

# Appendix 11: Acoustic Report

DEPARTMENT OF PLANNING, LANDS  
AND HERITAGE

DATE  
29-Oct-2020

FILE  
SDAU-004-20



# ARCHITECTURAL ACOUSTICS

DEVELOPMENT APPROVAL STAGE

REVISION 3

## THE MELVISTA, NEDLANDS RESIDENTIAL AGED CARE FACILITY

15<sup>th</sup> October 2020



For

**ORYX COMMUNITIES**

14/23 Railway Rd  
SUBIACO WA 6008

---

---

## CONTENTS

	PAGE
1. INTRODUCTION.....	2
2. PART F5 OF THE BUILDING CODE OF AUSTRALIA.....	2
3. ENVIRONMENTAL NOISE EMISSIONS.....	5

## ATTACHMENTS

- APPENDIX A - PART F5 ACOUSTIC REQUIREMENTS FOR WALLS
- APPENDIX B - NOISE CONTOUR PLANS (ENVIRONMENTAL NOISE EMISSIONS)

---

Report Version	Author	Comment	Date
3	Benjamin Farrell	Minor edit to Section 3.3	15 <sup>th</sup> October 2020



Gabriels Hearne Farrell Pty Ltd is a Member Firm of the Association of Australian Acoustical Consultants. The report author is a full member of the Australian Acoustical Society.

Disclaimer – The information contained within this report is solely for the use of the client identified on the cover page. The report is based on a specific scope as agreed between Gabriels Hearne Farrell Pty Ltd and the client. Gabriels Hearne Farrell Pty Ltd accepts no liability where this report is used by any third party who may rely upon this document. This report shall only be reproduced in full.

## 1. INTRODUCTION

This report addresses the relevant acoustic issues for the proposed Oryx Communities residential aged care facility called The Melvista, at the Development Approval stage. This report is based on the revised design drawings issued October 12, 2020.

This report addresses the mandatory acoustic requirements for this project including:

- Part F5 'Sound Transmission and Insulation' of the Building Code of Australia; and,
- Environmental noise emissions (compliance with the Environmental Protection (Noise) Regulations 1997.

The proposed site consists of the combination of Lots 10 and 11 Betty Street and Lots 19 and 18 Doonan Road, in Nedlands. The building consists of a sunken basement, with four storeys above. There will be a total of 80 aged care suites.

Note - The site does not fall within the zone of influence of State Planning Policy 5.4 'Road and Rail Noise', therefore external noise intrusion does not require consideration.

## 2. PART F5 OF THE BUILDING CODE OF AUSTRALIA

Given that the proposed development is a Class 9c building, each Bed Room suite is considered to be a *sole-occupancy unit*. As such, Part F5 'Sound Transmission and Insulation' of the Building Code of Australia (BCA) applies to each Bed Room within the proposed aged care facility.

NCC 2019 establishes the following Performance Requirements for this project.

### FP5.4 Sound transmission through floors in residential care buildings

Floors separating *sole occupancy units* must provide insulation against the transmission of airborne and impact generated sound sufficient to prevent illness or loss of amenity to the occupants.

### FP5.5 Sound transmission through walls in residential care buildings

Walls separating *sole-occupancy units*, or a *sole-occupancy unit* from a kitchen, bathroom, sanitary compartment (excluding associated ensuites), laundry, plant room or utility room, must provide insulation against the transmission of-

- (a) Airborne sound; and
- (b) Impact generated sound, if the wall separates a *sole-occupancy unit* from a kitchen or laundry, sufficient to prevent illness or loss of amenity to the occupants.

### FP5.6 Sound transmission through floor and wall penetrations in residential care buildings

The required sound insulation of a floor or a wall must not be compromised by the incorporation or penetration of a pipe or other service element.

Table 1 below identifies the specific acoustic criteria that must be met for this project.

Situation	BCA Clause	Acoustic requirement
Walls between <i>sole-occupancy units</i>	Part F5.5(c)(i)	R <sub>w</sub> 45
Walls between <i>sole-occupancy units</i> and kitchens, bathrooms, sanitary compartments, laundries, plant rooms, and utility rooms	Part F5.5(c)(ii)	R <sub>w</sub> 45
Walls between <i>sole-occupancy units</i> and kitchens/laundries	Part F5.5(d)	R <sub>w</sub> 45 <i>discontinuous construction</i>
Where a hydraulic service is located on or in a wall onto a <i>sole-occupancy unit</i>	Specification F5.2(2)(e)(iii)	R <sub>w</sub> 45 <i>discontinuous construction</i>
Floors between <i>sole-occupancy units</i>	Part F5.4(b)	R <sub>w</sub> 45
Separation between duct, soil, waste or water supply pipe and a bed room of a <i>sole-occupancy unit</i>	Part F5.6(a)(i)	R <sub>w</sub> + C <sub>tr</sub> 40
Separation between duct, soil, waste or water supply pipe and an ensuite of a <i>sole-occupancy unit</i>	Part F5.6(a)(ii)	R <sub>w</sub> + C <sub>tr</sub> 25

Table 1 – Summary of the Part F5 acoustic requirements

These requirements are identified on the attached marked-up plans (Appendix A) and discussed further below:

## 2.1 Wall construction between the sole-occupancy units



As per Part F5.5(c)(i), the walls between the *sole-occupancy units* must achieve a sound reduction of  $R_w$  45. Options include:

- 110 mm masonry, rendered both sides.
- Concrete panel wall, minimum 100 mm thickness.
- 2 layers of 13 mm standard plasterboard + 76 mm stud frame with 75 mm glasswool partition batts + 1 layer of 13 mm standard plasterboard.
- 1 layer of 13 mm ECO08 Impact plasterboard + 76 mm stud frame with 75 mm glasswool partition batts + 1 layer of 13 mm ECO08 Impact plasterboard.
- 1 layer of 13 mm Impactchek plasterboard + 92 mm stud frame with 75 mm glasswool partition batts + 1 layer of 13 mm Impactchek plasterboard.

### 2.1.1 Control of room-to-room flanking noise transmission via the ceiling space

The room-to-room flanking noise transmission via the ceiling space must be controlled by one of the following options:

- Option 1 – Extend the walls between *sole-occupancy units* to the underside of the concrete slab or roof sheeting above; or,
- Option 2 – Provide 13 mm flush plasterboard ceilings throughout the suite, with a minimum of 75 mm glasswool ceiling insulation over. Implementing this option will also assist in addressing the services requirements outlined in Section 2.5.

### 2.1.2 General detailing

Specification F5.2(2) of the BCA establishes the following detailing requirements:

- Masonry walls – Units must be laid with all joints filled solid.
- Sheeting of studs – If one layer of plasterboard is required on each side of the studs, then it must be fastened to the studs with joints staggered on opposite sides. Where two layers of plasterboard are required on one side of a stud then the second layer must be fastened over the first layers so the joints do not coincide with those of the first layer. Joints between sheets and between sheets and adjoining construction must be taped and sealed.
- Perimeter of wall framing – Perimeter framing members must be securely fixed to the adjoining structure and bedded in resilient compound or the joints must be caulked so that there are no gaps between the framing members and the adjoining structure.
- Electrical outlets – Within masonry walls electrical outlets must be offset by less than 100 mm. In stud framed walls electrical outlets must be offset by at least 300 mm, or a vertical stud must be positioned between the electrical outlets of adjacent rooms.
- Services must not be chased into concrete or masonry elements (as per Part F5.2(2)(e)).

## 2.2 Discontinuous wall construction between a sole-occupancy units



On Level 2 of the proposed development, there are toilet cisterns mounted on walls to other *sole-occupancy units*. A *discontinuous* wall construction is required in these locations due to Specification F5.2(2)(e)(iii):

A water supply pipe must-

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

A suitable wall construction consists of:

- (*Wet area side*) 1 layer of 13 mm plasterboard + 64 mm studs + 20 mm gap + 64 mm studs with 75 mm glasswool insulation + 2 layers of 13 mm plasterboard (*habitable room side*).

It is important that the water supply pipes do not cross over the 20 mm gap and that the two rows of studs are not bridged in any way.

#### 2.2.1 *Water supply pipes serving the kitchenette sinks in the single suites*

Given Specification F5.2(2)(e)(iii), the water supply pipes serving the small kitchenette sinks within the single suites must not be mounted to or installed within the wall to the adjacent *sole-occupancy unit*. The water supply pipe shall be mounted to the underside of the bench-top utilising resilient/binder clips.

### 2.3 **Duct walls onto ensuites ( $R_w + C_{tr}$ 25)**



As per Part F5.6(a)(ii), the walls between the duct/shafts and the ensuites must achieve a minimum sound reduction of  $R_w + C_{tr}$  25. Options include:

- Pipes wrapped with Pyrotek Soundlag 4525 + stud frame with any plasterboard lining (no partition batts)
- Acoustic pipework (eg Rehau Raupiano Plus) + stud frame + plasterboard lining.
- Pipes without lagging + 76 mm stud frame with 75 mm glasswool partition batts + 1 layer of 13 mm plasterboard.
- Pipes without lagging + 90 mm masonry leaf.

Note – the above requirements also apply to any enclosed stormwater pipes.

### 2.4 **Duct walls onto habitable rooms ( $R_w + C_{tr}$ 40)**



As per Part F5.6(a)(i), the walls between the ducts and the habitable rooms of the suites must achieve a minimum sound reduction of  $R_w + C_{tr}$  40. Options include:

- Pipes wrapped with Pyrotek Soundlag 4525 + 76 mm stud frame with 75 mm partition batts + 1 layer of 13 mm plasterboard.
- Acoustic pipework (eg Rehau Raupiano Plus) + 76 mm stud frame with 75 mm partition batts + 1 layer of 13 mm plasterboard.
- Pipes wrapped with Pyrotek Soundlag 4525 + 90 mm masonry leaf.
- Pipes without lagging + 110 mm masonry leaf.

Note – the above requirements also apply to the enclosed stormwater pipes.

### 2.5 **Services located above the ceilings of the *Sole-Occupancy Units***

Where a soil/waste pipe, storm water pipe, or water supply pipe that serves an adjacent *sole-occupancy unit* runs above the ceiling, the following acoustic separation is required.

#### 2.5.1 *Services located above habitable rooms ( $R_w + C_{tr}$ 40)*

- Wrap the pipe with Pyrotek Soundlag 4525 + install 75 mm glasswool insulation above the ceiling within a minimum 1200 mm zone each side of the pipe; or,
- Use acoustic pipework (eg Rehau Raupiano Plus) + install 75 mm glasswool insulation above the ceiling within a minimum 1200 mm zone each side of the pipe.

#### 2.5.2 *Services located above ensuites ( $R_w + C_{tr}$ 25)*

- Wrap the pipe with Pyrotek Soundlag 4525; or,
- Use acoustic pipework (eg Rehau Raupiano Plus); or,
- Pipes without lagging + 13 mm plasterboard ceiling with 75 mm glasswool insulation over.

### 2.6 **Access panels**

Access panels must not open onto habitable rooms, they must only open onto the ensuite itself or the corridor. The access panels must be configured as follows:

- The access panel must be constructed of timber with minimum thickness of 33 mm, or 9 mm compressed fibre cement sheeting, or a sheet material with a surface density of not less than 24.4 kg/m<sup>2</sup>.
- The access panel must overlap the frame or rebate by not less than 10 mm and be fitted with a sealing gasket fitted along all edges.

NOTE – Access panels are permitted in Bed Rooms where the panel is use for accessing the fan coil unit or exhaust fan that serves that Bed Room only. The access panel shall be detailed as recommended above.

## 2.7 Storm water pipes

Where stormwater pipes are within the building, they must be treated in accordance with Section 2.3 2.4, and 2.5 of this report where the pipes are in a duct adjacent a *sole occupancy unit*.

## 2.8 Ensuite exhaust

From an acoustics point of view, the best approach is to have individual in-line fans for each *sole-occupancy unit*, ducted to an external louvre/grille.

Where a large bathroom exhaust fan will serve several separate *sole-occupancy units*, it is critical that the shared ductwork does not compromise the sound reduction requirement of  $R_w$  45 between ensuites. Where there is shared ductwork between two ensuites of separate *sole-occupancy units*, a minimum of 4 metres length of internally insulated ductwork (50 mm perforated foil faced glasswool insulation) is required between the exhaust grille in one ensuite and the exhaust grill in the other ensuite.

## 2.9 Floors between *sole-occupancy units*

Part F5.4(b) states that the floors separating the *sole-occupancy units* within Class 9c buildings must achieve a minimum sound reduction of  $R_w$  45. This can be achieved by a concrete slab with minimum thickness of 100 mm.

NCC 2019 introduced a new requirement whereby the floor construction of the sole-occupancy units in Class 9c buildings must provide impact isolation of  $L_{nTw}$  62 dB or less. This requirements is outlined in FP5.4 'Sound transmission through floors in residential care buildings':

*"Floors separating sole-occupancy units must provide insulation against the transmission of airborne and impact generated sound to prevent illness or loss of amenity to the occupants".*

During the detailed design stages, strategies for controlling impact noise transmission will be considered.

## 2.10 Acoustic isolation between Bed Rooms and the corridor and the other BCA classifications

The BCA does not establish any requirements for the doors and walls between the *sole-occupancy units* and the corridors within Class 9c buildings.

# 3. ENVIRONMENTAL NOISE EMISSIONS

The proposed development is surrounded by noise sensitive premises, including:

- Residences immediately north of the proposed aged care facility;
- Residences across Betty St and Doonan Rd; and,
- The Melvista Nursing Home located on the lot immediately south.

The noise transmission from the proposed development to the surrounding noise sensitive premises must comply with the Environmental Protection (Noise) Regulations 1997.

The noise transmission to these noise sensitive premises must not exceed the 'Assigned Levels' outlined in Section 3.1.

**Note – The Environmental Protection (Noise) Regulations 1997 do not apply to the noise emissions from the mechanical plant, service vehicles, etc to the bed room suites of the proposed aged care facility. The aforementioned regulations only apply to the noise transmission to adjacent lots - they do not apply to locations within the same lot/premises. This is because the bed rooms are not strata titled lots like apartments are.**

Notwithstanding the above, in order to maintain amenity for the occupiers of the bed rooms, the building services will be specified and designed to comply with the *Design Sound Levels* of Australian Standard 2107:2016. This is not a mandatory requirement, but represents good practice.

### 3.1 Assigned Levels

The following 'Assigned Levels' are applicable at the nearest residences. The 'Assigned Levels' are based on an *Influencing Factor* of 0 dB as there are no major or secondary roads, or any commercial developments within a 450 metre radius of the residences.

Part of premises receiving noise	Time of day	Assigned Level (dB)		
		LA10	LA1	LAmax
Noise Sensitive Premises: highly sensitive area (eg within 15 metres of a house)	7 am to 7 pm Monday to Saturday	45	55	65
	9 am to 7 pm Sunday and public holidays	40	50	65
	7 pm to 10 pm all days	40	50	55
	10 pm to 7 am Monday to Saturday and 10 pm to 9 am on Sundays and public holidays	35	45	55

Table 2- Assigned Levels for nearest residences

### 3.2 Noise modelling procedure

Noise modelling has been undertaken using the SoundPLAN 8.2 noise modelling software, utilising the *concave* algorithms. The assessment was based on the following meteorological conditions, in accordance with the document titled 'Draft Guidance for Assessment of Environmental Factors No.8 - Environmental Noise':

Time of day	Daytime	Night
Temperature	20°C	15°C
Humidity	50%	50%
Wind speed	4 m/s	3 m/s
Wind direction	All directions at once	All directions at once
Pasquil Stability Class	E	F

Table 3 - Meteorological conditions

The topography of the land was input into the noise model based on contour information available from the City of Nedlands Intramaps. The building heights and form were based on the Development Application drawings.

### 3.3 Delivery vans / service vehicles moving along the entry/exit ramps (Scenario 1)

The proponent has advised that the service/delivery vehicles that will access the basement will be commercial vans and small trucks (eg 2 tonne) rather than large trucks due to the horizontal and vertical clearances of the sunken laneway. The potential noise emission from delivery/service vehicles has been modelled, based on the following Sound Power Level.

Frequency (Hz)	63	125	250	500	1k	2k	4k	dB(A)
Delivery vehicle (eg Mercedes Sprinter) Sound Power Level	93	91	89	88	89	86	79	93

Table 4 - Sound Power Level of delivery vehicle

For the purpose of the assessment, a delivery vehicle has been positioned in the noise model driving down the entry ramp, and another one driving up the exit ramp. The noise model has included acoustic screening on the southern side of the access laneway, which is 2400 mm taller than the ground level at Lot 25 Betty St (Melvista Nursing Home). The extent of the screening is shown in Figure 1 below. Please note that the acoustic screening is not required along the entire southern boundary given that the existing store rooms on Lot 25 Betty St provided an equivalent acoustic barrier.

The acoustic screening shall be solid without gaps or slots, with a minimum surface density of 10 kg/m<sup>2</sup> (eg 9 mm fibre-cement, 18 mm marine plywood, 6 mm glass, 12 mm Perspex, single leaf of masonry).

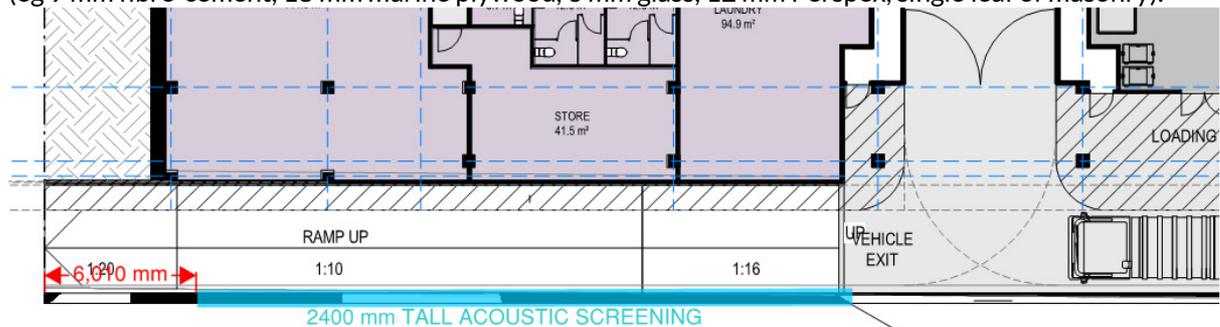


Figure 1

The noise emissions from delivery vans driving along the access way must comply with the L<sub>1</sub> 'Assigned Levels', given that the noise will occur for less than 10% of the time.

The results of the noise modelling are presented as a noise contour plan in Appendix B (Scenario 1). The noise contours are generated at 1500 mm above ground level. The results are summarised in Table 5 below.

Noise receiver location	Calculated noise level	Adjusted noise level#
Melvista Nursing Home	L <sub>1</sub> 55 dB(A)	L <sub>1</sub> 55 dB(A)
11 Betty Street	L <sub>1</sub> 52 dB(A)	L <sub>1</sub> 52 dB(A)
80 Doonan Road	L <sub>1</sub> 53 dB(A)	L <sub>1</sub> 53 dB(A)

Table 5 - Scenario 1 results (two delivery vehicles driving along sunken laneway)

# 'Tonality' does not apply given that the noise emissions are present for less than 10% of the time.

The adjusted noise levels are compliant with the L<sub>1</sub> 'Assigned Levels' between 7 am and 7 pm, Monday to Saturday.

### 3.4 Fire pumps (Scenario 2)

The fire pumps will be located in an enclosed plant room at basement level, with doors and ventilation openings facing onto the sunken laneway. The assessment of the fire pumps has been based on the following assumptions:

- The fire pumps are packaged attenuated units with an engine radiated noise level of 88 dB(A) at 1 metre (eg Allied Pumps Enviropac Class 1 Attenuation); and,
- There is <1.0 m<sup>2</sup> of ventilation louvres/grilles on the south side of the plantroom.
- High grade mufflers/attenuators will be provided for the diesel exhaust, and the exhaust cowls will be located in the roof-top plant area.

The fire-pumps will be tested during the daytime twice monthly, for a period of no greater than 20 minutes. Given this the noise emissions during the testing shall comply with the 'Assigned Level' of L<sub>1</sub> 55 dB(A) at the surrounding noise sensitive premises.

The results of the noise modelling of the fire-pumps are presented on the Scenario 2 noise contour plan provided in Appendix B. A summary of the results is provided in Table 6 below.

Noise receiver location	Calculated noise level	Adjusted noise level#	Assigned Level	Compliance
Melvista Nursing Home	L <sub>1</sub> 55 dB(A)	L <sub>1</sub> 55 dB(A)	L <sub>1</sub> 55 dB(A)	YES
11 Betty Street	L <sub>1</sub> 50 dB(A)	L <sub>1</sub> 50 dB(A)	L <sub>1</sub> 55 dB(A)	YES
78 Doonan Road	L <sub>1</sub> 46 dB(A)	L <sub>1</sub> 46 dB(A)	L <sub>1</sub> 55 dB(A)	YES

Table 6 – Scenario 2 results (Fire-pumps operating)

# ‘Tonality’ does not apply given that the noise emissions are present for less than 10% of the time.

The noise modelling indicates that the fire-pumps have the capability of complying with the ‘Assigned Levels’. Please note that if the extent of ventilation louvres/grilles to the fire-pump room exceeds 1 m<sup>2</sup> then 300 mm acoustic louvres shall be used.

### 3.5 Mechanical services (Scenario 3A and 3B)

The mechanical plant will be located in a roof-top external area, which is well screened on all four sides by the skillion roof forms.

DSA Pty Ltd have provided indicative equipment selections for the air-conditioning condensers that will serve the building. The indicative selections are as follows:

- 10 off Daikin RXYQ14 condensers, each with a sound pressure level of 71 dB(A) at 1 metre; and,
- 14 off Daikin RXYQ10 condensers, each with a sound pressure level of 68 dB(A) at 1 metre.

#### 3.5.1 Scenario 3A – Condensers operating during the daytime

An assessment of the air-conditioning condensers has been undertaken, based on all of the units operating at the same time. Given that the aged care facility will operate 7 days a week, the noise emission from the condensing units must not exceed L<sub>10</sub> 40 dB(A) at the surrounding residences during the daytime (this is the ‘Assigned Levels’ on Sundays and Public Holidays)

The results of the noise modelling are presented on the Scenario 3A noise contour plan. The contours are generated at a height of 4800 mm above ground level, representative of second storey window height of the surrounding residences. The specific noise levels noted on the contour plan are taken from the point receivers positioned on the façade of each of the surrounding houses. Given this, the noise levels noted for the single storey houses are slightly lower than the noise contours.

The noise levels are greater on the northern side of the development given that the topography slopes upwards to the north, meaning that the receiver locations are located higher than elsewhere.

A summary of the results is provided below:

Noise receiver location	Calculated noise level	Adjusted noise level#	Assigned Level	Compliance
Melvista Nursing Home	L <sub>10</sub> 28 dB(A)	L <sub>10</sub> 33 dB(A)	L <sub>10</sub> 40 dB(A)	YES
80 Doonan Road	L <sub>10</sub> 26 dB(A)	L <sub>10</sub> 31 dB(A)	L <sub>10</sub> 40 dB(A)	YES
71 Doonan Road	L <sub>10</sub> 34 dB(A)	L <sub>10</sub> 39 dB(A)	L <sub>10</sub> 40 dB(A)	YES
69 Doonan Rd	L <sub>10</sub> 31 dB(A)	L <sub>10</sub> 36 dB(A)	L <sub>10</sub> 40 dB(A)	YES
67 Doonan Rd	L <sub>10</sub> 30 dB(A)	L <sub>10</sub> 35 dB(A)	L <sub>10</sub> 40 dB(A)	YES
11 Betty St	L <sub>10</sub> 23 dB(A)	L <sub>10</sub> 28 dB(A)	L <sub>10</sub> 40 dB(A)	YES
14 Betty St	L <sub>10</sub> 26 dB(A)	L <sub>10</sub> 31 dB(A)	L <sub>10</sub> 40 dB(A)	YES
12 Betty St	L <sub>10</sub> 33 dB(A)	L <sub>10</sub> 38 dB(A)	L <sub>10</sub> 40 dB(A)	YES
10 Betty St	L <sub>10</sub> 31 dB(A)	L <sub>10</sub> 36 dB(A)	L <sub>10</sub> 40 dB(A)	YES
8 Betty Street	L <sub>10</sub> 32 dB(A)	L <sub>10</sub> 37 dB(A)	L <sub>10</sub> 40 dB(A)	YES

Table 7 – Scenario 3A results (condensers operating during the daytime)

# - Includes a +5 dB penalty for ‘tonality’.

The noise modelling indicates that the noise emissions from the condensers operating at full-load will comply with the ‘Assigned Levels’ during the daytime, and also the evening period between 7 pm and 10 pm.

3.5.2 Scenario 3B – Condensers operating at night after 10 pm

Simulation 3B was undertaken to determine the noise emissions from the condensing units at night, with the condensers incorporating a minimum 5 dB night set-back mode (ie the noise emissions from the condensers is at least 5 dB lower at night). The results are presented as a noise contour plan (Scenario 3B) in Appendix B. A summary of the results is provided below.

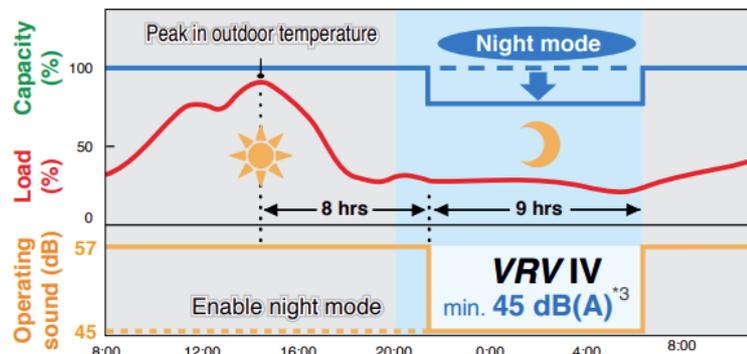
Noise receiver location	Calculated noise level	Adjusted noise level#	Assigned Level	Compliance
Melvista Nursing Home	L <sub>10</sub> 24 dB(A)	L <sub>10</sub> 29 dB(A)	L <sub>10</sub> 35 dB(A)	YES
80 Doonan Road	L <sub>10</sub> 21 dB(A)	L <sub>10</sub> 26 dB(A)	L <sub>10</sub> 35 dB(A)	YES
71 Doonan Road	L <sub>10</sub> 29 dB(A)	L <sub>10</sub> 34 dB(A)	L <sub>10</sub> 35 dB(A)	YES
69 Doonan Rd	L <sub>10</sub> 26 dB(A)	L <sub>10</sub> 31 dB(A)	L <sub>10</sub> 35 dB(A)	YES
67 Doonan Rd	L <sub>10</sub> 25 dB(A)	L <sub>10</sub> 30 dB(A)	L <sub>10</sub> 35 dB(A)	YES
11 Betty St	L <sub>10</sub> 18 dB(A)	L <sub>10</sub> 23 dB(A)	L <sub>10</sub> 35 dB(A)	YES
14 Betty St	L <sub>10</sub> 22 dB(A)	L <sub>10</sub> 27 dB(A)	L <sub>10</sub> 35 dB(A)	YES
12 Betty St	L <sub>10</sub> 28 dB(A)	L <sub>10</sub> 33 dB(A)	L <sub>10</sub> 35 dB(A)	YES
10 Betty St	L <sub>10</sub> 26 dB(A)	L <sub>10</sub> 31 dB(A)	L <sub>10</sub> 35 dB(A)	YES
8 Betty Street	L <sub>10</sub> 27 dB(A)	L <sub>10</sub> 32 dB(A)	L <sub>10</sub> 35 dB(A)	YES

Table 8 – Scenario 3B results (condensers operating at night)

# - Includes a +5 dB penalty for ‘tonality’.

The noise modelling indicates that by incorporating a minimum night set-back mode the condensing units will comply with the ‘Assigned Levels’ at night after 10 pm.

The night set-back mode, or ‘Nighttime Quiet Operation Function’ as termed by Daikin, is a mode that can be programmed onsite by the installer at the PCB, but cannot be interfered with or altered by the building occupants and maintenance staff. Only a Daikin technician can modify this setting. Essentially what this mode does is ensures that the condenser fans only operate at low speed between 10 pm and 7 am (9 am on Sundays). The excerpt from a Daikin manual below demonstrates the night set-back mode.



- Note:
- This function is available in setting at site.
  - The operating sound in quiet operation mode is the actual value measured by our company.
  - The relationship of outdoor temperature (load) and time shown above is just an example.

Figure 2 – Excerpt from Daikin manual regarding the night set-back mode

This mode is a common requirement for condensing units in aged care developments, apartments, and other multi-residential projects that are located in a residential setting.

3.6 Miscellaneous exhaust fans

At this early stage of the project there is no mechanical design or equipment selections for the various exhaust fans that may be used on this project. However, in our experience of previous similar projects it is likely that the following noise control will be required:

- A 2D attenuator shall be incorporated on the exhaust side of the carpark exhaust fan. This fan shall incorporate a variable speed drive and be linked to carbon monoxide sensors to ensure that the fan only operates when required.
- The Kitchen Exhaust Fan shall be selected on the basis of quiet operation. It may be necessary to specify an in-line fan with an appropriate attenuator (eg Fantech Q-seal) in order to achieve sufficiently low noise emissions.
- The toilet exhaust fans shall be selected on the basis of quiet operation. It may be necessary to oversize the fan and operate it at lower fan speeds in order to achieve sufficiently low noise emissions.

The required noise control for the exhaust fans will be determined prior to the Building Permit submission.

### 3.7 Waste collection vehicles

Regulation 14A of the Environmental Protection (Noise) Regulations 1997 addresses the noise emissions associated with waste collection. Fundamentally, waste collection activities are exempt from complying with the 'Assigned Levels', provided the collection only occurs between the hours of 7 am and 7 pm Monday to Saturday, and between 9 am and 7 pm on Sundays and Public Holidays.

We understand that at this stage there is no proposal for out-of-hours waste collection. If the waste collection for The Melvista will occur out of these hours, then the waste collection service provider will need to prepare a noise management plan in accordance with Regulation 14A(6).

### 3.8 Laundry dryers

The commercial dryers used in aged care facilities are externally flued. The noise emissions from these flues can be problematic. Although the dryers will only operate during the daytime, the potential noise emissions from the flues requires consideration.

The laundry dryers will be located in the basement, with the flues travelling vertically up the interior of the building to the roof-top plant area. At this early stage of the project, the type/brand of dryer is unknown and therefore cannot be assessed. However, it is our recommendation that the flue discharges be located lower than the top of the roof such that there is no acoustic 'line-of-sight' between the flues and the residences.

Prior to the Building Permit submission, an assessment of the selected dryers will be undertaken. If necessary for compliance, in-line attenuators (eg Fantech Q-seal) will be incorporated into the dryer flues.

### 3.9 Emergency Generator

An emergency generator will be located in the basement. This is an ideal location for the generator as any noise break-out will be into the enclosed basement carpark rather than towards the residential boundaries. The generator shall be tested during the daytime (7 am to 7 pm), Monday to Saturday, when the Assigned Level is L<sub>10</sub> 45 dB(A).

This will likely required a packaged attenuated genset, in addition to an extent of attenuated ventilation between the generator room and the carpark. The exact noise control requirements will be determine prior to the lodgement of the Building permit when preliminary equipment selections have been made.

### 3.10 Summary of noise control requirements

- A minimum 2400 mm high solid acoustic screen will be required along the southern boundary, as illustrated in Figure 1 of this report;
- Delivery/service vehicles shall only enter the site between 7 am and 7 pm, Monday to Saturday;
- The fire pumps shall be packaged attenuated units with an engine radiated noise level of no greater than 88 dB(A) at 1 metre (eg Allied Pumps Enviropac Class 1 Attenuation). High grade mufflers/attenuators shall be provided for the diesel exhaust, and the exhaust cowls to be located in the roof-top plant area. The fire pumps shall only be tested between 7 am and 7 pm, Monday to Saturday;
- If the fire pump room has ventilation through the façade that exceeds 1 m<sup>2</sup> in area, 300 mm acoustic louvres will be required;

- The emergency generator shall be a packaged attenuated genset and shall only be tested between 7 am and 7 pm, Monday to Saturday;
- The top of the skillion roof shall be no less than 2100 mm above the 'floor' of the roof-top plant compound; and,
- The air-conditioning condensers shall incorporate a night setback mode which achieves a minimum 5 dB noise reduction.
- Prior to the Building Permit submission, assessments will be undertaken to determine the acoustic requirements for the various exhaust fans – particularly the carpark exhaust fan(s) and the Kitchen Exhaust Fan.

Author:

**Benjamin Farrell**

Director M.A.A.S.

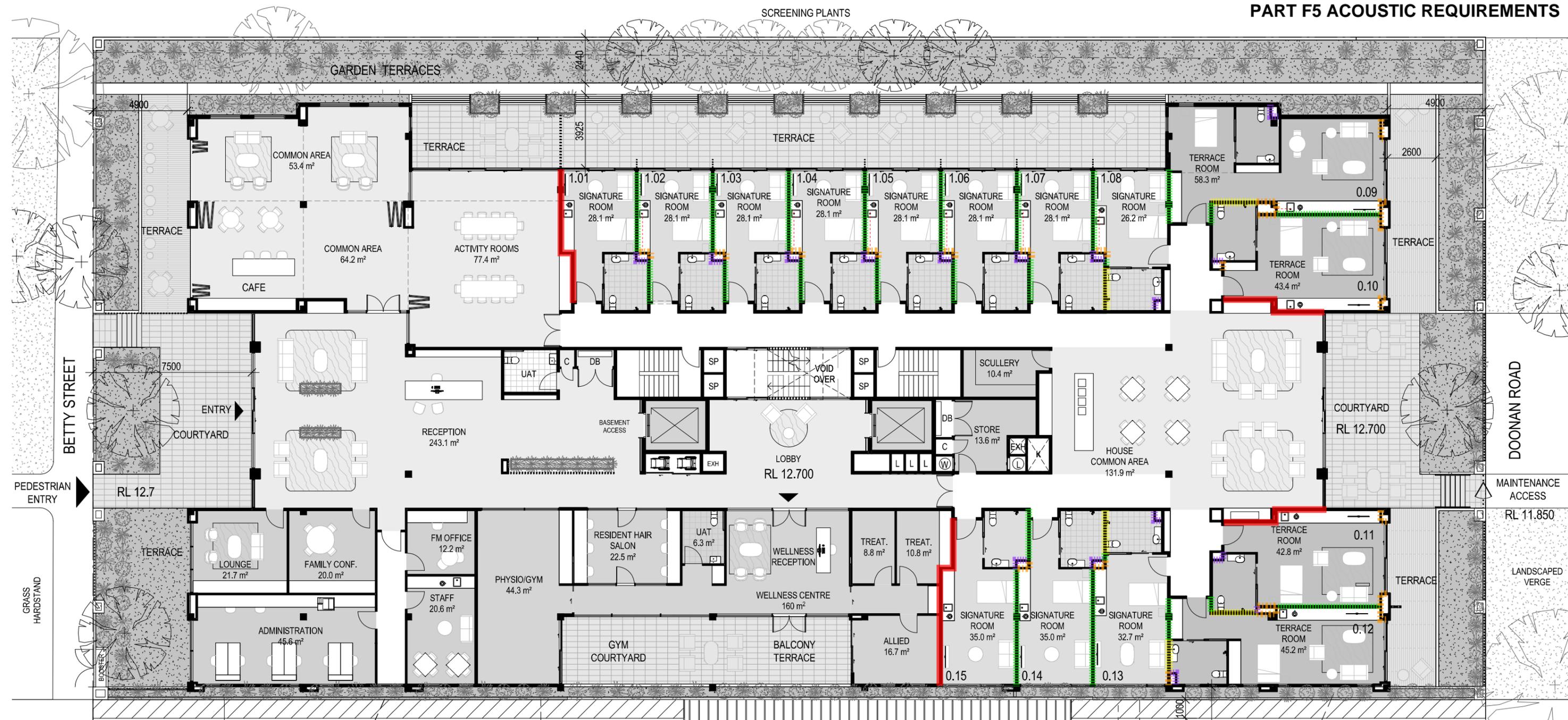


**GABRIELS HEARNE FARRELL PTY LTD**

Member Firm - Association of Australian Acoustical Consultants

#### **ATTACHMENTS**

- APPENDIX A - PART F5 ACOUSTIC REQUIREMENTS FOR WALLS
- APPENDIX B - NOISE CONTOUR PLANS (ENVIRONMENTAL NOISE EMISSIONS)



- Rw 45 WALL CONSTRUCTION (eg 2 LAYERS OF 13 mm PLASTERBOARD + 76 mm STUD FRAME WITH 75 mm GLASSWOOL INSULATION + 1 LAYER OF 13 mm PLASTERBOARD)
- Rw 45 **DISCONTINUOUS** WALL CONSTRUCTION (eg **WET AREA SIDE** - 1 LAYER OF 13 mm PLASTERBOARD + 64 mm STUDS + 20 mm GAP + 64 mm STUDS WITH 75 mm GLASSWOOL INSULATION + 2 LAYERS OF 13 mm PLASTERBOARD - **HABITABLE ROOM SIDE**)
- RECOMMENDED Rw 50 WALL CONSTRUCTION BETWEEN SOU AND COMMON/ADMIN AREAS (eg 2 LAYERS OF 13 mm PLASTERBOARD + 76 mm STUD FRAME WITH 75 mm GLASSWOOL INSULATION + 2 LAYERS OF 13 mm PLASTERBOARD)
- Rw + Ctr 40 SEPARATION BETWEEN DUCT/RISER AND HABITABLE ROOM OF AN SOU (eg REHAU RAUPIANO PLUS ACOUSTIC PIPEWORK + STUD FRAME WITH 75 mm GLASSWOOL INSULATION + 13 mm PLASTERBOARD LINING)

- Rw + Ctr 25 SEPARATION BETWEEN DUCT/RISER AND WET AREA OF SOU (eg REHAU RAUPIANO PLUS ACOUSTIC PIPEWORK + STUD FRAME + 13 mm PLASTERBOARD)
- WATER SUPPLY PIPE SERVING THE SINK MUST NOT BE FIXED WITHIN OR TO THE SURFACE OF THE SOU WALL. THE WATER SUPPLY PIPES SHALL BE FIXED TO THE UNDERSIDE OF THE BENCH USING RESILIENT/BINDER CLIPS

	CONSULTANT	Hassel LTD ABN 24 007 711 435 Level 1 Commonwealth Bank Building 242 Murray Street Perth WA 6000 Australia T +61 8 6477 6000 perth@hasselstudio.com	REFERENCE	NORTH	NOTES	REV DESCRIPTION	DATE	CLIENT	STATUS	REVIEWED	SCALE @ A3
	1. Do not scale drawing. Written dimensions govern 2. All dimensions are in millimeters unless noted otherwise 3. All dimensions shall be verified on site before proceeding with the work. Hassell shall be notified in writing of any discrepancies. 4. This drawing must be read in conjunction with all relevant contracts, specifications and drawings This drawing is an uncontrolled copy. Unless noted otherwise © Copyright of this drawing is vested in Hassell Ltd.	A SDRP REVIEW 2	11/09/2020	ORYX COMMUNITIES	DRAWING TITLE GA PLAN - LEVEL 00	MJ	1 : 200				
			0m 1m 2m 3m 4m					PROJECT		APPROVED	PROJECT NO.
								THE MELVISTA, NEDLANDS		MJ	013409
										DRAWING NO.	REV NO.
										SK_0021	A



- Rw 45 WALL CONSTRUCTION (eg 2 LAYERS OF 13 mm PLASTERBOARD + 76 mm STUD FRAME WITH 75 mm GLASSWOOL INSULATION + 1 LAYER OF 13 mm PLASTERBOARD)
- Rw 45 *DISCONTINUOUS* WALL CONSTRUCTION (eg *WET AREA SIDE* - 1 LAYER OF 13 mm PLASTERBOARD + 64 mm STUDS + 20 mm GAP + 64 mm STUDS WITH 75 mm GLASSWOOL INSULATION + 2 LAYERS OF 13 mm PLASTERBOARD - *HABITABLE ROOM SIDE*)
- RECOMMENDED Rw 50 WALL CONSTRUCTION BETWEEN SOU AND COMMON/ADMIN AREAS (eg 2 LAYERS OF 13 mm PLASTERBOARD + 76 mm STUD FRAME WITH 75 mm GLASSWOOL INSULATION + 2 LAYERS OF 13 mm PLASTERBOARD)
- Rw + Ctr 40 SEPARATION BETWEEN DUCT/RISER AND HABITABLE ROOM OF AN SOU (eg REHAU RAUPIANO PLUS ACOUSTIC PIPEWORK + STUD FRAME WITH 75 mm GLASSWOOL INSULATION + 13 mm PLASTERBOARD LINING)

- Rw + Ctr 25 SEPARATION BETWEEN DUCT/RISER AND WET AREA OF SOU (eg REHAU RAUPIANO PLUS ACOUSTIC PIPEWORK + STUD FRAME + 13 mm PLASTERBOARD)
- WATER SUPPLY PIPE SERVING THE SINK MUST NOT BE FIXED WITHIN OR TO THE SURFACE OF THE SOU WALL. THE WATER SUPPLY PIPES SHALL BE FIXED TO THE UNDERSIDE OF THE BENCH USING RESILIENT/BINDER CLIPS

**H**

**CONSULTANT**  
**Hassell**  
 Hassell LTD ABN 24 007 711 435  
 Level 1  
 Commonwealth Bank Building  
 242 Murray Street  
 Perth WA 6000 Australia  
 T +61 8 6477 6000  
 perth@hasselstudio.com

**REFERENCE**

**NORTH**

**NOTES**

1. Do not scale drawing. Written dimensions govern
2. All dimensions are in millimeters unless noted otherwise
3. All dimensions shall be verified on site before proceeding with the work. Hassell shall be notified in writing of any discrepancies.
4. This drawing must be read in conjunction with all relevant contracts, specifications and drawings

This drawing is an uncontrolled copy. Unless noted otherwise  
 © Copyright of this drawing is vested in Hassell Ltd.

REV	DESCRIPTION
A	SDRP REVIEW 2

**DATE**  
11/09/2020

**CLIENT**  
ORYX COMMUNITIES

**PROJECT**  
THE MELVISTA, NEDLANDS

**STATUS**

**DRAWING TITLE**  
GA PLAN - LEVEL 01-02

**REVIEWED**  
MJ

**APPROVED**  
MJ

**DRAWING NO.**  
SK\_0022

**SCALE @ A3**  
1 : 200

**PROJECT NO.**  
013409

**REV NO.**  
A



█ Rw 45 WALL CONSTRUCTION (eg 2 LAYERS OF 13 mm PLASTERBOARD + 76 mm STUD FRAME WITH 75 mm GLASSWOOL INSULATION + 1 LAYER OF 13 mm PLASTERBOARD)

█ Rw 45 DISCONTINUOUS WALL CONSTRUCTION (eg WET AREA SIDE - 1 LAYER OF 13 mm PLASTERBOARD + 64 mm STUDS + 20 mm GAP + 64 mm STUDS WITH 75 mm GLASSWOOL INSULATION + 2 LAYERS OF 13 mm PLASTERBOARD - HABITABLE ROOM SIDE)

GA PLAN - LEVEL 03  
1:200

█ RECOMMENDED Rw 50 WALL CONSTRUCTION BETWEEN SOU AND COMMON/ADMIN AREAS (eg 2 LAYERS OF 13 mm PLASTERBOARD + 76 mm STUD FRAME WITH 75 mm GLASSWOOL INSULATION + 2 LAYERS OF 13 mm PLASTERBOARD)

█ Rw + Ctr 40 SEPARATION BETWEEN DUCT/RISER AND HABITABLE ROOM OF AN SOU (eg REHAU RAUPIANO PLUS ACOUSTIC PIPEWORK + STUD FRAME WITH 75 mm GLASSWOOL INSULATION + 13 mm PLASTERBOARD LINING)

█ Rw + Ctr 25 SEPARATION BETWEEN DUCT/RISER AND WET AREA OF SOU (eg REHAU RAUPIANO PLUS ACOUSTIC PIPEWORK + STUD FRAME + 13 mm PLASTERBOARD)

--- WATER SUPPLY PIPE SERVING THE SINK MUST NOT BE FIXED WITHIN OR TO THE SURFACE OF THE SOU WALL. THE WATER SUPPLY PIPES SHALL BE FIXED TO THE UNDERSIDE OF THE BENCH USING RESILIENT/BINDER CLIPS



CONSULTANT

Hassell LTD ABN 24 007 711 435  
Level 1  
Commonwealth Bank Building  
242 Murray Street  
Perth WA 6000 Australia  
T +61 8 6477 6000  
perth@hassellstudio.com

REFERENCE



NORTH



NOTES

1. Do not scale drawing. Written dimensions govern
  2. All dimensions are in millimeters unless noted otherwise
  3. All dimensions shall be verified on site before proceeding with the work. Hassell shall be notified in writing of any discrepancies.
  4. This drawing must be read in conjunction with all relevant contracts, specifications and drawings
- This drawing is an uncontrolled copy. Unless noted otherwise  
© Copyright of this drawing is vested in Hassell Ltd.

REV DESCRIPTION

A SDRP REVIEW 2

DATE

11/09/2020

CLIENT

ORYX COMMUNITIES

PROJECT

THE MELVISTA, NEDLANDS



STATUS

DRAWING TITLE  
GA PLAN - LEVEL 03

REVIEWED

MJ

APPROVED

MJ

DRAWING NO.

SK\_0024

SCALE @ A3

1 : 200

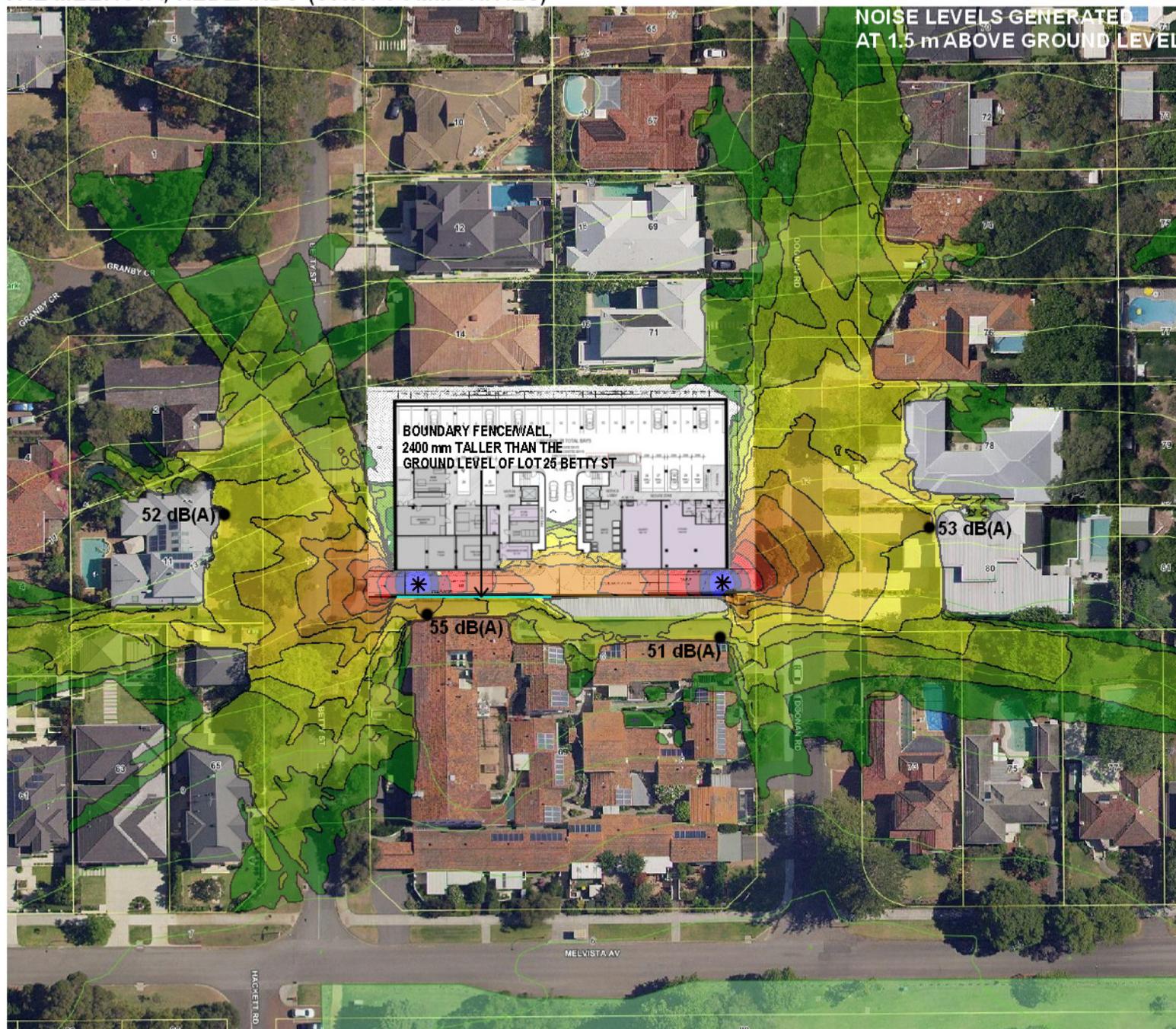
PROJECT NO.

013409

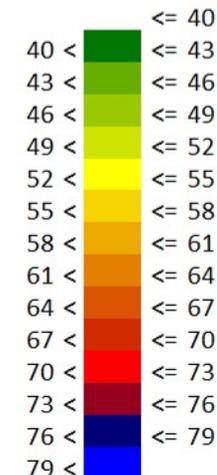
REV NO.

A

**ENVIRONMENTAL NOISE ASSESSMENT  
THE MELVISTA, NEDLANDS (ORYX COMMUNITIES)**



Noise level  
dB(A)



Scale 1:1100



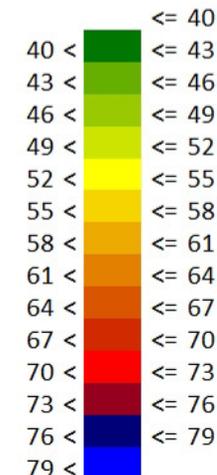
**SCENARIO 1  
DELIVERY/SERVICE VEHICLES DRIVING  
ALONG THE ENTRY/EXIT RAMPS**

- DELIVERY VEHICLE WITH SWL OF 93 dB(A)
- SOLID FENCE/WALL ALONG SOUTHERN BOUNDARY, 2400 mm TALLER THAN THE GROUND LEVEL OF LOT 25 (RUNNING FROM THE WESTERN END OF THE NURSING HOME STORE ROOMS TO 6 METRES FROM THE WESTERN BOUNDARY).
- THE PERGOLA ABOVE THE LOADING AREA HAS BEEN MODELLED AS AN OPEN/SLATTED PERGOLA.

**ENVIRONMENTAL NOISE ASSESSMENT  
THE MELVISTA, NEDLANDS (ORYX COMMUNITIES)**



Noise level  
dB(A)



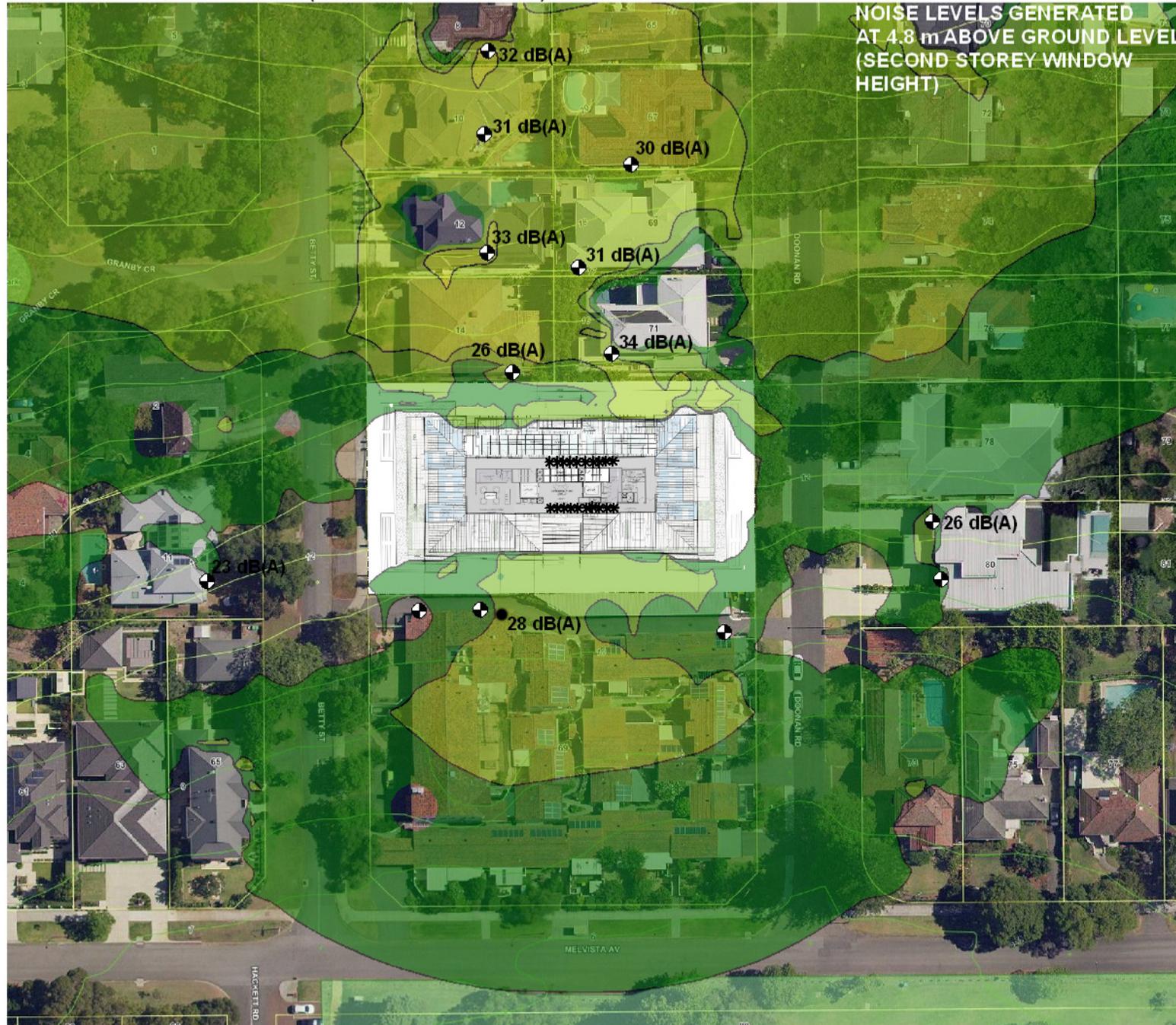
Scale 1:1100



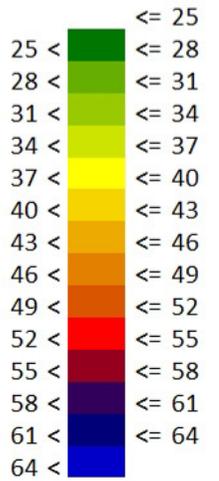
**SCENARIO 2  
FIRE PUMP OPERATING FOR TESTING  
PURPOSES**

- ATTENUATED FIRE PUMP UNIT RATED AT 88 dB(A) AT 1 METRE (eg ALLIED PUMPS ENVIROPAC CLASS 1 ATTENUATION)
- 1 m<sup>2</sup> OF LOUVRE/GRILLE ON SOUTH SIDE OF PUMP ROOM FOR VENTILATION
- SOLID FENCE/WALL ALONG SOUTHERN BOUNDARY, 2400 mm TALLER THAN THE GROUND LEVEL OF LOT 25 (RUNNING FROM THE WESTERN END OF THE NURSING HOME STORE ROOMS TO 6 METRES FROM THE WESTERN BOUNDARY).

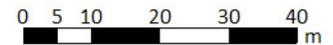
**ENVIRONMENTAL NOISE ASSESSMENT  
THE MELVISTA, NEDLANDS (ORYX COMMUNITIES)**



Noise level  
dB(A)



Scale 1:1100



**SCENARIO 3A  
AIR-CONDITIONING CONDENSERS  
OPERATING AT FULL LOAD  
(DAYTIME CONDITIONS)**

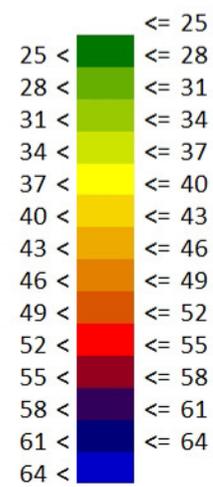
- 10 OFF DAIKIN RXYQ14 CONDENSERS (EACH 71 dB(A) AT 1 METRE)
- 10 OFF DAIKIN RXYQ10 CONDENSERS (EACH 68 dB(A) AT 1 METRE)

**ENVIRONMENTAL NOISE ASSESSMENT  
THE MELVISTA, NEDLANDS (ORYX COMMUNITIES)**

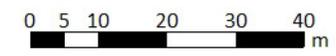


**NOISE LEVELS GENERATED  
AT 4.8 m ABOVE GROUND LEVEL  
(SECOND STOREY WINDOW  
HEIGHT)**

Noise level  
dB(A)



Scale 1:1100



**SCENARIO 3B  
AIR-CONDITIONING CONDENSERS  
OPERATING IN NIGHT SET-BACK MODE**

- 10 OFF DAIKIN RXYQ14 CONDENSERS (EACH 66 dB(A) AT 1 METRE)
- 10 OFF DAIKIN RXYQ10 CONDENSERS (EACH 63 dB(A) AT 1 METRE)