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Acoustic Report

- Noise Impact Assessment -

For the Proposed Boarding House

at

No. 71-73 Thomas St, Parramatta

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1.0 INTRODUCTION

The aim of this report is to determine the building materials to be used and the noise mitigation methods to be adopted such that the proposed boarding house development at No. 71-73 Thomas St, Parramatta (Figure 1 – Site Location) is built to achieve acceptable internal break-in and external break-out noise levels as per the requirements of Parramatta City Council.

The architectural plans by Vourtzoumis Architects – Revision 3 dated the October 1st, 2021, are for the proposed construction of a five storey Boarding House development to consist of the following:

- Seventy Two (72) Boarding Rooms including one (1) manager's room
- Two (2) Indoor Communal Living Areas
- Three (3) Outdoor Communal Areas
- Car Park for Thirty Six (36) Car Spaces including Three (3) Disable Parking.
- Fifteen (15) Motorbike Spaces
- Twenty-four (24) bicycle spaces.

The site is located on the corner of Thomas St and Pemberton St in the suburb of Parramatta. The subject site is located in predominately residential area with small commercial/retail facilities to service the needs of the community (Figure 2 – Surrounding Environment). The background noise levels are dominated by traffic from Thomas St & Pemberton St as well as surrounding residential activities.

The nearest residential receivers that have the potential to be affected by the proposed boarding house share site boundaries with the proposed site and are detailed in Table 1.1 below (Figure 3 – Nearest Residential Receivers).

Table 1.1 – Nearest Residential Receivers

Receiver	Location	Description
1.	69 Thomas St (west of site)	Single storey residential dwelling
2.	28-30 Broughton St (south of site)	Town Houses

The following assessment will ensure that noise break out from the proposed boarding house at No. 71-73 Thomas St, Parramatta, will comply with the requirements of Parramatta City Council, including the NSW EPA Noise Guide for Local Government, Noise Policy for Industry (2017) and the Protection of the Environment Operations Act 1997 (POEO).

This report will also ensure noise intrusion levels are to be within the limits adopted by the AS/NZS 2107:2016 "*Acoustics – Recommended Design Sound Levels and Reverberation Times*".

2.0 NOISE SURVEY, INSTRUMENTATION & RESULTS

On the 22nd September 2021, an engineer from this office visited the site to inspect the surroundings and carry out noise measurements for the proposed development. Unattended noise readings were carried out near the western boundary of the site, adjacent to the nearest residential receiver at No. 69 Thomas St, Parramatta (Figure 4 – Noise Reading Location- Point A).

Unattended environmental noise monitoring was carried out for a period of seven (7) days from September 22nd , 2021 to September 29th, 2021. The noise survey was conducted to determine a conservative reading of the existing $L_{(A90,\ 15\ minutes)}$ and $L_{(Aeq,\ 15\ minutes)}$ for the day, evening and night.

All sound pressure levels are rounded to the nearest whole decibel. All measurements were taken in accordance with the Australian Standards AS 1055:2018 "*Acoustics- Description and Measurements of Environmental Noise*". All sound level measurements and analysis carried throughout this report are carried with Svantek 977 Noise and vibration level meter which 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 and Client interfaces (real time PC "front end" application supported)
- RS 232 and IrDA interfaces
- Modbus protocol

The noise logger was positioned at a maximum height of 1.5m from the ground. The machine was calibrated prior and after reading using our Svantek SV 33A S/N: 90200 class 1 Calibrator. Any readings affected by strong wind or rain have been disregarded.

The Full Average Statistical Noise Parameters $\mathbf{L_{(Aeq,\ 15\ minutes)}}$, $\mathbf{L_{(A90,\ 15\ minutes)}}$, $\mathbf{L_{(A10,\ 15\ minutes)}}$, $\mathbf{L_{(A1,\ 15\ minutes)}}$ are presented in Figure 5 – Noise Survey. A Summary of those readings is presented in the Table 2.1.

Table 2.1 - Summary of existing noise survey for the assessment of impact noise from the proposed boarding house between the 22nd September, 2021 – 29th September, 2021 (Point A)

Location	*Time Period*	*Arithmetic Mean LAeq dB(A)*	*Arithmetic Mean LA90 dB(A)*	*RBL dB(A)*
Point A – Western site boundary (see Figure 4)	Day Time (7:00am-6:00pm)	53	46	45
	Evening Time (6:00pm-10:00pm)	48	44	43
	Night/Early Morning (10:00pm – 7:00am)	46	41	36

3.0 EXISTING ACOUSTIC ENVIRONMENT & POTENTIAL NOISE IMPACT

The proposed boarding house at No. 71-73 Thomas St, Parramatta will include the following:

- Seventy Two (72) Boarding Rooms including one (1) manager's room
- Two (2) Indoor Communal Living Areas
- Three (3) Outdoor Communal Areas
- Car Park for Thirty Six (36) Car Spaces Including Three (3) Disable Parking
- Fifteen (15) Motorcycle Spaces
- Twenty-four (24) bicycle spaces.

Noise producing activities from the proposed boarding house at No. 71-73 Thomas St, Parramatta are categorized into major and minor as follows:

Table 3.1 – Noise Producing Activities from Proposed Boarding House

Aspects	*Noise sources*
Entertainment	• Entertainment in Communal Areas (major)
Car Park	• Noise from Vehicles (major)
Equipment and systems	• Mechanical Plant and Air conditioning Units (major) • Washing and machine operation in laundry (minor) • Dishwashing, cleaning and cooking in kitchens (minor) • Lawnmowers and saws in gardening (minor) • Vacuum cleaners in housekeeping (minor)
Guest rooms	• Music and TV (major) • Conversation (minor) • Door closing (minor)

2.0 ACCEPTABLE NOISE LEVELS

2.1 ACOUSTICAL STUDY (AS/NZS 2107:2000) - *NOISE BREAK IN*

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 Reverberations 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 major and 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	—

2.2 NOISE GUIDE FOR LOCAL GOVERNMENT & POEO – *NOISE BREAK OUT*

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:** **46 + 5 = 51 dB(A)**
- **Evening period:** **44 + 5 = 49 dB(A)**
- **Night period:** **41 + 5 = 46 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.

2.2.1 SLEEP DISTURBANCE

In order to minimize the potential of sleep disturbance due to transient noises from the boarding house during night hours (10:00pm – 7:00am), Section 2.2.4 of the Noise Guide For Local Government recommends that $L_{A1,1\text{-minute}}$ level of any noise outside a bedroom should not exceed the background noise level by more than 15dB.

$L_{A1,\ 1\ minute}$ =< 41 + 15= 56 dB(A) outside window of residential receiver

Additionally, Section 5.4 of the NSW Road Noise Policy mentions the Environment Protection Authority NSW 1999 guideline which aims at limiting the level of sleep disturbance due to environmental noise. It states that the $L_{A1,\ 1\text{-minute}}$ level of any noise should not exceed the ambient L_{AF90} noise level by more than 15dB. This guideline takes into account the emergence of noise events but does not directly limit the number of such events or their highest level, which are also found to affect sleep disturbance.

Further studies by the enHealth Council (2004) and the guidelines published by the World Health Organisation (1999) were reviewed and analysed in terms of the guidance on noise exposure and sleep disturbance. The enHealth report states that:

'as a rule for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A) $L_{A,\ (Max)}$ more than 10 or 15 times per night'.

2.3 NSW NOISE POLICY FOR INDUSTRY (2017) - *NOISE BREAK OUT*

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.

2.3.1 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 boarding house at No. 71-73 Thomas St, Parramatta the recommended amenity noise levels are presented in Table 4.3.1.1 below:

Table 4.3.1.1 - Recommended Noise Levels from Industrial Noise Sources

Type of Receiver	*Area*	*Time Period*	*Recommended Leq Noise Level, dB(A)*
Residence	Suburban	Day	55
		Evening	45
		Night	40

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

Factor	*Correction*
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 $L_{Aequ,15min}$ equivalent noise criterion is depicted in Table 4.2.1.3 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 4.3.1.3 – Adjustment for Duration as per Fact Sheet C (Noise Policy for Industry 2017)

Allowable duration of noise (one event in any 24-hour period)	***Allowable exceedance of LAeq,15min equivalent project noise trigger level at receptor for the period of the noise event, dB(A)***	
	Daytime & evening (7 am–10 pm)	***Night-time (10 pm–7 am)***
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 boarding house at No. 71-73 Thomas St, Parramatta is as follows:

- **Day period:** **55 – 5 + 3 = 53 dB(A)**
- **Evening period:** **45 – 5 + 3 = 43 dB(A)**
- **Night period:** **40 – 5 + 3 = 38 dB(A)**

2.3.2 INTRUSIVENESS NOISE CRITERIA

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

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

While the background noise level known as $LA_{90,15\ minutes}$ 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 $L_{A90,15\ minutes}$ 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 LAF90,15min level. For the long-term method, the rating background noise level is defined as the median value of:

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

The predicted noise from the source $L_{Aeq,15\ min}$ 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 and night is as follows:

- **Day period:** **45 + 5 = 50 dB(A)**
- **Evening period:** **43 + 5 = 48 dB(A)**
- **Night period:** **36 + 5 = 41 dB(A)**

2.3.3 PROJECT NOISE TRIGGER LEVEL

A summary of intrusiveness and amenity noise levels as determined in Section 4.3.1 and 4.3.2 are shown in Table 4.3.3 below:

Table 4.3.3 - Summary of Intrusiveness and project amenity noise levels

Period	*Intrusiveness Noise Level*	*Project Amenity Noise level*
Day Time (7:00am-6:00pm)	50	53
Evening Time (6:00pm-10:00pm)	48	43
Night and Early Morning (10:00pm – 7:00am)	41	38

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:

- **Day period $L_{Aeq,15\ min}$:** **50 dB(A)**
- **Evening period $L_{Aeq,15\ min}$:** **43 dB(A)**
- **Night period $L_{Aeq,15\ min}$:** **38 dB(A)**

The proposed boarding house and its activities including all mechanical plant will not exceed the project noise trigger level at the most sensitive locations, provided all noise control recommendations in Section 6 of this report are adhered to.

2.4 TRAFFIC NOISE GENERATION CRITERIA

The Road Noise Policy in table 3, page 11 states that the Leq (1 hour) level of noise intrusion from land use developments with potential to create additional traffic on local roads should not exceed 55 dB(A) during the day time (7am to 10pm) and 50 dB(A) during night time (10pm to 7am).

3.0 PREDICTED NOISE FROM THE BOARDING HOUSE

As stated in Section 3.0 of this report, noise levels from the boarding house are classified into major and minor offensive noise sources. The main major noise sources are:

- Noise from occupants entering and existing the on-ground carpark,
- Noise from lodgers gathering in the indoor and outdoor communal spaces
- Noise from air-conditioning units, pumps and compressors and mechanical plant.

3.1 TRAFFIC NOISE FROM PROPOSED BOARDING HOUSE

The basement parking for the proposed boarding house will accommodate a total of thirty six (36) car parking spaces including three disable parking, fifteen (15) motorcycle spaces and twenty-four (24) bicycle spaces (Figure 6 - Proposed Basement Parking). Access to the basement parking is from Pemberton St.

It is expected that most lodges will utilise public transport. Bus services are readily available in the surrounding streets. Alternatively, some residents will utilise the on-ground parking.

A Traffic and Parking Assessment prepared by ANACivil Pty Ltd dated the October 5th, 2021 predicts a net traffic generation of maximum 29 (27 increase) vehicles per hour during AM & PM peak periods.

The predicted noise levels due to vehicles arriving and departing the site will be governed by existing background noise levels from Pemberton St, Thomas St and the surrounding residential activities.

As shown in sections 4.1.1 & 4.1.2 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 Road Noise Policy and the Noise Policy for Industry 2017 provided the recommendations in Section 6 of this report are adhered to.

3.1.1 NOISE BREAK-OUT FROM ADDITIONAL TRAFFIC GENERATION

The Traffic and Parking Assessment prepared by ANACivil Pty Ltd predicted two-nine (29) vehicle movements in the AM & PM peak hours.

The nearest residential receivers that will be affected by vehicles entering/exiting the proposed basement parking will be the residential properties at No. 75 Thomas St, 16 Pemberton St & 28-30 Broughton St. Predicted noise levels at 1.0m from the building line of the above premises, due to additional traffic generation on Pemberton St are presented in Table 5.1.1.

Table 4.1.1 – Predicted Noise from Traffic Generation at 1.0m from facade of The Nearest Receiver at (No. corner of 75 Thomas St & 16 Pemberton St)

Activity	Period	Expected Leq 1hr dB(A) from Additional Traffic Noise	Complies with Traffic Noise Criteria- as per section 3.4
Noise on Pemberton St from Additional Traffic Generation	AM Peak Hour Period-Day	53 dB(A)	Yes <55 dB(A) – Day <50 dB(A) – Night
	PM Peak Hour Period-Night -	47 dB(A)	

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

Access to the proposed basement parking will be from Pemberton St, with the driveway entry located adjacent to the southern boundary of the site (Figure 7 – Proposed Basement Parking). Therefore, the nearest residential receiver affected by vehicles entering and leaving the basement car park will be the residential receiver at No. 28-30 Broughton St.

Garage 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 4.1.2.1 – Swl Levels for Different Car Activities Expected to Occur in the Garage

Car Park Noise Source	*Sound Power Level, dB(A)*
Car Door Closing	91*
Car Starting	87*
Car Moving at 10 km/hr	81
Automate Roll Up Garage Door Opening and Closing	75

*Not applicable through this project as operation is carried inside building.

Predicted noise levels at the boundary of the nearest residential receivers No. 28-30 Broughton St, due to cars entering and exiting the car park, are presented in Table 4.1.2.2.

Table 4.1.2.2 – Predicted noise from vehicles entering and exiting the basement parking at boundary of No. 28-30 Broughton St*, *

Activity	Period	Expected Leq dB(A)	*Compliance with Noise Trigger level (Noise Policy For Industry 2017).*
Noise impact from vehicles entering/exiting the basement parking at boundary of No. 28-30 Broughton St	7.00am - 6.00pm (Day)	43 dB(A)	Yes < 50 dB(A)
	6:00pm – 10:00pm (Evening)	43 dB(A)	Yes < 43 dB(A)
	10:00pm – 7:00am (Night)	39 dB(A)*	NO > 38 *** Exceeds criteria by 1 dB(A)

***Based on Max. (5) Vehicles per 15 minutes (day and evening), Max (2) per 15 minutes (10:00 p.m. to 7:00 a.m), ** Assuming all recommendations in section 6 of this report are adhered to.**
***** background noise levels at the front adjacent to proposed driveway are expected to be higher than readings carried out at the back. The 2 dB(A) exceedance is not perceivable as per Harris. The following table lists sound perception relative to dB sound level change.**

Sound Pressure Level change	Subjective perception	Sound energy change
0 - 3 dB	Barely perceivable	50%
4 - 5 dB	Perceivable and significant	69%
6 dB	Resultant sound 1/4 lower than initial level	75%
7 - 9 dB	Major perceived reduction	87%
10 dB	Resultant sound 1/2 lower than initial level	90%

3.2 NOISE FROM COMMUNAL AREAS

The proposed boarding house will include seventy-two (72) boarding rooms including one manager room. Indoor & outdoor communal areas are located on the ground floor & Level 3 of the proposed site (Figure 7 – Proposed Indoor & Outdoor Communal Areas).

Lodgers may listen to music or watch television in their rooms or in the common room. No congregation is permitted in the outdoor communal area after 10 p.m.

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

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 lodgers (n) 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

$$L = 10\,\mathrm{Log}_{10}\left(\sum_{i=1}^{n} 10^{(L_i/10)}\right)$$

Where L_i is the noise level from each group.

The sound loss through the façade of the communal room in particular and the boarding rooms in general is given at any center frequency using Lord/Templeton as follows:

$$L_2 = L_1 - R + 10\log S - 17 - 20\log(r) + DI$$

Where;

L_2 is the noise level at location 2 outside the room;
L_1 is the internal noise level at the source;
r is the distance in meters to location 2 from the source;
R is the weighted sound reduction index of the façade;
S is the area of the façade; and
DI is the directivity associated with the source.

Tables 4.2.2 below lists the predicted noise levels when the indoor communal area is operating at full capacity at the most critical residential receivers at No.69 Thomas St & No. 28-30 Broughton St (external facade).

Table 4.2.2 – Predicted Noise from Indoor Communal Area at façade of Residential Receiver*

Activity	Residential receiver	Period	Expected. Leq dB(A)	*Complies with Noise Guide for Local Government Background level at Point A + 5***
Lodgers in indoor communal lounge with music playing	No. 69 Thomas St,	7.00am - 6.00pm (Day) 6.00pm-10:00pm (Evening) 10:00pm – 7:00am (Night & Early Morning)	25 dB(A)	Yes ✓ (< 51, 49, 46 dB(A))

Lodgers in indoor communal lounge with music playing	No. 28-30 Broughton St	7.00am - 6.00pm (Day) 6.00pm-10:00pm (Evening) 10:00pm – 7:00am (Night & Early Morning)	24 dB(A)	Yes ✓ (< 51, 49, 46 dB(A))

***Assume sliding doors and windows are closed. -Ventilation can be achieved Via Silenceair® external wall vents-. ** NSW Noise Policy for Industry does not apply to Lodger/Patron noise (Section 1.5 exclusions). Background noise level + 5 applies.**

If sound from music and TV are played inside the guest rooms or common room at a reasonable level, then the noise transmitted into the most affected residences, will comply with the criteria allowed as per Section 3 of this report, provided noise control recommendations in Section 6 are also adhered to.

The noise levels from people congregating in the outdoor communal area is calculated in accordance with ISO 9613.2 – *Acoustics – Attenuation of sound during propagation outdoors — Part 2: General method of calculation.* The predicted noise levels at the most affected residential receivers are presented in Table 5.2.3 below:

Table 4.2.3 - Predicted Noise from Outdoor Communal Open Space at External Façade of Residential Receivers*-

Activity	*Residential receiver*	*Period*	*Expected. Leq dB(A) at Façade of Receiver**	*Complies with Background level + 5 ***
**** Lodgers in outdoor communal open space (50% talking)**	No. 28-30 Broughton St	7.00am - 6.00pm (Day) 6.00pm-10:00pm (Evening)	48.5 dB(A)	Yes ✓ (< 51, 49, 46 dB(A))***

Assuming all recommendation in Section 6 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**

3.3 NOISE FROM MECHANICAL PLANT & AIR CONDITIONING UNITS

A range of mechanical plant, equipment and ventilation might be included in the proposed boarding house at No. 71-73 Thomas St, Parramatta. Noise emitted by the use of the proposed mechanical plant is assessed by the NSW Noise Policy for Industry 2017 and Parramatta City Council requirements.

The proposed level of basement parking is located below ground level. That makes providing natural ventilation not possible and a mechanical extract system should be used. The mechanical ventilation system will include the use of supply air fans/exhaust air fans to achieve all required air changes for exhaust fume and extract smoke clearance in accordance with Australian

Standard *AS1668.2:2012 "The use of ventilation and air-conditioning in buildings -Mechanical ventilation in buildings"*. Air-conditioning might also be installed in the proposed development.

Typical noise emitted from condensing unit, basement exhaust fans and roller door are presented in Table 5.3.1.

Table 4.3.1 – Typical Mechanical Plant Sound Power Levels

FREQUENCY [Hz]	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dBA***
Typical car park exhaust/supply fan	80	82	84	87	86	83	78	71	**90**
Typical condensing unit	71	69	67	61	58	54	47	44	**64**
Basement security roller door	69	63	65	65	77	78	80	79	**85**

In order for the operation of the car park & basement garage door to meet NSW Noise Policy for Industry 2017, we recommend the following:

- 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

As the proposed development is still in the initial application stage, we recommend that further acoustic assessment is carried out when the development has been approved and Mechanical Services plans have been prepared for our review.

However, provided recommendations in Section 6.2 of this report are adhered to, all proposed mechanical plant and equipment is likely to comply with the criteria of the Noise Policy for Industry (2017) and Parramatta Council Conditions.

4.0 RECOMMENDATIONS

4.1 EXTERNAL BUILDING SPECIFICATIONS

To limit the level of noise emission from the proposed boarding house (noise breakout) and limit noise intrusion into the boarding house (noise break in), we recommend the following materials are used in the construction:

Building Component	*Rw Rating to be Achieved*
Windows and Sliding Doors in all boarding rooms and Common Room are to be 6.38mm laminated type with full perimeter Schlegel Q-Lon acoustic seals (Ph: 8707-2000) (1)(2)(3).	32
Windows in all other Areas (Bathrooms/Ensuites/Laundries etc) are to be unrestricted and to be in accordance with AS 2047 (Windows in Buildings) (1)(2)(3).	25
External Doors are to be Solid Core with acoustic seals fitted around the door. A drop seal is required at the base of the external door (2).	30-33
External Walls are to be 270/250 mm double brick, brick veneer construction *or any other method of wall construction with an Rw of 44* (2)(3).	44
Roof is to be Colorbond Steel Roofing, on 13mm gypsum plaster board ceiling with 75mm thick, 11kg/m³ mineral wool batts between ceiling joists(3).	35-40

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 been window & door frames and the masonry are to be sealed using acoustic foam Hilti CP620 or similar. Glass wool batts can be applied prior to the application of the foam to seal larger gaps. (3). All gaps are to be acoustically sealed.

4.2 AIR CONDITIONING UNITS, MECHANICAL VENTILATION

As previously mentioned, we recommend acoustic assessment of all proposed mechanical plant and equipment once the development has been approved and Mechanical Services Plans have been prepared. In general, we recommend that all new external air-conditioning units are to be acoustically enclosed or set away by more than 3.0m from any boundary.

For the operation of the mechanical plants and garage door to meet the requirements of the NSW Noise Policy for Industry (2017), we recommend the following:

- 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.

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 boarding house at No. 71-73 Thomas St, meet the requirements of Section 4.0 of this report.

4.3 SOUND BARRIER FENCE

We recommend that a 1.8 metre gap free fence is installed on the southern and western boundaries of the site (Figure 8 – Sound Barrier Location). The fence can be of lapped and capped timber, Colourbond steel or masonry construction.

4.4 PLAN OF MANAGEMENT

The use of the boarding house is usually regulated through a Plan of Management (PoM).

No residents/visitors are to be gathered in the outdoor communal area during night hours (i.e. between 10:00pm and 7:00am). All residences and visitors are not to make unreasonable noise while on the premises.

When tv/music are played at a high volume inside boarding rooms or indoor common room, windows are to be closed and volume levels are to be adjusted such that noise is not transmitted to nearby residential receivers.

It is the responsibility of the managing authority of the boarding room to ensure that the above rules are adhered to by both residents and their visitors.

4.5 SIGNS & RESTRICTION OF USE OF OUTDOOR COMMUNAL AREAS

The following signs are to be placed in and around the boarding house.

- Signs reminding residents to minimise noise at all times shall be installed at entry and hallways of the boarding house and the common room, to ensure that all sounds are to be restricted within the property and not transmitted into adjoining residences.
- Signs are to be also installed in the outdoor communal areas, advising that no access is permitted during the night hours (10:00pm – 7:00am).

4.6 NOISE MANAGEMENT PLAN

A Noise Management Plan should be implemented and should include the following:

- Install a contact number at the front of the Boarding House so that complaints regarding the station operation can be made.
- Implement a complaint handling procedure. If a noise complaint is received the complaint should be recorded on a Complaint Form, containing the following:
    - Name and address of the complainant
    - Time and date the complaint was received
    - The nature of the complaint and the time/date the noise was heard
    - The name of the employee that received the complaint
    - Actions taken to investigate the complaint and the summary of the results of the investigation

- Indication of what was occurring at the time the noise was happening (if applicable)
- Required remedial action (if applicable)
- Validation of the remedial action
- Summary of feedback to the complaint

All complaints received shall be reported to management with initial action/investigation commencing within 7 days. The complaint should also be notified of the results and actions arising from the investigation.

7.0 CONCLUSION

Acoustic, Noise & Vibration Solutions Pty Ltd has taken noise level measurements at the most noise sensitive locations near the proposed Boarding House located at No. 71-73 Thomas St, Parramatta. The levels of noise emission from the proposed boarding house have been calculated and quantified using reliable test data.

Provided the noise controls as recommended in Section 6 of this report are fully implemented, we are confident that the noise emission levels from the proposed boarding house and its various uses including the mechanical plant will comply with the relative sections of the NSW EPA Noise Guide for Local Government, Noise Policy for Industry and Parramatta City Council requirements and will not create any offensive noise to the surrounding residential and commercial environment as per the definition of the POEO.

We hope this report meets your requirements. Should you require further explanations, please do not hesitate to contact us.

Yours sincerely,

M. Zaioor
Australian Acoustical Society (Member).
M.S. Eng'g Sci. (UNSW).
M.I.E.(Aust), CPEng

5.0 APPENDIX

Figure 1 - Site Location

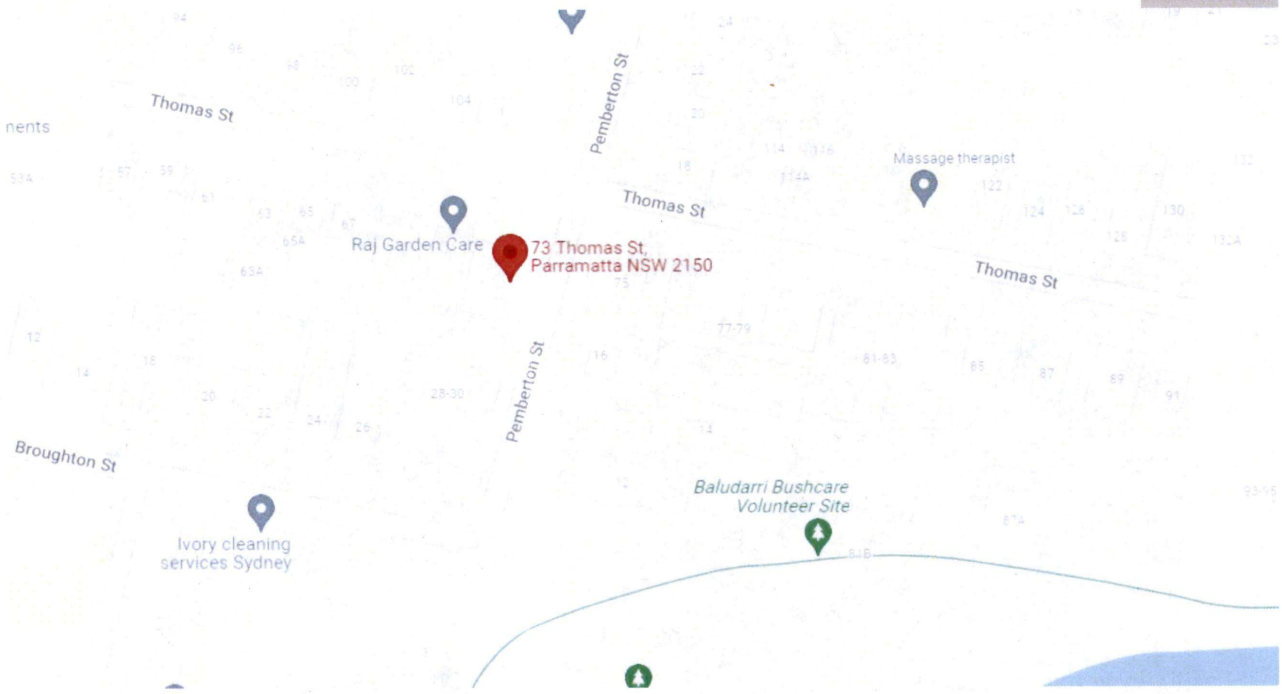


Figure 2 - Surrounding Environment

Figure 3 - Nearest Residential Receivers

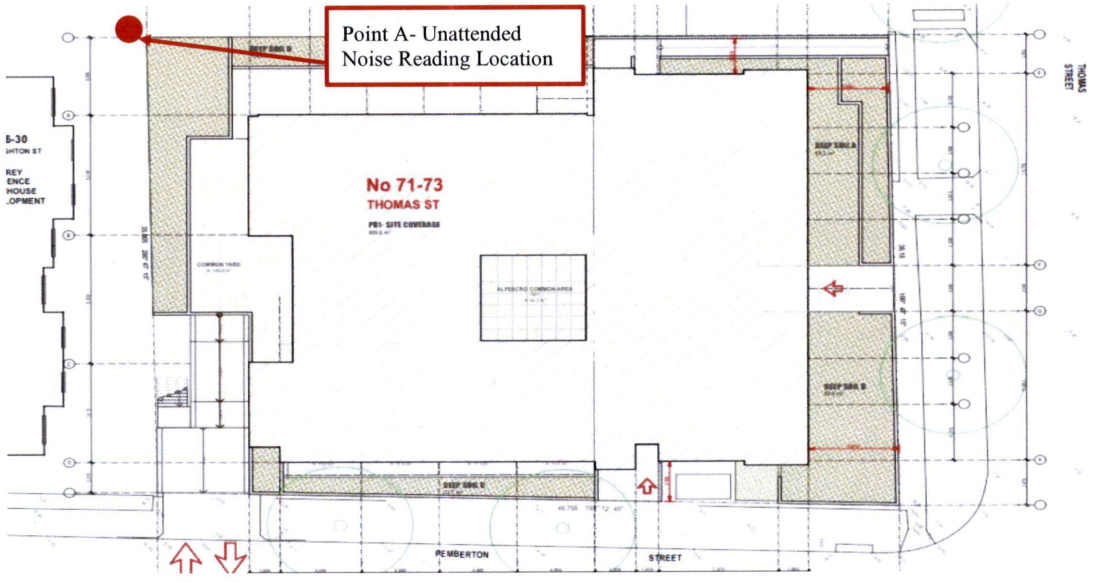


Figure 4 - Noise Reading Location

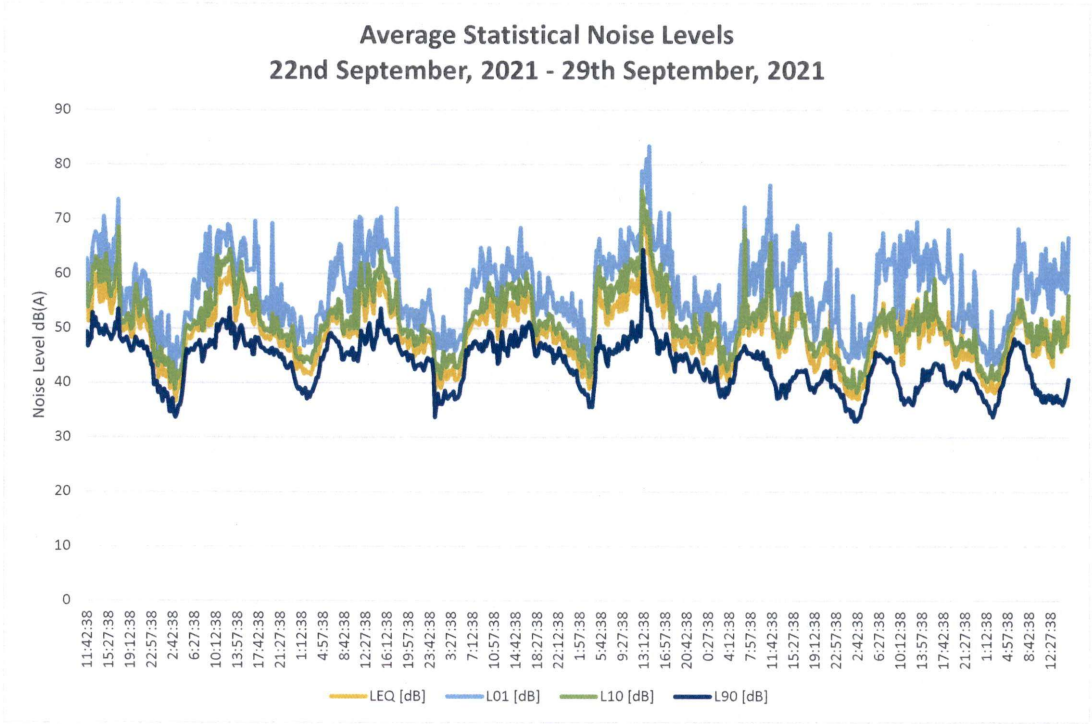


Figure 5 - Noise Survey

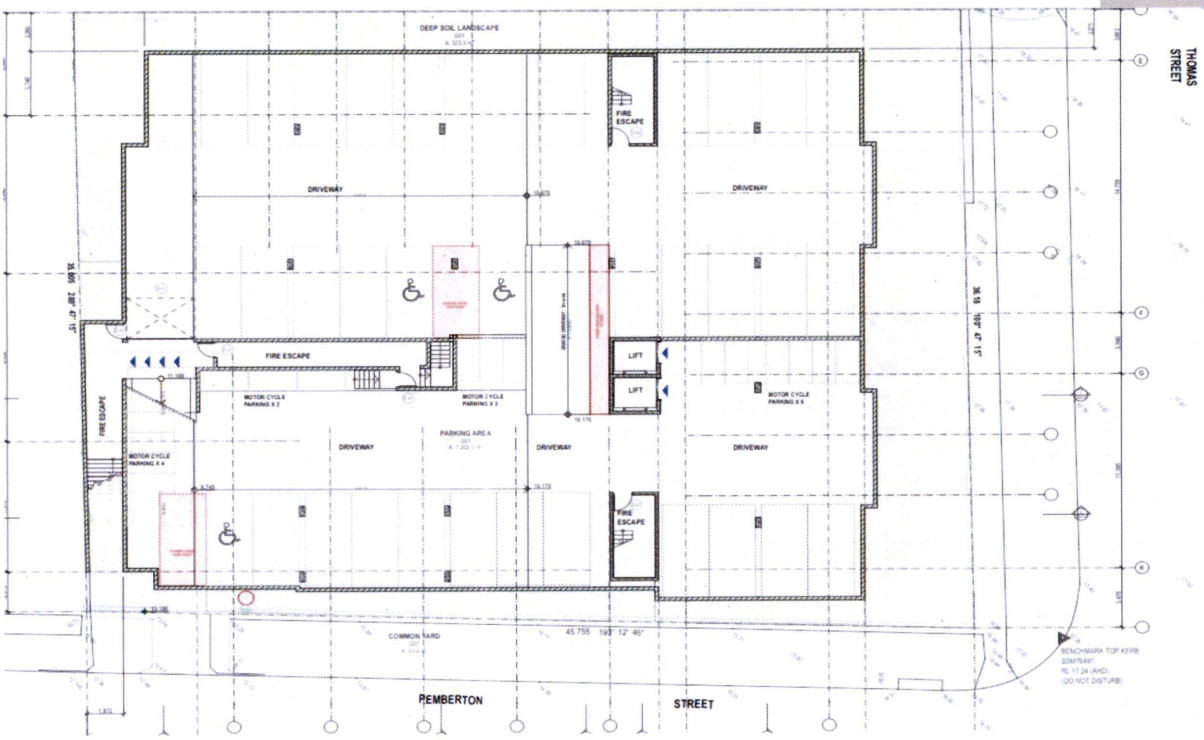


Figure 6 - Proposed Basement Parking Layout

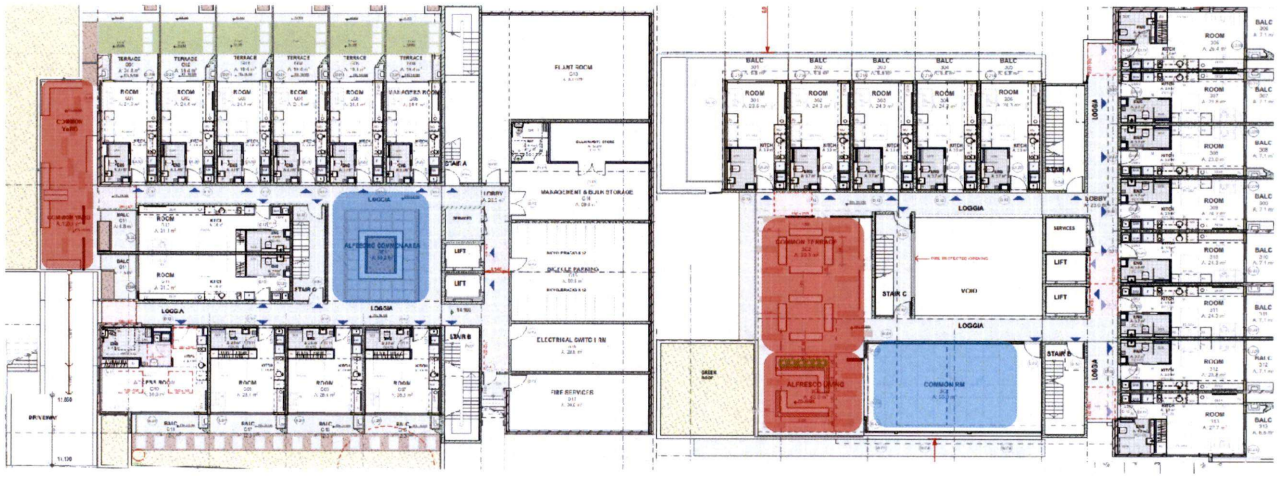
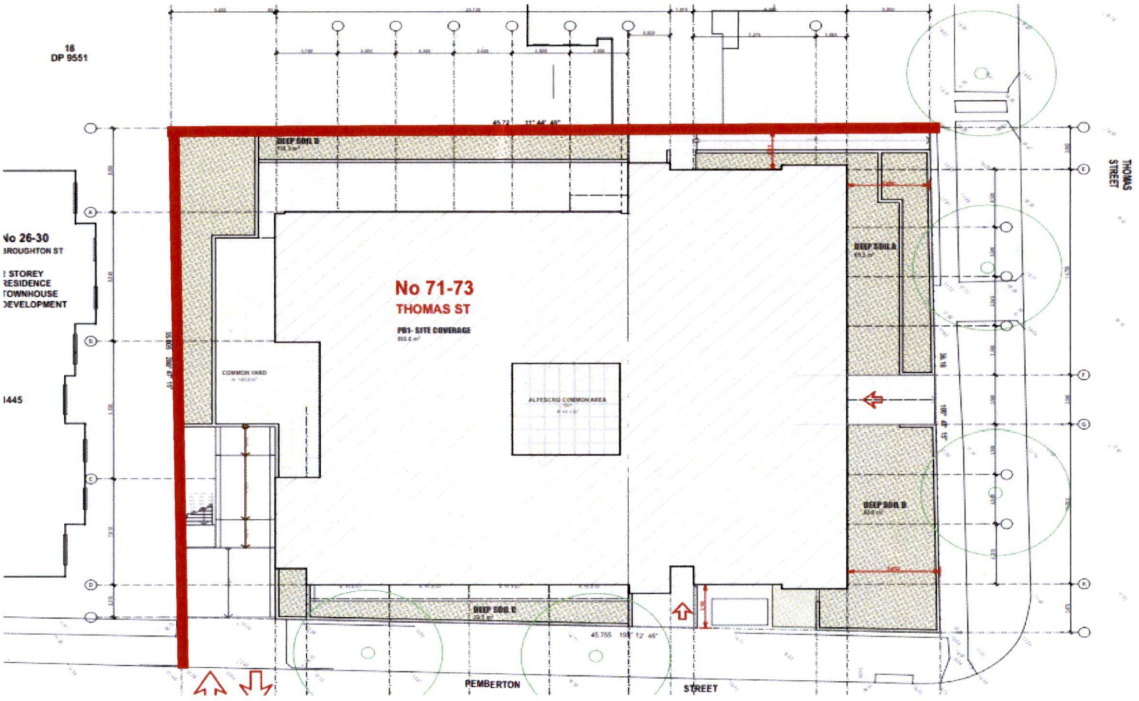


Figure 7 - Proposed Indoor & Outdoor Communal Areas



1.8m Sound Barrier Fence

Figure 8 - Sound Barrier Location