

105 MILLER STREET - EDUCATIONAL SCHEME

NORTH SYDNEY, NSW

NOISE AND VIBRATION IMPACT ASSESSMENT SSDA

RWDI # 2506347

29 April 2025

SUBMITTED TO

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DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
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B	Final	16 April 2025	Remi Larmandieu	Henry Kuo
C	Final – minor update	29 April 2025	Remi Larmandieu	-

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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.

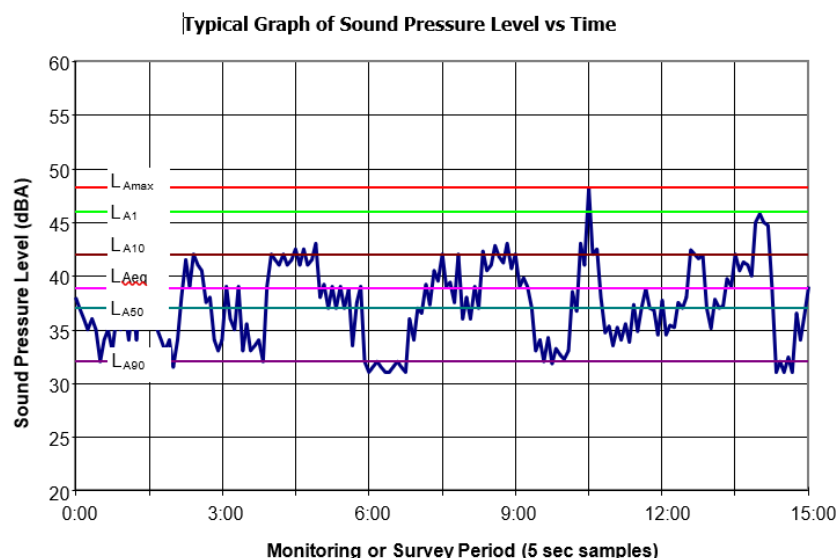


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1 INTRODUCTION

This Noise and Vibration Impact Assessment (NVIA) is submitted to the Department of Planning, Housing and Infrastructure (DPHI) on behalf of our client, Investa Custodian (2) Pty Ltd as Trustee for 105 Miller Street North Sydney Trust (Investa) to support a State Significant Development Application (SSDA) for the redevelopment and adaptive reuse of an existing state heritage building at 105 Miller Street, North Sydney (the site) as an education institution.

Specifically, the proposed works include the following:

- Adaptive reuse and restoration of the Miller Street wing;
- Demolition of the Denison Street wing, central core structure and pavilion on the northwestern corner of Miller Street;
- Construction of a new Denison Street wing, comprising ground level retail and educational establishment uses above;
- Construction of a new central core structure, comprising the lift core and building services;
- Alterations to the ground level to deliver a significantly enhanced public domain;
- Construction of an almost double height ground floor retail and the delivery of a new public open space along Miller Street; and
- Basement carparking and loading dock accessed from a relocated entry off Denison Street.

For a detailed project description, refer to the Environmental Impact Statement prepared by Beam Planning and the Architectural Drawings prepared by FJC.

This Noise and Vibration Impact Assessment addresses the following Secretary's Environmental Assessment Requirements (SEARs) relevant to tertiary institutions for the SSDA set out in the table below.

Table 1-1: SEARs Compliance Table

SEARs Request	Response/Location in Report
12. Noise and Vibration • <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>	Operational noise impacts assessed in Section 7 . Construction noise and vibration impact assessed in Section 8 . Proposed management and mitigation measures outlined in Section 8.3.3 .

The NVIA was assessed based on FJC Studio architectural drawings dated 1st April 2025 (DA set for Review).

2 SITE DESCRIPTION

The address of the site is 105-153 Miller Street, North Sydney and is legally described as Lot 2 in DP 792740. The site sits in the heart of the North Sydney Central Business District (CBD), immediately south of the Victoria Cross Metro Station and in walking distance of the North Sydney Train Station.

The site has a total area of 6,640m², with three street frontages, to Miller Street, Brett Whiteley Plaza and Denison Street. The Miller Street frontage is occupied by a landscaped area, pedestrian walkway and retail frontage. The site has a highly visible interface with Brett Whiteley Plaza, which is identified as a key public open space in North Sydney. A range of retail occupancies are located on the Denison Street frontage of the site, set back under a low awning. **Figure 2-1** shows the site and its context.

The North Sydney MLC Centre and associated turfed public domain currently occupy the site. The existing building comprises a modular building mass with a 13-storey north-south oriented western wing, a central service core and a 6-storey eastern wing, setback from the southern boundary.

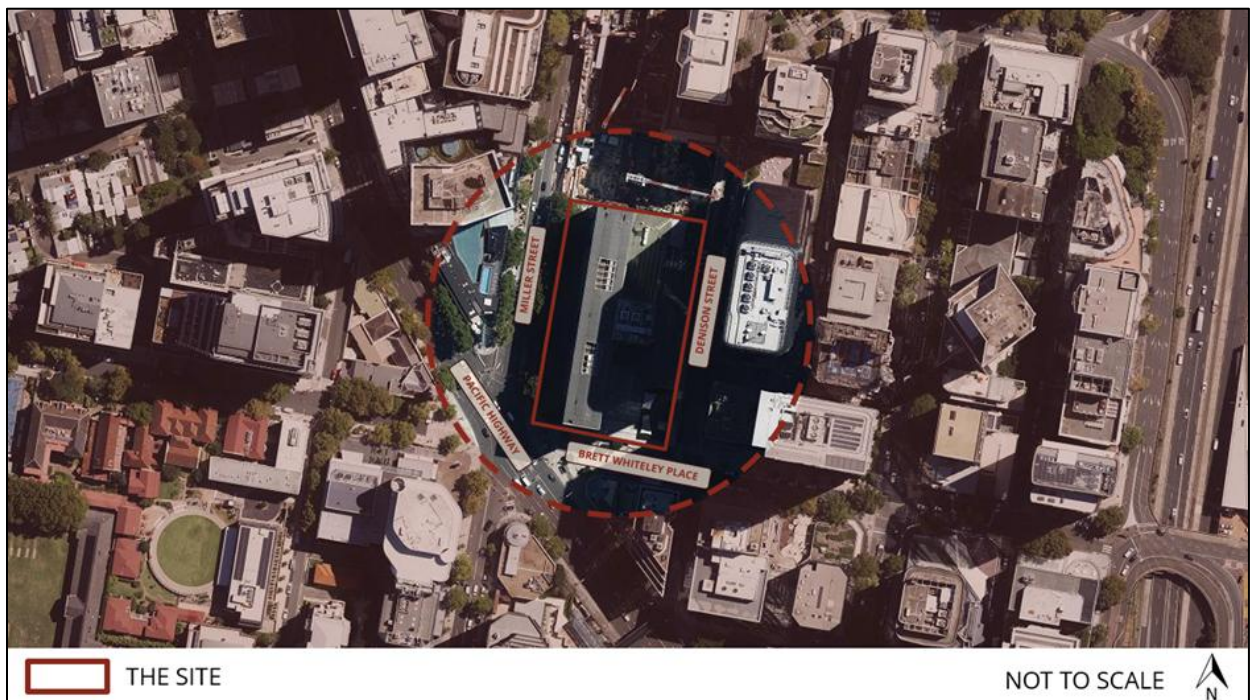


Figure 2-1 Aerial View of the Site

The site is situated as follows:

- **To the west and south:** Bounded by Miller Street and the Pacific Highway, respectively.
- **Surrounding area:** Predominantly existing commercial developments, consisting of large-scale commercial facilities. Victoria Cross Station is located adjacent to the north of the site, with the underground tunnel located directly under Miller Street.



- **Nearest residential development:** Located at Beau Monde, 79-81 Berry Street, a multistorey building to the north-east of the site, with upper levels that have a direct line of sight to the site. The noise environment near these residents is typically characterised by an "urban hum."
- **Approximately 200m to the west:** Single-dwelling residential properties. Background noise levels in this area are usually dominated by distant traffic noise from Pacific Highway, with residents generally shielded from the proposed development by existing buildings.

Both Miller Street and the Pacific Highway are busy roads with traffic volumes above 20,000 vehicles per day.

Notable sources of noise generation from the proposed development are expected to be:

- Operation of retail tenancies;
- Use of the outdoor terrace.
- Mechanical/plant rooms and communal areas;
- Vehicle movements to the basement levels via the car park ramp;

Notable external noise and vibration sources potentially impacting the proposed development include:

- Road traffic noise from Miller Street and Pacific Highway, which is a classified road, and surrounding roadways
- Ground borne noise and vibration impacts from Sydney Metro underground tunnel.
- General urban noise and mechanical plant noise from surrounding premises.

2.1 Surrounding Sensitive Receivers

The location of the site and sensitive receivers are presented in **Figure 2-2**. The surrounding noise sensitive receivers are presented in **Table 2-1**.



Figure 2-2: Site Map and Monitoring Locations

Table 2-1: Surrounding Sensitive Receivers

Receiver	Description	Receiver Type
R1	Residential dwellings 200m west of the site	Residential
R2	Apartment building at 79-81 Berry Street, North Sydney	Residential
R3	Apartment building at 9 William Street, North Sydney	Residential
C1	Mixed use buildings to the west of the site	Commercial
C2	Victoria Cross Station and OSD Tower currently under construction	Commercial
C3	One Denison building, 20m to the east of the site	Commercial
C4	Commercial towers, 20m to the southeast of the site	Commercial
C5	Mixed use buildings to the south of the site	Commercial



3 EXISTING NOISE AND VIBRATION ENVIRONMENT

3.1 Noise Monitoring

Attended and unattended noise monitoring was conducted to quantify the existing noise environment surrounding the site. Figure 3-1 presents the location of noise monitoring, with long-term unattended noise monitoring being conducted between Thursday 31st October 2024 and Friday 9th November 2024, and short-term unattended measurements conducted between 3:00pm and 4pm on Friday 9th November 2024 for the purpose of measuring traffic noise levels of the surrounding roads (primarily Miller Street and Pacific Highway).

Instrumentation for the survey comprised of the following:

Table 3-1: Noise Monitoring Equipment

Instrumentation	Manufacturer	Model	Serial Number
Sound Level Meter	NTi	XL2-TA	A2A-15945-E0
	Rion	NL-52EX	01276558
			00396932
			00998079
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”.

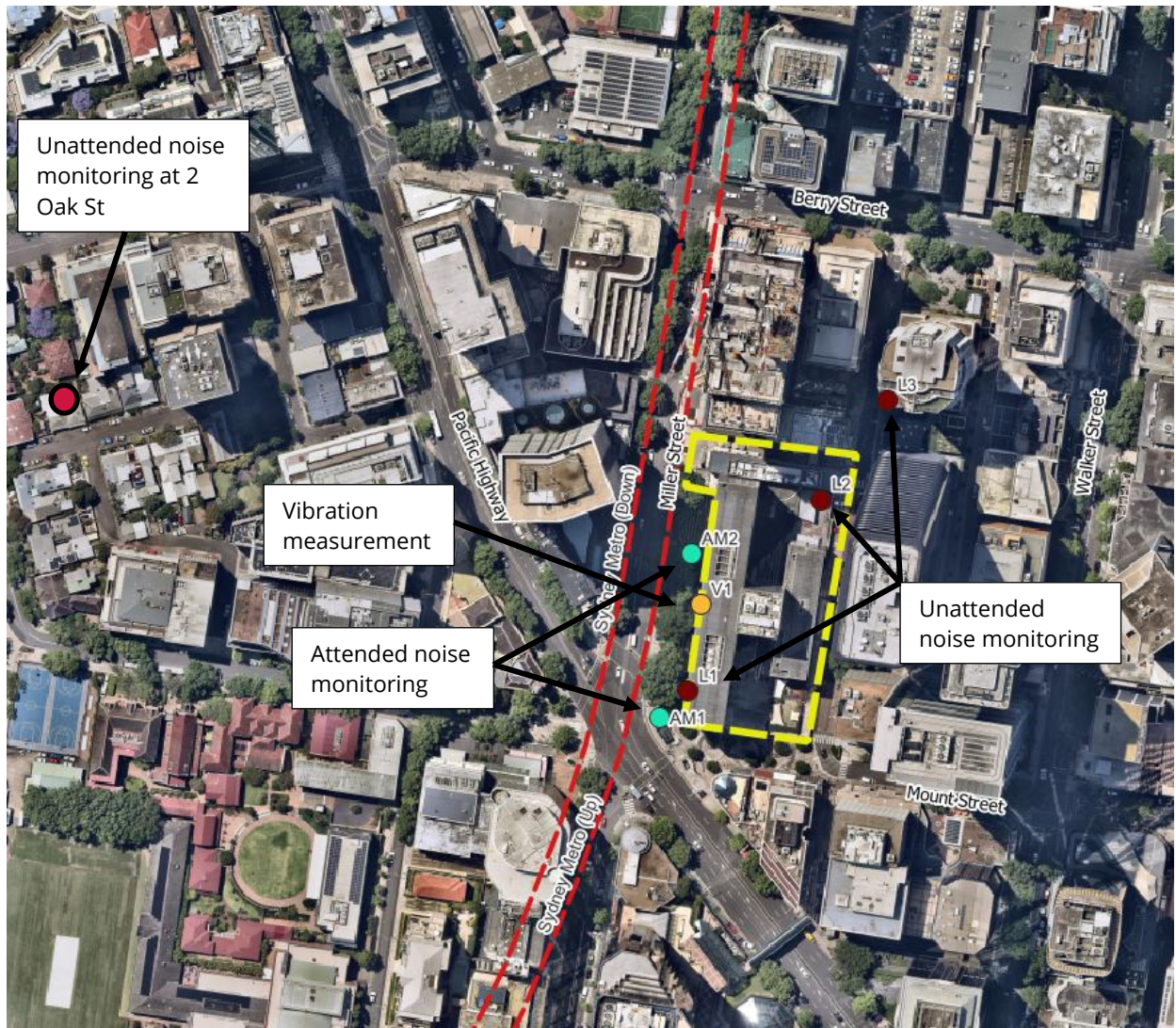


Figure 3-1: Noise Monitoring Locations

3.2 Background Noise Levels

Unattended noise monitoring was conducted between 30th October and 9th October 2024 by RWDI at three locations. The measured data was processed according to the *NPfI* requirements. The noise monitor at Location L1 was installed on the top floor of the 105 Miller Street building. The noise monitor at Location L2 was installed on the 1st floor podium, on the northeastern corner of the site. The noise monitor at Location L3 was installed on the 1st floor podium between the 1 Denison Street and 79-81 Berry Street buildings.

Additional noise monitoring was undertaken by Acoustic Logic Consultancy (ALC) at 2 Oak Street, North Sydney between the 23rd of October to the 4th of June 2019. The noise monitor was installed on the front veranda of the property with line of sight to traffic movements along Oak Street. This monitoring location was considered relevant as this receiver is the nearest residential receiver located to the west of the site.

Table 3-2 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 (as defined by the *NPfI*) or extraneous noise was removed from the data prior to processing. Full noise monitoring plots are provided in **Appendix A**.

Table 3-2: Unattended Noise Monitoring Results – Background Noise Levels, dBA

Location	Time Period ¹	RBL, L_{A90} , period dBA
L1 105 Miller Street (west)	Day	61
	Evening	57
	Night	52
L2 105 Miller Street (northeast)	Day	59
	Evening	57
	Night	55
L3 79-81 Berry Street	Day	58
	Evening	54
	Night	50
L4 2 Oak Street	Day	45
	Evening	42
	Night	40

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

3.3 Existing Ambient Noise Levels

The noise data at all monitoring locations was reviewed to determine the existing ambient noise levels around the site. **Table 3-3** below presents the measured ambient noise levels.

Table 3-3: Existing Ambient Noise Levels, dBA

Location	Day ¹	Night ¹
L1 - 105 Miller Street (west)	65 dBA L _{Aeq,15hour}	61 dBA L _{Aeq,9hour}
L2 - 105 Miller Street (northeast)	61 dBA L _{Aeq,15hour}	58 dBA L _{Aeq,9hour}
L3 - 79-81 Berry Street	61 dBA L _{Aeq,15hour}	56 dBA L _{Aeq,9hour}
L4 - 2 Oak Street	53 dBA L _{Aeq,15hour}	49 dBA L _{Aeq,9hour}

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

Attended noise measurements were conducted on Friday 9th November 2024 to assist in quantifying road traffic noise levels.

Table 3-4: Attended Noise Monitoring Results, dBA

Location	Description	L _{Amax}	L _{Aeq}	L _{A90}
AM1 3:13 pm	13m from Miller Street	75	65	62
AM2 3.35pm	8m from Pacific Highway	80	67	64

3.4 Short-Term Vibration Measurements

Measurements of vibration levels were conducted on 9th November 2024 at 105 Miller Street, in the basement level closest to the Sydney Metro underground line. Measurements were conducted on a concrete slab at the location shown in **Figure 3-1**. The attended vibration measurements were carried out between 3:00pm to 4:25pm on 9th November 2024.

3.4.1 Measurements Equipment and Results

Equipment used to measure vibration consisted of a SVAN 958A Class 1 Four-channel Sound & Vibration Analyser. The analyser was connected to a SV84 four channel input module fitted with a triaxial accelerometer (tri-axial measurements).

A number of passbys were captured during the monitoring period. The highest measured vibration level from train passbys is presented in **Table 3-5**.



Table 3-5: Highest measured vibration dose value (VDV) (Conducted on 9th November 2024 between 3.00pm and 4.25pm)

Sydney Metro City and Southwest line Passby	Calculated Passby VDV (m/s ^{1.75})
3.13pm – Basement level, adjacent Miller Street	0.000168

4 NOISE AND VIBRATION INTRUSION CRITERIA

The North Sydney Council Development Control Plan (DCP) does not provide any quantitative external noise intrusion criteria for commercial developments. Relevant guidelines and standards with external noise intrusion criteria are presented in the following sub-sections.

4.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

Section 2.100 *Impact of rail noise or vibration on non-rail development* states the following:

- 1) *This section applies to development for any of the following purposes that is on land in or adjacent to a rail corridor and that the consent authority considers is likely to be adversely affected by rail noise or vibration—*
 - (a) *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.*

Section 2.120 *Impact of road noise or vibration on non-road development* states the following:

- 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.
- 3A) Subsection (3) does not apply to a building to which State Environmental Planning Policy (Housing) 2021, Chapter 3, Part 7 applies.
- 4) In this section, freeway, tollway and transitway have the same meanings as they have in the Roads Act 1993.

4.2 Australian Standard 2107-2016

Australian Standard AS/NZS 2107:2016 Acoustics – *Recommended Design Sound Levels and Reverberation Times for Building Interiors* specifies allowable internal noise levels for internal spaces within different spaces.

Table 4-1 (based on Section 5 of AS2107-2016), outlines the expected relevant recommended internal noise levels from the Standard.

Table 4-1: AS2107:2016 Internal Noise Goals

Space / Activity Type	Design Sound Level Range
Office Uses	
Open Plan Office	40 – 45dBA LAeq (when in use)
Corridors and lobbies	45 – 50dBA LAeq (when in use)
Meeting Rooms	40 – 45dBA LAeq (when in use)
Commercial Uses	
Restaurants / Cafés	40 – 50dBA LAeq (when in use)
Small retail stores (general)	50dBA LAeq (when in use)
Educational Uses	

Space / Activity Type	Design Sound Level Range
Corridors and lobbies	50dBA L_{Aeq} (when in use)
Teaching spaces	35 – 45dBA L_{Aeq} (when in use)
Lecture Rooms (up to 50 seats)	30 – 35dBA L_{Aeq} (when in use)
Libraries – general areas	40 – 50dBA L_{Aeq} (when in use)
Libraries – reading areas	40 – 45dBA L_{Aeq} (when in use)
Office areas	40 – 45dBA L_{Aeq} (when in use)

4.3 Ground Borne Noise and Vibration Criteria

4.3.1 Ground Borne Noise

The Department of Planning (DoP) 'Development Near Rail Corridors and Busy Road – Interim Guideline' only requires structure borne noise assessments to be conducted where buildings are over or adjacent to rail tunnels. The existing Sydney Metro line railway tunnel is located underground, approximately 30m under Miller Street adjacent the western boundary of the development.

Train passbys within the train line below the proposed development will generate vibration which could potentially be radiated to the internal building elements such as walls, floors and ceiling and be perceived as audible structure borne noise within the development. We know that this track is equipped with high attenuation fasteners to reduce the vibration impacts generated by train passbys to surrounding buildings, especially residential buildings subject to more stringent objectives.

Section 3.6.2 of the NSW DoP's Development Near Rail Corridors and Busy Roads - Interim Guideline provides the following criteria with respect to ground-borne noise impacts on residential development where the development is located on land over or adjacent to a rail tunnel:

"Generally, ground borne noise is associated more closely with rail operations than roads. Where buildings are constructed over or adjacent to land over tunnels, ground-borne noise may be present without the normal masking effect of airborne noise. In such cases, residential buildings should be designed so that the 95th percentile of train pass-bys complies with a ground-borne L_{Amax} noise limit of 40dBA (daytime) or 35dBA (night-time) measured using the "slow" response time setting on a sound level meter."

4.3.1.1 NSW EPA's Assessing Vibration: A Technical Guideline

The EPA's document Assessing Vibration: A Technical Guideline provides criteria for intermittent vibration impacts on residential and commercial development from external vibration sources to protect the amenity of occupants. The criteria presented in the Guideline are consistent with the recommendations outlined in British Standard BS6472:1992 – Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz).

The vibration criteria presented in the EPA's Assessing Vibration: A Technical Guideline is in terms of the vibration dose value (VDV) parameter. The relevant VDV criteria are summarised in **Table 4-2**.



Table 4-2 Acceptable Vibration Dose Values for Intermittent Vibration ($\text{m/s}^{1.75}$)

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
Offices, Schools, Educational Institutions and Places of Worship	0.40	0.80	0.40	0.80

5 NOISE EMISSION CRITERIA

5.1 North Sydney Council Development Control Plan 2013

Section 2.3.2 of the North Sydney Council Development Control Plan (DCP) outlines noise emission limits for non-residential premises or non-residential components of a building, in which they must not exceed the maximum 1-hour noise levels specified in **Table 5-1**.

Table 5-1: Noise Emission Limits

Time Period			Noise Criteria dBA L _{Aeq} , 1hr
Day	Week	Time	
Weekday	Day	7am – 6pm	60
	Evening	6pm – 10pm	50
	Night	10pm – 7am	45
Weekend	Day	8am – 7pm	60
	Evening	7pm – 10pm	50
	Night	10pm – 8am	45

5.2 NSW Noise Policy for Industry

The emission of noise and potential noise impact from the operation of the proposed development is 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.

5.2.1 Amenity Noise Level

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.

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 5-2**.

Table 5-2: 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 Noise Level L _{Aeq,15min} dBA
Commercial	When in use	65	60	63
Residential - Urban	Day	60	55	58
	Evening	50	45	48
	Night	45	40	43

5.2.2 Intrusiveness 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 5-3**.

Table 5-3: Project Intrusiveness Noise Levels

Type	Receiver	Intrusiveness Noise Level L _{Aeq, period} dBA		
		Day (7am – 6pm)	Evening (6pm-10pm)	Night (10pm-7am)
Residential	R1 (west)	50	47	45
	R2 (northeast)	63	59	55
	R3 (southwest) ¹	50	47	45

Note 1: The intrusiveness levels for R3 residential receivers were assessed based on background noise levels measured at 2 Oak Street, North Sydney, which are expected to be representative of the area.

5.2.3 Project Noise Trigger Levels

The project noise trigger levels for the project are presented in **Table 5-4**.

Table 5-4 NPfI Overall Project Trigger Noise Level Criteria

Receivers	Time of Day	North Sydney DCP 'Maximum Noise Level' dBA $L_{eq}(1hour)$	Project Intrusiveness Criteria $L_{Aeq,15min}$ dBA	Project Amenity Criteria $L_{Aeq,15min}$ dBA	Project Noise Trigger Criteria $L_{Aeq,15min}$ dBA
R1 & R3 (Residential)	Day	60	50	58	50
	Evening	50	47	48	47
	Night	45	45	43	43
R2 (Residential)	Day	60	63	58	58
	Evening	50	59	48	48
	Night	45	55	43	43
Commercial Receivers	When In Use	-	-	63	63

5.2.4 Sleep Disturbance

Guidance for assessing the potential for sleep disturbance impacts on nearby residences is provided in Section 2.5 of the NPfI, which states:

Where the subject development/premises night-time noise levels at a residential location exceed:

- $L_{Aeq,15min}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{Amax} 52 dBA or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

Table 5-5 Sleep Disturbance Criteria

Receivers	NPfI Criteria for Sleep Disturbance dBA
R1 -R3 (Residential)	45 dBA $L_{eq, 15min}$; 55 dBA L_{Amax}
R2 (Residential)	55 dBA $L_{eq, 15min}$; 65 dBA L_{Amax}

6 NOISE AND VIBRATION INTRUSION ASSESSMENT

The primary source of external noise on the proposed development is from traffic noise on Miller Street and Pacific Highway. The assessment of external noise levels for the site will be determined using attended and unattended noise monitoring at the site.

6.1 Noise Intrusion

6.1.1 Glazing and Glazed Doors

Detailed glazing performances for the development will be developed at Detailed Design Stage. These recommendations will require to be revised once layouts, glazing sizes and internal finishes are finalised.

Glazing requirements are expected to be of standard construction for the development.

6.1.2 External Walls

The construction of external walls of the building are unknown at this stage. Any masonry or concrete external wall construction is expected to be acoustically acceptable and is unlikely to require any additional 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.

6.1.3 Roof/Ceiling

The construction of the roof is unknown at this stage. However, we expect that standard roof constructions will provide adequate acoustic isolation for the purposes of mitigating traffic noise intrusion. The roof construction should be reviewed at detailed design stage.

6.1.4 Ventilation

Regarding natural ventilation of the dwelling, the NSW Department of Planning document "Development near Busy Roads and Rail Corridors - Interim Guideline" dictates that:

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

With windows open, the allowable internal noise goal is permitted to be 10dBA higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45dBA $L_{eq}(9hr)$).

6.2 Ground Borne Noise and Vibration – Underground Sydney Metro Line

6.2.1 Measurements Equipment and Results

Equipment used to measure vibration consisted of a SVAN 958A Class 1 Four-channel Sound & Vibration Analyser. The analyser was connected to a SV84 four channel input module fitted with a triaxial accelerometer (tri-axial measurements).

A number of passbys were captured during the monitoring period. The highest measured vibration level from train passbys is presented in **Table 6-1**.

Table 6-1 Highest measured vibration dose value (VDV) (Conducted on 9th November 2024 between 3.00pm and 4.25pm)

Sydney Metro West line Passby	Location	Calculated Passby VDV ($\text{m/s}^{1.75}$)
3.13pm	Basement Level	0.000168

6.2.2 Calculated Vibration Dose Values

The maximum train passby ground vibration acceleration, the typical passby period (gained from both the noise and vibration measurements) and the number of train passbys were used to calculate the overall eVDV values for each period of the day. The results are presented in **Table 3-5**.

eVDV values were determined based on the daily train timetable information. The VDV per train used in the eVDV calculation was determined by using the measured vibration levels during passbys.

Table 6-2 Internal Railway Noise Level Criteria

Test Location	Time Period	Calculated eVDV $\text{m/s}^{1.75}$	Criteria eVDV $\text{m/s}^{1.75}$	Complies
Ground Level	Day (7am – 10pm)	0.0006	0.4	Yes
	Night (10pm -7am)	0.0004	0.4	Yes

In the event the future train use increases, say by 10%, predicted eVDV will not increase significantly (no more than approximately 0.02 above the levels predicted in the table above) and will not impact recommended vibration isolation treatments.

6.2.3 Ground Borne Noise and Vibration Levels

Ground borne noise and vibration measurements conducted for the project indicate that ground borne noise levels will achieve compliance with the applicable objectives. Measurements during typical Sydney Metro operations confirm that levels are well below the established criteria for both ground-borne noise and vibration.

This compliance aligns with findings presented in the SLR Consulting Australia report prepared as part of the Environmental Impact Statement (EIS) for the Sydney Metro project (Report Number: 610.147418R1, dated 28



April 2016). The SLR report outlines the relevant noise criteria for the Metro project and evaluates the predicted noise and vibration impacts on land surrounding the railway. Predicted noise and vibration levels detailed in the SLR report were referenced to assess the likely impact of future operational use of the tunnel on the development proposed for 105 Miller Street.

These results support the conclusion that the proposed development will not experience adverse impacts from ground borne noise or vibration associated with the Sydney Metro operations.

7 OPERATIONAL NOISE ASSESSMENT

The primary sources of noise generation from the site are as follows:

- Outdoor terrace space located on the ground floor;
- Future retail tenancies to be located on the lower ground floor; and
- Mechanical plant noise servicing the development.

We note that noise emissions from vehicles entering the site, then manoeuvring within the enclosed basement carpark, as well as from delivery vehicles unloading within the basement carpark will have a negligible impact on the surrounding residences and so have not been considered in this assessment.

7.1 Outdoor Terrace Space and Future Retail Tenancies

The primary noise sources expected from the proposed outdoor terrace space located on the ground floor is patron noise. A preliminary assessment of noise emissions to the closest residential receivers is provided below, based on the following assumptions:

- **Outdoor Seating and Patron Activity:**
 - External seating will be included in the outdoor terrace area.
 - It is assumed there will be 200 patrons, including outdoor seating. The terrace may accommodate significantly more patrons; however, the exact quantity and seating distribution will be determined as the design progresses.
 - Approximately 50% of patrons are assumed to be speaking at any given time with a raised voice with an estimated sound power level of 75 dBA L_{eq} per patron.
- **Operational Hours:**
 - The assessment covers operations between **7:00 AM and 10:00 PM** (typical day and evening hours).
 - Operations during the **night-time period** are subject to stricter acoustic criteria and will require separate assessments on a case-by-case basis.

Not all tenancies are anticipated to operate during night hours. If proposed, night operations should be subject to a separate application detailing compliance with relevant noise requirements

The predicted noise levels based on these assumptions are outlined in **Table 7-1** and compared against the required evening noise level, which represents the most stringent criteria for typical operations. In the absence of specific criteria for assessing patron or operational noise, the assessment assumes a 'background + 5 dBA' standard, consistent with similar developments.

Table 7-1: Predicted Patron Noise Levels

Receivers	Time Period	Predicted Noise Level	BG + 5 dBA Level	Comments
R1 (receivers to the west)	Evening (6 PM – 10 PM)	< 30 dBA Leq(15min)	≤ 47 dBA Leq(15min)	Complies
R2 (79-81 Berry Street, North Sydney)	Evening (6 PM – 10 PM)	47 dBA Leq(15min)	≤ 48 dB(A) Leq(15min)	Complies
R3 (9 William St, North Sydney)	Evening (6 PM – 10 PM)	< 20 dB(A) Leq(15min)	≤ 47 dBA Leq(15min)	Complies

It is recommended that any retail or hospitality uses proposed to operate during the evening or night periods submit a separate development application once specific uses and operators are identified. At that stage, individual tenancies should demonstrate compliance with noise emission requirements and outline any necessary management controls or building treatments to achieve compliance.

7.2 Mechanical Plant

No details of specific mechanical plant have been finalised at this stage of the project. Likely sources of noise from the proposed development will be the mechanical plant associated with building air-conditioning and ventilation.

A detailed review of noise from mechanical plant servicing the development should be conducted once specific mechanical system details are selected by the mechanical engineer/contractor. Considering the distance separation to the surrounding residences, the use of standard noise mitigation measures (screens and attenuators) are expected to be sufficient for adequately controlling mechanical noise emissions. Generally, the noise contribution from mechanical plant should be controlled to 5dB below the trigger levels to allow headroom for the noise contribution from each building/tenancy.

8 CONSTRUCTION NOISE & VIBRATION IMPACT ASSESSMENT

8.1 Acoustic Criteria / Management Levels

8.1.1 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
Recommended Standard Hours Monday to Friday 7am to 6pm Saturday 8am to 1pm 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. 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. 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. 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: 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; 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Time of Day	NML	How to Apply
Outside Recommended Standard Hours	Noise Affected RBL+5 dBA	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

Based on the above, **Table 8-2** presents the applicable noise management levels for construction activities at surrounding receivers.

Table 8-2 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 (residential)	55	50	47	45
R2 (residential)	68	63	59	55
R3 (residential)	55	50	47	45
C1-C5 (commercial)	70	70	70	70

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)

8.1.2 Vibration – Construction Noise & Vibration Strategy (TfNSW, 2018)

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

The minimum working distances presented in Appendix D of the CNVS 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 CNVS are presented in **Table 8-3**.

Table 8-3 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)	4 m
Piling Rig – Hammer	12 t down force	15 m	50 m
Jackhammer	Hand held	1 m (nominal)	Avoid contact with structure

8.2 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. Where Out-of-Hours Works (OOHWs) are required (for emergency works/delivery, etc) it is likely that they would require separate approval.

8.3 Construction Noise Assessment

Noise modelling of the construction noise emissions was undertaken using the ISO9612 noise prediction algorithm in the Cadna/A 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.

8.3.1 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 8-4** 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 8-4 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.

8.3.2 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 8-4**.

The typical $L_{Aeq,15min}$ noise levels at the surrounding receivers are provided in **Table 8-5**. 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 8-5 Predicted Construction Noise Impacts

Stage	Receivers	Predicted Noise Level	Noise Level – $L_{Aeq,15min}$ dBA			
			Noise Affected Noise Management Levels (NMLs)			
			Day ¹	Day	Eve	Night
			Standard	OOH	OOH ²	OOH ³
Demolition and Clearing	R1	43	55	50	47	45
	R2	66	68	63	59	55
	R3	35	55	50	47	45
	C1	70	70	70	70	70
	C2	74	70	70	70	70
	C3	74	70	70	70	70
	C4	73	70	70	70	70
	C5	68	70	70	70	70
Excavation and Piling	R1	51	55	50	47	45
	R2	74	68	63	59	55
	R3	43	55	50	47	45
	C1	78	70	70	70	70
	C2	82	70	70	70	70
	C3	82	70	70	70	70
	C4	81	70	70	70	70
	C5	76	70	70	70	70

Stage	Receivers	Predicted Noise Level	Noise Level – $L_{Aeq,15min}$ dBA			
			Noise Affected Noise Management Levels (NMLs)			
			Day ¹	Day	Eve	Night
			Standard	OOH	OOH ²	OOH ³
Construction	R1	46	55	50	47	45
	R2	69	68	63	59	55
	R3	38	55	50	47	45
	C1	73	70	70	70	70
	C2	77	70	70	70	70
	C3	77	70	70	70	70
	C4	76	70	70	70	70
	C5	71	70	70	70	70

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)

Exceedances of the noise affected NMLs are generally expected at receivers R2, C1, C2, C3, C4 and C5 during standard hours due to the proximity of the site.

Measures to manage construction noise emissions are discussed in **Section 8.3.3**.

8.3.3 Construction Noise Mitigation

As discussed in **Section 8.3.2**, 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 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 8-6**, along with the likely reduction in noise levels. Where reasonable and feasible, these measures should be employed during the construction of the development.

Table 8-6 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
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

Mitigation Measure	Anticipated Noise Reduction, dBA
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

8.4 Predicted Construction Vibration Impacts

The proposed building intrudes into the 2nd Reserve of the Metro tunnel reserve, outside of the 1st Reserve. It should be noted that the distance from the track to the closest point of the school is approximately 35 metres and the distance from the tunnel to the closest point of the construction is approximately 20 metres.

8.4.1 Construction Vibration Assessment to the Sydney Metro Tunnel

The highest potential vibration levels from construction on the Metro tunnel will occur when construction equipment is located on the western side of the site near the eastern boundary of Miller Street.

Operation of rock hydraulic hammers, rock saws, rippers, etc generate ground vibration that has the potential to be transmitted to the nearby Metro tunnel. **Table 8-7** sets out the typical ground vibration levels at various distances for different equipment.

Table 8-7 Typical Ground Vibration Generated by Construction Plant

Plant	PPV Vibration Level (mms ⁻¹) at Distance					
	5m	10m	20m	30m	40m	50m
Heavy Hydraulic Hammer (1500kg hammer on 30t exc)	4.5	2.5	0.5	0.2	0.12	<0.1
Light Hydraulic Hammer (300kg on 5t exc)	1.5	0.3	0.1	<0.1	-	-
Air trac drill (Ingersoll/Rand CM350)	4.4	1.4	-	0.6	-	<0.1

Plant	PPV Vibration Level (mms ⁻¹) at Distance					
	5m	10m	20m	30m	40m	50m
Jack Hammer	0.2	0.1	<0.1	-	-	-
Rock Sawing	1.2	0.5	0.3	<0.1	-	-
Ripping (measured in Sydney sandstone)	0.7	0.15	<0.1	-	-	-

A review of the site plan and the Sydney Metro tunnel indicates that the minimum distance between the vibration generating activities and the tunnel will be in the order of 20 metres.

It is likely that rock hammers will be used in the excavation of the site, including the use of rock saws and ripping. Reviewing the data in **Table 8-7** indicates that the Sydney Metro criterion of 15mm/s will not be exceeded at the tunnel from all plant including the largest hydraulic hammers.

If required by Metro, the contractor may need to install vibration monitors and conduct trial testing of equipment such as rock hammers.

8.5 Discussion

It is likely that rock hammers will be used for the excavation of the site, which will include the use of rock saws and ripping. Reviewing the data in **Table 8-7** indicates that the Sydney Metro criterion of 15mm/s will not be exceeded at the tunnel from all plant including the largest hydraulic hammers.

8.5.1 Construction Vibration Impacts to Surrounding Buildings

The nearest neighbouring building to the site is part of Victoria Cross Station to the north of the site.

Based on the CNVS's recommended minimum working distances for vibration sensitive equipment (refer to **Section 8.1.2**), the vibration intensive activities that could potentially occur at distances less than the recommended minimum working distances from the sensitive receivers with respect to cosmetic building damage and human comfort are listed in **Table 8-8**.

Table 8-8 Vibration Intensive Equipment that Could Operate within the Minimum Recommended Distances of Sensitive Receivers

Equipment Potentially Operating Within Recommended Minimum Distances to Sensitive Receivers	
Cosmetic Damage (BS 7385)	Human Response (NSW EPA Guideline)
Vibratory Roller < 4 tonne	Vibratory Roller < 4 tonne
	Medium Hydraulic Hammer – 900 kg
	Piling Rig – Bored

Should these pieces of plant be operated within the minimum recommended distances of the CNVS of a sensitive receiver, or if there are any other vibration intensive plant items that the Contractor has concerns for causing disruption at neighbouring development, 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 surrounding roadways, 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.

9 CONCLUSION

This report has presented a Noise and Vibration Impact Assessment for the proposed redevelopment of 105 Miller Street, North Sydney. The assessment has been conducted to address the acoustic requirements of the State Environmental Planning Policy (Transport and Infrastructure) 2021, the North Sydney Development Control Plan 2013, and relevant Australian Standards.

Existing ambient noise and vibration levels at the site were established through long-term unattended monitoring and attended measurements. These results were processed in accordance with the NSW Noise Policy for Industry (NPfI) to determine baseline conditions. Short-term vibration measurements were conducted to assess potential impacts from the Sydney Metro underground line beneath Miller Street.

The assessment concluded that noise emissions from the operation of the proposed development, including mechanical plant, outdoor spaces and retail tenancies, can comply with the relevant acoustic requirements through careful design and implementation of appropriate noise management measures. Noise intrusion from external sources, including road traffic noise from Miller Street and the Pacific Highway, was assessed against internal noise criteria. Preliminary recommendations for façade elements, including glazing and external walls, have been provided to adequately mitigate external noise intrusion.

Ground borne noise and vibration from Sydney Metro operations were evaluated using measured data and compliance with applicable criteria has been confirmed. This finding is consistent with the Environmental Impact Statement prepared by SLR Consulting Australia for the adjacent Victoria Cross Metro Over Station Development (OSD), further supporting the suitability of the proposed development in this location.

Construction noise and vibration impacts have been assessed in principle, and preliminary predictions indicate that while exceedances of construction noise management levels (NMLs) may occur for sensitive receivers closest to the site, these can be managed with a detailed Construction Noise and Vibration Management Plan (CNVMP) typically prepared at construction certificate stage. The CNVMP should develop feasible and reasonable noise mitigation measures to minimise impacts.

In summary, the proposed redevelopment of 105 Miller Street is predicted to be able to achieve compliance with all relevant noise and vibration criteria through considered design and appropriate mitigation measures. Further detailed assessments and refinements are recommended during subsequent design stages to ensure that the proposed development continues to meet all acoustic requirements.



10 STATEMENT OF LIMITATIONS

This report entitled Noise and Vibration Impact Assessment was prepared by RWDI Australia Pty Ltd ("RWDI") for Investa ("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.

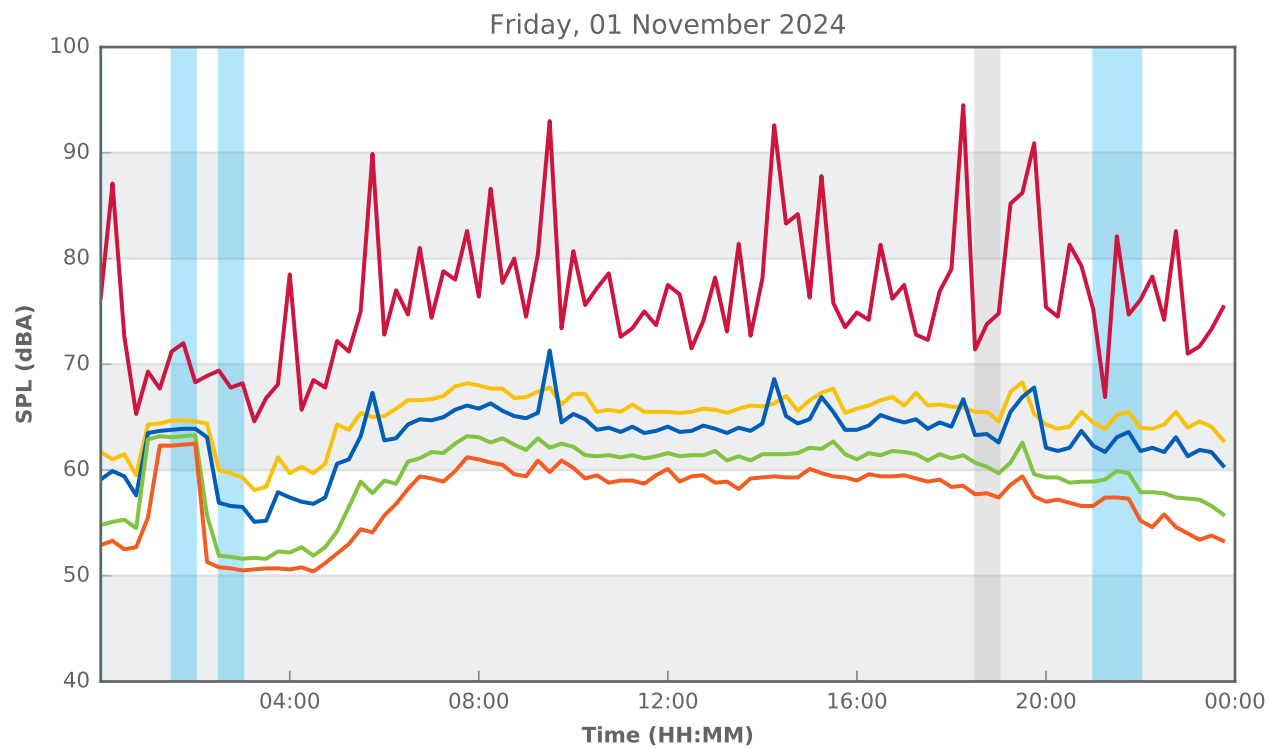
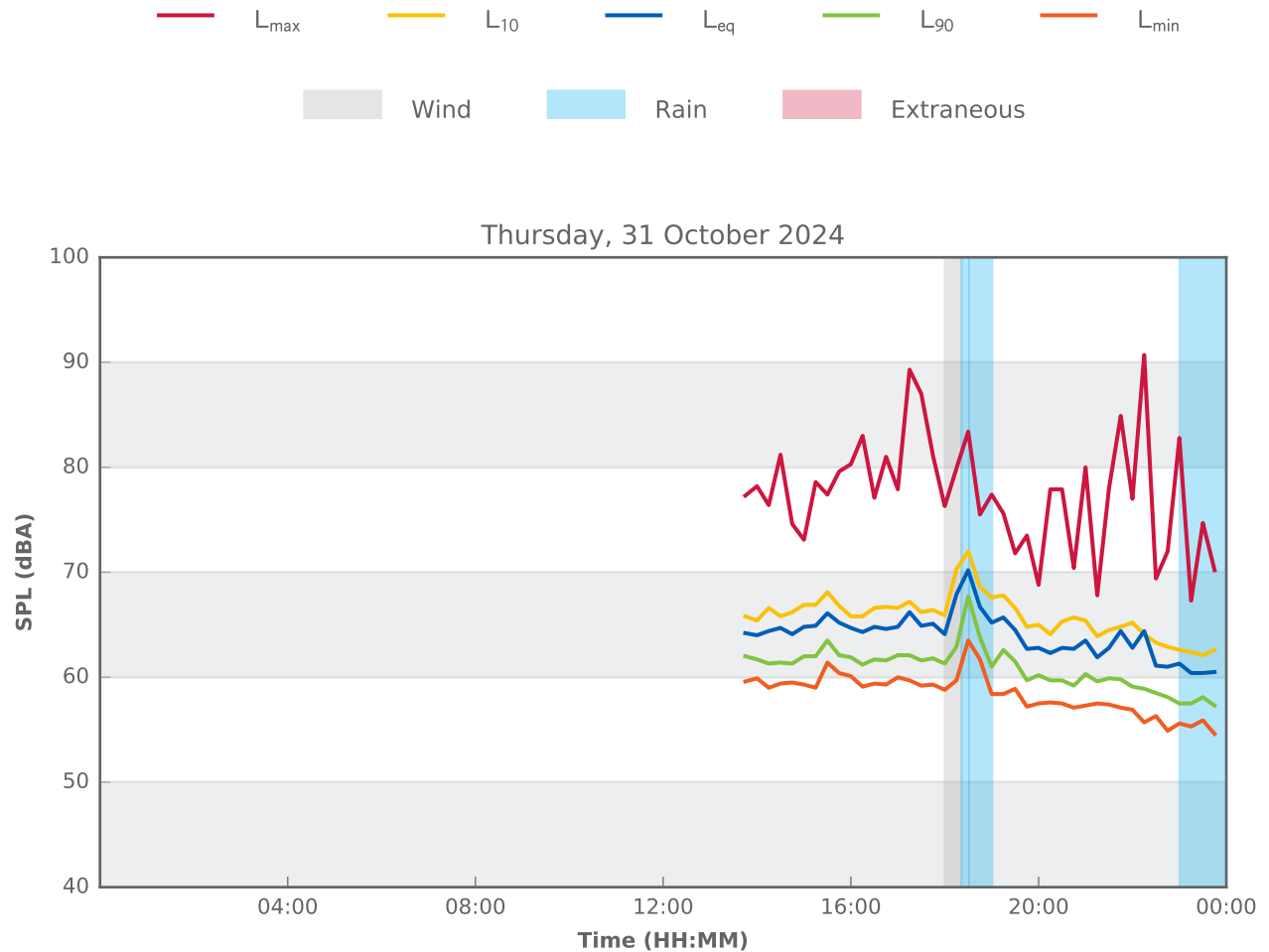
The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the 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.

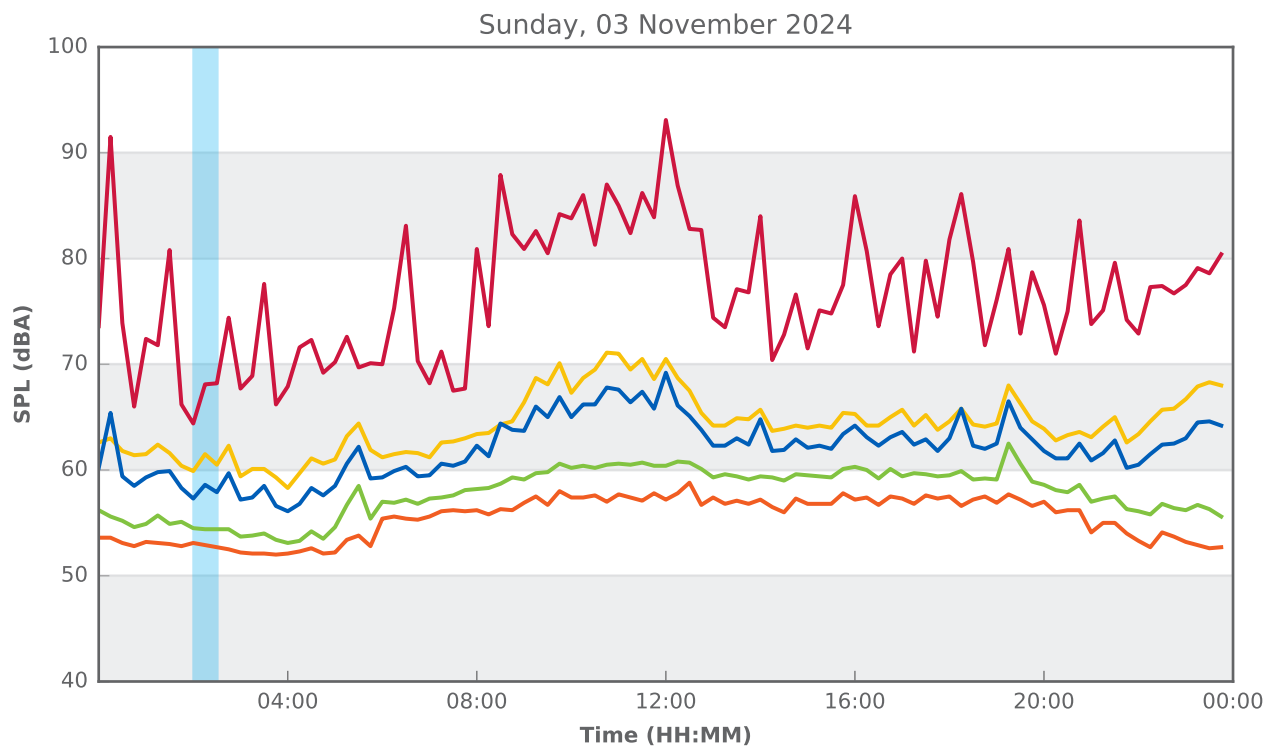
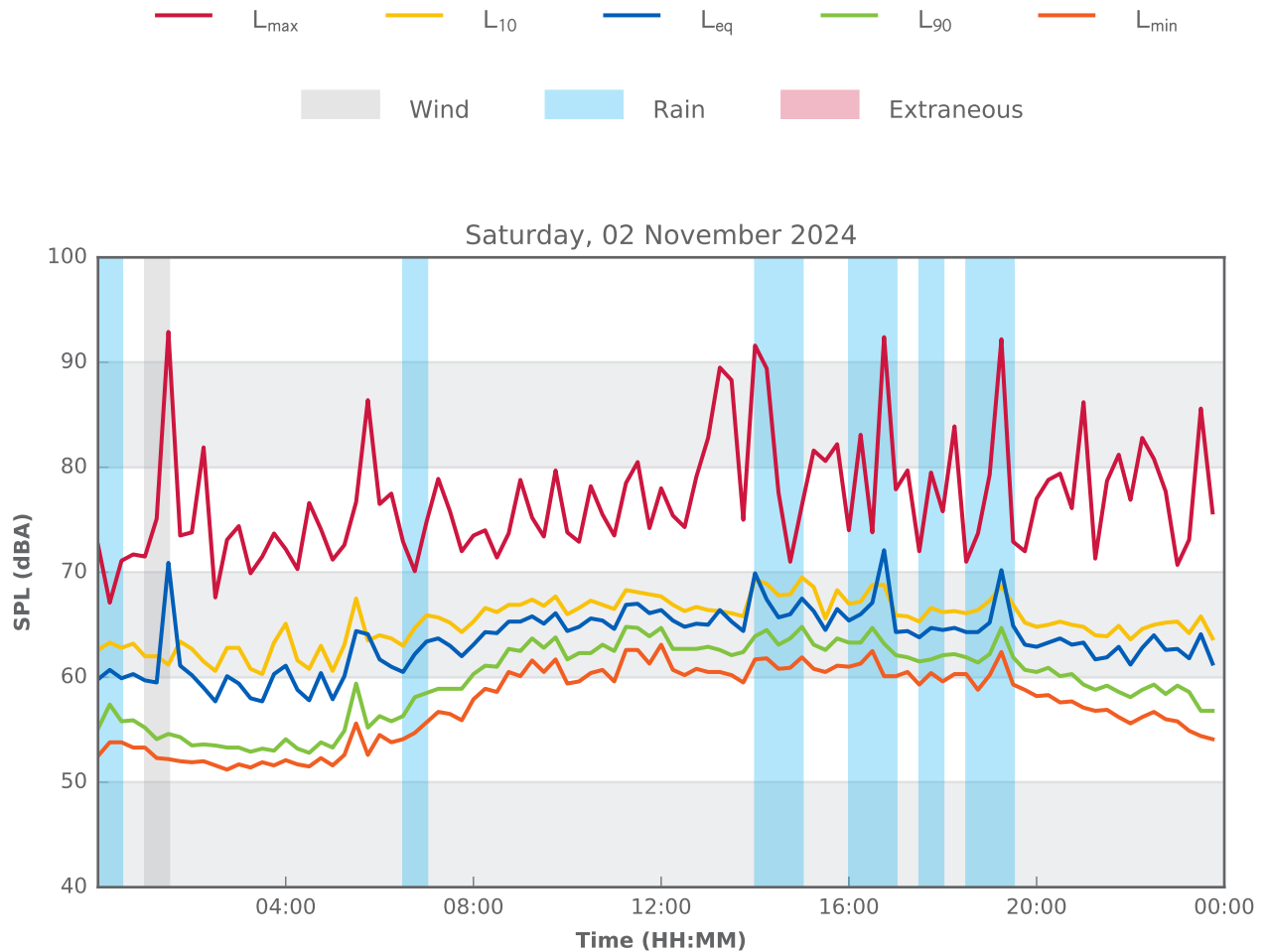


APPENDIX A: UNATTENDED NOISE MONITORING RESULTS

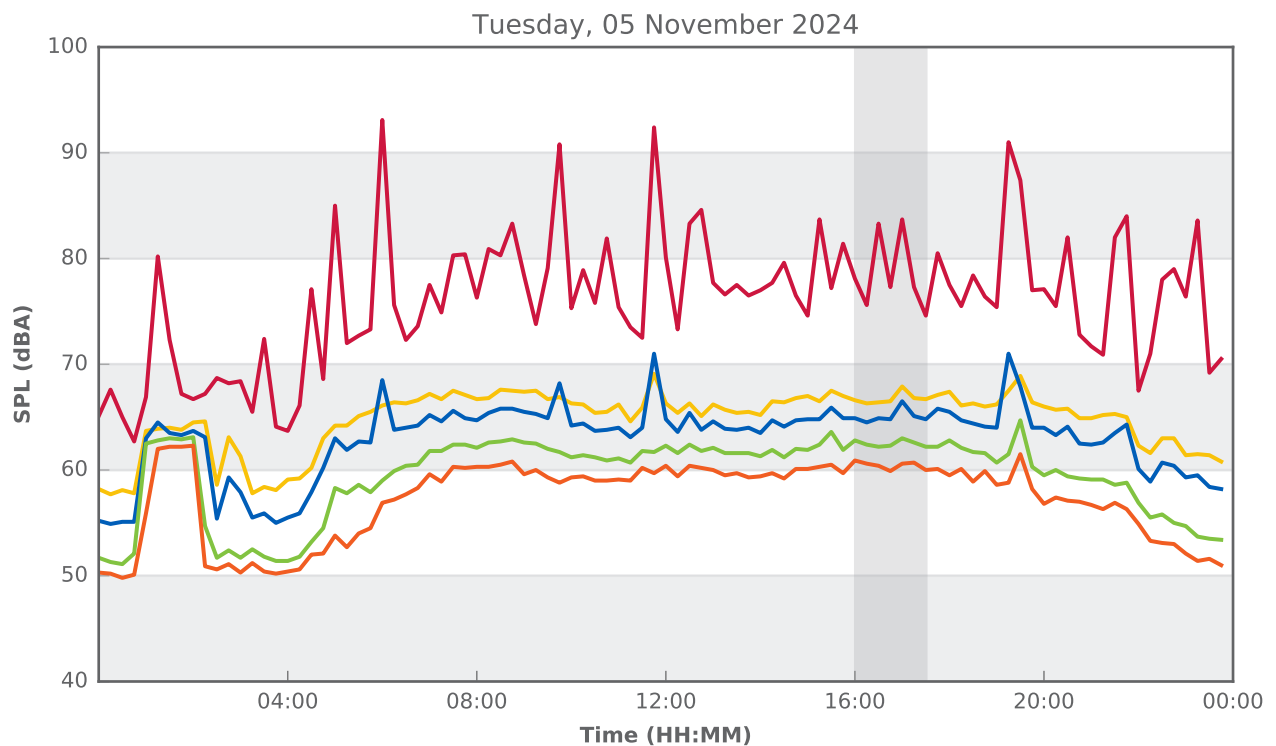
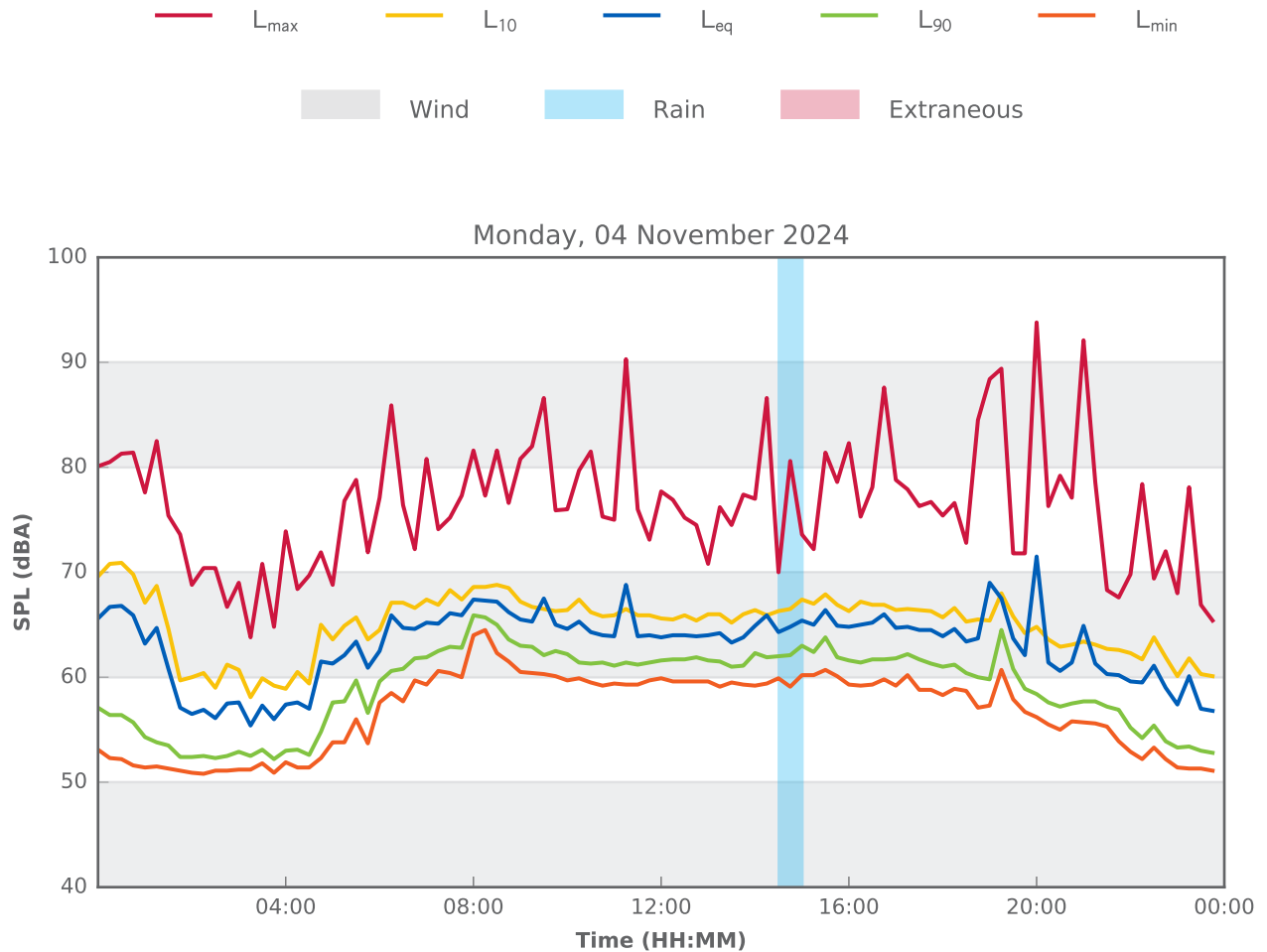
L1 - 105 Miller St - 14th Floor facing west



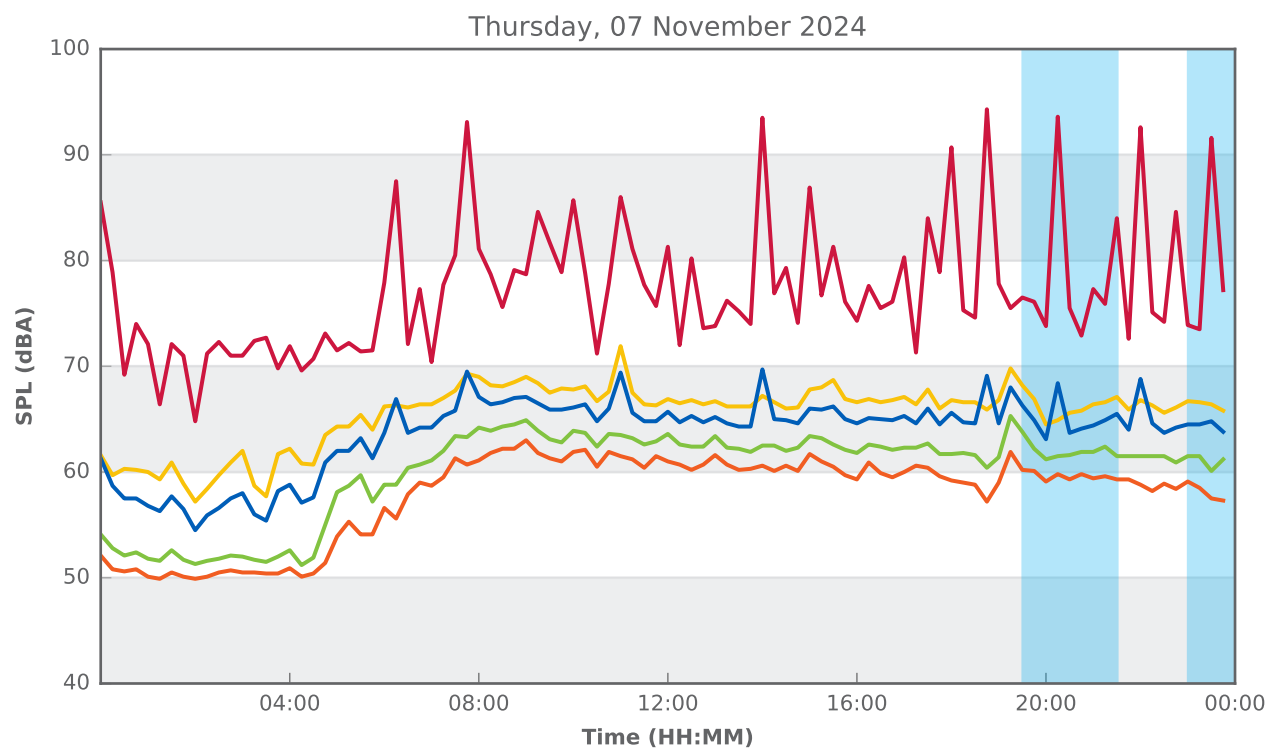
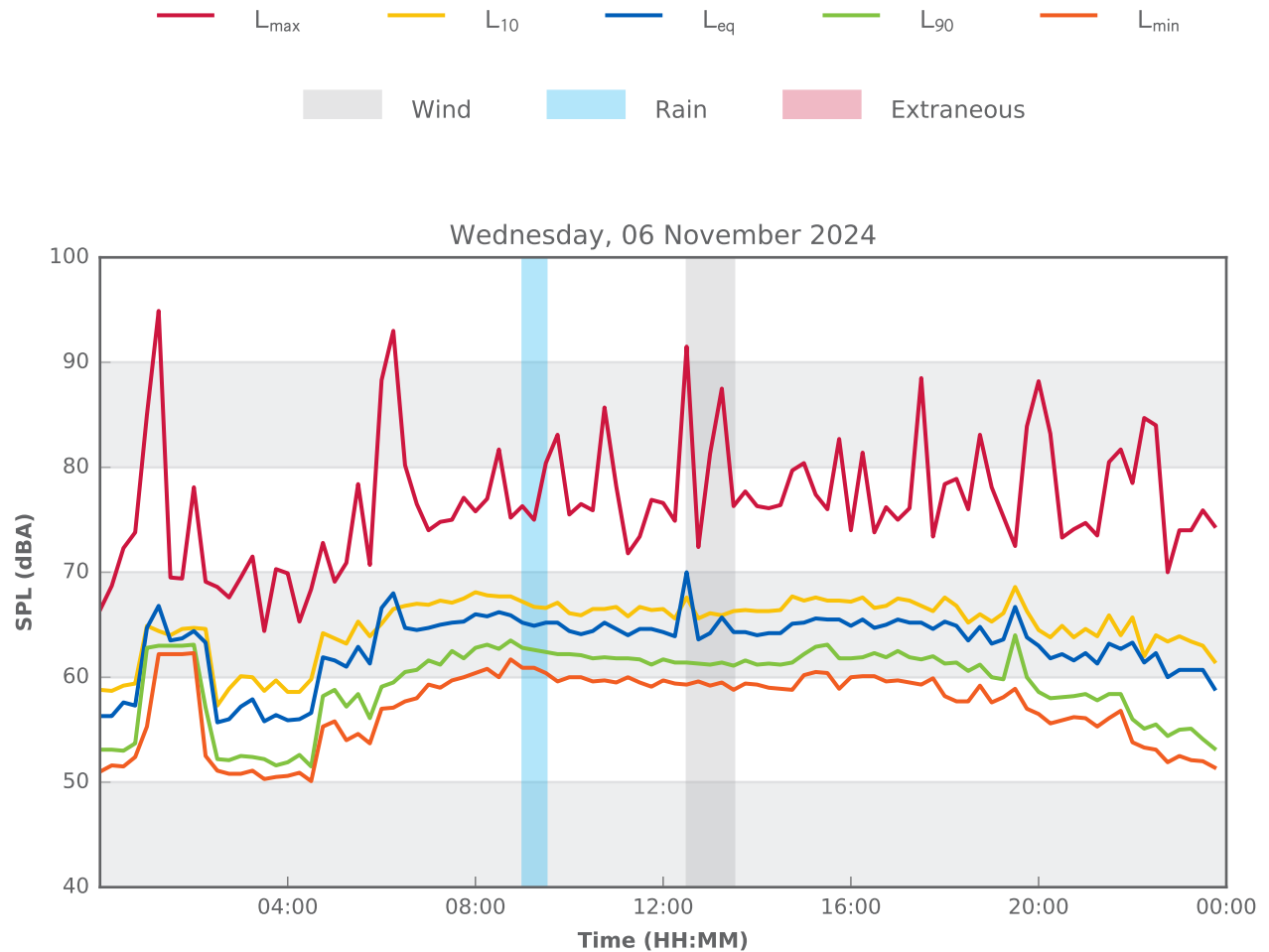
L1 - 105 Miller St - 14th Floor facing west



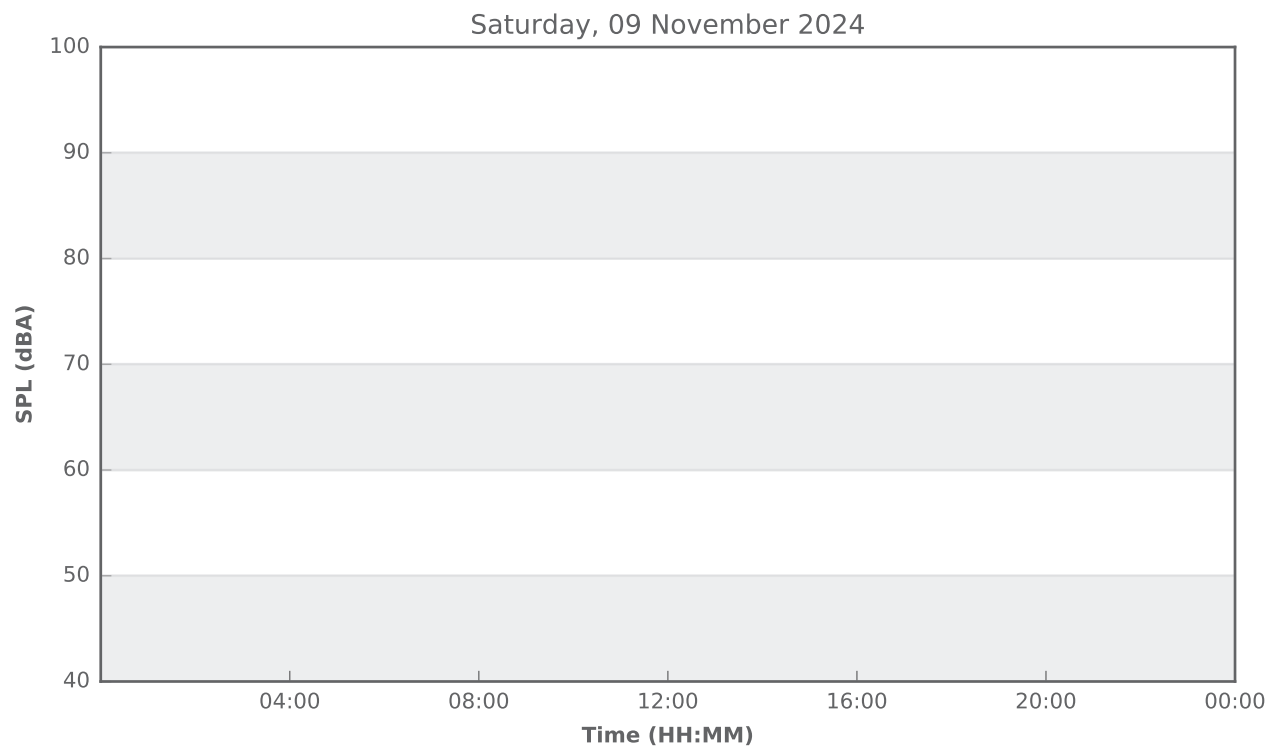
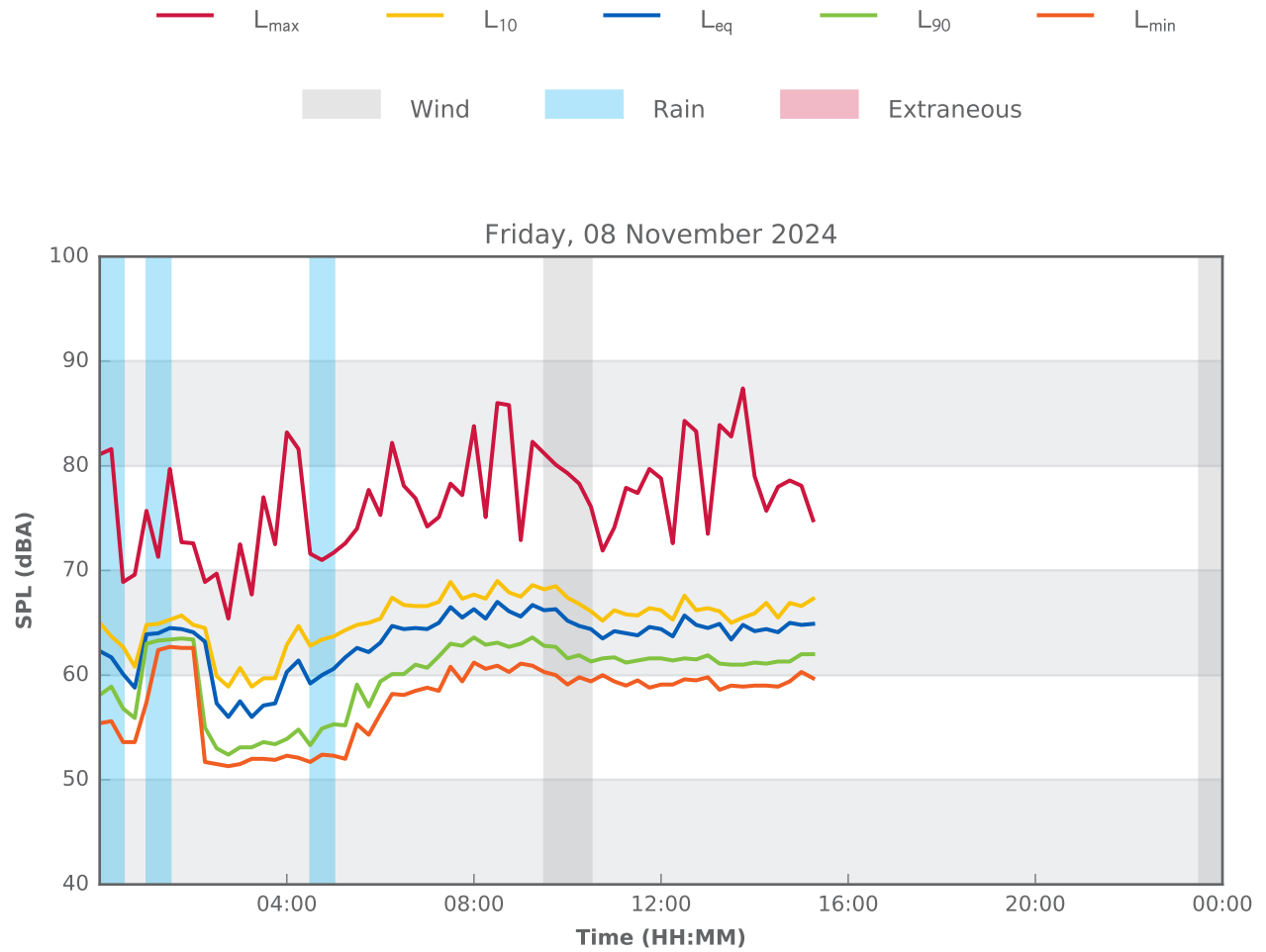
L1 - 105 Miller St - 14th Floor facing west



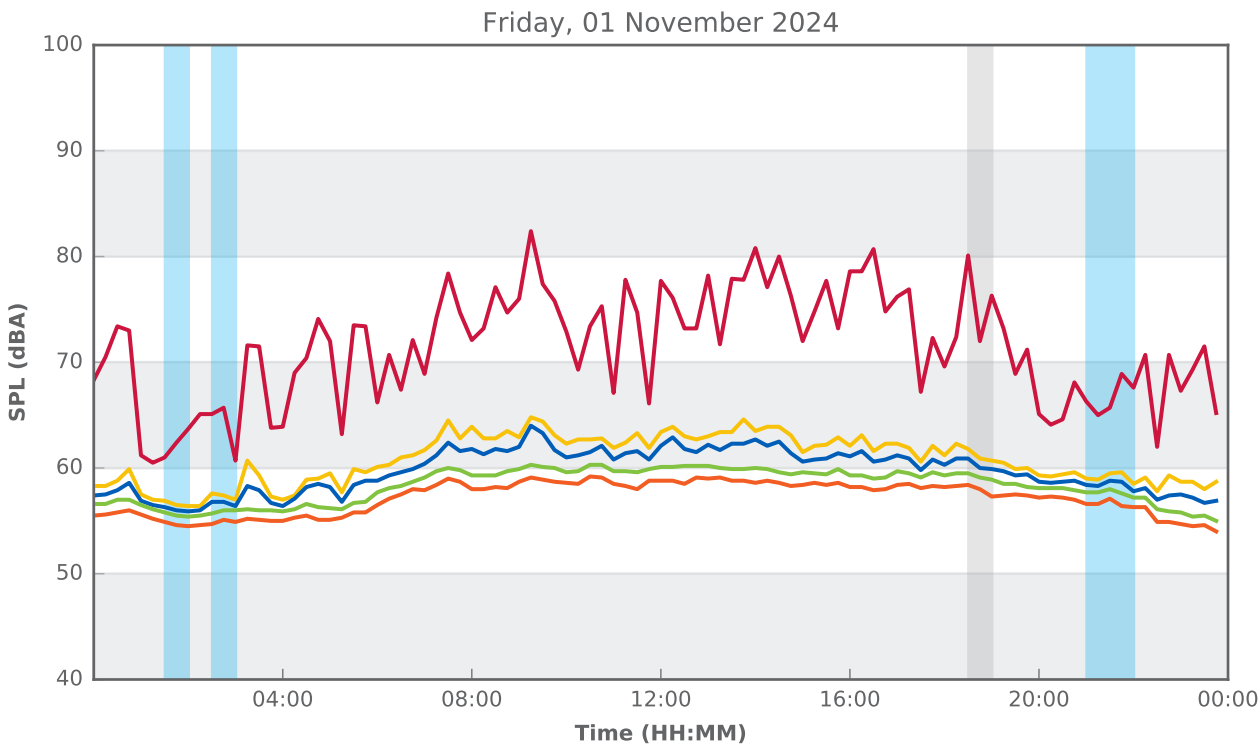
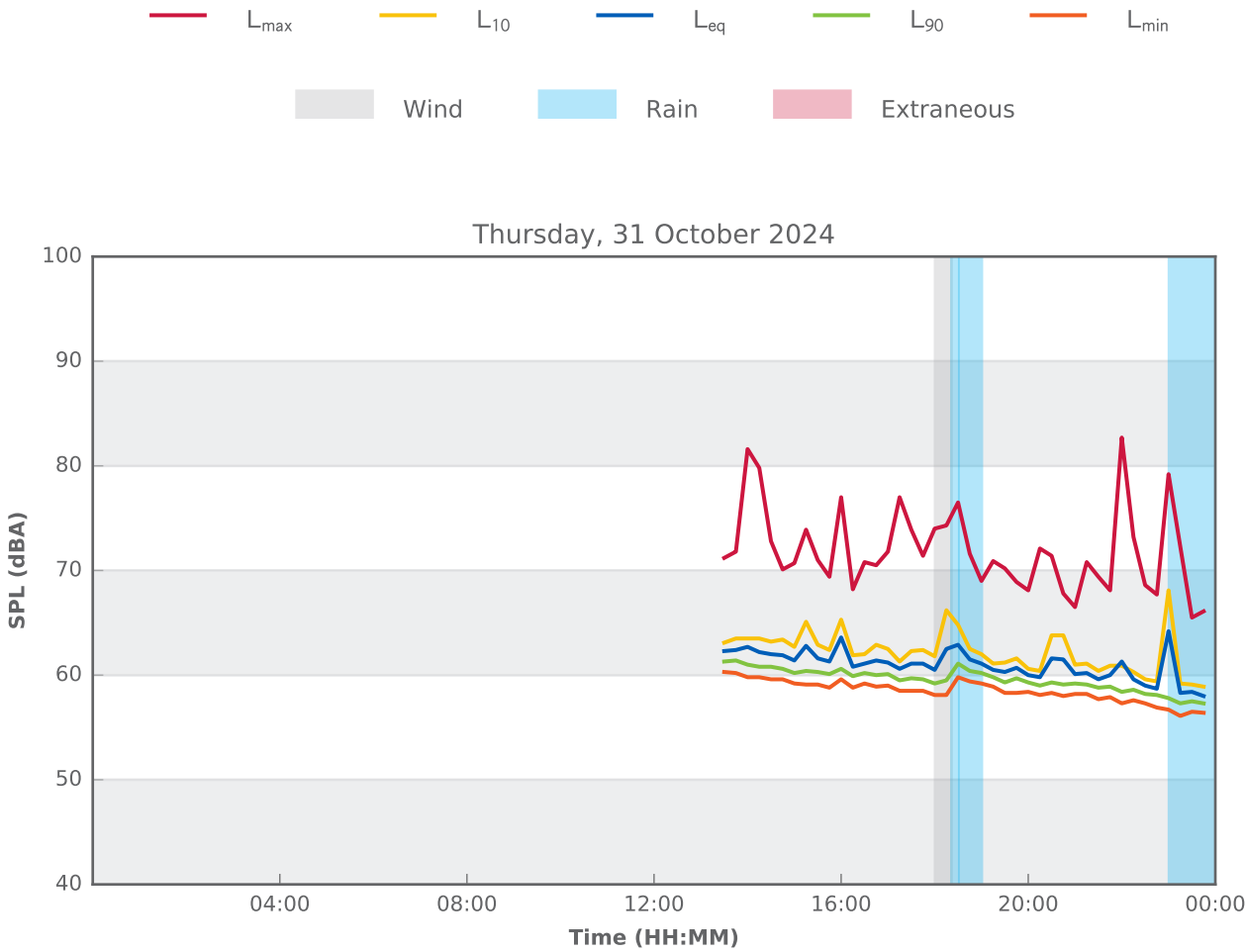
L1 - 105 Miller St - 14th Floor facing west



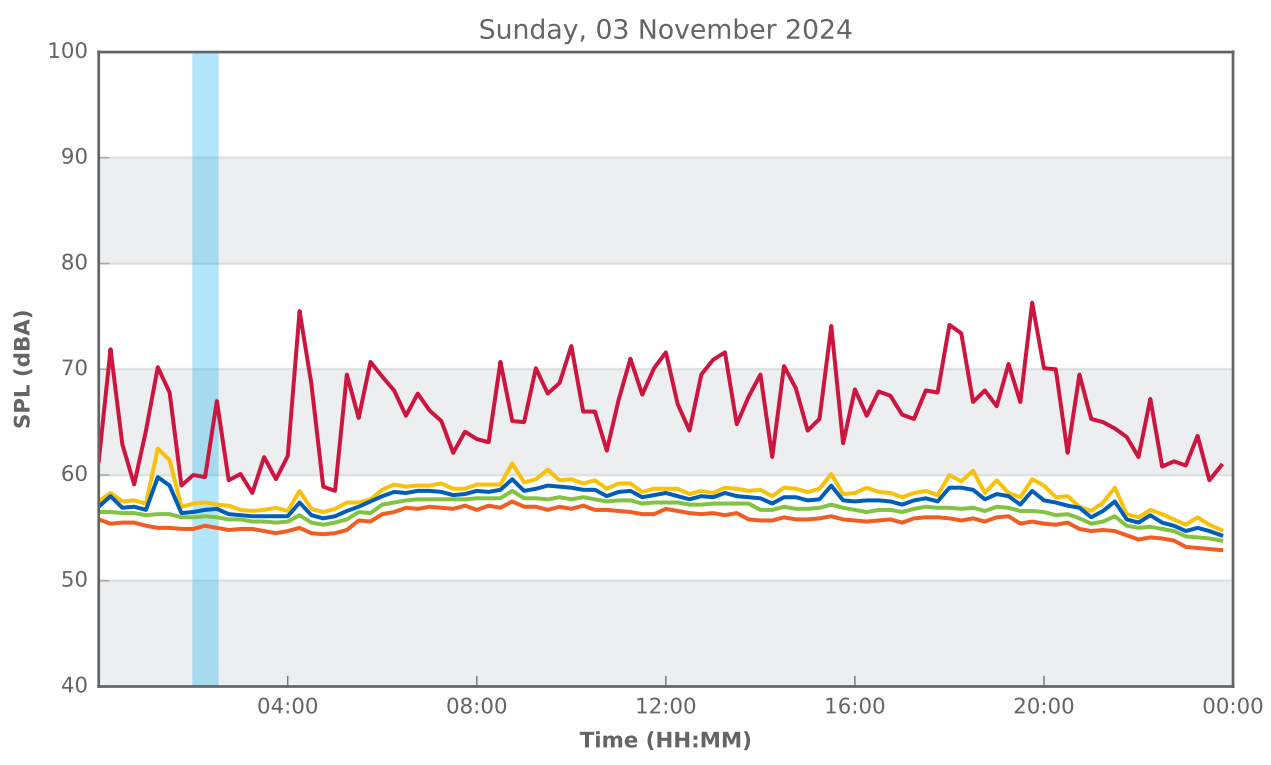
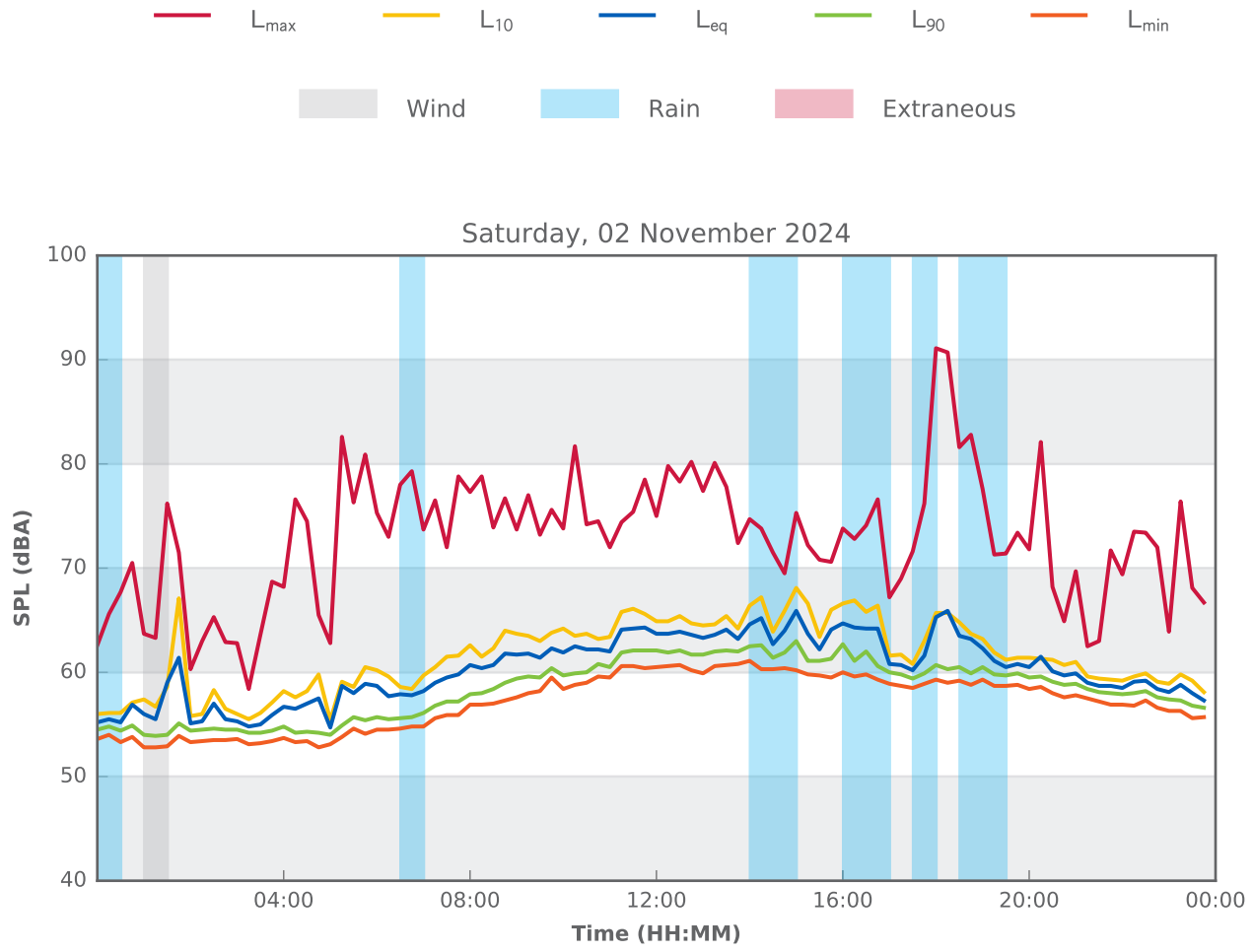
L1 - 105 Miller St - 14th Floor facing west



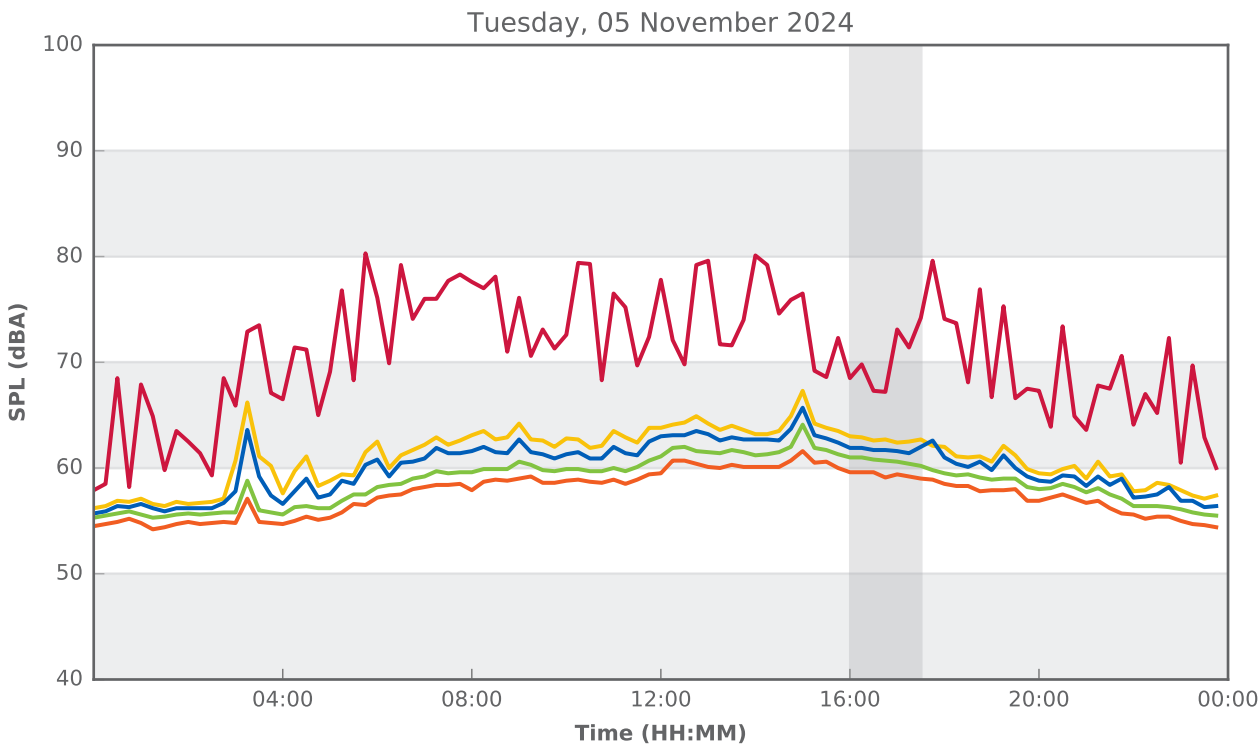
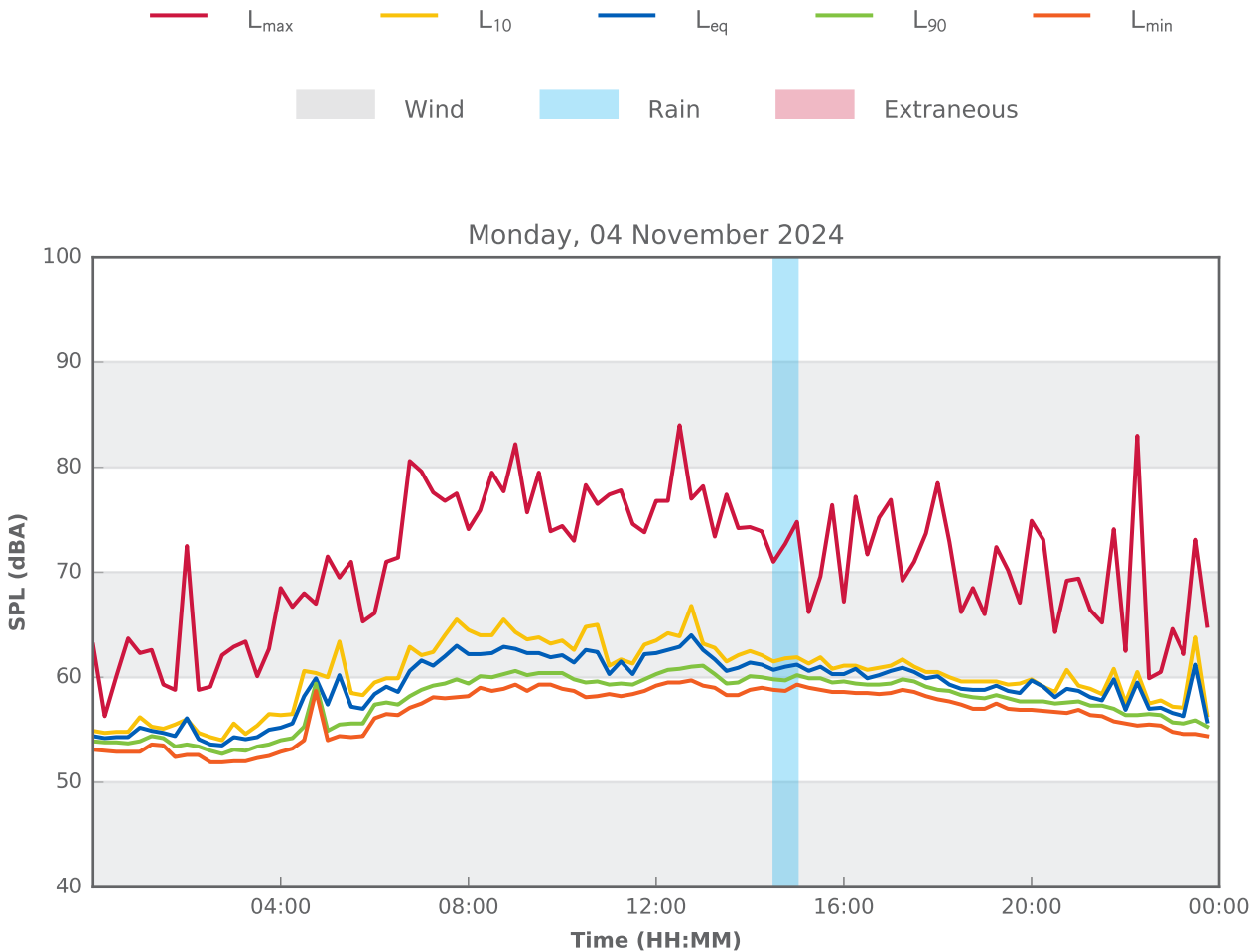
L2 - 105 Miller St - 1st Floor podium facing east



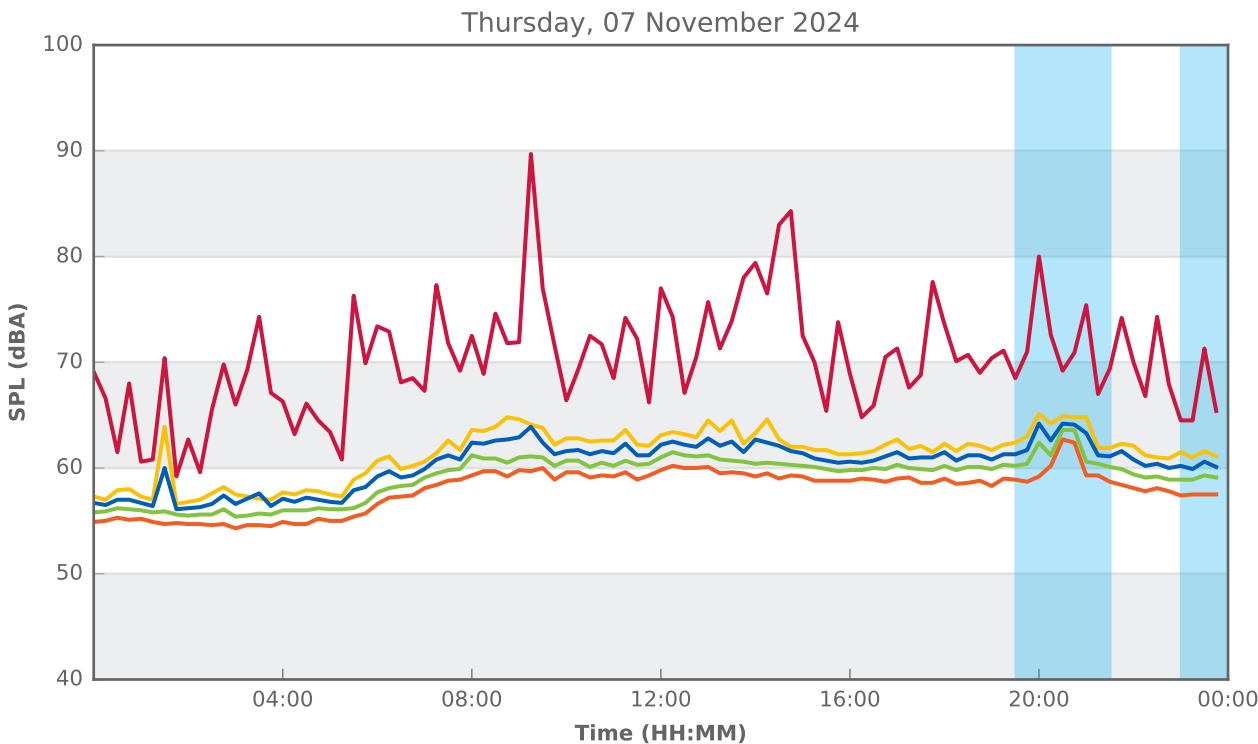
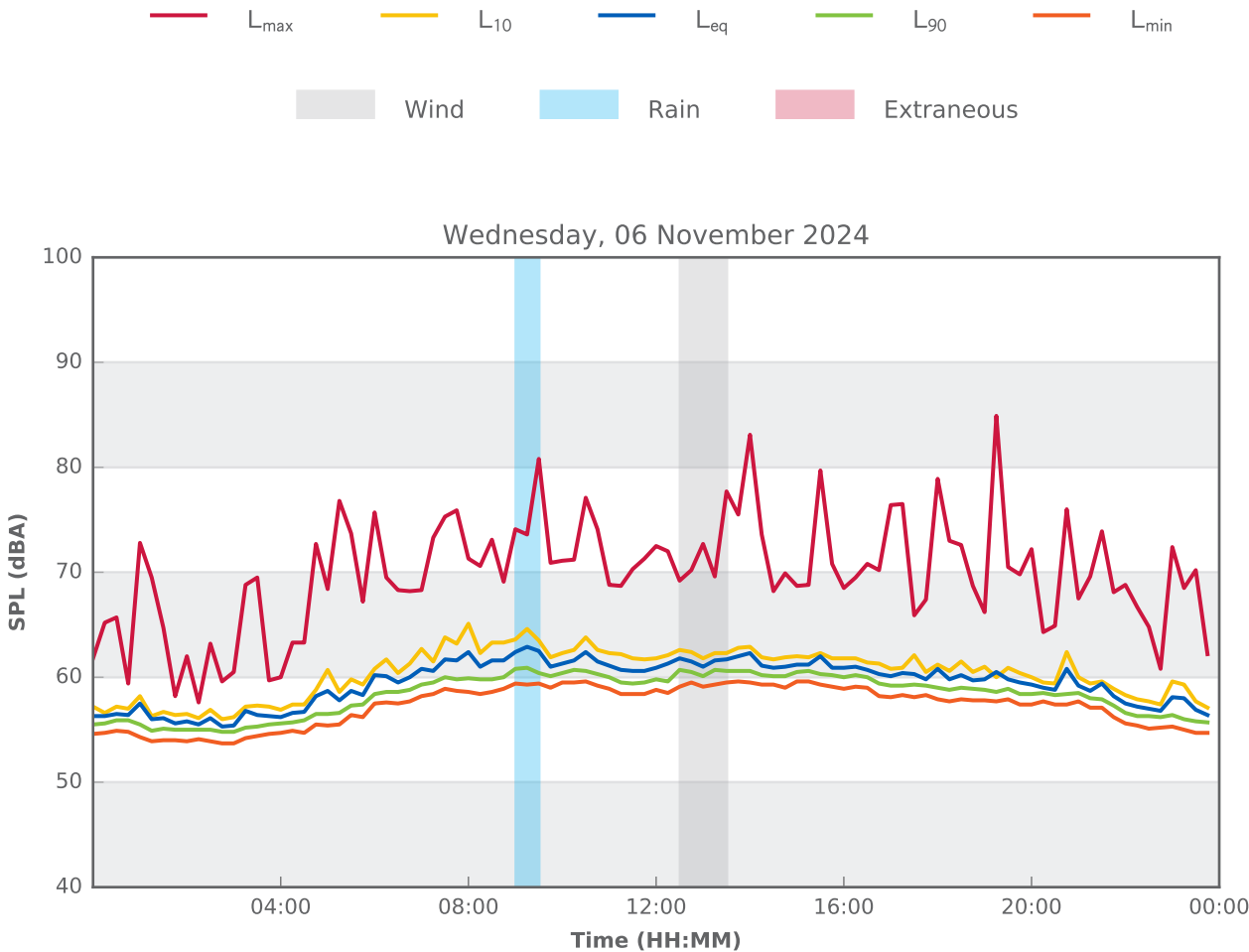
L2 - 105 Miller St - 1st Floor podium facing east



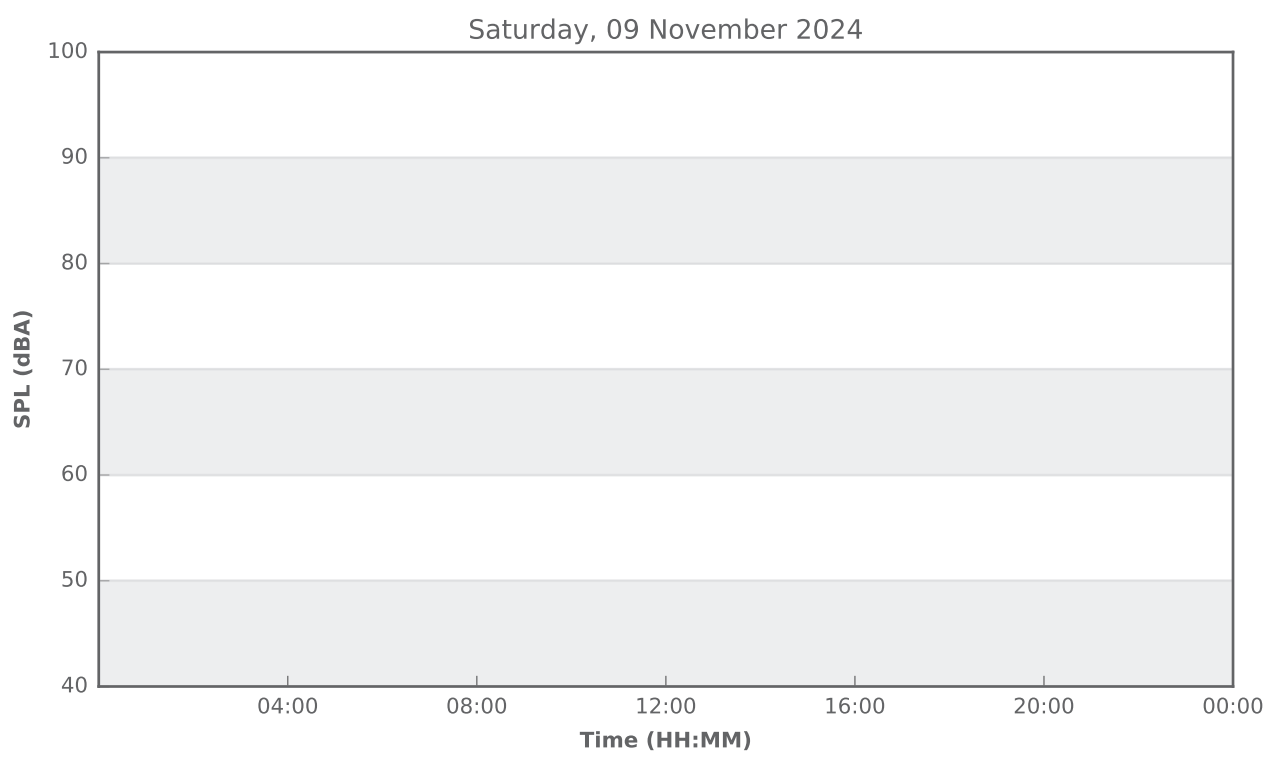
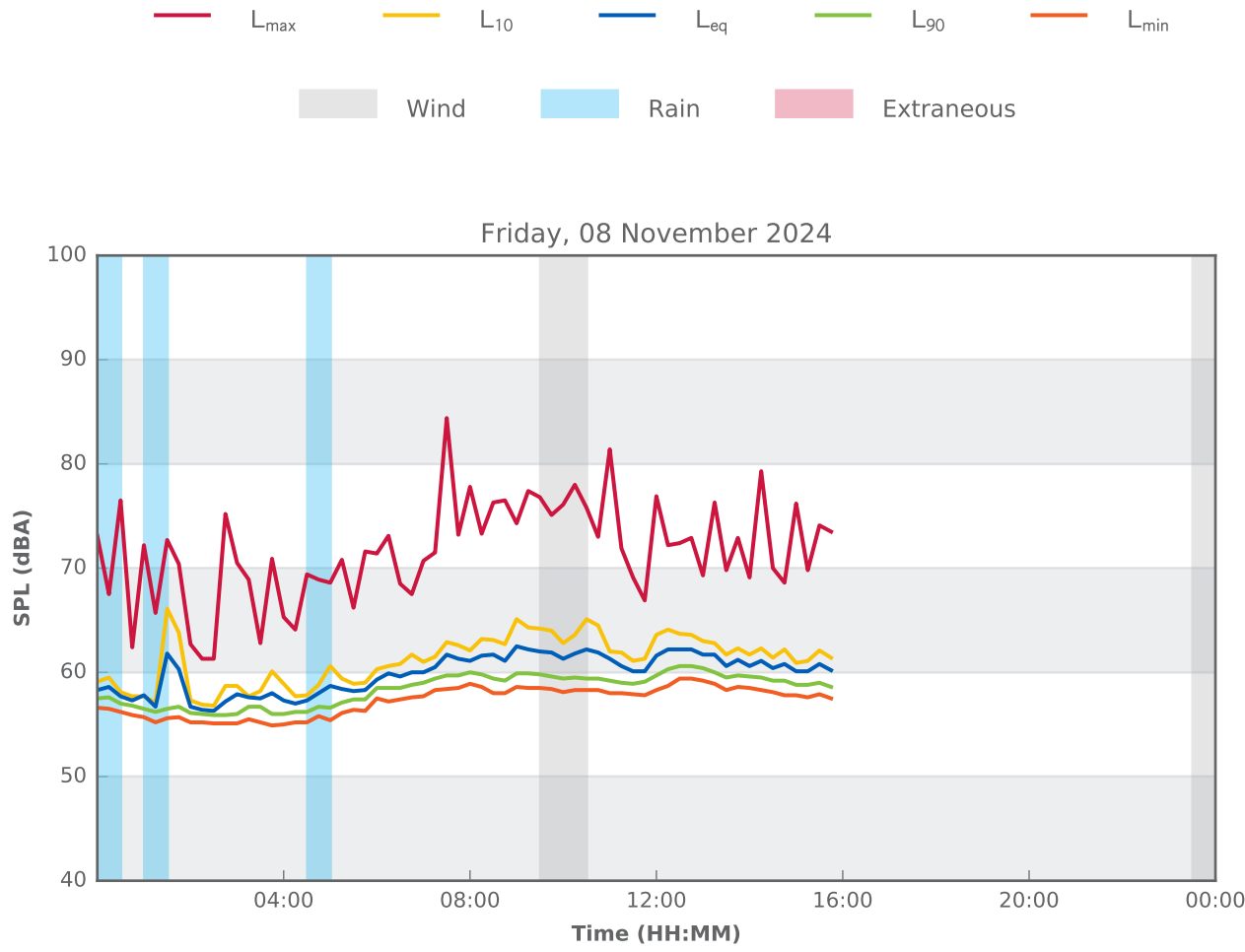
L2 - 105 Miller St - 1st Floor podium facing east



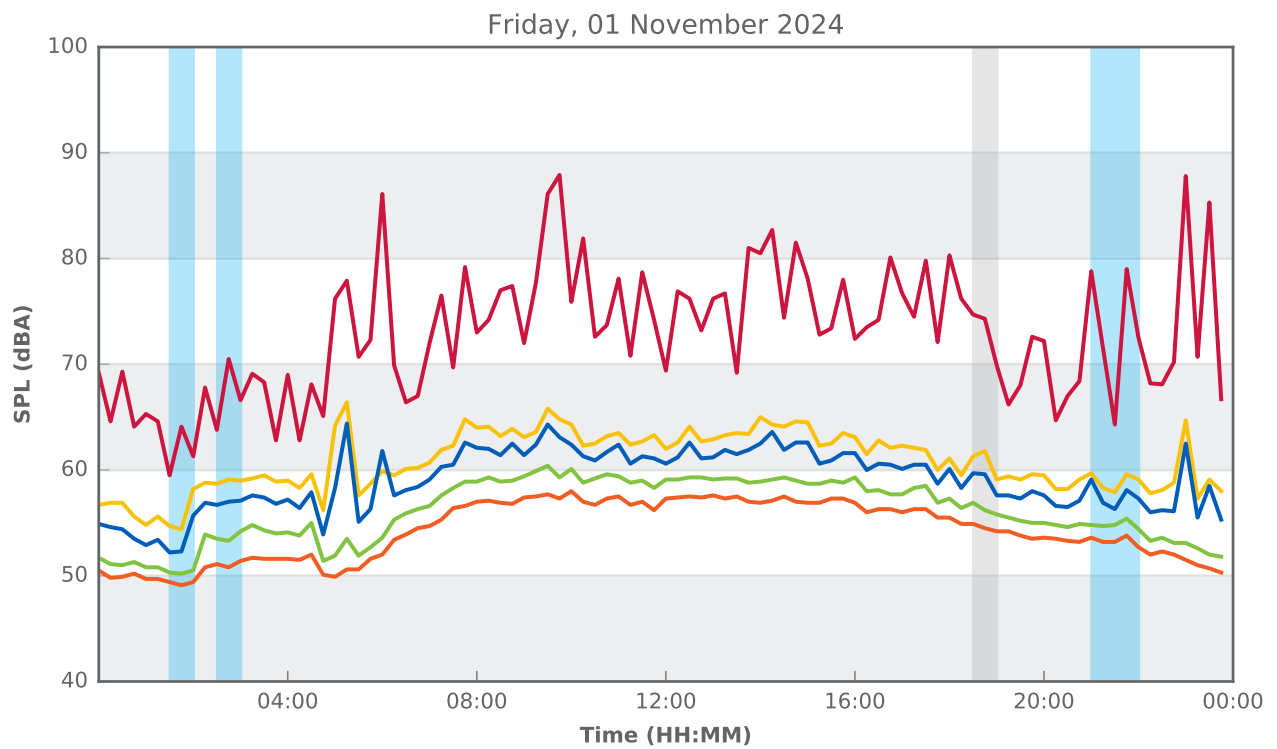
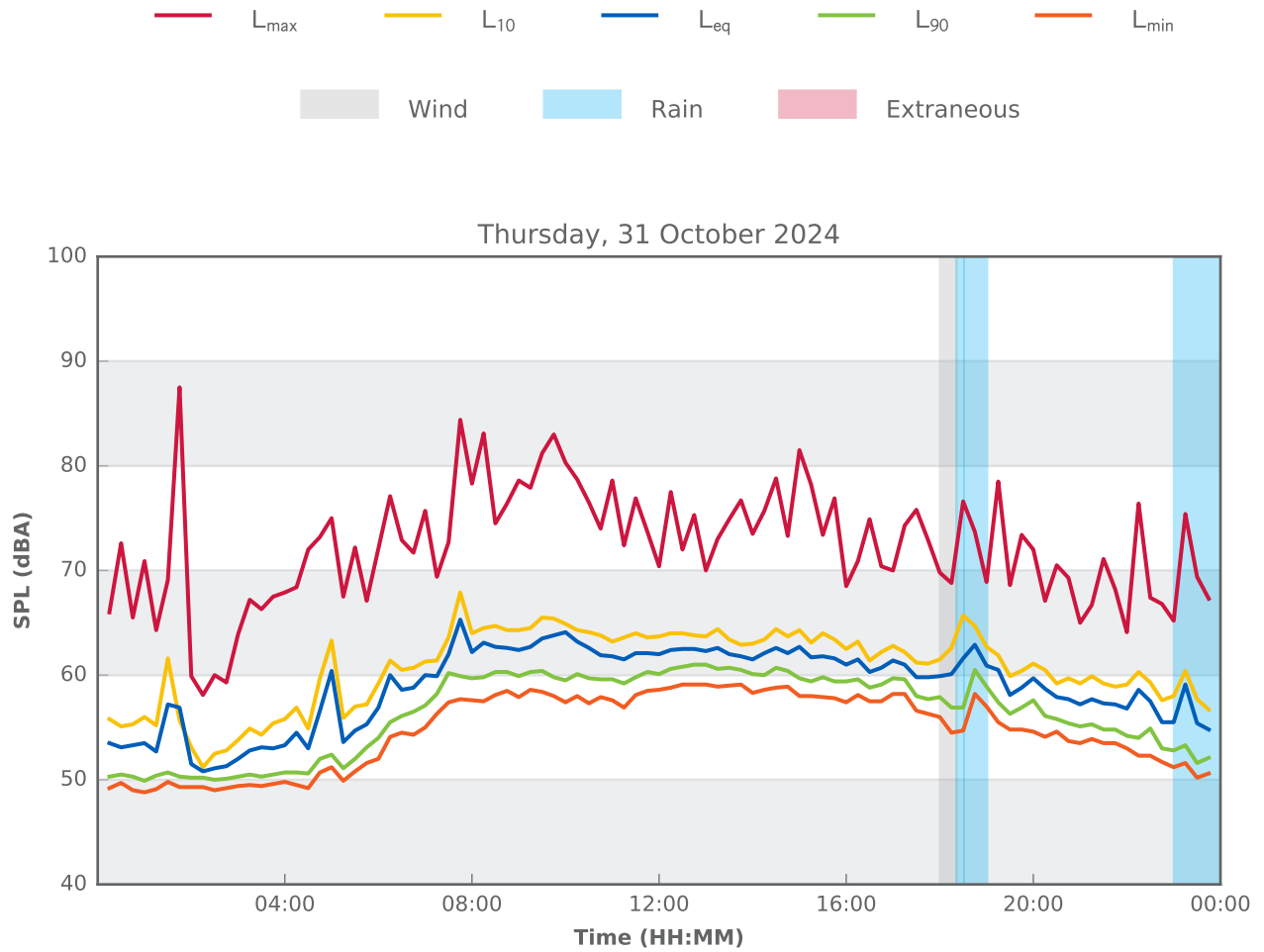
L2 - 105 Miller St - 1st Floor podium facing east



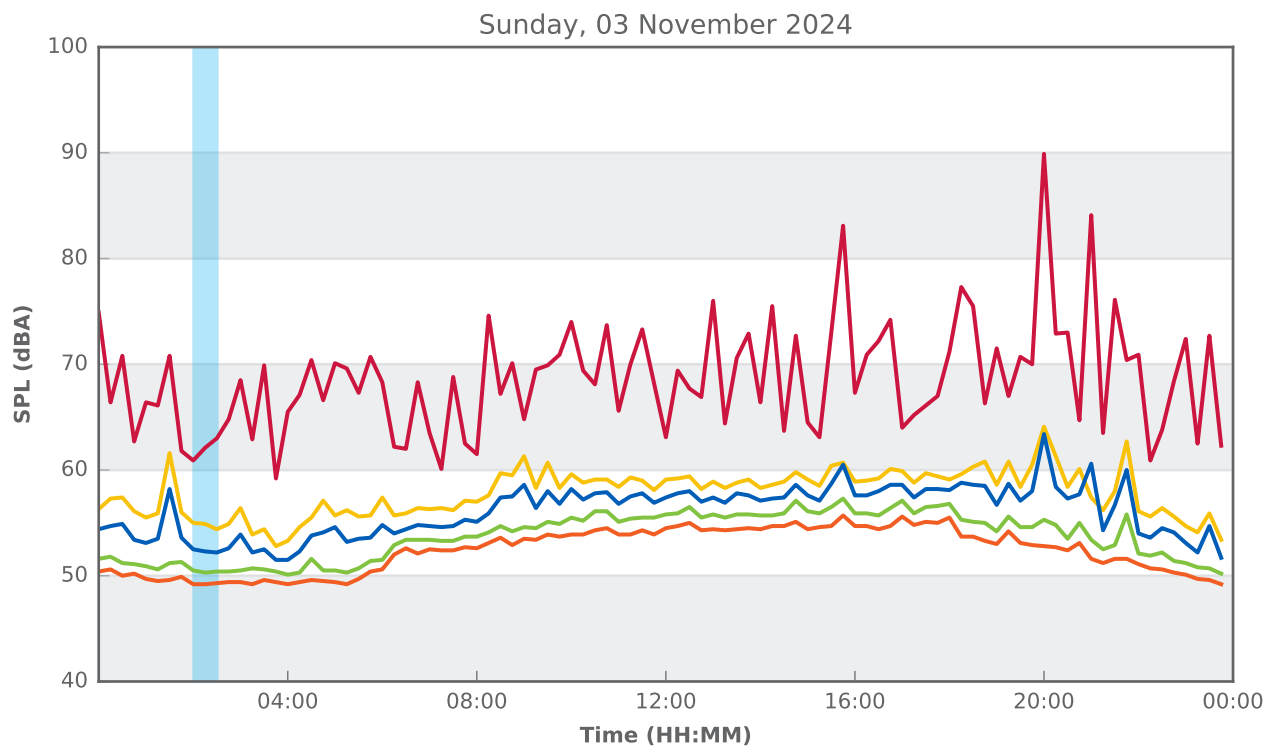
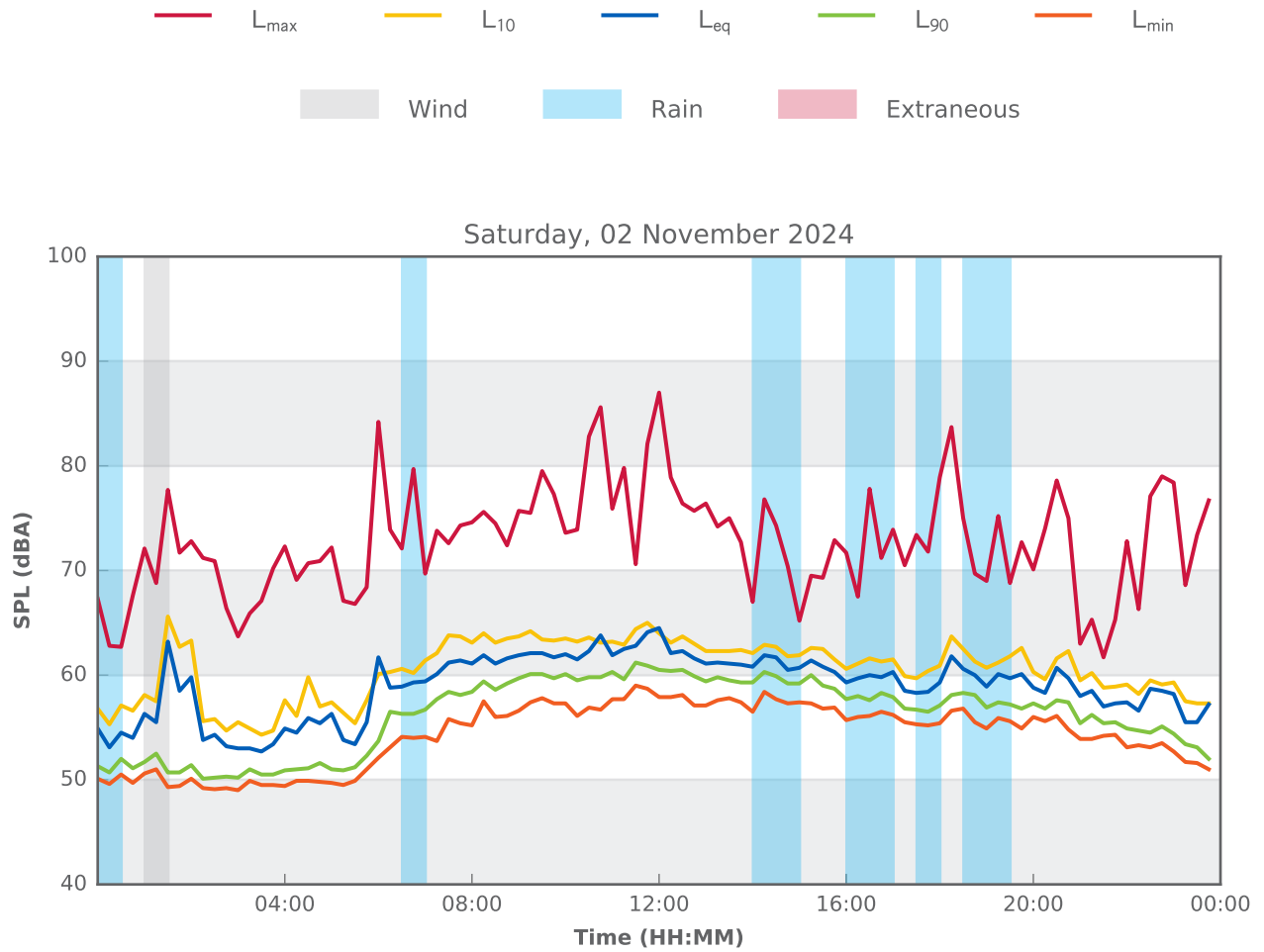
L2 - 105 Miller St - 1st Floor podium facing east



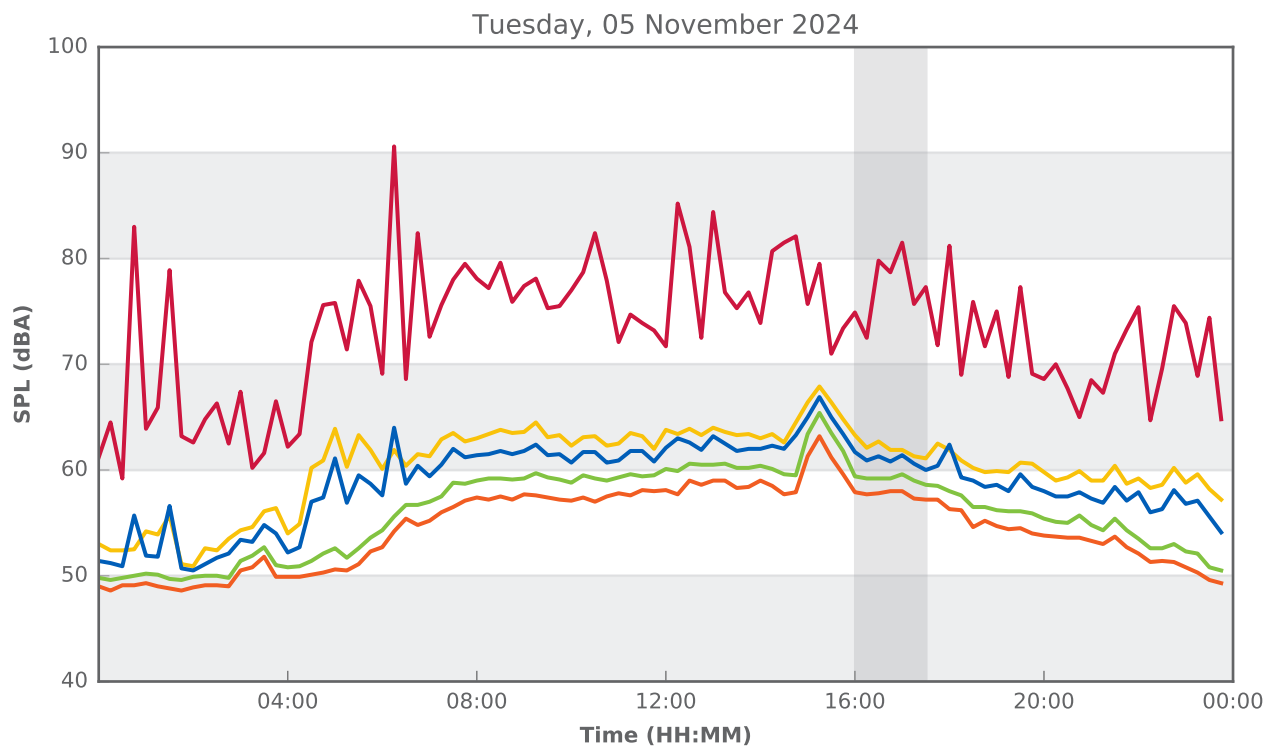
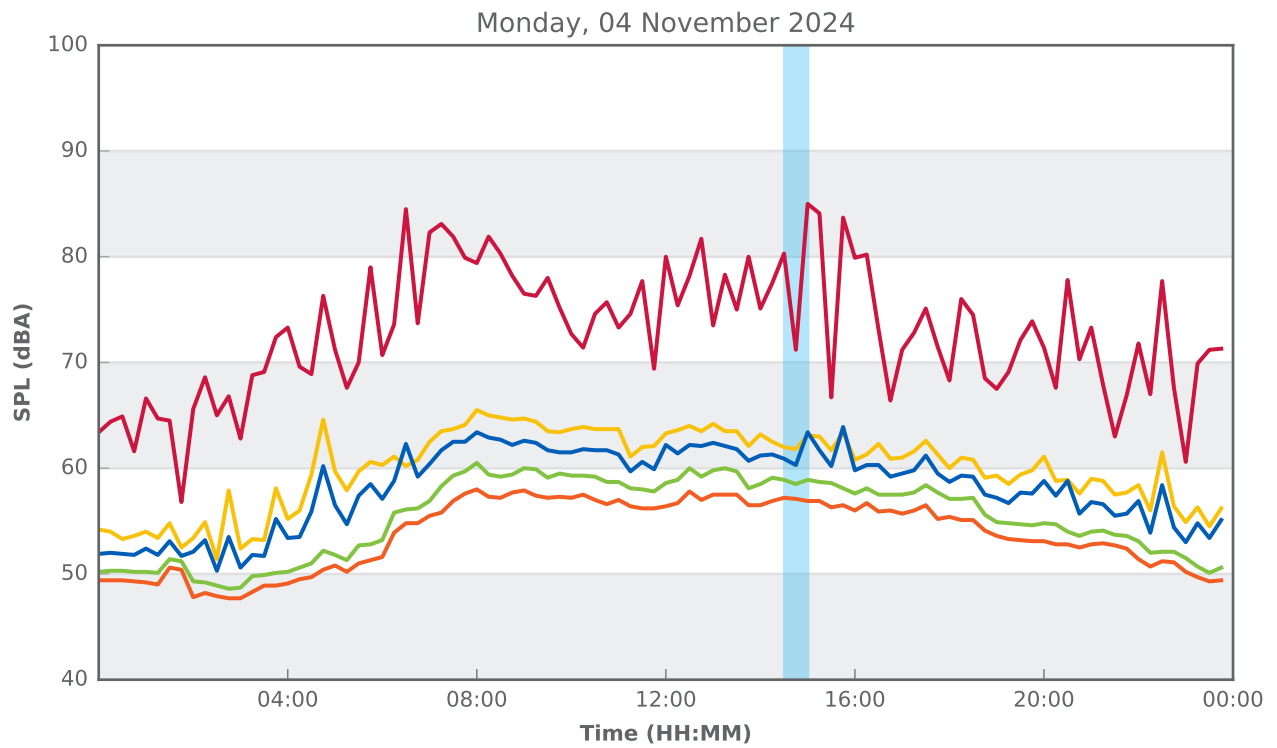
L3 - 79-81 Berry St



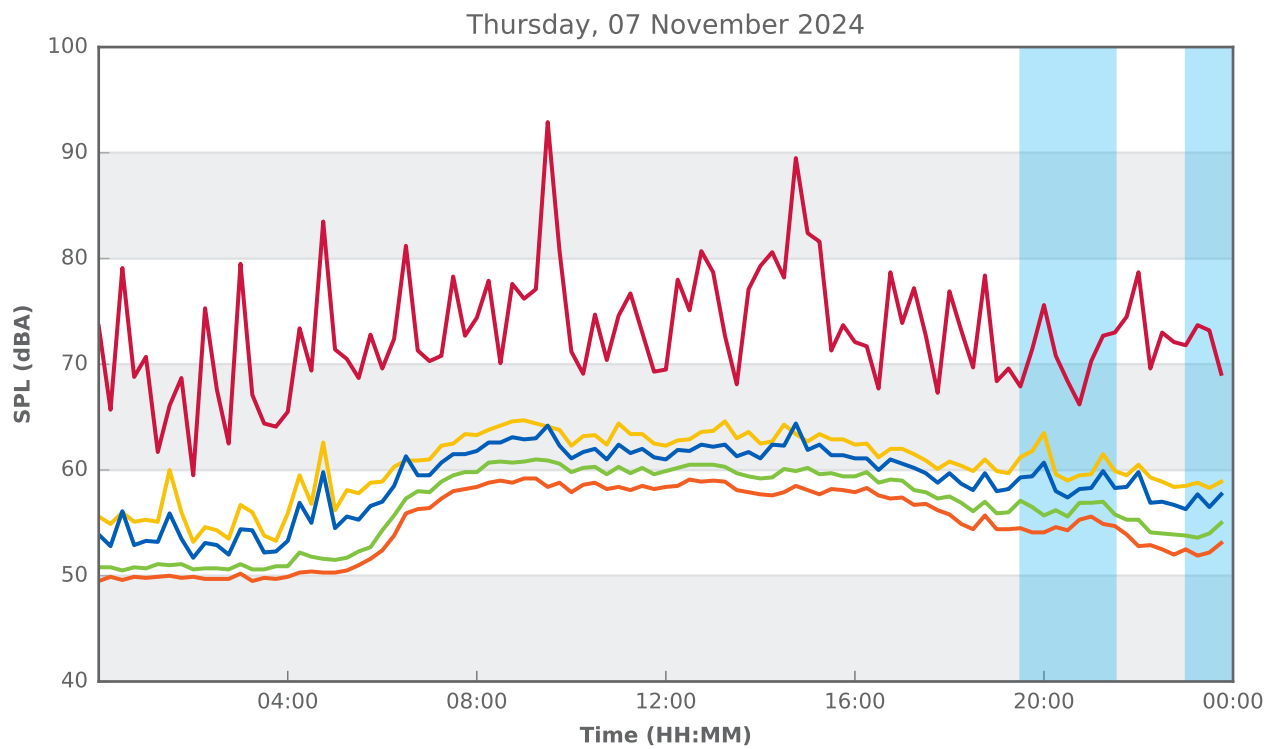
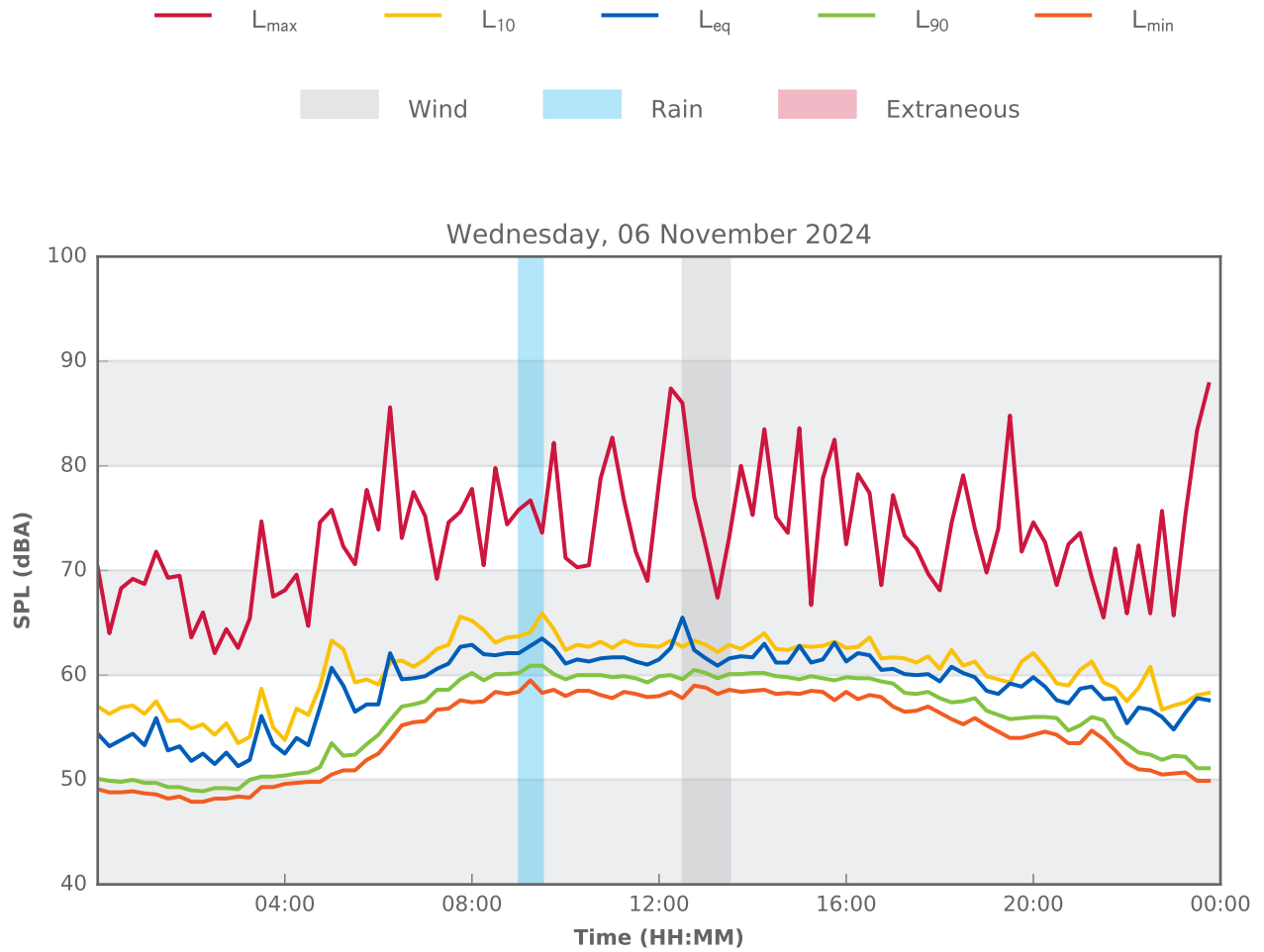
L3 - 79-81 Berry St



L3 - 79-81 Berry St



L3 - 79-81 Berry St



L3 - 79-81 Berry St

