

## FOREST LODGE SENIORS

2 - 32 JUNCTION STREET, FOREST LODGE, NSW 2037

NOISE AND VIBRATION IMPACT ASSESSMENT

RWDI # 2408699

8 December 2025

### SUBMITTED TO

**Chris West**  
Assistant Development Manager  
[Chris.west@corioprojects.com.au](mailto:Chris.west@corioprojects.com.au)

**Corio Projects**  
Forest Lodge NSW 2037

### SUBMITTED BY

**Claire Graham-White**  
Project Engineer  
[Claire.Graham-White@rwdi.com](mailto:Claire.Graham-White@rwdi.com)

**Remi Larmandieu, MIEAust, CPEng, MAAS**  
Associate Principal  
[Remi.Larmandieu@rwdi.com](mailto:Remi.Larmandieu@rwdi.com)

**Henry Kuo**  
Project Manager  
[Henry.Kuo@rwdi.com](mailto:Henry.Kuo@rwdi.com)

**RWDI Australia Pty Ltd**  
ABN 86 641 303 871



# DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
<b>A</b>	Initial	3 June 2025	Claire Graham-White	Remi Larmandieu
<b>B</b>	Final	10 June 2025	Claire Graham-White	Remi Larmandieu
<b>C</b>	Final Preliminary Mechanical Design	20 November 2025	Claire Graham-White	Remi Larmandieu
<b>D</b>	Final – Minor Updates	8 December 2025	Claire Graham-White	Remi Larmandieu

**NOTE**

All materials specified by RWDI Australia Pty Ltd (RWDI) have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose.

The information contained in this document produced by RWDI is solely for the use of the client identified on the front page of this report. Our client becomes the owner of this document upon full payment of our Tax Invoice for its provision. This document must not be used for any purposes other than those of the document's owner. RWDI undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.

**RWDI**

RWDI is a team of highly specialised consulting engineers and scientists working to improve the built environment through three core areas of practice: building performance, climate engineering and environmental engineering. More information is available at [www.rwdi.com](http://www.rwdi.com).

**AAAC**

This firm is a member firm of the Association of Australasian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.



**QUALITY ASSURANCE**

RWDI Australia Pty Ltd operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued for the following scope: The provision of consultancy services in acoustic engineering, air quality and wind engineering; and the sale, service, support and installation of acoustic monitoring and related systems and technologies.





## GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

**Maximum Noise Level ( $L_{Amax}$ )** – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

**$L_{A1}$**  – The  $L_{A1}$  level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the  $L_{A1}$  level for 99% of the time.

**$L_{A10}$**  – The  $L_{A10}$  level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the  $L_{A10}$  level for 90% of the time. The  $L_{A10}$  is a common noise descriptor for environmental noise and road traffic noise.

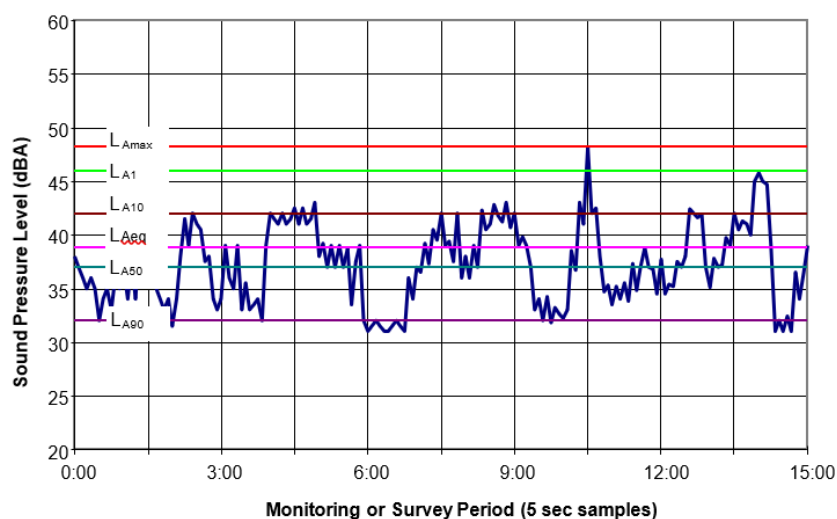
**$L_{A90}$**  – The  $L_{A90}$  level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the  $L_{A90}$  level for 10% of the time. This measure is commonly referred to as the background noise level.

**$L_{Aeq}$**  – The equivalent continuous sound level ( $L_{Aeq}$ ) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

**ABL** – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level ( $L_{A90}$ ) for each period.

**RBL** – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time





# TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>6</b>
1.1	Project Description.....	6
1.2	Site and Surrounding Sensitive Receivers.....	8
<b>2</b>	<b>EXISTING NOISE ENVIRONMENT .....</b>	<b>11</b>
2.1	Noise Monitoring .....	11
2.2	Background Noise Levels.....	12
2.3	Existing Noise Levels .....	12
<b>3</b>	<b>NOISE INTRUSION CRITERIA .....</b>	<b>14</b>
3.1	City of Sydney .....	14
3.2	Australian Standard 2107:2016 .....	15
3.3	Summary of Internal Noise Criteria .....	15
<b>4</b>	<b>NOISE EMISSION CRITERIA .....</b>	<b>17</b>
4.1	City of Sydney .....	17
4.2	NSW Noise Policy for Industry.....	17
4.2.1	Project Intrusiveness Noise Levels.....	17
4.2.2	Project Amenity Noise Levels .....	17
4.2.3	Project Noise Trigger Levels .....	20
<b>5</b>	<b>NOISE INTRUSION ASSESSMENT .....</b>	<b>21</b>
5.1	Analysis.....	21
5.2	Recommendations .....	21
5.2.1	Glazing and Glazed Doors.....	21
5.2.2	External Walls .....	22
5.2.3	Roof/Ceiling .....	22
5.2.4	Ventilation.....	22
<b>6</b>	<b>NOISE EMISSION ASSESSMENT .....</b>	<b>23</b>
6.1	Noise Modelling Procedure.....	23
6.1.1	Vehicle Noise .....	23
6.1.2	Mechanical Plant.....	23
6.1.3	Predicted Noise Levels .....	24
6.2	Operational Noise Recommendations .....	25



6.2.1	Vehicle Movements.....	25
6.2.2	Other Tenancies.....	25
<b>7</b>	<b>INTERNAL NOISE AND VIBRATION TRANSFER.....</b>	<b>26</b>
<b>7.1</b>	<b>Noise Criteria.....</b>	<b>26</b>
7.1.1	City of Sydney.....	26
7.1.2	National Construction Code.....	26
<b>7.2</b>	<b>Design Recommendations.....</b>	<b>27</b>
7.2.1	Residents Pool.....	27
7.2.2	Residents Fitness Area.....	28
7.2.3	Cinema and Café.....	28
7.2.4	Other Ancillary Spaces.....	29
<b>8</b>	<b>CONSTRUCTION NOISE AND VIBRATION IMPACT ASSESSMENT.....</b>	<b>30</b>
<b>8.1</b>	<b>Acoustic Criteria / Management Levels.....</b>	<b>30</b>
8.1.1	Noise - City of Sydney.....	30
8.1.2	Noise - Interim Construction Noise Guideline (EPA, 2009).....	30
<b>8.2</b>	<b>Vibration Criteria.....</b>	<b>32</b>
8.2.1	Non-Heritage Listed Buildings and Human Response (TfNSW CNVS).....	33
8.2.2	Cosmetic Damage to Heritage Buildings.....	34
<b>8.3</b>	<b>Proposed Construction Activities.....</b>	<b>34</b>
<b>8.4</b>	<b>Construction Noise Assessment.....</b>	<b>34</b>
8.4.1	Proposed Works.....	35
8.4.2	Predicted Construction Noise Impacts.....	36
8.4.3	Construction Noise Mitigation.....	37
<b>8.5</b>	<b>Predicted Construction Vibration Impacts.....</b>	<b>39</b>
<b>8.6</b>	<b>Construction Traffic Noise Assessment.....</b>	<b>40</b>
<b>9</b>	<b>CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>41</b>
<b>10</b>	<b>STATEMENT OF LIMITATIONS.....</b>	<b>42</b>

## LIST OF APPENDICES

Appendix A: Unattended Noise Monitoring Plots



# 1 INTRODUCTION

RWDI Australia Pty Ltd. (RWDI) has been engaged by Corio Projects to conduct a noise and vibration impact assessment in support of a Significant State Development Application (SSDA) for a proposed development comprising Residential Aged Care Facility and Independent Living Units at 2-32 Junction Street, Forest Lodge, NSW. This report presents the project objectives, discusses the results from RWDI’s on-site environmental noise survey, and provides recommended treatments for the development to comply with applicable acoustic requirements.

This Noise and Vibration Impact Assessment is submitted to the Department of Planning and Environment (DPE) in support of SSD-75493483.

This report responds to the Secretary’s Environmental Assessment Requirements (SEARs) as they relate to noise and vibration. This report supports an Environmental Impact Statement (EIS) prepared in respect of the proposal and should be read in conjunction with the EIS and development plans submitted with the SSDA.

The SEARs relevant to this report have been considered and are addressed as outlined in Table 1-1.

**Table 1-1: Secretary’s Environmental Assessment Requirements (SEARs)**

Relevant SEARs	Response
<p><b>12. Noise and Vibration Impact Assessment</b></p> <ul style="list-style-type: none"> <li><i>Provide a noise and vibration 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.</i></li> </ul>	<p>Operational noise and vibration emissions associated with the construction and operation of the proposed development have been assessed against the relevant EPA and State guidelines, with noise and vibration mitigation recommendations provided to ensure that the acoustic amenity of sensitive receivers in the vicinity of the site is preserved.</p>

The following documents have been referenced in establishing noise and vibration criteria for the proposed development:

- City of Sydney Development Control Plan (DCP)
- AS 2107:2016 *Recommended Design Sound Levels and Reverberation Times for Building Interiors*;
- NSW Environmental Protection Agency *Noise Policy for Industry* (NPfi), NSW EPA, 2017;
- NSW EPA Interim Construction Noise Guideline (ICNG), 2009;
- Transport for NSW’s (TfNSW) *Construction Noise and Vibration Strategy* (CNVS);
- DIN 4150-3-2016: *German Standard – Vibrations in buildings – Effects on structures*

## 1.1 Project Description

The proposal involves the construction and operation of a Seniors Housing at 2-32 Junction Street, Forest Lodge, comprising:

- Earthworks involving cut and fill;
- Augmentation of existing services and infrastructure such as water, power, and sewer;
- Construction of car parking comprising 79 car parking spaces on Lower Ground Floor and Ground Floor;
- Construction of a 5-storey building containing a Residential Aged Care Facility (RACF) and Independent Living Units (ILUs), including:
  - 71 Independent Living Units. Including 4 one-bedroom units, 43 two-bedroom units and 24 three-bedroom units, split across Levels G - 5;
  - Residential Care Units comprising 12 beds, located on Level 1;
  - Staff administration areas;
  - Amenities including cinema, hair salon, café, courtyard, and multipurpose space;
- Construction of publicly accessible open space located at the rear of the building and expanding on the existing Larkin Street Reserve;
- Construction of a paved accessway along the north boundary of the site;
- Construction of a dedicated pedestrian laneway along the south boundary of the site; and • Provision of associated landscaping.

Notable sources of noise generation from the proposed development are:

- Mechanical plant;
- Operation of communal areas/retail tenancies; and
- Vehicle noise from the proposed driveway.

Notable external noise sources that will impact the proposed development include:

- Road traffic noise from Bridge Road, St Johns Road, Junction Street and Larkin Street.

The proposed Ground Floor and Level 1 layouts, by WMK Architecture dated 19 June 2025, are shown in **Figure 1-1** and **Figure 1-2** respectively.

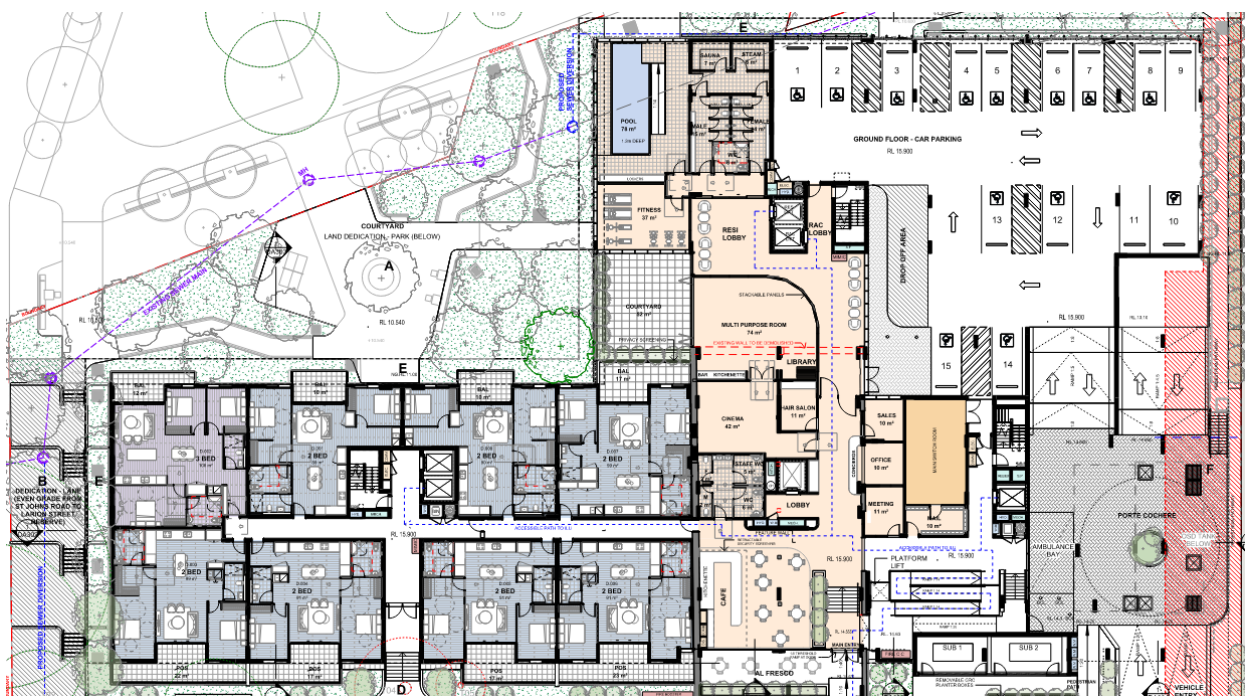


Figure 1-1 Ground Floor Layout



Figure 1-2 Level 1 Layout

## 1.2 Site and Surrounding Sensitive Receivers

The site is located at 2-32 Junction Street, Forest Lodge, surrounded by low rise residential and commercial receivers. The site and sensitive receivers are shown in Figure 1-3. Addresses of the surrounding noise sensitive receivers are presented in Table 1-2.

Figure 1-3: Site Location and Surrounding Receivers



Table 1-2: Surrounding Sensitive Receivers

Receiver	Address	Receiver Type
R1	300 Bridge Road, Forest Lodge	Commercial <sup>1</sup>
R2	288 Bridge Road, Forest Lodge	Residential
R3	34 Junction Street, Forest Lodge	Residential
R4	282 Bridge Road, Forest Lodge	Commercial
R5	278 Bridge Road, Forest Lodge	Residential
R6	23 Junction Street, Forest Lodge	Residential
R7	215 St Johns Road, Forest Lodge	Residential

**FOREST LODGE SENIORS****RWDI#2408699  
8 December 2025**

Receiver	Address	Receiver Type
<b>R8</b>	250 St John Road, Forest Lodge	Residential
<b>R9</b>	2A Short Street, Forest Lodge	Residential
<b>R10</b>	14 Larkin Street, Forest Lodge	Commercial
<b>R11</b>	112 Larkin Street, Forest Lodge	Residential
<b>R12</b>	21 Larkin Street, Forest Lodge	Residential
<b>R13</b>	3 Larkin Street, Forest Lodge	Residential
<b>R14</b>	Larkin Street Park, Forest Lodge	Passive Recreation

Note 1: Forest Lodge Child & Family Health Centre; assessed as commercial on the assumption that usage is for short term consultant appointments



## 2 EXISTING NOISE ENVIRONMENT

### 2.1 Noise Monitoring

Attended and unattended noise monitoring was conducted to quantify the existing noise environment surrounding the site. Figure 2-1 presents the location of noise monitoring, with long-term unattended noise monitoring being conducted between Wednesday 28<sup>th</sup> August 2024 and Friday 6<sup>th</sup> September 2024, and short-term unattended measurements conducted between 9am and 11am on Wednesday 28<sup>th</sup> September 2024 for the purpose of measuring traffic noise levels of the surrounding roads (Bridge Road, St Johns Road, Junction Street and Larkin Street). A markup indicating measurement locations are shown in Figure 2-1.

Table 2-1 details the instrumentation for the survey comprised of the following:

**Table 2-1: Noise Monitoring Equipment**

Instrumentation	Manufacturer	Model	Serial Number
Sound Level Meter	NTi	XL2-TA	A2A-15945-E0
	Rion	NL-52EX	01276560
			00242768
Sound Calibrator	Brüel & Kjær	Type 4231	2035391

Each Sound Level Meter was fitted with a microphone windshield. Calibration of each logger was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Noise monitoring was completed in accordance with Australian Standard AS 1055-2018 *“Acoustics - Description and measurement of environmental noise”*. All acoustic instrumentation utilised complies with AS IEC 61672.1-2004 *“Electroacoustics - Sound level meters – Specifications”*.

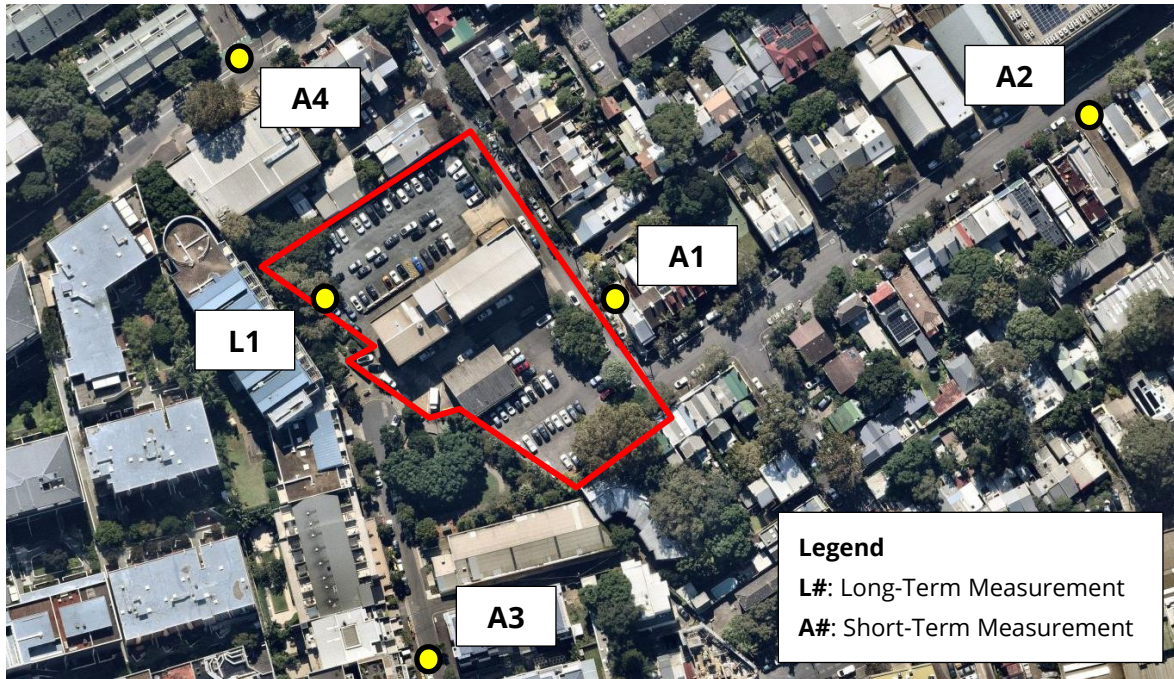


Figure 2-1: Noise Monitoring Locations

## 2.2 Background Noise Levels

Unattended noise monitoring was conducted between 28<sup>th</sup> August and 6<sup>th</sup> September 2024 by RWDI in the carpark on the west side of Junction Street and to the north of Larkin Street. The measured data was processed according to the *NPfI* requirements.

**Table 2-2** details the  $L_{A90}$  presented as Rating Background Level (RBL) logged during the daytime, evening, and night periods. RBL data affected by adverse meteorological conditions or extraneous noise was removed from the data prior to processing. Full noise monitoring plots are provided in Appendix A.

**Table 2-2: Unattended Noise Monitoring Results – Ambient Noise Levels, dBA**

Location	Time Period <sup>1</sup>	RBL
L1	Day	46
	Evening	42
	Night	38

Note 1: Daytime (7am – 6pm), Evening (6pm – 10pm), and Night time (10pm – 7am).

## 2.3 Existing Noise Levels

The noise data at L1 was reviewed to determine the existing road traffic noise levels for the proposed site at 2-32 Junction Street, Forest Lodge. Table 2-3 below presents the measured road traffic noise levels at this location.



**Table 2-3: Existing Traffic Noise Levels – Forest Lodge, dBA**

Location	Time Period	Day	Night
L1	15hr / 9hr	59 dBA $L_{Aeq,15hour}$	48 dBA $L_{Aeq,9hour}$

Note 1: Day (7am – 10pm) and Night (10pm – 7am).

Attended noise measurements were conducted on 28<sup>th</sup> August 2024 to assist in quantifying road traffic noise levels.

**Table 2-4: Attended Noise Monitoring Results, dBA**

Location	$L_{Amax, 15 min}$	$L_{Aeq,15min}$	$L_{A90,15min}$	Comments
A1 (Junction St) 9:41 am	75	53	48	Approx. 1 m from the road Pedestrians $L_{AF}$ 50-60 dBA Car passbys $L_{AF}$ 56-64 dBA Motorcycle passbys $L_{AF}$ 69-72 dBA
A2 (St Johns Road) 10:11 am	74	57	49	Approx. 2 m from the road Car passbys $L_{AF}$ 64-69 dBA Truck passbys $L_{AF}$ 66-73 dBA
A3 (Larkin St) 10:33 am	75	57	47	Approx. 1 m from the road Truck passbys $L_{AF}$ 70-75 dBA Car passbys $L_{AF}$ 64-68 dBA PedestrianS $L_{AF}$ 50-60 dBA
A4 (Bridge Rd) 10:56 am	89	66	56	Approx. 4 m from the nearest lane Truck passbys $L_{AF}$ 76-82 dBA Car passbys $L_{AF}$ 64-76 dBA Motorcycle drive bys $L_{AF}$ 65-73 dBA

## 3 NOISE INTRUSION CRITERIA

### 3.1 City of Sydney

The proposed development is located within the City of Sydney Council Area and as such the controls of the City of Sydney Development Control Plan (DCP) 2012 are applicable to the site. At the time of writing, proposed amendments to the DCP have recently finished their public review phase (Department Ref: PP-2024-709) and are expected to be included in the next revision of the DCP. These proposed amendments have been considered for this assessment.

Section 3.13.4 of the DCP Proposed Amendments relates to objectives and provisions for residential accommodation. The following acoustic controls are outlined for new developments “within 50 metres of a classified road or a road with annual average daily traffic volume over 20,000”. The northern boundary of the site is approximately 50 metres from Bridge Road, which is a classified road. There are no other classified roads within 50 metres of site.

The following noise intrusion targets apply to the site:

(7) *The repeatable maximum internal sound levels for dwellings which [sic] must not exceed the following levels:*

*(a) where natural ventilation is provided through windows and doors:*

*(i) when windows and doors closed:*

*a. bedrooms – LAeq (1 hour) 35dB (10pm to 7am); and*

*b. bedrooms – LAeq (1 hour) 40dB (7am to 10pm); and*

*c. all other habitable rooms – LAeq (15 hour) 40dB (7am to 10pm) and LAeq (9 hour) 40dB (10pm to 7am) and*

*(ii) when windows and doors are open:*

*a. bedrooms – LAeq (1 hour) 45dB (10pm to 7am); and*

*b. bedrooms – LAeq (1 hour) 50dB (7am to 10pm); and*

*c. all other habitable rooms – LAeq (15 hour) 50dB (7am to 10pm) and LAeq (9 hour) 50dB (10pm to 7am).*

*(b) where natural ventilation is provided through other means (such as a plenum), with the ventilation system open:*

*(i) bedrooms – LAeq (1 hour) 35dB (10pm to 7am); and*

*(ii) bedrooms – LAeq (1 hour) 40dB (7am to 10pm); and*

*(iii) all other habitable rooms – LAeq (15 hour) 40dB (7am to 10pm) and LAeq (9 hour) 40dB (10pm to 7am).*

*(c) where ventilation is provided by a mechanical system, including the noise from the ventilation system operating:*



(i) bedrooms – LAeq (1 hour) 35dB (10pm to 7am); and

(ii) bedrooms – LAeq (1 hour) 40dB (7am to 10pm); and

(iii) for all other habitable rooms – LAeq (15 hour) 40dB (7am to 10pm) and LAeq (9 hour) 40dB (10pm to 7am).

(d) natural ventilation and noise requirements consistent with (a) or (b) must be met concurrently for all apartments.

Note: The above noise levels represent the combined noise from all external sources and any ventilation system noise when operating normally.

### 3.2 Australian Standard 2107:2016

The AS/NZS 2107:2016 - Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors provides recommended design sound levels for different spaces depending on their intended use. These internal noise recommendations apply to steady or quasi-steady state noise source, including road traffic.

The noise criteria for this development are presented in Table 3-1 and are based on applicable design sound levels from AS/NZS 2107:2016.

**Table 3-1: Summary of Noise Intrusion Criteria**

Type of Occupancy	Time of Day	Internal Noise Criteria
Apartment Sleeping Areas <sup>1</sup>	Night (10 pm – 7 am)	35-40 dB LAeq, 9hr
Apartment Living Areas <sup>1</sup>	Day (7 am – 10 pm)	35-45 dB LAeq, 15hr
Indoor Communal Spaces	When in use	40-45 dB LAeq,period
General Office Areas	When in use	40-45 dB LAeq,period
Small Retail Stores	When in use	<50 dB LAeq,period
Fitness Area	When in use	<50 dB LAeq,period
Library	When in use	40-45 dB LAeq,period r
Pool	When in use	50-60 dB LAeq,period
Cinema	When in use	30-35 dB LAeq,period

Note 1: For apartments in inner city areas

### 3.3 Summary of Internal Noise Criteria

Based on the sub-sections above, a summary of the most-stringent internal noise criteria for the development is presented in Table 3-2.



**Table 3-2 Summary of Internal Noise Level Recommendations**

Type of Occupancy	Ventilation Method	Internal Noise Criteria (dBA)	Basis for Criteria
<b>SOU</b> <b>(7 am - 10 pm)</b>	Open windows and doors	≤ 50 L <sub>Aeq,1hr</sub>	CoS DCP Amendments
	Closed windows and doors	≤ 40 L <sub>Aeq,1hr</sub>	CoS DCP Amendments
<b>SOU</b> <b>(10 pm - 7 am)</b>	Open windows and doors	≤ 45 L <sub>Aeq,1hr</sub>	CoS DCP Amendments
	Closed windows and doors	≤ 35 L <sub>Aeq,1hr</sub>	CoS DCP Amendments
<b>Indoor Communal Spaces</b>	N/A	≤ 45 L <sub>eq,period</sub>	AS 2107
<b>Indoor Communal Spaces</b>	N/A	≤ 45 L <sub>eq,period</sub>	AS 2107
<b>General Office Areas</b>	N/A	≤ 45 L <sub>eq,period</sub>	AS 2107
<b>Small Retail Stores</b>	N/A	< 50 L <sub>eq,period</sub>	AS 2107
<b>Fitness Area</b>	N/A	< 50 L <sub>eq,period</sub>	AS 2107
<b>Library</b>	N/A	≤ 45 L <sub>eq,period</sub>	AS 2107
<b>Pool</b>	N/A	≤ 60 L <sub>eq,period</sub>	AS 2107
<b>Cinema</b>	N/A	≤ 35 L <sub>eq,period</sub>	AS 2107



## 4 NOISE EMISSION CRITERIA

### 4.1 City of Sydney

There are no quantitative noise emission criteria within the City of Sydney DCP.

### 4.2 NSW Noise Policy for Industry

The NSW EPA *Noise Policy for Industry* 2017 provides a framework for assessing environmental noise impacts from industrial premises and industrial development proposals in New South Wales. Although this policy is aimed at addressing industrial noise, it is also used as an appropriate reference document for government authorities for assessing noise from premises it regulates. The noise criteria set by this policy can be generally applied to noise from mechanical plant and equipment and vehicle movements on site.

The NPfI recommends the development of project noise trigger levels, which provide a benchmark for assessing a proposal or site. The project noise trigger levels should not be interpreted as mandatory noise criteria but rather as noise levels that, if exceeded, would indicate a potential noise impact on the community.

The project noise trigger level is the lower value of the project intrusiveness noise level and the project amenity noise level. The project intrusiveness noise level assesses the likelihood of noise being intrusive above the ambient noise level and is applied to residential receivers only. The project amenity noise level ensures the total industrial noise from all sources in the area does not rise above a maximum acceptable level.

#### 4.2.1 Project Intrusiveness Noise Levels

The intrusiveness noise level is the noise level 5 dBA above the background noise level for each time period (daytime, evening or night time) of interest at a residential receiver. The background noise level is derived from the measured  $L_{A90}$  noise levels.

The project intrusiveness noise levels for residential receivers are shown in Table 4-1.

**Table 4-1 Project Intrusiveness Noise Levels**

Type	Receiver	Time of Day <sup>1</sup>	Intrusiveness Noise Level $L_{Aeq,period}$ dBA
Residential	R2, R3, R5-R9, R11-R13	Day	51
		Evening	47
		Night	43

Note 1: Daytime (7am – 6pm), Evening (6pm – 10pm), Night (10pm – 7am)

#### 4.2.2 Project Amenity Noise Levels

Project amenity noise levels aim to set a limit on continuing increases in noise levels from all industrial noise sources affecting a variety of receiver types; that is, the ambient noise level in an area from all industrial noise sources remains below recommended amenity noise levels.



The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include transportation noise (when on public transport corridors), noise from motor sport, construction noise, community noise, blasting, shooting ranges, occupational workplace noise, wind farms, amplified music/patron noise.

The amenity noise level aims to limit continuing increases in noise levels which may occur if the intrusiveness level alone is applied to successive development within an area.

The recommended amenity noise level represents the objective for total industrial noise at a receiver location. The project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

To prevent increases in industrial noise due to the cumulative effect of several developments, the project amenity noise level for each new source of industrial noise is set at 5dBA below the recommended amenity noise level.

Amenity noise levels are not used directly as regulatory limits. They are used in combination with the project intrusiveness noise level to assess the potential impact of noise, assess mitigation options and determine achievable noise requirements.

The project amenity noise levels are calculated from the recommended amenity noise levels presented in Table 4-2.

**Table 4-2 Recommended Amenity Noise Levels**

Receiver	Noise Amenity Area	Time of Day <sup>1</sup>	Recommended Amenity Noise Level L <sub>Aeq,period</sub> dBA
<b>Residential</b>	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
<b>Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks</b>	See Column 4	See Column 4	5dBA above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day.



Receiver	Noise Amenity Area	Time of Day <sup>1</sup>	Recommended Amenity Noise Level L <sub>Aeq,period</sub> dBA
School classroom-internal	All	Noisiest 1-hour period when in use	35
Hospital ward internal external	All	Noisiest 1-hour	35
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
Industrial interface (applicable only to residential noise amenity areas)	All	All	Add 5dB(A) to recommended noise amenity area

Note 1: Daytime (7am – 6pm), Evening (6pm – 10pm), Night (10pm – 7am)

The project amenity trigger level sets limits on the total noise level from all industrial noise sources affecting a receiver. Different amenity noise levels apply for different types of receivers (e.g. residential, commercial, industrial – or for areas specifically reserved for passive recreation) and different areas (e.g. urban, suburban, rural). The amenity noise level applies to the L<sub>Aeq,period</sub> during the full day (or evening or night). To ensure that industrial noise levels remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise. This is calculated as the recommended amenity noise level for the receiver type minus 5 dBA. Where noise sources are not continuous for the whole period it is allowable to add 3 dB to convert from a period level to a 15-minute level.

The project amenity noise levels are presented in Table 4-3.

**Table 4-3 Project Amenity Noise Levels**

Receiver	Time of Day	Recommended Amenity Noise Level L <sub>Aeq,period</sub> dBA	Project Amenity Noise Level L <sub>Aeq,15min</sub> dBA
Residential R2, R3, R5 - R9, R11-R13	Day	60	58
	Evening	50	48
	Night	45	43
Commercial R1, R4, R10	When in use	65	63



Receiver	Time of Day	Recommended Amenity Noise Level L <sub>Aeq,period</sub> dBA	Project Amenity Noise Level L <sub>Aeq,15min</sub> dBA
Passive Recreation R14	When in use	50	48

### 4.2.3 Project Noise Trigger Levels

The project noise trigger levels are presented in Table 4-4.

**Table 4-4 NPFI Project Noise Trigger Level Criteria**

Receiver	Time of Day	Intrusiveness Criteria L <sub>Aeq,15min</sub> dBA	Amenity Criteria L <sub>Aeq,15min</sub> dBA	Project Noise Trigger Criteria L <sub>Aeq,15min</sub> dBA
Residential R2, R3, R5 - R9, R11-R13	Day	51	58	51
	Evening	47	48	47
	Night	43	43	43
Commercial R1, R4, R10	When in use	-	63	63
Passive Recreation R14	When in use	-	48	48



## 5 NOISE INTRUSION ASSESSMENT

The primary source of external noise on the proposed development is from traffic noise on Bridge Road, St Johns Road, Junction Street and Larkin Street. The assessment of external noise level for the site will be determined using attended and unattended noise monitoring at the site.

### 5.1 Analysis

Using the measured noise levels presented in **Section 2.3**, calculations were performed to determine the internal noise levels within the development as a result of noise transmission through the building façade elements (glazing, external walls, and roof/ceiling). This modelling considered the transmission loss performance of the façade elements, the surface area of each façade element exposed to external noise and the absorption characteristics of the internal spaces due to room finishes.

### 5.2 Recommendations

The indicative recommended weighted sound reduction index ( $R_w$ ) performances for the building façade elements are presented in the sub-sections below. These recommendations for the building envelope should be reviewed at detailed design stage.

#### 5.2.1 Glazing and Glazed Doors

The indicative glazing performance values required for noise sensitive areas in the proposed development to achieve the internal noise requirements are presented in Table 5-1.

Glazing suppliers are to provide acoustic laboratory test reports confirming that the acoustic performance of their window systems (combined performance of the glass and window/door frame) meet the  $R_w$  requirements specified below. Glazing requirements should be confirmed at detailed design stage.

**Table 5-1: Indicative Recommended Acoustic Performance for Glazing**

Space	Facade	Indicative Glazing Performance
Retail	All	$R_w$ 29
Bedroom	All	$R_w$ 31
Living	All	$R_w$ 31

Sample glazing assemblies for each of the  $R_w$  ratings are noted below.

**Glazing,  $R_w$  29**

- 6 mm glass

**Glazing,  $R_w$  31**

- 6.38mm laminated glass



## **5.2.2 External Walls**

Any proposed concrete or masonry external walls will provide adequate acoustic isolation to meet the internal noise requirements. No additional acoustic treatment is expected to be required for these external walls.

Any lightweight external walls should be reviewed at detailed design stage to determine the appropriate construction to meet in the internal noise requirements.

Any penetrations in the external walls (e.g. for services) should be adequately sealed so as not to reduce the acoustic performance of the external walls.

## **5.2.3 Roof/Ceiling**

Any concrete roof will provide adequate acoustic isolation to meet the internal noise requirements. No additional acoustic treatment is expected to be required for the roof/ceiling to mitigate external noise intrusion.

Any lightweight roof constructions should be reviewed at detailed design stage to determine the appropriate construction to meet in the internal noise requirements.

## **5.2.4 Ventilation**

Natural ventilation requirements in accordance with the CoS DCP are required to be achieved while also meeting the noise targets shown in Table 3-2. If opening of balcony doors or windows would cause an exceedance to the internal noise criteria, alternative ventilation solutions should be provided to allow for attenuated natural ventilation while maintaining acoustic compliance. No alternative pathways to achieving natural ventilation are proposed or anticipated to be required for this project.



## 6 NOISE EMISSION ASSESSMENT

The primary sources of noise generation that have been identified for the proposed development are as follows:

- Noise from light vehicles using the proposed driveway leading to the two levels of underground basement parking, accessible from Junction Street;
- Noise from heavy vehicles accessing the loading bay on the lower ground floor, accessible via Larkin Street
- Mechanical plant noise; and
- Operational noise from the café located on Ground Floor;

### 6.1 Noise Modelling Procedure

#### 6.1.1 Vehicle Noise

RWDI’s modelling of noise emissions from vehicle movements along the proposed driveway and into the basement are based on measurements undertaken by RWDI. The sound power level of a car manoeuvring at 10 km/hr is taken as 85 dBA.

RWDI has been advised that the traffic generation for the proposed seniors housing development is expected to be in the order of 0.10 vehicles per unit during the AM peak and 0.18 vehicles per unit during the PM peak, based on a total of 71 Independent Living Units. This equates to approximately 7 vehicle movements per hour in the AM peak and 13 vehicle movements per hour in the PM peak. Peak vehicle movements during the night period are assumed to be no more than half of the peak hour vehicle traffic volumes. A maximum of 1 heavy vehicle movement per 15 minutes has been assumed at any time of day. Heavy vehicles accessing the site are assumed to be no larger than a class 3 size.

Modelling of noise emissions from vehicle movements have been based on the SWL noise emissions presented in **Table 6-1** (based on measurements conducted by RWDI):

**Table 6-1: Vehicle Noise Sources**

Noise Source (SWL)	Sound Power Level, $L_{Aeq}$ , dBA
Car Manoeuvring at 10km/hr	85
Truck Manoeuvring at 10km/hr	99

#### 6.1.2 Mechanical Plant

Mechanical noise emissions have been reviewed based on the locations and quantities of equipment indicated in the preliminary mechanical drawings *Building Services (MEP) Spatial Markup* issued 23 May 2025, and equipment selections provided by the mechanical engineer on the 12 November 2025. The markup shows the following total quantities of equipment, located across the rooves of Building A, B, C, and D:

- Small VRF Condenser (servicing communal areas): 12
- Large VRF Condenser (servicing communal areas): 2
- Apartment Condenser: 71



- Exhaust Fan: 5
- Heat Pump: 4

It has been assumed that up to half of the residential condenser units are running simultaneously, at any time of day. Noise levels of the assessed external mechanical plant (per unit) are shown in **Table 6-2**.

**Table 6-2: External Mechanical Services**

Description	Model	SWL (dB) per unit								Overall (dBA)
		63	125	250	500	1k	2k	4k	8k	
Apartment Condenser	RXYMQ5BVM	59	58	56	53	49	44	39	34	<b>55</b>
Large VRF Condenser (Communal Areas)	REYQ20BYM	78	75	70	65	60	54	48	42	<b>67</b>
Small VRF Condenser (Communal Areas)	REYQ12BYM	69	69	67	61	56	47	42	35	<b>63</b>
Exhaust Fan <sup>1</sup>	Fantech TD-500/150SIL	61	51	62	61	57	49	43	39	<b>59</b>
Heat Pump	DHW 35KW non-ducted	-	-	-	-	-	-	-	-	<b>76</b>

Note 1: No selection provided, nominal fan selection assessed.

### 6.1.3 Predicted Noise Levels

The predicted cumulative noise levels at the surrounding receivers from vehicle movements and mechanical services are presented in **Table 6-3**. The noise levels have been assessed against the project noise trigger levels of the NPfl (refer to **Section 4.2.3**).

**Table 6-3: Predicted Noise Levels from Vehicle Noise**

Receivers	Predicted Noise Levels			NPfl Noise Criteria			Complies
	dBA LAeq, 15min			dBA LAeq, 15min			
	Day	Evening	Night	Day	Evening	Night	
<b>R01</b>	34	34	34	63	63	63	<b>Yes</b>
<b>R02</b>	36	36	35	51	47	43	<b>Yes</b>
<b>R03</b>	46	46	43	51	47	43	<b>Yes</b>
<b>R04</b>	36	36	34	63	63	63	<b>Yes</b>
<b>R05</b>	20	20	20	51	47	43	<b>Yes</b>
<b>R06</b>	43	43	41	51	47	43	<b>Yes</b>
<b>R07</b>	28	28	27	51	47	43	<b>Yes</b>



Receivers	Predicted Noise Levels			NPfI Noise Criteria			Complies
	dBA LAeq, 15min			dBA LAeq, 15min			
	Day	Evening	Night	Day	Evening	Night	
R08	24	24	24	51	47	43	Yes
R09	38	38	38	51	47	43	Yes
R10	36	36	36	63	63	63	Yes
R11	34	34	34	51	47	43	Yes
R12	36	36	36	51	47	43	Yes
R13	38	38	38	63	63	63	Yes
R14	39	39	39	48	48	48	Yes

## 6.2 Operational Noise and Vibration Recommendations

### 6.2.1 Vehicle Movements

Any speed bumps, drainage grates or expansion joint covering plates should be firmly down such that they do not generate any rattling noises when driven over by vehicles.

The truck turntable located within the lower ground loading bay should be vibration isolated in order to minimise vibration impacts to nearby spaces, particularly residential. Spaces should meet the "preferred value" shown in Table 2.4 of the EPA guideline *Assessing Vibration: A technical Guideline*, shown in **Table 6-4**.

**Table 6-4 Acceptable Vibration Dose Values for Intermittent Vibration (m/s<sup>1.75</sup>)**

Location	Daytime (7 am – 10 pm)		Night-time (10 pm – 7 am)	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Residences	0.20	0.40	0.13	0.26
Commercial General	0.40	0.80	0.40	0.80

### 6.2.2 Other Tenancies

A small café is proposed as part of the development, comprising approximately five indoor tables and four outdoor tables, each seating four patrons. Due to its limited scale and passive operation, it is not expected to result in significant external noise emissions, assuming background music is managed appropriately. However, as the café adjoins a sole occupancy unit (SOU), potential for structure-borne impact noise (e.g. footfall, furniture movement) should be reviewed at the detailed design stage. Appropriate acoustic floor treatments or construction detailing may be required if found necessary.

Similar internal noise considerations may apply to the cinema as well (e.g. footfall, wall isolation). See Section 7.



## 7 INTERNAL NOISE AND VIBRATION TRANSFER

### 7.1 Noise Criteria

#### 7.1.1 City of Sydney

The City of Sydney DCP outlines requirements for impact noise transfer through floors separating Sole Occupancy Units (SOUs). It does not include requirements for any other sources of internal noise transfer.

The requirements is as follows:

*To limit the transmission of noise to and between dwellings, all floors are to have a weighted standardised impact sound level ( $L'_{nT,w}$ ) less than or equal to 55 where the floor separates a habitable room and another habitable room, bathroom, toilet, laundry, kitchen, plant room, stairway, public corridor, hallway and the like.*

This condition is not changing in the forthcoming updates to the DCP.

#### 7.1.2 National Construction Code

The bounding walls and floors of the residential components of the development should, at minimum, be designed to meet the acoustic requirements of Part F7 of the National Construction Code (NCC) 2022, which are presented in Table 7-1. Where apartments adjoin high noise generating spaces (e.g. a plant room, cinemas) the separating partition construction may be required to exceed the requirements of the NCC in order to maintain an adequate acoustic amenity for the apartment spaces.

Specific constructions required to meet the requirements of the NCC (or any more stringent requirements to preserve acoustic amenity) will be determined at detailed design stage.

**Table 7-1: NCC Acoustic Requirements**

Construction	NCC Requirements	
	Laboratory Rating	Verification
Walls between sole occupancy units	$R_w + C_{tr}$ not < 50	$D_{nT,w} + C_{tr}$ not < 45
Walls between a bathroom, sanitary compartment, laundry or kitchen in one sole occupancy unit and a habitable room (other than a kitchen) in an adjoining unit	$R_w + C_{tr}$ not < 50 and Must have a minimum 20mm cavity between two separate leaves <sup>1</sup>	$D_{nT,w} + C_{tr}$ not < 45
Walls between sole occupancy units and a plantroom or lift shaft	$R_w$ not < 50 and Must have a minimum 20mm cavity between two separate leaves <sup>1</sup>	$D_{nT,w}$ not < 45



Construction	NCC Requirements	
	Laboratory Rating	Verification
Walls between sole occupancy units and a stairway, public corridor, public lobby or the like, or parts of a different classification	$R_w$ not < 50	$D_{nT,w}$ not < 45
Door assemblies located in a wall between a sole-occupancy unit and a stairway, public corridor, public lobby or the like	$R_w$ not < 30	$D_{nT,w}$ not < 25
Floors between sole-occupancy units or between a sole-occupancy unit and a plantroom, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification	$R_w + C_{tr}$ not < 50 $L_{n,w}$ not > 62	$D_{nT,w} + C_{tr}$ not < 45 $L_{nT,w}$ not > 62
Soil, waste, water supply and stormwater pipes and ductwork to habitable rooms	$R_w + C_{tr}$ not < 40	N/A
Soil, waste, water supply and stormwater pipes and ductwork to kitchens and other rooms	$R_w + C_{tr}$ not < 25	N/A
Intra-tenancy Walls	There is no statutory requirement for airborne isolation via intra-tenancy walls.	

Note 1: A wall must be of “discontinuous construction” if it separates a sole occupancy unit from a plantroom or lift shaft. Clause F7D4(3) defines “discontinuous construction” as a wall having a minimum 20mm cavity between two separate leaves with no mechanical linkage except at the periphery. For masonry walls, resilient wall ties must be used if wall ties are required.

## 7.2 Design Recommendations

### 7.2.1 Residents Pool

The ground floor of Building A includes a pool for use by residents of the building. The spaces horizontally adjacent to the indoor pool will be a fitness area, associated changerooms and sauna, and outdoor garden spaces. Sleeping areas are located on the level directly above the pool area, and a void/truck turntable directly below.

The NCC requirements for airborne noise through floors separating SOUs from public spaces (refer to **Section 7.1.2**) apply to the slab separating the pool from the above sleeping areas. The City of Sydney requirements for impact/footfall noise through floors separating SOUs from public spaces (refer to **Section 7.1**) do not apply to the slab separating the pool from the above sleeping areas, as the pool is not an SOU.



There are no mandatory requirements in the NCC for airborne sound insulation between the indoor pool and gym area. In the absence of this, we recommend that the wall separating these spaces be designed to achieve a minimum  $R_w$  45 performance.

Pool activities such as diving into the pool or bobbing in the pool generate vibration in the pool shell which can then transmit to the building structure. If this vibration transmission between the pool shell and the building is not adequately mitigated, it can result in unacceptable levels of structure-borne noise being generated in nearby sensitive spaces within the development.

To prevent this, the pool shell (horizontal and vertical floors/walls) must be vibration isolated from the building structure using a resilient isolation support system. The detailed requirements of this isolation should be determined at detailed design stage.

### 7.2.2 Residents Fitness Area

The ground floor of Building A contains a fitness area for use by residents of the building. The spaces horizontally adjacent to the fitness area will be a pool, entry lobby, and external courtyard/garden spaces. A communal dining area is located above the fitness area, and basement directly below. No information is available at this stage concerning the equipment expected to be installed within the fitness area.

There are no NCC or CoS requirements for noise transmission between public areas. In the absence of this, we recommend that the walls and floor separating these spaces be designed to achieve a minimum  $R_w$  45 performance. These assumptions should be confirmed at detailed design stage, particularly if amplified music is intended to be played in the fitness area.

The requirement for vibration isolation of the gym floor should be reviewed at detailed design stage, based on the proposed layout, equipment and use of the space. If required, appropriate isolation measures should be developed to control transmission of structure-borne vibration into surrounding areas.

### 7.2.3 Cinema and Café

The ground floor of Building A includes a 40m<sup>2</sup> cinema, for use by residents of the building. The cinema is horizontally adjacent to a multi-purpose room, hair salon, staff toilets, and 2-bed SOU. A 3-bed SOU (Sole Occupancy Unit) is located above the cinema, and basement car parking below. The Café is adjacent to a 2-bed SOU.

Design of the cinema, both for suitability of the space for its intended purpose, and for noise breakout into surrounding spaces, especially SOUs, should be considered at detailed design stage. Provisionally it is recommended that partitions separating the cinema from SOUs should achieve a minimum acoustic performance of  $R_w$  55, and  $R_w$  50 for all partitions separating the cinema from other spaces.

Both the Café and the Cinema should have walls of discontinuous construction where they are adjacent to an SOU.



## 7.2.4 Other Ancillary Spaces

The remainder of the ancillary spaces currently proposed for the development (Sales room, Office, Meeting Room, Multipurpose Room) which are not discussed in this section or in **Section 6.2.2**, are not expected to be significant sources of noise. Nonetheless, minimum acoustic separation requirements from these spaces should be determined at detailed design stage.



# 8 CONSTRUCTION NOISE AND VIBRATION IMPACT ASSESSMENT

## 8.1 Acoustic Criteria / Management Levels

### 8.1.1 Noise - City of Sydney

The City of Sydney Council requires assessment of construction noise to the guideline *Construction Hours/Noise within the Central Business District*, for developments located within the CBD, the extent of which is defined within the guideline. The suburb of Forest Lodge falls outside this area, and as a result there are no council specific criteria applicable to construction noise from this site.

### 8.1.2 Noise – Interim Construction Noise Guideline (EPA, 2009)

The NSW EPA Interim Construction Noise Guideline (ICNG) requires project-specific Noise Management Levels (NMLs) to be established for noise affected receivers. In the event construction noise levels are predicted to be above the NMLs, all feasible and reasonable work practices are investigated to minimise noise emissions.

Having investigated all feasible and reasonable work practices, if construction noise levels are still predicted to exceed the NMLs then the potential noise impacts would be managed via site specific construction noise management plans, to be prepared in the detailed design phase. Table 8-1 details the ICNG noise management levels.

**Table 8-1 Interim Construction Noise Guideline Criteria**

Time of Day	NML	How to Apply
<p><b>Recommended Standard Hours</b></p> <p><b>Monday to Friday</b> 7am to 7pm</p> <p><b>Saturday</b> 8am to 1pm</p> <p><b>No work on Sundays or Public Holidays</b></p>	<p>Noise Affected RBL+10 dBA</p>	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <p>Where the predicted or measured <math>L_{Aeq(15min)}</math> is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>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.</p>



Time of Day	NML	How to Apply
	Highly Noise Affected 75 dBA	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <p>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:</p> <ol style="list-style-type: none"> <li>1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences;</li> <li>2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ol>
<b>Outside Recommended Standard Hours</b>	Noise Affected RBL+5 dBA	<p>A strong justification would typically be required for works outside the recommended standard hours.</p> <p>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.</p> <p>For guidance on negotiating agreements see Section 7.2.2 of the <i>ICNG</i>.</p>

Table 8-2 details the ICNG noise management levels for non-residential receivers, which are applicable when the premises are in use.

**Table 8-2 ICNG Criteria at Sensitive Land Uses**

Land Use	Management Level <sup>1</sup> LAeq,15min
<b>Classrooms at schools and other educational institutions</b>	Internal noise level 45 dB
<b>Passive Recreation</b>	External noise level 60 dB



Land Use	Management Level <sup>1</sup> L <sub>Aeq,15min</sub>
Commercial - offices, retail outlets	External noise level 70 dB

Note 1: Applies when properties are being used.

Based on the above, Table 8-3 presents the applicable noise management levels for construction activities at surrounding receivers that have been adopted for all applications.

**Table 8-3 Site-Specific Construction Noise Management Levels**

Location	Construction Noise Management Level (NMLs)				Highly Noise Affected Noise Level L <sub>Aeq,15min</sub>
	L <sub>Aeq,15min</sub>				
	Day Standard Hours <sup>1</sup>	Day OOH <sup>2</sup>	Evening OOH <sup>2</sup>	Night OOH <sup>2</sup>	
R01	70	70	70	70	N/A
R02	56	51	47	43	75
R03	56	51	47	43	75
R04	70	70	70	70	N/A
R05	56	51	47	43	75
R06	56	51	47	43	75
R07	56	51	47	43	75
R08	56	51	47	43	75
R09	56	51	47	43	75
R10	70	70	70	70	N/A
R11	56	51	47	43	75
R12	56	51	47	43	75
R13	56	51	47	43	75
R14	65	65	65	65	N/A

Note 1: Standard Hours (7am – 6pm Monday to Friday, 8am – 1pm Saturday with no work on Sundays or Public Holidays)

Note 2: Day OOH (7am – 6pm), Evening OOH (6pm – 10pm), Night OOH (10pm – 7am)

## 8.2 Vibration Criteria

There are no Australian Standards that assess potential ground-borne vibration impacts to buildings. The following sets of standards are generally adopted in Australia for construction:

- BS 7385-2-1993: British Standard – Evaluation and measurement for vibration in buildings – Part 2 Guide to Damage Levels from Ground-borne Vibration (addresses potential structural damage to buildings in general from ground-borne vibration)



- DIN 4150-3-2016: German Standard – Vibrations in buildings – Effects on structures (addresses potential structural damage to heritage buildings from ground-borne vibration)

The British Standards is the more widely adopted, with the German Standards only being applied to particularly sensitive receivers such as heritage buildings. It is understood that Building C, which will be retained on site, is heritage listed.

Minimum working distances for typical vibration intensive construction equipment and typical receivers are provided in the Transport for NSW’s (TfNSW) Construction Noise and Vibration Strategy (CNVS), based on BS 7385.

Criteria for assessment of the effects of vibration on human comfort are set out in British Standard 6472-1992. Methods and criteria from that Standard are used to set “preferred” and “maximum” vibration levels in the document “Assessing Vibration: A Technical Guideline” (2006) produced by the NSW EPA.

### 8.2.1 Non-Heritage Listed Buildings and Human Response (TfNSW CNVS)

The minimum working distances presented in Appendix D of the CNVS are for both cosmetic damage (from BS 7385) and human comfort (from the NSW EPA Vibration Guideline) and are based on empirical data which suggests that where vibration intensive works are conducted outside the minimum distances, adverse vibration impacts are unlikely.

The recommended minimum working distances for vibration intensive activities from the CNVS are presented in Table 8-4.

**Table 8-4 Recommended Minimum Working Distances from Vibration Intensive Equipment**

Plant Item	Approx. Size / Weight / Model	Minimum Distance	
		Cosmetic Damage (BS 7385)	Human Response (NSW EPA Guideline)
<b>Vibratory Roller</b>	1-2 tonne	5 m	15 m to 20 m
	2-4 tonne	6 m	20 m
	4-6 tonne	12 m	40 m
	7-13 tonne	15 m	100 m
	13-18 tonne	20 m	100 m
	> 18 tonne	25 m	100 m
<b>Small Hydraulic Hammer</b>	300 kg (5 to 12t excavator)	2 m	7 m
<b>Medium Hydraulic Hammer</b>	900 kg (12 to 18t excavator)	7 m	23 m
<b>Large Hydraulic Hammer</b>	1600 kg (18 to 34t excavator)	22 m	73 m
<b>Pile Driver – Vibratory</b>	Sheet Piles	2 m to 20 m	20 m
<b>Piling Rig – Bored</b>	≤ 800 mm	2 m (nominal)	4 m



Plant Item	Approx. Size / Weight / Model	Minimum Distance	
		Cosmetic Damage (BS 7385)	Human Response (NSW EPA Guideline)
Piling Rig – Hammer	12 t down force	15 m	50 m
Jackhammer	Hand held	1 m (nominal)	Avoid contact with structure

### 8.2.2 Cosmetic Damage to Heritage Buildings

Table 8-5 summarises the guideline values for the prevention of building damage, which are derived from the more stringent German Standard DIN 4150-3-2016.

The values presented in Table 8-5 reference the guideline’s goals relating to “short-term vibration” events, which are considered reasonable in this case because it is unlikely that vibration over the duration of this project would cause structural fatigue in adjacent buildings.

Following development of a detailed construction plan, compliance with these thresholds should be reviewed if any vibration intensive works are proposed to be conducted in close proximity to heritage buildings.

**Table 8-5 Vibration Guide Values for Building Damage – DIN4150-3**

Guideline Values for Peak Particle Velocity – mm/s				
Frequency	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz	>100 Hz
Residential	5	5 to 15	15 to 20	20
Commercial	20	20 to 40	40 to 50	50
Heritage listed buildings	3	3 to 8	8 to 10	10

## 8.3 Proposed Construction Activities

Where possible, works should be completed during the standard daytime construction hours of Monday to Friday 7:00am to 7:00pm and Saturday 8:00am to 1:00pm. Where Out-of-Hours Works (OOHWs) are required (for emergency works/delivery etc.) it is likely that they would require separate approval.

## 8.4 Construction Noise Assessment

Noise modelling of the construction noise emissions was undertaken using the ISO9612 noise prediction algorithm in the CadnaA modelling software.

The noise model was constructed from a combination of aerial photography, existing ground topography, design ground topography and proposed design. The local terrain, receiver buildings and structures have been digitised in the noise model to develop a three-dimensional representation of the construction works and surrounding environment.



### 8.4.1 Proposed Works

This report provides a preliminary assessment of the potential construction noise and vibration impacts associated with the proposed development. The construction noise and vibration assessment has considered the following construction stages in-principle:

- Demolition and clearing works
- Excavation and piling
- Building construction

Sound power levels (SWLs) for the typical operation of construction equipment applied in the modelling are listed in Table 8-6 and have been based on measurements conducted by RWDI and Appendix C of the CNVS. To assess construction noise levels against the NMLs, the noise levels have been converted to equivalent  $L_{Aeq,15min}$  noise emissions based on the expected period of operation of the individual pieces of construction plant.

**Table 8-6 Construction Noise Sources**

Stage	Equipment	Operating minutes in 15-min period	Quantity	Sound Power Level (dB)		
				Individual Item (SWL)	$L_{Aeq}$ Activity	$L_{Amax}$ Activity
Demolition and Clearing	Excavator (30 t)	15	2	110	<b>113</b>	114
	Truck & Dog (30 t)	15	1	108	<b>108</b>	
Excavation and Piling	Dozer (D10)	10	2	116	<b>117</b>	122
	Truck & Dog (30 t)	15	2	108	<b>111</b>	
	Excavator (40 t)	15	2	115	<b>118</b>	
	Piling Rig	5	1	116	<b>111</b>	
	Concrete Truck	15	1	109	<b>109</b>	
Construction	Concrete Truck / Agitator	15	2	106	<b>109</b>	117
	Concrete Pump	15	1	109	<b>109</b>	
	Truck (20 t)	15	1	103	<b>103</b>	
	Mobile Crane	10	1	113	<b>113</b>	
	Hand Tools	7.5	5	105	<b>109</b>	
	Elevated Work Platform	10	2	97	<b>98</b>	

Consistent with the requirements of the ICNG, and to inform the scheduling of construction activity and management of noise during the detailed design phase, the construction noise impacts are based on an expected typical worst-case scenario. The ICNG recommends that the realistic worst-case or conservative noise levels from the source should be predicted for assessment locations representing the most noise exposed residences or other sensitive land uses. For each receiver area the noise levels are predicted at the most noise-exposed location, which would usually be the closest receiver.



For most construction activities, it is expected that the construction noise levels would frequently be lower than predicted at the most-exposed receiver as the noise levels presented in this report are based on a realistic worst-case assessment.

### 8.4.2 Predicted Construction Noise Impacts

Preliminary noise impacts have been quantitatively assessed of construction activities for the receivers surrounding the site. The activities considered are described in Table 8-7.

The typical  $L_{Aeq,15min}$  noise levels at the surrounding receivers are provided in Table 8-7. Each of the construction activities are representative of the 'noisiest' construction periods where there may be simultaneous operation of noise intensive construction plant on site.

**Table 8-7 Predicted Construction Noise Impacts**

Stage	Receivers	Predicted Noise Level $L_{Aeq,15min}$ dB	Noise Level - $L_{Aeq,15min}$ dB				Exceedance to Day Standard NML dB
			Noise Affected Noise Management Levels (NMLs)				
			Day <sup>1</sup> Standard	Day OOH <sup>2</sup>	Eve OOH <sup>2</sup>	Night OOH <sup>2</sup>	
Demolition and Clearing	R01	68	70	70	70	70	-
	R02	57	56	51	47	43	5
	R03	79	56	51	47	43	23
	R04	64	70	70	70	70	-
	R05	49	56	51	47	43	-
	R06	75	56	51	47	43	21
	R07	79	56	51	47	43	23
	R08	78	56	51	47	43	22
	R09	78	56	51	47	43	22
	R10	74	70	70	70	70	4
	R11	48	56	51	47	43	-
	R12	68	56	51	47	43	14
	R13	72	56	51	47	43	4
	R14	75	65	65	65	65	10
Excavation and Piling	R01	76	70	70	70	70	8
	R02	65	56	51	47	43	13
	R03	87	56	51	47	43	31
	R04	72	70	70	70	70	6
	R05	57	56	51	47	43	4
	R06	83	56	51	47	43	29



Stage	Receivers	Predicted Noise Level L <sub>Aeq,15min</sub> dB	Noise Level – L <sub>Aeq,15min</sub> dB				Exceedance to Day Standard NML dB
			Noise Affected Noise Management Levels (NMLs)				
			Day <sup>1</sup> Standard	Day OOH <sup>2</sup>	Eve OOH <sup>2</sup>	Night OOH <sup>2</sup>	
	R07	87	56	51	47	43	31
	R08	86	56	51	47	43	30
	R09	86	56	51	47	43	30
	R10	82	70	70	70	70	12
	R11	56	56	51	47	43	2
	R12	76	56	51	47	43	22
	R13	80	56	51	47	43	12
	R14	83	65	65	65	65	18
Construction	R01	71	70	70	70	70	3
	R02	60	56	51	47	43	8
	R03	82	56	51	47	43	26
	R04	67	70	70	70	70	1
	R05	52	56	51	47	43	-
	R06	78	56	51	47	43	24
	R07	82	56	51	47	43	26
	R08	81	56	51	47	43	25
	R09	81	56	51	47	43	25
	R10	77	70	70	70	70	7
	R11	51	56	51	47	43	-
	R12	71	56	51	47	43	17
	R13	75	56	51	47	43	7
	R14	78	65	65	65	65	13

Significant exceedances of the both the noise affected and highly noise affected NMLs are generally expected at most receivers due to the proximity of the site to said receivers.

Measures to manage construction noise emissions are discussed below.

### 8.4.3 Construction Noise Mitigation

Noise levels from construction activities during standard hours are predicted to exceed the NMLs of the ICNG at several receivers surrounding the site. Therefore, in accordance with the ICNG, all reasonable and feasible



measures should be applied to manage construction noise emissions from the site. In particular, the following is recommended:

A detailed Construction Noise and Vibration Management Plan (CNVMP) should be prepared at CC stage and should include, but not be limited to the following:

- Identification of nearby residences and other sensitive land uses,
- Description of approved hours of work,
- Description and identification of construction activities, including work areas, equipment and duration,
- Description of what work practices (generic and specific) will be applied to minimise noise,
- Consider the selection of plant and processes with reduced noise emissions,
- A complaints handling process,
- Noise monitoring procedures,
- Overview of community consultation required for identified high impact works,
- Overview of community consultation process and assessment required for identified additional works outside of standard construction hours, and
- Induction and training will be provided to relevant staff and sub- contractors outlining their responsibilities with regard to noise.

Examples of typical construction noise mitigation measures are provided in Table 8-8, along with the likely reduction in noise levels. Where reasonable and feasible, these measures should be employed during the construction of the development.

**Table 8-8 Indicative Construction Noise Mitigation Measures**

Mitigation Measure	Anticipated Noise Reduction, dBA
<b>Administrative Controls</b>	
<b>Operate during approved hours</b>	N/A
<b>Undertake regular noise monitoring to determine the impact of operating plant on sensitive receivers</b>	N/A
<b>Appropriate training of onsite staff</b>	N/A
<b>Undertake community consultation and respond to complaints in accordance with established project procedures</b>	N/A
<b>Turning off machinery when not in use</b>	0-5
<b>Respite periods for pile drivers and rock breakers (if applicable)</b>	N/A
<b>Conducting regular maintenance of plant to ensure that they are operating as efficiently and quietly as practicable</b>	N/A
<b>Engineering Controls</b>	
<b>Portable temporary screens</b>	5-10
<b>Screen or enclosure for stationary equipment</b>	10-15



Mitigation Measure	Anticipated Noise Reduction, dBA
<b>Maximising the offset distance between noisy plant items and sensitive receivers</b>	3-6
<b>Avoiding using noisy plant simultaneously and / or close together, adjacent to sensitive receivers</b>	2-3
<b>Orienting equipment away from sensitive receivers</b>	3-5
<b>Carrying out loading and unloading away from sensitive receivers</b>	3-5
<b>Using dampened tips on rock breakers</b>	3-6
<b>Using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks</b>	5-10
<b>Selecting site access points and roads as far as reasonably practicable away from sensitive receivers</b>	3-6
<b>Using spotters, closed circuit television monitors, “smart” reversing alarms, or “squawker” type reversing alarms in place of traditional reversing alarms</b>	2-5
<b>Employ non noise-generating structures such as site offices, storage sheds, stockpiles and tanks as noise barriers</b>	5-10

## 8.5 Predicted Construction Vibration Impacts

The nearest neighbouring building to the site is 3m adjacent to the north of the site.

The vibration intensive activities have not yet been finalised. They should be based on the CNVS’s recommended minimum working distances for vibration sensitive equipment (refer to Table 8-4).

Due to the close proximity with the nearest external building, and of heritage listed building C, it is recommended that a preliminary vibration survey (typically attended vibration measurements) be undertaken of each vibration generating piece of plant.

This vibration survey will determine whether there will be any exceedances of the relevant construction vibration criteria. If exceedances are observed, vibration mitigation and management strategies can be developed to minimise vibration impacts as far as practicable, and ideally to be compliant with the vibration criteria.

The vibration management strategy may also include the installation of unattended vibration monitors at sensitive receivers to notify the contractor of any exceedances of the vibration criteria. Any such vibration management strategy should be developed as part of a CNVMP.



## **8.6 Construction Traffic Noise Assessment**

Given the existing traffic volumes on Junction Street and Bridge Road, it is unlikely that traffic generated during construction works will result in any appreciable change to the levels of road traffic noise currently experienced at surrounding receivers along the construction traffic route.

Access to the site for construction vehicles should be via Junction Street.

## 9 CONCLUSIONS AND RECOMMENDATIONS

This report has presented a noise and vibration impact assessment for the proposed seniors living development to be located at 2 -32 Junction Street, Forest Lodge. This assessment has been prepared to address the noise and vibration clause of the SEARs for the State Significant Development Application (SSDA).

Existing ambient noise levels have been established via long-term unattended noise monitoring as presented in **Section 2**. The noise monitoring data has been processed in accordance with the NPfl to establish the RBLs at sensitive receivers. Short-term attended noise measurements were conducted to measure road traffic noise levels on surrounding roads.

Noise intrusion from surrounding roads have been assessed with reference to the internal noise recommendations of the City of Sydney DCP and AS2107. Indicative recommendations for the building façade construction have been presented in **Section 5** to achieve the internal noise requirements. These recommendations should be reviewed once the room layouts, glazing areas and ventilation systems have progressed sufficiently.

The potential for structure-borne impact noise from the café, cinema, pool and gym area to the adjacent sole occupancy units (SOUs) should be reviewed at detailed design stage. If required, appropriate acoustic floor treatments or construction detailing should be implemented to minimise internal noise transfer.

Noise impacts associated with vehicle noise and mechanical services from the development have been assessed with reference to the NPfl and found to comply with NPfl criteria, based on the preliminary mechanical design, as discussed in **Section 6**.

Noise and vibration impacts from the construction of the development have been assessed in-principle in **Section 8** of the report in accordance with the ICNG. Construction NMLs have been established for sensitive receivers based on the established RBLs. Representative construction noise levels have been predicted for a range of construction activities. The predicted  $L_{Aeq,15min}$  construction noise levels are expected to exceed the established NMLs for receivers in close proximity to the site. It is therefore recommended that a CNVMP be developed for the site and that all reasonable and feasible measures be implemented to minimise construction noise and vibration impacts. Noise and vibration mitigation strategies can be found in **Section 8.4.3**.

## 10 STATEMENT OF LIMITATIONS

This report entitled "*Forest Lodge Seniors – SSDA Noise Impact Assessment*" was prepared by RWDI Australia Pty Ltd ("RWDI") for Corio Projects ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

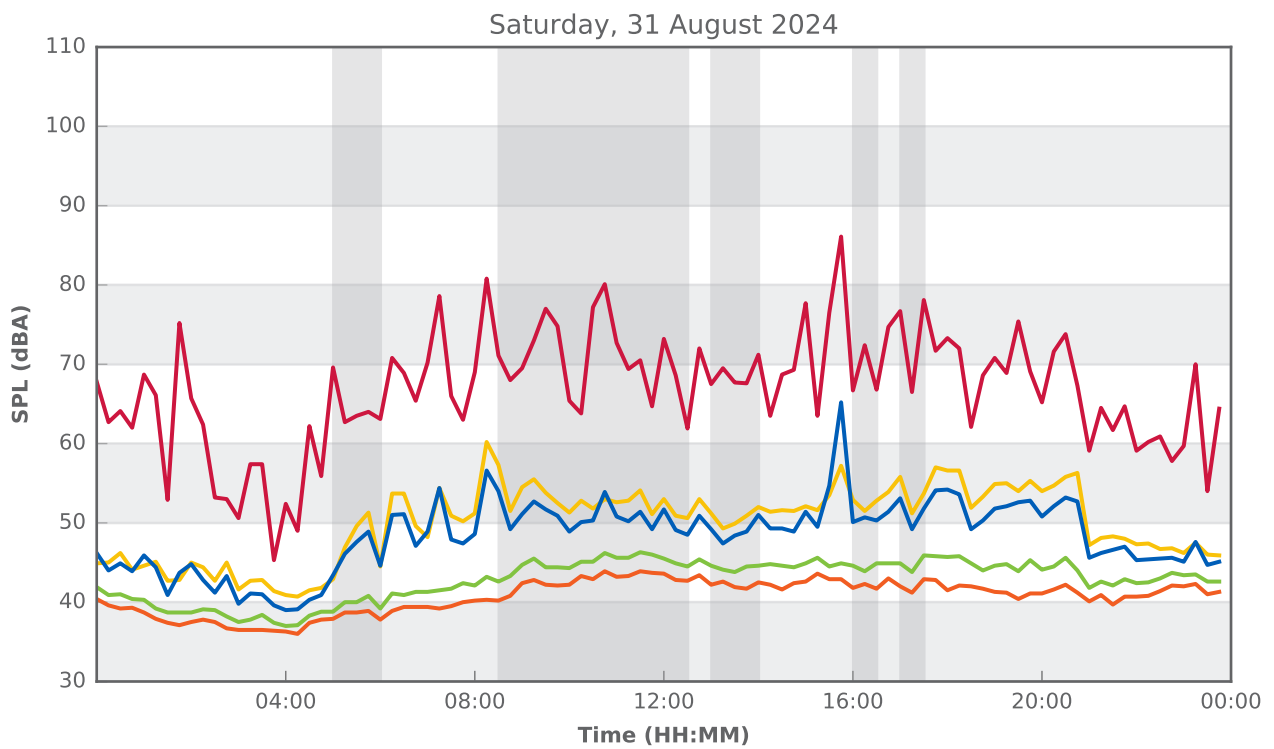
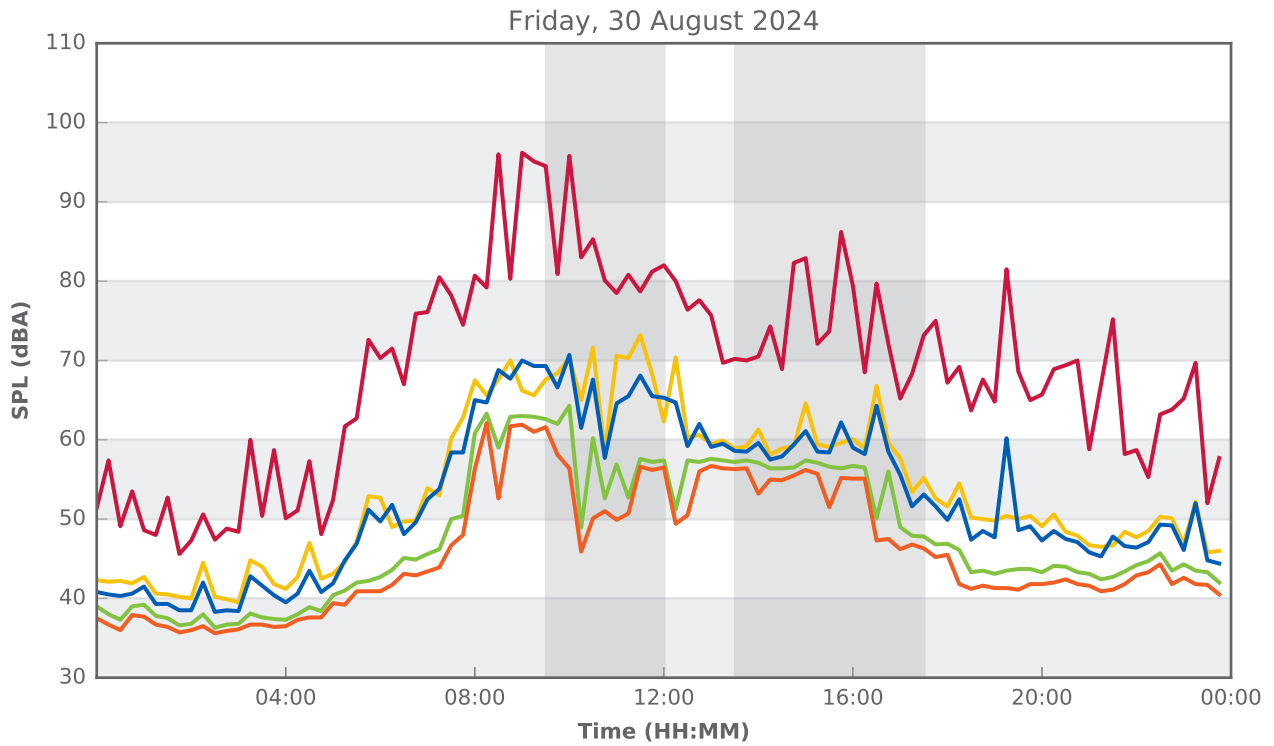
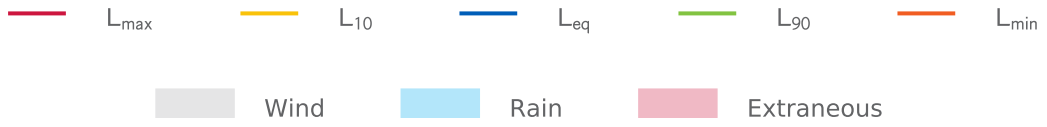
The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

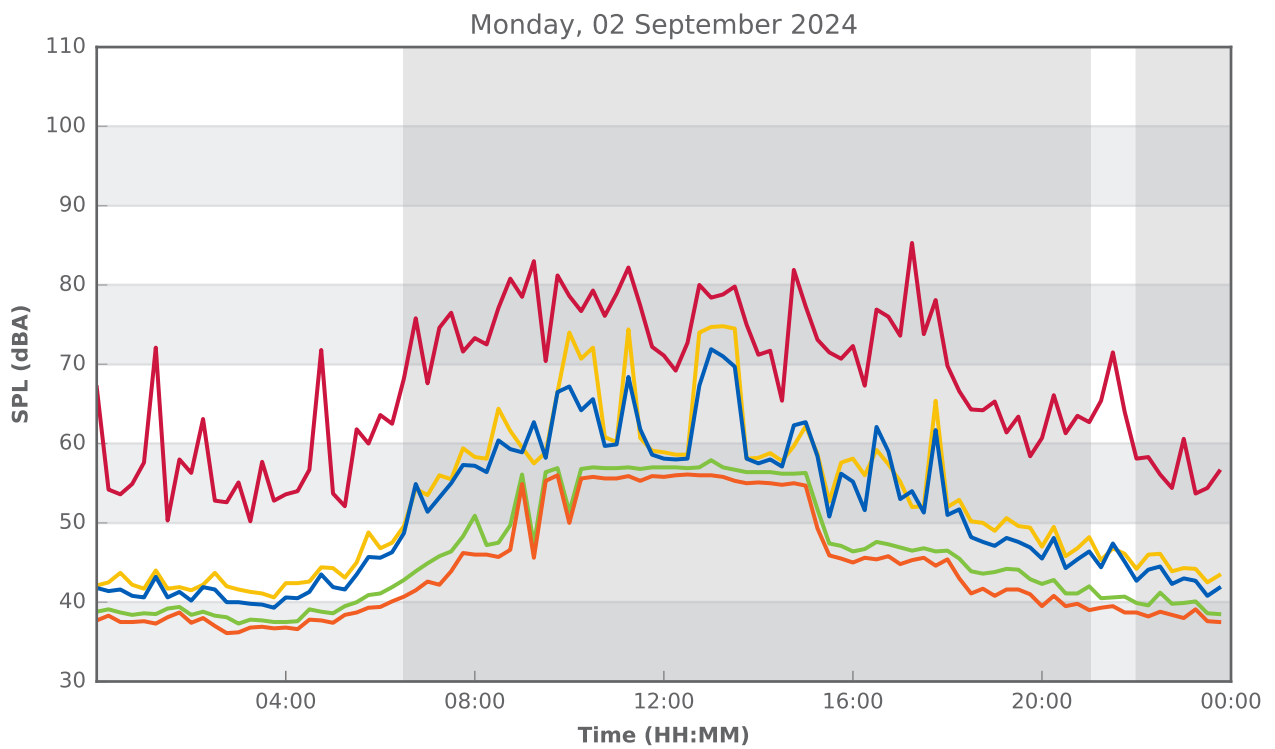
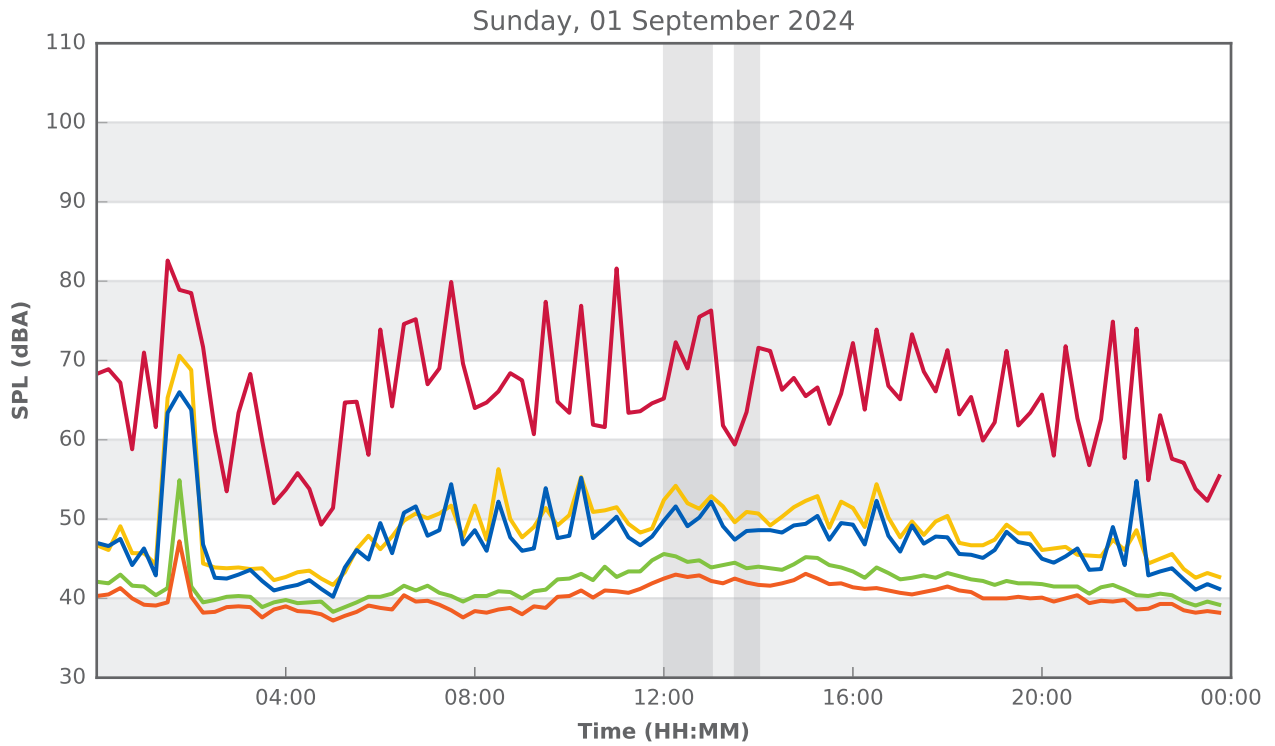
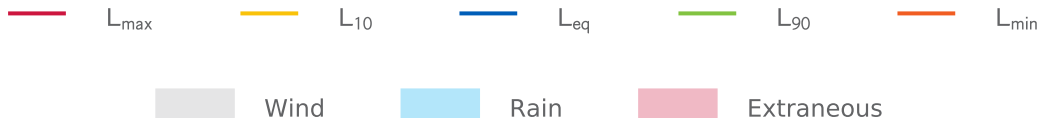
The page features a decorative background with a large grey curved shape on the right and a blue curved shape on the left, separated by a white line.

# APPENDIX A

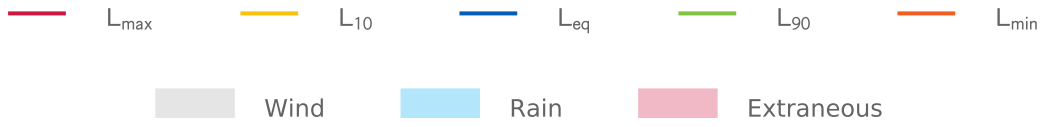
# 18 Junction St, Forest Lodge



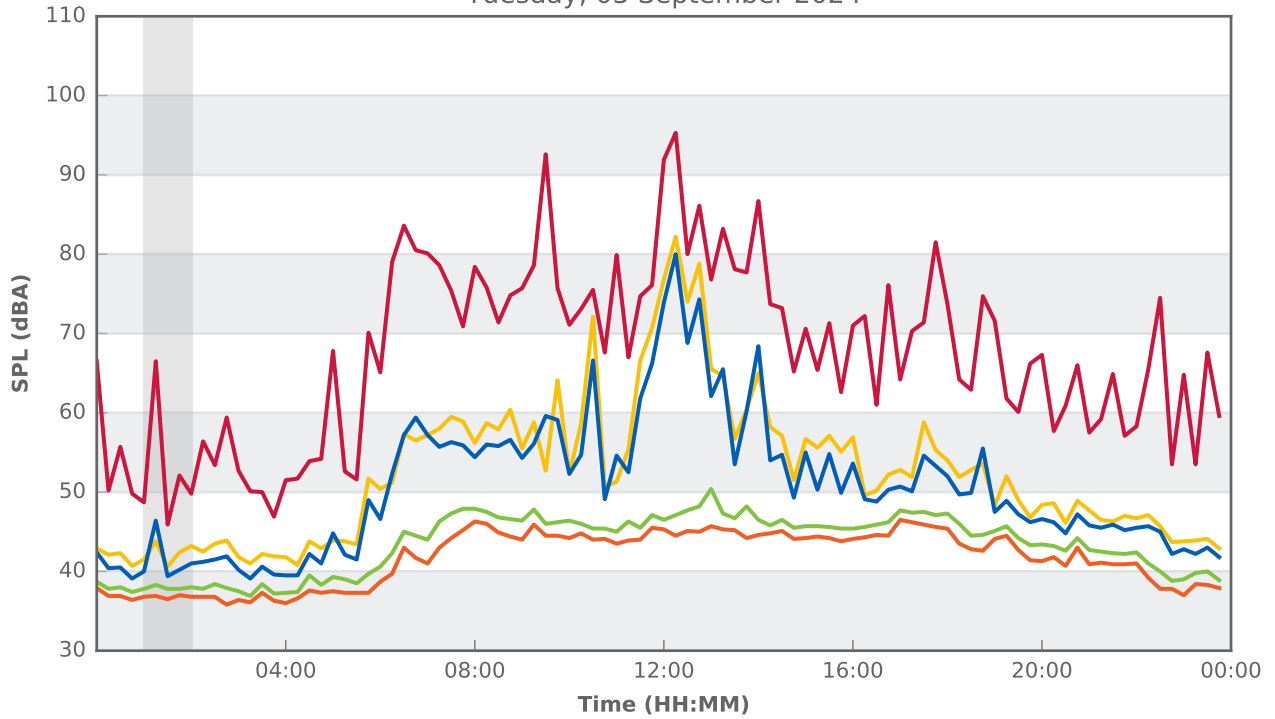
# 18 Junction St, Forest Lodge



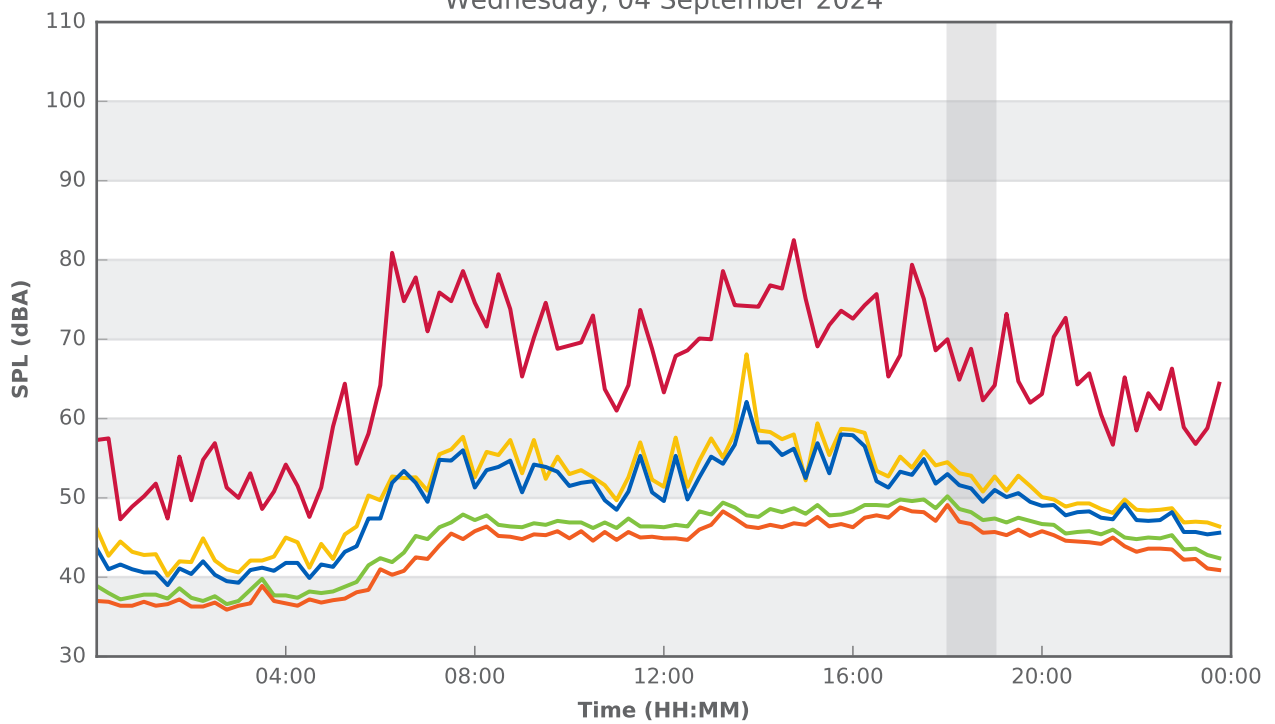
# 18 Junction St, Forest Lodge



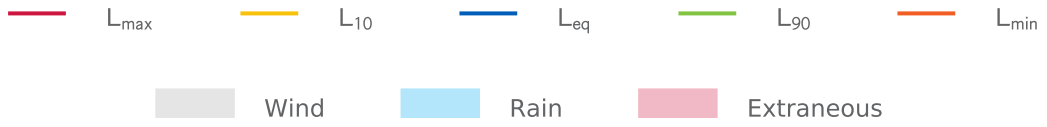
Tuesday, 03 September 2024



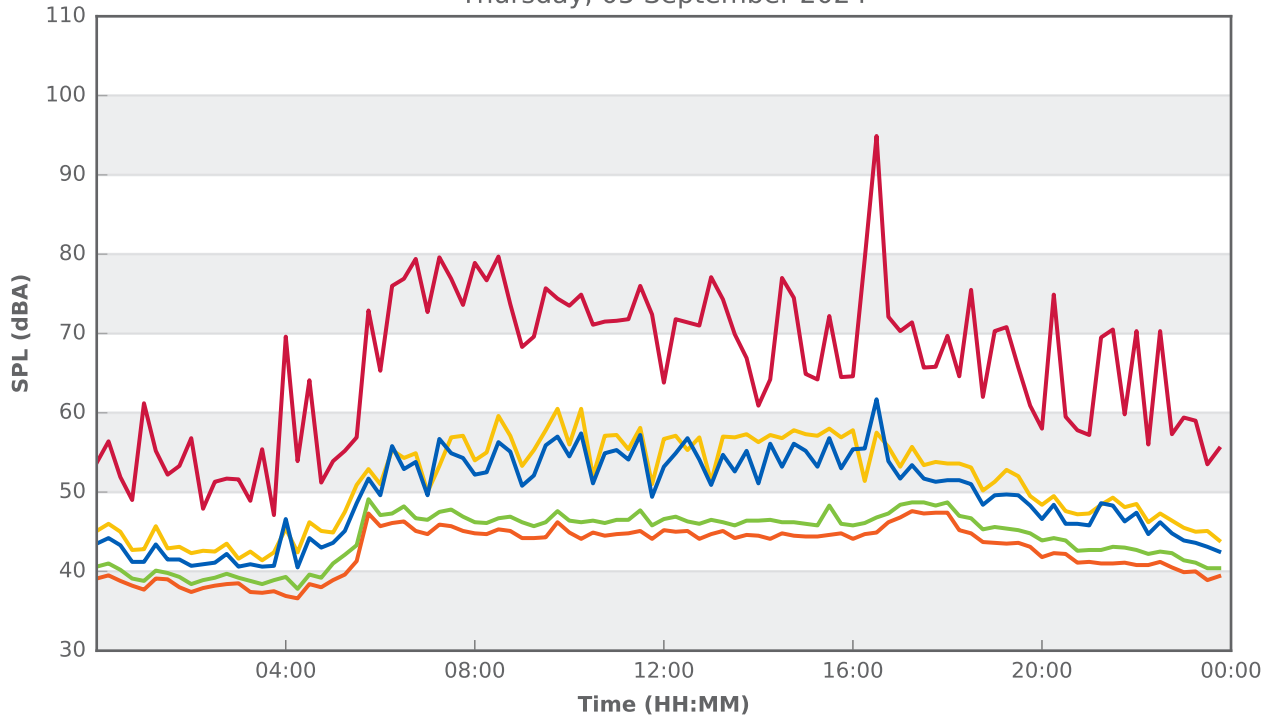
Wednesday, 04 September 2024



# 18 Junction St, Forest Lodge



Thursday, 05 September 2024



Friday, 06 September 2024

