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218-246 MACAULAY ROAD

NORTH MELBOURNE, VIC

PRELIMINARY ACOUSTIC ASSESSMENT

RWDI # 2302676

30 March 2023

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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.

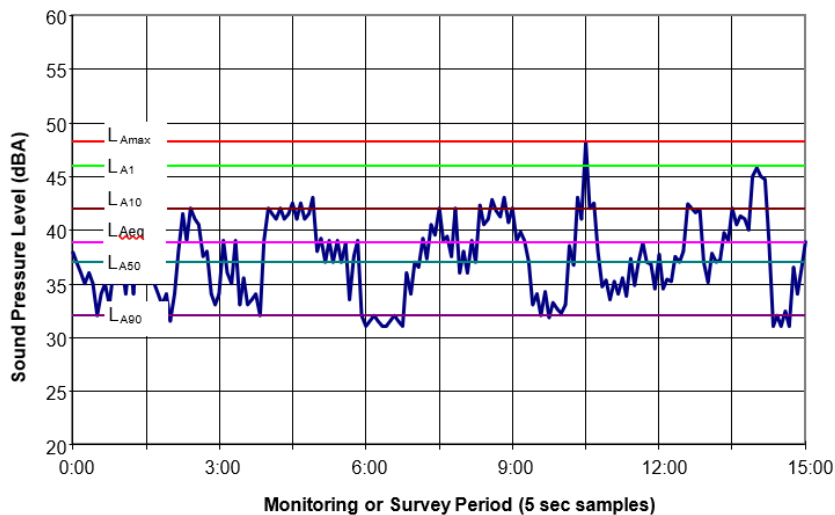
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

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.

Typical Graph of Sound Pressure Level vs Time



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Appendix A: Unattended Noise Monitoring Graphs

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1 INTRODUCTION

RWDI Australia Pty Ltd (RWDI) was retained to conduct an acoustic assessment for the proposed mixed-use development to be located at 218-246 Macaulay Road, North Melbourne. This report presents the project objectives, discusses the results from RWDI's on-site environmental noise survey, and provides our recommendations in order for the development to comply with the relevant acoustic requirements.

Our assessment has been based on the architectural drawings set supplied by Rothelowman, dated 27 February 2023. The updated drawings supplied by Rothelowman, dated 24 March 2023 do not impact this assessment and recommendations.

1.1 Project Description

The proposed development is mixed-used and is located at Lot CM RP17165, 218-246 Macaulay Road, North Melbourne on land zoned Commercial 1 Zone (C1Z) under the City of Melbourne Local Government Area.

The site is bounded by commercial/industrial buildings and the Southern Cross Educational Institute to the north, Macaulay Road to the south, Boundary Road to the east, and commercial/industrial buildings to the west.

Currently the property is occupied by a warehouse with multiple commercial tenancies.

The proposal (presented in Figure 1-1 and Figure 1-2) comprises three residential buildings with approximately 400 apartments, and a shared ground floor which accommodates a supermarket and various commercial tenancies. Two of the towers are 12 storeys in height, with the southern tower at 6 storeys in height. Supporting these buildings are a new internal road running along the northern and western boundaries of the site, an underground carpark for residential and retail use, and a loading dock on the northern aspect of the site (both accessed using the new road).

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Figure 1-1 Proposed Development - East Elevation (Boundary Road)

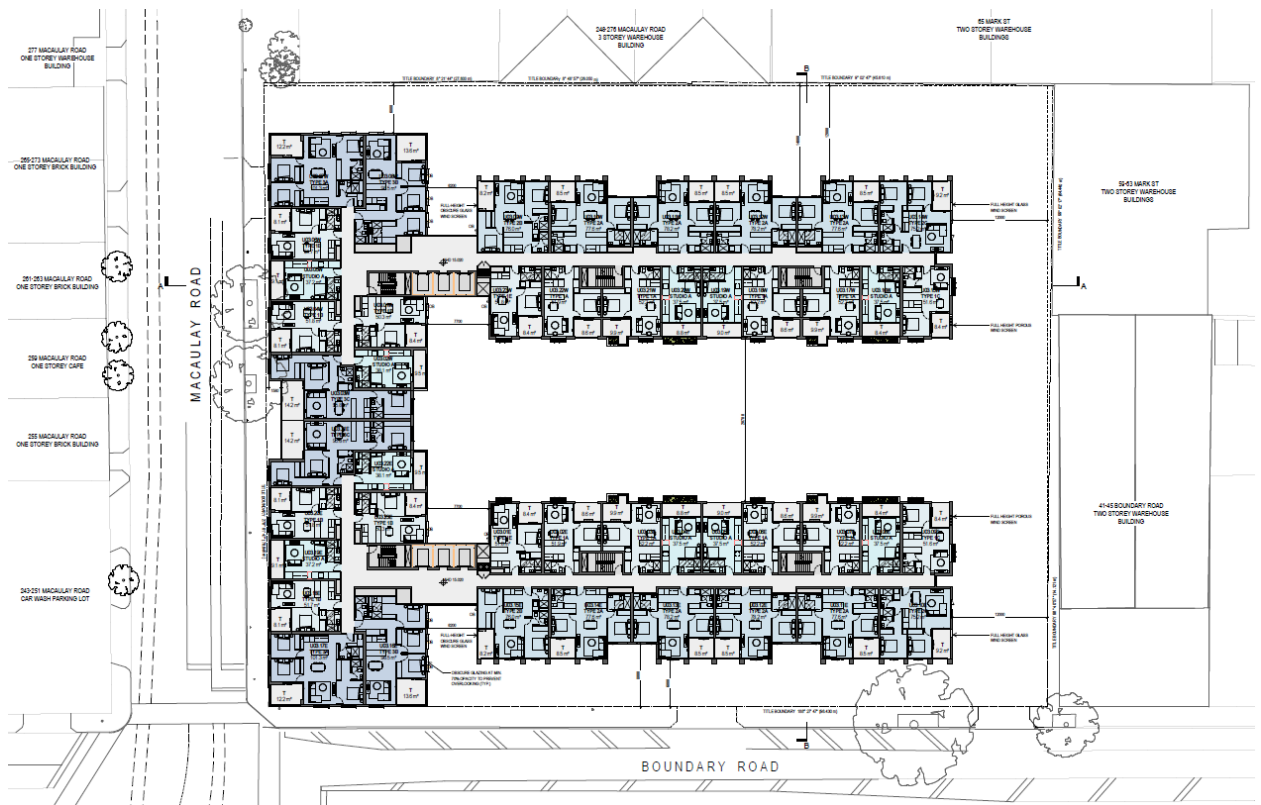


Figure 1-2 Proposed Development - Level 3

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1.2 Acoustic Considerations

The nearest noise sensitive developments surrounding the site are:

- Residential receivers located to the east of the site along Boundary Road (mixed use zoning);
- Educational receiver along the north boundary of the site (mixed use zoning);
- Commercial receivers along the north and west boundary of the site (mixed use zoning), and to the south along Macaulay Road (special use zoning).

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

- Traffic noise from Macaulay Road, Boundary Road, and to a lesser extent CityLink (located approximately 150m west of the site)

An aerial photo of the site and the surrounding developments are presented in Figure 1-3 below.

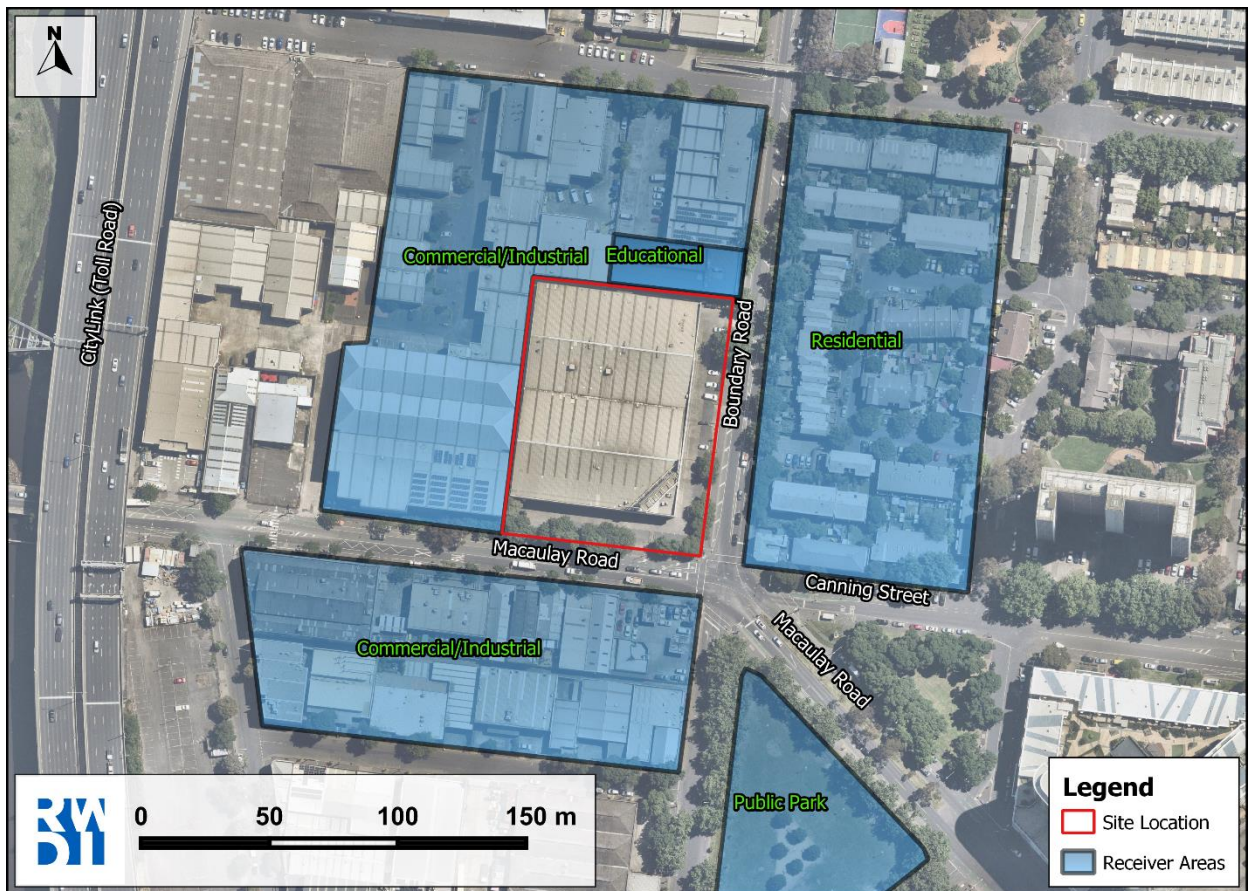


Figure 1-3 Site Location and Receivers

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1.3 Objectives

The objectives of the assessment are to:

- Identify the neighbouring land use and sensitive receivers.
- Establish the existing acoustic environment by conducting ambient and background noise level measurements.
- Establish project-specific noise criteria in accordance with the EPA's Noise Protocol document and other relevant Victorian guidelines, policies and Standards.
- Assess traffic intrusion into the development and provide in-principle acoustic performance recommendations for the building façade to achieve the internal noise requirements.
- Assess operational noise impacts from the development including vehicle noise and noise from mechanical services.

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2 ENVIRONMENTAL NOISE SURVEY

To characterise the existing noise environment of the project location, RWDI personnel attended site to conduct short and long-term unattended noise measurements as described in the sub-section below. The noise environment of the site consists primarily of traffic noise from the surrounding roadways, and to a lesser extent noise from the commercial/industrial activity to the north and west of the site.

Unattended noise monitors were installed on the edge of the roof of the existing site. Attended noise measurements were conducted at around the site, including at the residential area to the east of the site behind the noise wall. All monitoring locations are presented in Figure 2-1.

All Sound Level Meters and Noise Loggers used were a type approved system offering Class 1 performance according to IEC 61672-1:2013 *Electroacoustics – Sound level meters – Part 1: Specifications* and with a current calibration certificate as per the *National Association of Testing Authorities, Australia* requirements (NATA), calibrated according to IEC 61672-3:2013 *Electroacoustics – Sound level meters – Part 3: Periodic tests*.

The A-weighting filter of the meter was selected, and the time weighting was set to “Fast”. The field calibration of the meters was checked before and after the measurements with a Brüel & Kjær Type 4231 sound level calibrator (SLC) and no significant drift was noted. This SLC is a Class 1 calibrator according to AS IEC 60942-2004 *Electroacoustics – Sound calibrators* and has been calibrated to the same Standard and in accordance with our in house quality system. Calibration certificates can be provided upon request.

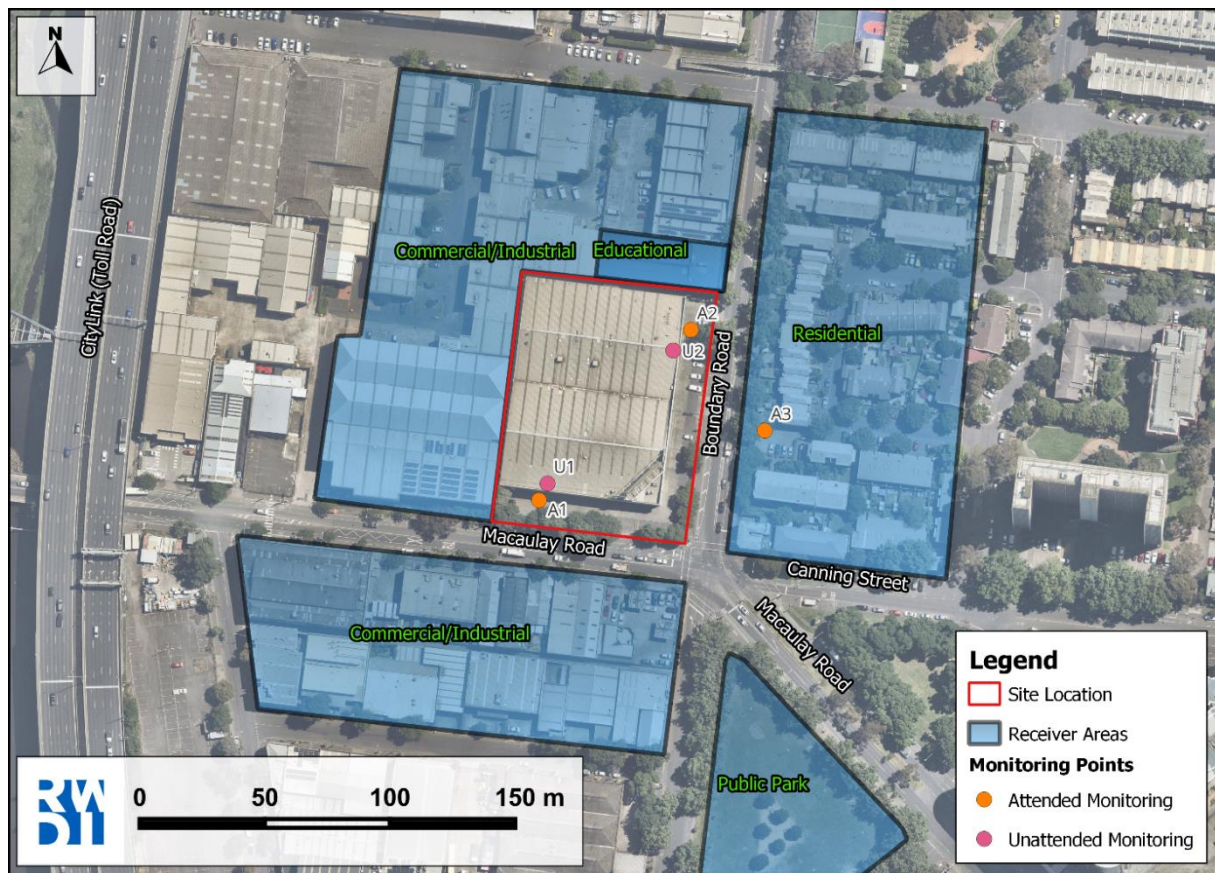


Figure 2-1 Site and Logging Locations

2.1 Long-Term Noise Monitoring

Two unattended noise monitors were installed from Thursday the 2nd of February to Monday the 13th of February to measure the ambient and background noise levels.

The unattended noise measurements were conducted using Acoustic Research Laboratories noise monitors, with statistical noise levels stored at 15-minute intervals on fast response mode. The noise monitors were calibrated at the beginning and end of the monitoring period, with no significant drift being observed.

The measured noise levels at the unattended noise monitoring locations are presented in **Table 2-1** and **Table 2-2** below. Refer to Appendix A for graphs of the unattended noise monitoring data.

The background noise levels have been determined by taking the lowest of the average day, evening and night time L_{A90} noise level obtained over the noise monitoring period.

The unattended noise monitoring data has been analysed in conjunction with weather data obtained from the Melbourne Olympic Park weather station. Any noise measurement data that have been adversely affected by weather (periods where average wind speeds exceed 5 metres per second [m/s] and periods that are rain affected) have been excluded in determining the existing noise levels on site.

Table 2-1: Unattended Noise Measurements – Traffic (L_{Aeq}) Noise Levels

Noise Monitor Location	Time of Day	Measured Ambient Noise Level $L_{Aeq, period}$ dBA
U1	Day (6 am – 10 pm)	55
	Night (10 pm – 6 am)	52
U2	Day (6 am – 10 pm)	66
	Night (10 pm – 6 am)	63

Table 2-2: Unattended Noise Measurements – Background Noise Levels

Noise Monitor Location	Time of Day	Background Noise Level $L_{A90, period}$ dBA
U2	Day (7 am – 6 pm) ¹	55
	Evening (6 pm – 10 pm) ²	54
	Night (10 pm – 7 am)	48

Notes 1. Except Sundays

2. 7am-10pm on Sundays

In order to determine the background noise level at the residential receivers to the east of the site, the background noise levels in Table 2-2 have been adjusted by the difference between the simultaneously recorded measurements at U2 and A3 (refer to section 2.2), producing the background noise levels shown in Table 2-3.

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Table 2-3: Residences to the East - Background Noise Levels

Location	Time of Day	Background Noise Level
		L _{A90, period} dBA
A3	Day (7 am – 6 pm) ¹	48
	Evening (6 pm – 10 pm) ²	47
	Night (10 pm – 7 am)	41

Notes 1. Except Sundays
2. 7am-10pm on Sundays

A representative night time background noise spectrum for the residential receivers to the east of the site (across Boundary Road) has been similarly determined using the unattended noise monitoring data from noise monitor U2. The representative background noise spectrum is presented in **Table 2-4**.

Table 2-4: Measured Background Noise Spectrum

Measurement Location	Time	Frequency								Total A-Wt.	
		31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz		8kHz
Unattended Noise Monitoring Location U2	Night time period (10pm-7am)	41	45	42	39	37	38	33	23	12	41

2.2 Short-Term Noise Monitoring

RWDI personnel also conducted short-term attended noise measurements around the site to supplement the long-term unattended noise monitoring. The measurements were conducted between 3:30pm and 4pm on February the 2nd, and 8am and 9am on February the 3rd, 2023, using a Class 1 NTI XL2 sound level meter. The sound analyser was calibrated at the beginning and end of the measurement period and no significant drift was observed. All attended measurements were conducted during suitable meteorological conditions.

The location of short-term noise measurements are shown in Figure 2-1 and the results are summarised in Table 2-5.

Table 2-5: Short-Term Noise Measurement Results

Measurement Location	Time and Date	Measured Noise Level dBA		Measurement Observations
		Ambient L _{Aeq,15min}	Background L _{A90,15 min}	
A1 14m from kerb	2023-02-02 15:37	63	56	Wind speed 0 m/s Noise environment dominated primarily by traffic noise along Macaulay Road



Measurement Location	Time and Date	Measured Noise Level dBA		Measurement Observations
		Ambient L _{Aeq,15min}	Background L _{A90,15 min}	
A2 8m from kerb	2023-02-03 08:26	70	57	Wind speed 0 m/s Noise environment dominated primarily by traffic noise along Boundary Road
A3 Residential area behind noise wall	2023-02-03 08:45	60	53	Wind speed 0-1 m/s Noise environment dominated primarily by traffic noise along Boundary Road

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3 ACOUSTIC CRITERIA

The following sub-sections detail the acoustic criteria that are applicable to the proposed development.

3.1 External Noise Intrusion Criteria

3.1.1 City of Melbourne Requirements

The site and its surrounds are located within the City of Melbourne. Standard D16 of the Melbourne Planning Scheme requires the following noise level objectives to be achieved for residential premises located within 300 metres of an industrial zone:

- Not greater than 35dB(A) for bedrooms, assessed as an LAeq,8h from 10pm to 6am.
- Not greater than 40dB(A) for living areas, assessed LAeq,16h from 6am to 10pm.

It is noted that there are no quantitative acoustic requirements in the Victoria Planning Provisions with respect to external noise intrusion for other development types. Given this, external noise intrusion criteria for the development will be formulated with reference to Australian Standard/New Zealand Standard AS/NZS 2107:2016 – Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors.

3.1.2 AS/NZS 2107:2016

AS/NZS 2107:2016 provides recommended internal noise criteria for different spaces depending on their intended use. This internal noise recommendations apply to steady or quasi-steady state noise source, including road traffic. The applicable internal noise criteria from the Standard that have been adopted for this development are presented in Table 3-1 below.

Table 3-1: AS/NZS 2107:2016 Internal Noise Level Recommendations

Type of Occupancy	Time of Day	Internal Noise Criteria dBA
Small retail stores (general)	When in use	< 50 LAeq
Supermarket	When in use	< 55 LAeq

3.1.3 Summarised Internal Noise Criteria

The internal noise criteria for all spaces within the development are summarised in Table 3-2.

Table 3-2: Internal Noise Criteria All Spaces

Type of Occupancy	Time of Day	Internal Noise Criteria dBA
Residential Living Spaces	6am to 10pm	≤40 LAeq
Residential Bedrooms	10pm to 6am	≤35 LAeq



Type of Occupancy	Time of Day	Internal Noise Criteria dBA
Small retail stores (general)	When in use	< 50 L _{Aeq}
Supermarket	When in use	< 55 L _{Aeq}

3.2 Noise Emission Criteria

3.2.1 Operation Noise Emissions – Mechanical Plant and Vehicle Noise

The Victorian environmental noise policy relating to industrial noise is Part I of the EPA's *Noise Limit and Protocol for the Control of Noise from Commercial, Industrial and Trades Premises and Entertainment Venues* (Noise Protocol). Noise emissions from plant, equipment, and vehicles on commercial and industrial properties are required to comply with the noise limits of Noise Protocol Part I.

The assessment of noise emissions under Noise Protocol Part I is based on the calculation of a noise limit at a receiver position, taking into account the land use in the surrounding area and the background noise level. Once a noise limit has been established, the noise emission is assessed.

The noise emission from the site, when corrected for duration and character, is referred to as the 'effective noise level'. The effective noise level (L_{eff}) is the adjusted L_{Aeq} of the noise source or sources measured over a 30-minute period. The predicted effective noise level is compared to the noise limit to determine if noise controls are required to comply with Noise Protocol Part I.

Noise Protocol Part I separates the day into three different time periods – day, evening and night as defined in the Environment Protection Regulations. These time periods are shown in **Table 3-3**.

Using the measured noise levels outlined in Table 2-3, operational noise limits for residences to the east across Boundary road are presented in

Table 3-4. Table 3-3: Noise Protocol Part I Time Periods

Period	Day of Week	Time Period
Day	Monday-Saturday (Except Public Holidays)	0700-1800hrs
Evening	Monday-Saturday	1800-2200hrs
	Sunday, Public Holidays	0700-2200hrs
Night	All	2200-0700hrs

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Table 3-4: Noise Protocol Part I Zoning Levels and Environmental Noise Emission Limits at Residences to the East

Location	Period	Day of Week	Start Time	End Time	Measured Background L _{A90} dB	Zoning Level dB	Background Relative to Zoning Level	Noise Limit L _{eff} dBA
A3	Day	Monday-Saturday	0700hrs	1800hrs	48	59	Low	58
	Evening	Monday-Saturday	1800hrs	2200hrs	47	52	Neutral	52
		Sunday, Public holidays	0700hrs	2200hrs				
	Night	All	2200hrs	0700hrs	41	47	Neutral	47

Noise Protocol Part I contains additional noise limits for emissions from emergency sources such as standby generators, standby boilers and fire pumps. For these plant items, the noise limit shall be increased by 10dB during the daytime period and by 5dB during all other periods. The limiting criteria for the proposed standby generator and any other emergency plant items are shown in Table 3-5.

Table 3-5: Noise Protocol Part I Environmental Noise Emission Limits – Emergency Plant

Period	Day of Week	Start Time	End Time	Noise Limit L _{eff} dBA
Day	Monday-Saturday	0700hrs	1800hrs	68
Evening	Monday-Saturday	1800hrs	2200hrs	57
	Sunday, Public holidays	0700hrs	2200hrs	
Night	All	2200hrs	0700hrs	52

3.2.2 Sleep Disturbance Criteria

There are no mandatory sleep disturbance criteria applicable in Victoria and so sleep disturbance criteria will be formulated with reference to the NSW EPA Noise Policy for Industry (NPfI) 2017. This Policy provides acoustic criteria for noise sources of short, transient noise events that may cause disturbance to sleep if occurring during the night time period (10pm – 7am).

The approach recommended by the NPfI is to apply the following initial screening noise level criteria:

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

The sleep disturbance screening noise levels apply outside bedroom windows during the night-time period. Where these levels are exceeded, a detailed maximum noise level event assessment should be undertaken according to the NSW EPA Road Noise Policy (RNP).

The sleep disturbance criteria of the NPI are summarised in Table 3-6.



Table 3-6: NPfl Sleep Disturbance Criteria

Receiver Location	Night-time Background Noise Level	Sleep Disturbance Screening Criteria
Residential Receivers on Boundary Road	41 L _{A90} , dBA	56 L _{Amax} , dBA

3.2.3 Operational Noise Emissions – Music Noise

The EPA’s Noise Protocol Part II document provides noise emission criteria for music noise generated by a development. Although the proposed uses of the commercial tenancies have not been determined at this early stage of the development, the music noise emission requirements of the Noise Protocol Part II have been provided in any case. The acoustic requirements would be applicable to any entertainment venue uses that are proposed to occupy the commercial tenancies of the development in the future. The music noise emission requirements of the Noise Protocol Part II for indoor venues are as follows:

- Day/Evening Periods: Background noise level (L_{A90}) + 5 dB(A)
- Night-Time Period: Background noise level in octave bands (L_{OCT90}) + 8 dB

Noise Protocol Part II separates the day into three different time periods – day, evening and night as defined in the Environment Protection Regulations. These time periods are shown in Table 3-7.

Table 3-7: Noise Protocol Part II Time Periods

Period	Day of Week	Time Period
Day and Evening	Monday-Saturday (Except Public Holidays)	0700-2300hrs
	Sunday, Public Holidays (other than if either is preceding a Public Holiday)	0900-2200hrs
	Sunday, Public Holidays (if either is preceding a Public Holiday)	0900-2300hrs
Night	Monday-Friday (Except Public Holidays or a day preceding a Public Holiday)	2300-0700hrs
	Saturday or any day preceding a Public Holiday	2300hrs-0900hrs
	Sunday, Public Holidays (if neither is preceding a Public Holiday)	2200hrs-0700hrs

Based on the attended and unattended noise measurements conducted on site, the music noise emission criteria for the development are summarised in Table 3-8 and Table 3-9.

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Table 3-8: Noise Protocol Part II Music Noise Emission Limits – Day/Evening Period

Period	Measured Background Noise Level L _{A90} dB	Music Noise Limit L _{eff} dB
Day	48	53
Evening	47	52

Table 3-9: Noise Protocol Part II Music Noise Emission Limits –Night-time Period

	Frequency							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	Total dBA
Measured Background Noise Level L _{A90} dB	45	42	39	37	38	33	23	41
Music Noise Limit L _{eff} dB	53	50	47	45	46	41	31	49

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4 EXTERNAL NOISE INTRUSION ASSESSMENT

4.1 Analysis

To assess external noise intrusion from major roads surrounding the site, a 3D model of the proposed development and the surrounding buildings and roadways was developed using Cadna/A, which is a commercially available software implementation of the ISO 9613 (ISO, 1994 and ISO, 1996) algorithms. Factors that are considered in the modelling are:

- equipment sound level emissions (in octave bands) and locations
- screening effects from buildings and barriers
- receiver locations
- ground topography
- noise attenuation due to geometric spreading
- ground absorption and atmospheric absorption

Noise modelling results were used to determine the internal noise levels within the development as a result of noise transmission through the building façade elements (glazing, external walls and roof/ceiling). This modelling considered the transmission loss performance of the façade elements, the surface area of each façade element exposed to external noise, and the expected absorption characteristics of the internal spaces due to room finishes.

4.2 Recommendations

Based on our analysis, the indicative weighted sound reduction index (R_w) performance for the building façade elements to achieve the internal noise criteria (summarised in Section 3.1) are presented in the sub-sections below. **These recommendations for the building façade should be reviewed at detailed design stage.**

4.2.1 Glazing and Glazed Doors

The minimum glazing performance for the development are presented in Table 4-1 below.

Glazing suppliers should 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.

Table 4-1: Recommended Minimum Acoustic Performance for Residential Apartment Glazing

Facade	Level	Room Type	Minimum Glazing Performance
Residential			
Macaulay Road	2-5	Studio Apartments	R_w 35
	2	Bedroom	R_w 31
	2-5	Living	R_w 31

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Facade	Level	Room Type	Minimum Glazing Performance
	6-11		R _w 29
Corner Boundary Road and Macaulay	2-6	Bedroom (glazing on two facades)	R _w 38
		Living (glazing on two facades)	R _w 35
Boundary Road	1-5	Bed (glazing on two facades)	R _w 38
	6-11		R _w 35
	1-5	Bed (glazing on single facade)	R _w 35
	6-11		R _w 31
	1-5	Living	R _w 35
	6-11		R _w 31
All other facades	All	All	R _w 29
Commercial (Ground Floor)			
Small retail stores (general)	Ground	All	R _w 29
Supermarket	Ground	All	R _w 29

Indicative sample glazing assemblies for each of the R_w ratings are noted below.

R_w 29 Glazing

- 6mm float glazing with continuous rubber acoustic seals (similar to Schlegel Q-Ion seals)

R_w 31 Glazing

- 6.38mm laminated glazing with continuous rubber acoustic seals (similar to Schlegel Q-Ion seals)

R_w 35 Glazing

- 10.38mm laminated glazing with continuous rubber acoustic seals (similar to Schlegel Q-Ion seals)

R_w 38 Glazing

- 12.5mm VLam Hush glazing with continuous rubber acoustic seals (similar to Schlegel Q-Ion seals)

4.2.2 External Walls

The proposed brick/concrete external walls will provide adequate acoustic isolation and will not require any additional acoustic treatment to meet the internal noise requirements.

Any lightweight external walls that are introduced into the design should be reviewed to confirm that the internal noise requirements will be met.



4.2.3 Roof/Ceiling

The proposed concrete roof 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.

Should lightweight roof/ceiling constructions be introduced into the design, a review should be conducted of the sound isolation performance of these constructions to ensure that the internal noise requirements are met.

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5 NOISE EMISSION ASSESSMENT

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

- Loading dock noise;
- Vehicle movements into/out of the basement car park;
- Mechanical plant noise.

Noise emissions from the identified noise sources listed above will be addressed in the following sub-sections. Modelling of noise emissions from the development has been conducted using Cadna/A noise prediction software, which is a commercially available software implementation of the ISO 9613 outdoor noise propagation algorithms

5.1 Vehicle Noise

This sub-section presents an assessment of potential noise impacts from the operation of the new internal road along the northern and western boundaries of the site, and the loading dock located on the ground floor near the north-western corner of the site.

5.1.1 Noise Modelling Procedure

Modelling of noise emissions from the loading dock has been undertaken based on the following:

- Based on information provided by the traffic consultant:
 - There will be at most one truck movement into and out of the loading dock via the Boundary Road entrance within a 30-minute period at any time of day;
 - The quantity of cars per half hour period is shown in Table 5-1. Evening and night-time traffic volumes have been estimated from provided peak hour volumes.

Table 5-1: Car Movements per Period

Road segment	Day	Evening	Night
East/West (from Boundary Road) up until carpark entry	214	123	107
North/South (from Macaulay Road) up until carpark entry	53	25	27

- Trucks will idle for no longer than a minute during the period of unloading or loading, and cut their engines for the remainder of the time they use the loading dock;
- Cars manoeuvring within the basement level carpark will be negligible and will have no appreciable contribution to noise impacts on surrounding receivers;
- All vehicles have been conservatively assumed to travel at 10 km/h.
- The sound power level (SWL) of vehicle sources are presented in Table 5-2:

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Table 5-2: SWL of Sources

Noise Source	Sound Power Level L_{Aeq} , dBA ¹
Truck Manoeuvring at 10km/hr	99
Truck Idling with Engine Running	96
Truck airbrake discharge	115 (instantaneous)
Car Manoeuvring at 10km/hr	85

Note 1: Sound power levels based on measurements conducted by RWDI.

5.1.2 Predicted Noise Levels

The potentially most affected residential receivers from vehicles accessing the site are the residences located to the east of the site across Boundary Road. If noise emissions from on-site vehicle movements are compliant at these receivers then they will be compliant at all other residential receivers in the vicinity of the site.

Noise emissions will be assessed against the requirements of the Noise Protocol Part I (refer to section 3.1.3)

The predicted noise levels from vehicles manoeuvring along the internal roadways within the development at the nearest receivers are presented in Table 5-3.

Table 5-3: Predicted Noise Levels from internal roads and loading dock

Receiver Location	Predicted Noise Level $L_{Aeq, 30min}$	Noise Criteria $L_{Aeq, 30min}$	Complies
Residences to East	44	Day – 58	Yes
	42	Evening – 52	Yes
	42	Night – 47	Yes

Our analysis indicates that noise emissions from internal roads will comply with the noise emission requirements.

5.1.3 Sleep Disturbance Assessment

The worst case noise emission for L_{Amax} assessments is assumed to be truck airbrake discharge at the loading dock, if deliveries are to occur during the night-time period. Due to building shielding between this point and the residential receivers, an assessment was also conducted of a truck entering the site off Boundary Road, travelling at 10 km/h. Sound power levels for both events are presented in Table 5-2.

The predicted noise levels at the residential receivers to the east across Boundary Road during the night-time are presented in Table 5-4.

Noise emissions will be assessed against the sleep disturbance criteria of the NSW EPA NPI (refer to section 3.2.2). Vehicle noise emissions will be assessed outside the windows of nearest residential receivers.



Table 5-4: Predicted Noise Levels from the On-Site Vehicle Movements During Night-time Period

Receiver Location	Source	Predicted Noise Level dBA	Noise Criteria dBA	Complies with Screening Criteria
Residences to East	Airbrake at loading dock	42 L _{AMax}	56 L _{AMax}	Yes
	Truck entering site	60 L _{AMax}	56 L _{AMax}	No

Our assessment indicates that noise from truck air braking will not exceed sleep disturbance criteria at the nearest external residences, however any trucks accessing the new road via boundary road have the potential to cause exceedances to the NPfl criteria, requiring a maximum noise level event assessment according to the NSW EPA Road Noise Policy (RNP).

The RNP specifies that “maximum internal noise levels below 50–55 dBA are unlikely to awaken people from sleep”. Assuming a minimum façade transmission loss of 10 dB, as recommended by standard practise in the NSW Infrastructure SEPP for premises with open windows, internal noise levels are unlikely to exceed this threshold, making significant sleep disturbance impacts unlikely.

5.2 Mechanical Plant

At this stage, selections of specific mechanical equipment and the location of the equipment have not been finalised. Assessment of mechanical plant noise emissions should be conducted at detailed design stage once the mechanical design has been finalised.

Noise from the development’s mechanical plant is expected to be able to be designed to comply with the noise emission requirements of the Noise Protocol I through the implementation of standard noise mitigation treatments (e.g. in-duct insulation, silencers, acoustic screens and louvres).

5.3 Recommendations

To reduce noise impacts on surrounding receivers, it is recommended that trucks all trucks using the loading dock turn off their engines while making deliveries.

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6 CONCLUSION

This report has presented noise impacts associated with the proposed mixed-use development to be located at 218-246 Macaulay Road, North Melbourne.

External noise intrusion from traffic noise into the development has been assessed against the requirements of Standard D16 of the Melbourne Planning Scheme and AS/NZS 2017:2016. Recommendations for building façade construction have been presented in section 4.2 to ensure that internal noise levels within the development comply with the nominated criteria.

In addition, noise emissions from the development's loading dock, and vehicle movements along the new internal roads within the development have been assessed against the requirements of the Victoria EPA's Noise Protocol I as well as the sleep disturbance criteria of the NSW EPA NPfl. Noise emissions have been modelled using Cadna/A software and the results of the assessment are presented in section 5.1. The modelling indicates that noise emissions from the development will comply with the Noise Protocol Part I acoustic criteria.

Neither truck air braking nor truck entry to the site via Boundary Road are anticipated to exceed internal noise levels which typically give rise to sleep disturbance.

At this stage, selections of specific mechanical equipment and the location of the equipment have not been finalised. Assessment of mechanical plant noise emissions should be conducted at detailed design stage once the mechanical design has been finalised.

Please do not hesitate to contact us if you have any questions regarding this report.

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7 STATEMENT OF LIMITATIONS

This report entitled 218-246 Macaulay Road was prepared by RWDI Australia Pty Ltd (“RWDI”) for The Brott Group (“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.

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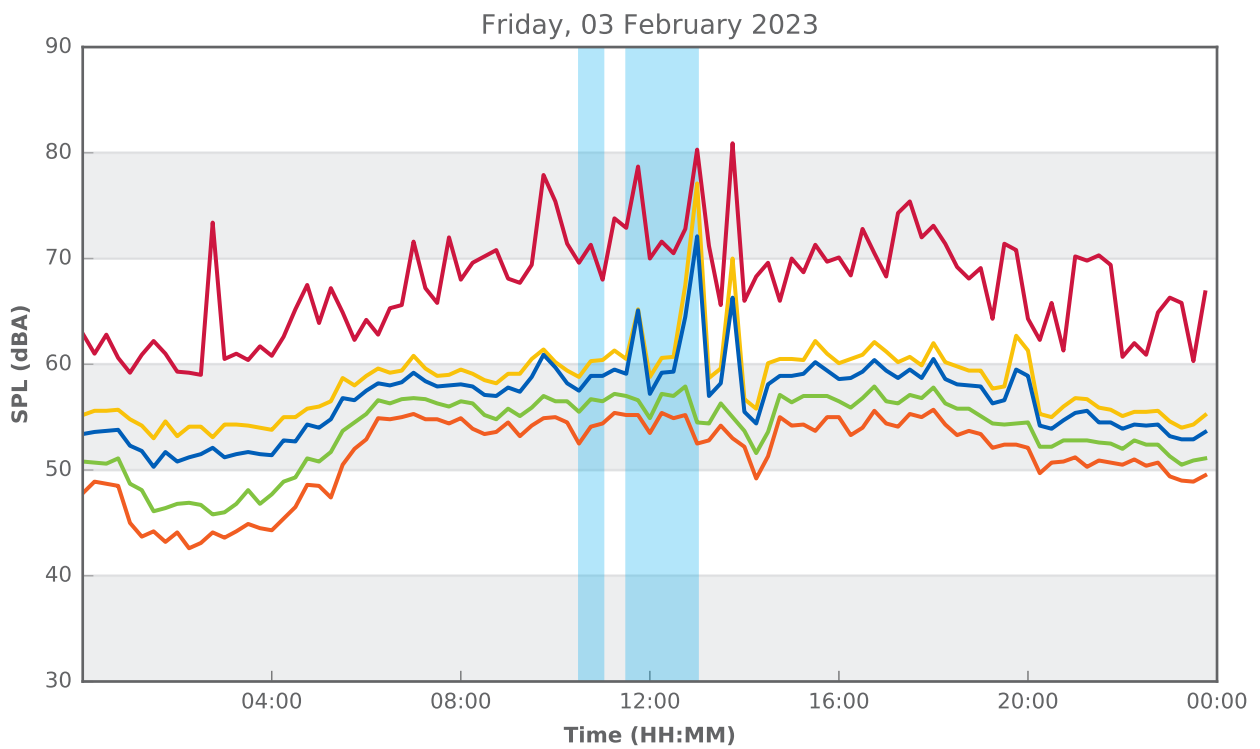
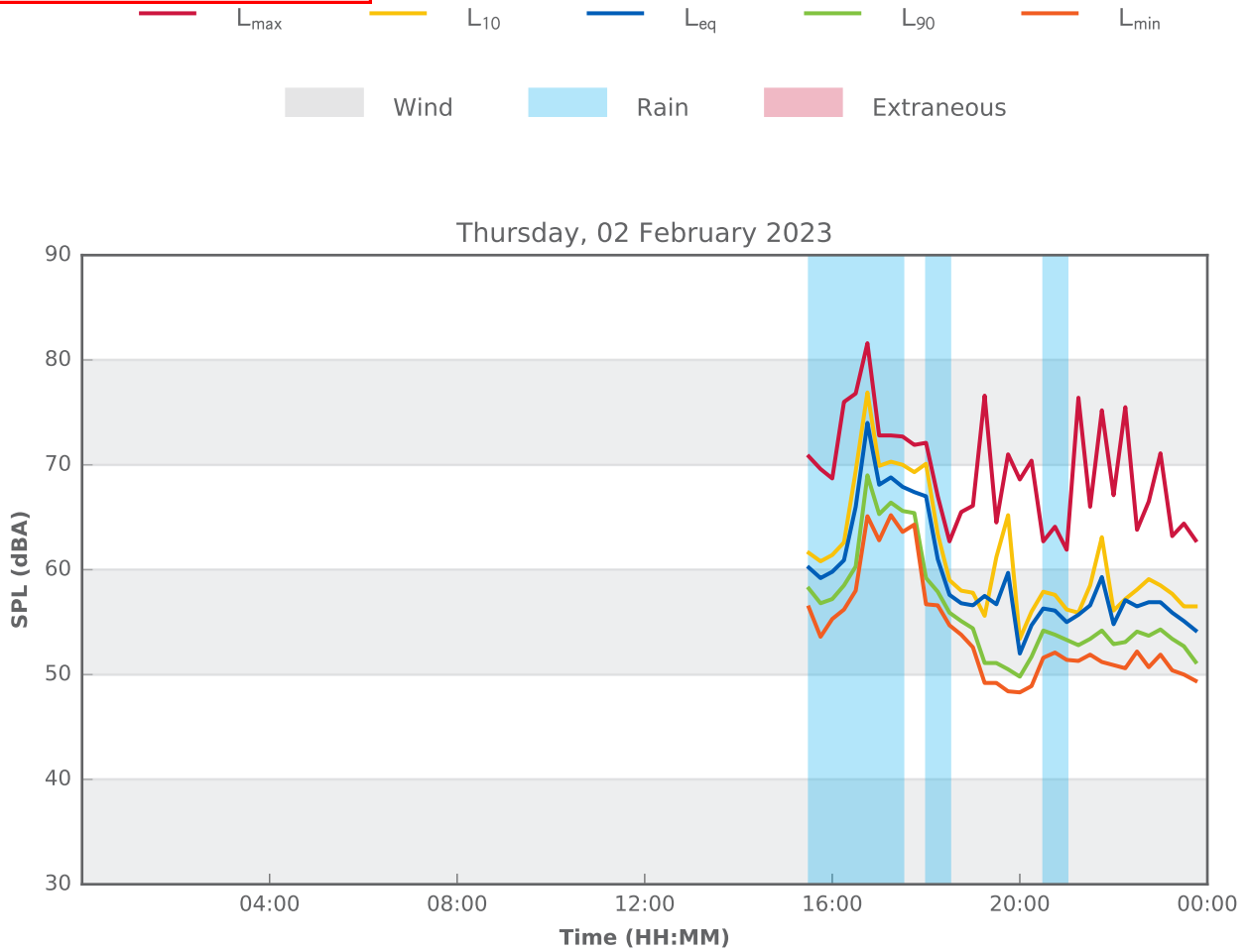
APPENDIX A

UNATTENDED NOISE MONITORING GRAPHS

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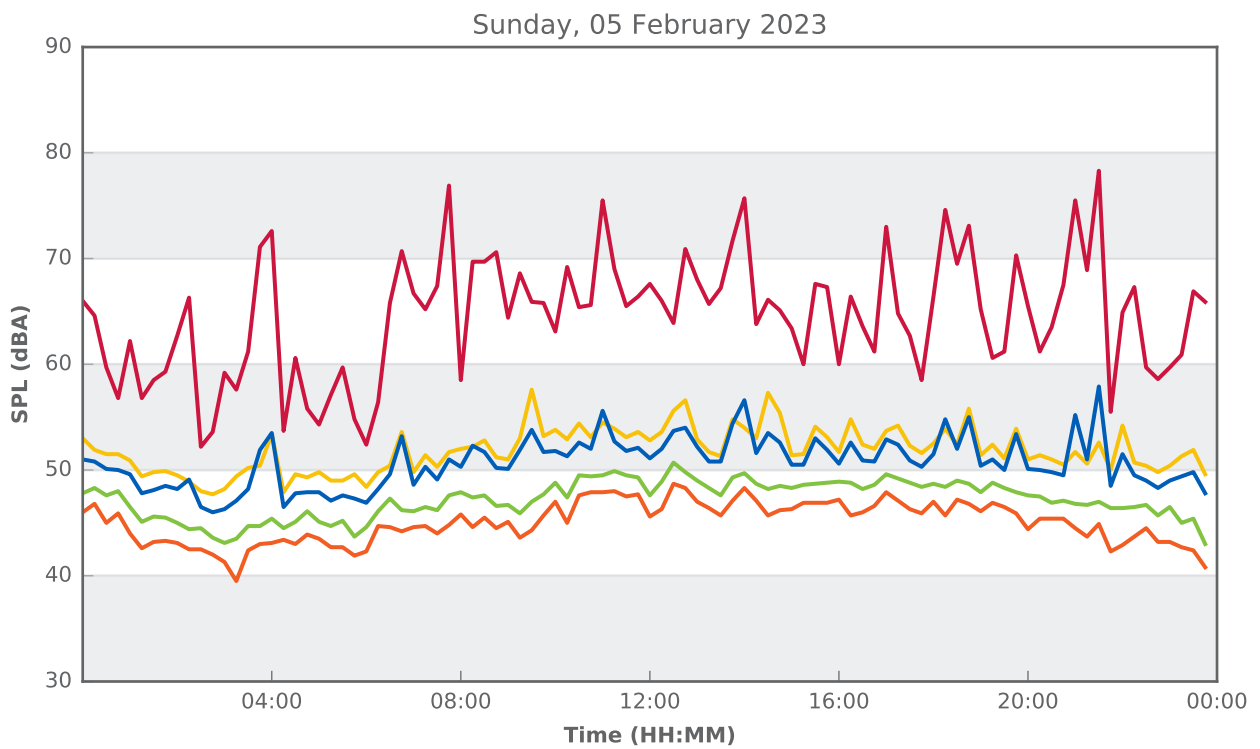
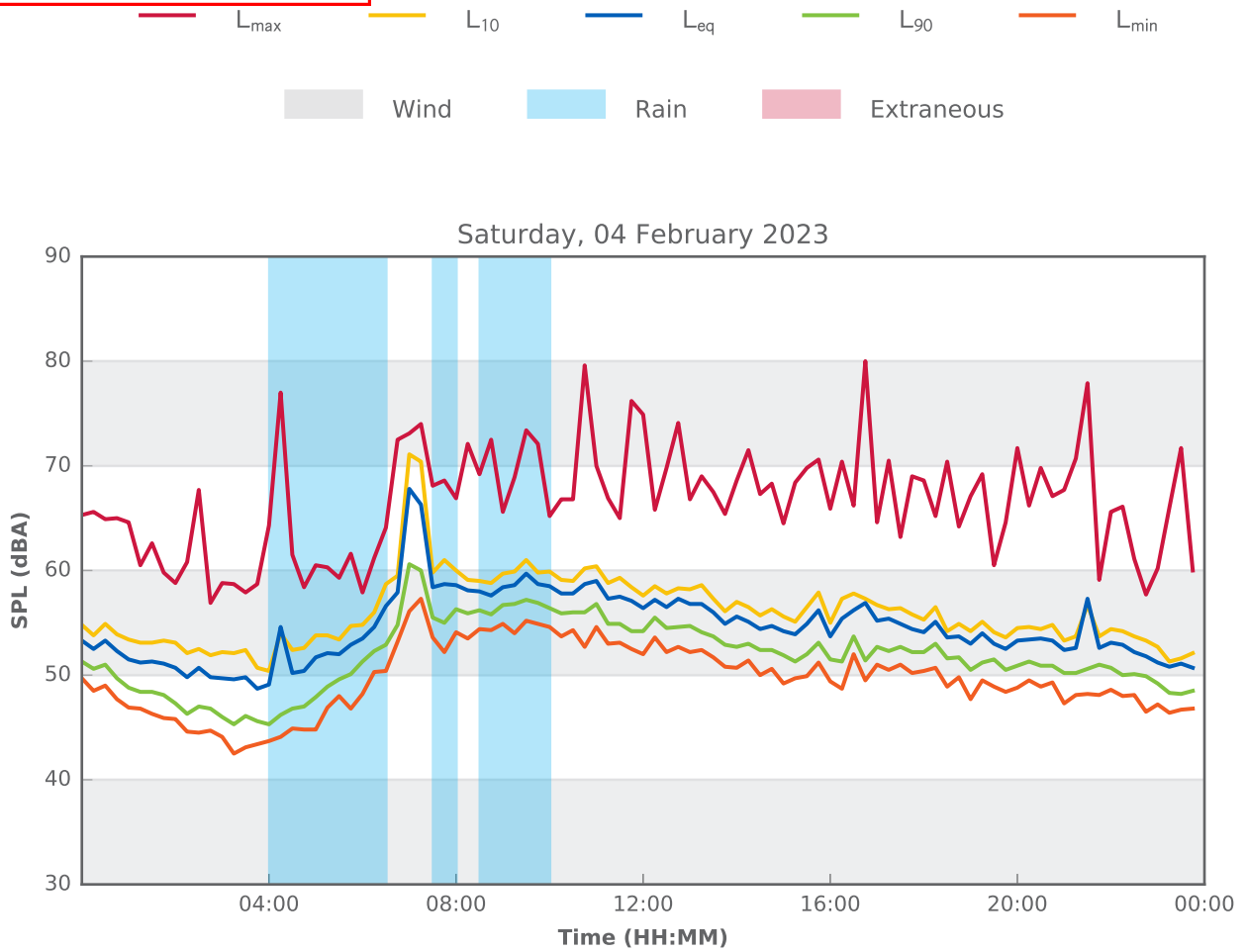
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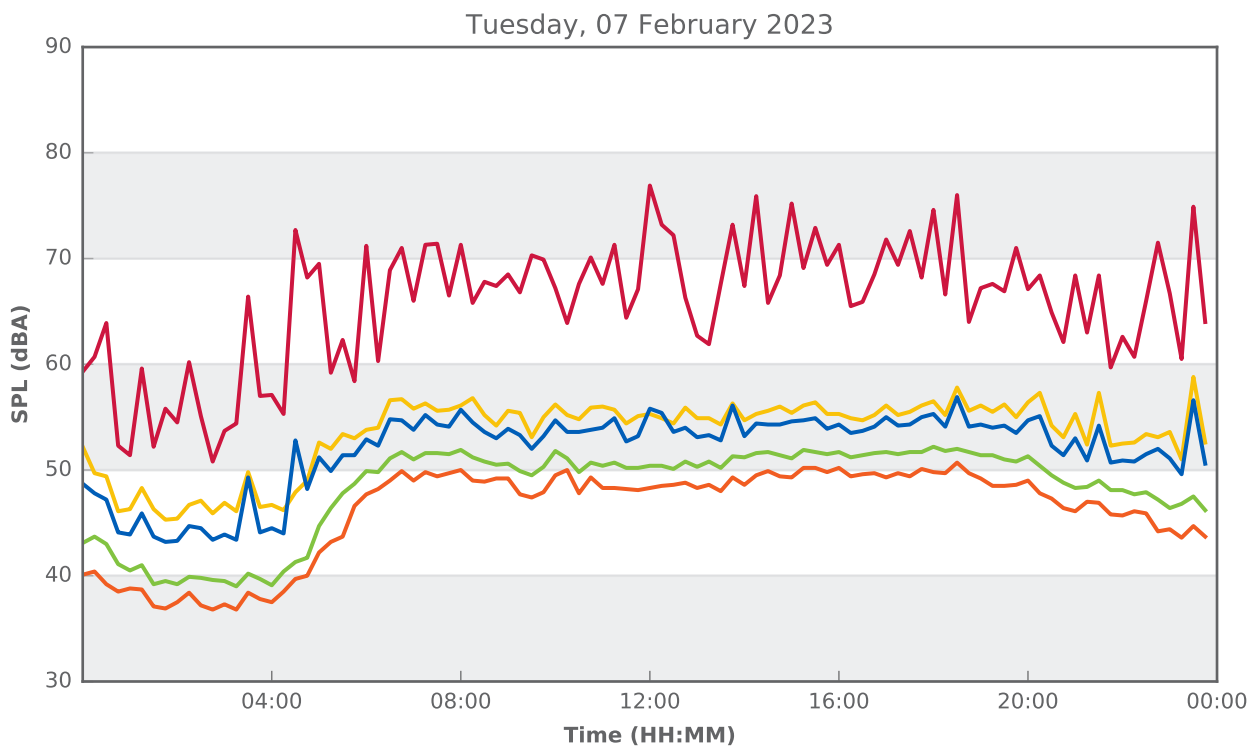
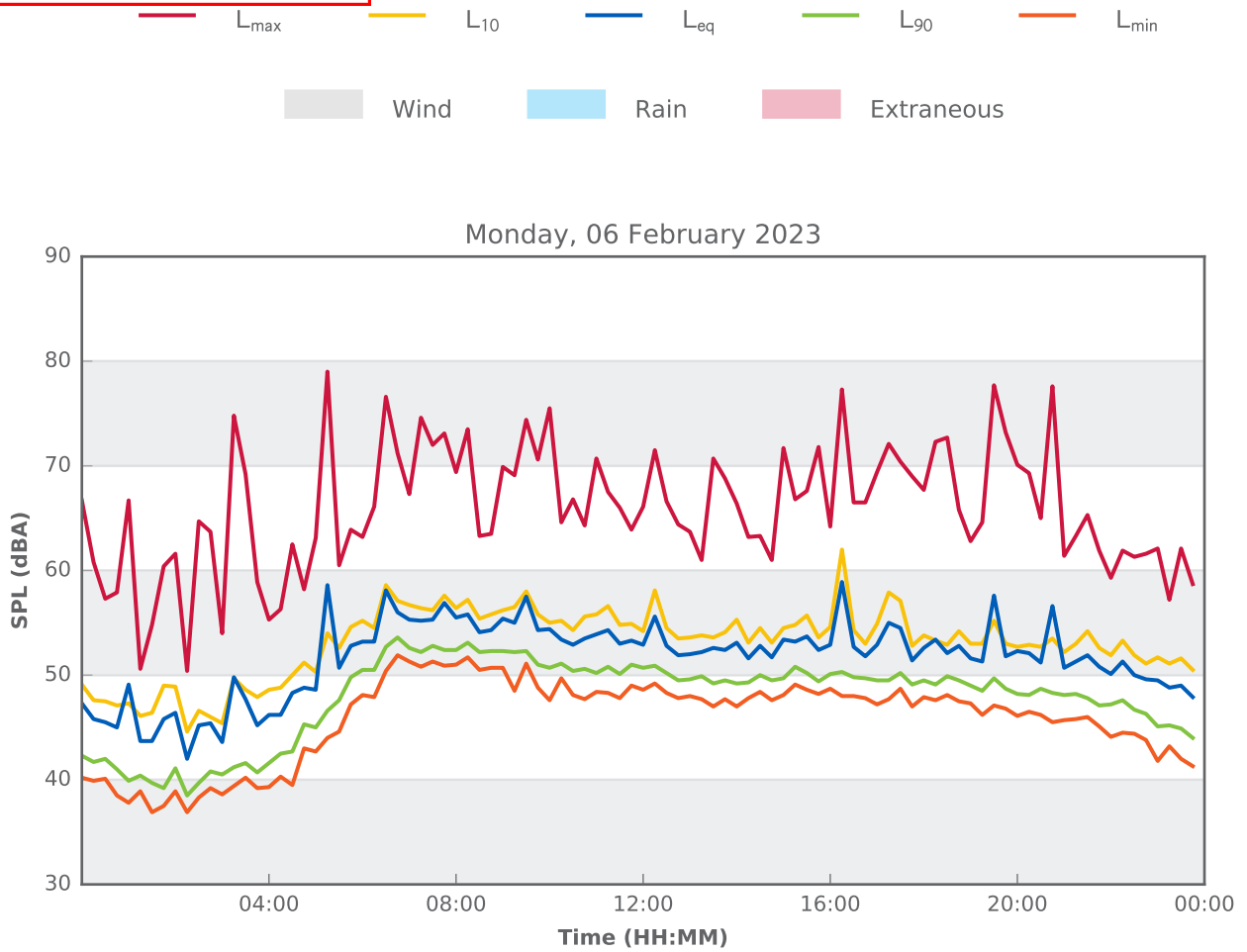
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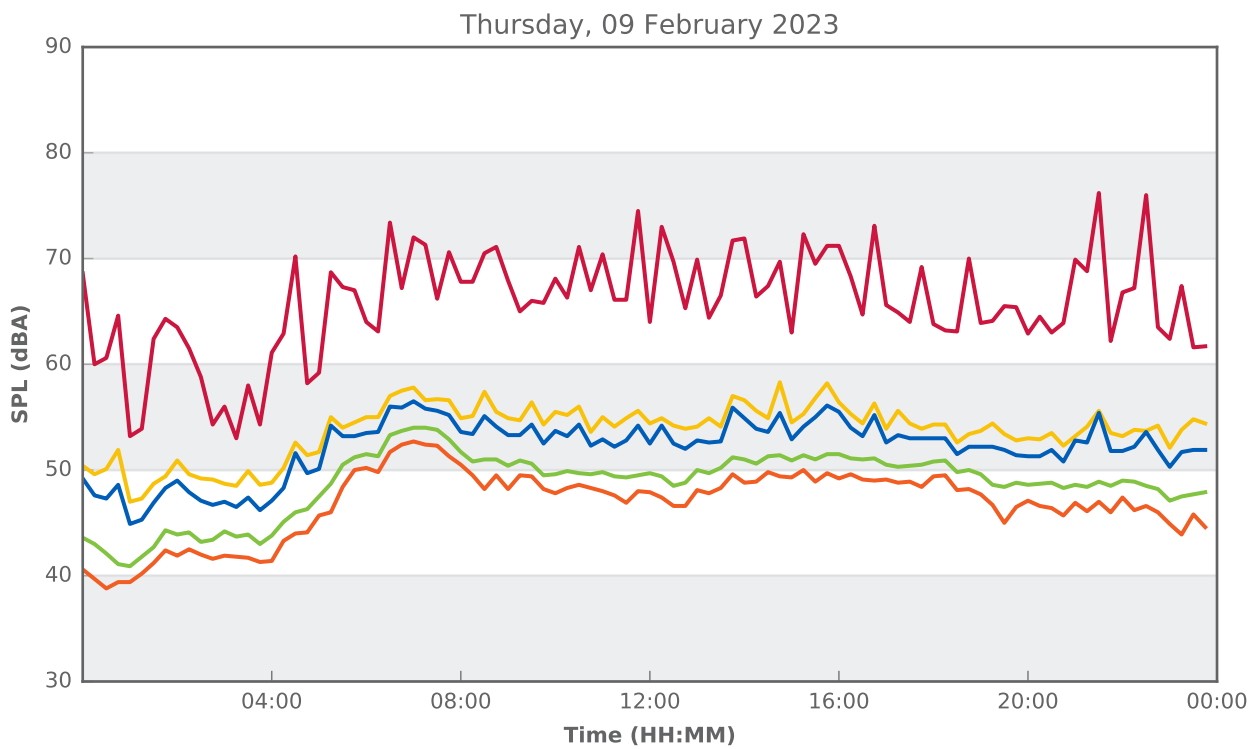
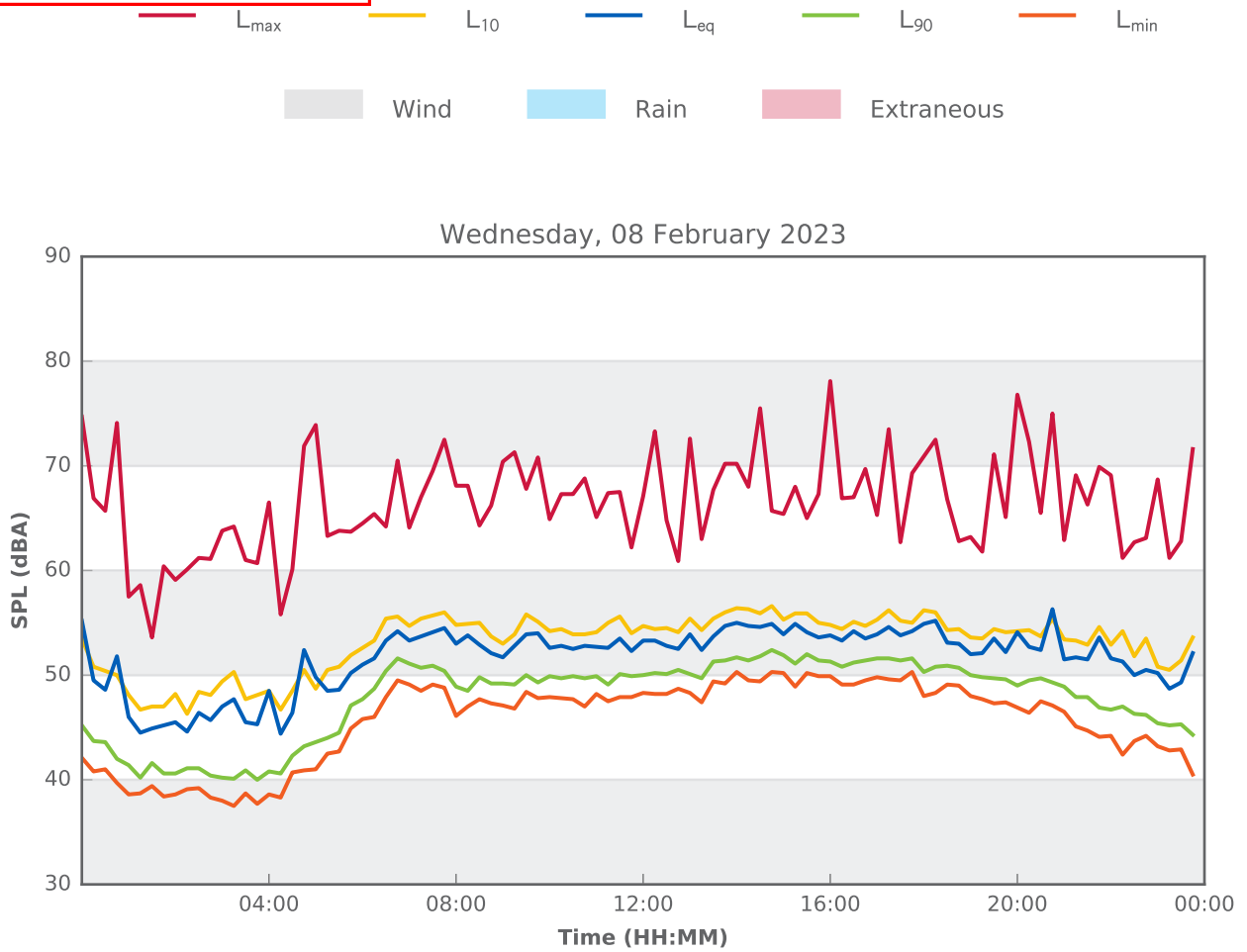
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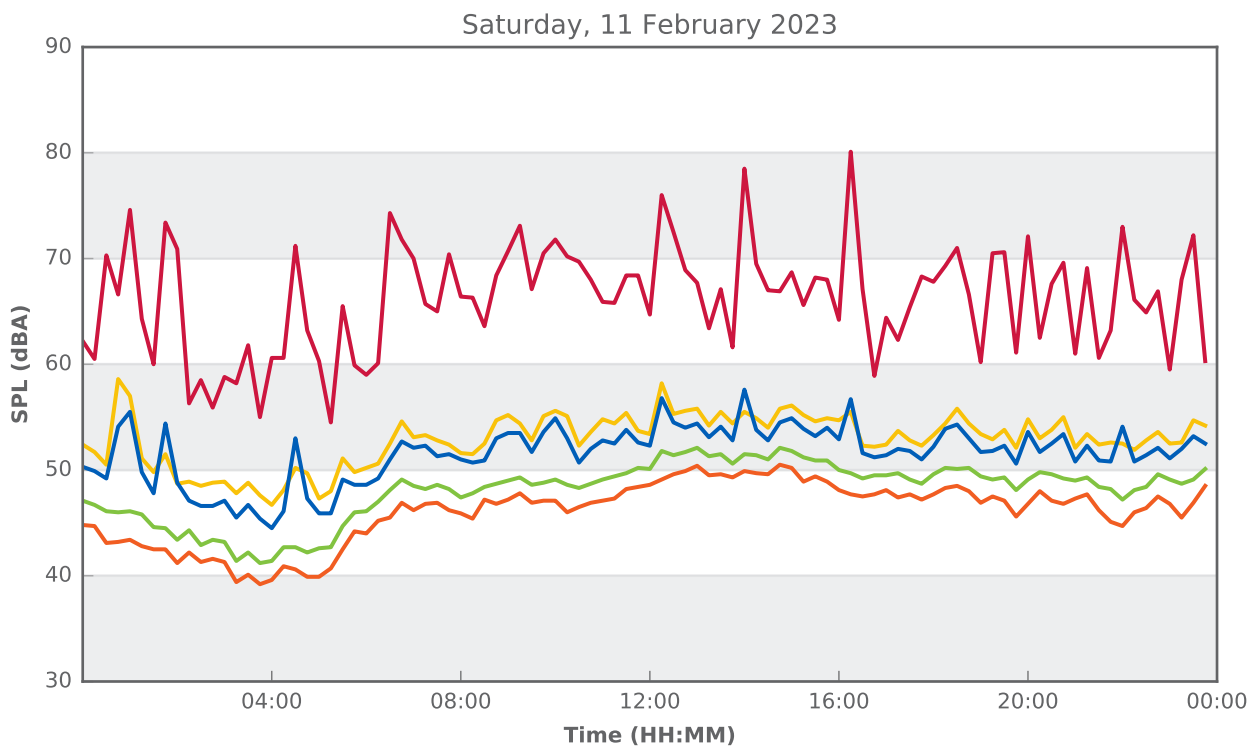
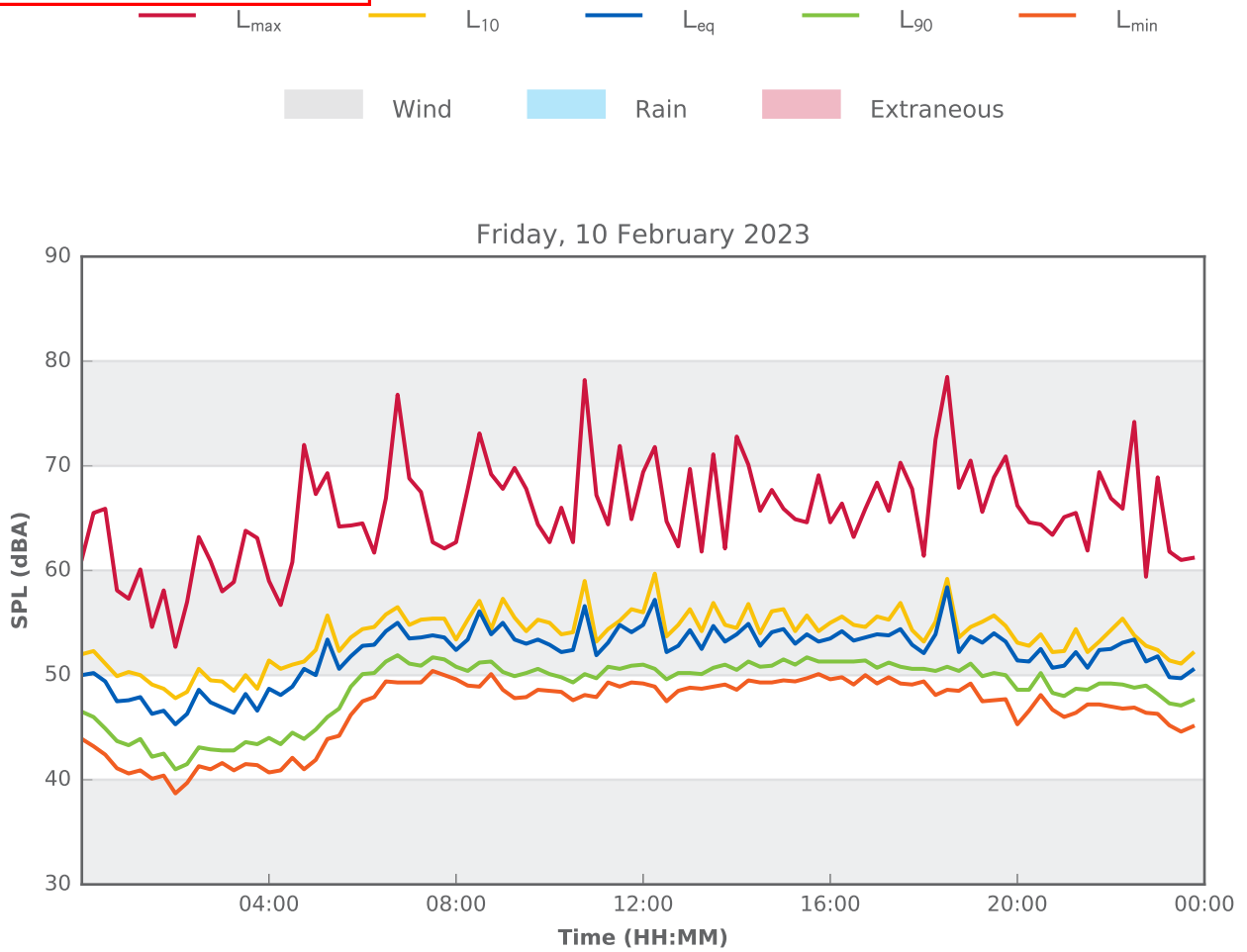
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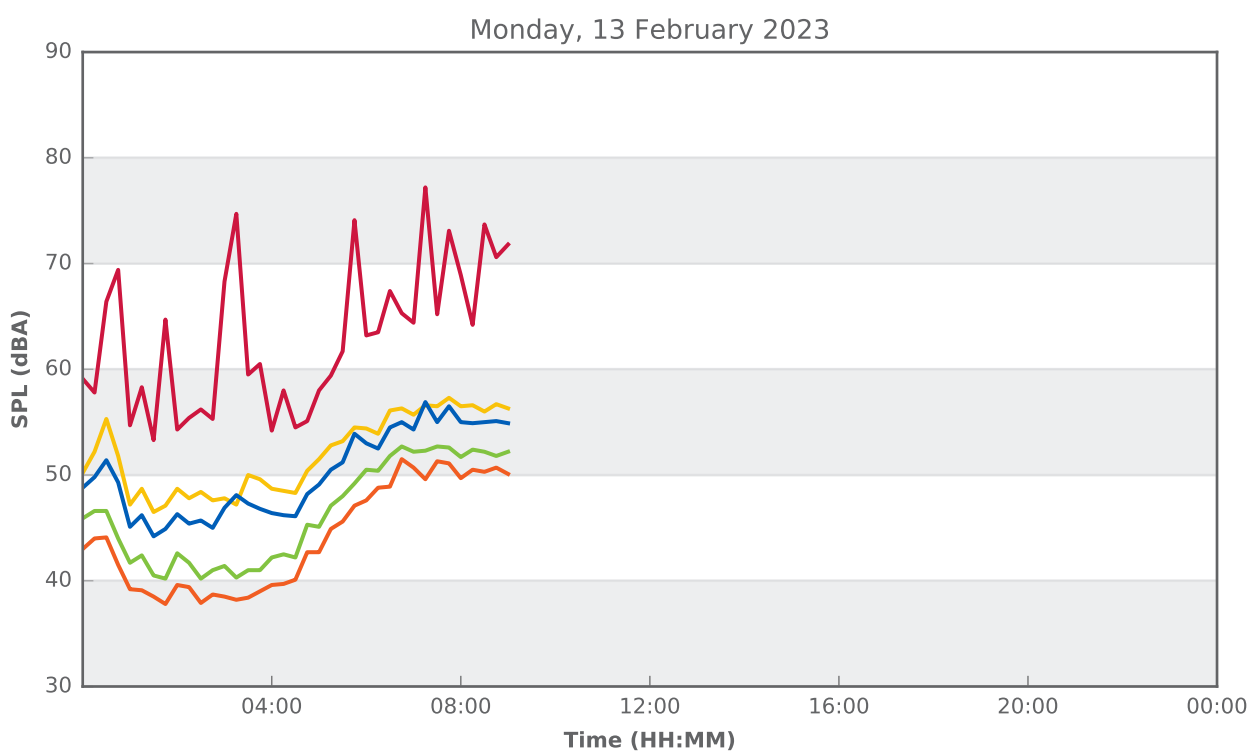
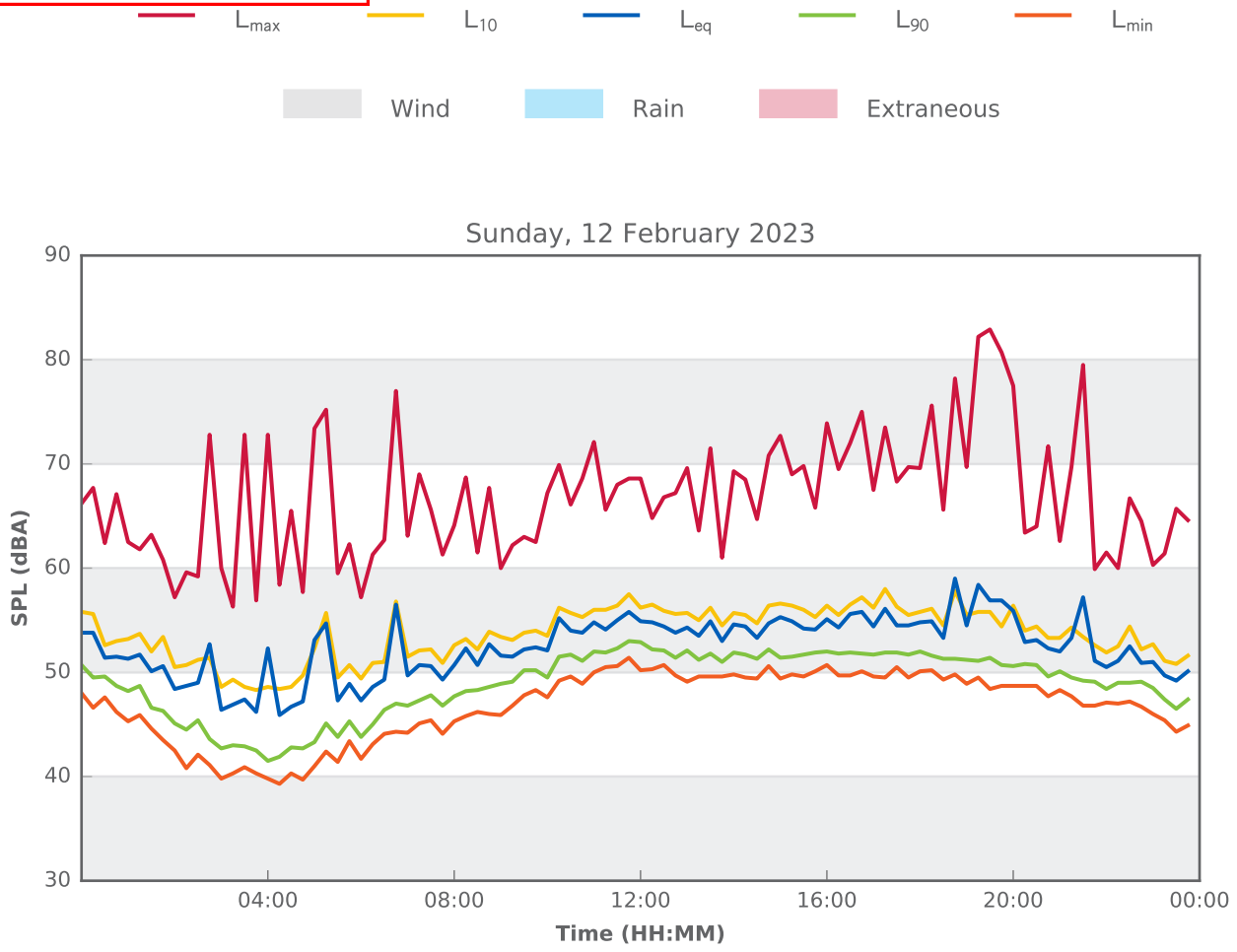
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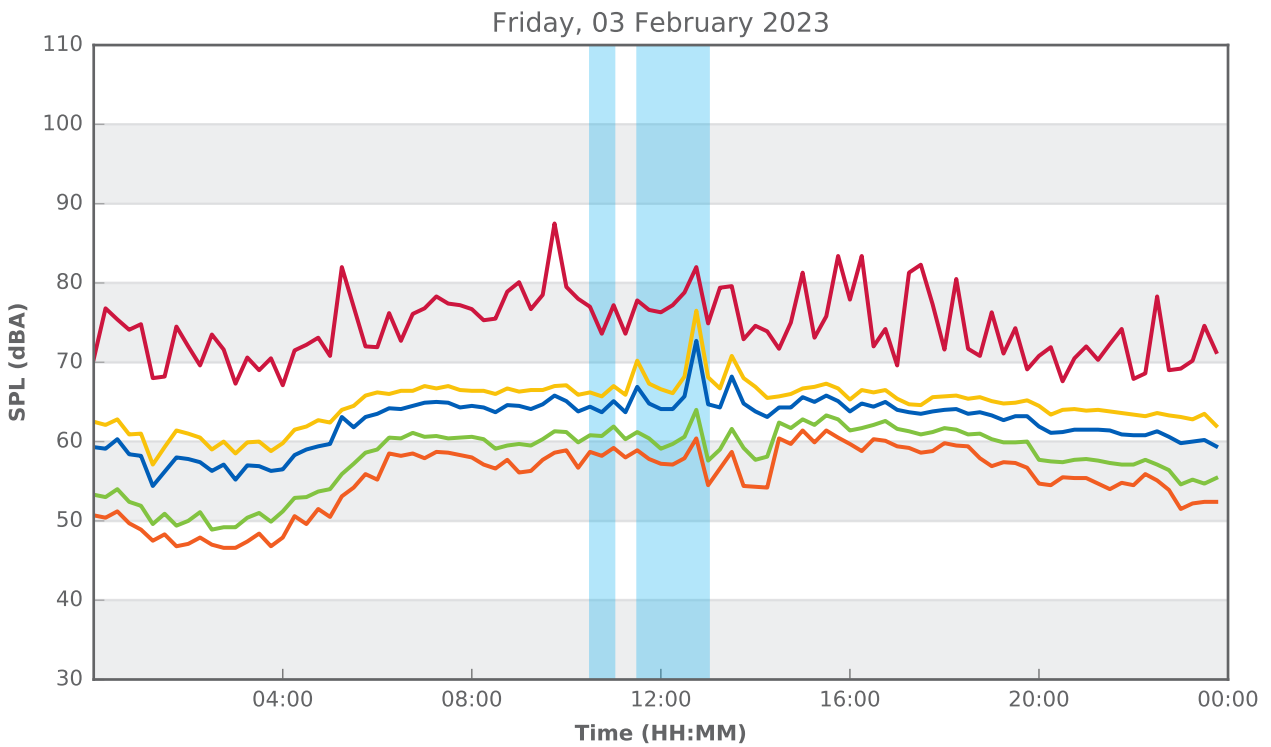
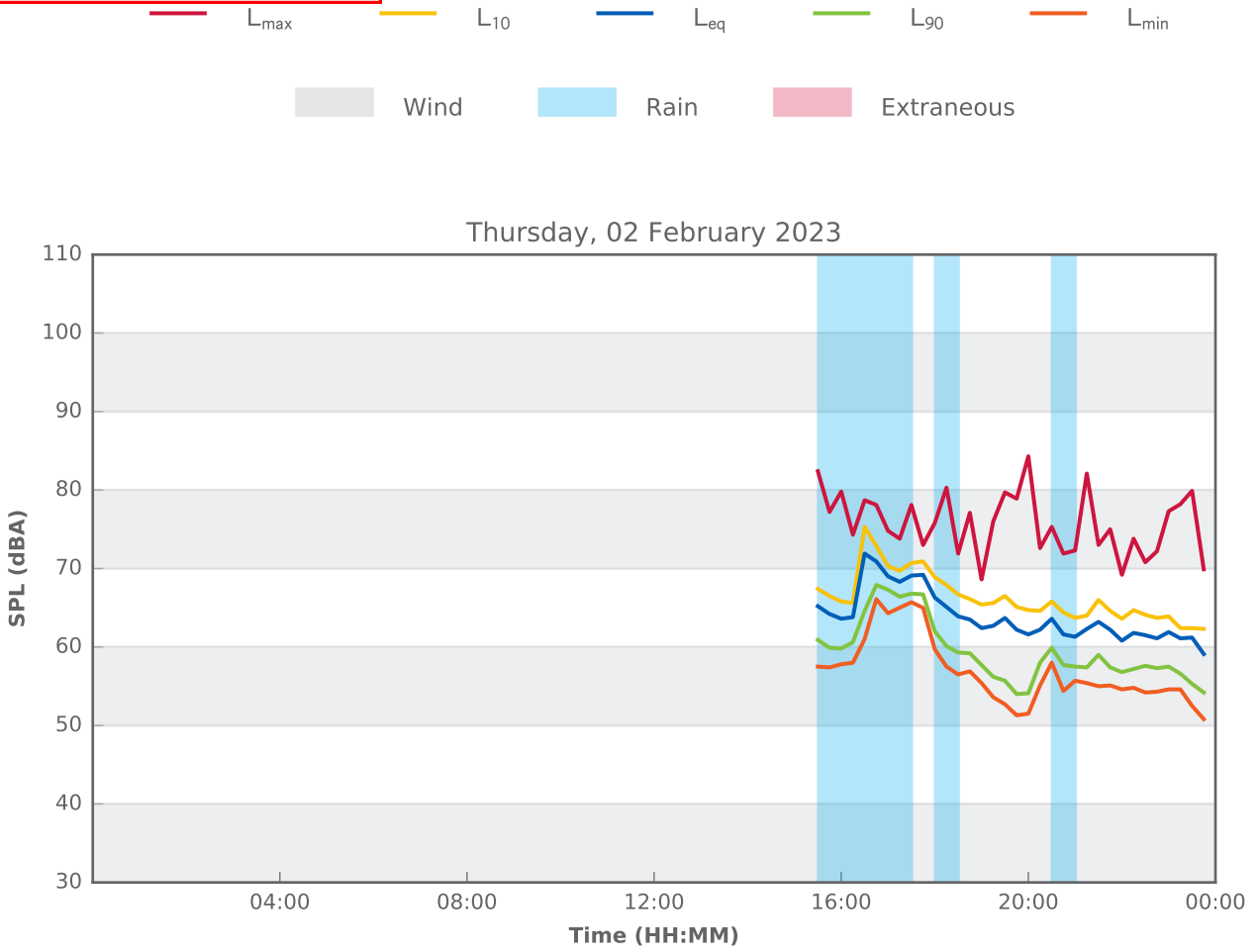
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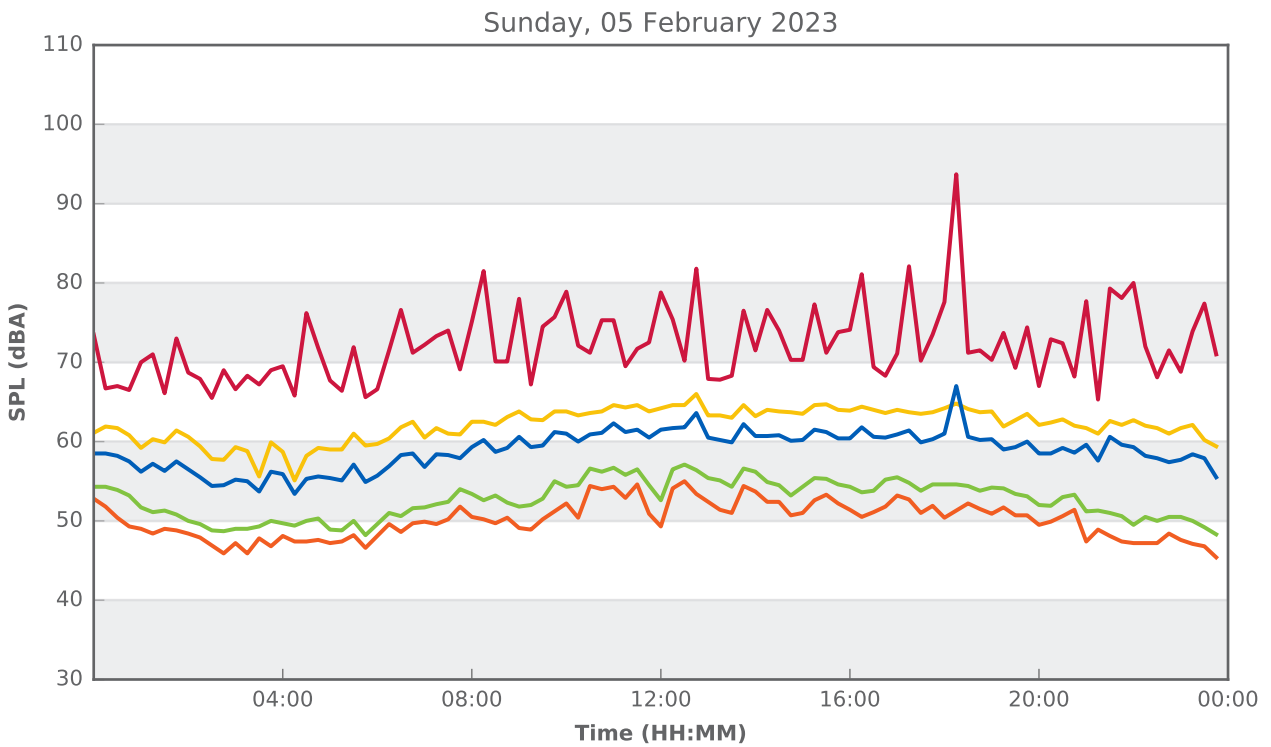
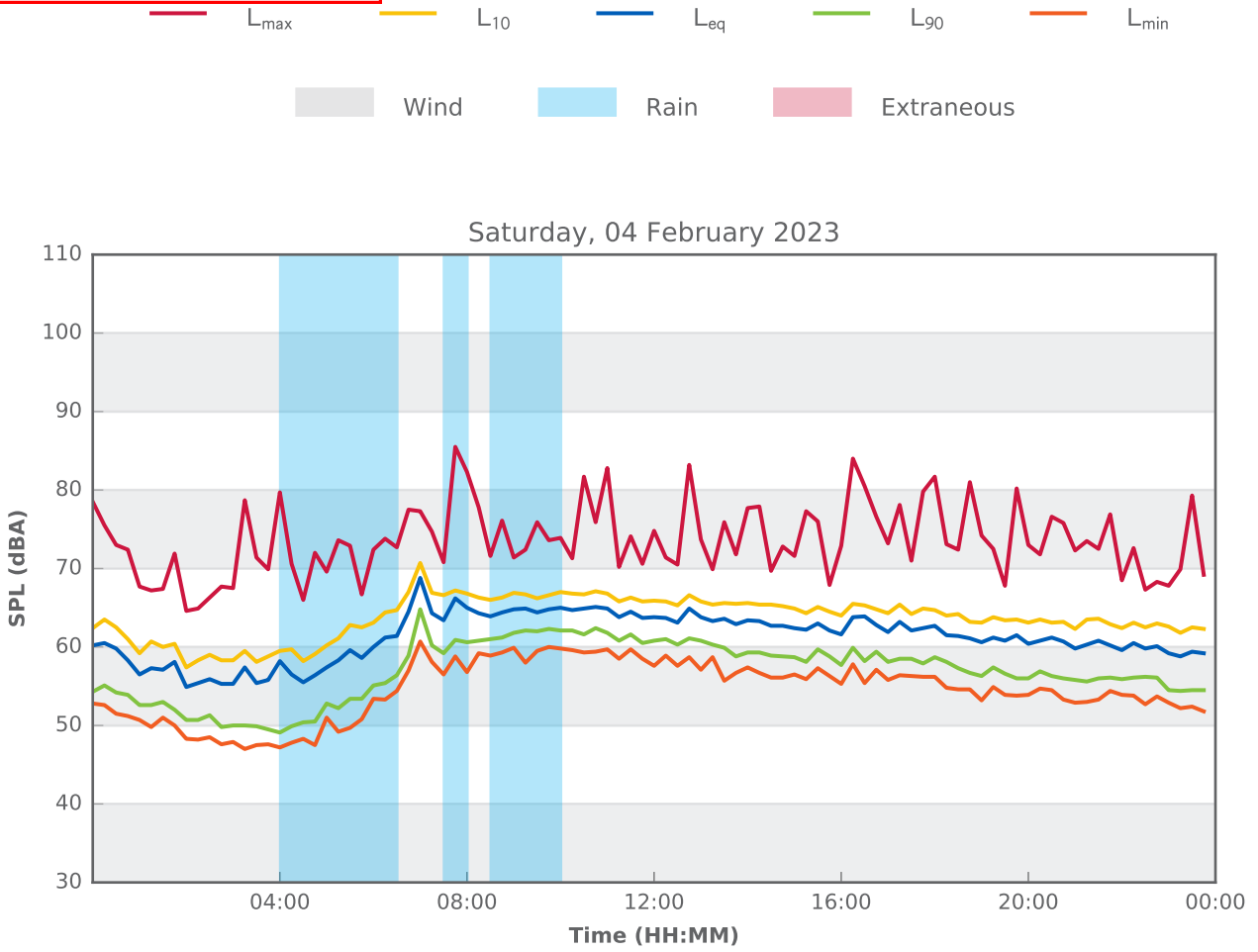
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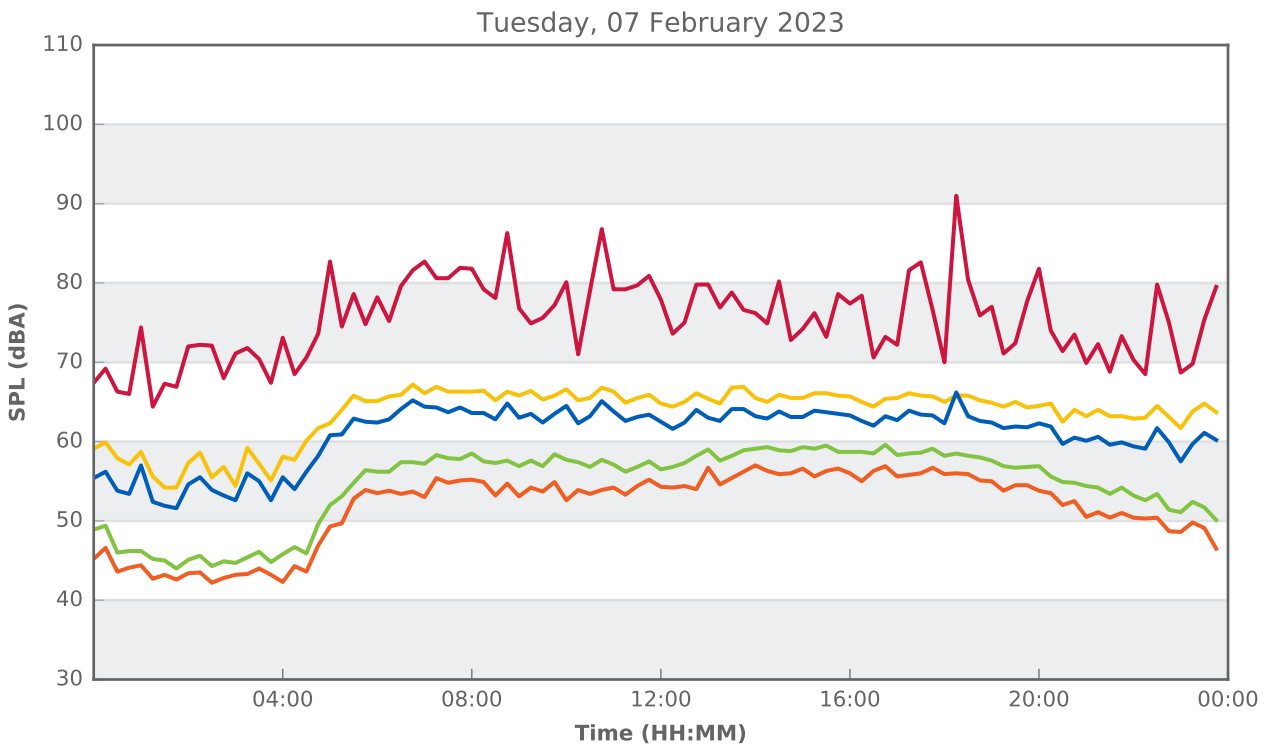
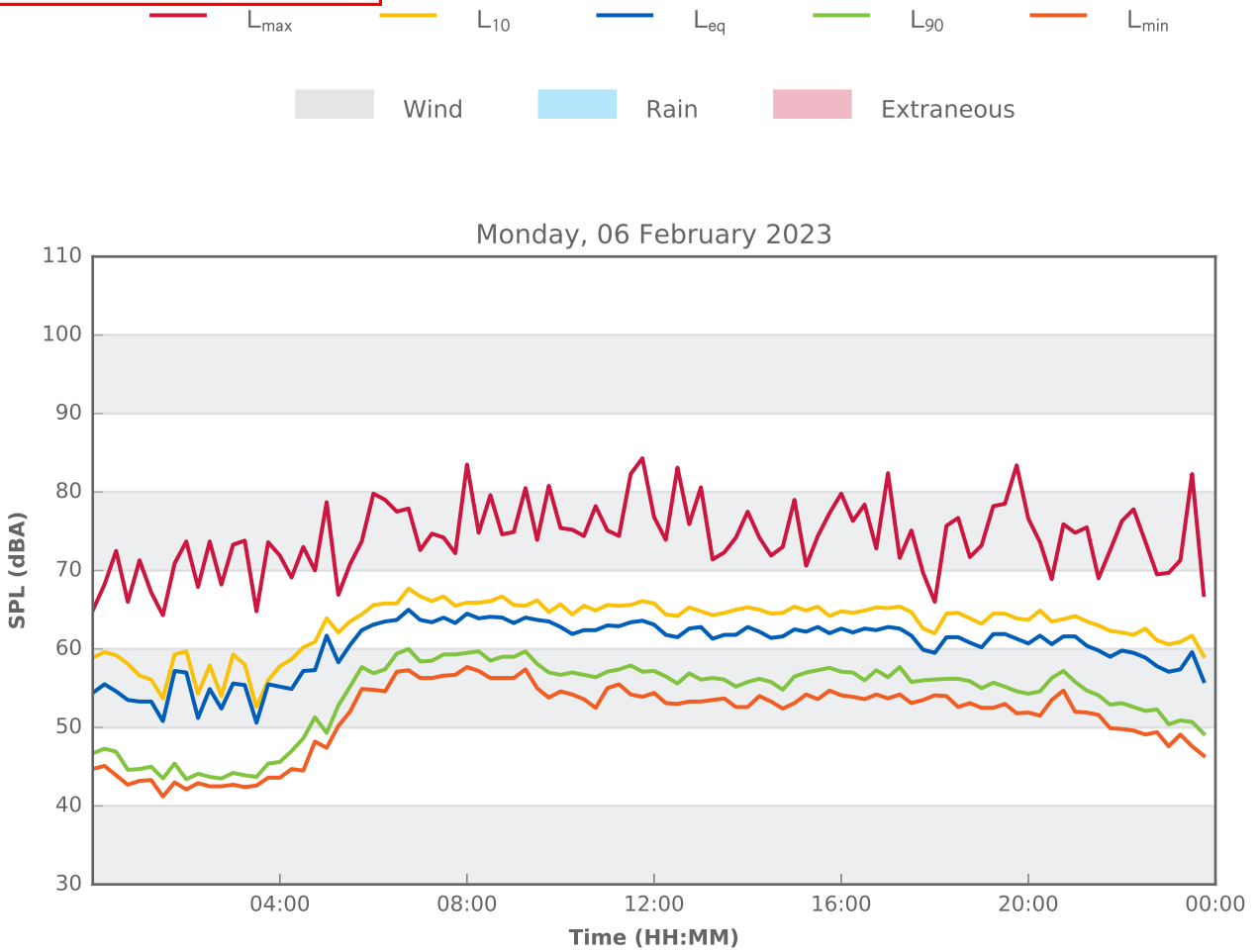
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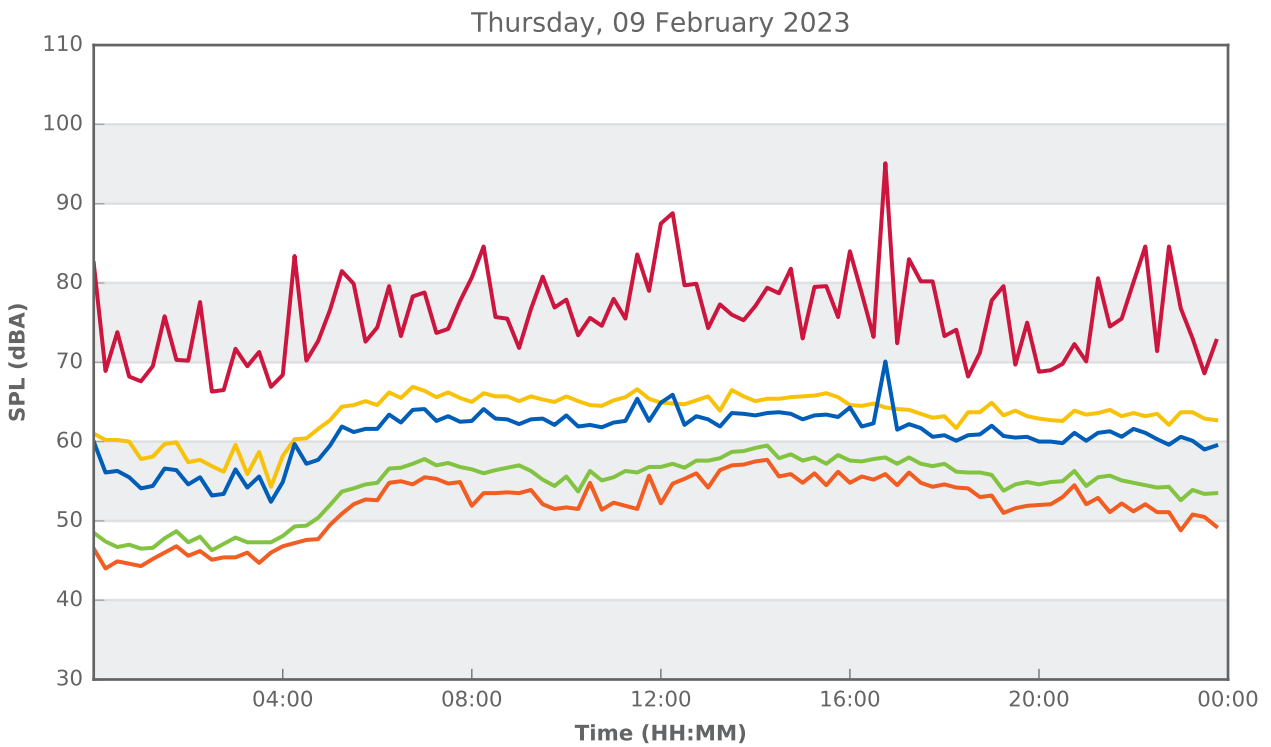
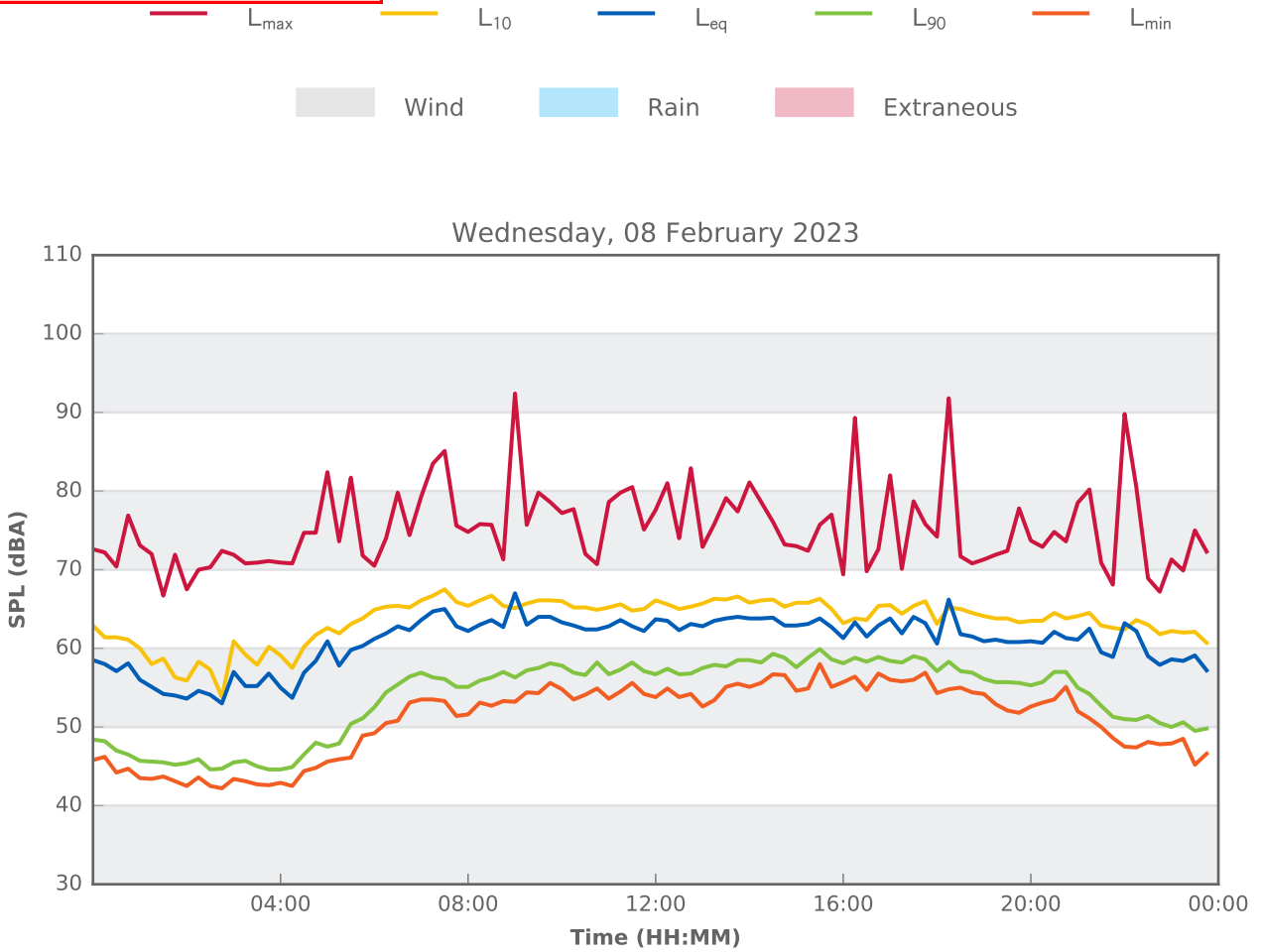
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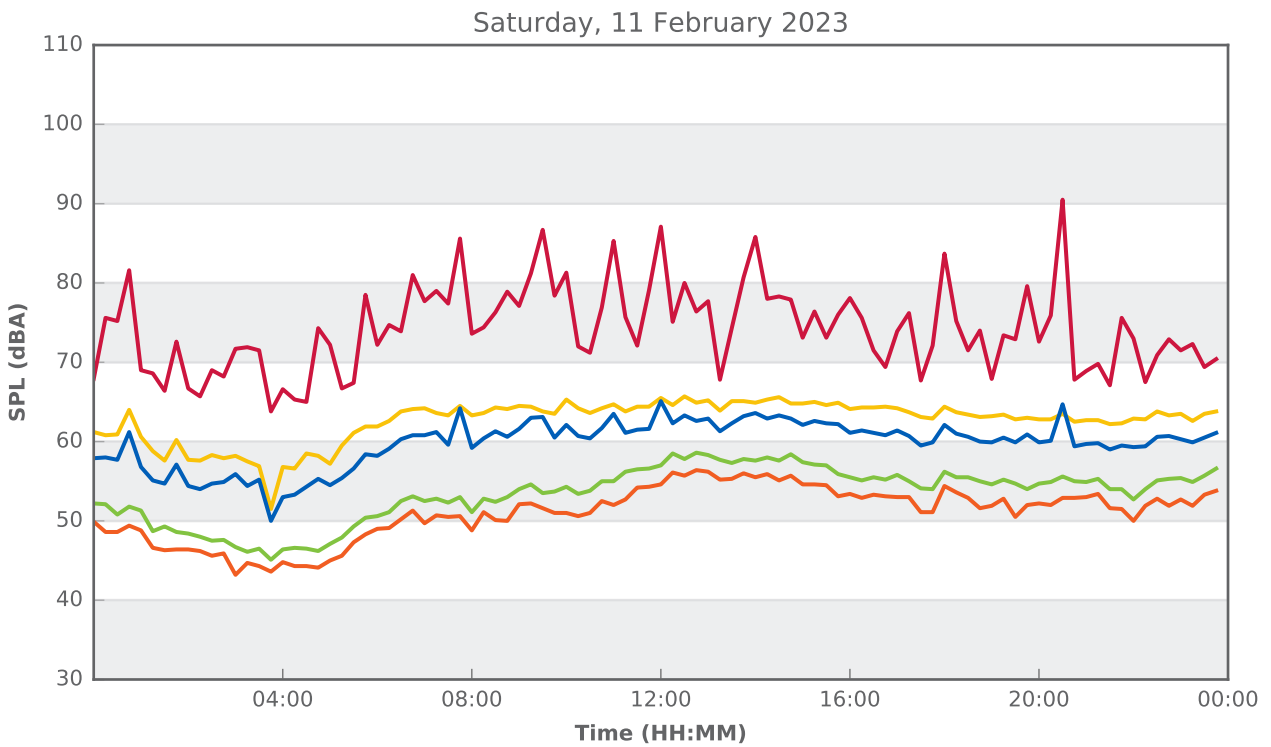
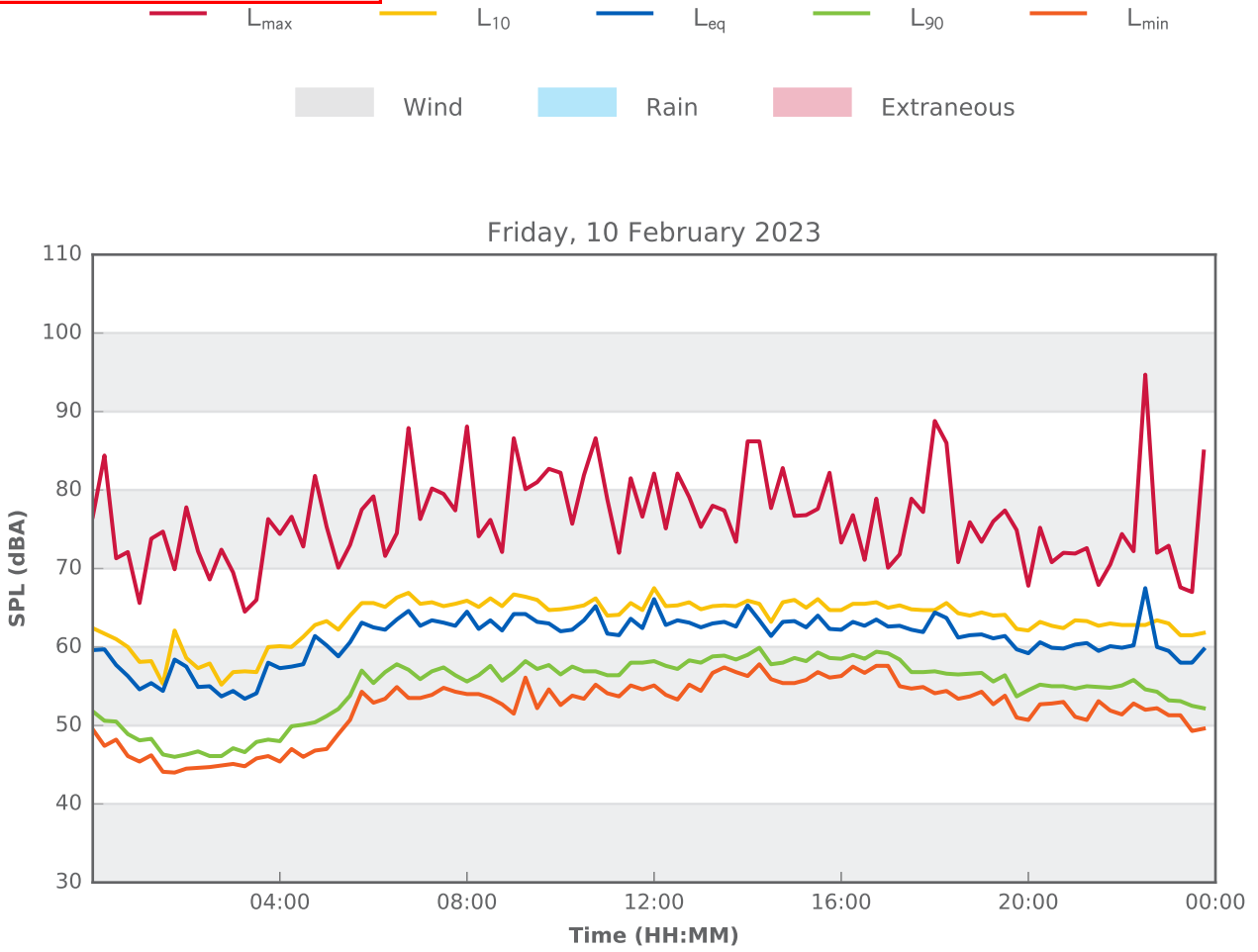
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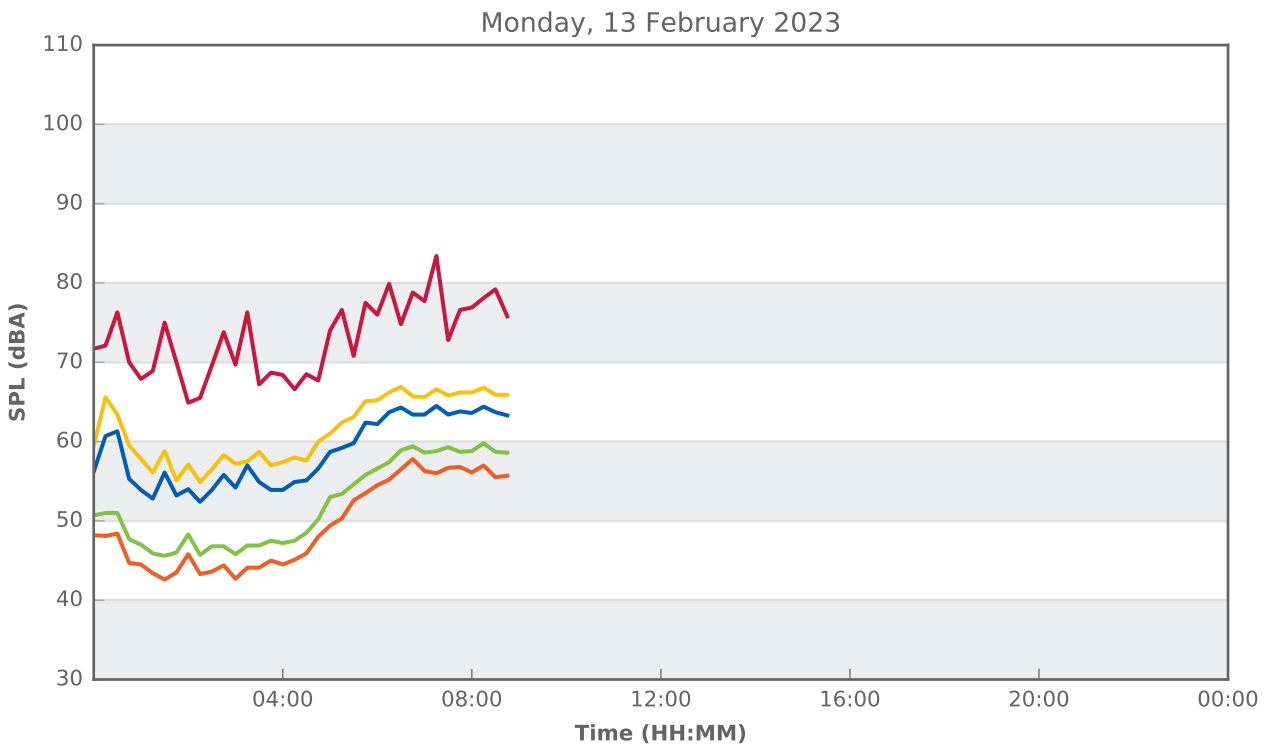
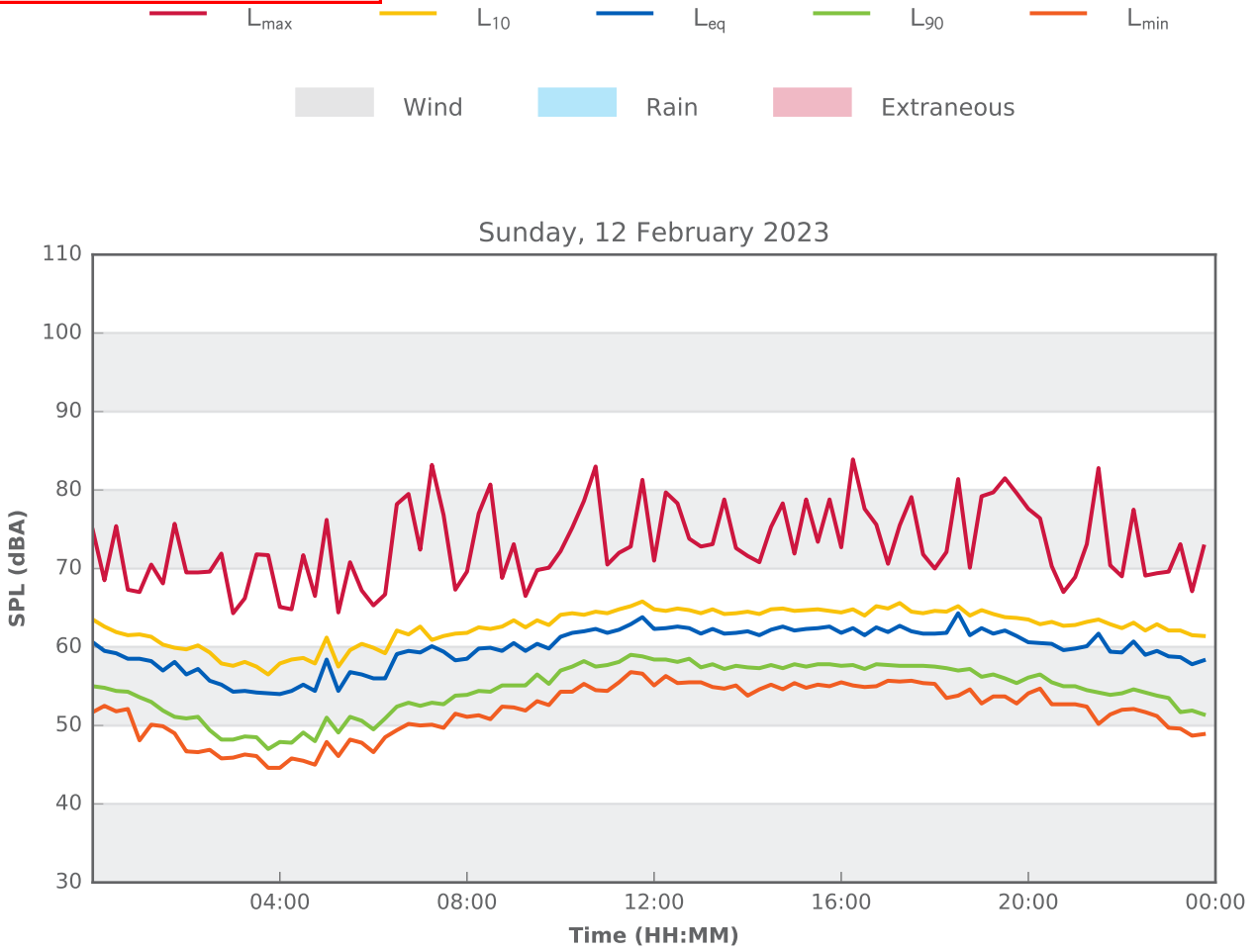
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