

# HOMES NSW, CABRAMATTA WEST

## NCC Acoustic Report & Certification

6 February 2025

McGregor Westlake Architects

TN581-01F02 Acoustic NCC report and certification (r1)

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# 1 Introduction

Renzo Tonin & Associates were engaged to provide acoustic design advice and confirm compliance for elements required to comply with Part F7 of the National Construction Code - Building Code of Australia 2022. This includes separating partitions (including inter-tenancy walls and floors and the separation of services) for the proposed Senior Living Development at 10-16 Birdwood Avenue Cabramatta West to achieve compliance with the sound insulation provisions of the National Construction Code Building Code of Australia (NCC 2022). This report also provides recommendations on acoustic treatment of services and services penetration in sound-rated partitions.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

## 2 Criteria

### 2.1 NCC 2022 Requirements

#### *F7D3 Determination of airborne sound insulation ratings*

*A form of construction required to have an airborne sound insulation rating must –*

*have the required value for weighted sound reduction index ( $R_w$ ) or weighted sound reduction index with spectrum adaptation term ( $R_w + C_{tr}$ ) determined in accordance with AS/NZS 1276.1 or ISO 717.1 using results from laboratory measurements; or*

*comply with Specification 28.*

#### *F7D4 Determination of impact sound insulation ratings*

*1) A floor in a building required to have an impact sound insulation rating must –*

*a) have the required value for weighted normalised impact sound pressure level ( $L_{n,w}$ ) determined in accordance with AS/ISO 717.2 using results from laboratory measurements; or*

*b) comply with Specification 28*

*2) A wall in a building required to have an impact sound insulation rating must –*

*a) for a Class 2 or 3 building be of discontinuous construction;*

*3) For the purposes of this part, discontinuous construction means a wall having a minimum 20 mm cavity between 2 separate leaves, and*

*a) for masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and*

*b) for other than masonry, there is no mechanical linkage between leaves except at the periphery.*

#### *F7D5 Sound insulation rating of floors*

*1) A floor in a Class 2 or 3 building must have an  $R_w + C_{tr}$  (airborne) not less than 50 and an  $L_{n,w}$  (impact) not more than 62 if it separates –*

*a) sole-occupancy units; or*

*b) a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification.*

#### *F7D6 Sound insulation rating of walls*

*1) A wall in a Class 2 or 3 building must –*

*a) have an  $R_w + C_{tr}$  (airborne) not less than 50, if it separates sole-occupancy units; and*

*b) have an  $R_w$  (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification; and*

*c) comply with F7D4(2) if it separates:*

*(i) a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit; or*

*(ii) a sole-occupancy unit from a plant room or lift shaft.*

*2) A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like, provided the door assembly has an  $R_w$  not less than 30.*

*5) Where a wall required to have sound insulation has a floor above, the wall must continue to –*

*a) the underside of the floor above; or*

*b) a ceiling that provides the sound insulation required for the wall.*

#### *F7D7 Sound insulation rating of internal services*

*1) If a duct or 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, the duct or pipe must be separated from the rooms of any sole-occupancy unit by construction with an  $R_w + C_{tr}$  (airborne) not less than –*

*a) 40 if the adjacent room is a habitable room (other than a kitchen); or*

*b) 25 if the adjacent room is a kitchen or non-habitable room.*

*2) If a storm water pipe passes through a sole-occupancy unit it must be separated in accordance with (1)(a) and (b).*

#### *F7D8 Sound isolation of pumps*

*A flexible coupling must be used at the point of connection between the service pipes in a building and any circulating or other pump.*

Penetrations in the wall shall be acoustically treated to ensure that the wall  $R_w + C_{tr}$  rating is not diminished.

## 2.2 Sound insulation rating for walls required for this development

**Table 1 - Acoustic Criteria for Walls Separating Sole Occupancy Units**

Item		Acoustic Requirement
One Side of Occupancy	Other Side of Occupancy	NCC/BCA 2022 Requirement
Enclosed habitable room 1	Non-habitable room 2	Rw+Ctr 50
	Wet area 3	Rw+Ctr 50 & discontinuous construction
	Open-plan kitchen/living/dining and hallways	Rw+Ctr 50 & discontinuous construction
	Enclosed habitable room 1	Rw+Ctr 50
Open-plan kitchen/living/dining and hallways	Open-plan kitchen/living/dining and hallways	Rw+Ctr 50 & discontinuous construction
	Wet area 3	Rw+Ctr 50 & discontinuous construction
	Non-habitable room 2	Rw+Ctr 50
Wet area 3	Wet area 3	Rw+Ctr 50

Notes:

1. Enclosed habitable rooms include enclosed spaces such as bedrooms and studies, but not combined kitchens opening into living and dining areas.
2. Non-habitable rooms include hallways and corridors.
3. Wet areas include bathrooms, en-suites and laundries.

There is no criteria stipulated in the Building Code of Australia for walls separating an external area and apartments.

In addition, doors are located within external walls and not from an enclosed lobby. Therefore, there are no acoustic requirements for entrance doors to apartments within the development.

## 2.3 Sound Insulation Rating for Floors Required for this Development

**Table 2 - Minimum Sound Reduction Requirements for Floors**

Item		Acoustic Requirement	
Acoustic Criteria for Floors Separating Sole Occupancy Units			
Floor of Occupancy	Floor Below	NCC/BCA 2022 Requirement	
		R <sub>w</sub> +C <sub>tr</sub> not less than	L <sub>n,w</sub> not more than
Enclosed habitable room1	Apartment	50	62
Kitchen	Apartment	50	62
Hallways	Apartment	50	62
Open-plan living/dining	Apartment	50	62
Wet area 2	Apartment	50	62
Non-habitable room 3	Apartment	50	62

Item		Acoustic Requirement	
Acoustic Criteria for Floors Separating Sole Occupancy Units			
Floor of Occupancy	Floor Below	NCC/BCA 2022 Requirement	
		$R_w + C_{tr}$ not less than	$L_{n,w}$ not more than

Notes:

4. Enclosed habitable rooms include enclosed spaces such as bedrooms and studies, but not combined kitchens opening into living and dining areas.
5. Wet areas include bathrooms, en-suites, washrooms and laundries.
6. Non-habitable areas include entry lobbies and hallways.

**Table 3 - Minimum Constructions for Stormwater and Soil and Waste Pipe Separation**

Partition Description	Minimum $R_w + C_{tr}$ Requirement
Habitable spaces (other than a kitchen)	40
Open kitchens connected to an open living or dining area	40
Non-habitable spaces	25



### 3 Recommendations

#### 3.1 Recommended wall constructions

A markup of architectural plans showing recommended wall buildups is shown in Appendix B.

The following table presents the recommended acoustic wall constructions for the proposed development to meet the minimum requirements of the National Construction Code.

Description	Airborne Sound Insulation Rating	Basis of rating*	Risk Level^
<b>Wall Separating Apartment Habitable to Habitable</b>			
75mm thick CSR Hebel Powerpanel, with: One side: <ul style="list-style-type: none"><li>28mm furring channels</li><li>13mm standard plasterboard</li></ul> Other side: <ul style="list-style-type: none"><li>Minimum 35mm air gap</li><li>Minimum 64mm metal stud @600mm centres</li><li>13mm standard plasterboard</li><li>75mm thick polyester insulation or 75mm thick glasswool insulation (11kg/m3) installed in the wall cavity between the studs.</li></ul>	Rw + Ctr 50	ESTIMATE - EXPERT JUDGEMENT	Low
<b>Wall Separating Apartment Wet to Wet</b>			
75mm thick CSR Hebel Powerpanel, with: One side: <ul style="list-style-type: none"><li>28mm furring channels</li><li>13mm wet area plasterboard</li></ul> Other side: <ul style="list-style-type: none"><li>Minimum 35mm air gap</li><li>Minimum 64mm metal stud @600mm centres</li><li>13mm wet area plasterboard</li><li>75mm thick polyester insulation or 75mm thick glasswool insulation (11kg/m3) installed in the wall cavity between the studs.</li></ul>	Rw + Ctr 50	ESTIMATE - EXPERT JUDGEMENT	Low

Description	Airborne Sound Insulation Rating	Basis of rating*	Risk Level^
Wall Separating Apartment Habitable and Wet area (inc Kitchen)			
75mm thick CSR Hebel Powerpanel, with: Habitable side: <ul style="list-style-type: none"><li>• 28mm furring channels</li><li>• 13mm standard plasterboard</li></ul> Wet area/kitchen side: <ul style="list-style-type: none"><li>• Minimum 35mm air gap</li><li>• Minimum 64mm metal stud @600mm centres</li><li>• 13mm wet area plasterboard</li><li>• 75mm thick polyester insulation or 75mm thick glasswool insulation (11kg/m3) installed in the wall cavity between the studs.</li></ul>	Rw + Ctr 50	ESTIMATE - EXPERT JUDGEMENT	Low
Riser walls -Wet area – all sides of the riser are to be located within a wet area			
No acoustic lagging to services 92mm metal stud, with: <ul style="list-style-type: none"><li>• 13mm standard or moisture resistant plasterboard (in wet areas) direct fixed to stud</li><li>• 50mm glasswool insulation (11kg/m3) or polyester insulation (14kg/m3) within the studs</li></ul>	Rw + Ctr 25	EXPERT JUDGEMENT	Low
Riser walls -Habitable area – or where any sides of the riser are located within a habitable area			
Acoustic lagging to services 92mm metal stud, with: <ul style="list-style-type: none"><li>• 13mm standard or moisture resistant plasterboard (in wet areas) direct fixed to stud</li><li>• 50mm glasswool insulation (11kg/m3) or polyester insulation (14kg/m3) within the studs</li></ul>	Rw + Ctr 40	EXPERT JUDGEMENT	Low

Description	Airborne Sound Insulation Rating	Basis of rating*	Risk Level^
By way of explanation, the Sound Insulation Rating Rw and Rw + Ctr is a measure of the noise reduction property of the partition, a higher rating implying a higher sound reduction performance.			
LEGEND where no appropriate test certificate exists:			
ESTIMATE – The client is advised not to commence detailing or otherwise commit to partition construction systems which have not been tested in an approved laboratory or for which an opinion only is available. Testing of partition construction systems is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved thereby necessitating the use of an alternative which may affect the cost and timing of the project. No responsibility is taken for use of or reliance upon untested partition construction systems, estimates or opinions. The advice provided here is in respect of acoustics only.			
In accordance with Clauses FV5.1 and FV5.2 of Part F5 of the BCA.			
GENERAL			
The sealing of all gaps in partitions is critical in a sound rated construction. Use only sealer approved by the acoustic consultant.			
Check design of all junction details with acoustic consultant prior to construction.			
Check the necessity for HOLD POINTS with the acoustic consultant to ensure that all building details have been correctly interpreted and constructed.			
The information provided in this table is subject to modification and review without notice.			
The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.			
Where there are hydraulic services (serving another apartment) in the ceiling space the wet-area such as bathroom, en-suite or laundry.			

3.2 Recommended Floor Constructions

Carpeted floors provide high insulation against impact noise; however, where tiled and timber surfaces are located above habitable spaces of the apartment below, the floor shall be acoustically treated for impact noise. The following treatments are recommended to control footfall noise and comply with the NCC BCA.

Table 4 - Recommended Floor/Ceiling Constructions

Description				
Source Room (over)	Living/Dining/ Hallway/	Kitchen	Bedrooms (carpeted)	Bathroom/Ensuite/Laundry
Receiver Room (below)	Apartment	Apartment	Apartment	Bathroom/ Ensuite/Laundry
Floor Finish	Ceramic tile	Ceramic tile	Carpet	Ceramic tiles on screed
Acoustic Isolating Material	5mm thick approved acoustic underlay	5mm thick approved acoustic underlay	Foam or felt underlay	-
Slab	Minimum 200mm thick concrete slab	Minimum 200mm thick concrete slab	Minimum 200mm thick concrete slab	Minimum 200mm thick concrete slab
Ceiling Void Insulation		Insulation installed in ceiling void/ bulkhead beneath services as specified in Table 5		Insulation installed in ceiling void/ bulkhead beneath services as specified in Table 5
Ceiling cavity (minimum)	40mm	250mm	40mm	250mm
Ceiling	10mm standard ceiling plasterboard	10mm standard ceiling plasterboard	10mm standard ceiling plasterboard	10mm wet area plasterboard
Airborne Sound Insulation Rating	R <sub>w</sub> +C <sub>tr</sub> no less than 50	R <sub>w</sub> +C <sub>tr</sub> no less than 50	R <sub>w</sub> +C <sub>tr</sub> no less than 50	R <sub>w</sub> +C <sub>tr</sub> no less than 50
Impact Sound Insulation Rating	L <sub>n,w</sub> no more than 62	L <sub>n,w</sub> no more than 62	L <sub>n,w</sub> no more than 62	L <sub>n,w</sub> no more than 62
Laboratory Test Number or Reference1	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE

Enclosed habitable rooms include enclosed spaces such as studies, bedrooms and walk in wardrobes, but not combined kitchens opening into living and dining areas.

By way of explanation, the Sound Insulation Rating R<sub>w</sub> and R<sub>w</sub> + C<sub>tr</sub> is a measure of the noise reduction property of the partition, a higher rating implying a higher sound reduction performance.

The L<sub>n,w</sub> rating is a measure of the ability of the partition to suppress footfall noise and noise from other impacts, a lower rating implying a higher impact sound reduction performance.

LEGEND where no appropriate test certificate exists:

ESTIMATE – The client is advised not to commence detailing or otherwise commit to partition construction systems which have not been tested in an approved laboratory or for which an opinion only is available. Testing of partition construction systems is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved thereby necessitating the use of an alternative which may affect the cost and timing of the project. No responsibility is taken for use of or reliance upon untested partition construction systems, estimates or opinions. The advice provided here is in respect of acoustics only.

In accordance with Clauses FV5.1 and FV5.2 of Part F5 of the BCA.

NOTES FOR FLOOR CONSTRUCTIONS:

Floor construction design, thicknesses of materials, method of construction and the like are to be in strict accordance with manufacturers’ specifications.

L<sub>n,w</sub>+C<sub>i</sub> refers to Weighted Normalised Impact Sound Pressure Level with spectrum adaptation term.

Nails or screws are not to penetrate rubber isolation layers.

Description				
Source Room (over)	Living/Dining/ Hallway/	Kitchen	Bedrooms (carpeted)	Bathroom/Ensuite/Laundry
Receiver Room (below)	Apartment	Apartment	Apartment	Bathroom/ Ensuite/Laundry

GENERAL

The sealing of all gaps in partitions is critical in a sound rated construction. Use only sealer approved by the acoustic consultant.

Check design of all junction details with acoustic consultant prior to construction.

Check the necessity for HOLD POINTS with the acoustic consultant to ensure that all building details have been correctly interpreted and constructed.

The information provided in this table is subject to modification and review without notice.

The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

### 3.3 Recommended Door Constructions

The BCA specifies acoustic requirements for door separating a sole-occupancy unit from a stairway, public corridor, public lobby or the like to have an  $R_w$  of not less than 30. All apartment entry doors are from external so no acoustic rating is required for external doors.

### 3.4 Additional Acoustic Treatment

#### 3.4.1 Use of Wall Brackets

- s1. Wall brackets connecting the stud wall to the Hebel panel are only permitted in walls not requiring discontinuous construction.
- s2. For walls requiring discontinuous construction, wall brackets may only be used at the periphery of the walls in order to meet the BCA's discontinuous requirements.

#### 3.4.2 Treatment of inter-tenancy partitions above ceilings

- s3. Inter-tenancy partitions on the upper level are to extend beyond the ceiling to the underside of the roof trusses.

#### 3.4.3 General Construction Techniques – Walls & Services

All walls recommended in Table 4 above shall be full height construction – extending beyond the ceiling line to the underside of the concrete slabs.

- s4. Masonry units must be laid with joint filled solid, including those between the masonry and any adjoining construction.
- s5. Sheeting materials shall be installed as follows:
  - i. if one layer is required on both sides of a wall, it must be fastened to the furring channels with joints staggered on opposite sides; and
  - ii. if two layers are required, the second layer must be fastened over the first layer so that the joints do not coincide with those of the first layer; and
  - iii. joints between sheets or between sheets and any adjoining construction must be taped and filled solid.
- s6. Services must not be chased into concrete or masonry element.
- s7. A door or panel required to have a certain  $R_w + C_{tr}$  that provides access to a duct, pipe or other service must –
  - iv. not open into any habitable room (other than a kitchen); and

- v. be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10mm, be fitted with a sealing gasket along all edges and be constructed of –
    - wood, particleboard or blockboard not less than 33mm thick; or
    - compressed fibre reinforced cement sheeting not less than 9mm thick; or
    - other suitable material with a mass per unit area not less than 24.4kg/m<sup>2</sup>.
- s8. Electrical outlets must be offset from each other –
- in masonry walling, not less than 100mm; and
  - in steel framed walling, not less than 300mm.

#### **3.4.4 Fixing of Electrical Services**

- s9. No services shall be fixed in the 20mm discontinuous separating zone between the concrete or masonry elements and the separate stud of inter-tenancy walls.
- s10. Fixing of cable, conduit and the like to concrete or masonry elements is permitted provided the cable or conduit is contained in the cavity of the furring channels or void between plasterboard and masonry wall of daub fixed areas.

#### **3.4.5 General Construction Techniques – Floors**

- s11. Where concrete slabs are installed, joints between concrete slabs or panels and any adjoining construction must be filled solid.

#### **3.4.6 Additional Architectural Acoustic Advice Pertinent To This Development**

- s12. Services within the Logicwall Acoustic walls are to be cast into the wall.
- s13. Bathrooms, Kitchen areas and Risers – 6mm fibrous cement sheeting (Villaboard) and 13mm Moisture Resistant (MR) plasterboard is acceptable in lieu of 13mm plasterboard.
- s14. All gaps around perimeter of inter-tenancy walls, ceilings and adjoining constructions shall be acoustically sealed using a mastic sealer equivalent to CSR Gyprock Fire Mastic, Promaseal Acrylic Sealant, Hilti CP606 or Bostik Fireban 1.
- s15. The perimeter of all acoustically treated hard surface floor areas shall be isolated from the adjoining wall construction and any joinery with a minimum 4mm gap. The gap shall be filled with foam backing rod, continuous strip of acoustic underlay or folded piece of acoustic underlay and a flexible sealant.
- s16. Skirting boards and beadings shall be separated from tile and timber floor with a minimum gap of 3mm. The gap shall be filled with flexible sealant.

- s17. All access panels in apartments shall be rated a minimum of  $R_w + C_{tr}$  25 and are to be similar to the 'Trafalgar APT/WW 30' or 'Rondo SRAP30' hinged panel system.

### 3.4.7 Acoustic Underlay

The following is a list of approved acoustic underlays for the project

1. Uniroll RF700 5mm underlay
2. Vibramat Acoustic Underlay 5mm
3. AcoustaMat 5mm Underlay
4. Regupol 5512 Sonus Core 5 - 5mm Underlay
5. Impactamat 5mm Underlay

### 3.4.8 Acoustic Sealant

- s18. Where acoustic sealant is specified anywhere in this document, the material shall be a flexible non-hardening compound (flexible non-hardening acrylic specific gravity 1.6 or polyurethane specific gravity 1.45). Approved products are CSR Gyprock Fire Mastic, Promaseal Acrylic Sealant, Hilti CP606 or Bostik Fireban 1 or equivalent.

## 3.5 Hydraulics Services Advice Pertinent to this Development

### 3.5.1 Special hydraulic services advice pertinent to this development

**Table 5 - Hydraulics Services Advice Pertinent To This Development**

Location	Treatment to Waste Pipes (Plumbing Contractor)	Treatment to Ceiling/Riser
Waste pipes and stormwater pipes located in the ceiling cavity of kitchens, living/dining areas and bedrooms	Wrap all soil and waste pipes and stormwater pipes with 4.5kg/m <sup>2</sup> loaded vinyl sheet bonded with 25mm foam equivalent to Pyrotek 4525C	1 layer of 10mm ceiling plasterboard with 75mm glasswool insulation (11kg/m <sup>3</sup> ) or polyester insulation (14kg/m <sup>3</sup> ) in the ceiling cavity beneath services (extending 1.5m either side of the service)
Waste pipes and stormwater pipes located in the ceiling cavity of wet areas	Nil	1 layer of 10mm ceiling plasterboard with 75mm glasswool insulation (11kg/m <sup>3</sup> ) or polyester insulation (14kg/m <sup>3</sup> ) in the ceiling cavity beneath services (extending 1.5m either side of the service) Walls around wet areas to be full height
Waste pipes and stormwater pipes located in hydraulic risers	Wrap all soil and waste pipes and stormwater pipes with 4.5kg/m <sup>2</sup> loaded vinyl sheet bonded with 25mm foam equivalent to Pyrotek 4525C	Riser wall construction as detailed in Table 4



The acoustic ratings of constructions separating soil and waste pipes shall comply with the minimum requirements of the Building Code of Australia.

- s19. No part of any ceiling, bulkhead, accompanying suspension frame or of any riser shall come into contact with any soil, waste or hydraulic lines. Minimum separation distance is 15 mm.
- s20. Waste pipes shall not be supported from or come in to contact with any lightweight construction including ceiling support members, stud wall framing or plasterboard lining.
- s21. Refer to Section 3.5.1 for acoustic treatment to soil, waste, water supply and storm water pipes within the development.
- s22. All downpipes located in the cavity of external walls and internal walls shall be lagged with Pyrotek 4525C or equivalent. All other downpipes shall be cast in concrete columns.
- s23. A ceiling in wet areas of units shall be constructed as outlined in Section 3.5.1.
- s24. All soil, waste and stormwater pipes in ceiling cavities of apartments shall be acoustically lagged with a 4.5kg/m<sup>2</sup> loaded vinyl sheet bonded to 25mm foam equivalent to Pyrotek 4525C. In conjunction a ceiling shall be constructed as outlined in Section 3.5.1.
- s25. Acoustic treatment to PVC or HDPE soil and waste pipes and storm water pipes passing through non-habitable spaces of units shall consist of a combination of the lagging of any enclosed soil and waste pipes using a 4.5kg/m<sup>2</sup> loaded vinyl sheet bonded with 25mm foam equivalent to Pyrotek 4525C. In conjunction a ceiling or riser shaft shall be constructed as outlined in Section 3.5.1.
- s26. Acoustic treatment to PVC or HDPE soil and waste pipes and stormwater pipes passing through habitable spaces of units shall consist of a combination of the lagging of any enclosed soil and waste pipes using a 4.5kg/m<sup>2</sup> loaded vinyl sheet bonded with 25mm foam equivalent to Pyrotek 4525C. In conjunction a ceiling or riser shaft shall be constructed as outlined in Section 3.5.1.
- s27. Soil, waste and stormwater pipes located within 600mm of any non-acoustically treated return air opening shall be lagged with 2 layers of 4.5kg/m<sup>2</sup> loaded vinyl sheet bonded to 25mm foam equivalent to Pyrotek 4525C. In conjunction a ceiling or riser shaft shall be constructed as outlined in Section 3.5.1.
- s28. A door or panel providing access to the pipe must not open into any habitable room (other than a completely enclosed kitchen) or combined kitchen/dining room. Also, an access door or panel in any other part must be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10mm and be fitted with a sealing gasket along all edges.
- s29. All access panels shall be rated a minimum of  $R_w + C_{tr} 25$  and are to be equivalent to the 'Trafalgar APT/WW 30' or 'Rondo Panther SRAP 30' hinged access panel systems.

- s30. Rw + Ctr 40 treatment is required between waste pipes in a ceiling and the adjoining habitable room such as a bedroom or living/dining room.
- s31. If waste pipes and services are NOT acoustically lagged, all intra-tenancy walls constructed around en-suites, bathrooms, laundry, kitchens and any other room or riser containing soil and waste pipes serving a different tenancy in the ceiling space or riser (as the case may be) shall be constructed full height to the soffit slab above.
- s32. The walls shall be sealed at the soffit slab on both sides with approved acoustic mastic sealer.
- s33. Waste pipes shall not be supported from or come in to contact with any lightweight construction including ceiling support members, stud wall framing or plasterboard lining.
- s34. Where possible, waste pipes shall not be fixed to the walls of the riser shaft. Fixing shall occur only at slab edges.

## 4 Conclusion

Renzo Tonin & Associates have reviewed the acoustic partitioning details and treatment to services within the proposed Senior Living Development at 10-16 Birdwood Avenue Cabramatta West.

The construction contained within this report and shown on the architectural plans from McGregor Westlake Architecture comply with the minimum acoustic requirements of the National Construction Code - Building Code of Australia Volume 1, Part F7.

## APPENDIX A Glossary of terminology



The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

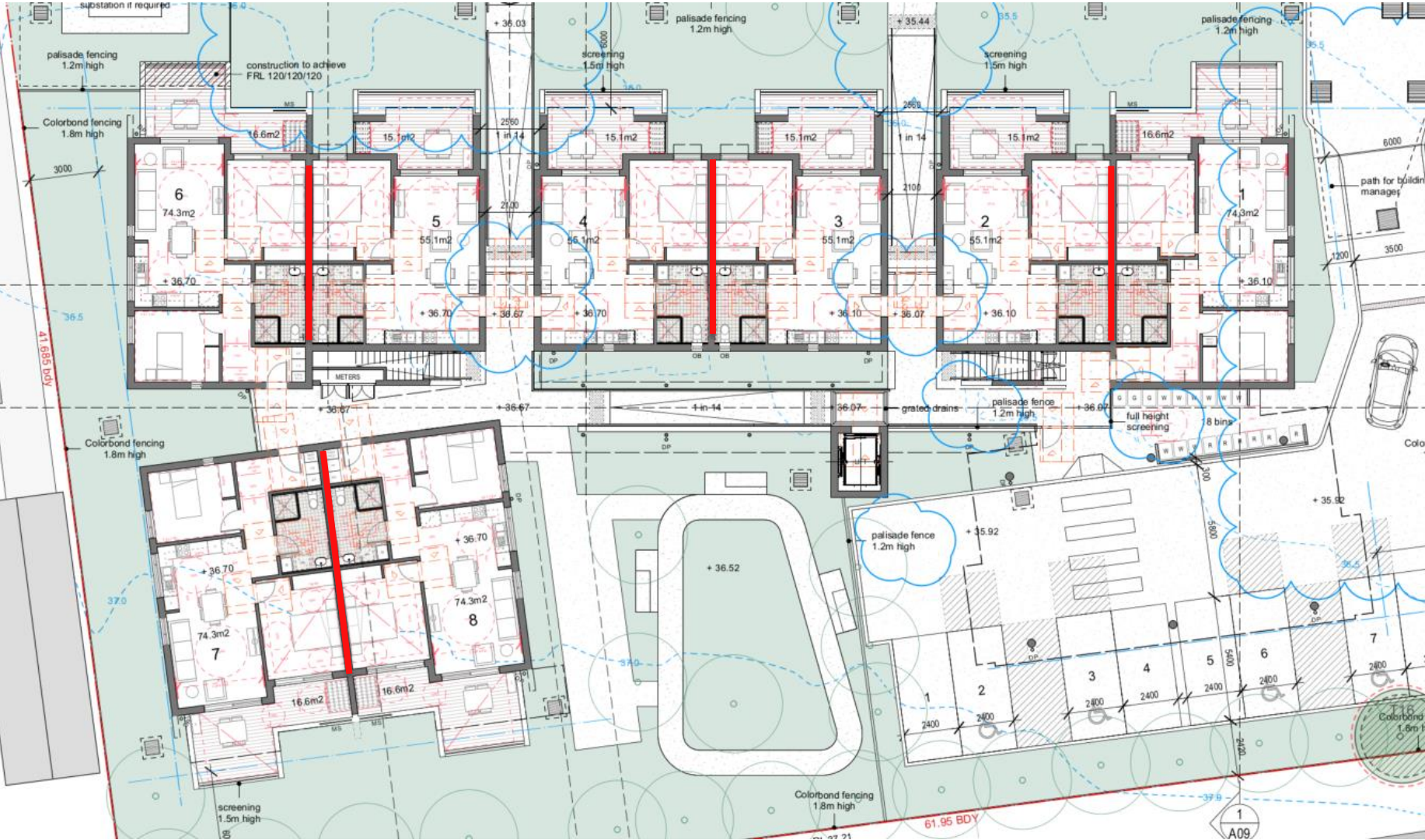
Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).																																								
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.																																								
Assessment period	The period in a day over which assessments are made.																																								
Assessment Point	A point at which noise measurements are taken or estimated.																																								
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).																																								
Decibel [dB]	<p>The units that sound is measured in. The following are examples of the decibel readings of common sounds in our daytime environment:</p> <table><tr><td rowspan="2">threshold of hearing</td><td>0 dB</td><td>The faintest sound we can hear</td></tr><tr><td>10 dB</td><td>Human breathing</td></tr><tr><td rowspan="2">almost silent</td><td>20 dB</td><td></td></tr><tr><td>30 dB</td><td>Quiet bedroom or in a quiet national park location</td></tr><tr><td rowspan="2">generally quiet</td><td>40 dB</td><td>Library</td></tr><tr><td>50 dB</td><td>Typical office space or ambience in the city at night</td></tr><tr><td rowspan="2">moderately loud</td><td>60 dB</td><td>CBD mall at lunch time</td></tr><tr><td>70 dB</td><td>The sound of a car passing on the street</td></tr><tr><td rowspan="2">loud</td><td>80 dB</td><td>Loud music played at home</td></tr><tr><td>90 dB</td><td>The sound of a truck passing on the street</td></tr><tr><td rowspan="2">very loud</td><td>100 dB</td><td>Indoor rock band concert</td></tr><tr><td>110 dB</td><td>Operating a chainsaw or jackhammer</td></tr><tr><td rowspan="2">extremely loud</td><td>120 dB</td><td>Jet plane take-off at 100m away</td></tr><tr><td>130 dB</td><td></td></tr><tr><td>threshold of pain</td><td>140 dB</td><td>Military jet take-off at 25m away</td></tr></table>			threshold of hearing	0 dB	The faintest sound we can hear	10 dB	Human breathing	almost silent	20 dB		30 dB	Quiet bedroom or in a quiet national park location	generally quiet	40 dB	Library	50 dB	Typical office space or ambience in the city at night	moderately loud	60 dB	CBD mall at lunch time	70 dB	The sound of a car passing on the street	loud	80 dB	Loud music played at home	90 dB	The sound of a truck passing on the street	very loud	100 dB	Indoor rock band concert	110 dB	Operating a chainsaw or jackhammer	extremely loud	120 dB	Jet plane take-off at 100m away	130 dB		threshold of pain	140 dB	Military jet take-off at 25m away
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dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the “A” filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.																																								
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.																																								

Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L <sub>Max</sub>	The maximum sound pressure level measured over a given period.
L <sub>Min</sub>	The minimum sound pressure level measured over a given period.
L <sub>1</sub>	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L <sub>10</sub>	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L <sub>90</sub>	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L <sub>eq</sub>	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L <sub>eq</sub> sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

**APPENDIX B**      Markup of Architectural Plans

4.1      **Figure 1 - Ground Floor Plan**

-   $R_w + C_{tr} 50$  Inter-tenancy Wall
-   $R_w + C_{tr} 50$  Discontinuous Inter-tenancy Wall





## 4.2 Figure 2 - First Floor Plan

