



SMALL BAR 12 HEDLAND PLACE, KARRATHA NOISE MANAGEMENT PLAN

Noise Management Plan 10.00072-01

prepared on 01/06/2020





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BASIS OF REPORT

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DOCUMENT CONTROL

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Noise Management Plan 10.00072-01

1. INTRODUCTION

This Noise Management Plan (NMP) outlines the commitments made by the proposed entertainment, food and beverage venue to be located at 12 Hedland Place, Karratha, in regards to management of airborne noise emissions. The NMP has been developed to address the requirements of the WA Environmental Protection (Noise) Regulations.

The NMP is to be read in conjunction with the *Development Approval Acoustics Report* prepared by Gabriels Hearne Farrell (Ref. 18-066D Rev A, dated 13th September 2019), which addresses entertainment noise (i.e. crowds and music noise impacts). Further assessment required by the City of Karratha has been included in this NMP with regards to treatment to mechanical services to minimise noise breakout from site.

Music and crowd were identified as the principal sources of noise with potential to exceed enforceable noise limits under the State Regulations and a combination of building additions and management measures are recommended in this NMP aimed to reduce noise to acceptable levels.



2. BACKGROUND

The site will operate as a food and beverage venue with four main areas of interest for noise purposes:

- Ground floor indoor bar;
- First floor indoor bar;
- Rooftop bar; and
- Smokers' area on the ground floor.

Also, the building will include a covered car park, toilets, basic kitchen and an administrative office.

2.1. Site Location

The site is a two storey building located at 12 Hedland Place, Karratha. The building is within the City Centre Precinct, as identified in the Local Planning Scheme No. 8, zoned as 'Commercial' (P2). **Figure 1** depicts an annotated aerial view of the site and its nearest noise sensitive receivers.

Figure 1 Site location and nearest noise sensitive receivers



2.2. Operations and noise sources

The trading hours and activities conducted at the venue will be:

- The bar will operate during the day serving food and drinks for lunch and dinner with background music.
- 9pm – 3am the indoor bar on the ground floor may include music from DJ during weekends.

The identified principal noise sources associated with the site are:

- Music (live and DJs) played in the ground floor bar area until 3am.
- Crowd within the outdoor rooftop area.
- Mechanical plant located on the rooftop associated with building ventilation and kitchen operations.

2.3. Noise Sensitive Receivers

Figure 1 shows the location of the nearest noise sensitive receptors. The nearest noise sensitive receivers are residential premises located on Padbury Way.

The State Regulations require noise from the site to be compliant at both surrounding residential and commercial lots. Due to proximity of the residents, this NMP considers that management of noise to reduce impacts on residents implies compliance on the neighbouring commercial lots.

2.4. Discussion of Criteria

2.4.1. Applicable Noise Limits

Table 1 adopted from the assessment summarises the **assigned noise levels**, which are applicable noise limit targets for purposes of compliance with the Environmental Protection (Noise) Regulations 1997 (EPNR).

Table 1 WA EPNR Assigned Noise Levels

Type of premises receiving noise	Time of day	Assigned Level (dB)		
		LA10	LA1	LAm _{ax}
Noise sensitive premises: highly sensitive area	0700 to 1900 hours Monday to Saturday	48	58	68
	0900 to 1900 hours Sunday and public holidays	43	53	68
	1900 to 2200 hours All days	43	53	58
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	38	48	58

Type of premises receiving noise	Time of day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80

Note: A 10 dB penalty will apply to music noise emissions in this case where noise levels are audible and dominant off site.

2.4.2. Recommended Indoor Noise Criteria

Tables 2 and 3 adopted from the assessment summarises the recommended internal noise targets for purposes of meeting recommendations of Australian Standard 2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors* (AS/NZS 2107) and the World Health Organisation Guidelines for Community Noise 1999 (The WHO Guidelines).

Indoor targets are considered more appropriate to noise sensitive activities such as sleep and residential living since they generally occur indoors. Therefore, where it can be shown that the *outdoor* Assigned Noise Levels are impracticable to achieve, consideration is usually given to appropriate application of industry guidelines such as Australian Standard 2107:2016.

The following table presents recommended internal noise levels recommended for residential houses in rural areas in Table 1 of AS/NZS 2107.

Table 2 AS/NZS 2107 Recommended design sound levels

Type of occupancy	Design sound levels (L _{Aeq,t} range) – dB
Houses in rural areas with negligible transportation	
Sleeping areas (night-time)	25-30

The WHO Guidelines provide internal noise limits recommended to avoid sleep disturbance scenarios. These are shown in **Table 3**.

Table 3 WHO Guidelines, sleep disturbance recommended noise limits

Noise metric	Recommended indoor levels – dB
Sleep disturbance, inside bedrooms	
L _{Aeq,8hour}	35
L _{Amax}	50

Note: A 10 dB safety factor is recommended in the Guidelines when significant low frequency components are present.



2.4.3. Where the Environmental Standard Cannot be Met

The Regulations are intended to be flexible enough to allow for reasonable economic, cultural and social activity to occur. There will be genuine cases where the assigned levels cannot reasonably or practicably be met. This could be an existing industry which is very close to residences. Or it could be a proposed industry which cannot be located far enough away from residences.

In such cases, the person who believes they cannot reasonably or practicably meet the assigned levels can apply to the Environment Minister for approval to allow the noise emission to exceed or vary from the assigned level. The Minister's approval can be for a set period and may include conditions or restrictions.

The chief executive officer (CEO) can approve an event or venue if satisfied that:

- its noise emissions would exceed the assigned levels; and
- it would lose its character or usefulness if it had to meet the assigned levels.

This NMP proposes a site-specific alternative environmental performance standard.



3. NOISE ASSESSMENT

As part of the works in developing this NMP, an environmental noise impact assessment was undertaken to quantify entertainment noise at sensitive locations. Details of the assessment are provided in **Appendix B** of this NMP. Its results were used to as the basis for this NMP.

3.1. Entertainment Noise

The assessment forecasted compliance with the Assigned Noise Levels subject to:

1. Maintaining the internal music levels to 92 dB(A) downstairs and 82 dB(A) upstairs, for night-time operations.
2. Limiting the number of patrons to 50 within the rooftop bar area.
3. Building a set of 2.1m and 2.8m high barriers around the rooftop area.
4. Building barriers around the smokers' area on the ground floor.

These recommendations provided in the assessment are summarised in the commitments section of this NMP.

3.2. Mechanical Plant Noise

Noise from the existing mechanical plant has been assumed 'as is' on the entertainment noise assessment; however, herein it is provided an impact assessment for the new proposed (small) kitchen operations.

Mechanical noise has been estimated for a worst case scenario based on distance and shielding from the site's walls and structure. The equipment will include an air exhaust fan and cooling equipment. It is understood that the sizing of mechanical equipment has not been determined as of the issuing date of this NMP. Thus, typical noise emissions from similar developments have been used for a high level assessment that indicates need to treat the mechanical plant services within the proposal.

Noise from air extraction is typically the controlling and dominant noise source from a kitchen. A roof-mounted exhaust fan unit has been assessed in this case. Sound power levels of a representative commercial unit were used; SWL = 81 dB(A) (Source: Fantech CEE45D) have been used to calculate the potential noise impact.

Table 4 Exhaust fan sound power levels

Noise Source	1/1 Octave Band Noise Levels (dB)								Overall dB(A)
Frequency (Hz)	63	125	250	500	1k	2k	4k	8k	
Typical Commercial Kitchen Roof mounted Exhaust Fan	73	80	82	75	77	71	71	58	81



Based on a distance of 74 m between the mechanical plant compound, located on the rooftop of the building, to the nearest resident and assuming that barriers with minimum height of 1.8m around the compound apply, the predicted noise level at the receiver's location is 33 dB(A), which complies with the night-time assigned noise level, inclusive of the 5 dB tonality penalty. Further in-line attenuation to control the source is recommended (e.g. use an attenuator or an extraction fan that emits quieter noise levels that those shown in **Table 4**).

Further, noise from the DJ music may be transmitted through building services to outdoor areas. That is, ducts and penetrations have the potential to be paths for noise and compromise the sound insulation provided by the building envelope. Thus, treatments will be implemented to minimise the noise breakout through building services.

In summary, compliance with the assigned noise levels of mechanical noise emissions (or noise linked to mechanical services) is subject to:

1. Use of noise barriers 1.8m high around the mechanical plant compound or, if barriers already exists, ensure that no gaps or penetrations compromise the effective attenuation on the residents' side.
2. Using an extraction fan with sound power levels no greater than those shown in table 4 or use an attenuator with enough attenuation to ensure compliance, which must be calculated by an acoustics engineer prior installation.
3. Review of the mechanical services by an acoustics consultant prior to building.
4. Treat the ductwork to minimise flanking noise through the services. Subject to detail review of mechanical services' drawings before construction, this may be achieved by:
 - a. Using hard ductwork throughout the site;
 - b. Introducing duct bends between the indoor grilles and the external grille;
 - c. Lining the ducts internally with enough foil insulation to minimise in-duct sound transmission;
 - d. Directing external vents/grills away from the nearest sensitive residents (i.e. away from the eastern/south-eastern façade).



4. NOISE MANAGEMENT PLAN

The entertainment venue will consider design measures to meet the noise criteria and to implement those measures “where reasonable and practicable”.

In this NMP, the developer commits to undertaking:

1. Engineered noise controls;
2. Ongoing administrative noise controls;
3. Verification of the performance improvements;
4. Community consultation and active improvement.

This NMP is a dynamic document and it will be updated according to performance feedback from the community, site observations or testing results.

4.1. Noise Control Measures

The total set of engineered noise controls are a combination of fabrics and dense flexible materials to facilitate noise path control under various conditions.

4.1.1. Summary

Table 5 summarises the noise mitigation commitments to be implemented by Froth Craft. The following proposed stages optimise the use of noise mitigation in the early stages of implementation.

Table 5 Noise mitigations

Item #	Recommendation	Benefit / Constraint
Treating the Source		
1	<u>Entertainment noise</u> : Management of ‘bass beat’ within internal music will be required. Avoid excessive emission of low frequencies. Indicatively, the maximum noise levels measured indoor in dB(C) shall not exceed the maximum dB(A) levels by 15 dB. Ensure that loudspeakers shall be installed with appropriate resilient mounts to stop vibration or resonances being transmitted to the building structure	Reduce risk of annoyance and to minimise structure borne noise transmitted.
2	<u>Entertainment noise</u> : Internal noise levels in the ground floor area to be limited to no more than 92 dB(A)	To avoid excessive breakout noise from the site.
3	<u>Entertainment noise</u> : Internal noise levels in the upstairs area to be limited to no more than 82 dB(A)	
4	<u>Mechanical plant</u> : Use noise barriers 1.8m high around the mechanical plant compound	

Item #	Recommendation	Benefit / Constraint
5	<u>Mechanical plant</u> : Use preferably in-duct air extraction with an attenuator, over roof mounted exhaust. Perform noise breakout calculations before construction to minimise indoor/outdoor noise break out. Use hard ducts where possible, in-duct insulation and design the paths to include bends.	To reduce mechanical noise and block any potential flanking noise through the building services.
6	All mechanical services, kitchen equipment and furniture shall be disconnected off the building structure with resilient anti vibration mounts.	Reduce risk of structure borne noise.
7	In general: Restaurant furniture to be fitted sliding panels or felt.	To avoid impact noise.
Treating the Path		
8	All entrances and exits to the proposed nightclub are to have dedicated acoustic lobbies installed: - Minimum distance between doors to be 1.2m - Acoustic absorption to be provided to lobby space as much as practicable, such as 50mm thick Autex Quietspace - Full perimeter acoustic door seals are to be provided, such as Raven RP 38 drop seals and Raven RP10 full perimeter seals.	To minimise breakout and/or flanking noise through the building envelope.
9	A solid 2.1m high barrier to be provided to the North and South of the smokers area, with the East side barrier to meet the underside of the floor slab above.	
10	A solid 2.1m high barrier around the Western half of the rooftop bar area, with the Eastern side to have a 2.8m high barrier.	
11	Barrier to be constructed of minimum 9mm fibre cement sheeting, glass, perspex or similar with no gaps.	
12	Flooring of rooftop bar to be solid with no gaps for sound to flank under.	

4.2. Administrative Controls

Best management practices involve adopting operational procedures that minimise noise while retaining operations. These include:

Table 6 Administrative noise controls

Item #	Recommendation	Benefit / Constraint
1	Responsible serving of alcohol	Crowd noise is highly affected by the levels of alcohol intake and an active RSA control will be applied by the venue staff.

Item #	Recommendation	Benefit / Constraint
2	Use signage in key locations within the venue and near entries/exits to raise patron awareness of noise-sensitive locations.	To encourage patrons to be quiet.
3	No more than 16 people at any given time in the outdoor smokers area	To align with the noise assessment conditions for compliance
4	The rooftop bar to be limited to 50 people after 10pm. No restrictions acoustically on capacity prior to this time.	
5	All door and windows are closed during operation.	
6	Glass shall only be emptied into the outside bins between the hours of 7am and 7pm (9am to 7pm on Sundays and Public Holidays).	To minimise elevated peak noise emissions during sensitive times.
7	A log book shall be maintained for the purpose of recording and resolving noise complaints.	For environmental compliance.
8	Keeping neighbours informed of any major planned venue improvements. Details of required construction works, duration and the reasons for the activity.	This applies to temporary work such as installation of noise barriers, maintenance and commissioning testing.
9	Update NMP	Update this NMP to adjust to changes in conditions.

4.3. Verification Method

After implementation of these measures, compliance may be achieved at the most impacted sensitive receivers per Section 2.4.2. of this NMP.

The verification of the implemented noise control measures may be conducted through:

1. Long-term unattended noise measurements;
2. Short-term operator attended measurements; and
3. Visual inspection of the implemented works.

After conducting the measurements, an acoustic report will be prepared including analysis and consolidation of the results as well as provision of further recommendations.

The following sections outline the Standards and procedures to be followed, the specific locations where to conduct measurements and the noise performance criteria to be achieved.

4.3.1. Standards

The monitoring of airborne noise will be undertaken in accordance with the following Standards and guidelines, where relevant:



- Sound levels meters and noise loggers shall be Class 1 certification as defined in Australian Standard AS IEC-61672.1-2004.
- Sound level meters or noise loggers must be calibrated before and after measurement periods using a calibrator, suitable for a Class 1 instrument, which complies to AS IEC-60942-2004.
- Measurement and procedures must be in accordance with Part 3 – Noise Measurements of the EPNR (Regulations 19, 20, 22 and 23) and AS 1055.1-1997 Acoustics – Description and measurement of environmental noise – General Procedures.

4.3.2. Methodology

After commissioning of the implemented noise control measures, monitoring of music and crowd shall be conducted over a period of 7 days following the implementation of those measures. In order for the noise control measures to be verified, the noise monitoring data shall be interpreted by a qualified acoustic consultant who will determine if the performance criteria are achieved.

An unattended noise logger will be required to conduct the 7-day monitoring. Further, visual inspection of the works implemented will be conducted and any issues believed to affect the acoustic performance will be recorded and reported for amendment.

During inspection or during the noise logger deployment, other spot short-term measurement may be conducted by the acoustic consultant. The location and length of these measurements will be recorded and reported by the consultant to support the assessment. Coordination with the venue management will be arranged to conduct testing within an operational “worst case scenario”, this assumes performances within outdoor areas.

A testing procedure will be prepared in coordination with the audio-visual supplier.

4.3.3. Metrics

The noise measurements must be recorded continuously over 7 days with 15-minute intervals, as minimum; however, 1 second data is highly desirable. The logging of noise must contain but should not be limited to the following metrics:

- L_{Aeq} , L_{Amax} , L_{Amin}
- Statistical measures L_{A1} , L_{A10} and L_{A90} , which must be processed for the entire assessment periods.

The long-term monitoring required must include data in one third octave bands to allow for spectral analysis in the case narrow band components are found to be an ongoing issue.

4.3.4. Environmental Noise Performance

The nominated metric to evaluate environmental noise performance is L_{A10} for each of the assessment periods. It is acknowledged; however, that the existing noise environment may be affected from roads and nearby commercial activity and correction should be factored in.



The results of the monitoring data will be used to calculate internal noise levels within residential dwellings. The extrapolation method/correction will be conducted by the acoustic consultant based on the field observations and measurements; this will be documented in the validation report.

When a resident requests internal noise measurement at his/her dwelling, these may be provided as a verification method by either measuring internally during operations of the venue or, alternatively, conducting façade sound transmission loss measurements

4.3.5. Review and Corrections

Where the above monitoring determines in the report that the criteria are not achieved at commissioning, the steps to review and implement further reasonable and practicable mitigation will include:

- Identifying where the criteria are exceeded and by how much.
- Confirming the noise reduction performance of mitigation constructed.
- Quantifying the change in noise and/or vibration levels upon commission of the project.
- Identifying the key noise sources contributing to the exceedances.
- Undertaking a review of reasonable and practicable mitigation measures available to further reduce and control noise levels.
- Where reasonable and practicable, implementing additional mitigation.

4.3.6. Reporting

An acoustic report will be prepared by the acoustic consultant after analysis and interpretation of the 7-day monitoring data has been concluded. The report will include the monitoring results and judgement of the environmental performance overall from music and crowd noise and it will indicate the recommendations to further mitigate noise and to achieve compliance, where not achieved, or to prevent further noise issues.

4.4. Complaint Handling Procedure

4.4.1. Noise Complaint Form

A complaint system must be available to residents to record nuisances when this is perceived.

An electronic copy of the details provided by the complainant will be kept. A detailed qualitative description of the nuisance source is intended to be collected to help identify the noise sources that might be causing the annoyance. The following details are proposed to prepare a noise complaint form:

- Unique identification number for future reference;
- Time and date of complaint as received by the venue;



- Location where the noise was perceived (indoors, outdoors, exact location if possible)
- Approximate time and date of event associated with the complaint;
- Times when noise is audible (daytime, night-time, present at a particular time or all the time);
- Subjective perception of the noise level (clearly audible all the time, clearly audible during lulls in traffic, just audible during the day at times, just audible at night-time at times);
- Perception of noise character (can the noise be described as low frequency, high frequency, no particular frequency, steady, intermittent)

During trading hours, noise complaints might be received over one of the following means:

- By walking in the premises, in such case the complainant will be provided a noise complaint form;
- By email or other electronic means (e.g. website electronic links), in such case the venue may contact the complainant to fill out an electronic version of the complaint form;

Outside trading hours, noise complaints may be received electronically.

4.4.2. Investigation and responses

Noise complaints investigation will be deemed necessary when a number of complaints occur within a short period of time (i.e. more than two complaints within a week)), and in a reasonable timeframe with respect to the occurrence of each event. The investigation will entail the following:

1. Substantiated complaints to be investigated to determine level of extent and review any mitigation options;
2. An appropriate number of short-term attended noise measurements will be undertaken to accurately determine the cause of substantiated complaint/incidents and to determine how to rectify the situation;
3. Review any unattended noise measurement data obtained relevant to the complaint or incident;
4. File incident report; and
5. Supply a response in writing within 10 working days of the complaint where determined appropriate.



APPENDICES



APPENDIX A: Glossary of Acoustic Terms



1 Sound Level or Noise Level

The terms “sound” and “noise” are almost interchangeable, except that in common usage “noise” is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_p are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 “A” Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dB(A), which is measured using a sound level meter with an “A-weighting” filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People’s hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dB(A) is a good measure of the loudness of that sound. Different sources having the same dB(A) level generally sound about equally loud.

A change of 1 dB(A) or 2 dB(A) in the level of a sound is difficult for most people to detect, whilst a 3 dB(A) to 5 dB(A) change corresponds to a small but noticeable change in loudness. A 10 dB(A) change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dB(A))	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as “linear”, and the units are expressed as dB(lin) or dB.

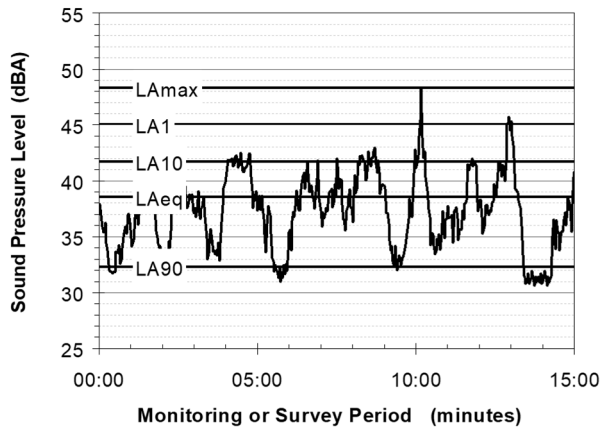
3 Sound Power Level

The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dB(A)), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W. The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15-minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

- LA1 The noise level exceeded for 1% of the 15 minute interval.
- LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.
- LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.
- LAeq The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the “repeatable minimum” LA90 noise level over the daytime and night-time measurement periods, as required by the EPA. In addition, the method produces mean or “average” levels representative of the other descriptors (LAeq, LA10, etc)



APPENDIX B: ENTERTAINMENT NOISE ASSESSMENT



ARCHITECTURAL ACOUSTICS

DEVELOPMENT APPROVAL REPORT

**12 HEDLAND PLACE, KARRATHA
PROPOSED NIGHTCLUB**

Rev A - 13th September 2019



For

JOANNE NELL

**12 Hedland Place
KARRATHA WA 6714**

EXECUTIVE SUMMARY

The potential noise emissions from the proposed nightclub at 12 Hedland Place have been assessed using SoundPLAN 8.0 acoustic modelling software. The assessment indicates that the noise emissions from the proposed facility has the capability of complying with the Environmental Protection (Noise) Regulations 1997. The following noise control strategies and management shall be implemented by the proponent in order to comply with the regulations:

Building Construction Requirements

- All entrances and exits to the proposed nightclub are to have dedicated acoustic lobbies installed:
 - Minimum distance between doors to be 1.2m
 - Acoustic absorption to be provided to lobby space as much as practicable, such as 50mm thick Autex Quietspace
 - Full perimeter acoustic door seals are to be provided, such as Raven RP 38 drop seals and Raven RP 10 full perimeter seals.
- A solid 2.1m high barrier to be provided to the North and South of the smokers area, with the East side barrier to meet the underside of the floor slab above.
- A solid 2.1m high barrier around the Western half of the rooftop bar area, with the Eastern side to have a 2.8m high barrier.
- Barrier to be constructed of minimum 9mm fibre cement sheeting, glass, perspex or similar with no gaps.
- Flooring of rooftop bar to be solid with no gaps for sound to flank under.

Management Requirements

- Internal noise levels in the ground floor area to be limited to no more than 92 dB(A)
- Internal noise levels in the upstairs area to be limited to no more than 82 dB(A)
- No more than 16 people at any given time in the outdoor smokers area
- The rooftop bar to be limited to 50 people after 10pm. No restrictions acoustically on capacity prior to this time.
- Management of 'bass beat' within internal music and particularly noisy patrons will be required.
- All door and windows are closed during operation.
- Glass shall only be emptied into the outside bins between the hours of 7am and 7pm (9am to 7pm on Sundays and Public Holidays).
- A log book shall be maintained for the purpose of recording and resolving noise complaints.

Report Version	Author	Notes	Date
Initial Report	Michael Ferguson		03 rd October 2018
Rev A	Michael Ferguson		13 th September 2019



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ATTACHMENTS

- APPENDIX A - Noise Contour Diagrams (x3)

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1. INTRODUCTION

As requested, this report summarises all potential environmental noise issues applicable to the Development Approval stage of the proposed nightclub at 12 Hedland Place, Karratha.

This report is based upon the drawings of the existing building structure received 27th August, 2018. This report outlines the following:

- Demonstrates that the project team is aware of their Regulatory obligations with regards to noise emissions,
- Establishes the project specific Assigned Noise Level criteria in accordance with the Regulations,
- Identifies the relevant Noise Sources and the Assigned Noise Levels applicable to each source,
- Identifies acoustic issues that will be addressed in detail during design and documentation stages, to ensure compliance with the Environmental Protection (Noise) Regulations (EPNR),
- Provides an initial assessment and recommendations to ensure compliance with the EPNR.

2. ENVIRONMENTAL NOISE EMISSIONS

Noise emissions generated by the use of the proposed facilities must comply with the Environmental Protection (Noise) Regulations, 1997 (as amended Dec 2013). The criteria for noise emissions from this development to neighbouring premises are called the Assigned Noise Levels, and vary depending on time of day, receiver location, duration of the noise source etc. The site specific criteria are set out in Section 3.1 of this report.

The neighbouring highly noise sensitive premises are:

- Existing residences located to the East of the proposed development, across Hedland Place.

Our current calculations and recommendations are based upon the above mentioned properties. There are some adjacent commercial properties however it is our understanding that whilst the Assigned Noise Level technically is required to be met at these premises, these facilities are not open during the proposed operation times.

The site specific Assigned Noise Level criteria takes into account the land zoning and traffic flows within 100m and 450m of the relevant receiver locations. This has been based on the land zoning information obtained from aerial imagery:



Image 01 –Assigned Noise Level Circumferences

Land Zoning Influencing Factor

There is approximately 29% of the inner circle and that is deemed to be commercial in nature, and approximately 31% commercial properties present in the outer circle. Therefore the Influencing Factor for land use is a +3dB(A) adjustment to the Assigned Noise Levels.

Transport Influencing Factor

Typically, the amount of traffic on nearby roads has an influencing factor on the assigned noise levels. In this case however there are no Major or Secondary roads within the 100m of 450m radii. Therefore, there are no influencing factors applied to the assigned noise levels for Transport.

2.1 Assigned Noise Levels

Based on the above, there is an Influencing Factor +3dB(A) relevant to the residences in the surrounding area to the proposed development. On this basis, the regulatory Assigned Noise Level criteria to be applied to this development are:

Type of premises receiving noise	Time of day	Assigned Noise Level (dB)		
		L _{A10}	L _{A1}	L _{A max}
Noise sensitive premises; highly sensitive area (i.e. within 15m of a residential building)	0700 to 1900 hours Monday to Saturday	48	58	68
	0900 to 1900 hours Sunday and public holidays	43	53	68
	1900 to 2200 hours all days	43	53	68
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays.	38	48	58
Commercial Premises	All hours	60	75	80

Table 01 –Assigned Noise Levels

The sound level parameters used for the various environmental noise criteria are described below, based on an assessment period of 15 minutes up to 4 hours:

L_{A10} is the 'A' weighted noise level which is not to be exceeded for more than 10% of the time, e.g. for more than 10 minutes in 100 minutes. This is the parameter relevant to most HVAC equipment, and emissions from other longer term noise sources that run for extended duration (such as crowd noise, music etc.).

L_{A1} is the 'A' weighted noise level which is not to be exceeded for more than 1% of the time, e.g. for more than 1 minute in 100 minutes, or up to 24 minutes in 4 hours. This is the parameter relevant to noise sources that only occur occasionally, for short durations, (e.g. vehicle movements).

L_{Amax} is the 'A' weighted noise level for individual events (e.g. car door closes) which is not to be exceeded at any time.

2.2 Adjustments for Noise Character

Regulation 7 requires that the noise emission must be free of annoying characteristics, namely tonality (e.g. whining, droning), modulation (like a siren), and impulsiveness (e.g. thumping). Where noise emissions do exhibit the above noise characteristics, an adjustment is made to the measured/calculated noise level:

<i>Tonality</i>	5dB is added to the measured level
<i>Modulation</i>	5dB is added to the measured level
<i>Impulsiveness</i>	10dB is added to the measured level

Where the noise emission is music the following adjustments to the measured noise levels apply:

<i>Impulsiveness not present</i>	10dB is added to the measurement level
<i>Impulsiveness present</i>	15dB is added to the measurement level

The above adjustments only apply where the noise character is audible and measurable the noise receiver. In our experience music from an internal noise breakout source is typically not deemed to be impulsive. Therefore any music noise emissions for the purpose of this assessment have had a penalty of +10dB(A) applied to the noise levels calculated.

Outdoor crowd noise is generally considered to be free from tonality and/or modulation and therefore has no penalties applied to it.

3. NOISE SOURCES

All noise emissions from the proposed development are to be in full compliance with the requirements of the Environmental Protection (Noise) Regulations 1997. All noise generated by the various activities and building services must meet the Assigned Noise Levels at neighbouring premises, as determined by the Regulations. Noise sources to be addressed include:

- Indoor breakout of music through the building fabric
- Outdoor crowd noise from proposed smokers area
- Outdoor crowd noise from proposed rooftop bar area
- Outdoor crowd noise from entrance line
- Mechanical units (e.g. condensing units / exhaust fans / air compressors etc.)*

At this stage we have assumed that the existing mechanical and air-conditioning systems will remain 'as is'. Therefore these have not been assessed as it is assumed compliance is already achieved at all times of the day.

We have been advised by the client that the proposed nightclub will operate from 9pm to 3am.

Vehicle Movements

It should be noted that the parking area available for the nightclub patrons is open to the public. It is therefore our understanding that the main trafficable areas are considered 'road'. In accordance with clause 3 of the EPNR:

1) *Nothing in these regulations applies to the following noise emissions-*

a) *noise emissions from the propulsion and braking systems of motor vehicles operating on a road;*

Therefore propulsion and braking noise associated with vehicle movements has not been assessed.

Waste Collection & Site Cleaning

Waste collection and other similar works are covered by Regulation 14A of the EPNR. The regulation states that the collection of rubbish etc. is exempt from meeting the regulations, provided that:

a) *the works are carried out in the quietest reasonable and practicable manner; and*

b) *the equipment used to carry out the works is the quietest reasonably available; and*

c) *is carried out during day time hours, defined as 7am to 7pm Monday to Saturday, and 9am to 7pm Sundays and Public Holidays.*

3.1 EPNR Noise Specific Criteria

Based on the above, the relevant EPNR criteria are shown against the noise emissions listed above. The most stringent Assigned Noise Level criteria applicable to these periods will therefore be applied (as seen below).

Noise Emissions from Music Breakout		
	Time of Day	Relevant Assigned Noise Level
Daytime - Monday to Saturday	7am to 7pm	L _{A10} 48 dB(A)
Daytime - Sundays & Public Holidays	9am to 7pm	L _{A10} 43 dB(A)
Evening - All Days	7pm to 10pm	L _{A10} 43 dB(A)
Overnight - All Days	All other times from above	L _{A10} 38 dB(A)

Table 02 - Relevant Assigned Noise Levels - Music Breakout

Noise Emissions from Outdoor Crowd Noise		
	Time of Day	Relevant Assigned Noise Level
Daytime - Monday to Saturday	7am to 7pm	L _{A10} 48 dB(A)
Daytime - Sundays & Public Holidays	9am to 7pm	L _{A10} 43 dB(A)
Evening - All Days	7pm to 10pm	L _{A10} 43 dB(A)
Overnight - All Days	All other times from above	L _{A10} 38 dB(A)

Table 03 - Relevant Assigned Noise Levels - Mechanical Plant

The noise assessment calculations below have been performed with SoundPLAN 8.0 noise modelling software and is based upon the following assumptions:

- The construction of the existing roof / ceiling systems is steel roof sheeting with a layer of sisilation under, approximately 900mm air gap, suspended 13mm flush plasterboard with 75mm fibreglass insulation over.
- The side of the roof system where it returns down is steel roof sheeting with sisilation under, approximately 250mm air gap, fixed 13mm flush plasterboard with 75mm fibreglass over.
- The glazing is assumed to be 14.52mm thick security glass based on the drawings and discussions with the client.
- The upstairs window sill box is constructed of 7mm fibre cement sheeting externally with 10mm flush plasterboard or 18mm particle board. No insulation in cavity space.
- Suspended concrete floor slab to be minimum 220mm thick
- External walls to be minimum two layers of 90mm concrete blockwork with wall ties.
- No fresh air ventilation paths etc. downgrading the performance of the above mentioned building structures.
- The current location of houses and surrounding buildings.

3.2 Noise Sources Used in Modelling

Based on in house data and other previous measurements, the following noise sources have been used in the modelling process:

Sound Power Level of Noise Sources								
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	dB(A)
Music at inside face of downstairs construction	99.0	101.5	97.5	90.5	88.5	87.5	76.5	95.0
Music at inside face of upstairs construction	89.0	91.5	87.5	80.5	78.5	77.5	66.5	85.0
Crowd noise - Smokers area (16ppl - half talking)	67	68	78	85	83	77	73	86.6
Crowd noise - Rooftop area (50ppl - third talking)	70	71	81	88	86	80	76	89.6
Crowd noise - Entrance line (10ppl - half talking)	65	66	76	83	81	75	71	84.5

Table 04 - Sound Power Level of Noise Sources used in the Modelling Procedure

Crowd Noise

The noise level information used in the modelling procedure is based upon an individual patron talking with a raised voice level of 66 dB(A) at 1m (as per Australian Standard 2822). We have estimated that the outdoor smokers area will have a maximum 16 patrons at any given point in time. Half of these have been assumed to be talking with a raised voice at the same time.

The entrance line at the front of the nightclub has been assumed to have no more than 10 people at any given point in time. Similarly to above it is assumed that half are talking with a raised voice at the same time.

Due to the different nature of the proposed rooftop bar area (i.e. general bar area is typically different from a smokers yard or entrance line), the rooftop area has been modelled with one third of occupants talking at the same time. The total number of people allowed for in this area is 50 i.e. 16 people talking at the same time.

All outdoor crowd areas have been modelled at a height of 1.4m above ground level to represent people standing.

3.3 Penalties Applied to Noise Sources

As per Section 2.2 of this report, any 'annoying' characteristics of noise emissions from the proposed development are subject to penalties. Based on our experience, and in the interest of being conservative, the following penalties have been applied to the above noise sources:

- | | | |
|-----------------------|-----------------------|-----------|
| • Music Breakout | Music (not impulsive) | +10 dB(A) |
| • Outdoor crowd noise | No penalty applied | +0 dB(A) |

4. MODELLING METHODOLOGY

The noise emissions from the proposed nightclub have been modelled using the *SoundPLAN* v8.0 software with the *Concawe* algorithm. This software allows the input of topographical data, building heights and forms, meteorological conditions, and noise source data. The software produces noise contour plans, indicating the predicted noise level over a given area.

Note – the output noise levels from *SoundPLAN* are base noise levels not including adjustment for noise character.

4.1 Meteorological Conditions

The meteorological conditions used in the calculations were as follows (based on the requirements of the Department of Environment Regulation):

Day-time Assessment

- Temperature – 20°C
- Relative Humidity – 50%
- Wind – 4 m/s in all directions simultaneously
- Pasquil Stability Class - E

Night-time Assessment

- Temperature – 15°C
- Relative Humidity – 50%
- Wind – 3 m/s in all directions simultaneously
- Pasquil Stability Class - F

4.2 Topography and Building Form

The building form, height, and configuration were input into the noise model, based on the architectural drawings and the information available on the Landgate mapping system.

All roads and carpark areas were input into the noise model as hard reflecting ground surface.

5. RESULTS OF ACOUSTIC MODELLING

5.1 Noise Breakout from Internal Music

In discussions with the client it was agreed that the down stairs area of the proposed nightclub will be the main dance floor and DJ / bar area, whilst the upstairs area will be a quieter area reserved more for conversational purposes. With this in mind the internal noise level allowed for in the two areas is approximately 95 dB(A) downstairs and 85 dB(A) upstairs. We feel this prediction is a relatively accurate prediction of the expected scenario, especially based on a stairwell void between the two zones.

Based on the above the modelled noise breakout results are as follows:

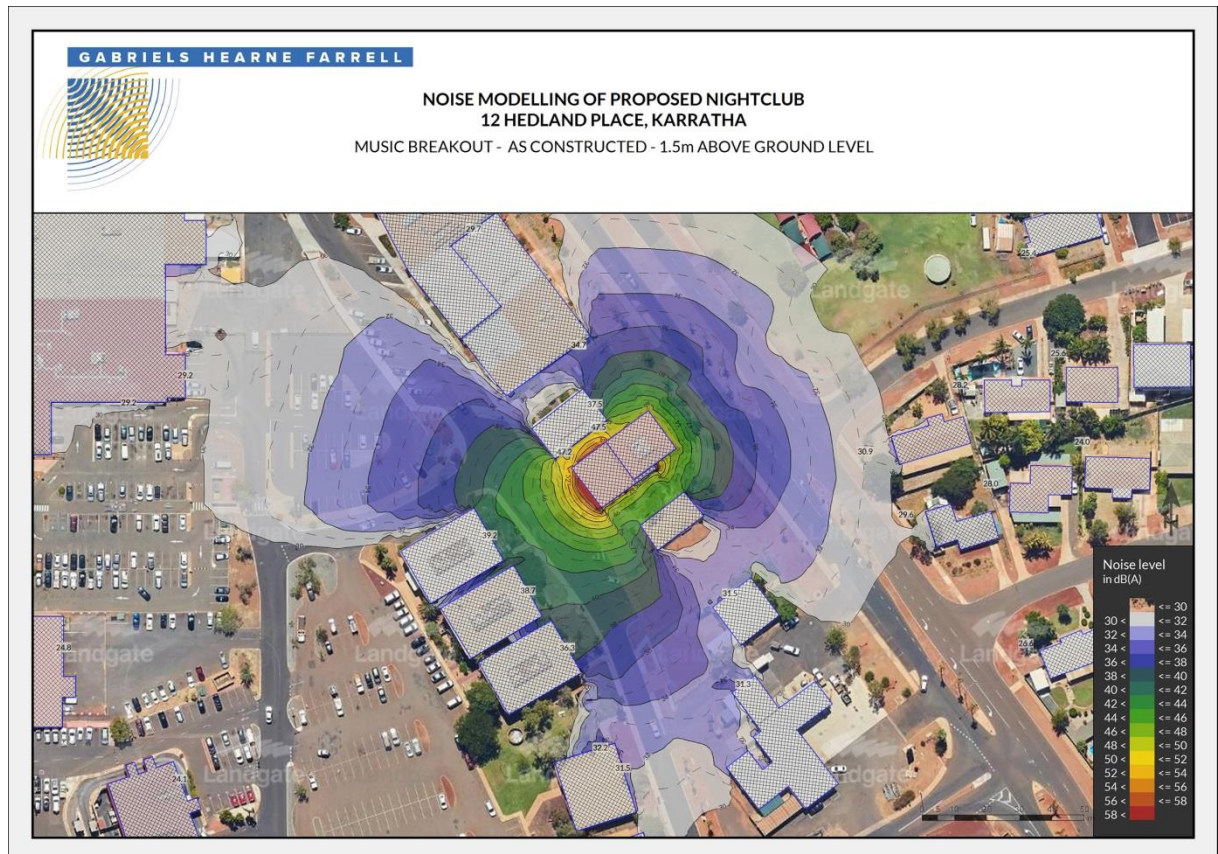


Image 02 - Noise Breakout from Music

At the most affected receiver position (i.e. the closest residence) the predicted noise level is approximately 31 dB(A). after applying penalties for music noise this increases to approximately 41 dB(A). This exceeds the night time Assigned Noise Level of 38 dB(A).

Due to the minimal exceedance of the Assigned Noise Level, it is our recommendation that the interior noise level is limited to 92 dB(A) downstairs and 82 dB(A) upstairs. These internal noise levels are predicted to achieve compliance at all times of the day.

Alternatively if the internal noise levels are desired to be louder than this then the building structure can be increased. It should be noted however that based on the source contribution at the closest residence (i.e. the noise level from all the individual elements e.g. roof / ceiling construction, upstairs glazing, upstairs window sill, blockwork walls etc.) the increase in construction that will be required to achieve a noticeable increase in noise level could be considered quite onerous. Information on this can be provided if required.

It is critical with all situations that low frequency 'bass beat' is adequately controlled and managed within all music played. No outdoor speakers are allowed.

It is also critical that all entrances /exits to the nightclub, particularly to the outdoor smokers area, have dedicated acoustic lobbies installed. This is to be via two sets of acoustically sealed solid doors with a minimum distance of 1.2m from one another (note more distance may be required for other purposes). Acoustic seals must be rubberised and suitable for the situation. Suitable acoustic seals are Raven RP 38

drop seals and Raven RP 10 full perimeter acoustic seals. Acoustic absorption must be provided within this lobby space, such as 50mm Autex Quietspace or similar, with as much installed as possible.

5.2 Noise Emissions from Crowd Noise

As discussed with the client the current proposal is to provide an outdoor ventilated smokers area to the rear of the property, as well as a rooftop bar area over the existing structure on the Hedland Place side of the building. Whilst the undercroft area is facing the closest noise sensitive receiver position, the rooftop bar area is partially blocked by the higher portion of the existing building. The local council have also expressed concern regarding the possible line of patrons at the front of the development waiting to enter.

As mentioned in Section 3.2 of this report, we have estimated that the outdoor smokers area will have a maximum number of 16 people at any given time. This is based on the smokers area being reserved for this purpose, rather than providing this space as a typical outdoor alfresco area. Similarly we have estimated that the line at the front of the nightclub will not exceed 10 people at any given point in time.

For the purposes of these calculations we have limited the numbers of patrons on the rooftop bar area to 50 people. This is explained in more detail below.

As mentioned previously in both smoker yard and the front line we have allowed for half of the patrons talking at a raised voice level at the same time. The rooftop bar area has a third of the patrons talking at the same time as we believe people will behave slightly differently when in larger groups of people i.e. small groups of smokers and people waiting in line may talk in pairs, whereas in larger gatherings this could easily be one person talking to two other people.

The modelling results of this situation as currently constructed is as follows:

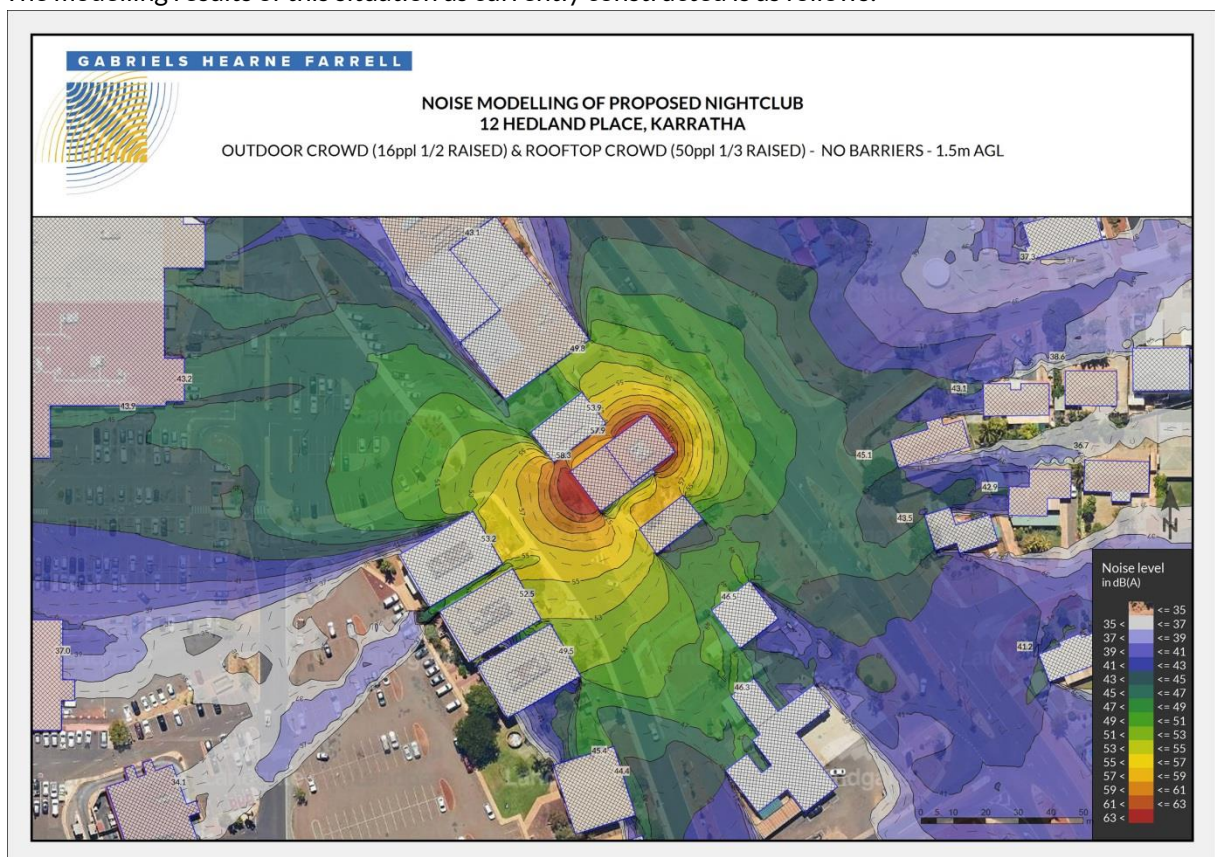


Image 03 - Noise Emissions from Outdoor Crowd Noise

The results of this modelling is currently indicating a noise level of approximately 45 dB(A) at the neighbouring noise sensitive premises. No penalties are applied to this noise source, however the night time Assigned Noise Levels are still exceeded by approximately 8 dB(A).

To attenuate this noise level at the neighbouring premises a barriers have been introduced around all sides of the outdoor smokers area, as well as the rooftop bar area. The height of these barriers are shown in the image below:



These barriers must be continuous with no gaps and be adequately sealed to the ground. Suitable materials are 9mm fibre cement sheeting or glass etc. provided the mass of the barrier is maintained.

The results of modelling with this barrier included is as follows:

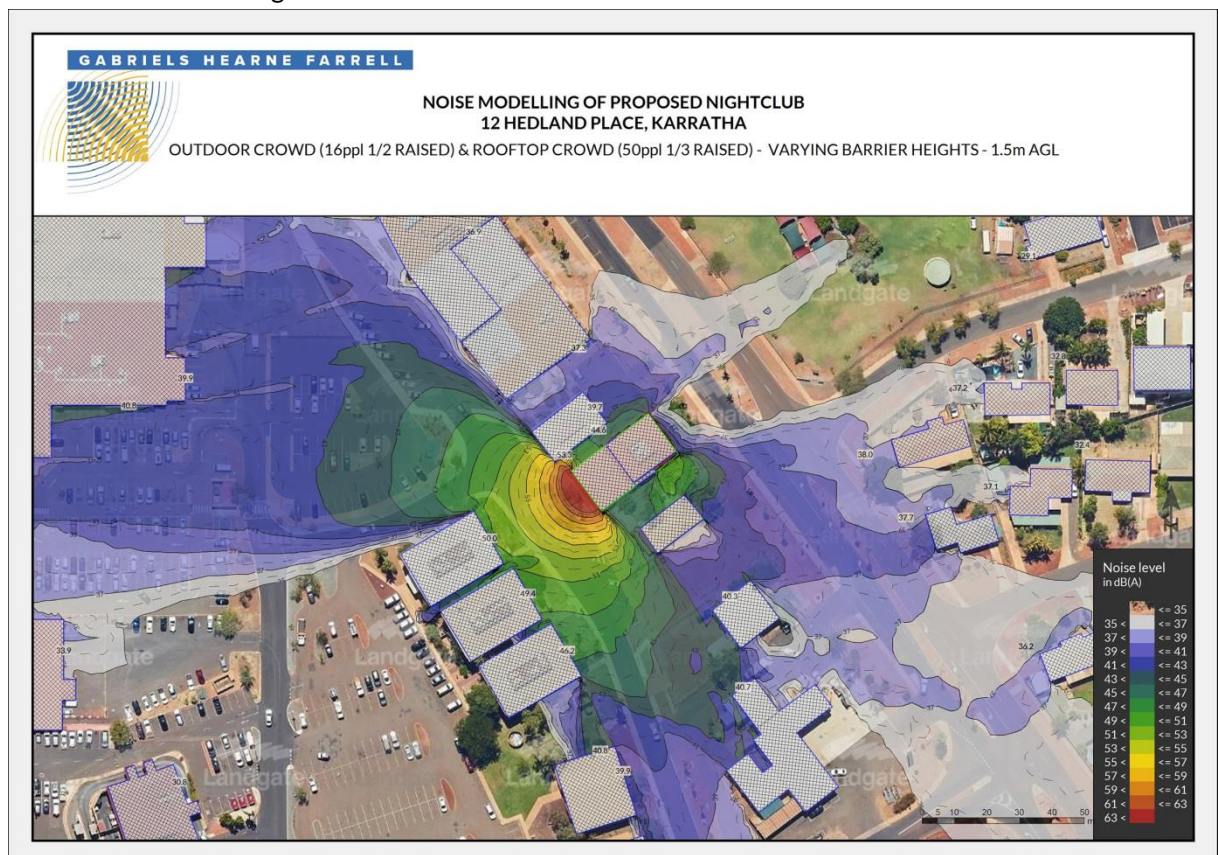


Image 03 - Noise Emissions from Outdoor Crowd Noise with Barriers

The noise modelling of this scenario is indicating that the predicted noise level at the closest residence is now 38 dB(A), achieving compliance at all times of the day. It must be noted that management of particularly noisy patrons will still be required in order to maintain this compliance.

For the rooftop bar area we have limited the numbers to 50 people in order to achieve compliance at all times. It should be noted that our calculations are indicating that there is no restriction on numbers prior to 10pm i.e. the results are indicating that 240 people on the roof top area would still achieve compliance at this 'evening' time period (43 dB(A) at the nearest neighbour).

It is assumed that the gap remaining around the smokers area is adequate for code ventilation purposes. It is also critical that the flooring of the rooftop bar area maintains the barrier performance. This can be achieved via fibre cement sheeting meeting the surrounding barriers. Open slatted decking by itself is unlikely to be adequate. Care must therefore be taken as to water runoff, with any openings not to be facing residences.

6. GENERAL NOISE MANAGEMENT STRATEGIES

In addition to the noise control previously outlined in this report, the following general noise management strategies should be implemented by the proponents.

- Glass shall only be emptied into the outside bins between the hours of 7am and 7pm (9am to 7pm on Sundays and Public Holidays).
- Management will maintain a log book for any complaints regarding noise and disturbance in the area. Any complaint received is entered into the book, with the date and time of the complaint, the staff member who received the complaint, and the action taken. The approved manager will then contact the complainant to ascertain whether the action taken is sufficient to answer the concern expressed.

7. CONCLUSION

This report summarises the project requirements in terms of compliance with the Environmental Protection (Noise) Regulations, 1997. This includes determination of the relevant site specific Assigned Noise Level criteria.

A description of each noise source and applicable noise level criteria has been provided, including acknowledgment of relevant adjustments required for noise sources with particular characteristics.

A preliminary acoustic assessment and construction has been provided based upon a review of the current architectural documented supplied. In short, these calculations indicate that:

Noise Breakout from Internal Music

- Compliance is achieved at all times on any day of the week, provided:
 - Internal noise levels are limited to 92 dB(A) downstairs
 - Internal noise levels are limited to 82 dB(A) upstairs
 - All entrances / exits are provided with dedicated acoustic lobbies.
 - Lobbies are to be acoustically absorbent and doors to have adequate acoustic seals.

Noise Emissions from Outdoor Crowd Noise

- Compliance is achieved at all times on any day of the week, provided:
 - A solid 2.1m high barrier to be provided to the North and South of the smokers area, with the East side barrier to meet the underside of the floor slab above.
 - A solid 2.1m high barrier around the Western half of the rooftop bar area, with the Eastern side to have a 2.8m high barrier.
 - The rooftop bar to be limited to 50 people after 10pm. No restrictions acoustically on capacity prior to this time.
 - Barrier to be constructed of minimum 9mm fibre cement sheeting, glass, perspex or similar with no gaps.
 - Flooring of rooftop bar to be solid with no gaps for sound to flank under.

Hopefully all of the information contained within this report is clear. However, if you have any queries regarding any of this then please feel free to contact the undersigned on 9474 5966.

Regards,

Michael Ferguson

Associate Director B.IntArch(Hons) M.A.A.S.



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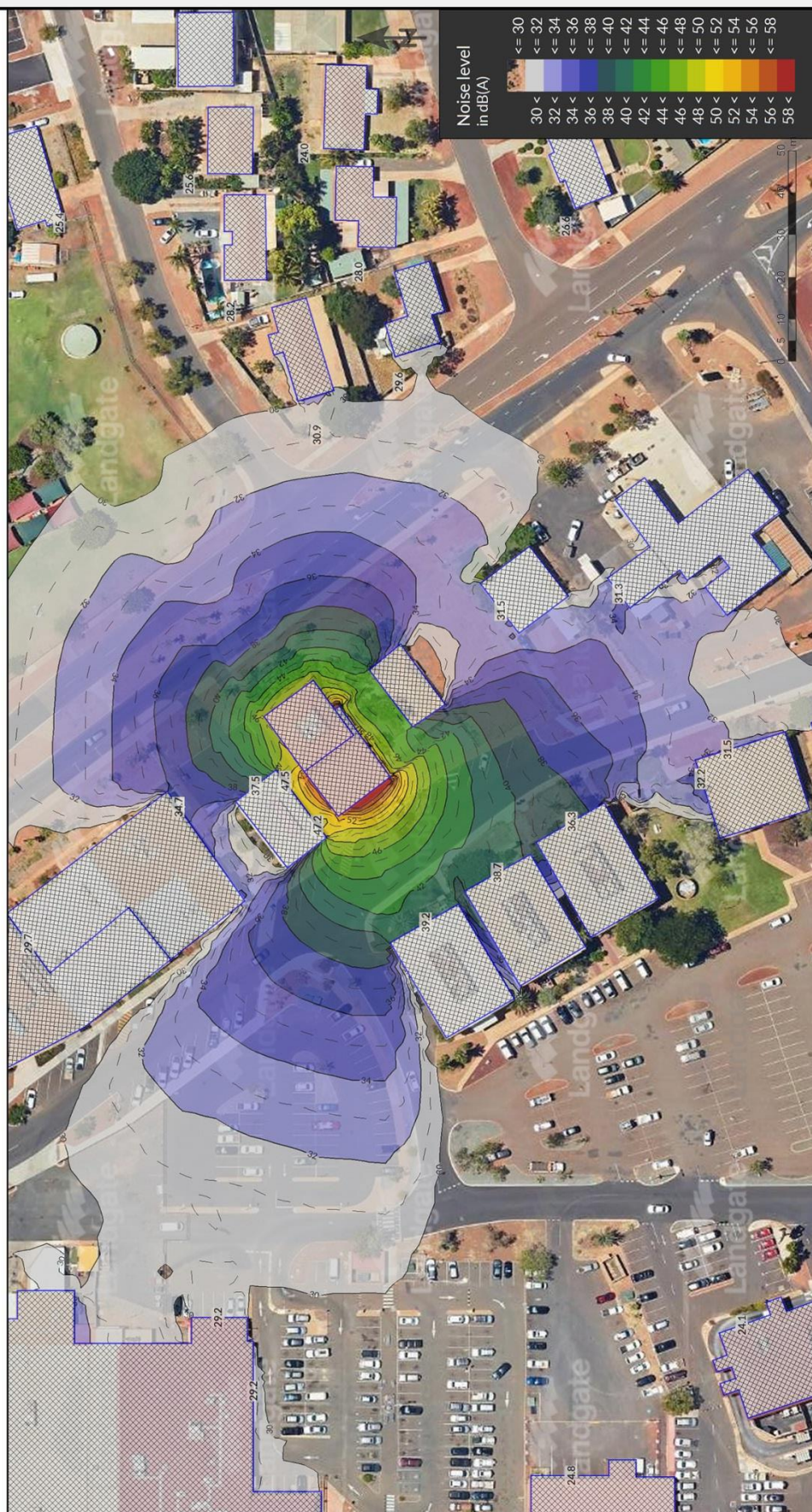
ATTACHMENTS

APPENDIX A - Noise Contour Diagrams (x3)

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**NOISE MODELLING OF PROPOSED NIGHTCLUB
 12 HEDLAND PLACE, KARRATHA**
 MUSIC BREAKOUT - AS CONSTRUCTED - 1.5m ABOVE GROUND LEVEL

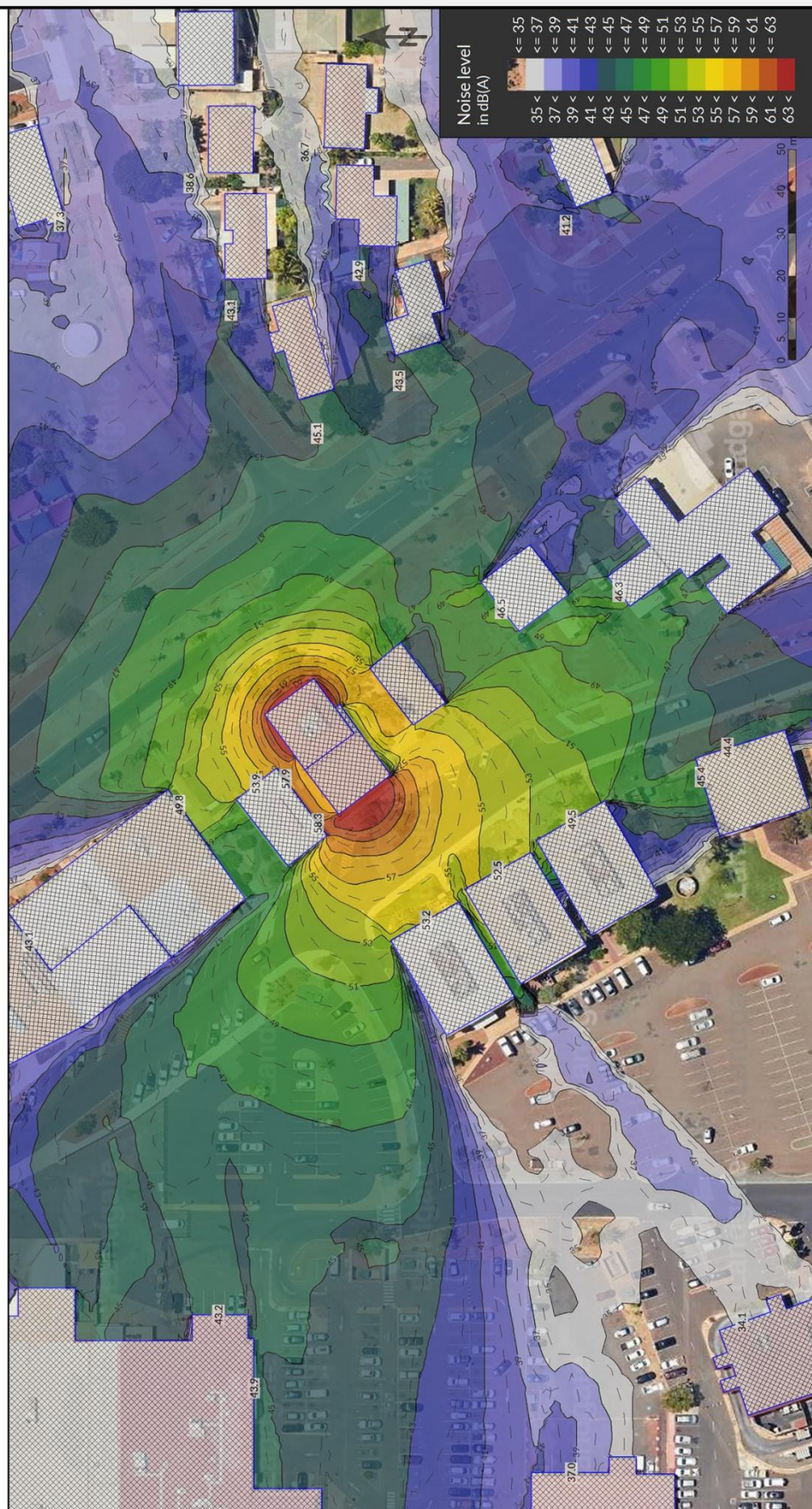


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NOISE MODELLING OF PROPOSED NIGHTCLUB 12 HEDLAND PLACE, KARRATHA

OUTDOOR CROWD (16ppl 1/2 RAISED) & ROOFTOP CROWD (50ppl 1/3 RAISED) - NO BARRIERS - 1.5m AGL



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NOISE MODELLING OF PROPOSED NIGHTCLUB
12 HEDLAND PLACE, KARRATHA

OUTDOOR CROWD (16pppl 1/2 RAISED) & ROOFTOP CROWD (50pppl 1/3 RAISED) - VARYING BARRIER HEIGHTS - 1.5m AGL

