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MULGOA SUBDIVISION – STAGE 1

DA Acoustic Assessment

3 April 2024

MIRVAC

TN871-01F02 Traffic Noise Report (r1)

35 1982-2017 ACOUSTIC ENGINEERING EXCELLENCE

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1 Introduction

Renzo Tonin & Associates was engaged to undertake a noise impact assessment of the proposed Stage 1 residential sub-division (approximately 228 lots) at the corner of Chain-O-Ponds Road and The Northern Road, Mulgoa (Stage 1).

This report has been prepared to address the acoustic requirements of *SEPP (Transport and Infrastructure) 2021*, the *Penrith Council DCP (2014*) and *Development Near Rail Corridors and Busy Roads – Interim Guideline*.

The purpose of this assessment is to determine existing road traffic noise levels at site, to demonstrate that the proposed subdivision development is capable of meeting acoustic requirements with respect to internal noise levels and determine appropriate building control treatments to ensure an acceptable level of internal acoustic amenity is achieved, in accordance with *SEPP (Transport & Infrastructure) 2021*.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

APPENDIX A contains a glossary of acoustic terms used in this report.

1.1 References

- Penrith Council DCP 2014
- NSW Government. State Environmental Planning Policy (Transport and Infrastructure), 2021.
- NSW Department of Planning, Industry and Environment (DPIE). '*Development Near Rail Corridors and Busy Roads – Interim Guideline*', 2008.
- Architectural drawing prepared by ADW Johnson, dated 30/10/2023.
- Traffic report prepared by Transport Planning, dated 30/10/2023.

2 Project Overview

The DA seeks consent for the seditions to 228 residential dwellings at Mulgoa. No dwellings re proposed under this DA, dwelling construction will be subject to separate approval.

The subject site is located within the Penrith Council local government area (LGA) in Mulgoa.

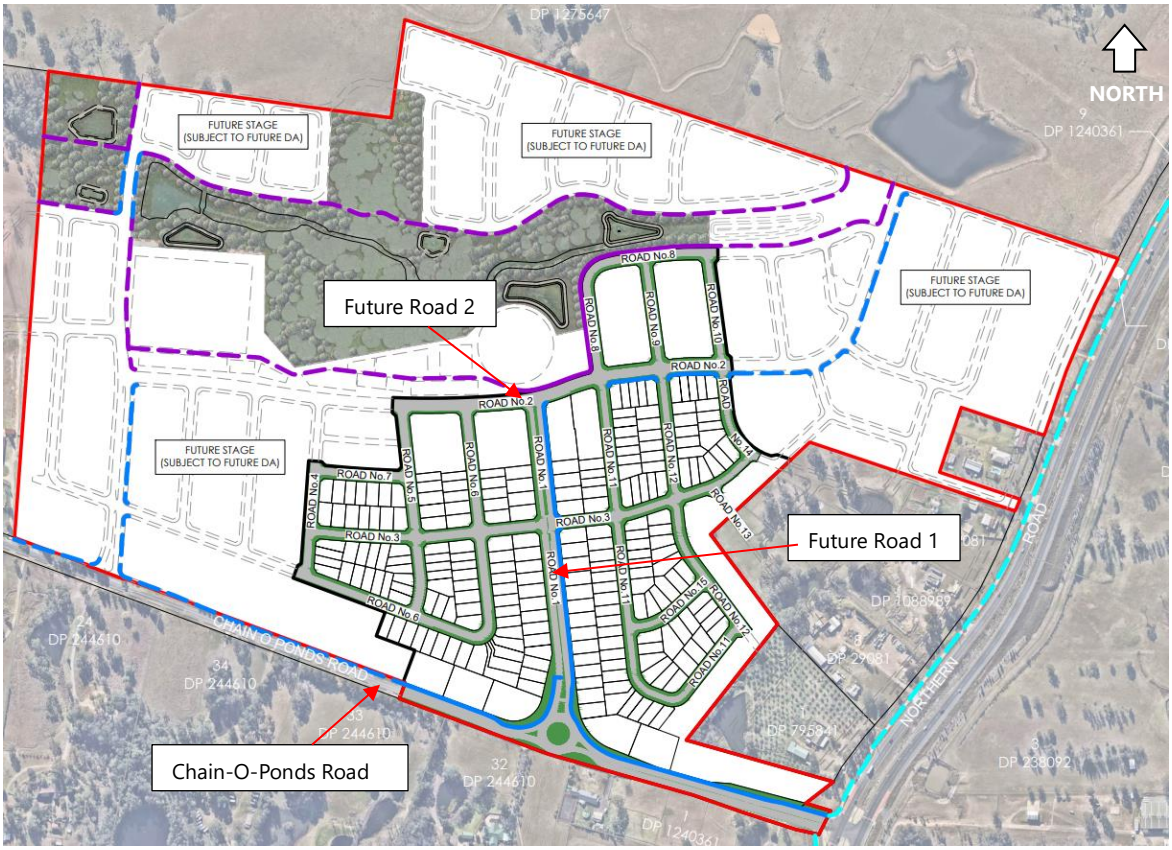
It will be bounded by:

- North and West – Future residential sub-divisions.
- East by existing by commercial and residential development adjacent to the Northern Road.
- South – Chain-O-Ponds Road (Collector Road).

There will be a number of internal roadways created as part of the subdivision. It is anticipated that new Internal Roads 1 and 2 will be considered as Collector Roads following the development of the sub-division.

See below.

Figure 2-1: Site Context



3 Noise criteria

3.1 Penrith Council DCP (2014)

Regarding the developments affected by noise from existing or possible future rail or traffic noise, Section C12.1 of the DCP on Road Traffic noise states:

1) Road traffic noise criteria including sensitive land uses

a) Council will not grant consent to development, particularly residential development, including subdivisions, unless the impact of traffic noise from freeway, arterial, designated or collector roads complies with the standards and guidelines for road traffic noise prepared by the relevant State Government authorities or agencies, as well as relevant Australian Standards.

b) Council will not grant consent to development for sensitive land uses unless it complies with the provisions and standards for road traffic noise prepared by the relevant State Government authorities or agencies, as well as relevant Australian Standards.

c) Sensitive land uses subject to road traffic noise criteria referred to in b) above include educational establishments (including schools), places of public worship, hospitals, and passive and active recreation areas.

Regarding the private open space affected by noise from existing or possible future rail or traffic noise, Part D2 Section 2.4.19 of the DCP on acoustic privacy of private open space states:

2.4.19 Visual and Acoustic Privacy and Outlook

A. Objectives

a. Provide an outlook from dwellings and their private open space, and achieve levels of acoustic and visual privacy that are reasonable for a residential neighbourhood.
b. To provide a high level of visual and acoustic privacy for residents and neighbours in dwellings and private open space.
c. To ensure that building design minimises overlooking problems.

There are no specific noise goals set out by the DCP, because of this *SEPP (T&I) 2021* and *Development Near Rail Corridors & Busy Roads – Interim Guideline* will be adopted.

3.2 Department of Planning Publication 'Development near rail corridors and busy roads - Interim guideline'

The Guideline provides direction for developments that may be impacted by rail corridors and/or busy roads and consideration for the Guideline is a requirement for development specified under the SEPP.

The Guideline recommends an acoustic traffic assessment be undertaken for roads having an AADT of greater than 20,000 and less than 40,000 vehicles per day and states an assessment is mandatory for roads having an AADT of greater than 40,000 vehicles per day.

The internal noise goals determined in the Guideline are presented below.

Table 3-1: DoP Guideline Internal Noise Levels

Condition	Occupancy	Design Internal Noise Level
Windows closed	Bedroom (10pm – 7am)	35 dB(A) $L_{eq\ 9hr}$
	Living / Dining /Kitchen (24 hours)	40 dB(A) $L_{eq\ 15hr}$
Windows open	Bedroom (10pm – 7am)	45 dB(A) $L_{eq\ 9hr}$
	Living / Dining /Kitchen (24 hours)	50 dB(A) $L_{eq\ 15hr}$

3.3 Australian/New Zealand Standard AS/NZS 2107:2016

As traffic noise levels are not constant, an L_{eq} noise level descriptor is used when assessing this type of noise source. The L_{eq} is the mean energy level of the noise being measured and has been found to accurately describe the level of annoyance caused by traffic noise.

This standard provides recommended noise levels for steady state such as noise from building services and quasi-steady state sounds, such as traffic and industrial noise. The noise levels recommended in AS/NZS 2107:2016 take into account the function of the area and apply to the sound level measured within the space unoccupied although ready for occupancy.

This standard recommends the following noise levels for residential buildings.

Table 3-2: Design sound levels and reverberation times for different areas of occupancy in buildings

Item	Type of occupancy/activity	Design sound level (LAeq,t) range	Design reverberation time (T) range, s
7	**RESIDENTIAL BUILDINGS (see Note 5 and Clause 5.2)**		
	Houses and apartments in suburban areas or near minor roads -		
	Apartment common areas (e.g. foyer, lift lobby)	45 to 50	-
	Living areas	30 to 40	-
	Sleeping areas (nighttime)	30 to 35	-
	Work areas	35 to 40	-

NOTES:

1. Reverberation time should be minimized for noise control.
2. Health requirements for hygiene and infection control may preclude achieving these recommended reverberation times.

4 Traffic Noise Assessment

4.1 Traffic Volumes

The Traffic Report prepared by Transport Planning dated, 30/10/2023 provides traffic volumes for 2036 for Chain o ponds and internal roadways.

The Comprehensive Transport Impact Assessment Stage 2 dated 19 August 2022 was prepared to accompany the rezoning of the site and provides traffic volumes for 2036 for Chain-O-Ponds Road and internal roadways when the site is fully developed. This report was used for traffic volumes for 2036 for Chain o ponds and internal roadways.

Appendix 2 presents an extract showing 2036 future traffic flows on northern road and the Entry Boulevard (north of Stage 1).

Roads 1 and 2 are not specifically identified, however the maximum anticipated traffic flow can be inferred by the traffic volumes shown for the internal roadway connection Chain-O-Ponds Road and the Entry Boulevard.

Traffic volumes are as follows:

Table 4-1: Traffic volumes and compositions

Road	Total number of vehicles in peak hour	Speed, km/h
Chain-O-Ponds Road (2036 Year) *	971	60
Future Road 1 (2036 Year) *	432	60
Future Road 2 (2036 Year) *	492	60

*Traffic Data from email from Transport Planning dated 19/8/2022.

4.2 Prediction methodology

Noise predictions are based on a method developed by the United Kingdom Department of Environment entitled '*Calculation of Road Traffic Noise (1988)*' known as the CoRTN (1988) method. The method has been adapted to Australian conditions and extensively tested by the Australian Road Research Board. As a result, it is recognised and accepted by the NSW Environment Protection Authority (EPA). The model predicts noise levels for steady flowing traffic and adjustments have been made to account for the higher source locations associated with heavy vehicle engines and exhausts.

The noise prediction considers the following:

Table 4-2: Summary of modelling inputs

Input parameters	Input used
Source height	0.5m for car engines, exhaust, and car & truck tyres, 1.5m for truck engines and 3.6m for truck exhaust as detailed within CoRTN
Ground topography at receiver and road	From architectural drawings
Angles of view from receiver	Calculated within CoRTN
Reflections from existing barriers, structures, and cuttings on opposite side of road	Calculated within CoRTN
Air and ground absorption – Values vary between 0 (hard surface) to 1 (100% absorptive)	0.3 has been used in this study *It is noted that where screening is calculated CoRTN uses hard surface correction.*
Receiver heights	1.5m above ground level for ground floor and 4.5m above ground level for 1st floor
Building setbacks	This report assumes all dwellings are constructed a minimum of 1 metre from both side boundaries and 4.5m from the front.

4.3 Results

Table 4-3 below outlines the predicted traffic noise levels were calculated based on predicted traffic volumes for Years 2036 which also includes widening of the current Richmond Road.

The calculated traffic noise levels at building facades at Lot 7009 are shown in Table 3-1 below:

Table 4-3: Predicted Peak Hour Traffic Noise Levels at Site (Year 2036)

Noise Source	Receiver Location	Predicted Traffic Noise Levels $L_{Aeq,\ T}$
Future Road Number 1, 2	Lots along Future Road Number 1 (5.5m set back)	Daytime (7am-10pm) - 64dB(A)$L_{eq(1hr),}$ Night time (10pm-7am)- 61dB(A)$L_{eq(1hr),*}$
Chain-O-Ponds Road	Lots along Chain-O-Ponds Road (15m setback)	Daytime (7am-10pm) - 64dB(A)$L_{eq(1hr),}$ Night time (10pm-7am)- 61dB(A)$L_{eq(1hr),*}$

*Typical difference between day and night peak for Collector Roads.

Recommended building treatments to ensure that suitable internal noise levels are achieved are detailed in Section 5.

5 Noise control treatment recommendations

The following provides noise control recommendations to reduce road traffic noise intrusion into residential dwellings.

As detailed dwelling designs are not available, the recommendations are based on a number of assumptions relating to the built form.

The advice provided here is in respect of acoustics only. Supplementary professional advice should be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

5.1 Building Façade

Recommended glazing systems are identified below.

Any dwellings or room scenarios not identified as requiring Table 5-1 treatments may use standard glazing (4mm thick glass).

Table 5-1: Recommended Glazing Systems – Lots facing Chain o Ponds Road, Road 1, Road 2

Lots	Room	Window/Door Orientation	Glazed Element Area (Windows/Doors)	Recommended Glazing
All Lots	Bedrooms (Ground Floor and First Floor)	Facing Road	<2m²	4mm glass (Rw 27)
			2m² to 3m²	6mm glass (Rw 29)
			3m² to 9m²	6mm glass (Rw 29)
		Facing Neighbouring Lots	<5m²	4mm glass (Rw 27)
			5m² to 8m²	6mm glass (Rw 29)
			>8m²	6mm glass (Rw 29)
	Living Rooms	Facing Road	<5m²	4mm glass (Rw 27)
			5m² to 8m²	6mm glass (Rw 29)
		Facing Neighbouring Lots	>8m²	6mm glass (Rw 29)

All R_w ratings listed in the table above are for window in frame (and not just glass alone).

For all rooms outlined in the table above, operable windows/doors are to incorporate seals equal to Schlegel Q-lon are to be incorporated.

Note - The constructions above would typically be considered as standard. Large windows (>2m2) are typically be at least 6mm thick.

5.2 External Walls

External walls are to be constructed of double brick or brick veneer and will not require upgrade for acoustics.

If a lightweight external wall is used for any dwelling:

- 75mm thick 14kg/m^3 insulation is required in the external wall cavity.
- For bedrooms facing Chain o Ponds Road or Roads 1 and 2, external wall system is to include 1x13mm thick plasterboard sheeting for internal wall lining (in 6mm fc sheet or equivalent external lining.

Note - The constructions above would typically be considered as standard.

5.3 Roof:

Roof/ceiling construction:

- Roofs can be sheet metal or tile.
- Roof ceiling cavity to have minimum 75mm thick 14kg/m^3 insulation to cavity.
- Ceiling to be minimum 10mm thick.

Note - The constructions above would typically be considered as standard. Thermal ceiling insulation is typically thicker than the minimum standard shown below.

5.4 External doors

External non-glazed doors are to be minimum 35mm solid core timber or glazed, fitted with acoustic seals around the perimeter (Raven RP 10 to top and sides, minimise gap at base).

5.5 Mechanical ventilation

- The NSW Department of Planning document *Development Near Rail Corridors and Busy Roads* provides guidance on the provision of supplementary ventilation in noise impacted areas.
- Supplementary ventilation should be provided in the event that when windows/doors are left open, the noise level within the room exceeds the following:
    - For Bedrooms, internal noise levels are not to exceed 45dB(A)$L_{eq(9hr)}$ between 10pm and 7am.
    - For other habitable areas, internal noise levels are not to exceed 50dB(A)$L_{eq(15hr)}$ between 7am and 10pm.
- Suitable internal noise levels with windows left open will not be achieved at the following locations:
    - Bedroom windows directly facing Road 1, 2 or Chain o Ponds Road.
- This does not mean that windows to these rooms must be fixed shut. However, for these rooms, supplementary ventilation is to be supplied. This could consist of an open window on another façade, borrowed ventilation from a hallway or via a ventilation fan. It is recommended that a mechanical engineer is consulted to ensure the ventilation requirements of the Building Code of Australia and Australian Standard 1668 '*The use of ventilation and air-conditioning in buildings*' are achieved.

6 Conclusion

Renzo Tonin & Associates has completed a road traffic noise impact assessment for proposed approximately 228 lots subdivision at Mulgoa.

Provided that the recommendations in this report are adopted, internal noise levels in dwellings and in outdoor areas will comply with relevant Council and NSW Planning acoustic requirements, with respect to residences impacted by road traffic noise.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

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 all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of everyday sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch, and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.

L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L_{eq} sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance, and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX A Traffic Report Data

Figure 7.6: Year 2036 Future Traffic Volumes (with Development Traffic)