

810 PACIFIC HIGHWAY, GORDON

SSDA Noise & Vibration Impact Assessment

16 January 2026

Ecove Group Pty Ltd

TP397-01F03 SSDA Noise & Vibration Impact Assessment (r2)

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The information contained herein is for the purpose of acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

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1 Introduction

1.1 Overview and Purpose of Report

Renzo Tonin & Associates was engaged by Ecove Group Pty Ltd to undertake an acoustic assessment for a State Significant Development Application (SSDA) for the mixed-use development at 810 Pacific Highway, Gordon.

In this report we will:

- Identify noise emission goals applicable to the site
- Identify nearby noise sensitive developments
- Provide advice with respect to building shell construction to address road and rail traffic noise impacts on the development
- Provide advice on apartments that can be naturally ventilated whilst satisfying internal noise goals
- Provide advice on acoustic treatment of proposed communal gym/wellness centre, library/study room.
- Provide advice on acoustic separation of communal indoor and outdoor spaces from residential spaces
- Provide advice with respect to treatment of plant and equipment noise and vibration to ensure compliance relevant EPA noise guidelines.

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

1.2 Project Description

This noise and vibration impact assessment report has been prepared by Renzo Tonin & Associates on behalf of Ecove Group Pty Ltd to accompany a State Significant Development Application (SSDA) (SSD-101444458) for a mixed-use development at 810 Pacific Highway, Gordon. The site is described as Lot 12 DP631351 and has a total area of 2,357m² and is located within the Gordon town centre, immediately north of the Gordon Centre and south of the Ku-ring-gai Council Chambers. The proposal delivers approximately 180 new dwellings (including affordable housing apartments), together with a full-line supermarket in a highly accessible location, contributing to both State and Council housing objectives while revitalising Gordon Town Centre.

The proposal is declared State Significant Development (SSD) pursuant to Schedule 1, section 26A of State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP). SSD-101444458 seeks approval for an amending DA which proposes to amend DA-0610-17, except for the demolition, excavation, shoring and piling works, which are to proceed under the existing approval.

1.3 Background

Development consent (DA-0610/17) was issued on 12 December 2018 by the Sydney North Planning Panel for the demolition of existing buildings and the construction of a mixed-use development on the subject site. The approved scheme provided for:

- 56 apartments in a shop-top housing format, comprising a mix of one, two and three-bedroom dwellings.
- An Aldi supermarket and a small retail tenancy at ground floor level, supported by storage, loading and back-of-house facilities at the lower ground level.
- Three basement levels containing 142 car parking spaces for residents, visitors, and retail customers.
- Associated landscaping, signage, earthworks and tree removal, including the relocation of a Canary Island Date Palm.

The consent was issued as a Deferred Commencement Approval, subject to the satisfaction of several preconditions. The consent was subsequently modified on three occasions:

- MOD0222/20 (21 September 2021)
- MOD0194/21 (18 November 2021)
- MOD0061/25 (13 November 2025)

These modifications collectively removed the deferred commencement condition, amended the development description, and incorporated an amended construction traffic management plan into the approved documentation. MOD0061/25 approved the increased depth of excavation, realigned basement walls in the northeast corner and modified conditions relating to the issue of construction certificates to allow preliminary basement excavation to occur independently. This SSDA will amend the existing Development Consent and associated modifications. Notwithstanding, preliminary works are proposed to proceed under the current consent to meet Aldi's contractual requirement to be established and operating on the site by 2028.

1.4 Planning Context

The planning context for the site has evolved significantly since the original consent was issued. In April 2024, the Department of Planning, Housing and Infrastructure (DPHI) identified the site as being located within a Transport Oriented Development (TOD) precinct. In parallel, Ku-ring-gai Council progressed a preferred planning framework for Gordon Town Centre, including proposed amendments to the Ku-ring-gai Local Environmental Plan 2015 (KLEP 2015). Following a Council-initiated legal process,

legislative amendments removed access to TOD uplift for proposals that had not been submitted in June 2025. As part of the resolution of this legal process, Council formally endorsed its preferred planning framework for Gordon Town Centre on 5 June 2025. That framework was subsequently accepted by the Department, with minor amendments, and implemented through an amendment to the KLEP 2015 via the State Environmental Planning Policy Amendment (Ku-ring-gai Station Precincts) 2025, which commenced on 14 November 2025.

The proposed development responds to the amended KLEP 2015 and, in addition, seeks to utilise the floor space ratio and height incentives available under Chapter 2, Part 2, Division 1 of the State Environmental Planning Policy (Housing) 2021.

Document Purpose and Structure

The report aims to address the Noise and Vibration Impact of component of item 10 of the Secretary's Environmental Assessment Requirements (SEARs) issued for the project on 9 December 2025.

The key issues with respect to noise and vibration from the SEARs are extracted below:

"10. Noise and Vibration

• Provide a noise and vibration impact assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented."

1.5 Assessment Objectives

As part of preparing this assessment, the following policies, guidelines and standards have been considered:

- NSW EPA Noise Policy for Industry (NPfI) 2016
- NSW EPA Interim Construction Noise Guideline (ICNG) 2009
- State Environmental Planning Policy (Transport & Infrastructure) 2021 (the "SEPP (T&I)")
- Department of Planning publication "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008
- State Environmental Planning Policy No 65 – Design Quality of Residential Flat Development (Amendment No. 3)"
- Ku-ring-gai Council Development Control Plan (4th December 2025)
- SEPP 65 Apartment Design Guide 2015
- Australian Standard AS2107:2016 "Recommended Design Sound Levels and Reverberation Times for Building Interiors"

1.6 Reference Material

This report is prepared based on:

- Architectural drawings prepared by PBD Architects dated 12/12/2025.

2 The Proposal

2.1 Site and Noise Monitoring Locations

The site is bounded by Pacific Highway to the east, Dumaresq Street to the south and Radford Place to the west. To the north, the site is bordered by three-storey commercial building. The Sydney Trains rail corridor (T1 and T9 Lines) which only serves commuter rail traffic, is situated approximately 100m east of the site as indicated in Figure 2-1 below. Long-term term noise monitoring has been undertaken on site to determine the existing acoustic environment surrounding the site. Figure 2-1 below shows location of the noise monitoring and identified noise-sensitive neighbours.



Figure 2-1: Site Surrounds and Noise Monitoring Locations

2.2 Nearby Noise Sensitive Receivers

The nearest noise-sensitive receivers to subject development have been identified as follows and indicated in Figure 1 above.

Table 2-1: Noise Sensitive Receiver Locations

Receiver ID	Address	Description
Residential Receivers		
R1	12 Dumaresq Street, Gordon	5-storey apartment building across Dumaresq Street at approximately 46m south-west of the development.
R2	15 & 17 Dumaresq Street, Gordon	Single storey houses across Radford Place at approximately 63m west the development
R3	8-18 McIntyre Street, Gordon	5-storey apartment building approximately 87m north-west of the development
Non-residential Receivers		
C1	802-808 Pacific Highway, Gordon	3 storey commercial building (Gordon Shopping Centre) located across Dumaresq Street at 22m south of site.
C2	781 to 793 Pacific Highway, Gordon	2 storey retail/commercial buildings located across Pacific Highway at 25m east of site
C3	2 Park Avenue and 799 Pacific Highway, Gordon	2 storey commercial building (Gordon Police Station and Gordon Library) located across Pacific Highway at 50m north-east of site.
C4	818 Pacific Highway, Gordon	2 to 3 storey commercial building (Ku-ring-gai Council) locate 3.5m north of site

3 Ambient and Background Noise Surveys

3.1 Noise Surveys

The proposed development is potentially affected by road traffic noise from Pacific Highway on the east boundary of the site and distant rail noise from the Sydney Trains rail corridor approximately 100m to the east.

Environmental noise loggers were installed on the east and west boundaries of the site from 13/12/2025 to 22/12/2025 to measure the existing ambient and background noise surrounding the site. Noise monitoring locations are indicated in Figure 2-1 above.

The noise logger records noise levels on a continuous basis and stores data every fifteen minutes. The noise logger was calibrated before and after measurements and no significant deviation in calibration was noted. The noise monitoring equipment used here complies with Australian Standard 1259.2-1990 "Acoustics - Sound Level Meters" and is designated as Type 2 instruments suitable for field use.

The results of the background and ambient noise monitoring conducted on site are presented in APPENDIX C.

3.2 Measured Road Traffic and Rail Noise Levels

The design noise levels are taken from the representative L_{Aeq} for the week for both the day time (7am to 10pm) and night time (10pm-7am) periods. The design external noise levels are presented Table 3-1 below.

Table 3-1: Day and Night Road Traffic and Rail Noise Levels

Monitoring Location	Survey Period	Measured Traffic Noise Levels over Day (15 hour) and Night (9 hour) Periods in dB(A)	
		$L_{Aeq, 15hour}^1$	$L_{Aeq, 9hour}^1$
L1 – East boundary of 810 Pacific Highway, Gordon	Day (7am to 10pm) 13/12/2025 to 22/12/2025	74	-
	Night (10pm to 7am) 13/12/2025 to 22/12/2025	-	70
L2 – West boundary of 810 Pacific Highway, Gordon	Day (7am to 10pm) 13/12/2025 to 22/12/2025	59	-
	Night (10pm to 7am) 13/12/2025 to 22/12/2025	-	54

Notes:

- Noise levels presented are facade values.

3.3 Site Ambient and Background Noise Level

The results of the long-term noise monitoring have been summarised in accordance with Noise Policy for Industry requirements published by NSW Environmental Protection Authority (EPA) and are presented in the following tables.

Table 3-2: Measured Site Background Noise Levels (L_{A90})

Noise Monitoring		Representative L _{A90} Background Noise Levels in dB(A)		
Location	Period	Day ¹	Evening ²	Night ³
L1 – East boundary of 810 Pacific Highway, Gordon	Saturday 13/12/2025 to Monday 22/12/2025	59	55	41
L2 – West boundary of 810 Pacific Highway, Gordon	Saturday 13/12/2025 to Monday 22/12/2025	49	45	38

Notes:

Day, Evening & Night assessment periods are defined in accordance NSW EPA's Industrial Noise Policy as follows.

1. Day is defined as 7:00am to 6:00pm, Monday to Saturday; 8:00am to 6:00pm Sundays & Public Holidays.
2. Evening is defined as 6:00pm to 10:00pm, Monday to Sunday & Public Holidays.
3. Night is defined as 10:00pm to 7:00am, Monday to Saturday; 10:00pm to 8:00am Sundays & Public Holidays

Table 3-3: Measured Site Ambient Noise Levels

Noise Monitoring		Representative L _{Aeq} Ambient Noise Levels in dB(A)		
Location	Period	Day ¹	Evening ²	Night ³
L1 – East boundary of 810 Pacific Highway, Gordon	Saturday 13/12/2025 to Monday 22/12/2025	72	71	67
L2 – West boundary of 810 Pacific Highway, Gordon	Saturday 13/12/2025 to Monday 22/12/2025	57	54	51

Notes:

Day, Evening & Night assessment periods are defined in accordance NSW EPA's Noise Policy for Industry as follows.

1. Day is defined as 7:00am to 6:00pm, Monday to Saturday; 8:00am to 6:00pm Sundays & Public Holidays. As results were affected by construction noise weekend day and Saturday morning, Sunday results have been presented for the Day time period
2. Evening is defined as 6:00pm to 10:00pm, Monday to Sunday & Public Holidays
3. Night is defined as 10:00pm to 7:00am, Monday to Saturday; 10:00pm to 8:00am Sundays & Public Holidays

The measured overall background (L_{A90}) and ambient (L_{Aeq}) noise levels obtained from location L2 and outlined in Table 3-2 and Table 3-3 are representative of surrounding residential neighbours and are used in defining external noise emission criteria from the development such as mechanical ventilation and air-conditioning, carpark activities in accordance with EPA Noise Policy for Industry (NPfI).

4 Acoustic Criteria

4.1 Rail and Road Traffic Noise Criteria

Table 3-1 below presents internal noise criteria recommended for this development which was based on the following documentations.

- State Environmental Planning Policy (Transport & Infrastructure) 2021
- Department of Planning publication "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008
- State Environmental Planning Policy No 65 – Design Qualify of Residential Flat Development (Amendment No. 3)"
- SEPP 65 Apartment Design Guide 2015
- Australian Standard AS2107:2016 "Recommended Design Sound Levels and Reverberation Times for Building Interiors"

The Department of Planning provides a guideline for assessing noise and vibration impacts on developments in proximity of busy roads and rail corridors to the requirements of the State Environmental Planning Policy (Transport & Infrastructure) 2021 or SEPP (T&I).

The internal noise criteria for this development as per SEPP (T&I) 2021 and DoP Guideline are presented in Table 4-1 below.

Table 4-1: Recommended Maximum Internal Road Traffic and Rail Noise Levels

Type of Occupancy	Windows & Doors Condition	Maximum Design Noise Levels	
		Day, L _{Aeq} (15hour)	Night, L _{Aeq} (9hour)
Sleeping areas	Closed	-	35dB(A)
	Open	-	45dB(A)
All other habitable rooms	Closed	40dB(A)	40dB(A)
	Open	-	50dB(A)
Bathrooms and en-suites ¹	Closed	45dB(A)	45dB(A)
	Open	55db(A)	55db(A)
Lobbies and communal indoor spaces ¹	Closed	50dB(A)	50dB(A)
Small retail stores (general) ¹	Closed	50dB(A)	-
Supermarkets ¹	Closed	50dB(A)	-

Notes:

1. Design sound pressure levels for spaces not covered in the SEPP (T&I) or DoP Guideline are adopted from Australian Standard AS2107

Relevant sections of the State Environment Planning Policy, Australia Standard AS2107 are presented in APPENDIX A of this report. Results and location of the background and ambient noise monitoring conducted on site are presented in APPENDIX C.

5 Noise Intrusion Assessment

5.1 External Noise Sources

This section addresses external noise impacts on the proposed development being,

- Traffic noise from Pacific Highway on the east boundary of the subject site – dominate source of external noise impacting the development
- Distance rail noise from the Sydney Trains rail corridor approximately 100m east the development.

The target interior noise levels from ingress of the above external sources have been defined in Table 3-1 in accordance with the applicable noise guidelines.

To meet the internal noise levels outlined Table 3-1 in the recommendations for glazing and façade are provided in Section 5.2 and 5.5 below.

5.2 Predicted Traffic Noise Levels at Building Facades

The level of road traffic noise impacting on the each of the proposed building façades were predicted by modelling road noise sources, existing surrounding buildings, intervening structures and ground topography using the internationally recognised environmental noise prediction computer program CadnaA (version 2025 MR1). The program calculates the contribution of each noise source at each specified receptor point and allows for the prediction of the total noise from a site.

The external noise prediction models take into account:

- Location of noise sources and receiver locations;
- Height of sources and receivers;
- Separation distances between sources and receivers;
- Shielding from building and intervening structures;
- Land topography and ground absorption

The results of the long-term traffic noise survey conducted on the eastern site boundary (summarised in Table 3-1) were used to calibrate and fine tune the acoustic model of the existing level of traffic noise impacting on the site.

5.3 Building Ventilation

Predicted day and night traffic noise levels on the worst-affected facades of the proposed development is shown graphically in APPENDIX C. Based on these predicted levels an assessment of external noise intrusion to the “Windows Open” noise criteria (Table 4-1) have been conducted and apartments that can be naturally ventilated whilst satisfying the “Windows open” criteria has been identified and marked

(highlighted yellow) on the typical floor plans in APPENDIX E. Apartments that will require alternative methods of ventilation such that windows can remain closed to ensure internal noise levels can be satisfied are also indicated on the markup floorplan in APPENDIX E. Alternative ventilation can be in form of an air-conditioning system that incorporate ducted fresh air from outside, or glazing systems that has acoustically treated vents/outside air paths in the framing such as AWS Trickle vents

5.4 Glazing Recommendations

Table 5-1 below presents recommended glazing treatment for the building facades to achieve compliance with the maximum noise levels nominated in Table 3-1 above.

Table 5-1: Recommended Glazing Treatment

Levels	Facades	Occupancy Type	Recommended Minimum Sound Insulation Rating of Glazing Assembly	Typical Compliance Glazing Thickness, Type and Configuration	Laboratory Test Reference
Loading Dock Level	South	Commercial /Retail	Rw28	6mm monolithic glass or IGU consisting of 6mm glass / 12mm air gap / 4mm glass Or equivalent	ESTIMATE
Ground	East and south	Aldi Supermarket	Rw28	6mm monolithic glass or IGU consisting of 6mm glass / 12mm air gap / 4mm glass Or equivalent	ESTIMATE
Level 1	North and east	Café/Retail (2-storey high)	Rw32	6.38mm laminated glass or IGU consisting of 6mm glass / 12mm air gap / 6mm glass Or equivalent	ESTIMATE
	South	Study/Library	Rw32	6.38mm laminated glass or IGU consisting of 6mm glass / 12mm air gap / 6mm glass Or equivalent	ESTIMATE
	All	Gym / Fitness Zone	Rw32	6.38mm laminated glass or IGU consisting of 6mm glass / 12mm air gap / 6mm glass Or equivalent	ESTIMATE
		Lift lobby	Rw24	4mm monolithic glass or equivalent	ESTIMATE
Levels 2 to 28	Refer to APPENDIX D for details				

By way of explanation, the Sound Insulation Rating Rw is a measure of the noise reduction property of the partition, a higher rating implying a higher sound reduction performance.

Note that the Rw rating of systems measured as built on site (R'w Field Test) may be up to 5 points lower than the laboratory result.

Levels	Facades	Occupancy Type	Recommended Minimum Sound Insulation Rating of Glazing Assembly	Typical Compliance Glazing Thickness, Type and Configuration	Laboratory Test Reference
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LEGEND where no appropriate test certificate exists:

1. ESTIMATE: The client is advised not to commence detailing or otherwise commit to partition construction systems which have not been tested in an approved laboratory or for which an opinion only is available. Testing of partition construction systems is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved thereby necessitating the use of an alternative which may affect the cost and timing of the project. No responsibility is taken for use of or reliance upon untested partition construction systems, estimates or opinions. The advice provided here is in respect of acoustics only.
2. ESTIMATE – APPROVED FOR CONSTRUCTION: Use of the form of construction is approved prior to laboratory certification. To complete the quality control of the design process and confirm the acoustical performance of the construction, we recommend testing in a laboratory to confirm the R_w rating as soon as practicable. In the case of impact rating for floor systems, no particular impact rating is guaranteed to comply with either the Building Code of Australia or Strata Scheme Management Act and hence carpet runners may still be required.
3. ESTIMATE – TEST NOT REQUIRED: Use of the form of construction is approved without laboratory certification. The STC/R_w of the form of construction exceeds the project requirements.
4. The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

NOTES FOR GLAZING CONSTRUCTIONS:

5. The information in this table is provided for the purpose of Council approvals process and cost planning and shall not be used for construction unless otherwise approved in writing by the acoustic consultant.
6. The design in this table is preliminary and a comprehensive assessment shall be conducted prior to Construction Certification.
7. Before committing to any form of construction or committing to any builder, advice should be sought from an acoustic consultant to ensure that adequate provisions are made for any variations which may occur as a result of changes to the form of construction where only an "estimate" is available for the sound insulation properties of recommended materials.
8. The glazing supplier shall ensure that installation techniques will not diminish the R_w performance of the glazing when installed on site.
9. All openable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon, which enable the R_w rating performance of the glazing to not be reduced.
10. The above glazing thicknesses should be considered the minimum thicknesses to achieve acoustical ratings. Greater glazing thicknesses may be required for structural loading, wind loading etc.

GENERAL

11. The sealing of all gaps in partitions is critical in a sound rated construction. Use only sealer approved by the acoustic consultant.
12. Check design of all junction details with acoustic consultant prior to construction.
13. Check the necessity for HOLD POINTS with the acoustic consultant to ensure that all building details have been correctly interpreted and constructed.
14. The information provided in this table is subject to modification and review without notice.
15. The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

5.5 Facade & Roof Sound Insulation

In principle advice is provided below for the acoustic requirements of the roofs and external walls.

5.5.1 External Walls

All external walls shall have sound isolation ratings, R_w , of at least 15dB higher acoustic performance than that of the acoustic glazing specified in Table 5-1 above.

This will typically be achieved for external walls having masonry elements. Detailed acoustic design of light weight cladding systems to be conducted at CC stage.

5.5.2 Roof and Ceiling

Roof/ceiling construction shall have a sound isolation rating, R_w , at least 10dB higher than that of the acoustic glazing on its facade walls.

This will typically be achieved for roof systems consisting of concrete slab without need for further acoustic upgrade.

5.5.3 Glazing Assembly Requirements

The following acoustic measures should also be incorporated into the building design:

- s1. All operable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon, which enable the R_w rating performance of the glazing to not be reduced.
- s2. The glazing thicknesses outlined in Table 5-1 should be considered the minimum thicknesses to achieve acoustical ratings. Greater glazing thicknesses may be required for structural loading, wind loading etc.
- s3. The glazing supplier shall ensure that installation techniques will not diminish the R_w performance of the glazing when installed on site. Sliding door meeting stiles should form an airtight seal when closed and locked.
- s4. The perimeter of all window and door frames are to be sealed airtight in the external facade using the following methods:
 - For gaps less than 10mm - Fill all gaps around the window perimeter with an acoustic mastic sealer (minimum specific gravity 1.6sg) equivalent to Promat Promaseal. The depth of sealer shall be at least equal to the width of the gap.
 - If the gap is greater than 10mm, fill the cavity with polyester insulation and a backing rod. Seal the gap airtight an acoustic mastic sealer (min specific gravity 1.6sg) equivalent to Promat Promaseal. The depth of sealer shall be at least equal to the width of the gap. The gaps between frames shall also be sealed using aluminium angle brackets (approximately 25 x 25 x 3mm).

6 Noise Emission Assessment

This section examines noise emission from the development and their potential impacts on surrounding neighbours and noise-sensitive occupancies within the development.

6.1 Noise Emission Criteria

6.1.1 EPA Noise Policy for Industry (NPfI) – Plant and Equipment Noise

The NSW Environment Protection Authority (EPA) sets out noise criteria in its Noise Policy for Industry (NPfI) to control the noise emission from industrial sources.

The NPfI sets project noise trigger level to protect noise amenity for residential receivers. The project noise trigger level is set as the lower value of the following two assessment components:

- Controlling intrusive noise impacts in the short term for residences; and
- Maintaining noise level amenity for particular land uses for residences and other land uses.

Noise intrusiveness ensures that industrial noise does not exceed the background noise level by an excessive margin, preventing significant changes in the noise characteristic pertinent to the development site and surrounds. This is commonly referred to as the 'background plus 5' criterion. That is, the noise level from new industrial development, assessed in periods of 15 minutes, should not exceed the existing background noise level (measured in the absence of that development) by more than 5dB(A).

Noise amenity ensures that industrial noise levels do not increase without limit, for if a number of industrial noise sources are permitted to increase the background noise level by 5dB(A), in turn there would be a point where the ultimate noise level is unacceptable. A limit on the ultimate acceptable noise level is therefore included in the NPfI as a way of ensuring that cumulative noise impact from industrial growth is curtailed. This limit is referred to as the project amenity noise level. The appropriate limit in any circumstance relates to the land use category, for example, there are different limits for rural, suburban and urban areas.

The table below presents the recommended amenity noise level relevant to the receivers surrounding the proposed development site. The project amenity noise level is defined as the recommended amenity noise level minus 5dB(A).

Table 6-1: NPfI Amenity Noise Levels - Recommended L_{Aeq} Amenity Noise Levels from Industrial Noise Sources [EPA NPfI Table 2.1]

Receiver	Noise amenity area	Time of day	L_{Aeq} , dB(A)
			Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45

Receiver	Noise amenity area	Time of day	L _{Aeq} , dB(A)
			Recommended amenity noise level
	Suburban	Night	40
		Day	55
		Evening	45
	Urban	Night	40
		Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See Column 4	5dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom – internal	All	Noisiest 1-hour period when in use	35
Hospital ward	All		
Internal		Noisiest 1-hour	35
External		Noisiest 1-hour	50
Place of worship – internal	All	When in use	40
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50
Active recreation area (e.g. school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70

Notes:

- Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
- On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.
- The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

In accordance with Section 2.4 of the NPfI, the following **exceptions** to the above method to derive the project amenity noise level apply:

1. In areas with high traffic noise levels (see Section 2.4.1 of the NPfI).
2. In proposed developments in major industrial clusters (see Section 2.4.2 of the NPfI).
3. Where the resultant project amenity noise level is 10dB, or more, lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.
4. Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such

cases the relevant amenity noise level is assigned as the project amenity noise level for the development.

The following table below presents the site-specific noise production criteria from industrial noise sources, namely mechanical plant noise to neighbouring residential properties identified in Section 2.2.

Table 6-2: Project noise trigger levels for noise emission from mechanical plant to residential neighbours

Time of Day	Column 1 Rating Background Level (RBL) LA90	Column 2 Intrusive-ness Trigger Level, LAeq, 15minute (RBL+5)	Column 3 Recommended Amenity Noise Level (RANL), LAeq, period	Column 4 Project Amenity Noise Level (PANL), LAeq, period	Column 5 Measured LAeq, period existing noise levels	Column 6 Traffic noise exceed RANL by more than 10dB?	Column 7 Existing noise level likely to decrease in future?	Column 8 Exceptions to PANL LAeq, period?	Column 9 Project Noise Trigger Level, LAeq, 15minute
Day (7am to 6pm)	49	54	60	55	57	No	No	None	54
Evening (6pm to 10pm)	45	50	50	45	54	No	No	None	48
Night (10pm to 7am)	38	43	45	40	51	No	No	None	43

Explanatory notes:

Column 1 – RBL measured in accordance with the NPfl and presented in Table 3-2 above. Where the evening time criterion is greater than the daytime criterion, the evening time goal is amended to be the same as the daytime criteria.

Column 4 – Project Amenity Noise Level determined based on 'Residential - Urban' area in Table 2.2 (Amenity noise levels) of the EPA's NPfl minus 5dB

Column 5 – Measured in accordance with the NPfl

Column 8 – Determined in accordance with Section 2.4 of the NPfl.

Column 9 – Project Noise Trigger Level is the lower value of project intrusiveness noise level and project amenity noise level. In accordance with Section 2.2 of the NPfl, LAeq, 15minute is calculated as LAeq, period + 3dB(A)

Notes: Intrusiveness noise level for Evening must be set at no greater than the intrusiveness level for daytime in accordance with NPfl Section 2.3.

The following table below presents the site-specific noise production criteria from industrial noise sources, namely mechanical plant noise to neighbouring non-residential properties identified in Section 2.2.

Table 6-3: Project noise trigger level for noise emission from mechanical plant to non-residential neighbours

Assessment / Receiver location	Intrusiveness criteria, LAeq,15min			Amenity criteria, LAeq, period in dB(A)		
	Day	Evening	Night	Day	Evening	Night
Retail and commercial buildings	N/A	N/A	N/A	65 (when in use)		

Notes:

1. Typical noise reduction through an open window is 10dB

Where necessary, noise amelioration treatment to mechanical plant such as basement ventilation and air conditioning systems will be incorporated in the design to ensure that noise levels comply with the recommended NPfI noise emission criteria defined in Table 6-2 and Table 6-3 above.

6.1.2 Sleep Disturbance Noise Levels (10pm-7am)

The potential for sleep disturbance from maximum noise level events from premises during the night-time period (between 10pm and 7am next day) needs to be considered. In accordance with NPfI, a detailed maximum noise level event assessment should be undertaken where the subject development night-time noise levels at a residential location exceed:

- $L_{Aeq,15min}$ 40dB(A) or the prevailing RBL plus 5dB, whichever is the greater, and/or
- L_{AFmax} 52dB(A) or the prevailing RBL plus 15dB, whichever is the greater.

Where there are noise events found to exceed the initial screening level, further analysis is undertaken to identify:

- The likely number of events that might occur during the night assessment period,
- The extent to which the maximum noise level exceeds the rating background noise level.

The sleep disturbance noise levels for the project are presented below.

Table 6-4: Sleep Disturbance Assessment Levels

Receiver Type	Assessment Level $L_{Aeq,15min}$ in dB(A)	Assessment Level L_{AFmax} in dB(A)
Residential receivers	$38 + 5 = 43$	$38 + 15 = 53$

Notes:

1. Based on representative background noise levels presented in Table 3-2

6.2 Assessment of Noise Emissions

6.2.1 Mechanical Plant Noise

Mechanical plant such as carpark exhaust systems and air-conditioning associated with the development has the potential to impact on nearby residential and commercial properties. As details of mechanical plant and equipment such as location, quantity, make & model are not available at this stage of the development the following in principle noise control advice is provided.

- Acoustic assessment of mechanical services will be required to be undertaken during the detail design phase of the development to ensure that they shall not either singularly or in total emit noise levels which exceed the noise limits in established Table 6-2 and Table 6-3 above.

- Mechanical plant noise emission can be controllable by appropriate mechanical system design and implementation of common engineering methods that may include any of the following;
 - procurement of 'quiet' plant
 - strategic positioning plant equipment away from sensitive neighbouring premises, maximising the intervening shielding between the plant and sensitive neighbouring premises
 - installation of commercially available silencers or acoustic attenuators for air discharge and air intakes of plant
 - acoustically lined and lagged ductwork
 - provide acoustic screens and/or acoustic louvres between plant and sensitive neighbouring premises
 - provide partially enclosed or fully enclosed acoustic enclosure over plant
 - Mechanical plant shall have their noise specifications and proposed locations checked prior to installation
 - Fans shall be mounted on vibration isolators and balanced in accordance with Australian Standard 2625 "Rotating and Reciprocating Machinery - Mechanical Vibration"

6.2.1.1 Compliance Certification

- s1. The levels shall be measured using a sound level meter complying with AS 1259, Part 2 – Sound Level Meters, Type 1 – Precision.
- s2. Internal noise compliance tests shall be conducted over a 1-minute period with all plant operating at normal rated speed. The ambient noise level shall also be obtained with all plant turned off. The measurements shall be carried out when ambient noise levels are sufficiently low to obtain a valid measurement and corrected for the ambient noise level. The noise level contribution from all plant when operating in isolation or in combination with any other plant shall not exceed the criteria in Section 4.
- s3. An allowance of 3 dB(A) (subtracted from the noise level contribution determined in accordance with the preceding clause) may be applied when measurements are made in rooms which are uncarpeted for the time being. However, this does not preclude the Sub-Contractor from complying with the requirements of Section 4 when the rooms are finally carpeted.
- s4. Where both mechanical and hydraulic plant noise are audible, the total noise level from all plant operating shall include noise contribution from all mechanical and all hydraulic plant running contemporaneously at normal rated speed.

- s5. Noise levels shall be conducted in typical spaces on every level within the building as directed by the Principal's acoustic consultant.
- s6. External noise compliance measurements shall be conducted over a 15-minute period with all plant operating at normal rated speed. The ambient noise level with all plant turned off shall be measured immediately after. Measurements shall only be conducted when ambient noise levels are sufficiently low to obtain a valid measurement and shall be corrected for the ambient noise level. The noise contribution from all measured mechanical services plant when operating in isolation or in combination with any other plant shall not exceed the criteria in Section 6.1.
- s7. The external noise emission criteria specified in Section 6.1 are applicable at any boundary or other noise sensitive location as determined by the Principal's acoustic consultant.
- s8. Where the ambient external noise level prevents noise levels being measured at the boundary of nearby affected premises, extrapolation of measurements closer to the noise source is permitted.
- s9. The Principal reserves the right to test plant noise emission and noise intrusion in order to determine their conformance with each of the criteria nominated in this specification.
- s10. A Noise Compliance Report detailing the results of mechanical plant noise levels measured in accordance with this specification shall be presented to the Principal.

6.2.2 Operational Noise

The usage of the communal amenities such gym and outdoor communal and has potential to impact residences within the development, the following mitigation measures are recommended.

6.2.2.1 Level 1 Communal Gym

Structure-borne noise associated with impacts such as dropping weights, movement of equipment and music/TV sounds from the gym has the potential to cause disturbances to apartments directly above the gym. To mitigate the transfer of structure-borne and airborne noise to adjoining spaces, the following in-principle acoustic treatment are recommended.

- s1. Provide a plasterboard ceiling inside the gym consisting of 1 layer of 13mm standard/moisture resistant plasterboard suspended a minimum 100mm off slab soffit with minimum 75mm insulation in cavity.
- s2. Floor covering throughout the gym shall be a minimum 25mm thick acoustic rubber tiles or matts
- s3. Where free-weights are provided - install minimum 50mm thick acoustic rubber tiles equivalent to Regupol Sonusfit M513 over concrete slab in the designated free weight area.

- s4. Install coil springs beneath the weight stacks in the pin-weight machines to prevent the sudden impact of weights falling on the supporting steel frame.
- s5. Glazed façade and windows of the gym shall have a minimum sound reduction of $Rw32$ typically achieved with 6.38mm laminated glass.

6.2.2.2 Level 24 & 26 Communal Spaces

The indoor and outdoor communal spaces on Levels 24 and 26 are located directly apartments and associated footfall noise has potential to cause disturbances to the occupants below. To alleviate the risk of noise impacts, the following in-principle acoustic treatment are recommended,

- s1. Tiles or pavers in the outdoor communal areas shall be treated with an acoustic underlay equivalent to 5mm Uniroll RF700. For pavers, custom-cut strips of acoustic underlay to be fitted underneath the paver pedestals.
- s2. Apartment ceiling below shall have a minimum void of 80mm with 50mm insulation (14kg/m^3) in ceiling cavity.
- s3. For the indoor communal space on Level 26 with except of the toilet – a carpet floor finish is recommended for control of footfall noise to unit below.

7 Internal Sound Insulation

Internal walls, floors and risers of the sole occupancy units shall comply with the National Construction Code of Australia 2022 (formally Building Code of Australia). All services and doors shall comply with the requirements of the NCC 2022.

APPENDIX B presents a summary of acoustic provisions outlined in Part F7 of the NCC 2022.

Detailed acoustic design of internal walls, floor/ceiling system, riser walls, treatment of pipework is to be undertaken after development approval ie. at Construction Certificate stage. Acoustic design of internal walls, floors, risers and services treatments is a routine part of acoustic design and is typically undertaken at CC stage.

8 Construction Noise and Vibration Assessment

8.1 Construction noise objectives

8.1.1 Noise management levels (NMLs)

The NSW *Interim Construction Noise Guideline* (ICNG, 2009) provides guidelines for assessing noise generated during the construction phase of developments.

The key components of the guideline that are incorporated into this assessment include:

- Use of L_{Aeq} as the descriptor for measuring and assessing construction noise.
- Application of reasonable and feasible noise mitigation measures.
- As stated in the ICNG, a noise mitigation measure is feasible if it is capable of being put into practice and is practical to build given the project constraints.
- Selecting reasonable mitigation measures from those that are feasible involves making a judgement to determine whether the overall noise benefit outweighs the overall social, economic and environmental effects.

The ICNG provides two methods described for the assessment of construction noise, being either a quantitative or a qualitative assessment. A quantitative assessment is recommended for major construction projects of significant duration and involves the measurement and prediction of noise levels and assessment against set criteria. A qualitative assessment is recommended for small projects with duration of less than three weeks and focuses on minimising noise disturbance through the implementation of reasonable and feasible work practices, and community notification. Given the scale and duration of the construction works proposed, a quantitative assessment is carried out herein, consistent with the ICNG requirements.

Table 8-1 reproduces from the ICNG, sets out the airborne noise management levels and how they are to be applied for residential receivers.

Table 8-1: Noise management levels at residential receivers

Time of day	Management level L_{Aeq} (15 min) *	How to apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured L_{Aeq} (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

Time of day	Management level L _{Aeq} (15 min) *	How to apply
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. - Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: - times identified by the community when they are less sensitive to noise (such as before/ after school for works near schools, or mid-morning or mid-afternoon for works near residences) - if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	- A strong justification would typically be required for works outside the recommended standard hours. - The proponent should apply all feasible and reasonable work practices to meet the noise affected level. - Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community. - For guidance on negotiating agreements see ICNG section 7.2.2.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 metres above ground level. If the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence. Noise levels may be higher at upper floors of the noise affected residence.

The table below sets out the ICNG noise management levels for other noise sensitive receiver locations.

Table 8-2: Noise management levels at other noise sensitive land uses

Land use	Time of day	Where objective applies	Management level L _{Aeq} (15 min)
Classrooms at schools and other educational institutions	When in use	Internal noise level	45 dB(A) internally Or 55 dB(A) externally
Hospital wards and operating theatres	When in use	Internal noise level	45 dB(A)
Places of worship	When in use	Internal noise level	45 dB(A) internally or 55 dB(A) externally
Active recreation areas	When in use	Outdoor noise level	65 dB(A)
Passive recreation areas	When in use	Outdoor noise level	60 dB(A)
Commercial premises	When in use	Outdoor noise level	70 dB(A)
Industrial premises	When in use	Outdoor noise level	75 dB(A)

Notes: 1. Outdoor noise level based on internal noise level in ICNG and assumes 10 dB loss through an open window

8.1.2 Summary of construction noise management levels

A summary of construction noise management levels is presented below.

Table 8-3: Construction noise management levels (NML)

Receiver ID	Location description	Noise management level $L_{Aeq}(15min)^{1, 2}$
		Monday to Fridays (7:00am to 6:00pm) Saturdays (8:00am to 1:00pm)
R1	12 Dumaresq Street, Gordon	$49^3 + 10 = 59$
R2	15 & 17 Dumaresq Street, Gordon	
R3	8-18 McIntyre Street, Gordon	
C1	Gordon Shopping Centre at 802-808 Pacific Highway, Gordon	70
C2	Retail shops at 781 to 793 Pacific Highway, Gordon	70
C3	Gordon Police Station at 2 Park Avenue and Gordon Library at 799 Pacific Highway, Gordon	70
C4	Ku-ring-gai Council Administration building at 818 Pacific Highway, Gordon	70

- Notes:
- Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise affected residence.
 - Noise management levels apply when receiver areas are in use only.
 - Based on day background noise level at Location L2 (Table 3-2)

8.2 Proposed construction noise sources

The schedule of items of plant and equipment likely to be used during the construction phases of the development is presented in the table below.

Table 8-4: Typical construction equipment & sound power levels, dB(A) re 1pW

Plant item	Plant description	Sound power levels
Demolition		
1.	Truck - Dump	109
2.	20 tonne Excavator with Bucket	106
3.	Bobcat	102
Excavation		
4.	30 tonne excavators with bucket	107
5.	Truck - Dump	109
6.	Delivery trucks	108
7.	50 tonne mobile telescopic crane	95
Civil		
8.	45 tonne bored piling rigs	111
9.	30 tonne excavators with bucket	106
10.	Concrete trucks	109
11.	Delivery trucks	108
12.	50 tonne mobile telescopic crane	95

Plant item	Plant description	Sound power levels
Substructure and building works		
13.	Concrete trucks	108
14.	Delivery trucks	108
15.	Hand tools	108
16.	Mobile/Tower crane	105
17.	Concrete pump	103
18.	Bobcat	102
19.	Concrete vibrator	99

The sound power levels for the majority of construction plant and equipment presented in the above table are based on maximum noise levels given in Table A1 of Australian Standard 2436 - 2010 'Guide to Noise Control on Construction, Demolition and Maintenance Sites', the Interim Construction Noise Guideline (ICNG), information from past projects and/or information held in our library files.

8.3 Construction noise assessment

Noise levels at any receiver locations resulting from construction works would depend on the location of the receiver with respect to the area of construction, shielding from intervening topography and structures, and the type and duration of construction being undertaken. Furthermore, noise levels at receivers would vary significantly over the total construction program due to the transient nature and large range of plant and equipment that could be used.

Table 8-5 presents noise levels likely to be experienced at the nearby affected receivers based on the construction activities, and plant and equipment associated with the proposed site compound at a range from the furthest to the closest proximity to each receiver location. Noise levels were calculated taking into consideration attenuation due to distance between the construction works and the receiver locations and any intervening structures.

Table 8-5: Predicted $L_{Aeq(15min)}$ noise levels for typical construction plant, dB(A)

Plant description	Predicted $L_{Aeq(15min)}$ construction noise levels						
	Receiver R1	Receiver R2	Receiver R3	Receiver C1	Receiver C2	Receiver C3	Receiver C4
<i>Noise Management Levels</i>	59	59	59	70	70	70	70
Demolition							
Truck - Dump	46-61	47-54	38-49	63-71	58-67	51-57	67-77
20 tonne Excavator with Bucket	43-58	44-51	35-46	60-68	55-64	48-54	64-74
Bobcat	39-54	40-47	31-42	56-64	51-60	44-50	60-70
Excavation							
30 tonne excavators with bucket	44-59	45-53	38-48	60-69	55-65	49-55	65-75
Truck - Dump	46-61	47-55	40-50	62-71	57-67	51-57	67-77

Plant description	Predicted $L_{eq}(15min)$ construction noise levels						
	Receiver R1	Receiver R2	Receiver R3	Receiver C1	Receiver C2	Receiver C3	Receiver C4
Delivery trucks	45-60	46-54	39-49	61-70	56-66	50-56	66-76
Civil							
45 tonne bored piling rigs	48-63	49-57	46-57	64-74	58-69	53-59	69-77
Concrete trucks	45-60	46-54	43-54	61-71	55-66	50-56	66-74
Delivery trucks	45-60	46-54	43-54	61-71	55-66	50-56	66-74
Substructure and building works							
Concrete trucks	45-60	46-54	43-54	61-71	55-66	50-56	66-74
Delivery trucks	45-60	46-54	43-54	61-71	55-66	50-56	66-74
Hand tools	45-60	46-54	43-54	61-71	55-66	50-56	66-74

Notes:

1. Three loudest equipment from each stage is used in the noise prediction

Based on results of the assessment in Table 8-5 above the management noise levels at the residential receivers R1, R2 & R3 are generally compliance at all stages of the construction due to greater distance from site and noise shielding effect of the solid hoarding around perimeter of the site. The predicted levels also indicate management noise levels at all commercial receivers except for C4 are generally compliance at all stages of construction. Construction noise levels are predicted to exceed the management levels at receiver C4 during demolition, excavation, civil and construction works are conducted in close proximity to the receiver.

Furthermore, construction noise levels are predicted to be greater than the highly noise affected level of 75dB(A) when the three noisiest plant and equipment items are used concurrently in close proximity to the following receiver locations.

Table 8-6: Receivers predicted to be highly noise affected

Site Activity	Receiver locations exceeding highly affected noise level of 75dB(A)
Demolition	C4
Excavation	C4
Civil	C4
Substructure and building works	None

In light of the predicted noise levels above, it is recommended that a feasible and reasonable approach towards noise management measures be applied to reduce noise levels as much as possible to manage the impact from construction noise.

Further details on construction noise mitigation and management measures are provided in Section 8.4 below.

8.4 Construction noise mitigation and management measures

The following recommendations provide in-principle feasible and reasonable noise control solutions to reduce noise impacts to sensitive receivers. Where actual construction activities differ from those assessed in this report, more detailed design of noise control measures may be required once specific items of plant and construction methods have been chosen and assessed on site.

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

8.4.1 General engineering noise controls

Implementation of noise control measures, such as those suggested in Australian Standard 2436-2010 "Guide to Noise Control on Construction, Demolition and Maintenance Sites", are expected to reduce predicted construction noise levels. Reference to Australian Standard 2436-2010, Appendix C, Table C1 suggests possible remedies and alternatives to reduce noise emission levels from typical construction equipment. Table C2 in Appendix C presents typical examples of noise reductions achievable after treatment of various noise sources. Table C3 in Appendix C presents the relative effectiveness of various forms of noise control treatment.

Table 8-7 below presents noise control methods, practical examples and expected noise reductions according to AS2436 and according to Renzo Tonin & Associates' opinion based on experience with past projects.

Table 8-7: Relative effectiveness of various forms of noise control, dB(A)

Noise control method	Practical examples	Typical noise reduction possible in practice		Maximum noise reduction possible in practice	
		AS 2436	Renzo Tonin & Associates	AS 2436	Renzo Tonin & Associates
Distance	Doubling of distance between source and receiver	6	6	6	6
Screening	Acoustic barriers such as earth mounds, temporary or permanent noise barriers	5 to 10	5 to 10	15	15
Acoustic Enclosures	Engine casing lagged with acoustic insulation and plywood	15 to 25	10 to 20	50	30
Engine Silencing	Residential class mufflers	5 to 10	5 to 10	20	20
Substitution by alternative process	Use electric motors in preference to diesel or petrol	-	15 to 25	-	40

The Renzo Tonin & Associates' listed noise reductions are conservatively low and should be referred to in preference to those of AS2436.

Table 8-8 below identifies possible noise control measures, which are applicable for the construction plant likely to be used on site.

Table 8-8: Noise control measures for likely construction plant

Plant description	Screening	Acoustic enclosures	Silencing	Alternative process
Truck - dump	✓	✗	✓	✗
Excavator with bucket	✓	✗	✓	✗
Bobcat	✓	✗	✓	✗
Piling drilling rig	✓	✗	✓	✗
Machine mounted hydraulic drill	✓	✗	✓	✗
Concrete trucks	✓	✗	✓	✗
Delivery trucks	✓	✗	✓	✗
Mobile crane	✓	✗	✓	✗
Concrete pump	✓	✗	✓	✗
Concrete vibrator	✓	✗	✓	✗
Hand tools	✓	✗	✓	✗

8.4.2 Physical noise controls

Physical noise control measures are recommended for implementation at the worst affected neighbouring receiver locations. The following in-principal noise mitigation measure is provided to reduce noise impacts to the neighbouring receivers.

- Erect solid hoarding/ noise screens around the perimeter of the construction site to break the line of site between the high noise generating activities and the windows of the receiver locations.

8.4.3 Regular periodic noise monitoring

The following approach would be adopted with regard to noise monitoring procedures during the construction works.

- Where potential noise impacts are predicted to be within 10 to 15dB(A) of the noise management level, the potential construction noise nuisance is considered to be moderate. Noise monitoring should be carried out to confirm predicted noise impacts within two weeks of commencement of construction. Reasonable and feasible noise reduction measures would be investigated, where necessary.
- Where potential noise impacts are predicted to be more than 15dB(A) above the noise management levels, the potential construction noise nuisance is considered to be high. All reasonable and feasible noise control measures should be implemented prior to the commencement of construction works. Noise compliance monitoring for all major equipment and activities on the site should be undertaken prior to their commencement of work on site. Finally, noise levels during construction should be monitored and where exceeded, further noise reduction measures (where reasonable and feasible) should be implemented eg. restrict working hours, use silencing equipment, etc.

8.4.4 General noise management measures

In addition to physical noise controls, the following general noise management measures should be followed:

- Use less noisy plant and equipment, where feasible and reasonable.
- Plant and equipment should be properly maintained.
- Provide special attention to the use and maintenance of 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended.
- Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel.
- Avoid any unnecessary noise when carrying out manual operations and when operating plant.
- Any equipment not in use for extended periods during construction work should be switched off.
- In addition to the noise mitigation measures outlined above, a management procedure would need to be put in place to deal with noise complaints that may arise from construction activities. Each complaint would need to be investigated and appropriate noise amelioration measures put in place to mitigate future occurrences, where the noise in question is in excess of allowable limits. See Appendix D for an example of a complaint handling procedure and form.
- Good relations with people living and working in the vicinity of a construction site should be established at the beginning of a project and be maintained throughout the project, as this is of paramount importance. Keeping people informed of progress and taking complaints seriously and dealing with them expeditiously is critical. The person selected to liaise with the community should be adequately trained and experienced in such matters.

Where noise level exceedances cannot be avoided, then consideration may be given to implementing time restrictions and/or providing periods of repose for residents, where feasible and reasonable. That is, daily periods of respite from noisy activities may also be scheduled for building occupants during business hours.

Some items of plant may exceed noise limits even after noise treatment is applied. To reduce the overall noise impact, the use of noisy plant may be restricted to within certain time periods, where feasible and reasonable and to be negotiated with Council and the residents. For example, between 10am and 3pm (with one-hour break for lunch between 12pm and 1pm), noisy activities could occur with no noise level restrictions over a limited time period. Residents would be notified of the potential noise impact during this time period so that they can organise their day around the noisy period. Allowing the construction activities to proceed, despite the noise exceedance may be the preferred method in order to complete the works expeditiously.

8.5 Vibration management plan

8.5.1 Vibration criteria

Construction vibration is associated with three main types of impact:

- disturbance to building occupants
- potential damage to buildings, and
- potential damage to sensitive equipment in a building.

Generally, if disturbance to building occupants is controlled, there is limited potential for structural damage to buildings.

Vibration amplitude may be measured as displacement, velocity, or acceleration.

- Displacement (x) measurement is the distance or amplitude displaced from a resting position. The International System of Units (SI unit) for distance is the metre (m), although common industrial standards include mm.
- Velocity ($v=\Delta x/\Delta t$) is the rate of change of displacement with respect to change in time. The SI unit for velocity is metres per second (m/s), although common industrial standards include mm/s. The Peak Particle Velocity (PPV) is the greatest instantaneous particle velocity during a given time interval. If measurements are made in 3-axis (x, y, and z) then the resultant PPV is the vector sum (i.e. the square root of the summed squares of the maximum velocities) regardless of when in the time history those occur.
- Acceleration ($a=\Delta v/\Delta t$) is the rate of change of velocity with respect to change in time. The SI unit for acceleration is metres per second squared (m/s^2). Construction vibration goals are summarised below.

Construction vibration goals are summarised below.

8.5.2 Disturbance to buildings occupants

Assessment of potential disturbance from vibration on human occupants of buildings is made in accordance with the DECC 'Assessing Vibration; a technical guideline' (DECC, 2006). The guideline provides criteria which are based on the British Standard BS 6472-1992 'Evaluation of human exposure to vibration in buildings (1-80Hz)'. Sources of vibration are defined as either 'Continuous', 'Impulsive' or 'Intermittent'. Table 8-9 provides definitions and examples of each type of vibration.

Table 8-9: Types of vibration

Type of vibration	Definition	Examples
Continuous vibration	Continues uninterrupted for a defined period (usually throughout the day-time and/or night-time)	Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).

Type of vibration	Definition	Examples
Impulsive vibration	A rapid build-up to a peak followed by a damped decay that may or may not involve several cycles of vibration (depending on frequency and damping). It can also consist of a sudden application of several cycles at approximately the same amplitude, providing that the duration is short, typically less than 2 seconds	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading.
Intermittent vibration	Can be defined as interrupted periods of continuous or repeated periods of impulsive vibration that varies significantly in magnitude	Trains, nearby intermittent construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer, this would be assessed against impulsive vibration criteria.

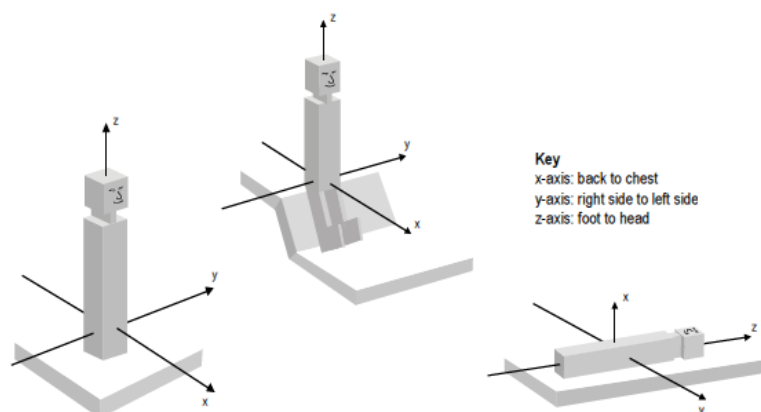
Source: Assessing Vibration; a technical guideline, Department of Environment & Climate Change, 2006

The vibration criteria are defined as a single weighted root mean square (rms) acceleration source level in each orthogonal axis. Section 2.3 of the guideline states:

'Evidence from research suggests that there are summation effects for vibrations at different frequencies. Therefore, for evaluation of vibration in relation to annoyance and comfort, overall weighted rms acceleration values of the vibration in each orthogonal axis are preferred (BS 6472).'

When applying the criteria, it is important to note that the three directional axes are referenced to the human body, i.e. x-axis (back to chest), y-axis (right side to left side) or z-axis (foot to head). Vibration may enter the body along different orthogonal axes and affect it in different ways. Therefore, application of the criteria requires consideration of the position of the people being assessed, as illustrated in Figure 8-1. For example, vibration measured in the horizontal plane is compared with x- and y-axis criteria if the concern is for people in an upright position, or with the y- and z- axis criteria if the concern is for people in the lateral position.

Figure 8-1: Orthogonal axes for human exposure to vibration



The preferred and maximum values for continuous and impulsive vibration are defined in Table 2.2 of the guideline and are reproduced in Table 8-10.

Table 8-10: Preferred and maximum levels for human comfort

Location	Assessment period ^[1]	Preferred values		Maximum values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Continuous vibration (weighted RMS acceleration, m/s ² , 1-80Hz)					
Critical areas ²	Day- or night-time	0.005	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day- or night-time	0.020	0.014	0.040	0.028
Workshops	Day- or night-time	0.04	0.029	0.080	0.058
Impulsive vibration (weighted RMS acceleration, m/s ² , 1-80Hz)					
Critical areas ²	Day- or night-time	0.005	0.0036	0.010	0.0072
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day- or night-time	0.64	0.46	1.28	0.92
Workshops	Day- or night-time	0.64	0.46	1.28	0.92

Notes: 1. Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am
 2. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specify above. Stipulation of such criteria is outside the scope of their policy and other guidance documents (e.g. relevant standards) should be referred to. Source: BS 6472-1992

The acceptable vibration dose values (VDV) for intermittent vibration are defined in Table 2.4 of the guideline and are reproduced in Table 8-11.

Table 8-11: Acceptable vibration dose values for intermittent vibration (m/s^{1.75})

Location	Daytime ¹		Night-time ¹	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas ²	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes: 3. Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am
 4. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas.
 Source: BS 6472-1992

8.5.3 Building damage

Potential structural damage of buildings as a result of vibration is typically managed by ensuring vibration induced into the structure does not exceed certain limits and standards, such as British Standard 7385 Part 2 and German Standard DIN4150-3. Currently there is no existing Australian Standard for assessment of structural building damage caused by vibration energy.

Within British Standard 7385 Part 1: 1990, different levels of structural damage are defined:

- *Cosmetic - The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition the formation of hairline cracks in mortar joints of brick/concrete block construction.*
- *Minor - The formation of large cracks or loosening of plaster or drywall surfaces, or cracks through bricks/concrete blocks.*
- *Major - Damage to structural elements of the building, cracks in supporting columns, loosening of joints, splaying of masonry cracks, etc.*

The vibration limits in Table 1 of British Standard 7385 Part 2 (1993) are for the protection against cosmetic damage, however guidance on limits for minor and major damage is provided in Section 7.4.2 of the Standard:

"7.4.2 Guide values for transient vibration relating to cosmetic damage

Limits for transient vibration, above which cosmetic damage could occur are given numerically in Table 1 and graphically in Figure 1. In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for the building types corresponding to line 2 are reduced. Below a frequency of 4 Hz, where a high displacement is associated with a relatively low peak component particle velocity value a maximum displacement of 0.6 mm (zero to peak) should be used.

Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 1, and major damage to a building structure may occur at values greater than four times the tabulated values."

Within DIN4150-3, damage is defined as *"any permanent effect of vibration that reduces the serviceability of a structure or one of its components"* (p.2). The Standard also outlines:

"that for structures as in lines 2 and 3 of Table 1, the serviceability is considered to have been reduced if

- cracks form in plastered surfaces of walls;*
- existing cracks in the building are enlarged;*
- partitions become detached from loadbearing walls or floors.*

These effects are deemed 'minor damage. " (DIN4150.3, 1990, p.3)

While the DIN Standard defines the above damage as 'minor', based on the definitions provided in BS7385, the DIN standard is considered to deal with cosmetic issues rather than major structural failures.

British Standard

British Standard 7385: Part 2 '*Evaluation and measurement of vibration in buildings*', can be used as a guide to assess the likelihood of building damage from ground vibration. BS7385 suggests levels at which 'cosmetic', 'minor' and 'major' categories of damage might occur.

The cosmetic damage levels set by BS 7385 are considered 'safe limits' up to which no damage due to vibration effects has been observed for certain particular building types. Damage comprises minor non-structural effects such as hairline cracks on drywall surfaces, hairline cracks in mortar joints and cement render, enlargement of existing cracks and separation of partitions or intermediate walls from load bearing walls. 'Minor' damage is considered possible at vibration magnitudes which are twice those given and 'major' damage to a building structure may occur at levels greater than four times those values.

BS7385 is based on peak particle velocity and specifies damage criteria for frequencies within the range 4Hz to 250Hz, being the range usually encountered in buildings. At frequencies below 4Hz, a maximum displacement value is recommended. The values set in the Standard relate to transient vibrations and to low-rise buildings. Continuous vibration can give rise to dynamic magnifications due to resonances and may need to be reduced by up to 50%. Table 8-12 sets out the BS7385 criteria for cosmetic, minor and major damage.

Table 8-12: BS 7385 structural damage criteria

Group	Type of structure	Damage level	Peak component particle velocity ¹ , mm/s		
			4Hz to 15Hz	15Hz to 40Hz	40Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	Cosmetic		50	
		Minor ²		100	
		Major ²		200	
2	Un-reinforced or light framed structures Residential or light commercial type buildings	Cosmetic	15 to 20	20 to 50	50
		Minor ²	30 to 40	40 to 100	100
		Major ²	60 to 80	80 to 200	200

Notes: 1. Peak Component Particle Velocity is the maximum Peak particle velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer.

2. Minor and major damage criteria established based on British Standard 7385 Part 2 (1993) Section 7.4.2

German Standard

German Standard DIN 4150 - Part 3 '*Structural vibration in buildings - Effects on Structure*' (DIN 4150-3), also provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are generally recognised to be conservative.

DIN 4150-3 presents the recommended maximum limits over a range of frequencies (Hz), measured in any direction, and at the foundation or in the plane of the uppermost floor of a building or structure.

The vibration limits increase as the frequency content of the vibration increases. The criteria are presented in Table 8-13.

Table 8-13: DIN 4150-3 structural damage criteria

Group	Type of structure	Vibration velocity, mm/s			
		At foundation at frequency of			Plane of floor uppermost storey
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 or 2 and have intrinsic value (eg buildings under a preservation order)	3	3 to 8	8 to 10	8

8.5.4 Potential vibration impacts to residential and commercial uses

Based on the proposed plant items presented in Section 8.2, vibration generated by construction plant was estimated and potential vibration impacts are summarised in Table 8-14 below. The assessment is relevant to the identified buildings and other similar type structures in the project area.

Table 8-14: Potential vibration for residential and non-residential properties

Receiver Location	Approx. distance to nearest buildings from works	Type of nearest sensitive buildings	Assessment on potential vibration impacts		
			Structural damage risk	Human disturbance - risk of adverse comment	Vibration monitoring
C1	22m	Commercial/retail	Low risk of structural damage from construction works	Low risk of adverse comment as a result of construction works	Vibration monitoring not required
C2	25m	Commercial/retail	Low risk of structural damage from construction works	Low risk of adverse comment as a result of construction works	Vibration monitoring not required
C3	50m	Commercial	Very low risk of structural damage from construction works	Low risk of adverse comment as a result of construction works	Vibration monitoring not required
C4	3.5m	Commercial	Low to medium risk of structural damage from construction works	Medium to high risk of adverse comment as a result of construction works	Vibration monitoring recommended at commencement of work
R1	46m	Residential	Very Low risk of structural damage from construction works	Low risk of adverse comment as a result of construction works	Vibration monitoring not required

Receiver Location	Approx. distance to nearest buildings from works	Type of nearest sensitive buildings	Assessment on potential vibration impacts		
			Structural damage risk	Human disturbance - risk of adverse comment	Vibration monitoring
R2	63m	Residential	Very Low risk of structural damage from construction works	Low risk of adverse comment as a result of construction works	Vibration monitoring not required
R3	90m	Residential	Very Low risk of structural damage from construction works	Low risk of adverse comment as a result of construction works	Vibration monitoring not required

Based on the above assessment neighbouring receivers surrounding the site are unlikely to be impacted by vibration generated from activities during demolition, excavation, and constructions works.

8.5.5 Vibration management measures

The following vibration management measures are provided to minimise vibration impact from construction activities to the nearest affected receivers and to meet the relevant human comfort and building damage vibration limits:

1. A management procedure should be implemented to deal with vibration complaints. Each complaint should be investigated and where vibration levels are established as exceeding the set limits, appropriate amelioration measures should be put in place to mitigate future occurrences.
2. Where vibration is found to be excessive, management measures should be implemented to ensure vibration compliance is achieved. Management measures may include modification of construction methods such as using smaller equipment, establishment of safe buffer zones as mentioned above, and if necessary, time restrictions for the most excessive vibration activities. Time restrictions are to be negotiated with affected receivers.
3. Where construction activity occurs in close proximity to sensitive receivers, vibration testing of actual equipment on site would be carried out prior to their commencement of site operation to determine acceptable buffer distances to the nearest affected receiver locations.
4. Dilapidation surveys should be conducted at all residential and other sensitive receivers within 50 metres of the construction site. Notification by letterbox drop would be carried out for all occupied buildings within 100m of the construction site. These measures are to address potential community concerns that perceived vibration may cause damage to property.

8.6 Complaints management

Noise and vibration levels generated by construction activities associated with the construction of the development must aim to comply with the noise and vibration goals set by the relevant regulations and guidelines.

The contractor is responsible for implementing this Demolition and Excavation Noise and Vibration Management Plan (DENVMP) and ensuring that all reasonable measures are implemented such as the provision of a Noise and Vibration Complaints Program (which forms part of the DENVMP), to minimise the generation of excessive noise and/or vibration levels from the site to nearby sensitive areas. This should be continued as part of the building construction and building fit-out stages.

Owners and occupants of nearby affected properties are to be informed by direct mail of a direct telephone line and contact person where any noise and/or vibration complaints related to the operation of the construction activities are to be reported.

9 Conclusion

Renzo Tonin & Associates have completed an assessment of the potential noise impacts to and from the proposed mixed-use development of the 810 Pacific Highway, Gordon.

The study of external noise intrusion into the subject development has found that appropriate controls can be incorporated into the building design to achieve a satisfactory accommodation environment consistent with the intended quality of the building and relevant standards. Recommendations on control of road and rail traffic noise intrusion to comply with the noise criteria stipulated in State Environmental Planning Policy (Transport & Infrastructure) 2021 and DoP "Development near Rail Corridors & Busy Roads – Interim Guideline" 2008 are presented in Section 5.

The report has quantified operational noise emission from the proposed development and has assessed noise at the nearest sensitive receivers. Based on the assumptions and inputs within this report, it has been established that operation of the site is capable of complying with relevant NSW EPA noise emission requirements. Recommendations with respect to operational noise control are presented in Section 6.2.

In addition, an assessment of construction noise and vibration impacts to the surrounding noise sensitive neighbours have been undertaken in accordance with EPA Interim Construction Noise Guideline (ICNG) 2009. Construction noise mitigations measures have been provided in Section 8 of the report.

APPENDIX A Criteria and design methodology

A.1 State Environmental Planning Policy (Transport & Infrastructure) 2021

The NSW State Environmental Planning Policy (Transport and Infrastructure) 2021 commenced on 1 March 2022 and consolidated a number of former state environmental planning policies. The former State Environmental Planning Policy (Infrastructure) 2007 (known as 'ISEPP') has been integrated into "Chapter 2 Infrastructure" of the Transport and Infrastructure SEPP.

Chapter 2 of the Transport and Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across NSW. The aim of the Chapter includes identifying the environmental assessment category into which different types of infrastructure and services development fall and identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure.

Pertinent to noise assessment, the Transport and Infrastructure SEPP includes the following sections:

2.100 *Impact of rail noise or vibration on non-rail development*

1. *This section applies to development for any of the following purposes that is on land in or adjacent to a rail corridor and that the consent authority considers is likely to be adversely affected by rail noise or vibration-*
 - a. *a building for residential use,*
 - b. *a place of public worship,*
 - c. *a hospital,*
 - d. *an educational establishment or centre-based child care facility.*
2. *Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this clause and published in the Gazette.*
3. *If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded-*
 - a. *in any bedroom in the residential accommodation - 35 dB(A) at any time between 10 pm and 7am,*
 - b. *anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway) - 40 dB(A) at any time.*

2.120 *Impact of road noise or vibration on non-road development*

1. *This section applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume*

data published on the website of TfNSW) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

- a. *Residential accommodation,*
 - b. *a place of public worship,*
 - c. *a hospital,*
 - d. *an educational establishment or centre-based child care facility.*
2. *Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this clause and published in the Gazette.*
 3. *If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*
 - a. *in any bedroom in the residential accommodation - 35 dB(A) at any time between 10 pm and 7am,*
 - b. *anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway) - 40 dB(A) at any time.*
 - c. *(3A) Subsection (3) does not apply to a building to which State Environmental Planning Policy (Housing) 2021, Chapter 3, Part 7 applies.*
 4. *In this section, "freeway", "tollway" and "transitway" have the same meanings as they have in the Roads Act 1993.*

A.1.1 Department of Planning publication 'Development near rail corridors and busy roads – Interim guideline'

To support the Infrastructure SEPP, the NSW Department of Planning released the *Development in Rail Corridors and Busy Roads – Interim Guideline* (December 2008). The Guideline assists in the planning, design and assessment of developments in, or adjacent to, major transport corridors in terms of noise, vibration and air quality. While the ISEPP applies only to roads with an AADT greater than 40,000 vehicles, the guideline is also recommended for other road traffic noise affected sites.

A.1.2 Clarification of ISEPP noise limits

The Guideline clarifies the time period of measurement and assessment. Section 3.4 '*What Noise and Vibration Concepts are Relevant*' and Table 3.1 of Section 3.6.1 confirms that noise assessment is based over the following time periods:

- Daytime 7:00am - 10:00pm $L_{Aeq(15hr)}$
- Night-time 10:00pm - 7:00am $L_{Aeq(9hr)}$

The noise criteria nominated in the ISEPP apply to internal noise levels with windows and doors closed. However, as the preliminary noise assessment is based on measurements/predictions at external locations, equivalent external noise criteria has been established. The equivalent external noise criterion is used to determine which areas of the development may require acoustic treatment in order to meet the internal noise requirements of the ISEPP. The equivalent external goals have been determined on the following basis:

- The ISEPP states: *"If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."* The internal criteria with windows open is therefore 10dB(A) above the criteria explicitly outlined in the ISEPP.
- The generally accepted noise reduction through an open window from a free-field external position is 10dB(A). Windows/doors are assumed to be open no more than 5% of room floor area, in accordance with the Building Code of Australia (BCA) ventilation requirements.

Table 9-1 presents the ISEPP internal noise criteria along with the equivalent external noise criteria for residential premises.

Table 9-1: ISEPP noise criteria for new residential development

Room	Location	L _{Aeq} , 15hr Day 7am – 10pm	L _{Aeq} 9hr Night 10pm – 7am
Living rooms*	Internal, windows closed	40	40
	Internal, windows open	50	50
	External free-field (allowing windows to remain open)^	60	60
Bedrooms*	Internal, windows closed	40	35
	Internal, windows open	50	45
	External free-field (allowing windows to remain open)^	60	55

Notes: * Requisite for 40,000AADT Roads only under ISEPP 2007.

^ ISEPP Guideline states that where internal noise criteria are exceeded by more than 10dB(A) with windows open mechanical ventilation is required. External goals have been calculated on the basis of nominal 10dB(A) reduction through an open window to a free-field position. Windows open to 5% of floor area in accordance with the BCA 2011 requirements.

A.2 Australian/New Zealand Standard AS/NZS 2107:2016

As traffic noise levels are not constant, an L_{eq} noise level descriptor is used when assessing this type of noise source. The L_{eq} is the mean energy level of the noise being measured, and has been found to accurately describe the level of annoyance caused by traffic noise.

This standard provides recommended noise levels for steady state such as noise from building services and quasi-steady state sounds, such as traffic and industrial noise. The noise levels recommended in AS/NZS 2107:2016 take into account the function of the area and apply to the sound level measured within the space unoccupied although ready for occupancy.

This standard recommends the following noise levels for residential buildings.

Table 9-2: Design sound levels and reverberation times for different areas of occupancy in buildings

Item	Type of occupancy/activity	Design sound level (LAeq,t) range	Design reverberation time (T) range, s
7	RESIDENTIAL BUILDINGS (see Note 5 and Clause 5.2)		
	Houses and apartments in inner city areas or entertainment districts or near major roads -		
	Apartment common areas (e.g. foyer, lift lobby)	45 to 50	-
	Living areas	35 to 45	-
	Sleeping areas (night time)	35 to 40	-
	Work areas	35 to 45	-
	Houses and apartments in suburban areas or near minor roads -		
	Apartment common areas (e.g. foyer, lift lobby)	45 to 50	-
	Living areas	30 to 40	-
	Sleeping areas (night time)	30 to 35	-
	Work areas	35 to 40	-
	Houses in rural areas with negligible transportation -		
	Sleeping areas (night time)	25 to 30	-
	Hotels and motels -		
	Bars and lounges	< 50	0.6 to 1.0
	Conference areas -		
	Without sound reinforcement -		
	Up to 50 persons	35 to 40	Curve 1*
	From 50 to 250 persons	30 to 35	Curve 1*
	With sound reinforcement	35 to 45	Curve 1*
	Dining rooms	40 to 45	See Note 1
	Enclosed carparks	< 65	-
	Foyers and recreation areas	45 to 50	See Note 1
	Kitchen, laundry and maintenance areas	< 55	-
	Sleeping areas (night time) -		
	Hotels and motels in inner city areas or entertainment districts or near major roads	35 to 40	-
	Hotels and motels in suburbs or near minor roads	30 to 35	-
	Washrooms and toilets	45 to 55	-
	Hostels, residential halls and barracks -		
	Cafeterias	45 to 50	< 1.0
	Common rooms	40 to 45	< 1.0
	Games rooms	45 to 50	< 1.0
	Kitchens and service areas	45 to 55	-
	Sleeping areas (night time) -		
	Hostels, residential halls and barracks in inner city areas or entertainment districts or near major roads	35 to 40	-
	Hostels, residential halls and barracks in suburbs or near minor roads	30 to 35	-

Item	Type of occupancy/activity	Design sound level (LAeq,t) range	Design reverberation time (T) range, s
	Mining camps -		
	Sleeping areas	35 to 40	-
	Other facilities	See Item 3 or Item 5 in this Table	
	Retirement homes/villages	See Houses and apartments; and Clause 5.2	
* See Appendix A for all references to 'Curve' in this Table.			

NOTES:

1. Reverberation time should be minimized for noise control.
2. Certain teaching spaces, including those intended for students with learning difficulties and students with English as a second language, should have reverberation times at the lower end of the range.
3. Specialist advice should be sought for these spaces.
4. A very wide range of noise levels can occur in the occupied state in spaces housing manufacturing processes, and the levels are primarily subject to control as part of a noise management program (see AS/NZS 1269.2). The possibilities for segregating very noisy processes from quieter ones by partitioning vary between particular industries and plants. For reasons such as these, it is difficult to make generalized recommendations for desirable, or even maximum, design levels for the unoccupied state, but one guiding principle may still be observed - when the activity in one area of a manufacturing plant is halted, it is desirable that the local level should if possible drop to 70 dB(A) or lower to permit speech communication without undue effort.
5. In situations where traffic noise levels may vary widely over a 24 h period, measurement to assess compliance with this Standard should be taken at the relevant time and for an appropriate measurement period according to the area of occupancy or activity in the building. Where traffic noise fluctuates rapidly with the passage of individual vehicles, the community reaction may not correlate well with the equivalent continuous noise level as measured.
6. The overall sound pressure level in dB(A) should conform to the recommended design sound level given in Table 1. In these spaces, a balanced sound pressure level across the full frequency range is essential. These spaces should therefore be evaluated in octave bands across the full frequency spectrum. The recommended maximum sound pressure levels for the individual octave bands corresponding to the overall dB(A) value are given in Appendix C.
7. In spaces in which high quality sound recordings are to be made, the levels set for low frequency octave bands should not be exceeded (see Appendix C). Subsequent replay of the recordings might cause an amplification of the low-frequency sound resulting in an overemphasis of its low-frequency components. Specialist advice should always be sought when these spaces are being designed. In some circumstances, for purposes of very high quality recording, lower levels than those in Table 1 may be necessary.
8. Health requirements for hygiene and infection control may preclude achieving these recommended reverberation times.

APPENDIX B Internal Sound Insulation

B.1 National Construction Code of Australia 2022

The National Construction Code of Australia (NCC) outlines minimum requirements for inter-tenancy (party) walls and ceiling/ floors to maintain privacy. This includes the incorporation of penetration of a service through a floor or through more than one sole-occupancy unit.

NCC nominates required Weighted Sound Reduction Indexes (R_w) and spectrum adaptation factor (C_{tr}) for partition constructions, of different space/ activity types in adjoining units. The R_w and $R_w + C_{tr}$ are single number descriptors for quantifying the attenuating performance of partitions for typical intrusive noises produced inside residences. The higher the rating, the greater the isolation provided by the partition.

Spectrum adaptation factors are commonly used to compensate for the fact that certain kinds of sounds are more readily transmitted through insulating materials than others insulate.

The adaptation factor C_{tr} has now been introduced for most building elements which require an airborne sound insulation rating. The only exception is a wall which separates a dwelling from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification. Therefore, both the C_{tr} factor and the R_w of the building element will need to be considered in most cases.

The C_{tr} factor takes into account lower frequency level sounds, and has been chosen in large part, in recognition of the problem of the high bass frequency outputs of modern home theatre systems and music reproduction equipment.

The Deemed-to-Satisfy Provisions also have impact sound insulation requirements for floors. The terms to describe the impact sound insulation of the floor is the weighted normalised impact sound pressure level ($L_{n,w}$). The lower the $L_{n,w}$ of the floor, the better the performance of the floor in terms of impact sound insulation.

The following section represents a summary of acoustic provisions outlined in the Part F7 of the NCC.

B.2 Sound Insulation Provision of NCC of Australia

The acoustic provisions for inter-tenancy walls, floors, doors and building services in Class 2 & 3 buildings are outlined in the National Construction Code of Australia and the following is an extract from the NCC:

F7D3 Determination of airborne sound insulation ratings

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

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

(b) comply with Specification 28.

F7D4 Determination of impact sound insulation ratings

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

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

(b) comply with Specification 28

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

(a) for a Class 2 or 3 building be of discontinuous construction and

(b) for a Class 9c building, must—

(i) for other than masonry, be two or more separate leaves without rigid mechanical connection except at the periphery; or

(ii) be identical with a prototype that is no less resistant to the transmission of impact sound when tested in accordance with Specification 29 than a wall listed in S28C4 to S28C7.

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

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

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

F7D5 Sound insulation rating of floors

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

(a) sole-occupancy units; or

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

(2) A floor in a Class 9c building separating sole-occupancy units must have an R_w not less than 45

F7D6 Sound insulation rating of walls

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

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

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

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

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

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

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

(3) A wall in a Class 9c building must have an R_w not less than 45 if it separates—

(a) sole-occupancy units; or

(b) a sole-occupancy unit from a kitchen, bathroom, sanitary compartment (not being an associated ensuite), laundry, plant room or utilities room.

(4) In addition to (3), a wall separating a sole-occupancy unit in a Class 9c building from a kitchen or laundry must comply with F7D4(2).

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

(a) the underside of the floor above; or

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

(6) Where a wall required to have sound insulation has a roof above, the wall must continue to –

(a) the underside of the roof above; or

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

F7D7 Sound insulation rating of internal services

(1) If a duct or soil, waste or water supply pipe, including a duct or pipe that is located in a wall or floor cavity, serves or passes through more than one sole-occupancy unit, the duct or pipe must be separated from the rooms of any sole-occupancy unit by construction with an $R_w + C_{tr}$ (airborne) not less than –

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

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

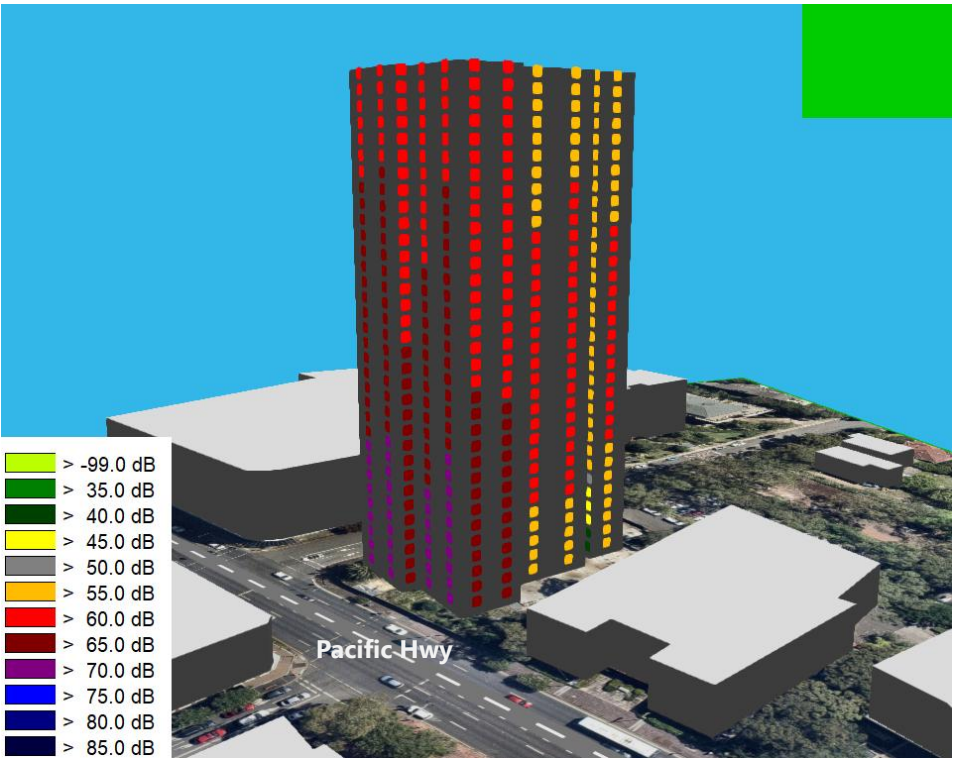
(2) If a stormwater pipe passes through a sole-occupancy unit, it must be separated in accordance with (1)(a) and (b).

F7D8 Sound isolation of pumps

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

APPENDIX C Predicted Façade Noise Levels

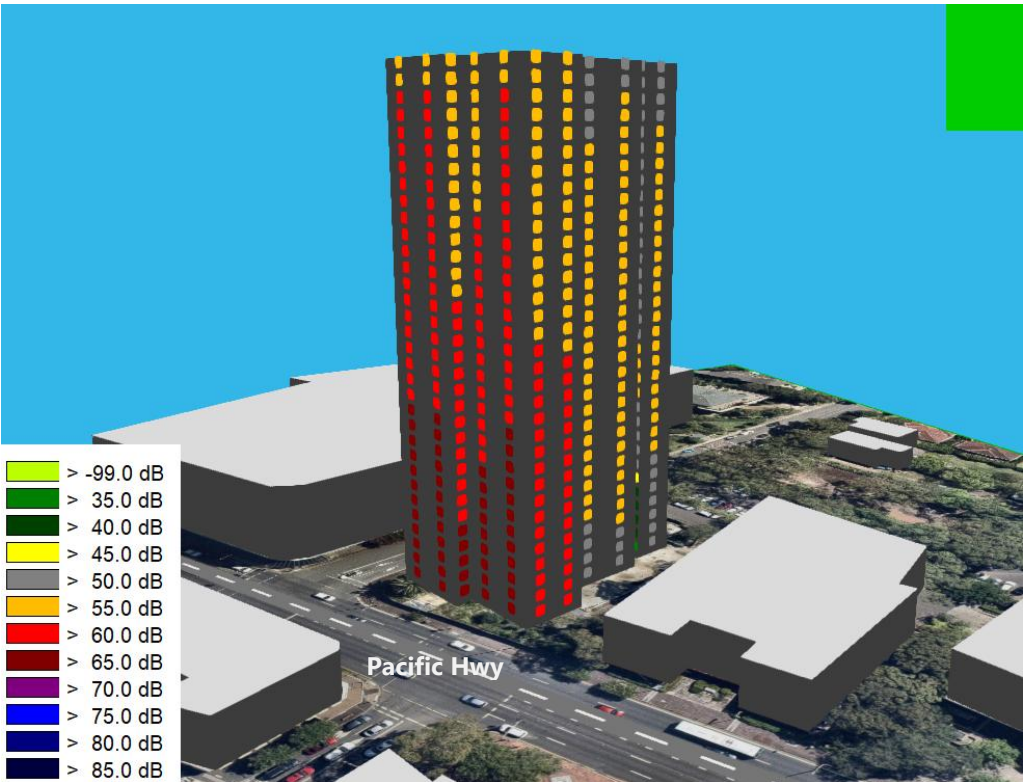
C.1 North and East Façades (Day time)



C.2 South and East Façades (Day time)



C.3 North and East Façades (Night time)



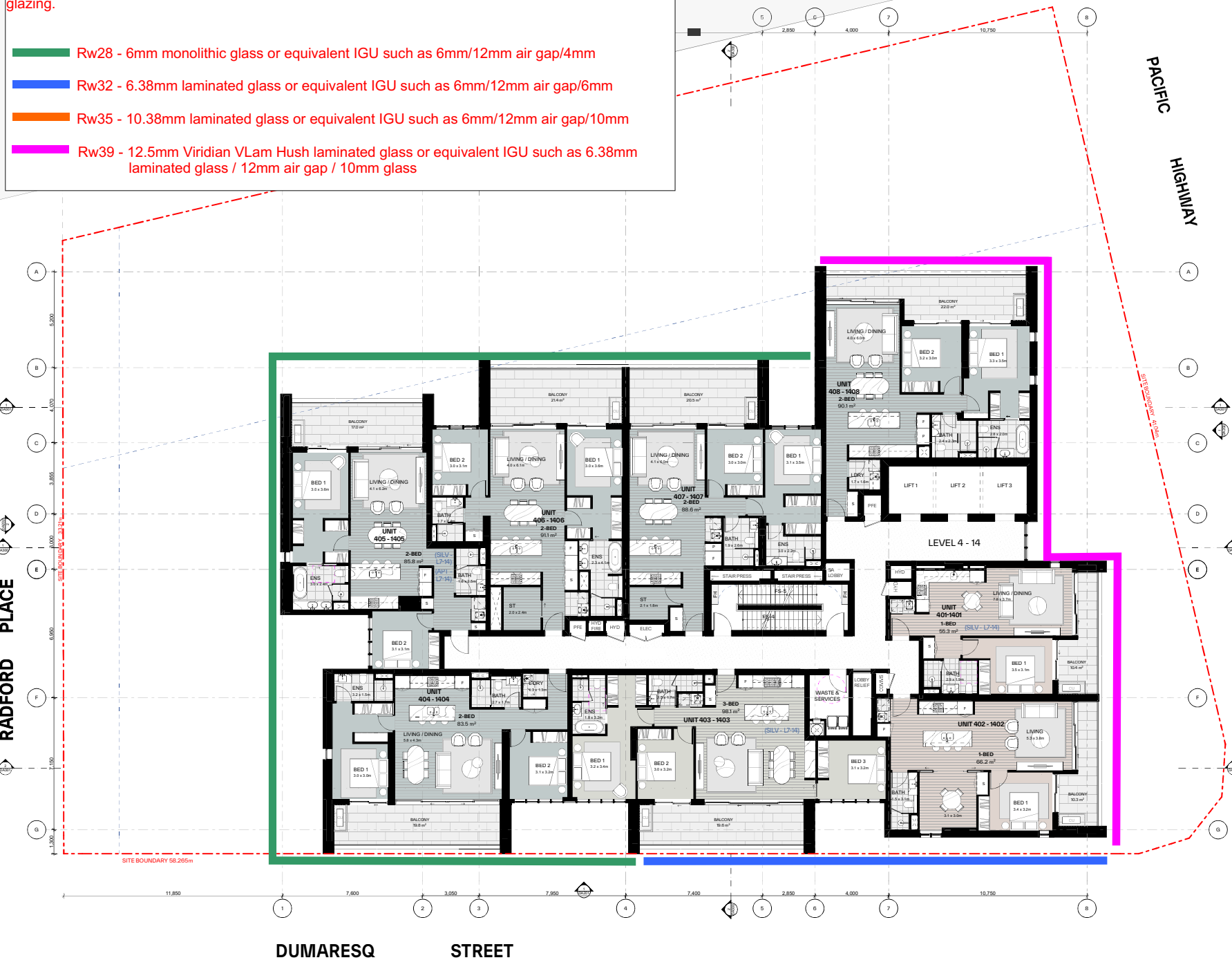
C.4 South and East Façades (Night time)



APPENDIX D Acoustic Glazing Markups (R_w)

Recommended minimum sound insulation rating (Rw) of glazing assemblies and typical compliance glazing.

	Rw28 - 6mm monolithic glass or equivalent IGU such as 6mm/12mm air gap/4mm
	Rw32 - 6.38mm laminated glass or equivalent IGU such as 6mm/12mm air gap/6mm
	Rw35 - 10.38mm laminated glass or equivalent IGU such as 6mm/12mm air gap/10mm
	Rw39 - 12.5mm Viridian VLam Hush laminated glass or equivalent IGU such as 6.38mm laminated glass / 12mm air gap / 10mm glass



GENERAL NOTES:

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LEGEND:

AH	ACCESS HATCH
CJ	A/C CONDENSER UNITS
FU	FIRE HYDRANT
FHR	FIRE HOSE REEL
FS	FIRE STAIRS
GC	GARBAGE CHUTE
HL	HIGH-LIGHT WINDOW
LQ	LOUVERS
MV	MECHANICAL RISEN TO FUTURE DETAIL
SK	SKYLIGHT
ST	STORAGE IN BASEMENT
STR	STORAGE ROOM
S	STORAGE
HWU	HOT WATER UNITS

MATERIALS LEGEND:

AFG	ALUMINIUM FRAMED GLAZING
AW	AWNING (TO FUTURE DETAIL)
BA	BATTEN SCREENS
BK	BRICK FINISH
CONC	CONCRETE
GB	GLASS BALUSTRADE
MCx	METAL CLADDING TYPEx
MF	METAL FENCING
PC	PRECAST PANEL
PSx	PRIVACY SCREEN (TO FUTURE SELECTION)
Px	PAINT FINISH TYPEx
RD	ROLLER DOOR
RP	ROOF RIVER PEBBLES
SCR	SCREENS TO ROOF-EQUIPMENTS

FINISHES TO BE READ IN CONJUNCTION WITH FINISHES SCHEDULE

[illegible]

Scale Bar 1 : 100 @ A1

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2072 Australia

DRAWING TITLE:

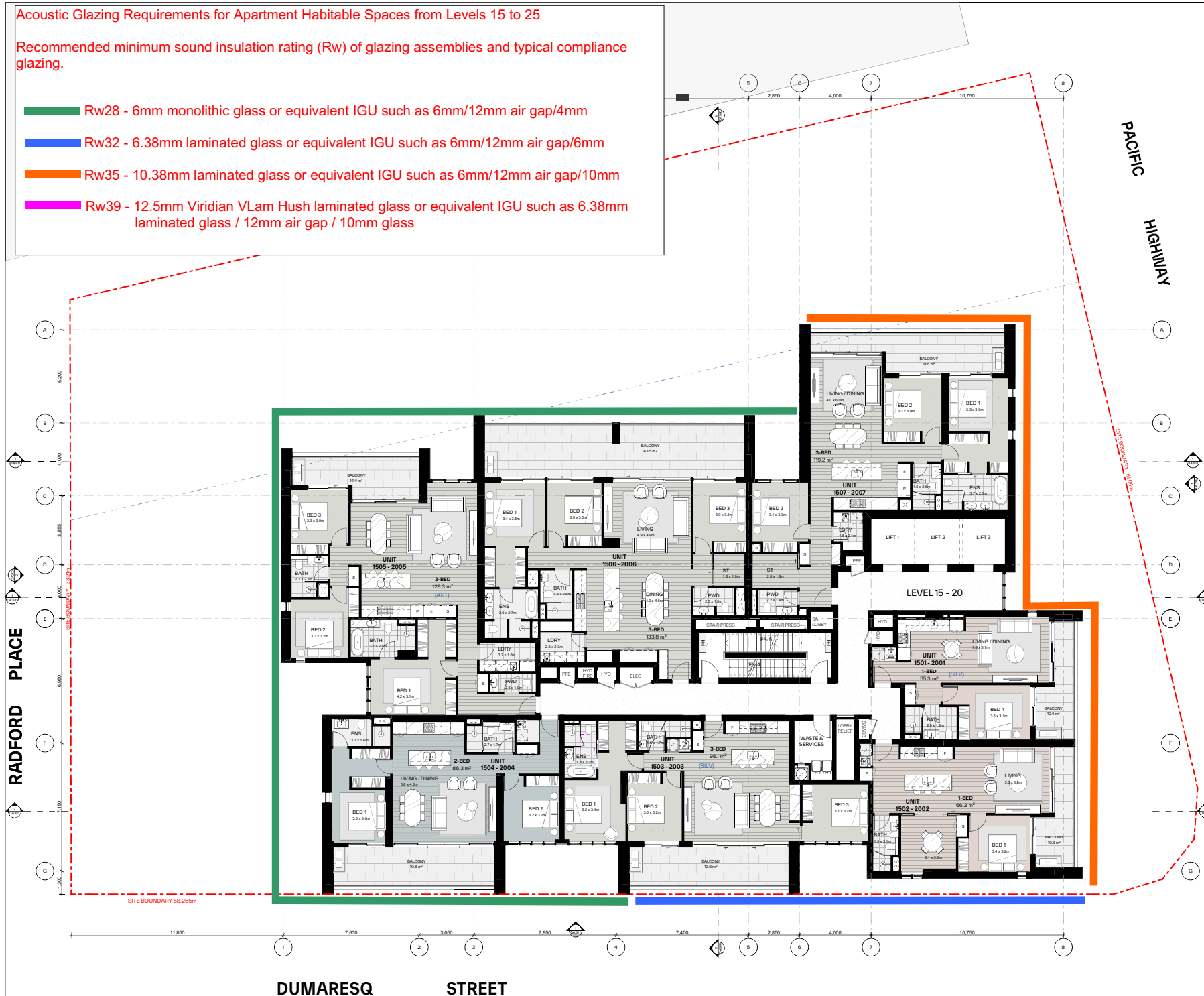
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SCALE: 1:100@A1	DRAWING NO: DA111	ISSUE: A
PROJECT NO: 2432		

Recommended minimum sound insulation rating (Rw) of glazing assemblies and typical compliance glazing.

Rw32 - 6.38mm laminated glass or equivalent IGU such as 6mm/12mm air gap/6mm

Rw35 - 10.38mm laminated glass or equivalent IGU such as 6mm/12mm air gap/10mm

Rw39 - 12.5mm Viridian VLam Hush laminated glass or equivalent IGU such as 6.38mm laminated glass / 12mm air gap / 10mm glass



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AH	ACCESS HATCH
CU	AVC CONDENSER UNITS
FH	FIRE HYDRANT
FHR	FIRE HOSE REEL
FS	FIRE STAIRS
GC	GARBAGE CHUTE
HL	HIGHLIGHT WINDOW
LV	LOUVERS
MV	MECHANICAL RISER TO FUTURE DETAIL
SK	SKYLIGHT
ST	STORAGE IN BASEMENT
STR	STORAGE ROOM
S	STORAGE
HWU	HOT WATER UNITS

AFG	ALUMINIUM FRAMED GLAZING
AW	AWNING (TO FUTURE DETAIL)
BA	BATTEN SCREENS
BK	BRICK FINISH
CONC	CONCRETE
GB	GLASS BALUSTRADE
MCx	METAL CLADDING TYPEx
MF	METAL FENCING
PC	PRECAST PANEL
PSx	PRIVACY SCREEN (TO FUTURE SELECTION)
Px	PAINT FINISH TYPEx
RD	ROLLER DOOR
RP	ROOF RIVER PEBBLES
SCR	SCREEN TO ROOF-EQUIPMENTS

FINISHES TO BE READ IN CONJUNCTION WITH FINISHES SCHEDULE

Issue	Date	Description
A	12/12/2025	Issue for SIDA Submission



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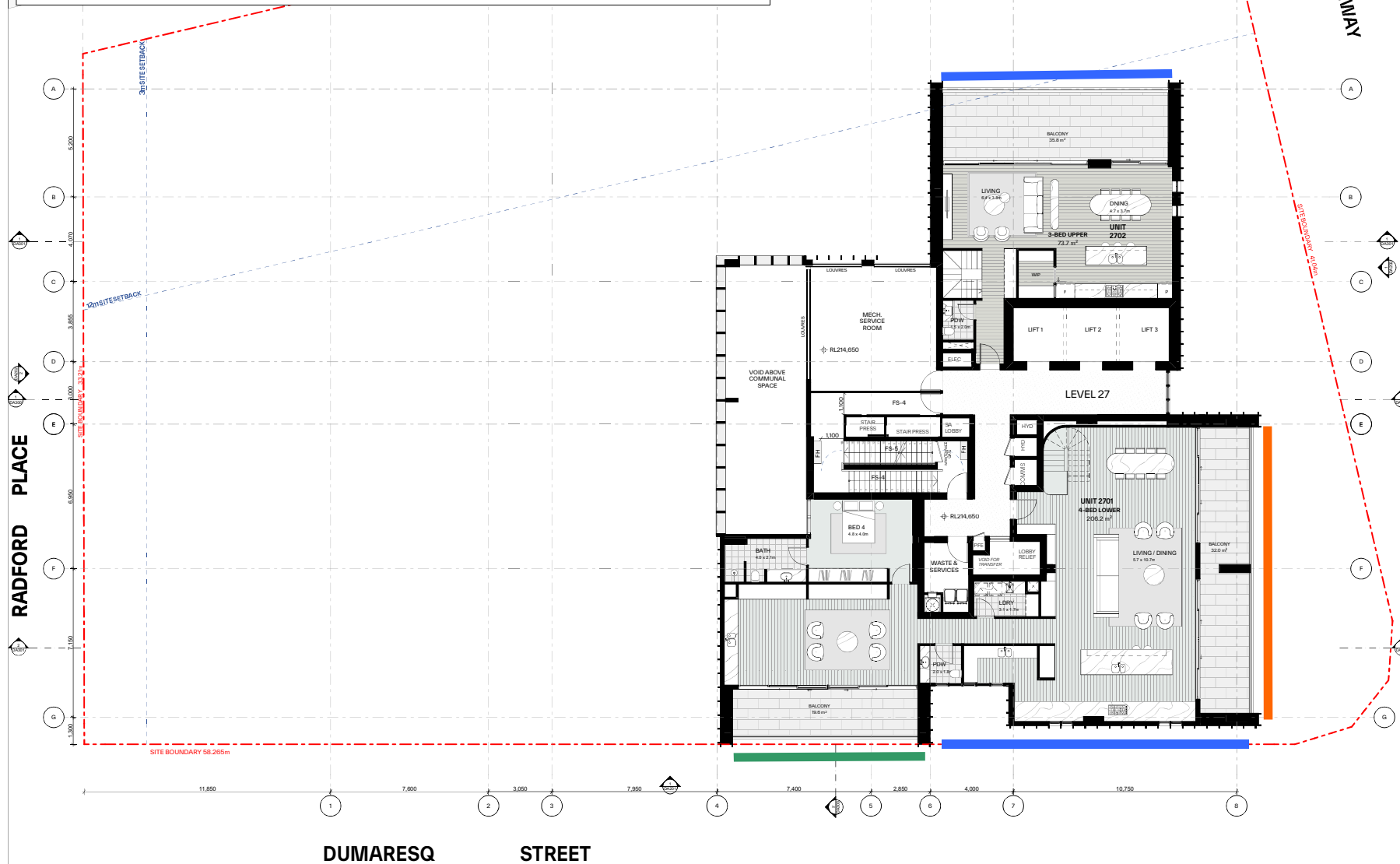
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810 Pacific Highway , Gordon Sydney NSW
2072 Australia

DRAWING BY: AA, HK	CHECKED BY: KS	DATE: 12/12/2025
SCALE: 1:100@A1	DRAWING NO: DA112	ISSUE: A
PROJECT NO:		

DRAWING BY: AA_HK	CHECKED BY: KS	DATE: 12/12/2025
SCALE: 1:100@A1	DRAWING NO: DA117	ISSUE: A
PROJECT NO: 2432		

Recommended minimum sound insulation rating (Rw) of glazing assemblies and typical compliance glazing.

Rw39 - 12.5mm Viridian VLam Hush laminated glass or equivalent IGU such as 6.38mm laminated glass / 12mm air gap / 10mm glass



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PROJECT NO: 2432		

Acoustic Glazing Requirements for Apartment on Level 28

Recommended minimum sound insulation rating (Rw) of glazing assemblies and typical compliance glazing.

- Rw28 - 6mm monolithic glass or equivalent IGU such as 6mm/12mm air gap/4mm
- Rw32 - 6.38mm laminated glass or equivalent IGU such as 6mm/12mm air gap/6mm
- Rw35 - 10.38mm laminated glass or equivalent IGU such as 6mm/12mm air gap/10mm
- Rw39 - 12.5mm Viridian VLam Hush laminated glass or equivalent IGU such as 6.38mm laminated glass / 12mm air gap / 10mm glass

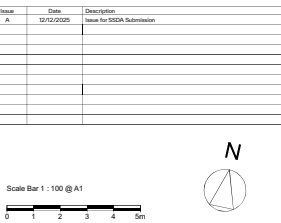


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- LEGEND:
- AH ACCESS HATCH
 - CU A/C CONDENSER UNITS
 - FH FIRE HYDRANT
 - FHR FIRE HOSE REEL
 - FS FIRE STAIRS
 - GC GARBAGE CHUTE
 - HL HIGHLIGHT WINDOW
 - LV LOUVERS
 - MV MECHANICAL RISER TO FUTURE DETAIL
 - SK SKYLIGHT
 - ST STORAGE IN BASEMENT
 - STR STORAGE ROOM
 - S STORAGE
 - HWU HOT WATER UNITS

- MATERIALS LEGEND:
- AFG ALUMINUM FRAMED GLAZING
 - AW AWNING (TO FUTURE DETAIL)
 - BA BATTER SCREENS
 - BR BRICK FINISH
 - CONC CONCRETE
 - GB GLASS BALUSTRADE
 - MCX METAL CLADDING TYPE X
 - MF METAL FENCINGS
 - PC PRECAST PANEL
 - PSK PRIVACY SCREEN (TO FUTURE SELECTION)
 - PN PAINT FINISH TYPE X
 - RD ROLLER DOOR
 - RP ROOF RIVER PEBBLES
 - SCX SCRAM TOWER EQUIPMENTS
- FINISHES TO BE READ IN CONJUNCTION WITH FINISHES SCHEDULE



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DRAWING TITLE:
Level 28

DRAWING BY: AAJ, HK	CHECKED BY: MS	DATE: 12/12/2025
SCALE: 1:100@A1	DRAWING NO: DA119	ISSUE: A
PROJECT NO: 2432		

APPENDIX E Apartment Natural Ventilation Markup

RENDERED BUILDING TILE ROOF
NO 818
KU-RING-GAI MUNICIPAL COUNCIL

Markup of Naturally and Mechanically
ventilated apartments
Levels 2 to 14 typical floor plan

Levels 2 to 14 apartments (highlighted
yellow) that can be naturally ventilated
by having windows or balcony sliders
open and comply with the SEPP
'Windows open' internal noise criteria.

Levels 2 to 14 apartments (highlighted
blue) that require mechanical
ventilation to bring in fresh air when
windows are closed to comply with
SEPP 'Windows closed' internal noise
criteria

GENERAL NOTES:

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LEGEND:

AH ACCESS HATCH
CU A/C CONDENSER UNITS
FH FIRE HYDRANT
FHR FIRE HOSE REEL
FS FIRE STAIRS
GO GARBAGE CHUTE
HL HIGHLIGHT WINDOW
LV LOUVERS
MV MECHANICAL RISER TO FUTURE DETAIL
SK SKYLIGHT
ST STORAGE IN BASEMENT
STR STORAGE ROOM
S STORAGE
HWU HOT WATER UNITS

MATERIALS LEGEND:

AFG ALUMINIUM FRAMED GLAZING
AW AWNING (TO FUTURE DETAIL)
BA BATTEN SCREENS
BK BRICK FINISH
CONC CONCRETE
GB GLASS BALUSTRADE
MCX METAL CLADDING TYPEX
MF METAL FENCING
PC PRECAST PANEL
PSX PRIVACY SCREEN (TO FUTURE SELECTION)
Px PAINT FINISH TYPEX
RD ROLLER DOOR
RP ROOF RIVER PEBBLES
SCR SCREEN TO ROOF EQUIPMENTS

FINISHES TO BE READ IN CONJUNCTION WITH FINISHES SCHEDULE

Scale Bar 1 : 100 @ A1
0 1 2 3 4 5m

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2072 Australia

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SCALE: 1:100@A1	DRAWING NO: DA111	ISSUE: A
PROJECT NO: 2432		

RENDERED BUILDING TILE ROOF
NO 818
KU-RING-GAI MUNICIPAL COUNCIL

Markup of Naturally and Mechanically
ventilated apartments
Levels 15 to 25 typical floor plan

Levels 15 to 25 apartments (highlighted
yellow) that can be naturally ventilated
by having windows or balcony
sliders open and comply with the SEPP
'Window open' internal noise criteria.

Levels 15 to 25 apartments (highlighted
blue) that require mechanical ventilation
to bring in fresh air when windows are
closed to comply with SEPP 'Windows
closed' internal noise criteria

GENERAL NOTES:

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LEGEND:

- AH ACCESS HATCH
- CU A/C CONDENSER UNITS
- FH FIRE HYDRANT
- FHR FIRE HOSE REEL
- FS FIRE STAIRS
- GO GARBAGE CHUTE
- HL HIGHLIGHT WINDOW
- LV LOUVERS
- MV MECHANICAL RISER TO FUTURE DETAIL
- SK SKYLIGHT
- ST STORAGE IN BASEMENT
- STR STORAGE ROOM
- S STORAGE
- HMU HOT WATER UNITS

MATERIALS LEGEND:

- AFG ALUMINUM FRAMED GLAZING
- AW AWNING (TO FUTURE DETAIL)
- BA BATTEN SCREENS
- BK BRICK FINISH
- CONC CONCRETE
- GB GLASS BALUSTRADE
- MCX METAL CLADDING TYPEX
- MF METAL FENCING
- PC PRECAST PANEL
- PSK PRIVACY SCREEN (TO FUTURE SELECTION)
- Px PAINT FINISH TYPEX
- RD ROLLER DOOR
- RP ROOF RIVER PEBBLES
- SCR SCREEN TO ROOF EQUIPMENTS

FINISHES TO BE READ IN CONJUNCTION WITH FINISHES SCHEDULE

Scale Bar 1 : 100 @ A1

0 1 2 3 4 5m

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810 Pacific Highway, Gordon Sydney NSW
2072 Australia

DRAWING TITLE:

I.

DRAWING BY:
AA, HK

SCALE:
1:100@A1

PROJECT NO:
2432

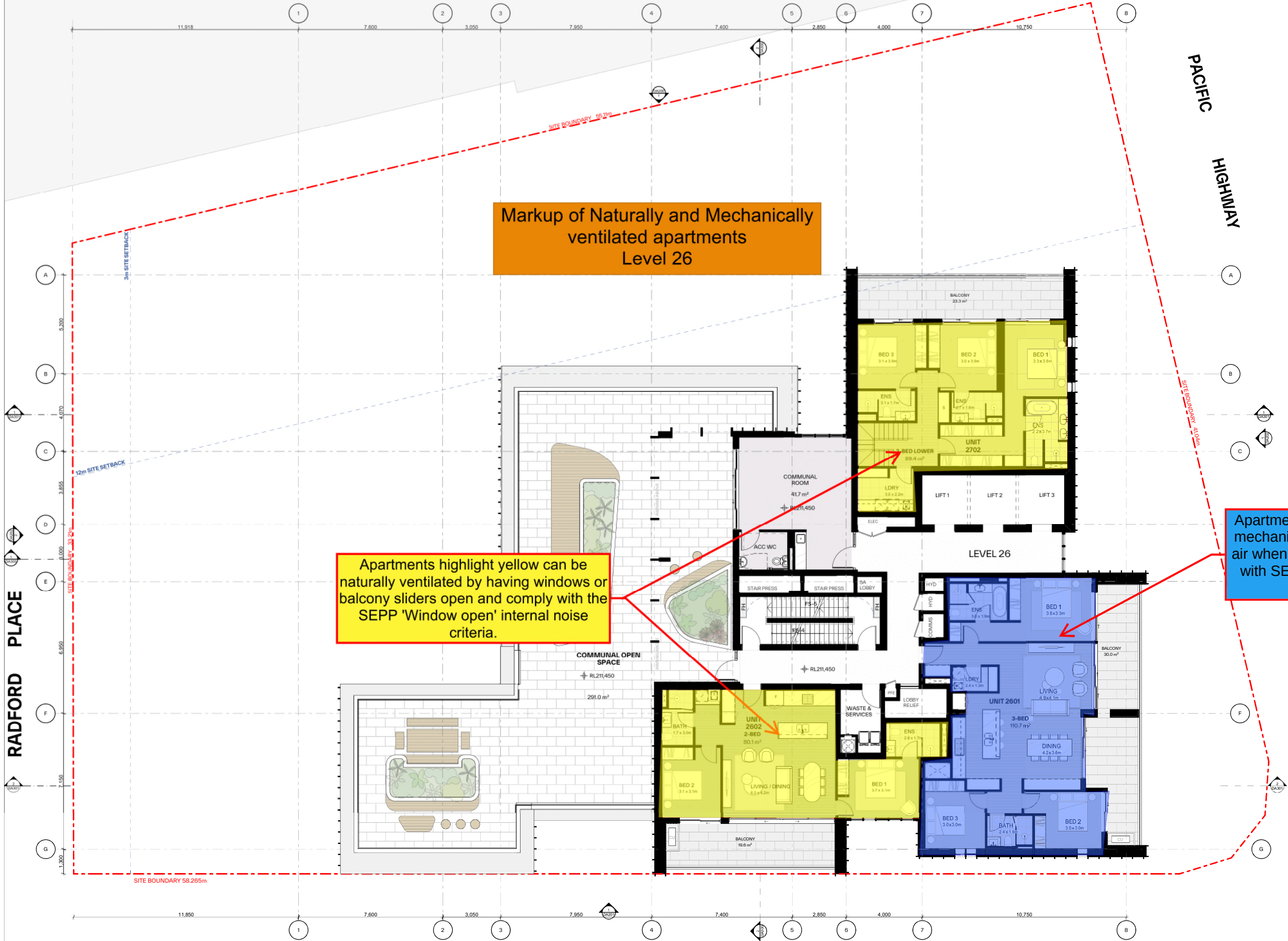
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DRAWING NO:
DA112

DATE:
12/12/2025

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RENDERED BUILDING TILE ROOF
NO 818
KU-RING-GAI MUNICIPAL COUNCIL



Markup of Naturally and Mechanically ventilated apartments
Level 26

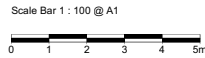
Apartments highlight yellow can be naturally ventilated by having windows or balcony sliders open and comply with the SEPP 'Window open' internal noise criteria.

Apartment highlighted blue will require mechanical ventilation to bring in fresh air when windows are closed to comply with SEPP 'Windows closed' internal noise criteria

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- LEGEND:
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 - CU A/C CONDENSER UNITS
 - FH FIRE HYDRANT
 - FHR FIRE HOSE REEL
 - FS FIRE STAIRS
 - GO GARBAGE CHUTE
 - HL HIGHLIGHT WINDOW
 - LV LOUVERS
 - MV MECHANICAL RISER TO FUTURE DETAIL
 - SK SKYLIGHT
 - ST STORAGE IN BASEMENT
 - STR STORAGE ROOM
 - S STORAGE
 - HMU HOT WATER UNITS

- MATERIALS LEGEND:
- AFG ALUMINIUM FRAMED GLAZING
 - AW AWNING (TO FUTURE DETAIL)
 - BA BATTEN SCREENS
 - BK BRICK FINISH
 - CONC CONCRETE
 - GB GLASS BALUSTRADE
 - MCX METAL CLADDING TYPEX
 - MF METAL FENCING
 - PC PRECAST PANEL
 - PSX PRIVACY SCREEN (TO FUTURE SELECTION)
 - Px PAINT FINISH TYPEX
 - RD ROLLER DOOR
 - RP ROOF RIVER PEBBLES
 - SCR SCREEN TO ROOF EQUIPMENTS
- FINISHES TO BE READ IN CONJUNCTION WITH FINISHES SCHEDULE



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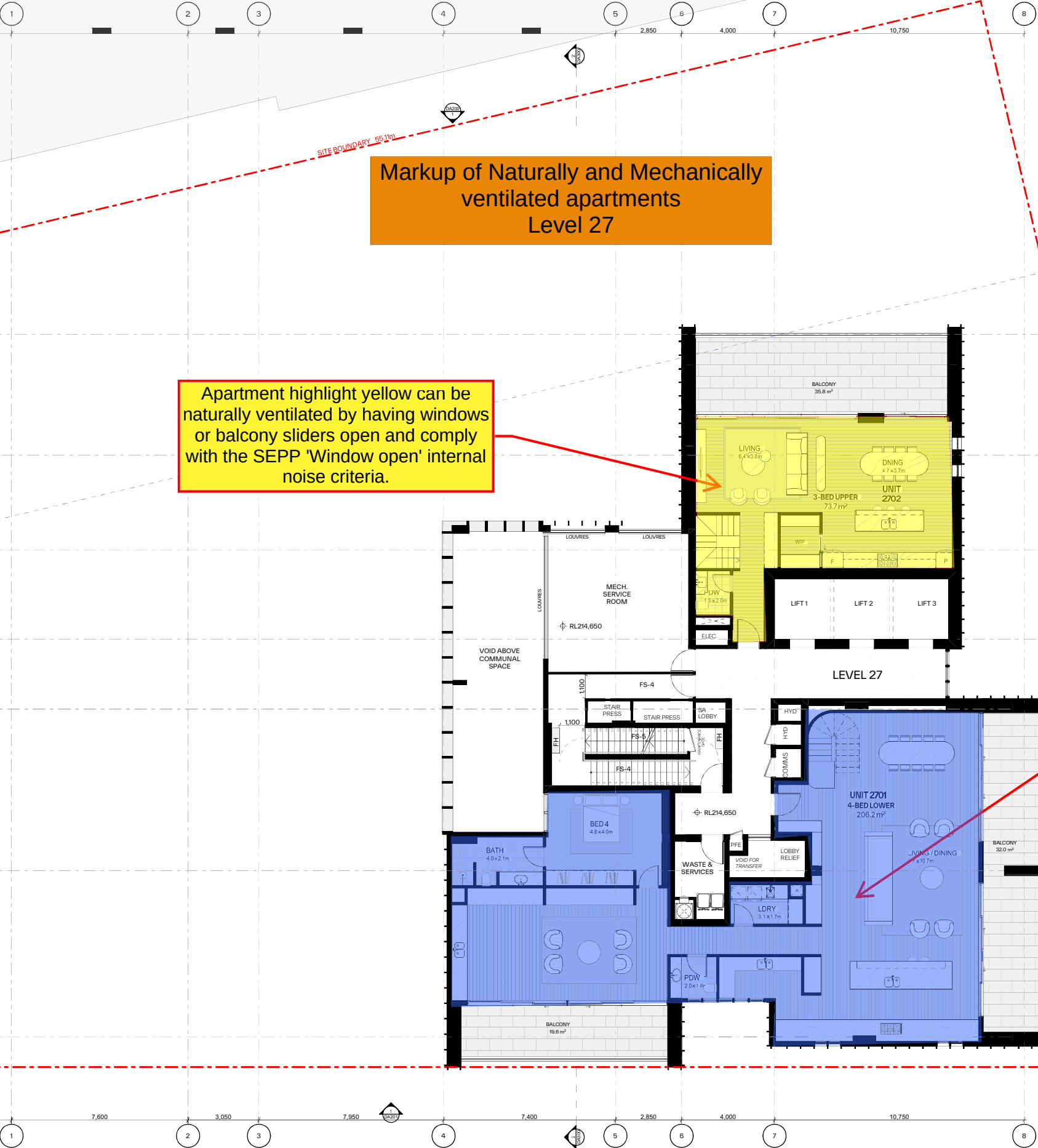
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810 Pacific Highway, Gordon Sydney NSW
2072 Australia

DRAWING TITLE:
Level 26

DRAWING BY: AA, HK	CHECKED BY: KS	DATE: 12/12/2025
SCALE: 1:100@A1	DRAWING NO: DA117	ISSUE: A
PROJECT NO: 2432		

RENDERED BUILDING TILE ROOF
NO 818
KU-RING-GAI MUNICIPAL COUNCIL



Markup of Naturally and Mechanically ventilated apartments
Level 27

Apartment highlight yellow can be naturally ventilated by having windows or balcony sliders open and comply with the SEPP 'Window open' internal noise criteria.

Apartment highlighted blue will require mechanical ventilation to bring in fresh air when windows are closed to comply with SEPP 'Windows closed' internal noise criteria

GENERAL NOTES:

- ALL WORKS TO COMPLY WITH BUILDING CODE OF AUSTRALIA, REQUIREMENTS OF RELEVANT STATUTORY AUTHORITIES/ LOCAL GOVERNMENT & RELEVANT AUSTRALIAN BUILDING STANDARDS
- DRAWINGS FOR THE PURPOSES OF DA ONLY (NOT FOR CONSTRUCTION) - FURTHER CONSULTANT/ AUTHORITY COORDINATION WILL BE REQUIRED AT CC STAGE WHICH MAY IMPACT ON DESIGN AND PLANNING LAYOUTS
- ARCHITECTURAL PLANS TO BE READ IN CONJUNCTION WITH CONSULTANT'S DRAWINGS, SPECIFICATIONS & REPORTS
- COPYRIGHT OF DESIGN SHOWN HEREON IS RETAINED BY PBD ARCHITECTS AND AUTHORITY IS REQUIRED FOR ANY REPRODUCTION
- AREA SCHEDULES SUPPLIED ARE APPROXIMATE ONLY. FUTURE ALLOWANCE FOR VERTICAL SERVICE DUCTS, STRUCTURAL WALL SYSTEMS AND CONSULTANT INPUT WILL BE REQUIRED

LEGEND:

AH ACCESS HATCH
CU A/C CONDENSER UNITS
FH FIRE HYDRANT
FHR FIRE HOSE REEL
FS FIRE STAIRS
GC GARBAGE CHUTE
HL HIGHLIGHT WINDOW
LV LOUVRES
MV MECHANICAL RISER TO FUTURE DETAIL
SK SKYLIGHT
ST STORAGE IN BASEMENT
STR STORAGE ROOM
S STORAGE
HWU HOT WATER UNITS

MATERIALS LEGEND:

AFG ALUMINIUM FRAMED GLAZING
AW AWNING (TO FUTURE DETAIL)
BA BATTEN SCREENS
BK BRICK FINISH
CONC CONCRETE
GB GLASS BALUSTRADE
MCX METAL CLADDING TYPEX
MF METAL FENCING
PC PRECAST PANEL
PSX PRIVACY SCREEN (TO FUTURE SELECTION)
Px PAINT FINISH TYPEX
RD ROLLER DOOR
RP ROOF RIVER PEBBLES
SCR SCREEN TO ROOF EQUIPMENTS

FINISHES TO BE READ IN CONJUNCTION WITH FINISHES SCHEDULE

Issue	Date	Description
A	12/12/2025	Issue for SSDA Submission

CLIENT:
Ecove Group



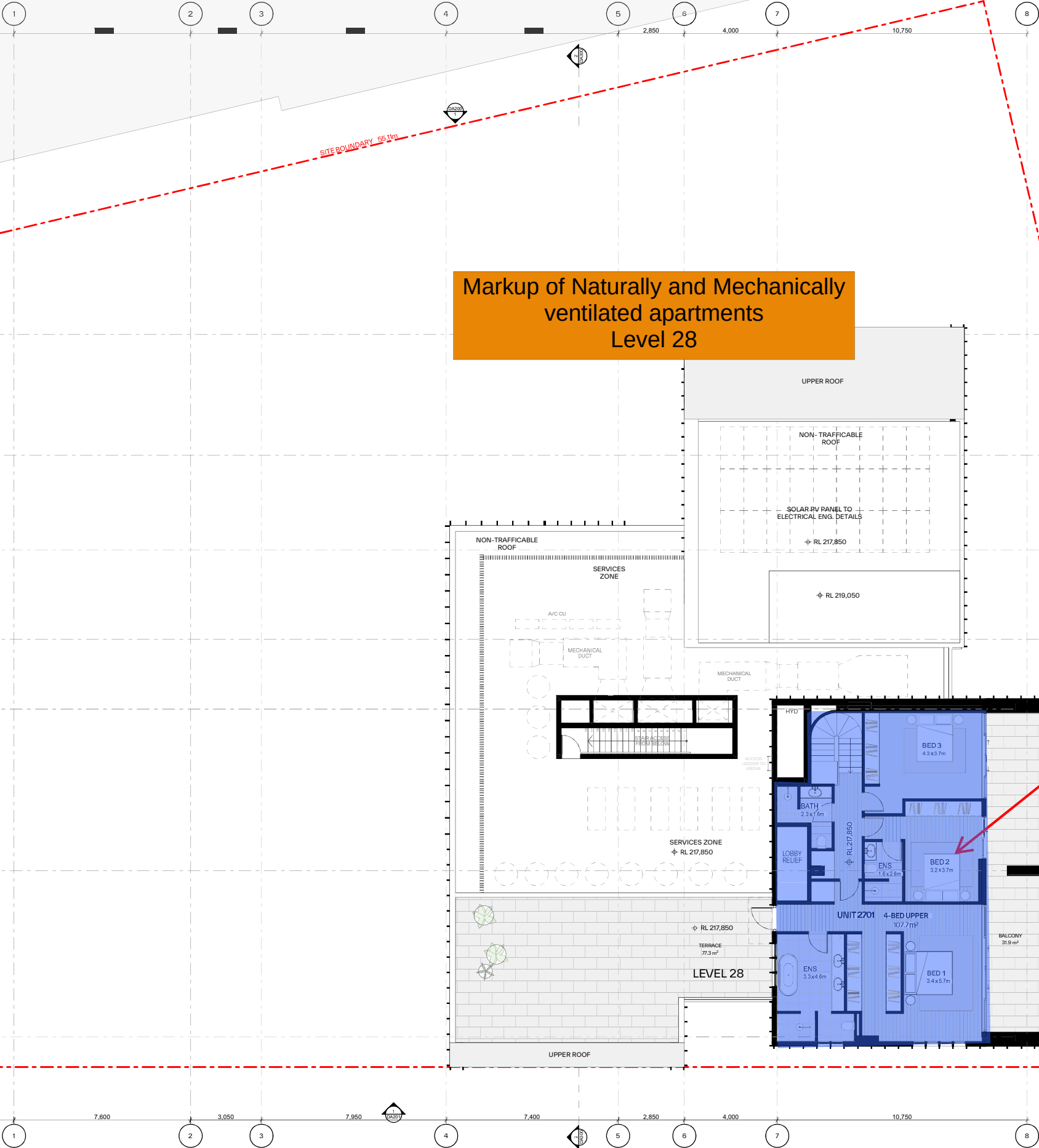
P - 02 9698 8140
E - info@pbdarchitects.com.au
W - pbdarchitects.com.au
Level 2, 52 Albion Street,
Sunny Hills NSW 2100
ABN 36 147 035 550
Nominated Architect,
Paul Buljevic NSW 7768

PROJECT:
Proposed Mixed Use Development
810 Pacific Highway, Gordon Sydney NSW
2072 Australia

DRAWING TITLE:
Level 27

DRAWING BY: AA, HK	CHECKED BY: KS	DATE: 12/12/2025
SCALE: 1:100@A1	DRAWING NO: DA118	ISSUE: A
PROJECT NO: 2432		

RENDERED BUILDING TILE ROOF
NO 818
KU-RING-GAI MUNICIPAL COUNCIL



Markup of Naturally and Mechanically
ventilated apartments
Level 28

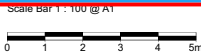
Apartment highlighted blue will require
mechanical ventilation to bring in fresh
air when windows are closed to comply
with SEPP 'Windows closed' internal
noise criteria

- GENERAL NOTES:
- ALL WORKS TO COMPLY WITH BUILDING CODE OF AUSTRALIA, REQUIREMENTS OF RELEVANT STATUTORY AUTHORITIES/ LOCAL GOVERNMENT & RELEVANT AUSTRALIAN BUILDING STANDARDS
 - DRAWINGS FOR THE PURPOSES OF DA ONLY (NOT FOR CONSTRUCTION) - FURTHER CONSULTANT/ AUTHORITY COORDINATION WILL BE REQUIRED AT CC STAGE WHICH MAY IMPACT ON DESIGN AND PLANNING LAYOUTS
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 - AREA SCHEDULES SUPPLIED ARE APPROXIMATE ONLY FUTURE ALLOWANCE FOR VERTICAL SERVICE DUCTS, STRUCTURAL WALL SYSTEMS AND CONSULTANT INPUT WILL BE REQUIRED

- LEGEND:
- AH ACCESS HATCH
 - CU A/C CONDENSER UNITS
 - FH FIRE HYDRANT
 - FHR FIRE HOSE REEL
 - FS FIRE STAIRS
 - GO GARBAGE CHUTE
 - HL HIGHLIGHT WINDOW
 - LV LOUVERS
 - MV MECHANICAL RISER TO FUTURE DETAIL
 - SK SKYLIGHT
 - ST STORAGE IN BASEMENT
 - STR STORAGE ROOM
 - S STORAGE
 - HMU HOT WATER UNITS

- MATERIALS LEGEND:
- AFG ALUMINIUM FRAMED GLAZING
 - AW AWNING (TO FUTURE DETAIL)
 - BA BATTEN SCREENS
 - BK BRICK FINISH
 - CONC CONCRETE
 - GB GLASS BALUSTRADE
 - MCX METAL CLADDING TYPEX
 - MF METAL FENCING
 - PC PRECAST PANEL
 - PSX PRIVACY SCREEN (TO FUTURE SELECTION)
 - Px PAINT FINISH TYPEX
 - RD ROLLER DOOR
 - RP ROOF RIVER PEBBLES
 - SCR SCREEN TO ROOF EQUIPMENTS
- FINISHES TO BE READ IN CONJUNCTION WITH FINISHES SCHEDULE

Issue	Date	Description
A	12/12/2025	Issue for SSDA Submission



CLIENT:
Ecove Group



P - 02 9698 8140
E - info@pbdarchitects.com.au
W - pbdarchitects.com.au
Level 2, 52 Albion Street,
Sunny Hills NSW 2010
ABN 36 147 035 650
Nominated Architect,
Paul Buljevic NSW 7768

PROJECT:
Proposed Mixed Use Development
810 Pacific Highway , Gordon Sydney NSW
2072 Australia

DRAWING TITLE:
Level 28

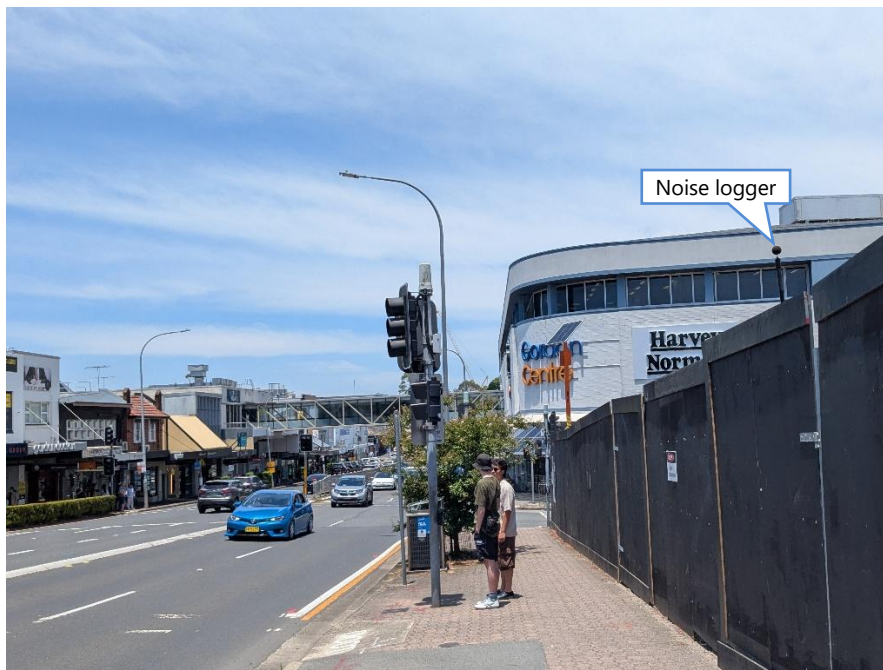
DRAWING BY: AA, HK	CHECKED BY: KS	DATE: 12/12/2025
SCALE: 1:100@A1	DRAWING NO: DA119	ISSUE: A
PROJECT NO: 2432		

APPENDIX F Long-term Noise Monitoring Locations and Results

F.1 Ambient and Background Noise Surveys

Unattended Noise Monitoring Location L1: East boundary of site.

Monitoring Period: Saturday 13/12/2025 to Tuesday 22/12/2025



Unattended Noise Monitoring Location L2: West boundary of site.

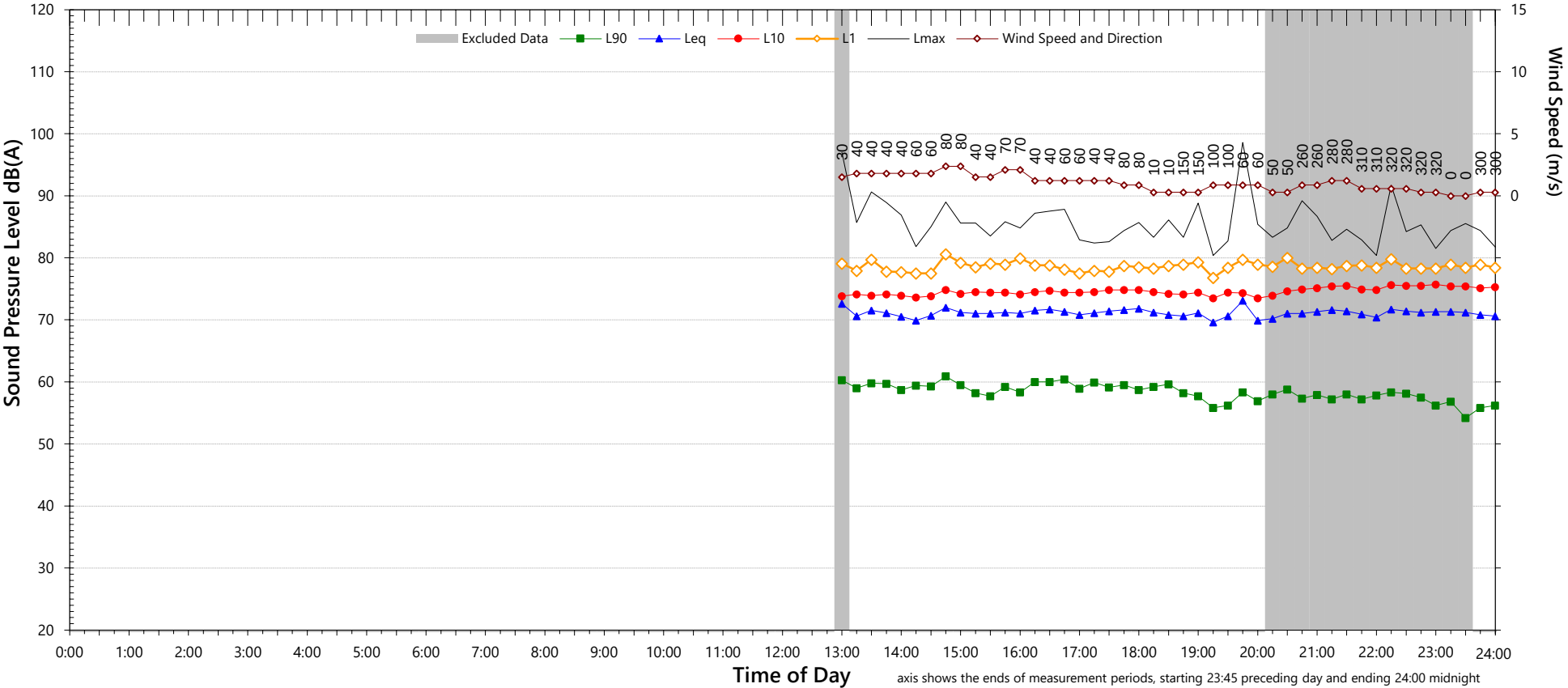
Monitoring Period: Saturday 13/12/2025 to Tuesday 22/12/2025



Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Saturday, 13 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4 5}
L _{A90} ABL	-	-	-
L _{Aeq}	#N/A	-	-

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	85	to	91
L _{AFMax} - L _{Aeq} (Range)	16	to	25

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

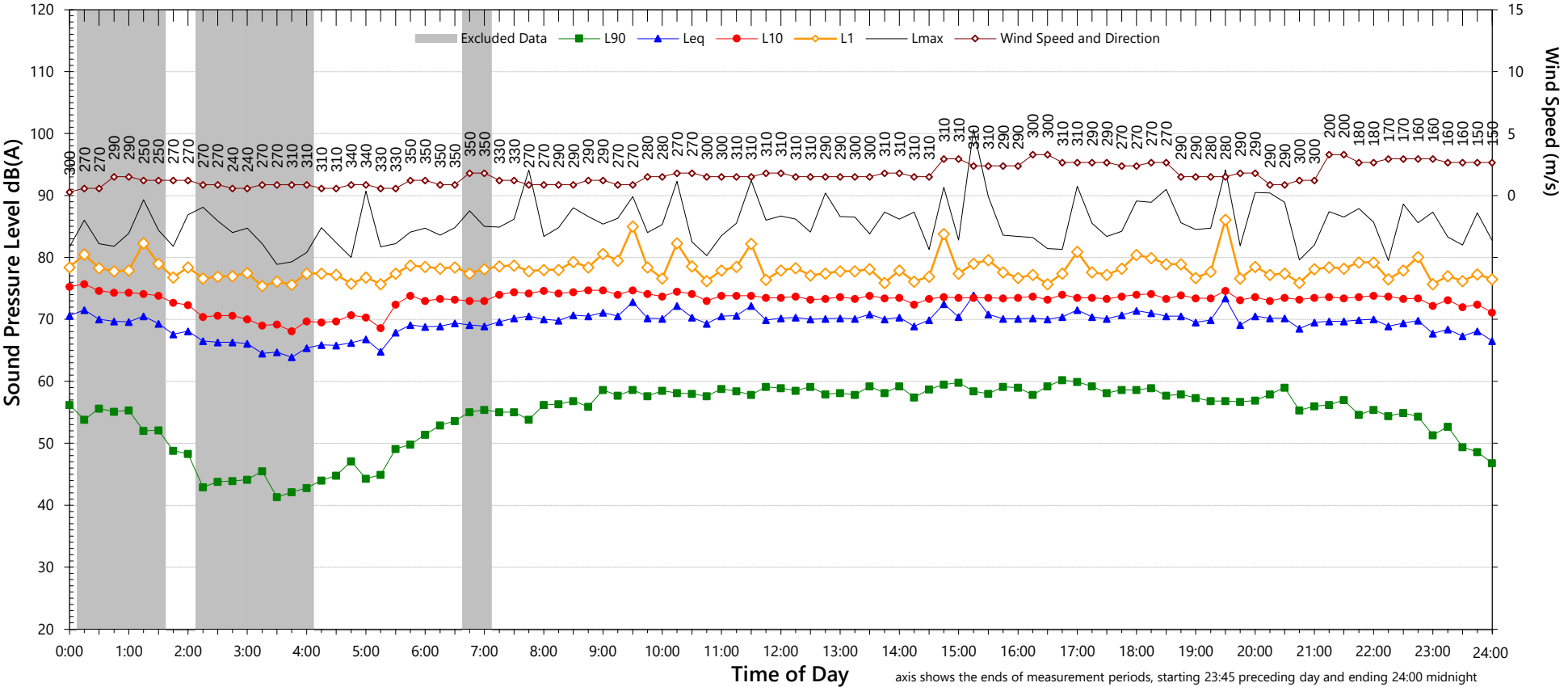
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	-	71
L _{Aeq} 1hr upper 10 percentile	-	73
L _{Aeq} 1hr lower 10 percentile	-	69

Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Sunday, 14 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	58	55	38
L _{Aeq}	#N/A 71	70	67

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	84	to	91
L _{AFMax} - L _{Aeq} (Range)	20	to	23

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
3. "Evening" is the period from 6pm till 10pm

#N/A

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	73	70
L _{Aeq} 1hr upper 10 percentile	74	72
L _{Aeq} 1hr lower 10 percentile	72	65

4. "Night" relates to the remaining periods

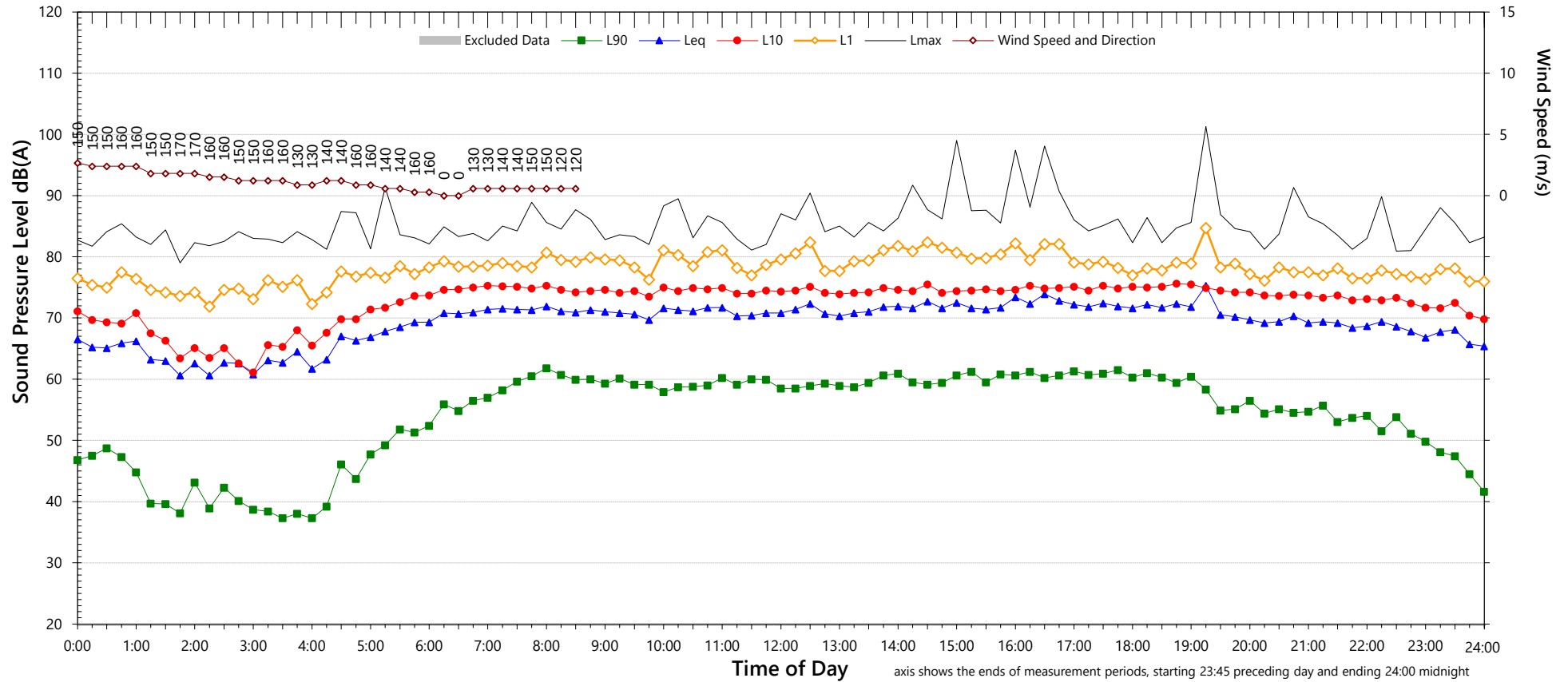
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
5. "Night" relates to period from 10pm on this graph to morning on the following graph.

Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Monday, 15 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	59	54	39
L _{Aeq}	#N/A	72	68

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	87	to	92
L _{AFMax} - L _{Aeq} (Range)	19	to	23

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

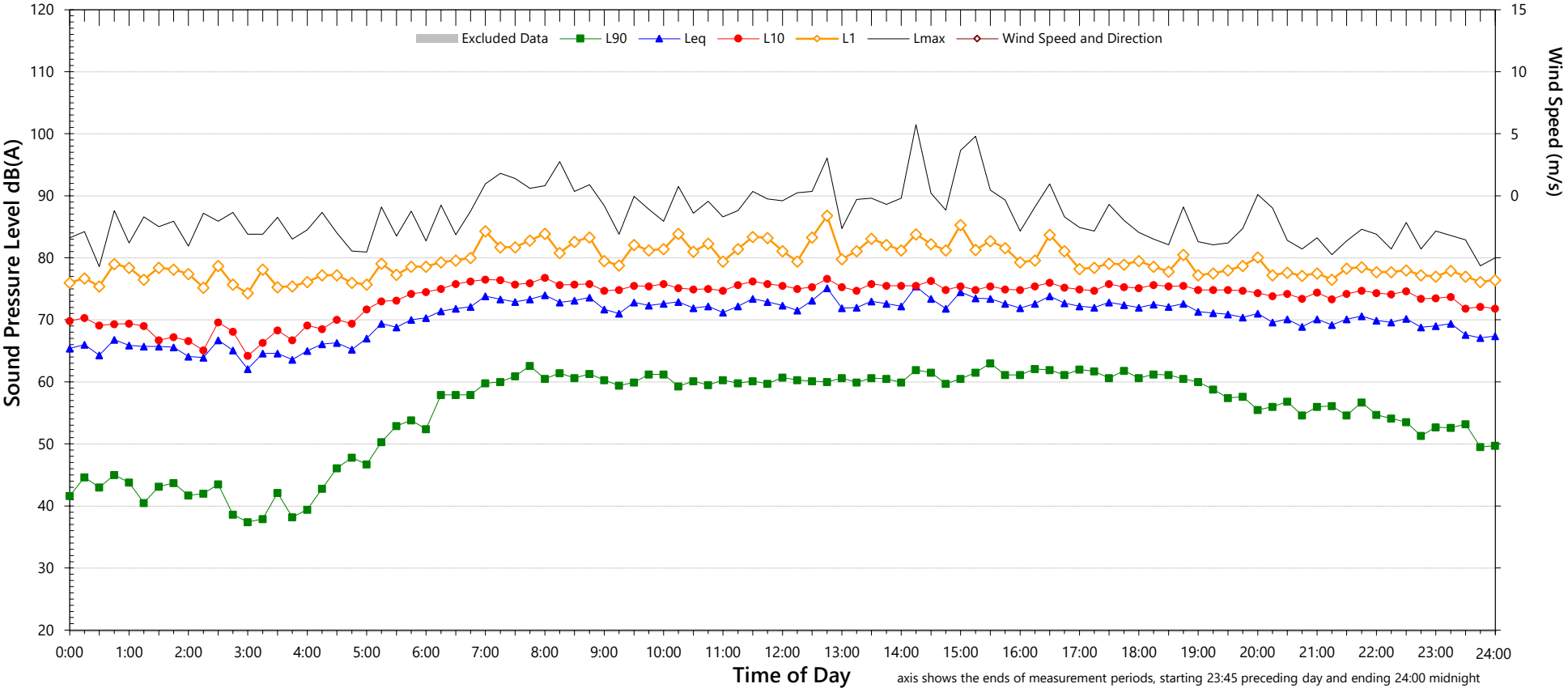
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	74	70
L _{Aeq} 1hr upper 10 percentile	75	73
L _{Aeq} 1hr lower 10 percentile	72	67

Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Tuesday, 16 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	60	55	40
L _{Aeq}	#N/A 73	71	68

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	84	to	96
L _{AFMax} - L _{Aeq} (Range)	16	to	26

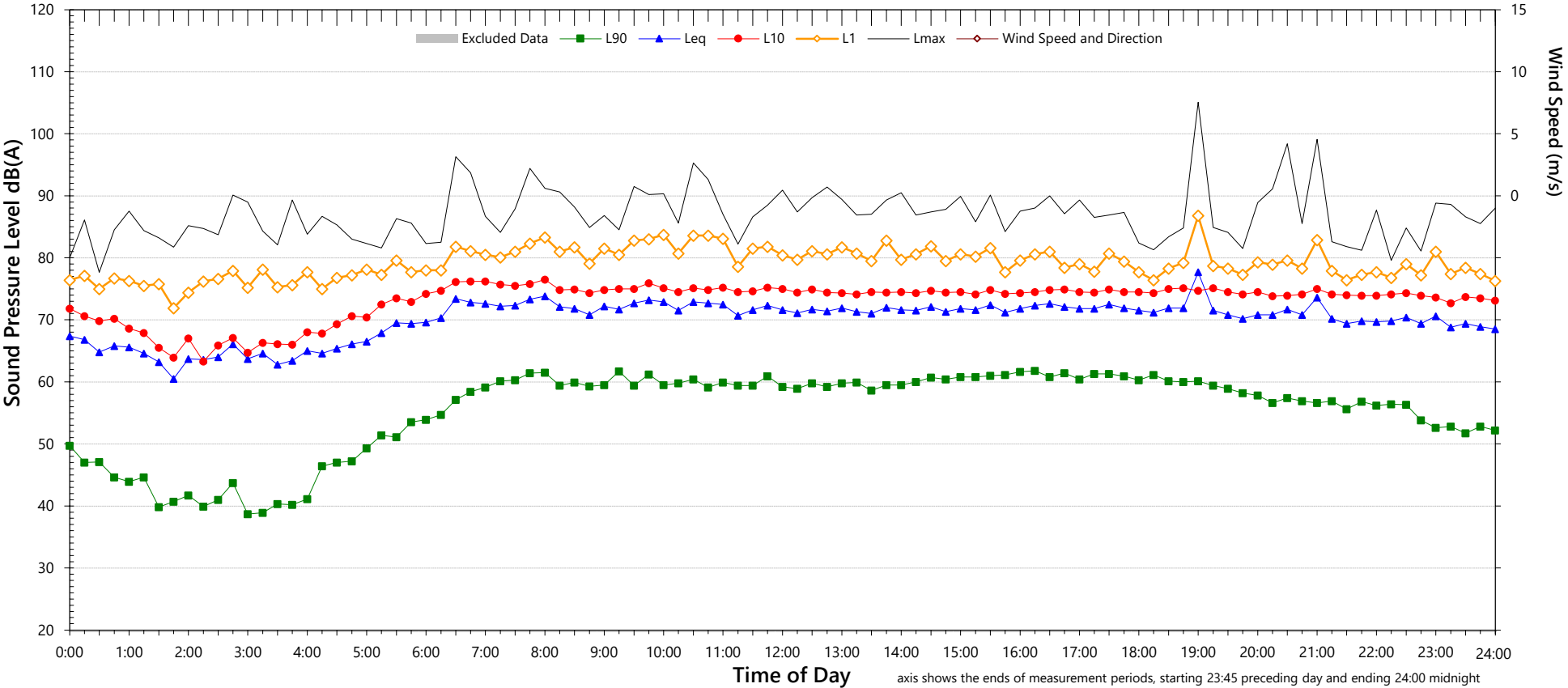
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. #N/A
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Wednesday, 17 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4 5}
L _{A90} ABL	59	56	40
L _{Aeq}	#N/A 72	72	68

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	81	to	93
L _{AFMax} - L _{Aeq} (Range)	19	to	23

Notes:

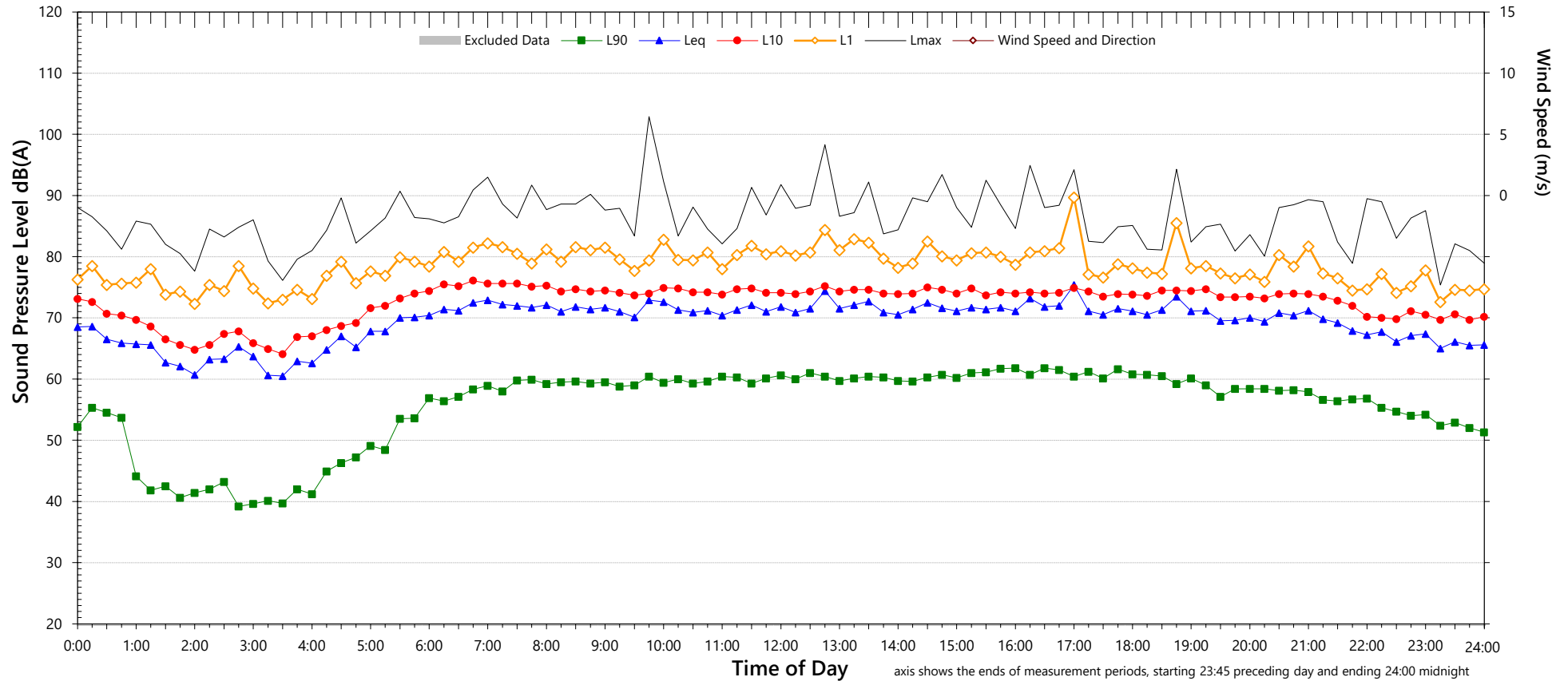
1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. #N/A
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	75	71
L _{Aeq} 1hr upper 10 percentile	75	73
L _{Aeq} 1hr lower 10 percentile	74	65

Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Thursday, 18 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	59	57	44
L _{Aeq}	#N/A 72	70	67

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	82	to	89
L _{AFMax} - L _{Aeq} (Range)	17	to	23

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	74	69
L _{Aeq} 1hr upper 10 percentile	75	72
L _{Aeq} 1hr lower 10 percentile	73	67

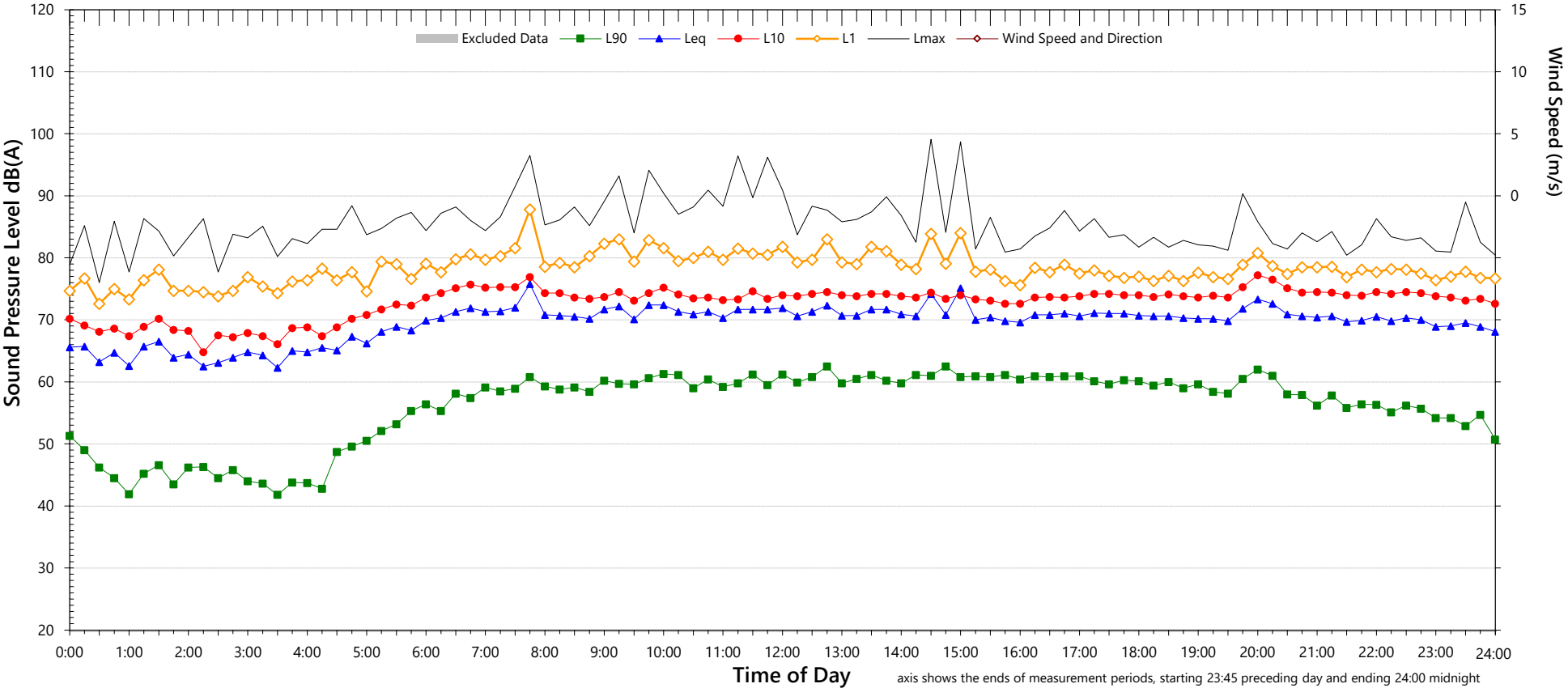
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days

5. "Night" relates to period from 10pm on this graph to morning on the following graph.

Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Friday, 19 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4 5}
L _{A90} ABL	59	56	42
L _{Aeq}	#N/A 72	71	67

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	83	to	92
L _{AFMax} - L _{Aeq} (Range)	15	to	26

Notes:

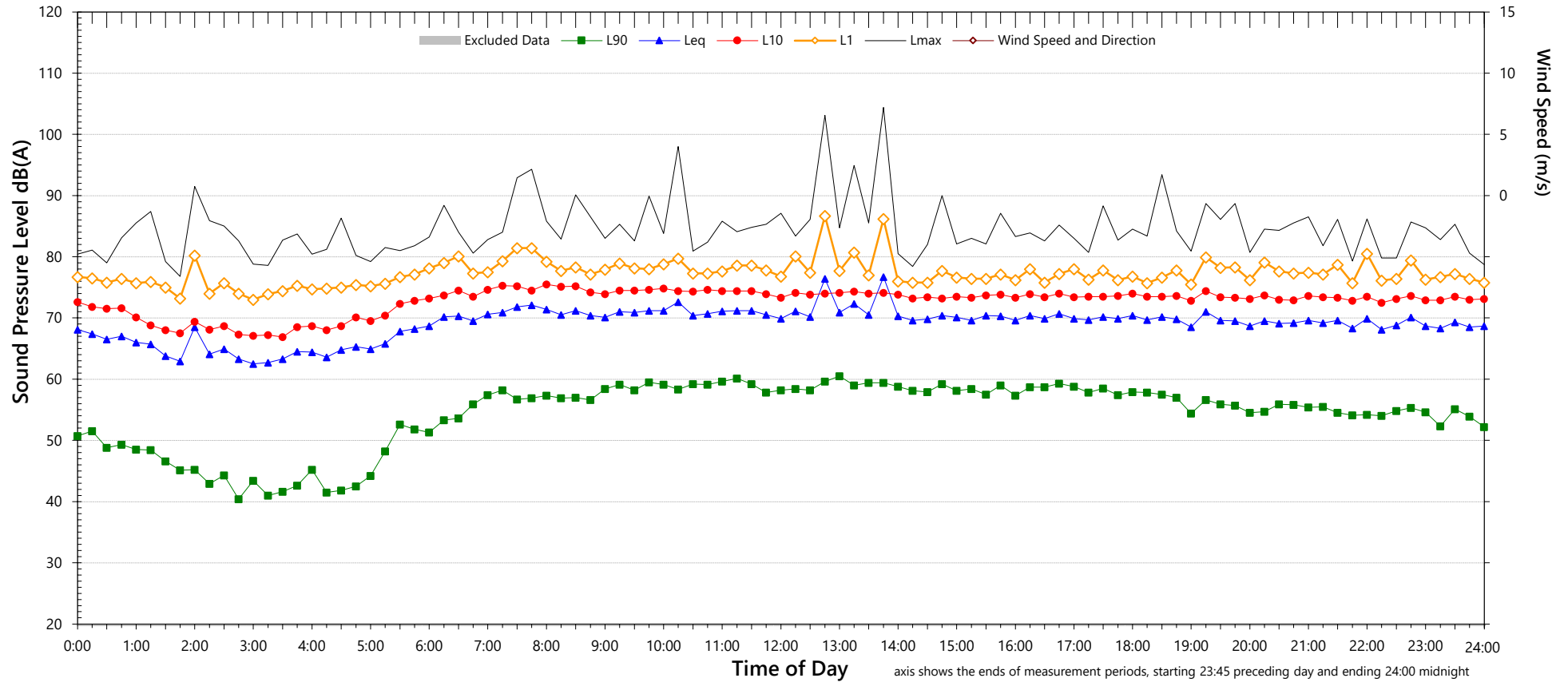
1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. #N/A
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	74	70
L _{Aeq} 1hr upper 10 percentile	75	72
L _{Aeq} 1hr lower 10 percentile	73	66

Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Saturday, 20 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	57	54	41
L _{Aeq}	#N/A 71	70	67

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	83	to	97
L _{AFMax} - L _{Aeq} (Range)	17	to	28

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	73	69
L _{Aeq} 1hr upper 10 percentile	75	72
L _{Aeq} 1hr lower 10 percentile	72	66

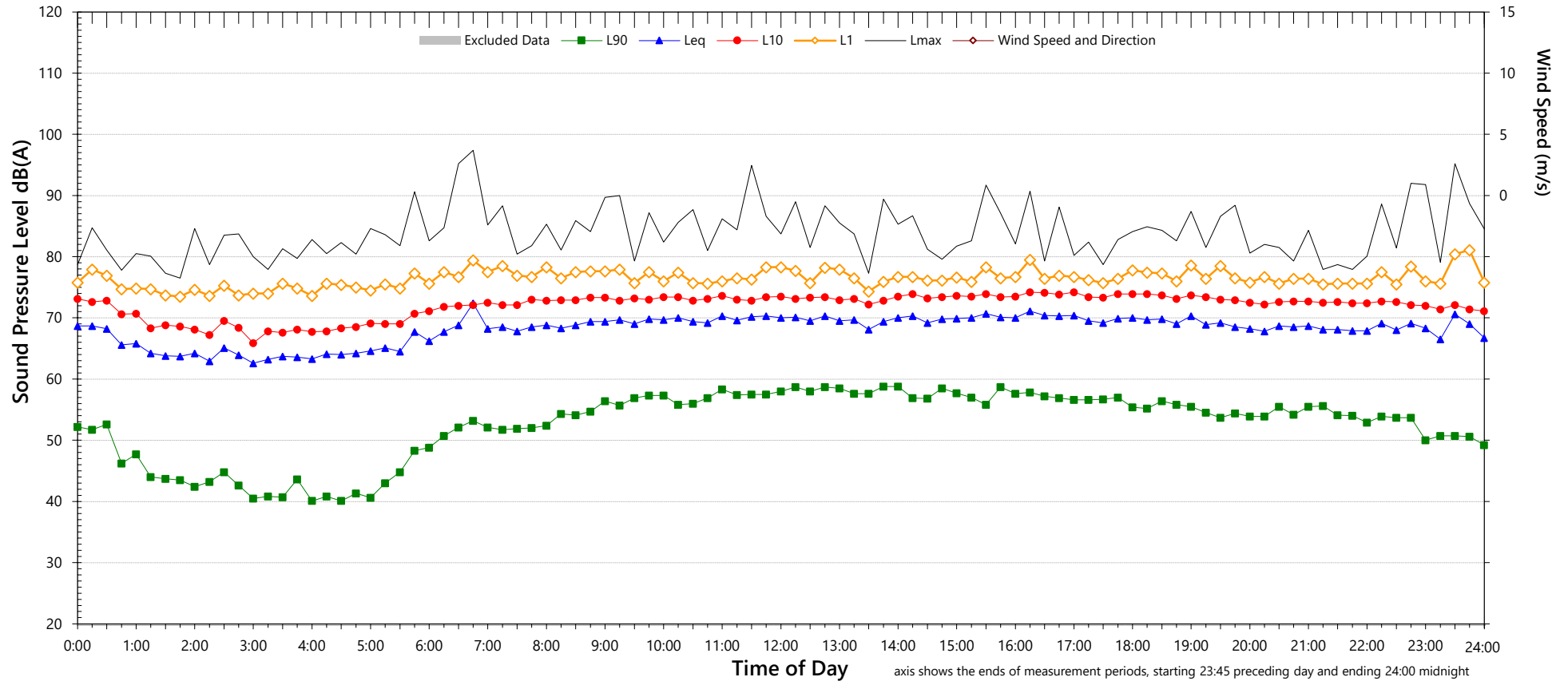
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days

5. "Night" relates to period from 10pm on this graph to morning on the following graph.

Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Sunday, 21 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	56	54	41
L _{Aeq}	#N/A 70	69	67

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	84	to	95
L _{AFMax} - L _{Aeq} (Range)	16	to	27

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

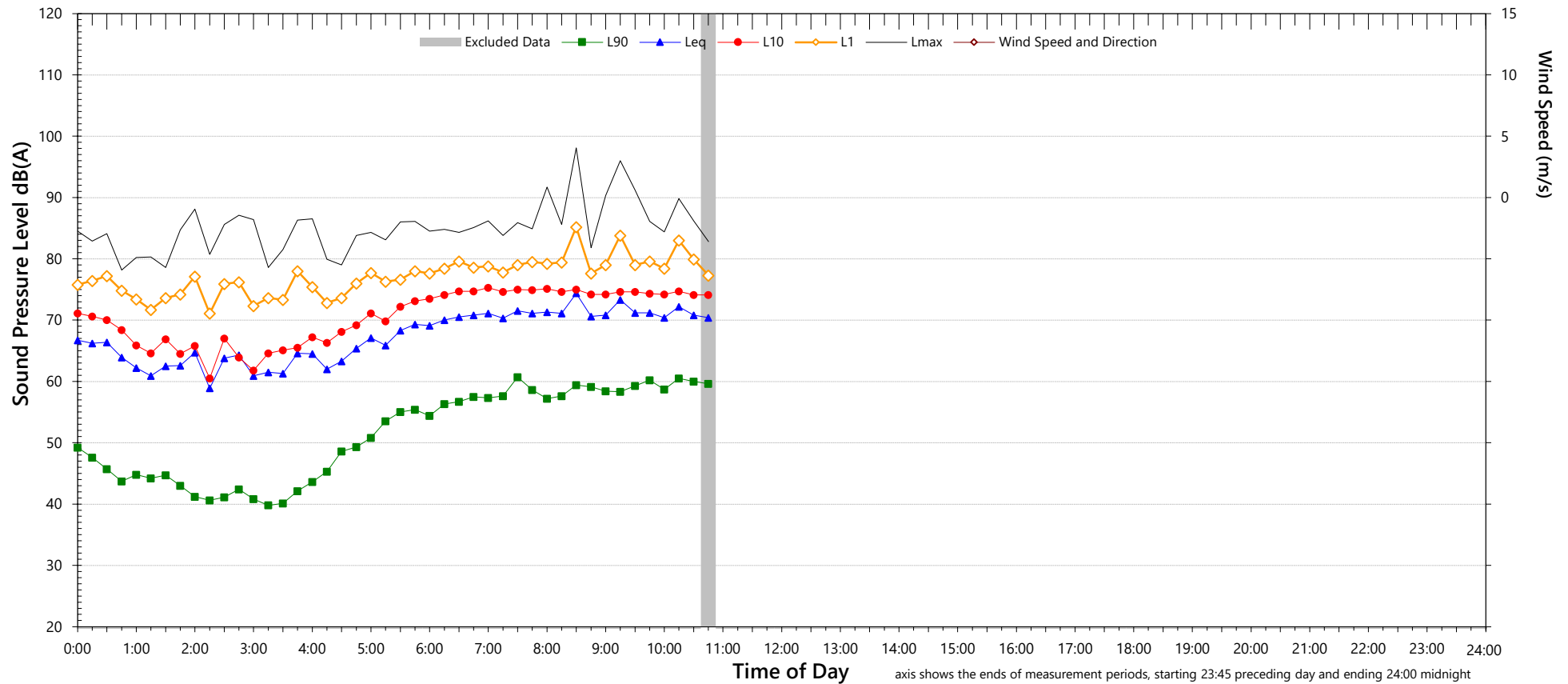
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	72	69
L _{Aeq} 1hr upper 10 percentile	73	72
L _{Aeq} 1hr lower 10 percentile	71	65

Unattended Noise Monitoring Results

810 Pacific Hwy, Gordon - Pacific Hwy Boundary

Monday, 22 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	-	-	-
L _{Aeq}	#N/A	-	-

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	-	to	-
L _{AFMax} - L _{Aeq} (Range)	-	to	-

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

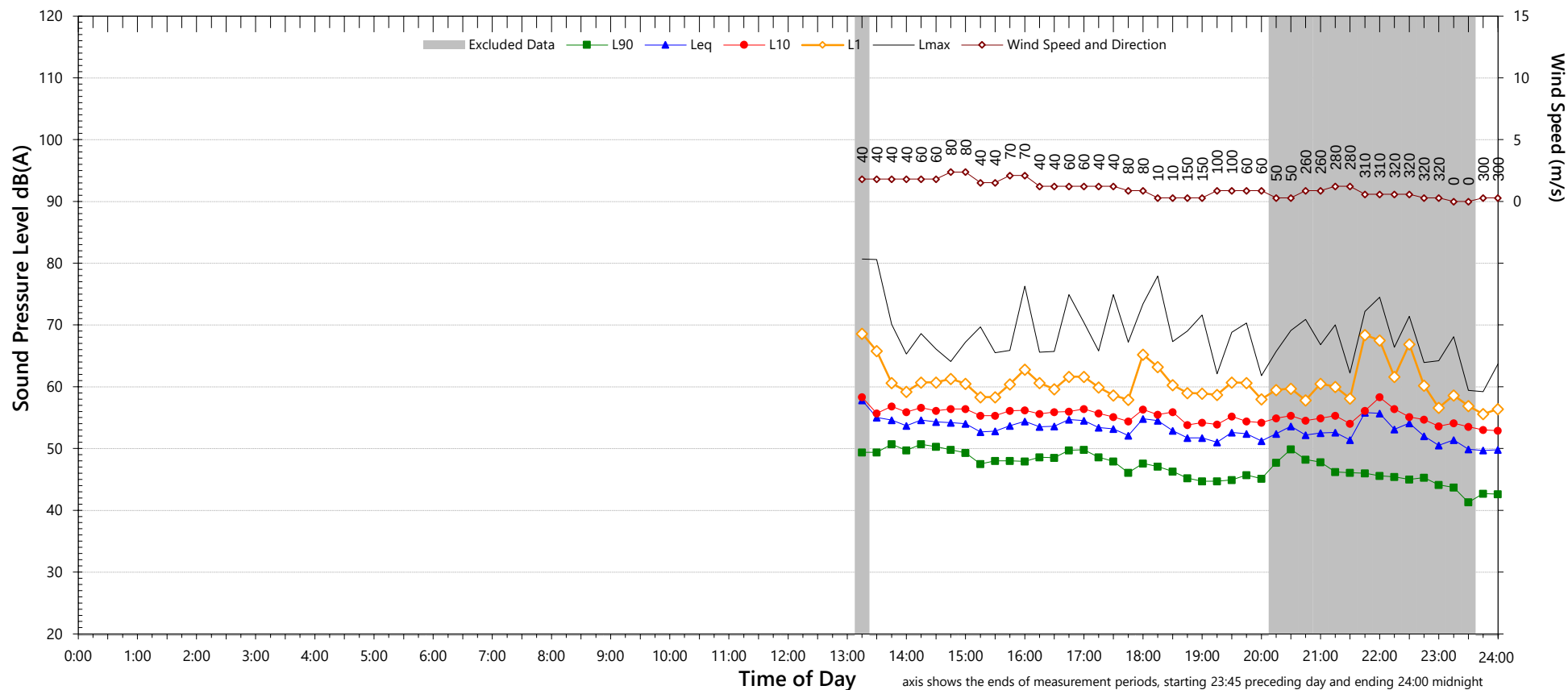
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	-	-
L _{Aeq} 1hr upper 10 percentile	-	-
L _{Aeq} 1hr lower 10 percentile	-	-

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Saturday, 13 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	-	-	-
L _{Aeq}	#N/A	-	-

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	65	to	77
L _{AFMax} - L _{Aeq} (Range)	18	to	27

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

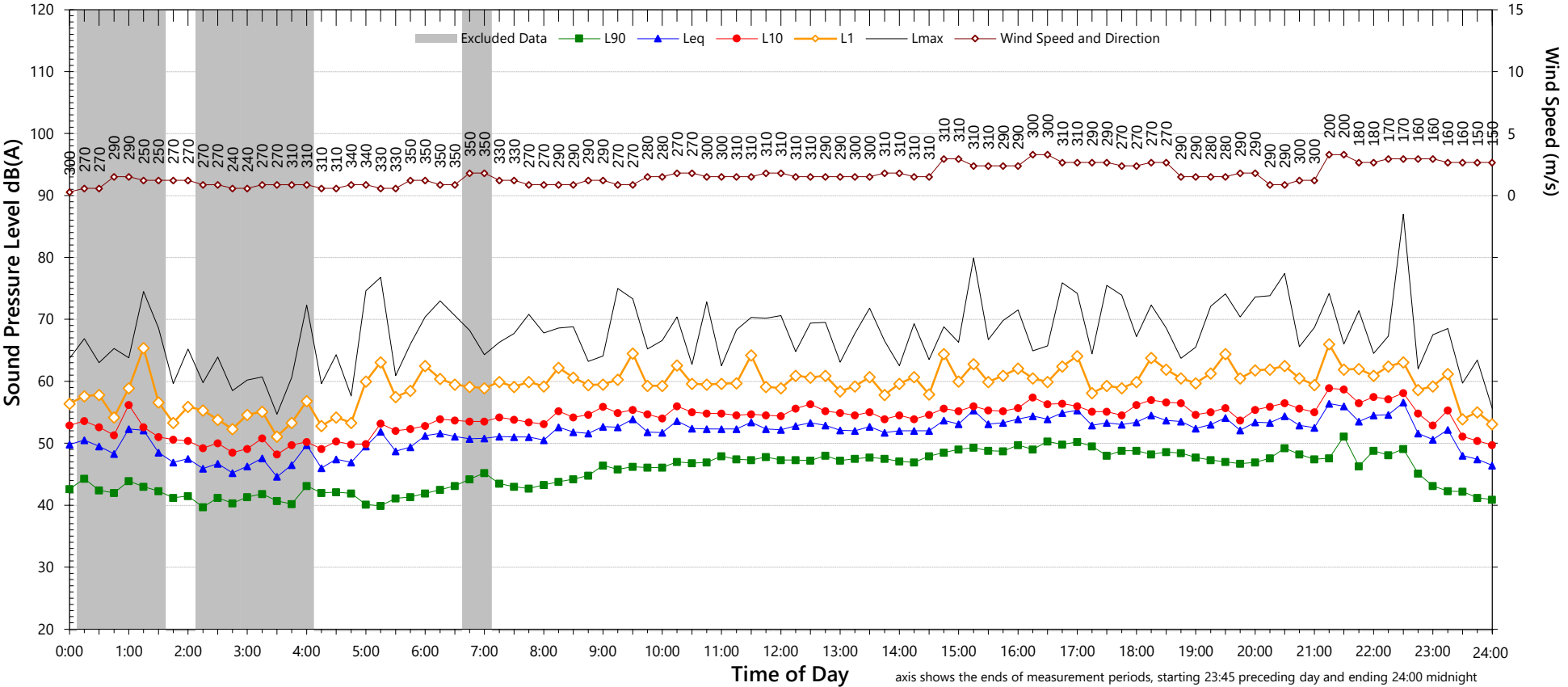
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	-	52
L _{Aeq} 1hr upper 10 percentile	-	54
L _{Aeq} 1hr lower 10 percentile	-	50

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Sunday, 14 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4 5}
L _{A90} ABL	46	47	37
L _{Aeq}	#N/A	53	51
Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	66	to	87
L _{AFMax} - L _{Aeq} (Range)	16	to	33

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

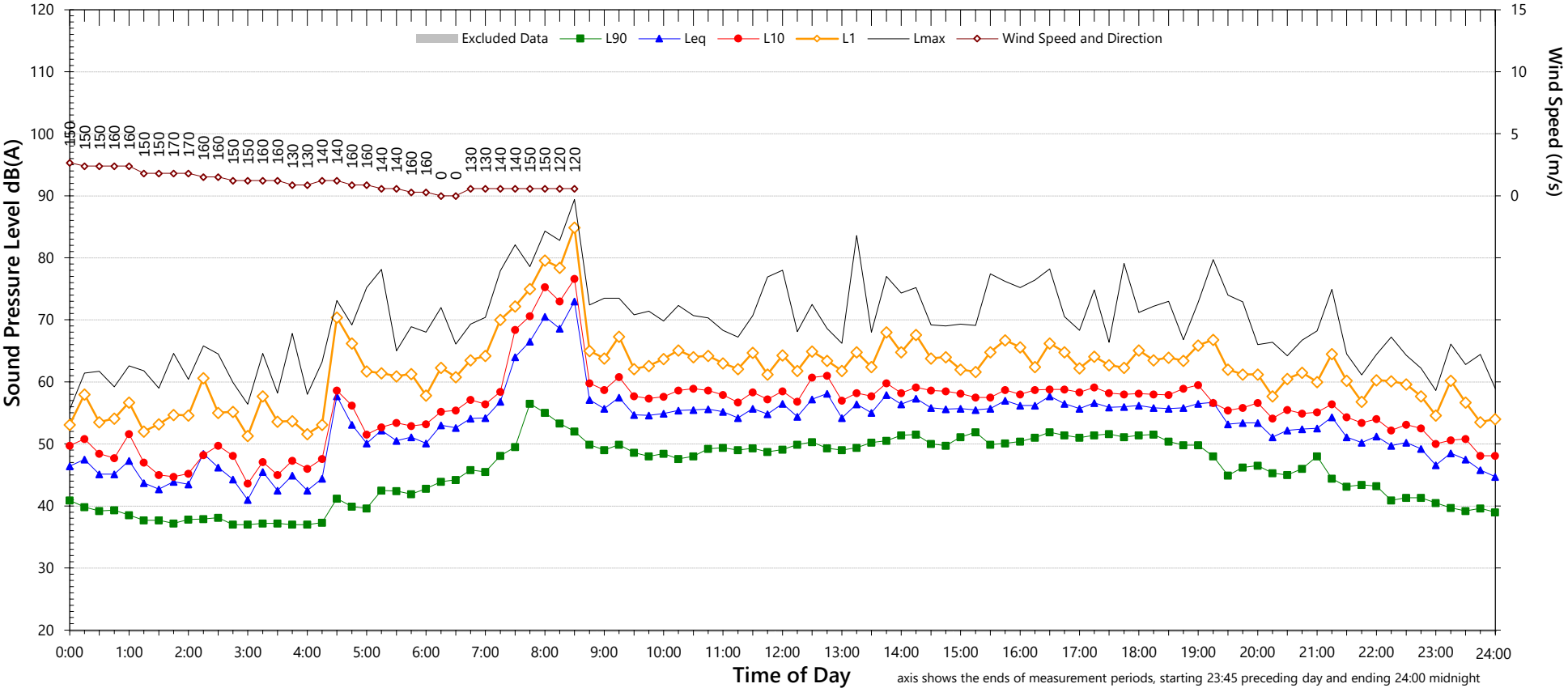
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax} - L_{Aeq} ≥15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	56	53
L _{Aeq} 1hr upper 10 percentile	57	56
L _{Aeq} 1hr lower 10 percentile	55	46

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Monday, 15 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4 5}
L _{A90} ABL	48	43	38
L _{Aeq}	#N/A 61	54	55

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	66	to	83
L _{AFMax} - L _{Aeq} (Range)	18	to	27

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

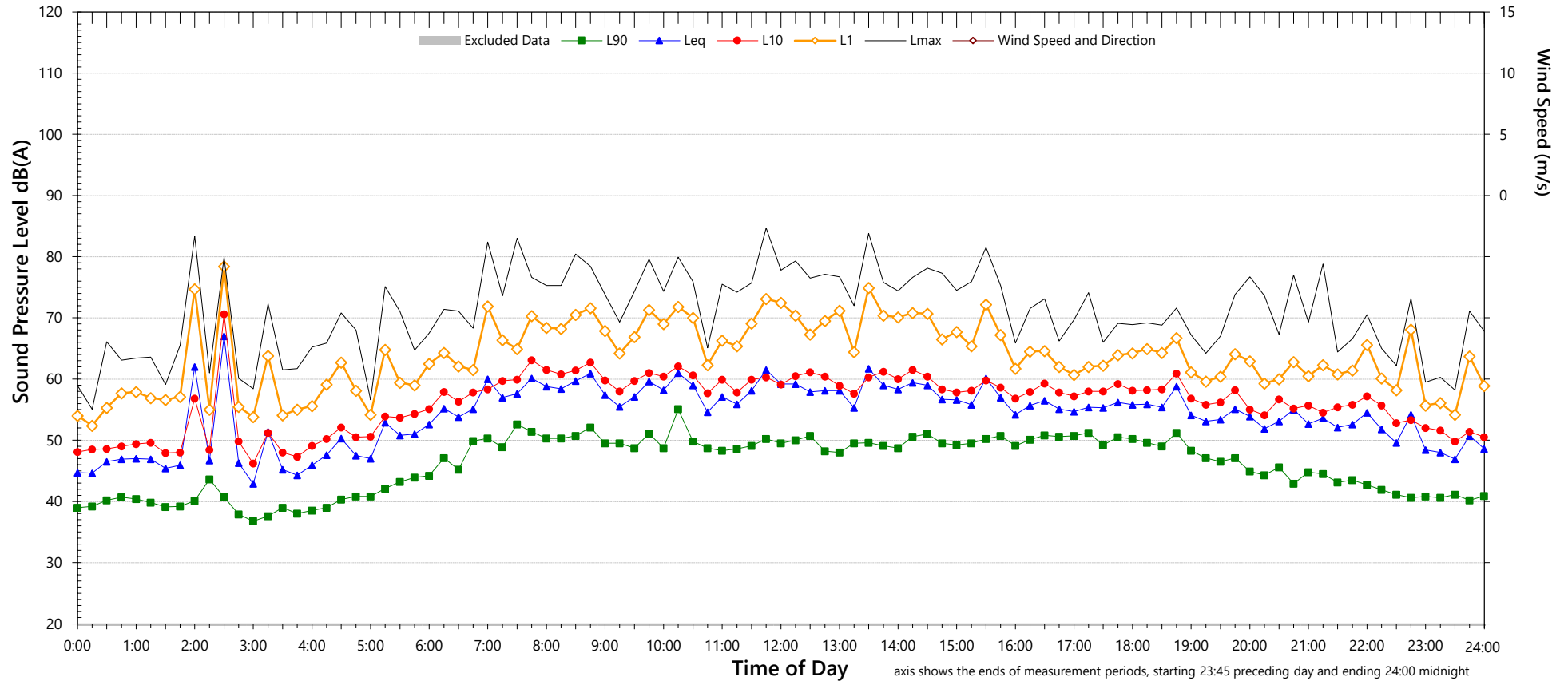
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

NSW Road Noise Policy (1m from facade)			#N/A
Descriptor	Day	Night ⁵	
	7am-10pm	10pm-7am	
L _{Aeq} 15 hr and L _{Aeq} 9 hr	63	57	
L _{Aeq} 1hr upper 10 percentile	65	60	
L _{Aeq} 1hr lower 10 percentile	56	49	

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Tuesday, 16 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	49	43	-
L _{Aeq}	#N/A	58	54
Night Time Maximum Noise Levels (see note 7)			
L _{AFMax} (Range)	69	to	74
L _{AFMax} - L _{Aeq} (Range)	17	to	22

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

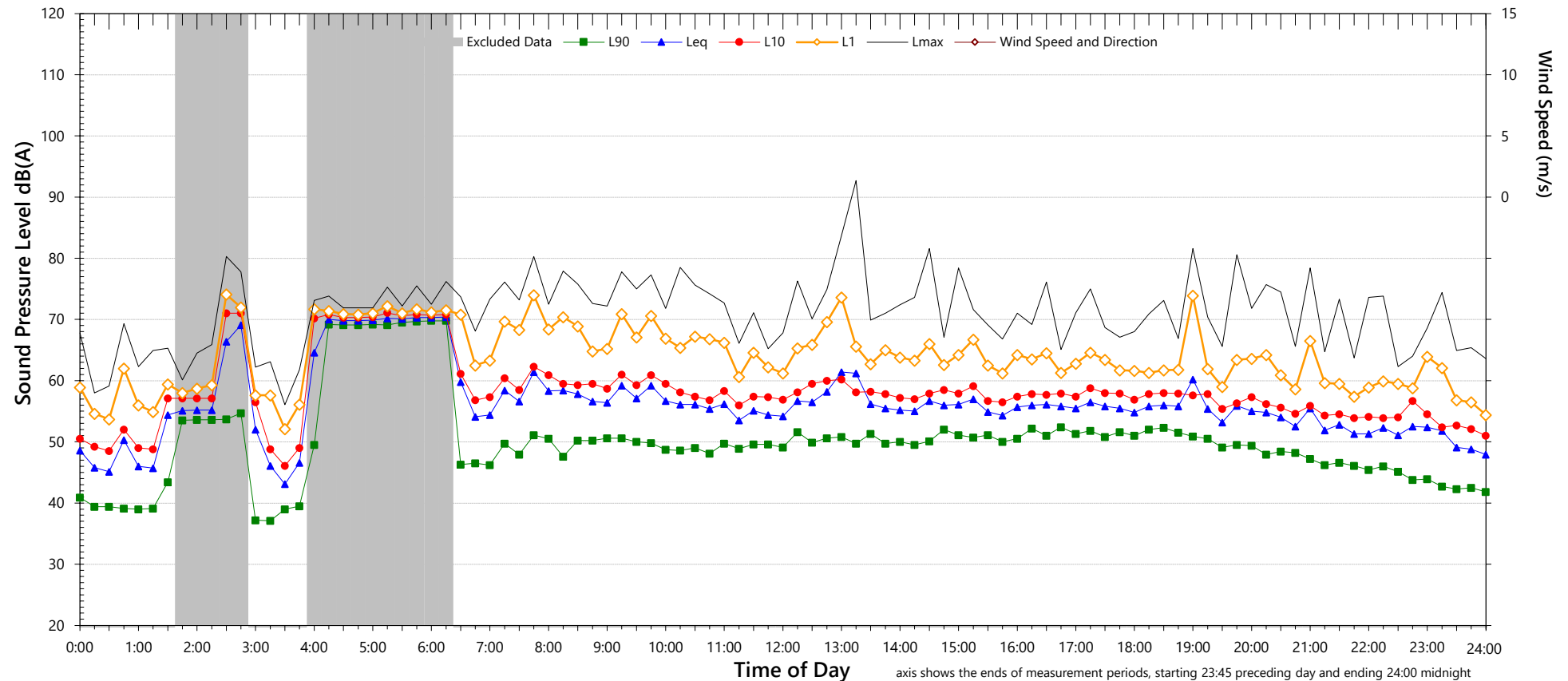
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)			#N/A
Descriptor	Day	Night ⁵	
	7am-10pm	10pm-7am	
L _{Aeq} 15 hr and L _{Aeq} 9 hr	60	54	
L _{Aeq} 1hr upper 10 percentile	62	56	
L _{Aeq} 1hr lower 10 percentile	56	49	

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Wednesday, 17 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	49	46	38
L _{Aeq}	#N/A	57	52

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	69	to	78
L _{AFMax} - L _{Aeq} (Range)	17	to	25

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

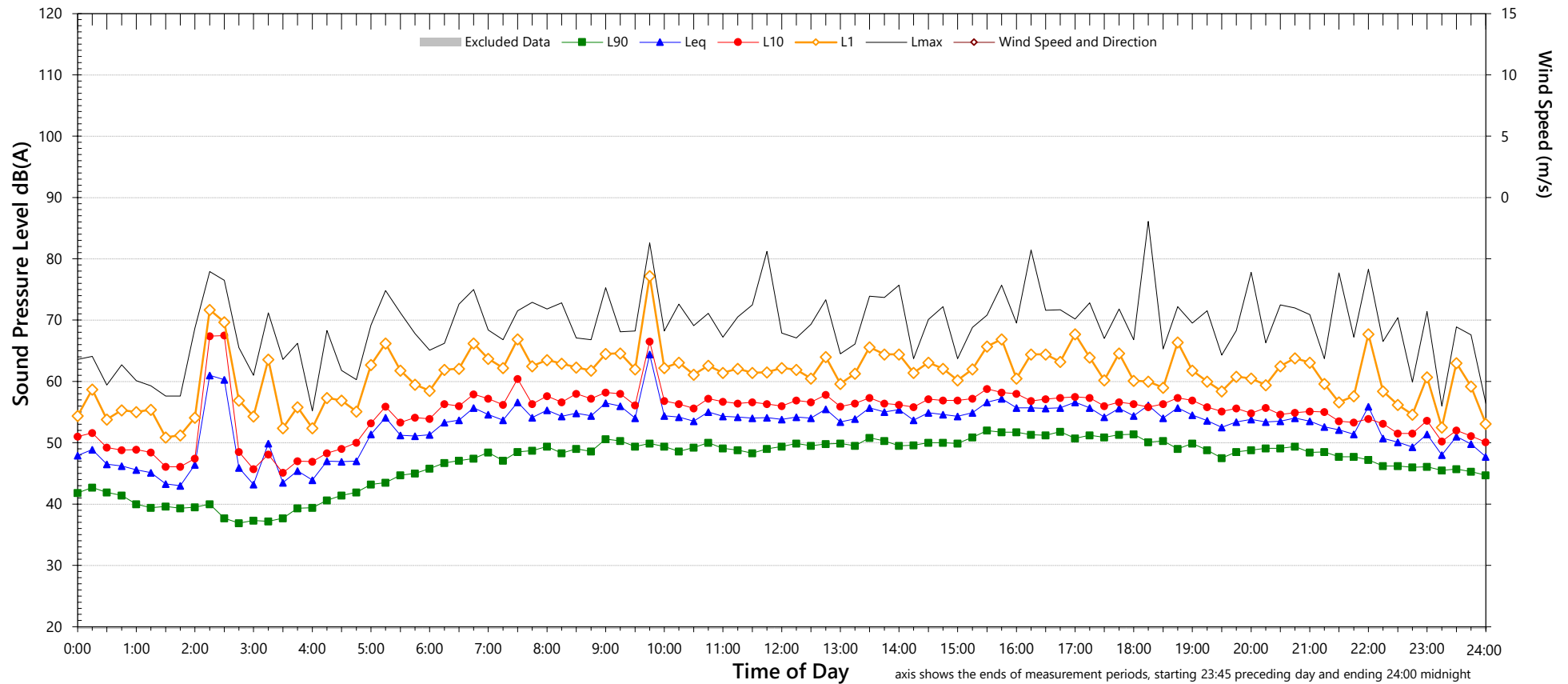
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)			#N/A
Descriptor	Day	Night ⁵	
	7am-10pm	10pm-7am	
L _{Aeq} 15 hr and L _{Aeq} 9 hr	59	55	
L _{Aeq} 1hr upper 10 percentile	61	58	
L _{Aeq} 1hr lower 10 percentile	57	49	

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Thursday, 18 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	49	48	42
L _{Aeq}	#N/A	56	52

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	67	to	83
L _{AFMax} - L _{Aeq} (Range)	17	to	30

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

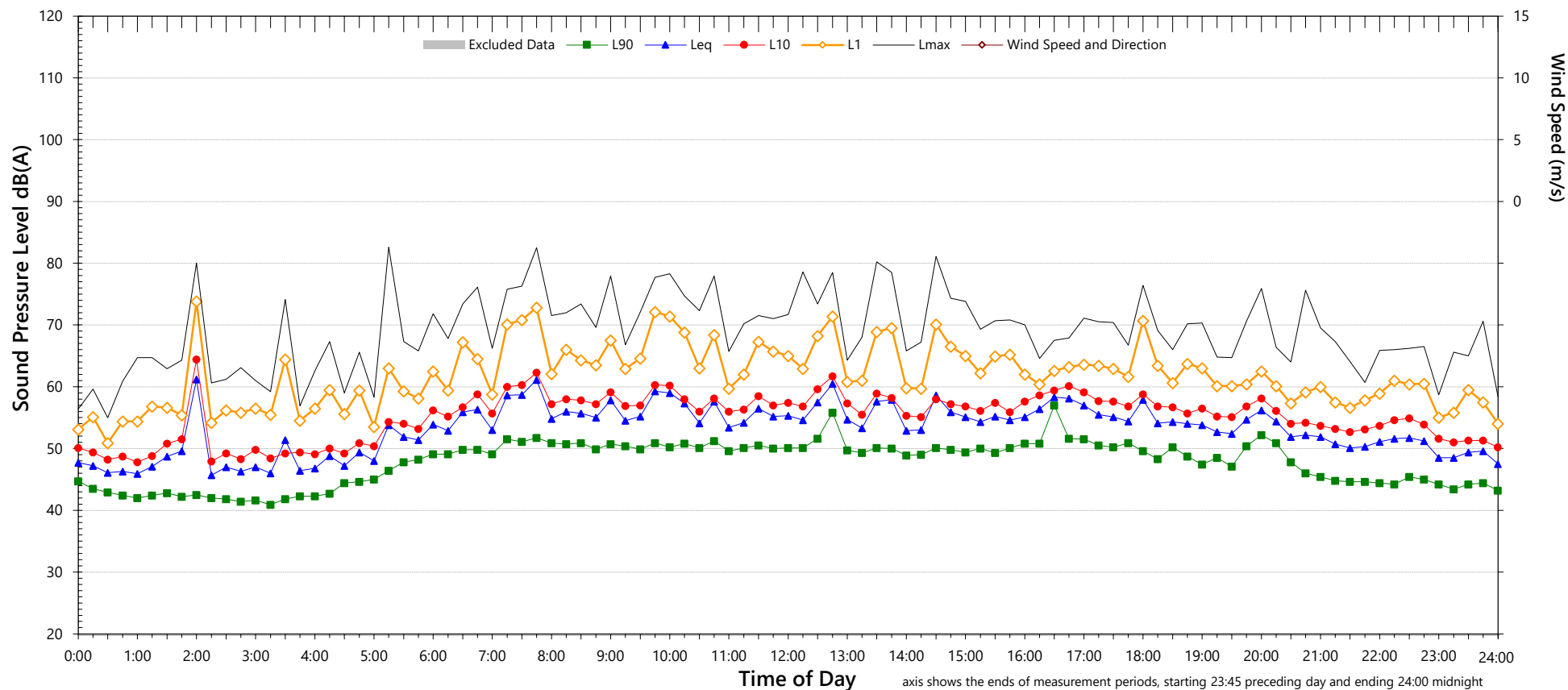
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	58	54
L _{Aeq} 1hr upper 10 percentile	59	58
L _{Aeq} 1hr lower 10 percentile	56	49

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Friday, 19 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	49	45	40
L _{Aeq}	#N/A 57	53	50

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	67	to	81
L _{AFMax} - L _{Aeq} (Range)	16	to	34

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

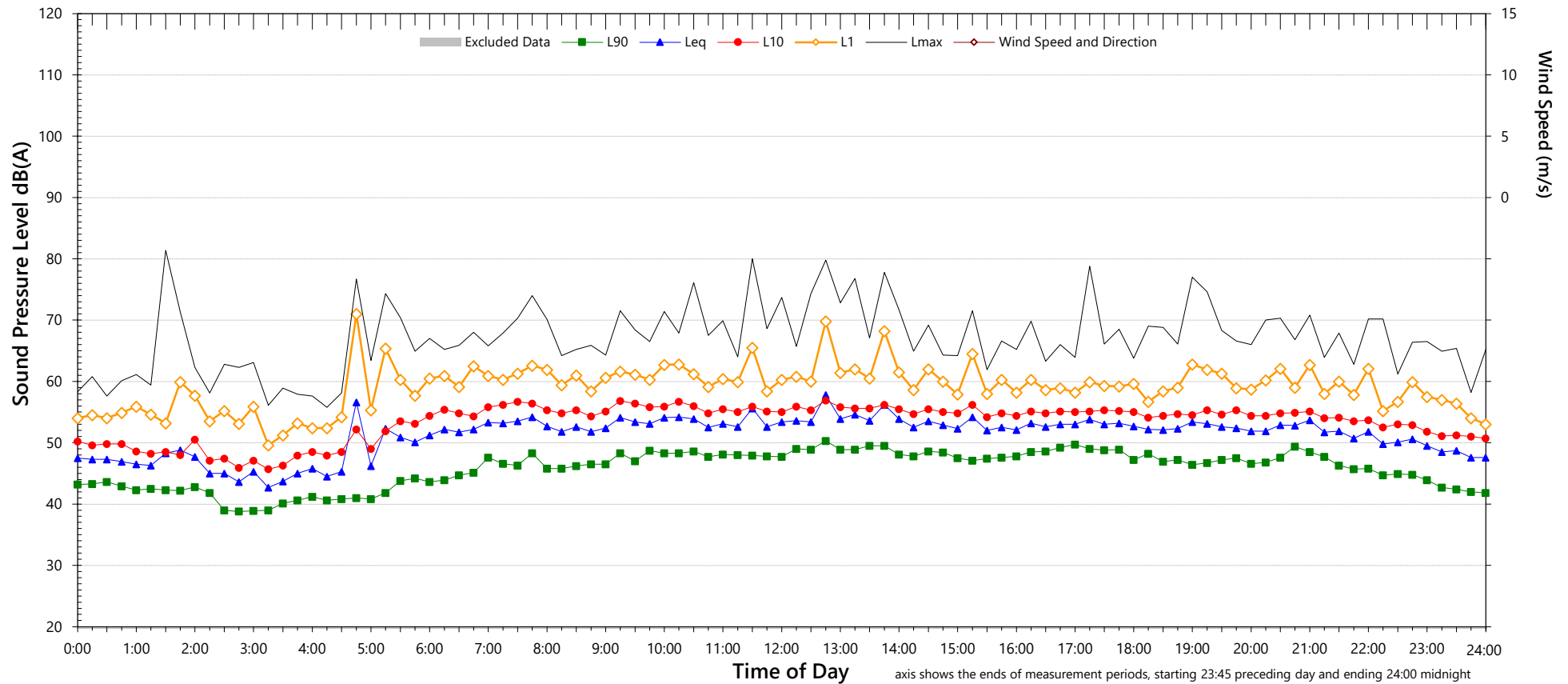
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	58	52
L _{Aeq} 1hr upper 10 percentile	60	54
L _{Aeq} 1hr lower 10 percentile	56	47

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Saturday, 20 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	47	46	38
L _{Aeq}	#N/A 54	52	48

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	65	to	78
L _{AFMax} - L _{Aeq} (Range)	17	to	26

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

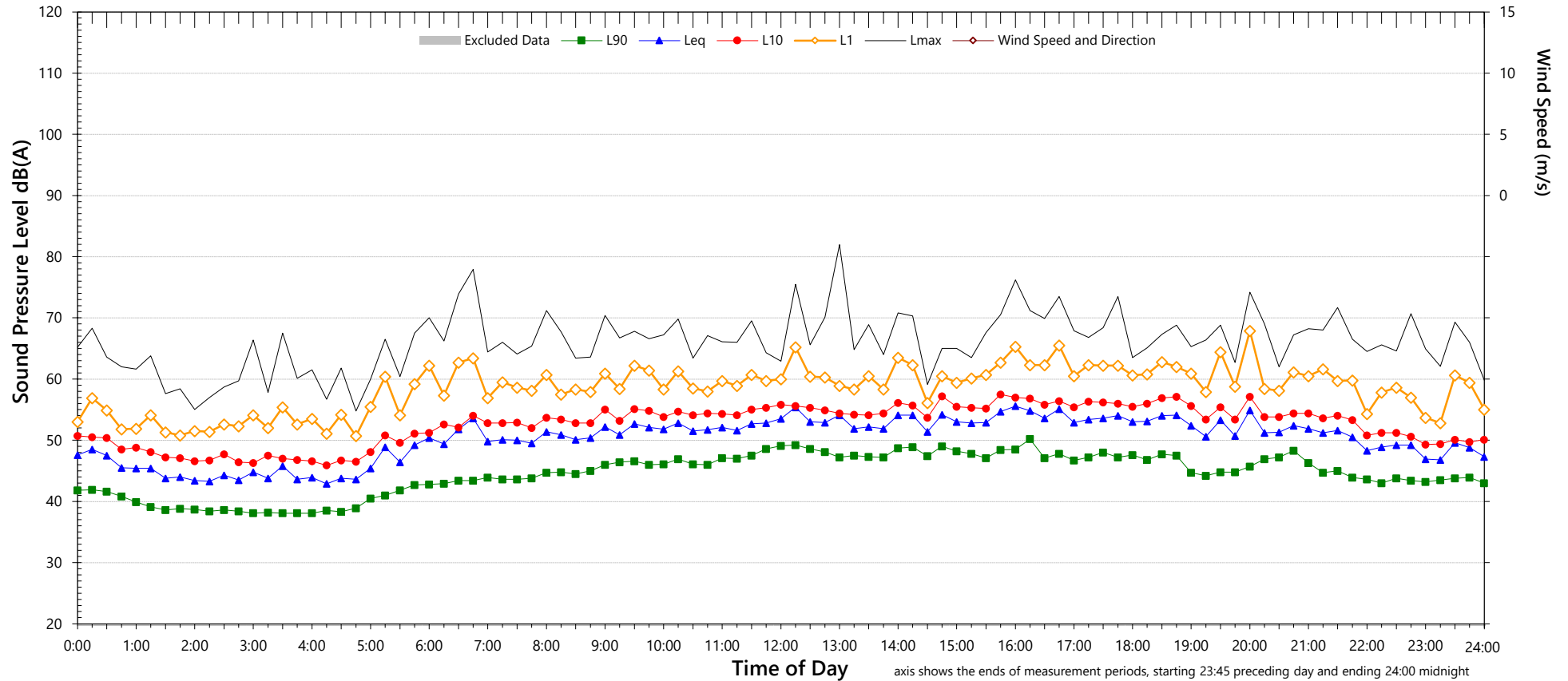
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	56	50
L _{Aeq} 1hr upper 10 percentile	57	53
L _{Aeq} 1hr lower 10 percentile	55	47

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Sunday, 21 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	46	44	40
L _{Aeq}	#N/A 53	52	50
Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	65	to	80
L _{AFMax} - L _{Aeq} (Range)	19	to	25

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

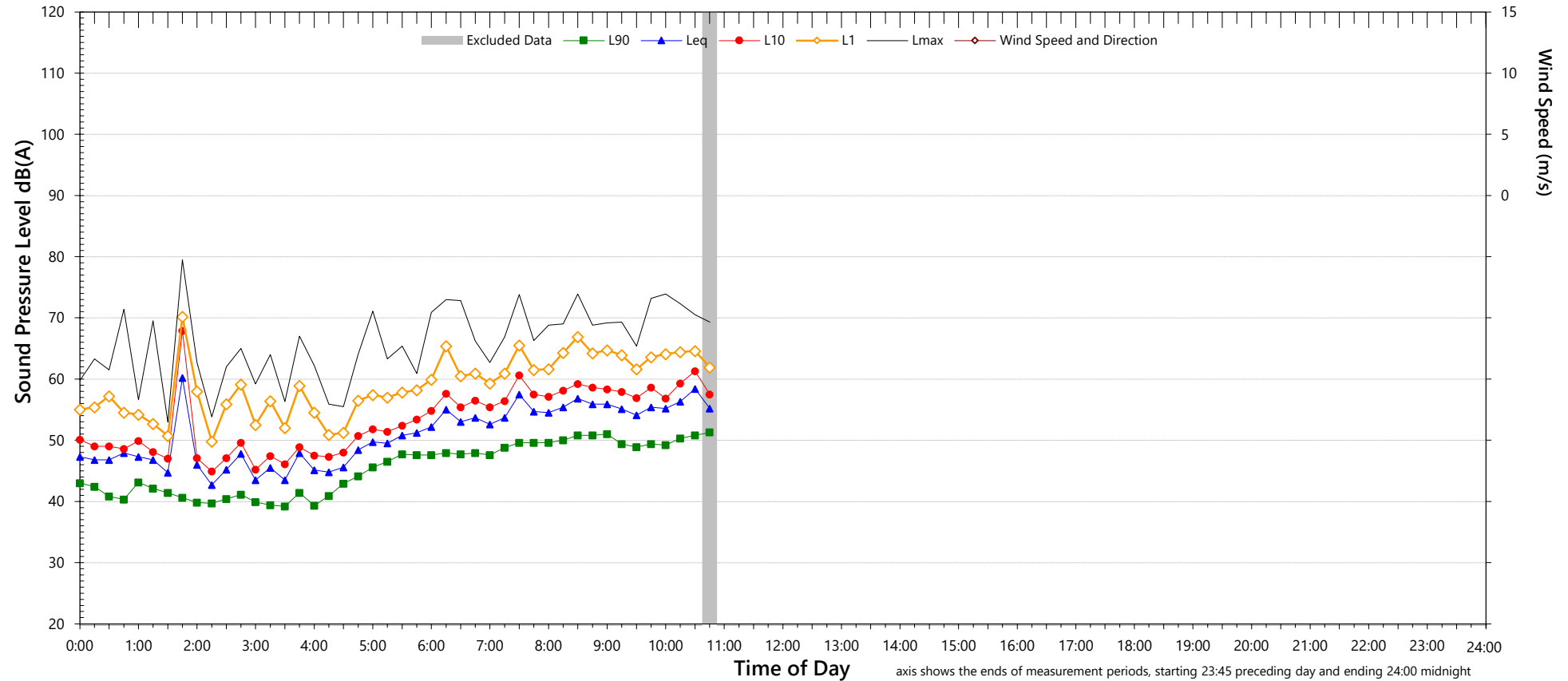
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	55	53
L _{Aeq} 1hr upper 10 percentile	57	56
L _{Aeq} 1hr lower 10 percentile	53	48

Unattended Noise Monitoring Results

810 Pacific Highway, Gordon - Rear boundary

Monday, 22 December 2025



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day ²	Evening ³	Night ^{4,5}
L _{A90} ABL	-	-	-
L _{Aeq}	#N/A	-	-

Night Time Maximum Noise Levels		(see note 7)	
L _{AFMax} (Range)	-	to	-
L _{AFMax} - L _{Aeq} (Range)	-	to	-

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

3. "Evening" is the period from 6pm till 10pm

#N/A

4. "Night" relates to the remaining periods

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} > 65dB(A) and where L_{AFMax} - L_{Aeq} ≥ 15dB(A)

NSW Road Noise Policy (1m from facade)		#N/A
Descriptor	Day	Night ⁵
	7am-10pm	10pm-7am
L _{Aeq} 15 hr and L _{Aeq} 9 hr	-	-
L _{Aeq} 1hr upper 10 percentile	-	-
L _{Aeq} 1hr lower 10 percentile	-	-