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Traffic & Environmental Noise Assessment

For proposed development at

No. 892, 898-902 & 906
Canterbury Road, Roselands

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1.0 SCOPE REPORT

The aim of this report is to determine the building materials to be used and the construction methods to be adopted such that the proposed development at No. 892, 898-902 & 906 Canterbury Rd, Roselands is built to achieve acceptable noise break-in and break-out levels as per Canterbury Bankstown Council requirements.

The site is located on the corner of Canterbury Rd and Flora St, Roselands (Figure 1 – Site Location) & (Figure 2- Surrounding Environment). The architectural plans by Architecture Design Studio Pty Ltd dated the 28th January, 2022, are for the proposed construction of a six (6) storey mixed use development with two (2) levels of basement parking.

The proposed development is located on busy road with an Annual Average Daily Traffic (AADT) greater than 40,0000 vehicles.

Internal noise intrusion levels are to be within the limits adopted by the Australian Standard/New Zealand Standard AS/NZS 2107:2016 “*Acoustics – Recommended Design Sound Levels and Reverberation Times*”, and Clause 102 of the State Environmental Planning Policy – (Infrastructure) 2007.

Noise breakout from the use of the proposed building, including all proposed mechanical plant and equipment is to comply with the Noise Guide for Local Government and NSW Noise Policy for Industry (2017).



Figure 1 - Site Location

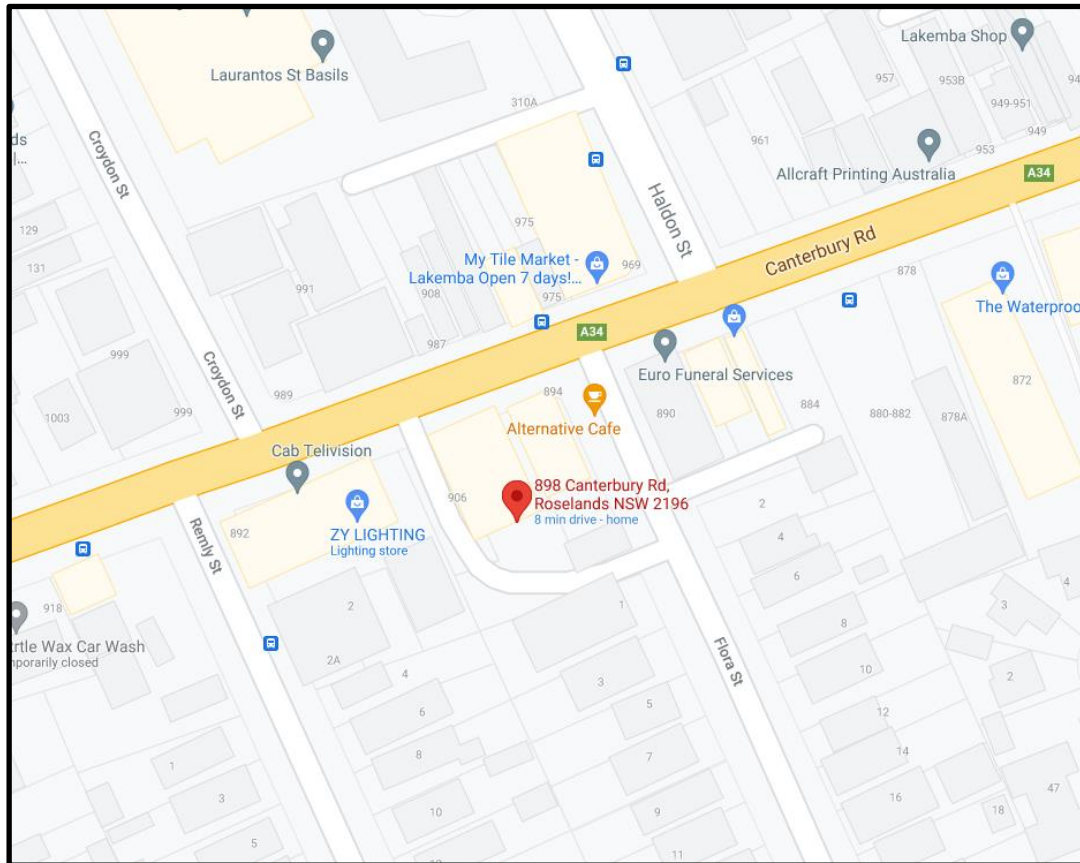


Figure 2 – Surrounding Environment

2.0 ACOUSTIC DESCRIPTORS

L_{Amax} – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

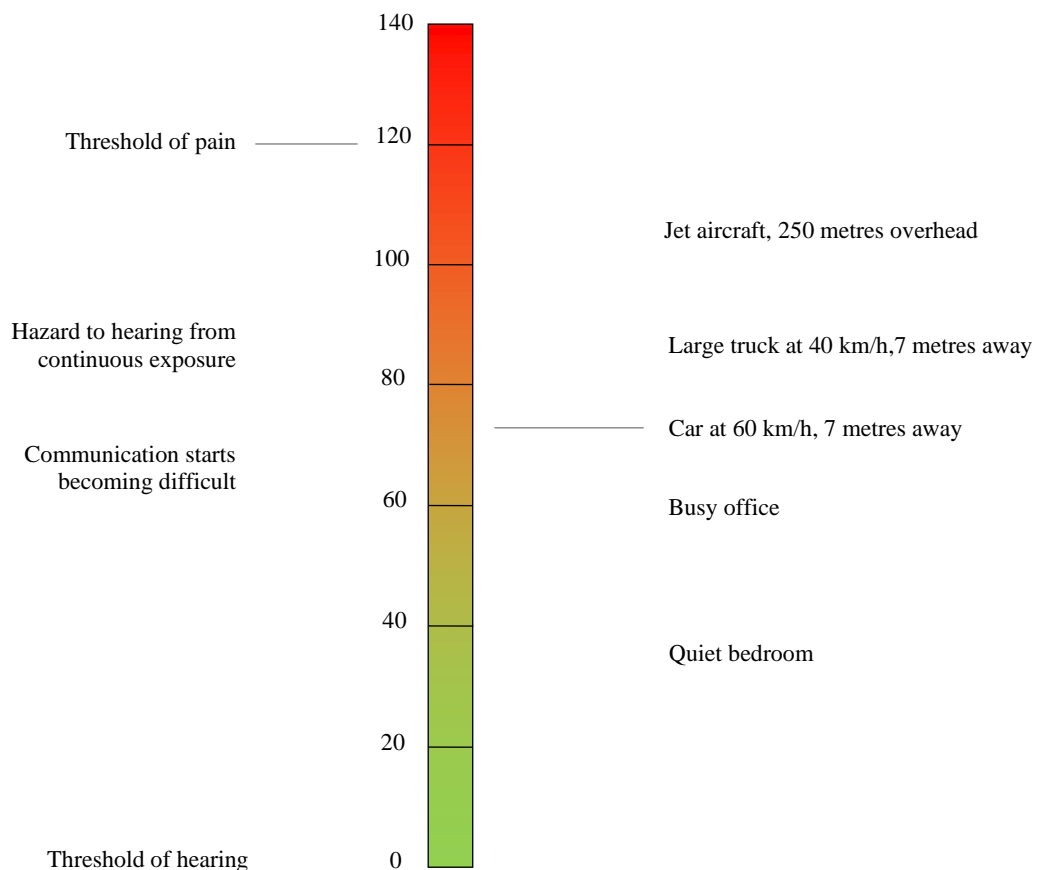
L_{A50} – The L_{A50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{A50} level for 50% of the time.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and nighttime) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and nighttime.

The level of common sounds on the dB(A) scale as the figure below:



3.0 NOISE SURVEY, INSTRUMENTATION & RESULTS

On the 3rd May, 2021, an engineer from this office went to the above address and carried out unattended noise measurements at the following locations (Figure 3 – Noise Reading Locations):

- Rear southern boundary in order to determine existing Background Noise Levels (Point A)
- Front proposed building line in order to determine existing Traffic Noise Levels from Canterbury Rd (Point B)



Figure 3 - Noise Reading Locations (Point A & B)

The unattended environmental noise monitoring at Points A & B were conducted for a period of seven (7) days between May 3rd, 2021 and May 10th, 2021. All measurements were taken in accordance with the Australian Standards AS 1055 “Acoustics- Description and Measurements of Environmental Noise”.

All sound pressure levels are rounded to the nearest whole decibel. All sound level measurements and analysis carried throughout this report are carried with Svantek 977/977 Noise and vibration level meters – Serial Number 92626/34893 - (Refer to Figure 4 for current calibration certificate).

The Svantek 977 noise logger has the following features:

- Type 1 sound level measurements meeting IEC 61672:2002
- General vibration measurements (acceleration, velocity and displacement) and HVM meeting ISO 8041:2005 standard
- Three parallel independent profiles
- 1/1 and 1/3 octave real time analysis
- Acoustic dose meter function
- FFT real time analysis (1920 lines in up to 22.4 kHz band)
- Reverberation Time measurements (RT 60)
- Advanced Data Logger including spectra logging
- USB Memory Stick providing almost unlimited logging capacity
- Time domain signal recording
- Advanced trigger and alarm functions
- USB 1.1 Host & Client interfaces (real time PC “front end” application supported)
- RS 232 and IrDA interfaces
- Modbus protocol

The noise loggers were positioned at a maximum height of 1.5m from the ground. The machines were calibrated prior and after reading using our Svantek SV 33A S/N: 90200 class 1 Calibrator (Figure 4 – Calibration Certificate). Any readings affected by strong wind or rain have been disregarded.

A summary of the noise reading results at Points A & B are presented in Tables 3.1 & 3.2 below:

*Table 3.1- Summary of Unattended Background Noise Readings at Point A
(May 3rd, 2021- May 10th, 2021)*

<i>Measurement Location</i>	<i>Time Period</i>	<i>Arithmetic Mean LA90 dB(A)</i>	<i>Rating Background Level (RBL)* dB(A)</i>
Point A – Rear Southern Boundary	<i>Day, dB(A) (7am-6pm)</i>	50	46
	<i>Evening dB(A) (6pm-7pm)</i>	47	43
	<i>Night/Early Morning, dB(A) (6am-7am)</i>	43	39

**RBL is calculated as per Fact Sheet B of the NPfI (2017)*

Table 3.2- Summary of Unattended Traffic Noise Readings at Point B
(May 3rd, 2021 - May 10th, 2021)*

<i>Location</i>	<i>Period</i>	<i>Arithmetic Mean LAeq dB(A)</i>	<i>Arithmetic Mean LA90 dB(A)</i>
Point B –Northern Boundary	Day Time – 7:00am-6:00pm	69	57
	Evening Time – 6:00pm- 10:00pm	66	54
	Night/Early Morning Time – 10:00pm-7:00am	64	48

**The Full Average Statistical Noise Parameters $L_{(Aeq, 15 \text{ minutes})}$, $L_{(A90, 15 \text{ minutes})}$, $L_{(A10, 15 \text{ minutes})}$, $L_{(A1, 15 \text{ minutes})}$ at Point A are presented in Figure 5 – Noise Survey.*

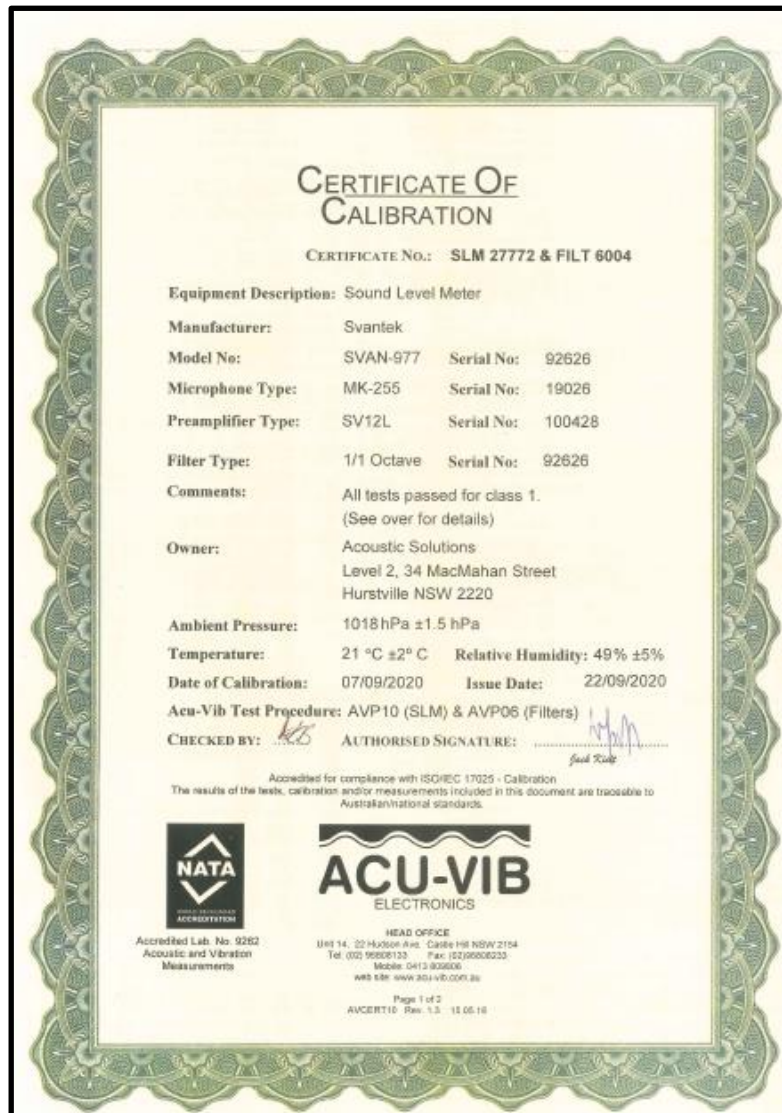


Figure 4 - Calibration Certificate

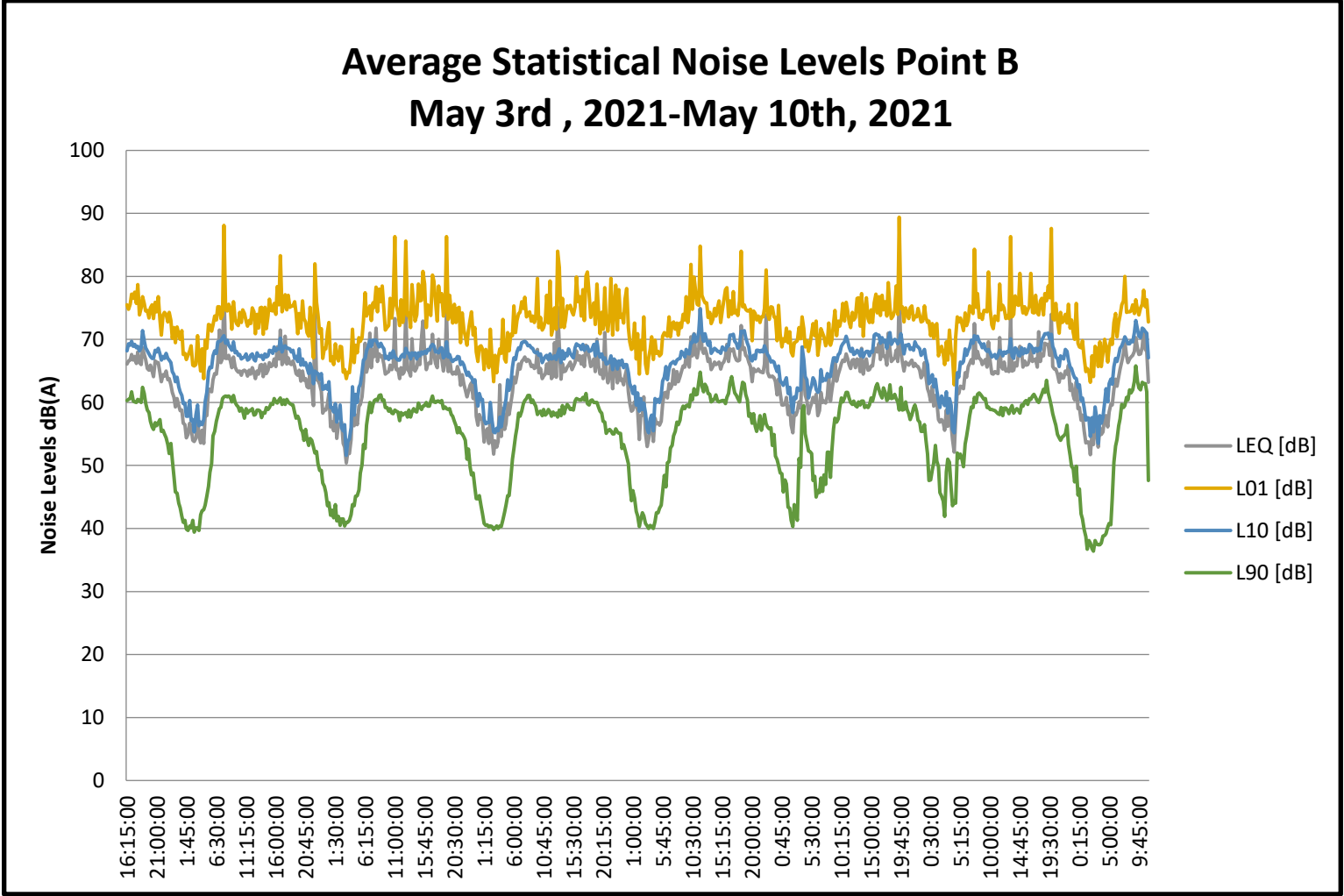


Figure 5 - Noise Survey – Unattended Noise Reading (Point A)

4.0 ACOUSTICAL STUDY for NOISE BREAK IN (TRAFFIC NOISE)

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

The above standard has formulated the criteria for developments situated in urban areas.

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

It is usual practice, when we find it necessary to recommend internal sound levels in buildings to refer to Australian/New Zealand Standard AS/NZS 2107:2016 “*Acoustics – Recommended Design Sound Levels and Reverberation times for Building Interiors*”.

AS/NZS 2107:2016 sets out design internal noise levels and reverberation times for different buildings depending on the use of these structures. The noise levels recommended in AS/NZS 2107:2016 take into account the function of the area and apply that to the sound level measured within the space unoccupied although ready for occupancy.

In Table 1, Page 13, the standard recommends the following noise levels for residential buildings proposed next to minor Roads.

Type of occupancy/activity	Design sound level ($L_{Aeq,t}$) range	Design reverberation time (T) range, s
RESIDENTIAL BUILDINGS (see Note 5 and Clause 5.2)		
Houses and apartments in inner city areas or entertainment districts or near major roads—		
Apartment common areas (e.g. foyer, lift lobby)	45 to 50	—
Living areas	35 to 45	—
Sleeping areas (night time)	35 to 40	—
Work areas	35 to 45	—
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	—

4.2 DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS – INTERIM GUIDELINE & CLAUSE 102 OF THE SEPP

Canterbury Road as a busy Road with more than 40,000 AADT. The proposed development’s front habitable rooms are in direct line of sight of the road. According to Figure 3.4 (a) of the Interim Guideline, an acoustic assessment is required for the proposed development.

The detailed site-specific assessment carried out throughout this report as required by Figure 3.4 (a) of the Interim Guideline is for the proposed development to comply with Clause 102 of the SEPP.

Clause 102 of the SEPP applies to developments on land in or adjacent to road corridor for a freeway, a tollway or a transitway or any other road with annual average traffic volume of more than 20,000 vehicles, a consent authority considers likely to be adversely affected by road noise or vibration to residential accommodation.

Additionally, Clause 102 of the SEPP states that where the development is for residential use and is located in or adjacent to a relevant road corridor, a consent authority must not grant consent unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:

- In any bedroom in the building – 35db(A) at any time between 10.00pm and 7.00am
- Anywhere else in the building (other than a garage, kitchen, bathroom or hallway) - 40db(A) at any time.

External façade recommendations will be provided in Section 5.0 of this report to ensure compliance with the above internal amenity criteria.

5.0 EXTERNAL BUILDING RECOMMENDATIONS

5.1 Windows/Sliders, Walls, Doors and Roofs

Building Component	Rw Rating to be Achieved
Windows & Sliders in Shop Areas on Ground Floor are to be 10.38mm laminated type with full perimeter Schlegel Q-Lon acoustic seals (Ph: 8707-2000). ⁽¹⁾⁽²⁾⁽³⁾	35
Windows & Sliders in Living/Dining/Kitchen Areas of Residential Units <u>facing Canterbury Rd & corner of Flora St are</u> to be 12.38mm laminated type with full perimeter Schlegel Q-Lon acoustic seals (Ph: 8707-2000). ⁽¹⁾⁽²⁾⁽³⁾	38
Windows & Sliders in Bedroom Areas of Residential Units <u>facing Communal Areas on 1st, 4th & 5th Floors</u> are to be 10.38mm laminated type with full perimeter Schlegel Q-Lon acoustic seals (Ph: 8707-2000). ⁽¹⁾⁽²⁾⁽³⁾	35
Windows & Sliding Doors in Living/Dining/Kitchen and Bedroom Areas of all other Units are to be 6.38 mm laminated with full perimeter Schlegel Q-Lon acoustic seals ⁽¹⁾⁽²⁾⁽³⁾	32
Windows in all other Areas (Bathrooms/Ensuites/Laundries/Staircase etc) are to be 6mm thick in accordance with Australian Standard AS 2047:2014 “ <i>Windows and external glazed doors in buildings</i> ” ⁽¹⁾⁽²⁾⁽³⁾ .	28
External Doors (if any) are to be Solid Core with acoustic seals fitted around the door. A drop seal is required at the base of the external door ⁽¹⁾⁽²⁾⁽³⁾	30
External Walls are to be 270/250 mm double brick, brick veneer, AFS, Hebel construction or any other method of wall construction with an Rw of 44. ⁽²⁾⁽³⁾	40-44
Roof of all Units is to be Minimum 150mm Concrete Roof on 10 gypsum plaster board ceiling with 75mm thick, 11kg/m ³ mineral wool batts between ceiling joists ⁽³⁾ .	39-41

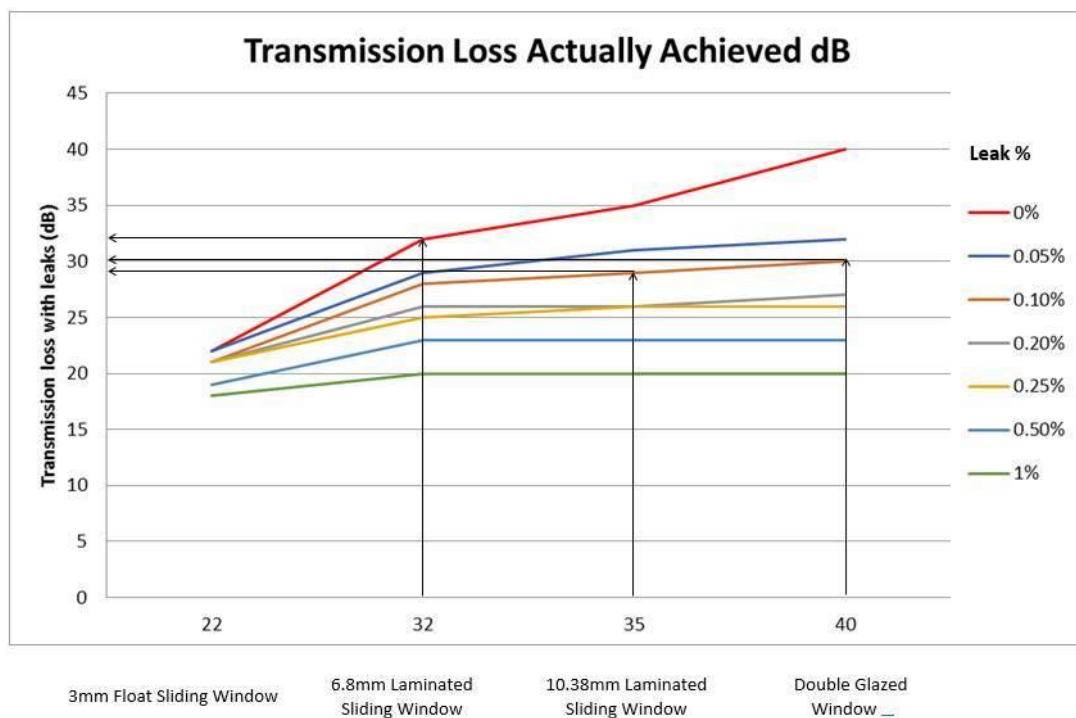
NB: This report is to be read in conjunction with the BASIX certificate and any other related building specification.

⁽¹⁾ No through weep holes in windows/sliders. ⁽²⁾ All gaps between window & door frames and the masonry walls are to be sealed using acoustic foam Hilti CP620 or similar. Glass wool batts should be applied prior to the application of the foam to seal larger gaps. ⁽³⁾ All gaps are to be acoustically sealed.

****Glazing Notes -Leaks & Glazing Attenuation-**

- The Acoustic performance of a glazing system highly depends on the leaks around and within the glazing frame and façade. A double-glazing system with Rw of 40 will have its acoustic performance dropped to Rw of 30 (less than that of 6.38 mm glass) at a leak of 0.1 %. Moreover, a double-glazing system with Rw of 40 will have its acoustic performance dropped to Rw of 20 (less than that of 3.0 mm float glass) at a leak of 1 % of the glazing area.
- A 10.38mm laminated glazing system with Rw of 35 will have its acoustic performance dropped to Rw of 29 (less than that of 6.38 mm glass) at a leak of 0.1 %. Moreover, 10.38mm laminated glazing system with Rw of 35 will have its acoustic performance dropped to Rw of 20 (less than that of 3.0 mm float glass) at a leak of 1 % of the glazing area.
- A double-glazing system with Rw of 40, a 10.38m mm laminated glazing system with Rw of 35, and a 6.38 mm laminated glazing system with Rw of 32 will all attain almost the same Rw of around 20 (less than that of 3.0 mm float glass) at a leak of 1 % in the façade or a within/around the glazing system.

The graph below shows the actual transmission loss achieved inside a room with different glazing thicknesses relative to small leaks occurring along the window frame and façade.



A test report is to be provided from a recognized acoustic laboratory, verifying that the glazing system (glass, frame and seals) will meet the nominated sound rating required.

6.0 ACCEPTABLE NOISE LEVEL FROM PROPOSED DEVELOPMENT (Noise Break Out)

6.1 NSW NOISE POLICY FOR INDUSTRY (2017)

The above policy seeks to promote environmental well-being through preventing and minimizing noise by providing a framework and process for deriving noise limits conditions for consent and licenses.

The Noise Policy for Industry 2017 recommends two separate noise criteria to be considered, the Intrusive Noise Criteria and the Amenity Noise Criteria. A project noise trigger level being the lowest of the amenity and the intrusiveness noise level is then determined.

If the predicted noise level L_{Aeq} from the proposed project exceeds the noise trigger level, then noise mitigation is required. The extent of any ‘reasonable and feasible’ noise mitigation required whether at the source or along the noise path is to ensure that the predicted noise level L_{Aeq} from the project at the boundary of most affected residential receiver is not greater than the noise trigger level.

6.1.1 AMENITY NOISE CRITERIA

The amenity noise levels presented for different residential categories are presented in Table 2.2 of the Noise Policy for Industry 2017. These levels are introduced as guidance for appropriate noise levels in residential areas surrounding industrial areas.

For the proposed mixed development at No. 892, 898-902 & 906 Canterbury Rd, Roselands the recommended amenity noise levels are presented in Table 6.1.1.1 below:

Table 6.1.1.1 - Recommended Noise Levels from Industrial Noise Sources

<i>Type of Receiver</i>	<i>Area</i>	<i>Time Period</i>	<i>Recommended Leq Noise Level, dB(A)</i>
Residence	Urban	Day	60
		Evening	50
		Night	45

Where a noise source contains certain characteristics such as tonality, intermittency, irregularity or dominant low-frequency content, a correction is to be applied which is to be added to the measured or predicted noise levels at the receiver, before comparison with the criteria. Shown below are the correction factors that are to be applied:

Table 6.1.1.2 – Modifying Factor Corrections as per Fact Sheet C (Noise Policy for Industry 2017)

<i>Factor</i>	<i>Correction</i>
Tonal Noise	+ 5 dB ^{1,2}
Low-Frequency Noise	+ 2 or 5 dB ¹
Intermittent Noise	+ 5 dB
Duration	+ 0 to 2 dB(A)
Maximum Adjustment	Maximum correction of 10 dB(A) ¹ (excluding duration correction)

1. Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.
2. Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.

Correction for duration is to be applied where a single-event noise is continuous for a period of less than two and a half hours in any assessment period. The allowable exceedance of the $L_{Aeq,15min}$ equivalent noise criterion is depicted in Table 6.1.1.3 for the duration of the event. This adjustment accounts for unusual and one-off events and does not apply to regular and/or routine high-noise level events.

Table 6.1.1.3 – Adjustment for Duration as per Fact Sheet C (Noise Policy for Industry 2017)

<i>Allowable duration of noise (one event in any 24-hour period)</i>	<i>Allowable exceedance of $L_{Aeq,15min}$ equivalent project noise trigger level at receptor for the period of the noise event, dB(A)</i>	
	<i>Daytime & evening (7 am–10 pm)</i>	<i>Night-time (10 pm–7 am)</i>
1 to 2.5 hours	2	Nil
15 minutes to 1 hour	5	Nil
6 minutes to 15 minutes	7	2
1.5 minutes to 6 minutes	15	5
less than 1.5 minutes	20	10

According to Section 2.4 of the above policy, the project amenity noise level is determined as follows:

Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)

To convert from a period level to a 15-minute level, a plus 3 is added as per section 2.2 of the policy.

Therefore, the project amenity noise level for the proposed development at No. 892, 898-902 & 906 Canterbury Rd, Roselands is as follows:

Daytime: $60 - 5 + 3 = 58$ **dB(A)**
Evening: $50 - 5 + 3 = 48$ **dB(A)**
Night-time: $45 - 5 + 3 = 43$ **dB(A)**

6.1.2 INTRUSIVE NOISE CRITERIA

Section 2.3 of the Noise Policy for Industry summarizes the intrusive criteria as below:

$$L_{Aeq, 15 \text{ minute}} \leq \text{rating background level plus 5}$$

While the background noise level known as $L_{A90,15 \text{ minutes}}$ is the Noise exceeded 90% percent of a time period over which annoyance reactions may occur (taken to be 15 minutes). The RBL is defined as the overall single-figure $L_{A90,15 \text{ minutes}}$ background level representing each assessment period (day/evening/night) over the whole monitoring period.

For the short-term method, the rating background noise level is simply the lowest measured $L_{AF90,15\text{min}}$ level. For the long-term method, the rating background noise level is defined as the median value of:

- All day assessment background levels over the monitoring period for the day,
- All evening assessment background levels over the monitoring period for the evening,
- or,
- All night assessment background levels over the monitoring period for the night.

The predicted noise from the source $L_{Aeq,15 \text{ min}}$ is measured as at the most affected point within the most affected residential at the point where the most impact occurs.

Therefore, the acceptable L_{eq} noise intrusiveness criterion for broadband noise during the day, evening & night is as follows:

- **46 + 5 = 51 dB (A)** during the day,
- **43 + 5 = 48 dB (A)** during the evening and
- **39 + 5 = 44 dB (A)** during the night.

6.1.3 PROJECT NOISE TRIGGER LEVEL

A summary of intrusiveness and amenity noise levels as determined in sections 6.1.1 & 6.1.2 are shown in Table 6.1.3 below:

Table 6.1.3 - Summary of Intrusiveness and project amenity noise levels

<i>Period</i>	<i>Intrusiveness Noise Level dB(A)</i>	<i>Project Amenity Noise level dB(A)</i>
Day Time (7:00am-6:00pm)	51	58
Evening Time (6:00pm-10:00pm)	48	48
Night & Early Morning (10:00pm – 7:00am)	44	43

The project noise trigger level is the lower (that is, the most stringent) value of the amenity and intrusiveness noise levels for the day, evening and night-time. Therefore, the project noise trigger levels for the proposed development are as shown below

- **Daytime:** $L_{Aeq,15\text{ min}}$ **51 dB(A)**
- **Evening:** $L_{Aeq,15\text{ min}}$ **48 dB(A)**
- **Night-time:** $L_{Aeq,15\text{ min}}$ **43 dB(A)**

The proposed mixed development and its activities including all mechanical plant will not exceed the project noise trigger level at the most sensitive location, provided all noise control recommendations in Section 8.0 are adhered to.

6.2 NOISE GUIDE FOR LOCAL GOVERNMENT & POEO

The Department of Environment and Conservation (NSW) published the amended *Noise Guide for Local Government* in October 2010. The policy is specifically aimed at assessing noise from light industry, shops, entertainment, public buildings, air conditioners, pool pumps and other noise sources in residential areas.

Section 2.2.1 of the Noise Guide for Local Government states that a noise source is generally considered to be intrusive if the noise from the source when measured over a 15-minute period exceeds the background noise by more than 5 dB(A). Therefore, the noise criteria are as follows:

- **Day period:** $50 + 5 = 55 \text{ dB(A)}$
- **Evening period:** $47 + 5 = 52 \text{ dB(A)}$
- **Night period:** $43 + 5 = 48 \text{ dB(A)}$

The appropriate regulatory authority (Local Council) may, by notice in writing given to such a person, prohibit the person from causing, permitting or allowing:

1. any specified activity to be carried on at the premises, or
2. any specified article to be used or operated at the premises.

or both, in such a manner as to cause the emission from the premises, at all times or on specified days, or between specified times on all days or on specified days, of noise that, when measured at any specified point (whether within or outside the premises,) is in excess of a specified level.

It is an offence to contravene a noise control notice. Prior to being issued with a noise control notice, no offence has been committed.

The Protection of the Environment Operations Act 1997 (POEO) defines “Offensive Noise” as noise:

1. (a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:
2. (i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or
3. (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 regulation.

6.3 TRAFFIC NOISE GENERATION CRITERIA

Table 3 in Section 2.3.1 of the NSW Road Noise Policy, sets out traffic noise assessment criteria as follows:

Table 6.3 – NSW Road Noise Policy Traffic Noise Criteria

Road Category	Type of Project/Land Use	Assessment Criteria – dB(A)	
		Day (7am – 10pm)	Night (10pm – 7am)
Local Roads	Existing Residences affected by additional traffic on existing local roads general by land use developments	L _{Aeq} (1 hour) 55 (external)	L _{Aeq} (1 hour) 50 (external)

7.0 PREDICTED NOISE FROM PROPOSED DEVELOPMENT & IMPACT ON RECEIVERS

7.1 IMPACT OF MECHANICAL PLANT & EQUIPMENT

A range of mechanical plant, equipment and ventilation will be included in the proposed development at No. 892, 898-902 & 906 Canterbury Rd, Roselands. Noise emitted by the use of the proposed mechanical plant is assessed by the Noise Policy for Industry 2017 and Canterbury Bankstown Council conditions/requirements.

The proposed levels of basement parking are located below ground level and that makes providing natural ventilation not possible and a mechanical extract system should be used. The mechanical ventilation system needs to achieve all required air changes for exhaust fume and extract smoke clearance in accordance with Australian Standard AS 1668.2 “*The use of ventilation and air-conditioning in buildings Mechanical ventilation in buildings*”.

Having a small basement will probably require the mechanical engineer to provide a jet fan in the basement for smoke exhaust while the opening area in the roller door will be cater for the air supply.

A garage roller door may also be located at the entry of the car park. Predicted noise levels from the operation of garage roller doors have been estimated according to typical rollers doors installed at other developments. The average time duration for a garage roller door to fully open

or close is approximately 30 seconds. Air-conditioning might also be installed in the proposed development. Typical noise levels for car park exhaust fans, condensing unit and car-park roller door and are presented in Table 7.1.1

Table 7.1.1 – Typical Mechanical Plant Leq Sound Power Levels (dB(A))

<i>Frequency [Hz]</i>	<i>63</i>	<i>125</i>	<i>250</i>	<i>500</i>	<i>1k</i>	<i>2k</i>	<i>4k</i>	<i>8k</i>	<i>dB(A)</i>
Typical Car park Jet Fan	82	79	77	76	72	68	60	53	77
Typical Condensing Unit	71	69	67	61	58	54	47	44	64
Car-Park Security Roller Door	73	75	77	79	82	77	76	74	85

The operation of the proposed mechanical plant & equipment will comply with the criteria of the NSW Noise Policy for Industry 2017, provided the recommendations in Section 8 of this report are adhered to.

7.2 TRAFFIC GENERATION & CARPARK NOISE FROM PROPOSED DEVELOPMENT

The proposed development at No. 892, 898-902 & 906 Canterbury Rd, Roselands will include Ground Floor & Basement Parking. Access to the parking areas will be from Flora St.

As per the Traffic & Parking Impact Assessment by Motion Traffic Engineers dated April 2021, the proposed development use will generate an additional twenty-four (24) vehicle trips in the AM peak hour period and twenty-two (22) trips in the PM peak hour period.

The predicted noise levels due to vehicles arriving and departing the site will be governed by existing background noise levels from Canterbury Rd & Flora St, especially that the existing carparks for the residential receiver at No. 1 Flora St is above ground with its driveway running along the rear boundary.

As shown in sections 7.2.1 & 7.2.2 below, the noise break-out from additional traffic generation and the predicted noise levels at the nearest residential receiver due to vehicles entering/exiting the carpark will comply with the Environmental Criteria for Road Traffic Noise (ECRTN) and the Noise Policy for Industry 2017 provided the recommendations are adhered to.

7.2.1 NOISE BREAK-OUT FROM ADDITIONAL TRAFFIC GENERATION

The Traffic & Parking Impact Assessment by Motion Traffic Engineers dated April 2021, the proposed development use will generate an additional twenty-four (24) vehicle trips in the AM peak hour period and twenty-two (22) trips in the PM peak hour period.

The nearest residential receiver that will be affected by vehicles entering/exiting the proposed basement car park will be the residential property located south of the site at No. 1 Flora St. Predicted noise levels at 1.0m from the nearest receiver due to additional traffic generation on Flora St are presented in Table 7.2.1.

Table 7.2.1 – Predicted Noise from Additional Traffic Generation on Flora St at 1.0m from facade of

Activity	Period	Expected Leq 1hr dB(A) from Additional Traffic Generation	Complies with Traffic Noise Criteria- as per section 4.3
Noise on Flora St from Additional Traffic Generation	AM Peak Hour Period	48 dB(A)	Yes
	PM Peak Hour Period	47 dB(A)	<55 dB(A) – Day <50 dB(A) – Night

7.2.2 NOISE BREAK-OUT FROM CARS ENTERING/EXITING THE CARPARK

Carparking noises typically may comprise of people talking, car radios, cars starting, car doors closing and cars moving. The following table summarises the noise from a typical car activity (Sound Power Levels -Swl-).

Table 7.2.2.1 – Swl Levels for Different Car Activities Expected to Occur in the Garage

<i>Garage Noise Source</i>	<i>Sound Power Level, dB(A)</i>
Car Door Closing	91*
Car Starting	88*
Car Moving at 10 km/hr	81

**N/A Noise is inside enclosed carpark*

Access to the ground floor and basement parking is from Flora St, with the driveway being adjacent to the nearest receiver No. 1 Flora St. (Figure 7 – Carpark Driveway).

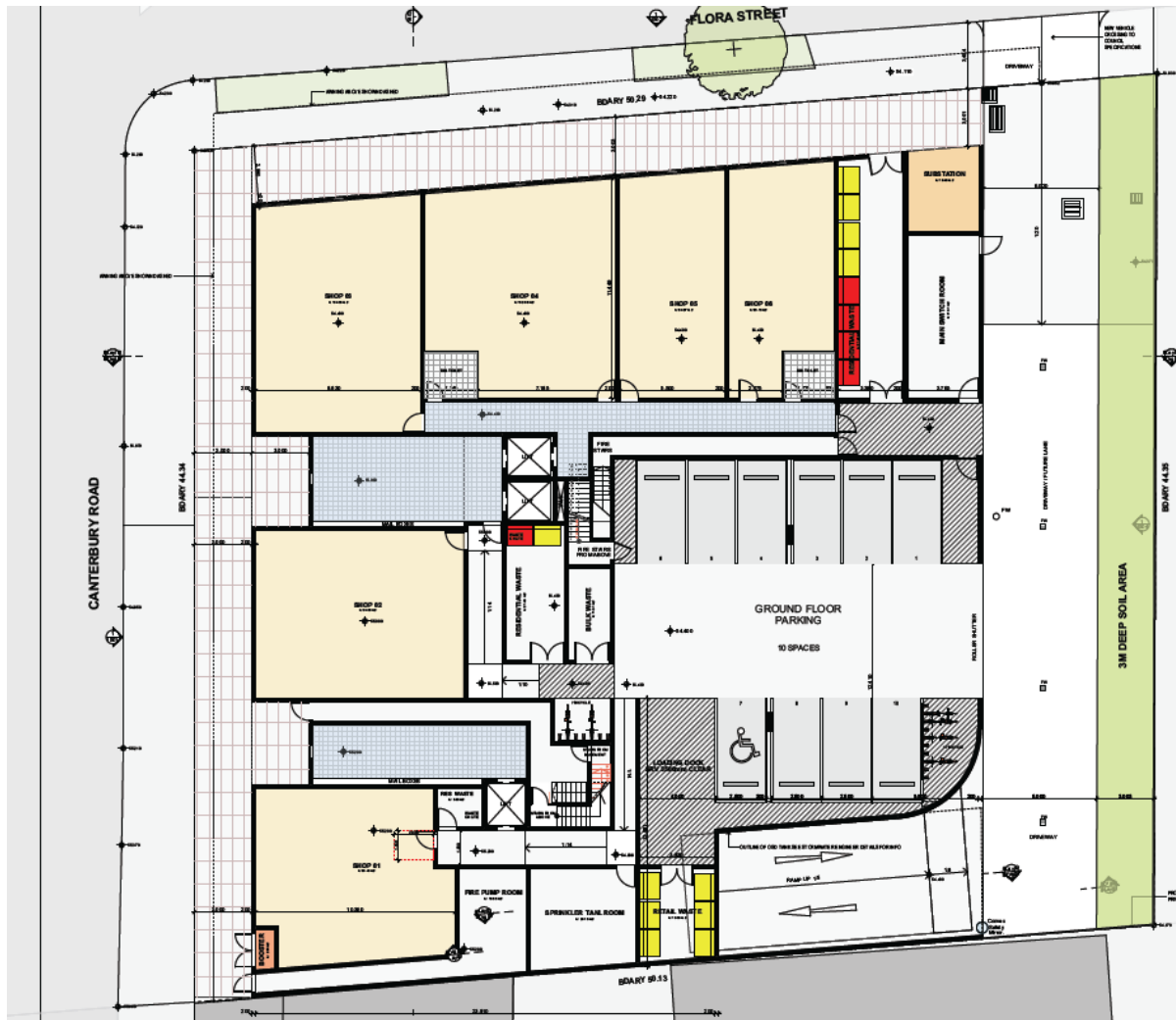


Figure 7 - Proposed Carpark Driveway

The Predicted noise levels at the boundary of the nearest residential receivers No. 1 Flora St due to cars entering and exiting the carpark, are presented in Table 7.2.2.2 below.

Table 7.2.2.2 – Predicted noise from vehicles entering and exiting the basement parking at external facades of No. 1 Flora St *, **, ***

Activity	Period	Expected Leq dB(A) at No. 1 Flora St	Compliance with Noise Trigger level (Noise Policy For Industry 2017).
Noise impact from vehicles entering/exiting the ground floor & basement parking	7.00am - 6.00pm (Day)	40.0 dB(A)*	Yes < 51 dB(A)
	6:00pm – 10:00pm (Evening)	38.0 dB(A)*	Yes < 48 dB(A)
	10:00pm – 7:00am (Night)	32.0 dB(A)*	Yes <43 dB(A)

*Based on Max. (6/4/1) Vehicles per 15 minutes (Peak hours)/day/evening/night.

**** Assuming all recommendations in section 8 of this report are adhered to.**
***** Noise include garage door opening and closing**

7.3 NOISE BREAK-OUT FROM COMMUNAL AREA

As per architectural plans by Architecture Design Studio dated the 28th January, 2022, the proposed development at No. 892, 898-902 & 906 Canterbury Rd, Roselands will have three (3) communal areas, located on the First Floor, Fourth Floor & Fifth Floor (Figures 8, 9 & 10 – Proposed Communal Areas).



Figure 8 - Proposed First Floor Communal Area



Figure 9 - Proposed Fourth Floor Communal Area

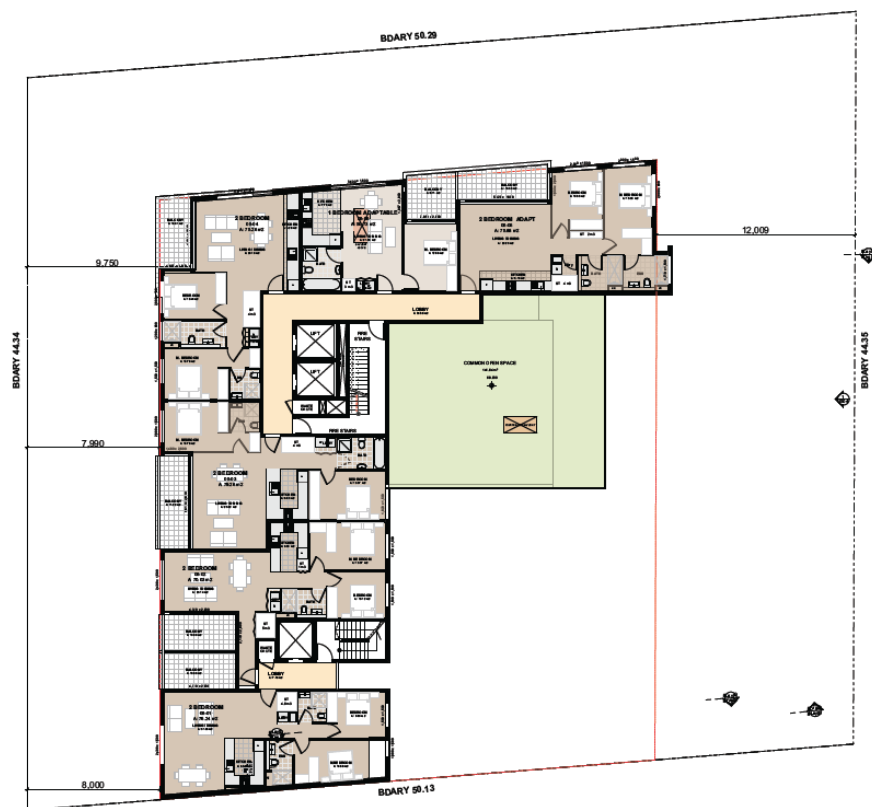


Figure 10 - Proposed Fifth Floor Communal Area

As per Harris /Pearson, Bennet, & Fidell (1977) report, the sound power level of one (1) person talking is as per the table below.

Table 7.3.1 Typical Vocal Sound Power Level Reference Sheet

Vocal Effort	No. of Talkers	Sound Power Levels [dB] at Octave Band Centre Frequencies [Hz] *,**,***							
		125	250	500	1000	2000	4000	8000	dB(A)
Females									
Casual	1	48.0	61.0	61.0	54.0	51.0	47.0	48.0	61.0
Normal	1	49.0	63.0	66.0	61.0	56.0	44.0	50.0	66.0
Raised	1	47.0	67.0	72.0	70.0	66.0	61.0	54.0	74.0
Loud	1	47.0	62.0	77.0	79.0	76.0	70.0	62.0	82.0
Shouted	1	48.0	68.0	82.0	89.0	88.0	81.0	71.0	93.0
Males									
Casual	1	58.0	62.0	63.0	55.0	53.0	51.0	48.0	63.0
Normal	1	60.0	66.0	69.0	62.0	58.0	54.0	48.0	69.0
Raised	1	65.0	71.0	76.0	70.0	66.0	61.0	55.0	76.0
Loud	1	69.0	78.0	85.0	84.0	79.0	73.0	63.0	87.0
Shouted	1	58.0	83.0	93.0	97.0	93.0	85.0	76.0	100.0

For a number of people (n) in the outdoor communal area in any vocal category the increase in noise level at any octave band centre frequency is $\Delta L = 10 \log_{10}(n)$.

The total noise level from all groups is determined using the equation

$$L = 10 \log_{10} \left(\sum_{i=1}^n 10^{(L_i / 10)} \right) \quad \text{Where } L_i \text{ is the noise level from each group.}$$

The noise levels from people congregating in the outdoor communal areas is calculated in accordance with ISO 9613.2 – *Acoustics – Attenuation of sound during propagation outdoors — Part 2: General method of calculation.*

The nearest receivers that have the potential to be impacted by the use of the communal areas are the proposed residential units located adjacent to the communal areas on Level 1 & Level 5, as well as the neighbouring developments at No. 1 Flora St & No. 908 Canterbury Rd.

The predicted noise levels at the most affected residential receivers, including residents of the proposed development, are presented in Table 7.3.2 below:

Table 7.3.2 - Predicted Noise from Outdoor Communal Open Spaces at External Façade of Receivers*-

Activity	Period	Expected. Leq dB(A) at Façade of Receiver*	Complies with Background level + 5 **
Residents Congregating in First Floor Outdoor Communal open space (50% talking)	7.00am - 6.00pm (Day)	41 dB(A) @ No. 1 Flora St.	Yes ✓ Day Time (< 55 dB(A))* Evening Time (<52 dB(A))***
	6.00pm-10:00pm (Evening)	N/A dB(A), @ No. 908 Canterbury Rd as it is built to boundary with full solid wall neighboring proposed Communal area.	
		44 dB(A) @ Proposed Residential Units critical façade - within strata of proposed building-	

Residents Congregating in <u>Fourth Floor</u> Outdoor Communal open space (50% talking)	7.00am - 6.00pm (Day)	N/A dB(A), @ No. 908 Canterbury Rd as it is built to boundary with full solid wall neighboring proposed Communal area.	Yes ✓ Day Time (< 55 dB(A))* Evening Time (<52 dB(A))***
	6.00pm-10:00pm (Evening)	44 dB(A) @ Proposed Residential Units critical façade - within strata of proposed building-	
		45 dB(A) @ Proposed Residential Units critical façade - within strata of proposed building-	
Residents Congregating in <u>Fifth Floor</u> Outdoor Communal open space (50% talking)	7.00am - 6.00pm (Day)	N/A dB(A), @ No. 908 Canterbury Rd as it is built to boundary with full solid wall neighboring proposed Communal area.	Yes ✓ Day Time (< 55 dB(A))* Evening Time (<52 dB(A))***
	6.00pm-10:00pm (Evening)	44 dB(A) @ Proposed Residential Units critical façade - within strata of proposed building-	
		45 dB(A) @ Proposed Residential Units critical façade - within strata of proposed building-	

*Assuming all recommendation in Section 8 are adhered to. ** NSW Noise Policy for Industry does not apply to Lodger/Patron noise (Section 1.5 exclusions). Background noise level + 5 applies.*** Outdoor communal area is closed between 10:00 pm and 7:00 am.

8.0 NOISE CONTROL RECOMMENDATIONS

8.1 MECHANICAL PLANT & EQUIPMENT RECOMMENDATIONS

Table 8.1 – Typical Mechanical Plant Recommendations

MECHANICAL PLANT	RECOMMENDATIONS
Basement Roller Door	<ul style="list-style-type: none"> Ensure maintenance and lubrication of motor bearings, door tracks and joints. The proposed security door fitted to the car parking area entrance must be independently mounted on rubber pads to prevent vibration noise transmission through the concrete walls and/or columns.
AC Condenser Units	<ul style="list-style-type: none"> we recommend that all outdoor air-conditioning units to be acoustically enclosed or set away by more than 3.0m from any boundary with a sound power level of each unit no more than 65 dB(A).
General Mechanical Plant	<ul style="list-style-type: none"> Procurement of quiet plant (when required) and the maintenance of existing plant; Strategic positioning of plant away from potential sensitive receivers;

	<ul style="list-style-type: none"> • Commercially available silencers or acoustic attenuators for air discharge and air intakes of plant; • Acoustically lined and lagged ductwork; • Acoustic screens and barriers between plant and sensitive neighbouring premises; and/or, • Partially enclosed or fully enclosed acoustic enclosures around plant.
Assessment of Mechanical Plans at CC	<ul style="list-style-type: none"> • We recommend acoustic assessment of all proposed mechanical plants and equipment once the development has been approved and full Mechanical Services Plans have been prepared. • The assessment of the Mechanical Plans once available will recommend proper silencer/(s) and duct lagging such that noise levels emitted from the mechanical plant servicing the proposed development meet the requirements of Section 6.1 of this report.

8.2 SOUND BARRIER & COMMUNAL AREA RECOMMENDATIONS

We recommend a 1.8m gap free barrier is installed on the southern and western boundaries of the proposed site in order to mitigate noise from vehicles entering/exiting the basement carpark (Figure 11 – Ground Floor Proposed Sound Barrier). The barrier is to be of lapped & capped timber, colourbond or masonry construction.

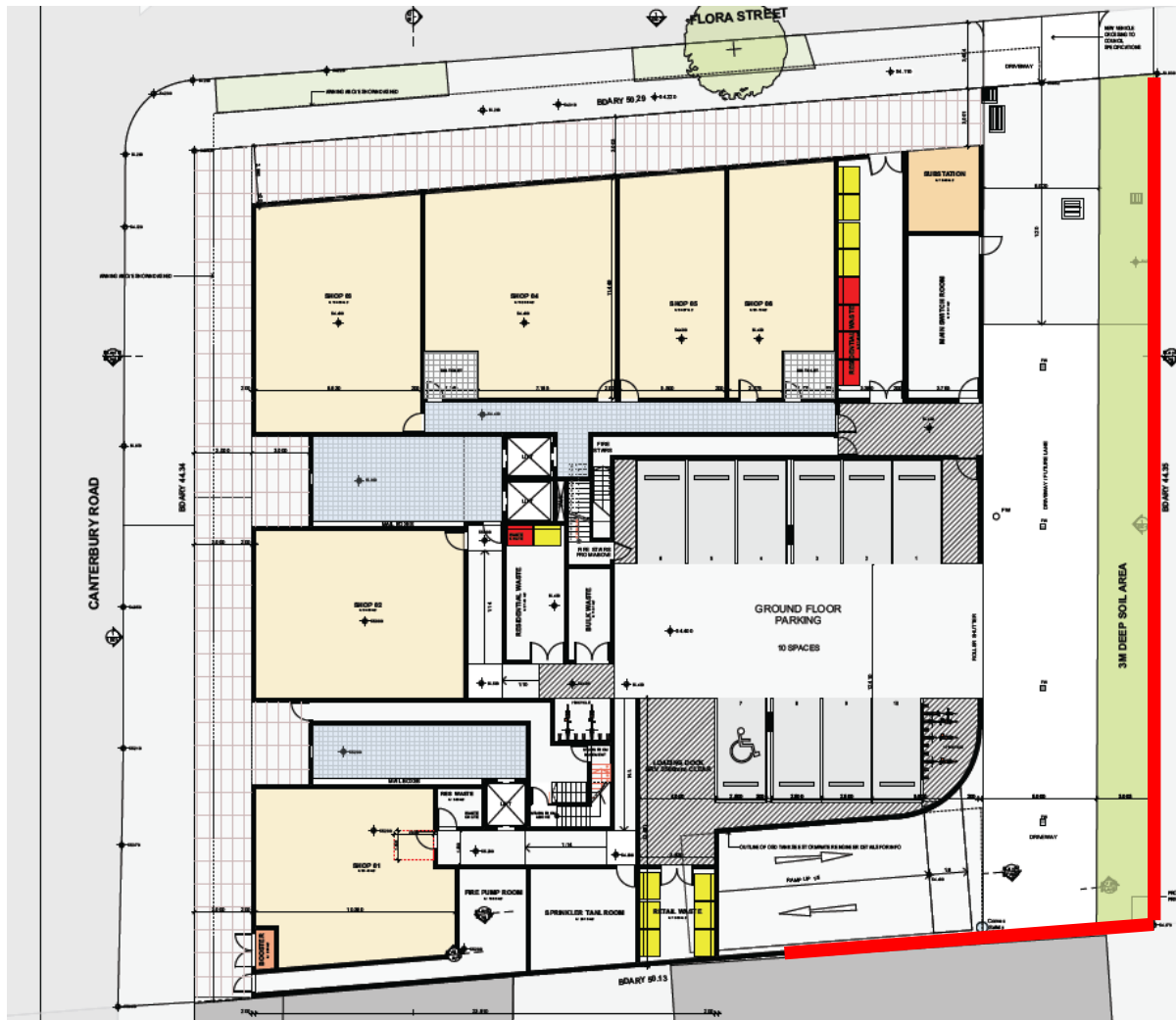


Figure 11 – Ground Floor Proposed Sound Barrier

**1.8 gap-free Sound
 Barrier**



In order for the use of the proposed communal areas to comply with the criteria set out in Section 6.2 of this report, we recommend the following:

- A 1.8m gap free barrier is to be installed along the perimeter of the Communal areas on the First, Fourth & Fifth Floor (Figures 12, 13 & 14 – Communal Areas Sound Barrier). The barriers are to be of lapped & capped timber, colourbond or masonry construction.
- NO music to be played in the outdoor communal areas at any time
- Access to the Communal areas is to be restricted to Day Time (7:00am – 6:00pm) and Evening Time (6:00pm – 10:00pm) only. No night time access permitted (10:00pm – 7:00am).
- Bedrooms Windows of Residential Units facing the Communal Areas, are to be 10.38mm laminated with full perimeter acoustic seals, as per recommendations listed in Section 5.1 of this report.



Figure 12 - Proposed First Floor Communal Area Sound Barrier

**1.8 gap-free Sound
Barrier**



Figure 13 - Proposed Fourth Floor Communal Area Sound Barrier

**1.8 gap-free Sound
 Barrier**

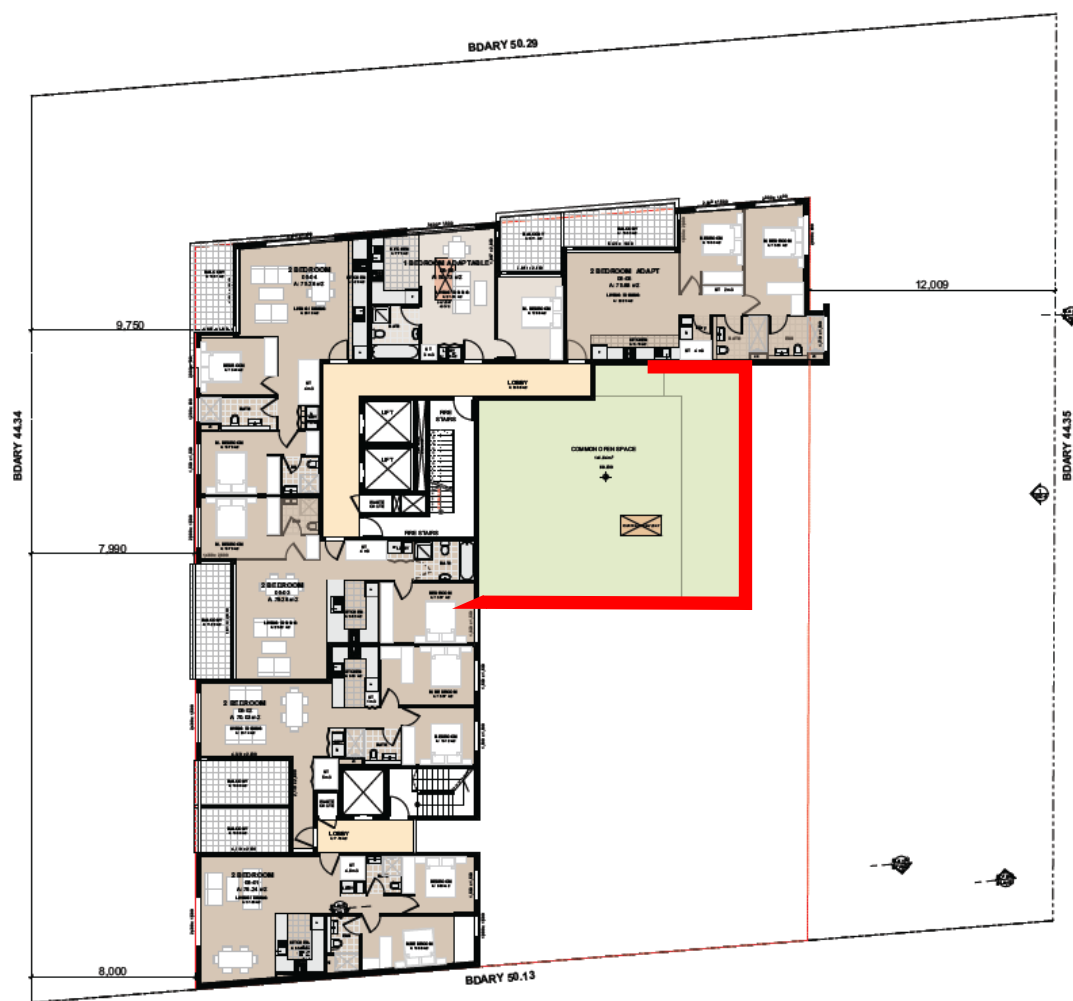


Figure 14 - Proposed Fifth Floor Communal Area Sound Barrier

— 1.8 gap-free Sound Barrier

9.0 DISCUSSION & CONCLUSION

The construction of the proposed development at No. 892, 898-902 & 906 Canterbury Rd, Roselands, if carried out as recommended in the plans and specifications and including the acoustic recommendations in Section 5.0 of this report, will meet the required internal noise levels as required in Clause 102 of the State Environmental Planning Policy – (Infrastructure) 2007 and AS 2107 '*Acoustics – Recommended Design Sound Levels and Reverberation Times*'.

All proposed Mechanical Plant & Equipment and Communal Areas, will comply with the requirements of the NSW Noise Guide for Local Government, NSW Noise Policy for Industry 2017 and Canterbury-Bankstown figure requirements, provided recommendations in Section 8 of this report are adhered to.

Should you require further explanations, please do not hesitate to contact us.

Yours Sincerely,



M. Zaioor

M.S. Eng'g Sci. (UNSW).

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