

Patyegarang Project

Planning Proposal Acoustic Report

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Attention To	Belrose Land Pty Ltd

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1 INTRODUCTION

Acoustic Logic (AL) has been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed Patyegarang Project development to be located at Morgan Road, Belrose.

This document addresses noise impacts associated with the following:

- Noise intrusion to project site from adjacent roadways;
- Noise emissions from mechanical plant to service the project site (in principle).

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

- Warringah Development Control Plan (DCP) 2011;
- Australian Standard AS/NZS 3671:1989 'Acoustics—Road traffic noise intrusion—Building siting and Construction';
- Australian Standard AS2107:2016 – '*Recommended Design Sound Levels and Reverberation Times for Building Interiors*,' and
- NSW Department of Environment and Heritage, Environmental Protection Authority document – '*Noise Policy for Industry*' (NPI) 2017.

This assessment has been conducted using the COX Architecture Draft Structural Plan dated 14 September 2022.

2 SITE DESCRIPTION/PROPOSAL

The purpose of this Planning Proposal is to implement the Development Delivery Plan for the subject site created under State Environmental Planning Policy (Planning Systems) 2021.

The objective of the Planning Proposal is to create a residential community embodying strong conservation principles to support the enhancement of the unique environmental and Aboriginal cultural heritage characteristics of the site.

The intended outcome of the Planning Proposal is to amend the applicable local planning controls to accommodate up to 450 new residential dwellings with a variety of scale and character reflective of the dominant dwelling type in the Belrose locality, as well as a new cultural community centre and protection of aboriginal heritage sites.

An indicative draft structure plan has been developed by COX Architecture that is reflective of the site's opportunities and constraints in the areas of flora and fauna biodiversity, bushfire management, transport planning, Aboriginal heritage and stormwater management. The Planning Proposal intends to ensure development outcomes align with traditional indigenous 'Caring for Country' practices and relevant 'Connecting with Country' and 'Designing with Country' principles and strategies.

2.1 NEAREST NOISE SENSITIVE RECEIVERS

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

The nearest noise sensitive receivers around the project site include:

- **Receiver 1:** Residential Receiver – Residential agreed care facility comprising one and two storey buildings located at 2A, 2B and 2C Morgan Road, Belrose.
- **Receiver 2:** Residential Receiver – One and two storey private residences located along Oates Place, Lyndhurst Way, Caley Way, Ocean View Way and 30 Forest Way.
- **Receiver 3:** Residential Receiver – One and two storey private residences located along Childs Circuit, Belmont Place, Paramount Close, Laurie Place, Perentie Road, Harstaf Close, Niven Place and Simpson Street.
- **Receiver 4:** Commercial Receiver. Telstra Oxford Falls located at Oxford Falls Road.
- **Receiver 5:** Commercial Receiver located at 1000 Oxford Falls Road.
- **Receiver 6:** Residential and Commercial receivers. One and two storey receivers located along Kelly's Way.
- **Receiver 7:** Residential Receiver. One and two storey private residences located along Morgan Road and Hilversum Crescent.

An aerial site map, measurement locations and surrounding nearest receivers are presented in Figure 1 below. The draft structure plan for the development is included in Figure 2.

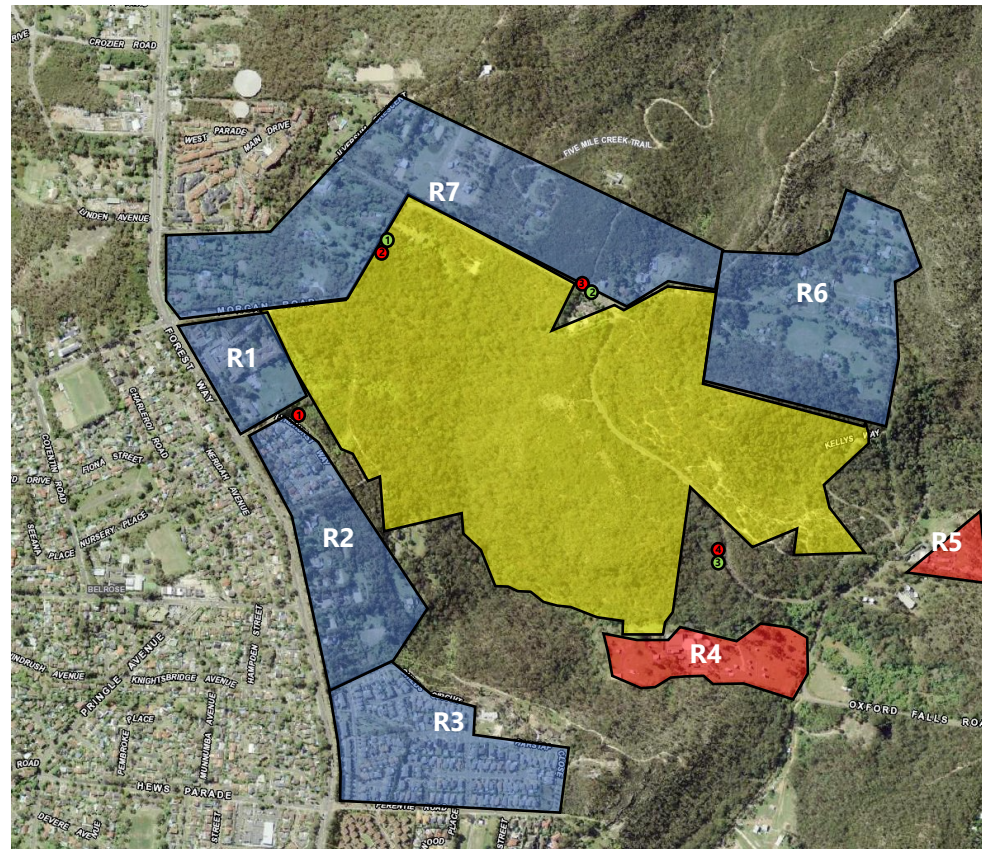
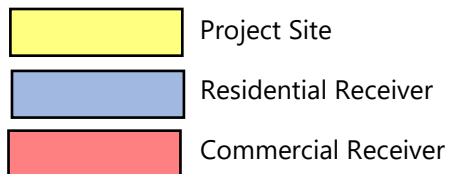


Figure 1 – Site Map. Source: Six Maps





-  Unattended noise monitor location
-  Attended measurement location



Figure 2 – Draft Structure Plan. Source: COX Architecture

3 NOISE DESCRIPTORS

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

To quantify ambient noise, a 15 minute measurement interval is typically utilised. Noise levels are monitored on a continuous basis over this period, and statistical and integrating techniques are used to characterise the noise being measured.

The principal measurement parameters are:

Leq - represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. Leq is important in the assessment of noise impact as it closely corresponds with how humans perceive the loudness of steady state and quasi-steady state noise sources (such as traffic noise).

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

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

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

L1 is sometimes used in place of Lmax to represent a typical noise level from a number of high level, short term noise events.

4 AMBIENT NOISE SURVEY

NSW EPA's Rating Background Noise Level (RBL) assessment procedure requires determination of background noise level for each day (the ABL) then the median of the individual days as set out for the entire monitoring period.

Appendices in this report present results of unattended noise monitoring conducted at the project site. Weather affected data was excluded from the assessment. The processed RBL (lowest 10th percentile noise levels during operation time period) are presented in Table 4-.

4.1 MEASUREMENT POSITION AND MEASUREMENT PERIOD

Four unattended noise monitors were installed at the project site. Details of location, time period and description of the noise are in table 4-1.

Table 4-1 – Measured Noise Levels

Noise Monitor Number	Measurement Period	Noise Monitor Location	Description of Noise Environment
1	Wednesday 13 th January – Wednesday 20 th January	Lyndhurst Way	Local traffic along adjacent private roads. Ambient noise from wildlife.
2	Wednesday 13 th January – Friday 22 nd January	Morgan Road (North) Adjacent to 11 Morgan Road	Local traffic along Morgan Road. Ambient noise from wildlife.
3	Wednesday 13 th January – Friday 22 nd January	Morgan Road (North east) Adjacent to 19 Morgan Road	Local traffic along Morgan Road. Ambient noise from wildlife.
4	Friday 22 nd January – Monday 1 st February	Morgan Road (South east) Adjacent to 11 Morgan Road	Local traffic along Morgan Road. Ambient noise from wildlife.

4.2 MEASUREMENT EQUIPMENT

Equipment used consisted of an Acoustic Research Laboratories Pty Ltd noise logger. The loggers were set to A-weighted fast response and was programmed to store 15-minute statistical noise levels throughout the monitoring period. The monitors were calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted. Noise logger data is provided in Appendix A, B, C and D of this report.

4.3 SUMMARISED RATING BACKGROUND NOISE LEVELS

Summarised rating background noise levels for the project site and immediate surroundings are presented below. Weather affected data has been removed in line with the recommendations of Fact Sheets A & B of the NSW EPA Noise Policy for Industry.

Table 4-2 – Measured Noise Levels

Noise Monitor Number	Noise Monitor Location	Time of day	Rating Background Noise Level dB(A) _{L90(Period)}
1	Lyndhurst Way	Day (7am – 6pm)	47
		Evening (6pm – 10pm)	38
		Night (10pm – 7am)	30
2	Morgan Road (North) Adjacent to 11 Morgan Road	Day (7am – 6pm)	49
		Evening (6pm – 10pm)	40
		Night (10pm – 7am)	33
3	Morgan Road (North east) Adjacent to 19 Morgan Road	Day (7am – 6pm)	50
		Evening (6pm – 10pm)	39
		Night (10pm – 7am)	28
4	Morgan Road (South east)	Day (7am – 6pm)	46
		Evening (6pm – 10pm)	40
		Night (10pm – 7am)	38

4.4 SURVEY OF ROAD TRAFFIC NOISE FROM ADJACENT ROADWAYS

In addition, noise monitoring and supplementary attended measurements were used to determine the existing traffic noise levels at the site. This is relevant to the assessment of noise due to the potential for road noise impacts on future occupants of the proposed development.

4.4.1 Attended Measurement Locations

Attended measurements were conducted in the following locations:

- Location One (Morgan Road, north) – Measurement was conducted at monitoring location 2, approximately 1m from the kerb of Morgan road. Measurement position and had full line of sight to traffic movements along the roadway.
- Location Two (Morgan Road, north east) – Measurement was conducted at monitoring location 3, approximately 1m from the kerb of Morgan road. Measurement position and had full line of sight to traffic movements along the roadway.
- Location Three (Morgan Road, south east) - Measurement was conducted at monitoring location 4, approximately 3m from the kerb of Morgan road. Measurement position and had full line of sight to traffic movements along the roadway.

4.4.2 Measurement Equipment

Attended measurements were conducted using a Norsonic 140 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonic Sound Calibrator type 1251. No significant drift was noted.

4.4.3 Measured Traffic Noise Levels

Table 4-3 – Measured Traffic Noise Levels

Type	Location	Time of Day	Measured Noise Level
Long -term monitoring	Lyndhurst Way	Day (7am-10pm)	63 dB(A) $L_{eq}(15 \text{ hour})$
		Night (10pm-7am)	45 dB(A) $L_{eq}(9 \text{ hour})$
	Morgan Road (North) Adjacent to 11 Morgan Road	Day (7am-10pm)	66 dB(A) $L_{eq}(15 \text{ hour})$
		Night (10pm-7am)	56 dB(A) $L_{eq}(9 \text{ hour})$
	Morgan Road (North east) Adjacent to 19 Morgan Road	Day (7am-10pm)	63dB(A) $L_{eq}(15 \text{ hour})$
		Night (10pm-7am)	49 dB(A) $L_{eq}(9 \text{ hour})$
	Morgan Road (South east)	Day (7am-10pm)	62 dB(A) $L_{eq}(15 \text{ hour})$
		Night (10pm-7am)	56 dB(A) $L_{eq}(9 \text{ hour})$
Attended measurements	Adjacent to 11 Morgan Road, Belrose, Approximately 1m from kerb	3:00pm – 3:15pm	67 dB(A) $L_{eq}(15 \text{ min})$
	Adjacent to 19 Morgan Road, Belrose, Approximately 1m from kerb	3:30pm - 3:45pm	64 dB(A) $L_{eq}(15 \text{ min})$
	Morgan Road, Belrose (South east) Approximately 3m from kerb	4:00pm – 4:15pm	63 dB(A) $L_{eq}(15 \text{ min})$

5 EXTERNAL NOISE INTRUSION ASSESSMENT

Site investigation indicates that the major external noise source around the project site is from traffic movements along Morgan Road which bounds the site.

5.1 NOISE INTRUSION CRITERIA

A noise intrusion assessment has been conducted based on the requirements of the following acoustic noise criteria and standards:

- Warringah Development Control Plan (DCP) 2011;
- Australian Standard AS/NZS 3671:1989 'Acoustics—Road traffic noise intrusion—Building siting and Construction'; and
- Australian Standard AS2107:2016 – '*Recommended Design Sound Levels and Reverberation Times for Building Interiors.*'

5.1.1 Warringah Development Control Plan (DCP) 2011

The Warringah DCP 2011 contains no specific numerical controls for the treatment of noise intrusion.

5.1.2 Australian Standard AS/NZS 3671:1989 '*Acoustics—Road traffic noise intrusion—Building siting and Construction*'

Australian Standard AS 3671-1989 notes the following in relation to traffic noise:

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

Internal noise levels have been selected in accordance with AS 2107:2016.

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

AS2107:2016: Recommended design sound levels and reverberation times for building interiors specifies allowable internal noise levels for internal spaces within residential and commercial buildings. Table 1, in Section 5 of AS2107:2016, gives the following maximum internal noise levels for commercial buildings and residential buildings near minor roads.

Table 5-1 – Recommended Design Sound Levels

Space /Activity Type	Recommended Design Sound Levels
Sleeping Areas	30-35 dB(A) _{Leq(10pm-7am)}
Living Areas	30-40 dB(A) _{Leq(anytime)}

5.1.4 Summarised External Noise Intrusion Criteria

The internal noise criteria adopted for each internal space is therefore summarised below based on the relevant Council and Australian Standard requirements.

Table 5-2 – Adopted Internal Noise Levels

Space / Activity Type	Required Internal Noise Level
Sleeping Areas	35 dB(A) _{Leq(10pm-7am)}
Living Areas	40 dB(A) _{Leq(worst 1hr)}

5.2 RECOMMENDED CONSTRUCTIONS

Recommended treatments to meet the criteria detailed in Section 4 have been determined based on the concept plan provided. The major source of noise impacting the site is from Morgan Road. As such it is anticipated that facades facing these roadways will require acoustic treatment. Other facades will face roads carrying only local traffic, therefore it is anticipated that no specific acoustic treatment will be required. A full assessment of all treatments recommended within this report is to be conducted during detailed design stage to ensure that the criteria determined within this report is met.

5.2.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-Ion type acoustic seals. **(Mohair Seals are unacceptable)**.

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable. The recommended constructions are detailed in Table 5-3.

Table 5-3 – Recommended Glazing Construction

Façade	Glazing Thickness	Acoustic Seals
Facing Morgan Road	10.38mm laminated	Yes

It is recommended that only window systems having test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 5-4 for all areas. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 5-4 – Minimum R_w of Glazing Assembly (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
10.38mm laminated	35

5.2.2 Roof / Ceiling

Masonry or concrete roof structures will be acceptable without any further acoustic treatment required. In the event that light weight constructions are proposed as part of the detailed design of the project, these are to be reviewed by the project acoustic consultant to ensure that the internal noise criteria is achieved.

Any penetrations through the ceiling are to be acoustically sealed to maintain the required acoustic rating of the façade structure.

5.2.3 External Walls

Masonry or concrete wall structures will be acceptable without any further acoustic treatment required. In the event that light weight constructions are proposed as part of the detailed design of the project, these are to be reviewed by the project acoustic consultant to ensure that the internal noise criteria is achieved.

Any penetrations through the ceiling are to be acoustically sealed to maintain the required acoustic rating of the façade structure.

5.2.4 Entry Doors

All external entry doors shall have glazing thicknesses equal to those recommended in Section 5.2.1 and are to have Raven RP10 to the top and sides and Raven RP38 to the underside of a swing door.

Note that mohair seals in windows and doors are not acceptable where acoustic seals are required.

5.2.5 Mechanical Ventilation

With respect to natural ventilation of a dwelling, the NSW Department of Planning document '*Development near Busy Roads and Rail Corridors - Interim Guideline*' dictates that:

"If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45dB(A) and living rooms becomes 50dB(A) $L_{eq}(worst\ 1hr)$).

- Bedrooms and living rooms facing Morgan Road *will not* be able to achieve required internal noise levels with windows or doors open.
- Bedrooms and living rooms not facing Morgan Road *will* be able to achieve required internal noise levels with windows or doors open.

Any supplementary ventilation system proposed to be installed should be acoustically designed to ensure that the acoustic performance of the acoustic treatments outlined above is not reduced and does not exceed Council criteria for noise emission to nearby properties. A mechanical engineer is to confirm if supplementary ventilation (to meet Australian Standard AS1668.2 requirements) will be required to these rooms.

6 NOISE EMISSION CRITERIA

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

- Warringah Development Control Plan (DCP) 2011; and
- NSW Department of Environment and Heritage, Environmental Protection Authority document – ‘Noise Policy for Industry’ (NPI) 2017 for the assessment of mechanical noise emissions from the site.

6.1 WARRINGAH DEVELOPMENT CONTROL PLAN (DCP) 2011

The Warringah DCP 2011 contains the following controls regarding noise emissions:

D3 Noise:

Noise from combined operation of all mechanical plant and equipment must not generate noise levels that exceed the ambient background noise by more than 5dB(A) when measured in accordance with the NSW Industrial Noise Policy at the receiving boundary of residential and other noise sensitive land uses.

6.2 NSW EPA NOISE POLICY FOR INDUSTRY (NPI) 2017

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

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

6.2.1 Intrusiveness Criterion

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

Background noise levels adopted are presented in Table 4-. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

6.2.2 Project Amenity Criterion

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

The EPA's NPI sets out acceptable noise levels for various localities. The recommended noise amenity area is based upon the measured background noise levels at the sensitive receiver. Based on the measured background noise levels detailed in Table 4-, the Noise Policy for Industry suggests the adoption of the 'suburban' categorisation.

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

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

The amenity levels appropriate for the receivers surrounding the site are presented in Table 6-1.

Table 6-1 – EPA Amenity Noise Levels

Type of Receiver	Time of day	Recommended Noise Level dB(A) $L_{eq}(\text{period})$	Project Amenity Noise Level dB(A) $L_{eq}(15 \text{ minute})$
Residential – Suburban	Day (7am – 6pm)	55	53
	Evening (6pm – 10pm)	45	43
	Night (10pm – 7am)	40	38

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

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

6.2.3 Sleep Arousal Criteria

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

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

- $L_{eq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{Fmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater, a detailed maximum noise level even assessment should be undertaken.

Table 6-2 – Sleep Arousal Criteria for Residential Receivers

Receiver	Rating Background Noise Level (Night) dB(A)L₉₀	Emergence Level
Residences surrounding western boundary of site Night (10pm – 7am)	30 dB(A) L ₉₀	40 dB(A)L _{eq, 15min} ; 52 dB(A)L _{Fmax}
Residences surrounding north western boundary of site Night (10pm – 7am)	33 dB(A) L ₉₀	40 dB(A)L _{eq, 15min} ; 52 dB(A)L _{Fmax}
Residences surrounding north eastern boundary of site Night (10pm – 7am)	28 dB(A) L ₉₀	40 dB(A)L _{eq, 15min} ; 52 dB(A)L _{Fmax}
Residences surrounding southern boundary of site Night (10pm – 7am)	38 dB(A) L ₉₀	43 dB(A)L _{eq, 15min} ; 53 dB(A)L _{Fmax}

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.*

6.3 SUMMARISED NOISE EMISSION CRITERIA

Table 6-3 – EPA NPFI Noise Emission Criteria (for Mechanical Noise)

Receiver	Time Period	Assessment Background Noise Level dB(A) L_{90}	Project Amenity Criteria dB(A) L_{eq}	Intrusiveness Criteria $L_{eq}(15min)$	NPI Criteria for Sleep Disturbance
Residences surrounding western boundary of site	Day (7am – 6pm)	47	53	52	N/A
	Evening (6pm – 10pm)	38	43	43	N/A
	Night (10pm – 7am)	30	38	35	40 dB(A)$L_{eq, 15min}$; 52 dB(A)L_{Fmax}
Residences surrounding north western boundary of site	Day (7am – 6pm)	49	53	54	N/A
	Evening (6pm – 10pm)	40	43	45	N/A
	Night (10pm – 7am)	33	38	38	40 dB(A)$L_{eq, 15min}$; 52 dB(A)L_{Fmax}
Residences surrounding north eastern boundary of site	Day (7am – 6pm)	50	53	55	N/A
	Evening (6pm – 10pm)	39	43	44	N/A
	Night (10pm – 7am)	28	38	33	40 dB(A)$L_{eq, 15min}$; 52 dB(A)L_{Fmax}
Residences surrounding southern boundary of site	Day (7am – 6pm)	46	53	51	N/A
	Evening (6pm – 10pm)	40	43	45	N/A
	Night (10pm – 7am)	38	38	43	43 dB(A)$L_{eq, 15min}$; 53 dB(A)L_{Fmax}

Table 5-4 – EPA NPI Project Noise Trigger Level (Non-Residential)

Receiver	Time of Day	Amenity Criteria dB(A) $L_{eq, 15min}$
Commercial	When in use	63
Industrial	When in use	68

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

7 NOISE EMISSION ASSESSMENT

7.1 NOISE FROM MECHANICAL PLANT WITHIN PROPOSED SITE GENERALLY

Detailed plant selection and location has not been undertaken at this stage. Satisfactory levels will be achievable through appropriate plant selection, location and if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of Section 6.

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

8 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed Patyegarang Project development to be located at Morgan Road, Belrose.

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

- Warringah Development Control Plan (DCP) 2011;
- Australian Standard AS/NZS 3671:1989 'Acoustics—Road traffic noise intrusion—Building siting and Construction'; and
- Australian Standard AS2107:2016 – '*Recommended Design Sound Levels and Reverberation Times for Building Interiors.*'

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

- Warringah Development Control Plan (DCP) 2011; and
- NSW Department of Environment and Heritage, Environmental Protection Authority document – '*Noise Policy for Industry*' (NPI) 2017.

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

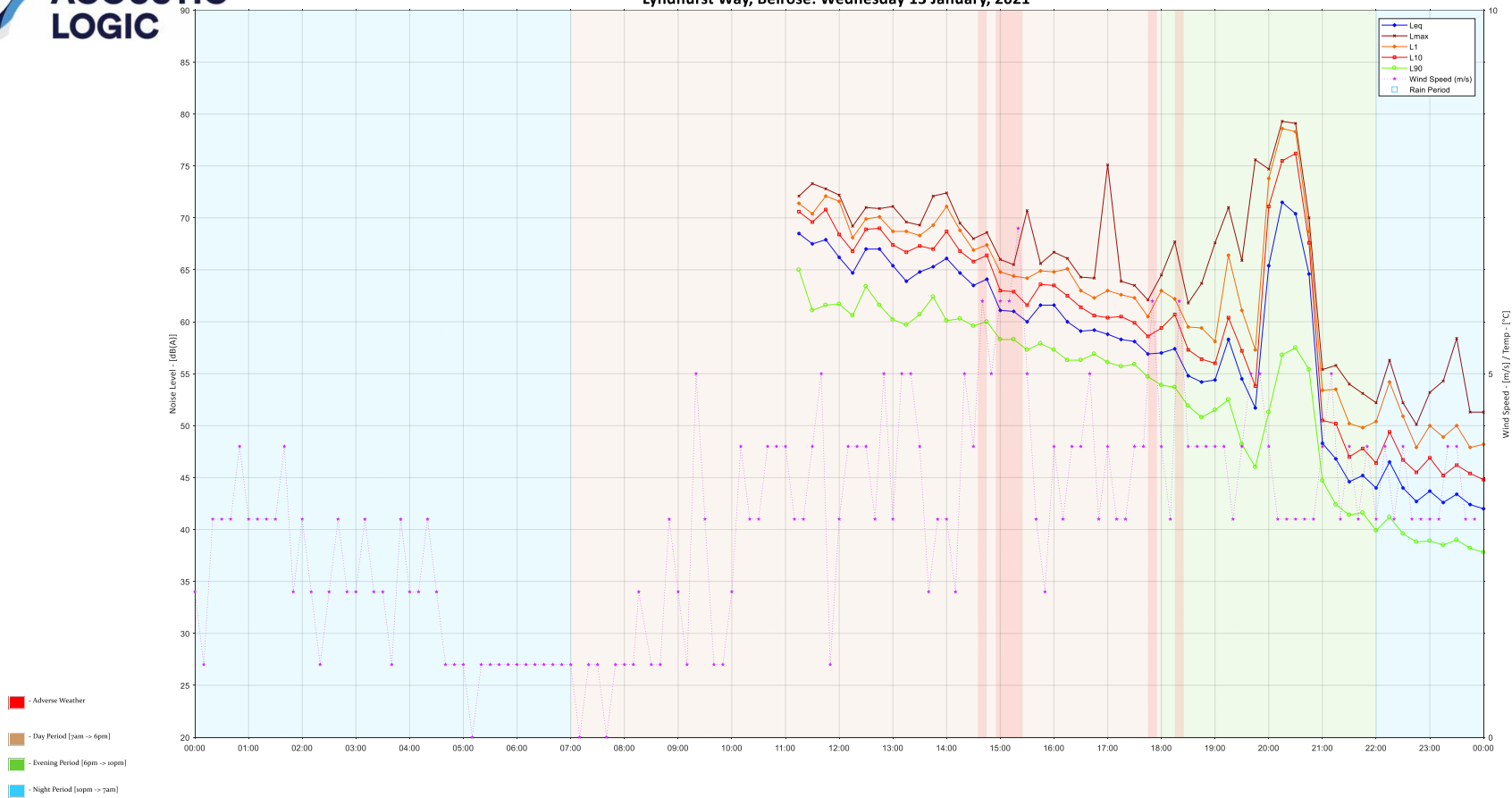
Yours faithfully,

A handwritten signature in black ink, appearing to be 'RF', followed by a long horizontal line extending to the right.

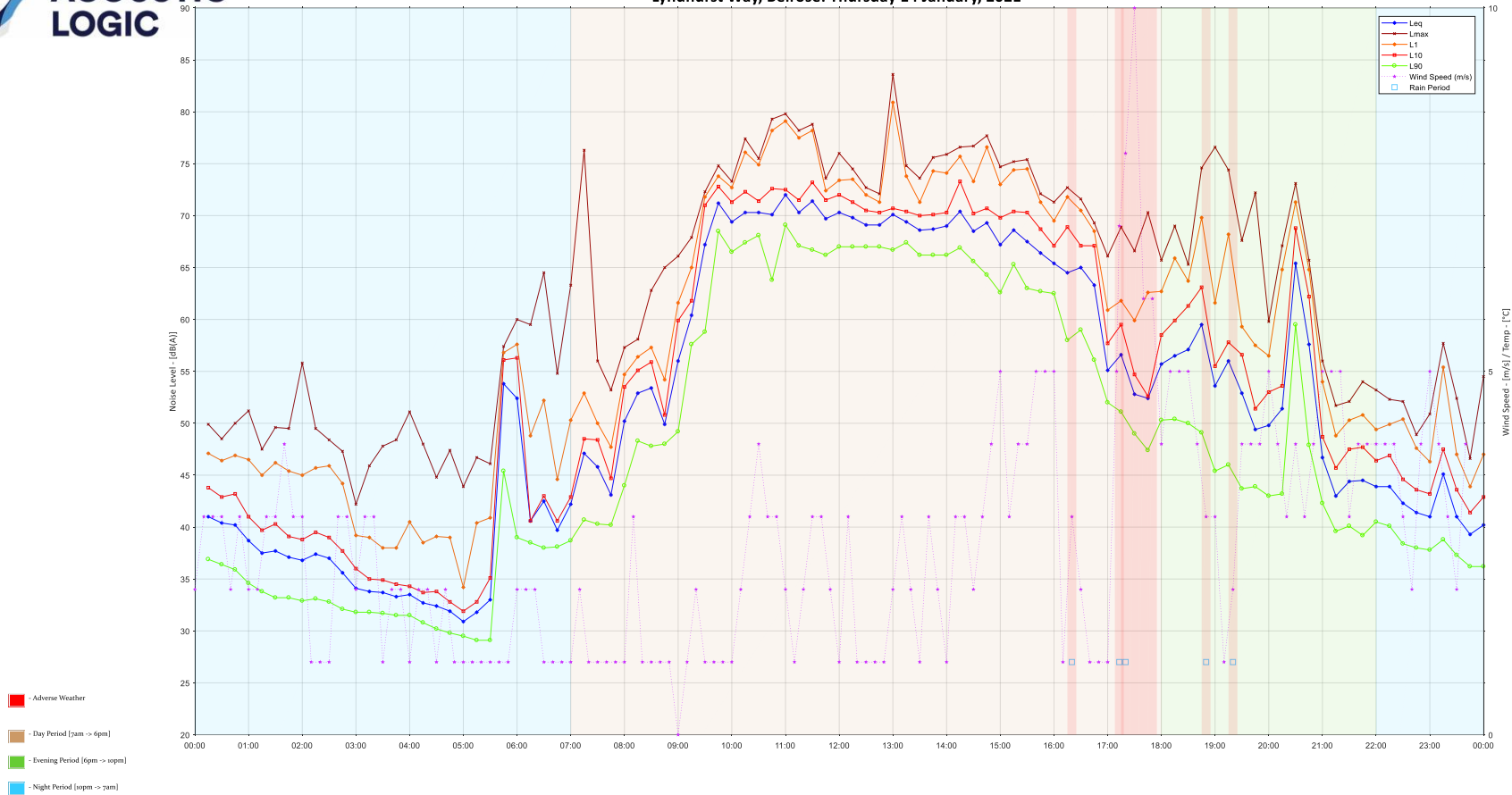
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Ross Ferraro

APPENDIX A – UNNATENDED NOISE MONITORING DATA – MONITOR 1

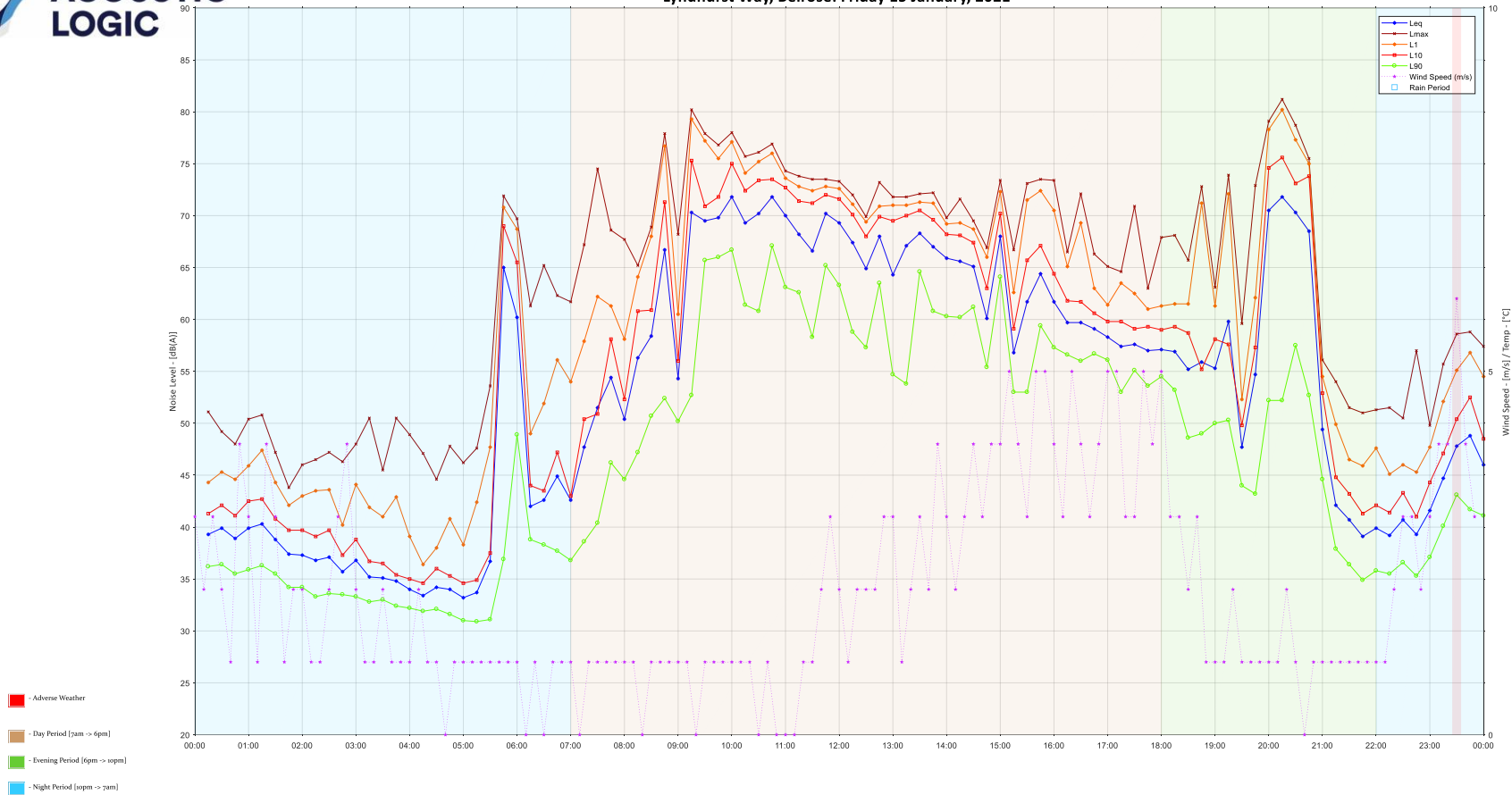
Lyndhurst Way, Belrose: Wednesday 13 January, 2021



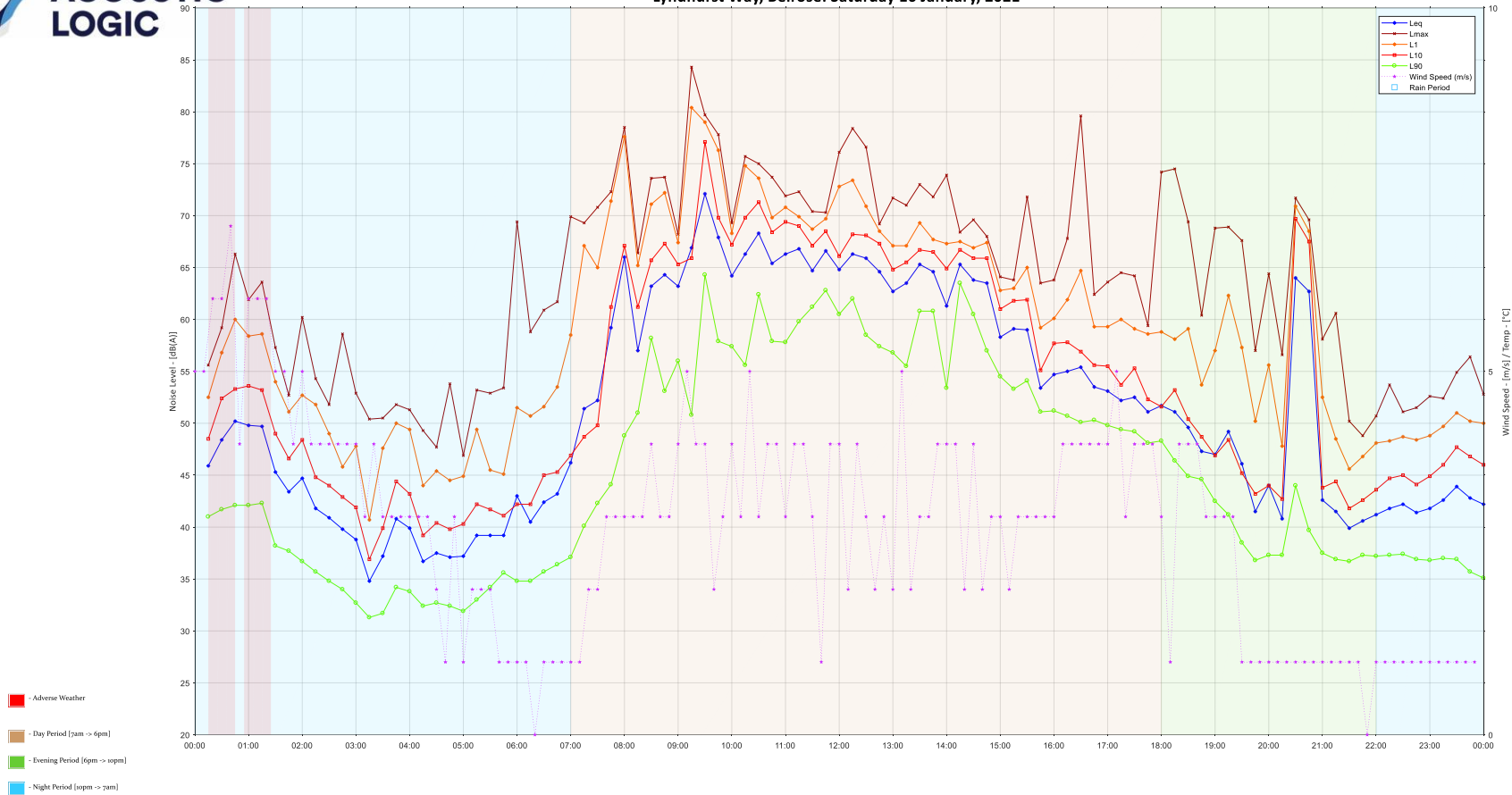
Lyndhurst Way, Belrose: Thursday 14 January, 2021



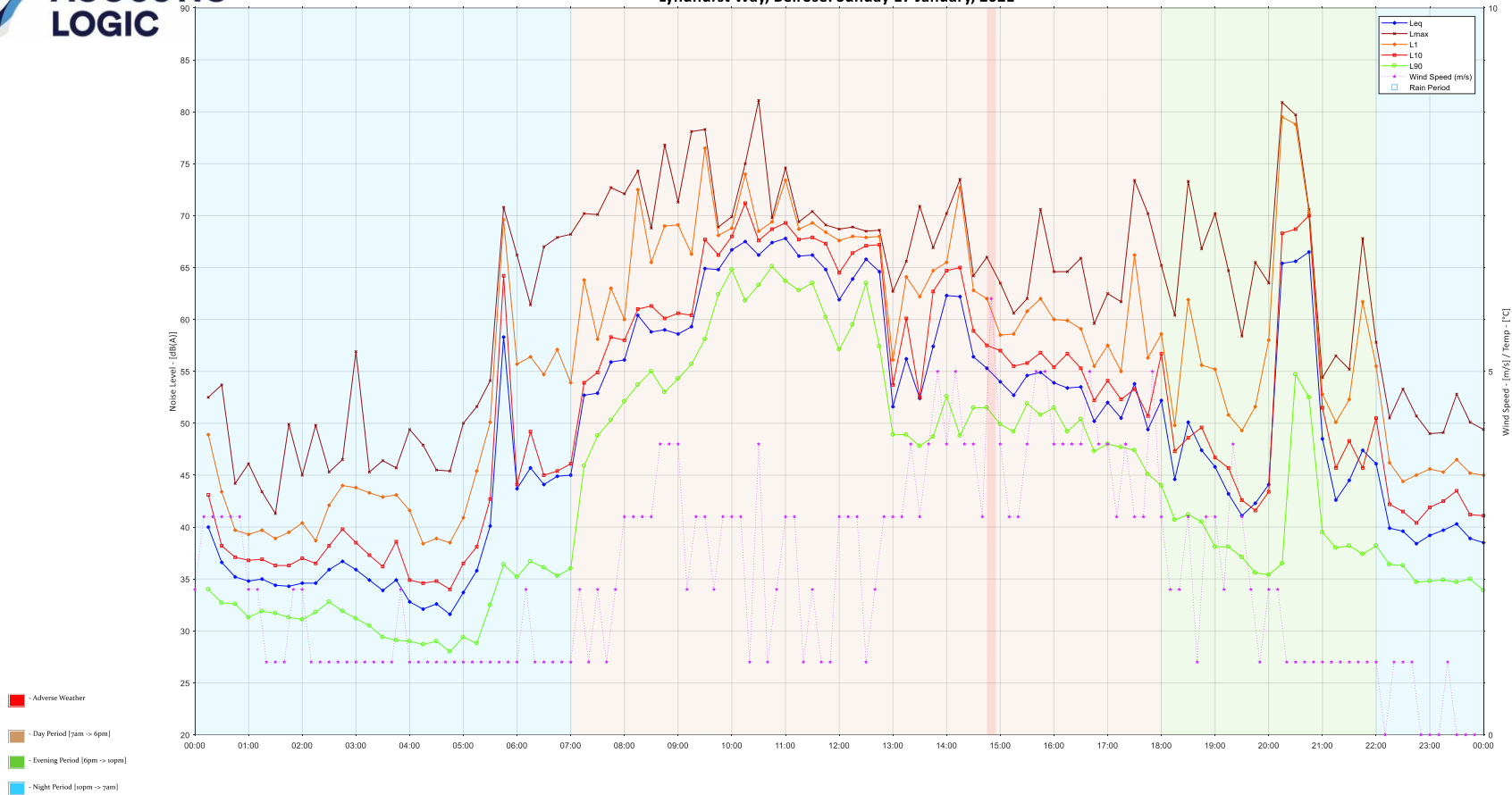
Lyndhurst Way, Belrose: Friday 15 January, 2021



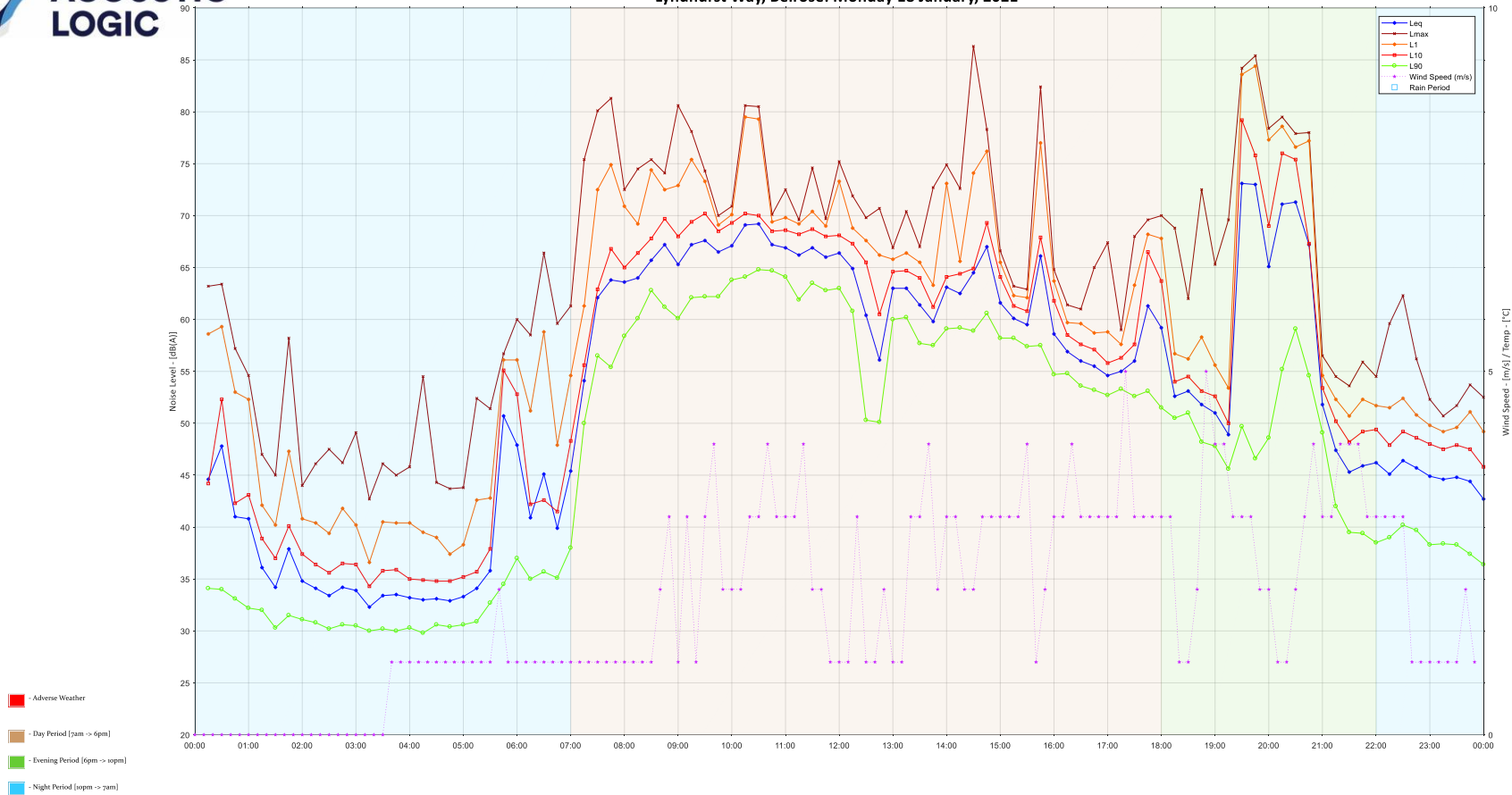
Lyndhurst Way, Belrose: Saturday 16 January, 2021



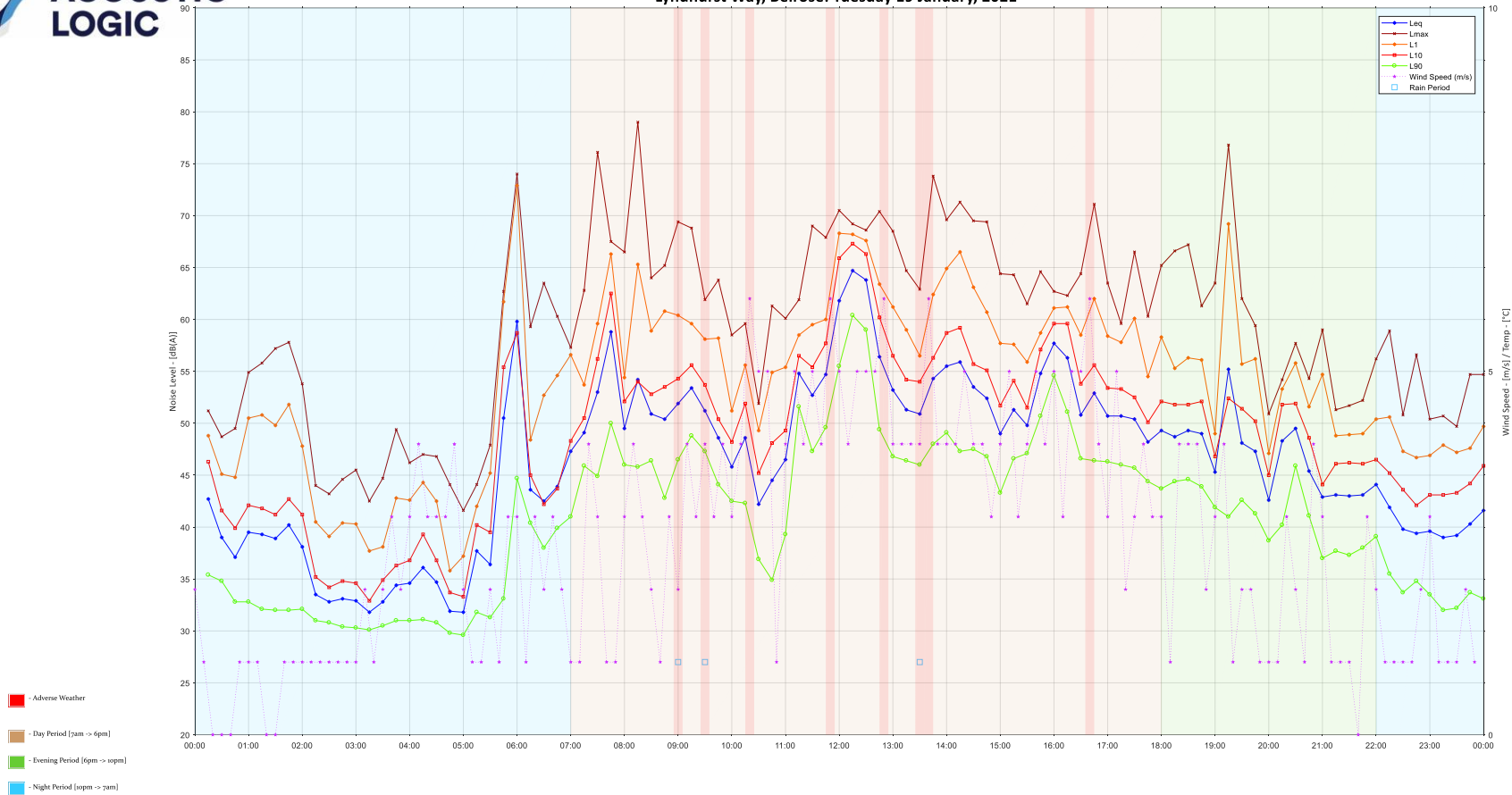
Lyndhurst Way, Belrose: Sunday 17 January, 2021



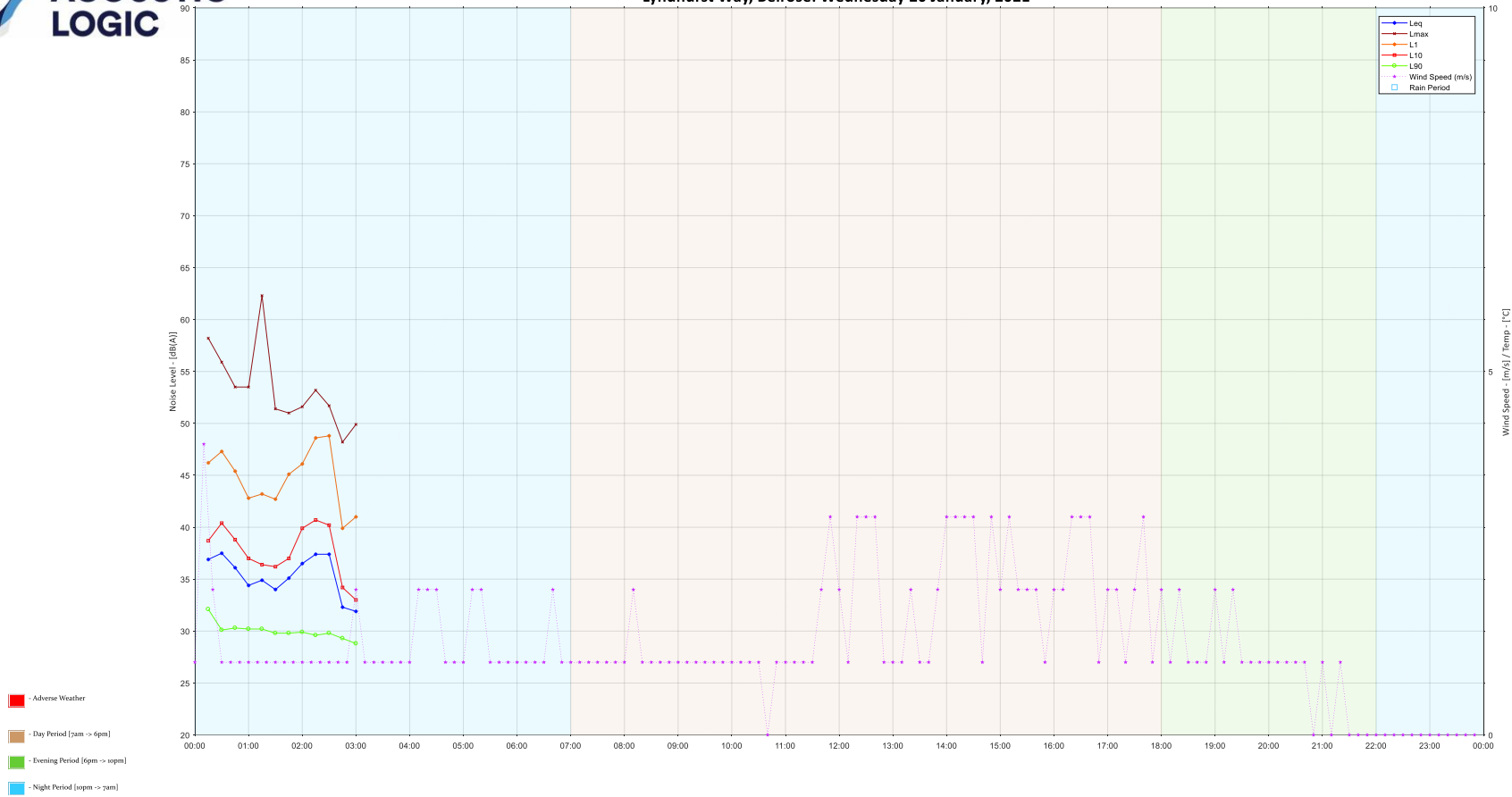
Lyndhurst Way, Belrose: Monday 18 January, 2021



Lyndhurst Way, Belrose: Tuesday 19 January, 2021



Lyndhurst Way, Belrose: Wednesday 20 January, 2021

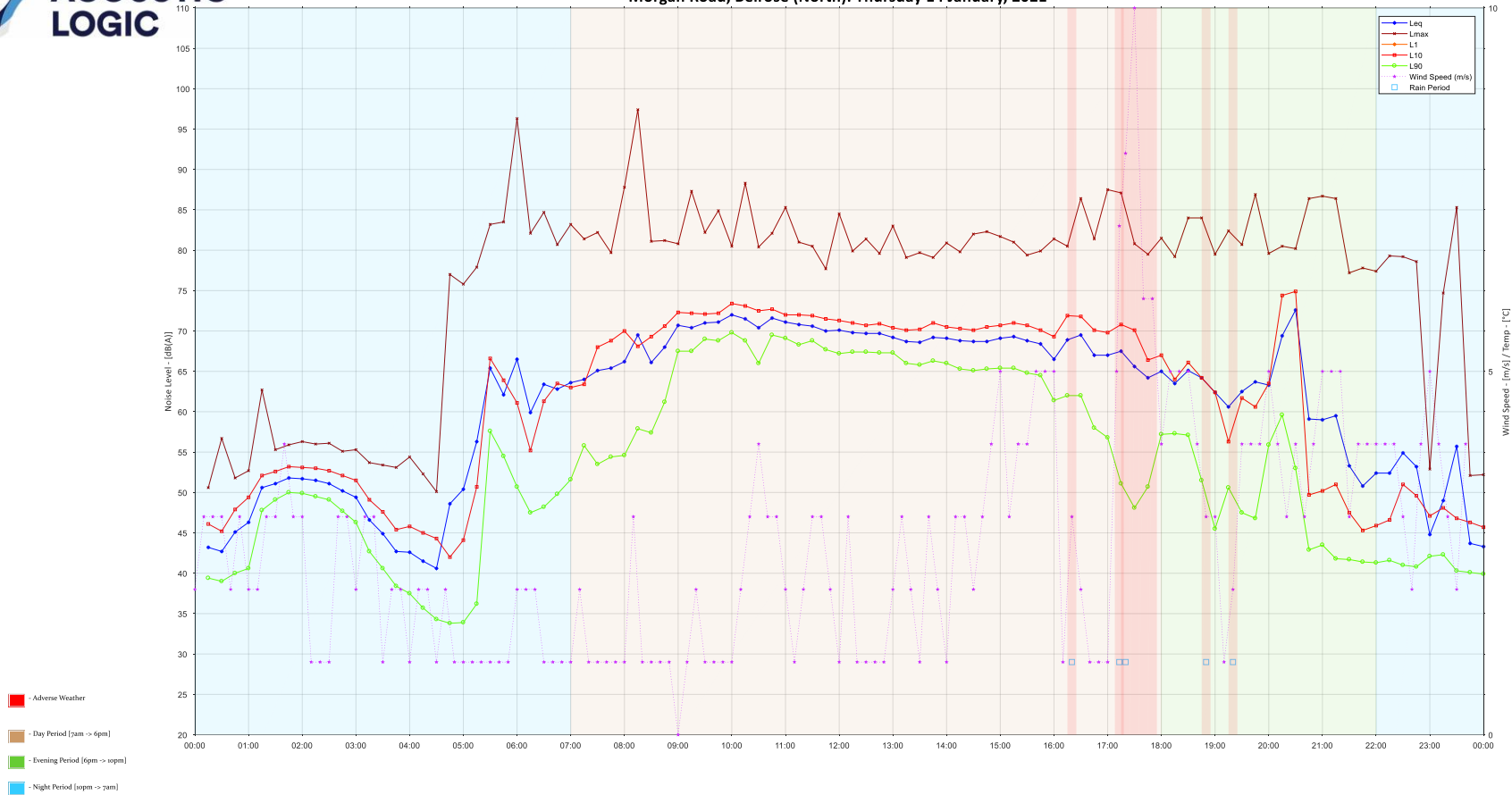


APPENDIX B – UNNATENDED NOISE MONITORING DATA – MONITOR 2

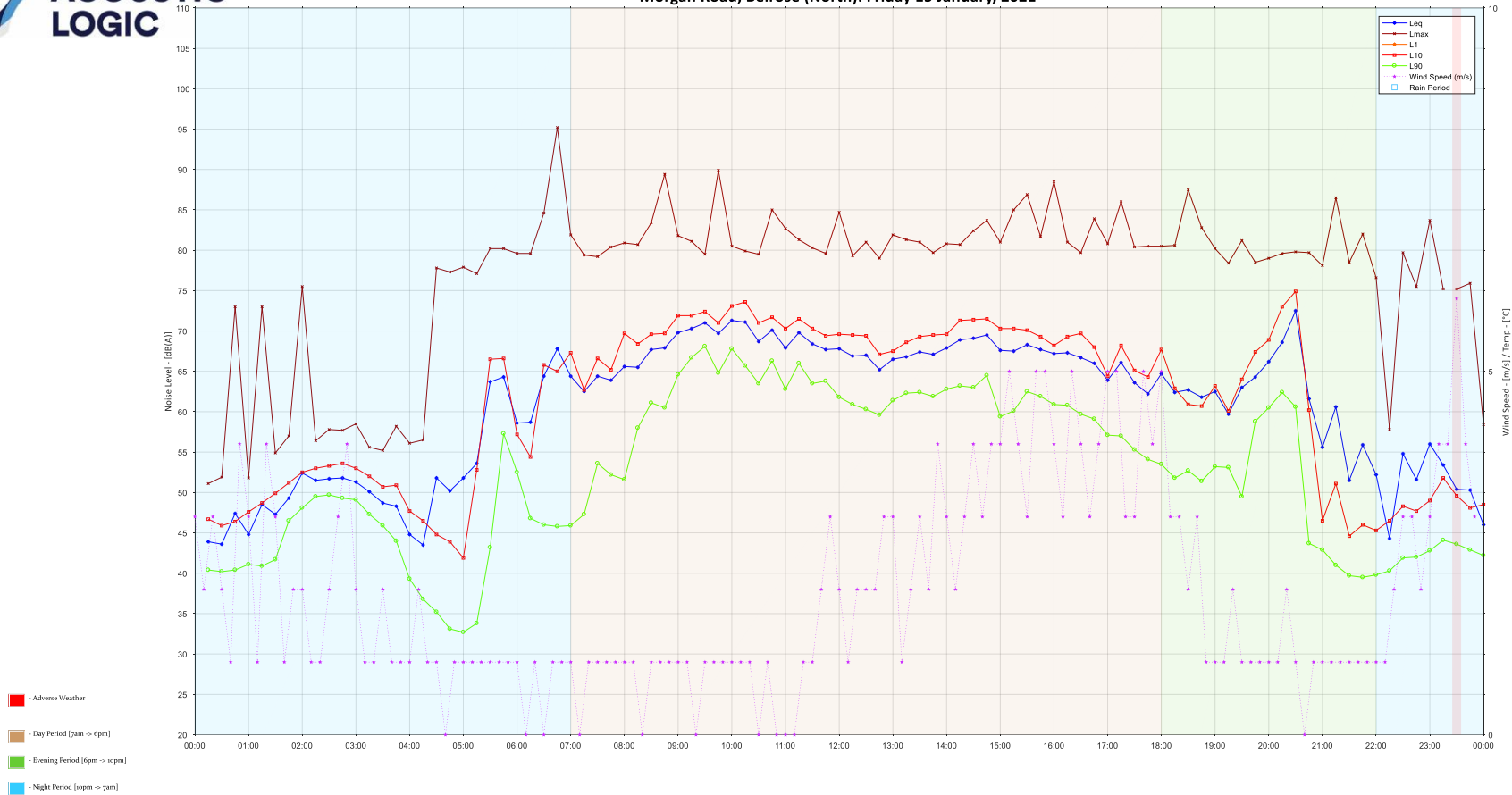
Morgan Road, Belrose (North): Wednesday 13 January, 2021



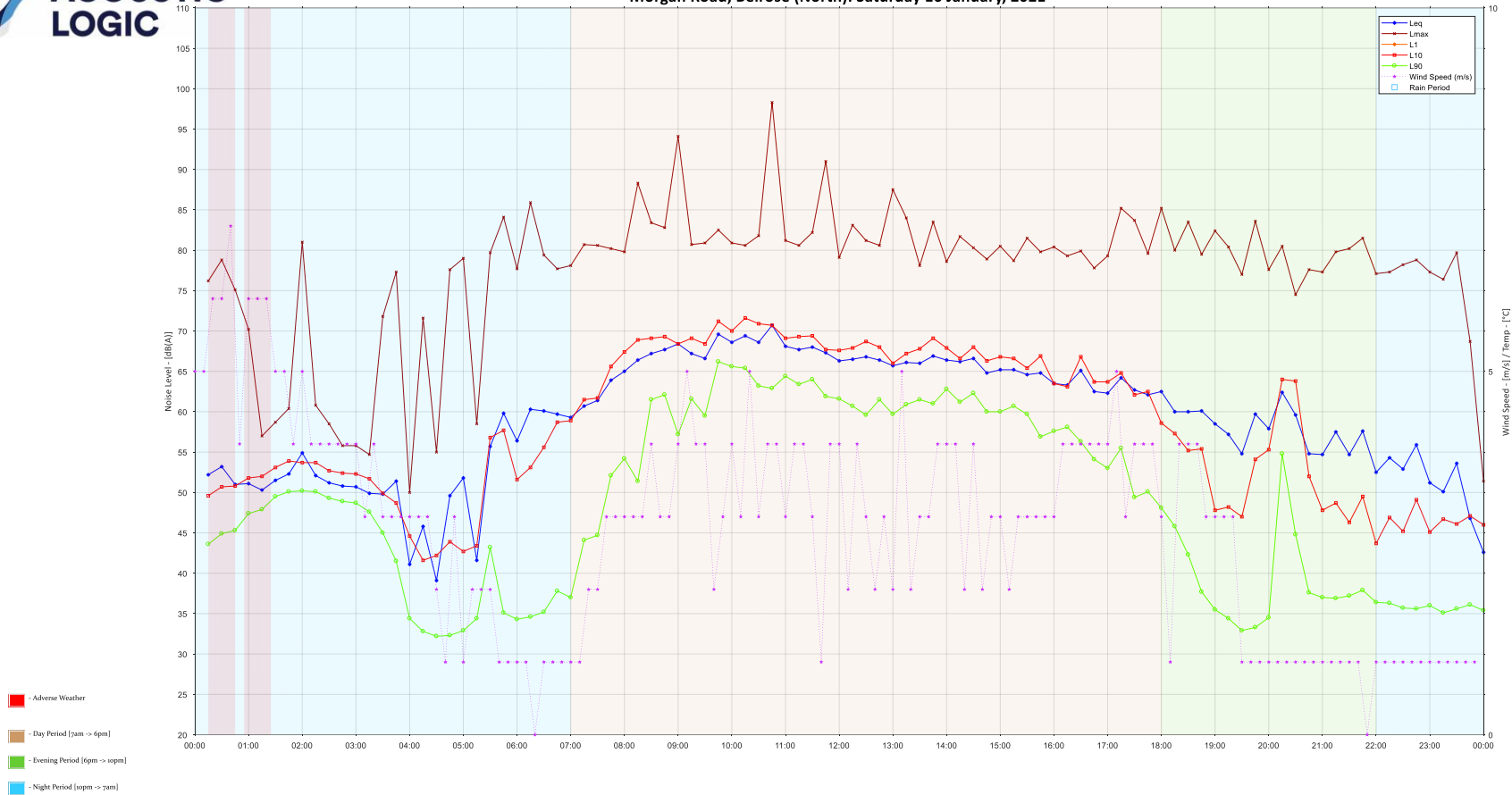
Morgan Road, Belrose (North): Thursday 14 January, 2021



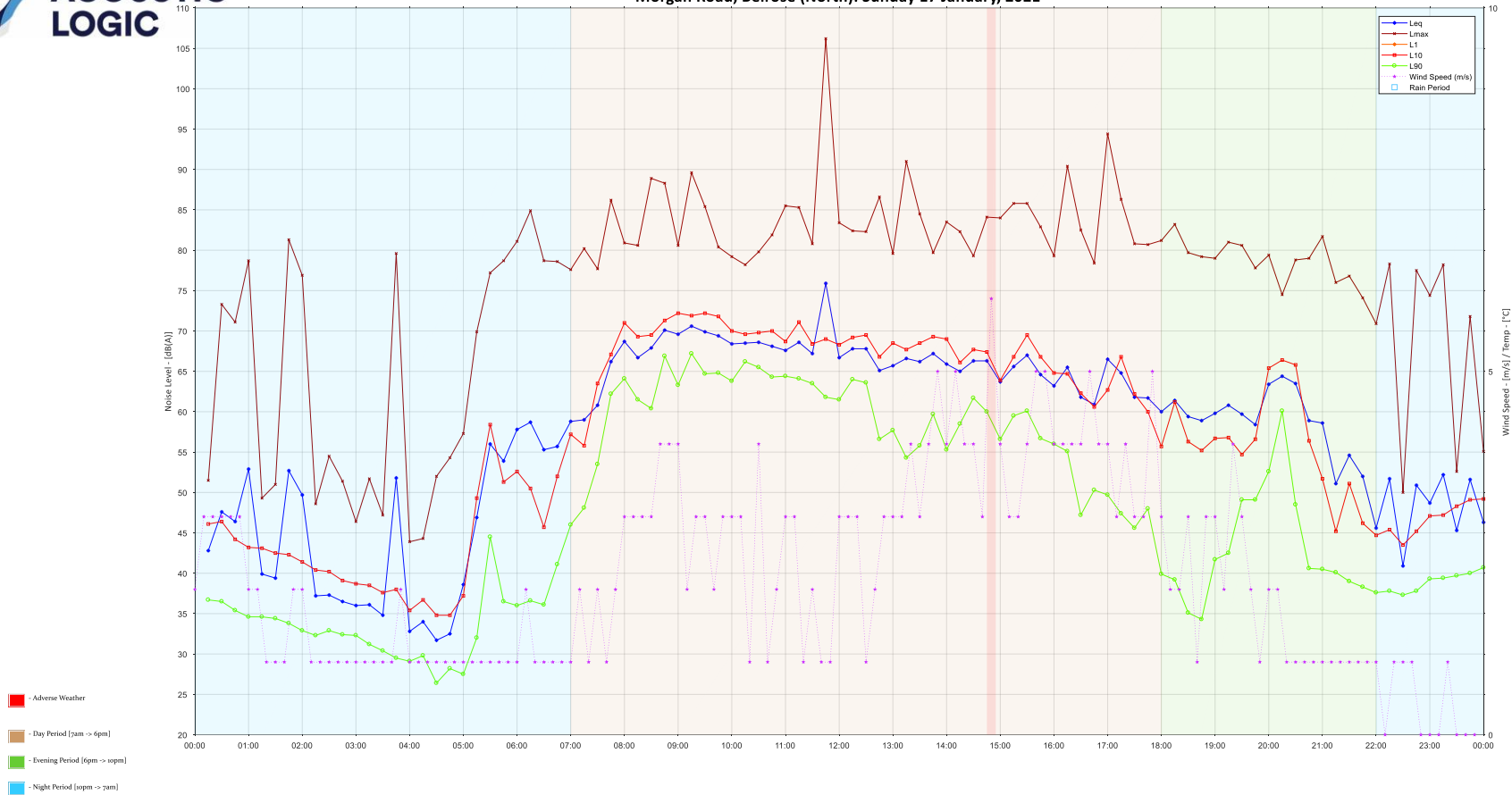
Morgan Road, Belrose (North): Friday 15 January, 2021



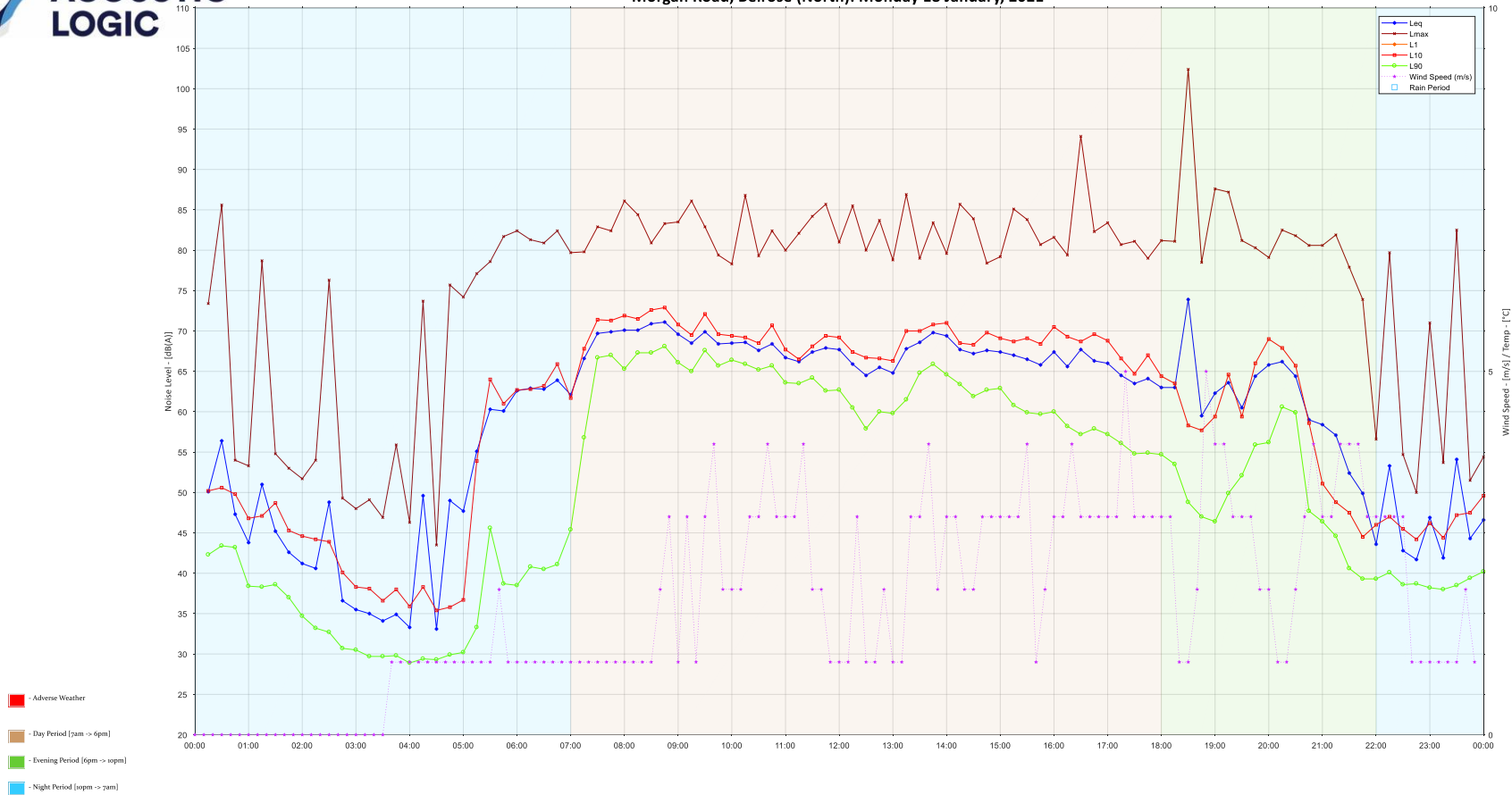
Morgan Road, Belrose (North): Saturday 16 January, 2021



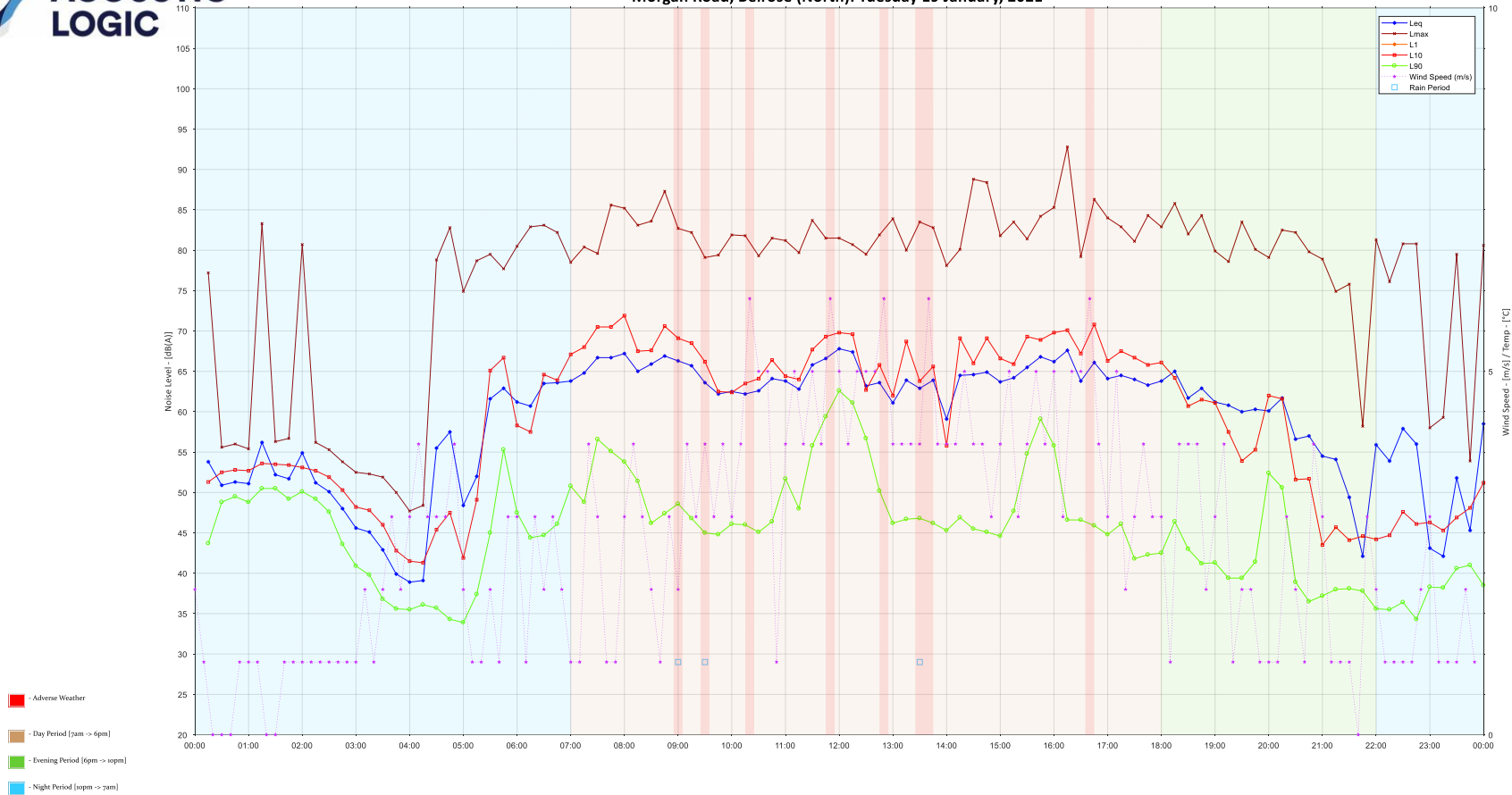
Morgan Road, Belrose (North): Sunday 17 January, 2021



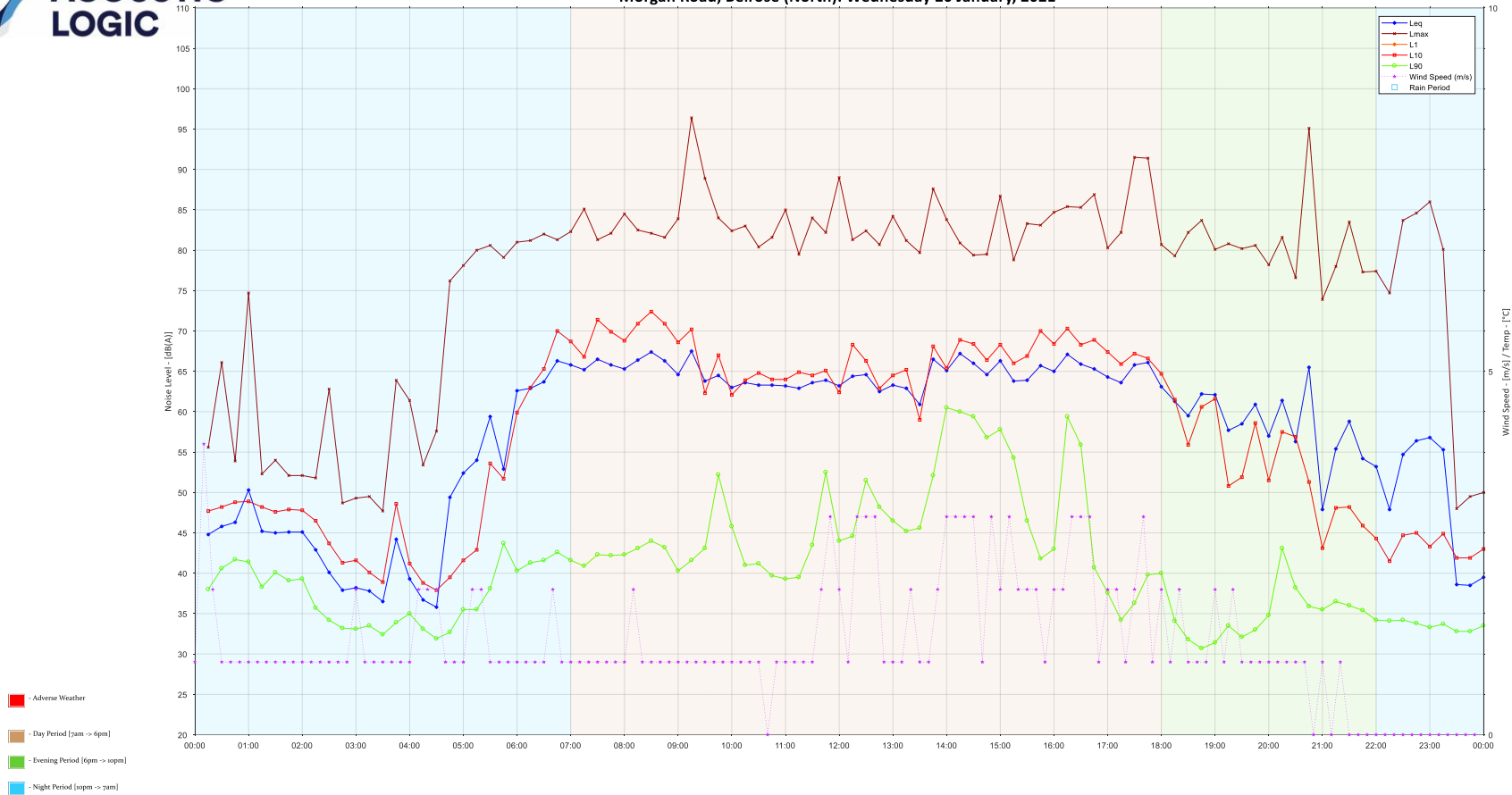
Morgan Road, Belrose (North): Monday 18 January, 2021



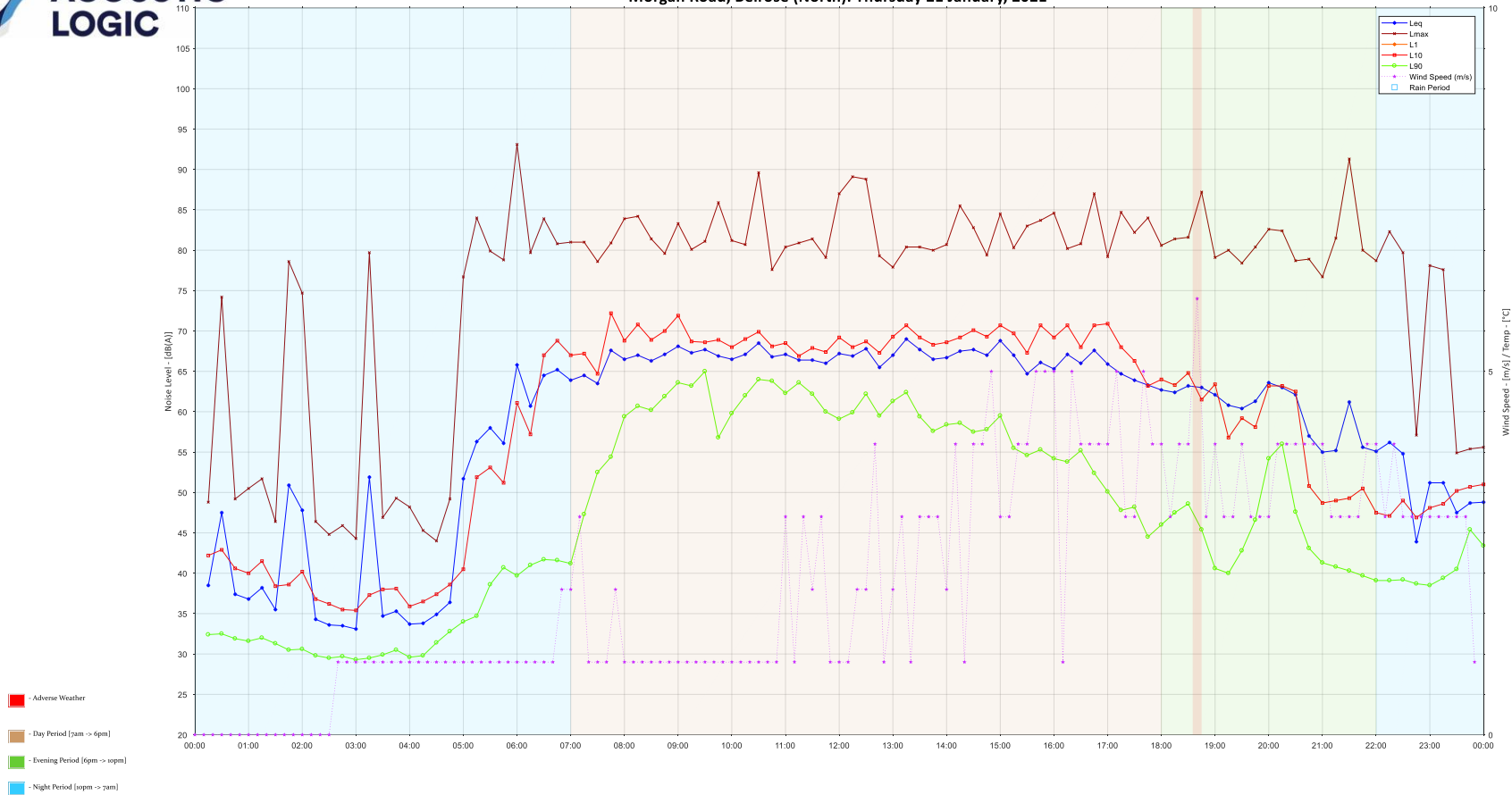
Morgan Road, Belrose (North): Tuesday 19 January, 2021



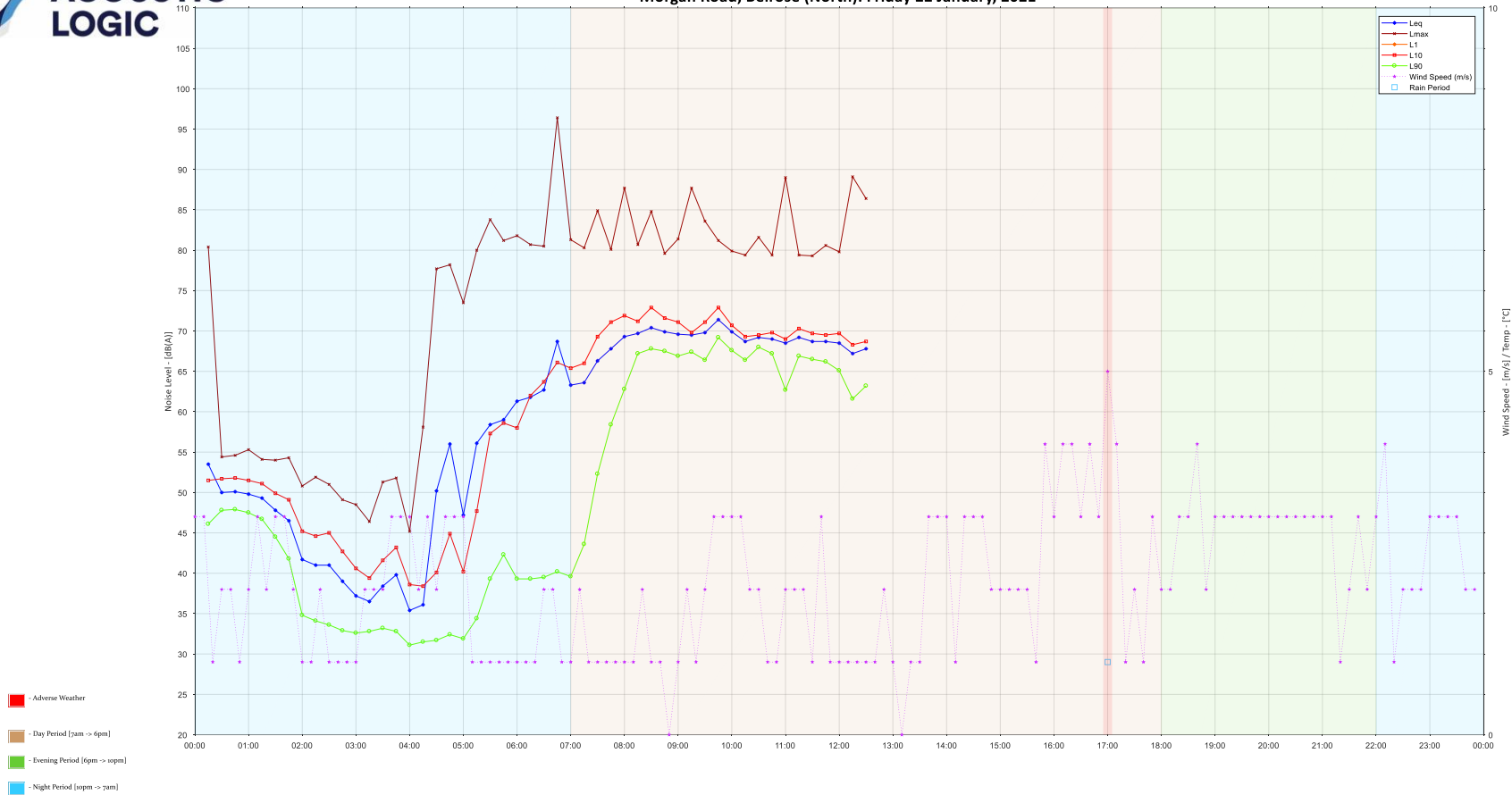
Morgan Road, Belrose (North): Wednesday 20 January, 2021



Morgan Road, Belrose (North): Thursday 21 January, 2021

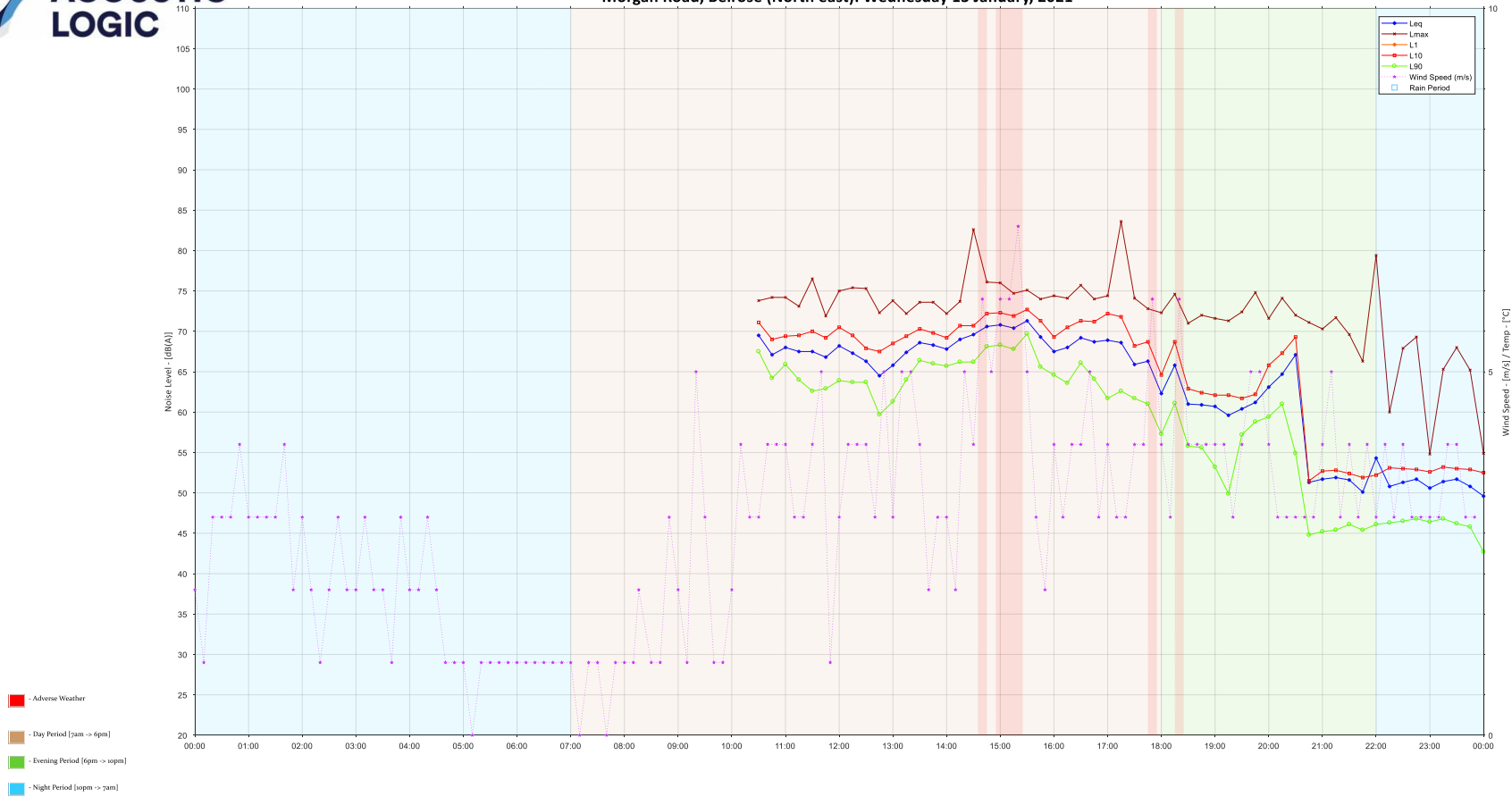


Morgan Road, Belrose (North): Friday 22 January, 2021

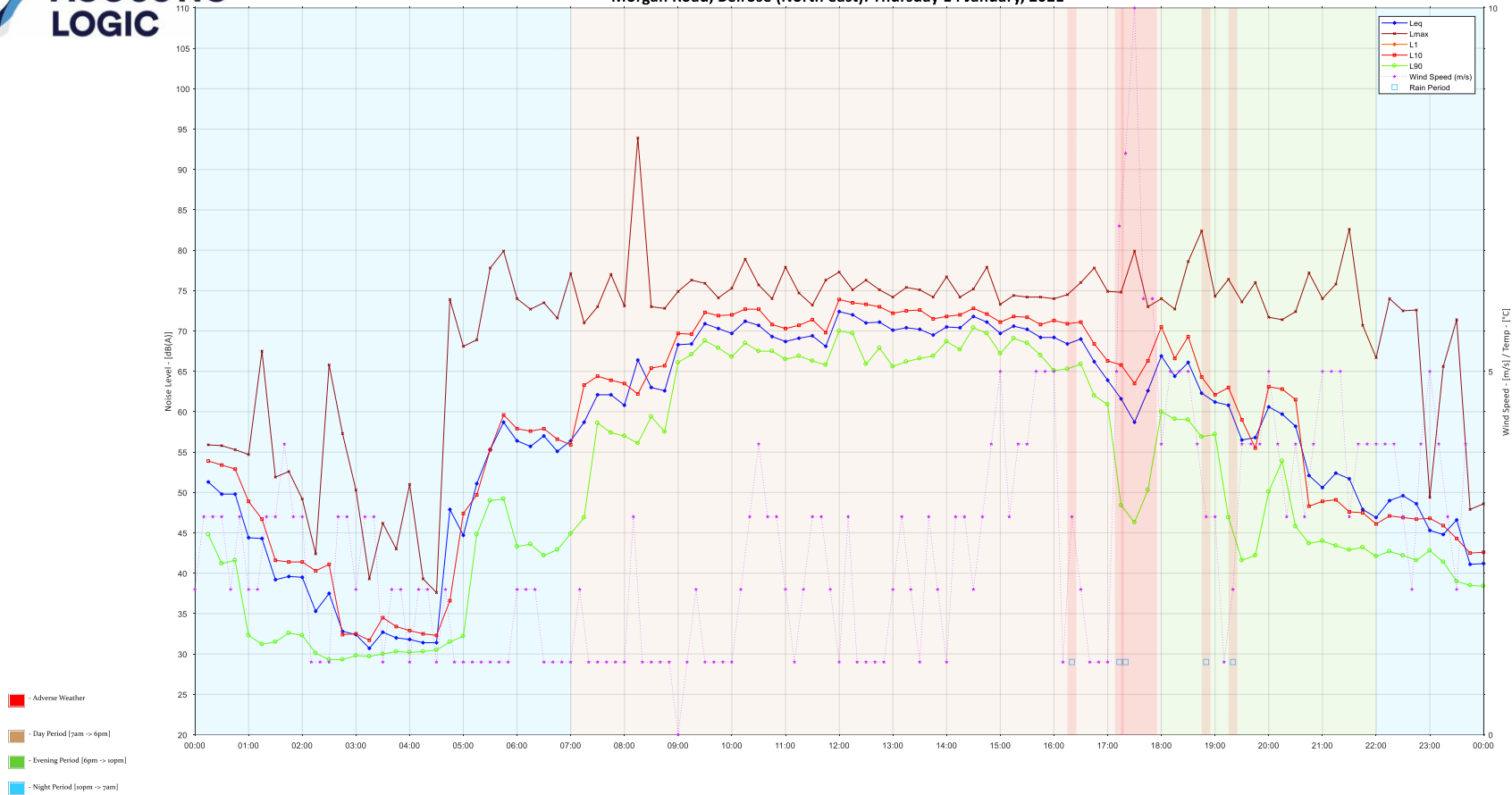


APPENDIX C – UNNATENDED NOISE MONITORING DATA – MONITOR 3

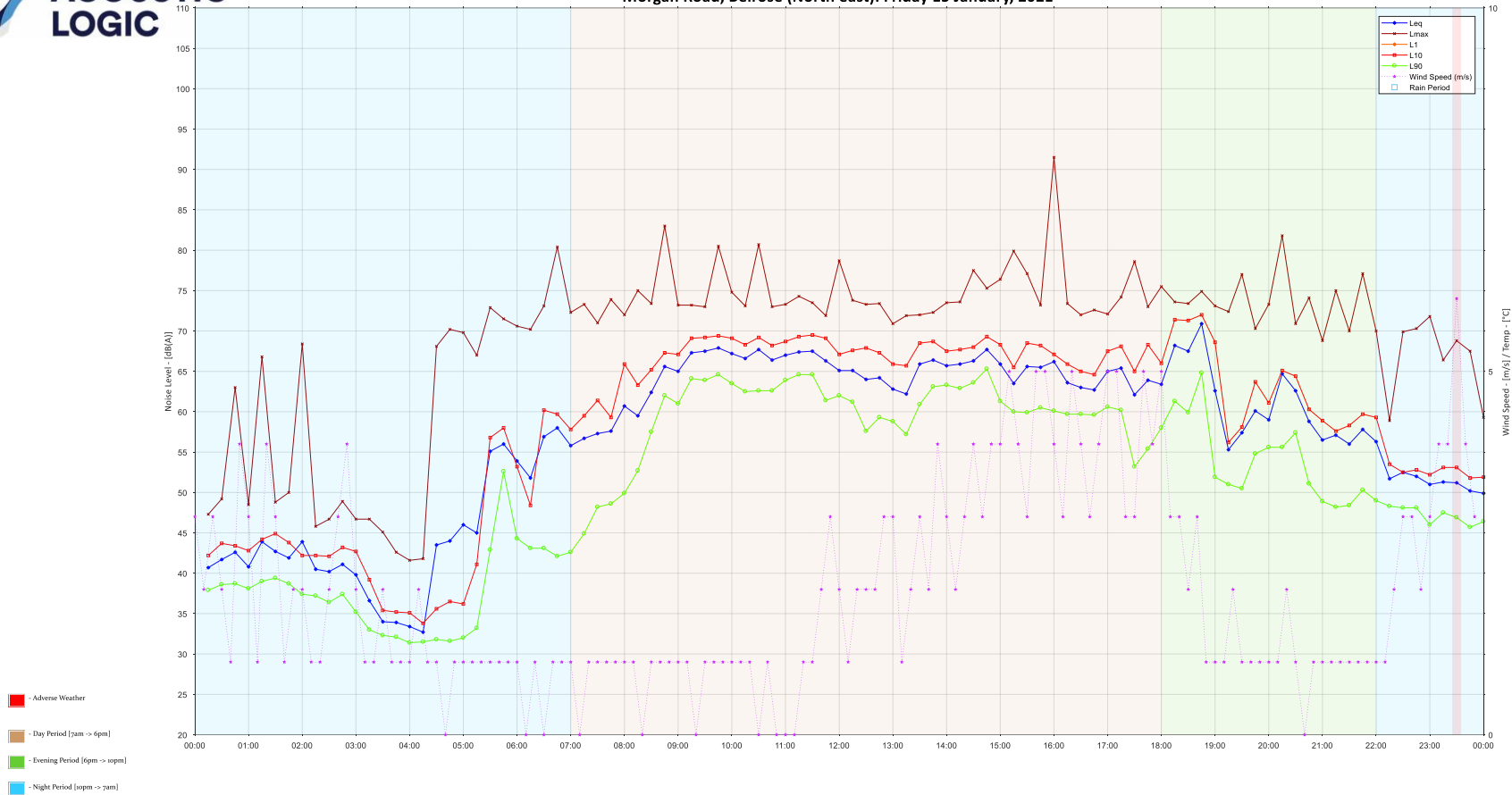
Morgan Road, Belrose (North east): Wednesday 13 January, 2021



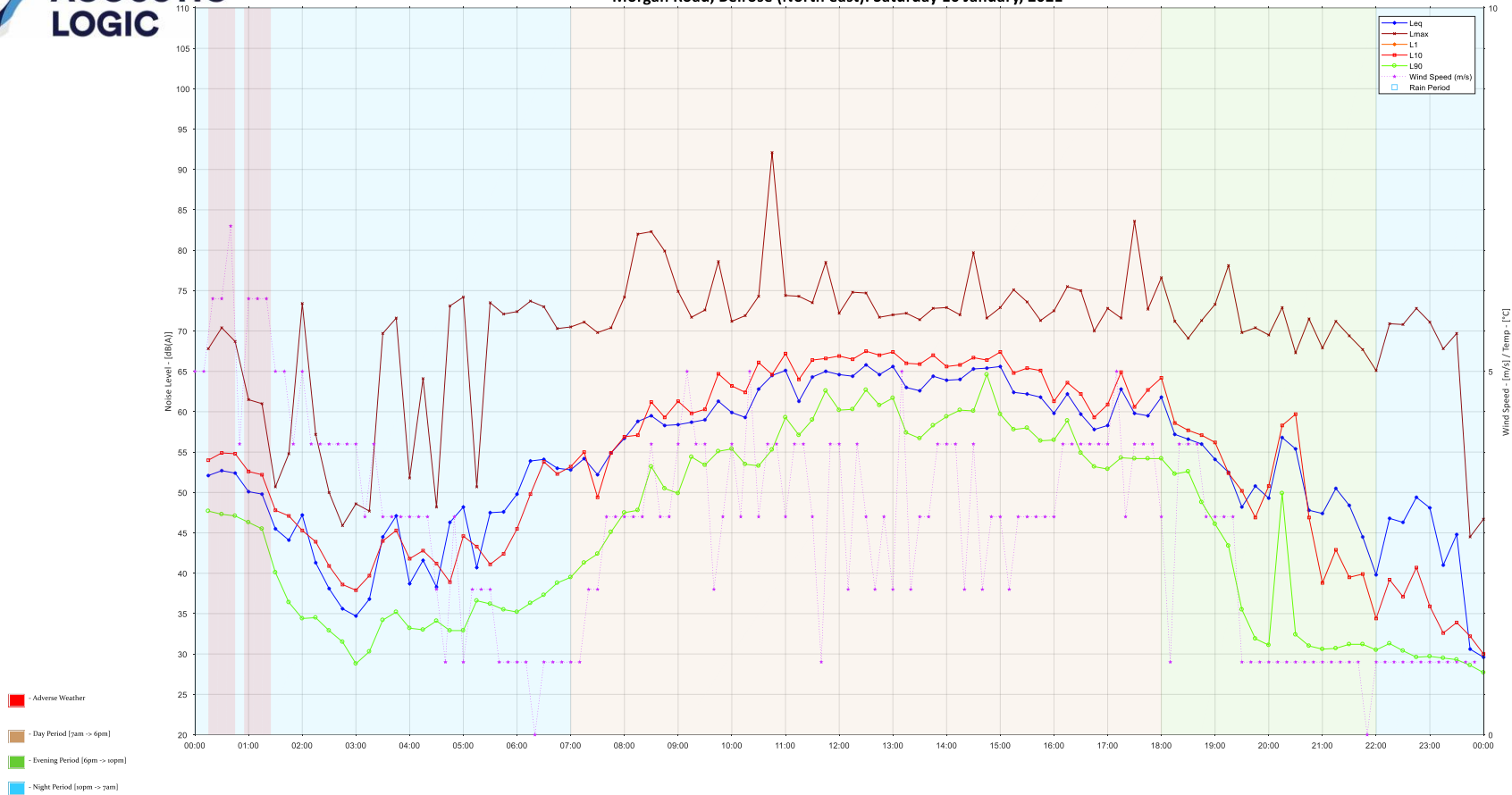
Morgan Road, Belrose (North east): Thursday 14 January, 2021



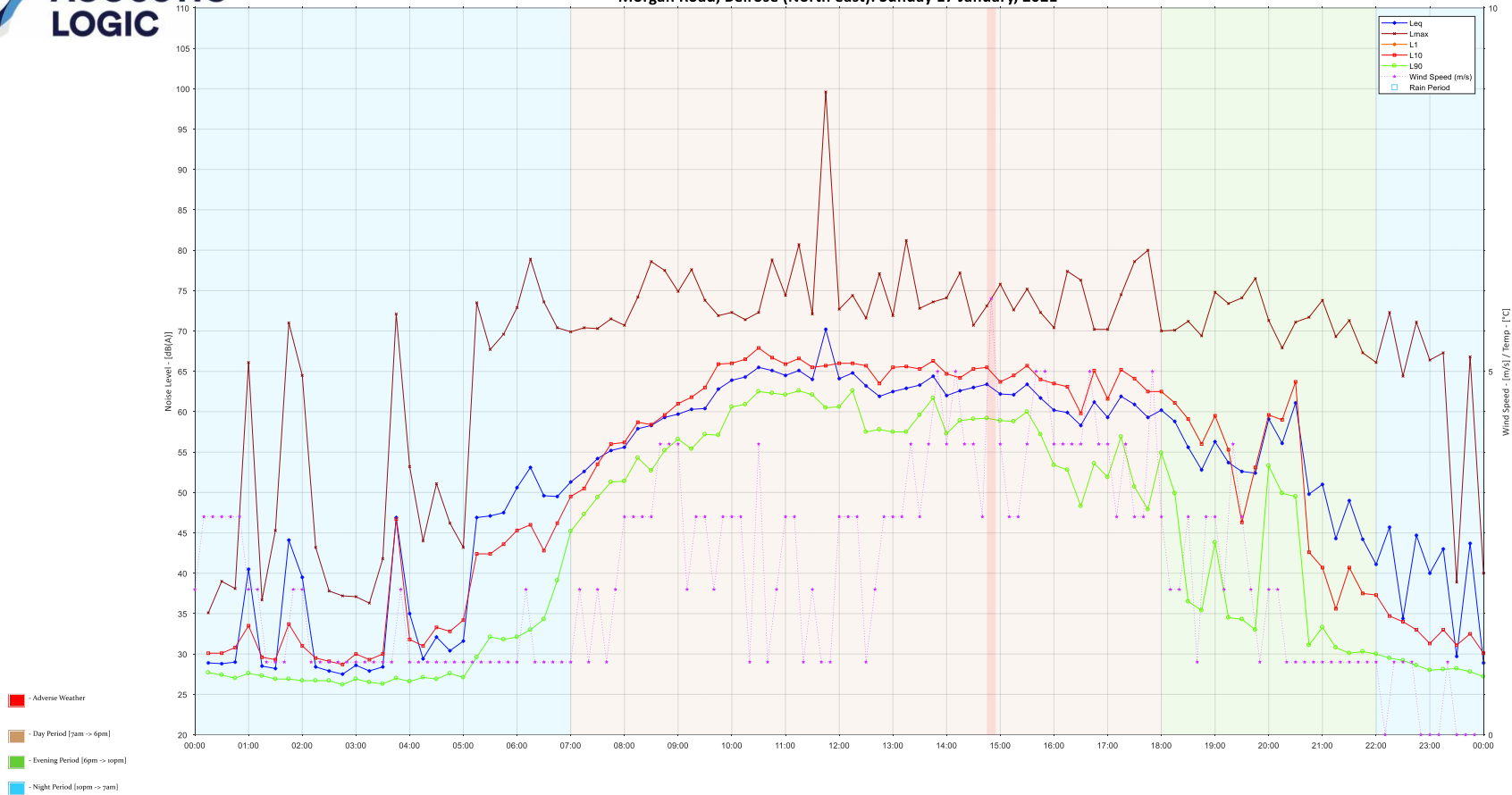
Morgan Road, Belrose (North east): Friday 15 January, 2021



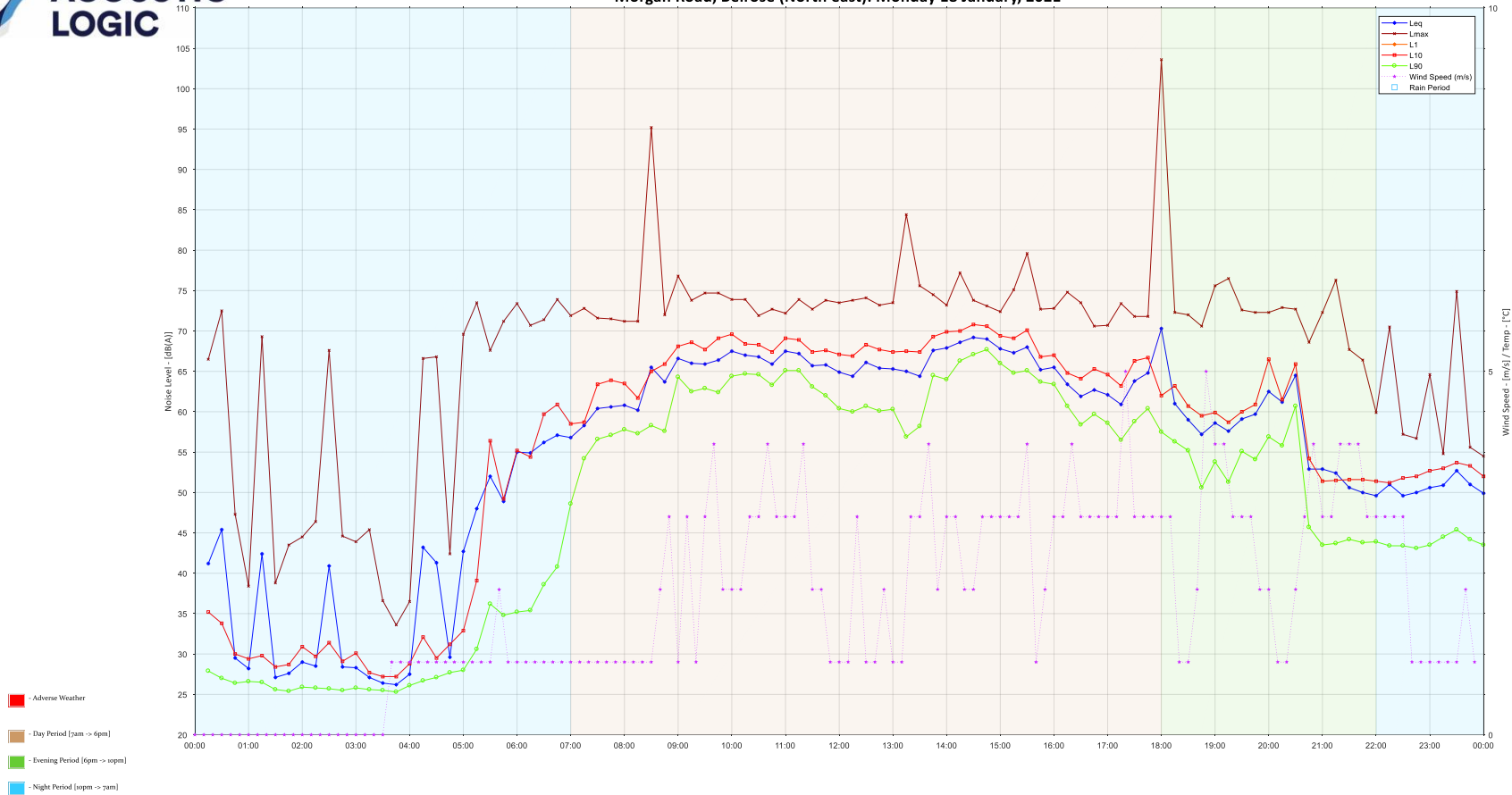
Morgan Road, Belrose (North east): Saturday 16 January, 2021



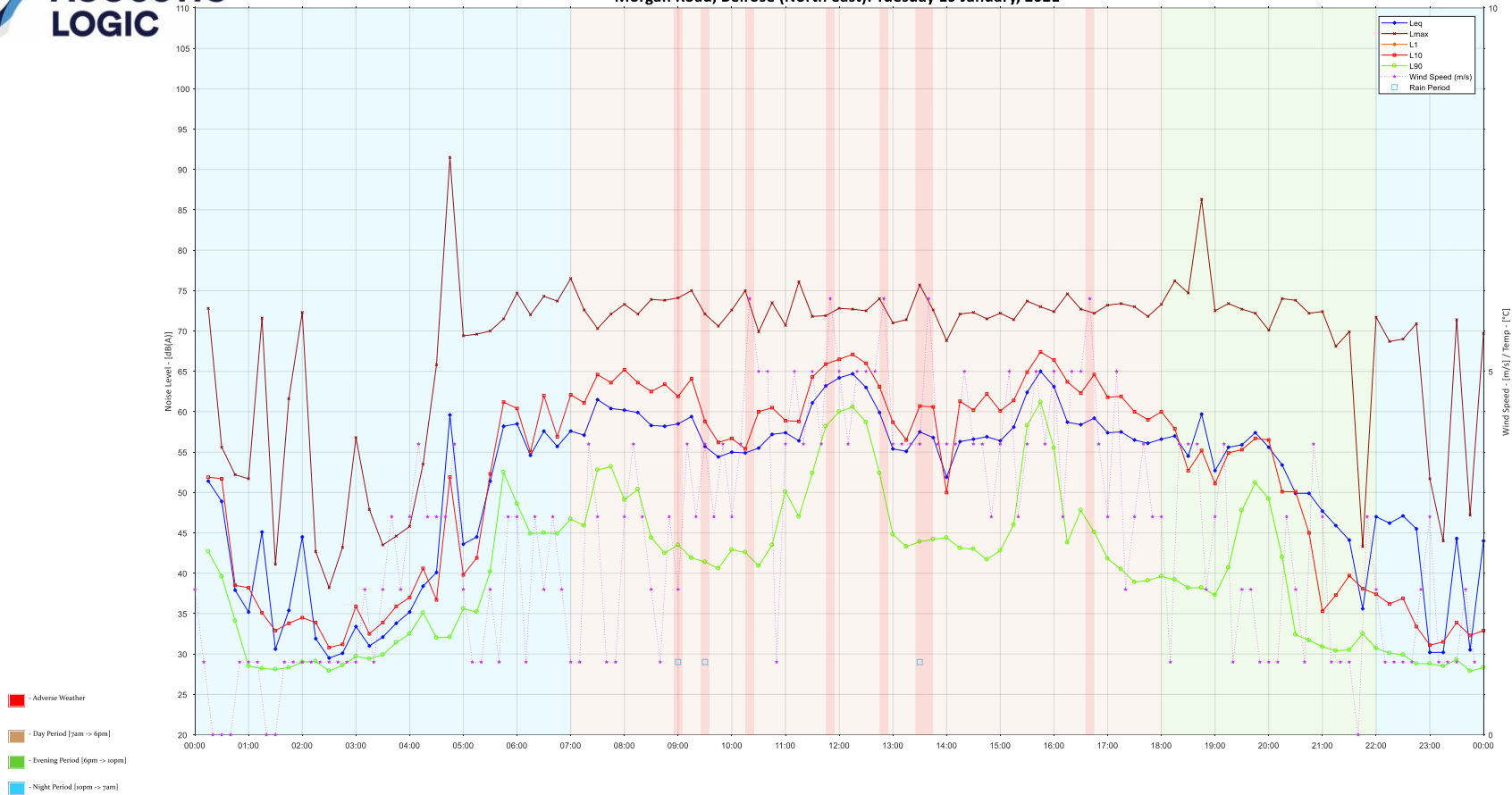
Morgan Road, Belrose (North east): Sunday 17 January, 2021



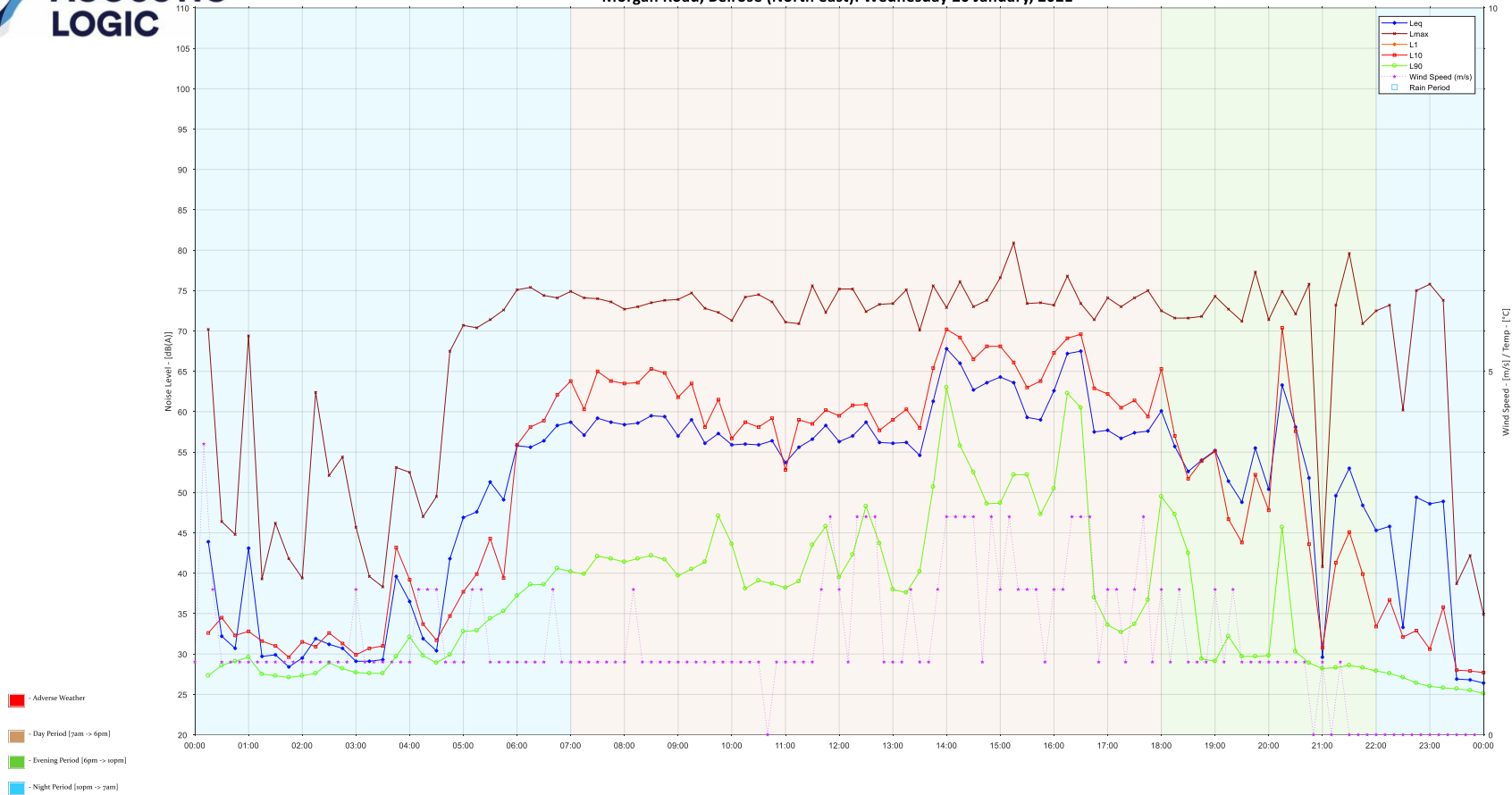
Morgan Road, Belrose (North east): Monday 18 January, 2021



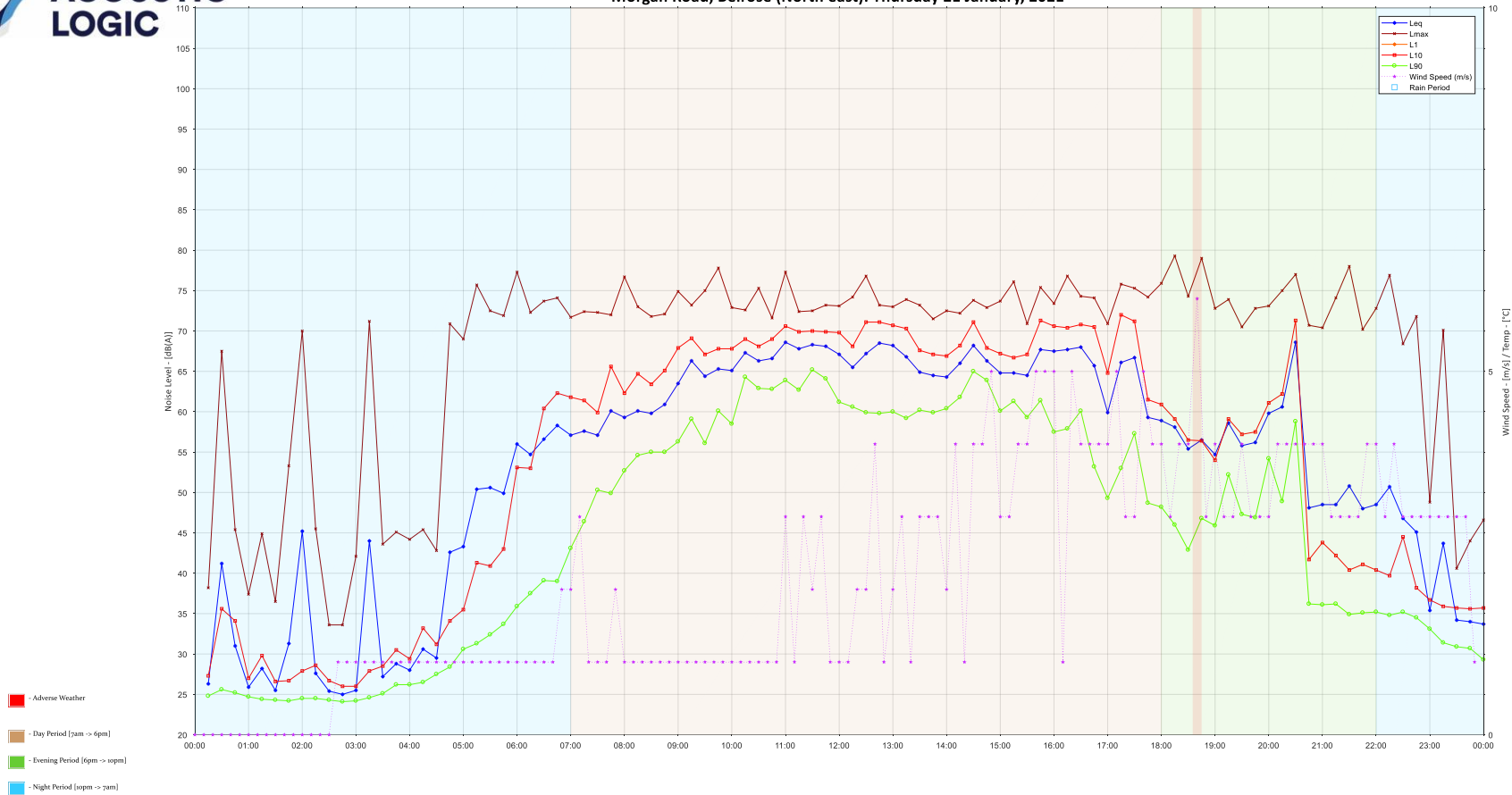
Morgan Road, Belrose (North east): Tuesday 19 January, 2021



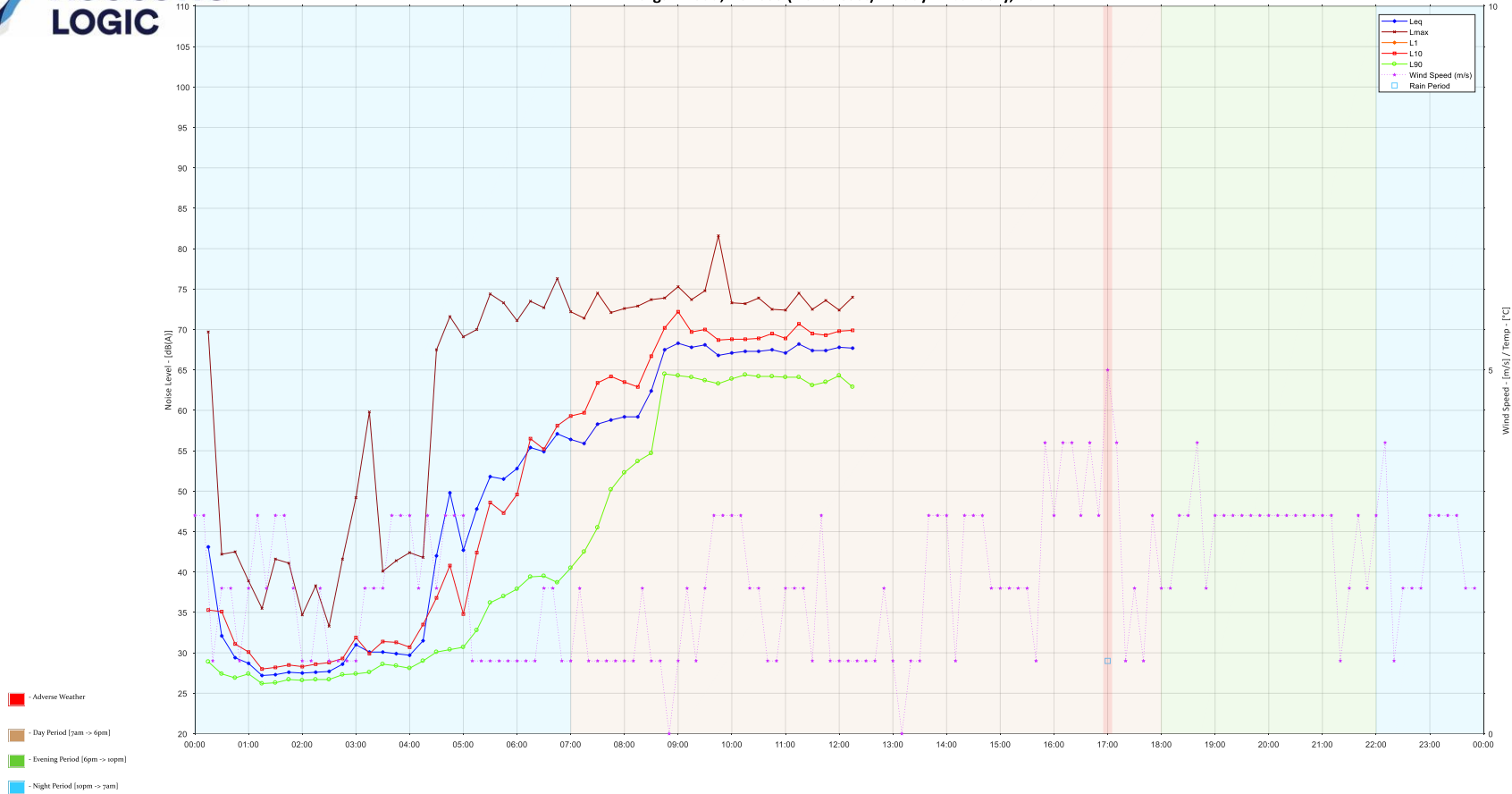
Morgan Road, Belrose (North east): Wednesday 20 January, 2021



Morgan Road, Belrose (North east): Thursday 21 January, 2021

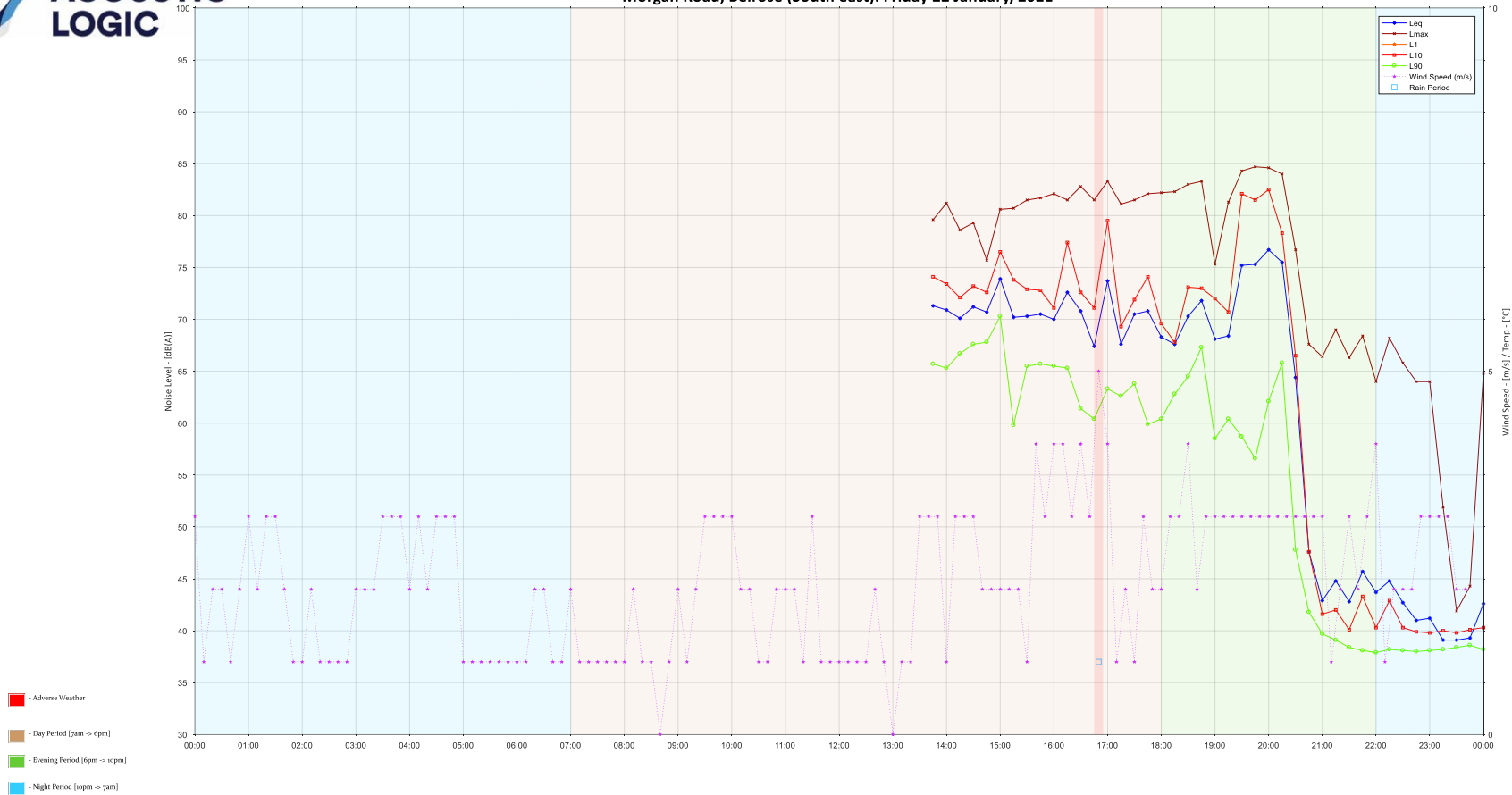


Morgan Road, Belrose (North east): Friday 22 January, 2021

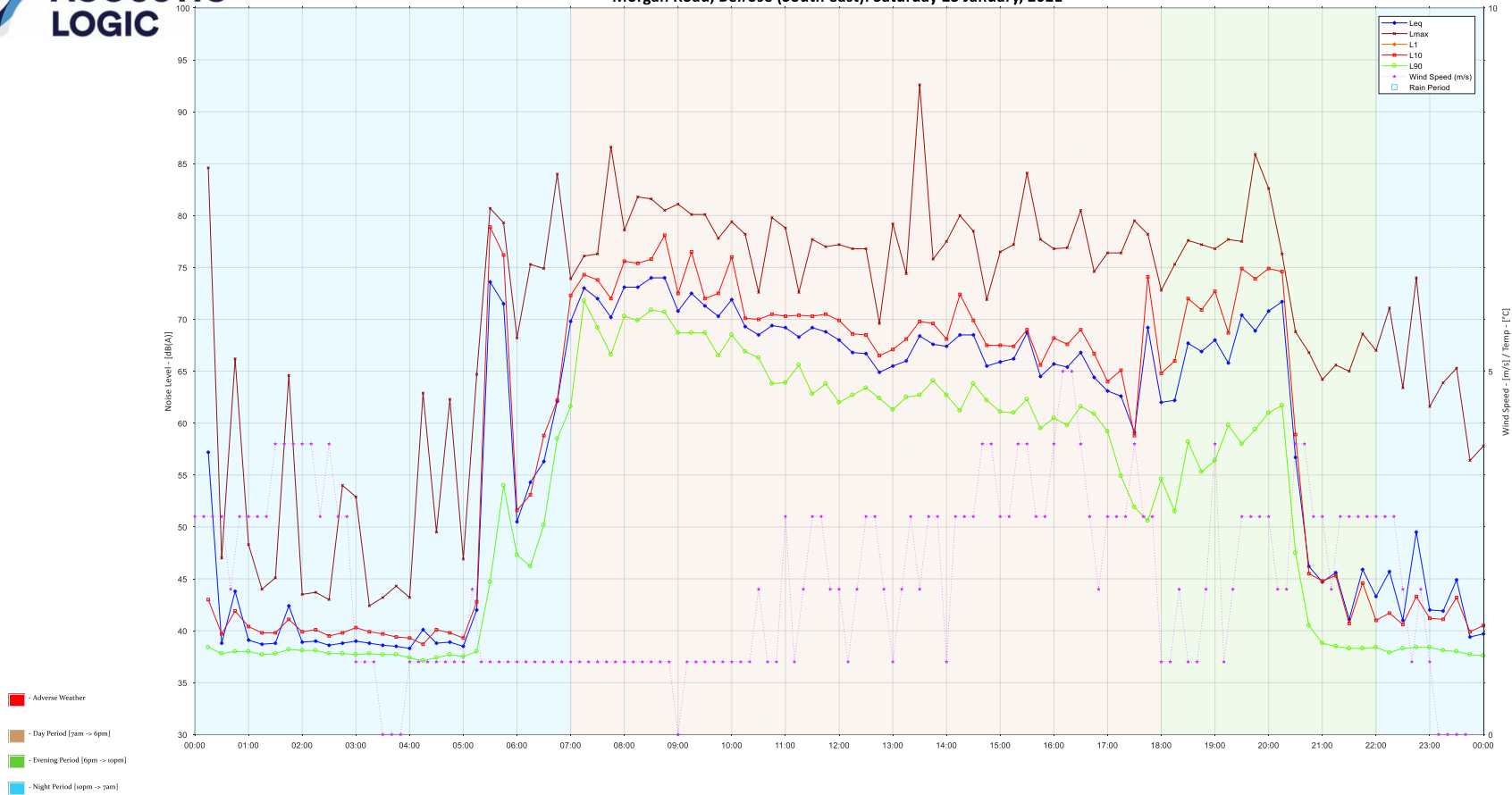


APPENDIX D – UNNATENDED NOISE MONITORING DATA – MONITOR 4

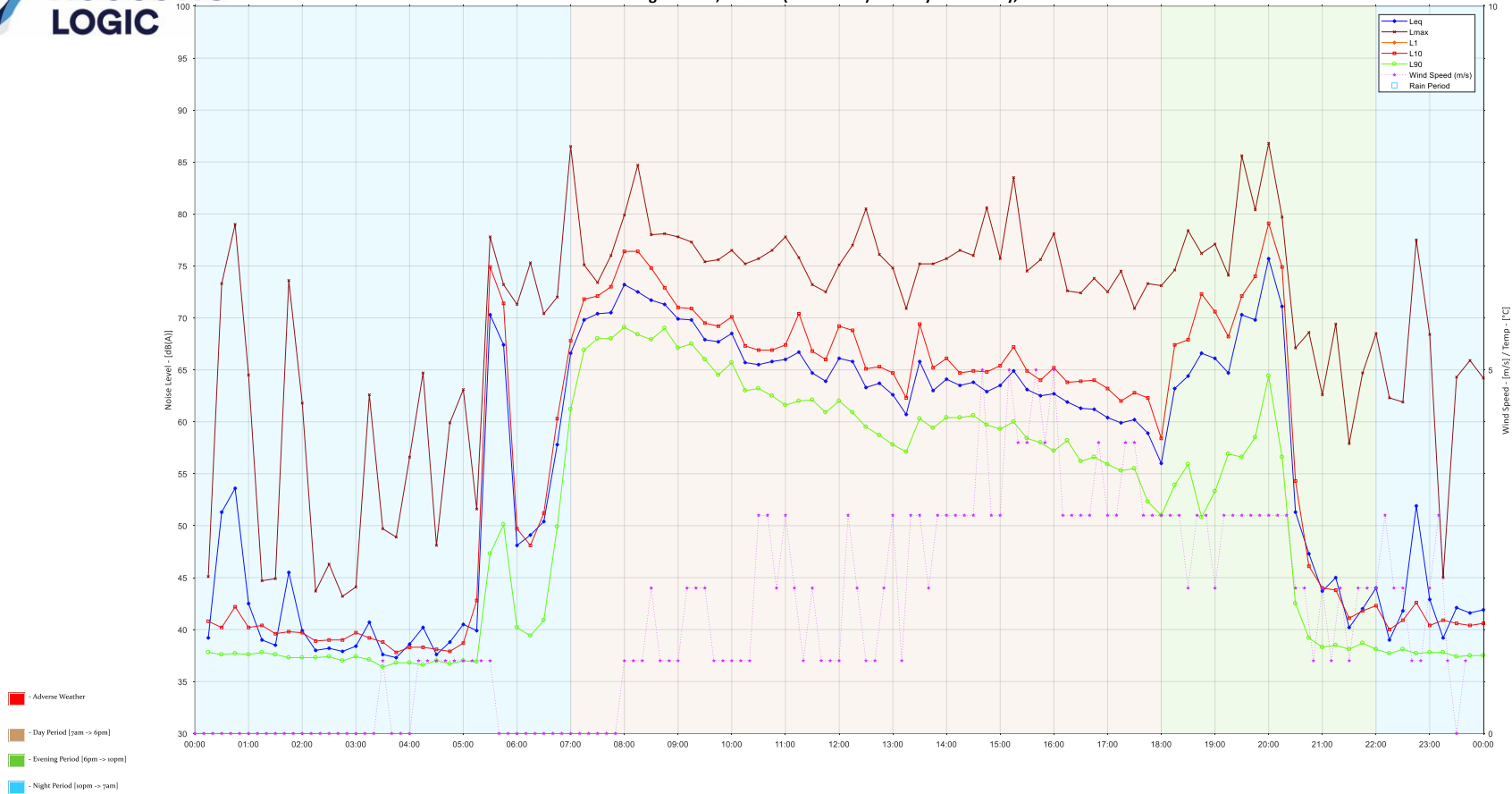
Morgan Road, Belrose (South east): Friday 22 January, 2021



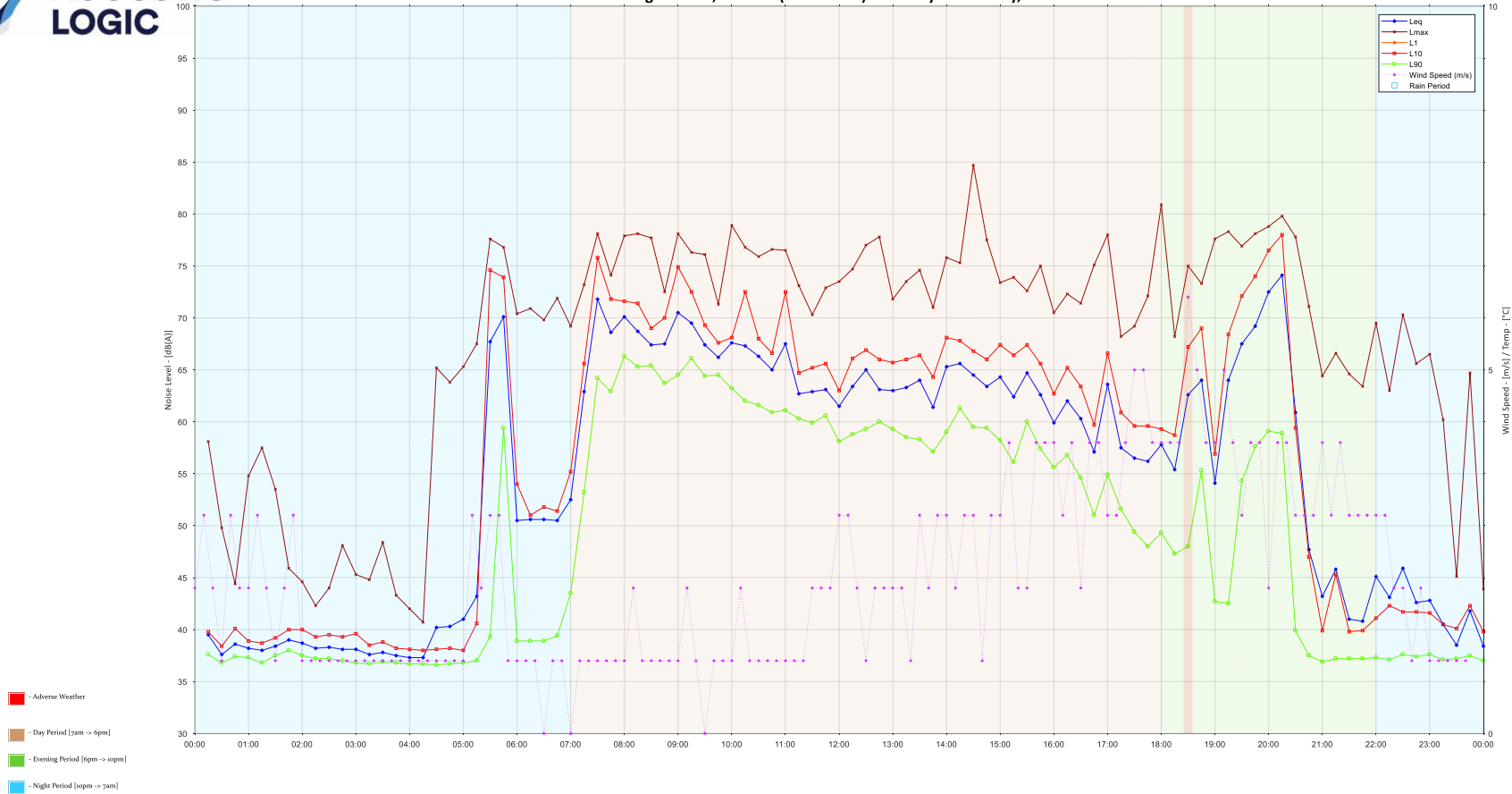
Morgan Road, Belrose (South east): Saturday 23 January, 2021



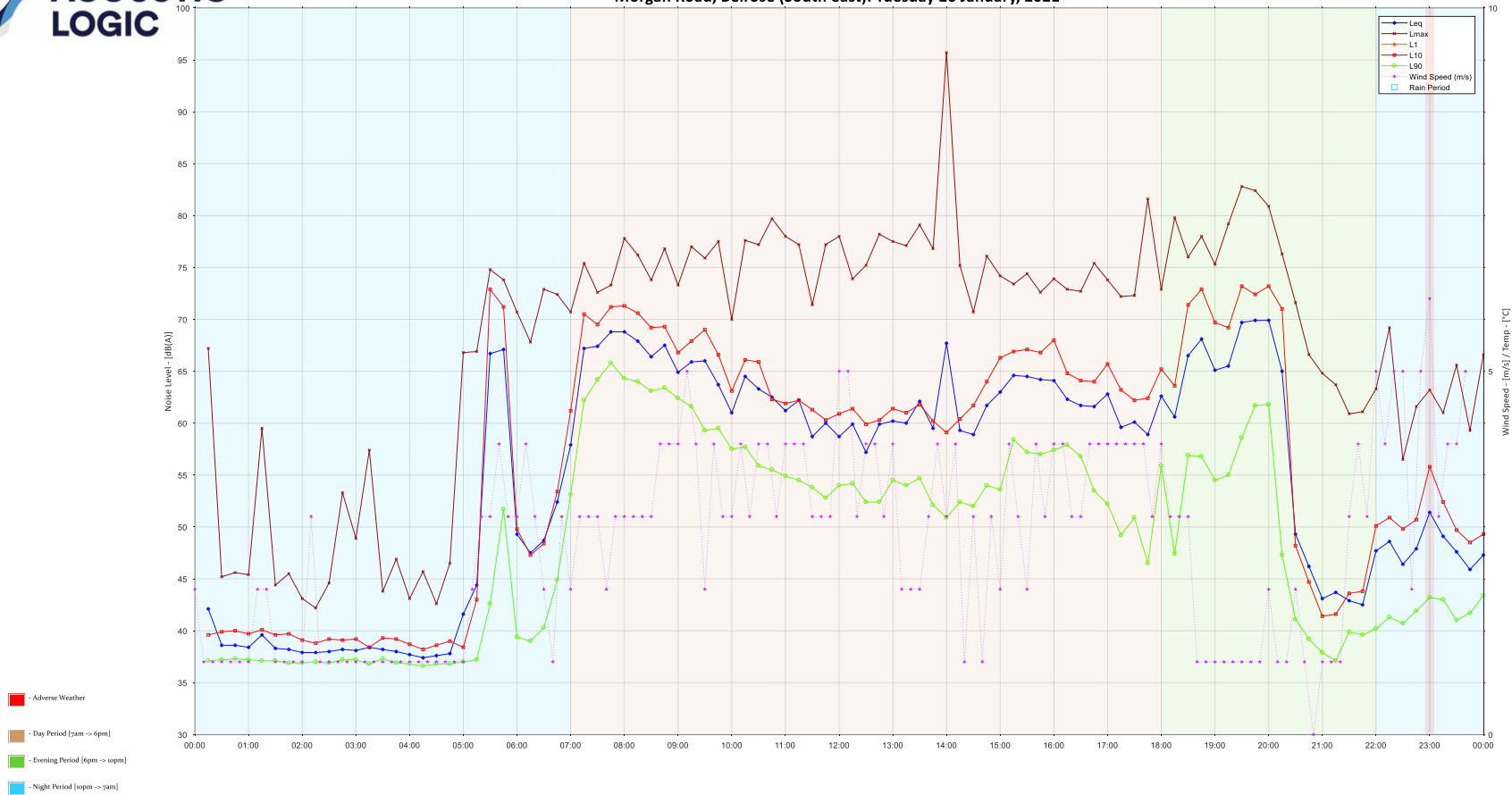
Morgan Road, Belrose (South east): Sunday 24 January, 2021



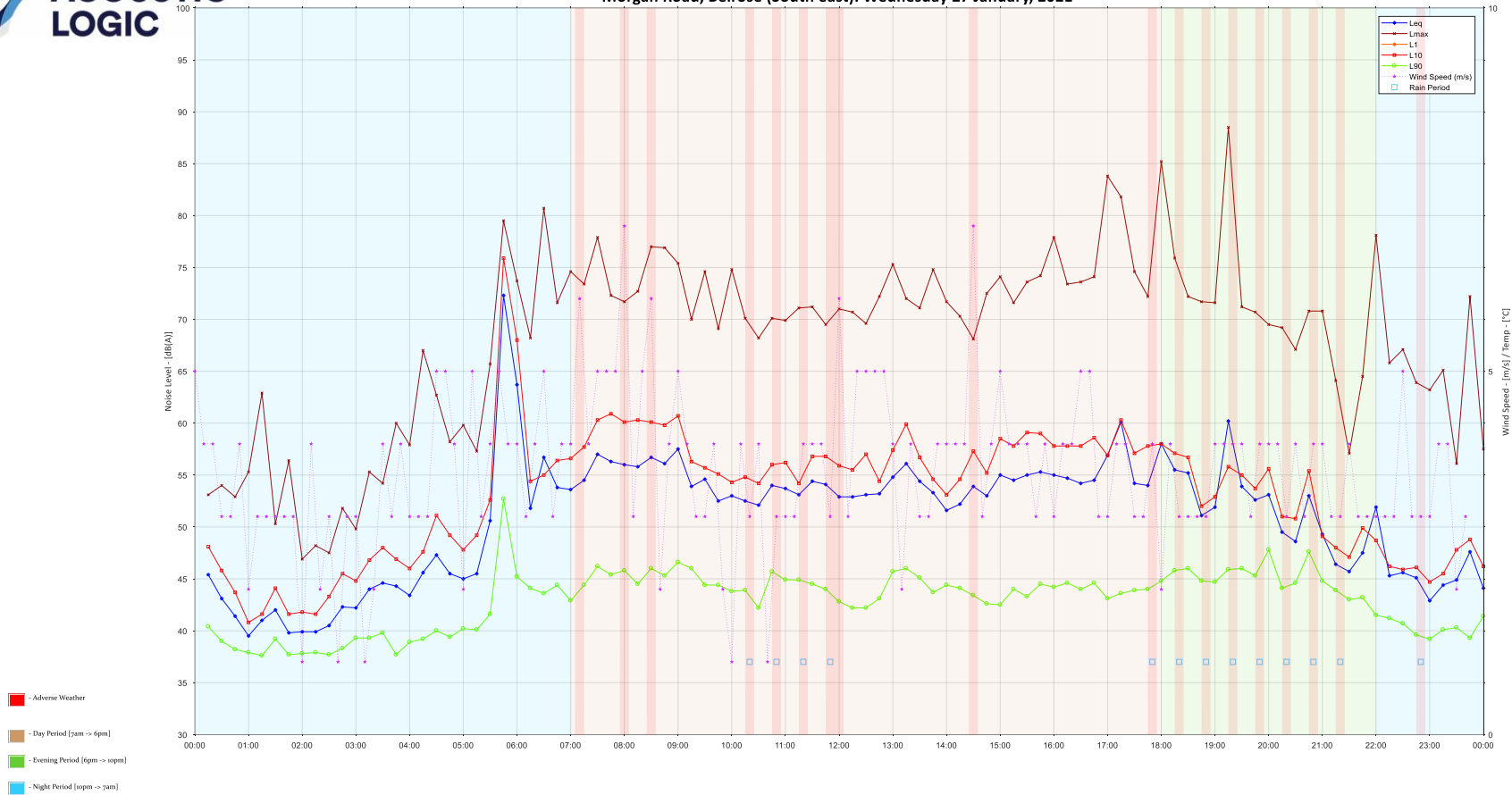
Morgan Road, Belrose (South east): Monday 25 January, 2021



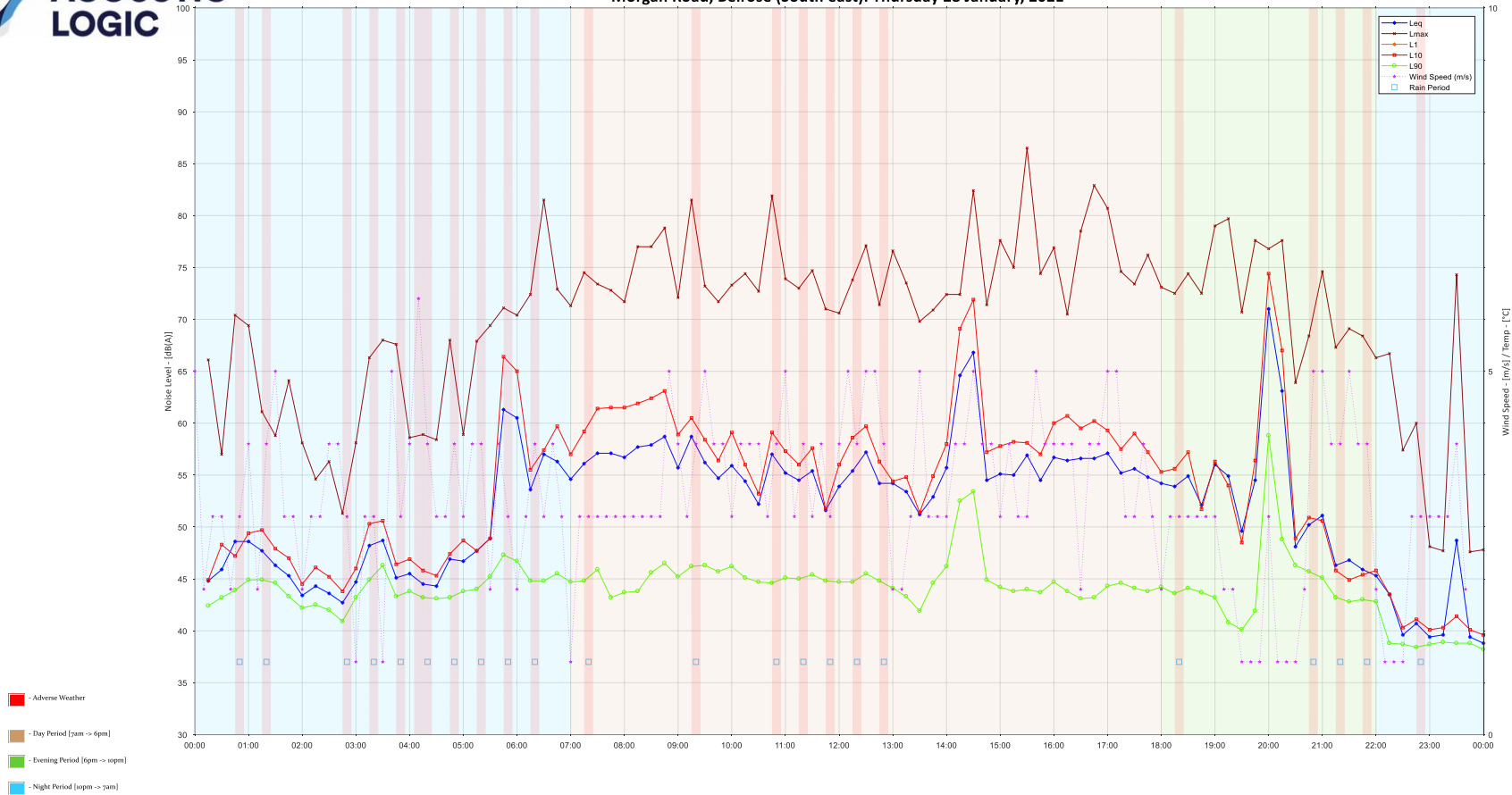
Morgan Road, Belrose (South east): Tuesday 26 January, 2021



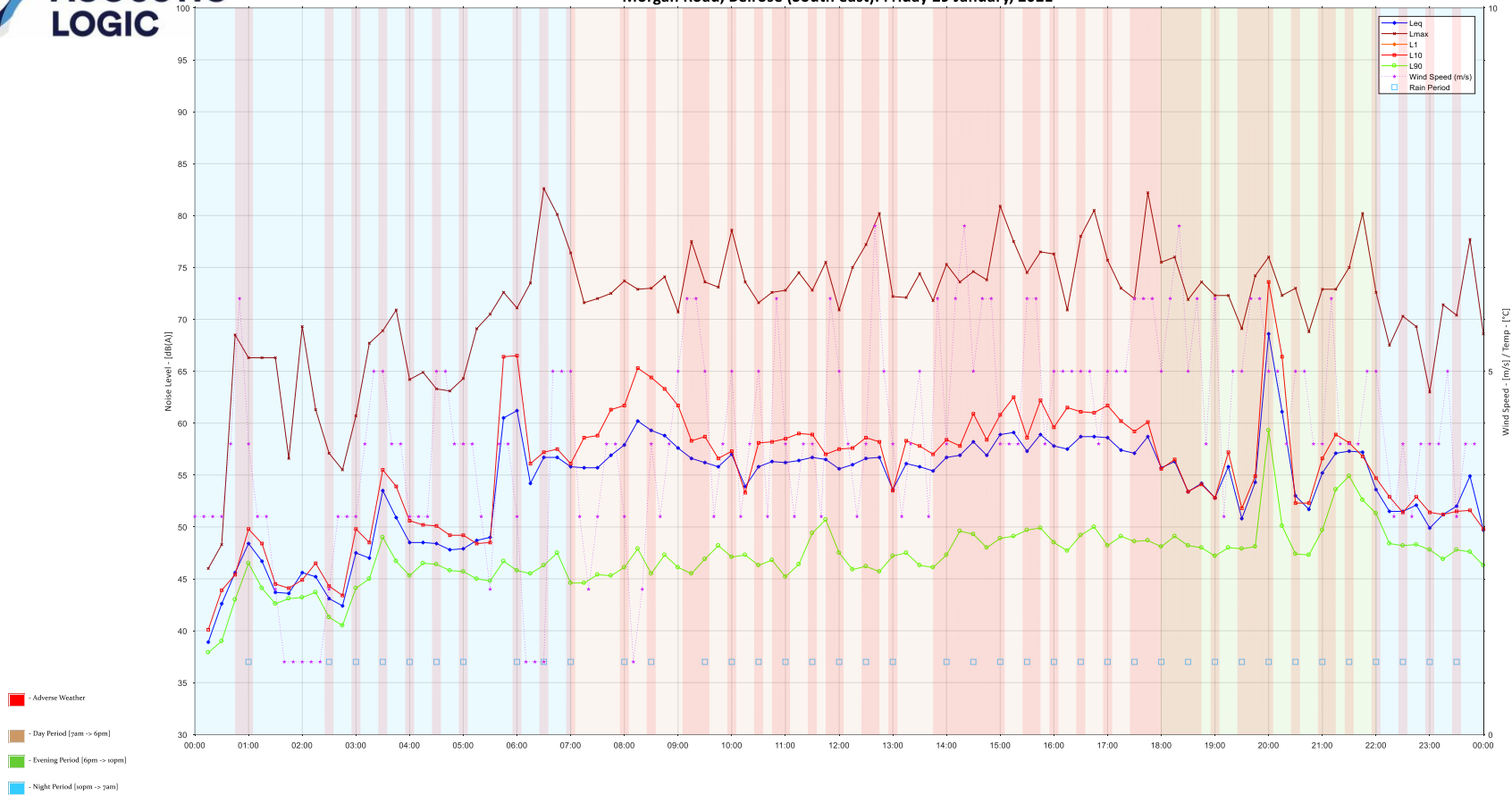
Morgan Road, Belrose (South east): Wednesday 27 January, 2021



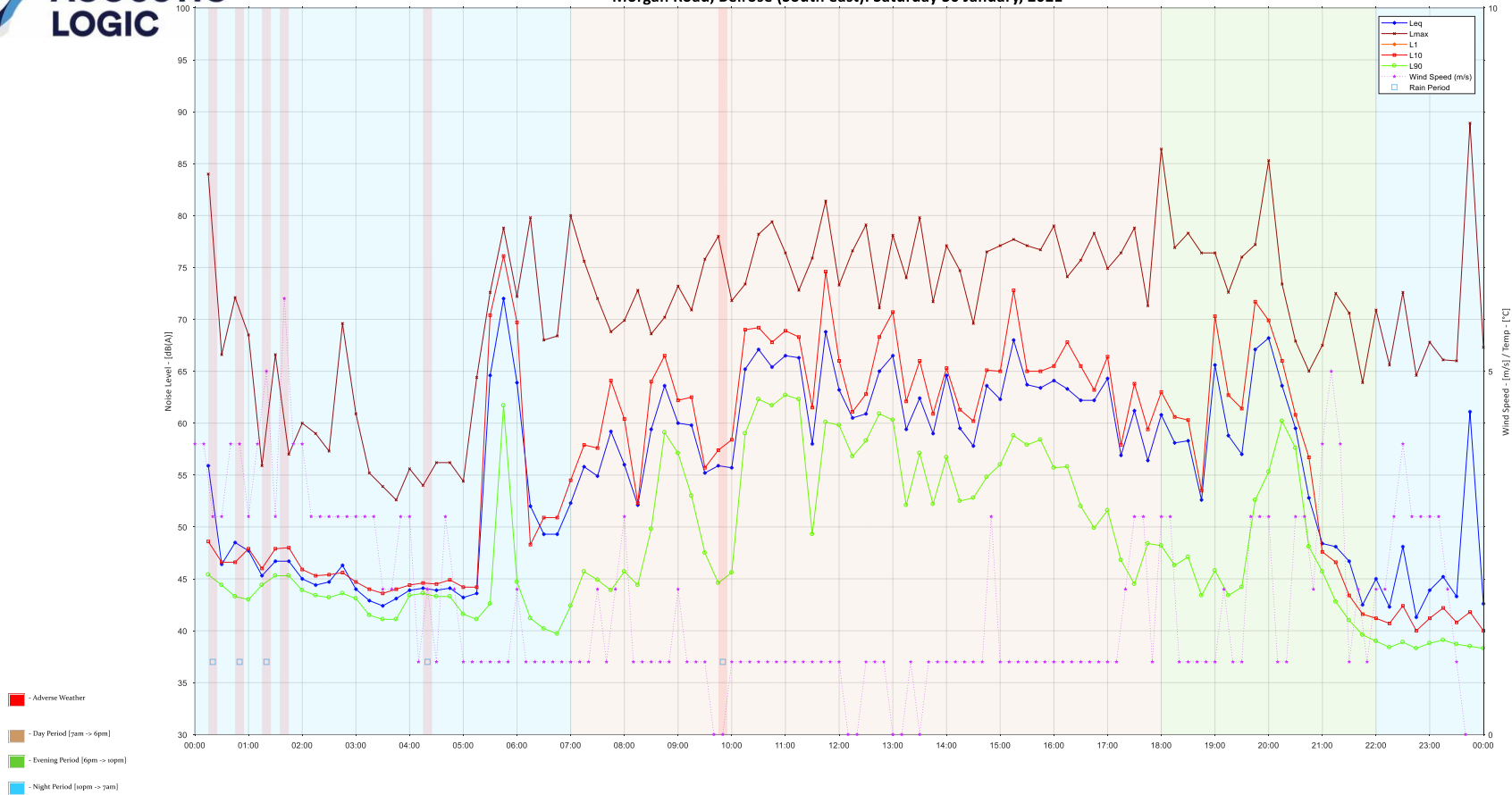
Morgan Road, Belrose (South east): Thursday 28 January, 2021



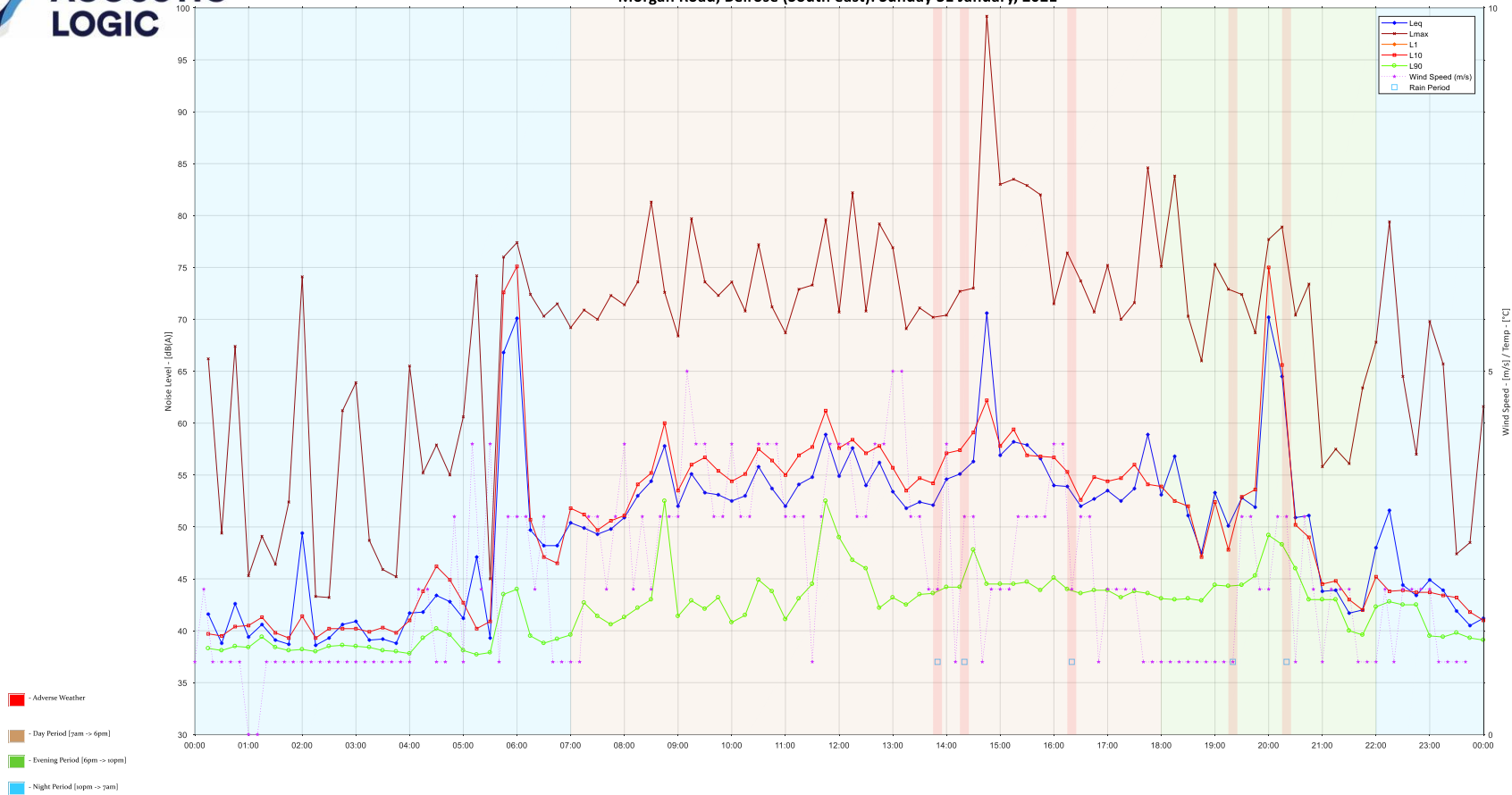
Morgan Road, Belrose (South east): Friday 29 January, 2021



Morgan Road, Belrose (South east): Saturday 30 January, 2021



Morgan Road, Belrose (South east): Sunday 31 January, 2021



Morgan Road, Belrose (South east): Monday 01 February, 2021

