

136-148 Donnison Street, Gosford

SSDA Acoustic Assessment

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1 EXECUTIVE SUMMARY

This *SSDA Acoustic Assessment* has been prepared by Acoustic Logic (**AL**) to accompany State Significant Development Application (SSDA-78031991) for a mixed use, residential development at 136-146 & 148 Donnison Street, Gosford.

SSD-78031991 encompasses the stage 2 detailed design of the development that follows on from the concept and stage 1 SSD-9813 which was approved by the IPC in 2020.

The legal description of the site is outlined in Table 1 below.

Table 1 – Legal Description of the Site

Property Address	Title Description
136-146 Donnison Street	Lot 6 in Deposited Plan 598833
146 Donnison Street	Lot 1 in Deposited Plan 540292
Site Area	14,194 sqm

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-78031991) and the relevant Future Environmental Assessment Requirements identified within the development consent for the Gosford Alive Concept and Stage 1 SSDA.

Table 2 – SEARs Requirements

Item	Description of Requirement	Section Reference (this Report)
12. 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	Sections 8, 10-14.

This report concludes that the proposed development is suitable and warrants approval subject to the implementation of the following mitigation measures.

- Complying façade constructions as described in Section 8.
- Indicative external seating capacity as noted in Section 8.
- Noise emissions criteria from mechanical plant to be designed to the requirements as outlined in Section 6.
- Construction noise and vibration management as outlined in Sections 10-14.

Following the implementation of the above mitigation measures, the remaining impacts are appropriate.

2 INTRODUCTION

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 27/11/2024 and issued for the SSDA (SSD-78031991). Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Table 3 – SEARs Requirements

Item	Description of Requirement	Section Reference (this Report)
12. 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	Sections 8, 10-14.

This application seeks consent for a mixed-use residential development, involving the construction of five buildings, ranging in height from 17 to 28 storeys.

In 2020, consent was granted by the IPC for the Concept and Stage 1 development of SSD- 9813 known as Gosford Alive. The scope of this approval included:

- Building envelopes including three podiums, five towers and basements, comprising:
 - Maximum podium heights RL 28m, 24m and 21m.
 - Maximum tower heights ranging between RL 60.7m and RL 101m. – Maximum 72,782sqm GFA for residential and commercial uses.
 - Site-wide concept landscape plan including through site links.
 - Design guidelines and design excellence strategy.
- Stage 1 works
 - Demolition of existing buildings and substation, removal of existing on-site vegetation extinguish easements and realignment of stormwater / sewer infrastructure.

A requirement of the conditions of consent for SSD-9813 was for an Architectural Design Competition to be held to inform the detailed design development of the site. In December 2023, Plus Architecture, Architecture AND, CHROFI and Arcadia Landscape Architecture won the Architectural Design Competition. The 'design excellence' scheme has been used as the basis for this detailed SSDA.

Specifically, under this SSDA development consent is sought for:

- Earthworks and excavation of two basement levels to accommodate the proposed consolidated basement structure.

- Construction of five (5) mixed-use residential towers (ranging in height from 17 to 28 storeys), comprising:
 - 3,010 sqm of non-residential GFA within the podium levels (including 2,535 sqm of retail GFA)
 - 705 apartments, equating to 69,772 sqm of residential GFA.
 - On-site parking for:
 - Approximately 860 residential car parking spaces.
 - Approximately 90 non-residential car parking spaces.
 - Communal open spaces, landscaping, storage areas and services.
- Construction of through site links and activated frontages.

The purpose of the project is to facilitate the delivery of housing at a strategically located site and to deliver a built form outcome that is consistent with the desired future character of the Gosford Civic Centre.

2.1 THE SITE

The site is located at 136-146 and 148 Donnison Street, Gosford within the Central Coast local government area (LGA). The site is legally described as Lot 6 in Deposited Plan 598833 and Lot 1 in Deposited Plan 540292. The site has an area of 14,194sqm and is an L-shaped block that is bound by William Street to the north, Donnison Street to the south, Albany Street North to the east and Henry Parry Drive to the west, and currently occupies the former Kibbleplex Shopping Centre which is currently leased to Council for use as a public car park.

Gosford is a regional city located on the Central Coast of NSW. It is located approximately 76km north of Sydney. Gosford is currently undergoing a significant revitalisation, with a focus on improving public spaces, boosting the local economy, and enhancing the city's liveability. Gosford is well-connected through a variety of transport options. The city is serviced by the Central Coast & Newcastle Line, providing regular train services to Sydney and Newcastle. The Central Coast Highway, a key road network, offers easy access to other parts of the region. Additionally, local bus services operate throughout the city, and the Gosford Ferry Wharf provides water transport options.

The subject site is located approximately 500 metres south-east of Gosford transport interchange and is easily accessible to several key arterial and state roads that combine with the M1 to provide connection to both Sydney and Newcastle.

The site is located within the civic precinct of Gosford City Centre and is geographically located at the centre of the city. The Civic Heart is focused around Kibble Park which is located to the west of the subject site. The surrounding character of the subject site is primarily commercial in nature and there is no consistency in architectural design or form, however an increasing number of high-density residential apartments are emerging in the area.

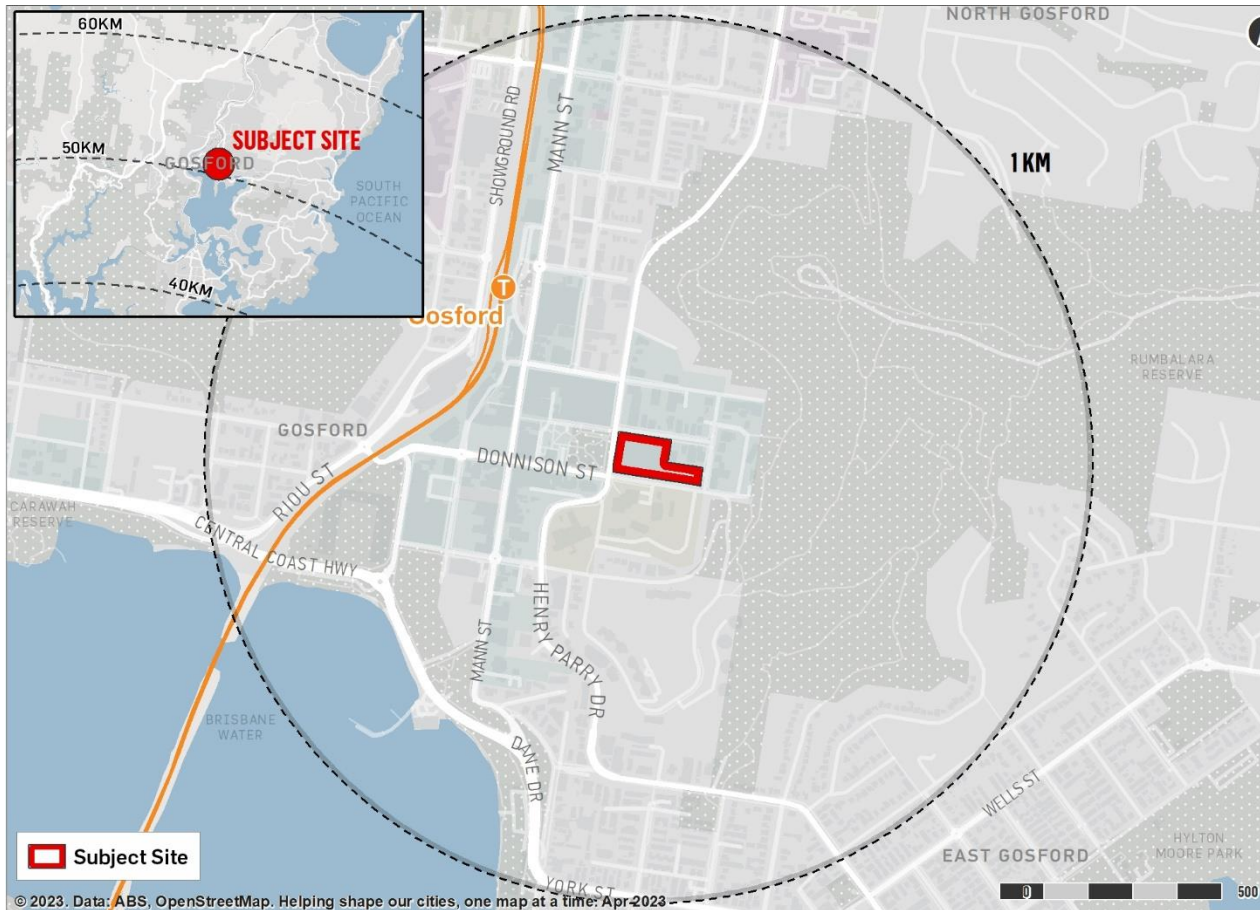


Figure 1 – Site Location Plan (Source: Urbis GIS, 2023)



Figure 2 – Aerial Photograph (Source: Urbis GIS, 2023)

2.2 NEAREST SENSITIVE RECEIVERS

Table 4 – Sensitive Receivers

Receiver (Refer Figure 1)	Land Use	Comment
R1	Residential	Residential receivers to the far south across Margin Street
E1	Educational	TAFE NSW Gosford to the south
P1	Place of Worship	Gosford Uniting Church to the south west
PP1	Passive Play	Kibble Park to the west
C1-C4	Commercial	Commercial receivers surrounding the site

An aerial view of the project site and measurement locations are presented in Figure 3 below.

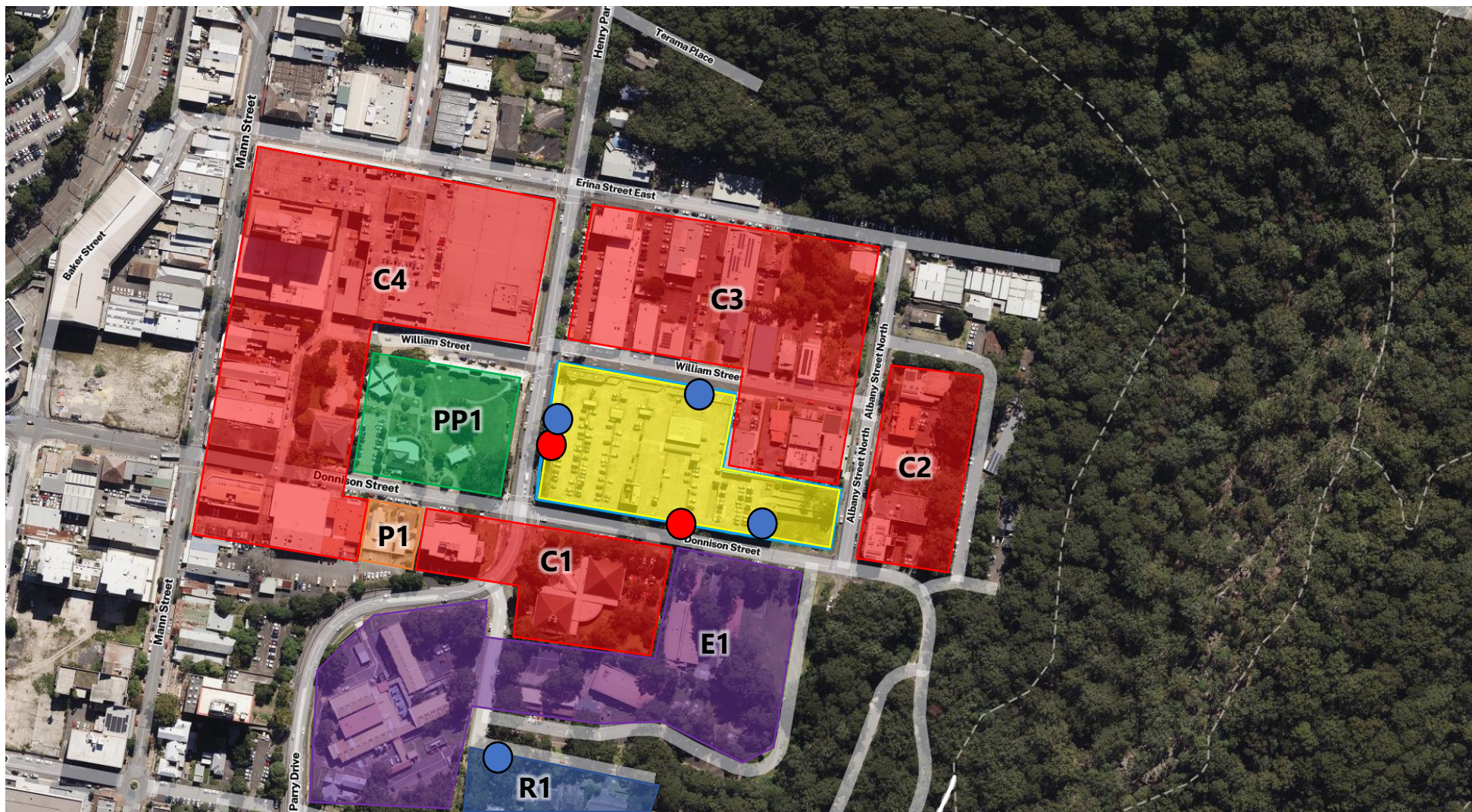
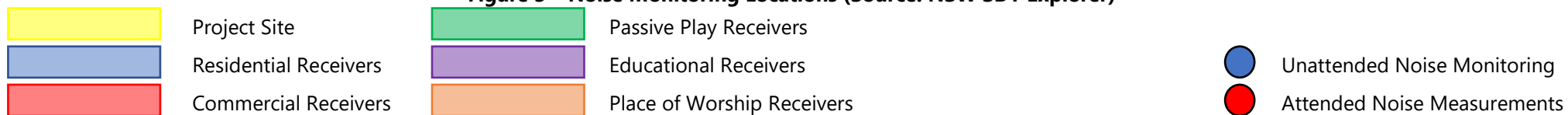


Figure 3 – Noise Monitoring Locations (Source: NSW SDT Explorer)



3 REFERENCED DOCUMENTS

3.1 BACKGROUND INFORMATION USED

This assessment has been conducted using the Plus Architecture architectural drawings provided by Bathla, dated XXth of XXXX 2025.

3.2 PLANNING GUIDELINES

This document addresses noise and impacts associated with the following:

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

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

- Central Coast Council *Development Control Plan (DCP)* 2022.
- Australian and New Zealand AS/NZS 2107:2016 *Recommended design sound levels and reverberation times for building interiors*.
- NSW Environment Protection Authority (**EPA**) *Noise Policy for Industry (NPfI)* 2017.

4 ABBREVIATIONS AND DEFINITIONS

The following abbreviations and definitions are used in this noise impact assessment.

dB	Decibels – unit for the measurement of sound
dB(A)	A-weighted decibels. Unit of measurement for broadband sound with the A-frequency weighting applied to approximate human loudness perception to sounds of different pitch.
L_{eq}	Energy, time averaged sound level
L_{max}	Maximum sound pressure level, fast response
L₉₀	Sound level exceeded for 90% of the measurement period
R_w	Frequency weighted sound reduction index.
NRC	Average absorption co-efficient for the octave bands with centre frequencies of 250Hz to 2 kHz inclusive.
Day*	The period from 7am to 6pm (Monday to Saturday) and 8am to 6pm (Sundays and public holidays).
Evening*	Refers to the period from 6pm to 10pm.
Night*	The period from 10 pm to 7 am (Monday to Saturday), and 10pm to 8am (Sundays and public holidays).
Project Trigger Level	Target noise levels for a particular noise-generating facility.
Assessment Background Level (ABL)	Background noise level representative of a single period.
Rating Background Level (RBL)	The overall, single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period. (Calculated in accordance with NPfl unless noted otherwise)

* Unless nominated otherwise.

5 TRAFFIC NOISE INTRUSION AND VIBRATION ASSESSMENT

The noise sources assessed as potentially impacting the proposed development are traffic noise from Henry Parry Drive, Donnison Street, Albany Street North and William Street.

5.1 GUIDELINES AND ASSESSMENT CRITERIA

Noise intrusion from the project site shall comply with the requirements of the following documents:

- Central Coast Council *Development Control Plan (DCP)* 2022.
- Australian and New Zealand AS/NZS 2107:2016 *Recommended design sound levels and reverberation times for building interiors*.

5.1.1 Central Coast Council DCP 2022

No specific controls are presented in the DCP, therefore AS2107:2016 shall be adopted.

5.1.2 Australian and New Zealand AS/NZS 2107:2016 *Recommended design sound levels and reverberation times for building interiors*

Australian Standard AS 2107:2016: *Recommended design sound levels and reverberation times for building interiors* specifies allowable internal noise levels for internal spaces within various building types. AS 2107:2016, gives the following maximum internal noise levels for relevant areas of the proposed building.

Table 5 – Recommended Design Sound Level

Space /Activity Type	Recommended Maximum Design Sound Level dB(A) L_{eq}
Sleeping Areas	35-40 dB(A) $L_{eq}(10pm-7am)$
Living Areas	35-45 dB(A) $L_{eq}(anytime)$
General Office Areas	40-45 dB(A) $L_{eq}(anytime)$
Apartment Common Areas (Foyer, Lift Lobby)	45-50 dB(A) $L_{eq}(anytime)$
Restaurants	40-50 dB(A) $L_{eq}(anytime)$
Small Retail Stores	<50 dB(A) $L_{eq}(anytime)$

5.2 PROJECT SPECIFIC NOISE AND VIBRATION CRITERIA

The following criteria have been adopted following a review of the applicable guidelines.

Table 6 – Airborne Noise Criteria

Building Use	Room	Noise Level dB(A) L_{eq}
Residential	Sleeping Area (Bedroom)	35 dB(A) $L_{eq}(10pm-7am)$
	Other habitable rooms	40 dB(A) $L_{eq}(anytime)$
	Lift Lobby/ Foyer	50 dB(A) $L_{eq}(anytime)$
Retail/ Commercial	General Office Areas	45 dB(A) $L_{eq}(anytime)$
	Restaurants	50 dB(A) $L_{eq}(anytime)$

	Small Retail Stores	50 dB(A) $L_{eq(anytime)}$
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5.3 SITE AMBIENT NOISE LEVELS

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. The survey data and the calculated noise descriptors are described in detail in Appendix A.

A summary of the site data used in the assessment is provided below.

Table 7 – Noise Measurement Summary

Location	Ambient Noise Level (dB(A) $L_{eq,period}$)	
	Day (7am to 10pm)	Night (10pm to 7am)
Noise monitor facing Henry Parry Drive	58.5	51.2
Noise monitor facing Donnison Street	50.4	44.9
Noise monitor facing William Street	51.3	46.2
Noise monitor facing Margin Street (R1)	52.6	49.5

5.3.1 Predicted Façade Noise Levels

Predicted façade noise levels based on the collected site data are provided in Appendix C.

5.4 AIRBORNE NOISE ASSESSMENT

An assessment of noise impact has been undertaken using the following methodology:

Windows closed noise levels were calculated to the centre of the room using the predicted octave band façade incident external noise levels and, for each façade element, correcting for the exposed area, octave band sound transmission loss and room sound power to pressure correction. The room noise level was calculated by accumulating all significant noise paths.

Envelope performance requirements to comply with the noise criteria stipulated in Section 5.2 have been assessed.

5.4.1 External 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 9.1 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 found in Appendix C. SoundPLAN "grid noise map" contours include a 2.5dB façade reflection increase close to a façade. SoundPLAN "façade noise maps" do not include a façade reflection allowance and therefore do not require correction.

5.4.2 Discussion

The modelling indicates that mitigation of noise impacts is needed to achieve compliance with the nominated assessment criteria. Complying mitigation is provided in Section 8.

6 NOISE EMISSION CRITERIA

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

- Central Coast Council *Development Control Plan (DCP)* 2022.
- NSW Environment Protection Authority (EPA) *Noise Policy for Industry (NPfI)* 2017.

6.1.1 Central Coast Council DCP 2022

The Central Coast Council DCP does not stipulate any quantitative requirements with respect to noise emissions criteria for this development and as such the NSW EPA NPfI 2017 will be utilised for this assessment.

6.2 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.

6.2.1 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 8 – Project Intrusiveness Noise Levels

Receiver	Period/Time	Project Intrusiveness Noise Levels dB(A) $L_{Aeq}(15min)$
R1	Day (7am-6pm)	52
	Evening (6pm-10pm)	49
	Night (10pm-7am)	45

6.2.2 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 $L_{Aeq, 15 \text{ minute}}$ descriptor. The project amenity noise level criteria are presented in the table below.

Table 9 – Project Amenity Noise Levels

Location	Period/Time	Project Amenity Noise Levels dB(A) $L_{Aeq(15min)}$
Nearby residences – Urban Receivers (R1)	Day (7am-6pm)	58
	Evening (6pm-10pm)	48
	Night (10pm-7am)	43
Educational Receiver (E1)	When in use	35 (internal noisiest 1 hour)
Place of Worship (P1)	When in use	40 (internal)
Passive Play Area (PP1)	When in use	48
Commercial Receivers (C1, C2, C3, C4)	When in use	63

6.2.2.1 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 10 – Sleep Arousal Criteria for Residential Receivers

Receiver	Rating Background Noise Level (Night) dB(A) L_{90}	Emergence Level
R1 Night (10pm – 7am)	40 dB(A) L_{90}	45 dB(A) $L_{eq, 15min}$; 55 dB(A) L_{Fmax}

6.2.2.2 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 11 – Project Noise Trigger Levels (NPfl)

Receiver(s)	Time Period	Assessment Background Noise Level dB(A) L_{90}	Intrusiveness Criteria dB(A) $L_{eq}(15min)$	Project Amenity Criteria dB(A) $L_{eq}(15min)$	NPfl Criteria for Sleep Disturbance
Residential Receiver (R1)	Day (7am – 6pm)	52	57	58	N/A
	Evening (6pm-10pm)	51	56	48	N/A
	Night (10pm-7am)	43	48	43	45 dB(A)$L_{eq, 15min}$; 55 dB(A)L_{Fmax}
Educational Receiver (E1)	When in use	N/A	N/A	35 (internal noisiest 1 hr)	N/A
Place of Worship (P1)		N/A	N/A	40 (internal)	N/A
Passive Play Area (PP1)		N/A	N/A	48	N/A
Commercial Receivers (C1, C2, C3, C4)		N/A	N/A	63	N/A

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

7 NOISE EMISSIONS ASSESSMENT

Noise impacts from the development have been addressed for the following:

- Noise generated from mechanical plant and equipment in principle.
- Noise generated from the use of the outdoor dining areas.

7.1 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 6.

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 within enclosure plantrooms, 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 basement 1, 2 and 3 as nominated within the architectural documentation.
 - Indicatively, fans may require attenuation treatment to meet NPfl requirements are surrounding sensitive receivers.
 - To ensure compliance with NPfl requirements during the day, evening and night time, additional review is recommended following final plant selection and review.

7.2 NOISE FROM OUTDOOR DINING SPACES

Outdoor dining spaces are proposed for ground floor and level 1 of the podium. The noise generated by the outdoor dining spaces to the site itself is considered neighbourhood noise and no documented acoustic legislation can be applied. However, noise emissions to other residents shall be designed to be no higher than background noise level + 5dB(A) as is typical of Liquor and Gaming NSW requirements if any tenancy pursues liquor licensing in the future. A general emissions model has been created reviewing noise emission to both our own site and neighbouring receivers to ascertain baseline recommended façade constructions by adopting drawn seating locations with one in two patrons speaking at raised voice (77dB(A) L₁₀). Modelling results can be found in Appendix C.

8 COMPLYING CONSTRUCTIONS AND CONTROLS

The assessment indicates that the building envelope is required to be upgraded beyond what is considered to be a “standard” form of construction to comply with the internal noise criteria. The following complying mitigation has been determined to comply with the required internal noise levels.

8.1 GLAZED WINDOWS AND DOORS

Acoustically rated external windows and doors are required. 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 (or equal) acoustic seals. **(Mohair Seals are unacceptable)**. The suitability of alternative seal types should be determined to an appropriately qualified acoustic expert.

The complying constructions are listed below.

Table 12 – Complying Glazing Constructions

Building	Façade	Level	Space	Glazing Construction	Acoustic Seals
Tower 1 & Tower 2	All Façades	Level 1-10	Bedrooms	10.38mm Laminated	Yes
			Living Rooms	10.38mm Laminated	Yes
		Level 11 and higher	Bedrooms	6.38mm Laminated or 8mm Float or Toughened	Yes
			Living Rooms	6.38mm Laminated or 8mm Float or Toughened	Yes
Tower 3 & Tower 4	Eastern Façade	Level 1-10	Bedrooms	6.38mm Laminated or 8mm Float or Toughened	Yes
			Living Rooms	6.38mm Laminated or 8mm Float or Toughened	Yes
	All Other Façades		Bedrooms	10.38mm Laminated	Yes
			Living Rooms	10.38mm Laminated	Yes
		Level 11 and higher	Bedrooms	6.38mm Laminated or 8mm Float or Toughened	Yes
			Living Rooms	6.38mm Laminated or 8mm Float or Toughened	Yes
Tower 5	All Façades	All Levels	Bedrooms	6.38mm Laminated or 8mm Float or Toughened	Yes
			Living Rooms	6.38mm Laminated or 8mm Float or Toughened	Yes

Final glazing selections are to be iterated in CC Stage once the design has progressed. The above complying glazing thicknesses take into account traffic noise reduction as well as upgraded glazing to minimise operational noise from the retail/ commercial/ food and beverage tenancies as a project recommendation and not for statutory compliance.

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.

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.

In addition to complying with the minimum complying glazing construction, 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 the following table. 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 13 – Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w/R_w+C_{tr} of Installed Window
6.38mm Laminated	31
8mm Float or Toughened	31
10.38mm Laminated	35

8.1.1 Use of Insulated Glass Units (Double Glazing)

Where single glazing has been recommended in Table 13, the following IGU's can be used in place of the tabled single glazing.

Table 14 – Equivalent IGU Systems

Single Glazing Assembly	Equivalent IGU	Minimum R_w/R_w+C_{tr} of Installed Window
8mm Float or Toughened and 6.38mm Laminated	8/16AG/8 OR 6/12/6.38	35/31
10.38mm Laminated	6/12AG/10.38 or 8/12/8.38	40/35

8.1.2 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.

8.1.3 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.

9 CONSTRUCTION NOISE AND VIBRATION IMPACTS

A preliminary assessment of construction noise and vibration impacts during the main building works of the development has been undertaken. The assessment includes:

- Identification of the noise and vibration guidelines which will be applicable to this project.
- Identification of potentially affected nearby sensitive receivers.
- Identification of likely noise sources and vibration generating activities.
- Formulation of a strategy to address the guidelines identified including mitigation treatments.

A detailed construction staging program is yet to be finalised, however we have assumed there will be excavation and piling. Construction work (and the associated typical loudest plant/equipment) would be expected to comprise of:

- Bulk excavation.
- Bored or CFA piling of foundations.
- Erection of building structure (powered hand tools for formwork, concrete pump, vibrators).
- Façade Installation (powered hand tools).
- Landscaping (front end loaders etc).

The following work hours are the recommended standard working hours stipulated in the NSW Interim Construction Noise Guideline:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and/or Public Holidays: No work

9.1 NOISE MANAGEMENT LEVELS

Noise associated with construction activities on the site will be assessed in accordance with the NSW EPA Interim Construction Noise Guideline.

9.1.1 NSW Environmental Protection Authority (EPA) document – ‘Interim Construction Noise Guideline’ (“ICNG”) July 2009

The “quantitative” assessment procedure, as outlined in the Interim Construction Noise Guideline (ICNG) will be used. The quantitative assessment method requires: Determination of noise generation goals (based on ambient noise monitoring); Prediction of operational noise levels at nearby development; and if necessary, recommendation of noise controls strategies in the event that compliance with noise emission goals is not possible.

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- *“Noise affected” level.* Where construction noise is predicted to exceed the “noise affected” level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the “noise affected level”. For residential properties, the “noise affected” level occurs when construction noise exceeds ambient levels by more than 10dB(A)_{Leq(15min)}.
- *“Highly noise affected level”.* Where noise emissions are such that nearby properties are “highly noise affected”, noise controls such as respite periods should be considered. For residential properties, the “highly noise affected” level occurs when construction noise exceeds 75dB(A)_{Leq(15min)} at nearby residences.

In addition to the above management levels for residential receivers, the ICNG nominates a Management Level of 70dB(A) _{Leq(15min)} at commercial receiver facades (typical office, retail). And a Management Level of RBL + 5 dB(A) for any work done outside of standard hours.

A summary of the above recommended noise levels from the ICNG is presented below.

Table 15 – Noise Emission Goal at Residential Property Boundaries

Location	“Noise Affected” Level - dB(A) _{Leq(15min)} Standard Hours	“Highly Noise Affected” Level - dB(A) _{Leq(15min)}
Residential Receiver R1	57 externally at façade	75

Where noise from the construction works is above the “noise affected” level, the proponent should apply any feasible and reasonable work practices to minimise noise. The “noise affected level is representative of a level where there may be some community reaction to noise.

If noise emissions are likely to exceed 75 dB(A)_{Leq(15min)} “highly noise affected” at the boundary of surrounding affected residential receivers, the receiver is deemed to be “highly noise affected”. The “highly noise affected” level is representative of a level where strong community reaction to noise is expected. Introduction of management controls such as scheduling of noisy periods, or respite periods is then recommended. Refer to Section 10 for specific recommendations.

Section 4.1.2 and 4.1.3 of the EPA Interim Construction Noise Guideline also nominates management levels for other sensitive land uses (other than residences). Criteria relevant to this assessment is detailed below.

Table 16 – Noise Emission Goal at Commercial/ Sensitive Property Boundaries

Location	Management Level dB(A)_{Leq(15min)}
Educational Receivers E1	45 internally
Place of Worship Receivers P1	45 internally
Passive Play (Recreation) Receiver PP1	60 externally
Commercial Receivers C1, C2, C3, C4	70 externally at facade

9.1.2 Australian Standard AS2436:2010 “Guide to Noise Control on Construction, Maintenance and Demolition Sites”

The Australian Standard AS2436 states that where all reasonable and available measures have been taken to reduce construction noise, mitigation strategies may be put in place to reduce levels noise levels to within a reasonable and acceptable level.

For the control and regulation of noise from construction sites, AS2436:1981 nominates the following:

- a. *That reasonable suitable noise criterion is established,*
- b. *That all practicable measures be taken on the building site to regulate noise emissions, including the siting of noisy static processes to locations of the site where they can be shielded, selecting less noisy processes, and if required regulating construction hours, and*
- c. *The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the construction site.*

The guideline reflects on feasible and reasonable mitigation strategies, management controls and public liaising in the effort to reach realistic compromises between construction sites and potential noise affected receivers.

Based on these criteria the following procedure will be used to assess noise emissions:

- Predict noise levels produced by typical construction activities at the sensitive receivers.
- Adopt management conditions as per AS2436 in the event of a non-compliance.

9.2 VIBRATION OBJECTIVES

Vibration caused by construction at any residence or structure outside the subject site will be assessed with reference to:

- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures*; and
- For human exposure to vibration, Department of Environment and Conservation NSW “Assessing Vibration: A Technical Guideline” (Feb 2006) is based on the guidelines contained in BS 6472:1992 *Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80Hz)* for low probability of adverse comment.

The criteria and the application of this standard are discussed in separate sections below.

9.2.1 Structure Borne Vibrations (Building Damage Criteria)

German Standard DIN 4150-3 (2016-12) 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 below 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.

Table 17 – DIN 4150-3 (2016-12) Safe Limits for Building Vibration

TYPE OF STRUCTURE		PEAK PARTICLE VELOCITY (mms ⁻¹)			
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

9.2.2 Assessing Amenity

The NSW EPA's *Assessing Vibration – a technical guideline* is based on the guidelines contained in British Standard BS 6472-1992 'Guide to Evaluate Human Exposure to Vibration Buildings (1Hz to 80Hz'. This guideline provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings.

The recommendations of this guideline should be adopted to assess and manage vibration from the site. Where vibration exceeds, or is likely to exceed, the recommended levels then an assessment of reasonable and feasible methods for the management of vibration should be undertaken.

Table 18 – BS 6472 Vibration Criteria

		RMS acceleration (m/s ²)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	Time	Preferred	Maximum	Preferred	Maximum	Preferred	Maximum
Continuous Vibration							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices	Day or night-time	0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices	Day or night-time	0.64	1.28	13	26	18	36
Workshops		0.64	1.23	13	26	18	36

Note 1: Continuous vibration relates to vibration that continues uninterrupted for a defined period (usually throughout the daytime or night-time), e.g., continuous construction or maintenance activity. (DECC, 2006).

Note 2: Impulsive vibration relate to vibration that builds up rapidly to a peak followed by a damped decay and that may or may not involve several cycles of vibration (depending on frequency and damping), with up to three occurrences in an assessment period, e.g., occasional loading and unloading, or dropping of heavy equipment. (DECC, 2006).

9.3 CONSTRUCTION NOISE EMISSIONS ASSESSMENT

9.3.1 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 – Sound Power Levels of Typical Equipment

Equipment/ Process	Sound Power Level dB(A)	Duty*
Excavator with hydraulic hammer (10t)	118	75%
Jackhammer	113	75%
Tower Crane	113	50%
Piling Rig – Bored	112	100%
Pump – Concrete	109	100%
Truck – Concrete	109	100%
Trucks – Medium Rigid	103	10%
Powered Hand Tools	102	50%

*Typical amount of time operational within any given 15-minute period.

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).

9.3.2 Predicted Noise Levels

The predicted noise levels during demolition, excavation and construction will depend on:

- The activity undertaken.
- The distance between the work site and the receiver. For many of the work areas, the distance between the noise source and the receiver will vary depending on which end of the site the work is undertaken. For this reason, the predicted noise levels will be presented as a range.

Predicted noise levels are presented in the following tables. Predictions take into account noise reduction as a result of distance, and barrier effects where applicable.

Table 20 – Predicted Noise Generation to R1

Activity	Predicted Level dB(A)	Comment
Excavator with hydraulic hammer (10t)	60-64	Exceeds 57 dB(A) Noise Management Level but under 75 dB(A) Highly Noise Affected Level (Refer to Recommendations Section 10).
Jackhammer	55-59	Exceeds 57 dB(A) Noise Management Level when working near the southern boundary but under 75 dB(A) Highly Noise Affected Level (Refer to Recommendations Section 10).
Tower Crane	53-57	Under 57 dB(A) Noise Management Level.
Piling Rig – Bored	55-59	Exceeds 57 dB(A) Noise Management Level when working near the southern boundary but under 75 dB(A) Highly Noise Affected Level (Refer to Recommendations Section 10).
Pump – Concrete	52-56	Under 57 dB(A) Noise Management Level.
Truck – Concrete	52-56	
Trucks – Medium Rigid	36-40	
Powered Hand Tools	42-46	

Table 21 – Predicted Noise Generation to P1

Activity	Predicted Level* dB(A)	Comment
Excavator with hydraulic hammer (10t)	50-61	Exceeds 45 dB(A) internal Noise Management Level (Refer to Recommendations Section 10).
Jackhammer	45-56	Exceeds 45 dB(A) internal Noise Management Level when working near the western boundary (Refer to Recommendations Section 10).
Tower Crane	43-54	
Piling Rig – Bored	45-56	
Pump – Concrete	42-53	
Truck – Concrete	42-53	
Trucks – Medium Rigid	26-37	Under 45 dB(A) internal Noise Management Level.
Powered Hand Tools	32-43	

* Conservative 10dB(A) reduction through a window open for natural ventilation.

Table 22 – Predicted Noise Generation to E1

Activity	Predicted Level* dB(A)	Comment
Excavator with hydraulic hammer (10t)	57-69	Exceeds 45 dB(A) internal Noise Management Level (Refer to Recommendations Section 10).
Jackhammer	52-64	
Tower Crane	50-62	
Piling Rig – Bored	52-64	
Pump – Concrete	49-61	
Truck – Concrete	49-61	
Trucks – Medium Rigid	33-45	Under 45 d(B)A internal Noise Management Level.
Powered Hand Tools	39-51	Exceeds 45 dB(A) internal Noise Management Level when working near the southern boundary (Refer to Recommendations Section 10).

* Conservative 10dB(A) reduction through a window open for natural ventilation.

Table 23 – Predicted Noise Generation to PP1

Activity	Predicted Level dB(A)	Comment
Excavator with hydraulic hammer (10t)	62-83	Exceeds 60 dB(A) Noise Management Level (Refer to Recommendations Section 10).
Jackhammer	57-78	Exceeds 60 dB(A) Noise Management Level when working near the western boundary (Refer to Recommendations Section 10).
Tower Crane	55-76	
Piling Rig – Bored	57-78	
Pump – Concrete	54-75	
Truck – Concrete	54-75	
Trucks – Medium Rigid	38-59	Under 60 d(B)A Noise Management Level.
Powered Hand Tools	44-65	Exceeds 60 dB(A) Noise Management Level when working near the western boundary (Refer to Recommendations Section 10).

Table 24 – Predicted Noise Generation to C1

Activity	Predicted Level dB(A)	Comment
Excavator with hydraulic hammer (10t)	67-79	Exceeds 70 dB(A) Noise Management Level when working near the southern boundary (Refer to Recommendations Section 10).
Jackhammer	62-74	
Tower Crane	60-72*	Under 70 d(B)A Noise Management Level.
Piling Rig – Bored	62-74	Exceeds 70 dB(A) Noise Management Level when working near the southern boundary (Refer to Recommendations Section 10).
Pump – Concrete	59-71*	Under 70 d(B)A Noise Management Level.
Truck – Concrete	59-71*	
Trucks – Medium Rigid	43-55	
Powered Hand Tools	49-61	

* A 1-2dB(A) increase is considered imperceptible to the human ear and is thus negligible.

Table 25 – Predicted Noise Generation to C2

Activity	Predicted Level dB(A)	Comment
Excavator with hydraulic hammer (10t)	62-79	Exceeds 70 dB(A) Noise Management Level when working near the eastern boundary (Refer to Recommendations Section 10).
Jackhammer	57-74	
Tower Crane	56-72*	Under 70 d(B)A Noise Management Level.
Piling Rig – Bored	58-74	Exceeds 70 dB(A) Noise Management Level when working near the eastern boundary (Refer to Recommendations Section 10).
Pump – Concrete	55-71*	Under 70 d(B)A Noise Management Level.
Truck – Concrete	55-71*	
Trucks – Medium Rigid	39-55	
Powered Hand Tools	45-61	

* A 1-2dB(A) increase is considered imperceptible to the human ear and is thus negligible.

Table 26 – Predicted Noise Generation to C3

Activity	Predicted Level dB(A)	Comment
Excavator with hydraulic hammer (10t)	67-95	Exceeds 70 dB(A) Noise Management Level when working near the northern boundary (Refer to Recommendations Section 10).
Jackhammer	62-90	
Tower Crane	60-88	
Piling Rig – Bored	62-90	
Pump – Concrete	59-87	
Truck – Concrete	59-87	
Trucks – Medium Rigid	43-71	Under 70 d(B)A Noise Management Level.
Powered Hand Tools	49-77	Exceeds 70 dB(A) Noise Management Level when working near the northern boundary (Refer to Recommendations Section 10).

* A 1-2dB(A) increase is considered imperceptible to the human ear and is thus negligible.

Table 27 – Predicted Noise Generation to C4

Activity	Predicted Level dB(A)	Comment
Excavator with hydraulic hammer (10t)	61-79	Exceeds 70 dB(A) Noise Management Level when working near northwestern corner (Refer to Recommendations Section 10).
Jackhammer	56-74	
Tower Crane	54-72*	Under 70 d(B)A Noise Management Level.
Piling Rig – Bored	56-74	Exceeds 70 dB(A) Noise Management Level when working near northwestern corner (Refer to Recommendations Section 10).
Pump – Concrete	53-71*	Under 70 d(B)A Noise Management Level.
Truck – Concrete	53-71*	
Trucks – Medium Rigid	37-55	
Powered Hand Tools	43-61	

* A 1-2dB(A) increase is considered imperceptible to the human ear and is thus negligible.

9.4 DISCUSSION

Noise

The demolition stage utilises the loudest equipment in any stage of construction.

Primarily, the use of the excavator with hydraulic hammer and/or jackhammers are predicted to be the highest noise generating equipment. It is also noted that both equipment are only expected to be used in during specific portions of the demolition and excavation stages and will not be continuous throughout these stages.

External noise level predictions to all receivers have been presented as worst-case scenarios where the closest receiver has direct line of sight to construction plant operating at the closest point of the site with respect to each individual receiver. It is noted that many locations are shielded by other developments, which would lead to lower noise levels than those predicted in the previous section. It is likely that the demolition staging will allow for much more screening of local receivers than predicted. This will be dependent on the demolition staging process that is to be detailed by the Client. Shielding by the existing building itself will provide a considerable increase in noise amenity to local receivers.

It is also noted that ground level receivers will also receive lower noise levels than predicted due to hoarding around the perimeter of the site, likely to reduce the construction noise level by 10 dB(A).

To assess whether mitigation of these exceedances is feasible or reasonable, the ICNG indicates the following should be considered:

- The levels of impact including noise levels and the number of people affected.
- The benefits of noise mitigation and the number of people protected.
- Cost effectiveness of mitigation.
- Community views.

For **R1**, noise at the receivers will be partially screened by the existing buildings at **C1** and **E1**. This is likely to further reduce received noise levels. Any significant mitigation for these receivers is not indicated beyond "good practice" management of the works. Additional controls are recommended in Section 10. Should the application of feasible and reasonable mitigation not reduce noise levels below a satisfactory level then the application of respite periods is recommended.

For all other receivers closer to the project site, this assessment indicates that feasible and reasonable noise mitigation would need to be investigated to by the contractor to minimise noise impacts, based on the procedures and methods in Section 10 and the ICNG.

All receivers are predicted to exceed noise management levels during heavy demolition works when operating at the closest boundary however **E1** and parts of **C3** are more affected due to its close proximity to possible construction works.

The most effective mitigation investigation strategy is likely to be:

- Select the quietest plant/activity available (or retrofit acoustic treatment to the plant such as residential class mufflers) to minimise any NML exceedances.
- If any residual exceedances, investigate the use of additional barriers to screen the affected receivers. It is noted that solid hoardings are proposed along the whole perimeter of the site.

- If any remaining residual significant exceedances, investigate time restrictions (e.g. avoiding loud early morning works at the residences) and notification of affected receivers when works likely to exceed the NML's is likely to occur.
- Stage demolition works in a way to retain as much of the external façade as practicable to act as an acoustic barrier with internal demolition to be conducted prior to external works.

Detailed construction noise planning is typically undertaken after engagement of a builder and a construction program is prepared (i.e., after DA stage) and therefore, detailed planning is not possible at this stage.

In light of the above, we recommend:

- During preparation of the construction program (CC stage), acoustic review of proposed construction activities and plant/methods should be undertaken to identify work items likely to exceed Noise Management Levels.
- For those activities likely to generate high noise levels, the analysis should identify where on the site are the areas likely to result in high noise levels. This will then assist in determining the likely time period for which high noise levels will occur.
- Identify feasible acoustic controls or management techniques (use of screens, scheduling of noisy works, notification of adjoining land users, respite periods) when excessive levels may occur.
- For activities where acoustic controls and management techniques still cannot guarantee compliant noise levels, implement a notification process whereby nearby development is made aware of the time and duration of noise intensive construction processes.

Through adoption of the above, noise impacts on nearby development can be suitably managed to prevent excessive impact. Treatment processes are recommended as per Section 10 with further recommendations in Sections 11, 12 & 13. With the implementation of the aforementioned sections, the Client demonstrates that all reasonable and feasible vibration and noise mitigation measures have been taken.

Vibration

Given the distance and Type 1 vibration limits (from DIN-4150), vibration impacts to surrounding developments are not expected to require specific mitigation unless conducting high vibration generating activities to the building at **C3** that is directly adjacent to the site boundary. Where a complaint is received, attended measurements of vibration may be undertaken to determine the cause and any further investigation or monitoring which should be undertaken.

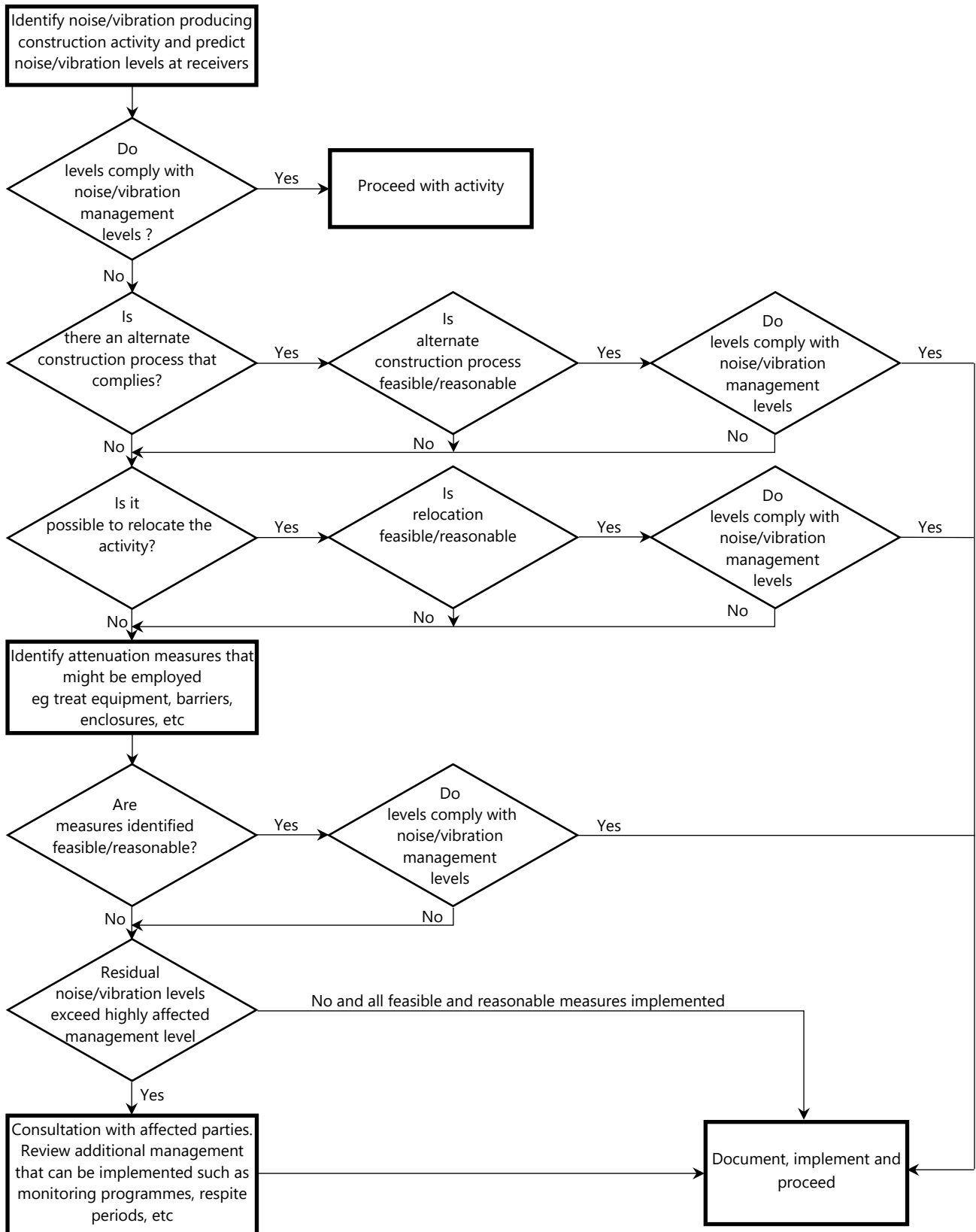
10 PROJECT SPECIFIC CONSTRUCTION MANAGEMENT CONTROLS

In light of the above, we recommend:

1. **Community Consultation/Notification:** Notification (leaflet or similar) of all receivers identified in Section 2.2 is recommended 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 9.3.2. 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 stage.
 - 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.
3. **Vibration monitoring:** It is recommended to conduct vibration monitoring at **C3** during the demolition and excavation stage. In the event of a complaint at any other receiver, we recommend vibration monitoring is to be implemented along the property boundary closest to the vibration receiver who issued the complaint.
4. **Noise monitoring:** In the event of a complaint, noise monitoring can be implemented along the property boundary closest to the noise receiver who issued the complaint.
5. **Quiet Work Methods/Technologies:**
 - a. The primary noise generating activity at the site will be the demolition and excavation periods. As much as practicable, use of quieter methods is to be adopted.
 - b. It is recommended to 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) should turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).
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 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

The installation of rubber matting over material handling areas can 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.

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 2.2). This will include a construction management plan detailing the proposed works on site and duration of each stage.

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.

14 SUMMARY OF COMPLYING MITIGATION

Modelling indicated that additional mitigation is needed to achieve compliance with each respective criterion. This additional mitigation is described below, along with other measures to minimise impacts.

14.1 INTERNAL NOISE CONTROL

Minimum façade requirements including glazing, external roof/ceilings, external wall constructions are provided in detail within Section 8.

Façade constructions are to be reviewed at CC stage based on construction drawings pending final façade design.

14.2 OPERATIONAL NOISE

14.2.1 Management Controls

Management controls for the outdoor communal spaces as stipulated within Section 7.2 is as follows:

- Building management is to ensure the outdoor common areas are not to be used for parties, such that normal vocal levels would be expected as opposed to raised voices.
- Use of the common areas is to be limited to 7:00am to 10:00pm and no use from 10:00pm to 7:00am.

In addition to this, detailed acoustic review shall be undertaken at CC stage to determine acoustic treatments to control noise emissions from any mechanical plant and equipment servicing the development.

14.3 CONSTRUCTION NOISE

14.3.1 Management Controls

Recommendations within Sections 10 to 14 have been provided to reduce noise levels resulting from the construction of the development.

15 CONCLUSION

This document provides an assessment of the various noise and vibration impacts associated with the proposed development at 136-148 Donnison Street, Gosford.

Provided that the recommendations presented in Section 8 are adopted, internal noise levels for the development will comply with the acoustic requirements of the following documents:

- Central Coast Council *Development Control Plan (DCP)* 2022.
- Australian and New Zealand AS/NZS 2107:2016 *Recommended design sound levels and reverberation times for building interiors*.

External noise emissions criteria have been established in this report to satisfy the requirements from the following documents:

- Central Coast Council *Development Control Plan (DCP)* 2022.
- NSW Environment Protection Authority (**EPA**) *Noise Policy for Industry (NPfI)* 2017.

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

Yours faithfully,

A handwritten signature in blue ink, appearing to read 'Weber Yeh', is positioned below the 'Yours faithfully,' text.

Acoustic Logic Pty Ltd
Weber Yeh

APPENDIX A AMBIENT NOISE MONITORING

This appendix summarises the ambient noise data measured near the subject site, and the calculated noise level descriptors adopted to characterise the existing noise environment.

Monitoring has been undertaken to provide the following ambient data:

- Background noise levels at the surrounding residential properties.
- Traffic noise levels.
- Noise generated by adjacent land uses.

A.1 NOISE DESCRIPTORS

Ambient 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 on a continuous basis over this period, and statistical and integrating techniques are used to characterise the noise being measured.

The principal measurement parameters 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 steady state and quasi-steady state noise sources (such as traffic noise).

L₉₀ - This is commonly used as a measure of the background noise level as it represents the noise level heard in the quieter periods during the measurement interval. The **L₉₀** 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 **L₉₀** level.

L₁₀ 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 noise and ground vibration induced noise from railways.

L₁ is sometimes used in place of **L_{max}** to represent a typical noise level from a number of high-level, short-term noise events.

A.2 UNATTENDED LONG TERM NOISE MONITORING

A.2.1 Equipment Used

Unattended noise monitoring was conducted using the following equipment:

- Rion NL-42 (Type 2)
- Svan calibrator SV 338

Monitoring was continuous, with statistical noise levels recorded at 15-minute intervals throughout the monitoring period. Measurements were taken on "A" frequency weighting and fast time response, unless noted otherwise.

All monitoring equipment used retains current calibration - either manufacturers' calibration or NATA certified calibration. The monitors were field calibrated at the beginning and the end of the measurement with no significant drift in calibration noted.

A.2.2 Location Monitored

The locations monitored are indicated in Figure 4. The three monitors situated within the site boundary were located on the top level of the existing structure with the microphone approximately 1.5m above FFL. The noise monitor near **R1** was located above a dirt mound at approximately 4m above FFL of Margin Street.

A.2.3 Weather Affected and Extraneous/ Outlying Data

Periods affected by adverse weather conditions (as defined by Fact Sheet B) are indicated on the following data graphs and have been excluded from the assessment. Weather data was obtained from records provided by the Bureau of Meteorology for the following station:

As the Bureau of Meteorology wind data is typically obtained at an exposed location at 10m above ground level, and the monitoring locations were at approximately 1.5m above ground in more sheltered locations a wind multiplying factor of 0.33 has been applied to the BOM data to estimate the wind speed at the microphone location based on monitoring being done in a suburban/ urban area.

Wind speed and rain fall data were obtained from Gosford AWS.

Multiple time periods were identified as likely to contain significant periods of non-representative data and have been excluded from the assessment.

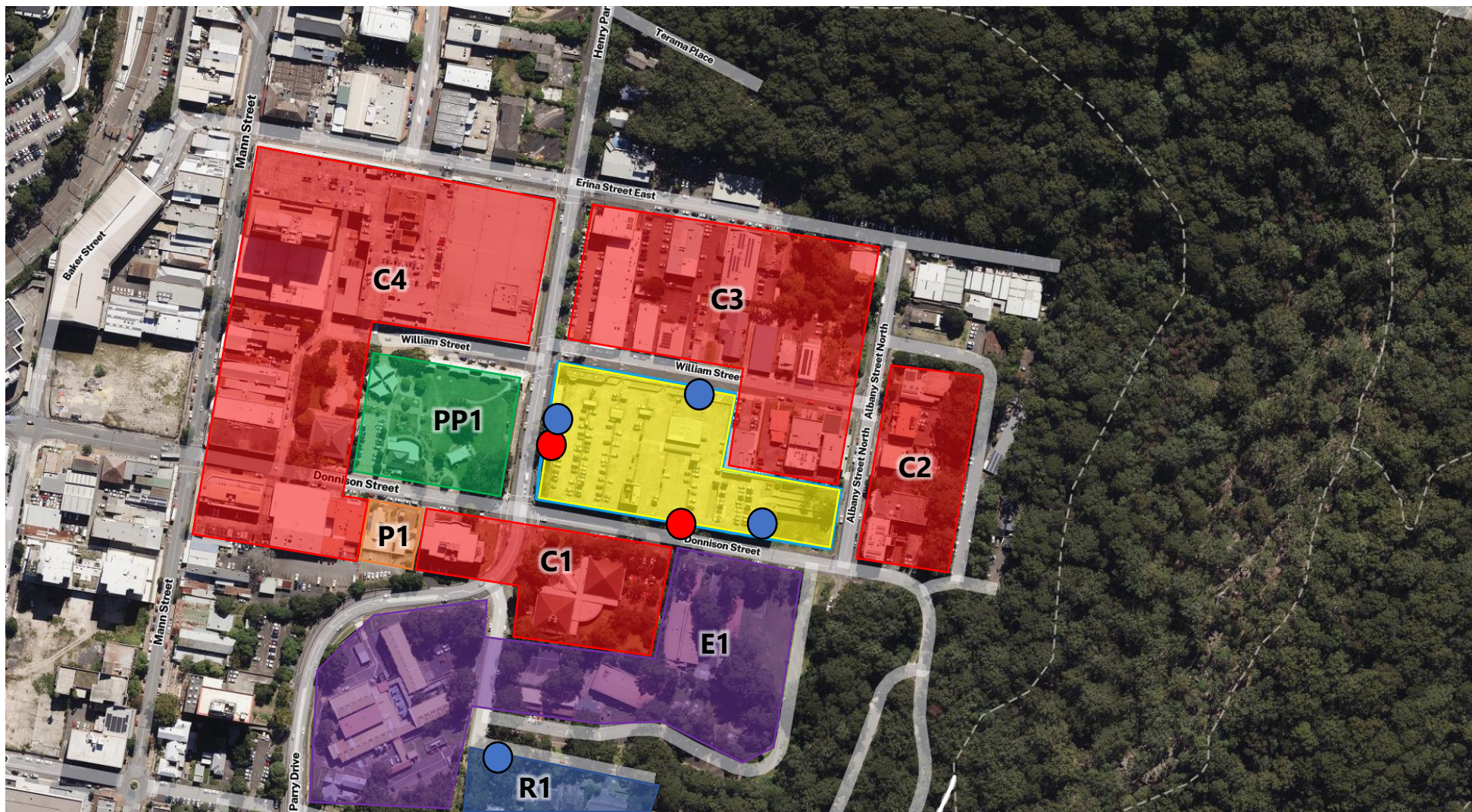
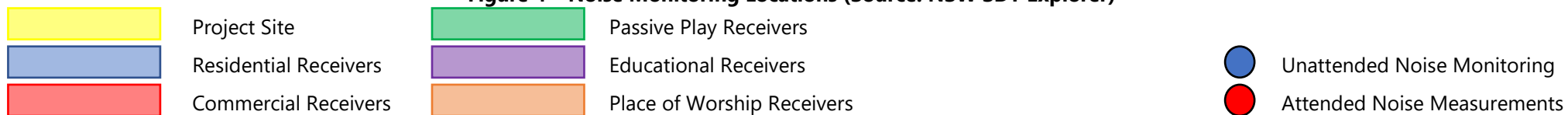


Figure 4 – Noise Monitoring Locations (Source: NSW SDT Explorer)



A.3 CALCULATION OF REPRESENTATIVE AMBIENT NOISE LEVELS

The ambient, assessment and rating background levels have been determined from the unattended, long-term noise monitoring data based on the methodology in the Noise Policy for Industry Fact Sheet B.

A.4 RATING BACKGROUND NOISE LEVELS

The following table summarises the assessment background noise levels (ABL) for each location. Note that where no ABL is indicated, this is because that period was significantly affected by adverse weather or other extraneous noise.

In accordance with the NPfl:

- If the calculated evening rating background noise level is higher than the day level, the day rating background noise level has been adopted for the evening period.
- If the calculated night rating background noise level is higher than the evening level, the evening rating background noise level has been adopted for the evening period.
- If the calculated day rating background noise level was less than 35 dB(A), a “default” background of 35 dB(A) has been adopted.
- If the calculated evening or night rating background noise level was less than 30 dB(A), a “default” background of 30 dB(A) has been adopted.
- Where monitoring was conducted within 3m of a significant sound reflecting surface, 2.5 dB(A) has been subtracted from the calculated rating background to account for an increase in noise from reflections.

Table A-1 – Assessment Background Noise Levels – Facing Henry Parry Drive

Location	Date		ABL		
			Day	Evening	Night
Facing Henry Parry Drive (P1, PP1, C4)	Friday	28/03/2025	-	47.7	44.7
	Saturday	29/03/2025	53.4	48.5	45.4
	Sunday	30/03/2025	52.2	46.9	44.5
	Monday	31/03/2025	54.1	46.8	42.6
	Tuesday	1/04/2025	53.8	47.6	42*
	Wednesday	2/04/2025	52.4	46.5	41.9
	Thursday	3/04/2025	52.8	46.7	41.4
	Friday	4/04/2025	52.3	46.8	42*
	Saturday	5/04/2025	50.6	46.5	41*
	Sunday	6/04/2025	49.4*	46.6	41.1
	Monday	7/04/2025	52.4	45.8	41.1*
	Tuesday	8/04/2025	53.2*	46.6	40.8*
	Wednesday	9/04/2025	52.6	48.2	41.5
	Thursday	10/04/2025	53	50.6	41.5
	Friday	11/04/2025	-	-	-
	Calculated RBL		53	47	42
	Adopted RBL		53	47	42

*Weather affected data removed from calculation.

Table A-2 – Assessment Background Noise Levels – Facing Donnison Street

Location	Date		ABL		
			Day	Evening	Night
Facing Donnison Street (C1, E1)	Friday	28/03/2025	-	40.8	39.4
	Saturday	29/03/2025	44.8	43.3	41.3
	Sunday	30/03/2025	45.5	42.6	40.3
	Monday	31/03/2025	47.3	42.2	37.6
	Tuesday	1/04/2025	46.3	39.3	36.7*
	Wednesday	2/04/2025	43.8	39.8	36.3
	Thursday	3/04/2025	44	39.6	36.1
	Friday	4/04/2025	43.6	39	36.5*
	Saturday	5/04/2025	41.6	38.5	35.1*
	Sunday	6/04/2025	41.8*	39.6	36.6
	Monday	7/04/2025	44.7	38.4	35*
	Tuesday	8/04/2025	44.5*	38.1	34.9*
	Wednesday	9/04/2025	43.9	40.2	35.3
	Thursday	10/04/2025	44.3	40.9	35.4
	Friday	11/04/2025	-	-	-
	Calculated RBL		44	40	37
	Adopted RBL		44	40	37

*Weather affected data removed from calculation.

Table A-3 – Assessment Background Noise Levels – Facing William Street

Location	Date		ABL		
			Day	Evening	Night
Facing William Street (C2, C3)	Friday	28/03/2025	-	42.3	42
	Saturday	29/03/2025	47.7	43.7	42.9
	Sunday	30/03/2025	48.2	44.6	42.4
	Monday	31/03/2025	49.9	43.6	39.3
	Tuesday	1/04/2025	48.7	42.2	38.5*
	Wednesday	2/04/2025	45.7	40.1	37.7
	Thursday	3/04/2025	46.1	40.8	37.2
	Friday	4/04/2025	45.9	40.5	38.3*
	Saturday	5/04/2025	44	39.8	36.4*
	Sunday	6/04/2025	43.3*	40.7	37.8
	Monday	7/04/2025	46.8	41.1	36.5*
	Tuesday	8/04/2025	47.2*	40.5	36.2*
	Wednesday	9/04/2025	46.3	41.8	37
	Thursday	10/04/2025	47.1	42.6	37.1
	Friday	11/04/2025	-	-	-
	Calculated RBL		47	41	38
	Adopted RBL		47	41	38

*Weather affected data removed from calculation.

Table A-4 – Assessment Background Noise Levels – Facing Margin Street

Location	Date		ABL		
			Day	Evening	Night
Facing Margin Street (R1)	Friday	28/03/2025	-	44.6	45.5
	Saturday	29/03/2025	48.2	45.1	43.3
	Sunday	30/03/2025	47	44.6	42.8
	Monday	31/03/2025	48.6	43.7	40.4
	Tuesday	1/04/2025	47.7	43.4	39.4*
	Wednesday	2/04/2025	47	43	40.3
	Thursday	3/04/2025	46.8	44.2	39.8
	Friday	4/04/2025	47	46	40.2*
	Saturday	5/04/2025	44.6	43	39.1*
	Sunday	6/04/2025	45.3*	44	38.6
	Monday	7/04/2025	46.9	42.8	39.1*
	Tuesday	8/04/2025	47.9*	44.2	39.4*
	Wednesday	9/04/2025	48.1	45.1	39.3
	Thursday	10/04/2025	0	44.6	45.5
	Friday	11/04/2025	-	-	-
	Calculated RBL		47	41	38
	Adopted RBL		47	41	38

*Weather affected data removed from calculation.

It is noted that only the noise monitoring near **R1** at Margin Street shall be adopted for project noise trigger levels as it is the only area of residential receivers near the development.

A.5 AMBIENT NOISE LEVELS

The data for the day, evening and night periods have been processed to determine the ambient noise levels at the monitoring locations for each period.

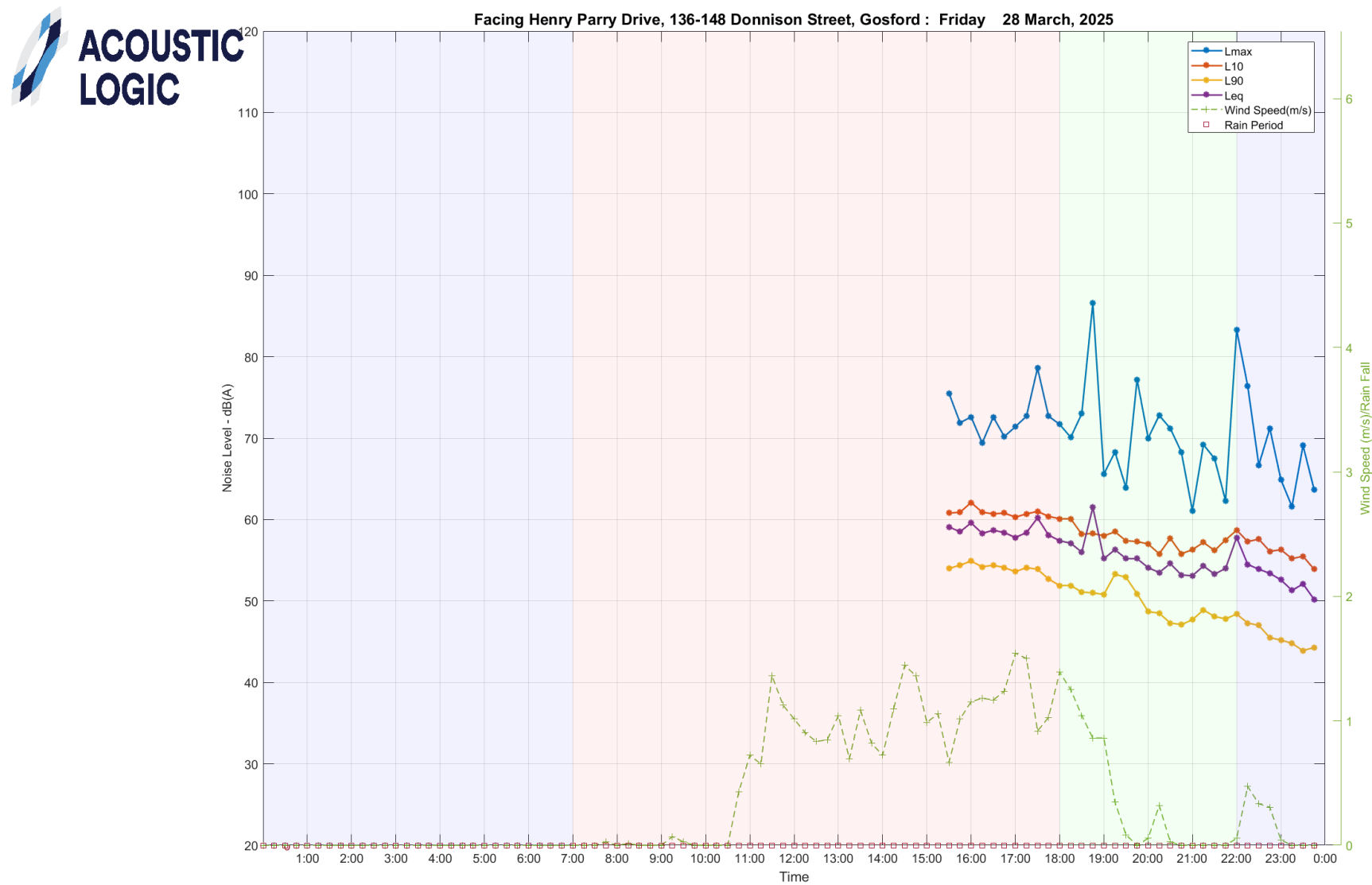
The $L_{eq,15hr}$ (day period, 7am to 10pm) and $L_{eq,9hr}$ (night period, 10pm to 7am) ambient noise level descriptors adopted in the NSW *Road Noise Policy* 2011 guideline have been calculated from the data and are summarised in the following table.

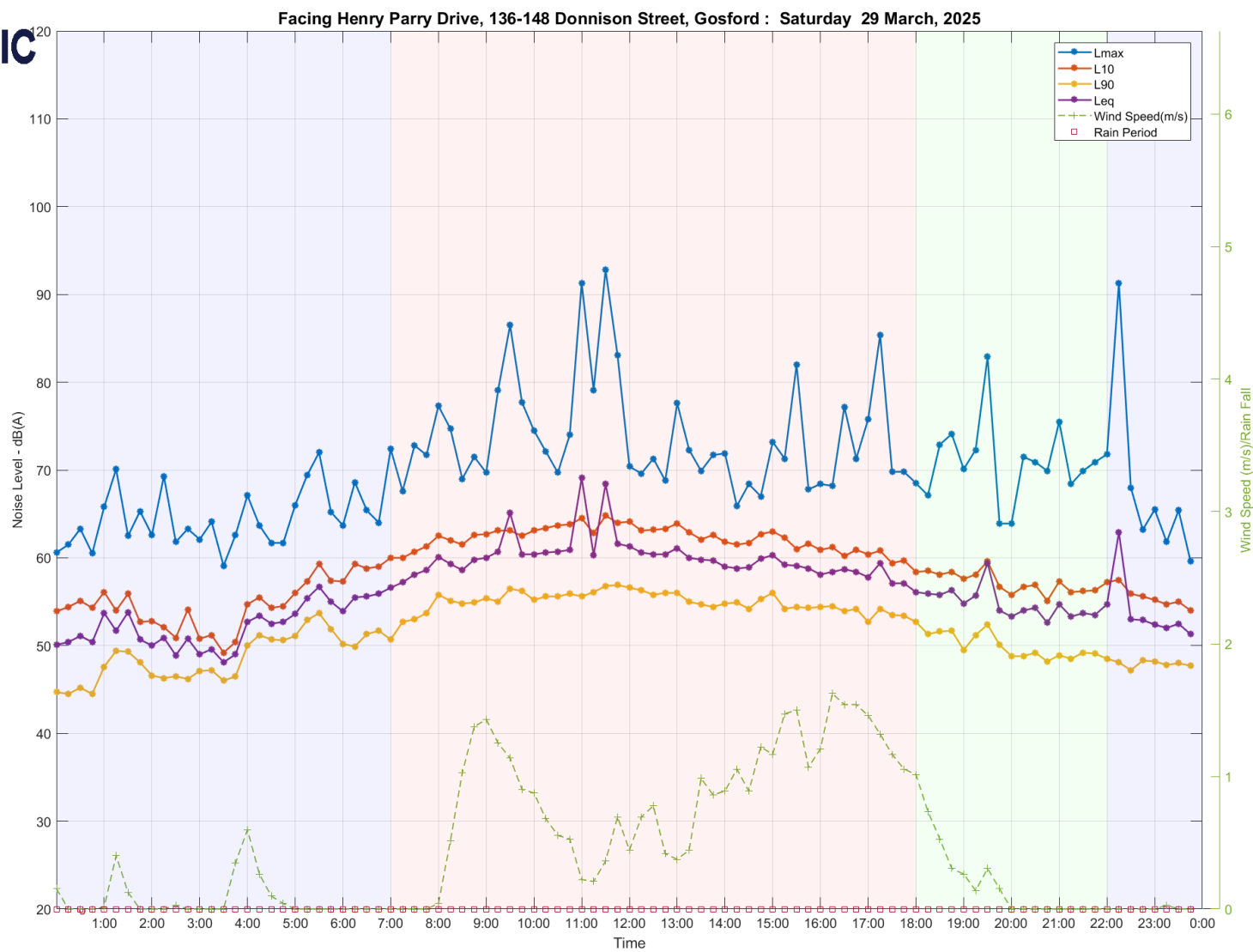
Table A-5 – RNP Ambient Noise

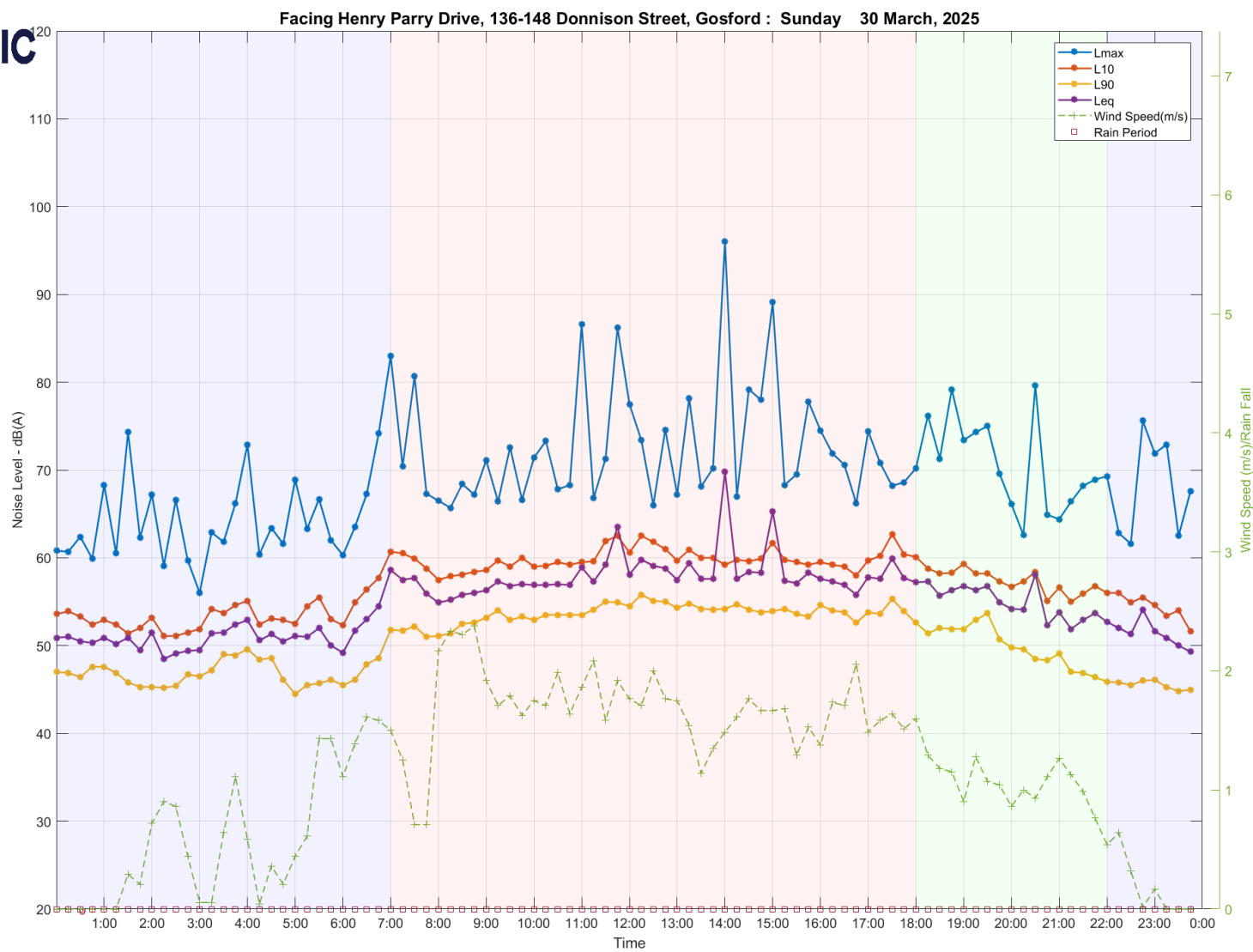
Location	Ambient Noise Level (dB(A) $L_{eq,period}$)	
	Day (7am to 10pm)	Night (10pm to 7am)
Noise monitor facing Henry Parry Drive	58.5	51.2
Noise monitor facing Donnison Street	50.4	44.9
Noise monitor facing William Street	51.3	46.2
Noise monitor facing Margin Street (R1)	52.6	49.5

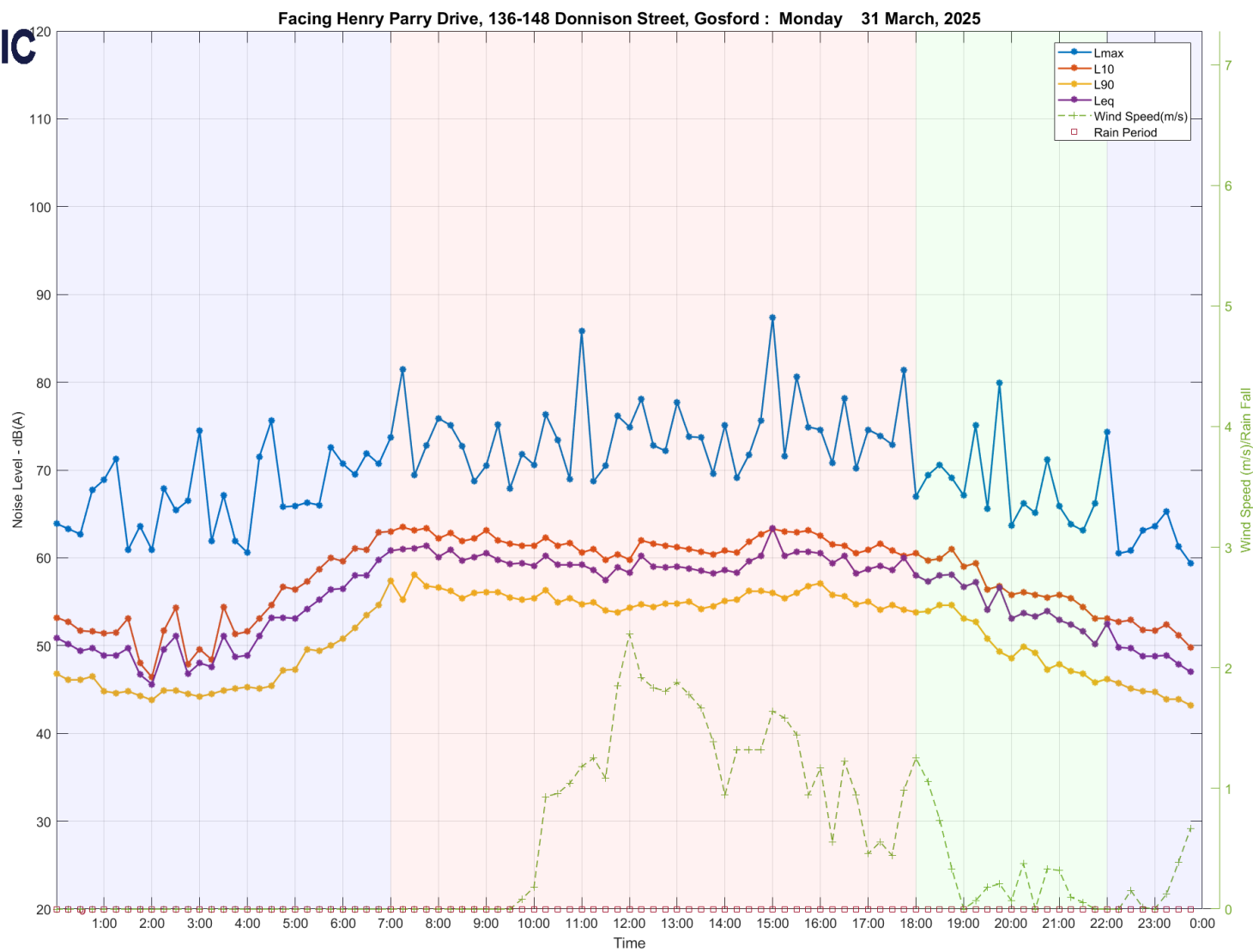
A.6 UNATTENDED MONITORING DATA GRAPHS

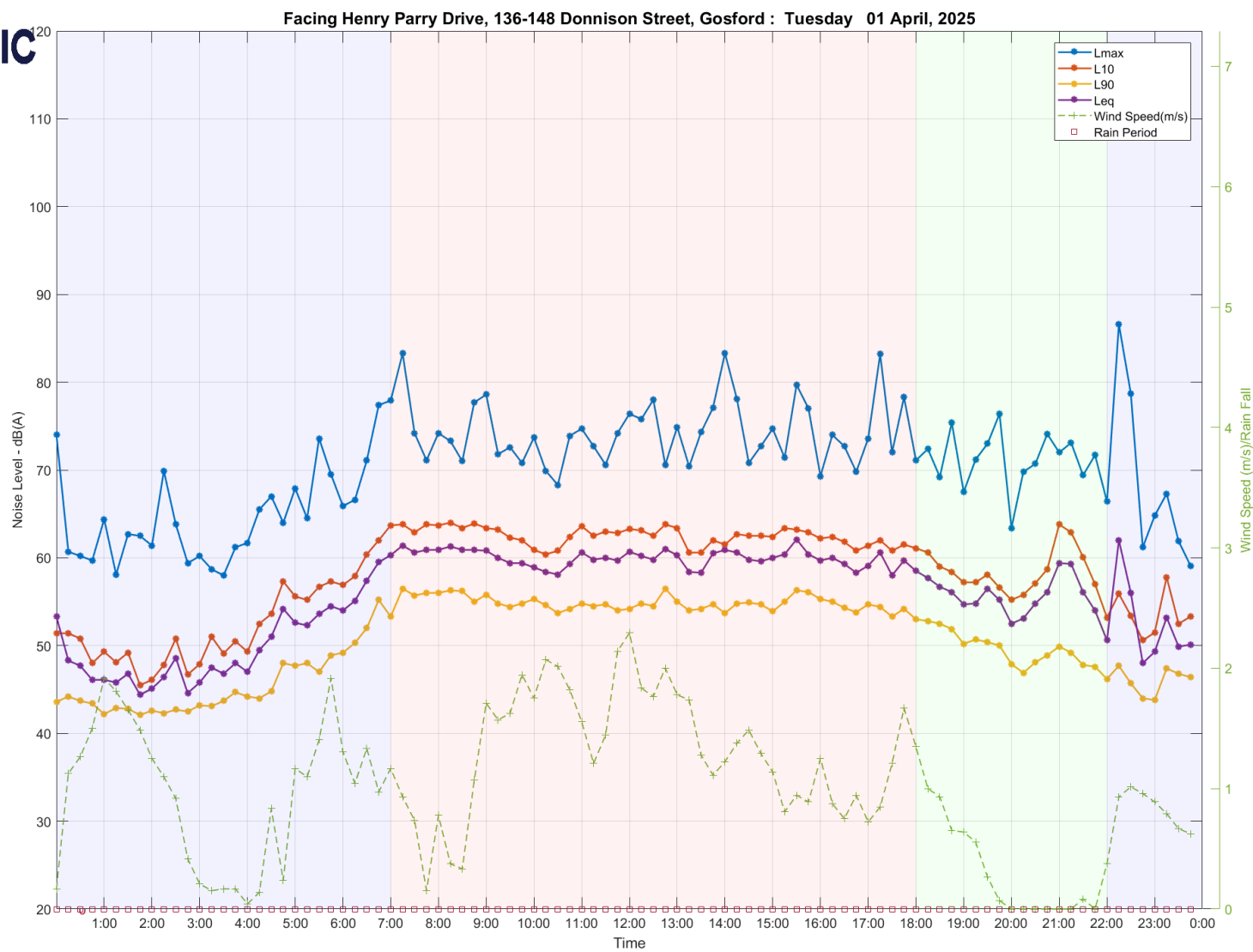
A.6.1 Facing Henry Parry Drive

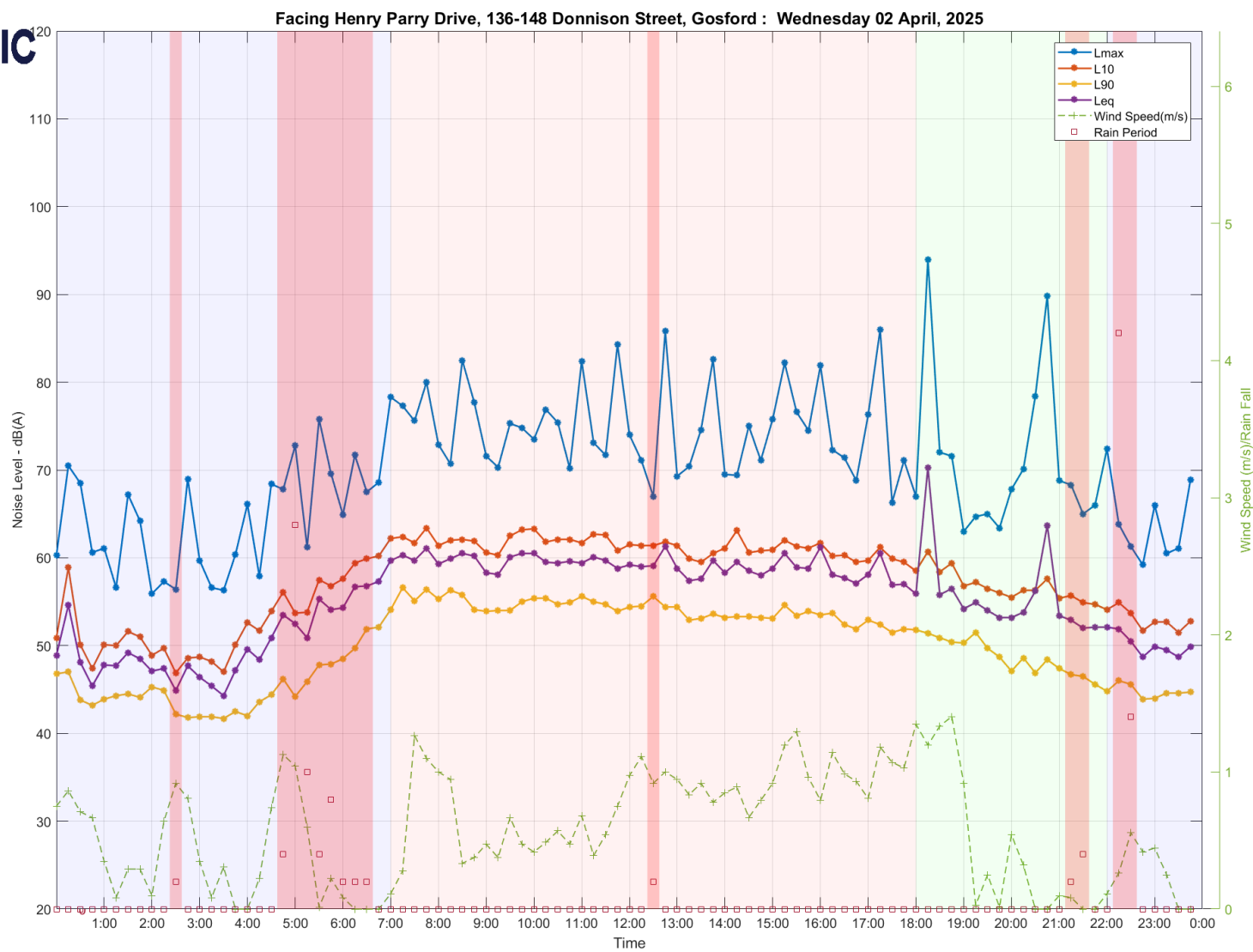


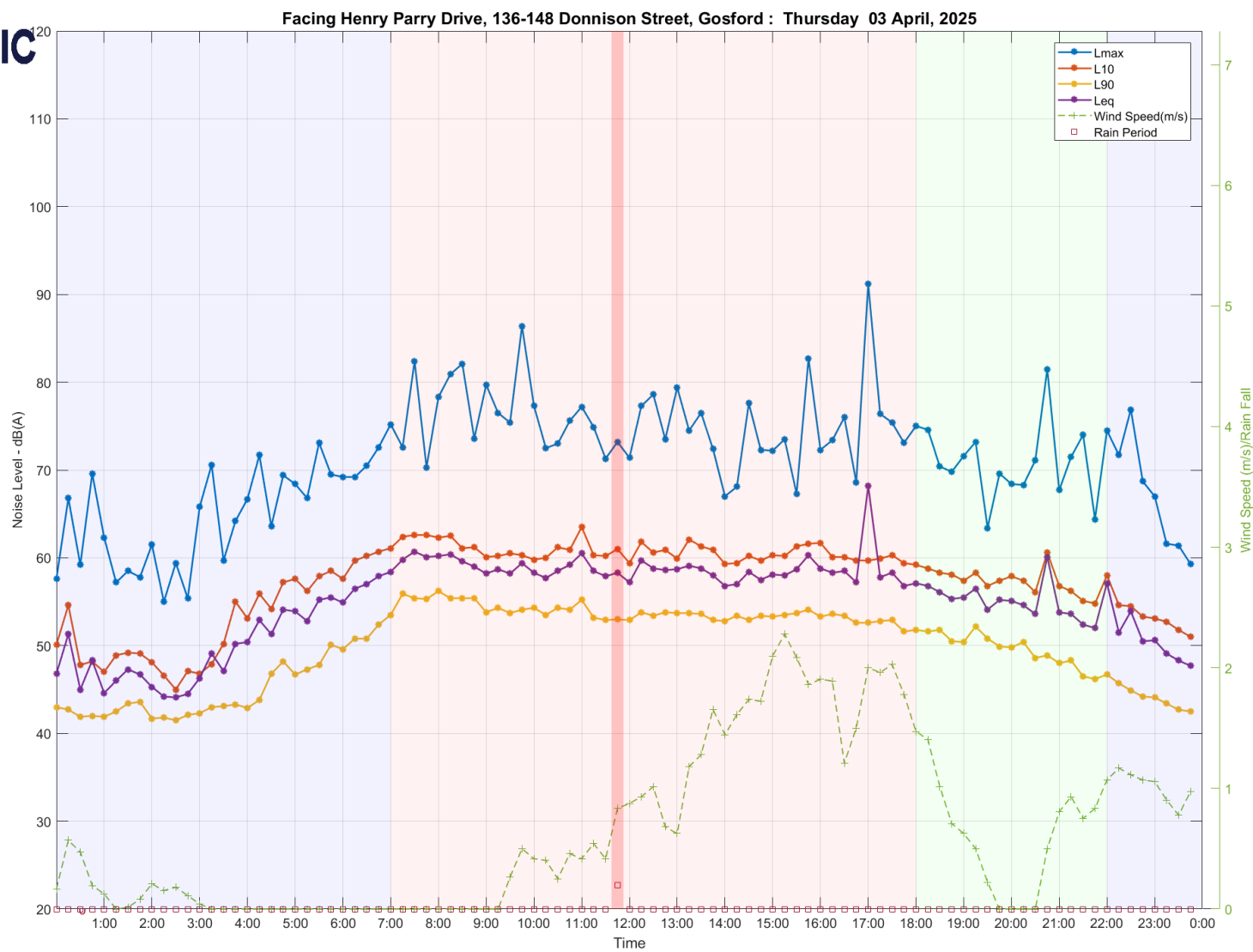


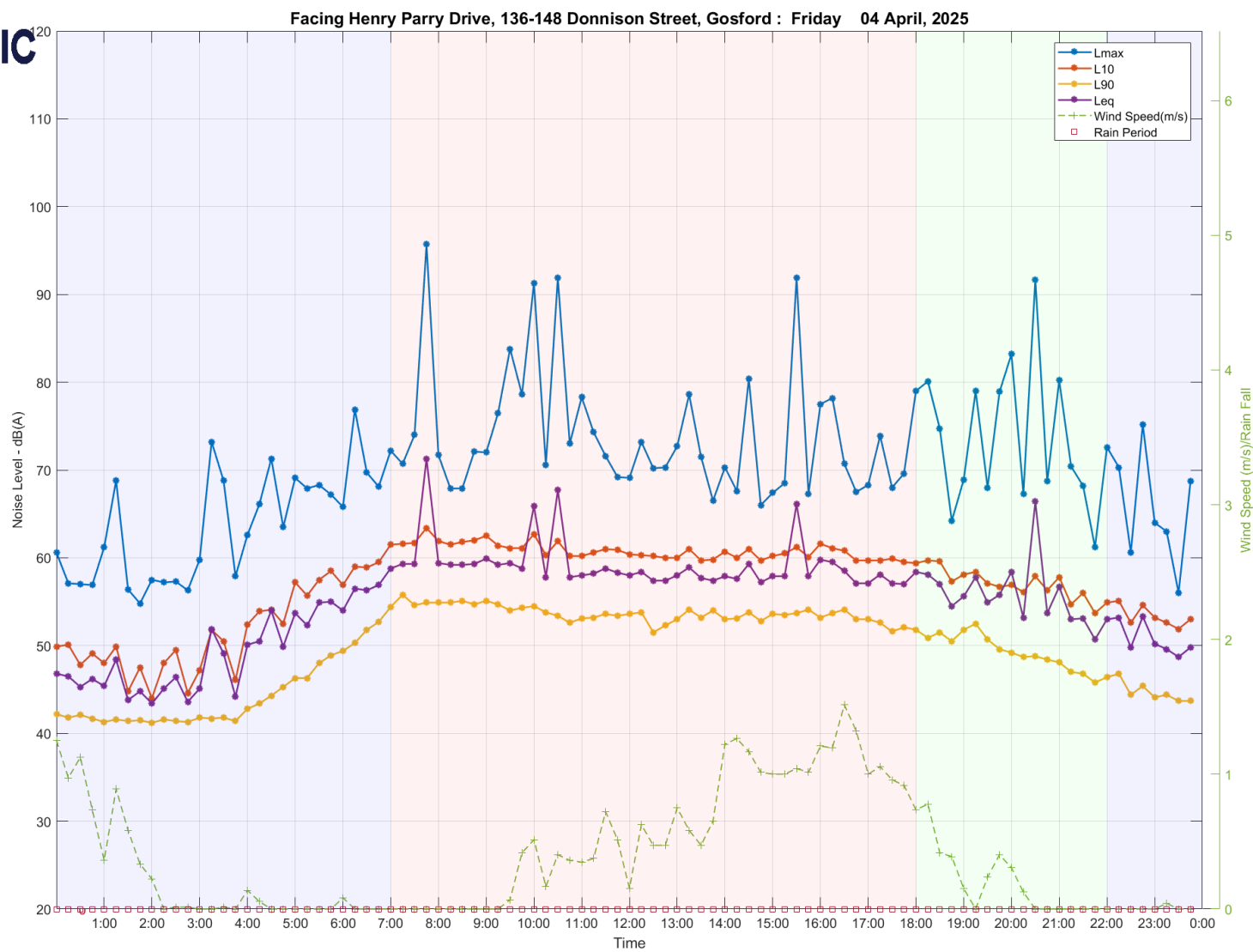


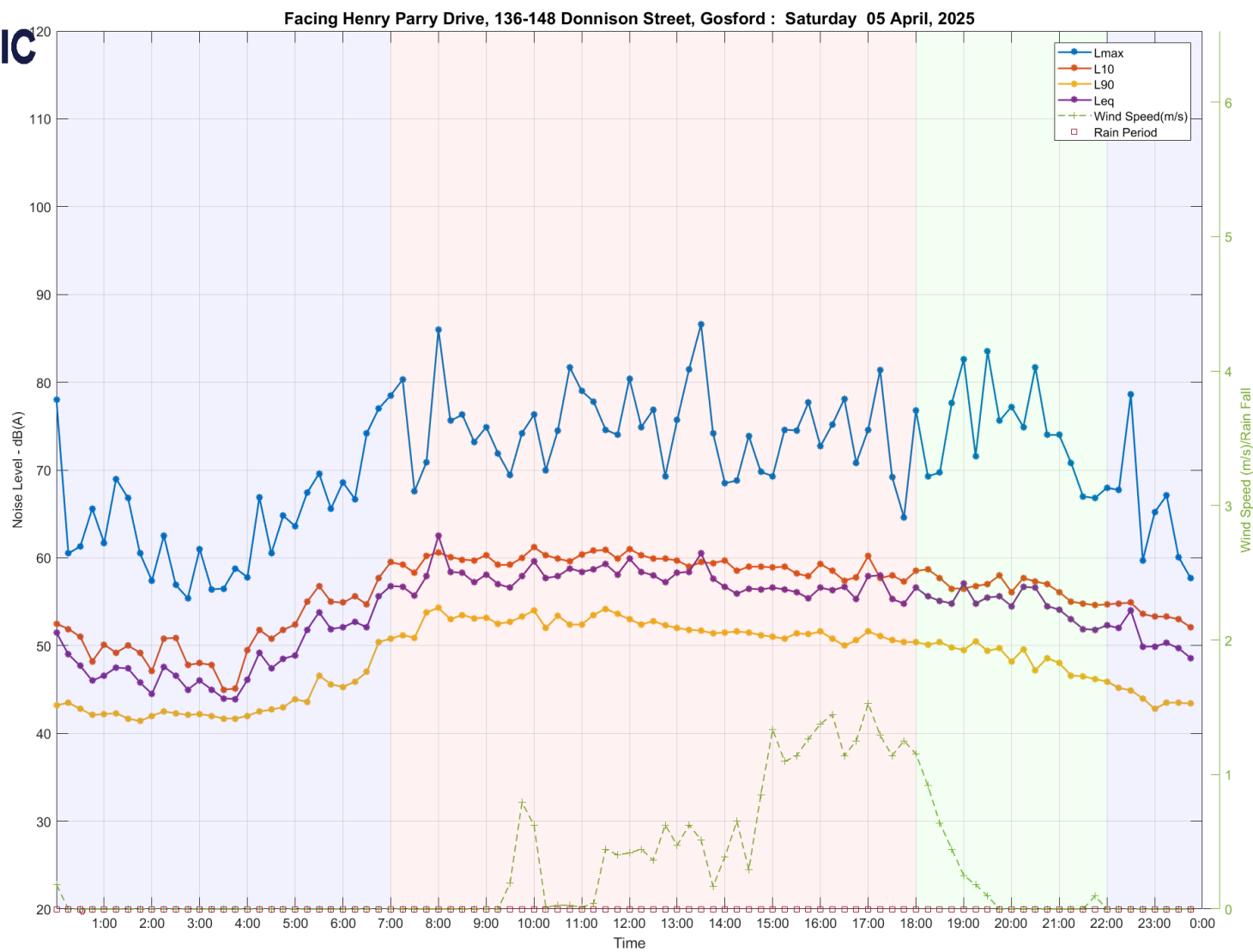


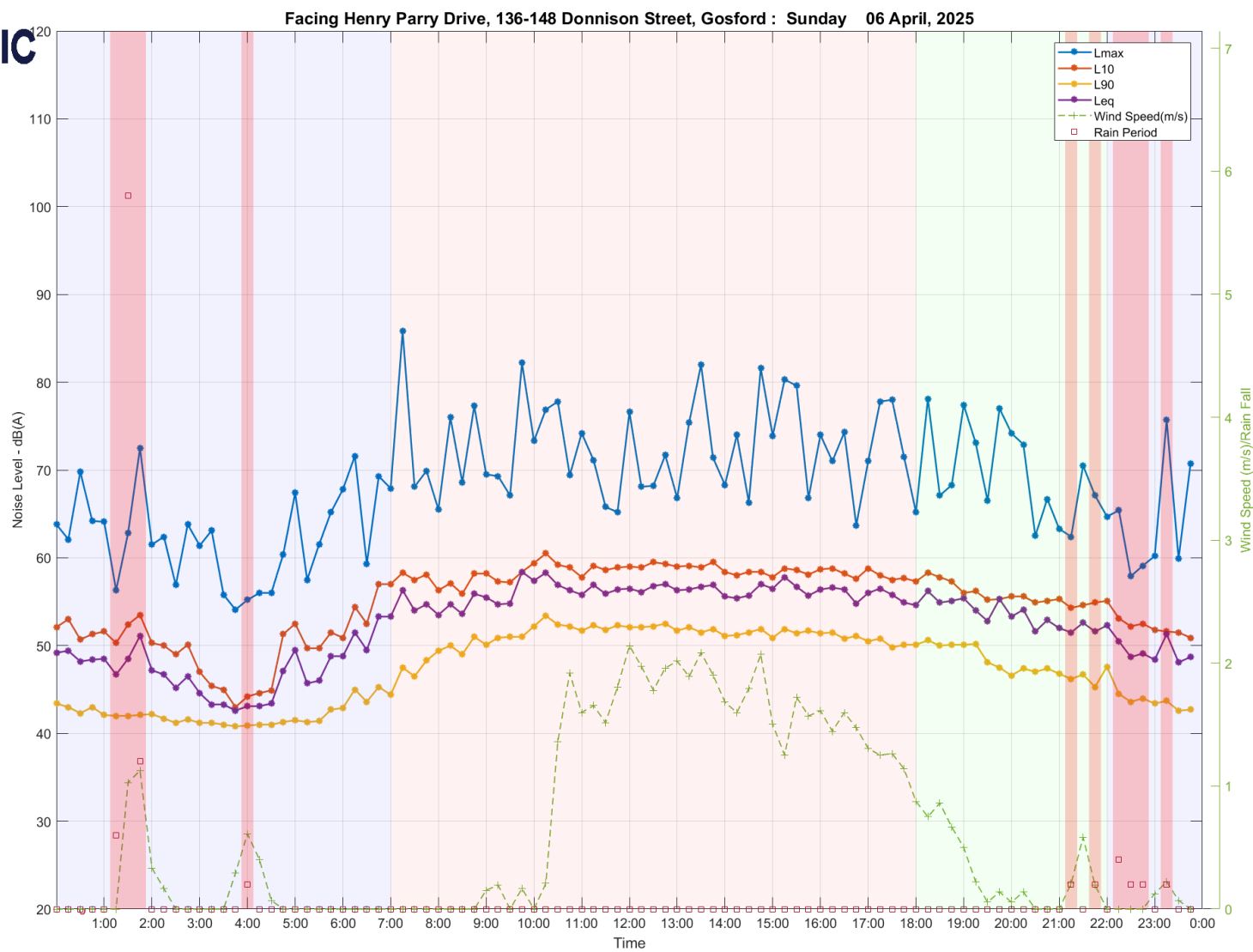


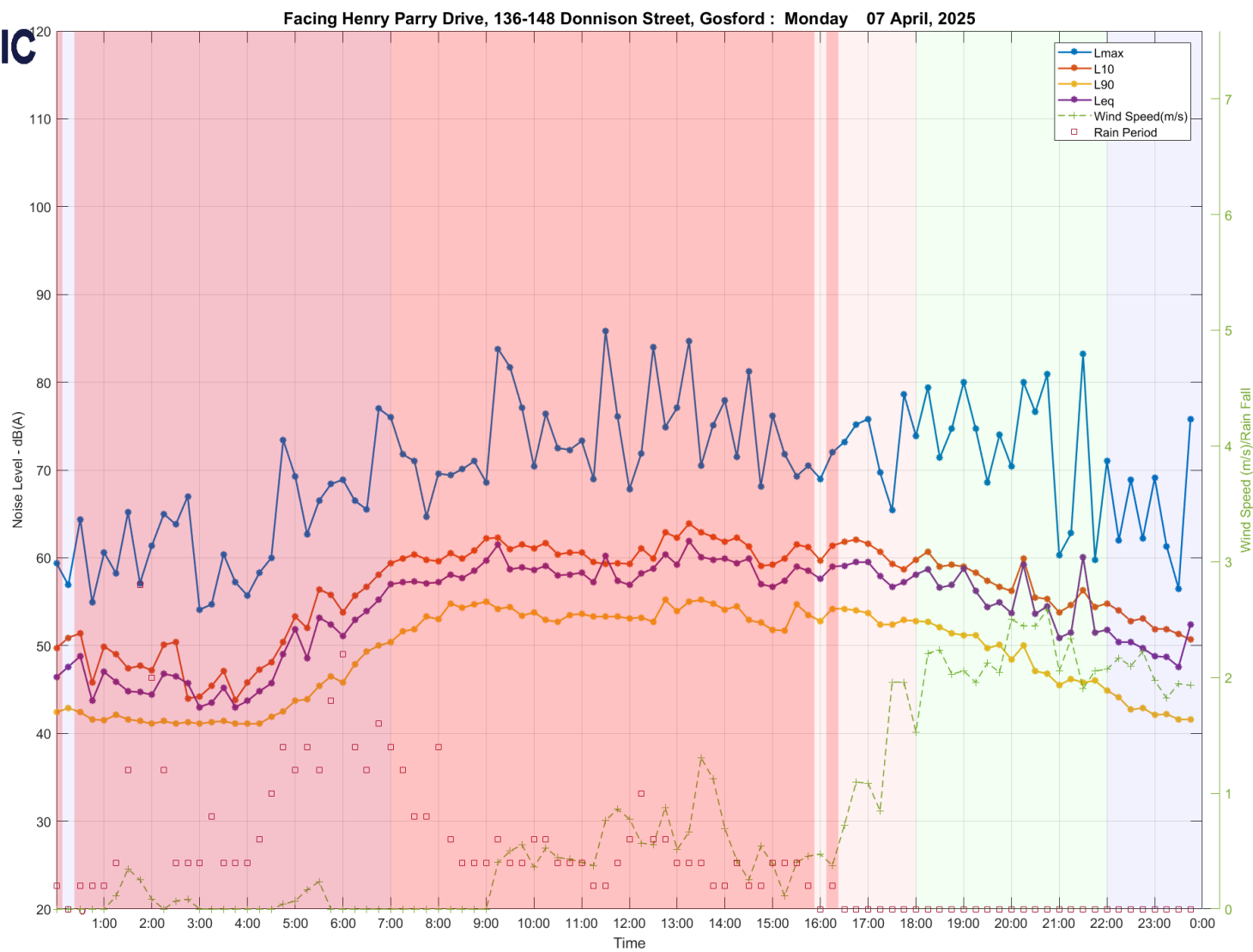


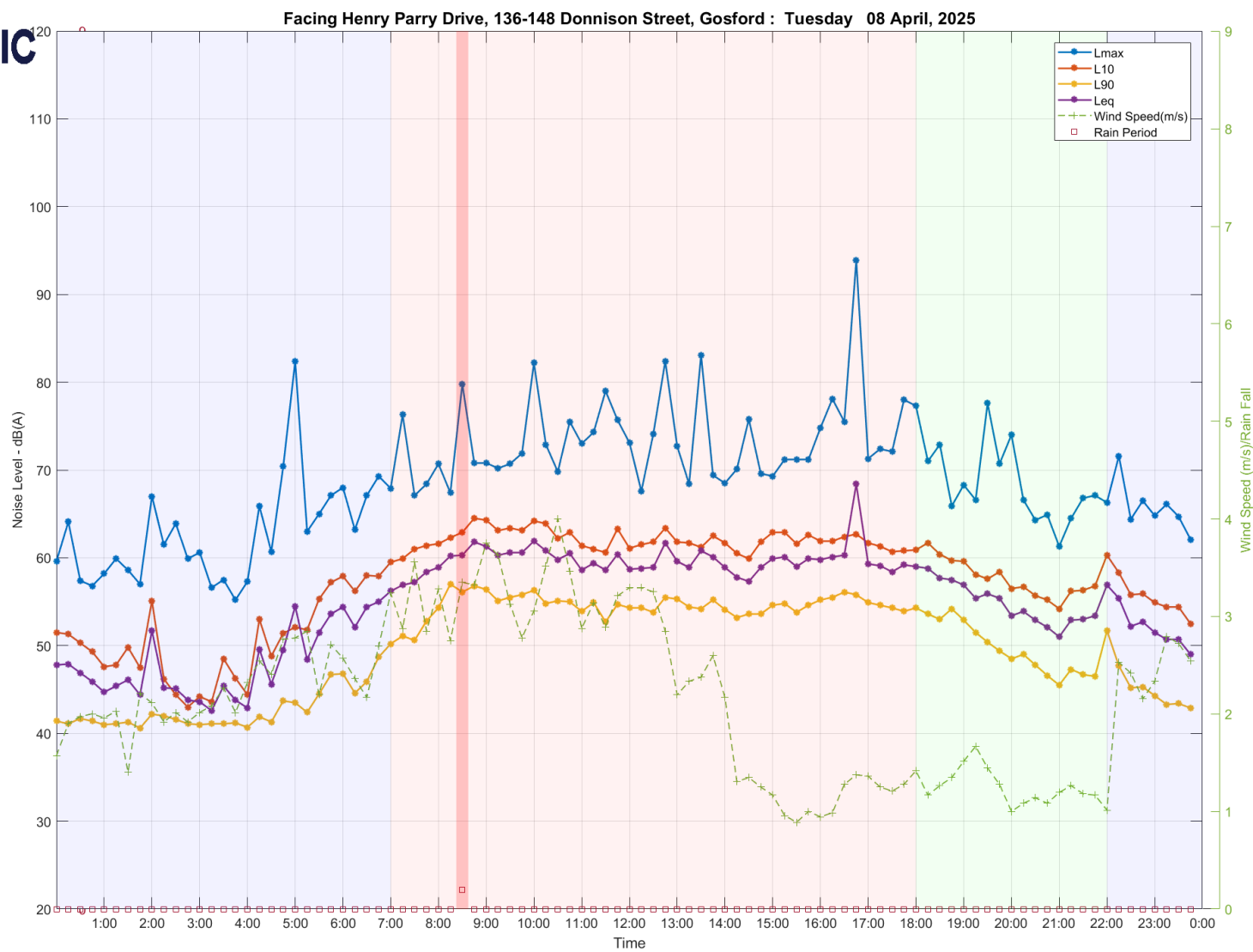


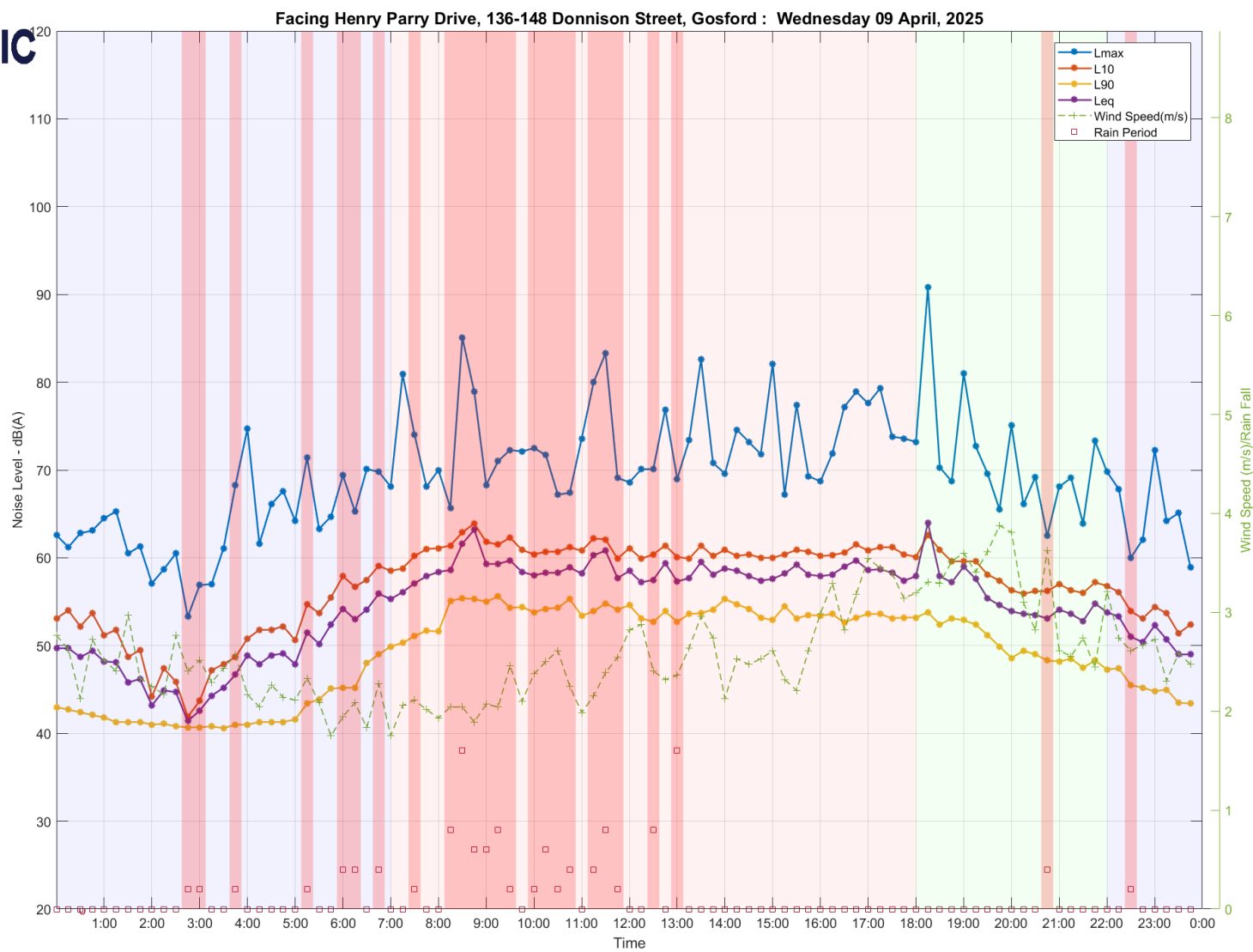


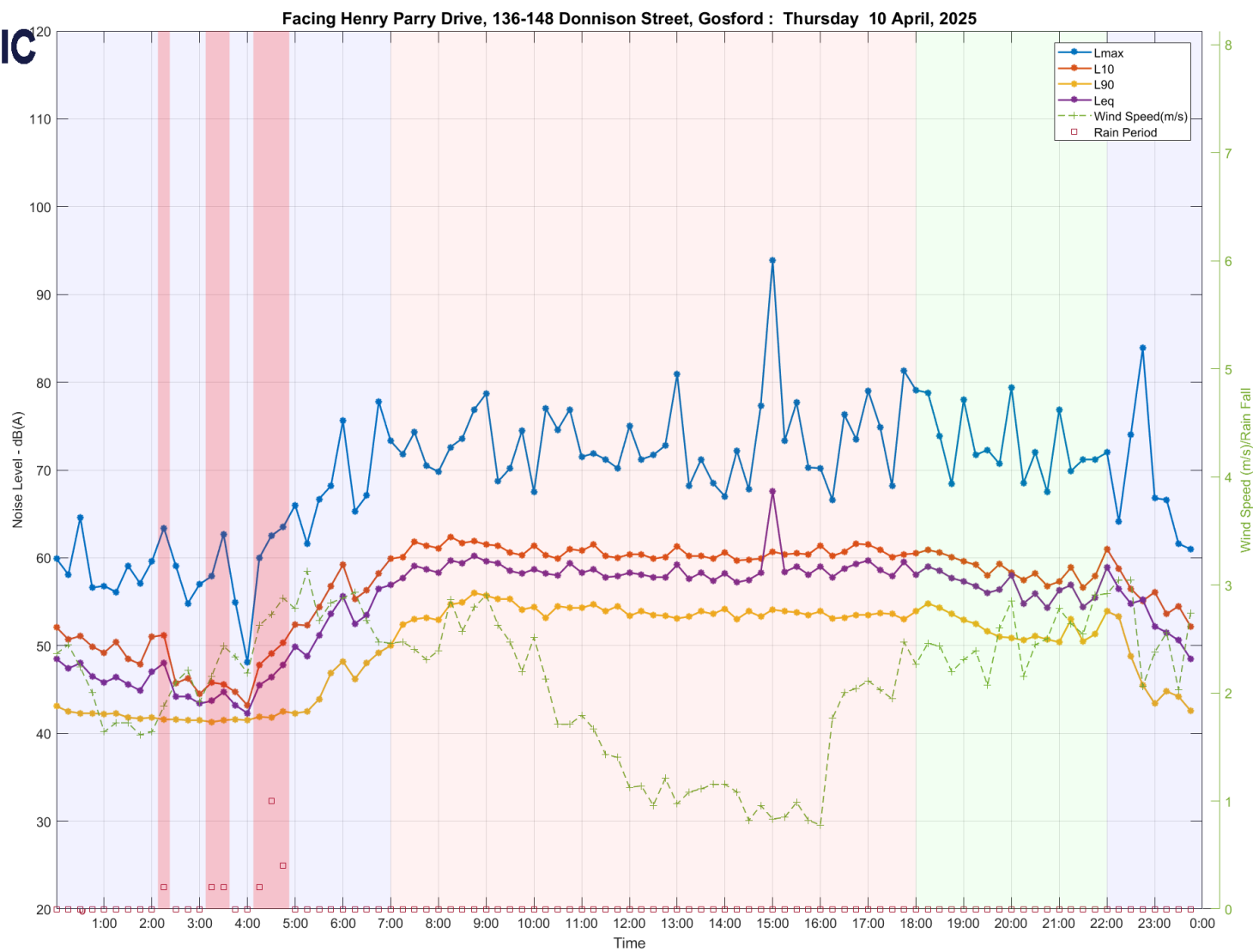


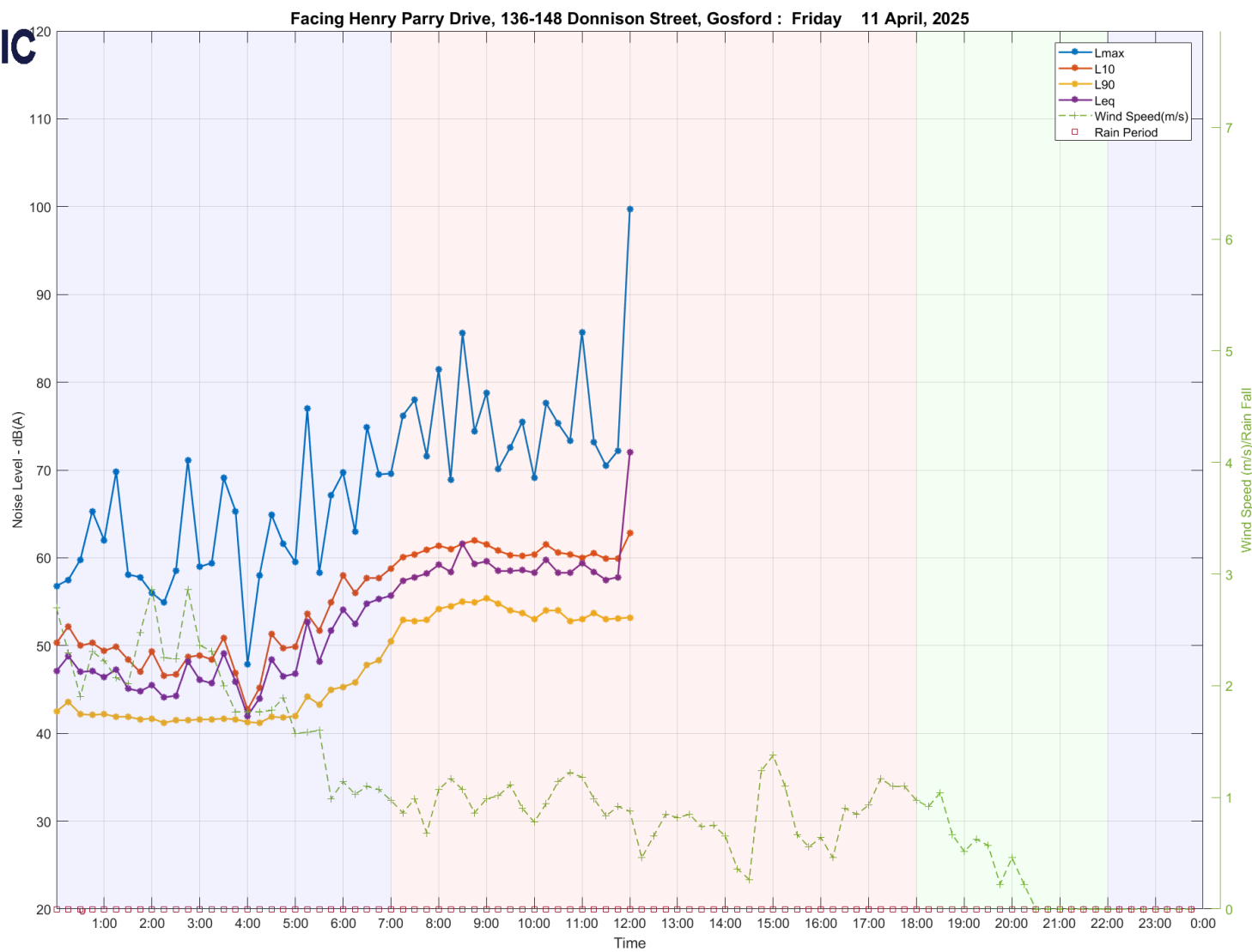










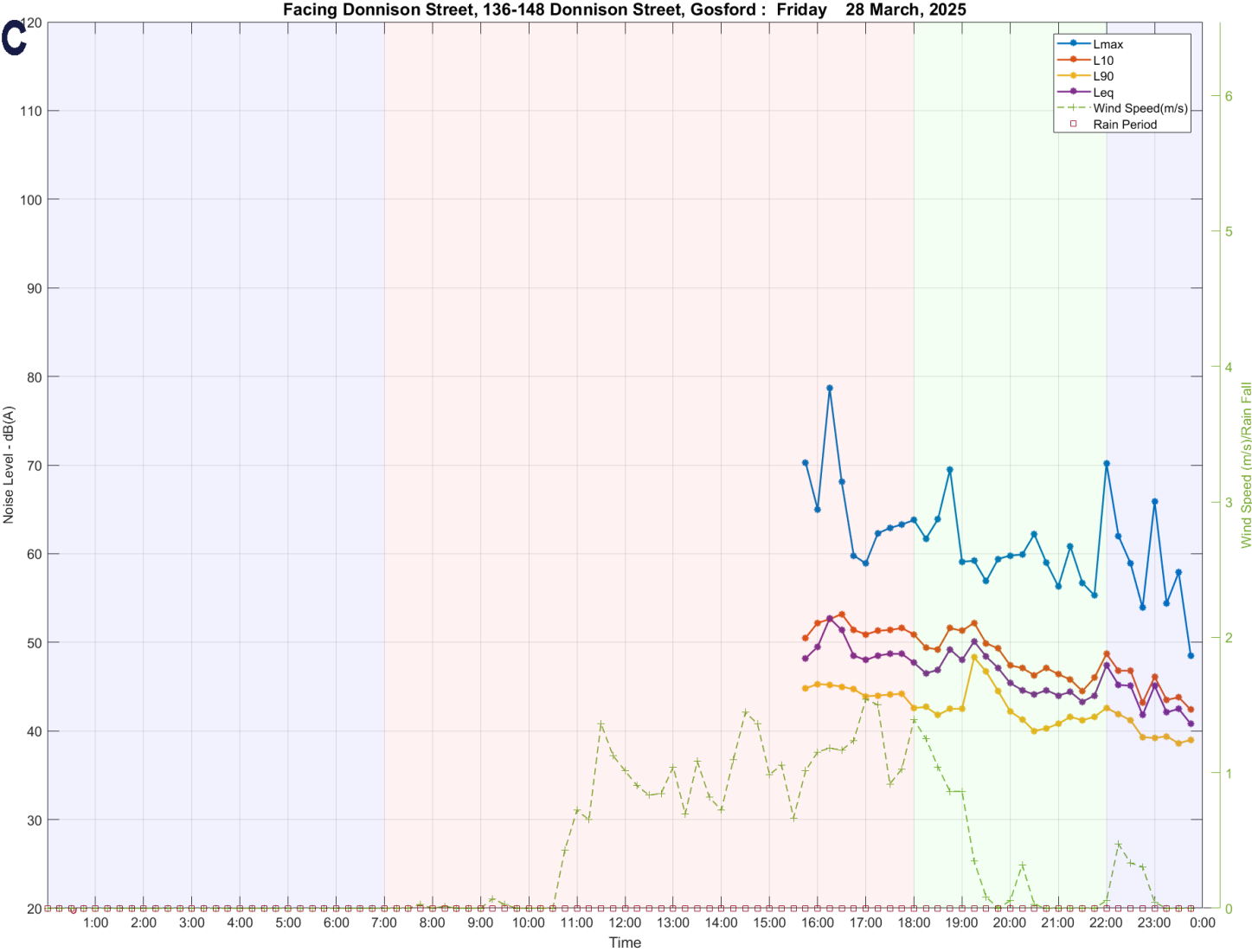


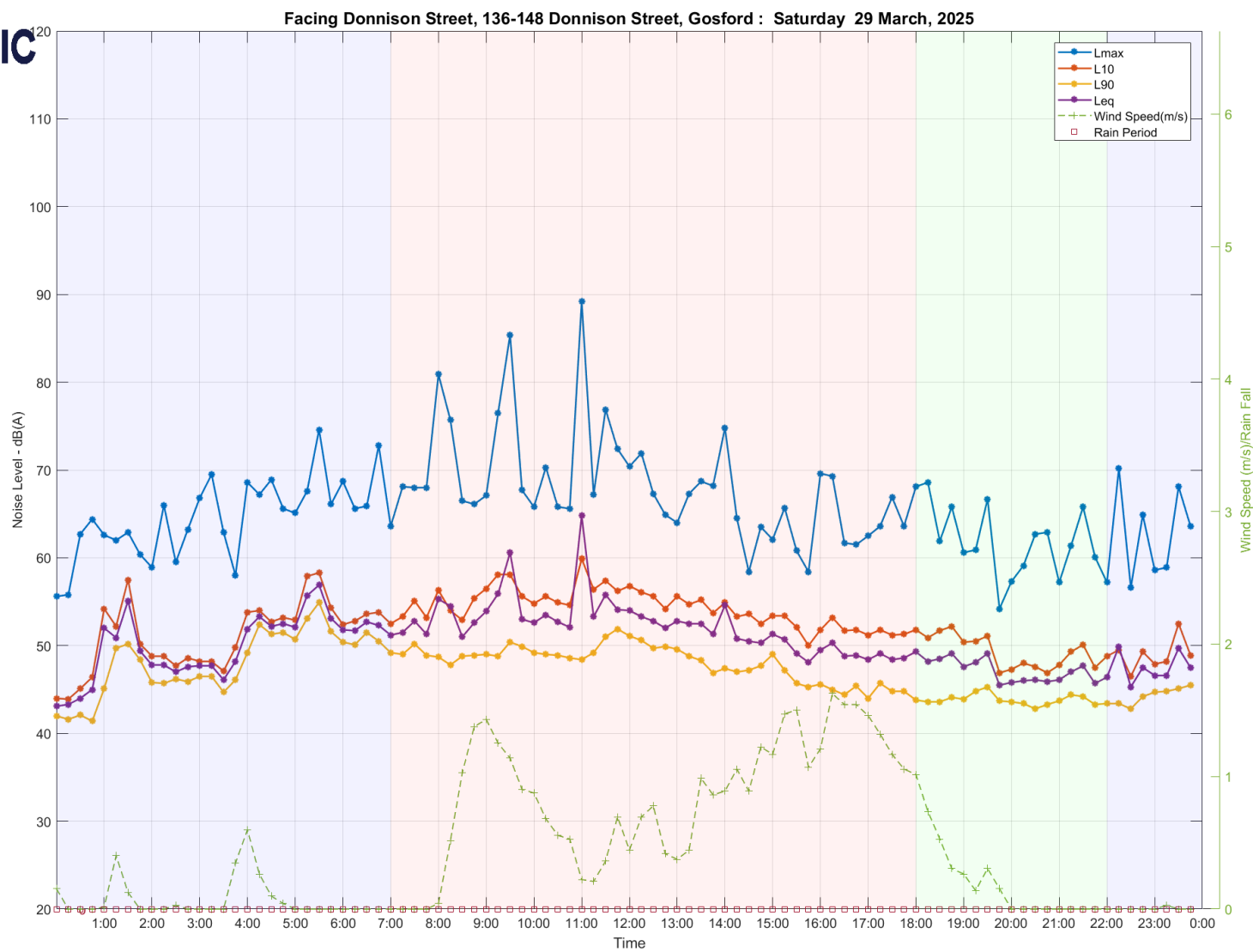
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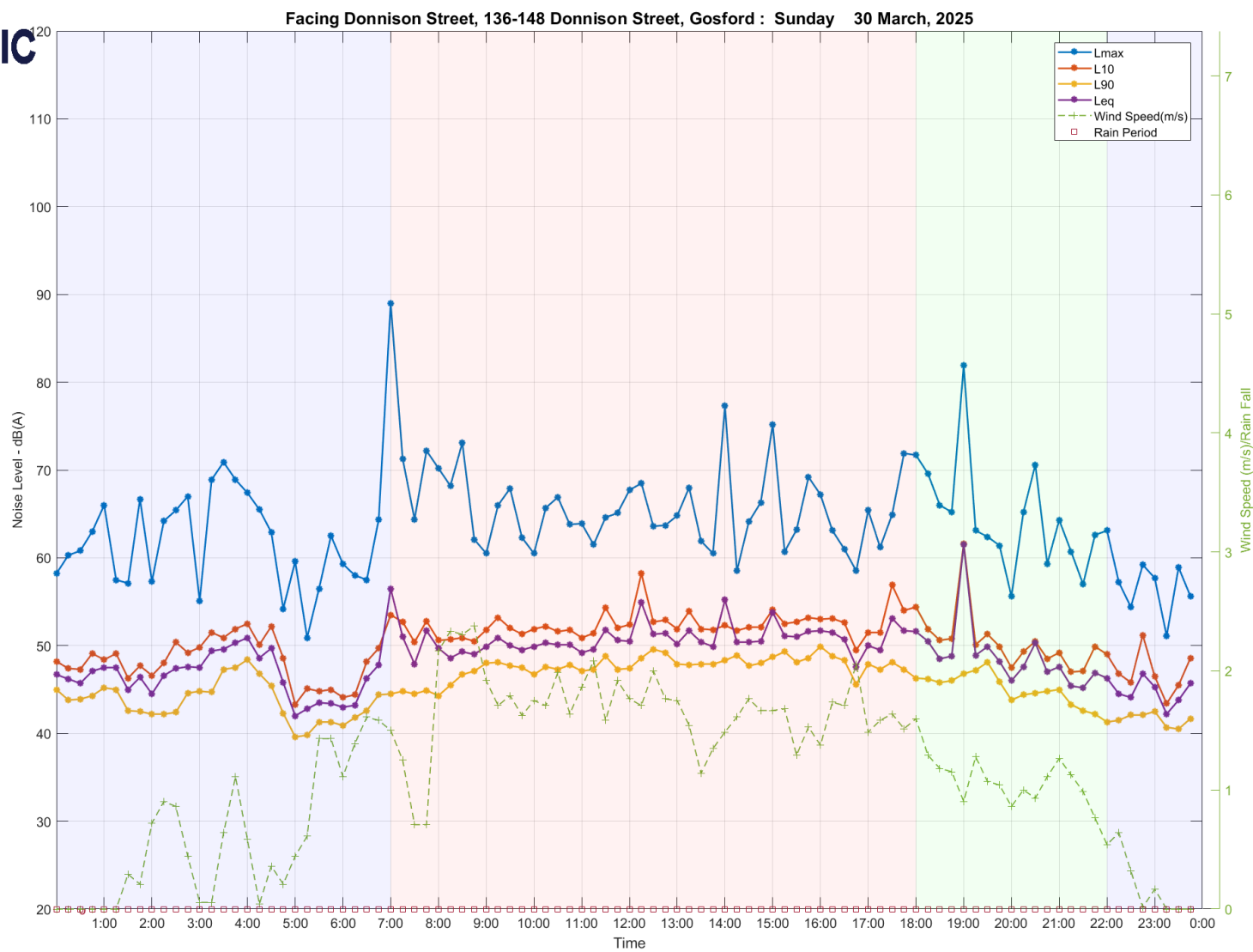
A.6.2 Facing Donnison Street

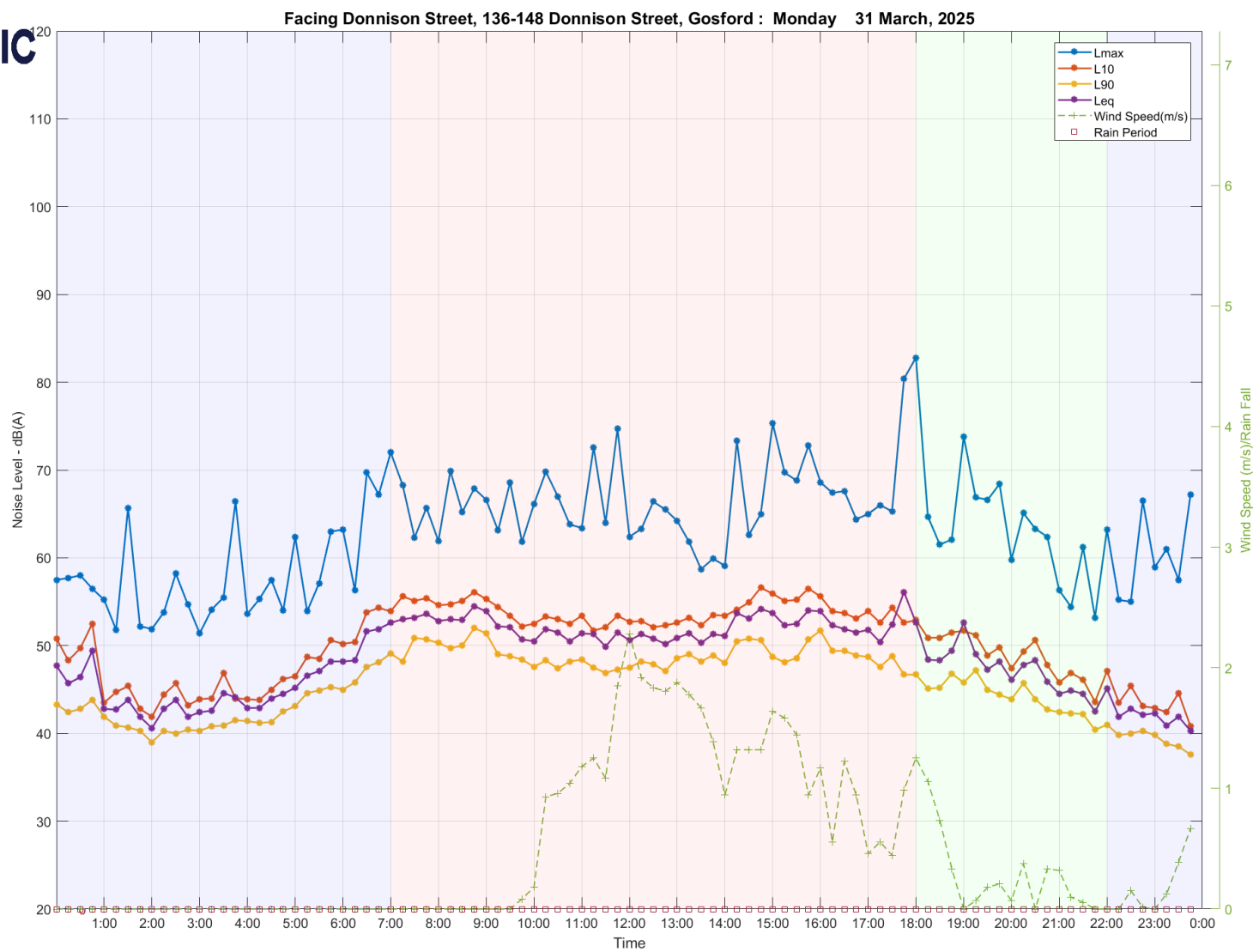


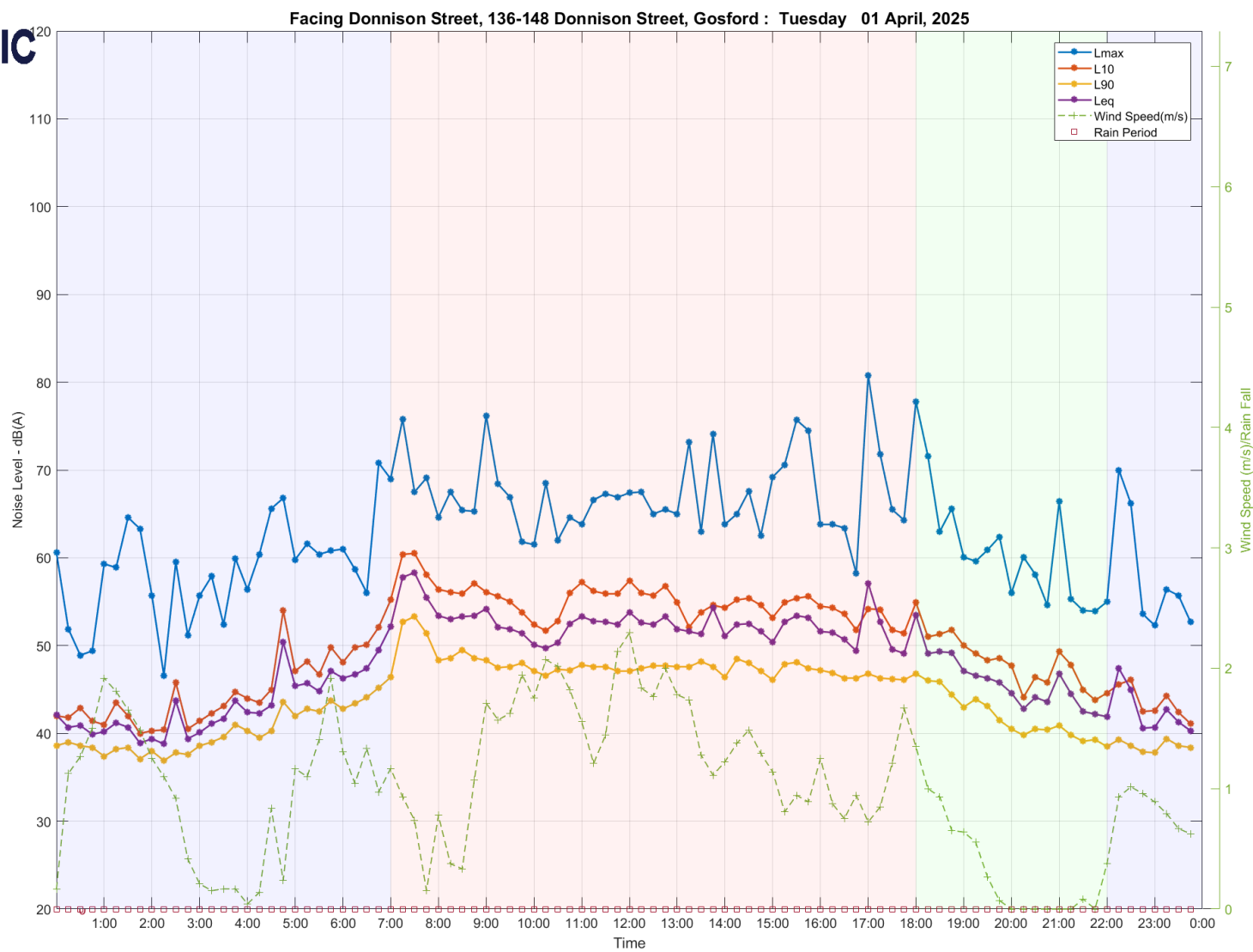
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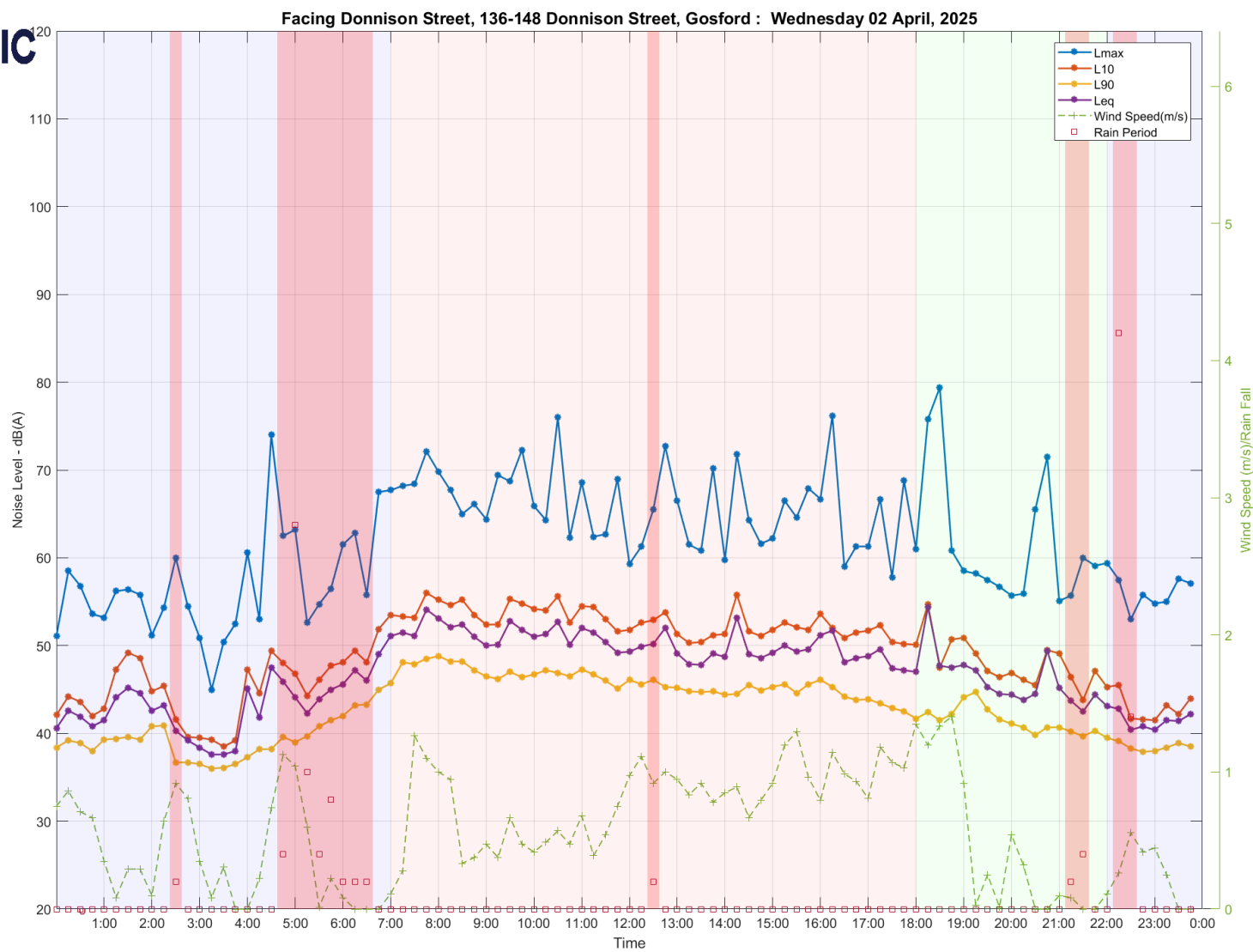


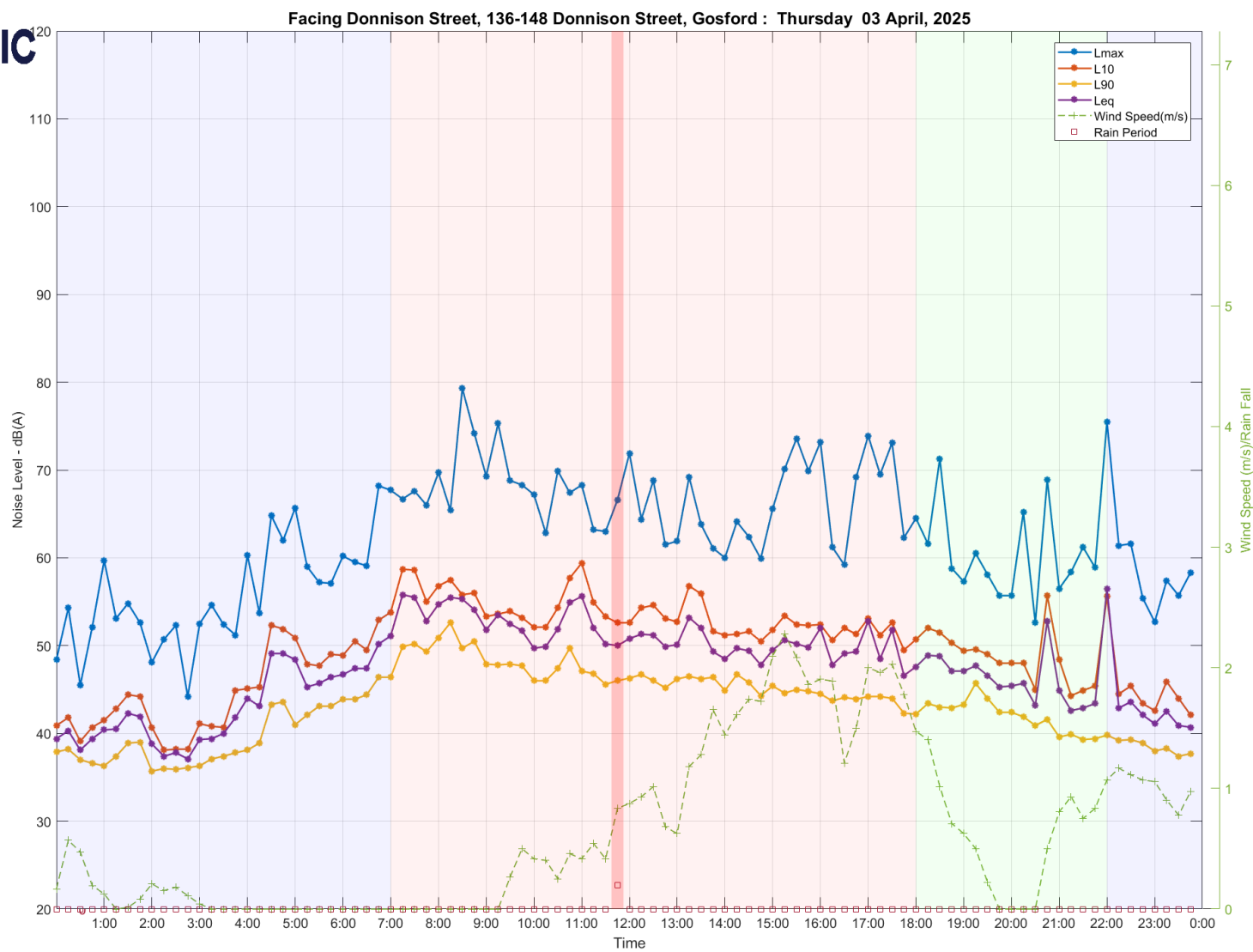


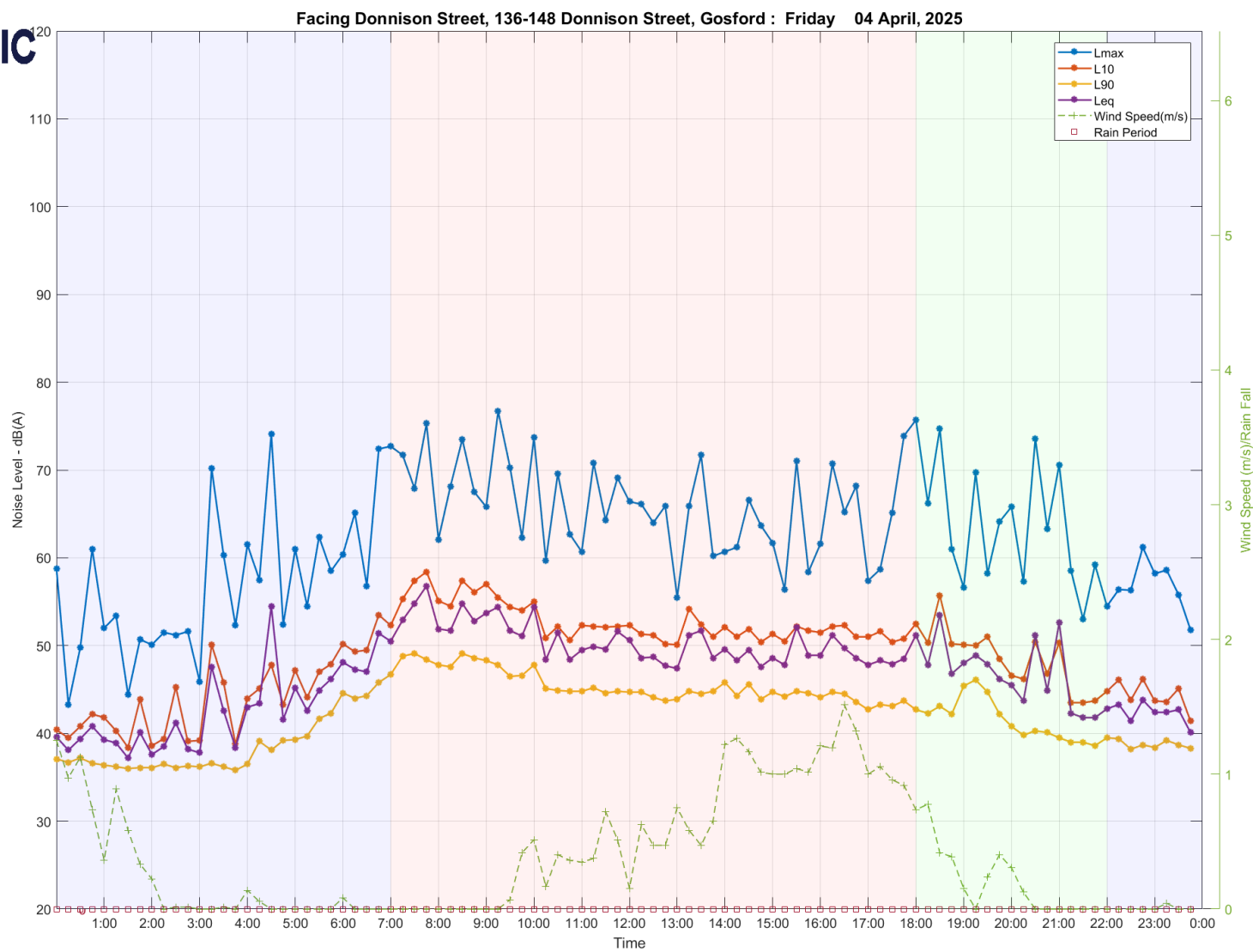


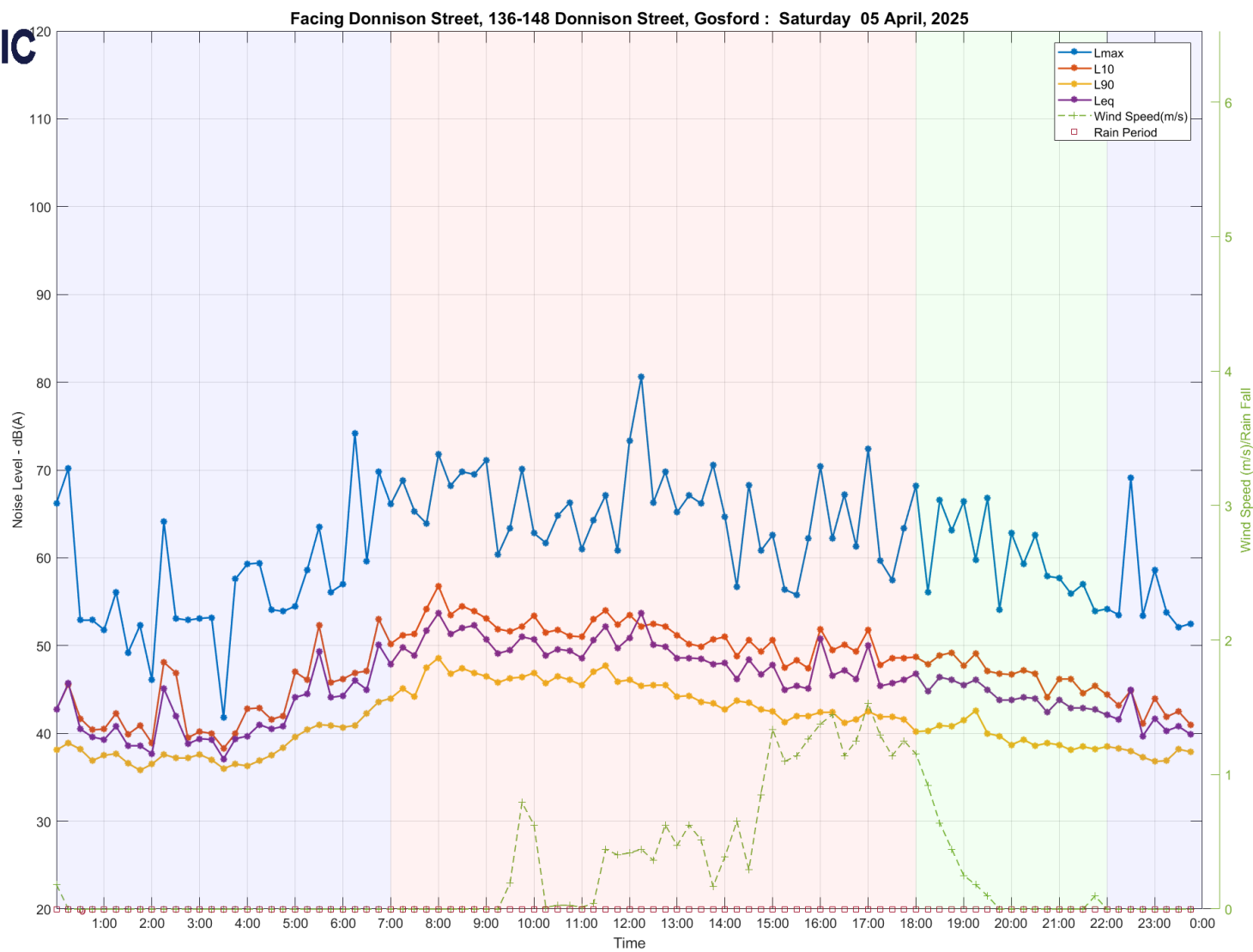


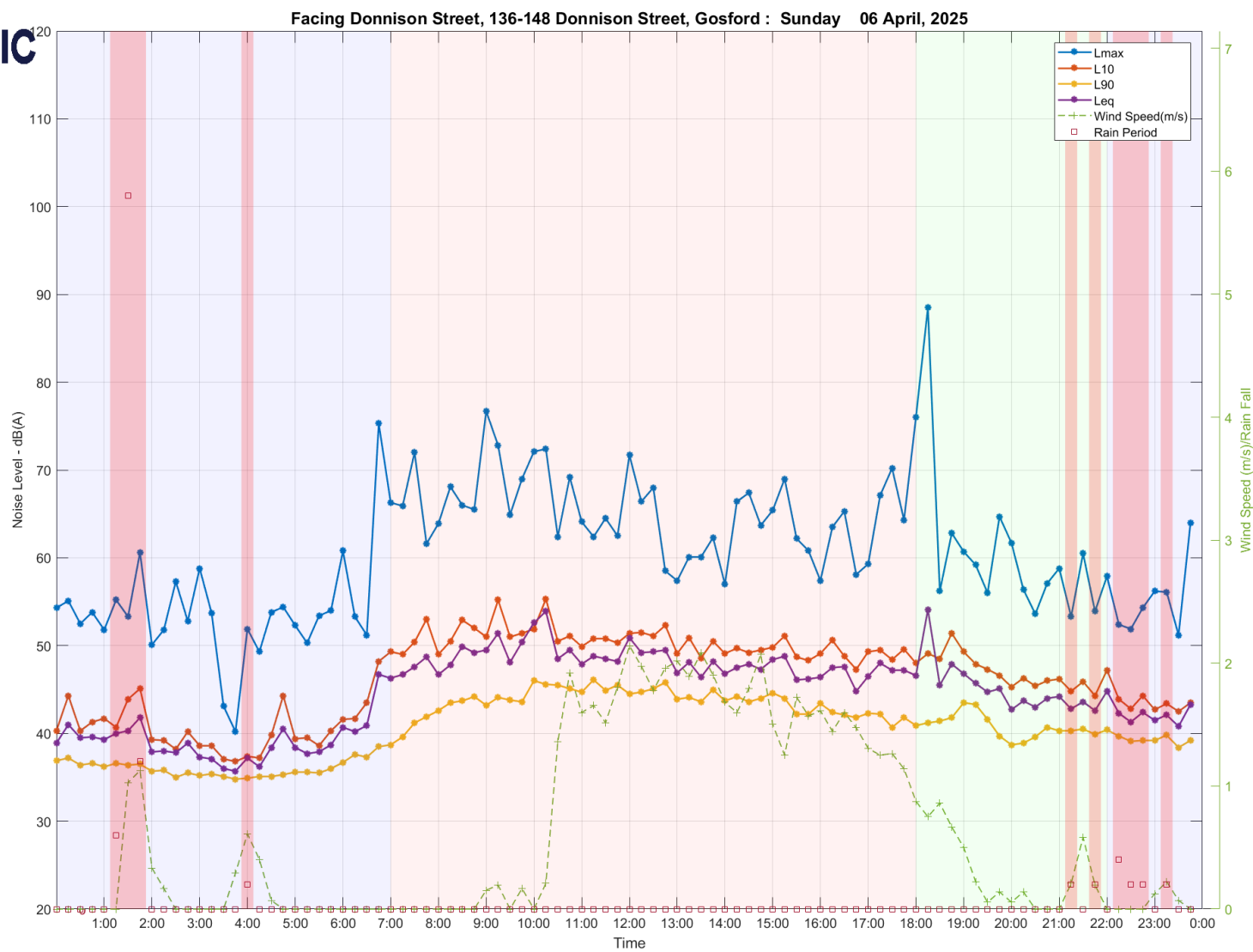


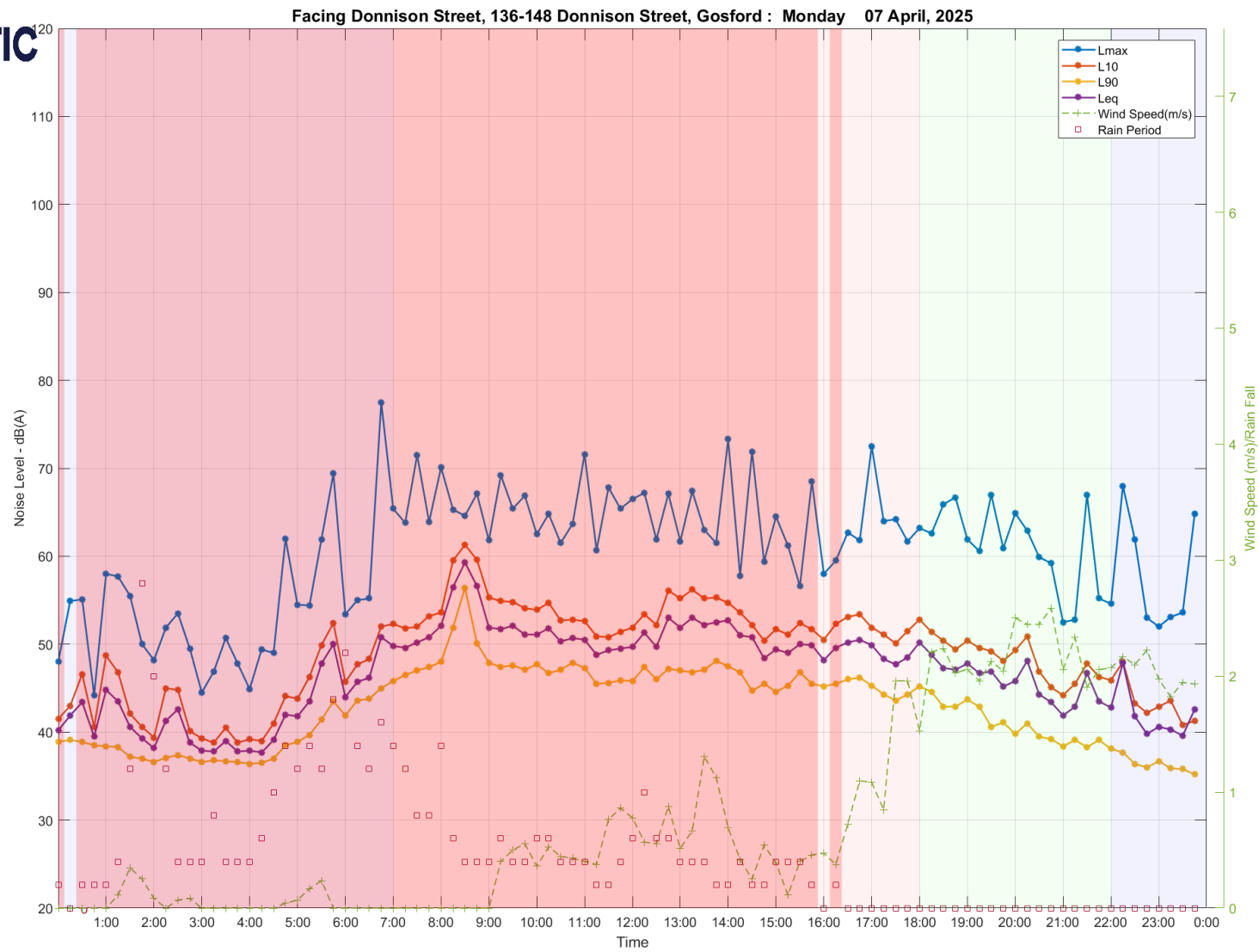


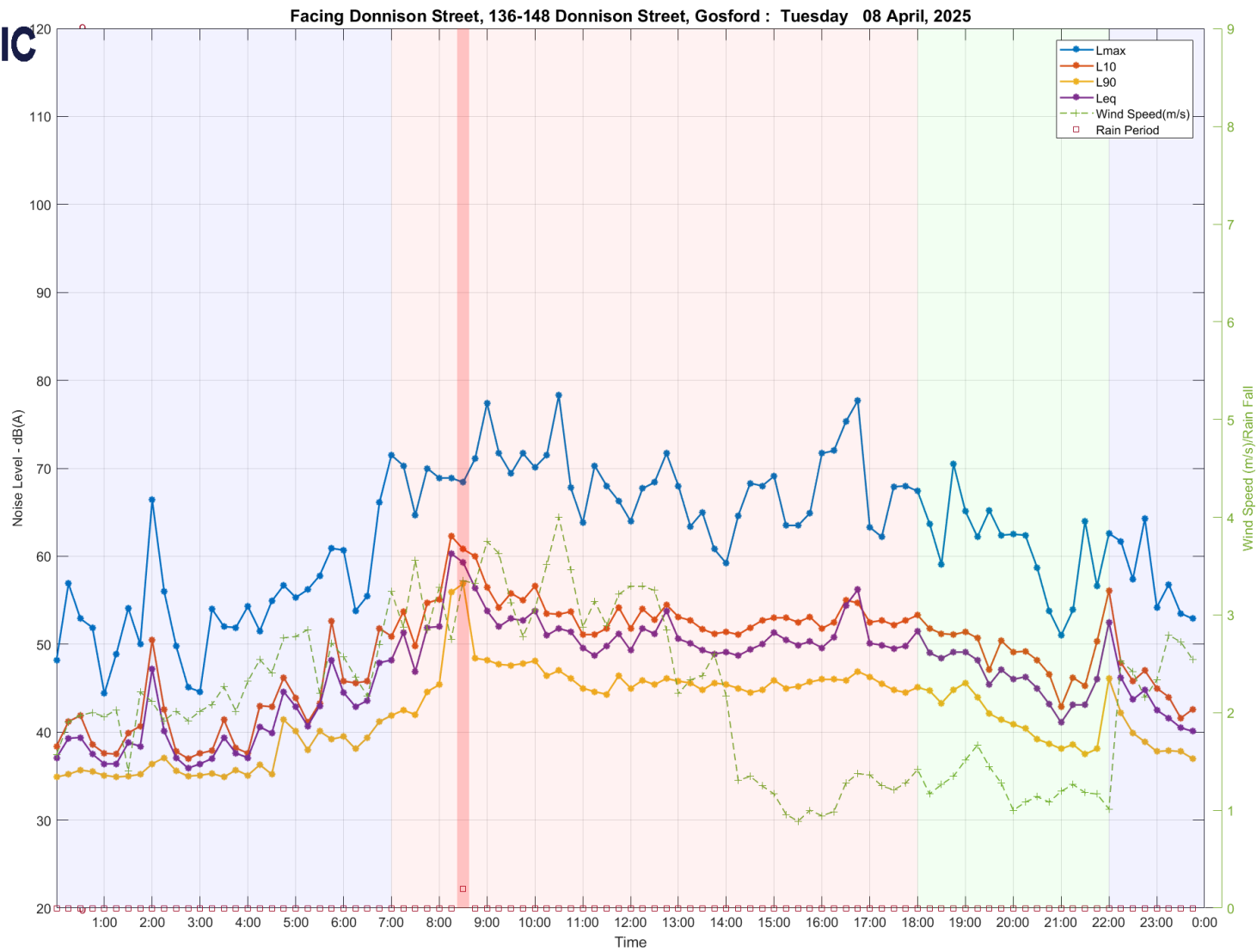


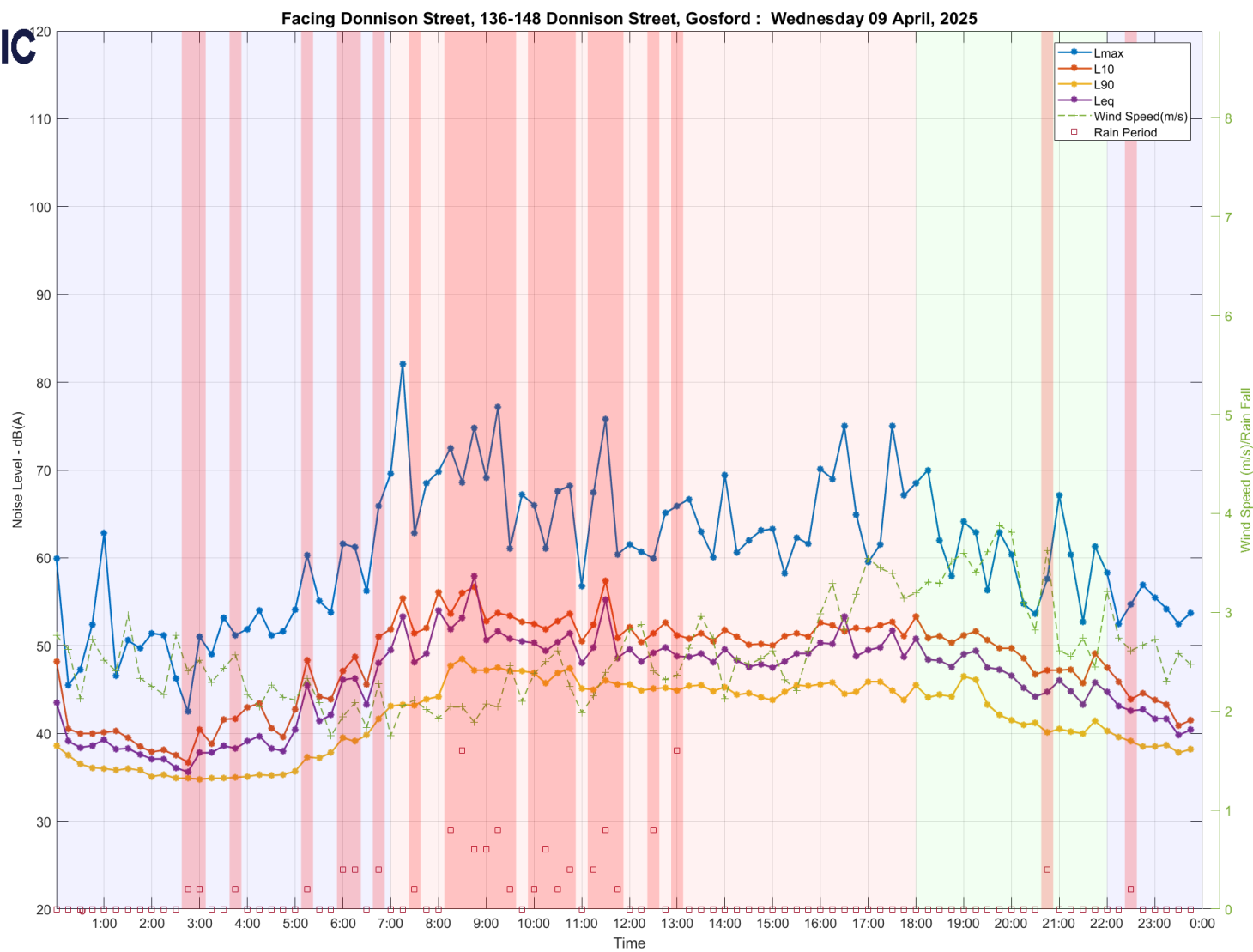


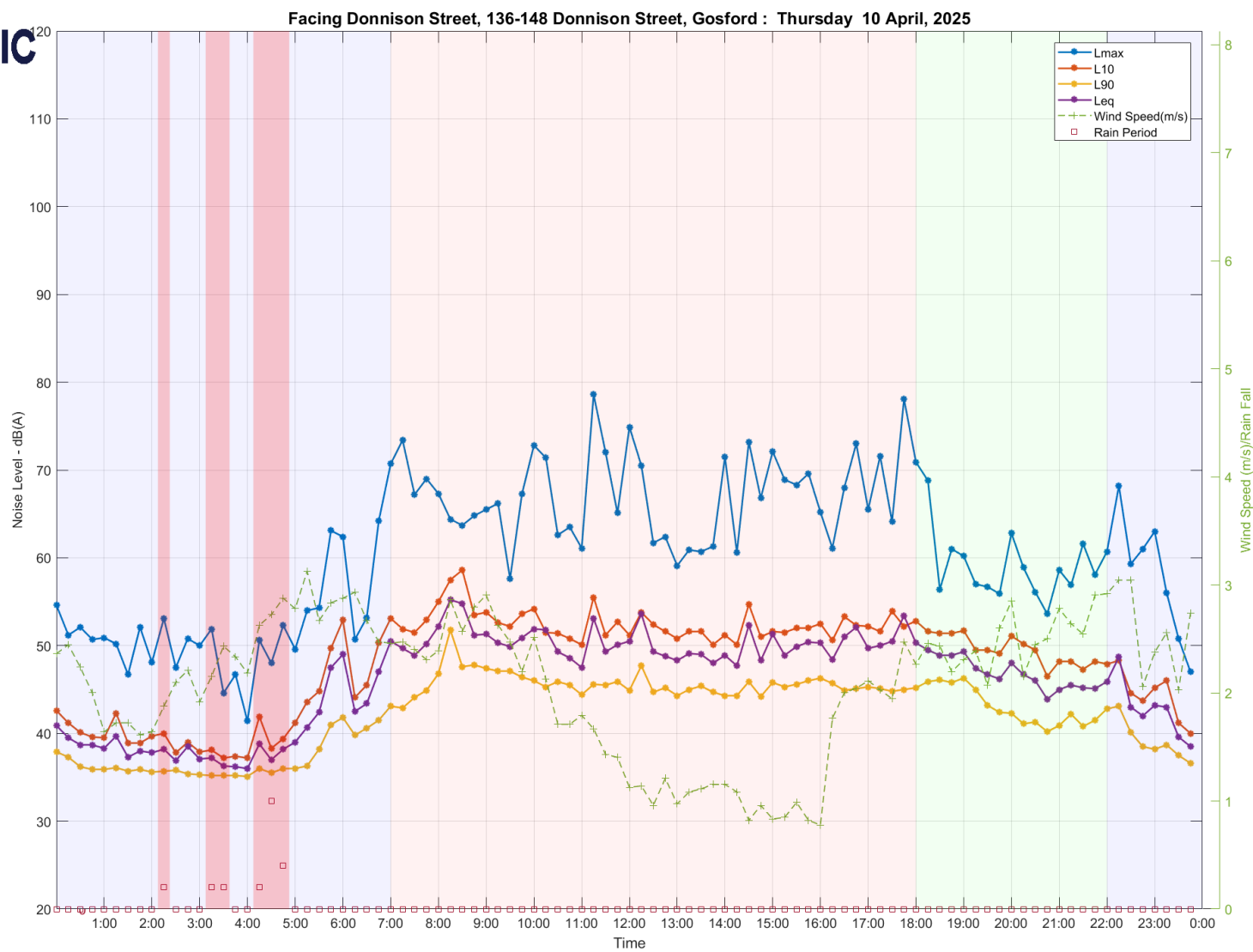


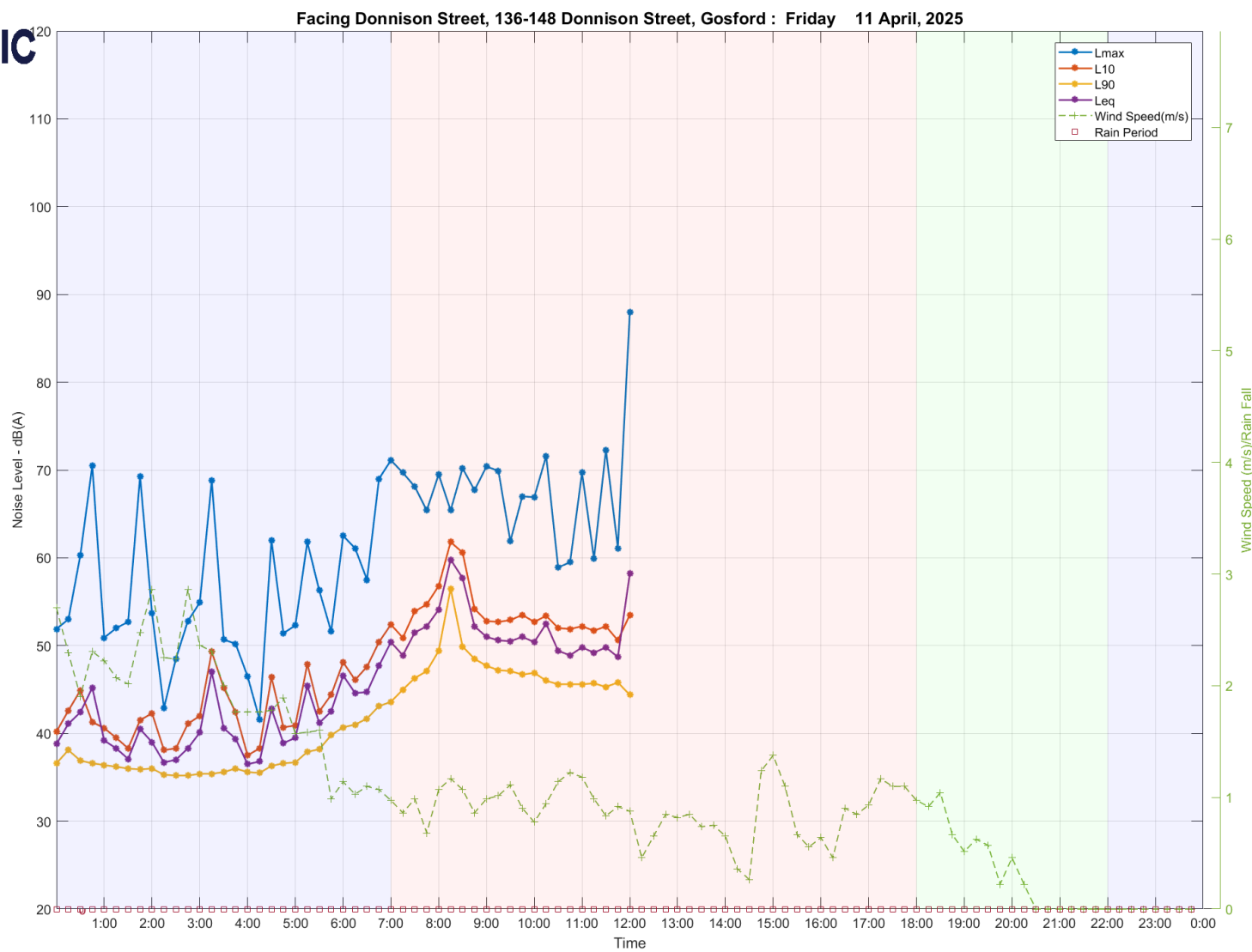










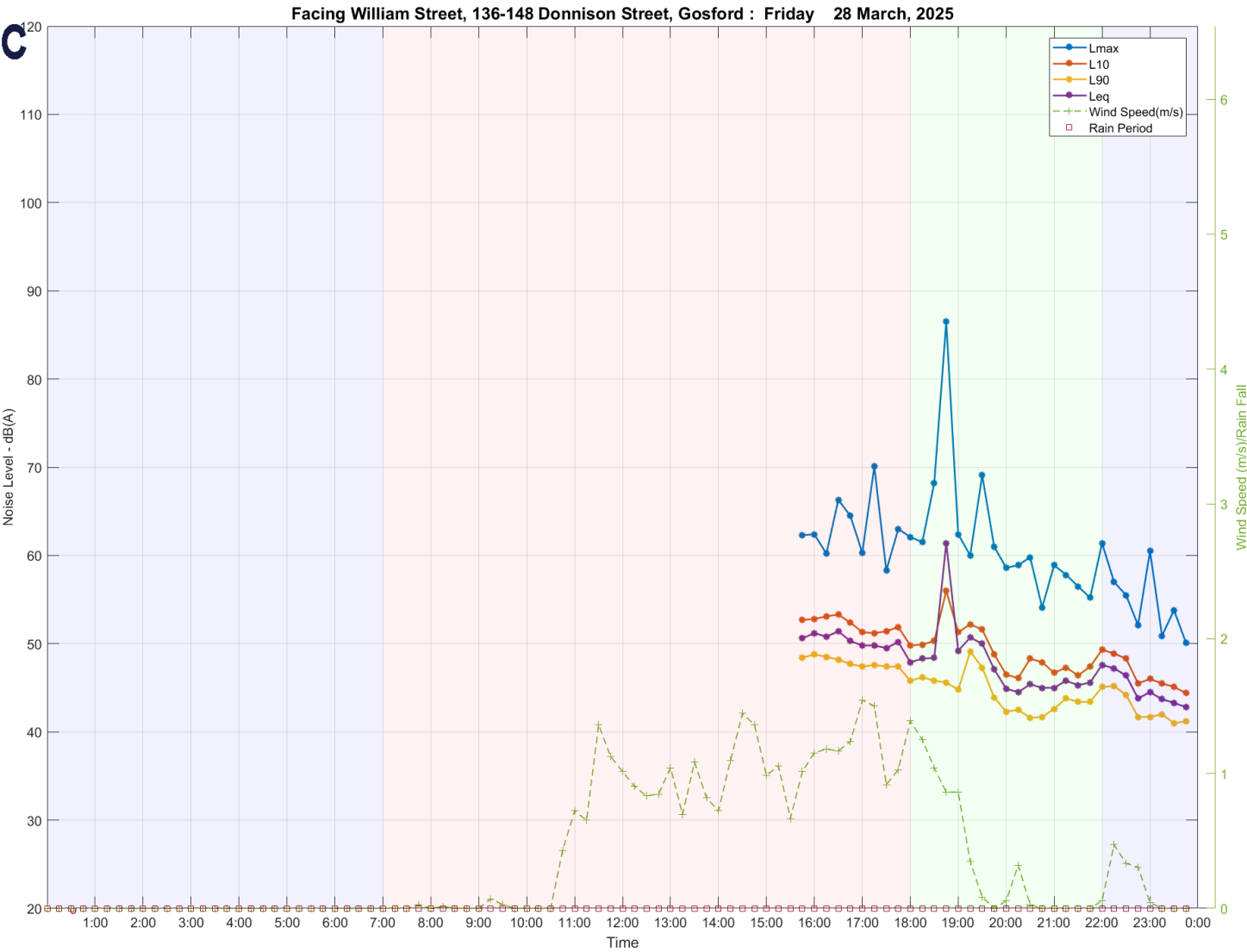


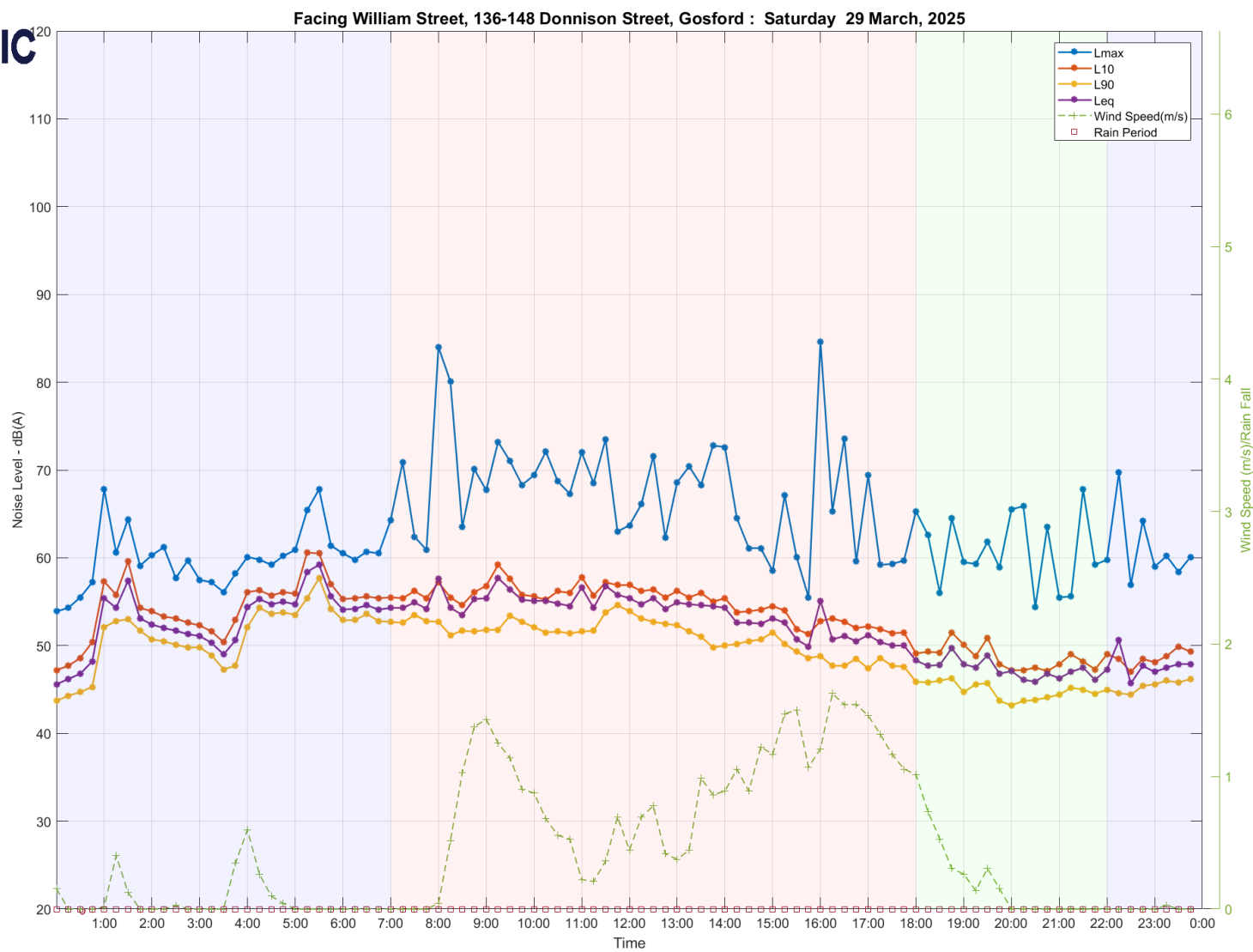
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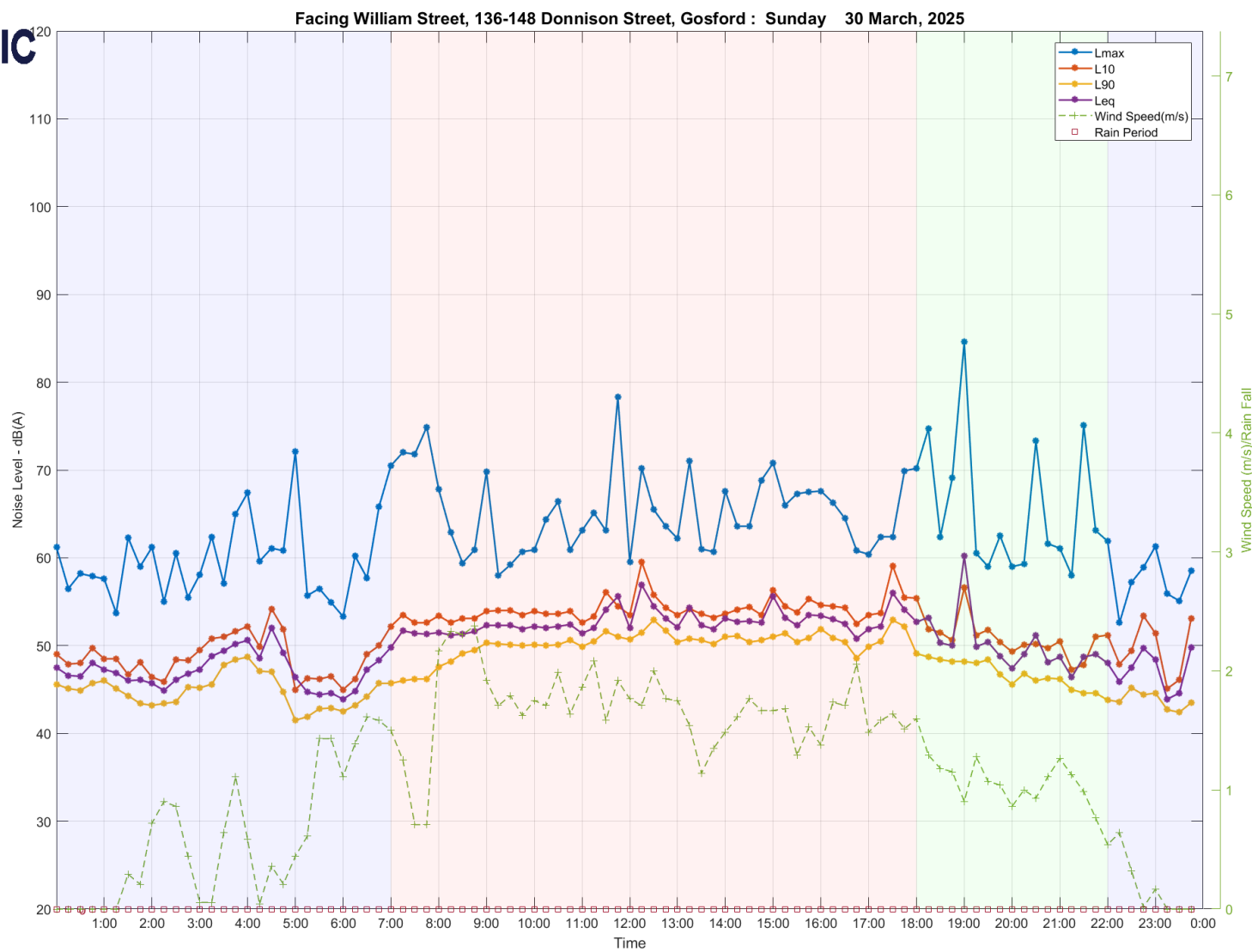
A.6.3 Facing William Street

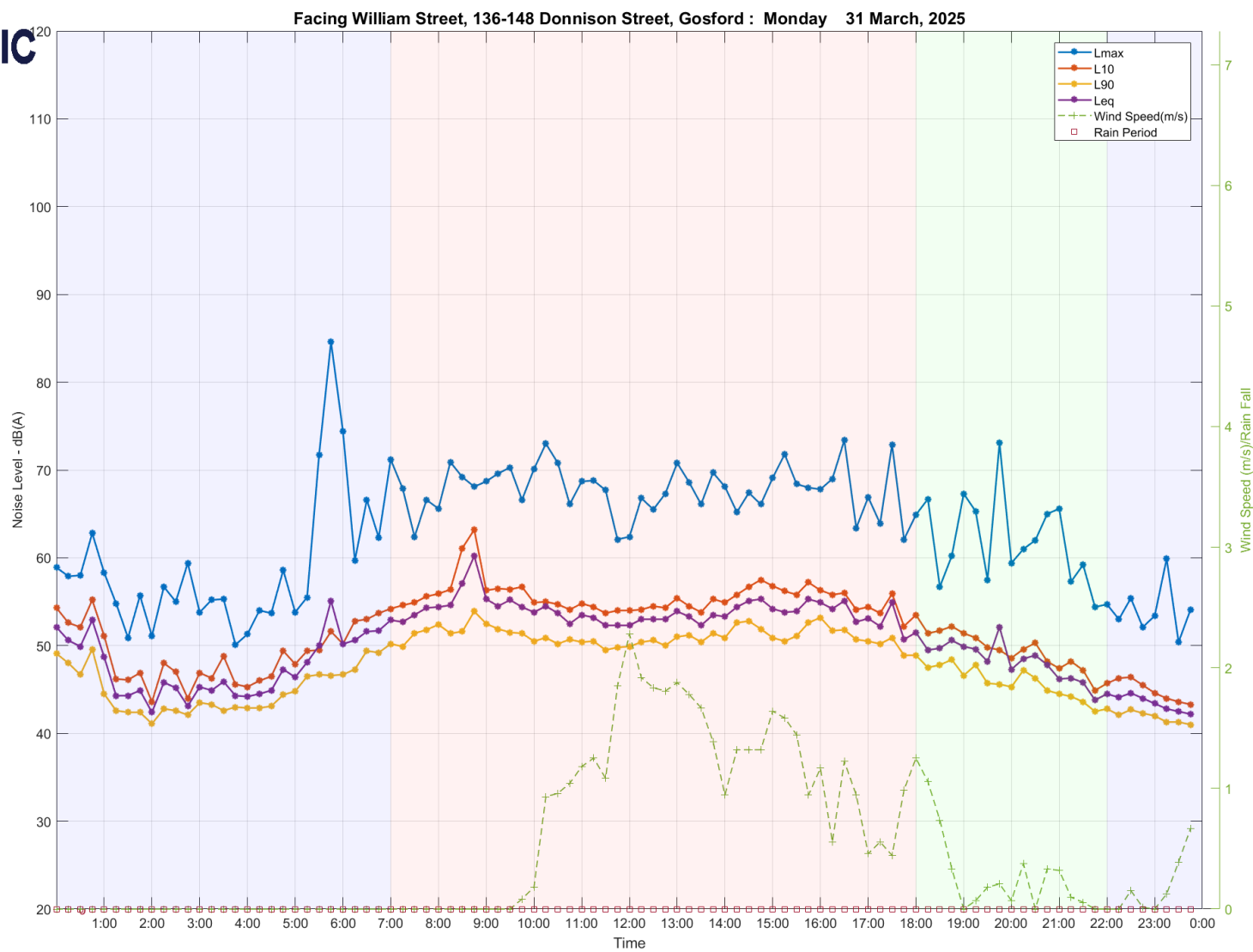


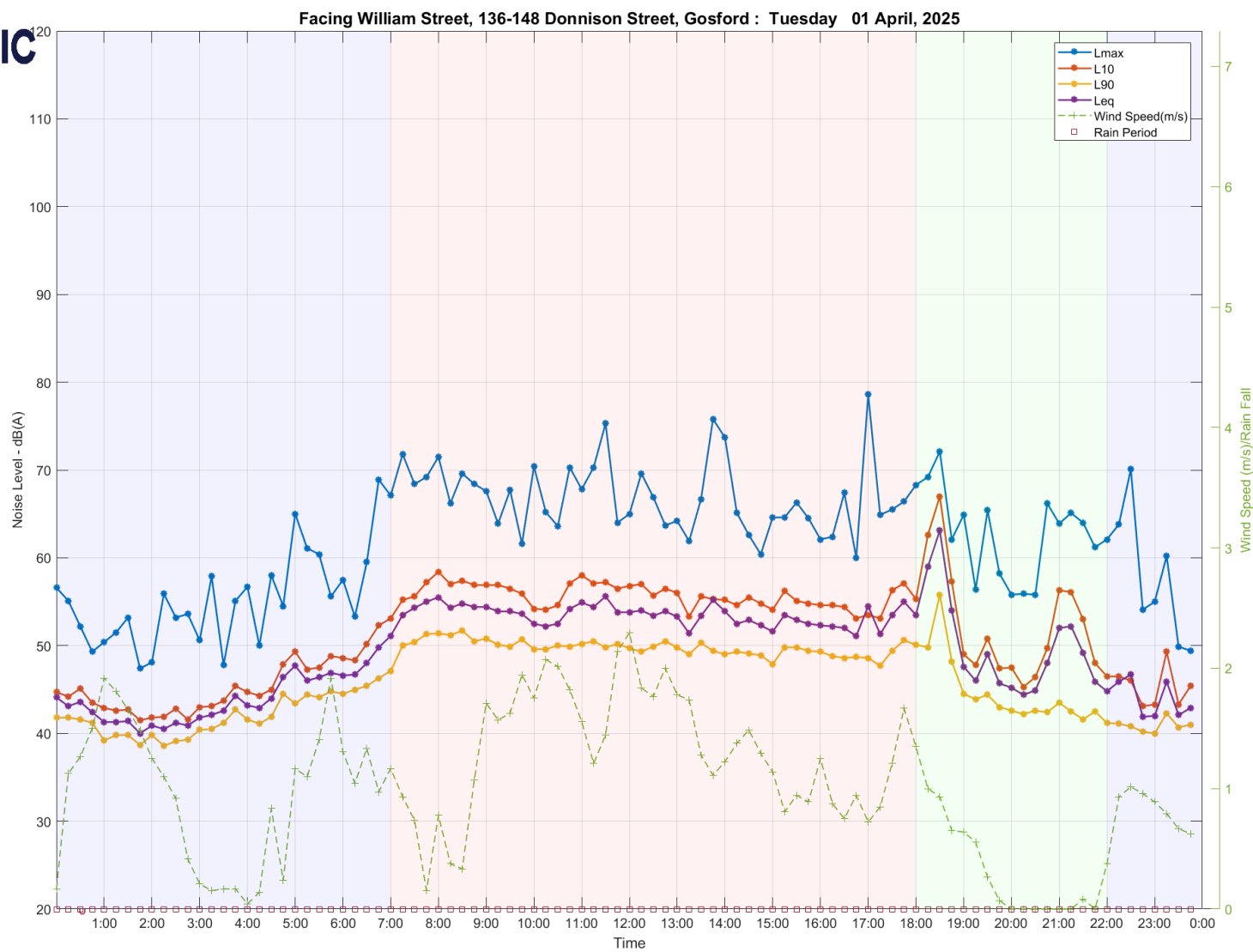
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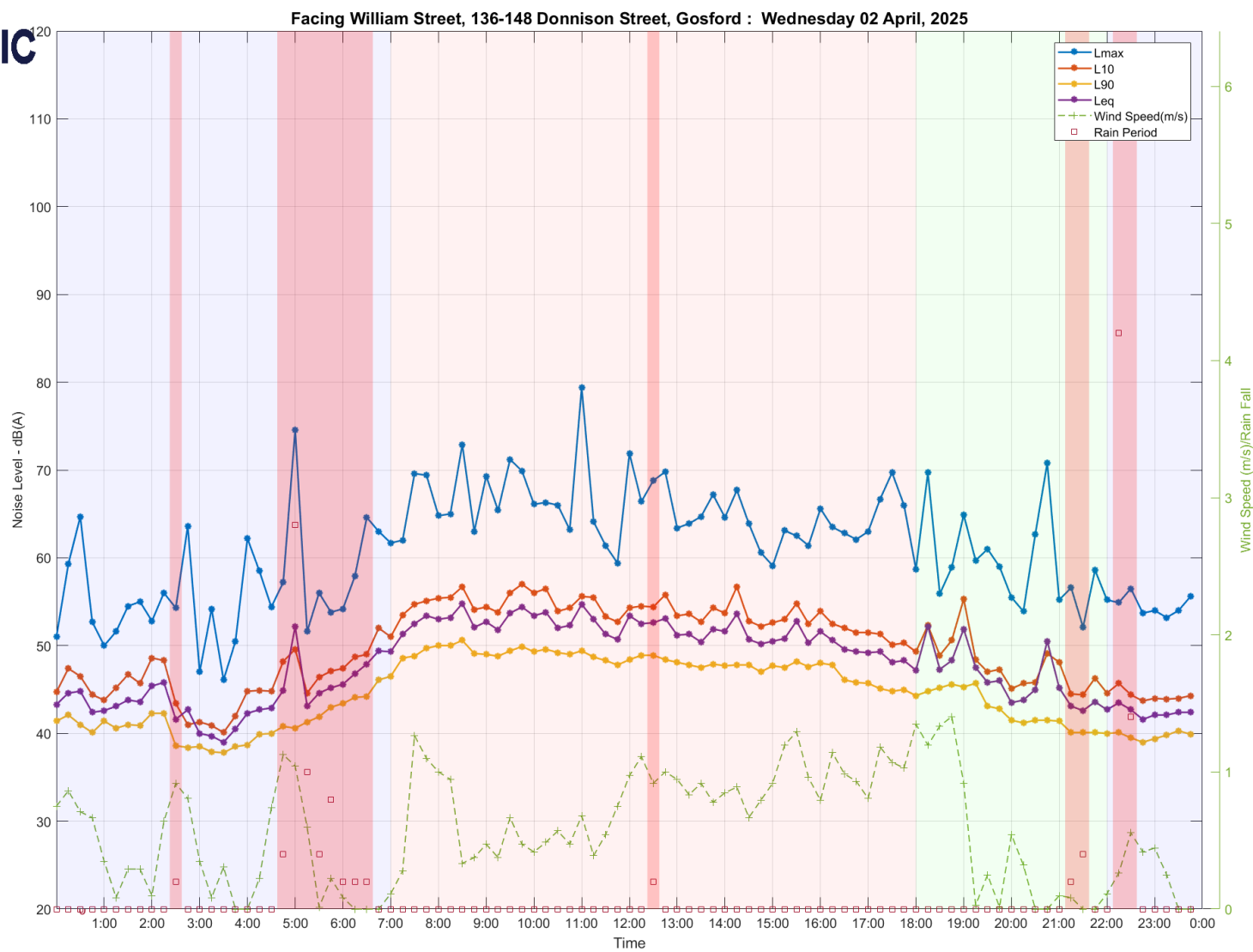


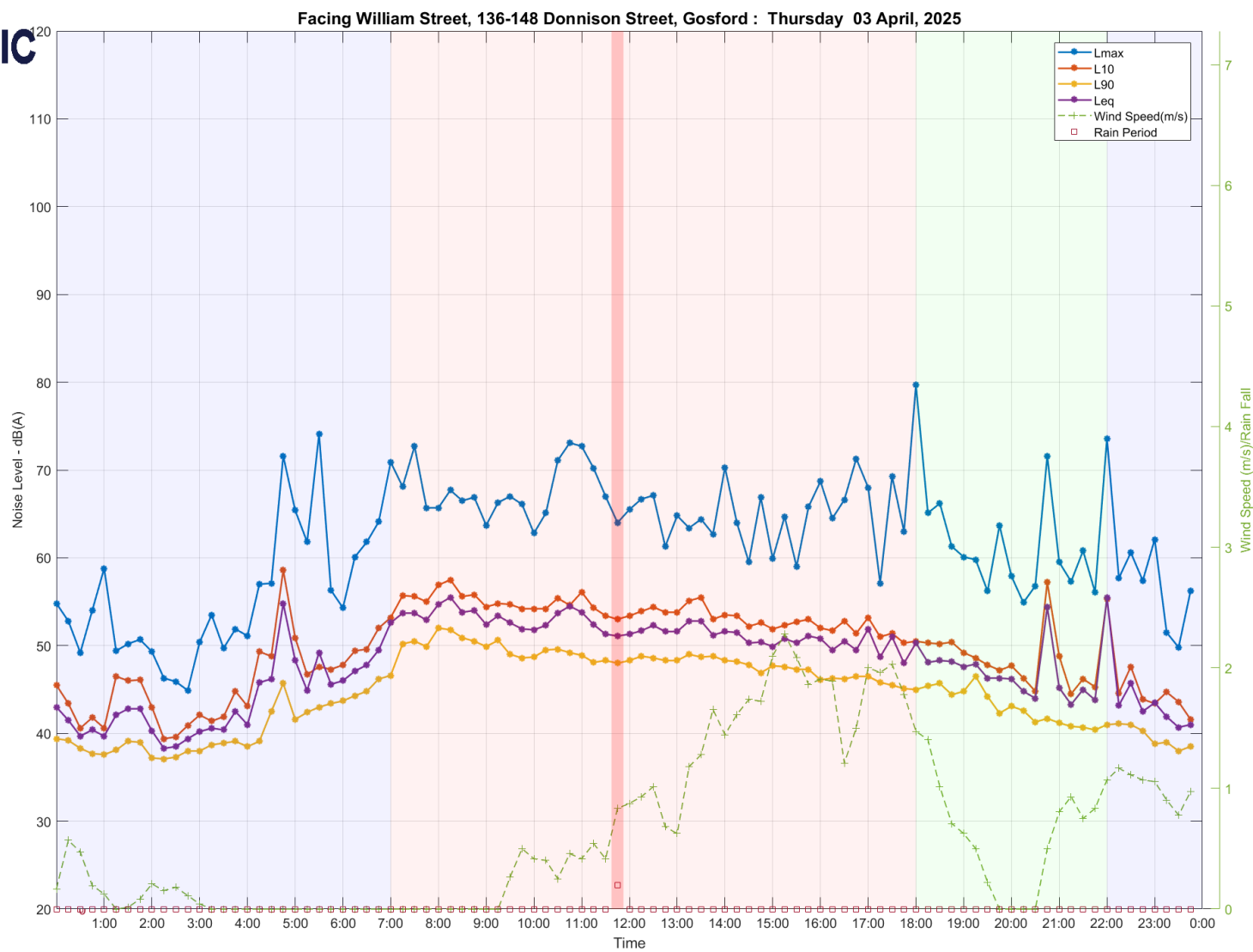


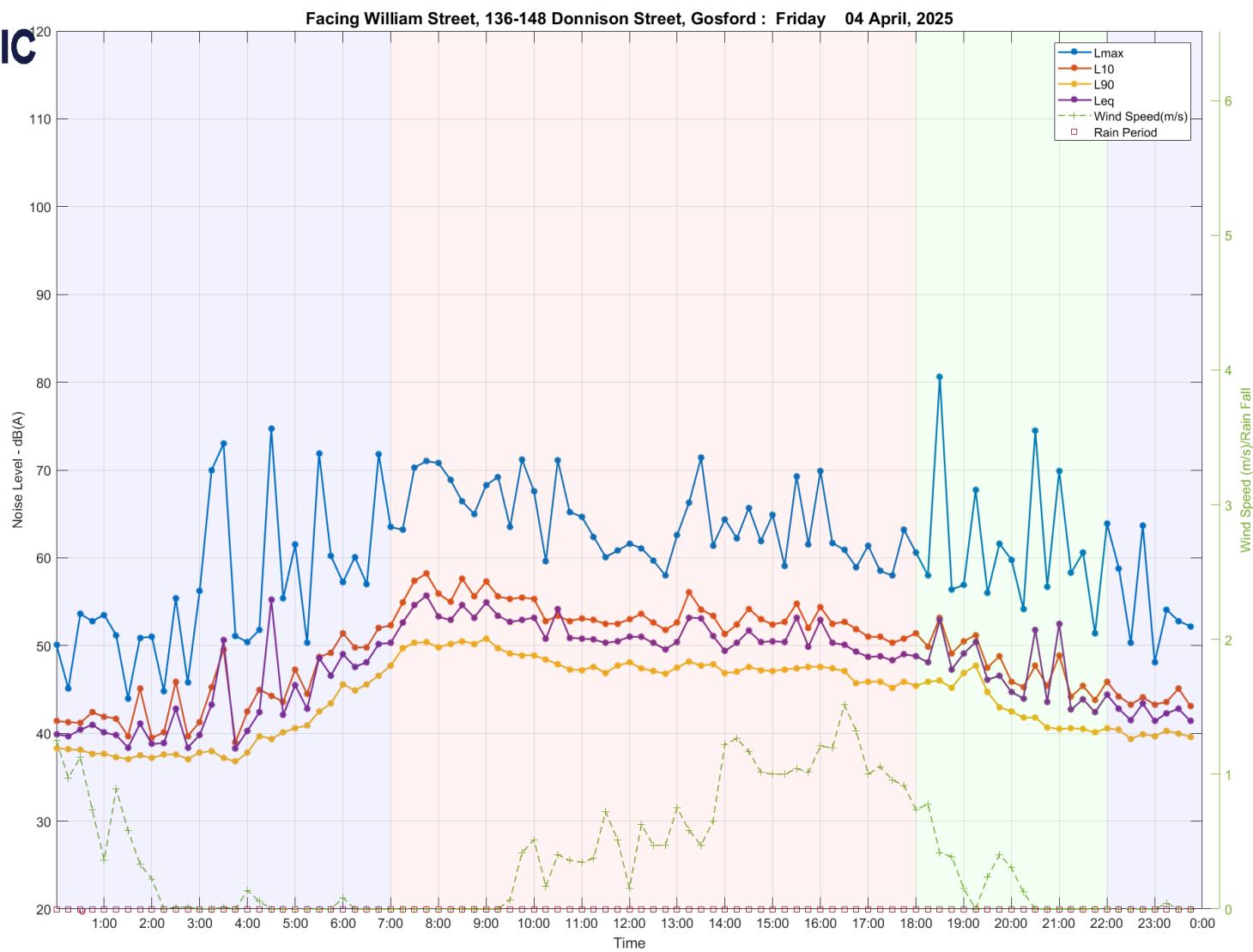


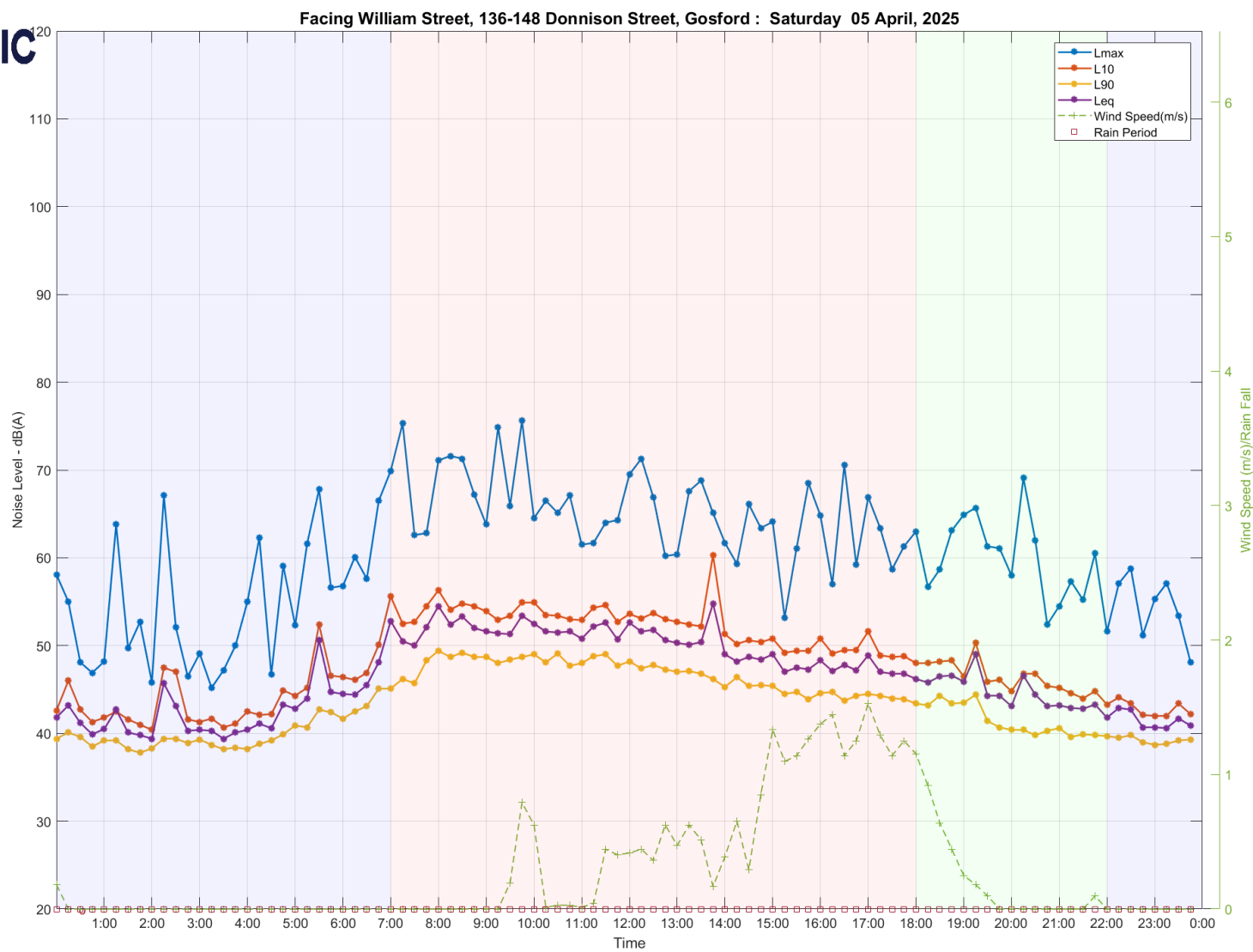


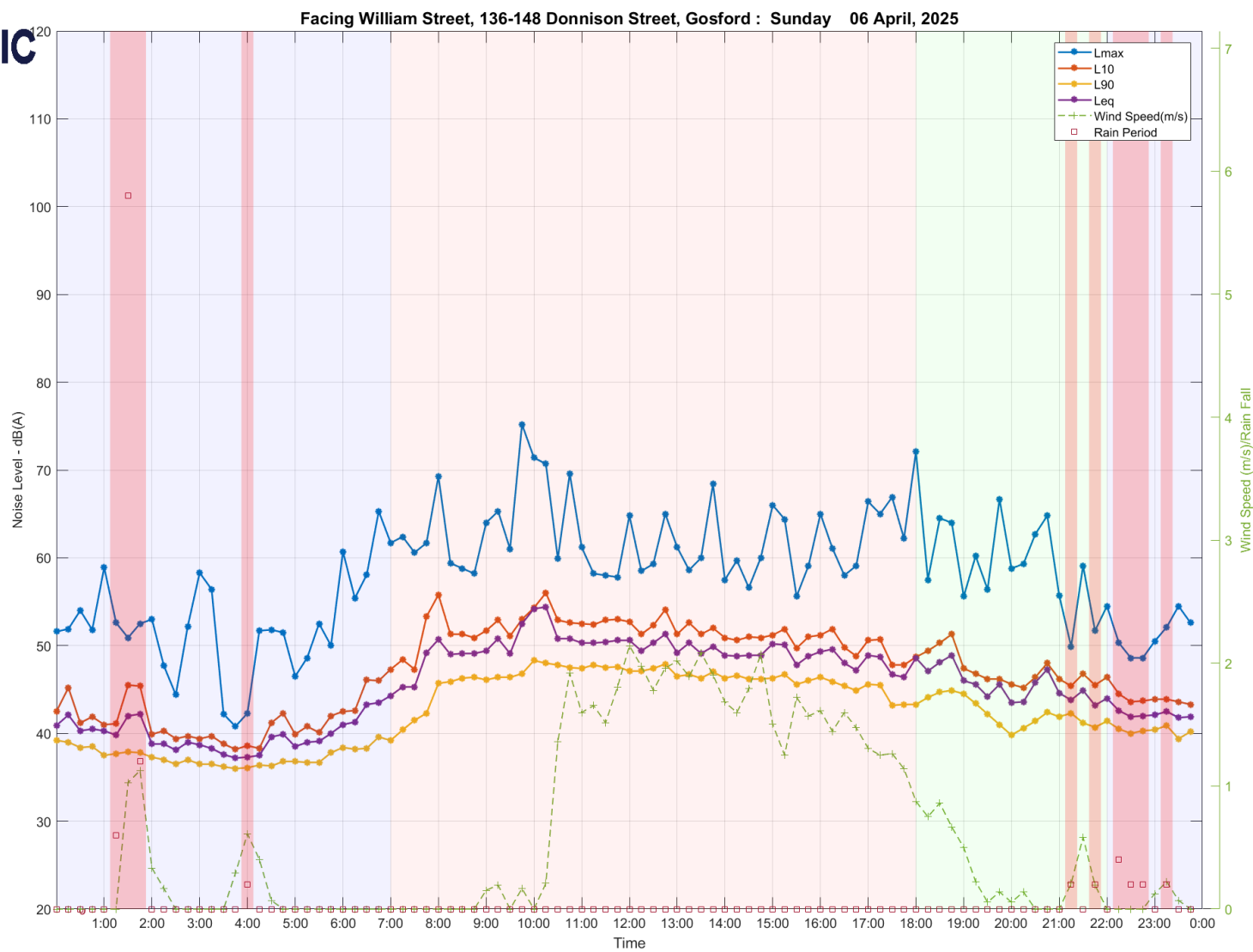


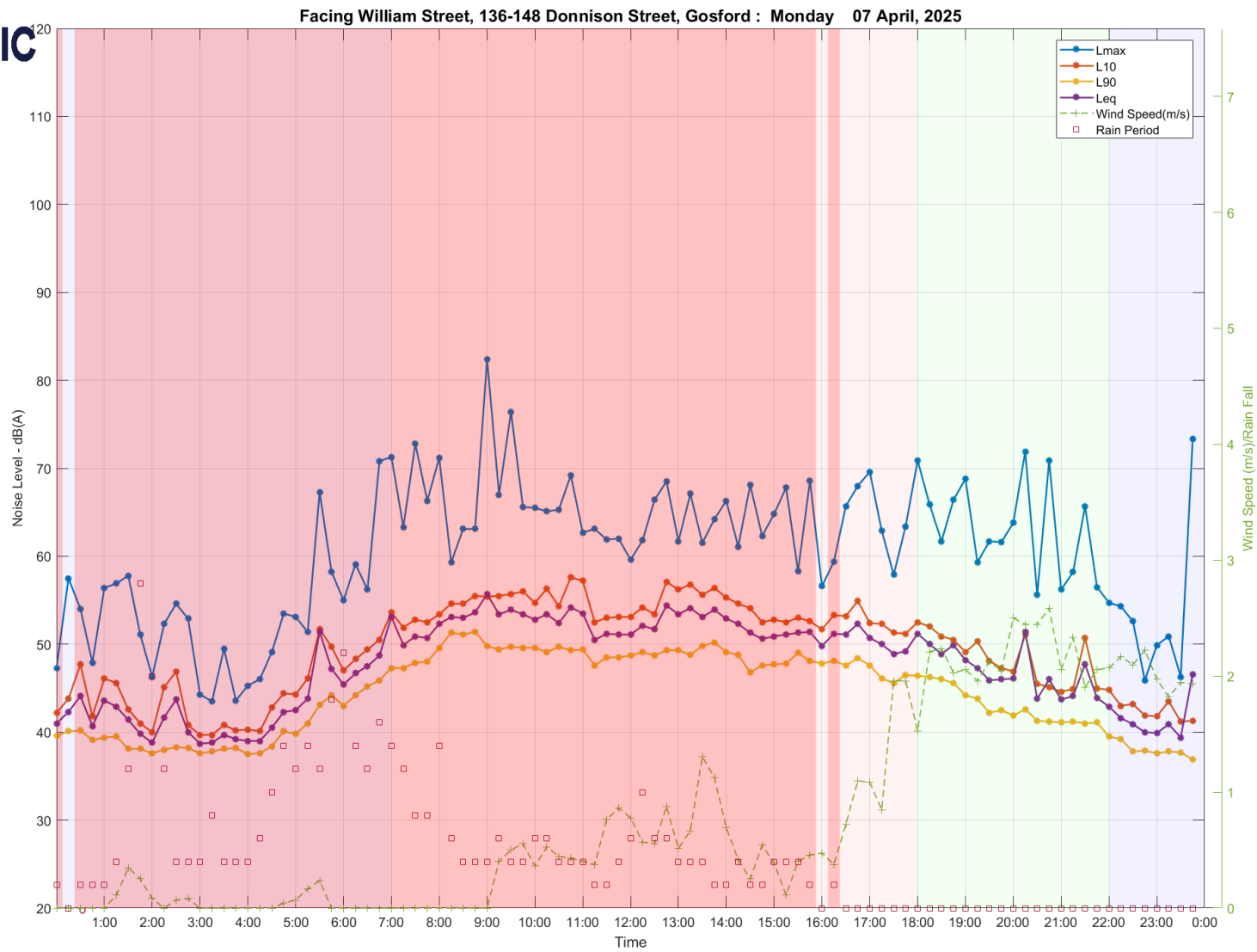


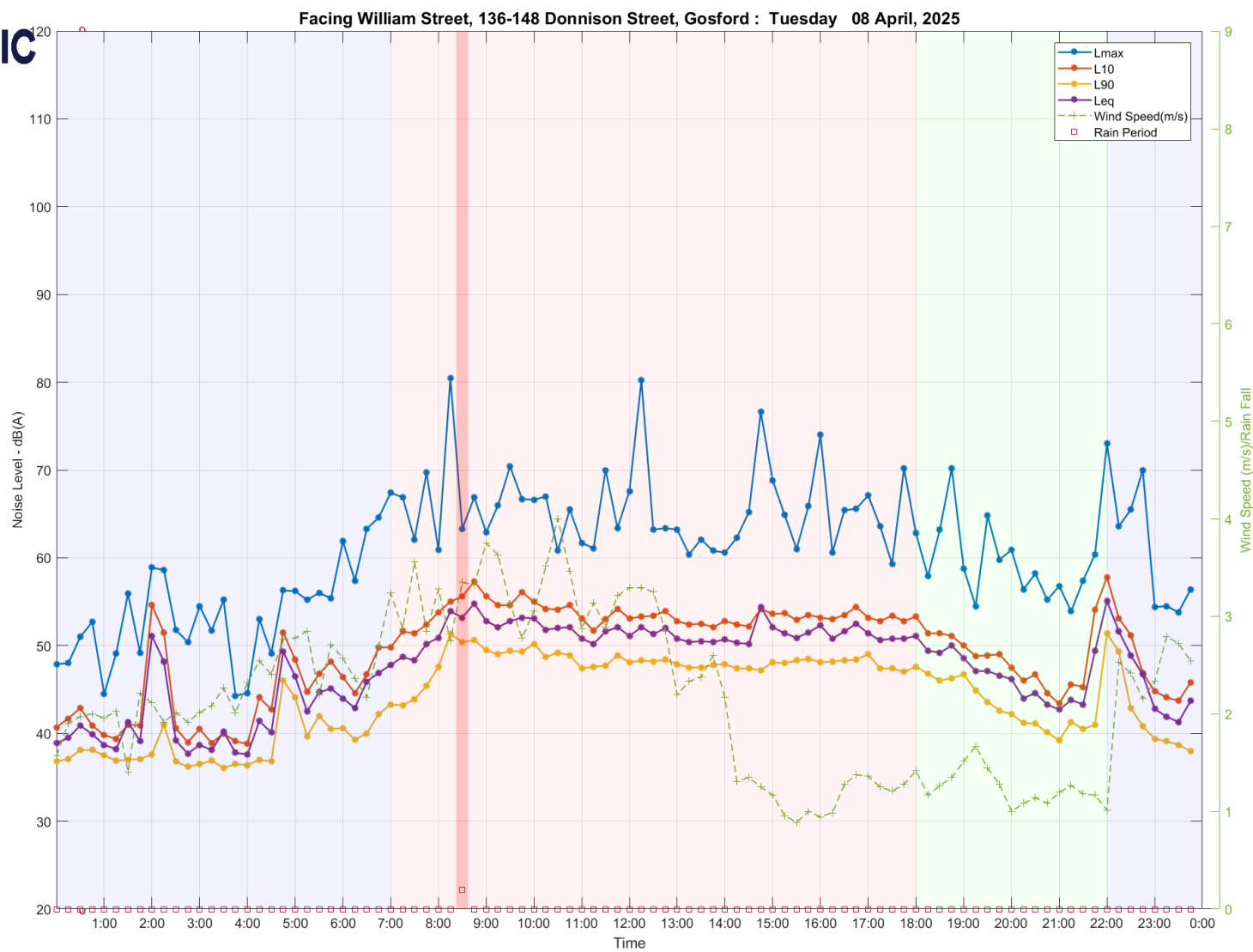


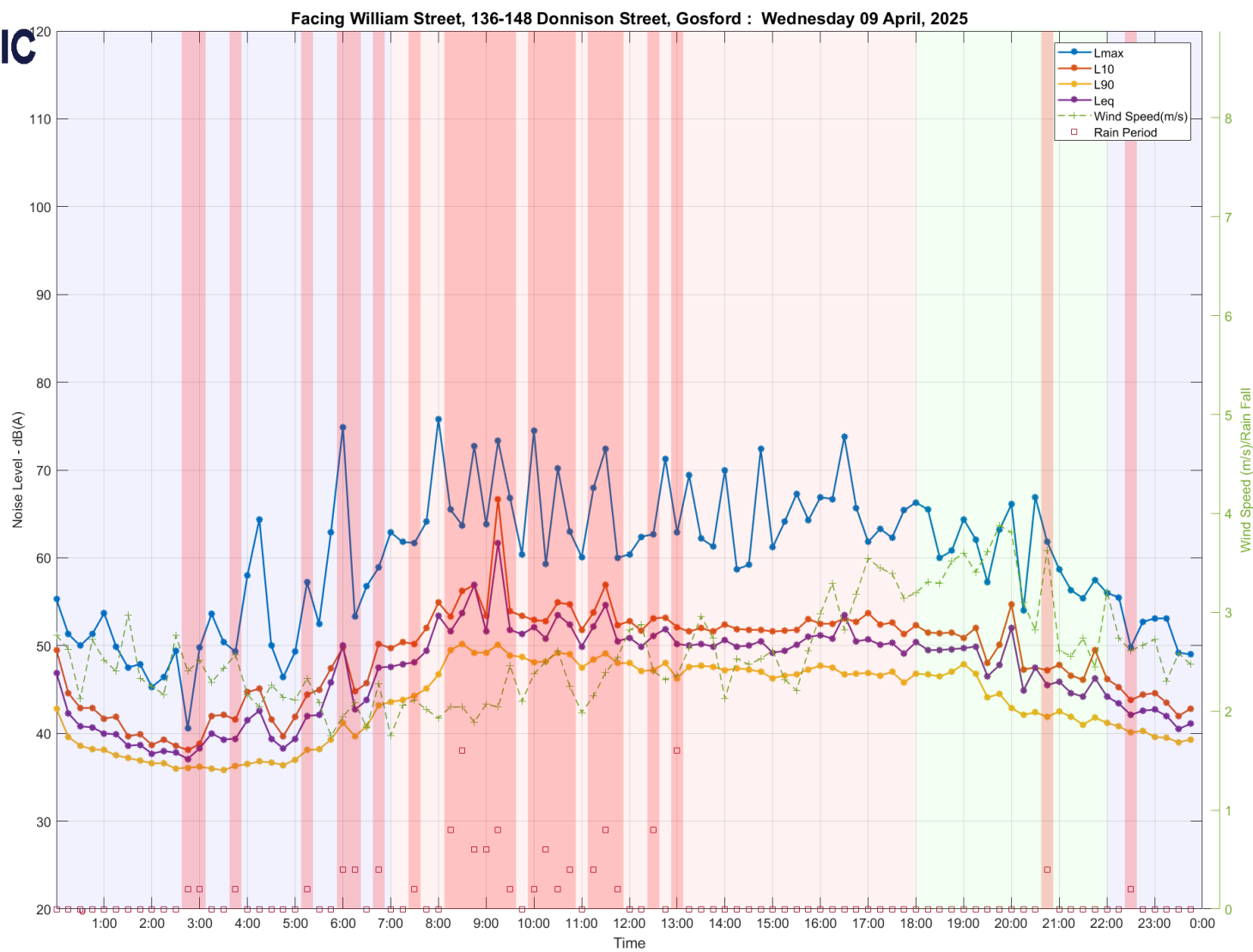


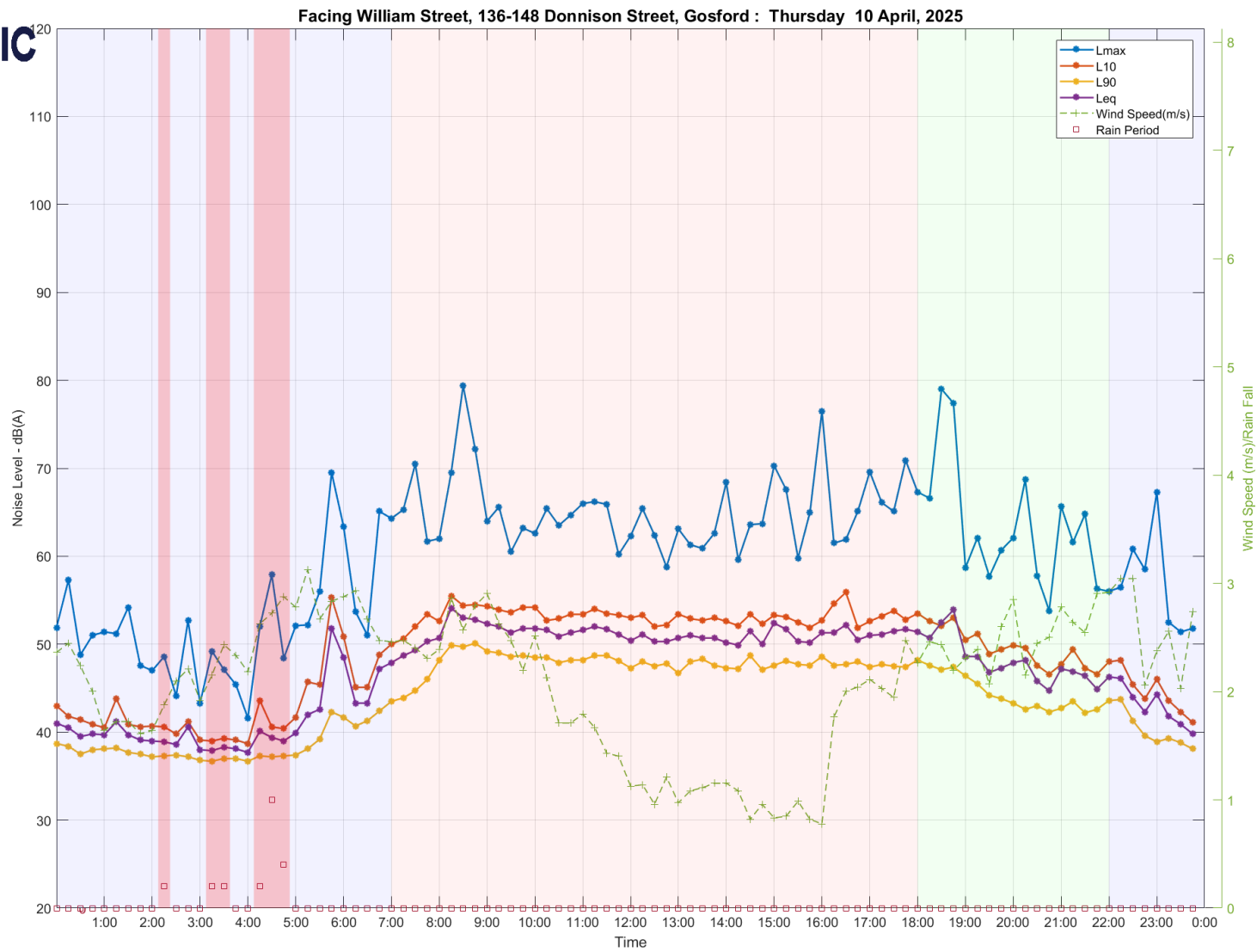


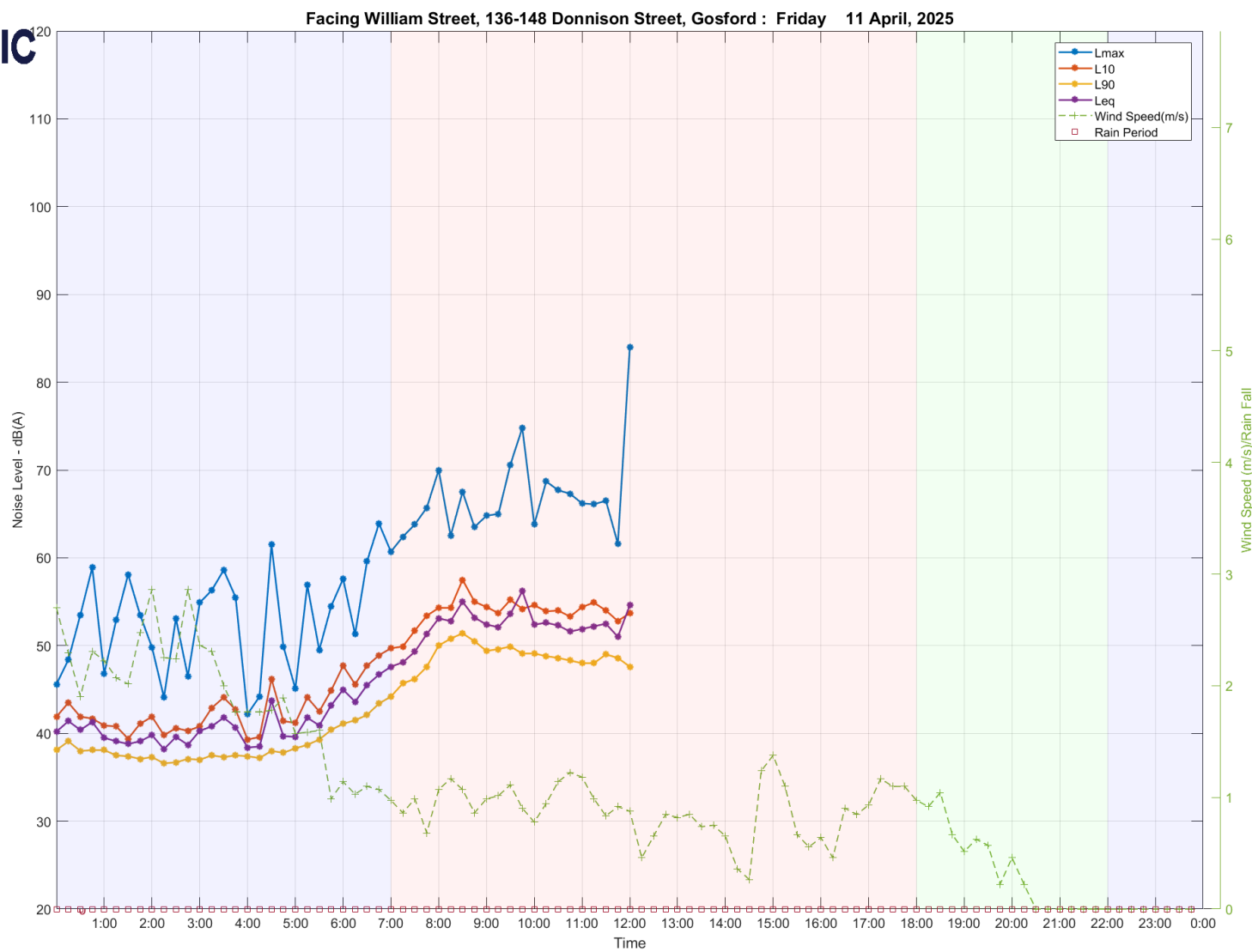






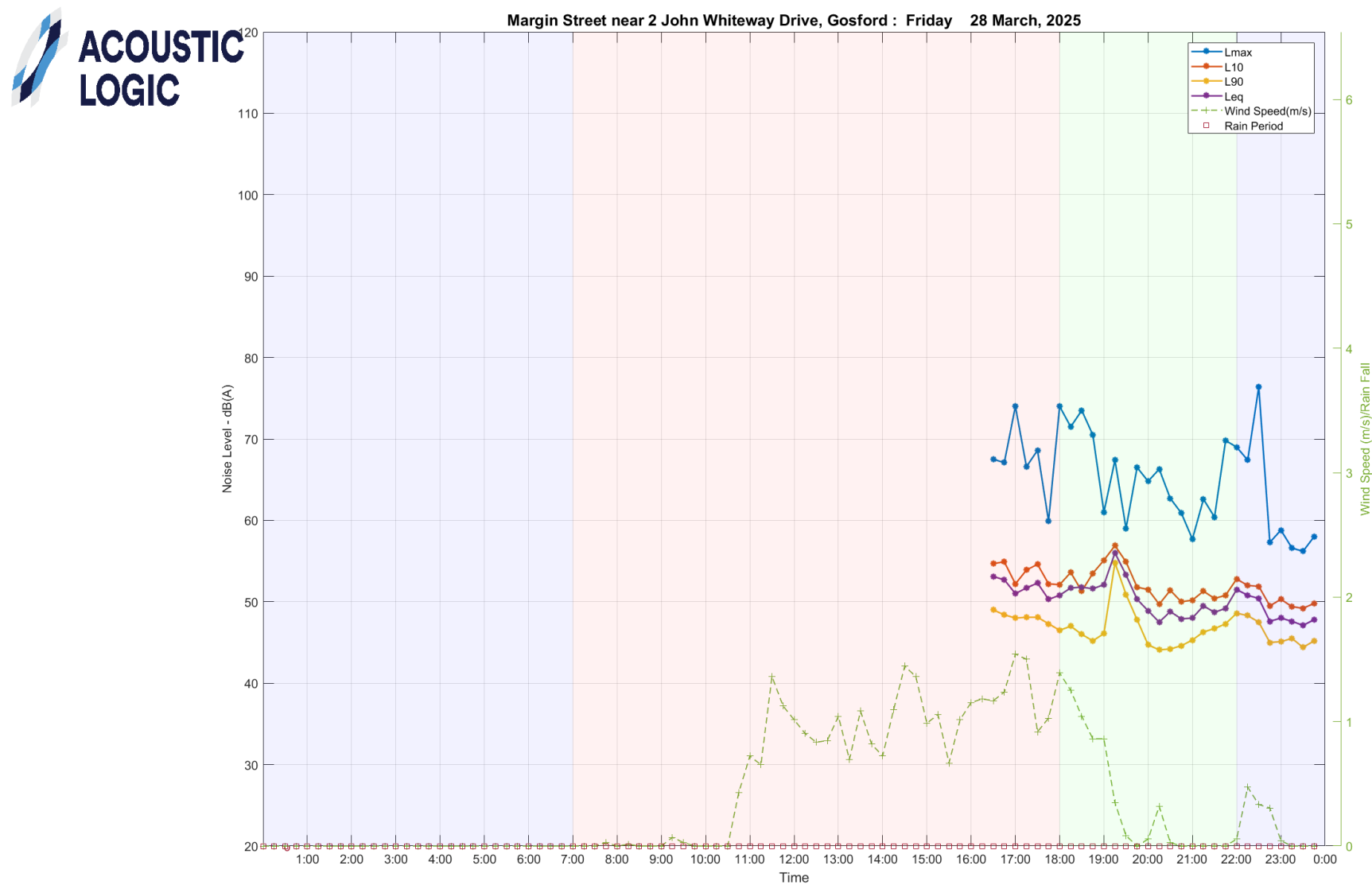


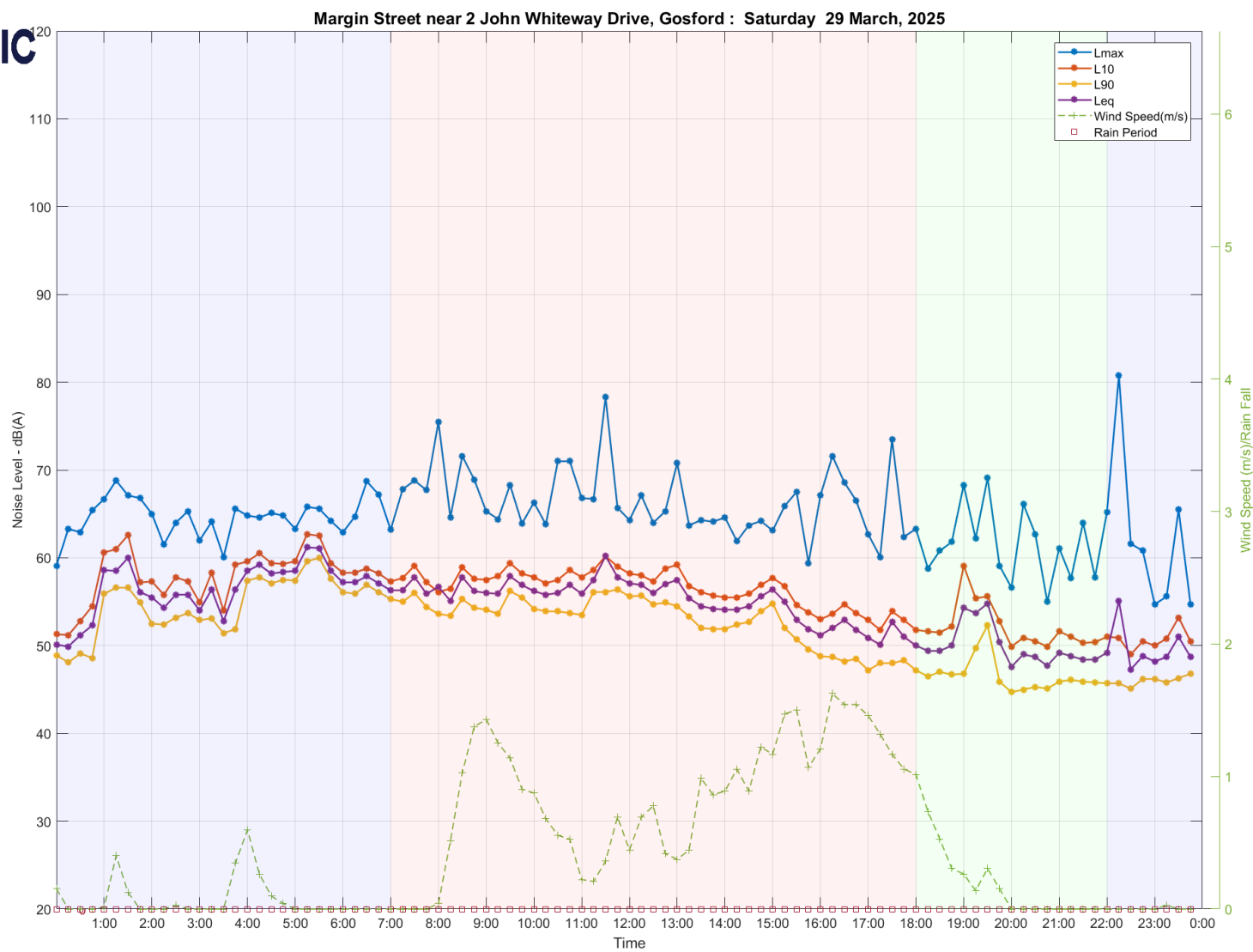


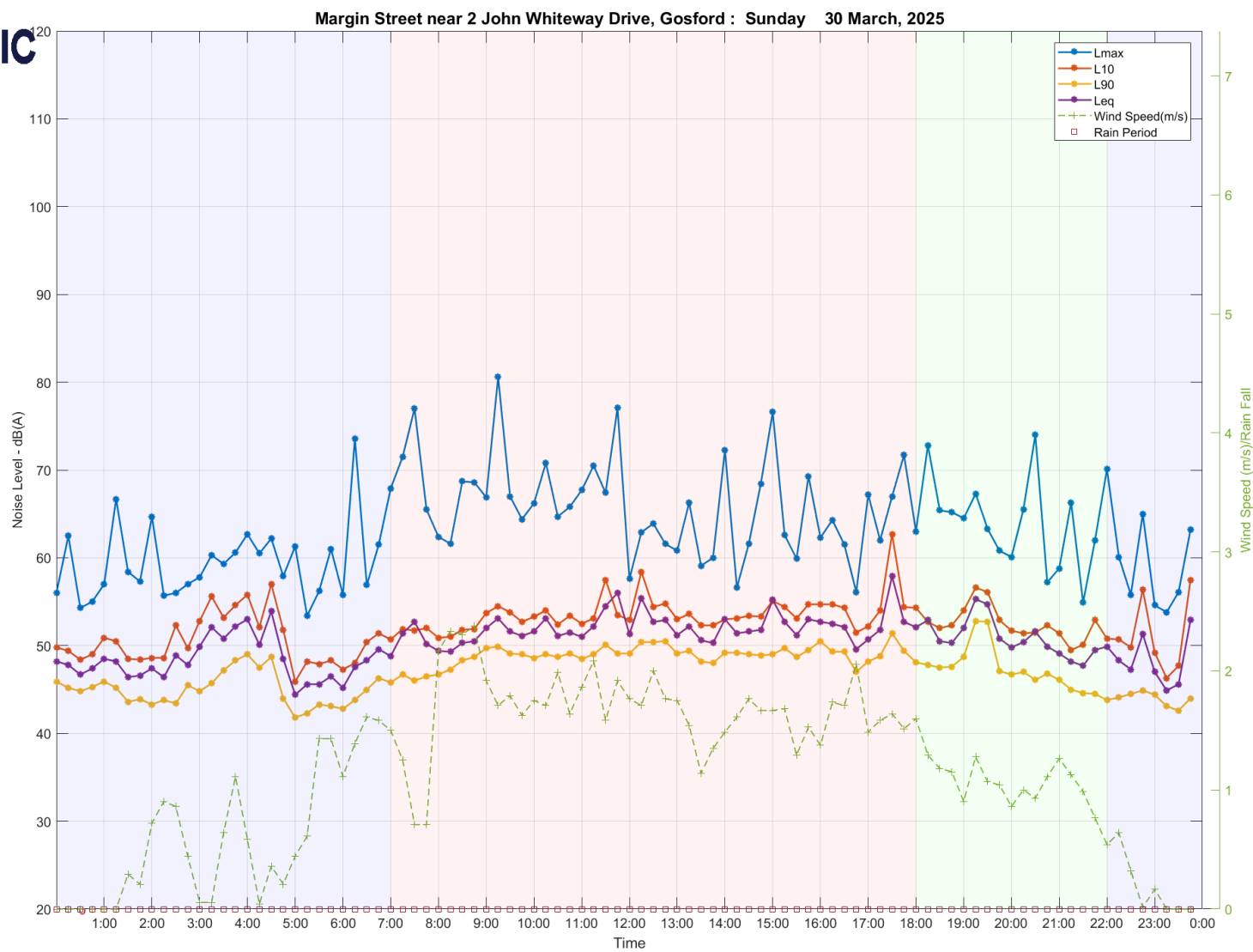


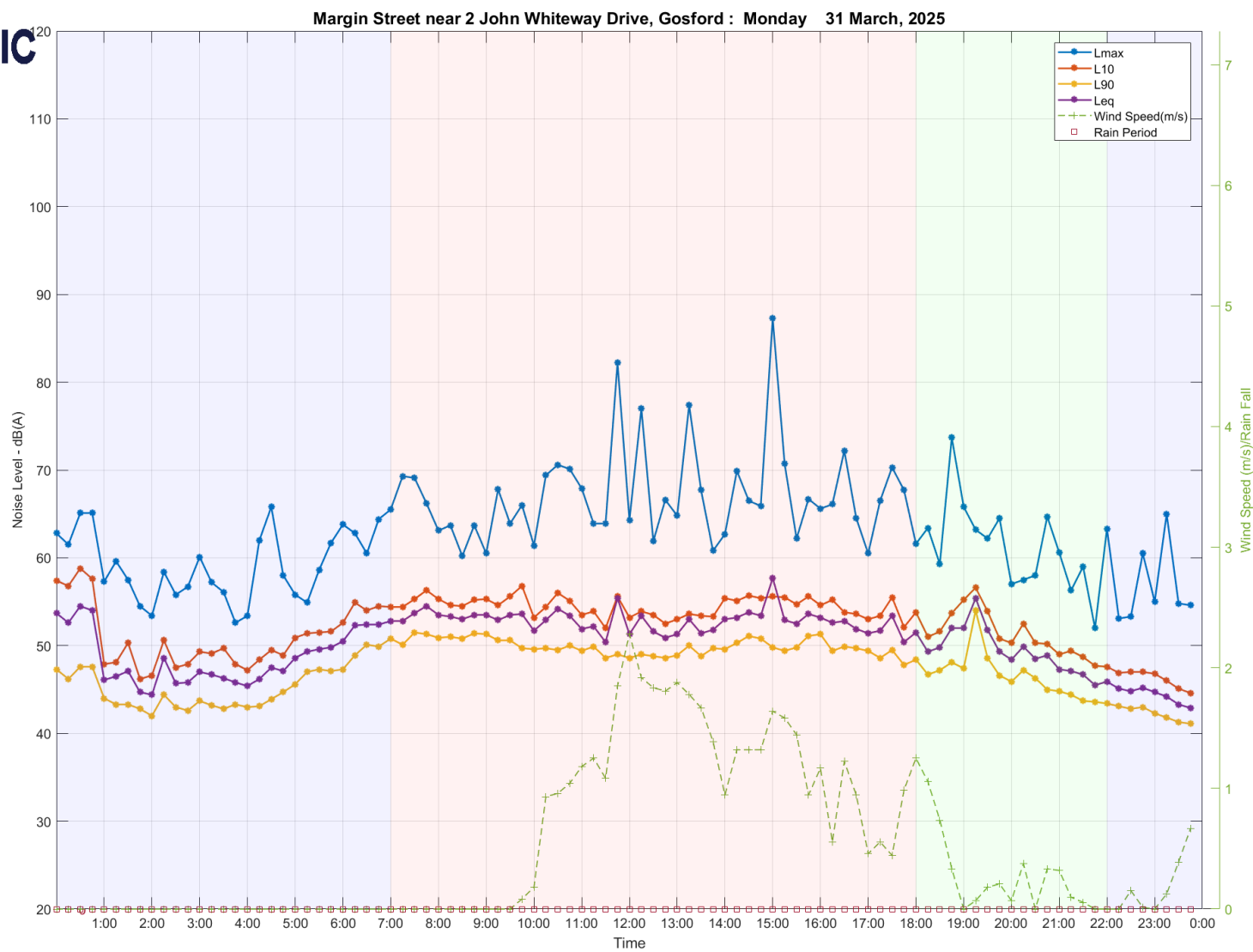
Wind Speed is corrected using factor 0.5000 based on logger location

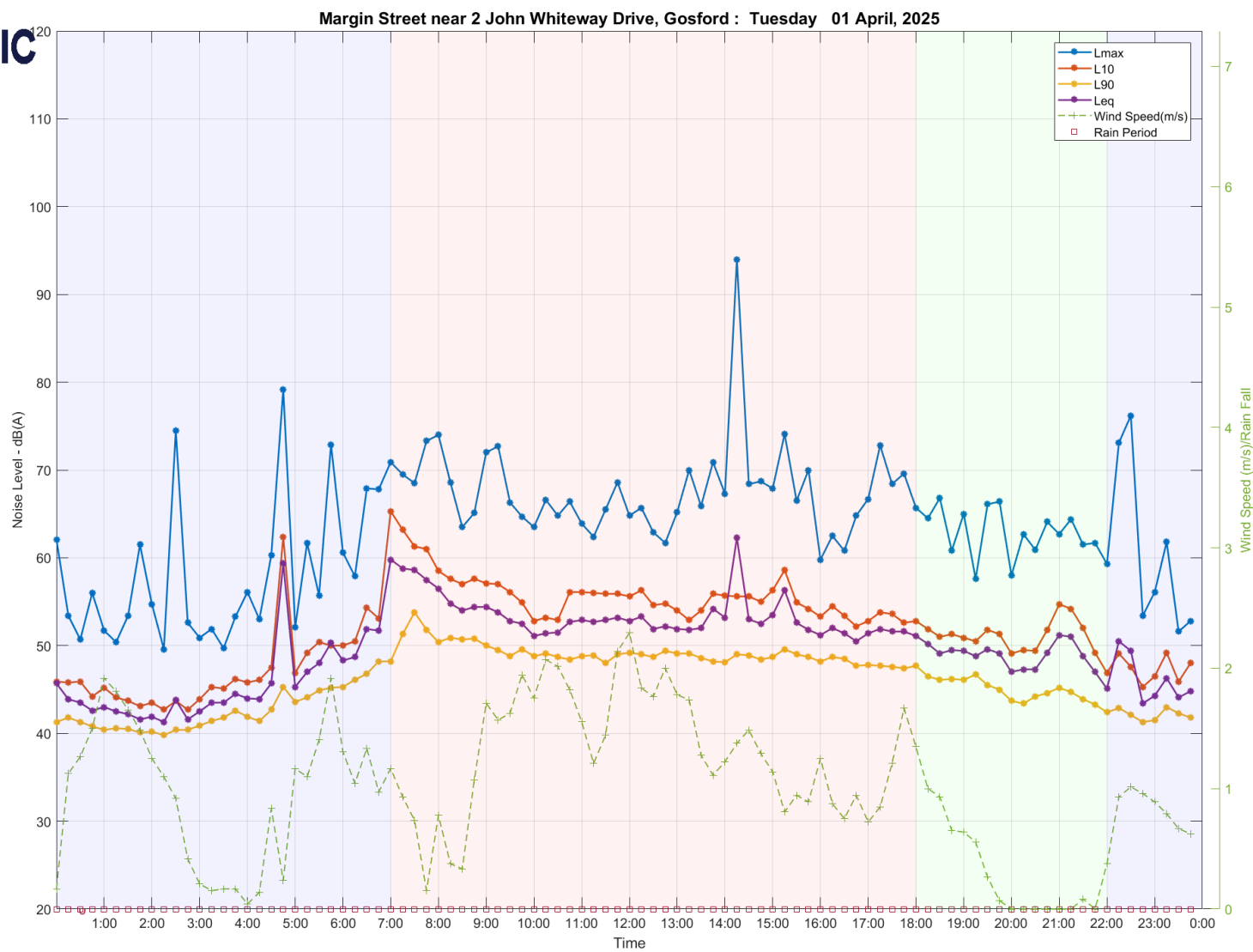
A.6.4 Facing Margin Street (R1)

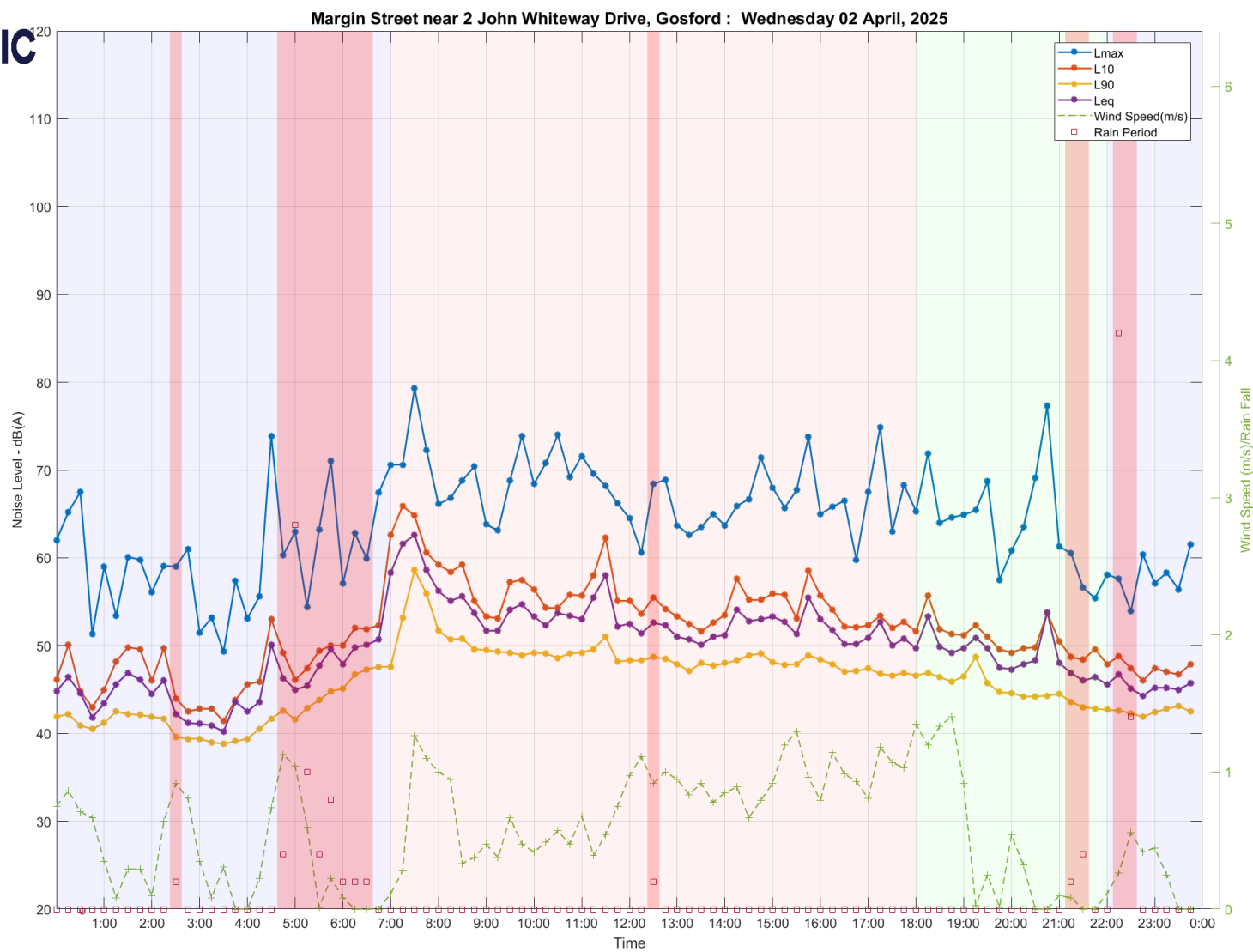


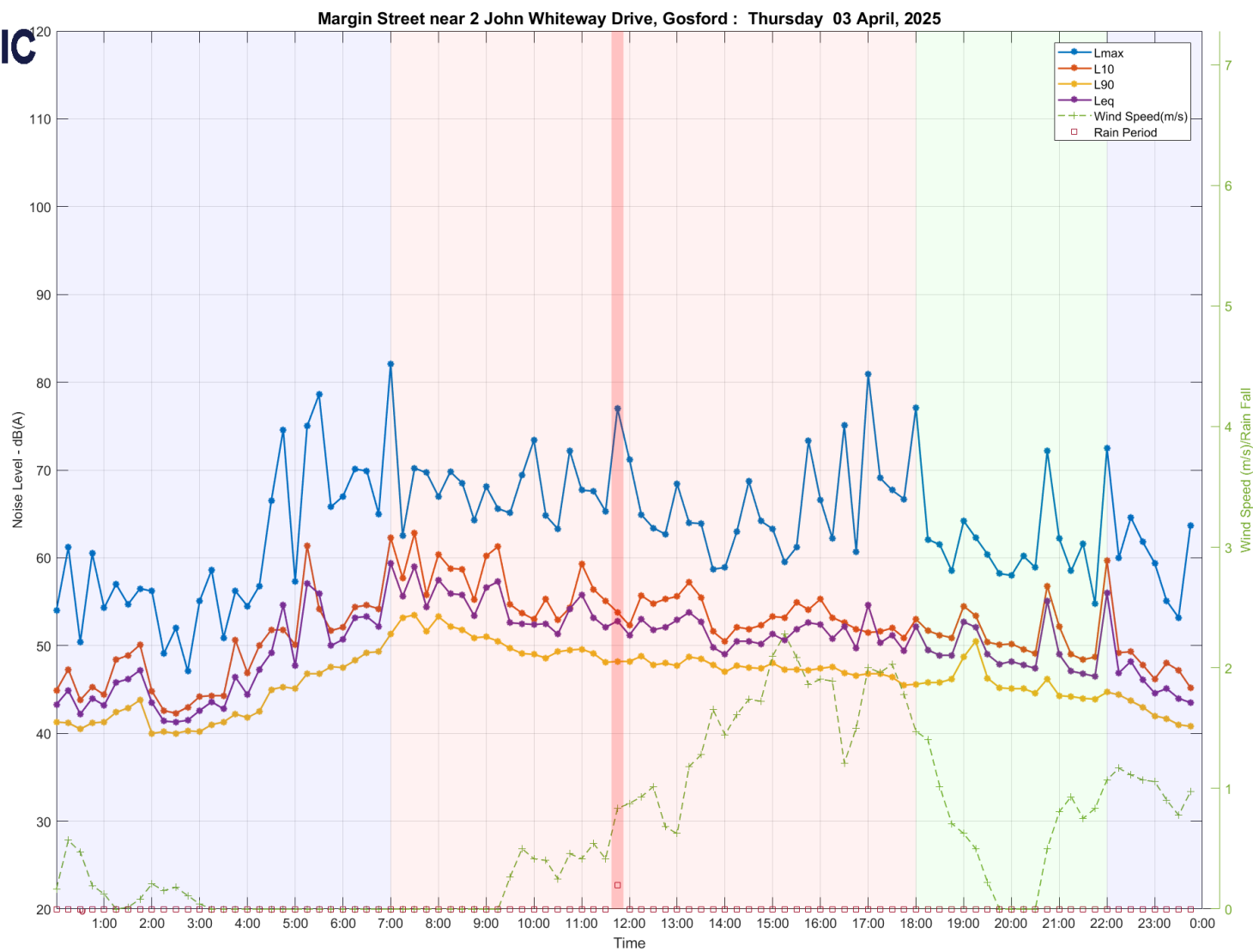


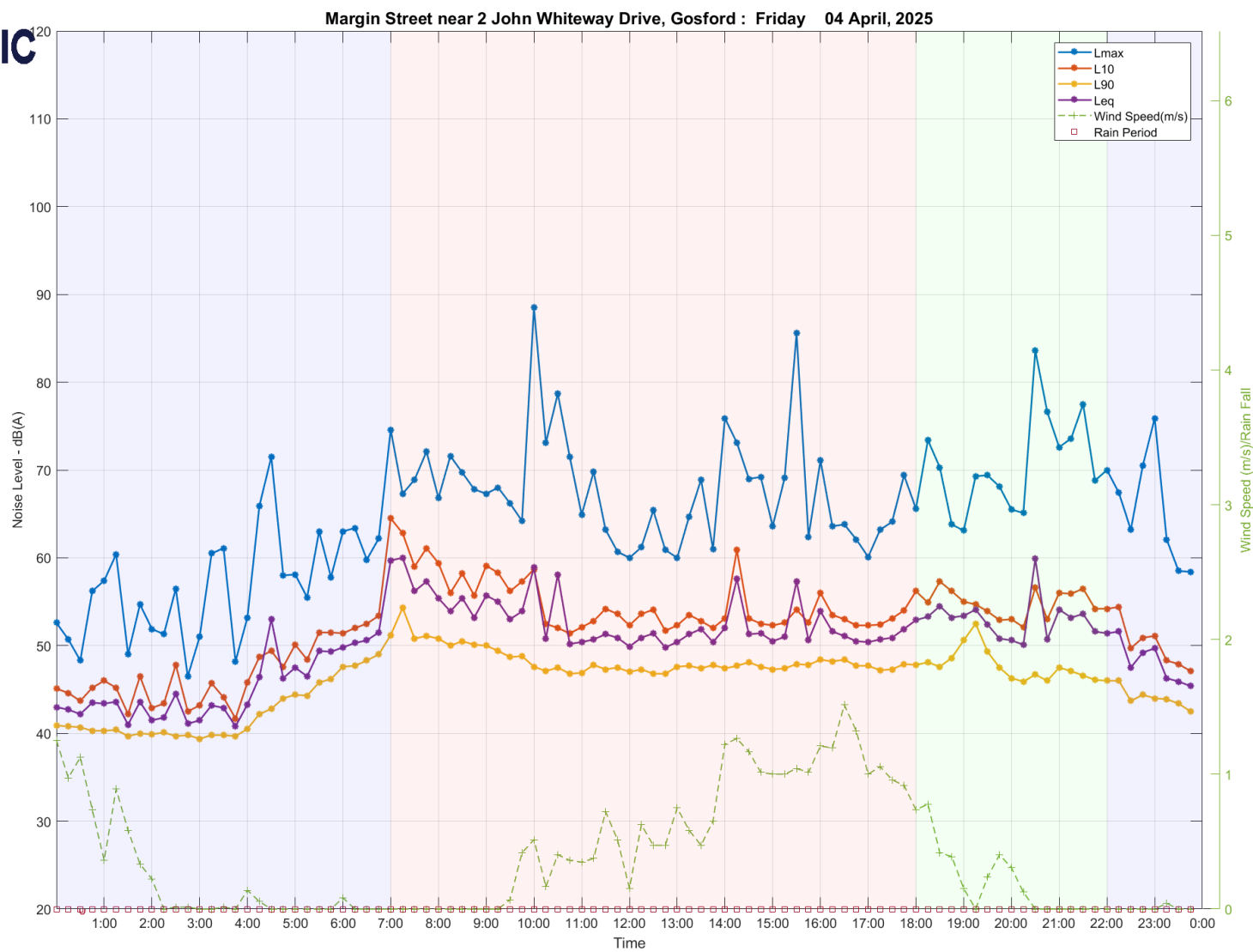


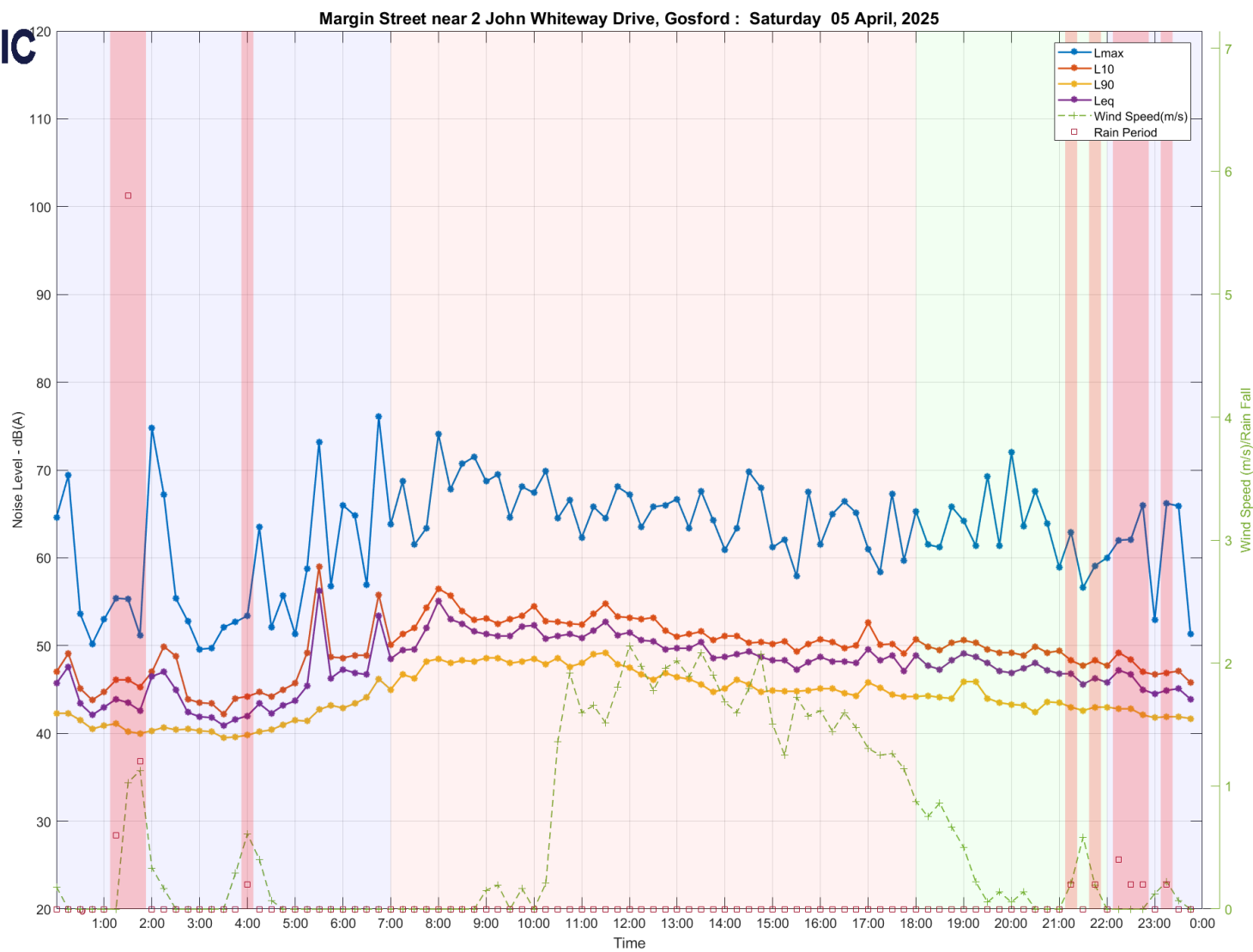


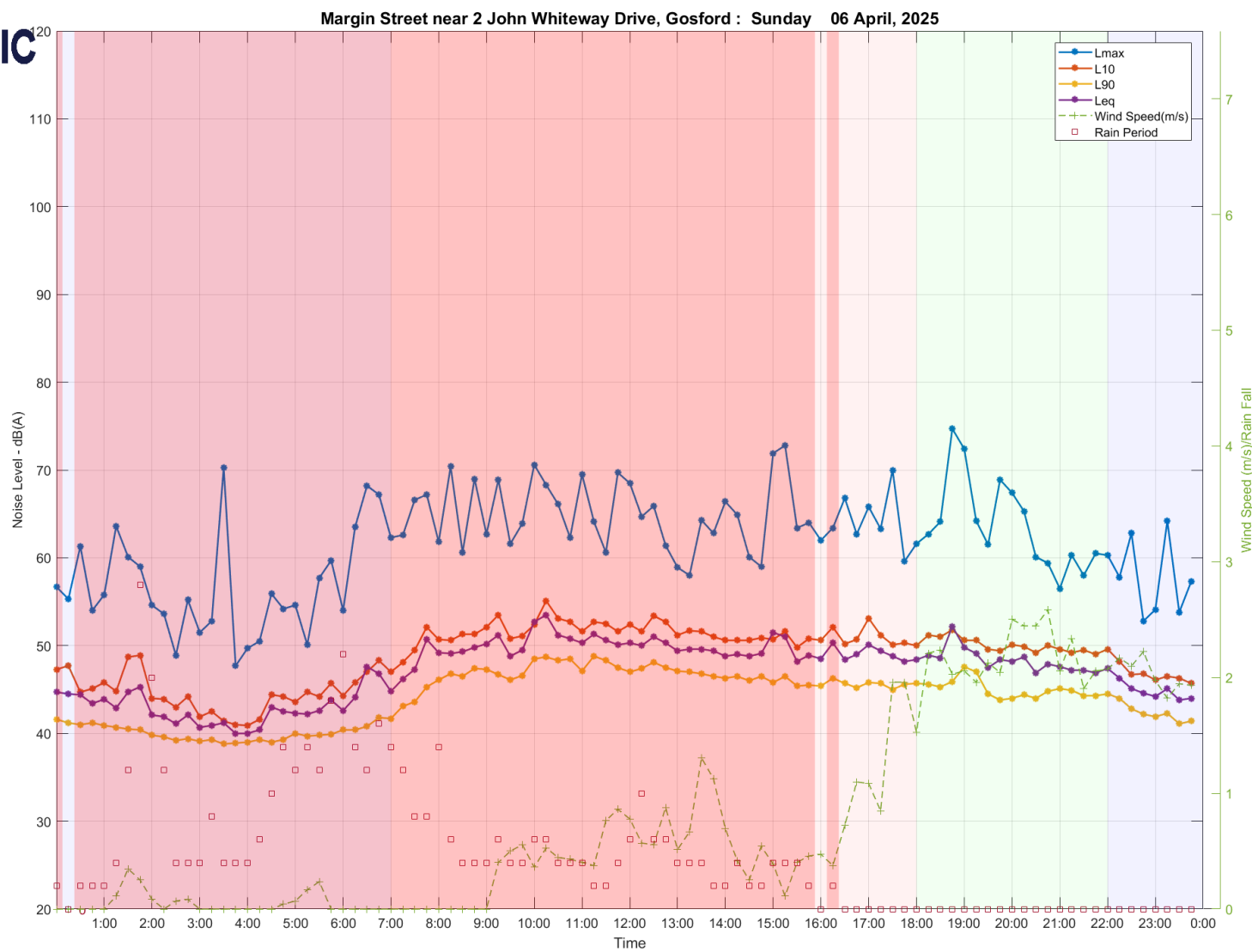


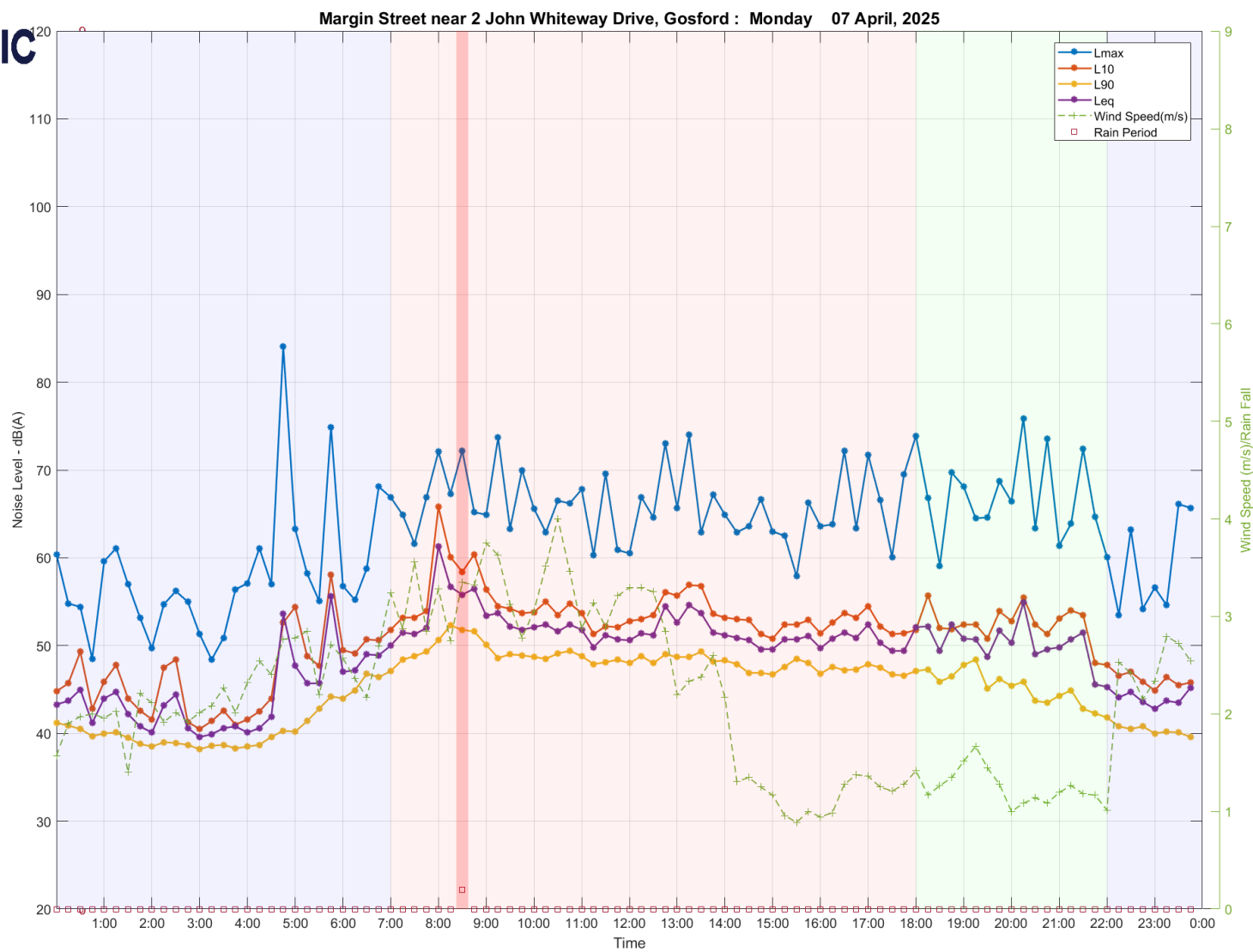


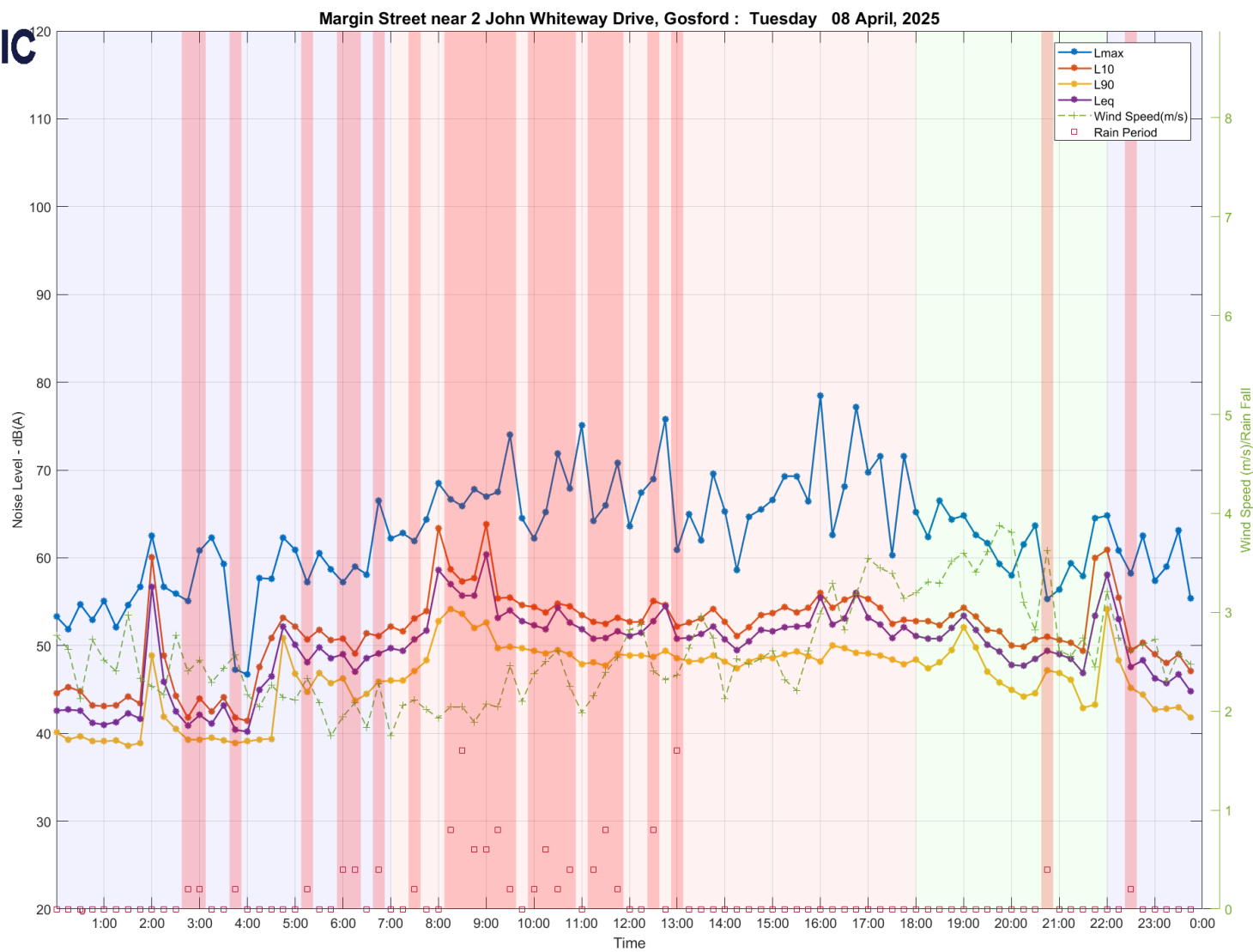


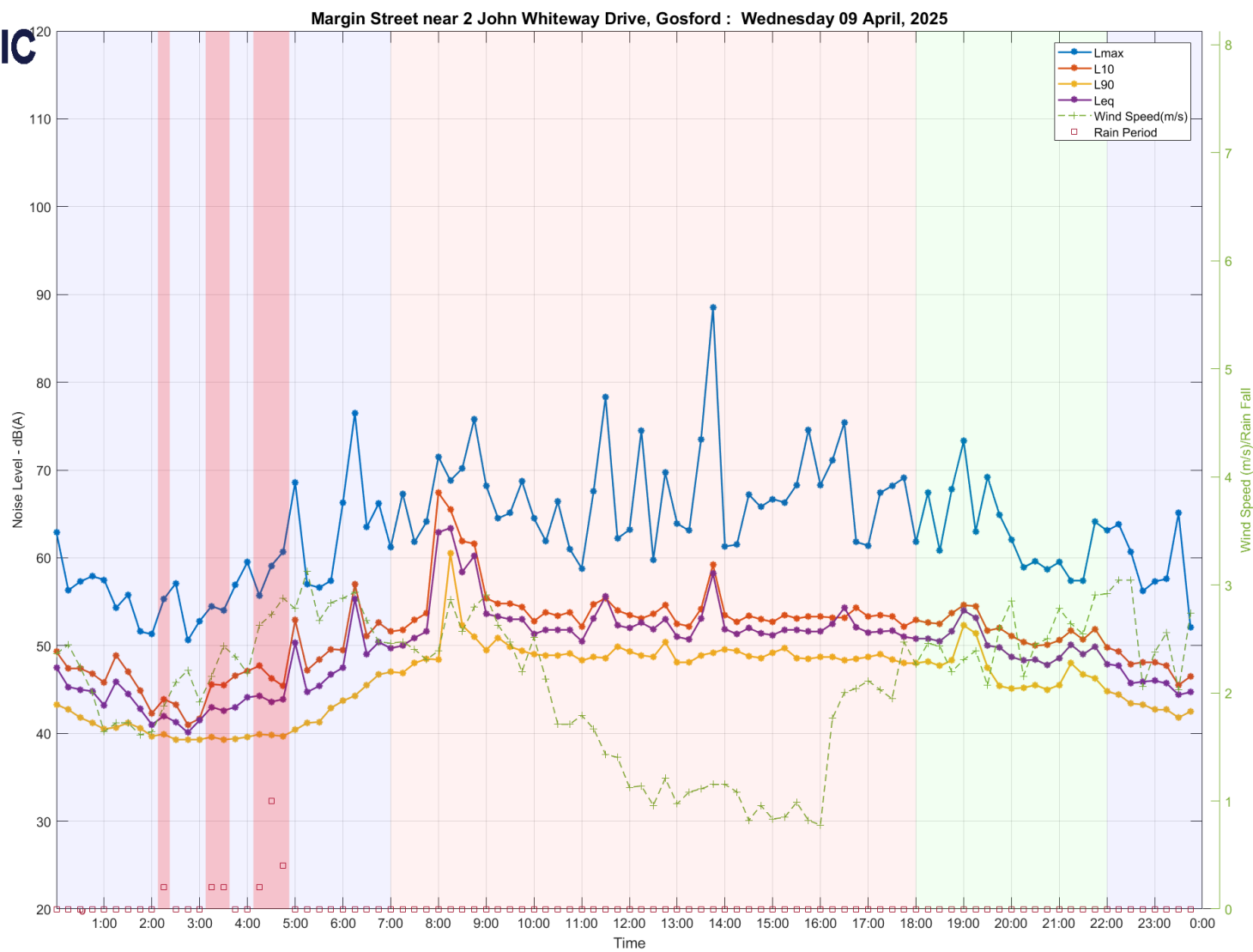


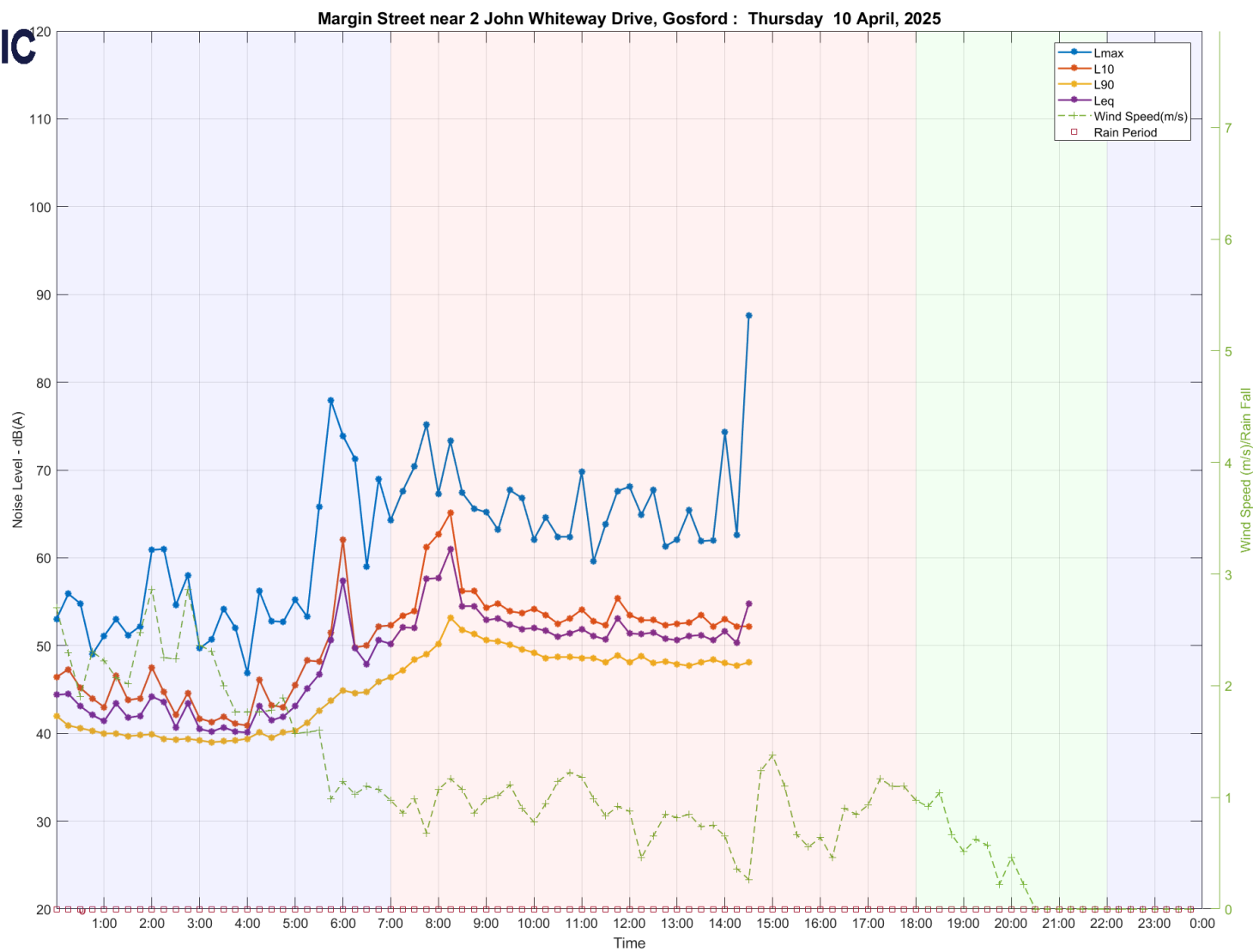












Wind Speed is corrected using factor 0.5000 based on logger location

APPENDIX B EPA NOISE POLICY FOR INDUSTRY TRIGGER LEVELS

Project specific assessment trigger levels have been determined for each noise source applying at the identified potentially most impacted receivers.

B.1 NPFI TRIGGER LEVELS

The NPFI requires noise impacts at residential receivers to be assessed in 3 ways:

- Whether the emitted noise is unreasonably loud relative to ambient background noise. (which the EPA calls the “intrusiveness” trigger level).
- Whether the noise emitted is unreasonably loud in an absolute sense, and consistent with surrounding land use and environment. (“amenity” trigger level)
- For night noise emissions, whether discrete noise events are likely to adversely impact sleep (“maximum noise level” trigger levels).

For other receiver types only the amenity trigger level is relevant.

B.1.1 Intrusiveness

The $L_{eq,15min}$ descriptor is used for the intrusiveness trigger level, and is set at a level that is 5dB(A) above the rating background noise level.

B.1.2 Amenity

Table 2.2 of the NPFI (repeated below) sets out acceptable noise levels for various receiver types.

There are 3 categories of residential receivers - rural, suburban, urban. The nearest residential receivers to the subject site are categorised as “urban” receivers. Categories for non-residential uses are also indicated in the table.

The NPFI typically requires project amenity noise levels to be calculated in the following manner:

$$L_{Aeq,15min} = \text{Recommended Amenity Noise Level} - 5 \text{ dB(A)} + 3 \text{ dB(A)}$$

NPfI Table 2.2: Amenity Noise Levels			
Receiver	Noise Amenity Area	Time of Day	Recommended Amenity Noise Level L_{Aeq}
<i>Residential</i>	<i>Rural</i>	<i>Day</i>	50
		<i>Evening</i>	45
		<i>Night</i>	40
	<i>Suburban</i>	<i>Day</i>	55
		<i>Evening</i>	45
		<i>Night</i>	40
	<i>Urban</i>	<i>Day</i>	60
		<i>Evening</i>	50
		<i>Night</i>	45
<i>Hotels motels caretakers' quarters holiday accommodation permanent resident caravan parks</i>	<i>See column 4</i>	<i>See column 4</i>	<i>5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day</i>
<i>School classroom – internal</i>	<i>All</i>	<i>Noisiest 1-hour period when in use</i>	<i>35 (see notes for table)</i>
<i>Hospital ward internal external</i>	<i>All</i>	<i>Noisiest 1-hour</i>	35
	<i>All</i>	<i>Noisiest 1-hour</i>	50
<i>Place of worship – internal</i>	<i>All</i>	<i>When in use</i>	40
<i>Area specifically reserved for passive recreation (e.g. national park)</i>	<i>All</i>	<i>When in use</i>	50
<i>Active recreation area (e.g. school playground golf course)</i>	<i>All</i>	<i>When in use</i>	55
<i>Commercial premises</i>	<i>All</i>	<i>When in use</i>	65
<i>Industrial premises</i>	<i>All</i>	<i>When in use</i>	70
<i>Industrial interface (applicable only to residential noise amenity areas)</i>	<i>All</i>	<i>All</i>	<i>Add 5 dB(A) to recommended noise amenity area</i>

Notes: The recommended amenity noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as follows:

- rural residential – see Table 2.3
- suburban residential – see Table 2.3
- urban residential – see Table 2.3
- industrial interface – an area that is in close proximity to existing industrial premises and that extends out to a point where the existing industrial noise from the source has fallen by 5 dB or an area defined in a planning instrument. Beyond this region the amenity noise level for the applicable category applies. This category may be used only for existing situations (further explanation on how this category applies is outlined in Section 2.7)
- commercial – commercial activities being undertaken in a planning zone that allows commercial land uses
- industrial – an area defined as an industrial zone on a local environment plan; for isolated residences within an industrial zone the industrial amenity level would usually apply.

Time of day is defined as follows:

- day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
- evening – the period from 6 pm to 10 pm
- night – the remaining periods.

(These periods may be varied where appropriate, for example, see A3 in Fact Sheet A.)

In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable L_{Aeq} noise level may be increased to 40 dB $L_{Aeq}(1hr)$.

B.1.3 Noise Characteristic Modifying Factors

Where applicable, the emitted intrusive noise level should be modified (increased or decreased) to account for characteristics such as tonality, low frequency, duration, etc according to NPfI Fact Sheet C.

B.1.4 Maximum Noise Level Assessment

The purpose of this assessment is to identify whether discrete, night time noise events have the potential to produce adverse sleep impacts.

Section 2.5 of NPfI recommends the following procedure to assess the potential for adverse sleep 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 (L_{90}) plus 5 dB, whichever is the greater, and/or
- L_{max} 52 dB(A) or the prevailing RBL (L_{90}) plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy.

Other factors that may be important in assessing the extent of impacts on sleep include:

- how often high noise events will occur
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development
- whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)
- current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

For the research on sleep disturbance to date it can be concluded that:

- Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep.
- One to two noise events per night with maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly.

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels.

B.2 PROJECT SPECIFIC TRIGGER LEVELS

The following table summarises the trigger levels applying at each of the identified “most impacted” receivers. These have been determined based on the NPfI methodology described above and the measured rating background noise levels.

The trigger levels in bold indicate the most stringent trigger level at each location.

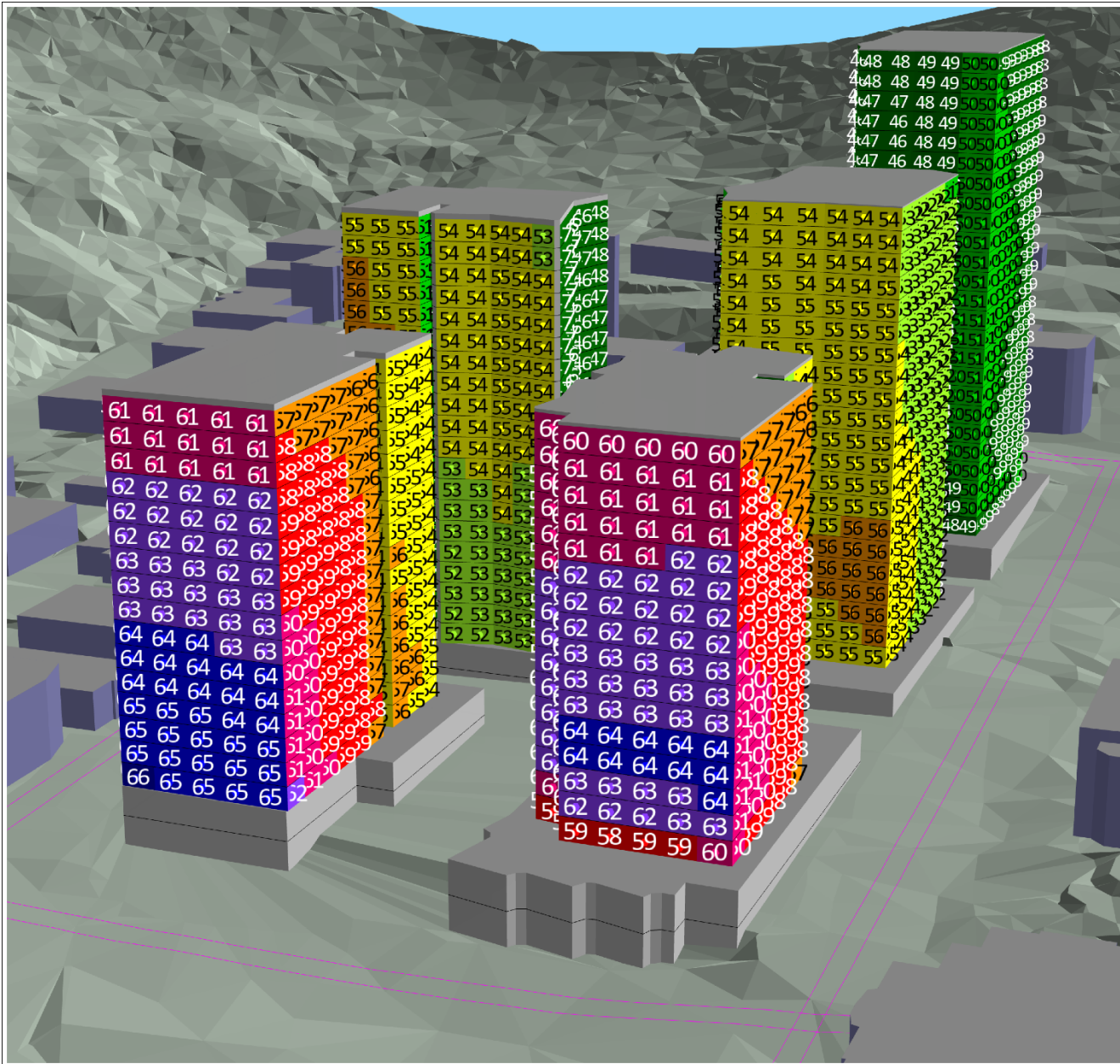
Table B-1 – Project Specific Trigger Levels

Location/ Receiver Type	Time	RBL dB(A) L ₉₀	Trigger Noise Level (dB(A) L _{eq,15min})		
			Intrusiveness	Amenity	Max Event
Residential R1	Day	47	52	58	N/A
	Evening	44	49	48	N/A
	Night	40	45	43	45 L_{eq} 55 L_{max}
Educational Receiver (E1)	When in use	N/A	N/A	35 (internal noisiest 1 hr)	N/A
Place of Worship (P1)		N/A	N/A	40 (internal)	N/A
Passive Play Area (PP1)		N/A	N/A	48	N/A
Commercial Receivers (C1, C2, C3, C4)		N/A	N/A	63	N/A

The project noise trigger levels are bolded above.

APPENDIX C SOUNDPLAN MODELLING RESULTS

C.1 DAY TIME TRAFFIC NOISE LEVELS



136-148 Donnison Street Gosford

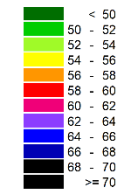
Traffic Noise Prediction

Day time (7am-10pm)

Prepared by: WY
Date: 13/05/2025

Noise Level

Leq
in dB(A)





136-148 Donnison Street Gosford

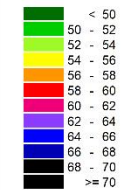
Traffic Noise Prediction

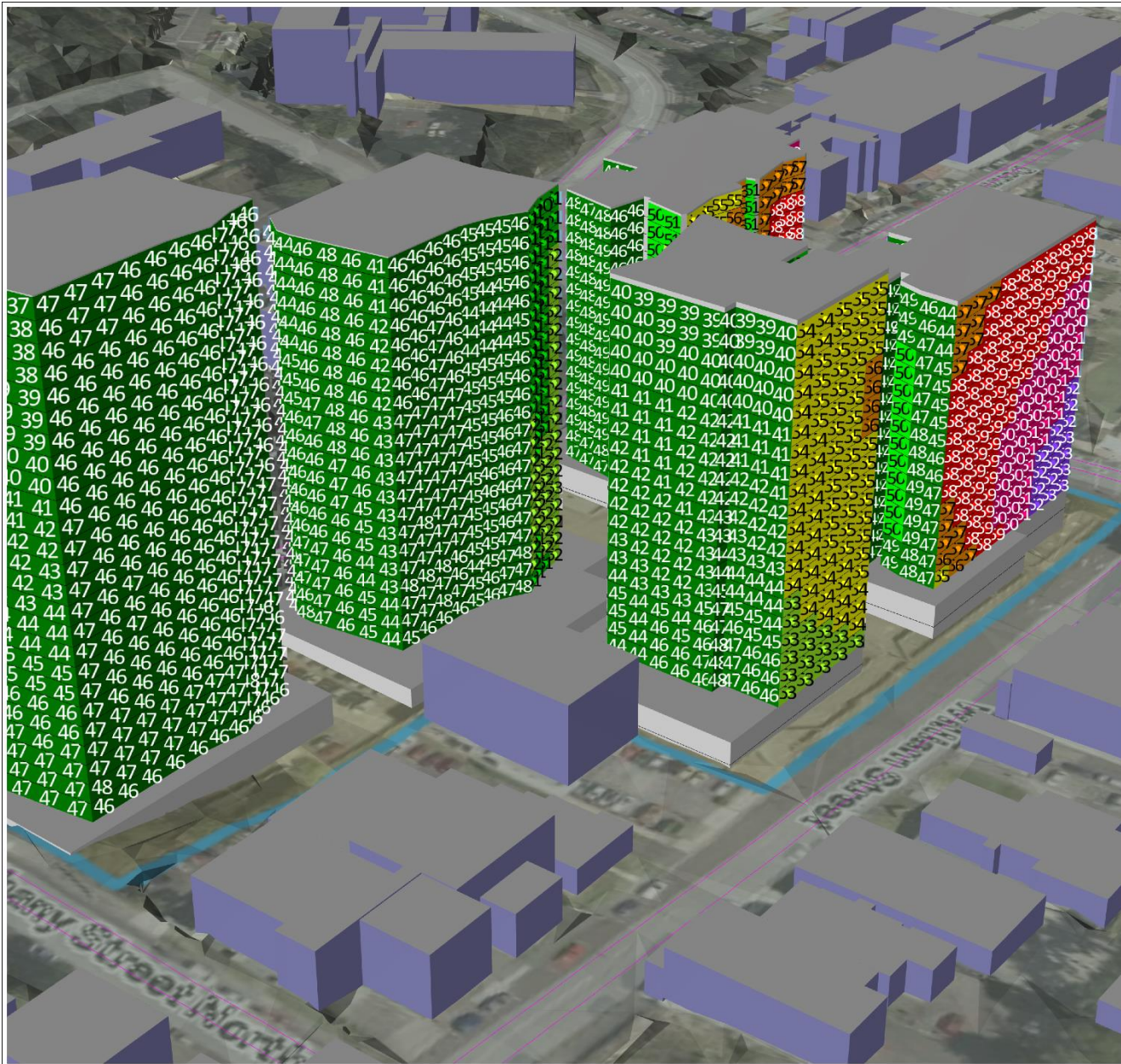
Day time (7am-10pm)

Prepared by: WY
Date: 13/05/2025

Noise Level

L_{eq}
in dB(A)





136-148 Donnison Street Gosford

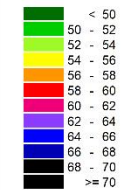
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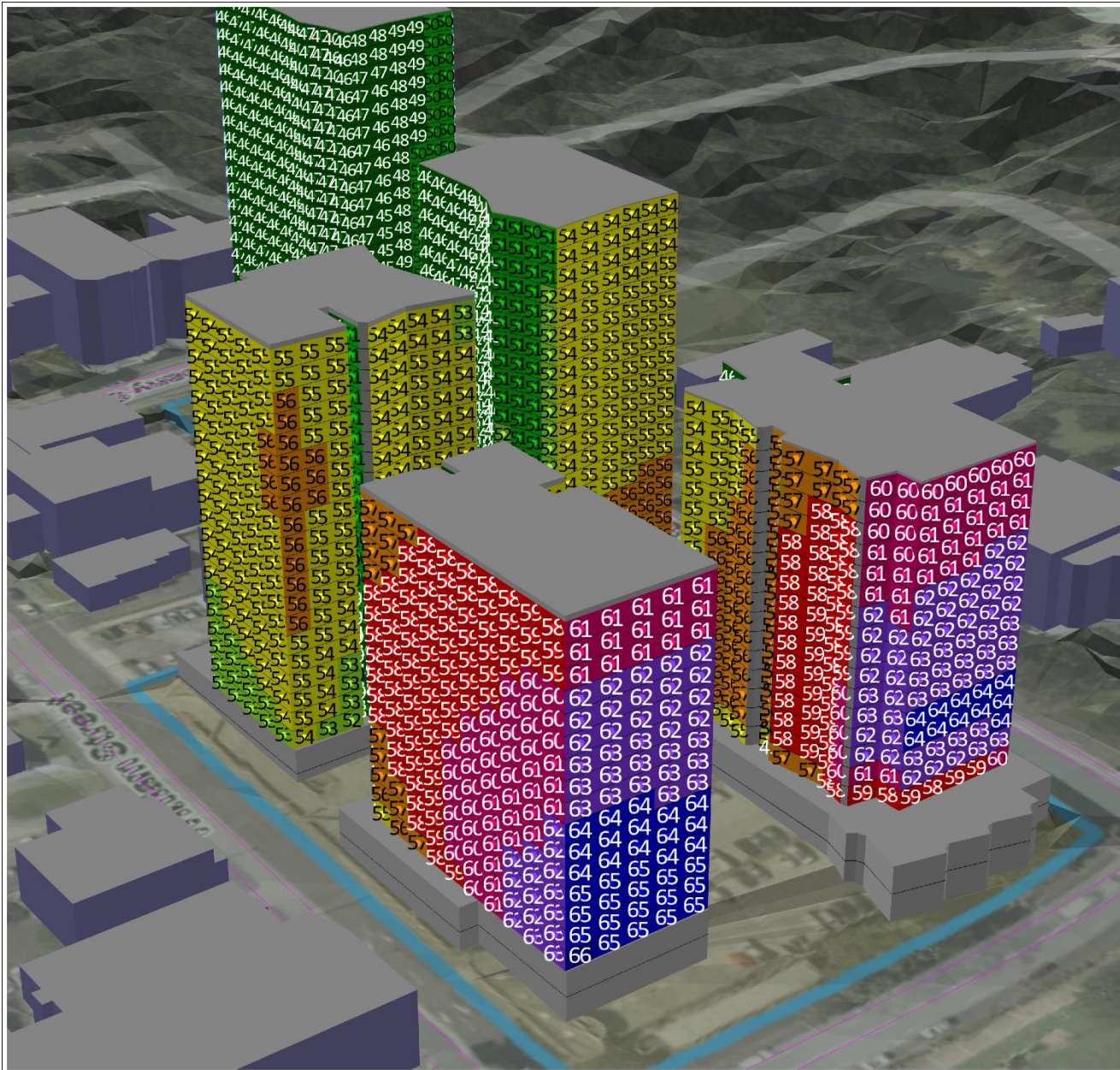
Day time (7am-10pm)

Prepared by: WY
Date: 13/05/2025

Noise Level

Leq
in dB(A)





136-148 Donnison Street Gosford

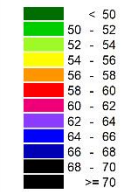
Traffic Noise Prediction

Day time (7am-10pm)

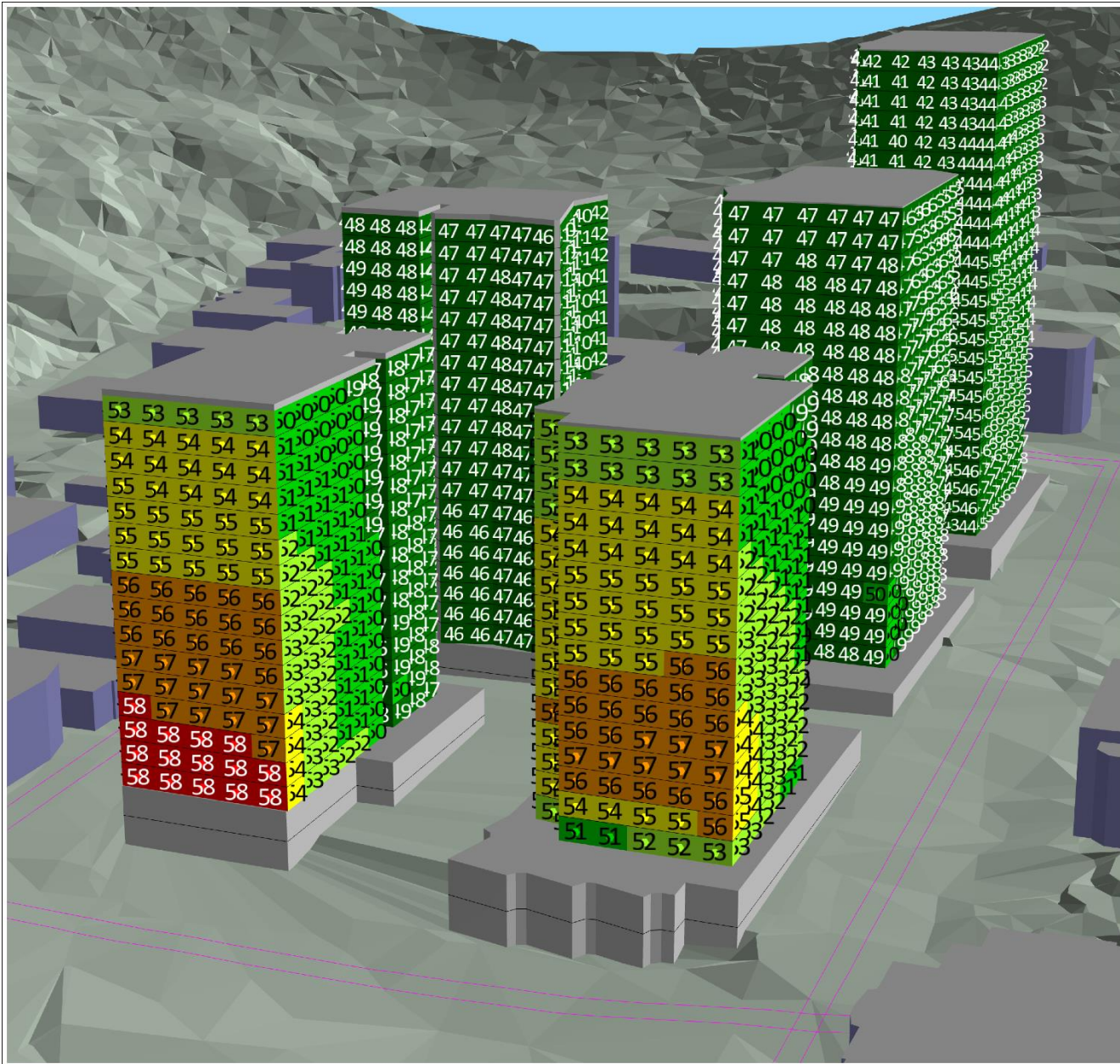
Prepared by: WY
Date: 13/05/2025

Noise Level

Leq
in dB(A)



C.2 NIGHT TIME TRAFFIC NOISE LEVELS



136-148 Donnison Street Gosford

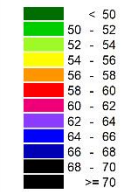
Traffic Noise Prediction

Night time (10pm-7am)

Prepared by: WY
Date: 13/05/2025

Noise Level

Leq
in dB(A)





136-148 Donnison Street Gosford

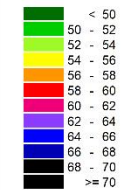
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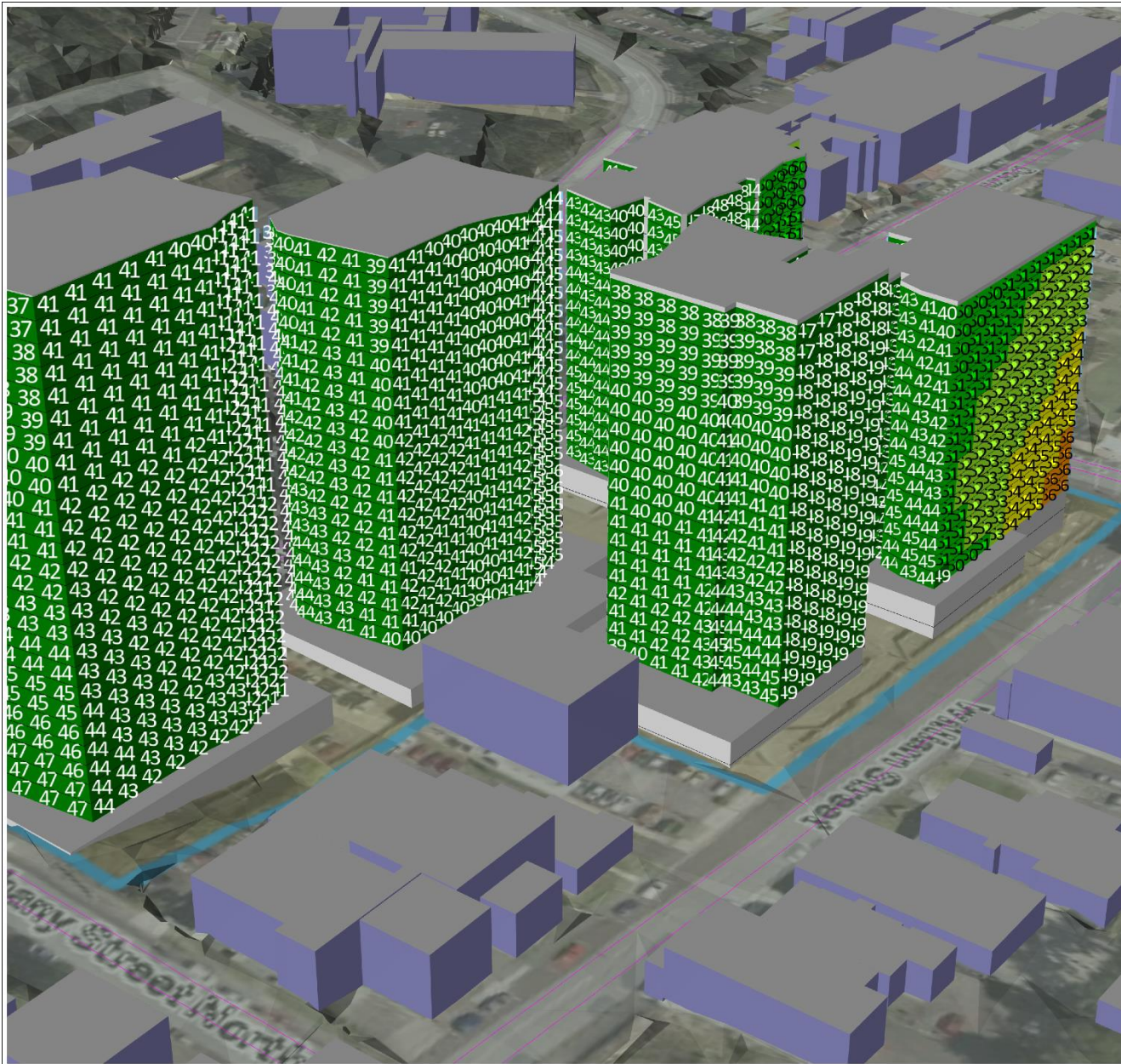
Night time (10pm-7am)

Prepared by: WY
Date: 13/05/2025

Noise Level

Leq
in dB(A)





136-148 Donnison Street Gosford

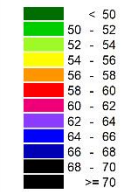
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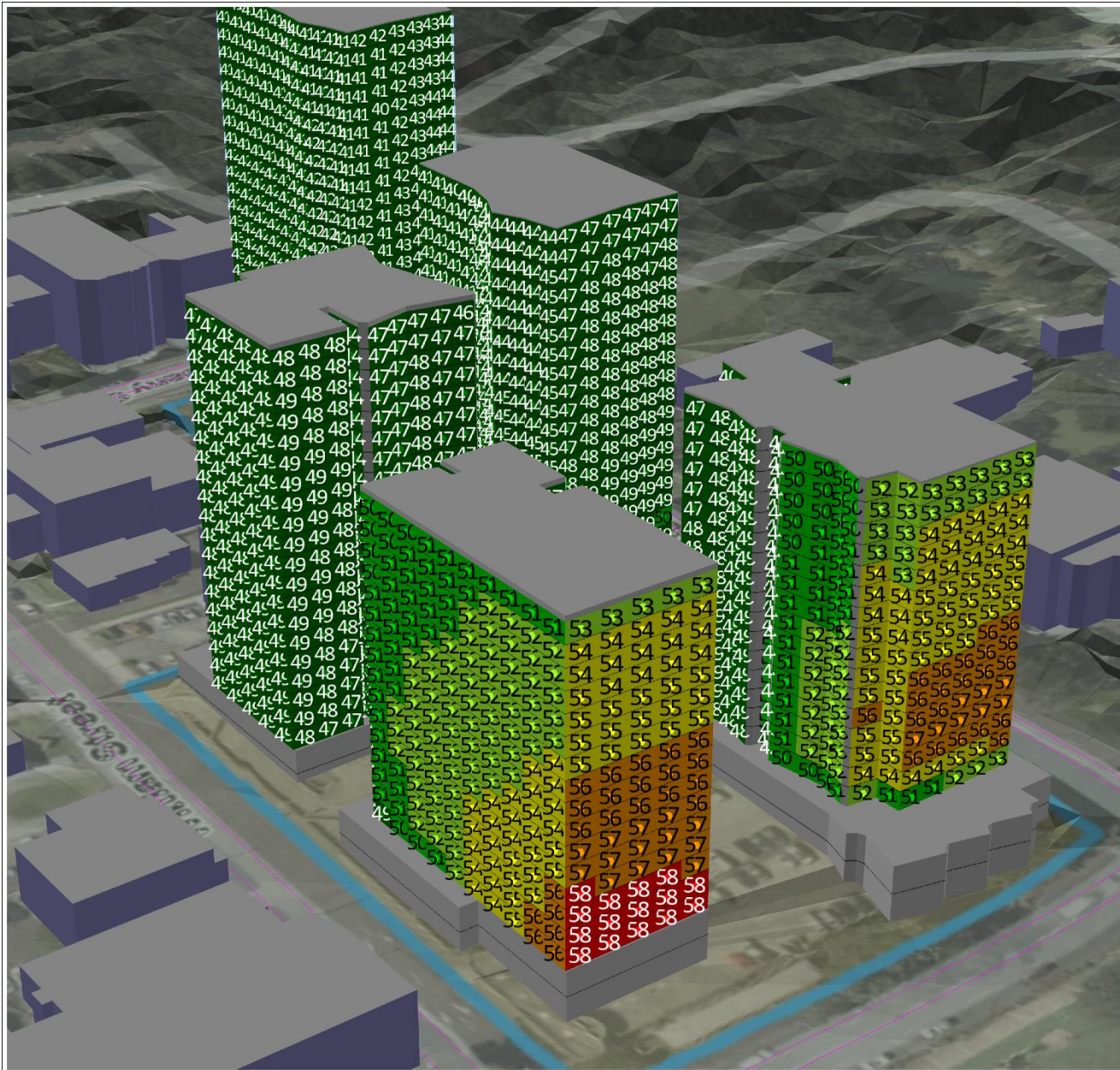
Night time (10pm-7am)

Prepared by: WY
Date: 13/05/2025

Noise Level

Leq
in dB(A)





136-148 Donnison Street Gosford

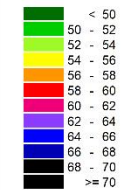
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Night time (10pm-7am)

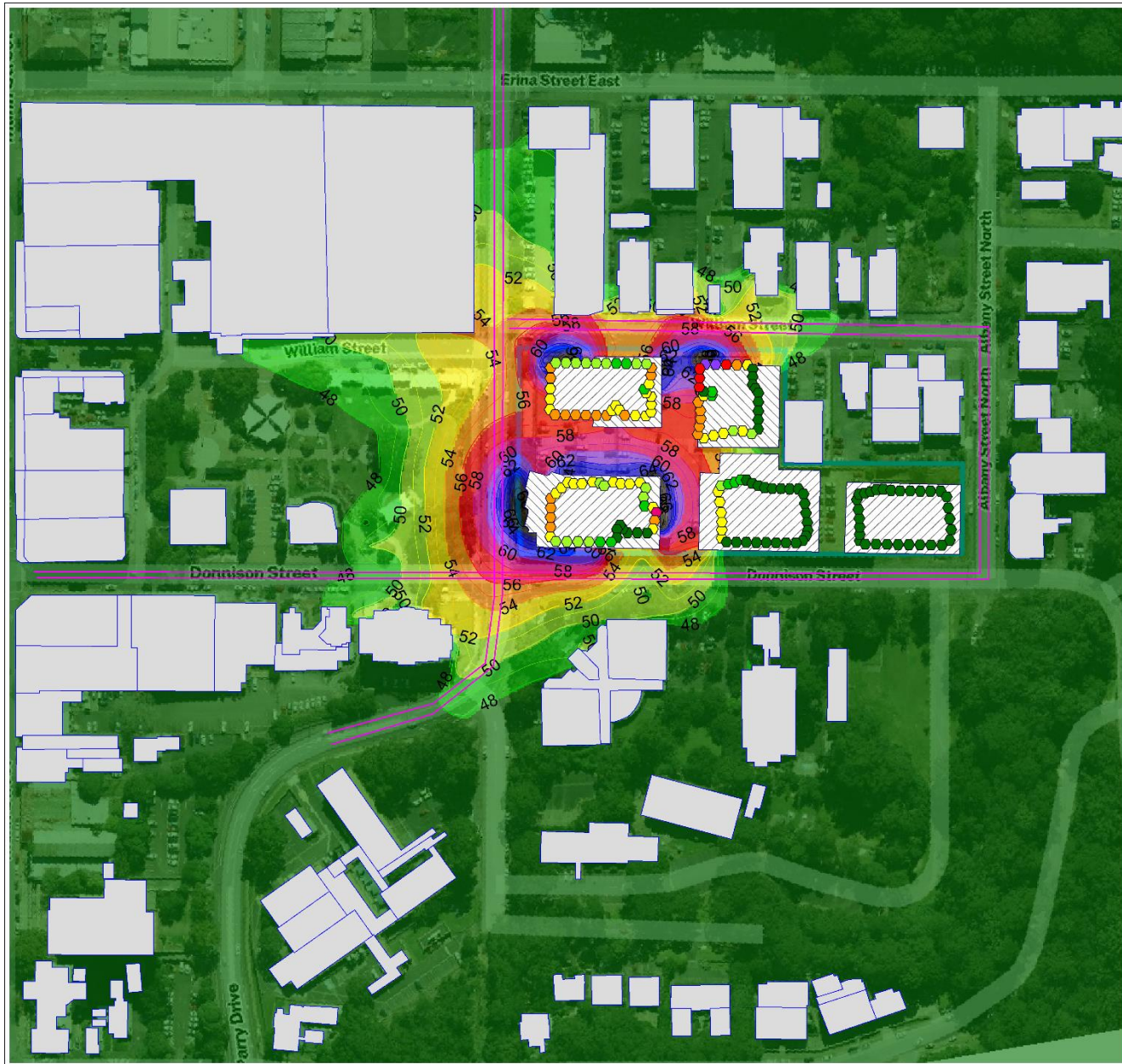
Prepared by: WY
Date: 13/05/2025

Noise Level

Leq
in dB(A)



C.3 OPERATIONAL NOISE EMISSIONS



136-148 Donnison Street Gosford

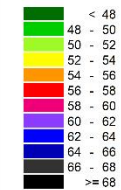
Operational Noise Prediction

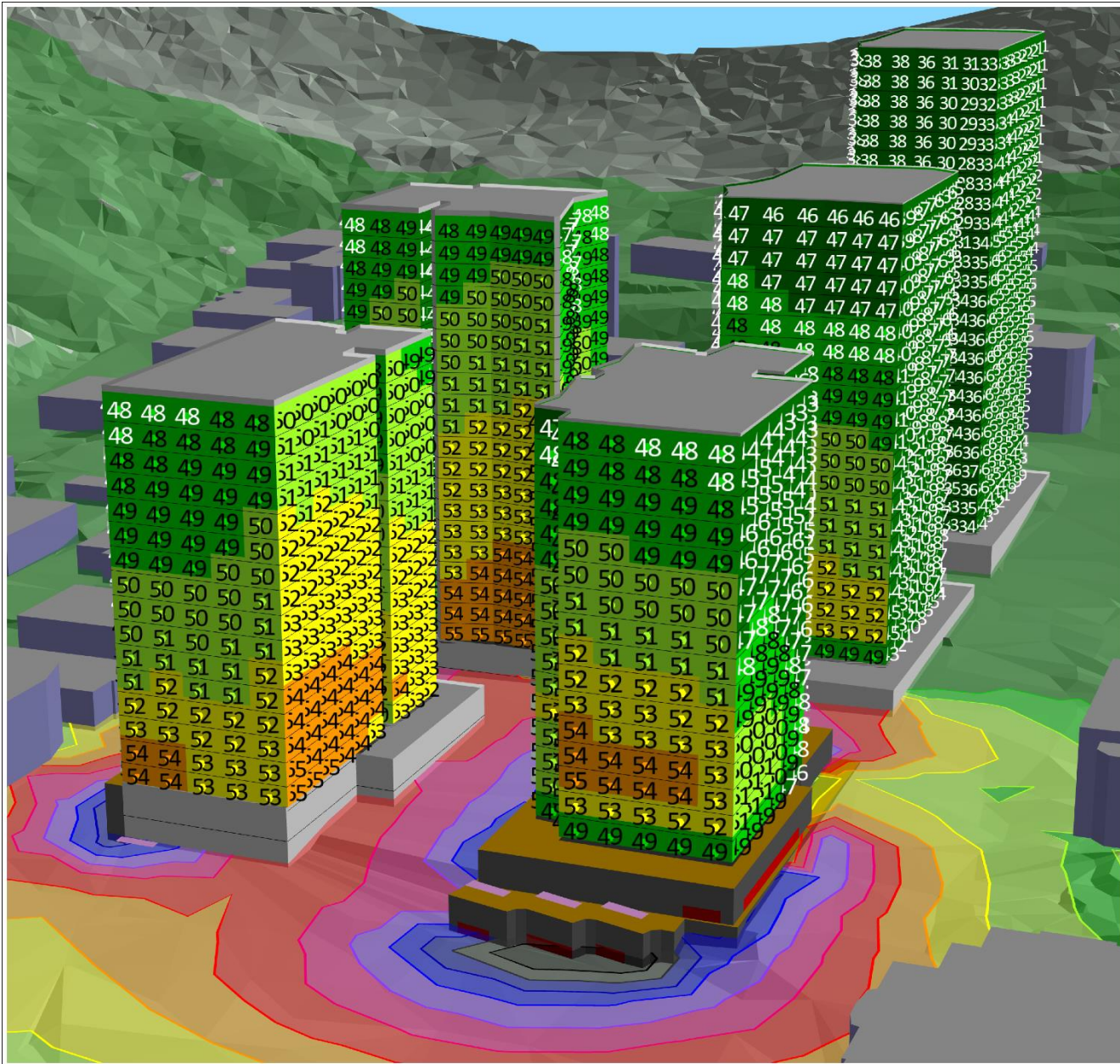
External Patron Noise

Prepared by: WY
Date: 29/05/2025

Noise Level

L_{eq}
in dB(A)





136-148 Donnison Street Gosford

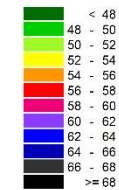
Operational Noise Prediction

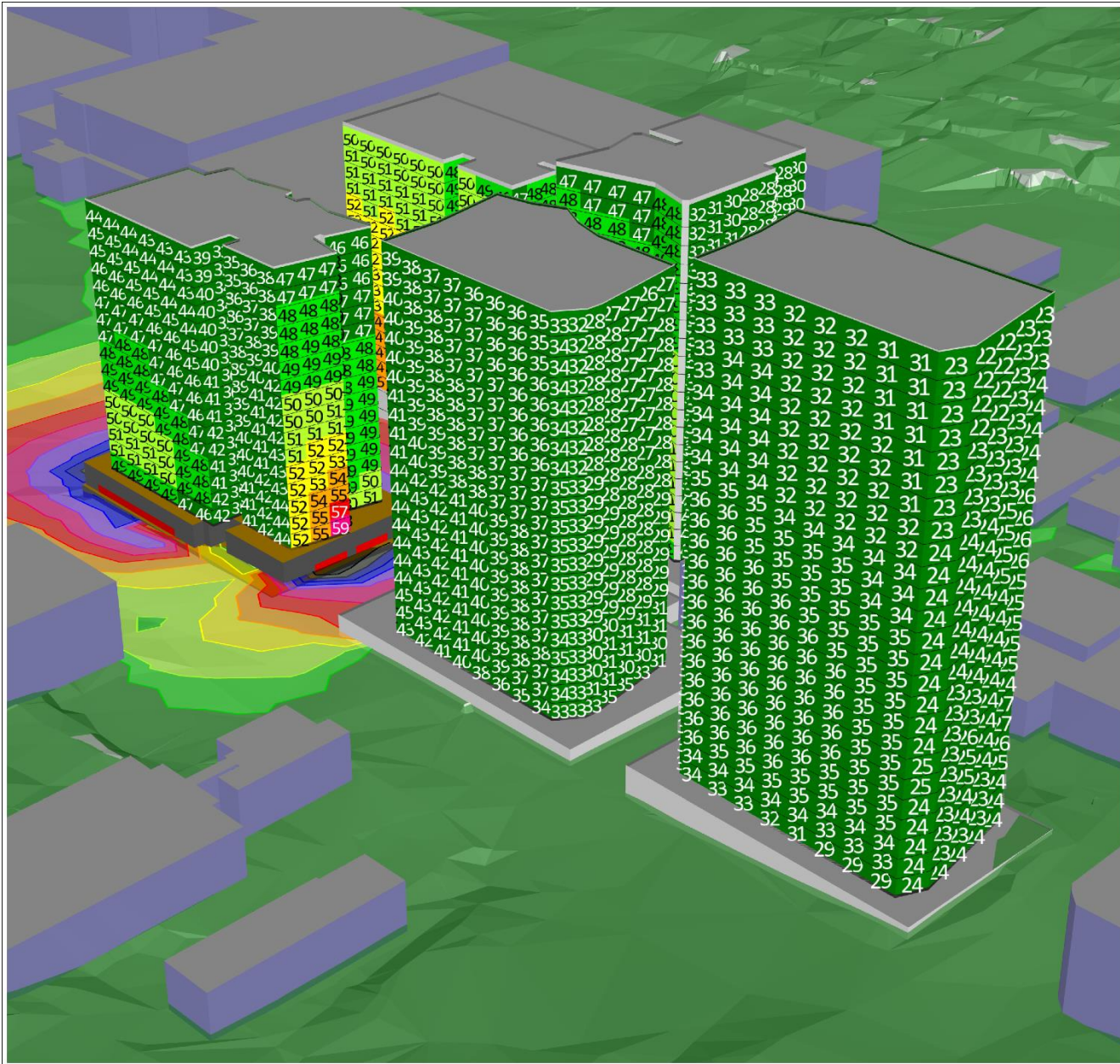
External Patron Noise

Prepared by: WY
Date: 29/05/2025

Noise Level

Leq
in dB(A)





136-148 Donnison Street Gosford

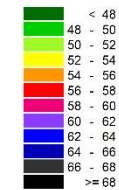
Operational Noise Prediction

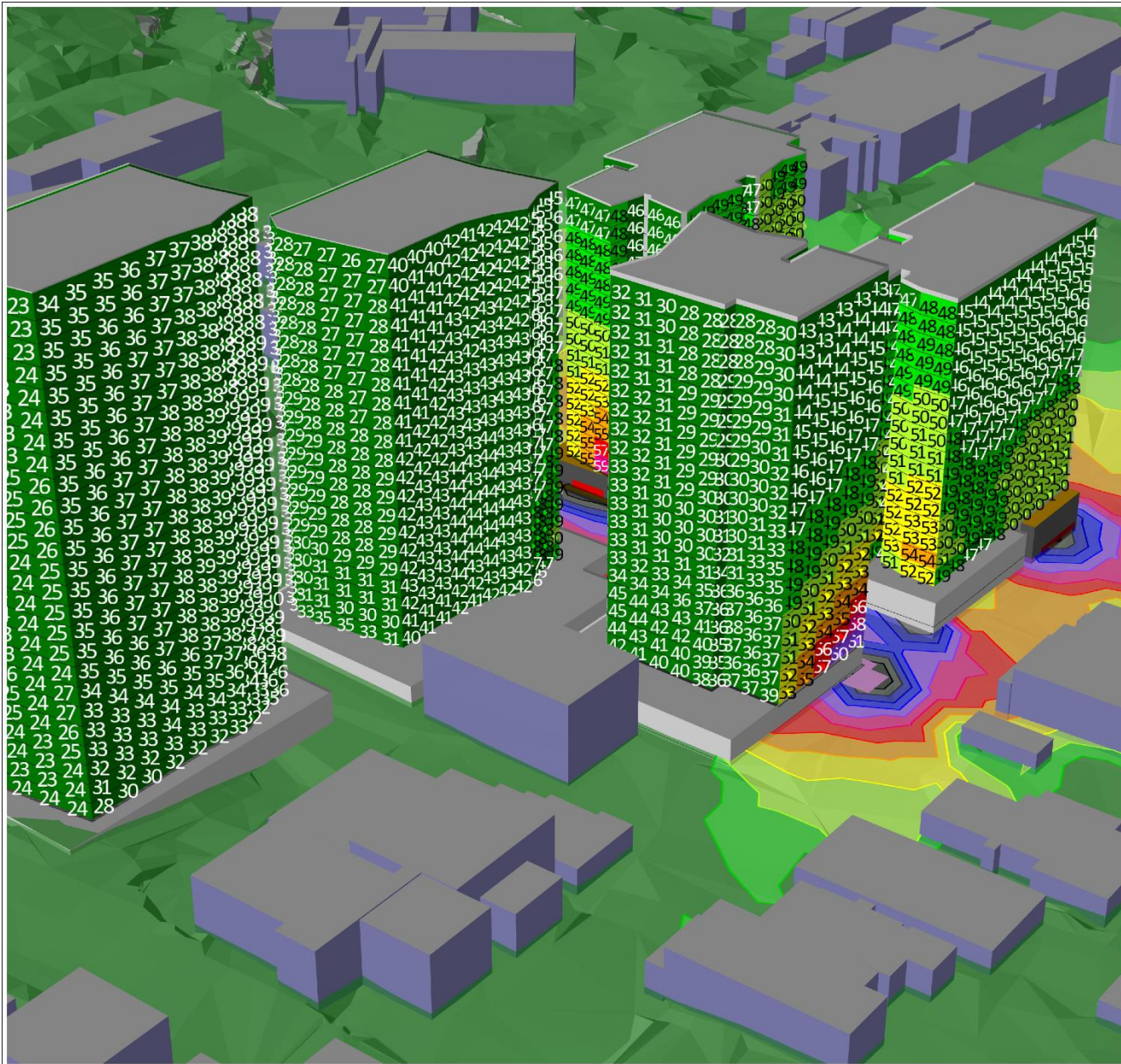
External Patron Noise

Prepared by: WY
Date: 29/05/2025

Noise Level

Leq
in dB(A)





136-148 Donnison Street Gosford

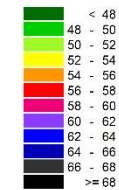
Operational Noise Prediction

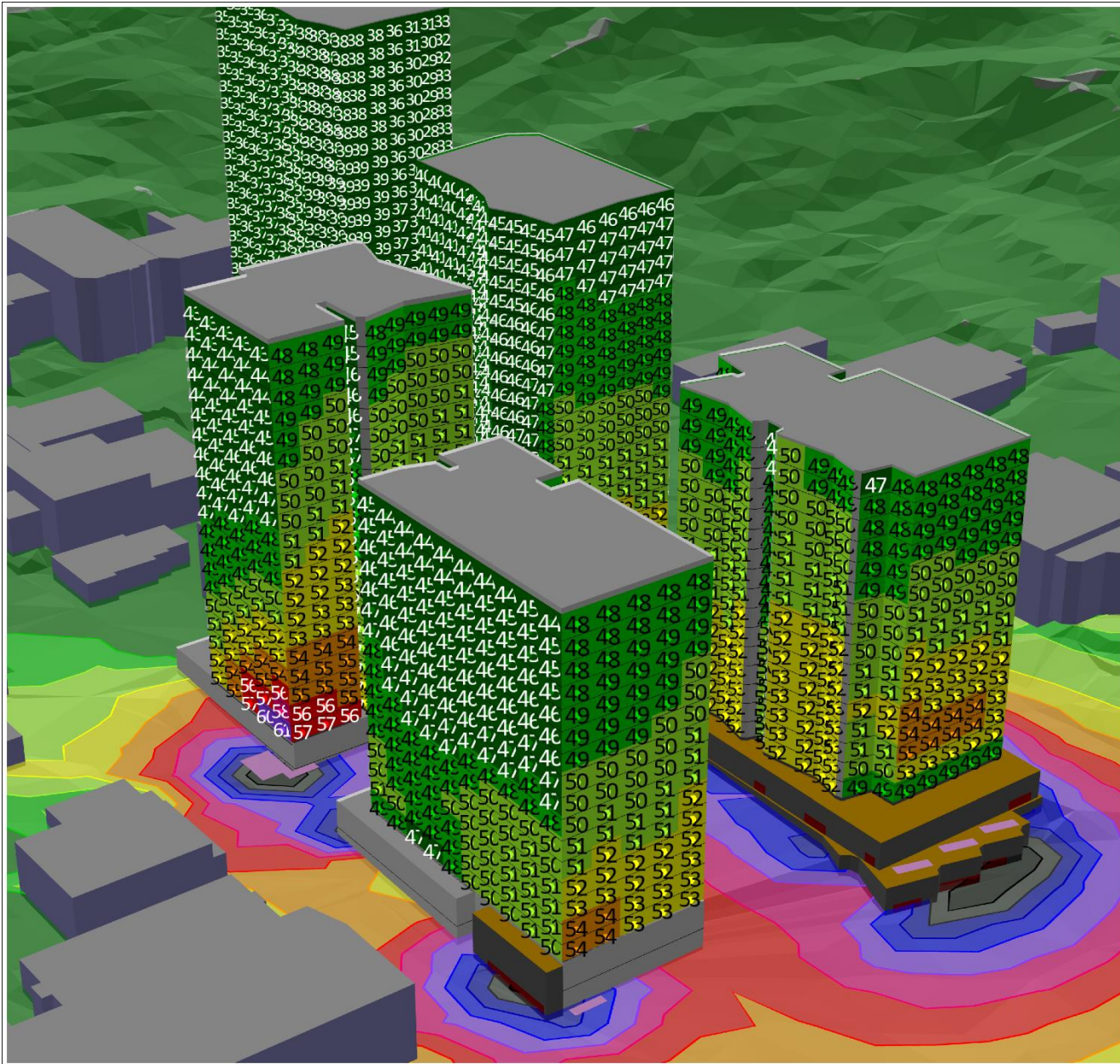
External Patron Noise

Prepared by: WY
Date: 29/05/2025

Noise Level

Leq
in dB(A)





136-148 Donnison Street Gosford

Operational Noise Prediction

External Patron Noise

Prepared by: WY
Date: 29/05/2025

Noise Level

L_{eq}
in dB(A)

