

Middle Head Oval Amenities Building, Mosman

DA Acoustic Assessment

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1 INTRODUCTION

This Acoustic Assessment report has been prepared by Acoustic Logic (AL) to accompany a development application (DA) for the proposed works located at Middle Head Oval Amenities Building, Mosman (the Site). The proposed building includes a kiosk, office space, amenities and ancillary spaces. Additionally, shelter is being provided to the existing tiered seating as well as a new community space and barbecue area.

This document addresses noise impacts associated with noise emissions from the kiosk, existing tiered seating, new community space and barbecue area. There is no mechanical plant in the proposed design; therefore, no review was undertaken for any noise emissions from the mechanical plant.

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

- Mosman Council *Open Space & Infrastructure Development Control Plan (OS&IDCP)* 2012 (amended December 2023), and
- NSW Environmental Protection Authority (**EPA**) *Noise Policy for Industry (NPI)* 2017.

This assessment has been conducted using the Archer Office architectural drawings (*Project No: 1903*, Revision A, dated 2nd May 2024).

2 SITE DESCRIPTION

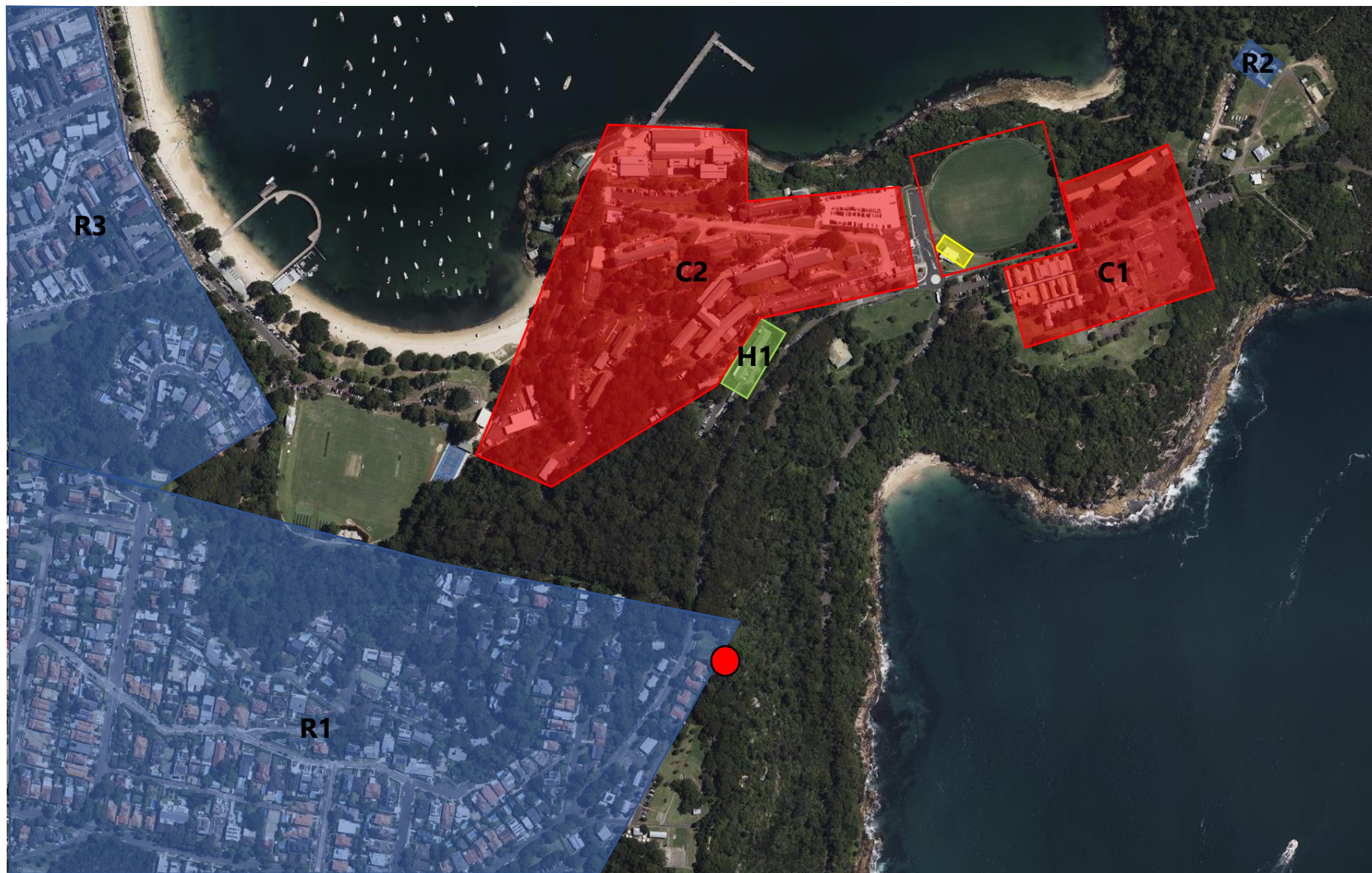
Investigation has been carried out by this office in regards to the existing properties and noise impacts surrounding the proposed development, which is detailed below:

- Existing residential blocks to the far south and west.
- Existing commercial receivers to the east, south and west of the site, and
- Existing hospital facility to the west of the site.

The nearest noise receivers around the site include:

- **R1:** Residential Receiver 1 – Residential receivers to the far south along Middle Head Road and branching local roads.
- **R2:** Residential Receiver 2 – Holiday accommodation to the east (Middle Head Officers Quarters) at 3 Govenors Road.
- **R3:** Residential Receiver 3 – Residential receivers to the far west along The Esplanade and branching local roads.
- **C1:** Commercial Receiver 1 – Commercial receivers to the south and east along Middle Head Road.
- **C2:** Commercial Receiver 2 – HMAS Penguin to the west, and
- **H1:** Hospital Receiver 1 – Balmoral Naval Hospital to the southwest.

A site map, measurement description and surrounding receivers are presented in Figure 1 below.



- Project Site
- Residential Receivers
- Commercial Receivers

Figure 1 – Project Site
Source: NSW Six Maps

- Development Envelope
- Hospital Receivers
- Unattended Noise Monitor

3 AMBIENT NOISE MONITORING

Monitoring has been undertaken to obtain the following data:

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

Figure 1 above shows the monitoring locations used.

3.1 NOISE DESCRIPTORS

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

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

The principal measurement parameters obtained from the data are:

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

L₉₀ – This is commonly used as a measure of the background noise level as it represents the noise level heard in the typical, quiet periods during the measurement interval. The **L₉₀** parameter is used to set noise emission criteria for potentially intrusive noise sources since the disturbance caused by a noise source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the **L₉₀** level.

L₁₀ is used in some guidelines to measure noise produced by an intrusive noise source since it represents the average of the loudest noise levels produced at the source. Typically, this is used to assess noise from licenced venues.

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

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

3.2 ENVIRONMENTAL NOISE SURVEY

3.2.1 Equipment Used

Unattended noise monitoring was conducted using a Rion NL-42 (Type 2). Attended noise monitoring was conducted using a Norsonic N-140 Type 1 sound level meter.

The unattended noise 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.

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.

3.2.2 Locations Monitored

One unattended noise monitor was located at the southeastern corner of the park north of 1105 Middle Head Road. Refer to Figure 1 for detailed location. The monitor was located approximately 1.5m from ground level.

3.2.3 Measurement Period

Unattended noise monitoring was conducted from 20th of March 2024 to 2nd of April 2024.

3.2.4 Calculated Noise Levels

Ambient, assessment and rating background levels have been determined from the long term, unattended noise monitoring data based on the methodology in the NSW EPA NPI Fact Sheet B. Appendix One – Unattended Noise Monitoring contains the data collected, and the periods identified as being affected by adverse weather conditions or extraneous noise (as defined by NPI Fact Sheet B).

Weather data was obtained from records provided by the Bureau of Meteorology for the weather stations located at Observatory Hill for rain data and Fort Denison for wind data.

The NSW EPA NPI 2017 defines:

- Day as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays.
- Evening as the period from 6pm to 10pm.
- Night as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

Representative traffic noise levels have been calculated using the guidelines in the NSW EPA *Road Noise Policy* 2011.

3.2.4.1 Background Noise Levels

The following table summarises the assessment background noise levels (ABL) for the monitoring location.

Table 3-1 – NPI Assessment Background Noise Levels

Location	Date	ABL		
		Day	Evening	Night
Park Near 1105 Middle Head Road, Mosman	20/03/2024	-	-	39
	21/03/2024	40	39	35
	22/03/2024	40	39	36
	23/03/2024	40	38	30
	24/03/2024	38	38	30
	25/03/2024	39	37	31
	26/03/2024	39	38	31
	27/03/2024	40	37	34
	28/03/2024	39	35	31
	29/03/2024	38	35	35
	30/03/2024	39	38	34
	31/03/2024	36	37	36
	1/04/2024	39	41	37
	2/04/2024	-	-	-
	RBL	39	41	37

*Periods affected by adverse weather or other extraneous noise and excluded from the ABL calculation.

It is noted that the wind data presented in Appendix One – Unattended Noise Monitoring has been obtained at a height of 10m as collected by the Bureau of Meteorology. Due to surface friction, there is a wind gradient between ground and a 10m height. As the logger was placed in a relatively open location at ground level, the wind speed at 1.5m above ground level (logger microphone height) is estimated to be 1/2 of the 10m high wind speeds collected by the BOM. This correction factor has been applied before assessing the 5 m/s wind criterion for valid background data.

On review of the monitoring data, the measured L₉₀ noise levels during high wind speed days do not increase background noise levels significantly as periods with little to no wind. This demonstrates that even though wind speeds measured at Fort Denison (the closest weather station with wind data) exceed EPA guidelines, either:

- The wind speed on site at this time was significantly lower than at Fort Denison (which is likely given Fort Denison is located in a very exposed area) and/or
- The wind on site was not sufficiently consistent to increase background noise levels compared to calm periods.

Therefore, only periods of adverse weather that were determined to have affected the noise data have been eliminated when determining the rating background noise level at the site, which is presented above.

The following table summarises the rating background noise levels determined for the day, evening and night periods as defined in the NPI. Furthermore, analysis of background noise levels during the night time shoulder period of 10pm-12am have been presented for operational noise criteria (see Section 4).

Table 3-2 – NPI Rating Background Noise Levels

Location	Rating Background Noise Level (dB(A) L ₉₀)			
	Day	Evening	Night	Evening Shoulder (10pm-12am)
Park Near 1105 Middle Head Road, Mosman	39	39*	37	38

*Lowered to the daytime RBL in line with the community expectation clause in section 2.3 of the NPI.

4 NOISE EMISSION CRITERIA

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

- Mosman Council *Open Space & Infrastructure Development Control Plan (OS&IDCP)* 2012 (amended December 2023), and
- NSW EPA NPI 2017.

4.1 OS&IDCP 2012

The OS&IDCP 2012 provides the following planning controls.

Part 4 General Planning Controls

4.6 Visual and acoustic privacy

- P3. Consideration must be given to the hours of operation of business uses and potential noise impacts that may arise, particularly on nearby residential development.*
- P4. In all locations, noise control measures should be applied to development at the design stage so that during occupation internal noise levels are acceptable.*
- P5. Proper consideration must be given to noise mitigation measures at the source, in the transmission path, and at the noise receiver, including:*
- (a) locating and orienting the noise source away from receivers or behind existing structures that can act as a barrier;*
 - (b) providing enclosures around the noise source so that the noise is contained;*
 - (c) choosing noise efficient technology;*
 - (d) appropriate separation between the noise source and the receiver;*
 - (e) locating acoustic barriers between the noise source and the receiver;*
 - (f) site and building layout, such as locating less sensitive areas closest to the noise source; and*
 - (g) building construction methods and insulating building elements such as doors, walls, windows, floors, roof and ceilings.*

The OS&IDCP does not provide specific numerical criteria relating to noise emissions from commercial tenancies, therefore AL has adopted operational noise criteria based on similar venues and previous project experience. The NSW EPA NPI 2017 has been adopted for mechanical noise emissions.

4.2 ADOPTED OBJECTIVES FROM SIMILAR VENUES

As The OS&IDCP 2012 does not present numerical criteria relating to noise emissions for non-liquor licensed food and beverage venues and/or entertainment venues, noise objectives outlined by other Councils and similar projects can be considered for this development.

Specifically, for patron and music noise, the L_{10} noise level emitted from the premises shall not exceed 5dB above the background L_{90} sound level between the hours of 7.00am to 12.00 midnight when assessed at the boundary of the nearest affected residential premises, and the L_{10} noise level emitted from the premises shall not exceed the background L_{90} sound after midnight when assessed at the boundary of the nearest affected residential premises. These objectives are in line with similar developments completed by this office based on other Council conditions of consent with numerical criteria and similar retail developments as an adaptation of typical Liquor & Gaming NSW requirements.

The following assessment criteria have been determined based on the noise levels measured. These apply when measured outside the open window of a residential facade. The most sensitive period will be before midnight as this is the quietest period in which the premises will operate.

Table 4-1 – Noise Emission Objectives (Operational Noise) – dB(A) $L_{10}(15min)$

Time	Measured Background Noise Level L_{90} (15 min)	Operational Noise Criteria L_{10} (15min)
Day (7am –6pm) BG + 5 dB(A)	39	44
Evening (6pm –10pm) BG + 5 dB(A)	39	44
Evening Shoulder (10pm –12am) BG + 5 dB(A)	38	43

Noise emissions to non-residential developments shall be assessed to the NSW EPA NPI 2017.

4.3 NSW EPA NPI 2017

The EPA NPI has two criteria which both are required to be satisfied, namely Intrusiveness and amenity. The NPI sets out acceptable noise levels for various localities. The policy indicates four categories to assess the appropriate noise level at a site. They are rural, suburban, urban and urban/industrial interface. Under the policy the nearest residential receivers would be assessed against the urban criteria.

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

4.3.1 Intrusiveness Criterion

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

Background noise levels adopted are presented in Table 3-2. Noise emissions from the Site should comply with the noise levels presented below when measured at nearby property boundaries.

4.3.2 Project Amenity Criterion

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

The EPA's NPI sets out acceptable noise levels for various localities. The recommended noise amenity area is based upon the measured background noise levels at the sensitive receiver. Based on the measured background noise levels detailed in Table 3-2, the Noise Policy for Industry suggests the adoption of the 'suburban' categorisation.

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

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

The amenity levels appropriate for the receivers surrounding the site are presented in Table 4-2.

Table 4-2 – EPA Amenity Noise Levels

Type of Receiver	Time of day	Project Amenity Noise Level dB(A) $L_{eq}(15 \text{ minute})$
Surrounding Residents (R1, R3)	Day	58
	Evening	48
	Evening Shoulder	48
	Night	43

*The evening shoulder period (10pm-12am) shall utilise the project amenity noise level of the evening period per Fact Sheet A3 of the NSW EPA NPI 2017.

Table 4-3 – EPA NPI Noise Emission Criteria (Non-Residences Surrounding Project Site)

Type of Receiver	Time of day	Project Amenity Noise Level dB(A) $L_{eq}(15 \text{ minute})$
Commercial (C1-C2)	When in Use	63
Hospital Wards (H1)	When in Use	50 (noisiest 1 hour)
Holiday Accommodation (R2)	Day	63
	Evening	53
	Night	48

The NSW EPA Noise Policy for Industry (2017) defines:

- Day as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays.
- Evening as the period from 6pm to 10pm.
- Night as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

4.3.3 Sleep Arousal Criteria

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

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

- $L_{eq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{Fmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level even assessment should be undertaken.

4.4 SUMMARISED OPERATIONAL NOISE EMISSIONS CRITERIA

Table 4-4 – Noise Emission Objectives (Operational Noise) – dB(A) $L_{10}(15min)$

Time	Measured Background Noise Level L_{90} (15 min)	Operational Noise Criteria L_{10} (15min)
Day (7am –6pm) BG + 5 dB(A)	39	44
Evening (6pm –10pm) BG + 5 dB(A)	39	44
Evening Shoulder (10pm –12am) BG + 5 dB(A)	38	43

Table 4-5 – EPA NPI Noise Emission Criteria (Non-Residences Surrounding Project Site)

Type of Receiver	Time of day	Project Amenity Noise Level dB(A) $L_{eq}(15\text{ minute})$
Commercial (C1-C2)	When in Use	63
Hospital Wards (H1)	When in Use	50 (noisiest 1 hour)
Holiday Accommodation (R2)	Day	63
	Evening	53
	Night	48

4.5 SUMMARISED MECHANICAL NOISE EMISSIONS CRITERIA

Table 4-6 – EPA NPI Noise Emission Criteria to Local Residents

Receiver	Time Period	Assessment Background Noise Level dB(A)L ₉₀	Intrusiveness Criteria L _{eq} (15min)	Project Amenity Criteria dB(A) L _{eq}	NPI Criteria for Sleep Disturbance
R1-R3	Day	39	44	53	N/A
	Evening	39	44	43	N/A
	Evening Shoulder	38	43	43	N/A
	Night	37	41	38	40 dB(A)L_{eq, 15min}; 52 dB(A)L_{Fmax}

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

Table 4-7 – EPA NPI Noise Emission Criteria (Non-Residences Surrounding Project Site)

Type of Receiver	Time of day	Project Amenity Noise Level dB(A)L _{eq} (15 minute)
Commercial (C1-C2)	When in Use	63
Hospital Wards (H1)	When in Use	50 (noisiest 1 hour)
Holiday Accommodation (R2)	Day	63
	Evening	53
	Night	48

5 NOISE EMISSIONS ASSESSMENT

5.1 NOISE FROM MECHANICAL PLANT WITHIN PROPOSED SITE GENERALLY

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 receivers should comply with the requirements of Section 0.

Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Indicative treatments to be reviewed and/ or iterated at CC stage are shown below.

5.1.1 Preliminary Mechanical Treatment Advice

- Condenser plant equipment: No indicative location of condenser plant is currently shown. Night time operational speeds shall be restricted with a night mode card (Daikin RXYMQ or similar) if condenser is to run between 10pm-7am.
- Major fans (typically with a sound power over 80dB(A) such as kitchen exhaust or major toilet exhaust) may require acoustic treatment if located externally near sensitive receivers. It is recommended that axial (as opposed to roof mounted fans) are to be used as this will enable acoustic treatment to be incorporated within ductwork running to atmosphere and with attenuators if necessary. Indicatively a 1d unpodded attenuator with 2m of 50mm internally lined ductwork.
- Cumulative assessment of both plant noise with other noise sources is recommended when conducting acoustic design of plant items.

Compliance with EPA acoustic criteria (as set out in Section 0) will be achievable provided that detailed acoustic review of plant items is undertaken once plant is selected, and acoustic treatments similar to those outlined above are adopted.

5.2 OPERATIONAL NOISE ASSESSMENT

An assessment of the kiosk within the new building and associated external areas has been conducted for authority approval purposes. If parameters above and beyond the assessment below are requested in the future, this shall be subject to a separate DA.

Noise from the use of the new building will primarily be from patron noise and amplified background music noise sources. An assessment for predicted noise levels emitted from the noise sources above has been predicted to nearby sensitive receivers. The analysis presented in this section of the report has been based on the internal dimensions of the space, building construction, openings in the façade and spatial layouts including awnings.

Noise emissions will be assessed with reference to the relevant criteria outlined in Section 0.

5.2.1 Acoustic Data

Noise emissions from the operation of the venue will be predicted to the closest residential receivers based on the following assumed noise levels.

- A sound pressure level per patron of 67dB(A) @ 1m L_{eq} for male raised voice consistent with a dense retail food and beverage environment with the following spectrum per the AAAC *Licensed Premises Noise Assessment Technical Guideline* V2 2020 (Cushing et al). The L_{10} levels have been determined based on the addition of exceedances per Table B3 of the guideline (77 dB(A) L_{10} SWL).
- The uniform sound pressure level for amplified music/ PA within the venue has been assessed as 85 dB(A) L_{10} . The noise level is typical of loud music which would be considered an expected worst-case scenario if large sports events are held.

It is noted that amplified music is likely to only be used as background music around the kiosk, therefore being played at a low volume to allow for conversation.

5.2.2 Operational Assumptions

Operational noise has been assessed to the most sensitive time periods of operation, that being the day/evening period (7am – 10pm) and evening shoulder period (10pm – 12am). It is assumed that no operations are expected between 12am – 7am. Assessment has been based on the following assumptions:

- Up to 500 patrons located within the spectator area, community space and barbecue area with 1 in 2 patrons talking at any one time (typical for conversation).
- Music within the general community space, kiosk and spectator area limited to 85 dB(A) L_{10} sound pressure level. This is a spatially averaged sound pressure of loud music/ PA.
- Operating hours from 7:00am-9:30pm from Mondays to Sundays.

The purpose of this assessment is to provide confidence that predicted noise levels are within operational noise emissions requirements as opposed to acting as patron limits subject to Authority review.

5.2.3 Predicted Noise Levels

The predicted noise levels from venue operation are presented in the following table. Predicted noise levels are based on the dimensions of the building, factor in losses due to distance attenuation and barrier effects (where applicable). Predicted noise emissions have been calculated on the assumption that the complying controls in Section 5.3 are implemented.

Table 5-1 – Predicted Noise Levels from Amenities Operation (L₁₀)

Noise Source	Receiver	Time of Day	Predicted Noise Level L ₁₀ *	External Criteria (BG+5) L ₉₀	Complies?
Venue Operation (Patron and Amplified Music Noise)	R1	7am-9:30pm	38	44	Yes
	R2	7am-9:30pm	41	44	Yes
	R3	7am-9:30pm	34	44	Yes
	C1	When in Use	62	63	Yes
	C2	When in Use	61	63	Yes
	H1		46 (external)	50 (external)	Yes

*Predicted noise levels at receivers shall not be taken as noise limits.

5.3 COMPLYING CONSTRUCTIONS AND CONTROLS

The findings in this report show that compliance with the noise criteria set out in Section 0 can be readily achieved. Predicted noise levels indicate that this venue has a low acoustic impact on the surrounding receivers. However, to ensure ongoing compliance with these noise criteria, the following complying controls can be implemented.

5.3.1 Management Controls

- Up to 500 patrons located within the spectator area, community space and barbecue area with 1 in 2 patrons talking at any one time (typical for conversation).

It is noted that Mosman Council only expects 50-100 patrons using the spectator area, community spaces and barbecue area at any given time. The high number of patrons used for calculations was to provide confidence that adequate acoustic amenity can be maintained.

- Music within the general community space, kiosk and spectator area limited to 85 dB(A) L₁₀ sound pressure level. This is a spatially averaged sound pressure of loud music/ PA. PA design and final specifications to be reviewed in design stage.
- Operating hours from 7:00am-9:30pm from Mondays to Sundays.
- If allowances above and beyond the above hours are requested, a separate acoustic assessment is recommended.
- To protect the amenity of residents located around the development, where possible – garbage collection, deliveries and disposal of bottle/waste should be completed between the hours of 7:00am and 6:00pm. In particular, glass bottles and similar should not be disposed of after 10:00pm. They should instead be stored within the premises and disposed of the following day.
- Speakers are to be vibration isolated by Embelton NRD/RDSHS mounts or equal.

6 CONCLUSION

This report presents an acoustic assessment of noise impacts associated for the proposed alternations and additions at Middle Head Oval Amenities Building, Mosman (the Site). The proposal seeks to refurbish and construct a new building for amenities as well as external areas.

External noise emissions criteria have been established in this report. Provided that the complying controls presented in Section 5.3 are adopted, the development will comply with the acoustic requirements of the following documents:

- Mosman Council *Open Space & Infrastructure Development Control Plan (OS&IDCP)* 2012 (amended December 2023), and
- NSW Environmental Protection Authority (**EPA**) *Noise Policy for Industry (NPI)* 2017.

A detailed acoustic review of mechanical plant will be undertaken during CC Stage, however preliminary calculations have been undertaken and general complying controls have been documented.

Overall, the proposal will not result in any adverse noise or vibration impacts subject to the implementation of the complying constructions and controls set out in this report.

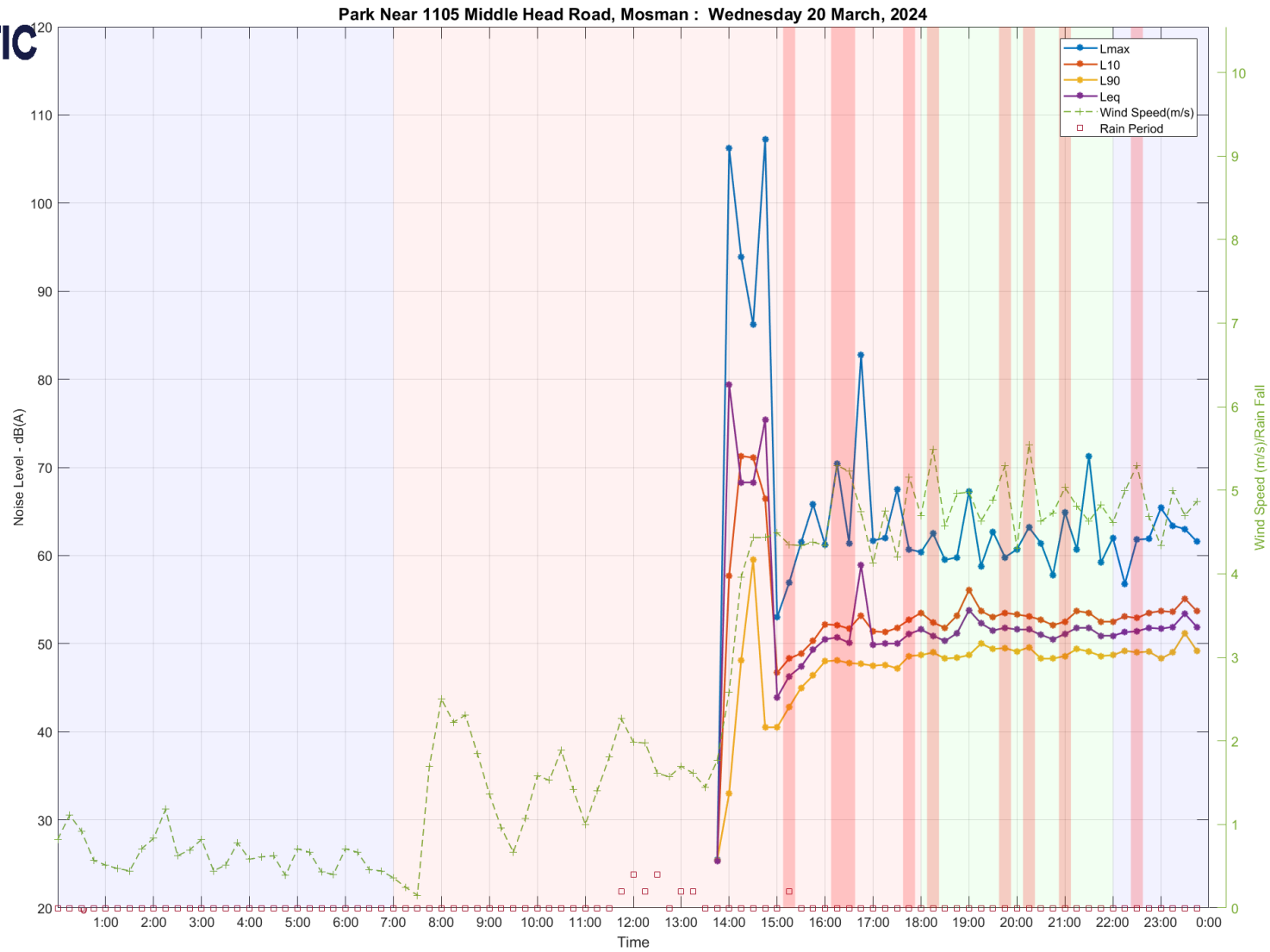
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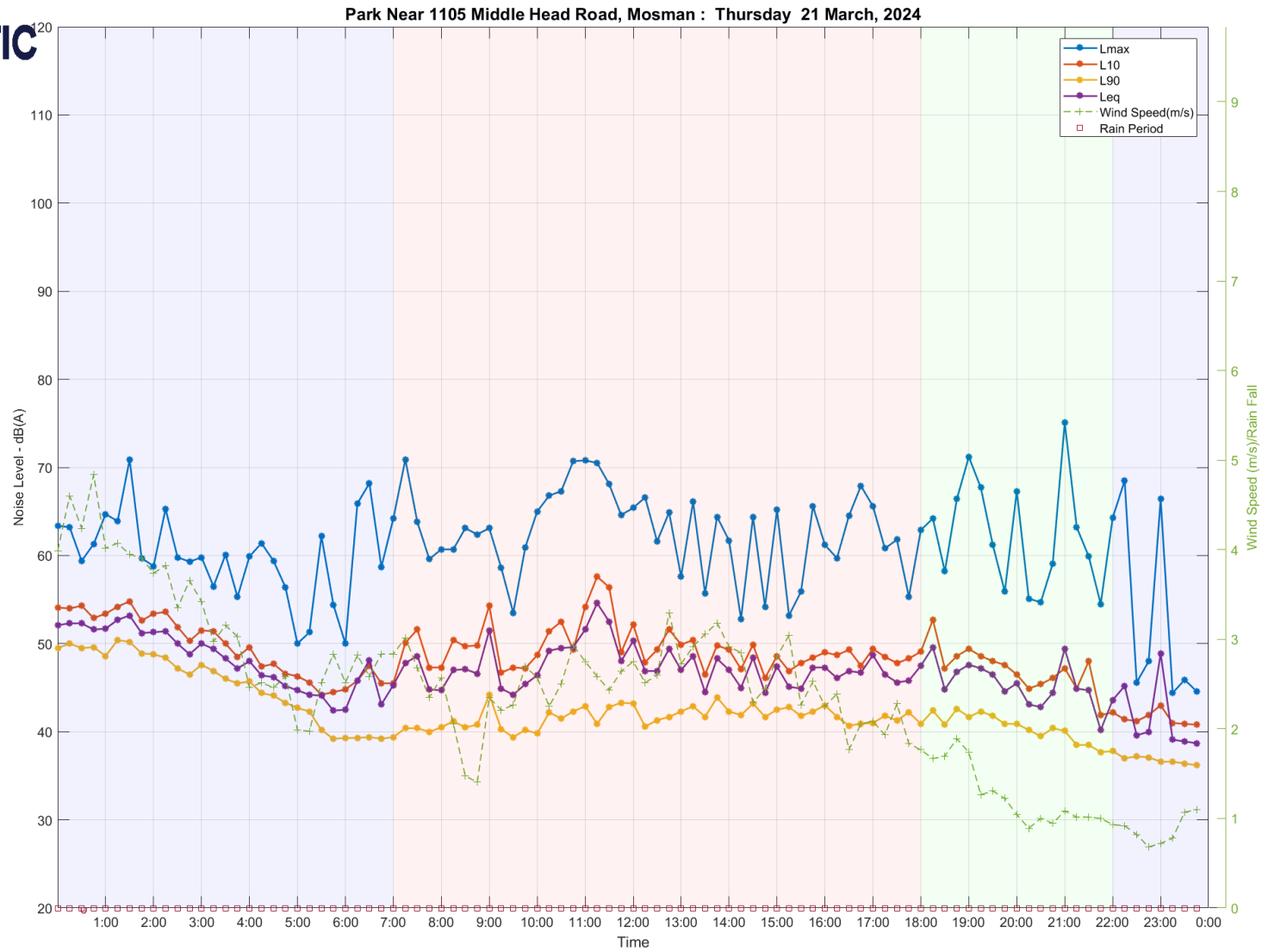
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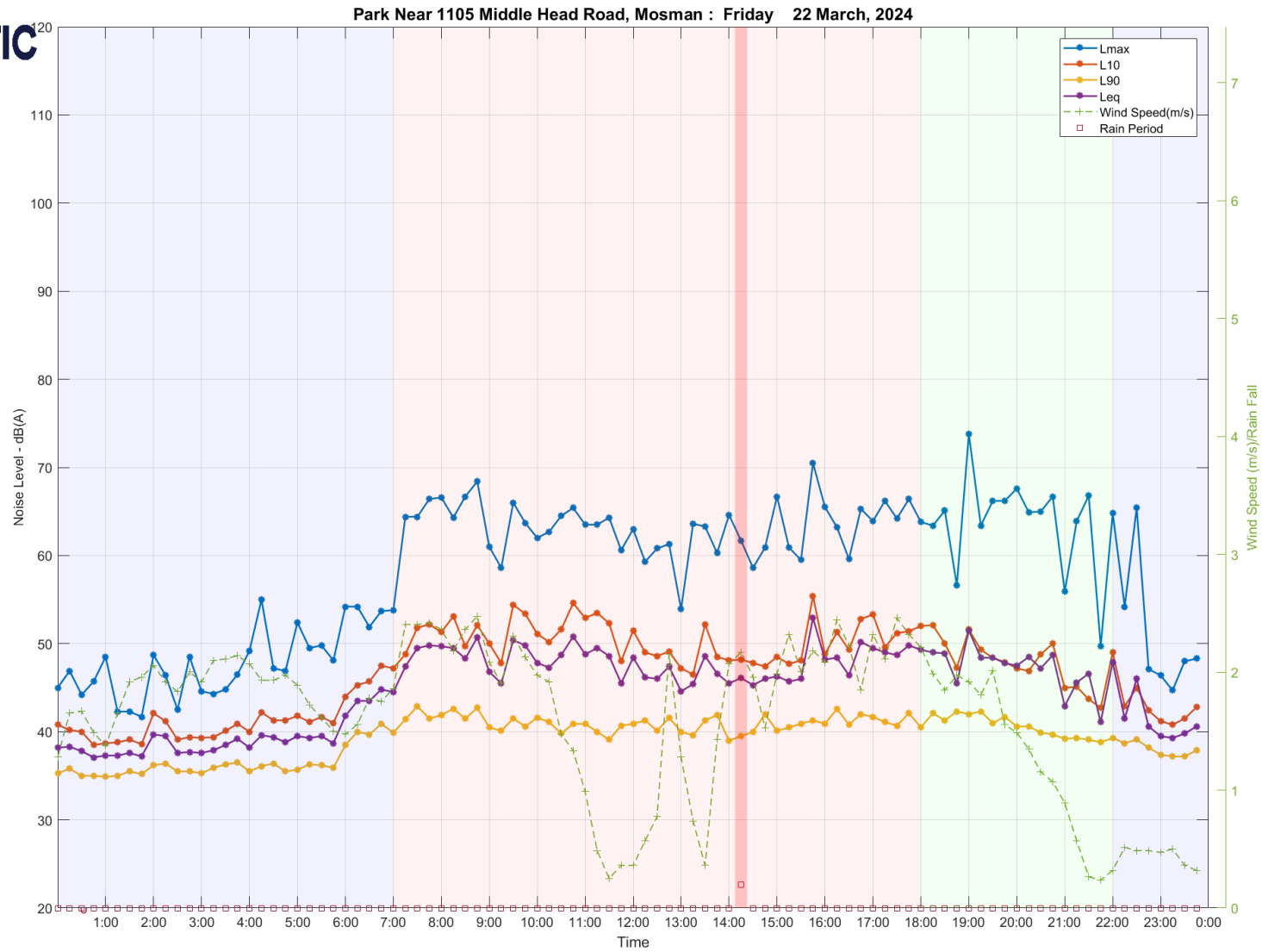


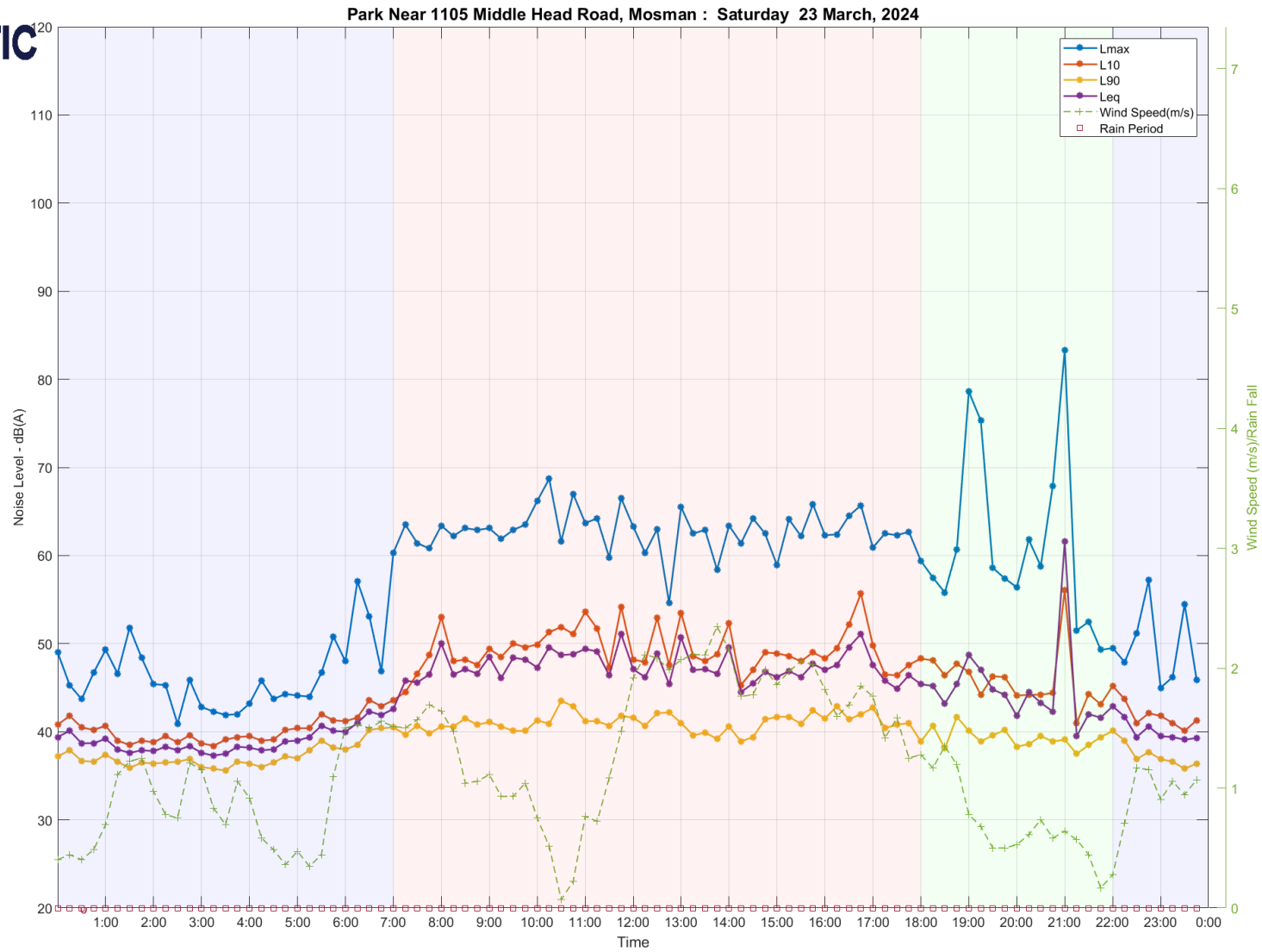
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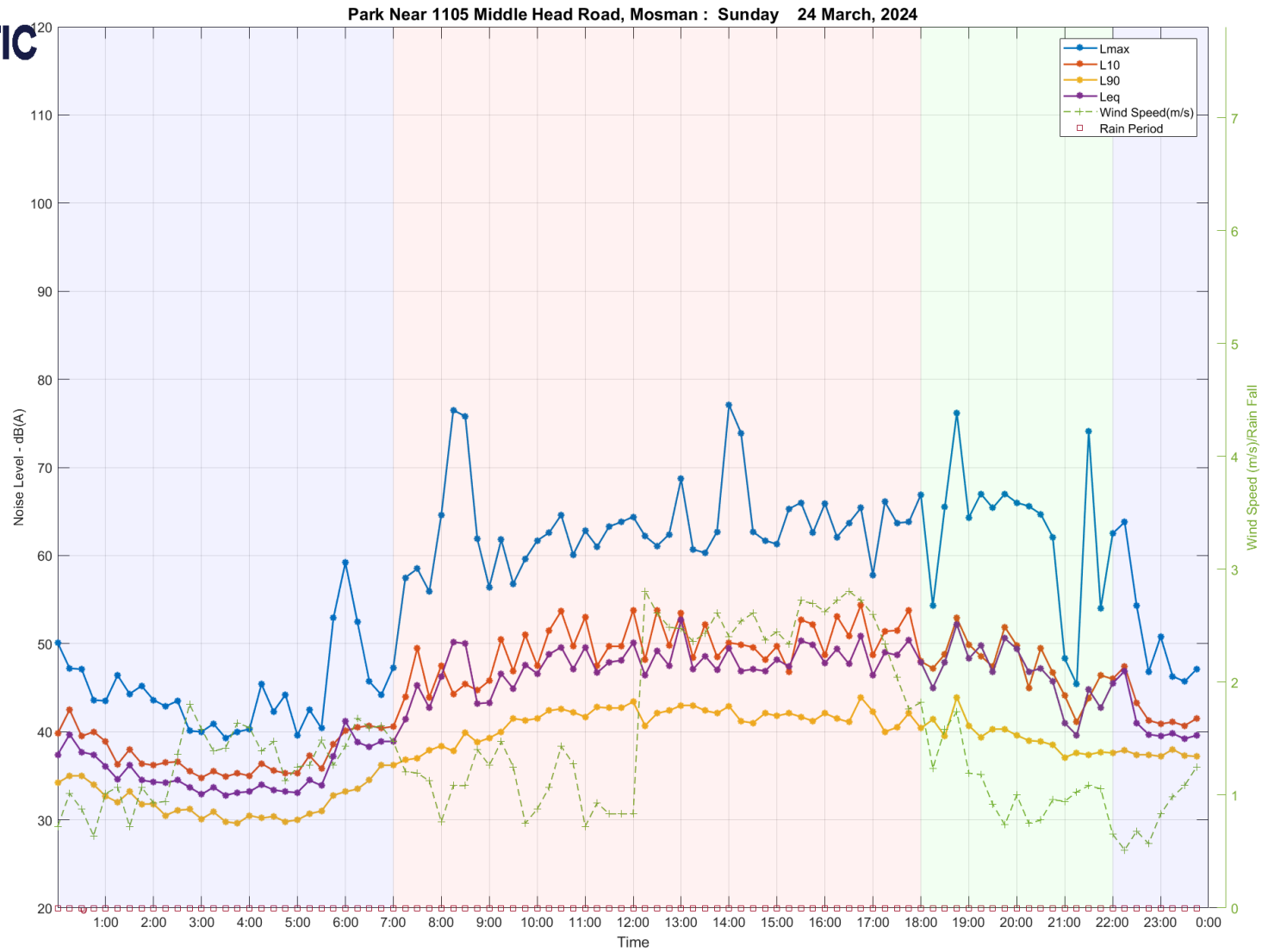
APPENDIX ONE – UNATTENDED NOISE MONITORING

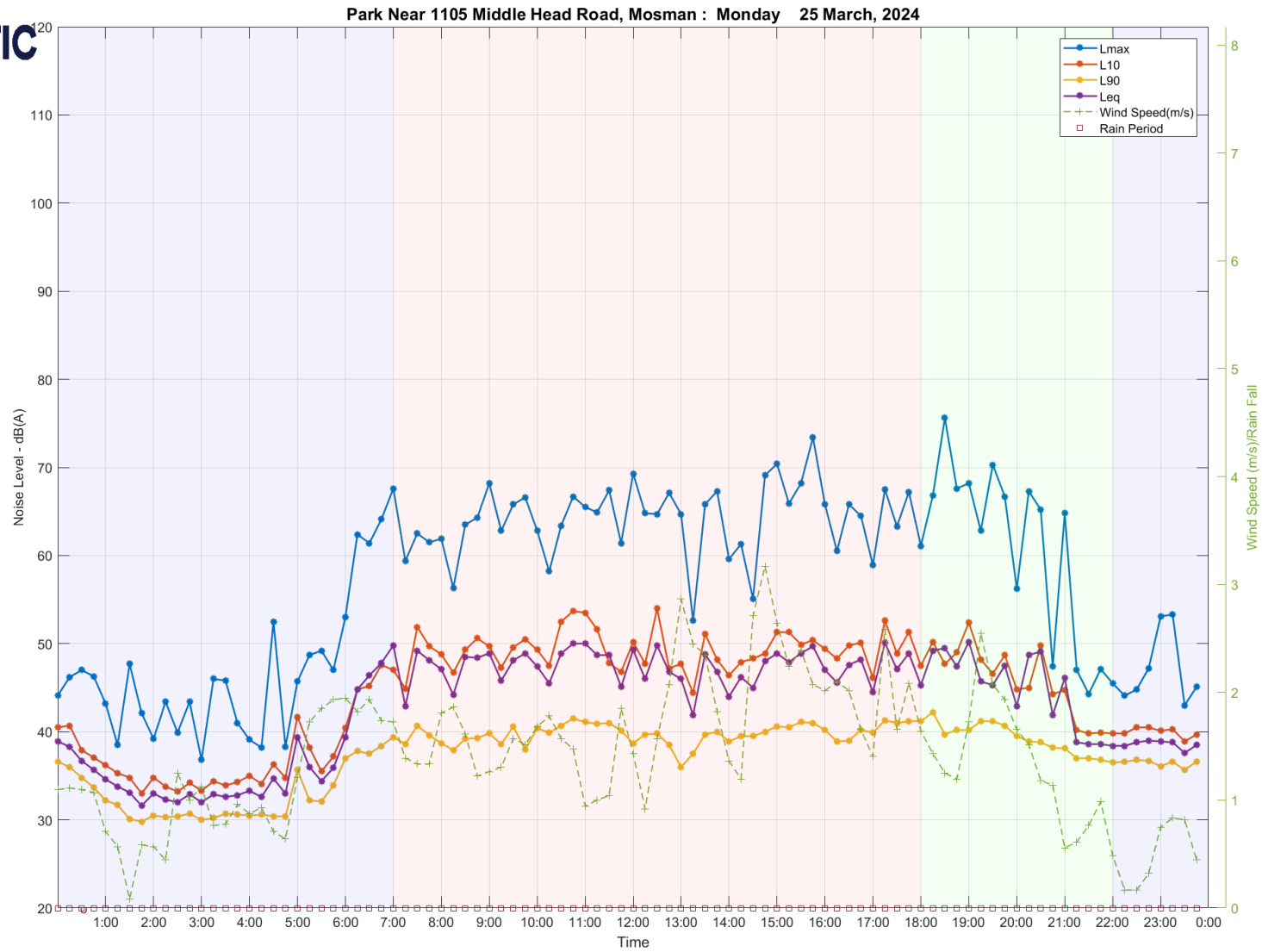


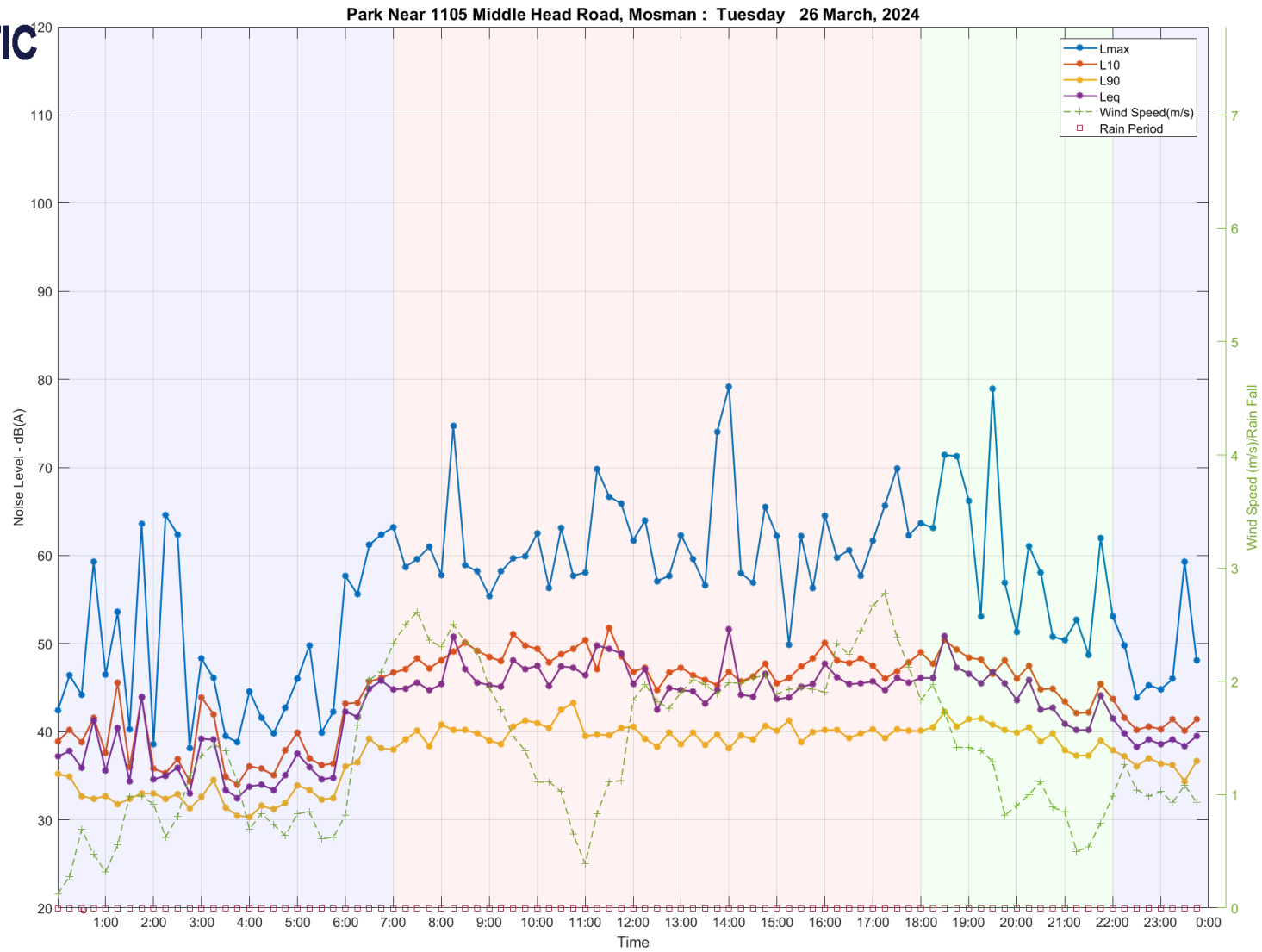


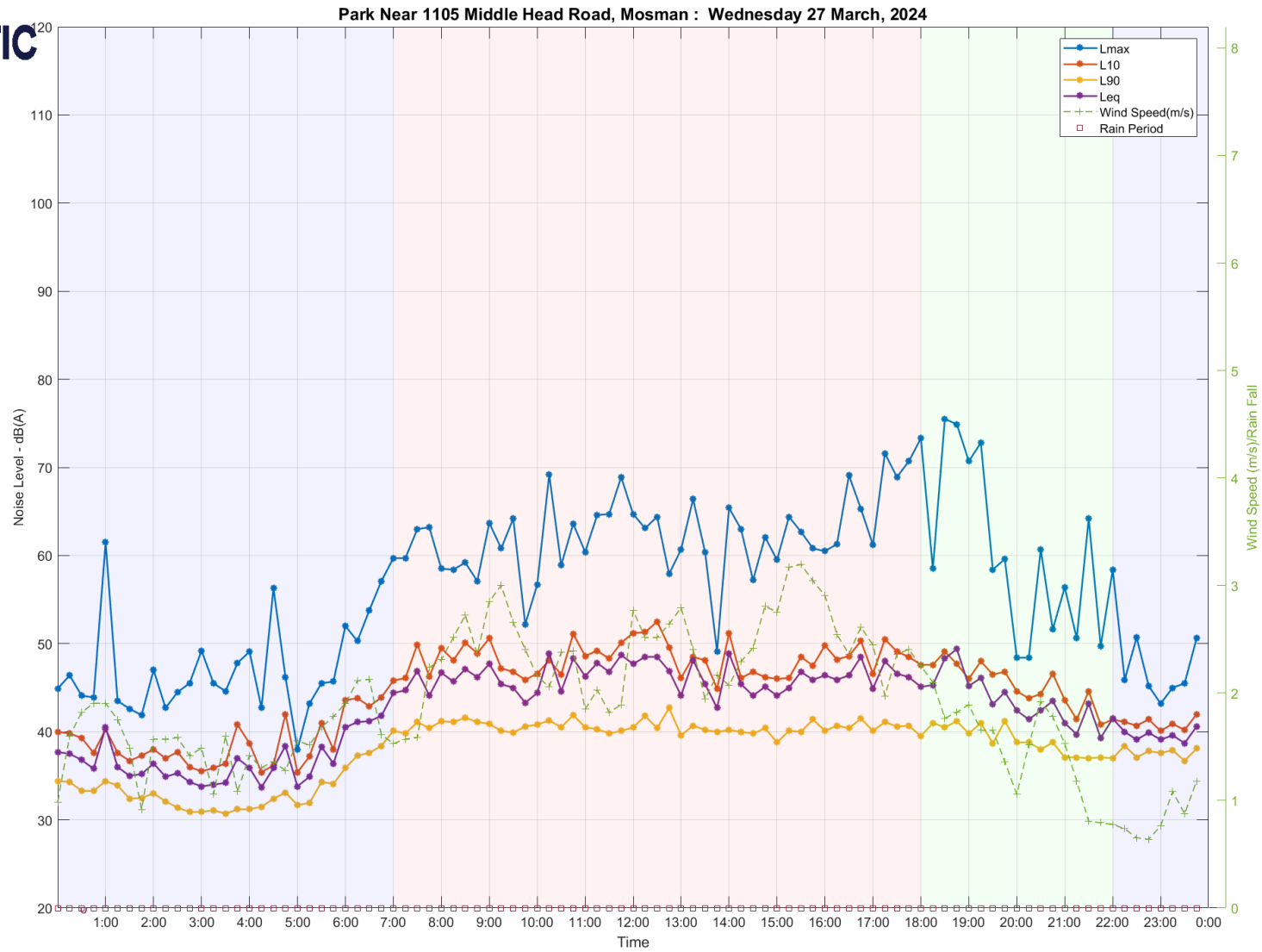


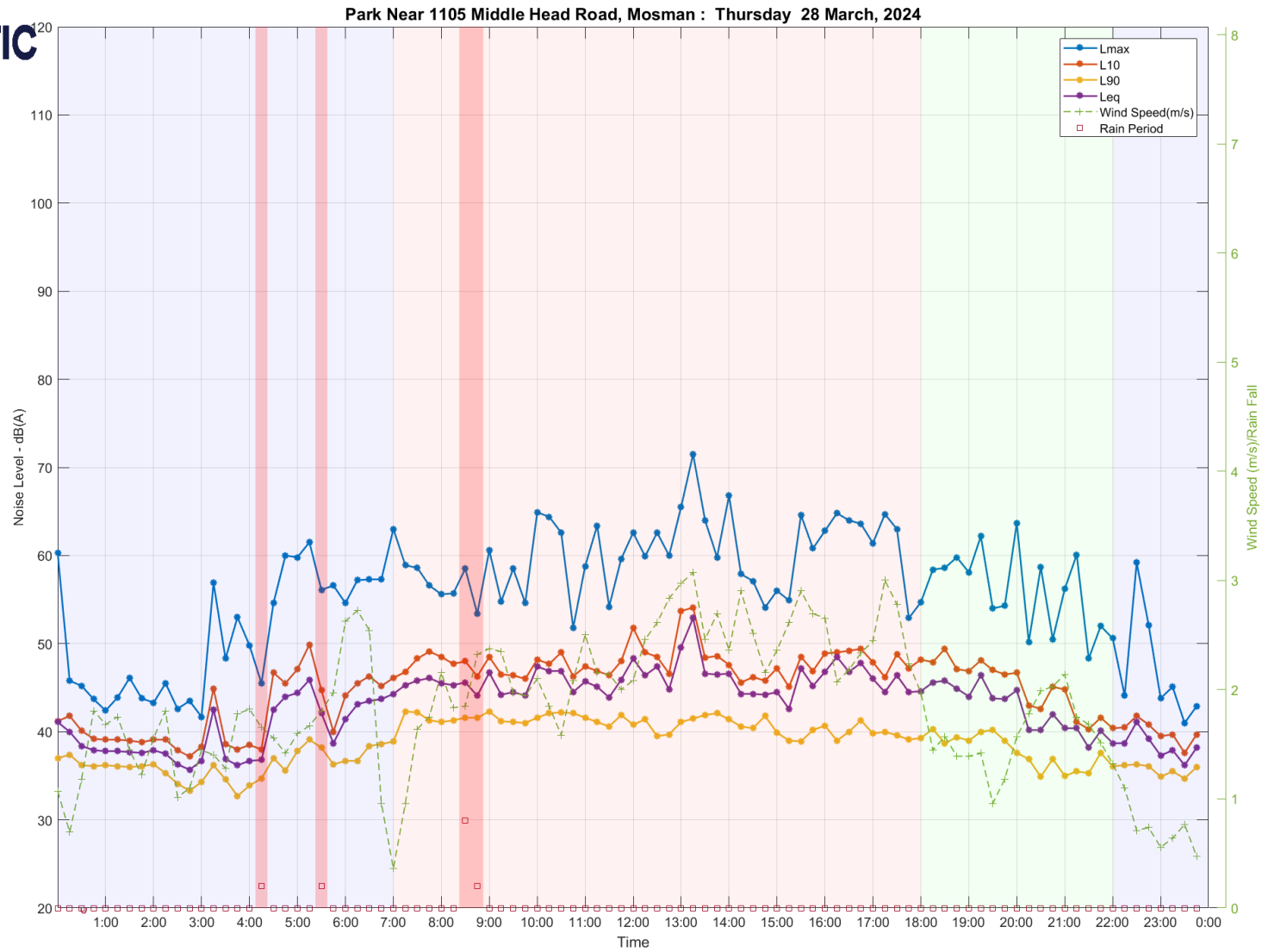


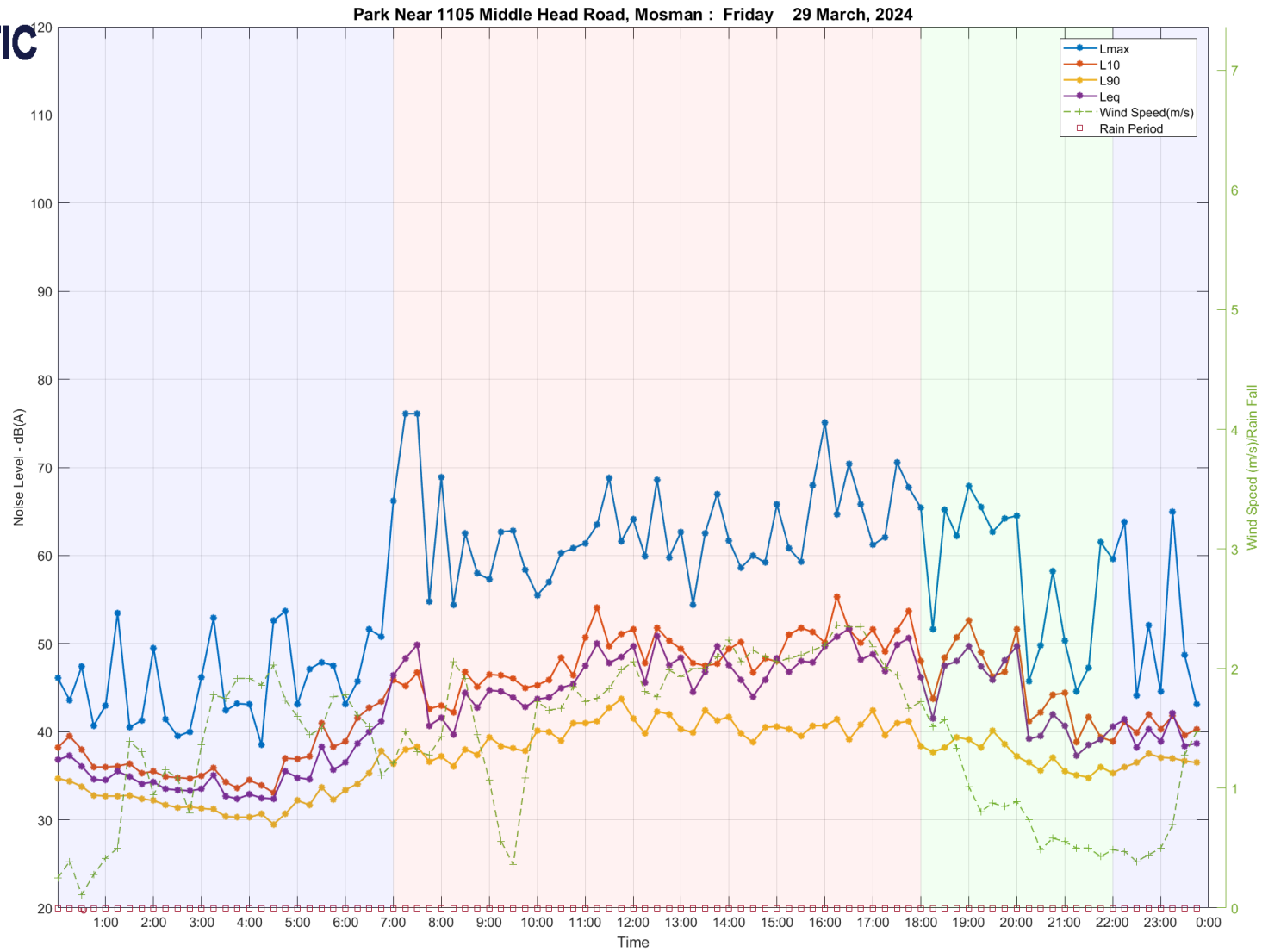


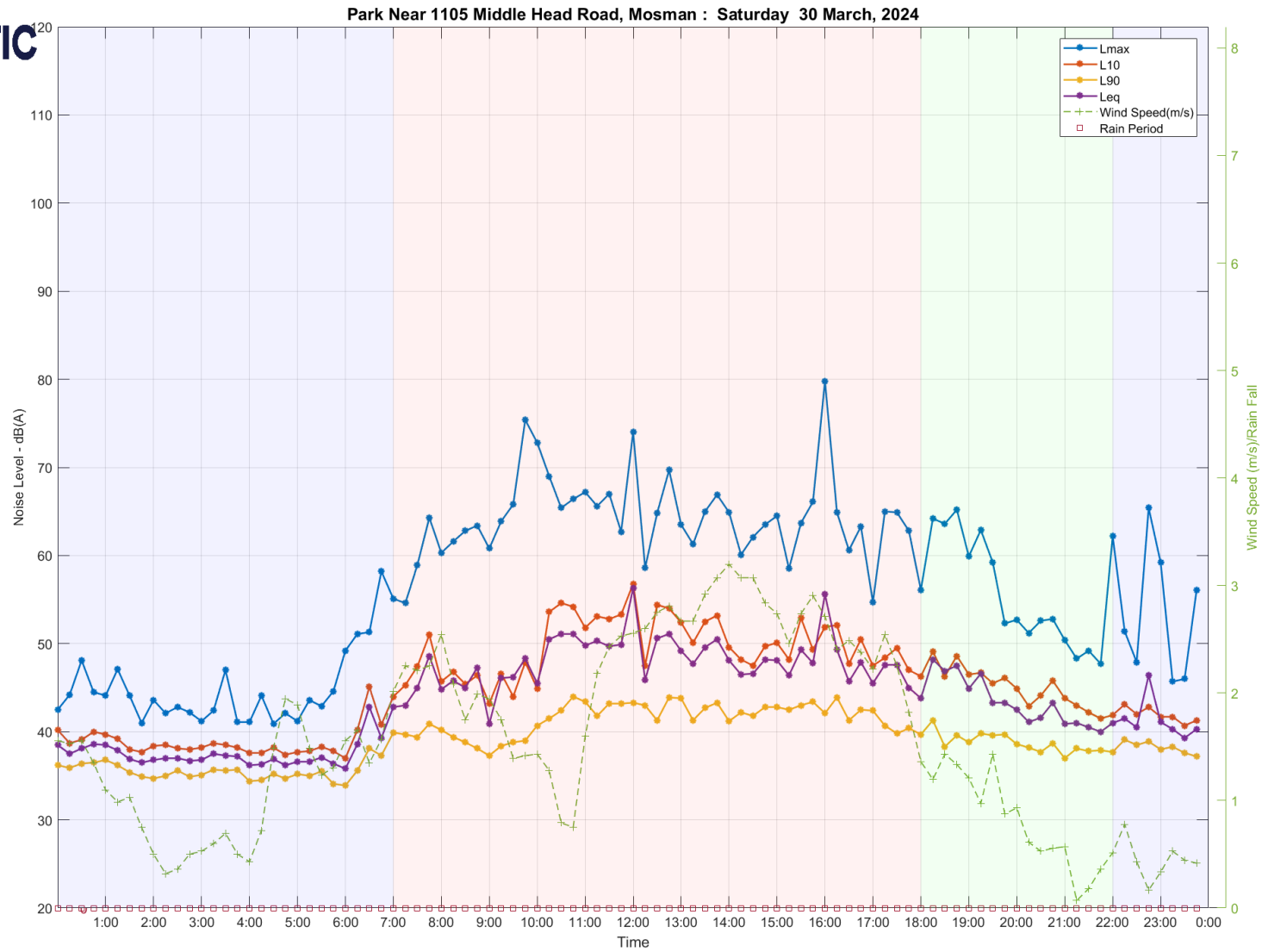


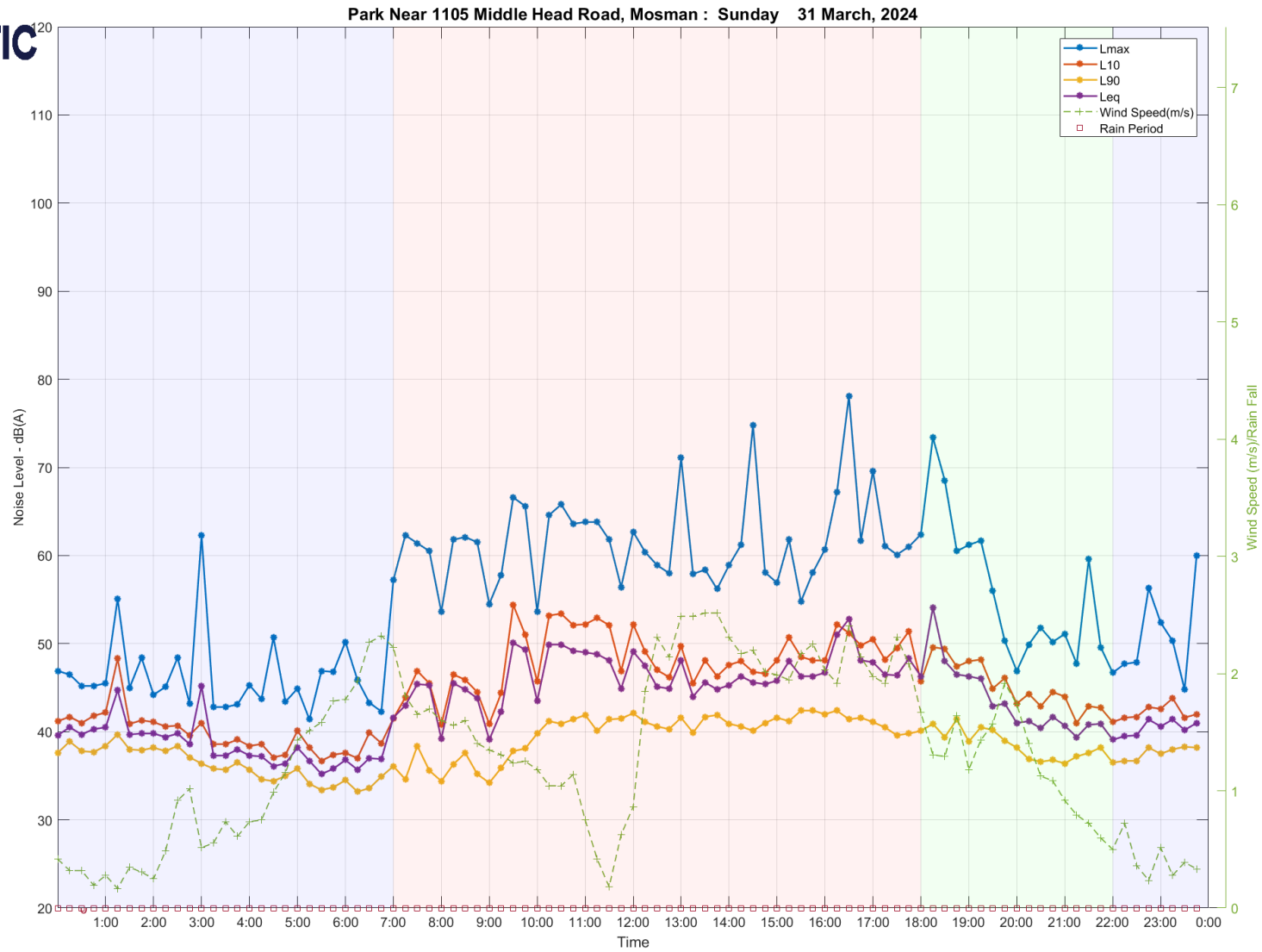


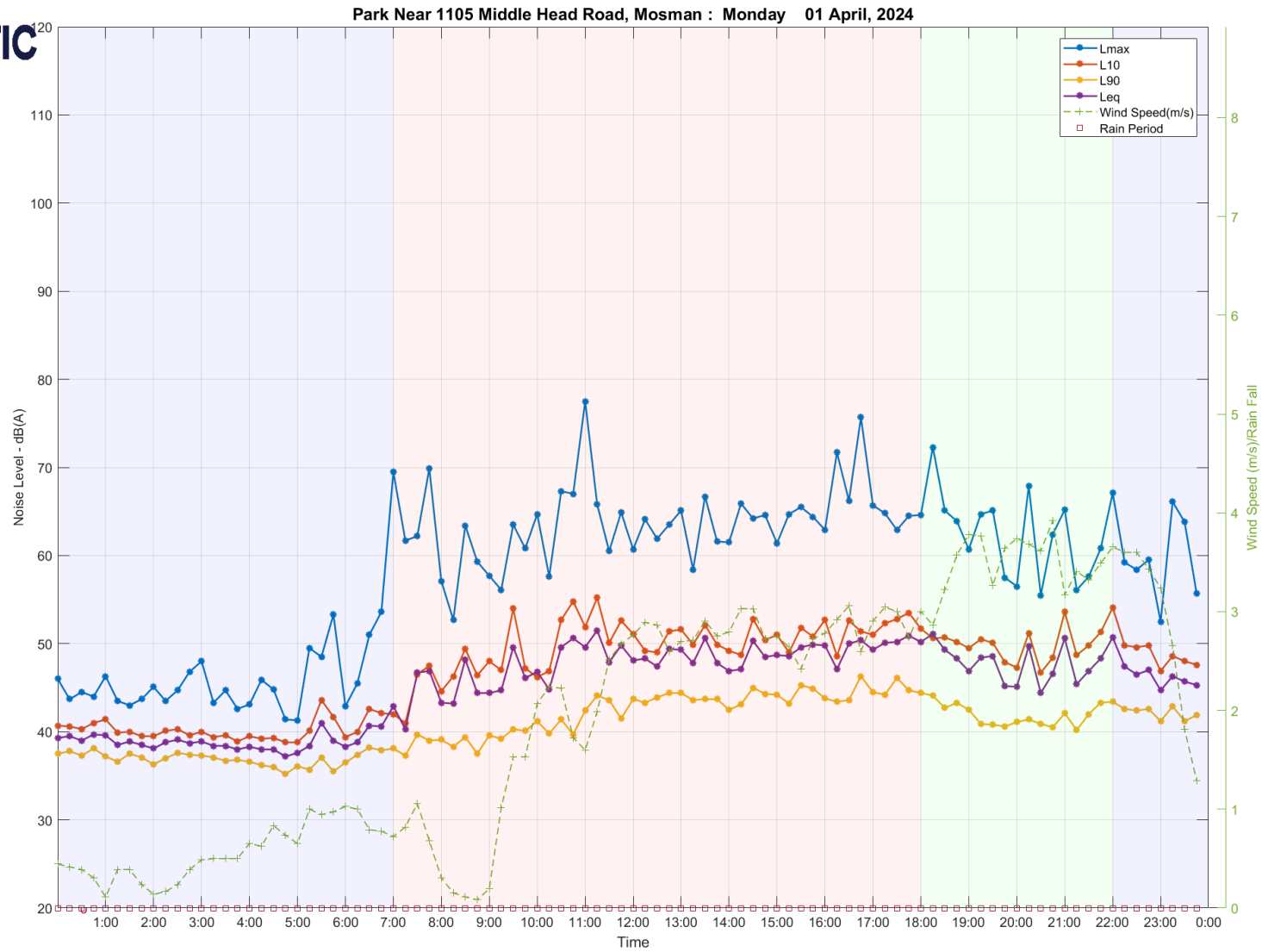


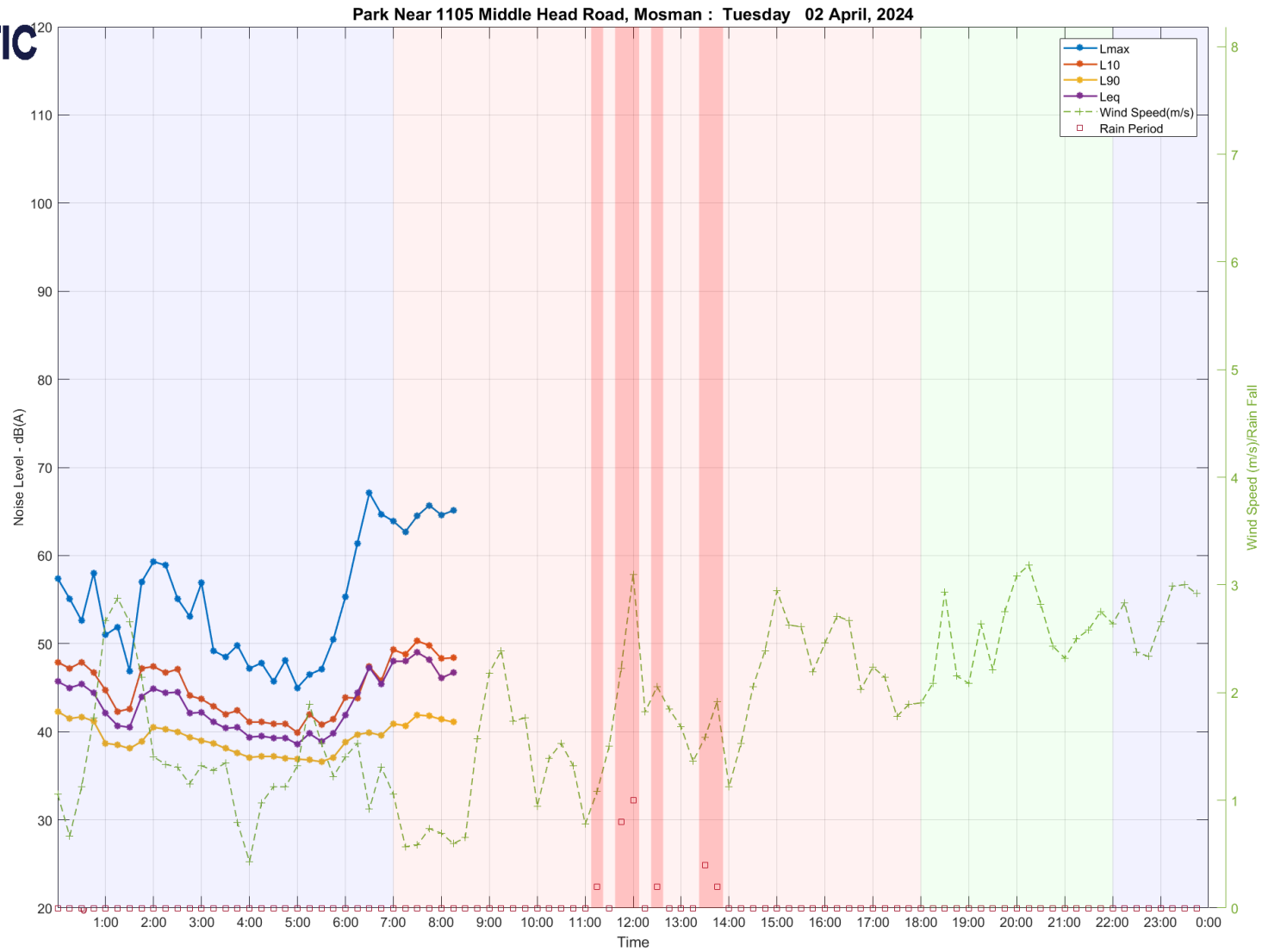












Wind Speed is corrected using factor 0.5000 based on logger location