Acoustics
Vibration
Structural Dynamics

OCEANGROVE
DEE WHY PARADE, DEE WHY

Site Compatibility Statement for Planning Proposal - Acoustics

18 December 2023

Dee Why RSL Club

TN504-01F01 Site Compatibility Study (r4)

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1 Introduction

Renzo Tonin & Associates was engaged to undertake a site suitability study with respect to acoustics to support a Planning Proposal for a proposed residential development at 2-6 Dee Why Parade, part of 8 Dee Why Parade, 10-12 Dee Why Parade and part of 2 Clarence Ave, Dee Why.

This assessment investigates the effects of external noise intrusion onto the site from road traffic (Pittwater Road).

This study has been undertaken in order to address concerns raised by Northern Beaches Council with respect to site suitability given the noise impact on it from Pittwater Road. Issues relating to acoustics raised by Council are summarised below:

- For sustainability, reliance on mechanical ventilation/air-conditioning over the life cycle of the development is not supported for units affected by noise. Noise barrier planning and means of demonstrating how natural ventilation is achieved with acoustic amenity is required.

- A reference design & accompanying acoustic report confirming how the acoustic requirements of SEPP-I can be achieved while providing natural ventilation & natural cross ventilation (windows and doors open).

This report has been prepared in order to address the concerns raised by Council, in particular identifying how acoustic treatment is proposed to be implemented to ensure suitable internal noise levels within apartments to meet SEPP Infrastructure requirements and providing natural ventilation to apartments with acoustic impacts minimised.

This report is based on drawings by Marchese Partners dated December 2023. The drawings reviewed are concept and indicative for the purposes of a Planning Proposal and will be further developed and design to achieve compliance with acoustic requirements in a future DA submission.

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. Appendix A contains a glossary of acoustic terms used in this report.

2 Site description

The site is located at 2-6 Dee Why Parade, part of 8 Dee Why Parade, 10-12 Dee Why Parade and part of 2 Clarence Ave, Dee Why.

It is proposed to extend the existing senior housing development with two new buildings, one on the western portion of the site (closer to Pittwater Road) and one on the eastern portion of the site (further from Pittwater Road).

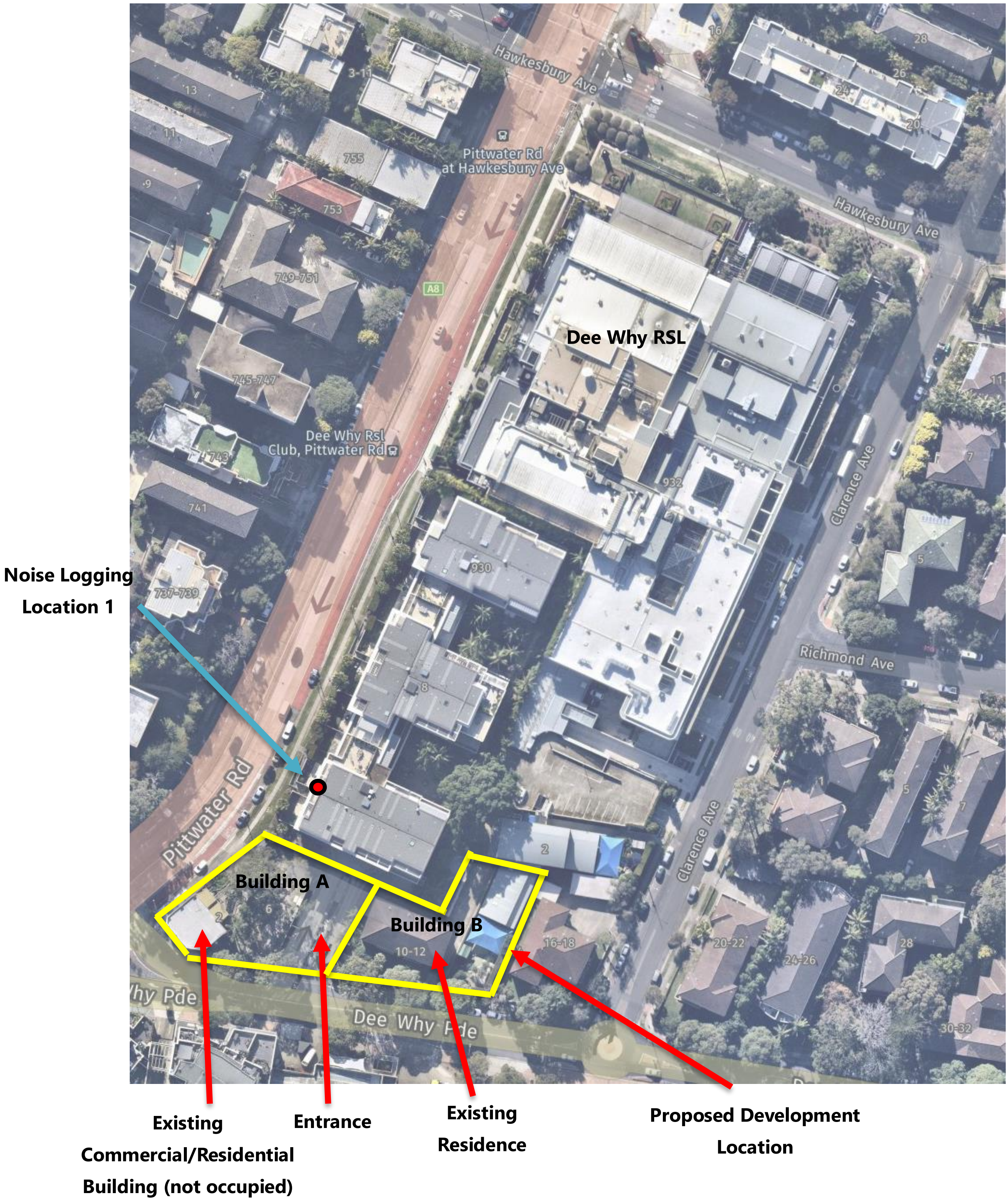
The site lies adjacent to Pittwater Road, which carries high levels of traffic (and associated traffic noise)

Development in the vicinity of the site is as follows:

- The northern edges of the site are bounded by Dee Why RSL/Dee Why Seniors Living development.
- The eastern edges of the site are bounded by the Parking Lot at 1-3 Clarence Ave.
- The southern edge of the site is bounded by existing residential dwellings (Dee Why Parade).

An aerial photograph showing the site and surrounds is presented below.

Figure 1: Proposed site plan and measurement locations



3 Ambient and Background noise surveys

An unattended long-term noise monitor was installed from the 14th to 22nd of August to determine the existing level of ambient and background noise levels pertinent to the site. The long-term noise monitoring location is shown in the figure above and detailed in Table 1 below.

Table 1: Noise monitoring locations

Location ID	Description
Long-term noise monitoring	
Location 1	Noise monitor installed on the western side of the site on the balcony of Apartment 14 on Level 3, approximately 17m from the centre southbound lane of Pittwater Road. The microphone position had uninterrupted line of site to the road. Noise measured at this location is relevant for establishing background noise levels (used when setting noise emission goals for the site).

The noise monitor 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.

Short term measurements were made using a XL2 Type 1 sound analyser on fast response mode.

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

3.1 Results of long-term noise monitoring

3.1.1 Road traffic noise

The traffic noise levels have been taken from the representative $L_{Aeq(15/9hr)}$ for the week for both day time (7am to 10pm) and night time (10pm to 7am) periods. The measured noise levels are presented in Table 2 below.

Table 2: Representative day and night road traffic noise levels

Monitoring Location (refer to **Figure 1)**	**Survey Period**	**Measured Noise Level**
Location L1 – Oceangrove Level 3, Apartment 14 Balcony (Representative of the proposed Western facades)	Day time (7am to 10pm) 14 to 22 August 2023	69dB(A)$L_{eq(15hr)}$
	Night time (10pm to 7am) 14 to 22 August 2023	64dB(A)$L_{eq(9hr)}$

Notes:

1. Noise levels presented are facade corrected values.
2. Representative external noise levels in measured L_{Aeq} over 15 hour and 9 hour day and night period respectively.

Using the table above, noise levels incident on the proposed building façade can be determined. For the purpose of calculations, the following façade noise levels will be used:

Table 3: Road Traffic Noise Levels for the purpose of acoustic calculations.

Assessment Location	Measured Noise Levels, dB(A)	
	Day Time	Night Time
	$L_{eq,\ 15\ hr}$	$L_{eq,\ 9\ hr}$
Western building (Building A) Western façade - facing Pittwater Rd	69	64
Eastern Building (Building B) Southern façade - facing Dee Why Pde	60	55

3.1.2 Background noise

Table 3 below presents the results of the long-term unattended noise monitoring for background noise.

Table 3: Background noise levels from long-term noise monitoring

Noise Monitoring		Representative Background Noise Levels in dB(A)	Day[1]	Evening[2]	Night[3]
Location	Duration				
Location L1 – Oceangrove Level 3, Apartment 14 Balcony	14 to 22 August 2023	L_{A90}	58	54	43
		L_{Aeq}	69	67	64

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.
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

4 External noise intrusion assessment

4.1 Criteria

4.1.1 Warringah DCP 2011

Part B Section D3 states the following objective:

To ensure that noise emission does not unreasonably diminish the amenity of the area or result in noise intrusion which would be unreasonable for occupants, users or visitors.

4.1.2 SEPP Transport and Infrastructure 2021

Being located adjacent to a major road, the acoustic requirements of *SEPP Transport and Infrastructure* (2021) (previously SEPP Infrastructure) will be applicable to any future development on the site.

The noise criteria outlined in the SEPP are summarised as shown in the table below.

Table 4: Recommended internal noise criteria for road traffic noise

Type of Occupancy	Windows Condition	Target Internal Noise Level	
		Day, - $L_{eq\ (15hour)}$	Night, - $L_{eq\ (9hour)}$
Bedrooms	Closed	-	35dB(A)
Open-plan Living/Dining/Kitchen	Closed	40dB(A)	40dB(A)

4.1.3 Development Near Rail Corridors and Busy Roads

NSW Planning document *Development Near Rail Corridors and Major Roads* sets internal noise goals for developments near noisy road/rail corridors. The guideline sets internal noise goals within dwellings for both windows open and windows closed conditions, namely:

- Windows closed:
    - Bedrooms: 35dB(A)$L_{eq9hr(night)}$.
    - Other Habitable Rooms: 40dB(A)$L_{eq15hr(Day)}$ and 40dB(A)$L_{eq9hr(Night)}$
- Windows open:

  If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that the occupants can leave windows closed if they so desire and also to meet the ventilation requirements of the Building Code of Australia.

Section 3.6.1 of the Guideline clearly envisages the possibility that the "windows open" internal noise goal may be unachievable and in that situation it is acceptable to rely on the windows closed to meet the required noise level. The *Development Near Rail Corridors and Major Roads* does not state how ventilation is to be provided – it is not prescriptive that ventilation should be provided passively, mechanically or by some other means.

It is relevant to note that on pages 23, 31 and 35 it is expressly stated that mechanically provided ventilation (such as by a ventilation fan and acoustically treated air intake ducting) is considered an acceptable design solution.

Section 3.8 of the *Development Near Rail Corridors and Major Roads* also provides some guidance with respect to design principles that can be adopted to minimise external noise impacts. This includes building orientation, room layouts, use of podiums and balconies as a noise shield. However, it is relevant to note that Section 3.8:

- Expressly envisages use of mechanical systems to provide ventilation to apartments (pages 23, 31, 35).
- Does not make any comment about strict compliance with internal noise levels being achieved under windows open conditions when adopting the "good design principles".

It appears clear in Section 3.8 that good design can improve an existing situation. However, it also appears clear that while good design may provide an improvement:

- Good design does not necessarily mean that there will always be a solution that can remove the need for windows to be closed to ensure a suitable internal noise level.
- The use of mechanical ventilation is an acceptable design solution in these circumstances.

4.1.4 The Apartment Design Guide (ADG) 2015 – Natural Ventilation (Section 4B) and Acoustics (Section 4J).

The Apartment Design Guide contains provisions with respect to natural ventilation (Section 4B) and for developments in areas with high external noise levels (Section 4J).

Natural ventilation of apartments typically relies on an opening (window or similar) to allow fresh air to an apartment. Obviously in an area of high external noise, opening a window may result in an excessively high internal noise level. The question then arises of how sections 4B and 4J are satisfied simultaneously.

This issue is addressed as follows:

- Part 4 of the ADG sets out guidance for "Designing the Building". Part 4 is then separated into subsections. Section B relates to Natural Ventilation and Section J relates to sites located in noisy areas.

- Each subsection of Part 4 will typically have design objectives, design criteria and design guidance. However not all sections present design criteria, and therefore there is no numerical standard by which to demonstrate compliance. However, the issue of how the subsection is complied with is addressed in the introduction to the ADG in the section titled "How to Use This Guide". On page 11 it states:

  "*Not all sections within parts 3 and 4 specify design criteria. In these instances the design guidance should be referred to when demonstrating how an objective is being achieved*".

- Section 4J (Noise Pollution) does NOT have design criteria, while section 4B (Natural Ventilation) does have design criteria.

- Section 4B (Natural Ventilation) sets design guidance and criteria with respect to natural ventilation. There are no acoustic requirements in Section 4B. Compliance or otherwise with Section 4B is achieved without consideration of acoustics.

- Section 4J (Noise Pollution) does NOT have design criteria, it only has design objectives and design guidance. Therefore, as per the instructions in the introduction to the AGD, compliance with Section 4J is demonstrated by adoption of the Design Guidance. If the Design Guidance is followed, Section 4J is satisfied.

- Concurrent compliance with 4B and 4J can therefore be achieved, by having openable windows (section 4B) ad by applying the design guidance for buildings in noisy areas (4J)

A focus on good design principles, as opposed to numerical targets is also consistent with the siting and design guidance from the *Development Near Rail Corridors and Major Road*s document, which is also referenced in Section 4J of the ADG.

4.1.4.1 ADG Part 4J 1 Design Guidance

Design guidance in this section states that to minimise impacts the following design solutions may be used:

- Physical separation between buildings and the noise or pollution source.
- Residential uses are located perpendicular to the noise source and where possible buffered by other uses.
- Non-residential buildings are site to be parallel with the noise source to provide a continuous building that shields residential uses and communal open space.
- Non-residential uses are located at lower levels vertically separating the residential component from the noise or pollution source. Setbacks to the underside of the residential floor levels should increase relative to traffic volumes and other noise sources.
- Buildings should respond to both solar access and noise. Where solar access is away from the noise source, dual aspect apartments with shallow building depths are preferable.
- Landscape design reduces the perception of noise and acts as a filter for air pollution generated by traffic and industry.

4.1.4.2 ADG 4J2 – Design Guidance:

Design guidance states that design solutions to mitigate noise include:

- Limiting the number and size of openings facing noise sources.
- Providing seals to prevent noise transfer through gaps.
- Using double or acoustic glazing, acoustic louvres or enclosed balconies.
- Using materials with mass and or sound insulation or absorption properties eg solid balcony balustrades, external screens and soffits.

4.2 Recommendations – SEPP Compliance (Internal Noise Levels, Windows/Doors Closed)

The internal noise level requirements of the SEPP must be achieved when windows/doors are closed.

The sections below provide indicative construction requirements to comply with the SEPP internal noise level targets.

4.2.1 Glazing

Recommended glazing systems are presented below:

Table 5: Indicative Façade Systems

<table>
<tr><th>Location</th><th>Facade</th><th>Location</th><th>Rom Type</th><th>Glazing Requirement</th></tr>
<tr><td rowspan="17">Building A (western building)</td><td rowspan="4">Western</td><td rowspan="2">Window Inside Enclosed Balcony</td><td>Bedroom</td><td>10.38mm laminated glass (R_w 35)</td></tr>
<tr><td>Living Room</td><td>10.38mm laminated glass (R_w 35)</td></tr>
<tr><td rowspan="2">Window Outside Enclosed Balcony</td><td>Bedroom</td><td>12.38mm laminated glass (R_w 37)</td></tr>
<tr><td>Living Room</td><td>12.38mm laminated glass (R_w 37)</td></tr>
<tr><td rowspan="4">South</td><td rowspan="2">Window Inside Enclosed Balcony</td><td>Bedroom</td><td>10.38mm laminated glass (R_w 35)</td></tr>
<tr><td>Living Room</td><td>6.38mm laminated glass (R_w 31)</td></tr>
<tr><td rowspan="2">Window Outside Enclosed Balcony</td><td>Bedroom</td><td>10.38mm laminated glass (R_w 35)</td></tr>
<tr><td>Living Room</td><td>10.38mm laminated glass (R_w 35)</td></tr>
<tr><td rowspan="4">North</td><td rowspan="2">Window Inside Enclosed Balcony</td><td>Bedroom</td><td>10.38mm laminated glass (R_w 35)</td></tr>
<tr><td>Living Room</td><td>6.38mm laminated glass (R_w 31)</td></tr>
<tr><td rowspan="2">Window Outside Enclosed Balcony</td><td>Bedroom</td><td>10.38mm laminated glass (R_w 35)</td></tr>
<tr><td>Living Room</td><td>10.38mm laminated glass (R_w 35)</td></tr>
<tr><td rowspan="4">East</td><td rowspan="2">Window Inside Enclosed Balcony</td><td>Bedroom</td><td>6.38mm laminated glass (R_w 31)</td></tr>
<tr><td>Living Room</td><td>6mm glass (R_w 29)</td></tr>
<tr><td rowspan="2">Window Outside Enclosed Balcony</td><td>Bedroom</td><td>6.38mm laminated glass (R_w 31)</td></tr>
<tr><td>Living Room</td><td>6.38mm laminated glass (R_w 31)</td></tr>
<tr><td>All</td><td>Enclosed Balcony external glazing</td><td>All</td><td>Enclosed Balcony external glazing</td></tr>
<tr><td rowspan="4">Building B (eastern building)</td><td rowspan="2">South/West</td><td rowspan="2">All</td><td>Bedroom</td><td>10.38mm laminated glass (R_w 35)</td></tr>
<tr><td>Living Room</td><td>6.38mm laminated glass (R_w 35)</td></tr>
<tr><td rowspan="2">North/East</td><td rowspan="2">All</td><td>Bedroom</td><td>6.38mm laminated glass (R_w 35)</td></tr>
<tr><td>Living Room</td><td>6.mm laminated glass (R_w 31)</td></tr>
</table>

The above treatments are indicative only. A detailed review of façade systems is required once a more detailed layout is available.

With respect to the above:

- All operable window/door elements are to have acoustic seals (equal to q-lon).
- For all glazing systems, it is necessary to ensure that the acoustic performance of the window/sliding door frame does not downrate the acoustic performance of the glass. This can be particularly difficult for 12.5mm V-lam hush. Any window frame suppliuer should provide test reports to demonstrate that their frame will not downrate the acoustic performance of the nominated glass.

4.2.2 External Walls and Roof

- External walls and roof are assumed to be masonry. If light weight external wall elements are used, these need to be reviewed in detail and may also impact the glazing requirements for that room (as the cumulative result of noise through window and external wall element needs to be considered).

The above treatments are indicative only. A detailed review of façade systems is required once a more detailed layout is available.

4.2.3 Supplementary Ventilation

The NSW Department of Planning document *Development Near Rail Corridors and Busy Roads* provides guidance on the provision of supplementary ventilation/air-conditioning in noise impacted areas.

Supplementary ventilation should be provided in the event that when windows/doors are left open, the noise level within the room exceeds the following:

- For Bedrooms (between 10pm and 7am) - Pursuant to the Department of Planning Guideline - internal noise levels are not to exceed 45dB(A)$L_{eq(9hr)}$.
- For Other Habitable Rooms (between 7am and 10pm) - Pursuant to the Department of Planning Guideline - internal noise levels are not to exceed 55dB(A)$L_{eq(15hr)}$ between 10pm and 7am.

The noise levels in the Guideline are not a noise limit that must be achieved with window open. They are a trigger for when supplementary ventilation must be considered.

The “open window” noise targets identified above cannot be achieved on in Building A. In this building, supplementary ventilation to meet AS1668 requirements is required.

A discussion of acoustics and natural ventilation is provided in the following section.

4.3 Natural Ventilation, Acoustics and the ADG

In accordance with the DoP *Development Near Rail Corridors and Busy Roads* Guideline:

> *If the 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.*

In effect, this means that if the "windows open" criteria (table 5) are exceeded, a ventilation system must be provided to meet BCA requirements.

We note that the guideline uses the term "should", as opposed to "must", and so strictly speaking the Guideline does not appear to impose a mandatory criteria with respect to meeting ventilation requirements. However, three façades in Building A are expected to be exposed to external noise levels such that the "windows open" criteria outlined above will be exceeded. Supplementary fresh air (natural or fan assisted) "should" be provided to the apartments.

While it is open to the Applicant to consider using natural or mechanical means to provide fresh air to apartments, it is also necessary that the Apartment Design Guideline is considered. In this case, section 4J (Noise and Pollution) not be addressed.

Section 4J provides design guidance for how to design apartment buildings in high noise areas. Compliance with Section 4J is achieved through adopting the design guidance in the ADG. The ADG does not stipulate specific internal noise levels that must be achieved when apartments are operating in a naturally ventilated condition.

Through adopting design guidance from the ADG Section 4J, apartments in noisy areas have the opportunity to have fresh air provided to the apartments naturally (not mechanically) yet building design is used to help reduce the noise impact when doing this. By adopting the design guidance, there would be a reduced need to rely on a "windows closed/air-conditioner" solution to address road traffic noise impact.

There are a number of design mechanisms that are proposed within the concept design that will assist in the provision of acoustic treated fresh air to the apartments in Building A but with reduced noise impact.

4.3.1 Enclosed Balconies.

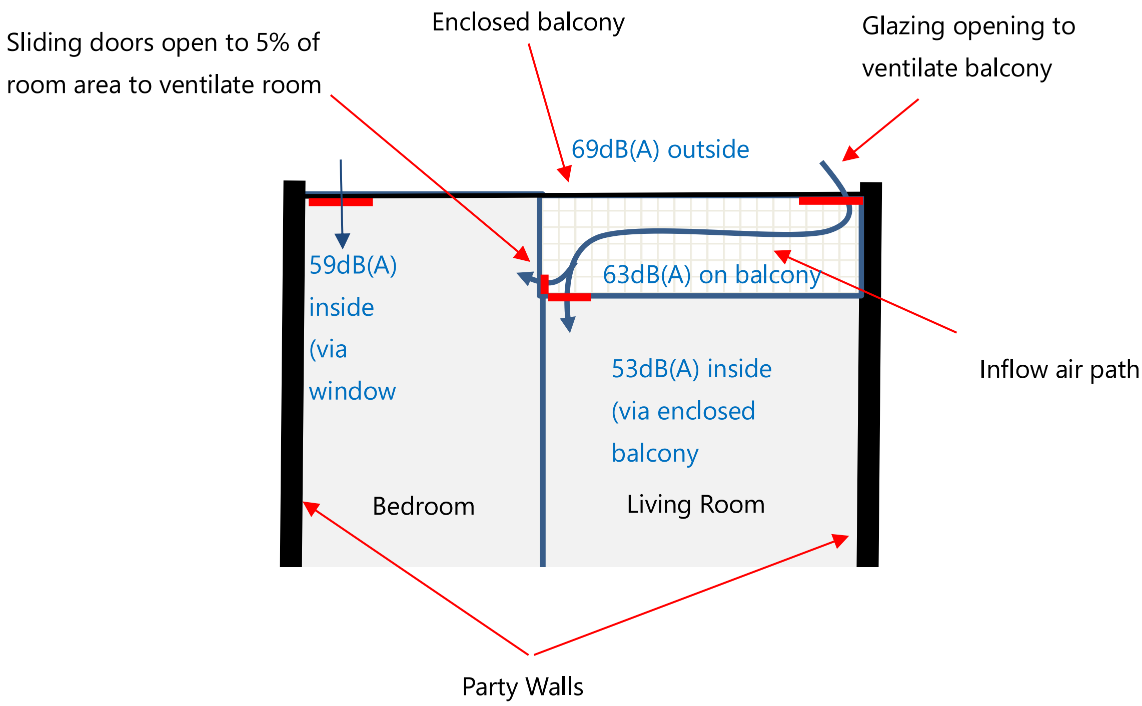
This is the most effective item in the ADG design guidance (Section 4J-2) to provide acoustically protected natural ventilation.

All apartments in Building A have an enclosed balcony. There is typically a living room and at least one bedroom in each apartment that opens onto the enclosed balcony.

It is recommended that all enclosed balconies be completely enclosable if permitted by council (minimum 6mm glass).

Enclosed balconies provide amenity benefit to occupants in a number of ways:

- An enclosed balcony provides better acoustic amenity on the balcony/private open space. This makes them a preferable acoustic treatment to designs that focus only on internal amenity.
- Balcony noise levels on the Pittwater Road façade are anticipated to experience up to 69dB(A) if left unenclosed. At the noise level, conversation would require raised vocal effort and speech clarity over larger distances (more than 2m) is compromised. The space will be less conducive to outdoor dining, reading or other noise sensitive activities.
- Full enclosure of the balcony will obviously provide significant acoustic benefit (15-20dB(A)).
- However even is used in a partially open manner (for example, 25% of the balcony remains open to outside), this will typically provide a 5-6dB(A) benefit on the balcony while also allowing the balcony to have fresh air.
- If the balcony noise level is reduced from 69dB(A) to 63dB(A) when used in a ventilated/partially enclosed manner, conversation would not typically require raised voice and the space will be more suitable for outdoor dining or similar activities.
- Secondly, the winter garden creates a travel path for air to reach internal spaces via convoluted path. This provides acoustic benefit while also enabling natural ventilation of the internal space. By strategically choosing which balcony windows and living room/bedroom windows are open, an approximately 16dB(A) noise reduction between outside and inside can be achieved (compared to 10dB(A) for a typical window open directly to outside). This is a significant benefit.
- See schematic illustration below, showing difference in noise level for the two air paths.



If applying the enclosed balcony design:

- With an external noise level of 69dB(A)$L_{eq(15hr)}$ (Pittwater Road façade, daytime), this means an internal noise level of 53dB(A)$L_{eq(15hr)}$ is achieved in the living room (only marginally exceeding the 50dB(A) "windows open"" noise goal for these spaces.
- With an external noise level of 64dB(A)$L_{eq(9hr)}$ (Pittwater Road façade, nighttime), this means an internal noise level of 48dB(A)$L_{eq(15hr)}$ is achieved in the bedroom (only marginally exceeding the 45dB(A) "windows open"" noise goal for these spaces.
- On other facades (where noise levels are reduced given their orientation to Pittwater Road, the internal noise level will approach the 50dB(A) (Living Room) and 45dB(A) (bedroom) noise targets for "windows open".

4.3.2 Spaces NOT opening onto Enclosed Balconies.

We note that there will remain some apartments with bedrooms that do not open onto enclosed balconies, and so have windows open directly to outside. However, there are still acoustically mitigated ventilation options in this regard:

- The majority of these bedrooms open into a corridor directly connected to a living room (and the living room in each case has the benefit of the enclosed balcony).
- The bedroom would be able to use borrowed ventilation from a space that is acoustically protected (the living room).

Further, all apartments in the Western Building have dual frontages, meaning there is an opportunity for cross ventilation:

- In a cross ventilated situation, pressure differential between the two building facades can assist in drawing air through the apartment more efficiently compared to apartments with a single frontage.
- While typically a window opening of 5% of the floor area of the room is needed to ventilate the space, we understand that this open area can reduce to an opening of approximately one quarter that size if the apartment has dual frontages.
- In the event that the open window area needed to ventilate a room is 1.25%, as opposed to 5%, the reduction in noise level between outside and inside via an open window would be expected to be closer to 16dB(A) (assuming 1.25% open window area) as opposed to 10dB(A) (assuming 5% open window area). Again – this is a significant benefit in comparison to the base condition.

4.3.3 Site Specific Application of Design

On applying the various noise mitigation methods to the proposed floor plan – the following is achieved:

4.3.4 Comparison to ADG Design Guidance

Looking at the design guidance in 4J1:

- *Physical separation between buildings and the noise or pollution source.* The Pittwater Road setback is moderate and consistent with other development in the area. Further increasing setback produces minimal noise reduction (double the set back reduces noise incident on façade by only 3dB(A)).

- *Residential uses are located perpendicular to the noise source and where possible buffered by other uses.* The main axis of the site is perpendicular to the noise source.

- *Non-residential buildings are site to be parallel with the noise source to provide a continuous building that shields residential uses and communal open space.* This cannot be incorporated as there are no non-residential uses on the site.

- *Non-residential uses are located at lower levels vertically separating the residential component from the noise or pollution source. Setbacks to the underside of the residential floor levels should increase relative to traffic volumes and other noise sources.* This cannot be incorporated as there are no non-residential uses on the site.

- *Buildings should respond to both solar access and noise. Where solar access is away from the noise source, dual aspect apartments with shallow building depths are preferable.* All apartments have dual access.
- *Landscape design reduces the perception of noise and acts as a filter for air pollution generated by traffic and industry.* There is not sufficient space on the site for planting to make a perceptible noise difference.

Looking at the design guidance in 4J2:

- *Limiting the number and size of openings facing noise sources.* There are only three rooms per level that have only one frontage facing Pittwater Road. There rooms all are connected to an acoustically protected living room.
- *Providing seals to prevent noise transfer through gaps.* This is a standard construction and will be incorporated.
- *Using double or acoustic glazing, acoustic louvres or enclosed balconies.* All glazing will be acoustically rated as needed to meet internal noise level requirements. Winter gardens are proposed to all apartments.
- *Using materials with mass and or sound insulation or absorption properties eg solid balcony balustrades, external screens and soffits.* Enclosed balconies will incorporate solid elements.

In our opinion, the proposed acoustic/natural ventilation design adopts ADG 4J design guidance wherever feasible and produces an outcome that provides all rooms of all apartments with acoustically mitigated fresh air that can be supplied without reliance on mechanical ventilation.

5 Conclusion

Renzo Tonin & Associates has completed a site suitability assessment of the proposed residential development at 2-6 Dee Why Parade, part of 8 Dee Why Parade, 10-12 Dee Why Parade and part of 2 Clarence Ave, Dee Why.

Through appropriate façade glass selection, the site will be capable of meeting the internal noise level requirements of SEPP Transport and Infrastructure and the Department of Planning Guideline Development Near Rail Corridors and Busy Roads.

In addition, this assessment has focussed on how the concept design of the site adopts design guidance from the ADG with a view to providing acoustically protected natural ventilation to the apartments.

In our opinion, the design adopts ADG design guidance whenever practicable. That being the case, the concept design should be considered compliant with the requirements of ADG Section 4J. This will assist in providing acoustic amenity to occupants without over reliance on mechanical ventilation/air-conditioning and as such has addressed the concerns raised by Council.

APPENDIX A Glossary of terminology

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

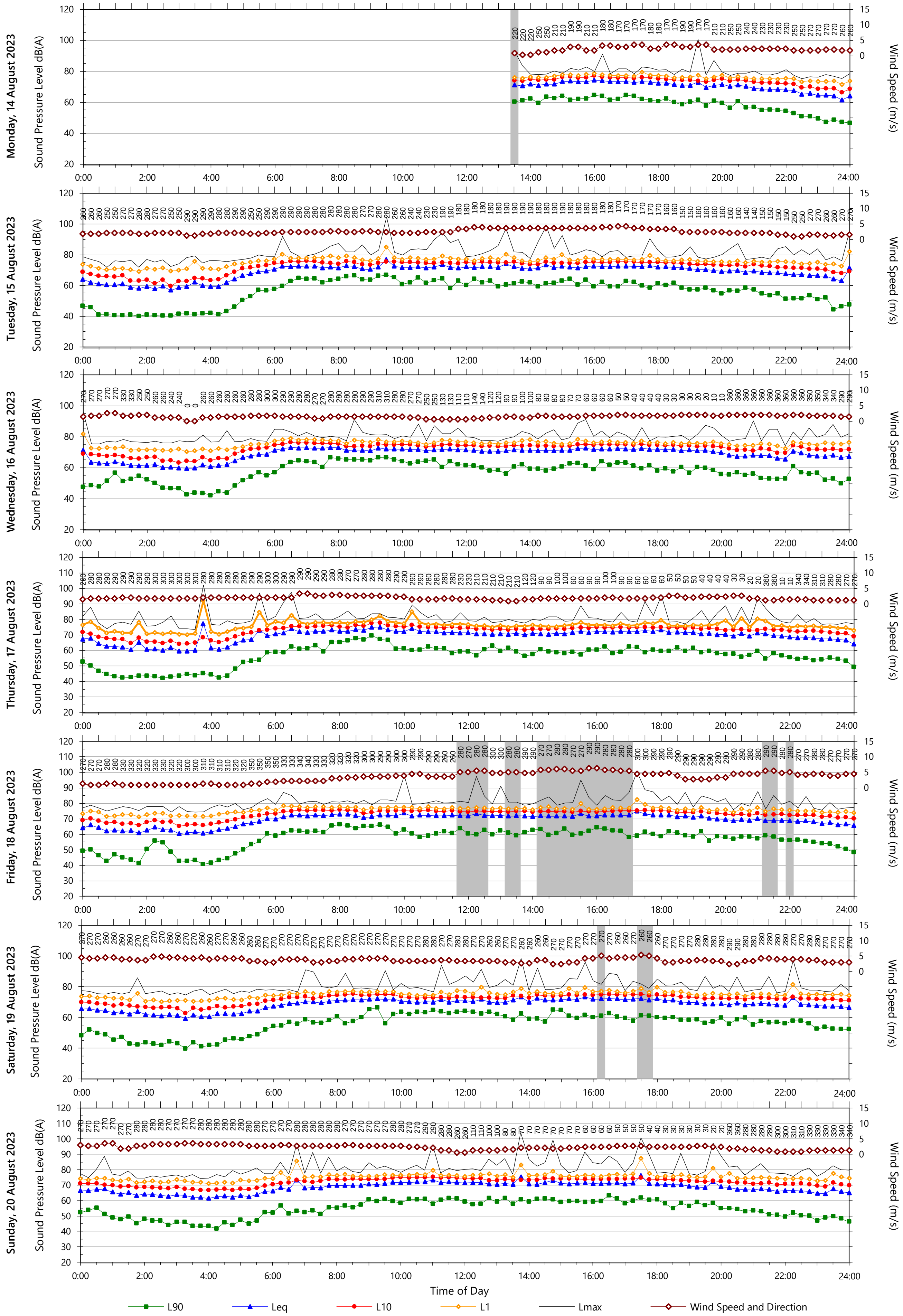
Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.

L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Background Noise Logging Data

Unattended Monitoring Results

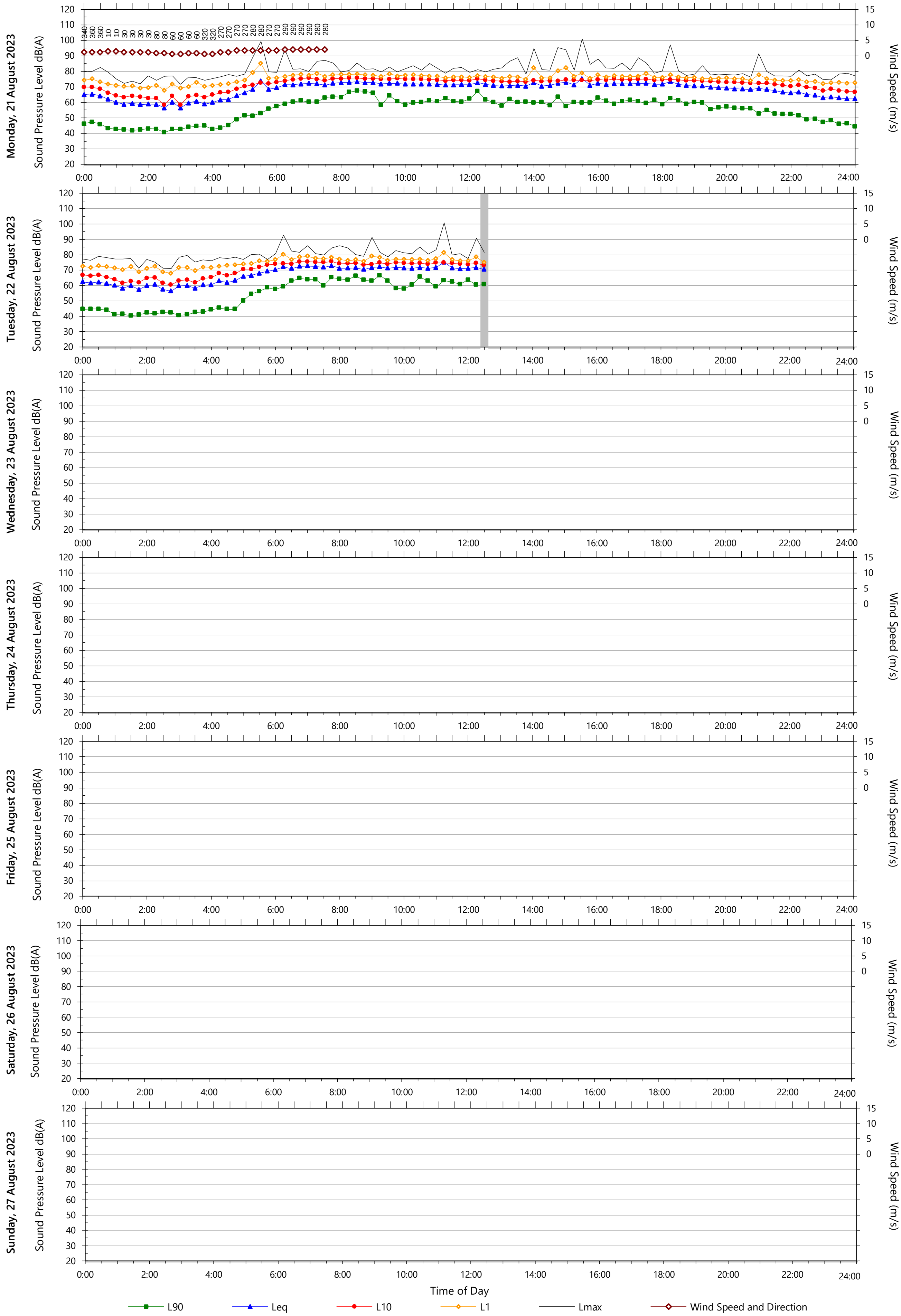
Location: Level 2, Rm 14 Balcony facing Pittwater Rd



Data File: 2023-08-14_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r42)

Unattended Monitoring Results **Location: Level 2, Rm 14 Balcony facing Pittwater Rd**



Data File: 2023-08-14_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r42)