MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

46-52 Nicholson Street and 59-67 Christie Street, St Leonards

SSDA Noise and Vibration Impact Assessment

SYDNEY
9 Sarah St
MASCOT NSW 2020
(02) 8339 8000

ABN 98 145 324 714
www.acousticlogic.com.au

Project ID	20241388.1
Document Title	SSDA Noise and Vibration Impact Assessment
Attention To	Coronation Property Co Pty Ltd

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	3/02/2025	20241388.1/0302A/R0/ANP	ANP	SN	SN
1	26/08/2025	20241388.1/2608A/R1/ANP	ANP		WY
2	15/10/2025	20241388.1/1510A/R2/ANP	ANP		WY

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1 INTRODUCTION

A noise and vibration impact assessment has been prepared on behalf of the applicant for the proposed residential development to be located at 46-52 Nicholson Street and 59-67 Christie Street, St Leonards. The proposed development is described within Section 3 of the report.

This document will investigate the existing ambient environment surrounding the project site, development options, alternative material uses and indicative construction methodologies with their likely effect on acoustics.

This noise and vibration impact assessment addresses the external noise intrusion and noise emissions associated with the proposed residential development which includes:

- Traffic noise impacts from surrounding roads,
- Noise emissions from mechanical plant and equipment to service the development (in principle), and
- Construction noise and vibration impacts to surrounding receivers.

2 REFERENCED DOCUMENTS

2.1 BACKGROUND INFORMATION USED

This assessment has been conducted using the "Nicholson Place" architectural drawings provided by Cox Architecture Revision 2, dated 25/08/2025.

2.2 PLANNING GUIDELINES

This document addresses noise and impacts associated with the following:

- Traffic noise impacts from Pacific Highway and surrounding roads.
- Noise emissions from mechanical plant and equipment servicing the development (in principle).
- Construction noise and vibration impacts.

Acoustic Logic have utilised the following documents and regulations in the noise assessment of the development:

- SSD 88113706 – "Secretary's Environmental Assessment Requirements **(SEARs)**"
- NSW Department of Planning and Environment's document "State Environmental Planning Policy **(SEPP)** (Transport and Infrastructure) 2021",
- NSW Department of Planning's "Developments near Rail Corridors or Busy Roads – Interim Guideline" **(DNRCBR)**, and
- NSW Environmental Protection Authority (EPA) – "Noise Policy for Industry" **(NPfI)** 2017.

2.3 RESPONSE TO SEARS

This report has been prepared in response to the Secretary's Environmental Assessment Requirements (SEARs) dated 31 July 2025 for SSD-88113706. Specifically, this report has been prepared to respond to those SEARs summarised in Table 1.

Table 1 – SSD-88113706 SEARs Requirements

Item	Description of Requirement	Section Reference
10 Noise and Vibration	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.	This report forms the Noise and Vibration Impact Assessment (NVIA)

3 SITE DESCRIPTION AND THE PROPOSAL

The proposed development seeks approval for the rezoning of the site and construction of a BTR development.

The SSDA specifically involves the following works:

- A single 36-storey tower including a 4-storey podium comprising approximately 500 units,
- Three levels of basement parking,
- BTR amenity provided in lower ground, upper ground, podium, tower and rooftop levels,
- Vehicular access from Christie Street and loading access from Nicholson Street,
- Site landscaping and public domain improvements, and
- Utility and services augmentation as required.

To accommodate the proposed SSDA, a concurrent rezoning is sought to increase the site's maximum building height and floor space ratio.

Separate development approvals have been sought with Lane Cove Council. These relate to demolition of existing structures, tree removal, excavation, shoring wall and capping beam.

The site has an existing concept State Significant Development approval (SSD-56527976). The proposed development does not rely on this approval and will be surrendered upon consent being granted.

3.1 NEAREST SENSITIVE RECEIVERS

Table 2 – Sensitive Receivers

Receiver (Refer Figure 1)	Land Use	Comment
R1	Residential	A mixed use multistorey residential complex-maintained northeast of the project site.
R2	Residential	Two mixed use multistorey residential maintained east of the project site.
R3	Residential	A residential complex maintained southwest of the project site.
R4	Residential	Multistorey mixed-use complexes maintained northwest of the project site.
E1	Educational	Reddam Early Learning School, a childcare centre maintained west of the project site.
C1	Commercial	A collection of commercial receivers-maintained northeast of the project site.
C2	Commercial	A collection of commercial receivers maintained south of the project site.
C3	Commercial	Commercial complexes maintained west of the project site.

An aerial view of the project site and measurement locations are presented in Figure 1 below.

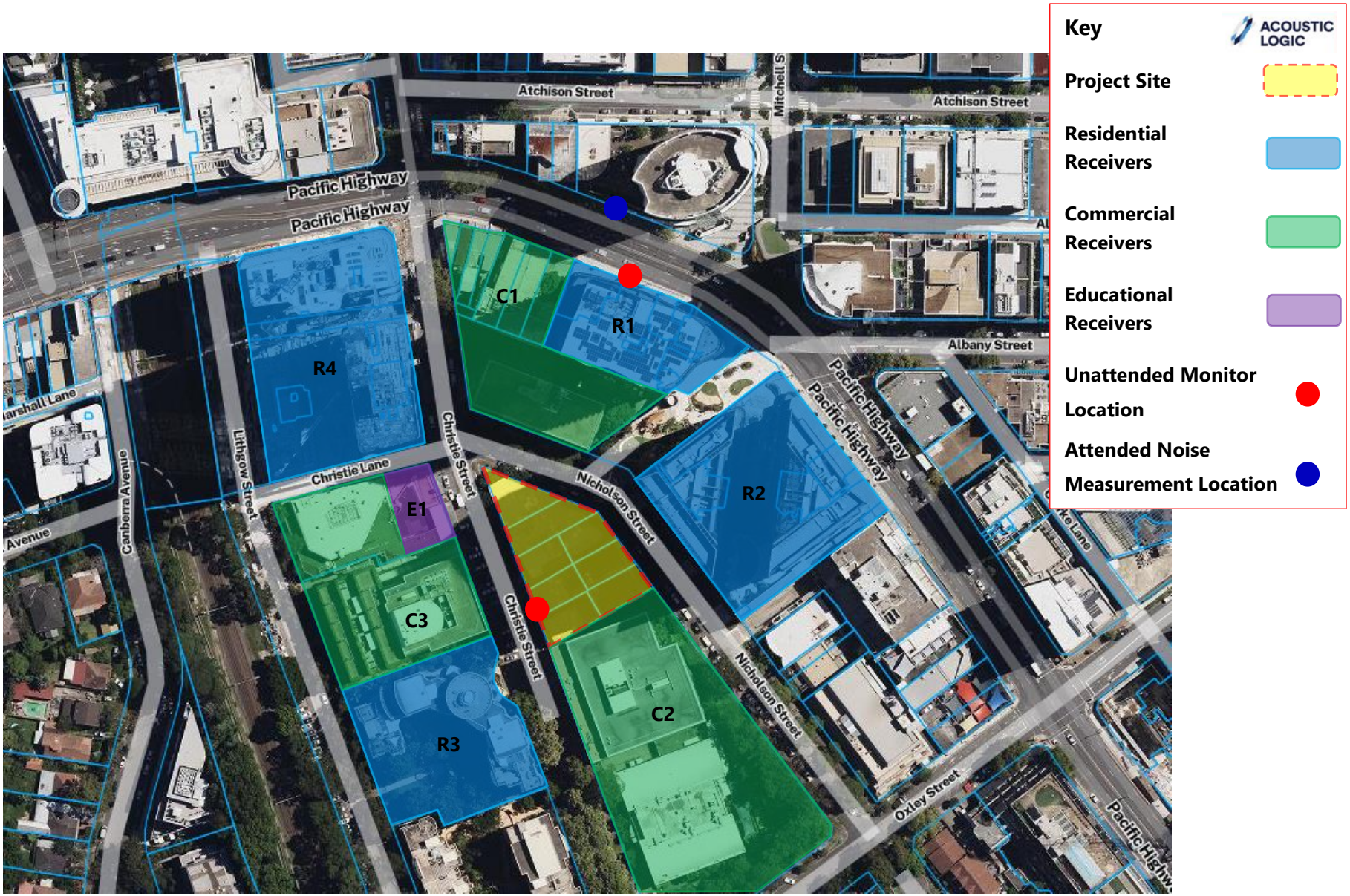


Figure 1: Project Site and Local Context

4 NOISE DESCRIPTORS

Environmental noise constantly varies in level from moment to moment, so it is not possible to accurately determine prevailing noise conditions by measuring a single, instantaneous noise level.

To quantify ambient noise, a 15-minute measurement interval is typically utilised. Noise levels are monitored continuously during this period, and then statistical and integrating techniques are used to characterise the noise being measured.

The principal measurement parameters obtained from the data are:

L_{eq} - represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of noise impact as it closely corresponds with how humans perceive the loudness of time-varying noise sources (such as traffic noise).

L_{90} – This is commonly used as a measure of the background noise level as it represents the noise level heard in the typical, quiet periods during the measurement interval. The L_{90} parameter is used to set noise emission criteria for potentially intrusive noise sources since the disturbance caused by a noise source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

L_{10} is used in some guidelines to measure noise produced by an intrusive noise source since it represents the average of the loudest noise levels produced at the source. Typically, this is used to assess noise from licenced venues.

L_{max} is the highest noise level produced during a noise event and is typically used to assess sleep arousal impacts from short term noise events during the night. It is also used to assess internal noise levels resulting from aircraft and railway ground vibration induced noise.

L_1 is sometimes used in place of L_{max} to represent a typical noise level from a number of high-level, short-term noise events.

5 ENVIRONMENTAL NOISE SURVEY

A survey of ambient noise and vibration has been undertaken to characterise the existing environment. Representative noise levels have been determined from the data using the methodology outlined in Appendix B3 of the RNP.

5.1 AMBIENT NOISE MONITORING

NSW EPA's Rating Background Noise Level (RBL) assessment procedure requires determination of background noise level for each day (the ABL) then the median of the individual days as set out for the entire monitoring period.

Appendices within this report presents the results of unattended noise monitoring previously conducted at the project site. Weather affected data was excluded from the assessment in line with Fact Sheet B of NPfI.

5.1.1 Measurement Equipment

Equipment used consisted of an Acoustic Research Laboratories Pty Ltd noise logger. The logger was set to A-weighted fast response and was programmed to store 15-minute statistical noise levels throughout the monitoring period. The monitor was calibrated at the start and end of the monitoring period using a Rion NC-74 calibrator. No significant drift was noted.

5.1.2 Measurement Position and Period

Multiple noise monitors have been used to determine appropriate background noise levels for surrounding receivers. Unattended noise monitoring was conducted by this office on the following dates and the locations are as follows:

- Level 2 of 500 Pacific Highway, St Leonards – Wednesday 24th of September 2025 to Tuesday 7th of October 2025, and
- 61 Christie Street, St Leonards – Thursday 8th of May 2025 to Monday 26th of May 2025.

Figure 2: 500 Pacific Highway (Left), 61 Christie Street (Right)

Attended noise measurements to supplement the above were undertaken on Monday 26th of May 2025. Refer to Figure 1 for detailed locations of monitor placements and attended noise measurement locations.

Attended noise measurements were conducted using a Norsonic 140 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonic Sound Calibrator type 1251. No significant drift was noted.

5.2 SUMMARISED RATING BACKGROUND NOISE LEVELS

Summarised rating background noise levels for the project site and immediate surroundings are presented below.

Table 3 – Measured Rating Background Noise Levels

Monitor Location	Measured Assessment Background Noise Level dB(A)L_{A90}		
	Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
61 Christie Street, St Leonards	54	48	43

Weather affected monitoring data was excluded in line with Factsheets A & B of the NSW EPA Noise Policy for Industry. Weather data was obtained from records provided by the Bureau of Meteorology for the following stations:

- Sydney Observatory Hill, and
- Fort Denison

5.3 SUMMARISED TRAFFIC NOISE LEVELS

The following noise levels for the site have been established based on short term attended measurements and long-term noise monitoring:

Table 4 – Measured Traffic Noise Levels

Monitor Location	Noise Level dB(A)$L_{eq(Period)}$	
	Day $L_{eq(15hr)}$ (7am – 10pm)	Night $L_{eq(9hr)}$ (10pm – 7am)
L2 of 500 Pacific Highway, St Leonards	71	67
61 Christie Street, St Leonards	60	56

6 EXTERNAL NOISE IMPACTS TO THE SITE

Potential noise impacts to the site from external roadways are addressed within this section. Site investigation indicates that the major external noise sources around the project site is traffic movements along Pacific Highway.

6.1 NOISE INTRUSION CRITERIA

An external noise intrusion assessment has been conducted based off the requirements of the following acoustic noise criteria/standards:

- NSW Department of Planning and Environment's document 'State Environmental Planning Policy **(SEPP)** (Transport and Infrastructure) 2021", and
- NSW Department of Planning's 'Developments near Rail Corridors or Busy Roads – Interim Guideline' **(DNRCBR)**.

6.1.1 NSW Department of Planning and Environment (SEPP) (Transport and Infrastructure) 2021

"2.120 Impact of road noise or vibration on non-road development

(1) This clause 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 transit way 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 the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

(a) a building for residential use,

(b) a place of public worship,

(c) a hospital,

(d) an educational establishment or childcare centre.

(3) If the development is for the purposes of a building for residential use, 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 building--35 dB(A) at any time between 10 pm and 7 am,

(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway) --40 dB(A) at any time."

Represented in Figure 3 and based on Clause 2.120 item 1, it is expected that the stretch of Pacific Highway is a road carrying an annual average daily traffic volume of more than 20,000. Therefore, the project site will be assessed based on the requirements of Clause 2.120 item 3 above.

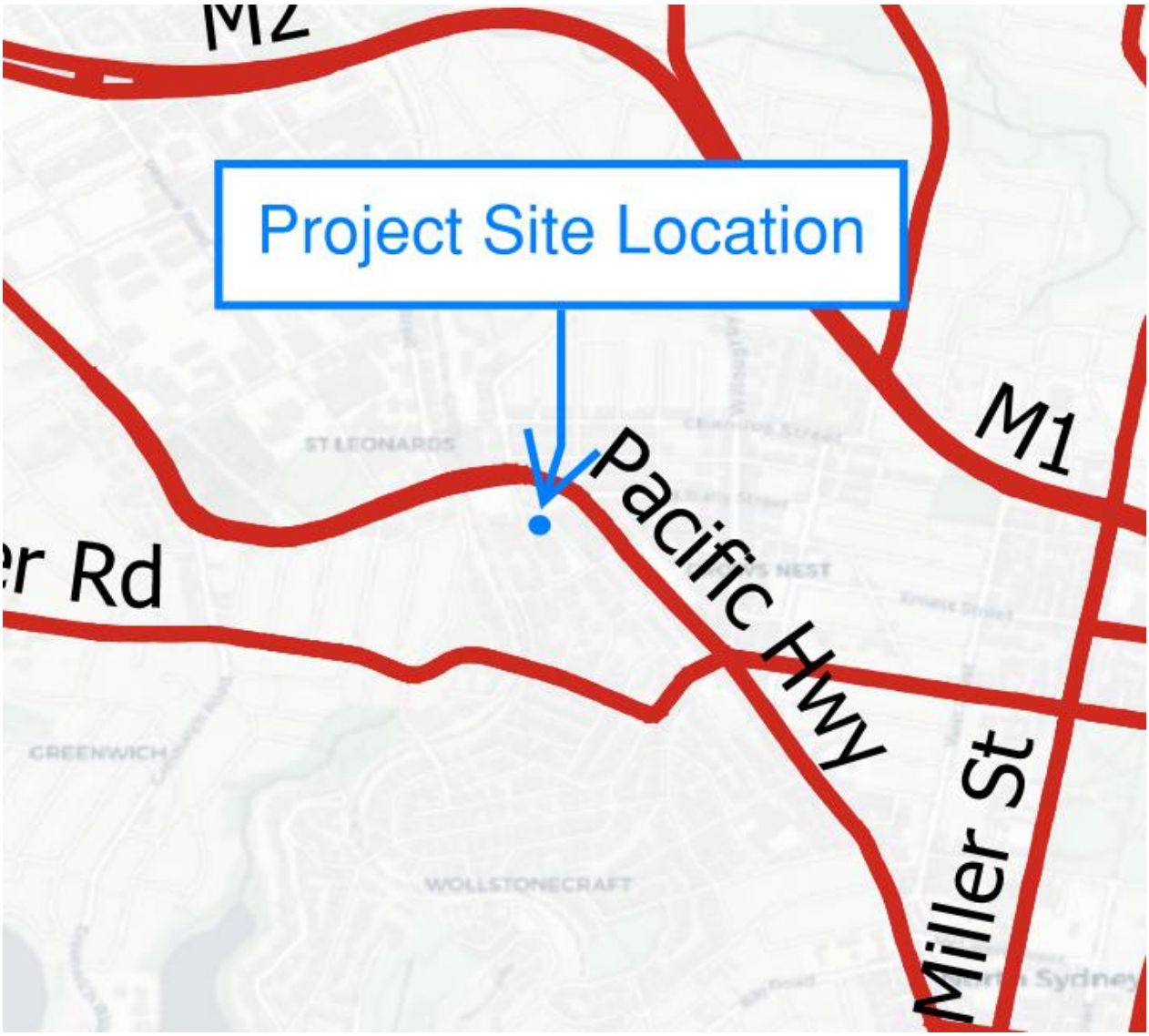


Figure 3: SEPP Traffic Volume Map with Project Site Location

6.1.2 NSW Department of Planning and Environment's Document – *'Developments near Rail Corridors or Busy Roads – Interim Guideline'*

Section 3.5 of the NSW Department of Planning's 'Development near Rail Corridors and Busy Roads (Interim Guideline)' states:

"The following provides an overall summary of the assessment procedure to meet the requirements of clauses 87 and 102 of the Infrastructure SEPP. The procedure covers noise at developments for both Road and Rail.

- *If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:*
  - *in any bedroom in the building: 35dB(A) at any time 10pm-7am*
  - *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time.*

6.1.3 Summary of Noise Intrusion Criteria

The governing project criteria is presented in the table below based on requirements above.

Table 5 – Summary of Internal Noise Level Criteria

Space/Activity Type	Internal Traffic Noise Criteria dB(A)$L_{eq(period)}$
Bedroom	35dB(A)$L_{eq(9hour)}$
Living Room	40dB(A)$L_{eq(15hour)}$

6.2 CALCULATION OF FACADE NOISE LEVELS

The measured noise levels have been used as a basis for predicting noise levels around the development by:

- Correcting for different distances between the noise source compared to the monitoring location.
- Barrier effects, where applicable.
- Reflections off adjacent structures where significant.

Noise levels around the site have been predicted using the Soundplan computer model. The model is able to calculate façade noise levels, taking into account the factors indicated above.

The model:

- Has been calibrated for each noise source using the relevant measured noise levels.
- Includes a digitised geo-map of the proposed building and any nearby structures that may affect noise levels at the site.
- Includes data obtained from Geoscape for the surrounding land, roadways and built form.

Results of the SoundPLAN modelling can be visualised within the Appendix A – SoundPLAN Modelling Output.

7 COMPLYING CONTROLS

7.1.1 Glazed Windows

The following constructions are recommended to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. (**Mohair Seals are unacceptable**).

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

The recommended constructions are listed in the table below.

Table 6 – Recommended Glazing Thicknesses

Level	Space	Glazing Construction	Acoustic Seals
All Levels	All Bedroom/ Studio Spaces	6.38mm Laminated	**Yes**
	All other habitable Spaces	6mm Float/ Toughened	**Yes**

It is recommended that only window systems having test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended. All windows shall have glazing thicknesses equal to those recommended above and are to have Raven RP10 to the top, bottom and sides.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 7 below for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 7 – Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
6mm Float/ Toughened	29
6.38mm Laminated	31

7.1.2 Use of Insulated Glass Units (Double Glazing)

Where single glazing has been recommended in Table 6, the following IGU's can be used in place of the tabled single glazing.

Table 8 – Equivalent IGU Systems

Single Glazing Assembly	Equivalent IGU	Minimum R_w/Rw+C_{tr} of Installed Window
6mm float/ Toughened	6/12AG/6	33/29
6.38mm laminated	8/16AG/8 OR 6/12/6.38	35/31

7.1.3 External Roof/Ceiling Construction

Roof constructions of brick, concrete or masonry will not require acoustic upgrading. Where other systems are proposed they should be reviewed and approved by a suitably qualified acoustic consultant.

7.1.4 External Wall Construction

External walls constructed of brick, concrete or masonry will not require acoustic upgrading. Where other systems are proposed they should be reviewed and approved by a suitably qualified acoustic consultant.

If any penetrations are required through any of the external lining of any of the systems above for other building services, all gaps should be filled with acoustic sealant to ensure compliance with internal noise level requirements.

7.1.5 Ventilation

With respect to 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 10dB(A), 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 10dB(A) higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45dB(A), and 50dB(A) in living rooms).

Analysis indicates that natural ventilation is achievable for the entirety of the development.

8 NOISE EMISSION CRITERIA

The noise emission from the project site shall comply with the requirements of the following documents:

- SSD 88113706 – "Secretary's Environmental Assessment Requirements (SEARs)"
- NSW Environmental Protection Authority (EPA) – "Noise Policy for Industry" (NPfI) 2017.

8.1 SEARS (REF: SSD 88113706)

10. Noise and Vibration

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.

8.2 NSW EPA NOISE POLICY FOR INDUSTRY (NPFI) 2017

The NSW EPA Noise Policy for Industry (NPfI) 2017, has two criteria which need to be satisfied: namely the Intrusiveness noise level criteria and the Project Amenity noise level criteria. The Project Noise Trigger Levels are then established based on the lower of the intrusiveness and project amenity levels.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

8.2.1 Intrusiveness Noise Level Criteria

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor do not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Section 4. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 9 – Project Intrusiveness Noise Levels

Receiver	Period/Time	Project Intrusiveness Noise Levels dB(A)$L_{Aeq(15min)}$
Residential	Day (7am-6pm)	59
	Evening (6pm-10pm)	53
	Night (10pm-7am)	48

8.2.2 Project Amenity Noise Level Criteria

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The NSW EPA Noise Policy for Industry sets out acceptable noise levels for various localities. Table 2.2 on page 11 of the policy indicates 3 categories to distinguish different residential areas. They are rural, suburban, urban. This site is categorised by urban receivers.

For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

The project amenity noise level is calculated by taking the recommended amenity noise level (as presented in table 2.2 of the policy), subtracting 5dB(A) and then adding 3dB(A) to convert from $L_{Aeq,\ period}$ to a $L_{Aeq,\ 15\ minute}$ descriptor. The project amenity noise level criteria are presented in the table below.

Table 10 – Project Amenity Noise Levels

Location	Period/Time	Project Amenity Noise Levels dB(A)$L_{Aeq(15min)}$
Nearby residences – Urban Receivers	Day (7am-6pm)	58
	Evening (6pm-10pm)	48
	Night (10pm-7am)	43
Educational Receivers	Noisiest 1 hour	35 (internally)
Commercial Receivers	When in use	63

8.2.2.1 Sleep Disturbance Criteria

The Noise Policy for Industry recommends the following noise limits to mitigate sleeping disturbance:

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

- *$L_{eq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *L_{Fmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater, a detailed maximum noise level event assessment should be undertaken.*

Table 11 – Sleep Arousal Criteria for Residential Receivers

Receiver	Rating Background Noise Level (Night) dB(A)L_{90}	Emergence Level
Residential receivers Night (10pm – 7am)	43 dB(A) L_{90}	48 dB(A)$L_{eq,\ 15min}$; 58 dB(A)L_{Fmax}

8.2.2.2 Project Noise Trigger Levels

The project noise trigger level (as outlined in section 2.1 of the policy) is the lower of the intrusiveness and project amenity noise levels. The project noise trigger levels are presented in the table below.

Table 12 – Project Noise Trigger Levels (NPfI)

Receiver(s)	Time Period	Assessment Background Noise Level dB(A)L_{90}	Project Amenity Criteria dB(A) $L_{eq(15min)}$	Intrusiveness Criteria $L_{eq(15min)}$	NPfI Criteria for Sleep Disturbance
Residential Receivers **(R1, R2, R3, R4)**	Day (7am – 6pm)	54	**58**	59	N/A
	Evening (6pm-10pm)	48	**48**	53	N/A
	Night (10pm-7am)	43	**43**	48	**48 dB(A)$L_{eq, 15min}$; 58 dB(A)L_{Fmax}**
Educational Receiver (**E1**)	Noisiest 1 hour	N/A	**35 (internal)**	N/A	N/A
Commercial Receivers **(C1, C2, C3)**	When in use	N/A	**63**	N/A	N/A

The project noise trigger levels are indicated by the bolded values in the table above.

9 NOISE EMISSIONS ASSESSMENT

Noise impacts from the development have been addressed with regard to noise generated from mechanical plant and equipment in principle.

9.1 NOISE FROM MECHANICAL PLANT (IN PRINCIPLE)

Detailed plant selection and location has not been undertaken at this stage. Satisfactory levels will be achievable through appropriate plant selection, location and if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of Section 8.

Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels.

Notwithstanding the above, an assessment of preliminary plant layouts and locations is presented below, noting that it is likely for layouts or equipment types to vary during the detailed design phase of the project.

- Roof top plant:
    - All rooftop plant is proposed to be maintained on level 34 with louvres, as nominated by the architectural documentation.
    - Major fans (typically with a sound power level over 80db(A) – such as kitchen exhaust, major toilet exhaust and major relief air fans) will require acoustic treatment if located externally. Wherever possible for major fans it is recommended that axial (as opposed to roof mounted fans) are to be used as this will enable acoustic treatment to be incorporated within ductwork running to atmosphere.
- Basement:
    - All basement fans are located within fan room enclosures of basements 1, 2, and 3 as nominated within the architectural documentation.
    - Indicatively, fans may require attenuation treatment to meet NPfI requirements are surrounding sensitive receivers.
    - To ensure compliance with NPfI requirements during the day, evening and night time, additional review is recommended following final plant selection and review.

10 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

10.1 EPA INTERIM CONSTRUCTION NOISE GUIDELINE

The EPA Interim Construction Noise Guideline (ICNG) assessment requires:

- Determination of noise management levels (based on ambient noise monitoring).
- Review of operational noise levels at nearby development.
- If necessary, recommendation of noise controls strategies in the event that compliance with noise emission management levels is not possible.

Residential noise management levels are based on the "rating background noise level" ("**RBL**") applicable to the receivers. RBL's are typically determined by measuring the ambient noise environment using the methodology in the EPA NPfI. The measurements, analysis and RBL's determined for this project are summarised in Appendix A.

The ICNG construction noise management levels are summarised in the following table, along with how they should be used to manage impacts.

Table 13 – Construction Noise Management Levels

Management Level $L_{Aeq,(15min)}$*	**How to Apply**
Noise affected Management Level ("**NML**") RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ 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 dB(A)	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.

*** Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.**

The ICNG recommended standard hours are as follows:

- Monday to Friday – 7:00am to 6:00pm
- Saturday – 8:00am to 1:00pm
- No work on Sundays or public holidays

10.1.1 Other Land Uses

For other land uses, the management levels are absolute noise levels, independent of the prevailing noise environment, so monitoring of the prevailing environment is not generally required for these uses. The **ICNG** construction noise management levels for uses other than residential dwellings are summarised in the following table.

Table 14 – Construction Noise Management Levels – Non Residential Uses

Land Use	Management Level, $L_{Aeq\ (15min)}$ (applies for times when properties are being used)
Commercial Receivers	70 (external)
Classrooms at schools and other educational institutions	45 (internal)

10.1.2 Receiver Noise Management Levels

The projects specific management levels for the most impacted receivers are summarised in the following table using the objectives tabled above and the adopted RBL's.

Table 15 – Noise Management Levels for Most Impacted Receivers

Location/Receiver	RBL dB(A) L_{90}	NML dB(A) L_{eq}	HANML dB(A) L_{eq}
Residential Receivers (**R1, R2, R3, R4**)	54	64	75
Educational Receiver (**E1**)	-	45 (internal)	-
Commercial Receiver (**C1, C2, C3**)	-	70 (external)	-

10.2 CONSTRUCTION VIBRATION MANAGEMENT LEVELS

10.2.1 Amenity Management

Vibration goals for the amenity of nearby land users are those recommended by the EPA document *Assessing Vibration: A technical guideline*. These levels (extracted from Tables 2.2 and 2.4 of the guideline) are presented in the following table for various types of vibration:

Table 16 -(Table 2.2 Assessing Vibration: A Technical Guideline) – Preferred and Maximum Weighted RMS Values for Continuous and Impulsive Vibration Acceleration (m/s2) 1-80Hz

Location	Assessment Period [1]	Preferred values		Maximum Values	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Continuous Vibration					
Critical areas[2]	Day or night-time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.02	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028
Workshops	Day or night-time	0.04	0.029	0.080	0.058
Impulsive Vibration					
Critical areas[2]	Day or night-time	0.0050	0.0036	0.010	0.0072
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day or night-time	0.64	0.46	1.28	0.92
Workshops	Day or night-time	0.64	0.46	1.28	0.92

1 Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am.

2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate task require more stringent criteria than the human comfort criteria specified above. Stipulation of such criteria is outside the scope of this policy, and other guidance documents (e.g. relevant standards) should be referred to. Source: BS6472-1992.

Table 17 – (Table 2.4 Assessing Vibration: A technical guideline) – Acceptable Vibration Dose Values for Intermittent Vibration (m/s1.75)

Location	Daytime[1]		Night-time[1]	
	Preferred value	Maximum Value	Preferred value	Maximum Value
Critical areas[2]	0.10	0.20	0.10	0.20
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
Workshops	0.80	1.60	0.80	1.60

1 Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am.
2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas. Source: BS6472-1992.

10.2.2 Structure Damage Risk Criteria

German Standard DIN 4150-3 (2016) provides a guideline for acceptable levels of vibration velocity in building foundations, to assess the effects of vibration on structures. The table give guidance on the maximum accepted values of velocity at the foundation and in the plane of the highest floor of various types of buildings, to prevent any structural damage.

The table following lists the peak particle velocity, which is the maximum absolute value of the velocity signals for the three orthogonal components. This is measured as a maximum value of any of the three orthogonal component particle velocities when measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

It is noted that if measured vibration levels do not exceed the guidelines listed in the following table, damage that will reduce the serviceability of the building will not occur, and if damage to the building does occur, it is assumed that the damage is related to other causes. Furthermore, the DIN4150-3 guideline states the following regarding the limits presented in Table 1 of the standard:

"Exceeding the guideline values does not necessarily lead to damage. Should they be exceeded, however, further investigations may be necessary, such as determining and evaluating the stresses as detailed in 4.3 and 4.4.".

Table 18 – (Table 1 – DIN 4150-3 (2016)) – Guideline Values for Vibration Velocity, $v_{i,max}$, for Evaluating the Effects of Short-Term Vibration on Structures

	TYPE OF STRUCTURE	Guideline values for $v_{i,max}$ in mm/s				
		Foundation, all directions, i = x, y, z, at a frequency of			Topmost floor, horizontal direction, i = x, y	Floor slabs, vertical direction, i = z
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz [a]	All Frequencies	All Frequencies
L/C	1	2	3	4	5	6
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Residential buildings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 **and** are of great intrinsic value (e.g. listed buildings) buildings that are under a preservation order)	3	3 to 8	8 to 10	8	20[b]

NOTE Even if guideline values as in line 1, columns 2 to 5, are complied with, minor damage cannot be excluded.

a At frequencies above 100 Hz, the guideline values for 100 Hz can be applied as minimum values.

b It may be necessary to lower the guideline value markedly to prevent minor damage

10.3 CONSTRUCTION NOISE EMISSIONS ASSESSMENT

10.3.1 Noise Levels of Typical Construction Activities

Typically, the most significant sources of noise or vibration generated during a construction project will be demolition, excavation, structural works and piling.

A summary of the equipment/processes which typically generate the highest noise levels during demolition, excavation and construction are summarised below.

Table 19 – Primary Noise Sources

Equipment / Process	Sound Power Level dB(A)
Excavator (10 tonne)	100
Truck – Medium Rigid	103
Electric Hand Tools	102
Saw – Concrete	118
Jackhammer	113
Truck and dog	108
Crane – Franna	98
Pump – Concrete	109
Truck – Concrete	109

The noise levels presented in the above table are derived from the following sources, namely:

1. On-site measurements
2. Table A1 of Australian Standard 2436-2010, and
3. *Data held by this office from other similar studies

Noise levels take into account correction factors (for tonality, intermittency where necessary).

10.3.2 Predicted Noise Levels

Construction noise emissions to nearby development depend on the activities being undertaken at the time, and where on the site the activities occur.

Construction noise levels at the surrounding receivers have been predicted based on the following inputs.

- The plant sound power levels indicated in Appendix C – Construction Plant Noise Levels. These have been corrected for estimated typical operation duty indicated in the table using 10 x log(% duty/100) within a 15-minute period.
- Corrections for source to receiver distance attenuation including air absorption (20°C, 70% RH, neutral wind conditions).
- Source heights – 1.5m above the ground/building level of the noise source location, unless noted otherwise.

Table 20 – Predicted Noise Impacts

Receiver	Range of Highest Predicted Level dB(A) L_{eq}	NML dB(A) L_{eq}	HNAML dB(A) L_{eq}
R1	68 – 74	64	75
R2	73 – 83	64	75
R3	71 – 80	64	75
R4	68 – 80	64	75
E1	69 – 83	55*	-
C1	72 – 82	70	-
C2	71 – 97	70	-
C3	73 – 83	70	-

**A conservative 10dB reduction through an open façade has been utilised to establish internal noise impacts.*

With respect to the predicted noise impacts provided within the above table, the analysis indicates that:

Primarily, the use of the concrete saws and jackhammers are predicted to be the highest noise generating demolition equipment. All noise predictions have been presented as external noise levels. Internal noise levels at all locations are expected to be approximately 30dB(A) lower internally dependant on the façade construction of the receiver, therefore reducing noise impacts in all internal spaces surrounding the site significantly more than the predicted values.

Concrete saws are to be used throughout the demolition phase with a cut and lift methodology. This methodology will reduce structure borne noise compared to utilising the jackhammer.

Truck zones will be located within a small alley way which connects Christie Street and Nicholson Street; management of construction traffic control will aid in reducing the acoustic impact to local receivers.

Noise impacts will be reduced post demolition phase as each other phase utilises less noise generating equipment. Furthermore, once the building shell has been constructed, noise impacts to all receivers will be further reduced as works will be attenuated due to the inherent shielding of the building structure.

10.4 SITE SPECIFIC RECOMMENDATIONS

In light of the above, we recommend:

1. **Community Consultation/Notification:** Notification (leaflet or similar) of all receivers identified in Section 3.1 is to be provided prior to commencement of works. Notification should advise of anticipate date and duration of demolition.

2. **Respite Periods:** To protect the amenity of nearby residential receivers, it is proposed to introduce respite periods where construction activities exceed the 'highly noise affected level (75 dB(A) $L_{eq(15min)}$) based on the predicted noise levels presented in Section 10.3.2. In the event that respite periods are to be imposed, it is recommended to consider respite hours as follows:

    a. Monday to Friday: 7:00am-8:00am

    b. Monday to Friday: 12:00pm-1:00pm

    c. It is noted that the construction plant which is predicted to exceed the 'highly noise affected level' would only be in use intermittently during the demolition phase.

    d. It is noted that respite periods will extend the length of demolition works and may provide heavier loss of amenity compared to non-imposed demolition.

    e. Further consultation with the surrounding schools and residential receivers is to be conducted on a regular basis to align noisy works with less sensitive time periods.

3. **Vibration monitoring**: Expert advice and assessment is to be provided by a Geotechnical Engineer and if required, vibration monitoring is to be undertaken. Indicatively, vibration monitoring is recommended for commercial receiver **C2** throughout the phases of demolition and excavation.

4. **Noise monitoring**: In the event of a complaint, noise monitoring:

    a. Is to be implemented along the property boundary closest to the noise receiver who issued the complaint.

    b. Sample testing of different construction activities is to be conducted at each different phase of construction within learning and teaching areas of the surrounding schools.

    c. All employees, contractors and sub-contractors are to be reminded to avoid noisy works near the boundaries of the project site. Compounding high noise generating activities simultaneously near receivers are to be avoided where practical.

5. **Quiet Work Methods/Technologies:**

    a. The primary noise generating activity at the site will be the demolition phase. As much as practicable, use of quieter methods is to be adopted such as using a ripper as opposed to a hydraulic hammer and reducing the speed of piling if ground conditions permit.

    b. Where practical and feasible use rock/ concrete saws near all boundaries to reduce vibration and noise levels if required.

    c. Materials handling/vehicles:

        i. Trucks and bobcats to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.

        ii. Avoid careless dropping of construction materials into empty trucks.

        iii. Trucks, trailers and concrete trucks (if feasible) must turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).

iv. Deliveries should use straps in place of chains for handling materials wherever possible.

v. Deliveries are to be scheduled during less sensitive time periods where practical.

vi. A maximum delivery vehicle speed of 10km/hr throughout the project site.

6. **Complaints Handling:** In the event of complaint, the procedures outlined in Section 13 should be adopted.

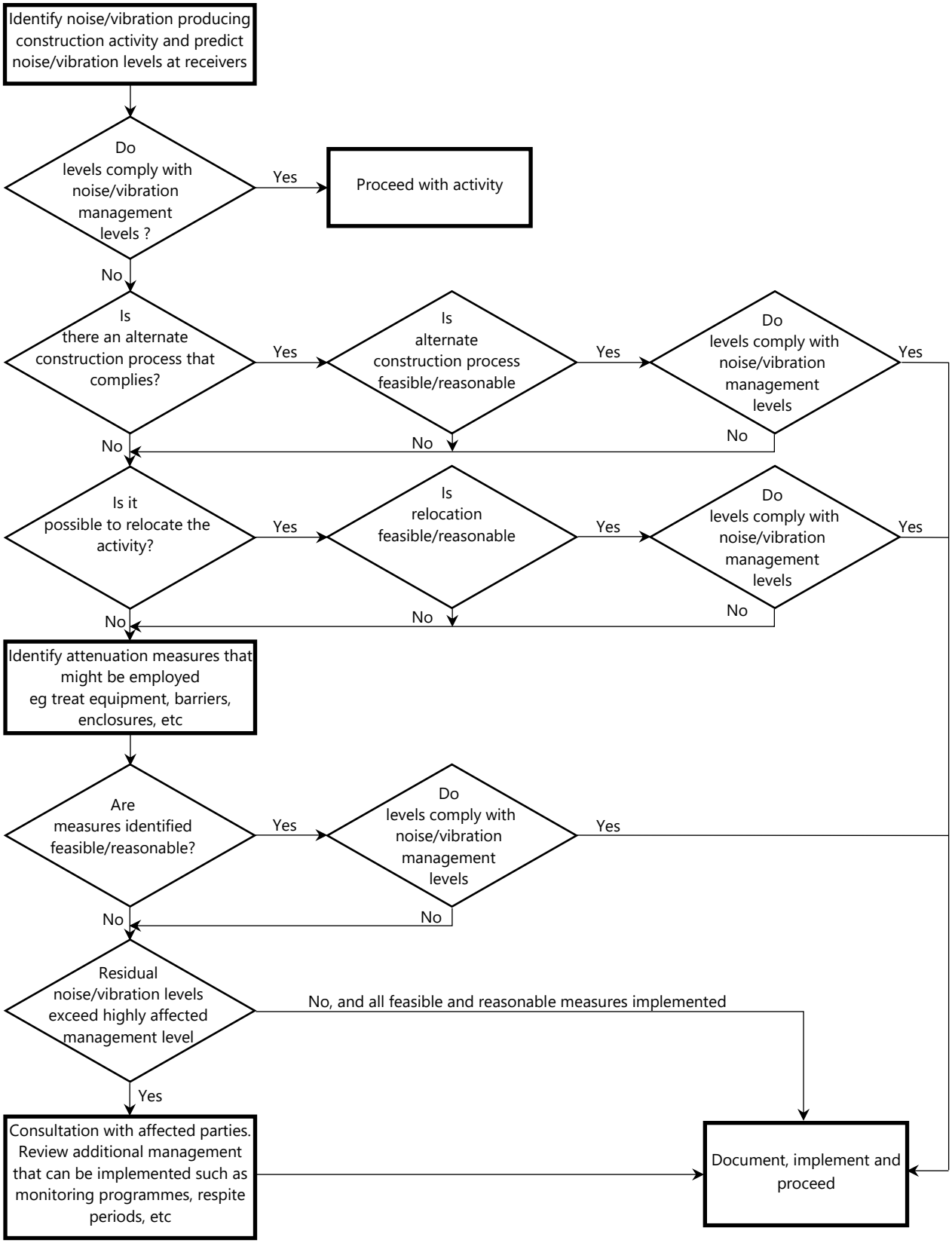
7. **Site Induction:**

a. A copy of these recommendations is to be available to contractors. The location of this should be advised in any site induction.

b. Site induction should also detail the site contact in the event of noise complaint.

11 CONTROL OF CONSTRUCTION NOISE AND VIBRATION – PROCEDURAL STEPS

The flow chart presented below illustrates the process that will be followed in assessing construction activities.



12 ADDITIONAL GENERAL NOISE AND VIBRATION CONTROL METHODS

In the event of complaints, there are a number of noise mitigation strategies available which can be considered.

The determination of appropriate noise control measures will be dependent on the particular activities and construction appliances. This section provides an outline of available methods.

12.1 SELECTION OF ALTERNATE APPLIANCE OR PROCESS

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example, the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. Undertaking this activity using bulldozers, ripping and/or milling machines will result in lower noise levels.

12.2 ACOUSTIC BARRIER

Given the position of adjacent development, it is unlikely that noise screens will provide significant acoustic benefit for residential receivers but will provide noticeable improvement for those on ground level.

The placement of barriers at the source is generally only effective for static plant. Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuated by placing barriers at the source.

Barriers can also be placed between the source and the receiver.

The degree of noise reduction provided by barriers is dependent on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15dB(A) can be affected. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8dB(A) may be achieved. Where no line of sight is obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance that is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10mm or 15mm thick plywood (radiata plywood) would be acceptable for the barriers.

12.3 MATERIAL HANDLING

Where practical and feasible; rubber matting is to be installed over material handling areas to reduce the sound of impacts due to material being dropped by up to 20dB(A).

12.4 TREATMENT OF SPECIFIC EQUIPMENT

In certain cases, it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted. Stationary construction equipment is to be enclosed, shielded or positioned furthest away from sensitive receivers if practical and feasible.

12.5 ESTABLISHMENT OF SITE PRACTICES

This involves the formulation of work practices to reduce noise generation. A more detailed management plan will be developed for this project in accordance with the construction methodology outlining work procedures and methods for minimising noise.

12.6 COMBINATION OF METHODS

In some cases, it may be necessary that two or more control measures be implemented to minimise noise.

13 COMMUNITY INTERACTION AND COMPLAINTS HANDLING

13.1 ESTABLISHMENT OF DIRECT COMMUNICATION WITH AFFECTED PARTIES

In order for any construction noise management programme to work effectively, continuous communication is required between all parties, which may be potentially impacted upon, the builder and the regulatory authority. This establishes a dynamic response process which allows for the adjustment of control methods and criteria for the benefit of all parties.

The objective in undertaking a consultation process is to:

- Inform and educate the groups about the project and the noise controls being implemented
- Increase understanding of all acoustic issues related to the project and options available
- Identify group concerns generated by the project, so that they can be addressed, and
- Ensure that concerned individuals or groups are aware of and have access to a Constructions Complaints Register which will be used to address any construction noise related problems should they arise.

Community consultation is recommended prior to any works commencing on site, with letterbox notifications to all identified surrounding sensitive receivers (refer Section 3.1). This will include a construction management plan detailing the proposed works on site and duration of each phase.

13.2 DEALING WITH COMPLAINTS

Should ongoing complaints of excessive noise or vibration criteria occur immediate measures shall be undertaken to investigate the complaint, the cause of the exceedances and identify the required changes to work practices. In the case of exceedances of the vibration limits all work potentially producing vibration shall cease until the exceedance is investigated.

The effectiveness of any changes shall be verified before continuing. Documentation and training of site staff shall occur to ensure the practices that produced the exceedances are not repeated.

If a noise complaint is received the complaint should be recorded on a Noise Complaint Form. The complaint form should list:

- The name and address of the complainant (if provided)
- The time and date the complaint was received
- The nature of the complaint and the time and date the noise was heard
- The name of the employee who received the complaint
- Actions taken to investigate the complaint, and a summary of the results of the investigation
- Required remedial action, if required
- Validation of the remedial action, and
- Summary of feedback to the complainant.

A permanent register of complaints should be held. All complaints received should be fully investigated and reported to management. The complainant should also be notified of the results and actions arising from the investigation.

The investigation of a complaint shall involve where applicable:

- Noise measurements at the affected receiver
- An investigation of the activities occurring at the time of the incident
- Inspection of the activity to determine whether any undue noise is being emitted by equipment, and
- Whether work practices were being carried out either within established guidelines or outside these guidelines.

Where an item of plant is found to be emitting excessive noise, the cause is to be rectified as soon as possible. Where work practices within established guidelines are found to result in excessive noise being generated then the guidelines should be modified so as to reduce noise emissions to acceptable levels. Where guidelines are not being followed, the additional training and counselling of employees should be carried out.

Measurement or other methods shall validate the results of any corrective actions arising from a complaint where applicable.

13.3 REPORTING REQUIREMENTS

The following shall be kept on site:

1. A register of complaints received/communication with the local community shall be maintained and kept on site with information as detailed in this report.
2. Where noise/vibration complaints require noise/vibration monitoring, results from monitoring shall be retained on site at all times.
3. Any noise exceedances occurring including the actions taken and results of follow up monitoring.
4. A report detailing complaints received and actions taken shall be presented to the construction liaison committee.

13.4 CONTINGENCY PLANS

Where non-compliances or noise complaints are raised the following methodology will be implemented.

1. Determine the offending plant/equipment/process.
2. Locate the plant/equipment/process further away from the affected receiver(s) if possible.
3. Implement additional acoustic treatment in the form of localised barriers, silencers etc where practical.
4. Selecting alternative equipment/processes where practical.

Table 21 – Recommended Base Minimum Working Distances for Vibration Intensive Plant from Sensitive Receivers

Plant item	Rating / Description	Minimum Working Distance			
		Cosmetic Damage			Human Response
		Light-Framed Structure (BS 7385)	Residential Structures (DIN 4150)	Heritage and Other Sensitive Structures (DIN 4150)	NSW EPA's Vibration Guideline
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2 m	-	5 m	7 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7 m	-	19 m	23 m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22 m	-	60 m	73 m
Vibratory Pile Driver	Sheet piles	20 m	-	50 m	100 m
Pile Boring	≤ 800 mm	2 m (nominal)	-	5 m	7 m
Jackhammer	Hand held	1 m (nominal)	-	2 m	3 m
Profiler	Wirtgen W210	4 m	-	-	-
Asphalt Paver	Vogele Super 1800-3	1 m	-	-	-
Steel Drum Roller	Hamm HD70 (Oscillating Mode)	2 m	-	-	-
Steel Drum Roller	Hamm HD70 (Static Mode)	1 m	-	-	-

14 SUMMARY OF COMPLYING MITIGATION

Initial modelling indicated that additional mitigation is needed to address the impacts identified in the report, and to reasonably minimise impacts.

This additional mitigation is described below, along with other measures to be implemented during the design, construction, commissioning and operation of the proposed development.

14.1 CONSTRUCTION NOISE AND VIBRATION MANAGEMENT

Prior to the commencement of site construction activities, the proponent/main contractor should:

- Assess the noise and vibration impacts based on the proposed construction methodologies.
- Develop and adopt a project specific construction noise and vibration management plan in accordance with Section 10.3, as well as adopt any recommendations in Section 10.3, to manage and regulate construction.

14.2 OPERATIONAL NOISE

14.2.1 Pre Construction

- A detailed noise emissions assessment of all ventilation or other plant items should be undertaken at construction certificate stage once equipment items are selected and locations are finalised. The assessment should indicate any treatment required to comply with the trigger levels identified in Section 8 and this treatment should be implemented.

14.2.2 Duration Operation – Management Controls

- Construction and maintenance (including the collection of waste) is to occur between the following hours (unless specific approval is obtained otherwise):
    - General construction and site maintenance – 7am to 6pm Monday to Friday and 8am to 1pm Saturdays.
    - Waste collection -7am to 6pm Monday to Friday

14.3 PHYSICAL CONTROLS

- Complying mitigation controls are provided within Section 6 to minimise noise from noise intrusion.
- Plant and equipment is to be maintained so that it does not emit excessive noise.

15 CONCLUSION

This report presents an assessment of noise and vibration impacts associated with the proposed residential development to be located at 46-52 Nicholson Street and 57-67 Christie Street, St Leonards.

Based on the information provided above we conclude the following:

Provided complying constructions are presented within Section 7 of this report are adopted, internal noise levels for the development will comply with the acoustic requirements of the following documents:

- NSW Department of Planning and Environment's document "State Environmental Planning Policy **(SEPP)** (Transport and Infrastructure) 2021",
- NSW Department of Planning's "Developments near Rail Corridors or Busy Roads – Interim Guideline" **(DNRCBR)**, and

Noise emissions criteria from the operation of the development has been set up by using the following documents:

- SSD – 88113706 – "Secretary's Environmental Assessment Requirements (**SEARs**)",
- NSW Environmental Protection Authority (EPA) – "Noise Policy for Industry" (**NPfI**) October 2017,

Once detailed location and selections of all proposed mechanical plant are known, an acoustic review should be undertaken to ensure compliance with the above. This should be undertaken during CC stage.

Once detailed construction plans and methodologies have been established a full noise and vibration management plan should be parped in CC stage to ensure compliance with the following:

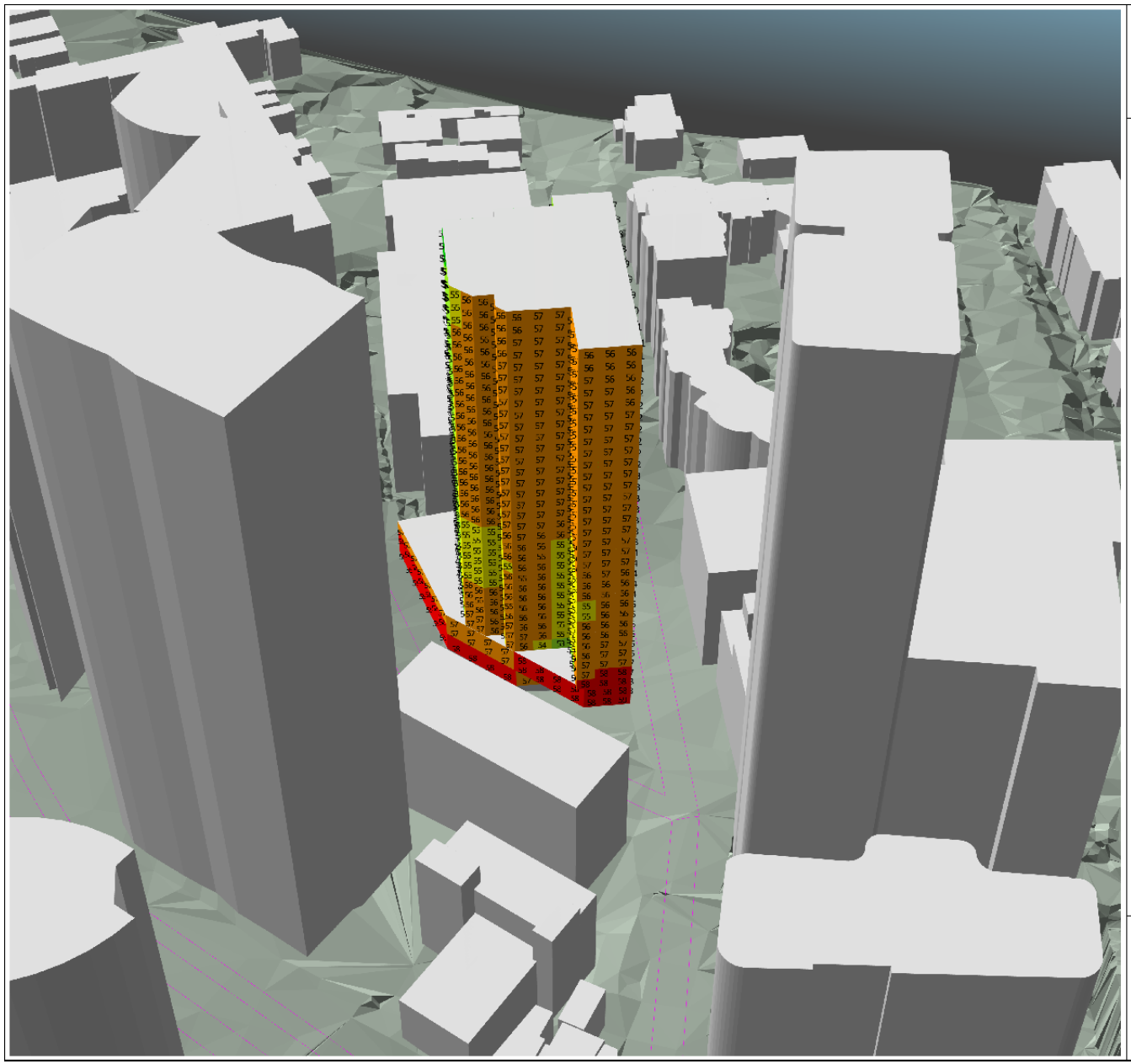
- NSW Environmental Protection Authority (EPA) – "Interim Construction Noise Guideline" (**ICNG**) July 2009,
- NSW Department of Environment and Conservation Assessment Vibration: A Technical Guideline "**Assessment Vibration Guideline**" February 2006.
- German Standard **DIN 4150 – 3** "Structural Vibration: effects of Vibration on Structures"

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Andrew Pham

APPENDIX A – SOUNDPLAN MODELLING OUTPUT



46-52 Nicholson Street & 59-67 Christie Street, St Leonards

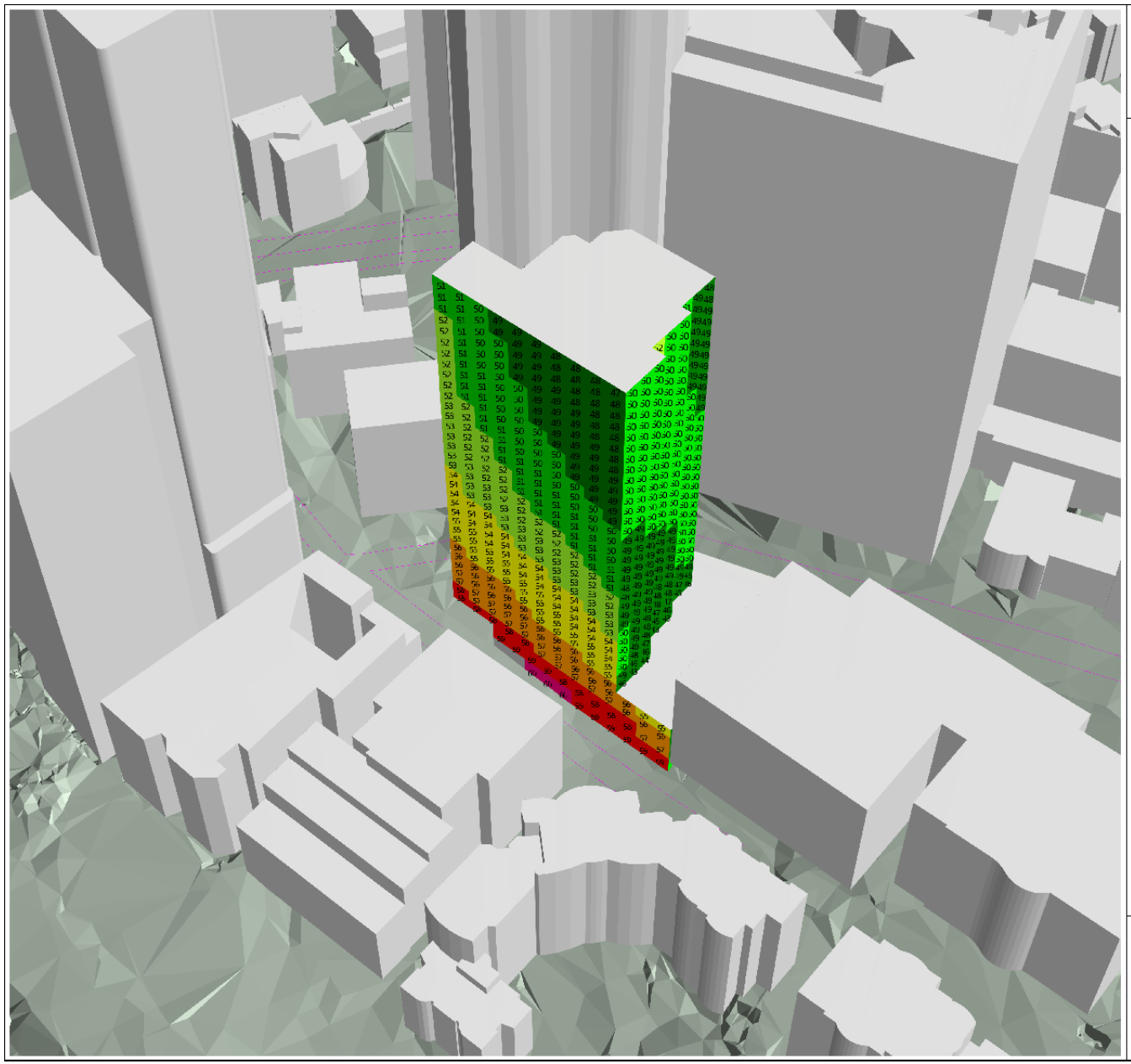
Traffic Noise Levels - Day

Prepared by: A. Pham
Date: 15/10/2025

Noise Level
L_{eq}
in dB(A)

	< 50
	50 - 52
	52 - 54
	54 - 56
	56 - 58
	58 - 60
	60 - 62
	62 - 64
	64 - 66
	66 - 68
	68 - 70
	>= 70

ACOUSTIC LOGIC



46-52 Nicholson Street & 59-67 Christie Street, St Leonards

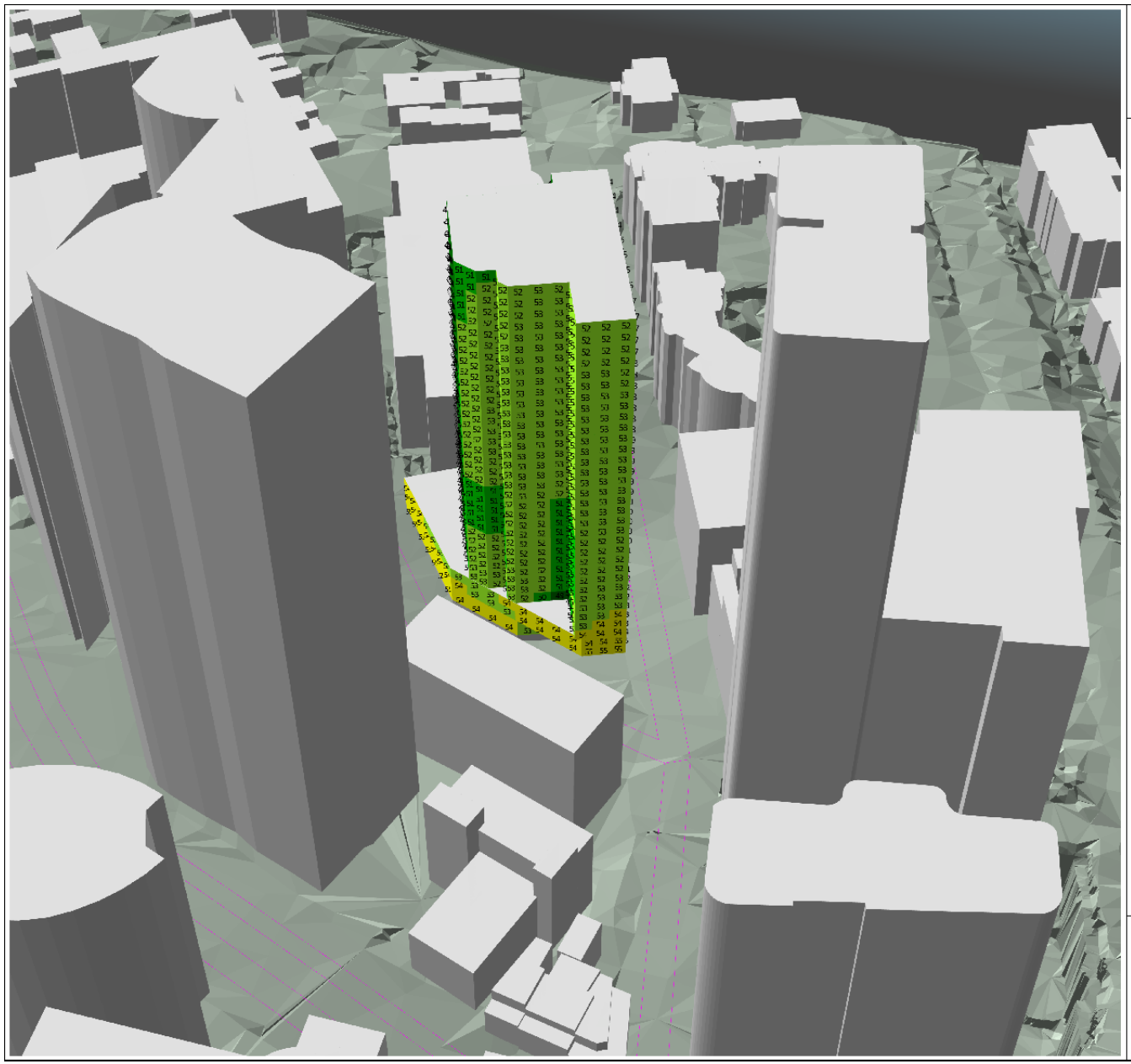
Traffic Noise Levels - Day

Prepared by: A. Pham
Date: 15/10/2025

Noise Level
L_{eq}
in dB(A)

	< 50
	50 - 52
	52 - 54
	54 - 56
	56 - 58
	58 - 60
	60 - 62
	62 - 64
	64 - 66
	66 - 68
	68 - 70
	>= 70

ACOUSTIC LOGIC



46-52 Nicholson Street & 59-67 Christie Street, St Leonards

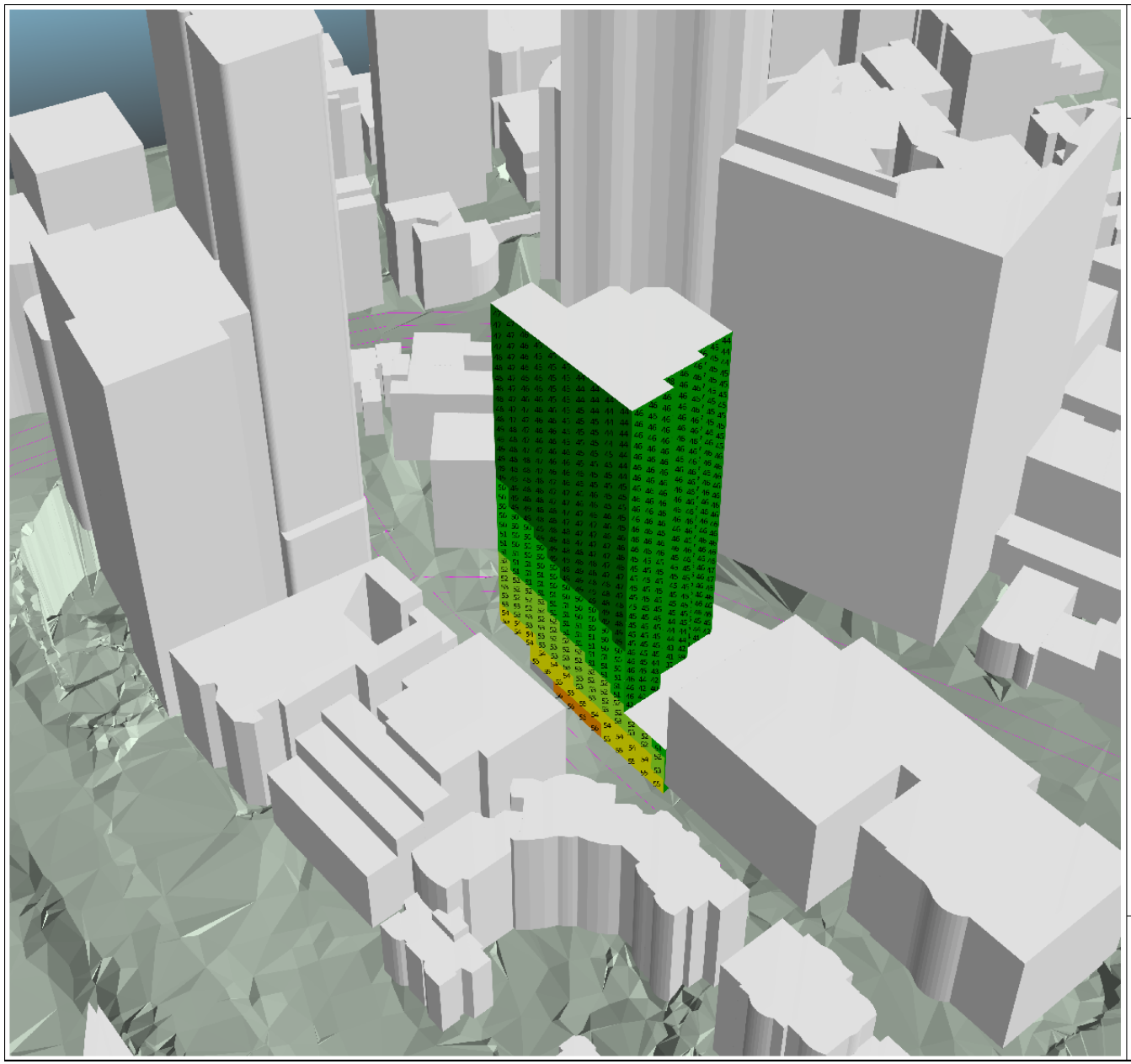
Traffic Noise Levels - Night

Prepared by: A. Pham
Date: 15/10/2025

Noise Level
L_{eq}
in dB(A)

	< 50
	50 - 52
	52 - 54
	54 - 56
	56 - 58
	58 - 60
	60 - 62
	62 - 64
	64 - 66
	66 - 68
	68 - 70
	>= 70

ACOUSTIC LOGIC



46-52 Nicholson Street & 59-67 Christie Street, St Leonards

Traffic Noise Levels - Night

Prepared by: A. Pham
Date: 15/10/2025

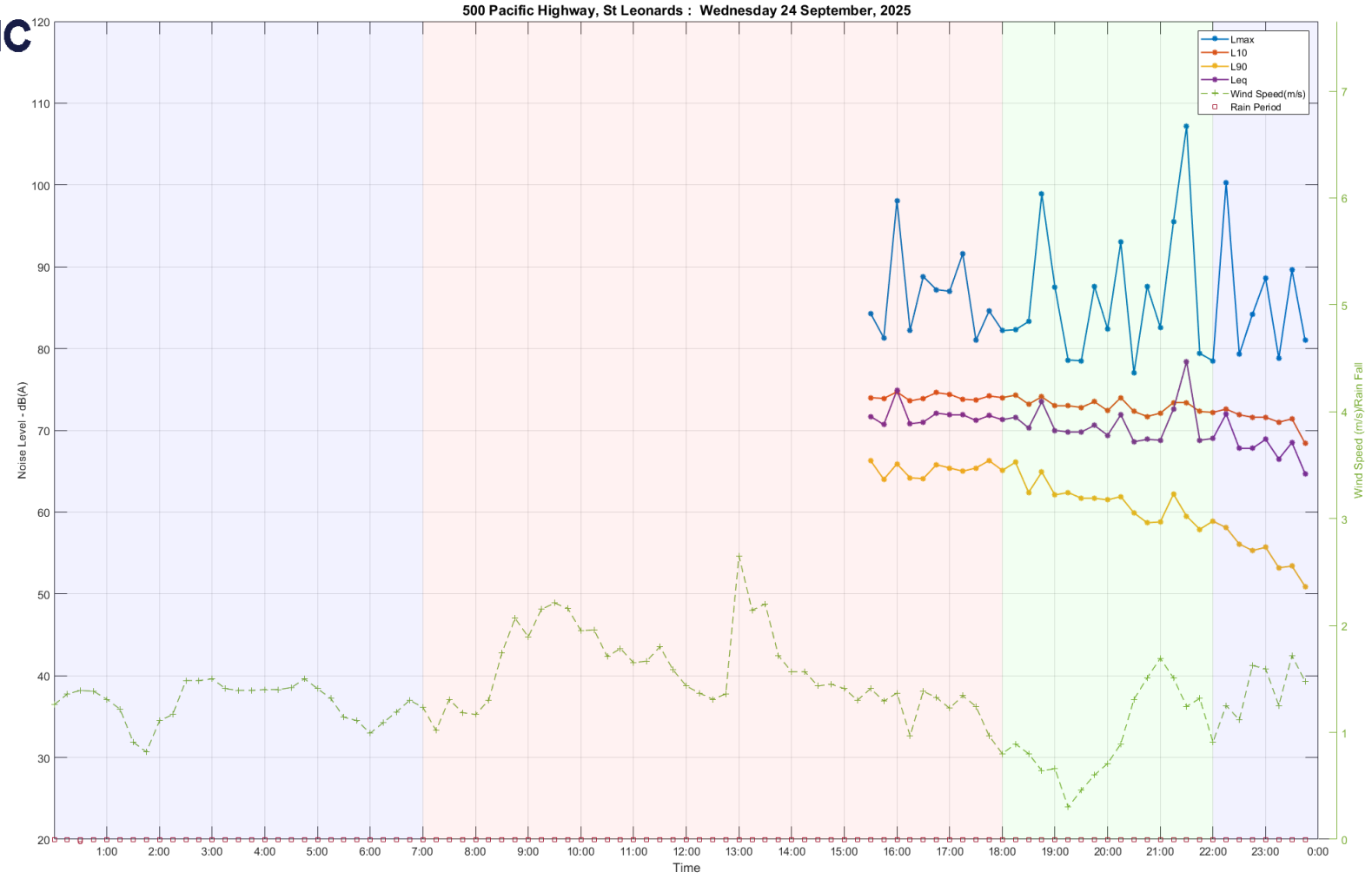
Noise Level
L_{eq}
in dB(A)

	< 50
	50 - 52
	52 - 54
	54 - 56
	56 - 58
	58 - 60
	60 - 62
	62 - 64
	64 - 66
	66 - 68
	68 - 70
	>= 70

ACOUSTIC LOGIC

APPENDIX B – UNATTENDED NOISE MONITORING GRAPHS

B.2 L2 OF 500 PACIFIC HIGHWAY, ST LEONARDS


500 Pacific Highway, St Leonards : Wednesday 24 September, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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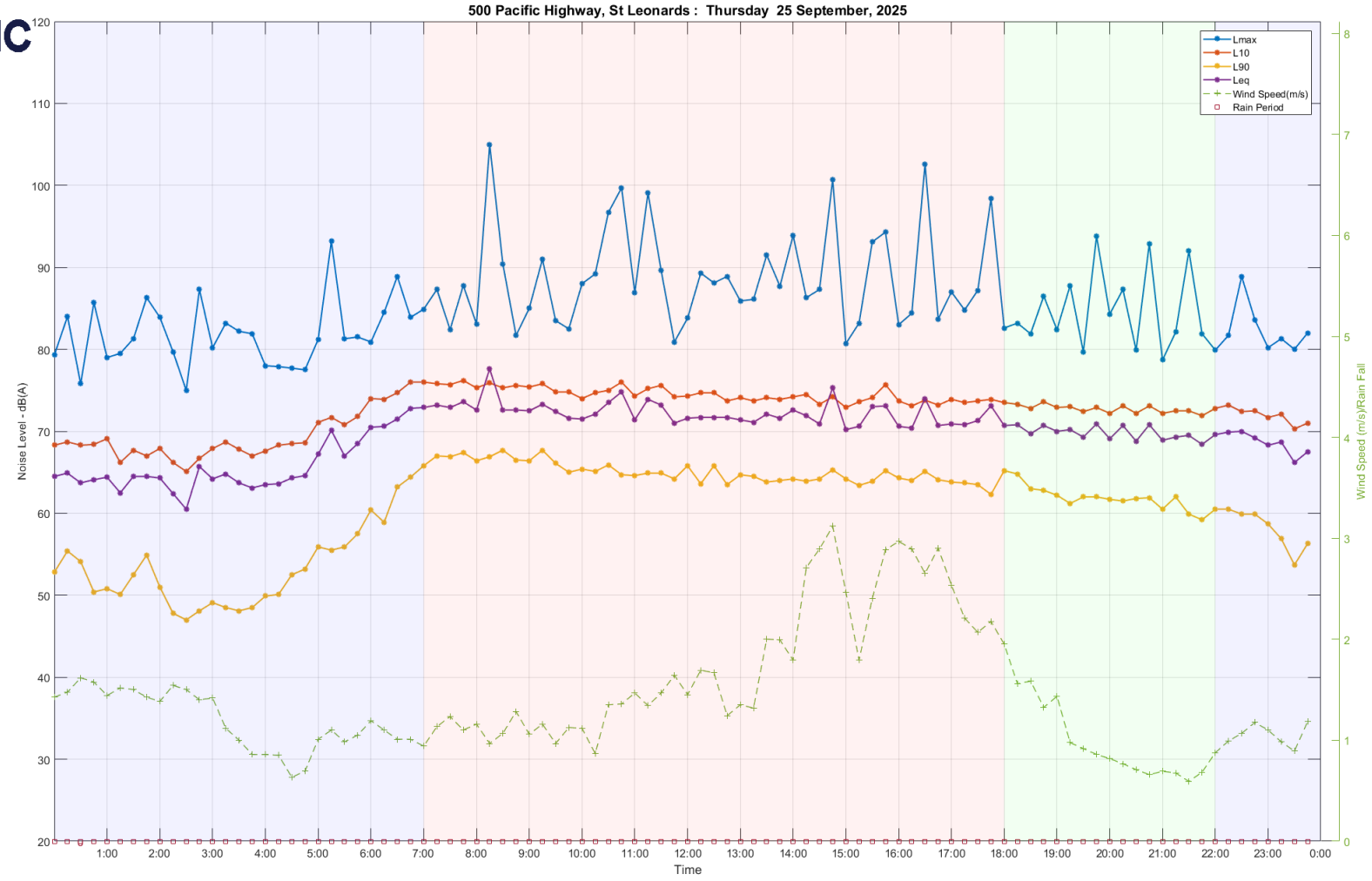
19:00
20:00
21:00
22:00
23:00
0:00


500 Pacific Highway, St Leonards : Thursday 25 September, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
8
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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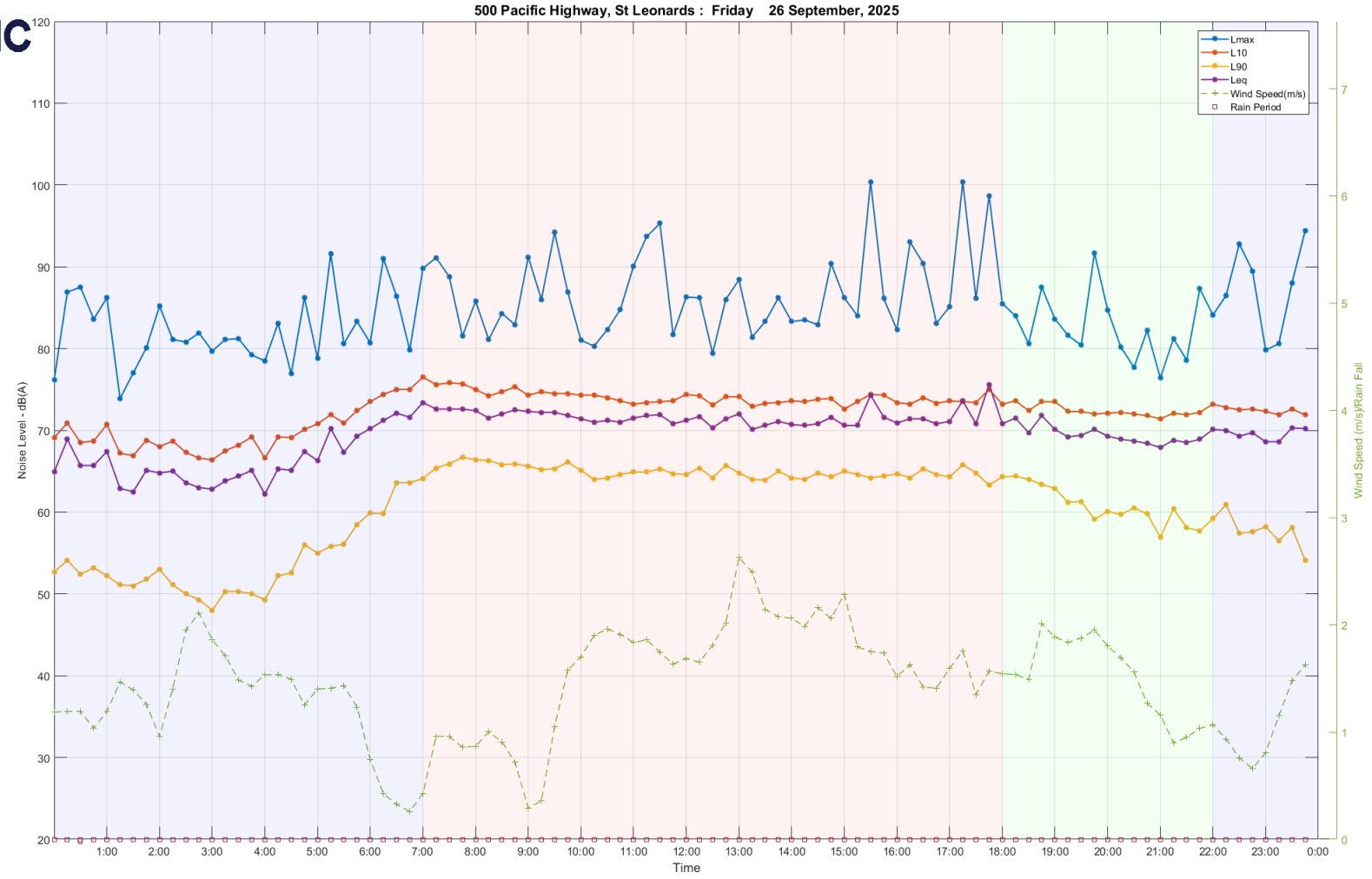
23:00
0:00


500 Pacific Highway, St Leonards : Friday 26 September, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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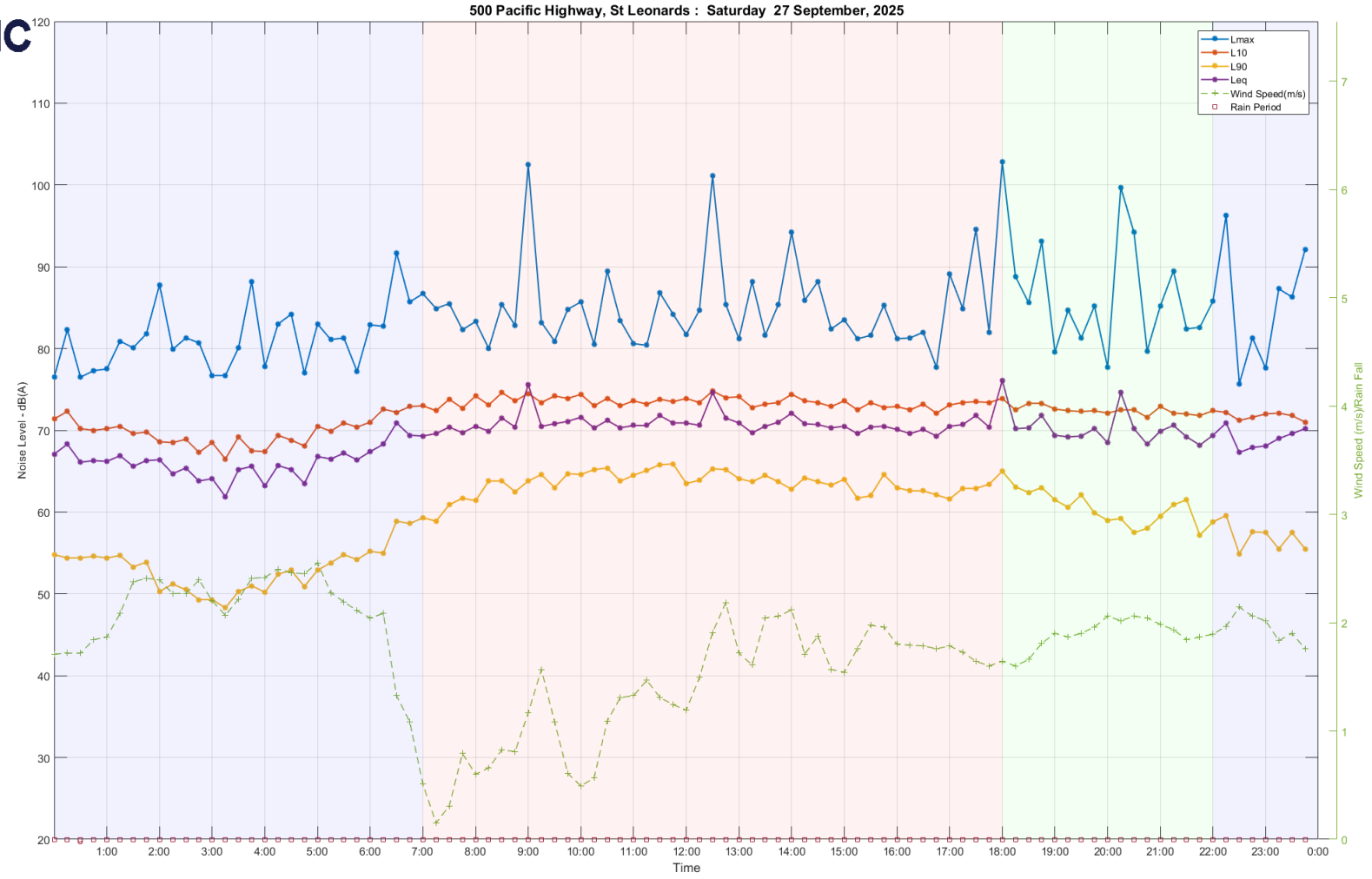
0:00


500 Pacific Highway, St Leonards : Saturday 27 September, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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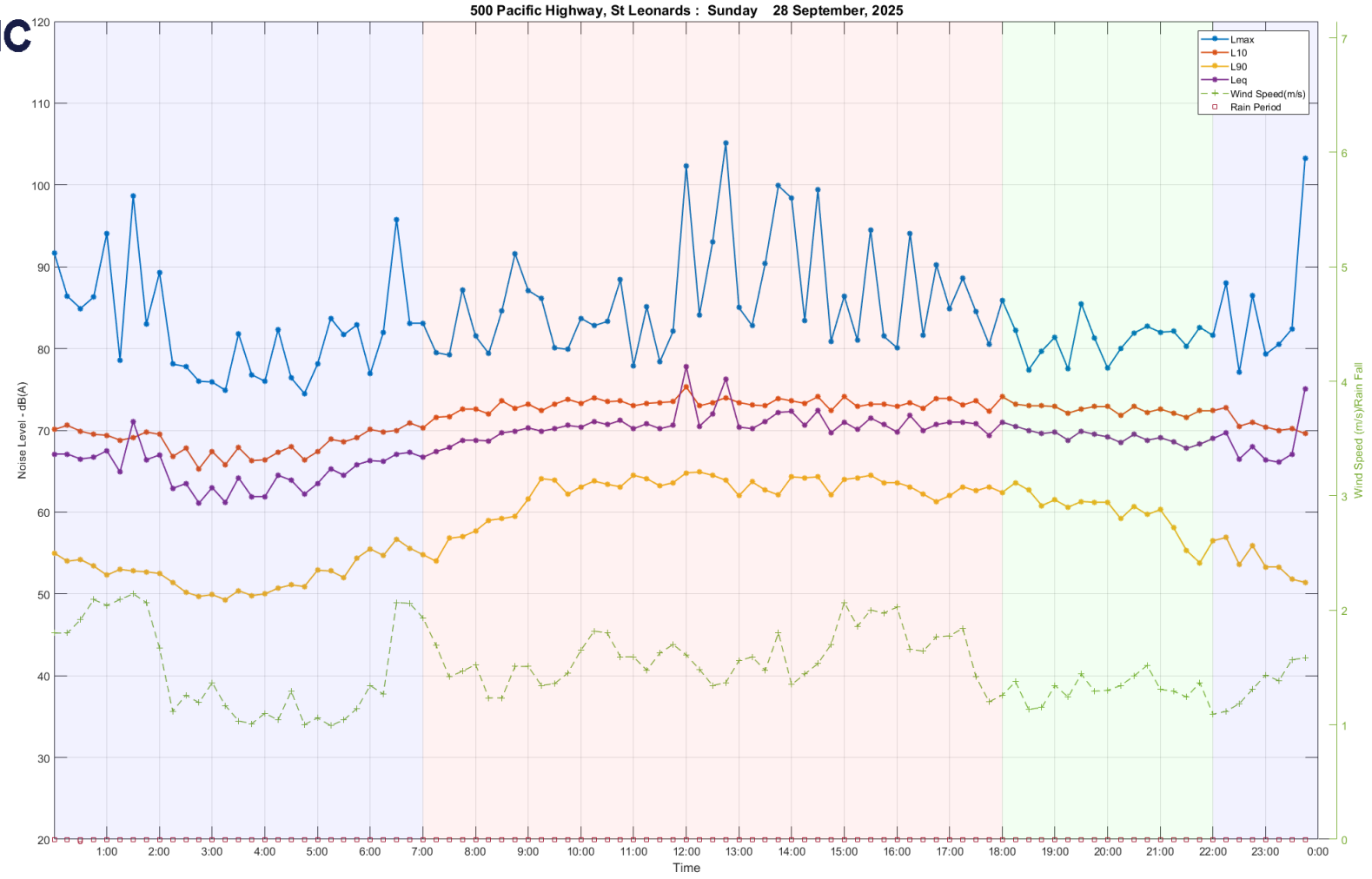
19:00
20:00
21:00
22:00
23:00
0:00


500 Pacific Highway, St Leonards : Sunday 28 September, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
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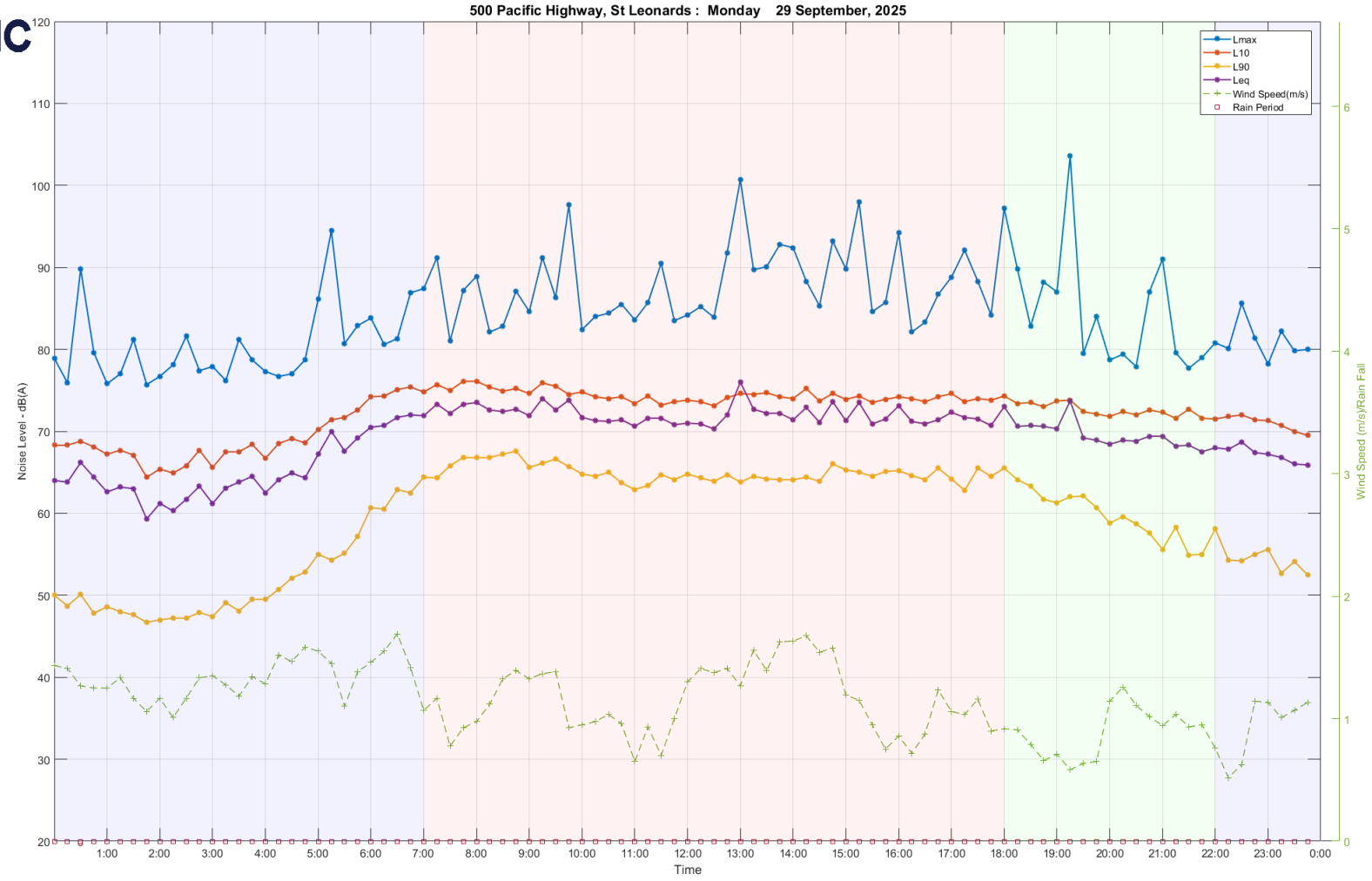
500 Pacific Highway, St Leonards : Monday 29 September, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
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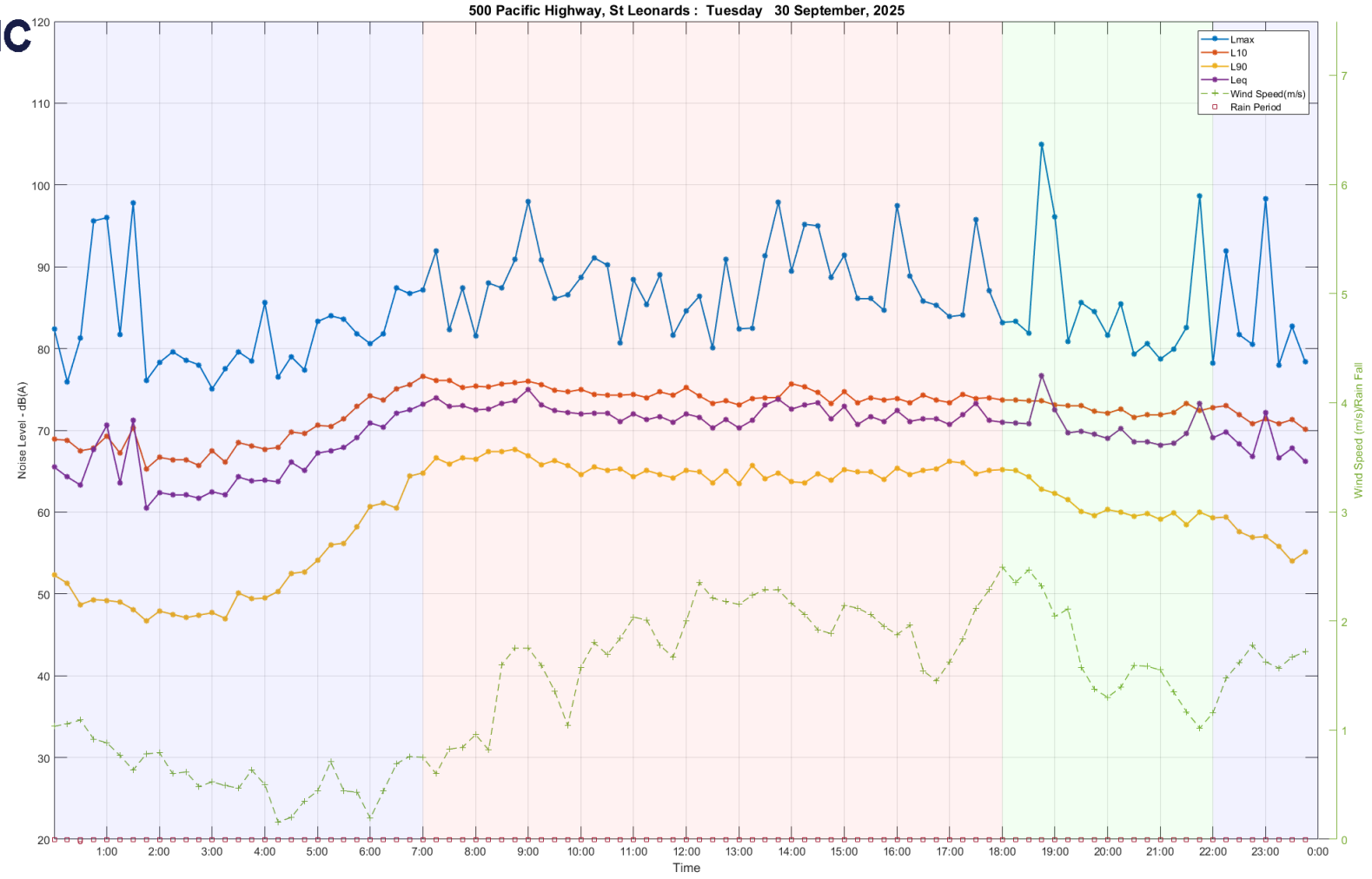
500 Pacific Highway, St Leonards : Tuesday 30 September, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
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40
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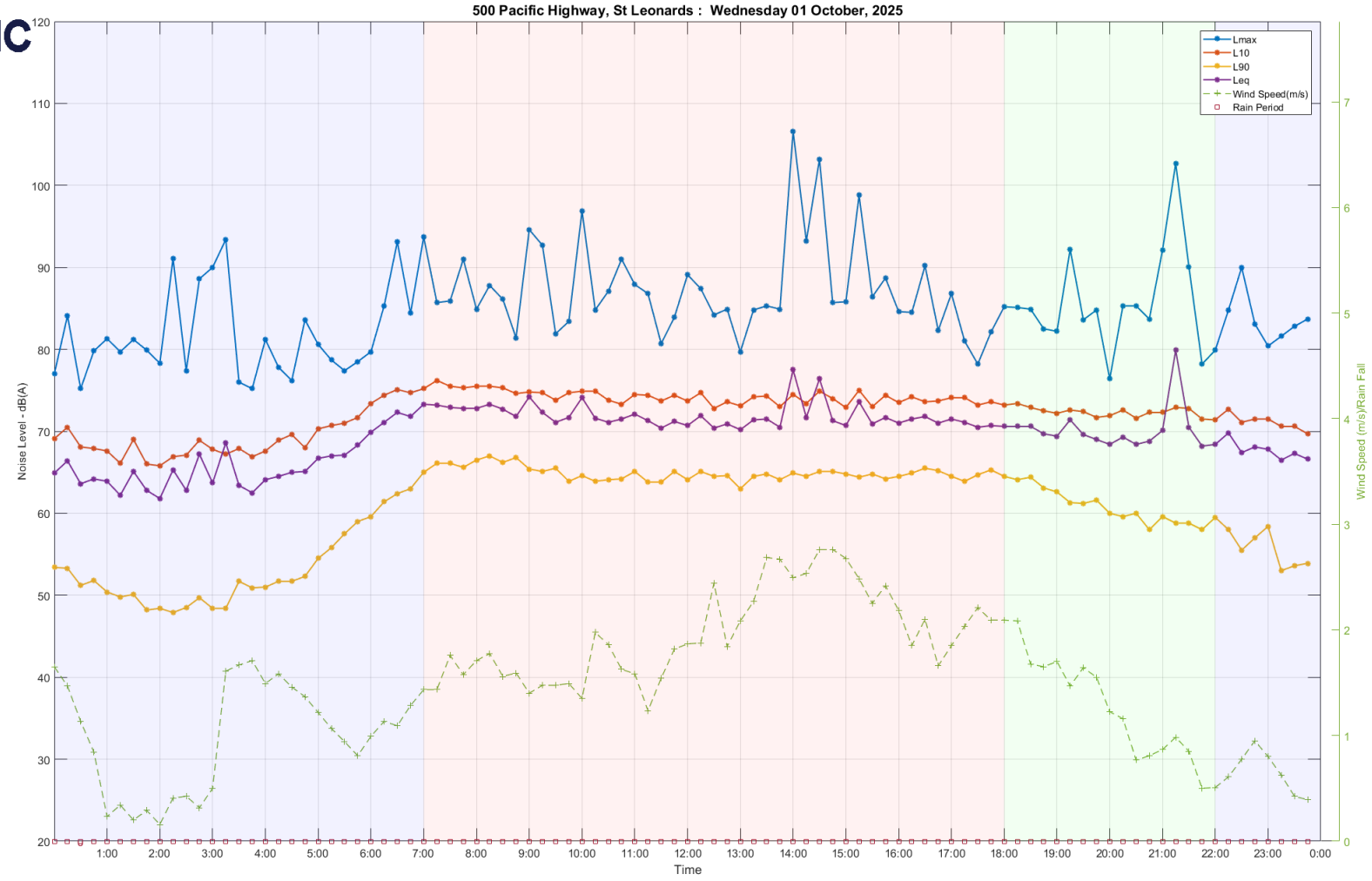
500 Pacific Highway, St Leonards : Wednesday 01 October, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
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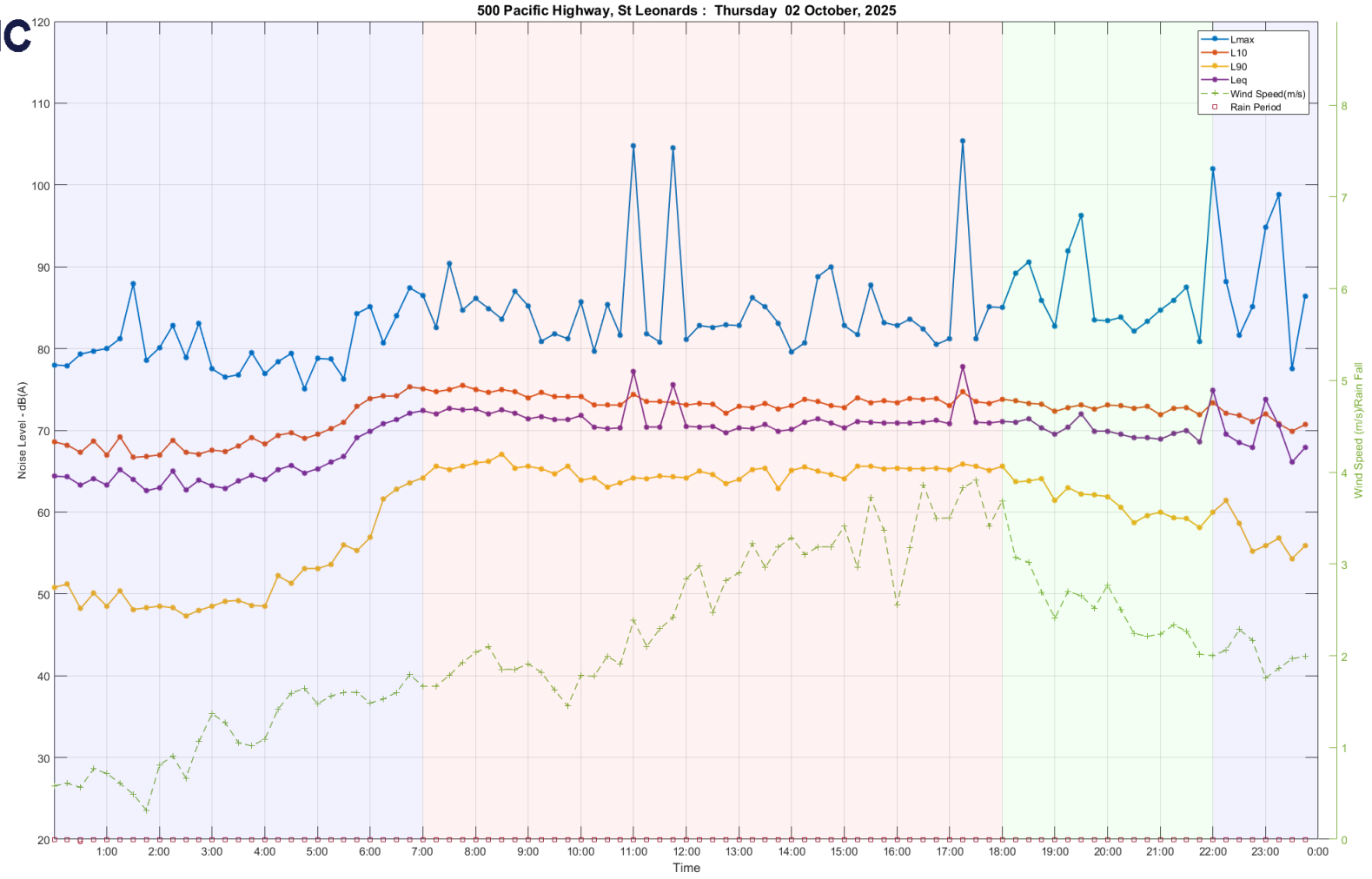
500 Pacific Highway, St Leonards : Thursday 02 October, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
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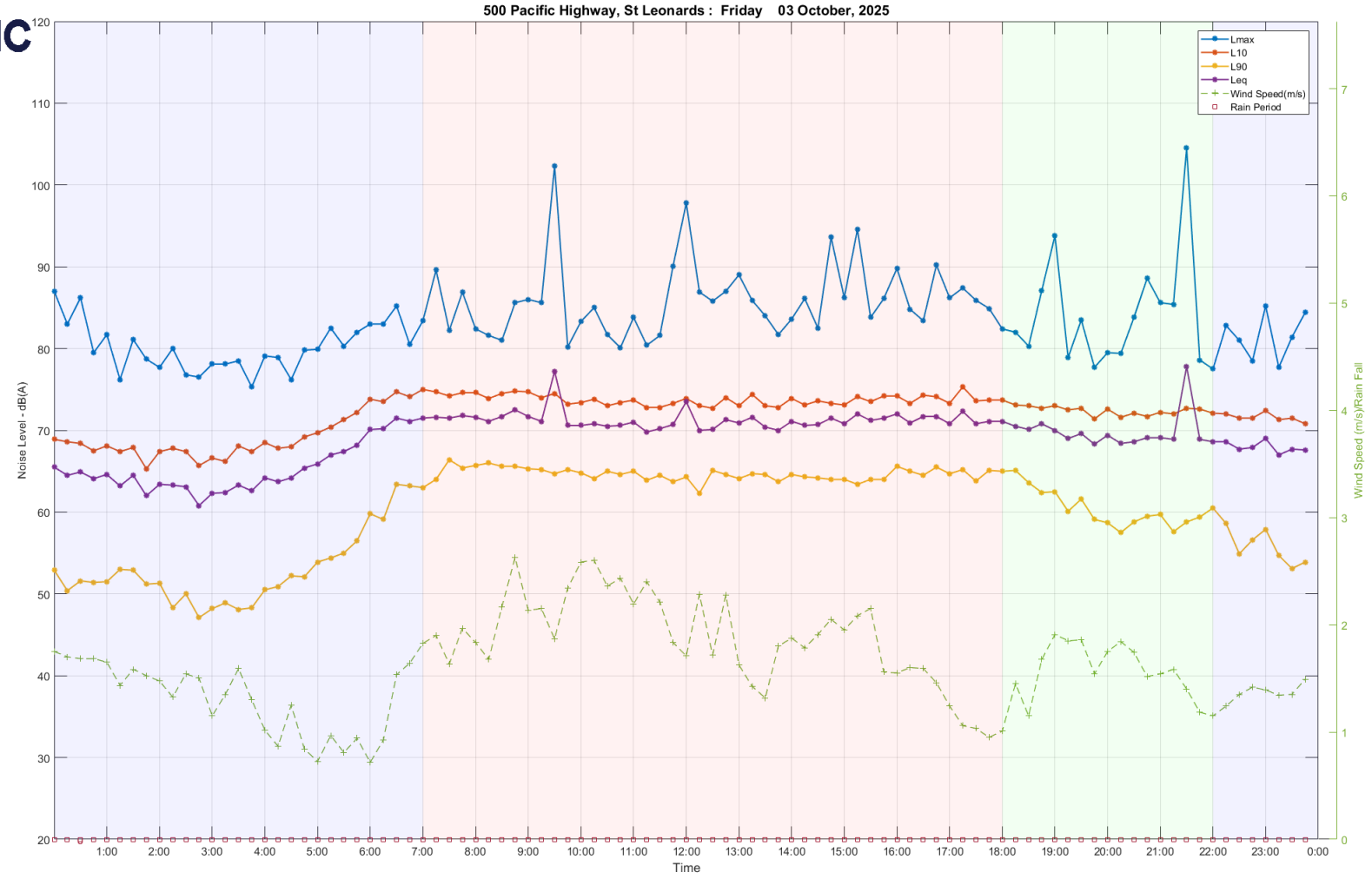
500 Pacific Highway, St Leonards : Friday 03 October, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
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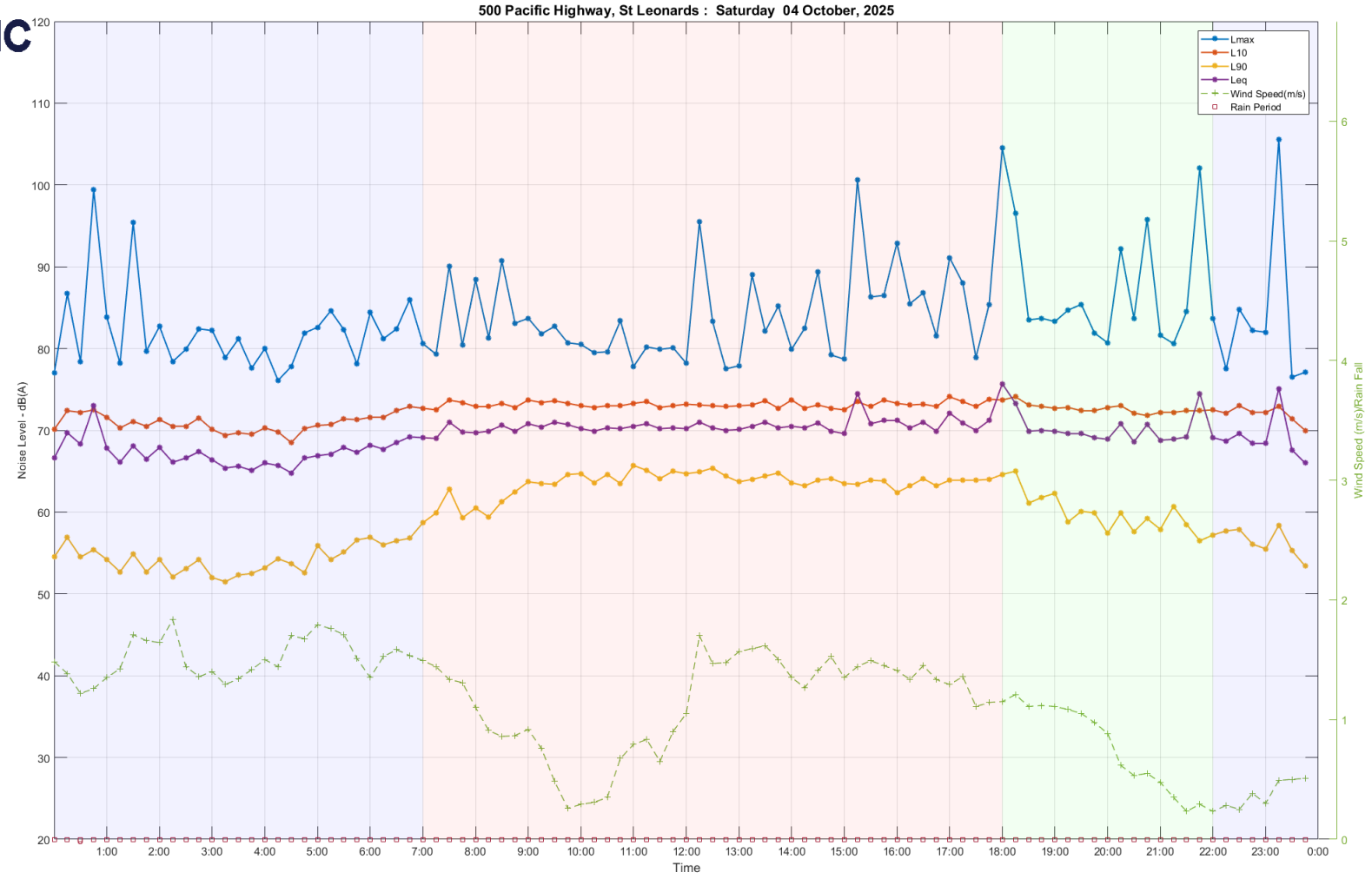
500 Pacific Highway, St Leonards : Saturday 04 October, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
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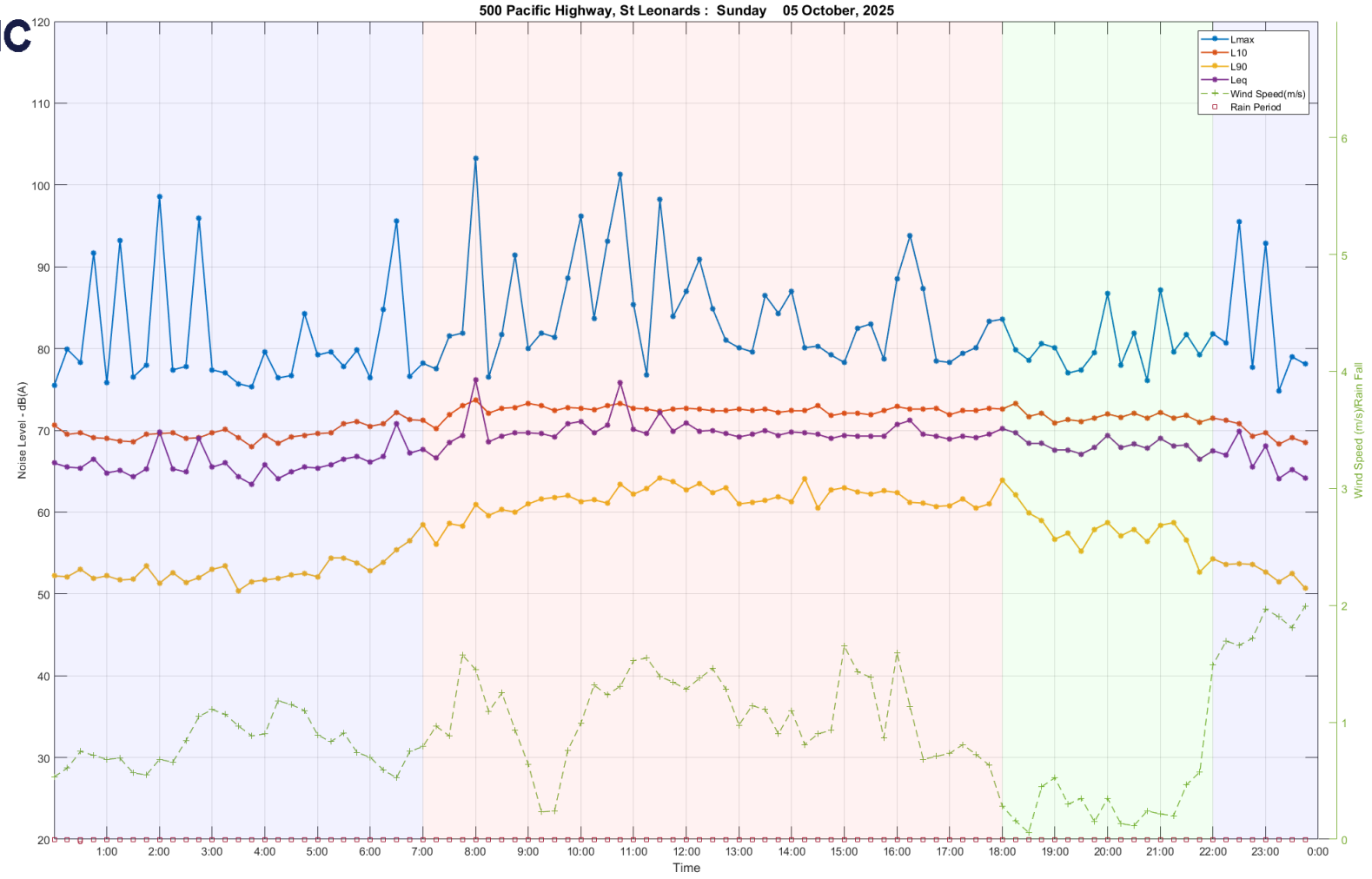
500 Pacific Highway, St Leonards : Sunday 05 October, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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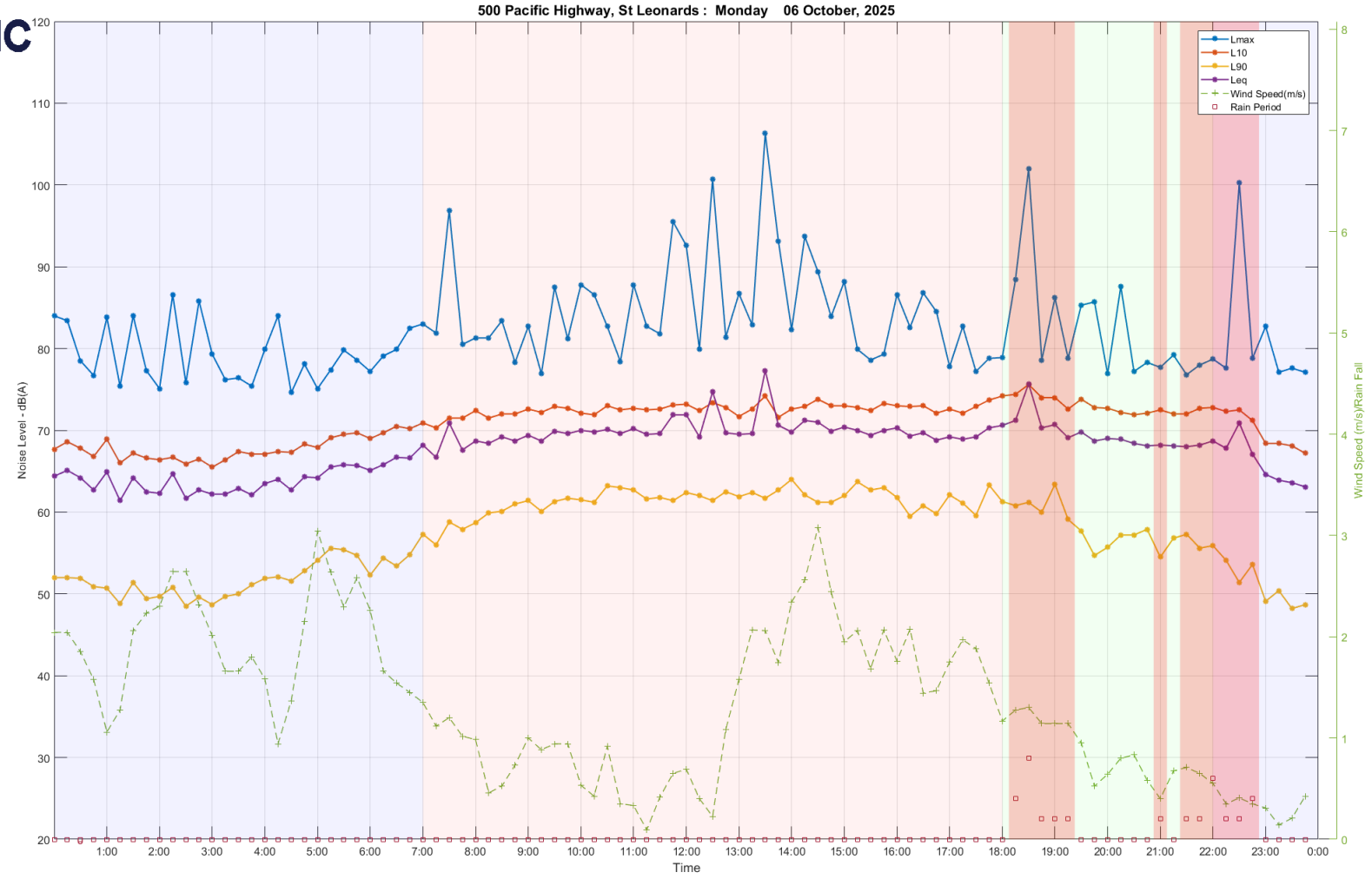
500 Pacific Highway, St Leonards : Monday 06 October, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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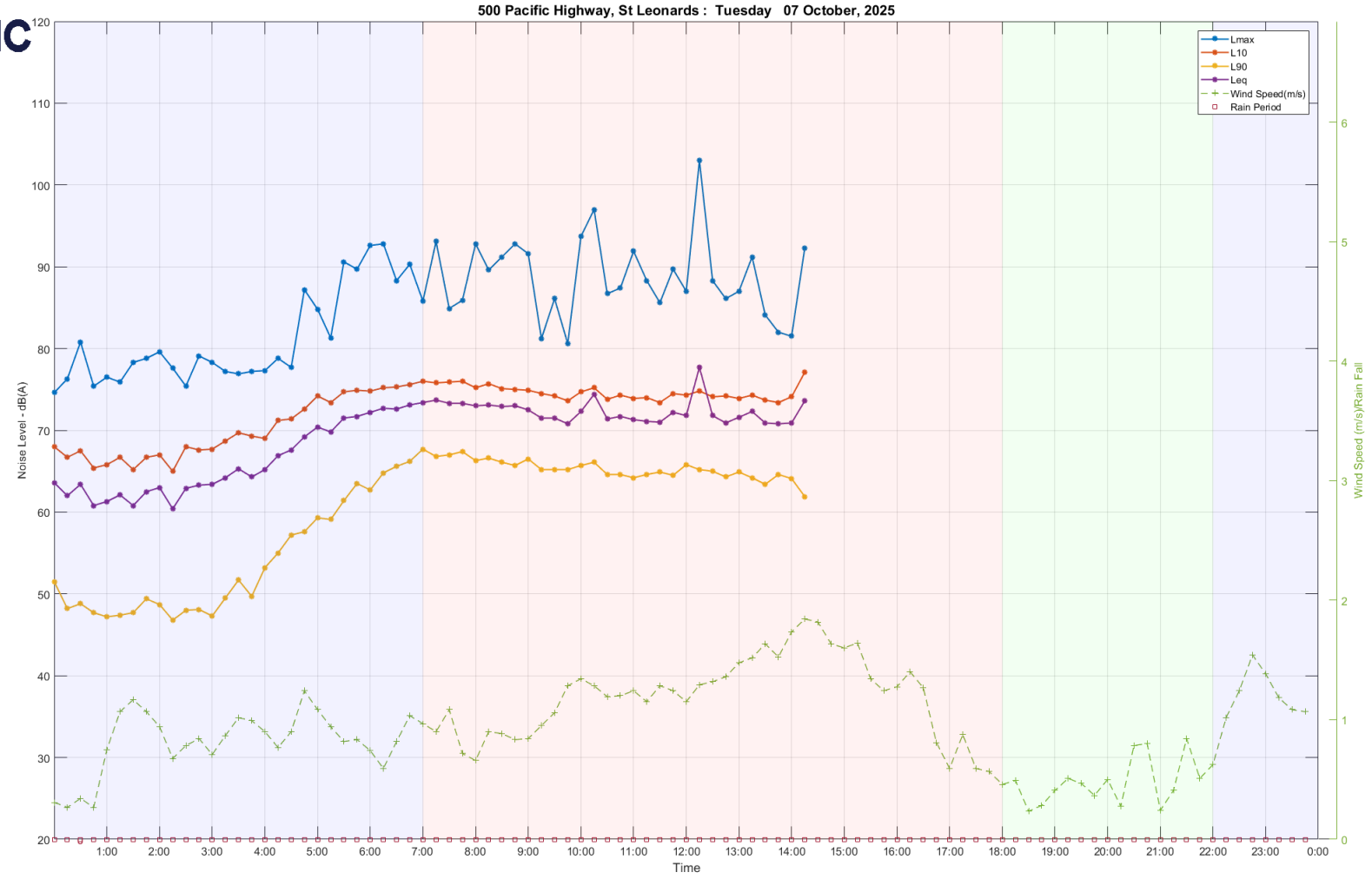
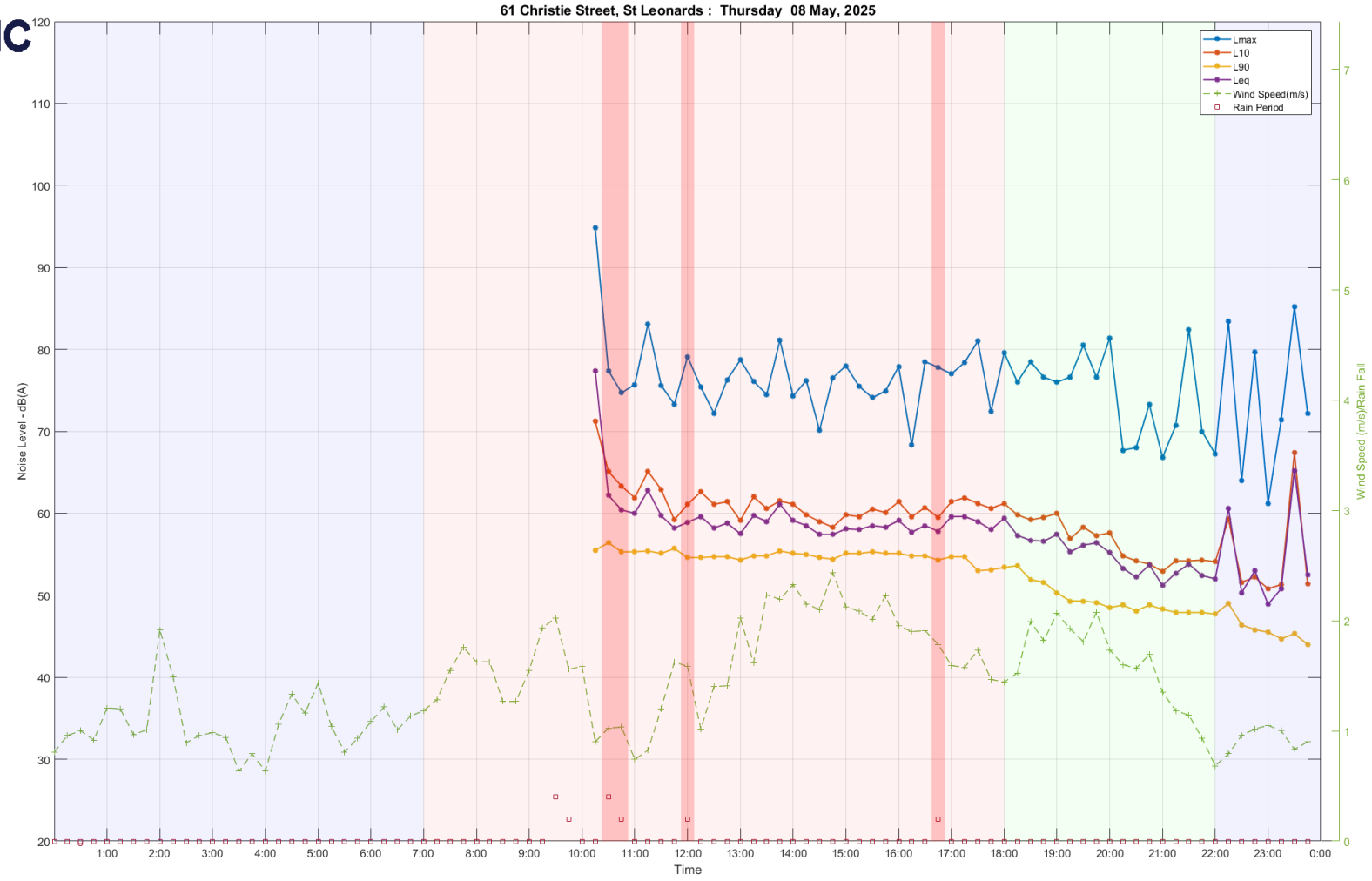


Wind Speed is corrected using factor 0.3000 based on logger location

B.3 61 CHRISTIE STREET, ST LEONARDS


61 Christie Street, St Leonards : Thursday 08 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
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7
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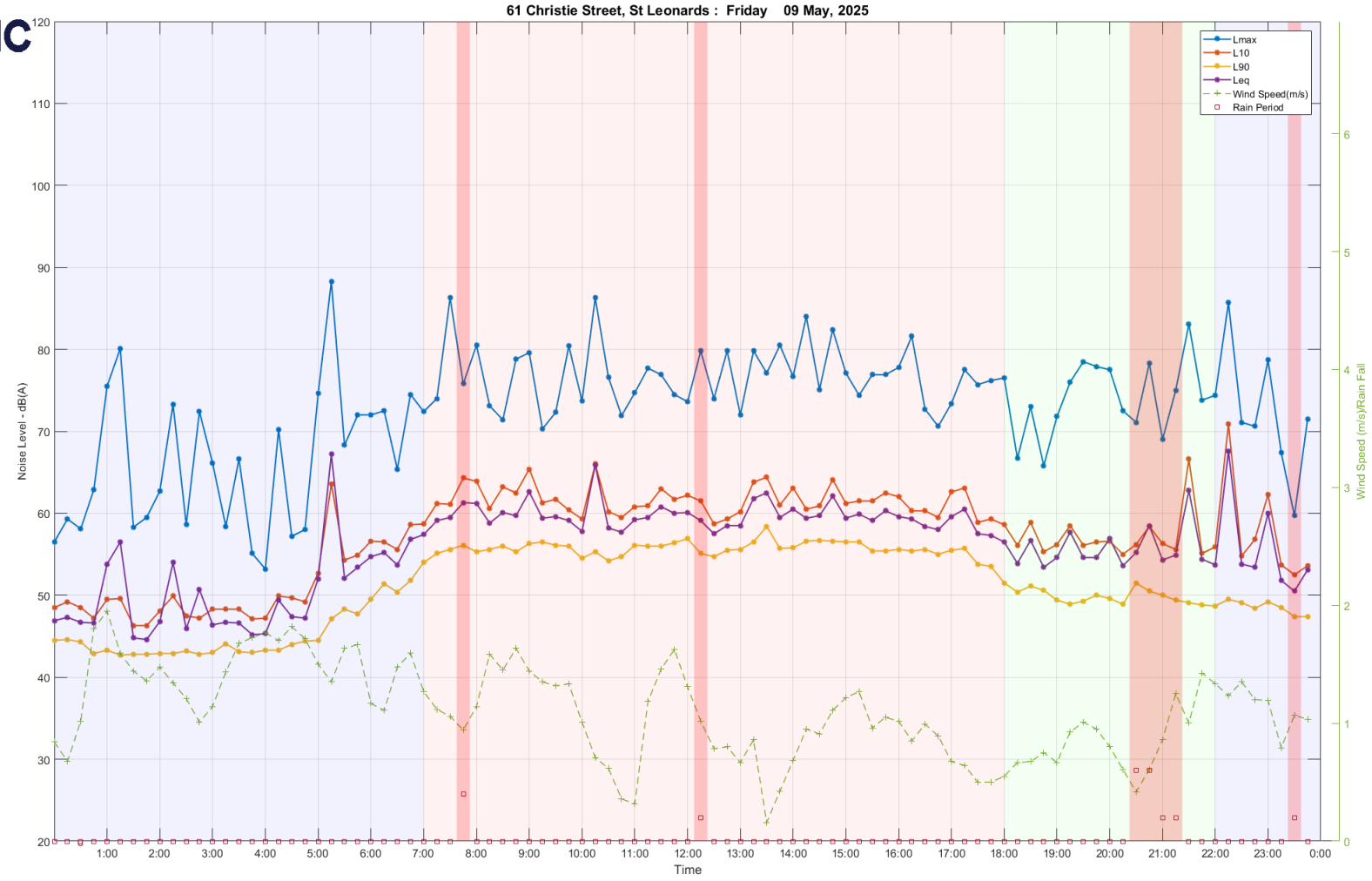
61 Christie Street, St Leonards : Friday 09 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
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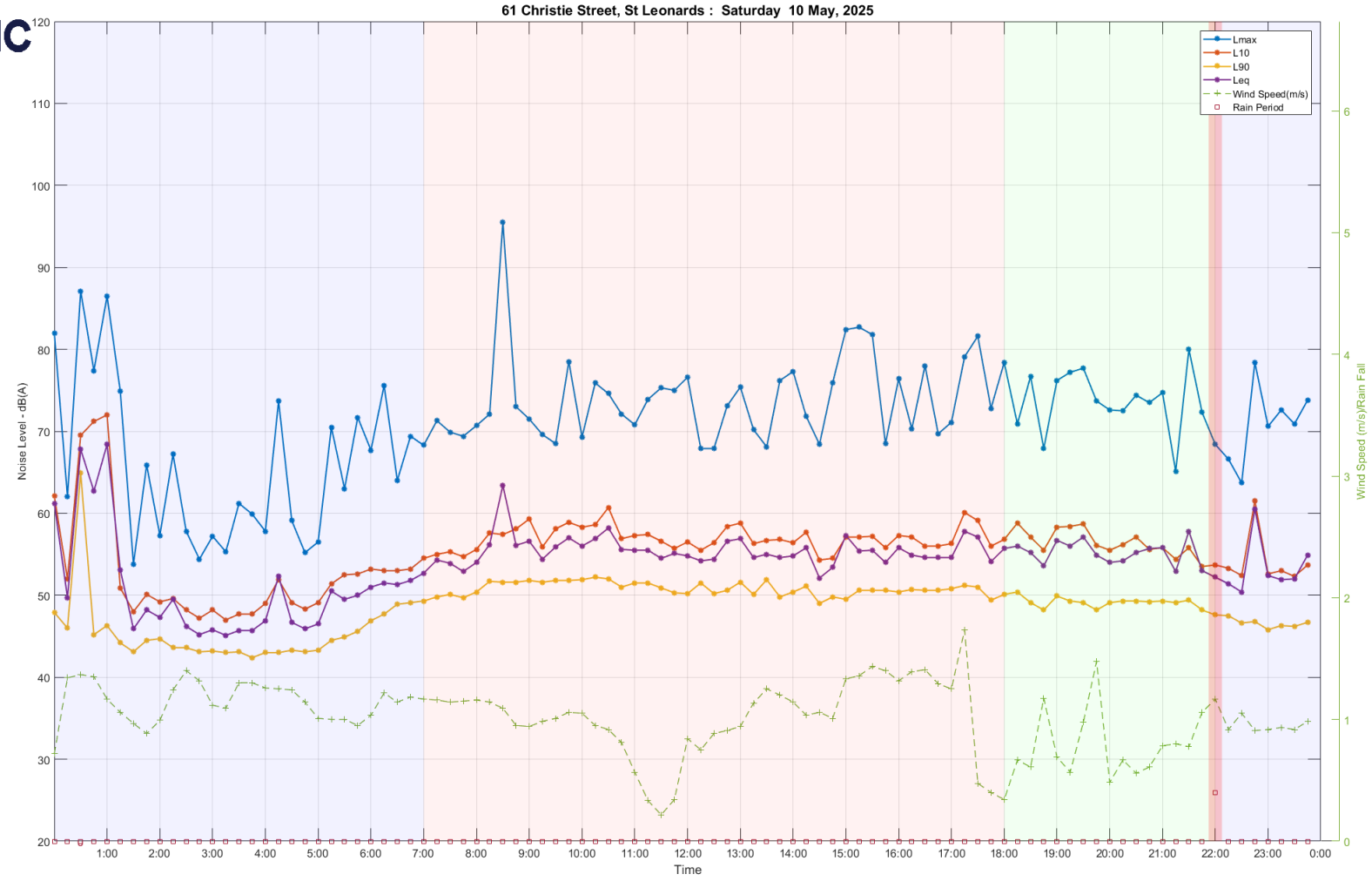
61 Christie Street, St Leonards : Saturday 10 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
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40
30
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6
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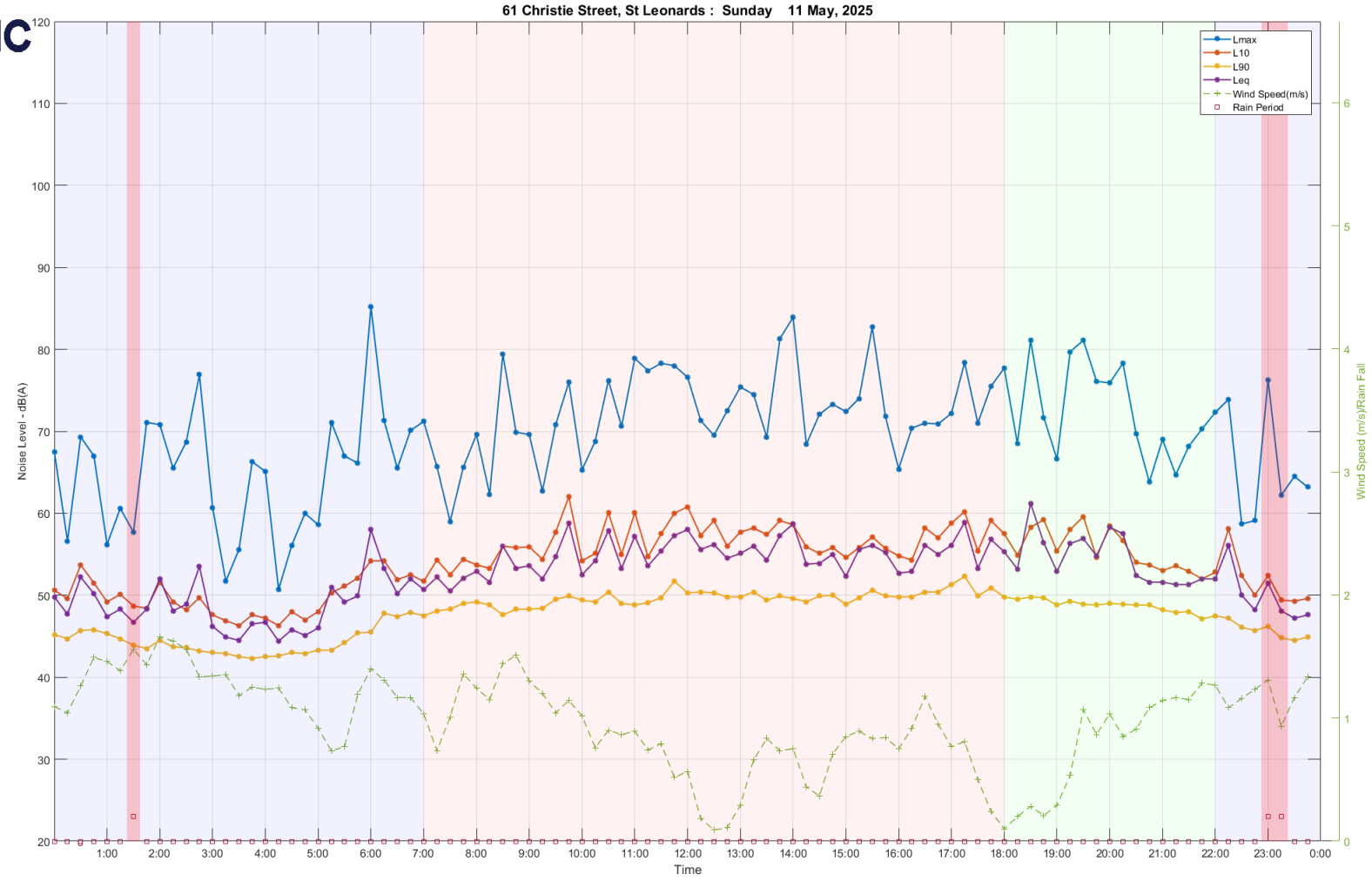
61 Christie Street, St Leonards : Sunday 11 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
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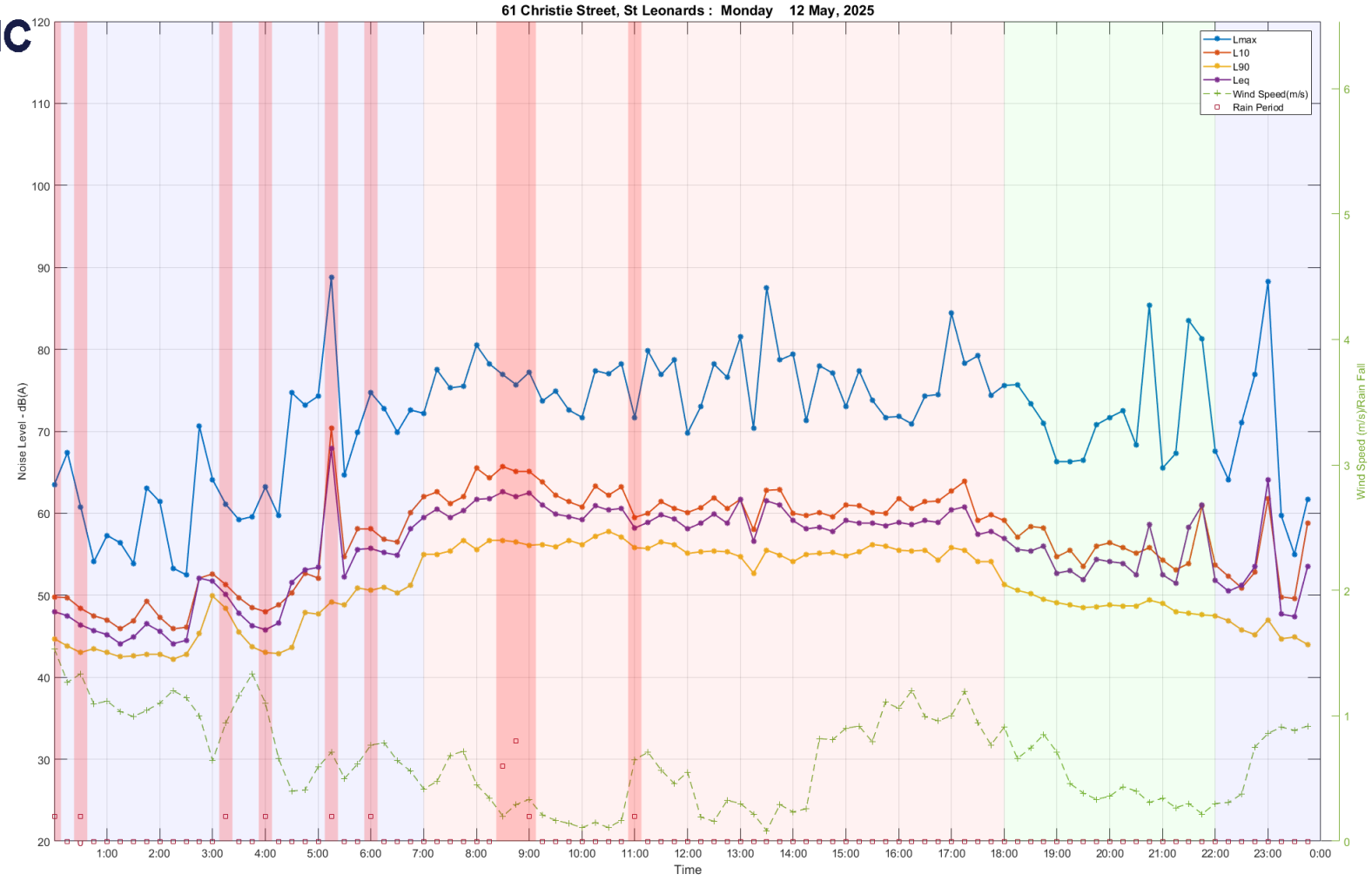
61 Christie Street, St Leonards : Monday 12 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
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50
40
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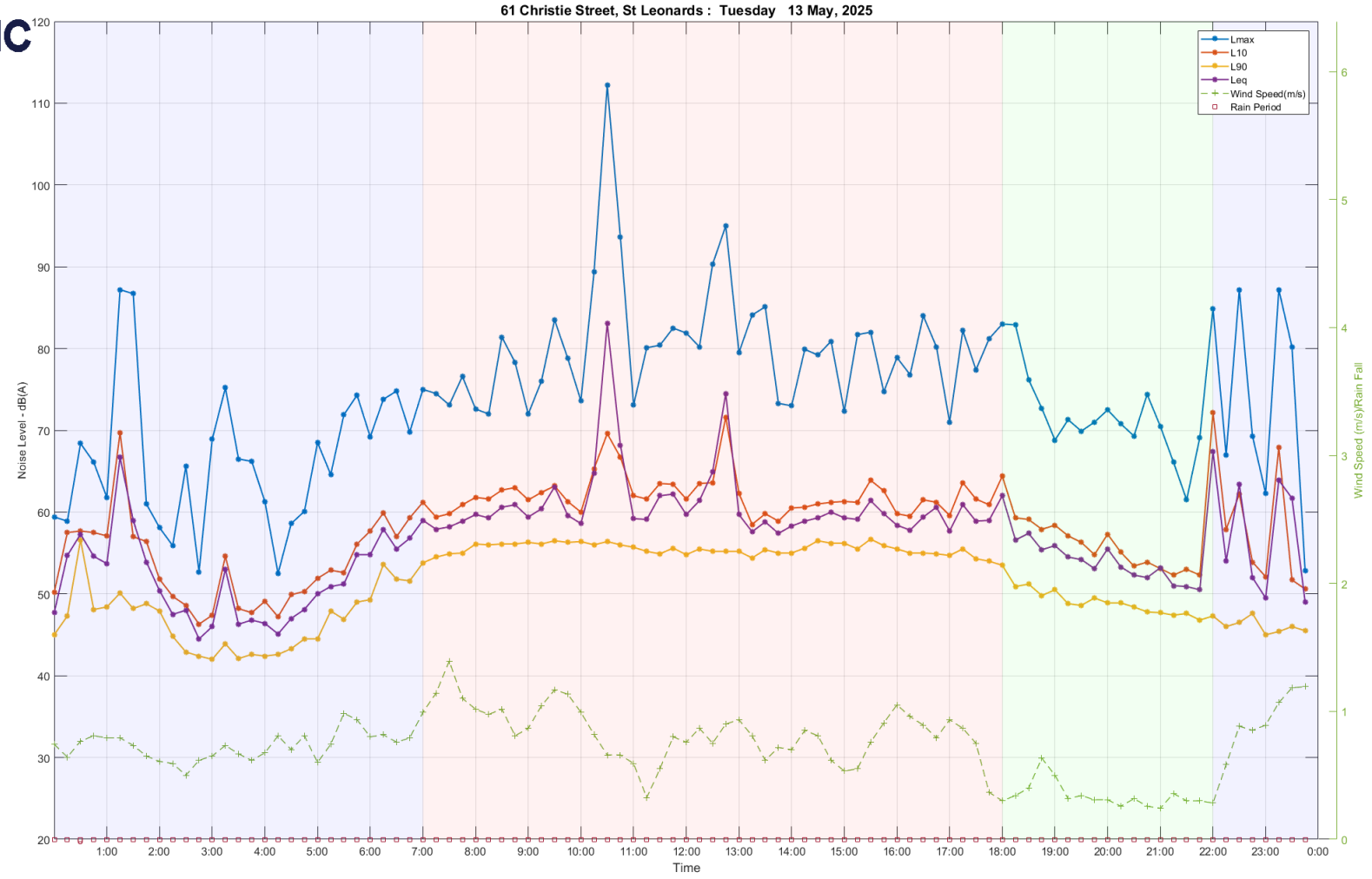
61 Christie Street, St Leonards : Tuesday 13 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
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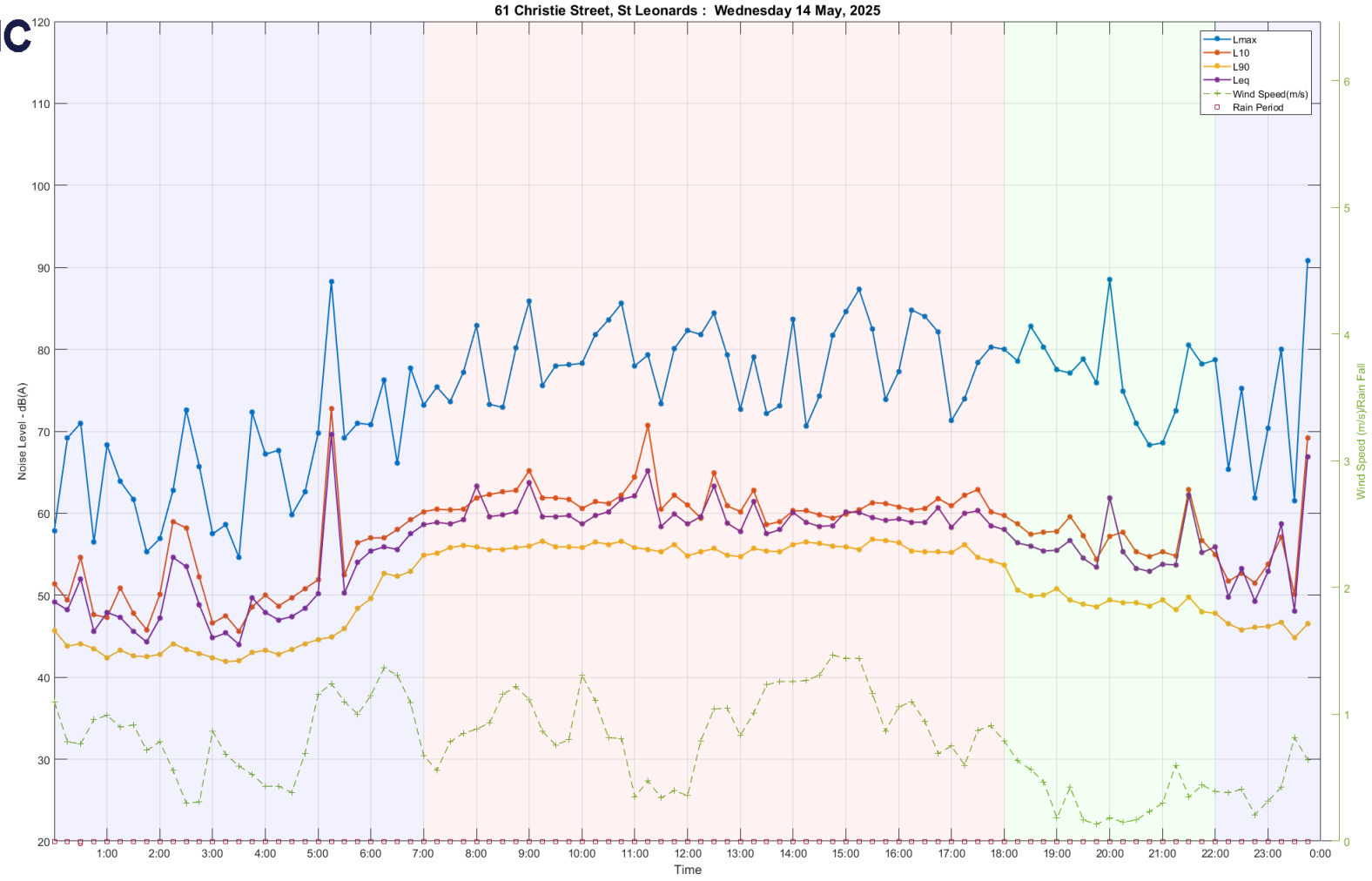
61 Christie Street, St Leonards : Wednesday 14 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
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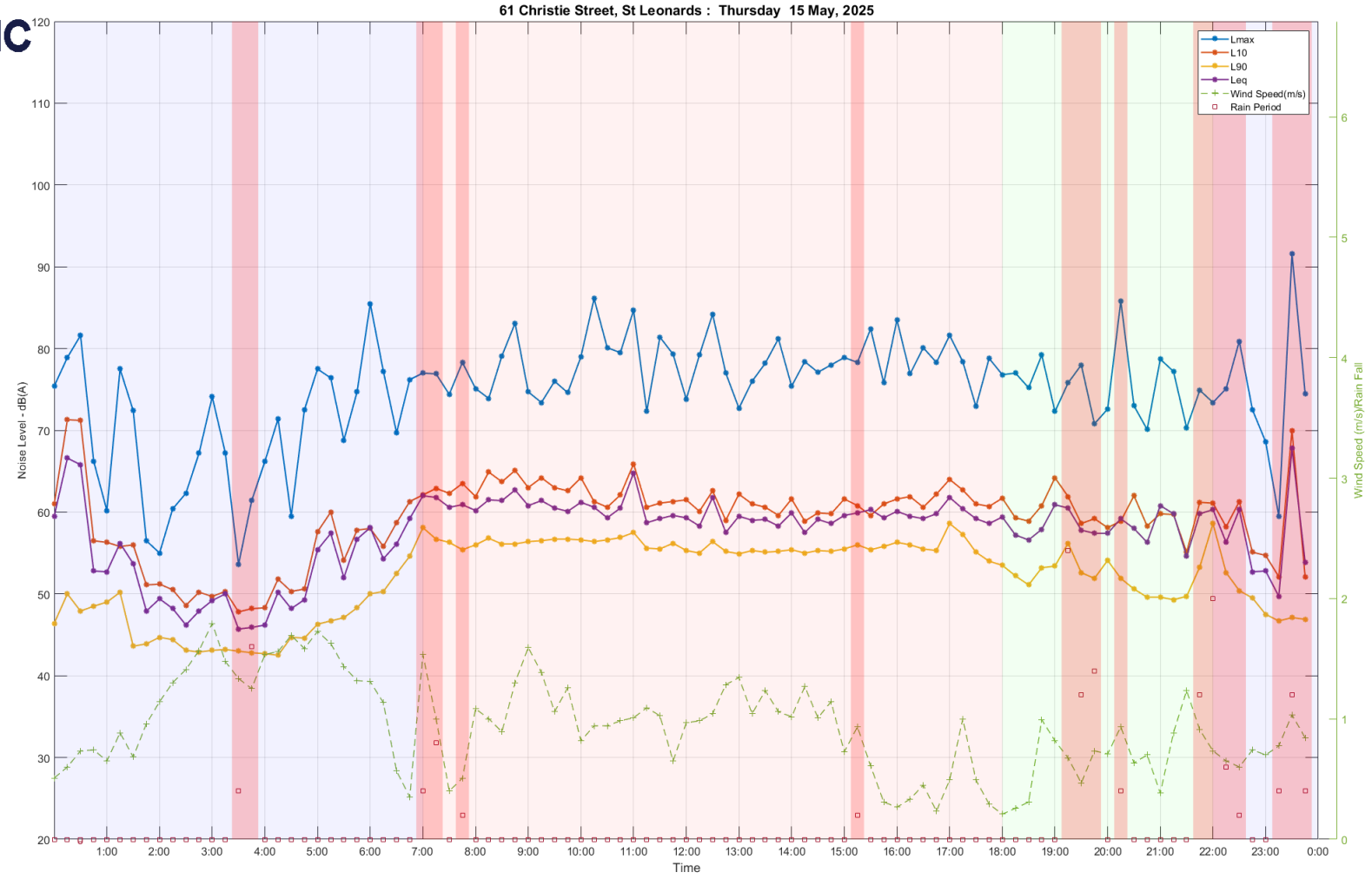
61 Christie Street, St Leonards : Thursday 15 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
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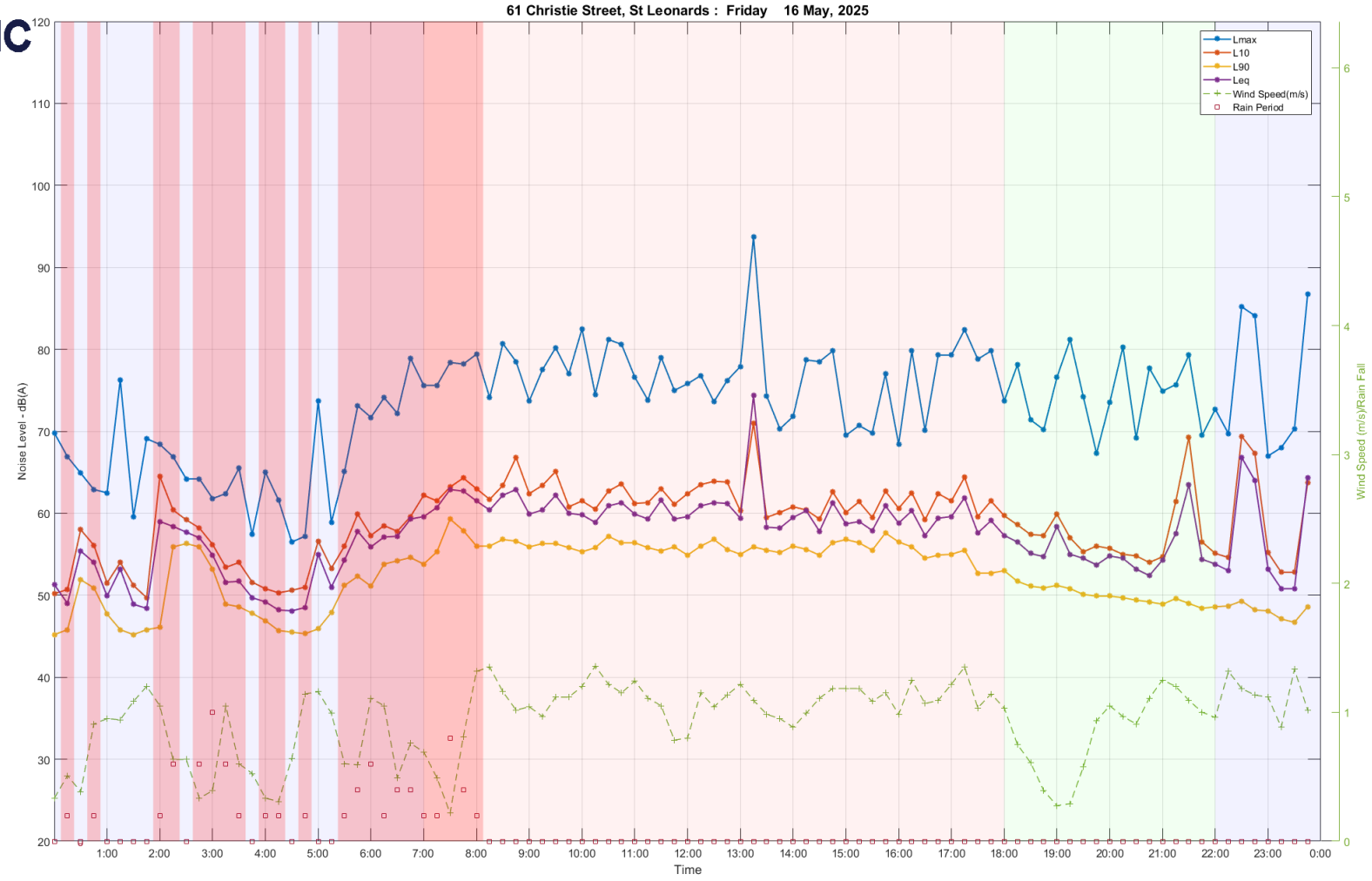
61 Christie Street, St Leonards : Friday 16 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
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50
40
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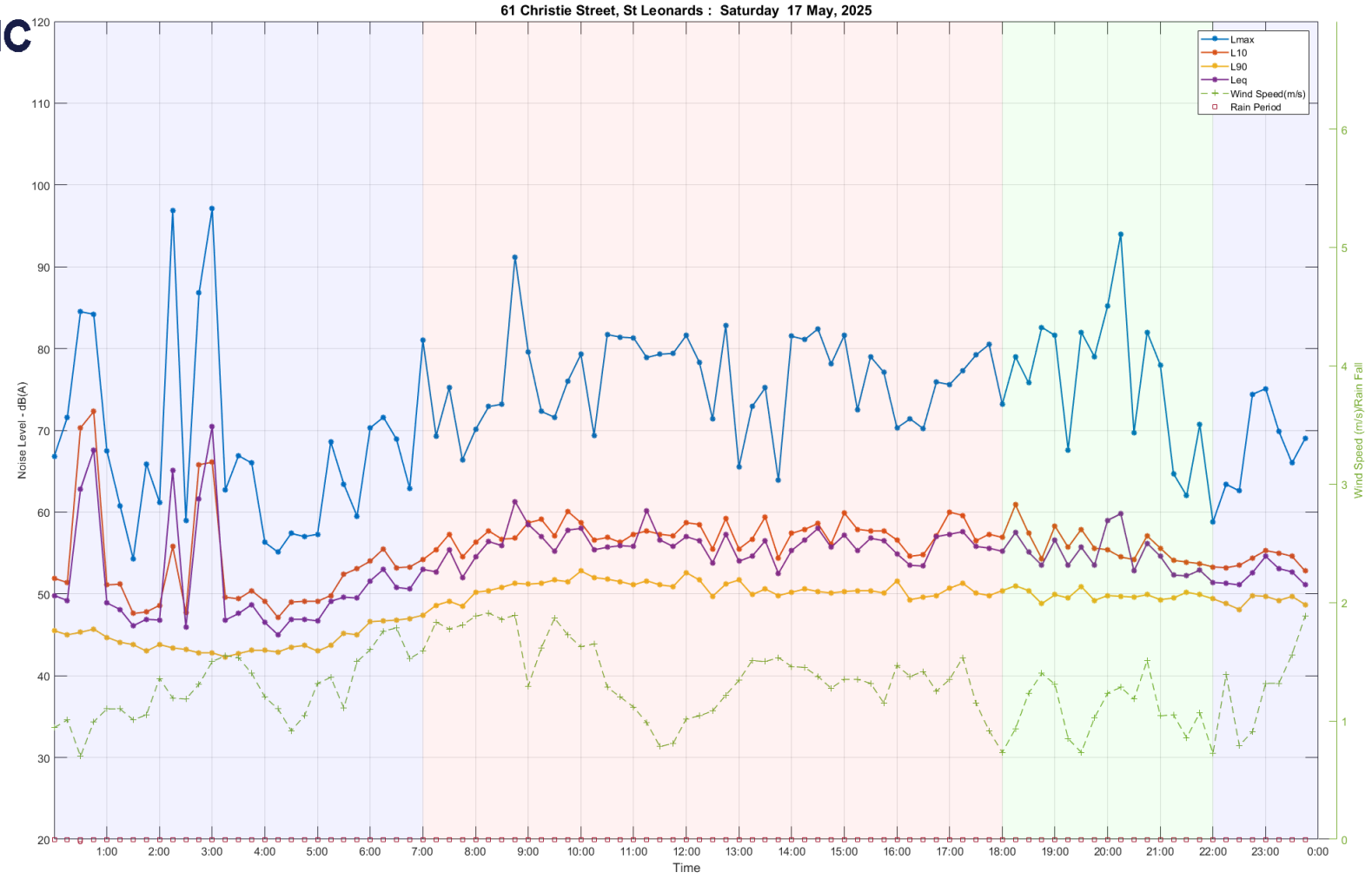
61 Christie Street, St Leonards : Saturday 17 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
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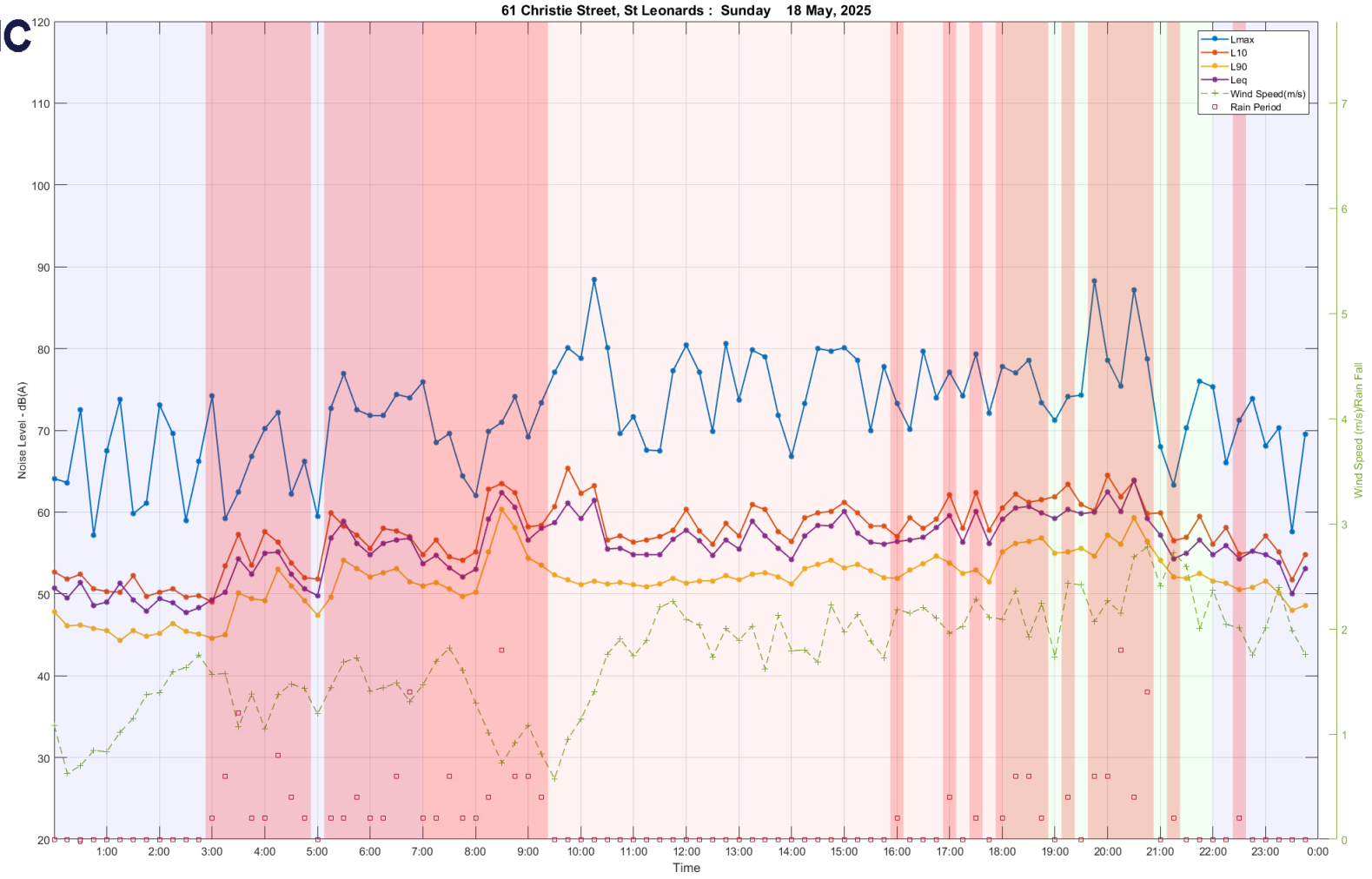
61 Christie Street, St Leonards : Sunday 18 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
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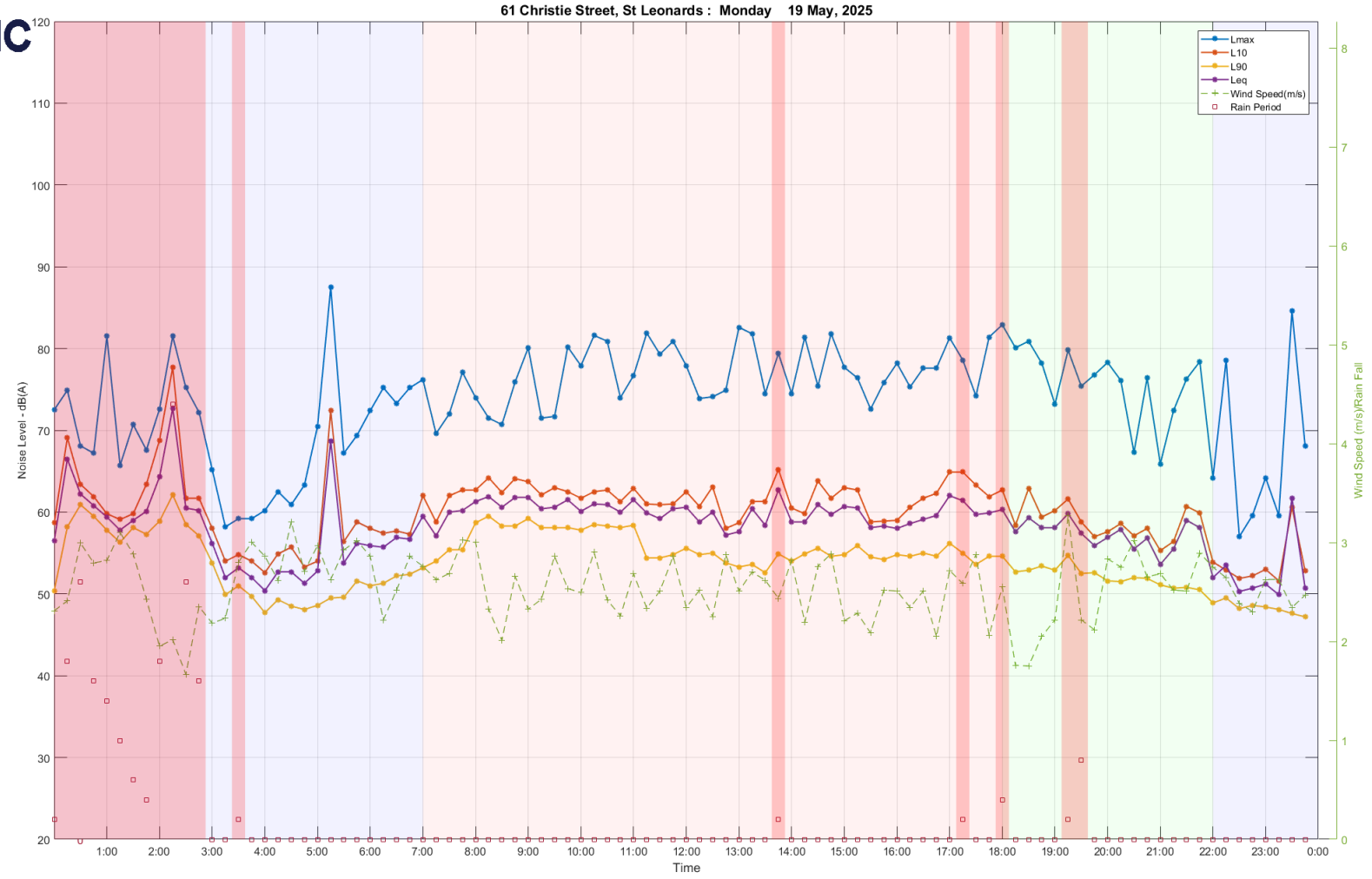
61 Christie Street, St Leonards : Monday 19 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
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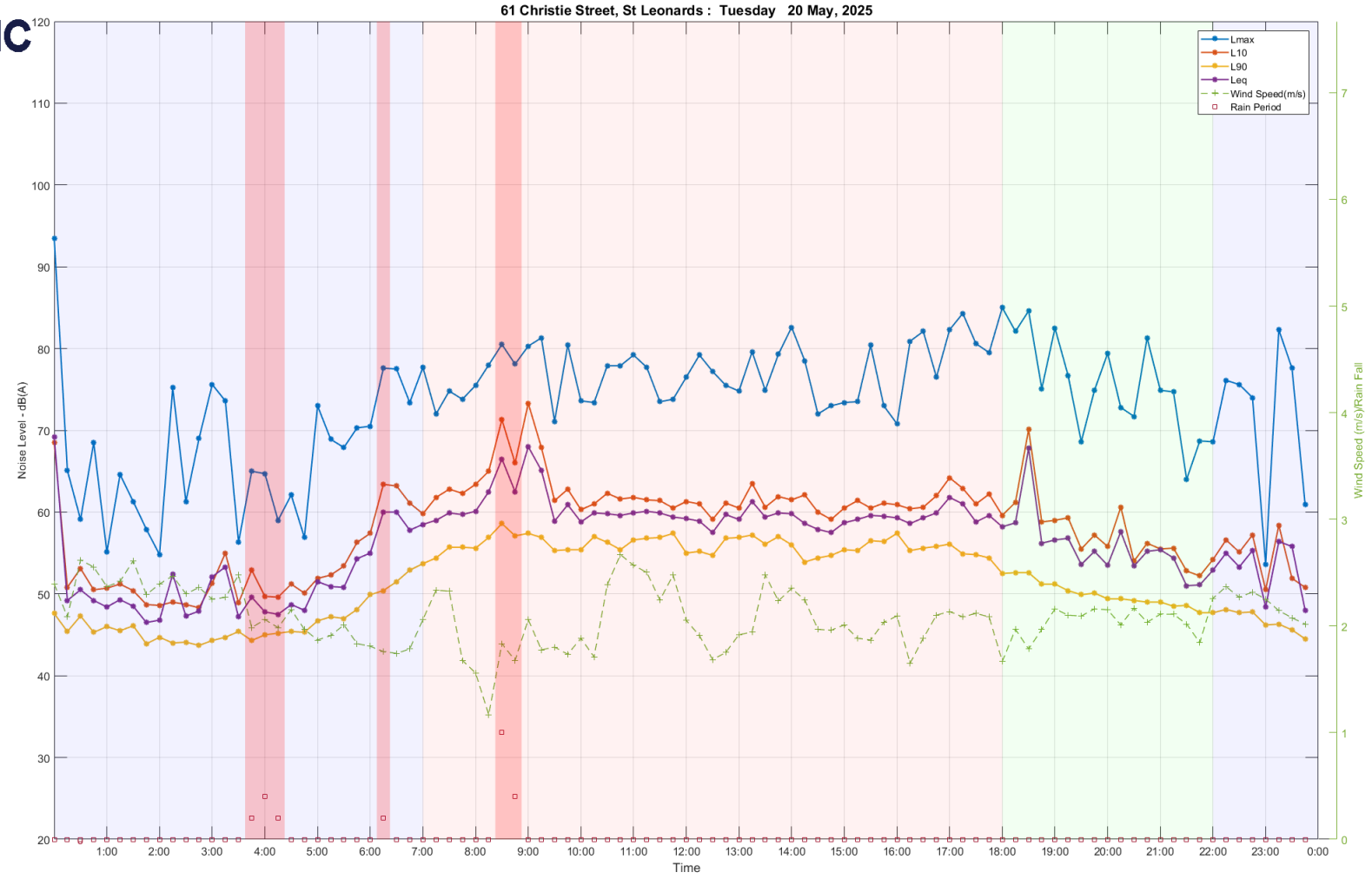
61 Christie Street, St Leonards : Tuesday 20 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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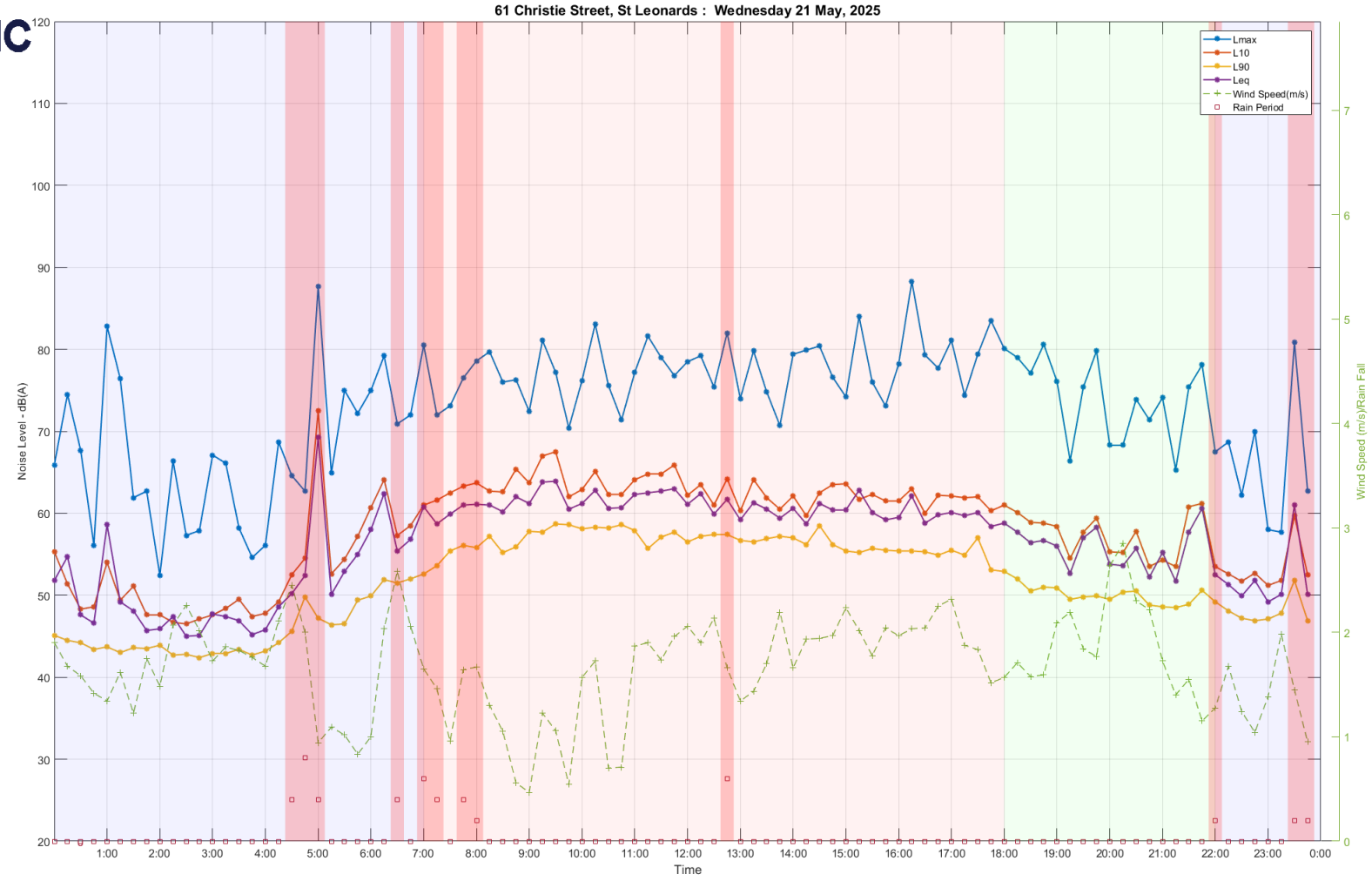
61 Christie Street, St Leonards : Wednesday 21 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
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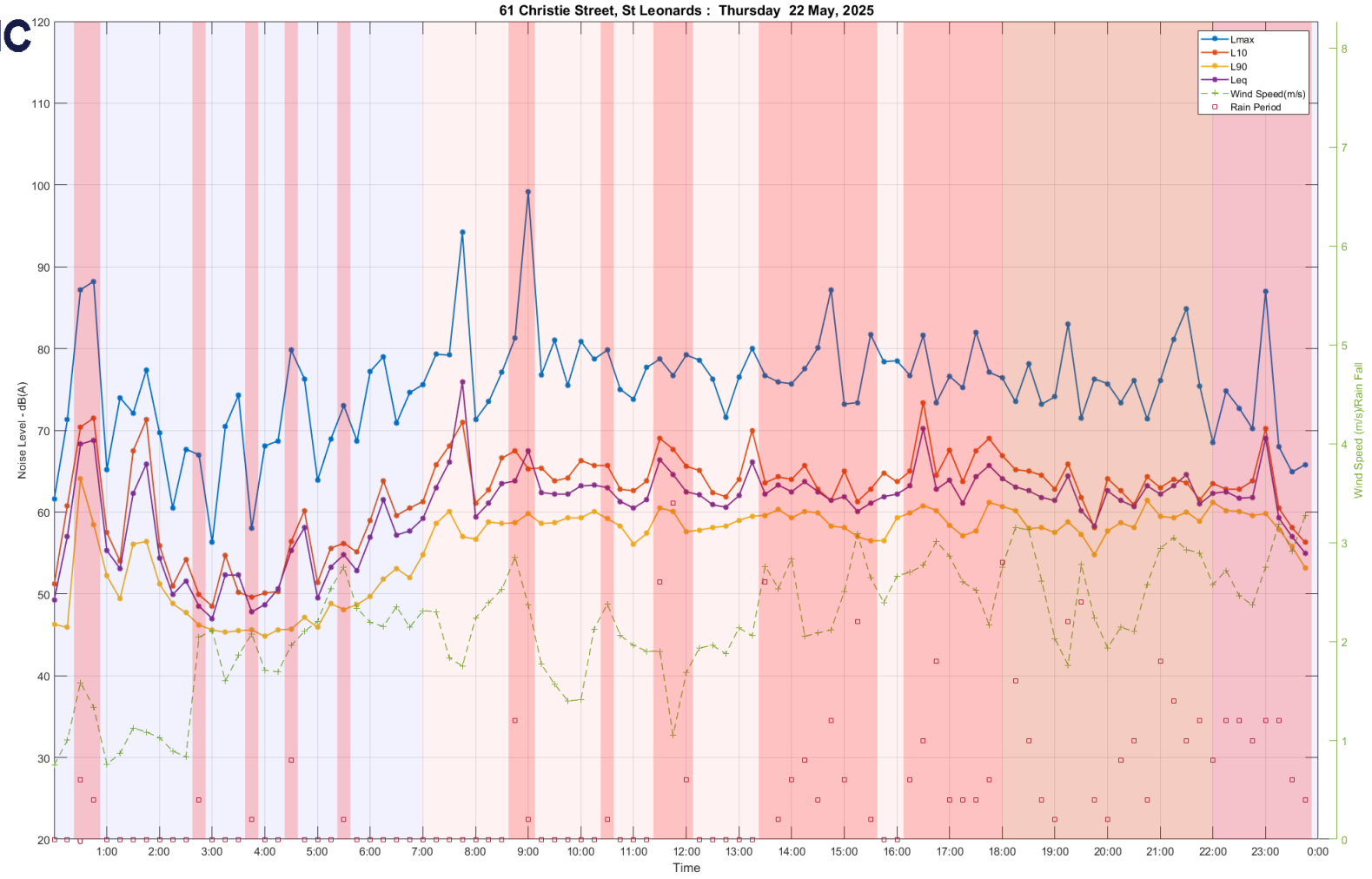
21:00
22:00
23:00
0:00


61 Christie Street, St Leonards : Thursday 22 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
8
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
5:00
6:00
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23:00
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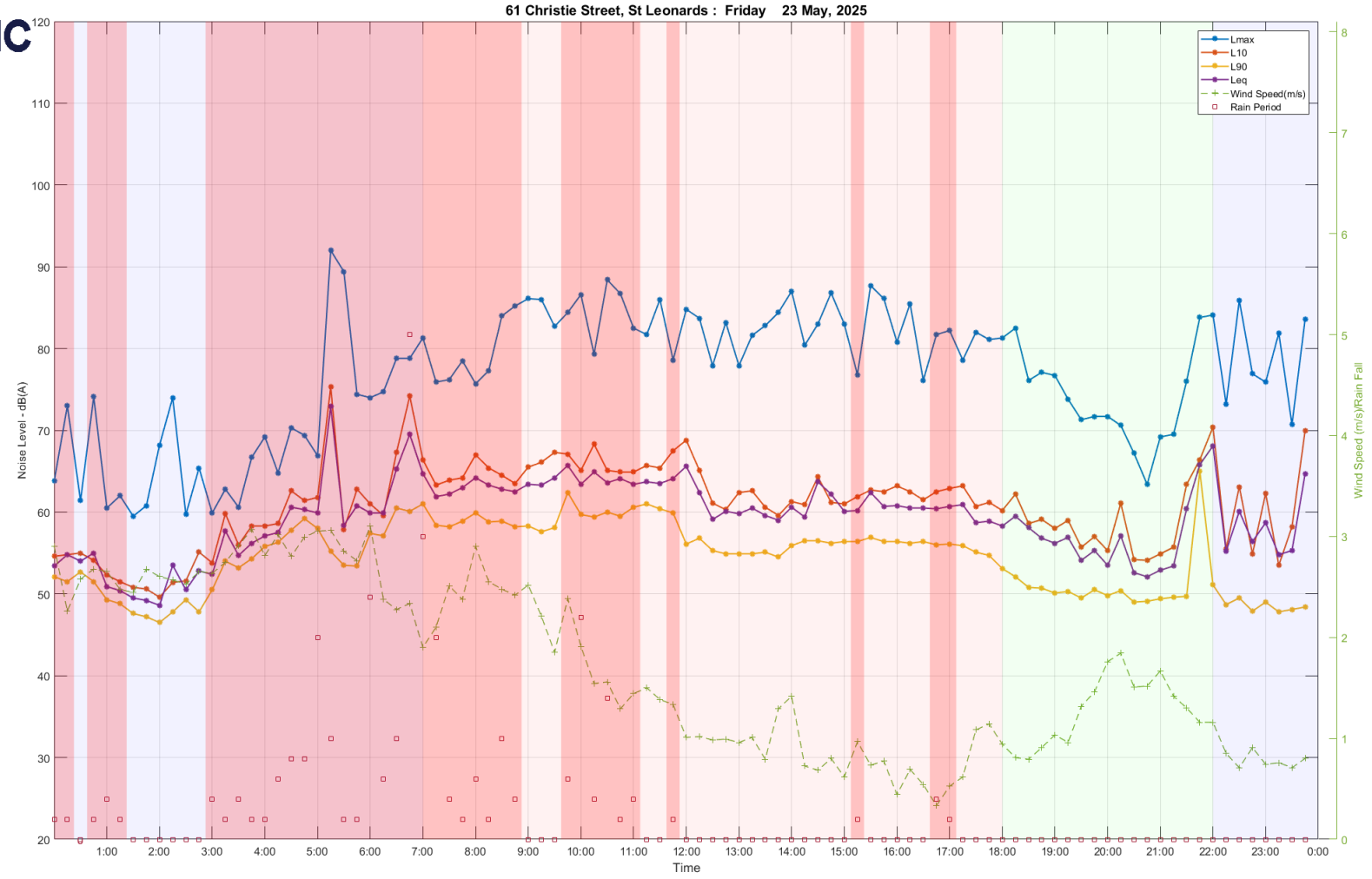
61 Christie Street, St Leonards : Friday 23 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
8
7
6
5
4
3
2
1
0
1:00
2:00
3:00
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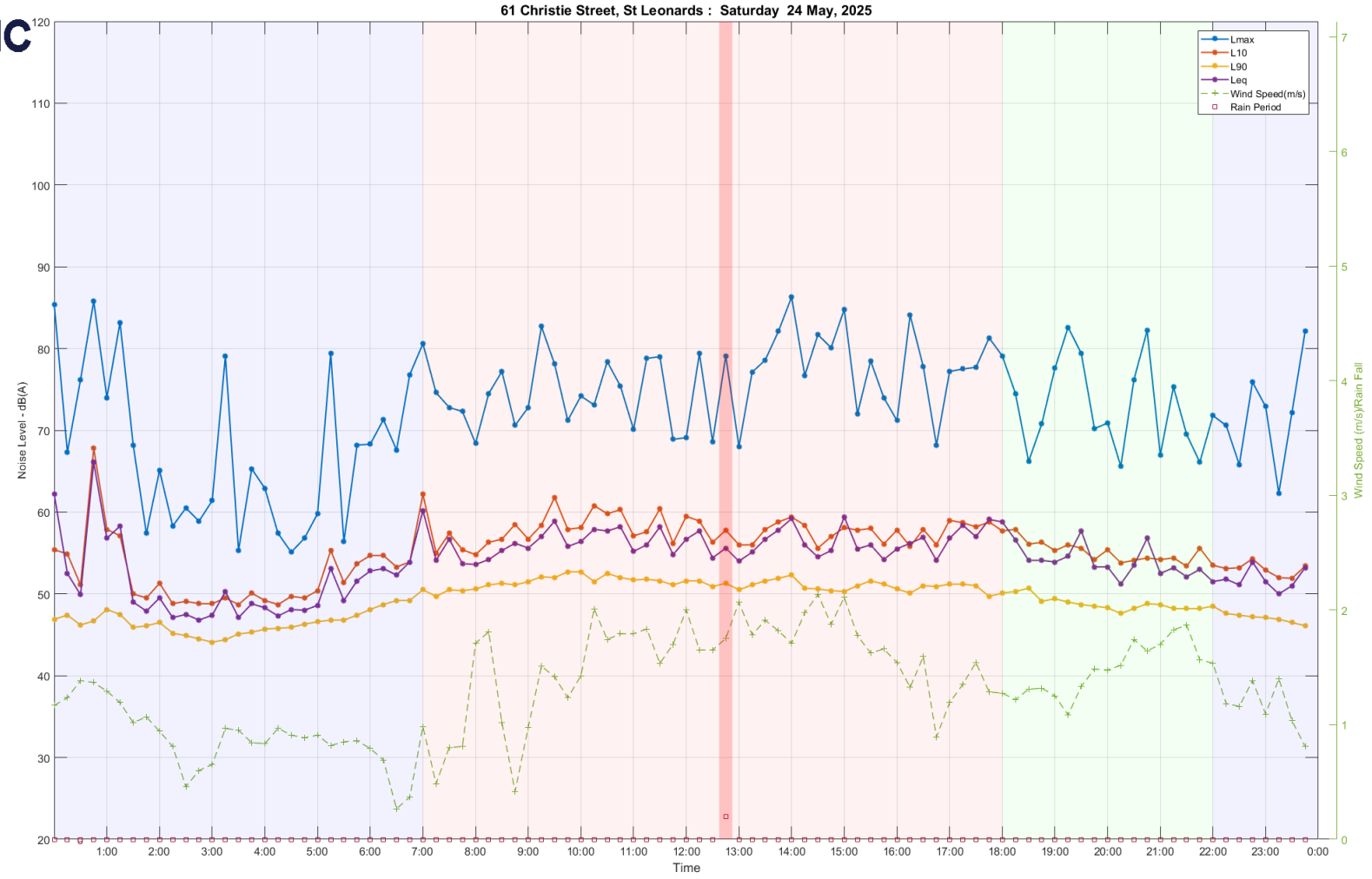
61 Christie Street, St Leonards : Saturday 24 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
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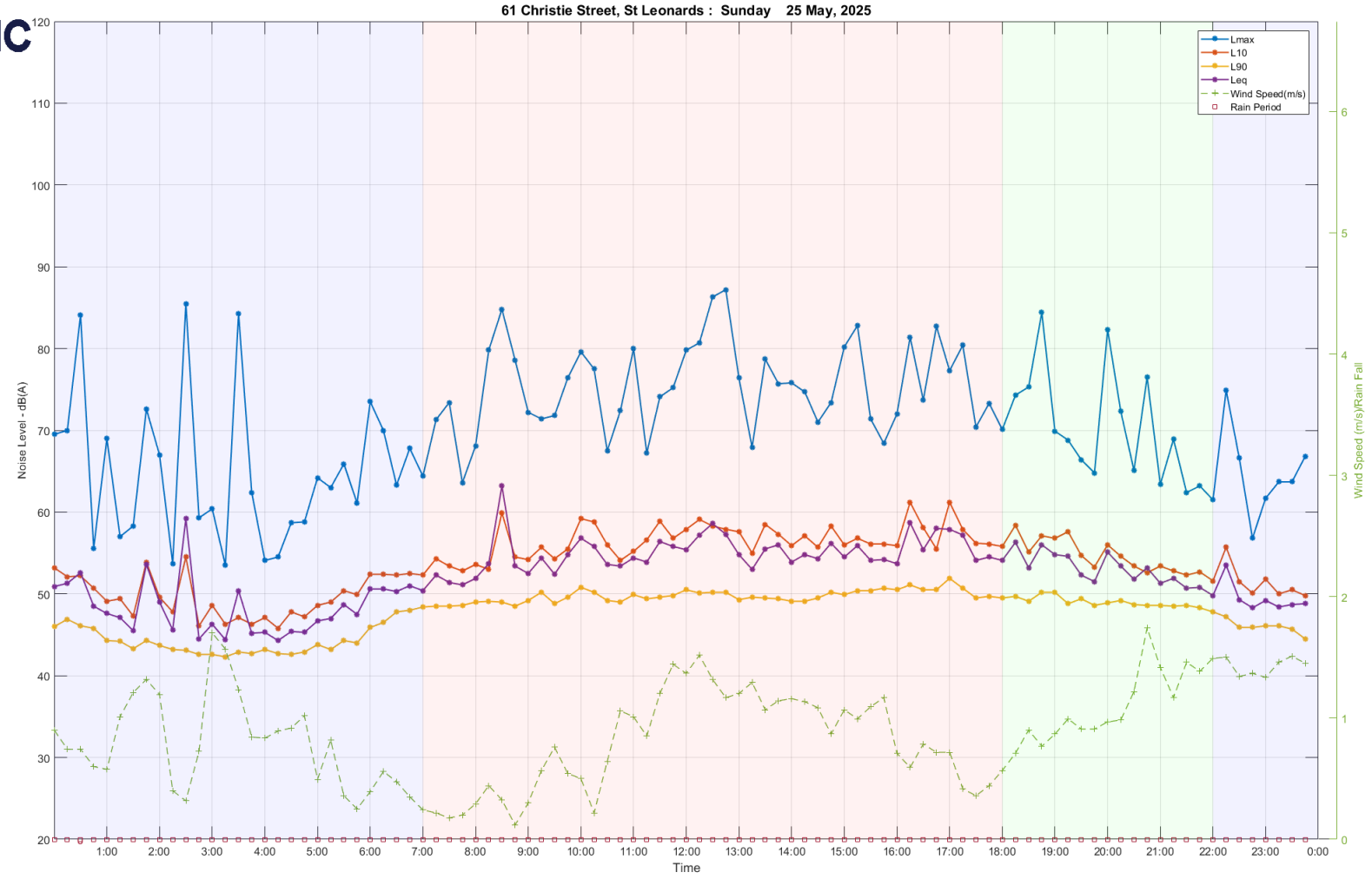
61 Christie Street, St Leonards : Sunday 25 May, 2025
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
120
110
100
90
80
70
60
50
40
30
20
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
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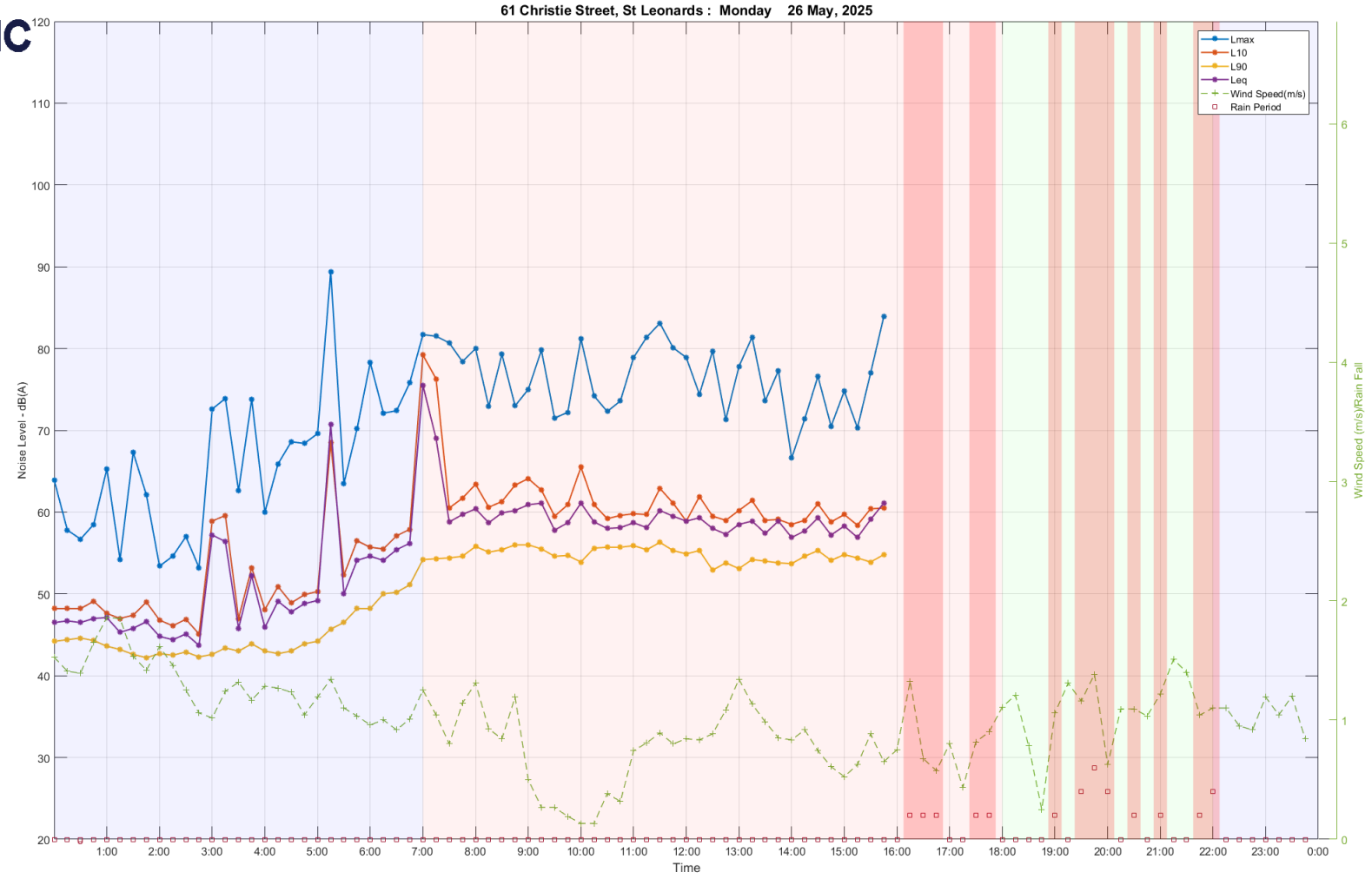

Wind Speed is corrected using factor 0.3000 based on logger location

APPENDIX C – CONSTRUCTION PLANT NOISE LEVELS

This section provides the plant noise emission levels adopted in the assessment.

The following table presents typical sound power levels for construction plant used in this assessment.

The following have been considered to establish typical plant A-weighted sound power levels:

- Transport for NSW Construction Noise and Vibration Strategy (April 2018).
- Previous measurements undertaken by Acoustic Logic.
- AS 2436-2010 "Guide to noise and vibration control on construction, demolition and maintenance sites (Appendix A).

The equipment sound power spectra are based on information in the DEFRA database, and when not available from that source, from manufacturer's data or from measured spectra taken by this office of similar machinery.

Items identified as having annoying characteristics have been penalised by adding 5dB to the levels in the Transport for NSW's noise data base.

The emission levels in the table assume that machinery operates continuously (i.e. 100% duty), which is not always be the case. For example, excavators may load trucks intermittently for 5 minutes in every 15-minute assessment period so their duty would be 33%. The duty correction used in the assessment is indicated in the table.

For impact piling the sound power levels have been given in both L_{Aeq} and L_{Amax} descriptors as the City of Sydney uses the $L_{Amax,avg}$ to assess impact piling noise.

Table 22 – Construction, Demolition and Civil works Machinery Effective Sound Power Levels based on Continuous operation (100% duty)

Equipment	Approx. Size/ Weight/Model	Sound Power Level (dBA) 100% Duty (inc Penalties)	Duty	Unweighted Octave Band Sound Power Levels, dB (includes Applicable Penalties)							
				63	125	250	500	1000	2000	4000	8000
Asphalt - Truck & Sprayer	-	106	100%	112	110	104	102	99	97	100	92
Backhoe	-	111	66%	113	107	103	111	104	103	98	94
Chainsaw – petrol*	4-5hp	114	50%	92	106	103	111	113	114	112	109
Compactor	-	106	100%	99	101	97	100	100	100	96	93
Compressor	-	109	25%	127	116	107	102	100	98	101	90
Crane – Fixed	-	113	50%	120	115	116	112	106	99	93	87
Crane – Franna	20 tonne	98	50%	108	104	99	91	92	91	84	78
Crane – Mobile	-	113	25%	115	114	108	109	108	108	99	90
Crane - Truck mounted	20 to 60 tonne	108	25%	112	109	107	105	103	100	95	87
Crusher – Rock*	-	118	100%	135	128	121	123	117	113	108	101
Dozer	CAT D9	116	75%	112	116	114	114	111	108	102	94
Dozer	CAT D10	121	75%	130	131	122	114	115	111	109	105
Elevated work platform - scissor lift	-	98	10%	100	97	94	94	94	91	85	83
Elevated work platform	-	97	10%	108	106	92	93	90	89	88	79
Excavator – tracked	3 tonne	90	75%	101	91	88	88	85	83	78	72
Excavator – tracked	6 tonne	95	75%	102	104	95	89	89	87	82	77
As above + hydraulic hammer*	6 tonne	115	75%	110	113	110	114	117	113	111	106
Excavator – tracked	10 tonne	100	100%	104	100	99	97	95	92	86	81
As above + hydraulic hammer*	10 tonne	118	75%	124	124	121	116	118	116	114	109
Excavator – tracked	20 tonne	105	75%	107	114	106	101	98	97	93	90
Excavator – tracked	30 tonne	110	75%	113	113	107	107	105	102	97	91
As above + hydraulic hammer*	-	122	75%	125	123	119	123	121	121	118	114
Excavator – tracked	40 tonne	115	75%	111	114	113	110	110	109	104	97
Grader	-	113	100%	114	113	109	105	110	104	100	91

Generator - diesel/petrol	6kW	103	100%	115	110	102	98	97	95	92	80
Generator – attenuated	30kW	92	100%	95	95	93	86	85	86	82	79
Grinder*	-	105	50%	86	80	81	89	99	106	102	102
Jackhammer	-	113	75%	108	97	93	96	96	101	109	110
Lighting Tower	-	80	100%	73	73	73	73	73	73	73	73
Lighting – Daymakers	-	98	100%	110	105	97	93	92	90	87	75
Light Vehicle - 4WD	-	103	10%	96	96	96	96	96	96	96	96
Line Marking Truck	-	108	100%	114	112	106	104	101	99	102	94
Loader - Front-end (wheeled)	23 tonne	112	75%	118	118	107	109	105	103	102	94
Loader – Skidsteer	1/2 tonne	107	75%	112	115	104	106	101	98	92	92
Loaders – Skidsteer	1 tonne	110	75%	113	104	108	108	104	103	97	91
Loader – Tracked	0 to 50 kW	115	75%	108	108	108	108	108	108	108	108
Loaders- Tracked	200 to 300 kW	121	75%	114	114	114	114	114	114	114	114
Pavement Laying Machine	-	114	100%	117	114	111	110	109	106	104	95
Pavement Profiler	-	117	100%	116	122	114	112	112	109	105	102
Pile Driver – Vibratory*	-	121	50%	121	120	117	120	122	120	115	105
Piling Rig – Bored	-	105	100%	112	120	109	108	106	104	96	89
Piling Rig Lmax – Impact*	-	151	n/a	137	138	143	152	152	148	143	138
Piling Rig Leq- Impact*	-	134	100%	124	125	128	135	135	132	127	121
Pump – Concrete	-	109	100%	115	107	101	102	104	104	97	89
Rattle gun (hand held)	-	104	50%	82	81	81	87	96	98	98	98
Roller - smooth drum	-	107	100%	114	112	102	100	102	100	96	90
Roller - large pad foot	-	109	100%	120	111	103	107	105	98	95	89
Roller – Vibratory*	10 tonne	109	100%	125	116	108	112	110	103	100	94
Saw – Concrete*	-	118	75%	120	122	114	114	113	114	118	116
Scraper/Grader	-	113	100%	120	122	113	107	107	105	100	95
Truck - Concrete	-	109	100%	112	103	95	98	99	107	89	84
Truck - Dump	15 tonne	110	10%	114	111	111	107	104	103	97	90
Truck - Medium rigid	20 tonne	103	10%	109	107	101	99	96	94	97	89
Truck - road truck/ truck and dog	30 tonne	108	10%	123	109	101	100	104	99	98	91

Truck - Vacuum (NDD or non-destructive digger)	-	109	75%	111	112	97	102	101	104	103	96
Tub Grinder/Mulcher	40-50hp	116	100%	105	106	110	110	112	111	105	96
Vibrator – Concrete*	-	113	100%	122	120	120	113	109	112	110	105
Water Cart	-	107	100%	106	107	101	105	99	100	96	91
Welding equipment	-	110	50%	104	105	106	105	106	103	98	93
Wrench - Impact	-	111	50%	81	84	89	91	95	101	107	107

TABLE A1

TYPICAL SOUND LEVELS OF CONSTRUCTION PLANT AND EQUIPMENT*

Plant description	A-weighted sound power levels L_{wA} dB ref: 10^{-12} W		A-weighted sound pressure levels L_{pA} (mid-point) dB at 10 m
	Typical or Range	Typical (mid-point)	
Asphalt paver	103-112	108	80
Asphalt rotomill	111	111	83
Backhoe	100-108	104	76
Backhoe with auger	100-111	106	78
Bulldozer	102-114	108	80
Cherry picker	105	105	77
Compactor	110-115	113	85
Compressor (silenced)	93-110	101	73
Concrete agitator truck	107-111	109	76
Concrete pencil vibrator	101-105	103	75
Concrete pump truck	103-113	108	80
Concrete saw	112-122	117	89
Concrete vibratory screed	115	115	87
Crane (mobile)	95-113	104	76
Crane (tower)	105	105	77
Excavator	97-117	107	79
Filtration unit (40 000 cfm)	109	109	81
Forklift	106	106	78
Front end loader	110-115	113	85
Generator (diesel)	84-113	99	71
Grader	105-115	110	82
Gritblaster (grit & nozzle air noise)	129	129	101
Hand tools (electric)	95-110	102	74
Hand tools (pneumatic)	114-117	116	88