

Fuye Development International Pty Ltd

7-9 Merriwa Street, Gordon

Acoustic DA Assessment

Author	Fu Siong Hie, B.Eng, MAAS Principal Consultant
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1 Introduction

The following report has been prepared by Acouras Consultancy on behalf of Fuye Development International Pty Ltd to assess the potential for noise impact associated with the mixed use development at 7-9 Merriwa Street, Gordon. The residential development will include:

- Carpark on basement to level 3.
- Commercial premises on level 4.
- Residential apartment on level 1 to level 8.

The proposed residential development is surrounded by existing residential and commercial buildings. The site location is shown in Figure 1.



Figure 1 – Site Location, Nearest Residents and Noise Logger Position

2 Noise Criteria

The following standards and guidelines are applicable to this project:

- Ku-ring-gai Council Development Control Plan Part 21 and Part 23.
- NCC/BCA Part F7 (2022).
- Australian standard AS/NZS 2107-2016: Acoustics – Recommended design sound levels and reverberation times for building interiors.
- Australian standard AS 1055.1-1997: Acoustics – Description and measurement of environmental noise - General procedures.

2.1 Internal Noise Levels

According to the Ku-ring-gai Council Development Control Plan Part 21, the following is required to be assessed to minimise the impact of road traffic noise to new residential developments:

1 All development that is in, or immediately adjacent to, the rail corridor or a busy road must be designed in accordance with NSW Department of Planning 'Development Near Rail Corridors and Busy Roads - Interim Guidelines, December 2008' (DNRCBR 2008).

Note: Under NSW DNRCBR 2008, busy roads include:

- Pacific Highway;
- Ryde Road;
- Mona Vale Road;
- Main Road 328, Section of Boundary Street, between Pacific Highway and Babbage Road, within the Local Centre boundary; and
- Secondary Road 2043, Section of Horace Street, Link Road, Killeaton Street within the Local Centre boundary.

Note: Under DNRCBR 2008, the rail corridor refers to the North Shore rail line.

Note: SEPP Infrastructure will also apply

2 Buildings must be designed to minimise the impact of noise through planning, construction and materials in accordance with the relevant acoustic standards in relation to noise transmission from traffic:

i) AS3671-1989: Acoustics- Road traffic noise intrusion- Building siting and construction.

ii) AS2107-2000: Acoustics- Recommended design sound levels and reverberation times for building interiors.

The State Environmental Planning Policy (SEPP) Clause 102 (road) requires the following L_{Aeq} levels are not to be exceeded for residential developments.

Table 1— Development near Rail Corridors and Busy Roads – Interim Guideline

Residential Space	Internal Noise Criteria
in any bedroom in the building	35dB(A) at any time 10pm–7am
anywhere else in the building (other than a garage, kitchen, bathroom or hallway)	40dB(A) at any time

The AS/NZS 2107–2016 outlines the acceptable internal noise levels such that a satisfactory acoustic environment within non-residential spaces in new and existing buildings can be achieved. Table 2 presents the recommended internal design noise levels.

Table 2— Recommended Internal Design Noise Levels (AS/NZS 2107)

Type of occupancy/activity	Design sound level ($L_{Aeq,t}$) range
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 (night time)	30 to 35
Work areas	35 to 40
Enclosed Carparks	< 65

2.2 Sound Insulation Requirement (Part F7 NCC/BCA)

For sound transmission and insulation between sole occupancy units (SOU) within the same development, walls and floors to be constructed in accordance with requirements of Part F7 of the Building Code of Australia (BCA). Sound insulation requirements are summarised in Table 3.

Table 3 - NCC Part F7 Requirements (Class 2 or 3)

Building Element	Minimum NCC Part F7 Requirements
Sound Insulation Rating of Walls (Class 2 or 3)	
Walls between separate sole occupancy units.	Rw + Ctr 50 (airborne)
Walls between wet areas (bathrooms, sanitary compartment, laundry or kitchen) and a habitable room (other than kitchen) in adjoining apartments.	Rw + Ctr 50 (airborne) & of discontinuous construction
Walls between sole occupancy unit and stairway, public corridors, public lobby or the like or parts of a different classification.	Rw 50 (airborne)
Walls between a plant room or lift shaft and a sole occupancy unit.	Rw 50 (airborne) & of discontinuous construction
Sound Insulation Rating of Floors (Class 2 or 3)	
Floors between sole occupancy units or between a sole occupancy unit and plant room, lift shaft, stairway, public corridor, public lobby or the like.	Rw + Ctr 50 (airborne) & Ln,w + CI < 62 (impact)
Apartment Entry Doors (Class 2 or 3)	
A door incorporated in a wall that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like.	Rw 30 (airborne)
Services (Class 2, 3 or 9c)	
If a storm water pipe, a duct, soil, waste or water supply pipe including a duct or pipe that is located in a wall or floor cavity serves or passes through more than one sole occupancy unit must be separated:	
if the adjacent room is a habitable room (other than a kitchen); or	Rw + Ctr 40
if the room is a kitchen or non-habitable room	Rw + Ctr 25

Construction Deemed to Satisfy

The forms of construction must be installed as follows:

- (a) Masonry—Units must be laid with all joints filled solid, including those between the masonry and any adjoining construction.
- (b) Concrete slabs—Joints between concrete slabs or panels and any adjoining construction must be filled solid.
- (c) Sheeting materials—
 - (i) if one layer is required on both sides of a wall, it must be fastened to the studs with joints staggered on opposite sides; and
 - (ii) if two layers are required, the second layer must be fastened over the first layer so that the joints do not coincide with those of the first layer; and
 - (iii) joints between sheets or between sheets and any adjoining construction must be taped and filled solid.
- (d) Timber or steel-framed construction—perimeter framing members must be securely fixed to the adjoining structure and—
 - (i) bedded in resilient compound; or
 - (ii) the joints must be caulked so that there are no voids between the framing members and the adjoining structure.
- (e) Services—
 - (i) Services must not be chased into concrete or masonry elements.
 - (ii) A door or panel required to have a certain $R_w + C_{tr}$ that provides access to a duct, pipe or other service must—
 - (A) not open into any habitable room (other than a kitchen); and
 - (B) be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10 mm, be fitted with a sealing gasket along all edges and be constructed of—
 - (aa) wood, particleboard or blockboard not less than 33 mm thick; or
 - (bb) compressed fibre reinforced cement sheeting not less than 9 mm thick; or
 - (cc) other suitable material with a mass per unit area not less than 24.4 kg/m²
 - (iii) A water supply pipe must—
 - (A) only be installed in the cavity of discontinuous construction; and
 - (B) in the case of a pipe that serves only one sole-occupancy unit, not be fixed to the wall leaf on the side adjoining any other sole-occupancy unit and have a clearance not less than 10 mm to the other wall leaf.
 - (iv) Electrical outlets must be offset from each other—
 - (A) in masonry walling, not less than 100 mm; and
 - (B) in timber or steel framed walling, not less than 300 mm.

2.3 Noise Survey and Project Specific Limits

An unattended noise survey was carried out at the site to measure the background and ambient noise levels. Noise monitoring was conducted between Wednesday 11th to Wednesday 18th September 2024. The monitor was positioned, as shown in Figure 1 on level 6 balcony of the existing building with a line of site to the Ryde Road.

Measurements were conducted using the following equipment:

- SVAN 977C Type 1 Real time Analyser/Noise Logger. Serial No. 98078.
- SVAN SV30A Type 1 Sound Level Calibrator. Serial No. 31830.

Noise monitoring was conducted in general accordance with Australian standard AS 1055.1-1997: Acoustics-Description and measurement of environmental noise-General procedures.

The noise analyser was calibrated immediately before and after measurements were taken with no discernible differences between these two recorded levels. The sound analyser is Type 1 and complies with Australian standard AS1259.2: 1990.

During the monitoring period any adverse weather condition have been excluded. The noise logger results are presented in Appendix C.

2.3.1 Traffic Noise Levels

Table 4 presents a summary of the measured ambient noise level and traffic noise impacting the development. The noise monitor was located on level 6 balcony line of site to the Ryde Road.

Table 4 – Measured Ambient and Traffic Noise and Levels, dBA

Location	Period	Average L _{eq}	Highest L _{eq} 1hr
Merriwa St	Day (07:00-22:00)	55	59
	Night (22:00-07:00)	51	57

2.4 Noise Emission from Air-Conditioners

Ku-ring-gai Council DCP Part 23, provides the following objectives and noise limits:

6 Noise levels associated with air conditioning, kitchen, bathroom, laundry ventilation, or other mechanical ventilation systems and plant either as an individual piece of equipment or in combination is not to be audible within any habitable room in any residential premises before 7am and after 10pm. Outside of these restricted hours noise levels associated with air conditioning, kitchen, bathroom, laundry ventilation, or other mechanical ventilation systems and plant either as an individual piece of equipment or in combination is not to emit a noise level greater than 5dB(A) above the background noise (LA90, 15 min) when measured at the boundary of the nearest potentially affected neighbouring properties. The background (LA90, 15 min) level is to be determined without the source noise present.

Note: Council requires an acoustic assessment be undertaken for multi-dwelling housing, residential flat buildings, mixed-use development, non-residential buildings, and child care centres. Council may require an acoustic assessment be undertaken for dwelling houses and secondary dwellings. Assessment is to be undertaken by a suitably qualified acoustic consultant to assess compliance with the above criteria. Recommended noise attenuation measures are to be included in this report where applicable.

Table 5 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project in accordance with the DCP. For the purpose of the assessment, the background noise level has been determined using the RBL in accordance with the method given in the EPA INP.

Table 5—Noise Survey Summary and Project Limits, dBA

Time Period	Existing Noise Levels		DCP Noise Limits, Leq(15min)
	Leq (period)	RBL	
Day	55	49	54
Evening	54	47	52
Night	51	37	42

During detailed design stage, the design and selection of the mechanical equipment required to service the proposed development will be required to achieve the DCP noise limits as presented in the table above.

3 Assessment and Recommendations

3.1 Façade Glazing Requirements

Acoustic glazing for the apartments are given in Table 6 are required to reduce noise impact on the internal occupants and should result in noise levels within such units in accordance with the Department of Planning and Australian Standard AS/NZS 2107:2016.

Table 6 – Schedule of Window and Glazing (R_w)

Level	Apartment	Space	Glazing Thickness	Minimum R_w (Glazing+Frame)
All	All	Living & Bedrooms	6.38mm laminated	30
All	-	Office	6.38mm laminated	30

All other non-habitable spaces, such as bathrooms and laundries require minimum 6mm monolithic glass (R_w 28). All Windows/doors should be well sealed (air tight) when closed with good acoustic seals around the top and bottom sliders. Mohair seals are not considered to be acoustic seals.

3.2 Building Façade Construction

To provide sufficient acoustic attention of noise, the general external construction of the proposed building would need to be constructed as detailed in Table 7.

Table 7 – External Façade Construction (R_w)

Building Element	Proposed Construction	Minimum R_w
External Wall	Masonry or cavity brick. Insulation as per thermal requirements.	45
Roof and ceiling	Concrete with a plasterboard cavity ceiling Insulation as per thermal requirements.	45

3.3 Mechanical Services

At this stage, the design and selection of mechanical equipment has not been selected or finalised. Typically, based on the current documentation, list of equipment and similar sized residential projects we would expect the following noise control measures to be implemented:

- Carpark exhaust/supply fans located in the basement plantroom (Figure 2):
 - Exhaust and supply fans operate with a VSD and CO sensor.
 - The fans operate on variable speed and are unlikely to operate at full speed during the night period of between 10pm and 7am.
 - Provide acoustic attenuators to the supply and discharge of the fans.

- Apartment exhaust fans (toilet, laundry, kitchen):
 - Electrically inter-locked with the light switch or have manual switch for the room served.
 - Internally lined ducts and acoustic flex ducts to be fitted to the fans.
 - These units would be inaudible at the boundary and at the nearest affected receivers.
- Residential condenser would be located in the rooftop plantroom with an acoustic barrier/wall (Figure 2).

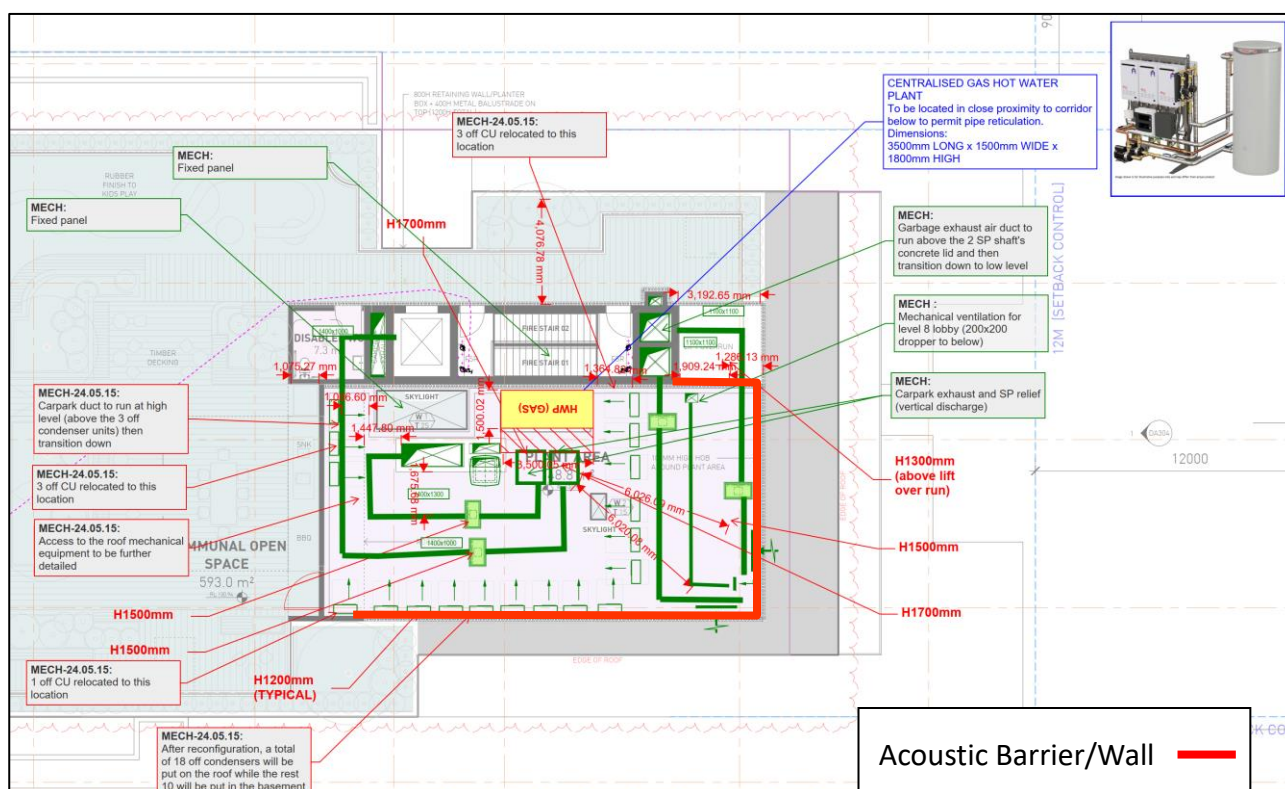


Figure 2 – Rooftop Plantroom Area

- Vibration isolation mounts are to be selected in accordance with manufacturer's recommendations. Where required, incorporate restraining devices to prevent excessive movement of plant, equipment and piping systems.

During the Construction Certification stage review, a detail assessment of all mechanical plant and equipment will be conducted to ensure compliance with the DCP noise criteria.

3.4 Commercial Storage Facility

The use of the commercial business tenancies and storage facilities located on level 4 are subject to the requirements of the Council's approved consent condition and EPA NSW 'Noise Policy for Industry' guidelines.

In addition to the above, any operation activity should not cause an 'Offensive noise', which is defined in the dictionary of the Protection of the Environment Operations Act 1997 (POEO) and Protection of the Environment Operations (Noise Control) Regulation 2017 as noise:

- (a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:*
 - (i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*
 - (ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or*
- (b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.*

Provided the use of the commercial premises and storage within their approved conditions, EPA guidelines and POEO, then there would not be any additional adverse impact onto the surrounding receivers.

4 Conclusion

An acoustic assessment of the proposed development has been carried out in accordance with the requirements of Ku-ring-gai Council DCP, Department of Planning and the Australian Standards,

An environmental noise survey of the site has been conducted and the noise limiting criteria for mechanical plant/equipment noise emission has been determined based on the DCP. The limits are presented in Table 5. Once all equipment has been selected, a detailed review of the proposed mechanical plant and equipment would be conducted to ensure compliance with the DCP noise limits.

Construction for glazing, external walls and the roof/ceiling systems have been provided to achieve the internal noise criteria and are detailed in Section 3.1 and Section 3.2 based on the impact of road traffic noise.

Providing the recommendations in this report are implemented, the noise from the proposed development is predicted to comply with acoustic requirements of the Ku-ring-gai Council DCP noise limits, BCA Part F7 and relevant Australian standards.

Appendix A – Acoustic Terminology

Decibel, dB: A dimensionless unit which denotes the ratio between two quantities that are proportional to power, energy or intensity. One of these quantities is a designated reference by which all other quantities of identical units are divided. The sound pressure level in decibels is equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 micro Pascals.

A-WEIGHTING: A measure of sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. To describe sound in a manner representative of the human ear's response it is necessary to reduce the effects of the low and high frequencies with respect to medium frequencies. The resultant sound level is said to be A-weighted, and the units are in decibels (dBA). The A-weighted sound level is also called the noise level.

Sound Pressure Level, L_p (dB), of a sound: 20 times the logarithm to the base 10 of the ratio of the r.m.s. sound pressure to the reference sound pressure of 20 micro Pascals. Sound pressure level is measured using a microphone and a sound level meter, and varies with distance from the source and the environment.

Ambient Noise/Sound: All noise level present in a given environment, usually being a composite of sounds from many sources far and near. Traffic, HVAC, masking sound or even low-level background music can contribute to ambient level of noise or sound.

Percentile Level - L_{90} , L_{10} , etc: A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L_{90} is the level which is exceeded for 90% of a measurement period. L_{90} is commonly referred to as the "background" sound level.

Background Noise (L_{90}): The sum total of all unwanted residual noise generated from all direct and reflected sound sources in a space that can represent an interface to, or interfere with good listening and speech intelligibility.

Rating Background Level – RBL: Method for determining the existing background noise level which involves calculating the tenth percentile from the L_{A90} measurements. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

$L_{AEQ,T}$: Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

Appendix B – Architectural Drawings

This assessment was based on the following architectural drawings provided by Giles Tribe Pty Ltd.

Drawing	Issue	Date	Description
DA100	G	10/05/2024	Site Analysis
DA101	I	10/05/2024	Site Plan
DA200	L	30/04/2024	Carpark Basement Plan
DA201	M	03/05/2024	Level 1 Plan
DA202	K	10/05/2024	Level 2 Floor Plan
DA203	K	10/05/2024	Level 3 Floor Plan
DA204	M	03/05/2024	Level 4 Floor Plan
DA205	K	10/05/2024	Level 5 Floor Plan
DA206	J	12/04/2024	Level 6 Floor Plan
DA207	K	10/05/2024	Level 7 Floor Plan
DA208	I	12/04/2024	Level 8 Floor Plan
DA209	H	16/04/2024	Roof Plan
DA301	I	10/05/2024	Elevation West
DA302	I	10/05/2024	Elevation East
DA303	I	10/05/2024	Elevation North
DA304	I	10/05/2024	Elevation South

Appendix C – Noise Logger Results

