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MAC211274-01LR1

Attention: Bob Lander
Tattersall Lander Pty Ltd
PO Box 580
Raymond Terrace NSW 2324

Dear Bob,

Technical Acoustic Review: Noise Impact Assessment

Proposed Pet Resort - 96 Coomba Road, Charlotte Bay, NSW.

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Technical Acoustic Review (TAR) of the Noise Impact Assessment (the 'historic assessment'), Proposed Pet Resort, 96 Coomba Road, Charlotte Bay, NSW (the 'project') prepared by Spectrum Acoustics Pty Limited (October 2020).

The TAR has been prepared in response to the Notice of Determination (DA-346/2020) issued by MidCoast Council on 4 December 2020, which states:

> *… Council is unable to determine if the development is likely to be a source of 'offensive noise' as defined by the Protection of the Environment Operations Act 1997. As such, it is not known whether the proposed development is likely to result in unreasonable noise impacts.*

The TAR has been undertaken in general accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI) 2017; and
- Association of Australasian Acoustical Consultants (AAAC) - Consultants Guideline for Report Writing, 2017.

A glossary of terms, definitions and abbreviations used in this report is provided in Appendix A.

2 Key Outcomes of the Technical Review of the Historic Noise Assessment

2.1 General Findings

The TAR identified that the historic assessment used standard theoretical noise propagation calculations with consideration of the effects of hemispherical spreading, atmospheric absorption, ground effects and barrier losses from the project to the nearest affected receivers. The calculation methodology and assumptions are generally representative of industry standards.

The historic assessment was undertaken in accordance with the provisions of the NPI, which provides a framework for the derivation of appropriate noise criteria used to assess the potential impacts of noise from industry and indicate the noise level at which feasible and reasonable noise mitigation measures should be considered.

2.1.1 Noise Guidelines

The Notice of Determination detailed that Council was unable to determine that the development was not likely to be a source of 'offensive noise' as defined by the Protection of the Environment Operations Act 1997 (POEO Act). The POEO Act is the main legal framework and basis for managing unacceptable noise, however, the POEO Act does not recommend noise limits, nor does it contain provisions for the assessment of noise from a proposed facility. The POEO Act is therefore used primarily in enforcement actions and not in determining environmental impact in planning matters.

In the absence of a local Council policy on intrusive noise, it is industry standard to adopt the NPI for the assessment of noise at the planning stage of a development. While not specifically aimed at the types of sources Councils need to address, the NPI is useful for local government in assessing noise from premises it regulates and in the carrying out of land use planning responsibilities.

2.1.2 Derivation of Rating Background Level and Project Noise Trigger Levels

The historic assessment has adopted the minimum assumed Rating Background Levels (RBLs) as per Section 2.3 of the NPI. The minimum RBLs can be adopted for low noise environments, such as rural environments, in lieu of completing a background noise assessment. This method is considered the most conservative method for establishing the Project Noise Trigger Levels (PNTL) for a project.

Furthermore, the historic assessment has adopted the minimum sleep disturbance criterion (ie maximum noise trigger levels) of 52dB LA_{max}, in accordance with Section 2.5 of the NPI. This method is considered the most conservative method for establishing the maximum noise trigger levels.

2.1.3 Adopted Sound Power Levels

The historic assessment has adopted a sound power level (Lw) of 100dBA for three (3) dogs barking in the outdoor play area and 109dBA for up to 15 dogs barking within the facility during the night. Additionally, an LA_{max} of 112dB was adopted for the assessment of maximum noise levels. According to the historic assessment, the Lw of typical dogs barking was derived from measurements taken at commercial kennels in the NSW Hunter Valley.

Measurements undertaken by MAC in March 2020 at a commercial kennel, also in the Hunter Valley, derived an Lw of 100dBA for up to 7 dogs barking and an LA_{max} of 112dB. Therefore, it is considered that the Lw and LA_{max} adopted in the historic assessment are consistent or slightly conservative compared with similar measurements by MAC.

2.1.4 Modifying Factors

The NPI stipulates that modifying factors are to be applied to the predicted noise levels at the receiver to account for noise sources that contain certain characteristics that can cause greater annoyance than other noise at the same noise level.

The historic assessment has appropriately adopted a 5dB correction to night time noise levels to account for intermittent noise from dogs barking, as per Table C1 of the NPI.

2.1.5 Calculation Assumptions

Assessed Receiver Locations

Figure 1 of the historic assessment identified the nearest potentially affected residential receivers to the proposal. R1 is located approximate 100m to the NE of the facility, R2 approximately 195m SSE, and R3 (future residence on Proponent's property) approximately 100m WSW. The historic assessment states that assessment points were taken as 30m from the residences. In accordance with the NPI, the assessment location for a receiver is the reasonably most-affected point on or within the residential property boundary or, if that is more than 30m from the residence, at the reasonably more affected point within 30m of the residence. The historic assessment has appropriately considered the reasonably most affected point within 30m of the residence.

Calculation Method

The historic assessment has adopted a loss for distance calculation with hemispherical spreading. The calculation has made allowances for atmospheric absorption, ground effects and barrier effects.

The loss for distance calculation method is a simplified method of determining noise propagation on a 2-D plane. The method is generally considered conservative as it does not take into account a comprehensive array of obstacles that influence noise propagation. In most circumstances, a simple loss for distance calculation will over-estimate noise levels at the receiver location.

In the case of the historic assessment, the fundamental obstacles have been considered through the application of barrier loss and atmospheric and foliage absorption factors. MAC considers that the loss for distance method is adequate for the prediction of noise imissions at the receiver locations.

Barrier Loss

The historic assessment has applied a transmission loss factor through the Hebel Power Panel wall system of the building proper of the proposal, as well as a barrier loss for the recommended barriers to a height of 1.5m along the southern and eastern perimeters of the outdoor play area, extending to 3.0m in height on the eastern side.

For attenuation through the Hebel Power Panel wall system, the historic assessment has applied a transmission loss from an insulated metal panel roof as representative of the Hebel Power Panel. A review of the 'Technical Manual Part 2: Energy Efficiency, Acoustic Performance & Fire Design' (Hebel, 2008) identifies that the Power Panel has greater attenuation than a metal panel roof. Therefore, there is also a level of conservatism in predicted historic levels as a result.

The barrier insertion loss figures for the 1.5m and 3.0m walls, as provided in the historic assessment, are consistent with the widely accepted figures cited in 'Noise and Vibration Control' (Beranek, 1971).

Atmospheric Absorption and Ground Effects

The calculation method in the historic assessment applied atmosphere/foliage absorption, based on the publication 'Handbook of Noise Control' (Harris, 1957). MAC notes that the atmosphere/foliage absorption used in the historic assessment are consistent with commonly used values for sound attenuation for evergreen and deciduous trees, as cited in Hannah, L. (2006) 'Ground, Terrain and Structure Effects on Sound Propagation', *New Zealand Acoustics* Vol.20(3). Hannah points out that research on propagation through trees has produced greatly conflicting results, however, the general sentiment is that trees provide little, if any, attenuation, where the foliage is sufficiently dense to block the view along the propagation path. Notwithstanding, Hannah indicates that some research suggests that a band of trees of at least 50m in depth can achieve a significant level of attenuation. It is noted that the depth of vegetation is at least 50m between the proposal receiver locations.

It is noted that the historic assessment did not consider noise enhancing meteorological conditions including prevailing winds and temperature inversion conditions. Over short separation distances, noise enhancement from such conditions is negligible and unlikely to contributed to elevated noise levels at the receiver locations.

2.1.6 Further Modelling

To confirm the results of the historic assessment MAC undertook noise modelling using the DGMR (iNoise, Version 2021) noise modelling software. The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

It is noted that the noise model assumed the same parameters as the historic assessment for dogs barking both within the external play area (day) and kennels (night). Each scenario was modelled under noise enhancing meteorological conditions consistent with CONCAWE. The Ground factor was modelled as a conservative 0.7 representative of an absorbing environment (forest). The regional topographic data was sourced from the NSW Digital Topographic Database Clip and Ship, with local high resolution height lines sourced from the 'Contour Survey over Part Lot 120, DP 848586' (Rennie Golledge, 2015).

A comparison between the results of the historic assessment and the modelled noise results are provided in **Table 1**.

Table 1 Comparison of Noise Prediction Results

Receiver	Predicted Noise Level dB $L_{Aeq(15min)}$	
	Historic Assessment	Noise Modelling
Dogs in Outdoor Play Area – Day Period		
R1	33	27
R2	28	27
R3	33	30
Dogs in Kennel – Night Period		
R1	29	29

A review comparing results indicates that the historic assessment is generally consistent with the modelled noise levels for both the day period and night period scenarios. It is noted that the calculated noise levels are slightly higher for the day period than the modelled results, indicating that the assumptions in the historic report are generally conservative.

2.1.7 Key Findings and Summary

Section 3.3.3 of the NPI identifies that a development is considered to have a noise impact if the predicted levels at a receiver exceeds the corresponding project noise trigger level. Review of operational noise levels from the historic assessment identifies that the proposal would comply with the PNTL at all receiver locations following implementation of the noise controls identified.

Furthermore, taking into account the conservative assumptions in the historic assessment noise calculations, reported noise levels are likely to be an overestimation of potential noise levels at the most affected receivers.

In response to the reason for refusal as cited in the Notice of Determination (DA-345/2020), the POEO Act and its regulations are primarily concerned about enforcement of noise limits to prevent 'offensive noise' rather than the consideration of noise at the planning stage. The industry standard for assessing potential noise impacts at the planning stage for new developments or intensification of existing developments is the NPI. MAC considers that the historic assessment has appropriately assessed the proposal in accordance with industry standard methods.

We trust this information is satisfactory for your requirements at this time, if you have any questions please contact the undersigned.

Yours sincerely

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Reviewed: OM

Appendix A – Glossary of Terms

Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms

Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L_{A90} statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dB(A)	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear. In some cases the overall change in noise level is described in dB rather than dB(A), or dB(Z) which relates to the weighted scale.
dB(Z)	Linear Z-weighted decibels.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
L_{A10}	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
L_{A90}	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
L_{Aeq}	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
L_{Amax}	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dB(A)

Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound