time weightings at 1 kHz	*Pass*	17: Peak C sound level	*Pass*
		18: Overload Indication	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2006, 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 61672-1:2002 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 61672-1:2002 and because the periodic tests of IEC 61672-3:2006 cover only a limited subset of the specifications in IEC 61672-1:2002.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.120dB*	*Temperature*	*±0.3°C*
12.5kHz	*±0.165dB*	*Relative Humidity*	*±4.1%*
16kHz	*±0.245dB*	*Barometric Pressure*	*±0.1kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.121dB*		

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

NATA
WORLD RECOGNISED ACCREDITATION

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

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

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

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