Attachment 5 to Item 2.1.2.

Acoustic Report

Date of meeting: 17 October 2024
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Time: 10am

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Noise Impact Assessment

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1 INTRODUCTION

This report presents our assessment of the likely noise impact on surrounding occupancies acoustic amenity from operational activities associated with the proposed licenced premise at 27 Douglas Road, Kurrajong Heights.

This report will:

- Identify relevant noise emission criteria applicable to the project site.
- Identify nearby noise sensitive receivers and any project site noise sources with the potential to adversely impact nearby developments.
- Predict noise emissions and assess them against established acoustic criteria.
- If necessary, determine building and/or management controls necessary to ensure ongoing compliance with noise emission goals.

The following documents have been used in accordance with this assessment:

- Hawkesbury Development Control Plan (DCP) 2002;
- NSW Liquor and Gaming; and
- NSW EPA's 'Noise Policy for Industry' (NPfI) 2017

This assessment is conducted using architectural plans for DA submission provided to us by Archebiosis Architects, Issue 1 dated 17th March 2022.

2 SITE DESCIPTION

The proposed development is a licenced hotel consisting of a bistro, sports bar, gaming rooms, function rooms, dining areas and a car park. Vehicle access is via Douglas Street.

Noise sensitive receivers in proximity to the project site are listed below:

R1: Residential receiver – Residential dwelling located at south western boundary of site at 29 Douglas Road.

R2: Residential receiver – Residential dwelling located at the north west boundary of the site at 1269 Bells Line of Road.

R3: Residential receiver – Residential dwellings located to the north east of the site at 1260, 1262 & 1264 Bells Line of Road.

R4: Commercial receiver – Commercial development located at the eastern boundary of the site at 1255 Bells Line of Road.

R5: Place of Worship – Kurrajong Heights Uniting Church located at the south eastern boundary of site at 1251 Bells Line of Road.

See Figure 1 for detailed site map including receiver locations and monitoring positions.

Figure 1 – Site Map

Source: Six Maps

Project Site

Residential Receiver

Commercial Receiver

Place of Worship

Attended Noise Measurement Location

Unattended Noise Monitoring Location

3 NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particularly intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new 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.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

4 AMBIENT NOISE SURVEY

Attended and unattended background noise measurements were obtained in order to characterise the existing noise environment.

Equipment used for unattended measurements consisted of an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the unattended monitoring period. The equipment was calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

Noise monitoring data was obtained during the period of Tuesday 2nd February to Thursday 11th February 2021 with two unattended noise monitors installed at the east and west if the site. See Figure 1 for detailed location. The existing background noise environment is dominated by traffic and noise from birds and insects.

The measured background noise levels have been corrected for meteorological conditions (excessive wind and/or rain), as required by section 3.4 of the EPA Noise Policy for Industry. Exceedances of the 5m/s average wind speed limit of the EPA were noted and corrected for in determining the background noise levels. These areas are highlighted in the logging data in Appendix 1.

Summarised rating background noise levels are presented below.

Table 1 – Summary of Background Noise Levels

Monitor Location	Rating Background Noise Level dB(A)$L_{90(period)}$			
	Daytime (7:00am to 6:00pm)	**Evening (6:00pm – 10:00pm)**	**Before Midnight (10:00pm – 12:00am)**	**After Midnight (12:00am – 7:00am)**
1 (North east)	39	38	33	32
2 (South west)	37	36	36	33

Attended measurements conducted by this office on 11th February 2021 provide the background noise level spectrums for areas as indicated in Figure 1. Measurements were conducted at the unattended monitor locations.

Tables 2-4 below present the night-time background noise level spectrum for residential receivers monitor locations 1 and 2.

Table 2 -Background Noise Level Spectrum dB(A) L90 – Location 1 (R1/R5) (External)

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Background Noise Spectrum	45	45	41	29	31	32	26	27	25	**36**

Table 3 - Background Noise Level Spectrum dB(A) L90 – Location 2 (R2/R3) (External)

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Background Noise Spectrum	39	39	33	27	25	24	21	30	19	**33**

5 NOISE EMISSION CRITERIA

Noise emission goals for the assessment of the general operation of the venue have been determined in accordance with the requirements of the following:

- Hawkesbury Development Control Plan (DCP) 2002;
- Office of Liquor and Gaming and Racing NSW; and
- NSW EPA 'Noise Policy for Industry' (NPfI) 2017.

5.1 HAWKESBURY DEVELOPMENT CONTROL PLAN (DCP) 2002

2.7 Environmental Issues

Aims

(a) An acoustic report prepared by a qualified acoustic consultant submitted prior to the approval of any noise generating development. The report shall include background noise measurements, suitable noise criteria, an assessment of noise and any noise control measures.

(b) Any machinery or activity considered to create a noise nuisance adequately soundproofed in accordance with the provisions of the Protection of the Environment Operations Act 1997 (POE Act).

5.2 OFFICE OF LIQUOR, GAMING AND RACING (OLG)

When assessing noise emissions from licensed premises, noise emissions must comply with the acoustic requirements generally imposed by the NSW OLG. These guidelines relate to noise generated by patrons and by music. The requirements are set out below:

- *The L_{10} noise level emitted from the premises shall not exceed 5dB above the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) between the hours of 7.00am to 12.00 midnight when assessed at the boundary of the nearest affected residential premises.*
- *L_{10} noise level emitted from the premises shall not exceed the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) after midnight when assessed at the boundary of the nearest affected residential premises.*
- *After midnight, noise emissions from the Place of Public Entertainment are to be inaudible within any habitable rooms in nearby residential properties.*

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 between 10pm and 12am as this is the quietest period in which the premises will operate.

Table 4 – OLG Noise Emission Objectives (dB(A) $L_{10,15min}$) – R1/R5 Residential Boundary

Time of Day	Frequency								
	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
7am-6pm BG+5dB(A)	50	50	47	35	36	38	32	33	31
6pm-10pm BG+5dB(A)	50	50	47	35	36	38	32	33	31
10pm-12am BG+5dB(A)	50	50	46	34	36	37	31	32	30

Table 5 – OLG Noise Emission Objectives (dB(A) $L_{10,15min}$) – R2/R3 Residential Boundary

Time of Day	Frequency								
	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
7am-6pm BG+5dB(A)	50	50	45	38	37	35	32	41	31
6pm-10pm BG+5dB(A)	49	49	43	37	35	34	31	40	29
10pm-12am BG+5dB(A)	44	44	38	32	30	29	26	35	24

5.3 NSW EPA NOISE POLICY FOR INDUSTRY (NPFI) 2017

The NSW EPA NPfI provides guidelines for assessing noise impacts from developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day and the type of noise source. The NPfI has two requirements which must both be complied with, namely an intrusiveness criterion and amenity criterion.

5.3.1.1 Intrusiveness Criteria

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5dB(A). The intrusiveness criteria applicable to the development are presented in the table below.

Table 6 – NPfI Intrusiveness Criteria

Location	Time of Day	Rating Background Noise Level dB(A)$L_{90(15min)}$	Project Noise Trigger Level (Intrusiveness) dB(A)$L_{eq(15min)}$
R2, R3	Day (7am – 6pm)	39	44
	Evening (6pm-10pm)	38	43
	Night (10pm – 7am)	32	37
R1, R5	Day (7am – 6pm)	37	42
	Evening (6pm-10pm)	36	41
	Night (10pm – 7am)	33	38

5.3.1.2 Amenity Criteria

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

The EPA's NPfI 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 Section 4, the NPfI suggests the adoption of the 'urban' categorisation.

The NPfI requires project amenity noise levels to be calculated in the following manner;

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

The amenity levels appropriate for the receivers surrounding the project site are presented in

The project amenity noise levels for relevant receivers are detailed in Table 6 below:

Table 7 – NPfI Amenity Criteria

Type of Receiver	Time of day	Recommended Amenity Noise Level dB(A)$L_{eq(15\text{-}minutes)}$	Project Noise Trigger Level (Amenity) dB(A)$L_{eq(15\text{-}minutes)}$
Residential (Suburban)	Day (7:00am-6:00pm)	55	53
	Evening (6:00pm-10:00pm)	45	43
	Night (10:00pm-7:00am)	40	38
Commercial	When in use	65	63

5.3.1.3 Sleep Disturbance (Maximum Noise Level Event Assessment)

The potential for sleep disturbance from maximum noise level events from premises during the night-time period must be considered as the proposed operation extends into night-time hours. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages. Where the subject development night-time noise levels at a residential location exceed:

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

A detailed maximum noise level event assessment should be undertaken.

Table 8 - Sleep Arousal Emergence Criteria (Night)

Location	Rating Background Noise Level Night (10:00pm – 7:00am) - dB(A)L_{90}	Emergence Level
R2, R3	32	40 dB(A)$L_{eq, 15min}$; 52 dB(A)$L_{max, F}$
R1, R5	33	40 dB(A)$L_{eq, 15min}$; 52 dB(A)$L_{max, F}$

If there are noise events that could exceed the emergence levels detailed in the table above, then an assessment of sleep arousal impact is required to be carried out, taking into account the level and frequency of noise events during the night, existing noise sources, etc. This more detailed sleep arousal test is conducted using the guidelines in the EPA Road Noise Policy. Most relevantly, the Road Noise Policy states:

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

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

5.4 SUMMARY OF NOISE EMISSION CRITERIA

The following table presents the most stringent noise emission criteria for the project, based on the requirements outlined above.

Table 9 –Noise Emission Criteria –

Patron/Music Noise to Residential Receivers R1/R5 10:00-12:00am (dB(A)L_{10}) - Externally

Time of Day	Frequency								
	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
7am-6pm BG+5dB(A)	50	50	47	35	36	38	32	33	31
6pm-10pm BG+5dB(A)	50	50	47	35	36	38	32	33	31
10pm-12am BG+5dB(A)	50	50	46	34	36	37	31	32	30

Table 10 –Noise Emission Criteria –

Patron/Music Noise to Residential Receiver R2/R3 10:00-12:00am (dB(A)L_{10}) - Externally

Time of Day	Frequency								
	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
7am-6pm BG+5dB(A)	50	50	45	38	37	35	32	41	31
6pm-10pm BG+5dB(A)	49	49	43	37	35	34	31	40	29
10pm-12am BG+5dB(A)	44	44	38	32	30	29	26	35	24

Table 11 –NPfI Noise Emission Criteria for Mechanical Plant and on site Vehicle Movements

Receiver	Period	Amenity Criteria dB(A) L_{eq}	Intrusiveness Criteria (Background + 5dB(A))	Sleeping Disturbance
R3, R4	Day (7:00am-6:00pm)	53	**44**	N/A
	Evening (6:00pm-10:00pm)	43	**43**	N/A
	Night (10:00pm-7:00am)	38	**37**	**40 dB(A)$L_{eq, 15min}$; 52 dB(A)$L_{max, F}$**
R1, R2, R5	Day (7:00am-6:00pm)	53	**42**	N/A
	Evening (6:00pm-10:00pm)	43	**41**	N/A
	Night (10:00pm-7:00am)	38	**38**	**40 dB(A)$L_{eq, 15min}$; 52 dB(A)$L_{max, F}$**
Commercial	When in use	**63**	N/A	N/A

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

6 NOISE EMISSION ASSESSMENT

6.1 OPERATIONAL NOISE SOURCES

Noise from the use of the venue will primarily be from the following noise sources:

- Noise from patrons;
- Noise from music within the venue.

As assessment for noise levels emitted from noise sources above has been predicted to nearby sensitive receivers. The analysis presented in this section of the report has been based on drawings issued for this project by Archebiosis Architects, Issue 2 dated 6th December 2021.

Noise emissions will be assessed with reference to the relevant criteria outlined in Section 5.

6.2 ACOUSTIC DATA

6.2.1 Assessed Noise Levels

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

- The average sound power level per patron / staff member has been taken as 77 dB(A)L_{10}. Predictions have been based on one in every four patrons speaking in tea garden, and one in every two people speaking in other areas. The noise spectrum for patron speech is as follows:

Table 12 – Noise Spectrum for Patron Speech Sound Power Level

31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-weighted level dB(A)L_{10}
62	62	67	70	74	75	70	51	48	**77**

- The uniform sound pressure level for background music within internal areas of the premises has been assessed as 65 dB(A) L_{10}. The noise spectrum has been measured at venues typical of a bass heavy spectrum, as follows:

Table 13 – Noise Spectrum for Background Music Sound Pressure Level

31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-weighted level dB(A)L_{10}
61	61	67	63	62	61	56	47	49	**65**

6.3 OPERATIONAL ASSUMPTIONS

The following assumptions have formed the basis of the assessment and predicted noise levels presented below:

- Patrons within internal areas are to be limited as follows:
    - *Bistro /Dining Room - up to 100 patrons at any one time*
    - *Sports/casual Bar - up to 100 patrons at any one time*
    - *Function Room - up to 120 patrons at any one time*
- Patrons in external areas are to be limited as follows:
    - *Ground Floor verandah - up to 50 patrons at any one time*
    - *First Floor verandah – up to 50 patrons at any one time*
    - *Tea Garden – up to 30 patrons at any one time*
    - *Roof Garden – up to 12 patrons at any one time*
    - *Smoking Area - up to 7 patrons at any one time*
- Music Noise Levels
    - Music in internal spaces to be limited to background music only. There is to be no music in any external area.
- The recommendations in Section 7 have been adopted.

6.4 PREDICTED NOISE LEVELS

The predicted noise levels from venue operation are presented in the following tables. Predicted noise levels are based on the dimensions of the building and factor in losses due to distance attenuation and barrier effects.

Predicted noise emissions have been calculated on the assumption that the recommendations in Section 7 are implemented.

6.4.1 Predicted (L_{10}) External Noise Emissions

Table 14– Predicted External Noise Levels from Venue Operation – Receiver 1

Noise Source	Receiver Location	Time of Day		Octave Band Noise Levels, dB								
				31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Combined Hotel Operation, noise from Roof Garden and Outdoor Smoking Areas	R1 29 Douglas Road.	Day 7am-6pm	Predicted Noise Level L_{10}	24	24	29	32	36	36	30	11	7
			External Criteria (BG + 5)	50	50	47	35	36	38	32	33	31
			Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Combined Hotel Operation, noise from Roof Garden and Outdoor Smoking Areas		Evening 6pm – 10pm	Predicted Noise Level L_{10}	24	24	29	32	36	36	30	11	7
			External Criteria (BG + 5)	50	50	47	35	36	38	32	33	31
			Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Combined Hotel Operation, noise from Outdoor Smoking Area		Late Evening 10pm – 12am	Predicted Noise Level L_{10}	19	19	24	27	31	32	27	8	5
			External Criteria (BG + 5)	50	50	46	34	36	37	31	32	30
			Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Refer to Section 7 for recommendations required to achieve predicted noise levels.

Table 15– Predicted External Noise Levels from Venue Operation – Receiver 2

Noise Source	Receiver Location	Time of Day		Octave Band Noise Levels, dB								
				31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Combined Hotel Operation, Including Tea Garden	R2 1269 Bells Line of Road.	Day 7am-6pm	Predicted Noise Level L_{10}	35	35	38	35	36	34	28	<15	<15
			External Criteria (BG + 5)	50	50	45	38	37	35	32	41	31
			Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Combined Hotel Operation, Including Tea Garden		Evening 6pm – 10pm	Predicted Noise Level L_{10}	35	35	38	35	35	34	28	<15	<15
			External Criteria (BG + 5)	49	49	43	37	35	34	31	40	29
			Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Combined Hotel Operation, No use of Tea Garden		Late Evening 10pm – 12am	Predicted Noise Level L_{10}	34	34	36	31	30	29	24	<15	<15
			External Criteria (BG + 5)	44	44	38	32	30	29	26	35	24
			Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Refer to Section 7 for recommendations required to achieve predicted noise levels.

Table 16 – Predicted External Noise Levels from Venue Operation – Receiver 3

Noise Source	Receiver Location	Time of Day		Octave Band Noise Levels, dB								
				31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Combined Hotel Operation, Including Tea Garden	R3 1260, 1262 & 1264 Bells Line of Road.	Day 7am-6pm	Predicted Noise Level L_{10}	24	24	27	29	31	30	23	<15	<15
			External Criteria (BG + 5)	50	50	45	38	37	35	32	41	31
			Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Combined Hotel Operation, Including Tea Garde		Evening 6pm – 10pm	Predicted Noise Level L_{10}	24	24	27	29	31	30	23	<15	<15
			External Criteria (BG + 5)	49	49	43	37	35	34	31	40	29
			Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Combined Hotel Operation, No use of Tea Garden		Late Evening 10pm – 12am	Predicted Noise Level L_{10}	20	20	21	20	18	20	14	<15	<15
			External Criteria (BG + 5)	44	44	38	32	30	29	26	35	24
			Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Refer to Section 7 for recommendations required to achieve predicted noise levels.

6.5. NOISE FROM USE OF CAR PARK

Assessment of the driveway noise emissions has been predicted to nearby sensitive receivers. The analysis presented in this section of the report has been based on drawings issued for this project by Archebiosis Architects, Issue 2 dated 6th December 2021.

Noise emissions will be assessed with reference to the relevant criteria outlined in Section 5.

6.5 ACOUSTIC DATA

The following noise emission data for vehicle-related noise sources measured by this office have been used for the assessment.

Table 17 – Sound Power Levels of Vehicle Noise

Noise Source	Sound Power Level
Car Manoeuvring @ 10km/h	84 dB(A) L_{eq}
Car engine starting	90 dB(A) L_{max}
Car door closing	95 dB(A) L_{max}

6.6 PREDICTED NOISE LEVELS

The predicted noise levels from use of the carpark are presented in this section. Predicted noise emissions have been calculated on the assumption that recommendations in Section 7 of this report have been implemented.

6.6.1 Predicted Noise Emissions – Average/$L_{eq(15min)}$ Noise Levels

Average noise levels from use of the car park have been predicted to nearby receivers. Noise levels presented in the following table have been predicted based upon the following assumptions:

- Up to 58 vehicle movements per 15 minute period based on total number of available parking spaces.

Predicted noise levels factor in losses due to distance attenuation and barrier effects (where applicable). Predicted noise emissions have been calculated on the assumption that the recommendations in Section 7 of this report have been implemented.

Table 18– Predicted External Noise Levels ($L_{eq(15\ min)}$) from Use of Car Park – Receiver 1

Noise Source	Time of Day	Predicted Noise Level	Criteria	Compliance
Car Manoeuvring @ 10km/h	Day 7am – 6pm	38 dB(A) $L_{eq(15min)}$	42 $L_{eq(15min)}$ (Intrusiveness Criteria)	Yes
	Evening 6pm – 10pm	38 dB(A) $L_{eq(15min)}$	41 $L_{eq(15min)}$ (Intrusiveness Criteria)	Yes
	Night 10pm – 12am	38 dB(A) $L_{eq(15min)}$	38 $L_{eq(15min)}$ (Intrusiveness Criteria)	Yes

Table 19– Predicted External Noise Levels from Use of Car Park – Receiver 2

Noise Source	Time of Day	Predicted Noise Level	Required Noise Level (NPfI Intrusiveness Criterion)	Compliance
Car Manoeuvring @ 10km/h	Day 7am – 6pm	37 dB(A) $L_{eq(15min)}$	42 $L_{eq(15min)}$ (Intrusiveness Criteria)	Yes
	Evening 6pm – 10pm	37 dB(A) $L_{eq(15min)}$	41 $L_{eq(15min)}$ (Intrusiveness Criteria)	Yes
	Night 10pm – 12am	37 dB(A) $L_{eq(15min)}$	38 $L_{eq(15min)}$ (Intrusiveness Criteria)	Yes

6.6.2 Predicted Noise Emissions – Peak Noise Events (LMax)/Sleep Disturbance

Peak noise levels from use of the car park have been predicted to nearby receivers. Noise levels presented in the following tables are predicted from worst case location on site. It is expected that peak noise events would typically be generated as follows:

- Vehicle Door Closing;
- Car Engine Start.

Predicted noise levels factor in losses due to distance attenuation and barrier effects (where applicable). Predicted noise emissions have been calculated on the assumption that the recommendations in Section 7 of this report have been implemented.

Table 5 – Predicted Peak Noise Levels (L_{max}) from Drive Through and Car Park

Noise Source	Receiver	Time of Day	Predicted Noise Level	Criteria	Compliance
Car Engine Starting	**R1**	Night Time (10pm – 12am & 6am – 7am)	55 dB(A)L_{AFmax}	≤ 52 dB(A)L_{Fmax} (Sleep Disturbance Criteria)	No*
	R2		49 dB(A)L_{AFmax}		Yes
Car Door Closing	**R1**	Night Time (10pm – 12am & 6am – 7am)	60 dB(A)L_{AFmax}	≤ 52 dB(A)L_{Fmax} (Sleep Disturbance Criteria)	No*
	R2		54 dB(A)L_{AFmax}		No*

*Predicted peak noise event exceeds the sleep disturbance criteria. Detailed assessment as required by criteria in Section 5.3.1.3 is contained in Section 6.7 below.

6.7 DETAILED ASSESSMENT OF SLEEP DISTURBANCE POTENTIAL

We note that exceedances of the "Background+15" initial test are anticipated for the following noise events:

- Door close, and engine start anticipated to generate noise levels of between 55-60dB(A)Lmax at the façade of the most impacted residences (R1, west of the site).

This is discussed below:

- The predicted noise associated with the loudest of these noise sources is expected to be 60 dB(A)L_{max} at the residence to the west.
- Typically, there is a 10dB(A) noise reduction between an external noise level and the noise level inside the residence (assuming that the windows are left open.
- This being the case, it would be expected that the noise level generated by an engine start, or door close would be 50dB(A) inside the residence to the west, even if the windows are left open.
- We note the EPA guidance in this regard which states:
  Maximum internal noise levels below 50 – 55 dB(A) are unlikely to awaken people from sleep.
- Given that the peak noise events in question are 50dB(A) or less (equal or below the quieter end of the range identified by the EPA), in our opinion this noise generation should be considered reasonable.

6.6. 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 receiver should comply with the requirements of Section 5.

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

7 RECOMMENDATIONS

The following is recommended to achieve the noise levels detailed in Section 6.4

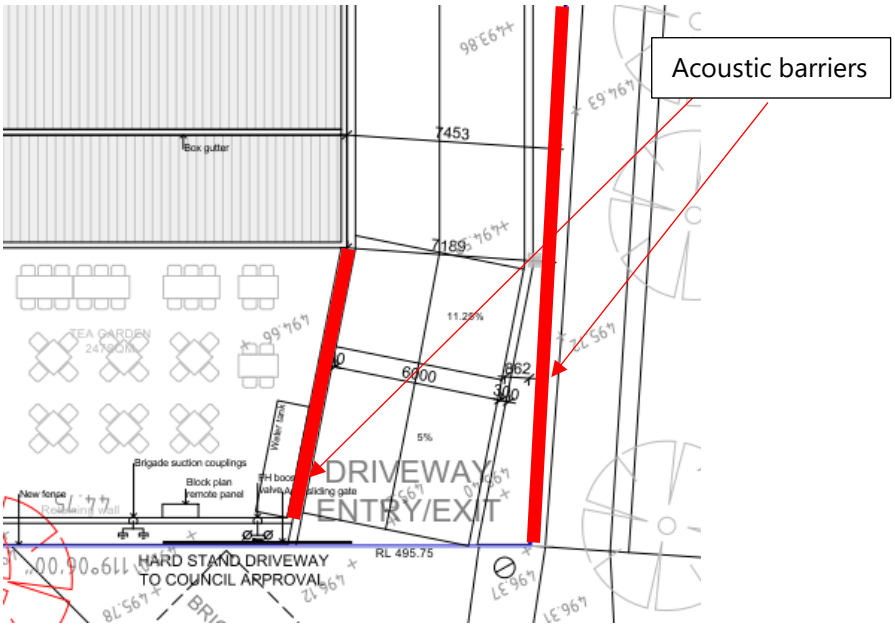
- Music noise levels:
    - Amplified music in internal areas of the venue is to be background only, with a maximum sound pressure level of 65 dB(A)$L_{10(15min)}$
    - Drum kits/live bands are not to be used within the premises, except where subject to an additional noise assessment.
- Façade
    - Doors and windows to be installed with acoustic seals.
    - Verandah screening to remained closed at higher capacities – indicatively 15 patrons. Refer screening recommendation p.27.
    - Doors windows opening to external areas to remain closed except for patron ingress/egress where verandah screening is open.
    - Verandah areas to have absorptive material applied to approximately 60% of ceiling area, with a NRC of 0.9 (Martini Decoquiet, Planobevel, or equivalent).
- Patron Numbers & Operating Times
    - The tea garden and the roof garden are not to operate after 10pm.
    - The outdoor smoking area may operate until 12am midnight.
    - Patrons within internal areas are to be limited as follows:
        - *Bistro /Dining Room - up to 100 patrons at any one time*
        - *Sports/casual Bar - up to 100 patrons at any one time*
        - *Function Room - up to 120 patrons at any one time*
    - Patrons in external areas are to be limited as follows:
        - *Ground Floor verandah - up to 50 patrons at any one time*
        - *First Floor verandah – up to 50 patrons at any one time*
        - *Tea Garden – up to 30 patrons at any one time*
        - *Roof Garden – up to 12 patrons at any one time*
        - *Smoking Area - up to 7 patrons at any one time*

- Acoustic Barrier Screening

  - Ground floor and first floor veranda areas are to be fully enclosed, with acoustic screening to be fitted behind the proposed external slats. Screening is to be constructed of a system which achieves a minimum performance of R_w 31.

  - A barrier fence is to be constructed along the northern western boundary of the tea garden. See markup below. The barrier must have an RL of 3m above tea garden ground floor level. The barrier may be constructed of lapped and capped timber, plexiglass, 4mm Perspex, Colorbond, 9mm fibrous cement sheet or equivalent, installed with no gaps between the panels, and maximum of a 20mm gap at the bottom to allow water flow if required.

  - An additional barrier is to be constructed along the extent of the north western boundary of the site. See markup below. The barrier must have an RL of 2.4m above ground floor level of the adjacent resident. The barrier may be constructed of lapped and capped timber, plexiglass, 4mm Perspex, Colorbond, 9mm fibrous cement sheet or equivalent, installed with no gaps between the panels, and maximum of a 20mm gap at the bottom to allow water flow if required.



  - A 2 metre high barrier is be constructed to enclose the Level 1 Roof Garden. The barrier may be constructed of lapped and capped timber, plexiglass, 4mm Perspex, Colorbond, 9mm fibrous cement sheet or equivalent, installed with no gaps between the panels, and maximum of a 20mm gap at the bottom to allow water flow if required.

- Car Park

  - A 2.4 metre high arched canopy barrier is to be installed along the entire length of the western boundary of the car park. The underside of the canopy is to be fitted with absorptive material such as Bradford Anticon Insulation or equivalent, with a NRC of 0.9.

- Additional Management Controls

  - Signs are to be displayed at the entry / exit of the venue reminding patrons to minimise noise when departing the premises, especially after 10pm. It is noted that existing staff and security arrangements for the site would be able to enforce the above.

  - Tables in outdoor Tea Garden are to be limited to seat 4 people. Management is to strictly control seating arrangements so that no more than 4 people are seated at any one table.

- Mechanical Plant
    - Any mechanical plant that may be proposed to service the premises are to be assessed with reference to the NSW EPA Noise Policy for Industry (Table 11). Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels.

8 CONCLUSION

Acoustic Logic has assessed noise impacts associated with the proposed licenced venue at 27 Douglas Road, Kurrajong Heights.

Provided that the recommendations in Section 7 of this report are adopted, noise emissions will comply with NSW OLG criteria for licenced/entertainment venues as well as noise emission requirements of the NSW EPA's NPfI 2017.

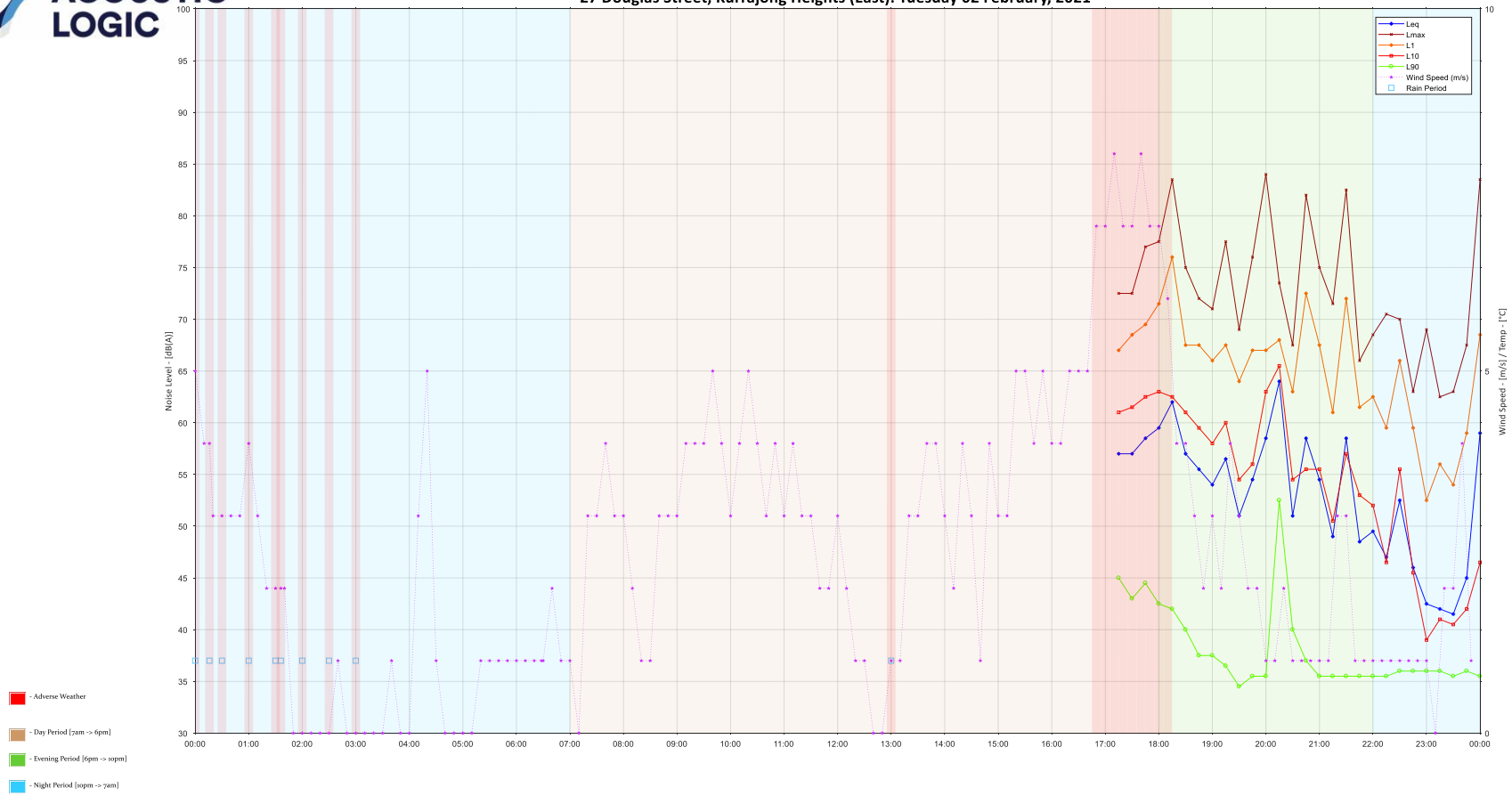
We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

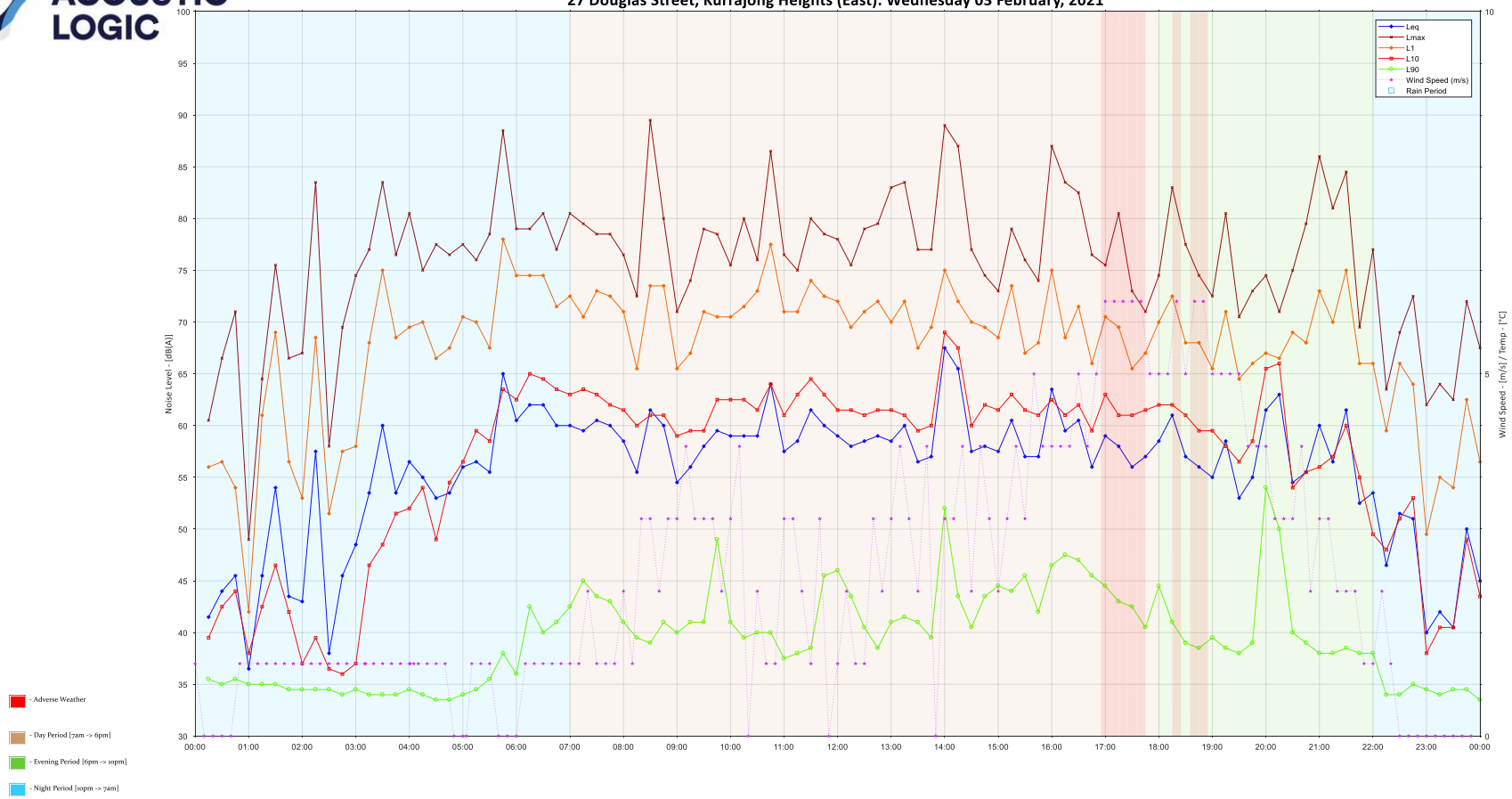
Acoustic Logic Pty Ltd
Ross Ferraro

APPENDIX A – UNATTENDED NOISE MONITORING DATA – MONITOR 1 (EAST)

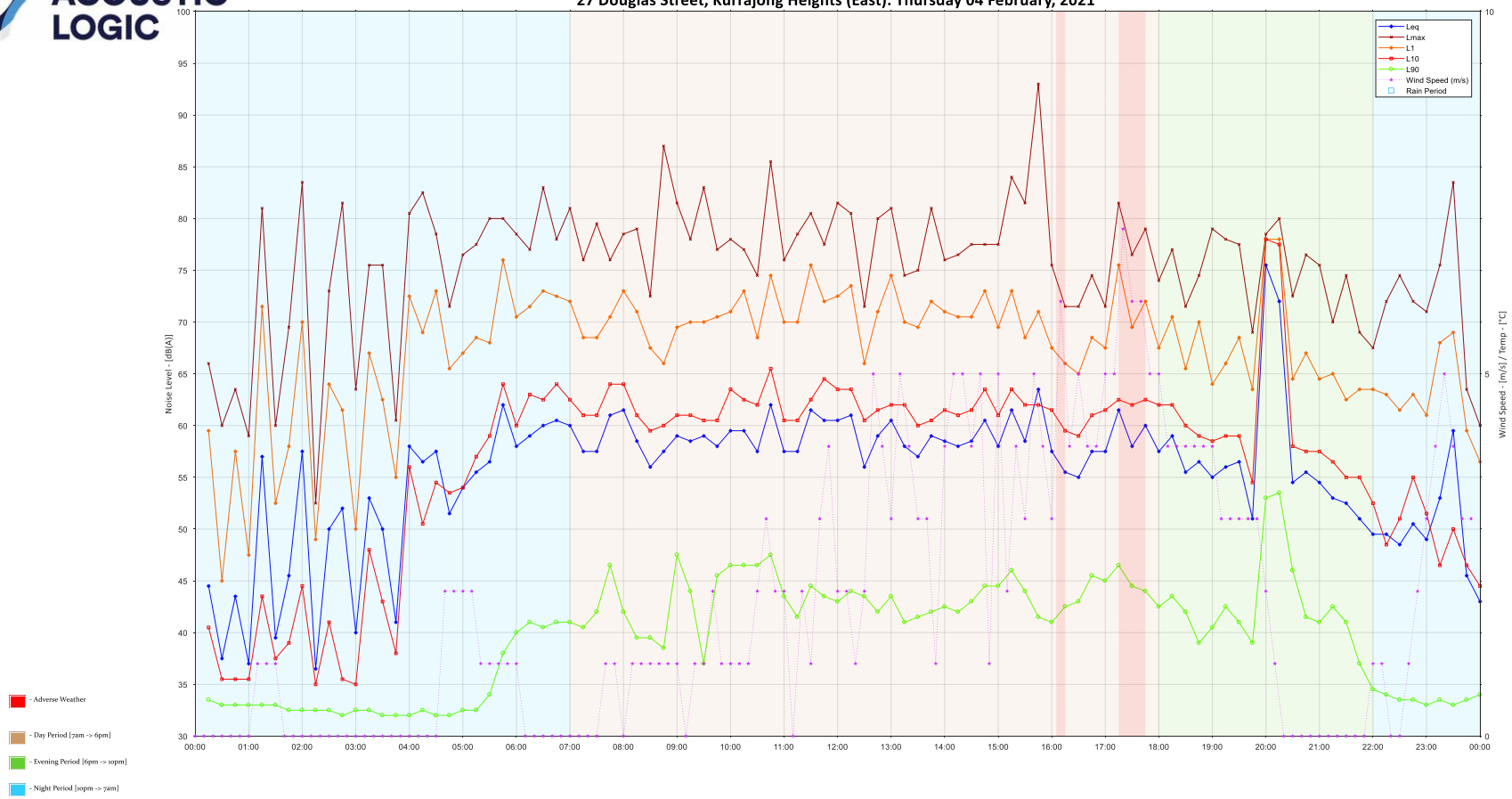
27 Douglas Street, Kurrajong Heights (East): Tuesday 02 February, 2021

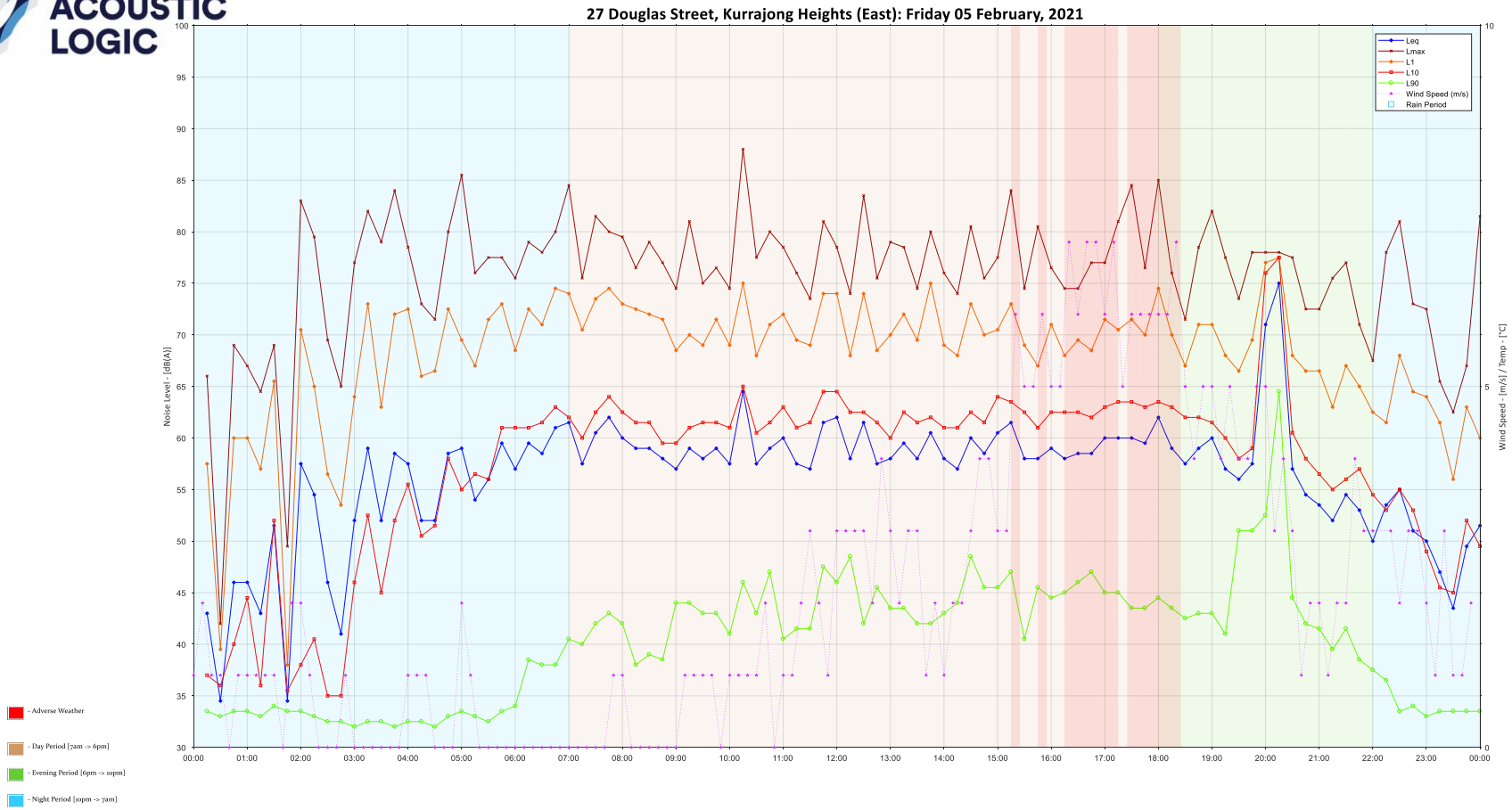


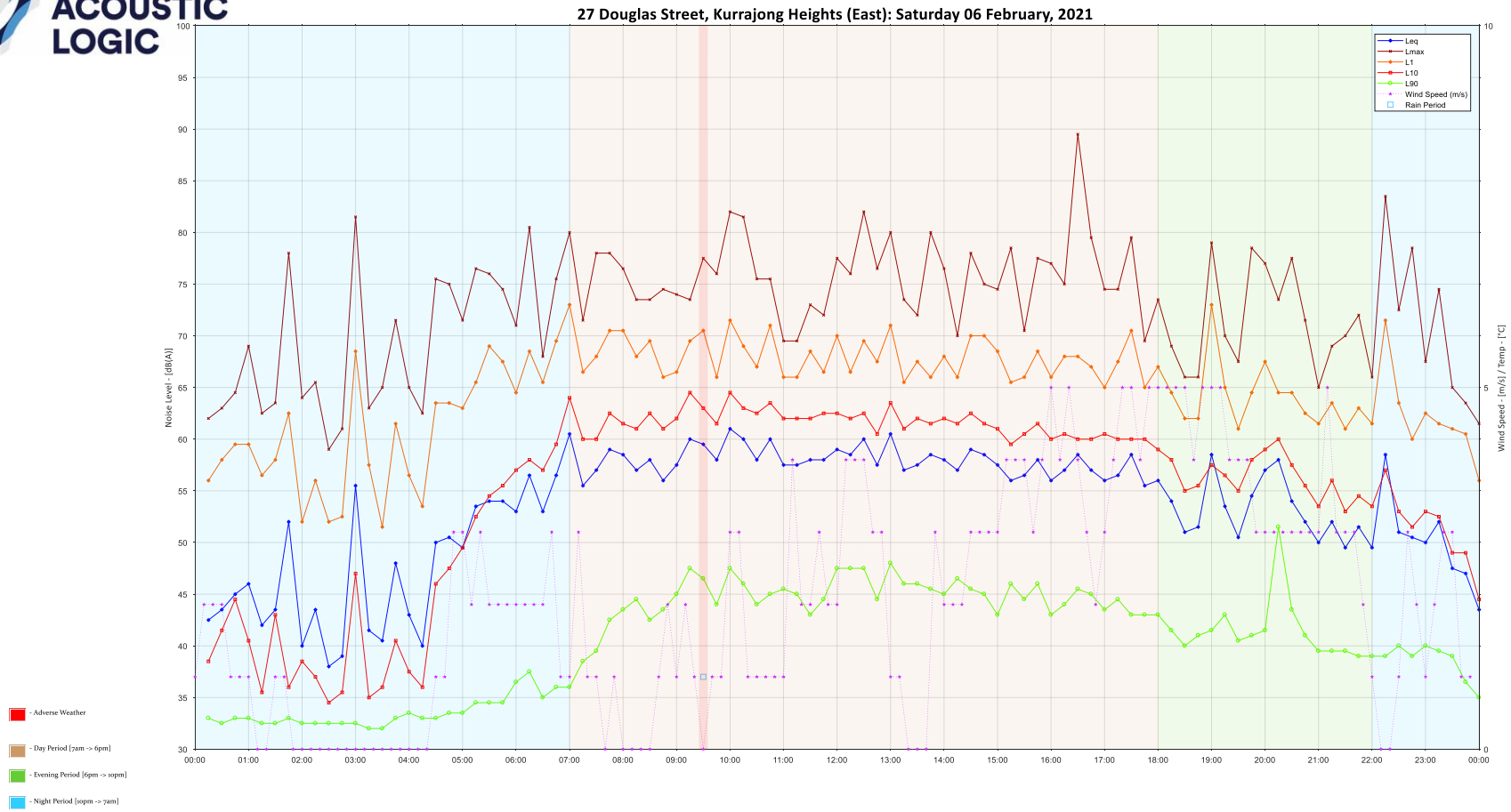
27 Douglas Street, Kurrajong Heights (East): Wednesday 03 February, 2021

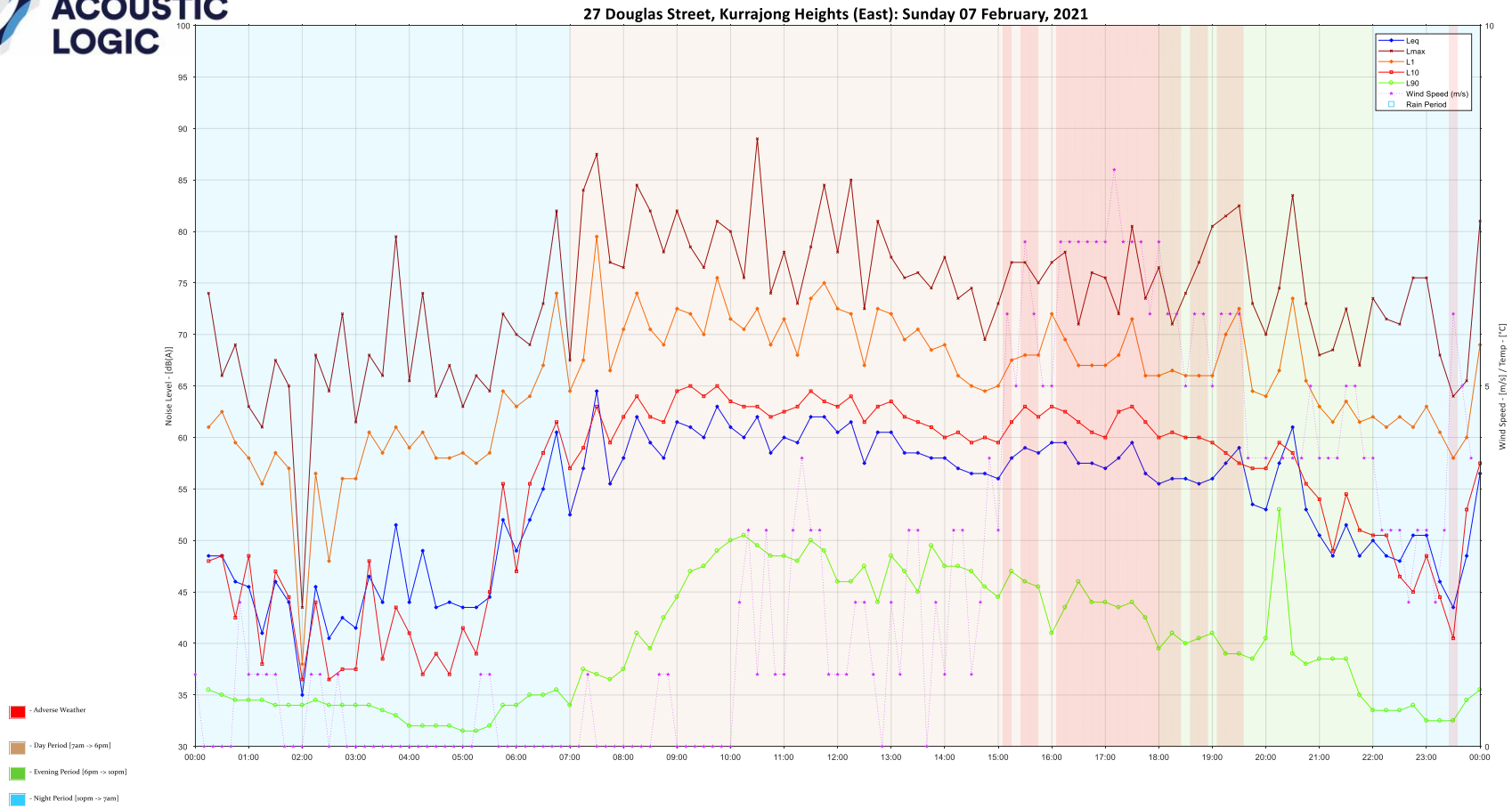


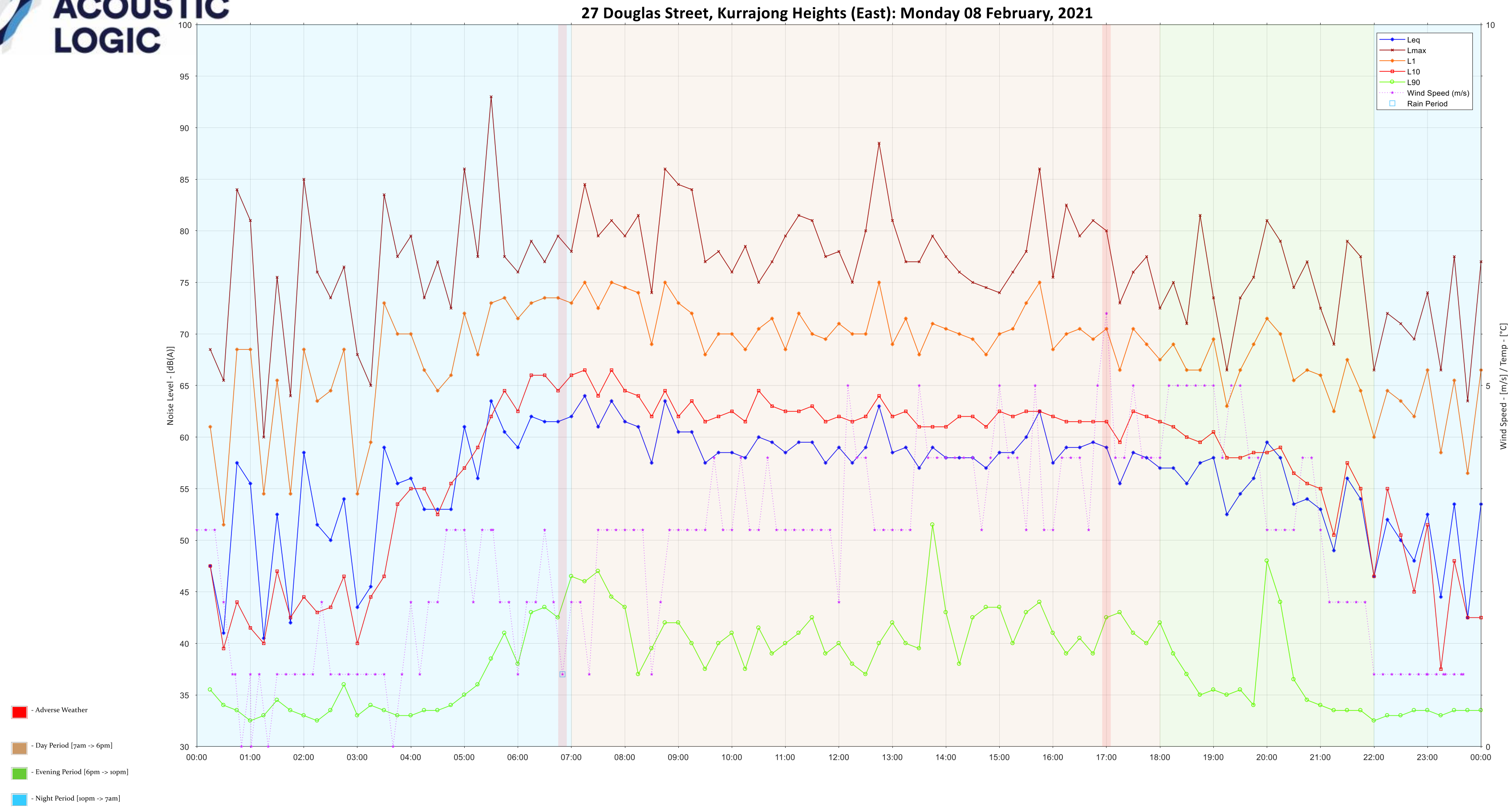
27 Douglas Street, Kurrajong Heights (East): Thursday 04 February, 2021




27 Douglas Street, Kurrajong Heights (East): Friday 05 February, 2021
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


27 Douglas Street, Kurrajong Heights (East): Saturday 06 February, 2021
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


27 Douglas Street, Kurrajong Heights (East): Sunday 07 February, 2021
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]



27 Douglas Street, Kurrajong Heights (East): Monday 08 February, 2021
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
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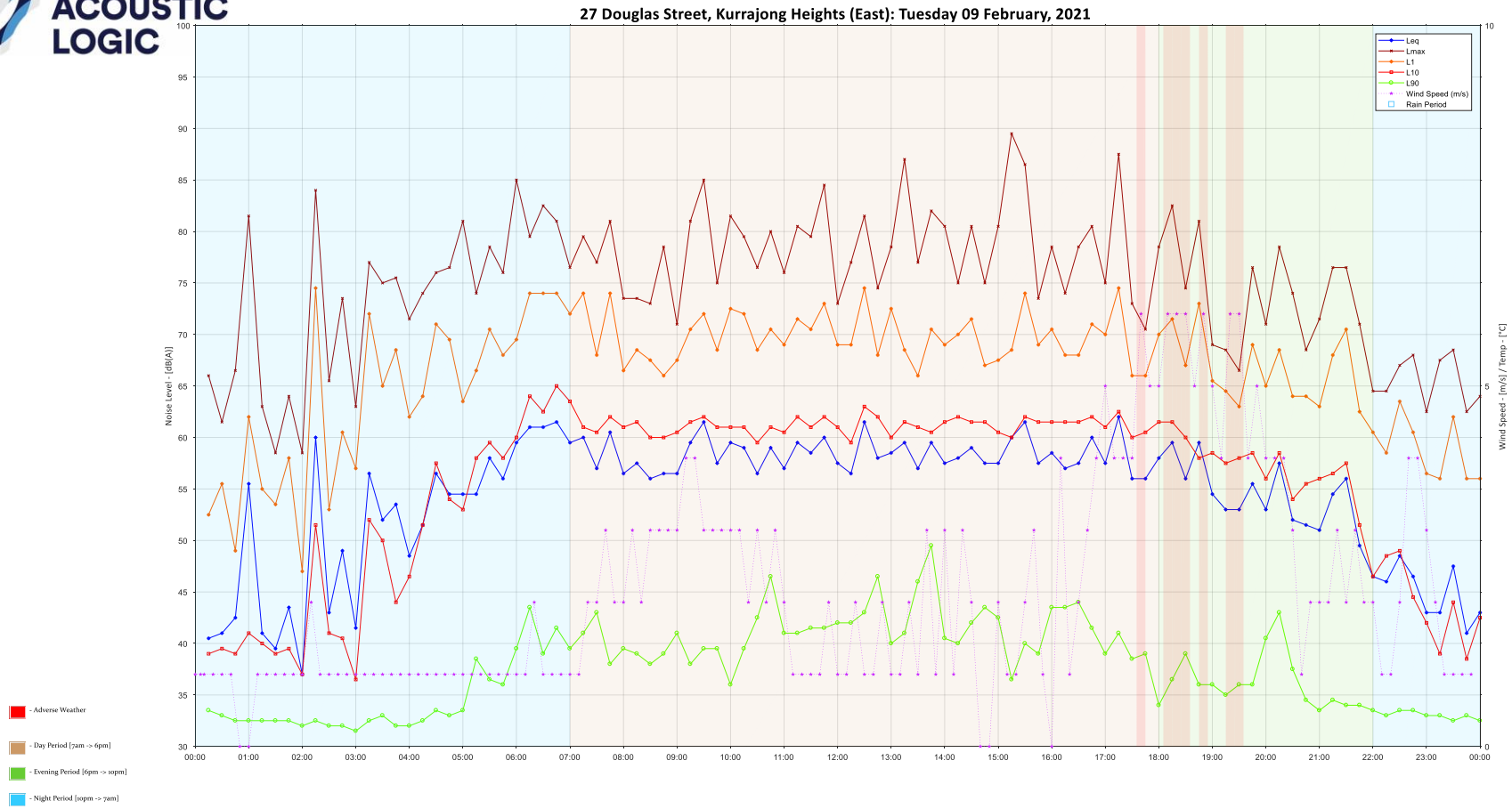
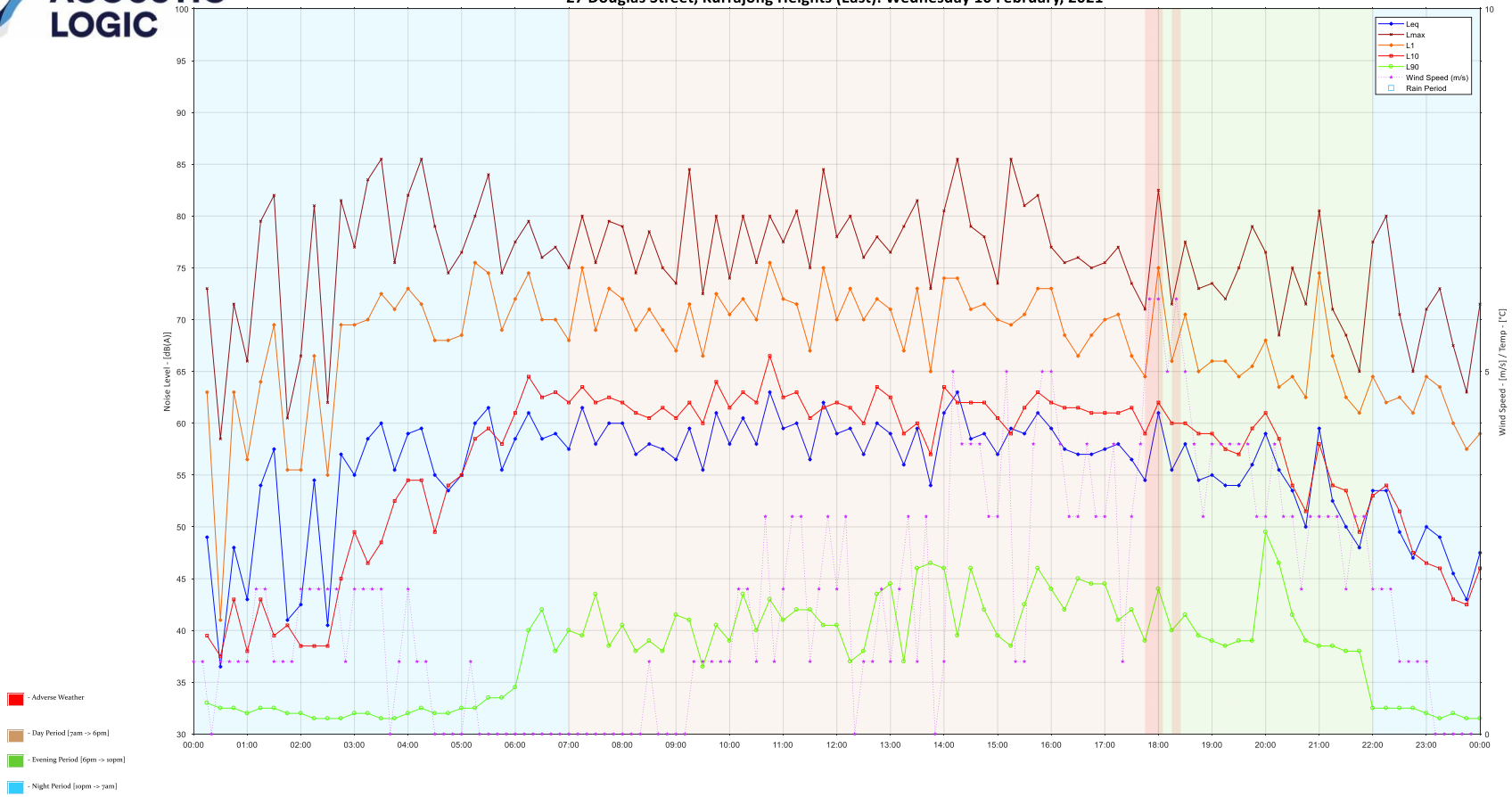
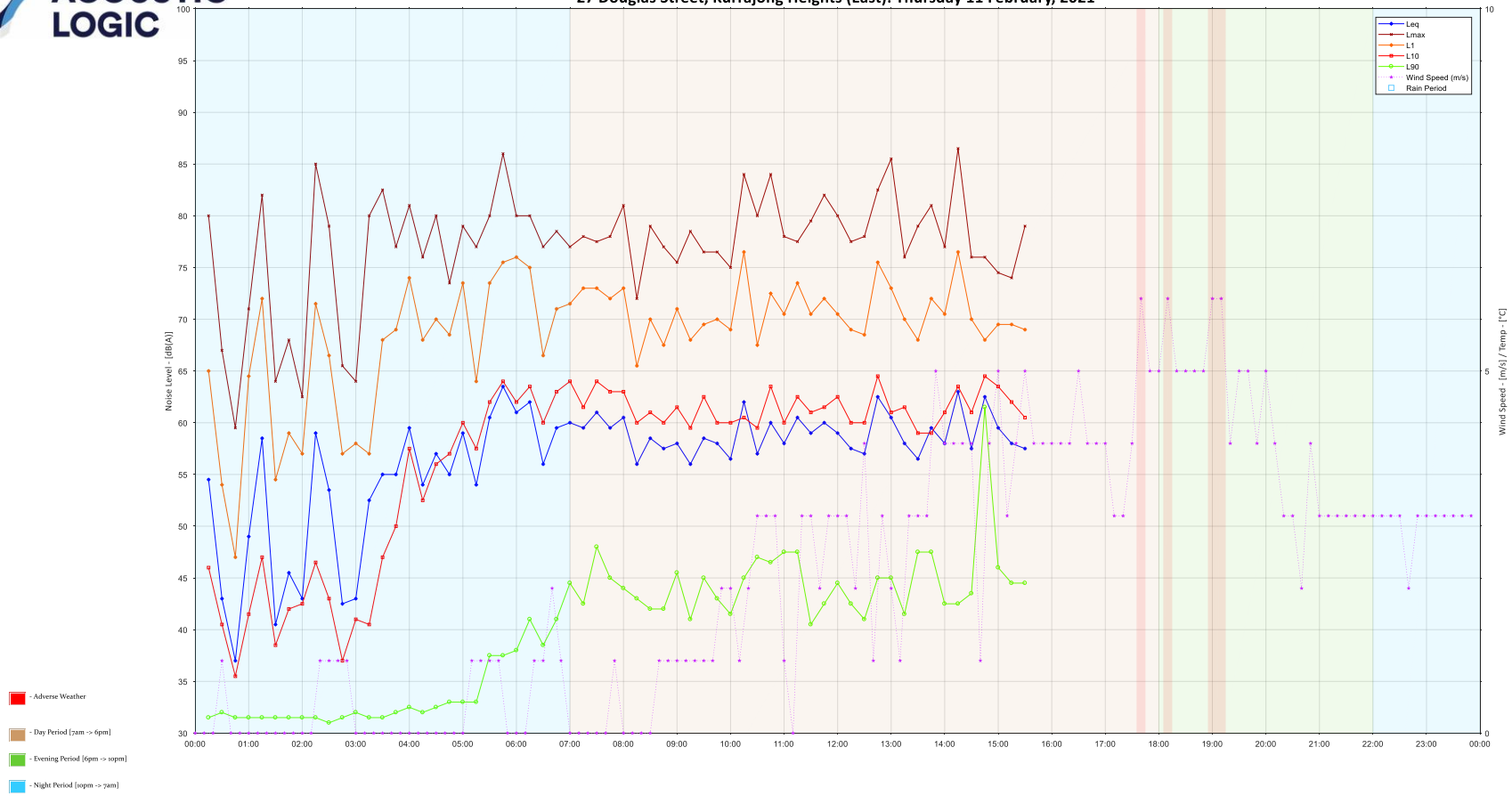
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


27 Douglas Street, Kurrajong Heights (East): Tuesday 09 February, 2021
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

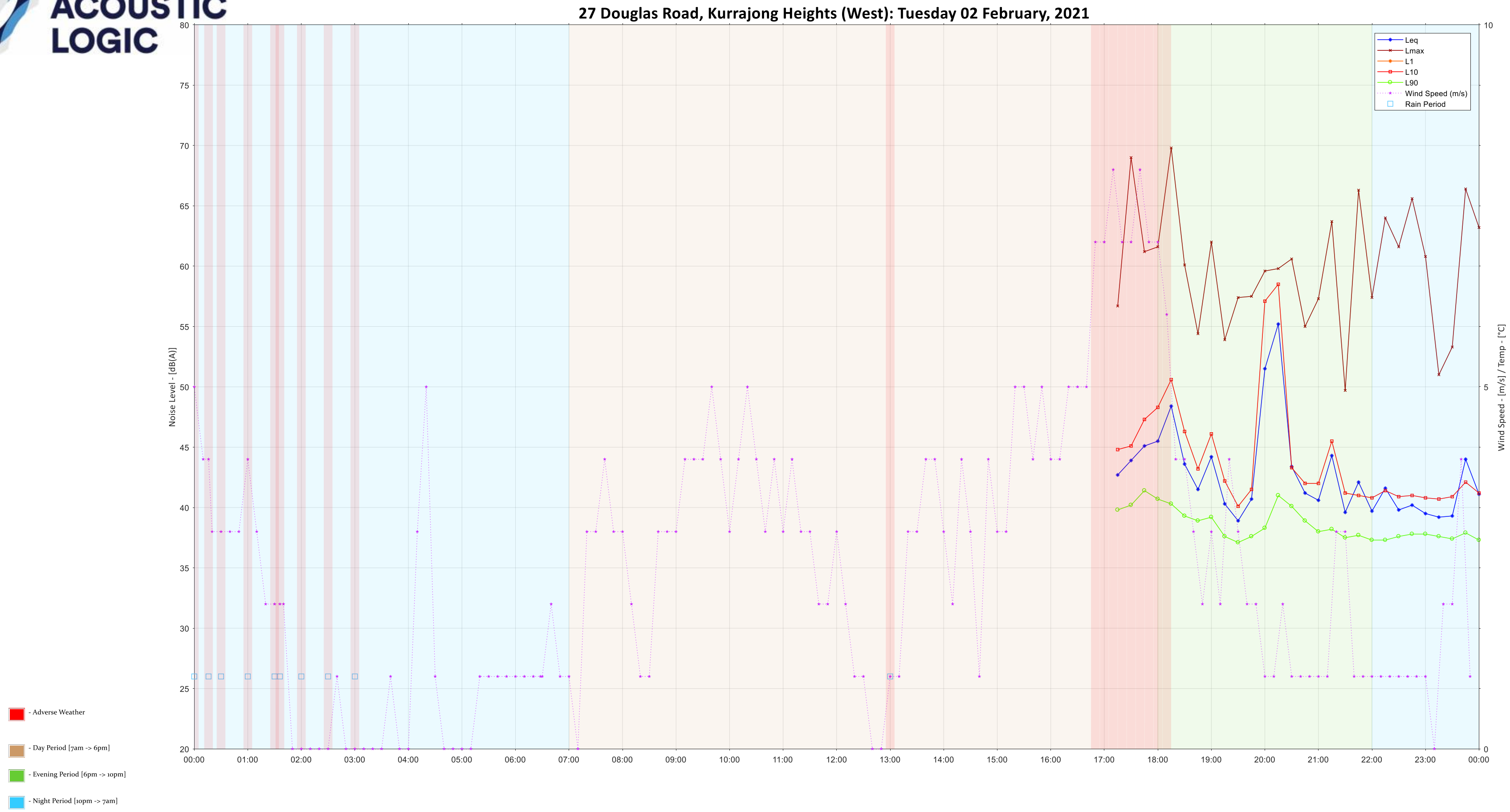
27 Douglas Street, Kurrajong Heights (East): Wednesday 10 February, 2021



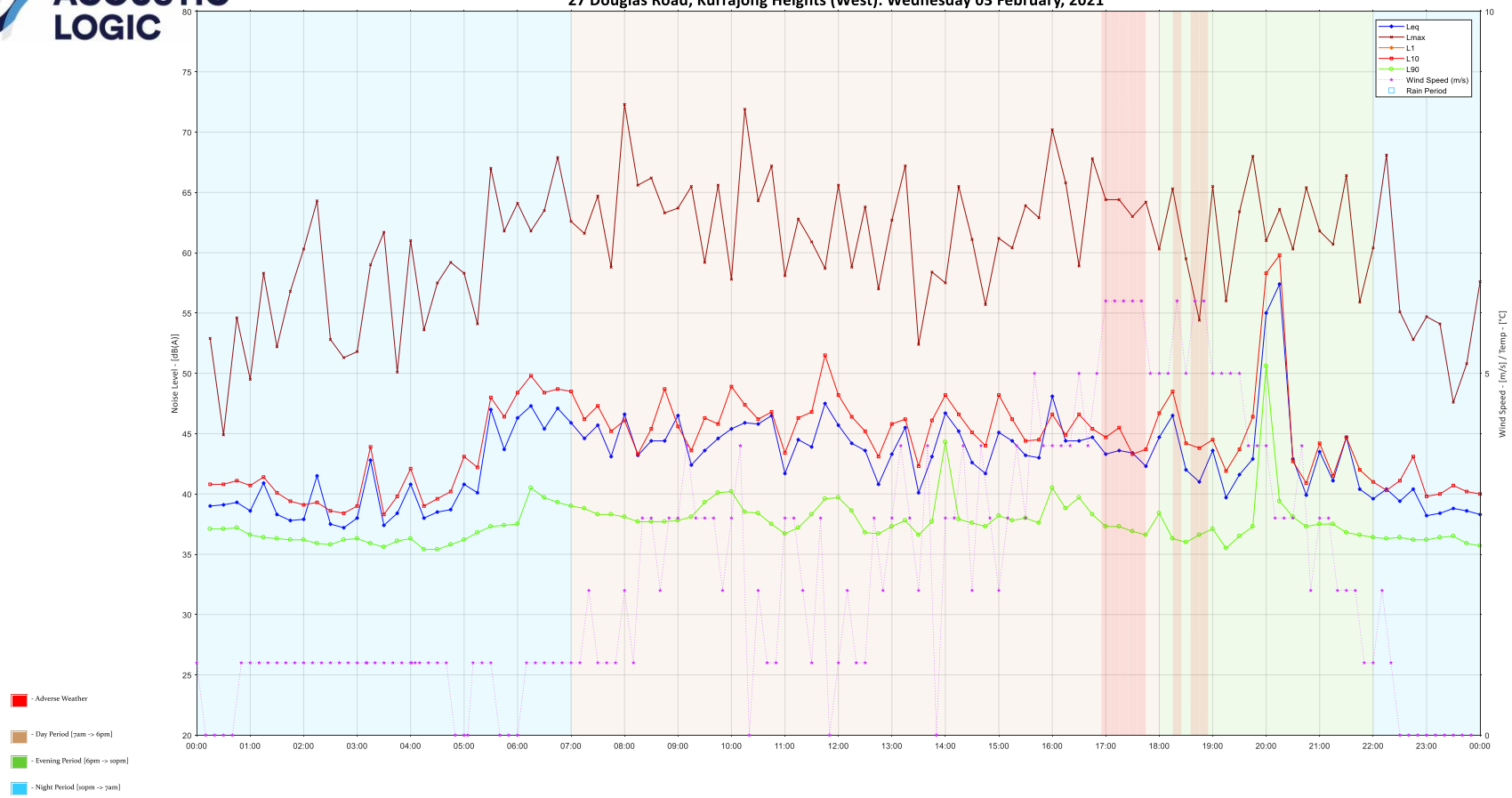
27 Douglas Street, Kurrajong Heights (East): Thursday 11 February, 2021

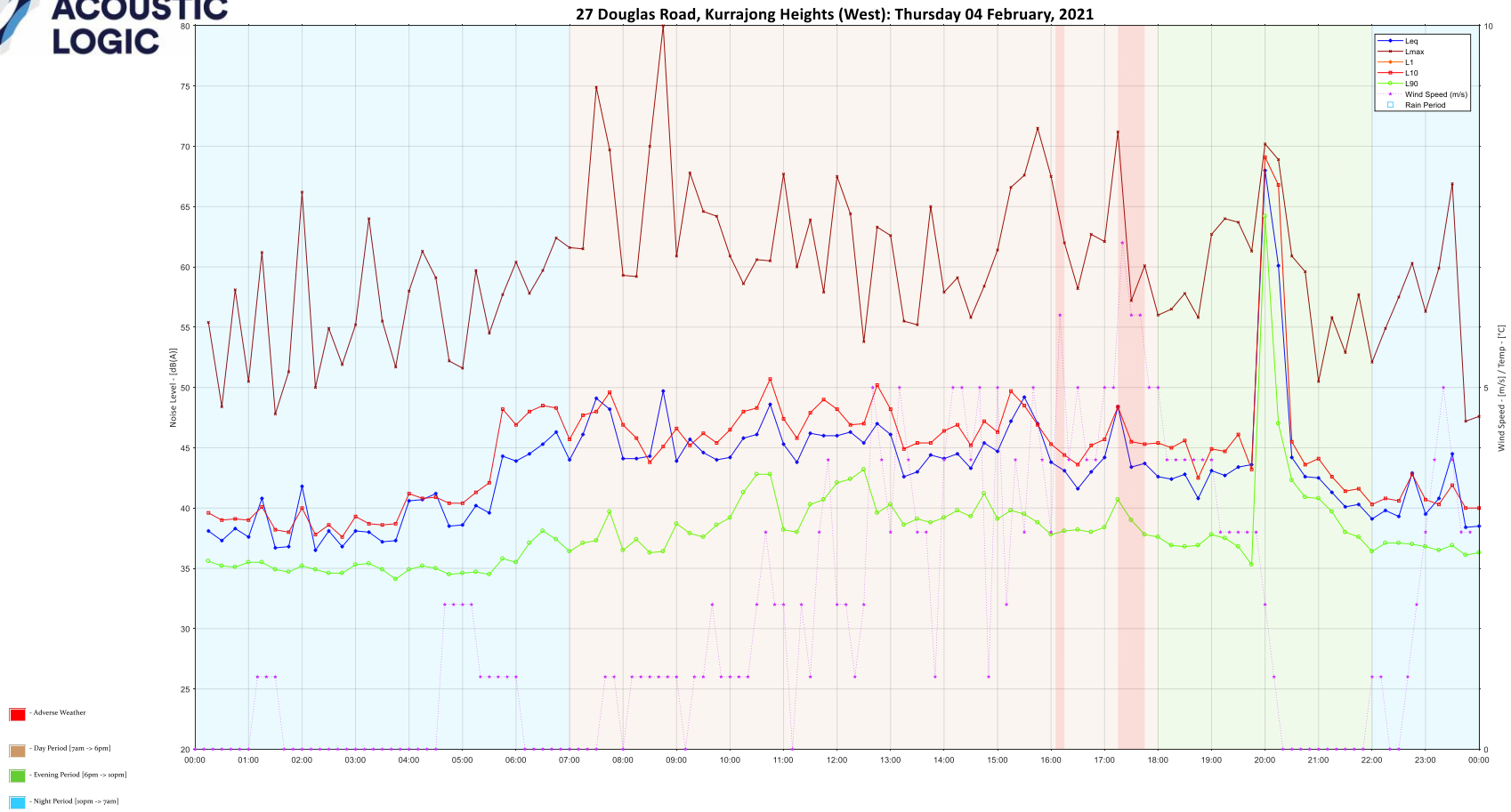


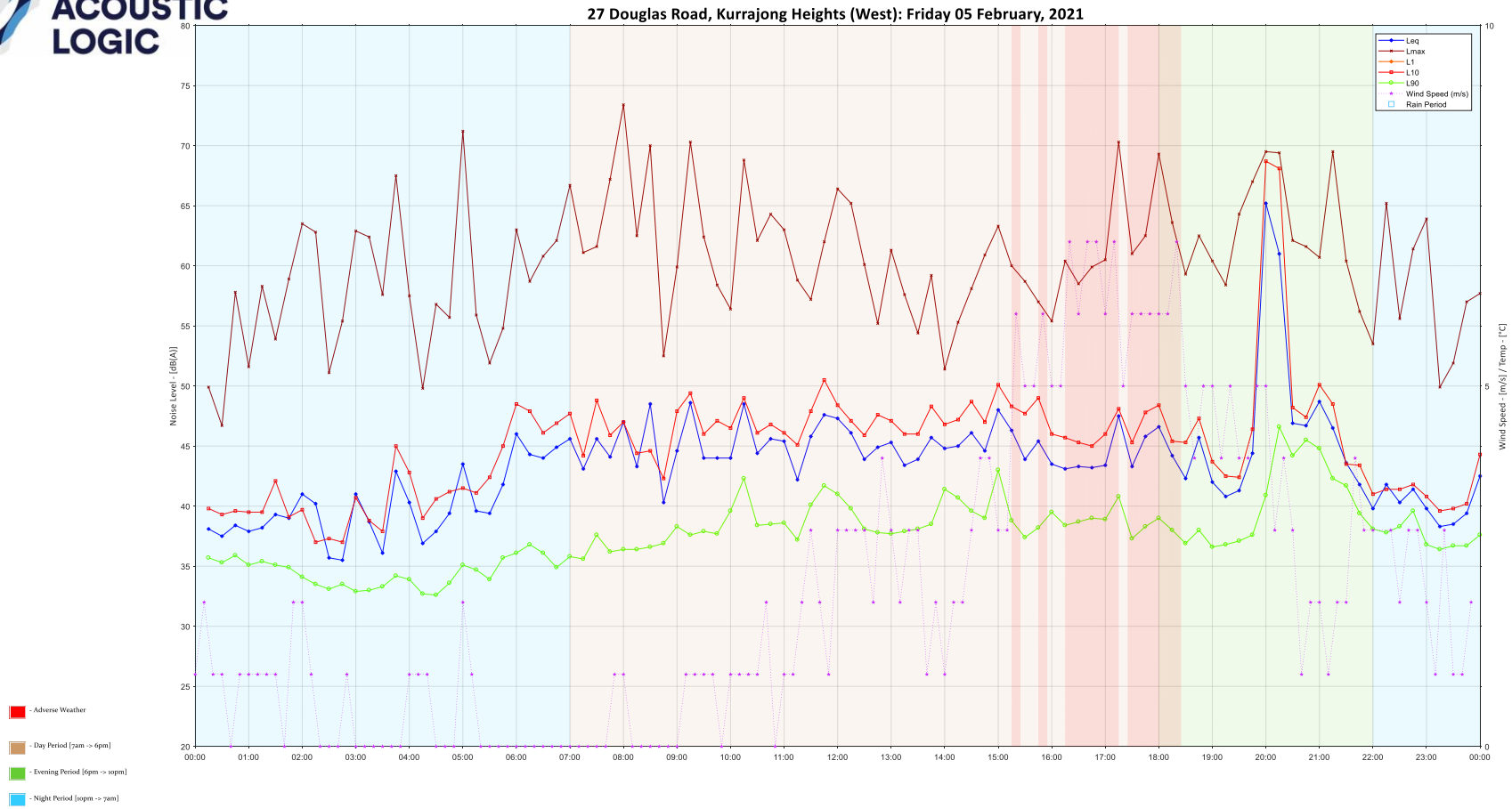
APPENDIX B – UNATTENDED NOISE MONITORING DATA – MONITOR 2 (WEST)


27 Douglas Road, Kurrajong Heights (West): Tuesday 02 February, 2021
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

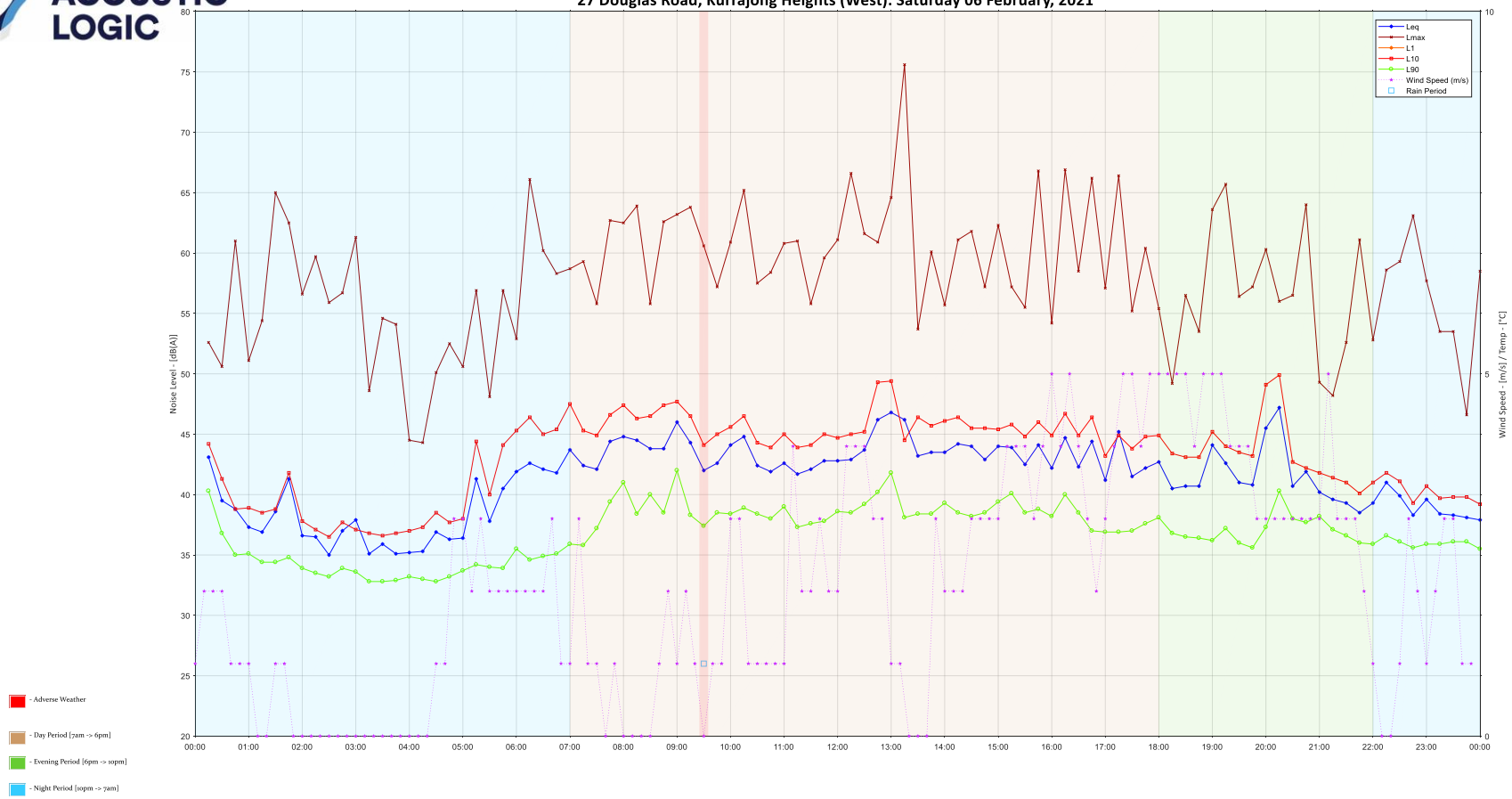
27 Douglas Road, Kurrajong Heights (West): Wednesday 03 February, 2021

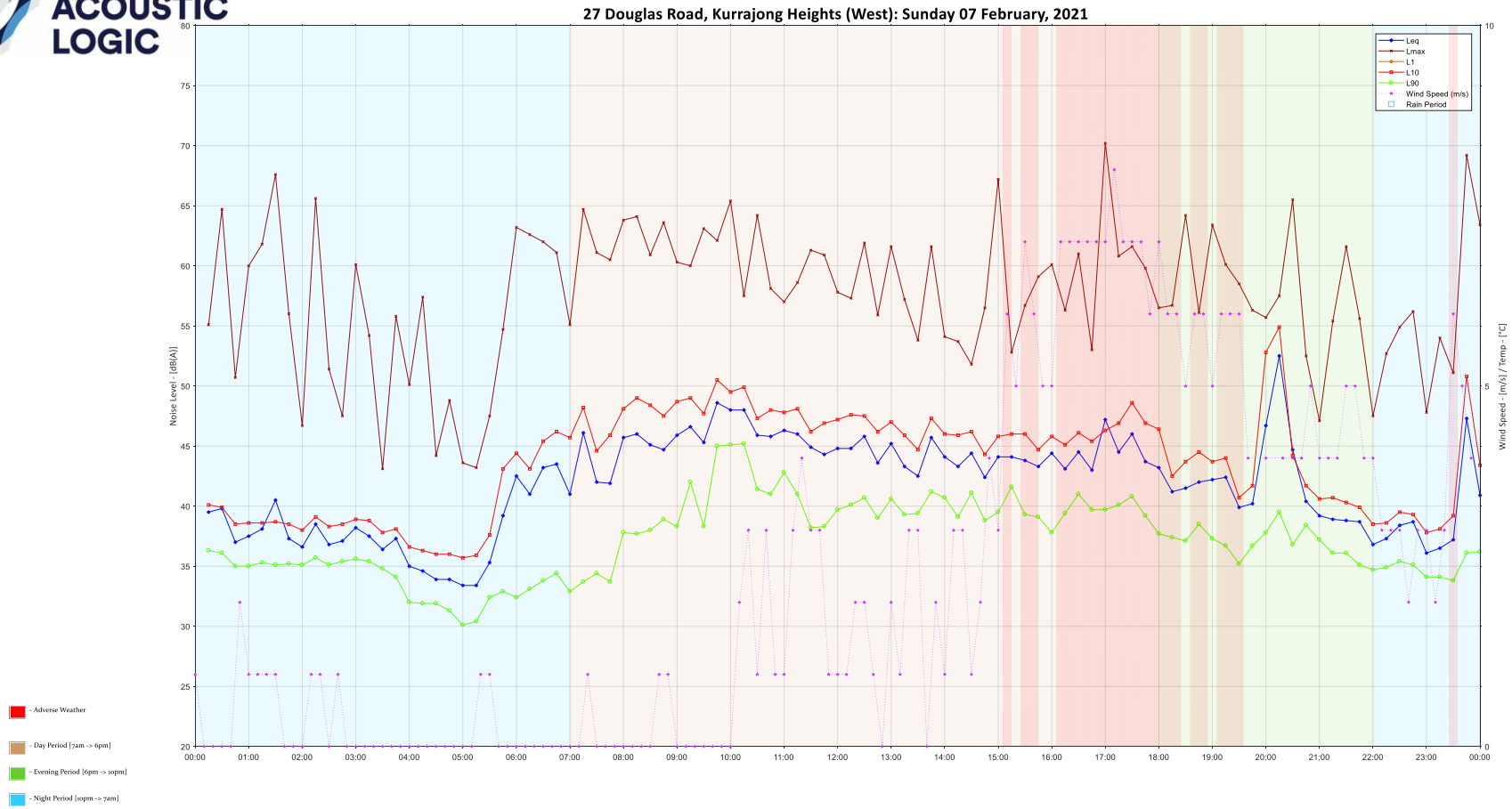



27 Douglas Road, Kurrajong Heights (West): Thursday 04 February, 2021
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

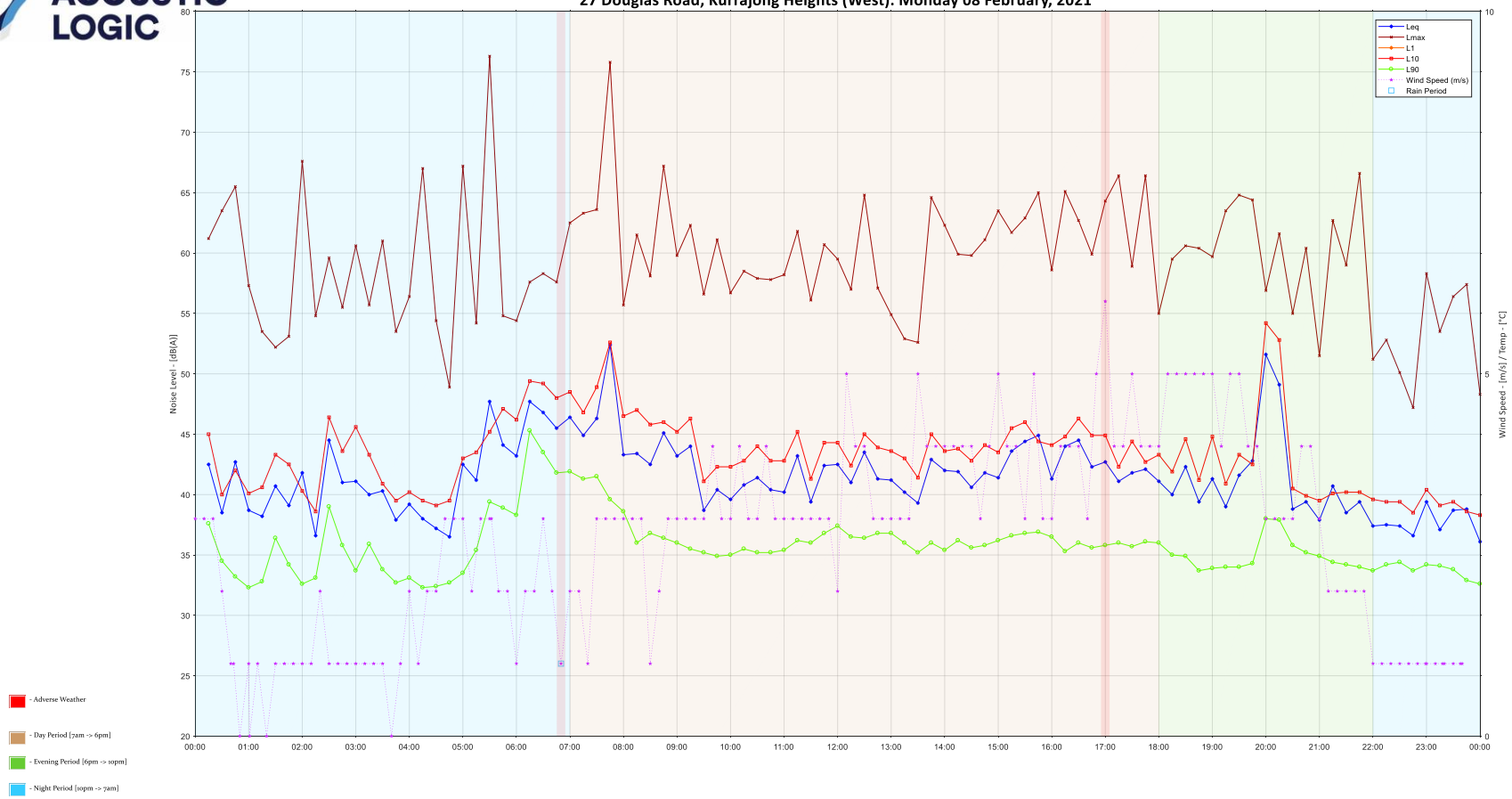

27 Douglas Road, Kurrajong Heights (West): Friday 05 February, 2021
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

27 Douglas Road, Kurrajong Heights (West): Saturday 06 February, 2021

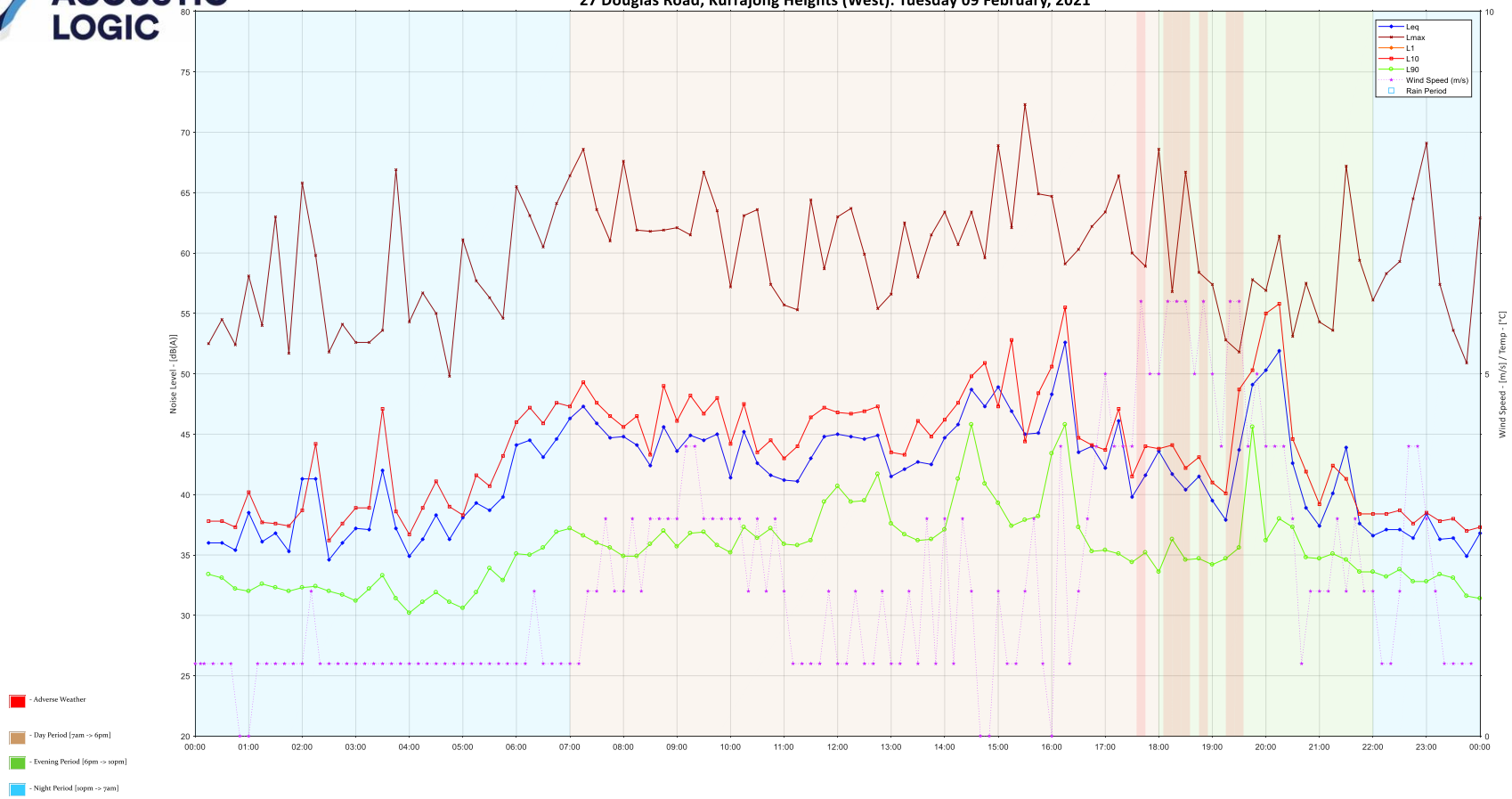



27 Douglas Road, Kurrajong Heights (West): Sunday 07 February, 2021
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

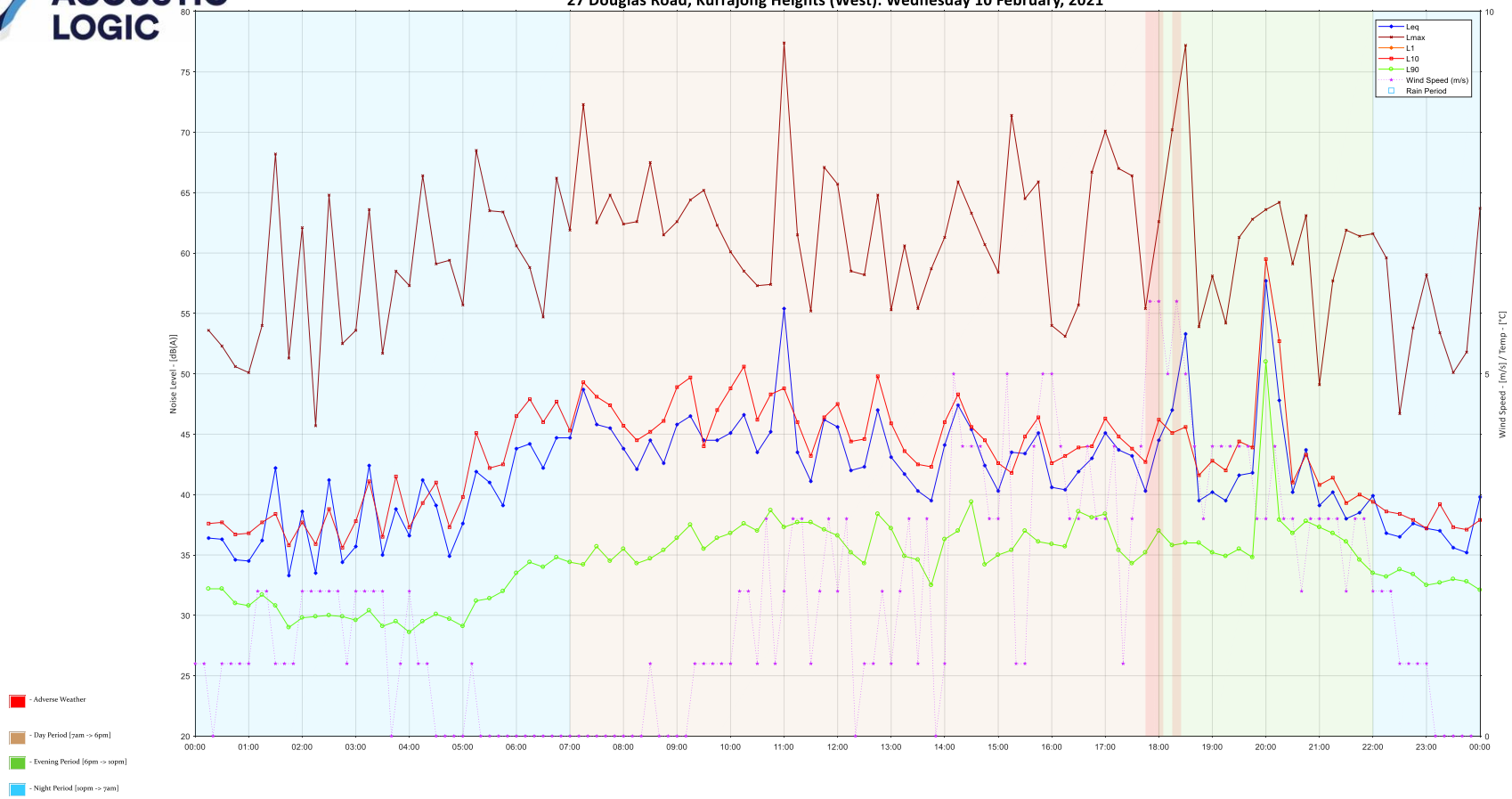
27 Douglas Road, Kurrajong Heights (West): Monday 08 February, 2021



27 Douglas Road, Kurrajong Heights (West): Tuesday 09 February, 2021



27 Douglas Road, Kurrajong Heights (West): Wednesday 10 February, 2021



27 Douglas Road, Kurrajong Heights (West): Thursday 11 February, 2021