RODNEY STEVENS ACOUSTICS
Acoustic Consultants

REPORT R200665R3

Revision 2

Noise Impact Assessment

DA 10/2024

Mixed Use Development

46-54 Court Road, Fairfield NSW 2165

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46-54 Court Road, Fairfield NSW 2165

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TABLE OF CONTENTS

1 INTRODUCTION 5

2 PROJECT DESCRIPTION 5

2.1 Existing Site and Proposed Development 5

2.2 Surrounding Receivers 5

3 ARCHITECTURAL ACOUSTIC REVIEW 7

3.1 National Construction Code (NCC) 7

3.2 Partitions Between Sole Occupancy Units 8

3.3 Inter-tenancy Wall Partitions 8

3.3.1 Corridor Wall 8

3.3.2 Lift Shaft Wall 8

3.3.3 Fire Stair Wall 8

3.4 Partition Types 8

3.5 Inter-tenancy Flooring 11

3.6 Glazing 12

3.6.2 Glazing – 2014 12

3.6.3 Glazing (Revised 2024 Impact) 14

3.6.4 Unattended Noise Monitoring 14

3.6.5 Data Processing 14

3.6.6 Noise Intrusion (State Environmental Planning Policy (Transport and Infrastructure) 2021) 15

3.6.7 Road Traffic Noise Impact 15

3.7 Treatment for Wastepipes in Non-Habitable Spaces 20

3.8 Entry Doors 21

3.9 Recessed Lights 22

3.10 Acoustic Sealants 22

3.11 Seals and Gaps 22

3.12 Services / Hydraulic Piping 23

3.13 Access Panels 23

4 MECHANICAL NOISE IMPACT ASSESSMENT 24

4.1 Background Noise Measurement 24

4.2 Mechanical Plant Schedule 24

4.3 Mechanical Plant Noise Emission 25

4.4 Predicted Noise Levels 26

5 LOADING DOCK NOISE IMPACT ASSESSMENT 27

5.1 Background Noise Measurement 27

5.2 Predicted Noise Assessment 27

6 RECOMMENDATIONS 29

7 CONCLUSION 30

APPENDIX A – ACOUSTIC TERMINOLOGY 32

APPENDIX B – LOGGING GRAPH 36

APPENDIX C – CALIBRATION CERTIFICATE 40

APPENDIX D – WALL TYPES 42

Table 2-1 Sensitive Receivers 6
Table 3-1 Part F7 of NCC Acoustic Requirements 7
Table 3-2 Proposed Wall Types And Sound Isolation Performance. 9
Table 3-3 Generic Floor/Ceiling Construction 11
Table 3-4 Traffic Noise Levels Corresponding to Defined SEPP 2021 Periods 15
Table 3-5 DP&I Interim Guideline Noise Criteria 15
Table 3-6 Wastepipes in Riser Adjacent to Habitable Spaces – Externally Lagged 20
Table 3-7 Wastepipes in Riser Adjacent to Non-Habitable (Wet) Spaces 21
Table 4-1 Project Trigger Noise Levels 24
Table 4-2 Mechanical Plant Schedules 24
Table 4-3 AC Condenser Unit Details 25
Table 4-4 Predicted Noise Levels At Sensitive Receivers 26
Table 5-1 Project Trigger Noise Levels 27
Table 5-2 Predicted Noise Levels At Sensitive Receivers 29

Figure 2-1 Aerial Photo – Site location and Surrounding Receivers 6
Figure 3-1 Level 7 Rw Requirements 16
Figure 3-2 Level 8 Rw Requirements 17
Figure 3-3 Level 9 Rw Requirements 17
Figure 3-4 Level 10 Rw Requirements 18
Figure 3-5 Level 12 Rw Requirements 18
Figure 3-6 Level 13 Rw Requirements 19
Figure 3-7 Level 14 Rw Requirements 19
Figure 3-8 Wastepipes in Habitable Ceiling Spaces 20
Figure 3-9 Wastepipes on non-habitable spaces 21
Figure 3-10 Duct/services pipe penetration detailing 23
Figure 4-1 Rooftop Mechanical Plant and Surrounding Receivers 26
Figure 5-1 Loading Dock Location 28

1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by Level 33 Property Development Group Sydney to undertake an acoustic impact assessment of the proposed multi-storey residential development at 46-54 Court Road, Fairfield.

The acoustic assessment involves reviewing the proposed internal walls and floors to ensure the acoustic properties comply with the acoustic requirements outlined within the National Construction Code/Building Code of Australia (NCC/BCA). The review also consists of assessing the proposed mechanical plans to ensure noise amenity is achieved at surrounding receivers and tenants within the proposed development.

Fairfield City Council has requested the following be addressed in an updated acoustic report:

> (f) An acoustic report was not submitted to demonstrate that the proposed development will not result in unacceptable acoustic impacts to the surrounding locality or be subject to such unacceptable impacts. In this regard, the application has not addressed the potentially adverse acoustic impacts to and from the development arising from the classified road, from the revised service and truck loading area, from surrounding commercial properties, and from new mechanical plant proposed on the roof. The consent authority cannot be satisfied as to the matters in sections 2.119(2)(c) and 2.120(3) of SEPP T&I in the absence of an acoustic report.

This revision the report addresses the following amendments to the proposed development:

- Noise impact from the surrounding classified road to the additional levels
- Noise from the operation of the revised service and truck loading area
- Noise from the revised mechanical plants on the roof top

Specific acoustic terminology is used in this report. An explanation of acoustic terms is provided in Appendix A.

2 PROJECT DESCRIPTION

2.1 Existing Site and Proposed Development

The development site is bounded by adjoining commercial receivers to the north-west and south, residential development to the north, Court Road to the north-east and The Horsley Drive to the south-west. The proposed twelve storey mixed use development is to be located at 46-54 Court Road, Fairfield NSW.

2.2 Surrounding Receivers

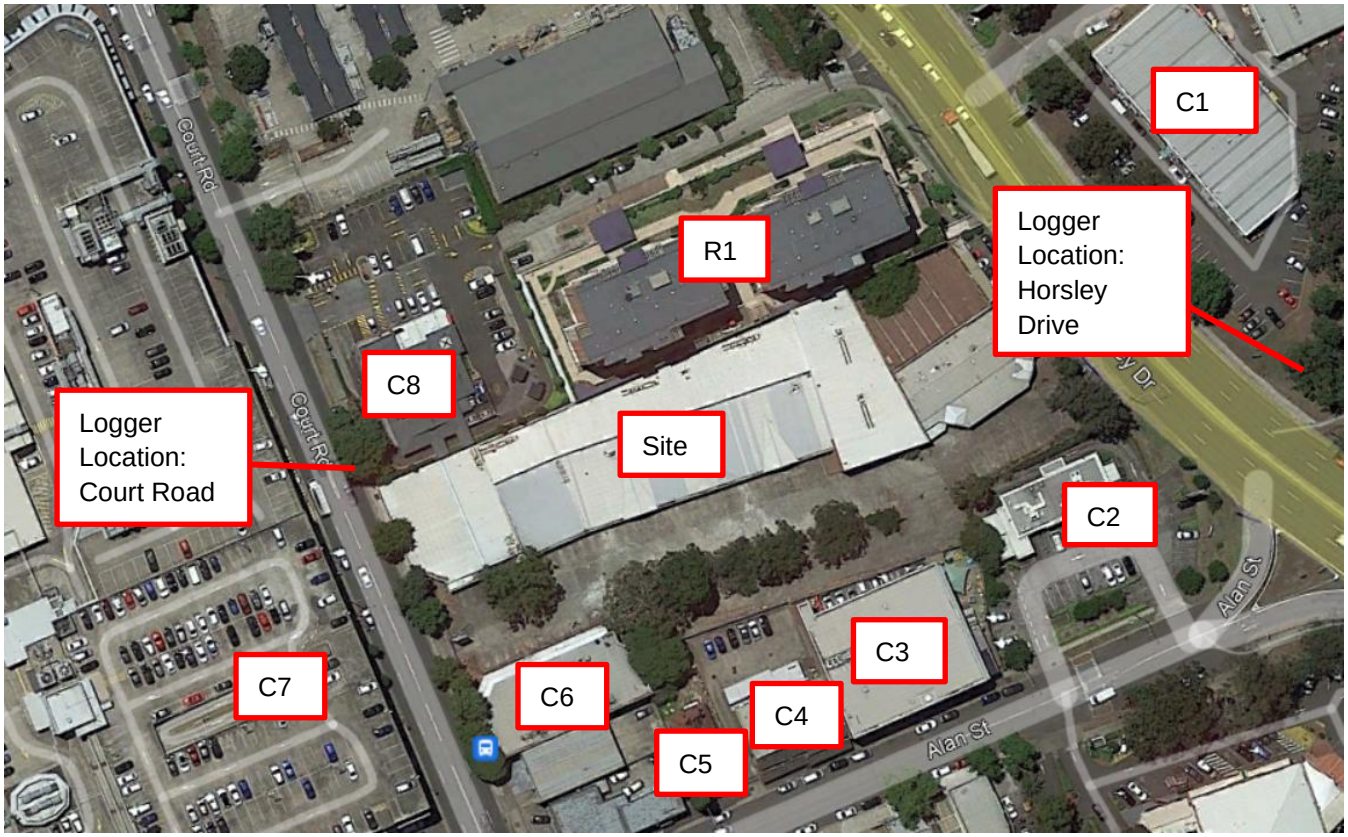
The nearest receivers surrounding the site are considered in the mechanical noise impact assessment and outlined in Table 2-1.

Table 2-1 Sensitive Receivers

Receiver	Sensitive Receiver's Address
R1	360-364 The Horsley Drive, Fairfield
C1	291-303 The Horsley Drive, Fairfield
C2	352-354 The Horsley Drive, Fairfield
C3	6-8 Alan Street, Fairfield
C4	4 Alan Street, Fairfield
C5	2 Alan Street, Fairfield
C6	44 Court Road, Fairfield
C7	1-29 Court Road, Fairfield
C8	Cnr Horsley Drive & Court Road

Figure 2-1 shows an aerial image of the site area, nearby receivers and the noise monitoring locations

Figure 2-1 Aerial Photo – Site location and Surrounding Receivers



Aerial image courtesy of Google Map © 2021

3 ARCHITECTURAL ACOUSTIC REVIEW

3.1 National Construction Code (NCC)

It is necessary to safeguard future occupants from loss of amenity as a result of undue sound being transmitted between adjoining sole-occupancy premises and also from common spaces into sole-occupancy premises.

NCC (formerly BCA) deemed to satisfy sound insulation requirements for inter-tenancy walls for Class 2 buildings are summarised in table below in accordance with Part F7.

A waste pipe or other penetration that is embedded in or passes through a floor, serves or passes through more than one apartment must also be separated from the rooms of any sole-occupancy unit by construction of a partition with the $R_w + C_{tr}$ ratings specified in table below.

Table 3-1 Part F7 of NCC Acoustic Requirements

Separating Partitions	Minimum NCC Requirement
Walls and Floors	
Walls between habitable spaces of sole occupancy	Rw + Ctr 50
Walls between habitable spaces and stairway, public corridors, public lobby or the like	Rw 50
Walls between wet areas (bathrooms, sanitary compartment, laundry or kitchen) and a habitable room (other than kitchen) in adjoining apartments	Rw + Ctr 50 and of discontinuous construction
Walls between a plant room or lift shaft and a sole occupancy unit	Rw 50 and of discontinuous construction
Doors assemblies located in a wall between an apartment and a stairway, public corridor, public lobby or the like	Rw 30
Doors	
Door assemblies located in a wall between an apartment and a stairway, public corridor, public lobby or the like	Rw 30
Services	
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	
(i) if the adjacent room is a habitable room (other than a kitchen); or	Rw + Ctr 40
(ii) if the room is a non-habitable room	Rw + Ctr 25
(b) a storm water pipe passes through a sole occupancy unit	

(i) if the adjacent room is a habitable room (other than a kitchen); or	Rw + Ctr 40
(ii) if the room is a non-habitable room	Rw + Ctr 25

3.2 Partitions Between Sole Occupancy Units

The materials and construction of dividing partitions determine the amount of sound transmission between adjoining sole occupancy premises and from common spaces into sole occupancy premises. The performance of any dividing partition can be measured and reported as a single figure value known as R_w (Weighted Sound Reduction Index). Consideration of C_{tr} should also be given.

3.3 Inter-tenancy Wall Partitions

Partitions separating sole occupancy units are to have an acoustic performance of R_w+C_{tr} 50. Where adjacent to a wet area the wall is to have discontinuous construction (e.g. a double stud wall system will require minimum 20mm air gap between each wall leaf).

As part of the performance requirements, a wall or a floor must not be compromised by the penetration of a pipe or other service elements, since chasing of masonry walls for electrical and hydraulic services (or any other services) would result in a reduction of the wall performance and is prohibited for masonry or concrete walls (NCC Part F5.2 Section 2 (e) (i)).

3.3.1 Corridor Wall

Walls between an apartment (habitable or wet area) and a public corridor, public lobby or the like, or parts of a different classification, would require a R_w not less than 50, when tested in the laboratory.

3.3.2 Lift Shaft Wall

Walls between an apartment (habitable or wet area) and a lift shaft would require a Rw not less than 50 and of discontinuous construction, when tested in the laboratory.

3.3.3 Fire Stair Wall

Walls between an apartment (habitable or wet area) and a stairway or the like, or parts of a different classification, would require a R_w not less than 50, when tested in the laboratory.

3.4 Partition Types

To meet the NCC requirements, the selection of wall types should make allowance for the C_{tr} value, so that both $R_w + C_{tr}$ values are met. For heavy wall types like precast concrete, the C_{tr} value is relatively low, due to a much heavier wall mass (typically in the order of C_{tr} = -5). Conversely, for lighter wall types like drywall systems, the C_{tr} value tends to be relatively high (typically in the order of C_{tr} = -10).

In addition, wall types specified in the NCC as requiring discontinuous construction will require each wall leaf to be separated by a minimum of a 20mm air gap.

Level 33 Property Development Group Sydney has provided a wall type schedule for the proposed development at 46-54 Court Road, Fairfield. The specific wall types and schedule are presented in Appendix D.

The following table presents the relevant proposed wall types and upgrades needed to achieve the NCC/BCA requirements.

Table 3-2 Proposed Wall Types And Sound Isolation Performance.

Wall Type	Location	Construction Type	Predicted Rw/ Rw+Ctr	Upgrade	Requirement
H1	Corridor to Apartment	15mm Plasterboard (PBD) 75mm steel stud, 75mm insulation, 25mm air gap, 75mm Hebel Powerpanel, 15mm PBD	61/52	-	Rw 50
H2	Intertenancy between units	15mm PBD, 75mm steel stud, 75mm insulation, 25mm air gap, 75mm Hebel Powerpanel, 15mm PBD	61/52	-	Rw+Ctr 50
W1	Intertenancy Wet Area to Dry Area	6mm Cemintel Board, 75mm steel stud, 75mm insulation, 25mm air gap, 75mm Hebel Powerpanel, 13mm PBD	61/52	-	Rw+Ctr 50 Dis-continuous
W2	Corridor to Apartment Wet Area	6mm Cemintel Board, 75mm steel stud, 75mm insulation, 25mm air gap, 75mm Hebel Powerpanel, 13mm PBD	61/52	-	Rw 50
W3	Intertenancy Wet Area to Wet Area	6mm Cemintel Board, 75mm steel stud, 75mm insulation, 25mm air gap, 75mm Hebel Powerpanel, 13mm PBD	61/52	-	Rw+Ctr 50 Dis-continuous

Wall Type	Location	Construction Type	Predicted Rw/ Rw+Ctr	Upgrade	Requirement
S1	Service Riser	75mm Hebel Power Panel	36/33	If the service pipe passes a habitable space then the service pipe should be fitted with Acousticlag 45	Rw+Ctr 40 (Habitable) Or Rw+Ctr 25 (Non-Habitable)
S2	Service Riser	13mm PBD, 75mm steel stud, 75mm insulation	31/27	If the service pipe passes a habitable space then the service pipe should be fitted with Acousticlag 45	Rw+Ctr 40 (Habitable) Or Rw+Ctr 25 (Non-Habitable)
S4	Other Services Rooms	Besser Block 100 series	44/41	-	Rw+Ctr 40 (Habitable) Or Rw+Ctr 25 (Non-Habitable)
S6	Services Cupboard	13mm PBD, 28mm furring channel, Hebel Power Panel	44/37	If the service pipe passes a habitable space then the service pipe should be fitted with Acousticlag 45	Rw+Ctr 40 (Habitable) Or Rw+Ctr 25 (Non-Habitable)

Wall Type	Location	Construction Type	Predicted Rw/ Rw+Ctr	Upgrade	Require ment
S7	Services Cupboard	150mm Blockwork, 10mm Rendering	49/45	-	Rw+Ctr 40 (Habit-able) Or Rw+Ctr 25 (Non-Habit-able)

3.5 Inter-tenancy Flooring

In terms of inter-tenancy floor construction, it has been established in Section 3.1 that floors separating sole-occupancy units will need to achieve a rating $R_w + C_{tr}$ not less than 50.

To ensure sufficient impact sound insulation between tenancies where balconies, corridors, communal spaces, roof terrace and wet areas pass over habitable spaces in separate tenancies below, the floor construction is to achieve $L_{n,w}$ not more than 62.

Soft floor configurations (carpet with foam underlay) will meet the NCC Part F7D5 impact insulation requirement.

Based upon our current understanding, tiled areas within apartments are proposed to be installed in areas such as, laundry, kitchen, bathroom and ensuite. All ground floor lobby areas are also to be tiled. The remaining areas such as bedrooms and lounge rooms are to be carpeted.

At this stage, a specific floor/ceiling system has not been assigned, a generic floor/ceiling system can consist of a 200mm thick concrete slab, with a typical services void of 150mm and a standard plasterboard ceiling. Where carpet is not present on the flooring over habitable spaces, the following allowances should be made to meet NCC requirements.

Table 3-3 Generic Floor/Ceiling Construction

Lnw	O(Opinion), T(Test) M(Manufacturer)	Requirement	Compliance
55-58	O/T	<62	Yes

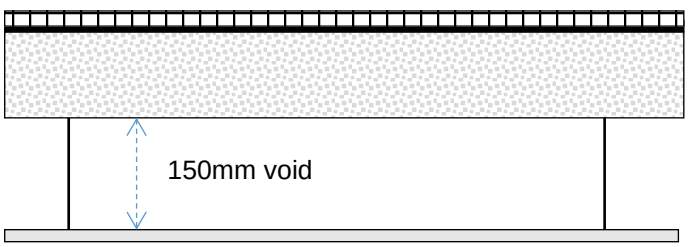
Tile layer (TBC)

5mm thick Regupol(or equivalent)underlay;

200mm thick slab;

100mm void;

13mm thick plasterboard;



3.6 Glazing

3.6.2 Glazing – 2014

The window acoustic performance (Rw) should achieve the recommended acoustic rating outlined in Section 5.1 of the DA acoustic report prepared by RSA (Document Reference: 13719R1 48-54 Court Rd). The glazing requirement, as noted in the DA acoustic report, are shown below:

Standard window glazing of a building will typically attenuate external noise ingress by 20 dBA with windows closed and 10 dBA with windows open (allowing for natural ventilation). The expected range of internal noise levels for standard facade glazing is presented in Table 5-1 for the windows open and windows closed scenarios and the predicted future levels of environmental noise impinging on the future facades of apartments.

Table 5-1 Acoustic Performance Requirements of Glazing

Building/Facade	Space	Descriptor	Internal Noise Level		Criterion	
			Windows Open	Windows Closed	Windows Open	Windows Closed
The Horsley Drive Building						
East Facade	Habitable	LAeq(15hr)	58	48	50	40
	Bedrooms	LAeq(9hr)	54	44	45	35
West Facade	Habitable	LAeq(15hr)	53	43	50	40
	Bedrooms	LAeq(9hr)	49	39	45	35
North Facade	Habitable	LAeq(15hr)	55	45	50	40
	Bedrooms	LAeq(9hr)	51	41	45	35
South Facade	Habitable	LAeq(15hr)	55	45	50	40
	Bedrooms	LAeq(9hr)	51	41	45	35
Court Road Building						
West Facade	Habitable	LAeq(15hr)	55	45	50	40
	Bedrooms	LAeq(9hr)	52	42	45	35
East Facade	**Habitable**	LAeq(15hr)	**50**	**40**	50	40
	Bedrooms	LAeq(9hr)	47	37	45	35
North Facade	Habitable	LAeq(15hr)	52	42	50	40
	Bedrooms	LAeq(9hr)	49	39	45	35
South Facade	Habitable	LAeq(15hr)	52	42	50	40
	Bedrooms	LAeq(9hr)	49	39	45	35
Eastern Tower						
North Facade	Habitable	LAeq(15hr)	53	43	50	40
	Bedrooms	LAeq(9hr)	49	39	45	35
South Facade	Habitable	LAeq(15hr)	53	43	50	40
	Bedrooms	LAeq(9hr)	49	39	45	35
East Facade	Habitable	LAeq(15hr)	53	43	50	40
	Bedrooms	LAeq(9hr)	49	39	45	35
West Facade	**Habitable**	LAeq(15hr)	**50**	**40**	50	40
	Bedrooms	LAeq(9hr)	46	36	45	35
Western Tower						
North Facade	Habitable	LAeq(15hr)	52	42	50	40
	Bedrooms	LAeq(9hr)	49	39	45	35
South Facade	Habitable	LAeq(15hr)	52	42	50	40
	Bedrooms	LAeq(9hr)	49	39	45	35
East Facade	**Habitable**	LAeq(15hr)	**50**	**40**	50	40
	Bedrooms	LAeq(9hr)	46	36	45	35
West Facade	**Habitable**	LAeq(15hr)	**50**	**40**	50	40
	Bedrooms	LAeq(9hr)	47	37	45	35

The predicted internal noise levels indicate that the regulatory internal noise criteria for open and closed windows will generally be exceeded in habitable rooms and bedrooms throughout the development, with the following exceptions as indicated in **bold** in Table 5-1:

- Court Road Building – East facade habitable rooms
- Eastern Tower – West facade habitable rooms
- Western Tower – East and west facade habitable rooms.

Upgraded glazing will be required for the rooms as nominated in Table 5-1 (ie that are not shown in **bold**) in order to achieve acceptable internal noise levels with the windows closed. In-principle, windows and doors with a laboratory-tested minimum acoustical performance of $\mathbf{R_w}$ **33** will provide the required additional attenuation of external noise levels. This acoustical performance can typically be achieved with 6.38 mm laminated glazing in well-sealed frames of heavy-duty construction. Full perimeter acoustical seals (eg Q-Lon seals) will be required, felt weather seals are inappropriate.

In addition, where windows and doors are required to be closed to meet internal noise levels as nominated in Table 5-1, alternative means of achieving the requirement for "comfort ventilation" will need to be considered to enable openings in the external facade to remain fully closed during noisy periods. The ventilation requirements of the BCA should be satisfied and design input should be sought from an appropriately qualified mechanical consultant. It is likely that an alternative means of comfort ventilation will need to be provided for all habitable spaces in the development.

3.6.3 Glazing (Revised 2024 Impact)

The proposal has been revised to include additional levels on level 7 to 10 and 12 to 14. This report addresses the road traffic noise impacts from Court Road and The Horsley Drive on the amenity of the proposed additional levels. The determination of an acceptable level of traffic noise impacting the internal residential spaces requires consideration of the activities carried out within the space and the degree to which noise will interfere with those activities.

3.6.4 Unattended Noise Monitoring

In order to characterise the existing acoustical environment of the area, unattended noise monitoring was conducted between 17 December and 24 December 2024 at the logging locations being on Court Road and Horsley Drive Fairfield. Two noise loggers were set up on site. The first logger was located in the rear of the site overlooking Court Road this location is representative of the traffic noise levels that the site will be exposed to.

The second logger was located front of the site, overlooking The Horsley Road

Logger locations were selected with consideration to other noise sources which may influence readings, security issues for noise monitoring equipment and gaining permission for access from other landowners.

Instrumentation for the survey comprised of 2 RION NL-42EX environmental noise loggers (serial numbers 572559 and 654678) fitted with microphone windshields. Calibration of the loggers was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dB(A). All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

3.6.5 Data Processing

In order to assess noise emission from the proposed development the data obtained from the noise logger has been processed in accordance with the procedures contained in the NSW Environmental Protection Authority's (EPA) *Noise Policy for Industry* (NPfI, 2017) to establish representative noise levels that can be expected in the residential vicinity of the site. The monitored baseline noise levels are detailed in table below.

3.6.6 Noise Intrusion (State Environmental Planning Policy (Transport and Infrastructure) 2021)

To assess noise intrusion into the residential component of the development, the data obtained from the first logger location has been processed to establish representative ambient noise levels at the facades most exposed to Cour Road and The Horsley Drive.

The time periods used for this assessment are as defined in the State Environmental Planning Policy (Transport and Infrastructure) 2021 and the Development near Rail Corridors and Busy Roads Interim Guideline. Results are presented below in Table 3-4.

Table 3-4 Traffic Noise Levels Corresponding to Defined SEPP 2021 Periods

Location	Period	External Noise Levels dB(A)
Court Road	Day Time 7:00 am - 10:00 pm	$L_{Aeq(15hour)}$ 65
	Night Time 10:00 pm - 7:00 am	$L_{Aeq(9hour)}$ 62
The Horsley Drive	Day Time 7:00 am - 10:00 pm	$L_{Aeq(15hour)}$ 67
	Night Time 10:00 pm - 7:00 am	$L_{Aeq(9hour)}$ 65

As sleep is the activity most affected by traffic noise, bedrooms are considered to be the most sensitive internal living areas. Higher levels of noise are acceptable in living areas without interfering with activities such as reading, listening to the television etc. Noise levels in utility spaces such as kitchens, bathrooms, laundries etc. can be higher.

3.6.7 Road Traffic Noise Impact

The NSW Government's State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP (Transport and Infrastructure) 2021) was introduced to facilitate the delivery of infrastructure across the State by improving regulatory certainty and efficiency. The NSW Department of Planning and Infrastructure's "*Development near Rail Corridors and Busy Roads - Interim Guideline"* (the DP&I Guideline) of December 2008 provides noise criteria for residential and non-residential buildings. These criteria are summarised in Table 3-5.

Table 3-5 DP&I Interim Guideline Noise Criteria

Type of occupancy	Noise Level 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

Note 1: Airborne noise is calculated as $L_{Aeq(15hour)}$ daytime and $L_{Aeq(9hour)}$ night-time

The R_w rating required for each window will vary from room to room. Recommendations for windows also apply to any other item of glazing located on the external facade of the building in a habitable room unless otherwise stated.

Note that the R_w rating is required for the complete glazing and frame assembly. The minimum glazing thicknesses will not necessarily meet the required R_w rating without an appropriate frame system. It will be

therefore necessary to provide a window glass and frame system having a laboratory tested acoustic performance meeting the requirements below

The window systems must be tested in accordance with both of the following:

- Australian Window Association Industry Code of Practice Window and Door – Method of Acoustic Testing; and
- AS 1191 Acoustics – Method for laboratory measurement of airborne sound insulation of building elements.

It is necessary to submit such Laboratory certification for the proposed glazing systems (i.e. windows and framing systems) (e.g. NAL or CSIRO) for approval by RSA prior to ordering or commitment.

The entire frame associated with the glazing must be sealed into the structural opening using acoustic mastics and backer rods. Normal weather proofing details do not necessarily provide the full acoustic insulation potential of the window system. The manufacturers' installation instructions for the correct acoustic sealing of the frame must be followed.

It is possible that structural demands for wind loading or fire rating or the like may require more substantial glass and framing assemblies than nominated above. Where this is the case the acoustic requirements must clearly be superseded by the structural or fire rating demands.

The glazing upgrades are marked on plans below.

Figure 3-1 Level 7 Rw Requirements

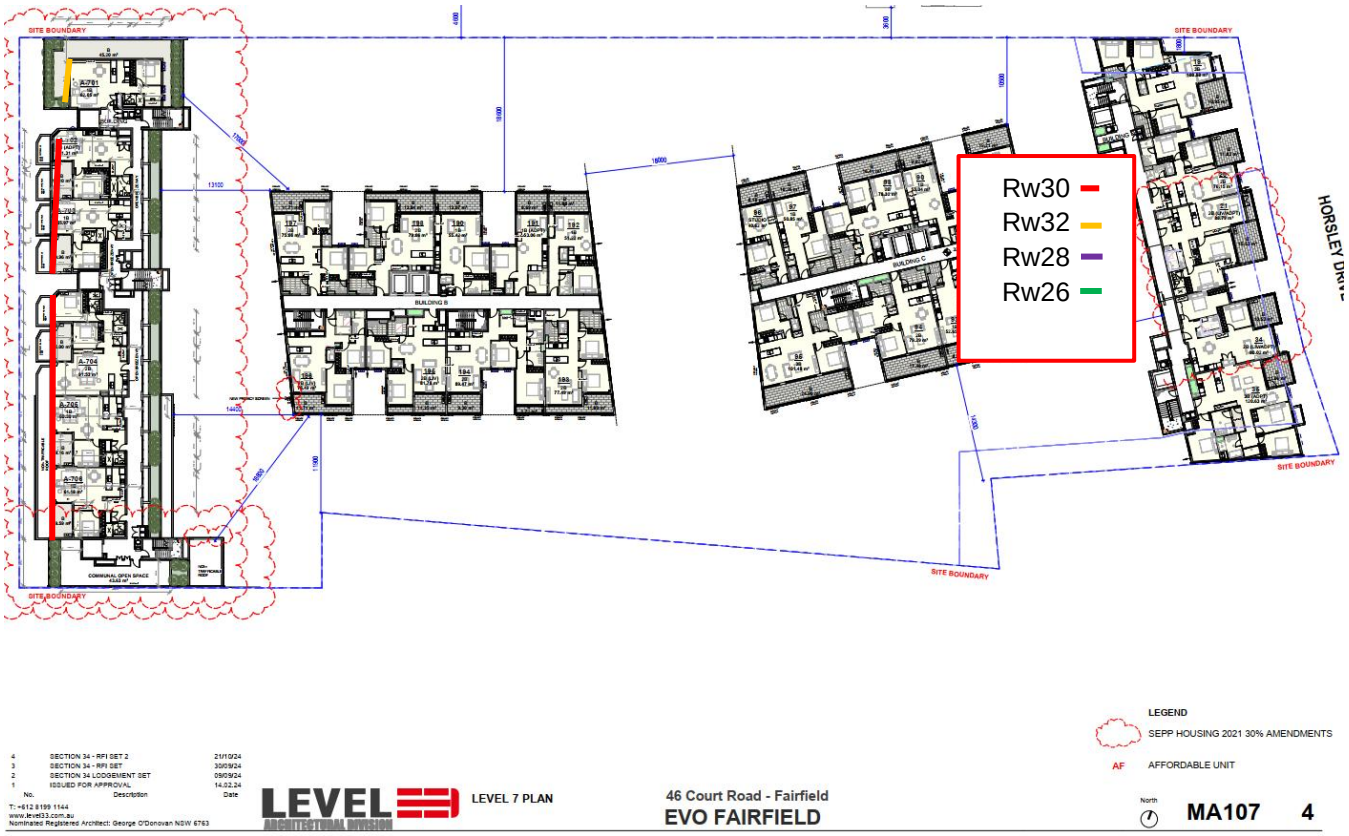


Figure 3-2 Level 8 Rw Requirements

Figure 3-3 Level 9 Rw Requirements

Figure 3-4 Level 10 Rw Requirements

Figure 3-5 Level 12 Rw Requirements

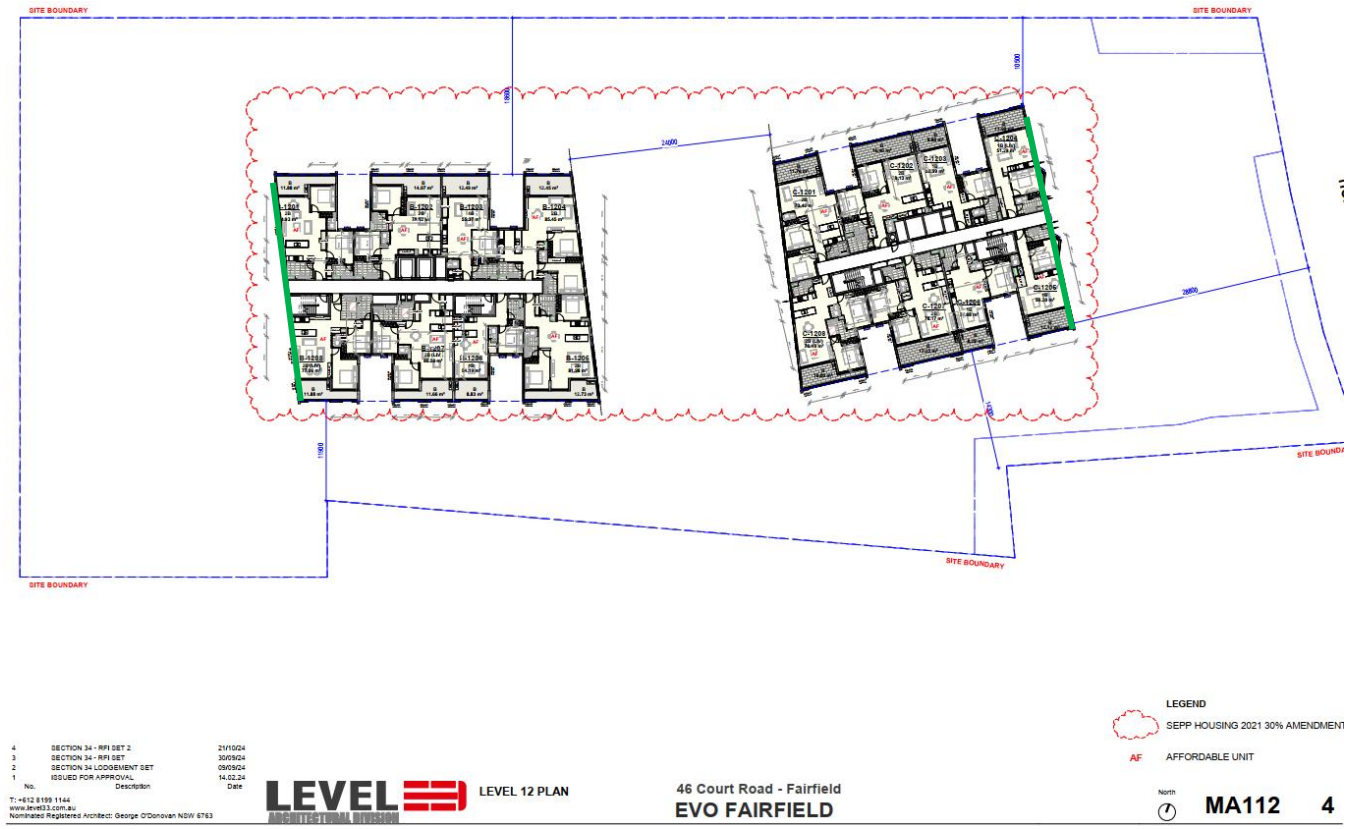


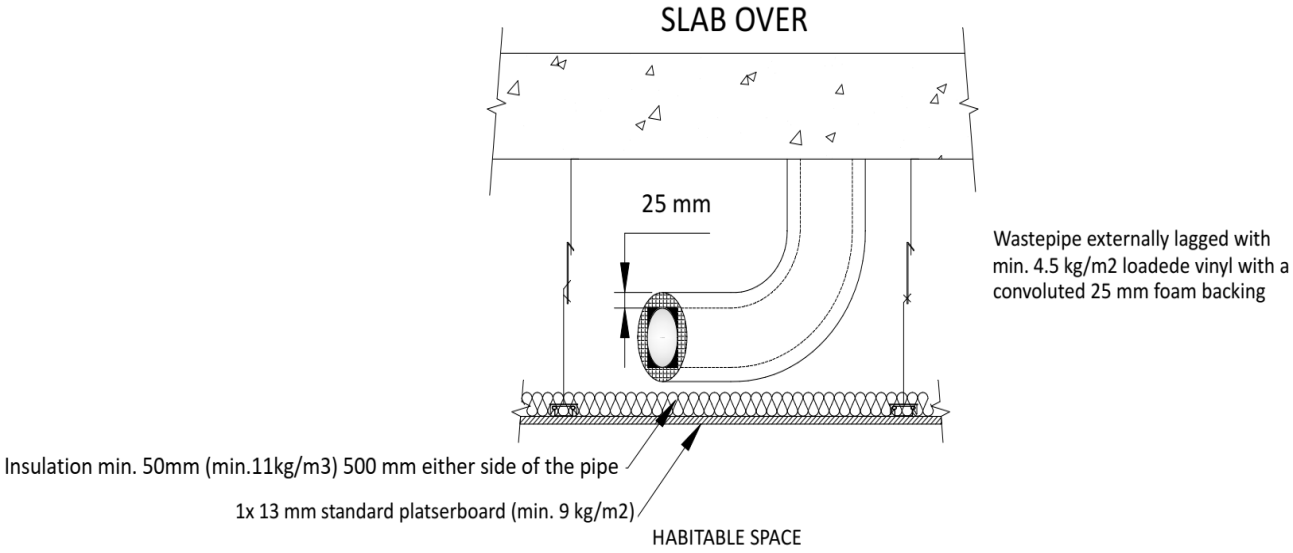
Figure 3-6 Level 13 Rw Requirements

Figure 3-7 Level 14 Rw Requirements

Treatment for Wastepipes in Habitable Spaces

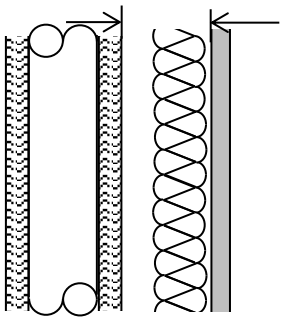
The minimum NCC requirement for ceiling insulation for soil and waste pipes passing through/above habitable spaces is to achieve minimum $R_w + C_{tr}$ 40. Wherever soil and waste pipes pass through/above habitable spaces they should be acoustically treated as shown in Figure 3-8.

Figure 3-8 Wastepipes in Habitable Ceiling Spaces



It should be noted that where a kitchen adjoins a common living area, the kitchen shall be deemed to be part of the habitable space and this treatment should also apply to kitchens in this instance – see Table 3-6.

Table 3-6 Wastepipes in Riser Adjacent to Habitable Spaces – Externally Lagged

R_w	R_w+C_{tr}	O(Opinion), T(Test) M(Manufacturer)	Requirement
50	42	O	$R_w + C_{tr}$ 40
Habitable side of apartment – 1x13mm plasterboard on steel stud. Wastepipe externally lagged with 4.5kg/m^3 loaded vinyl with a convoluted 25mm foam backing. Cavity – 75 mm thick Polyester insulation (or equivalent with a density of 11kg/m^3). No penetrations through riser except above ceiling.	50mm gap 		

3.7 Treatment for Wastepipes in Non-Habitable Spaces

In terms of ceiling insulation for soil and waste pipes passing through/above non-habitable spaces, NCC requirement is to achieve $R_w + C_{tr}$ 25 as a minimum.

Figure 3-9 shows the recommended constructions where $R_w + C_{tr}$ 25 can be achieved.

Figure 3-9 Wastepipes on non-habitable spaces

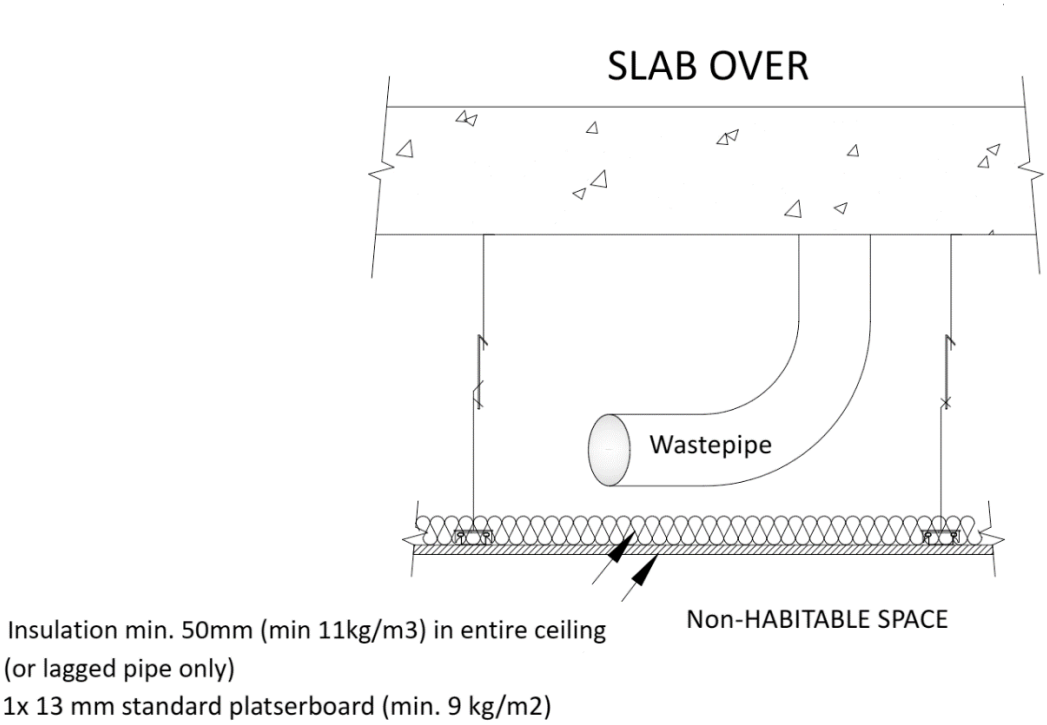
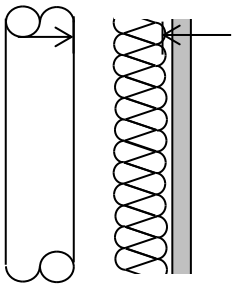


Table 3-7 Wastepipes in Riser Adjacent to Non-Habitable (Wet) Spaces

R_w	R_w+C_{tr}	O(Opinion), T(Test) M(Manufacturer)	Requirement
30	27	O	$R_w + C_{tr}$ 25
Non-habitable (wet) apartment side – 1x13mm plasterboard on steel stud. Wastepipe is un lagged. Cavity – 75 mm thick Polyester insulation (or equivalent with a density of 11kg/m^3). No penetrations through riser except above ceiling.		50mm gap 	

3.8 Entry Doors

To comply with the NCC requirements, entry doors separating tenancies from common areas are to achieve an R_w not less than 30. A 45 mm solid core with medium acoustic seals will achieve this requirement. Suggested systems include:

- Lorient LE1212 and IS8010si (Rw 31) or the Lorient IS7025 and IS8011si (Rw 32) (both recommended with threshold plate IS4130).
- Raven RP10 and RP38 drop seal with a threshold plate.

Alternatives to the above should be reviewed by RSA, prior to final approval, with test data provided.

3.9 Recessed Lights

RSA recommends that where bulkheads and ceilings above habitable areas contain wastepipes and A/C units, light fittings to be provided with acoustic covers behind. Alternatives should be reviewed by RSA prior to final approval.

3.10 Acoustic Sealants

Where acoustic constructions are provided, all joints should be overlapped and penetrations and gaps are to be fully sealed with acoustic sealant similar to:

- Bostik Fireban 1 or Seal'n'Flex;
- Hilti CP606 Firestop;
- CSR Gyprock Firemastic;
- Sika Firerate;
- Ramset Blaze Brake 201;
- Any other acoustic sealant that is polyurethane (non-hardening) with a minimum specific gravity sg > 1.5.

If a different option is to be used, it should be reviewed by RSA prior to installation.

3.11 Seals and Gaps

Junctions are required to be sealed airtight to achieving the required acoustic ratings between spaces. General guidelines for acoustic seals are as follows:

- All junctions and penetrations should be sealed air tight and seals are to extend continuously along the length of the junction – to both sides of the partition;
- Where more than one layer of wall linings are required to walls, all linings should be overlapped to minimise potential gaps between linings;
- It is recommended that plasterboard or other wall linings are cut such that the junction is as close a flush fit as possible. The maximum gap between joints in wall linings is 3mm.

For air gaps, the following detailing should be applied to maintain an adequate airtight seal through acoustic rated elements. For the following air gaps, the following details are recommended:

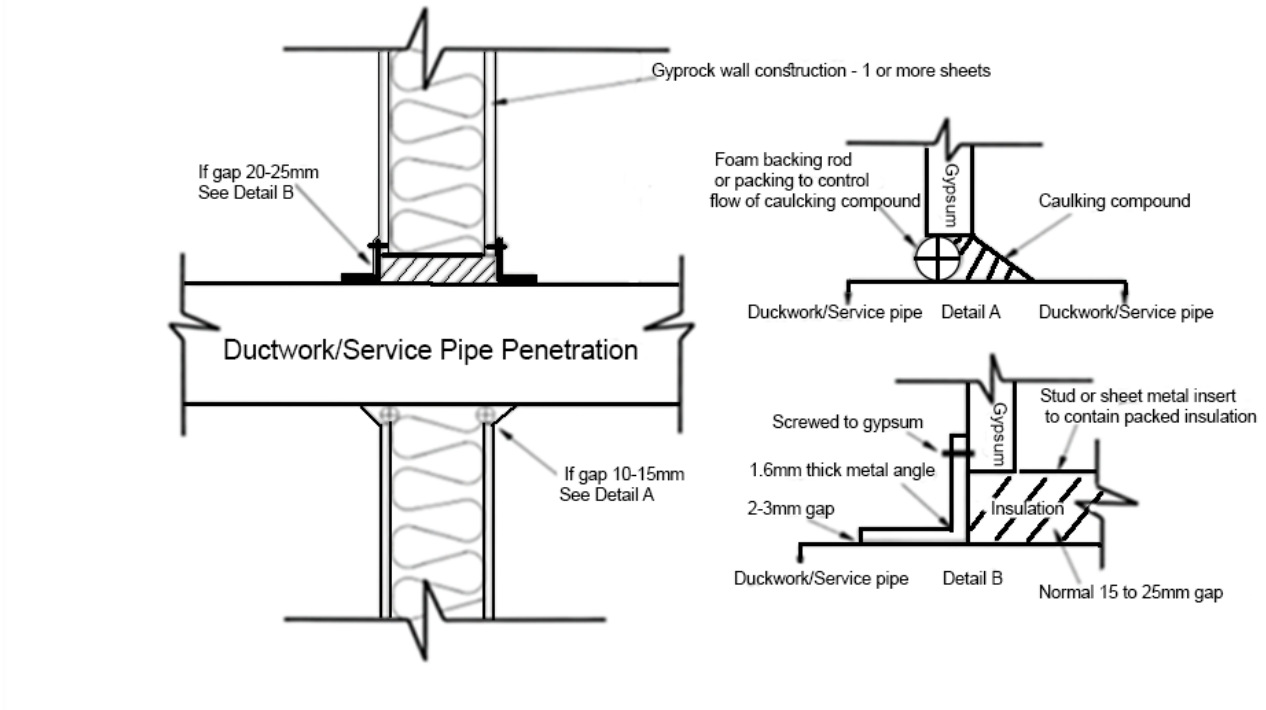
- Gaps < 5mm – hard pack with glass wool insulation (minimum 32kg/m^3) and apply mastic.
- Gaps > 5mm and up to 20mm: Pack with backing rods and dense insulation (50mm, 48kg/m^3 glass wool) to seal and mastic.
- Gaps > 20mm – pack with insulation, and patch with Plasterboard (the same thickness and number of layers as the base partition (applied either side) leaving small gap (~5mm), which can be sealed with mastic.
- Recommended Mastic Sealants, are as follows:
    - Sikaflex "Pro;
    - Bostik "Fireban One";
    - Gyprock "Seal 'n Flex".

3.12 Services / Hydraulic Piping

Hot and cold water pipes do not need to be treated when penetrating an acoustic rated wall; however the gaps around the piping are required to be treated as per Section 3.11. All pipes, fittings and fixtures need to be isolated from the partitions by means of resilient sleeves or mounts.

For partitions, Rw 45 or greater, services piping should be caulked at the penetration on both sides. The gap between the pipe and the gypsum board should not exceed 20 mm, where gaps exceed 20 mm the gap should be reduced to 20 mm by adding an additional piece of gypsum/plasterboard, or a sheet metal disk to cover the gap, as shown in Figure 3-10.

Figure 3-10 Duct/services pipe penetration detailing



NB: Details A+B are alternative sealing methods
Ductwork or pipe must not be supported by wall

3.13 Access Panels

All ceiling access panels that are required to gain access to plant and equipment mounted in the ceiling cavity are required to be acoustic rated access panels, with the exception of access panels required in the open plan office or similar spaces. The minimum acoustic rating of the access hatch is R_w30-35. Recommended panels are Rondo or Trafalgar STC Series rated R_w30-35, or similar.

4 MECHANICAL NOISE IMPACT ASSESSMENT

4.1 Background Noise Measurement

A detailed account of the environmental noise survey of the site has been provided within the previous Acoustic DA report prepared by RSA (Document Reference:13719R1 Revision 2, dated 28 October 2014). Background noise measurement was used to establish the intrusive noise criteria for the site. Table 4-1 presents the established Project Trigger Noise Levels for the site.

Table 4-1 Project Trigger Noise Levels

Location	Project Trigger Noise Levels		
	Daytime 7 am - 6 pm	Evening 6 pm – 10 pm	Night-time 10 pm – 7 am
Site	55	55	43
Commercial	68	68	68

4.2 Mechanical Plant Schedule

Mechanical details of the proposed Car Park Supply and Exhaust Fans are presented in the Table 4-2 below. The Sound Power Level (Lw) of these fans presented in the table below were extracted from the mechanical plan prepared by Gold & Bay (Project Number 21086, Drawings: M00 to M127, Revision P3 & Drawings: MS-09 to MS-11, Revision P3).

Table 4-2 Mechanical Plant Schedules

Fan	Fan Location	Fan Model	Sound Power Level (Lw) dB(A)
CPEF-B01	Basement Level 1	AP11004CP12/33	98
CPEF-R-01	Building C Roof	AP0804GP6/27	92
CPEF-R-02	Building D Roof	AP1004CP9/23	96
CPEF-L1-01	Level 2	AP1004CP9/24	96
CPSF-B1-01	Basement 1	AP1004CP12/33	98
CPSF-B1-02	Basement 1	AP904CP12/31	94

The details of the proposed Air Conditioning (AC) condenser units for the proposed development are presented in Table 4-3.

Table 4-3 AC Condenser Unit Details

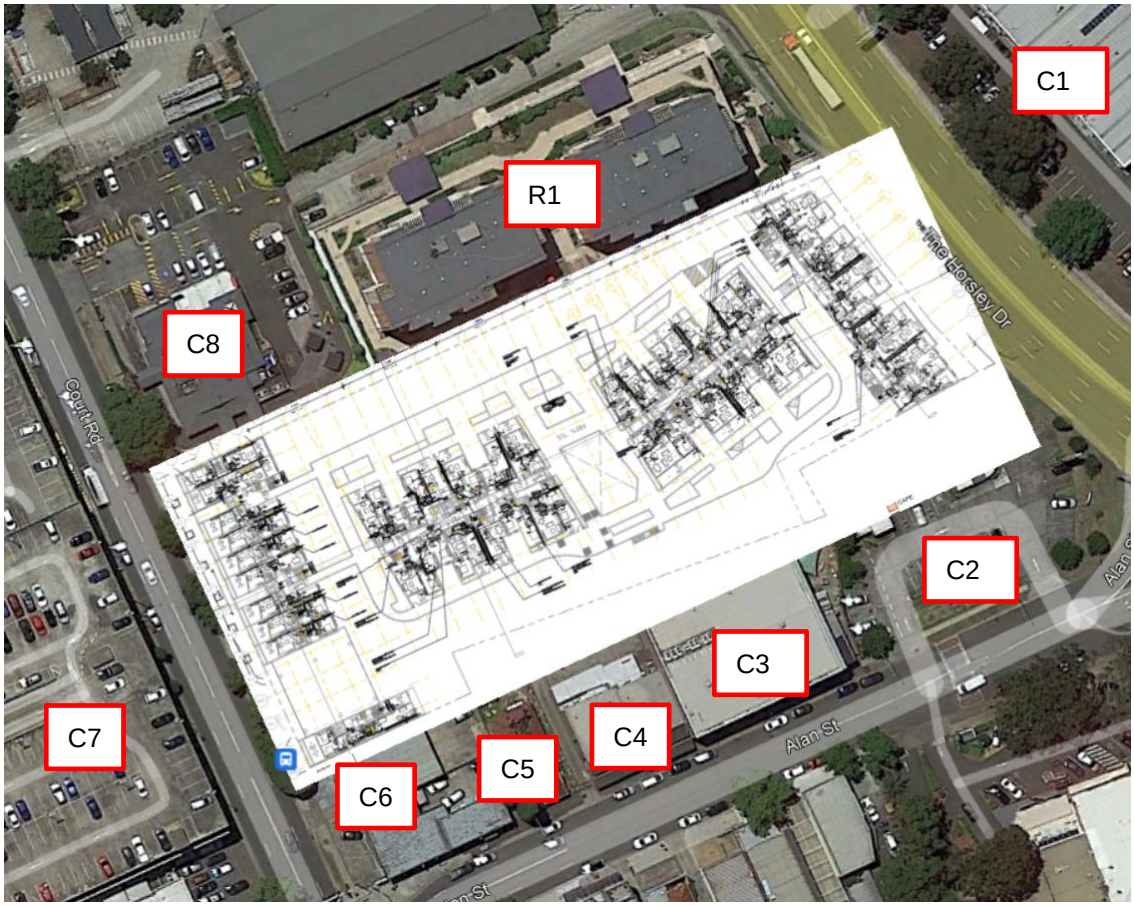
Model	Condenser ID	SWL dB(A)
RZAV100BVMA	CU-01	64
RZAV125BVMA	CU-02	65
RXYYMQ4AV4A	CU-03	65
4MXM80RVMA	CU-04	61
4MXM68RVMA	CU-05	60
RZAV71BVMA	CU-06	61

4.3 Mechanical Plant Noise Emission

Calculations of the noise levels from the operation of the proposed mechanical plant have been carried out using the data presented in Section 4.2. We have used the worst case scenario where all plant is running at the same time. Calculations take into account factors such as distance, shielding from buildings and barriers.

- Heights of receivers are assumed to be 1.5 meters above respective level;
- All mechanical units outlined in Section 4.2 are assumed to be operating simultaneously.
- All condenser units are placed on the balcony floor (not mounted on wall) and the balustrade is assumed to provide some noise shielding;
- Resulting noise levels have been calculated to the most affected point on the boundary of the affected receivers.
- Noise control measures such CPEF & CPSF silencer and inline insulation are assumed in the noise prediction assessment. Further details of the noise control measures are provided in Section 5 of this report.
- The site layout and surrounding receivers is presented in figure below.

Figure 4-1 Rooftop Mechanical Plant and Surrounding Receivers



4.4 Predicted Noise Levels

Predictive resultant noise levels have been calculated for all mechanical plant items. Noise emissions at the nearest residential receivers are presented in the table below.

Table 4-4 Predicted Noise Levels At Sensitive Receivers

Receiver	Period	Calculated Noise Level L_{Aeq} – dB(A)	Criteria	Compliance
R1	Day	43	55	Yes
	Evening	43	55	Yes
	Night	43	43	Yes
C2	All	37	68	Yes
C3	All	39	68	Yes
C4	All	37	68	Yes
C5	All	37	68	Yes
C6	All	36	68	Yes

Receiver	Period	Calculated Noise Level L_{Aeq} – dB(A)	Criteria	Compliance
C7	All	37	68	Yes
C8	All	38	68	Yes

5 LOADING DOCK NOISE IMPACT ASSESSMENT

5.1 Background Noise Measurement

A detailed account of the environmental noise survey of the site has been provided within the previous Acoustic DA report prepared by RSA (Document Reference:13719R1 Revision 2, dated 28 October 2014). Background noise measurement was used to establish the intrusive noise criteria for the site. Table 4-1 presents the established Project Trigger Noise Levels for the site.

Table 5-1 Project Trigger Noise Levels

Location	Project Trigger Noise Levels		
	Daytime 7 am - 6 pm	Evening 6 pm – 10 pm	Night-time 10 pm – 7 am
Site	55	55	43
Commercial	68	68	68

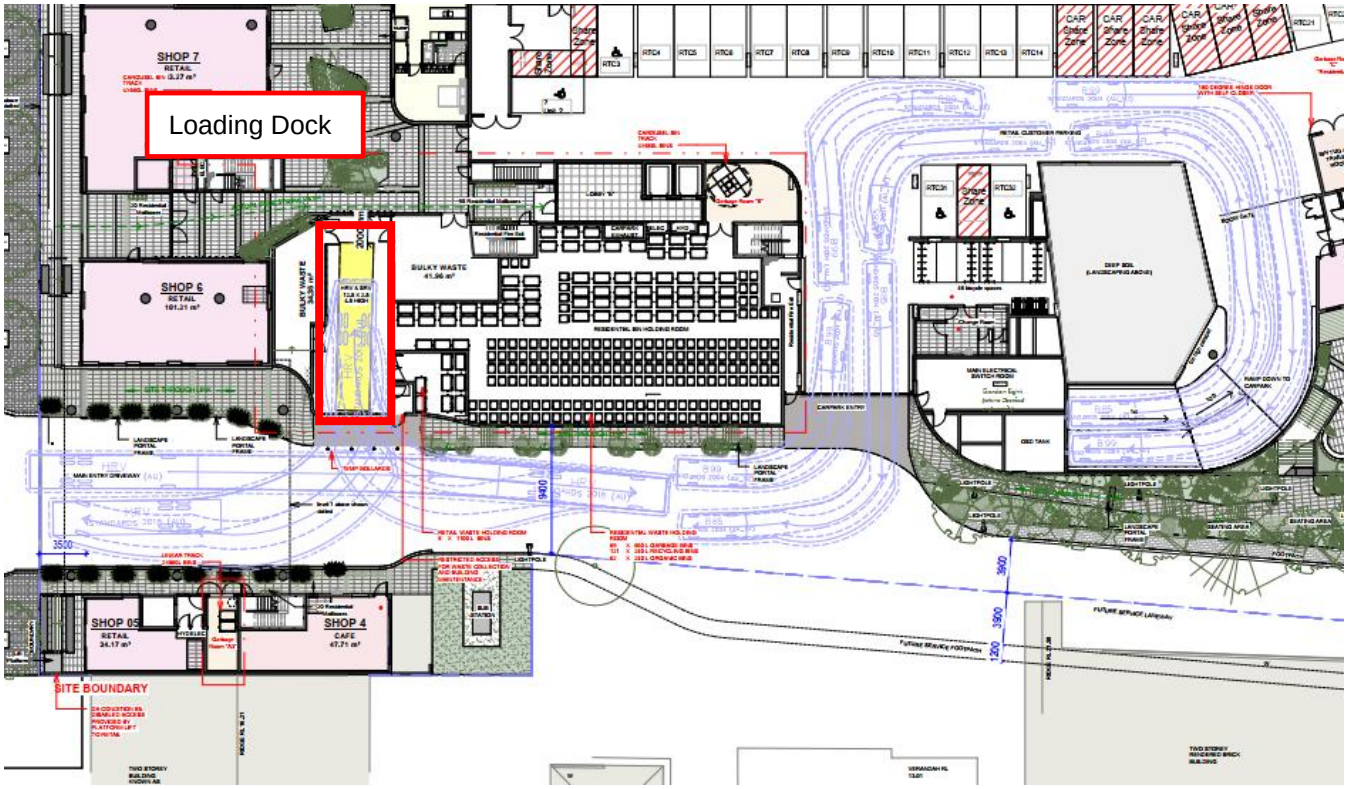
5.2 Predicted Noise Assessment

At this stage there is no information on the specific tenancies that will operate on site, the noise assessment focuses on the noise emissions from the operation of the loading dock.

Calculations of the noise levels from the operation of the proposed loading dock has been conducted from operations of similar size development. Calculations take into account factors such as distance, shielding from buildings and barriers

The location of the loading dock is presented in figure below.

Figure 5-1 Loading Dock Location



Predictive resultant noise levels have been calculated for the operation of the loading dock. Noise emissions at the nearest residential receivers are presented in the table below. The predicted noise calculations take into account the following:

Loading Dock

- A maximum of 1 trucks load/unload in a 15 minute period in the loading dock
- Loading dock is enclosed
- Trucks/Vehicles reversing into the dock with reversing alarms present
- The loading dock operate during the day and evening periods
- Resulting noise levels have been calculated to the most affected point on the boundary of the affected receivers.

Table 5-2 Predicted Noise Levels At Sensitive Receivers

Receiver	Period	Calculated Noise Level L_{Aeq} – dB(A)	Criteria	Compliance
R1	Day	18	55	Yes
	Evening	18	55	Yes
	Night	n/a	43	Yes
R2 (Unit 142 of proposed development)	Day	38	55	Yes
	Evening	38	55	Yes
	Night	n/a	43	Yes
C2	All	20	68	Yes
C3	All	22	68	Yes
C4	All	20	68	Yes
C5	All	20	68	Yes
C6	All	19	68	Yes
C7	All	29	68	Yes
C8	All	32	68	Yes

The operation of the loading dock complies with the established noise criteria. No further noise control measures are required.

6 RECOMMENDATIONS

The operation of the mechanical plant servicing the proposed residential development been assessed to comply with the project specific noise criteria with the implementation of the following noise controls:

- Carpark Exhaust & Supply Fans are fitted with a silencer for the discharge. The Silencer should have a Transmission Loss no less than the recommended Transmission Loss:

Description	CPEF Silencer Transmission Loss							
	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
CPEF-L1-01	13	20	33	39	41	28	22	16
CPSF-B1-01	4	6	9	12	12	11	9	9

- CPEF-B-01 inlet duct must be fitted with at least 15 metre of 50mm f/g internal lining between CPEF-B-01 and each inlet duct.
- CPEF-B-01 outlet duct must be fitted with at least 10 metres of 50mm f/g internal lining between CPEF-B-01 and the outlet duct

- CPEF-R-01 inlet duct must be fitted with at least 15 metre of 50mm f/g internal lining between CPEF-R-01 and each inlet duct.
- The entire CPEF-R-01 outlet duct must be fitted with 50mm f/g internal lining
- The entire CPEF-R-02 outlet duct must be fitted with 50mm f/g internal lining
- CPEF-R-02 inlet duct must be fitted with at least 15 metre of 50mm f/g internal lining between CPEF-R-02 and each inlet duct.
- CPEF-L1-01 inlet duct must be fitted with at least 8 metre of 50mm f/g internal lining between CPEF-L1-01 and each inlet duct.
- CPSF-B1-01 outlet duct must be fitted with at least 5 metre of 50mm f/g internal lining between CPSF-B1-01 and each outlet duct.
- The entire CPSF-B1-01 inlet duct must be fitted with 50mm f/g internal lining
- CPEF-B1-02 outlet duct must be fitted with at least 15 metre of 50mm f/g internal lining between CPEF-B1-02 and each inlet duct.
- CPEF-B1-02 inlet duct must be fitted with at least 15 metre of 50mm f/g internal lining between CPEF-B1-02 and each inlet duct.
- All AC units located on the northern balconies are to operate on night/quiet mode during the night period (10pm to 7am).
- All AC units are to be installed on the floor and not mounted on the wall. In addition to this, all AC units are to have resilient padding underneath.
- All duct between Fan Coil Units (FCU) and internal outlet should be fitted with 50mm f/g internal lining.

7 CONCLUSION

RSA has conducted a noise impact assessment of the proposed multi-storey residential development 46 – 54 Court Road Fairfield. This report addresses the noise from and to the development site as requested by the RFI sent by Fairfield City Council.

This revision the report addresses the following amendments to the proposed development:

- Noise impact from the surrounding classified road to the additional levels. This report addresses the road traffic noise impacts from Court Road and The Horsley Drive on the amenity of the proposed additional levels. The assessment has been conducted as per the requirements of The *NSW Government's State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP (Transport and Infrastructure) 2021)*.
- Noise from the operation of the revised service and truck loading area has been conducted as per the requirements of *NSW EPA Noise Policy for Industry*.
- Noise from the revised mechanical plants on the roof top has been conducted as per the requirements of *NSW EPA Noise Policy for Industry*.

The assessment has comprised the review of proposed wall types and comparison with the requirements in Part F7 of the National Construction Code, review of the mechanical plans and assessment of the road traffic noise impact on the proposed development.

Section 6 provides mechanical noise control measures required to satisfy the relevant noise criteria.

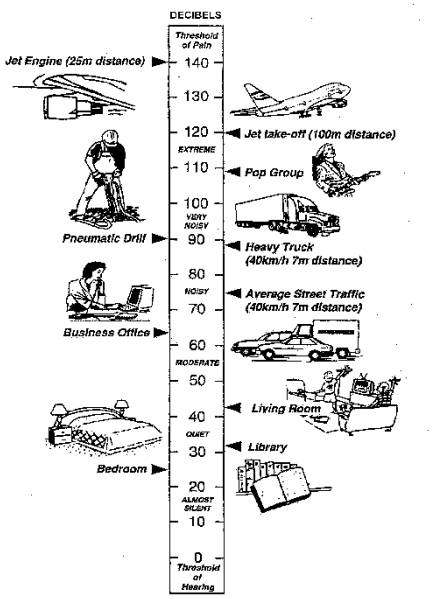
Section 3.6.3 provides a revised noise impact assessment to the additional levels.

The proposed multi-residential development at Level 33 Property Development Group Sydney, is deemed comply with the NCC/BCA Part F7 requirements, internal noise limits and noise emission criteria (NPfI project trigger as presented in Table 4-1), provided the noise control measures recommended in this report are implemented. It is therefore recommended that planning approval be granted for the proposed development on the basis of acoustics.

Appendix A – Acoustic Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic '*A-weighting*' frequency filter is applied to the measured sound level *dB(A)* to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content) character of the environment (e.g. very quiet suburban, suburban, urban, near industry) miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations) human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: Noise mitigation benefits (amount of noise reduction provided, number of people protected). Cost of mitigation (cost of mitigation versus benefit provided). Community views (aesthetic impacts and community wishes). Noise levels for affected land uses (existing and future levels, and changes in noise levels).

Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.
Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10th percentile min L_{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa. The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound power Level (SWL)

The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in *dB(A)*.

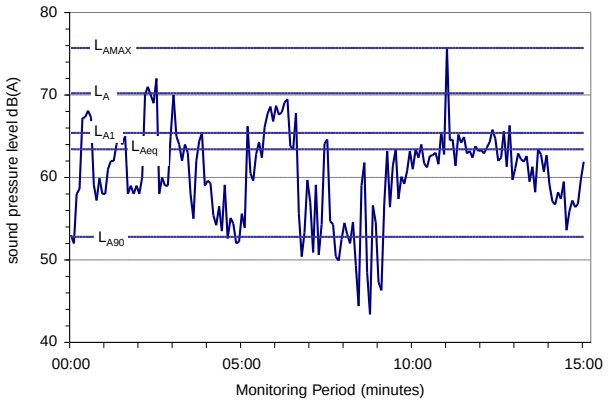
Sound Pressure Level (SPL)

The level of noise, usually expressed as SPL in *dB(A)*, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in *dB(A)* gives a close indication of the subjective loudness of the noise.

Statistic noise levels

Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

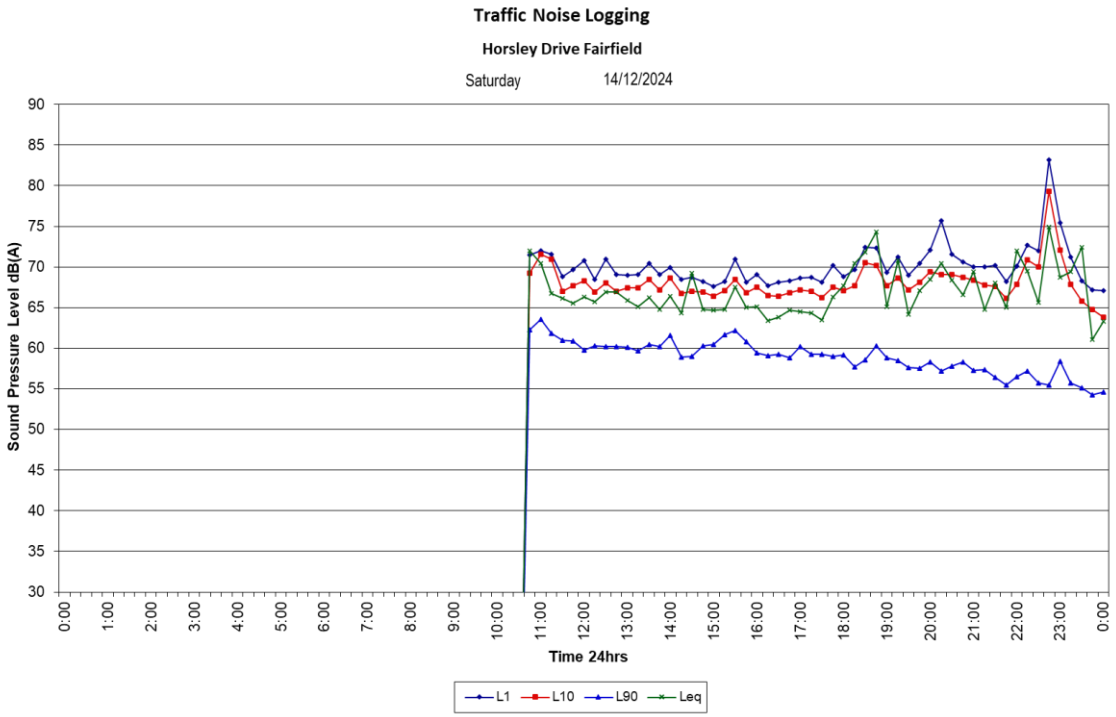
A hypothetical example of A weighted noise levels over a 15 minute measurement period is indicated in the following figure:

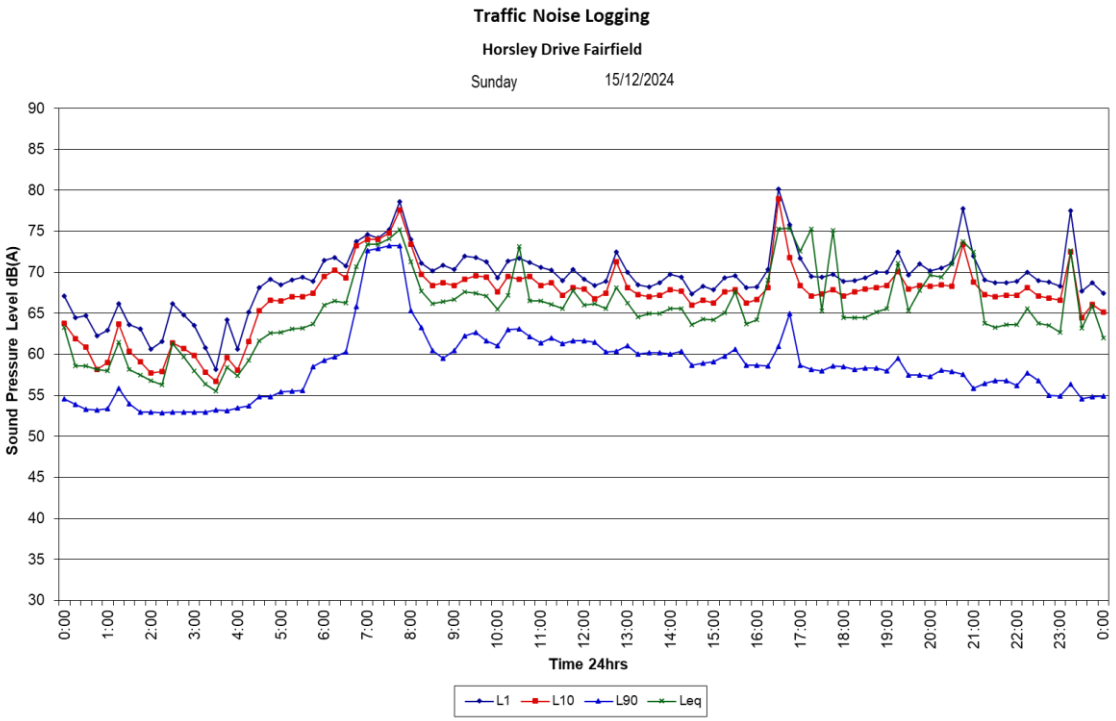


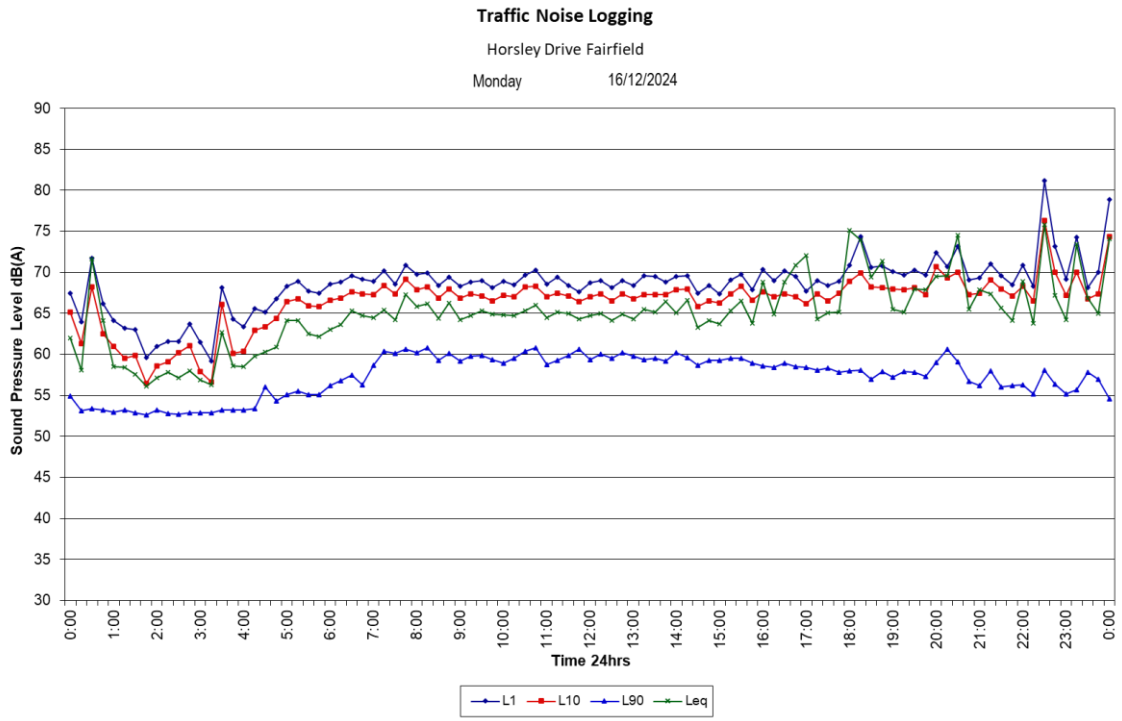
Key descriptors:

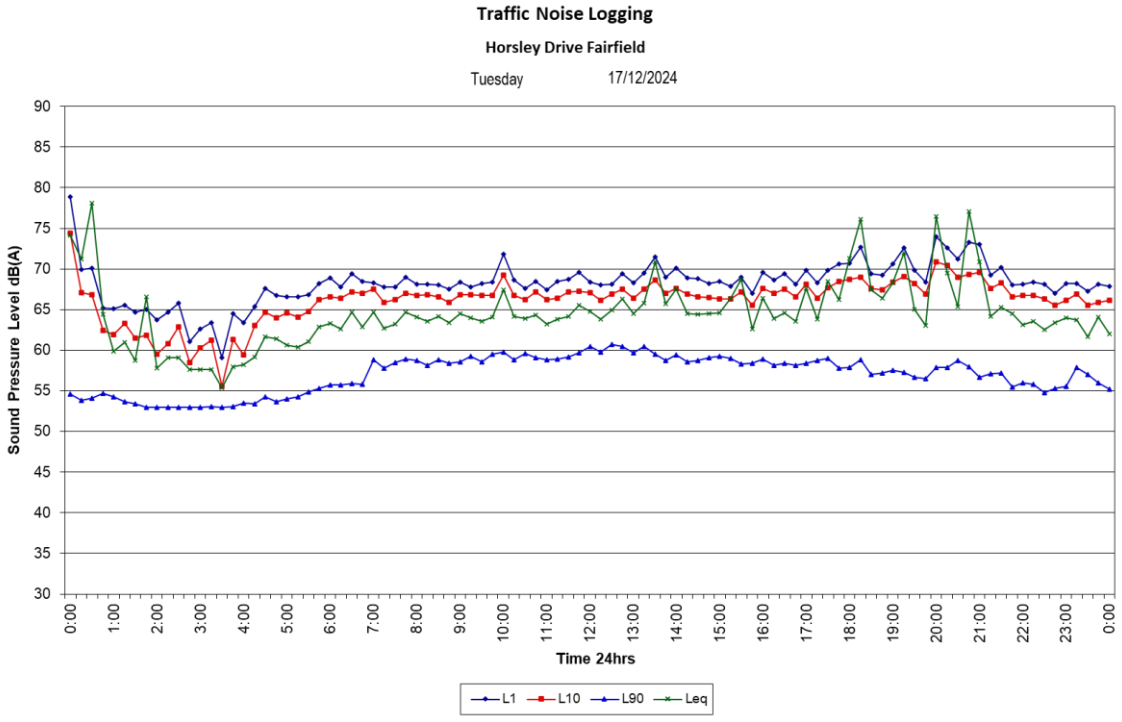
	L_{Amax} Maximum recorded noise level.
	L_{A1} The noise level exceeded for 1% of the 15 minute interval.
	L_{A10} Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level.
	L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.
	L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).
Threshold	The lowest sound pressure level that produces a detectable response (in an instrument/person).
Tonality	Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

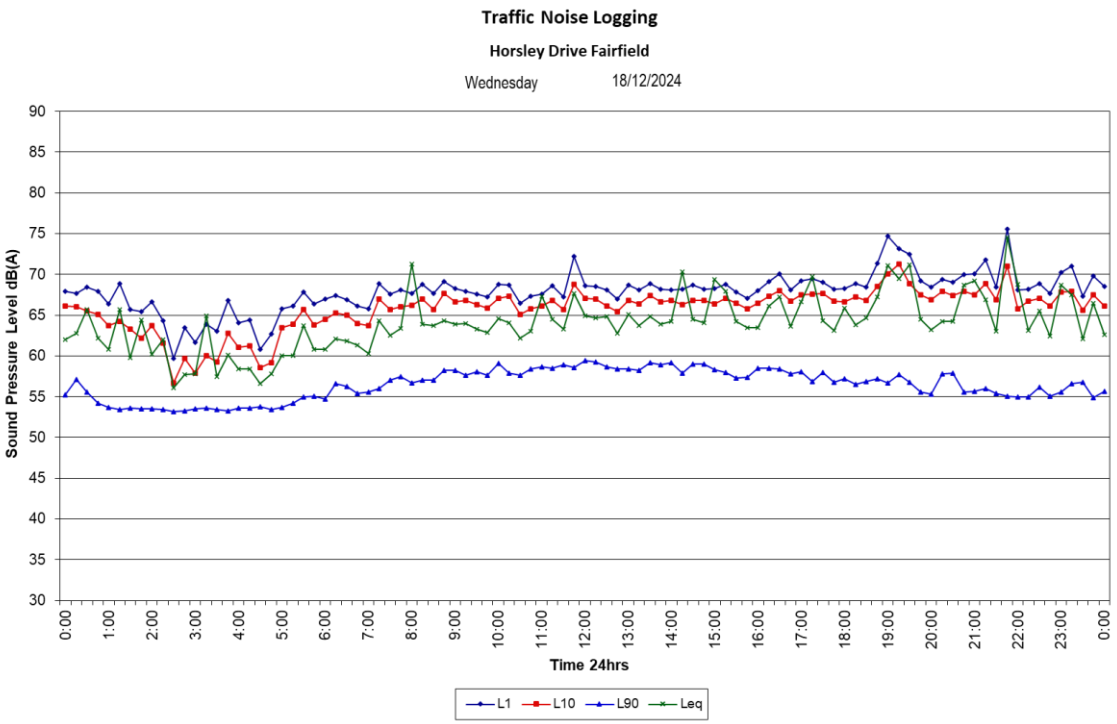
Appendix B – Logging Graph

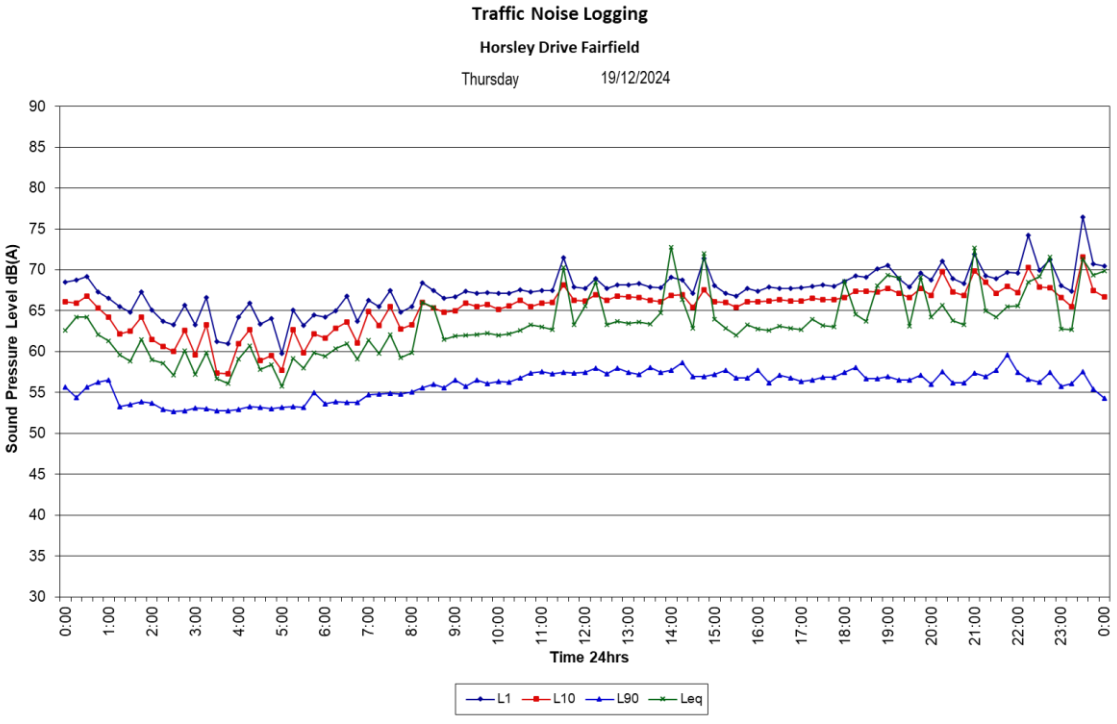


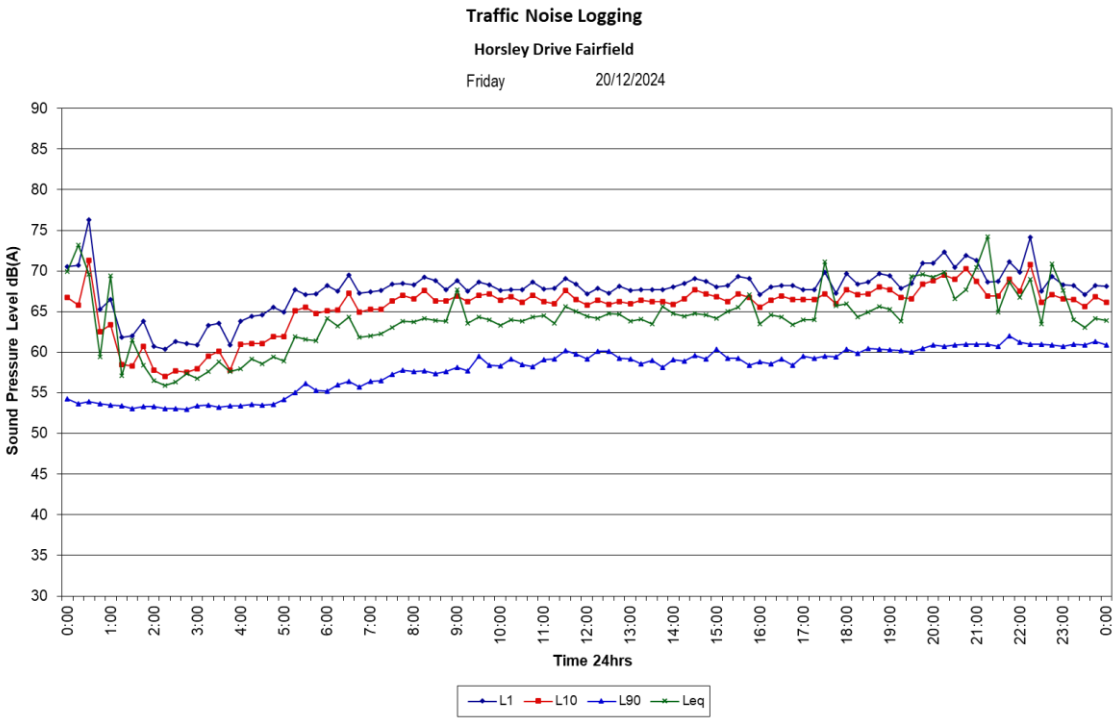


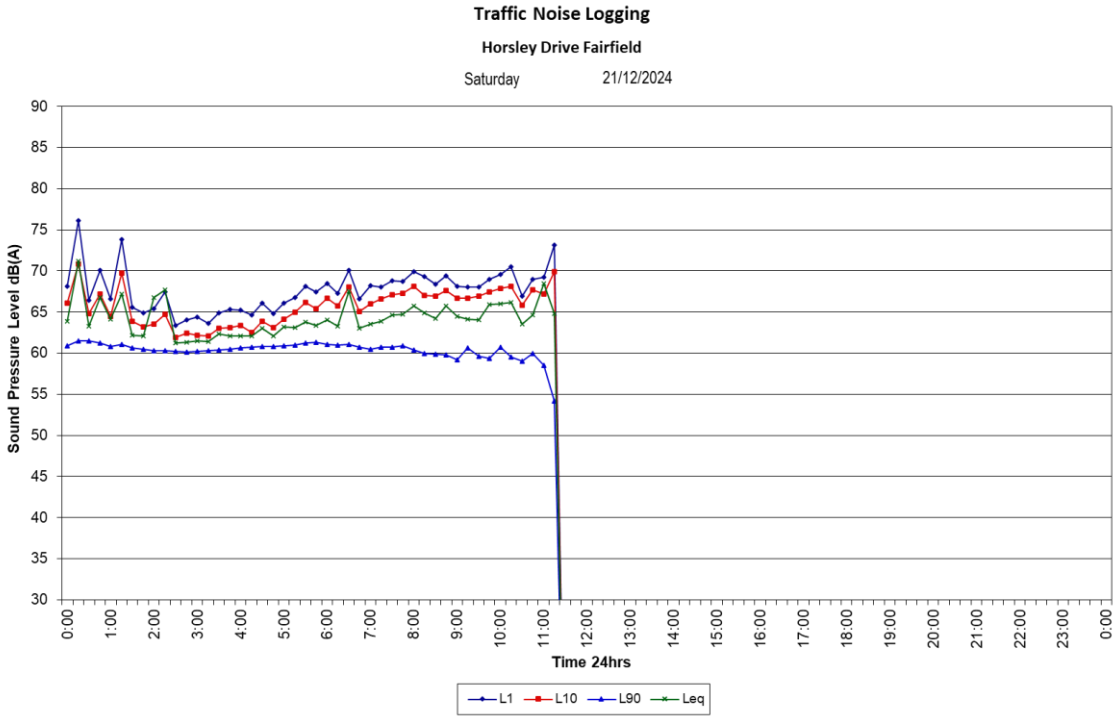

Traffic Noise Logging
Horsley Drive Fairfield
Monday 16/12/2024
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Traffic Noise Logging
Horsley Drive Fairfield
Tuesday 17/12/2024
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Traffic Noise Logging
Horsley Drive Fairfield
Wednesday 18/12/2024
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time 24hrs
L1 L10 L90 Leq


Traffic Noise Logging
Horsley Drive Fairfield
Thursday 19/12/2024
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time 24hrs
L1 L10 L90 Leq


Traffic Noise Logging
Horsley Drive Fairfield
Friday 20/12/2024
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq


Traffic Noise Logging
Horsley Drive Fairfield
Saturday 21/12/2024
Sound Pressure Level dB(A)
Time 24hrs
L1 L10 L90 Leq

Appendix C – Calibration Certificate

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C23782

Client Details	Rodney Stevens Acoustics Pty Ltd PO Box 522 Wahroonga NSW 2076
Equipment Tested/ Model Number :	NL-42EX
Instrument Serial Number :	00572559
Microphone Serial Number :	170370
Pre-amplifier Serial Number :	72880
Firmware Version :	2.0

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	23.5 °C	**Ambient Temperature :**	24.4 °C
Relative Humidity :	45.1 %	**Relative Humidity :**	43.1 %
Barometric Pressure :	100.17 kPa	**Barometric Pressure :**	100.09 kPa

Calibration Technician :	Max Moore	**Secondary Check:**	Emanuel Eid
Calibration Date :	30 Oct 2023	**Report Issue Date :**	30 Oct 2023

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*N/A*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13 dB*	*Temperature*	*±0.1 °C*
1kHz	*±0.13 dB*	*Relative Humidity*	*±1.9 %*
8kHz	*±0.14 dB*	*Barometric Pressure*	*±0.11 kPa*
Electrical Tests	*±0.13 dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

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Sound Level Meter
IEC 61672-3:2013
Calibration Test Report

Calibration Number C23782

Client Details	Rodney Stevens Acoustics Pty Ltd PO Box 522 Wahroonga NSW 2076
Equipment Tested/ Model Number :	NL-42EX
Instrument Serial Number :	00572559
Microphone Serial Number :	170370
Pre-amplifier Serial Number :	72880
Firmware Version :	2.0

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	23.5 °C	**Ambient Temperature :**	24.4 °C
Relative Humidity :	45.1 %	**Relative Humidity :**	43.1 %
Barometric Pressure :	100.17 kPa	**Barometric Pressure :**	100.09 kPa

Calibration Technician :	Max Moore	**Secondary Check:**	Emanuel Eid
Calibration Date :	30 Oct 2023	**Report Issue Date :**	30 Oct 2023

Approved Signatory :  Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*N/A*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

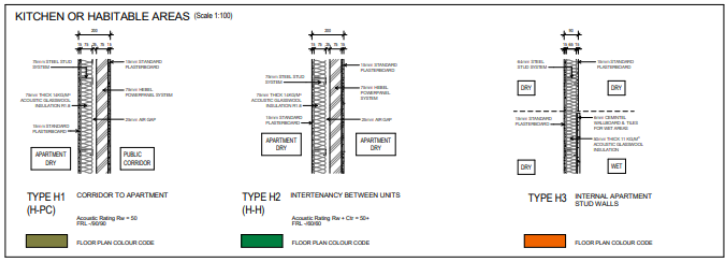
However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

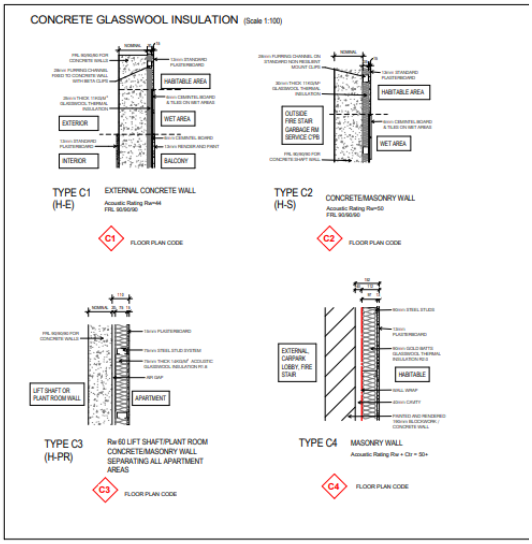
Uncertainties of Measurement -

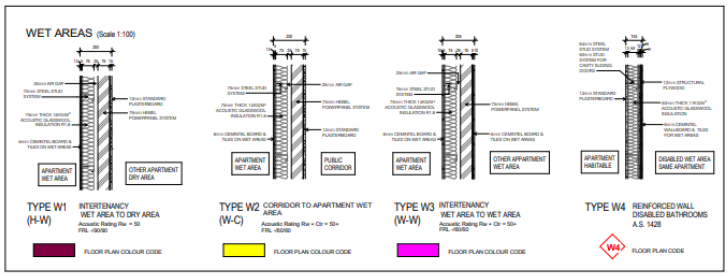
Acoustic Tests		Environmental Conditions	
125Hz	*±0.13 dB*	*Temperature*	*±0.1 °C*
1kHz	*±0.13 dB*	*Relative Humidity*	*±1.9 %*
8kHz	*±0.14 dB*	*Barometric Pressure*	*±0.11 kPa*
Electrical Tests	*±0.13 dB*		

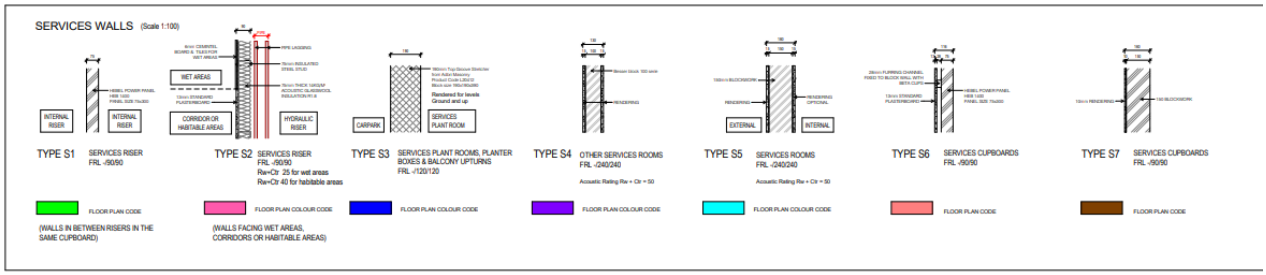
All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

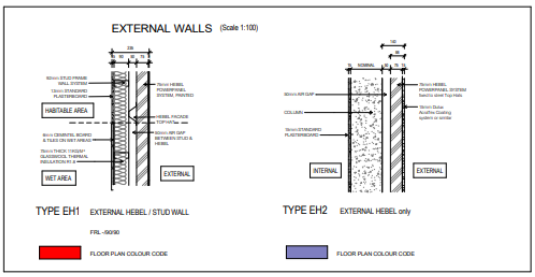
Appendix D – Wall Types











THIS DRAWING SHALL BE READ IN CONJUNTION WITH THE FOLLOWING DOCUMENTS:

1- FIRE ENGINEERING REPORT
2- BASIX REPORT
3- SECTION J REPORT
4- ACOUSTIC REPORT
5- WATERPROOFING SPECIFICATIONS
6- THERMAL INSULATION SPECIFICATIONS
7- ACOUSTIC INSULATION SPECIFICATIONS
8- FIRE COMPARTMENTATION PLANS