

Appendix 6: Acoustic Report

Acoustic Report: Development Application

**South Bunbury Community Aged Care
11 Hayward Street, South Bunbury WA 6230**

Reference: 19075070-03A

Prepared for:
Signature Care, C/o- Croft Developments

Reference: 19075070-03A

Lloyd George Acoustics Pty Ltd

ABN: 79 125 812 544

PO Box 717

Hillarys WA 6923

www.lgacoustics.com.au

Contacts	General	Daniel Lloyd	Terry George	Matt Moyle
E:	info@lgacoustics.com.au	daniel@lgacoustics.com.au	terry@lgacoustics.com.au	matt@lgacoustics.com.au
P:	9401 7770	0439 032 844	0400 414 197	0412 611 330
Contacts	Rob Connolly	Hao Tran	Matt Nolan	
E:	rob@lgacoustics.com.au	hao@lgacoustics.com.au	matt.nolan@lgacoustics.com.au	
P:	0410 107 440	0438 481 207	0448 912 604	

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Date	Rev	Description	Author	Verified
9-Feb-24	0	Issued to Client	Daryl Thompson	Terry George
4-Sep-24	A	Drawings Updated	Matt Nolan	Terry George

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1. INTRODUCTION

It is proposed to construct the South Bunbury Community Aged Care development at 11 Hayward Street, South Bunbury, as located in the modified composite image on *Figure 1-1 over the page*. The development (refer *Appendix A plans*) consists of:

- 138x individual Ground floor aged care units designated Signature, Premium Signature and Classic with views to internal courtyard(s) or external landscaped gardens;
- Main Reception, Main Kitchens with Communal Dining facilities and servery, Café area with Alfresco seating, Lounges, Cinema, Multi-Function Room and BoH Offices, Shops/Services and Administration rooms;
- Outdoor Bowling Lane in central courtyard, 2 x car parking areas (total 93 Bays), Maintenance Sheds, Workshop(s) and Essential Services located around the site;
- 36x individual Level 1 aged care residence units designated Signature, Premium Signature and Classic with balconies and First Floor views to internal courtyard(s) or external landscaped gardens;
- Staff Room and Facilities, Facility Management Offices, Communal indoor and outdoor Alfresco Dining facilities, Lounges and BoH Services rooms;
- Mechanical plant (assumed) distributed at Ground Floor and roof level.

The project represents substantial revisions to a prior approved DA application acoustic report (*Ref: 19075070-01 Rev C*), dated 3-March 2020, which assessed 138x individual rooms across Lot 1 (No.15) and Lot 18 (No.15) Hayward Street, Lot 13 (No.15), Lot 19 (No.15) and Lot 213 (No.21) Holywell Street and Lot 180 (No.180) Jarvis Street.

Additional land area is now part of the development site plan comprised Lot 20 (#30) Jarvis Street, proposed to accommodate a revised car parking layout from the previous design. Lot 20 will now host 40 car parking bays and a services/loading area accessed via Jarvis Street with a separate car park to the north accessed via Hayward Street.

The revised design necessarily implies changes to the previously assessed noise sources - changes to car parking layout and mechanical services layout will affect noise emission results, hence an updated noise model study has been undertaken in this report.

With regard to acoustics, the following will need to be addressed as the design progresses:

- Noise emissions – considering noise from the proposed air-conditioning units against the requirements of the *Environmental Protection (Noise) Regulations 1997*;
- Noise separation – considering construction requirements to satisfy *National Construction Code (NCC) Volume One Building Code of Australia (BCA) Part F5*.

The revised project design is at Development Application (DA) stage and therefore much of the detailed design for the new areas is yet to occur. For noise emissions, typical noise levels from air-conditioning units, exhaust fans, refrigeration plant and the like have been assumed and modelled to neighbouring premises. For compliance with the NCC, the focus is on the criteria with broad advice provided until project specifics are known.

Appendix E contains a description of some of the terminology used throughout this report.

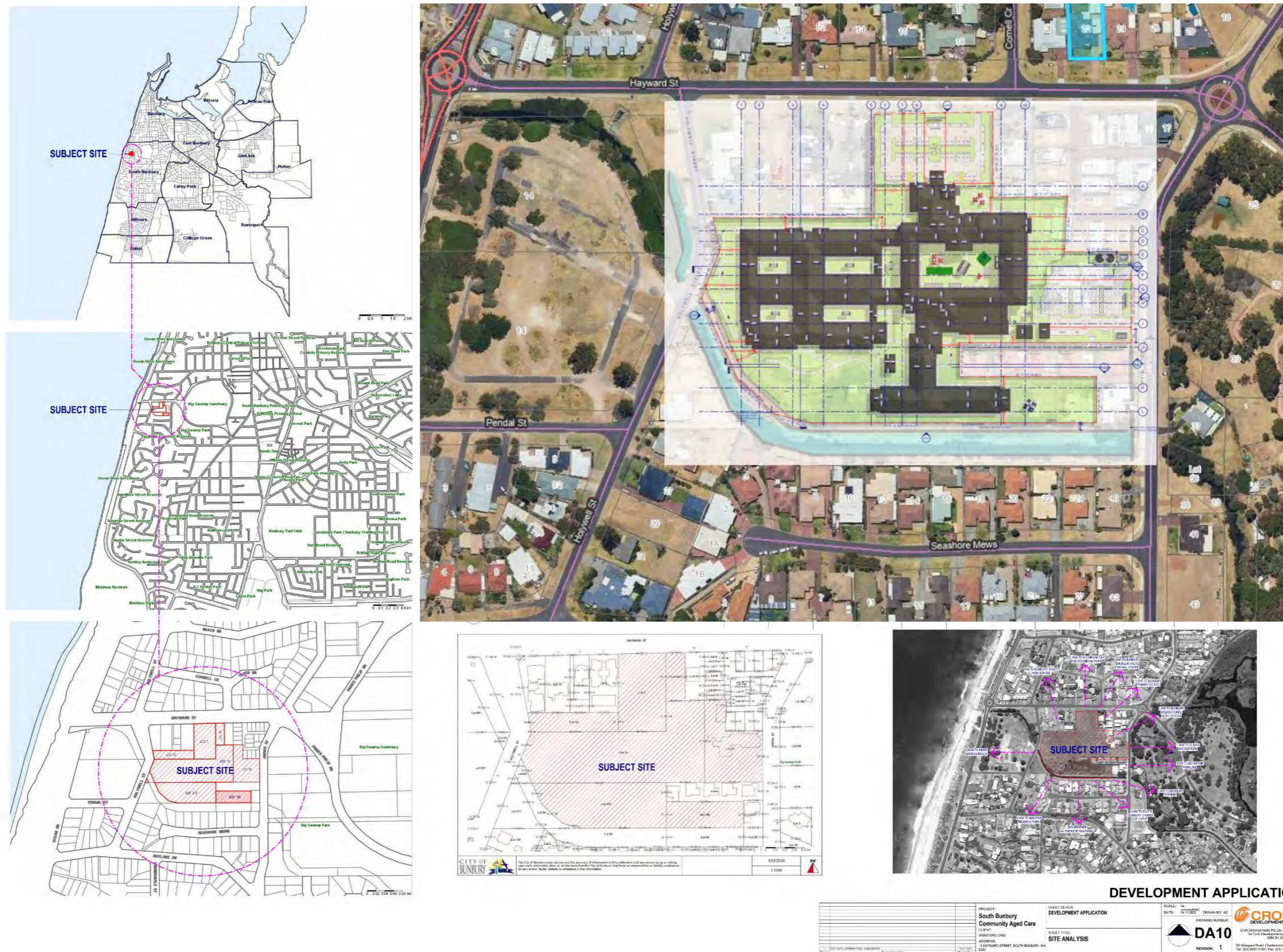


Figure 1-1: Site Locality and Site Plan

2. CRITERIA

Each of the relevant criteria are discussed in the following sections. Compliance with these will be further worked through during detailed design.

2.1. Noise Emissions

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations or EPNR).

2.1.1. Regulations 7, 8 & 9

This group of regulations provide the prescribed standard for noise as follows:

“7. Prescribed standard for noise emissions

- (1) *Noise emitted from any premises or public place when received at other premises –*
- (a) *must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and*
 - (b) *must be free of –*
 - (i) *tonality; and*
 - (ii) *impulsiveness; and*
 - (iii) *modulation,**when assessed under regulation 9.*
- (2) *For the purposes of subregulation (1)(a), a noise emission is taken to significantly contribute to a level of noise if the noise emission ... exceeds a value which is 5 dB below the assigned level at the point of reception.”*

Tonality, impulsiveness and modulation are defined in regulation 9 (refer *Appendix E*). Under regulation 9(3), “noise is to be taken to be free of these characteristics if:

- (a) *the characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and*
- (b) *the noise emission complies with the standard prescribed under regulation 7(1)(a) after the adjustments in the table [Table 2-1] ... are made to the noise emission as measured at the point of reception.”*

Table 2-1 EPNR Adjustments Where Characteristics Cannot Be Removed

Where Noise Emission is Not Music*			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

* These adjustments are cumulative to a maximum of 15 dB.

The nearest noise sensitive premises are identified as:

- R1 – 5/34 Jarvis Street, existing single-storey residence
- R2 – 7 Hayward Street, existing single-storey residence
- R3 – 15 Hayward Street, existing single-storey residence

The assigned levels (prescribed standards) for all premises are specified in regulation 8(3) and are shown in *Table 2-2*. The L_{A10} assigned level is applicable to noises present for more than 10% of a representative assessment period, generally applicable to “steady-state” noise sources. The L_{A1} is for short-term noise sources present for less than 10% and more than 1% of the time. The L_{Amax} assigned level is applicable for incidental noise sources, present for less than 1% of the time.

Table 2-2 EPNR Baseline Assigned Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area ¹	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial Premises	All hours	60	75	80
Industrial and Utility Premises	All hours	65	80	90

1. *highly sensitive area* means that area (if any) of noise sensitive premises comprising —
- a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
 - any other part of the premises within 15 metres of that building or that part of the building.

The influencing factor, applicable at the noise sensitive premises has been calculated as 0 dB, as demonstrated in *Appendix B*. The transport factor has been calculated as 0 dB, due to there being no major nor secondary road) within 100-450 metres of the nearby residences.

Table 2-3 shows the assigned levels including the influencing factor and transport factor at the receiving locations.

Table 2-3 EPNR Assigned Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
0 dB IF Noise sensitive premises: highly sensitive area ¹	0700 to 1900 hours Monday to Saturday (Day)	45	55	65
	0900 to 1900 hours Sunday and public holidays (Sunday)	40	50	65
	1900 to 2200 hours all days (Evening)	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35	45	55

It must be noted the assigned levels above apply outside the receiving premises and at a point at least 3 metres away from any substantial reflecting surfaces. Where this was not possible to be achieved due to the close proximity of existing buildings and/or fences, the noise emissions were assessed at a point within 1 metre from building facades and a -2 dB adjustment was made to the predicted noise levels to account for reflected noise.

The assigned levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as “*a period of time of not less than 15 minutes, and not exceeding 4 hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission*”.

An inspector or authorised person is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government Environmental Health Officers and Officers from the Department of Water Environmental Regulation. Acoustic consultants or other environmental consultants are not appointed as an inspector or authorised person. Therefore, whilst this assessment is based on a 4-hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

2.1.2. Regulation 3

“3. Regulations do not apply to certain noise emissions

- (1) *Nothing in these regulations applies to the following noise emissions –*
- (a) *Noise emissions from the propulsion and braking systems of motor vehicles operating on a road;”*

The car park is considered a road and therefore vehicle noise (propulsion and braking) is not assessed. Noise from vehicle car doors however are assessed, since these are not part of the propulsion or braking system.

2.1.3. Regulation 14A

“14A. Waste Collection and Other Works

- (2) *Regulation 7 does not apply to noise emitted in the course of carrying out class 1 works if –*
- (a) *The works are carried out in the quietest reasonable and practicable manner; and*
 - (b) *The equipment used to carry out the works is the quietest reasonably available;*

class 1 works means specified works carried out between -

- (a) *0700 hours and 1900 hours on any day that is not a Sunday or a public holiday; or*
- (b) *0900 hours and 1900 hours on a Sunday or public holiday.*

specified works means -

- (a) *The collection of waste; or*
- (b) *The cleaning of a road or the drains for a road; or*
- (c) *The cleaning of public places, including footpaths, cycle paths, car parks and beaches;”*

In the case where specified works are to be carried out outside of class 1, a noise management plan is to be prepared and approved by the CEO.

2.2. Noise Separation

2.2.1. National Construction Code

It is a requirement under the *National Construction Code* (NCC) for sound transmission and insulation to be considered. In this case, the building is classified as Class 9C Aged Care Facility, hence the relevant volume of the NCC is Volume One of the *Building Code of Australia, Class 2 to Class 9 Buildings* (BCA) and specifically Part F5.

Note, where the term sole-occupancy unit (SOU) is used, this refers to one within a Class 2, 3 or 9C (Aged Care) building.

The Objective of Part F5 as stated in *Guide to NCC Volume One* is to:

“...safeguard occupants from illness or loss of amenity as a result of undue sound being transmitted –

- (a) Between adjoining sole-occupancy units; and*
- (b) From common spaces to sole-occupancy units; and*
- (c) From parts of different classifications to sole-occupancy units.”*

The BCA separates the performance requirements into floors and walls for Class 9C buildings as follows:

“FP5.4 Sound Transmission Through Floors

*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

*Walls separating **sole-occupancy units** or a **sole-occupancy unit** from a kitchen, bathroom, sanitary compartment (not being an associated ensuite), laundry, plant room or utilities 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 Services Penetrations

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.”

In order to satisfy FP5.1 to FP5.3, building elements are to satisfy the minimum acoustic performances nominated in *Table 2-4*, being a summary of the Deemed-to-Satisfy Provisions provided in F5.4 to F5.6 (Laboratory Tests) and Verification Methods provided in FV5.1 and FV5.2 (Field/On-Site Tests).

Table 2-4 NCC Deemed-to-Satisfy Provisions and Verification Methods

Description	Deemed-to-Satisfy (Laboratory)	Verification (On-Site)
F5.4 Sound Insulation Rating of Floors & FV5.1 Sound Transmission Through Floors		
Separating SOU's (airborne sound)	$R_w \geq 45$	$D_{nT,w} \geq 40$
Separating SOU's (impact sound)	$L_{n,w} \leq 62$	$L_{nT,w} \leq 62$
F5.5 Sound Insulation Rating of Walls & FV5.2 Sound Transmission Through Walls		
Separating SOU's	$R_w \geq 45$	$D_{nT,w} \geq 40$
Separating SOU from kitchen, bathroom, sanitary compartment (not being an associated ensuite), laundry, plant room or utilities room	$R_w \geq 45$	$D_{nT,w} \geq 40$
Separating SOU from kitchen or laundry	Discontinuous Construction*	N/A
F5.6 Sound Insulation Rating of Internal Services		
SOU (Habitable) to duct, soil, waste, water supply or storm water (not associated with the SOU)	$R_w + C_{tr} \geq 40$	N/A
SOU (Non-Habitable) to duct, soil, waste, water supply or storm water (not associated with the SOU)	$R_w + C_{tr} \geq 25$	N/A

* Discontinuous construction is defined in F5.3(c) as “a wall having a minimum 20mm cavity between 2 separate leaves, and:

- (i) For masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and
- (ii) For other than masonry, there is no mechanical linkage between leaves except at the periphery.”

3. NOISE EMISSION PRELIMINARY ASSESSMENT

3.1. Methodology

Computer modelling has been used to predict the noise emissions from the development to all nearby receivers. The software used was *SoundPLAN 8.2* with the ISO 9613 algorithms (ISO 17534-3 improved method) selected, as they include the influence of wind and are considered appropriate given the relatively short source to receiver distances. Input data required in the model are listed below and discussed in *Section 3.1.1* to *Section 3.1.4*:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.1.1. Meteorological Conditions

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

Table 3-1: Modelling Meteorological Conditions

Parameter	Day (7.00am to 7.00pm)	Night (7.00pm to 7.00am)
Temperature (°C)	20	15
Humidity (%)	50	50
Wind Speed (m/s)	Up to 5	Up to 5
Wind Direction*	All	All

* The modelling package allows for all wind directions to be modelled simultaneously.

Alternatives to the above default conditions can be used where one year of weather data is available and the analysis considers the worst 2% of the day and night for the month of the year in which the worst-case weather conditions prevail (source: *Draft Guideline on Environmental Noise for Prescribed Premises*, May 2016). In most cases, the default conditions occur for more than 2% of the time and therefore must be satisfied.

3.1.2. Topographical Data

Topographical data was adapted from publicly available information (e.g. *Google*) in the form of spot heights and combined with the site plan.

Existing buildings in the direct vicinity of the proposed retirement village have also been included as these can provide barrier attenuation when located between a source and receiver, much the same as a hill. Single storey buildings were modelled as 3.5 metres high, double storey buildings were modelled as 7.0 metres high, and 3-storey buildings were modelled as 10.5 metres high.

Boundary fences at the closest existing residential premises have been implemented into the noise model based on digital imagery available on 'Google'.

The residences at 34 Jarvis Street are noted as being 1.1 metres lower than the finished floor level of the Aged Care Development, as shown in *Appendix A*.

The proposed 'Feature Fence' is not of solid construction as they include many gaps. These fences are therefore considered to have little to no screening effect acoustically. The proposed 1.8m "Acoustic Metal Fence" barrier is expected to provide noise reduction due to its acoustically screening effect, as long as it is solid and continuous and its surface mass is minimum 4kg/m^2 (such as singled skinned *Colorbond*) with the extent shown in blue in *Figure 3-1*.



Figure 3-1: Extents of Proposed 1.8m Acoustic Metal Fence

Figure 3-2 shows a 3D overview of the noise model with and relevant aspects of the model identified:

- Red Sphere – Noise Prediction points (Receivers)
- Yellow Buildings – Proposed Ancillary Buildings
- Orange Buildings – Existing Residential Buildings
- Brown Buildings – Proposed Aged Care Buildings
- Pink Sphere – Outdoor Noise Sources
- Turquoise – Effective Acoustic Fences

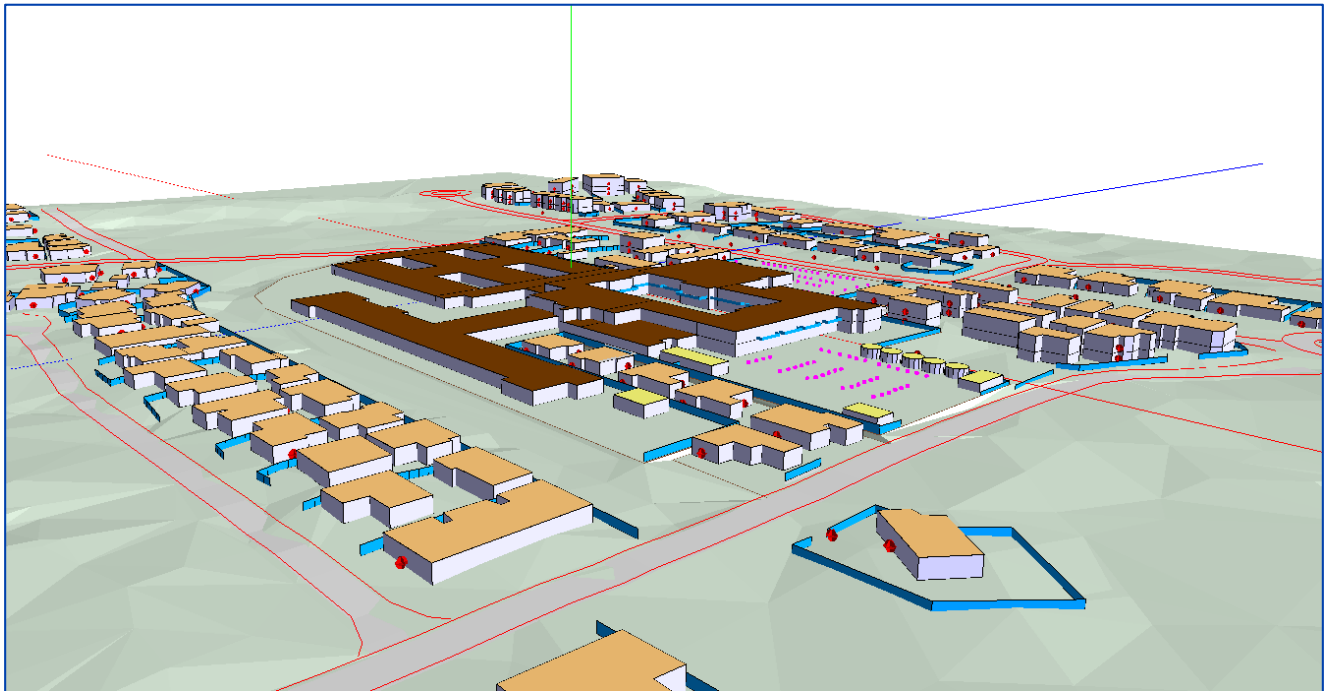


Figure 3-2: Overview of Noise Model

3.1.3. Ground Absorption

The ground attenuation has been assumed to be 0.0 (0%) for the roads and 0.5 (50%) elsewhere, noting that 0.0 represents hard reflective surfaces such as water and 1.0 represents absorptive surfaces such as grass.

3.1.4. Source Sound Levels

The sound power levels used in the modelling are provided in *Table 3-2* and are indicative only.

Table 3-2: Source Sound Power Levels, dB

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Essential Building Services Plant									
Main Kitchen Exhaust Fan (KEF) L_{A10}	95	99	95	83	84	82	83	81	92
Satellite Kitchen Exhaust Fan (KEF) L_{A10}	90	94	91	80	79	77	78	75	92

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Laundry Exhaust Fan (EF, Typical) L_{A10}	79	82	74	76	76	71	69	62	80
General Exhaust Fan (GEF, Typical, Lge) L_{A10}	75	79	75	71	70	71	67	61	77
General Exhaust Fan (GEF, Typical, Sml) L_{A10}	61	58	63	58	57	52	43	36	61
Toilet Exhaust Fan (Typical) L_{A10}	82	76	68	65	57	57	55	49	67
Residential AC CU (2kW) L_{A10}	68	72	65	62	58	51	50	40	64
Residential AC CU (3.5kW) L_{A10}	75	75	73	71	68	65	59	53	73
Communal AC CU (14kW) L_{A10}	73	73	71	64	63	60	55	48	69
Communal AC CU (24kW) L_{A10}	68	66	66	62	58	52	47	42	64
EVAP Cooler (Kitchen Make-up Air) L_{A10}	92	89	85	82	80	78	72	63	85
EVAP Cooler (Kitchen Make-up Air) L_{A10}	82	80	77	73	71	70	67	58	77
Fire Pump Testing									
Diesel Fire Pump Plant Testing – L_{A1}	79	89	96	101	100	101	96	94	107
Logistics and Car Park									
Standard Truck Deliveries L_{A1}	97	88	84	85	80	78	76	72	87
Small Refrigerated Truck delivery – L_{A1}	100	91	87	88	83	81	79	75	90
Unloading Goods (Incl. pallets) L_{AMAX}	94	99	88	82	82	95	88	81	97
Car Park Door Closings L_{AMAX}	71	74	77	81	80	78	72	61	84

The following is noted in relation to *Table 3-2*:

- Mechanical plant sound levels are estimated from previous projects and are located for preliminary assessment as follows:
 - Ground Floor AC CUs at 1.0m above local ground level mounted to unit exterior wall;
 - Level 1 AC CUs at 1.0m above roof level over serviced area;
 - Larger plant for communal areas at 1.2m above roof level, over or near to serviced area;
 - Locations will need to be reviewed at detailed design;
- All sources have been modelled as point sources;
- The truck refrigeration unit was modelled at 2.2 metres above ground;
- Exhaust Fans were modelled at 0.5m above roof level; directly above the rooms they are serving; except for the kitchen exhaust fan which was modelled at 1.2 metres above roof level;
- Evaporative coolers were modelled at 1.2 metres above roof level;
- All facade mounted fans were modelled at 2.8 metres above ground;

- All other sources were modelled at 1 metre above ground;
- All noise sources are assumed to be L_{A10} unless noted otherwise.

3.2. Building Sound Attenuation Performance Properties

3.2.1. Building Envelope Sound Transmission Loss

Sound insulation of the plant rooms and fire pump room building envelope (roof, walls, doorsets and ventilation louvres) is a key consideration for noise emissions.

Very high levels of internal sound from plant will radiate more or less sound through the building envelope as noise emissions in a direct relationship to the acoustic performance of the wall/roof material. This characteristic is referred as Sound Transmission Loss, expressed as a single figure value “ R_w ” – however, each material build-up is frequency specific, hence a profile across the frequency range 63Hz – 8kHz is required to ensure adequacy of design relative to anticipated internal activity noise levels.

In the case of the fire pump shed room (and First Floor enclosed plant room), ventilation louvres are an anticipated requirement – to be determined during detailed design. Example constructions and their performances used in the Schematic Design noise emissions modelling from the fire pump room are listed in *Table 3-3*.

Table 3-3: Building Envelope Materials - Sound Transmission Loss Data, R_w

Construction Build-up	R_w	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Heavyweight Walls - 180mm thick concrete panel w/P/Board internal lining on frame	58	36	42	41	53	59	61	65	70
Profile steel sheet – 0.6mm profiled steel sheet over rigid steel frame	27	11	14	18	23	28	33	38	38
Example Acoustic Louvre – Acran 100	15*	7	8	8	10	15	21	21	28
Steel Double Door System – steel doors, solid core with effective gasket seals at all jambs	35	18	18	29	32	36	37	32	34
Roof – Inclined profile metal sheeting over roof frame to 13mm P/Board sus. ceiling w/100mm insulation over;	41	20	23	30	37	45	53	55	58

* - R_w value is representative of Insertion Loss (IL, dB)

3.2.2. Acoustic Absorption Properties

Internal sound levels can be reduced by the application of acoustic absorption at room boundary surfaces. The extent to which a sound is absorbed at each reflection is expressed as an acoustic absorption coefficient, referred as Alpha, “ α ”, and is frequency-specific hence is expressed in octave bands.

A coefficient of 0.1 is considered mostly reflective, absorbing only 10% of incident sound energy; Whereas a coefficient of 0.9 absorbs 90% of incident sound energy. By reducing internal sound levels, there is a directly proportional reduction in corresponding noise emissions. *Table 3-4* lists the acoustic absorption coefficients used in Schematic Design noise emissions modelling from the fire pump shed room.

Table 3-4: Internal Acoustic Absorption Coefficient Data, “ α ”

Acoustic Absorbing Surface	α	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Plasterboard over airspace w/insulation behind	0.1	0.30	0.28	0.15	0.10	0.05	0.05	0.10	0.10
Block wall, no plaster	0.05	0.02	0.03	0.03	0.03	0.04	0.05	0.06	0.07
Mineral Fibre Acoustic Absorber Panels	0.65	0.30	0.40	0.45	0.60	0.70	0.80	0.85	0.90
Profile steel sheet over metal frame	0.1	0.3	0.25	0.15	0.1	0.08	0.05	0.06	0.05
Concrete Floor	0.05	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04
Openings	1.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Note – re: built form materials, this works is anticipated to be undertaken during Detailed Design when particulars are available re: finishes and fit out information.

3.3. Results and Assessment

Noise modelling was undertaken for the following scenarios:

- Scenario 1 – Typical Day Operations, L_{A10} ;
 - All mechanical plant including residential and communal area condensers, toilet exhaust fans and evaporative coolers, fans in the facade serving plant maintenance and bin rooms running at rated capacity running at rated capacity (including kitchen exhaust fan).
- Scenario 2 – Typical Night Operations, L_{A10} ;
 - All residential AC CU plant and Refrigeration R-CU Plant (24-Hour) only;
 - Communal areas and kitchens deemed to be not operating after 10.00pm;
- Scenario 3 – Separate assessment of incidental refrigerated delivery truck, L_{A1} ;
 - Refrigerated deliveries assessed against L_{A1} for periodic noise events present for <1% of typical operating times for the facility. Located at loading area/service bay with refrigeration unit assumed to be left on during the delivery.
- Scenario 4 – Separate assessment of incidental noise from logistics deliveries, L_{AMAX} ;
 - Noise from a standard goods delivery at loading area/service bay inclusive of incidental loading/unloading noise e.g. stacking pallets or dropping pallets on ground.
- Scenario 5 – Car Park Car Doors Closing, L_{AMAX} ;
 - Assessment of car door closing noise at the most sensitive night time hours, assumed to be representative of staff and visitors coming and going;
- Scenario 6 – Fire pump test, L_{A1}
 - Noise emitted by the fire pump building when the monthly test take place.

The results of the noise modelling for each scenario above are presented in the following sections. *Figure 3-3* to *Figure 3-13* also show the predicted noise levels as contour maps at ground floor level.

3.3.1. Scenario 1 – All Plant Operating, Normal Day Operations L_{A10}

Scenario 1 model assesses services noise (L_{A10}) radiating from all plant. At the current stage, specifics relating to the mechanical services concept for the revised DA are not yet determined. In order to provide realistic assessment at Schematic Design stage, noise emission evaluation has been carried out assuming a similar concept and layout to the previous scheme detailed design report, *Ref: 19075070-01C*.

A summary of the layout and early stage assumptions as follows:

- Individual SOUs are to have 1x individual AC CU unit based upon size:
 - Standard sized “Classic” and “Signature” SOUs to have 2kW condenser – Ground Floor SOUs to be located at ground level, wall mounted on external facade. First Floor SOUs mounted on roof over;
 - “Premium Signature” and larger “Classic” and “Signature” SOUs to have 3.5kW condenser – Ground and First Floor mounting as per above;
- Standard Communal Lounges, Activity and Dining Rooms on Ground Floor to have 1x or 2x 14kW AC CUs pending room size (based on capacity occupancy heating/cooling load). First Floor Lounges assume equivalent load/sizing, with AC CUs on roof over;
- Large Dining and Breakout Lounge Rooms on Ground Floor to have 1x or 2x 24kW AC CUs pending room size (based on capacity occupancy heating/cooling load). First Floor areas assume equivalent load/sizing, with AC CUs on roof over;
- Main Ground Floor Kitchen to have 1 x EVAP unit for make-up air and 1x Commercial KEF serving main kitchens, ducted to and exhausting at roof level – NB duct routing TBC during detailed design;
 - Satellite kitchen to have smaller EVAP and KEF units, ducted to exhaust terminations at roof level – duct routing TBC during detailed design;
- Coolroom, Freezer room areas served by 1x Refrigeration Condenser Unit (R-CU) each, operating 24 hours.
- General and Toilet Exhaust fans assumed for Bin Stores, toilets and sundry spaces – TBC during detailed design;

Scenario 1 assumes all mechanical plant above is running at rated capacity, with no mitigation in the initial model – aside from where roof units are assumed, these have been set back toward the centre of the roof to take advantage of natural screening from the roof edges to single-storey receiving buildings.

As the general ambient background noise levels are expected to be low (no significant existing noise sources or road traffic volumes present), a +5 dB penalty is applied for *Tonality*. The results for Scenario 1 are provided in *Table 3-5*. *Figure 3-3* shows the predicted noise levels as contour maps at ground floor level.

Note, given the size of the site and layout of sources arranged around the site it is necessary to consider noise emissions to all surrounding streets resulting in a large number of individual receiver points assessed. Some properties area assessed across multiple facades, floors and in some cases gardens (free field), hence total number of properties assessed is approximately 80 surrounding residences.

In the majority of cases, where exceedences are identified, receivers are screened according to nearest sources/source type and mitigations suggested accordingly.

Table 3-5: Scenario 1 Predicted Levels and Assessment, dB LA10

Receiver	Flr Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
Nearest Noise Sensitive Premises (NSPs)						
R1 5/34 Jarvis Street	GF	W	48	53	45	EXCEEDS, +8dB(A)
R1 5/34 Jarvis Street	GF	N	54	59	45	EXCEEDS, +14dB(A)
R1 5/34 Jarvis Street	GF	S	48	53	45	EXCEEDS, +8dB(A)
R1 5/34 Jarvis Street	GF	E	51	56	45	EXCEEDS, +11dB(A)
R2 7 Hayward Street	GF	S	38	43	45	COMPLIES
R2 7 Hayward Street	GF	W	35	40	45	COMPLIES
R2 7 Hayward Street	GF	E	37	42	45	COMPLIES
R2 7 Hayward Street	GF	S	38	43	45	COMPLIES
R2 7 Hayward Street	GF	S	40	45	45	COMPLIES
R2 7 Hayward Street	GF	E	39	44	45	COMPLIES
R2 7 Hayward Street	GF	E	34	39	45	COMPLIES
R3 15 Hayward Street	GF	S	38	43	45	COMPLIES
R3 15 Hayward Street	GF	W	39	44	45	COMPLIES
Surrounding Noise Sensitive Premises (NSPs)						
R4 1 Cornell Crescent	GF	S	32	37	45	COMPLIES
R4 1 Cornell Crescent	GF	E	32	37	45	COMPLIES
R5 3 Cornell Crescent	GF	S	32	37	45	COMPLIES
R6 5 Cornell Crescent	GF	S	35	40	45	COMPLIES
R7 7 Cornell Crescent	GF	S	34	39	45	COMPLIES
R7 7 Cornell Crescent	GF	W	35	40	45	COMPLIES
R8 9 Cornell Crescent	GF	E	34	39	45	COMPLIES
R8 9 Cornell Crescent	GF	S	34	39	45	COMPLIES
R8 9 Cornell Crescent	F 1	S	37	42	45	COMPLIES
R8 9 Cornell Crescent - Garden	GF		33	38	45	COMPLIES
R8 9 Cornell Crescent - Garden	F 1		36	41	45	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R9 11 Cornell Crescent	GF	E	34	39	45	COMPLIES
R10 1 Hayward Street	GF	S	33	38	45	COMPLIES
R10 1 Hayward Street	GF	E	32	37	45	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	GF	E	34	39	45	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	F 1	E	34	39	45	COMPLIES
R12 Unit 3 / 2 Hayward Street	GF	E	34	39	45	COMPLIES
R12 Unit 3 / 2 Hayward Street	F 1	E	34	39	45	COMPLIES
R13 Unit 4 / 2 Hayward Street	GF	E	34	39	45	COMPLIES
R13 Unit 4 / 2 Hayward Street	F 1	E	34	39	45	COMPLIES
R14 3 Hayward Street	GF	S	40	45	45	COMPLIES
R14 3 Hayward Street	GF	S	41	46	45	EXCEEDS, +1dB(A)
R14 3 Hayward Street - garden	GF		41	46	45	EXCEEDS, +1dB(A)
R14 3 Hayward Street - garden	GF		41	46	45	EXCEEDS, +1dB(A)
R15 5 Hayward Street	GF	W	29	34	45	COMPLIES
R15 5 Hayward Street	F 1	W	32	37	45	COMPLIES
R15 5 Hayward Street	GF	S	39	44	45	COMPLIES
R15 5 Hayward Street	F 1	S	41	46	45	EXCEEDS, +1dB(A)
R16 10 Hayward Street	GF	S	35	40	45	COMPLIES
R16 10 Hayward Street - Garden	GF		32	37	45	COMPLIES
R17 12 Hayward Street	GF	E	26	31	45	COMPLIES
R17 12 Hayward Street	GF	E	33	38	45	COMPLIES
R17 12 Hayward Street	GF	S	36	41	45	COMPLIES
R17 12 Hayward Street - Garden	GF		35	40	45	COMPLIES
R18 14 Hayward Street	GF	S	36	41	45	COMPLIES
R18 14 Hayward Street - Garden	GF		37	42	45	COMPLIES
R19 16 Hayward Street	GF	S	37	42	45	COMPLIES
R19 16 Hayward Street - Garden	GF		38	43	45	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R20 17 Hayward Street	GF	E	25	30	45	COMPLIES
R20 17 Hayward Street	F 1	E	28	33	45	COMPLIES
R20 17 Hayward Street	GF	S	31	36	45	COMPLIES
R20 17 Hayward Street	F 1	S	35	40	45	COMPLIES
R20 17 Hayward Street	GF	S	31	36	45	COMPLIES
R20 17 Hayward Street	F 1	S	35	40	45	COMPLIES
R20 17 Hayward Street	GF	S	28	33	45	COMPLIES
R20 17 Hayward Street	F 1	S	32	37	45	COMPLIES
R20 17 Hayward Street	GF	S	37	42	45	COMPLIES
R20 17 Hayward Street	F 1	S	41	46	45	EXCEEDS, 1dB(A)
R20 17 Hayward Street	GF	W	33	38	45	COMPLIES
R20 17 Hayward Street	F 1	W	39	44	45	COMPLIES
R20 17 Hayward Street	GF	W	37	42	45	COMPLIES
R20 17 Hayward Street	F 1	W	41	46	45	EXCEEDS, +1dB(A)
R20 17 Hayward Street	GF	S	31	36	45	COMPLIES
R20 17 Hayward Street	F 1	S	35	40	45	COMPLIES
R20 17 Hayward Street	GF	W	36	41	45	COMPLIES
R20 17 Hayward Street	F 1	W	40	45	45	COMPLIES
R20 17 Hayward Street	GF	W	39	44	45	COMPLIES
R20 17 Hayward Street	F 1	W	43	48	45	EXCEEDS, +3dB(A)
R20 17 Hayward Street	GF	W	35	40	45	COMPLIES
R20 17 Hayward Street	F 1	W	38	43	45	COMPLIES
R20 17 Hayward Street	GF	S	35	40	45	COMPLIES
R20 17 Hayward Street	F 1	S	40	45	45	COMPLIES
R20 17 Hayward Street	GF	W	34	39	45	COMPLIES
R20 17 Hayward Street	F 1	W	39	44	45	COMPLIES
R20 17 Hayward Street	GF	S	40	45	45	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R20 17 Hayward Street	F 1	S	42	47	45	EXCEEDS, +2dB(A)
R20 17 Hayward Street	GF	W	37	42	45	COMPLIES
R20 17 Hayward Street	F 1	W	42	47	45	EXCEEDS, +2dB(A)
R20 17 Hayward Street - garden	GF		39	44	45	COMPLIES
R21 18 Hayward Street	GF	S	38	43	45	COMPLIES
R21 18 Hayward Street - Garden	GF		38	43	45	COMPLIES
R22 20 Hayward Street	GF	S	37	42	45	COMPLIES
R22 20 Hayward Street	GF	W	36	41	45	COMPLIES
R22 20 Hayward Street - garden	GF		38	43	45	COMPLIES
R23 22 Hayward street - Garden	GF		32	37	45	COMPLIES
R23 22 Hayward Street	GF	S	34	39	45	COMPLIES
R24 24 Hayward Street	GF	S	34	39	45	COMPLIES
R24 24 Hayward Street - Garden	GF		30	35	45	COMPLIES
R25 26 Hayward Street	GF	S	32	37	45	COMPLIES
R25 26 Hayward Street - Garden	GF		29	34	45	COMPLIES
R26 28 Hayward Street - Garden	GF		28	33	45	COMPLIES
R26 Hayward Street	GF	S	30	35	45	COMPLIES
R27 2 Holylake Avenue	GF	N	33	38	45	COMPLIES
R28 4 Holylake Avenue	GF	N	34	39	45	COMPLIES
R28 4 Holylake Avenue	F 1	N	35	40	45	COMPLIES
R29 6 Holylake Avenue	GF	N	34	39	45	COMPLIES
R29 6 Holylake Avenue	GF	E	33	38	45	COMPLIES
R30 8 Holylake Avenue	GF	E	28	33	45	COMPLIES
R30 8 Holylake Avenue	GF	N	29	34	45	COMPLIES
R31 10 Holylake Avenue	GF	SE	33	38	45	COMPLIES
R31 10 Holylake Avenue	GF	NE	34	39	45	COMPLIES
R32 7 Holywell Street	GF	SE	32	37	45	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R32 7 Holywell Street	F 1	SE	33	38	45	COMPLIES
R32 7 Holywell Street	GF	S	34	39	45	COMPLIES
R32 7 Holywell Street	F 1	S	36	41	45	COMPLIES
R32 7 Holywell Street - Garden	GF		33	38	45	COMPLIES
R32 7 Holywell Street - Garden	F 1		34	39	45	COMPLIES
R33 8A Holywell Street	GF	E	31	36	45	COMPLIES
R33 8A Holywell Street	F 1	E	33	38	45	COMPLIES
R34 8B Holywell Street	GF	SW	29	34	45	COMPLIES
R34 8B Holywell Street	F 1	SW	34	39	45	COMPLIES
R35 8C Holywell Street	GF	S	31	36	45	COMPLIES
R35 8C Holywell Street	F 1	S	34	39	45	COMPLIES
R36 9 Holywell Street	GF	E	31	36	45	COMPLIES
R36 9 Holywell Street	GF	E	32	37	45	COMPLIES
R37 10 Holywell Street	GF	E	33	38	45	COMPLIES
R37 10 Holywell Street - Garden	GF		31	36	45	COMPLIES
R38 11 Holywell Street	GF	S	33	38	45	COMPLIES
R39 12 Holywell street	GF	S	34	39	45	COMPLIES
R39 12 Holywell street	F 1	S	35	40	45	COMPLIES
R39 12 Holywell street	GF	SE	35	40	45	COMPLIES
R39 12 Holywell street	F 1	SE	35	40	45	COMPLIES
R39 12 Holywell street	GF	SE	34	39	45	COMPLIES
R39 12 Holywell street	F 1	SE	35	40	45	COMPLIES
R39 12 Holywell street	GF	SE	34	39	45	COMPLIES
R39 12 Holywell street	F 1	SE	35	40	45	COMPLIES
R39 12 Holywell Street - Garden	GF		35	40	45	COMPLIES
R40 13 Holywell Street	GF	S	45	50	45	EXCEEDS, +5dB(A)
R40 13 Holywell Street	GF	E	36	41	45	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R41 25 Holywell Street	GF	N	40	45	45	COMPLIES
R41 25 Holywell Street	GF	E	40	45	45	COMPLIES
R42 32 Holywell Street	GF	E	35	40	45	COMPLIES
R43 33 Holywell Street	GF	NE	37	42	45	COMPLIES
R43 33 Holywell Street	GF	N	35	40	45	COMPLIES
R43 33 Holywell Street	GF	N	36	41	45	COMPLIES
R43 33 Holywell Street	GF	E	29	34	45	COMPLIES
R44 34 Holywell Street	GF	E	35	40	45	COMPLIES
R45 36 Holywell Street	GF	SE	35	40	45	COMPLIES
R46 16 Jarvis Street	GF	SW	32	37	45	COMPLIES
R47 23 Jarvis Street	GF	W	34	39	45	COMPLIES
R48 1/34 Jarvis Street	GF	N	47	52	45	EXCEEDS, +7dB(A)
R48 1/34 Jarvis Street	GF	S	38	43	45	COMPLIES
R48 1/34 Jarvis Street	GF	W	44	49	45	EXCEEDS, +4dB(A)
R49 2/34 Jarvis Street	GF	E	36	41	45	COMPLIES
R49 2/34 Jarvis Street	GF	S	40	45	45	COMPLIES
R49 2/34 Jarvis Street	GF	W	46	51	45	EXCEEDS, +6dB(A)
R50 3/34 Jarvis Street	GF	N	49	54	45	EXCEEDS, +9dB(A)
R50 3/34 Jarvis Street	GF	E	48	53	45	EXCEEDS, +8dB(A)
R50 3/34 Jarvis Street	GF	W	50	55	45	EXCEEDS, +10dB(A)
R50 3/34 Jarvis Street	GF	S	47	52	45	EXCEEDS, +7dB(A)
R51 4/34 Jarvis Street	GF	W	54	59	45	EXCEEDS, +14dB(A)
R51 4/34 Jarvis Street	GF	N	53	58	45	EXCEEDS, +13dB(A)
R51 4/34 Jarvis Street	GF	S	49	54	45	EXCEEDS, +9dB(A)
R51 4/34 Jarvis Street	GF	E	48	53	45	EXCEEDS, +8dB(A)
R52 36 Jarvis Street	GF	N	43	48	45	EXCEEDS, +3dB(A)
R52 36 Jarvis Street	GF	S	35	40	45	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R52 36 Jarvis Street	GF	W	43	48	45	EXCEEDS, +3dB(A)
R53 37 Jarvis street - Garden	GF		39	44	45	COMPLIES
R53 37 Jarvis Street	GF	SW	38	43	45	COMPLIES
R53 37 Jarvis Street	GF	NW	40	45	45	COMPLIES
R54 40C Jarvis Street	GF	N	39	44	45	COMPLIES
R54 40C Jarvis Street	GF	S	31	36	45	COMPLIES
R55 41 Jarvis Street	GF	W	37	42	45	COMPLIES
R56 169 Ocean Drive	GF	E	32	37	45	COMPLIES
R56 169 Ocean Drive	F 1	E	32	37	45	COMPLIES
R57 171B Ocean Drive	GF	E	32	37	45	COMPLIES
R57 171B Ocean Drive	F 1	E	32	37	45	COMPLIES
R57 171B Ocean Drive	F 2	E	33	38	45	COMPLIES
R58 173 Ocean Drive	GF	NE	30	35	45	COMPLIES
R58 173 Ocean Drive	F 1	NE	32	37	45	COMPLIES
R58 173 Ocean Drive	F 2	NE	32	37	45	COMPLIES
R58 173 Ocean Drive	GF	SE	28	33	45	COMPLIES
R58 173 Ocean Drive	F 1	SE	31	36	45	COMPLIES
R58 173 Ocean Drive	F 2	SE	32	37	45	COMPLIES
R58 173 Ocean Drive (Garden)	GF		30	35	45	COMPLIES
R59 187 Ocean Drive	GF	E	34	39	45	COMPLIES
R60 189 Ocean Drive	GF	E	28	33	45	COMPLIES
R60 189 Ocean Drive	GF	E	29	34	45	COMPLIES
R61 191 Ocean Drive	GF	E	30	35	45	COMPLIES
R61 191 Ocean Drive	GF	N	28	33	45	COMPLIES
R62 193 Ocean Drive	GF	E	31	36	45	COMPLIES
R62 193 Ocean Drive	F 1	E	34	39	45	COMPLIES
R62 193 Ocean Drive	GF	S	16	21	45	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R62 193 Ocean Drive	F 1	S	23	28	45	COMPLIES
R62 193 Ocean Drive	GF	N	29	34	45	COMPLIES
R62 193 Ocean Drive	F 1	N	33	38	45	COMPLIES
R63 195 Ocean Drive	GF	E	23	28	45	COMPLIES
R64 3 Pandal Street	GF	E	35	40	45	COMPLIES
R64 3 Pandal Street	GF	N	36	41	45	COMPLIES
R64 3 Pandal Street	GF	E	33	38	45	COMPLIES
R65 1/5 Pandal Street	GF	N	33	38	45	COMPLIES
R65 1/5 Pandal Street	GF	E	32	37	45	COMPLIES
R66 9 Pandal Street	GF	N	37	42	45	COMPLIES
R66 9 Pandal Street	GF	E	38	43	45	COMPLIES
R66 9 Pandal Street	GF	N	37	42	45	COMPLIES
R67 1A Seashore Mews	GF	E	38	43	45	COMPLIES
R67 1A Seashore Mews	GF	W	29	34	45	COMPLIES
R68 1B Seashore Mews	GF	NE	37	42	45	COMPLIES
R68 1B Seashore Mews	GF	NE	33	38	45	COMPLIES
R69 2 Seashore Mews	GF	SE	38	43	45	COMPLIES
R69 2 Seashore Mews	GF	W	32	37	45	COMPLIES
R69 2 Seashore Mews	GF	N	35	40	45	COMPLIES
R70 1/4 Seashore Mews	GF	NW	36	41	45	COMPLIES
R70 1/4 Seashore Mews	GF	NE	37	42	45	COMPLIES
R71 2/4 Seashore Mews	GF	NW	41	46	45	EXCEEDS, +1dB(A)
R71 2/4 Seashore Mews	GF	NE	42	47	45	EXCEEDS, +2dB(A)
R72 6 Seashore Mews	GF	N	37	42	45	COMPLIES
R73 6A Seashore Mews	GF	E	41	46	45	EXCEEDS, +1dB(A)
R73 6A Seashore Mews	GF	E	42	47	45	EXCEEDS, +2dB(A)
R74 1/8 Seashore Mews	GF	N	38	43	45	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R74 1/8 Seashore Mews	GF	E	40	45	45	COMPLIES
R75 10 Seashore Mews	GF	N	44	49	45	EXCEEDS, +4dB(A)
R75 10 Seashore Mews	GF	W	36	41	45	COMPLIES
R75 2/8 Seashore Mews	GF	N	44	49	45	EXCEEDS, +4dB(A)
R76 12 Seashore Mews	GF	N	41	46	45	EXCEEDS, +1dB(A)
R77 12A Seashore Mews	GF	N	39	44	45	COMPLIES
R79 1/14 Seashore Mews	GF	N	39	44	45	COMPLIES
R80 2/14 Seashore Mews	GF	N	42	47	45	EXCEEDS, +2dB(A)
R81 16A Seashore Mews	GF	N	44	49	45	EXCEEDS, +4dB(A)
R81 16A Seashore Mews	GF	W	42	47	45	EXCEEDS, +2dB(A)
R82 16B Seashore Mews	GF	N	41	46	45	EXCEEDS, +1dB(A)
R82 16B Seashore Mews	GF	W	44	49	45	EXCEEDS, +4dB(A)
R83 18 Seashore Mews	GF	N	41	46	45	EXCEEDS, +1dB(A)
R84 18A Seashore Mews	GF	W	45	50	45	EXCEEDS, +5dB(A)
R84 18A Seashore Mews	GF	N	45	50	45	EXCEEDS, +5dB(A)
R85 20 Seashore Mews	GF	N	39	44	45	COMPLIES
R85 20 Seashore Mews	GF	E	39	44	45	COMPLIES
R86 20A Seashore Mews	GF	W	45	50	45	EXCEEDS, +5dB(A)
R86 20A Seashore Mews	GF	N	44	49	45	EXCEEDS, +4dB(A)
R87 22A Seashore Mews	GF	W	42	47	45	EXCEEDS, +2dB(A)
R88 22B Seashore Mews	GF	N	44	49	45	EXCEEDS, +4dB(A)
R89 1/24 Seashore Mews	GF	N	36	41	45	COMPLIES
R90 2/24 Seashore Mews	GF	N	42	47	45	EXCEEDS, +2dB(A)
R91 27 Seashore Mews	GF	N	39	44	45	COMPLIES
R91 27 Seashore Mews	GF	E	38	43	45	COMPLIES
R91 27 Seashore Mews	GF	SE	38	43	45	COMPLIES
R92 31 Seashore Mews	GF	N	34	39	45	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R92 31 Seashore Mews	GF	SE	36	41	45	COMPLIES
R93 Bunbury Wildlife Park	GF	W	33	38	45	COMPLIES

From the above it is evident compliance is not achieved at 47 noise receiving locations, ranging from 1 dB(A) (negligible) to 14 dB(A) (significant). Source analysis screening of the exceedences at each receiver, the most significant contributors are identified as Kitchen Exhaust Fans (KEFs) serving both kitchens, Laundry Exhaust Fan and EVAP units serving both kitchens. This allows targeting of noise mitigation measures for most efficient compliance treatments.



19075070 South Bunbury Community Aged Care Facility
 Noise Level Contours @ 1.4m Above Ground Level

Scenario 1 - L_{A10} All Building Services Noise

SoundPLAN v8.2
 ISO Algorithms

3 October 2024



Lloyd George Acoustics
 PO Box 717
 HILLARYS WA 6923
 (08) 9401 7770

Length Scale 1:3000

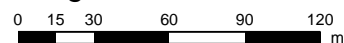
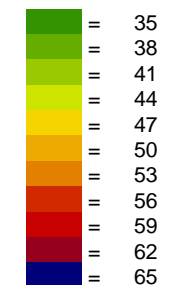


Figure 3-3

Signs and symbols

- * Noise Source
- ⊙ Point receiver

Noise levels
 L_{A10} - dB



3.3.2. Scenario 1 - Proposed Mitigation

Proposed Mitigation as follows:

- Kitchen Exhaust Fans (KEFs) serving both kitchens
 - Pending ducted route to roof and final outlet location, both Kitchen Exhaust Fans may be treated with “packless” in-line attenuator(s), suitable for grease-laden exhaust air flow. Minimum Insertion Loss (IL, dB) values required are presented in *Table 3-6*;
 - Refer *Appendix C* for technical product data:

Table 3-6: KEF (Packless) Minimum Attenuator Insertion Loss Data, “IL, dB”

Attenuator Type	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
IAC Ultra-pals™ Type XM (“Packless”) Attenuator Model 6XM, 1800mm length, Assumed +5ms ⁻¹ face velocity	7	9	15	27	25	14	14	12

- And Laundry Exhaust Fan
 - Pending Laundry EF atmospheric termination point, outlet is required to be treated with a standard in-line attenuator. Minimum Insertion Loss (IL, dB) values in *Table 3-7*;
 - Refer *Appendix C* for technical product data:

Table 3-7: Standard Attenuator Minimum Insertion Loss Data, “IL, dB”

Attenuator Type	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
IAC Quiet-Duct -Type S Attenuator Model 3S, 900mm length, Assumed +5ms ⁻¹ face velocity	5	9	15	30	37	35	27	17

- EVAP units serving both kitchens
 - EVAP units must be screened using solid screening – proposed screening to be 2.4m height and of solid material with no gaps and minimum material surface mass >12kg\m².
 - *Figure 3-4* shows the proposed screening arrangement in the model space with inset of typical louvered-type screen, which would require 9mm FC sheet as backing to internal face of louvers.

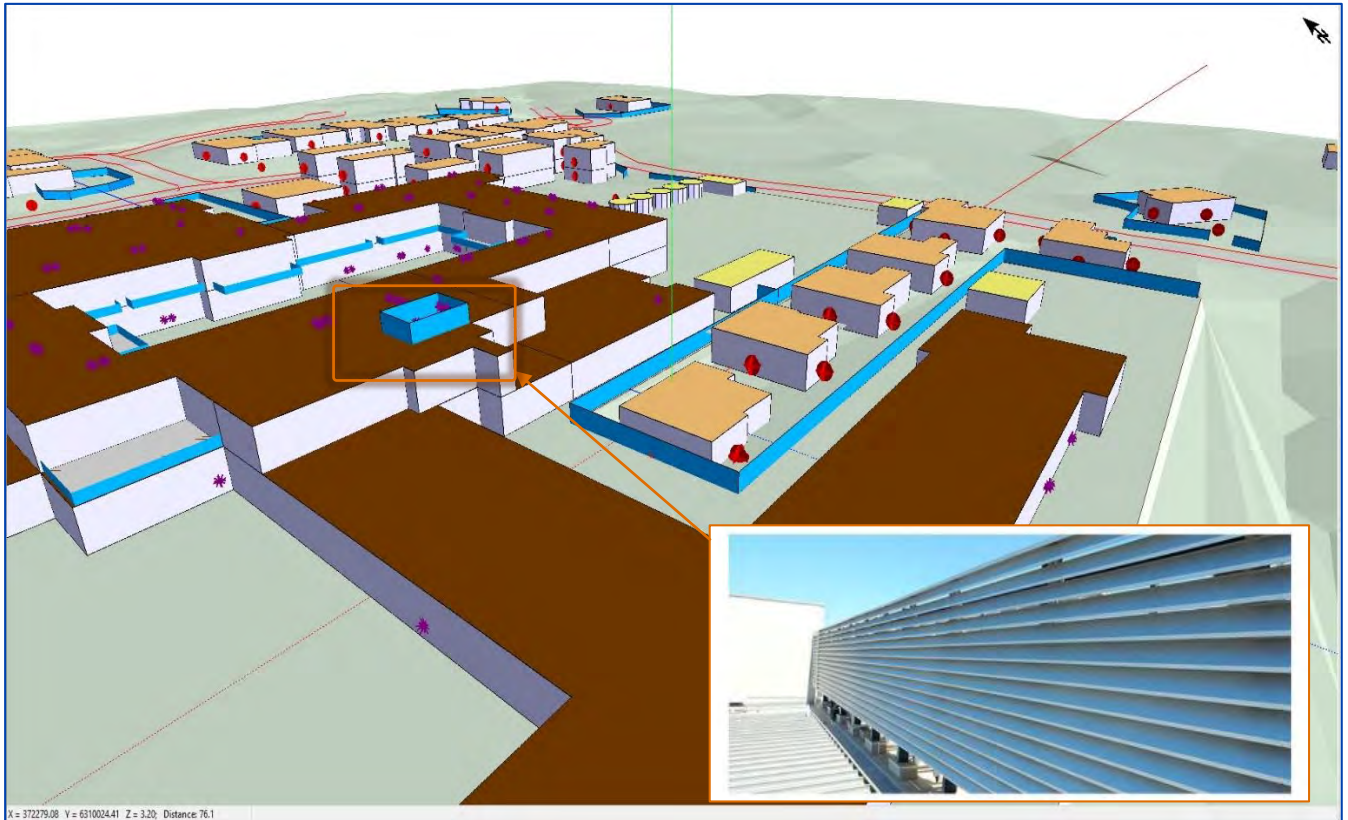


Figure 3-4: Overview of Noise Model

3.3.3. Scenario 1 Results with Proposed Mitigation

Table 3-8 presents results of the exceedences compared with/without mitigation:

Table 3-8: Scenario 1 With Mitigation - Predicted Levels and Assessment, dB L_{A10}

Receiver	Fir Level	Facade	Predicted Noise Level incl. Tonality	Daytime ANL Limit	Predicted Noise Level incl. Tonality with Attenuation	Assessment
Nearest Noise Sensitive Premises (NSPs)						
R1 5/34 Jarvis Street	GF	W	53	45	45	COMPLIES
R1 5/34 Jarvis Street	GF	N	59	45	45	COMPLIES
R1 5/34 Jarvis Street	GF	S	53	45	43	COMPLIES
R1 5/34 Jarvis Street	GF	E	56	45	44	COMPLIES
Surrounding Noise Sensitive Premises (NSPs)						
R14 3 Hayward Street	GF	S	46	45	42	COMPLIES
R14 3 Hayward Street - garden	GF		46	45	44	COMPLIES

Receiver	Flr Level	Facade	Predicted Noise Level incl. Tonality	Daytime ANL Limit	Predicted Noise Level incl. Tonality with Attenuation	Assessment
R14 3 Hayward Street - garden	GF		46	45	44	COMPLIES
R15 5 Hayward Street	F 1	S	46	45	43	COMPLIES
R20 17 Hayward Street	F 1	S	46	45	39	COMPLIES
R20 17 Hayward Street	F 1	W	46	45	34	COMPLIES
R20 17 Hayward Street	F 1	W	48	45	37	COMPLIES
R20 17 Hayward Street	F 1	S	47	45	45	COMPLIES
R20 17 Hayward Street	F 1	W	47	45	44	COMPLIES
R40 13 Holywell Street	GF	S	38	45	43	COMPLIES
R48 1/34 Jarvis Street	GF	N	52	45	34	COMPLIES
R48 1/34 Jarvis Street	GF	W	49	45	40	COMPLIES
R49 2/34 Jarvis Street	GF	W	51	45	38	COMPLIES
R50 3/34 Jarvis Street	GF	N	54	45	43	COMPLIES
R50 3/34 Jarvis Street	GF	E	53	45	39	COMPLIES
R50 3/34 Jarvis Street	GF	W	55	45	42	COMPLIES
R50 3/34 Jarvis Street	GF	S	52	45	42	COMPLIES
R51 4/34 Jarvis Street	GF	W	59	45	45	COMPLIES
R51 4/34 Jarvis Street	GF	N	58	45	45	COMPLIES
R51 4/34 Jarvis Street	GF	S	54	45	45	COMPLIES
R51 4/34 Jarvis Street	GF	E	53	45	40	COMPLIES
R52 36 Jarvis Street	GF	N	48	45	37	COMPLIES
R52 36 Jarvis Street	GF	W	48	45	32	COMPLIES
R71 2/4 Seashore Mews	GF	NW	46	45	41	COMPLIES
R71 2/4 Seashore Mews	GF	NE	47	45	41	COMPLIES
R73 6A Seashore Mews	GF	E	46	45	41	COMPLIES
R73 6A Seashore Mews	GF	E	47	45	41	COMPLIES
R75 10 Seashore Mews	GF	N	49	45	43	COMPLIES

Receiver	Flr Level	Facade	Predicted Noise Level incl. Tonality	Daytime ANL Limit	Predicted Noise Level incl. Tonality with Attenuation	Assessment
R75 2/8 Seashore Mews	GF	N	49	45	44	COMPLIES
R76 12 Seashore Mews	GF	N	46	45	37	COMPLIES
R80 2/14 Seashore Mews	GF	N	47	45	40	COMPLIES
R81 16A Seashore Mews	GF	N	49	45	39	COMPLIES
R81 16A Seashore Mews	GF	W	47	45	38	COMPLIES
R82 16B Seashore Mews	GF	N	46	45	39	COMPLIES
R82 16B Seashore Mews	GF	W	49	45	41	COMPLIES
R83 18 Seashore Mews	GF	N	46	45	36	COMPLIES
R84 18A Seashore Mews	GF	W	50	45	42	COMPLIES
R84 18A Seashore Mews	GF	N	50	45	43	COMPLIES
R86 20A Seashore Mews	GF	W	50	45	42	COMPLIES
R86 20A Seashore Mews	GF	N	49	45	43	COMPLIES
R87 22A Seashore Mews	GF	W	47	45	37	COMPLIES
R88 22B Seashore Mews	GF	N	44	49	44	COMPLIES
R90 2/24 Seashore Mews	GF	N	42	47	41	COMPLIES

As is evident in *Table 3-8*, predicted noise emissions with the proposed mitigation in place demonstrates compliance at all receivers during normal daytime operations.

NB – it must be acknowledged that this preliminary noise study uses assumed plant, sound power levels and locations to assess the design for compliance. It is anticipated that the detailed design scheme will be assessed once more and better particulars of the mechanical system become known, to ensure the finished facility is able to fully comply with *the Regulations*.

3.3.4. Scenario 2 – Residential AC Plant Only, Normal Night Operations L_{A10}

Scenario 2 model assesses services noise (L_{A10}) radiating from all residential AC CU plant and 24-Hr refrigeration plant only, with communal lounges, dining and activity areas assumed to be closed after 10.00pm. This scenario assesses assumed normal night time plant operations.

Scenario 2 assumes all mechanical plant above is running at rated capacity, with no mitigation in the initial model. As the general ambient background noise levels are expected to be low (no significant existing noise sources or road traffic volumes present), a +5 dB penalty is applied for *Tonality*. As per Scenario 1, it is necessary to consider noise emissions to all surrounding streets.

The results for Scenario 2 are provided in *Table 3-9*. *Figure 3-5* shows the predicted noise levels as contour maps at ground floor level. Where exceedences are identified, receivers are screened according to nearest sources/source type and mitigations suggested accordingly.

Table 3-9: Scenario 2 Predicted Levels and Assessment, dB L_{A10}

Receiver	Flr Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
Nearest Noise Sensitive Premises (NSPs)						
R1 5/34 Jarvis Street	GF	W	34	39	35	EXCEEDS, +4dB(A)
R1 5/34 Jarvis Street	GF	N	33	38	35	EXCEEDS, +3dB(A)
R1 5/34 Jarvis Street	GF	S	36	41	35	EXCEEDS, +6dB(A)
R1 5/34 Jarvis Street	GF	E	35	40	35	EXCEEDS, +5dB(A)
R2 7 Hayward Street	GF	S	33	38	35	EXCEEDS, +3dB(A)
R2 7 Hayward Street	GF	W	30	35	35	COMPLIES
R2 7 Hayward Street	GF	E	30	35	35	COMPLIES
R2 7 Hayward Street	GF	S	29	34	35	COMPLIES
R2 7 Hayward Street	GF	S	28	33	35	COMPLIES
R2 7 Hayward Street	GF	E	31	36	35	EXCEEDS, +1dB(A)
R2 7 Hayward Street	GF	E	25	30	35	COMPLIES
R3 15 Hayward Street	GF	S	29	34	35	COMPLIES
R3 15 Hayward Street	GF	W	32	37	35	EXCEEDS, +2dB(A)
Surrounding Noise Sensitive Premises (NSPs)						
R4 1 Cornell Crescent	GF	S	21	26	35	COMPLIES
R4 1 Cornell Crescent	GF	E	21	26	35	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R5 3 Cornell Crescent	GF	S	21	26	35	COMPLIES
R6 5 Cornell Crescent	GF	S	23	28	35	COMPLIES
R7 7 Cornell Crescent	GF	S	23	28	35	COMPLIES
R7 7 Cornell Crescent	GF	W	24	29	35	COMPLIES
R8 9 Cornell Crescent	GF	E	23	28	35	COMPLIES
R8 9 Cornell Crescent	GF	S	23	28	35	COMPLIES
R8 9 Cornell Crescent	F 1	S	26	31	35	COMPLIES
R8 9 Cornell Crescent - Garden	GF		22	27	35	COMPLIES
R8 9 Cornell Crescent - Garden	F 1		25	30	35	COMPLIES
R9 11 Cornell Crescent	GF	E	24	29	35	COMPLIES
R10 1 Hayward Street	GF	S	23	28	35	COMPLIES
R10 1 Hayward Street	GF	E	25	30	35	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	GF	E	26	31	35	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	F 1	E	26	31	35	COMPLIES
R12 Unit 3 / 2 Hayward Street	GF	E	26	31	35	COMPLIES
R12 Unit 3 / 2 Hayward Street	F 1	E	26	31	35	COMPLIES
R13 Unit 4 / 2 Hayward Street	GF	E	26	31	35	COMPLIES
R13 Unit 4 / 2 Hayward Street	F 1	E	26	31	35	COMPLIES
R14 3 Hayward Street	GF	S	33	38	35	EXCEEDS, +3dB(A)
R14 3 Hayward Street	GF	S	34	39	35	EXCEEDS, +4dB(A)
R14 3 Hayward Street - garden	GF		36	41	35	EXCEEDS, +6dB(A)
R14 3 Hayward Street - garden	GF		34	39	35	EXCEEDS, +4dB(A)
R15 5 Hayward Street	GF	W	23	28	35	COMPLIES
R15 5 Hayward Street	F 1	W	27	32	35	COMPLIES
R15 5 Hayward Street	GF	S	29	34	35	COMPLIES
R15 5 Hayward Street	F 1	S	33	38	35	EXCEEDS, +3dB(A)
R16 10 Hayward Street	GF	S	24	29	35	COMPLIES

Receiver	Flr Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R16 10 Hayward Street - Garden	GF		24	29	35	COMPLIES
R17 12 Hayward Street	GF	E	25	30	35	COMPLIES
R17 12 Hayward Street	GF	E	18	23	35	COMPLIES
R17 12 Hayward Street	GF	S	25	30	35	COMPLIES
R17 12 Hayward Street - Garden	GF		25	30	35	COMPLIES
R18 14 Hayward Street	GF	S	25	30	35	COMPLIES
R18 14 Hayward Street - Garden	GF		26	31	35	COMPLIES
R19 16 Hayward Street	GF	S	27	32	35	COMPLIES
R19 16 Hayward Street - Garden	GF		28	33	35	COMPLIES
R20 17 Hayward Street	GF	E	15	20	35	COMPLIES
R20 17 Hayward Street	F 1	E	19	24	35	COMPLIES
R20 17 Hayward Street	GF	S	19	24	35	COMPLIES
R20 17 Hayward Street	F 1	S	23	28	35	COMPLIES
R20 17 Hayward Street	GF	S	20	25	35	COMPLIES
R20 17 Hayward Street	F 1	S	25	30	35	COMPLIES
R20 17 Hayward Street	GF	S	20	25	35	COMPLIES
R20 17 Hayward Street	F 1	S	24	29	35	COMPLIES
R20 17 Hayward Street	GF	S	31	36	35	EXCEEDS, +1dB(A)
R20 17 Hayward Street	F 1	S	34	39	35	EXCEEDS, +4dB(A)
R20 17 Hayward Street	GF	W	26	31	35	COMPLIES
R20 17 Hayward Street	F 1	W	30	35	35	COMPLIES
R20 17 Hayward Street	GF	W	28	33	35	COMPLIES
R20 17 Hayward Street	F 1	W	31	36	35	EXCEEDS, +1dB(A)
R20 17 Hayward Street	GF	S	25	30	35	COMPLIES
R20 17 Hayward Street	F 1	S	29	34	35	COMPLIES
R20 17 Hayward Street	GF	W	30	35	35	COMPLIES
R20 17 Hayward Street	F 1	W	34	39	35	EXCEEDS, +4dB(A)

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R20 17 Hayward Street	GF	W	23	28	35	COMPLIES
R20 17 Hayward Street	F 1	W	27	32	35	COMPLIES
R20 17 Hayward Street	GF	W	28	33	35	COMPLIES
R20 17 Hayward Street	F 1	W	32	37	35	EXCEEDS, +2dB(A)
R20 17 Hayward Street	GF	S	29	34	35	COMPLIES
R20 17 Hayward Street	F 1	S	33	38	35	EXCEEDS, +3dB(A)
R20 17 Hayward Street	GF	W	28	33	35	COMPLIES
R20 17 Hayward Street	F 1	W	32	37	35	EXCEEDS, +2dB(A)
R20 17 Hayward Street	GF	S	38	43	35	EXCEEDS, +8dB(A)
R20 17 Hayward Street	F 1	S	39	44	35	EXCEEDS, +9dB(A)
R20 17 Hayward Street	GF	W	34	39	35	EXCEEDS, +4dB(A)
R20 17 Hayward Street	F 1	W	38	43	35	EXCEEDS, +8dB(A)
R20 17 Hayward Street - garden	GF		33	38	35	EXCEEDS, +3dB(A)
R21 18 Hayward Street	GF	S	28	33	35	COMPLIES
R21 18 Hayward Street - Garden	GF		28	33	35	COMPLIES
R22 20 Hayward Street	GF	S	26	31	35	COMPLIES
R22 20 Hayward Street	GF	W	27	32	35	COMPLIES
R22 20 Hayward Street - garden	GF		27	32	35	COMPLIES
R23 22 Hayward street - Garden	GF		22	27	35	COMPLIES
R23 22 Hayward Street	GF	S	24	29	35	COMPLIES
R24 24 Hayward Street	GF	S	24	29	35	COMPLIES
R24 24 Hayward Street - Garden	GF		21	26	35	COMPLIES
R25 26 Hayward Street	GF	S	22	27	35	COMPLIES
R25 26 Hayward Street - Garden	GF		19	24	35	COMPLIES
R26 28 Hayward Street - Garden	GF		18	23	35	COMPLIES
R26 Hayward Street	GF	S	19	24	35	COMPLIES
R27 2 Holylake Avenue	GF	N	24	29	35	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R28 4 Holylake Avenue	GF	N	24	29	35	COMPLIES
R28 4 Holylake Avenue	F 1	N	25	30	35	COMPLIES
R29 6 Holylake Avenue	GF	N	24	29	35	COMPLIES
R29 6 Holylake Avenue	GF	E	23	28	35	COMPLIES
R30 8 Holylake Avenue	GF	E	18	23	35	COMPLIES
R30 8 Holylake Avenue	GF	N	20	25	35	COMPLIES
R31 10 Holylake Avenue	GF	SE	24	29	35	COMPLIES
R31 10 Holylake Avenue	GF	NE	22	27	35	COMPLIES
R32 7 Holywell Street	GF	SE	22	27	35	COMPLIES
R32 7 Holywell Street	F 1	SE	24	29	35	COMPLIES
R32 7 Holywell Street	GF	S	24	29	35	COMPLIES
R32 7 Holywell Street	F 1	S	26	31	35	COMPLIES
R32 7 Holywell Street - Garden	GF		23	28	35	COMPLIES
R32 7 Holywell Street - Garden	F 1		25	30	35	COMPLIES
R33 8A Holywell Street	GF	E	22	27	35	COMPLIES
R33 8A Holywell Street	F 1	E	24	29	35	COMPLIES
R34 8B Holywell Street	GF	SW	20	25	35	COMPLIES
R34 8B Holywell Street	F 1	SW	24	29	35	COMPLIES
R35 8C Holywell Street	GF	S	21	26	35	COMPLIES
R35 8C Holywell Street	F 1	S	25	30	35	COMPLIES
R36 9 Holywell Street	GF	E	21	26	35	COMPLIES
R36 9 Holywell Street	GF	E	22	27	35	COMPLIES
R37 10 Holywell Street	GF	E	25	30	35	COMPLIES
R37 10 Holywell Street - Garden	GF		20	25	35	COMPLIES
R38 11 Holywell Street	GF	S	23	28	35	COMPLIES
R39 12 Holywell street	GF	S	26	31	35	COMPLIES
R39 12 Holywell street	F 1	S	27	32	35	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R39 12 Holywell street	GF	SE	26	31	35	COMPLIES
R39 12 Holywell street	F 1	SE	27	32	35	COMPLIES
R39 12 Holywell street	GF	SE	26	31	35	COMPLIES
R39 12 Holywell street	F 1	SE	27	32	35	COMPLIES
R39 12 Holywell street	GF	SE	26	31	35	COMPLIES
R39 12 Holywell street	F 1	SE	27	32	35	COMPLIES
R39 12 Holywell Street - Garden	GF		26	31	35	COMPLIES
R40 13 Holywell Street	GF	S	31	36	35	EXCEEDS, +1dB(A)
R40 13 Holywell Street	GF	E	35	39	35	EXCEEDS, +4dB(A)
R41 25 Holywell Street	GF	N	31	36	35	EXCEEDS, +1dB(A)
R41 25 Holywell Street	GF	E	29	34	35	COMPLIES
R42 32 Holywell Street	GF	E	26	31	35	COMPLIES
R43 33 Holywell Street	GF	NE	26	31	35	COMPLIES
R43 33 Holywell Street	GF	N	22	27	35	COMPLIES
R43 33 Holywell Street	GF	N	26	31	35	COMPLIES
R43 33 Holywell Street	GF	E	26	31	35	COMPLIES
R44 34 Holywell Street	GF	E	26	31	35	COMPLIES
R45 36 Holywell Street	GF	SE	26	31	35	COMPLIES
R46 16 Jarvis Street	GF	SW	21	26	35	COMPLIES
R47 23 Jarvis Street	GF	W	23	28	35	COMPLIES
R48 1/34 Jarvis Street	GF	N	33	38	35	EXCEEDS, +3dB(A)
R48 1/34 Jarvis Street	GF	S	28	33	35	COMPLIES
R48 1/34 Jarvis Street	GF	W	32	37	35	EXCEEDS, +2dB(A)
R49 2/34 Jarvis Street	GF	E	25	30	35	COMPLIES
R49 2/34 Jarvis Street	GF	S	33	38	35	EXCEEDS, +3dB(A)
R49 2/34 Jarvis Street	GF	W	32	37	35	EXCEEDS, +2dB(A)
R50 3/34 Jarvis Street	GF	N	33	38	35	EXCEEDS, +3dB(A)

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R50 3/34 Jarvis Street	GF	E	31	36	35	EXCEEDS, +1dB(A)
R50 3/34 Jarvis Street	GF	W	35	40	35	EXCEEDS, +5dB(A)
R50 3/34 Jarvis Street	GF	S	35	40	35	EXCEEDS, +5dB(A)
R51 4/34 Jarvis Street	GF	W	38	43	35	EXCEEDS, +8dB(A)
R51 4/34 Jarvis Street	GF	N	33	38	35	EXCEEDS, +3dB(A)
R51 4/34 Jarvis Street	GF	S	39	44	35	EXCEEDS, +9dB(A)
R51 4/34 Jarvis Street	GF	E	33	38	35	EXCEEDS, +3dB(A)
R52 36 Jarvis Street	GF	N	30	35	35	COMPLIES
R52 36 Jarvis Street	GF	S	29	34	35	COMPLIES
R52 36 Jarvis Street	GF	W	24	29	35	COMPLIES
R53 37 Jarvis street - Garden	GF		28	33	35	COMPLIES
R53 37 Jarvis Street	GF	SW	26	31	35	COMPLIES
R53 37 Jarvis Street	GF	NW	27	32	35	COMPLIES
R54 40C Jarvis Street	GF	N	18	23	35	COMPLIES
R54 40C Jarvis Street	GF	S	29	34	35	COMPLIES
R55 41 Jarvis Street	GF	W	25	30	35	COMPLIES
R56 169 Ocean Drive	GF	E	22	27	35	COMPLIES
R56 169 Ocean Drive	F 1	E	24	29	35	COMPLIES
R57 171B Ocean Drive	GF	E	22	27	35	COMPLIES
R57 171B Ocean Drive	F 1	E	22	27	35	COMPLIES
R57 171B Ocean Drive	F 2	E	24	29	35	COMPLIES
R58 173 Ocean Drive	GF	NE	18	23	35	COMPLIES
R58 173 Ocean Drive	F 1	NE	21	26	35	COMPLIES
R58 173 Ocean Drive	F 2	NE	23	28	35	COMPLIES
R58 173 Ocean Drive	GF	SE	20	25	35	COMPLIES
R58 173 Ocean Drive	F 1	SE	22	27	35	COMPLIES
R58 173 Ocean Drive	F 2	SE	22	27	35	COMPLIES

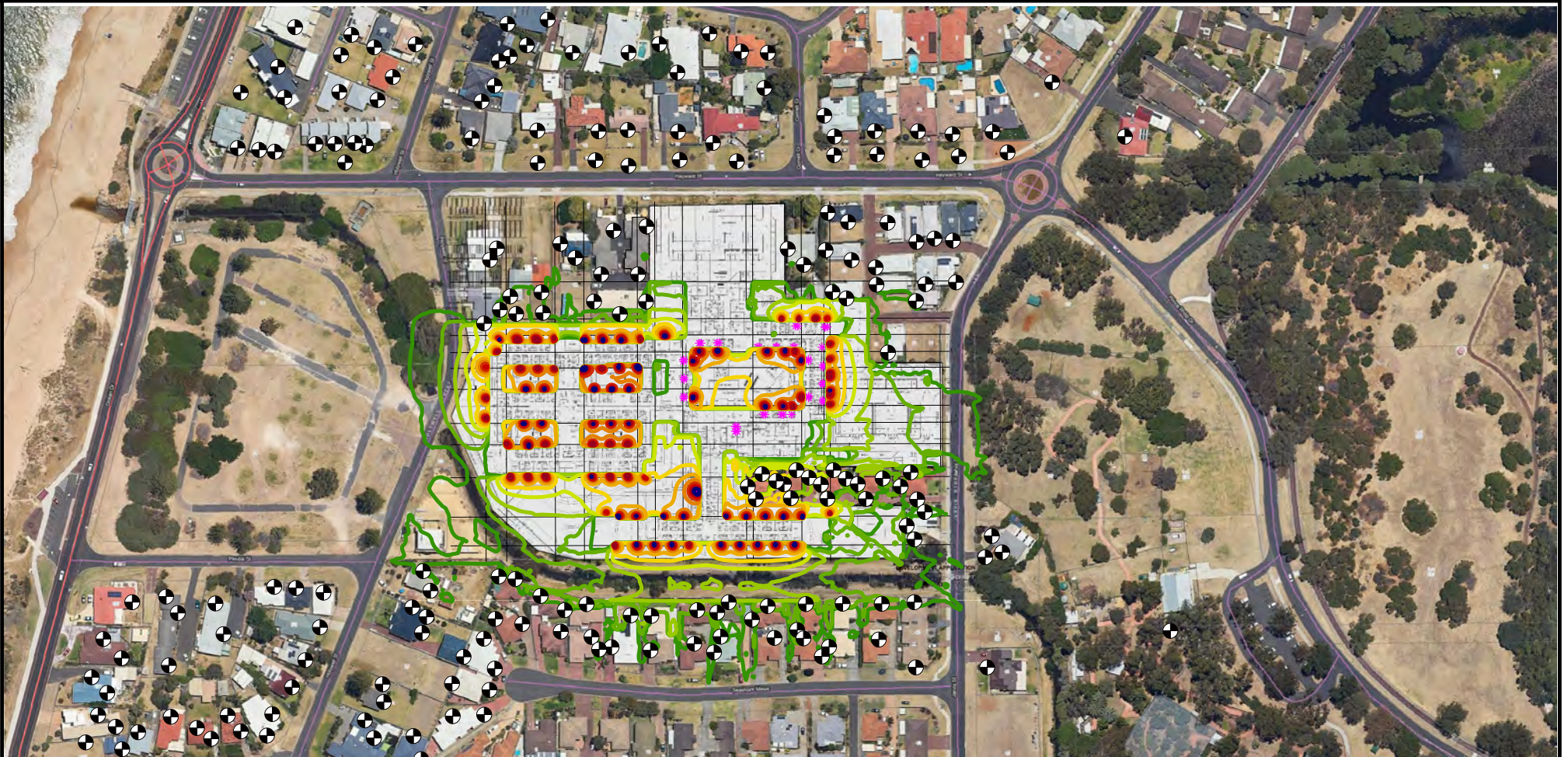
Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R58 173 Ocean Drive (Garden)	GF		20	25	35	COMPLIES
R59 187 Ocean Drive	GF	E	25	30	35	COMPLIES
R60 189 Ocean Drive	GF	E	20	25	35	COMPLIES
R60 189 Ocean Drive	GF	E	19	24	35	COMPLIES
R61 191 Ocean Drive	GF	E	20	25	35	COMPLIES
R61 191 Ocean Drive	GF	N	18	23	35	COMPLIES
R62 193 Ocean Drive	GF	E	7	12	35	COMPLIES
R62 193 Ocean Drive	F 1	E	13	18	35	COMPLIES
R62 193 Ocean Drive	GF	S	22	27	35	COMPLIES
R62 193 Ocean Drive	F 1	S	24	29	35	COMPLIES
R62 193 Ocean Drive	GF	N	20	25	35	COMPLIES
R62 193 Ocean Drive	F 1	N	24	29	35	COMPLIES
R63 195 Ocean Drive	GF	E	15	20	35	COMPLIES
R64 3 Pandal Street	GF	E	27	32	35	COMPLIES
R64 3 Pandal Street	GF	N	27	32	35	COMPLIES
R64 3 Pandal Street	GF	E	24	29	35	COMPLIES
R65 1/5 Pandal Street	GF	N	26	31	35	COMPLIES
R65 1/5 Pandal Street	GF	E	23	28	35	COMPLIES
R66 9 Pandal Street	GF	N	29	34	35	COMPLIES
R66 9 Pandal Street	GF	E	29	34	35	COMPLIES
R66 9 Pandal Street	GF	N	29	34	35	COMPLIES
R67 1A Seashore Mews	GF	E	26	31	35	COMPLIES
R67 1A Seashore Mews	GF	W	22	27	35	COMPLIES
R68 1B Seashore Mews	GF	NE	26	31	35	COMPLIES
R68 1B Seashore Mews	GF	NE	22	27	35	COMPLIES
R69 2 Seashore Mews	GF	SE	26	31	35	COMPLIES
R69 2 Seashore Mews	GF	W	23	28	35	COMPLIES

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R69 2 Seashore Mews	GF	N	26	31	35	COMPLIES
R70 1/4 Seashore Mews	GF	NW	26	31	35	COMPLIES
R70 1/4 Seashore Mews	GF	NE	26	31	35	COMPLIES
R71 2/4 Seashore Mews	GF	NW	31	36	35	EXCEEDS, +1dB(A)
R71 2/4 Seashore Mews	GF	NE	32	37	35	EXCEEDS, +2dB(A)
R72 6 Seashore Mews	GF	N	27	32	35	COMPLIES
R73 6A Seashore Mews	GF	E	32	37	35	EXCEEDS, +2dB(A)
R73 6A Seashore Mews	GF	E	31	36	35	EXCEEDS, +1dB(A)
R74 1/8 Seashore Mews	GF	N	28	33	35	COMPLIES
R74 1/8 Seashore Mews	GF	E	27	32	35	COMPLIES
R75 10 Seashore Mews	GF	N	35	40	35	EXCEEDS, +5dB(A)
R75 10 Seashore Mews	GF	W	26	31	35	COMPLIES
R75 2/8 Seashore Mews	GF	N	36	41	35	EXCEEDS, +6dB(A)
R76 12 Seashore Mews	GF	N	29	34	35	COMPLIES
R77 12A Seashore Mews	GF	N	34	39	35	EXCEEDS, +4dB(A)
R79 1/14 Seashore Mews	GF	N	28	33	35	COMPLIES
R80 2/14 Seashore Mews	GF	N	33	38	35	EXCEEDS, +3dB(A)
R81 16A Seashore Mews	GF	N	30	35	35	COMPLIES
R81 16A Seashore Mews	GF	W	31	36	35	EXCEEDS, +1dB(A)
R82 16B Seashore Mews	GF	N	32	37	35	EXCEEDS, +2dB(A)
R82 16B Seashore Mews	GF	W	32	37	35	EXCEEDS, +2dB(A)
R83 18 Seashore Mews	GF	N	28	33	35	COMPLIES
R84 18A Seashore Mews	GF	W	33	38	35	EXCEEDS, +3dB(A)
R84 18A Seashore Mews	GF	N	36	41	35	EXCEEDS, +6dB(A)
R85 20 Seashore Mews	GF	N	28	33	35	COMPLIES
R85 20 Seashore Mews	GF	E	27	32	35	COMPLIES
R86 20A Seashore Mews	GF	W	33	38	35	EXCEEDS, +3dB(A)

Receiver	Fir Level	Facade	Predicted Noise Level	Adjusted for Tonality, +5dB(A)	Daytime Assigned Level	Assessment
R86 20A Seashore Mews	GF	N	35	40	35	EXCEEDS, +5dB(A)
R87 22A Seashore Mews	GF	W	30	35	35	COMPLIES
R88 22B Seashore Mews	GF	N	36	41	35	EXCEEDS, +6dB(A)
R89 1/24 Seashore Mews	GF	N	27	32	35	COMPLIES
R90 2/24 Seashore Mews	GF	N	33	38	35	EXCEEDS, +3dB(A)
R91 27 Seashore Mews	GF	N	28	33	35	COMPLIES
R91 27 Seashore Mews	GF	E	28	33	35	COMPLIES
R91 27 Seashore Mews	GF	SE	28	33	35	COMPLIES
R92 31 Seashore Mews	GF	N	24	29	35	COMPLIES
R92 31 Seashore Mews	GF	SE	25	30	35	COMPLIES
R93 Bunbury Wildlife Park	GF	W	23	28	35	COMPLIES

From the above it is evident noise emissions compliance from residential AC CUs and refrigeration plant (24-Hours) is not achieved at 53 noise receiving locations, due to increased stringency after 10.00pm. Exceedences range from 1 dB(A) (negligible) to 9 dB(A) (significant).

Noise source contribution analysis at each of the exceedences identifies the most significant contributors in all cases are cumulative noise from each residential AC CUs, localised to each receiver. Given the distributed arrangement modelled in this early assessment, noise mitigation measures are recommended to be applied across all AC CUs.



19075070 South Bunbury Community Aged Care Facility
 Noise Level Contours @ 1.4m Above Ground Level

Scenario 2 - L_{A10} Night-time Building Services Noise Only

SoundPLAN v8.2
 ISO Algorithms

3 October 2024



Lloyd George Acoustics
 PO Box 717
 HILLARYS WA 6923
 (08) 9401 7770

Length Scale 1:3000

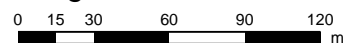
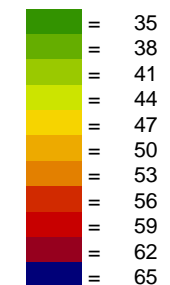


Figure 3-5

Signs and symbols

- * Noise Source
- ⊙ Point receiver

Noise levels
 L_{A10} - dB



3.3.5. Scenario 2 - Proposed Mitigation

Proposed Mitigation as follows:

- All AC CUs
 - All residential Air Conditioning Condenser Units (AC CUs) must have “Night Mode” functionality enabled, to reduce maximum output (i.e. heating/cooling) capacity during peak load periods. This is managed by each individual CU unit being slightly oversized to deliver the required heating (and cooling) loads at less than 100% capacity.
 - Night-mode functionality would be required to be programmed into each individual AC CU at building management level during the evening hours 7.00pm – 10.00pm and from 10.00pm until 7.00am (9.00am Sundays).
 - *Figure 3-6* presents a typical AC CU performance schematic of how “Night-Mode” operating settings function for a Daikin VRV unit. The schematic highlights the application of “Night-Mode” in steps – each step correspond to 2-3 dB(A) reduction. Operation Mode 3 (i.e. 3 steps) highlighted orange in the image below shows a reduction in Sound Pressure Level of up to 9dB(A) between the hours of 10.00pm and 8.00am using Factory settings:

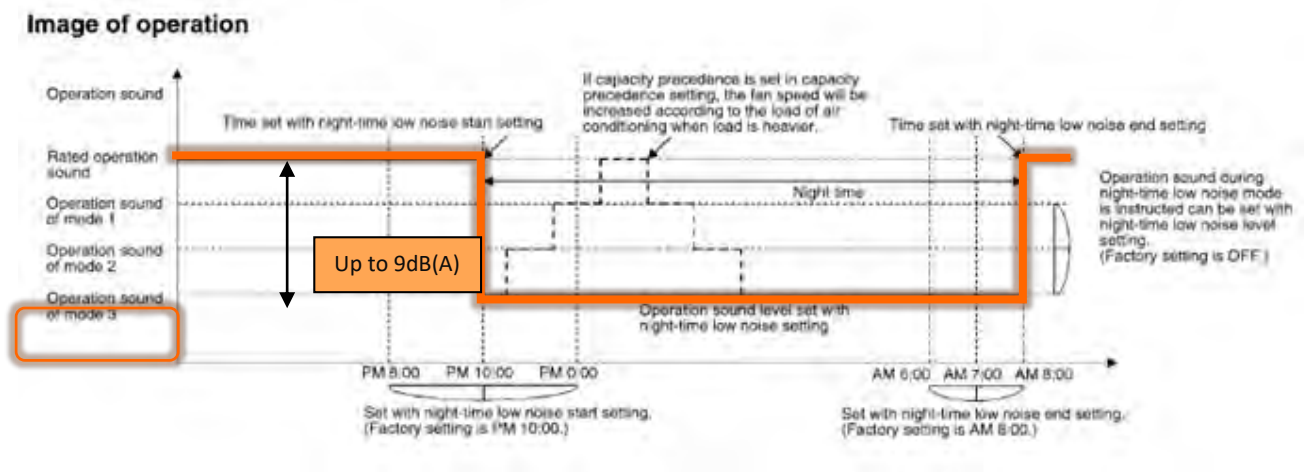


Figure 3-6: Schematic of Night Mode Operation re: Noise Emission Reductions

- Application of night mode offers 9 dB(A) reduction in individual CU noise emission, hence cumulative 9 dB(A) at received premises.

Where night mode units are not preferred, alternative mitigation to achieve up to 9 dB(A) would require a combination of:

- Reselect AC CUs for units with lower Sound Power Level than those shown in *Table 3-2*;
- Construct periodic screened area(s) to grouped AC CUs with internal acoustic absorptive lining;
- Enclose AC CUs in individual vented cabinets;
- Increase acoustic fence height to 2.4m.

NB – it must be acknowledged that this preliminary noise study uses assumed AC CU plant, sound power levels and locations to assess the design for compliance. It is anticipated that the detailed design scheme will be assessed once more and better particulars of the mechanical system become known, to ensure the finished facility is able to fully comply with *the Regulations*.

3.3.6. Scenario 3 – Refrigerated Truck Deliveries, LA1

Scenario 3 model assesses noise (LA1) from refrigerated delivery trucks, assumed to arrive and unload at the designated services area bay in the south west car park. Noise source height is assumed to be 2.2m above ground level. Figure 3-7 shows the noise source location (pink) and surrounding receivers (red) in plan and in noise model environment.

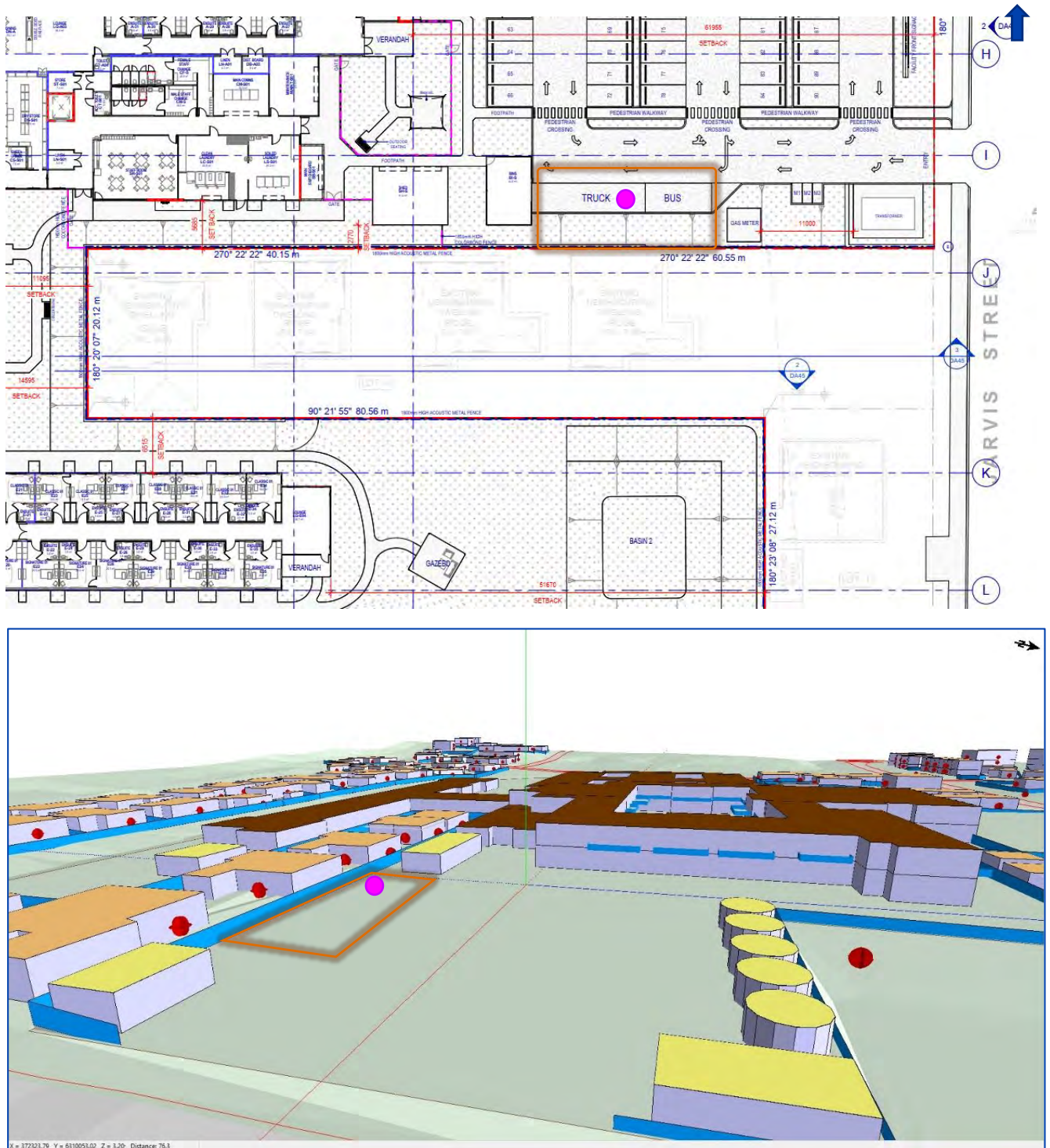


Figure 3-7: Refrigerated Truck in Services Area – Plan and Noise Model Space

Anticipating daytime-only deliveries of approx. half hour duration, one or two times per week, refrigerated trucks are considered a periodic noise source, assessed against the L_{A1} criteria, i.e. present for <1% of the time. No additional penalty is applied for intrusive characteristics on account of the 8 dB rule applicable where noise is present for less than 10% of the time.

The results for Scenario 3 are provided in *Table 3-10*. *Figure 3-8* shows the predicted noise levels as contour maps at ground floor level.

Table 3-10: Scenario 3 Predicted Levels and Assessment, dB L_{A1}

Receiver	Flr Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
Nearest Noise Sensitive Premises (NSPs)					
R1 5/34 Jarvis Street	GF	W	34	55	COMPLIES
R1 5/34 Jarvis Street	GF	N	32	55	COMPLIES
R1 5/34 Jarvis Street	GF	S	39	55	COMPLIES
R1 5/34 Jarvis Street	GF	E	26	55	COMPLIES
R2 7 Hayward Street	GF	S	20	55	COMPLIES
R2 7 Hayward Street	GF	W	18	55	COMPLIES
R2 7 Hayward Street	GF	E	19	55	COMPLIES
R2 7 Hayward Street	GF	S	19	55	COMPLIES
R2 7 Hayward Street	GF	S	16	55	COMPLIES
R2 7 Hayward Street	GF	E	18	55	COMPLIES
R2 7 Hayward Street	GF	E	19	55	COMPLIES
R3 15 Hayward Street	GF	S	20	55	COMPLIES
R3 15 Hayward Street	GF	W	24	55	COMPLIES
Surrounding Noise Sensitive Premises (NSPs)					
R4 1 Cornell Crescent	GF	S	16	55	COMPLIES
R4 1 Cornell Crescent	GF	E	16	55	COMPLIES
R5 3 Cornell Crescent	GF	S	16	55	COMPLIES
R6 5 Cornell Crescent	GF	S	18	55	COMPLIES
R7 7 Cornell Crescent	GF	S	14	55	COMPLIES
R7 7 Cornell Crescent	GF	W	17	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R8 9 Cornell Crescent	GF	E	22	55	COMPLIES
R8 9 Cornell Crescent	GF	S	18	55	COMPLIES
R8 9 Cornell Crescent	F 1	S	25	55	COMPLIES
R8 9 Cornell Crescent - Garden	GF		20	55	COMPLIES
R8 9 Cornell Crescent - Garden	F 1		24	55	COMPLIES
R9 11 Cornell Crescent	GF	E	23	55	COMPLIES
R10 1 Hayward Street	GF	S	17	55	COMPLIES
R10 1 Hayward Street	GF	E	16	55	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	GF	E	19	55	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	F 1	E	19	55	COMPLIES
R12 Unit 3 / 2 Hayward Street	GF	E	19	55	COMPLIES
R12 Unit 3 / 2 Hayward Street	F 1	E	19	55	COMPLIES
R13 Unit 4 / 2 Hayward Street	GF	E	19	55	COMPLIES
R13 Unit 4 / 2 Hayward Street	F 1	E	19	55	COMPLIES
R14 3 Hayward Street	GF	S	22	55	COMPLIES
R14 3 Hayward Street	GF	S	19	55	COMPLIES
R14 3 Hayward Street - garden	GF		21	55	COMPLIES
R14 3 Hayward Street - garden	GF		21	55	COMPLIES
R15 5 Hayward Street	GF	W	11	55	COMPLIES
R15 5 Hayward Street	F 1	W	13	55	COMPLIES
R15 5 Hayward Street	GF	S	18	55	COMPLIES
R15 5 Hayward Street	F 1	S	20	55	COMPLIES
R16 10 Hayward Street	GF	S	18	55	COMPLIES
R16 10 Hayward Street - Garden	GF		17	55	COMPLIES
R17 12 Hayward Street	GF	E	16	55	COMPLIES
R17 12 Hayward Street	GF	E	16	55	COMPLIES
R17 12 Hayward Street	GF	S	19	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R17 12 Hayward Street - Garden	GF		18	55	COMPLIES
R18 14 Hayward Street	GF	S	20	55	COMPLIES
R18 14 Hayward Street - Garden	GF		20	55	COMPLIES
R19 16 Hayward Street	GF	S	22	55	COMPLIES
R19 16 Hayward Street - Garden	GF		22	55	COMPLIES
R20 17 Hayward Street	GF	E	30	55	COMPLIES
R20 17 Hayward Street	F 1	E	36	55	COMPLIES
R20 17 Hayward Street	GF	S	36	55	COMPLIES
R20 17 Hayward Street	F 1	S	44	55	COMPLIES
R20 17 Hayward Street	GF	S	24	55	COMPLIES
R20 17 Hayward Street	F 1	S	29	55	COMPLIES
R20 17 Hayward Street	GF	S	37	55	COMPLIES
R20 17 Hayward Street	F 1	S	38	55	COMPLIES
R20 17 Hayward Street	GF	S	22	55	COMPLIES
R20 17 Hayward Street	F 1	S	27	55	COMPLIES
R20 17 Hayward Street	GF	W	22	55	COMPLIES
R20 17 Hayward Street	F 1	W	27	55	COMPLIES
R20 17 Hayward Street	GF	W	27	55	COMPLIES
R20 17 Hayward Street	F 1	W	32	55	COMPLIES
R20 17 Hayward Street	GF	S	28	55	COMPLIES
R20 17 Hayward Street	F 1	S	31	55	COMPLIES
R20 17 Hayward Street	GF	W	37	55	COMPLIES
R20 17 Hayward Street	F 1	W	39	55	COMPLIES
R20 17 Hayward Street	GF	W	25	55	COMPLIES
R20 17 Hayward Street	F 1	W	30	55	COMPLIES
R20 17 Hayward Street	GF	W	29	55	COMPLIES
R20 17 Hayward Street	F 1	W	31	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R20 17 Hayward Street	GF	S	22	55	COMPLIES
R20 17 Hayward Street	F 1	S	26	55	COMPLIES
R20 17 Hayward Street	GF	W	28	55	COMPLIES
R20 17 Hayward Street	F 1	W	31	55	COMPLIES
R20 17 Hayward Street	GF	S	36	55	COMPLIES
R20 17 Hayward Street	F 1	S	41	55	COMPLIES
R20 17 Hayward Street	GF	W	36	55	COMPLIES
R20 17 Hayward Street	F 1	W	40	55	COMPLIES
R20 17 Hayward Street - garden	GF		38	55	COMPLIES
R21 18 Hayward Street	GF	S	23	55	COMPLIES
R21 18 Hayward Street - Garden	GF		23	55	COMPLIES
R22 20 Hayward Street	GF	S	24	55	COMPLIES
R22 20 Hayward Street	GF	W	23	55	COMPLIES
R22 20 Hayward Street - garden	GF		22	55	COMPLIES
R23 22 Hayward street - Garden	GF		34	55	COMPLIES
R23 22 Hayward Street	GF	S	35	55	COMPLIES
R24 24 Hayward Street	GF	S	24	55	COMPLIES
R24 24 Hayward Street - Garden	GF		24	55	COMPLIES
R25 26 Hayward Street	GF	S	27	55	COMPLIES
R25 26 Hayward Street - Garden	GF		20	55	COMPLIES
R26 28 Hayward Street - Garden	GF		22	55	COMPLIES
R26 Hayward Street	GF	S	23	55	COMPLIES
R27 2 Holylake Avenue	GF	N	23	55	COMPLIES
R28 4 Holylake Avenue	GF	N	26	55	COMPLIES
R28 4 Holylake Avenue	F 1	N	26	55	COMPLIES
R29 6 Holylake Avenue	GF	N	27	55	COMPLIES
R29 6 Holylake Avenue	GF	E	25	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R30 8 Holylake Avenue	GF	E	20	55	COMPLIES
R30 8 Holylake Avenue	GF	N	19	55	COMPLIES
R31 10 Holylake Avenue	GF	SE	26	55	COMPLIES
R31 10 Holylake Avenue	GF	NE	27	55	COMPLIES
R32 7 Holywell Street	GF	SE	18	55	COMPLIES
R32 7 Holywell Street	F 1	SE	21	55	COMPLIES
R32 7 Holywell Street	GF	S	16	55	COMPLIES
R32 7 Holywell Street	F 1	S	19	55	COMPLIES
R32 7 Holywell Street - Garden	GF		17	55	COMPLIES
R32 7 Holywell Street - Garden	F 1		20	55	COMPLIES
R33 8A Holywell Street	GF	E	15	55	COMPLIES
R33 8A Holywell Street	F 1	E	18	55	COMPLIES
R34 8B Holywell Street	GF	SW	16	55	COMPLIES
R34 8B Holywell Street	F 1	SW	19	55	COMPLIES
R35 8C Holywell Street	GF	S	16	55	COMPLIES
R35 8C Holywell Street	F 1	S	19	55	COMPLIES
R36 9 Holywell Street	GF	E	17	55	COMPLIES
R36 9 Holywell Street	GF	E	15	55	COMPLIES
R37 10 Holywell Street	GF	E	16	55	COMPLIES
R37 10 Holywell Street - Garden	GF		15	55	COMPLIES
R38 11 Holywell Street	GF	S	17	55	COMPLIES
R39 12 Holywell street	GF	S	19	55	COMPLIES
R39 12 Holywell street	F 1	S	19	55	COMPLIES
R39 12 Holywell street	GF	SE	19	55	COMPLIES
R39 12 Holywell street	F 1	SE	19	55	COMPLIES
R39 12 Holywell street	GF	SE	18	55	COMPLIES
R39 12 Holywell street	F 1	SE	19	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R39 12 Holywell street	GF	SE	18	55	COMPLIES
R39 12 Holywell street	F 1	SE	18	55	COMPLIES
R39 12 Holywell Street - Garden	GF		18	55	COMPLIES
R40 13 Holywell Street	GF	S	18	55	COMPLIES
R40 13 Holywell Street	GF	E	20	55	COMPLIES
R41 25 Holywell Street	GF	N	30	55	COMPLIES
R41 25 Holywell Street	GF	E	29	55	COMPLIES
R42 32 Holywell Street	GF	E	27	55	COMPLIES
R43 33 Holywell Street	GF	NE	24	55	COMPLIES
R43 33 Holywell Street	GF	N	15	55	COMPLIES
R43 33 Holywell Street	GF	N	28	55	COMPLIES
R43 33 Holywell Street	GF	E	25	55	COMPLIES
R44 34 Holywell Street	GF	E	26	55	COMPLIES
R45 36 Holywell Street	GF	SE	29	55	COMPLIES
R46 16 Jarvis Street	GF	SW	31	55	COMPLIES
R47 23 Jarvis Street	GF	W	32	55	COMPLIES
R48 1/34 Jarvis Street	GF	N	50	55	COMPLIES
R48 1/34 Jarvis Street	GF	S	34	55	COMPLIES
R48 1/34 Jarvis Street	GF	W	48	55	COMPLIES
R49 2/34 Jarvis Street	GF	E	40	55	COMPLIES
R49 2/34 Jarvis Street	GF	S	44	55	COMPLIES
R49 2/34 Jarvis Street	GF	W	48	55	COMPLIES
R50 3/34 Jarvis Street	GF	N	36	55	COMPLIES
R50 3/34 Jarvis Street	GF	E	52	55	COMPLIES
R50 3/34 Jarvis Street	GF	W	40	55	COMPLIES
R50 3/34 Jarvis Street	GF	S	47	55	COMPLIES
R51 4/34 Jarvis Street	GF	W	41	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R51 4/34 Jarvis Street	GF	N	36	55	COMPLIES
R51 4/34 Jarvis Street	GF	S	35	55	COMPLIES
R51 4/34 Jarvis Street	GF	E	39	55	COMPLIES
R52 36 Jarvis Street	GF	N	42	55	COMPLIES
R52 36 Jarvis Street	GF	S	31	55	COMPLIES
R52 36 Jarvis Street	GF	W	41	55	COMPLIES
R53 37 Jarvis street - Garden	GF		37	55	COMPLIES
R53 37 Jarvis Street	GF	SW	36	55	COMPLIES
R53 37 Jarvis Street	GF	NW	34	55	COMPLIES
R54 40C Jarvis Street	GF	N	21	55	COMPLIES
R54 40C Jarvis Street	GF	S	32	55	COMPLIES
R55 41 Jarvis Street	GF	W	31	55	COMPLIES
R56 169 Ocean Drive	GF	E	16	55	COMPLIES
R56 169 Ocean Drive	F 1	E	17	55	COMPLIES
R57 171B Ocean Drive	GF	E	17	55	COMPLIES
R57 171B Ocean Drive	F 1	E	17	55	COMPLIES
R57 171B Ocean Drive	F 2	E	20	55	COMPLIES
R58 173 Ocean Drive	GF	NE	14	55	COMPLIES
R58 173 Ocean Drive	F 1	NE	16	55	COMPLIES
R58 173 Ocean Drive	F 2	NE	17	55	COMPLIES
R58 173 Ocean Drive	GF	SE	15	55	COMPLIES
R58 173 Ocean Drive	F 1	SE	16	55	COMPLIES
R58 173 Ocean Drive	F 2	SE	16	55	COMPLIES
R58 173 Ocean Drive (Garden)	GF		15	55	COMPLIES
R59 187 Ocean Drive	GF	E	25	55	COMPLIES
R60 189 Ocean Drive	GF	E	21	55	COMPLIES
R60 189 Ocean Drive	GF	E	20	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R61 191 Ocean Drive	GF	E	22	55	COMPLIES
R61 191 Ocean Drive	GF	N	21	55	COMPLIES
R62 193 Ocean Drive	GF	E	22	55	COMPLIES
R62 193 Ocean Drive	F 1	E	23	55	COMPLIES
R62 193 Ocean Drive	GF	S	21	55	COMPLIES
R62 193 Ocean Drive	F 1	S	23	55	COMPLIES
R62 193 Ocean Drive	GF	N	7	55	COMPLIES
R62 193 Ocean Drive	F 1	N	18	55	COMPLIES
R63 195 Ocean Drive	GF	E	14	55	COMPLIES
R64 3 Pandal Street	GF	E	24	55	COMPLIES
R64 3 Pandal Street	GF	N	26	55	COMPLIES
R64 3 Pandal Street	GF	E	28	55	COMPLIES
R65 1/5 Pandal Street	GF	N	23	55	COMPLIES
R65 1/5 Pandal Street	GF	E	23	55	COMPLIES
R66 9 Pandal Street	GF	N	26	55	COMPLIES
R66 9 Pandal Street	GF	E	27	55	COMPLIES
R66 9 Pandal Street	GF	N	26	55	COMPLIES
R67 1A Seashore Mews	GF	E	15	55	COMPLIES
R67 1A Seashore Mews	GF	W	26	55	COMPLIES
R68 1B Seashore Mews	GF	NE	21	55	COMPLIES
R68 1B Seashore Mews	GF	NE	26	55	COMPLIES
R69 2 Seashore Mews	GF	SE	25	55	COMPLIES
R69 2 Seashore Mews	GF	W	16	55	COMPLIES
R69 2 Seashore Mews	GF	N	26	55	COMPLIES
R70 1/4 Seashore Mews	GF	NW	22	55	COMPLIES
R70 1/4 Seashore Mews	GF	NE	25	55	COMPLIES
R71 2/4 Seashore Mews	GF	NW	20	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R71 2/4 Seashore Mews	GF	NE	29	55	COMPLIES
R72 6 Seashore Mews	GF	N	23	55	COMPLIES
R73 6A Seashore Mews	GF	E	31	55	COMPLIES
R73 6A Seashore Mews	GF	E	29	55	COMPLIES
R74 1/8 Seashore Mews	GF	N	29	55	COMPLIES
R74 1/8 Seashore Mews	GF	E	25	55	COMPLIES
R75 10 Seashore Mews	GF	N	33	55	COMPLIES
R75 10 Seashore Mews	GF	W	20	55	COMPLIES
R75 2/8 Seashore Mews	GF	N	34	55	COMPLIES
R76 12 Seashore Mews	GF	N	26	55	COMPLIES
R77 12A Seashore Mews	GF	N	20	55	COMPLIES
R79 1/14 Seashore Mews	GF	N	28	55	COMPLIES
R80 2/14 Seashore Mews	GF	N	29	55	COMPLIES
R81 16A Seashore Mews	GF	N	29	55	COMPLIES
R81 16A Seashore Mews	GF	W	30	55	COMPLIES
R82 16B Seashore Mews	GF	N	22	55	COMPLIES
R82 16B Seashore Mews	GF	W	28	55	COMPLIES
R83 18 Seashore Mews	GF	N	27	55	COMPLIES
R84 18A Seashore Mews	GF	W	34	55	COMPLIES
R84 18A Seashore Mews	GF	N	23	55	COMPLIES
R85 20 Seashore Mews	GF	N	31	55	COMPLIES
R85 20 Seashore Mews	GF	E	25	55	COMPLIES
R86 20A Seashore Mews	GF	W	40	55	COMPLIES
R86 20A Seashore Mews	GF	N	28	55	COMPLIES
R87 22A Seashore Mews	GF	W	30	55	COMPLIES
R88 22B Seashore Mews	GF	N	39	55	COMPLIES
R89 1/24 Seashore Mews	GF	N	28	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R90 2/24 Seashore Mews	GF	N	39	55	COMPLIES
R91 27 Seashore Mews	GF	N	28	55	COMPLIES
R91 27 Seashore Mews	GF	E	26	55	COMPLIES
R91 27 Seashore Mews	GF	SE	27	55	COMPLIES
R92 31 Seashore Mews	GF	N	23	55	COMPLIES
R92 31 Seashore Mews	GF	SE	25	55	COMPLIES
R93 Bunbury Wildlife Park	GF	W	28	55	COMPLIES

From the above it is evident that anticipated refrigerated truck deliveries comply with the L_{A1} criteria at all receivers with no mitigation. To minimise audible noise from day-to-day operations at nearby receiving premises, the following ‘best practice’ measures are suggested:

- Truck drivers are to be instructed to use good driving techniques and minimise excessive vehicle noise (no air brakes, excessive revving etc.);
- Where reversing must occur, alternatives to tonal ‘beeper’ reversing alarms are to be implemented, whilst still maintaining a safe workplace such as:
 - Trucks and forklifts to be fitted with broadband style alarms; or
 - Reversing alarms are to be turned off and spotters used to ensure a safe environment.
- Delivery activities are to be undertaken in as careful and quiet a manner as practicable and this is to be advised to staff and delivery personnel;
- Areas where known impact noise will occur are to have suitable rubber impact matting installed;
- Service road area is to be smooth and free of gaps that may cause banging when driven over with vehicles, pallet jacks or the like. Control joints are to be filled with non-hardening mastic to provide a flat finish;
- Metal grates shall be secured with rubber gaskets or plastic grates used;
- Waste collection shall not occur outside of Monday to Saturday, 7.00am to 7.00pm and Sundays and public holidays, 9.00am to 7.00pm.



19075070 South Bunbury Community Aged Care Facility
 Noise Level Contours @ 1.4m Above Ground Level

Scenario 3 - L_{A1} Refrigerated Truck Deliveries Noise

SoundPLAN v8.2
 ISO Algorithms

3 October 2024



Lloyd George Acoustics
 PO Box 717
 HILLARYS WA 6923
 (08) 9401 7770

Length Scale 1:3000

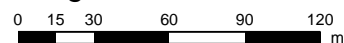
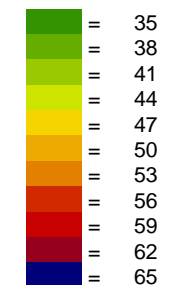


Figure 3-8

Signs and symbols

- * Noise Source
- ⊙ Point receiver

Noise levels
 L_{A10} - dB



3.3.7. Scenario 4A – Standard Delivery Truck, L_{A1}

Scenario 4 models A and B assess noise from standard delivery trucks and associated unloading goods noise inclusive of incidental stacking pallets and potential forklift noise. Noise source height for delivery truck idling is assumed to be 1.2m above ground level.

As per Scenario 3, for the purposes of this early assessment, standard (i.e. non-refrigerated) delivery trucks are assumed to arrive and unload at the designated services area bay in the south west car park – refer *Figure 3-5*.

Anticipating daytime-only deliveries of approx. half hour duration, one or two times per week, standard delivery trucks idling are considered a periodic noise source, assessed against the L_{A1} criteria, i.e. present for <1% of the time. No additional penalty is applied for intrusive characteristics on account of the 8 dB rule.

The results for Scenario 4A are provided in *Table 3-11*. *Figure 3-9* shows the predicted noise levels as contour maps at ground floor level.

Table 3-11: Scenario 4A – Standard Delivery Truck Noise - Predicted Levels and Assessment, dB L_{A1}

Receiver	Flr Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
Nearest Noise Sensitive Premises (NSPs)					
R1 5/34 Jarvis Street	GF	W	30	55	COMPLIES
R1 5/34 Jarvis Street	GF	N	28	55	COMPLIES
R1 5/34 Jarvis Street	GF	S	36	55	COMPLIES
R1 5/34 Jarvis Street	GF	E	23	55	COMPLIES
R2 7 Hayward Street	GF	S	17	55	COMPLIES
R2 7 Hayward Street	GF	W	15	55	COMPLIES
R2 7 Hayward Street	GF	E	16	55	COMPLIES
R2 7 Hayward Street	GF	S	15	55	COMPLIES
R2 7 Hayward Street	GF	S	13	55	COMPLIES
R2 7 Hayward Street	GF	E	15	55	COMPLIES
R2 7 Hayward Street	GF	E	16	55	COMPLIES
R3 15 Hayward Street	GF	S	18	55	COMPLIES
R3 15 Hayward Street	GF	W	22	55	COMPLIES
Surrounding Noise Sensitive Premises (NSPs)					
R4 1 Cornell Crescent	GF	S	12	55	COMPLIES
R4 1 Cornell Crescent	GF	E	12	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R5 3 Cornell Crescent	GF	S	13	55	COMPLIES
R6 5 Cornell Crescent	GF	S	16	55	COMPLIES
R7 7 Cornell Crescent	GF	S	12	55	COMPLIES
R7 7 Cornell Crescent	GF	W	15	55	COMPLIES
R8 9 Cornell Crescent	GF	E	20	55	COMPLIES
R8 9 Cornell Crescent	GF	S	15	55	COMPLIES
R8 9 Cornell Crescent	F 1	S	23	55	COMPLIES
R8 9 Cornell Crescent - Garden	GF		18	55	COMPLIES
R8 9 Cornell Crescent - Garden	F 1		22	55	COMPLIES
R9 11 Cornell Crescent	GF	E	20	55	COMPLIES
R10 1 Hayward Street	GF	S	13	55	COMPLIES
R10 1 Hayward Street	GF	E	13	55	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	GF	E	15	55	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	F 1	E	15	55	COMPLIES
R12 Unit 3 / 2 Hayward Street	GF	E	15	55	COMPLIES
R12 Unit 3 / 2 Hayward Street	F 1	E	15	55	COMPLIES
R13 Unit 4 / 2 Hayward Street	GF	E	15	55	COMPLIES
R13 Unit 4 / 2 Hayward Street	F 1	E	15	55	COMPLIES
R14 3 Hayward Street	GF	S	18	55	COMPLIES
R14 3 Hayward Street	GF	S	16	55	COMPLIES
R14 3 Hayward Street - garden	GF		17	55	COMPLIES
R14 3 Hayward Street - garden	GF		18	55	COMPLIES
R15 5 Hayward Street	GF	W	8	55	COMPLIES
R15 5 Hayward Street	F 1	W	10	55	COMPLIES
R15 5 Hayward Street	GF	S	15	55	COMPLIES
R15 5 Hayward Street	F 1	S	17	55	COMPLIES
R16 10 Hayward Street	GF	S	15	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R16 10 Hayward Street - Garden	GF		14	55	COMPLIES
R17 12 Hayward Street	GF	E	12	55	COMPLIES
R17 12 Hayward Street	GF	E	13	55	COMPLIES
R17 12 Hayward Street	GF	S	16	55	COMPLIES
R17 12 Hayward Street - Garden	GF		15	55	COMPLIES
R18 14 Hayward Street	GF	S	16	55	COMPLIES
R18 14 Hayward Street - Garden	GF		17	55	COMPLIES
R19 16 Hayward Street	GF	S	20	55	COMPLIES
R19 16 Hayward Street - Garden	GF		20	55	COMPLIES
R20 17 Hayward Street	GF	E	27	55	COMPLIES
R20 17 Hayward Street	F 1	E	33	55	COMPLIES
R20 17 Hayward Street	GF	S	33	55	COMPLIES
R20 17 Hayward Street	F 1	S	41	55	COMPLIES
R20 17 Hayward Street	GF	S	19	55	COMPLIES
R20 17 Hayward Street	F 1	S	25	55	COMPLIES
R20 17 Hayward Street	GF	S	32	55	COMPLIES
R20 17 Hayward Street	F 1	S	38	55	COMPLIES
R20 17 Hayward Street	GF	S	20	55	COMPLIES
R20 17 Hayward Street	F 1	S	24	55	COMPLIES
R20 17 Hayward Street	GF	W	20	55	COMPLIES
R20 17 Hayward Street	F 1	W	26	55	COMPLIES
R20 17 Hayward Street	GF	W	27	55	COMPLIES
R20 17 Hayward Street	F 1	W	32	55	COMPLIES
R20 17 Hayward Street	GF	S	21	55	COMPLIES
R20 17 Hayward Street	F 1	S	26	55	COMPLIES
R20 17 Hayward Street	GF	W	33	55	COMPLIES
R20 17 Hayward Street	F 1	W	40	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R20 17 Hayward Street	GF	W	19	55	COMPLIES
R20 17 Hayward Street	F 1	W	27	55	COMPLIES
R20 17 Hayward Street	GF	W	19	55	COMPLIES
R20 17 Hayward Street	F 1	W	24	55	COMPLIES
R20 17 Hayward Street	GF	S	18	55	COMPLIES
R20 17 Hayward Street	F 1	S	22	55	COMPLIES
R20 17 Hayward Street	GF	W	18	55	COMPLIES
R20 17 Hayward Street	F 1	W	27	55	COMPLIES
R20 17 Hayward Street	GF	S	30	55	COMPLIES
R20 17 Hayward Street	F 1	S	36	55	COMPLIES
R20 17 Hayward Street	GF	W	33	55	COMPLIES
R20 17 Hayward Street	F 1	W	40	55	COMPLIES
R20 17 Hayward Street - garden	GF		34	55	COMPLIES
R21 18 Hayward Street	GF	S	21	55	COMPLIES
R21 18 Hayward Street - Garden	GF		22	55	COMPLIES
R22 20 Hayward Street	GF	S	19	55	COMPLIES
R22 20 Hayward Street	GF	W	20	55	COMPLIES
R22 20 Hayward Street - garden	GF		20	55	COMPLIES
R23 22 Hayward street - Garden	GF		32	55	COMPLIES
R23 22 Hayward Street	GF	S	22	55	COMPLIES
R24 24 Hayward Street	GF	S	21	55	COMPLIES
R24 24 Hayward Street - Garden	GF		17	55	COMPLIES
R25 26 Hayward Street	GF	S	19	55	COMPLIES
R25 26 Hayward Street - Garden	GF		18	55	COMPLIES
R26 28 Hayward Street - Garden	GF		17	55	COMPLIES
R26 Hayward Street	GF	S	19	55	COMPLIES
R27 2 Holylake Avenue	GF	N	10	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R28 4 Holylake Avenue	GF	N	22	55	COMPLIES
R28 4 Holylake Avenue	F 1	N	23	55	COMPLIES
R29 6 Holylake Avenue	GF	N	22	55	COMPLIES
R29 6 Holylake Avenue	GF	E	21	55	COMPLIES
R30 8 Holylake Avenue	GF	E	16	55	COMPLIES
R30 8 Holylake Avenue	GF	N	15	55	COMPLIES
R31 10 Holylake Avenue	GF	SE	22	55	COMPLIES
R31 10 Holylake Avenue	GF	NE	23	55	COMPLIES
R32 7 Holywell Street	GF	SE	14	55	COMPLIES
R32 7 Holywell Street	F 1	SE	17	55	COMPLIES
R32 7 Holywell Street	GF	S	13	55	COMPLIES
R32 7 Holywell Street	F 1	S	16	55	COMPLIES
R32 7 Holywell Street - Garden	GF		13	55	COMPLIES
R32 7 Holywell Street - Garden	F 1		17	55	COMPLIES
R33 8A Holywell Street	GF	E	12	55	COMPLIES
R33 8A Holywell Street	F 1	E	15	55	COMPLIES
R34 8B Holywell Street	GF	SW	13	55	COMPLIES
R34 8B Holywell Street	F 1	SW	16	55	COMPLIES
R35 8C Holywell Street	GF	S	13	55	COMPLIES
R35 8C Holywell Street	F 1	S	15	55	COMPLIES
R36 9 Holywell Street	GF	E	13	55	COMPLIES
R36 9 Holywell Street	GF	E	12	55	COMPLIES
R37 10 Holywell Street	GF	E	12	55	COMPLIES
R37 10 Holywell Street - Garden	GF		11	55	COMPLIES
R38 11 Holywell Street	GF	S	14	55	COMPLIES
R39 12 Holywell street	GF	S	15	55	COMPLIES
R39 12 Holywell street	F 1	S	15	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R39 12 Holywell street	GF	SE	15	55	COMPLIES
R39 12 Holywell street	F 1	SE	15	55	COMPLIES
R39 12 Holywell street	GF	SE	14	55	COMPLIES
R39 12 Holywell street	F 1	SE	14	55	COMPLIES
R39 12 Holywell street	GF	SE	14	55	COMPLIES
R39 12 Holywell street	F 1	SE	14	55	COMPLIES
R39 12 Holywell Street - Garden	GF		14	55	COMPLIES
R40 13 Holywell Street	GF	S	14	55	COMPLIES
R40 13 Holywell Street	GF	E	16	55	COMPLIES
R41 25 Holywell Street	GF	N	26	55	COMPLIES
R41 25 Holywell Street	GF	E	25	55	COMPLIES
R42 32 Holywell Street	GF	E	23	55	COMPLIES
R43 33 Holywell Street	GF	NE	20	55	COMPLIES
R43 33 Holywell Street	GF	N	12	55	COMPLIES
R43 33 Holywell Street	GF	N	23	55	COMPLIES
R43 33 Holywell Street	GF	E	22	55	COMPLIES
R44 34 Holywell Street	GF	E	22	55	COMPLIES
R45 36 Holywell Street	GF	SE	24	55	COMPLIES
R46 16 Jarvis Street	GF	SW	29	55	COMPLIES
R47 23 Jarvis Street	GF	W	30	55	COMPLIES
R48 1/34 Jarvis Street	GF	N	45	55	COMPLIES
R48 1/34 Jarvis Street	GF	S	39	55	COMPLIES
R48 1/34 Jarvis Street	GF	W	44	55	COMPLIES
R49 2/34 Jarvis Street	GF	E	35	55	COMPLIES
R49 2/34 Jarvis Street	GF	S	48	55	COMPLIES
R49 2/34 Jarvis Street	GF	W	42	55	COMPLIES
R50 3/34 Jarvis Street	GF	N	32	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R50 3/34 Jarvis Street	GF	E	45	55	COMPLIES
R50 3/34 Jarvis Street	GF	W	34	55	COMPLIES
R50 3/34 Jarvis Street	GF	S	42	55	COMPLIES
R51 4/34 Jarvis Street	GF	W	35	55	COMPLIES
R51 4/34 Jarvis Street	GF	N	31	55	COMPLIES
R51 4/34 Jarvis Street	GF	S	30	55	COMPLIES
R51 4/34 Jarvis Street	GF	E	37	55	COMPLIES
R52 36 Jarvis Street	GF	N	37	55	COMPLIES
R52 36 Jarvis Street	GF	S	27	55	COMPLIES
R52 36 Jarvis Street	GF	W	37	55	COMPLIES
R53 37 Jarvis street - Garden	GF		32	55	COMPLIES
R53 37 Jarvis Street	GF	SW	30	55	COMPLIES
R53 37 Jarvis Street	GF	NW	28	55	COMPLIES
R54 40C Jarvis Street	GF	N	18	55	COMPLIES
R54 40C Jarvis Street	GF	S	28	55	COMPLIES
R55 41 Jarvis Street	GF	W	26	55	COMPLIES
R56 169 Ocean Drive	GF	E	13	55	COMPLIES
R56 169 Ocean Drive	F 1	E	13	55	COMPLIES
R57 171B Ocean Drive	GF	E	14	55	COMPLIES
R57 171B Ocean Drive	F 1	E	13	55	COMPLIES
R57 171B Ocean Drive	F 2	E	17	55	COMPLIES
R58 173 Ocean Drive	GF	NE	11	55	COMPLIES
R58 173 Ocean Drive	F 1	NE	12	55	COMPLIES
R58 173 Ocean Drive	F 2	NE	13	55	COMPLIES
R58 173 Ocean Drive	GF	SE	11	55	COMPLIES
R58 173 Ocean Drive	F 1	SE	12	55	COMPLIES
R58 173 Ocean Drive	F 2	SE	12	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R58 173 Ocean Drive (Garden)	GF		11	55	COMPLIES
R59 187 Ocean Drive	GF	E	22	55	COMPLIES
R60 189 Ocean Drive	GF	E	16	55	COMPLIES
R60 189 Ocean Drive	GF	E	14	55	COMPLIES
R61 191 Ocean Drive	GF	E	18	55	COMPLIES
R61 191 Ocean Drive	GF	N	15	55	COMPLIES
R62 193 Ocean Drive	GF	E	19	55	COMPLIES
R62 193 Ocean Drive	F 1	E	21	55	COMPLIES
R62 193 Ocean Drive	GF	S	18	55	COMPLIES
R62 193 Ocean Drive	F 1	S	20	55	COMPLIES
R62 193 Ocean Drive	GF	N	1	55	COMPLIES
R62 193 Ocean Drive	F 1	N	7	55	COMPLIES
R63 195 Ocean Drive	GF	E	10	55	COMPLIES
R64 3 Pandal Street	GF	E	21	55	COMPLIES
R64 3 Pandal Street	GF	N	23	55	COMPLIES
R64 3 Pandal Street	GF	E	22	55	COMPLIES
R65 1/5 Pandal Street	GF	N	21	55	COMPLIES
R65 1/5 Pandal Street	GF	E	20	55	COMPLIES
R66 9 Pandal Street	GF	N	23	55	COMPLIES
R66 9 Pandal Street	GF	E	23	55	COMPLIES
R66 9 Pandal Street	GF	N	23	55	COMPLIES
R67 1A Seashore Mews	GF	E	12	55	COMPLIES
R67 1A Seashore Mews	GF	W	22	55	COMPLIES
R68 1B Seashore Mews	GF	NE	18	55	COMPLIES
R68 1B Seashore Mews	GF	NE	22	55	COMPLIES
R69 2 Seashore Mews	GF	SE	20	55	COMPLIES
R69 2 Seashore Mews	GF	W	13	55	COMPLIES

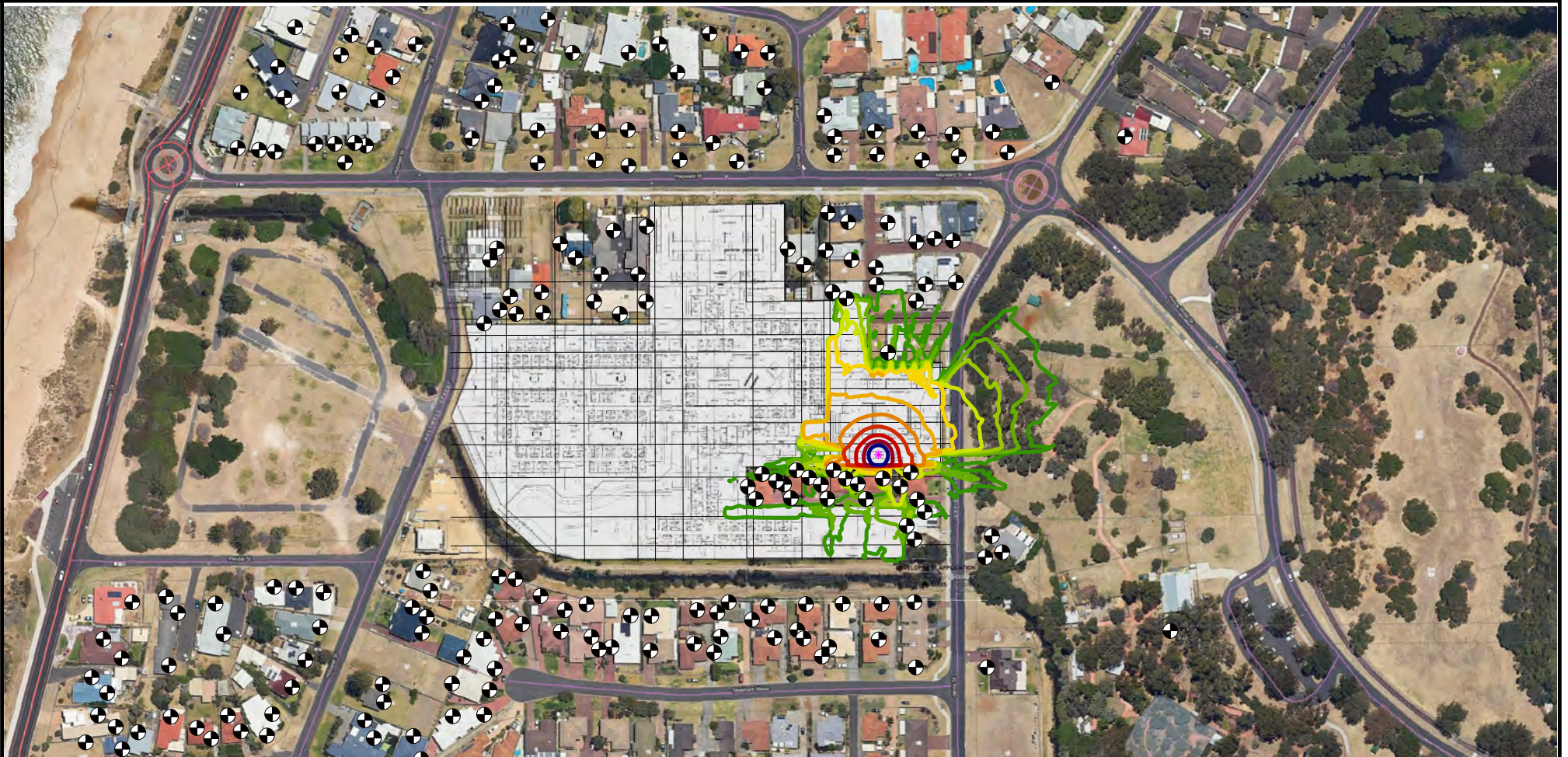
Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R69 2 Seashore Mews	GF	N	22	55	COMPLIES
R70 1/4 Seashore Mews	GF	NW	18	55	COMPLIES
R70 1/4 Seashore Mews	GF	NE	21	55	COMPLIES
R71 2/4 Seashore Mews	GF	NW	18	55	COMPLIES
R71 2/4 Seashore Mews	GF	NE	25	55	COMPLIES
R72 6 Seashore Mews	GF	N	20	55	COMPLIES
R73 6A Seashore Mews	GF	E	26	55	COMPLIES
R73 6A Seashore Mews	GF	E	23	55	COMPLIES
R74 1/8 Seashore Mews	GF	N	24	55	COMPLIES
R74 1/8 Seashore Mews	GF	E	22	55	COMPLIES
R75 10 Seashore Mews	GF	N	27	55	COMPLIES
R75 10 Seashore Mews	GF	W	17	55	COMPLIES
R75 2/8 Seashore Mews	GF	N	29	55	COMPLIES
R76 12 Seashore Mews	GF	N	22	55	COMPLIES
R77 12A Seashore Mews	GF	N	18	55	COMPLIES
R79 1/14 Seashore Mews	GF	N	23	55	COMPLIES
R80 2/14 Seashore Mews	GF	N	25	55	COMPLIES
R81 16A Seashore Mews	GF	N	24	55	COMPLIES
R81 16A Seashore Mews	GF	W	25	55	COMPLIES
R82 16B Seashore Mews	GF	N	19	55	COMPLIES
R82 16B Seashore Mews	GF	W	24	55	COMPLIES
R83 18 Seashore Mews	GF	N	24	55	COMPLIES
R84 18A Seashore Mews	GF	W	27	55	COMPLIES
R84 18A Seashore Mews	GF	N	22	55	COMPLIES
R85 20 Seashore Mews	GF	N	27	55	COMPLIES
R85 20 Seashore Mews	GF	E	22	55	COMPLIES
R86 20A Seashore Mews	GF	W	32	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R86 20A Seashore Mews	GF	N	26	55	COMPLIES
R87 22A Seashore Mews	GF	W	25	55	COMPLIES
R88 22B Seashore Mews	GF	N	32	55	COMPLIES
R89 1/24 Seashore Mews	GF	N	25	55	COMPLIES
R90 2/24 Seashore Mews	GF	N	31	55	COMPLIES
R91 27 Seashore Mews	GF	N	24	55	COMPLIES
R91 27 Seashore Mews	GF	E	22	55	COMPLIES
R91 27 Seashore Mews	GF	SE	22	55	COMPLIES
R92 31 Seashore Mews	GF	N	19	55	COMPLIES
R92 31 Seashore Mews	GF	SE	20	55	COMPLIES
R93 Bunbury Wildlife Park	GF	W	24	55	COMPLIES

From the above it is evident that anticipated standard truck deliveries comply with the L_{A1} criteria at all receivers.

To minimise audible noise from day-to-day operations at nearby receiving premises, the following 'best practice' measures are suggested:

- Truck drivers are to be instructed to use good driving techniques and minimise excessive vehicle noise (no air brakes, excessive revving etc);
- Where reversing must occur, alternatives to tonal 'beeper' reversing alarms are to be implemented, whilst still maintaining a safe workplace such as:
 - Trucks and forklifts to be fitted with broadband style alarms; or
 - Reversing alarms are to be turned off and spotters used to ensure a safe environment.
- Delivery activities are to be undertaken in as careful and quiet a manner as practicable and this is to be advised to staff and delivery personnel;
- Areas where known impact noise will occur are to have suitable rubber impact matting installed;
- Service road area is to be smooth and free of gaps that may cause banging when driven over with vehicles, pallet jacks or the like. Control joints are to be filled with non-hardening mastic to provide a flat finish;
- Metal grates shall be secured with rubber gaskets or plastic grates used;
- Waste collection shall not occur outside of Monday to Saturday, 7.00am to 7.00pm and Sundays and public holidays, 9.00am to 7.00pm.



19075070 South Bunbury Community Aged Care Facility
 Noise Level Contours @ 1.4m Above Ground Level

Scenario 4A - L_{A1} Standard Truck Deliveries Noise

SoundPLAN v8.2
 ISO Algorithms

3 October 2024



Lloyd George Acoustics
 PO Box 717
 HILLARYS WA 6923
 (08) 9401 7770

Length Scale 1:3000

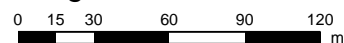
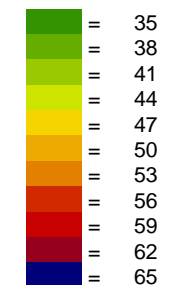


Figure 3-9

Signs and symbols

- * Noise Source
- ⊙ Point receiver

Noise levels
 L_{A10} - dB



3.3.8. Scenario 4B – Unloading Goods Incl. Forklift/Pallets, L_{AMAX}

Scenario 4B assesses incidental noise associated with unloading goods noise inclusive of incidental stacking pallets and potential forklift noise. For short-term, instantaneous noise sources, the L_{AMAX} criteria is the appropriate index for assessment, hence is examined separately. Unloading goods noise (incl. forklifts) is likely to be considered *Impulsive* under *the Regulations* intrusive noise characteristics criteria, hence a +10 dB penalty is applied.

As per Scenario 3, for the purposes of this early assessment, standard (i.e. non-refrigerated) delivery trucks are assumed to arrive and unload at the designated services area bay in the south west car park – refer *Figure 3-5*.

The results for Scenario 4B are provided in *Table 3-12*. *Figure 3-10* shows the predicted noise levels as contour maps at ground floor level.

Table 3-12: Scenario 4B Predicted Levels and Assessment, dB L_{AMAX}

Receiver	Flr Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
Nearest Noise Sensitive Premises (NSPs)						
R1 5/34 Jarvis Street	GF	W	40	50	65	COMPLIES
R1 5/34 Jarvis Street	GF	N	40	50	65	COMPLIES
R1 5/34 Jarvis Street	GF	S	47	57	65	COMPLIES
R1 5/34 Jarvis Street	GF	E	34	44	65	COMPLIES
R2 7 Hayward Street	GF	S	25	35	65	COMPLIES
R2 7 Hayward Street	GF	W	24	34	65	COMPLIES
R2 7 Hayward Street	GF	E	24	34	65	COMPLIES
R2 7 Hayward Street	GF	S	23	33	65	COMPLIES
R2 7 Hayward Street	GF	S	23	33	65	COMPLIES
R2 7 Hayward Street	GF	E	23	33	65	COMPLIES
R2 7 Hayward Street	GF	E	25	35	65	COMPLIES
R3 15 Hayward Street	GF	S	29	39	65	COMPLIES
R3 15 Hayward Street	GF	W	31	41	65	COMPLIES
Surrounding Noise Sensitive Premises (NSPs)						
R4 1 Cornell Crescent	GF	S	22	32	65	COMPLIES
R4 1 Cornell Crescent	GF	E	21	31	65	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
R5 3 Cornell Crescent	GF	S	23	33	65	COMPLIES
R6 5 Cornell Crescent	GF	S	24	34	65	COMPLIES
R7 7 Cornell Crescent	GF	S	20	30	65	COMPLIES
R7 7 Cornell Crescent	GF	W	23	33	65	COMPLIES
R8 9 Cornell Crescent	GF	E	29	39	65	COMPLIES
R8 9 Cornell Crescent	GF	S	23	33	65	COMPLIES
R8 9 Cornell Crescent	F 1	S	29	39	65	COMPLIES
R8 9 Cornell Crescent - Garden	GF		27	37	65	COMPLIES
R8 9 Cornell Crescent - Garden	F 1		29	39	65	COMPLIES
R9 11 Cornell Crescent	GF	E	29	39	65	COMPLIES
R10 1 Hayward Street	GF	S	21	31	65	COMPLIES
R10 1 Hayward Street	GF	E	22	32	65	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	GF	E	21	31	65	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	F 1	E	21	31	65	COMPLIES
R12 Unit 3 / 2 Hayward Street	GF	E	21	31	65	COMPLIES
R12 Unit 3 / 2 Hayward Street	F 1	E	21	31	65	COMPLIES
R13 Unit 4 / 2 Hayward Street	GF	E	22	32	65	COMPLIES
R13 Unit 4 / 2 Hayward Street	F 1	E	22	32	65	COMPLIES
R14 3 Hayward Street	GF	S	27	37	65	COMPLIES
R14 3 Hayward Street	GF	S	25	35	65	COMPLIES
R14 3 Hayward Street - garden	GF		25	35	65	COMPLIES
R14 3 Hayward Street - garden	GF		26	36	65	COMPLIES
R15 5 Hayward Street	GF	W	18	28	65	COMPLIES
R15 5 Hayward Street	F 1	W	19	29	65	COMPLIES
R15 5 Hayward Street	GF	S	24	34	65	COMPLIES
R15 5 Hayward Street	F 1	S	23	33	65	COMPLIES
R16 10 Hayward Street	GF	S	24	34	65	COMPLIES

Receiver	Flr Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
R16 10 Hayward Street - Garden	GF		22	32	65	COMPLIES
R17 12 Hayward Street	GF	E	19	29	65	COMPLIES
R17 12 Hayward Street	GF	E	20	30	65	COMPLIES
R17 12 Hayward Street	GF	S	25	35	65	COMPLIES
R17 12 Hayward Street - Garden	GF		25	35	65	COMPLIES
R18 14 Hayward Street	GF	S	26	36	65	COMPLIES
R18 14 Hayward Street - Garden	GF		25	35	65	COMPLIES
R19 16 Hayward Street	GF	S	27	37	65	COMPLIES
R19 16 Hayward Street - Garden	GF		27	37	65	COMPLIES
R20 17 Hayward Street	GF	E	38	48	65	COMPLIES
R20 17 Hayward Street	F 1	E	44	54	65	COMPLIES
R20 17 Hayward Street	GF	S	42	52	65	COMPLIES
R20 17 Hayward Street	F 1	S	52	62	65	COMPLIES
R20 17 Hayward Street	GF	S	29	39	65	COMPLIES
R20 17 Hayward Street	F 1	S	31	41	65	COMPLIES
R20 17 Hayward Street	GF	S	42	52	65	COMPLIES
R20 17 Hayward Street	F 1	S	48	58	65	COMPLIES
R20 17 Hayward Street	GF	S	29	39	65	COMPLIES
R20 17 Hayward Street	F 1	S	31	41	65	COMPLIES
R20 17 Hayward Street	GF	W	27	37	65	COMPLIES
R20 17 Hayward Street	F 1	W	30	40	65	COMPLIES
R20 17 Hayward Street	GF	W	28	38	65	COMPLIES
R20 17 Hayward Street	F 1	W	33	43	65	COMPLIES
R20 17 Hayward Street	GF	S	30	40	65	COMPLIES
R20 17 Hayward Street	F 1	S	38	48	65	COMPLIES
R20 17 Hayward Street	GF	W	45	55	65	COMPLIES
R20 17 Hayward Street	F 1	W	51	61	65	COMPLIES

Receiver	Flr Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
R20 17 Hayward Street	GF	W	30	40	65	COMPLIES
R20 17 Hayward Street	F 1	W	35	45	65	COMPLIES
R20 17 Hayward Street	GF	W	29	39	65	COMPLIES
R20 17 Hayward Street	F 1	W	33	43	65	COMPLIES
R20 17 Hayward Street	GF	S	29	39	65	COMPLIES
R20 17 Hayward Street	F 1	S	31	41	65	COMPLIES
R20 17 Hayward Street	GF	W	35	45	65	COMPLIES
R20 17 Hayward Street	F 1	W	41	51	65	COMPLIES
R20 17 Hayward Street	GF	S	43	53	65	COMPLIES
R20 17 Hayward Street	F 1	S	48	58	65	COMPLIES
R20 17 Hayward Street	GF	W	47	57	65	COMPLIES
R20 17 Hayward Street	F 1	W	53	63	65	COMPLIES
R20 17 Hayward Street - garden	GF		44	54	65	COMPLIES
R21 18 Hayward Street	GF	S	29	39	65	COMPLIES
R21 18 Hayward Street - Garden	GF		30	40	65	COMPLIES
R22 20 Hayward Street	GF	S	25	35	65	COMPLIES
R22 20 Hayward Street	GF	W	27	37	65	COMPLIES
R22 20 Hayward Street - garden	GF		28	38	65	COMPLIES
R23 22 Hayward street - Garden	GF		29	39	65	COMPLIES
R23 22 Hayward Street	GF	S	30	40	65	COMPLIES
R24 24 Hayward Street	GF	S	28	38	65	COMPLIES
R24 24 Hayward Street - Garden	GF		25	35	65	COMPLIES
R25 26 Hayward Street	GF	S	27	37	65	COMPLIES
R25 26 Hayward Street - Garden	GF		28	38	65	COMPLIES
R26 28 Hayward Street - Garden	GF		27	37	65	COMPLIES
R26 Hayward Street	GF	S	27	37	65	COMPLIES
R27 2 Holylake Avenue	GF	N	17	27	65	COMPLIES

Receiver	Flr Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
R28 4 Holylake Avenue	GF	N	34	44	65	COMPLIES
R28 4 Holylake Avenue	F 1	N	35	45	65	COMPLIES
R29 6 Holylake Avenue	GF	N	30	40	65	COMPLIES
R29 6 Holylake Avenue	GF	E	34	44	65	COMPLIES
R30 8 Holylake Avenue	GF	E	23	33	65	COMPLIES
R30 8 Holylake Avenue	GF	N	23	33	65	COMPLIES
R31 10 Holylake Avenue	GF	SE	33	43	65	COMPLIES
R31 10 Holylake Avenue	GF	NE	33	43	65	COMPLIES
R32 7 Holywell Street	GF	SE	24	34	65	COMPLIES
R32 7 Holywell Street	F 1	SE	26	36	65	COMPLIES
R32 7 Holywell Street	GF	S	21	31	65	COMPLIES
R32 7 Holywell Street	F 1	S	24	34	65	COMPLIES
R32 7 Holywell Street - Garden	GF		23	33	65	COMPLIES
R32 7 Holywell Street - Garden	F 1		25	35	65	COMPLIES
R33 8A Holywell Street	GF	E	19	29	65	COMPLIES
R33 8A Holywell Street	F 1	E	21	31	65	COMPLIES
R34 8B Holywell Street	GF	SW	19	29	65	COMPLIES
R34 8B Holywell Street	F 1	SW	21	31	65	COMPLIES
R35 8C Holywell Street	GF	S	19	29	65	COMPLIES
R35 8C Holywell Street	F 1	S	21	31	65	COMPLIES
R36 9 Holywell Street	GF	E	20	30	65	COMPLIES
R36 9 Holywell Street	GF	E	21	31	65	COMPLIES
R37 10 Holywell Street	GF	E	20	30	65	COMPLIES
R37 10 Holywell Street - Garden	GF		18	28	65	COMPLIES
R38 11 Holywell Street	GF	S	21	31	65	COMPLIES
R39 12 Holywell street	GF	S	23	33	65	COMPLIES
R39 12 Holywell street	F 1	S	22	32	65	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
R39 12 Holywell street	GF	SE	22	32	65	COMPLIES
R39 12 Holywell street	F 1	SE	22	32	65	COMPLIES
R39 12 Holywell street	GF	SE	22	32	65	COMPLIES
R39 12 Holywell street	F 1	SE	22	32	65	COMPLIES
R39 12 Holywell street	GF	SE	21	31	65	COMPLIES
R39 12 Holywell street	F 1	SE	21	31	65	COMPLIES
R39 12 Holywell Street - Garden	GF		21	31	65	COMPLIES
R40 13 Holywell Street	GF	S	22	32	65	COMPLIES
R40 13 Holywell Street	GF	E	23	33	65	COMPLIES
R41 25 Holywell Street	GF	N	35	45	65	COMPLIES
R41 25 Holywell Street	GF	E	35	45	65	COMPLIES
R42 32 Holywell Street	GF	E	33	43	65	COMPLIES
R43 33 Holywell Street	GF	NE	28	38	65	COMPLIES
R43 33 Holywell Street	GF	N	18	28	65	COMPLIES
R43 33 Holywell Street	GF	N	31	41	65	COMPLIES
R43 33 Holywell Street	GF	E	31	41	65	COMPLIES
R44 34 Holywell Street	GF	E	31	41	65	COMPLIES
R45 36 Holywell Street	GF	SE	33	43	65	COMPLIES
R46 16 Jarvis Street	GF	SW	38	48	65	COMPLIES
R47 23 Jarvis Street	GF	W	43	53	65	COMPLIES
R48 1/34 Jarvis Street	GF	N	54	64	65	COMPLIES
R48 1/34 Jarvis Street	GF	S	42	52	65	COMPLIES
R48 1/34 Jarvis Street	GF	W	54	64	65	COMPLIES
R49 2/34 Jarvis Street	GF	E	42	52	65	COMPLIES
R49 2/34 Jarvis Street	GF	S	57	67	65	EXCEEDS, +2dB(A)
R49 2/34 Jarvis Street	GF	W	50	60	65	COMPLIES
R50 3/34 Jarvis Street	GF	N	43	53	65	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
R50 3/34 Jarvis Street	GF	E	53	63	65	COMPLIES
R50 3/34 Jarvis Street	GF	W	41	51	65	COMPLIES
R50 3/34 Jarvis Street	GF	S	50	60	65	COMPLIES
R51 4/34 Jarvis Street	GF	W	42	52	65	COMPLIES
R51 4/34 Jarvis Street	GF	N	43	53	65	COMPLIES
R51 4/34 Jarvis Street	GF	S	39	49	65	COMPLIES
R51 4/34 Jarvis Street	GF	E	46	56	65	COMPLIES
R52 36 Jarvis Street	GF	N	45	55	65	COMPLIES
R52 36 Jarvis Street	GF	S	39	49	65	COMPLIES
R52 36 Jarvis Street	GF	W	46	56	65	COMPLIES
R53 37 Jarvis street - Garden	GF		41	51	65	COMPLIES
R53 37 Jarvis Street	GF	SW	39	49	65	COMPLIES
R53 37 Jarvis Street	GF	NW	38	48	65	COMPLIES
R54 40C Jarvis Street	GF	N	28	38	65	COMPLIES
R54 40C Jarvis Street	GF	S	37	47	65	COMPLIES
R55 41 Jarvis Street	GF	W	33	43	65	COMPLIES
R56 169 Ocean Drive	GF	E	19	29	65	COMPLIES
R56 169 Ocean Drive	F 1	E	19	29	65	COMPLIES
R57 171B Ocean Drive	GF	E	20	30	65	COMPLIES
R57 171B Ocean Drive	F 1	E	20	30	65	COMPLIES
R57 171B Ocean Drive	F 2	E	24	34	65	COMPLIES
R58 173 Ocean Drive	GF	NE	17	27	65	COMPLIES
R58 173 Ocean Drive	F 1	NE	18	28	65	COMPLIES
R58 173 Ocean Drive	F 2	NE	19	29	65	COMPLIES
R58 173 Ocean Drive	GF	SE	17	27	65	COMPLIES
R58 173 Ocean Drive	F 1	SE	18	28	65	COMPLIES
R58 173 Ocean Drive	F 2	SE	18	28	65	COMPLIES

Receiver	Flr Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
R58 173 Ocean Drive (Garden)	GF		17	27	65	COMPLIES
R59 187 Ocean Drive	GF	E	33	43	65	COMPLIES
R60 189 Ocean Drive	GF	E	24	34	65	COMPLIES
R60 189 Ocean Drive	GF	E	23	33	65	COMPLIES
R61 191 Ocean Drive	GF	E	29	39	65	COMPLIES
R61 191 Ocean Drive	GF	N	24	34	65	COMPLIES
R62 193 Ocean Drive	GF	E	29	39	65	COMPLIES
R62 193 Ocean Drive	F 1	E	29	39	65	COMPLIES
R62 193 Ocean Drive	GF	S	27	37	65	COMPLIES
R62 193 Ocean Drive	F 1	S	29	39	65	COMPLIES
R62 193 Ocean Drive	GF	N	10	20	65	COMPLIES
R62 193 Ocean Drive	F 1	N	12	22	65	COMPLIES
R63 195 Ocean Drive	GF	E	17	27	65	COMPLIES
R64 3 Pandal Street	GF	E	32	42	65	COMPLIES
R64 3 Pandal Street	GF	N	34	44	65	COMPLIES
R64 3 Pandal Street	GF	E	32	42	65	COMPLIES
R65 1/5 Pandal Street	GF	N	31	41	65	COMPLIES
R65 1/5 Pandal Street	GF	E	32	42	65	COMPLIES
R66 9 Pandal Street	GF	N	34	44	65	COMPLIES
R66 9 Pandal Street	GF	E	32	42	65	COMPLIES
R66 9 Pandal Street	GF	N	34	44	65	COMPLIES
R67 1A Seashore Mews	GF	E	20	30	65	COMPLIES
R67 1A Seashore Mews	GF	W	30	40	65	COMPLIES
R68 1B Seashore Mews	GF	NE	28	38	65	COMPLIES
R68 1B Seashore Mews	GF	NE	28	38	65	COMPLIES
R69 2 Seashore Mews	GF	SE	30	40	65	COMPLIES
R69 2 Seashore Mews	GF	W	21	31	65	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
R69 2 Seashore Mews	GF	N	29	39	65	COMPLIES
R70 1/4 Seashore Mews	GF	NW	28	38	65	COMPLIES
R70 1/4 Seashore Mews	GF	NE	29	39	65	COMPLIES
R71 2/4 Seashore Mews	GF	NW	31	41	65	COMPLIES
R71 2/4 Seashore Mews	GF	NE	35	45	65	COMPLIES
R72 6 Seashore Mews	GF	N	29	39	65	COMPLIES
R73 6A Seashore Mews	GF	E	33	43	65	COMPLIES
R73 6A Seashore Mews	GF	E	31	41	65	COMPLIES
R74 1/8 Seashore Mews	GF	N	34	44	65	COMPLIES
R74 1/8 Seashore Mews	GF	E	30	40	65	COMPLIES
R75 10 Seashore Mews	GF	N	37	47	65	COMPLIES
R75 10 Seashore Mews	GF	W	26	36	65	COMPLIES
R75 2/8 Seashore Mews	GF	N	38	48	65	COMPLIES
R76 12 Seashore Mews	GF	N	29	39	65	COMPLIES
R77 12A Seashore Mews	GF	N	25	35	65	COMPLIES
R79 1/14 Seashore Mews	GF	N	33	43	65	COMPLIES
R80 2/14 Seashore Mews	GF	N	33	43	65	COMPLIES
R81 16A Seashore Mews	GF	N	31	41	65	COMPLIES
R81 16A Seashore Mews	GF	W	32	42	65	COMPLIES
R82 16B Seashore Mews	GF	N	27	37	65	COMPLIES
R82 16B Seashore Mews	GF	W	32	42	65	COMPLIES
R83 18 Seashore Mews	GF	N	31	41	65	COMPLIES
R84 18A Seashore Mews	GF	W	34	44	65	COMPLIES
R84 18A Seashore Mews	GF	N	31	41	65	COMPLIES
R85 20 Seashore Mews	GF	N	34	44	65	COMPLIES
R85 20 Seashore Mews	GF	E	30	40	65	COMPLIES
R86 20A Seashore Mews	GF	W	37	47	65	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Daytime Assigned Level	Assessment
R86 20A Seashore Mews	GF	N	31	41	65	COMPLIES
R87 22A Seashore Mews	GF	W	31	41	65	COMPLIES
R88 22B Seashore Mews	GF	N	42	52	65	COMPLIES
R89 1/24 Seashore Mews	GF	N	33	43	65	COMPLIES
R90 2/24 Seashore Mews	GF	N	43	53	65	COMPLIES
R91 27 Seashore Mews	GF	N	35	45	65	COMPLIES
R91 27 Seashore Mews	GF	E	30	40	65	COMPLIES
R91 27 Seashore Mews	GF	SE	32	42	65	COMPLIES
R92 31 Seashore Mews	GF	N	26	36	65	COMPLIES
R92 31 Seashore Mews	GF	SE	28	38	65	COMPLIES
R93 Bunbury Wildlife Park	GF	W	34	44	65	COMPLIES

From the above it is evident that anticipated unloading goods deliveries is predicted to comply with the L_{AMAX} criteria at all receivers except for one receiver identified in *Table 3-12*.



19075070 South Bunbury Community Aged Care Facility
 Noise Level Contours @ 1.4m Above Ground Level

Scenario 4B - L_{AMAX} Deliveries, Unloading Goods Noise

SoundPLAN v8.2
 ISO Algorithms

3 October 2024

Lloyd George Acoustics
 PO Box 717
 HILLARYS WA 6923
 (08) 9401 7770

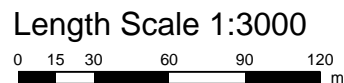
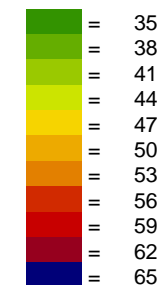


Figure 3-10

Signs and symbols

- * Noise Source
- ⊙ Point receiver

Noise levels
 L_{AMAX} - dB



3.3.9. Scenario 4B - Proposed Mitigation

Proposed Mitigation as follows:

- Increased Acoustic Barrier Fence Height
 - The acoustic fence along the Lot boundary between the Service Bay and north extent of 34 Jarvis Street is to be increased in height to 2.0m above the proposed floor level of the Aged Care Facility (noting the Aged Care Finished Floor Level is at 3.2m as shown in *Appendix A*) for the full extent of the boundary as shown in *Figure 3-11*. This proposed 2.0m fence is also required to be solid and continuous with a minimum surface mass of 8kg/m² (e.g. 9 mm fibre cement or double sheeted Colorbond). The acoustic fence on the north side of the car park will also require this same minimum surface mass as shown in *Figure 3-11*.
- Best Practice Measures
 - Truck drivers are to be instructed to use good driving techniques and minimise excessive vehicle noise (no air brakes, excessive revving etc);
 - Where reversing must occur, alternatives to tonal ‘beeper’ reversing alarms are to be implemented, whilst still maintaining a safe workplace such as:
 - Trucks and forklifts to be fitted with broadband style alarms; or
 - Reversing alarms are to be turned off and spotters used to ensure a safe environment.
 - Delivery activities are to be undertaken in as careful and quiet a manner as practicable and this is to be advised to staff and delivery personnel;
 - Areas where known impact noise will occur are to have suitable rubber impact matting installed;
 - Service road area is to be smooth and free of gaps that may cause banging when driven over with vehicles, pallet jacks or the like. Control joints are to be filled with non-hardening mastic to provide a flat finish;
 - Metal grates shall be secured with rubber gaskets or plastic grates used;
 - Waste collection shall not occur outside of Monday to Saturday, 7.00am to 7.00pm and Sundays and public holidays, 9.00am to 7.00pm.

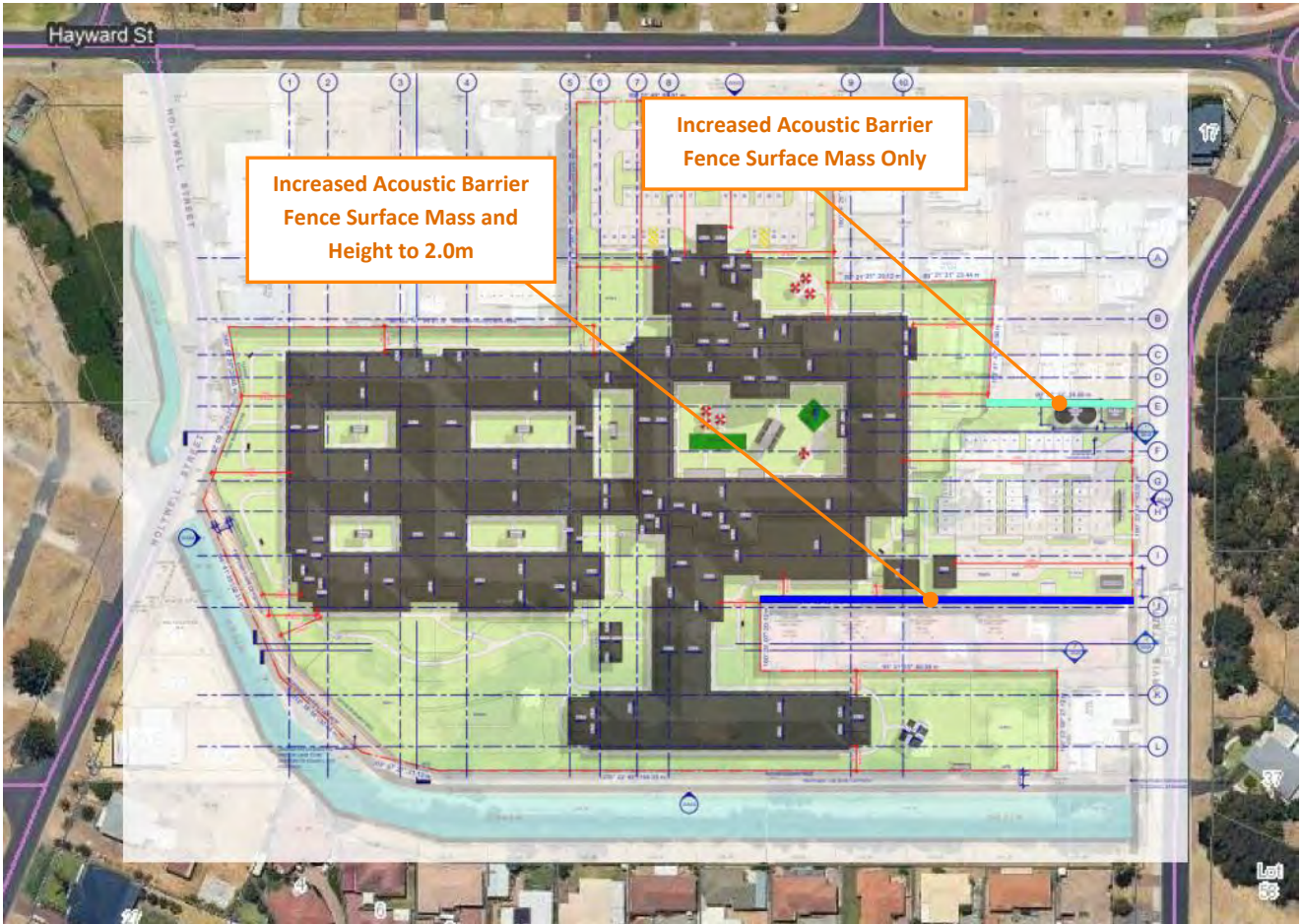


Figure 3-11: Fence Upgrade Extents

3.3.10. Scenario 5 – Car Park Car Doors Closing, L_{AMAX}

Scenario 5 assesses incidental noise associated with car doors closing in the car park. The most sensitive time is during night time hours, (i.e. 10.00pm –7.00am), hence this is the criteria assessed for compliance. Car doors closing is considered short-term, instantaneous noise, therefore the L_{AMAX} criteria is the appropriate index for assessment. Car Doors closing is also likely to be considered *Impulsive* under *the Regulations* intrusive noise characteristics criteria, hence a +10 dB penalty is applied.

The results for Scenario 5 are provided in *Table 3-13* - note, noise mitigation wall height of 2.0m from Scenario 4B is necessarily included in Scenario 5 assessment. *Figure 3-12* shows the predicted noise levels as contour maps at ground floor level.

Table 3-13: Scenario 5 Predicted Levels and Assessment, dB L_{AMAX}

Receiver	Flr Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
Nearest Noise Sensitive Premises (NSPs)						
R1 5/34 Jarvis Street	GF	W	28	38	55	COMPLIES
R1 5/34 Jarvis Street	GF	N	25	35	55	COMPLIES
R1 5/34 Jarvis Street	GF	S	27	37	55	COMPLIES
R1 5/34 Jarvis Street	GF	E	21	31	55	COMPLIES
R2 7 Hayward Street	GF	S	59	69	55	EXCEEDS, +14dB(A)
R2 7 Hayward Street	GF	W	31	41	55	COMPLIES
R2 7 Hayward Street	GF	E	49	59	55	EXCEEDS, +4dB(A)
R2 7 Hayward Street	GF	S	39	49	55	COMPLIES
R2 7 Hayward Street	GF	S	30	40	55	COMPLIES
R2 7 Hayward Street	GF	E	26	36	55	COMPLIES
R2 7 Hayward Street	GF	E	37	47	55	COMPLIES
R3 15 Hayward Street	GF	S	49	59	55	EXCEEDS, +4dB(A)
R3 15 Hayward Street	GF	W	43	53	55	COMPLIES
Surrounding Noise Sensitive Premises (NSPs)						
R4 1 Cornell Crescent	GF	S	26	36	55	COMPLIES
R4 1 Cornell Crescent	GF	E	22	32	55	COMPLIES
R5 3 Cornell Crescent	GF	S	25	35	55	COMPLIES
R6 5 Cornell Crescent	GF	S	31	41	55	COMPLIES

Receiver	Flr Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
R7 7 Cornell Crescent	GF	S	30	40	55	COMPLIES
R7 7 Cornell Crescent	GF	W	30	40	55	COMPLIES
R8 9 Cornell Crescent	GF	E	33	43	55	COMPLIES
R8 9 Cornell Crescent	GF	S	25	35	55	COMPLIES
R8 9 Cornell Crescent	F 1	S	34	44	55	COMPLIES
R8 9 Cornell Crescent - Garden	GF		31	41	55	COMPLIES
R8 9 Cornell Crescent - Garden	F 1		35	45	55	COMPLIES
R9 11 Cornell Crescent	GF	E	34	44	55	COMPLIES
R10 1 Hayward Street	GF	S	24	34	55	COMPLIES
R10 1 Hayward Street	GF	E	20	30	55	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	GF	E	17	27	55	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	F 1	E	18	28	55	COMPLIES
R12 Unit 3 / 2 Hayward Street	GF	E	18	28	55	COMPLIES
R12 Unit 3 / 2 Hayward Street	F 1	E	17	27	55	COMPLIES
R13 Unit 4 / 2 Hayward Street	GF	E	29	39	55	COMPLIES
R13 Unit 4 / 2 Hayward Street	F 1	E	28	38	55	COMPLIES
R14 3 Hayward Street	GF	S	31	41	55	COMPLIES
R14 3 Hayward Street	GF	S	32	42	55	COMPLIES
R14 3 Hayward Street - garden	GF		26	36	55	COMPLIES
R14 3 Hayward Street - garden	GF		27	37	55	COMPLIES
R15 5 Hayward Street	GF	W	25	35	55	COMPLIES
R15 5 Hayward Street	F 1	W	16	26	55	COMPLIES
R15 5 Hayward Street	GF	S	26	36	55	COMPLIES
R15 5 Hayward Street	F 1	S	36	46	55	COMPLIES
R16 10 Hayward Street	GF	S	35	45	55	COMPLIES
R16 10 Hayward Street - Garden	GF		34	44	55	COMPLIES
R17 12 Hayward Street	GF	E	20	30	55	COMPLIES

Receiver	Flr Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
R17 12 Hayward Street	GF	E	27	37	55	COMPLIES
R17 12 Hayward Street	GF	S	39	49	55	COMPLIES
R17 12 Hayward Street - Garden	GF		40	50	55	COMPLIES
R18 14 Hayward Street	GF	S	41	51	55	COMPLIES
R18 14 Hayward Street - Garden	GF		44	54	55	COMPLIES
R19 16 Hayward Street	GF	S	42	52	55	COMPLIES
R19 16 Hayward Street - Garden	GF		46	56	55	EXCEEDS, +1dB(A)
R20 17 Hayward Street	GF	E	34	44	55	COMPLIES
R20 17 Hayward Street	F 1	E	41	51	55	COMPLIES
R20 17 Hayward Street	GF	S	34	44	55	COMPLIES
R20 17 Hayward Street	F 1	S	43	53	55	COMPLIES
R20 17 Hayward Street	GF	S	33	43	55	COMPLIES
R20 17 Hayward Street	F 1	S	35	45	55	COMPLIES
R20 17 Hayward Street	GF	S	35	45	55	COMPLIES
R20 17 Hayward Street	F 1	S	40	50	55	COMPLIES
R20 17 Hayward Street	GF	S	39	49	55	COMPLIES
R20 17 Hayward Street	F 1	S	42	52	55	COMPLIES
R20 17 Hayward Street	GF	W	39	49	55	COMPLIES
R20 17 Hayward Street	F 1	W	40	50	55	COMPLIES
R20 17 Hayward Street	GF	W	37	47	55	COMPLIES
R20 17 Hayward Street	F 1	W	39	49	55	COMPLIES
R20 17 Hayward Street	GF	S	31	41	55	COMPLIES
R20 17 Hayward Street	F 1	S	41	51	55	COMPLIES
R20 17 Hayward Street	GF	W	35	45	55	COMPLIES
R20 17 Hayward Street	F 1	W	41	51	55	COMPLIES
R20 17 Hayward Street	GF	W	30	40	55	COMPLIES
R20 17 Hayward Street	F 1	W	36	46	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
R20 17 Hayward Street	GF	W	26	36	55	COMPLIES
R20 17 Hayward Street	F 1	W	28	38	55	COMPLIES
R20 17 Hayward Street	GF	S	28	38	55	COMPLIES
R20 17 Hayward Street	F 1	S	29	39	55	COMPLIES
R20 17 Hayward Street	GF	W	32	42	55	COMPLIES
R20 17 Hayward Street	F 1	W	34	44	55	COMPLIES
R20 17 Hayward Street	GF	S	30	40	55	COMPLIES
R20 17 Hayward Street	F 1	S	36	46	55	COMPLIES
R20 17 Hayward Street	GF	W	37	47	55	COMPLIES
R20 17 Hayward Street	F 1	W	40	50	55	COMPLIES
R20 17 Hayward Street - garden	GF		44	54	55	COMPLIES
R21 18 Hayward Street	GF	S	44	54	55	COMPLIES
R21 18 Hayward Street - Garden	GF		46	56	55	COMPLIES
R22 20 Hayward Street	GF	S	40	50	55	COMPLIES
R22 20 Hayward Street	GF	W	40	50	55	COMPLIES
R22 20 Hayward Street - garden	GF		40	50	55	COMPLIES
R23 22 Hayward street - Garden	GF		37	47	55	COMPLIES
R23 22 Hayward Street	GF	S	37	47	55	COMPLIES
R24 24 Hayward Street	GF	S	35	45	55	COMPLIES
R24 24 Hayward Street - Garden	GF		34	44	55	COMPLIES
R25 26 Hayward Street	GF	S	33	43	55	COMPLIES
R25 26 Hayward Street - Garden	GF		30	40	55	COMPLIES
R26 28 Hayward Street - Garden	GF		29	39	55	COMPLIES
R26 Hayward Street	GF	S	33	43	55	COMPLIES
R27 2 Holylake Avenue	GF	N	22	32	55	COMPLIES
R28 4 Holylake Avenue	GF	N	21	31	55	COMPLIES
R28 4 Holylake Avenue	F 1	N	22	32	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
R29 6 Holylake Avenue	GF	N	20	30	55	COMPLIES
R29 6 Holylake Avenue	GF	E	20	30	55	COMPLIES
R30 8 Holylake Avenue	GF	E	18	28	55	COMPLIES
R30 8 Holylake Avenue	GF	N	12	22	55	COMPLIES
R31 10 Holylake Avenue	GF	SE	20	30	55	COMPLIES
R31 10 Holylake Avenue	GF	NE	21	31	55	COMPLIES
R32 7 Holywell Street	GF	SE	28	38	55	COMPLIES
R32 7 Holywell Street	F 1	SE	33	43	55	COMPLIES
R32 7 Holywell Street	GF	S	25	35	55	COMPLIES
R32 7 Holywell Street	F 1	S	30	40	55	COMPLIES
R32 7 Holywell Street - Garden	GF		28	38	55	COMPLIES
R32 7 Holywell Street - Garden	F 1		31	41	55	COMPLIES
R33 8A Holywell Street	GF	E	21	31	55	COMPLIES
R33 8A Holywell Street	F 1	E	27	37	55	COMPLIES
R34 8B Holywell Street	GF	SW	26	36	55	COMPLIES
R34 8B Holywell Street	F 1	SW	28	38	55	COMPLIES
R35 8C Holywell Street	GF	S	25	35	55	COMPLIES
R35 8C Holywell Street	F 1	S	27	37	55	COMPLIES
R36 9 Holywell Street	GF	E	23	33	55	COMPLIES
R36 9 Holywell Street	GF	E	22	32	55	COMPLIES
R37 10 Holywell Street	GF	E	27	37	55	COMPLIES
R37 10 Holywell Street - Garden	GF		24	34	55	COMPLIES
R38 11 Holywell Street	GF	S	29	39	55	COMPLIES
R39 12 Holywell street	GF	S	29	39	55	COMPLIES
R39 12 Holywell street	F 1	S	29	39	55	COMPLIES
R39 12 Holywell street	GF	SE	28	38	55	COMPLIES
R39 12 Holywell street	F 1	SE	29	39	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
R39 12 Holywell street	GF	SE	28	38	55	COMPLIES
R39 12 Holywell street	F 1	SE	29	39	55	COMPLIES
R39 12 Holywell street	GF	SE	29	39	55	COMPLIES
R39 12 Holywell street	F 1	SE	29	39	55	COMPLIES
R39 12 Holywell Street - Garden	GF		28	38	55	COMPLIES
R40 13 Holywell Street	GF	S	21	31	55	COMPLIES
R40 13 Holywell Street	GF	E	19	29	55	COMPLIES
R41 25 Holywell Street	GF	N	23	33	55	COMPLIES
R41 25 Holywell Street	GF	E	22	32	55	COMPLIES
R42 32 Holywell Street	GF	E	19	29	55	COMPLIES
R43 33 Holywell Street	GF	NE	21	31	55	COMPLIES
R43 33 Holywell Street	GF	N	15	25	55	COMPLIES
R43 33 Holywell Street	GF	N	23	33	55	COMPLIES
R43 33 Holywell Street	GF	E	20	30	55	COMPLIES
R44 34 Holywell Street	GF	E	21	31	55	COMPLIES
R45 36 Holywell Street	GF	SE	23	33	55	COMPLIES
R46 16 Jarvis Street	GF	SW	27	37	55	COMPLIES
R47 23 Jarvis Street	GF	W	31	41	55	COMPLIES
R48 1/34 Jarvis Street	GF	N	37	47	55	COMPLIES
R48 1/34 Jarvis Street	GF	S	33	43	55	COMPLIES
R48 1/34 Jarvis Street	GF	W	39	49	55	COMPLIES
R49 2/34 Jarvis Street	GF	E	29	39	55	COMPLIES
R49 2/34 Jarvis Street	GF	S	40	50	55	COMPLIES
R49 2/34 Jarvis Street	GF	W	37	47	55	COMPLIES
R50 3/34 Jarvis Street	GF	N	28	38	55	COMPLIES
R50 3/34 Jarvis Street	GF	E	39	49	55	COMPLIES
R50 3/34 Jarvis Street	GF	W	31	41	55	COMPLIES

Receiver	Flr Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
R50 3/34 Jarvis Street	GF	S	35	45	55	COMPLIES
R51 4/34 Jarvis Street	GF	W	32	42	55	COMPLIES
R51 4/34 Jarvis Street	GF	N	26	36	55	COMPLIES
R51 4/34 Jarvis Street	GF	S	27	37	55	COMPLIES
R51 4/34 Jarvis Street	GF	E	29	39	55	COMPLIES
R52 36 Jarvis Street	GF	N	33	43	55	COMPLIES
R52 36 Jarvis Street	GF	S	24	34	55	COMPLIES
R52 36 Jarvis Street	GF	W	33	43	55	COMPLIES
R53 37 Jarvis street - Garden	GF		34	44	55	COMPLIES
R53 37 Jarvis Street	GF	SW	27	37	55	COMPLIES
R53 37 Jarvis Street	GF	NW	29	39	55	COMPLIES
R54 40C Jarvis Street	GF	N	14	24	55	COMPLIES
R54 40C Jarvis Street	GF	S	24	34	55	COMPLIES
R55 41 Jarvis Street	GF	W	25	35	55	COMPLIES
R56 169 Ocean Drive	GF	E	22	32	55	COMPLIES
R56 169 Ocean Drive	F 1	E	25	35	55	COMPLIES
R57 171B Ocean Drive	GF	E	27	37	55	COMPLIES
R57 171B Ocean Drive	F 1	E	27	37	55	COMPLIES
R57 171B Ocean Drive	F 2	E	29	39	55	COMPLIES
R58 173 Ocean Drive	GF	NE	19	29	55	COMPLIES
R58 173 Ocean Drive	F 1	NE	26	36	55	COMPLIES
R58 173 Ocean Drive	F 2	NE	27	37	55	COMPLIES
R58 173 Ocean Drive	GF	SE	21	31	55	COMPLIES
R58 173 Ocean Drive	F 1	SE	26	36	55	COMPLIES
R58 173 Ocean Drive	F 2	SE	27	37	55	COMPLIES
R58 173 Ocean Drive (Garden)	GF		23	33	55	COMPLIES
R59 187 Ocean Drive	GF	E	20	30	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
R60 189 Ocean Drive	GF	E	19	29	55	COMPLIES
R60 189 Ocean Drive	GF	E	18	28	55	COMPLIES
R61 191 Ocean Drive	GF	E	19	29	55	COMPLIES
R61 191 Ocean Drive	GF	N	12	22	55	COMPLIES
R62 193 Ocean Drive	GF	E	20	30	55	COMPLIES
R62 193 Ocean Drive	F 1	E	21	31	55	COMPLIES
R62 193 Ocean Drive	GF	S	16	26	55	COMPLIES
R62 193 Ocean Drive	F 1	S	20	30	55	COMPLIES
R62 193 Ocean Drive	GF	N	4	14	55	COMPLIES
R62 193 Ocean Drive	F 1	N	12	22	55	COMPLIES
R63 195 Ocean Drive	GF	E	11	21	55	COMPLIES
R64 3 Pandal Street	GF	E	21	31	55	COMPLIES
R64 3 Pandal Street	GF	N	21	31	55	COMPLIES
R64 3 Pandal Street	GF	E	21	31	55	COMPLIES
R65 1/5 Pandal Street	GF	N	21	31	55	COMPLIES
R65 1/5 Pandal Street	GF	E	18	28	55	COMPLIES
R66 9 Pandal Street	GF	N	22	32	55	COMPLIES
R66 9 Pandal Street	GF	E	22	32	55	COMPLIES
R66 9 Pandal Street	GF	N	22	32	55	COMPLIES
R67 1A Seashore Mews	GF	E	15	25	55	COMPLIES
R67 1A Seashore Mews	GF	W	18	28	55	COMPLIES
R68 1B Seashore Mews	GF	NE	14	24	55	COMPLIES
R68 1B Seashore Mews	GF	NE	19	29	55	COMPLIES
R69 2 Seashore Mews	GF	SE	18	28	55	COMPLIES
R69 2 Seashore Mews	GF	W	20	30	55	COMPLIES
R69 2 Seashore Mews	GF	N	20	30	55	COMPLIES
R70 1/4 Seashore Mews	GF	NW	17	27	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
R70 1/4 Seashore Mews	GF	NE	17	27	55	COMPLIES
R71 2/4 Seashore Mews	GF	NW	23	33	55	COMPLIES
R71 2/4 Seashore Mews	GF	NE	21	31	55	COMPLIES
R72 6 Seashore Mews	GF	N	23	33	55	COMPLIES
R73 6A Seashore Mews	GF	E	24	34	55	COMPLIES
R73 6A Seashore Mews	GF	E	23	33	55	COMPLIES
R74 1/8 Seashore Mews	GF	N	21	31	55	COMPLIES
R74 1/8 Seashore Mews	GF	E	19	29	55	COMPLIES
R75 10 Seashore Mews	GF	N	25	35	55	COMPLIES
R75 10 Seashore Mews	GF	W	15	25	55	COMPLIES
R75 2/8 Seashore Mews	GF	N	27	37	55	COMPLIES
R76 12 Seashore Mews	GF	N	20	30	55	COMPLIES
R77 12A Seashore Mews	GF	N	22	32	55	COMPLIES
R79 1/14 Seashore Mews	GF	N	21	31	55	COMPLIES
R80 2/14 Seashore Mews	GF	N	22	32	55	COMPLIES
R81 16A Seashore Mews	GF	N	22	32	55	COMPLIES
R81 16A Seashore Mews	GF	W	25	35	55	COMPLIES
R82 16B Seashore Mews	GF	N	16	26	55	COMPLIES
R82 16B Seashore Mews	GF	W	20	30	55	COMPLIES
R83 18 Seashore Mews	GF	N	20	30	55	COMPLIES
R84 18A Seashore Mews	GF	W	26	36	55	COMPLIES
R84 18A Seashore Mews	GF	N	21	31	55	COMPLIES
R85 20 Seashore Mews	GF	N	30	40	55	COMPLIES
R85 20 Seashore Mews	GF	E	18	28	55	COMPLIES
R86 20A Seashore Mews	GF	W	30	40	55	COMPLIES
R86 20A Seashore Mews	GF	N	26	36	55	COMPLIES
R87 22A Seashore Mews	GF	W	26	36	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Adjusted for Impulsiveness, +10dB(A)	Night-time Assigned Level	Assessment
R88 22B Seashore Mews	GF	N	31	41	55	COMPLIES
R89 1/24 Seashore Mews	GF	N	21	31	55	COMPLIES
R90 2/24 Seashore Mews	GF	N	31	41	55	COMPLIES
R91 27 Seashore Mews	GF	N	23	33	55	COMPLIES
R91 27 Seashore Mews	GF	E	22	32	55	COMPLIES
R91 27 Seashore Mews	GF	SE	19	29	55	COMPLIES
R92 31 Seashore Mews	GF	N	15	25	55	COMPLIES
R92 31 Seashore Mews	GF	SE	19	29	55	COMPLIES
R93 Bunbury Wildlife Park	GF	W	28	38	55	COMPLIES

From the above it is evident that anticipated car doors closing during night-time hours is able to comply with the L_{MAX} criteria at all receivers except R2 7 Hayward Street, identified in *Table 3-13*.

3.3.11. Scenario 5 - Proposed Mitigation

Noise source contribution analysis identifies the L_{MAX} exceedences as Car Bays in the North Car Park only, with all receivers adjacent to the South West car park as compliant, therefore mitigation is to use the South West car park only for after-hours access.




19075070 South Bunbury Community Aged Care Facility
 Noise Level Contours @ 1.4m Above Ground Level

Scenario 5 - L_{AMAX} Car Park, Car Doors Closing

SoundPLAN v8.2
 ISO Algorithms

3 October 2024

 **Lloyd George Acoustics**
 PO Box 717
 HILLARYS WA 6923
 (08) 9401 7770

Length Scale 1:3000

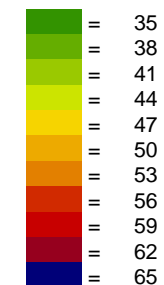


Figure 3-12

Signs and symbols

- * Noise Source
- Point receiver

Noise levels
 L_{AMAX} - dB



3.3.12. Scenario 6 – Fire Pump Room, Periodic Maintenance Testing, L_{A1}

Under emergency operation, fire pump plant noise emissions are exempt from any *Regulatory* requirements. However, Fire pump plant is subject to mandatory routine maintenance operations under AS 1851, which is considered as a regular noise emission source, requiring compliance.

Where fire pump equipment is left untreated, the combination of diesel pumps, combustion engine exhaust muffler and water flow noise through piping and valve systems can generate significant levels of noise (> 100 dB(A)) potentially causing significant disturbance to residents during testing, and to nearby off-site noise-sensitive receivers. *Figure 3-13* shows the fire pump shed located on-grade near the South West car park entrance, and its corresponding representation in the noise model environment.

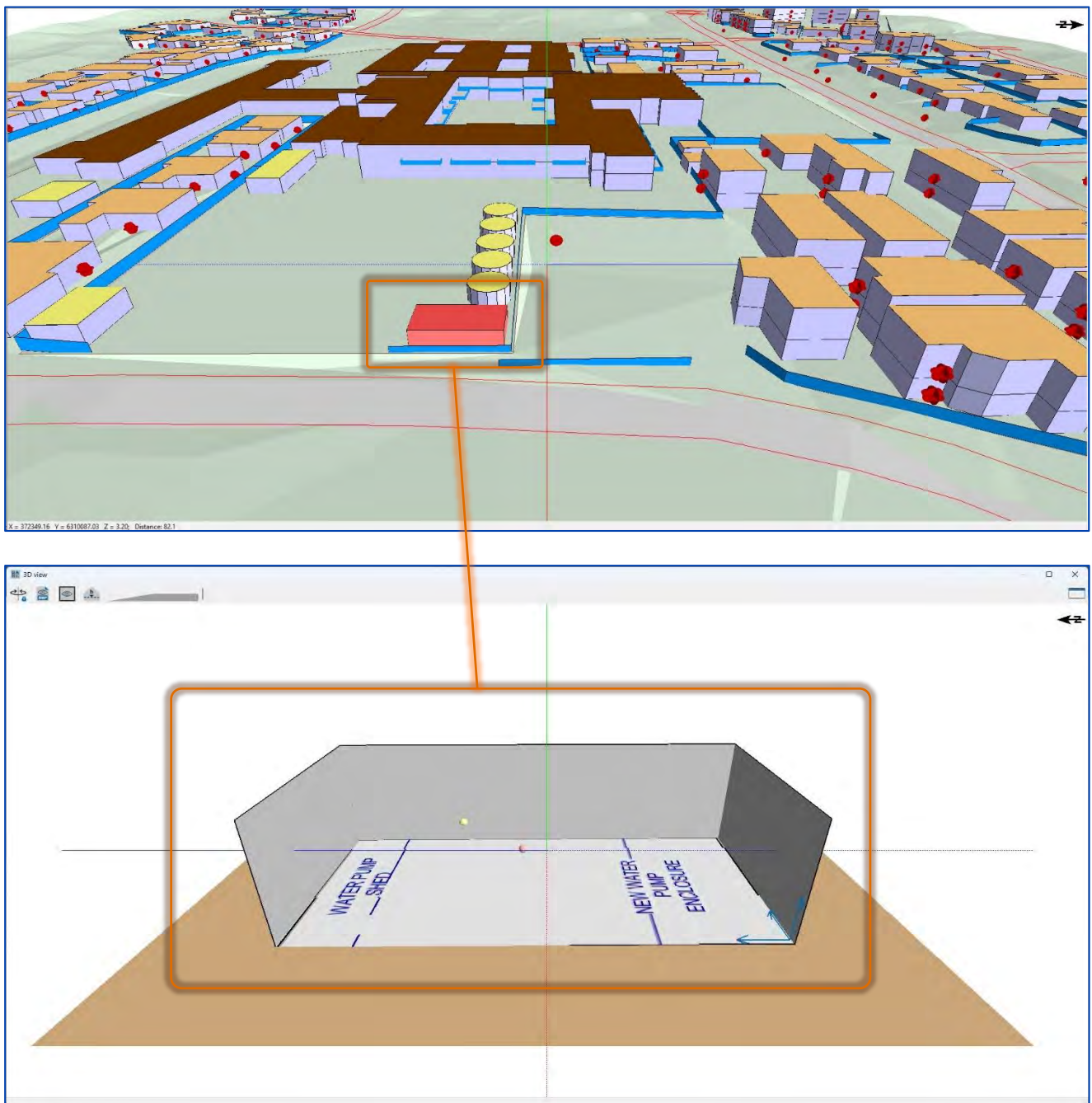


Figure 3-13: Overview of Fire Pump Shed in Noise Model

For the purposes of preliminary assessment, the fire pump room shed is modelled as bare steel shed walls and roof, concrete floor with no doors or ventilation grilles – this is considered appropriate for this early stage of assessment. Pending mechanical ventilation strategy, pump room doors and/or walls may require ventilation louvers to allow air flow for diesel engine operation which act as noise leak points. These will need to be assessed as detailed design progresses.

As the typical test regimen for such emergency equipment is monthly, the noise source is assessed against the L_{A1} criteria, present for <1% of the time.

The results for Scenario 5 are provided in *Table 3-14*. *Figure 3-14* shows the predicted noise levels as contour maps at ground floor level.

Table 3-14: Scenario 5 Predicted Levels and Assessment, dB L_{A1}

Receiver	Flr Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
Nearest Noise Sensitive Premises (NSPs)					
R1 5/34 Jarvis Street	GF	W	33	55	COMPLIES
R1 5/34 Jarvis Street	GF	N	39	55	COMPLIES
R1 5/34 Jarvis Street	GF	S	49	55	COMPLIES
R1 5/34 Jarvis Street	GF	E	37	55	COMPLIES
R2 7 Hayward Street	GF	S	26	55	COMPLIES
R2 7 Hayward Street	GF	W	25	55	COMPLIES
R2 7 Hayward Street	GF	E	23	55	COMPLIES
R2 7 Hayward Street	GF	S	26	55	COMPLIES
R2 7 Hayward Street	GF	S	27	55	COMPLIES
R2 7 Hayward Street	GF	E	26	55	COMPLIES
R2 7 Hayward Street	GF	E	28	55	COMPLIES
R3 15 Hayward Street	GF	S	32	55	COMPLIES
R3 15 Hayward Street	GF	W	28	55	COMPLIES
Surrounding Noise Sensitive Premises (NSPs)					
R4 1 Cornell Crescent	GF	S	25	55	COMPLIES
R4 1 Cornell Crescent	GF	E	24	55	COMPLIES
R5 3 Cornell Crescent	GF	S	25	55	COMPLIES
R6 5 Cornell Crescent	GF	S	27	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R7 7 Cornell Crescent	GF	S	26	55	COMPLIES
R7 7 Cornell Crescent	GF	W	23	55	COMPLIES
R8 9 Cornell Crescent	GF	E	32	55	COMPLIES
R8 9 Cornell Crescent	GF	S	26	55	COMPLIES
R8 9 Cornell Crescent	F 1	S	35	55	COMPLIES
R8 9 Cornell Crescent - Garden	GF		30	55	COMPLIES
R8 9 Cornell Crescent - Garden	F 1		34	55	COMPLIES
R9 11 Cornell Crescent	GF	E	32	55	COMPLIES
R10 1 Hayward Street	GF	S	25	55	COMPLIES
R10 1 Hayward Street	GF	E	24	55	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	GF	E	27	55	COMPLIES
R11 Unit 1-2 / 2 Hayward Street	F 1	E	27	55	COMPLIES
R12 Unit 3 / 2 Hayward Street	GF	E	27	55	COMPLIES
R12 Unit 3 / 2 Hayward Street	F 1	E	27	55	COMPLIES
R13 Unit 4 / 2 Hayward Street	GF	E	27	55	COMPLIES
R13 Unit 4 / 2 Hayward Street	F 1	E	27	55	COMPLIES
R14 3 Hayward Street	GF	S	27	55	COMPLIES
R14 3 Hayward Street	GF	S	31	55	COMPLIES
R14 3 Hayward Street - garden	GF		29	55	COMPLIES
R14 3 Hayward Street - garden	GF		28	55	COMPLIES
R15 5 Hayward Street	GF	W	19	55	COMPLIES
R15 5 Hayward Street	F 1	W	20	55	COMPLIES
R15 5 Hayward Street	GF	S	27	55	COMPLIES
R15 5 Hayward Street	F 1	S	28	55	COMPLIES
R16 10 Hayward Street	GF	S	26	55	COMPLIES
R16 10 Hayward Street - Garden	GF		25	55	COMPLIES
R17 12 Hayward Street	GF	E	24	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R17 12 Hayward Street	GF	E	28	55	COMPLIES
R17 12 Hayward Street	GF	S	23	55	COMPLIES
R17 12 Hayward Street - Garden	GF		27	55	COMPLIES
R18 14 Hayward Street	GF	S	29	55	COMPLIES
R18 14 Hayward Street - Garden	GF		28	55	COMPLIES
R19 16 Hayward Street	GF	S	31	55	COMPLIES
R19 16 Hayward Street - Garden	GF		31	55	COMPLIES
R20 17 Hayward Street	GF	E	44	55	COMPLIES
R20 17 Hayward Street	F 1	E	45	55	COMPLIES
R20 17 Hayward Street	GF	S	43	55	COMPLIES
R20 17 Hayward Street	F 1	S	48	55	COMPLIES
R20 17 Hayward Street	GF	S	34	55	COMPLIES
R20 17 Hayward Street	F 1	S	41	55	COMPLIES
R20 17 Hayward Street	GF	S	31	55	COMPLIES
R20 17 Hayward Street	F 1	S	35	55	COMPLIES
R20 17 Hayward Street	GF	S	35	55	COMPLIES
R20 17 Hayward Street	F 1	S	37	55	COMPLIES
R20 17 Hayward Street	GF	W	48	55	COMPLIES
R20 17 Hayward Street	F 1	W	48	55	COMPLIES
R20 17 Hayward Street	GF	W	31	55	COMPLIES
R20 17 Hayward Street	F 1	W	35	55	COMPLIES
R20 17 Hayward Street	GF	S	29	55	COMPLIES
R20 17 Hayward Street	F 1	S	32	55	COMPLIES
R20 17 Hayward Street	GF	W	31	55	COMPLIES
R20 17 Hayward Street	F 1	W	36	55	COMPLIES
R20 17 Hayward Street	GF	W	33	55	COMPLIES
R20 17 Hayward Street	F 1	W	36	55	COMPLIES

Receiver	F1r Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R20 17 Hayward Street	GF	W	47	55	COMPLIES
R20 17 Hayward Street	F 1	W	47	55	COMPLIES
R20 17 Hayward Street	GF	S	52	55	COMPLIES
R20 17 Hayward Street	F 1	S	52	55	COMPLIES
R20 17 Hayward Street	GF	W	32	55	COMPLIES
R20 17 Hayward Street	F 1	W	37	55	COMPLIES
R20 17 Hayward Street	GF	S	34	55	COMPLIES
R20 17 Hayward Street	F 1	S	41	55	COMPLIES
R20 17 Hayward Street	GF	W	40	55	COMPLIES
R20 17 Hayward Street	F 1	W	43	55	COMPLIES
R20 17 Hayward Street - garden	GF		46	55	COMPLIES
R21 18 Hayward Street	GF	S	33	55	COMPLIES
R21 18 Hayward Street - Garden	GF		32	55	COMPLIES
R22 20 Hayward Street	GF	S	30	55	COMPLIES
R22 20 Hayward Street	GF	W	32	55	COMPLIES
R22 20 Hayward Street - garden	GF		31	55	COMPLIES
R23 22 Hayward street - Garden	GF		40	55	COMPLIES
R23 22 Hayward Street	GF	S	43	55	COMPLIES
R24 24 Hayward Street	GF	S	31	55	COMPLIES
R24 24 Hayward Street - Garden	GF		30	55	COMPLIES
R25 26 Hayward Street	GF	S	31	55	COMPLIES
R25 26 Hayward Street - Garden	GF		29	55	COMPLIES
R26 28 Hayward Street - Garden	GF		29	55	COMPLIES
R26 Hayward Street	GF	S	30	55	COMPLIES
R27 2 Holylake Avenue	GF	N	23	55	COMPLIES
R28 4 Holylake Avenue	GF	N	34	55	COMPLIES
R28 4 Holylake Avenue	F 1	N	35	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R29 6 Holylake Avenue	GF	N	33	55	COMPLIES
R29 6 Holylake Avenue	GF	E	34	55	COMPLIES
R30 8 Holylake Avenue	GF	E	27	55	COMPLIES
R30 8 Holylake Avenue	GF	N	26	55	COMPLIES
R31 10 Holylake Avenue	GF	SE	35	55	COMPLIES
R31 10 Holylake Avenue	GF	NE	34	55	COMPLIES
R32 7 Holywell Street	GF	SE	25	55	COMPLIES
R32 7 Holywell Street	F 1	SE	28	55	COMPLIES
R32 7 Holywell Street	GF	S	26	55	COMPLIES
R32 7 Holywell Street	F 1	S	30	55	COMPLIES
R32 7 Holywell Street - Garden	GF		25	55	COMPLIES
R32 7 Holywell Street - Garden	F 1		29	55	COMPLIES
R33 8A Holywell Street	GF	E	23	55	COMPLIES
R33 8A Holywell Street	F 1	E	26	55	COMPLIES
R34 8B Holywell Street	GF	SW	24	55	COMPLIES
R34 8B Holywell Street	F 1	SW	28	55	COMPLIES
R35 8C Holywell Street	GF	S	24	55	COMPLIES
R35 8C Holywell Street	F 1	S	28	55	COMPLIES
R36 9 Holywell Street	GF	E	23	55	COMPLIES
R36 9 Holywell Street	GF	E	25	55	COMPLIES
R37 10 Holywell Street	GF	E	24	55	COMPLIES
R37 10 Holywell Street - Garden	GF		23	55	COMPLIES
R38 11 Holywell Street	GF	S	26	55	COMPLIES
R39 12 Holywell street	GF	S	27	55	COMPLIES
R39 12 Holywell street	F 1	S	27	55	COMPLIES
R39 12 Holywell street	GF	SE	28	55	COMPLIES
R39 12 Holywell street	F 1	SE	28	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R39 12 Holywell street	GF	SE	26	55	COMPLIES
R39 12 Holywell street	F 1	SE	26	55	COMPLIES
R39 12 Holywell street	GF	SE	26	55	COMPLIES
R39 12 Holywell street	F 1	SE	27	55	COMPLIES
R39 12 Holywell Street - Garden	GF		27	55	COMPLIES
R40 13 Holywell Street	GF	S	29	55	COMPLIES
R40 13 Holywell Street	GF	E	26	55	COMPLIES
R41 25 Holywell Street	GF	N	37	55	COMPLIES
R41 25 Holywell Street	GF	E	37	55	COMPLIES
R42 32 Holywell Street	GF	E	35	55	COMPLIES
R43 33 Holywell Street	GF	NE	34	55	COMPLIES
R43 33 Holywell Street	GF	N	22	55	COMPLIES
R43 33 Holywell Street	GF	N	35	55	COMPLIES
R43 33 Holywell Street	GF	E	31	55	COMPLIES
R44 34 Holywell Street	GF	E	34	55	COMPLIES
R45 36 Holywell Street	GF	SE	36	55	COMPLIES
R46 16 Jarvis Street	GF	SW	39	55	COMPLIES
R47 23 Jarvis Street	GF	W	39	55	COMPLIES
R48 1/34 Jarvis Street	GF	N	60	55	EXCEEDS, +5dB(A)
R48 1/34 Jarvis Street	GF	S	53	55	COMPLIES
R48 1/34 Jarvis Street	GF	W	60	55	EXCEEDS, +5dB(A)
R49 2/34 Jarvis Street	GF	E	55	55	COMPLIES
R49 2/34 Jarvis Street	GF	S	64	55	EXCEEDS, +10dB(A)
R49 2/34 Jarvis Street	GF	W	47	55	COMPLIES
R50 3/34 Jarvis Street	GF	N	56	55	EXCEEDS, +1dB(A)
R50 3/34 Jarvis Street	GF	E	44	55	COMPLIES
R50 3/34 Jarvis Street	GF	W	46	55	COMPLIES

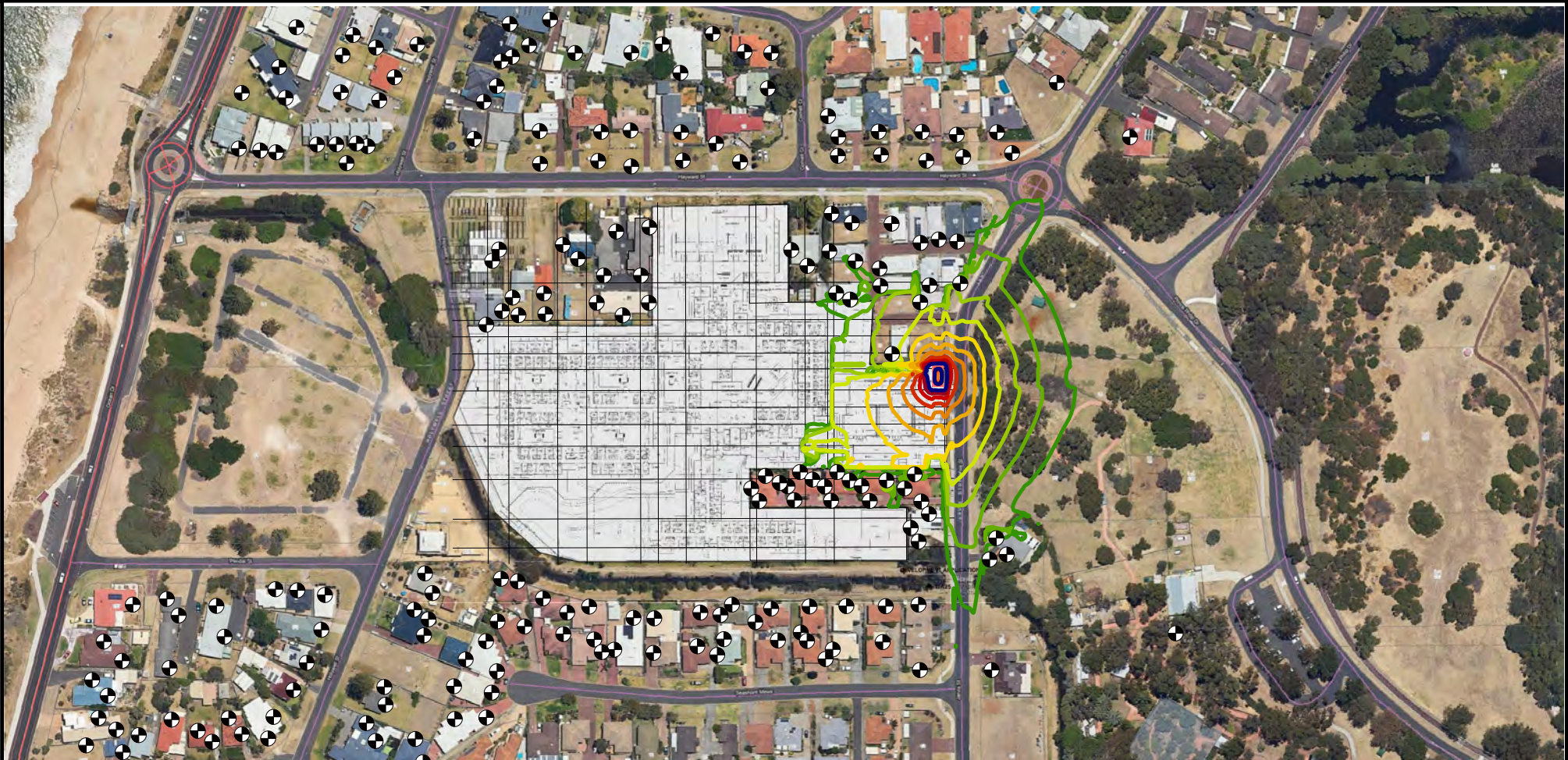
Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R50 3/34 Jarvis Street	GF	S	59	55	<i>EXCEEDS, +4dB(A)</i>
R51 4/34 Jarvis Street	GF	W	53	55	<i>COMPLIES</i>
R51 4/34 Jarvis Street	GF	N	41	55	<i>COMPLIES</i>
R51 4/34 Jarvis Street	GF	S	37	55	<i>COMPLIES</i>
R51 4/34 Jarvis Street	GF	E	46	55	<i>COMPLIES</i>
R52 36 Jarvis Street	GF	N	43	55	<i>COMPLIES</i>
R52 36 Jarvis Street	GF	S	51	55	<i>COMPLIES</i>
R52 36 Jarvis Street	GF	W	38	55	<i>COMPLIES</i>
R53 37 Jarvis street - Garden	GF		38	55	<i>COMPLIES</i>
R53 37 Jarvis Street	GF	SW	38	55	<i>COMPLIES</i>
R53 37 Jarvis Street	GF	NW	39	55	<i>COMPLIES</i>
R54 40C Jarvis Street	GF	N	28	55	<i>COMPLIES</i>
R54 40C Jarvis Street	GF	S	38	55	<i>COMPLIES</i>
R55 41 Jarvis Street	GF	W	40	55	<i>COMPLIES</i>
R56 169 Ocean Drive	GF	E	25	55	<i>COMPLIES</i>
R56 169 Ocean Drive	F 1	E	26	55	<i>COMPLIES</i>
R57 171B Ocean Drive	GF	E	26	55	<i>COMPLIES</i>
R57 171B Ocean Drive	F 1	E	25	55	<i>COMPLIES</i>
R57 171B Ocean Drive	F 2	E	29	55	<i>COMPLIES</i>
R58 173 Ocean Drive	GF	NE	22	55	<i>COMPLIES</i>
R58 173 Ocean Drive	F 1	NE	23	55	<i>COMPLIES</i>
R58 173 Ocean Drive	F 2	NE	24	55	<i>COMPLIES</i>
R58 173 Ocean Drive	GF	SE	22	55	<i>COMPLIES</i>
R58 173 Ocean Drive	F 1	SE	24	55	<i>COMPLIES</i>
R58 173 Ocean Drive	F 2	SE	25	55	<i>COMPLIES</i>
R58 173 Ocean Drive (Garden)	GF		22	55	<i>COMPLIES</i>
R59 187 Ocean Drive	GF	E	35	55	<i>COMPLIES</i>

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R60 189 Ocean Drive	GF	E	25	55	COMPLIES
R60 189 Ocean Drive	GF	E	27	55	COMPLIES
R61 191 Ocean Drive	GF	E	26	55	COMPLIES
R61 191 Ocean Drive	GF	N	29	55	COMPLIES
R62 193 Ocean Drive	GF	E	30	55	COMPLIES
R62 193 Ocean Drive	F 1	E	34	55	COMPLIES
R62 193 Ocean Drive	GF	S	15	55	COMPLIES
R62 193 Ocean Drive	F 1	S	20	55	COMPLIES
R62 193 Ocean Drive	GF	N	30	55	COMPLIES
R62 193 Ocean Drive	F 1	N	31	55	COMPLIES
R63 195 Ocean Drive	GF	E	22	55	COMPLIES
R64 3 Pandal Street	GF	E	37	55	COMPLIES
R64 3 Pandal Street	GF	N	35	55	COMPLIES
R64 3 Pandal Street	GF	E	33	55	COMPLIES
R65 1/5 Pandal Street	GF	N	32	55	COMPLIES
R65 1/5 Pandal Street	GF	E	33	55	COMPLIES
R66 9 Pandal Street	GF	N	34	55	COMPLIES
R66 9 Pandal Street	GF	E	34	55	COMPLIES
R66 9 Pandal Street	GF	N	35	55	COMPLIES
R67 1A Seashore Mews	GF	E	22	55	COMPLIES
R67 1A Seashore Mews	GF	W	33	55	COMPLIES
R68 1B Seashore Mews	GF	NE	28	55	COMPLIES
R68 1B Seashore Mews	GF	NE	33	55	COMPLIES
R69 2 Seashore Mews	GF	SE	33	55	COMPLIES
R69 2 Seashore Mews	GF	W	23	55	COMPLIES
R69 2 Seashore Mews	GF	N	32	55	COMPLIES
R70 1/4 Seashore Mews	GF	NW	32	55	COMPLIES

Receiver	Fir Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R70 1/4 Seashore Mews	GF	NE	28	55	COMPLIES
R71 2/4 Seashore Mews	GF	NW	30	55	COMPLIES
R71 2/4 Seashore Mews	GF	NE	37	55	COMPLIES
R72 6 Seashore Mews	GF	N	30	55	COMPLIES
R73 6A Seashore Mews	GF	E	36	55	COMPLIES
R73 6A Seashore Mews	GF	E	38	55	COMPLIES
R74 1/8 Seashore Mews	GF	N	32	55	COMPLIES
R74 1/8 Seashore Mews	GF	E	36	55	COMPLIES
R75 10 Seashore Mews	GF	N	28	55	COMPLIES
R75 10 Seashore Mews	GF	W	42	55	COMPLIES
R75 2/8 Seashore Mews	GF	N	39	55	COMPLIES
R76 12 Seashore Mews	GF	N	34	55	COMPLIES
R77 12A Seashore Mews	GF	N	27	55	COMPLIES
R79 1/14 Seashore Mews	GF	N	33	55	COMPLIES
R80 2/14 Seashore Mews	GF	N	37	55	COMPLIES
R81 16A Seashore Mews	GF	N	36	55	COMPLIES
R81 16A Seashore Mews	GF	W	35	55	COMPLIES
R82 16B Seashore Mews	GF	N	35	55	COMPLIES
R82 16B Seashore Mews	GF	W	29	55	COMPLIES
R83 18 Seashore Mews	GF	N	35	55	COMPLIES
R84 18A Seashore Mews	GF	W	33	55	COMPLIES
R84 18A Seashore Mews	GF	N	38	55	COMPLIES
R85 20 Seashore Mews	GF	N	33	55	COMPLIES
R85 20 Seashore Mews	GF	E	37	55	COMPLIES
R86 20A Seashore Mews	GF	W	40	55	COMPLIES
R86 20A Seashore Mews	GF	N	45	55	COMPLIES
R87 22A Seashore Mews	GF	W	36	55	COMPLIES

Receiver	Flr Level	Façade	Predicted Noise Level	Daytime Assigned Level	Assessment
R88 22B Seashore Mews	GF	N	46	55	COMPLIES
R89 1/24 Seashore Mews	GF	N	35	55	COMPLIES
R90 2/24 Seashore Mews	GF	N	43	55	COMPLIES
R91 27 Seashore Mews	GF	N	36	55	COMPLIES
R91 27 Seashore Mews	GF	E	34	55	COMPLIES
R91 27 Seashore Mews	GF	SE	33	55	COMPLIES
R92 31 Seashore Mews	GF	N	30	55	COMPLIES
R92 31 Seashore Mews	GF	SE	32	55	COMPLIES
R93 Bunbury Wildlife Park	GF	W	34	55	COMPLIES

From the above it is evident compliance is/is not achieved at the nearest receiving residences at 34 Jarvis Street, inclusive of upgraded height acoustic fence.



19075070 South Bunbury Community Aged Care Facility
 Noise Level Contours @ 1.4m Above Ground Level

Scenario 6 - L_{A1} Fire Pump Room, Maintenance Testing

SoundPLAN v8.2
 ISO Algorithms

3 October 2024



Lloyd George Acoustics
 PO Box 717
 HILLARYS WA 6923
 (08) 9401 7770

Length Scale 1:3000

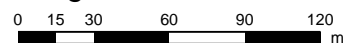
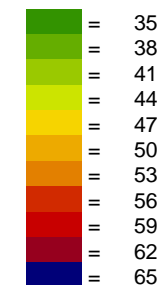


Figure 3-14

Signs and symbols

- * Noise Source
- ⊗ Point receiver
- Fire Pump Building as Source

Noise levels
 L_{AMAX} - dB



In terms of consideration for "noise" containment, advice for bounding construction and overall strategy is provided below:

- Enclosing walls – should be minimum 200mm concrete or 190mm core filled blockwork, rated $R_w + C_{tr} \geq 50$ dB. Walls to be full height and sealed airtight at roof over;
- Roof – should be inclined profile metal sheeting over roof frame to 9mm fibre cement sus. ceiling w/100mm insulation over;
- Doorsets – recommend min. 50mm solid-core Fire door sets, with compressible gasket seals to all jambs, and with rebated closing edge at perimeter with supplementary gasket seal - Seals to be Raven RP47 and RP10 seals to perimeter, RP38 bottom seal. Where double door is stiled, RP16 and RP10 to meeting stile;
- Supply and Exhaust Ventilation Air paths to be indicated on Mechanical scheme drawings to allow calculation and noise control assessment - TBC
- Vibration Isolation Mounts - Primary plant skid mounts are to be load-rated to the static and dynamic load requirements of the plant, TBC.

3.3.13. Recommended Fire Pump Noise Mitigation Strategy

Considering the various noise emission paths and cumulative treatment costs, our recommended strategy for Fire Pump plant test noise control is to apply purpose-built Enviropac plant enclosure system <https://alliedpumps.com.au/product/commercial/fire-protection-systems/enviropac-sound-attenuation-fire-pump-system/>.

The Enviropac enclosure reduces in-room noise levels during testing from >100 dB(A) to 78 dB(A), significantly reducing noise controls for mechanical ventilation air path noise control requirements, and largely removing OH&S requirement for hearing protection and mandatory signage.

Secondary controls can be applied to the Fire Pump room internal surfaces in the form of acoustically absorptive wall and ceiling surface treatments, though would be much less effective at reducing noise levels – typical maximum in-room noise reduction from 100% absorptive treatment to all surfaces (except flooring) would be of the order of 4 dB(A) only, hence \$ cost-per dB reduction when factoring in materials and labour is maximised using the Enviropac system.

To further minimise the risk of potential noise nuisance during maintenance testing, each test should be scheduled to occur during weekdays, preferably in the mid-afternoon period, when generated noise is likely to be effectively masked by the presence of external local noise.

Fire Pump Room doorsets, application of “Enviropac” residential specification for muffler and jacket, and mechanical supply and exhaust air paths to/from atmosphere TBC as these details become known.

3.4. Recommendations

3.4.1. Mitigation Requirements - Summary

The following noise mitigation is required for the current (assumed) scheme to fully comply with *the Regulations*:

- “Packless” Ultra-pals™ IAC Type 6XM Attenuator (or equivalent performing) to Main Kitchen Exhaust Fan;
- “Packless” Ultra-pals™ IAC Type 6XM Attenuator (or equivalent performing) to 1st Floor Satellite Kitchen Exhaust Fan;
- 2.4m solid surrounding noise screen to EVAP units and KEFs, to be grouped at roof level;
- Standard Quiet-Duct® IAC Type 3S Attenuator to Laundry Exhaust Fan;
- Night-mode set to 3-step attenuation (-9dB) for all AC CUs to operate after 10.00pm;
- Acoustic fence to be upgraded to 2.0m height with a minimum surface mass of 8kg/m² (e.g. 9 mm fibre cement or double sheeted Colorbond) along northern Lot boundary to 34 Jarvis Street. 1.8m high fence along the north side of the eastern car park is also to be upgraded with a minimum surface mass of 8kg/m² as shown in *Figure 3-11*;
- After hours car park use to be limited to South West car parking bays only.

3.4.2. Further Recommendations

In addition to the required noise mitigations, at this stage, mechanical plant has not been designed with assessment based on nominal sound levels. As such, the following is recommended:

- Once the mechanical plant has been designed and selected, the noise levels shall be reviewed prior to Building Permit;
- All exhaust fans shall be located inside the ceiling void and shall be axial fan type, allowing the incorporation of an attenuator if required;
- All fans shall be variable speed drive so that maximum speed is only occurring when necessary with demand;
- Air-conditioning shall have a ‘night’ / ‘quiet’ mode option, in case required for prior to 7.00am operation, subject to final detailed analysis;
- All plant shall be selected for quiet operation;
- All plant is to be appropriately vibration isolated to 95% isolation efficiency.

To minimise audible noise from day-to-day operations at nearby receiving premises, the following ‘best practice’ measures are suggested:

- Truck drivers are to be instructed to use good driving techniques and minimise excessive vehicle noise (no air brakes, excessive revving etc);
- Where reversing must occur, alternatives to tonal ‘beeper’ reversing alarms are to be implemented, whilst still maintaining a safe workplace such as:
 - Trucks and forklifts to be fitted with broadband style alarms; or
 - Reversing alarms are to be turned off and spotters used to ensure a safe environment.
- Delivery activities are to be undertaken in as careful and quiet a manner as practicable and this is to be advised to staff and delivery personnel;
- Areas where known impact noise will occur are to have suitable rubber impact matting installed;

- Service road area is to be smooth and free of gaps that may cause banging when driven over with vehicles, pallet jacks or the like. Control joints are to be filled with non-hardening mastic to provide a flat finish;
- Metal grates shall be secured with rubber gaskets or plastic grates used;
- Waste collection shall not occur outside of Monday to Saturday, 7.00am to 7.00pm and Sundays and public holidays, 9.00am to 7.00pm.

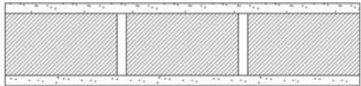


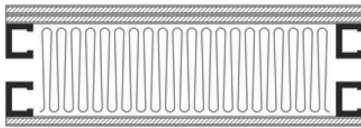
4. NOISE SEPARATION

At this stage of the project, the construction materials are unknown and will be considered further at detailed design, however the following sections provide some broad information for key areas.

4.1. Separating Walls

A typical mark-up is shown in *Appendix D*. This shows the minimum performance requirement in accordance with the NCC, however it should be noted that for higher end developments, these performances should be exceeded. *Table 4-1* provides various wall constructions suitable between sole-occupancy units (party walls). These serve as examples only until the project moves to detailed design. The walls below can be used to achieve $R_w \geq 45$ (orange line). Where walls are to be of discontinuous construction either double studs are required separated by 20mm or a separated stud from the mass element (blue line). Where dashed lines are shown, these are recommended rather than mandatory.

Table 4-1: NCC Volume One Acceptable Forms of Construction: Party Walls

Description	Image
<p>Masonry</p> <p>110mm thick clay brick with 13mm cement render to each side.</p>	
<p>Concrete</p> <p>110mm thick concrete brickwork.</p>	
<p>Steel Framing</p> <p>One row of 64mm steel studs with 2 layers of 16mm fire-protective grade plasterboard fixed to each face.</p>	
<p>Two rows of 64mm steel studs at 600mm centre with –</p> <ul style="list-style-type: none"> • An air gap of not less than 20mm between the rows of studs; and • 200mm thick polyester insulation with a density of 14kg/m³, positioned between studs; and • One layer of 13mm fire-protective grade plasterboard and one layer of 13mm plasterboard on one face and one layer of 13mm fire-protective plasterboard on the other outside face. 	

4.1.1. Wall Construction Deemed to Satisfy

Within Specification F5.2, installation details are provided and these must also be followed to achieve the acoustic ratings as follows:

- (a) **Masonry** – Units must be laid with all joints filled solid, including those between the masonry and any adjoining construction.
- (b) **Concrete** – Joints between concrete slabs or panels and any adjoining construction must be filled solid.
- (c) **Sheeting materials** –
 - (i) If one layer is required on both sides of a wall, it must be fastened to the studs 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.
- (d) **Timber or steel-framed construction** – Perimeter framing members must be securely fixed to the adjoining structure and
 - (i) Bedded in resilient compound; or
 - (ii) The joints must be caulked so that there are no voids between the framing members and the adjoining structure.

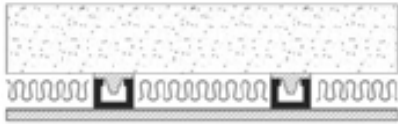

4.2. Separating Floors

The acoustic requirements for all floors involving a sole-occupancy unit are the same being $R_w \geq 45$ and $L_{n,w} \leq 62$, noting the impact requirement only applies when received in a sole-occupancy unit.

4.2.1. Floors Separating Sole-Occupancy Units

Table 4-2 provides suitable floor constructions.

Table 4-2: NCC Volume One Acceptable Forms of Construction: Floors

Description	Image
<p>Concrete</p> <p>150mm thick concrete slab with -</p> <ul style="list-style-type: none"> • 28mm metal furring channels and isolation mounts fixed to underside of slab, at 600mm centres; • 65mm thick polyester insulation with a density of 8kg/m^3, positioned between furring channels; and • One layer of 13mm plasterboard fixed to furring channels. 	
<p>Concrete</p> <p>200mm thick concrete slab with carpet on underlay.</p>	

Where the floor finish is carpet, the $L_{n,w}$ is nominally 45 dB and thus significantly below that required in the Code. Impact performance is often directly linked to perception of quality and privacy and achieving $L_{n,w}$ 62 is considered acoustically poor. A more appropriate minimum standard is considered to be $L_{n,w}$ 55, which exceeds (i.e. improves upon) the NCC minima, to align with potential expectations of quality representing “3 Star” performance when considered under the AAAC *Guideline for Apartment and Townhouse Ratings*.

Where hard floor coverings are applied, additional treatments to the floor substrate (impact isolation mats) are required. The recommended approach is the inclusion of an impact isolation mat and insulated, suspended plasterboard ceiling below.

4.2.2. Floor Construction Deemed to Satisfy

The same Deemed to Satisfy provisions of *Section 4.1.1* are also relevant to floors.

4.3. Penetrations and Flanking Paths

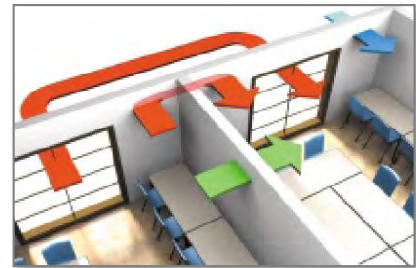
During detailed design, further advice will be provided with regard to the required treatment of penetrations such as recessed lighting, air-conditioning grilles etc). As per FP5.3 of the NCC,

“The required sound insulation of a floor or a wall must not be compromised by –

(a) the incorporation or penetration of a pipe or other service element.”

Similarly, care is required to control flanking paths (see adjoining image), which can exist where a party wall meets and external wall for instance. As per F5.5 of the NCC, the following are provided as deemed to satisfy:

- (e) Where a wall required to have sound insulation has a floor above, the wall must continue to –*
 - (i) The underside of the floor above;*
- (f) Where a wall required to have sound insulation has a roof above, the wall must continue to –*
 - (i) The underside of the roof above.*



4.4. Services

It is common for another person's hydraulic services to be located in a vertical service riser and in ceiling spaces of another sole-occupancy unit. Where the room of the sole-occupancy unit is a habitable space (including open plan entry corridors and kitchens), the minimum NCC requirement is $R_w + C_{tr} \geq 40$. Where the room of the sole-occupancy unit is non-habitable, the minimum performance requirement is $R_w + C_{tr} \geq 25$. *Table 4-3* and *Table 4-4* provides construction options for service risers and ceiling spaces.

Table 4-3: Construction Options for Services Risers

Description	Rating
<p>Masonry</p> <p>90mm clay brick with –</p> <ul style="list-style-type: none"> • PVC pipe wrapped in <i>Soundlag 4525</i> or equivalent; or • Acoustic pipe (e.g. <i>Raupiano Plus</i>). 	$R_w + C_{tr} \geq 40$
<p>Masonry</p> <p>110mm clay brick with –</p> <ul style="list-style-type: none"> • 13mm cement render. 	$R_w + C_{tr} \geq 40$
<p>Timber and Steel Framing</p> <p>CSR 7655 Shaft Wall System comprising –</p> <ul style="list-style-type: none"> • 25mm Gyprock Shaft Liner Panel in 102 C-H Stud; • 75mm Glasswool <i>Acoustigard</i> 11kg/m³ insulation; and • 16mm Fire-rated plasterboard. 	$R_w + C_{tr} \geq 40$
<p>Timber and Steel Framing</p> <p>2 x 13mm thick plasterboard –</p> <ul style="list-style-type: none"> • 75mm Glasswool <i>Acoustigard</i> 11kg/m³ insulation between studs; • PVC pipe wrapped in <i>Soundlag 4525</i> or equivalent; or • Acoustic pipe (e.g. <i>Raupiano Plus</i>). 	$R_w + C_{tr} \geq 40$
<p>Masonry</p> <p>90mm clay brick with –</p> <ul style="list-style-type: none"> • 10mm plasterboard. 	$R_w + C_{tr} \geq 25$
<p>Timber and Steel Framing</p> <p>1 x 13mm thick plasterboard –</p> <ul style="list-style-type: none"> • PVC pipe wrapped in <i>Soundlag 4525</i> or equivalent; or • Acoustic pipe (e.g. <i>Raupiano Plus</i>). 	$R_w + C_{tr} \geq 25$

Table 4-4: Construction Options for Services in Ceilings

Description	Rating
1 x 13mm thick plasterboard - <ul style="list-style-type: none"> • 75mm Glasswool <i>Acoustigard</i> 11kg/m³ insulation above ceiling; • PVC pipe wrapped in 2 x <i>Soundlag 4525</i> or equivalent; or • Acoustic pipe (e.g. <i>Raupiano Plus</i>) wrapped in <i>Soundlag 4525</i> or equivalent. 	R _w + C _{tr} ≥ 40
1 x 13mm thick plasterboard - <ul style="list-style-type: none"> • 75mm Glasswool <i>Acoustigard</i> 11kg/m³ insulation above ceiling; • PVC pipe wrapped in <i>Soundlag 4525</i> or equivalent; or • Acoustic pipe (e.g. <i>Raupiano Plus</i>). 	R _w + C _{tr} ≥ 25

4.4.1. Services Deemed to Satisfy

Specification F5.2 provides the following deemed-to-satisfy provisions in relation to services:

- (i) *Services must not be chased into concrete or masonry elements.*
- (ii) *A door or panel required to have a certain R_w + C_{tr} that provides access to a duct, pipe or other service must –*
 - A. *Not open into any habitable room (other than a kitchen); and*
 - B. *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 –*
 - aa. *Wood, particleboard or blockboard not less than 33mm thick; or*
 - ab. *Compressed fibre-reinforced cement sheeting not less than 9mm thick; or*
 - ac. *Other suitable material with a mass per unit area not less than 24.4kg/m².*
- (iii) *A water supply pipe must –*
 - A. *Only be installed in the cavity of discontinuous construction; and*
 - B. *In the case of a pipe that services 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 not less than 10mm to the other leaf.*
- (iv) *Electrical outlets must be offset from each other –*
 - A. *In masonry walling, not less than 100mm; and*
 - B. *In timber or steel framed walling, not less than 300mm.*

4.5. Special Cases

4.5.1. Communal Lounge, Dining and Activity Areas

NCC standard separating performance to SOUs is R_w 45dB, shown orange on mark-ups in *Appendix D*; Given potential for higher activity levels in Lounges, Activity Rooms and Dining Rooms, the Principal may consider upgrading to R_w 45dB plus Discontinuous Construction (blue) to for improved acoustic amenity.

4.5.2. Recessed Services Cupboards to SOUs

NCC standard separating performance for SOUs is R_w 45 dB. Where habitable areas (i.e. living and sleeping spaces) within an SOU is adjacent to stores, plant or services areas the Principal may consider upgrading to R_w 45dB plus Discontinuous Construction (shown blue on mark-ups in *Appendix D*) for improved acoustic amenity, avoiding transfer of bangs/knocks associated with use of stores and recessed services cupboards.

4.5.3. Interconnecting Doorsets

NCC standard separating performance is for R_w 45 dB, shown orange on mark-ups in *Appendix D*.

To achieve this with a doorset requires a bespoke/specialist door system, such as the Intercon Q (rated R_w 45dB) - refer *Appendix C*, expected to add cost/complexity to these walls.

Minimum possible alternative solution would be to install standard apartment entry doorsets rated at R_w 30dB (as applicable to Class 2/3 multi-residential buildings) formed from 40mm solid core doorset well fitted in frame with 5mm gap at threshold and effective compressible seals to head and jambs.

However it must be noted this doorset will not achieve NCC minimum separation of R_w 45dB between these rooms and would need to be accepted by the Certifier. This detail to be resolved during Detailed Design.

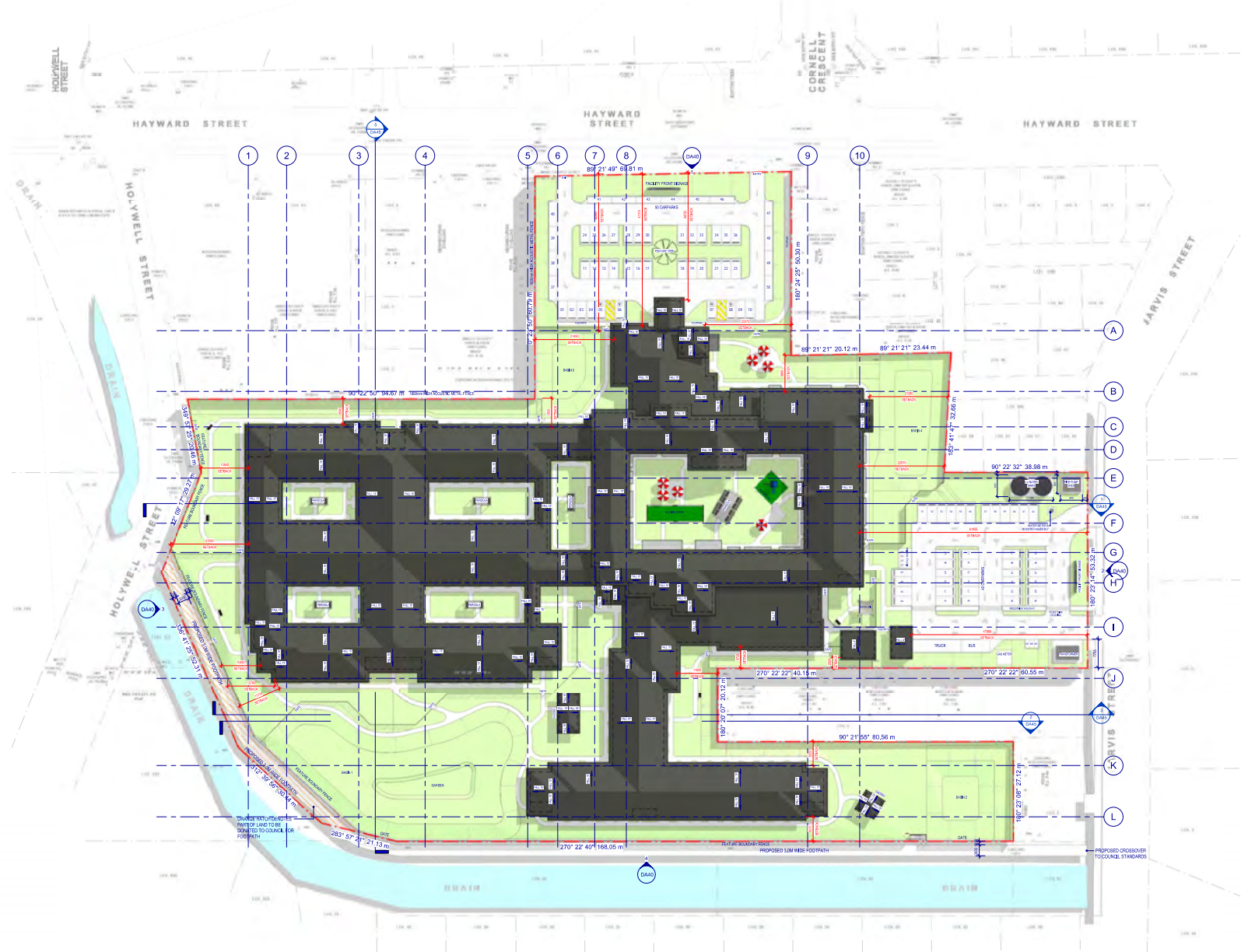
4.5.4. Car Park

Whilst noise from the sole-occupancy units to the car park is not considered, the opposite is and with this in mind, the following general advice is provided:

- Car Park Entry Gate:
 - Is to be a hinged type door, fitted with a 'slow-down device';
 - Is to be supported via its own structure;
 - Motors are to be vibration isolated to achieve minimum 97% isolation efficiency with guidance provided by a mount supplier such as Embelton's;
 - Stopping points are to be vibration isolated;
 - Closing latches to be quiet in operation; and
 - Noise levels must comply with the prescribed standards of the *Environmental Protection (Noise) Regulations 1997*.
- Car Park Floor
 - Shall be constructed so that there are no significant gaps in construction or where these exist, are to be filled with non-hardening mastic;

- Drainage grates and other trafficable panels are to be plastic or metal with rubber gasket and secure to avoid excess banging;
- Brushed concrete finish to avoid tyre squeal. Where the concrete is to be sealed, a product such as Aquaron 1000 by Markham is understood to be suitable and not contribute to tyre squeal.

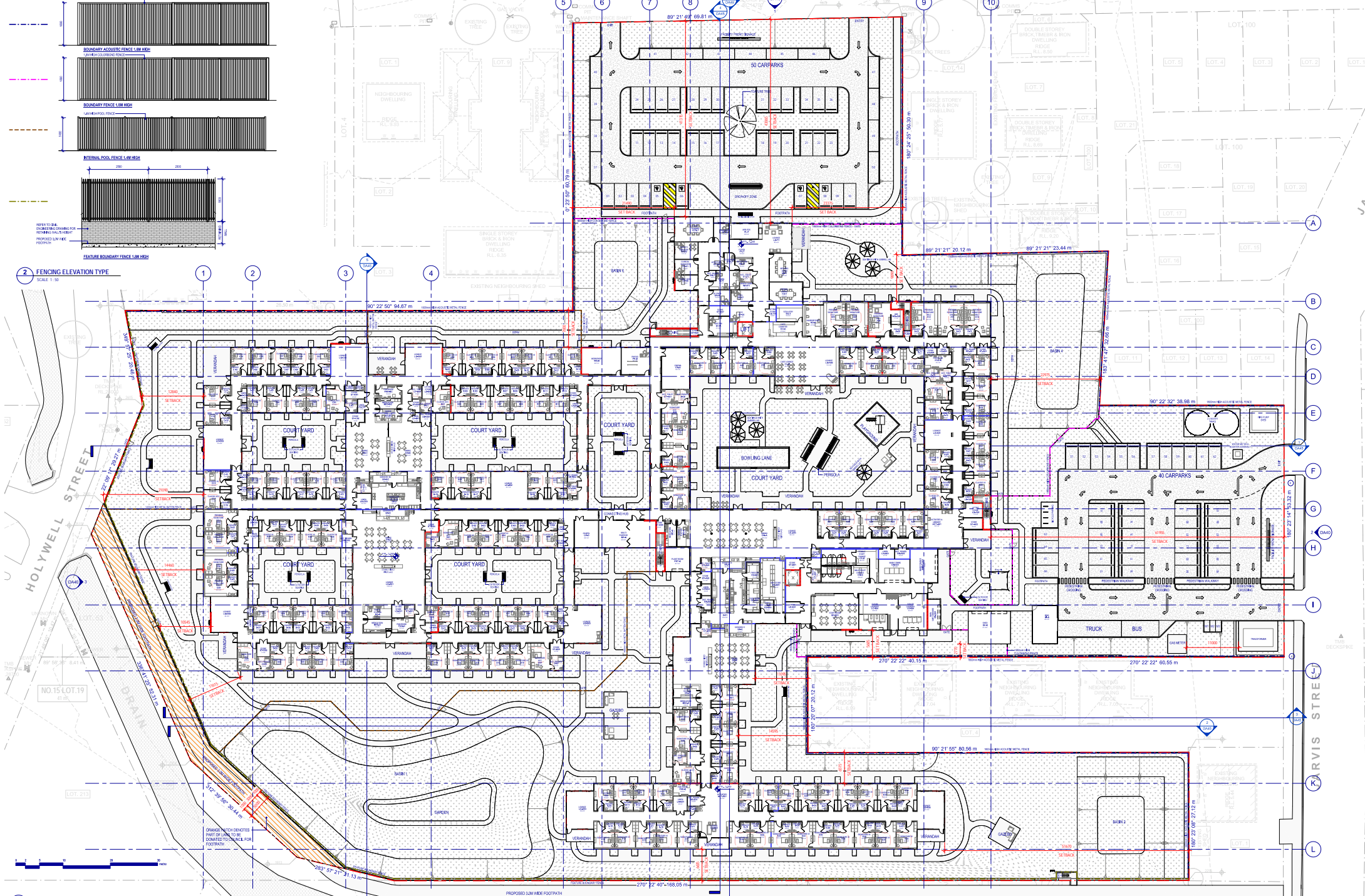
Appendix A – Development Plans



1 PROPOSED SITE PLAN
SCALE 1:400

DEVELOPMENT APPLICATION

PROJECT: South Bumbury Community Aged Care		SHEET SERIES: DEVELOPMENT APPLICATION		SCALE: 1:400(A3) DATE: 02/2024		DRAWN BY: JG CHECKED BY: JG		<p>CROFT DEVELOPMENTS Pty Ltd 89 Marjorie Place, Chesham VIC 3193 Tel: 031 956 1700 Fax: 031 956 8800</p>	
CLIENT: SENIORS CARE		SHEET TITLE: PROPOSED SITE PLAN		REVISION: 4					
ADDRESS: 11 HAYWARD STREET, SOUTH BUMBURY, VIC 3700		PROJECT NO.: 20240000000000000000		DRAWING NO.: 00000000000000000000		DATE:		DRAWN BY:	



2 FENCING ELEVATION TYPE
SCALE 1:50

1 PROPOSED GROUND FLOOR PLAN
SCALE 1:200

DEVELOPMENT APPLICATION

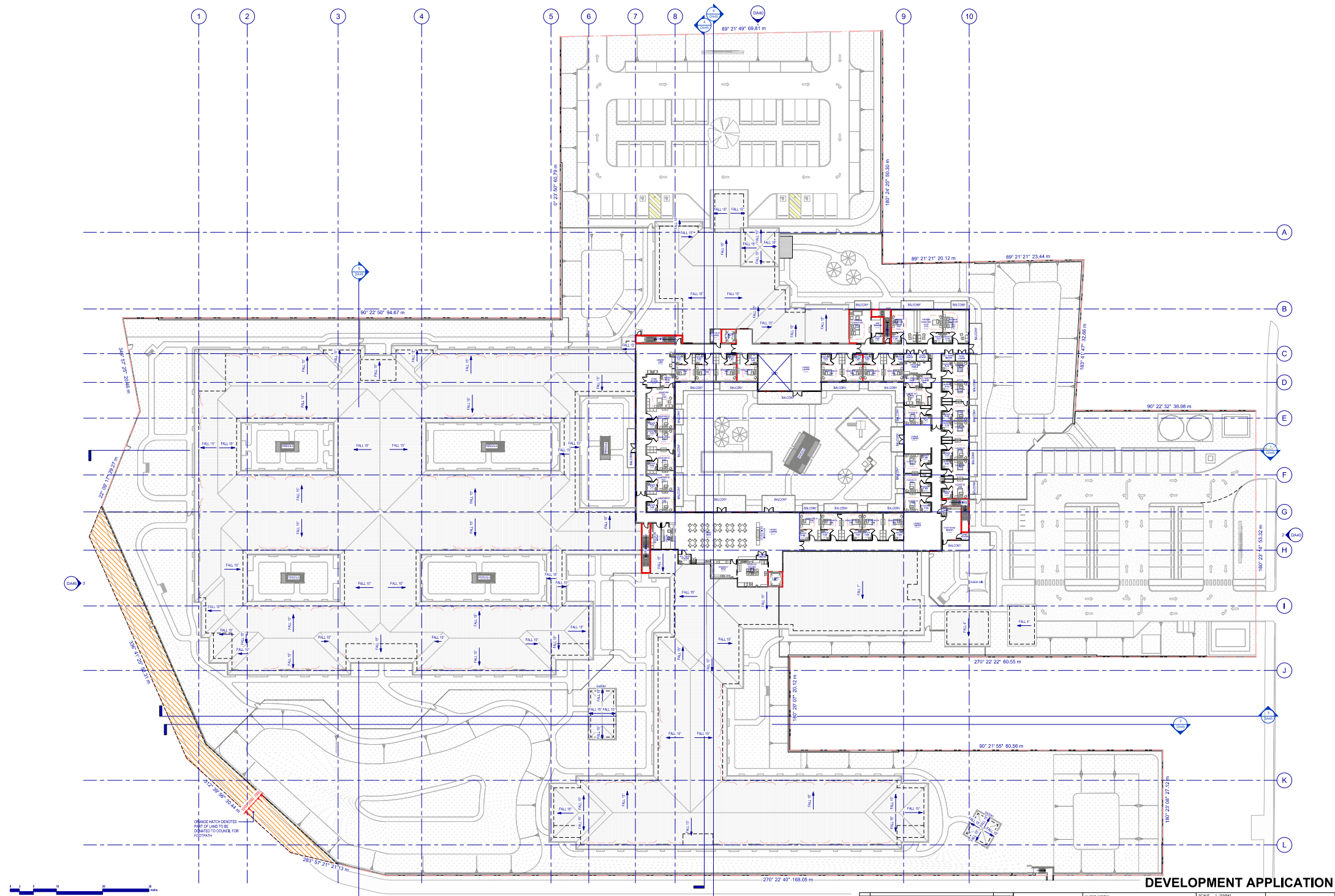
PROJECT	South Bumbury Community Aged Care
CLIENT	SENIORS CARE
ADDRESS	11 HARVARD STREET, SOUTH BUMBURY, WA 6201
DATE	11/03/2024
DESIGNER	CROFT DEVELOPMENTS
APPLICANT	SENIORS CARE
PROPOSED DEVELOPMENT	COMMUNITY AGED CARE

PROJECT TITLE
PROPOSED GROUND FLOOR PLAN

SHEET SERIES
DEVELOPMENT APPLICATION

SCALE: AS SHOWN
DATE: 11/03/2024
DRAWING NUMBER: DA25
REVISION 4

CROFT DEVELOPMENTS
CROFT DEVELOPMENTS PTY. LTD. 10/1100
10/1100 WASHINGTON STREET, SOUTH BUMBURY, WA 6201
99 Margaret Road, Chesham WA 6185
14 081 089 1700 (M-F 09:00-18:00)



1 PROPOSED FIRST FLOOR PLAN
AS0 SCALE 1:250

DEVELOPMENT APPLICATION

PROJECT	South Bumbury Community Aged Care
CLIENT	SENIOR CARE
ADDRESS	11 HAYWARD STREET, SOUTH BUMBURY, WA 6201
DATE	05/20/2023
SCALE	1:250
DRAWING NUMBER	DA30
REVISION	4

PROJECT TITLE
PROPOSED FIRST FLOOR PLAN

SHEET SERIES
DEVELOPMENT APPLICATION

SCALE 1:250
DATE 05/20/23
DRAWING NUMBER DA30
REVISION 4

CROFT DEVELOPMENTS Pty Ltd
 69 Marjorie Place, Chesham WA 6215
 Tel: 081 956 1700 Fax: 081 956 6800

Appendix B – Influencing Factor Calculation

The assigned levels combine a baseline assigned level with an influencing factor, with the latter increasing the assigned level on the basis of the existence of significant roads and commercial or industrial zoned land within an inner circle (100 metre radius) and an outer circle (450 metre radius) of the noise sensitive premises. The calculation for the influencing factor is:

$$= \frac{1}{10} (\% \text{ Type A}_{100} + \% \text{ Type A}_{450}) + \frac{1}{20} (\% \text{ Type B}_{100} + \% \text{ Type B}_{450})$$

where :

% Type A₁₀₀ = the percentage of industrial land within
a 100m radius of the premises receiving the noise

% Type A₄₅₀ = the percentage of industrial land within
a 450m radius of the premises receiving the noise

% Type B₁₀₀ = the percentage of commercial land within
a 100m radius of the premises receiving the noise

% Type B₄₅₀ = the percentage of commercial land within
a 450m radius of the premises receiving the noise

+ Transport Factor (maximum of 6 dB)

= 2 for each secondary road (6,000 to 15,000 vpd) within 100m

= 2 for a major road (> 15,000 vpd) within 450m

= 6 for a major road within 100m

The nearest noise sensitive premises are identified as:

- R1 – 5/34 Jarvis Street, existing single-storey residence
- R2 – 7 Hayward Street, existing single-storey residence
- R3 – 15 Hayward Street, existing single-storey residence

Table B-5 shows the identification of zero percentage Industrial (I) and Commercial (C) land use within the inner (100 metre radius) and outer (450 metre radius) circles of the nearest noise sensitive premises, with this also shown on Figure B-1 for Receiver R1.

Table B-5: Percentage of Land Types within 100m and 450m Radii

Receiver	Land Type	Within 100m	Within 450m
R1 – 5/34 Jarvis Street	Type A - Industrial and Utility	0	0
	Type B – Commercial	0	0
R2 – 7 Hayward Street	Type A - Industrial and Utility	0	0
	Type B – Commercial	0	0
R3 – 15 Hayward Street	Type A - Industrial and Utility	0	0
	Type B – Commercial	0	0

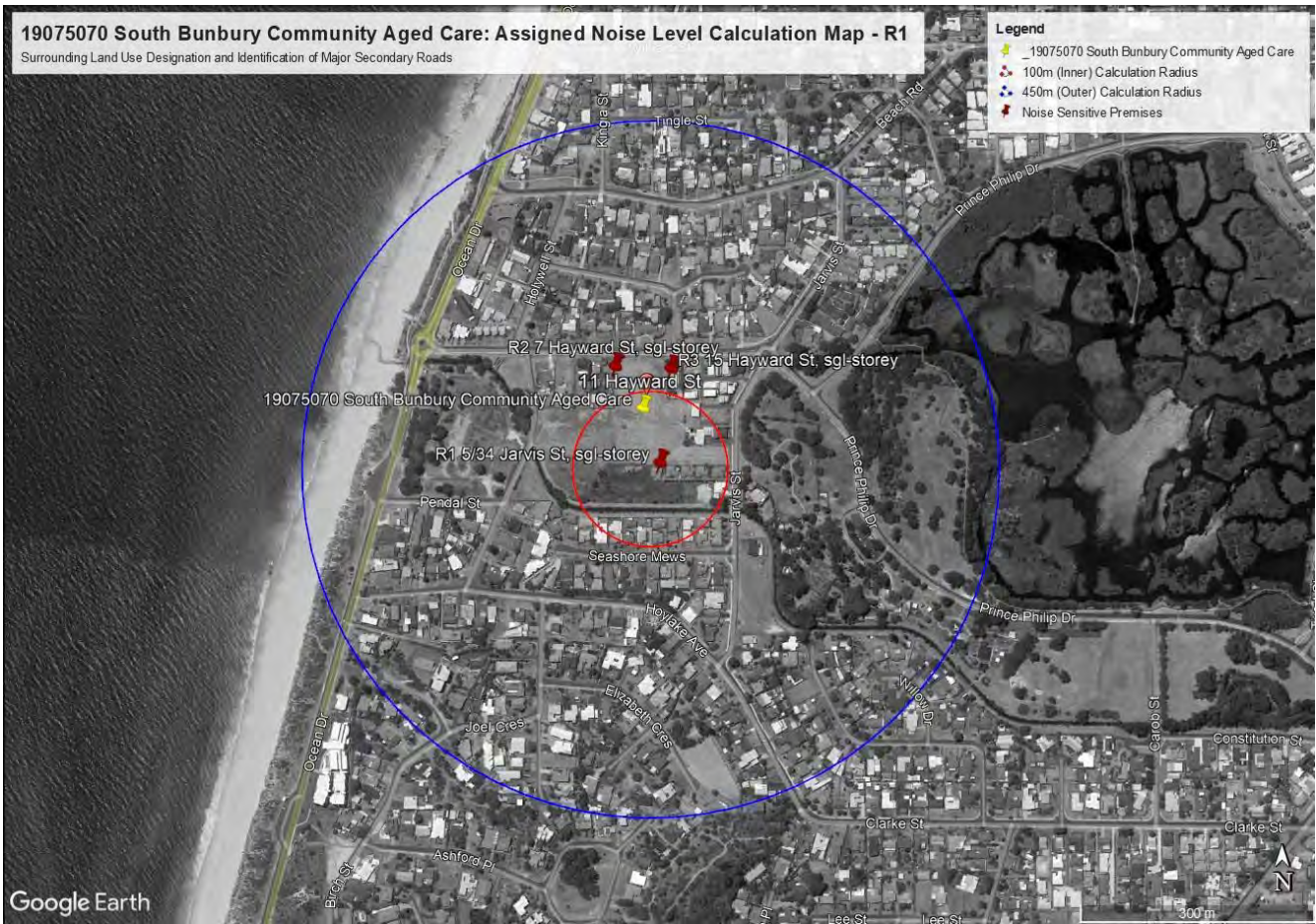


Figure B-1: Land Types within 100m and 450m Radii of R1

From the Main Roads WA Traffic Map (refer *Figure B-2*), shows no roads with traffic counts >6,000 vehicles per day (vpd) within the inner (100 metre radius) and outer (450 metre radius) circles. The nearest qualifying road with a traffic count of >15,000 as per Main Roads 2023 traffic data is Spencer Street, situated at a distance more than 1km away from site.

Table B-6: Relevant Roads within 100m and 450m Radii

Receiver	Within 100m		Within 450m
	Major Road (+ 6 dB)	Secondary Road (+ 2 dB)	Major Road Not Within 100m (+ 2 dB)
R1 – 5/34 Jarvis Street	n/a	n/a	n/a
R2 – 7 Hayward Street	n/a	n/a	n/a
R3 – 15 Hayward Street	n/a	n/a	n/a

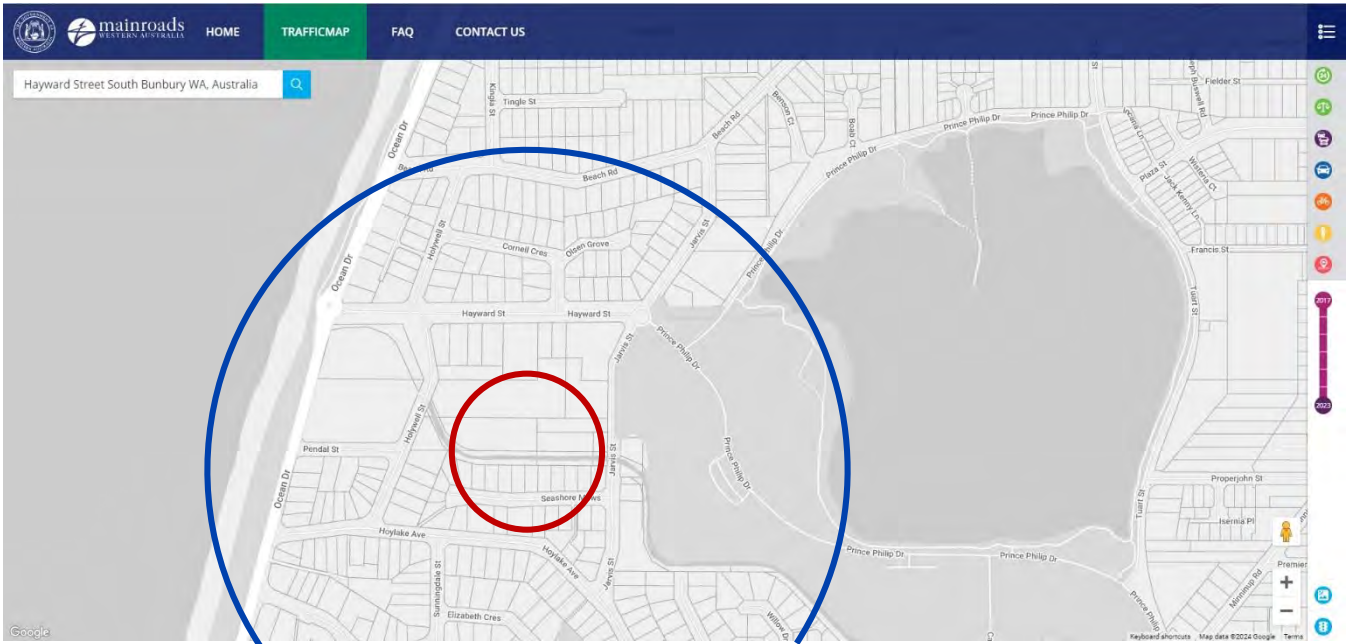


Figure B-2: MRWA Published Traffic Data

Table B-7 combines the percentage land types and Transport Factor to calculate the influencing factor.

Table B-7: Influencing Factor Calculation, dB

Receiver	Industrial Land	Commercial Land	Transport Factor	Total
R1 – 5/34 Jarvis Street	0	0	0	0
R2 – 7 Hayward Street	0	0	0	0
R3 – 15 Hayward Street	0	0	0	0

The influencing factor calculated in Table B-7 is combined with those baseline assigned levels of Table 2-2, resulting in the project assigned levels provided in Table 2-3.

Appendix C – Product Data

Specifications:

Ultra-Pals™ Packless Silencers

Suitable for ultra-clean environments:

- Chemical plants
- Clean rooms
- Fume cupboards
- Indoor shooting ranges
- Electronics manufacturing
- Food production plants
- Hospital operating theatres
- Forensic laboratories
- Microchip manufacturing plants
- Nuclear processing plants

General

Furnish and install packless silencers of the models and sizes shown on plans and/or listed in schedule. Silencers shall be the product of Industrial Acoustics Company. Any change in this specification must be submitted in writing to and approved by the Architect/Engineer, in writing, at least 10 days prior to bid due-date.

Materials and Construction

Unless otherwise specified, silencer modules shall be constructed entirely of galvanised steel in accordance with HVAC DW 144 recommendations for high-pressure rectangular duct-work. Seams shall be lock formed. No sound absorptive material of any kind is to be used in the silencers. Silencers specified shall attenuate air/gas transmitted noise solely by virtue of controlled impedance membranes and broadly tuned resonators. Silencers to be subjected to corrosive environments shall be noted on the schedule as being made of stainless steel or other appropriate material for exposure to a specific gas. Silencers shall not fail structurally when subjected to a differential air pressure of 2000Pa inside or outside of casing.

Acoustic Performance

Silencer ratings shall be determined in a duct-to-reverberant room test facility which provides for airflow in both directions through the test silencer in accordance with applicable sections of ASTM E 477 and ISO 7235. The test set-up and procedure shall be such that all effects due to end reflections, directivity, flanking transmission, standing waves and test chamber sound absorption are eliminated. Acoustic ratings shall include Dynamic Insertion Loss (DIL) and self-noise power levels both for forward and reverse flow. Data shall be presented for tests conducted using silencers no smaller than 600mm x 600mm or 750mm x 600mm.



Aerodynamic Performance

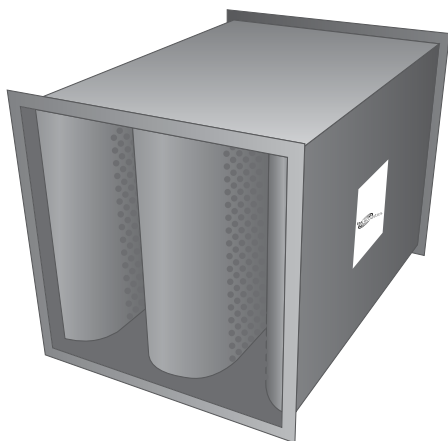
Static pressure loss of silencers shall not exceed those listed in the silencer schedule at the airflow indicated. Airflow measurements shall be made in accordance with ASTM Specification E 477 and applicable portions of ASME, AMCA and ADC airflow test codes. Tests shall be reported on the identical units for which acoustic data is presented.

Certification

With submittals, the manufacturer shall supply certified test data on Dynamic Insertion Loss (DIL), self-noise power levels, and aerodynamic performance for reverse and forward test conditions. Test data shall be for a standard product. All rating test shall be conducted in the same facility, utilise the same silencer, and be open to inspection upon request from the Architect/Engineer.

Ultra-pals™ Packless Silencers Type: XM

With Forward and Reverse Flow Ratings



The complete absence of fill combined with ease of cleaning and draining, makes packless silencers well suited for chemical plants, refineries, nuclear power plants and facilities handling petrol, grease, solvents or other hazardous materials.

Supplied as Standard:

- Aerodynamic inlet and discharge to splitter elements to reduce pressure drop and conserve energy

Designating Silencers: Example

Model: 6XM-600x600

Length	Type	Width	Height
1800mm	XM	600mm	600mm

XM Silencers must be supplied in standard modular widths that are multiples of 300mm.

- No Fibreglass
- No Foam
- No Mineral Wool
- No Fill of Any Kind

Self-Noise Power Levels dB re: 10⁻¹² Watts (for a 0.37m² face area silencer)

IAC XM Model	Octave Band	1	2	3	4	5	6	7	8
	Hz	63	125	250	500	1K	2K	4K	8K
	Silencer Face Velocity, m/s	Self-Noise Power Levels, dB							
3XM	-7.5	54	52	56	58	59	64	65	58
	-5	42	44	49	51	55	59	55	45
	+5	46	42	44	46	52	57	55	52
	+7.5	54	54	57	54	54	62	65	59
6XM & 9XM All Sizes (mm)	-10	64	61	58	59	60	64	67	64
	-5	56	52	52	52	55	61	60	50
	+5	58	54	49	46	52	60	60	50
	+10	66	67	65	61	58	63	69	67

Face Area Adjustment Factors (add or subtract from Lw values above)

Ultra-Pals™ Face Area, m ² *	0.09	0.19	0.37	0.74	1.50	3.00	6.00	12.00
Lw Adjustment Factor, dB	-6	-3	0	+3	+6	+9	+12	+15

* For intermediate face areas, interpolate to the nearest whole number

Aerodynamic Performance

IAC Model	Length (mm)	Static Pressure Drop N/m ²							
		5	7	10	15	17	22	27	32
XM	900	5	7	10	15	17	22	27	32
	1800	7	10	15	20	25	30	37	42
	2700	10	12	17	25	30	37	45	55
Silencer Face Velocity, m/s		1.27	1.52	1.78	2.03	2.29	2.54	2.79	3.05

Dynamic Insertion Loss (DIL) Ratings: Forward (+) / Reverse (-) Flow

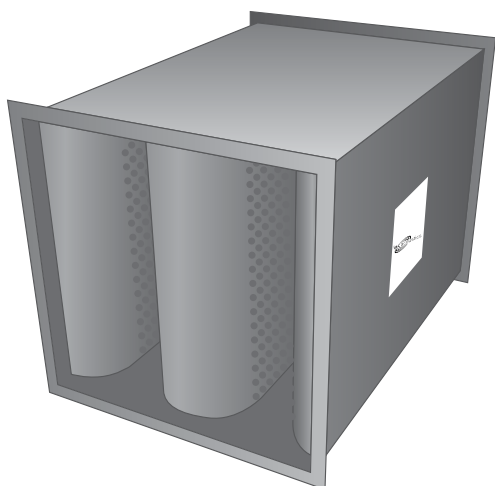
IAC XM Model (length in mm)	Octave Band	1	2	3	4	5	6	7	8
	Hz	63	125	250	500	1K	2K	4K	8K
	Silencer Face Velocity, m/s	Dynamic Insertion Loss, dB							
3XM (900)	-7.5	6	8	12	18	22	13	10	7
	-5	6	6	10	17	20	12	9	8
	0	4	4	7	15	17	11	10	9
	+5	6	4	10	17	20	12	10	9
	+7.5	5	5	11	17	23	13	10	8
6XM (1800)	-7.5	10	15	23	33	30	16	11	10
	-5	9	12	17	30	25	14	12	11
	0	5	7	11	25	22	14	13	12
	+5	7	9	15	27	25	14	14	12
	+7.5	7	11	17	30	29	16	14	13
9XM (2700)	-7.5	12	22	32	39	38	21	16	13
	-5	10	19	26	36	31	19	18	16
	0	7	12	15	31	27	19	18	17
	+5	8	16	22	35	29	20	19	18
	+7.5	7	17	25	38	34	22	18	17

Note

- Silencer Face Area is the cross-sectional area at the silencer entrance
- Face Velocity is the airflow (m³/s) divided by the Face Area (m²)
- Pressure drop for any face velocity can be calculated from the equation:
 $PD = (\text{Actual FV} / \text{catalogue FV})^2 \times (\text{Catalogue PD})$
- Self Noise values shown are for a 0.37m² face area silencer
- For each doubling of face area add 3dB to the self noise values listed
- For each halving of face area subtract 3dB from the self noise values listed

Quiet-Duct® Silencer Type: S

With Forward and Reverse Flow Ratings



Supplied as Standard

- Aerodynamic inlet and discharge to splitter elements to reduce pressure drop and conserve energy
- Perforated galvanised steel facings to all splitter elements to protect acoustic media from damage and erosion

Designating Silencers: Example

Model: 5S-600-600

Length	Type	Width	Height
1500mm	S	600mm	600mm

Weight

Average weight 100kg/m³

Standard modular widths are multiples of 300mm, other widths are also available.

Self-Noise Power Levels dB re: 10⁻¹² Watts (for a 0.37m² face area silencer)

IAC S Model	Octave Band	1	2	3	4	5	6	7	8
	Hz	63	125	250	500	1K	2K	4K	8K
S All Lengths	Silencer Face Velocity, m/s								
	-10	68	62	61	66	61	64	67	66
	-5	54	51	50	51	54	56	52	40
	-2.5	40	40	39	36	47	48	37	20
	+2.5	36	29	35	30	31	35	22	20
	+5	55	49	49	47	46	49	42	32
	+10	74	69	63	64	61	63	62	56

Face Area Adjustment Factors (add or subtract from Lw values above)

Quiet-Duct® Face Area, m ² *	0.05	0.09	0.19	0.37	0.74	1.5	3.0	6.0	12.0
Lw Adjustment Factor, dB	-9	-6	-3	0	+3	+6	+9	+12	+15

* For intermediate face areas, interpolate to the nearest whole number

Aerodynamic Performance

IAC Model	Length (mm)	Static Pressure Drop N/m ²							
S	900	2	7	15	22	32	45	57	72
	1500	5	10	17	25	37	50	65	82
	2100	5	10	17	27	40	52	70	87
	3000	5	10	20	30	45	60	80	100
Silencer Face Velocity, m/s		1.02	1.52	2.03	2.54	3.05	3.56	4.06	4.57

Dynamic Insertion Loss (DIL) Ratings: Forward (+) / Reverse (-) Flow

IAC S Model (length in mm)	Octave Band	1	2	3	4	5	6	7	8
	Hz	63	125	250	500	1K	2K	4K	8K
	Silencer Face Velocity, m/s	Dynamic Insertion Loss, dB							
3S (900)	-10	6	12	20	33	39	35	23	14
	-5	5	11	17	33	38	35	25	14
	0	5	10	16	32	38	35	26	16
	+5	5	9	15	30	37	35	27	17
	+10	5	8	14	27	36	35	27	17
4S (1200)	-10	8	16	24	35	44	39	30	18
	-5	8	15	22	39	43	40	32	18
	0	7	14	21	38	43	41	33	20
	+5	6	13	19	36	42	41	34	21
	+10	6	12	18	34	41	41	34	21
5S (1500)	-10	10	20	27	45	48	43	36	22
	-5	10	19	26	44	47	45	38	22
	0	9	17	25	43	47	46	39	24
	+5	7	17	23	42	46	46	40	25
	+10	6	16	22	40	46	46	40	25
6S (1800)	-10	11	22	32	47	49	44	39	25
	-5	11	21	31	46	48	46	41	25
	0	10	19	29	45	48	47	42	28
	+5	8	18	27	45	48	47	43	30
	+10	7	16	27	43	48	47	43	30
7S (2100)	-10	12	23	37	48	50	45	41	27
	-5	12	22	35	47	49	47	44	28
	0	11	20	33	47	49	47	45	31
	+5	9	18	31	47	49	47	45	34
	+10	8	16	31	46	49	48	45	35
8S (2400)	-10	13	24	39	49	50	47	42	30
	-5	13	24	37	48	50	48	46	31
	0	12	22	36	48	48	48	46	34
	+5	10	19	34	48	50	48	46	37
	+10	9	17	34	47	50	49	46	39
9S (2700)	-10	13	25	41	49	51	48	44	34
	-5	13	26	40	48	50	49	47	34
	0	12	23	39	48	51	49	48	38
	+5	11	21	38	48	51	49	48	41
	+10	10	18	37	49	51	49	48	42
10S (3000)	-10	14	26	43	50	51	50	45	37
	-5	14	28	42	49	51	50	49	37
	0	13	25	42	49	52	50	49	41
	+5	12	22	41	49	52	50	49	44
	+10	11	19	40	50	52	50	49	46

Note

- The tabulated airflow in m/s is based upon tests conducted in the IAC Acoustics R&D Laboratory, in accordance with applicable sections of internationally recognised airflow test codes. These codes require specific lengths of straight duct both upstream and downstream of the test specimen. Non-compliance with these codes can add from ½ to several velocity heads depending on specific conditions. The downstream measurements are made far enough downstream to include static regain. Therefore, if silencers are installed immediately before or after elbows, transitions or at the intake or discharge of a system, sufficient allowance to compensate for these factors must be included when calculating the operating static pressure loss through the silencer. See pages 10 & 11 for further details.
- Silencer Face Area is the cross-sectional area at the silencer entrance or exit
- Face velocity (FV) in m/s is the airflow in m³/s divided by the silencer face area in m²
- Pressure drop (PD) for any face velocity can be calculated from the equation: $PD = (\text{Actual FV} / \text{Catalogue FV})^2 \times (\text{Catalogue PD})$

2 hr fire rated, 50 Rw, Interconnecting, Acoustic/Smoke/Fire doorset

DESCRIPTION

Pyropanel AS-INTERCON-A is a 50 Rw, 2 hour fire rated interconnecting door leaf arrangement in a single frame, with perimeter and bottom seals.

APPLICATIONS

Ideal for interconnecting rooms that require up to 2 hours of fire rating and an acoustic rating of 50 Rw.

FEATURES

Acoustic Rating

- 50 Rw

Fire Resistance

- Up to -/120/30

Smoke Resistance

- Meets the NCC requirement for a smoke door.

Door Configuration

- Two doors in a single frame. (Interconnecting)

Thickness

- Both doors 48mm nom.

Door Weight

- Door A: approx 22 kg/m² & Door B: approx 36 kg/m²

Size

- Maximum Size - 2400mm high x 1200mm wide.

Frame

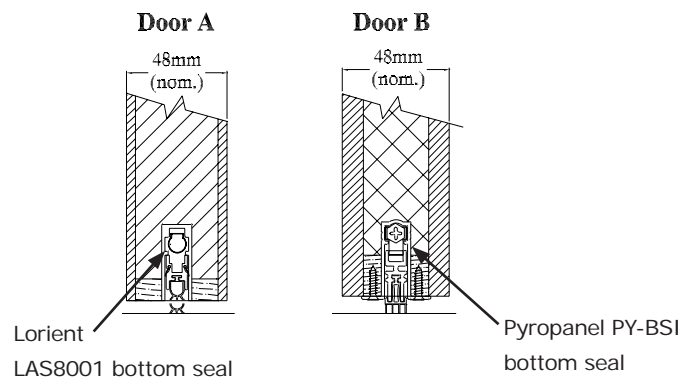
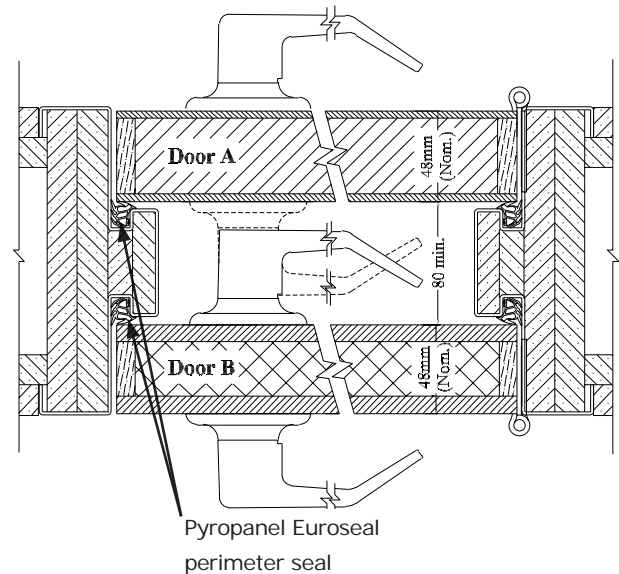
- Double rebated KDHW timber (limited to 1hr fire rating) or Steel Euroseal door frame, designed to receive one door on each side. The separation distance between the leaves is 80mm (min.)

Seals:

Door Type	Perimeter	Bottom	Rw
Door A	Pyropanel Euroseal	Lorient LAS8001	50
Door B		Pyropanel PY-BSI	

INSTALLATION

Door frame must be tightly sealed against wall structure using Pyropanel Pyroseal fire and acoustic sealant. Steel door frames will require filling with fire rated plasterboard, Pyropanel light weight M4 Mortar, concrete or mortar to achieve the desired acoustic rating. Internal door hardware must be offset to prevent any clashing when both leaves are closed.



HOW TO SPECIFY

"Door to be a Pyropanel AS-INTERCON-A acoustic interconnecting doorset, installed into a Pyropanel fire-rated filled steel* Euroseal door frame".

* denotes example - delete, change or specify as required

Appendix D – NCC Mark-up



AIRBORNE SOUND INSULATION KEY:
SEPARATING WALLS

>Rw 45dB	[Orange box]	[Orange box]
>Rw 45dB PLUS D.C.	[Blue box]	[Blue box]

CONCEALED BUILDING SERVICES DUCTS

>Rw+Ctr 40dB	[Blue box]
>Rw+Ctr 25dB	[Yellow box]

SHARED SERVICES DUCT CONSTRUCTIONS

Shared service duct walls to "habitable" areas must achieve performance of Rw+Ctr 40dB. This can be achieved with 2 x 13mm plasterboard on stud frame with 11kgm-3 fibrous insulation retained in the services duct; Where standard PVC pipework is used, pipes must be wrapped in Pyrotek 4525C;

Shared service duct walls to "non-habitable" areas must achieve performance of Rw+Ctr 25dB. This can be achieved with 1 x 13mm plasterboard on stud frame with 11kgm-3 fibrous insulation retained in the services duct; Where standard PVC pipework is used, pipes must be wrapped in Pyrotek 4525C;

Note, where acoustically-rated pipework is installed, e.g. REHAU - Raupiano Plus, pipe wrapping may be omitted in service walls requiring Rw+Ctr 25dB (i.e. to wet areas) only; Where acoustically-rated pipework is used in service walls requiring Rw+Ctr 40dB (i.e. to habitable areas), 1 x pipe lagging layer (e.g. Pyrotek Soundlag 4525c) and fibrous insulation behind 1 x 13mm FR P/Board will suffice.

Interconnecting Doors
 NCC standard separating performance is for Rw 45dB, shown orange;
 To achieve this with a doorset requires a bespoke/specialist door system, such as the ASSA ABLLOY AS-Intercon-A (rated Rw 50dB) or Intercon Q (rated Rw 45dB) - refer Appendix C, expected to add cost/complexity to these walls.

Minimum possible alternative solution would be to install standard apartment entry doorsets rated at Rw 30dB (as applicable to Class 2/3 multi-residential buildings) formed from 40mm solid core doorset well fitted inframe with 5mm gap at threshold and effective compressible seals to head and jambs.

However it must be noted this doorset will not achieve NCC minimum separation of Rw 45dB between these rooms.
 This detail to be resolved during Detailed Design.

Wall to Communal Lounge, Activity and Dining Rooms
 NCC standard separating performance to SOUs is Rw 45dB, shown orange;
 Given potential for higher activity levels in Lounges, Activity Rooms and Dining Rooms, the Principal may consider upgrading to Rw 45dB plus Discontinuous Construction (blue) to for improved acoustic amenity

Interconnecting Doors
 NCC standard separating performance is for Rw 45dB, shown orange;
 To achieve this with a doorset requires a bespoke/specialist door system, such as the ASSA ABLLOY AS-Intercon-A (rated Rw 50dB) or Intercon Q (rated Rw 45dB) - refer Appendix C, expected to add cost/complexity to these walls.

Minimum possible alternative solution would be to install standard apartment entry doorsets rated at Rw 30dB (as applicable to Class 2/3 multi-residential buildings) formed from 40mm solid core doorset well fitted inframe with 5mm gap at threshold and effective compressible seals to head and jambs.

However it must be noted this doorset will not achieve NCC minimum separation of Rw 45dB between these rooms.
 This detail to be resolved during Detailed Design.

Wall to Communal Lounge, Activity and Dining Rooms
 NCC standard separating performance to SOUs is Rw 45dB, shown orange;
 Given potential for higher activity levels in Lounges, Activity Rooms and Dining Rooms, the Principal may consider upgrading to Rw 45dB plus Discontinuous Construction (blue) to for improved acoustic amenity

Wall to Stores and Services Recessed Cupboards
 NCC standard separating performance for SOUs is Rw 45dB; Where habitable areas (i.e. living and sleeping spaces) within an SOU is adjacent to stores, plant or services areas the Principal may consider upgrading to Rw 45dB plus Discontinuous Construction (blue) to for improved acoustic amenity, avoiding transfer of bangs/knocks associated with use of stores and recessed services cupboards.

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Interconnecting Doors
 NCC standard separating performance is for Rw 45dB, shown orange;
 To achieve this with a doorset requires a bespoke/specialist door system, such as the ASSA ABLLOY AS-Intercon-A (rated Rw 50dB) or Intercon Q (rated Rw 45dB) - refer Appendix C, expected to add cost/complexity to these walls.

Minimum possible alternative solution would be to install standard apartment entry doorsets rated at Rw 30dB (as applicable to Class 2/3 multi-residential buildings) formed from 40mm solid core doorset well fitted inframe with 5mm gap at threshold and effective compressible seals to head and jambs.

However it must be noted this doorset will not achieve NCC minimum separation of Rw 45dB between these rooms.
 This detail to be resolved during Detailed Design.

Wall to Communal Lounge, Activity and Dining Rooms
 NCC standard separating performance to SOUs is Rw 45dB, shown orange;
 Given potential for higher activity levels in Lounges, Activity Rooms and Dining Rooms, the Principal may consider upgrading to Rw 45dB plus Discontinuous Construction (blue) to for improved acoustic amenity

Wall to Stairwell
 NCC standard separating performance for SOUs is Rw 45dB only; Where SOU is adjacent to stairwells, the Principal may consider upgrading to Rw 45dB plus Discontinuous Construction (blue) to for improved acoustic amenity, avoiding transfer of footfall noise associated with use of stairwells, particularly where hard floor finishes are proposed in the stair trends.

Wall to Stores and Services Recessed Cupboards
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1 PROPOSED GROUND FLOOR PLAN
 SCALE 1:250

DEVELOPMENT APPLICATION

PROJECT: South Bunbury Community Aged Care	SHEET SERIES: DEVELOPMENT APPLICATION	SCALE: 1:250 @ A4	
CLIENT: SOUTH BUNBURY COMMUNITY AGED CARE	SHEET TITLE: PROPOSED GROUND FLOOR PLAN	DATE: 14.11.2023	
ADDRESS: 11 HAYWARD STREET, SOUTH BUNBURY, WA 6250	REVISION: 1	DRAWN BY: AG	99 Wargara Road, Chesham VIC 3192 Tel: (03) 9581 0100 Fax: (03) 9580 4363



>Rw 45dB	[Orange bar]	[Orange bar]	[Orange bar]
>Rw 45dB PLUS D.C.	[Blue bar]	[Blue bar]	[Blue bar]
DASH = RECOMMENDED ONLY			

CONCEALED BUILDING SERVICES DUCTS

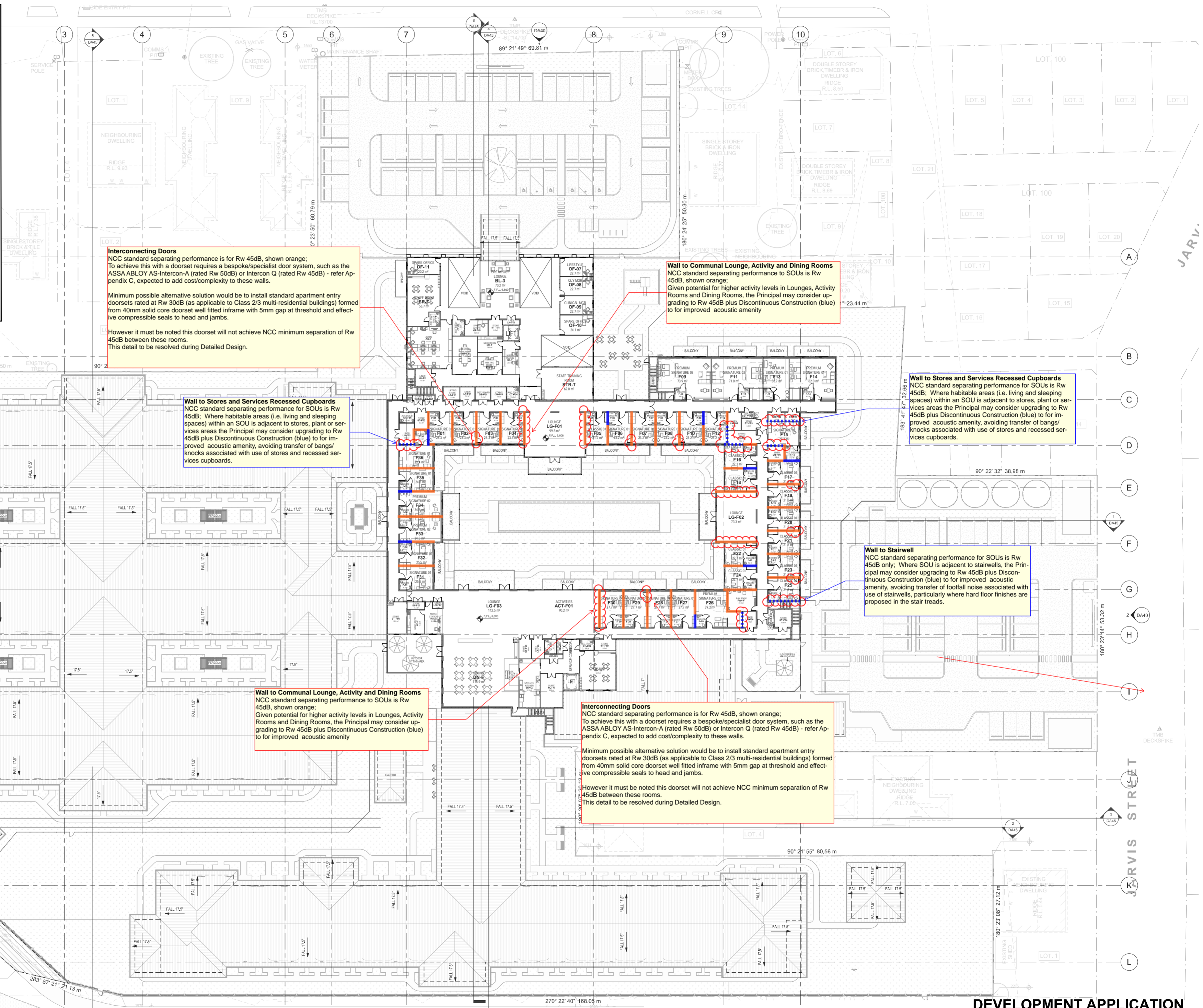
>Rw+Ctr 40dB	[Blue bar]
>Rw+Ctr 25dB	[Yellow bar]

SHARED SERVICES DUCT CONSTRUCTIONS

Shared service duct walls to "habitable" areas must achieve performance of Rw+Ctr 40dB. This can be achieved with 2 x 13mm plasterboard on stud frame with 11kgm-3 fibrous insulation retained in the services duct; Where standard PVC pipework is used, pipes must be wrapped in Pyrotek 4525C;

Shared service duct walls to "non-habitable" areas must achieve performance of Rw+Ctr 25dB. This can be achieved with 1 x 13mm plasterboard on stud frame with 11kgm-3 fibrous insulation retained in the services duct; Where standard PVC pipework is used, pipes must be wrapped in Pyrotek 4525C;

Note, where acoustically-rated pipework is installed, e.g. REHAU - Raupiano Plus, pipe wrapping may be omitted in service walls requiring Rw+Ctr 25dB (i.e. to wet areas) only; Where acoustically-rated pipework is used in service walls requiring Rw+Ctr 40dB (i.e. to habitable areas), 1 x pipe lagging layer (e.g. Pyrotek Soundlag 4525c) and fibrous insulation behind 1 x 13mm FR P/Board will suffice.



Interconnecting Doors
 NCC standard separating performance is for Rw 45dB, shown orange;
 To achieve this with a doorset requires a bespoke/specialist door system, such as the ASSA ABLOY AS-Intercon-A (rated Rw 50dB) or Intercon Q (rated Rw 45dB) - refer Appendix C, expected to add cost/complexity to these walls.
 Minimum possible alternative solution would be to install standard apartment entry doorsets rated at Rw 30dB (as applicable to Class 2/3 multi-residential buildings) formed from 40mm solid core doorset well fitted inframe with 5mm gap at threshold and effective compressible seals to head and jambs.
 However it must be noted this doorset will not achieve NCC minimum separation of Rw 45dB between these rooms.
 This detail to be resolved during Detailed Design.

Wall to Communal Lounge, Activity and Dining Rooms
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 However it must be noted this doorset will not achieve NCC minimum separation of Rw 45dB between these rooms.
 This detail to be resolved during Detailed Design.

Appendix E – Terminology

The following is an explanation of the terminology used throughout this report:

- **Decibel (dB)**

The decibel is the unit that describes the sound pressure levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

- **A-Weighting**

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A , dB.

- **Sound Power Level (L_w)**

Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure level at known distances. Noise modelling incorporates source sound power levels as part of the input data.

- **Sound Pressure Level (L_p)**

The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc. and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

- **L_{ASlow}**

This is the noise level in decibels, obtained using the A-frequency weighting and the S (slow) time weighting. Unless assessing modulation, all measurements use the slow time weighting characteristic.

- **L_{AFast}**

This is the noise level in decibels, obtained using the A-frequency weighting and the F (fast) time weighting. This is used when assessing the presence of modulation.

- **L_{APeak}**

This is the greatest absolute instantaneous sound pressure level in decibels using the A-frequency weighting.

- **L_{Amax}**

An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

- **L_{eq}**

The L_{eq} level represents the average noise energy during a measurement period.

- **L₁**

The L₁ level represents the noise level exceeded for 1 percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

- **L₁₀**

The L₁₀ level represents the noise level exceeded for 10 percent of the measurement period and is considered to represent the “intrusive” noise level.

- **L₉₀**

The L₉₀ level represents the noise level exceeded for 90 percent of the measurement period and is considered to represent the “background” noise level.

- **One-Third-Octave Band**

Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20000 Hz inclusive.

- **Representative Assessment Period**

Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

- **L_{Amax} assigned level**

Means an assigned level, which, measured as a L_{ASlow} value, is not to be exceeded at any time.

- **L_{A1} assigned level**

Means an assigned level, which, measured as a L_{ASlow} value, is not to be exceeded for more than 1 percent of the representative assessment period.

- **L_{A10} assigned level**

Means an assigned level, which, measured as a L_{ASlow} value, is not to be exceeded for more than 10 percent of the representative assessment period.

- **Major Road**

Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

- **Secondary / Minor Road**

Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

- **Tonal Noise**

A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

- the presence in the noise emission of tonal characteristics where the difference between -
 - (a) the A-weighted sound pressure level in any one-third octave band; and
 - (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

- **Modulating Noise**

A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

- a variation in the emission of noise that —
 - (a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band; and
 - (b) is present for at least 10% of the representative assessment period; and
 - (c) is regular, cyclic and audible.

- **Impulsive Noise**

An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness means:

- a variation in the emission of a noise where the difference between L_{Apeak} and L_{Amax} is more than 15 dB when determined for a single representative event.

- **R_w**

This is the weighted sound reduction index. It is a single number rating determined by moving a grading curve in integral steps against the laboratory measured transmission loss until the sum of the deficiencies at each one-third-octave band, between 100 Hz and 3.15 kHz, does not exceed 32 dB. The higher the R_w value, the better the acoustic performance.

- **C_{tr}**

This is a spectrum adaptation term for airborne noise and provides a correction to the R_w value to suit source sounds with significant low frequency content such as road traffic or home theatre systems. A wall that provides a relatively high level of low frequency attenuation (i.e. masonry) may have a value in the order of – 4 dB, whilst a wall with relatively poor attenuation at low frequencies (i.e. stud wall) may have a value in the order of -12 dB.

- **$L'_{n,w}$**

This is the weighted normalised impact sound pressure level, which is determined by measuring the sound pressure level in the receiving room in one-third-octave bands between 100 Hz and 3.15 kHz and moving a grading curve in integral steps, such that the curve is as high as possible without the sum of deficiencies exceeding 32 dB. The normalisation is to a receiving room sound absorption area of 10m². The lower the $L'_{n,w}$ value the better the acoustic performance.

- **Assessment Method**

Means a method used for determining that a Building Solution complies with the Performance Requirements.

- **Verification Method**

Means a test, inspection, calculation or other method that determines whether a performance solution complies with the relevant performance requirements.

- **Performance Solution**

Means a method of complying with the performance requirements other than by a deemed to satisfy solution.

- **Deemed to Satisfy Provisions**

Means provisions which are deemed to satisfy the Performance Requirements.

- **Deemed to Satisfy Solution**

Means a method of satisfying the deemed to satisfy provisions.

- **Expert Judgement**

Means the judgement of an expert who has the qualifications and experience to determine whether a Performance Solution or Deemed to Satisfy Solution complies with the Performance Requirements.

- **Habitable Room**

Means a room used for normal domestic activities, and

- a) includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom; but
- b) excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes-drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.

- **Public Corridor**

Means an enclosed corridor, hallway or the like which –

- a) Serves as a means of egress from 2 or more sole-occupancy units to a required exit from the storey concerned; or
- b) Is required to be provided as a means of egress from any part of a storey to a required exit.

- **Performance Requirement**

Means a requirement which states the level of performance which a Performance Solution or deemed to satisfy solution must meet.

- **Sole Occupancy Unit**

Means a room or other part of a building for occupation by one or joint owner, lessee, tenant, or other occupier to the exclusion of any other owner, lessee, tenant, or other occupier and includes –

- a) a dwelling; or
- b) a room or suite of rooms in a Class 3 building which includes sleeping facilities; or
- c) a room or suite of associated rooms in a Class 5, 6, 7, 8 or 9 building; or
- d) a room or suite of associated rooms in a Class 9c aged care building, which includes sleeping facilities and any area for the exclusive use of a resident.

- **Class 2 Building**

A building containing 2 or more sole occupancy units each being a separate dwelling.

- **Class 3**

A residential building, providing long term or transient accommodation for a number of unrelated persons, including –

- a) a boarding house, guest house, hostel, lodging house or backpacker accommodation.
- b) a residential part of a hotel or motel.
- c) a residential part of a school.
- d) accommodation for the aged, children or people with disability.
- e) a residential part of a health-care building which accommodates members of staff.
- f) a residential part of a detention centre
- g) a residential care building.

- **$L_{Aeq(Day)}$**

The $L_{Aeq(Day)}$ level is the logarithmic average of the L_{Aeq} levels from 6.00am to 10.00pm.

- **$L_{Aeq(Night)}$**

The $L_{Aeq(Night)}$ level is the logarithmic average of the L_{Aeq} levels from 10.00pm to 6.00am.

- **$L_{A10,18hour}$**

The $L_{A10,18hour}$ level is the arithmetic average of the hourly L_{A10} levels between 6.00am and midnight.

- **$L_{Aeq,24hour}$**

The $L_{Aeq,24hour}$ level is the logarithmic average of the L_{Aeq} levels from over an entire day.

- **Noise-sensitive land use and/or development**

Land-uses or development occupied or designed for occupation or use for residential purposes (including dwellings, residential buildings or short-stay accommodation), caravan park, camping ground, educational establishment, child care premises, hospital, nursing home, corrective institution or place of worship.

- **About the Term 'Reasonable'**

An assessment of reasonableness should demonstrate that efforts have been made to resolve conflicts without comprising on the need to protect noise-sensitive land-use activities. For example, have reasonable efforts been made to design, relocate or vegetate a proposed noise barrier to address community concerns about the noise barrier height? Whether a noise mitigation measure is reasonable might include consideration of:

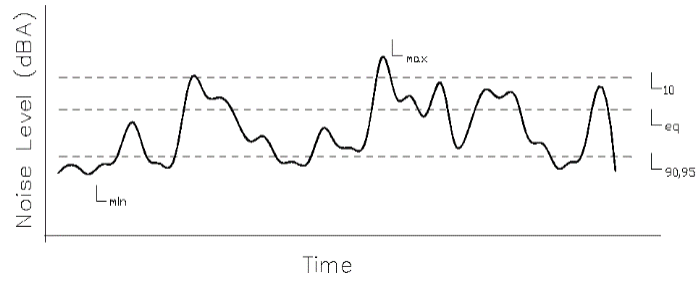
- The noise reduction benefit provided;
- The number of people protected;
- The relative cost vs benefit of mitigation;
- Road conditions (speed and road surface) significantly differ from noise forecast table assumptions;
- Existing and future noise levels, including changes in noise levels;
- Aesthetic amenity and visual impacts;
- Compatibility with other planning policies;
- Differences between metropolitan and regional situations and whether noise modelling requirements reflect the true nature of transport movements;
- Ability and cost for mobilisation and retrieval of noise monitoring equipment in regional areas;
- Differences between Greenfield and infill development;
- Differences between freight routes and public transport routes and urban corridors;
- The impact on the operational capacity of freight routes;
- The benefits arising from the proposed development;
- Existing or planned strategies to mitigate the noise at source.

- **About the Term 'Practicable'**

'Practicable' considerations for the purposes of the policy normally relate to the engineering aspects of the noise mitigation measures under evaluation. It is defined as "reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge" (*Environmental Protection Act 1986*). These may include:

- Limitations of the different mitigation measures to reduce transport noise;
- Competing planning policies and strategies;
- Safety issues (such as impact on crash zones or restrictions on road vision);
- Topography and site constraints (such as space limitations);
- Engineering and drainage requirements;
- Access requirements (for driveways, pedestrian access and the like);
- Maintenance requirements;
- Bushfire resistance or BAL ratings;
- Suitability of the building for acoustic treatments.

• **Chart of Noise Level Descriptors**



• **Austrroads Vehicle Class**

VEHICLE CLASSIFICATION SYSTEM	
AUSTRROADS	
CLASS	VEHICLE CATEGORIES
1	SMALL PASSENGER VEHICLES Includes: Cars, Light Trucks, Buses, Motorcycles
2	BUSES, TRUCKS Includes: Conventional Buses
HEAVY VEHICLES	
3	HEAVY VEHICLES ON RAILS Includes: Trains
4	HEAVY VEHICLES ON WHEELS Includes: 3 axle, 3 axle groups
5	HEAVY VEHICLES ON WHEELS Includes: 4 axle, 2 axle groups
6	HEAVY VEHICLES ON WHEELS Includes: 5 axle, 3 axle groups
7	HEAVY VEHICLES ON WHEELS Includes: 6 axle, 3 axle groups
8	HEAVY VEHICLES ON WHEELS Includes: 7 axle, 3 axle groups
9	HEAVY VEHICLES ON WHEELS Includes: 8 axle, 3 axle groups or 7 axle, 4 axle groups
LONG VEHICLES AND ROAD TRAINS	
10	LONG VEHICLES OR ROAD TRAINS Includes: 10 axle, 3 axle groups
11	LONG VEHICLES OR ROAD TRAINS Includes: 11 axle, 3 axle groups
12	LONG VEHICLES OR ROAD TRAINS Includes: 12 axle, 3 axle groups

• **Typical Noise Levels**

