MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

26-30 Hope Street, Penrith

DA Acoustic Report

SYDNEY
9 Sarah St
MASCOT NSW 2020
(02) 8339 8000

ABN 11 068 954 343
www.acousticlogic.com.au

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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed residential development to be constructed at the 26-30 Hope Street, Penrith.

This document addresses noise impacts associated with the traffic noise from Hope Street and noise emissions from mechanical plant and car park use.

ALC have utilised the following documents and regulations in the noise assessment of the development;

- Penrith City Council DCP 2014;
- Australian and New Zealand AS/NZS 2107:2000 *'Recommended design sound levels and reverberation times for building interiors'*;
- NSW EPA Noise Policy for Industry;
- Protection of the Environmental Operation (Noise Control) Regulation 2008.

This assessment has been conducted using Building Design & Technology (BDT) architectural drawings, project number 201727A and dated February 2020.

2 SITE DESCRIPTION

The proposed development comprises of two levels of basement parking, the ground floor will accommodate residential units, communal multi-purpose space and the car parking entrance. Level one through level five will accommodate residential units. There is an additional communal roof terrace on level 5.

In addition, a service driveway will be located along the western boundary of the site which will be utilised by waste collection trucks potentially up to four times a week. The driveway will facilitate access to the enclosed garbage area located at the south-western boundary of the site, which will contain a truck turntable and a bin lift.

Acoustic investigation has been carried out by this office regarding the developments surrounding the proposed development, which has been detailed below:

Parker Street carries a high volume of traffic, mostly light passenger traffic and state transit buses. Hope Street carries a moderate to low volume of traffic, mostly light passenger traffic.

The nearest residential noise receivers around the project site include:

- Receiver 1: Residential apartments to the north of the site, over Hope Street, located at 25-31 Hope Street, Penrith. Residential apartments are six-storeys high;
- Receiver 2: Residential houses adjoining to the east of the proposed site, located at 24 Hope Street, Penrith. Residential house is single-storey;
- Receiver 3: Residential houses adjoining to the south of the proposed site, located at 87-95 Derby Street, Penrith. Residential houses are single and double-storey; and
- Receiver 4: Residential houses adjoining to the west of the proposed site, located at 32 Hope Street, Penrith. Residential house is single-storey;

A site map, measurement description and surrounding receivers are presented in Figure 2-1 below.

Unattended Noise Monitor

Attended Noise Measurement

Figure 2-1: Site Survey and Monitoring Positions

Residential Receiver

Proposed Site

3 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment is categorised by moderate background noise levels during the day and evening due to traffic movements along Hope Street. Low background noise levels during the night as most of the volume of traffic have finished for the day.

Acoustic monitoring was conducted at the site to establish the background noise levels which will be used as basis for this assessment.

3.1 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

3.2 BACKGROUND NOISE LEVELS

Background noise levels which will be used as a basis for this assessment are detailed in the following sections.

3.2.1 Measurement Equipment

Unattended noise monitoring was conducting using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

3.2.2 Measurement Location

An unattended noise monitor was installed in the front yard of the existing house located at 30 Hope Street, Penrith. For a detailed location refer to Figure 1.

3.2.3 Measurement Period

Unattended noise monitoring was conducted from Friday the 1st to Friday the 8th of December 2017.

3.2.4 Measured Background Noise Levels

The background noise levels established from the unattended noise monitoring are detailed in the Table below.

3.2.4.1 Unattended Noise Measurements

NSW EPA's RBL assessment procedure requires determination of background noise level for each day (the ABL) then the median of the individual days as set out for the entire monitoring period.

Appendix 1 provides the results of the unattended noise monitoring. Weather affected data was excluded from the assessment. The processed Rating Background Noise Levels (lowest 10th percentile noise levels during operation time period) are presented in Tables below.

Table 1 – Unattended Noise Monitor Rating Background Noise Level

Date	Measured Rating Background Noise Level dB(A)L_{90}		
	Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am Next Day)
Friday, 1st of December 2017	-	39.4	34.7
Saturday, 2nd of December 2017	45.9	41.0	35.6
Sunday, 3rd of December 2017	38.2	38.8	31.8
Monday, 4th of December 2017	40.3	34.2	31.1
Tuesday, 5th of December 2017	41.2	39.0	32.2
Wednesday, 6th of December 2017	41.2	41.7	36.4
Thursday, 7th of December 2017	41.5	40.1	36.6
Median	**41**	**39**	**35**

3.2.4.2 Summarised Rating Background Noise Levels

Summarised rating background noise levels for each receiver are presented below.

Table 2 -Summarised Rating Background Noise Level

Location	Time of day	Rating Background Noise Level dB(A)L_{90}
Project Site	Day	41
	Evening	39
	Night	35

4 EXTERNAL NOISE INTRUSION ASSESSMENT

Site investigation indicates that the major external noise sources around project site are traffic noise impacts from Hope Street & Parker Street.

4.1 NOISE INTRUSION CRITERIA

A traffic noise intrusion assessment has been conducted based off the requirements of the following acoustic noise criteria/standards;

- Penrith City Council Development Control Plan 2014;
- Australian and New Zealand AS/NZS 2107:2016 *'Recommended design sound levels and reverberation times for building interiors'*;

4.1.1 Penrith City Council Development Control Plan 2014

Part C, Section 12.1, Road Traffic Noise

"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.

Noise Impact Statements - Specific Requirements

a) Where a site is likely to be affected by unacceptable levels of road traffic noise, the applicant is required to provide a Noise Impact Statement prepared by a qualified acoustic consultant in accordance with the requirements set out in the DA Submission Requirements Appendix of this DCP.
b) *The Noise Impact Statement should demonstrate acoustic protection measures necessary to achieve an indoor environment meeting residential standards, in accordance with EPA and Department of Planning Criteria, as well as relevant Australian Standards."*

4.1.2 Australian and New Zealand AS/NZS 2107:2016 *'Recommended design sound levels and reverberation times for building interiors'* (Rail and Traffic Noise Intrusion)

Australian Standard AS 2107-2016: Recommended design sound levels and reverberation times for building interiors specifies allowable internal noise levels for internal spaces within residential and commercial buildings. Table 1, in Section 5 of AS 2107-2016, gives the following maximum internal noise levels for commercial buildings and residential buildings near major roads.

Table 3 – Recommended Design Sound Level

Space /Activity Type	Design Sound Level Range dB(A)L_{eq}
Living Areas	35-45 dB(A)L_{eq}
Sleeping Areas	35-40 dB(A)$L_{eq(nightime)}$

4.1.3 Summary of Criteria

The governing project criteria is presented in the table below.

Table 4 – Summary of Internal Noise Level Criteria

Location	Time Period	Traffic Noise Intrusion Criteria
Bedroom	Night (10pm-7am)	35 dB(A) $L_{eq(9hour)}$
Living Room	Day (7am-10pm)	40 dB(A) $L_{eq(15hour)}$

4.2 EXTERNAL NOISE MEASUREMENTS

This section of the report details noise measurements conducted at the site to establish traffic and surrounding environmental noise levels impacting the development.

4.2.1 Traffic Noise Measurements

4.2.1.1 Measurement Equipment

Attended short term measurements of traffic noise along Parker Street were undertaken by this office, to supplement the unattended noise monitoring along Hope Street. Measurements were conducted using a Norsonic 140 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonic Sound Calibrator type 1251. No significant drift was noted.

Unattended noise monitoring was conducting using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

4.2.1.2 Measurement Location

An unattended noise monitor was installed within the existing front yard at 30 Hope Street, Penrith. For a detailed location refer to Figure 1. Noise monitor location had a full view Hope Street. Logger was located approximately 5m from the Hope Street kerb.

An attended traffic noise measurement was conducted near Parker Street. See figure 1 for Measurement location. Noise measurement location had a 180° view of Princes Highway which was 3m from the kerb.

4.2.1.3 Measurement Period

Unattended noise monitoring was conducted from Friday the 1st to Friday the 8th of December 2017.

Attended noise measurements were undertaken between the hours of 4:30pm and 5:30pm on Friday the 8th of December 2017.

4.2.1.4 Measured Traffic Noise Measurements

Unattended and attended noise measurements have been summarised below for each location.

Table 5 – Unattended Noise Monitoring of Traffic Noise Measurements

Date	Measured Traffic Noise Level dB(A)L_{eq}	
	Day (7am-10pm)	Night (10pm-7am)
Friday, 1st of December 2017	-	48
Saturday, 2nd of December 2017	57	50
Sunday, 3rd of December 2017	52	48
Monday, 4th of December 2017	62	53
Tuesday, 5th of December 2017	59	49
Wednesday, 6th of December 2017	59	50
Thursday, 7th of December 2017	61	50
Logarithmic Average	**58**	**50**

*Note that noise monitor location was 5m from kerb and had a full view of Hope Street.

Table 6 – Attended Traffic Noise Measurements

Location	Time of Measurement	Measured Noise Level dB(A)L_{eq}
Parker Street (See Figure 1) 3m from kerb 180° view of the road	4:30pm – 5:30pm Friday the 8th December 2017	69dB(A)$L_{eq(15mins)}$

4.2.2 Noise from Garbage Trucks

Noise from garbage trucks accessing the enclosed garbage area located at the south-western boundary of the site impacting apartments within the development will also be assessed. Noise from the garbage trucks will be assessed based on the following assumptions:

- One truck entering the site within a 15 minute period. It is assumed that the truck will not leave the site within the same 15 minute period that it entered the site.
- Truck is travelling at 10km/hour with typical sound power level 97 dB(A) (noise data based measurements conducted by this office).

Table 7 – Predicted Garbage Truck Noise Impacts on Proposed Development

Location	Predicted Noise Level from Garbage Truck dB(A)L_{eq}
Western Façade of Development	55dB(A)$L_{eq(15min)}$

4.3 RECOMMENDED CONSTRUCTIONS

Traffic noise intrusion into the proposed development was assessed using the measured traffic noise levels presented above.

Calculations were undertaken taking into account the orientation of windows, barrier effects *(where applicable)*, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way, the likely interior noise levels can be predicted.

4.3.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. (**Mohair Seals are not acceptable**).

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

The recommended constructions are listed in the table below.

Table 8 – Recommended Glazing Construction

Level	Façade	Space	Recommended Construction	Acoustic Seals
All	North, South & East Façades	Living Area	4mm Float	Yes
		Bedroom	6mm Float	Yes
	West Façade	Living Area	6.38mm laminated	Yes
		Bedroom	6.38mm laminated	Yes
All Remaining Areas			4mm Float	Yes

It is recommended that only window systems having test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 9 for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 9 - Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
4mm Float	27
6mm Float	29
6.38mm laminated	31

4.3.2 External Roof/Ceiling

External roof construction will be constructed from concrete. This proposed structure will not require any further acoustic upgrading. In the event that any penetrations are required thru the external skin, an acoustic grade sealant should be used to minimise all gaps.

4.3.3 External Walls

External wall construction will be constructed from concrete or masonry elements. This proposed structure will not require any further acoustic upgrading. In the event that any penetrations are required thru the external skin, an acoustic grade sealant should be used to minimise all gaps.

4.3.4 Mechanical Ventilation

With respect to natural ventilation of the dwelling, the NSW Department of Planning document "Development near Busy Roads and Rail Corridors - Interim Guideline" dictates that:

- *"If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45dB(A), and 50dB(A) in living rooms).

All bedrooms and living spaces along all facades of the development will be able to achieve the internal noise goals with windows open.

5 NOISE EMISSION ASSESSMENT

Noise emissions from the site have been assessed for noise emitted from base building mechanical plant and carpark entry facilities.

The noise emission from the project site shall comply with the requirements of the following documents;

- Penrith City Council Development Control Plan 2014;
- NSW Department of Environment and Heritage, *Environmental Protection Agency document - Noise Policy for Industry (INP) 2017*; and
- Protection of the Environmental Operation (Noise Control) Regulation 2008.

5.1 NOISE CRITERIA

5.1.1 Penrith City Council Development Control Plan 2014

Penrith Council Development Control Plan does not contain noise criteria for noise emissions. Therefore, the typically adopted NSW EPA Noise Policy for Industry will be adopted.

5.1.2 NSW EPA Noise Policy for Industry 2017

The NSW EPA Noise Policy for Industry 2017, has two criteria which need to be satisfied; namely the Intrusiveness noise level criteria and the Project amenity noise level criteria. The project noise trigger level is then established based on the lower of the intrusiveness and project amenity levels.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

5.1.2.1 Intrusiveness Noise Level Criteria

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor do not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Section 3.2. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 10 – Intrusiveness Noise Level Criteria

Location	Period/Time	Intrusiveness Noise Level Criteria dB(A) $L_{eq(15min)}$
Nearby Residences	Day (7am-6pm)	46
	Evening (6pm-10pm)	44
	Night (10pm-7am)	40

5.1.2.2 Project Amenity Noise Level Criteria

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The NSW EPA Noise Policy for Industry sets out acceptable noise levels for various localities. Table 2.2 on page 11 of the policy indicates 3 categories to distinguish different residential areas. They are rural, suburban, urban. This site is categorised by urban receivers.

For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

The project amenity noise level criteria are presented in the table below.

Table 11 – Project Amenity Noise Level Criteria

Location	Period/Time	Project Amenity Noise Level Criteria dB(A) $L_{eq(15min)}$
Nearby Residences – Suburban Receiver	Day (7am-6pm)	53
	Evening (6pm-10pm)	43
	Night (10pm-7am)	38

5.1.2.3 Project Noise Trigger Level

The project noise trigger level (as outlined in section 2.1 of the policy) is the lower of the intrusiveness and project amenity noise levels. The project noise trigger levels are presented in the table below.

Table 12 – Project Noise Trigger Level Criteria

Location	Period/Time	Project Noise Trigger Level Criteria dB(A) $L_{eq(15min)}$
Nearby Residences	Day (7am-6pm)	46
	Evening (6pm-10pm)	43
	Night (10pm-7am)	38

5.1.3 Sleep Arousal Assessment (Peak Noise Events)

Potential sleep arousal impacts should be considered for noise generated before 7am or after 10pm, in this case from potential garbage truck movements to/from the site.

Short duration, intermittent noise events (such as cars driving by or noise from equipment used in the vehicle repair workshops) are typically assessed for potential sleep disturbance.

Potential impacts are assessed using the recommended procedure in the NSW EPA Noise Policy for Industry. As recommended in the policy, when assessing potential sleep arousal impacts, a two stage test is carried out:

- Step 1 - An assessment should be conducted to determine if noise levels at a residential location during the night time period (10pm-7am) exceed:
    - $L_{Aeq,\ 15min}$ 40dB(A) of the prevailing RBL (rating background noise level) plus 5 dB, whichever is greater, and/or
    - L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is greater.

The policy does not explicitly state where noise impacts should be assessed within the residential location. For the purposes of this assessment, noise impacts will be assess at the location immediately outside a resident's bedroom window. If the noise events are compliant with this criteria, then sleep arousal impacts are unlikely and no further analysis is needed. This is consistent with the Noise Guide for Local Government. The criteria is set out below.

Table 13 – Sleep Arousal Criteria ("Emergence"/Background+15dB(A) Test)

Location	Time Period	Background Noise Level dB(A)$_{L90}$	Sleep Arousal Criteria dB(A)
All Potentially Affected Residential Properties	Night (10pm-7am)	40	45dB(A)$L_{eq(15min)}$ 55dB(A)L_{Max}

- Step 2 - If there are noise events that could exceed the step 1 criteria, then a more detailed assessment of sleep arousal impact is required to be carried out taking into account the level and frequency of noise events during the night, existing noise sources, etc. This test takes into account the noise level and number of occurrences of each event with the potential to create a noise disturbance. As is recommended in the EPA Noise Policy for Industry, this more detailed sleep arousal test is conducted using the guidelines in the EPA Road Noise Policy. Most relevantly, the Road Noise Policy states:

    For the research on sleep disturbance to date it can be concluded that:

    - *Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep.*
    - *One to two noise events per night with maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly.*

5.1.4 Protection of the Environmental Operation (Noise Control) Regulation 2008

Protection of the Environmental Operations regulation limits the noise levels associated within the operation of domestic air conditioning criteria during night time periods which is presented below:

Protection of the Environmental Operations (Noise Control) Regulation 2008-Sect 52

52 Air Conditioners

(1) A person must not cause or permit an air conditioner to be used on residential premises in such a manner that it emits noise that can be heard within a habitable room in any other residential premises (regardless of whether any door or window to that room is open):

(a) before 8 am or after 10 pm on any Saturday, Sunday or public holiday, or
(b) before 7 am or after 10 pm on any other day.

5.2 NOISE EMISSION ASSESSMENT

5.2.1 Mechanical Plant Noise

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of section 5.1.

5.2.2 Noise from Waste Collection Trucks

As discussed in section 2, a service driveway will be located along the western boundary of the site which will be utilised by waste collection trucks. The driveway will facilitate access to the enclosed garbage area located at the south-western boundary of the site. The garbage area will have a truck turntable and bin lift.

This office has been advised that waste collection trucks will attend the site potentially up to four times a week.

Noise impacts from garbage trucks on the surrounding residential receivers will be assessed based on the following assumptions:

- One truck entering the site within a 15 minute period. It is assumed that the truck will not leave the site within the same 15 minute period that it entered the site.
- Truck is travelling at 10km/hour with typical sound power level 97 dB(A) (noise data based measurements conducted by this office).

5.2.2.1 Recommendations

In order to comply with the noise emission requirements the following is recommended:

- Install a 2.1m acoustic screen along the western boundary of the site and 1.8m high acoustic screen along the southern boundary of the site.
- The screens are to be constructed of a solid, imperforate material. Suitable materials include Colorbond metal, lapped and capped timber or 6mm fibre cement.
- Trucks are to switch off their engines during idling.
- Where possible, waste collection should take place during the day time (i.e. between 7am and 6pm);

6 OTHER ACOUSTIC ISSUES

In addition to the acoustic issues addressed above, Penrith City Council has requested the following to be addressed:

- Noise from operation of lift to adjoining units within development
- Noise from garbage chute to adjoining units within development

6.1 LIFT NOISE

Noise from the lift core and bin lift to adjoining apartments within the development will need to comply with the requirements part F5 of the National Construction Code (NCC) 2016. The relevant acoustic requirements are as follows:

*"**F5.5 Sound insulation rating of walls***

(a) A wall in a Class 2 or 3 building must –

…

(ii) have an Rw (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification

(iii) comply with F5.3(b) if it separates –

…

(B) a sole-occupancy unit from a plant room or lift shaft.

F5.3 Determination of impact sound insulation ratings

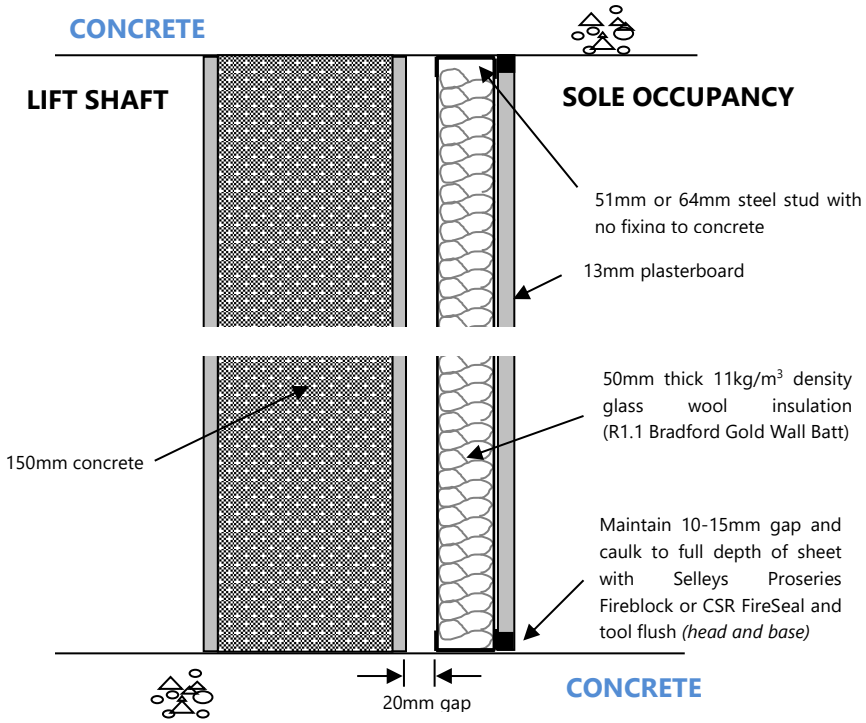
…

(b) A wall in a building required to have an impact sound insulation rating must –

(i) For a Class 2 or 3 building be of discontinuous construction."

6.1.1 Recommendations

Indicative treatments constructions to achieve compliance with the requirements of the BCA are presented in the figure below.



SECTION ELEVATION

6.2 GARBAGE CHUTE

Structure-borne noise from garbage chutes is generated by objects falling through the chute striking the sides of the chute. This impact causes vibration in the chute walls, which transmits through the building structure and is heard as noise.

6.2.1 Recommendations

To limit this source of noise, the garbage chutes shall be resiliently attached to the building structure. Indicative acoustic treatments to control noise from the garbage chute impacting adjoining units are as follows;

1. The isolation brackets used to support the chute should be set on neoprene isolation mounts. The mounts should be designed to have a maximum static deflection of 5mm when fully loaded.

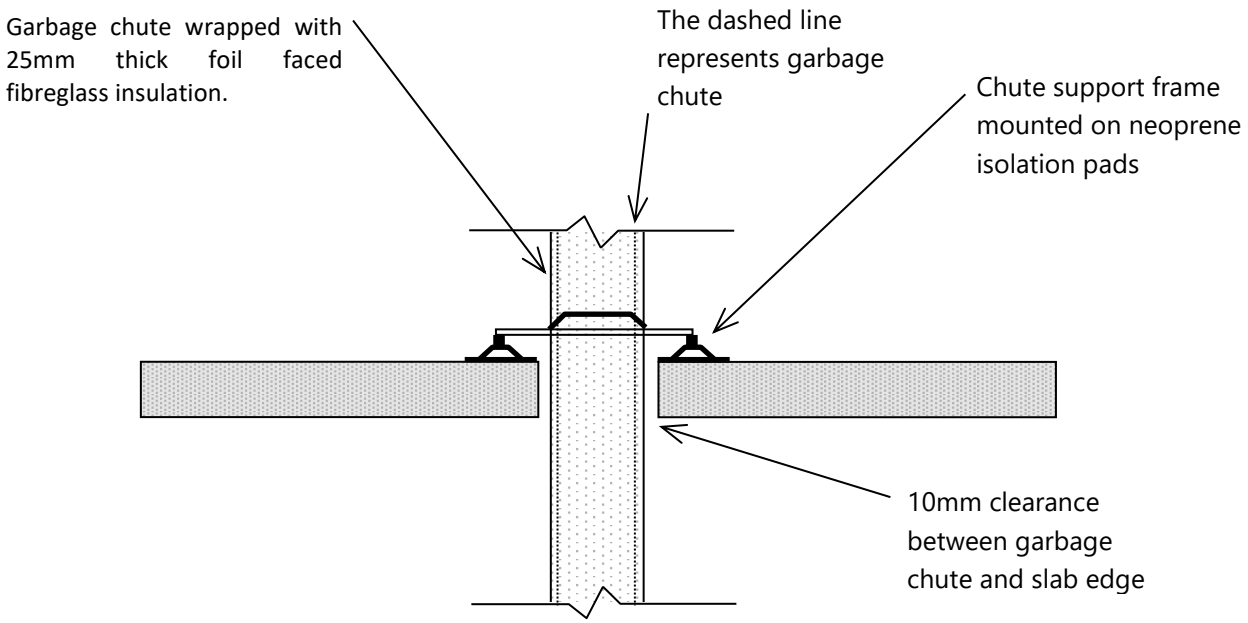
2. Garbage chutes are normally contained in a fire rated compartment within the building. Hence, there is no requirement to seal the slab penetrations where the chute passes from floor to floor. In order to control the transmission of structure-borne noise a 10mm gap should be left around the entire perimeter of the chute.

3. Alternatively, if it is required to seal the slab penetrations, then a resilient fire rated mastic compound, such as Selleys Proseries Fireblock should be used. This should be applied to a 10mm gap, fitted with a backing rod.

4. The garbage chute should be externally wrapped with 25mm thick foil faced fibreglass insulation or other dampening material.

5. Garbage compactors shall be vibration isolated from the building structure and shall incorporate Embelton NRD mounts with no mechanical bridging between the compactor mechanism and the building structure.

A schematic representation of the proposed treatment is shown below:



7 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed residential development to be located at 26-30 Hope Street, Penrith.

Provided that the treatments set out in section 4 of this report are employed, internal noise levels shall comply with the requirements below:

- Penrith City Council DCP 2014;
- Australian and New Zealand AS/NZS 2107:2016 *'Recommended design sound levels and reverberation times for building interiors'*;

External noise emissions criteria have been setup in this report with reference to the following documents;

- Penrith City Council DCP 2014;
- NSW Department of Environment and Heritage, Environmental Protection Agency document –Noise Policy for Industry.

Noise from garbage trucks accessing the site have been assessed with recommendations presented in section 5.2.2 in order to comply with the relevant noise emission requirements.

Noise from garbage chutes and the lift core adjoining units within the proposed building have been addressed in Section 6 above.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Katherine Beeston