Report

Acoustic Services

VICTORIA GARDENS DOONSIDE PRECINCT Salta Property Group

eport

CONFIDENTIAL Revision: 4.0 – DA Submission Issued: 1 March 2022



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1 EXECUTIVE SUMMARY

1.1 Purpose

This report presents our acoustic assessment of the proposed Victoria Gardens Doonside Precinct mixed-use development at 1-9 Doonside Street. The proposed development will comprise various uses including:

- Basement 2:
 - Loading dock
 - Car park
 - Services
- Basement 1:
 - Car park
 - Storage spaces
 - Services
- Ground Floor:
 - Retail including mini/major, specialty, lane way and mall circulation
 - Mixed use including a retail/showroom and heritage hotel
 - Office
 - Services
 - Bike/End of trip facilities
- Level 1
 - Residential amenities, including pool, gym and games room
 - Commercial offices
 - Mixed use includes a heritage pub
 - Residences
 - Residential car park
- Level 1 Mezzanine
 - Residences
 - Residential car park
 - Storage spaces
- Level 2
 - Residences
 - Residential car park
- Levels 3-16
 - Residences
 - Residential amenities

This document addresses the following:

- Noise limits based on the Noise Assessment Protocol in Victoria to be achieved by mechanical plant equipment of the development to existing neighbouring residential locations as well as residential dwellings within the development
- Sleep disturbance criteria
- External noise criteria within the development
- NCC requirements for the residential component
- Results of traffic noise measurements and attenuation measures to generally achieve AS/NZS 2107:2016 recommended internal noise criteria for traffic noise

1.2 Authority

Authority to undertake this report was provided by Richard Trevisan of Salta Property Group.

1.3 Information Sources

This report was written with reference to the following documents:

- The National Construction Code of Australia (NCC)
- Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues, Publication 1826.4, May 2021 (referred to as the Noise Protocol within this document) - Part I: Commercial, Industrial and Trade Premises
- Environment Protection Act, No.51, 2017
- Environment Protection Regulations (2021), S.R No 47/2021
- Australian/New Zealand Standard AS/NZS 2107:2016 Recommended design sound levels and reverberation times for building interiors
- New South Wales Road Noise Policy, March 2011

1.4 Revision History

Revision	Date Issued	Comment
1.0	9 th November 2020	DA Submission
2.0	24 th February 2021	DA Submission
3.0	16 th April 2021	DA Submission
4.0	24 th February 2021	DA Submission

2 PROJECT DESCRIPTION

The proposed development is bounded to the north by Victoria Gardens shopping centre and car park, to the east by David St, to the south by Doonside St and to the west by Burnley St.



Figure 1 - Site Context

The main source of external noise is traffic noise along Burnley St to the west and, in localised areas on the development, rooftop plant associated with Victoria Gardens shopping centre. Rooftop plant from within the development itself will also have some impact on the development. These will be controlled and treated as described in the following sections.

2.1 Development layout



Figure 2 provides an overview of the planned development while

Figure 3 to Figure 19 show layouts from Basement 2 to rooftop.



Figure 2 - Development Render from Doonside St Looking North.



Figure 3 - Basement 2 Plan



Figure 4 – Basement 1 Plan



Figure 5 – Ground Floor and Mezzanine Plan



Figure 6 - Level 1 Plan



Figure 7 – Level 1 Mezzanine



Figure 8 - Level 2 Plan



Figure 9 - Level 3 Plan



Figure 10 – Level 4 Plan



Figure 11 - Level 5 Plan



Figure 12 - Level 6 Plan



Figure 13 - Level 7-8 Plan



Figure 14 – Level 9 Plan



Figure 15 – Level 10 Plan



Figure 16 – Level 11 Plan



Figure 17 – Level 12 – 14 Plans



Figure 18 – Level 15 – 16 Plans



Figure 19 – Roof Plan

3 ACCEPTABLE NOISE EMISSION LEVELS

This section outlines the Environment Protection Regulations and Noise Protocol requirements of this project, preliminary control strategies of the mechanical plant are also provided in order achieve Noise Protocol limits.

3.1 Environment Protection Regulations and Noise Limit and Assessment Protocol Publication 1826.4 - Part I: Commercial, Industrial and Trade Premises

Section 118 of the Environment Protection Regulation 2021 relating to unreasonable noise emissions from commercial industrial and trade premises applies to this site and states the following:

"118 Unreasonable noise from commercial, industrial and trade premises

(1) For the purposes of paragraph (b) of the definition of unreasonable noise in section 3(1) of the Act, noise emitted from commercial, industrial and trade premises is prescribed to be unreasonable noise if the effective noise level of the noise exceeds—

(a) the noise limit that applies at the time the noise is emitted; or

(b) the alternative assessment criterion that applies at the time the noise is emitted if the assessment of an effective noise level is conducted at an alternative assessment location in accordance with the Noise Protocol."

Unreasonable noise as defined in the Environment Protection Act 2017 is noise that:

- a) is unreasonable having regard to the following
 - *i. its volume, intensity or duration;*
 - *ii. its character;*
 - iii. the time, place and other circumstances in which it is emitted;
 - iv. how often it is emitted;
 - v. any prescribed factors; or
- b) is prescribed to be unreasonable noise

Therefore the appropriate noise regulations for the proposed development are outlined in Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (referred to as Noise Protocol throughout this document).

Determining the acceptable noise emission levels using the Noise Protocol is a multi-step process, involving:

- Determining a zoning level, based on the location of the subject site
- Adjusting the zoning level, based on background noise level measurements conducted around the subject site.

The limits determined by the Noise Protocol apply to residential properties affected by noise emissions from the subject site.

3.1.1 Noise limits – Urban Area Method (Publication 1826.4 Part I)

To determine the zoning level, two concentric circles of diameter 140 and 400 metres are drawn around the noise sensitive location on the Victoria - Environment, Land, Water and Planning - Planning Maps Online. The area of the different zones (as scheduled in the Noise Protocol) is measured and the Influencing Factor is then calculated.

Due to the potential for significantly different zoning levels we have calculated at two residential receivers with differing influencing factors. Figure 20 below shows the zoning types for the areas in question along with the concentric circles located at 54 Leslie St and at 65 Burnley St within in the development.



Figure 20 Urban Area - Zoning Diagram.

For the most affected residential zone receivers, the Influencing Factor (IF) is calculated to be 0.0 at 54 Leslie St and 0.38 at 65 Burnley St. The Zoning Level for Day, Evening and Night is then calculated as per Table 1 below.

Table 1 - Zoning Limits

Designated	Day and Time		Zoning Limits (dBA)		
Period	Day and Time		54 Leslie St	65 Burnley St	
Dav	Monday – Saturday (except public holidays)	0700 - 1800	50	57	
Day	Sunday and Public Holidays	None	50		
Evoning	Monday – Saturday (except public holidays)	1800 - 2200	4.4	FO	
Evening	Sunday and Public Holidays	0700 - 2200	44	50	
Night	All days	2200 - 0700	39	45	

3.1.2 Sensitive Receptors

54 Leslie St and 65 Burnley St is the basis of our Calculated Noise Limit assessment due to anticipated lower Influencing Factors based on surrounding zone uses within the concentric circles. In addition to 54 Leslie St and 65 Burnley St, all sensitive receivers surrounding the site will be considered in the noise emission assessment including the following addresses:

- 50 Burnley St
- 12 David St
- 39 Appleton St

3.1.3 Existing Noise Environment

According to the Noise Protocol, a minimum of two hand-held representative measurements are required during each period that the premises will normally operate, i.e. day, evening or night periods, to determine whether the background noise level is "neutral", "high" or "low".

If background noise levels are determined to be "neutral", the zoning level becomes the noise limit. If background levels are not "neutral", additional measurements are required and the zoning level is set relative to the background noise level present at the receiving location.

Background noise measurements were completed during the day at the subject site to determine the existing noise environment and any corrections to be applied to the Zoning Level noise limits. Table 2 and Table 3 schedules the background-corrected noise limits for day, evening and night based on these measurements.

Time of Day	Zoning Level (dBA)	Measured Background, L90 (dBA)	Background Noise Level Classification	Calculated Noise Limit (dBA)	
Day	50	39	Neutral	50	
Evening	44	-	Neutral*	44	
Night	39	-	Neutral*	39	

Table 2 - Noise Limits Based on Measured Background Levels (54 Leslie St)

*We have used the Neutral classification for the Evening and Night periods based on the outcome of the Day period background noise measurement

Table 3 - Noise Limits Based on Measured Background Levels (65 Burnley St)

Time of Day Zoning Level (dBA)		Measured Background, L90 (dBA)	Background Noise Level Classification	Calculated Noise Limit (dBA)	
Day	57	39	Low	53	
Evening	50	-	Low*	47	
Night	45	-	Low*	42	

*We have used the Low classification for the Evening and Night periods based on the outcome of the Day period background noise measurement. These levels may be subject to change, pending future measurements.

3.1.4 Noise limits – Emergency equipment

Noise emitted during operation of equipment used solely in relation to emergencies are to comply with adjusted noise protocol limits in relation to its emergency status. This means that the noise limits in Table 2 and Table 3 shall be increased by 10 dB for day period and 5 dB for other periods.

These noise limits are shown below with equipment used in relation to emergencies:

"(a) a fire pump means a water pump permanently installed on a premises for extinguishing fires in emergencies;

(b) a standby boiler means a boiler which is used to supply hot water or steam in an emergency as an alternative to the normal boiler;

(c) a standby generator means a generator of electrical power used as an alternative to the mains supply in emergencies or for a maximum period of 4 hours per month for maintenance purposes;

(d) a smoke spill fan means a fan that forms part of a building emergency smoke control system;

(e) a stair pressurisation system means a pressurisation system used in emergencies to protect stairwells from smoke ingress;

(f) a hospital specialist ventilation system means a mechanical ventilation system used in relation to an emergency to prevent the spread of airborne infection, or other biological or chemical agents."

Time of Dou	Standby Generator, Boiler and Fire Pump Noise Limits (dBA)			
Time of Day	54 Leslie St	65 Burnley St		
Day	60	63		
Evening	49	52		
Night	44	47		

Table 4 - Noise Limits for Standby Generators, Boilers and Fire Pumps

3.2 Environment Protection Regulations 2021

Under the *Environment Protection Regulations 2021 S.R. No. 47/2008, Part 5.3, Division 2,* certain activities, such as the use of domestic air conditioning systems, are restricted in their permitted hours of operation.

According to this legislation, if SOUs are serviced by individual air conditioning units, these will not be permitted to operate at night unless they are inaudible at the most affected residential neighbour.

The night period for air conditioning operation is defined as:

- Monday to Friday before 7am and after 10pm for heating and before 7am and after 11pm for cooling
- Weekends and public holidays before 9am and after 10pm for heating and before 9am and after 11pm for cooling

If the air conditioning is centralised and operated by the Body Corporate or building owner (rather than by each individual resident), it will instead be required to comply with Noise Protocol limits of the development.

3.3 Sleep Disturbance Criteria

Noise intrusion within apartments surrounding the development have the potential to cause sleep disturbance for activities occurring during the night period 2200-0700hrs. A document published by the New South Wales Government Department of Environment Climate Change and Water, *NSW Road Noise Policy*, has compared a number sleep disturbance criteria and concluded that maximum internal noise levels below 50-55 dB L_{Amax} are unlikely to cause awakening. Assuming dwellings have open windows at night, providing a transmission loss of 10-15 dB, we propose the sleep disturbance criteria to apply at the façade of residences shown in Table 5. This criterion will influence the design of noise emission treatment from the development, primarily from building services.

Table 5 – Sleep Disturbance Criteria

Time Period	Maximum Noise Level incident on Façade (dBA L _{max})		
Night (2200-0700)	65		

4 NOISE EMISSION ASSESSMENT

4.1 Noise Emission Sources

We expect the following major noise sources within the development:

- Building services equipment
 - Car park exhaust and supply fans
 - Rooftop condensers serving residential towers
 - Chillers located over the shopping centre car park
 - Fire pump
 - Pool pump
- Loading dock
- Food & beverage uses

Treatment of these noise sources will be addressed in the following sections.

4.2 Building Services Treatment Recommendations

Although the mechanical design is still under development it is expected that there will be fans located on the facade throughout the development, with some major equipment on the rooftop.

The following lists the types of equipment and provides initial guidance on the design intent in complying with both Noise Protocol and internal levels.

- Car park exhaust and supply fans treated with attenuators and/or internally lined ductwork
- Rooftop and balcony condensers treated with either acoustic louvres or noise barriers (if required).
- Chillers treated with either acoustic louvres or noise barriers (if required)
- Fire pump treated with acoustic louvers, attenuators and/or lined ductwork

Implementing the above methods would ensure noise from building services sources comply with urban Noise Protocol limits at all times. All building services and acoustic treatment should be reviewed by a suitably qualified acoustic engineer.

4.3 Loading Dock Noise

Given that the loading dock is situated on Basement 2 and is therefore completely enclosed and forced ventilated we expect any loading dock noise to readily comply with the relevant noise emission limits. An assessment of loading dock noise, including noise emission from the entrance of the loading dock, will be carried out as the design progresses to confirm this, with any required acoustic treatment incorporated into the design.

Loading dock noise will be assessed to Noise Protocol L_{eq} criteria as well as the L_{Amax} sleep disturbance criteria outlined in 3.2 to the nearest affected residence at 12 David St.

4.4 Food & Beverage Noise Emissions

We recommend that further tenancy agreement requirements be put on hospitality and commercial type uses that are adjacent or above / below residential to ensure any future music and structure-borne noise sources are addressed. Suggested inclusions are as follows:

- Where music is to be potentially played above background levels, the operator must seek the input of an acoustic consultant and implement noise limiting devices to ensure Noise Protocol Music limits are met.
- Airborne and structure-borne noise from back of house, kitchen, gyms or similar areas must be controlled so as not to cause unreasonable impact to adjacent or nearby residential uses. This may require consideration of vibration isolated benches, walls and floors in some instances. The operator should seek the advice of an acoustical consultant if high noise levels or impact sounds from such areas are likely.

5 NOISE INTRUSION

This section outlines the recommended project internal noise levels based generally on AS/NSZ 2107:2016 standard with recommended minimum facade construction configurations required to achieve these internal noise levels. Commentary is also provided on noise impacts from existing commercial developments.

5.1 Internal Noise Criteria

Table 6 outlines the recommended project internal noise levels, which are based generally on AS/NZS 2107:2016 - *Acoustics - Recommended design sound levels and reverberation times for building interiors*. These criteria are inclusive of both external noise intrusion and building services noise contributions.

Table 6 - Overall Internal Noise Criteria.

Area	Internal Noise Criteria, L _{eq} (dBA)
Sleeping Areas	35
Living Areas, including Kitchen	40
Retail	50
Commercial	45

5.2 External Noise Sources

The primary noise sources impacting the development will be traffic along Burnley St to the West and noise from existing plant on the rooftop of Victoria Gardens shopping centre (including noise emissions from the cinema roof top plant). NDY have taken initial traffic and plant noise measurements, noted in Table 7.

Table 7 - External Noise Source Measurements.

Macaurament Description	Sound pressure level (dB) per octave frequency band							
Measurement Description	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Traffic noise on Burnley St ¹	68	64	66	65	68	62	52	45
Plant noise ²	67	63	55	48	46	41	44	38

¹ Measured 6.5m from the centreline of Burnley St

² Measured 10m from the plant

5.3 Glazing Recommendations

Based on the measurements recorded in Table 7, we recommend implementing glazing that meets the proposed Rw ratings provided in Table 8 (refer to Figure 8 for building name conventions). Indicative glazing configurations (but not limited to) have been provided to meet the proposed Rw ratings. Final glazing selections are to be reviewed by the acoustic engineer.

Area	Building	Façade	Level	Rw Rating	Indicative Glazing Configuration
Retail and Commercial	Building 1, Building 4	West, facing Burnley St	L00- L01M	Rw 37	6mm float/12mm air gap /6.38mm laminate
Residences	Building 1, Building 4	West, facing Burnley St	L02-L04	Rw 39	6mm float/12mm air gap/8.76mm laminate
Residences	Building 3, Building 6	East	L02-L04	Rw 39	6mm float/12mm air gap/8.76mm laminate
Residences	Building 6	Northwest corner	L02-L06	Rw 39	6mm float/12mm air gap/8.76mm laminate
Residences	All others	All others	All others	Rw 37	6mm float/12mm air gap/6.38mm laminate
Rest of development				Rw 33	6mm float/12mm air gap/6mm float

Table 8 - Recommend Glazing (Rw) Performance

5.4 External Noise Impacts

A plant deck is located on the rooftop adjacent Tower 3 and 6 (this includes two plant areas, one servicing Coles and the other servicing the cinema). Noise emissions from these rooftop plants will be appropriately treated to meet noise emissions criteria to the development. Treatments such as, but not limited to, additional acoustically lined ductwork, absorptive enclosures, selection of low noise equipment or relocation of plant equipment may be used to achieve compliance. Figure 21 highlights the rooftop plants of concern.



Figure 21 – Location of Adjacent Rooftop Plant

6 SOUND INSULATION - NCC VOLUME ONE - BUILDING CODE OF AUSTRALIA

6.1 Sound Control Between Residences

The residential units constitute a Class 2 building under the National Construction Code (NCC), and as such will be required to comply with part F5 of the Code to prevent undue sound transmission in the building, as described in Table 9.

Table 9 - Residential Intertenancy Design Criteria.

	Minimum Airborne Insulation Rating	Maximum Impact Insulation Rating	
Sound Insulation of Floors			
Separating SOUs	R _w + C _{tr} 50	L _{n,w} 62	
Separating a dwelling from a plantroom, lift shaft, stairway, public corridor, public lobby, etc.	R _w + C _{tr} 50	L _{n,w} 62	
Separating a balcony from a dwelling below	-	L _{n,w} 62	
Sound Insulation of Walls			
Separating dwellings, generally	R _w + C _{tr} 50	-	
Separating a habitable room in one dwelling from a bathroom, sanitary compartment, laundry or kitchen in an adjoining dwelling	R _w + C _{tr} 50	Discontinuous	
Separating a dwelling from a stairway, public corridor, public lobby, etc.	R _w 50	-	
Separating a dwelling from a plantroom or lift shaft	R _w 50	Discontinuous	
Between a car park and a dwelling	R _w 50	Discontinuous	
Separating rooms within the same dwelling	No specific requirements	-	
Door separating a dwelling from a stairway, public corridor, public lobby, etc.	R _w 30	-	
Sound Insulation of Services			
Riser, wall or ceiling construction separating a duct, soil, waste, storm water or water supply pipe passing through more than one dwelling from - - a habitable room - a non-habitable room or kitchen	R _w + C _{tr} 40 R _w + C _{tr} 25	-	
Circulating or other pumps	Flexible coupling required		
Electrical outlets located in a wall separating dwellings	 Electrical outlets must be offset from each other: In masonry walling, not less than 100mm; and In timber or steel framed walling, not less than 300mm. 		

7 CONCLUSION

This report has provided commentary around the noise impacts of the proposed Victoria Gardens Doonside Precinct at 1-9 Doonside Street. We expect the major sources of noise emission from the development to be:

- Building services equipment
- Loading dock
- Food & beverage outlets

Subject to appropriate treatment and design considerations outlined in this report, the proposal should comply with the relevant design targets. The design will be reviewed through the detailed design stages to ensure appropriate treatment is incorporated.

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