Road Noise Intrusion Assessment
Proposed Residential Development
1110 Victoria Road, West Ryde, NSW

Client:
Ms Xuemei Zhan
C/o- Cadi Development

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GLOSSARY

NOISE

Noise is produced through rapid variations in air pressure at audible frequencies (20 Hz – 20 kHz). Most noise sources vary with time. The measurement of a variable noise source requires the ability to describe the sound over a particular duration of time. A series of industry standard statistical descriptors have been developed to describe variable noise, as outlined in **Section 2** below.

NOISE DESCRIPTORS

L_{eq} – The sound pressure level averaged over the measurement period. It can be considered as the equivalent continuous steady-state sound pressure level, which would have the same total acoustic energy as the real fluctuating noise over the same time period.

$L_{Aeq(15min)}$ – The A-weighted average equivalent sound level over a 15 minute period.

L_{A10} – The A-weighted noise level that has been exceeded for 10% of the measurement duration.

L_{A90} – The A-weighted noise level that has been exceeded for 90% of the measurement duration. This descriptor is used to describe the background noise level.

RBL – Rating Background Level. The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24hr period used for assessment background level) This is the level used for assessment purposes.

dB – Decibels. The fundamental unit of sound, a Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell. Probably the most common usage of the Decibel in reference to sound loudness is dB sound pressure level (SPL), referenced to the nominal threshold of human hearing. For sound in air and other gases, dB(SPL) is relative to 20 micropascals (μPa) = 2×10^{-5} Pa, the quietest sound a human can hear.

R_w – Weighted Sound Reduction Index. A measure of sound insulation performance of a building element. The higher the number, the better the insulation performance.

A-WEIGHTING

"A-weighting" refers to a prescribed amplitude versus frequency curve used to "weight" noise measurements in order to represent the frequency response of the human ear. Simply, the human ear is less sensitive to noise at some frequencies and more sensitive to noise at other frequencies. The A-weighting is a method to present a measurement or calculation result with a number representing how humans subjectively hear different frequencies at different levels.

NOISE CHARACTER, NOISE LEVEL AND ANNOYANCE

The perception of a given sound to be deemed annoying or acceptable is greatly influenced by the character of the sound and how it contrasts with the character of the background noise. A noise source may be measured to have only a marginal difference to the background noise level, but may be perceived as annoying due to the character of the noise. Acoustic Dynamics' analysis of noise considers both the noise level and sound character in the assessment of annoyance and impact on amenity.

1 INTRODUCTION

1.1 SUMMARY

Acoustic Dynamics is engaged by **Cadi Development** on behalf of **Ms Xuemei Zhan** to prepare an assessment of external noise intrusion for the proposed residential development located at 1110 Victoria Road, West Ryde, NSW.

This document provides an assessment of road traffic noise intrusion into the various areas of the subject building and is prepared in accordance with the relevant acoustic assessment requirements of:

(a) Ryde City Council;
(b) NSW Guidelines; and
(c) Australian Standards.

1.2 DESCRIPTION OF PROPOSAL

The development proposal is for the construction of a new duplex at 1110 Victoria Road, West Ryde, NSW, as shown on the floor plans within **Appendix A**.

The development site is situated within a Low Density Residential (R2) land zone within the Ryde City Council area of NSW. The subject site has road frontage direct to Victoria Road to the north. All other site boundaries are shared with residential properties.

The proposed development is shown in the Location Map, Aerial Image & Drawings presented within **Appendix A**.

1.3 SCOPE

Acoustic Dynamics is engaged to provide an aircraft noise intrusion assessment confirming the proposed development will satisfy the design goals and comply with the various relevant acoustic criteria.

The scope of the assessment is to include the following:

- Review of legislation, Council criteria, NSW Guidelines and Australian Standards relevant to assessment of road traffic noise intrusion at the proposed development;
- Assessment of noise measurements and establishment of maximum road noise levels at the subject development site;
- Examination of architectural drawings, review of the proposed construction and calculation of the sound transmission reduction required to meet the criteria; and
- Recommendation of materials and construction techniques to achieve the required noise attenuation.

2 ASSESSMENT CRITERIA AND STANDARDS

Acoustic Dynamics has conducted a review of the local council, state government and federal legislation that is applicable to noise assessment for the proposed development. The relevant sections of the legislation are presented below. The most stringent criteria which have been used in this assessment of the subject development are summarised below.

2.1 COUNCIL CRITERIA

2.1.1 COUNCIL PLANNING & DEVELOPMENT CONTROL INSTRUMENTS

Acoustic Dynamics has conducted a review of the relevant Ryde City Council's planning and development control instruments including the following documents:

- *Ryde Local Environmental Plan (LEP) 2014*; and
- *Ryde Development Control Plan (DCP) 2014*.

Acoustic Dynamics' review of the *Ryde LEP 2014* did not yield specific acoustic criteria or information relevant to this assessment.

Acoustic Dynamics' review of the *Ryde DCP 2014* indicated the following information relevant to this assessment:

> ***"3.3 Dwelling Houses and Dual Occupancy (attached)***
>
> ***2.14.3 Acoustic Privacy***
>
> ***Objectives***
>
> *1. To provide a high level of acoustic privacy.*
>
> *2. To minimise the impacts of noise generating uses such as traffic, air conditioners, pumps and other mechanical equipment.*
>
> ***Controls***
>
> *b. Dwellings located on arterial roads are preferably to have double glazed windows where these windows face the road and provide light to living rooms or bedrooms. This is the case whether or not the dwelling has a solid masonry wall to the arterial road.*
>
> *c. Dwellings located on arterial roads are preferably to have an acoustic seal on the front door to reduce noise transmission."*

Council may enforce the above planning conditions under the *Environmental Planning and Assessment Act of 1979*.

2.2 NSW DEPARTMENT OF PLANNING & INFRASTRUCTURE (DP&I)

2.2.1 STATE ENVIRONMENTAL PLANNING POLICY (INFRASTRUCTURE) 2007

The NSW Department of Planning & Infrastructure's (DP&I) *State Environmental Planning Policy (SEPP) (Infrastructure) 2007* provides information and criteria for the assessment of infrastructure development within NSW, and identifies matters to be considered in the assessment of development adjacent to particular types of infrastructure projects.

The policy details issues to be considered when assessing the impact of road traffic and rail noise on residential development, such as the proposed development. The following relevant guidelines and criteria are set out within the policy:

> *"**102 Impact of road noise or vibration on non-road development***
>
> *(1) This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:*
>
> *(a) a building for residential use,*
> *(b) a place of public worship,*
> *(c) a hospital,*
> *(d) an educational establishment or child care centre.*
>
> *(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:*
>
> *(a) in any bedroom in the building—35 dB(A) at any time between 10.00 pm and 7.00 am,*
> *(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.*
>
> *(4) In this clause, freeway, tollway and transit way have the same meanings as they have in the Roads Act 1993."*

The above planning conditions may be enforced under the *Environmental Planning and Assessment Act of 1979*.

2.3.2 DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS

The NSW DP&I's *Development Near Rail Corridors and Busy Roads – Interim Guidelines,* provides information and criteria for the assessment of developments within close proximity to rail corridors and busy roads.

The interim guidelines include information on the appropriate methodology for assessment of rail traffic noise intrusion into a development. This is in accordance with the general noise assessment requirements contained within the NSW Environment Protection Authority's (EPA) *Noise Policy for Industry (NPfI) 2017*.

The relevant guidelines and criteria within the document have been reproduced below:

> ***"Section 3.6 What Noise and Vibration Criteria Should be Applied***
>
> ***3.6.1 Airborne Noise***
>
> *The noise criteria for residential buildings in Table 3.1 for both road and rail are specified in the Infrastructure SEPP. Other values in Table 3.1 are based on the Environmental Criteria for Road Traffic Noise (EPA 1999).*
>
> *These criteria apply to all forms of residential buildings as well as aged care and nursing home facilities. For some residential buildings, the applicants may wish to apply more stringent design goals in response to market demand for a higher quality living environment.*
>
> *The night-time 'sleeping areas' criterion is 5 dB(A) more stringent than the 'living areas' criteria to promote passive acoustic design principles. For example, designing the building such that sleeping areas are less exposed to road or rail noise than living areas may result in less onerous requirements for glazing, wall construction and acoustic seals. If internal noise levels with windows or doors open exceed the criteria by more than 10 dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

Table 2.1 Noise Criteria for Residential Buildings (Extract from Interim Guidelines Table 3.1)

Residential Buildings		
Type of Occupancy	***Noise Levels dB(A)***	***Applicable Time Period***
Sleeping areas (bedroom)	*35*	*Night 10 pm to 7 am*
Other habitable rooms (excl. Garages, kitchens, bathrooms & hallways)	*40*	*At any time*

2.3 AUSTRALIAN STANDARDS

Acoustic Dynamics has conducted a review of relevant Australian Standards in relation to the subject development. The following details this review.

2.3.1 AS 2107:2016 "ACOUSTICS–RECOMMENDED DESIGN SOUND LEVELS"

Australian Standard 2107:2016 "Acoustics–Recommended design sound levels and reverberation times for building interiors" recommends satisfactory and maximum design sound levels for various types of occupancy within buildings. AS 2107 recommends the following satisfactory and maximum design sound levels for the various types of occupancies and areas within the proposed development.

Table 2.2 Recommended Design Sound Levels for Different Areas (Extract from AS 2107 Table 1)

Type of occupancy / activity	Design sound level, ($L_{Aeq,t}$) range [dB (A)]
7 RESIDENTIAL BUILDINGS	
Houses and apartments in inner city areas or entertainment districts or near major roads-	
Living areas	35 to 45
Sleeping areas	35 to 40
Work areas	35 to 45
Apartment common areas (eg. foyers)	45 to 50

Acoustic Dynamics advises that any levels of airborne noise transmitted into the development or tenancies adjacent or within close proximity to the subject development, should not exceed the relevant design sound levels presented in **Table 2.2** above.

By ensuring the internal noise levels do not exceed the recommended internal design levels, it is likely to ensure occupants of the development and adjacent and nearby sensitive receivers are not adversely affected by road noise intrusion or the use of the development.

2.3.2 AS 3671:1989 "ACOUSTICS – ROAD TRAFFIC NOISE INTRUSION"

Australian Standard 3671:1989 "*Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction*" concerns the reduction of road traffic noise intrusion in buildings in areas near new or upgraded freeways, tollways, major roads and national routes or other roads carrying more than 2000 vehicles per day.

The Standard may also be used to assess the acoustical adequacy of existing buildings in similar areas. The standard provides methodology for the assessment of noise intrusion from road traffic and guidance for determining the type of building construction necessary to achieve acceptable noise levels indoors, for different types of occupancy.

To determine the existing road noise levels in accordance with the calculation method within AS 3671, Acoustic Dynamics has conducted long-term unattended noise monitoring at a representative location within the subject site from Monday 18 October 2021 until Monday 25 October 2021. The measurement location is marked in **Appendix A**.

The results of this monitoring are presented in **Table 2.3**.

Table 2.3 Measured Ambient Noise Environment

Location	Period	Measured Noise Levels [dB]	
		Maximum $L_{Aeq\ (1\ hour)}$	Maximum $L_{Aeq\ (15hr/9hr)}$
1110 Victoria Rd West Ryde Property Boundary	Day (7am[1] to 10pm)	72	72
	Night (10pm to 7am[1])	73	69

Note: 1) 8am on Sundays and public holidays.

3 NOISE MEASUREMENT EQUIPMENT & STANDARDS

All measurements were conducted in general accordance with Australian Standard 1055.1-1997, *"Acoustics - Description and Measurement of Environmental Noise Part 1: General Procedures"*. Acoustic Dynamics' sound measurements were carried out using precision sound level meters conforming to the requirements of IEC 61672-2002 *"Electroacoustics: Sound Level Meters – Part 1: Specifications"*. The survey instrumentation used during the survey is set out in **Table 3.1**.

Table 3.1 Noise Survey Instrumentation

Type	Serial Number	Instrument Description
2250	2679541	Brüel & Kjaer Modular Precision Sound Level Meter
4189	2670479	Brüel & Kjaer 12.5 mm Prepolarised Condenser Microphone
4230	1234136	Brüel & Kjaer Acoustic Calibrator
316	16-207-012	ARL Environmental Noise Logger

The reference sound pressure level was checked prior to and after the measurements using the acoustic calibrator and remained within acceptable limits.

4 EXTERNAL NOISE INTRUSION ASSESSMENT

The following subsections provide an assessment of external (road traffic) noise intrusion into the proposed development against the various noise criteria and objectives outlined in **Section 2** above.

4.1 SURROUNDING ACOUSTIC ENVIRONMENT & NOISE MONITORING

The external L_{Aeq} noise levels have been determined for daytime and night-time periods, in accordance with the relevant assessment guidelines. The following table presents the processed noise data obtained from the unattended noise monitoring.

Based on the results of the unattended noise monitoring data, Acoustic Dynamics advises the following maximum $L_{Aeq\ (15hr/9hr)}$ noise levels have been determined for the facades of the proposed development as per the requirements of the NSW RNP. The noise measurement location is representative of the proposed development facade direct to Victoria Road.

Table 4.1 Determined Maximum Noise Levels at Development Facade

Location	Period	Determined $L_{Aeq\ (15hr/9hr)}$ Noise Level [dB][2]
1110 Victoria Rd West Ryde Property Boundary	Day (7am[1] to 10pm)	72
	Night (10pm to 7am[1])	69

Note: 1) 8am on Sundays and public holidays.

2) Maximum noise measurement used for sub-arterial roads as per the NSW RNP requirements.

The noise environment at the site is dominated by road traffic noise from Victoria Road to the north. Accordingly, the assessment of external noise intrusion applies the procedure outlined in AS 3671, to determine compliance with the relevant internal noise requirements.

4.2 INTERNAL DESIGN SOUND LEVELS

The internal design sound level for a particular area of the subject development is the maximum permissible $L_{Aeq(1hr)}$ noise level within that area, with external windows and doors closed.

The internal design sound levels applicable to the critical areas of the proposed development have been determined in accordance with the criteria and guidelines of Council, NSW Guidelines and Australian Standards, and are presented in **Table 4.2** below.

Table 4.2 Internal Design Sound Levels

Room type	Maximum Internal Noise Level $L_{Aeq,1hr}$ [dB]	Time Period
Sleeping areas	35	At any time
Living areas	40	At any time

4.3 TRAFFIC NOISE REDUCTION (TNR)

The road Traffic Noise Reduction is the level (measured in decibels) of road traffic noise attenuation required to satisfy the relevant criterion. It is used to evaluate the suitability of building components to achieve the required noise reduction. The TNR is determined by subtracting the **internal design sound level** for the internal spaces from the **maximum external road traffic noise level** at the facade of each area.

The TNRs required for habitable and non-habitable areas have been determined for the proposed development. The weighted sound reduction indexes (R_w's) for building components to be used in each area, have been calculated based on the information provided in the proposed architectural drawings and are presented in **Table 4.3**.

Table 4.3 Noise Attenuation & R_w Requirements for Building Components

Area	Indoor Design Sound Level [dB(A)]	Calculated Max External Noise Level [dB(A)][1]	Req'd TNR [dB(A)]	Required Component Noise Attenuation[2]					
				Walls		Windows / Doors		Roof	
				TNA_c	R_w	TNA_c	R_w	TNA_c	R_w
Ground Floor									
Study	40	72	32	33	39	**E/W Window**		N/A	
						26	32		
Bedroom	35	69	34	34	40	**E/W Window**			
						28	34		
Bathroom	40	72	32	30	36	N/A			
Kitchen, Living and Dining	40	72	32	30	36	**S Door**			
						23	29		
						E/W Window			
						22	28		
First Floor									
Master (Northern)	35	69	34	35	41	**N Door**		39	45
						31	37		
						N Window			
						27	33		
						E/W Window			
						29	35		
Bedrooms	35	69	34	36	42	**E/W Window**		37	43
						31	37		
Sitting	40	72	32	33	39	**E/W Window**		35	41
						29	35		
Master (Southern)	35	69	34	30	36	**E/W Window**		35	41
						27	33		
						S Window			
						25	31		

Note: 1) Maximum External Noise Levels are based on measured noise levels and include adjustments to account for distance losses and shielding.

2) Maximum indoor design sound level based on AS 2107 maximum recommended design sound level for apartments near major roads. These values are also consistent with the SEPP criteria. See **Table 2.1**.

Further, Australian Standard 3671 provides the following note:

> *"Either STC or R_W may be used as a guide to the selection of components able to provide a desired TNA_c value, provided that approximate allowance is made for the spectral composition of the noise as follows-*
>
> $$TNA_c \approx R_w - 6 \text{ or } R'_w - 6"$$

During peak periods of high traffic noise levels, the calculated noise levels within some of the rooms for any potential development may exceed the relevant internal noise level criteria by more than 10 dB, with the windows and/or glass doors open.

Acoustic Dynamics recommends that consideration be given to installing air-conditioning systems to service any residential unit. This will provide the option for mechanical ventilation of the dwelling, and provide building occupants with the option to leave external doors and windows closed, during peak periods of high traffic noise levels.

Construction systems and materials should be selected to provide the required design noise reduction shown in **Table 4.3** for the respective areas within the development.

5 RECOMMENDATIONS & DESIGN ADVICE

Acoustic Dynamics' analysis and prediction calculations indicate the following recommendations should be incorporated into the proposed development, as a minimum, to ensure that the internal design sound levels are achieved.

5.1 EXTERNAL WALL SYSTEMS

Acoustic Dynamics understands that the wall construction of the proposed development is to be of brick construction and must achieve a minimum sound transmission performance of **$R_w + C_{tr} \geq 42$.**

The following table details the minimum external wall construction recommended to ensure the internal design sound levels at the proposed development are achieved.

Table 5.1 Recommended External Wall Construction ($R_w + C_{tr} \geq 48$)[1]

External Wall Leaf
1. Fire rated masonry veneer wall; to 2. Minimum 40mm air gap; to 3. One (1) layer of wall wrap; to
Frame & Insulation
4. Minimum 70mm timber studs at 600mm centres; with 5. Minimum 75mm thick R1.5 CSR Gold Batts (or equivalent); to
Internal Finish
6. One (1) layer of 10mm Gyprock Plus plasterboard (or equivalent).

Note: 1) Wall system from *CSR Redbook (2020)*. System number CSR 5877a. Refer to CSR Redbook for more information.

The external wall system detailed above, if properly installed, will achieve an acceptable design sound transmission performance for the various areas of the development.

NB: Any penetrations within the above wall systems will diminish the acoustic performance of the proposed systems. Acoustic Dynamics recommends that specific advice be sought for any such penetrations.

5.2 ROOF / CEILING SYSTEMS

Acoustic Dynamics understands that the roof construction of the proposed development is to be of tiled construction and must achieve a minimum sound transmission performance of $\mathbf{R_w + C_{tr} \geq 45}$.

The following table details the minimum roof construction recommended to ensure the internal design sound levels at the proposed development are achieved.

Table 5.2 Recommended Metal Sheet Roof System ($R_w + C_{tr} \geq 46$)[1]

External
1. Pitched tile roof; over 2. 40mm roof battens; over 3. Bradford Thermoseal Roof Tile sarking (or equivalent); to
Frame & Insulation
4. Ceiling Joists or Trusses at 600mm maximum centres; with 5. Minimum 215mm thick R4.1 CSR Gold Batts (or equivalent); with
Internal
6. Two (2) layers of 16mm Gyprock Fyrchek plasterboard (or equivalent).

Note: 1) Ceiling system adapted from *CSR Redbook (2020).* System based on number CSR 6522c. Refer to CSR Redbook for more information.

The roof/ceiling system detailed above, if properly installed in accordance with the manufacturer specification, will achieve an adequate design sound transmission performance for the various areas of the development.

NB: Any penetrations within the above ceiling/roof system will diminish the acoustic performance of the proposed system. Acoustic Dynamics advises that any sound flanking paths (airgaps) around the structural components must be sealed (airtight) to provide adequate acoustic insulation. All airgaps are to be sealed with a fire rated sealant.

With the exception of penetrations for down lights, for which Acoustic Dynamics recommends the inclusion of acoustic cones within the ceiling space, Acoustic Dynamics recommends that specific advice be sought for any such penetrations.

Fireproof downlight cones can also be used however care should be taken when using these as manufacturers advise that downlights and their transformers should not be covered as they need space for heat to escape. Covering down lights can be a fire hazard. It is recommended that LED downlights be used where possible.

5.3 WINDOWS AND GLASS DOORS

The following table sets out the minimum required glazing for the various glazed components associated with the proposed alterations within the development and have been recommended based on the architectural drawings and specifications provided.

Table 5.3 Development Glazing Schedule Requirements

Room	Window/Door	Min. Required $R_W + C_{tr}$ of Glazing	Minimum Recommended Glazing	
			Preferred	Alternate
Ground Floor				
Study	E/W Window	32	10.38mm Laminated	10mm Annealed
Bedroom	E/W Window	34	12.38mm Laminated	12mm Annealed
Kitchen, Living and Dining	S Door	29	6.38mm Laminated	6mm Annealed
	E/W Window	28	6.38mm Laminated	6mm Annealed
First Floor				
Master (Northern)	N Door	37	10mm VFloat / 16mm Gap / 10.5mm Vlam Hush	12.5mm VLam Hush
	N Window	33	10.38mm Laminated	10mm Annealed
	E/W Window	35	8mm VFloat / 16mm Gap / 10.5mm Vlam Hush	10.5mm VLam Hush
Bedrooms	E/W Window	37	10mm VFloat / 16mm Gap / 10.5mm Vlam Hush	12.5mm VLam Hush
Sitting	E/W Window	35	8mm VFloat / 16mm Gap / 10.5mm Vlam Hush	10.5mm VLam Hush
Master (Southern)	E/W Window	33	10.38mm Laminated	10mm Annealed
	S Window	31	8.38mm Laminated	8mm Annealed

Note: 1) Minimum glazing has been specified to meet acoustic requirements. Acoustic Dynamics advises that some windows may also need to meet applicable safety standards. Additional advice should be sought to verify such requirements.

Further to the above minimum glazing requirements, Acoustic Dynamics advises the glazed systems must be installed in consideration of the following:

1. Any sound flanking paths (airgaps) around the windows, doors, framing components and wall structure must be sealed **airtight** to provide adequate acoustic insulation. All airgaps are to be sealed with a flexible mastic sealant;

2. Glazed sliding components should have a high performing acoustic wipe seal installed to form an **airtight** seal between the sliding component and the adjacent fixed glazing; and

3. It is advised that the acoustic performance of the selected glazing frames be confirmed with the suppliers, to ensure that the glazing and frame systems will achieve the minimum acoustic performance levels ($\mathbf{R_w + C_{tr}}$) recommended above.

NB: A supplier of appropriate perimeter compression seals and sliding door wipe/gasket seals is Raven (www.raven.com.au), Door Seals Australia (www.doorseals.com.au), or Kilargo (www.kilargo.com.au).

5.4 RESIDENTIAL ENTRY DOORS

Acoustic Dynamics advises that the entry door(s) into the building must provide an adequate sound transmission performance.

Accordingly, the following recommendations are provided for residential unit entry doors to achieve approximately $\mathbf{R_w}$ **40**:

1. All residential entry doors must be **solid-core doors**, and be a minimum thickness of **40mm**;

2. Acoustic seals are required to be installed around the door frame and door bottom. We recommend the installation of the following door seals:

    - Door frame seals: 3798A “Zero” seal and B119W Seal (or equivalent);
    - Door bottom seals: 267A “Zero” seal and Pyrosill™ (or equivalent);

3. Door frames must form an airtight seal with the adjacent facade wall so that the acoustic rating of the facade wall is maintained. Sealants must be flexible, durable and have capacity to retain acoustic properties for the life of the design. Appropriate sealants are polyurethane or silicone based.

Acoustic Dynamics advises that installation of entry doors and seals in accordance with the above recommendations and manufacturer specifications will achieve the minimum acoustic performance levels (R_w) recommended above.

5.5 BUILDING MATERIAL CERTIFICATION

Acoustic Dynamics advises that all building materials specified must be tested and certified by a locally recognised and accepted testing agency in respect of their intended use. Where appropriate, materials and noise mitigation measures specified by Acoustic Dynamics must be certified by a locally recognised (qualified) and accepted professional for suitability (structural, wind loading, or other) for the intended use.

6 CONCLUSION

Acoustic Dynamics has conducted an assessment of external noise intrusion into the proposed development at 1110 Victoria Road, West Ryde, NSW. A review of applicable noise standards and local authority noise criteria has been conducted.

Noise levels were assessed in accordance with the requirements of:

(a) Ryde City Council;
(b) NSW Guidelines; and
(c) Australian Standards.

The performance of the building components proposed for use in the development have been assessed against the required TNA_c and R_w values to determine their suitability for achieving compliance with the noise criteria.

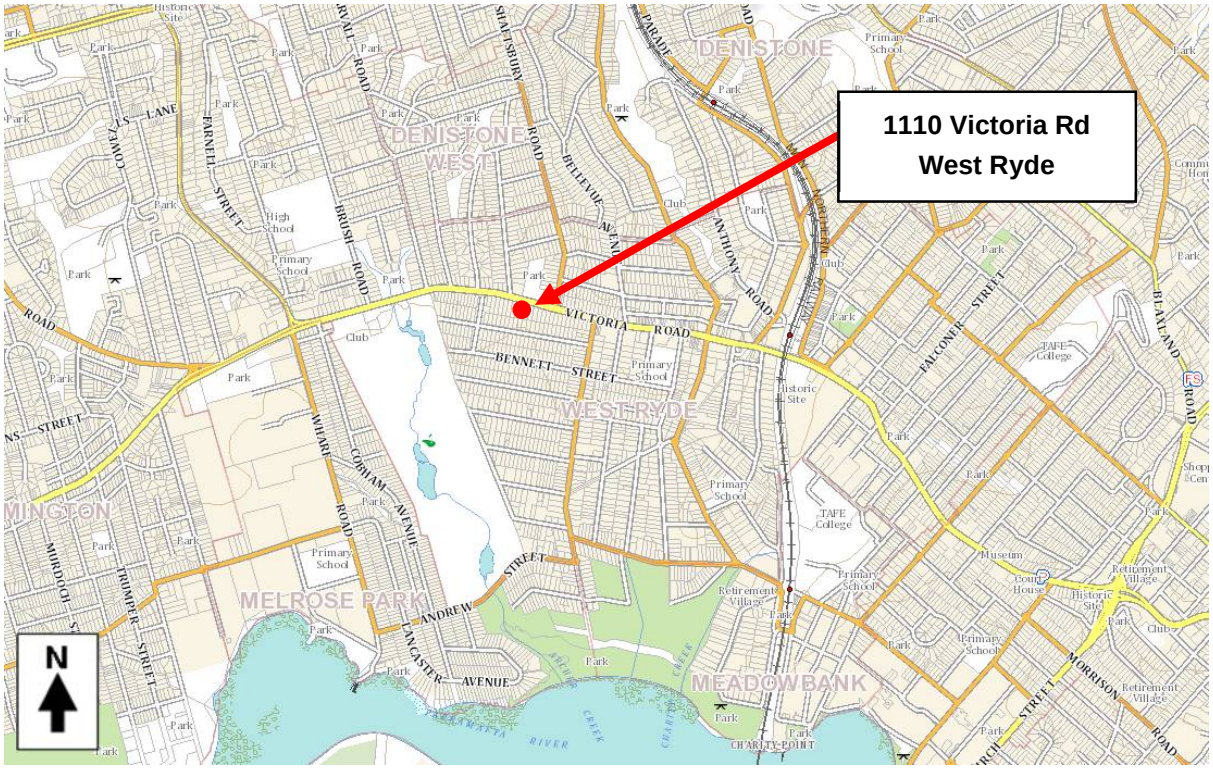
The assessment examined all facades most exposed to noise intrusion, as well as facades least exposed to external noise intrusion. Accordingly, the minimum construction requirements have been determined for each area, allowing the selection of components to be optimised for the respective areas within the development.

Recommendations and advice have been provided in **Section 5** for construction systems and materials to be incorporated into the building design. Should alternative construction systems and materials be selected, the selected construction systems should meet the required design noise reduction (R_w) shown in **Table 4.3** for the respective areas within the development.

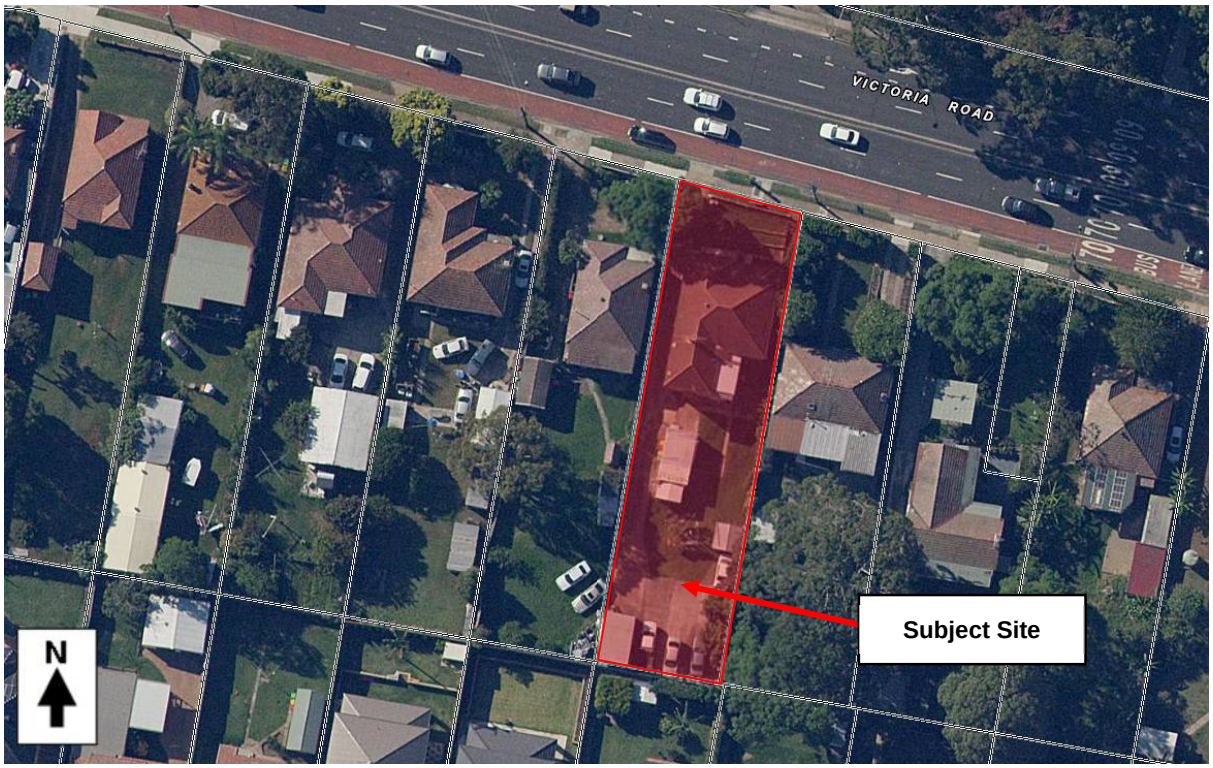
Acoustic Dynamics advises that the incorporation of these report recommendations into the design and construction of the proposed development will achieve compliance with the relevant acoustic design requirements of Ryde City Council, NSW Guidelines and relevant Australian Standards.

APPENDIX A – LOCATION MAP, AERIAL IMAGE & DRAWINGS

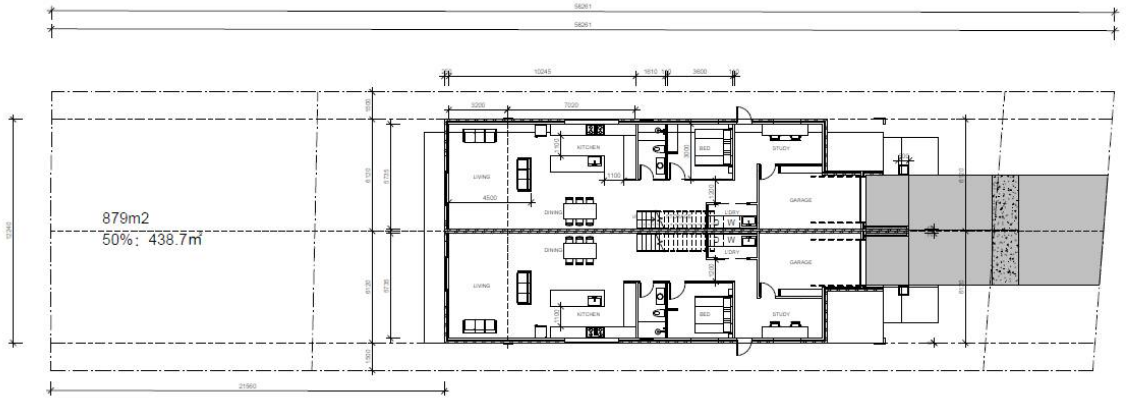
A.1 LOCATION MAP



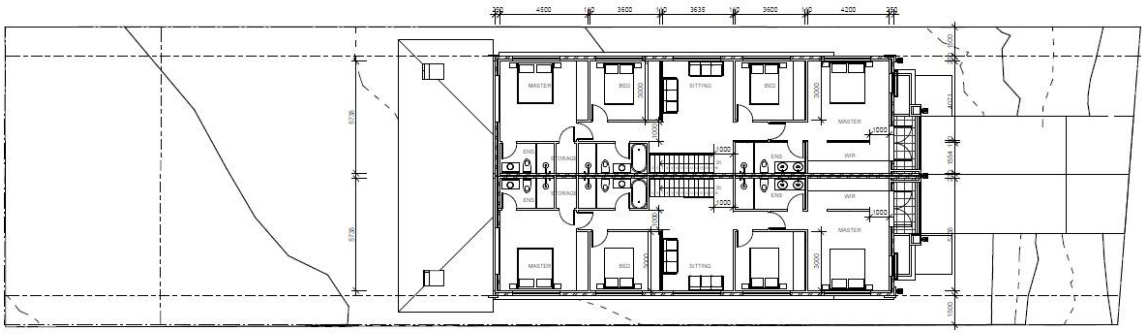
A.2 AERIAL IMAGE (COURTESY OF SIX MAPS)



A.3 DRAWINGS

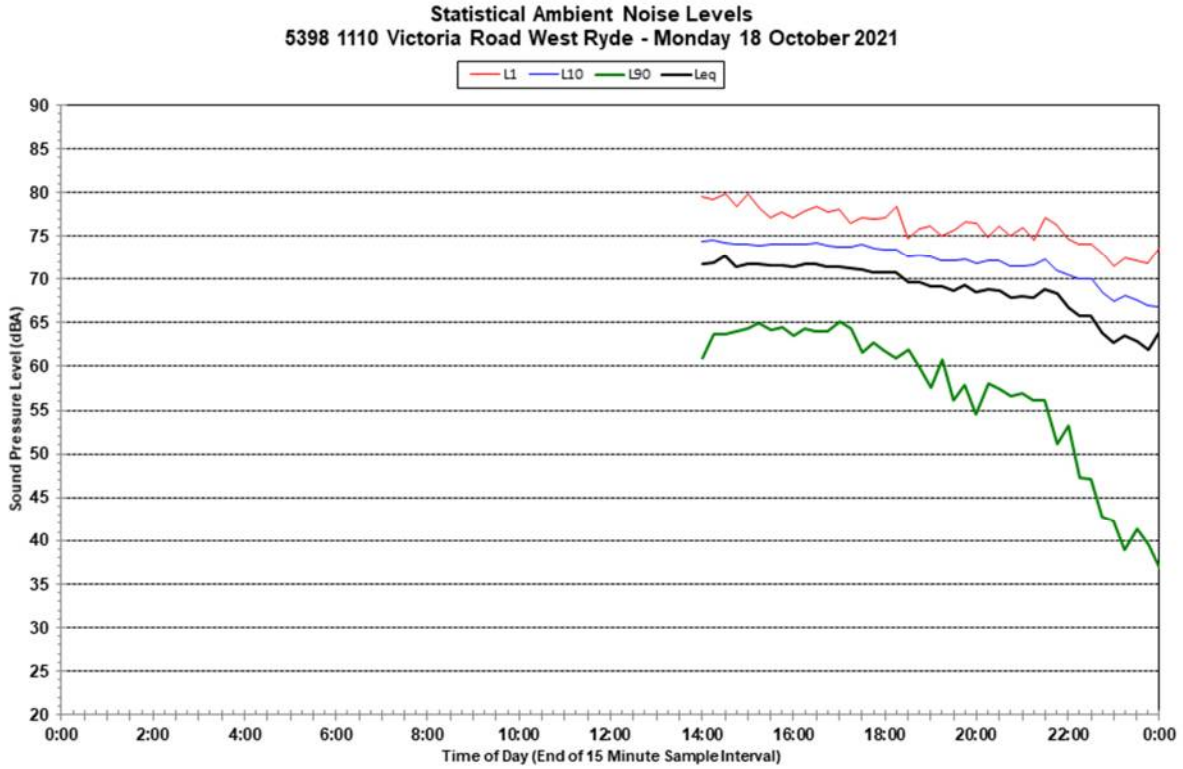


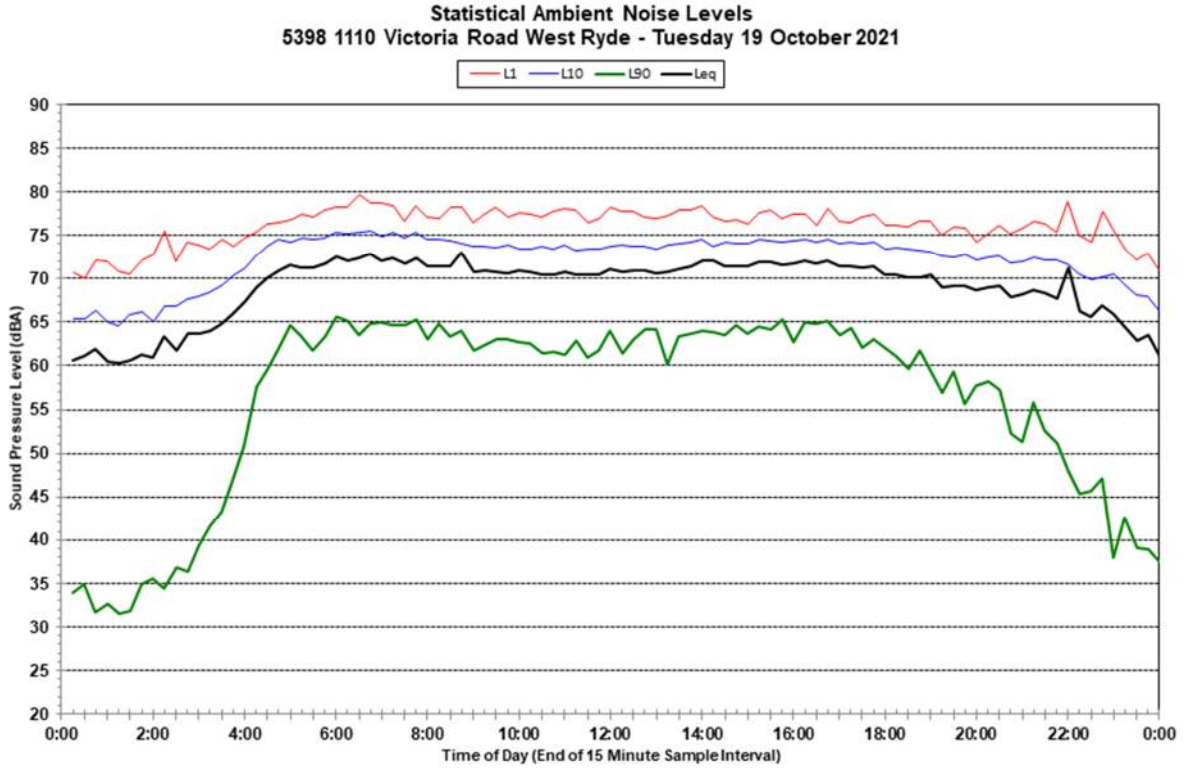
Ground Floor Plan

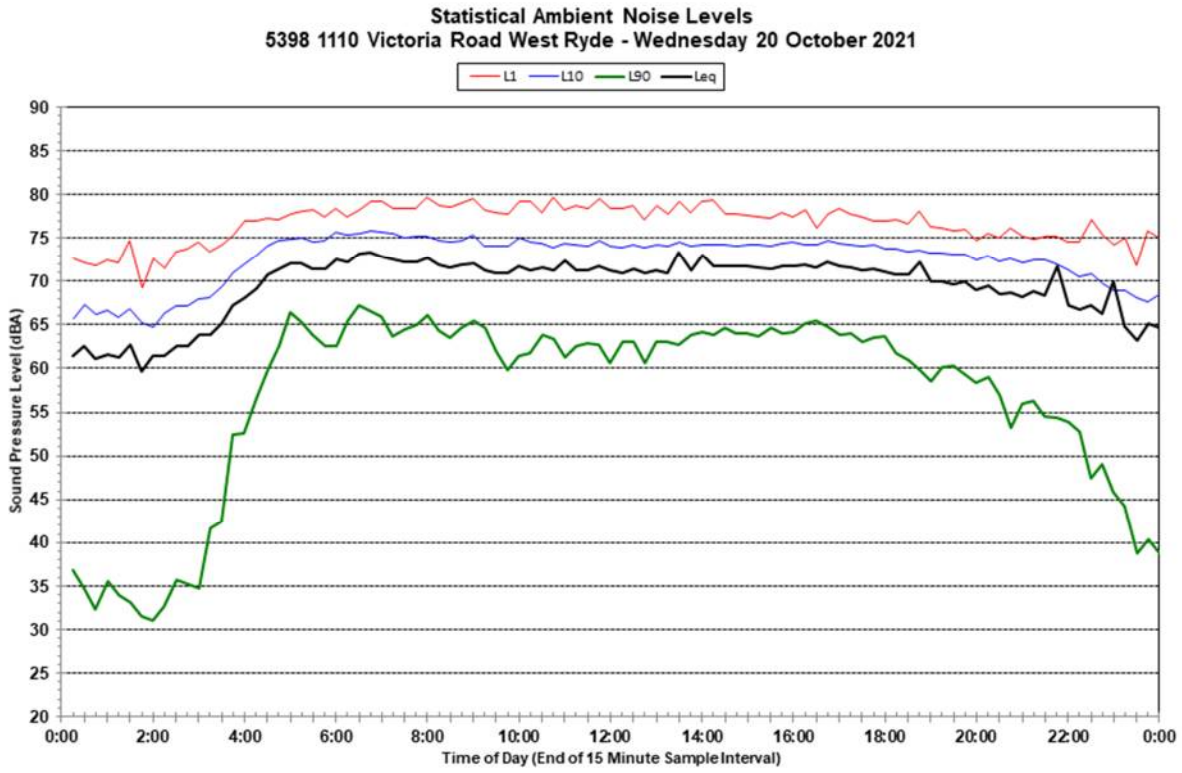


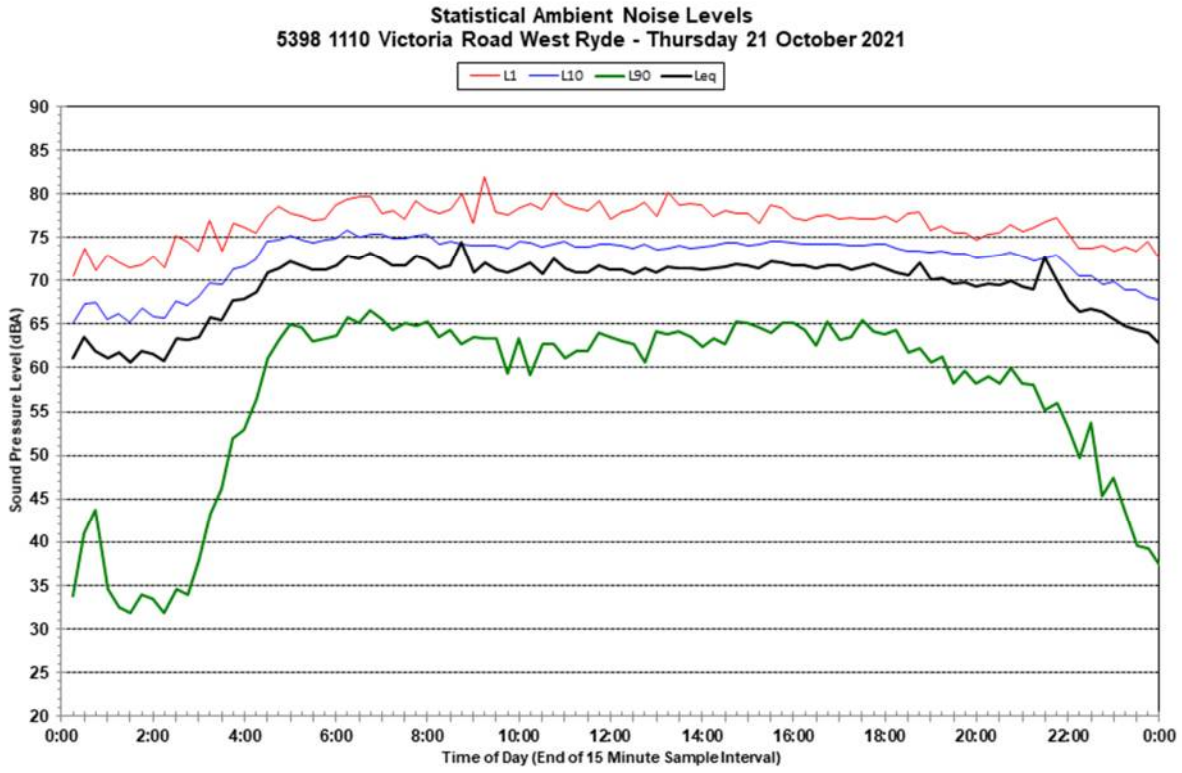
First Floor Plan

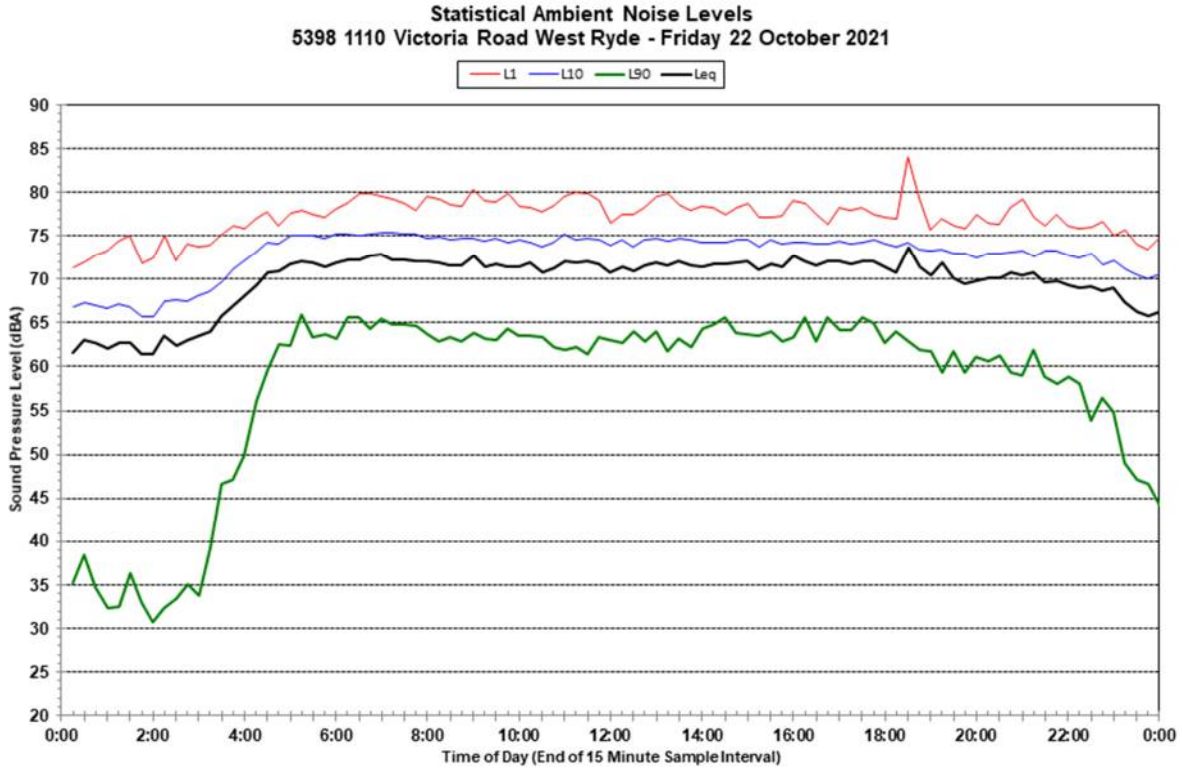
APPENDIX B – UNATTENDED NOISE-LOGGING CHARTS

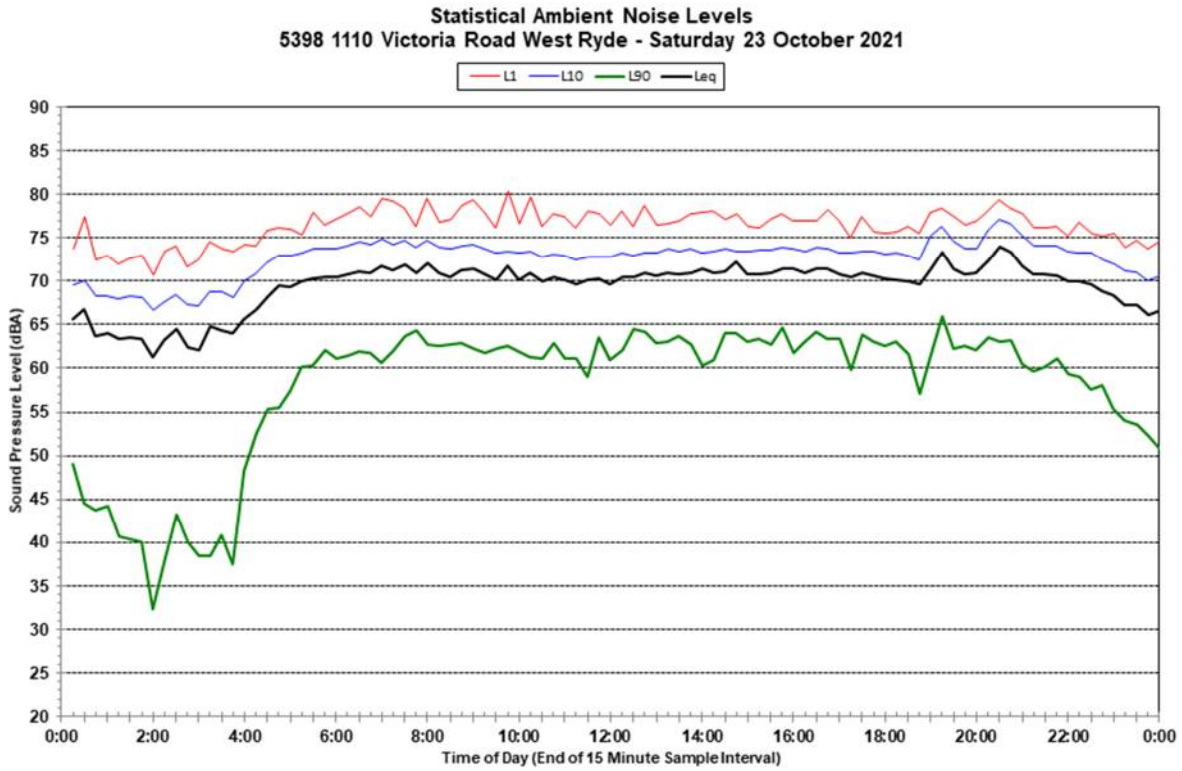


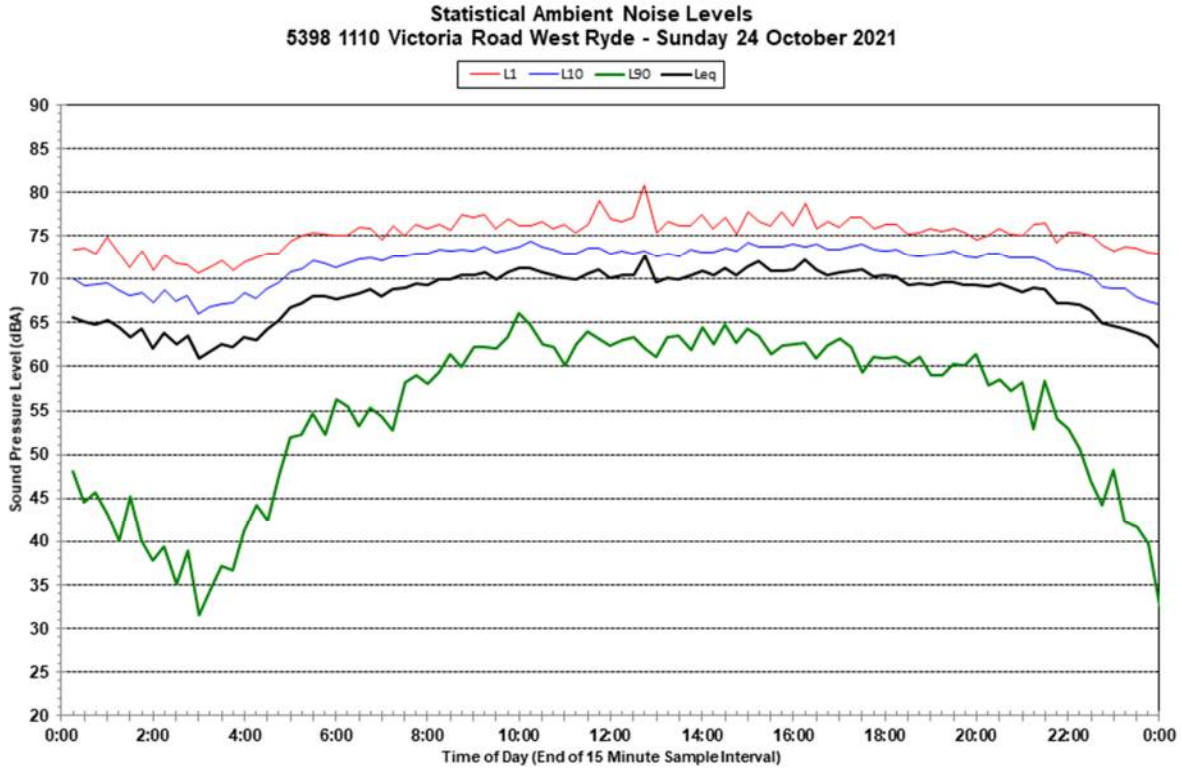


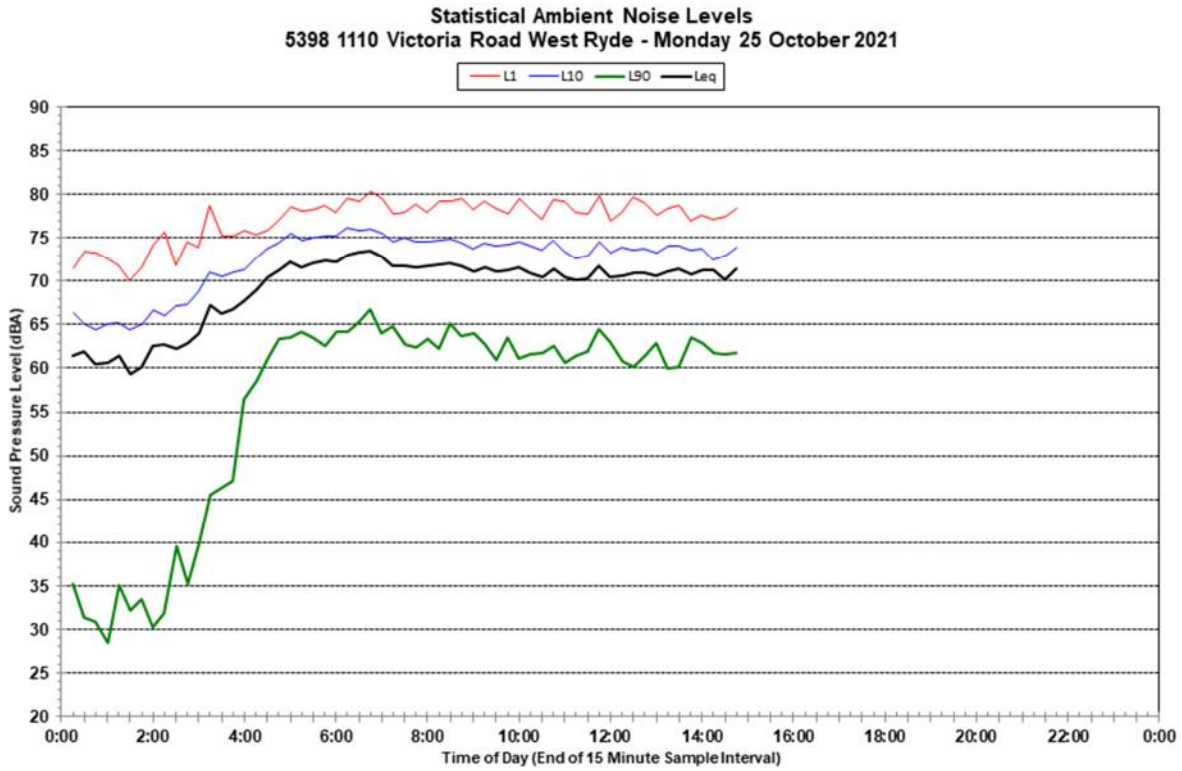

Statistical Ambient Noise Levels
5398 1110 Victoria Road West Ryde - Wednesday 20 October 2021
L1
L10
L90
Leq
Sound Pressure Level (dBA)
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
5398 1110 Victoria Road West Ryde - Thursday 21 October 2021
L1
L10
L90
Leq
Sound Pressure Level (dBA)
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
5398 1110 Victoria Road West Ryde - Friday 22 October 2021
L1
L10
L90
Leq
Sound Pressure Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
5398 1110 Victoria Road West Ryde - Saturday 23 October 2021
L1
L10
L90
Leq
Sound Pressure Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
5398 1110 Victoria Road West Ryde - Sunday 24 October 2021
L1
L10
L90
Leq
Sound Pressure Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
5398 1110 Victoria Road West Ryde - Monday 25 October 2021
L1
L10
L90
Leq
Sound Pressure Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time of Day (End of 15 Minute Sample Interval)