REPORT

# ST GEORGE PRIVATE HOSPITAL EXPANSION

PRINCES HIGHWAY, KOGARAH NSW 2217

SSDA NOISE AND VIBRATION IMPACT ASSESSMENT
RWDI # 2511035
20 November 2025

**SUBMITTED TO**

**Akalan Projects Pty Ltd**
Suite 212, 68 Alexander Street,
Crows Nest NSW 2065

**SUBMITTED BY**

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

# DOCUMENT CONTROL

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# 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.

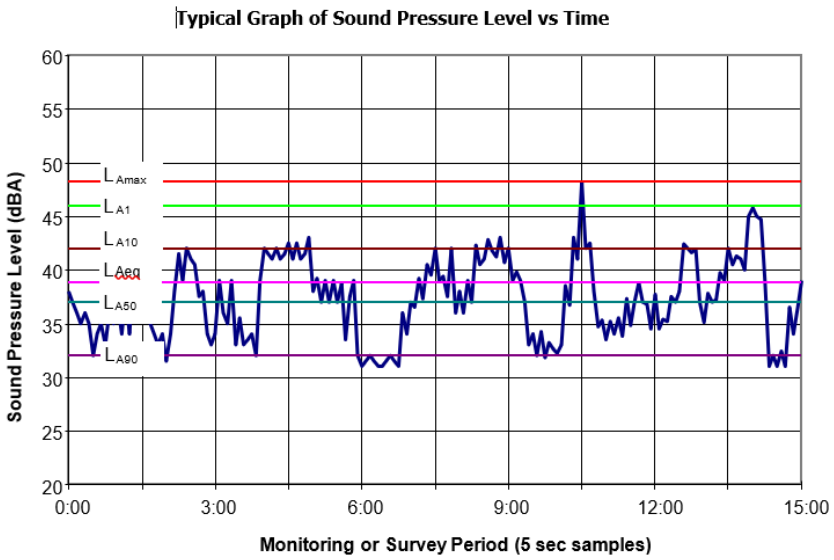
**$L_{A10}$** – The $L_{A10}$ level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the $L_{A10}$ level for 90% of the time. The $L_{A10}$ is a common noise descriptor for environmental noise and road traffic noise.

**$L_{A90}$** – 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.



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# 1 INTRODUCTION

This Noise and Vibration Impact Assessment report has been prepared on behalf of Akalan Projects Pty Ltd in support of a State Significant Development Application (SSDA) submitted to the Department of Planning, Housing and Infrastructure (DPHI) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act 1979).

The SSDA seeks approval for the expansion of the St George Private Hospital. Specifically, the SSDA seeks consent for two components: the first being the erection of a health services facility (hospital), and the second relating to upgrades to the main hospital campus, including a new emergency department.

For reporting purposes, the site subject to the new health services facility (hospital) is referred to herein as the 'clinical tower site' and the main hospital campus is referred to a such.

This report provides an assessment of noise and vibration impacts and responds to the Secretary's Environmental Assessment Requirements (SEARs) issued by DPHI on 30 June 2025 in relation to the proposed development.

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 (SSD-86969958) | Response |
|---|---|
| ***12. Noise and Vibration***<br>• *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.* | Noise and vibration emissions associated with the construction and operation of the project 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.<br><br>This report includes assessment of operational noise impacts associated with the development. In principle noise mitigation recommendations have been presented in Section 5 to facilitate compliance with the relevant EPA Noise Policy for Industry.<br><br>An assessment of road traffic noise generated by the future development has been undertaken, and is presented in Section 6 in accordance with the requirements of the Road Noise Policy.<br><br>A preliminary assessment of construction noise and vibration impacts from the development has been presented in Section 6, with noise and vibration mitigation strategies presented in section 7.3.4 to ensure that impacts are managed in accordance with the EPA's Interim Construction Noise Guideline. |

The following documents have been referenced:

- Noise from the operation of the proposed development has been assessed in accordance with the NSW *Noise Policy for Industry* (NPfI), NSW EPA, 2017;
- Traffic noise intrusion has been assessed in accordance with the NSW Department of Planning's *Development Near Rail Corridors and Busy Roads (Interim Guideline)* and the State Environmental Planning Policy (Transport and Infrastructure) 2021;
- Traffic noise generation on the surrounding public roadways has been assessed in accordance with the NSW EPA's *Road Noise Policy* 2011;
- Construction noise has been assessed in accordance with the *Interim Construction Noise Guideline* (ICNG) EPA, 2009;
- Construction vibration has been assessed in accordance with Transport for NSW's (TfNSW) *Construction Noise and Vibration Guideline* (CNVG).

This assessment and recommendations have been based on the architectural drawings set supplied by Fitzpatrick Partners, dated 14 August 2025.

## 1.1 Objectives

The objectives of the assessment are to:

- Evaluate noise intrusion from external noise sources (primarily traffic noise) and provide building envelope recommendations to mitigate noise ingress based on the Georges River Development Control Plan 2021, NSW Department of Planning's *Development Near Rail Corridors and Busy Roads*, State Environmental Planning Policy (Transport and Infrastructure) 2021 and Australian Standard AS/NZS 2107:2016.
- Establish noise emission criteria for the proposed development based on the requirements of the Georges River Development Control Plan and the *NSW EPA Noise Policy for Industry 2017*.
- Evaluate noise emissions from noise sources associated with the use of the proposed development at the nearest noise sensitive receivers.
- Evaluate noise emissions from noise sources associated with construction at the nearest noise sensitive receivers.

## 1.2 Site Location and Context

The sites are in the Georges River Local Government Area (LGA), within the Kogarah town centre.

The clinical tower site is adjoined to the south by an existing multi-storey health services facility, which forms part of the St George Private Hospital campus. South Street separates this facility from the main hospital campus, though a connecting sky-bridge provides pedestrian access between the buildings. Further west is the St George Public Hospital, and other surrounding development comprises a mix of commercial premises (typically at ground floor) and medium and high-density residential premises.

On the opposite (eastern) side of Princes Highway is a mix of educational premises including Moorfield Girls High School, James Cook Boys Technology, St George High School, and a TAFE NSW campus. Surrounding development on this side of Princes Highway primarily constitutes low density residential premises.

Kogarah Train Station is south-west of the site, approximately 500m away. There is a pedestrian bridge that extends from Hogben Street over the Princes Highway, which provides direct access to the eastern side of the highway.

The sites are approximately 1.7km from Brighton Le Sands Beach, and approximately 3.5km from Sydney Airport. Refer to Figure 1-1 for a site context map.

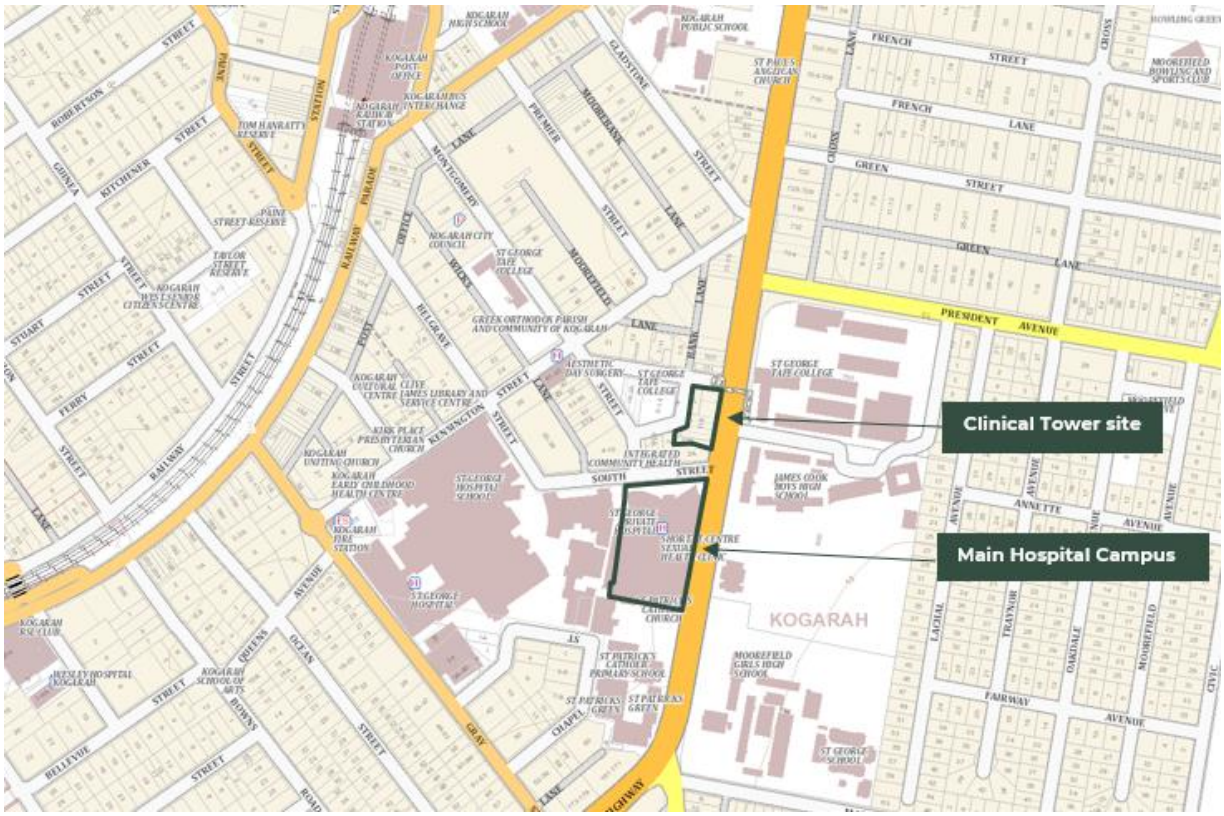


**Figure 1-1: Site Context Map (Source: Six Maps)**

## 1.3 Site Description

Clinical Tower Site:

The proposed new health services facility (hospital) will be located on land that is bound by three road frontages, being Princes Highway to the east (a classified road), Hogben Street to the north, and Bank Lane to the west. This site comprises eight adjoining allotments of land, known as 119-129 Princes Highway, Kogarah, and 2 Hogben Street, Kogarah.

The site currently accommodates a hard-stand parking lot, providing approximately 76 car parking spaces and a two-storey commercial premises (subject to a separate demolition), which is attached to the existing multi-storey health services facility at 2 South Street, Kogarah. Refer to Figure 1-2 for a site aerial excerpt.


**Figure 1-2: Site Aerial Extract (Source: Metro Map, modified by Patch)**

Main Hospital Campus

The existing hospital is located at 1 South Street, Kogarah which is also known as 1A South Street, Kogarah. This site is bound by two road frontages, being South Street to the north and Princes Highway (a classified road) to the east.

The site accommodates the St George Private Hospital's main campus, with vehicular access provided off South Street. Refer to Figure 1-3 for a site aerial excerpt.


**Figure 1-3: Main Hospital Site Aerial Extract (Source: Metro Map, modified by Patch)**

## 1.4 Overview of Proposed Development

The SSDA seeks approval for the expansion of the St George Private Hospital. Specifically, the SSDA seeks consent for two components: the first being the erection of a health services facility (hospital), and the second relating to upgrades to the main hospital campus, including a new emergency department.

In summary, approval for the following is sought for the clinical tower site:

- Site preparation works and bulk earthworks, including tree clearing;
- Construction of a seven (7) storey health services facility (hospital) equating to a total GFA of 9,952sqm.
- Construction of a five (5) level basement carpark including a radiation oncology unit, providing a total of 241 parking spaces;
- Ancillary office, amenities, and loading dock provisions;
- Basement storage and a substation; and
- Landscaping works.

The proposed development is depicted in Figure 1-4, with full architectural details provided within the EIS, of which this report also forms an Appendix.

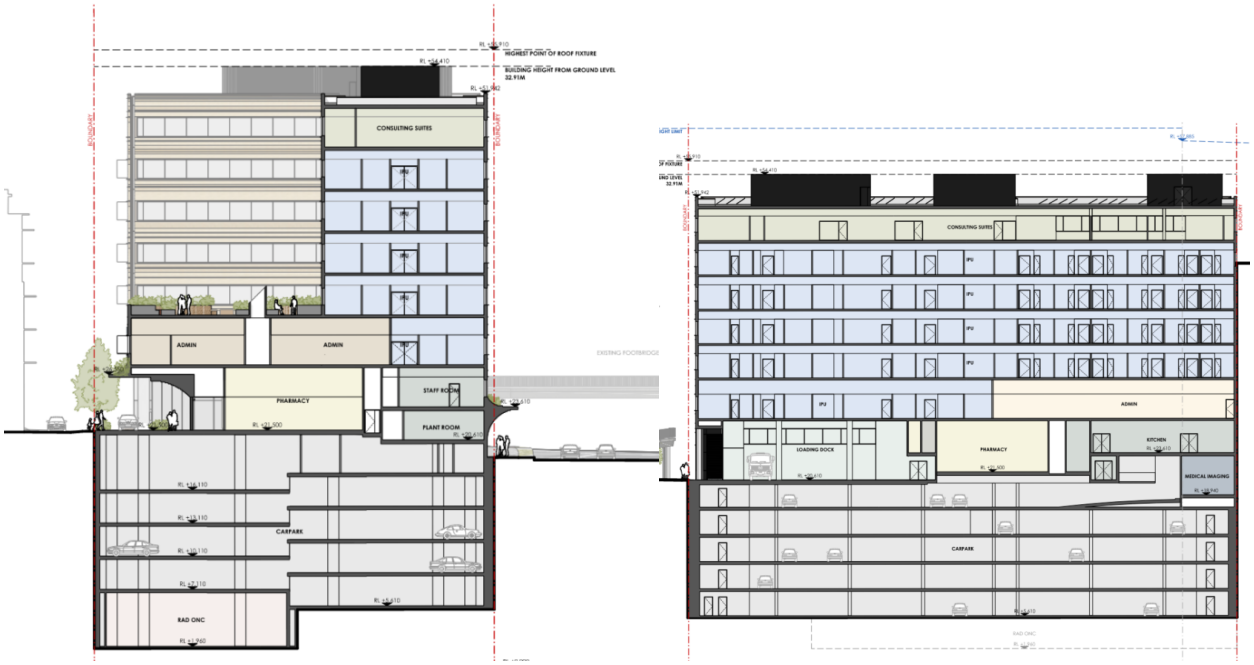


**Figure 1-4: Proposed Sections - Clinical Tower Site**

In addition, approval for the following is sought for the main hospital campus:

- Construction of an emergency department at the northern end of the existing hospital, to be operated 24 hours a day, seven days a week;
- Alterations to the South Street frontage, to facilitate ambulance bays and access requirements; and
- Associated internal re-configurations.

The proposed development is depicted in Figure 1-5, with full architectural details provided within the EIS, of which this report also forms an Appendix.

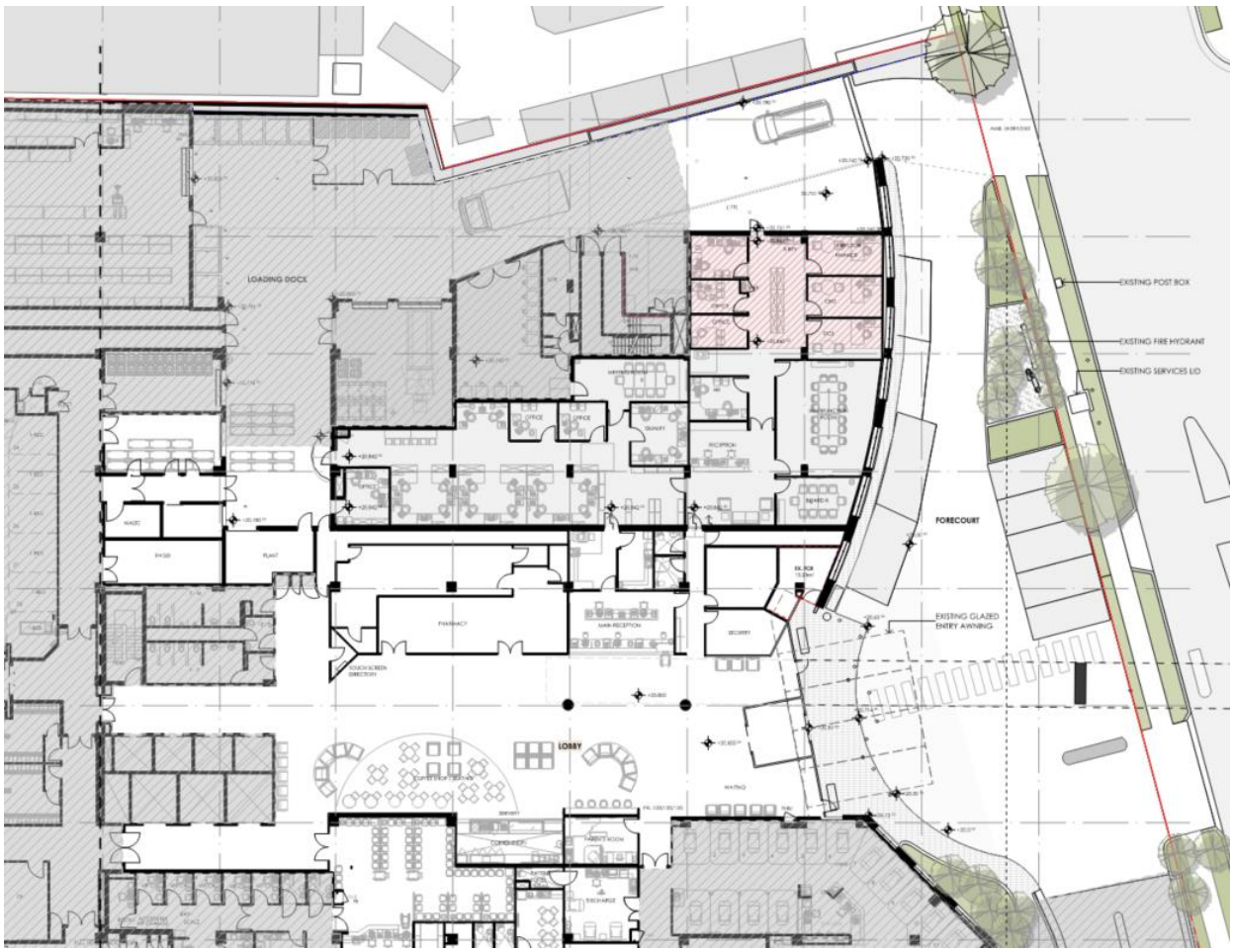


**Figure 1-5: Proposed Floor Plan - Main Hospital Campus**

## 1.5 Surrounding Sensitive Receivers

The location of the site and sensitive receivers is presented in **Figure 1-6**.

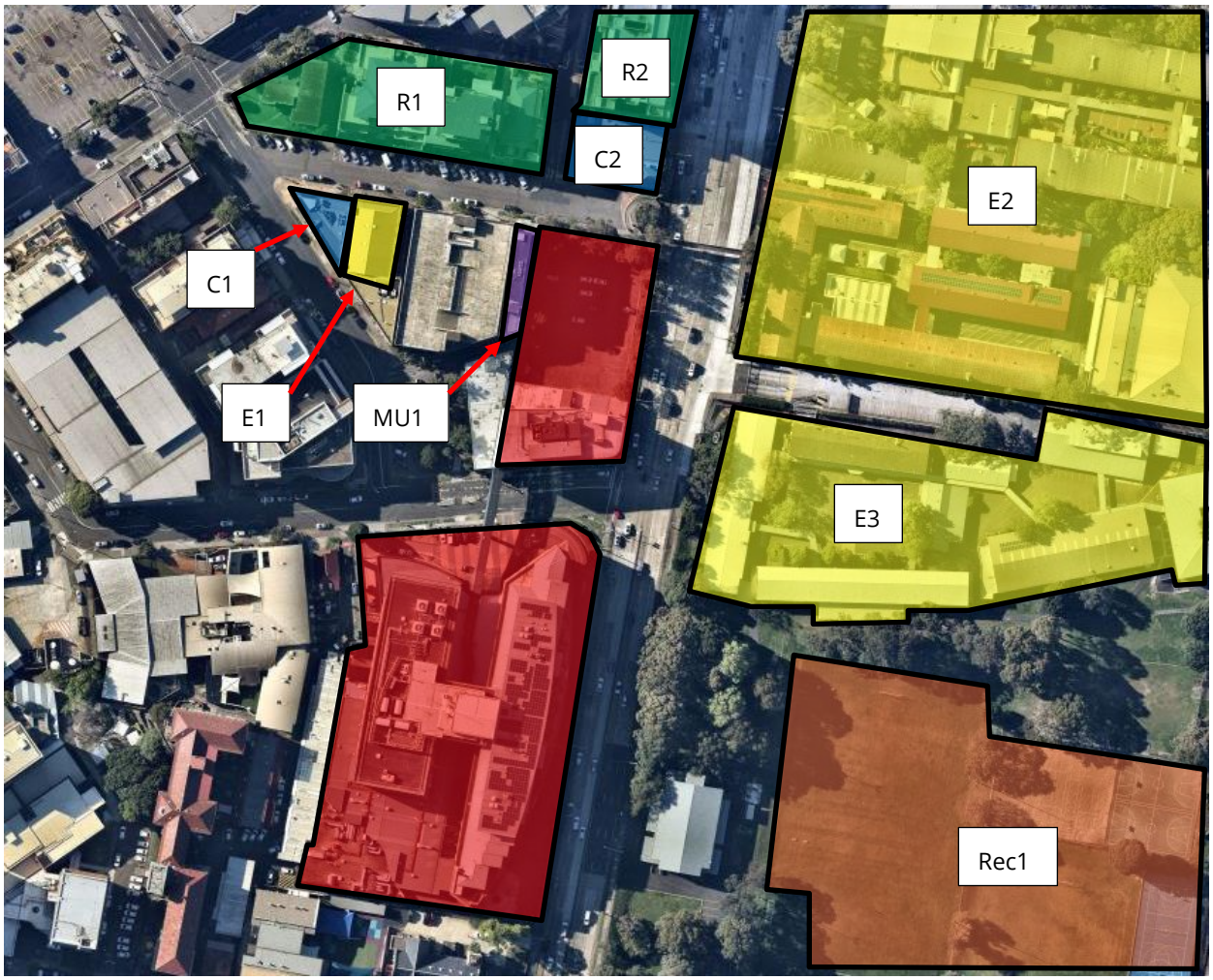


**Figure 1-6 Site Location and Surrounding Receivers**

The surrounding noise sensitive receivers are presented in Table 2-1.

**Table 1-2: Surrounding Sensitive Receivers**

| Receiver | Address | Receiver Type |
|---|---|---|
| **R1** | 1-21 Hogben Street, Kogarah | Residential |
| **R2** | 89-99 Princes Highway, Kogarah | Residential |
| **C1** | 52 Montgomery Street, Kogarah | Commercial |
| **C2** | 111 Princes Highway, Kogarah | Commercial |
| **E1** | 19 Montgomery Street, Kogarah | Educational |
| **E2** | 750 Princes Highway, Kogarah | Educational |
| **E3** | 800 Princes Highway, Kogarah | Educational |

| Receiver | Address | Receiver Type |
|---|---|---|
| **Rec1** | 2A Marshall Street, Kogarah | Active Recreation |
| **MU1** | 4 Hogben Street, Kogarah | Mixed Use |

It should be noted that receiver MU1 consists of office spaces and temporary healthcare accommodation.

# 2 EXISTING NOISE ENVIRONMENT

## 2.1 Noise Monitoring

Attended and unattended noise monitoring was conducted to quantify the existing noise environment surrounding the site (refer to Figure 2-1),

Unattended noise monitoring was conducted at one location between Friday 12th September 2025 and Monday 22nd September 2025.

Short-term attended measurements conducted between 1:45pm and 2:30pm on Friday 12th September 2025 for the purpose of measuring traffic noise levels of the surrounding roads (primarily Princes Highway and Montgomery Street.

Table 2-1 summarises the instrumentation used for the survey.

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

| Instrumentation | Manufacturer | Model | Serial Number |
|---|---|---|---|
| **Sound Level Meter** | NTi | XL3 | A3A-01891-F0 |
| | Rion | NL-53 | 00941350 |
| **Sound Calibrator** | GRAS | 42AG | 280942 |

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 12th September and 22nd September 2025 by RWDI at one location. The measured data was processed according to the *NPfI* requirements. The noise monitor at Location L1 was installed on the eastern balcony of the 6th floor tenancy at 4 Hogben Street.

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[1] | RBL |
|---|---|---|
| L1 | Day | 55 |
| | Evening | 52 |
| | Night | 43 |

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

## 2.3 Existing Road Traffic Noise Levels

The noise data at Location L1 was reviewed to determine the existing road traffic noise levels on Princes Highway. Table 2-3 presents the measured road traffic noise levels at this location.

**Table 2-3: Existing Traffic Noise Levels – Princes Highway, dBA**

| Location | Day | Night |
|---|---|---|
| L1 | 63 dBA $L_{Aeq,15hour}$ | 60 dBA $L_{Aeq,9hour}$ |
| | 64 dBA $L_{Aeq,1hour}$ | 62 dBA $L_{Aeq,1hour}$ |

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

## 2.4 Attended Noise Monitoring

Attended noise measurements were conducted on Friday 12th September 2025 to assist in qualifying the unattended noise levels measured at L1.

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

| Location | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | Comments |
|---|---|---|---|---|
| **L2 1:45pm** | 87 | 72 | 62 | Measurement taken along Princes Highway (2.5m from curb). Constant flow of Road Traffic Noise (3 lanes northbound, 2 lanes southbound). |
| **L3 2:15pm** | 79 | 59 | 51 | Measurement taken along Montgomery Street (1m from curb). Distant Road Traffic Noise from South Street and Kensington Street. |

# 3 NOISE AND VIBRATION CRITERIA

## 3.1 Noise **Intrusion** Criteria

### 3.1.1 Georges River Development Control Plan (DCP, 2021)

There are no quantifiable noise intrusion criteria outlined in the Georges River DCP. As such, relevant noise intrusion criteria have been adopted from the standards in the following subsections.

### 3.1.2 Development Near Rail Corridors & Busy Roads – Interim Guideline 2008

Table 3.1 of the NSW Department of Planning (DoP)'s *Development Near Rail Corridors & Busy Roads – Interim Guideline* provides recommended internal noise levels for various occupancy types. Table 3-1 presents goals for hospital buildings.

**Table 3-1: Recommended Internal Noise Levels for Hospital Buildings**

| Type of occupancy | Noise Level dBA | Applicable time period |
|---|---|---|
| Wards | 35 | At any time |
| Other noise sensitive areas | 45 | |

If internal noise levels with windows or doors open exceed the criteria by more than 10 dBA, 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.

### 3.1.3 State Environmental Planning Policy (Transport and Infrastructure) 2021

Princes Highway is a busy road with traffic volumes above 20,000 vehicles per day.

Section 102 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 states the following on impact of road noise or vibration on non-road development:

*(1) This section applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of TfNSW) and that the consent authority considers is likely to be adversely affected by road noise or vibration—*

*(a) residential accommodation,*

*(b) a place of public worship,*

*(c) a hospital,*

*(d) an educational establishment or centre-based child care facility.*

*(2) Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this section and published in the Gazette.*

*(3) If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded—*

*(a) in any bedroom in the residential accommodation—35 dB(A) at any time between 10 pm and 7 am,*

*(b) anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.*

## 3.2 Noise Emission Criteria

### 3.2.1 Georges River Development Control Plan (DCP, 2021)

There are no quantifiable noise emission criteria outlined in the Georges River DCP. As such, relevant noise emission criteria have been adopted from the NSW Noise Policy for Industry (NPfI), as outlined below.

### 3.2.2 NSW Noise Policy for Industry

Potential noise emissions from the operation of the proposed development are to be assessed with respect to the site-specific noise trigger levels based on the *NPfI*. The assessment procedure has two components: intrusiveness and amenity.

#### *3.2.2.1 Amenity Noise Level*

The amenity assessment is based on noise criteria specific to land use and associated activities. 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.

Typically, 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 5 dBA below the recommended amenity nose level specific to the area in which the proposed development is located.

Furthermore, due to different averaging periods for the $L_{Aeq,15min}$ and $L_{Aeq,period}$ noise descriptors, the values of project intrusiveness and amenity noise levels cannot be compared directly when identifying noise trigger levels i.e. the most stringent values of each category. In order to make a comparison between descriptors, the NPfI assumes that the $L_{Aeq,15min}$ equivalent of an $L_{Aeq,period}$ noise level is equal to the $L_{Aeq,period}$ level plus 3 dB.

Based on the above, the recommended amenity noise levels and corresponding project amenity noise levels applicable to the receivers surrounding the proposed development are summarised in Table 3-2.

**Table 3-2: Project Amenity Noise Level**

| Noise Amenity Area | Time of Day | Recommended Amenity Noise Level $L_{Aeq,period}$ dBA | Project Amenity Noise Level $L_{Aeq-period}$ dBA | Project Amenity Trigger Level $L_{Aeq,15min}$ dBA |
|---|---|---|---|---|
| **Residential - Urban** | Day | 60 | 55 | 58 |
| | Evening | 50 | 45 | 48 |
| | Night | 45 | 40 | 43 |
| **Commercial** | When in use | 65 | 60 | 63 |

| Noise Amenity Area | Time of Day | Recommended Amenity Noise Level $L_{Aeq,period}$ dBA | Project Amenity Noise Level $L_{Aeq\text{-}period}$ dBA | Project Amenity Trigger Level $L_{Aeq,15min}$ dBA |
|---|---|---|---|---|
| **School Classroom – Internal** | When in use | 35 | 30 | 33 |
| **Active Recreation Area** | When in use | 55 | 50 | 53 |

#### *3.2.2.2 Intrusive Noise Level*

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 3-3.

**Table 3-3: Project Intrusiveness Noise Levels**

| Type | Receiver | Time of Day | Intrusiveness Noise Level $L_{Aeq,\ period}$ dBA |
|---|---|---|---|
| **Residential** | R1-R2 | Day 7am – 6pm | 60 |
| | | Evening 6pm-10pm | 57 |
| | | Night 10pm-7am | 48 |

#### *3.2.2.3 Sleep Disturbance Screening Level*

Noise sources of short duration and high level that may cause disturbance to sleep if occurring during the night time need to be considered.

The approach recommended by the *NPfI* is to apply the following initial screening noise levels:

- $L_{Aeq,15min}$ 40 dBA or the prevailing RBL + 5 dB, whichever is the greater; and/or
- $L_{AFmax}$ 52 dBA or the prevailing RBL + 15 dB, whichever is the greater.

The sleep disturbance screening noise levels apply outside bedroom windows of residences during the night period.

Where the screening noise levels cannot be met, a detailed maximum noise level event assessment should be undertaken. It may also be appropriate to consider other guidelines including the NSW *Road Noise Policy* (RNP) which contains additional guidance relating to potential sleep disturbance impacts.

Table 3-4 presents the calculation screening level for residential receivers with the higher value in **BOLD**.

**Table 3-4: Sleep Disturbance Screening Level**

| Receiver | RBL | Screening Level $L_{AFmax}$ |
|---|---|---|
| **R1 and R2** | 43 | **58**/52 |

#### *3.2.2.4 Project Noise Trigger Levels*

The resulting project noise trigger levels (PNTLs) are the most stringent of the project intrusiveness noise level and the project amenity noise level. The resulting PNTLs are shown in Table 3-5.

**Table 3-5: Project Noise Trigger Level, dBA**

| Receiver | Assessment Period | PNTL (dBA) | Noise Descriptor |
|---|---|---|---|
| **R1, R2 and accommodation components of MU1** | Day | 58 | $L_{Aeq,15min}$ |
| | Evening | 48 | $L_{Aeq,15min}$ |
| | Night | 43 | $L_{Aeq,15min}$ |
| | Night | 58 | $L_{Afmax}$ |
| **C1, C2 and commercial/office components of MU1** | When in use | 63 | $L_{Aeq,15min}$ |
| **E1 – E3** | When in use | 33 | $L_{Aeq,15min}$ |
| **Rec1** | When in use | 53 | $L_{Aeq,15min}$ |

## 3.3 Construction Noise and Vibration

### 3.3.1 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 3-6 details the application of the ICNG noise management levels.

**Table 3-6 Interim Construction Noise Guideline Criteria**

| Time of Day | NML | How to Apply |
|---|---|---|
| **Recommended Standard Hours**<br><br>**Monday to Friday**<br>**7am to 6pm**<br>**Saturday**<br>**8am to 1pm**<br><br>**No work on Sundays or Public Holidays** | Noise Affected RBL+10 dBA | The noise affected level represents the point above which there may be some community reaction to noise.<br>Where the predicted or measured $L_{Aeq\ (15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.<br>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. |
| | Highly Noise Affected 75 dBA | The highly noise affected level represents the point above which there may be strong community reaction to noise.<br>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:<br>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;<br>2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. |
| **Outside Recommended Standard Hours** | Noise Affected RBL+5 dBA | A strong justification would typically be required for works outside the recommended standard hours.<br>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.<br>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.<br>For guidance on negotiating agreements see section 7.2.2 of the *ICNG*. |

In addition, the ICNG outlines the following NMLs for non-residential receivers, which are applicable when the premises are in use:

- Commercial premises: external $L_{Aeq,15min}$ 70 dBA
- Classrooms at schools and other educational institutions: internal $L_{Aeq,15min}$ 45 dBA
- Active recreation external $L_{Aeq,15min}$ 65 dBA

The internal NML for classrooms have been converted to an external level assuming that a 10dB reduction is expected to be achieved for noise travelling from outdoors to indoors through a window opening area that is 5% of the gross floor area of the internal space.

Table 3-7 presents the applicable noise management levels for construction activities at surrounding receivers.

**Table 3-7 Site-Specific Construction Noise Management Levels**

| Location | Construction Noise Management Level (NMLs) - $L_{Aeq,15min}$ | | | |
|---|---|---|---|---|
| | Day Standard Hours[1] | Day OOH | Evening OOH[2] | Night OOH[3] |
| **R1-R2 and MU1** | 65 | 60 | 62 | 53 |
| **C1 and C2** | 70 (external, when in use) | | | |
| **E1-E3** | 55 (external, when in use) | | | |

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

Note 2: Evening OOH (6pm – 10pm)

Note 3: Night OOH (10pm – 7am)

### 3.3.2 Vibration – Construction Noise & Vibration Guideline (TfNSW, 2023)

Minimum working distances for typical vibration intensive construction equipment are provided in the Transport for NSW's (TfNSW) *Construction Noise and Vibration Guideline* (CNVG).

The minimum working distances presented in Appendix D of the CNVG are for both cosmetic damage (from BS 7358) 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 CNVG are presented in Table 3-8.

**Table 3-8 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) |
| **Vibratory Roller** | 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 |
| **Small Hydraulic Hammer** | 300 kg (5 to 12t excavator) | 2 m | 7 m |
| **Medium Hydraulic Hammer** | 900 kg (12 to 18t excavator) | 7 m | 23 m |
| **Large Hydraulic Hammer** | 1600 kg (18 to 34t excavator) | 22 m | 73 m |
| **Pile Driver – Vibratory** | Sheet Piles | 2 m to 20 m | 20 m |
| **Piling Rig – Bored** | ≤ 800 mm | 2 m (nominal) | n/a |
| **Piling Rig – Hammer** | 12 t down force | 15 m | 50 m |
| **Jackhammer** | Hand held | 1 m (nominal) | Avoid contact with structure |

## 3.4 NSW EPA Road **Noise** Policy

The *RNP* is considered by RWDI to be the most suitable guideline to assess potential impacts at residences from both construction and operational traffic noise generated on public roads by developments.

For the purposes of this assessment, Bank Lane and Hogben Street will be classified as sub-arterial roads. This is based on the functional role definition for sub-arterial roads provided in Table 2 of the RNP where it states that sub-arterial roads "*may have been designed as local streets but can serve major traffic-generating developments or support non-local traffic*".

Given that the abovementioned roadways are used by non-local traffic to access the existing hospital, it can be reasonably concluded that the identified roadways (Bank Lane and Hogben Street) can be categorised as sub-arterial roads under the RNP.

Relevant criteria are summarised in Table 3-9.

**Table 3-9: Road Traffic Noise Criteria**

| Type of Development | Assessment Criteria | |
|---|---|---|
| | Day (7am–10pm) | Night (10pm–7am) |
| **Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use developments** | $L_{Aeq,15\ hour}$ 60 (external) | $L_{Aeq,9\ hour}$ 55 (external) |
| **School Classrooms** | $L_{Aeq,1\ hour}$ 40 (internal, when in use) | - |

In addition, for existing residences and other sensitive land uses affected by additional traffic on existing roads and where the criterion is exceeded, any increase in the total traffic noise level should preferably be limited to 2 dB. The *RNP* considers that a 2 dB increase is typically not noticeable.

It is worth noting that the EPA defines periods for on-site noise differently to that defined for road traffic (along the road network). For road traffic noise along the road network, the daytime period is defined as the time between 7.00am and 10.00pm and night-time is between 10.00pm and 7.00am.

# 4 NOISE INTRUSION ASSESSMENT

The primary source of external noise on the proposed development is from traffic noise on Princes Highway. The assessment of external noise level for the proposed development has been determined using attended and unattended noise monitoring at the site.

## 4.1 Analysis

Using the measured noise levels presented in Section 2.3, calculations were performed to determine the internal noise levels within the proposed 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.

## 4.2 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.**

### 4.2.1 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 4-1. Based on our review of the architectural

draiwngs, the glazing heights for the internal spaces are typically 1.7m high, except for the ground floor corridor, entry lobby and café areas where full height glazing is proposed.

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 4-1: Indicative Recommended Acoustic Performance for Glazing**

| Level | Space | Facade | Indicative Glazing Performance |
|---|---|---|---|
| **Ground Floor** | All | All | $R_w$ 29 |
| **Mezzanine** | Staff Room | East | $R_w$ 37 |
| | Pathology | East | $R_w$ 37 |
| | Kitchen | West | $R_w$ 29 |
| **Levels 1 - 5** | Wards | East – Glazing on Single Facade | $R_w$ 43 |
| | | East – Dual Aspect facing Princes Highway and Hogben Street | $R_w$ 45 |
| | | North | $R_w$ 35 |
| | | West | $R_w$ 31 |
| | Offices | West | $R_w$ 29 |
| **Level 6** | Consulting Suite | North and East | $R_w$ 35 |
| | | West | $R_w$ 29 |

Sample glazing assemblies for each of the $R_w$ ratings are noted below and should be reviewed and confirmed at detailed design stage. The glazing assemblies will required full perimeter acoustic seals.

**Glazing, $R_w$ 29**
- 6 mm glass

**Glazing, $R_w$ 31**
- 6.38mm laminated glass

**Glazing, $R_w$ 35**
- 10.38mm laminated glass

**Glazing, $R_w$ 37**
- 12.5mm VLam Hush glass

**Glazing, $R_w$ 43**
- 6.38mm laminated glass / 97.5mm airgap / 6.38mm laminated glass

**Glazing, $R_w$ 45**

- 10.38mm laminated glass / 110mm airgap / 6.38mm laminated glass

### 4.2.2 External Walls

It is understood that the external walls are proposed to be constructed primarily of masonry which should be acoustically acceptable and is not expected to require any additional acoustic treatment.

Any lightweight external wall constructions should be reviewed at detailed design stage to ensure that the internal noise criteria are met.

Any penetrations of the external walls should be acoustically sealed and treated to maintain the acoustic performance of the wall.

### 4.2.3 Roof/Ceiling

The construction of the roof is unknown at this stage. However, we have assumed that it will provide adequate acoustic isolation to meet the internal noise requirements. No additional acoustic treatment will be required for the roof/ceiling to mitigate external noise intrusion.

### 4.2.4 Ventilation

Regarding natural ventilation of the hospital, the *Development near Busy Roads and Rail Corridors - Interim Guideline* states that:

- "If internal noise levels with windows or doors open exceed the criteria by more than 10 dBA, 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."

We anticipate that the hospital will have fixed glazing with fresh air provided to the internal areas by means of mechanical ventilation. As a result, the above requirements regarding natural ventilation will not be applicable to the project.

# 5 NOISE EMISSION ASSESSMENT

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

- Car park ramp: vehicle movements to the basement levels.
- Loading Dock: truck movements.
- Mechanical plant noise.
- Operational noise from the Level 2 terrace.
- Siren noise from emergency vehicles.

## 5.1 Car Park Ramp and Loading Dock

Noise emissions from these noise sources will be assessed against the project noise trigger levels presented in Table 3-5. If noise emissions are compliant at the nearest receivers identified in Section 1.5, then they are expected to comply at all receivers in the vicinity of the proposed development.

Detailed information regarding hours of operation for any service vehicles was not available at the time of writing. As a result, noise emissions from the use of the ramp and loading dock have been assessed for all time periods.

To provide a conservative assessment, it has been assumed that a service vehicle may enter and leave the loading dock within any 15-minute period. It has also been assumed that all vehicles will travel at 10 km/hr. Trucks are assumed to access the loading dock during day periods only.

It is assumed that peak light vehicle movements will typically occur during the day and evening periods. Based on future traffic generation outlined in the Traffic Impact Assessment (TIA) for the project (PTC Consultants, 12 November 2025), we have assumed a worst-case scenario of 16 car movements entering the proposed Clinical Tower building and 66 car movements leaving the Clinical Tower building via Bank Lane during a one hour period (total 82 vehicles).

**Table 5-1** presents the sound power levels considered in this assessment.

**Table 5-1: Car Park Vehicles Sound Power Level, dBA**

| Noise Source | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz | dBA |
|---|---|---|---|---|---|---|---|---|---|
| **Light vehicle entering ramp at 10 km/hr** | 69 | 74 | 75 | 78 | 80 | 80 | 73 | 72 | **85** |
| **Truck manoeuvring at 10 km/hr** | 106 | 105 | 96 | 96 | 94 | 91 | 89 | 80 | **99** |

The predicted noise levels at the nearby receivers are presented in Table 5-2. Predictions have been compared against the relevant Project Noise Trigger Levels (PNTLs) in Table 3-5. For residential receivers, noise emissions have been assessed against the evening time criteria (which is the more stringent of the day and evening periods).

**Table 5-2: Predicted Noise Levels from Car Park Ramp and Loading Dock, dBA $L_{Aeq,15min}$**

| Receiver Location | Predicted Noise Level | PNTLs |
|---|---|---|
| **R1** | 36 | 48 |
| **R2** | 34 | 48 |
| **C1** | 20 | 63 |
| **C2** | 42 | 63 |
| **E1** | 26 | 33 |
| **E2** | 33 | 33 |
| **E3** | 25 | 33 |
| **Rec1** | 25 | 53 |
| **MU1** | 43 | 48 |

Predictions indicate that noise levels from use of the basement car park ramp and loading dock are likely to comply with the PNTLs.

## 5.2 Sleep Disturbance Noise Levels

Noise emissions during the night-time period require an assessment for potential sleep disturbance at the nearest noise-sensitive residential receivers.

The nearest residential receivers are located approximately 15 m north of the site. Sleep disturbance events associated with the proposed development would include car movements to and from the basement car park ramp.

Table 5-3: summarises the $L_{Amax}$ sound power levels of typical activities that may occur at the proposed development during the night-time period.

**Table 5-3: Sleep Disturbance – $L_{Amax}$ Sound Power Levels**

| Noise Source | $L_{Amax}$ SWL (dBA) | Source Height |
|---|---|---|
| **Vehicle movement along basement car ramp** | 85 | 0.5 m |

Predicted $L_{AFmax}$ levels are presented in Table 5-4.

**Table 5-4: Predicted Operational Noise Levels, $L_{AFmax}$ dBA**

| Receiver ID | Predicted Noise Level | Sleep Disturbance Screening Level | Compliance |
|---|---|---|---|
| **R1** | 49 | 58 | Yes |
| **R2** | 42 | | Yes |

Accordingly, noise from site-specific sleep disturbance events are expected to be well below established sleep disturbance criteria at residences.

## 5.3 Mechanical Plant

The major mechanical noise sources associated with the proposed development will be:

- Rooftop: Exhaust fans, SPFs and AHUs
- Level 6: Generator, Chillers, Hydraulic Plant and Water Pumps

At this stage, indicative selections of mechanical equipment have not been provided. These selections are required to be confirmed and finalised prior to the issue of the construction certificate. It is recommended that a detailed acoustic assessment of the mechanical plant is undertaken at construction certification stage. The major mechanical plant and their indicative locations that have been proposed in concept are presented in Figure 5-1 and Figure 5-2.

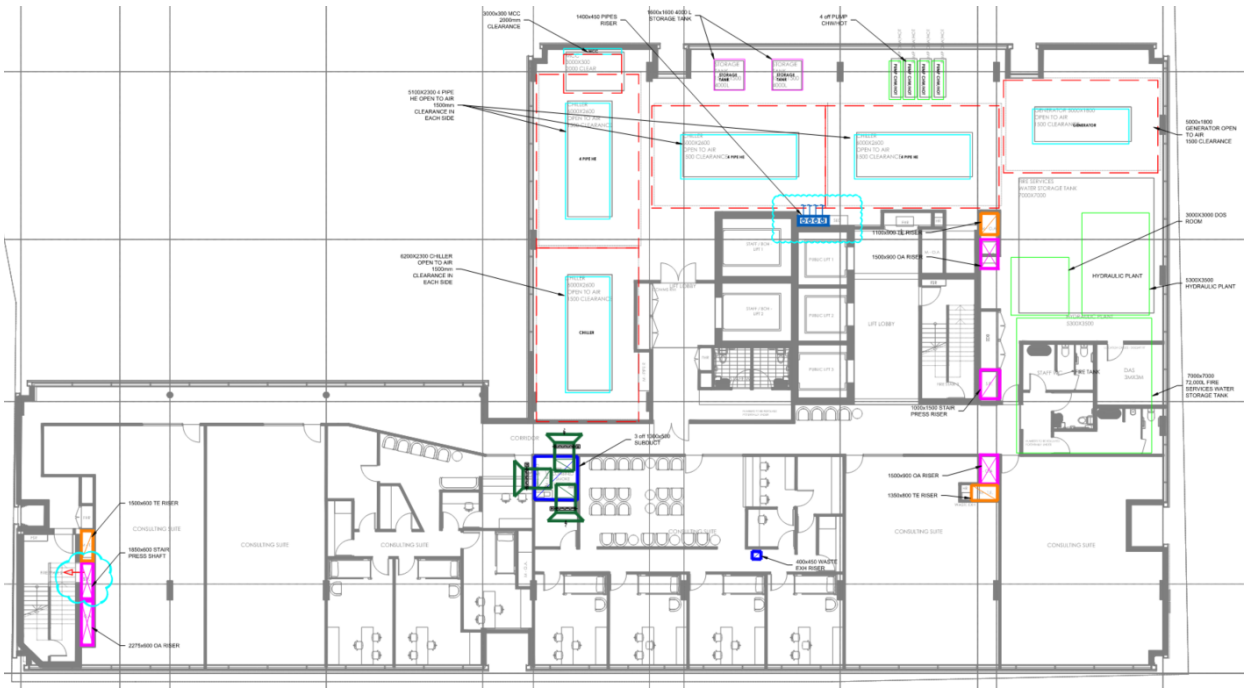

**Figure 5-1: Mechanical Services Level 6 Indicative Layout**

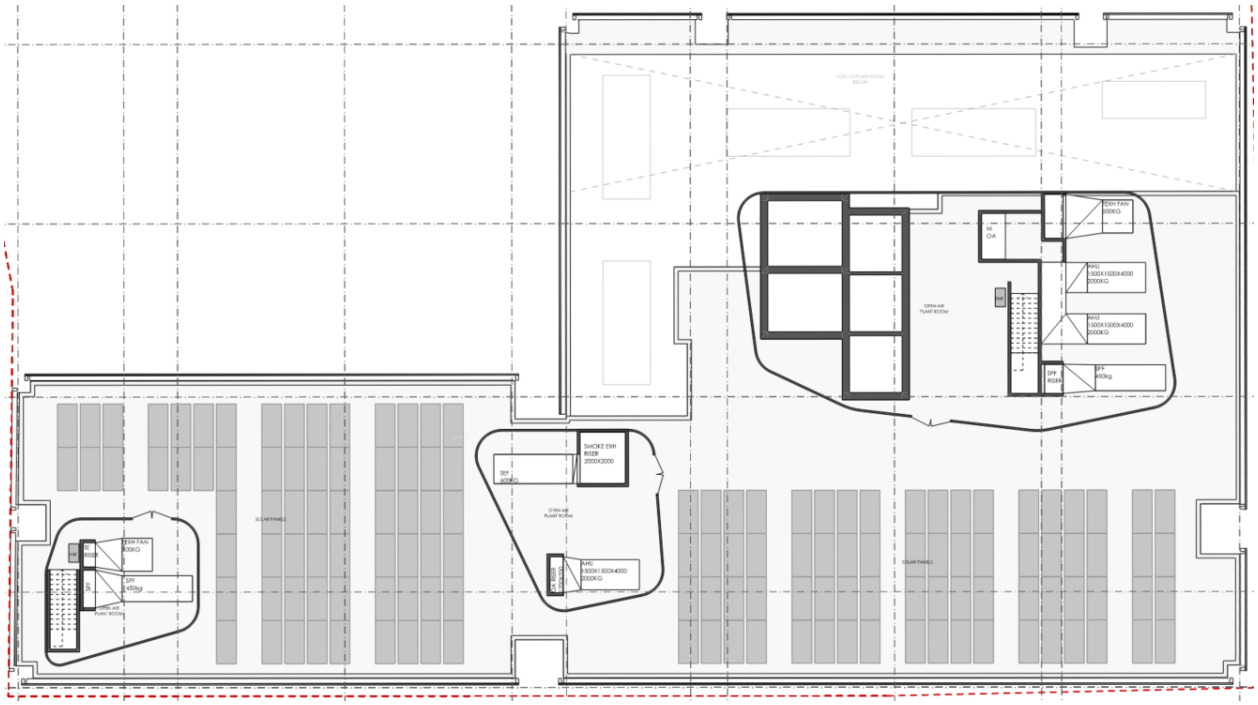

**Figure 5-2: Mechanical Services Roof Indicative Layout**

Noise emissions from mechanical plant should be designed to comply with the requirements of the NSW EPA NPfI (refer to section 3.2).

Mitigation measures that are commonly employed to control noise emissions from mechanical plant include:

- Locating mechanical equipment as far as practicable from noise sensitive receivers.
- Using in-duct treatments such as internally lined ductwork or attenuators.

- Building barriers or enclosures around equipment; and
- Use of acoustic louvres.

## 5.4 Level 2 Terrace

There is a proposed terrace/open space, located on level 2.

Calculations of noise emission from the terrace have been based on the following assumptions:

- 20 people using the terrace at one time.
- 1 in 2 people are talking with a normal effort voice.

The table below outlines the sound power level associated with the use of the terrace.

| Noise Source | $L_{Amax}$ SWL (dBA) | Source Height |
|---|---|---|
| **20 people, 10 speaking with normal effort voice** | 79 | 1.5 m |

Noise levels at the worst affected residential windows are 44 dBA during the daytime period. Given that background noise levels across the site are higher (section 2.2), it can be inferred that noise emission levels from the terrace would be masked by extraneous noise and not likely to have an appreciable impact on both the surroundings and on-site noise sensitive receivers.

## 5.5 Siren Noise

It is understood that as part of the proposed development, part of the existing hospital building will be redeveloped to accommodate an emergency department.

Access to and from site for emergency vehicles is proposed to come from South Street, along the existing driveway.

Whilst there are no quantifiable criteria for noise from sirens/emergency vehicles, measures should be adopted so that sirens are turned off by the time they get near the hospital, and that sirens should only be turned on near site to alert cars of their presence.

# 6 ROAD TRAFFIC NOISE ASSESSMENT

## 6.1 Road Traffic Volumes

Road traffic associated with the proposed development is expected to be on Bank Lane and Hogben Street (sub-arterial roads) before connecting onto major roads, South Street and Princes Highway (sub-arterial/arterial roads). As a result, traffic noise impacts from the proposed development will be assessed at the receivers along Bank Lane and Hogben Street.

Existing traffic volumes were provided in Appendix 4 of the TIA. Peak hour traffic volumes have been summarised in **Table 6-1**.

**Table 6-1: Existing Peak Hour Traffic Volumes**

| Roadway | Period | Volume | | |
|---|---|---|---|---|
| | | LV | HV | Total |
| Bank Lane | AM Peak | 44 | 0 | 44 |
| | PM Peak | 25 | 2 | 27 |
| Hogben Street | AM Peak | 65 | 0 | 65 |
| | PM Peak | 69 | 0 | 69 |

Section 6.3 of the TIA outlines the assumption that 80% of trips are inbound and 20% outbound for the AM peak hour period, and the opposite in the PM Peak hour period. For our assessment, we have assumed that the inbound traffic will be along Hogben Street, and outbound traffic via Bank Lane.

Table 7 of the TIA states that there will be a net increase of 75 and 82 vehicle movements during the AM and PM peak hour periods respectively from the proposed development.

Accounting for the above, and the assumption outlined above, predicted peak hour traffic volumes on Bank Lane and Hogben Street, including those generated by the proposed development are presented in **Table 6-2** and have been based on information provided by PTC Consultants.

**Table 6-2: Peak Hour Traffic Generation (Existing Traffic + Traffic From Proposed Development)**

| Roadway | Period | Volume | | |
|---|---|---|---|---|
| | | LV | HV | Total |
| Bank Lane | AM Peak | 59 | 0 | 59 |
| | PM Peak | 91 | 2 | 93 |
| Hogben Street | AM Peak | 125 | 0 | 125 |
| | PM Peak | 85 | 0 | 85 |

We note that the above numbers are representative of peak hour traffic generation, however assessment against the RNP requirements outlined in Table 3-9 requires assessment of total traffic volumes over the day (7am-10pm) and night time (10pm-7am) periods.

To do this, the average daily traffic volumes for Bank Lane and Hogben Street have been calculated based on the assumption that the peak hour traffic volume is approximately 10% of the daily traffic volume. This would correspond to 1,250 and 930 daily vehicle movements along Hogben Street and Bank Lane, respectively.

It has also been assumed that 75% of the daily traffic movements would occur during the daytime period, and the remaining 25% would occur during the night time period.

Based on the above, the traffic volumes that have been adopted for this assessment are summarised in Table 6-3.

**Table 6-3: Total Traffic Generation During Day and Night Time Periods (Existing Traffic + Traffic From Proposed Development)**

| Roadway | Period | Volume | | |
|---|---|---|---|---|
| | | LV | HV | Total |
| **Bank Lane** | Daytime | 698 | 0 | 698 |
| | Night time | 232 | 1 | 233 |
| **Hogben Street** | Daytime | 938 | 0 | 938 |
| | Night time | 313 | 0 | 313 |

## 6.2 Road Traffic Noise Levels

Traffic noise levels have been predicted using the *Calculation of Road Traffic Noise* (CoRTN) model (United Kingdom Department of Transport, 1988), which takes into account the following factors:

- Traffic flow volumes
- Average vehicle speed
- Percentage of heavy vehicles
- Gradient of road
- Type of road pavement
- Distance from receiver location to road
- Shielding from barriers / building and intervening topography
- Reflections from barriers / buildings
- Angle of view

Based on the traffic volumes presented in Table 6-3, predictions of noise impacts have been completed to R1, 1-21 Hogben Street (located along Hogben Street), and MU1, 4 Hogben Street (located along Bank Lane) and are presented in **Table 6-4**. Noise predictions have been assessed against the RNP criteria (refer to **Table 3-9**).

**Table 6-4: Predicted Road Traffic Noise Levels,**

| Receiver Location | Time Period [1] | Predicted Traffic Noise Level from Additional Traffic $L_{Aeq, period}$ dBA | Noise Criteria $L_{Aeq, period}$ dBA | Complies |
|---|---|---|---|---|
| **R1 (Along Hogben Street)** | Day | 53 | 60 | Yes |
| | Night | 51 | 55 | Yes |
| **MU1 (Along Bank Lane)** | Day | 54 | 60 | Yes |
| | Night | 52 | 55 | Yes |

Note 1: Day = 7am – 10pm; Night = 10pm – 7am

Traffic noise impacts are predicted to comply with the RNP criteria presented in **Table 3-9** at the nearest representative receivers, and so no further assessment is required.

# 7 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

## 7.1 Proposed Construction Activities

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

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

## 7.2 Construction Hours

Where possible, works should be completed during the standard daytime construction hours of Monday to Friday 7:00am to 6:00pm and Saturday 8:00am to 1:00pm.

It is understood that the preliminary construction traffic management plan outlines construction hours of Monday to Friday 7:00am to 6:00pm, Saturday 8:00am to 1:00pm, and Saturday 1:00pm to 7:00pm (excluding high impact noise works such as demolition, excavation and piling). Where Out-of-Hours Works (OOHWs) are required (for emergency works/delivery etc.) it is likely that they would require separate approval.

## 7.3 Construction Noise Assessment

### 7.3.1 Construction Noise Assessment Method

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.

### 7.3.2 Construction Noise Sources

Sound power levels (SWLs) for the typical operation of construction equipment applied in the modelling are listed in Table 7-1 and have been based on measurements conducted by RWDI and Appendix C of the CNVG. 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 7-1 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 | **113** | 114 |
| | Truck & Dog (30 t) | 15 | 1 | 108 | **108** | |
| **Excavation and Piling** | Dozer (D10) | 10 | 2 | 116 | **117** | 122 |
| | Truck & Dog (30 t) | 15 | 2 | 108 | **111** | |
| | Excavator (40 t) | 15 | 2 | 115 | **118** | |
| | Piling Rig | 5 | 1 | 116 | **111** | |
| | Concrete Truck | 15 | 1 | 109 | **109** | |
| **Construction** | Concrete Truck / Agitator | 15 | 2 | 106 | **109** | 117 |
| | Concrete Pump | 15 | 1 | 109 | **109** | |
| | Truck (20 t) | 15 | 1 | 103 | **103** | |
| | Mobile Crane | 10 | 1 | 113 | **113** | |
| | Hand Tools | 7.5 | 5 | 105 | **109** | |
| | Elevated Work Platform | 10 | 2 | 97 | **98** | |

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.

### 7.3.3 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 7-1. It is understood that construction would be limited to Standard Hours (refer to section 7.2**);** NMLs for other periods are presented for reference only.

The typical $L_{Aeq,15min}$ noise levels are presented in Table 7-2. 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 7-2 Predicted Construction Noise Impacts**

| Stage | Receivers | Predicted Noise Level | Noise Level – $L_{Aeq,15min}$ dBA | | | |
|---|---|---|---|---|---|---|
| | | | Noise Management Levels (NMLs) | | | |
| | | | Day [1] | Day | Eve | Night |
| | | | Standard | OOH | OOH [2] | OOH [3] |
| Demolition and Clearing | R1 | 66-77 | 65 | 60 | 62 | 53 |
| | R2 | 75 | | | | |
| | C1 | 59 | 70 (when in use) | | | |
| | C2 | 80 | | | | |
| | E1 | 64 | 55 (external, when in use) | | | |
| | E2 | 77 | | | | |
| | E3 | 76 | | | | |
| | Rec1 | 66 | 65 (when in use) | | | |
| | MU1 | 85 | 65 | 60 | 62 | 53 |
| Excavation and Piling | R1 | 76-85 | 65 | 60 | 62 | 53 |
| | R2 | 83 | | | | |
| | C1 | 67 | 70 (when in use) | | | |
| | C2 | 88 | | | | |
| | E1 | 72 | 45 (internal, when in use) | | | |
| | E2 | 85 | | | | |
| | E3 | 84 | | | | |
| | Rec1 | 74 | 62 (when in use) | | | |
| | MU1 | 93 | 65 | 60 | 62 | 53 |
| Construction | R1 | 71-80 | 65 | 60 | 62 | 53 |
| | R2 | 78 | | | | |
| | C1 | 62 | 70 (when in use) | | | |
| | C2 | 83 | | | | |
| | E1 | 67 | 45 (internal, when in use) | | | |
| | E2 | 80 | | | | |
| | E3 | 79 | | | | |
| | Rec1 | 69 | 65 (when in use) | | | |
| | MU1 | 88 | 65 | 60 | 62 | 53 |

Note 1: Standard Hours (7am – 6pm Monday to Friday, 8am – 1am Saturday with no work on Sundays or Public Holidays)
Note 2: Evening OOH (6pm – 10pm)
Note 3: Night OOH (10pm – 7am)

During standard construction hours, exceedances of the noise affected NMLs are generally expected at receivers due to the proximity, with receivers adjacent to the proposed development expected to be highly noise affected, i.e. with predicted noise levels exceeding 75 dBA.

Construction noise emissions for be managed carefully to minimise noise impacts at surrounding receivers. Measures to manage construction noise emissions are discussed in Section 7.3.4.

### 7.3.4 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.

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 7-3, along with the likely reduction in noise levels. Where reasonable and feasible, these measures should be employed during the construction of the proposed development.

**Table 7-3 Indicative Construction Noise Mitigation Measures**

| Mitigation Measure | Anticipated Noise Reduction, dBA |
|---|---|
| **Administrative Controls** | |
| **Operate during approved hours** | N/A |
| **Undertake regular noise monitoring to determine the impact of operating plant on sensitive receivers** | N/A |

| Mitigation Measure | Anticipated Noise Reduction, dBA |
|---|---|
| **Appropriate training of onsite staff** | N/A |
| **Undertake community consultation and respond to complaints in accordance with established project procedures** | N/A |
| **Turning off machinery when not in use** | 0-5 |
| **Respite periods for pile drivers and rock breakers (if applicable)** | N/A |
| **Conducting regular maintenance of plant to ensure that they are operating as efficiently and quietly as practicable** | N/A |
| **Engineering Controls** | |
| **Portable temporary screens** | 5-10 |
| **Screen or enclosure for stationary equipment** | 10-15 |
| **Maximising the offset distance between noisy plant items and sensitive receivers** | 3-6 |
| **Avoiding using noisy plant simultaneously and / or close together, adjacent to sensitive receivers** | 2-3 |
| **Orienting equipment away from sensitive receivers** | 3-5 |
| **Carrying out loading and unloading away from sensitive receivers** | 3-5 |
| **Using dampened tips on rock breakers** | 3-6 |
| **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** | 5-10 |
| **Selecting site access points and roads as far as reasonably practicable away from sensitive receivers** | 3-6 |
| **Using spotters, closed circuit television monitors, "smart" reversing alarms, or "squawker" type reversing alarms in place of traditional reversing alarms** | 2-5 |
| **Employ non noise-generating structures such as site offices, storage sheds, stockpiles and tanks as noise barriers** | 5-10 |

## 7.4 Construction Vibration Impacts

The nearest neighbouring building to the site is adjacent to the west of the site (receiver MU1).

Construction staging has yet to be finalised, and the need for any vibration generating activities have not been determined.

Vibration impacts are possible at neighbouring industrial sites if vibration intensive equipment is to be operated in close proximity to the site boundary. Should these pieces of plant be operated within the minimum recommended distances of the CNVG of a sensitive receiver (refer to Table 3-8, or if there are any other vibration intensive plant items that the Contractor has concerns for causing disruption at a neighbouring receiver), 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 CONCLUSIONS AND RECOMMENDATIONS

RWDI has completed a Noise and Vibration Impact Assessment for the proposed expansion of St George Private Hospital. This assessment has been prepared to address the noise and vibration clauses of the SEARs for the State Significant Development Application (SSD-86969958).

Existing ambient noise levels have been established via long-term unattended noise monitoring and processed in accordance with the NPfI to establish the RBLs at sensitive receivers. Short-term attended noise measurements were conducted to measure road traffic noise impacts.

Noise impacts associated with the operation of the proposed development (vehicle noise, mechanical plant noise and operational noise from terraces) have been assessed with reference to the NPfI. The results of the assessment indicate in-principle that noise emissions from the site are capable of complying with the relevant acoustic requirements.

Noise intrusion from road traffic noise from Princes Highway have been assessed with reference to the internal noise recommendations of NSW Department of Planning's Development Near Rail Corridors and Busy Roads (Interim Guideline), and the SEPP (Transport and Infrastructure) 2021. Indicative recommendations for the building façade construction have been presented to mitigate noise ingress. These recommendations should be reviewed once the room layouts, glazing areas and ventilation systems have progressed sufficiently.

Noise and vibration impacts from the construction of the proposed development have been assessed in-principle in accordance with the ICNG.

Traffic noise generated from the future development has been assessed to the criteria stated in the *Road Noise Policy*. The results of the assessment indicate that additional road traffic generated by the future development is likely to comply with the relevant criteria at the nearest representative receivers.

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.

Construction noise and vibration management and mitigation strategies have been recommended in this report. It is 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. Site-specific noise mitigation measures should be further addressed in the CNVMP once the construction methodology and schedule are known.

# 9 STATEMENT OF LIMITATIONS

This report entitled *"St George Private Hospital – SSDA Noise and Vibration Impact Assessment"* was prepared by RWDI Australia Pty Ltd ("RWDI") for Akalan Projects Pty Ltd ("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.

# APPENDIX A

## UNATTENDED MONITORING GRAPHS

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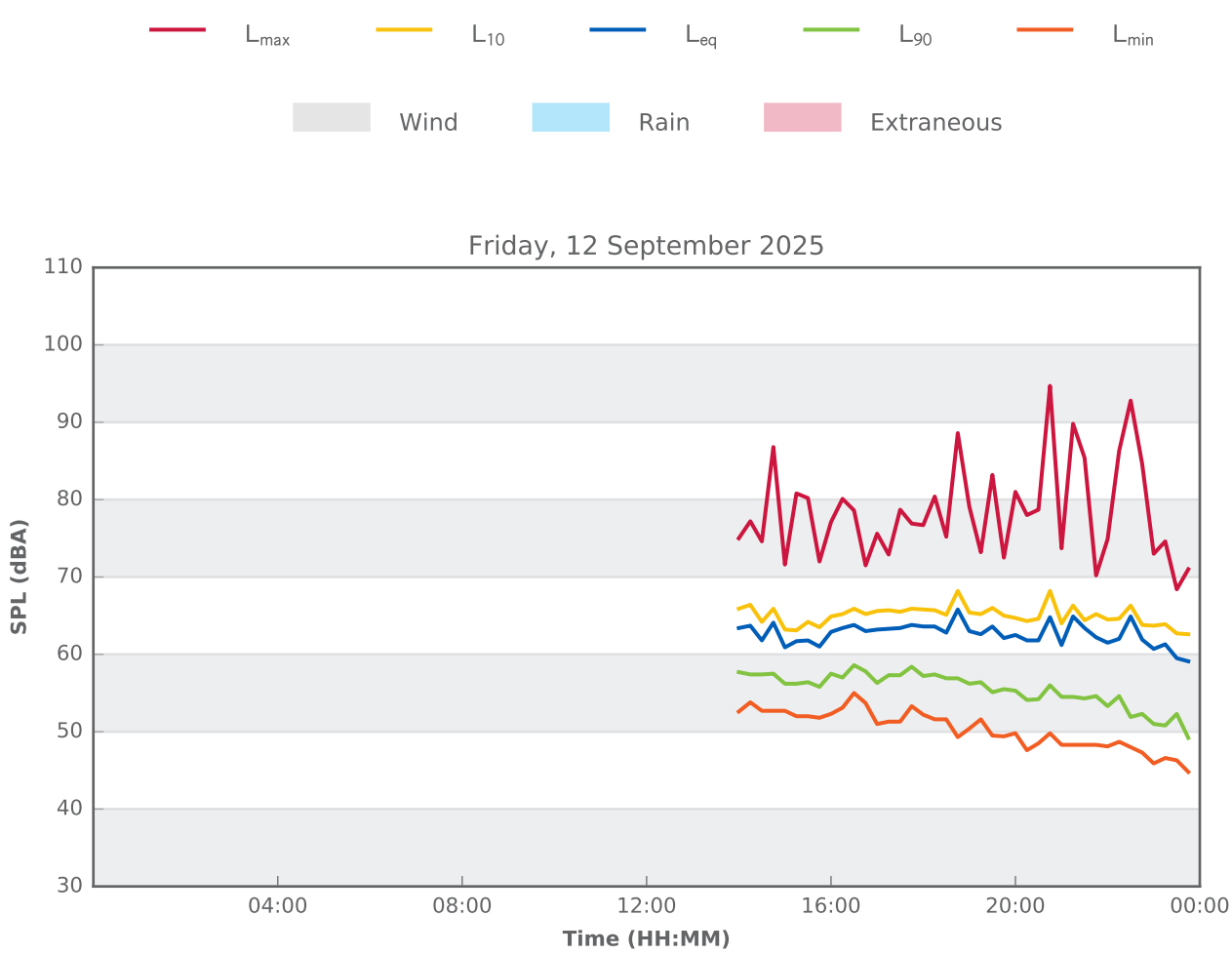


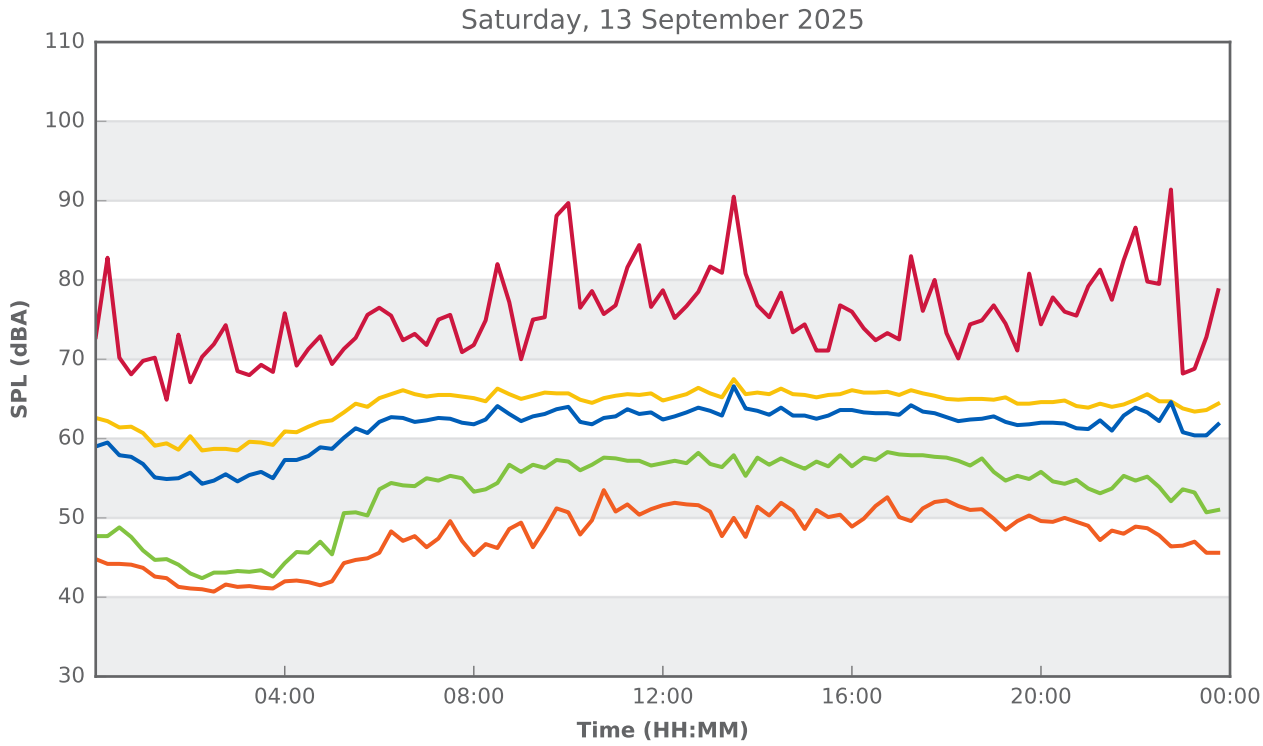

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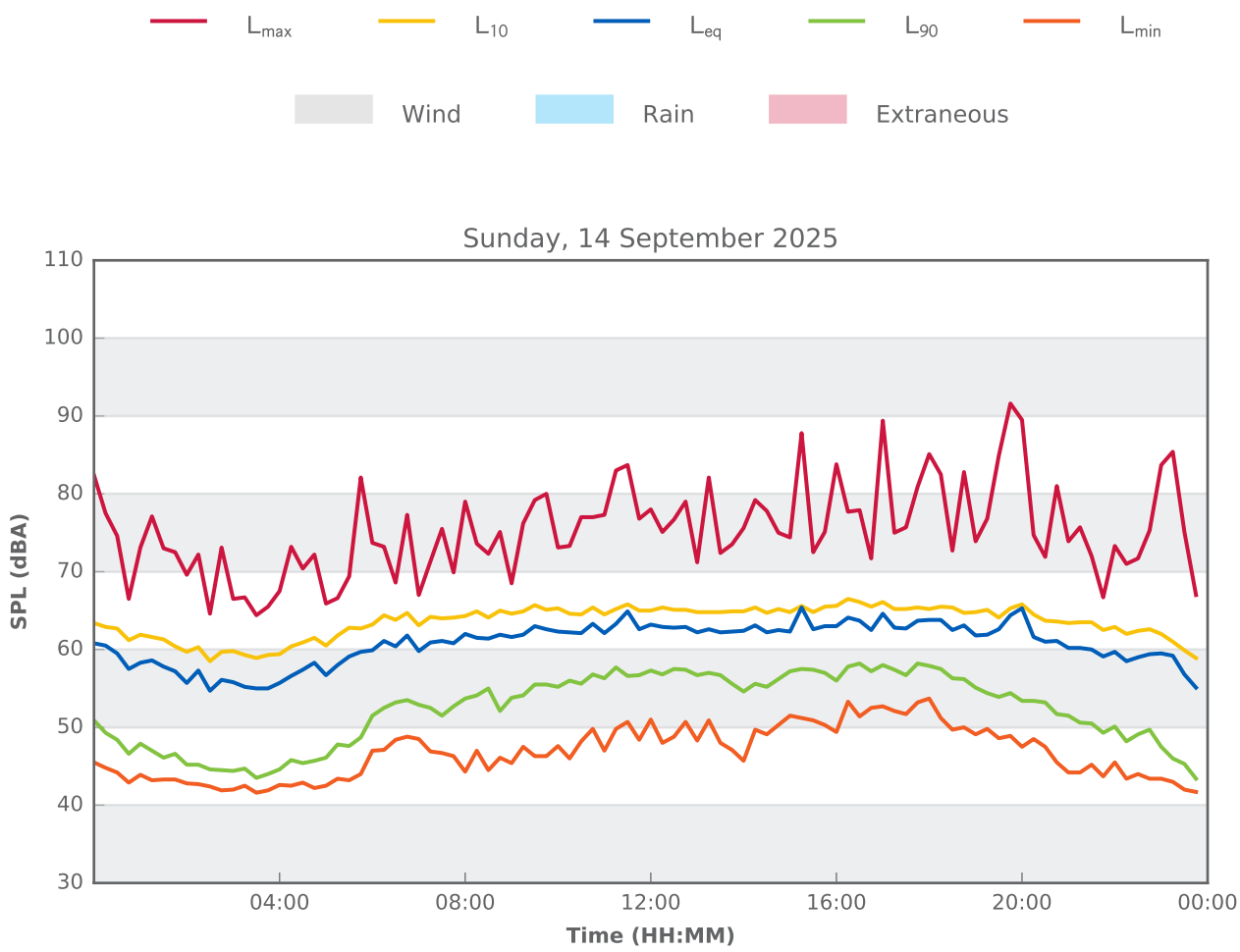


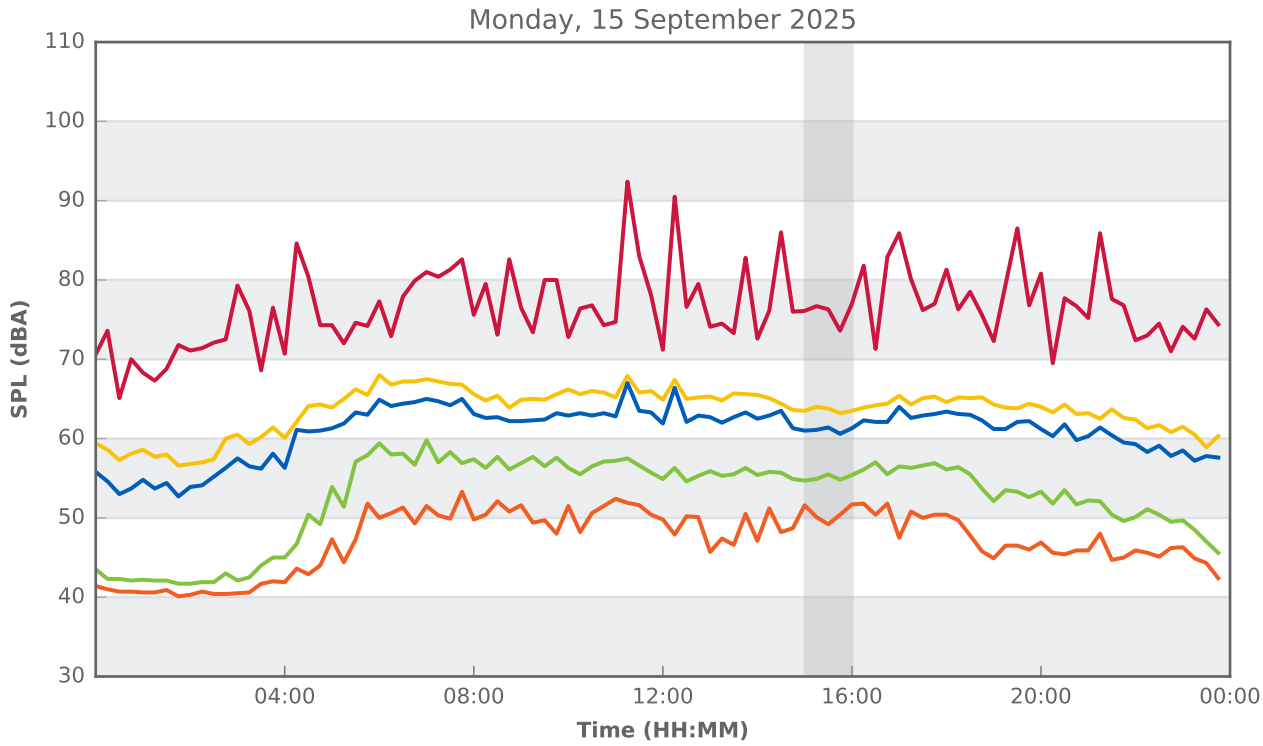

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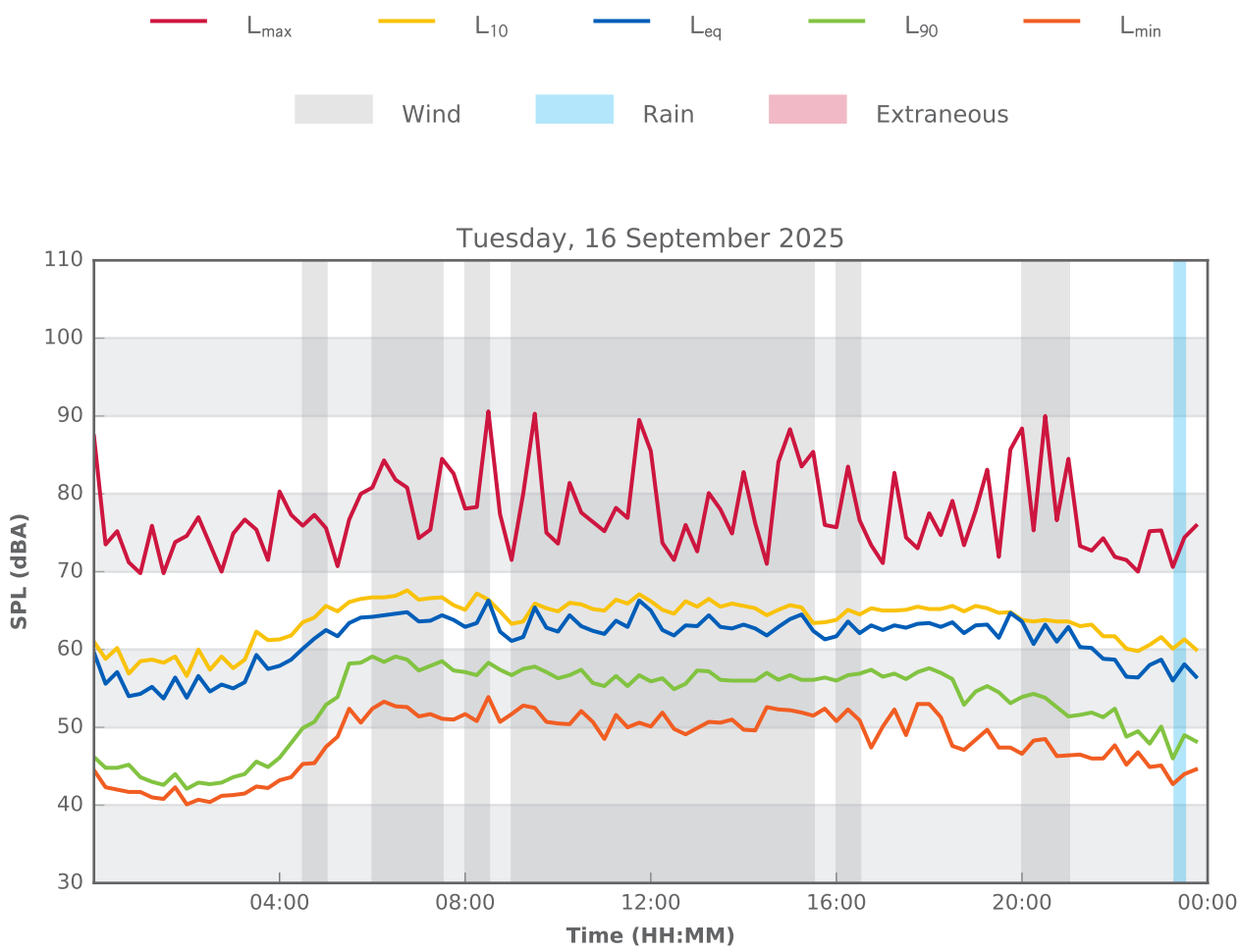


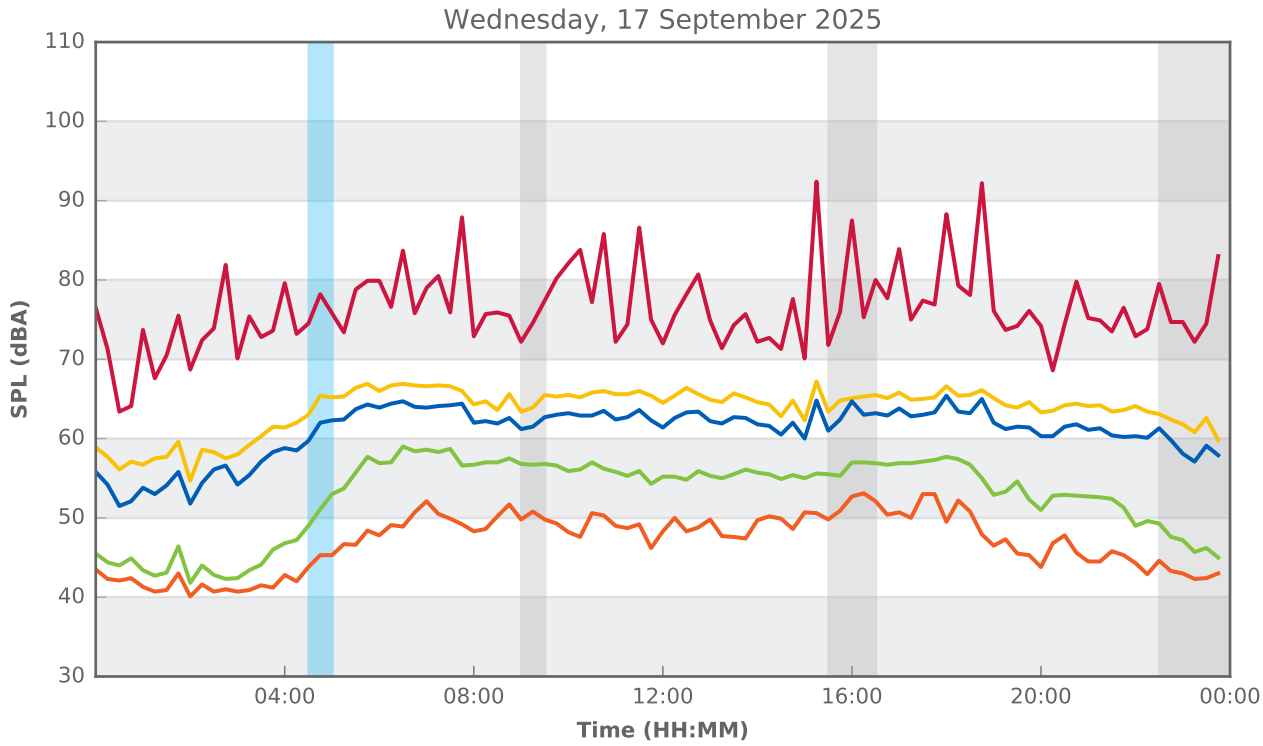

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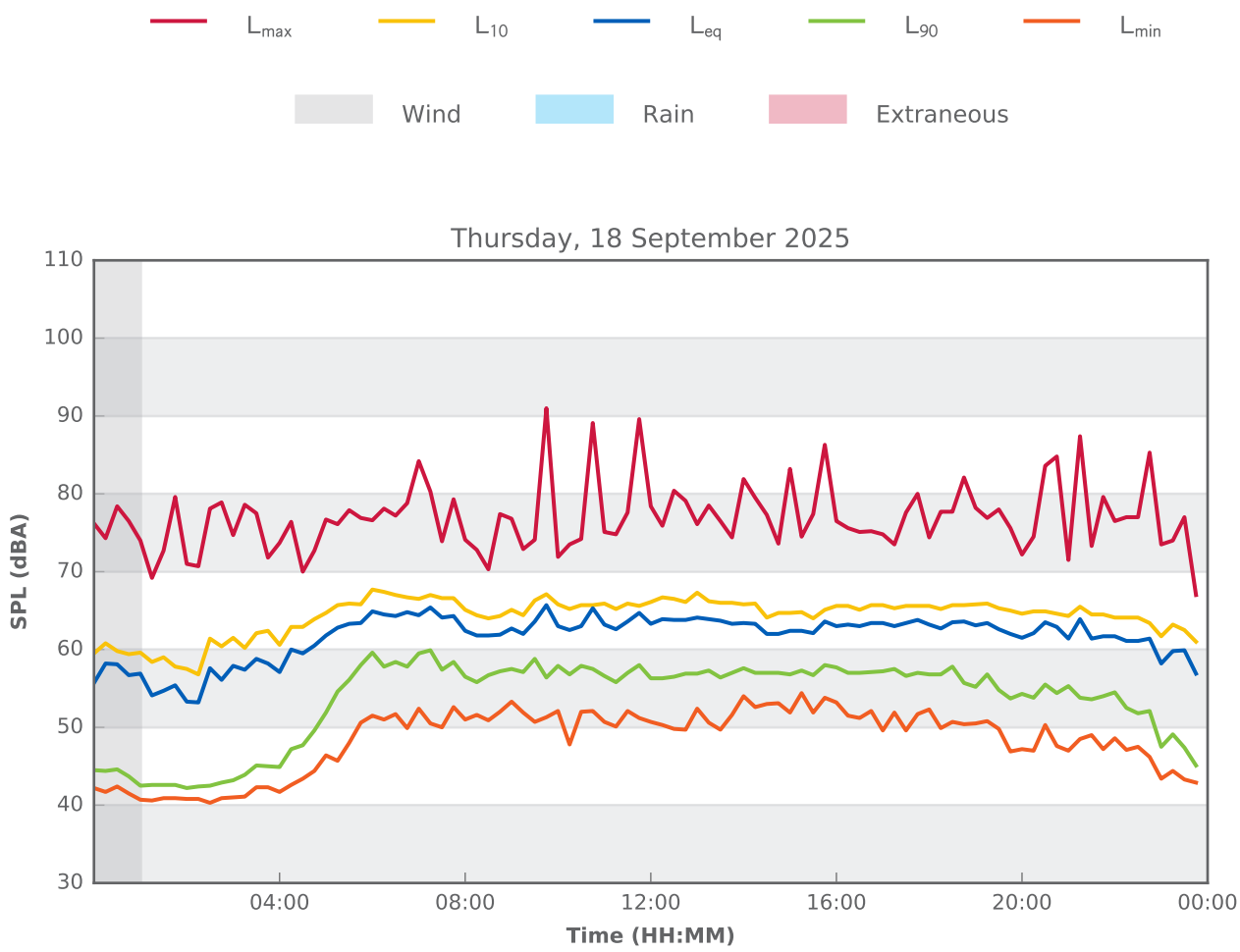


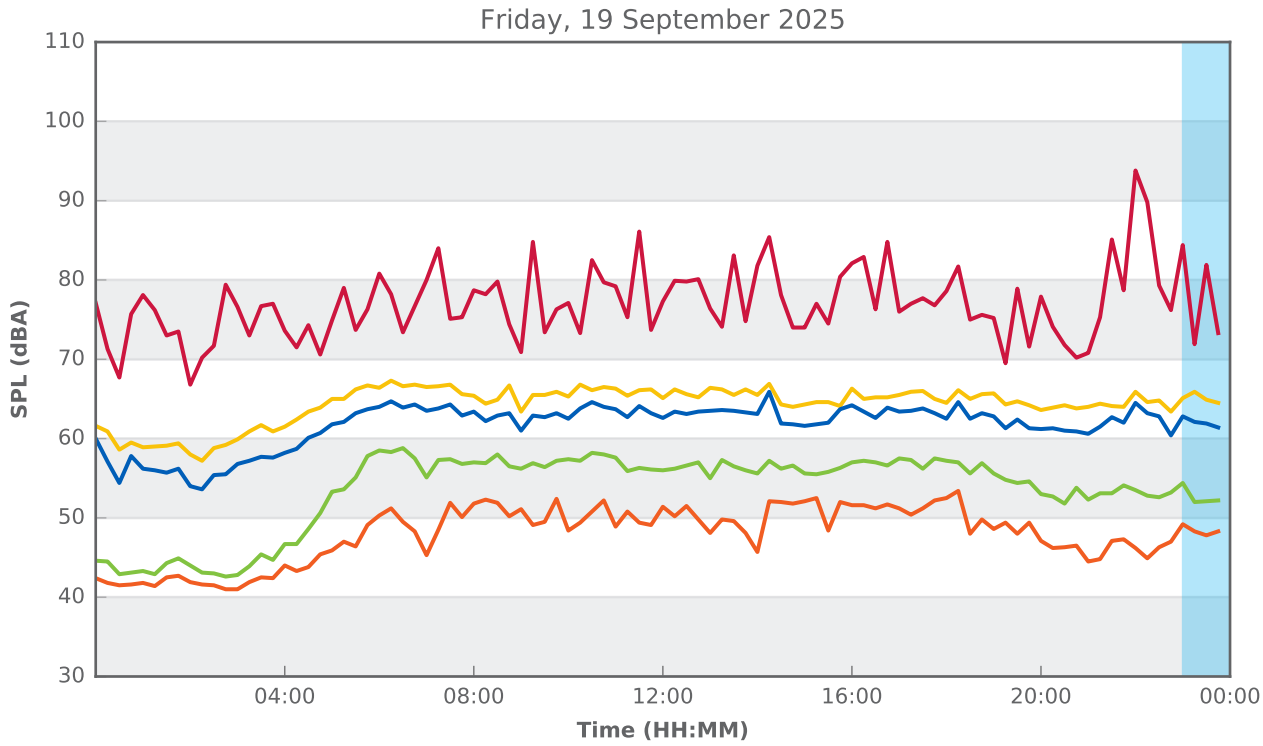

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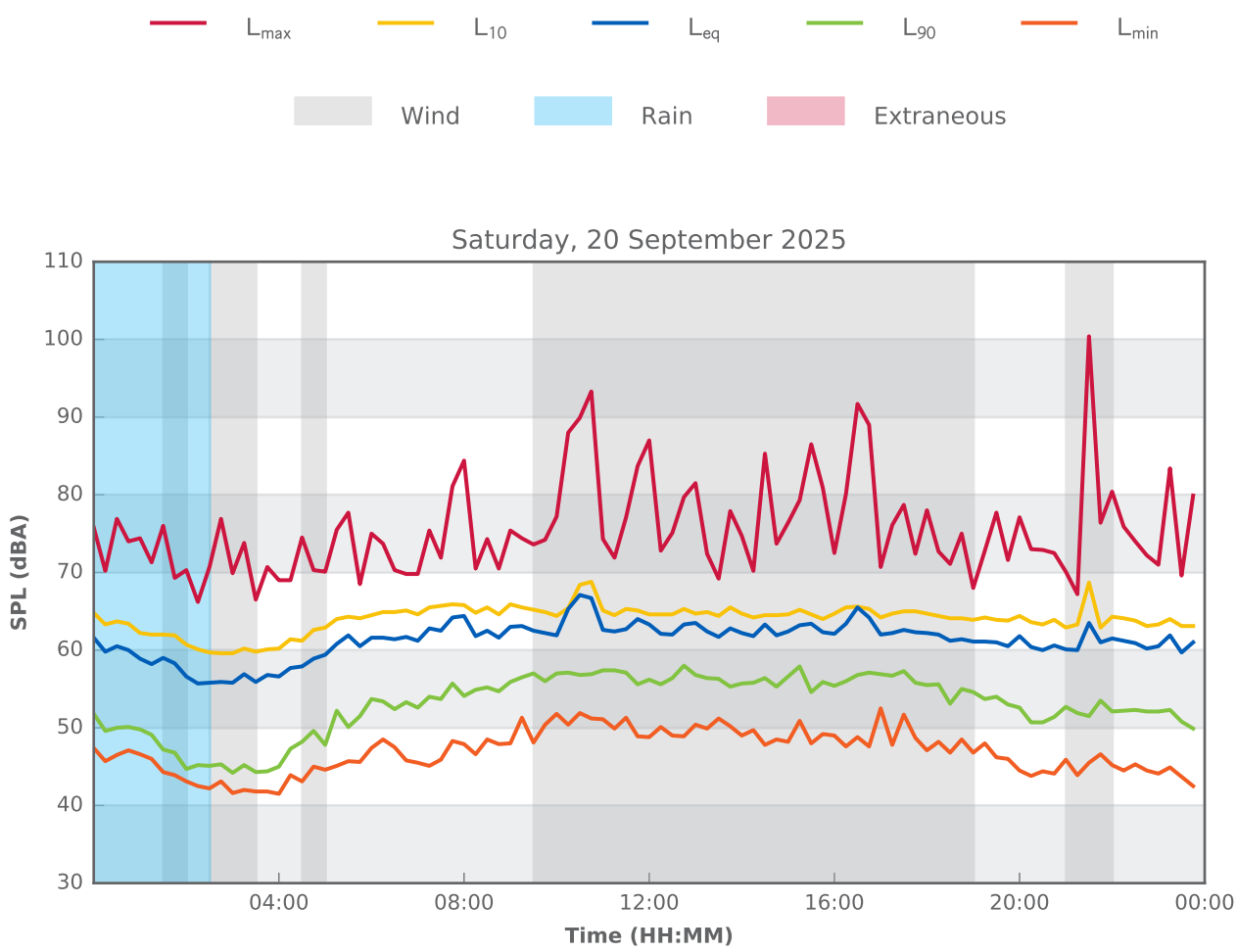


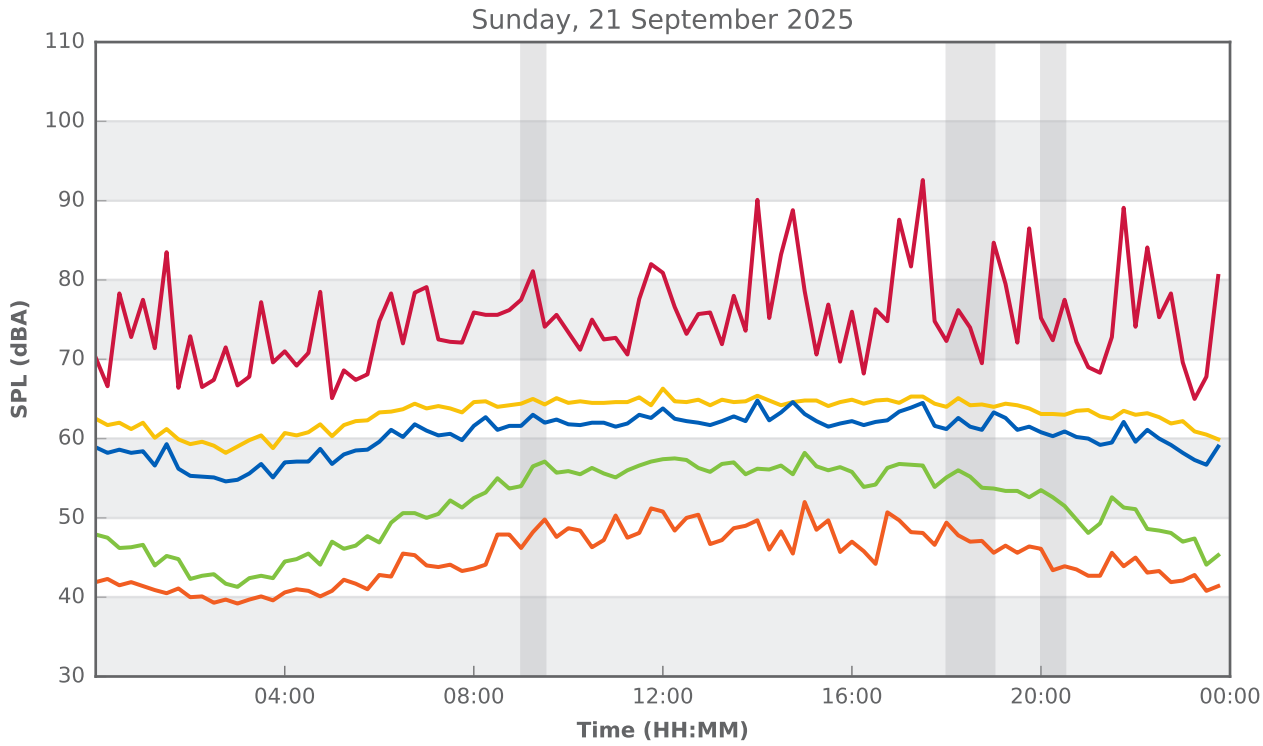

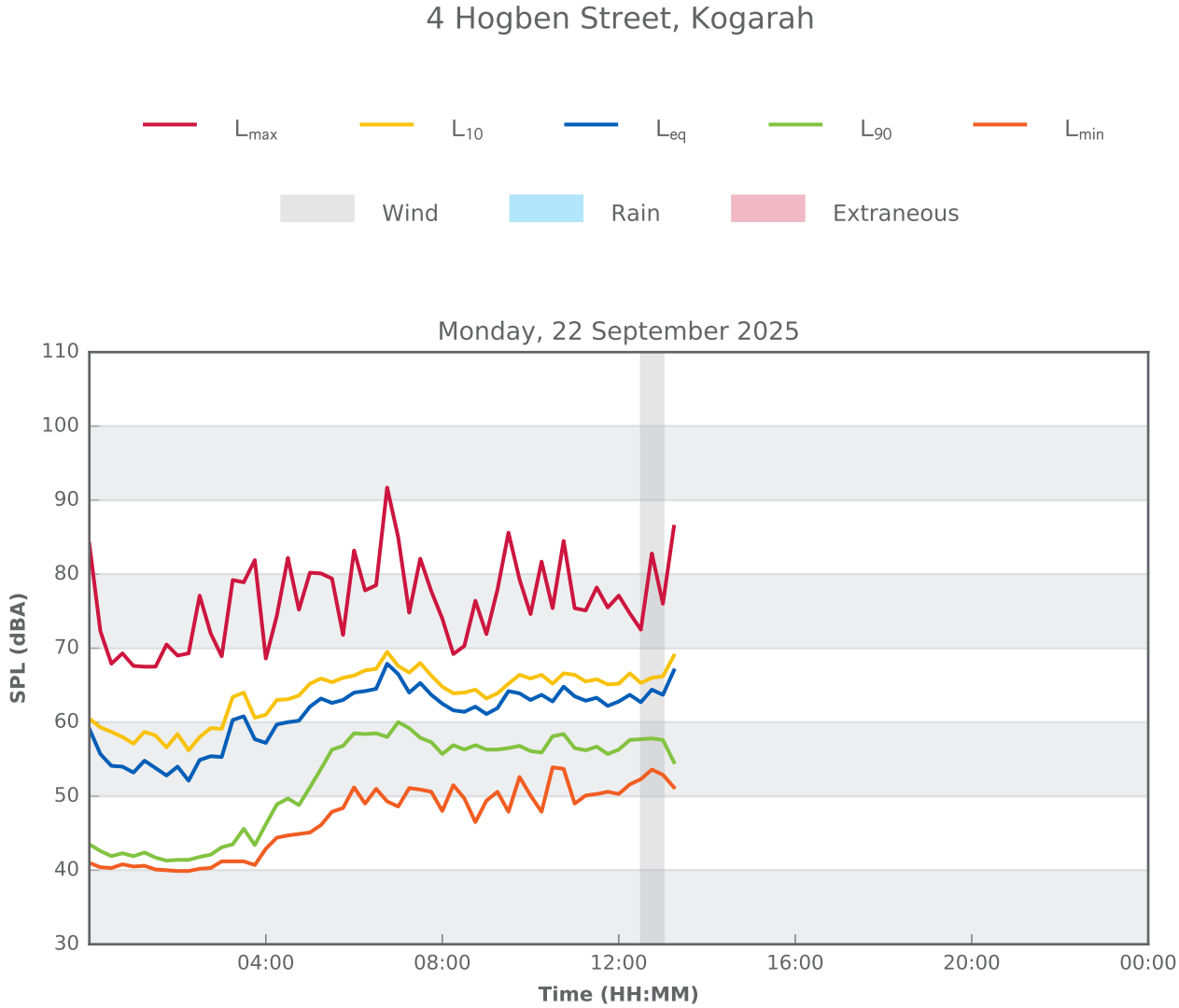
4 Hogben Street, Kogarah
$L_{max}$
$L_{10}$
$L_{eq}$
$L_{90}$
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Wind
Rain
Extraneous
Monday, 22 September 2025
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SPL (dBA)
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