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Acoustic Environmental & Impact Assessment Report and Aircraft Noise Impact Assessment

For proposed Vikings Club

at

No. 37 Tompsitt Dr, Jerrabomberra

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1.0 INTRODUCTION

Acoustic, Noise & Vibration Solutions Pty Ltd has been commissioned to prepare an acoustic impact assessment for the proposed Vikings Club located at No. 37 Tompsitt Dr, Jerrabomberra (Figure 1 – Proposed Site Location).

This report has been prepared to form part of the development application to be submitted to the Queanbeyan-Palerang Regional Council that seeks consent for staged works for the construction of a registered club premises. This report provides supporting design and assessment information relating to the noise issues associated with the club development. Furthermore, the report will determine building materials to be used and the construction methods to be adopted such that the proposed development is built to achieve the internal noise and vibration levels as specified in AS 2021:2015 *'Acoustics – Aircraft noise intrusion – Building siting and construction'*.

The existing site at No. 37 Tompsitt Dr, Jerrabombera is currently unoccupied. The architectural plans by Benson McCormack Architecture are for the construction of a club that includes two (2) stages of development.

Stage 1
Construction of the registered club premises as described:

- Construction of the Pavilion building comprising:
  - Reception, lounge and office area;
- Construction of the main building comprising:
  - Ground level with restaurant, bar areas, gaming areas, function room and amenities;
  - Mezzanine level containing building plant equipment for main buildings
- Construction of the eastern car park and part of the western car park for a total of 153 parking spaces
- Landscaping for the development including the construction of paths and refurbishment of the pond area.

Stage 2
Expansion of the registered club premises as described:

- Alterations and additions to the main building comprising:
  - Demolition works comprising the removal of the roof;
  - Construction of level 1 to provide for two (2) function rooms, bar, amenities and plant equipment;
- Alterations to the Pavilion building comprising:
  - Ground floor alteration including the construction of a stairwell, lift and removal of office rooms;
  - Mezzanine floor with office and meeting rooms;
  - Internal construction of level 1 with function room and reception area;
- Construction of an alfresco dining area to the east of the pond including a bar.
- Construction of a viewing platform to the north of the pond.
- Extension to the western car park to provide for a further 119 parking spaces (for a total of 272 car spaces).

1.1 SCOPE OF REPORT

The proposed development is located south of Canberra Airport, between the ANEF 20 and ANEF 25 contours. According to Clause 7.9 and 7.10 which applies to the Jerrabomberra URA of the Queanbeyan-Palerang Regional Local Environmental Plan 2022, any development in such a zone requires compliance with internal noise levels established in Australian Standard AS 2021:2015 *'Acoustics – Aircraft noise intrusion – Building siting and construction'*.

Part 1 of the following report will assess the impact of aircraft noise on the internal amenity of the proposed Vikings Club as per AS 2021:2015 as well as determine building materials in accordance with the noise mitigation requirements of the above code.

Part 2 of the following report will assess the noise impact from the operation of the Vikings Club on the surrounding residential receivers. The focus of this section will be on the noise emissions produced by Stage 2 of this development, as this will encompass all noise emissions from Stage 1 as well as additional noise generation due to the extension to the western carpark and the construction of additional facilities on the new Level 1.

The report will assess noise including but not limited to the following:

- Patron noise
- Entertainment noise (live music)
- Noise from gaming areas
- Noise from additional traffic generation and carpark
- Noise from proposed mechanical plant & equipment
- Noise from the use of the Club's loading dock.

As per our calculations and the acoustical study below, noise produced by the operation of the Vikings Club will comply with the requirements of the NSW Environmental Protection Authority (EPA), NSW Noise Policy for Industry (2017), NSW Office of Liquor, Gaming & Racing (OLGR) noise recommendations, and Queanbeyan-Palerang Regional Council requirements, provided all noise control recommendations in Section 9 of this report are adhered to.

This commission involves the following:

- Inspect the site and environs.
- Measure the background noise levels at critical locations and times.
- Prepare an Environmental Noise Impact Report.

- Establish acceptable noise level criterion.
- Quantify noise emissions from the proposed Vikings Club
- Calculate the level of noise emission, taking into account building envelope
- Transmission loss, screen walls and distance attenuation.
- Provide in principle noise control recommendations (if necessary).

The above-mentioned noise sources will be quantified and assessed in this report and we will propose practical and effective acoustic treatment measures to ensure that the acoustic amenity of the surrounding residences as well as the proposed development is maintained.

2.0 GENERAL DESCRIPTION AND ENVIRONMENT

The proposed Vikings Club is located on Tompsitt Dr in the suburb of Jerrabomberra (Figure 1 – Proposed Site Location). The following aspects of the proposed Vikings Club require consideration of the noise emission to external noise sensitive receivers for compliance with site noise emission criteria:

- Impact of vehicles entering/exiting within site boundary from Gwendoline Pl;
- Loading dock activity and associated deliveries for the Vikings Club;
- Impact of additional traffic on Gwendoline Pl;
- Parton noise and music outbreak from Vikings Club; and,
- Mechanical plants and equipment.

The nearest potential residential receivers impacted from the proposed Vikings Club are detailed in Table 2.1 and Figure 2 – Nearest Residential Receivers.

Table 2.1 – Noise Sensitive Receivers

Receiver	Location	Description
R1	No. 49 Esmond Ave, Jerrabomberra	Single-Storey Residential Dwelling
R2	No. 51 Esmond Ave, Jerrabomberra	Single-Storey Residential Dwelling
R3	No. 24 O'Sullivan Rd, Jerrabomberra	Single-Storey Residential Dwelling
R4	No. 17 O'Sullivan Rd, Jerrabomberra	Single-Storey Residential Dwelling
R5	No. 8 Miles Pl, Jerrabomberra	Single-Storey Residential Dwelling

The proposed Stage 2 of the development offers a mix of indoor and outdoor areas, with multiple natural outdoor areas located outside the main facility such as outdoor alfresco dining near the pond and an outdoor child nature play area. Within the main facility, there is an outdoor alfresco dining area on the northern boundary of the upper ground floor and an outdoor gaming area on the southern boundary of the upper ground floor [Figure 3 – Proposed Outdoor Areas – Upper Ground Floor (Stage 2)]. In addition, there is an outdoor terrace located outside the function rooms on the first floor located at the northern boundary [Figure 4 – Proposed Outdoor Areas – Level 1 (Stage 2)].

The proposed Vikings Club will provide entertainment including live music in the form of production shows or cover bands such as raffles and bingo.

The proposed operating hours for the Vikings Club are as follows:

- Monday to Sunday: 9:00am – 2:00am

Operating hours of the associated facilities within the Vikings Club are as follows:

- Poker Machine Lounge
  - Monday to Sunday: 9:00am – 2:00am
- Lounge/Bar
  - Monday – Sunday: 9:00am – 2:00am
- Bistro
  - Monday – Sunday: 11:00am – 10:00pm
- Café
  - Monday – Sunday: 9:00am – 2:00am
- Alfresco/outdoor areas
  - Monday – Sunday: 9:00am – 10:00pm
- Smoking Area in Outdoor Poker Machine Lounge
  - Monday – Sunday: 9:00am – 2:00am
- Function Rooms
  - Monday – Sunday: 9:00am – 12:00am (subject to reservations)

The proposed development will include two (2) car parks with a total of one-hundred and fifty-three (153) designated car spaces for club patrons (Figures 5 & 6). Entry to the car parks will be from Gwendoline Pl. It is expected that most patrons visiting the club will live/work in the local area or will access the site by public transport.

The club will also have its own dedicated enclosed loading dock, with access to the loading dock from the western carpark [Figure 7 – Proposed Loading Dock (Stage 2)].

A range of mechanical plants and equipment will be included in the proposed development to service the Vikings Club. The noise breakout from the development, including the operation of the club and mechanical plant is to comply with the Noise Policy for Industry (2017), Noise Guide for Local Government, NSW Road Noise Policy and the requirements of the Liquor Administration Board (LAB).

Existing background noise levels in the area are governed by traffic noise from O'Sullivan Rd, Esmond Ave and the operation of the commercial precinct behind the site.

3.0 NOISE SURVEY, INSTRUMENTATION & RESULTS

On August 24th, 2023, an engineer from this office went to the above address and carried out attended & unattended noise measurements near the proposed development. Attended and unattended noise measurements were carried out near the front boundaries of the nearest residential receivers at No. 24 O'Sullivan Rd and No. 17 O'Sullivan Rd [Figure 8 – Noise Reading Locations (Points A & B)].

The unattended noise measurements at points A & B were carried out for a period of seven (7) days between the 24th of August 2023 and the 31st of August 2023. The noise survey was conducted to determine the $L_{(A90,\ 15\ minutes)}$ and $L_{(Aeq,\ 15\ minutes)}$ of the existing *background noise levels* during the Day (7:00-18:00), Evening (18:00-22:00) and Night (22:00-7:00).

All unattended sound level measurements and analysis performed throughout this project are carried out with a NSRTW_MK3 wireless sound level data logger (Serial No. Alv8DHWQUXU3grtCZwJZPD- Office Tag- machine 4 & logger (Serial No. CPp0Dd04c1c9iLtiSwBRPD- Office tag -machine 1-).

The sound loggers specifications are as follows:

- Type 1 digital MEMS microphone
- Non-volatile 128 Mb recording memory
- Records L-max, L-min and Leq levels
- Log interval adjustable from 125 ms (8 points per second) up to hours
- A, C and Z weighting curves
- Oscilloscope and spectrum analyser features
- Observes and records 100% of the acoustic signal
- Software calculates global Leq according to ISO and OSHA methods
- WIFI connectivity to report measured levels remotely
- Weatherproof casing designed for indoor/outdoor applications
- Activity detection and logging.
- Long-term measurement and recording of acoustic levels for environmental impact studies.

The loggers are factory calibrated and calibration certificates dated 05/07/2022 and 14/08/2023 are presented in Figure 9 – Calibration Certificates.

The microphones were positioned 1.5m from ground level. The machines were calibrated prior and after reading using our Svantek SV 33A S/N: 90200 Class 1 Calibrator with no significant drift recorded. Any noise readings affected by strong wind or rain have been disregarded [1]. A summary of the noise readings statistical levels are presented in the tables below:

Table 3.1 – Summary of Unattended Background Noise Readings at Point A – August 24th, 2023 – August 31st, 2023

Location	*Time of Day*	*Leq 15 Minute dB(A)*	*L90 15 Minute dB(A)*	*RBL**
Point A	Day 7:00-18:00	52	45	44
	Evening 18:00-22:00	52	49	47
	Night 22:00-7:00	47	45	41

*RBL is calculated as per Fact Sheet B of the NPfI (2017)

Table 3.2 – Summary of Unattended Background Noise Readings at Point B – August 24th, 2023 – August 31st, 2023

Measurement Location	*Time Period*	*LAeq 15min dB(A)*	*LA90 15min dB(A)*	*Rating Background Level (RBL)* dB(A)*
Point B	*Day (7am-6pm)*	50	42	39
	Evening (6pm-10pm)	48	43	42
	Night (10pm-7am)	43	39	36

*RBL is calculated as per Fact Sheet B of the NPfI (2017)

The attended noise readings using our factory calibrated SVAN 957 (Serial No. 21437) noise logger were carried out to confirm unattended noise levels and determine the octave band frequency content of the existing background noise levels. Background noise levels at each Octave Band Centre Frequency are listed in Table 3.3 below.

Table 3.3 - Octave Band Centre Frequencies Summary of Background Noise Readings at Points A & B – August 24th, 2023 – August 31st, 2023

Noise Reading Location	*dB(A)*	*Leq, 15 mins – (Arithmetic Average) Octave Band Centre Frequencies (Hz)*								
		63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*16k*
Point A	**45**	25	25	32	37	39	39	37	36	34
Point B	**39**	29	30	28	30	32	33	34	35	35

Note [1]: Noise data is validated using the weather zone websites addresses:
https://www.weatherzone.com.au/station/SITE/70351/observations/2023-08-24
https://www.weatherzone.com.au/station/SITE/70351/observations/2023-08-25
https://www.weatherzone.com.au/station/SITE/70351/observations/2023-08-26
https://www.weatherzone.com.au/station/SITE/70351/observations/2023-08-27
https://www.weatherzone.com.au/station/SITE/70351/observations/2023-08-28
https://www.weatherzone.com.au/station/SITE/70351/observations/2023-08-29

https://www.weatherzone.com.au/station/SITE/70351/observations/2023-80-30
https://www.weatherzone.com.au/station/SITE/70351/observations/2023-80-31

The Full Average Statistical Noise Parameters L(Aeq, 15 minutes), L(A90, 15 minutes), L(A10, 15 minutes), L(A1, 15 minutes) at Point A and Point B are presented in Figures 10 & 11.

PART 1 – AIRCRAFT NOISE IMPACT ASSESSMENT

4.0 AIRCRAFT ACOUSTICAL STUDY

As mentioned above, the proposed development is located south of Canberra Airport, between the ANEF 20 and ANEF 25 contours. The noise attenuation proposed in this report and the building components described in Section 5.0 of this report will result in internal noise levels that are in compliance with AS 2021:2015 '*Acoustics – Aircraft noise intrusion – Building siting and construction'* and Queanbeyan-Palerang Regional Council requirements.

The maximum allowable indoor design sound level as determined from Table 3.3 of the above standard is 70 dB(A) for social activities as shown below.

Building type and activity	Indoor design sound level*, dB(A)
Houses, home units, flats, caravan parks	
Sleeping areas, dedicated lounges	50
Other habitable spaces	55
Bathrooms, toilets, laundries	60
Hotels, motels, hostels	
Relaxing, sleeping	55
Social activities	70
Service activities	75
Schools, universities	
Libraries, study areas	50
Teaching areas, assembly areas (see Note 5)	55
Workshops, gymnasia	75
Hospitals, nursing homes	
Wards, theatres, treatment and consulting rooms	50
Laboratories	65
Service areas	75
Public buildings	
Churches, religious activities	50
Theatres, cinemas, recording studios (see Note 4)	40
Court houses, libraries, galleries	50
Commercial buildings, offices and shops	
Private offices, conference rooms	55
Drafting, open offices	65
Typing, data processing	70
Shops, supermarkets, showrooms	75
Industrial	
Inspection, analysis, precision work	75
Light machinery, assembly, bench work	80

The maximum aircraft noise level as determined from the unattended noise readings between August 24th and August 31st is **80 dB (A)**.

As per Table 3.3 of AS 2021:2015,

- The Aircraft Noise Reduction for the proposed club is **80**-70 = **10 dB(A)**
- The Aircraft Noise Reduction for the staff and meeting rooms is **80**-55 = **25 dB(A)**

5.0 FACADE AND ROOF RECOMMENDATIONS

The façade, glazing and roof required Sound Reduction Indices (Rw) to comply with the Noise Criteria determined in Section 4.0 of this report are presented in Table 5.1 below. These indices are calculated in accordance with Appendix C and Appendix G, Section G3.1 of AS 2021:2015.

Table 5.1 Windows/Sliders, Doors, Walls & Roof Specifications

Building Component	*Rw Rating Achieved on Site*
Windows & Sliding Doors in all proposed Staff and Meeting Rooms are to be 6.38 mm Laminated with full perimeter Fin Mohair Woven Brush acoustic seals [(1)(2)(3)].	**32**
Roof - to be Colorbond Steel Roofing with Bradford Anticon 60 MD insulation over battens, 13 mm plasterboard ceiling and ceiling cavity filled with 165 thick R 3.0 Gold batts [(3), (4)].	**43-45**

NB: This report is to be read in conjunction with the Section J/NatHERS certificate and any other related building specification.

[(1).] No through weep holes in windows/sliders. [(2)] All gaps between window & door frames and the masonry walls are to be sealed using acoustic foam Hilti CP620 or similar(Bostic/Parfix/Sika). Glass wool batts should be applied prior to the application of the foam to seal larger gaps. [(3)] All gaps are to be acoustically sealed.

[(4)] Rw is mainly governed by the noise emission from the club as determined from Section 8

PART 2 – PROPOSED VIKINGS CLUB IMPACT ASSESSMENT

6.0 ASSESSING NOISE FROM ENTERTAINMENT VENUES & PATRON NOISE

Noise from pubs, clubs and entertainment venues is currently assessed in NSW using a variety of different policies and standards such as the NSW Noise Policy for Industry (2017), the Department of Environment and Conservation (NSW) Noise Guide for Local Government and the NSW Office of Liquor, Gaming & Racing.

The above-mentioned policies and standards will assess noise issues relating to the operation of clubs include entertainment noise from live music or pre-recorded music, noise from mechanical services equipment, noise from patrons inside as well as arriving and leaving the site and noise from deliveries to the site's loading dock. These noises differ in character and hence in the way they must be assessed.

Assessment criteria for different kinds of noise in can be divided into a fixed criteria or relative criteria. A fixed rating criterion specifies a limit that the noise should not exceed, for example the NSW Noise Policy for Industry's Amenity Criteria gives a desirable maximum noise levels inside various different buildings and rooms, expressed as LAeq values.

Relative ratings compare the noise level (LAeq) with the background noise level without the noise source (LA_{90}) with the noise level emitted by the proposed site allowed to exceed the background noise levels by only a certain amount (eg. Intrusive Criterion in the NSW Noise Policy for Industry). The NSW Noise Policy for Industry will be further discussed in Section 7.2 of our report.

Measurements for entertainment and patron/crowd noise are usually carried out at a number of locations within venues. Data is normally obtained on the busiest trading nights when music is played at a maximum and patron number are at their highest, in order to ensure that acoustic control measures are designed using appropriate source levels.

6.1 PREDICTING PATRON NOISE

Predicting noise from entertainment venues (including crowd noise) can be modelled in a similar way to traffic noise as it also involves several different factors. However, instead of variable factors such as vehicle number, traffic composition, speed etc; crowd noise has a unique set of variables which enable most crowd situations to be assessed.
Typically, patron noise is intermittent as people dine, listen to music or participate in conversation. Studies suggest that crowd noise cannot be encompassed by a single parameter, but rather multiple parameters are required to adequately quantify the noise. Patron noise normally consists of two main components:

- A babble due to multiple, simultaneous, random conversations; and,

- Transients due to events such as people laughing, yelling or cheering

The babble noise is usually represented by the L_{Aeq} parameter as patron noise is quasi-steady with random but minor variability as the number of patrons speaking changes at an instance.

Different factors that may influence the level of crowd noise include

- An individual's voice effort (which is also affected by the background noise level around them);
- The total number of people in the crowd;
- Whether the crowd is directional (i.e. concert) or has a diffused orientation (i.e. restaurant); and,
- Whether the source is synchronized or random with time.

Factors such as background noise level, number of people in the crowd of people, age, gender, and alcohol all contribute to an individual's voice effort. Another major factor affecting voice effort is the level of background noise. As a crowd increases in size, the background noise level increases too as an individual increases their voice effort in order to maintain communication with others in the group/crowd.

The table below presents noise levels at a distance of one (1) metre from the speaker for different vocal efforts.

Table 6.1.1 – Average Sound Levels of Difference Voice Efforts - SPL @ 1.0 m (Source: Lazarus 1986)

Voice Effort	Average Speech Level dB(A)*
Whispering	36
Soft Speaking	42
Relaxed Speaking	48
Relaxed Normal Speaking	54
Raised Normal Speaking	60
Raised Speaking	66
Loud Speaking	72
Very Loud Speaking	78
Shouting	84
Maximal Shout	90
Maximal Shout Individuals	96

Average speech levels are also presented in the Pearson, Bennett and Fidell (1977) Report. The noise level from the crowd inside the club can also be estimated using noise levels at one-third octave—band centre as presented by Cyril M. Harris in Chapter 16 (Handbook of Acoustic Measurements and Noise Controls).

7.0 ACCEPTABLE NOISE LEVELS

7.1 NOISE GUIDE FOR LOCAL GOVERNMENT

The Department of Environment and Conservation (NSW) published the *Noise Guide for Local Government* in June 2004. The policy is specifically aimed at assessing noise from light industry, shops, entertainment, public buildings, air conditioners, pool pumps and other noise sources in residential areas.

Section 2.2.1 of the Noise Guide for Local Government states that a noise source is generally considered to be intrusive if the noise from the source when measured over a 15-minute period exceeds the background noise by more than 5 dB(A).

Therefore, the acceptable noise criterion at Point A and Point B is as follows:

Table 7.1.1 – Noise Guide for Local Government Criteria at Point A

Time of Day	Point A
Day (7:00-18:00)	45 + 5 = 50 dB (A)
Evening (18:00-22:00)	49 + 5 = 54 dB (A)
Night (22:00-7:00)	45 + 5 = 50 dB (A)

Table 7.1.2 – Noise Guide for Local Government Criteria at Point B

Time of Day	Point B
Day (7:00-18:00)	42 + 5 = 47 dB (A)
Evening (18:00-22:00)	43 + 5 = 48 dB (A)
Night (22:00-7:00)	39 + 5 = 44 dB (A)

The appropriate regulatory authority (Local Council) may, by notice in writing given to such a person, prohibit the person from causing, permitting or allowing:

1. (a) any specified activity to be carried on at the premises, or
2. (b) any specified article to be used or operated at the premises,

or both, in such a manner as to cause the emission from the premises, at all times or on specified days, or between specified times on all days or on specified days, of noise that, when measured at any specified point (whether within or outside the premises,) is in excess of a specified level.

It is an offence to contravene a noise control notice. Prior to being issued with a noise control notice, no offence has been committed.

The Protection of the Environment Operations Act 1997 defines "Offensive Noise" as noise:

1. (a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

2. (b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulation.

7.1.1 SLEEP DISTURBANCE

In order to minimize the potential of sleep disturbance due to transient noises from Stage 2 of the proposed Vikings Club during night hours (10:00pm – 7:00am), Section 2.2.4 of the Noise Guide For Local Government recommends that $L_{A1,1\text{-minute}}$ level of any noise outside a bedroom should not exceed the background noise level by more than 15dB. Therefore, the Sleep Disturbance criteria for Points A and B is as follows:

- **$L_{A1,\ 1\ minute}$ =< 45 + 15= 60 dB(A) at Point A**
- **$L_{A1,\ 1\ minute}$ =< 39 + 15= 54 dB(A) at Point B**

Similar text about sleep arousal is adopted in the Noise Policy for Industry 2017 as below:

Where the subject development/premises night-time noise levels at a residential location exceed:

• $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
• L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

Additionally, Section 5.4 of the NSW Road Noise Policy states the following:

Further studies by the enHealth Council (2004) and the guidelines published by the World Health Organisation (1999) were reviewed and analysed in terms of the guidance on noise exposure and sleep disturbance. The enHealth report states that:

'as a rule for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A) $L_{A,(Max)}$ more than 10 or 15 times per night'.

7.2 NSW NOISE POLICY FOR INDUSTRY (2017)

The noise from Stage 2 of the proposed Vikings Club is governed under Section 2 of the Noise Policy for Industry 2017. The above policy seeks to promote environmental well-being through preventing and minimizing noise by providing a framework and process for deriving noise limits conditions for consent and licenses.

The Noise Policy for Industry 2017 recommends two separate noise criteria to be considered, the Intrusive Noise Criteria and the Amenity Noise Criteria. A project noise trigger level being the lowest of the amenity and the intrusiveness noise level is then determined.

If the predicted noise level L_{Aeq} from the proposed project exceeds the noise trigger level, then noise mitigation is required. The extent of any 'reasonable and feasible' noise mitigation required whether at the source or along the noise path is to ensure that the predicted noise level L_{Aeq} from the project at the boundary of most affected residential receiver is not greater than the noise trigger level.

Note* *Noise from mechanical plant & equipment is governed under the NSW Noise Policy for Industry. However, Section 1.5 of the above policy, excluded the assessment of noise from amplified music/patron noise from premises. Therefore patron/music noise from the use of the club will be governed under the Noise Guide for Local Government and OLGR.*

7.2.1 AMENITY NOISE CRITERIA

The amenity noise levels presented for different residential categories are presented in Table 2.2 of the Noise Policy for Industry 2017. These levels are introduced as guidance for appropriate noise levels in residential areas surrounding industrial areas.

The recommended amenity noise levels for the Vikings Club are presented in Table 7.2.1.1 below:

Table 7.2.1.1 - Recommended Amenity Noise Levels

Type of Receiver	***Area***	***Time Period***	***Recommended Leq Noise Level, dB(A)***
Residence	Urban	Day	60
		Evening	55

		Night	45
Commercial Premises	All	When in Use	65

Where a noise source contains certain characteristics such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content, a correction is to be applied which is to be added to the measured or predicted noise levels at the receiver, before comparison with the criteria. Shown below are the correction factors that are to be applied.

Table 7.2.1.2 – Modifying Factor Corrections

Factor	***Correction***
Tonal Noise	+ 5 dB [1,2]
Low-Frequency Noise	+ 2 or 5 dB [1]
Intermittent Noise	+ 5 dB
Duration	+ 0 to 2 dB(A)
Maximum Adjustment	Maximum correction of 10 dB(A) [1] (excluding duration correction)

1. Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.
2. Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.

Correction for duration is to be applied where a single-event noise is continuous for a period of less than two and a half hours in any assessment period. The allowable exceedance of the $L_{Aequ,15min}$ equivalent noise criterion is depicted in Table 7.2.1.3 for the duration of the event. This adjustment accounts for unusual and one-off events and does not apply to regular and/or routine high-noise level events.

Table 7.2.1.3 – Adjustment for Duration as per Fact Sheet C (Noise Policy for Industry 2017)

Allowable duration of noise (one event in any 24-hour period)	***Allowable exceedance of LAeq,15min equivalent project noise trigger level at receptor for the period of the noise event, dB(A)***	
	Daytime & evening (7 am–10 pm)	***Night-time (10 pm–7 am)***
1 to 2.5 hours	2	Nil
15 minutes to 1 hour	5	Nil
6 minutes to 15 minutes	7	2
1.5 minutes to 6 minutes	15	5
less than 1.5 minutes	20	10

According to Section 2.4 of the above policy, the project amenity noise level is determined as follows:

Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)

To convert from a period level to a 15-minute level, a plus 3 is added as per Section 2.2 of the policy.
Therefore, the project amenity noise level for the proposed Vikings Club is as follows:

Day: **60 – 5 + 3 = 58 dB(A)**
Evening: **50 – 5 + 3 = 48 dB(A)**
Night: **45 – 5 + 3 = 43 dB(A)**

7.2.2 INTRUSIVE NOISE CRITERIA

Section 2.3 of the Noise Policy for Industry summarises the intrusive criteria as below:

$L_{Aeq,\ 15\ minute} \leq$ rating background level plus 5

While the background noise level known as $L_{A90,15\ minutes}$ is the Noise exceeded 90% percent of a time period over which annoyance reactions may occur (taken to be 15 minutes). The RBL is defined as the overall single-figure $L_{A90,15\ minutes}$ background level representing each assessment period (day/evening/night) over the whole monitoring period.

For the short-term method, the rating background noise level is simply the lowest measured LAF90,15min level. For the long-term method, the rating background noise level is defined as the median value of all the evening assessment background levels over the monitoring period for the evening

The predicted noise from the source $L_{Aeq,15\ min}$ is measured as at the most affected point within the most affected residential at the point where the most impact occurs.

Therefore, the acceptable L_{eq} noise intrusiveness criterion for broadband noise during the day, evening & night at Point A and Point B is as follows:

- **44 + 5 = 49 dB (A) at Point A** during the day
- **47 + 5 = 52 dB (A) at Point A** during the evening
- **41 + 5 = 46 dB (A) at Point A** during the night

- **39 + 5 = 44 dB (A) at Point B** during the day
- **42 + 5 = 47 dB (A) at Point B** during the evening
- **36 + 5 = 41 dB (A) at Point B** during the night

7.2.3 PROJECT NOISE TRIGGER LEVEL

A summary of intrusiveness and amenity noise levels as determined in Sections 7.2.1 & 7.2.2 are shown in Tables 7.2.3 and 7.2.4 below.

Table 7.2.3 - Summary of Intrusiveness and project amenity noise levels – Point A

Period	Intrusiveness Noise Level	Project Amenity Noise level
Day Time (7:00 – 18:00)	49	58
Evening Time (18:00 – 22:00)	52	48
Night/Morning Time (22:00 – 7:00)	46	43

Table 7.2.4 - Summary of Intrusiveness and project amenity noise levels – Point B

Period	Intrusiveness Noise Level	Project Amenity Noise level
Day Time (7:00 – 18:00)	44	58
Evening Time (18:00 – 22:00)	47	48
Night/Morning Time (22:00 – 7:00)	41	43

The project noise trigger level is the lower (that is, the most stringent) value of the amenity and intrusiveness noise levels for the evening time. Therefore, the project noise trigger levels for the proposed development at Point A and Point B are as shown below:

Daytime: $L_{Aeq,15\ min}$ **49 dB(A) – Point A**
Evening: $L_{Aeq,15\ min}$ **48 dB(A) – Point A**
Night-time: $L_{Aeq,15\ min}$ **43 dB(A) – Point A**

Daytime: $L_{Aeq,15\ min}$ **44 dB(A) – Point B**
Evening: $L_{Aeq,15\ min}$ **47 dB(A) – Point B**
Night-time: $L_{Aeq,15\ min}$ **41 dB(A) – Point B**

The noise levels from Stage 2 of the proposed Vikings Club and associated mechanical plant (not including patron noise & amplified music) will not exceed the project noise trigger level at the most sensitive locations, provided all noise control recommendations in Section 9 of this report are

adhered to.

7.3 LIQUOR & GAMING NSW- NSW GOVERNMENT

The Liquor & Gaming NSW have a standard noise condition which states the following:

- The L_{10} noise level emitted from the licensed premises shall not exceed the background noise level in an octave Band Centre Frequency by more than 5dB between 7:00 am and 12:00midnight at the boundary of any affected residence.
- The L_{10} noise level emitted from the licensed premises shall not exceed the background noise level in an octave Band Centre Frequency 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 12:00midnight and 7:00am.

8.0 NOISE BREAKOUT FROM PROPOSED VIKINGS CLUB

As previously discussed, the proposed Vikings Club will include a range of services such as live entertainment and facilities such as gaming rooms, bars, restaurant and function rooms.

The main sources of noise from the proposed Vikings Club will be as follows:

- Noise from indoor patron noise, live music & gaming machines
- Noise from outdoor areas
- Noise from loading dock
- Noise from associated mechanical plant & equipment (kitchen exhausts, mechanical ventilation etc)
- Noise from Traffic generation
- Noise from Cars in the carpark area

8.1 NOISE FROM INDOOR PATRON NOISE, LIVE MUSIC & GAMING MACHINES

The maximum occupancy of the club is 1320 patrons. Expected daily average patrons visiting the proposed club is as follows:

Table 8.1.1 – Average number of patrons visiting the Vikings Club

Day of Week	***Average No. of Patrons***
Sunday – Wednesday	800

Thursday – Saturday	1100

Based on noise measurements carried out inside similar clubs, maximum noise levels from the operation of the club occurs during the evening period (6:00pm – 10:00pm) when the number of patrons is at its highest and live music/entertainment is performed. Typical Average noise levels including live band is as follows:

Table 8.1.2 – Typical Noise Level in Octaves for Club operation (1.0m away from band - SPL)

Description	***Octave Band Centre Frequencies (Hz)***								
Assessed inside during peak evening period (ie. live music playing with large number of patrons and use of gaming machines)	**dB(A)**	63	125	250	500	1k	2k	4k	8k
	96	92	90	81	88	87	82	74	67

Typical noise levels in the gaming area with music performing in the background is as follows:

Table 8.1.3 – Typical Noise Level in gaming area (Centre of room SPL)

Description	***Octave Band Centre Frequencies (Hz)***								
Assessed inside gaming area with patrons, background music and use of gaming machines)	**dB(A)**	63	125	250	500	1k	2k	4k	8k
	73	52	60	60	63	67	66	62	64

A typical noise level in other areas of the Club with background music is as follows:

Table 8.1.4 – Typical Noise Level in Octaves for Club operation (SPL)

Description	***Octave Band Centre Frequencies (Hz)***								
Assessed at Entrance to Club at entrance administration desk	**dB(A)**	63	125	250	500	1k	2k	4k	8k
	62	45	52	53	54	57	55	50	40

The nearest receivers that have the potential to be impacted by the proposed development are as follows (Figure 2 – Nearest Residential Receivers):

Table 8.1.5 – Noise Sensitive Receivers

Receiver	Location	Description
R1	No. 49 Esmond Ave, Jerrabomberra	Single-Storey Residential Dwelling

R2	No. 51 Esmond Ave, Jerrabomberra	Single-Storey Residential Dwelling
R3	No. 24 O'Sullivan Rd, Jerrabomberra	Single-Storey Residential Dwelling
R4	No. 17 O'Sullivan Rd, Jerrabomberra	Single-Storey Residential Dwelling
R5	No. 8 Miles Pl, Jerrabomberra	Single-Storey Residential Dwelling

As per Harris /Pearson, Bennet, & Fidell (1977) report, the sound power level of one (1) person talking is as per the table below.

Vocal Effort	No. of Talkers	Sound Power Levels [dB] at Octave Band Centre Frequencies [Hz]*,**,***							
		125	250	500	1000	2000	4000	8000	dB(A)
Females									
Casual	1	48.0	61.0	61.0	54.0	51.0	47.0	48.0	**61.0**
Normal	1	49.0	63.0	66.0	61.0	56.0	44.0	50.0	**66.0**
Raised	1	47.0	67.0	72.0	70.0	66.0	61.0	54.0	**74.0**
Loud	1	47.0	62.0	77.0	79.0	76.0	70.0	62.0	**82.0**
Shouted	1	48.0	68.0	82.0	89.0	88.0	81.0	71.0	**93.0**
Males									
Casual	1	58.0	62.0	63.0	55.0	53.0	51.0	48.0	**63.0**
Normal	1	60.0	66.0	69.0	62.0	58.0	54.0	48.0	**69.0**
Raised	1	65.0	71.0	76.0	70.0	66.0	61.0	55.0	**76.0**
Loud	1	69.0	78.0	85.0	84.0	79.0	73.0	63.0	**87.0**
Shouted	1	58.0	83.0	93.0	97.0	93.0	85.0	76.0	**100.0**

Noise prediction from the club into the outside is calculated using Lord Templeton Equation as follows:

$$L_{p2} = L_{p1} - R_w + 10Log_{10}S - 20Log_{10}r - 17 + DI \text{ dB(A)}$$

Where, L_{p1} is the internal sound pressure level;

R_w is the weighted sound reduction index of the building partition;
S is the area of the partition (m^2);
r is the distance between the receiver and the partition (m);
DI is the directivity index of the façade; and,
The constant 17 becomes 14 for a hemispheric sound source.

Noise Transfer outside the Vikings Club to the nearest building façade is calculated *in accordance with ISO 9613.2 – Acoustics – Attenuation of sound during propagation outdoors — Part 2: General method of calculation*

If all acoustic mitigations required are carried as per Sections 9.1 to 9.10 of this report, then noise levels from patron and music in the club will comply with the acoustic requirements of the Noise Guide for local Government (background + 5), Sleep Disturbance, and the NSW Office of Liquor, Gaming & Racing (OLGR) as described previously in Sections 7.1, 7.1.1 & 7.3 of this report.

8.2 NOISE FROM OUTDOOR AREAS

Stage 2 of the proposed Vikings Club will include one (1) outdoor gaming area and two (2) outdoor alfresco dining areas on the upper ground floor of the site [Figure 3 – Proposed Outdoor Areas – Upper Ground Floor (Stage 2)]. In addition, there will be one (1) outdoor terrace on the 1st floor [Figure 4 – Proposed Outdoor Areas – 1st Floor (Stage 2)]. Noise from patrons in the various outdoor areas have the potential to impact the nearest residential receivers.

All outdoor areas of the proposed development including gaming & alfresco areas will be restricted to Day and Evening Use only (9:00am – 10:00pm).

Table 8.2.1 below lists noise from the maximum number of patrons in the various outdoor areas at the facades of the nearest residential receivers.

Table 8.2.1 - LA10 Noise Level from Outside Seating Areas and outdoor gaming at Façade of Nearest Residential Receivers *, **, ***

Description		Octave Band Centre Frequencies (Hz)								
	dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
$L_{(A90, 15\ minutes)}$ – Point A(1)	45	25	25	32	37	39	39	37	36	34
$L_{(A90, 15\ minutes)}$ +5 – Point A(1)	50	30	30	37	42	44	44	42	41	39
$L_{(A90, 15\ minutes)}$ – Point B(1)	39	29	30	28	30	32	33	34	35	35
$L_{(A90, 15\ minutes)}$ +5 – Point B(1)	44	34	35	33	35	37	38	39	40	40
Noise levels L_{A10}-***,**** (Sound Power 114 People Outdoor gaming area + machines) (1)	90	-	50	60	74	83	88	78	73	70
Noise levels L_{A10}-****,**** (Sound Power 80 People outdoor alfresco dining – in building) (1)	87	-	68	76	84	87	81	76	70	68
Noise levels L_{A10}-****,***** (Sound Power 88 People outdoor alfresco dining – adjacent to pond) (1)	87	-	69	77	84	87	81	77	71	69
Noise levels L_{A10}-****,***** (Sound Power 50 people 1st floor terrace) (1)	85	-	67	74	82	85	79	74	69	66
Predicted L_{A10} Noise Level at façade of R1 + Spillage while automatic doors are opening(2)	39 + 29 = 39 dB(A)	-	-	13	26	36	34	30	24	14
Predicted Noise Level at façade of R2 + Spillage	41 + 29 = 41 dB(A)	-	-	15	28	38	36	32	26	16

while automatic doors are opening (2)										
Predicted L_{A10} Noise Level at façade of R3 + Spillage while automatic doors are opening (2)	**40 + 29 = 40 dB(A)**	-	-	14	27	37	35	31	24	13
Complies OLGR ** Criteria – Point A **$L_{A10} < L_{90} + 5$**	Yes ✓ ≤ 45 + 5 dB(A)	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓
Predicted L_{A10} Noise Level at façade of R4	**26**	-	-	4	13	23	33	17	11	2
Predicted L_{A10} Noise Level at façade of R5	**23**	-	-	2	10	20	18	14	8	1
Complies OLGR ** Criteria – Point B **$L_{A10} < L_{90} + 5$**	Yes ✓ ≤ 39 + 5 dB(A)	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓	Yes ✓

Note (1) NSW Noise Policy for Industry does not apply to Lodger/Patron noise (Section 1.5 exclusions). Background noise level + 5 applies.
Note (2) Assume façade minimum Rw 35 - 10.38mm laminated glass with 10% leakage (allowing for automatic door opening)
**No patrons allowed in the outdoor areas after 10 pm.*
*** Compliance in the night ensures compliance during the day/evening-as background noise levels during the night are lower than the day/evening.*
**** Provided recommendations in Section 9 of this report are adhered to and 3.0 m sound barrier as per Figure 12.*
***** L10= Leq+3.*
******Assuming 50% vocal effort and background music*

8.3 NOISE FROM PROPOSED LOADING DOCK

The proposed Club will also have a loading dock accessible from the eastern carpark (Figure 6 – Proposed Loading Dock). Noise produced by trucks using the proposed loading dock may have an effect on the nearest residential receivers near the proposed site.

The proposed loading dock can accommodate a maximum of (1) truck at a time of up to 8.8m in length. Typical power levels for trucks operating in the loading dock are presented below. The garbage bay is adjacent to the loading dock and garbage trucks accessing the loading dock will contribute as an additional noise source.

Table 8.3.1 - Loading Dock Noise Levels

Source	***Loading dock and vehicle movement sound power levels, dB Leq Octave band centre frequency (Hz)***						
	63	**125**	**250**	**500**	**1K**	**2K**	**4K**
Garbage truck/semi-trailer movement	114	116	111	106	104	103	102
5-10 tonne truck air brake	100	94	91	99	106	107	105
5-10 tonne truck movement	97	96	90	91	94	95	88
Van or small truck movement	95	90	89	88	89	91	83
Unloading of vehicles and bin/skip emptying	109	109	109	108	108	110	110

The predicted noise levels inside at the boundary of the nearest residential receivers LAeq $_{15min}$ due to trucks loading & unloading are presented in Tables 8.3.2 and 8.3.3 below.

Table 8.3.2 – Predicted Noise levels from Loading Dock and Carpark at R1, R2, R3 *

Activity	**Period**	**Expected Leq dB(A) at R1**	**Expected Leq dB(A) at R2**	**Expected Leq dB(A) at R3**	***Compliance with Noise Trigger level (Point A)- as per Section 7.2.3.***
Noise impact from truck in the loading dock/carpark **	7.00am - 6.00pm (Day)	18 dB(A)	21 dB(A)	24 dB(A)	Yes < 49 dB(A)
	6:00pm – 10:00pm (Evening)	18 dB(A)	21 dB(A)	24 dB(A)	Yes < 52 dB(A)
	10:00pm – 7:00am (Night)	-	-	-	N/A

***Provided recommendations in Section 9 are adhered to**
****Assuming 1 truck every 15 minutes**
*****Loading Dock will not operate during Night Hours**

Table 8.3.3 – Predicted Noise levels from Loading Dock and Carpark at R4, R5 *

Activity	Period	Expected Leq dB(A) at R4	Expected Leq dB(A) at R5	*Compliance with Noise Trigger level (Point B)- as per Section 7.2.3.*
Noise impact from truck in the loading dock/carpark **	7.00am - 6.00pm (Day)	33 dB(A)	31 dB(A)	Yes < 44 dB(A)
	6:00pm – 10:00pm (Evening)	33 dB(A)	31 dB(A)	Yes < 47 dB(A)
	10:00pm – 7:00am (Night)	-	-	N/A

***Provided recommendations in Section 9 are adhered to**
****Assuming a maximum of 1 truck every 60 minutes**
*****Loading Dock will not operate during Night Hours**

8.4 NOISE FROM PROPOSED MECHANICAL PLANT & EQUIPMENT

A range of mechanical plant, equipment and ventilation will be included in the proposed Club at No. 37 Tompsitt St, Jerrabomberra, such as kitchen and toilets exhausts, mechanical ventilation for all rooms etc. A chiller system/cooling tower might also be used.

As per Section 7 of this report, the cumulative noise emitted by the use of the proposed development including the mechanical plant is to comply with the NSW Noise Policy for Industry (2017) Project Noise Trigger Levels and the Sleep Disturbance Noise Criteria. Typical noise levels for Exhaust Fans, Cooling Towers and Kitchen Exhaust Fans are shown in Table 8.4.1.

Table 8.4.1 – Typical Mechanical Plant Leq Sound Power Levels (dB(A))

Frequency [Hz]	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Typical Exhaust Air/ Air Supply Fan	89	84	91	88	87	84	81	75	**91**
Typical Cooling Towers	99	104	97	92	88	86	84	79	**106**
Kirchen Exhaust Fan	86	79	82	79	82	80	78	70	**86**

As the development is still in DA stage, we recommend that further acoustic assessment is carried out when the development has been approved, and final recommendations will be provided for all associated mechanical plant & equipment as per Section 9.1 of this report.

8.5 TRAFFIC GENERATION FROM VIKINGS CLUB

The development at No. 37 Tompsitt St, needs to comply with the criteria of the NSW Road Noise Policy, for the potential impact of additional traffic that may be generated by the development, on nearby residential developments. Table 3 in Section 2.3.1 of the NSW Road Noise Policy, sets out traffic noise assessment criteria as follows:

Table 8.5.1 – NSW Road Noise Policy Traffic Noise Criteria

Road Category	***Type of Project/Land Use***	***Assessment Criteria – dB(A)***	
		Day (7am – 10pm)	***Night (10pm – 7am)***
Local Roads	Existing Residences affected by additional traffic on existing local roads general by land use developments	$L_{Aeq\ (1\ hour)}$ 55 (external)	$L_{Aeq\ (1\ hour)}$ 50 (external)

As per the Traffic Impact Assessment Report by QuantumTraffic dated the 4th December, 2023 Ref. 2023-013, the proposed site is expected to generate traffic demands of up to sixty-nine (69) vehicle trips per hour under Stages 1 + 2. Predicted noise levels at the nearest residential receivers R4 and R5 due to additional traffic generation on Gwendolyn Pl are presented in Table 8.5.2 below:

Table 8.5.2 – Predicted Noise from Traffic Generation on Gwendolyn Pl at 1.0m from facade of nearest residential receivers.

Activity	**Period**	**Expected Leq 1hr dB(A) at R4 & R5 from Additional Traffic Noise (dB(A))**	**Complies with NSW Road Noise Policy Traffic Noise Criteria-**
Additional Traffic Generation on Gwendolyn Pl	AM Peak Hour	46	Yes <55 dB(A)
	PM Peak Hour	46	Yes <50 dB(A)

8.6 NOISE FROM CARS IN THE CARPARK AREA

Car parking noises may typically comprise of adults talking, children's voices, car radios, cars starting up and car doors closing. Measurements and observations conducted at various other childcare centres were saved in our database in order to obtain generic car park noise data. Table 8.6.1 below represents the sound power level of different car activities.

Table 8.6.1 – Car Park Noise Source Levels

Car Park Noise Source	Average Sound Power Level, dB(A)
Car Door Closing	95
Car Starting	91
Car Accelerating	91
Car Moving	81

Predicted noise levels at the façade of the nearest residential receivers due to cars entering and exiting the car park are presented in Table 8.6.2 and 8.6.3 below. Noise attenuation loss from the distance to the nearest receiver as well as any sound barriers (such as fences) have been taken into account.

Table 8.6.2 – Predicted Noise from Vehicles Entering and Exiting the Car Park at R1, R2, R3*

Activity	Period	Expected L_{eq} dB(A) At R1	Expected L_{eq} dB(A) At R2	Expected L_{eq} dB(A) At R3	Complies with Noise Trigger level (Point A)- as per Section 7.1.3
Vehicles Entering/Exiting the Carpark*	9:00am – 2:00am	16 dB(A)	19 dB(A)	22 dB(A)	**Yes ✓** <= 49 dB(A) – Day <= 52 dB(A) – Evening <= 46 dB(A) – Night

***Based on Additional Traffic Generation predictions**

Table 8.6.3 – Predicted Noise from Vehicles Entering and Exiting the Car Park at R4 & R5*

Activity	Period	Expected L_{eq} dB(A) At R4	Expected L_{eq} dB(A) At R5	Complies with Noise Trigger level (Point B)- as per Section 7.1.3
Vehicles Entering/Exiting the Carpark*	9:00am – 2:00am	37 dB(A)	35 dB(A)	**Yes ✓** <= 44 dB(A) – Day <= 47 dB(A) – Evening <= 41 dB(A) – Night

***Based on Additional Traffic Generation predictions**

Tables 8.6.4 and 8.6.5 below presents $L_{Aeq\ ,\ 15\ mins}$ & $L_{A1,1\ minute}$ noise levels, at the external window of the nearest residential receivers from vehicles entering and exiting the carpark during the night hours.

Table 8.6.4 – Predicted Noise from Vehicles entering and exiting the carpark outside nearest Bedroom Windows of R1, R2, R3

Activity	Period	Expected $L_{A1,\ 1\ minute}$ dB(A) Outside Window of Residential Receiver R1	Expected $L_{A1,\ 1\ minute}$ dB(A) Outside Window of Residential Receiver R2	Expected $L_{A1,\ 1\ minute}$ dB(A) Outside Window of Residential Receiver R3	Complies with Sleep Arousal Criteria (Point A) as per Section 7.4
Vehicles Entering/Exiting the Car Park	10:00pm – 2:00am	29 dB(A)	32 dB(A)	35 dB(A)	**Yes** $L_{A1,\ 1\ minute}$ <60 dB(A), [L90+15] $L_{A1,\ 1\ minute}$ <56 dB(A), [RBL+15] L_{AFmax} <52.

Table 8.6.4 – Predicted Noise from Vehicles entering and exiting the carpark outside nearest Bedroom Windows of R1, R2, R3

Activity	Period	Expected $L_{A1,\ 1\ minute}$ dB(A) Outside Window of Residential Receiver R4	Expected $L_{A1,\ 1\ minute}$ dB(A) Outside Window of Residential Receiver R5	Complies with Sleep Arousal Criteria (Point B) as per Section 7.4
Vehicles Entering/Exiting the Car Park	10:00pm – 2:00am	47 dB(A)	45 dB(A)	**Yes** $L_{A1,\ 1\ minute}$ <54 dB(A), [L90+15] $L_{A1,\ 1\ minute}$ <51 dB(A), [RBL+15] L_{AFmax} <52.

9.0 RECOMMENDATIONS

We recommend the following measures to be placed in order for the operation of the proposed Vikings Club to comply with the above noise criteria. The Vikings club is to have the following measures incorporate into its design and operation.

9.1 MECHANICAL PLANT RECOMMENDATIONS

As the development is still in DA stage, we recommend that further acoustic assessment is carried out when the development has been approved, and final recommendations will be provided for all associated mechanical plant & equipment as per Table 9.1.1 below.

Table 9.1.1– Typical Mechanical Plant Recommendations

Item	RECOMMENDATIONS
Cooling Tower – If applicable –	• Provide acoustic barrier around cooling tower when necessary
General Mechanical Plant	• We recommend that further acoustic assessment is carried out at CC stage when development consent has been granted and there are conditions of consent to be satisfied, and a more detailed Mechanical Services Plans have been prepared for the approved registered club. This will appropriately allow for a further detailed acoustic assessment to be carried out when the specifications for mechanical plant equipment are confirmed.

	In the meantime, we recommend the following: o Procurement of quiet plant (when required) and the maintenance of existing plant. o Strategic positioning of plant away from potential sensitive receivers. o Commercially available silencers or acoustic attenuators for air discharge and air intakes of plant. o Acoustically lined and lagged ductwork. o Acoustic screens and barriers between plant and sensitive neighboring premises; and/or, o Partially enclosed or fully enclosed acoustic enclosures around plant.

9.2 GLAZING

All proposed glazing in the Vikings Club façade and external door to achieves Rw of 35. Typically, glazing configurations that achieve Rw of 35 consist of 10.38 mm laminated glazing with acoustic seals.

9.3 ENTRY DOORS

Automatic door closers are to be installed on all external entry doors to the proposed Vikings Club, including all doors providing access from outdoor spaces to indoor areas. This will ensure no noise propagation to the residential units or nearby residential premises.

9.4 OUTDOOR GAMING AREA

Acoustic Louvres are to be used in the Outdoor Gaming Area. Fantech Sound Bar Louvre (SBL 1) or similar are to be installed.

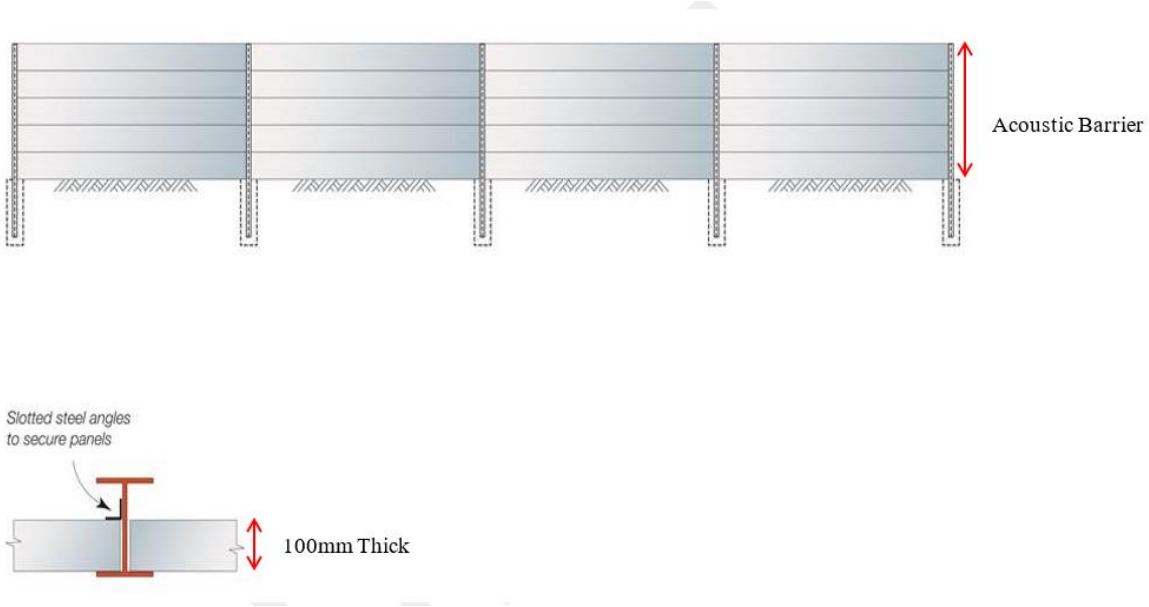
9.5 ACCESS TO OUTDOOR AREAS

There are to be no patrons allowed in all outside areas after 10:00 pm. Patrons are to be reminded to show consideration for neighbours and not to raise their voice when these areas in use.

9.6 SOUND BARRIERS

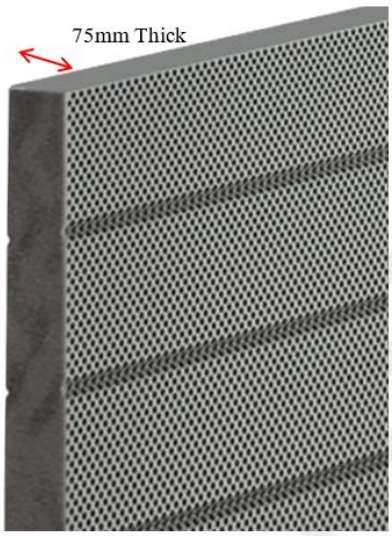
A 3.0m high gap-free acoustic barrier is to be installed along the eastern boundary of the site and around the perimeter of the eastern parking lot as per Figure 12 – Sound Barrier Locations – Ground Floor. Acoustic barrier form of construction is any of the following:

- 100 mm thick Hebel panels attached to a structural steel frame to suit Figure 3- Proposed Hebel Sound Barrier **as per below detail**:



Hebel Panels Acoustic Barrier Detail.

- AcoustiSorb75 sound absorbing panels attached to a structural steel frame to suit **as per below detail.**



	AcoustiSorb 75™
Outer Skin	Aluminium / Painted Steel (off white)
Panel Core	Sound Absorbing
Available Lengths (mm)	2400 - 4000
Available Widths (mm)	600
Thickness (mm)	75
Density (kg/m²)	14.32
NRC (frequencies hz)	125 250 500 1000 2000 4000 0.20 0.60 1.00 1.00 1.00 1.00 NRC 0.90
Rw (tuneable by mass)	29 - 34

AcoustiSorb 75 Acoustic Barrier Detail.

OR

- A structure with a material with density of between 10kg/m^2 and 15 kg/m^2 such as
  - 17 mm ply plus 9 mm fibre cement on 1st face.
  - 64mm stud with 11kg/m3 insulation.
  - 20 mm timber board on 2nd face plus
  - Echosoft 25 lining on the face fronting the Mechanical plant.

Noise modelling has been conducted with and without the above acoustic barrier, demonstrating a reduction of 8 decibels at the residential receiver boundaries with the barrier in place, thereby confirming the effectiveness of the acoustic barrier. Furthermore, the residential receivers are single-storey, minimising the potential for noise to bypass the barrier, as would be more likely with two-storey structures.

In addition, 1.2m high gap-free glass balustrade is to be installed around the perimeter of the outdoor terrace area on the 1st floor as per Figure 13 – Sound Barrier Locations – 1st floor.

9.7 MUSIC

There is to be no music played in any outdoor area after 10:00pm. Amplified music played in the outdoor areas before this time is not to exceed sound pressure level (SPL) of 50 dB(A) at boundary.

9.8 SIGNS

Signage will in place on the premises encouraging members and guests to depart in an orderly and prompt manner. Announcements will be made at regular intervals after 9:00pm asking members and guests to show consideration for neighbours and to depart in an orderly and prompt manner.

9.9 LOADING DOCK, GARBAGE COLLECTION & DELIVERIES

Loading dock is not to be used between 10:00pm and 7:00am. Roller door to loading dock is to be closed when loading dock is in use. Garbage collection and deliveries is to take place between the hours of 7:00 am and 10:00 pm.

9.10 NOISE MANAGEMENT PLAN

A Noise Management Plan should be implemented and should include the following:

- Install a contact number at the front of the Vikings Club so that complaints regarding the operation can be made.
- Implement a complaint handling procedure. If a noise complaint is received the complaint should be recorded on a Complaint Form. The Complaint Form should contain the following:
    - Name and address of the complainant
    - Time and date the complaint was received
    - The nature of the complaint and the time/date the noise was heard
    - The name of the employee that received the complaint
    - Actions taken to investigate the complaint and the summary of the results of the investigation
    - Indication of what was occurring at the time the noise was happening (if applicable)
    - Required remedial action (if applicable)
    - Validation of the remedial action
    - Summary of feedback to the complaint

Also, a permanent register of complaints should be held on the premises, which shall be reviewed monthly by staff to ensure all complaints are being responded to. All complaints received shall be reported to management with initial action/investigation commencing within 7 days. The complaint should also be notified of the results and actions arising from the investigation.

9.11 FURTHER ACOUSTIC ASSESSMENT AT CC STAGE

We recommend that further acoustic assessment is carried out at CC stage when a more detailed Statement of Environmental Effects has been provided and Mechanical Services Plans have been prepared for the proposed Vikings Club so that a more detailed and thorough acoustic assessment can be carried out.

10.0 NOISE IMPACT STATEMENT & CONCLUSION

Measurements and computations presented in this report show that the noise emissions from the proposed Vikings Club at No. 37 Tompsitt St, Jerrabomberra, will not exceed the noise criteria set out in the NSW Noise Policy for Industry (2017), Section 2.2.1 of the Noise Guide for Local Government, Liquor & Gaming NSW noise recommendations, and Queanbeyan-Palerang Regional Council requirements.

Noise control recommendations are outlined in Section 9 to ensure compliance through the operation of the proposed Vikings Club. The operation of the proposed Club will comply with the relative sections of the EPA and will not create any offensive noise.

We hope this report meets your requirements. Should you require further explanations, please do not hesitate to contact us.

Yours sincerely,

M. Zaioor
Australian Acoustical Society (Member).
M.S. Eng'g Sci. (UNSW).
M.I.E.(Aust), CPEng

11.0 APPENDIX

Figure 1 - Proposed Site Location

Figure 2 - Nearest Residential Receivers

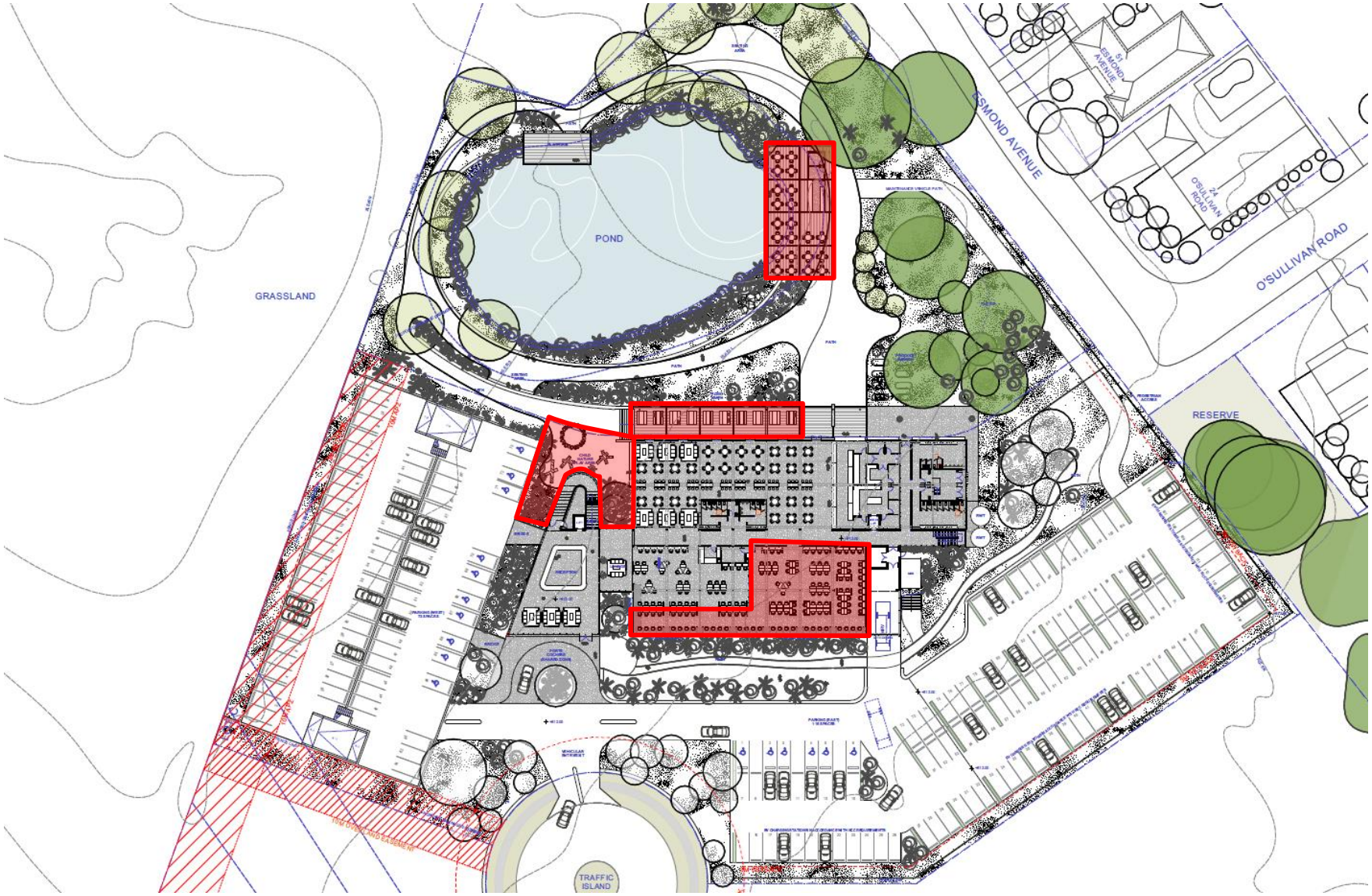


Figure 3 - Proposed Outdoor Areas - Upper Ground Floor (Stage 2)

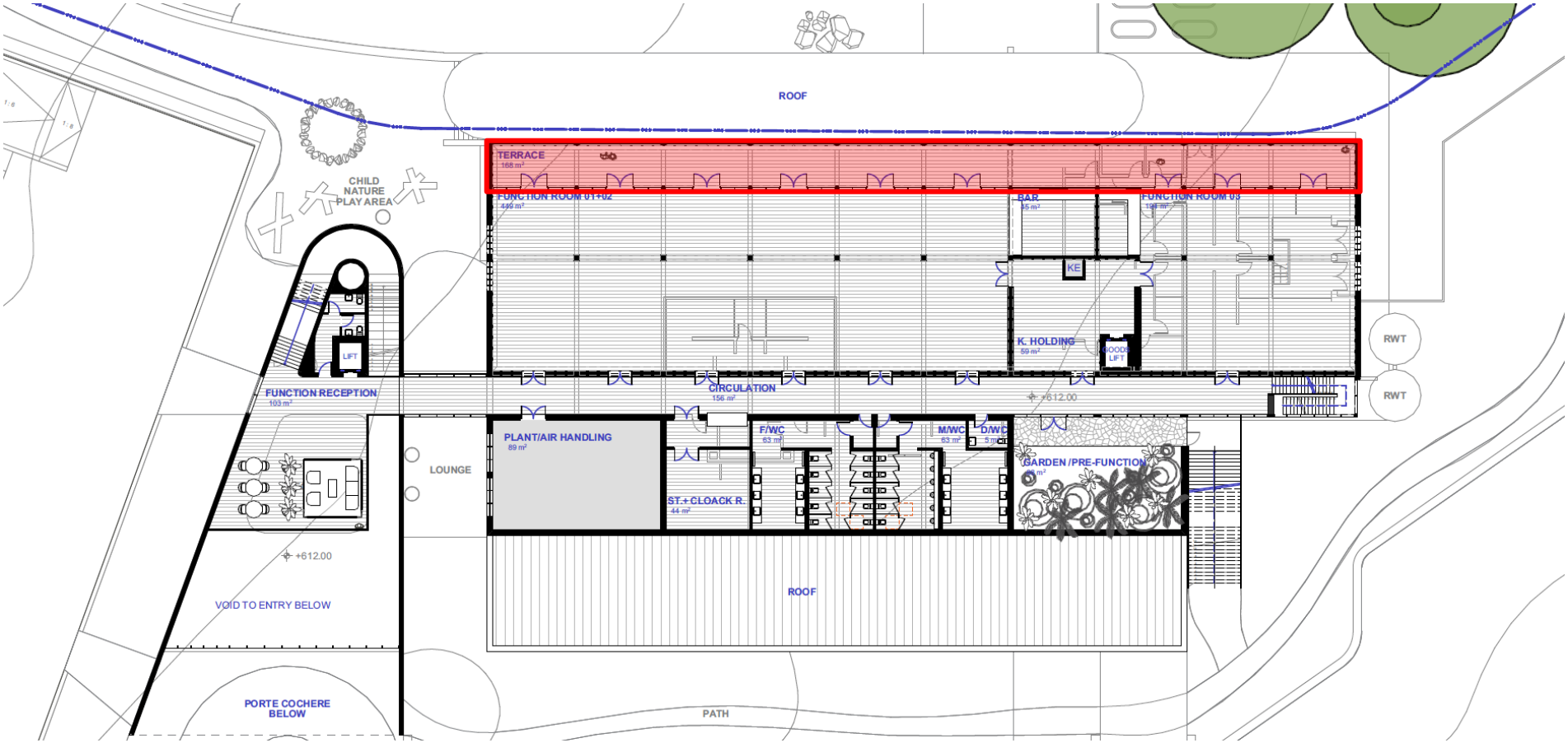


Figure 4 - Proposed Outdoor Areas - Level 1 (Stage 2)

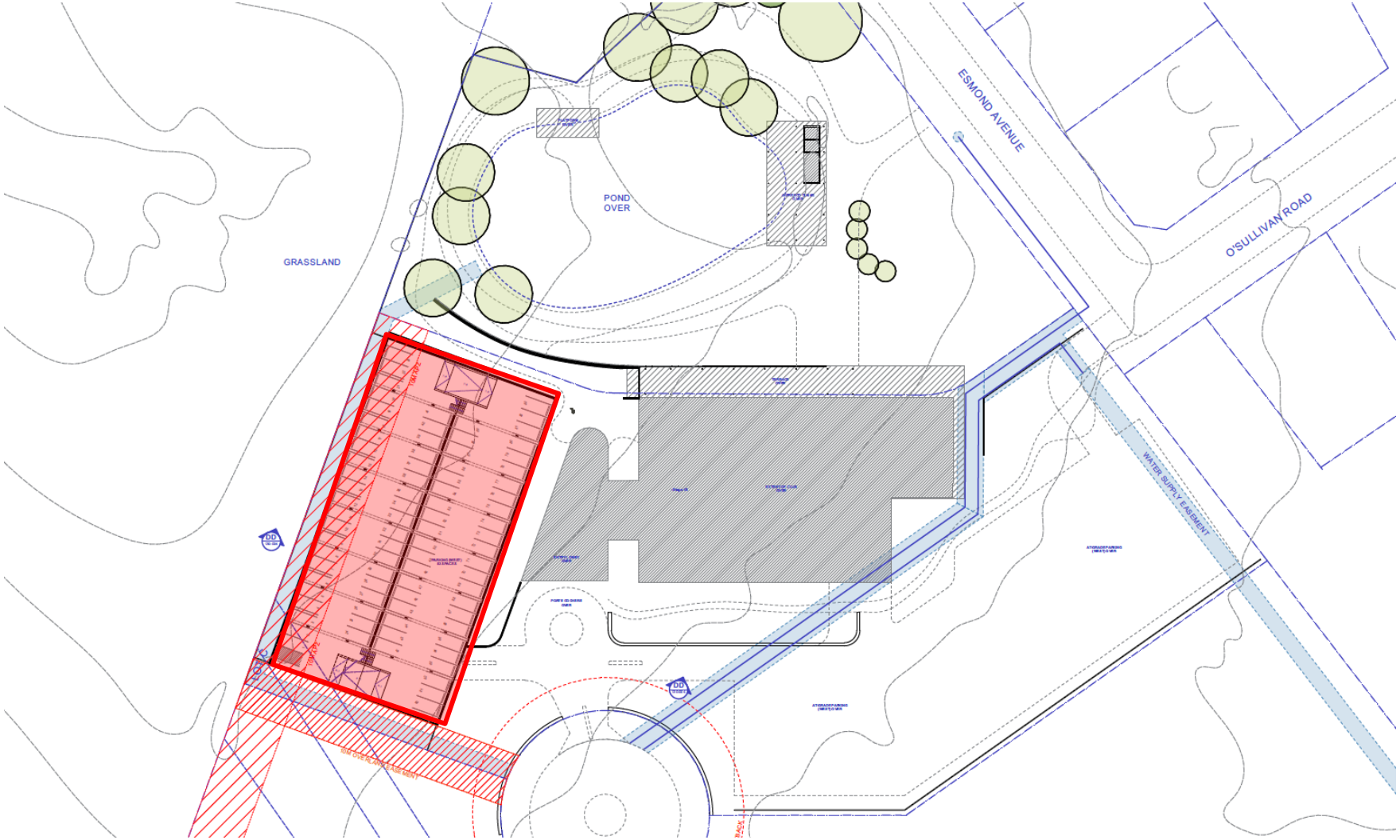


Figure 5 - Proposed Lower Ground Car Park (Stage 2)

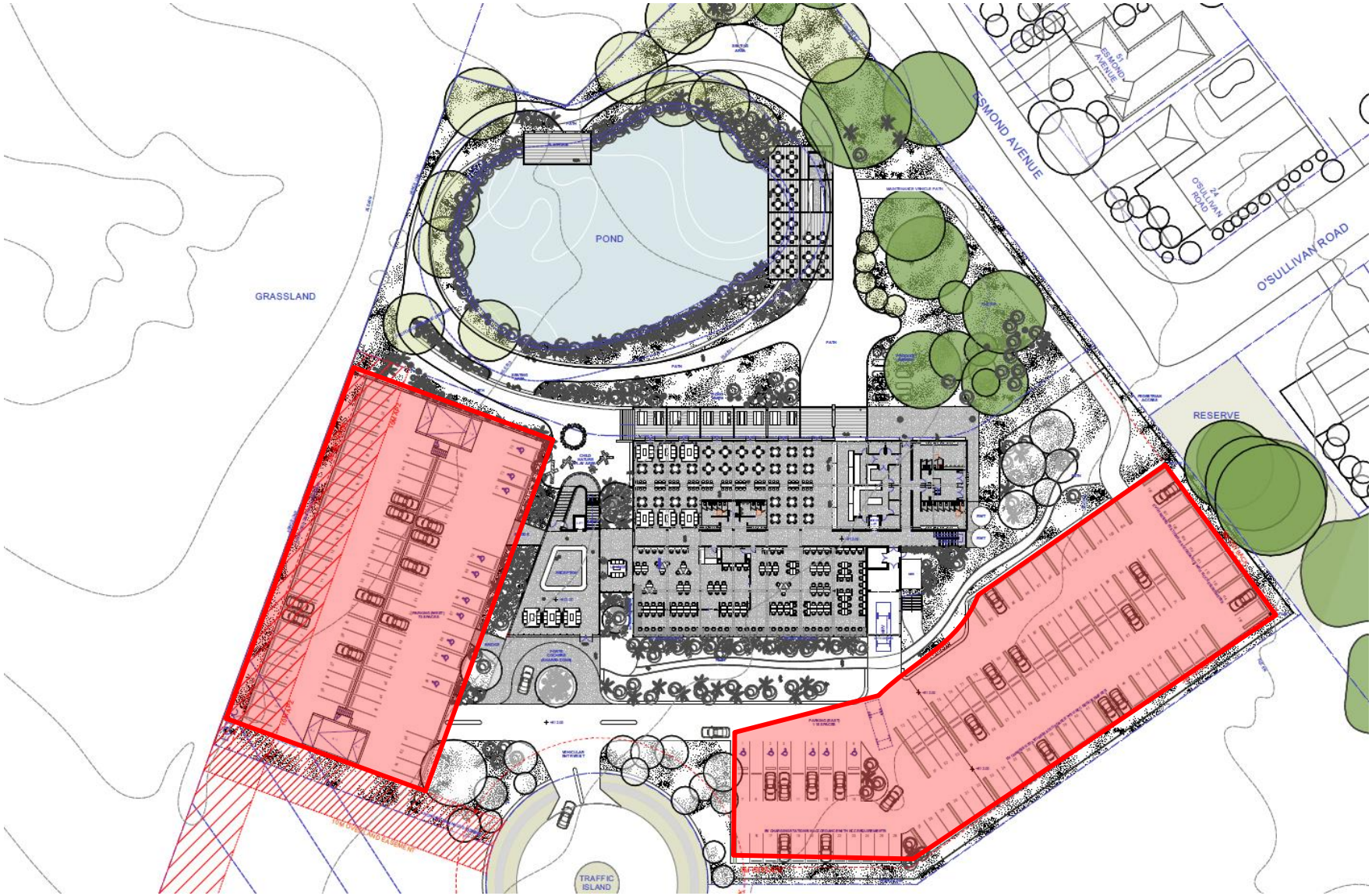


Figure 6 – Proposed Upper Ground Car Parks (Stage 2)

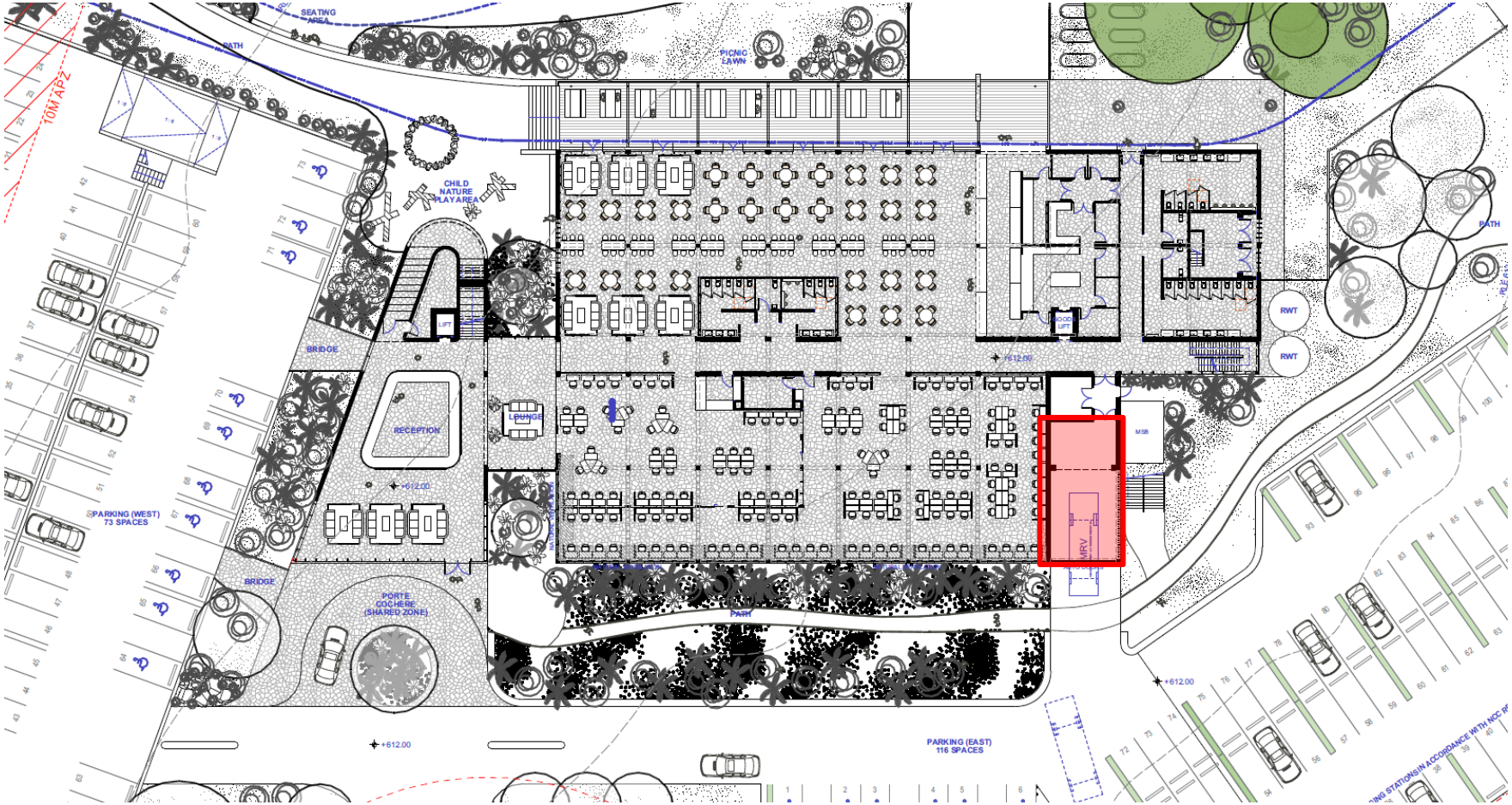
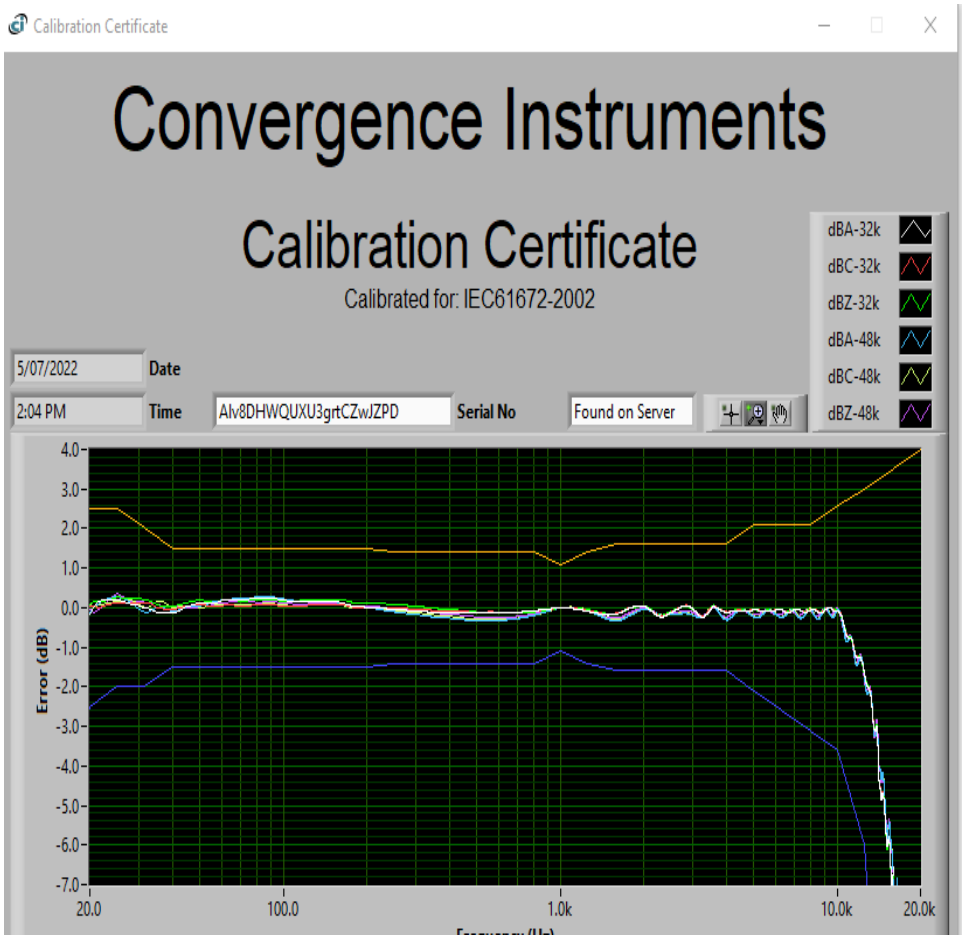
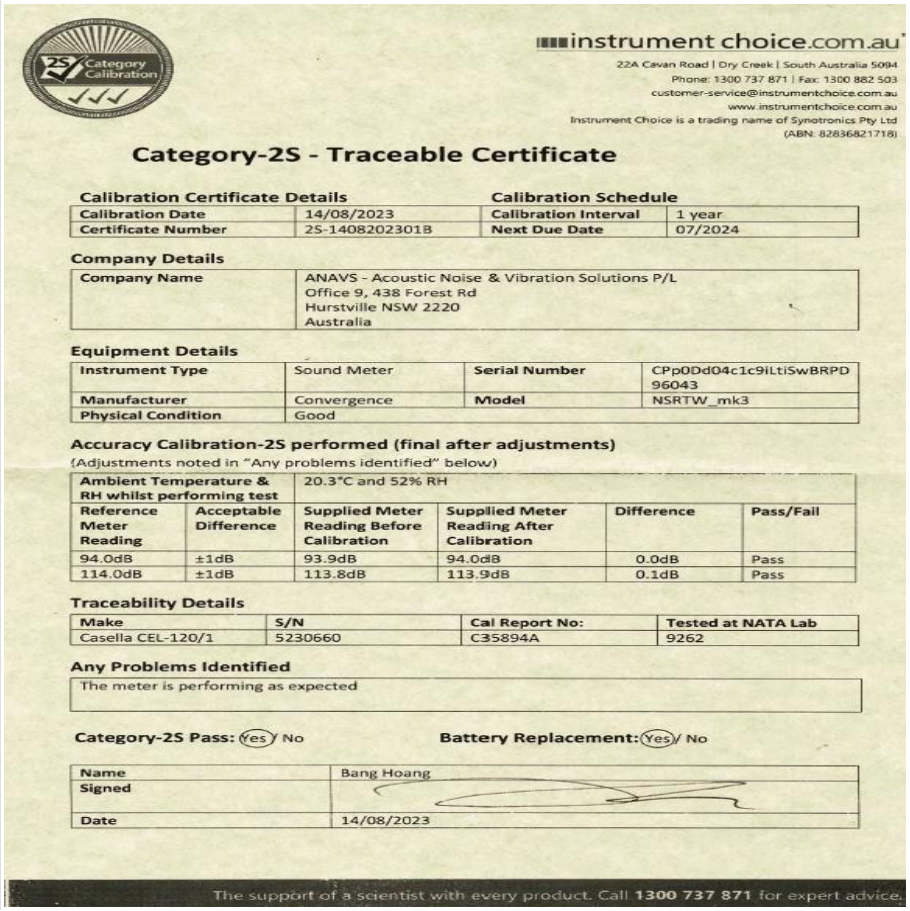


Figure 7 - Proposed Loading Dock (Stage 2)

Figure 8 - Noise Reading Locations (Points A & B)





instrument choice.com.au

22A Cavan Road | Dry Creek | South Australia 5094
Phone: 1300 737 871 | Fax: 1300 882 503
customer-service@instrumentchoice.com.au
www.instrumentchoice.com.au
Instrument Choice is a trading name of Synotronics Pty Ltd
(ABN: 82836821718)

Category-2S - Traceable Certificate

Calibration Certificate Details		Calibration Schedule	
Calibration Date	14/08/2023	Calibration Interval	1 year
Certificate Number	2S-14082023018	Next Due Date	07/2024

Company Details

Company Name	ANAVS - Acoustic Noise & Vibration Solutions P/L Office 9, 438 Forest Rd Hurstville NSW 2220 Australia

Equipment Details

Instrument Type	Sound Meter	Serial Number	CPp0Dd04c1c9iLtiSwBRPD 96043
Manufacturer	Convergence	Model	NSRTW_mk3
Physical Condition	Good		

Accuracy Calibration-2S performed (final after adjustments)

(Adjustments noted in "Any problems identified" below)

Ambient Temperature & RH whilst performing test		20.3°C and 52% RH			
Reference Meter Reading	Acceptable Difference	Supplied Meter Reading Before Calibration	Supplied Meter Reading After Calibration	Difference	Pass/Fail
94.0dB	±1dB	93.9dB	94.0dB	0.0dB	Pass
114.0dB	±1dB	113.8dB	113.9dB	0.1dB	Pass

Traceability Details

Make	S/N	Cal Report No:	Tested at NATA Lab
Casella CEL-120/1	5230660	C35894A	9262

Any Problems Identified

The meter is performing as expected

Category-2S Pass: (Yes) / No **Battery Replacement:** (Yes) / No

Name	Bang Hoang
Signed	
Date	14/08/2023

The support of a scientist with every product. Call **1300 737 871** for expert advice.

Figure 9 - Calibration Certificates

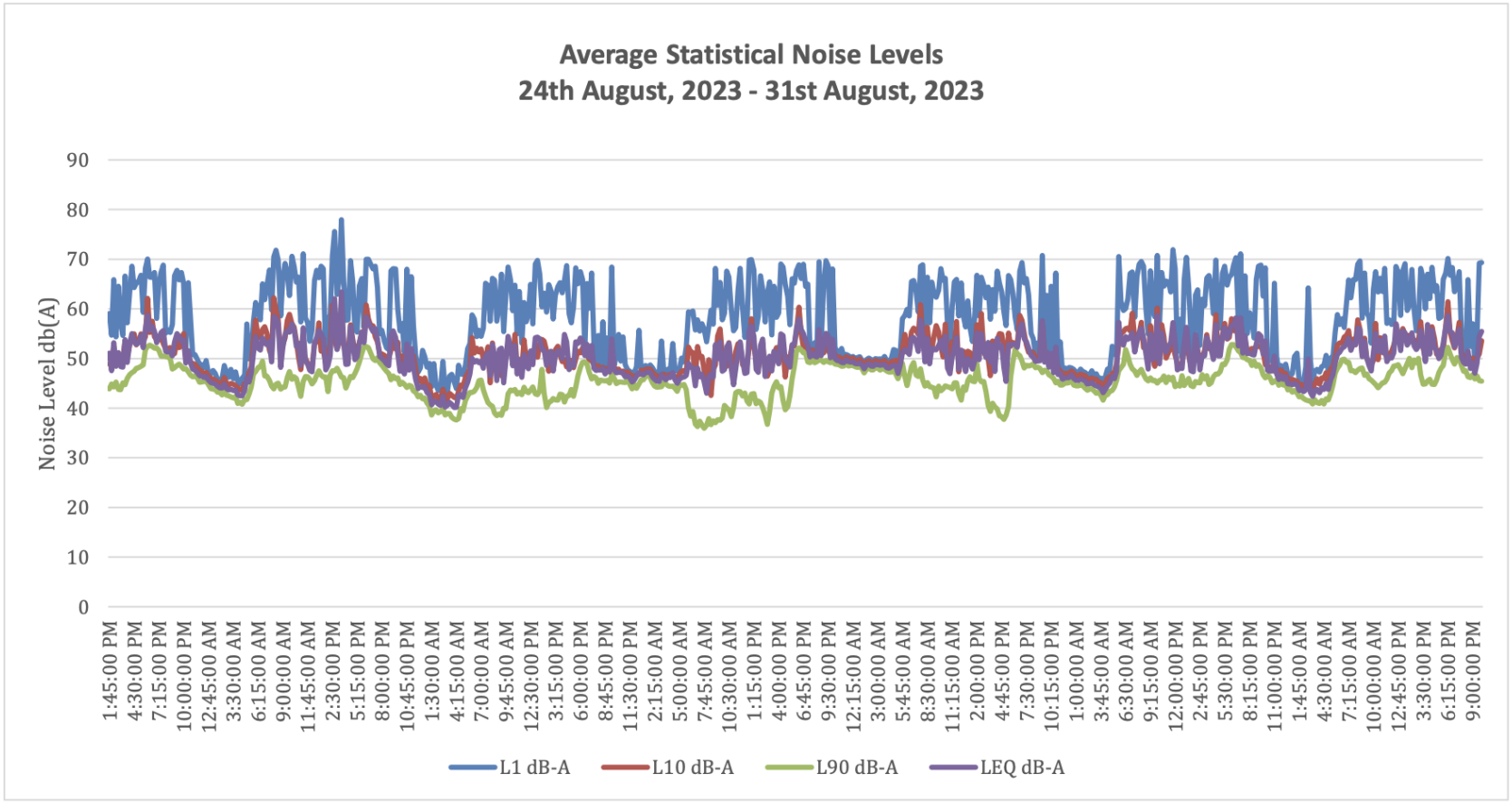


Figure 10 - Noise Survey (Point A)

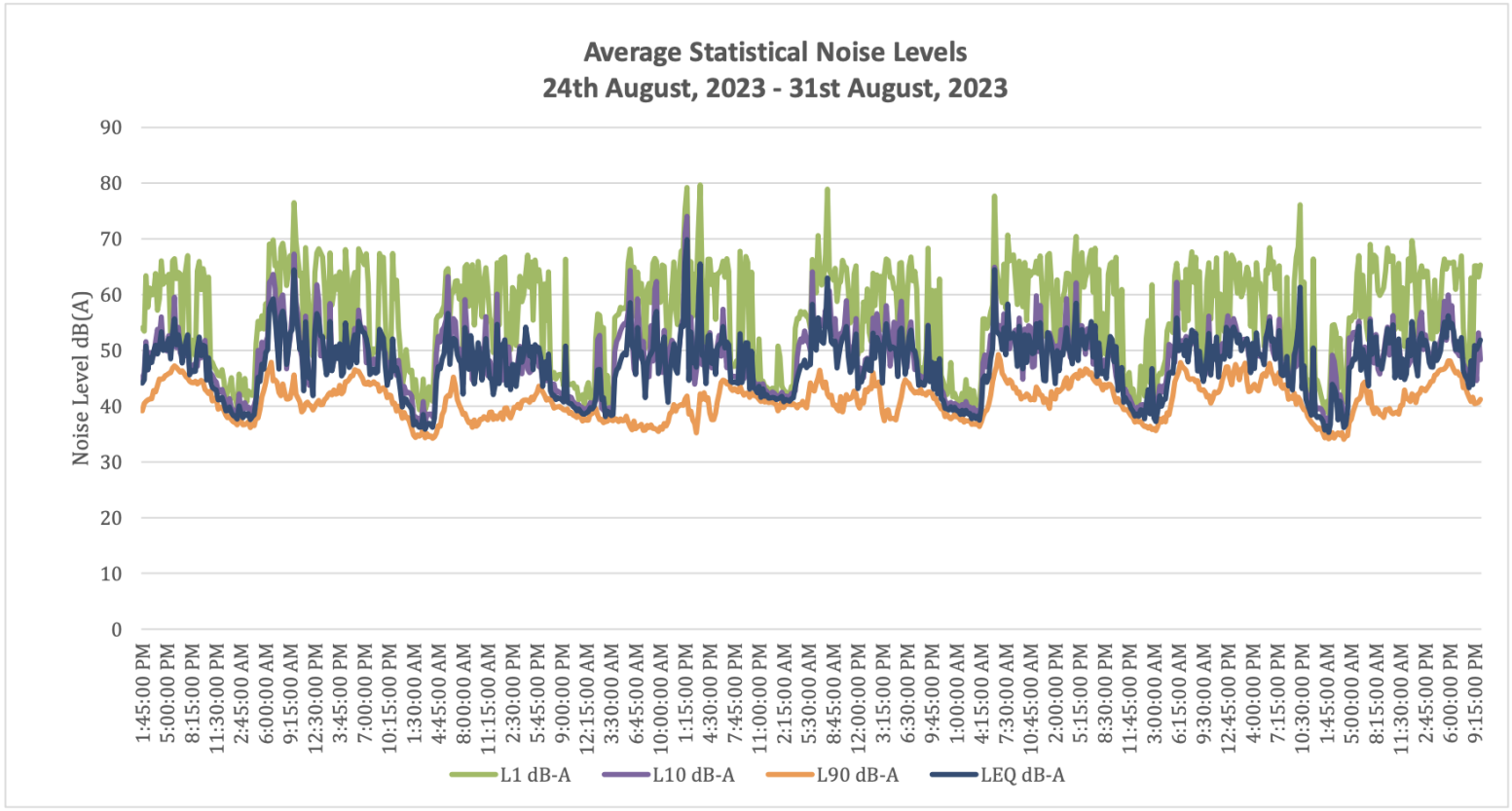


Figure 11 - Noise Survey (Point B)

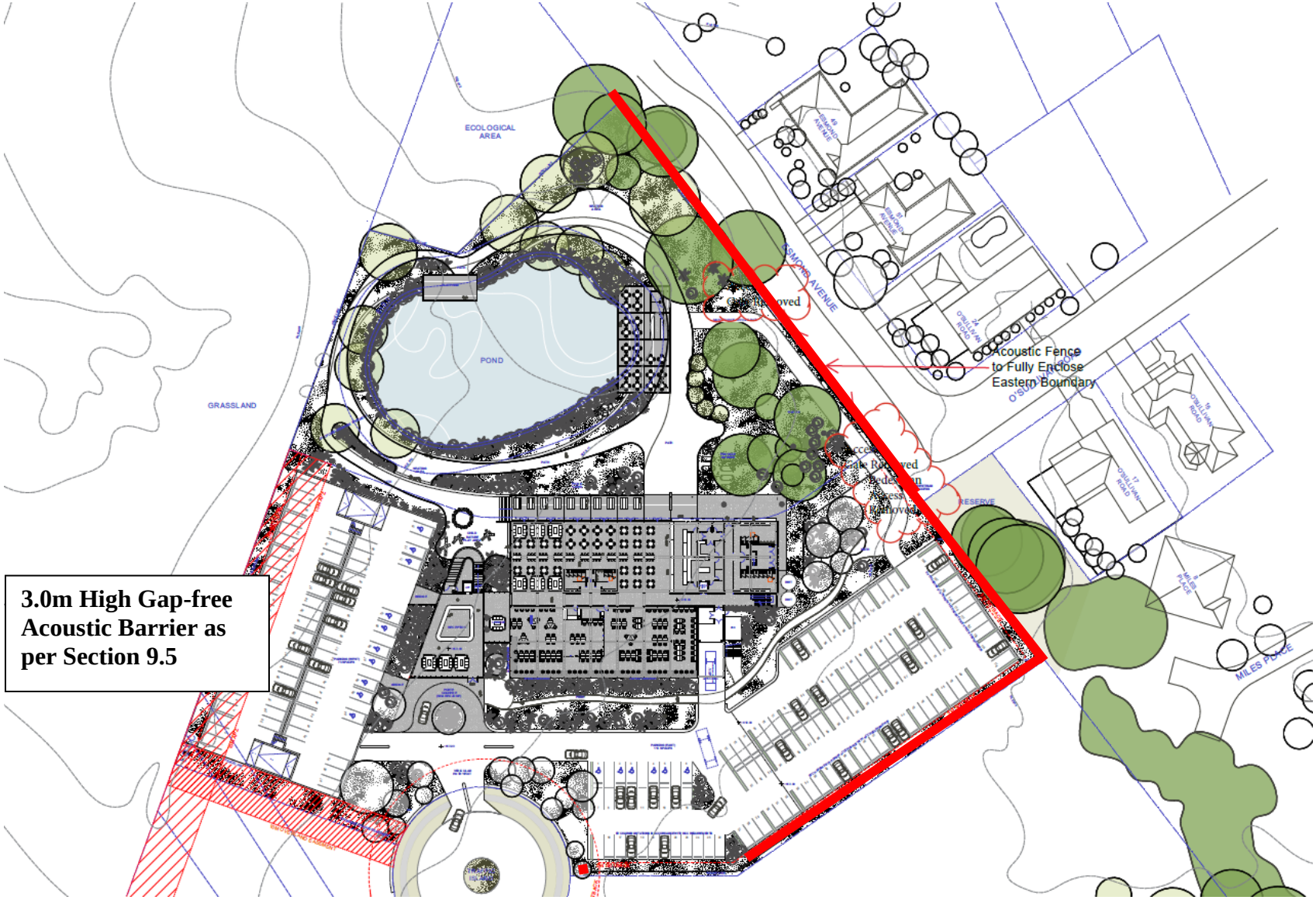


Figure 12 - Sound Barrier Locations – Ground Floor

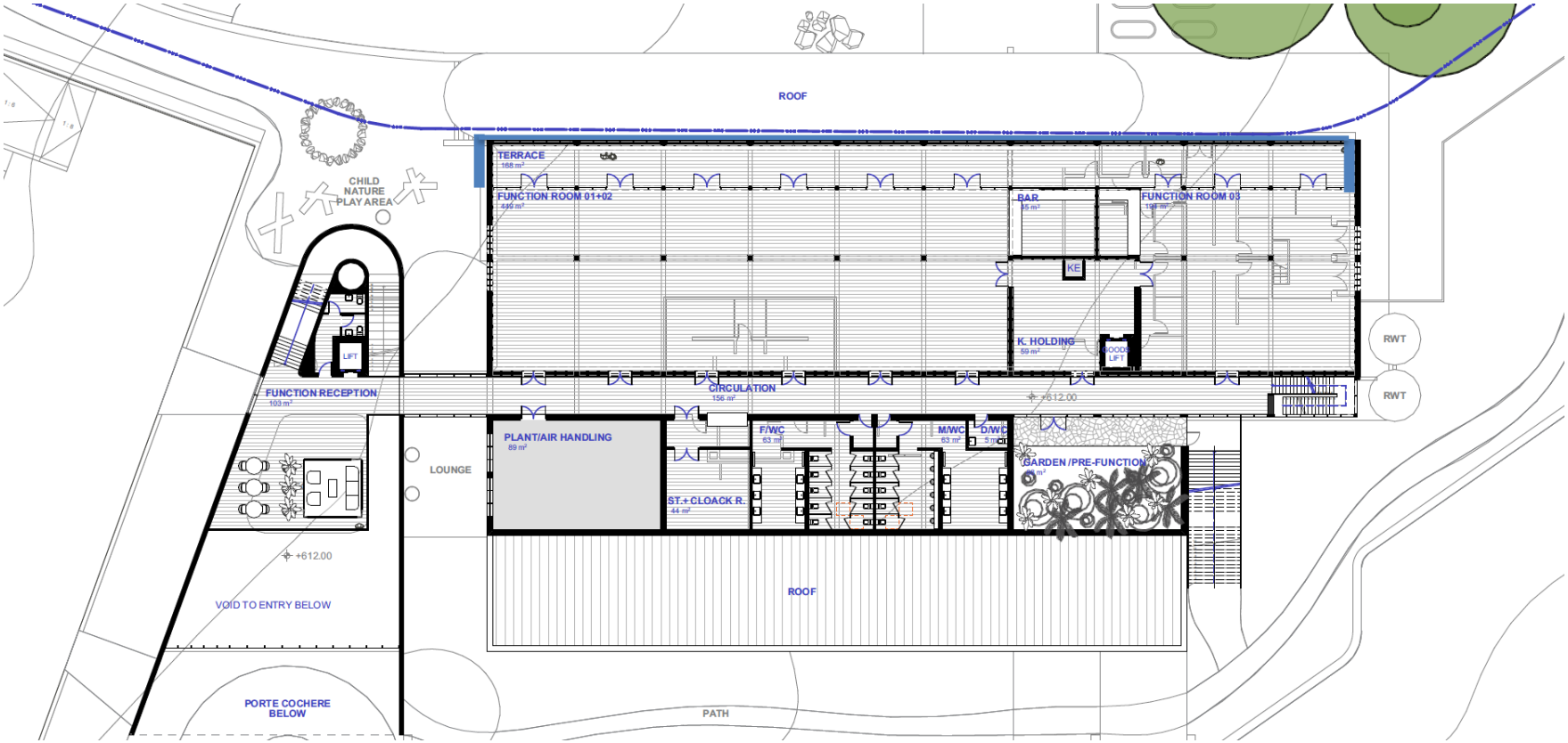


Figure 13 - Sound Barrier Locations – 1st Floor

1.2 High Gap-free Glass Balustrade

ANAVS-ACOUSTIC NOISE & VIBRATION SOLUTIONSP/L
Office 9, 438 Forest Rd, Hurstville, NSW 2220. ABN : 42 663 590 430
Phone : 9793 1393 Fax: 9708 3113 Email: info@acousticsolutions.com.au

February 3, 2025

Dear Sir/Madam

RE: Day Design – Acoustic Peer Review

37 Tompsitt Drive, Jerrabomberra

We refer to the Acoustic Peer Review conducted by Day Design Pty Ltd dated 12th December, 2024 regarding the proposed development at the above address.

Below is our response to the acoustic concerns in the peer review:

> **1.1 Noise Criteria**
>
> The noise criteria in the report have not been fully defined. The noise emission from patrons and music within the club is required to satisfy the noise criteria imposed by Liquor and Gaming NSW. The noise from mechanical plant and traffic should comply with the noise criteria in the NSW Noise Policy for Industry.
>
> As the Club is proposed to operate until 2 am, the noise criteria from patrons and music should be defined as a 'pre-midnight' criterion (7 am – midnight) and a 'post-midnight' criterion (midnight – 7 am). There is insufficient data in the acoustic report to determine the noise criteria.
>
> The omission of a noise criteria determined in line with the Liquor and Gaming NSW standard noise criteria, lacks a fundamental element of this assessment which affects its ability to be relied on.

- Pre-midnight and post-midnight noise criterion was already listed in Section 5.3 (now section 7.3 of amended Acoustic Report Rev 2).
- The predicted noise calculations of L_{A10} at nearest residential receivers as shown in Table 8.2.1 shows compliance with both the pre-midnight and post-midnight criteria outlined in Section 7.3 of our report (L_{A10} is less than L_{90} and L_{90} **+ 5)**. Furthermore, compliance with the post-midnight criteria ($L_{A10} < L_{90}$) is unnecessary due to outdoor activity being limited to during the Day and Evening only and hence was not included in Table 6.2.1 (now Table 8.2.1 of amended Acoustic Report Rev 2).

1.2 Outdoor Areas

The acoustic report does not limit outdoor activity after 10 pm, except on the 1st floor terrace. However, the SEE proposes the outdoor and alfresco areas of the Club to be closed at 10 pm.

We assume that outdoor and alfresco areas of the Club are proposed to be closed at 10 pm and that other outdoor areas of the Club will be open to patrons.

- We have amended Section 9.4 of the Acoustic Report to clarify that all outdoor activity is limited to Day and Evening Use only (7:00 am – 10:00 pm) in accordance with the SEE.

1.3 Section 7.2 – Entry Doors.

It is unclear whether entry doors include all external doors such as those connecting function rooms to terraces or other outdoor spaces, or just the front entry door.

Clarification should be provided to enable noise control recommendations to be applied to the appropriate areas.

- We have amended Section 9.2 of the Acoustic Report to further clarify our recommendations.

1.4 Table 4.1 – Average Sound Levels of Different Voice Effects

The Table provides a range of vocal effects of patrons. There is no information on whether the data is L_{eq} or L_{10}. The NSW Liquor and Gaming noise criteria requires the use of L_{10} data for music and patrons.

Due to the lack of clarity on the vocal effort of patrons was used, the conclusions cannot be relied on.

- The data provided in table 6.1.1 was Sound Pressure Levels at 1 metre and has been explained in the heading. The Sound Power levels at each vocal effort used in determining the Noise levels from the outside areas in Table 8.2.1 are as below..

A	B	C	D	E	F	G	H	I	J
Vocal Effort		Sound Power Levels [dB] at Octave Band Centre Frequencies [Hz]*,**,***							
	No. of Talkers	125	250	500	1000	2000	4000	8000	dB(A)
Females									
Casual	1	48.0	61.0	61.0	54.0	51.0	47.0	48.0	**61.0**
Normal	1	49.0	63.0	66.0	61.0	56.0	44.0	50.0	**66.0**
Raised	1	47.0	67.0	72.0	70.0	66.0	61.0	54.0	**74.0**
Loud	1	47.0	62.0	77.0	79.0	76.0	70.0	62.0	**82.0**
Shouted	1	48.0	68.0	82.0	89.0	88.0	81.0	71.0	**93.0**
Males									
Casual	1	58.0	62.0	63.0	55.0	53.0	51.0	48.0	**63.0**
Normal	1	60.0	66.0	69.0	62.0	58.0	54.0	48.0	**69.0**
Raised	1	65.0	71.0	76.0	70.0	66.0	61.0	55.0	**76.0**
Loud	1	69.0	78.0	85.0	84.0	79.0	73.0	63.0	**87.0**
Shouted	1	58.0	83.0	93.0	97.0	93.0	85.0	76.0	**100.0**

-

1.5 Section 5.3 – NSW Office of Liquor, Gaming and Racing

The NSW Office of Liquor Gaming and Racing has been renamed to Liquor and Gaming NSW.

The Section does not determine a noise criterion for pre-midnight or post-midnight operation as required by the standard noise criteria.

Octave band background noise levels are not presented in the report, which are used to determine the Liquor and Gaming NSW standard noise criteria.

The omission of a noise criteria determined in line with the Liquor and Gaming NSW standard noise criteria, lacks a fundamental element of this assessment which affects its ability to be relied on.

- As mentioned above, the criterion was already determined in Section 7.3 of our Acoustic Report. It does list Pre and post midnight Criteria.
- The octave band background noise levels were also already listed in Table 6.2.1 (now Table 8.2.1) of our Acoustic Report which were used to determine OLGR compliance.

1.6 Section 6.1 – Noise from Indoor Areas

It is unclear whether the calculations assume a level of 96 dBA at 1 m inside the Club, as presented in Table 6.1.2 or if the higher level of 107 dBA for a "heavy rock band" has been used as discussed beneath Table 6.1.2. A worst-case scenario should be used for the assessment.

- Our calculations assume a level of 96 dB(A) as outlined in Table 8.1.2. The higher level of 107 dB(A) is representative of a "heavy rock band" which has no association with the proposed use of the club. This was deleted in the revised Acoustic report.

1.7 Section 6.2 – Noise from Outdoor Areas

The assumptions of vocal effort and music are not clear in the data for Table 6.2.1. Each row listed as a "Sound Power Level" should be clearly identified with the assumptions of vocal effort and number of people talking, together with the type of music in the area.

Such clarity is required to assess the noise impact of the proposal on the nearby residential premises.

- Vocal Effort and Number of People Talking was already included within Table 6.2.1 (now Table 8.2.1) as well as in the table footnotes. The footnote has been edited to clarify that background music was assumed.

1.8 Section 6.6 – Noise from Cars in the Car Park

The data in Table 6.6.1 is not identified as either L_{eq} or L_1. Both are required – L_{eq} for assessment against the Noise Policy for Industry and L_1 for assessment against the sleep disturbance noise criterion.

Tables 6.6.2 and 6.6.3 contain no information on the number of cars assumed in the calculations.

The calculations should also include the noise from patrons talking in the carpark while walking to their car.

- The data in Table 6.6.1 (now Table 8.6.1) was clearly identified as the Average Sound Power Level. Table 8.6.1 only shows average car park noise source levels and has no affiliation with NPfI compliance. Compliance is based on our noise calculations.
- Number of cars assumed is based on additional traffic generation statistics provided in Traffic & Parking Report and is also mentioned in Section 8.5 of our report.
- As per traffic report, there are 13 trips per 15 minutes in the eastern carpark which is closest to the residential receivers. Assume there are 3 people in each car, entering & exiting the club, the total sound power level of people at the centre of the carpark is 87 dB(A). The noise level at the nearest residential receivers (R4 and R5) will be around 29 dB(A) which is much lower than noise levels from the cars themselves. Hence, the noise levels will only increase 0.5 dB(A) which still shows compliance.

1.9 Aircraft Noise Exposure

Aircraft Noise Exposure Forecast (ANEF) 2019 for Canberra Airport shows the site to be within the ANEF20-25 contour. Clause 7.9 of the Queanbeyan-Palerang Regional Local Environmental Plan 2022 requires the consideration of aircraft noise to meet AS2021:2015.

The impact of aircraft noise on the development has not been considered in the Acoustic Report.

- We have amended the report to include an Aircraft Impact Assessment located in Part 1 - Sections 4.0 & 5.0. The assessment was carried out in compliance with AS 2021:2015.

2.1 Table 5.1 – Noise criteria

The RBL at Point A is shown in Table 3.1 as 44 dBA in the daytime, 47 dBA in the evening and 41 dBA at night.

Assuming the RBL data are reliable, the criteria for Point A in Table 5.1 are incorrect and should be 49 dBA in the daytime, 52 dBA in the evening and 46 dBA at night.

Similarly, the RBL at Point B is shown in Table 3.2 as 39 dBA in the daytime, 42 dBA in the evening and 36 dBA at night.

The criteria for Point B in Table 5.1 are incorrect and should be 44 dBA in the daytime, 47 dBA in the evening and 41 dBA at night.

As the difference in Location 'A' and 'B' are minor, the more conservative noise criterion should be applied.

- Tables 5.1 & 5.2 (now 7.1 & 7.2) utilise the L_{90} + 5 to determine the criteria for compliance with NSW Noise Guide for Local Government. This Noise Guide is used to assess patron and music noise compliance inside of the proposed club. RBL + 5 is ONLY applicable in Noise Policy for Industry and as clearly stated in Section 1.5 of the NPfI: "amplified music/patron noise from premises including those licensed by Liquor and Gaming NSW" has been excluded from this policy. Therefore, L_{90} + 5 is the ONLY noise criteria that is applicable to assess patron and music noise compliance.

2.2 Section 5.1.1 – Sleep Disturbance

The calculated noise criteria are incorrect. As the RBL is 41 dBA at Point A, the sleep disturbance criterion should be 56 dBA (not 60 dBA).

Similarly, as the RBL is 36 dBA at Point B, the sleep disturbance criterion should be 52 dBA (not 54 dBA).

The reference to a childcare centre in this Section is an error as no childcare centre is proposed.

- Further to the above, due to exclusions stated in NPfI, L_{90} + 15 is used when assessing sleep disturbance due to patron and music noise inside of the club.

- The RBL has been used to determine Sleep Disturbance that is governed by the Noise Policy for Industry which includes loading dock and car park noise compliance.

2.3 Section 6.2 - Noise from Outdoor Areas

The calculations for people outdoors are incorrect and result in a lower noise level than what can be expected. As an example, very few of the recommended noise control measures would apply to the noise from patrons on the first floor terrace. The noise emission from each area should be itemised to establish the contribution at the residential premises.

The calculated noise emission in Table 6.2.1 exceeds the nominated noise criteria at 500 Hz based on the background noise levels measured at Point B.

Additional noise controls will be required to ensure the noise criteria are not exceeded.

- The noise calculations presented in Table 6.2.1 (now 8.2.1) are determined in accordance with AS ISO 9613 *"Acoustics — Attenuation of sound during propagation outdoors"*.

- As shown in Table 8.2.1, ALL octave band centre frequencies at ALL nearest residential receivers comply with the noise criteria determined at their corresponding points.

3.1 Section 7.2 – Entry Doors.

Entry doors are recommended to have automatic door closers installed, which we endorse. However, the calculations assume that doors will be closed at all times. There has been no consideration for the time when doors are open and noise from within the function room (or elsewhere) is spilling out through the open door/s.

Calculations should be provided with a reasonable assumption for the length of time doors will be open (eg doors connecting the function room and north facing terrace) and to determine the level of noise emission from those indoor spaces to the residential premises, across Esmond Ave.

- Amended noise calculations have specified an assumed façade with a minimum Rw of 35 - 10.38mm laminated glass and a 10% leakage. This takes into consideration the automatic doors being open. The noise spillage predicted is 29 dB(A) at the nearest affected receivers (R1, R2 & R3) which is much lower than the total noise break-out from the outdoor area. Hence, the noise calculations will not change.

3.2 Section 7.4 – Outdoor 1st Floor Terrace

A recommendation for patrons to "*not raise their voice when the terrace is in use*" is unlikely to be complied with. The report should make a more reasonable assumption for the likely reasonable behaviour of patrons and amend the calculations and noise control recommendations amended accordingly.

The recommendation suggests that if patrons were to raise their voice, the noise impact would be unacceptable. This suggests absolute compliance with the Plan of Management is required to achieve acoustic compliance.

- The recommendation in Section 7.4 (now 9.4) is a conservative approach to noise mitigation in the proposed club and will help decrease the noise at the receiver by 4-7 dB(A). Section 9.7 also states adding signage and announcements that reinforce the recommendation.

- Our noise calculations already take into consideration patrons using raised voices in outdoor areas. Hence, a neglect of this noise recommendation will still achieve acoustic compliance.

3.3 Section 7.10 – Further Acoustic Assessment at CC Stage

It is common to conduct a full acoustic assessment of the mechanical plant prior to issue of the Construction Certificate. However, to determine whether the size and location of the proposed plant areas will be acceptable, and given the close proximity of the site to residential dwellings, it is required to carry out an initial assessment of the noise emission from mechanical plant, especially the plant that is proposed to operate through the night. The omission of the noise impact from this part of the operation could impact sensitive receivers and without that assessment, it is unknown whether the noise impact could be adequately managed.

- The noise criteria for the mechanical plant is the Project Noise Trigger Level which have been given in Section 7.2.3 of the acoustic report. Mechanical plant equipment and their typical noise levels have also been provided in Section 8.4 of the acoustic

report. Mechanical plant recommendations have been outlined in Section 9.1 of the acoustic report. A full mechanical assessment will be carried out at the CC stage when mechanical service plans have been provided.

ANAVS has no objections towards collaborating with Day Design to clarify any further concerns or to prepare a joint acoustic report for council approval. We hope the above meets your requirements. Should you require further explanations, please do not hesitate to contact us.

Yours Sincerely,

Amir

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St Leonards NSW 2065
T: 02 9908 1270

Melbourne Office
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70 Racecourse Rd
Nth Melbourne VIC 3051
T: 03 7015 5112

ABN: 36 105 797 715
PO Box 270
Neutral Bay NSW 2089
E: info@acousticdynamics.com.au
W: www.acousticdynamics.com.au

Project 6641
16 January 2025

Vikings Group
C/o- Construction Consultants
Attention: Mr Sean Richards
Level 4,15 Moore Street
CANBERRA ACT 2600

Email: sean@constructionconsultants.net.au
Ph: 02 9633 9233

Dear Mr Richards

CLUB POPLARS 37 TOMPSITT DR JERRABOMBERRA – PROPOSED LICENCED VENUE
NOISE EMISSION ASSESSMENT – EXPERT PEER REVIEW

1 INTRODUCTION & BACKGROUND INFORMATION

1. Acoustic Dynamics is engaged by **Vikings Group**, to conduct a peer review of Council's acoustic peer review, and provide comment on the acoustic matters identified.

2. Queanbeyan-Palerang Regional Council engaged Day Design (DD) to conduct an acoustic peer review of the Acoustic Noise and Vibration Solutions (ANAVS) acoustic report prepared in support of the development application. The following documents were referenced and considered as part of our review:

    i. Acoustic Noise and Vibration Solutions acoustic report document titled: "*Acoustic Environmental & Impact Assessment Report For proposed Vikings Club at No. 37 Tompsitt Dr, Jerrabombera"*, dated 15 August 2024, Revision 1;

    ii. Day Design acoustic peer review document titled: "*Proposed Licensed Premises 37 Tompsitt Drive, Jerrabomberra Acoustic Peer Review*", dated 12 December 2024;

    iii. Benson McCormack Architecture various architectural drawings, dated 13 August 2024; and

    iv. Knight Frank document "Statement of Environmental Effects", dated September 2024.

2 SUMMARY OF ISSUES RAISED IN COUNCIL'S ACOUSTIC PEER REVIEW

3. The following summarises the issues identified by DD within their peer review of the ANAVS report:
    i. Insufficient information;
    ii. Incorrect calculations; and
    iii. Unworkable recommendations.

4. Our responses to each of the issues identified in the DD peer review are detailed below.

2.1.1 RESPONSES TO INADEQUATE LEVEL OF INFORMATION

DD Issue 1.1 Noise Criteria

5. **AD Response**: Table 6.2.1 of the ANAVS presents post-10:00pm octave band L_{A90} data from the two noise logging locations. The report requires a simple amendment of the presented background noise data to define the patron and music noise criteria in accordance with the requirements of Liquor and Gaming NSW (i.e. pre-midnight, and post-midnight octave band background data and criteria).

6. With regard to noise associated with mechanical plant, onsite traffic, the loading dock and sleep disturbance, criteria should be determined in accordance with the requirements of the NSW Noise Policy for Industry.

DD Issue 1.2 Outdoor Areas

7. **AD Response**: A minor update of the acoustic report is required to clarify which outdoor areas will remain open to patrons after 10:00pm. The outdoor area usage scheduling should be consistent between the acoustic report and the Statement of Environmental Effects.

DD Issue 1.3 Section 7.2 - Entry Doors

8. **AD Response**: Our interpretation of the acoustic report is that automatic door closers are to be installed on all entry doors to all rooms, including doors connecting function rooms to terraces, however to assist Council in understanding, the recommendation should be updated to clarify this.

DD Issue 1.4 Table 4.1 - Average Sound Levels of Different Voice Effects

9. **AD Response**: Table 4.1 of the acoustic report has omitted detail of whether the patron effort data is L_{eq} or L_{10}. Although Table 6.2.1 includes additional detail with regard to the L_{10} spectral content of patron noise, it is not clear what vocal effort has been relied upon. To ensure the patron noise calculations are conducted in accordance with the assessment requirements of Liquor and Gaming NSW, the patron noise data in Table 4.1 should be updated to refer to octave band, L_{10} levels.

DD Issue 1.5 Section 5.3 - NSW Office of Liquor Gaming and Racing

10. **AD Response**: As per **Point 5**, a simple amendment of the presented background noise data is required to define the patron and music noise criteria as per the requirements of Liquor and Gaming NSW.

DD Issue 1.6 Section 6.1 - Noise from Indoor Areas

11. **AD Response**: To clarify the likely noise impacts associated with typical and worst-case indoor music noise levels, we recommend a table be included that presents the predicted noise levels associated with a typical indoor music noise level (i.e. 96 dB(A)) and a worst-case indoor music noise level (i.e. 107 dB(A)).

DD Issue 1.7 Section 6.2 - Noise from Outdoor Areas

12. **AD Response**: As per Point 9, the outdoor area noise data in Table 6.2.1 should be updated to refer to the vocal effort and the number of patrons talking simultaneously, and contribution of music, in each of the areas. For conservativeness, the calculation should be based on a worst-case outdoor patron and music scenario likely to occur at the club.

DD Issue 1.8 Section 6.6 - Noise from Cars in the Car Park

13. **AD Response**: It is assumed that ANAVS have relied upon the L_{eq} descriptor for the Noise Policy for Industry assessment, and L_1 (or L_{max}) for the sleep disturbance assessment. For clarity, Table 6.6.1 requires a minor amendment to define the use of L_{eq} and L_1 (or L_{max}) sound power level noise descriptors.

14. With regard to omitted traffic movement data in Table 6.6.2 and Table 6.6.3, ANAVS refers to the traffic demand and vehicle trips in Section 6.5. Where this data has been relied upon for the onsite vehicle noise calculations, Table 6.6.2 and Table 6.6.3 could be updated to refer to this. Where other vehicle assumptions have been relied upon then these should be stated.

15. With regard to noise from patrons traversing the carpark, the impact is likely to be minor in comparison to the vehicle movements, and other noise sources on site. Nevertheless, to satisfy Council's concerns, Table 6.2.1 should be updated to include the predicted noise levels associated with patrons traversing the carpark.

DD Issue 1.9 Aircraft Noise Exposure

16. **AD Response**: The ANAVS report refers to an assessment of environmental noise on the internal amenity of the proposed Vikings Club, however it appears that this has been omitted from the report. Given the nature of the use of the indoor rooms, the likely facade construction, and the recommended glazing performance (i.e. 10.38mm laminate, R_w 35), noise intrusion from aircraft is expected to be compliant. We recommend a succinct aircraft noise intrusion assessment be included to ensure the internal design objectives of AS2021:2015 are satisfied, in accordance with the requirements of the Queanbeyan-Palerang Regional Local Environmental Plan 2022.

2.1.2 RESPONSES TO INCORRECT CALCULATIONS

DD Issue 2.1 Table 5.1 - Noise Criteria

17. **AD Response**: To ensure the cumulative noise criteria is determined in accordance with the requirements of the Noise Policy for Industry, Table 5.2 requires a minor update. The period RBLs should be used as the basis of the criteria (instead of the $L_{90,15minute}$).

18. With regard to the use of differing criteria for different locations, we do not agree with the DD recommendation that the more conservative criteria be used for all receivers. Although the receivers are within close proximity, it is clear from the ANAVS logging data that receivers fronting O'Sullivan Road and Edmond Avenue experience a higher background noise level than receivers away from the road.

DD Issue 2.2 Section 5.1.1 - Sleep Disturbance

19. **AD Response**: As per **Point 17**, the night time RBLs should be used as the basis of the sleep disturbance criterion. Where the prevailing RBL is less than 37 dB(A), L_{max} 52 dB(A) can be used as the criterion.

20. We assume the reference to a child care centre in this section is a typographical error and should be disregarded.

DD Issue 2.3 Section 6.2 - Noise from Outdoor Areas

21. **AD Response**: DD has neglected to provide any calculations or predictions to support the statement that the ANAVS calculations are incorrect.

22. Based on the inputs and assumptions detailed in the ANAVS report, our preliminary noise modelling results are in general agreeance with the results presented in Table 6.2.1. It is acknowledged that the assumed vocal effort of the patrons and number of patrons speaking simultaneously is unknown, and the inputs do not include noise associated with patron traversing the grounds. Hence, the noise impacts may be marginally underpredicted.

23. DD also recommends that the noise contribution from each area should be itemised however this is not a requirement of Liquor and Gaming NSW.

24. DD notes that the nominated noise criteria based on the background noise levels from Point B would be exceeded at 500 Hz, however as per **Point 18**, there is insufficient justification for the use of the more conservative criterion at all receivers.

25. To satisfy Council's concern regarding the patron and music noise predictions, Table 6.2.1 should be updated to include the vocal effort, the number of patrons talking simultaneously, and contribution of music, in each of the areas, along with noise associated with patrons traversing the grounds. An itemisation of noise from each area could be included, however this is not a mandatory requirement.

26. Should additional mitigation be required to ensure noise criteria are complied with, this could readily be achieved through the use of architectural mitigation and/or additional patron management measures.

2.1.3 RESPONSES TO UNWORKABLE RECOMMENDATIONS

DD Issue 3.1 Section 7.2 - Entry Doors

27. **AD Response**: Before 10:00pm, the contribution from a door opening for ingress/egress is likely to be less than the noise contribution associated with patrons outside. However, after 10:00pm (when there are less patrons outside), an open door may influence the noise contribution. Hence, it is recommended that the results in Table 6.2.1 be updated to include noise associated with a door being opened. A conservative worst-case door open duration would be 50% of the assessment period.

DD Issue 3.2 Section 7.4 - Outdoor 1st Floor Terrace

28. **AD Response**: DD has assumed, based on recommendation 7.4, that if any patrons on the level 1 terrace raise their voice, then the noise criteria will be exceeded. As per **Point 25**, the noise modelling assumptions require a minor update to clarify vocal effort.

29. To ensure the level 1 terrace patron management measures are practical and enforceable, recommendation 7.4 should be amended slightly. Appropriate wording could include:
    i. Installation of signage reminding patrons to be respectful of neighbouring residents;
    ii. Security to monitor the behaviour of patrons;
    iii. Staff to practice responsible service of alcohol including:
        - Monitoring patron behaviour;
        - Identifying patrons who are becoming intoxicated;
        - Restricting sale of alcohol to patrons who are becoming intoxicated; and
    iv. The level 1 terrace is to be vacated by 10:00pm.

DD Issue 3.3 Section 7.10 – Further Acoustic Assessment at CC Stage

30. **AD Response**: To address Council's concerns, Section 6.4 should be updated to include a preliminary assessment of noise associated with mechanical plant. The mechanical plant assumptions will assist in progressing the design, whilst the assessment will be beneficial for identifying and resolving potential mechanical plant noise issues.

3 CONCLUSION

31. Acoustic Dynamics has conducted a peer review of Council's acoustic peer review, and provided comment on the acoustic matters identified. The review was conducted in accordance with the requirements of:
    - Queanbeyan-Palerang Regional Council;
    - Liquor and Gaming NSW;
    - NSW Environment Protection Authority (EPA); and
    - Association of Australasian Acoustical Consultants (AAAC).

32. Our review has considered the proposed use of the site, the location of adjacent receivers, the assessment methodology and noise modelling assumptions, and provided responses to the matters identified within Council's acoustic peer review.

33. Our findings are summarised as follows:
    i. The acoustic report prepared by Acoustic Noise and Vibration Solutions requires minor updates in relation to insufficient information, determination of criteria, calculation assumptions, calculations, and noise management measures;
    ii. Day Design suggests that the patron and music noise calculations are incorrect yet did not provide calculations or predictions to support the statement;
    iii. Day Design recommend using the most conservative criterion for all receivers, however insufficient justification was provided;

iv. Patron and music noise impacts may be marginally underpredicted, however if required, additional mitigation could readily be achieved through the use of architectural mitigation and/or additional patron management measures; and
v. The recommended control measures may require minor updates.

34. It is our opinion that the required updates are not insurmountable and do not preclude the development from achieving compliance with the relevant acoustic criteria.

35. We trust the above information meets with your immediate requirements and expectations. Please do not hesitate to contact us on 02 9908 1270 should you require more information or clarification.

Kind Regards
ACOUSTIC DYNAMICS

LUCAS BROOKER
Associate, MArchSci (Audio & Acoustics), MAAS

RICHARD HAYDON
Managing Director, BE(Mech), MIEAust, MAAS, MASA,

Document	Rev	Date	Prepared	Reviewed	Authorised	Approved
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DAY DESIGN PTY LTD
CONSULTING ACOUSTICAL ENGINEERS

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Queanbeyan-Palerang Regional Council
PO Box 90
Queanbeyan NSW 2620

12 December, 2024
Refer: 8097-1.1R

Attention: Ms Kylie Coe
Telephone: 02 6285 6244 **Email: kylie.coe@qprc.nsw.gov.au**

Dear Madam,

PROPOSED LICENSED PREMISES

37 TOMPSITT DRIVE, JERRABOMBERRA

ACOUSTIC PEER REVIEW

Day Design has been engaged by Queanbeyan-Palerang Regional Council, to peer review an Acoustic Report prepared to support a development application for a licensed premises (Vikings Club) at 37 Tompsitt Drive, Jerrabomberra.

The following documents have been reviewed for the purpose of this peer review:

- Acoustic Environment & Impact Assessment Report prepared by Acoustic Noise & Vibration Solutions dated 15 August 2024
- Architectural Plans (DA-110-000 to 009) prepared by Benson McCormack Architecture dated 13 August 2024
- Statement of Environmental Effects (SEE) prepared by Knight Frank dated September 2024.

The proposal is located on the western outskirts of Jerrabomberra, adjacent to commercial premises. Esmond Ave adjoins the site to the east and residential premises are located on the eastern side of Esmond Ave, approximately 25 m from the Club's eastern boundary.

Following my review of the documentation provided, there are significant concerns that result from an inadequate level of information, incorrect calculations and unworkable recommendations. These issues are described in Sections 1, 2 and 3 of this review.

1.0 INADEQUATE LEVEL OF INFORMATION

1.1 Noise Criteria

The noise criteria in the report have not been fully defined. The noise emission from patrons and music within the club is required to satisfy the noise criteria imposed by Liquor and Gaming NSW. The noise from mechanical plant and traffic should comply with the noise criteria in the NSW Noise Policy for Industry.

As the Club is proposed to operate until 2 am, the noise criteria from patrons and music should be defined as a 'pre-midnight' criterion (7 am – midnight) and a 'post-midnight' criterion (midnight – 7 am). There is insufficient data in the acoustic report to determine the noise criteria.

The omission of a noise criteria determined in line with the Liquor and Gaming NSW standard noise criteria, lacks a fundamental element of this assessment which affects its ability to be relied on.

1.2 Outdoor Areas

The acoustic report does not limit outdoor activity after 10 pm, except on the 1st floor terrace. However, the SEE proposes the outdoor and alfresco areas of the Club to be closed at 10 pm.

We assume that outdoor and alfresco areas of the Club are proposed to be closed at 10 pm and that other outdoor areas of the Club will be open to patrons.

1.3 Section 7.2 – Entry Doors.

It is unclear whether entry doors include all external doors such as those connecting function rooms to terraces or other outdoor spaces, or just the front entry door.

Clarification should be provided to enable noise control recommendations to be applied to the appropriate areas.

1.4 Table 4.1 – Average Sound Levels of Different Voice Effects

The Table provides a range of vocal effects of patrons. There is no information on whether the data is L_{eq} or L_{10}. The NSW Liquor and Gaming noise criteria requires the use of L_{10} data for music and patrons.

Due to the lack of clarity on the vocal effort of patrons was used, the conclusions cannot be relied on.

1.5 Section 5.3 – NSW Office of Liquor, Gaming and Racing

The NSW Office of Liquor Gaming and Racing has been renamed to Liquor and Gaming NSW.

The Section does not determine a noise criterion for pre-midnight or post-midnight operation as required by the standard noise criteria.

Octave band background noise levels are not presented in the report, which are used to determine the Liquor and Gaming NSW standard noise criteria.

The omission of a noise criteria determined in line with the Liquor and Gaming NSW standard noise criteria, lacks a fundamental element of this assessment which affects its ability to be relied on.

1.6 Section 6.1 – Noise from Indoor Areas

It is unclear whether the calculations assume a level of 96 dBA at 1 m inside the Club, as presented in Table 6.1.2 or if the higher level of 107 dBA for a "heavy rock band" has been used as discussed beneath Table 6.1.2. A worst-case scenario should be used for the assessment.

1.7 Section 6.2 – Noise from Outdoor Areas

The assumptions of vocal effort and music are not clear in the data for Table 6.2.1. Each row listed as a "Sound Power Level" should be clearly identified with the assumptions of vocal effort and number of people talking, together with the type of music in the area.

Such clarity is required to assess the noise impact of the proposal on the nearby residential premises.

1.8 Section 6.6 – Noise from Cars in the Car Park

The data in Table 6.6.1 is not identified as either L_{eq} or L_1. Both are required – L_{eq} for assessment against the Noise Policy for Industry and L_1 for assessment against the sleep disturbance noise criterion.

Tables 6.6.2 and 6.6.3 contain no information on the number of cars assumed in the calculations.

The calculations should also include the noise from patrons talking in the carpark while walking to their car.

1.9 Aircraft Noise Exposure

Aircraft Noise Exposure Forecast (ANEF) 2019 for Canberra Airport shows the site to be within the ANEF20-25 contour. Clause 7.9 of the Queanbeyan-Palerang Regional Local Environmental Plan 2022 requires the consideration of aircraft noise to meet AS2021:2015.

The impact of aircraft noise on the development has not been considered in the Acoustic Report.

2.0 INCORRECT CALCULATIONS

2.1 Table 5.1 – Noise criteria

The RBL at Point A is shown in Table 3.1 as 44 dBA in the daytime, 47 dBA in the evening and 41 dBA at night.

Assuming the RBL data are reliable, the criteria for Point A in Table 5.1 are incorrect and should be 49 dBA in the daytime, 52 dBA in the evening and 46 dBA at night.

Similarly, the RBL at Point B is shown in Table 3.2 as 39 dBA in the daytime, 42 dBA in the evening and 36 dBA at night.

The criteria for Point B in Table 5.1 are incorrect and should be 44 dBA in the daytime, 47 dBA in the evening and 41 dBA at night.

As the difference in Location 'A' and 'B' are minor, the more conservative noise criterion should be applied.

2.2 Section 5.1.1 – Sleep Disturbance

The calculated noise criteria are incorrect. As the RBL is 41 dBA at Point A, the sleep disturbance criterion should be 56 dBA (not 60 dBA).

Similarly, as the RBL is 36 dBA at Point B, the sleep disturbance criterion should be 52 dBA (not 54 dBA).

The reference to a childcare centre in this Section is an error as no childcare centre is proposed.

2.3 Section 6.2 - Noise from Outdoor Areas

The calculations for people outdoors are incorrect and result in a lower noise level than what can be expected. As an example, very few of the recommended noise control measures would apply to the noise from patrons on the first floor terrace. The noise emission from each area should be itemised to establish the contribution at the residential premises.

The calculated noise emission in Table 6.2.1 exceeds the nominated noise criteria at 500 Hz based on the background noise levels measured at Point B.

Additional noise controls will be required to ensure the noise criteria are not exceeded.

3.0 UNWORKABLE RECOMMENDATIONS

3.1 Section 7.2 – Entry Doors.

Entry doors are recommended to have automatic door closers installed, which we endorse. However, the calculations assume that doors will be closed at all times. There has been no consideration for the time when doors are open and noise from within the function room (or elsewhere) is spilling out through the open door/s.

Calculations should be provided with a reasonable assumption for the length of time doors will be open (eg doors connecting the function room and north facing terrace) and to determine the level of noise emission from those indoor spaces to the residential premises, across Esmond Ave.

3.2 Section 7.4 – Outdoor 1st Floor Terrace

A recommendation for patrons to "*not raise their voice when the terrace is in use*" is unlikely to be complied with. The report should make a more reasonable assumption for the likely reasonable behaviour of patrons and amend the calculations and noise control recommendations amended accordingly.

The recommendation suggests that if patrons were to raise their voice, the noise impact would be unacceptable. This suggests absolute compliance with the Plan of Management is required to achieve acoustic compliance.

3.3 Section 7.10 – Further Acoustic Assessment at CC Stage

It is common to conduct a full acoustic assessment of the mechanical plant prior to issue of the Construction Certificate. However, to determine whether the size and location of the proposed plant areas will be acceptable, and given the close proximity of the site to residential dwellings, it is required to carry out an initial assessment of the noise emission from mechanical plant, especially the plant that is proposed to operate through the night. The omission of the noise impact from this part of the operation could impact sensitive receivers and without that assessment, it is unknown whether the noise impact could be adequately managed.

Stephen Gauld, MEngSc (Noise and Vibration), BE(Mechanical), MIEAust, MAAS
Principal Acoustical Consultant
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP
Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

The undersigned hereby certifies that this Report has been checked and approved in accordance with our Quality Management System.

DAY DESIGN PTY LTD
CONSULTING ACOUSTICAL ENGINEERS

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Queanbeyan-Palerang Regional Council
PO Box 90
Queanbeyan NSW 2620

26 February, 2025
Refer: 8097-1.1R

Attention: Ms Kylie Coe
Telephone: 02 6285 6244 **Email: kylie.coe@qprc.nsw.gov.au**

Dear Madam,

PROPOSED LICENSED PREMISES

37 TOMPSITT DRIVE, JERRABOMBERRA, NSW

ACOUSTIC PEER REVIEW

Day Design has been engaged by Queanbeyan-Palerang Regional Council, to peer review an Acoustic Report prepared to support a development application for a licensed premises (Vikings Club) at 37 Tompsitt Drive, Jerrabomberra, NSW.

Following our acoustic review dated 12/12/2024, an amended acoustic report has been prepared dated 3/2/2025 to respond to the issues raised. Our acoustic review has also been peer reviewed by Acoustic Dynamics dated 16/01/2025.

The following documents have been reviewed for the purpose of this further peer review:

- Acoustic Environment & Impact Assessment Report and Aircraft Noise Impact Assessment prepared by Acoustic Noise & Vibration Solutions dated 3 February 2025 (**Amended Report**)
- Response to Day Design Acoustic Peer Review prepared by Acoustic Noise & Vibration Solutions dated 3 February 2025 (**Acoustic Response**)
- Expert Peer Review prepared by Acoustic Dynamics dated 16 January 2025 (**AD Peer Review**)
- Acoustic Peer Review prepared by Day Design dated 12 December 2024 (**DD Peer Review**)
- Architectural Plans (A-DA-0-001-001 to 011) prepared by Benson McCormack Architecture dated 30 January 2025
- Stage 1 Architectural Plans (A-DA-1-110-001 to 005) prepared by Benson McCormack Architecture dated 30 January 2025
- Stage 2 Architectural Plans (A-DA-2-110-001 to 005) prepared by Benson McCormack Architecture dated 30 January 2025

The proposal is located on the western outskirts of Jerrabomberra, adjacent to commercial premises. Esmond Ave adjoins the site to the east and residential premises are located on the eastern side of Esmond Ave, approximately 25 m from the Club's eastern boundary.

Following my review of the documentation provided, there remains significant concerns that result from an inadequate level of information, incorrect calculations and unworkable recommendations. These issues are described in Sections 1, 2 and 3 of this review.

1.0 INADEQUATE LEVEL OF INFORMATION

1.1 Noise Criteria

The noise criteria in the report have not been amended. The noise emission from patrons and music within the club is required to satisfy the noise criteria imposed by Liquor and Gaming NSW. The noise from mechanical plant and traffic should comply with the noise criteria in the NSW Noise Policy for Industry.

As the Club is proposed to operate until 2 am, the noise criteria from patrons and music should be defined as a 'pre-midnight' criterion (7 am – midnight) and a 'post-midnight' criterion (midnight – 7 am). There is insufficient data in the acoustic report to determine the noise criteria.

The omission of a noise criteria determined in line with the Liquor and Gaming NSW standard noise criteria, lacks a fundamental element of this assessment which affects its ability to be relied on.

Noise criteria listed in Section 7.3 (previously 5.3) of the **Amended Report** does not provide project specific criteria rather general criteria required by Liquor and Gaming, NSW. The applicant must determine the octave background noise levels both pre- and post-midnight, apply the Liquor and Gaming noise criteria to the background noise levels to arrive at a set of project specific noise criteria in octave bands.

The **AD Peer Review** asserts that a simple amendment of the presented background noise data is required which is incorrect. The data provided is past 10 pm, not post-midnight.

In addition, the L_{A90} at Point A in Table 8.2.1 (45 dBA) is too high when compared with the RBL in Table 3.1 at night of 41 dBA.

1.2 Outdoor Areas

The amended acoustic report prohibits patrons in all outside areas after 10 pm.

1.3 Section 7.2 – Entry Doors.

The amended acoustic report requires automatic door closes on all external entry doors.

Clarification should be provided whether noise emission from inside the club is reduced when the doors are opened for entry or egress.

1.4 Table 6.1 – Average Sound Levels of Different Voice Effects (Previously 4.1)

Table 6.1.1 provides a range of vocal effects of patrons. There is no information on whether the data is L_{eq} or L_{10}. The Liquor and Gaming NSW noise criteria requires the use of L_{10} data for music and patrons.

The **AD Peer Review** agrees that the table should be updated to refer to octave band L_{10} noise levels, which has not occurred.

A new (coloured) table in Section 8.1 has been added that provides octave band sound power levels however is not consistent with the data previously provided in Table 6.1.1. Neither Table identifies whether the data is L_{eq} or L_{10}.

Due to the lack of clarity on the vocal effort of patrons was used, the conclusions cannot be relied on.

1.5 Section 7.3 – Liquor and Gaming (Previously 5.3)

The Section does not determine a noise criterion for pre-midnight or post-midnight operation as required by the standard noise criteria.

Octave band background noise levels are not presented in the report, which are used to determine the Liquor and Gaming NSW standard noise criteria.

The omission of a noise criteria determined in line with the Liquor and Gaming NSW standard noise criteria, lacks a fundamental element of this assessment which affects its ability to be relied on.

Noise criteria listed in Section 7.3 of the **Amended Report** does not provide project specific criteria rather general criteria required by Liquor and Gaming. The applicant must determine the octave background noise levels both pre- and post-midnight, apply the Liquor and Gaming noise criteria to the background noise levels to arrive at a set of project specific noise criteria in octave bands.

1.6 Section 6.1 – Noise from Indoor Areas

The **Amended Report** has deleted reference to 107 dBA for a "heavy rock band" as it "has no association with the proposed use of the club".

1.7 Section 6.2 – Noise from Outdoor Areas

The assumptions of vocal effort and music are not clear in the data for Table 6.2.1. Each row listed as a "Sound Power Level" should be clearly identified with the assumptions of vocal effort and number of people talking, together with the type of music in the area.

Such clarity is required to assess the noise impact of the proposal on the nearby residential premises.

The **Amended Report** includes "50% vocal effort" however does not identify whether the vocal effort is normal, raised, loud or shouting. Clarity of the assumptions made should be provided.

The **AD Peer Review** agrees that the calculation should be based on a worst-case outdoor patron and music scenario likely to occur at the club.

1.8 Section 8.6 – Noise from Cars in the Car Park (Previously 6.6)

The data in Table 8.6.1 is not identified as either L_{eq} or L_1. Both are required – L_{eq} for assessment against the Noise Policy for Industry and L_1 for assessment against the sleep disturbance noise criterion.

We can assume that average sound power level is L_{eq} sound power level. In this case L_1 sound power levels are required.

The **AD Peer Review** agrees that a minor amendment to define the use of L_{eq} and L_1 sound power levels is required. This has not occurred.

The **Amended Report** has not been updated to include noise from patrons talking while traversing the car park as requested. The **AD Peer Review** agrees this should be provided.

1.9 Aircraft Noise Exposure

The information provided in Sections 4 and 5 of the **Amended Report** addressing aircraft noise intrusion is acceptable.

2.0 INCORRECT CALCULATIONS

2.1 Table 7.1 – Noise criteria (Previously 5.1)

The **Amended Report** continues to rely on 'L_{90}+5' as described in Table 7.1.1 and 7.1.2, however it is not clear how the L_{90} is determined. The data set contains many $L_{90,\ 15\ minute}$ noise levels.

In Table 3.1 at Point A the $L_{90,\ 15\ minute}$ during the night is 45 dBA and the RBL at night is 41 dBA. The calculation of the RBL is described in the Noise Policy for Industry – Fact Sheet B. While the Policy is not to be used to assess patron and music noise, the RBL is useful as it is weighted towards the lower range of the measured $L_{90,\ 15\ minute}$ levels. It is unclear how the L_{90} in the **Amended Report** is calculated, it may be an average of the measured $L_{90,\ 15\ minute}$ levels. If this is the case the noise criteria will be exceeded half the time when the L_{90} is less than 45 dBA.

The **AD Review** recommends the 'period RBLs should be used as the basis of the criteria (instead of the $L_{90,\ 15\ minute}$)'.

We agree with the **AD Review**.

2.2 Section 7.1.1 – Sleep Disturbance (Previously 5.1.1)

Resulting from the disagreement between using the $L_{90,\ 15\ minute}$ versus the RBL, leads to a similar disagreement in the sleep disturbance criterion.

The **AD Review** recommends the 'night-time RBLs should be used as the basis of the sleep disturbance criterion.' We concur with this.

2.3 Section 8.2 - Noise from Outdoor Areas (previously Section 6.2)

Table 8.2.1 provides the wrong criteria at Point A and Point B due to the $L_{90,\ 15\ minute}$ being applied instead of the RBL.

Table 8.2.1 provides L_{10} noise levels of people outdoors however does not advise the assumed vocal effort to verify the calculations.

The **AD review** agrees that the assumed vocal effort of patrons and the number of patrons speaking simultaneously should be provided. In addition, patrons traversing the ground should be included.

The **AD Review** notes that itemised noise level contributions are not a requirement of Liquor & Gaming NSW however is helpful in verifying the calculations and assumptions. To aid transparency and assessment of the proposal we request these be provided.

3.0 UNWORKABLE RECOMMENDATIONS

3.1 Section 9.2 – Entry Doors. (previously Section 7.2)

The **Amended Report** has reduced the acoustic rating of external doors from Rw35 to account for a 10% leakage (Note 2 to Table 8.2.1). This is said to be equal to doors being open for an unspecified time.

The **AD Review** recommends the assumption the doors be open for 50% of the time. Applying this assumption will significantly reduce the performance of the external door to approximately Rw3.

The calculation in Table 8.2.1 should be reworked.

3.2 Section 9.5 – Outdoor 1st Floor Terrace (previously Section 7.4)

The **Acoustic Response** advises noise calculations consider patrons using raised voices in outdoor areas. The assumed vocal effort is not provided in the **Amended Report** and the recommendation for patrons to not raise their voices (Section 9.5) appears counter intuitive.

3.3 Section 7.10 – Further Acoustic Assessment at CC Stage

The **AD Review** recommends that Section 6.4 (now 8.4) should be updated to include a preliminary assessment of noise associated with mechanical plant.

We concur with the **AD Review**, however this has not been adopted in the **Amended Report**.

4.0 CONCLUSION

The **Amended Report** has not addressed many of the criticisms in the Day Design Review and has not adopted many of the recommendations in the **AD Review**. The **Amended Report** does not provide sufficient information or certainty to enable Council to properly consider the likely noise impacts from the proposal, regardless of whether Stage 1 alone is built or Stages 1 and 2 are built.

Stephen Gauld, MEngSc (Noise and Vibration), BE(Mechanical), MIEAust, MAAS
Principal Acoustical Consultant
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP
Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

The undersigned hereby certifies that this Report has been checked and approved in accordance with our Quality Management System.