14 April 2022

Ref: 212107R/29418

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RE: TRAFFIC NOISE – 34 MELBOURNE STREET, EAST MAITLAND

This letter report provides the results, findings and recommendations arising from an assessment of the potential traffic noise impacts on a proposed new mixed use development to be constructed at 34 Melbourne Street, East Maitland, NSW (shown with a star on **Figure 1)**. The proposal is for a two storey building with commercial spaces on the ground floor and three residential units above.

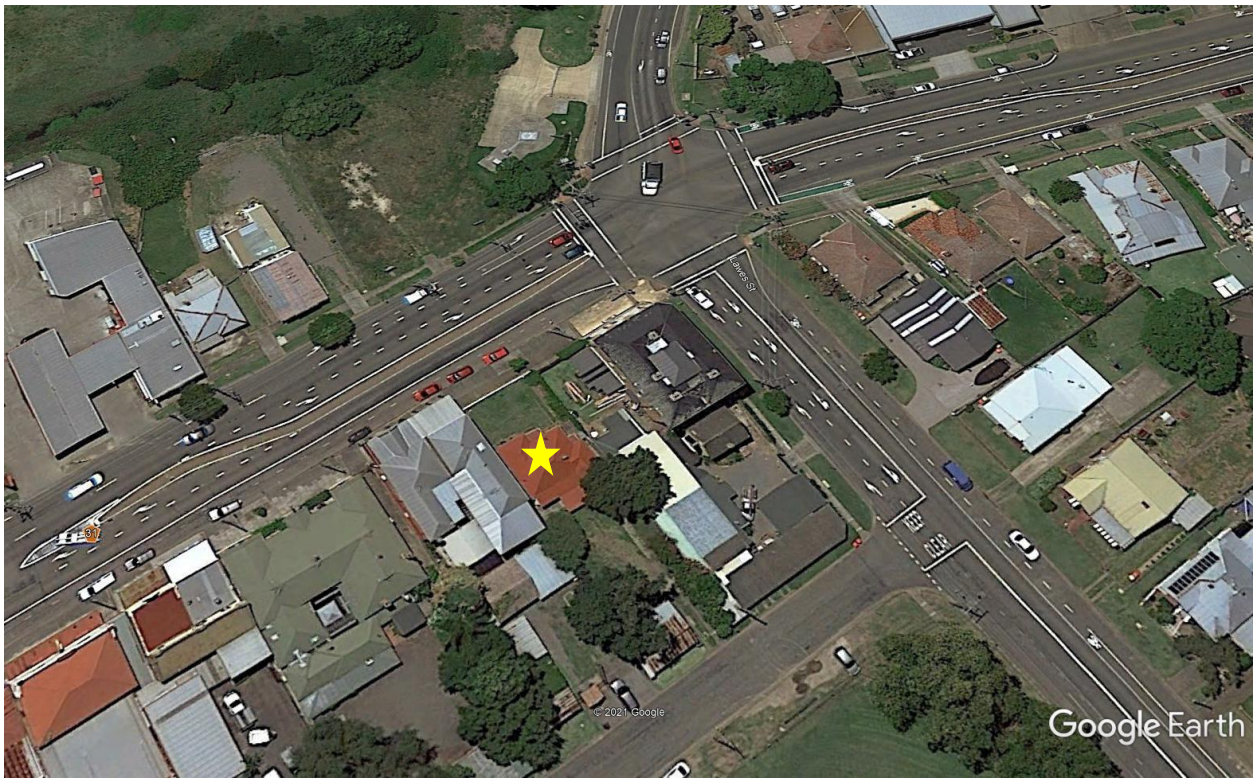


Figure 1 – Location Plan

The assessment has been prepared for Maitland City Council to address potential impacts on the proposed development due to noise emissions from traffic on Melbourne Street.

AMBIENT NOISE LOGGING

The existing traffic noise levels were monitored on site by Spectrum Acoustics from Monday 31st May to Monday 7th June, 2021.

Data was recorded at 15 minute statistical intervals using an ARL EL-315 Ngara environmental noise logger located on the site at 34 Melbourne Street as shown in **Appendix I**.

The measurements were conducted in accordance with relevant EPA guidelines and AS 1055-2018 "Acoustics – Description and Measurement of Environmental Noise". The noise logger used complies with the requirements of AS 1259.2-1990 "Acoustics – Sound Level Meters", and has current NATA calibration certification.

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

Ambient Leq and background (L90) noise levels, obtained from the logger, are summarised below in **Table 1** and shown graphically in Appendix I. The data is typical of the acoustic environment close to a major road with traffic noise increasing from early morning. Tree loppers were working on the site during the period between approximately 1pm and 5pm on Tuesday 2nd June, resulting in spurious elevated noise levels. The logger data for this period has been removed from the set prior to any analysis. The results shown in Table 1, therefore, exclude the noise from tree lopping.

TABLE 1
MEASURED AMBIENT NOISE LEVELS 31/5/21 to 7/6/21

Location	Day	Night
34 Melbourne Street	51 dB(A) L90	38 dB(A) L90
	60 dB(A) Leq	55 dB(A) Leq

The logger was located at the front of the existing dwelling on the site, approximately 25m from the centre of the traffic on Melbourne Street. The closest facade of the proposed residences will be approximately 17m from the centre of traffic. This would indicate that the traffic noise at the proposed facade would be approximately 1 dB higher than those measured at the logger.

It is usual for Transport for NSW (TfNSW) and Councils to require design standards to meet projected traffic levels for the 10 years after a development is completed. Assuming an increase in traffic volumes of 25%, over those at the times of the noise logging, this would lead to a resultant increase in traffic noise of slightly less than 1 dB(A) Leq.

Adding both the correction for distance and that for future growth would result in noise levels at the closest facade of the proposed residences of **62 dB(A),Leq (15 hr)** during the day and **57 dB(A),Leq (9 hr)** at night.

The future predicted night time noise level will be used to assess potential impacts in bedrooms and the future predicted day time noise level will be used to assess potential impacts in living areas. Due to the open plan design of the units, kitchens will be regarded as living spaces for the assessment of impacts.

The architectural drawings of the buildings, supplied by the proponent will form the basis of this assessment.

Windows and glass sliding doors in the facade of the building will be the most significant noise leakage paths into the living spaces. The remainder of the facades which are most exposed to the traffic noise will be brick veneer with internal plasterboard linings which will provide sufficient sound transmission loss to deliver an adequate internal acoustic amenity.

TRAFFIC NOISE IMPACTS

The Office of Environment and Heritage (OEH) NSW Road Noise Policy (RNP, 2012), as adopted by TfNSW, recommends various criteria for different road developments and uses. For new residential developments near roads, the RNP advises that land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW, 2007). The SEPP (2007) is supported by the Department of Planning guideline "Development near Rail Corridors and Busy Roads – Interim Guideline" (2008) which gives the following criteria in Section 3.5:

- In any bedroom in the building: **35 dB(A), Leq** at any time 10pm – 7am, and
- Anywhere else in the building (other than a garage, kitchen, bathroom or hallway): **40dB(A), Leq** at any time.

Note that for considering the practical implications of noise impacts open plan kitchens, ensuites and hallways opening directly to living spaces are all considered according to the classification of the adjoining space.

The noise 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.

The RNP states that each component of a mixed use development should be assessed separately. In regards to the commercial space guidance has been taken from AS/NZS 2107. The end use of the commercial space is not known at the time of the current assessment.

To consider some possible scenarios, AS2107 indicates that the internal noise level in a shop building/small retail store should be less than 50 dB(A) Leq. For an office building/general office area the design level is 40 to 45 dB(A). To allow for all options a design criteria of 40 dB(A) Leq has been adopted here.

Figure 2 is a reproduction of Figure B2 from the Interim Guideline showing a typical situation of a dwelling adjacent to a busy road. This Guideline (and Figure B2 specifically) is often used in recommending architectural modifications to achieve the recommended noise levels.

Figure 2. - Traffic noise reduction for various construction types

Figure 2 shows a theoretical example of a traffic noise level of 68 dB(A) at windows W1 and W2 directly facing the road. Windows W3 and W4 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.

These shielding and distance corrections have been made to the measured data for the current project prior to the further analysis detailed below. That is, for example, the bedroom windows at the proposed residence are on the rear façade of the building relative to the traffic noise. The detail in Figure 2 indicates that the traffic noise level at these windows will be reduced by more than 20 dB(A).

To achieve adequate internal noise levels in a residential development, such as that in the current proposal, noise control is, typically, achieved through architectural modifications to standard residence design and the recommendation of minimum construction types.

The acoustically weak points in the facade of the proposed building are the glazed areas (windows and sliding doors) exposed to traffic noise emanating from vehicles using Melbourne Street. It is noted that the design of the building has included good acoustic principles and there are minimal acoustic weak points that are directly exposed to the traffic noise.

Calculations to determine appropriate internal noise levels for each room were performed based on the room dimensions and glazing areas. All such dimensions and areas were determined by reference to, and scaling from, the appropriate building plans.

Once the noise level at the outer face of each glazed area was determined from the adjusted logger data and corrected for incidence and distance (as per Figure 2), the required Rw was calculated in accordance with the mathematical procedure given in AS3671-1989 "Acoustics - Road traffic noise intrusion - Building siting and construction". This procedure is based on the required internal noise level as shown in Tables 3 and 3a of the Standard.

Sample Calculation

Detailed below is a sample calculation of the required Rw for the glass sliding door to the Living/Dining/Kitchen in Residence 1, which is on the first floor and faces the traffic on Melbourne Street.

The road traffic noise level at the windows is 62 dB(A), (i.e., Leq day time). As the criterion for the living room is 40 dB(A) the required traffic noise reduction is;

$$TNR = 62\text{-}40 = 22 \text{ dB(A)}.$$

The traffic noise attenuation, *TNA*, required of the sliding door is calculated according to the equation given in Clause 3.4.2.6 of AS 3671,

$$TNA = TNR + 10\log_{10}[(S/S_f) \times 3/h \times 2T_{60} \times C] \quad \textit{Equation 1}$$

where
- S = Surface area of sliding door = 8.4m^2
- S_f = Surface area of floor = 42m^2
- h = Ceiling height, assumed to be 2.4m
- T_{60} = Reverberation time, 0.5s
- C = No. of components in wall = 2 (wall and window)

Assuming that the room is acoustically average (neither too 'live' nor too 'dead') equation 9.26 in *Noise and Vibration Control*, L.L.Beranek, 1971, gives a reverberation time of 0.46s. Consequently, the value of 0.5s was used in equation 1.

Using the values listed above gives;

$$TNA = 19 \text{ dB(A) for the window}$$

Substituting this value into the equation given in Clause 3.4.3.1 of AS3671 gives;

$$Rw = TNA + 6 \approx 25.$$ (note: the +6 is an allowance for the low frequency component of road traffic noise)

The results of the calculation show that the sliding door in Residence 1 should be fitted with a glazing system that will achieve an Rw of at least 25.

Similar calculations to those above were undertaken for all windows with the resultant Rw values shown on **Figure 3**. The traffic noise levels at the various glazed areas are depicted based on the corrections discussed above. Noise levels at bedrooms windows are based Leq (1hr) for the night period (see Table 1) and levels at living room windows are the Leq (1hr) for the day period.

Figure 3 shows the plan for Units 1 and 2 on the First Floor of the building. Unit 3 is located behind the other units relative to the road traffic noise and is effectively acoustically shielded from that noise by the structure of those units. There are no acoustic requirements for that unit.

It is assumed that the commercial spaces will be fitted with 6mm safety glass which will be acoustically adequate to achieve the adopted internal noise level of 40 dB(A) Leq.

First Floor

Figure 3. – Required Rw Values

The Rw of any glazing system varies with manufacturers and can be influenced by such things as frames, seals, closing systems etc. Published sound insulation performance in terms of Rw ratings relate to partitions tested in ideal laboratory conditions or opinions based on such measurements and suppliers must be able to ensure compliance with the detailed Rw ratings when windows are installed on site.

All windows must be in solid frames fitted as neatly as possible to the parent wall. Any remaining gaps between the frame and the parent wall must be filled with a flexible acoustic sealant prior to fitting of architraves.

Section 3.6.1 of the Guideline states:

"If internal noise levels with windows or doors open exceed the criteria by more than 10 dBA, the design of the 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."

It is generally accepted that the noise loss through an open window to the centre of a room is 10 dB(A) (source: Environmental Noise Management Manual). The above condition, therefore, does not apply to any rooms in the proposed development.

The plans for the house show that the remainder of the construction will incorporate relatively high mass building elements which will be acoustically adequate in attenuating the traffic noise.

In conclusion, the results of this assessment have produced a schedule of minimum Rw's for glazed areas in the proposed development. Compliance with these minimum requirements will ensure an adequate internal acoustic amenity for future occupants of the residences.

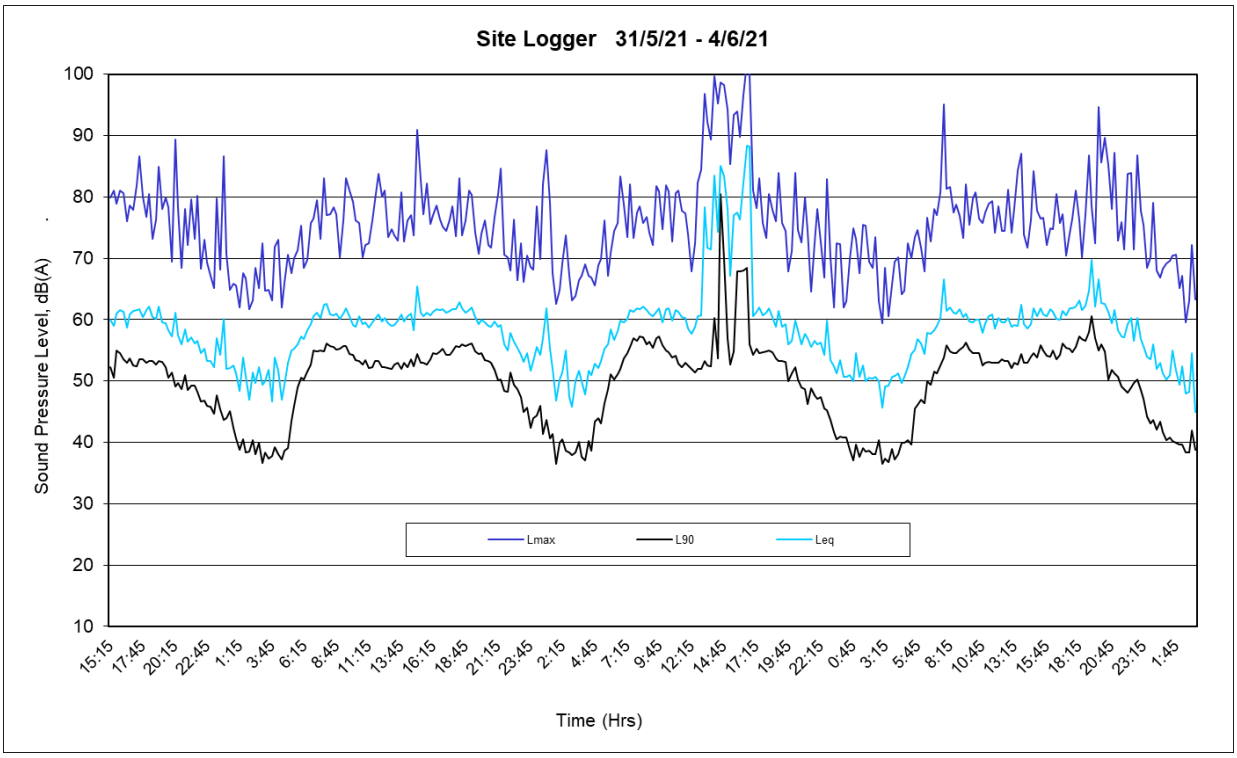
We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 0412 023 455.

SPECTRUM ACOUSTICS PTY LIMITED

Ross Hodge
Principal/Director

APPENDIX I

NOISE LOGGER DATA CHART & LOCATION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Sound Pressure Level, dB(A)
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60
50
40
30
20
10
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L90
Leq
15:15
17:45
20:15
22:45
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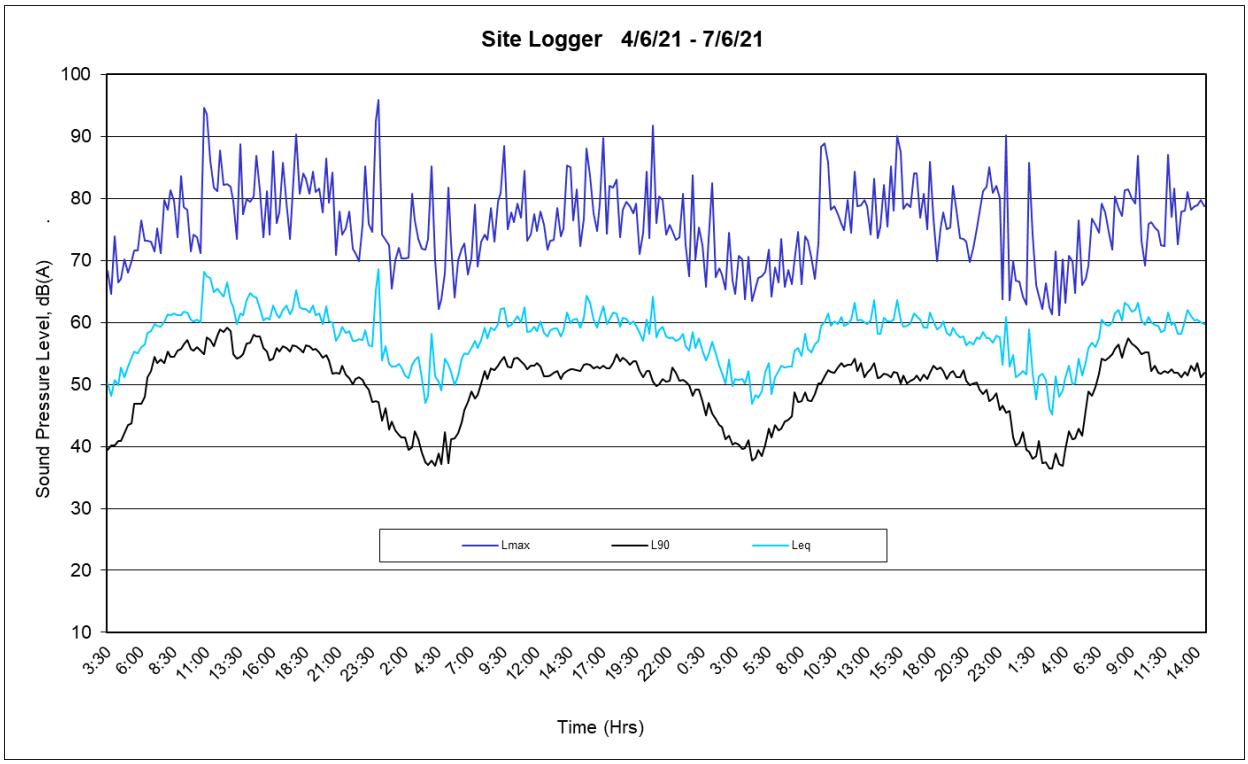
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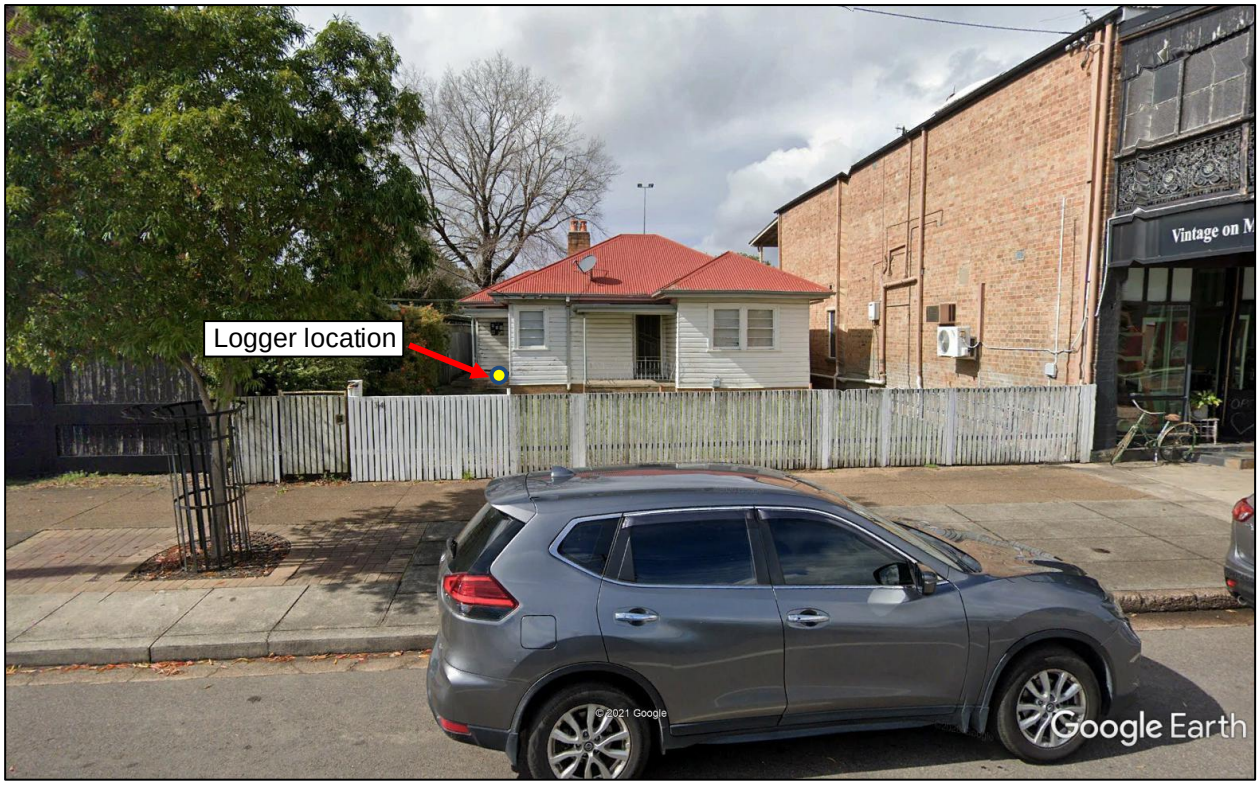
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