

Colin Henry

344 High Street, Penrith

## Acoustic DA Assessment

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## 1 Introduction

The following report has been prepared by Acouras Consultancy on behalf of Colin Henry to assess the potential for noise impact associated with the 344 High Street, Penrith. The mixed-use development will include:

- Two (2) levels of basement carpark.
- Building A:
  - Retail tenancies on ground level, commercial space on level 1 to level 4.
  - Residential apartment on level 5 and level 6.
- Building B:
  - Loading dock on ground level in Building B.
  - Residential apartment on level 1 and level 6.

The proposed residential development is surrounded by existing commercial buildings and to the east is St. Nicholas of Myra Catholic Church and Primary School. Traffic noise along the High Street and contributes to the surrounding ambient noise levels. The site location is shown in Figure 1.

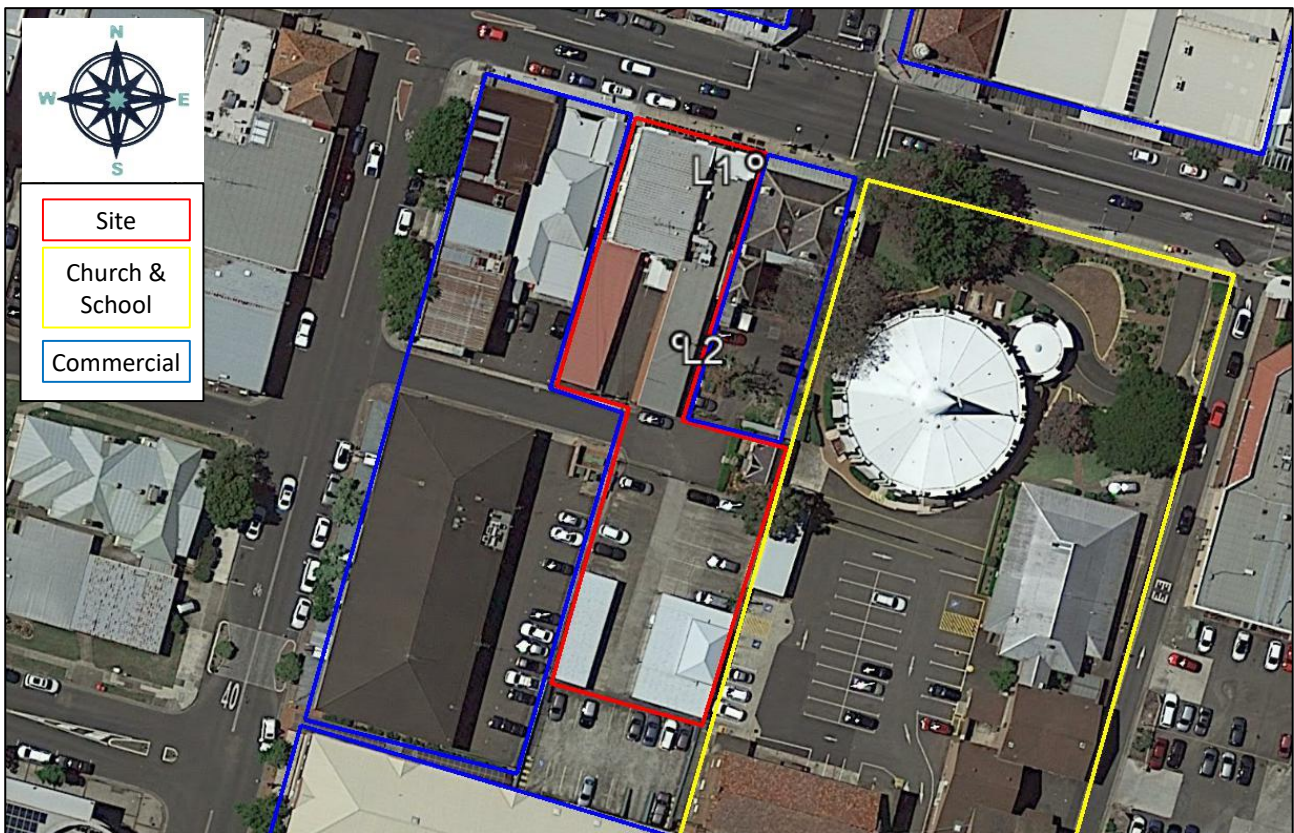


Figure 1 – Site Location, Nearest Residents and Noise Logger Position

## 2 Noise Criteria

The following standards and guidelines are applicable to this project:

- Penrith City Council: Development Control Plan (2010) Part C12.
- NSW Department of Planning “Development Near Rail Corridors and Busy Roads”.
- NCC/BCA Part F5.
- NSW EPA “Noise Policy for Industry” (NPfI).
- 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 Residential Internal Noise Levels

For road traffic noise, the DCP does not provide specific a guideline to implement. However, the NSW Department of Planning recommends Clause 102 (road) of the SEPP (Infrastructure) which requires that if the development is for the purpose of a building for residential use, the following  $L_{Aeq}$  levels are not exceeded.

**Table 1— SEPP Clause 102: Development near a Busy Roads**

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. Table 2 presents the recommended internal design noise levels in accordance with AS 2107 – 2016 for acceptable internal noise levels within non-residential spaces.

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

Type of occupancy/activity	Design sound level ( $L_{Aeq,t}$ ) range
Apartment common areas, corridors, lobbies (e.g. foyer, lift lobby)	45 to 50
Small retail stores (general)	< 50
General office	40 to 45
Enclosed Carparks	< 65

## 2.2 Sound Insulation Requirement (Part F5 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 F5 of the Building Code of Australia (BCA). Sound insulation requirements are summarised in Table 3.

**Table 3 - NCC Part F5 Requirements (Class 2 or 3)**

Building Element	Minimum NCC Part F5 Requirements
<b>Sound Insulation Rating of Walls (Class 2 or 3)</b>	
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
<b>Sound Insulation Rating of Floors (Class 2 or 3)</b>	
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)
<b>Apartment Entry Doors (Class 2 or 3)</b>	
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)
<b>Services (Class 2, 3 or 9c)</b>	
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

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**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 9.5 mm thick;  
or

(cc) other suitable material with a mass per unit area not less than 24.4 kg/m<sup>2</sup>

(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 Monday 17<sup>th</sup> to Monday 24<sup>th</sup> February 2020. The monitor was positioned (as shown in Figure 1):

- Location 1 (L1): at the 1<sup>st</sup> floor façade of the existing building on 340 High Street.
- Location 2 (L2): at the roof existing building on 344 High Street.

Measurements were conducted using the following equipment:

- SVAN 977 Type 1 Real time Analyser/Noise Logger. Serial No. 34892.
- SVAN 958A Type 1 Real time Analyser/Noise Logger. Serial No. 36624.
- 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.

#### 2.3.1 Traffic Noise Levels

Table 4 presents a summary of the measured ambient noise level and traffic noise impacting the development.

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

Location	Period	Average L <sub>eq</sub>	Highest L <sub>eq</sub> 1hr
L1: High Street	Day (07:00-22:00)	67	72
	Night (22:00-07:00)	62	69



### 2.3.2 Project Noise Limits

**Error! Reference source not found.** presents a summary of the measured background noise level and the allowable intrusive noise limit for this project in accordance with the EPA NPfI. 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 NPfI.

Table 5 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project. The amenity criteria are based on a urban receiver.

**Table 5—EPA Noise Limits for Development, dBA**

Receiver	Time Period	Existing Noise Levels			NSW EPA NPI		Project Noise Trigger Level Leq(15min)
		Leq (period)	RBL	ANL	Project ANL <sup>1</sup> Leq(15min)	Intrusiveness Criteria, Leq(15min)	
L1 Residential	Day	67	57	60	58	62	<b>58</b>
	Evening	66	55	50	48	60	<b>48</b>
	Night	62	43	45	43	48	<b>43</b>
L2 Residential	Day	55	48	60	58	53	<b>53</b>
	Evening	53	47	50	48	52	<b>48</b>
	Night	50	42	45	43	47	<b>43</b>
Commercial	All	-	-	-	-	-	<b>65</b>

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

Note, at location L2 (roof) the daytime noise levels may have been affected by mechanical noise on the roof.

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

<sup>1</sup> Project ANL is recommended ANL minus 5 dB(A) and plus 3 dB(A), to convert from a period level to a 15-minute level.

### 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 Noise Guidelines and AS/NZS 2107:2016.

**Table 6 – Schedule of Window and Glazing ( $R_w$ )**

Level	Apartment	Space	Glazing Thickness	Minimum $R_w$ (Glazing+Frame)
Building A				
G	-	Retail & Commercial	6.38mm lam	30
5	505 & 506	Living, Dining & Kitchen	10.38mm lam	32
		Bedroom	6.38mm lam	30
6	604	Living, Dining & Kitchen	10.38mm lam	32
		Bedroom & Study	6.38mm lam	30
Building B				
1 to 6	All	Living, Dining & Kitchen & Bedroom	6.38mm lam	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	45
Roof and ceiling	Concrete with a plasterboard cavity ceiling	45

### 3.3 Mechanical Services

At the DA stage, the design and selection of mechanical equipment has not been finalised. Following the DA approval of the proposed development, during the Construction Certification Stage a detail assessment of all mechanical plant and equipment will be conducted to ensure compliance with the EPA and DCP noise criteria. Typical acoustic measures may include the construction of acoustic barriers, enclosures, attenuators and/or acoustic louvres.

### 3.4 Separation Between Commercial and Residential

The wall partition and floor slab separating the retail/commercial space and the residential apartment is to be of solid masonry/concrete construction with a minimum sound insulation performance of  $R_w + C_{tr} 50$  for airborne noise.

Any operation of the retail/commercial space is to comply with the EPA noise policy and the any other relevant Council consent conditions related to the use.

A separate DA assessment would be submitted prior to occupation detailing proposed use and to ensure that any potential noise impacting the amenity of the adjoining residence is protected.

### 3.5 Delivery and Waste Collection Vehicles

For all delivery vehicles and privately operated waste collection vehicles used for the childcare centre, Part 4.3.3 of EPA Noise Guide for Local Government it is recommends the following time restrictions:

- Before 8.00 am or after 8.00 pm on any Saturday, Sunday or public holiday.
- Before 7.00 am or after 8.00 pm on any other day.

This excludes residential motor vehicles entering of existing the premises.

Additional management controls of the delivery and rubbish collection vehicles to minimise noise impact to the units on ground floor could include:

- Using up-to-date equipment that uses 'quieter' technology such as low-noise bin lifters.
- Maintaining rubbish trucks and braking materials to minimise or eliminate noise such as squeaky brakes.
- Educating drivers and collectors to be careful and to implement quiet work practices.
- Setting more appropriate times for the rubbish collection.

## **4 Conclusion**

An acoustic assessment of the proposed development has been carried out in accordance with the requirements of Penrith City Council DCP.

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 EPA NPfl. The limits are presented in Table 5.

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 noise along High Street.

Providing the recommendations in this report are implemented, the noise from the proposed development is predicted to comply with acoustic requirements of the Penrith City Council DCP, SEPP Clause 102, BCA Part F5 and relevant Australian standards.

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## 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<sub>p</sub> (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<sub>90</sub> , L<sub>10</sub> , etc:** A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L<sub>90</sub> is the level which is exceeded for 90% of a measurement period. L<sub>90</sub> is commonly referred to as the "background" sound level.

**Background Noise (L<sub>90</sub>):** 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<sub>A90</sub> measurements. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

**L<sub>AEQ,T</sub> :** 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.

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## Appendix B – Architectural Drawings

This assessment was based on the following architectural drawings provided by Integrated Design Group.

<b>Drawing</b>	<b>Issue</b>	<b>Date</b>	<b>Description</b>
DA-0100	J	08/10/21	Site Plan
DA-1000	S	08/10/21	Basement Plan
DA-1100	S	08/10/21	Ground Level Plan
DA-1101	Q	08/10/21	Level 1 Plan
DA-1102	S	08/10/21	Level 2 Plan
DA-1103	S	08/10/21	Level 3 Plan
DA-1104	S	08/10/21	Level 4 Plan
DA-1105	Q	08/10/21	Level 5 Plan
DA-1106	T	08/10/21	Level 6 Plan
DA-1107	Q	08/10/21	Roof Plan
DA-2000	J	08/10/21	Elevations Building A
DA-2001	J	08/10/21	Elevations Building B
DA-3000	H	08/10/21	Section 1
DA-3001	H	08/10/21	Section 2
DA-3002	H	08/10/21	Section 3

### Appendix C – Noise Logger Results

