Project No: 212151R

# Noise Assessment
# Proposed Residential Subdivision
# 62 New England Highway, Maitland, NSW

Prepared for:

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November 2021

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# 1.0 - INTRODUCTION

This report presents the results, findings and recommendations arising from an acoustic assessment for a proposed three lot residential subdivision of land at Lot 1 D.P. 1016905, 62 New England Highway, Maitland, NSW.

The proposed subdivision layout is shown in **Figure 1**. The existing house is to remain and the two new housing lots are to be created.

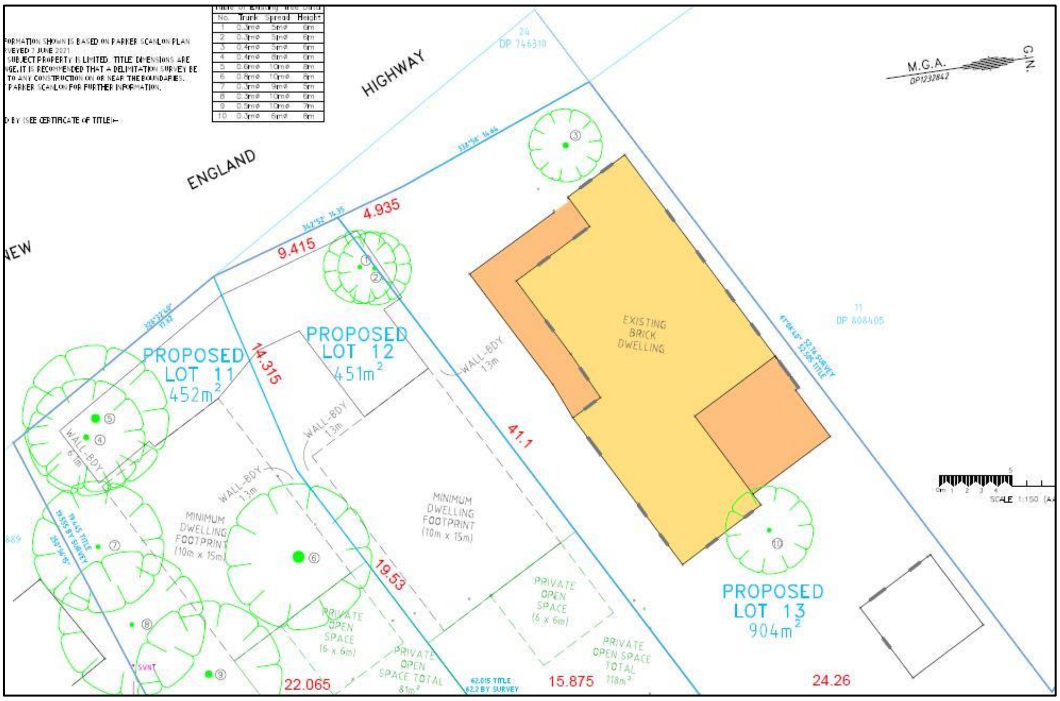



*Figure 1 – Site Plan*

The investigation was requested by Parker Scanlon to support a Development Application to Maitland City Council (MCC).

# 2.0 - TERMS AND DEFINITIONS

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

| TABLE 1<br>DEFINITION OF ACOUSTICAL TERMS | |
|---|---|
| Term | Definition |
| dB(A) | The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB). |
| SPL | Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard. |
| Lw | Sound Power Level radiated by a noise source per unit time re 1pW. |
| STL | Sound Transmission Loss. The ability of a partition to attenuate sound, in dB. |
| Leq | Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period. |
| L1 | Average Peak Noise Level - the level exceeded for 1% of the monitoring period. |
| L10 | Average Maximum Noise Level - the level exceeded for 10% of the monitoring period. |
| L90 | Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area. |

# 3.0 – NOISE CRITERIA

Advice from MCC is for "*An acoustic assessment reporting traffic noise levels from NEH is considered necessary to support the street setbacks for the dwellings and/or fencing treatments*."

The proposed subdivision is adjacent to the New England Highway and, council would typically require that consideration be given to the necessary noise control requirements as detailed in the publications, "*Development Near Rail Corridors and Busy Roads – Interim Guideline"* (Guideline) and the "*NSW Road Noise Policy"* (RNP).

The Guideline advises that land use developers must meet the internal noise goals in the Infrastructure SEPP (Department of Planning NSW, 2007).

The Infrastructure SEPP is aimed at facilitating the effective delivery of infrastructure across NSW. Key objectives of this planning policy were to:

- protect the safety and integrity of key transport infrastructure from adjacent development; and

- ensure that adjacent development achieves an appropriate acoustic amenity by meeting the internal noise criteria specified in the Infrastructure SEPP.

The Infrastructure SEPP states that if the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the relevant Leq levels are not exceeded.

The relevant noise criteria from Section 3.5 of the Guideline, and referenced in the SEPP, are shown in **Table 2**.

**TABLE 2**
**NOISE CRITERIA**

| Type of Occupancy | Time Period | Acceptable Noise Level |
|---|---|---|
| Sleeping areas (bedrooms) | Night (10pm to 7am) | 35 dB(A) Leq (9 hr) |
| Other habitable rooms (excluding garages, kitchens, bathrooms and hallways) | At any time | 40 dB(A) Leq (15 hr) |

These criteria originated from the Rail Infrastructure Corporation (RIC) publication "Consideration of Rail Noise and Vibration in the Planning Process" (2003) where it is explicit that the criteria apply with windows and doors closed.

The Guideline also states that "if internal noise levels with windows and doors open exceed the criteria by more than 10 dB(A), the design of ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also meet the ventilation requirements of the Building Code of Australia."

# 4.0 - NOISE ASSESSMENT

The approximate location of the proposed subdivision is shown on **Figure 2**.

To quantify the existing acoustic environment of the site unattended noise logging was carried out at the location shown on Figure 2 (denoted as "Logger") using an ARL Ngara environmental noise logger.

The logger was located on the verandah of the existing residence at 62 New England Highway (see **Appendix I**). The logger was approximately the same distance from the traffic as the closest facades of the proposed subdivided lots. The microphone had full line of sight to the traffic flow on the highway.

The logger was approximately 2m from the facade of the residence so no facade corrections are applicable to the data.

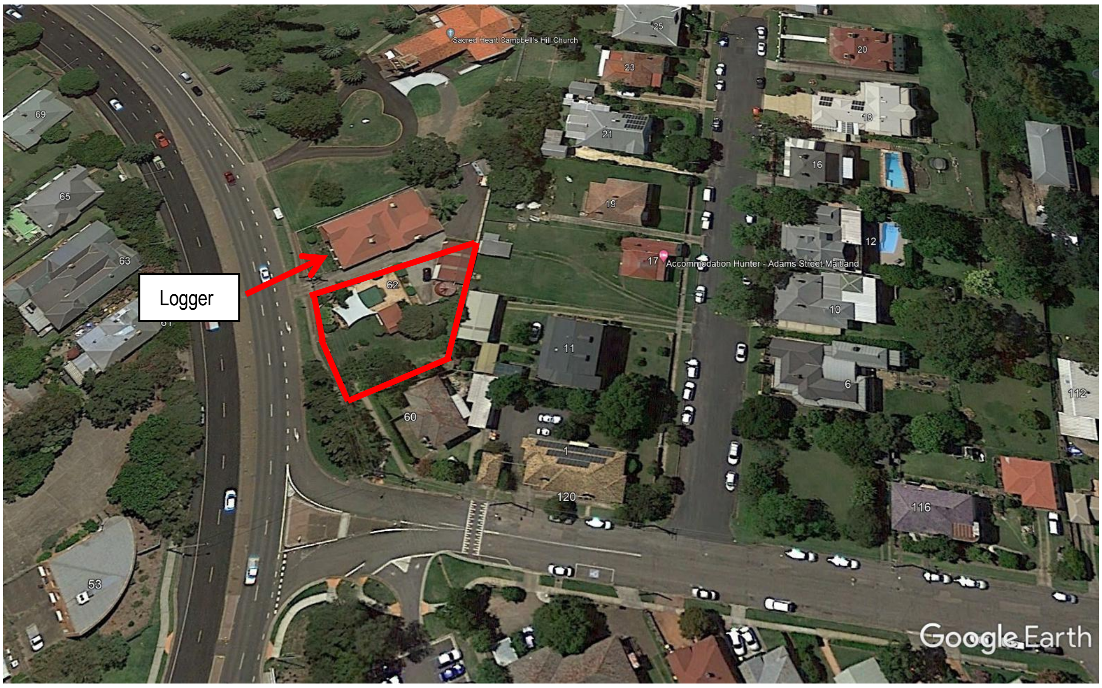



*Figure 2 – Location Plan*

The logger was programmed to continuously register environmental noise levels over 15 minute intervals with internal software calculating and storing $L_n$ percentile noise levels for each sampling period. Calibration of the logger was performed as part of the instrument's initialisation procedures, with calibration results being within the allowable ± 0.5 dB(A) range.

The noise logger measurements were done in accordance with relevant OEH guidelines and AS 1055-1997 "Acoustics – Description and Measurement of Environmental Noise". The noise logger used complies with the requirements of AS 1259.2-2004 "Acoustics – Sound Level Meters", and has current NATA calibration certification.

The relevant metrics taken from the logger measurements are shown in **Table 3** and presented graphically in Appendix I.

| TABLE 3<br>MEASURED LOGGER NOISE LEVELS dB(A) | | | |
|---|---|---|---|
| Metric | Day | Evening | Night |
| Leq | 70 | 6 | 66 |
| L90 | 64 | 52 | 39 |

The graphical representation of the data shows it to be typical of the acoustic environment near a busy road with a daily cyclical pattern of noise levels rising from early morning and late afternoon to coincide with commuter traffic and dropping off through the middle of the night.

# 5.0 - RESULTS AND DISCUSSION

The application is to subdivide the existing lot into three. At the time of this assessment building envelopes were defined but there were no final dwelling designs. The plans show that the proposed dwellings will be at approximately the same distance from the road as the logger location.

The proposal is that the fence along the roadside boundary will be a composite construction of solid brick to 1m high with a further 800mm of metal pickets, which satisfies the DCP for the area.

Based on the logger data, the noise level at the facade of each of the residences would be 69 dB(A) Leq (15hr), during the day and 66 dB(A) Leq (9hr) during the night. This indicates that the facade to living spaces, with line of sight to the traffic sight to the traffic, must be capable of attenuating 29 dB(A) of the traffic noise during the day. Similarly, the facade of sleeping areas, with line of sight to the traffic, must attenuate 31 dB(A) of traffic noise during the night.

**Figure 3** is a reproduction of Figure B2 from the Guideline showing a hypothetical situation of a dwelling adjacent to a busy road. Acoustic consultants often use the Guideline (and Figure B2 specifically) in recommending if and what architectural modifications are required to achieve the recommended noise levels.

Figure 3 shows that standard building construction with 4mm glass in the windows, for the floor plan as shown, provides up to 24dB reduction in traffic noise. The indication from Figure 3 is that standard construction will be adequate for any residences in the proposed subdivision.

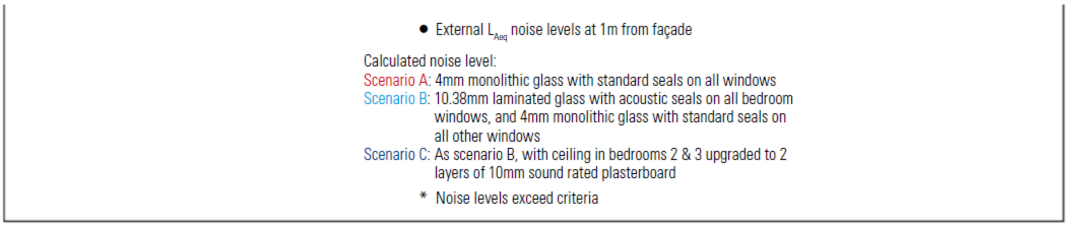



*Figure 3. Traffic noise reduction for various construction types*.

The Environmental Noise Management Manual (ENMM) details that the facade of a single glazed, light framed house, with the windows closed, will typically attenuate up to 20 dB(A) of traffic noise (note with the windows open it will attenuate up to 10 dB(A)). The acoustic weak point in a typical residence is through glazing (windows and/or glass doors) with line of sight to the noise source.

This would indicate that an external noise level of 69 dB(A) Leq (15hr) will result in internal noise levels of about 48 dB(A) Leq (15hr). Thus, the internal noise levels would exceed the adopted noise criterion by approximately 9 dB(A) for living areas. External noise at night of 66dB(A) Leq (9hr) would exceed the acceptable internal noise level in sleeping areas by 11dB(A) in facades with full line of sight to the road.

In most typical residential constructions noise control would need to be applied in order to achieve compliance with the adopted internal noise criteria in relation to the road noise.

By way of example, based on a “typical” house design the necessary noise reduction could usually be achieved with standard house design and the inclusion of windows to bedrooms and living spaces (facing the road) with Rw up to about 33 to 35 (say 6.5mm “Hush” glass or acoustically similar).

Standard wall and roof/ceiling design would, typically, be sufficient to attenuate the road traffic noise at this level.

### 5.1 Building Treatments

As detailed previously, the acoustic treatment for any residence requires specific analysis based on floor plans and the surface area of the various building elements which are potentially exposed to a noise source.

In general terms, however, the Guideline indicates that where a new residential development is planned to occur near a busy road appropriate building design, layout and construction techniques should be applied to minimise noise intrusion and provide suitable internal noise levels for sleeping and other uses.

The following sections provide some general information in relation to incorporating sound acoustic practises in house design.

#### 5.1.1 Acoustic Barriers

The use of an acoustic barrier in the noise transmission path can be effective in reducing traffic noise impacts. For an acoustic barrier to be effective it must break the line of sight between the noise source (traffic) and the receiver (residence).

The proponent has indicated that an existing brick fence to 1m high will remain. Due to the height of the roadway and the ground level at the residential lots, the proposed composite fence, which is solid to 1m high (the top 800mm is to be metal pickets with area gaps between), is unlikely to not have any significant acoustic impact.

The actual barrier insertion loss would have to be calculated based on survey information which details the R.L. of the road and the finished floor level of the houses. As the noise criteria are based on internal noise levels, the calculation must take into account the height of the top of any windows that are exposed to the traffic noise.

As a general rule of thumb, a noise barrier that just breaks the line of sight between a source and a receiver will reduce traffic noise by approximately 5 dB(A). Increasing the height of the barrier will increase the insertion loss (the amount would have to be calculated based on ground conditions).

To be effective in reducing traffic noise a barrier must be constructed of material with minimum surface density of 15 kg/m$^2$ and must extend from ground level to full height with no gaps for the passage of noise.

### 5.1.2 Walls

Typically, walls are not a significant noise transmission path. Walls of lightweight construction (e.g. weatherboard, compressed fibrous cement sheeting, timber slats, timber sheeting etc.) provide less noise insulation than masonry walls to low frequency noise. At particularly noisy sites lightweight cladding should include adequate acoustic insulation in the wall cavity.

Whether the walls are masonry or of light-weight construction, the wall's insulation capacity will be weakened if it contains ventilators, doors or windows of a lesser insulation capacity. To improve insulation response, ventilators can be treated with sound-absorbing material or located on walls which are not directly exposed to the external noise.

### 5.1.3 Windows

In acoustic terms windows are one of the weakest parts of a facade. An open or acoustically weak window will severely negate the effect of an acoustically strong facade. Whenever windows are incorporated in a building design their effect on acoustic performance of the building facade should be considered. Reducing the number and/or glazed area of windows and/or appropriately positioning them away from the road can be beneficial.

Proper sealing is crucial to the success of noise reduction of windows. To prevent sound leaks, windows should be caulked (with a flexible sealant such as mastic or silicone) thoroughly from the inside, and outside between the wall opening and the window frame. Usually, the best option is use one of the many commercially available double glazed or laminated windows with acoustic seals.

Laminated glass is usually cheaper and easier to install than double glazing and is relatively effective in reducing moderate to high levels of traffic noise as indicated previously in this report. Double-glazing: is cost-effective when a very high level of noise attenuation is required. When using double-glazing, the wider the air space between the panes the higher the insulation.

Standard louver windows are not recommended in areas of high traffic noise such as the current site. Acoustic rated louvers are commercially available and when closed these provide increased Rw when compared to standard louvers.

Other factors influencing the acoustic performance of windows include:

- Window seals: ensure windows are fitted with high quality acoustic seals and close windows to reduce internal noises levels.

- Reduction in window size, recognising that reducing the proportion of window to wall size from 50% to 25% reduces noise by only 3 decibels.

- Increase the glass thickness: the thicker the glass the more noise resistance it provides. However, glass thickness is only practical up to a point before the costs exceed the acoustic benefits of increasing glass thickness.

- The presence of absorbent materials on the window reveals will improve noise insulation.

- Window frames and their installation in wall openings must be air tight and operable. Windows must incorporate acoustic seals for optimal noise insulation.

In summary, it is considered that, based on the measured and calculated noise adequate internal noise levels can be achieved within the proposed residences using a combination of reasonable and feasible noise control options.

# 6.0 - CONCLUSION

An acoustical assessment has been conducted into the potential noise and vibration impacts at a proposed three lot residential subdivision of the existing lot at 62 New England Highway, Maitland, NSW.

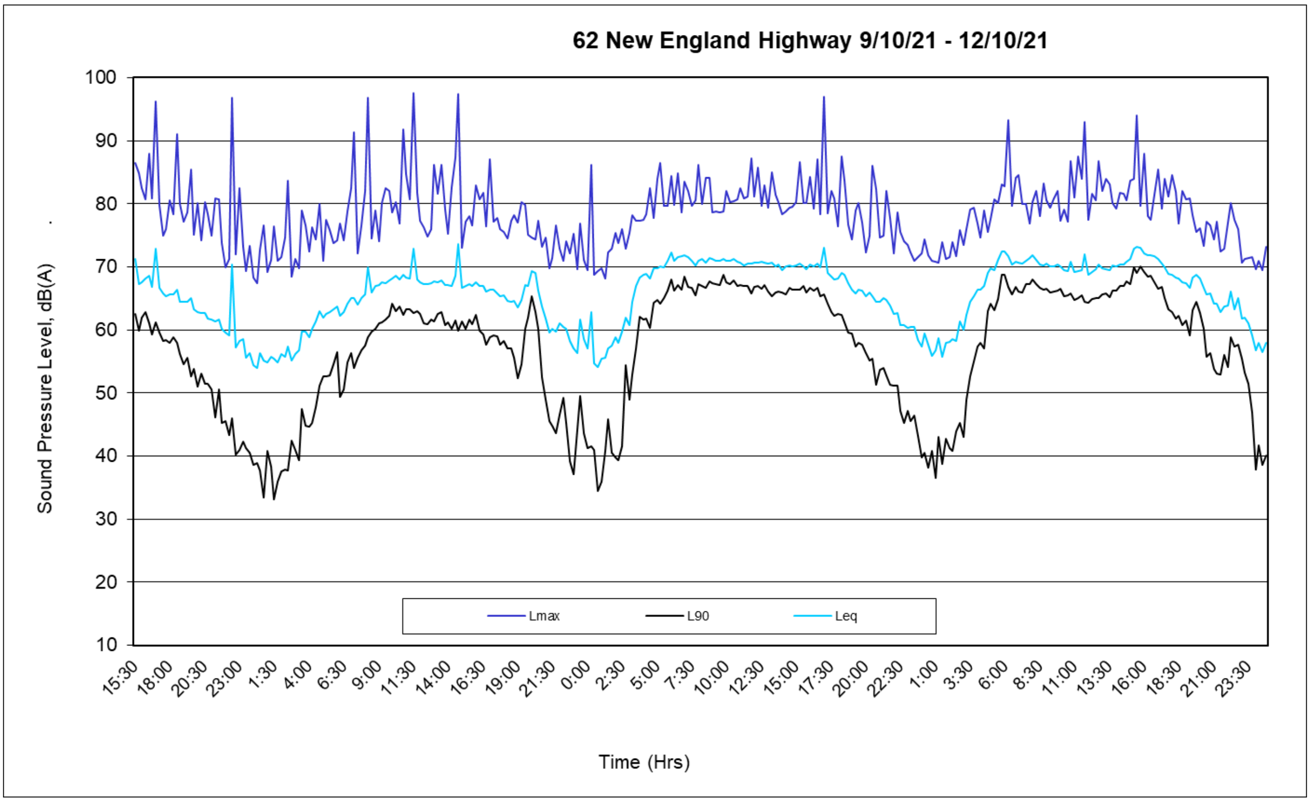
The results of site noise measurements and theoretical calculations have shown elevated noise from road traffic has the potential to create adverse impacts at the most affected facades of residences in the proposed lots.

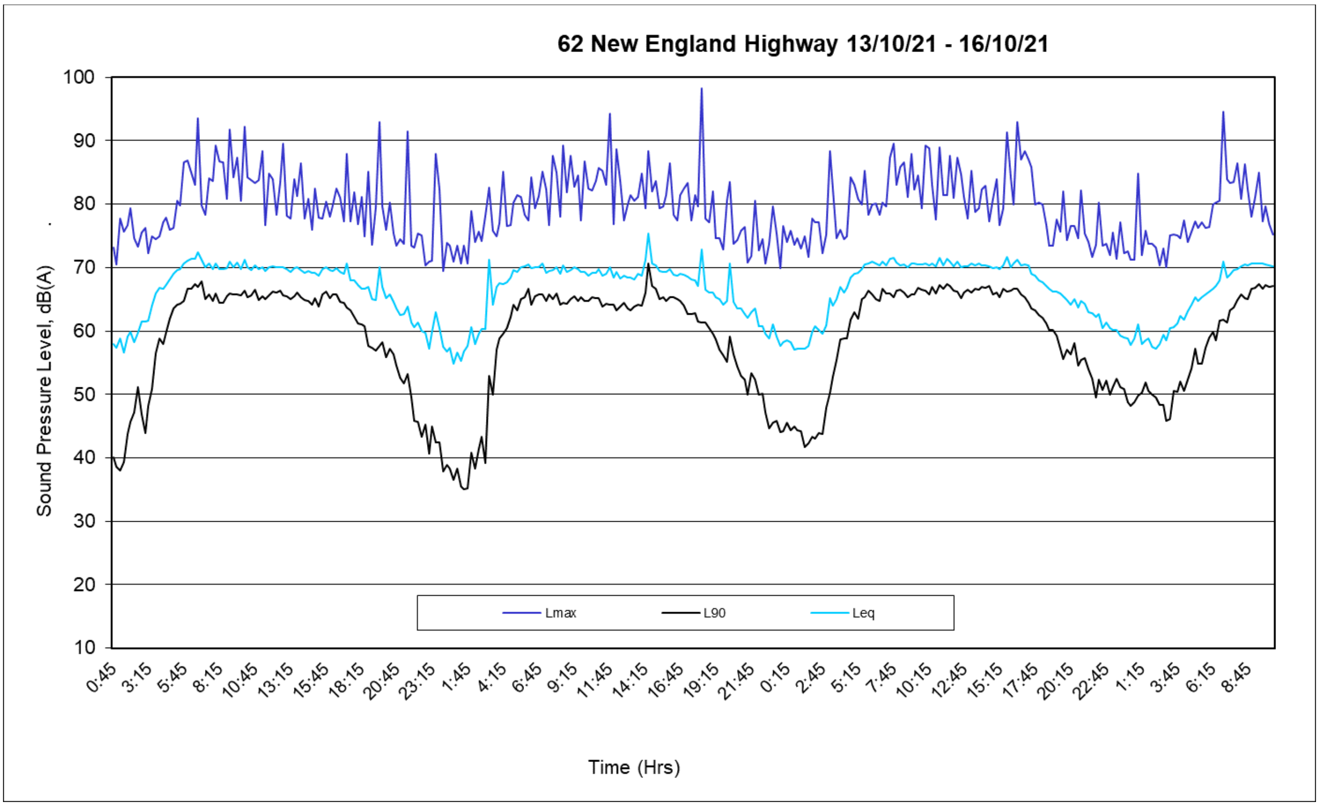
The assessment has shown, however, that relatively common noise control treatments and options can be employed to achieve an adequate acoustic amenity at any future residences that may be constructed in the area.

Based on these findings, we see no acoustic reason why the proposed subdivision should not be approved.

# APPENDIX I

## Noise Logger Charts


62 New England Highway 9/10/21 - 12/10/21
Sound Pressure Level, dB(A)
100
90
80
70
60
50
40
30
20
10
Lmax
L90
Leq
15:30 18:00 20:30 23:00 1:30 4:00 6:30 9:00 11:30 14:00 16:30 19:00 21:30 0:00 2:30 5:00 7:30 10:00 12:30 15:00 17:30 20:00 22:30 1:00 3:30 6:00 8:30 11:00 13:30 16:00 18:30 21:00 23:30
Time (Hrs)


62 New England Highway 13/10/21 - 16/10/21
Sound Pressure Level, dB(A)
100
90
80
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Lmax
L90
Leq
0:45 3:15 5:45 8:15 10:45 13:15 15:45 18:15 20:45 23:15 1:45 4:15 6:45 9:15 11:45 14:15 16:45 19:15 21:45 0:15 2:45 5:15 7:45 10:15 12:45 15:15 17:45 20:15 22:45 1:15 3:45 6:15 8:45
Time (Hrs)