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Citify & BFC Pty Ltd

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Regency Park, South Australia, 5007, Australia

24 May 2019

Ref: 50B-17-0128-DRP-8950037-2

Attention: Joel Wilkinson

Dear Joel,

248 Unley Road Hyde Park Acoustics – Minister's Specification SA 78B Assessment

1 INTRODUCTION

Vipac Engineers & Scientists Pty Ltd was engaged to undertake an assessment of road traffic noise impacts on a proposed residential development (the development) at 248 Unley Road, Hyde Park SA. The development will comprise 59 apartments over 6 levels (first to sixth floors), in addition to commercial/retail uses at ground and first floor level and six townhouses at the rear of the site.

This report provides details of an assessment of road traffic noise impacts on the proposed development against the Unley Council Development Plan [1] and Minister's Specification SA 78B (SA 78B) [3] and provides an overview of the required acoustic performance of the building envelope in accordance with SA 78B. In addition, recommendations regarding construction to meet the acoustic performance are provided.

A glossary of acoustic terminology is presented in Appendix A.

2 REFERENCES

- [1] Unley Council Development Plan (consolidated 19 December 2017), Department of Planning, Transport and Infrastructure (2017).
- [2] Development Regulations 2008 (Version 1.7.2018), Government of South Australia (2018).
- [3] Ministers Specification SA 78B Construction Requirements for the Control of External Sound, Government of South Australia (2013).
- [4] National Construction Code 2016, Australian Building Codes Board (2016).
- [5] Australian Standards AS 1666.2-2012 "The use of ventilation and airconditioning in buildings, Part 2: Mechanical ventilation in buildings", Standards Australia (2012).
- [6] Development plan consent drawings, prepared by Gemma Lea Design Studio, received 27/09/2018.
- [7] Architectural drawings, provided by Gemma Lea Design Studio, received 09 May 2019.

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3 ASSESSMENT CRITERIA

3.1 NOISE AND AIR EMISSIONS OVERLAY

The subject site is located within a 'Designated Area' adjacent to a 'Designated Road: Type B Road' as indicated by the 'Noise and Air Emissions Overlay' map provided in the Unley Council Development Plan (consolidated 19 December 2017) [1].

Regulation 78B of the *Development Regulations 2008 (SA)* [2] requires Class 1,2,3,4 or 9c buildings within a sound affected area as designated by the Noise and Air Emissions Overlay in the relevant Development Plan to comply with Minister's Specification SA 78B [3].

3.2 MINISTERS SPECIFICATION SA 78B

The purpose of Minister's Specification SA 78B [3] is to protect occupants of Class 1, 2, 3 and 4 buildings and 9c aged care buildings (as defined in the National Construction Code) from the impact of existing or future road and rail noise (in addition to noise from mixed land use areas).

Section B3 of SA 78B outlines performance requirements for the building envelope to provide sufficient acoustic amenity to the occupants and protect against the intrusion of noise from these noise sources. The internal noise criteria for road and rail noise intrusion are presented in Table 3-1 below.

Table 3-1: Internal noise criteria for road and rail sound intrusion

Internal sound criteria			
Type of room	Building design target averaged over the total number of such rooms in the building	Maximum allowable for individual rooms in the building	Applicable time period
Bedroom	30dB(A) $L_{eq, 9hr}$ (transport)	35dB(A) $L_{eq, 9hr}$ (transport)	Night (10pm to 7am)
Other <i>habitable room</i> , other than a bedroom	35dB(A) $L_{eq, 15hr}$	40dB(A) $L_{Aeq, 15hr}$	Day (7am to 10pm)

The above internal noise criteria may be achieved by demonstrating compliance with the 'Deemed to Satisfy' (DTS) provisions described by Part C of SA 78B. The deemed to satisfy solution for a particular development is based on the Sound Exposure Category (SEC), determined based on the noise source to which the development will be exposed (Type A, B or R road; or rail corridor) and the distance of the development from the noise source.

Unley Road is identified as a Type B Road by the Noise and Air Emissions overlay map contained in the Unley Council Development Plan [1]. As such the Sound Exposure Categories relevant to the development are shown in Table 3-2 below:

Table 3-2: Sound Exposure Categories for Type B roads

Separation distance from the road (m)	Sound Exposure Category (SEC)
<10m	4
10 – 20m	3
20 – 35m	2
35 – 60m	1
>60m	N/A

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The building envelope of the proposed development is located between 4 and 70 metres from Unley Road (type B road). As such, Sound Exposure Categories (SECs) 1- 4 are applicable to the development (facades not exposed to road traffic noise such as the western facade are subject to a SEC one less than the adjacent exposed facade).

4 ASSESSMENT

4.1 SOUND EXPOSURE CATEGORIES

The Sound Exposure Categories (SECs) and the required acoustic performance for windows/glazed doors (in terms of $R_w + C_{tr}$) that apply to the subject development are shown in Appendix A.

4.2 REQUIRED ACOUSTIC PERFORMANCE

Based on the Sound Exposure Categories (SECs) outlined in Table 3-2 above, the following acoustic performance is required for the building envelope for rooms identified as SEC 1 – 4 in Appendix A.

Table 4-1: Minimum airborne sound attenuation ratings (R_w and $R_w + C_{tr}$) for habitable rooms

Sound Exposure Category (SEC):	Building element:	Acoustic requirements:
1	External walls:	$R_w + C_{tr} \geq 45$ for all habitable rooms
	Windows and external glazed doors:	Refer to Table 4-2
2	Ground Floor:	$R_w + C_{tr} \geq 50$ for all habitable rooms
	External walls:	$R_w + C_{tr} \geq 50$ for all habitable rooms
	Windows and external glass doors:	Refer to Table 4-2
	External doors other than external glass doors:	$R_w \geq 27$ (for all habitable rooms)
	Roof and Ceiling:	$R_w + C_{tr} \geq 35$ for bedrooms
3	Ground Floor:	$R_w + C_{tr} \geq 50$ for all habitable rooms
	External walls	$R_w + C_{tr} \geq 50$ for all habitable rooms
	Windows and external glass doors:	Refer to Table 4-2
	External doors other than external glass doors:	$R_w \geq 30$ for all habitable rooms
	Roof and Ceiling:	$R_w + C_{tr} \geq 40$ for bedrooms $R_w + C_{tr} \geq 35$ for all other habitable rooms
4	Ground Floor:	$R_w + C_{tr} \geq 50$ for all habitable rooms
	External walls:	$R_w + C_{tr} \geq 50$ for all habitable rooms
	Windows and external glass doors:	External glass doors not permitted in bedrooms See Table 4-2
	External doors other than external glass doors:	$R_w \geq 30$ for all habitable rooms
	Roof and Ceiling	$R_w + C_{tr} \geq 45$ for bedrooms $R_w + C_{tr} \geq 40$ for all other habitable rooms

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Table 4-2: Minimum airborne ($R_w + C_{tr}$) requirements for closed windows and external glass doors to habitable rooms

Room	Area of window and external glass doors as a percentage of the floor area of the room	Designated Sound Exposure Category (SEC)			
		1	2	3	4
Bedrooms, and <i>non-habitable</i> rooms attached to bedrooms (e.g. ensuites, walk-in wardrobes)	$\leq 20\%$	25	28	31	34
	20% - 40%	28	31	34	**
	40% - 60%	31	34	**	**
	60% - 80%	34	**	**	**
	$\geq 80\%$	37	**	**	**
Habitable rooms, other than bedrooms and enclosed kitchens, and attached <i>non-habitable</i> rooms (e.g. pantries)	$\leq 20\%$	22	25	28	31
	20% - 40%	25	28	31	34
	40% - 60%	28	31	34	**
	60% - 80%	31	34	**	**
	$\geq 80\%$	34	**	**	**

Note that glazing indicated by ** in Table 4-2 above is beyond the scope of the 'Deemed to Satisfy' provisions of SA 78B [3]. Further discussion is provided in Section 4.3.3.

4.3 CONSTRUCTION REQUIREMENTS

Based on the indicative construction detailed in the provided drawings ([6] and [7]), the following recommendations are made regarding construction materials and methods to achieve compliance with acoustic requirements outlined above and hence the Minister's Specification SA 78B [3]:

4.3.1 WALLS

Based on the provided drawings [7], Vipac understands that the building façade will be constructed from the following wall types:

- Construction **C1** – WT1 comprising 150mm precast concrete panels lined with WT6 (comprising 92mm steel studs separated by 25mm airgap, internally lined with 10mm plasterboard and with cavity infill of 90mm R2.5 Glasswool insulation).
- Construction **C2** – WT1 comprising 150mm precast concrete panels lined with WT5 (comprising 92mm steel studs, internally lined with 10mm plasterboard and with cavity infill of R2.0 Glasswool insulation).
- Construction **C3** – WT2 comprising 200mm precast concrete panels lined with WT6 (comprising 92mm steel studs separated by 25mm airgap, internally lined with 10mm plasterboard and with cavity infill of 90mm R2.5 Glasswool insulation).

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- Construction **C4** – WT2 comprising 200mm precast concrete panels lined with WT5 (comprising 92mm steel studs, internally lined with 10mm plasterboard and with cavity infill of R2.0 Glasswool insulation).
- Construction **C5** – WT4 comprising 75mm Hebel, 50mm top hats, 92mm steel studwork with 2 layers of 16mm Fyrchek plasterboard lining, with 90mm R2.5 Glasswool insulation in the cavity and foil-backed sisilation fixed to the studs.

In order to ensure the required acoustic performance of $R_w + C_{tr} \geq 50$ is achieved, the following is recommended:

Table 4-3: Predicted acoustic performance – Walls

Construction	Wall System	Required Performance $R_w + C_{tr}$	Predicted Performance $R_w + C_{tr}$	Compliance
C1	WT1 + WT6	50	64	<i>Complies</i>
C2	WT1 + WT5	50	58	<i>Complies</i>
C3	WT2 + WT6	50	66	<i>Complies</i>
C4	WT2 + WT5	50	60	<i>Complies</i>
C5	WT4	50	56	<i>Complies</i>

General Recommendations:

- Wall construction

Sheeting materials, such as plasterboard or the like, must be installed as follows –

 - If two layers are required, the second layer must be fastened over the first layer so that the joints do not coincide with those of the first layer; and
 - Have all joints, between sheets or between sheets and any adjoining construction, taped and filled solid.
- Penetrations & openings

Penetrations through parts of the building envelope subject to a Sound Exposure Category (SEC) must meet the following:

 - Where a part of the building envelope has a sound exposure category, any plant or service, such as an air-conditioning unit, ventilation device or ductwork that pass through that part, or any permanent opening in that part, must not diminish the $R_w + C_{tr}$ of the part.
 - Penetrations of the building envelope by pipes, ducts, or conduits or the like must have all gaps caulked or filled with mortar.

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4.3.2 ROOF AND CEILING

Based on the provided drawings [7], only apartments on Level 6 (6.01, 6.02, 6.03 & 6.04) are exposed to road traffic noise via the roof (all remaining apartments are either partially or entirely beneath other apartments, or balconies).

As all Level 6 apartments fall within Sound Exposure Category (SEC) 1 or below (see Appendix A), no specific requirements apply under SA 78B [3] for the roof/ceiling system above this level.

However; as apartment 1.01 (studio apartment) falls within SEC 3 and is exposed to road traffic noise via the roof, the roof/ceiling system above this apartment must meet $R_w + C_{tr} \geq 40$. In accordance with the provisions of SA 78B, the following is recommended:

- Sheet metal roofing which complies with the National Construction Code (NCC, [4]).
- 165mm glass wool or rock wool insulation having a minimum density of 7kg/m^3 or 185mm polyester insulation having a minimum density of 11kg/m^3 (as indicated in the drawings)
- Two layers of 10mm plasterboard or one layer of 16mm fire-rated plasterboard direct fixed to the underside of the ceiling joists (ceiling specification is not provided in the drawings).

4.3.3 EXTERNAL GLAZING (INCLUDING GLASS DOORS)

Please note that the specifications associated with the glazing construction are not provided at this stage. Therefore, to achieve the required $R_w + C_{tr}$ performance indicated in Appendix A, the following glazing configurations are recommended:

Table 4-4: Acceptable forms of construction for windows and external glass doors

Required acoustic performance:	Glazing type:	Acceptable form of construction:
$R_w + C_{tr} \geq 22$	Windows and external glass doors:	3mm thick monolithic or laminated glass with sliding or double hung opening
$R_w + C_{tr} \geq 25$	Windows:	3mm thick monolithic or laminated glass with awning type opening
	External glass doors:	5mm or 6mm thick monolithic or laminated glass sliding door
$R_w + C_{tr} \geq 28$	Windows:	6mm thick monolithic or laminated glass with sliding or double hung type opening
	External glass doors	5mm or 6mm thick monolithic or laminated glass sliding door
$R_w + C_{tr} \geq 31$	Windows:	6mm thick monolithic or laminated glass with awning type opening
	External glass doors:	10mm thick monolithic or laminated glass sliding door, or 5mm or 6mm thick monolithic or laminated glass side-hung door
$R_w + C_{tr} \geq 34$	Windows:	10mm thick monolithic or laminated glass with awning type opening
	External glass doors:	10mm thick monolithic or laminated glass side-hung door

Where fixed glazing is installed alternative ventilation should be provided meeting the requirements of the NCC [4]. This may require installation of mechanical ventilation or an air conditioning system complying with AS 1668.2-2012 [5].

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Windows and glass doors marked ** in Appendix A require an $R_w + C_{tr}$ greater than 34 and are therefore beyond the scope of the 'Deemed to Satisfy' provisions of SA 78B [3] (as discussed above). Vipac has therefore conducted a preliminary assessment of the required glazing configurations for these spaces in accordance with the verification method described by Section B5 of SA 78B. Based on this preliminary assessment, the following acoustic performance is required to ensure compliance with SA 78B:

- **Apartment 1.08:** East-facing bedroom to achieve on the order of $R_w + C_{tr}$ 37
- **Apartments 2.05:** East-facing bedroom to achieve on the order of $R_w + C_{tr}$ 36
- **Apartments 3.05 and 3.06:** East-facing bedrooms to achieve on the order of $R_w + C_{tr}$ 37
- **Apartments 4.06:** east facing bedroom to achieve on the order of $R_w + C_{tr}$ 37

As the required $R_w + C_{tr}$ performance outlined above is very high, specialised glazing is likely to be required. Glazing units which have been tested and verified by the manufacturer to meet the relevant $R_w + C_{tr}$ rating outlined above should therefore be selected.

4.3.4 VENTILATION

For Sound Exposure Categories 1-3, SA 78B requires that natural ventilation be provided in accordance with F4.6 and F4.7 of Volume One and 3.8.5.2 of Volume Two of the National Construction Code (NCC) [4]. If mechanical ventilation is provided in conjunction with openable windows for SEC 1-3, then the system must have a minimum rating of R_w 40.

5 SUMMARY

An assessment of road traffic noise impacts on a proposed residential development (the development) at 248 Unley Road, Unley SA was undertaken against the Unley Council Development Plan [1] and Minister's Specification SA 78B [3]. Details of the required acoustic performance of the building envelope have been provided, in addition to recommendations regarding glazing construction to meet the acoustic performance.

On the basis of the assessment, it is considered that the proposed development will be able to be constructed to meet the requirements of the Unley Council Development Plan [1] and Minister's Specification SA 78B [3].

Yours sincerely,

Vipac Engineers & Scientists Ltd



Saksham Garg

Acoustic Engineer

Author



Josh Heenan









Project Engineer

Reviewer

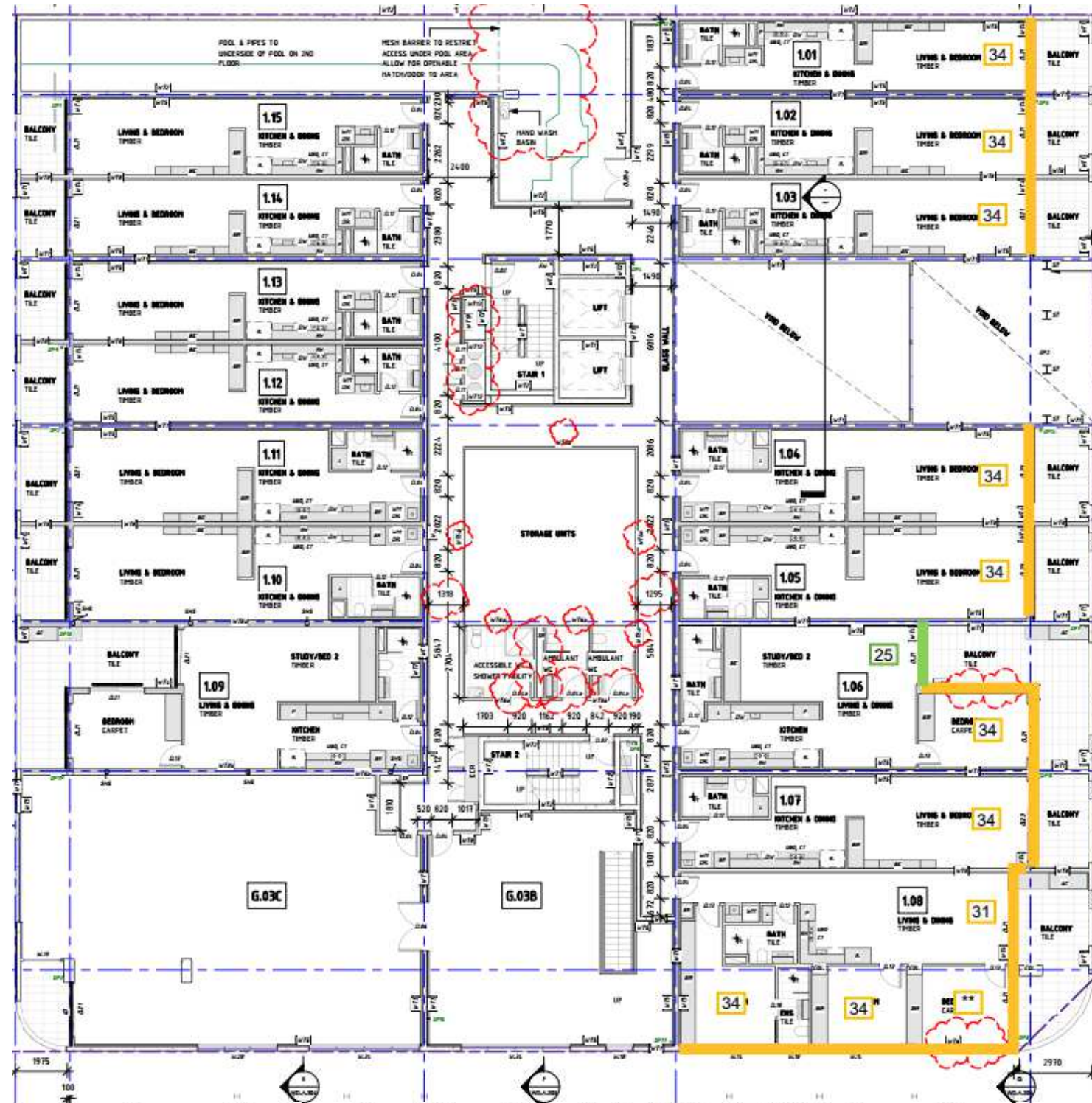
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Appendix A

Sound Exposure Categories & Glazing requirements

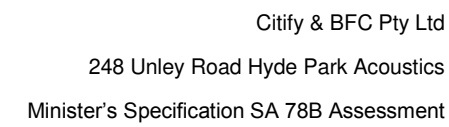
LEGEND:		Required Glazing Performance	
Sound Exposure Category (SEC)		$R_w + C_{tr}$	
SEC 1			xx
SEC 2			xx
SEC 3			xx
SEC 4			xx

Level 1



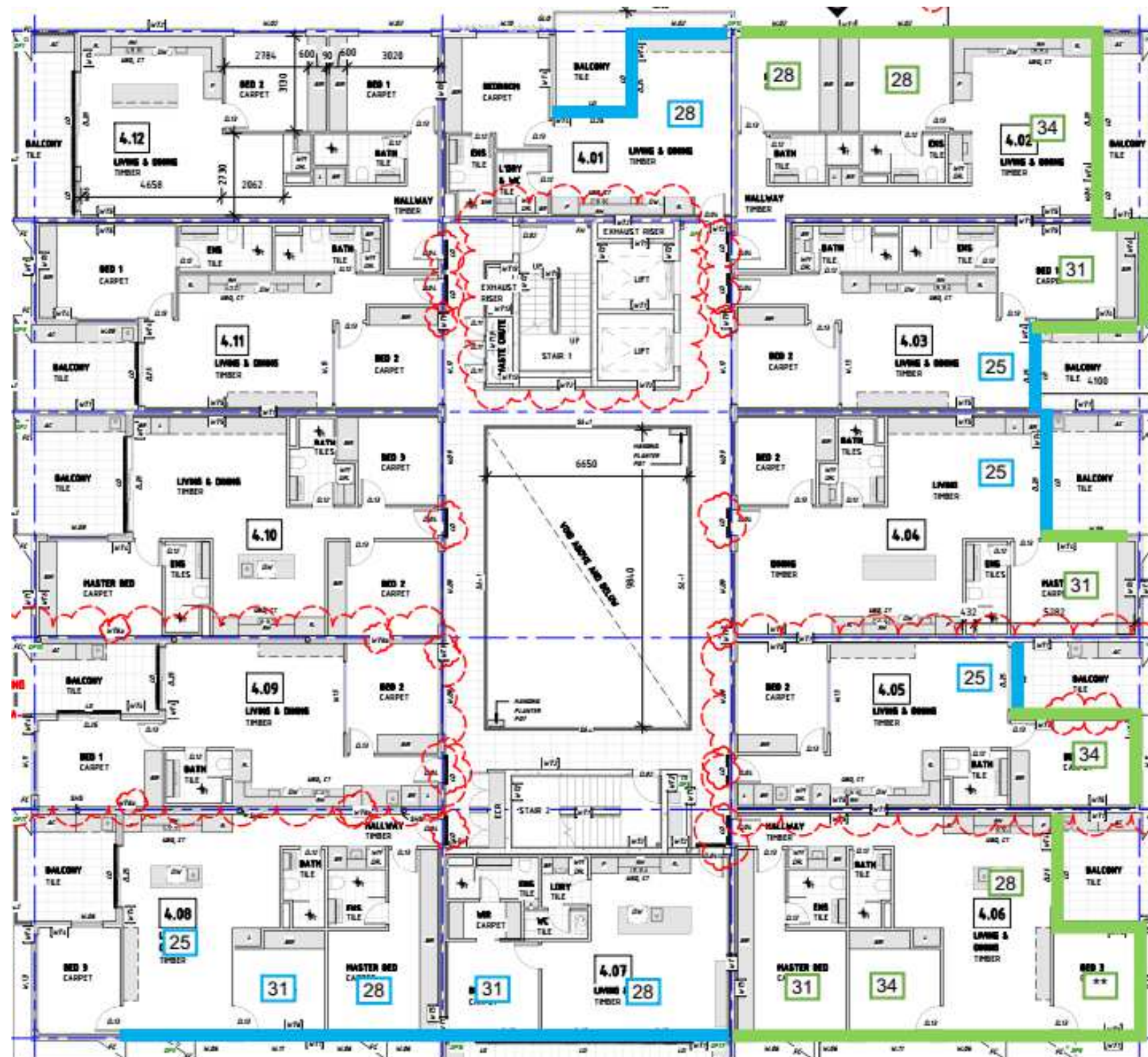
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Level 4

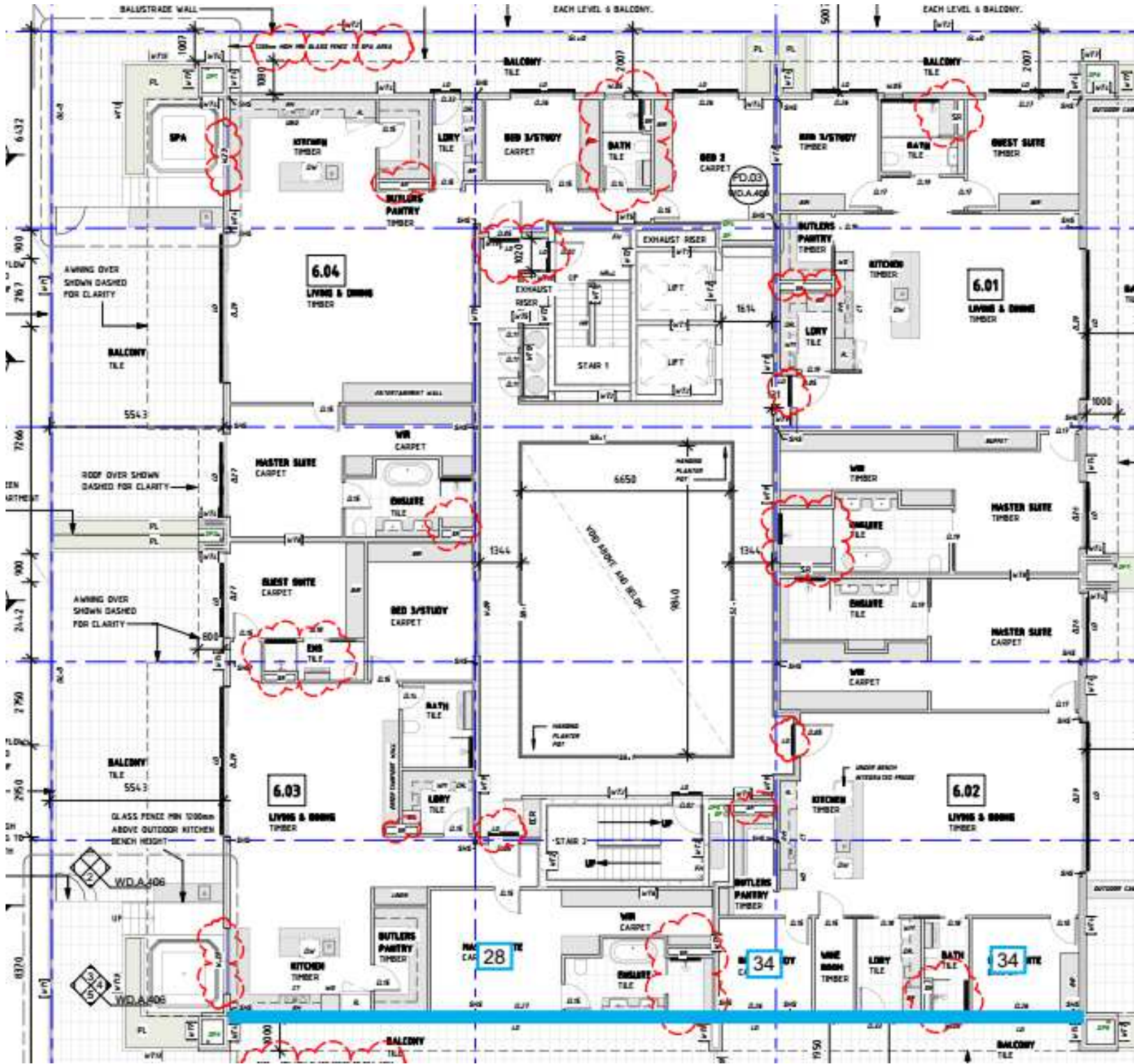


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This is a detailed architectural floor plan of a multi-unit residential building. The plan shows a central corridor system with multiple stairwells and elevator shafts. Units are arranged around this central core. Each unit is labeled with a number (e.g., 5.01, 5.02, 5.03, 5.04, 5.05, 5.06, 5.07, 5.08, 5.09, 5.10, 5.11, 5.12) and a color-coded border (blue, green, or red). The plan includes various rooms such as bedrooms (BED 1, BED 2, BED 3), living and dining areas, bathrooms, and balconies. A large central area is labeled 'STAIR 1' and 'STAIR 2'. A red dashed line outlines a specific area in the center of the plan, possibly indicating a common area or a specific unit. The plan also shows various doors, windows, and furniture placement. The overall layout is symmetrical, with units mirrored across the central corridor.

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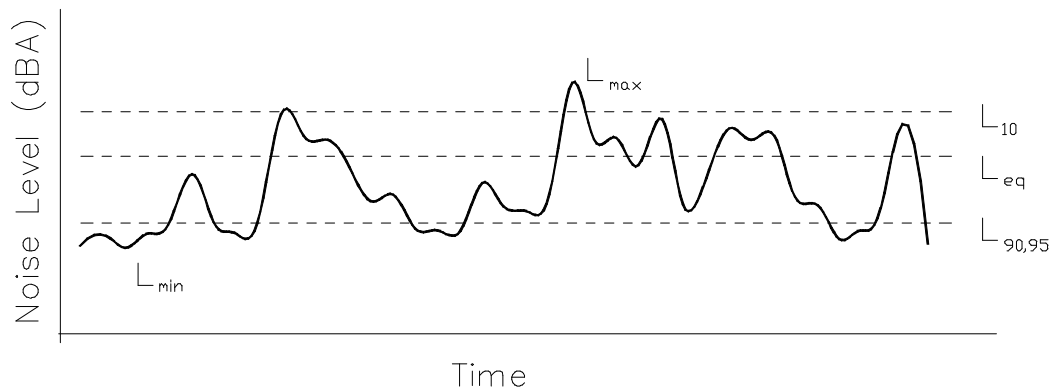
Level 6



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Appendix A GLOSSARY OF ACOUSTIC TERMINOLOGY

- dBA** A unit of measurement, decibels(A), of sound pressure level which has its frequency characteristics modified by a filter ("A-weighted") so as to more closely approximate the frequency response of the human ear.
- L₁₀** The noise level which is equalled or exceeded for 10% of the measurement period. L₁₀ is an indicator of the mean maximum noise level, and is used in Australia as the descriptor for intrusive noise [usually in dB(A)]. Nominal measurement period is usually 15 minutes.
- L₉₀** The noise level which is equalled or exceeded for 90% of the measurement period. L₉₀ or L₉₅ is an indicator of the mean minimum noise level, and is used in Australia as the descriptor for background or ambient noise [usually in dB(A)].
- L_{eq}** The equivalent continuous noise level for the measurement period, weighted for duration and intensity. L_{eq} is an indicator of the average noise level [usually in dB(A)].
- L_{max}** The maximum noise level for the measurement period [usually in dB(A)].



Note: The subjective response or reaction to changes in noise levels can be described as follows:

A 3dBA change in sound pressure level is just noticeable or perceptible to the average human ear; a 5dBA increase is quite noticeable and a 10dBA increase is typically perceived as a doubling in loudness.