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Marrickville Timberyards

SSDA Acoustic Assessment

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1 INTRODUCTION

This acoustic assessment has been prepared on behalf of Varsity Assets Management Pty Ltd (Developer) on behalf of RTL Investments 2 Pty Ltd as trustee for RTL Marrickville Property Trust ('RTL Co.') (**the Applicant**) to support a State Significant Development Application (SSDA) for the proposed *Timberyards* development. The SSDA (SSD-76927247) seeks consent for a diverse rental housing precinct comprising build-to-rent (BTR), co-living and affordable housing. The precinct development comprises seven buildings ranging from eight to thirteen storeys, with open space that includes a pocket park, through site links and communal open spaces. Specifically, consent is sought for the following:

- Site preparation (including remediation), demolition and bulk excavation for basement parking;
- Residential accommodation (shop top housing, residential flat buildings and mixed use buildings) that includes BTR, co-living and affordable housing;
- Retail premises on the ground floor within the MU1 zoned land and extending up to 25m into the R4 zoned land;
- Publicly accessible recreation area (pocket park) and through site links;
- Neighborhood shop (within the R4 zoned land);
- Associated landscaping and public domain works; and
- Augmentation of, and connection to, existing utilities as required.

A detailed description of the proposal is provided in the Environmental Impact assessment (EIS) by Ethos Urban. The development is declared State Significant by virtue of being a BTR development on land in Greater Sydney with an Estimated Development Cost (EDC) of greater than $50 million, with the tenanted component representing greater than 60% of the EDC (Schedule 1, *State Environmental Planning Policy (Planning Systems) 2021*).

1.1 PROJECT VISION

RTL Co. aim to deliver Sydney's premier neo-industrial residential neighbourhood - a global benchmark for imaginative urbanism. The Timberyards aims to seamlessly integrate diverse residential offerings into the distinctive character of Marrickville, fostering a sense of pride among residents and the local community. The project will deliver a wide range of rental living solutions, complemented by recreation spaces and local retail, all underpinned by Connection to Country and environmentally sustainable design principles.

This assessment is based on the architectural drawings Revision I-WIP dated 27/10/2024 provided by Turner Studio.

2 ACOUSTIC IMPLICATIONS FOR DESIGN

An acoustic investigation has been carried out and the following potential acoustic issues relating to the proposed development summarised below:

- Aircraft and traffic noise intrusion to the proposed dwellings.
- Noise emissions from mechanical plant servicing the site.
- Noise emissions from potential future non-residential occupancies.
- Noise emissions from the loading dock servicing the site.
- Construction noise and vibration impacts for receivers around the project site.

3 SEARS REQUIREMENTS

The Planning Secretary's Environmental Assessment Requirements (SSD-76927247) listed the following acoustic issues:

13. 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. The noise assessment must also consider: ○ *Australian Standard AS2021-2015 - Acoustics - Aircraft Noise Intrusion-Building Siting and Construction* ○ Marrickville Development Control Plan 2011, Part 9.47 Schedule 1, *Victoria Rd Precinct Noise Policy*. ○ Inner west Council *Good Neighbour Policy*.	• Noise and Vibration Impact Assessment

"Input to SEARs- State Significant Development" provided by Department of Planning, Housing and Infrastructure with ref: HMS ID 7564 added the following point:

5. Aircraft Noise Assessment

The property is located within the 25-30 Australian Noise Exposure Forecast (2039) Contour (ANEF). The Consent Authority is required to take into consideration the guidelines provided in Australian Standard AS2021-2015-Acoustics-Aircraft noise intrusion- Building Siting and Construction (AS2021-2015) regarding noise reduction for residential purposes where the ANEF exceeds 20. Under the provisions of IWLEP2022, the Consent Authority must be satisfied that the development will meet the interior noise levels specified in Australian Standard AS2021-2015.

The development would need to be noise attenuated in accordance with Australian Standard AS2021-2015-Acoustics-Aircraft Noise Intrusion-Building-Siting and Construction. This matter is required to be addressed with any application lodged for the site. In addition, a suitable qualified Acoustic Consultant is to carry out an assessment of the proposal and prepare an Acoustic Report based on the requirements of AS2021-2015 which should accompany any application lodged for the proposal.

This matter is to complement the requirements noted under item 12 of the draft SEARs.

6. Implementation of the Victoria Road Precinct Noise Policy

The developer should describe how they will implement the Victoria Rd Precinct Noise Policy 9.47.15 Schedule 1. This includes ensuring that occupants of buildings are informed about noise from existing live music and entertainment venues, including Noise Information Packs to be provided to any potential purchaser as part of Contract of Sale and that all Contracts of Sale are to include that specifies that the prospective of purchaser has read and acknowledge the Noise Information Pack.

The policy and protection of the pre-existing live music and entertainment venues is complemented by Council's Good Neighbour Policy. If new creative spaces are provided in the development, implementation of the Noise Policy will assist in integrating new cultural production activities as part of the creative character of the area and development.

This matter is to complement the requirements noted under Item 12 of the draft SEARs.

4 REFERENCED DOCUMENTS

4.1 BACKGROUND INFORMATION USED

The assessment is based on architectural drawings prepared by Turner Studio (Revision I-WIP dated 27/10/2024).

4.2 GUIDELINES

The following planning instruments and guidelines have been used in this assessment:

- Planning Secretary's Environmental Assessment Requirements with Application Number SSD-76927247.
- Inner West Council Response: SSD-76927247- The Timberyards by RTL Co (ref: External/2024/0020).
- Inner West Local Environmental Plan 2022, Clause 6.8- Development in areas subject to aircraft noise.
- Marrickville Development Control Plan (**DCP**) 2011, Part 9.47 Schedule 1, *Victoria Rd Precinct Noise Policy*.
- Marrickville Development Control Plan (**DCP**) 2011, Part 2.6 – Acoustic and Visual Privacy.
- Australian Standard AS2021:2015 Acoustics–Aircraft Noise Intrusion–Building Siting and Construction.(**AS2021:2015**)
- Australian and New Zealand AS/NZS 3671:1989 (**AS3671:1989)** *Acoustics - Road traffic noise intrusion - Building siting and construction*, and
- Australian and New Zealand AS/NZS 2107:2016 (**AS2107:2016)** *Recommended design sound levels and reverberation times for building interiors*.
- NSW Environment Protection Authority (**EPA**) *Noise Policy for Industry* (**NPI**) 2017.
- Inner West Council *Good Neighbour Policy*
- NSW DECC Interim Construction Noise Guideline (**ICNG**) 2009.
- German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures*.
- NSW Department of Environment and Conservation *Assessing Vibration: A Technical Guideline* (Feb 2006).

5 SITE DESCRIPTION

The site is known as the 'Timberyards', located in Marrickville within the Inner West Local Government Area (LGA). The site comprises 39 lots with legal identification listed in the table below, and has a total area of 22,770m2 or, for the purpose of calculation of floor space, an area of 22,564m2 (excluding the SP2-zoned Victoria Road widening land, which is within the site boundary). The site is located within Precinct 47: Victoria Road in the *Marrickville Development Control Plan 2011* (MDCP 2011). The site is primarily contained in the Timber Yards sub-precinct of Precinct 47, with the lots fronting Victoria Road falling within the Victoria Road Corridor sub-precinct.

The site is approximately 800m walking distance to the newly opened Sydenham Metro Station, with 7-minute travel time to the Sydney CBD.

The site currently comprises primarily industrial and light industrial uses, with residential dwellings to a minor portion of the site on Farr Street (western boundary) and Victoria Road (eastern boundary). The site also has frontage to Sydenham Road to the south and Mitchell Street to the north (and encompassing a small lane off Mitchell Street). An aerial map is provided at **Figure 1** below.

Lot/DP	Property Address	Lot/DP	Property Address	Lot/DP	Property Address
1/724487	119A Sydenham Rd	1/572829	35 Farr St	3/252507	19 Farr St
1/972534	121 Sydenham Rd	12/4590	14 Mitchell St	4/252507	21 Farr St
B/439802	129 Sydenham Rd	13/4590	10 Mitchell St	5/252507	23 Farr St
A/439802	131 Sydenham Rd	14/4590	8 Mitchell St	6/252507	25 Farr St
D/377270	133 Sydenham Rd	15/4590	183 Victoria Rd	7/252507	27 Farr St
1/700223	135 Sydenham Rd	16/4590	4 Mitchell St	8/252507	29 Farr St
B/343286	7 Farr St	17/4590	2 Mitchell St	9/252507	31 Farr St
A/304426	9 Farr St	3/4590	165 Victoria Rd	1/583801	33 Farr St
A/304426	11 Farr St	2/4590	167 Victoria Rd	C/301985	175 Victoria Rd
1/78883	13 Farr St	1/4590	169 Victoria Rd	D/301985	183 Victoria Rd
1/252507	15 Farr St	A/301985	171 Victoria Rd	E/301985	175 Victoria Rd
2/252507	17 Farr St	B/301985	173 Victoria Rd	A/166330	183 Victoria Rd
345/587262	191 Victoria Rd	1/315293	183 Victoria Rd	20/667441	183 Victoria Rd

Figure 1 Aerial site map

5.1 PROJECT DESCRIPTION

This DA seeks development consent for:

- Site preparation works, including.
    - Demolition.
    - Earthworks.
    - Piling.
- Construction of seven separate residential buildings reaching up to 13 storeys.
- Basement level carpark.
- Site landscaping, utility and services augmentation (as required).

5.2 NOISE SOURCES IDENTIFIED

The primary significant noise sources with the potential to impact the site are:

- Aircraft noise from an Aircraft flyover.as specified in Australian Standard AS2021:2015
- Traffic noise along Victoria Road and Sydenham Road.

Reference to the Australian Standard AS2021:2015 indicates that the site is within an ANEF zone of 25-30 and NSW Planning Portal identifies the project site to be zoned both R4 residential and MU1 Mixed Use as per Figure 2 below.

Figure 2 – Project Zoning (sourced from NSW Planning Portal Spatial Viewer)

5.3 NOISE RECEIVERS IDENTIFIED

The nearest noise receivers around the site include:

- **R1**: - Residential Receiver 1 – Multi storey Wicks Place Residential Development located southeast of the site adjacent Victoria Road.
- **R2**: - Public Recreation 1 – Public Recreation receiver adjacent Victoria Road.
- **R3**: - Residential Receiver 2 –Residential Receivers (1-2 storey) located southwest of the project site adjacent Sydenham Road.
- **R4**: - Commercial Receiver 1 – Commercial Receivers located northwest of the project site adjacent to Farr Street.
- **R5**: - Commercial Receiver 2 – Commercial Receivers located northeast of the project site adjacent Mitchell Street.
- **R6** – Commercial Receiver 3- Commercial /Industrial building located at 199-203 Victoria Road
- **R7**: - Residential Receiver 3 – Residential properties at 111-119 Sydenham Rd.

A site map, measurement locations and surrounding receivers are presented in Figure 3.

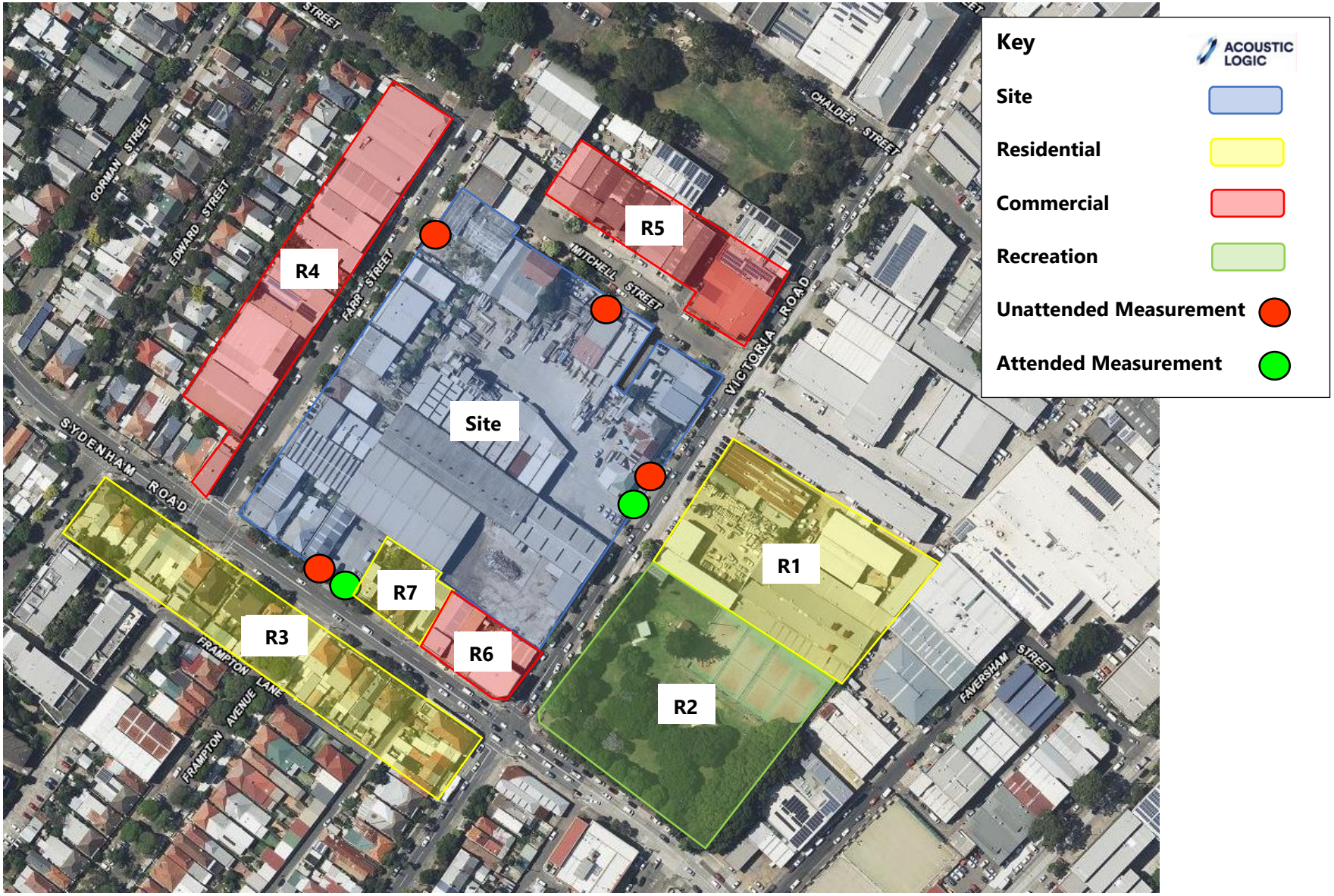


Figure 3 – Project Site and Nearest Surrounding Receivers (Source: NSW SIX Maps)

6 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, slow response for aircraft noise and fast response for other noise source related to this project.
L_{90}	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*	For noise emissions assessment - the period from 7 am to 6 pm (Monday to Saturday) and 8 am to 6 pm (Sundays and public holidays). For transportation noise - the period from 7 am to 10 pm
Evening*	Refers to the period from 6 pm to 10 pm.
Night*	The period from 10 pm to 7 am (Monday to Saturday), and 10 pm to 8 am (Sundays and public holidays). For transportation noise - the period from 10 pm to 7am
Project Trigger Level	Target receiver noise levels for a particular noise-generating facility.
Assessment Background Level (ABL)	A-weighted background noise level representative of a single period. (Calculated in accordance with NPI unless noted otherwise)
Rating Background Level (RBL)	The overall, single-figure A-weighted background level representing each assessment period (day/evening/night) over the whole monitoring period. (Calculated in accordance with NPI unless noted otherwise)

* Unless nominated otherwise.

7 GUIDELINES AND ASSESSMENT CRITERIA

7.1 INNER WEST LOCAL ENVIRONMENTAL PLAN 2022

6.8 Development in areas subject to aircraft noise

(3) In deciding whether to grant development consent to development to which this clause applies, the consent authority must—

(a) consider whether the development will result in an increase in the number of dwellings or people affected by aircraft noise, and

(b) consider the location of the development in relation to the criteria set out in Table 2.1 (Building Site Acceptability Based on ANEF Zones) in AS 2021:2015, and

(c) be satisfied the development will meet the indoor design sound levels shown in Table 3.3 (Indoor Design Sound Levels for Determination of Aircraft Noise Reduction) in AS 2021:2015.

7.2 MARRICKVILLE DCP ASSESSMENT CRITERIA

7.2.1 Part 2.6 – Acoustic and Visual Privacy

The following has been taken from the Marrickville Council Development Control Plan (DCP) 2011 Part 2.6 – Acoustic and Visual Privacy.

C1 Aircraft Noise

i. New development on land within an ANEF affected area must be designed and constructed in accordance with the relevant Australian Standard and other guidelines issued by relevant agencies and authorities; and

ii. The introduction of acoustic measures to reduce aircraft noise must not unacceptably detract from the streetscape value of individual buildings.

C2 General Acoustic Privacy

i. New dwellings close to high noise sources such as busy roads, rail lines and industry must be designed to locate habitable rooms and private open spaces away from noise sources or protect those areas with appropriate noise shielding devices. Development for the purpose of child care centres, educational establishments, hospitals, places of public worship and residential accommodation close to busy roads and rail lines must also comply with the relevant Australian Standards and State Environmental Planning Policies (SEPPs);

Refer to Australian Standard AS 3671 Roads traffic noise intrusion, Australian Standard AS 2107- Acoustics – recommended design sound levels and reverberation times for building interiors and requirements under State Environmental Planning Policy (Infrastructure) 2007 SEPP (Infrastructure SEPP). AS 3671 sets out guidelines to determine the acceptability of indoor and outdoor spaces for specific activities in the presence of road traffic noise, and the extent of noise reduction or type of construction that might be needed to make such spaces acceptable. It also sets out guidelines to determine the acoustical adequacy of existing buildings near routes carrying more than 2,000 vehicles per day.
AS 2107 recommends design sound levels and reverberation times for different areas of occupancy in various categories of buildings. It also specifies methods of measuring the ambient sound level reverberation time. This Standard is intended for

use in assessing the acoustic performance of buildings and building services. It does not apply to the evaluation of occupancy noise.

Certain development adjacent to major roadways and railway infrastructure must have regard to TI SEPP Clause 2.99 (rail) and 2.119 (traffic). As the subject site is not impacted by railways or roads with a daily traffic volume of 20,000 vehicles or more, these SEPP clauses do not apply to the subject development.

7.2.2 Part 9.47.15 Schedule 1 – *Victoria Rd Precinct Noise Policy*

The following has been taken from the Marrickville Council Development Control Plan (DCP) 2011 Part 9.47 '*Victoria Rd Precinct Noise Policy*'

Objectives:

- *To ensure that all development in the precinct is designed to achieve an appropriate level of amenity for its occupants taking into consideration its land use.*
- *To ensure that all residential development satisfies key necessary design criteria relating to building siting, design, building materials and facilities.*
- *To ensure that development within the precinct complies with Australian Standard AS 2021:2015.*
- *To ensure that future residents within the precinct are appropriately informed about aircraft noise and existing/future live music and entertainment venues within the precinct.*
- *To protect the ongoing operation of Sydney Airport and minimise the potential for reverse impacts from development within the precinct*

Design Principles (DP) for Internal Noise - To ensure that all buildings are designed with materials and treatments that appropriately insulate against aircraft noise to achieve internal noise levels in accordance with AS 2021.

The requirements of Marrickville Council Development Control Plan (DCP) 2011 Part 9.47 '*Victoria Rd Precinct Noise Policy*' have been covered by the Marrickville Council Development Control Plan (DCP) 2011 Part 2.6 – Acoustic and Visual Privacy.

7.2.3 Part 9.47.16.1 – *Live Music and Entertainment Noise and its context within the Victoria Road Precinct*

1. *Live Music and Entertainment Noise: Creative and cultural vibrancy are essential to what makes the Inner West a great place to live, visit and do business in. Living in the inner city comes with a range of benefits including being part of a diverse group of people; access to great places to eat and shop; and ready access to entertainment venues. The inner city provides residents; employees and visitors with the potential to live a rich cultural life by being in close proximity to a range of people and activities. Many of these activities are noise generating: e.g. from traffic noise generated by people in motorised vehicles travelling to; from; and within the precinct; and noise generated from people simply having conversations to groups of people participating in larger cultural events. The invitation of higher density inner city living comes with a need to balance potentially competing cultural pursuits by being tolerant of a wide variety of people and activities.*

2. *Victoria Road Precinct Context: The Victoria Road Precinct is home to a mix of existing creative industries, including live music and entertainment venues. Venues include the Red Rattler (6 Faversham Street, Marrickville); Marrickville Bowling & Recreation Club (91 Sydenham Road, Marrickville); and The Factory Theatre (105 Victoria Road, Marrickville). These venues pre-date the rezoning of the precinct which permitted a wider range of uses such as multi- level residential developments. Enjoyment of the precinct's live music and entertainment venues is a key attractor to living in the area. New buildings in the Victoria Road Precinct are designed to have a high level of*

noise attenuation. If you live in close proximity to a live music and entertainment venue, you can expect reasonable levels of noise during the legal hours of operation of those venues. When required, keeping windows and doors closed will enable the noise attenuation measures designed into buildings in the Victoria Road Precinct to assist in mitigating against live music and entertainment noise.

The satisfy the various noise-related requirements, long term noise monitoring around the project site has been undertaken at the site to characterise the existing noise environment. Acoustically-rated building envelopes and ventilation systems are proposed to address the impacts identified to ensure a suitable level of acoustic amenity for the future occupants.

7.3 INTERNAL AIRCRAFT NOISE CRITERIA

7.3.1 Australian Standard 2021:2015

The acceptability of Aircraft Noise exposure is assessed using AS2021:2015 *Acoustics–Aircraft noise intrusion–Building siting and construction.*

The standard sets criteria for allowable levels of aircraft noise exposure depending on the proposed land use for the site being assessed.

The acceptability of a site in terms of aircraft noise exposure is assessed using the Australian Noise Exposure Forecast System (ANEF). Three basic parameters influence perception of aircraft noise: the frequency of aircraft movements overhead, the noise level and duration of individual aircraft movements, and the time of the day in which they occur. ANEF was developed to provide a rating system that reflects actual human response to these factors so that the noise exposure of a particular location can be readily assessed.

The project site is located between the ANEF 25 and ANEF 30 contour, based on the Sydney Airport 2039. The SEARS implies that it is recognised that the site is impacted by aircraft noise and an acceptable level of amenity will be achieved if the internal noise levels comply with the levels recommended in AS 2021.

The standard recommends the following internal design noise levels for any proposed residential developments within the ANEF contour.

Building Type and Activity	Indoor design aircraft sound level, $L_{A,max}$ dB(A)
Houses, home units, flats, caravan parks	
Sleeping areas, dedicated lounges	50
Other habitable spaces	55
Bathrooms, toilets, laundries	60
Commercial	
Shop	75

Figure 4 – Recommended Maximum Internal Aircraft Noise Levels (Table 3.3 – AS2021-2015)

7.4 INTERNAL NOISE CRITERIA FROM OTHER NOISE SOURCE

7.4.1 AS/NZS 3671:1989

Although officially repealed, Australian Standard AS/NZS 3671:1989 *'Acoustics—Road traffic noise intrusion—Building siting and construction'* provides the following guidance in relation to traffic noise:

- Internal noise levels should be determined in accordance with AS/NZS 2107:2016 'Acoustics – Recommended design sound levels and reverberation times for building interiors.'
- A suitable descriptor should be adopted relevant to the use of the development. As AS2107:2016 adopts the L_{eq} descriptor, Acoustic Logic shall also use this descriptor.
- AS3671 does not specifically recommend a time interval. On this basis, Acoustic Logic have adopted the interval used by the EPA Road Noise Policy for main/arterial roads, that being:
    - Day – 7am to 10pm (15 hour); and
    - Night – 10pm to 7am (9 hour).
- Acoustic Logic have applied the daytime interval to the living/dining areas and the night time interval to the bedrooms of residential spaces.

Internal noise levels have been selected in accordance with AS 2107:2016, as presented in the below section.

7.4.2 AS/NZS 2107:2016

AS2107:2016 recommends design criteria for internal spaces within various types of spaces/occupancies to ensure a healthy, comfortable and productive environment for the occupant. For the basis of this assessment, AL will use the upper range of the "suburban" receiver category (notwithstanding that at least some of the proposed dwellings would meet the less stringent "inner city and entertainment area" category).

Table 1 – Recommended Design Sound Level

Space /Activity Type	Recommended Design Internal Noise Level dB(A)$L_{eq\ (Period)}$
Sleeping Areas (Night-time)	35
Living Areas	40
Common Rooms	40 to 45

7.5 ADOPTED PROJECT CRITERIA

The following tables provide the criteria adopted for this assessment based on the applicable instruments and guidelines. Although the retail spaces are identified on the drawings there is indication as to the type of occupancies. Hence two types have been assumed in our façade intrusion analysis - a shop space or an open office space. The shop space is an acoustically hard surfaced space, whereas an open office space is assumed to have carpet flooring or a suspended acoustic tile ceiling or both.

Table 2 – Internal Noise Assessment Criteria (Aircraft Noise)

Room	Indoor Design Sound Level from Aircraft Flyover dB(A)
Bedrooms/Studio	$50dB(A)_{(Slow, Lmax)}$
Living Spaces	$55dB(A)_{(Slow, Lmax)}$
Bathrooms, toilets, laundries	$60dB(A)_{(Slow, Lmax)}$
Common Room	$55dB(A)_{(Slow, Lmax)}$
Commercial Areas (Open Office spaces)	$65dB(A)_{(Slow, Lmax)}$
Retail Areas (Shops, supermarkets, show rooms)	$75dB(A)_{(Slow, Lmax)}$

Table 3 – Noise Assessment Criteria (Traffic Noise)

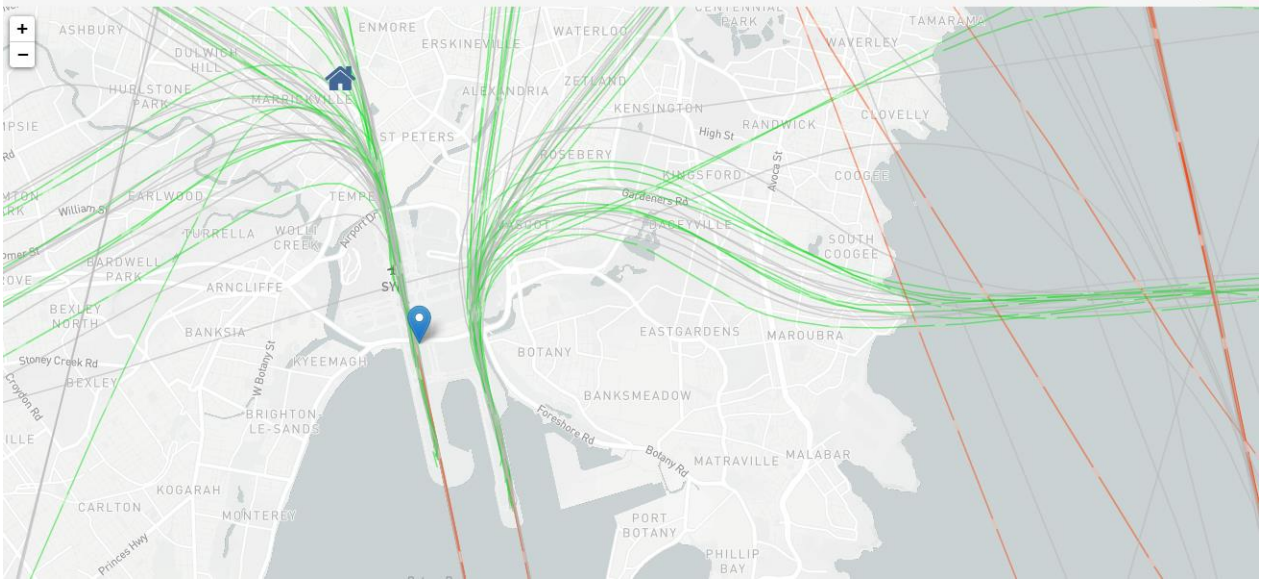
Space/Activity Type	Internal Traffic Noise Criteria dB(A)$L_{eq(period)}$
Bedroom/Studio	$35dB(A)L_{eq(9hour)}$
Living Room	$40dB(A)L_{eq(15hour)}$
Common Room	$45dB(A)L_{eq(when\ in\ use)}$

8 EXTERNAL NOISE INTRUSION ASSESSMENT

8.1 AIRCRAFT NOISE LEVELS

8.1.1 Site Location

Flight Paths as displayed on Marrickville Council Website



For departures to the north there are two flight paths for larger aircraft that pass on either side of the site. The is a third departure path that is used by smaller turboprop aircraft, which carry out a hook turn over Marrickville. The noise level at the site from this manoeuvre is in the order of 66dB(A), which is significantly less than the larger aircraft on the two main flightpaths.

The landing flight path in the vicinity of the development is in straight line directly onto the main runway.

ANEF-2039:

The two main aircraft flight paths are overlayed over the ANEF charts. Following the procedure in AS2021 the flight paths cross the lobes in the ANEF contours.

8.1.2 Design External Aircraft Noise Levels

Aircraft noise levels generated at the site were determined using AS 2021-2015. The Standard provides tables to determine site aircraft flyover noise level for aircraft landing and taking off.

Table 4 below summarises the predicted average maximum noise level at the site generated by the typical loudest typical aircraft movement(s) using the methodology in AS 2021-2015. The location of the runways was obtained from the Airservices Australia ANEF 2039 chart.

The site elevation using Google Earth was determined to be approximatyely equivalent RL to the runway so no height correction was required. For the top of the asumed 36m tall buildings the difference in takeoff noise levels due to elevation was negligible (in the order of 0.1-0.2dB).

Table 4 – AS 2021-2015 Worst Case Design External Aircraft Flyover Noise Levels

Aircraft Type	Runway	Landing/Take Off	Distance to Flight Path (m)	Average Maximum Flyover Noise Level dB(A) $L_{max,S}$
A330	Main North/South	Take Off	*DT - 6443* *DS -238*	86
A330	Main North/South	Take Off	*DT - 6419* *DS -270*	85
B777	Main North/South	Landing	*DL- 2643* *DS -342*	77

This noise level(s) in the table above will be used to predict the resultant internal noise levels and the building envelope constructions required to achieve the maximum levels recommended in the standard.

8.2 MEASURED EXTERNAL NOISE LEVELS

Long term noise monitors have been setup along all boundaries of the project site to record the existing industrial, traffic, music and entertainment activities noise around the project site. Detailed measurement results are summarised below.

8.2.1 Noise Measurements

Existing noise levels from the transportation sources have been measured using the methodology outlined in Appendix B3 of the RNP. Appendix A provides the measurement details, the data obtained, and the calculated noise descriptors. These are summarised in the Table below.

Note: the live music and entertainment noise around the project site have been included in the results below.

Table 5 – Noise Measurement Summary

Noise Source	Descriptor/Time Period	Noise Level (dB(A))
Traffic on Victoria Road	$L_{eq,15hr}$	68
	$L_{eq,9hr}$	65
Traffic on Sydenham Road	$L_{eq,15hr}$	70
	$L_{eq,9hr}$	68
Traffic on Farr Street	$L_{eq,15hr}$	62
	$L_{eq,9hr}$	55
Traffic on Mitchell Street	$L_{eq,15hr}$	64
	$L_{eq,9hr}$	58

8.2.2 Calculation of External Noise Levels

The measured noise levels have been used as a basis for predicting façade-incident 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.
- CoRTN programme has been used to carryout traffic noise predictions to the façades of the project buildings based on the measurement results above.

8.3 COMPLYING MITIGATION

Assessment of façade requirements to achieve the recommended indoor noise levels has been undertaken. Indicative dimensions of rooms, window openings and floor areas have been used.

The following treatment is indicated for the proposed development to comply with the nominated assessment criteria.

8.3.1 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.

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.

Table 6 – Complying Glazing Constructions

Building	External Noise Level* dB(A) L_{max}	Space	Façade Glazing Area	Complying IGU system	R_w Rating	Colourback Glazing with Backpan
All	Up to 86	Studio / Co Living / Bedroom	2/3 of the façade	8mm float / 12mm air gap / 13.52mm Lam	41	6mm float / 12mm air gap / 6mm float with backpan constructed by 1.2mm Zincalum with 90mm cavity filled by 100mm thick, 80kg/m^3 Rockwool.
			1/3 of the Façade	6mm float / 12mm air gap / 13.52mm Lam	40	
		Living Room	All Façade	6mm float / 12mm air gap / 13.52mm Lam	40	
		Bathroom /Toilet/Ensuite	All Facade	6/12/10	36	
		Common Area	All Façade	6/12/10	36	
		Retail Shop	All Façade	6/12/10	36	
		Communal	All facade	6mm float / 12mm air gap / 13.52mm Lam	40	

*Note: Some of project buildings are partially screened from typical flight path detailed in ANEF 2039 and the external aircraft noise is expected to be lower.

8.3.2 External Walls

External walls constructed from concrete/masonry elements will not require any acoustic upgrading to achieve the acoustic requirements. External walls constructed of lightweight materials will require acoustic upgrading, adopting the following constructions.

Table 7 – Complying External Light Weight Wall Construction

Building	Level	Space	External Lining	Internal Lining	Studwork
All	All Levels	All Spaces	2 x 9mm Fibre Cement Cladding	1 x 13mm Plasterboard	Min. 90mm Stud with 75mm Thick (14kg/m^3) Glasswool Insulation

In the event that any penetrations are required through the external skin, these should be treated to control leakage and noise ingress via these points.

8.3.3 External Roof and Ceiling Construction

Any external roof constructed from concrete will not require any acoustic upgrading to achieve the acoustic requirements. A complying construction for the lightweight roof to the Building D communal rooms is as follows:

Table 8 – External Light Weight Roof Construction

Building	Space	Internal Lining	Truss System	External Lining
D	Level 6 Communal Rooms	1 x 16mm Plasterboard	Minimum of 250mm truss with 75mm thick 14kg/m^3 glasswool insulation in cavity	0.5mm thick sheet metal

In the event that any penetrations are required through the external skin, the should be acoustically treated.

8.3.4 Mechanical Ventilation

AS2021:2015 requires the installation of a ventilation or air conditioning system where aircraft noise exposure exceeds ANEF 20. As internal noise levels cannot be achieved with windows open it is required that an in all areas to have alternative outside air supply system or air conditioning be installed. These should be in accordance with AS1668.2 requirements.

Any mechanical ventilation system that is installed should be acoustically designed such that the acoustic performance of the recommended constructions is not reduced by any duct or pipe penetrating the wall/ceiling/roof. Noise emitted to the property boundaries by any ventilation system shall comply with noise emission requirements.

9 NOISE EMISSIONS

9.1 CRITERIA

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

- Marrickville Development Control Plan (**DCP**) 2011.
- NSW Environment Protection Authority (**EPA**) *Noise Policy for Industry* (**NPI**) 2017.
- Marrickville Development Control Plan 2011, Part 9.47 Schedule 1, Victoria Rd Precinct Noise Policy and Inner west Council Good Neighbour Policy

9.1.1 Marrickville DCP

No numerical noise emission criteria have been outlined in the Marrickville DCP. Hence, NPI guidelines will be adopted.

9.1.2 NSW EPA Noise Policy for Industry (NPI) 2017

Criteria to assess noise emissions from the operation of the proposed development have been developed using the NPI. This policy was primarily developed to assess noise impacts from industrial development, but can also be adapted to assess other types of development such as commercial buildings and air conditioning plant.

For each receiver type:

- Receivers have been grouped into "catchments". These are receivers that have been assessed as having similar characteristics (receiver type and ambient noise level). These are shown in Figure 3.

- For each catchment, representative noise assessment trigger levels have been determined based on NPI guidelines. The trigger levels have been adopted in this assessment as criteria. These will be used to indicate whether additional mitigation is needed to manage noise emissions.

- For each catchment, noise emissions have been assessed to the most impacted receiver. This means that impacts at all other receivers within that catchment will be less. Compliance at the most impacted receiver will therefore also result in compliance at all other receivers within the catchment.

For residential receivers, three criteria are assessed:

- Intrusive assessment– that is, how audible is the emitted noise compared to ambient, background noise). Criteria are determined relative to the measured rating background noise level.

- Amenity assessment – that is, how loud is the absolute level of industrial noise, including cumulative noise from other industrial sources. The NPI nominates appropriate amenity noise levels depending on the receiver type and prevailing noise environment/zoning.

- Maximum Noise assessment – will high-level, short-term noise events cause adversely impact sleep at night? Trigger levels are determined relative to the measured night rating background, and assessed outside rooms where sleep is likely to occur.

For residential receivers, noise emissions are assessed against the trigger levels to determine the likely extent of impacts. The lower of the relevant intrusiveness and amenity trigger levels are adopted. Noise emissions lower than the trigger levels indicate there is no adverse impact. A maximum noise level assessment is separately undertaken if night time emissions occur.

For other receiver types, only an "amenity" assessment is required.

Appendix A – Ambient Noise Monitoring summarises the results of ambient noise monitoring. APPENDIX B provides the derivation of NPI trigger levels for each of the receivers. These are summarised in the following table.

9.1.2.1 Summarised NPI Noise Emission Criteria

Table 9 – 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
R1 - Residential	Day	56	61	**58**	N/A
	Evening	52	57	**48**	N/A
	Night	43	48	**43**	48 L_{eq} **58 L_{max}**
R3 & R7 - Residential	Day	56	61	**58**	N/A
	Evening	53	58	**48**	N/A
	Night	39	44	**43**	44 L_{eq} **54 L_{max}**
R2 – Active Recreation	When in use	N/A	-	**53**	N/A
R4, R5 & R6 - Commercial			-	**63**	

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

9.1.3 Inner West Good Neighbour Policy

Inner West "Good Neighbour Policy" V2 states:

Ongoing sound and activity management that cannot be resolved through the processes outlined above will need to be assessed against the Protection of the Environment Operations Act 1997, Environmental Planning and Assessment Act 1979 or any other relevant legislation. This may involve the customer completing a noise diary or the deployment of Council staff or a consultant to conduct noise monitoring at the premises at an undisclosed time and date.

To satisfy requirements of Good Neighbour Policy, the following noise criteria are recommended:

- NSW EPA Noise Policy for Industry. The noise emission criteria have been summarised in Section 9.3.
- Entertainment noise from any proposed licences venues is no longer subject to development conditions (Vibrancy Reforms). They should however typically demonstrate they are able to operate without causing disturbance, based on the historical NSW Office of Liquor & Gaming criteria detailed below:

  The L_{A10} noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8k Hz inclusive) by more than 5 dB between 07:00 am and 12:00 midnight at the boundary of any affected residence.*

The L_{A10} noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8k Hz inclusive) between 12:00 midnight and 07:00 am at the boundary of any affected residence.*

Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12:00 midnight and 07:00 am.

* *L_{A10} is the average maximum deflection of the noise emission from the licensed premises.*

As detailed operational information is not available at this stage, it is recommended that a separate acoustic assessment should be carried out for the future licensed premises and music activities to ensure that the overall noise emissions satisfy the above requirements.

It is noted that the building envelope of the proposed dwellings will be required to be upgraded to control other environmental noise sources. In accordance with the Vibrancy Reform guidelines, this will assist in mitigating noise impacts to occupancies within the proposed development adjacent to any entertainment.

9.2 PRELIMINARY NOISE EMISSION ASSESSMENT

9.2.1 Mechanical Plant Noise

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 (on and off the site) and commercial receivers should comply with the requirements of Section 9.1.2.1.

9.2.2 Loading Dock

The following preliminary controls have been recommended for the loading dock area.

- Trucks are to limit the use of airbrakes as much as possible, particularly when entering the site.
- Trucks are to limit idling where feasible during loading and unloading (unless required).
- Where feasible, the loading dock shall only be used in the daytime and evening periods (7:00am-10:00pm).

9.2.3 Basement Car Park

The following development controls should be incorporated to ensure that noise emissions from the basement car park comply with the nominated criteria.

- The car park pavement shall be smooth and level to ensure minimal vertical displacement and potential for noise generated by wheel to concrete impacts.
- Concrete to have a broom finish or similar, to precent tyre squeal.
- Traffic signs should be implemented to controls vehicle speeds to 10km/h.
- No speed humps are to be installed within the car park.
- Grate and any cover plates are to be fixed flush and tight. Any cover plates are to be smooth and level with the slab.

10 CONSTRUCTION NOISE AND VIBRATION MANAGEMENT

Construction noise emissions could be managed in accordance with the IGNG (generally), detailed Construction Noise and Vibration Management Plan will be prepared post conditions of consent being received and as part of CC by the appointed building contractor(s).

10.1 EPA INTERIM CONSTRUCTION NOISE GUIDELINE

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

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

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

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

Table 10 – Construction Noise Management Levels

Management Level $L_{Aeq,(15min)}$*	**How to Apply**
Noise affected Management Level ("**NML**") RBL + 10dB for Standard Hours: Monday – Friday 7am to 6pm Saturday 8am-1pm	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
Noise affected Management Level ("**NML**") RBL + 5 dB for Outside of recommended Standard Hours: Saturday 7am to 8am and 1pm to 6pm	The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.
Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur.

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

The recommended construction hours are as follows:

- **Monday to Saturday – 7:00am to 6:00pm.** (Note: Saturday 7am-8am and 1pm-6pm are outside of Standard Hours, no high noise affected work for this period)
- **No work on Sundays or public holidays**

10.1.1 Other Land Uses

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

Table 11 – Construction Noise Management Levels – Non-Residential Uses

Land Use	**Management Level, $L_{Aeq\ (15min)}$ (applies for times when properties are being used)**
Commercial and Retail Outlets	70 (external)*
Active Recreation Areas	65 (external)

*** Noise levels apply at the most affected occupied point of the premises when it is occupied.**

10.1.2 Receiver Noise Management Levels

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

Table 12 – Noise Management Levels for Most Impacted Receivers

Location/Receiver	RBL dB(A) L_{90}	NML dB(A) L_{eq} (Standard Hours/ Outside Hours)	HANML dB(A) L_{eq}
R1	56	66/61	75
R2	-	65	-
R3 & R7	56	66/61	75
R4	-	70	-
R5	-	70	-
R6	-	70	-

10.2 CONSTRUCTION NOISE PREDICTION

For this project, the most significant sources of noise or vibration generated during construction will be building demolition and excavation works. Note that as the depth of excavation will be limited, the anticipated duration of the excavation phase will be shorter than typical for this project.

The following table presents a general assessment of noise levels for typical construction equipment expected to be used during the construction of the proposal. A detailed assessment is recommended to be undertaken once the construction methodologies have been finalised.

Table 13 - Sound Power Levels of the Typical Equipment

Construction Stage	Equipment	Sound Power Level dB(A)
Early Works & Site Establishment	Mobile Crane / Crawler Crane	113
	CFA Piling Rig	112
	Excavator (20 Ton)	105
	Semi Rigid / Rigid Truck	106
	Skid Steer	107
	Dump Truck	110
	Concrete Pump	109
	Concrete Agitator	109
	Concrete Saw	118
	Jack Hammer	113
	Power Hand Tools	100
Main Works (Precinct 1-3)	Tower Crane / Mobile Crane	113
	Worker & Materials Hoist	100
	Semi Rigid / Rigid Truck	106
	Concrete Pump	109
	Concrete Agitator	109
	Jack Hammer	113
	Power Hand Tools	100
	Concrete Saw	118
	Welder	110

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

- Table A1 of Australian Standard 2436-2010.
- Data held by this office from other similar studies.
- Noise levels take into account correction factors (for tonality, intermittency where necessary).

10.3 NOISE PREDICTIONS

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

- The activity undertaken.
- The distance between the work site and the receiver. 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.
- It is recommended to install minimum 2m high solid fence equal to 18mm plywood along site boundaries to Farr St, Mitchell St, Victoria Rd and southern boundary.

Predicted noise levels are presented in the following tables. Predictions consider the expected noise reduction as a result of distance only.

To R1

Table 14 -Predicted Noise Level to R1

Receiver	Construction Stage	Equipment Used	Predicted Noise Levels dB(A)$L_{eq\ 15\ min}$	Comments
R1	Early Works & Site Establishment	Mobile Crane / Crawler Crane	61-80	Exceed HANML 75 dB(A) when work along Victoria Rd
		CFA Piling Rig	60-79	
		Excavator (20 Ton)	53-72	Lower than HANML 75 dB(A)
		Semi Rigid / Rigid Truck	54-73	
		Skid Steer	55-74	
		Dump Truck	58-77	Exceed HANML 75 dB(A) when work along Victoria Rd
		Concrete Pump	57-76	
		Concrete Agitator	57-76	
		Concrete Saw	66-85	
		Jack Hammer	61-80	
		Power Hand Tools	48-67	Lower than HANML 75 dB(A)
	Main Works (Precinct 1-3)	Tower Crane / Mobile Crane	61-80	Exceed HANML 75 dB(A) when work along Victoria Rd
		Worker & Materials Hoist	48-67	Lower than HANML 75 dB(A)
		Semi Rigid / Rigid Truck	54-73	
		Concrete Pump	57-76	Exceed HANML 75 dB(A) when work along Victoria Rd
		Concrete Agitator	57-76	
		Jack Hammer	61-80	
		Power Hand Tools	48-67	Lower than HANML 75 dB(A)
		Concrete Saw	66-85	Exceed HANML 75 dB(A) when work along Victoria Rd
		Welder	58-77	

To R2

Table 15 -Predicted Noise Level to R2

Receiver	Construction Stage	Equipment Used	Predicted Noise Levels dB(A)$L_{eq\ 15min}$	Comments
R2	Early Works & Site Establishment	Mobile Crane / Crawler Crane	51-70	Exceed NML 65 dB(A) when work along Victoria Rd
		CFA Piling Rig	50-69	
		Excavator (20 Ton)	43-62	Comply NML 65 dB(A)
		Semi Rigid / Rigid Truck	44-63	
		Skid Steer	45-64	
		Dump Truck	48-67	Exceed NML 65 dB(A) when work along Victoria Rd
		Concrete Pump	47-66	
		Concrete Agitator	47-66	
		Concrete Saw	56-75	
		Jack Hammer	51-70	
		Power Hand Tools	38-57	Comply NML 65 dB(A)
	Main Works (Precinct 1-3)	Tower Crane / Mobile Crane	51-70	Exceed NML 65 dB(A) when work along Victoria Rd
		Worker & Materials Hoist	38-57	Comply NML 65 dB(A)
		Semi Rigid / Rigid Truck	44-63	
		Concrete Pump	47-66	Exceed NML 65 dB(A) when work along Victoria Rd
		Concrete Agitator	47-66	
		Jack Hammer	51-70	
		Power Hand Tools	38-57	Comply NML 65 dB(A)
		Concrete Saw	56-75	Exceed NML 65 dB(A) when work along Victoria Rd
		Welder	48-67	

To R3

Table 16 -Predicted Noise Level to R3

Receiver	Construction Stage	Equipment Used	Predicted Noise Levels dB(A)$L_{eq\ 15\ min}$	Comments
R3	Early Works & Site Establishment	Mobile Crane / Crawler Crane	60-71	Exceed NML but lower than HANML 75 dB(A) when work is located close to southern boundary
		CFA Piling Rig	59-70	
		Excavator (20 Ton)	52-63	
		Semi Rigid / Rigid Truck	53-64	
		Skid Steer	54-65	
		Dump Truck	57-68	
		Concrete Pump	56-67	
		Concrete Agitator	56-67	
		Concrete Saw	65-76	
		Jack Hammer	60-71	
		Power Hand Tools	47-58	
	Main Works (Precinct 1-3)	Tower Crane / Mobile Crane	60-71	Exceed NML but lower than HANML 75 dB(A) when work is located close to southern boundary
		Worker & Materials Hoist	47-58	
		Semi Rigid / Rigid Truck	53-64	
		Concrete Pump	56-67	
		Concrete Agitator	56-67	
		Jack Hammer	60-71	
		Power Hand Tools	47-58	
		Concrete Saw	65-76	
		Welder	57-68	

To R4

Table 17 -Predicted Noise Level to R4

Receiver	Construction Stage	Equipment Used	Predicted Noise Levels dB(A)$L_{eq\ 15\ min}$	Comments
R4	Early Works & Site Establishment	Mobile Crane / Crawler Crane	56-68	Comply with the NML 70 dB(A) except concrete saw working close to Farr St
		CFA Piling Rig	55-67	
		Excavator (20 Ton)	48-60	
		Semi Rigid / Rigid Truck	49-61	
		Skid Steer	50-62	
		Dump Truck	53-65	
		Concrete Pump	52-64	
		Concrete Agitator	52-64	
		Concrete Saw	61-73	
		Jack Hammer	56-68	
		Power Hand Tools	43-55	
	Main Works (Precinct 1-3)	Tower Crane / Mobile Crane	56-68	Comply with the NML 70 dB(A) except concrete saw working close to Farr St
		Worker & Materials Hoist	43-55	
		Semi Rigid / Rigid Truck	49-61	
		Concrete Pump	52-64	
		Concrete Agitator	52-64	
		Jack Hammer	56-68	
		Power Hand Tools	43-55	
		Concrete Saw	61-73	
		Welder	53-65	

To R5

Table 18 -Predicted Noise Level to R5

Receiver	Construction Stage	Equipment Used	Predicted Noise Levels dB(A)$L_{eq\ 15\ min}$	Comments
R5	Early Works & Site Establishment	Mobile Crane / Crawler Crane	56-68	Comply with the NML 70 dB(A) except concrete saw working close to Mitchell St
		CFA Piling Rig	55-67	
		Excavator (20 Ton)	48-60	
		Semi Rigid / Rigid Truck	49-61	
		Skid Steer	50-62	
		Dump Truck	53-65	
		Concrete Pump	52-64	
		Concrete Agitator	52-64	
		Concrete Saw	61-73	
		Jack Hammer	56-68	
		Power Hand Tools	43-55	
	Main Works (Precinct 1-3)	Tower Crane / Mobile Crane	56-68	Comply with the NML 70 dB(A) except concrete saw working close to Mitchell St
		Worker & Materials Hoist	43-55	
		Semi Rigid / Rigid Truck	49-61	
		Concrete Pump	52-64	
		Concrete Agitator	52-64	
		Jack Hammer	56-68	
		Power Hand Tools	43-55	
		Concrete Saw	61-73	
		Welder	53-65	

To R6

Table 19 -Predicted Noise Level to R6

Receiver	Construction Stage	Equipment Used	Predicted Noise Levels dB(A)$L_{eq\ 15\ min}$	Comments
R6	Early Works & Site Establishment	Mobile Crane / Crawler Crane	57-89	Exceed the NML 70 dB(A) when equipment is close to the southern boundary
		CFA Piling Rig	56-88	
		Excavator (20 Ton)	79-81	
		Semi Rigid / Rigid Truck	50-82	
		Skid Steer	51-83	
		Dump Truck	54-86	
		Concrete Pump	53-85	
		Concrete Agitator	53-85	
		Concrete Saw	62-94	
		Jack Hammer	57-89	
		Power Hand Tools	44-76	
	Main Works (Precinct 1-3)	Tower Crane / Mobile Crane	57-89	Exceed the NML 70 dB(A) when equipment is close to the southern boundary
		Worker & Materials Hoist	44-76	
		Semi Rigid / Rigid Truck	50-82	
		Concrete Pump	53-85	
		Concrete Agitator	53-85	
		Jack Hammer	57-89	
		Power Hand Tools	44-76	
		Concrete Saw	62-94	
		Welder	54-86	

To R7 (111-119 Sydenham Rd)

Table 20 -Predicted Noise Level to R7 (111-119 Sydenham Rd)

Receiver	Construction Stage	Equipment Used	Predicted Noise Levels dB(A)$L_{eq\ 15\ min}$	Comments
R7 located at 111-119 Sydenham Rd	Early Works & Site Establishment	Mobile Crane / Crawler Crane	57-89	Exceed HANML 75 dB(A) when work is located close to the southern boundary
		CFA Piling Rig	56-88	
		Excavator (20 Ton)	79-81	
		Semi Rigid / Rigid Truck	50-82	
		Skid Steer	51-83	
		Dump Truck	54-86	
		Concrete Pump	53-85	
		Concrete Agitator	53-85	
		Concrete Saw	62-94	
		Jack Hammer	57-89	
		Power Hand Tools	44-76	
	Main Works (Precinct 1-3)	Tower Crane / Mobile Crane	57-89	Exceed HANML 75 dB(A) when work is located close to the southern boundary
		Worker & Materials Hoist	44-76	
		Semi Rigid / Rigid Truck	50-82	
		Concrete Pump	53-85	
		Concrete Agitator	53-85	
		Jack Hammer	57-89	
		Power Hand Tools	44-76	
		Concrete Saw	62-94	
		Welder	54-86	

10.4 RECOMMENDATIONS

In light of the above, the following recommendations are made:

- Install 2m high solid barrier by 18mm plywood or equal along boundaries to Farr St, Mitchell St, Victoria Rd and southern boundaries.
- A detailed noise management plan should be developed by the main contractor that describes in detail the construction phases, programme, processes and equipment used, noise impact assessment and proposed mitigation and management.
- Saturday 7am-8am and 1pm-6pm: No high noise activity (Piling/Skid/Truck/ concrete pump/Concrete agitate/ Saw cut/ Jack Hammer/Welder) is allowed along Victoria Rd and southern boundary.
- Quiet work methods/technologies:
    - Materials handling/vehicles:
        - Trucks and bobcats to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.
        - Avoid careless dropping of construction materials into empty trucks.
        - 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).
- Contingency plan should be detailed in the Construction Noise and Vibration Management plan.

10.5 CONSTRUCTION VIBRATION MANAGEMENT LEVELS

10.5.1 Amenity Management

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

Table 21 – (Table 2.2 Assessing Vibration: A Technical Guideline) – Preferred and Maximum Weighted RMS Values for Continuous and Impulsive Vibration Acceleration (m/s^2) 1-80Hz

Location	Assessment Period [1]	Preferred values		Maximum Values	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Continuous Vibration					
Residences	Daytime	0.010	0.0071	0.02	0.014
	Night-time	0.007	0.005	0.014	0.010
Impulsive Vibration					
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14

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

Table 22 – (Table 2.4 Assessing Vibration: A technical guideline) – Acceptable Vibration Dose Values for Intermittent Vibration ($m/s^{1.75}$)

Location	Daytime[1]		Night-time[1]	
	Preferred value	Maximum Value	Preferred value	Maximum Value
Residences	0.20	0.40	0.13	0.26

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

10.5.2 Structure Damage Risk Criteria

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

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

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

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

Table 23 – (Table 1 – DIN 4150-3 (2016)) – Guideline Values for Vibration Velocity, $v_{i,max}$, for Evaluating the Effects of Short-Term Vibration on Structures

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

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

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

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

10.6 VIBRATION PREDICTION

Vibration generated by the construction activities is difficult to be predicted accurately. Construction Noise and Vibration Management Plan will be provided by the appointed building contractor post conditions of consent being received and as part of CC by the appointed building contractor(s).

A vibration monitoring system should be determined to safeguard the receivers around project site based on vibration criteria listed above.

10.7 NOISE AND VIBRATION MANAGEMENT AND CONTROLS

Prior to the commencement of works on the site, a comprehensive Construction Noise and Vibration Management Plan in accordance with the ICNG recommendations should be developed to regulate activities and response procedures. The Plan should assess noise and vibration impacts during all stages of the project, identify those activities that are likely to produce impacts and proposed methods (including the general methods identified below) that will be adopted to minimise impacts.

The flow chart that follows illustrate the process followed to assess construction activities prior to the start of work on site, and for the ongoing investigation of noise and vibration impacts during the construction period.

The ICNG recommends "feasible and reasonable" mitigation measures to be implemented where works generate noise levels above the out of normal hours NML but does not specify what mitigation measures or to what extent these measures should be applied.

10.7.1 Management Plan

It is likely that some of the activities will produce noise or vibration that will exceed the adopted management levels. These impacts should be minimised by developing and adopting a project specific management plan to regulate site activities.

The plan should be revised as the works proceed in response to changing or latent conditions and to incorporate the results of additional analysis, monitoring or modified work practices implemented to minimise impacts.

The management plan should be prepared in accordance with ICNG guideline and include:

- Identification of sensitive receivers and applicable noise and vibration management levels
- A description of the main noise or vibration producing activities, processes and equipment that will be employed and an indicative construction programme.
- Proposed construction hours.
- A prediction of likely noise/vibration levels at the most impacted receivers.
- The assessment and recommendation of mitigation methods to be applied where the predicted levels exceed the management levels, as indicated below.
- A monitoring plan including the type and extent of monitoring, reporting procedures.
- Recommended management procedures including complaints handling, response to monitoring exceedances, reporting, site training, etc.
- Community liaison.

10.8 NOISE AND VIBRATION CONTROL

The flow chart that follows illustrate the process followed to assess construction activities prior to the start of work on site, and for the ongoing investigation of noise and vibration impacts during the construction period.

The ICNG recommends "feasible and reasonable" mitigation measures to be implemented where works generate noise levels above the out of normal hours NML but does not specify what mitigation measures or to what extent these measures should be applied.

10.8.1 General Noise Control Methods

The determination of appropriate additional noise control measures will be dependent on the particular activities and the construction equipment and plant identified as requiring future acoustic treatments to those already identified in this report. This section provides an outline of available methods which have previously been used on similar construction sites and may be possible on this site.

10.8.1.1 Selection of Alternate Appliance or Process

Where a particular activity or plant and equipment is found to generate noise levels that exceed the management levels, it may be possible to select an alternative approach or plant and equipment. For example; the use of excavator mounted hydraulic hammers of the site may potentially generate high levels of noise. By carrying this activity by using concrete saws or smaller plant here practical, construction noise levels and/or length of exposure to construction noise levels may be reduced.

10.8.1.2 Acoustic Barriers

The placement of barriers at the source is generally only effective for static plant. Placing barriers at the source cannot effectively attenuate equipment which is on the move or working in rough or undulating terrain.

The degree of noise reduction provided by barriers is dependent on the amount by which the line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15 dB(A) can be effected. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8 dB(A) may be achieved. Where the barrier does not obstruct line of sight, generally no noise reduction will occur.

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 which is approximately 10dB(A) greater than the maximum reduction provided by the barrier screening. In this case, the use of a material such as 15mm plywood (or equivalent material) would be acceptable for the barriers.

10.8.1.3 Silencing Devices

Where construction methodologies or plant and equipment permit, investigate the use of silencing devices. These may take the form of engine shrouding, or special industrial silencers fitted to exhausts, for example.

10.8.1.4 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.

10.8.1.5 Establishment of Site Practices

This involves the formulation of work practices to reduce noise generation. This includes, for example, investigating the possibility of locating fixed plant items as far as possible from residents, rotating plant and

activities to provide respite to receivers, scheduling activities after the construction of buildings that will screen receivers, avoiding noise sensitive periods for receivers, identify "safe" working distances, etc.

10.8.1.6 Vibration Management

The following principles should be considered to manage adverse vibration impacts identified:

- Obtaining separate structural or specialist advice for critical or fragile structures as to the level of damage risk.
- Selection of processes that minimise structure and ground vibration – generally avoiding percussive methods.
- Use smallest plant that is able to efficiently undertake the work activity.
- Lay vibration absorbing mats to cushion impacts from falling debris.
- Application of vibration dampening pads to metal surfaces subject to impacts.
- When demolishing, cut control joints in structures to form vibration "breaks", or work away from sensitive receiver locations to form natural vibration breaks in propagation path.
- Monitoring of structures using attended and/or unattended monitors with alarms.
- Time scheduling works to minimise amenity impacts.
- Communicating with affected receivers.
- Identify "safe" working distances to sensitive receivers/structures for various activities by conducting site simulation tests, and limiting activities within those distances to those that are not likely to exceed vibration goals. Vary locations/equipment/techniques used as determined by the simulation testing. The following table provides an initial guide to working distances that should be confirmed by site measurement.

10.8.1.7 Notification

Notification of affected receivers of the progress of works, particularly when short-term activities likely to create higher noise levels occur, can in many cases minimise community reaction.

10.8.1.8 Monitoring

Attended and unattended monitoring can be used to guide management of impacts, and the extent of monitoring should be included in the Management P.

Table 24 – Recommended Base Minimum Working Distances for Vibration Intensive Plant from Sensitive Receivers

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

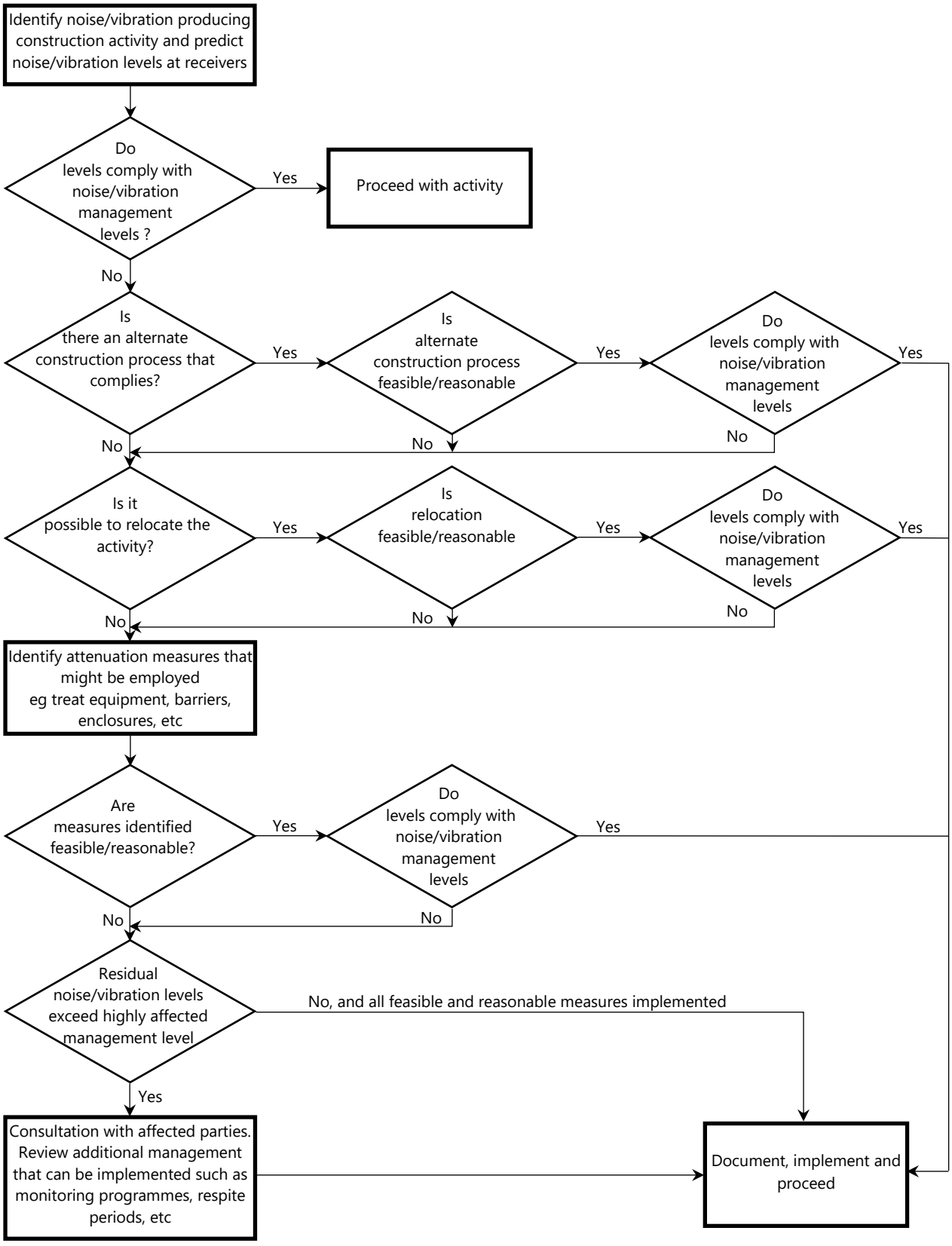


Figure 5 – Recommended Impact Management Flow Chart

11 COMMUNAL EVENTS

This section presents our review and recommendations for the proposed communal events and its impact on future residents from the publicly accessible park, site links and commercial uses.

Noise generated by communal events is regarded neighbourhood noise. Clearly, there are no applicable rules to apply when developing noise limits for occasional communal events to the project precinct. Essentially, what is appropriate will depend upon the circumstances. Typically, it is not practical to establish noise limits that prevent annoyance at every residence.

The impact on the residents is not just a function of the noise level but is also a function of, for example:

- the length of the event.
- the commencement and finishing times; and
- the number of similar events held per year.

These can all be juggled and need to be considered collectively and comprehensively. Therefore, the length of the event and commencement and finishing times etc. The impact on residents needs to be weighed up against the cultural, social and economic needs/expectations of the broader community to determine if the venue is suitable and if the event should proceed.

It is not reasonable to mitigate noise levels other than to manage impacts as recommended below:

- Selecting events and locations to minimise noise levels;
- Table 12 of the EIS and Appendix VV_Operational Management Plan outline a variety of operational uses and associated hours. These hours have been carefully considered to ensure noise impacts are negligible to both precinct residents and surrounding dwellings
- Ensure neighbours of the site are notified at least 7 days before the event. RTL Co. as the precinct manager will be responsible for resident communications and notifications regarding communal events held within the precinct. This will ensure precinct residents and surrounding neighbours are adequately informed regarding communal events that could have a noise impact
- Suitable proposal must be given as to the duration and frequency of respite periods that will be afforded to the occupiers of neighbouring property.
- Section 8 of the report outlines an external noise intrusion assessment – particularly focused on aircraft noise levels. To respond to this assessment, all external windows and doors require an acoustically rated façade system which is summarised within table 6. It is anticipated that these mitigation measures will further address any noise incurred from community events.

12 CONCLUSION

This report presents an assessment of noise and vibration impacts associated with the proposed residential development to be located within Marrickville to be known as Marrickville Timberyards.

12.1 AMENITY OBJECTIVES FOR FUTURE OCCUPANTS

The proposed development has been assessed using the acoustic requirements of the following documents:

- Planning Secretary's Environmental Assessment Requirements with Application Number SSD-76927247.
- Inner West Council Response: SSD-76927247- The Timberyards by RTL Co (ref: External/2024/0020).
- Inner West Local Environmental Plan 2022, Clause 6.8- Development in areas subject to aircraft noise.
- Marrickville Development Control Plan (**DCP**) 2011, Part 9.47 Schedule 1, *Victoria Rd Precinct Noise Policy*.
- Marrickville Development Control Plan (**DCP**) 2011, Part 2.6 – Acoustic and Visual Privacy.
- Australian Standard AS2021:2015 Acoustics–Aircraft Noise Intrusion–Building Siting and Construction.(**AS2021:2015**)
- Australian and New Zealand AS/NZS 3671:1989 (**AS3671:1989)** *Acoustics - Road traffic noise intrusion - Building siting and construction*, and
- Australian and New Zealand AS/NZS 2107:2016 (**AS2107:2016)** *Recommended design sound levels and reverberation times for building interiors*.

The assessment indicates the recommendations of these guidelines can be achieved by the proposed development, and complying constructions are presented in Section 8.3 of this report that satisfy these guidelines.

12.2 NOISE EMISSIONS FROM SITE PLANT AND ACTIVITIES

Noise emission criteria from the operational of the development has been developed using the following documents:

- Marrickville Development Control Plan (**DCP**) 2011.
- NSW Environment Protection Authority (**EPA**) *Noise Policy for Industry* (**NPI**) 2017.
- Inner West Good Neighbour Policy (V2).

Once detailed location and selections of all proposed mechanical plant are known, an acoustic review should be undertaken to ensure compliance with the above. This should be undertaken during CC stage. Future entertainment and licensed premises within the project site will be separately assessed to satisfy general objectives of the Good Neighbour Policy by Inner West Council and the Vibrancy Reforms.

12.3 CONSTRUCTION NOISE AND VIBRATION

Preliminary construction noise prediction has been presented in this report based on requirements of SEAR and NSW DECC Interim Construction Noise Guideline 2009. Once detailed construction plans have been established, a full noise and vibration management plan should be prepared in CC stage to ensure compliance with the following.

- NSW DECC Interim Construction Noise Guideline 2009.
- German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures*.
- NSW Department of Environment and Conservation *Assessing Vibration: A Technical Guideline* (Feb 2006).

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

Yours faithfully,

Acoustic Logic Pty Ltd
George Wei
MAAS

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:

- Traffic noise levels from local roads, and
- Background noise levels for the project site.

A.1 UNATTENDED LONG TERM NOISE MONITORING

A.1.1 Ambient 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).

L_{90} – 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 L_{90} parameter is used to set noise emission criteria for potentially intrusive noise sources since the disturbance caused by a noise source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

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

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

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

A.1.2 Equipment Used

Unattended noise monitoring was conducted using the following equipment:

- Rion NL-42 (Type 2).
- Rion Sound Level calibrator Type NC 74.

The 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.

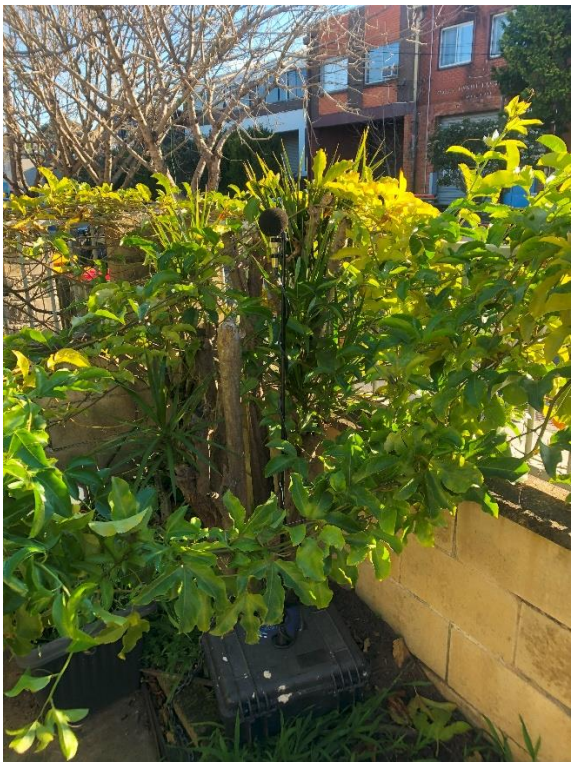
All monitoring equipment used retains current calibration - either manufacturers' calibration or NATA certified calibration. The monitors were field calibrated at the beginning and the end of the measurement with no significant drift in calibration noted.

A.1.3 Locations Monitored

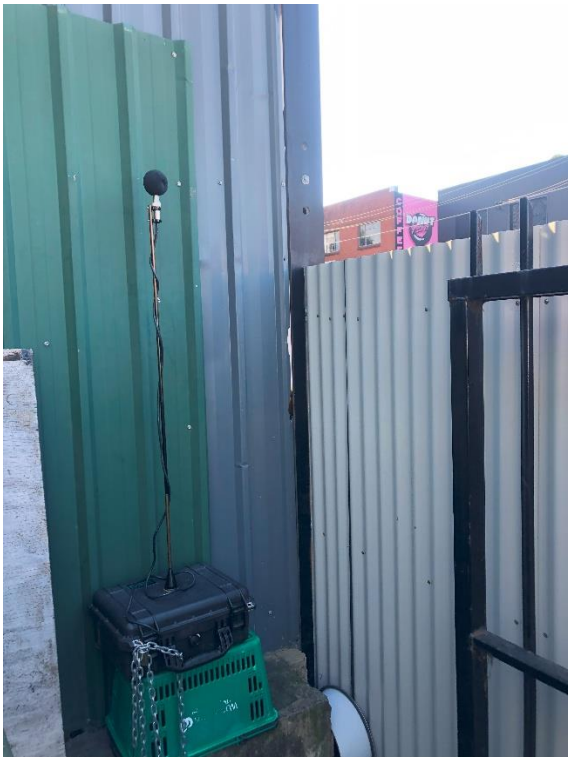
Detailed locations of the noise monitoring are presented in Figure 3. Photographs of the monitoring locations have been provided below:

Victoria Road

Sydenham Road



Farr Street



Mitchell Road

A.1.4 Weather Affected and Extraneous/Outlying Data

Periods affected by adverse weather conditions are indicated on the following data graphs. Weather data was obtained from records provided by the Bureau of Meteorology for the Sydney Airport weather station.

The following periods have been identified as likely to contain significant periods of non-representative data and have been excluded from the assessment:

- 13/08/2024 Night.
- 14/08/2024 Day.

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 a more sheltered locations a wind multiplying factor of 0.5 has been applied to the BOM data to estimate the wind speed at the microphone location.

A.2 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.2.1 Rating Background Noise Levels

The following tables summarise 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 NPI, 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.
- night rating background noise level is higher than the evening level, the evening rating background noise level has been adopted for the evening period.
- day rating background noise level was less than 35 dB(A), a “default” background of 35 dB(A) has been adopted.
- 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 25 – RBL – South-East Façade Facing Victoria Road

Date	Noise Level dB(A) $L_{90, period}$		
	Day	**Evening**	**Night**
06/08/2024	-	52	43
07/08/2024	55	53	42
08/08/2024	56	54	43
09/08/2024	56	53	44
10/08/2024	53	54	43
11/08/2024	52	50	43
12/08/2024	56	51	42
13/08/2024	56	51	-
14/08/2024	-	53	42
15/08/2024	56	53	44
16/08/2024	56	53	44
17/08/2024	53	52	44
18/08/2024	52	50	41
19/08/2024	56	51	43
Calculated RBL	**56**	**52**	**43**

Table 26 – RBL – South-West Façade Facing Sydenham Road

Date	Noise Level dB(A) $L_{90, period}$		
	Day	Evening	Night
06/08/2024	-	51	39
07/08/2024	55	54	42
08/08/2024	54	53	39
09/08/2024	55	54	44
10/08/2024	56	53	43
11/08/2024	55	53	41
12/08/2024	56	49	39
13/08/2024	56	52	-
14/08/2024	-	52	38
15/08/2024	56	55	40
16/08/2024	56	54	39
17/08/2024	56	51	41
18/08/2024	54	53	38
19/08/2024	56	50	37
Calculated RBL	**56**	**53**	**39**

Table 27 – RBL – South-West Façade Facing Farr Street

Date	Noise Level dB(A) $L_{90, period}$		
	Day	Evening	Night
06/08/2024	-	40	34
07/08/2024	43	44	36
08/08/2024	43	41	35
09/08/2024	41	39	38
10/08/2024	43	42	38
11/08/2024	43	43	37
12/08/2024	43	42	34
13/08/2024	44	39	-
14/08/2024	-	37	32
15/08/2024	46	45	36
16/08/2024	42	42	34
17/08/2024	41	38	34
18/08/2024	45	41	33
19/08/2024	43	38	35
Calculated RBL	**43**	**41**	**35**

Table 28 – RBL – South-West Façade Facing Mitchell Street

Date	Noise Level dB(A) $L_{90, period}$		
	Day	Evening	Night
06/08/2024	-	46	42
07/08/2024	50	47	42
08/08/2024	50	47	44
09/08/2024	50	47	44
10/08/2024	49	47	43
11/08/2024	48	47	43
12/08/2024	51	46	42
13/08/2024	51	46	-
14/08/2024	-	47	42
15/08/2024	51	48	44
16/08/2024	51	47	43
17/08/2024	48	46	42
18/08/2024	48	47	41
19/08/2024	49	47	43
Calculated RBL	**50**	**47**	**43**

A.2.2 Ambient Noise Levels

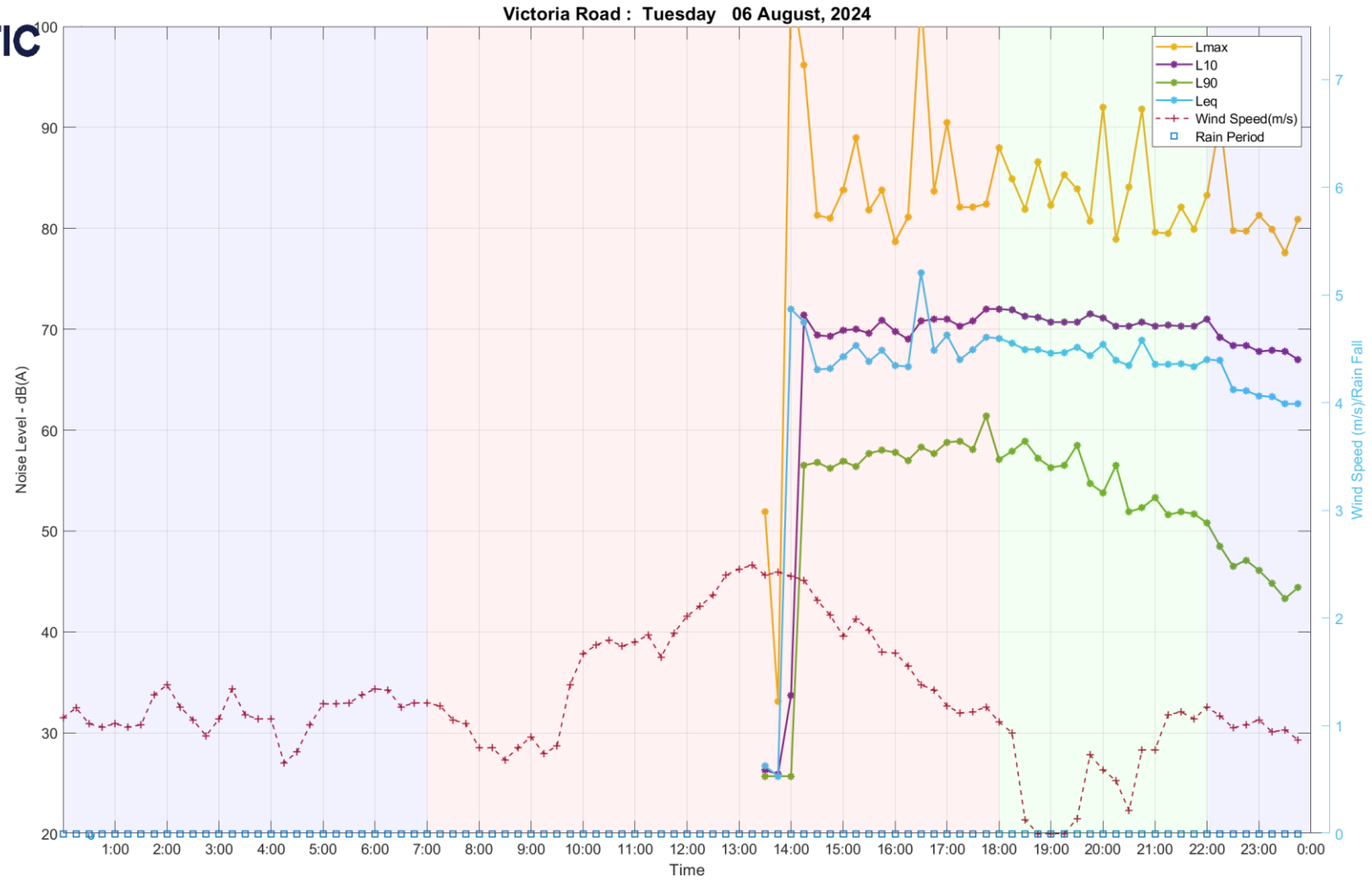
The $L_{eq,15hr}$ (day period, 7am to 10pm) and $L_{eq,9hr}$ (night period, 10pm to 7am) ambient noise level descriptors have been calculated from the data, and are summarised in the following table.

Table 29 – Ambient Noise Levels

Location	Ambient Noise Level (dB(A) $L_{eq,period}$)	
	Day (7am to 10pm)	Night (10pm to 7am)
Eastern Façade (Victoria Rd)	68	65
Southern Façade (Sydenham Rd)	70	68
Western Façade (Farr Street)	62	55
Northern Façade (Mitchell Road)	64	58

A.3 UNATTENDED MONITORING DATA GRAPHS

A.3.1 South East Façade – Victoria Road


Victoria Road : Tuesday 06 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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21:00
22:00
23:00
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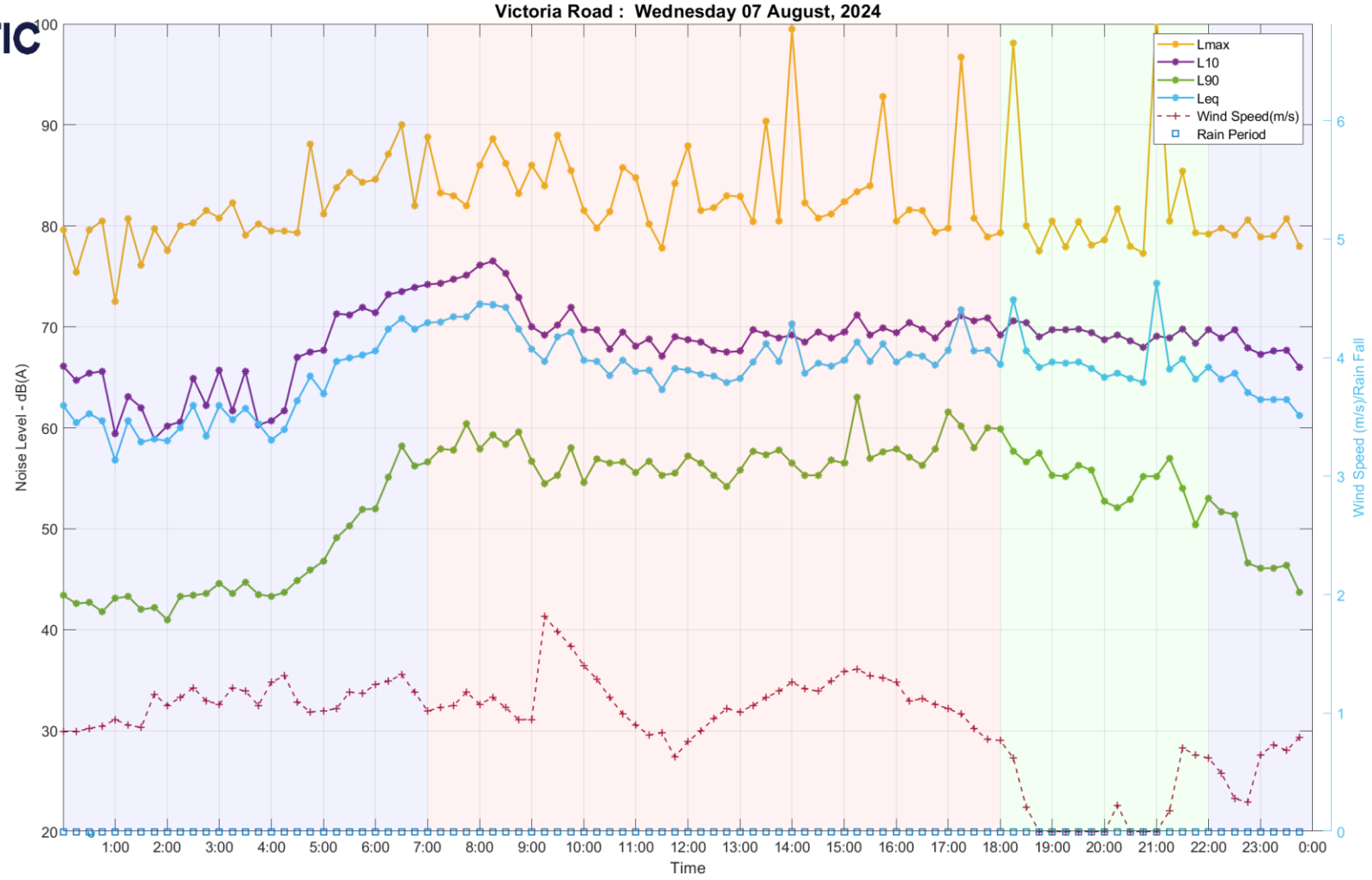
Victoria Road : Wednesday 07 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
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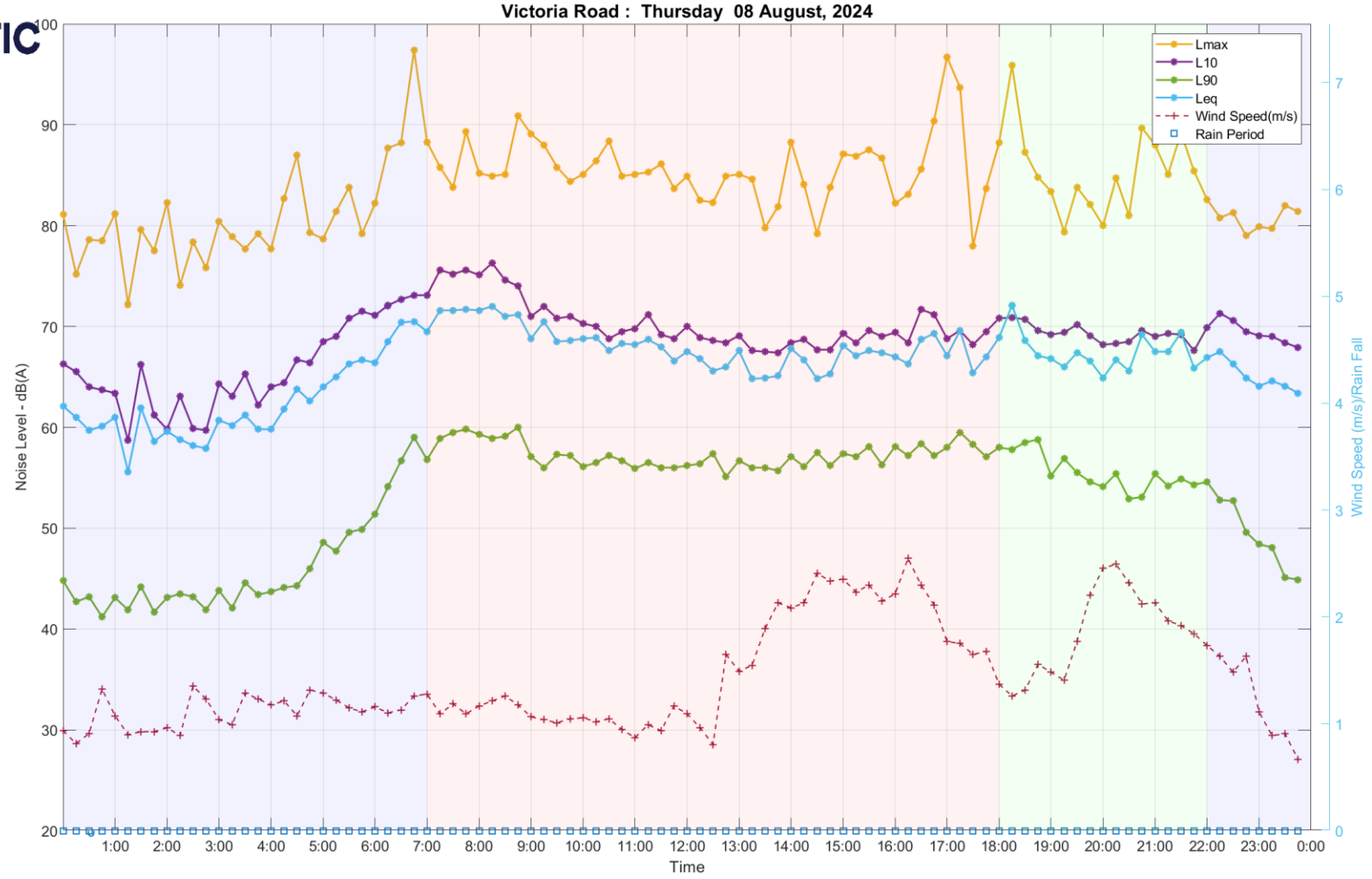
Victoria Road : Thursday 08 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
5:00
6:00
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9:00
10:00
11:00
12:00
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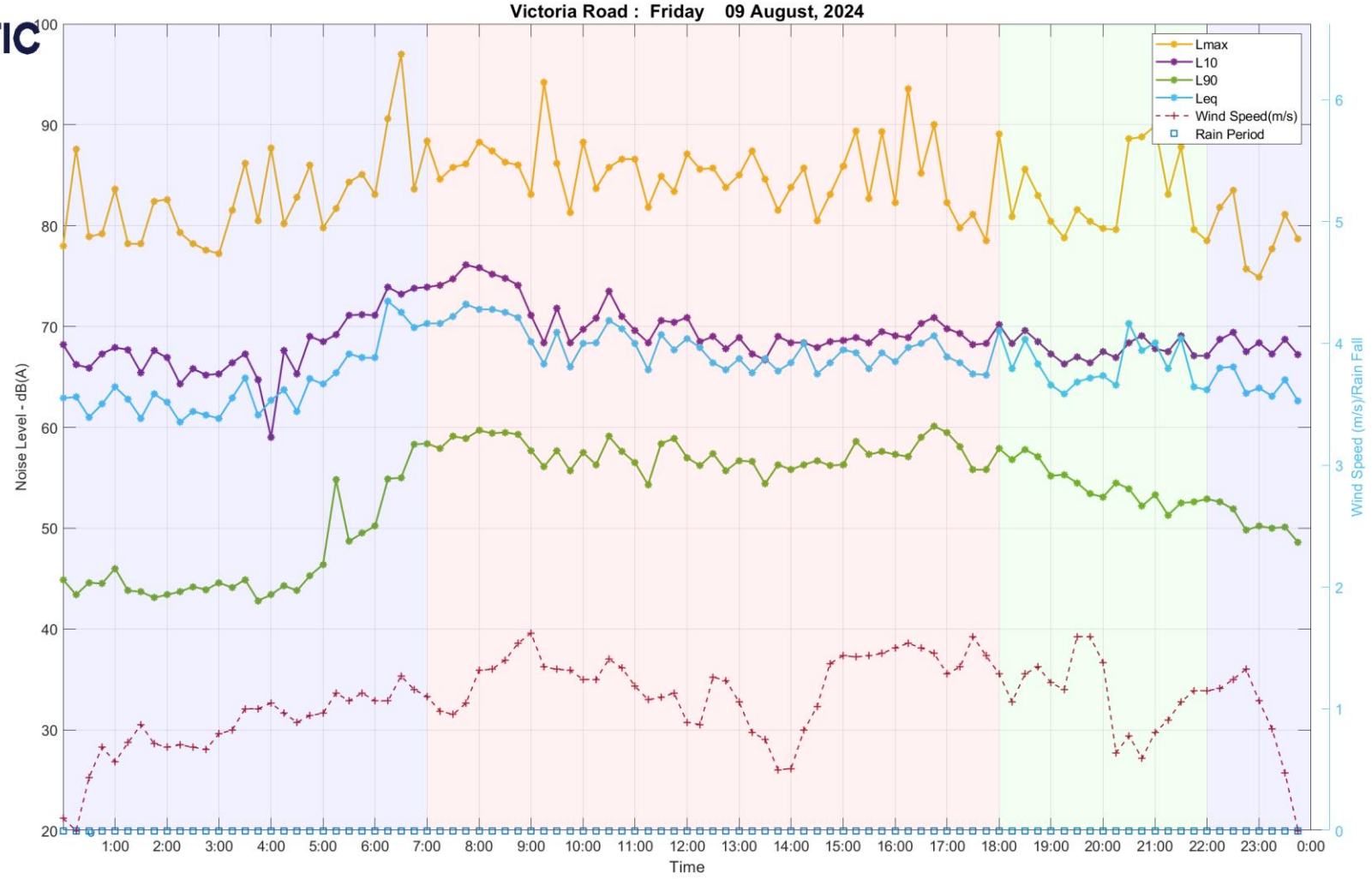
Victoria Road : Friday 09 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
5
4
3
2
1
0
1:00
2:00
3:00
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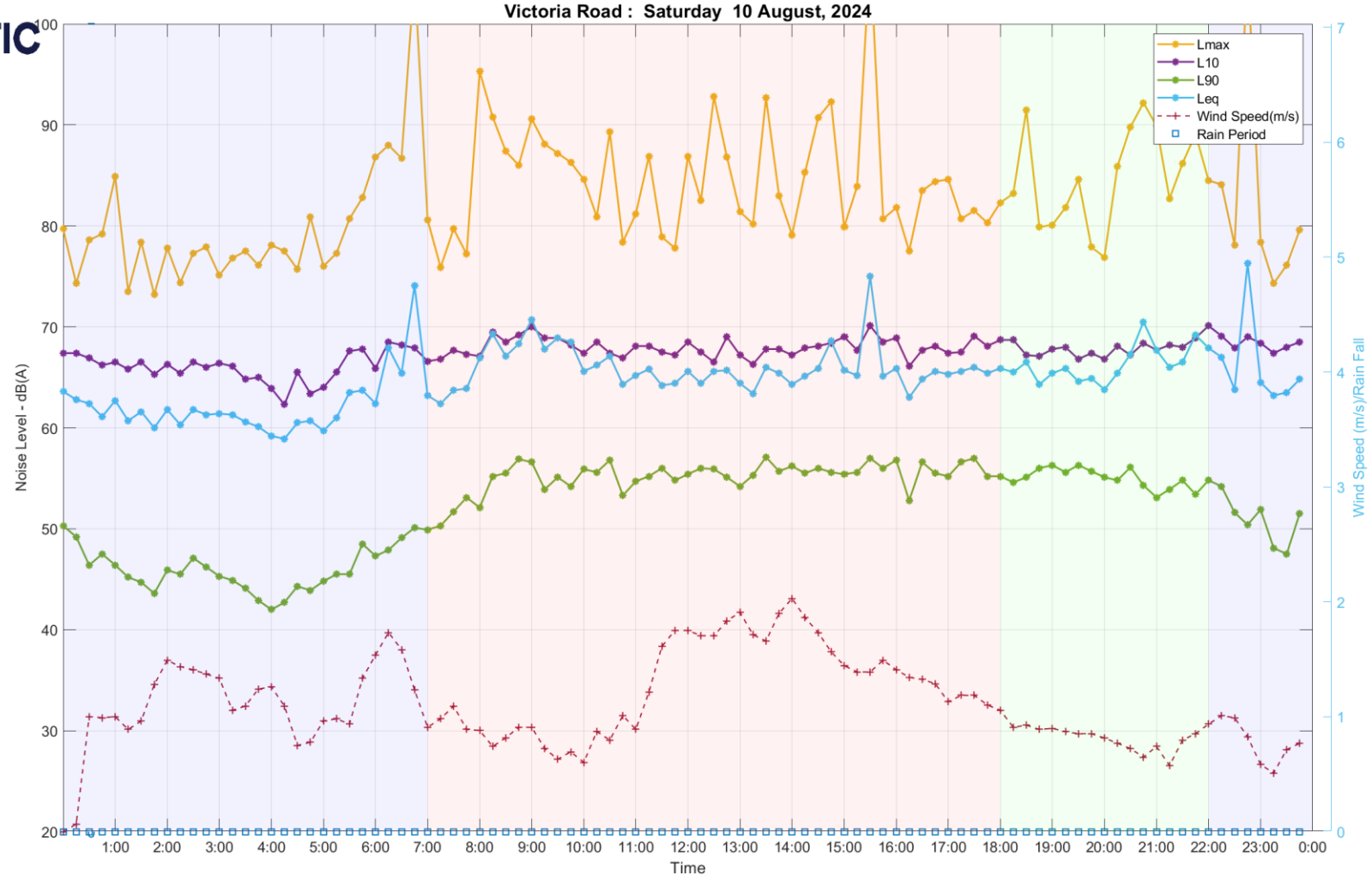
Victoria Road : Saturday 10 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
5:00
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8:00
9:00
10:00
11:00
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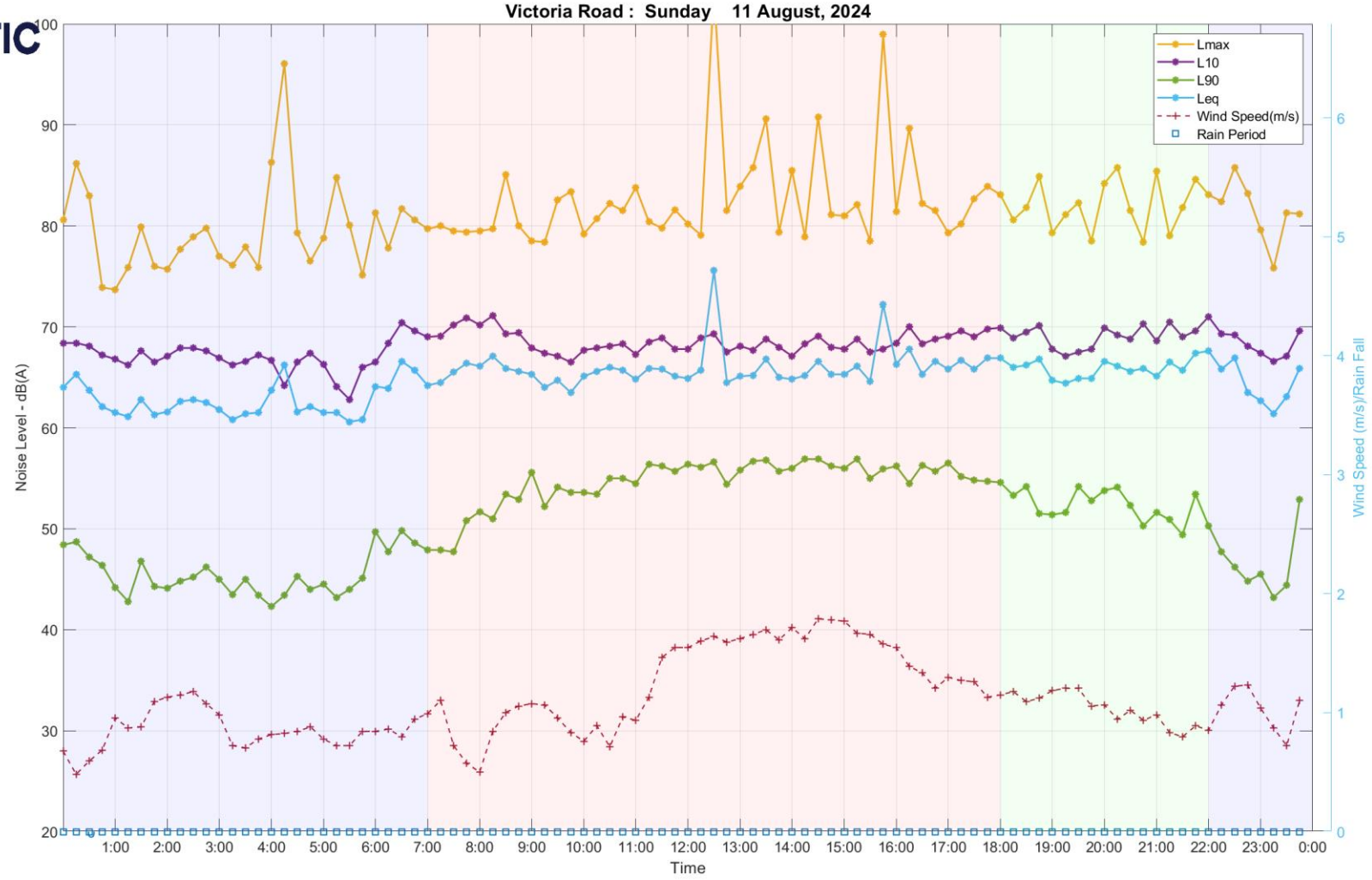
Victoria Road : Sunday 11 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
5
4
3
2
1
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1:00
2:00
3:00
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6:00
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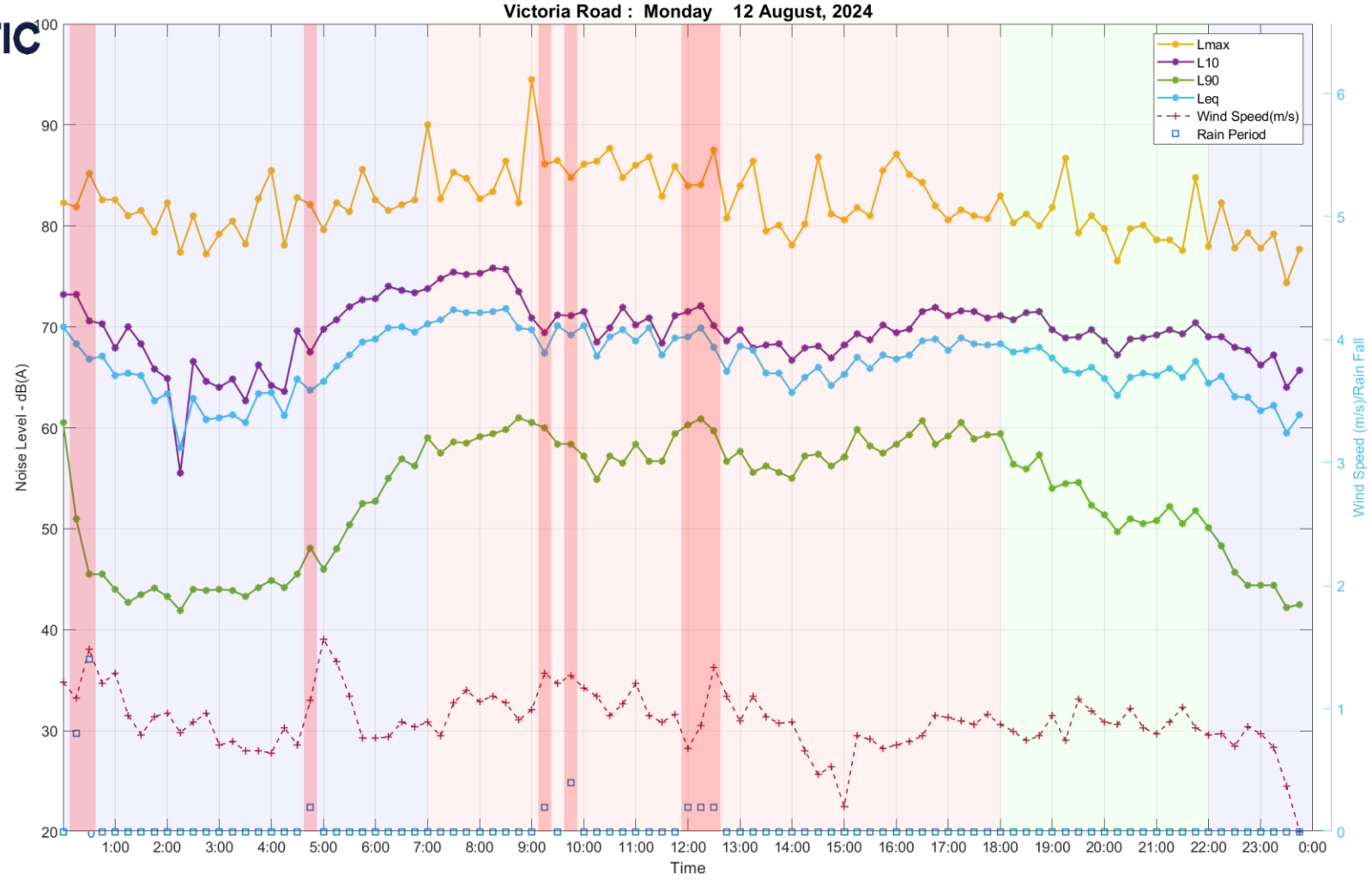
Victoria Road : Monday 12 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
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4
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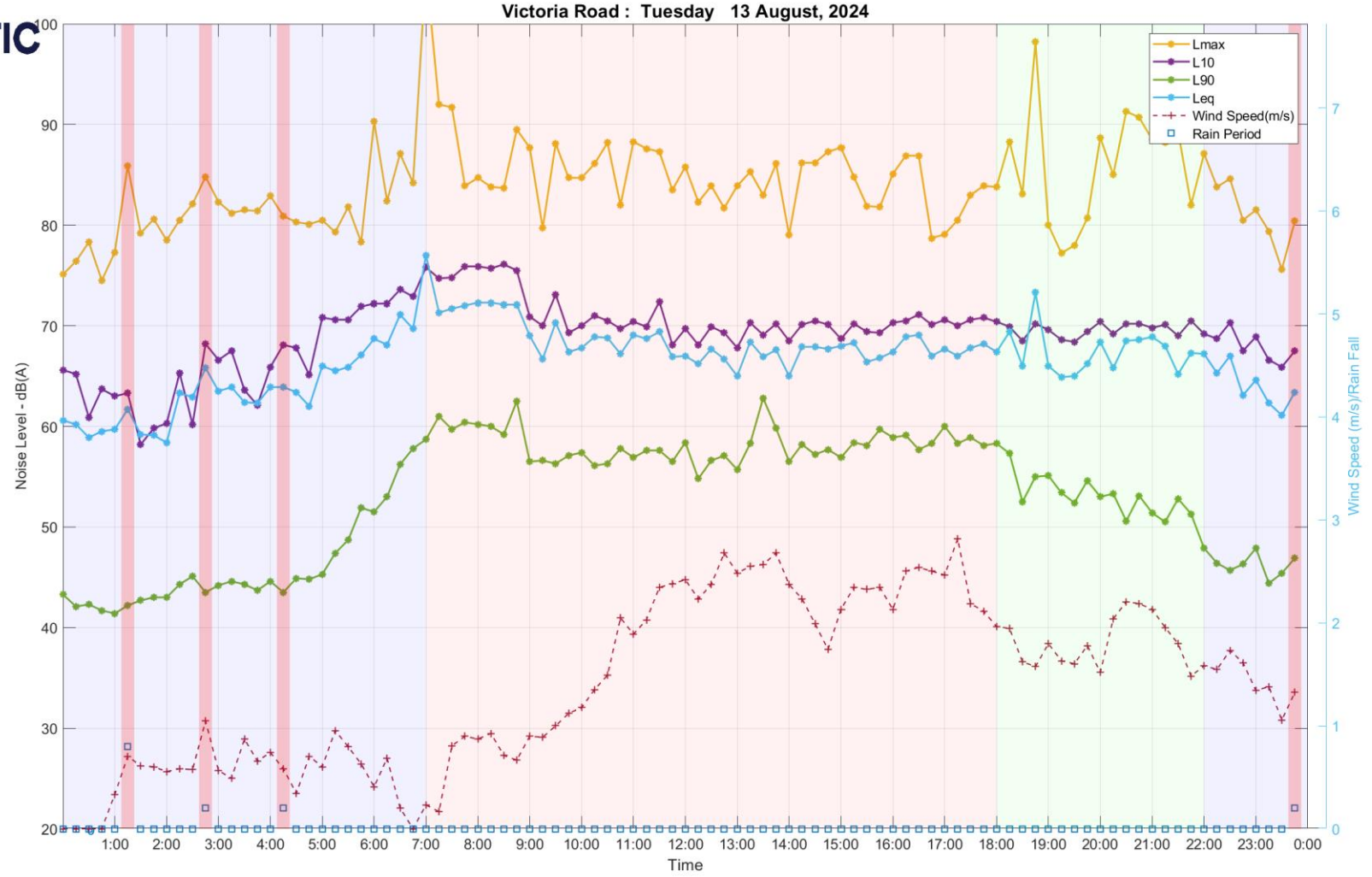
Victoria Road : Tuesday 13 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
6
5
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3
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1:00
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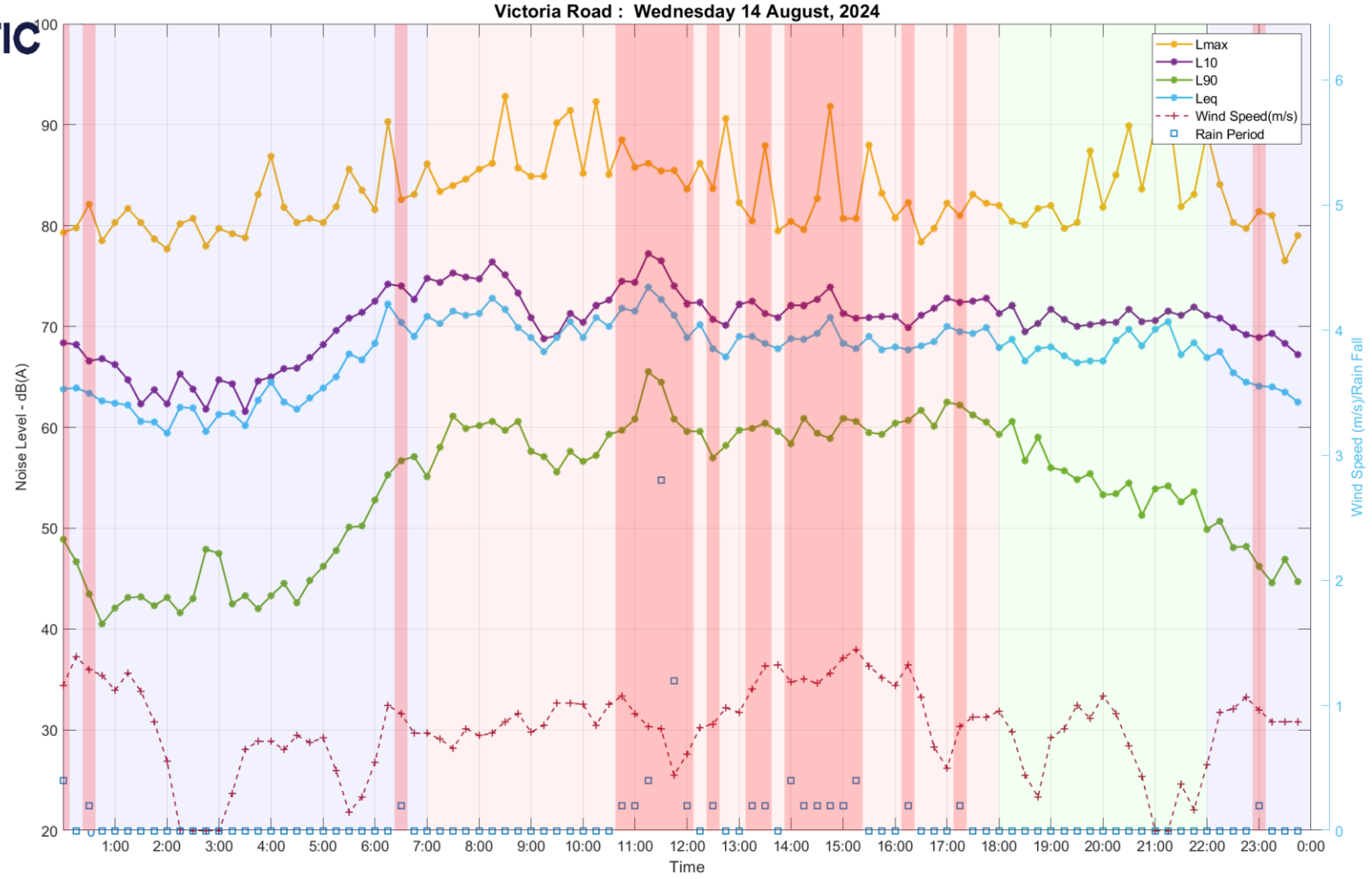
Victoria Road : Wednesday 14 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
5
4
3
2
1
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1:00
2:00
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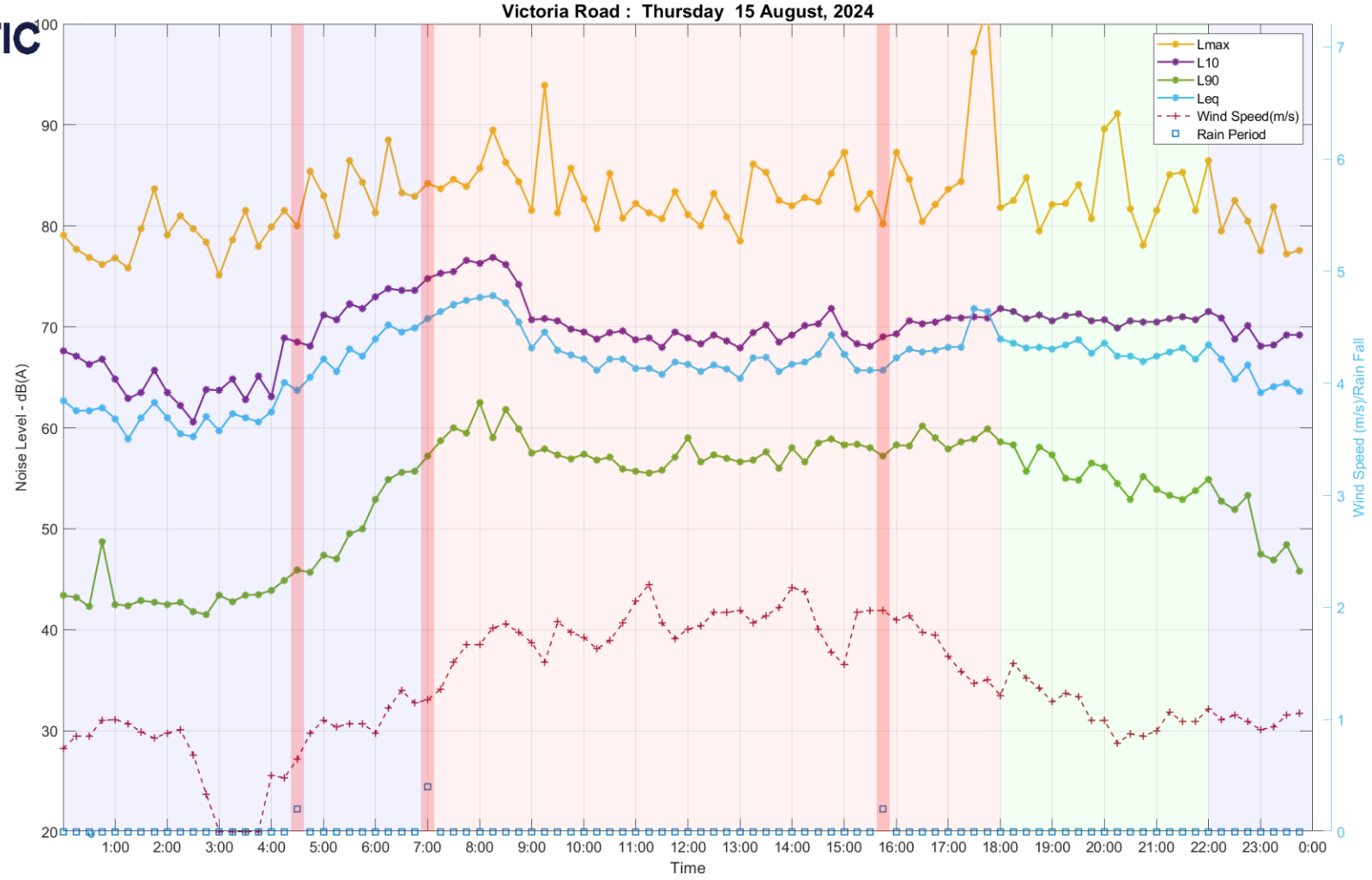
Victoria Road : Thursday 15 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
6
5
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3
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1:00
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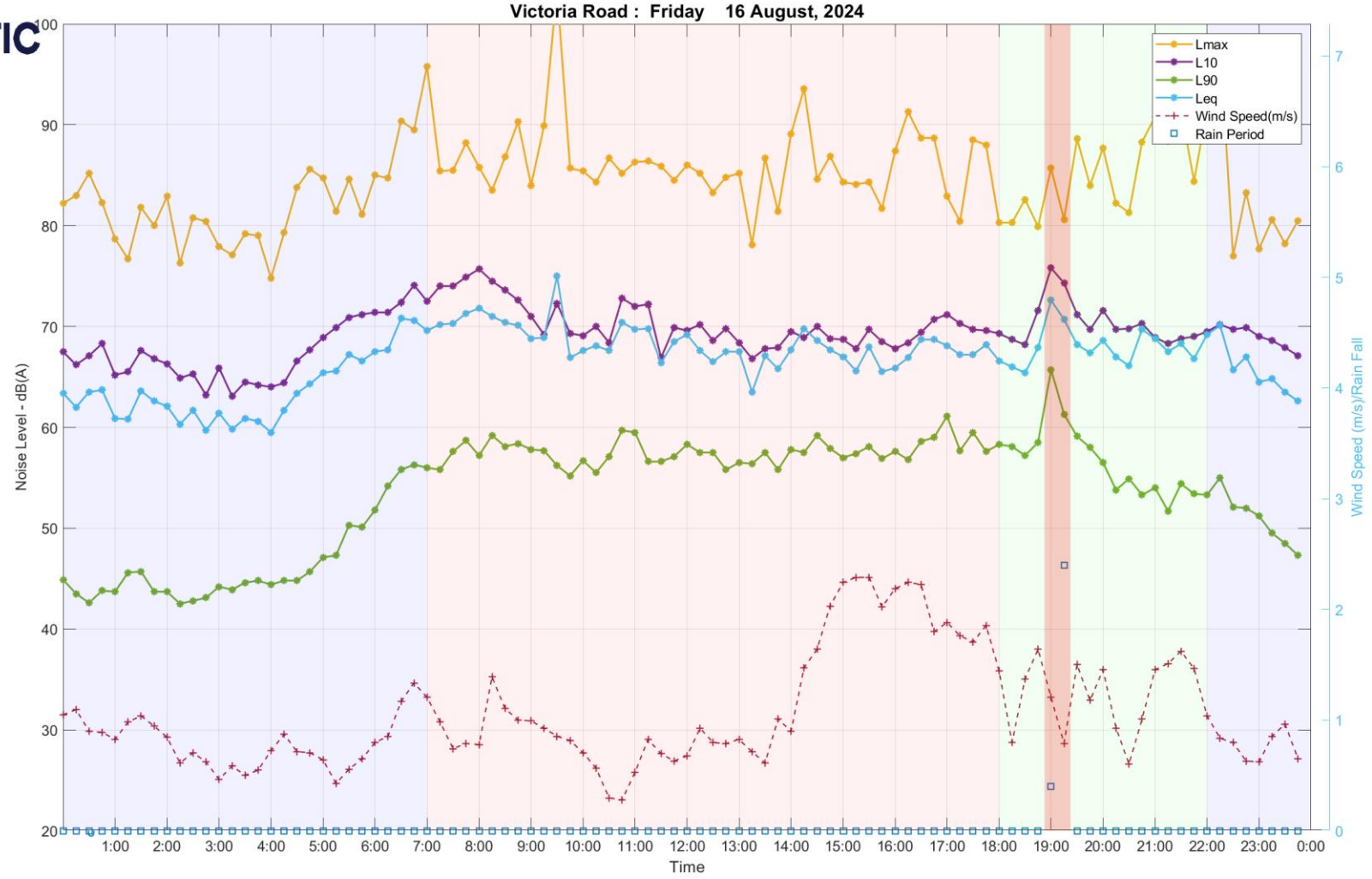
Victoria Road : Friday 16 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
6
5
4
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1:00
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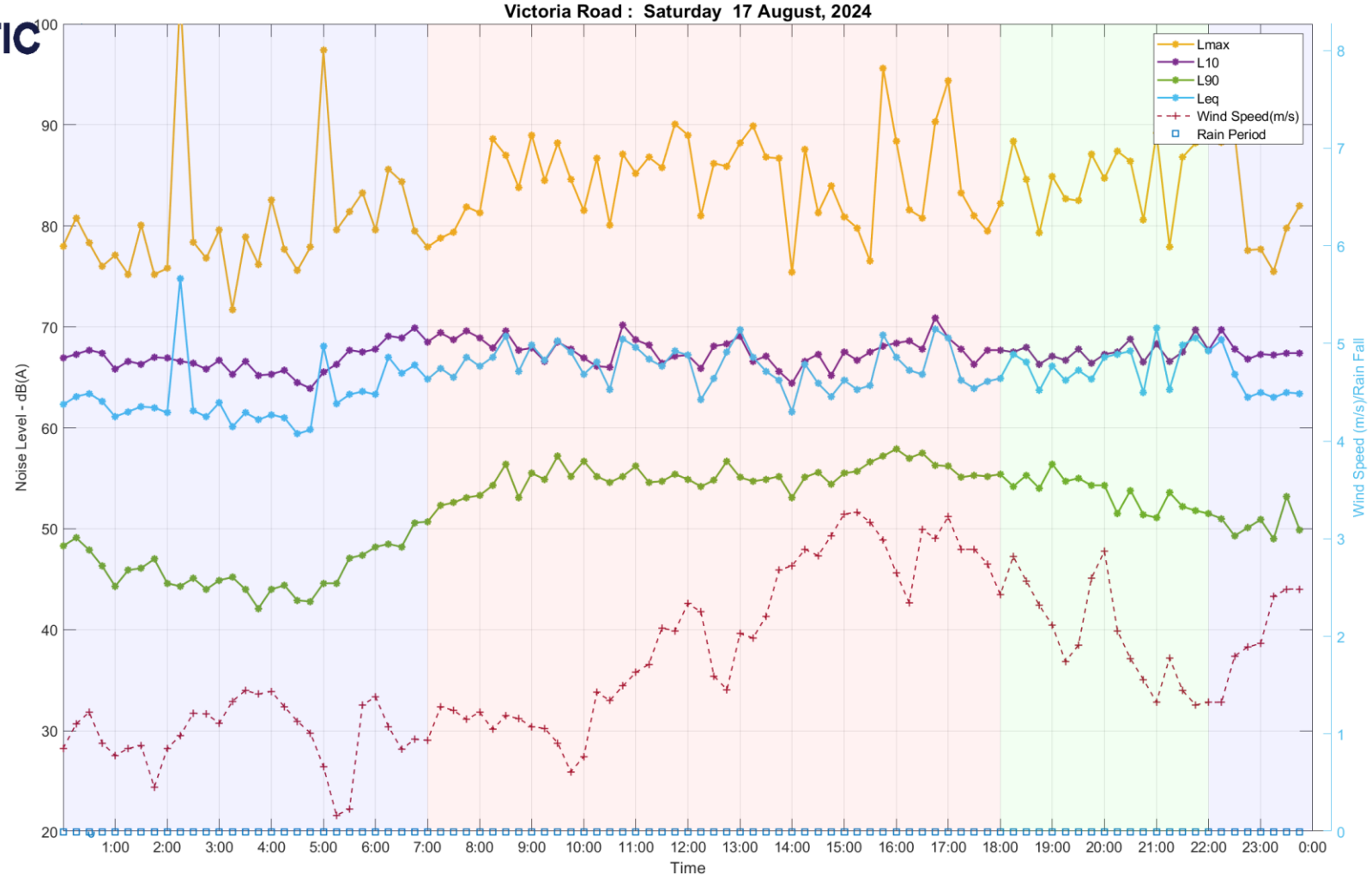
Victoria Road : Saturday 17 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
8
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1:00
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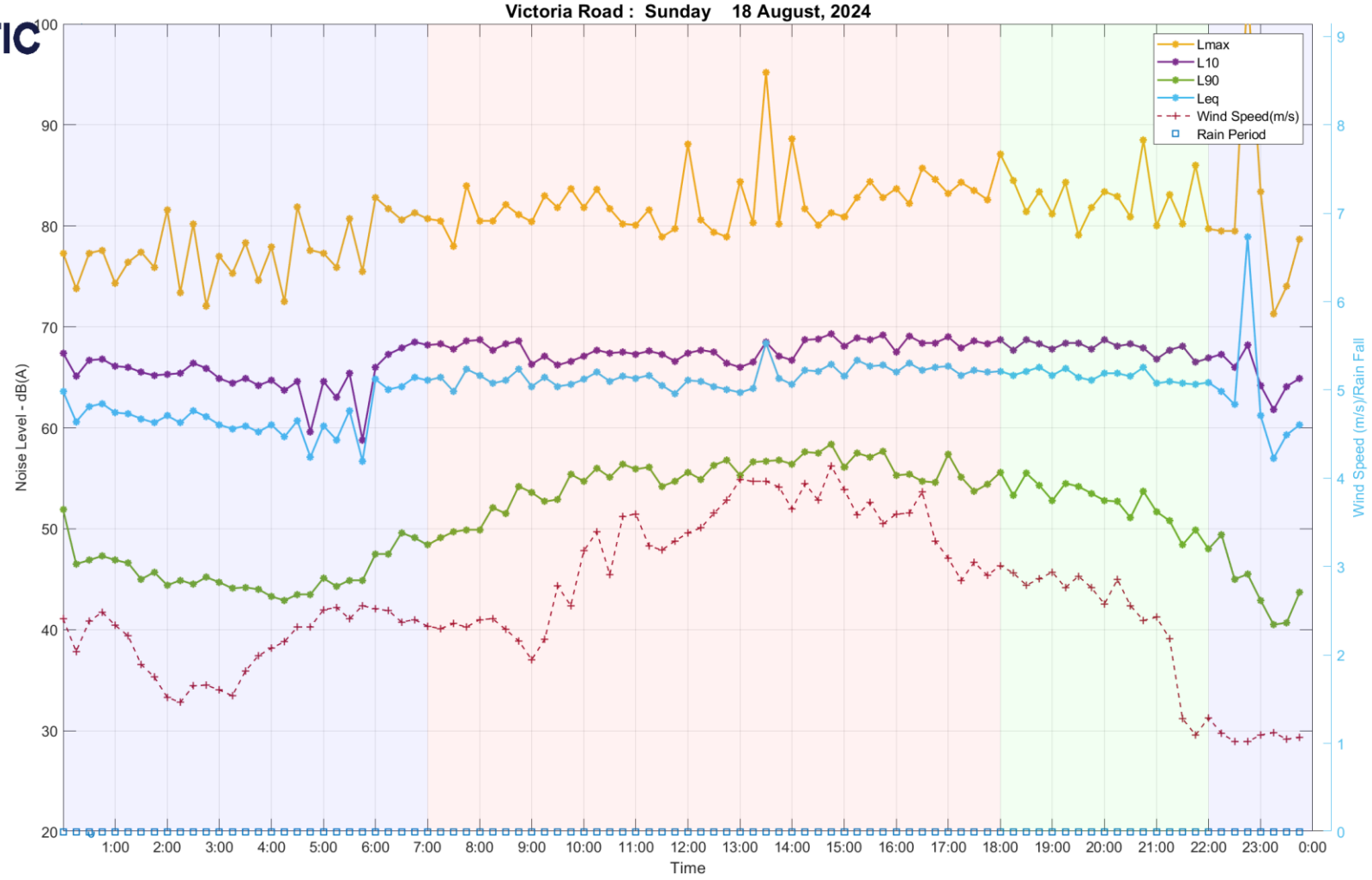
Victoria Road : Sunday 18 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
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5
4
3
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1
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1:00
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23:00
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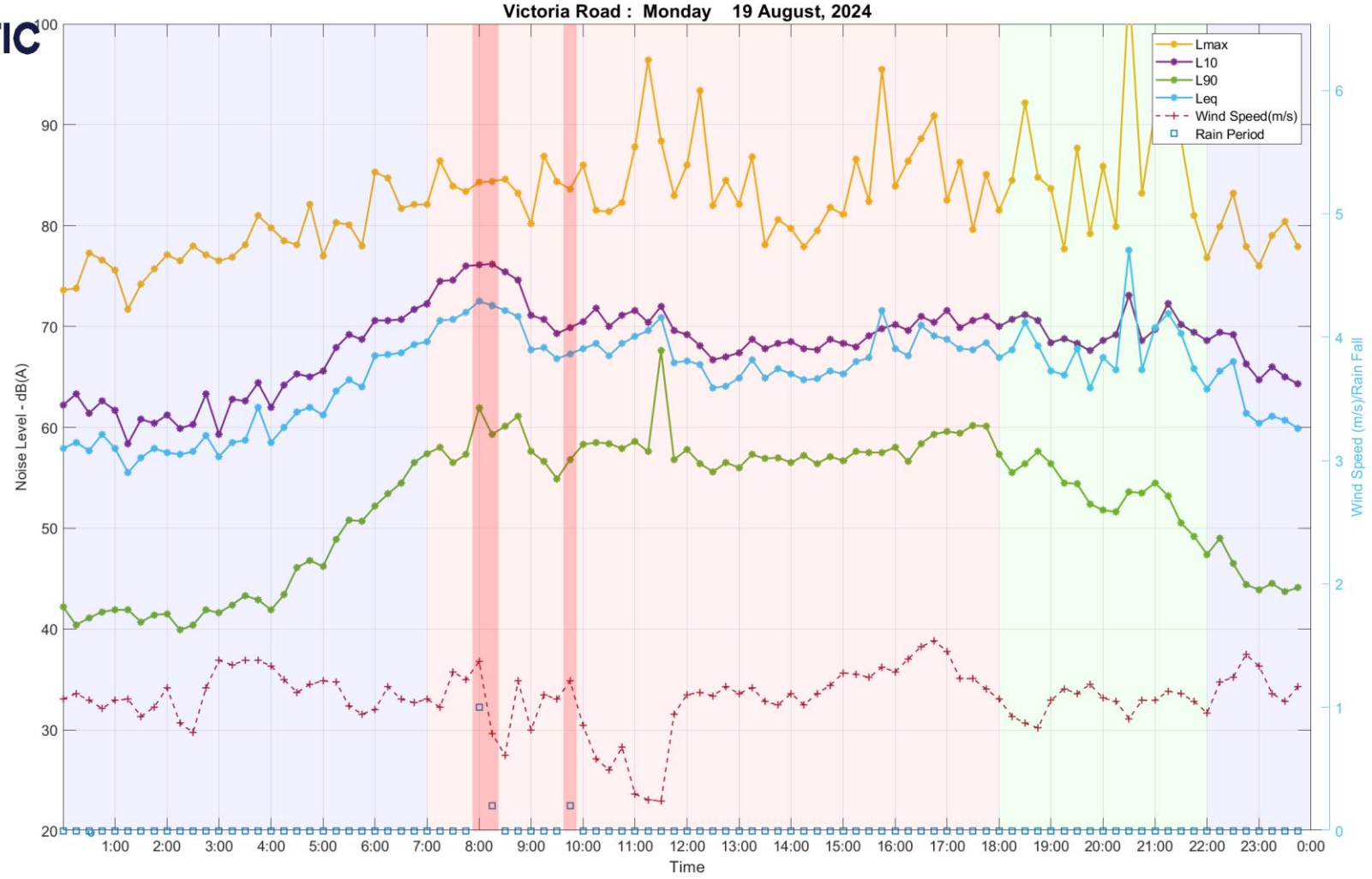
Victoria Road : Monday 19 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
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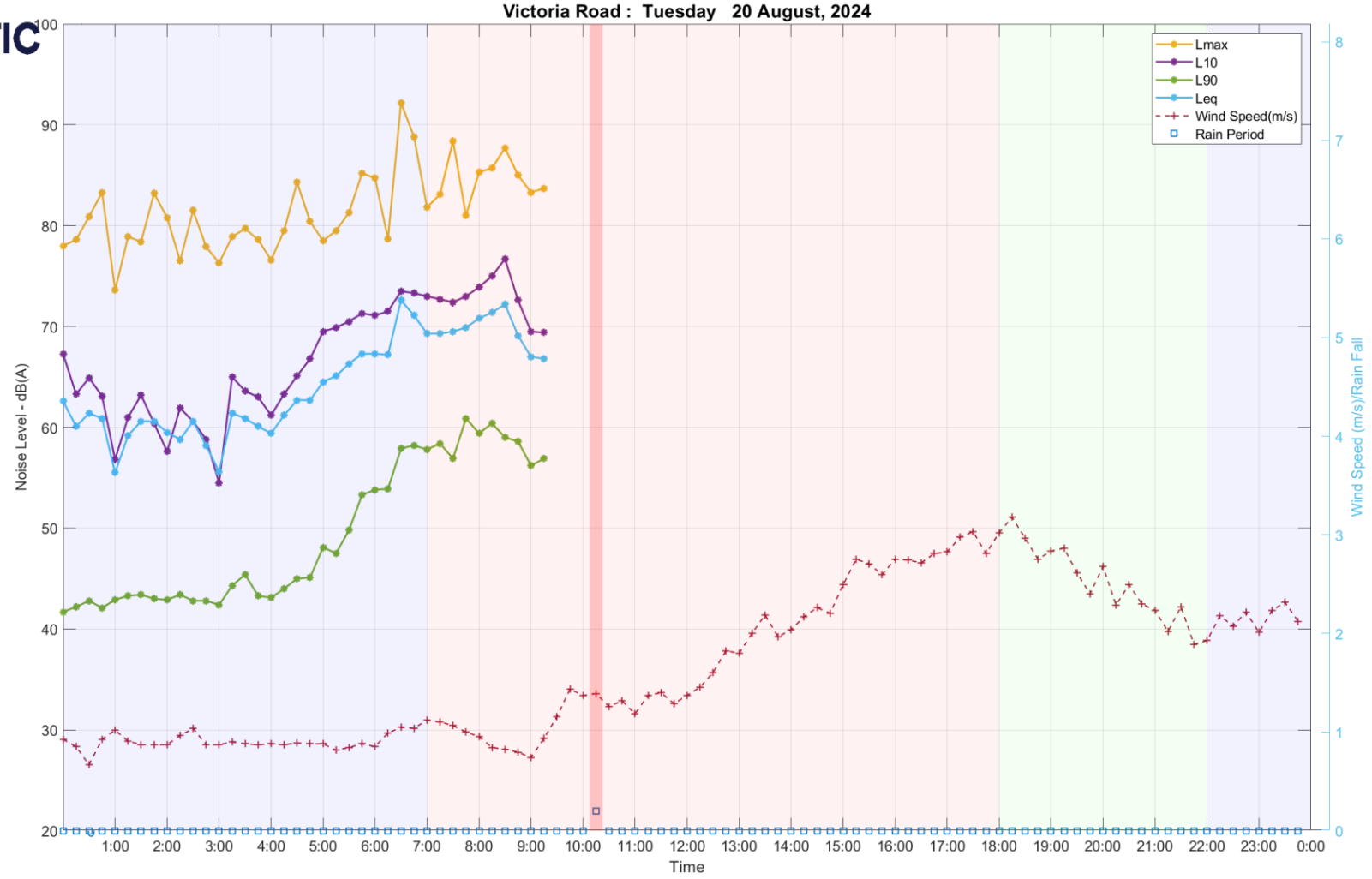
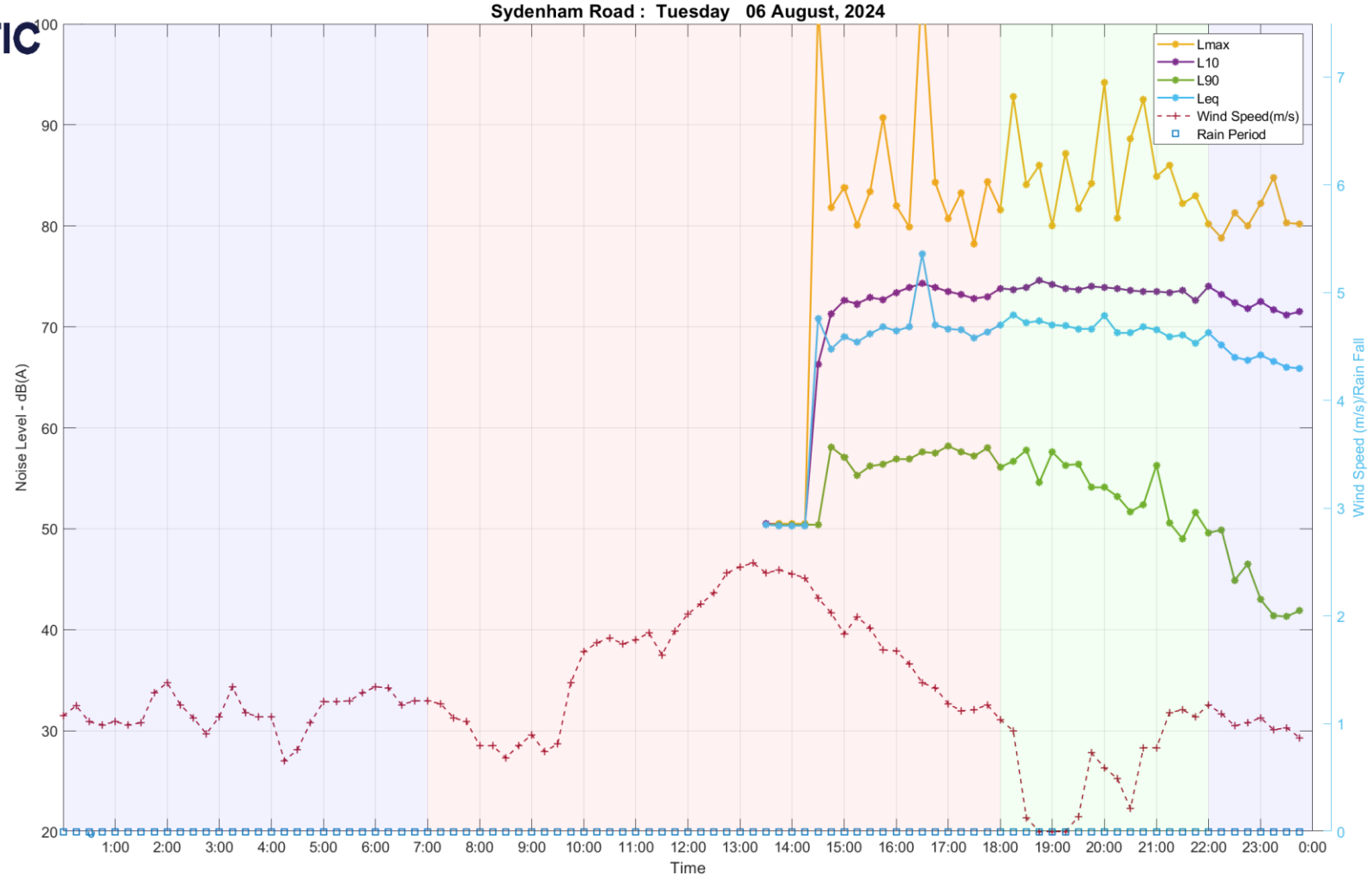


Wind Speed is corrected using factor 0.3333 based on logger location

A.3.2 South West Façade – Sydenham Road


Sydenham Road : Tuesday 06 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
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7
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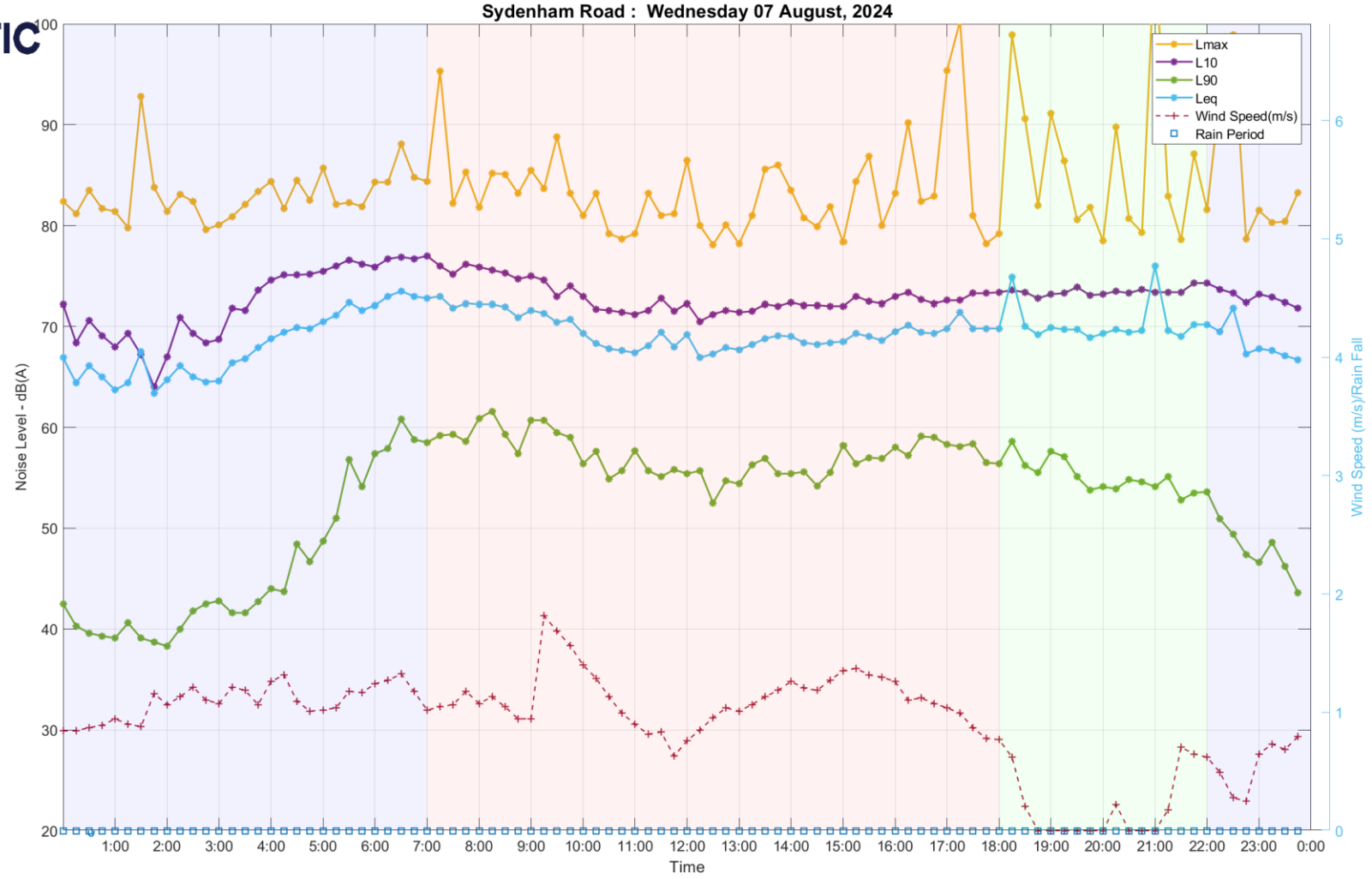
Sydenham Road : Wednesday 07 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
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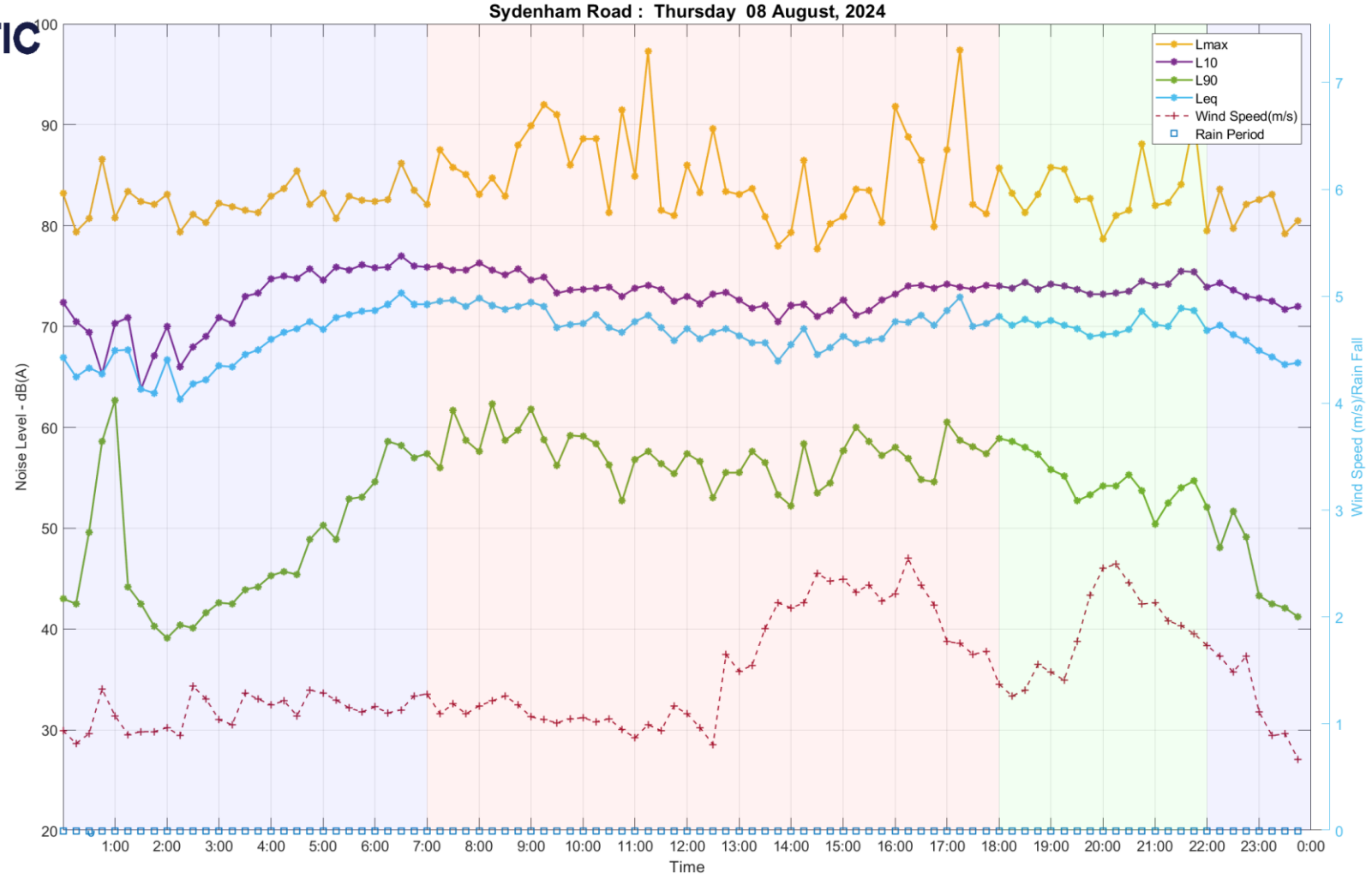
Sydenham Road : Thursday 08 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
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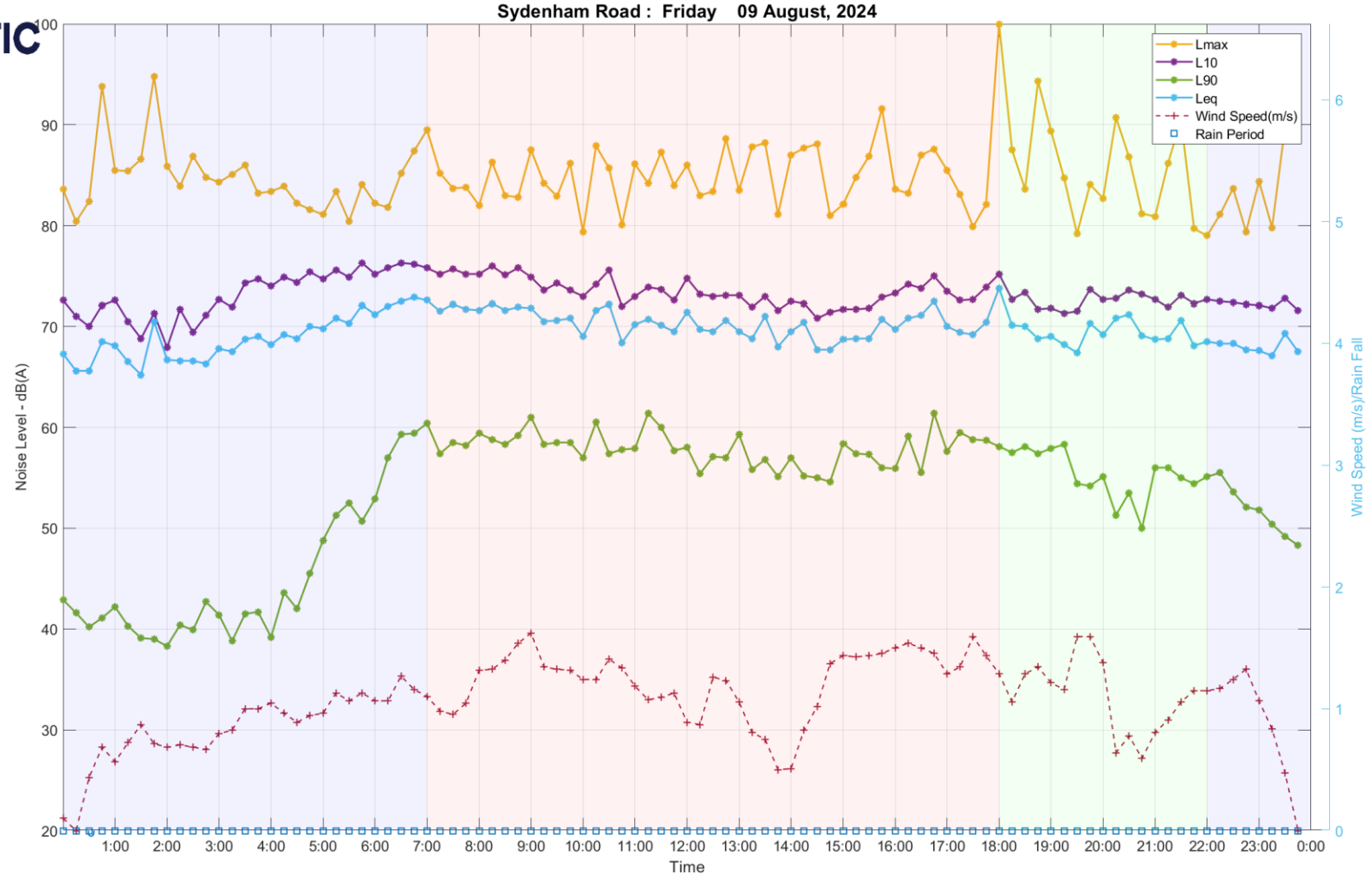
Sydenham Road : Friday 09 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
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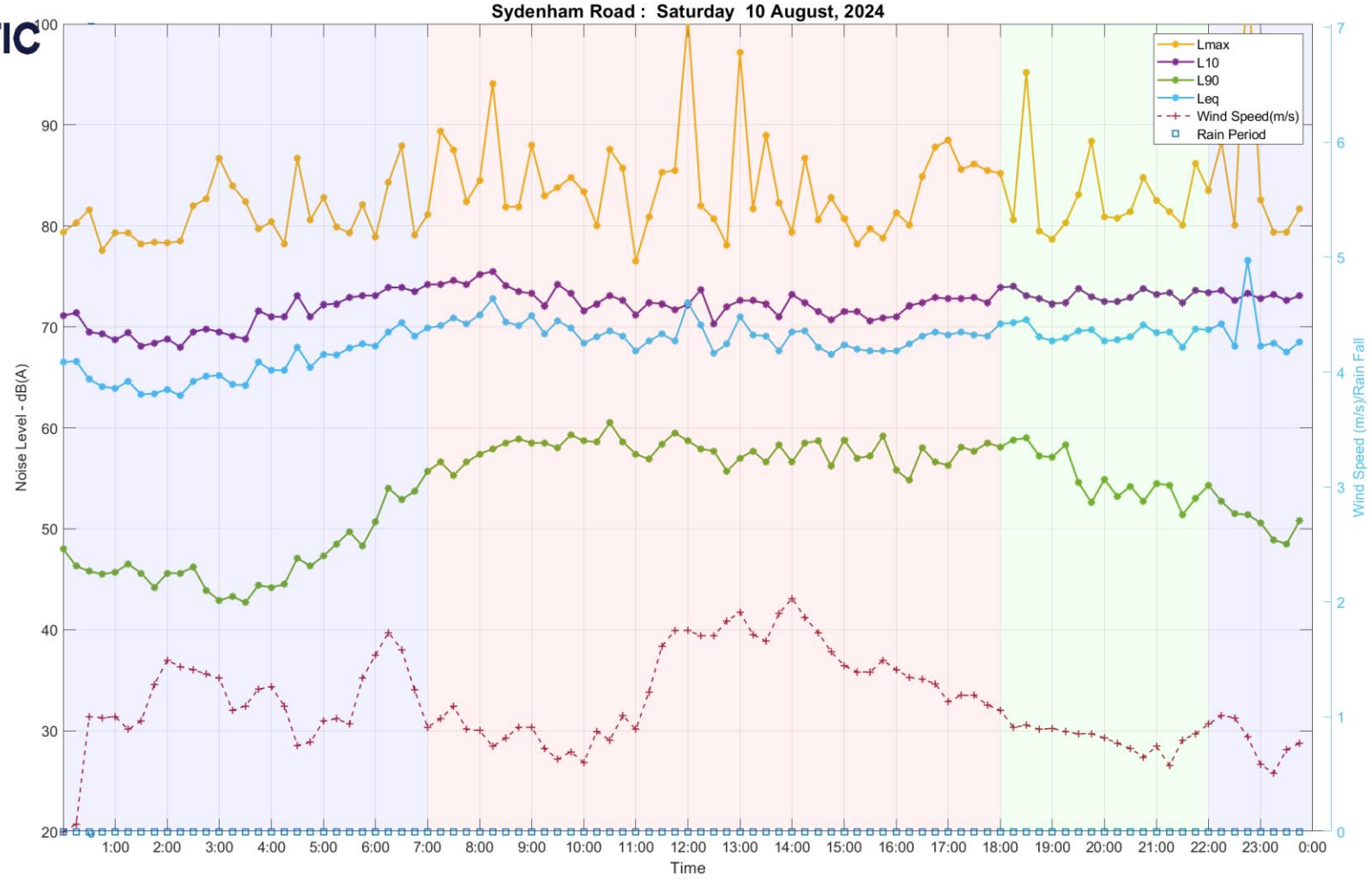
Sydenham Road : Saturday 10 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
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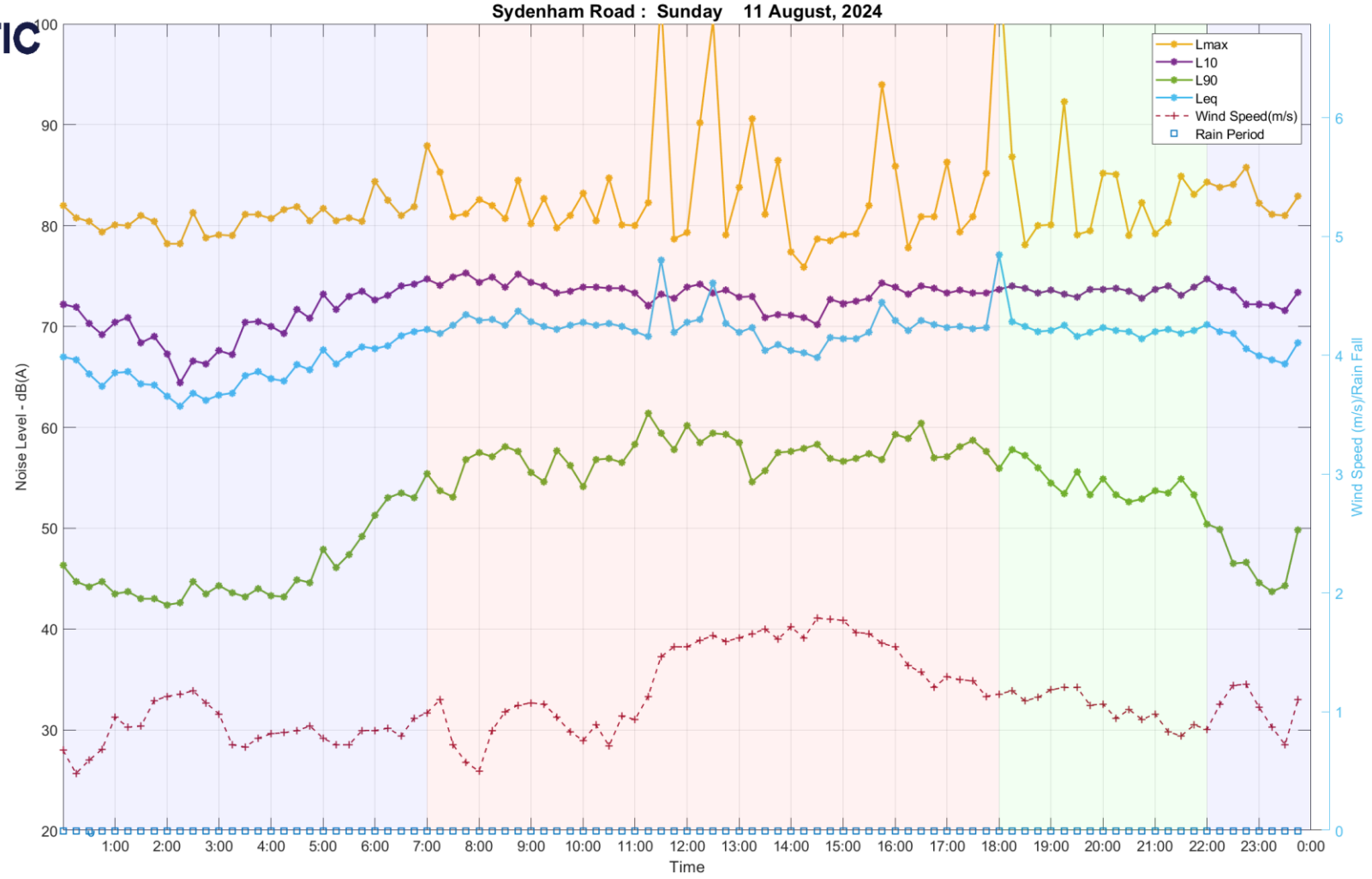
Sydenham Road : Sunday 11 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
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50
40
30
20
6
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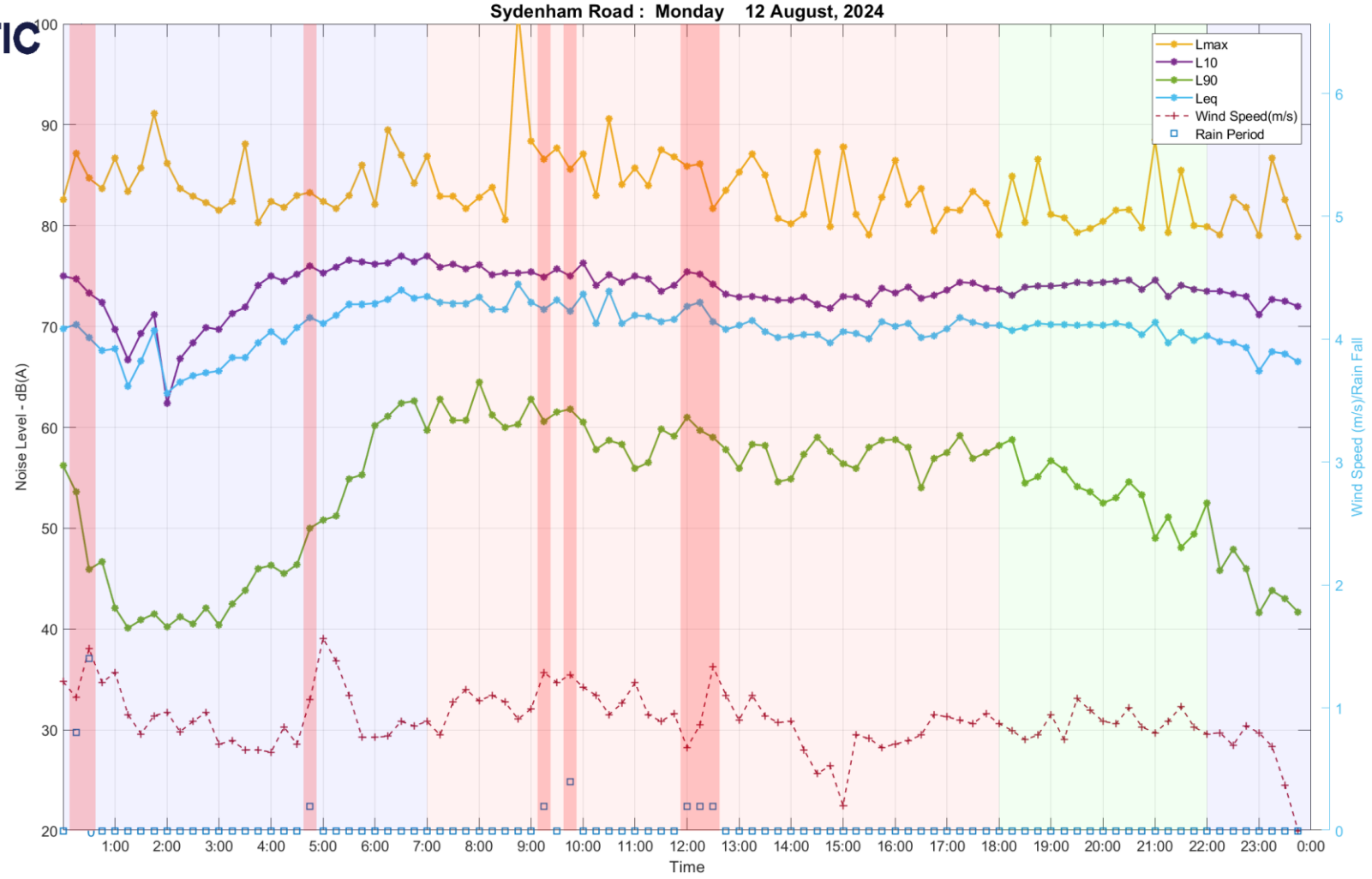
Sydenham Road : Monday 12 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
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40
30
20
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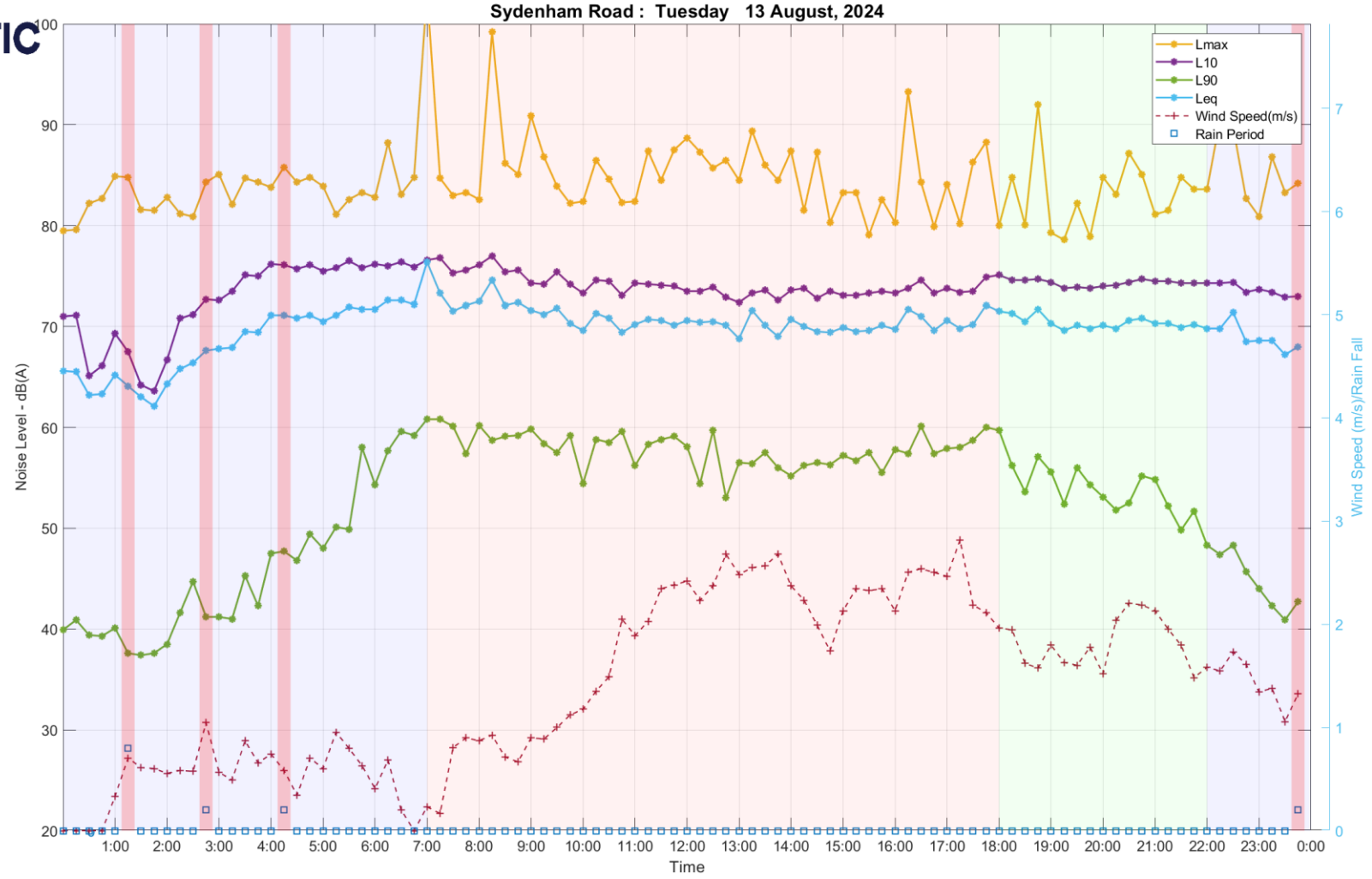
Sydenham Road : Tuesday 13 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
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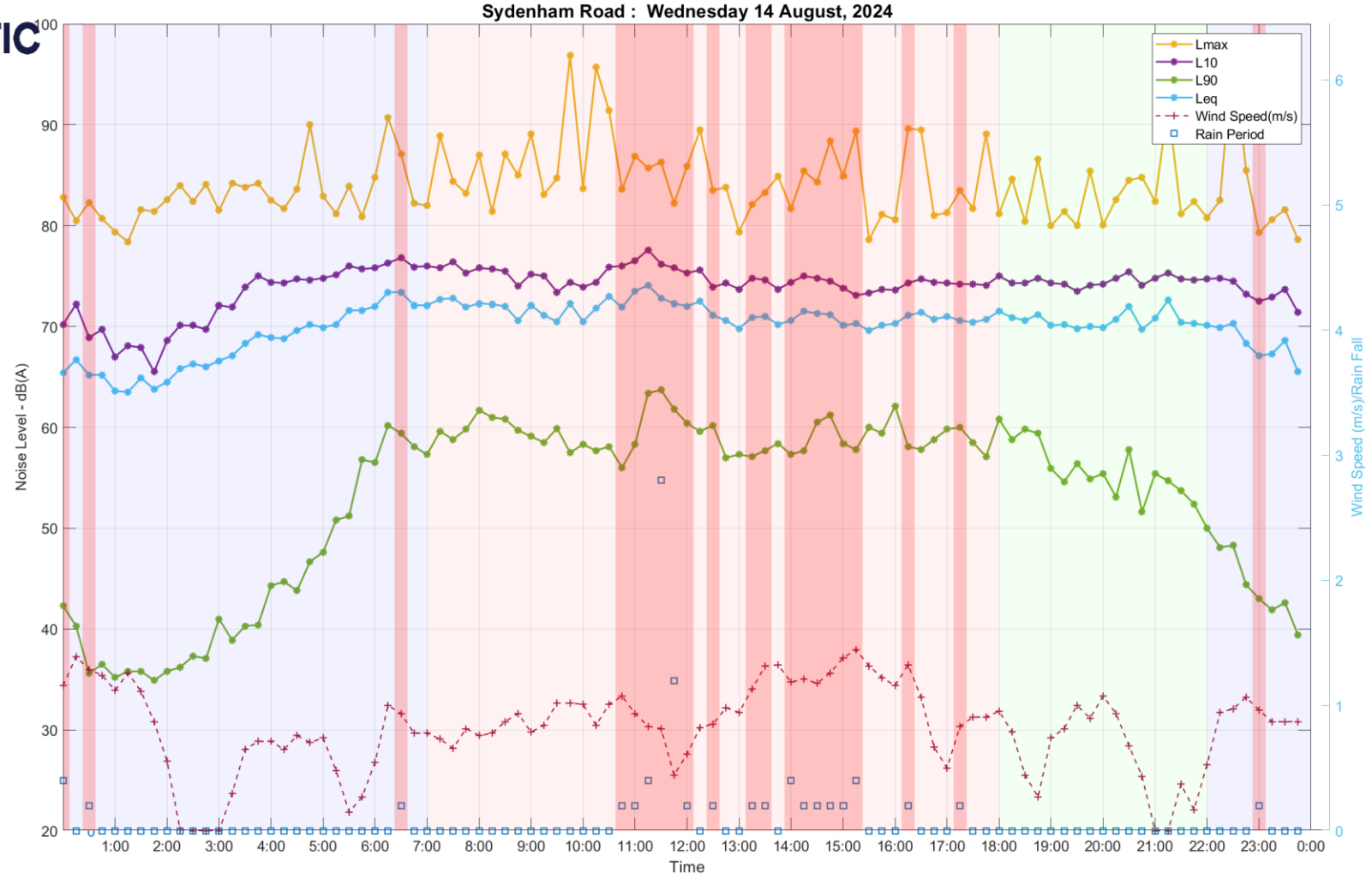
Sydenham Road : Wednesday 14 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
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30
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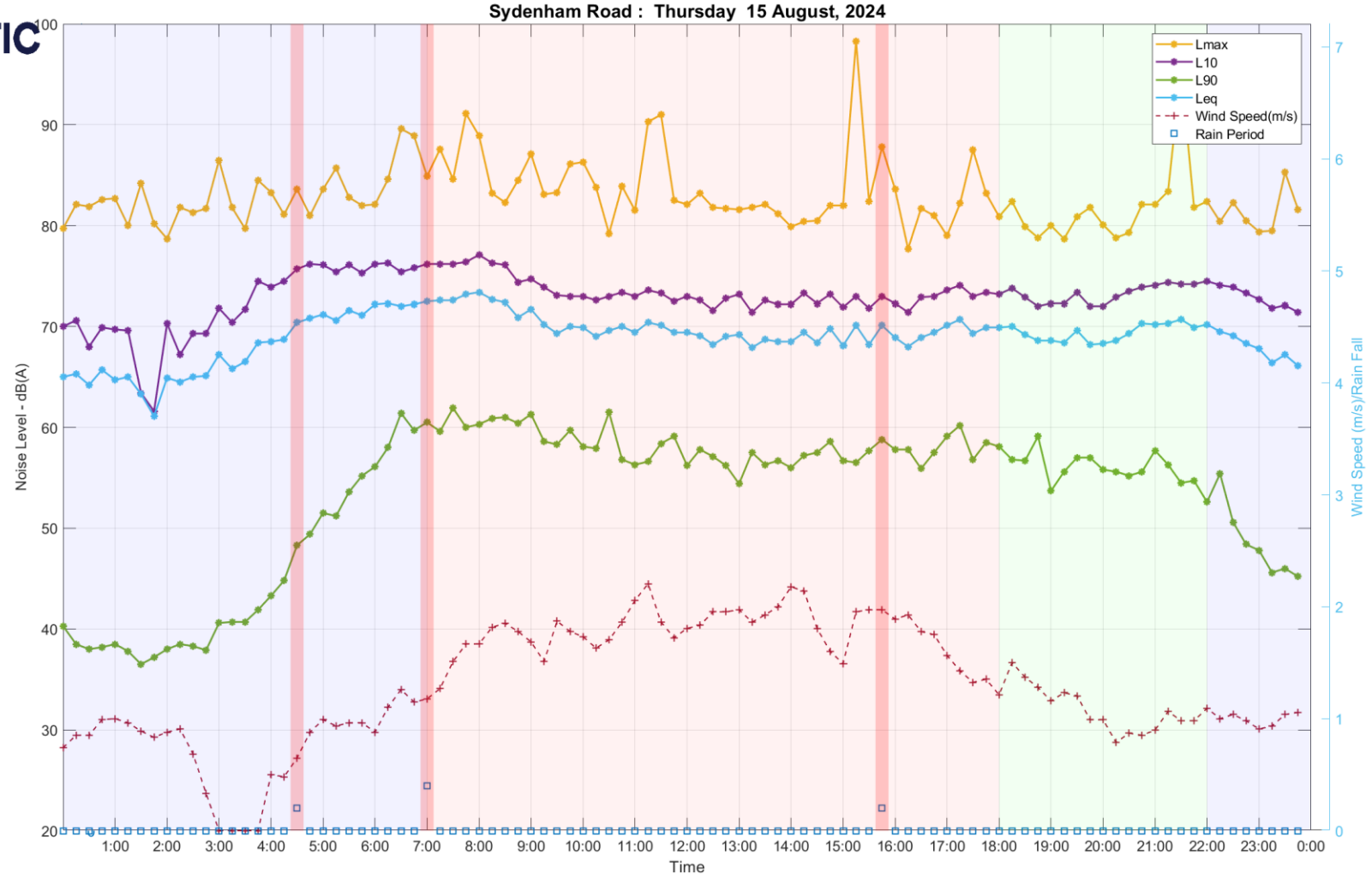
Sydenham Road : Thursday 15 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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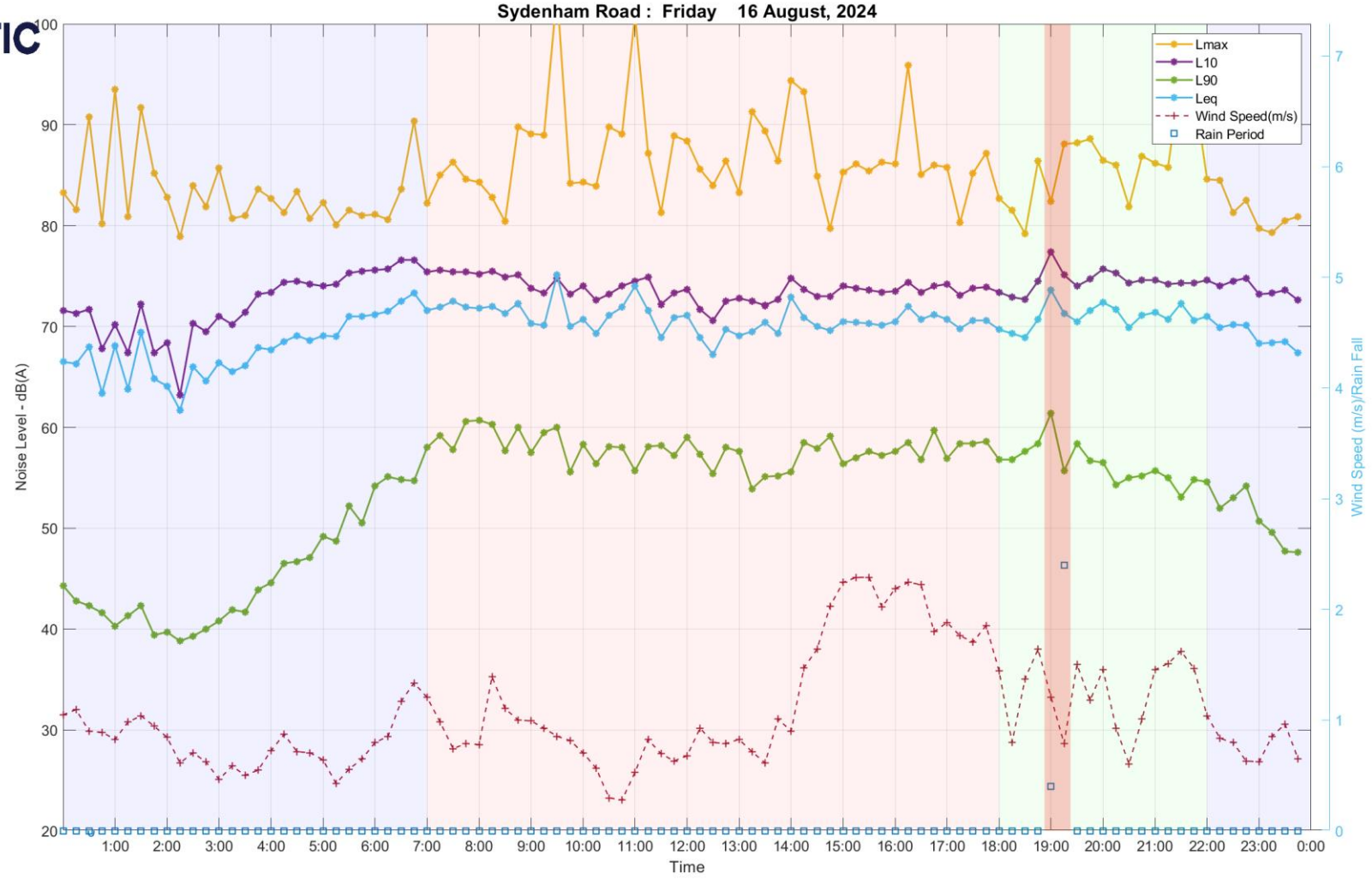
Sydenham Road : Friday 16 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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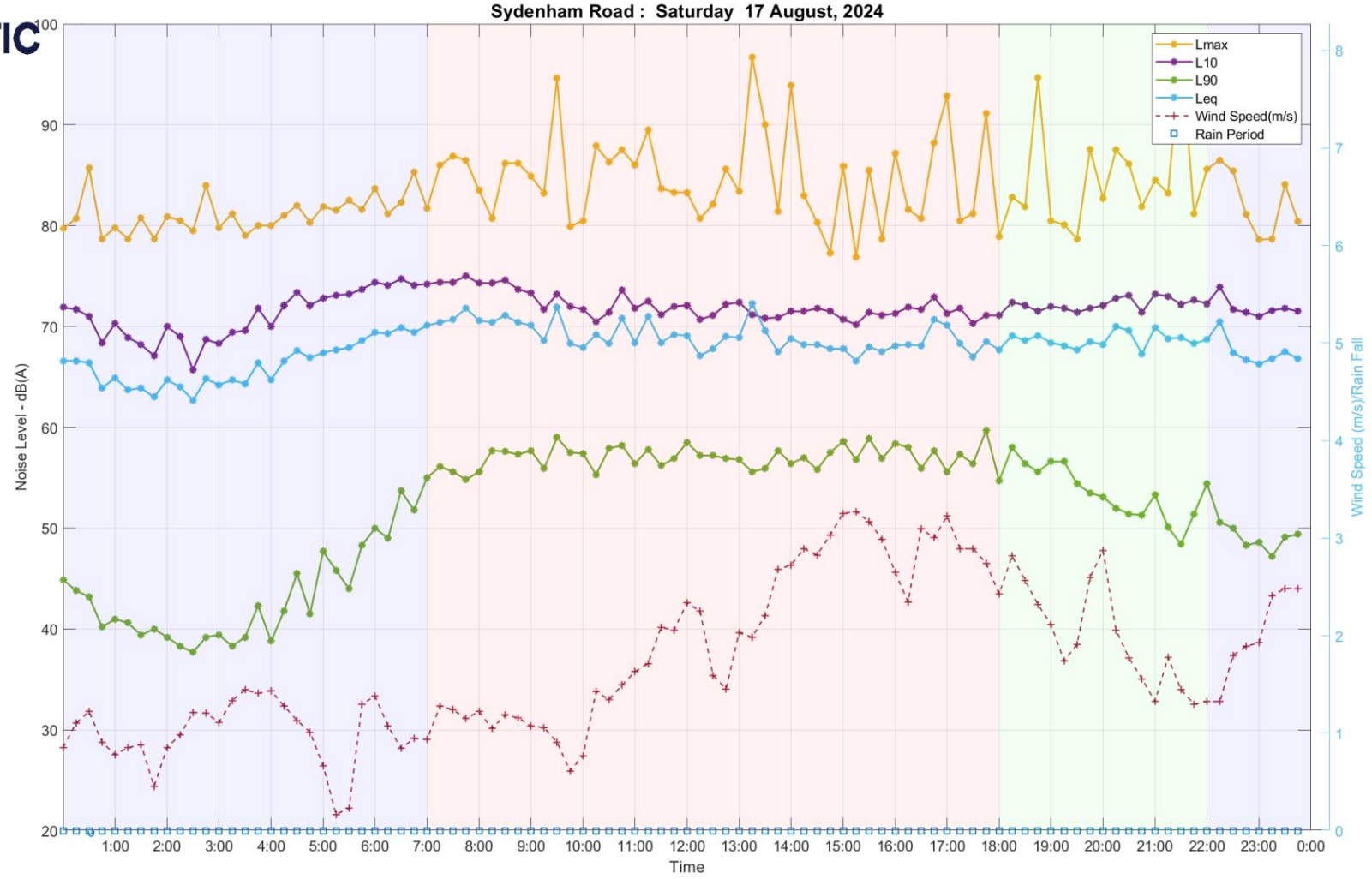
Sydenham Road : Saturday 17 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
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80
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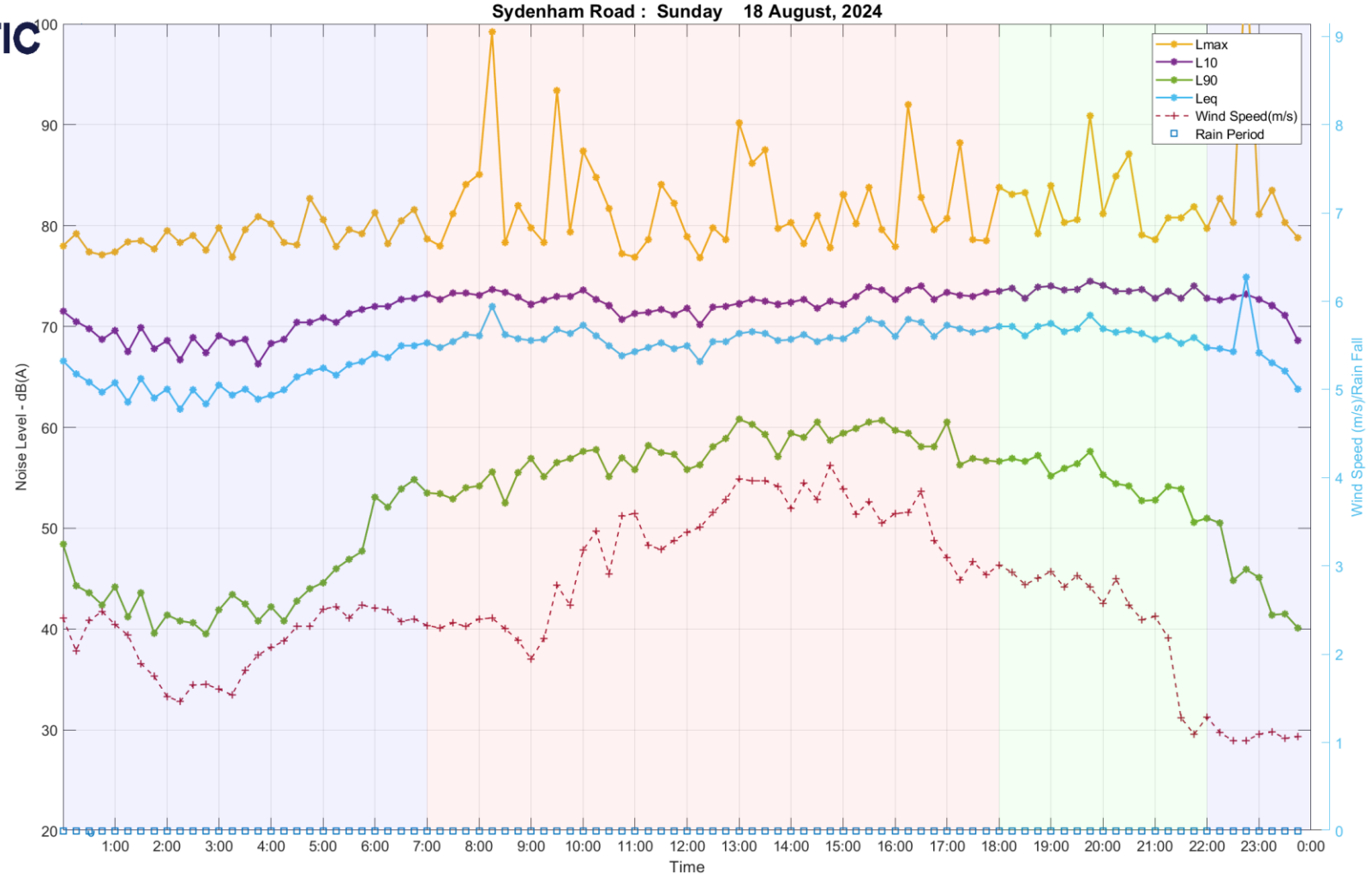
Sydenham Road : Sunday 18 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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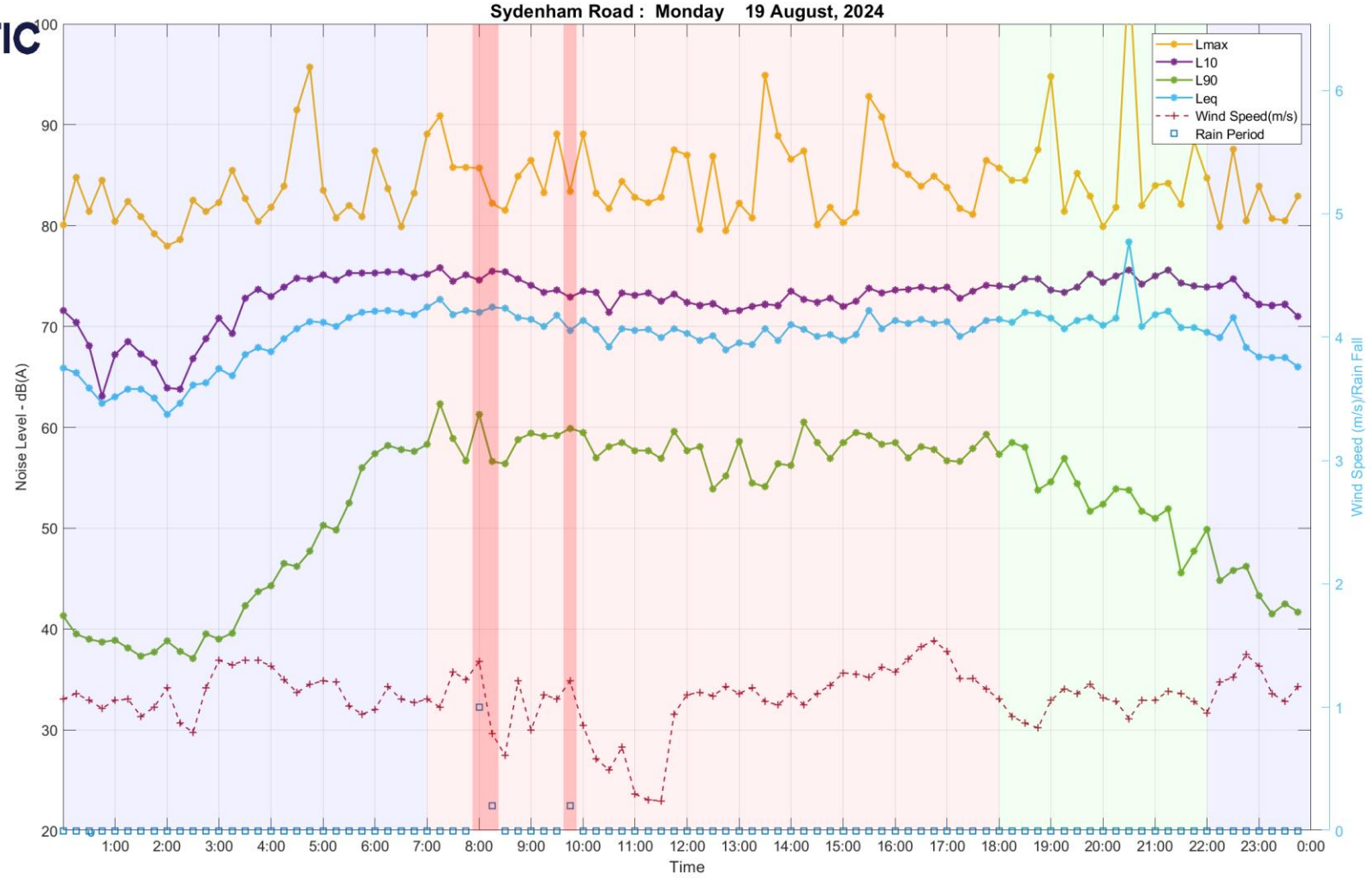
Sydenham Road : Monday 19 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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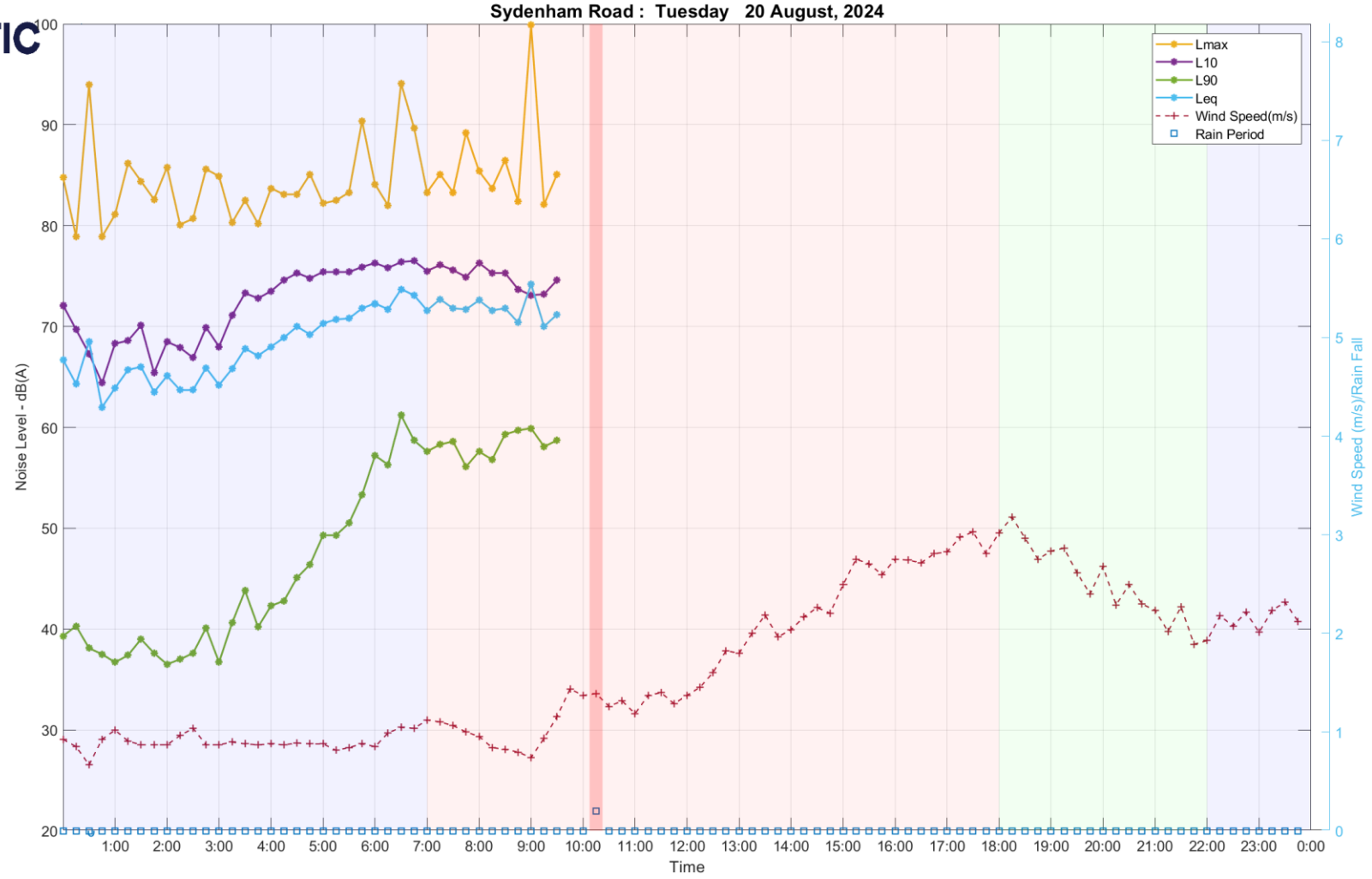
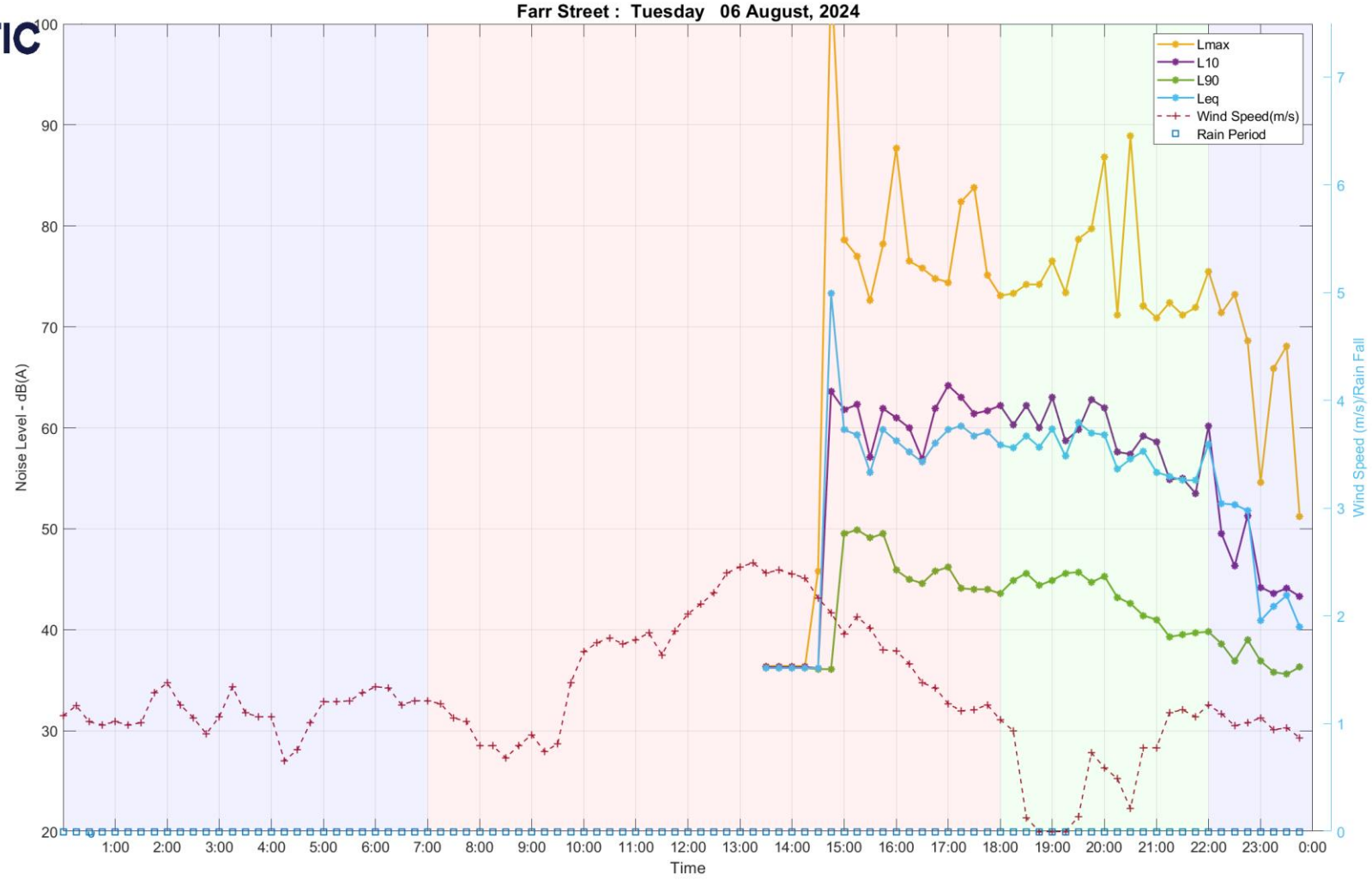


Wind Speed is corrected using factor 0.3333 based on logger location

A.3.3 North West Façade – Farr Street


Farr Street : Tuesday 06 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
2:00
3:00
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23:00
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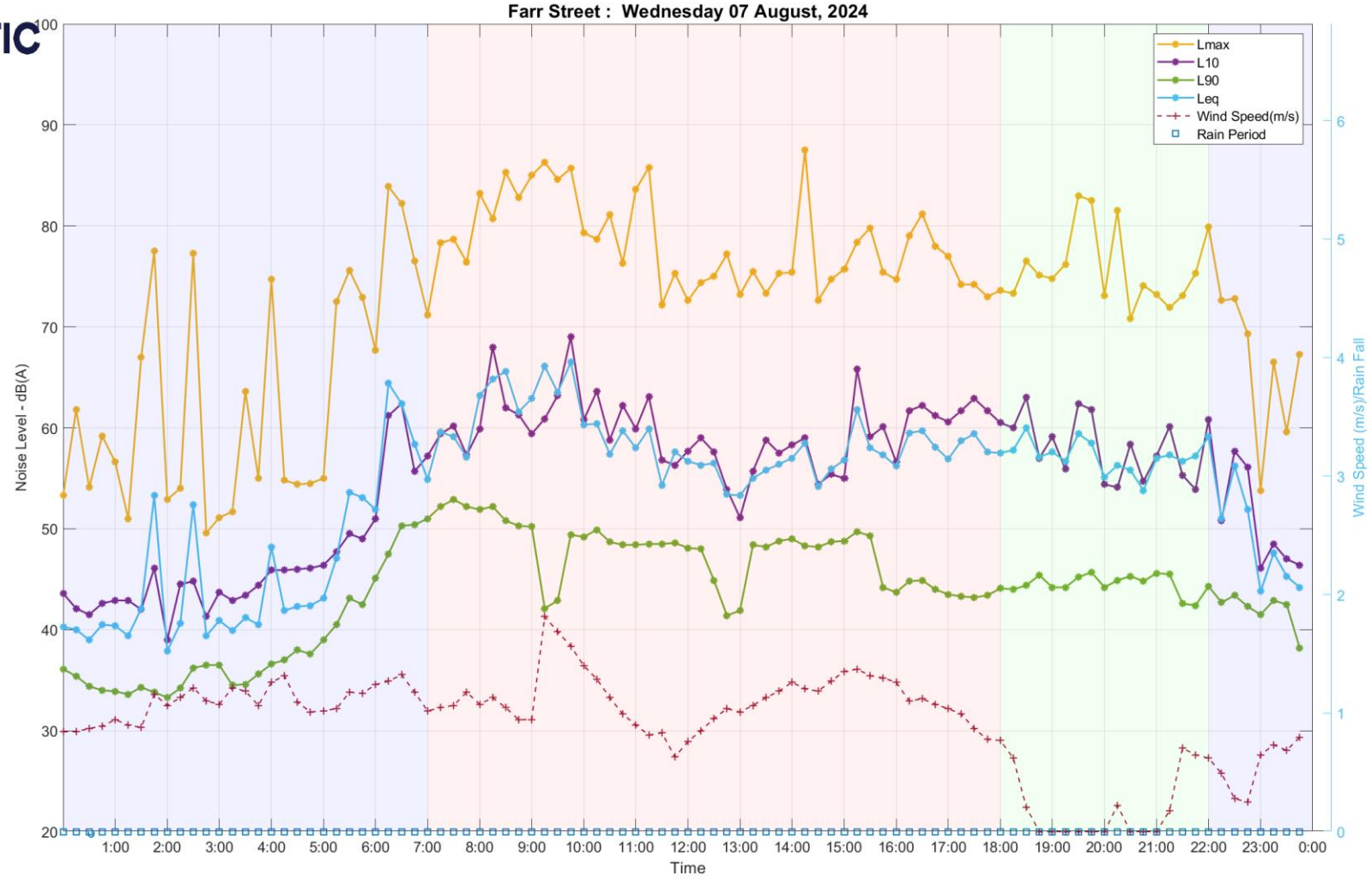
Farr Street : Wednesday 07 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
5
4
3
2
1
0
1:00
2:00
3:00
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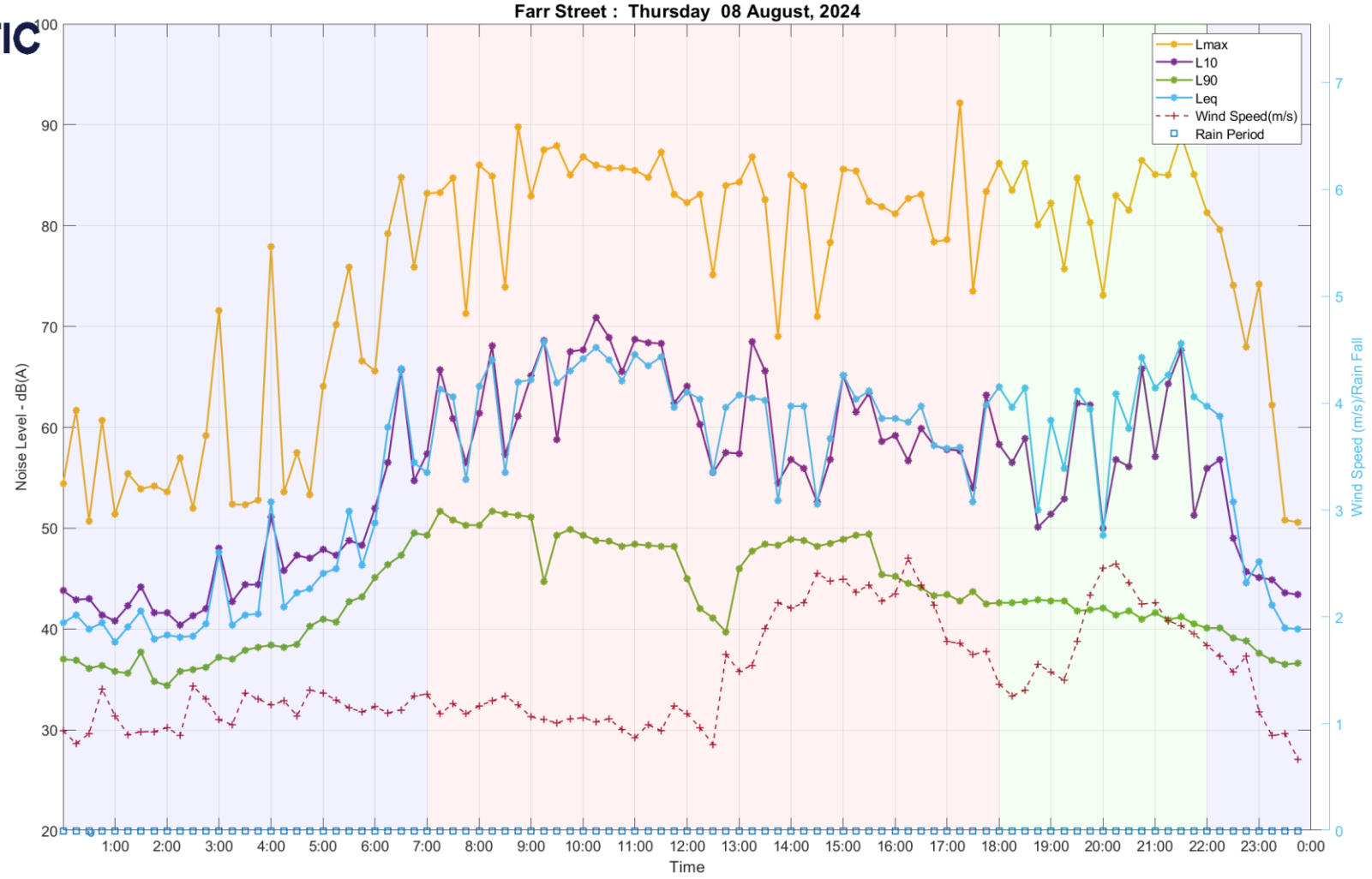
Farr Street : Thursday 08 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
6
5
4
3
2
1
0
1:00
2:00
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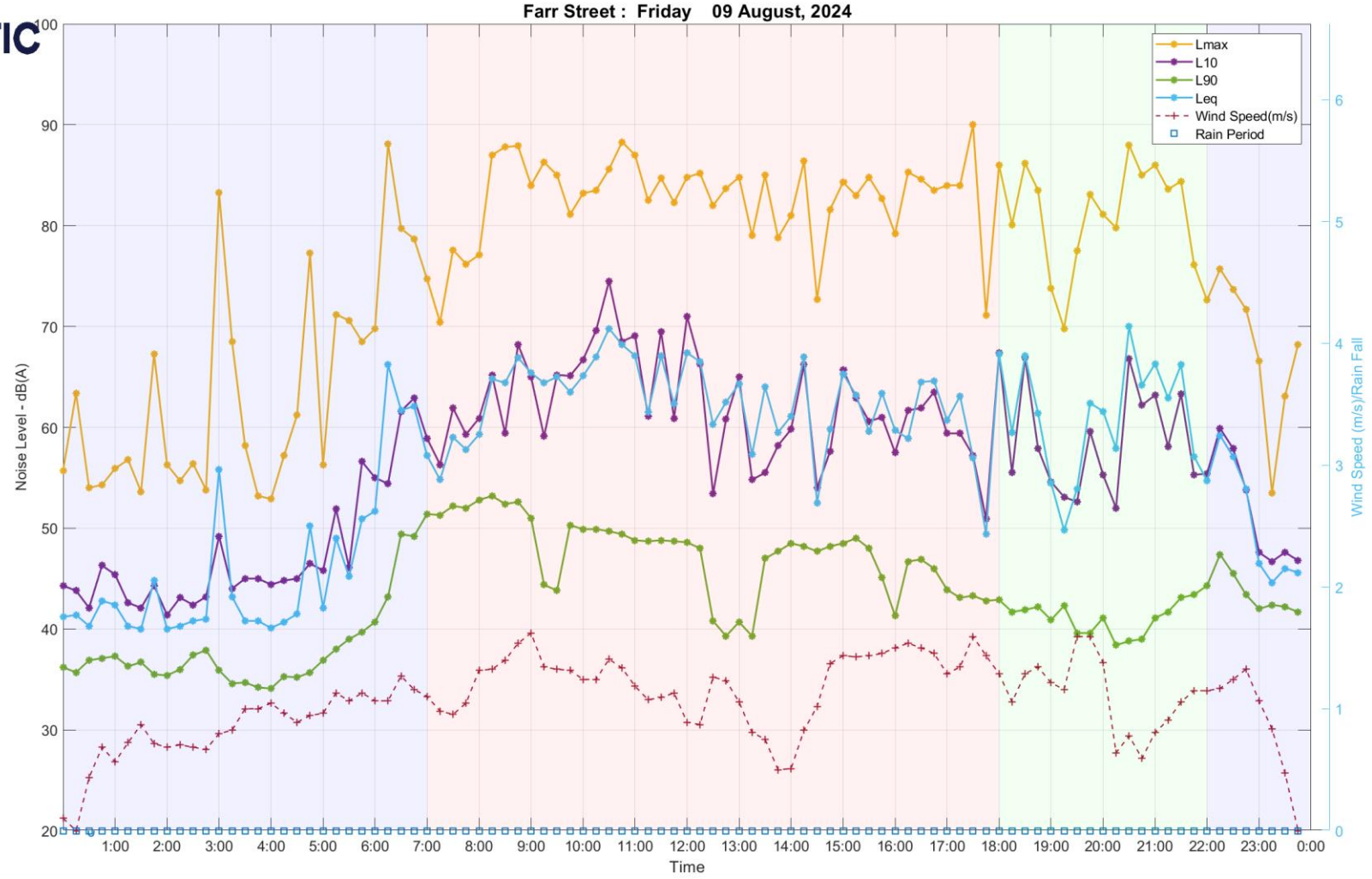
Farr Street : Friday 09 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
5
4
3
2
1
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1:00
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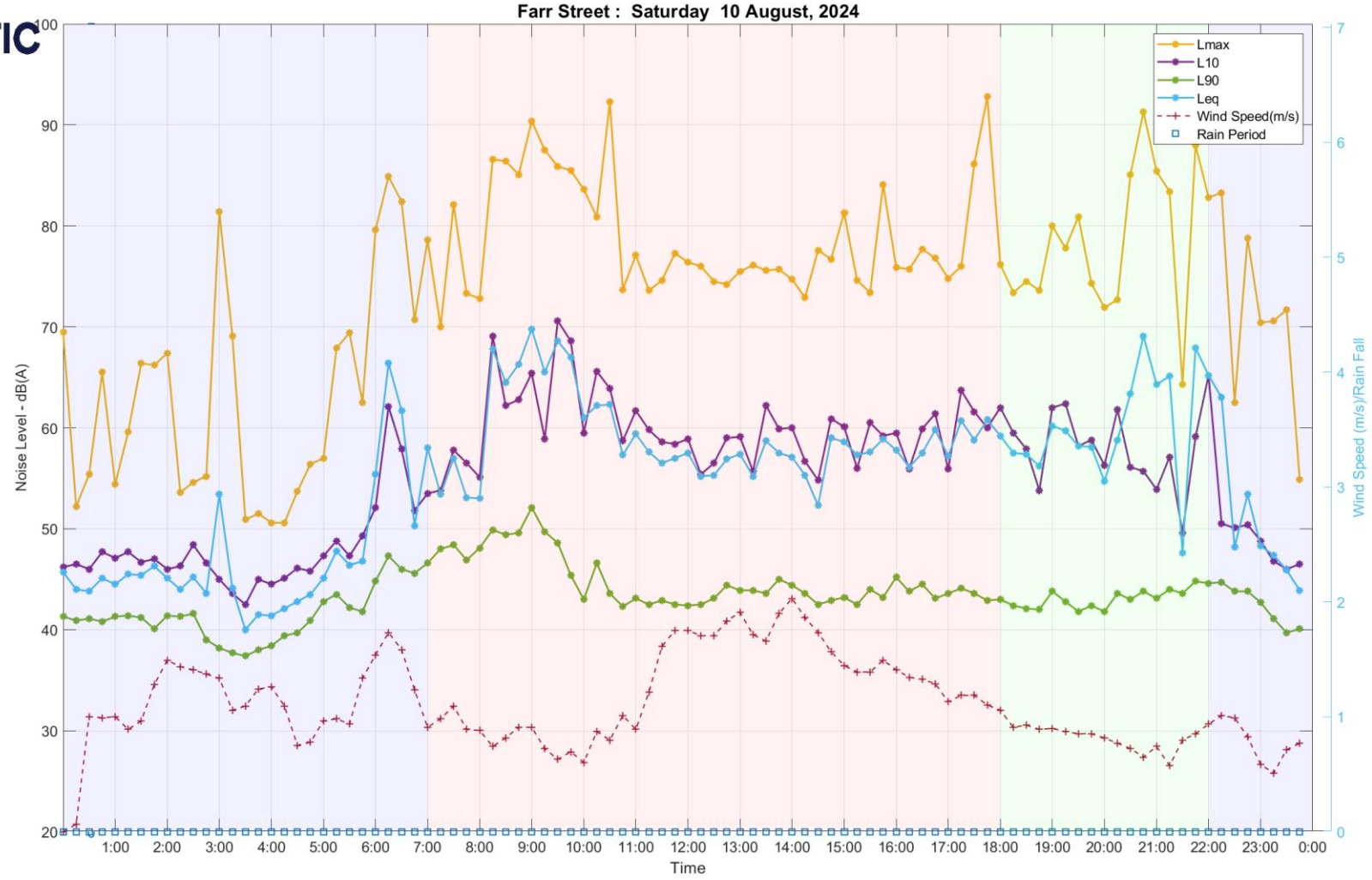
Farr Street : Saturday 10 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
6
5
4
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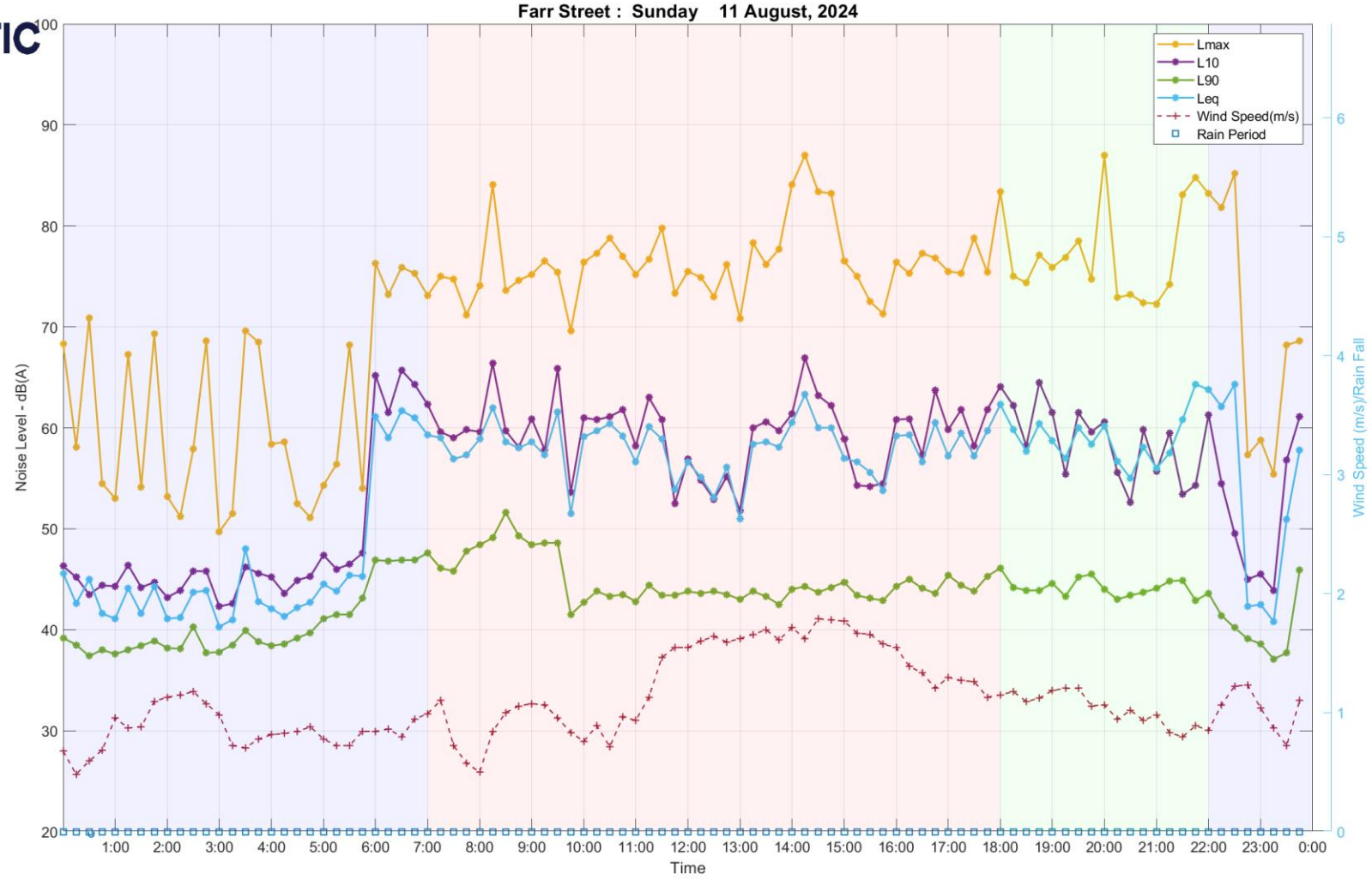
Farr Street : Sunday 11 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
5
4
3
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1:00
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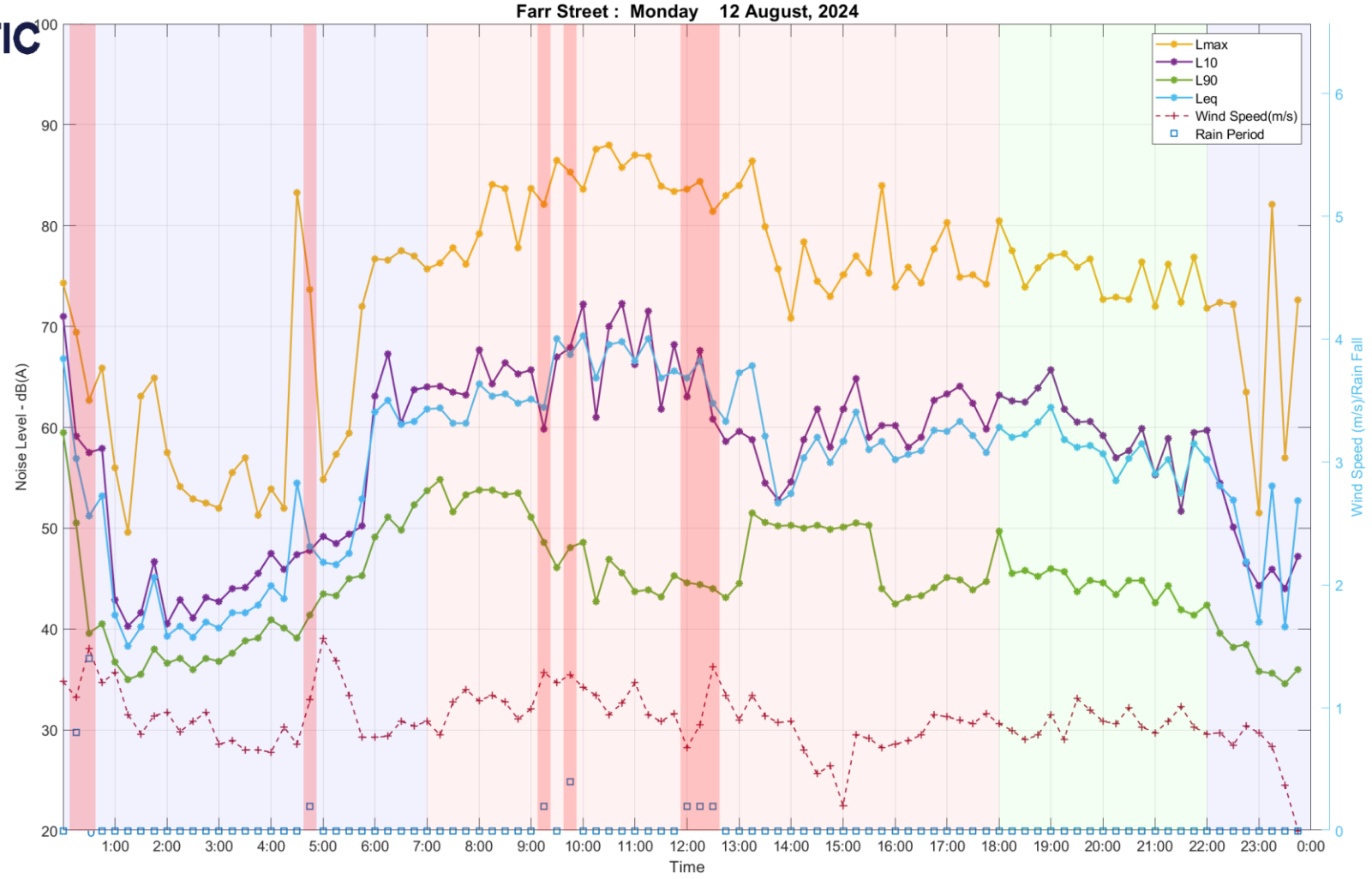
Farr Street : Monday 12 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
5
4
3
2
1
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1:00
2:00
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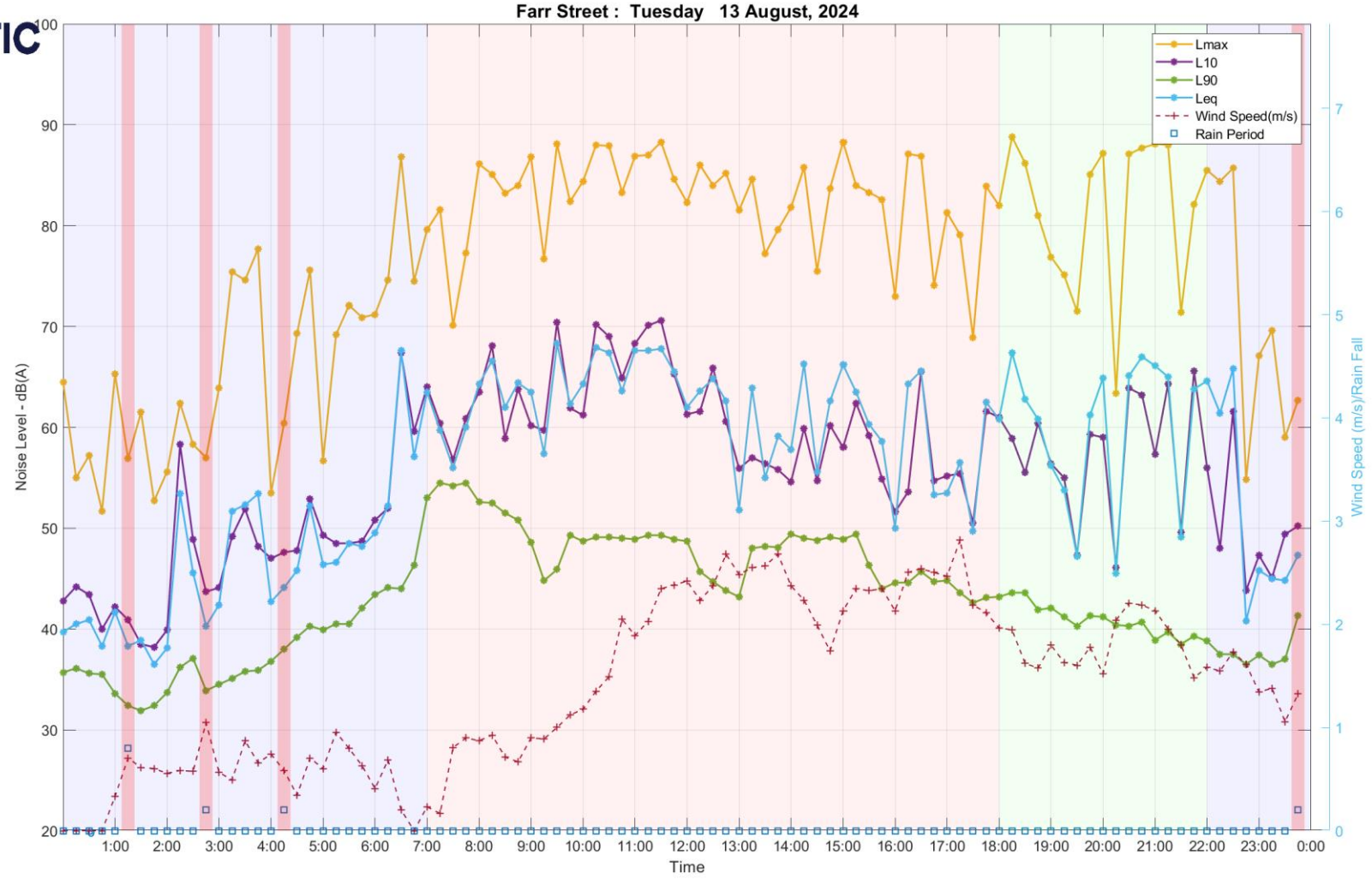
Farr Street : Tuesday 13 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
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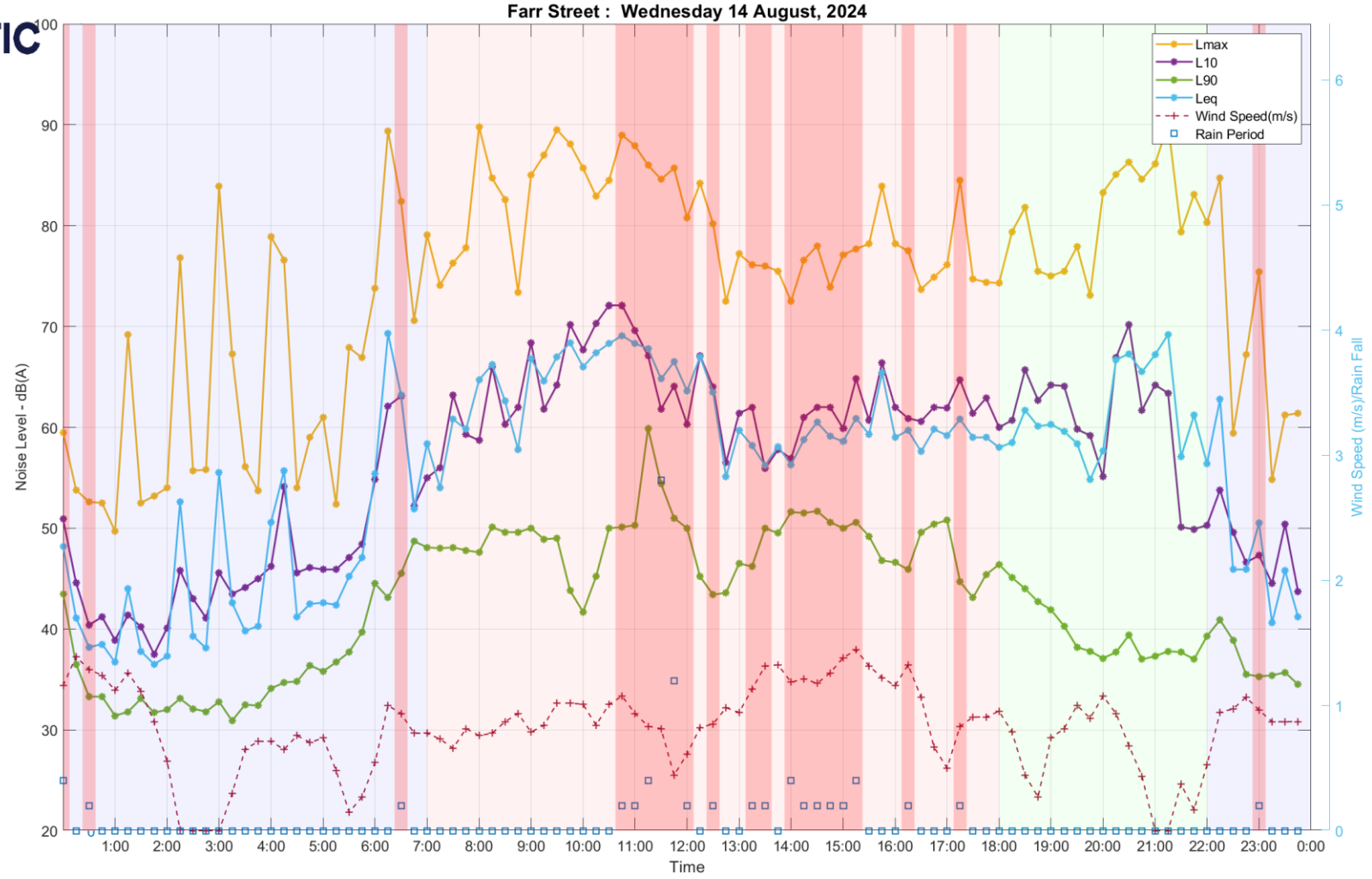
Farr Street : Wednesday 14 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
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20
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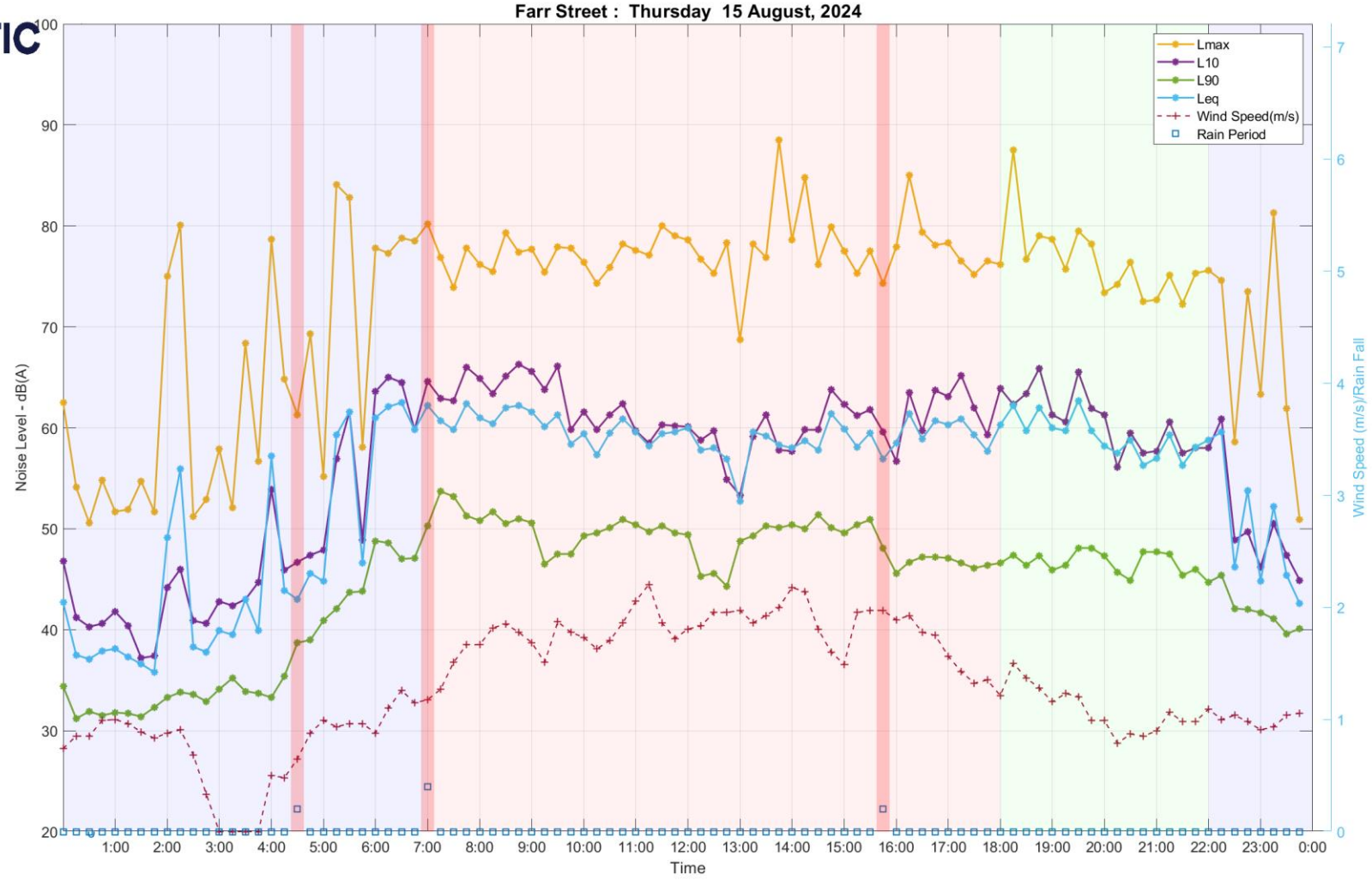
Farr Street : Thursday 15 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
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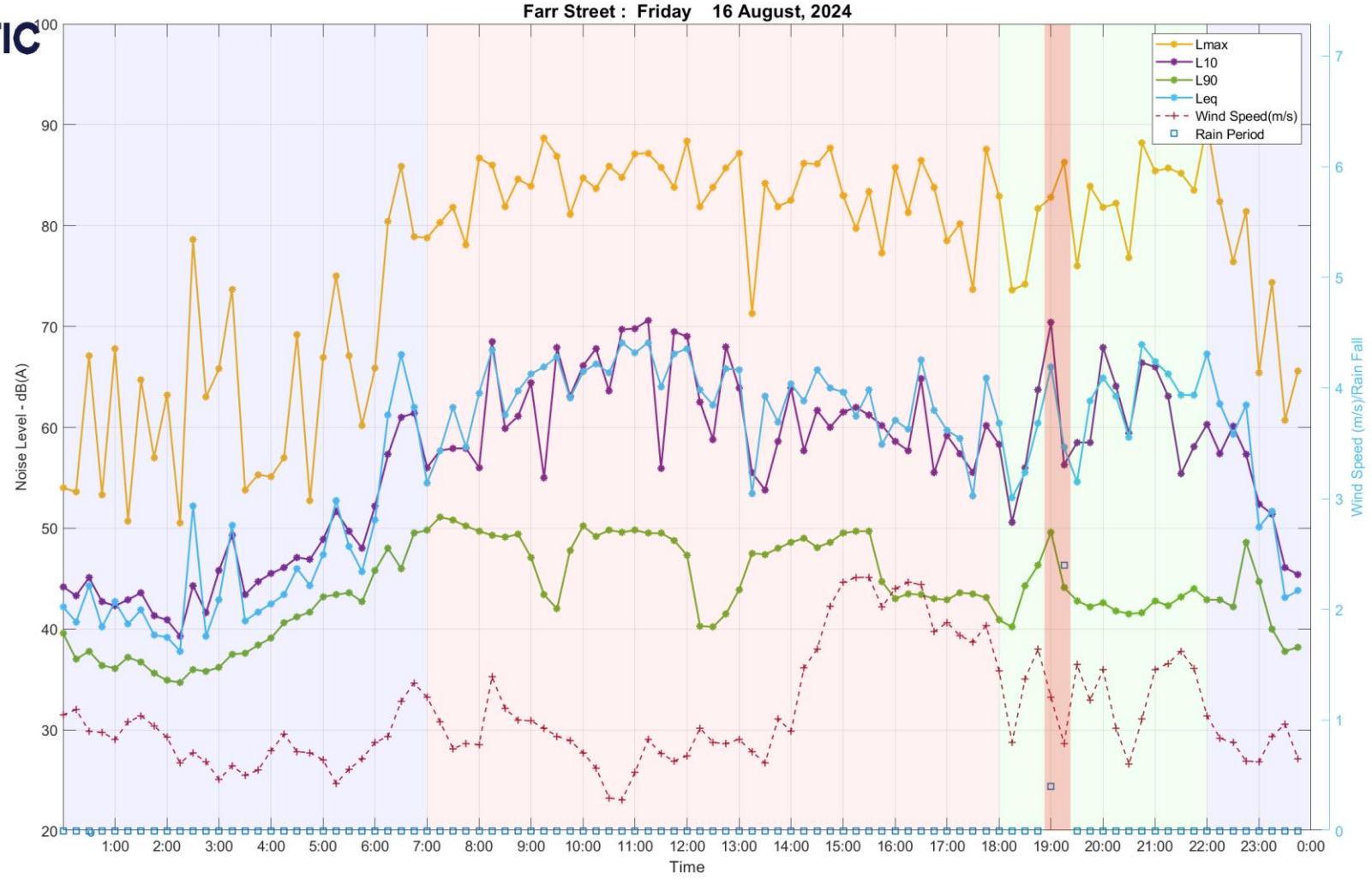
Farr Street : Friday 16 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
7
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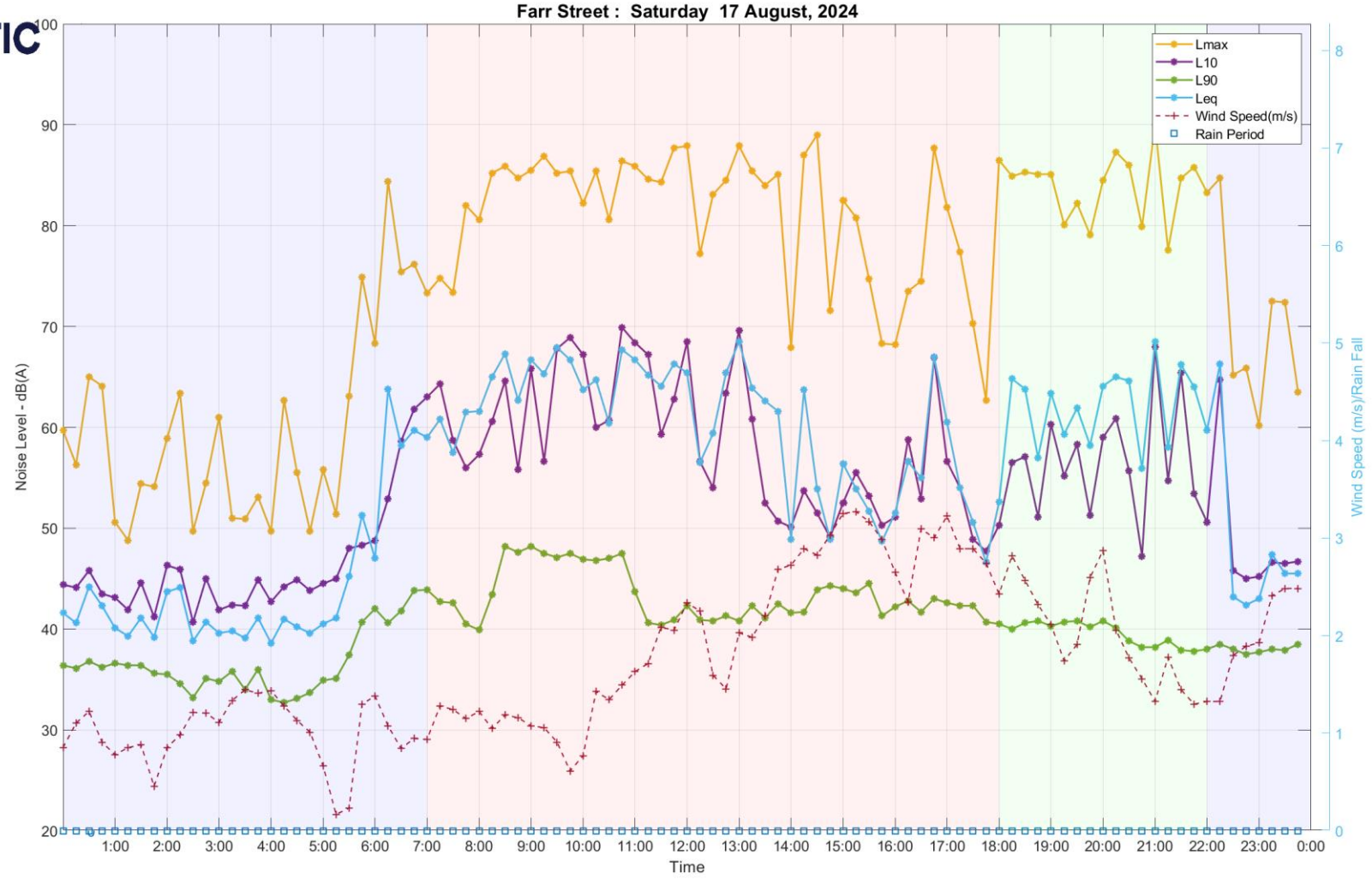
Farr Street : Saturday 17 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
8
7
6
5
4
3
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1
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1:00
2:00
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23:00
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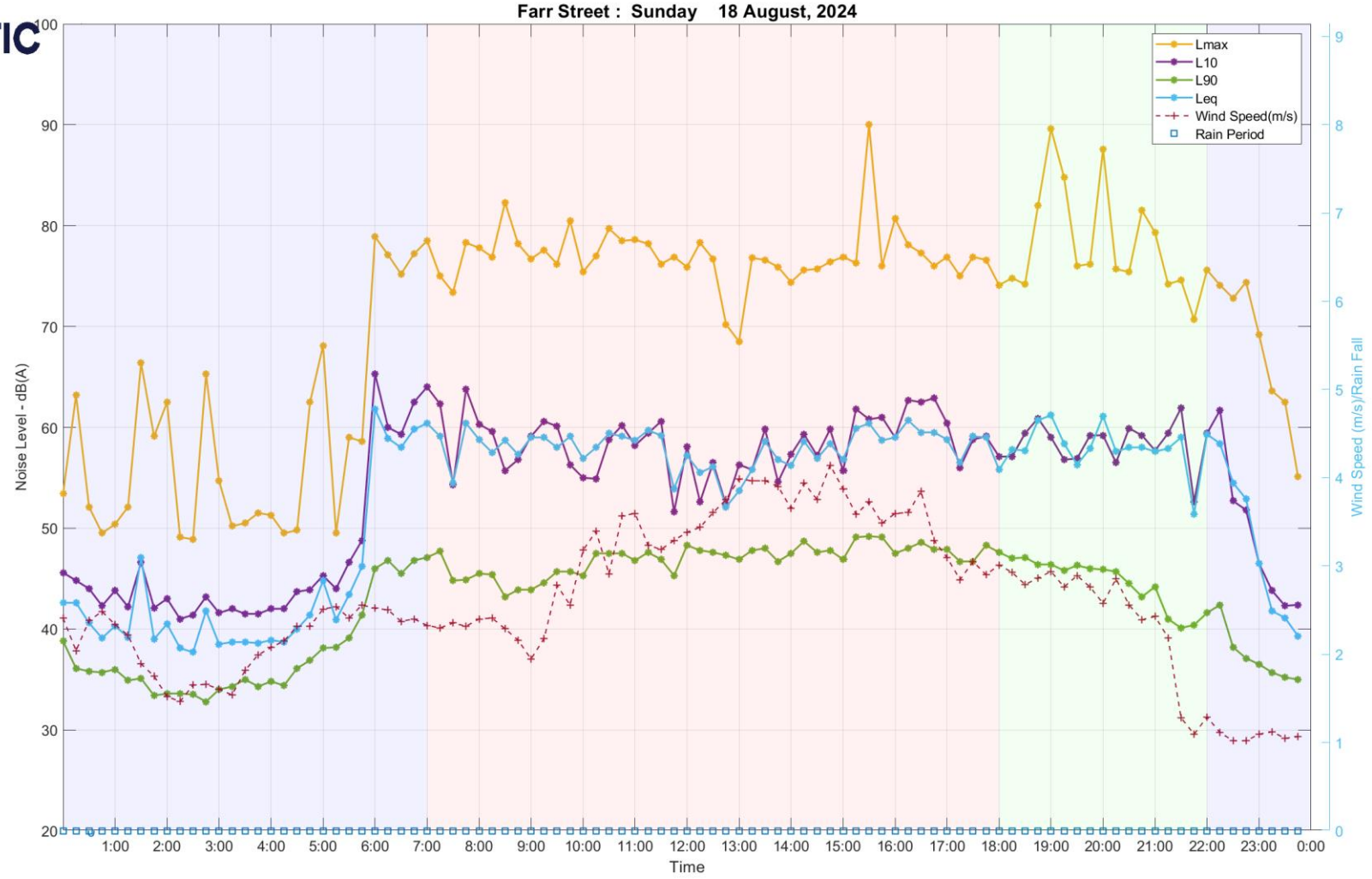
Farr Street : Sunday 18 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
9
8
7
6
5
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1:00
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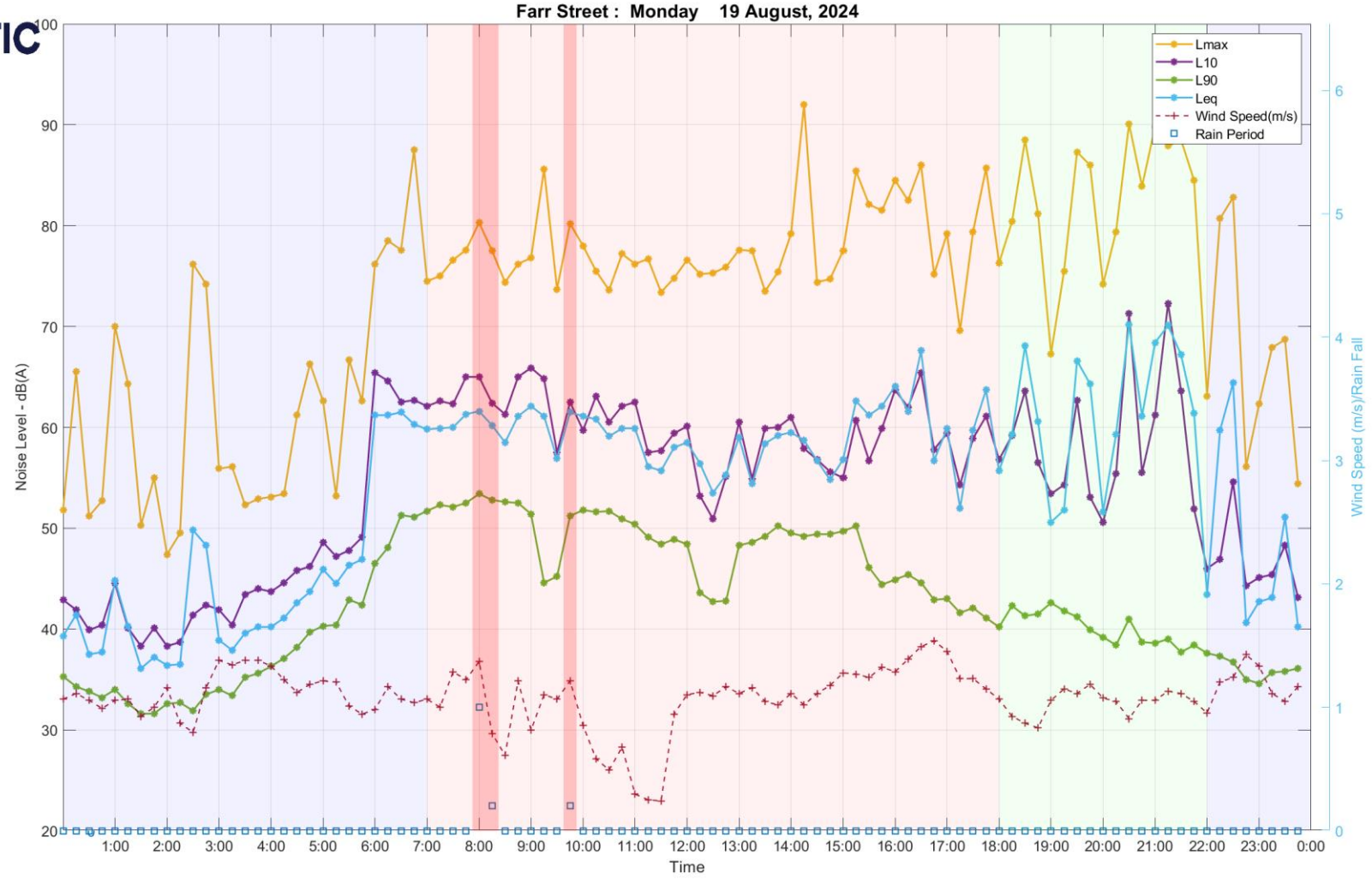
Farr Street : Monday 19 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
6
5
4
3
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1:00
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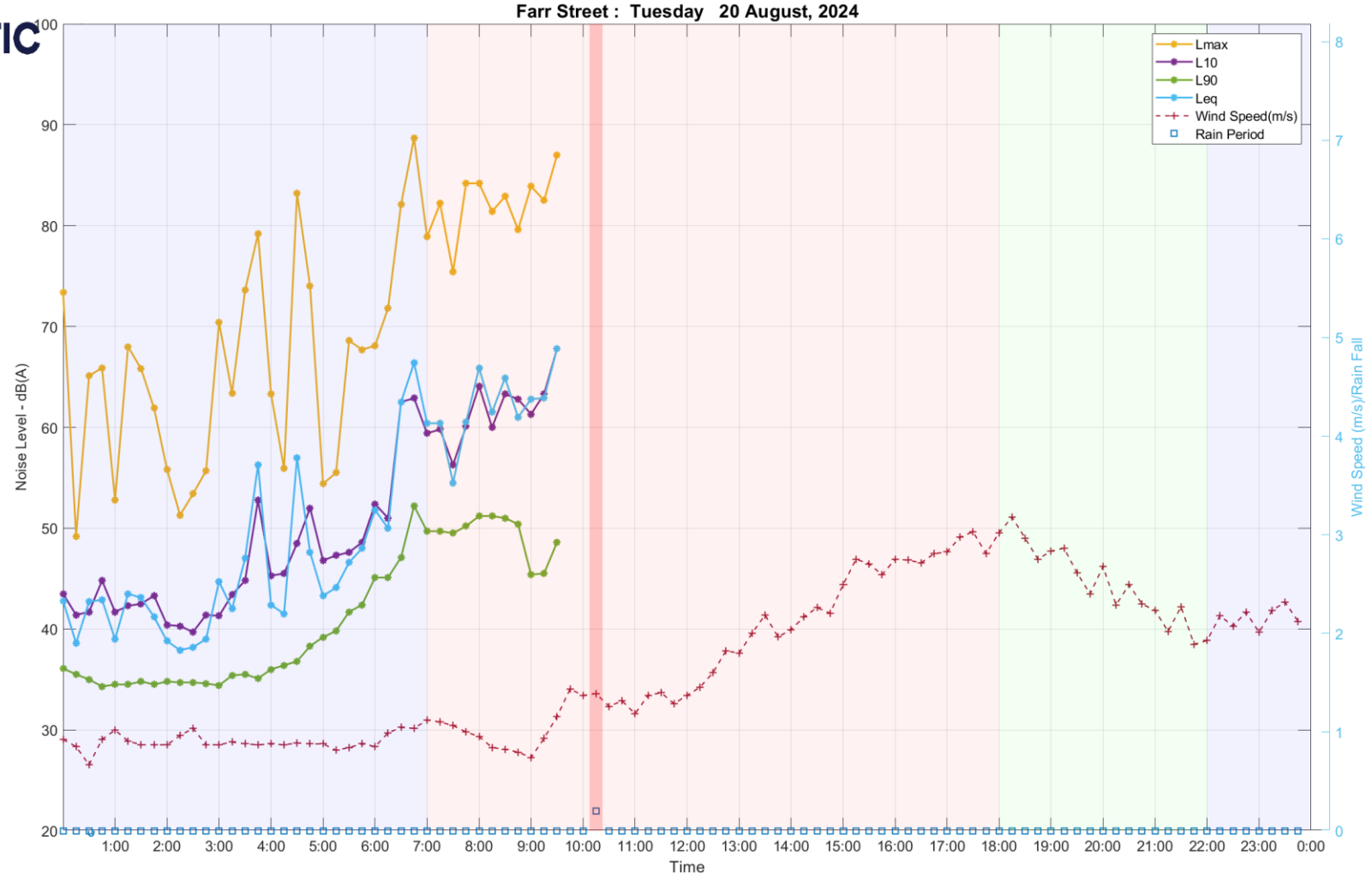
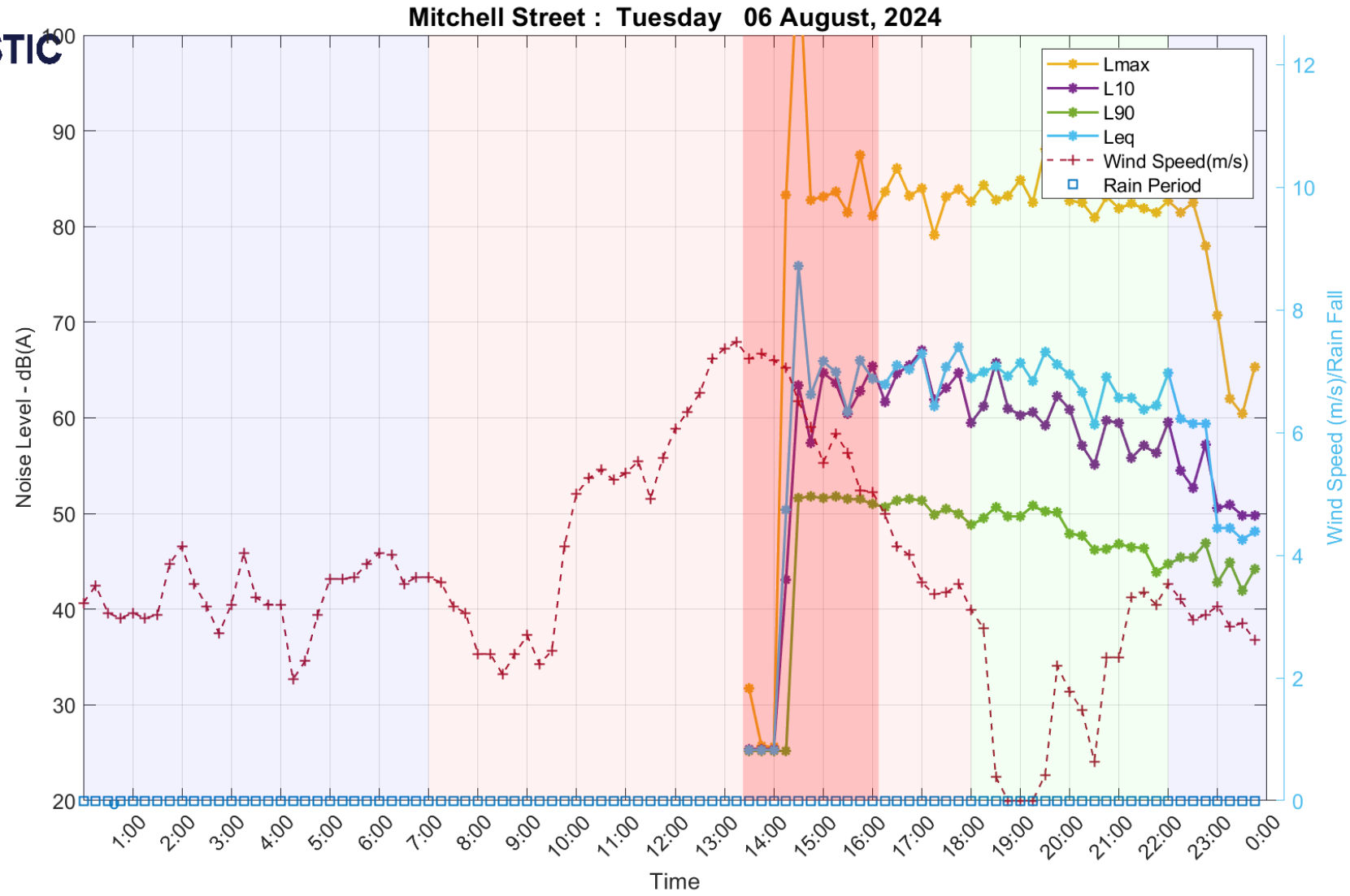


Wind Speed is corrected using factor 0.3333 based on logger location

A.3.4 North East Façade – Mitchell Street


Mitchell Street : Tuesday 06 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
1:00
2:00
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23:00
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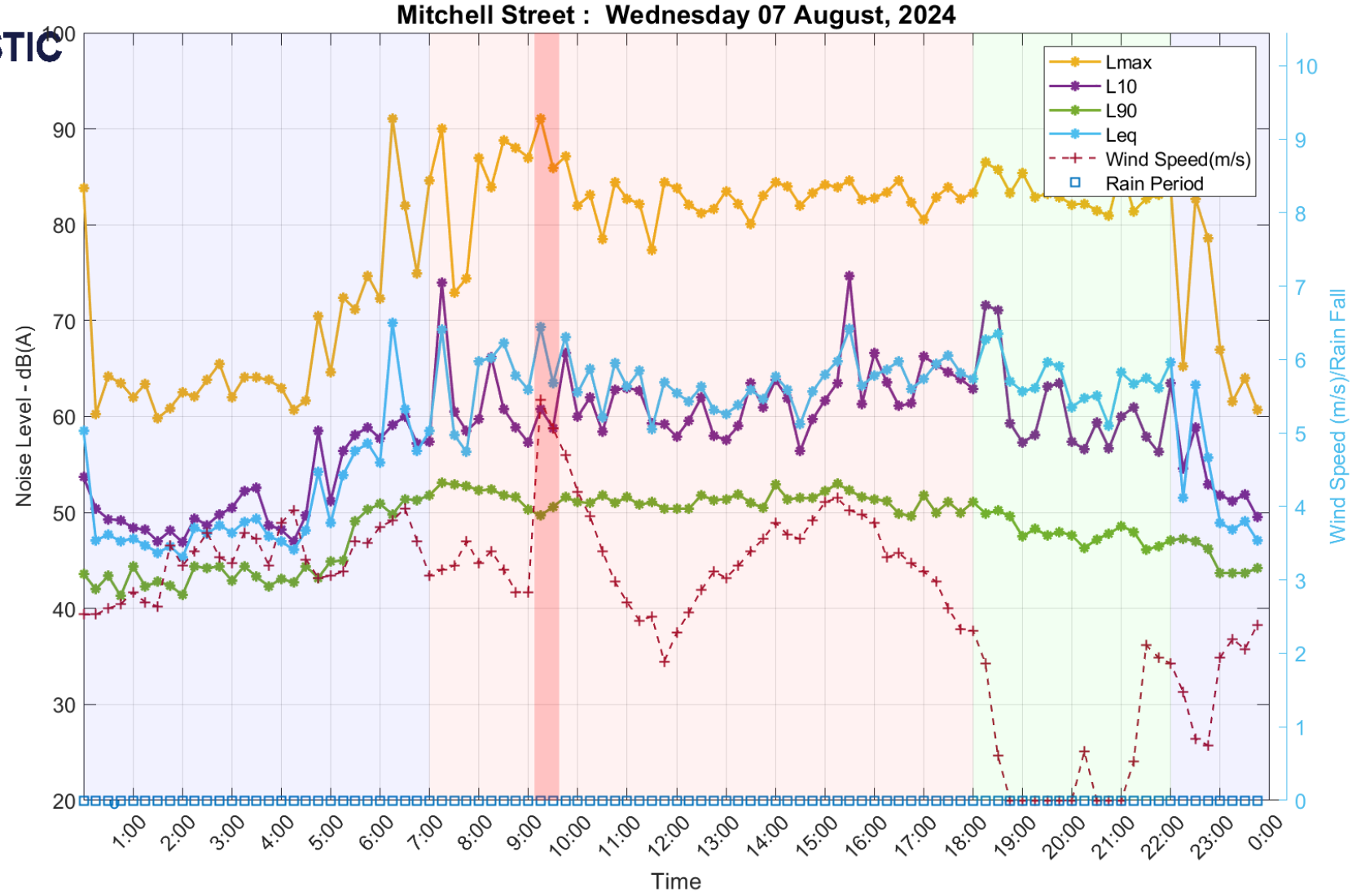
Mitchell Street : Wednesday 07 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
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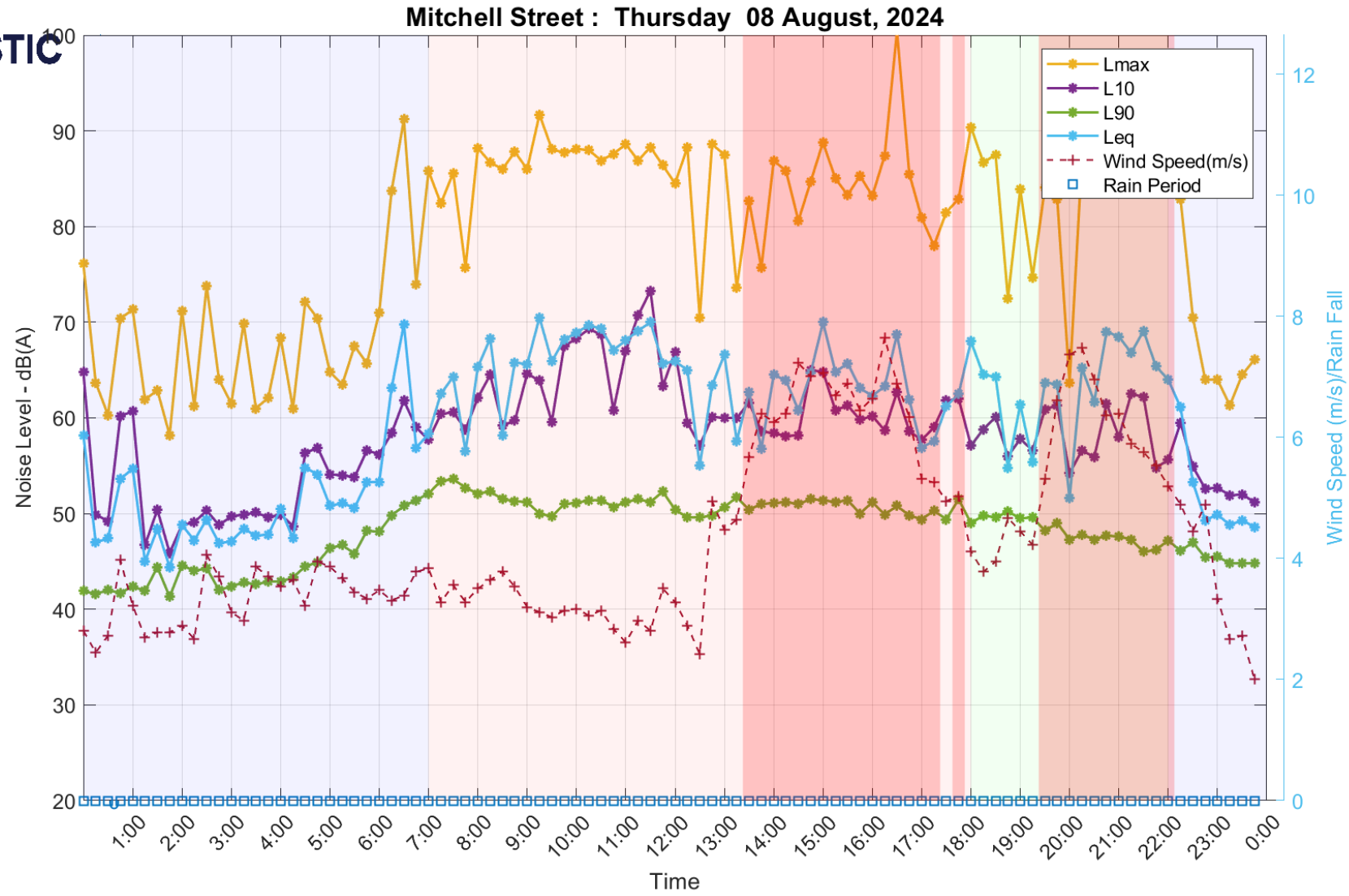
Mitchell Street : Thursday 08 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
12
10
8
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1:00
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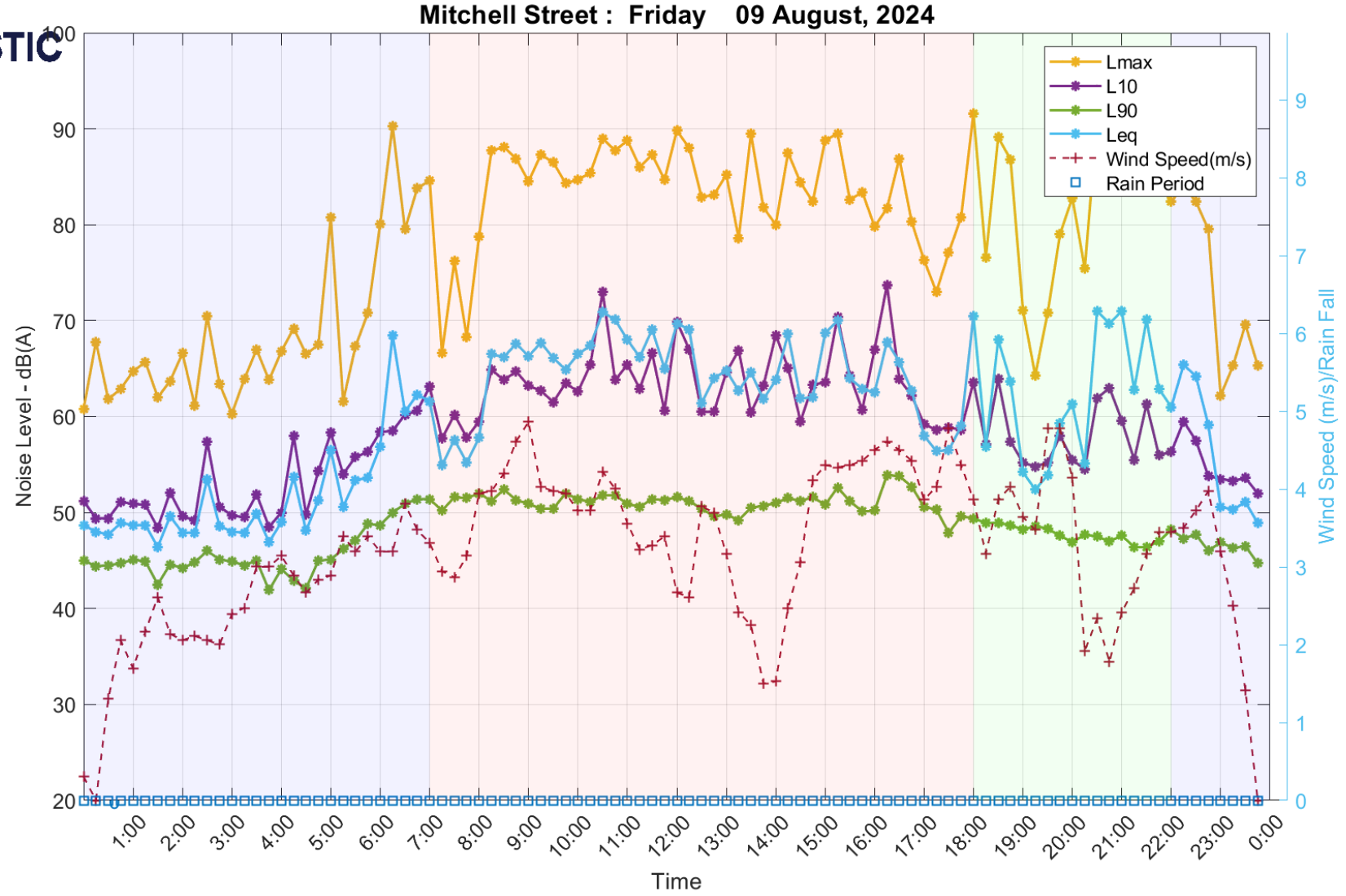
Mitchell Street : Friday 09 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
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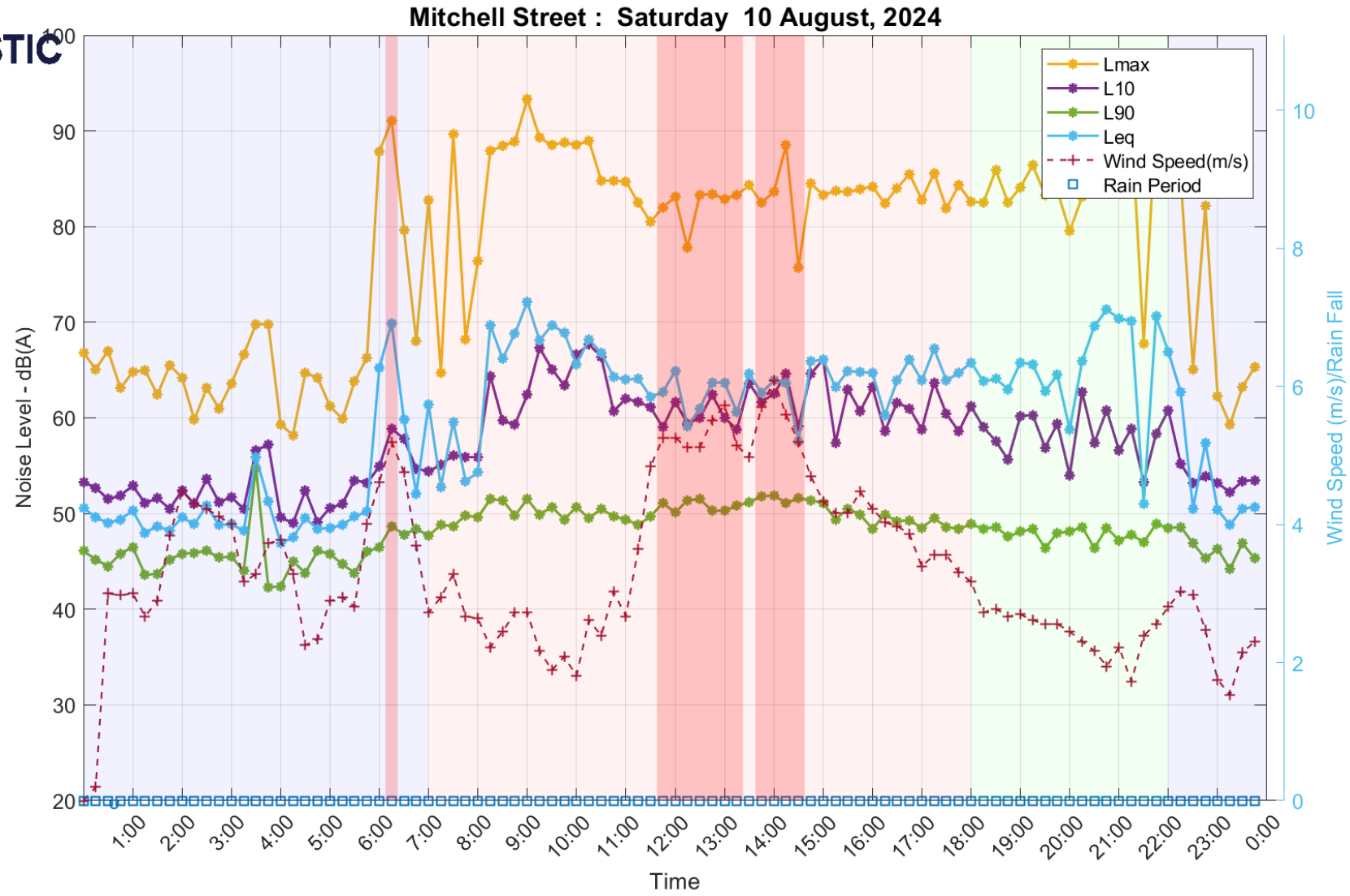
Mitchell Street : Saturday 10 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
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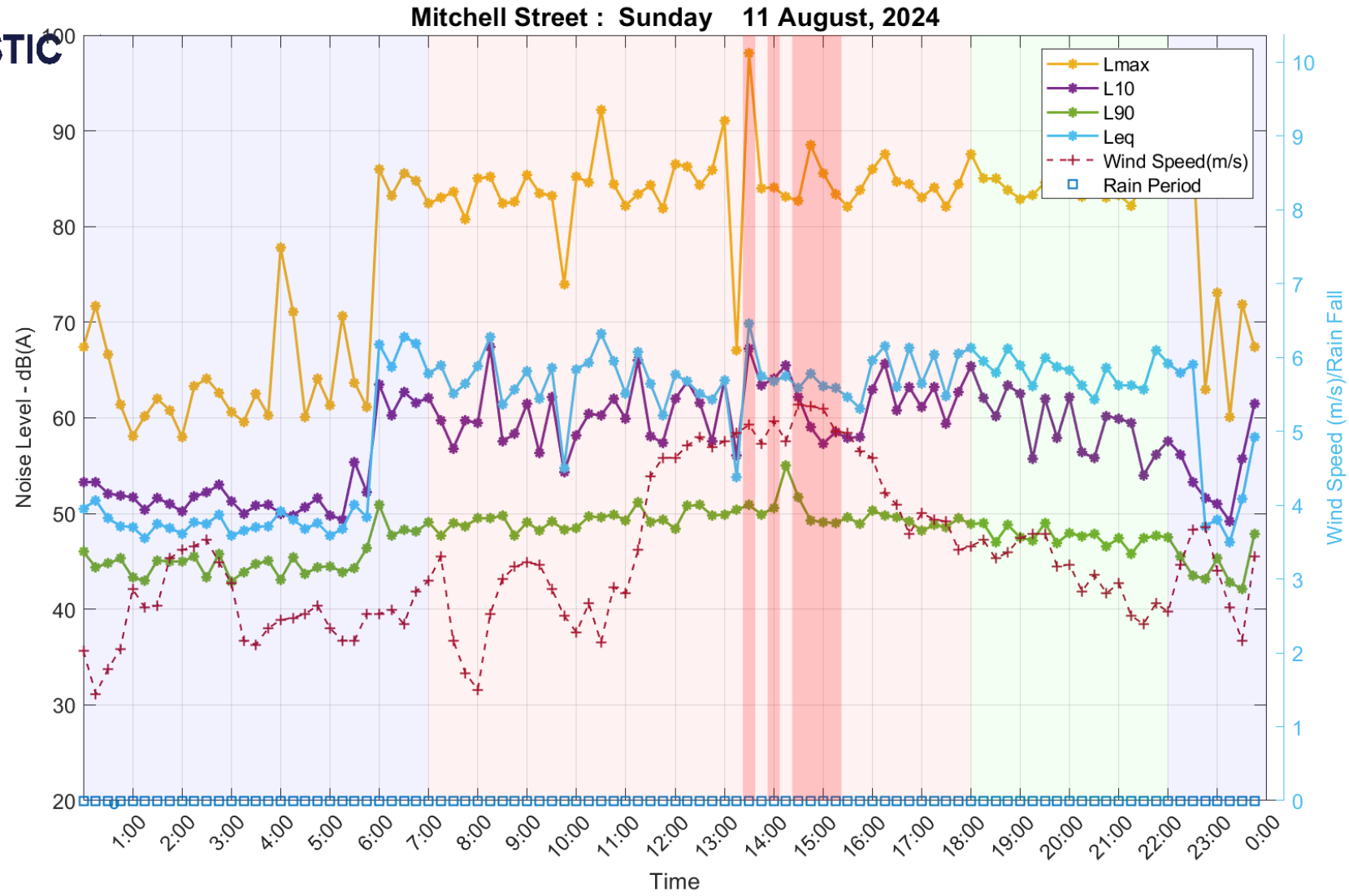
Mitchell Street : Sunday 11 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
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70
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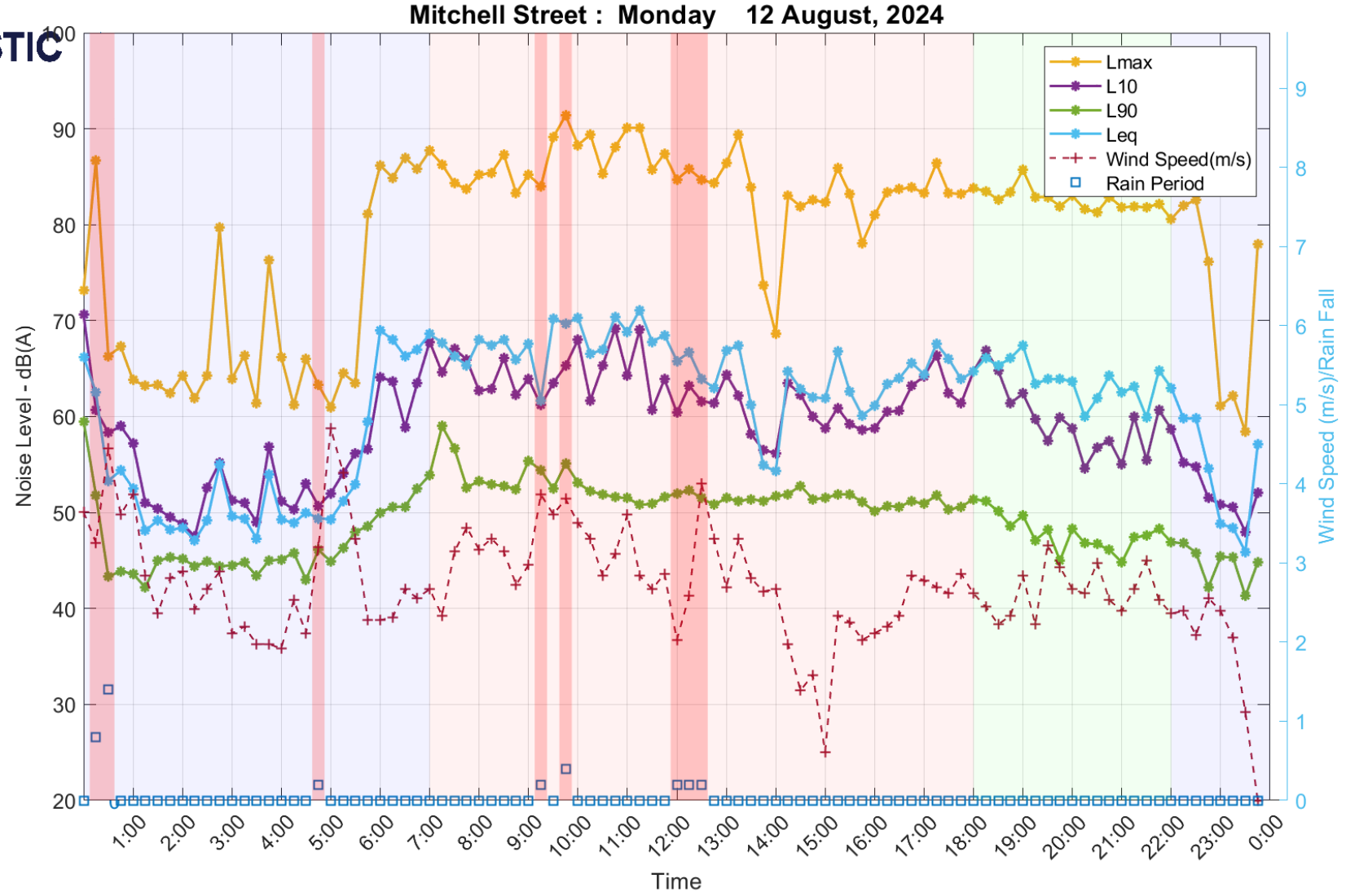
Mitchell Street : Monday 12 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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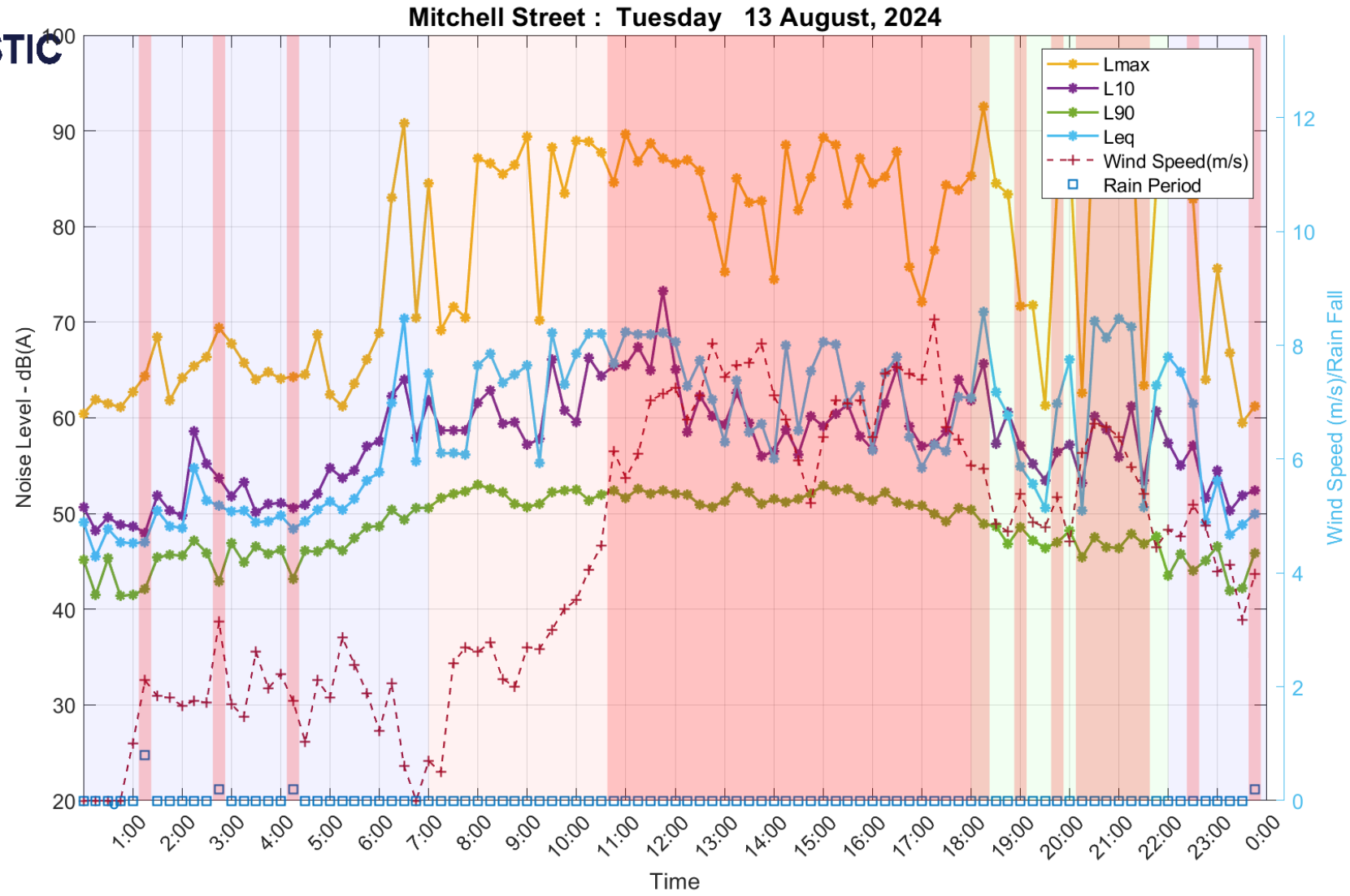
Mitchell Street : Tuesday 13 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
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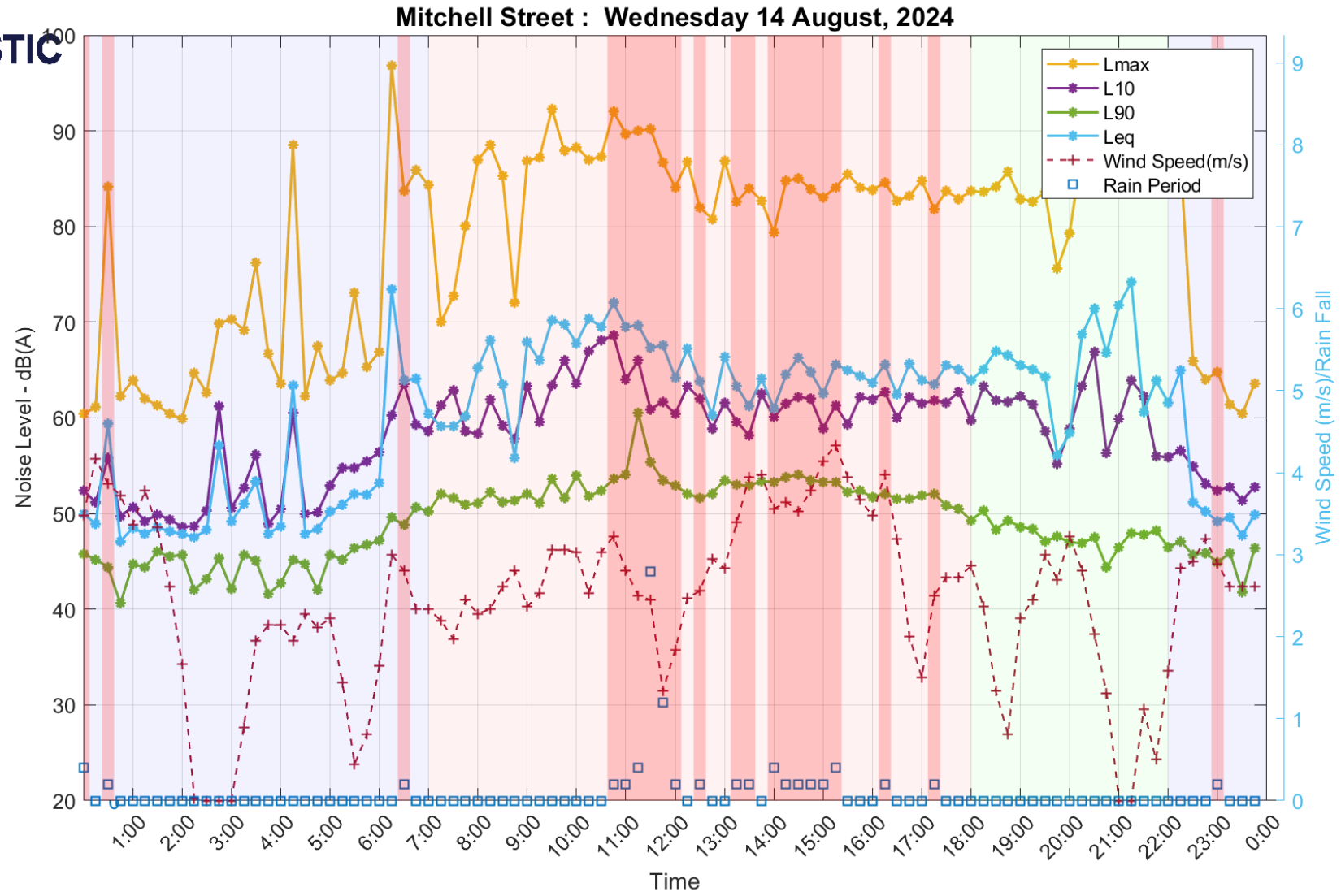
Mitchell Street : Wednesday 14 August, 2024
Lmax
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Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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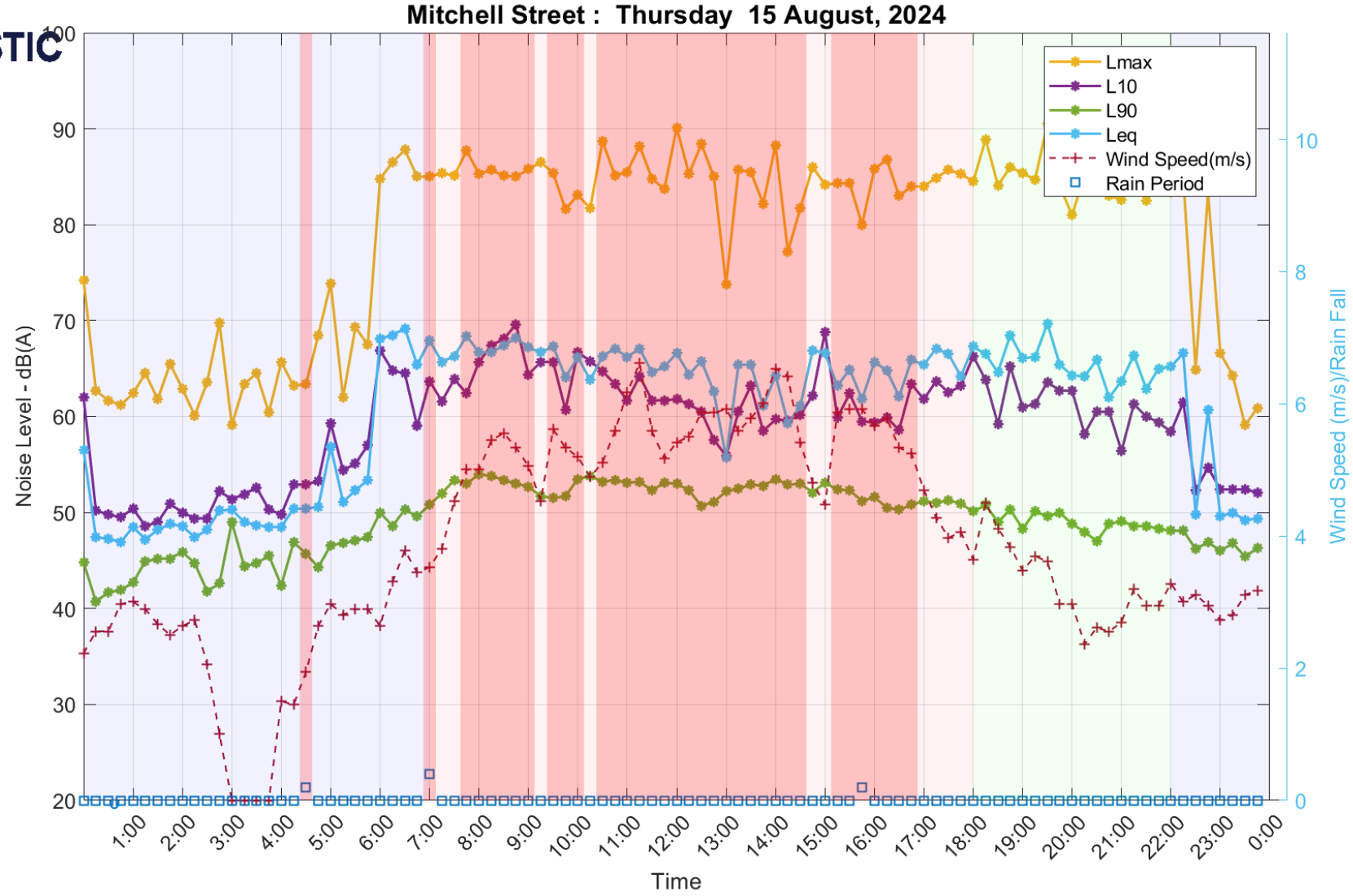
Mitchell Street : Thursday 15 August, 2024
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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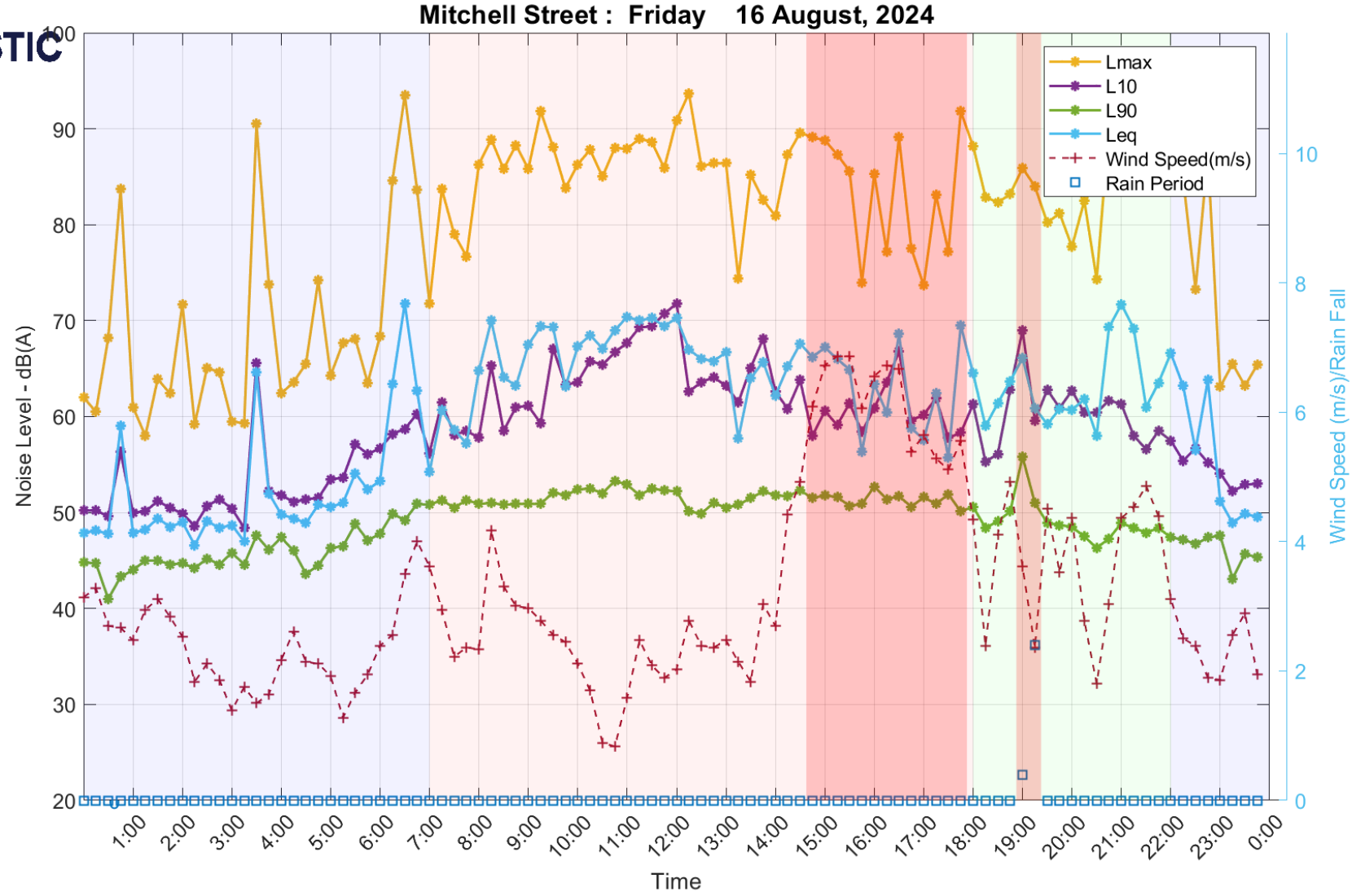
Mitchell Street : Friday 16 August, 2024
Lmax
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Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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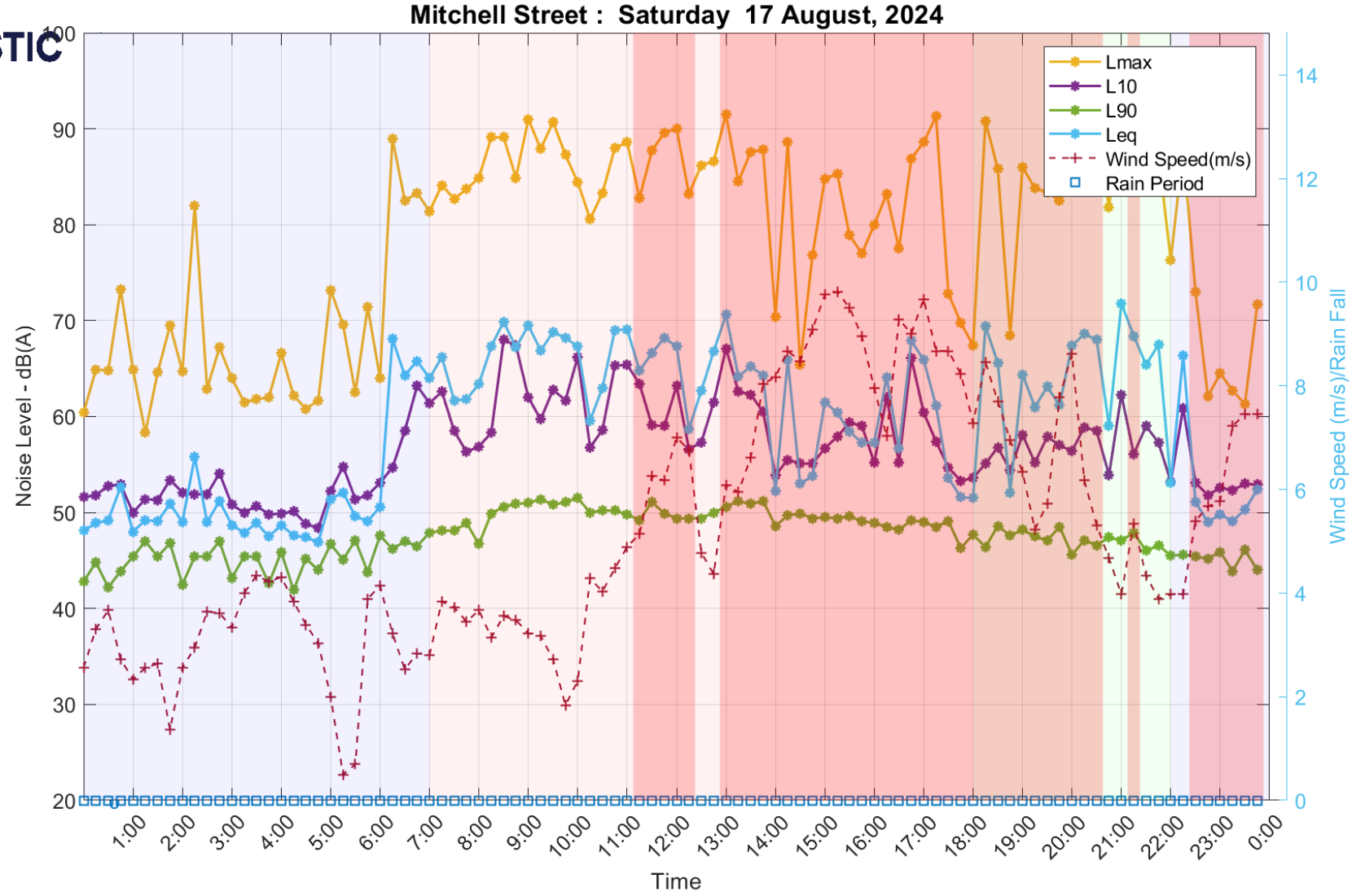
Mitchell Street : Saturday 17 August, 2024
Lmax
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Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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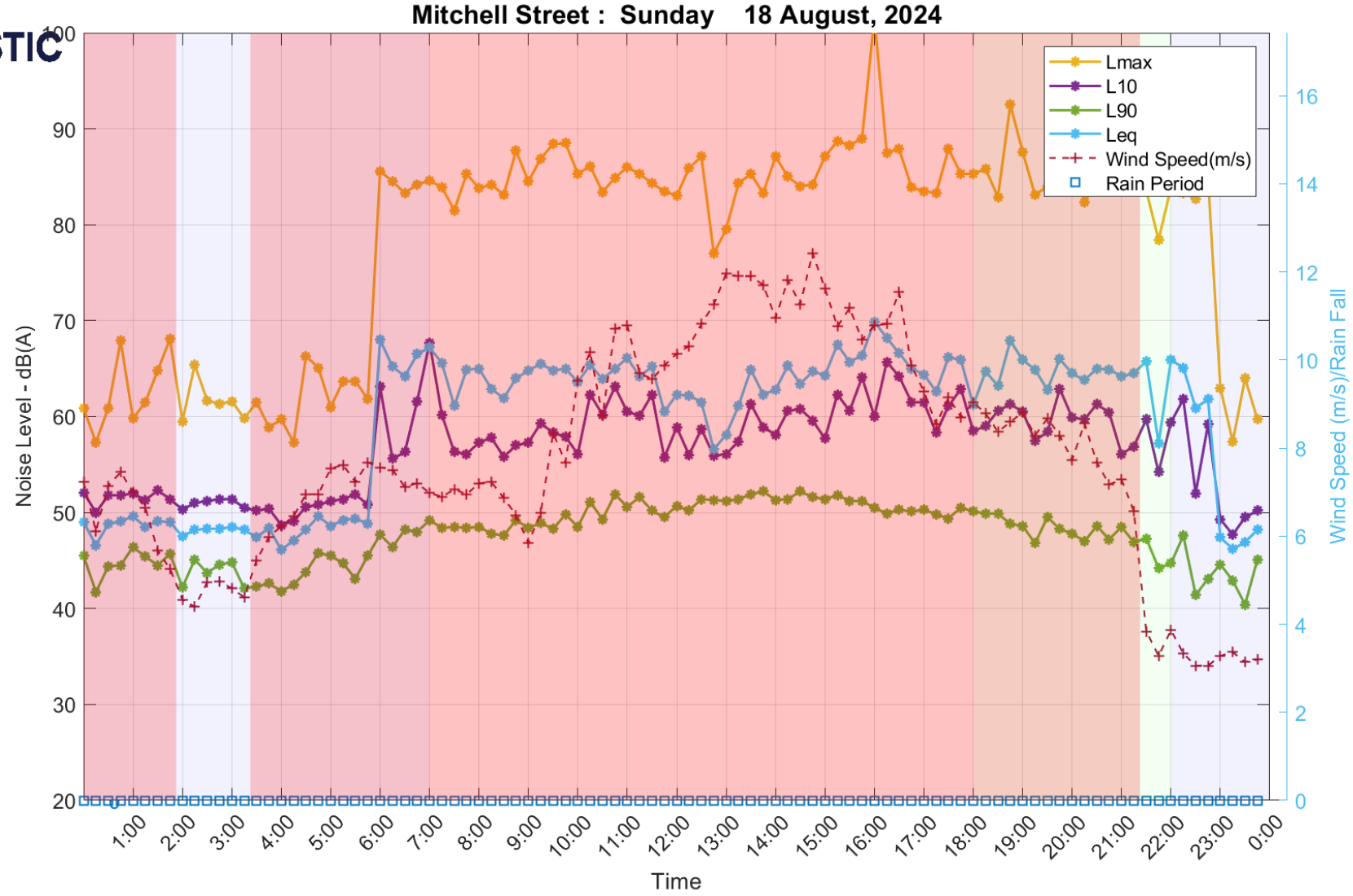
Mitchell Street : Sunday 18 August, 2024
Lmax
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Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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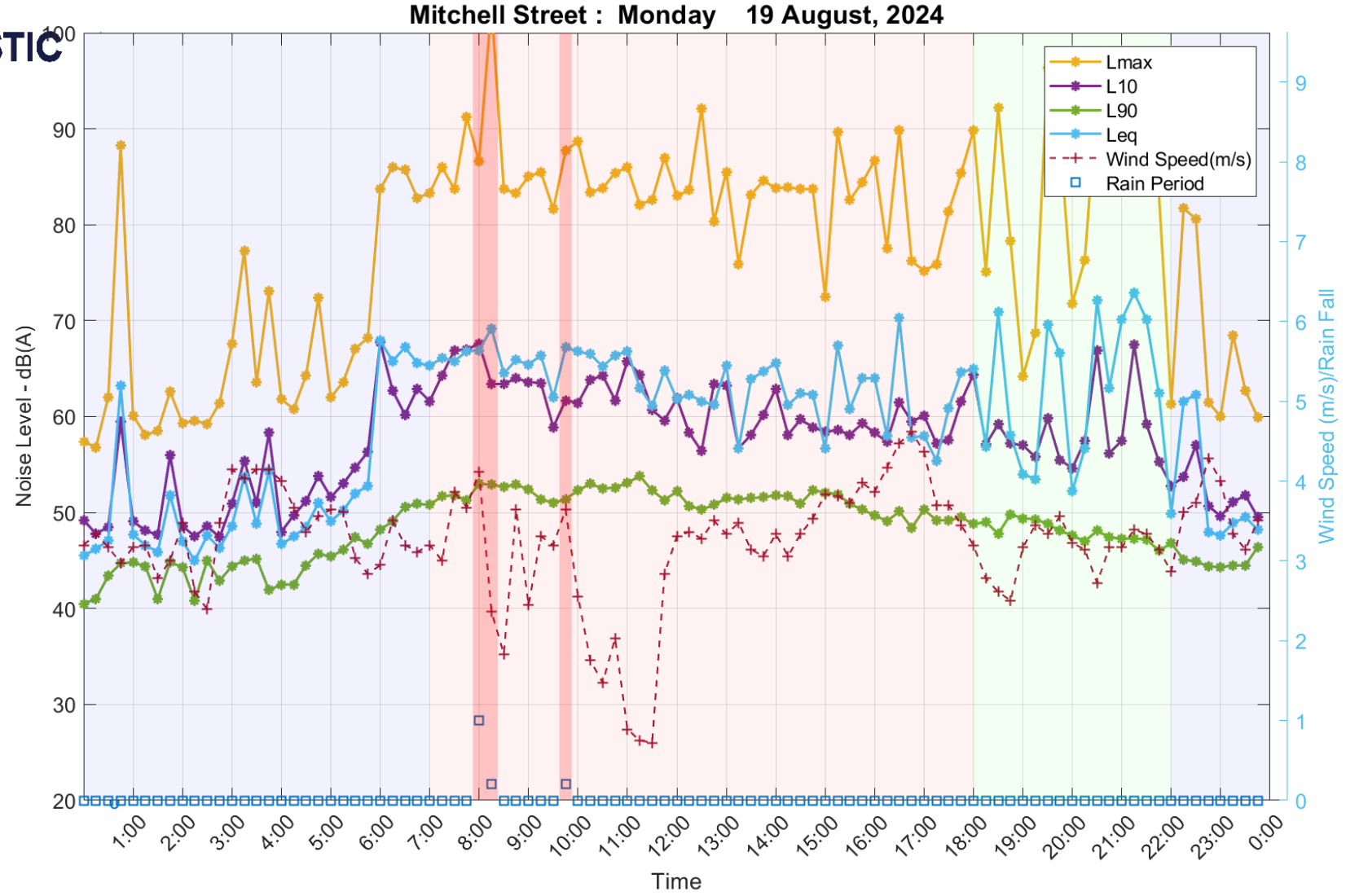
Mitchell Street : Monday 19 August, 2024
Lmax
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Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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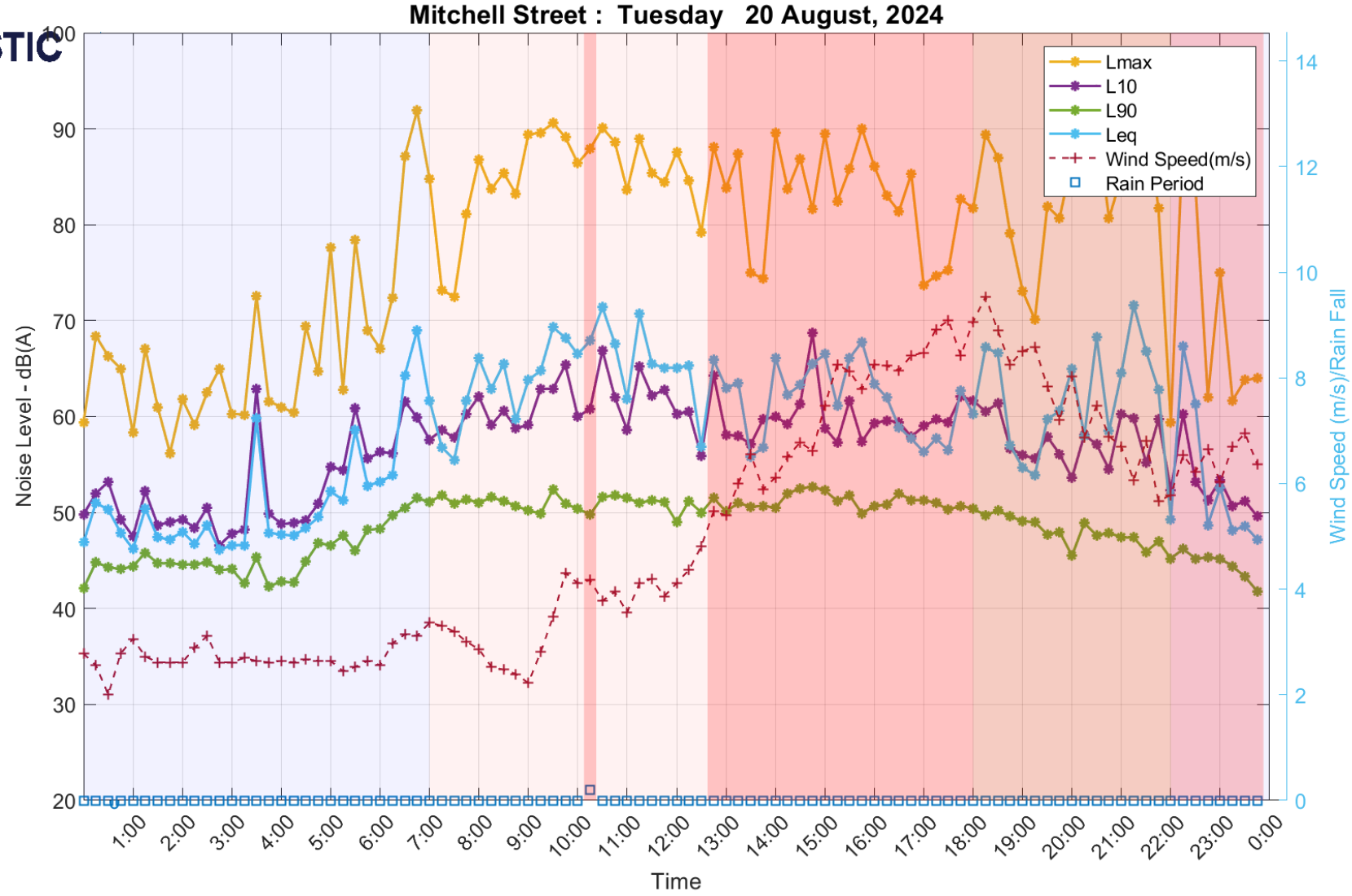
Mitchell Street : Tuesday 20 August, 2024
Lmax
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Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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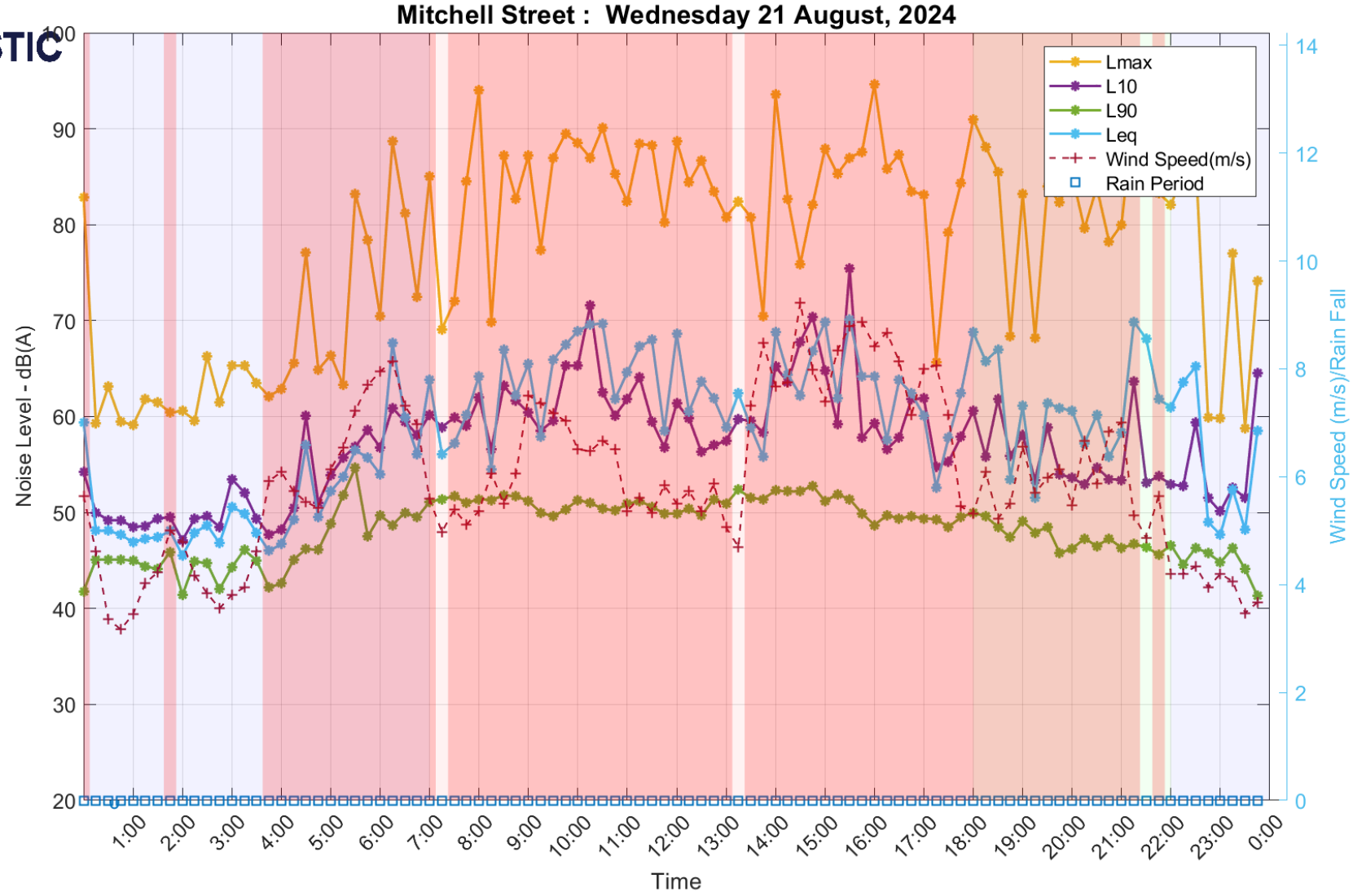
Mitchell Street : Wednesday 21 August, 2024
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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Wind Speed(m/s)
Rain Period
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APPENDIX B - EPA NOISE POLICY FOR INDUSTRY TRIGGER LEVELS

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

B.1 NPI TRIGGER LEVELS

The NPI 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 for the relevant period.

B.1.2 Amenity

Table 2.2 of the NPI (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 NPI typically requires project amenity noise levels to be calculated in the following manner:

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

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

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 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 NPI 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.

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 NPI 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 30 – 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**
R1 - Residential	Day	56	61	**58**	N/A
	Evening	52	57	**48**	N/A
	Night	43	48	**43**	48 L_{eq} **58 L_{max}**
R3 - Residential	Day	56	61	**58**	N/A
	Evening	53	58	**48**	N/A
	Night	39	44	**43**	44 L_{eq} **54 L_{max}**
R2 – Passive Recreation	When in use	N/A	-	**48**	N/A
R4 & R5 - Commercial			-	**63**	