RODNEY STEVENS ACOUSTICS
Acoustic Consultants

REPORT R200332R1

Revision 1

Noise Impact Assessment

Proposed Additions - The Robertson Hotel

1 Fountaindale Rd, Robertson NSW 2577

PREPARED FOR:
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13 August 2020

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1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by the XPACE Design Group to prepare a Noise Impact Assessment for the proposed additions to the existing Hotel located at 1 Fountaindale Rd, Robertson. This assessment forms part of the supporting documentation for DA submission to Wingecarribee 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 modifications may operate in an acoustically compliant manner in accordance with Wingecarribee Council's requirements and Liquor and Gaming NSW license conditions.

This report presents RSA's methodology, assessment criteria and recommendations regarding patron noise emissions from the operation of the proposed additions. Noise emission from the additions to the Robertson hotel will also be covered in this report. Mechanical services noise emission from the hotel do 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 Robertson Hotel was built in the early 1920's. The purpose of the country club was to provide the community with outdoor entertainment and activities. At the time the grounds of the hotel included a golf course, tennis courts, polo fields and walking tracks

For various reasons overtime the use of the land was reduced. The Council rezoned the land around the hotel which was then subdivided.

In the hundred years of its existence the hotel has never stopped operating. Since the 1970s the Hotel has operated as currently is, offering accommodation and catering for weddings, events, and dining facilities for the public..

It is noted that during its time of operation, the hotel has provided outdoor activities, has catered to the community for functions and special events and has not had an issue regarding noise impacts. This can be attributed to the need and acceptance of the hotel by the community

The proposed works have been designed to minimise any potential noise issues by having internal events and function areas that are acoustically contained and purpose built to eliminate issues. This is a more favourable solution than having a marquee on rural/residential land and holding major events and weddings as it is occurring in similar places.

Outdoor activities at The Robertson Hotel gardens such as wedding ceremonies, tea parties or similar have been held for 100 years and this is a main feature of the existing business. If these events continue to be professionally managed and operated it is unlikely there will be any noise issues.

The proposed additions consist of a number of new buildings to the north and west of the existing hotel as well as new accommodation for guests. The hotel currently has a restaurant and café and caters for members of the public as well as special events and functions

The Robertson Hotel is located within a residential area with empty land to the east. Figure 2-1 shows an aerial image of the location of the Robertson Hotel, the surrounding environment and the noise monitoring location.

2.2 Proposed Development

The proposal is to build a new reception hall and a number of guest rooms across the site. The following show the patron capacities of the Hotel

Function Room (New)	300 Patrons
Restaurant (Existing)	120 Patrons
Restaurant (New)	120 Patrons
Café (Existing)	50 Patrons

Figure 2-2 below show the floor plan of the proposed changes.

2.3 Hours of Operation

It is understood that the Robertson Hotel has the following hours of operation:

Table 2-1 Hours of Operation

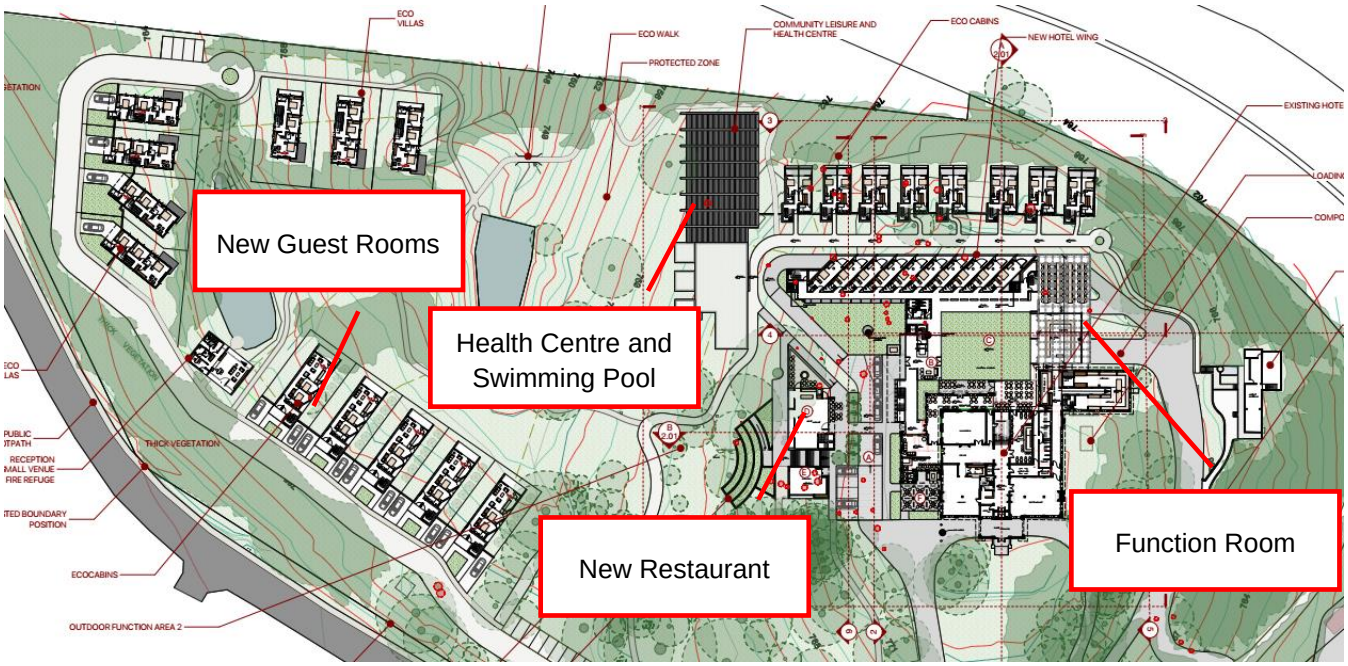
Space	Days	Hours of Operation
Restaurant	7 days	11:00am – 11:00pm
Café	Weekends	7:30am – 4:00pm
Function Room	As per Bookings	10:00am – Midnight*

* We note that all functions will finish at midnight, patrons will be directed to their rooms

Figure 2-1 Site Location

Image Courtesy of Near Maps © 2020.

Figure 2-2 Proposed Additions



3 BASELINE NOISE SURVEY

3.1 Unattended Noise Monitoring

In order to characterize the existing acoustical environment of the area unattended noise monitoring was conducted between Monday 22nd June and Monday 29th June 2020. The first logger was located at the west of the site away from any noise generating equipment from the Robertson Hotel, this location is representative of the ambient noise levels of the area. The second logger was installed inside the hotel on the 3rd level.

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 residents and landowners.

Instrumentation for the survey comprised of 2 Octave Frequency Analyzing Environmental Noise Loggers (serial numbers 546395 and 572558) fitted with microphone windshield. 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.

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 establish the ambient noise criteria of the area, the data obtained from the noise logger has been processed in accordance with the procedures contained in the NSW Environmental Protection Authority's (EPA) *Noise Policy for Industry* (NPfI, 2017) 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 NPfI Periods

Location	Measurement Descriptor	Measured Noise Level – dB(A) re 20 µPa		
		Daytime 7 am - 6 pm	Evening 6 pm – 10 pm	Night-time 10 pm – 7 am
Logger at western boundary of site	L_{Aeq}	49	45	44
	RBL (Background)	38	28	29

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

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 present for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

3.2.1 LG Analysis

Liquor and Gaming NSW provides a guideline to access noise from licensed venues, the noise criteria is required to be in one octave band frequency. The noise logger used for the unattended measurements has the capability of recording noise data in one octave band frequency allowing us to establish spectral information of typical background noise levels experienced by the nearby residential receivers.

The background noise levels have been processed in accordance with NPfI procedures and are presented in octave band frequency form in Section 4.2 of this report

4 NOISE CRITERIA

The establishment of the noise criteria for the assessment of the proposed additions have been based on the LG noise guidelines.

4.1 Liquor and Gaming

LG guidelines for the assessment of noise from licensed premises is as follows:

a) The L_{A10} noise level emitted from the use must not exceed the background noise level (L_{90}) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) by more than 5 dB between the hour of 7.00 am and 12.00 midnight when assessed at the boundary of any affected residence.

b) The L_{A10} noise level emitted from the use must not exceed the background noise level (L_{90}) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) between the hour of 12.00 midnight and 7.00 am when assessed at the boundary of any affected residence.

c) Notwithstanding compliance with a) and b) above, the noise from the use must not be audible within any habitable room in any residential property between the hours of 12.00 midnight and 7.00 am.

4.2 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.

4.2.1 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.

4.2.2 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.

4.2.3 Area Classification

The NPfI characterises the “Rural” noise environment as an area with an acoustical environment that:

- is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels.
- Settlement patterns would be typically sparse

The area surrounding the proposed development falls under the “Rural” area classification.

4.2.4 Project Specific Trigger Noise Levels

Having defined the area type, the processed results of the unattended noise monitoring have been used to determine project specific project trigger noise levels. The intrusive and amenity project trigger noise levels for nearby residential premises are presented in Table 4-1. These project trigger noise levels are nominated for the purpose of assessing potential noise impacts from the proposed development.

In this case, the ambient noise environment is not controlled by industrial noise sources and therefore the project amenity noise levels are assigned as per Table 2.2 of the NPfI (Recommended Amenity Noise Levels) and standardised as per Section 2.2 of the NPfI. For each assessment period, the lower (i.e. the more stringent) of the amenity or intrusive project trigger noise levels are adopted. These are shown in bold text in Table 4-1.

Table 4-1 Operational Project Trigger Noise Levels

Receiver	Time of Day	ANL [1] L_{Aeq}	Measured		Project Trigger Noise Levels	
			RBL [2] $L_{A90(15min)}$	Existing $L_{Aeq(Period)}$	Intrusive $L_{Aeq(15min)}$	Amenity $L_{Aeq(15min)}$
Residential	Day	50	38	49	**43**	53
	Evening	45	30*	45	**35**	58
	Night	40	30*	44	**35**	43

Note 1: ANL = "Amenity Noise Level" for residences in Rural Areas.

Note 2: RBL = "Rating Background Level".

* The ambient noise levels have been set to 30 dB(A) in accordance with Section A1.2 of the NPfI.

4.3 Project Specific Noise Criteria

Based on the spectral data from the noise logger the project specific noise criteria for the operation of the proposed additions to the hotel have been established in accordance with LG noise guidelines. The project specific noise criteria for the residential receivers is presented in tables below.

Table 4-2 External Criteria for Operational Noise

Description	Ambient Noise Level per Octave Band -dB								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
Measured Daytime L_{90} Background Noise Level	36	35	30	25	27	29	23	17	12
L_{10} Daytime Criterion (Between 7 am and 12 midnight): At Surrounding Residences	**41**	**40**	**35**	**30**	**32**	**34**	**28**	**22**	**17**
Measured Night-time L_{90} Background Noise Level	33	35	28	26	28	25	23	17	13
L_{10} Night-time Criterion (Between 12 midnight and 7 am): At Surrounding Residences	**33**	**35**	**28**	**26**	**28**	**25**	**23**	**17**	**13**

Table 4-3 Internal Criteria for Operational Noise

Description	Ambient Noise Level per Octave Band -dB								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
Measured Night-time L_{90} Background Noise Level	29	25	23	18	15	14	12	12	13

Description	Ambient Noise Level per Octave Band -dB								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
Inaudibility Criterion L90 – 10dB (Between 12 midnight and 7 am): Inside Residences	**19**	**15**	**13**	**8**	**5**	**4**	**2**	**2**	**3**

5 NOISE IMPACT ASSESSMENT

5.1 Typical Patron Vocal Levels

The following sections summarise the results of patron and music noise assessment and predicted levels at nearby receivers as a result of the operation of the proposed alterations and additions (see Figure 2-1 and Figure 2-2).

Calculations of the amount of noise transmitted to these receivers from the proposed additions 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 number of patrons expected to be in the respective areas at any given time

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

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

5.2 Patron Sound Power Levels

Based on the maximum number of patrons in all area as shown in Section 2.2, the following worst-case operational scenarios have been assumed for our assessment:

- Only 50% of all patrons per room will be talking at any given time, this is assuming that 1 person will be talking and 1 person will be listening.

Table 5-2 Sound Power Levels of People talking with Raised Voice - Lw – dB(A)

Scenario	Resultant Sound Power Level per Octave Band (dB)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
150 Patrons with Raised Vocal in Function Room	-	85	91	95	90	85	81	75

60 Patrons with Raised Vocal in Restaurants	-	81	87	91	86	81	77	71
25 Patrons with Raised Vocal in Cafe	-	77	83	88	82	78	73	67

It is generally agreed that the human voice is not capable of producing noise at 32 Hz and 63Hz octave bands at significant amplitudes. It is also very likely that even if noise emission in this low frequency octave bands exceeds the noise criterion; it will be very close to, if not below, the human threshold of hearing at the receivers.

Appropriate sound power levels conversations have been made for the varying distribution number of patrons.

5.3 Music Sound Power Level

RSA has conducted measurements of background music noise levels at various licensed venues, based on these measurements the sound power level spectrum of typical music is shown in Table 5-3 below:

Table 5-3 Typical Sound Power Level of Typical Music - Lw – dB(A)

Scenario	Resultant Sound Power Level per Octave Band (dB)								
	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Typical Background Music	70	79	87	84	79	82	80	78	71
Typical Live Band	93	103	103	102	104	97	91	90	87

5.4 Predicted Club Noise Impacts

Predictive resultant noise spectrums have been calculated for all proposed tavern activities. Noise emissions at the nearest receivers are presented in the tables below. The following operational scenarios have been calculated

Scenario 1 – Restaurants, Café and Amphitheatre

- The restaurants and café are operating at full capacity
- The outdoor siting areas are operational
- Background music is used in the internal areas only
- All windows and doors are closed, except for the café entry door leading to the outdoor siting area
- Background music is set to 85 dB(A) at 1 meter from any speaker
- The amphitheater will be used for unamplified performances only, we have assumed 50 patrons engaging in singing

Scenario 2 – Wedding Ceremony

- Wedding ceremonies will take place in the front yard
- No amplified music or performances will take place
- Only acoustic duets or string quartets are allowed to play
- A gathering of up to 50 people has been assumed
- Patrons celebrating will only take place at the end of the ceremony

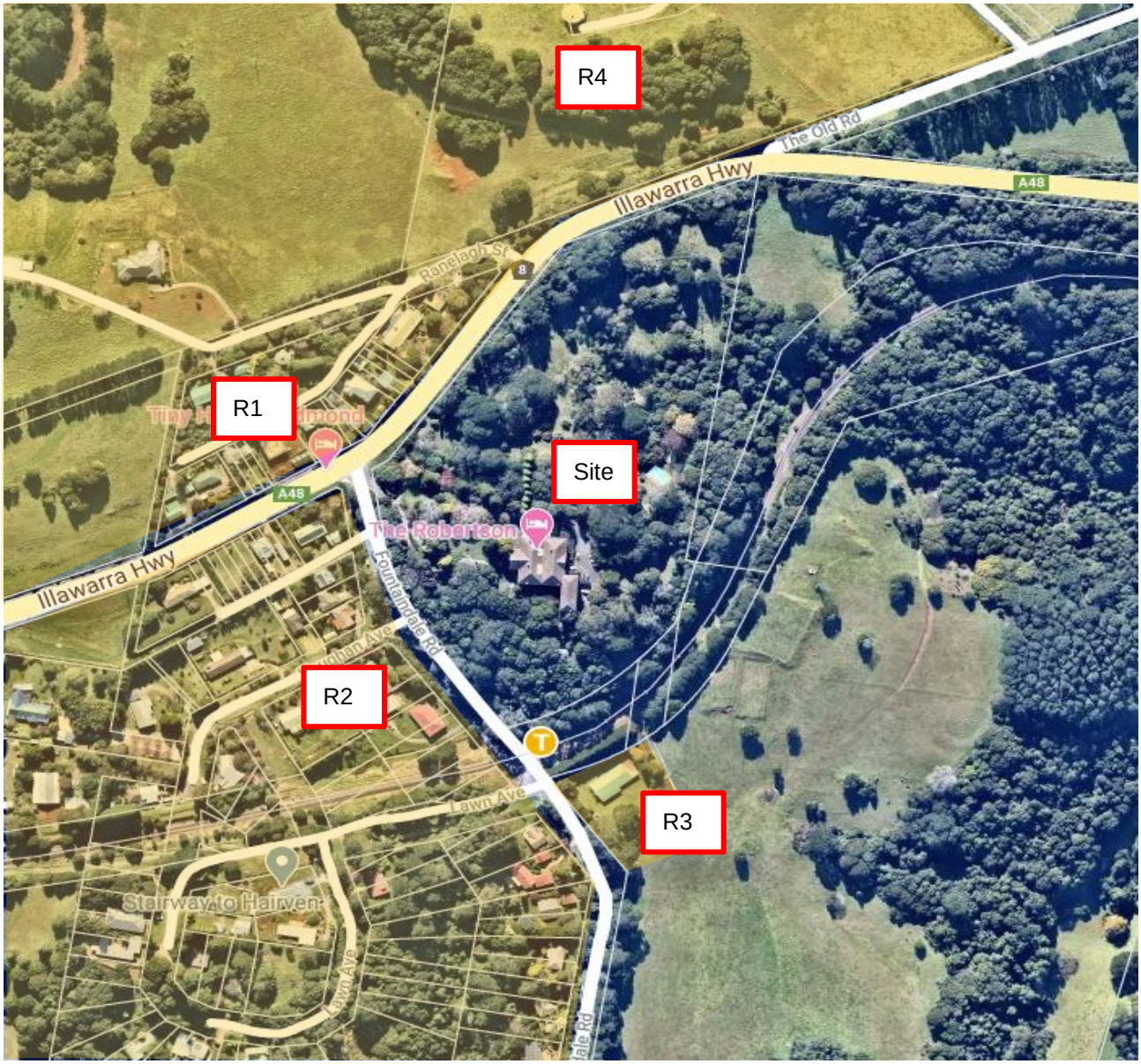
- Hotel stuff must supervise the patrons and guide them into the building once the ceremony ends

Scenario 3 – Venue

- All functions will take place in the reception hall
- All windows and doors are closed while the hall is in operation
- The number of patrons is as presented in Section 2.2.
- Live bands and DJs will be used in the function room.
- The function room will operate until 12:00 am
- Patrons may use the internal courtyard only
- Most of the guests will stay in the hotel after the function
- Resulting noise levels have been calculated to the most affected point on the boundary of the affected receivers

The following figure shows the proposed development in relation to the most affected receivers.

Figure 5-1 Affected Receiver Locations



The site is surrounded by residential premises to the north, south and west.

The resulting noise levels from the operation of the proposed additions are presented in the table below

Table 5-4 Predicted External Noise Impact Levels - Residential Receivers Daytime

Receivers	Resultant Sound Pressure Level per Octave Band - dB								
	31.5 Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Daytime Assessment (7:00am to 12:00am)									
Scenario 1									
R1	-10	5	18	22	30	33	29	24	9
R2	-20	-5	5	9	13	12	11	2	-15
R3	-24	-11	-1	4	9	6	4	-5	-27
R4	-13	2	15	18	26	29	26	19	-2
Daytime Criteria	**41**	**40**	**35**	**30**	**32**	**34**	**28**	**22**	**17**
Exceedance R1	-	-	-	-	-	-	***1****	-	-
Exceedance R2	-	-	-	-	-	-	-	-	-
Exceedance R3	-	-	-	-	-	-	-	-	-
Exceedance R4	-	-	-	-	-	-	-	-	-
Scenario 2									
R1	-16	1	15	16	18	25	24	20	3
R2	-19	-2	12	18	19	23	22	20	7
R3	-23	-7	5	10	7	9	5	-3	-27
R4	-21	-5	8	9	11	19	17	11	-16
Daytime Criteria	**41**	**40**	**35**	**30**	**32**	**34**	**28**	**22**	**17**
Exceedance R1	-	-	-	-	-	-	-	-	-
Exceedance R2	-	-	-	-	-	-	-	-	-
Exceedance R3	-	-	-	-	-	-	-	-	-
Exceedance R4	-	-	-	-	-	-	-	-	-

Receivers	Resultant Sound Pressure Level per Octave Band - dB								
	31.5 Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Scenario 3									
R1	-17	0	2	9	19	17	10	1	-27
R2	-13	5	6	6	16	8	3	-9	-30
R3	-10	8	11	10	22	16	11	-2	-21
R4	-18	-1	0	7	19	20	15	5	-26
Daytime Criteria	**41**	**40**	**35**	**30**	**32**	**34**	**28**	**22**	**17**
Exceedance R1	-	-	-	-	-	-	-	-	-
Exceedance R2	-	-	-	-	-	-	-	-	-
Exceedance R3	-	-	-	-	-	-	-	-	-
Exceedance R4	-	-	-	-	-	-	-	-	-

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

5.5 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 noise criteria can 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.

5.6 Carpark Emission

It is proposed to provide parking spaces across the site, there is capacity for 30 vehicles, calculations of noise from the carpark have been based on typical noise generating events within a carpark such as, door slams, engine starts and cars driving away. We have assumed a scenario were 15 cars enter or leave the carpark in a span of 15 minutes.

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

Table 5-5 Calculated Carpark Noise Levels

Receiver	Time	Predicted Carpark Activities Noise at Neighbouring Residents – dB(A)	Criteria	Compliance
R1	Day	38	43	Yes
	Evening	36	35	Yes*
	Night	36	35	Yes*
R2	Day	24	43	Yes
	Evening	24	35	Yes
	Night	24	35	Yes
R3	Day	<20	43	Yes
	Evening	<20	35	Yes
	Night	<20	35	Yes
R4	Day	32	43	Yes
	Evening	32	35	Yes
	Night	32	35	Yes

* We note that a 1 dB(A) exceedance is generally regarded as being acoustically insignificant

6 RECOMMENDATIONS

The noise emissions from the proposed additions to the Hotel have the potential to comply with the required criteria with the implementations of the following recommendations:

6.1 Function Room

- All glazing must have a minimum rating of Rw 36, the bifold doors on the western façade car have a minimum Rw rating of 33
- All doors and windows must be closed while the hall is operational
- A noise limiter is to be installed to ensure live bands and DJs do not exceed 90 dB(A) at 1 meter from the speakers. All amplified equipment must be connected to the limiter

6.2 Restaurants and Cafe

- Background music is to be played in any outdoor area, the sound system must be fitted with a noise limiter set to a sound level of 70 dB(A) at 1m of each speaker
- All windows must be closed while the spaces are operational
- Signs must be placed asking patrons to not cause unnecessary noise

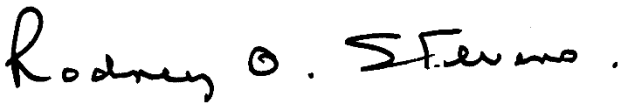
7 CONCLUSION

A noise impact assessment has been conducted in relation to the operation of the proposed additions to the Robertson hotel located at 1 Fountaindale Rd, Robertson.

This assessment has been conducted and appropriate noise emission criteria have been established in accordance with Liquor & Gaming NSW noise guidelines.

This report shows compliance with the specific noise criteria with the implementation of the recommendations provided in this report. It is therefore recommended that planning approval be granted for the proposed alterations and additions on the basis of acoustics.

Approved:-



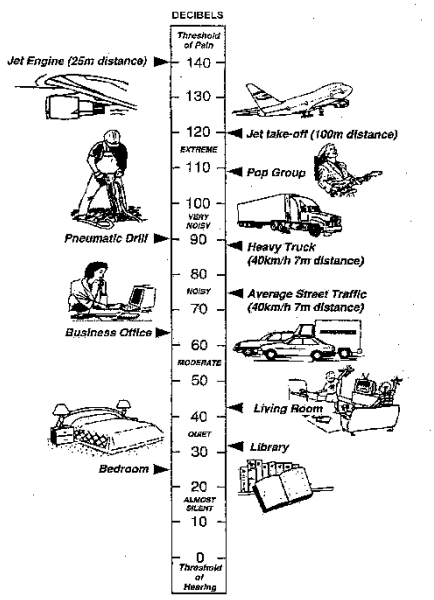
Rodney Stevens

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)*.

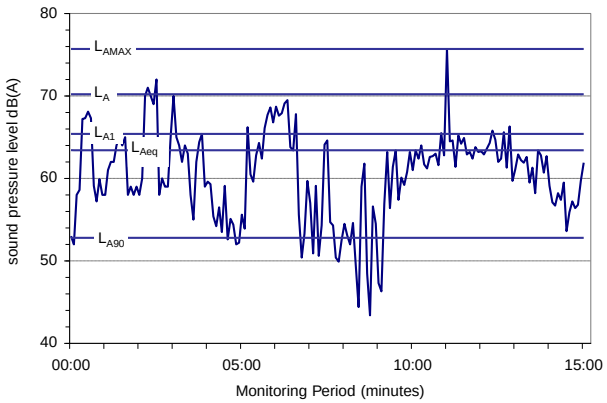
Sound Pressure Level (SPL)

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.

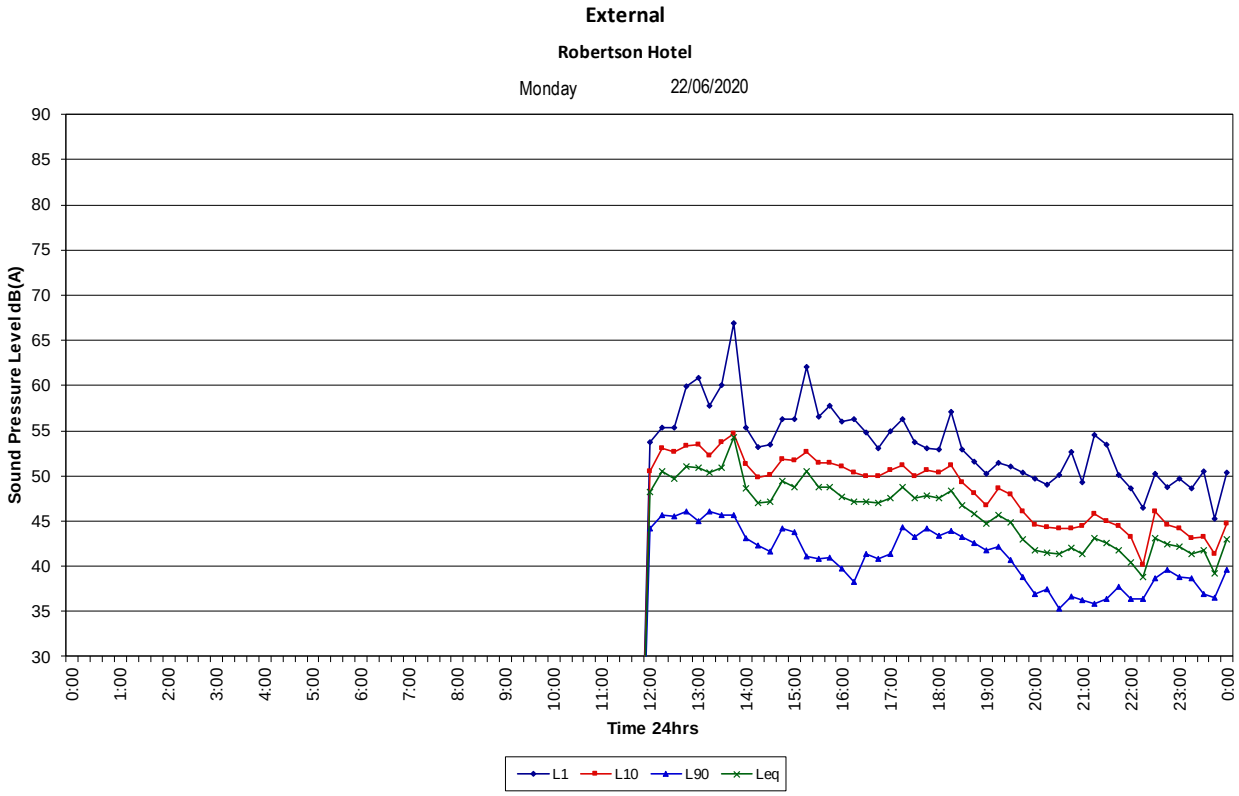
L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

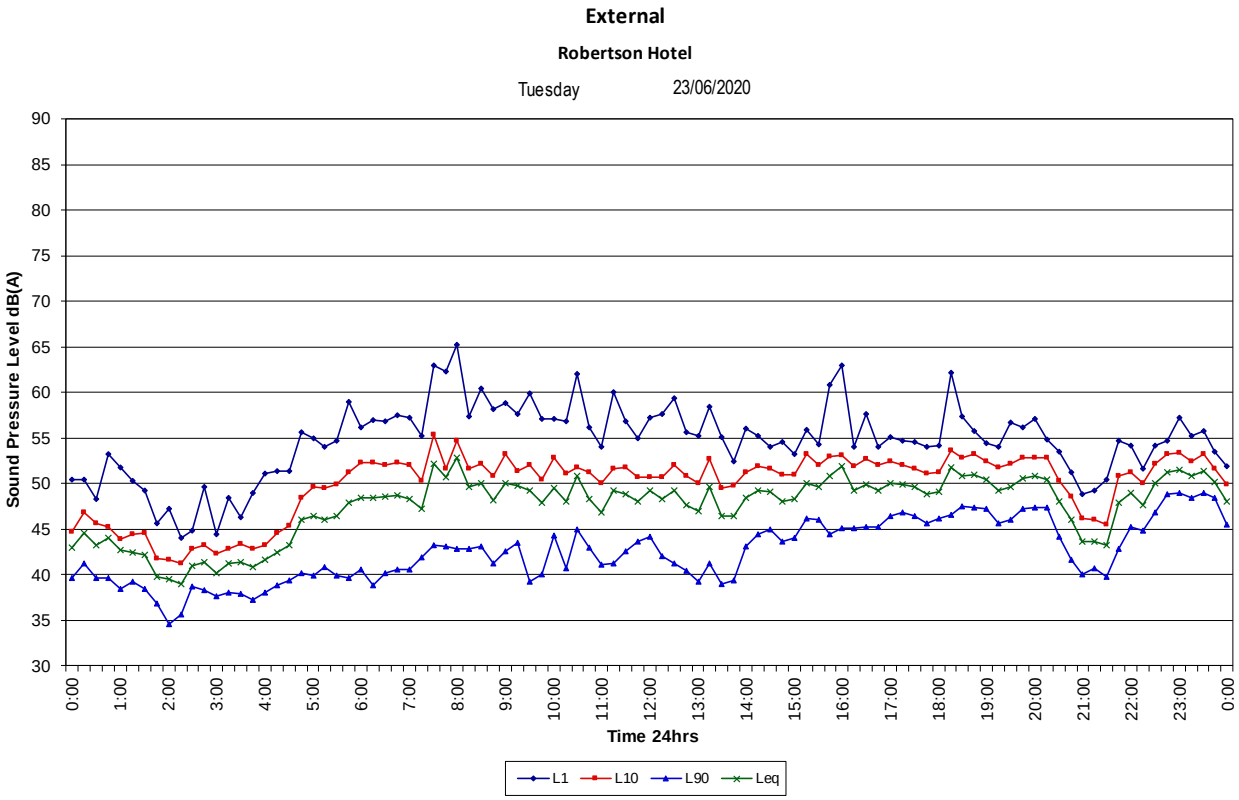
L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

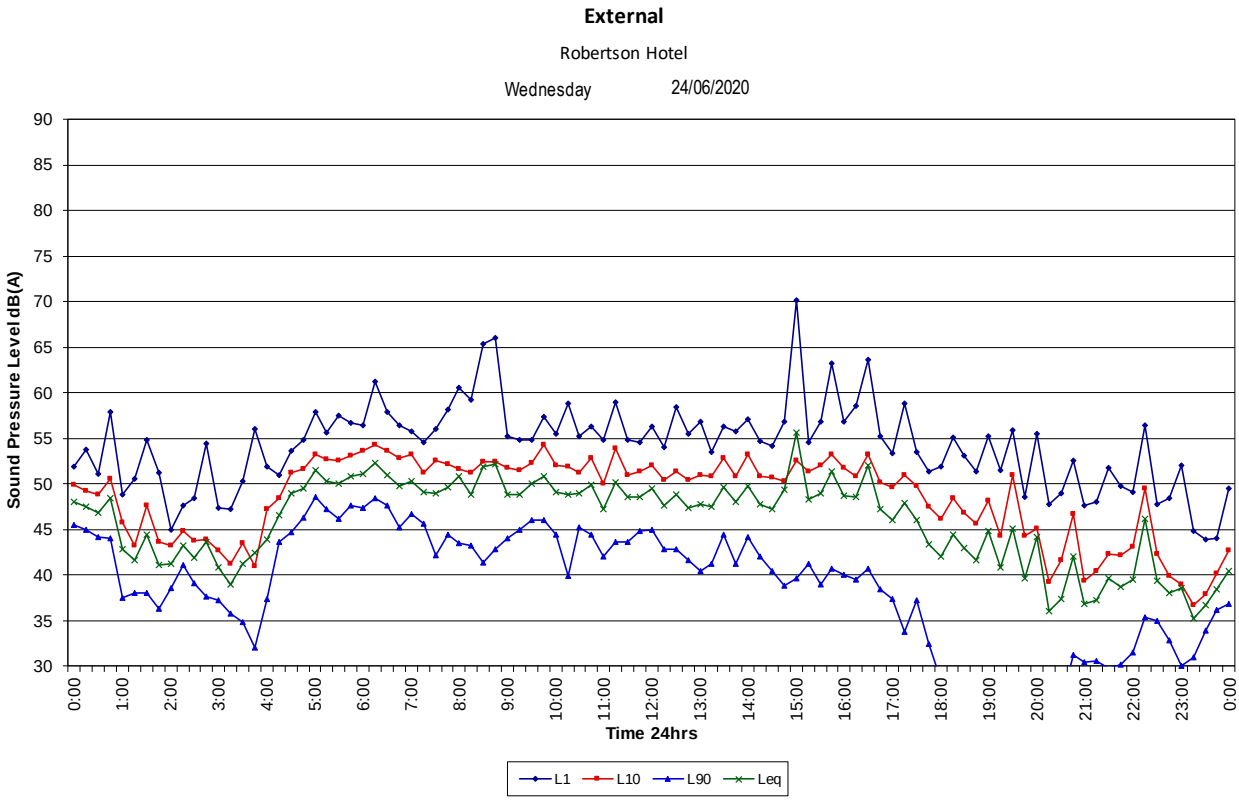
Threshold The lowest sound pressure level that produces a detectable response (in an instrument/person).

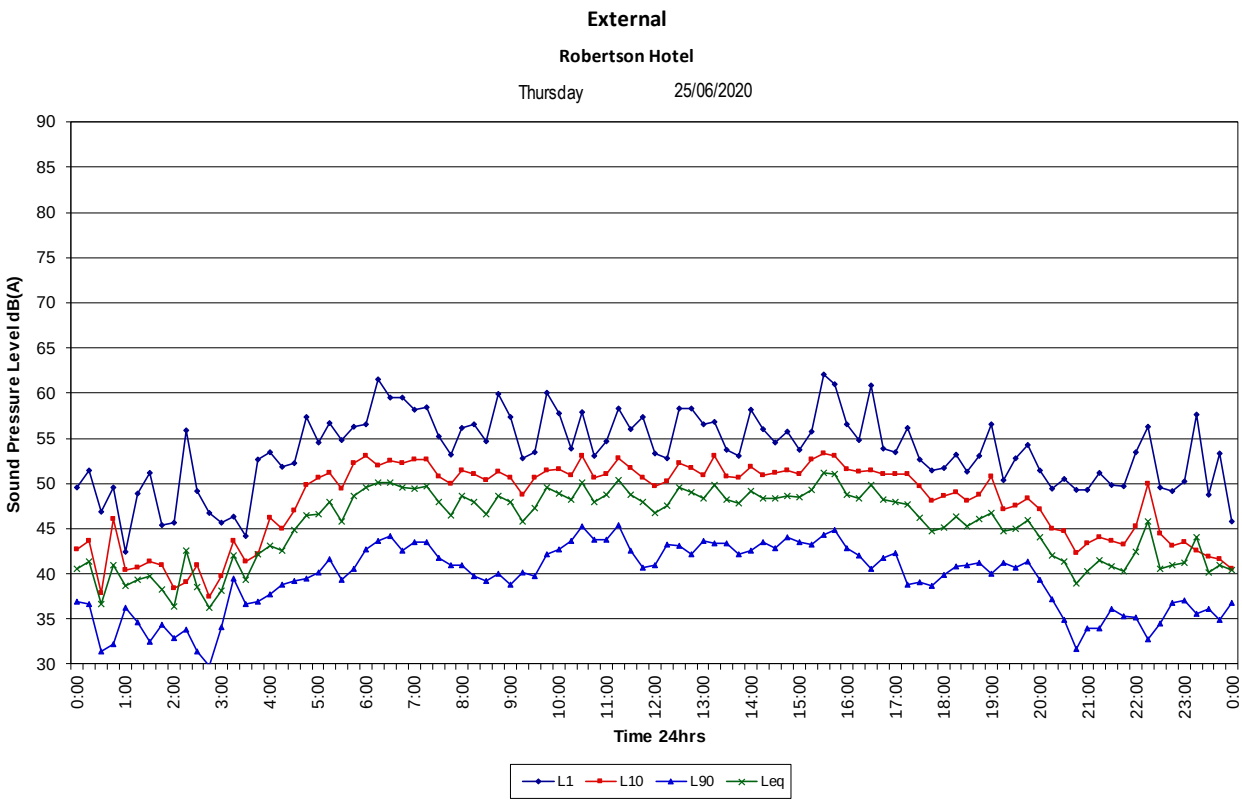
Tonality Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

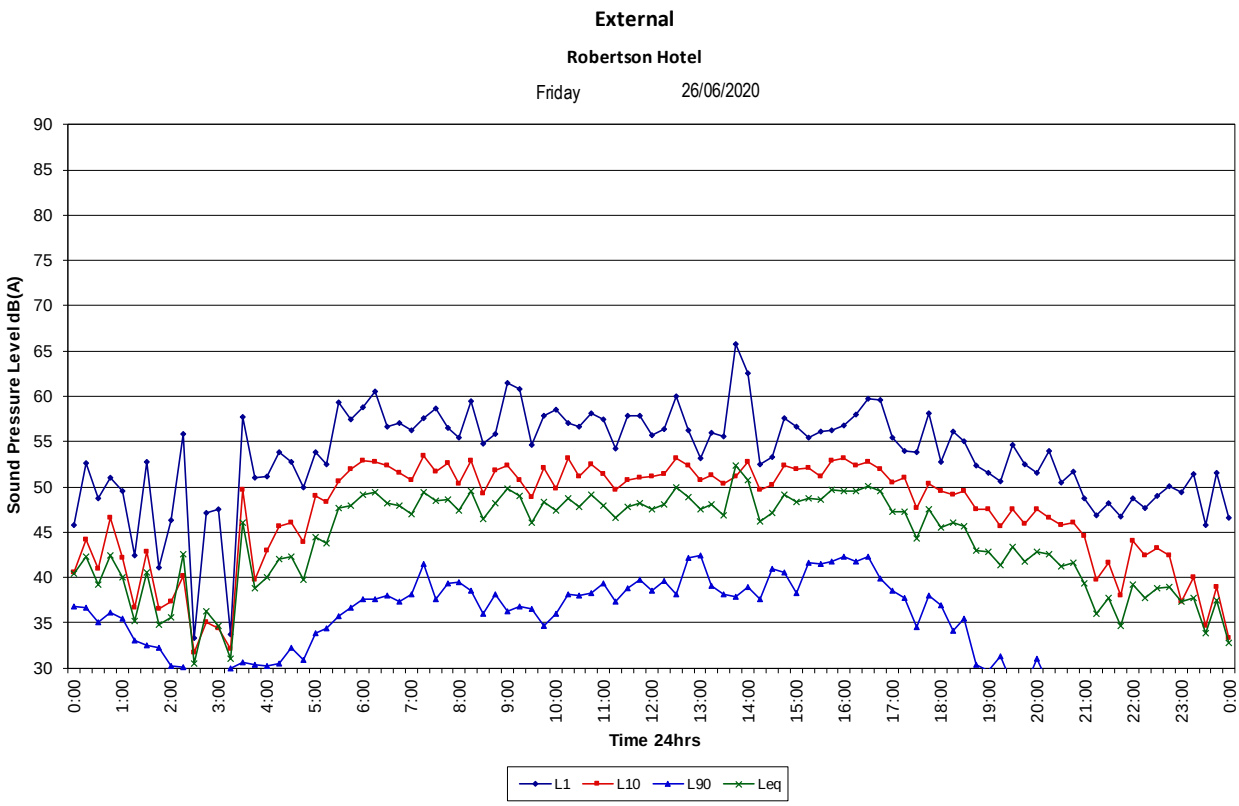
Appendix B – Baseline Noise Survey Graphs

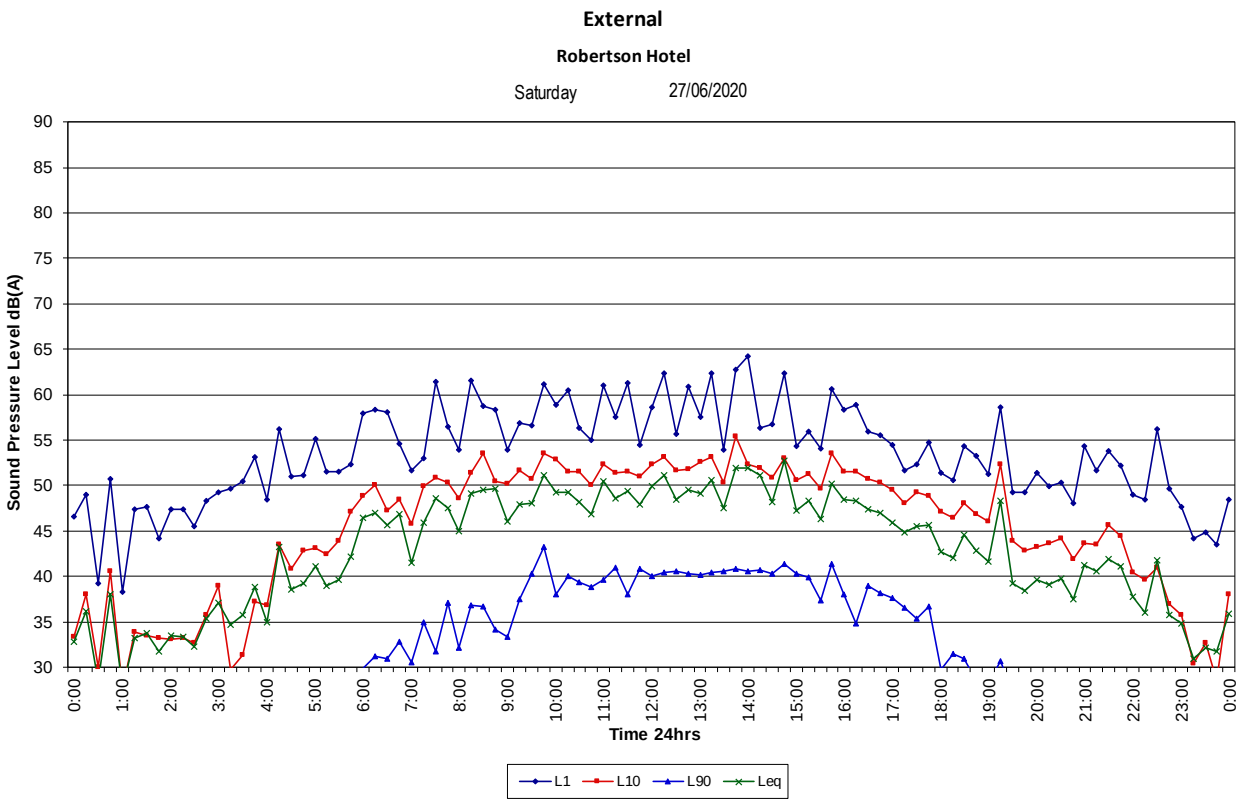


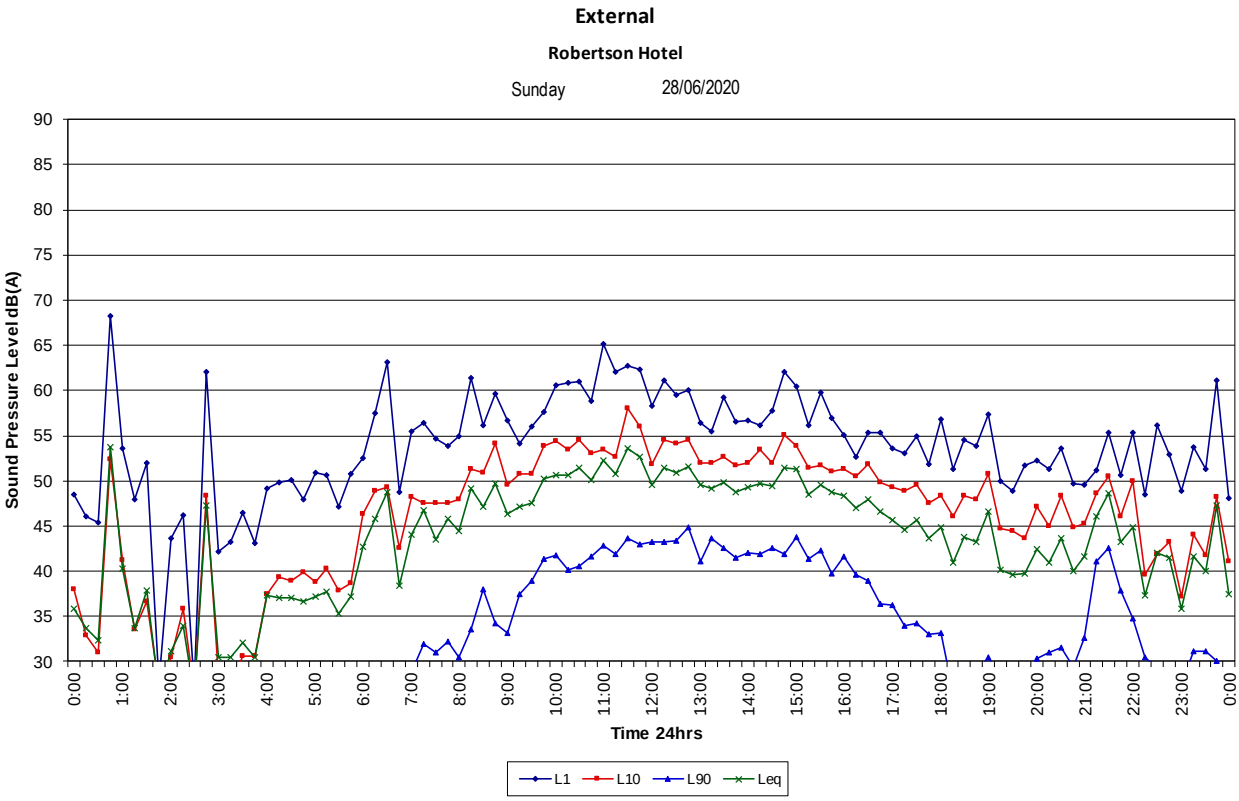


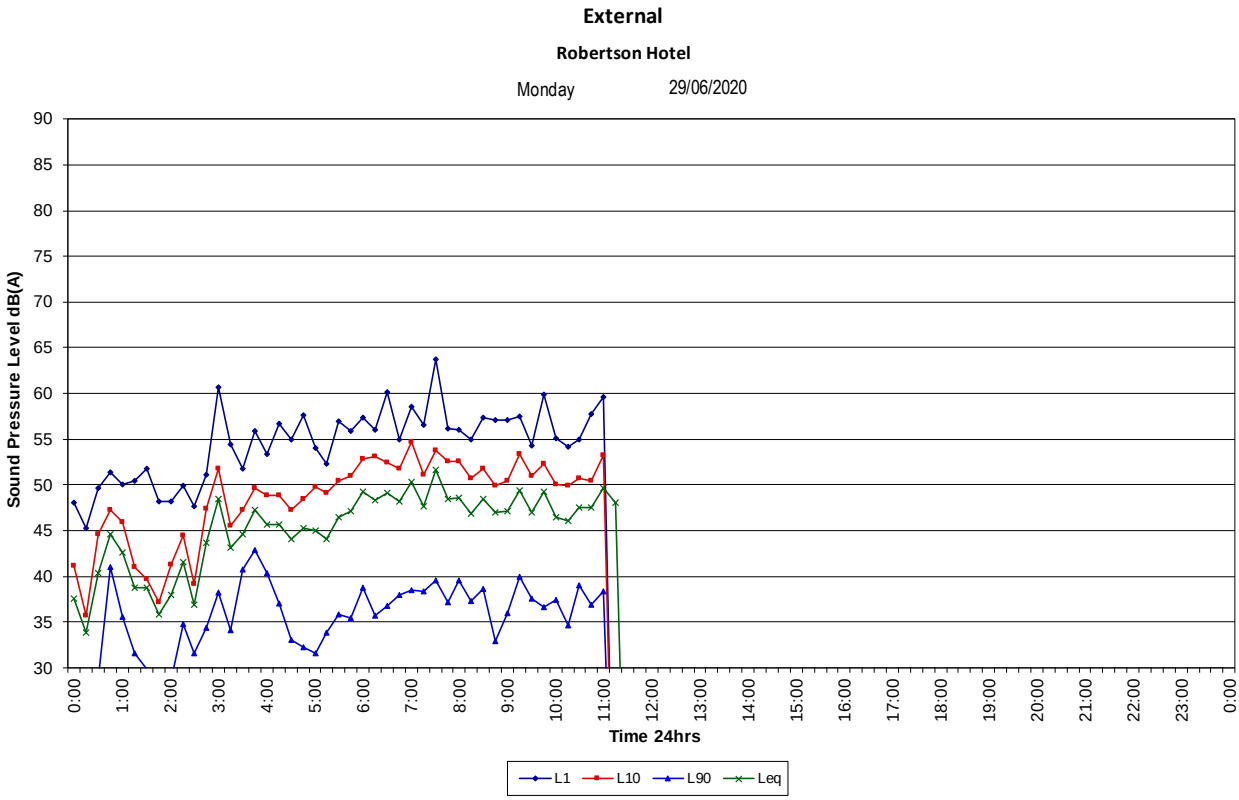

External
Robertson Hotel
Wednesday 24/06/2020
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


External
Robertson Hotel
Thursday 25/06/2020
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


External
Robertson Hotel
Friday 26/06/2020
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


External
Robertson Hotel
Saturday 27/06/2020
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


External
Robertson Hotel
Sunday 28/06/2020
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq


External
Robertson Hotel
Monday 29/06/2020
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
L90
Leq

Appendix C – Instrument Calibration Certificate

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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 : 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.

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.

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 C19415

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 :	00572558
Microphone Serial Number :	170393
Pre-amplifier Serial Number :	72896

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	22.1°C	**Ambient Temperature :**	23.2°C
Relative Humidity :	36.7%	**Relative Humidity :**	34.5%
Barometric Pressure :	100.84kPa	**Barometric Pressure :**	100.8kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 16 Jul 2019
Secondary Check: Eloise Burrows
Report Issue Date : 16 Jul 2019

Approved Signatory : 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.

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 - calibration.

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

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