



Project No: 212148R

Noise Assessment Proposed Redevelopment Maitland Gaol East Maitland, NSW

Prepared for:

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Appendix I

NOISE LOGGER CHARTS



1.0 - INTRODUCTION

This report provides the results, findings and recommendations arising from an acoustic assessment of the proposed redevelopment of Maitland Gaol (Gaol) at Lot 469 D.P. 1002766, John Street, East Maitland, NSW. The location of the Gaol is shown in **Figure 1**.



Figure 1 - Site Location Plan

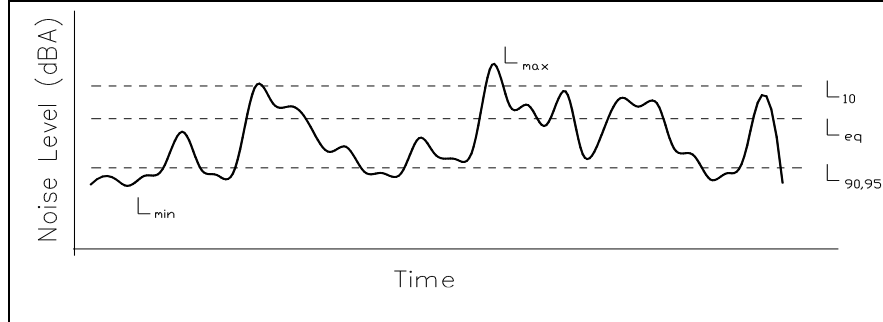
Site details have been obtained from reference to plans provided by Maitland City Council, (Revised DA Co-ordination issue, dated 24/07/23).

2.0 - TERMS AND DEFINITIONS

Table 1 contains the definitions of commonly used acoustical terms and is presented as an aid to understanding this report.

TABLE 1 DEFINITION OF ACOUSTICAL TERMS	
Term	Definition
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.

TABLE 1 (continued)	
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L10	Average Maximum Noise Level - the level exceeded for 10% of the monitoring period.
L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area.



3.0 - BACKGROUND TO THE PROPOSAL

Maitland Gaol is the longest continuously operating correctional institution in New South Wales. The facility closed in 1998 and was converted to a tourism facility in 2000 under the management of Maitland City Council. In January 2022 the NSW State and Federal Governments announced a funding grant for the redevelopment of the Gaol to deliver a substantial part of its 2020 Development Plan including capital investment in a new activity hub with enhance access and connectivity, innovative interpretation, along with the provision of event infrastructure and boutique accommodation.

The Maitland Gaol Redevelopment will be staged across three separate Development Applications consisting of:

Development Application 1:

Redevelopment of the 'Store' building (Building 14) to provide:

- *A new ticketing office and gift store;*
- *New administration office space;*
- *Upgraded amenities;*

- Construction of DDA access, ramps and stairs;
- Demolition of existing laundry; and
- Construction of a new loading dock.

Redevelopment of the 'Gaol Staff / Warder's Amenities' building (Building 22) consisting of:

- Demolition of Building 22;
- Construction of a new cafe/restaurant;
- External and internal landscaping; and
- Construction of enhanced access points.

Construction of new carpark:

- Construction of 16 space car park including two accessible parking spaces;
- Associated landscaping; and
- Construction of accessible pathways.

Development Application 2:

Refurbishment of the 'Lieutenant Governor and Governor's residences' (Buildings 2 and 3) to provide:

- Boutique accommodation consisting of several guest rooms.

Development Application 3:

Future works for the redevelopment of the 'Store' Building to provide:

- Additional amenities;
- Renovated theatre with bar, foyer, amphitheatre (pax:256);
- Renovated back of house; and
- Construction of external DDA ramp

The approximate location of the proposed works within the site is shown outlined in red on **Figure 2**.

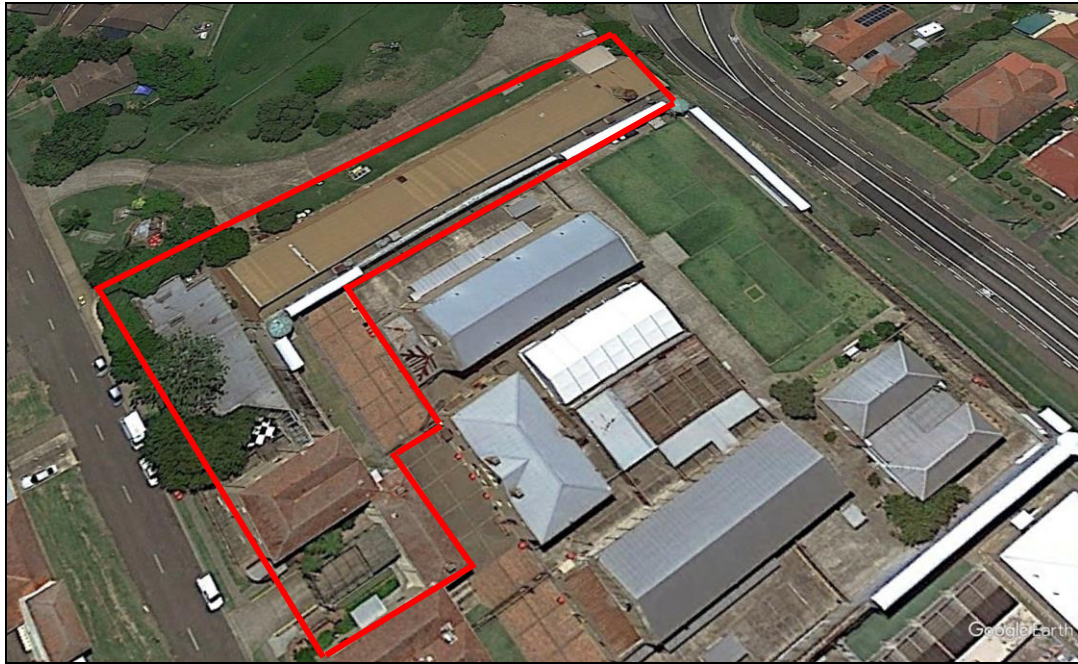


Figure 2 – Location of Proposed Redevelopment

From an acoustic point of view the parts of the redevelopment which have the potential to create adverse noise impacts and that will require assessment will entail the use of the renovated amphitheatre and bar, the use of the new cafe/restaurant as well as noise from patrons moving about the site.

Comments in relation to the potential acoustic impacts on parts of any proposed future development are included in the current assessment.

4.0 NOISE ASSESSMENT CRITERIA

4.1 Existing Acoustic Environment

To determine the appropriate noise criteria for the current assessment, the background noise levels in the area have been taken from unattended noise logging done by Spectrum Acoustics in 2015 as part of the assessment of other activities at the site. The logger was located adjacent to the north wall of the Gaol on Lindsay Street.

The background noise levels in the area are unlikely to have decreased in the period since the unattended noise logging was undertaken. Under such circumstances, the adoption of the background noise levels from 2015 for the current assessment would represent a conservative approach. That is, the “intrusiveness” noise criteria so derived would be lower than those that may be adopted based on a possibly higher

background noise level. There would be no difference in the “amenity” criteria (see text in **Section 4.3**).

The logger was programmed to continuously register environmental noise levels over 15 minute intervals with internal software calculating and storing L_n percentile noise levels for each sampling period.

Calibration of the logger was performed as part of the instrument’s initialisation procedures, with calibration results being within the allowable ± 0.5 dB(A) range.

All noise levels were monitored in accordance with relevant EPA guidelines and AS1055- “Acoustics - Description and measurement of environmental noise”.

The relevant metrics taken from the logger measurements are shown in **Table 2**. The data are shown graphically in **Appendix I**. A full set of logged data is not included in this report but is available on request.

TABLE 2 MEASURED AMBIENT NOISE LEVELS - SITE			
Noise Levels dB(A)			
Percentile	Day ¹	Evening	Night
Leq	62	59	54
L90	41	40	36

1. Day = 7am – 6pm (8am on Sunday & P. Hols), Evening = 6pm – 10pm, Night = all other times

The location is in a substantially residential area with no industrial or commercial premises in the near vicinity. The background noise level would be characterised by noise from residential activities and from distant traffic.

The short term Leq noise levels would also be influenced by the intermittent noise from local traffic and distant traffic and from trains on the nearby Main North Rail Line.

4.2 Licensed Premises

Parts of the premises will be licensed and, therefore, the standard noise conditions imposed by the Independent Liquor and Gaming Authority are applicable. These criteria apply to the noise from patrons and entertainment at the premises.

The Standard Noise Conditions imposed by the ILGA are as shown below;

“The L10 noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz - 8 kHz inclusive) by more than 5 dB between 7.00 a.m. and 12.00 midnight 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 07:00 a.m.”

ILGA criteria specifically relate to noise in octave band centre frequencies. To determine the applicable criteria, frequency spectral data were taken from typical suburban background noise measurements in the Spectrum Acoustics technical database.

The background noise levels used in this assessment for setting the ILGA criteria, therefore, have been derived by calculating the background L90 from the unattended logger for the likely worst case hours of operation of the licensed premises (i.e. day and evening and night - between 10 pm and midnight) and adopting the measured background octave band spectra.

The night time L90 noise level taken from the logger data (as shown in Table 2) represents the measurement for the period from 10pm until 7am. The operation of the licensed sections of the Gaol will finish at midnight (i.e., facilities close at 11.30pm with all patrons leaving by midnight). As such only the L90 for the period from 10pm to midnight need be included in the setting of the relevant noise criteria.

The adopted background noise level, for assessing potential impacts, and derived ILGA criteria are shown in **Table 3**. As per the discussion above, the L90 for the period from 10pm to midnight has been derived from the logger measurements. This is the same level as that for evening and, therefore, the adopted noise criterion will also be the same (as shown in Table 3).

TABLE 3										
MEASURED NOISE LEVELS (L90) and ILGA CRITERIA (L10)										
		Octave Band Centre Frequency, Hz								
	<i>dB(A)</i>	31.5	63	125	250	500	1k	2k	4k	8k
L90	41	25	28	31	33	34	35	32	32	30
OLGR - Day	46	30	33	36	38	39	40	37	37	35
OLGR – Evening/Night	45	29	32	35	37	38	39	36	36	34

4.3 Operational Noise

In relation to the noise from the general operation of the premises, the approvals are usually based on procedures and the criteria detailed in the Noise Policy for Industry (NPfI). These criteria would apply to noise emissions from mechanical plant, deliveries etc.

The NPfI describes intrusive and amenity criteria applicable to commercial sites. These noise criteria depend on the existing background noise level at potentially affected residential receiver areas.

Amenity criteria are dependent upon the nature of the receiver area and the existing level of industrial noise. The most potentially affected receiver area near the site would be considered “urban” as per the definitions in the NPfI.

The project amenity noise level for an industrial development is equal to the recommended amenity noise level (from Table 2.2 in the NPfI) minus 2 dB(A) (as detailed in notes to **Table 4**).

The intrusiveness criteria are based on the Rating Background Level (RBL) for the time period, plus 5 dB(A). The RBL (L90) is defined as the overall single figure background level representing each assessment period.

Table 4 specifies the Project Noise Trigger Levels (noise criteria) determined for the site based on the logger data and procedures in the NPfI.

TABLE 4 NOISE CRITERIA			
Criterion	Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
Intrusiveness dB(A),Leq(15-min.)	46	45	41
Amenity dB(A),Leq(15 min) ¹	53	43	38
Project Noise Trigger Levels	46 (15 min.)	43 (15 min)	38 (15 min)

1 Rating Background Level (RBL) + 5dB. RBL is the median value of each ABL (Assessment Background Level) over the entire monitoring period. The ABL is a single figure representing the “L₉₀ of the L_{90s}” for each separate day of the monitoring period.

2. Project amenity noise level (ANL) is suburban ANL (NPI Table 2.1) minus 5 dB(A) plus 3 dB(A) to convert from a period level to a 15-minute level

4.4 Sleep Disturbance

The amphitheatre and bar may operate at night (being between 10pm and midnight) and, therefore, the potential for sleep disturbance from maximum noise level events from the site during the night-time period needs to be considered.

Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

The NPfI states that a detailed maximum noise level event assessment should be undertaken where the subject development/premises night-time noise levels at a residential location exceed:

- Leq 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- Lmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

Based on the night time RBL from the noise logger, for the possible hours of operation, the trigger level for a detailed assessment is **45 dB(A) Leq (15 min)** and/or **55 dB(A) Lmax**.

If warranted, a detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy (RNP).

Other factors that may be important in assessing the extent of impacts on sleep include:

- how often high noise events will occur;
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development;
- whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods); and
- current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

Maximum noise level event assessments should be based on the Lmax descriptor on an event basis under 'fast' time response.

The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the detailed trigger levels.

5.0 - NOISE ASSESSMENT

The ground floor layout of the proposed modifications to the Gaol is shown in **Figure 3**. The locations of the Cafe/Restaurant, Amphitheatre and Bar and are as marked.

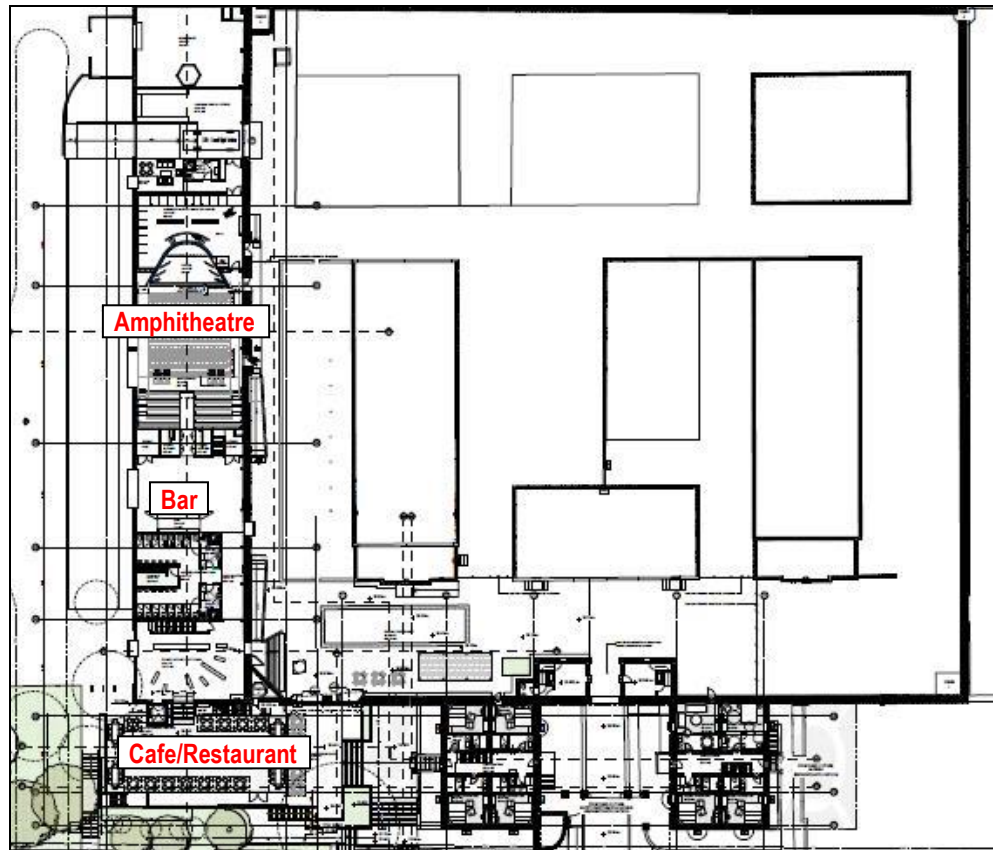


Figure 3 – Ground Floor Layout

5.1 Development Application 1

From an acoustic point of view the potential for adverse noise impacts associated with Development Application 1 may come from the use of the new cafe/restaurant on the ground floor.

The cafe/restaurant is to be located at the north eastern corner of the site. The proposed layout is shown in **Figure 4**. This shows there are to be indoor and outdoor areas at the cafe.

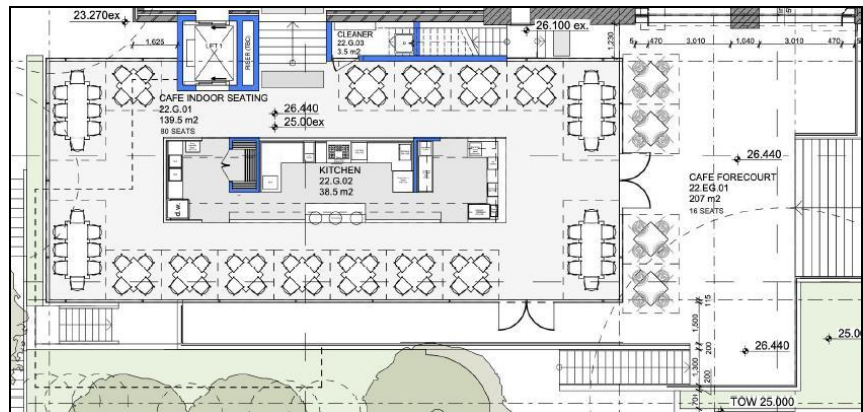


Figure 4 – Cafe/Restaurant

The major source of noise from the cafe/restaurant is considered to be that of patrons talking relatively loudly and simultaneously.

The noise from the indoor areas will be adequately attenuated by the glass facades of the cafe/restaurant. It is anticipated that the outdoor deck area directly adjacent to the cafe could cater for up to 16 people as shown on the plans (Figure 4).

The layout of the site and the proposed design of the cafe/restaurant is such that the people seated in outdoor areas will be significantly acoustically shielded from any residential receivers by the structure of the existing building and the proposed cafe/restaurant.

The L_w of the combined raised speech of 10 people conversing loudly at a restaurant (taken from the Spectrum Acoustics technical database) is in the order of 80 to 85 dB(A)L₁₀. That is, the noise source representing approximately one in three people in the cafe/restaurant speaking loudly and simultaneously to constitute an L₁₀ noise level.

Calculating the noise at the nearest potentially affected receiver, and taking into account distance loss alone, would result in a received noise of between 30 and 35 dB(A)L₁₀ which is significantly lower than the most stringent evening/night time noise criterion. In reality, the received noise would be at least 10 to 15 dB(A) lower than this due to the barrier effects of intervening building structures.

A further 12 patrons may be seated in an outdoor area inside the Gaol walls (Figure 4). As above, the noise from these patrons will be significantly acoustically shielded from any residential receivers by the structure of the existing buildings and the Gaol walls and there will be no adverse impacts due to noise emissions from them.

No further assessment of noise from the cafe/restaurant is, therefore, considered warranted.

5.2 Development Application 2

Development Application 2 involves the conversion of the upper levels of the Governors and Lieutenant Governors Buildings into a total of 20 boutique accommodation rooms over three levels of the two buildings.

The location of the buildings with respect to the main site entrance is shown in **Figure 5**.

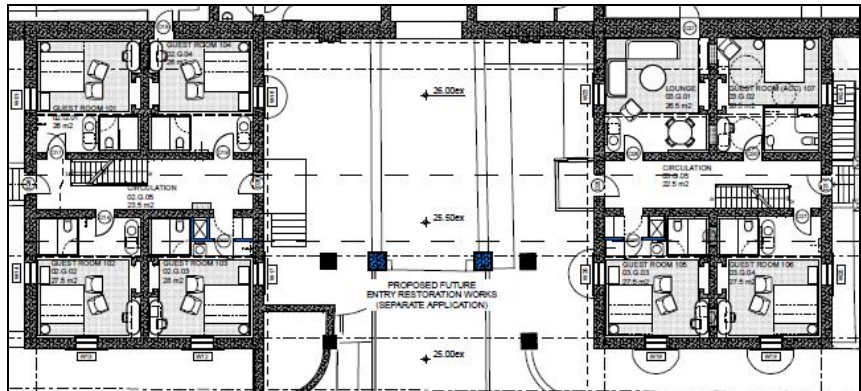


Figure 5 – Boutique Accommodation

The requirements and noise criteria in the NPfl and the ILGA are explicitly applicable at residential premises. In the absence of any specific noise criteria relating to short term accommodation, guidance can be gained from AS/NZS 2107 – “Acoustics—Recommended design sound levels and reverberation times for building interiors” (AS2107). AS2107 contains a table of recommended internal design sound levels for various areas of occupancy in different buildings.

For a “sleeping area in a hotel, near a major road” the acceptable internal noise level range is **35 to 40 dB(A) Leq**. These noise levels are applicable inside a room.

The criteria in AS2107 are not strictly applicable in this instance though as they relate to steady state, or quasi steady state, noise such as air conditioning noise and not really to occasional sporadic noise events which may most likely be those present here.

The rail noise screening tests from Section 3.5.1 of the Department of Planning guideline “Development near Rail Corridors and Busy Roads – Interim Guideline” Guideline is shown in **Figure 6**.

The closest facade of the proposed accommodation would be approximately 135m from the rail line. Figure 6 shows that this places the rooms outside of the potential zone of affectation in relation to rail traffic noise.

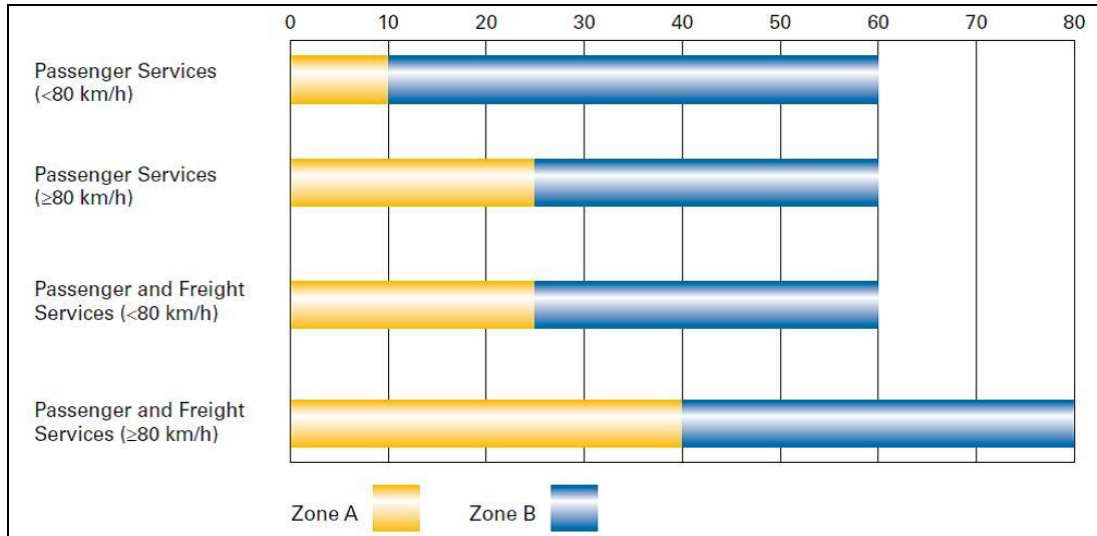


Figure 6. - Rail Noise Screening Test

The most significant potential for noise impacts, therefore, is most likely to come from noise emissions from the operation of the Gaol.

The majority of the facade of the two buildings is sandstone block which will provide an adequate attenuation of any predicted noise impacting on the site.

The acoustic weak points in each of the rooms will, therefore, be the windows. Each room is currently fitted with relatively old, double hung wooden windows which would have poor acoustic properties.

Table 5 shows a theoretical calculation of the noise from entertainment on the amphitheatre potentially impacting on the closest façade of the proposed accommodation.

Only the noise emissions from the roof of the amphitheatre are considered as the walls of the building will adequately attenuate any noise in the direction of the accommodation.

TABLE 5 CALCULATED SPL AT ACCOMODATION ENTERTAINMENT IN AMPHITHEATRE as dB(A) L10									
Item	Octave Band Centre Frequency, Hz								
	dB(A)	31.5	63	125	250	500	1K	2K	4K
Source Lw	105	45	72	88	95	99	101	98	92
STL of Roof		9	13	17	18	21	25	23	20
Directivity Loss @ 135°		8	10	12	13	14	15	16	18
Reverberant Field Loss (10m)		19	19	19	19	19	19	19	19
Area Gain		23	23	23	23	23	23	23	23
External SPL (roof)	73	34	54	63	68	68	65	63	58
SPL @ receiver Leq (roof)	35	4	16	25	30	30	27	25	20
Criterion L10 Evening/Night	45	29	32	35	37	38	39	36	36
Impact	0	0	0	0	0	0	0	0	0

The results in Table 5 show that the noise from entertainment in the amphitheatre will not exceed the adopted noise criterion at the outside of the windows of the proposed accommodation.

The received noise would also be below the acceptable level from AS2017.

It is understood that the Gaol may run tours at night in the future. These tours may involve the use of special effects to imitate previous events at the Gaol. Based on a previous assessment by Spectrum Acoustics, **Table 6** shows a calculation of potential impacts at the windows to the accommodation facing the yard (where the special effects may be played).

Note that the L10 noise level used in the previous assessment has been adjusted by a, conservative minus 2 dB to equate to an Leq level for the current assessment.

Preliminary calculations indicated that the existing windows (assumed to be 3mm glass in wooden frames) would not be adequate in attenuating the noise from the special effects. The calculation in Table 9, therefore, assumes that the existing windows had been replaced with 6.38mm laminated glass, fixed and in solid frames.

TABLE 6 CALCULATED SPL AT ACCOMODATION SPECIAL EFFECTS NOISE (Leq ¹)									
Item	Octave Band Centre Frequency, Hz								
	dB(A)	63	125	250	500	1k	2k	4k	8k
Lw Special Effects	103	68	80	91	97	99	95	87	73
Distance Loss (30m)		38	38	38	38	38	38	38	38
SPL at Receiver	65	30	42	53	59	61	57	49	35
STL windows (6.38mm laminated)		20	22	25	29	33	31	38	36
Internal noise	34	10	20	28	30	28	26	11	<0

1 Leq noise level adjusted from L10 minus 2dB

The results in Table 6 show that, with 6.38mm laminated glass in the windows that internal noise levels would comply with the acceptable noise level from AS2017.

The results in Table 6 are applicable to those windows which face in towards the Gaol yard and the proposed special effects.

Patrons leaving the site at night (after 10pm) may pass relatively close to some of the windows of the accommodation (most likely those not facing towards the Gaol yard). Under such circumstances there is a potential for sleep disturbance to occur (bearing in mind that, strictly speaking the sleep disturbance criteria are not applicable at short term accommodation).

Table 7 shows a representative sleep disturbance calculation based on the noise from loud male voice at 10m from a window in the accommodation. The calculation assumes the window has been fitted with 6.38mm laminated glass (fixed).

TABLE 7 CALCULATION SPL SLEEP DISTURBANCE (as L1 (1 min))	
Propagation Element	dB(A)
Loud male voice	95
Distance loss (10 m)	28
SPL bedroom window	67
Internal noise (6.38mm laminated glass)	36

The results in Table 7 show that, under the assessed conditions, the received noise inside the bedroom would be approximately 36 dB(A) L1 (1 min). This would not be expected to create any adverse sleep disturbance impacts.

In summary, it is recommended that the windows to the boutique accommodation be flitted with minimum 6.38mm laminated glass, in solid frames that fit neatly to the parent wall. Any gaps between the frames and the wall should be filled to full depth with a flexible sealant prior to fitting of architraves.

5.3 Development Application 3

From an acoustic point of view the potential for adverse noise impacts associated with Development Application 3 may come from the use of the renovated bar, foyer and amphitheatre on the ground floor.

The layout of the proposed amphitheatre is shown in **Figure 7**.

It is envisaged that the amphitheatre may be used for various activities and functions during which live or amplified music may be played. This would represent the worst case for noise generation from the amphitheatre.

To assess potential impacts the L_w of a live band, similar to that which may perform at the venue, has been sourced from the Spectrum Acoustics technical database. This is considered to be the loudest form of entertainment which may perform and, therefore, represents the worst case.

This noise source was assumed to be located on the stage as shown in Figure 7.

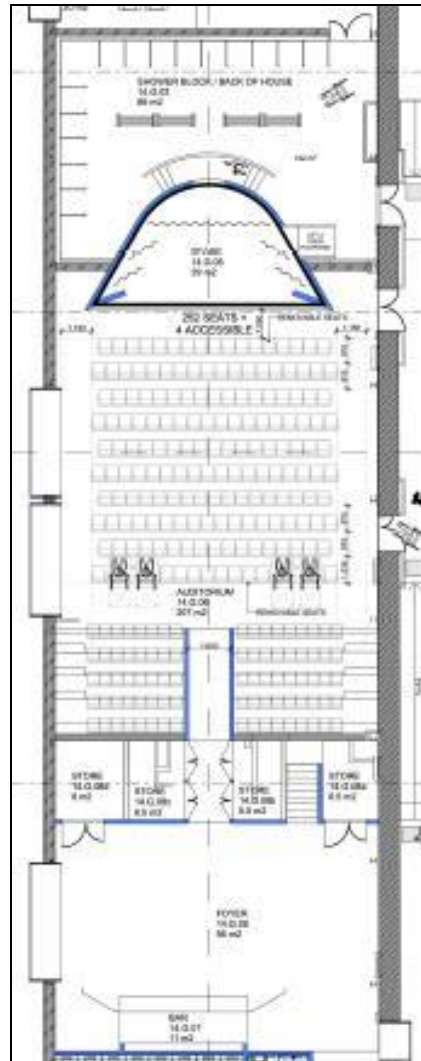


Figure 7 – Amphitheatre

The building that will house the amphitheatre is constructed of a brick exterior wall with a corrugated steel roof.

It is proposed that there be two windows in the exterior (northern) facade of the amphitheatre.

For the calculation of potential impacts the STL of the amphitheatre walls was based on published data for a system of an outer layer of bricks and an inner layer of 10mm plasterboard with an insulation in the cavity.

The STL of the roof/ceiling was based on data for 0.8mm steel sheeting underlain with a combination of solid and perforated plasterboard (approximately 50% each). Note that this is based on an assumption relating to the internal acoustic treatments of the amphitheatre and not on any specific acoustic advice (which is beyond the scope of the current assessment).

The STL of the windows was based on 6.38mm laminate glazing in solid frames with no gaps at the joins or at the walls. The glazing was assumed to be fixed.

For the calculations the noise source was considered to be an average distance of 7m from the internal surfaces of the external walls and windows an average of 10m from the centre of the ceiling. The space was considered to be semi reverberant.

The noise from the entertainment, as described above, was theoretically propagated to the nearest residential receiver taking into account the effects of semi reverberant field loss in the venue, transmission loss through building elements and hemispherical spreading (distance loss) to the receiver.

From consideration of the dimensions and orientation of the various building elements, the sound pressure levels immediately outside these were propagated to the nearest receiver using an equation¹ giving the sound field due to an incoherent plane radiator.

Note that a specific calculation of directivity loss for the roof, plus an area gain for the surface, was performed in lieu of the incoherent plane radiator calculation.

Table 8 shows the results of a theoretical calculation of noise from the entertainment in the venue propagated through the facades of the building, as described, and impacting on the residential receiver at 69 Cumberland Street, approximately 65m to the north.

¹ Equation (5.104), DA Bies and CH Hansen, *Engineering Noise Control*, E & FN Spon, 1996.

TABLE 8									
CALCULATED SPL AT 69 CUMBERLAND STREET									
ENTERTAINMENT IN AMPHITHEATRE as dB(A) L10									
Item	Octave Band Centre Frequency, Hz								
	dB(A)	31.5	63	125	250	500	1K	2K	4K
Source Lw	105	45	72	88	95	99	101	98	92
Reverberant Field Loss (7m)		17	17	17	17	17	17	17	17
Lp at inner surface	88	28	55	71	78	82	85	81	75
STL of glazing		20	22	25	28	33	30	35	35
External SPL (glazing)	58	8	33	46	50	49	55	46	40
SPL @ receiver Leq (glazing)	24	<0	<0	12	16	15	21	12	6
STL of Walls		26	29	34	39	44	54	58	64
Reverberant Field Loss (7m)		17	17	17	17	17	17	17	17
External SPL (walls)	43	2	26	37	39	38	30	23	11
SPL @ receiver Leq (walls)	16	<0	<0	10	12	11	3	<0	<0
STL of Roof		9	13	17	18	21	25	23	20
Directivity Loss @ 135°		8	10	12	13	14	15	16	18
Reverberant Field Loss (10m)		19	19	19	19	19	19	19	19
Area Gain		23	23	23	23	23	23	23	23
External SPL (roof)	73	34	54	63	68	68	65	63	58
SPL @ receiver Leq (roof)	29	<0	10	19	24	24	21	19	14
Total Received Noise	30	<0	10	20	25	25	24	20	15
Criterion L10 Evening/Night	45	29	32	35	37	38	39	36	36
Impact	0	0	0	0	0	0	0	0	0

The results in Table 8 show that, under the assessed conditions, there will be no adverse noise impacts at the closest and most potentially affected receiver due to the theoretical noise from entertainment in the amphitheatre.

Noise levels at all other receivers will be lower than those shown in the table and, therefore, in compliance with the adopted criteria.

The Bar will be located in the same building as, and adjacent to, the amphitheatre. The walls and roof/ceiling will be the same construction as the amphitheatre. There will be one window in the northern facade.

The major source of noise from the bar is considered to be the raised speech of patrons. A crowd of approximately 80 patrons in a bar could, as worst case, have a combined Lw of between 90 to 95 dB(A)L10, as taken from data in the Spectrum Acoustics technical database.

Table 9 shows the results of a theoretical calculation of noise from the raised speech of patrons in the bar propagated through the facades of the building, as described, and impacting on the residential receiver at 69 Cumberland Street, approximately 65m to the south.

TABLE 9									
CALCULATED SPL AT 69 CUMBERLAND STREET									
RAISED SPEECH IN BAR as dB(A) L10									
Item	Octave Band Centre Frequency, Hz								
	dB(A)	31.5	63	125	250	500	1K	2K	4K
Source Lw	95	38	45	64	77	91	90	86	77
Reverberant Field Loss (7m)		17	17	17	17	17	17	17	17
Lp at inner surface	78	21	28	47	60	74	73	69	60
STL of glazing		20	22	25	28	33	30	35	35
External SPL (glazing)	45	1	6	22	32	41	43	34	25
SPL @ receiver Leq (glazing)	11	<0	<0	<0	<0	7	9	0	<0
STL of Walls		26	29	34	39	44	54	58	64
Reverberant Field Loss (7m)		17	17	17	17	17	17	17	17
External SPL (walls)	31	<0	<0	13	21	30	19	11	<0
SPL @ receiver Leq (walls)	3	<0	<0	<0	<0	3	<0	<0	<0
STL of Roof		9	13	17	18	21	25	23	20
Directivity Loss @ 135°		8	10	12	13	14	15	16	18
Reverberant Field Loss (10m)		19	19	19	19	19	19	19	19
Area Gain		20	20	20	20	20	20	20	20
External SPL (roof)	58	22	23	36	47	57	51	48	40
SPL @ receiver Leq (roof)	13	<0	<0	<0	2	12	6	3	<0
Total Received Noise	14	<0	<0	<0	2	13	10	3	<0
Criterion L10 Evening/Night	45	29	32	35	37	38	39	36	36
Impact	0	0	0	0	0	0	0	0	0

The results in Table 9 show that, under the assessed conditions, there will be no adverse noise impacts at the closest and most potentially affected receiver due to the theoretical noise from the raised speech of patrons in the bar.

5.4 Mechanical Plant

There is to be new air conditioning and other mechanical plant associated with all stages of the development (i.e., with each development application).

The mechanical plant is to be installed in a plant room at the basement level, underneath the proposed cafe/restaurant.

The plant room will be fully enclosed within the basement of the building. The walls are solid concrete which will adequately attenuate the plant noise in the direction of all receivers. No further assessment of the plant noise is, therefore, considered warranted.

5.4 Sleep Disturbance

Noise from patrons leaving the site, after 10pm, has the potential to create sleep disturbance. This may include noise from the loud raised speech of patrons or the closing of car doors etc. Noise associated with this sort of activity would, typically, have an L1 (1min) level of up to approximately 95 dB(A).

For this assessment a noise source representing a loud male voice leaving the venue (at 95 dB(A) L1 (1min)) was considered to be located at the southern end of the parking area.

The noise was theoretically propagated to the nearest receiver to the south east in John Street, approximately 45m away. For the purposes of calculation, it was assumed that bedroom windows in the nearest residence faced the noise source. The results of the calculations are shown in **Table 10**.

Propagation Element	dB(A)
Loud male voice	95
Distance loss (45 m)	41
SPL bedroom window	54
Screening Criterion (night) dB(A)	55

The results in Table 10 show that, under the assessed conditions, there will be no adverse sleep disturbance impacts and a more detailed assessment is not warranted.

The assessed L1 (1 min) noise from a loud male voice is at a similar level to that of a car door closing and a car starting up and the calculations shown in Table 10 are considered representative of the worst case.

5.6 Future Development

The current project is confined to the redevelopment of the existing buildings at the Gaol. Possible future developments for the site may include hotel style accommodation that could be constructed on the land adjacent to the northern walls of the Gaol.

Each of the potential noise sources will be considered here, in general terms, in relation to any potential future impacts. In regards to the proposed hotel style accommodation it was assumed that there were rooms with windows and/or balconies facing towards the Gaol.

Amphitheatre

Similar calculations to those shown in Table 8 show that the received noise at the existing residences to the north east would be at the same, or lower levels than those shown and, therefore, the adopted criteria would not be exceeded.

The calculations undertaken to a theoretical reception point approximately 10m from the amphitheatre (say at the facade of an accommodation hotel) indicate that the received noise at the facade would be approximately 48 to 50 dB(A)L10, with most of the noise emanating from the roof. Noise emissions through the walls and glazing would contribute less than 40 dB(A) to the total.

This exceeds the adopted ILGA criteria and would do so in several octave bands, particularly those in the mid to high frequency range. The ILGA criteria are applicable at residential receivers and do not, strictly speaking, apply at short term accommodation such as hotels.

If considered warranted, to reduce the noise emissions through the ceiling additional mass would need to be incorporated into the construction of the ceiling or roof. Probably the most feasible option for this would be to install a solid ceiling of 16mm Soundchek (or acoustically similar) plasterboard to the room. This would reduce noise emissions by at least 5 to 6 dB(A).

As detailed in Section 5.1, the calculations of noise emissions from the amphitheatre assumed the ceiling of the space was constructed of a composite of 50% solid and 50% perforated plasterboard, with an insulation in the cavity between the ceiling and steel roof.

As discussed, this was based on an assumption of the requirements for the internal acoustics of the space. That is, a full solid plasterboard ceiling could result in a high reverberation time which may reduce the acoustic amenity of the space.

Some options that may be considered in this instance may be to fit a solid 16mm plasterboard layer below the roof and suspend an acoustic ceiling in a grid below this, or to suspend acoustic panelling from a solid plasterboard ceiling. The specifications for this would require detailed acoustic assessment of the amphitheatre.

The predicted noise, at the possible façade of a hotel, would be up to approximately 5 to 6 dB(A) over the adopted night time criterion for a residential receiver.

As indicated, noise impacts have been calculated to windows or balconies facing towards the Gaol. As an alternative, noise control

could be incorporated into the design of any potentially affected rooms at the hotel. This may include specification for the type, size and glazing thickness of any windows, e.g., smaller windows, fixed glazing and/or increased glazing thickness.

Bar

The emissions from the assessed patron noise in the bar will be sufficiently attenuated by the building structure such that they would be insignificant at any existing receivers or proposed hotel.

Mechanical Plant

Mechanical plant is to be housed in a dedicated plant room and will not create and adverse noise emissions.

Sleep Disturbance

Sleep disturbance assessments are not typically associated with short term accommodation.

6.0 RECOMMENDATIONS

The following is a summary of the acoustic recommendations relating to each Development Application.

6.1 Development Application 1

There are no specific acoustic requirements in relation to Development Application 1.

6.2 Development Application 2

In relation to the redevelopment of the Lieutenant Governor and Governor's Residences, it is recommended that the windows to the boutique accommodation be flitted with minimum 6.38mm laminated glass, in solid frames that fit neatly to the parent wall. Any gaps between the frames and the wall should be filled to full depth with a flexible sealant prior to fitting of architraves.

6.3 Development Application 3

The potential for acoustic impacts relating to Development Application 3 is considered to come from noise emissions from the proposed redeveloped amphitheatre.

The results of the assessment have shown there will be no adverse noise impacts providing the following minimum construction types are employed.

The roof/ceiling of the amphitheatre must be minimum 0.8mm steel sheeting underlain with a combination of solid and perforated plasterboard (approximately 50% each).

The windows of the amphitheatre must be minimum 6.38mm laminate glazing in solid frames with no gaps at the joins or at the walls. The glazing was assumed to be fixed.

The space was considered to be semi reverberant.

Any variation to the detailed construction types which may lower the STL of the various building elements must be approved by an acoustic consultant.

The walls, window and roof/ceiling of the bar and foyer should be of similar construction to the amphitheatre.

7.0 CONCLUSION

An acoustical assessment has been completed for the proposed redevelopment of Maitland Gaol at Lot 469 D.P. 1002766, John Street, East Maitland, NSW.

The assessment considered potential impacts from the operation of the redeveloped Gaol including noise from entertainment, patrons and mechanical plant.

The assessment has shown that, under the conditions considered, there will be no adverse noise impacts, at any existing residential receivers, due to the operation of the Gaol.

To avoid any potential adverse noise impacts at the proposed boutique accommodation at the Gaol it is recommended that the windows to these rooms be fitted with minimum 6.38mmlaminted glass.

APPENDIX I
NOISE LOGGER CHARTS

