Project No: 212251R

Road Traffic Noise Assessment
Proposed Residential Subdivision
523 Raymond Terrace Road
Thornton, NSW

Prepared for:

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CONTENTS

1.0 INTRODUCTION

This report provides the results, findings and recommendations arising from an acoustical assessment of the potential for noise emanating from traffic passing along Raymond Terrace Road, Thornton to impact on parts of a proposed residential subdivision at 523 Raymond Terrace Road (Lot 100, D.P.847510), as shown in **Figure 1**. On the figure, Raymond Terrace Road is at the southern end of the site (bottom of the page).

Figure 1 - Site Plan

The assessment was requested to accompany a Development Application to Maitland City Council (MCC).

2.0 NOISE CRITERIA

The Office of Environment and Heritage (OEH) and Roads and Maritime Service (RMS) of NSW adopt noise criteria for traffic noise assessments based on the NSW Road Noise Policy (RNP), as accepted by MCC.

For new residences, the RNP (Appendix C10) recommends assessment against internal noise criteria contained in the NSW Infrastructure SEPP (2007) and the supporting "Development near Rail Corridors and Busy Roads – Interim Guideline (DP&I, 2008, referred to in this report as "the Guideline"). The Infrastructure SEPP (2007) criteria are as follows:

"For new residential developments, internal noise levels of;

- 35 dB(A) for bedrooms during the night time period, and
- 40 dB(A) for other habitable rooms."

The road traffic metrics used in this assessment are defined in the RNP as follows:

- Leq(15hr) represents the Leq noise level for the period 7 am to 10 pm (day).
- Leq(9hr) represents the Leq noise level for the period 10 pm to 7 am (night).

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 criteria correspond with those in AS/NZS 2107.

3.0 TRAFFIC NOISE LEVELS

3.1 Existing Noise Levels

To quantify the existing acoustic environment of the area, data has been taken from unattended noise logging undertaken in March 2020 at 530 Raymond Terrace Road.

The logger location is approximately 250m east of the centre of the road frontage of the site of the current proposal and in a location with similar traffic flows.

The logger was located in the free field on the vacant block adjacent to Raymond Terrace Road at a distance of approximately 12m from the edge of the closest lane of traffic. This location has full line of sight to both lanes of traffic on Raymond Terrace Road.

The unattended noise logging was done using a Rion EL 215 noise logger used as an environmental noise logger. 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 $\pm$ 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.

3.2 Predicted Traffic Noise Levels

In considering potential traffic noise impacts on a residential subdivision it is usual for RMS to look at traffic noise levels projected for 10 years from the timing of a development.

A study undertaken by Parson Brinkerhoff in 2003, (*Thornton North Master Plan, Volume 3 – Traffic Impact Assessment Report, August 2003, Report 2122270A, PR_4055 Thornton_Rev D*) predicted a traffic growth rate of 34% p.a. for Raymond Terrace Road east of Government Road for the period from 2003 to 2016. This figure assumed full development of the Thornton North area and resultant traffic arising from that.

The area, however, is not yet fully developed. It is reasonable to deduce, though, that part of the traffic growth on Raymond Terrace Road, referred to above, had occurred at the time of the noise logging undertaken for the current assessment.

To consider a worst case, an increase in traffic volumes of approximately 25% over existing levels has been used to determine potential impacts. Such a growth in traffic volumes would result in an increase in traffic noise of about 1dB(A). For conservatism, an additional 1dB(A) has been added to the measured levels from the logger data

Table 1 shows the future predicted noise levels for the logger location for 2030 based on a predicted increase in traffic noise of 25% over current levels and the discussion above. The unadjusted logger data are shown graphically in **Appendix I**.

TABLE 1 CALCULATED NOISE LEVELS dB(A)		
Logger	Leq Day (7am to 10pm)	Leq Night (10pm to 7am)
Noise Level	69	65

4.0 NOISE IMPACT ASSESSMENT

At the time of this assessment there were no defined building envelopes in the subdivision. It is anticipated that individual dwelling designs will be lodged to council under the local government regulations in the future. A generic approach to possible noise control options is, therefore, taken here.

Houses in the first row of Lots from Raymond Terrace Road will, likely, face toward the service road in the estate. Due to the size and shape of the blocks the facades of any houses on these Lots will likely be at least a further 5m from the boundary.

In order to assess a conservative scenario, it is, therefore, assumed here that the closest facade of any residence in this first row is located approximately 30m from the edge of the closest trafficable lane on Raymond Terrace Road.

The boundary of the Lots with the easement for Raymond Terrace Road will be approximately 25m from the roadside. Based on the noise logger measurements and, assuming standard ground conditions and no acoustic barriers, the predicted traffic noise level at residences in the closest lots to the road line would be approximately **65 dB(A) Leq (15hr)** during the day and **61 dB(A) Leq (9hr)** at night. That is, a reduction of 4 dB(A) in relation to the noise levels at the logger location due to the increased distance from the noise source.

In keeping with adjacent and nearby subdivisions in the area there is to be an acoustic barrier constructed along the Raymond Terrace boundary of the site. To determine the effects of the acoustic barrier in reducing received noise a representative calculation of barrier insertion loss was undertaken for a cross section from the road to Lot 310 (as indicated with a star on Figure 1).

The particulars of the calculation of barrier insertion loss are detailed below. The R.L. of various locations has been taken from Google Earth data.

The calculation assumes a noise source height of 21.0m (being the road at that location at 19.0m plus 1.0m for the source height representing an average noise source height for the vehicles on the road). The barrier height was 24.8m (R.L. 23.0m at the boundary plus 1.8m fence). The receiver height was assumed to be 26.6m (being R.L. of the ground at 24.5m plus an assumed 0.3m slab height plus 1.8m to the top of a window).

The barrier was considered to be 25m from the noise source (roadside) and a further 5m from the receiver (house facade).

The results of the calculations are detailed in **Table 2**. The table also shows the calculated received noise at the facade of theoretical receivers 5m from the barrier. That is, it includes that additional distance loss from the noise logger to the theoretical residential facade.

TABLE 2
REPRESENTATIVE BARRIER INSERTION LOSS dB(A)
1.8m BARRIER

Location	Insertion Loss	Leq (15hr)	Leq (9hr)
Lot 310	Negligible	65	61

The results in Table 2 show that a 1.8m acoustic barrier along the boundary of the residential blocks would have a negligible effect on received traffic noise levels.

Further calculations of barrier insertion loss were undertaken which showed that, based on the assumptions above regarding site topography, to achieve any significant noise attenuation (>5dB), the acoustic barrier would need to be a minimum of 2.8m high.

5.0 RESULTS AND DISCUSSION

The comments in this section relate to acoustic requirements for any houses in Lots the closest row to Raymond Terrace Road. Other lots will be further from the traffic noise source and will be, at least, partially shielded from the traffic noise by the structure of intervening houses in the noise transmission path. Resultant received noise at these houses would be at levels that would not require specific acoustic treatment.

Noise Control

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)).

More specifically, the Guideline contains advice on the types of noise control applicable to residential premises potentially impacted by traffic

noise. **Figure 2** is a reproduction of Figure B2 from the Guideline showing a typical situation of a dwelling adjacent to a busy road with indicative noise levels for various volumes of traffic. Acoustic consultants often use the Guideline (and Figure B2 specifically) in recommending architectural modifications to achieve the recommended noise levels.

Figure 2 shows a traffic noise level of 68 dB(A) at windows W1 and W2 directly facing the road. Windows W3 and W4, however, are on facades perpendicular to the road, thereby being shielded from 50% of the traffic noise by the building structure, and noise levels are 2-3 dB below the traffic noise level at W1 and W2. Window W5 is approximately twice the distance from the road as W4 and experiences an external traffic noise level 4 dB below the level at W4.

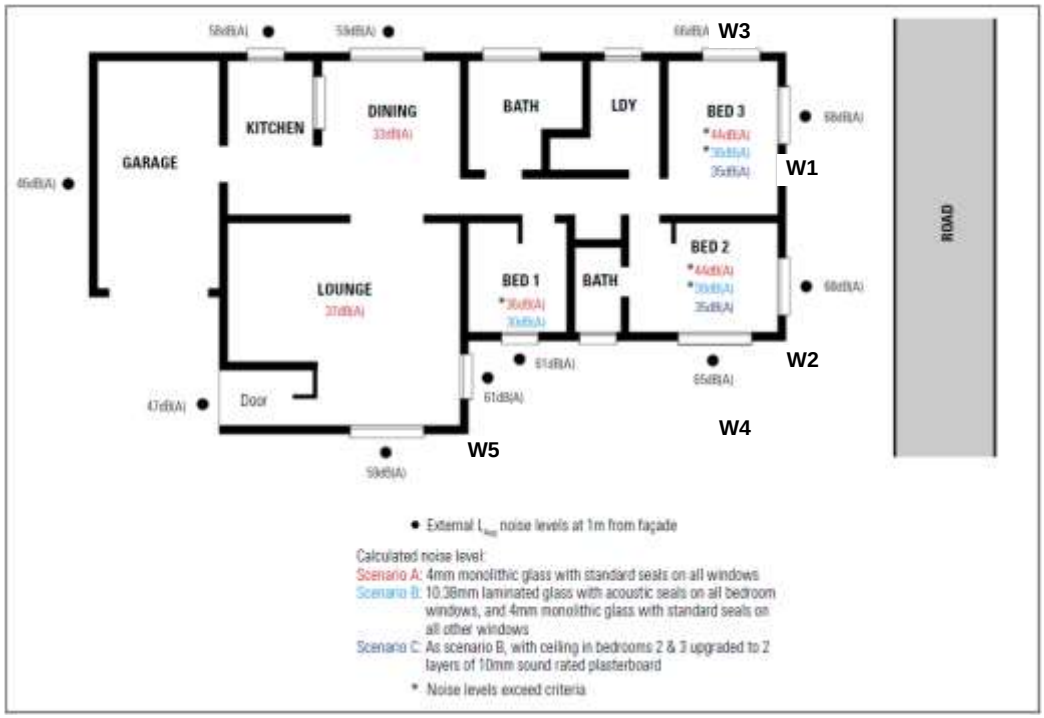


Figure 2 - Traffic noise reduction for various construction types.

Based on the adopted traffic noise levels detailed in Section 4.0, this indicates that the facade of any living areas in the row of houses closest, and with full line of sight, to Raymond Terrace Rd needs to attenuate 25 dB(A) of traffic noise (being 65 – 40). Similarly, the facade of any sleeping areas facing the road needs to attenuate 26 dB(A) of the traffic noise.

Figure 2 also gives the traffic noise attenuation for three construction scenarios labelled A, B and C. Interpretation of the figure indicates a construction scenario the equivalent of being between A and B is applicable to the current assessment. The specifications for these scenarios are reproduced, below, from the Guideline.

Specification A

Windows	standard 4mm monolithic glass with standard weather seals on all windows	(Rw 25)
Doors	30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms	(Rw 24)
Walls	brick-veneer and standard plasterboard on timber studs with insulation in cavity	(Rw 52)
Roof	tiled roof and standard plasterboard ceiling with insulation	(Rw 43)
Floor	concrete slab	

Note: 'Rw' is the weighted sound reduction index of a building element

Specification B

Windows	10.38mm laminated glass with acoustic seals on all bedroom windows, standard 4mm monolithic glass with standard seals on all other windows	(Rw 35)
Doors	30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms	(Rw 24)
Walls	brick-veneer and standard plasterboard on timber studs with insulation in cavity	(Rw 52)
Roof	tiled roof and standard plasterboard ceiling with insulation	(Rw 43)
Floor	concrete slab	

The construction types detailed above for Specifications A and B should be regarded as indicative only.

Based on the details in Figure 2, the information in the tables above indicate that, under the assessed conditions, standard building construction will achieve the required noise attenuation and provide an adequate internal noise amenity.

The acoustic treatment of a residence is dependent on several factors relating to such things as room size and orientation, the size and location of windows or other openings and shielding from other structures. If warranted, detailed acoustic treatment options would usually require specific analysis at the design stage of each residence.

By way of illustration of this, **Table 3** summarises the indicative traffic noise reduction provided by construction scenario A for the cases in Figure 2 where a room contains either one or two windows exposed to the traffic noise.

TABLE 4
TRAFFIC NOISE REDUCTION (dB) (from Figure B2 of the Interim Guideline (2008))

Construction scenario	Noise reduction (2 windows)	Noise reduction (1 window)
Scenario A	23	25

Building Treatments

As described above, the construction types shown in the table are not a specific requirement for the site. Other construction options would be permissible provided it can be demonstrated that they will achieve the required sound transmission loss (i.e. 25 or 26 dB(A)).

Typically, this would approximate to about Rw 28 to 30 which could be achieved using standard building techniques and an upgrade to windows, in the most exposed rooms, to 6.38mm laminated glass.

In general, 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 good acoustic practises in house design.

Walls

Masonry walls typically have better noise insulation properties than other elements in the building envelope. Typically, walls are not a significant noise transmission path. Attention, therefore, should be given to the windows, doors, roof and ventilation openings as these elements will not insulate as well as the walls.

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. On noisy sites lightweight cladding should be avoided unless specifically designed to provide adequate insulation.

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.

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 numbers 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.

Other factors influencing the acoustic performance of windows include:

- 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 the 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.

6.0 - CONCLUSION

An assessment has been carried out into the potential for noise from traffic passing along Raymond Terrace Road, Thornton to impact on parts of proposed residential subdivision at 523 Raymond Terrace Road (Lot 100, D.P.847510).

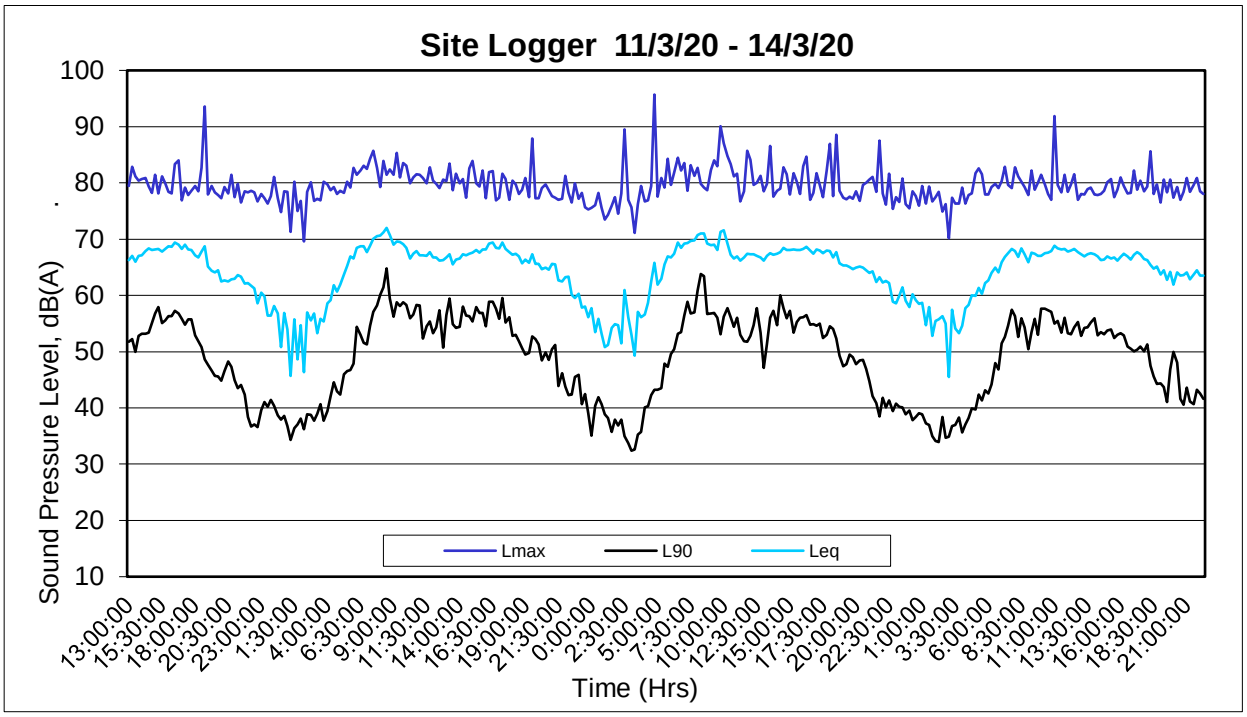
The assessment has shown that the application of relatively common architectural treatments can be employed to achieve an adequate acoustic amenity at any future residences that may be constructed in the area.

The construction of a standard 1.8 (or 2.1m) high acoustic barrier along the Raymond Terrace Road boundary of the site will provide little acoustic benefit.

In conclusion, there is no acoustic reason why the subdivision should not be approved.

APPENDIX I

NOISE LOGGER CHARTS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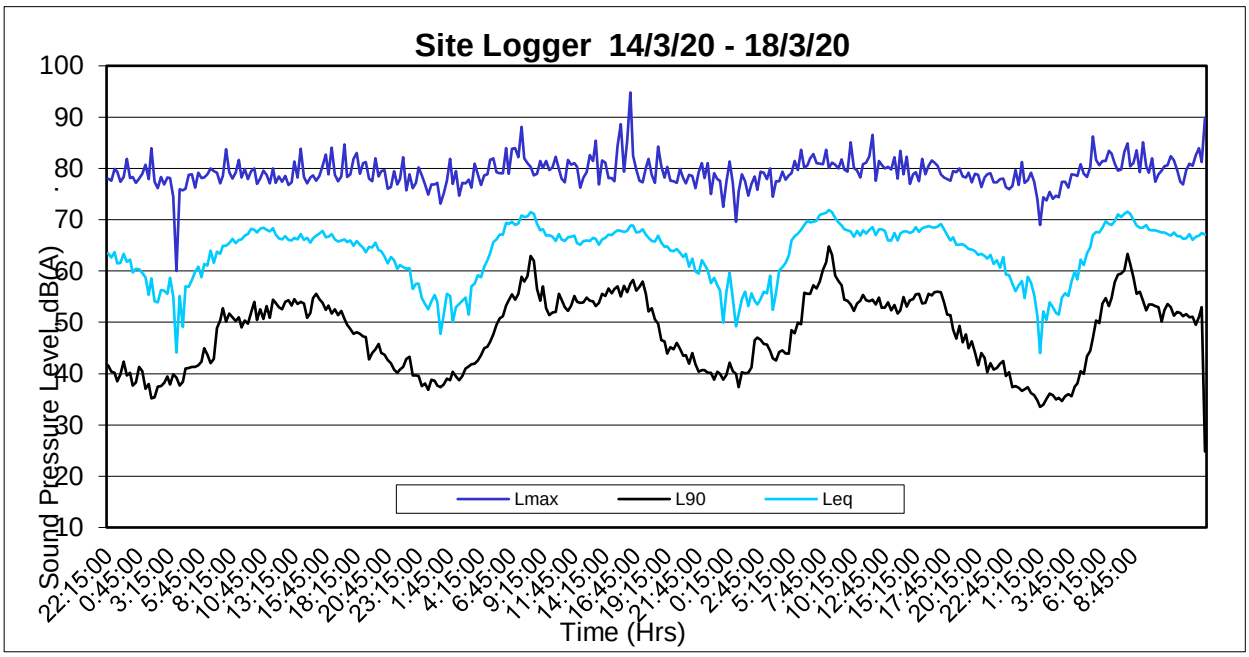
Site Logger 14/3/20 - 18/3/20
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40
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