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ST GEORGE HOTEL BELMORE PROPOSED EXTENSION OF GAMING ROOM

Acoustic Assessment

5 June 2024

MJW Hotels

TN843-01D01 Acoustic Report (r1)

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Document details

Detail	Reference
Doc reference:	TN843-01D01 Acoustic Report (r1)
Prepared for:	MJW Hotels
Attention:	Arti Nimalendran

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
30.4.2024	Prepare report		0	E. Fletcher	T. Taylor	T. Taylor
5.6.2024	1st revision	0	1	E. Fletcher	T. Taylor	T. Taylor

File Path: R:\AssocSydProjects\TN801-TN850\TN843 ef St George Hotel, Belmore\1 Docs\TN843-01D01 Acoustic Report (r1).docx

Contents

1 Introduction

Renzo Tonin & Associates was engaged to provide acoustic consulting services to accompany the DA for the St George Hotel, Belmore. The DA relates to:

- Construction of a new gaming area and
- Alterations to the existing gaming area.

Both gaming areas will have acoustically treated ventilation openings in the roof.

Acoustic treatments to the gaming room will be designed so as to ensure that the site con operate within its existing trading hours (up to 3am) while complying with the acoustic requirements of the Office of Liquor, Gaming and Racing.

This report is based on drawings by Fabric Architecture Studio dated 30/05/2024.

2 Project Description and Existing Development Approval for the Site.

The St George Hotel is located at 618 Canterbury Road in Belmore

The ground floor consists of:

- Bar Area
- Gaming room
- Amenities areas

There are entry doors on the ground floor opening onto Canterbury Road, Kingsgrove Road and facing the carpark.

There is a car park located on the southern side of the site.

The site is bounded as follows:

- To the north by Canterbury Road. Further north, on the opposite side of Canterbury Road is commercial development.
- To the east by Kingsgrove Road. Further east, on the opposite side of Kingsgrove Road is commercial development.
- To the south by residential development – 3 Kingsgrove Road (a single storey residential dwelling)
- To the west by mixed use commercial and residential apartment development at 628 Canterbury Road.

The residences to the west and south are the closest residences to the site.

The currently approved trading times are:

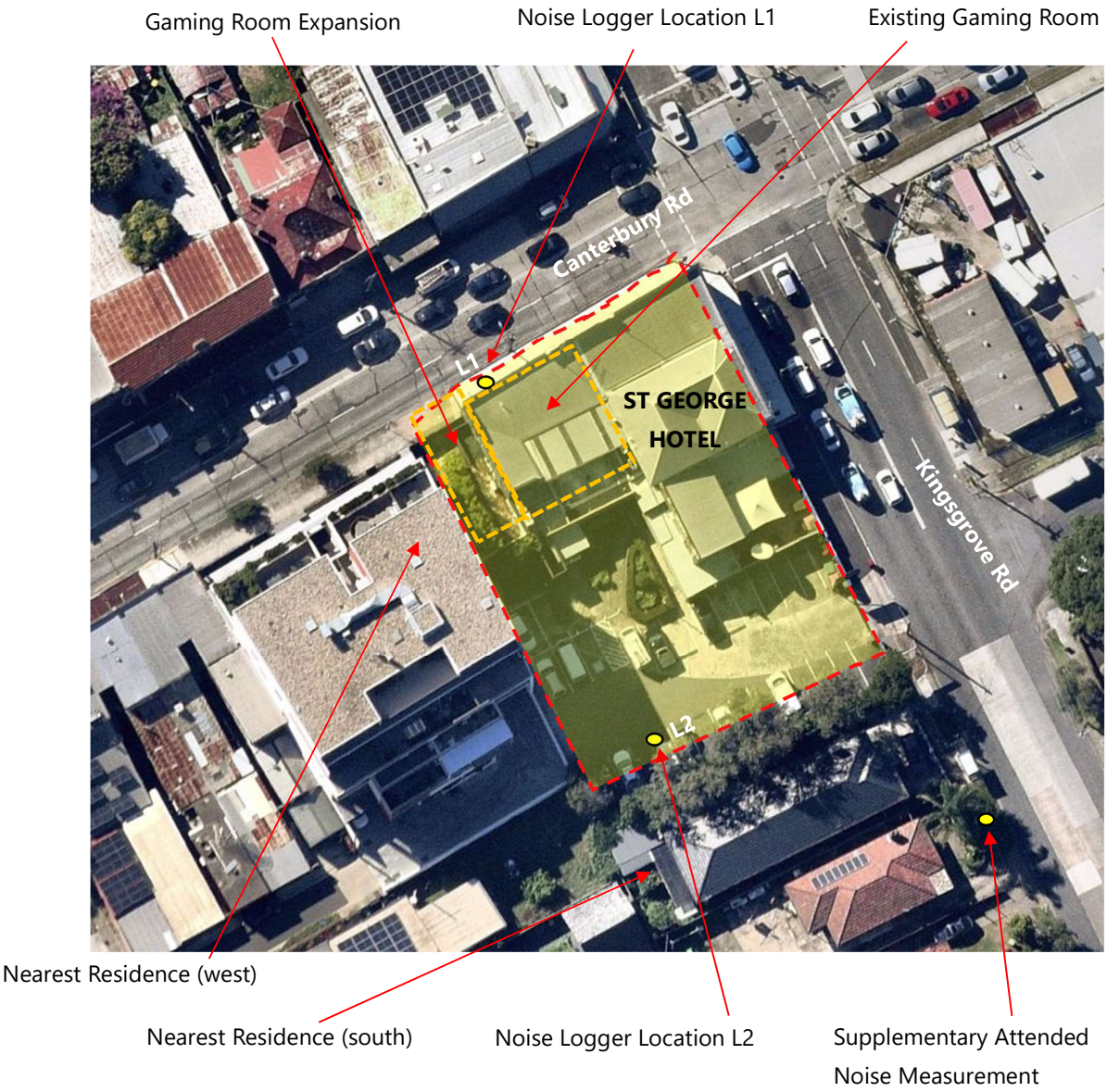
- 10am - 3am Monday to Saturday
- 10am-12am Sunday.

There is no change to current operating hours proposed.

The current proposed alterations/additions include:

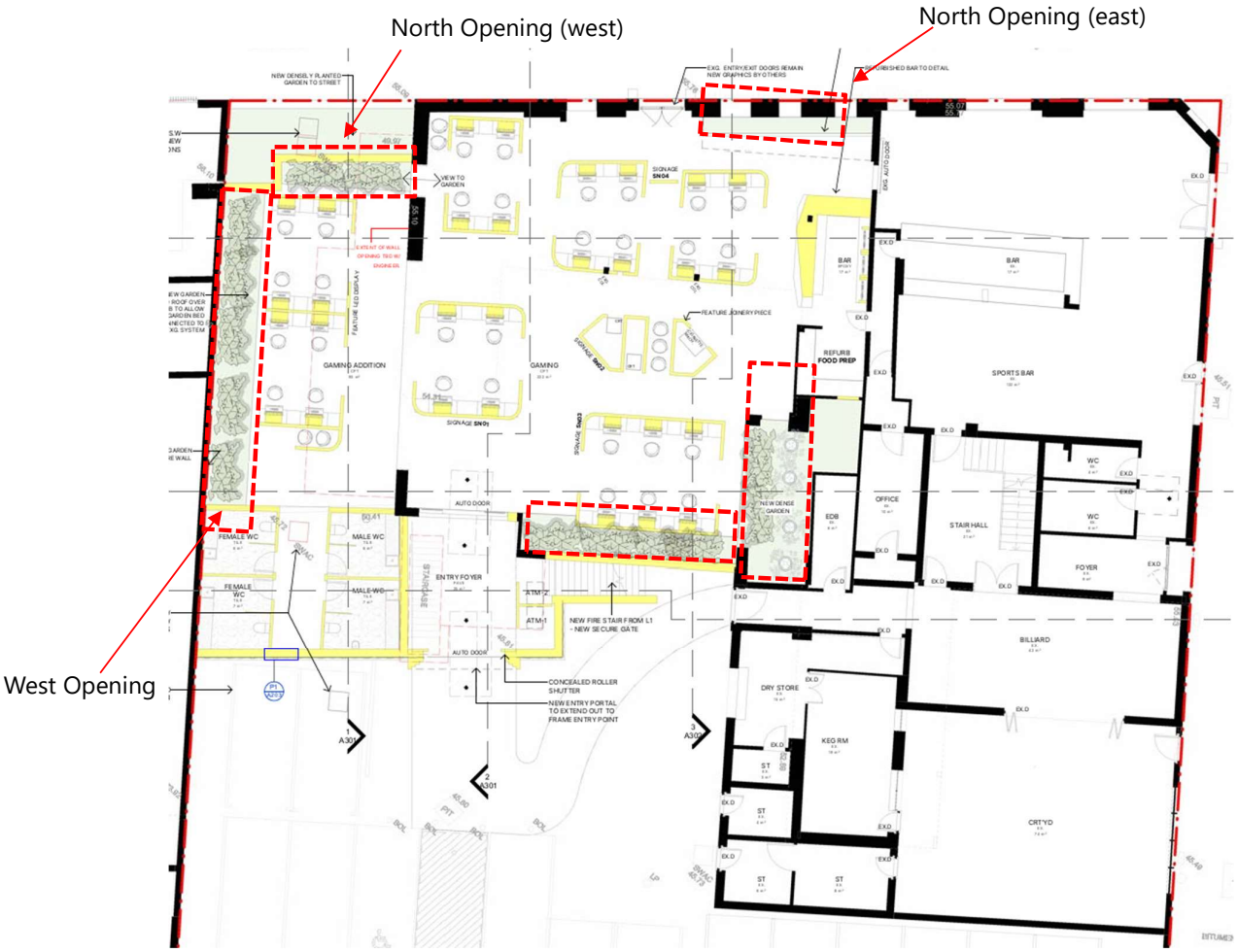
- Extension of the gaming area (western side of the site)
- New ventilation openings in the roof above the gaming area to meet ventilation requirements.

See aerial photo below showing site and noise logger positions.



2.1.1 Floor Plan

A floor plan with the proposed new ventilation openings is shown below:



3 Existing Noise Environment

The noise environment of an area varies over time. The NSW Environmental Protection Authority's (EPA) Noise Policy for Industry (NPfI) outlines standard time periods over which the background and ambient noise levels are to be determined, which is as follows:

- Day: 07:00-18:00 Monday to Saturday and 08:00-18:00 Sundays & Public Holidays
- Evening: 18:00-22:00 Monday to Sunday & Public Holidays
- Night: 22:00-07:00 Monday to Saturday and 22:00-08:00 Sundays & Public Holidays

The existing noise environment at the site was quantified using a combination of long term noise logging and attended noise measurement.

3.1 Long Term Noise Logger

An unattended noise survey was carried out by Renzo Tonin & Associates in March 2024 to quantify the existing noise environment, as follows:

- Logger 1 – Level 1 awning fronting Canterbury Road (representative of residences on Canterbury Road).
- Logger 2 – South side of site Car Park (representative of Kingsgrove Road receivers to the south of the site).

The noise monitor records noise levels on a continuous basis and stores data every fifteen minutes. The noise logger was calibrated before and after measurements and no significant deviation in calibration was noted. The noise monitoring equipment used here complies with Australian Standard 1259.2-1990 "Acoustics - Sound Level Meters" and is designated as Type 2 instruments suitable for field use.

The graphical recorded output from the long-term noise monitoring is included in Appendices B, C and D.

Background noise levels at all loggers are dominated by distant road traffic noise. The results of the background noise survey are presented below.

Table 3-1: Representative Rating Background Noise Levels

Date of Noise Survey	Location / Representative of Receiver	Rating Background Noise Levels – dB(A)L_{90}				
		Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)	Night (10pm-12am)	Night (12am-2am)
28.3.2024 to 7.4.2024	L1 – St George Hotel Awning facing Canterbury Rd	61	61	51	58	53
14.3.2024 to 19.3.2024	L2 – St George Hotel Carpark South (representative of residential receivers)	55	55	54	52	54

The measured background noise spectra are presented below:

Table 3-2: Measured Background Noise Spectra dB(Z) $L_{90,\ 15min}$

Description	Time of Day	Overall dB(A)	Octave band centre frequency – Hz, dB(Z)								
			31.5	63	125	250	500	1k	2k	4k	8k
L1 – St George Hotel Awning facing Canterbury Rd (representative of receivers on Canterbury Rd)	7am-6pm	61	70	68	59	58	56	56	53	45	35
	6pm-10pm	61	72	69	60	59	56	56	53	46	37
	10pm-7am	51	50	53	48	46	44	47	43	32	23
	10pm-12am	58	58	59	55	54	51	54	51	40	31
	12am-3am	53	52	53	49	48	46	49	45	36	34
L2 – St George Hotel Carpark South (representative of receivers on Kingsgrove Rd)	7am-6pm	55	65	62	60	51	50	51	45	36	26
	6pm-10pm	55	65	62	60	51	50	51	45	36	26
	10pm-7am	54	61	59	59	49	49	50	45	36	26
	10pm-12am	52	56	55	58	47	47	47	42	36	26
	12am-3am	54	61	59	59	49	49	50	45	36	26

3.2 Attended Noise Measurement

We note that ambient noise levels at the rear of the hotel are affected by noise from plant and equipment from commercial development. In order to determine the ambient noise level that is not affected by extraneous noise, a supplementary attended noise measurement was made at the location shown in Section 2.

The measurements were made on 18/4/2024 between 3am and 4am and would be representative of late noise levels at the residences to the south of the site (excluding the impact of local plant and equipment noise).

Results are presented below.

Table 3-3: Measured Background Noise Spectra dB(Z) $L_{90,\ 15min}$

Description	Time of Day	Overall dB(A)	Octave band centre frequency – Hz, dB(Z)								
			31.5	63	125	250	500	1k	2k	4k	8k
5 Kingsgrove Rd	3am - 4am	**39**	45	43	43	35	35	34	33	28	19

4 Noise Emission Criteria

4.1 Licensed premises (Patron/Music, Gaming)

Noise emissions from licensed premises in NSW, such as restaurants, bars, and clubs, should aim to comply with the standard noise criteria set by the L&GNSW. The L&GNSW, through the Liquor Act 2007, is the regulatory authority that deals with noise pollution issues pertaining to licensed premises. The L&GNSW criteria apply to noise emission associated with activities from the licensed area of the premises, including music and patron noise but excludes mechanical plant. Noise emissions are assessed in terms of the noise limits set out in the L&GNSW's 'Standard Noise Condition' which states as follows:

> *"The LA10* noise level emitted from the licensed premises shall not exceed the background noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) by more than 5dB between 7:00am and 12:00 midnight at the boundary of any affected residence.*
>
> *The LA10* noise level emitted from the licensed premises shall not exceed the background noise level in an Octave Band Centre Frequency (31.5Hz – 8kHz inclusive) between 12:00 midnight and 7:00am at the boundary of any affected residence.*
>
> *Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12:00 midnight and 7:00am.*
>
> *Interior noise levels which still exceed safe hearing levels are in no way supported or condoned by the Liquor Administration Board.*
>
> *This is a minimum standard. In some instances, the Board may specify a time earlier than midnight in respect of the above condition.*
>
> **For the purposes of this condition, the LA10 can be taken as the average maximum deflection of the noise emission from the licensed premises."*

Based on the noise emissions criteria stated above and the background noise levels presented in Section 3.1, the noise emission goals for the licensed premises in this development are as follows.

In order to meet the post midnight inaudibility requirement, a "Background-10dB" noise target is adopted, which is a typical practice in the when determining noise targets requiring inaudibility. If the "Background-10dB" target is met externally at the façade of a nearby residence, the noise will also be inaudible inside the residence regardless of whether the windows of the residence are open or closed.

Noise emission goals are as follows:

Table 4-1: Licensed premises noise spectra criteria, dBL_{10}

Description	Time of Day	Overall dB(A)	Octave band centre frequency – Hz, dB(Z)								
			31.5	63	125	250	500	1k	2k	4k	8k
Residences facing Canterbury Rd	12am-3am (BG-10)	***44***	42	43	39	38	36	39	35	26	24
Residences NOT facing Canterbury Rd	12am-3am (BG-10)	***29***	29	35	33	33	25	25	24	23	18

5 Assessment of Noise Emissions – Patron, Gaming and Music Noise.

The cumulative noise from the proposed new gaming area and the existing gaming area (with new ventilation openings) is assessed below.

5.1 Assumptions Used in Noise Emissions

The following assumptions have been adopted for the purpose of noise emission predictions.

- Gaming area operating at capacity (30 Machines).
- There is background music only in the gaming area (no more than 63dB(A) sound pressure.
- The sound pressure level in the gaming area is 69dB(A)L_{10}, which is based on measurements of busy gaming areas (background music) in our experience. 69dBB(A) as a conservative assessment, typically the noise level in a gaming room is closer to 65dB(A) unless the music is turned up above this level. Assuming sound spectrum as follows:

Table 5-1: Assumed Source Noise Levels

Noise Source	Sound Pressure Level Within Hotel (dB L_{10})									
	31.5	63	125	250	500	1k	2k	4k	8k	A-wt
Gaming Room Noise Level	66	66	69	69	65	64	61	57	49	**69**

- It is assumed that the acoustic treatment of the roof openings as detailed in Section 6 is adopted.

5.2 Noise Emission Predictions

Predictions are made to:

- Location 1: Receivers to the west (628 Canterbury Rd) – noise predicted to northern (Canterbury Road) façade.
- Location 1: Receivers to the west (628 Canterbury Rd) – noise predicted to southern (rear) façade.
- Location 3: Receivers to the south (3 Kingsgrove Rd) - at the northern façade (3 Kingsgrove Rd)

In each case, noise emissions are the predicted cumulative noise emission from all roof top ventilation openings.

Predicted noise levels are presented and assessed against relevant criteria below:

5.2.1 Location 1: 3am Operation – Gaming Room in Operation. Noise emission to 628 Canterbury Rd Northern Façade

Predicted noise levels are detailed below.

Provided that the acoustic treatments detailed in Section 6 are adopted, noise emissions from the gaming rooms (existing and new) will be inaudible at nearby residences when operated until closing time (3am).

Table 5-2: 3am Operation – Noise Emission to 628 Canterbury Rd (Northern Façade)

Noise Source	Noise Emission to Residence – dBL_{10}– dBL_{10}								
	A-wt	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Contribution 1 - South Roof Opening	*4*	13	17	9	-8	-14	-21	-25	-34
Contribution 2 - West Roof Opening	*16*	25	29	21	4	-3	-9	-13	-22
Contribution 3 - East Roof Opening	*3.5*	13	17	8	-7	-15	-20	-26	-35
Contribution 4 - North Roof Opening (west)	*20*	29	33	26	12	4	-1	-7	-16
Contribution 5 - North Roof Opening (east)	*9*	18	21	14	0	-5	-11	-16	-25
Total Noise Level at Resident - dBL_{10}	**22**	**31**	**35**	**27**	**13**	**5**	**0**	**-5**	**-15**
Permissible Noise Level (54BG-10dB)	*44*	*43*	*39*	*38*	*36*	*39*	*35*	*26*	*24*
Complies?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.2.1 Location 2: 3am Operation – Gaming Room in Operation. Noise emission to 628 Canterbury Rd Southern Façade

Predicted noise levels are detailed below.

Provided that the acoustic treatments detailed in Section 6 are adopted, noise emissions from the gaming rooms (existing and new) will be inaudible at nearby residences when operated until closing time (3am).

Table 5-3: 3am Operation – Noise Emission to 628 Canterbury Rd (Southern Façade)

Noise Source	Noise Emission to Residence – dBL_{10}– dBL_{10}								
	A-wt	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Contribution 1 - South Roof Opening	*9*	18	22	14	-2	-9	-14	-20	-30
Contribution 2 - West Roof Opening	*14*	23	27	19	2	-4	-11	-15	-24
Contribution 3 - East Roof Opening	*6*	15	19	11	-5	-12	-18	-23	-33
Contribution 4 - North Roof Opening (west)	*2*	11	15	7	-10	-16	-22	-27	-36
Total Noise Level at Resident - dBL_{10}	***16***	**25**	**29**	**21**	**4**	**-2**	**-8**	**-13**	**-22**
Permissible Noise Level (39BG-10dB)	*29*	*35*	*33*	*33*	*25*	*25*	*24*	*23*	*18*
Complies?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.2.1 Location 3: 3am Operation – Gaming Room in Operation. Noise emission to 3 Kingsgrove Road

Predicted noise levels are detailed below.

Provided that the acoustic treatments detailed in Section 6 are adopted, noise emissions from the gaming rooms (existing and new) will be inaudible at nearby residences when operated until closing time (3am).

Table 5-4: 3am Operation – Noise Emission to 3 Kingsgrove Road

Noise Source	Noise Emission to Residence – dBL_{10}– dBL_{10}								
	A-wt	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Contribution 1 - South Roof Opening	*15*	21	23	18	9	9	6	1	-6
Contribution 2 - West Roof Opening	*17*	23	24	19	10	11	8	3	-5
Contribution 3 - East Roof Opening	*14*	19	21	16	7	8	4	0	-8
Contribution 4 - North Roof Opening (west)	*18*	16	26	21	12	12	9	4	-3
Total Noise Level at Resident - dBL_{10}	***22***	**26**	**30**	**25**	**16**	**16**	**13**	**9**	**1**
Permissible Noise Level (39BG-10dB)	*29*	35	33	33	25	25	24	23	18
Complies?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

6 Noise Control Recommendations

In order to ensure that noise emissions are compliant with OLGR recommendations, the following noise controls are required:

Gaming room ventilation openings:

- Roof top ventilation openings. Acoustic lining and acoustic louvres to be introduced as marked in Appendix B. Acoustic lining to consist of 50mm thick Megasorber or similar material suitable for outdoor use with NRC no less than 0.8. Any facing material applied to the Megasorber must be min 20% open area.

- Acoustic louvres to be 200mm long and equal to CVS. Transmission loss requirement of the louvre as detailed below.

	Transmission Loss (dB)							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
200mm deep acoustic louvre	*8*	*5*	*6*	*10*	*15*	*15*	*13*	*12*

Gaming Room:

- Music in the gaming room to be limited to sound pressure of no more than 63dB(A)L_{10} at 2m from any speaker.

Table 6-1: Music Noise Limits

Noise Source	**Sound Pressure Level Within Bar (dB L_{10})**									
	31.5	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**A-wt**
Gaming Area	67	67	64	63	60	61	56	54	49	**65**

- Ceiling in the gaming room expansion to have acoustic lining to underside. 50mm thick Megasorber or equal (NRC no less than 0.8), 50% coverage;

- Gaming machines not to have coin drops.

- Gaming machine noise level to be no more than 65dB(A)L_{10} at the operator.

- All windows and doors other than the acoustically treated roof top openings are to remain closed after 12am.

- In the event that any new mechanical plant is required or existing plant is relocated as a result of the above works, noise from these items is to comply with the EPA Noise Policy for Industry (detailed design to be conducted at CC stage, pending final equipment design and selection).

7 Conclusion

Renzo Tonin & Associates has completed an acoustic assessment of the proposed additions and alterations to the St George Hotel.

This assessment has considered patron, music, gaming and mechanical noise associated with the proposed increase in trading hours.

Provided that the recommendations in Section 6 of this report are adopted, the site is capable of complying with relevant EPA, Council and Office of Liquor and Gaming acoustic requirements.

Please contact us if you have any queries.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment Point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our daytime environment:

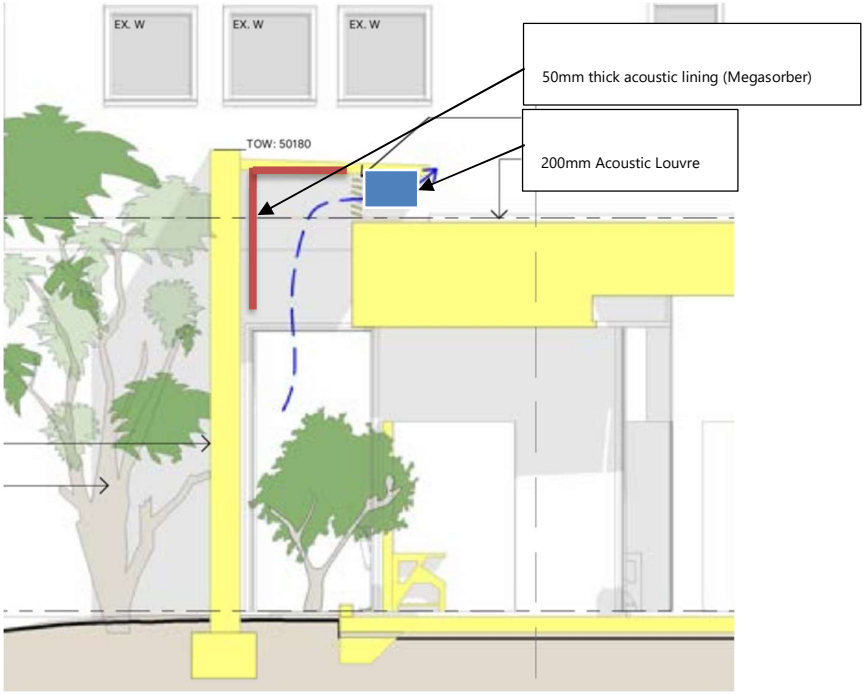
threshold of hearing	0 dB	The faintest sound we can hear
	10 dB	Human breathing
almost silent	20 dB	
	30 dB	Quiet bedroom or in a quiet national park location
generally quiet	40 dB	Library
	50 dB	Typical office space or ambience in the city at night
moderately loud	60 dB	CBD mall at lunch time
	70 dB	The sound of a car passing on the street
loud	80 dB	Loud music played at home
	90 dB	The sound of a truck passing on the street
very loud	100 dB	Indoor rock band concert
	110 dB	Operating a chainsaw or jackhammer
extremely loud	120 dB	Jet plane take-off at 100m away
threshold of pain	130 dB	
	140 dB	Military jet take-off at 25m away

dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.

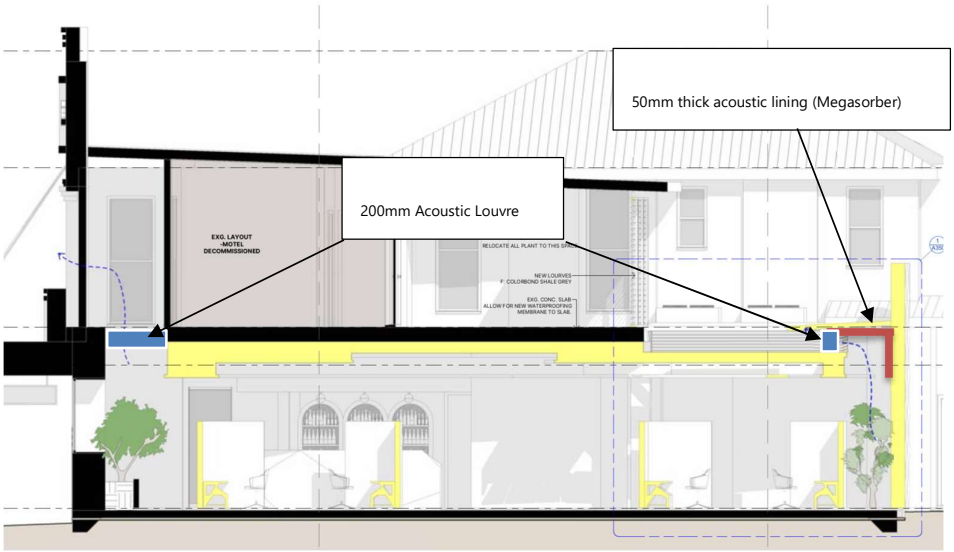
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Markup of Acoustic Treatments to Roof Ventilation Openings

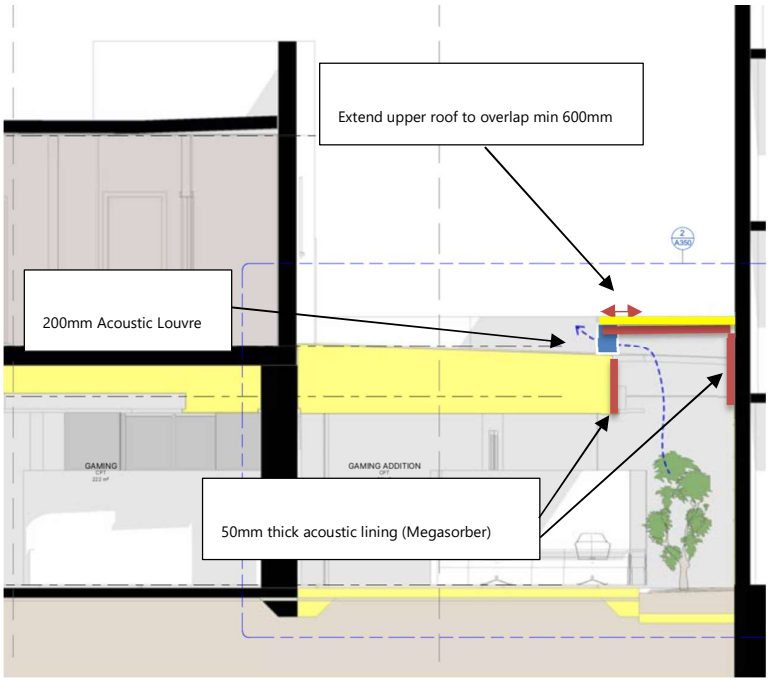
North opening (western):



North opening (eastern) and south opening:



Western Roof Opening:



Western and Eastern roof openings: