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Noise Impact Assessment Function Centre and Temporary Events 229 Glenarvon Road, Lorn, NSW

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CONTENTS

INTRODUCTION	1
BACKGROUND TO THE PROPOSAL	2
EXISTING ACOUSTIC ENVIRONMENT	4
NOISE IMPACT CRITERIA	5
Licensed function centre.....	5
Markets and Workshops.....	6
QUANTIFICATION OF NOISE SOURCES	6
RESULTS AND DISCUSSION	7
RECOMMENDATIONS AND CONCLUSION	10



INTRODUCTION

This report provides the results, findings and recommendations arising from an acoustical assessment of the proposed function centre and markets at 229 Glenarvon Road, Lorn, NSW.

The assessment is to support a Development Application (DA) to Maitland City Council (Council) and addresses acoustic issues raised in Council's RFI dated 8 May 2020, reproduced below.

Acoustics

An acoustic report which addresses the following:

- The impact of noise from the proposed markets, including (but not limited to) vehicle noise, car door closures, patron noise, and stall holder noise from setting up.
- The impact of noise from the proposed function centre, including (but not limited to) vehicle noise, car door closures, patron noise, and noise from entertainment (i.e. music).
- The impact of noise from any other activities the proponent is proposing to undertake on the property.
- The acoustic report is to provide recommendations for hours of operation, limits to the number of stall holders for market events and limits to the number of patrons based on noise impacts to affected noise sensitive receivers. The report must also specify the location of the proposed markets on the property.
- The acoustic report must also provide recommendations on any noise attenuation measures required to ensure the activities do not cause a noise nuisance to surrounding noise sensitive receivers.

The report also addresses Council's request for additional information following their review of our original report dated December 2020, as follows;

"Acoustic Report

- a) *The acoustic report noise assessment assumes noise levels emitted from the temporary events component held in the barn will be significantly greater than those produced by the markets. Council's Regulatory Compliance section does not accept this assumption, given the additional information requested regarding the events DA and the further assessment required. Moreover, given that the proposed locations of carparking and markets appear to be a closer distance to receivers and are not attenuated by the barn, attenuation by building and distance will be less. An assessment of the following potential impacts must be undertaken in accordance with "Noise Policy for Industry", and account for any likely tonal and impulsive characteristics:*

- *Car door closures and vehicle movements of patrons;*
- *Car door closures, vehicle movements/idling of deliveries and any noise potentially associated with stall holder set up/pack up (5am start and post 9pm finish);*
- *Music/entertainment/amplified sound provided at the markets."*

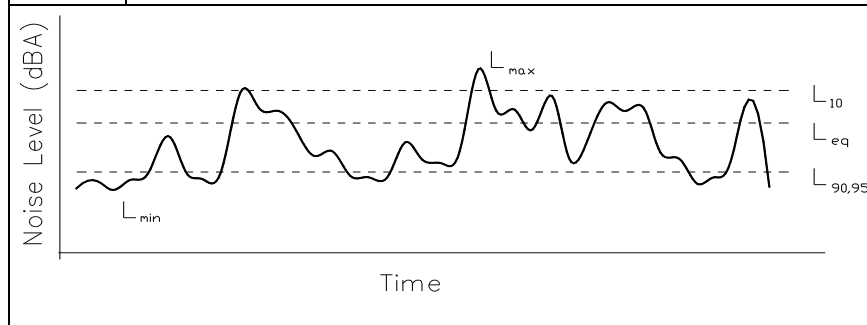
Council's review also identified additional approved residences near the site which were not considered in our original assessment.

Regarding dot point three above, the proponent has advised there will be no music/entertainment/amplified sound provided at the markets, which would comprise no more than 15 stalls. Quantitative assessment of this noise source is therefore not required and this commitment can be conditioned into a project approval, should one be granted.

This report also considers matters raised in a teleconference with the applicant, their planning consultants and Council officers on 1 June 2022. The main issue relevant to acoustics is the definition of activities that would occur on site and the times at which they would occur. This report presents separate sections on daytime and night time noise impacts.

Table 1 contains a glossary of commonly used acoustic 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.
L _w	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.



BACKGROUND TO THE PROPOSAL

The proponent has advised that the proposal comprises alterations and changes of use for a large portion of existing land and structures on site, a new market area, use of the adjacent existing barn for regular events and workshops, and an informal car parking area. It is intended

that the barn will also be able to be booked for use as a function centre for weddings and other temporary events.

The proposal will cater for a maximum capacity of 150 persons on site for temporary events and functions in the barn area. This report does not distinguish between traffic noise associated with the markets and the temporary functions, rather the assessment considers vehicle movement noise at specific locations on site for the worst case night time period.

The applicant has advised that proposed daytime activities include Weddings / Ceremonies / Celebrations / Workshops / Conferences / Seminars with PA system for safety.

There could be a band without speakers (e.g. Jazz band or string quartet) and volume-controlled PA system for background / event music and speeches, via low range bluetooth speaker or similar. Spectrum Acoustics has recently taken measurements at a wedding venue where the sound power level of Bluetooth speakers at a volume near distortion was 85 dB(A).

Night time noise-generating activities would be wedding receptions in the renovated barn with no noise permitted after 12 am. Noise emissions from within the barn have previously been assessed.

An aerial view of the existing site, and surrounding residential receivers is shown in **Figure 1**. Receivers R3 and R4 are approved future residences and are closer to the site than existing residences R1 and R2 which were considered in the initial version of this report. A concept layout of the proposed modifications is shown in **Figure 2** and **Figure 3**.

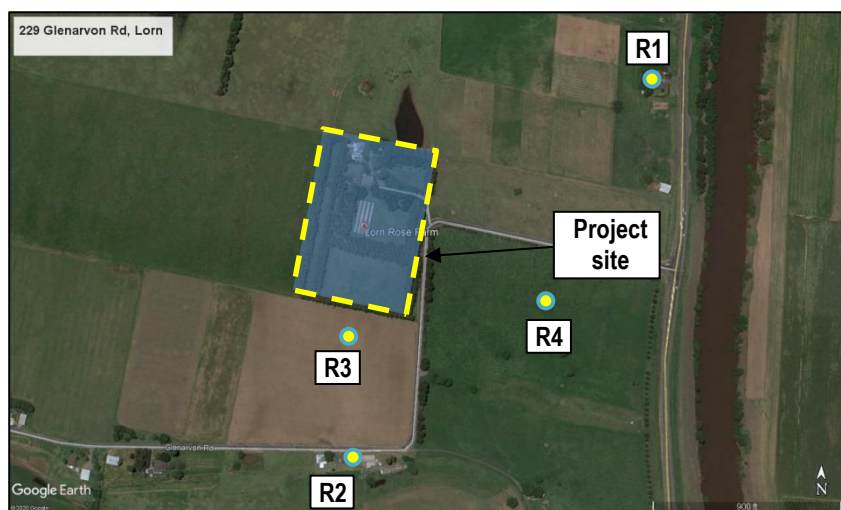


Figure 1 – Aerial view of project site (source: Google Earth)

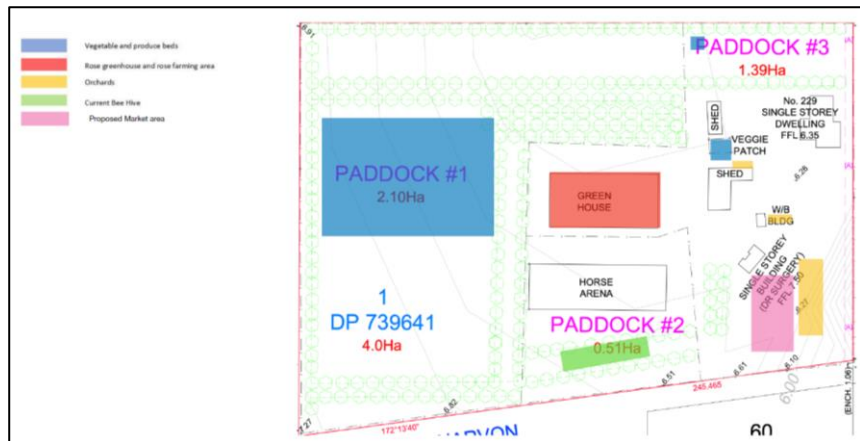


Figure 2 – Proposed Market Area

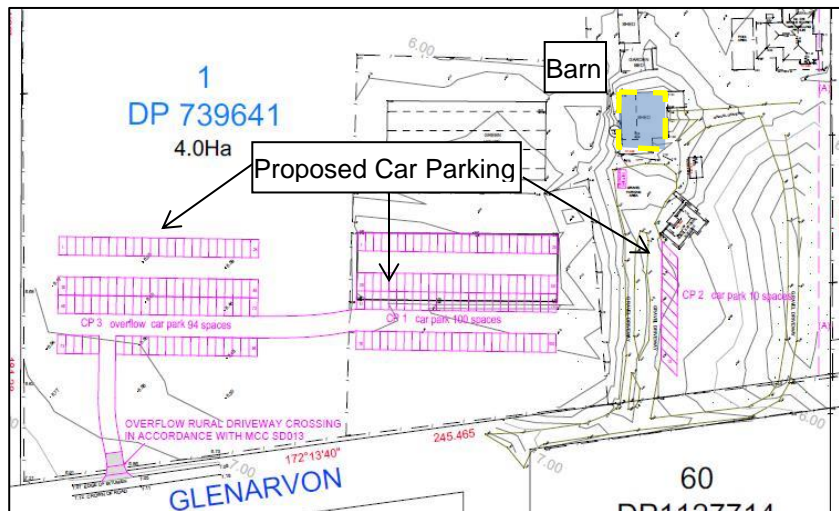


Figure 3 – Barn and Proposed Car Parking Areas

In our previous assessments it was found that some form of noise control would be required to limit night time Lmax noise impacts at potential future residential receiver R3 from cars in CP3. The applicant has committed to not using CP3 during the evening or night thereby mitigating the potential noise impacts.

EXISTING ACOUSTIC ENVIRONMENT

Noise emissions from licensed premises are assessed against the standard Independent Liquor and Gaming Authority (ILGA) criteria.

The requirements of the ILGA conditions relate to the existing acoustic environment of the area. The site is located in a rural acoustic environment. As such, the default minimum background levels of 35 dB(A),L90 day and 30 dB(A),L90 night have been adopted in accordance with section A1.2 of the NSW Noise Policy for Industry (NPI).

NOISE IMPACT CRITERIA

Licensed function centre

Premises which are licensed under the Liquor Act may be a source of offensive noise for neighbouring residents as a result of activities on the premises, or the activity of patrons arriving and departing.

The Police Department, ILGA and OEH have agreed that the ILGA will accept primary responsibility for the control of noise from licensed premises. Following are the Standard Noise Conditions imposed by ILGA;

“The LA10 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.

The LA10 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) between 12.00 midnight and 7.00 a.m. 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. In order to accurately assess the potential impacts of noise from patron activity, frequency spectral data were taken from attended noise surveys detailed in the Spectrum Acoustics technical database.

The database contains background noise levels measured in similar acoustic environments, in octave bands, with a Bruel & Kjaer Type 2260 Precision Sound analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Bruel & Kjaer Type 4231 Sound Level Calibrator prior to, and at the completion of measuring.

The background noise level used in this assessment for setting the ILGA criteria has been derived by adjusting a typical background octave band spectrum to match the adopted night time background L90 level of 30 dB(A). This will represent the worst-case trading hours after 10pm.

By assessing potential impacts against the most stringent night time criterion, compliance here will automatically imply compliance at all other times.

The adopted background noise level and ILGA criteria for assessing noise emission from the proposed modification are shown in **Table 3**.

TABLE 3 MEASURED NOISE LEVELS (L90) and ILGA CRITERIA (L10)										
		Octave Band Centre Frequency, Hz								
	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
L ₉₀	30	10	17	20	22	23	24	21	21	19
ILGA	35	15	22	25	27	28	29	26	26	24

Markets and Workshops

Noise emissions from markets, workshops and other proposed daytime activities are required to comply with the NSW default minimum noise trigger level of 40 dB(A), Leq(15min) at offsite residential receivers.

Sleep disturbance

To help protect against people waking from their sleep the NPI recommends that L_{max} noise levels should not exceed the greater of 52 dB(A), L_{max} or the background level plus 5dB(A) at residential receivers. The “sleep disturbance” screening level is only applicable to night-time noise emissions (i.e. between 10 pm and 7 am weekdays, 10 pm and 8 am Sundays and Public Holidays).

The sleep disturbance screening level for the current assessment is therefore 52 dB(A) L_{max}. This applies to any vehicle movements on site.

If the screening level is exceeded, the NPI requires a more thorough assessment of the potential impacts on residential amenity. In projects such as this, however, the goal is to engineer and manage noise emission so the sleep disturbance trigger level is not exceeded.

QUANTIFICATION OF NOISE SOURCES

The major source of night time noise from the site is considered to be that of formal proceedings occurring during temporary events and functions in the barn in the middle of the site, as indicated in **Figure 3**. Significant daytime sources include the volume-controlled PA system and Bluetooth speakers. An unamplified string quartet does not present a potential for significant noise emissions. Within Council’s original request for additional information, the potential for noise from the overflow carpark (CP3) to impact on the proposed future residence R3

in Figure 1, which may be only 30m south of the southern site boundary, was identified. The Applicant will avoid these potential impacts by prohibiting use of CP during the evening and night.

The adopted LA10 sound power level of typical function style music and vocal spectrum previously measured by Spectrum Acoustics is shown in **Table 4**. These levels are also typical of a small live band with no loudspeaker systems operating.

TABLE 4									
Lw OF DJ MUSIC OR SMALL BAND (L10)									
	Octave Band Centre Frequency, Hz dB(A)								
	dB(A)	63	125	250	500	1k	2k	4k	8k
DJ Music	105	53	74	85	95	99	100	97	89
Bluetooth speaker	85	30	51	65	74	80	79	77	69

Maximum noise levels associated with short term events such as raised speech, low speed vehicle movements, car doors closing and engines starting may be up to 90 dB(A), Lmax. Bus exhausts may briefly peak at 95 dB(A).

RESULTS AND DISCUSSION

Temporary Events and Functions (Night)

For the calculation of impacts the noise source representing a DJ playing at a wedding, or similar function was considered to be located inside the barn shown on **Figure 3**.

The noise representing the entertainment was then theoretically propagated to nearest receivers R3 and R4 taking into account the effects of internal distance loss, transmission loss, area gain, hemispherical spreading (distance loss), atmospheric absorption, a nominal +5 dB factor for downwind or inversion conditions as adopted in ISO 9613-1 “Acoustics – Attenuation of sound during propagation outdoors”, and a nominal minimum transmission loss through the barn building with repaired external corrugated iron, internal VJ board lining and insulation in the wall cavities. Results are shown in **Tables 2 and 3** based on the assumption that the barn doors are closed.

TABLE 2
CALCULATED SPL AT R3 (@ 220m) – DOORS CLOSED, dB(A),L10

Item	Octave Band Centre Frequency, Hz								
	dB(A)	31.5	63	125	250	500	1K	2K	4K
Source Lw	105	53	74	85	95	99	100	97	89
Internal loss* (5m)		-15	-15	-15	-15	-15	-15	-15	-15
Internal surface SPL	90	38	62	73	80	84	85	82	74
Barn Transmission loss*		-16	-21	-26	-31	-36	-37	-38	-39
External SPL		22	41	47	49	48	48	44	35
Area gain (200 m ²) #		+23	+23	+23	+23	+23	+23	+23	+23
External Lw ^	79	45	64	70	72	71	71	67	58
Atmospheric absorption		0	0	0	-1	-1	-2	-4	-6
Wind / inversion		+5	+5	+5	+5	+5	+5	+5	+5
Distance Loss (220m)		-55	-55	-55	-55	-55	-55	-55	-55
SPL @ receiver R3	26	0	14	20	21	20	19	13	2
Criterion (ILGA)	35	15	22	25	27	28	29	26	26
Impact	-9	-15	-8	-5	-6	-8	-10	-13	-24

* Semi-reverberant space.

* 15mm timber lining, external metal, R2.5 insulation cavity infill.

Approximately 200 m² wall and roof surfaces visible from the south and north.

^ Equivalent point source.

TABLE 3
CALCULATED SPL AT R4 (@ 290m) – DOORS CLOSED, dB(A),L10

Item	Octave Band Centre Frequency, Hz								
	dB(A)	31.5	63	125	250	500	1K	2K	4K
Source Lw	105	53	74	85	95	99	100	97	89
Internal loss* (5m)		-15	-15	-15	-15	-15	-15	-15	-15
Internal surface SPL	90	38	62	73	80	84	85	82	74
Barn Transmission loss*		-16	-21	-26	-31	-36	-37	-38	-39
External SPL		22	41	47	49	48	48	44	35
Area gain (200 m ²) #		+23	+23	+23	+23	+23	+23	+23	+23
External Lw ^	79	45	64	70	72	71	71	67	58
Distance Loss (290m)		-57	-57	-57	-57	-57	-57	-57	-57
Atmospheric absorption		0	0	0	-1	-1	-2	-4	-6
Wind / inversion		+5	+5	+5	+5	+5	+5	+5	+5
SPL @ receiver R4	24	-2	12	18	19	18	17	11	0
Criterion (ILGA, NPI)	35	15	22	25	27	28	29	26	26
Impact	-11	-17	-10	-7	-8	-10	-12	-15	-26

* Semi-reverberant space.

* 15mm timber lining, external metal, R2.5 insulation cavity infill.

Approximately 200 m² wall and roof surfaces visible from the south and north.

^ Equivalent point source.

The results in Tables 2 and 3 show that, under the previously stated conditions with barn doors closed, noise emissions from the barn would be well below the adopted (minimum) noise criterion at the nearest receivers. When doors on the northern side of the barn are open and music is playing there is potential for noise impacts at receiver R1 at a distance of 400m from the barn. Adjusting the results in Tables 2 and 3 to a distance of 400m gives a level of 21 dB(A) at R1 with barn doors

closed. **Table 4** shows predicted noise impacts at R1 with the barn doors open.

TABLE 4									
CALCULATED SPL AT R1 (@ 400m) – DOORS OPEN, dB(A),L10									
Item	Octave Band Centre Frequency, Hz								
	dB(A)	31.5	63	125	250	500	1K	2K	4K
Source Lw	105	53	74	85	95	99	100	97	89
Internal loss* (5m)		-15	-15	-15	-15	-15	-15	-15	-15
SPL at open door	90	38	62	73	80	84	85	82	74
Area gain (6 m ²) #		+8	+8	+8	+8	+8	+8	+8	+8
Open door Lw ^	98	46	70	81	88	92	93	90	82
Distance Loss (400m)		-57	-57	-57	-57	-57	-57	-57	-57
Atmospheric absorption		0	0	-1	-2	-3	-4	-5	-7
Wind / inversion		+5	+5	+5	+5	+5	+5	+5	+5
SPL @ receiver R1	42	-8	18	28	34	37	37	33	23
Criterion (ILGA, NPI)	35	15	22	25	27	28	29	26	26
Impact	7	-21	-4	3	7	9	8	7	-3

* Semi-reverberant space.

Approximately 12 m² total door area, assumed 50% open.

^ Equivalent point source.

The results in Table 4 show that the criterion would be exceeded by 7 dB at R1 with the northern barn door 50% open while music is playing. This is a significant exceedance requiring reduction to achieve the 35 dB(A) criterion. The two available options are to keep the barn doors closed at all times when music is played internally and install a western personal access door, or install an electronic sound limiting device calibrated to ensure internal noise levels do not exceed 83 dB(A), allowing for the barn door to be open while music is playing.

The engineering solution of installing a sound limiting device and calibrating it to the maximum allowable internal noise level is the preferred option and has been accepted by the proponent. Limiting the internal sound pressure level of music has the additional benefit to the community of also minimising noise emissions when the barn doors are closed, which is expected to be a significant portion of the time during any function. It is recommended that installation and calibration of the sound limiting device be conditioned into the development consent.

Markets and Workshops (Day)

Considering a worst-case sound power level of 85 dB(A) from the PA, Bluetooth speaker or unamplified music, a calculation similar to that in Table 4 results in a level of 30 dB(A) at the nearest residential receiver, compared to the daytime noise trigger level of 40 dB(A). Daytime events will therefore result in minimal potential for impacting the amenity of residential receivers.

RECOMMENDATIONS AND CONCLUSION

An acoustical assessment has been completed for the proposed alterations to land usage and existing structures at 229 Glenarvon Road, Lorn, NSW. The results of the assessment have shown that the received noise as a result of noise emissions from the proposal would exceed the adopted ILGA noise criteria at a receiver north of the site if the barn doors are open while music is playing inside during a function.

It has been recommended that an electronic sound limiting device be installed and calibrated to ensure noise levels at the most affected receiver do not exceed the adopted noise criterion.

Sleep disturbance impacts at a potential future receiver south of the site would be mitigated by restricting use of the southern overflow carpark to daytime/evening hours of 7 am to 10 pm.

Accordingly, this assessment has found that the proposal could operate within noise conditions as may be imposed in a development approval, subject to noise controls being implemented as recommended in this assessment.