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SNL Building Constructions Pty Ltd
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RE: NOISE ASSESSMENT – 150 TO 156 LAKE ROAD, ELERMORE VALE

This report provides the results, findings and recommendations arising from an acoustical assessment of the noise emanating from traffic passing along Lake Road, Elermore Vale, NSW impacting on the proposed multi residential development at numbers 150 (Lot A DP 350420) 152 (Lot 1 DP 725264), 154 (Lot A 394165) and 156 (Lot B 394165) Lake Road, Elermore Vale (see site plan attached as **Appendix A** to this report).

The purpose of the assessment was to determine the traffic noise levels generated for projected traffic flow, to 2025, on Lake Road and to recommend mitigation measures if exceedances of the relevant criteria occur.

The assessment was requested by SNL Constructions, to accompany a Development Application to Newcastle City Council (NCC).

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). 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) have been set for bedrooms during the night time period and 40 dB(A) for other habitable rooms."*

Additionally, NCC has previously advised that the criteria for bedrooms must also be met during the daytime period.

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).

To measure the existing traffic noise in the area ambient noise monitoring was conducted at the site from 13 February to 19 February, 2015. An ARL Type EL – 215 environmental noise logger was located in the front yard of number 150 Lake Road at a distance of approximately 20m from the centre of traffic on Lake Road.

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.

The relevant metrics taken from the logger measurements are shown below in **Table 1**. The data is shown graphically in **Appendix B**. The logger was located less than 1m from the façade of the existing residence and, therefore, there is no façade correction necessary as per RMS requirements. A full set of logged data is not included in this report but is available on request. The graphs of the logger data show that the acoustic environment of the area is dominated by traffic noise which increases sharply from very early morning.

TABLE 1
MEASURED NOISE LEVELS dB(A)

Percentile	Leq (period)
Day (i.e. 7 am to 10 pm)	71
Night (i.e. 10 pm to 7 am)	67

It is usual for RMS and Councils to require design standards to meet projected traffic levels for the 10 years after a development is completed. AADT figures for Lake Road, south of Reservoir Road, show that traffic levels increased from approximately 26,000 vpd in 1986 to approximately 28,000 vpd in 2002, which equates to an average growth of just over 0.75% p.a. Assuming this growth rate is to continue would result in a total increase in traffic volumes of less than 10% over current levels. This would lead to a resultant increase in traffic noise of slightly less than 0.5 dB(A) Leq or a total at the facade of the proposed residence of **71 dB(A),Leq (15 hr)** during the day and **67 dB(A),Leq (9 hr)** at night.

Assuming that noise at the above levels is incident upon the exposed facade of a proposed residence, the daytime noise level of 71 dB(A) must be reduced by 36 dB(A) in order to achieve the night time criterion of 35 dB(A) within bedrooms, and by 31 dB to achieve the criterion of 40 dB(A) within living rooms.

The architectural drawings of the buildings, supplied by the proponent (plans by Kim Gerrish Building Design, Job No. 1522, Section 96 version dated 5 September 2016), show that Units 1 to 11 are most

exposed to traffic noise. These units are in the first row in relation to Lake Road (With unit 1 having direct frontage to the road).

The most significant noise leakage paths in Units 1 to 11 exist through windows and glass doors on the facades with line of sight to Lake Road. The remainder of these façades will incorporate high mass building elements that provide good attenuation of mid to low frequency noise typically generated by road traffic.

The supplied plans will form the basis of the noise assessment. Transmission paths considered will include external windows and doors on the relevant facades. All dimensions required for the calculations were determined by reference to, and scaling from, the appropriate site plans.

Once the noise level at the outer face of a window was determined, the required Rw was calculated in accordance with the mathematical procedure given in AS3671-1989 "Acoustics - Road traffic noise intrusion - Building siting and construction".

Sample Calculation

Detailed below is a sample calculation of the Rw for the window in Bedroom 2 of Unit 9 (a Eucalyptus A type unit per the schedule). This window will be fully exposed to the traffic noise from Lake Road.

The Infrastructure SEPP refers specifically to sleeping areas and living areas. For the purpose of assessing potential impacts bedrooms are, typically, regarded as sleeping areas and, as such, in use at night. The night time traffic noise level, is, therefore, usually considered applicable to calculating the required Rw for windows to sleeping areas.

That is, the attenuation of night time traffic noise to comply with the Infrastructure SEPP will result in a satisfactory internal noise level in the bedrooms when they are being used as sleeping areas. NCC, however, has indicated they require consideration be given to these areas being used, at other times, as sleeping areas. Under such circumstances the day time traffic noise at the bedroom windows would be 71 dB(A), this being the future predicted day time traffic noise.

The criterion for a sleeping area is 35 dB(A), therefore, the required traffic noise reduction is;

$$TNR = 67\text{-}35 = 32 \text{ dB(A)}.$$

The traffic noise attenuation, *TNA*, required of the window 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 windows = $1.2m^2$
S_f = Surface area of floor = $8m^2$
h = Ceiling height, assumed to be 2.4m
T_{60} = Reverberation time, 0.5s
C = No. of components = 2 (wall and 1 x 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 = 28 dB(A) for the windows.

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

Rw = *TNA* + 6 ≈ 34 (note: the +6 is an allowance for the low frequency component of traffic noise)

The results show that the window in the bedroom should be fitted with glass with a minimum Rw of 34, which would, typically, be achieved by installing 10.38mm laminated glass. 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.

Similar calculations to that outlined above were performed for the windows on all affected facades of the other Units. From these calculations the required Rw and indicative glazing thickness for each potentially affected window was determined as presented in **Table 2** below. Windows not listed in the table may be of standard thickness.

TABLE 2
SCHEDULE OF GLAZING REQUIREMENTS

Unit No.	Room Type/No.	Rw Required	Typical Glazing Required*
Lake Rd Villa	Living	34	10.38 mm laminated
Lake Rd Villa	Bed 2	39	Double Glazed
2 to 9	Dining	30	6.38 mm laminated
2 to 9	Bed 2 (facing road)	34	10.38 mm laminated
10	Living/Dining	25	5mm Float
10	Bed 1	30	6.38 mm laminated
11	Living	24	4mm Float
11	Bed 1	29	6.38 mm laminated

As indicated above the glazing requirement detailed in Table 2 are indicative only. That is, the Rw of glazing systems varies with manufacturers and can be influenced by such things as seals, closing systems etc. Before installation the glazing supplier should provide evidence that the proposed window systems to be fitted will meet the minimum Rw requirements listed in Table 2.

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. Failure to attend to this detail may result in significant compromise to the acoustic integrity of the window systems and reductions to in situ Rw's.

Standard louvre windows have very poor sound transmission loss qualities and are not recommended for facades with line of sight to Lake Road. Heavy duty, acoustically sealed, louvre windows that can be shown to achieve the required Rw can be considered.

Traffic noise at the façade of units not shown in the Table (those further removed from the road and traffic noise) will be adequately attenuated by the additional distance loss and the acoustic shielding effects of the units closer to the road and the topography of the landform. Standard glazing will be suitable for these units.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please do not hesitate to contact the undersigned.

Yours faithfully

SPECTRUM ACOUSTICS PTY LIMITED

Ross Hodge
Acoustical Consultant

APPENDIX A
SITE PLAN

APPENDIX B
NOISE LOGGER CHART