acouras CONSULTANCY

Hyside Projects Subtwo Pty Ltd

21 Parramatta Road, Homebush

Acoustic DA Assessment

Author	Fu Siong Hie, B.Eng, MAAS Principal Consultant
Document Reference:	SYD2019-1108-R001C
Date	19/12/2019
Comments:	Final drawings

Table of Contents

1 Introduction 4
2 Noise Criteria 5
2.1 DCP Internal Noise Levels 5
2.2 Sound Insulation Requirement (Part F5 NCC/BCA) 7
2.3 Noise Survey and Project Specific Limits 9
2.3.1 Traffic Noise Levels 9
2.3.2 Ambient Noise Levels and Project Noise Limits 12
3 Assessment and Recommendations 13
3.1 Façade Glazing Requirements 13
3.2 Building Façade Construction 14
3.3 Mechanical Services 14
3.4 Apartment Ventilation 14
3.5 Separation Between Commercial and Residential 15
3.6 Commercial Delivery and Waste Collection Vehicles 15
4 Conclusion 16
Appendix A – Acoustic Terminology 17
Appendix B – Architectural Drawings 18
Appendix C – Noise Logger Results 19

Index of Figures

Figure 1 – Site Location, Nearest Residents and Noise Logger Position 4
Figure 2 – Daytime Traffic Noise Contour (Ground Level) 10
Figure 3 – Night-Time Traffic Noise Contour (Ground Level) 11

Index of Tables

Table 1— Development near Rail Corridors and Busy Roads – Interim Guideline 5
Table 2— Recommended Internal Design Noise Levels (AS/NZS 2107) 6
Table 3 - NCC Part F5 Requirements (Class 2 or 3) 7
Table 4 – Measured Ambient and Traffic Noise and Levels, dBA 9
Table 5 – Previous Traffic Noise and Levels (2015), dBA 9
Table 6—EPA Noise Limits for Development, dBA 12
Table 7 – Schedule of Window and Glazing (R_w) 13
Table 8 – External Façade Construction (R_w) 14

1 Introduction

The following report has been prepared by Acouras Consultancy on behalf of Hyside Projects Subtwo Pty Ltd to undertake a noise impact assessment for the proposed Stage 2 residential development located at 21 Parramatta Road, Homebush. The proposed mixed use development in Stage 2 will include the following:

- Existing four (4) levels of basement.
- Retail space on ground level.
- Apartments on level 1 to level 24.

The site is surrounded by existing commercial and multi-storey residential buildings. Traffic noise from Parramatta Road and the M4 Western Motorway dominates the ambient noise levels. The site location is shown in Figure 1.

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

2 Noise Criteria

The following standards and guidelines are applicable to this project:

- Strathfield Council DCP 2005 and DCP 20 Parramatta Road Corridor Area.
- NSW Department of Planning "Development Near Rail Corridors and Busy Roads" and State Environmental Planning Policy (Infrastructure) Clause 102.
- NCC/BCA Part F5.
- NSW EPA "Industrial Noise Policy" (INP) and "Noise Guide for Local Government" (NGLG).
- Australian Standard AS/NZS 2107-2016: Acoustics – Recommended design sound levels and reverberation times for building interiors.
- Australian Standard AS 3671-1989 'Acoustics - Road traffic noise intrusion -building siting and construction'.
- Australian standard AS 1055.1-1997: Acoustics – Description and measurement of environmental noise - General procedures.

2.1 DCP Internal Noise Levels

The Strathfield DCP refers AS/NZS 2107–2000 and AS3671-1989 when assessing development near a major road or rail. However, the Department of Planning (DoP) "Development near Rail Corridors and Busy Roads – Interim Guideline" requires residential developments be assessed according to the State Environmental Planning Policy (Infrastructure) Clause 102, which states:

> *Development for any of the following purposes that is on land in or adjacent to a road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data available on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:*
>
> - *building for residential use*
> - *a place of public worship*
> - *a hospital*
> - *an educational establishment or childcare centre*

In the SEPP Clause 102 (road) requires that if the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded.

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

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

Mitigation measures are based on having windows and external doors closed. If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, 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.

For all other spaces, the Strathfield Council DCP specifies the AS/NZS 2107 which outlines the acceptable internal noise levels such that a satisfactory acoustic environment within occupied spaces in new and existing buildings can be achieved.

The Australian Standard AS 3671-1989 'Acoustics - Road traffic noise intrusion -building siting and construction' provides guidance on the design but is limited as is refers to the Australian Standard AS 2107. Australian Standard AS 2107 – 2016 'Acoustic – Recommended Design Sound Levels and Reverberation Times for Building Interiors' to provide the recommended design sound levels for different areas of occupancy in buildings. Table 2 presents the recommended internal design noise levels in accordance with AS 2107 – 2016.

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

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

2.2 Sound Insulation Requirement (Part F5 NCC/BCA)

For sound transmission and insulation between sole occupancy units (SOU) within the same development, walls and floors to be constructed in accordance with requirements of Part F5 of the Building Code of Australia (BCA). Sound insulation requirements are summarised in Table 3.

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

Building Element	Minimum NCC Part F5 Requirements
Sound Insulation Rating of Walls (Class 2 or 3)	
Walls between separate sole occupancy units.	Rw + Ctr 50 (airborne)
Walls between wet areas (bathrooms, sanitary compartment, laundry or kitchen) and a habitable room (other than kitchen) in adjoining apartments.	Rw + Ctr 50 (airborne) & of discontinuous construction
Walls between sole occupancy unit and stairway, public corridors, public lobby or the like or parts of a different classification.	Rw 50 (airborne)
Walls between a plant room or lift shaft and a sole occupancy unit.	Rw 50 (airborne) & of discontinuous construction
Sound Insulation Rating of Floors (Class 2 or 3)	
Floors between sole occupancy units or between a sole occupancy unit and plant room, lift shaft, stairway, public corridor, public lobby or the like.	Rw + Ctr 50 (airborne) & Ln,w + CI < 62 (impact)
Apartment Entry Doors (Class 2 or 3)	
A door incorporated in a wall that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like.	Rw 30 (airborne)
Services (Class 2, 3 or 9c)	
If a storm water pipe, a duct, soil, waste or water supply pipe including a duct or pipe that is located in a wall or floor cavity serves or passes through more than one sole occupancy unit must be separated:	
if the adjacent room is a habitable room (other than a kitchen); or	Rw + Ctr 40
if the room is a kitchen or non-habitable room	Rw + Ctr 25

Construction Deemed to Satisfy

The forms of construction must be installed as follows:

(a) Masonry—Units must be laid with all joints filled solid, including those between the masonry and any adjoining construction.

(b) Concrete slabs—Joints between concrete slabs or panels and any adjoining construction must be filled solid.

(c) Sheeting materials—

(i) if one layer is required on both sides of a wall, it must be fastened to the studs with joints staggered on opposite sides; and

(ii) if two layers are required, the second layer must be fastened over the first layer so that the joints do not coincide with those of the first layer; and

(iii) joints between sheets or between sheets and any adjoining construction must be taped and filled solid.

(d) Timber or steel-framed construction—perimeter framing members must be securely fixed to the adjoining structure and—

(i) bedded in resilient compound; or

(ii) the joints must be caulked so that there are no voids between the framing members and the adjoining structure.

(e) Services—

(i) Services must not be chased into concrete or masonry elements.

(ii) A door or panel required to have a certain Rw + Ctr that provides access to a duct, pipe or other service must—

(A) not open into any habitable room (other than a kitchen); and

(B) be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10 mm, be fitted with a sealing gasket along all edges and be constructed of—

(aa) wood, particleboard or blockboard not less than 33 mm thick; or

(bb) compressed fibre reinforced cement sheeting not less than 9Â mm thick; or

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

(iii) A water supply pipe must—

(A) only be installed in the cavity of discontinuous construction; and

(B) in the case of a pipe that serves only one sole-occupancy unit, not be fixed to the wall leaf on the side adjoining any other sole-occupancy unit and have a clearance not less than 10 mm to the other wall leaf.

(iv) Electrical outlets must be offset from each other—

(A) in masonry walling, not less than 100 mm; and

(B) in timber or steel framed walling, not less than 300 mm.

2.3 Noise Survey and Project Specific Limits

An unattended noise survey was carried out at the site to measure the background and ambient noise levels. Nose monitoring was conducted between Tuesday 19th to Tuesday 26th November 2019. The monitor was positioned as shown in Figure 1. Measurements were conducted using the following equipment:

- SVAN 958A Type 1 Real time Analyser/Noise Logger. Serial No. 36624.
- SVAN SV30A Type 1 Sound Level Calibrator. Serial No. 31830.

Noise monitoring was conducted in general accordance with Australian standard AS 1055.1-1997: Acoustics-Description and measurement of environmental noise-General procedures. The noise analyser was calibrated immediately before and after measurements were taken with no discernible differences between these two recorded levels. The sound analyser is Type 1 and complies with Australian standard AS1259.2: 1990.

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

2.3.1 Traffic Noise Levels

Table 4 presents a summary of the measured ambient noise level and traffic noise impacting the development recently conducted in November 2019.

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

Location	Period	Average L_{eq}	Highest L_{eq} 1hr
Parramatta Rd	Day (07:00-22:00)	66	71
	Night (22:00-07:00)	66	71

Table 5 presents the traffic noise levels from our previous assessment as detailed in Acouras Consultancy's "Acoustic DA Assessment" report (ref: SYD2013-1048-R001J) dated 02/03/2015. Figure 2 and Figure 3 shows the predicted impact of traffic noise during the daytime and night time periods respectively that is impacting the development.

Table 5 – Previous Traffic Noise and Levels (2015), dBA

Location	Period	Average L_{eq}	Highest L_{eq}
Parramatta Rd	Day (7:00-22:00)	$L_{eq\ (15hr)}$ 67	$L_{eq\ (1hr)}$ 71
(2015)	Night (22:00-07:00)	$L_{eq\ (9hr)}$ 64	$L_{eq\ (1hr)}$68
Powell Street	Morning Peak (08:00-09:30)	-	$L_{eq\ (1hr)}$68
(North)	Afternoon Peak (16:30-18:00)	-	$L_{eq\ (1hr)}$ 66
M5 Motorway	Day (7:00-22:00)	$L_{eq\ (15hr)}$ 64	$L_{eq\ (1hr)}$ 67
	Night (22:00-07:00)	$L_{eq\ (9hr)}$ 60	$L_{eq\ (1hr)}$63

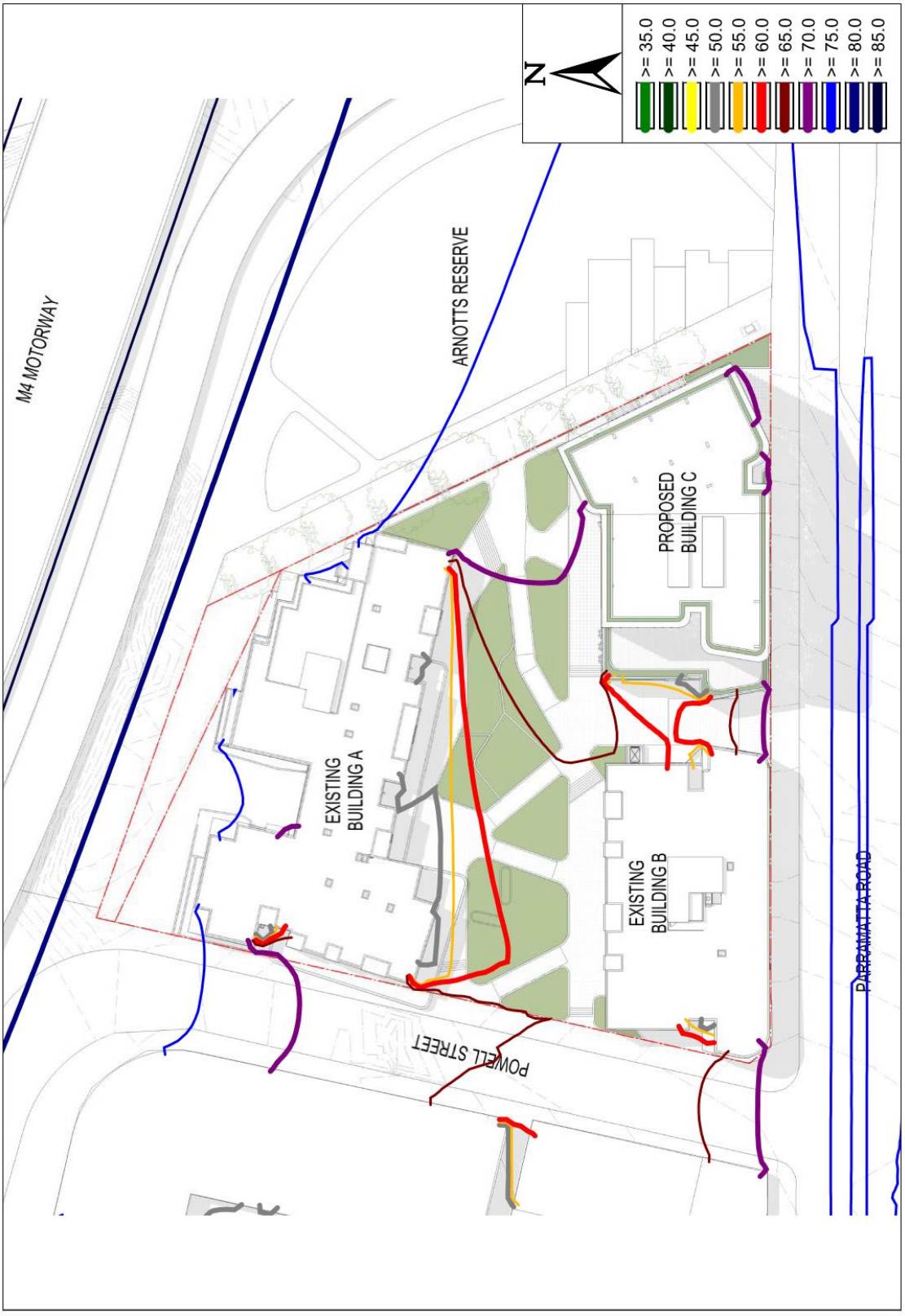


Figure 2 – Daytime Traffic Noise Contour (Ground Level)

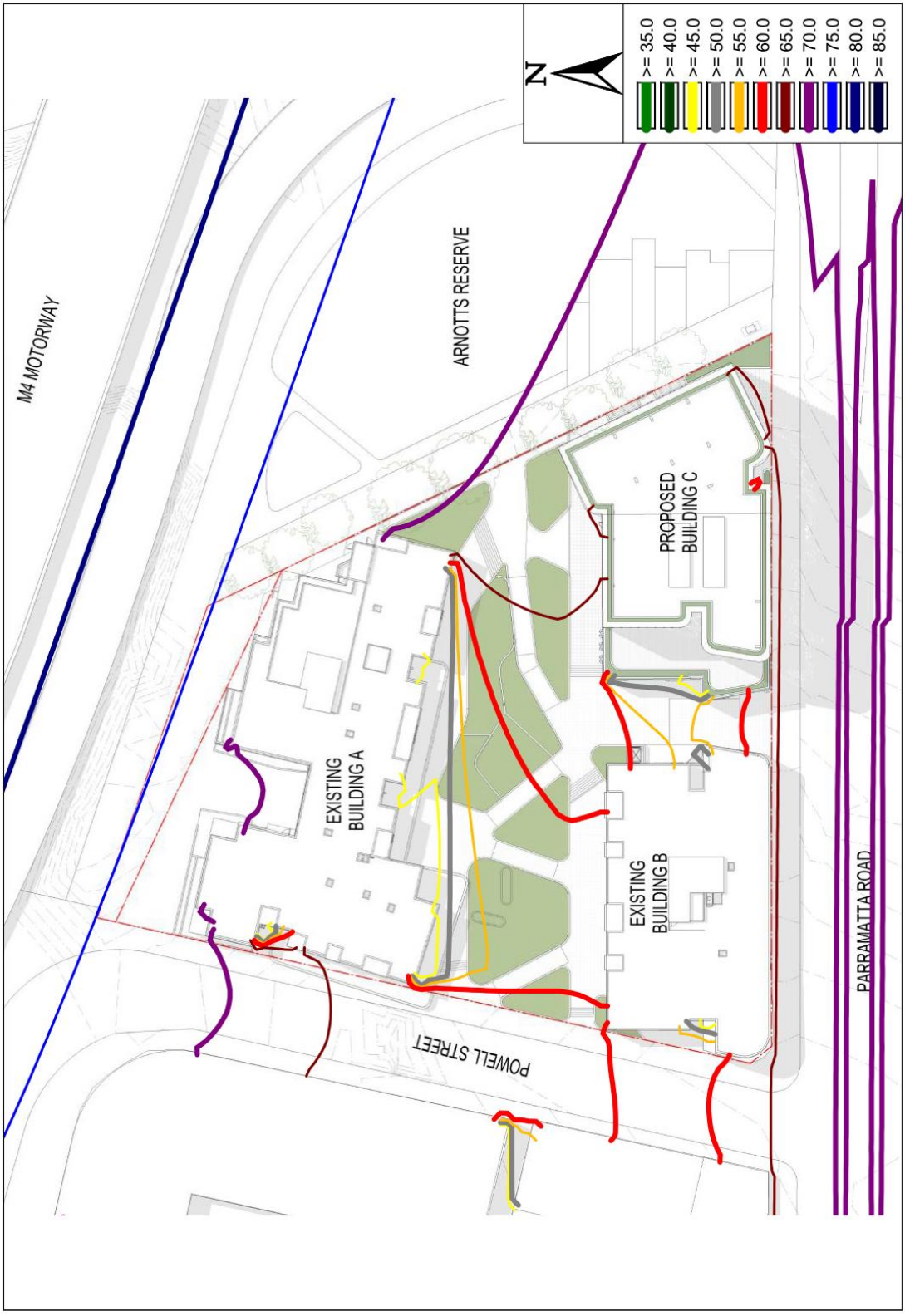


Figure 3 – Night-Time Traffic Noise Contour (Ground Level)

2.3.2 Ambient Noise Levels and Project Noise Limits

The operational noise limits have been assessed in accordance with the procedures as set out in the NSW NPI.

Table 6 presents a summary of the measured background noise level and the allowable intrusive noise limit for this project. The amenity criteria are based on an urban receiver.

Table 6—EPA Noise Limits for Development, dBA

Receiver	Time Period	Existing Noise Levels		NSW EPA NPI			Project Noise Trigger Level $L_{eq(15min)}$
		L_{eq} (period)	RBL	Recommended ANL	Project ANL[1] $L_{eq(15min)}$	Intrusiveness Criteria, $L_{eq(15min)}$	
Residential	Day	66	58	60	58	63	**58**
	Evening	66	58	50	48	63	**48**
	Night	66	49	45	43	54	**43**
Commercial	All	-	-	-	-	-	**65**
Industrial	All	-	-	-	-	-	**70**

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

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

3 Assessment and Recommendations

3.1 Façade Glazing Requirements

Acoustic glazing for the apartments are given in Table 7 are required to reduce noise impact on the internal occupants and should result in noise levels within such units in accordance with the Department of Planning Noise Guidelines and AS/NZS 2107:2016.

Table 7 – Schedule of Window and Glazing (R_w)

Level	Apartment	Space	Glazing Thickness	Minimum R_w (Glazing+Frame)
Ground	All Retail	Retail	10.38mm laminated	32
1-7	X01-X04	Living & Bedroom	12.5mm laminated (Viridian Acoustic)	40
	X05-X08	Living	10.38mm laminated	32
		Bedroom	12.5mm laminated (Viridian Acoustic)	40
	X09-X10	Living & Bedroom	10.38mm laminated	32
8	801-804	Living & Bedroom	12.5mm laminated (Viridian Acoustic)	40
	805	Living & Bedroom	10.38mm laminated	32
9-20	X01-X04	Living & Bedroom	12.5mm laminated (Viridian Acoustic)	40
	X05-X06	Living	10.38mm laminated	32
		Bedroom	12.5mm laminated (Viridian Acoustic)	40
	X07-X08	Living & Bedroom	10.38mm laminated	32
21-24	X01-X03	Living & Bedroom	12.5mm laminated (Viridian Acoustic)	40
	X04-X05	Living	10.38mm laminated	32
		Bedroom	12.5mm laminated (Viridian Acoustic)	40
	X06	Living & Bedroom	10.38mm laminated	32

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

3.2 Building Façade Construction

To provide sufficient acoustic attention of noise, the general external construction of the proposed building would need to be constructed as detailed in Table 8.

Table 8 – External Façade Construction (R_w)

Building Element	Proposed Construction	Minimum R_w
External Wall	Masonry or precast concrete with internal plasterboard lining. Insulation in wall cavity as per Thermal/BASIX requirements.	50
Roof and ceiling	Concrete with a plasterboard cavity ceiling. Insulation in ceiling cavity as per Thermal/BASIX requirements.	50

3.3 Mechanical Services

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

3.4 Apartment Ventilation

For apartments that are exposed to high noise levels and if internal noise levels with windows or doors open exceed the criteria by more than 10dBA, alternate ventilation systems (such as A/C systems) maybe be required to meet the BCA requirements.

All occupants have the option of having the window to be open for natural cross ventilation, or to close the window and achieve a quieter internal environment. Recommendations on appropriate systems are to be implemented during the Construction Certificate and detailed design phase of the project.

3.5 Separation Between Commercial and Residential

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

At this stage, the activities of the future tenant that have the potential to create noise is not known. Any operation of the retail/commercial space is to comply with the EPA Industrial Noise Policy and the any other relevant Council consent conditions related to the use.

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

3.6 Commercial Delivery and Waste Collection Vehicles

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

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

This excludes residential motor vehicles entering of existing the premises.

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

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

4 Conclusion

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

An environmental noise survey of the site has been conducted and the noise limiting criteria for mechanical plant/equipment noise emission has been determined based on the EPA noise policy. The limits are presented in Table 6.

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

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

Appendix A – Acoustic Terminology

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

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

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

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

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

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

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

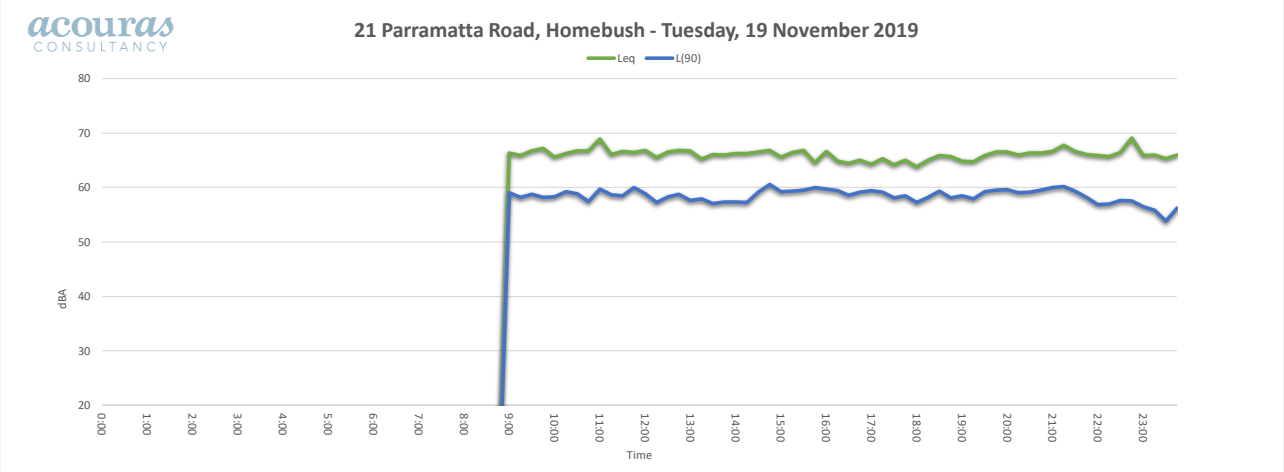
L AEQ,T : Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

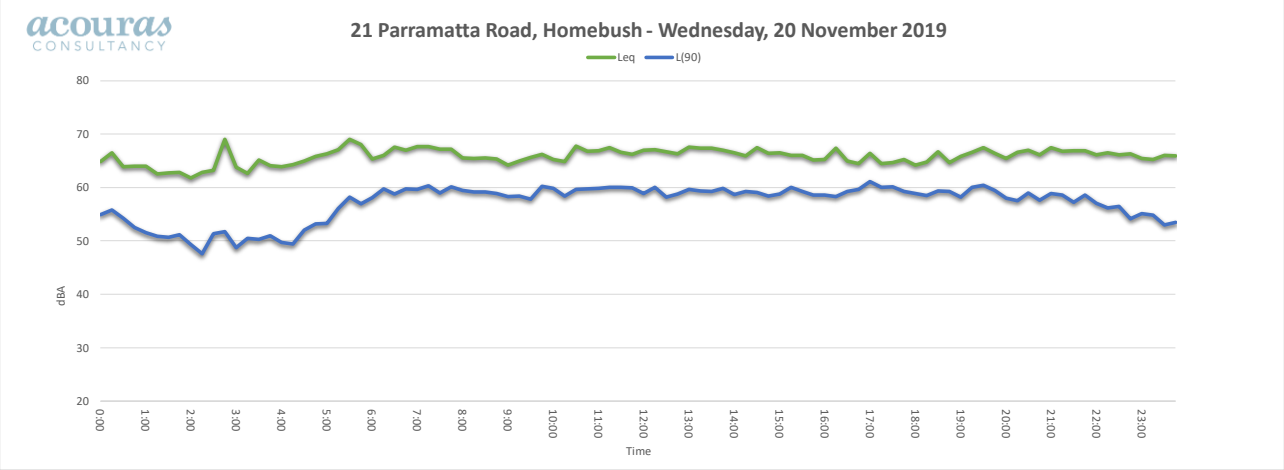
Appendix B – Architectural Drawings

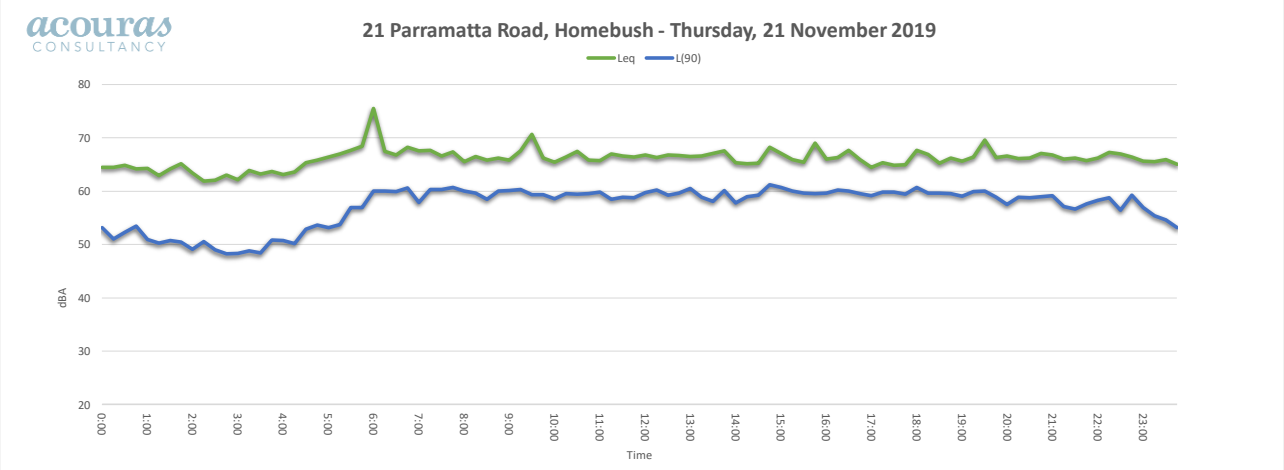
This assessment was based on the following architectural drawings provided by SJB Architects.

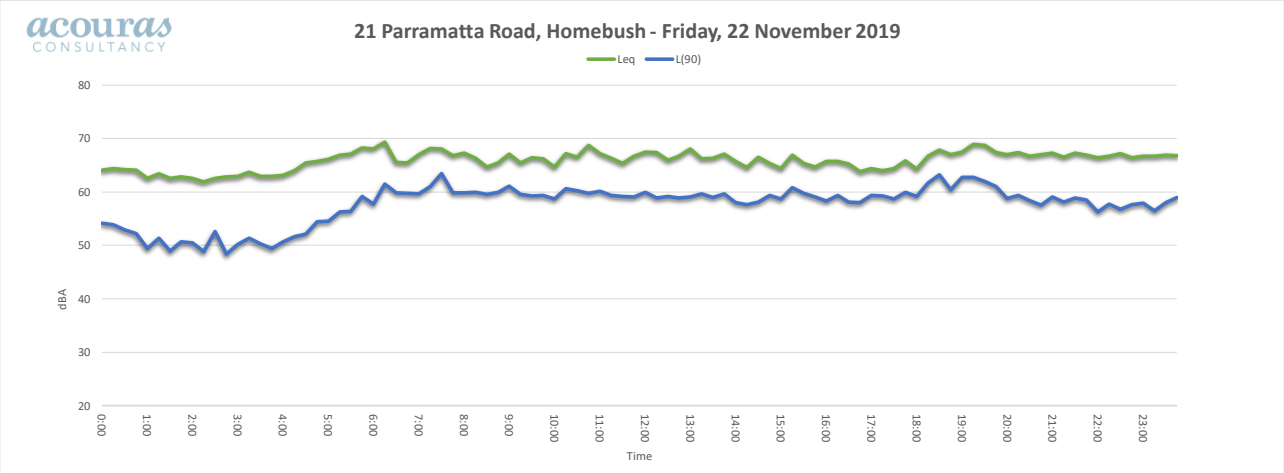
Drawing	Issue	Date	Description
DA-0102	6	18.12.2019	Site Plan
DA-0201	6	17.12.2019	Basement 4
DA-0202	6	17.12.2019	Basement 3
DA-0203	6	17.12.2019	Basement 2
DA-0204	6	17.12.2019	Basement 1
DA-0205	8	17.12.2019	Ground
DA-0206	8	17.12.2019	Level 1 – Level 4
DA-0207	4	17.12.2019	Level 5 – Level 7
DA-0208	9	17.12.2019	Level 8
DA-0209	8	17.12.2019	Level 9 – Level 20
DA-0210	8	17.12.2019	Level 21 – Level 23
DA-0211	2	17.12.2019	Level 24
DA-0212	6	17.12.2019	Roof
DA-0501	7	18.12.2019	Elevation – South (Parramatta Road)
DA-0502	6	18.12.2019	Elevation – East (Ismay Reserve)
DA-0503	7	18.12.2019	Elevation – North
DA-0504	6	17.12.2019	Elevation – West

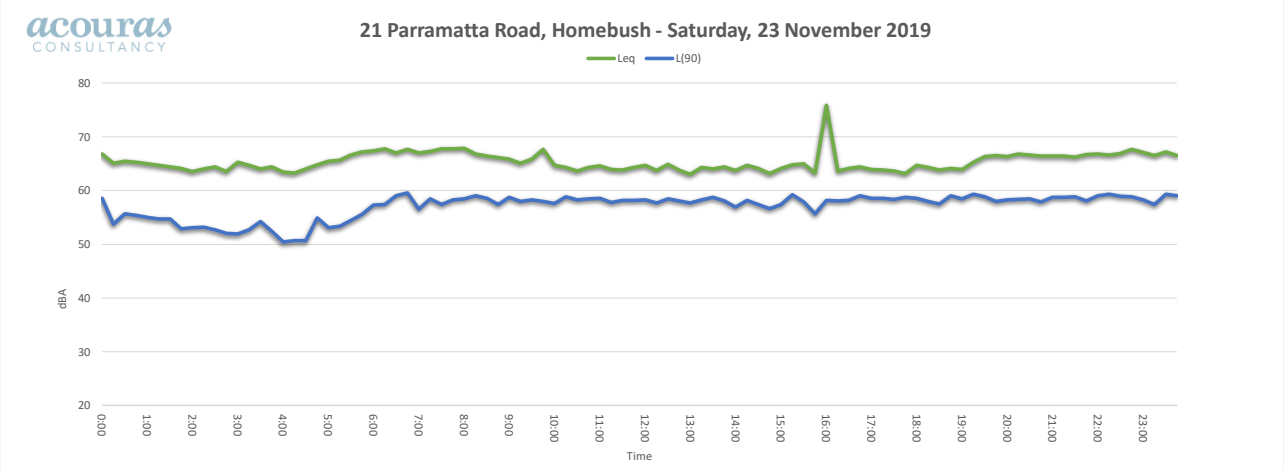
Appendix C – Noise Logger Results

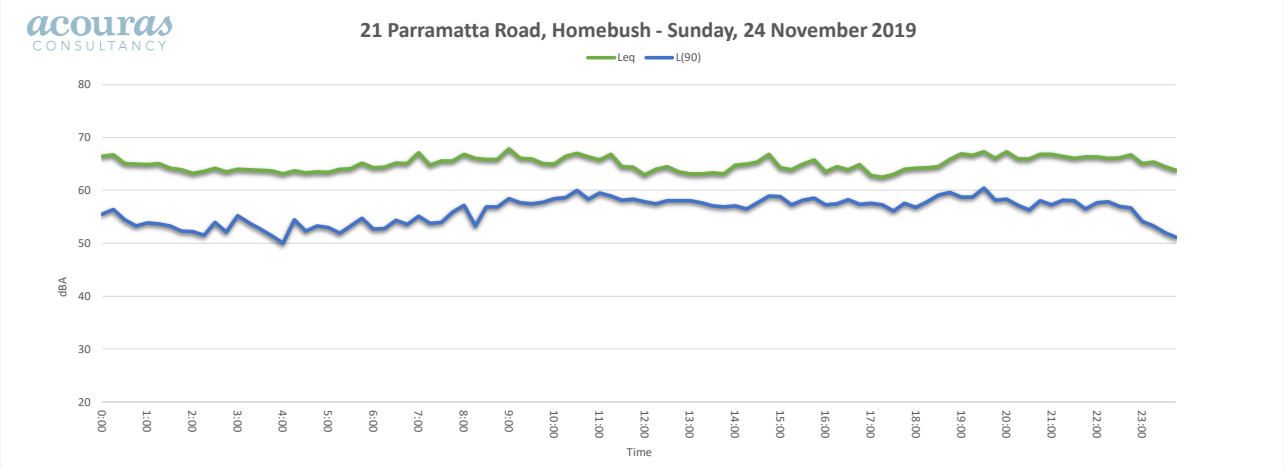


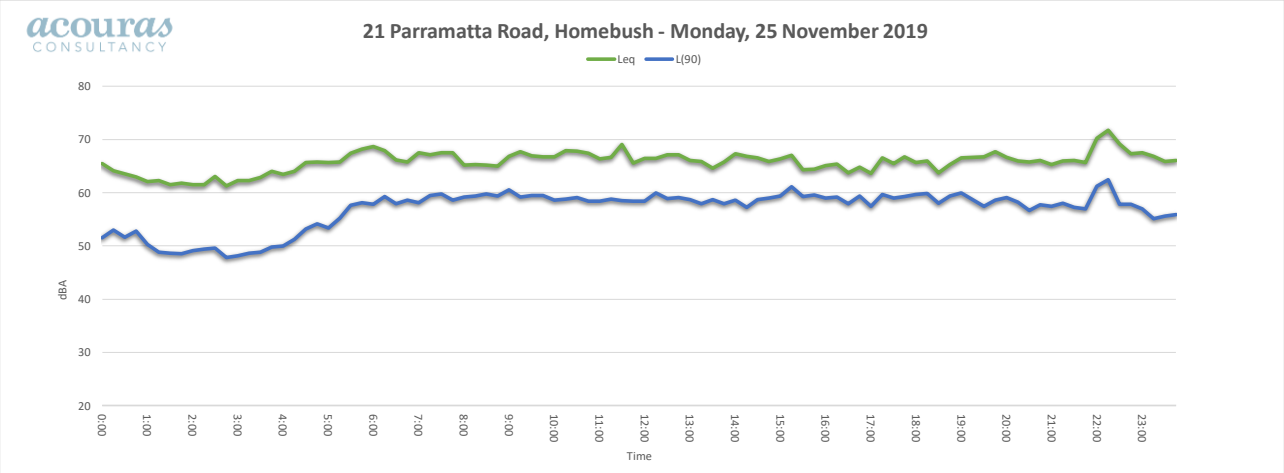


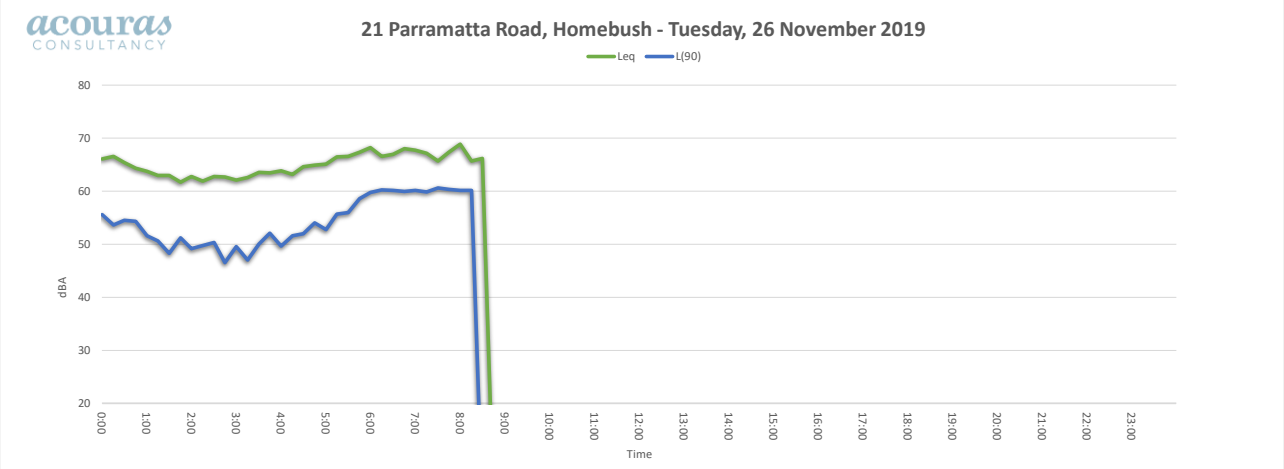



21 Parramatta Road, Homebush - Friday, 22 November 2019
Leq
L(90)
dBA
Time


21 Parramatta Road, Homebush - Saturday, 23 November 2019
Leq
L(90)
dBA
Time


21 Parramatta Road, Homebush - Sunday, 24 November 2019
Leq
L(90)
dBA
Time


21 Parramatta Road, Homebush - Monday, 25 November 2019
Leq
L(90)
dBA
Time


21 Parramatta Road, Homebush - Tuesday, 26 November 2019
Leq
L(90)
dBA
Time