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Noise Impact Assessment

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3	20/06/2023	20220401.1/2006B/R3/AZ	JHT		AZ

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1 INTRODUCTION

Acoustic Logic has been engaged to assess noise impacts associated with the proposed childcare development to be located at 72 Park Avenue, Kingswood.

This document addresses noise impacts associated with the following:

- Operational noise from indoor and outdoor play areas
- Carpark and traffic noise
- Mechanical plant noise

The subject site and local context are indicated in Figure 1.

The report has been prepared for the sole purpose of a development application assessment and should not be used or relied on for any other purpose.

1.1 COUNCIL REQUEST FOR ADDITIONAL INFORMATION (CCC DA23/0076)

Acoustic Logic has been advised that the following matters have been raised regarding acoustics previous revisions of this noise impact assessment. The correspondence of the information below is sent via email on Friday 28th April 2023. The additional concerns raised within this correspondence are addressed within this revision of the noise impact assessment.

"Environmental Matters

- *The Noise Impact Assessment prepared by Acoustic Logic dated 21/12/2022, ref: 20220401.1/2112A/R2/AZ refers to the Blacktown DCP in section 5.1.2.1. Whilst this is most likely a typographical error, this needs to be addressed by this consultant.*
- *Whilst the Noise Impact Assessment adequately addresses the expected noise from the operation of the childcare centre, however, it does not address noise from the excavation and construction phases of the development.*
- *A noise impact assessment will therefore be required for both the excavation and construction phases of the development.*
- *The excavation works are likely to be required for both the excavation and construction phases of the development.*
- *The excavation works are likely to be required to depths of 1.0m to 4.0m, should rock breaking be required as part of the excavation on the site, this is to be included in the construction noise impact assessment."*

2 REFERENCED DOCUMENTS & PLANNING GUIDELINES

The following documents, planning instruments and guidelines have been used in the assessment:

- Association of Australasian Acoustical Consultants (AAAC) document – '*Guideline for Childcare Centre Acoustic Assessment*' version 3.0
- Penrith City Council document – '*Penrith City Council Development Control Plan*' ("DCP") 2014
- NSW Department of Planning document – '*Development Near Rail Corridors and Busy Roads*' ("DNRCBR") 2008
- NSW Environment Protection Authority (EPA) document – '*Noise Policy for Industry*' ("NPfI") October 2017
- NSW Environment Protection Authority (EPA) document EPA – '*Road Noise Policy*' ("RNP") March 2011
- '*State Environmental Planning Policy (Infrastructure & Transport) 2021*' as amended ("I&TSEPP").
- The architectural drawings prepared by Altis Architecture, dated 21st June 2023 (project no. 3115.01).
- NSW EPA *'Interim Construction Noise Guideline' (*ICNG)

3 SITE DESCRIPTION AND THE PROPOSAL

The project site is located at 72 Park Avenue, Kingswood. The proposed development consists of:

- A three-storey building, consisting of 6 indoor classrooms, and three outdoor play areas with carparking for staff and visitors on the ground level (at grade).
- Associated amenities and administration areas.

3.1 NEAREST SENSITIVE RECEIVERS

The following table lists the nearest sensitive receivers surrounding the site. An aerial photo of the site indicating nearby noise sensitive receivers and measurement locations is presented in Figure 1.

Table 1 – Sensitive Receivers

Receiver (Refer Figure 1)	Land Use	Comment
R1	Residential	Multi-level residential immediately to the west of the site
R2	Residential	Multi-level residential immediately to the east of the site
S1	School	St Joseph's Primary School, immediately to the north of the site
Railway	Railway	T1 Western Line and T5 Cumberland line immediately to the south of the site

3.2 ENVIRONMENTAL NOISE AND VIBRATION SOURCES

The following significant environmental noise sources have been identified:

- Minor traffic noise from Park Avenue which is located immediately to the south of the site.
- Shielded railway noise from the nearby railway which is located immediately to the south of the site.
- Other adjacent land uses.

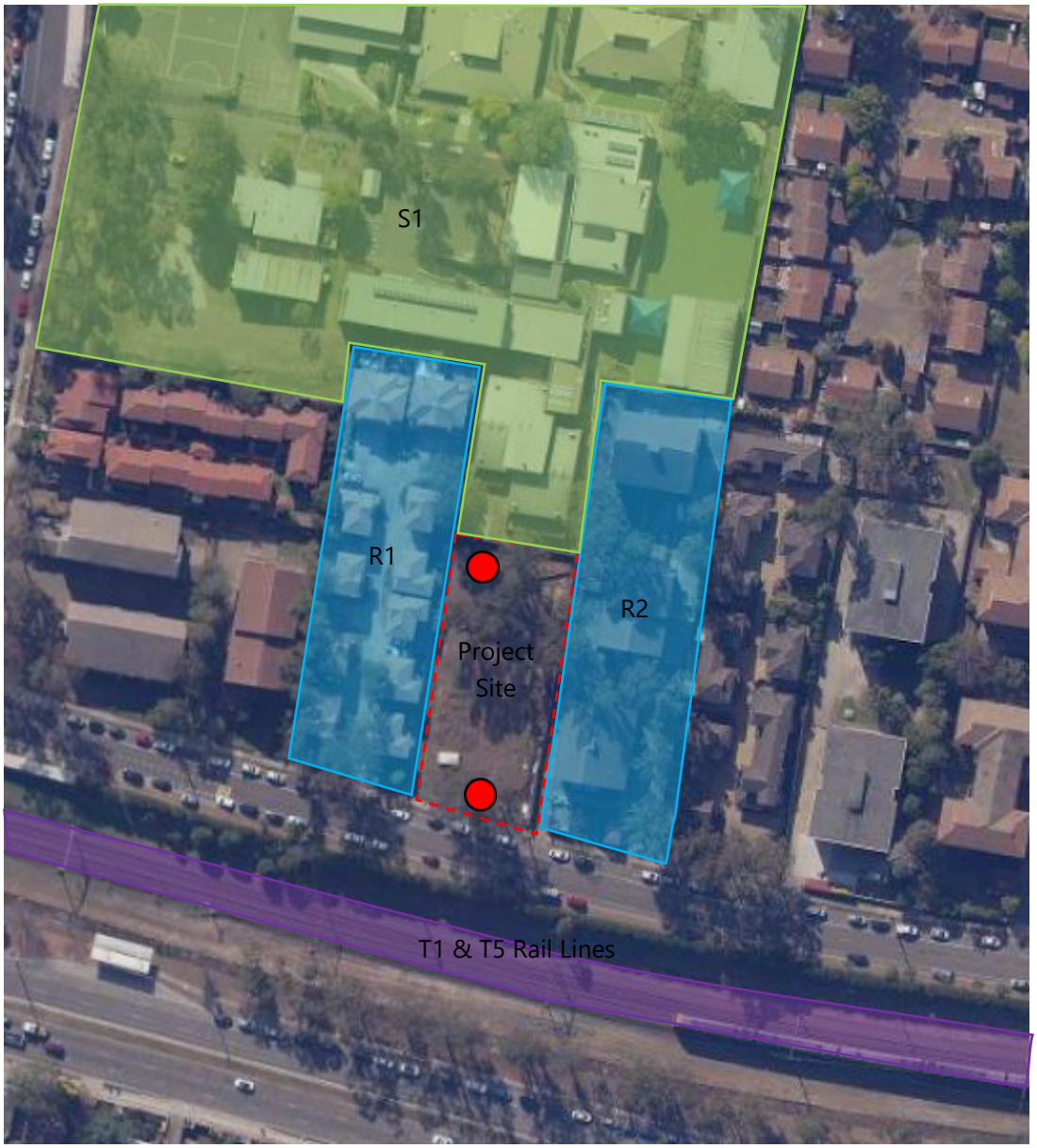


Figure 1 – Site Plan Showing Monitoring Locations and Surrounding Land Uses/Receivers

- Unattended Noise Monitoring Location - Attended Noise Monitoring Location	- Residential - School

4 EXISTING ACOUSTIC ENVIRONMENT

4.1 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).

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

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

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

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

4.2 UNATTENDED LONG TERM NOISE MONITORING

Long-term noise monitoring has been undertaken to obtain the following data:

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

Figure 1 above shows the monitoring locations used.

4.2.1 Monitoring Equipment

Unattended noise monitoring was conducted using two Rion NL-42 (Type 2) noise monitors.

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.

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.

4.2.2 Monitoring Location & Period

Two unattended noise monitors were placed on site, as indicated in Figure 1 above. The monitor locations were strategically selected to obtain data from multiple noise sources, primarily background noise at the rear of the site (away from potential ambient noise impacts) and at the front of the site to obtain traffic and rail noise levels at the site location.

Monitoring was conducted from Friday, 8th April 2022 to Tuesday, 26th April 2022

4.2.3 Calculated Noise Levels

Assessment and rating background levels have been determined from the long term, unattended noise monitoring data based on the methodology in the *Noise Policy for Industry* Fact Sheet B. Appendix 1 contains the data collected, and the periods identified as being affected by adverse weather conditions or extraneous noise (as defined by NPfI Fact Sheet B).

Weather data was obtained from records provided by the Bureau of Meteorology for the weather station located at Penrith Lakes.

The NPfI day, evening and night periods are:

- Day – 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

4.2.3.1 Background Noise Levels

The following tables summarise the assessment background noise levels (ABL) for each location. Where no ABL is indicated, that period was affected by adverse weather or other extraneous noise and excluded from the ABL calculation.

Table 2 – NPfI Assessment Background Noise Levels

Location	Date	Assessment Background Noise Level – dB(A)L_{90}		
		Day	Evening	Night
Rear of the Subject Site (Refer to Figure 1 above)	Friday, 8th April 2022	-	-	-
	Saturday, 9th April 2022	-	49	40
	Sunday, 10th April 2022	44	47	40
	Monday, 11th April 2022	47	47	39
	Tuesday, 12th April 2022	47	46	39
	Wednesday, 13th April 2022	50	-	39
	Thursday, 14th April 2022	47	45	38
	Friday, 15th April 2022	43	43	36
	Saturday, 16th April 2022	44	44	35
	Sunday, 17th April 2022	41	43	35
	Monday, 18th April 2022	42	44	36
	Tuesday, 19th April 2022	45	-	37
	Wednesday, 20th April 2022	46	47	40
	Thursday, 21st April 2022	49	46	37
	Friday, 22nd April 2022	49	-	-
	Saturday, 23rd April 2022	-	-	-
	Sunday, 24th April 2022	-	-	-
	Monday, 25th April 2022	-	-	-
	Tuesday, 26th April	-	-	-

The following table summarises the rating background noise levels determined for the day, evening and night periods as defined in the NPfI.

Table 3 – NPfI Rating Background Noise Levels

Location	Rating Background Noise Level (dB(A) L_{90})*		
	Day	Evening	Night
Subject Site	46	46	38

4.2.3.2 Ambient Noise Levels

The data for the day and night periods as defined in the I&TSEPP and DNRCBR have been processed to determine the ambient noise levels at the monitoring location.

Table 4 – Ambient Noise Levels

Location	Ambient Noise Level (dB(A) $L_{eq,\ period}$)			
	Day (7am to 10pm)	Day (Worst 1hr)	Night (10pm to 7am)	Night (Worst 1hr)
Subject Site	58	59	55	58

5 NOISE EMISSIONS ASSESSMENT

An assessment of potential noise emissions from the development has been conducted in accordance with the following criteria.

This assessment will review noise emissions associated with the following areas of the development.

- Indoor and outdoor play areas
- Use of the driveway/carpark spaces
- Mechanical plant (in principle).
- Indicative construction noise particularly from excavation.

5.1 NOISE EMISSION CRITERIA

5.1.1 Childcare Noise Emissions

5.1.1.1 Association of Australasian Acoustical Consultants (AAAC) document – *'Guideline for Childcare Centre Acoustic Assessment version 3.0'*

5.1.1.1.1 Indoor Play Areas

The AAAC technical guideline states the following regarding noise control for indoor play areas:

"*Noise emission from indoor play and activities should be considered, including scenarios with windows and doors both open and closed. Some childcare centres may need to close their windows and doors during active indoor play or music.*"

5.1.1.1.2 Outdoor Play Areas

The AAAC technical guideline states the following regarding noise control for external play areas:

"***Base Criteria*** *– With the development of childcare centres in residential areas, the background noise level within these areas can at certain times, be low. Thus, a base criterion of a contributed* $L_{eq,15min}$ *45 dB(A) for the assessment of outdoor play is recommended in locations where the background noise level is less than 40 dB(A).*

Up to 4 hours (total) per day *– If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed Leq,15min noise level emitted from the outdoor play shall not exceed the background noise level by more than 10 dB at the assessment location.*

More than 4 hours (total) per day *– If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed* $L_{eq,15min}$ *noise level emitted from the outdoor play shall not exceed the background noise level by more than 5 dB at the assessment location. "*

5.1.1.1.3 Other Sensitive Receivers

The AAAC technical guideline states the following regarding activity noise to other sensitive receivers:

"*Where appropriate, assessment should include consideration of noise emission to other sensitive uses including schools, hospitals, places of worship and parks (active and passive). Depending on the requirements of the state or territory where the centre is located, in the absence of applicable noise criteria for such a sensitive use, the cumulative Leq,15min noise level emitted from the use and operation of the child care centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within the sensitive property boundary, and shall not exceed 45 dB(A) internally, with windows or doors of the sensitive receiver open.*"

5.1.2 Carpark Noise/Mechanical Plant

5.1.2.1 Penrith City Council document – '*Penrith City Council Development Control Plan*' ("DCP") 2014

This office notes that the Penrith City Council DCP does not contain any specific noise criteria relating to carpark noise/mechanical plant noise from childcare centres, therefore the AAAC guideline and the NSW EPA *Noise Policy for Industry* will be used to formulate appropriate carpark and plant noise emission criteria.

5.1.2.2 Association of Australasian Acoustic Consultants (AAAC) document – '*Guideline for Childcare Centre Acoustic Assessment version 3.0*'

The AAAC technical guideline states the following regarding noise control for mechanical plant:

"*Childcare centres may include air-conditioning plant and equipment, kitchen and wet area exhaust fans, car park and garbage room ventilation fans. Depending on the requirements of the state or territory where the centre is located, any such mechanical should be assessed in accordance with this section and should not be audible outside the premises between 6pm and 7am.*"

5.1.2.3 NSW Environmental Protection Authority (EPA) document – '*Noise Policy for Industry*' ("*NPfI*") October 2017

The *Noise Policy for Industry* (*NPfI*) provides a methodology for assessing the need for noise mitigation:

- Determine project specific "trigger" levels.
- Predict noise emissions to surrounding properties and assess against the trigger levels.
- Noise mitigation should be assessed when the predicted noise emissions exceed the trigger levels.

In this assessment, the trigger levels determined using the *NPfI* will be adopted as assessment criteria for permanent plant and equipment.

Project specific noise "trigger" levels are determined based on the land use impacted, ambient noise environment and the time of day.

The EPA *NPfI* has three sets of criteria which are all required to be satisfied, namely "intrusiveness", "amenity" and "maximum noise levels". Intrusiveness and amenity are generally assessed at the most affected part of the property, or at the balcony or façade of an apartment or upper level of residence. Maximum noise levels are generally assessed outside bedroom windows.

The derivation of the project specific trigger levels is discussed in the subsequent sections.

5.1.2.3.1 Intrusiveness Criteria

The guideline is intended to limit the audibility of noise emissions at residential receivers only. Noise emissions measured using the L_{eq} descriptor should 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 (in accordance with Fact Sheet C of the Policy).

Intrusiveness criteria have been determined using the background noise levels in Section 4.2 and are summarised in table 7.

Table 5 – Intrusiveness Criteria

Location	Period/Time	Intrusiveness Noise Emission Trigger Level dB(A) $L_{eq(15min)}$
Nearest Residential Receivers	Day (7am – 6pm)	51
	Evening (6pm – 10pm)	51
	Night (10pm – 7am)	43

5.1.2.3.2 Amenity Criteria

The guideline is intended to limit the absolute noise level from all "industrial" noise sources so that it is consistent with the general environment.

Table 2.2 of the *NPfI* sets out acceptable noise levels for various land uses.

There are 3 categories for residential receivers - rural, suburban, urban. This subject site is most appropriately categorised as 'Suburban'.

Categories for non-residential uses are also indicated in the table.

Generally, the *NPfI* requires project amenity noise levels to be calculated in the following manner:

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

The applicable amenity goals are provided in the following table.

Table 6 - Amenity Noise Levels

Type of Receiver	Time of day	Recommended Noise Level dB(A)$L_{eq(period)}$	Project Amenity Noise Level dB(A)$L_{eq(15\ minute)}$
Residential – Suburban	Day (7am – 6pm)	55	53
	Evening (6pm – 10pm)	45	43
	Night (10pm – 7am)	40	38
School classroom – internal	Noisiest 1-hour period when in use	35	33
School playground	When in use	55	53

5.1.2.3.3 Maximum Noise Level Event Assessment

The procedure nominated in Section 2.5 of *NPfI* has been used to assess residential sleep disturbance impacts from maximum (i.e., short term) noise events. This is summarised below.

Where night time noise emissions outside a residential building 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.

The project specific maximum noise event trigger levels are summarised in table 13.

Table 7 – Maximum Noise Level Event Trigger Levels (Night Time)

Location	$L_{eq,\ 15min}$ (dB(A))	L_{AFmax} (dB(A))
Nearby Residences	43 dB(A)	53 dB(A)

5.1.3 Traffic Generation

5.1.3.1 NSW Environmental Protection Authority (EPA) document – '*Road Noise Policy*' ("RNP") March 2011

For land use developments with the potential to create additional traffic, the development shall comply with the requirements detailed in the EPA's *RNP* criteria, detailed in table 12. This has been applied to assess the future potential acoustic impacts of increased traffic that will result from the childcare centre once it is operational.

Table 8 – Criteria for Increased Traffic Generation from the Development

Time of Day	Criteria for Acceptable Traffic Noise Level (Local Roads) – dB(A)
Day (7am – 10pm)	55 dB(A)$L_{eq(1hr)}$
Night (10pm – 7am)	50 dB(A)$L_{eq(1hr)}$

Given that traffic noise levels measured along Park Avenue currently exceed the noise levels identified in the above table, the provisions outlined in Section 3.4 of the policy will apply, as follows:

"*If practicable, noise on public roads as a result of increased traffic generation should not result in an increase in traffic noise levels of more than 2 dB(A). In this regard, the policy relevant states that "an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person".*

5.1.4 NSW EPA Interim Construction Noise Guideline

Given the scale of the proposed works, the "quantitative" assessment procedure, as outlined in the Interim Construction Noise Guideline (ICNG) will be used (as opposed to the simpler "qualitative" assessment method outlined in the guidelines). The quantitative assessment method requires:

- Determination of noise management levels (based on ambient noise monitoring).
- Review and prediction 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.

5.1.5 Residential Receivers

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

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

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

Table 9 – Construction Noise Management Levels - Residential

Location	"Noise Affected" Level - dB(A)$L_{eq(15min)}$	"Highly Noise Affected" Level - dB(A)$L_{eq(15min)}$
All Residents Surrounding 72 Park Avenue, Kingswood	Background 55 +10 = **65**	**75**

If noise levels exceed the management levels identified in the tables above, reasonable and feasible noise management techniques will be reviewed.

5.1.6 Other Sensitive Receivers

EPA guidelines also provides strategies for noise control with regards to other (non-residential) sensitive noise receivers, such as classrooms at schools and other education institutions. The following management level is adopted for classrooms (whilst they are in use):

Table 10 – Construction Noise Management Levels - Classrooms

Location	Management Level - dB(A)$L_{eq(15min)}$
Classrooms at schools (When in Use)	45 (Internal)

5.1.7 Summarised Noise Emission Criteria

The applicable assessment criteria and trigger levels are summarised in the following table. It is noted that all criteria should be satisfied.

Table 11 – Summarised Noise Emission Criteria

Receiver	Noise Source	Time of Day	Project Noise Trigger Level	Project Sleep Emergence Level
All Nearest Residential Receivers	Operational Noise (Children Activity Noise)	Childcare Operating Hours (7:00am – 6:00pm)	56 dB(A)$L_{eq(15\text{-}min)}$ AAAC Criteria (No more than 4 hours (total) play per day)	-
	Driveway/Carpark Noise		38 dB(A)$L_{eq(15\text{-}min)}$ NSW EPA NPfI (Night-time Period)	43 dB(A)$L_{eq(15\text{-}min)}$ 53 dB(A)L_{AFmax}
	Mechanical Plant		51 dB(A)$L_{eq(15\text{-}min)}$ NSW EPA NPfI (Day-time Period)	-
S1 School Classroom	Operational Noise (Children Activity Noise)		45 dB(A)$L_{eq(15\text{-}min)}$ AAAC Criteria (Internally)	-
	Driveway/Carpark Noise		33 dB(A)$L_{eq(15\text{-}min)}$ NSW EPA NPfI	-
	Mechanical Plant			-
S1 School Playground	Operational Noise (Children Activity Noise)		65 dB(A)$L_{eq(15\text{-}min)}$ AAAC Criteria	-
	Driveway/Carpark Noise		53 dB(A)$L_{eq(15\text{-}min)}$ NSW EPA NPfI	-
	Mechanical Plant			-

Table 12 – Criteria for Increased Traffic Generation from the Development

Time of Day	Criteria for Acceptable Traffic Noise Level (Local Roads) – dB(A)
Day (7am – 10pm)	61 dB(A)$L_{eq(1hr)}$ (Existing Traffic Noise Level + 2 dB(A))
Night (10pm – 7am)	60 dB(A)$L_{eq(1hr)}$ (Existing Traffic Noise Level + 2 dB(A))

5.2 ASSESSMENT OF NOISE EMISSIONS

5.2.1 Childcare Noise Emissions (Child Play Areas)

Predicted noise levels are based on the following information regarding the proposed childcare centre:

- The operating hours of the childcare centre are anticipated to be between 7:00am – 6:00pm, Monday to Friday.
- The proposed centre will accommodate a total children capacity of 108 children, as determined in the architectural drawings. The following classroom capacities per age group adopted as part of this assessment are:
    - 0-2 Classes: 28 children
    - 2-3 Classes: 40 children
    - 3-6 Classes: 40 children.
- Outdoor play areas are assumed to be operating concurrently (i.e. at one time).
- Outdoor play area times to not exceed more than 4 hours (total) per day. Indicatively, a maximum of 2 hours during the morning and 2 hours during the afternoon.
- Indoor play areas are assumed to have all doors and windows closed.
- No music is to be playing in both indoor and outdoor play areas.
- Noise emissions from children activity are predicted using the Sound Power Level spectra recommended within the AAAC technical guideline. These noise levels are as follows:

Table 13 – Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)

Number and Age of Children	dB(A)	63	125	250	500	1k	2k	4k	8k
10 Children 0 to 2 years	78	54	60	66	72	74	71	67	64
10 Children 2 to 3 years	85	61	67	73	79	81	78	74	70
10 Children 3 to 5 years	87	64	70	75	81	83	80	76	72

- All recommendations outlined in Section 6 of this report have been implemented.

5.2.1.1 Predicted Cumulative Play Area Noise Levels

5.2.1.1.1 SoundPlan™ 8.0 Noise Modelling

Noise levels have been predicted at the receiver locations using SoundPlan™ 8.0 modelling software implementing the ISO 9613-2:1996 "*Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: general Method of Calculation*" noise propagation standard.

Noise enhancing meteorological conditions have been adopted as recommended by the *NPfI*, noting that the ISO 9613 modelling approach assumes that all receivers are 'downwind' (i.e., that noise enhancing wind conditions are in effect at all times).

Figures 2 to 4 detail computational noise modelling for the closest noise sensitive receivers and facades relating to the child play area noise emissions through the presentation of a façade noise map onto the respective buildings. Numerical results are presented in Table 12.

Ground absorption was conservatively calculated with a ground factor of 0 for all areas expected localised lawns and greenery surrounding the site with a ground factor of 0.6 as recommended in *Engineering Noise Control* (Bies & Hanson).

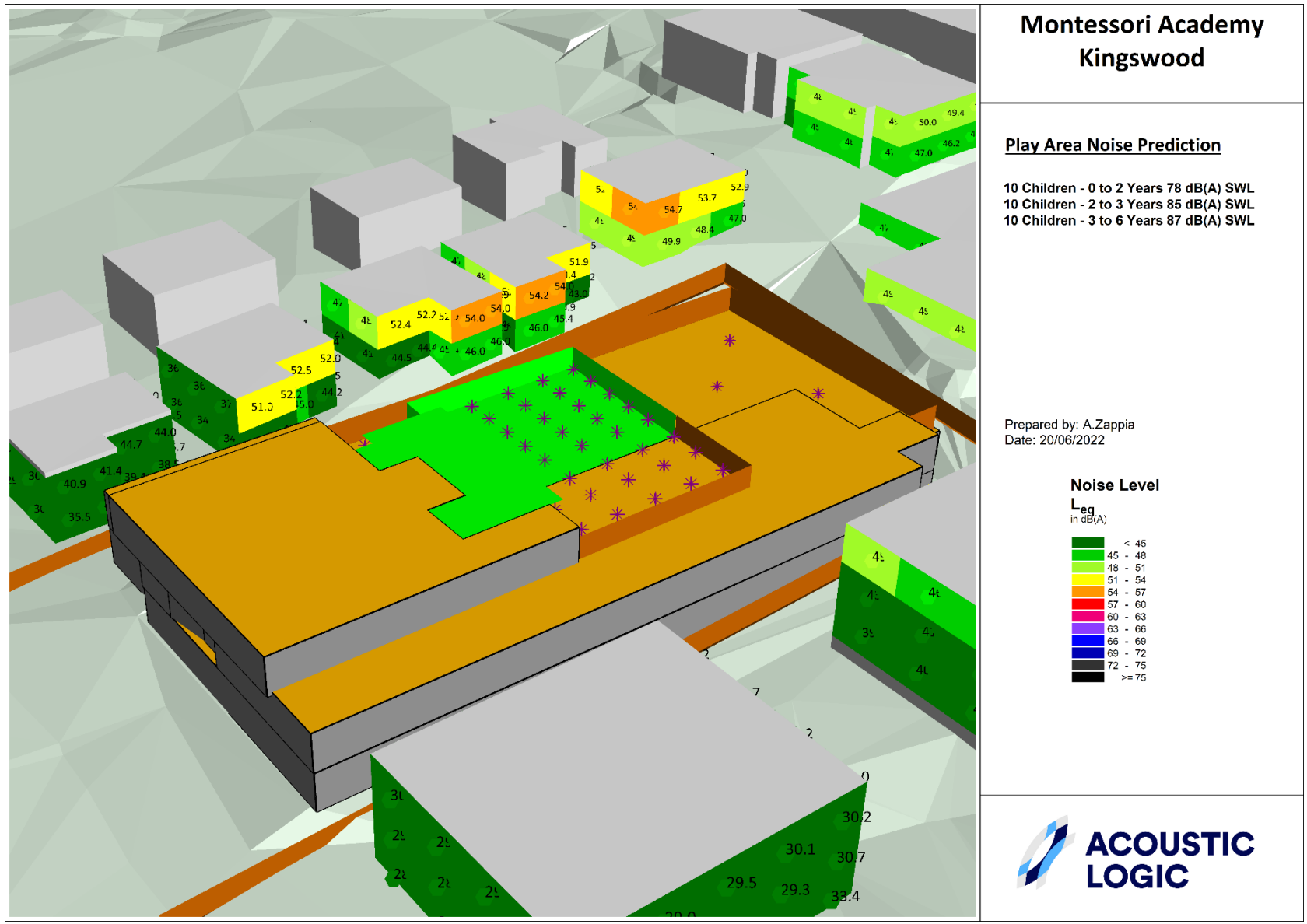


Figure 2 – Child Play Area Noise Levels – Western Receivers Façade Noise Map

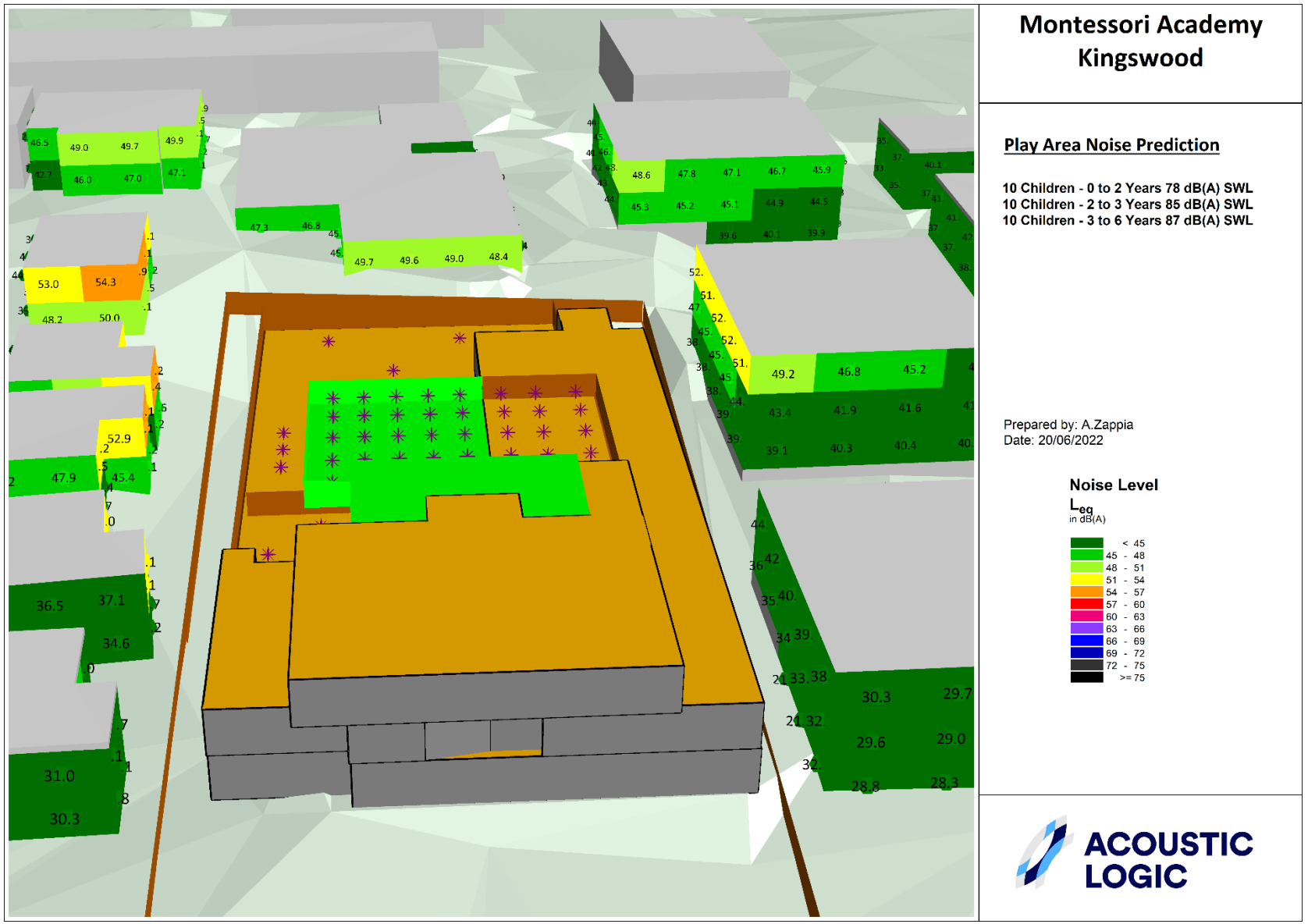


Figure 3 – Child Play Area Noise Levels – Northern Receivers Façade Noise Map

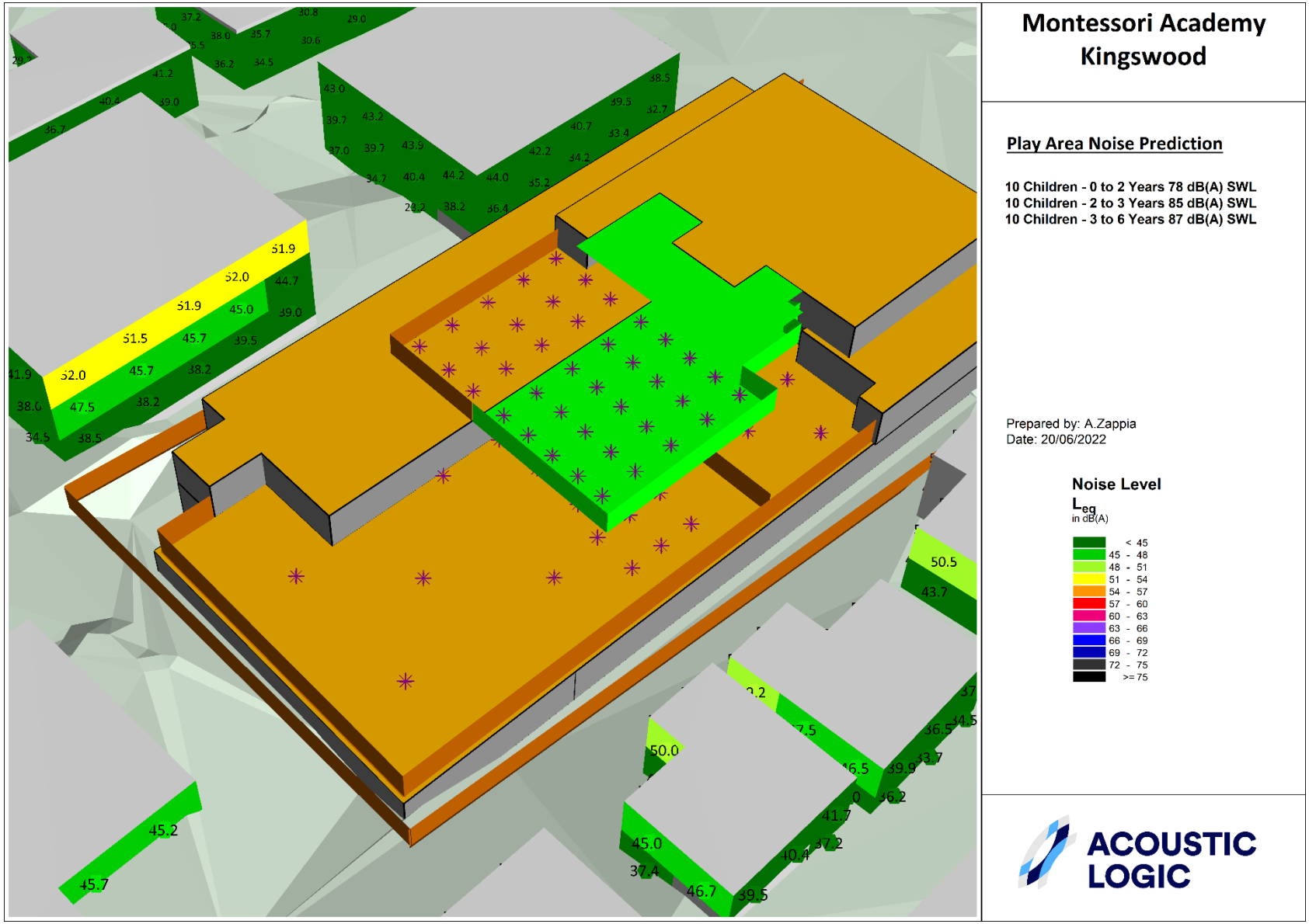


Figure 4 – Child Play Area Noise Levels – Eastern Receivers Façade Noise Map

The predicted noise emissions from the cumulation of play areas, at the nearest external noise receivers, have been summarised in the below table.

Table 14 – Predicted Cumulative Play Area Noise Levels to Receivers

Receiver	Predicted Noise Level – dB(A)L_{eq}	Project Noise Emission Criteria – dB(A)L_{eq}	Compliance
R1 Multi-level residential immediately to the west of the site	55	56 dB(A)$L_{eq(15\text{-}min)}$ AAAC Criteria (No more than 4 hours (total) play per day)	Yes
R2 Multi-level residential immediately to the east of the site	52		Yes
S1 St Joseph's Primary School, immediately to the north of the site	40 (Internally)[1]	45 dB(A)$L_{eq(15\text{-}min)}$ AAAC Criteria (Internally)	Yes

Table Note:

1. A nominal 10 dB(A) façade (external to internal) reduction is anticipated when assessing to internal areas.

5.2.2 Driveway Usage/Carpark Noise

Operational noise levels from the use of the carpark/driveway have been predicted and assessed against the relevant noise criteria, detailed in Section 6.1. This assessment has been conducted based on the following assumptions:

- A sound power level of 84 dB(A) has been adopted for a typical private motor vehicle.
- A sound power level of 95 dB(A) has been adopted for a vehicle door closing/slamming.
- From reviewing the total amount of carparking spaces noted in the architectural drawings, for a peak 15-minute period of usage, it is assumed there will be a total of 8 inbound or outbound movements within the proposed carpark and driveway from private/light motor vehicles.
    - The peak 15-minute period is expected to occur during drop off and pick-up activities. This can largely occur during the evening period, therefore, predicted noise levels will be assessed to the associated noise emission levels of this period.
- We note that the on-grade carpark will largely be shielded from the external building shell. Only movements from the driveway are expected to be exposed to the nearest residential receivers.
- All garbage and waste collection are expected to occur during the day-time period (7am – 6pm).
- All recommendations outlined in Section 6 have been implemented.

5.2.2.1 Predicted Average (L_{eq}) Noise Levels from Carpark Usage

The predicted average (L_{eq}) noise emissions from the carpark, at the nearest external noise receivers have been summarised in the table below.

Table 15 – Predicted Noise Levels from Carpark (Average/L_{eq} Noise Emissions)

Receiver	Predicted Noise Level – dB(A)L_{eq}	Project Noise Trigger Level – dB(A)L_{eq}	Compliance
R1 Multi-level residential immediately to the west of the site	<38	38 dB(A)$L_{eq(15\text{-}min)}$ NSW EPA NPfI (Night-time Period)	Yes
R2 Multi-level residential immediately to the east of the site	<38		Yes
S1 St Joseph's Primary School, immediately to the north of the site	<33	33 dB(A)$L_{eq(15\text{-}min)}$ NSW EPA NPfI	Yes

5.2.2.2 Predicted Peak (L_{Max}) Noise Levels from Carpark Usage

The predicted peak (L_{Max}) noise emissions from the carpark, at the nearest external noise receivers have been summarised in the table below.

Table 16 – Predicted Noise Levels from Carpark (Peak/L_{Max} Noise Emissions)

Receiver	Predicted Noise Level – dB(A)L_{Max}	Project Noise Trigger Level – dB(A)L_{Max}	Compliance
R1 Multi-level residential immediately to the west of the site	49	53 (Sleep Emergence Level)	Yes
R2 Multi-level residential immediately to the east of the site	38		Yes

5.2.3 Traffic Generation

Noise generated as a result of increased traffic on public roads has been assessed with reference to the NSW EPA's *Road Noise Policy*, utilising the US FHWA-TNM Technical Model 3.0, specifically the A-weighted sound pressure levels measured at 15 metres of automobiles on average pavement.

The main access point for vehicles is via Park Avenue. Predictions of traffic noise generation have been made using the following modelling parameters:

- Automobile sound power levels as defined in Figure 26 of the US FHWA-TNM Technical Model 3.0, travelling at 50km/h.
- It is assumed that, as a worst-case "peak hour" period, the total allowable vehicles (29 spaces) will be either entering or exiting the development.

Noise emissions have been predicted at the worst-affected residential receivers and compare against the relevant noise criteria set out in Section 5.2.

Table 17 – Predicted Traffic Noise Increase on Park Avenue from the Proposed Development

Noise Source	Predicted Traffic Noise Level – dB(A)$L_{eq(1hr)}$	Increased Traffic Noise Target Level – dB(A)$L_{eq(1hr)}$	Comment
Cumulative Noise from Vehicle Movements	60	61 dB(A)$L_{eq(1hr)}$ (Existing Traffic Noise Level + 2 dB(A))	Achieves the increased traffic noise target level

5.2.4 Mechanical Plant (In Principle)

The design and selection of plant have not been undertaken but would generally consist of carpark ventilation plant, apartment air conditioning condensing units, bathroom ventilation fans (which would typically be small fans located internally) and miscellaneous ventilation fans.

The plant would be selected to meet the noise levels required by the noise limits indicated above, and where required would be treated by enclosing the equipment, treating ducting, and acoustic louvres, as required to meet limit noise emissions.

Designers should have regard for the fact that allowances should be made in respect of plant locations to minimise impacts on sensitive receivers and to provide sufficient space to incorporate treatment to plant areas to meet the above guidelines.

5.2.5 Indicative Assessment of Construction Noise Emissions

This section will assess the potential noise emissions associated with excavation and construction activities. Given that no detailed plan of management of construction programme has been provided/available to date, we note the following:

- Typical excavation activities consist of the following:
    - Small to Medium Excavator (With bucket attachment).
    - Small to Medium Excavator (With hammer attachment).
    - General Materials Handling (Forklifts, etc,)
    - Small to Medium Trucks – Dump, etc,
- Typical construction activities consist of the following:
    - Power Hand Tools
    - General Materials Handling
    - Concrete Pump Truck

The following table displays the sound power levels for each equipment/plant machinery and activity:

Table 18 – Equipment and Activity Sound Power Levels dB(A) Operating 100% Duty

Activity	Sound Power Level dB(A)
30T Excavator (Bucket Attachment)	110
30T Excavator (Hammer)	122
Trucks/Bobcat	110
Concrete Pump Truck	110
Materials Handling (Forklits, etc,)	100
Powered Hand Tools	100

Utilised the above sound power levels, predicted noise levels for each stage (excavation and construction) are provided below:

Table 19 – Excavation Stage Predicted Noise Levels dB(A)$L_{eq(15\text{-}min)}$

Receivers	External Predicted Noise Level dB(A)$L_{eq(15\text{-}minute)}$	Management Noise Level dB(A)$L_{eq(15\text{-}minute)}$
R1 – Western Receivers	84-102	Management Noise Level - **65** Highly Noise Affected Management - **75**
S1 – Northern Receivers	77-97	Management Noise Level (Internal) – **45**
R2 – Eastern Receivers	84-102	Management Noise Level - **65** Highly Noise Affected Management - **75**

Table 20 – Construction Stage Predicted Noise Levels dB(A)$L_{eq(15\text{-}min)}$

Receivers	External Predicted Noise Level dB(A)$L_{eq(15\text{-}minute)}$	Management Noise Level dB(A)$L_{eq(15\text{-}minute)}$
R1 – Western Receivers	76-90	Management Noise Level - **65** Highly Noise Affected Management - **75**
S1 – Northern Receivers	68-88	Management Noise Level (Internal) – **45**
R2 – Eastern Receivers	76-90	Management Noise Level - **65** Highly Noise Affected Management - **75**

The predicted noise levels are presented as a range which reflect the varying distances on site and the dynamic nature of the equipment and plant during works. Typical construction noise management guidelines are provided within EPA Document – *Interim Construction Noise Guideline.* With regards to the above noise levels, we note the following:

- Excavation stage will involve higher noise levels than construction stage. Excavation noise levels will be above both the highly noise affected management level and management noise level in accordance with the NSW EPA Interim Construction Noise Guideline for residential receivers and the management noise level for school receivers.

- Construction stage will generally exceed the management noise levels when working close to the boundary.

- Worst-case noise is expected to occur when works are being undertaken closest to the boundaries of the receivers. Given that receivers R1 and R2 are directly overlooking the existing site, they will be the worst affected receivers. School receivers at S1 are likely to only be affected for shorter periods of time throughout the day given that students will have recess/lunch breaks and move between classrooms. Additionally, school receivers are only affected during school hours.

- It should be noted that construction noise activity will likely reduce further once façade construction has been completed. The additional façade will typically reduce up to a further 10-20dB.

- Whether rock breaking is required at this stage is unknown, however, should rock breaking be required, the recommended standard hours of work should be in accordance with the recommended hours of work as per the ICNG - Monday to Friday 9am to 5pm, Saturday 9am to 1pm. Should noise still be of concern, respite periods should be introduced.

- This assessment has been undertaken based on 100% duty (i.e., all plant simultaneously and continuously operating in a worst-case scenario) and, this is highly unlikely. It is typical that frequent breaks and respite periods will be taken during construction which will reduce the noise level experienced by nearby receivers. Where possible, quieter methodology and equipment should be chosen and prioritised.

6 RECOMMENDATIONS/MANAGEMENT CONTROLS

6.1 BUILDING/CONSTRUCTION RECOMMENDATIONS

- All southern façades facing the rail line are required to have 6.38mm laminated glazing with full perimeter acoustic seals.
- A minimum 2.1m high acoustic fence is to be installed along the retaining walls surrounding the Level 1 outdoor play area. Refer to Appendix 2 for detailed markup.
- A minimum 1.8m high acoustic fence is to be installed around the full perimeter of the Level 2 outdoor play area. Refer to Appendix 2 for detailed markup.
- The underside of the shaded area/awning of Level 1 outdoor play area is to have acoustic absorptive treatment (minimum NRC > 0.9) installed to the full extent. Absorptive treatment can include Envirospray 300, 50mm thick Bradford Supertel with ultraphon/perforated metal facing (maximum 20% open area), or CSR Martini XHD 50.
- Given that the current available construction programme is limited, detailed and specific advice cannot be provided with respect to construction and excavation activity. However, given the predicted high noise levels, a construction noise and vibration management plan should be prepared. Additionally, noise and vibration monitoring is recommended throughout the excavation and construction process to protect the acoustic amenity of nearby receivers whilst works are being undertaken.

6.2 MANAGEMENT CONTROLS

- No more than 108 children at any given time.
- No more than 4 hours (total) of outdoor playtime per day. Indicatively, a maximum of 2 hours during the morning and 2 hours during the afternoon.
- Waste collection is to only occur during the daytime period, between 7:00 am and 6:00 pm.
- Signs are to be implemented to remind staff and visitors to minimise noise at all times, at ingress/egress points from the childcare centre.
- All staff are to be given appropriate training in relation to acoustic impacts and requirements in terms of operation of the centre.
- Management is to ensure children are supervised at all times to minimise noise generated by the children whenever practical and possible.
- Install a contact phone number at the front of the centre so that any complaints regarding the operation of the centre can be made.

7 CONCLUSION

This report presents an acoustic assessment of potential noise impacts associated with the proposed childcare development to be located at 72 Park Avenue, Kingswood.

Noise emissions from the development once operational are to comply with the requirements of Section 5.1. Provided that the recommendations/management controls summarised in Section 6 are implemented, noise emissions from the use of the centre can comply with the requirements noted above.

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

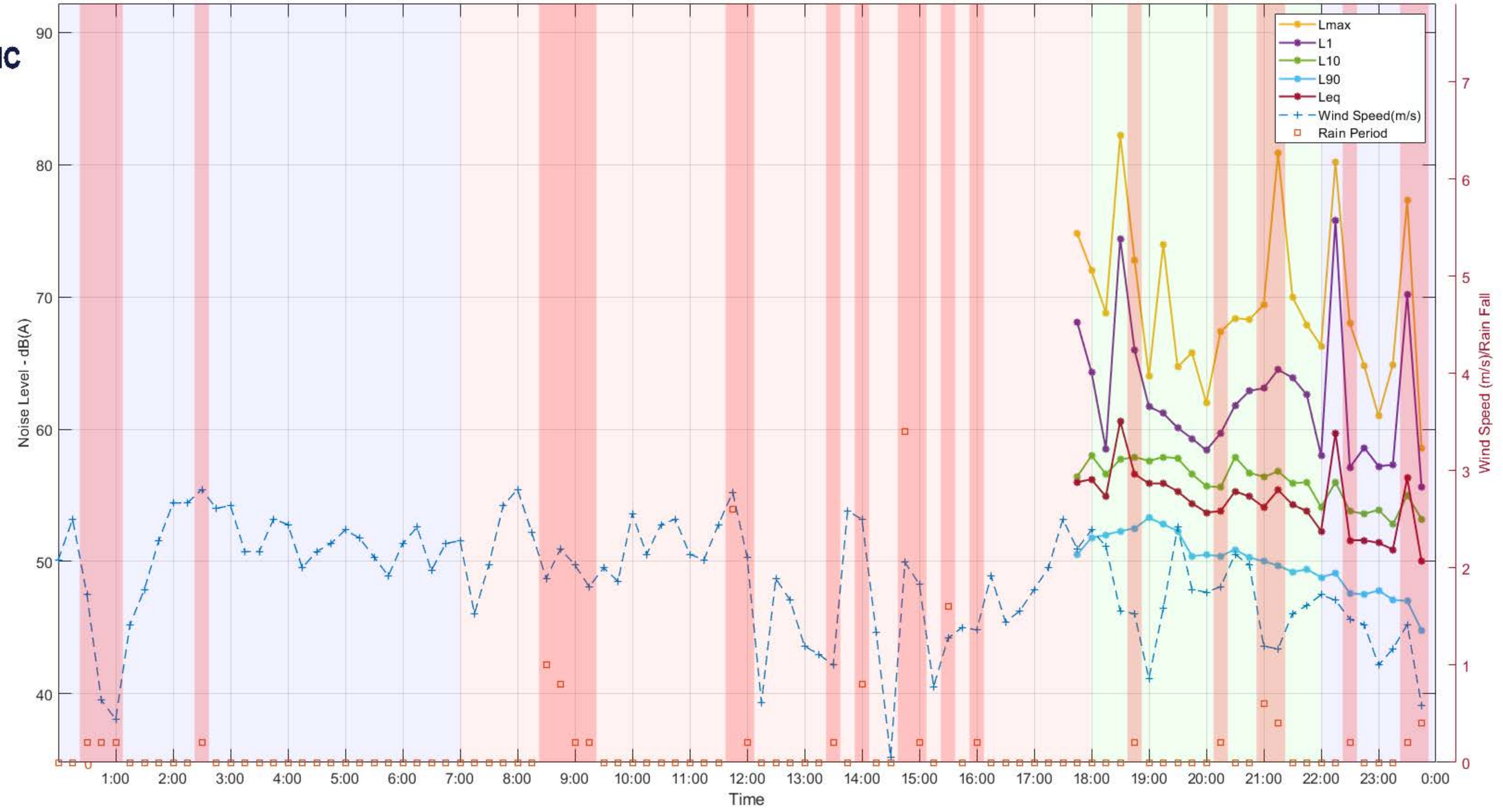
Yours faithfully,

Acoustic Logic Pty Ltd
Adrian Zappia

APPENDIX 1 – UNATTENDED NOISE MONITORING GRAPHS

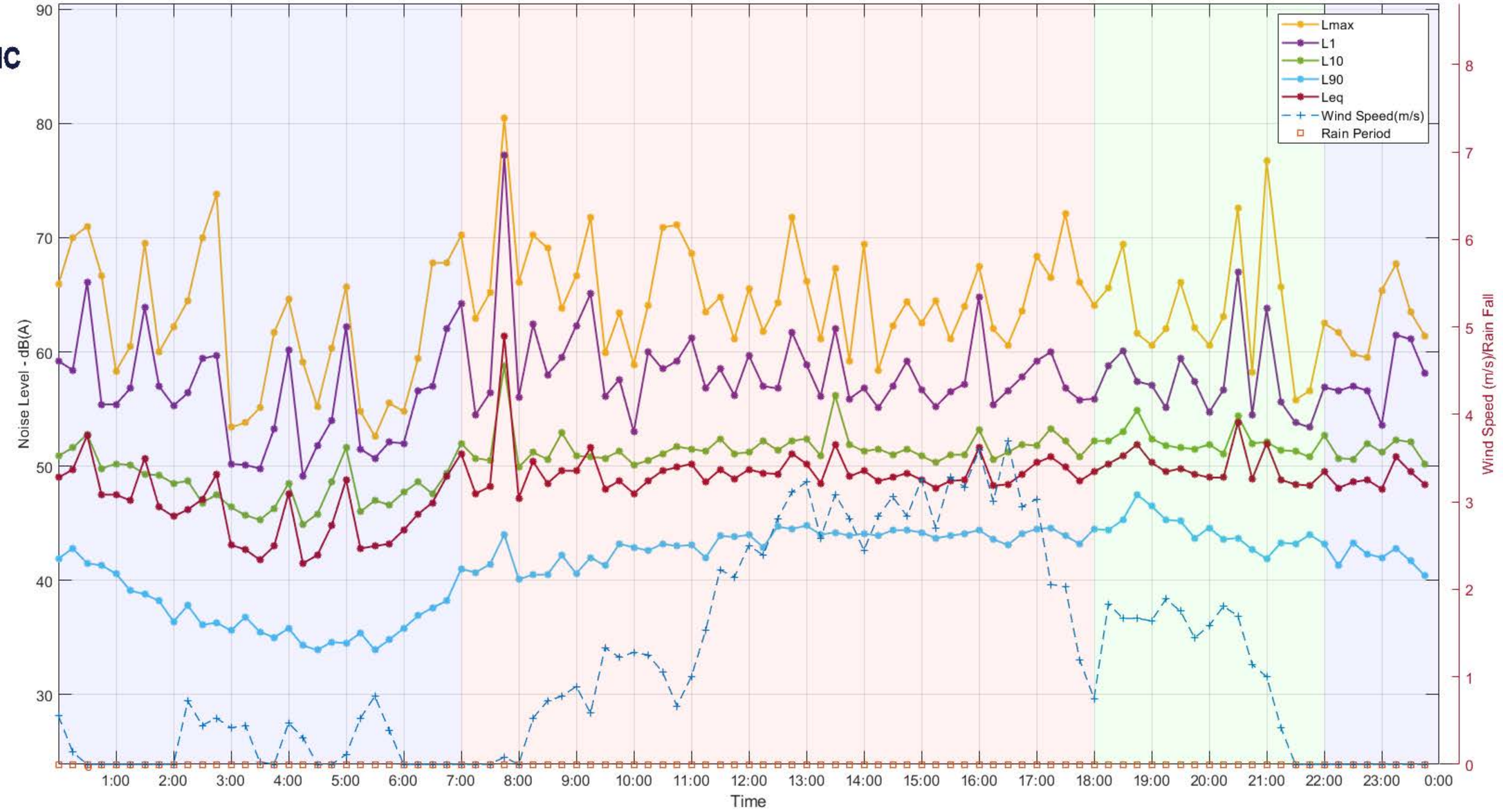
ACOUSTIC LOGIC

72 Park Avenue, Kingswood
8/04/2022



ACOUSTIC LOGIC

72 Park Avenue, Kingswood
17/04/2022



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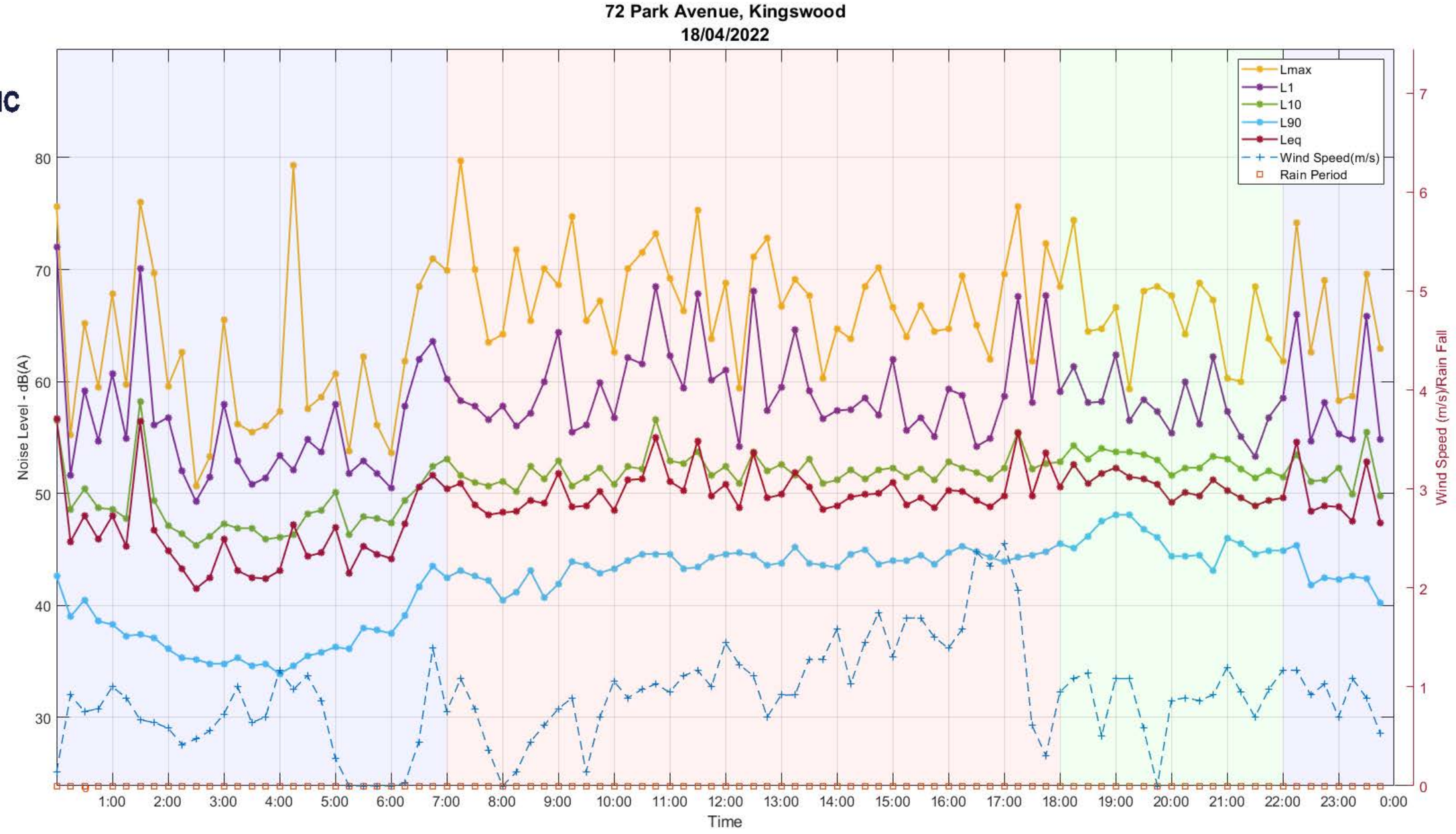

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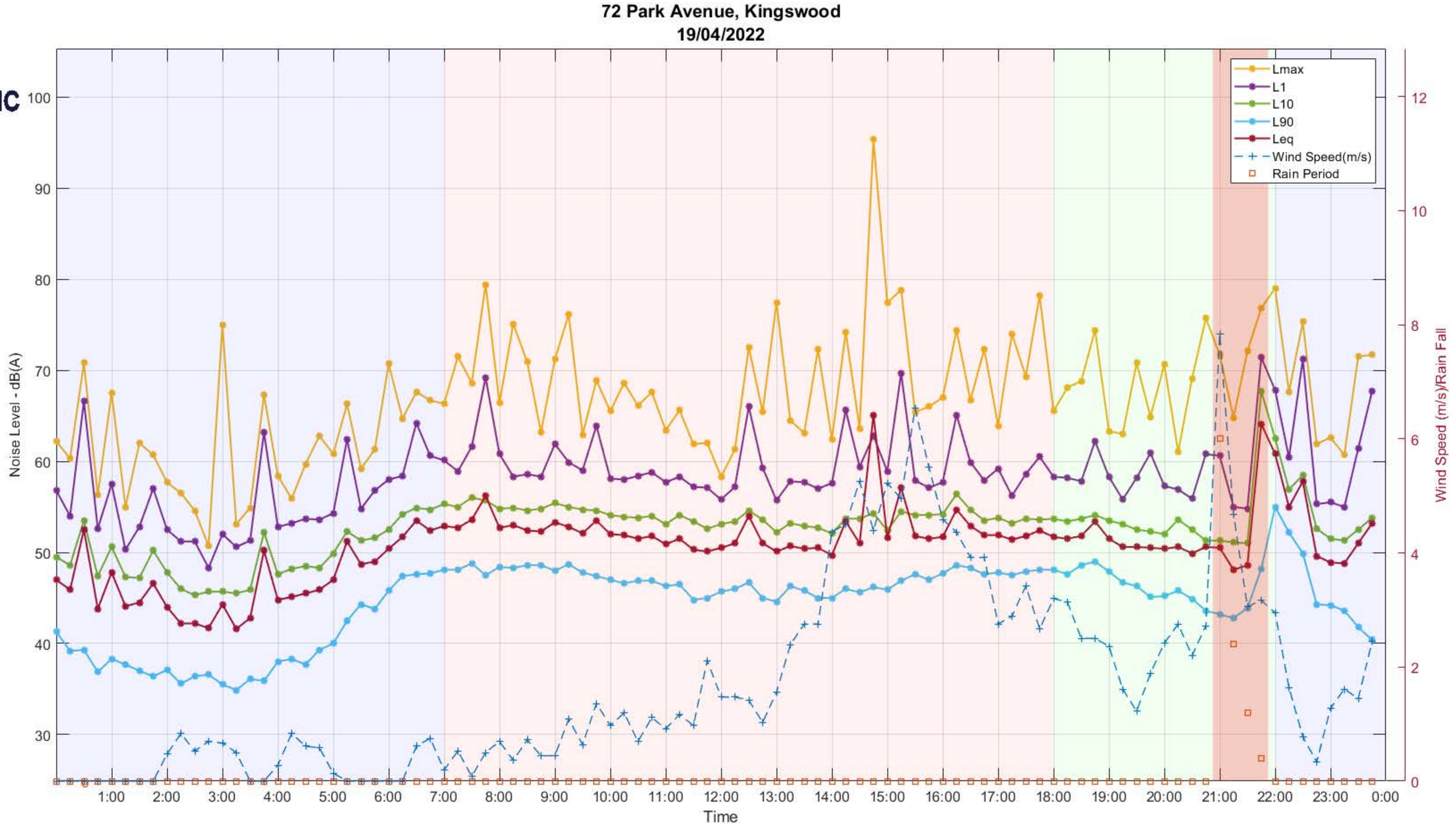

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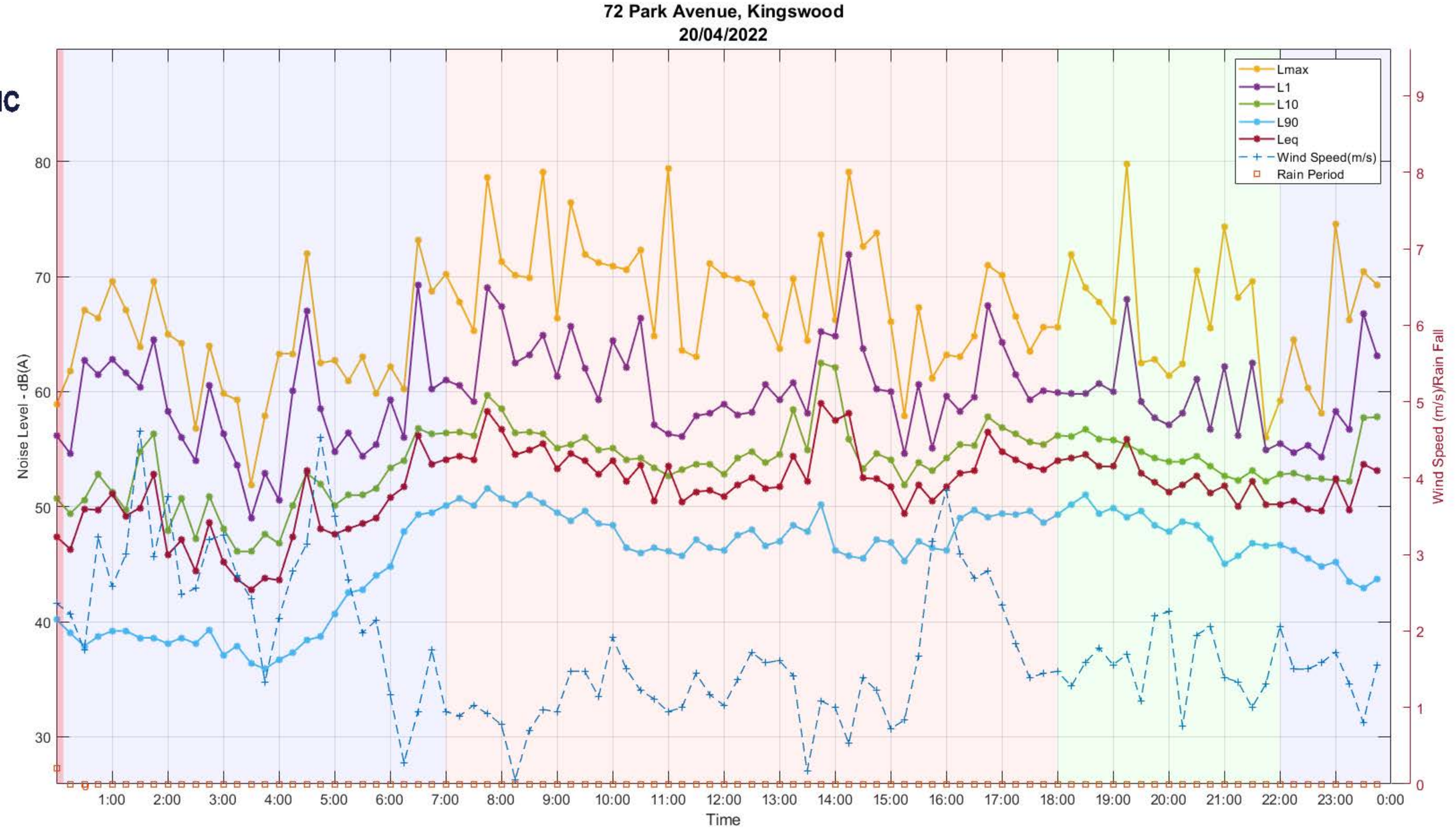
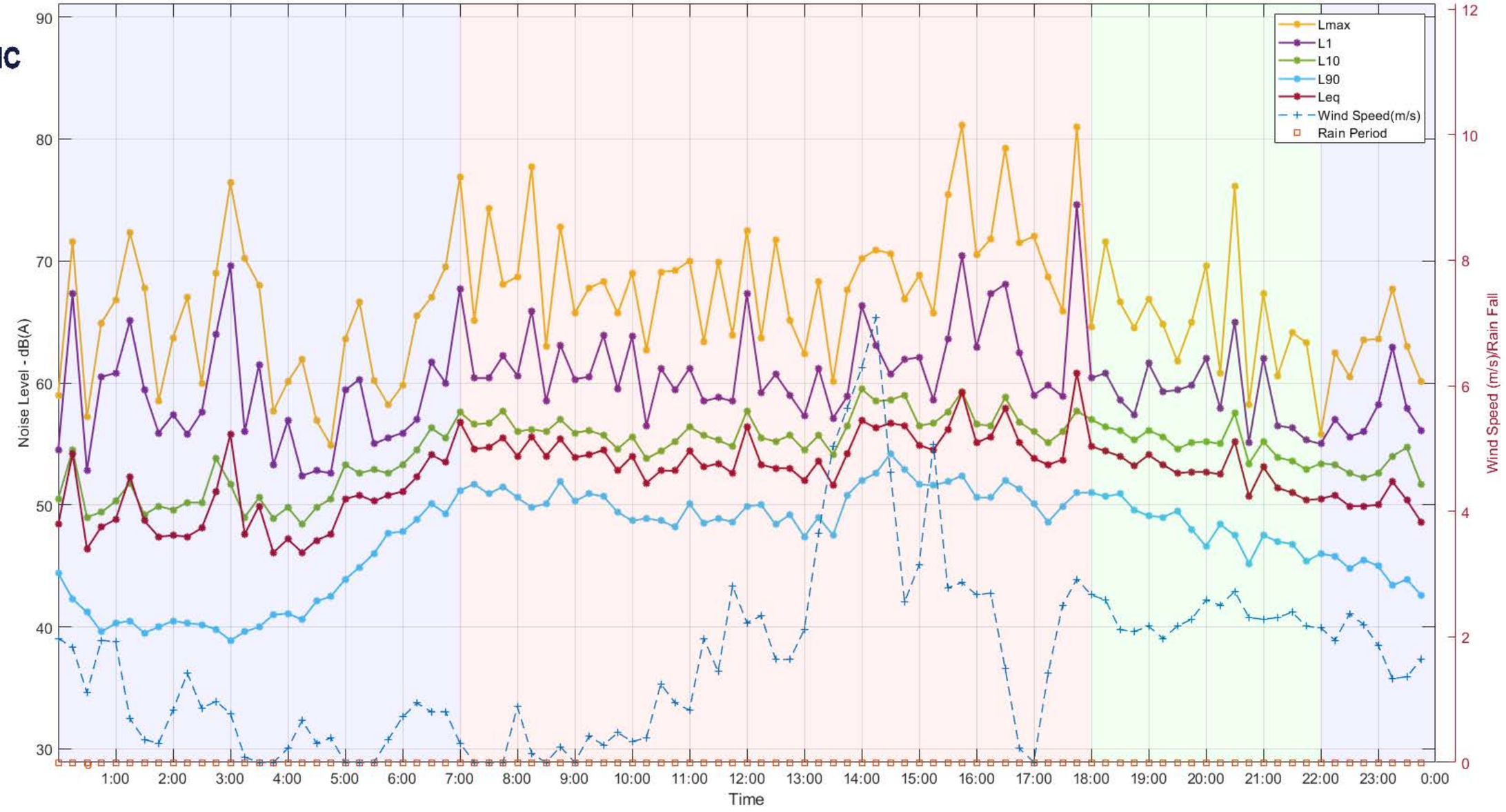


ACOUSTIC LOGIC

72 Park Avenue, Kingswood
21/04/2022



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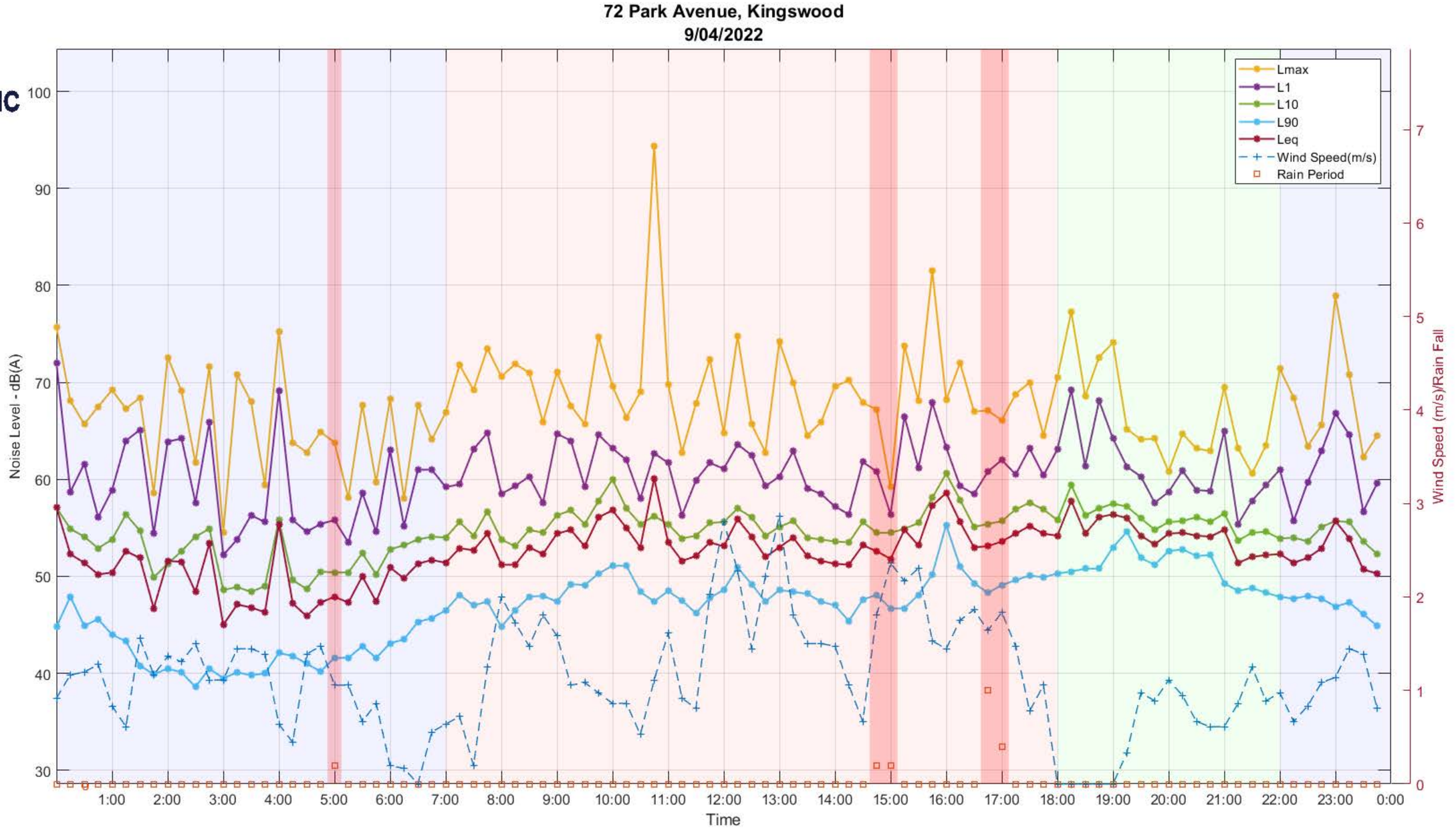

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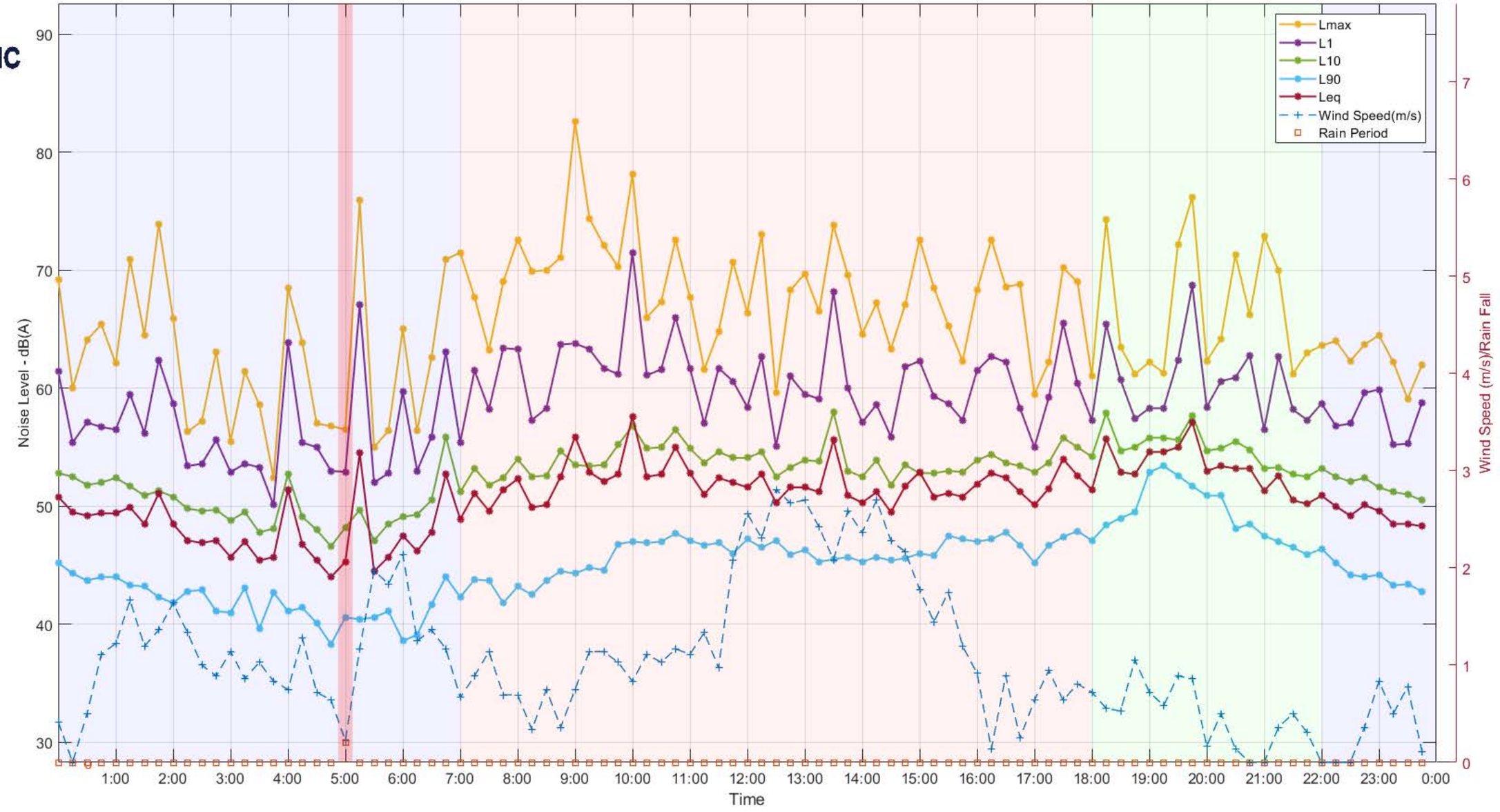
72 Park Avenue, Kingswood
10/04/2022



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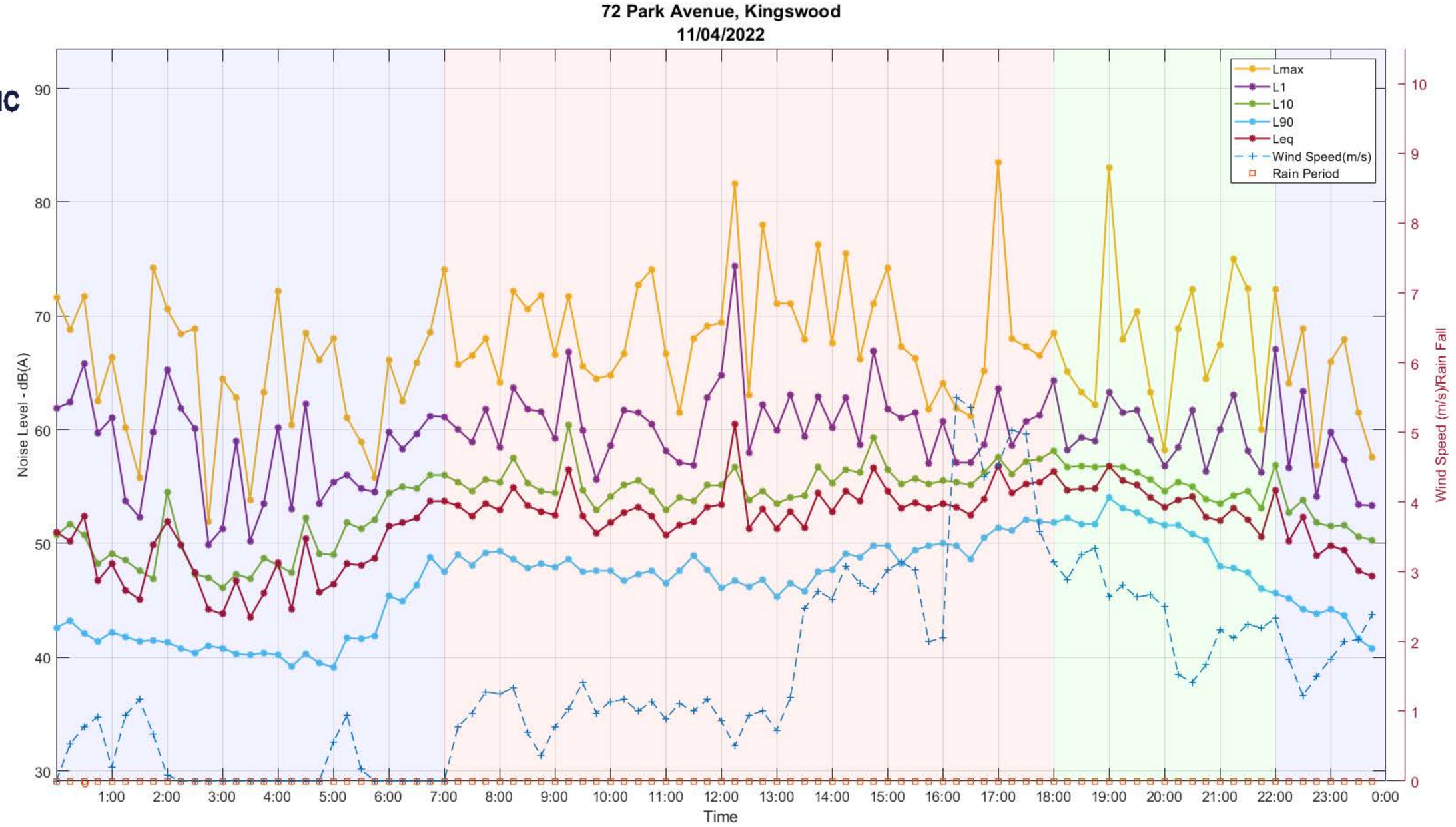

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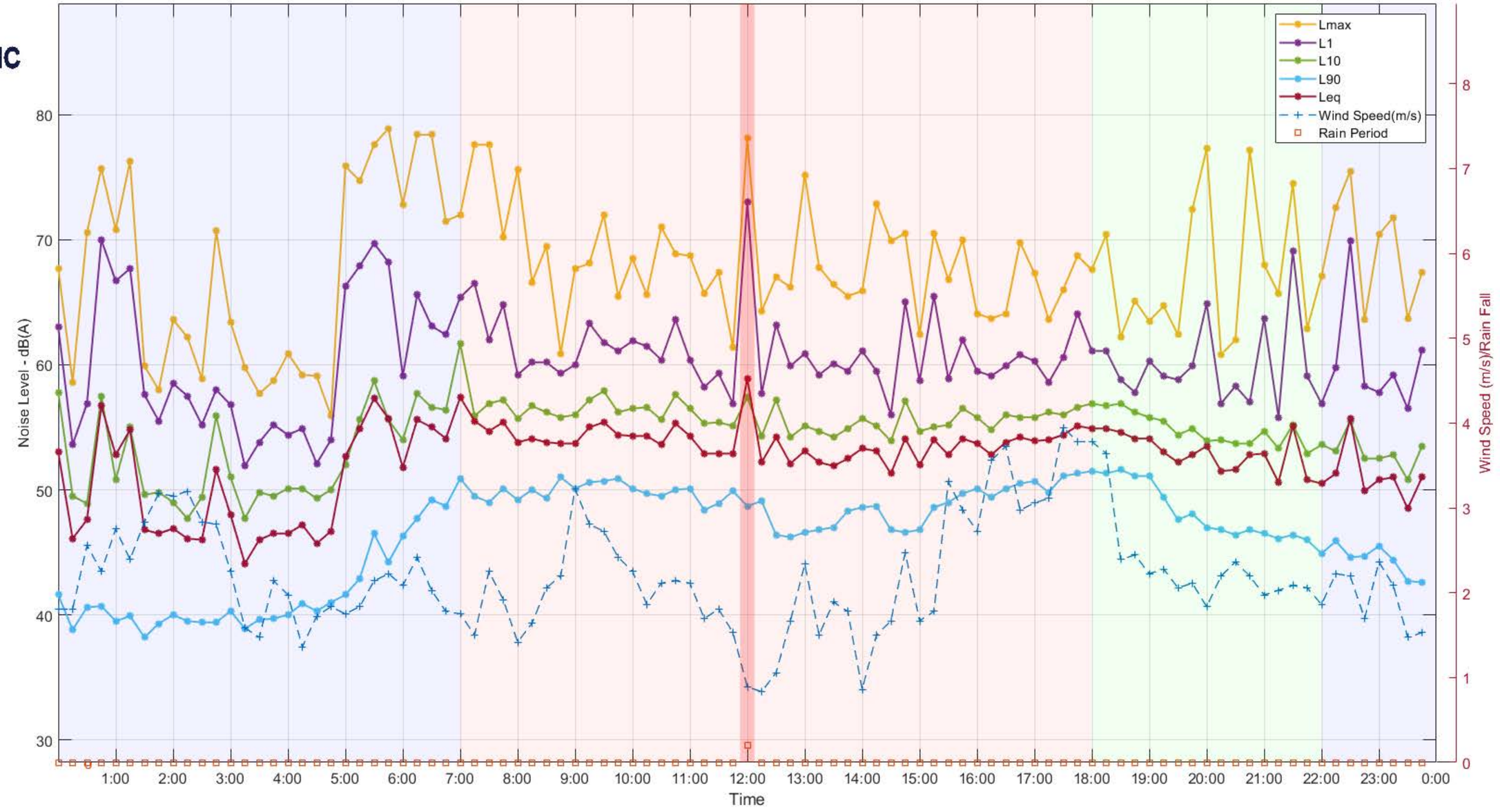
12/04/2022



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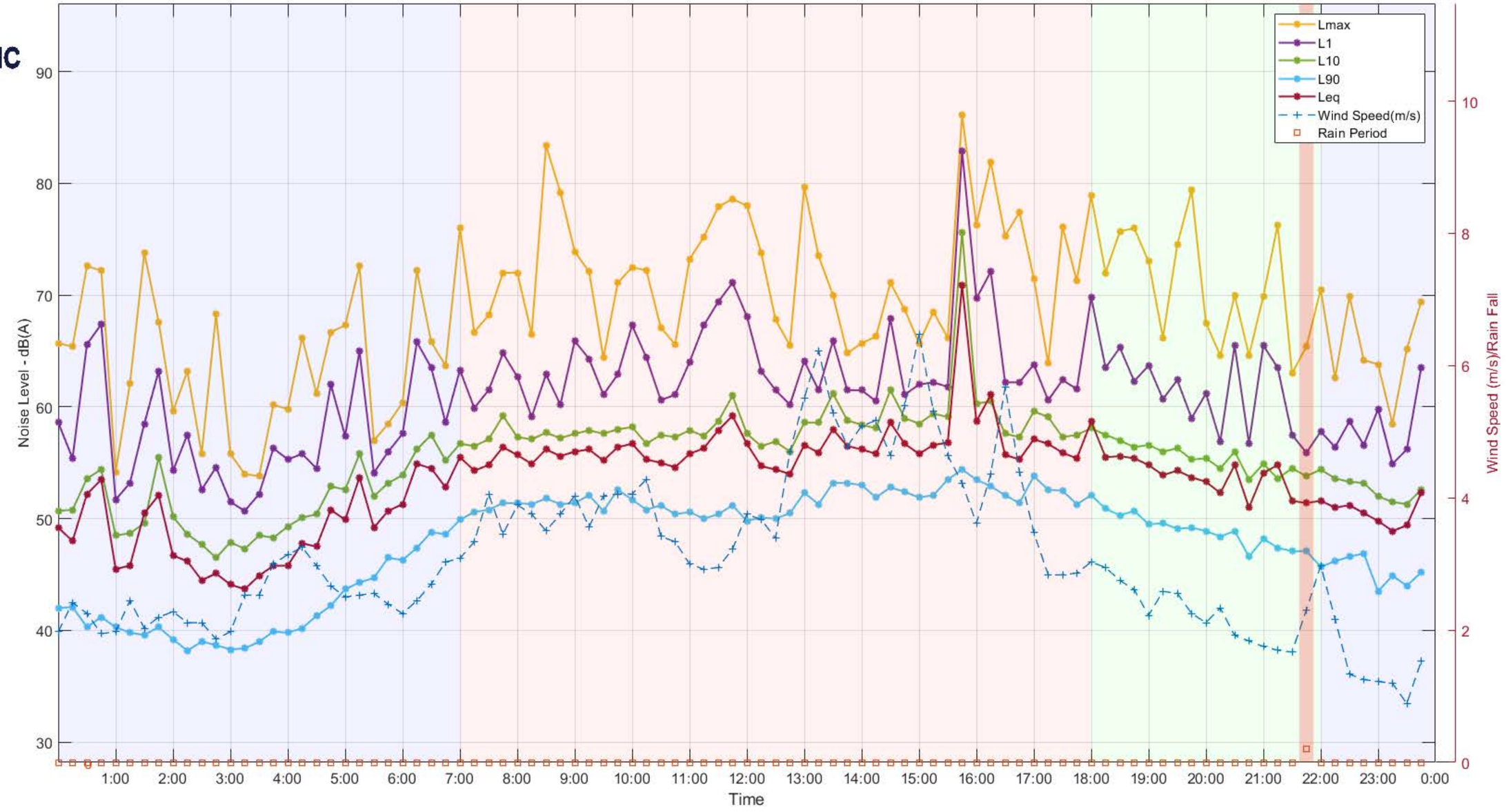

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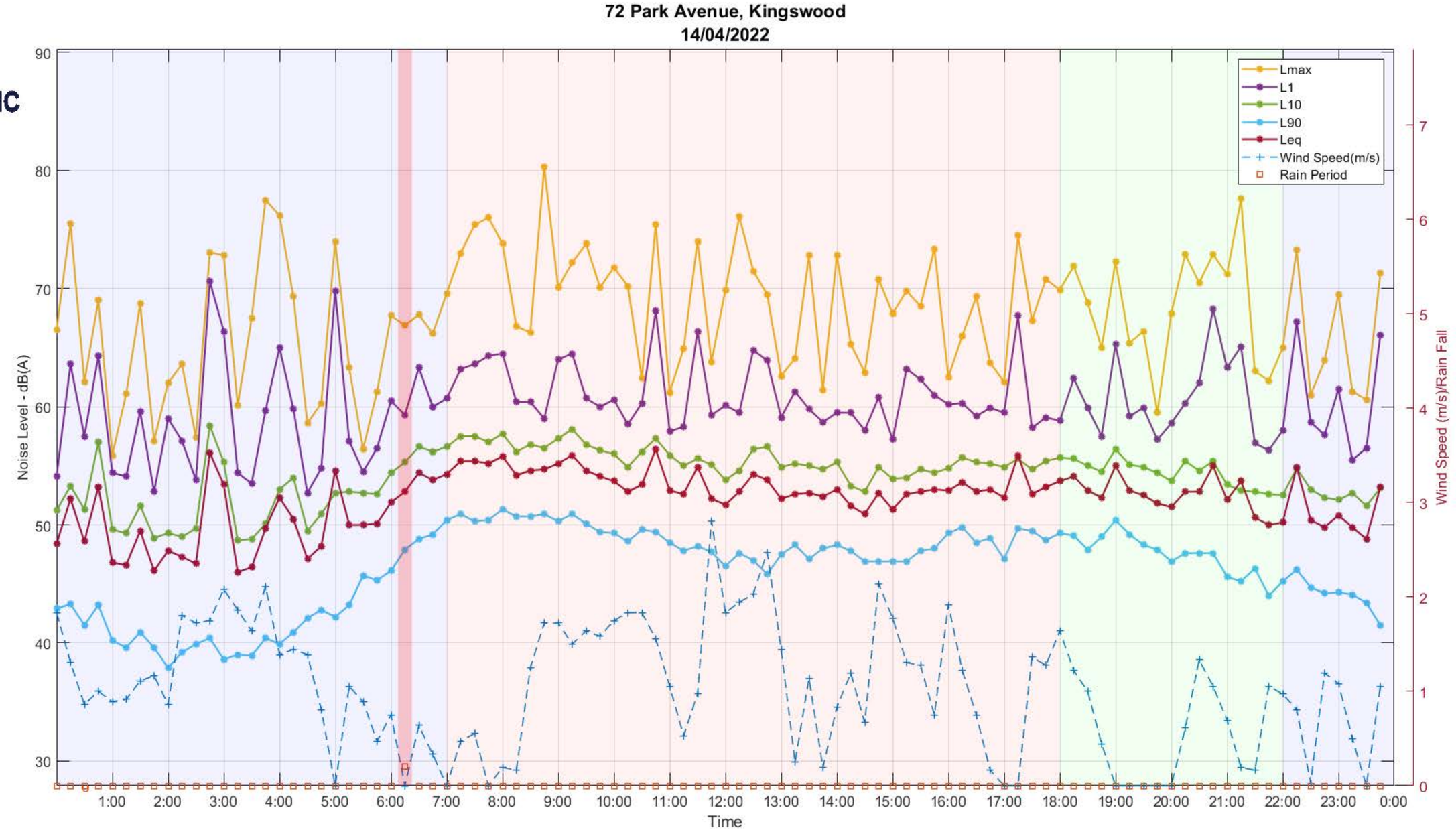

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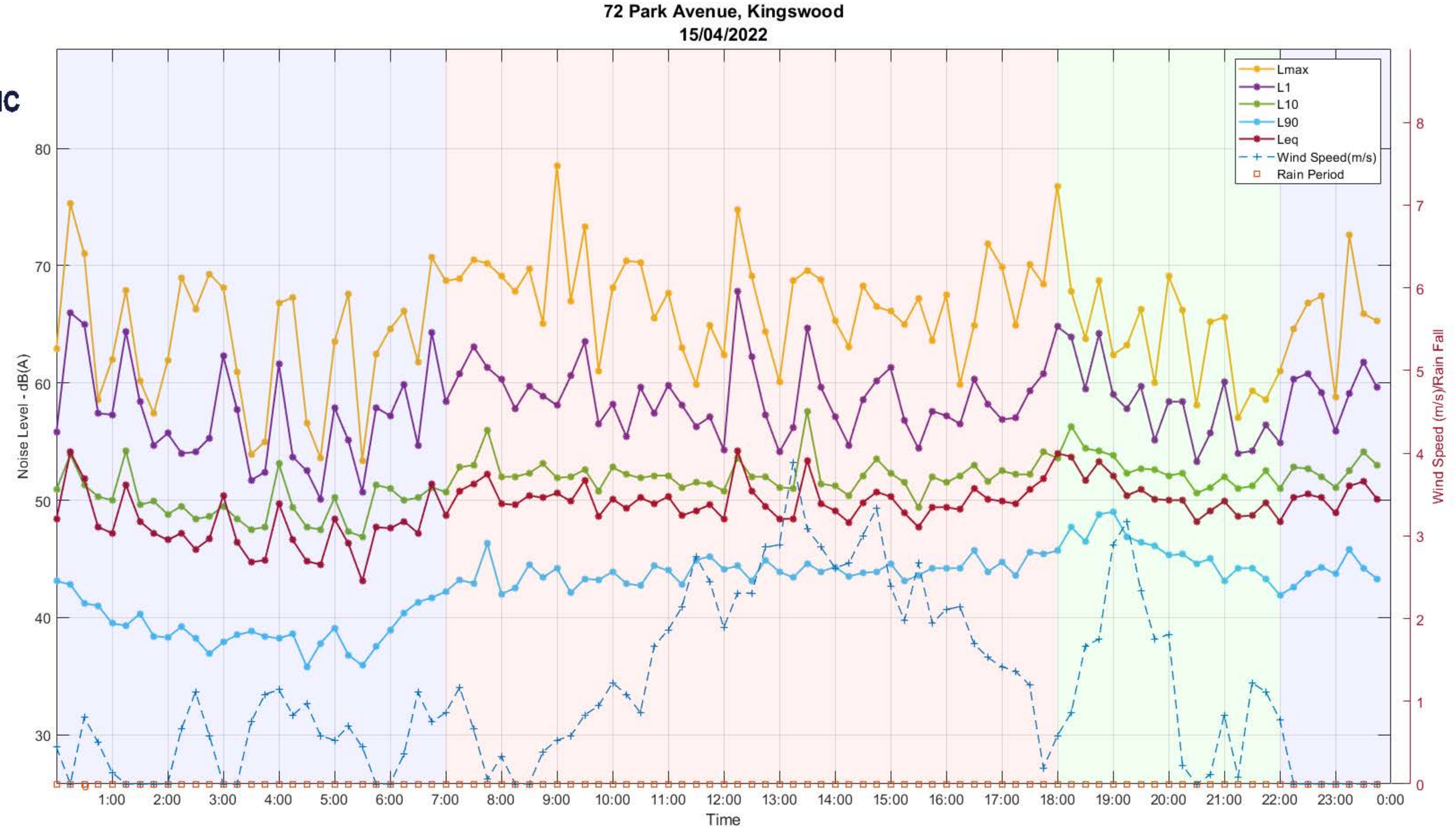

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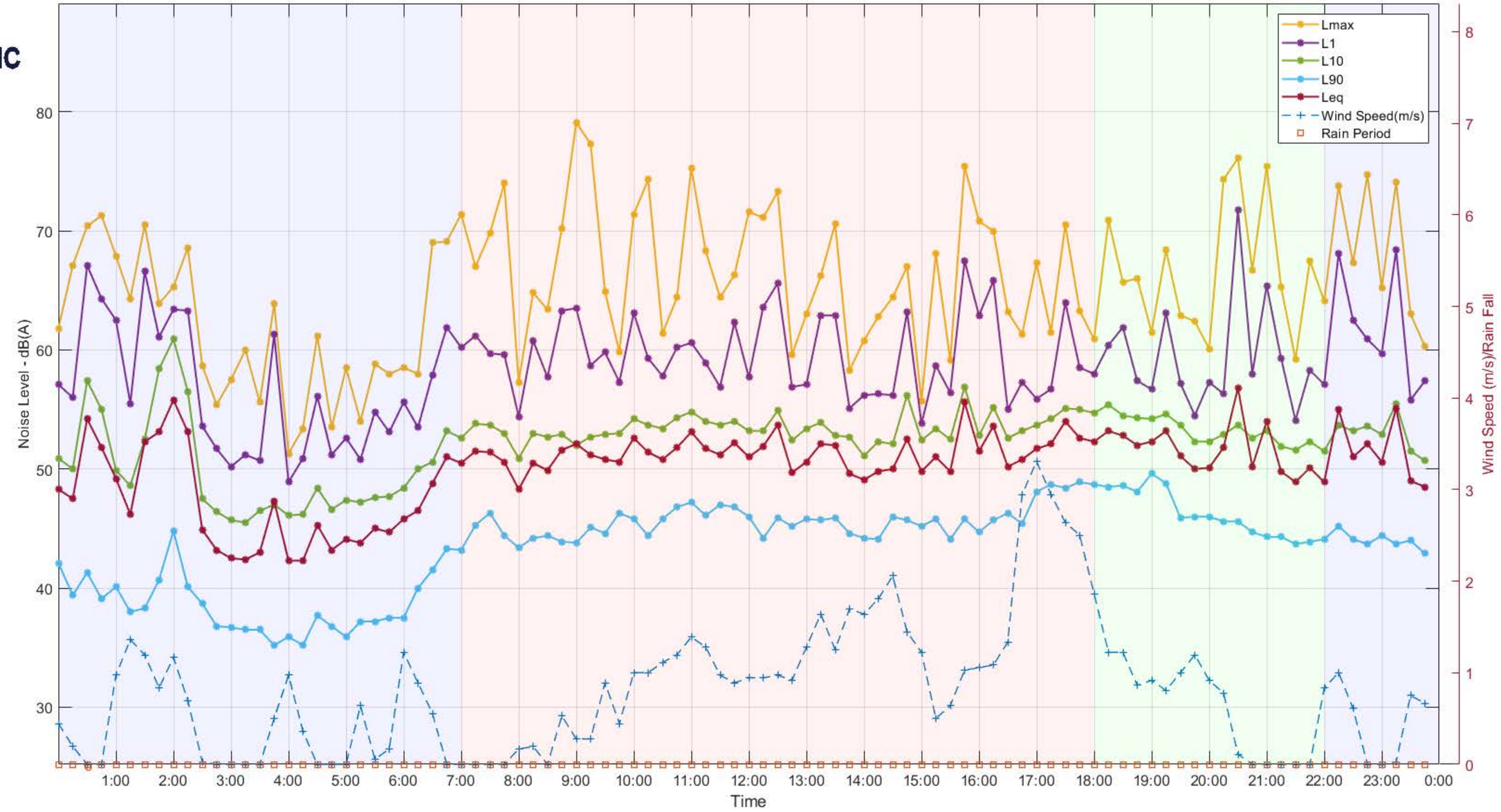
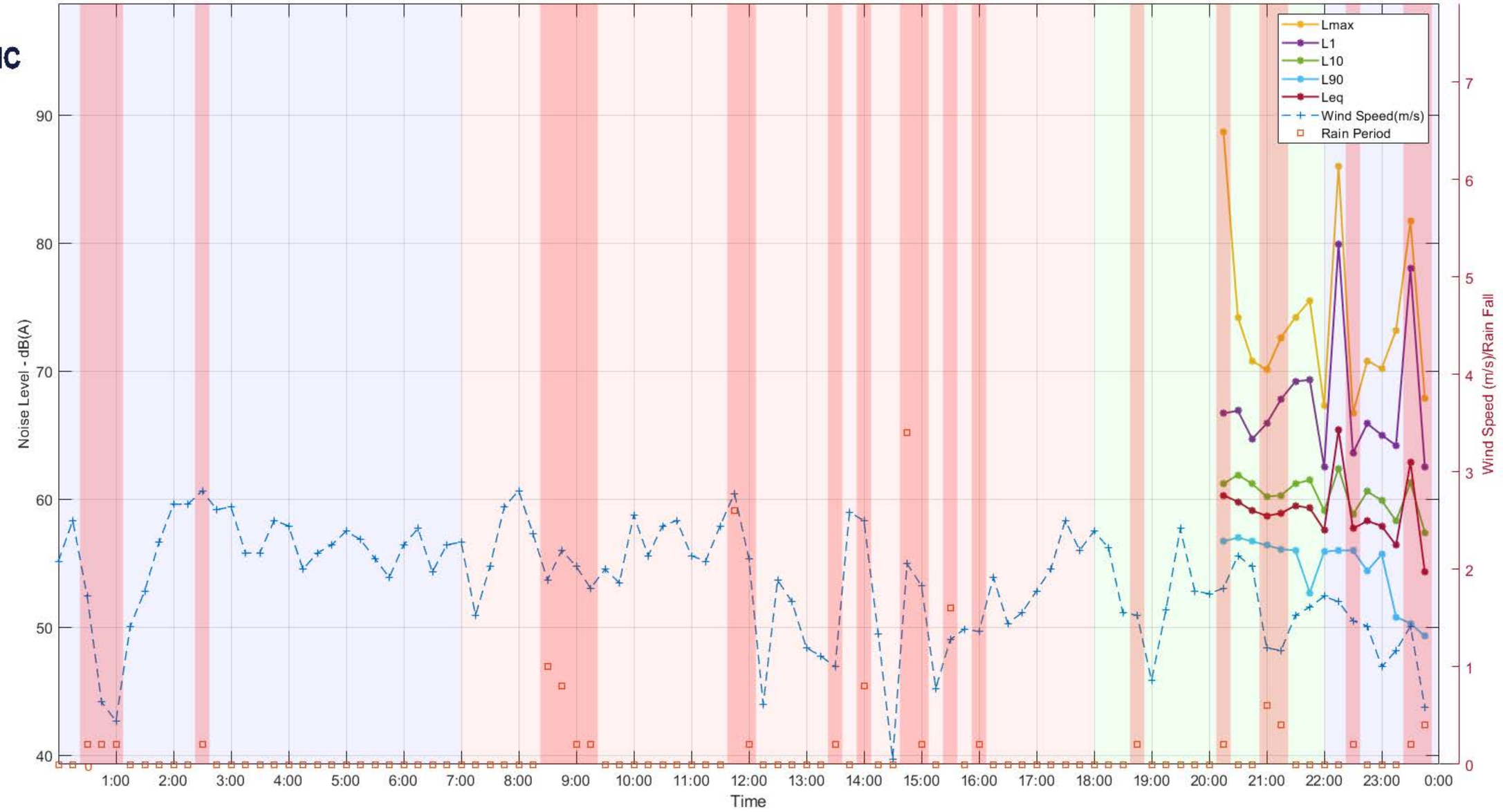
72 Park Avenue, Kingswood
16/04/2022



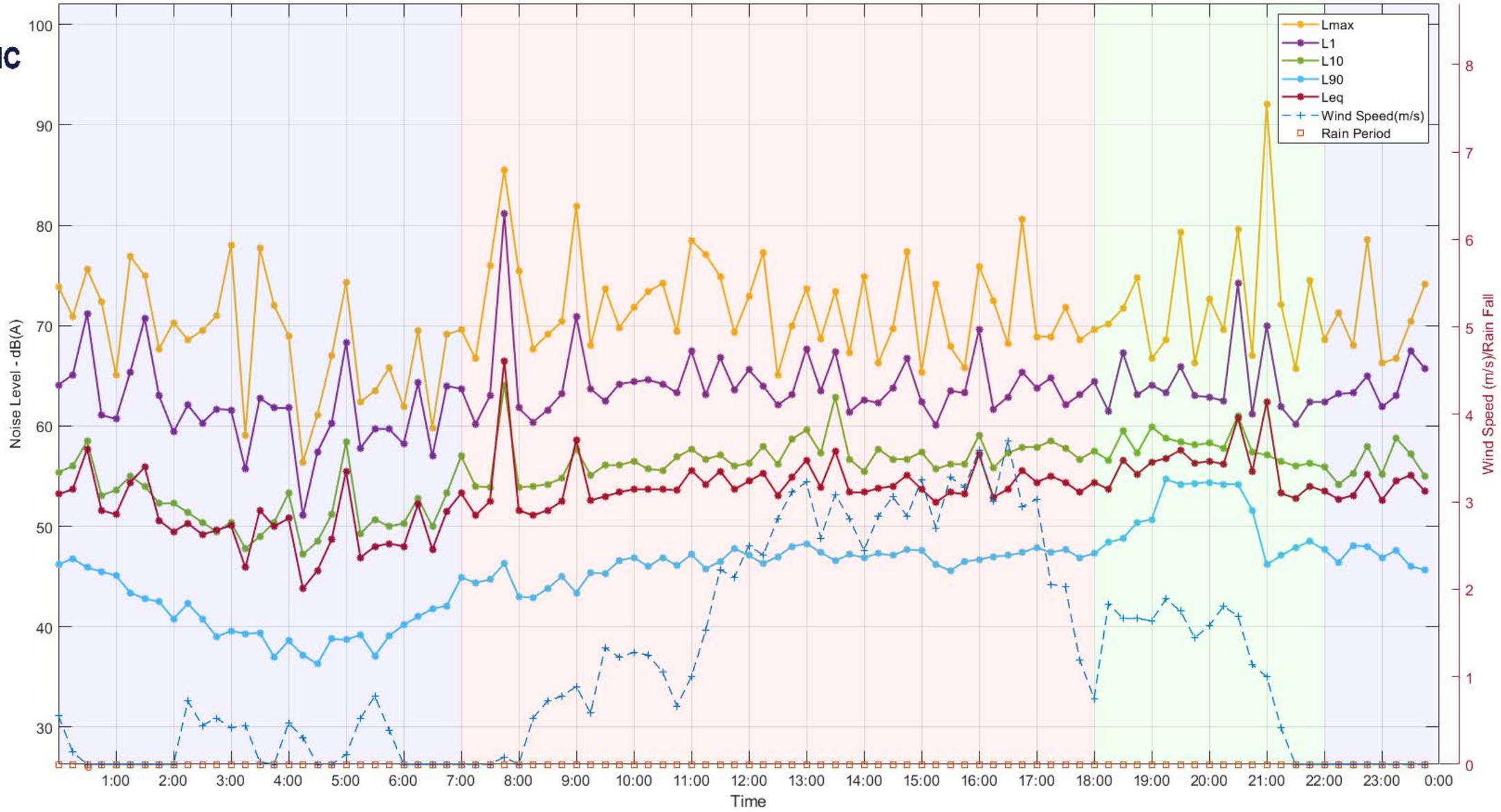
ACOUSTIC LOGIC

72 Park Avenue, Kingswood, Traffic
8/04/2022



ACOUSTIC LOGIC

72 Park Avenue, Kingswood, Traffic
17/04/2022



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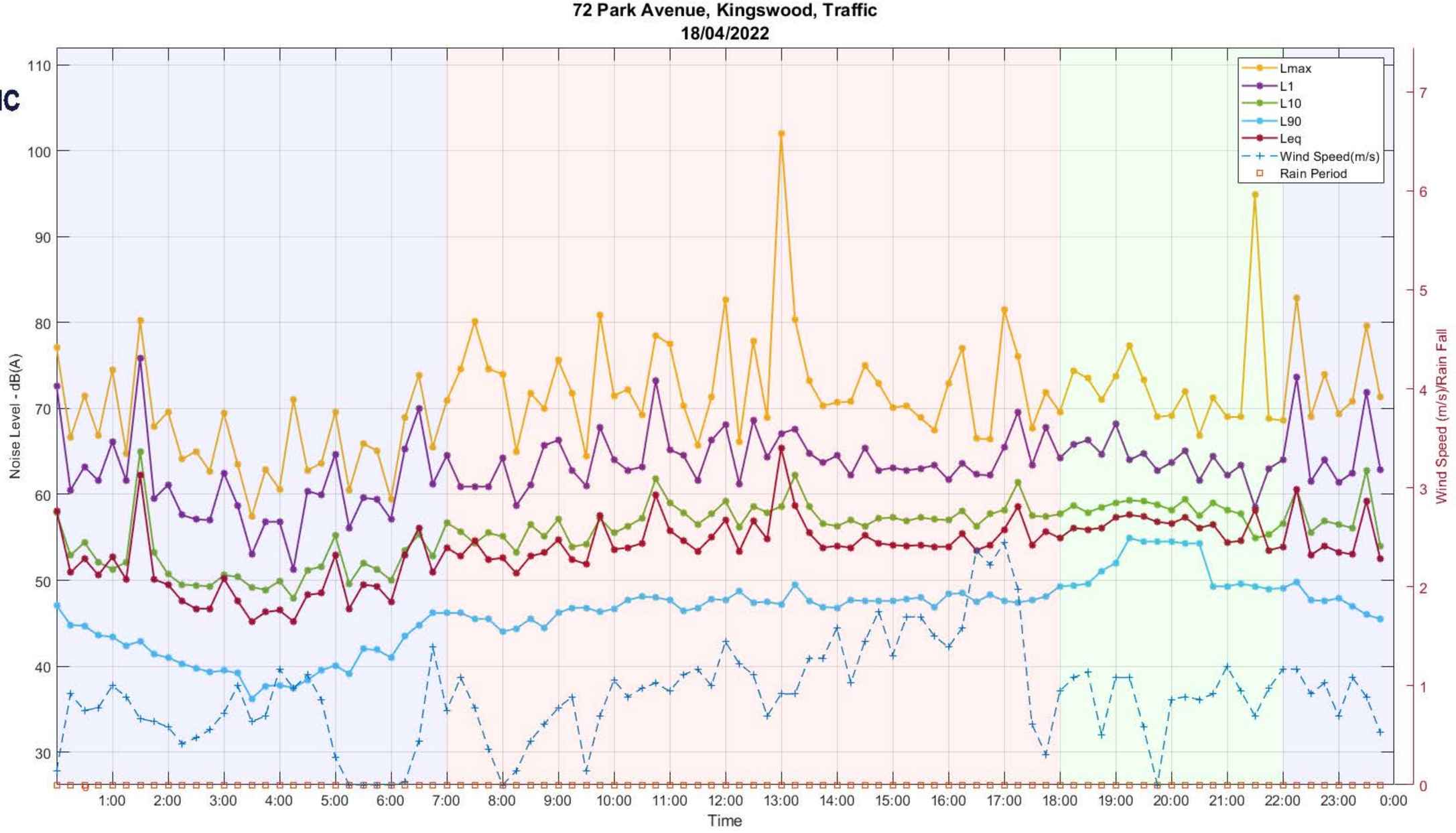
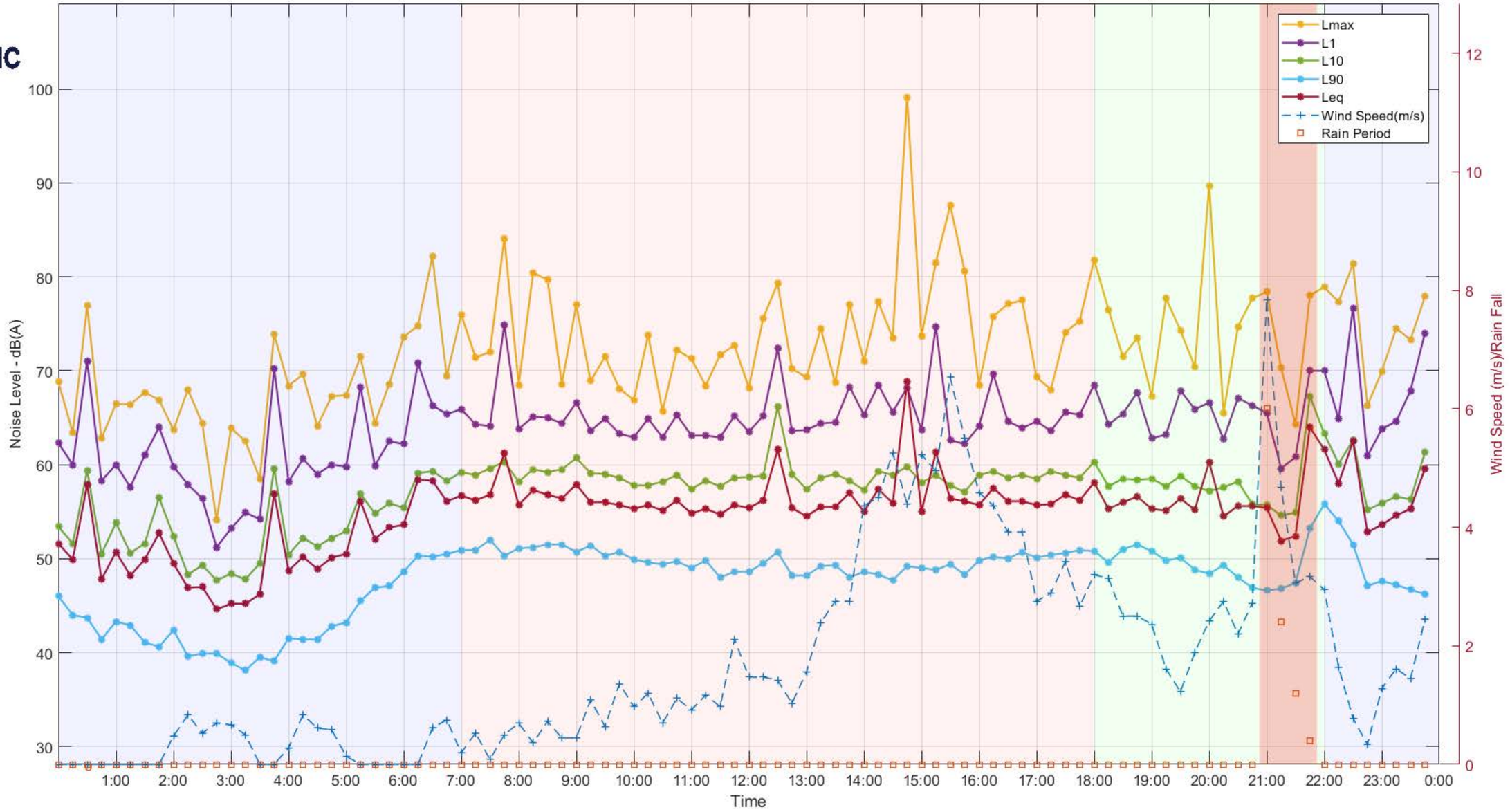


ACOUSTIC LOGIC

72 Park Avenue, Kingswood, Traffic
19/04/2022



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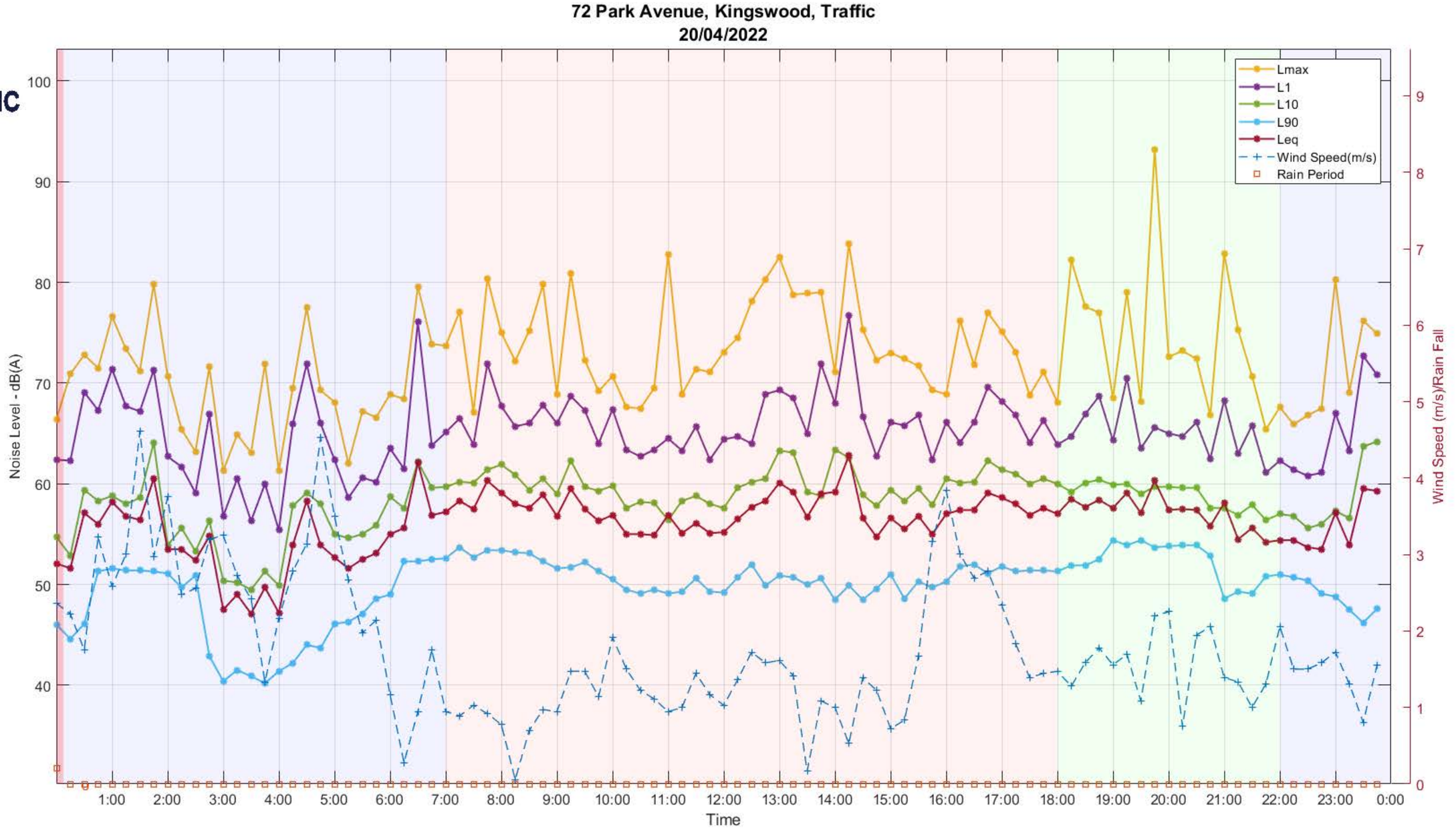

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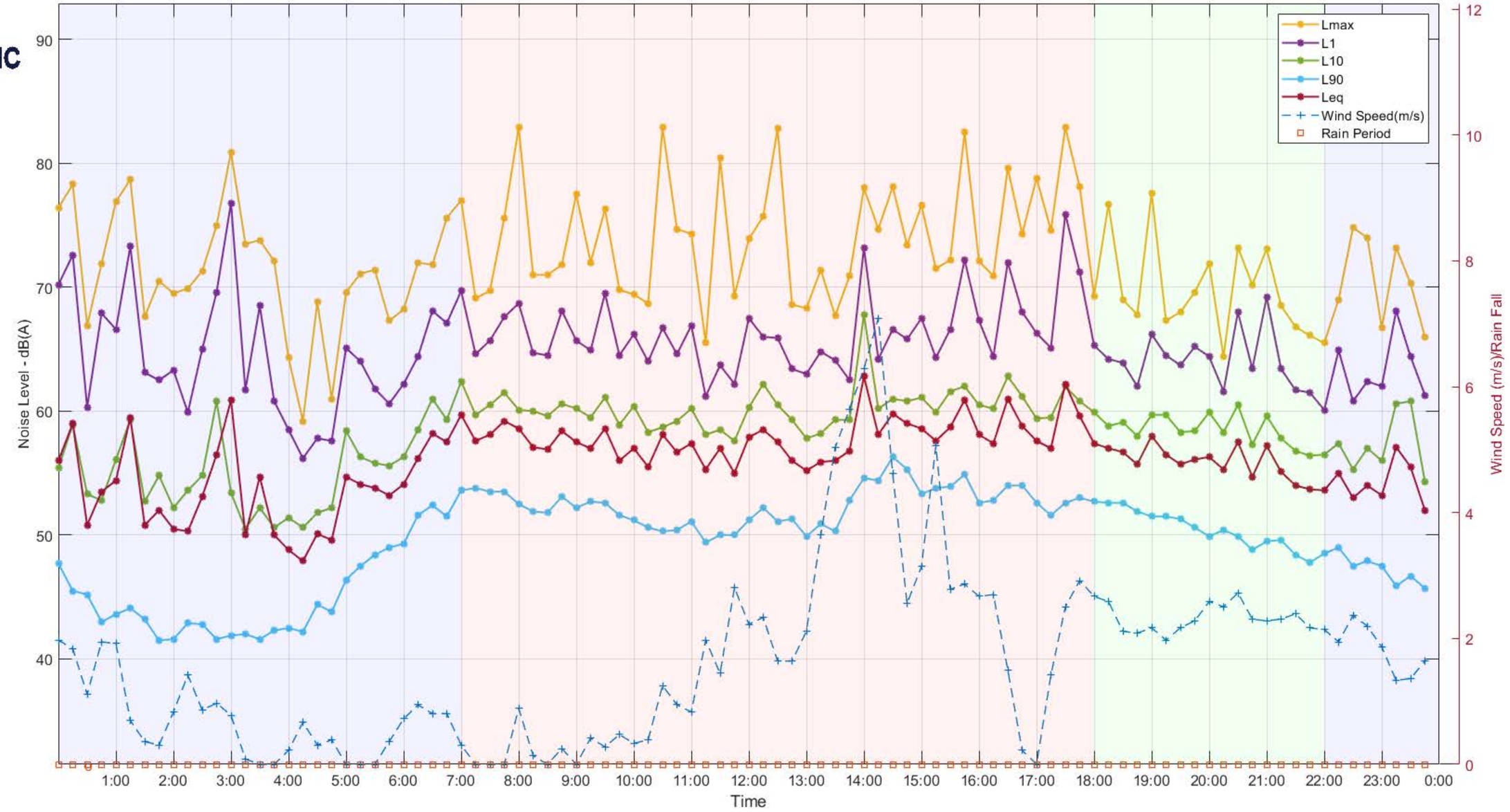

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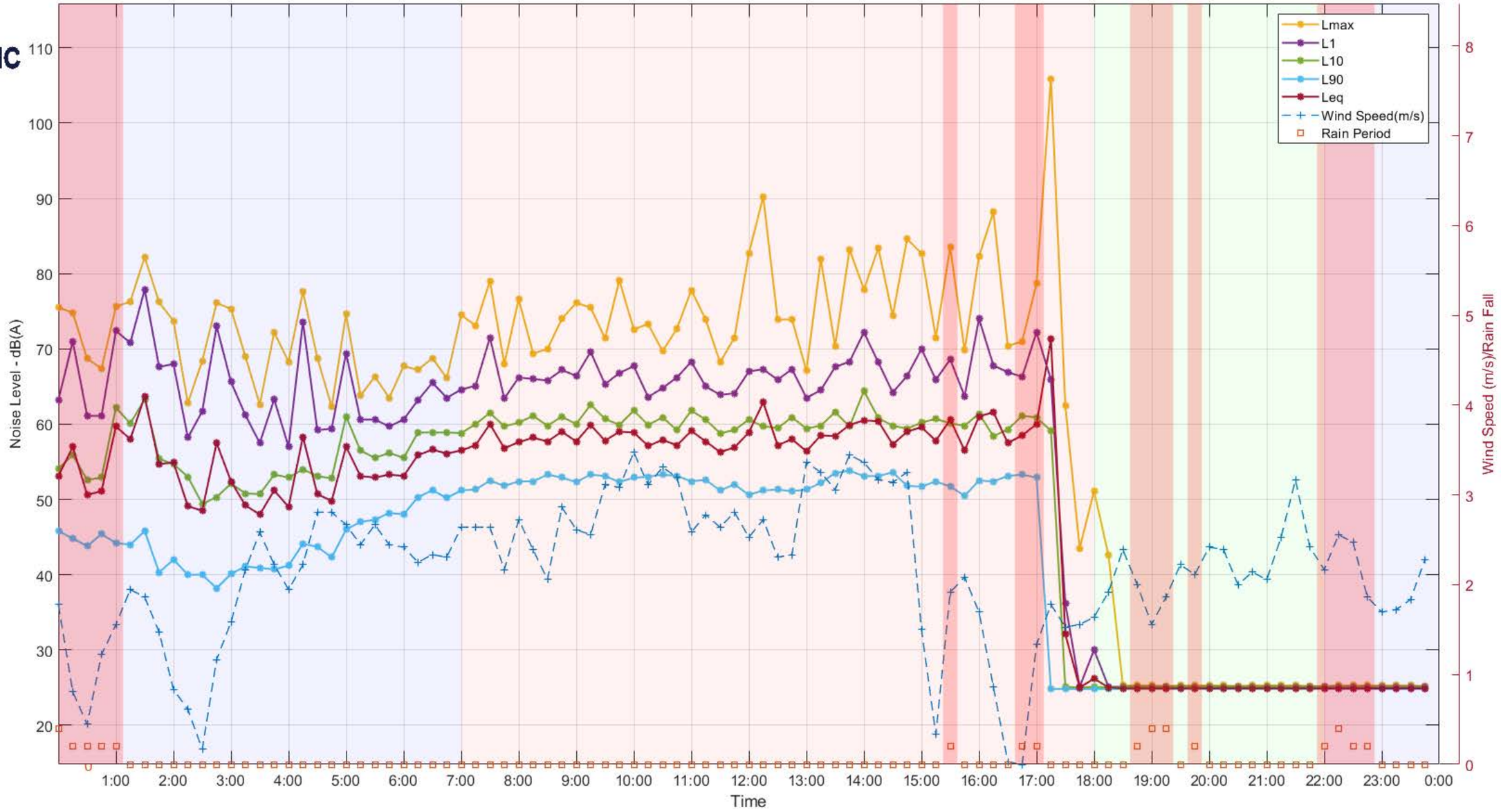

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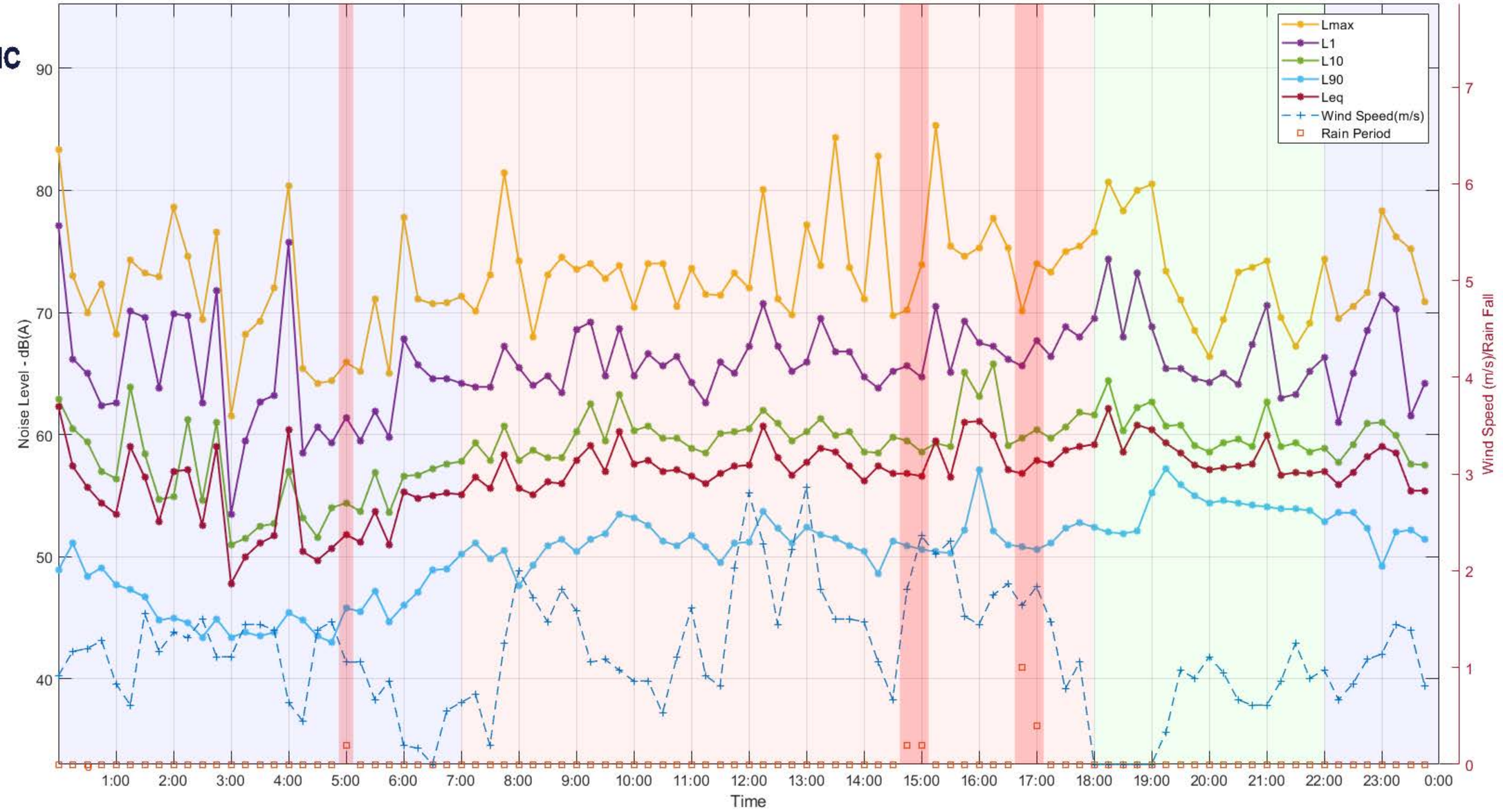
72 Park Avenue, Kingswood, Traffic
9/04/2022



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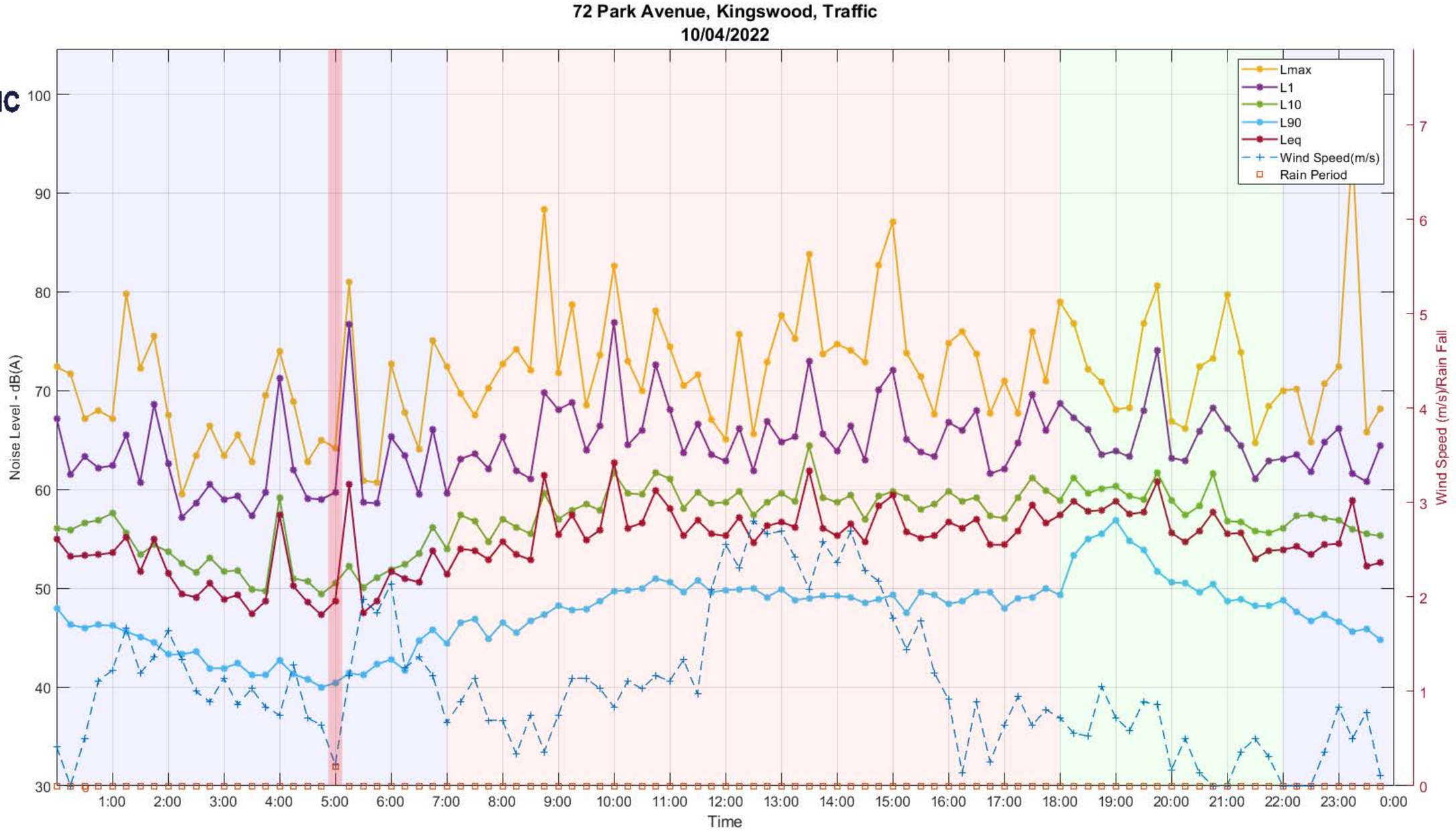

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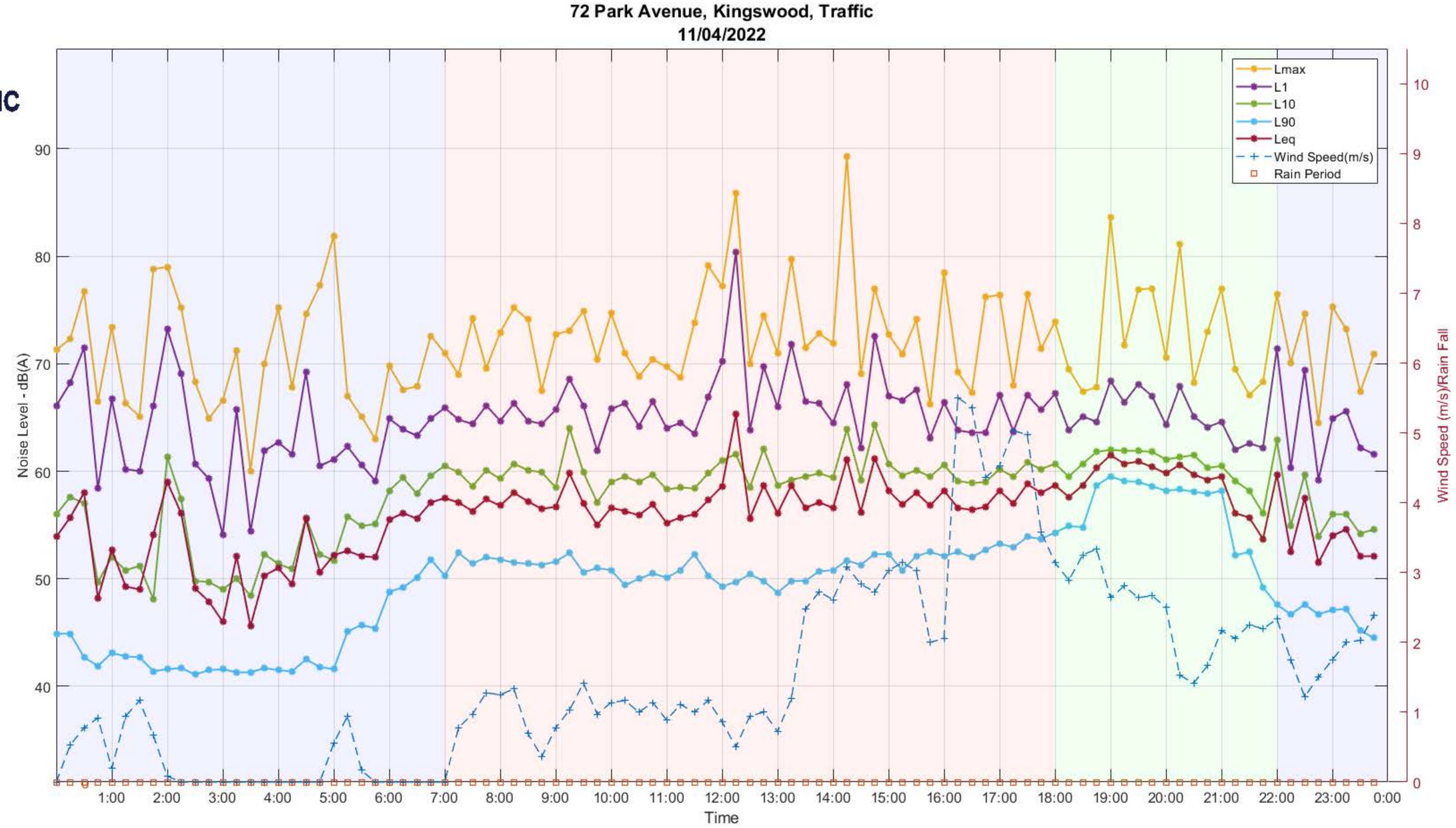

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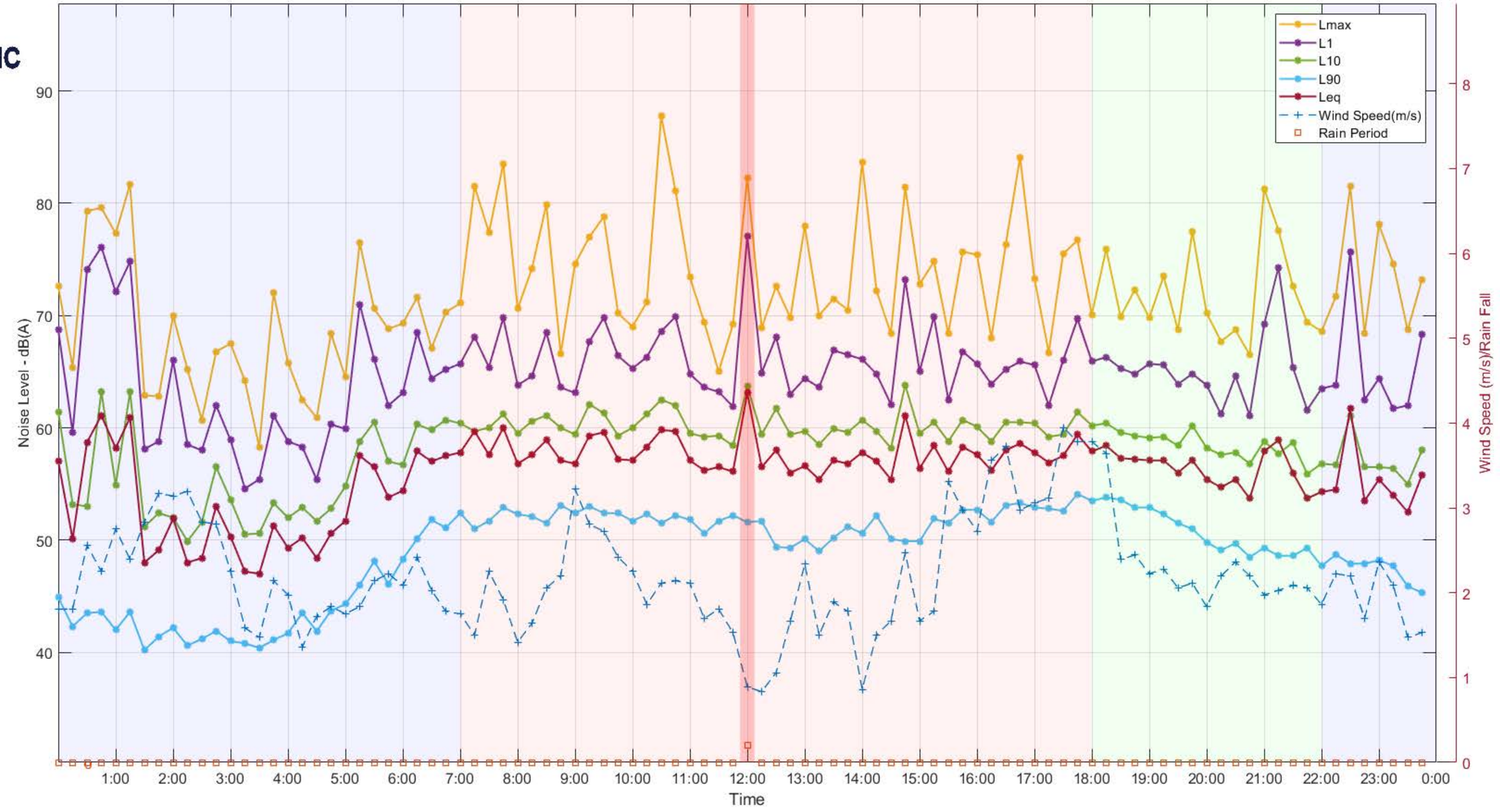
72 Park Avenue, Kingswood, Traffic
12/04/2022



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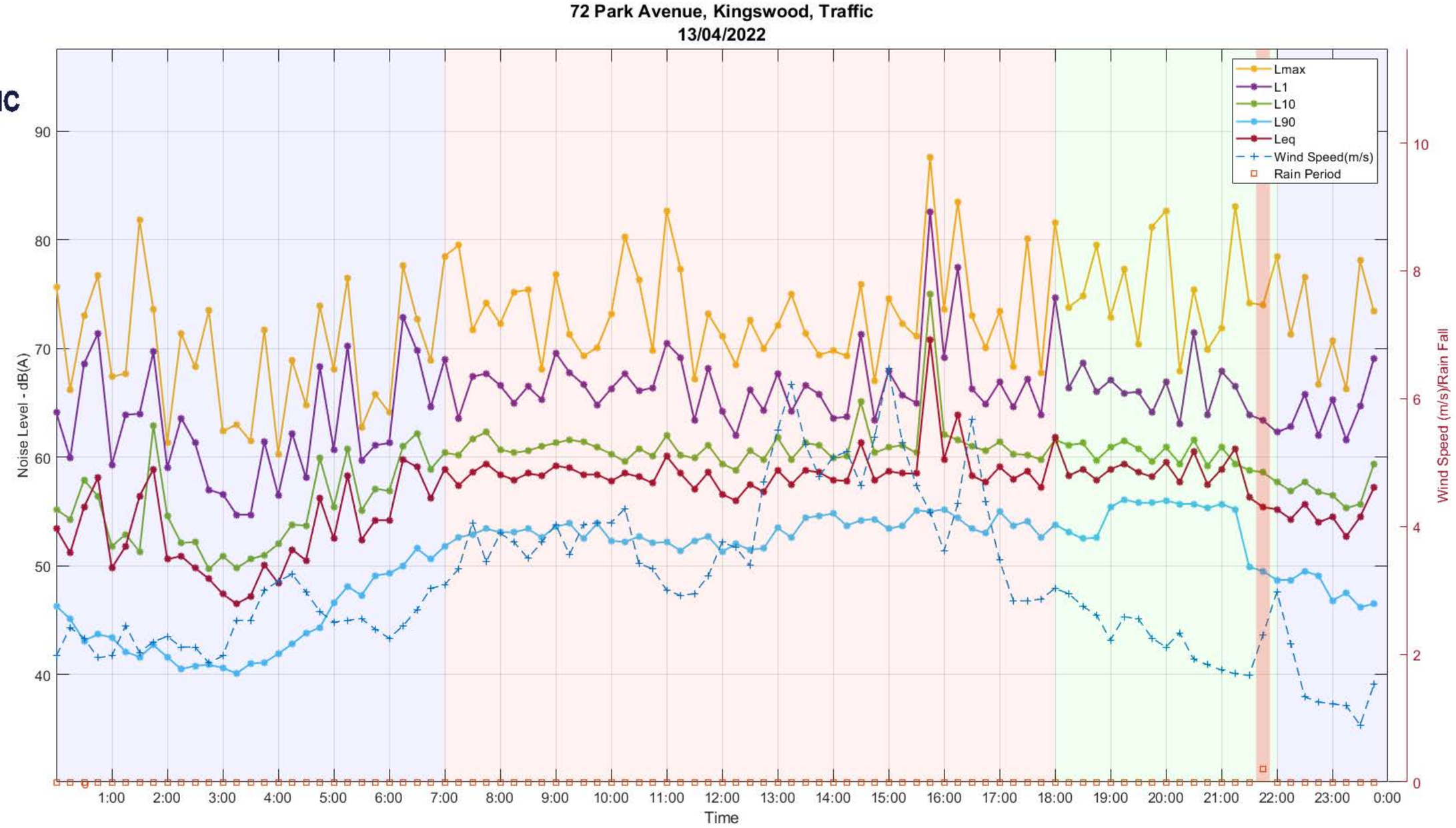

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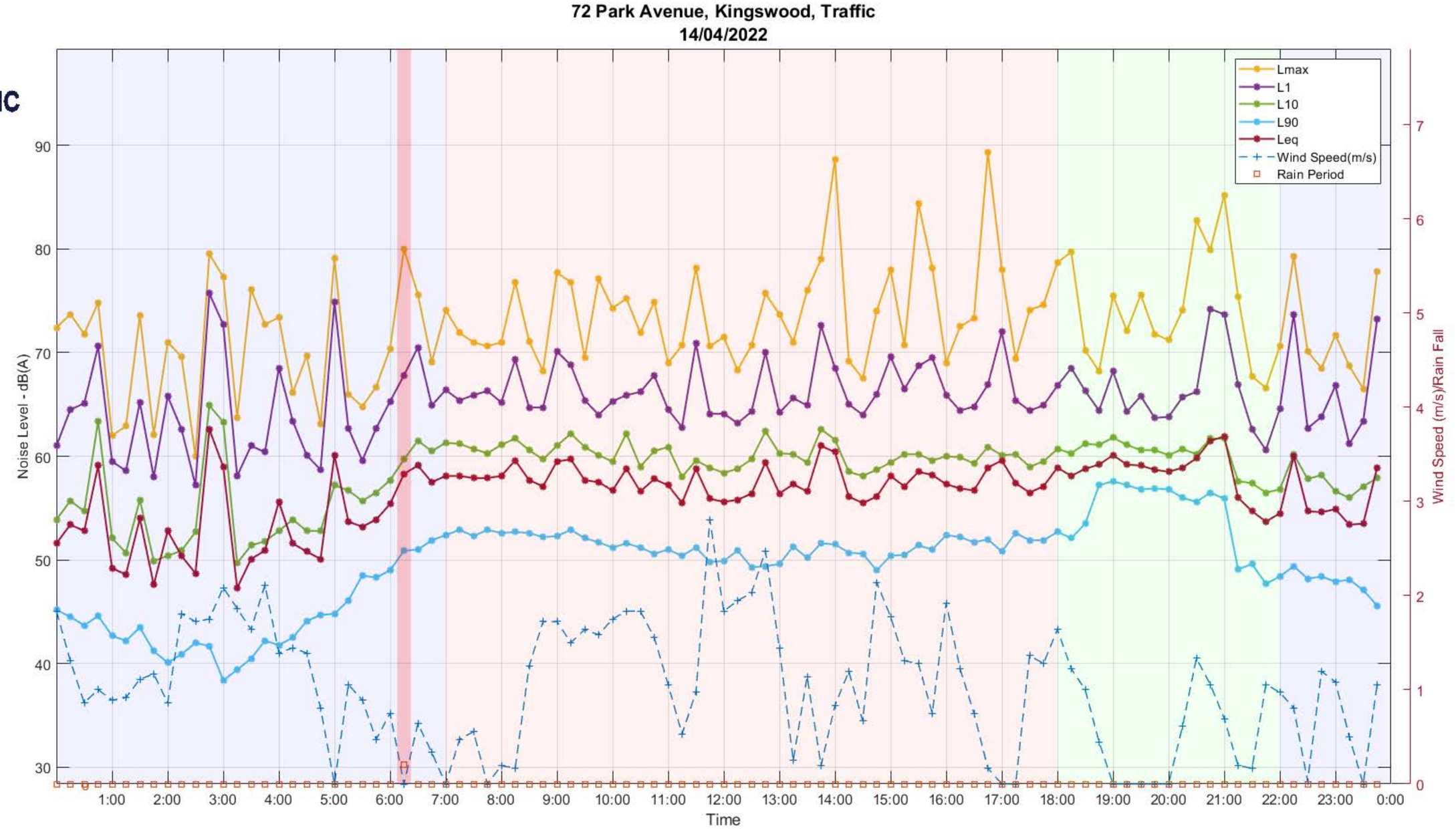

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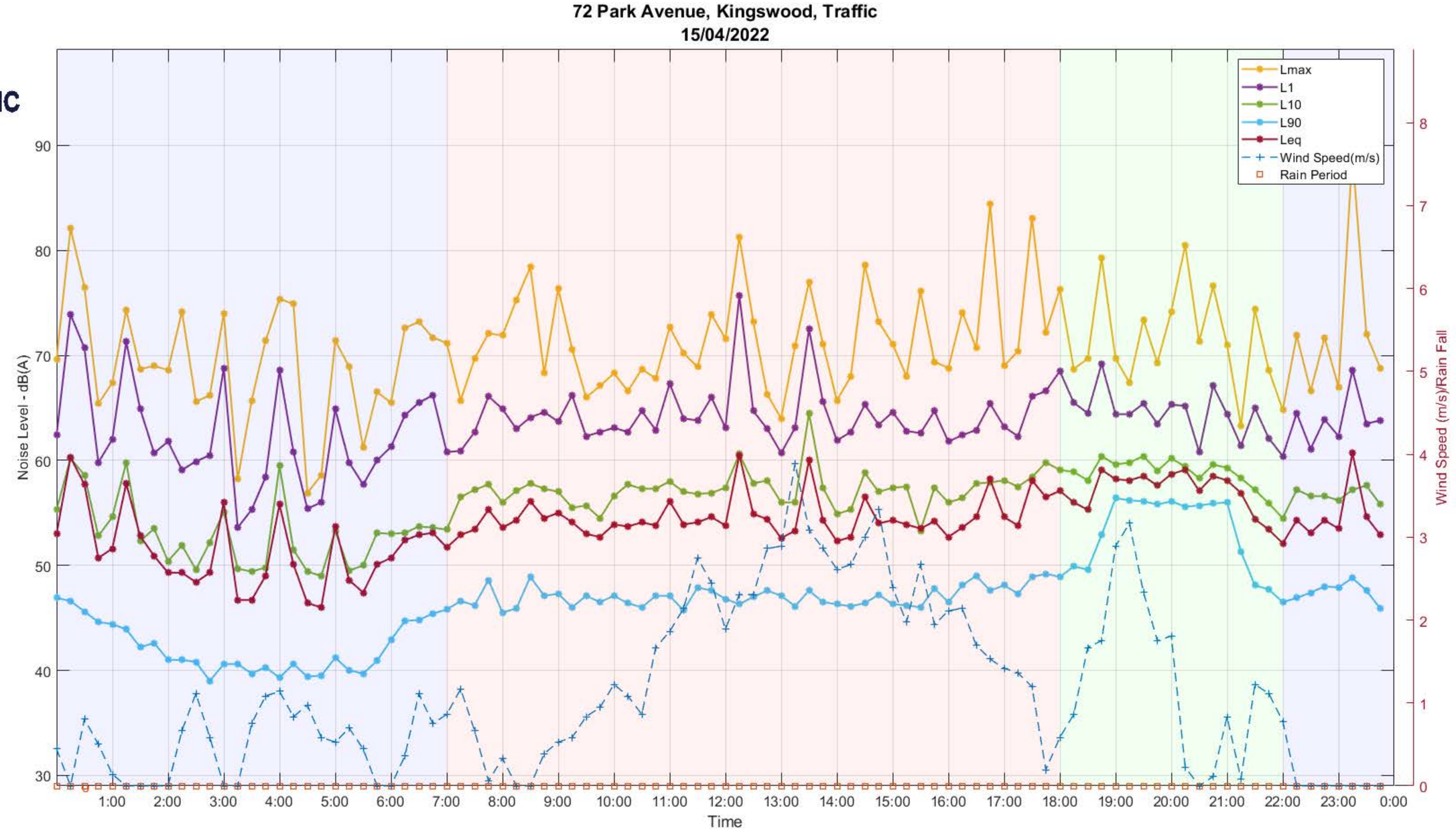

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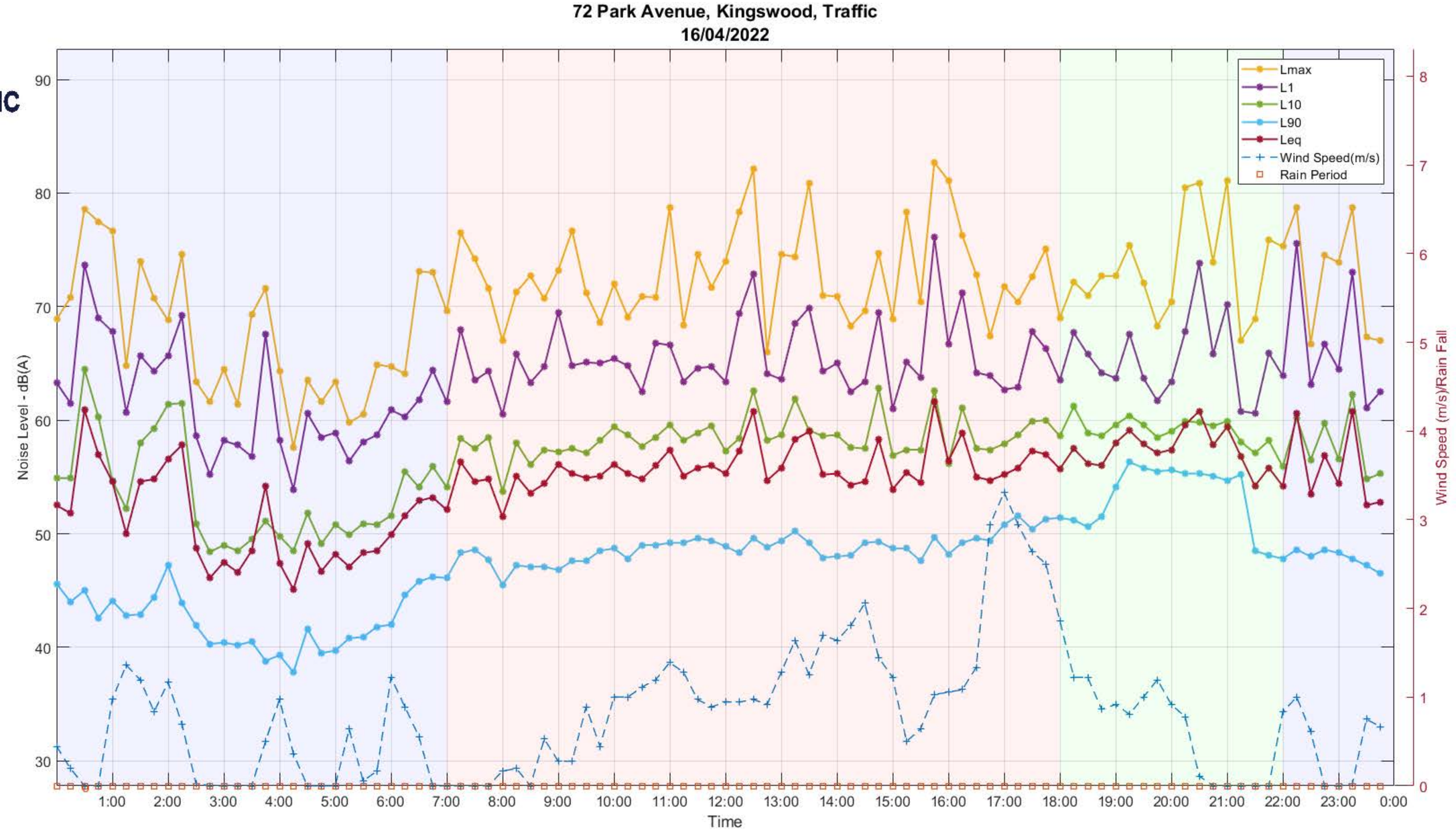


APPENDIX 2 – ACOUSTIC BARRIER MARKUP

ALL FOOD PREPARATION AREAS TO COMPLY WITH:
- AUSTRALIAN & NEW ZEALAND FOOD PREMISES CODE 3.2.2 & 3.2.3
- THE FOOD ACT 2003
- DESIGN, CONSTRUCTION & FIT-OUT OF FOOD PREMISES (AS4674:2004)
- NCC 2019 AMDT 1
- AS1688 PART 1 & PART 2
DETAILED DESIGN TO BE COMPLETED AT CC STAGE BY APPROPRIATE ENGINEERING & DESIGN CONSULTANCIES

ISSUE	DATE	DESCRIPTION
1	20.12.2022	ISSUED FOR DEVELOPMENT APPLICATION
2	31.05.2023	PLANS UPDATED IN RESPONSE TO COUNCIL RFI
3	16.06.2023	DRAWINGS UPDATED IN RESPONSE TO COUNCIL RFI - FINAL DRAFT
4	21.06.2023	DRAWINGS UPDATED IN RESPONSE TO RFI

NO OF CHILDREN REDUCED AND OUTDOOR PLAY AREAS ADJUSTED TO SUIT.

SETBACK INCREASED

PLANTER ADDED TO PROVIDE ADDITIONAL LANDSCAPING TO PROVIDE WIDER LANDSCAPED SETBACK

REPLACE EXISTING FENCE WHERE REQUIRED

CLASSROOMS AND OUTDOOR PLAY AREA UPDATED TO SUIT REDUCTION IN CHILDREN

SETBACK INCREASED TO PROVIDE ADDITIONAL LANDSCAPED AREA

REDUCED OUTDOOR PLAY AREA DUE TO INCREASED SETBACK

CLASSROOM SCHEDULE

Name	UNENCUMBERED AREA	NO.OF CHILDREN
LEVEL 1		
CLASSROOM 1 (0-2)	58 m²	16
CLASSROOM 2 (0-2)	51 m²	12
CLASSROOM 3 (2-3)	69 m²	20
CLASSROOM 4 (2-3)	72 m²	20
LEVEL 2		
CLASSROOM 5 (3-6)	78 m²	20
CLASSROOM 6 (3-6)	69 m²	20
TOTAL	396 m²	108

NOTE = 3.25m² UNENCUMBERED AREA PER CHILD REQ'D

TOTAL NUMBER OF CHILDREN = 108

MINIMUM REQUIRED UNENCUMBERED CLASSROOM AREA = 351m²

OUTDOOR PLAY

TOTAL NUMBER OF CHILDREN = 108

OUTDOOR PLAY REQUIREMENT = 7m² PER CHILD

REQUIRED OUTDOOR PLAY AREA = 108 x 7 =756m²

PROPOSED OUTDOOR PLAY

LEVEL 1	
OPA 1	= 162 m²
OPA 2	= 347m²
LEVEL 2	
OPA 3	= 308m²
TOTAL	= 817m²

SECTION J - BUILDING FABRIC REQUIREMENTS

THE BELOW ACHIEVES DTS COMPLIANCE WITH NCC SECTION J. COMPLIANCE IS ALSO ACHIEVABLE THROUGH A PERFOMANCE BASED SOLUTION & WILL BE FURTHER CLARIFIED DURING THE CONSTRUCTION CERTIFICATE STAGE

MASONRY VENEER WALLS

MINIMUM TOTAL R-VALUE = Rt1.40
- WALL TO INCORPORATE R1.5 INSULATION WITH REFLECTIVE AIR GAP

FRAMED EXTERNAL WALLS

MINIMUM TOTAL R-VALUE = Rt1.40
- WALL TO INCORPORATE R1.5 INSULATION WITH REFLECTIVE AIR GAP

GENERAL NOTES

ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH ALL OTHER DOCUMENTATION SUBMITTED FOR DA

PROPOSED WALLS, FLOORS, ROOFS

CLIENT:
MONTESSORI ACADEMY

PROJECT:
Montessori Academy Kingswood

72 Park Avenue,
Kingswood, NSW, 2747

ARCHITECT:
ALTIS ARCHITECTURE

DRAWING TITLE:
LEVEL 1 PLAN

NOTES:
Nominated architect: Rolfe Latimer : 5535
Copyright remains the property of Altis ArchitecturePty Ltd.
Use only figured dimensions.
All discrepancies to be referred to Altis Architecture Pty Ltd prior to construction.
Ensure compliance with the Building Code of Australia and all relevant Australian Standards and Authority requirements.

NORTH

SCALE:	DATE:
As indicated @ A1	JUNE 2023

DRAWN BY:	CHECKED BY:	PROJECT NO:	DRAWING NO:	ISSUE:
JW	DB	3115.01	DA1103	4

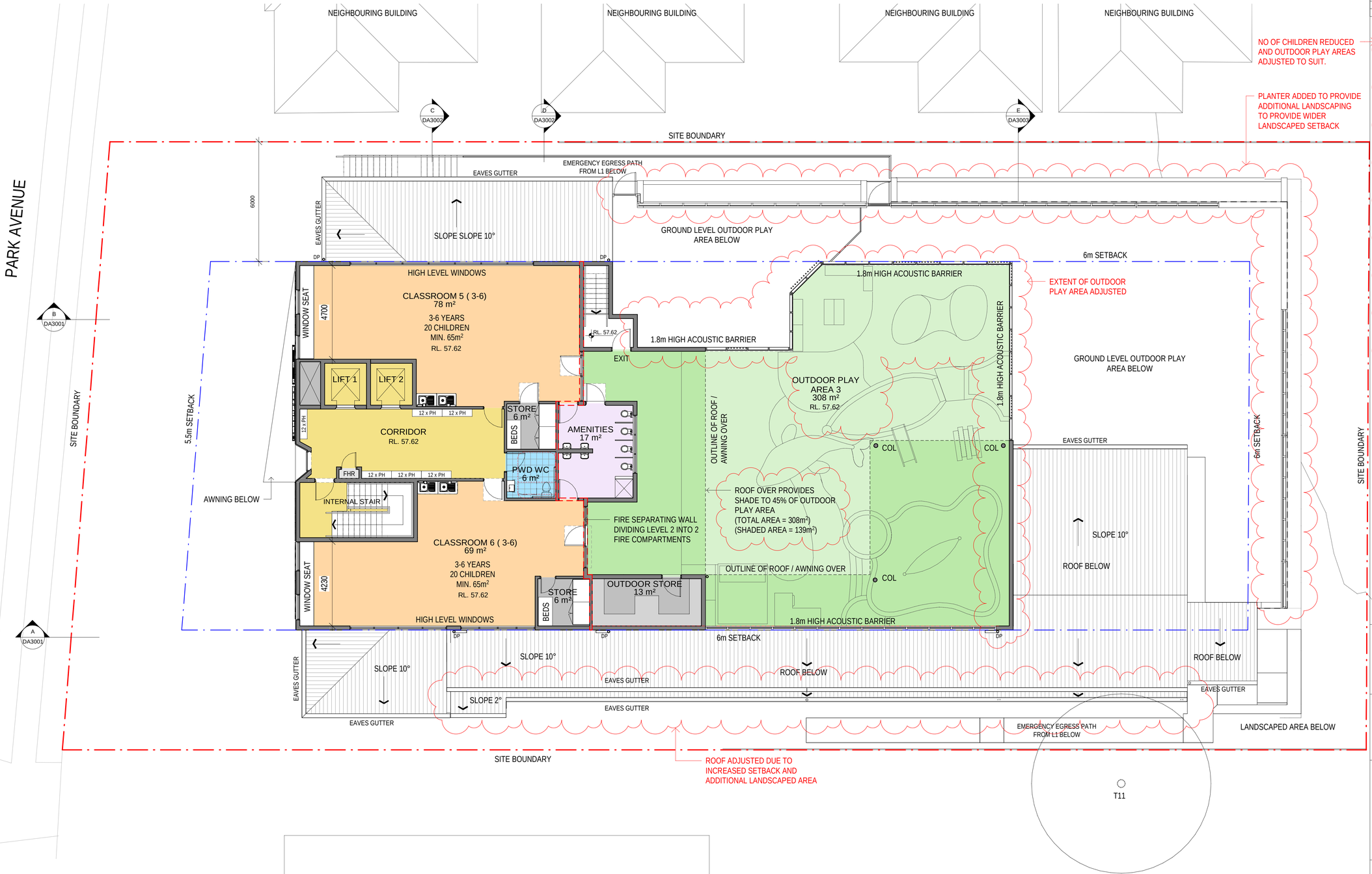
CAD FILE:

1 LEVEL 1 PLAN
Scale: 1 : 100

SCALE 1:100 (1 0 1 2 3 4 5 m)

DEVELOPMENT APPLICATION

22/06/2023 10:27:15 AM



1 **LEVEL 2 PLAN**
Scale: 1 : 100

ISSUE	DATE	DESCRIPTION
1	20.12.2022	ISSUED FOR DEVELOPMENT APPLICATION
2	31.05.2023	PLANS UPDATED IN RESPONSE TO COUNCIL RFI
3	16.06.2023	DRAWINGS UPDATED IN RESPONSE TO COUNCIL RFI - FINAL DRAFT
4	21.06.2023	DRAWINGS UPDATED IN RESPONSE TO RFI

CLASSROOM SCHEDULE

Name	UNENCUMBERED AREA	NO.OF CHILDREN
LEVEL 1		
CLASSROOM 1 (0-2)	58 m²	16
CLASSROOM 2 (0-2)	51 m²	12
CLASSROOM 3 (2-3)	69 m²	20
CLASSROOM 4 (2-3)	72 m²	20
LEVEL 2		
CLASSROOM 5 (3-6)	78 m²	20
CLASSROOM 6 (3-6)	69 m²	20
TOTAL	396 m²	108

NOTE = 3.25m² UNENCUMBERED AREA PER CHILD REQ'D

TOTAL NUMBER OF CHILDREN = 108

MINIMUM REQUIRED UNENCUMBERED CLASSROOM AREA = 351m²

OUTDOOR PLAY

TOTAL NUMBER OF CHILDREN = 108

OUTDOOR PLAY REQUIREMENT = 7m² PER CHILD

REQUIRED OUTDOOR PLAY AREA = 108 x 7 =756m²

PROPOSED OUTDOOR PLAY

LEVEL 1	
OPA 1	= 162 m²
OPA 2	= 347m²
LEVEL 2	
OPA 3	= 308m²
TOTAL	= 817m²

SECTION J - BUILDING FABRIC REQUIREMENTS

THE BELOW ACHIEVES DTS COMPLIANCE WITH NCC SECTION J. COMPLIANCE IS ALSO ACHIEVABLE THROUGH A PERFOMANCE BASED SOLUTION & WILL BE FURTHER CLARIFIED DURING THE CONSTRUCTION CERTIFICATE STAGE

MASONRY VENEER WALLS

MINIMUM TOTAL R-VALUE = Rt1.40
- WALL TO INCORPORATE R1.5 INSULATION WITH REFLECTIVE AIR GAP

FRAMED EXTERNAL WALLS

MINIMUM TOTAL R-VALUE = Rt1.40
- WALL TO INCORPORATE R1.5 INSULATION WITH REFLECTIVE AIR GAP

GENERAL NOTES

ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH ALL OTHER DOCUMENTATION SUBMITTED FOR DA

PROPOSED WALLS, FLOORS, ROOFS

CLIENT:
MONTESSORI ACADEMY

PROJECT:
Montessori Academy Kingswood

72 Park Avenue,
Kingswood, NSW, 2747

ARCHITECT:
ALTIS ARCHITECTURE

DRAWING TITLE:
LEVEL 2 PLAN

NOTES:
Nominated architect: Rolfe Latimer : 5535
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Use only figured dimensions.
All discrepancies to be referred to Altis Architecture Pty Ltd prior to construction.
Ensure compliance with the Building Code of Australia and all relevant Australian Standards and Authority requirements.

NORTH

SCALE: As indicated @ A1
DATE: JUNE 2023
DRAWN BY: JW
CHECKED BY: DB
PROJECT NO: 3115.01
DRAWING NO: DA1104
ISSUE: 4
CAD FILE:

1 0 1 2 3 4 5
SCALE 1:100 m

DEVELOPMENT APPLICATION

21/06/2023 3:59:21 PM