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Ascham School - Fiona Building Redevelopment

DA Acoustic Assessment

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1 INTRODUCTION

The report presents an acoustic assessment of potential noise impacts associated with the proposed alterations and additions to the existing Ascham School. Alterations and additions will specifically include the construction of a hall, minor internal alterations within the Fiona Heritage building and additions to the Fiona Wing. In this report, we will:

- Identify nearby noise sensitive receivers and operational noise sources with the potential to adversely impact nearby development.
- Identify relevant noise emission criteria applicable to the development.
- Where necessary, determine building and/or management controls necessary to mitigate potential noise impacts.

This document addresses noise impacts associated with the following:

- Traffic noise impacts from roads bounding the project site.
- Noise impacts from traffic generated by the development of the site.
- Noise emissions from the operation of the site.

Acoustic Logic have used the following documents and regulations in the assessment of noise intrusion and noise emanating from the development:

- Woollahra Council *Development Control Plan (DCP) 2015*.
- NSW Department of Planning *Development Near Rail Corridors & Busy Roads – Interim Guideline*
- NSW Planning Education SEPP 2017.
- NSW Environmental Protection Authority (EPA) *Noise Policy for Industry (NPfI) 2017*.

This assessment has been conducted using the BVN Architects drawings for DA submission dated 11th June 2021.

2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The proposed development includes the following:

- Partial demolition of the non-heritage Fiona Wing including removal of roof and staff room.
- Demolition of the later addition Fiona Annexe Building.
- Demolition of existing shop located at 208 New South Head Road.
- Upgrades to current learning facilities including:
    - Internal refurbishment to Fiona Heritage Wing including relocation of school reception and addition meeting room and bathrooms.
    - Replacement of current non-complaint stairs in Heritage Fiona Wing courtyard to meet BCA requirements.
    - Installation of new lift within the Main Fiona Building to improve accessibility.
    - Minor internal refurbishment to the first two floors of the Fiona Wing Building. New second floor to building for classrooms.
    - New circulation node with lift, stair and accessible bathroom blocks connecting existing Fiona Wing Building and new Fiona Wing Additional Building which houses staff room and classrooms.
- Construction of a new school hall, servery kitchen, bathrooms, offices & classrooms at 208 New South Head Road.
- External works including:
    - Construction of new entrance courtyard adjacent to new hall.
    - Construction of new wet weather canopy/COLA next to Fiona wing.
    - Construction of new canopy over heritage courtyard for weather protection.
    - Construction of new entry pavilion at relocated reception area of the Heritage Fiona Wing.
    - New paving and landscaping to improve connection between the Fiona Main building and the new school hall.
    - Construction of new pick up/drop off shelter adjacent the Fiona Wing building and carpark.

With respect to the above proposal, this office has been advised the following:

- No increase to the existing student numbers or capacity above the currently approved cap.
- No change in the current operation hours of the school.
- No change in vehicle access points to the school.
- No changes to loading arrangements.

With respect to the use of the hall:

- During School Hours
    - Band Practice
    - Music Classes
    - School Assembly
    - Rehearsals and Performances
- Out of School Hours:
    - Performances
    - Community/School Events

Figure 1 below shows a site plan of the proposed development. On-site investigations have been carried out by this office, and we note the following regarding the existing acoustic environment surrounding the proposed development:

- The project site is bound by New South Head Road to the south, and Ocean avenue to the east.
- The proposed hall is to be located on the southern boundary. On this basis, the nearest noise sensitive receivers will be and residential receivers to the west along the common boundary, and commercial receivers to the south across New South Head Road.

The nearest noise sensitive receivers have been identified in Figure 3 along with unattended noise monitoring and attended measurement locations. Noise sensitive receivers can be summarised by the following:

- Receiver **R1 –** Residential flat buildings situated along the western common boundary of the project site.
- Receiver **R2 –** Residential situated along the eastern common boundary of the project site.
- Receiver **R3 –** Residential flat building across New South Head Road.
- Receiver **R4 –** Commercial development across New South Head Road.

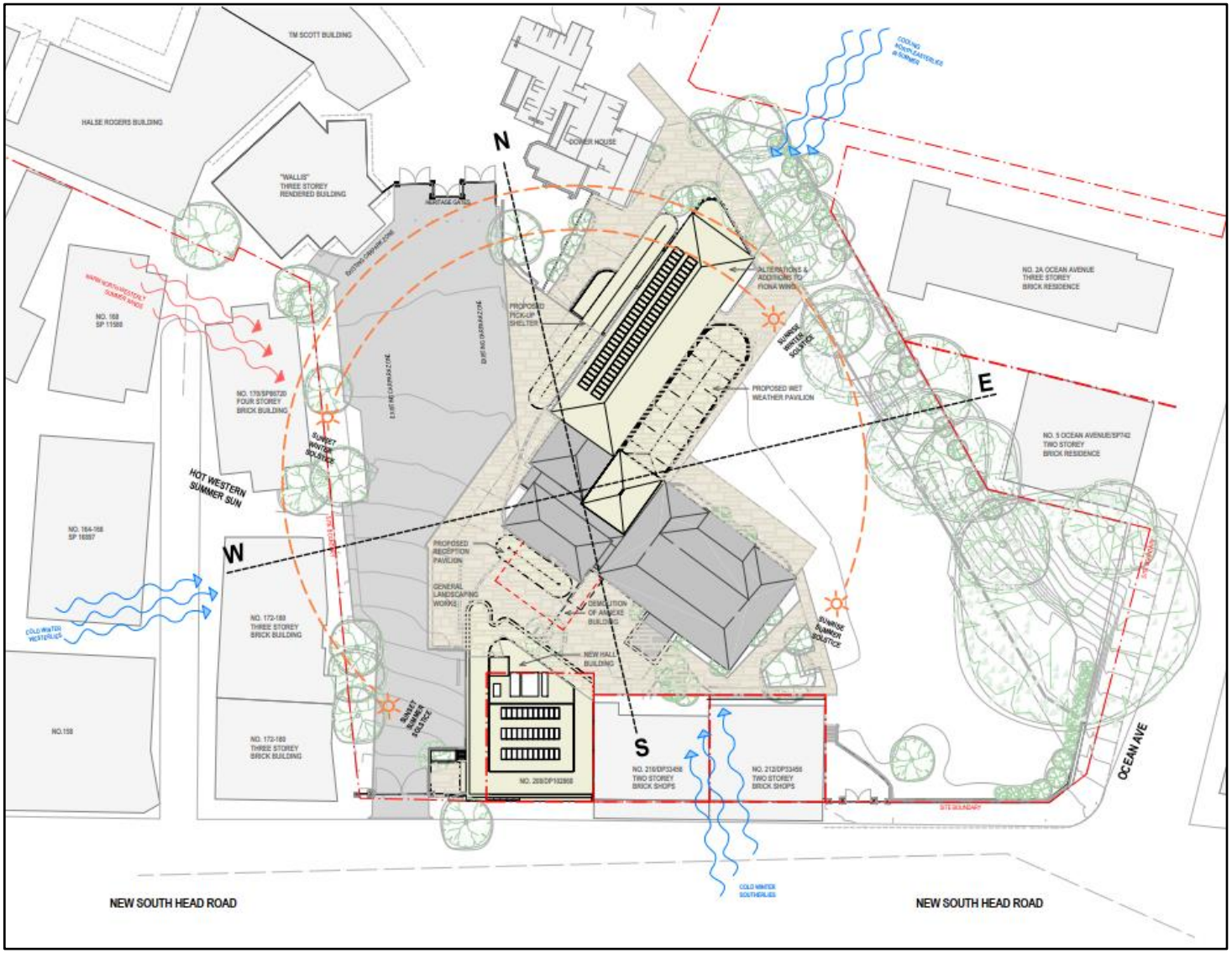


Figure 1 – Site Plan (Based on Drawing AR-A-XX-02 by BVN Architects)

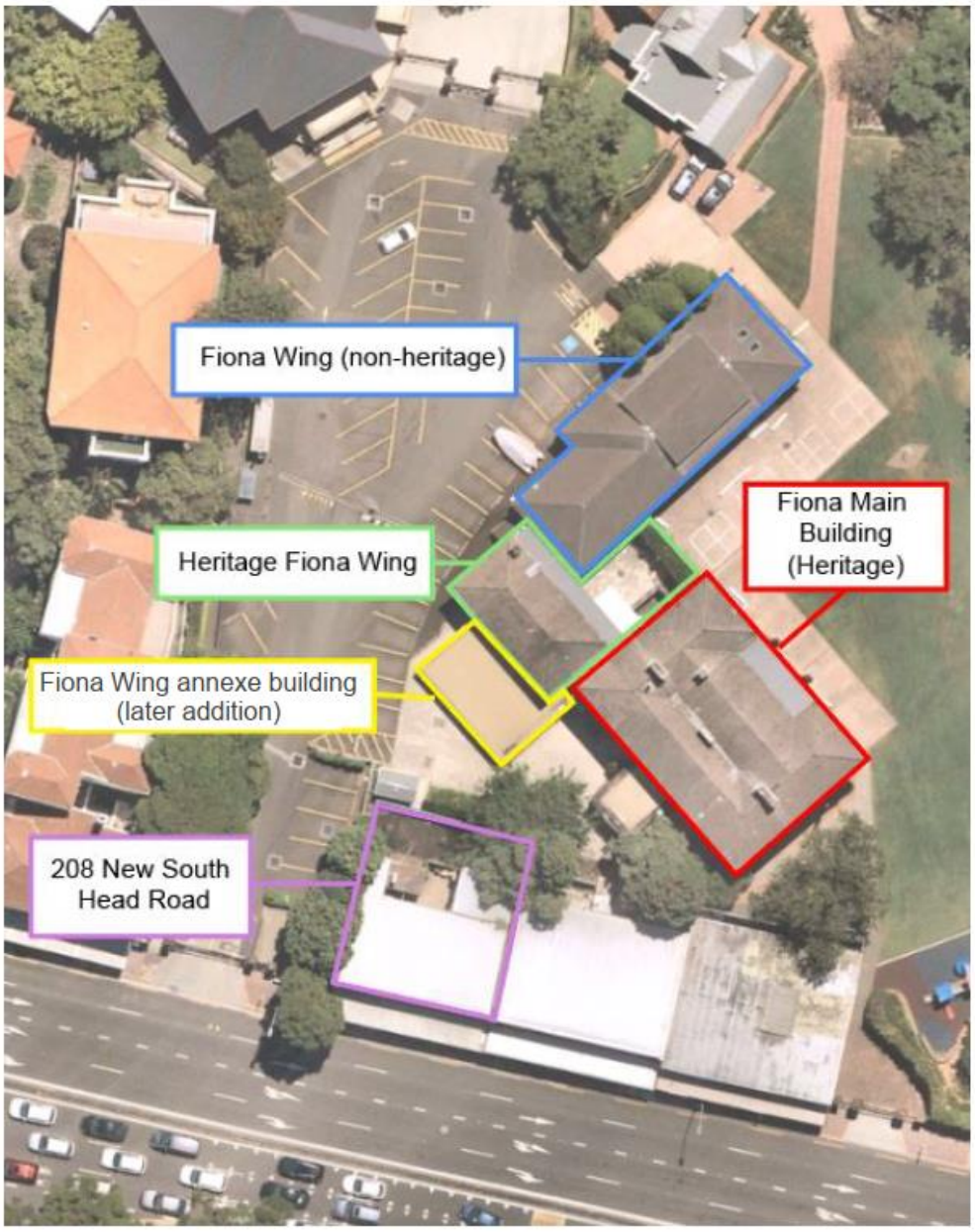


Figure 2 – Markup of Existing and Proposed Building Forms

Sourced from Urbis Request for Pre-DA Meeting Report, dated 26th March 2021

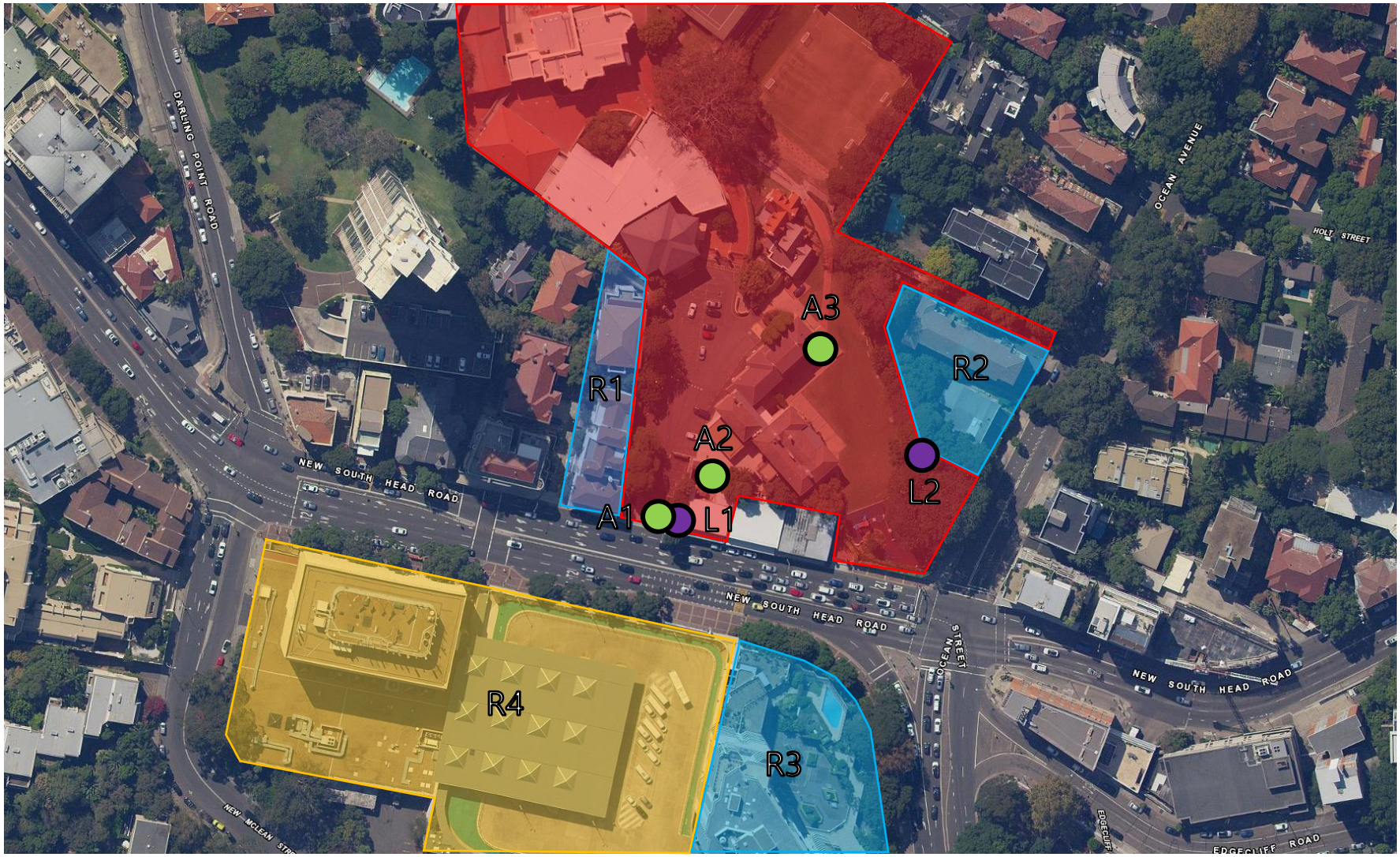


Figure 3 – Site Map, Receivers and Measurement Locations

Sourced from SIX Maps NSW

Unattended Noise Monitor

Attended Noise Measurement

Residential Receiver

Commercial Receiver

Project Site

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-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, two-principle measurement parameters are used, namely L_{90} and L_{eq}.

The L_{90} measurement parameter is a statistical level that represents the average minimum noise levels over the measurement intervals.

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

4.1 MEASUREMENT EQUIPMENT

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

In addition to the above, attended measurements were undertaken to supplement unattended noise monitoring. Attended short term measurements have been undertaken by this office 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.

4.2 MEASUREMENT LOCATION

The unattended noise monitors were installed at the following locations (also refer to Figure 2):

- **Noise Monitor L1** – Adjacent to carpark entry on New South Head Road. Microphone was in line with the existing building façade, approximately 4m from the kerb.
- **Noise Monitor L2** – Eastern boundary of the project site, along the common boundary with the residential dwelling at 5 Ocean Avenue.

4.3 MEASUREMENT PERIOD

Unattended long term noise monitoring has been conducted by this office from Wednesday 24th February 2021 to Tuesday 9th March 2021.

4.4 MEASURED NOISE LEVELS

NSW EPA's 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. Appendix A and B provides detailed results of the unattended noise monitoring. The processed Rating Background Noise Levels (lowest 10th percentile noise levels during operation time period) are presented in the table below.

Table 1 – Rating Background Noise Levels

Monitor Location	Time of Day	Rating Background Noise Level (RBL) dB(A)$L_{90(period)}$
Noise Monitor L1	Day (7:00am-6:00pm)	59
	Evening (6:00pm-10:00pm)	57
	Night (10:00pm-7:00am)	41
Noise Monitor L2	Day (7:00am-6:00pm)	55
	Evening (6:00pm-10:00pm)	52
	Night (10:00pm-7:00am)	39

5 OPERATIONAL NOISE EMISSION ASSESSMENT

5.1 CRITERIA

There are no specific EPA criteria applicable to the acoustic assessment of schools. The NSW Educational SEPP requirement relating to noise emissions is:

6. Noise

A new building or (if the development is an alteration or addition to an existing building for the purpose of changing its use) an existing building that is to be used for the purpose of a school or school-based child care must be designed so as not to emit noise exceeding an LAeq of 5dB(A) above background noise when measured at any lot boundary.

We note that the NSW EPA *Noise Policy for Industry* noise trigger levels are not strictly applicable to school developments. They are primarily intended to assess noise emissions from industrial/commercial developments. However, it is the most useful guideline policy for the assessment of plant and equipment noise impacts to nearby receivers and is typically applied to assess plant noise emissions from schools.

An outline of relevant acoustic criteria is presented below.

5.1.1 Educational SEPP

The SEPP requires that noise emissions not exceed the background by more than 5 dB(A) at the boundaries of the noise receivers. The following table presents the background noise levels determined for the boundaries and the resultant assessment criteria.

Table 2 – NSW Educational SEPP Criteria

Monitor Location	Site Boundary / Receiver Applicable	Time	Rating Background Noise Level dB(A)$L_{90(period)}$	Educational SEPP Criteria (BG+ 5) dB(A)$L_{eq(15min)}$
Monitor Location L1	Residents along Western Boundary	Day (7am-6pm)	59	64
		Evening (6pm-10pm)	57	62
		Night (10pm-7am)	41	46
Monitor Location L2	Residents along Eastern Boundary	Day (7am-6pm)	55	61
		Evening (6pm-10pm)	52	57
		Night (10pm-7am)	39	44

5.1.2 NSW EPA Noise Policy for Industry (NpfI)

The NPfI provides guidelines for assessing noise impacts from developments., and the noise sources covered by this policy are mechanical services and plant noise. 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 amenity criterion and an intrusiveness criterion.

5.1.2.1 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 5 dB(A).

Table 3 – NPfI Intrusiveness Criteria

Receiver	Time of day	Background Noise Level dB(A)$L_{90(Period)}$	Intrusiveness Criteria (Background + 5 dB(A)$L_{eq(15minute)}$
Residential Receiver R1 & R3 Based on noise monitor L1	Day (7:00am-6:00pm)	59	64
	Evening (6:00pm-10:00pm)	57	62
	Night (10:00pm-7:00am)	41	46
Residential Receiver R2 Based on noise monitor L2	Day (7:00am-6:00pm)	55	61
	Evening (6:00pm-10:00pm)	52	57
	Night (10:00pm-7:00am)	39	44

5.1.2.2 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 Noise Policy for Industry sets out acceptable noise levels for various land uses. Table 2.2 on page 11 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

For the purposes of a conservative assessment, ALC will assess noise emissions in accordance with the 'Urban' category.

Table 4 – NPfI Project Amenity Criteria

Type of Receiver	Time of day	Project Amenity Noise Level dB(A)$L_{eq(15\text{-}minutes)}$
Residential Receivers R1, R2 & R3 (Urban)	Day (7:00am-6:00pm)	58
	Evening (6:00pm-10:00pm)	48
	Night (10:00pm-7:00am)	43
Commercial Receivers R4	When in use	63 (External)

5.1.2.3 Sleep Arousal Assessment

In addition to the above, the NSW EPA NPfI provides an assessment procedure for assessing any potential sleep arousal impacts for when any noise is generated between 10:00pm and 7:00am (i.e. during the night period). Sleep arousal is a function of both the noise level and the duration of the noise.

As recommended in the NPfI, to assess the potential sleep arousal impacts a two-stage test is carried out:

- Step 1 – Section 2.5 *Maximum noise level event assessment* from the NPfI states the following:

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

  - $L_{Aeq,15min}$*40dB(A) or the prevailing RBL plus 5dB, whichever is the greater, and/or*
  - L_{AFmax}*52dB(A) or the prevailing RBL plus 15dB, whichever is greater*
- Step 2 – If there are noise events that could exceed the average/maximum criteria detailed 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 test takes into account the noise level and number of occurrences of each event with the potential to create a noise disturbance. As is recommended in the explanatory notes of the EPA *NPfI*, 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 60-75dB(A) are not likely to affect health and wellbeing significantly.*

5.1.2.4 Summarised NPfI Project Noise Trigger Levels

Table 5 – Summarised NPfI Project Noise Trigger Levels

Receiver	Time of Day	Intrusiveness Noise Level dB(A)$L_{eq(15min)}$	Amenity Level dB(A)$L_{eq(15min)}$	Sleep Arousal
R1 & R3 (Residential)	Day (7:00am-6:00pm)	64	58	-
	Evening (6:00pm-10:00pm)	62	48	-
	Night (10:00pm-7:00am)	46	43	46 dB(A)$L_{Aeq,15min}$ 56 dB(A)L_{AFmax}
R2 (Residential)	Day (7:00am-6:00pm)	61	58	-
	Evening (6:00pm-10:00pm)	57	48	-
	Night (10:00pm-7:00am)	44	43	44 dB(A)$L_{Aeq,15min}$ 54 dB(A)L_{AFmax}
R4 (Commercial)	When in Use	-	63 (External)	N/A

5.1.3 NSW EPA Road Noise Policy (RNP)

The RNP provides guidelines for assessing noise emissions from public roads, including the impact of traffic generated by developments.

The roadways bounding Ascham School can be categorised as the following:

Table 6 – RNP Assessment Criteria for Noise from Traffic Generation

Bounding Road	Road Category	Assessment Criteria – dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
New South Head Road	Arterial Road	$L_{Aeq(15hour)}$ 60	$L_{Aeq(9hour)}$ 55
Ocean Avenue	Collector Road (Sub-arterial)		

The policy also states that:

- Consideration of the noise increase should be made for sub-arterial and arterial roads.
- Noise impacts from increases in noise levels of 2dB(A) or less are minor, and by implication do not require mitigation.

5.2 NOISE EMISSION ASSESSMENT

An assessment of operational noise emissions is presented below. The following noise sources have been considered in this assessment:

- Noise from the use of the Fiona Hall by the school and for community use.
- Noise from additional traffic generation.
- Noise from use of the carpark.

We note that no changes are proposed to the use of the school in general (i.e. number of students, use of PA systems/bells generally), and no changes are proposed to waste collection procedures or pick-up/drop-off facilities generally (other than the addition of a pick-up/drop-off shelter to the west of the Fiona Wing).

5.2.1 Noise from Use of the Fiona Hall

The proposed hall is to be located adjacent to the school entry driveway on the southern boundary of the project site. Noise emissions to the surrounding properties have been calculated based on the following assumptions:

- An internal noise level of 80dB(A)$L_{eq(15min)}$ representing the typical noise level during louder events such as music performances from either school or community use of the space.
- Three scenarios have been assessed with respect to the use of the PAC. These include:
    - Scenario 1: All hall doors closed.
    - Scenario 2: Hall doors open at all times.
    - Scenario 3: Doors opened intermittently during performances.
- Entry and exit doors will be constructed from minimum 5mm glazing or 35mm timber with acoustic seals to the perimeter of the door.

Table 7 – Predicted Noise Levels from use of Fiona Hall (Scenario 1) – Doors Closed

Boundary	Predicted Noise Level	Noise Objective (Education SEPP – BG + 5dB(A))	Comments
West Boundary (Receiver R1)	< 20 dB(A)$L_{eq(15min)}$	Day: 64 dB(A)$L_{eq(15min)}$ Evening: 62 dB(A)$L_{eq(15min)}$ Night: 46 dB(A)$L_{eq(15min)}$	Achieves noise objective.
East Boundary (Receiver R2)	< 15 dB(A)$L_{eq(15min)}$	Day: 61 dB(A)$L_{eq(15min)}$ Evening: 57 dB(A)$L_{eq(15min)}$ Night: 44 dB(A)$L_{eq(15min)}$	Achieves noise objective.

Table 8 – Predicted Noise Levels from use of Fiona Hall (Scenario 2) – Doors Open

Boundary	Predicted Noise Level	Noise Objective (Education SEPP – BG + 5dB(A))	Comments
West Boundary (Receiver R1)	< 43 dB(A)$L_{eq(15min)}$	Day: 64 dB(A)$L_{eq(15min)}$ Evening: 62 dB(A)$L_{eq(15min)}$ Night: 46 dB(A)$L_{eq(15min)}$	Achieves noise objective.
East Boundary (Receiver R2)	< 38 dB(A)$L_{eq(15min)}$	Day: 61 dB(A)$L_{eq(15min)}$ Evening: 57 dB(A)$L_{eq(15min)}$ Night: 44 dB(A)$L_{eq(15min)}$	Achieves noise objective.

With regards to scenario three (doors opened intermittently during performances) we note the following:

- Noise emissions are assessed over a 15-minute period.
- During performances/noisy events, the entrances doors would only be open for short intervals.
- Notwithstanding, noise levels from the use of the hall are compliant even with doors open during the entire 15-minute period.
- Therefore, noise levels will also comply in the scenario that doors are closed and only opened intermittently.

We note, compliance with the Educational SEPP noise emission requirement of BG + 5dB at the school property boundary will inherently mean compliance is achieved with NSW EPA *Noise Policy for Industry* intrusiveness criterion of BG+5dB which is applicable at the receiver boundary with regards to noise from the use of the Hall.

Furthermore, noise impacts from the use of the hall have been assessed at the worst affected residential receivers (R1 and R2). Achieving compliance at these receivers will inherently mean compliance is achieved at receivers which are less affected by noise impacts (R3 and R4).

5.2.2 Traffic Generation

It is noted that the current traffic volume along New South Head Road is high. Any increase in traffic volume generated by the operation of the project site will be negligible (change in noise will be imperceptible) relative to the existing traffic noise levels.

5.2.3 Carpark Usage

With regards to noise emissions from the carpark associated with the proposed development, we note the following:

- Preliminary traffic assessment by ARUP indicates a loss of 6 car spaces within the main outdoor carpark to the west of the existing Fiona building.
- Vehicular access points to the site will not change.
- The current hours of operation for the school (7:30am to 5:00pm) will not change.
- The current number of staff and students will not increase.
- The carpark is already in use for events such as performance and teacher/parent nights.

In light of the above, noise from the use of the carpark will be less than the existing use as a result of the proposed development.

5.2.4 Mechanical Plant Noise

A detailed acoustic review of all external plant items should be undertaken following equipment selection and duct layout design. With the consideration of suitable acoustic treatments, all plant items will be capable of meeting noise emissions criteria at all boundaries.

5.2.5 Outdoor Play Area

As per the Landscape Assessment (dated 15th June 2021, Revision 04), the development includes minor alterations to the existing outdoor play area on the south-east corner of the project site. This involves decking to slightly expand the usable space a few metres beyond the current fence line. It is also expected that students will be able to walk adjacent to the boundary however this would only be when supervised with a teacher.

In light of the above, we note the following:

- The number of students using the outdoor play areas will not increase from the existing use.
- Use of the outdoor play space will not change (i.e. currently being used as both a playground and informal teaching area when required).
- The existing fence is not solid.
- Where students are allowed to walk adjacent to the eastern school boundary, it is expected that teachers would ensure significant levels of noise from student activity would not occur.

The proposed landscape modifications along the eastern boundary of project site will not result in a perceptible noise increase based on typical use by the school which includes use as an outdoor playground and informal teaching space.

6 NOISE INTRUSION ASSESSMENT

6.1 PROJECT CRITERIA

Internal noise levels are to comply with the requirements of the following:

- Woollahra Council *Development Control Plan (DCP) 2015 – Chapter F2 Educational Establishments*
- Department of Planning *Development Near Rail Corridors and Busy Roads – Interim Guideline*

6.1.1 Woollahra Council DCP 2015

The Woollahra Council DCP, specifically *Chapter F2 Educational Establishments*, does not provide specific internal noise level goals for educational establishments affected by traffic noise. On this basis, criteria will be adopted from NSW planning guidelines and relevant Australian Standards, summarised below.

6.1.2 Department of Planning *Development Near Rail Corridors and Busy Roads – Interim Guideline*

Table 3.1 of the guideline provides internal noise goals for non-residential buildings impacted by noise from busy roads. The guideline specifies a recommended 40 dB(A) recommended max level.

6.1.3 Summarised Requirements

The criteria presented above has been summarised in the table below.

Table 9 – Summarised Internal Noise Level Criteria

Space	Internal Noise Level Requirement dB(A) $L_{eq(T)}$
Fiona Hall	40
Learning Spaces	40
Offices & Staffroom	40

6.1.4 Measurement Results Summary

The table below summarises the details of attended measurements conducted by this office:

Table 10 – Attended Measurement Summary

Measurement Location	Time of Measurement/Monitoring Period	Measured Noise Level dB(A)$L_{eq(period)}$
L1 – Southern Boundary, 4m from Kerb of New South Head Road	Wednesday 24th February to Tuesday 9th March 2021	73 dB(A)$L_{eq(worst\ 1hr)}$ (1)
A1 – Southern Boundary, 4m from Kerb of New South Head Road	Tuesday 9th March 2021 9am-10am	72 dB(A)$L_{eq(15min)}$
A2 – Rear of Future Fiona Hall	Tuesday 9th March 2021 9am-10am	55 dB(A)$L_{eq(15min)}$
A3 – Fiona Wing, North Eastern Edge of Level 1 Balcony	Tuesday 9th March 2021 9am-10am	55 dB(A)$L_{eq(15min)}$

Table Note:

1. Presented noise level is the worst 1-hour L_{eq} out of the Day-time period (7am-10pm).

6.2 FIONA HALL

6.2.1 External Glazing

The recommended constructions are detailed in the Glazing Mark-up provided in Appendix C. These 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-Lon type acoustic seals. (**Mohair Seals not considered acoustic seals**). Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

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

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 11 for all rooms. 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 11 - Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
6.38mm Laminate	31
10.38mm Laminated	35
10.38mm Laminated / 114mm Airgap / 6mm Float	45

6.2.2 External Walls

Walls constructed from masonry/concrete elements will be acoustically acceptable and will not require further acoustic upgrade.

Lightweight walls as shown on the western façade will require additional acoustic treatment, summarised as follows:

- **Main Hall –** Rw 52 wall which could consist of the following:
  - External lining: One layer of 9mm Fibre Cement Sheeting
  - Wall Cavity: Minimum 92mm steel stud with 75mm thick 11kg/m^3 glasswool insulation.
  - Internal Lining: Two layers of 16mm Fyrcheck.
- **Lower Ground Classrooms –** Rw 52 wall which could consist of the following:
  - External lining: One layer of 9mm Fibre Cement Sheeting
  - Wall Cavity: Minimum 92mm steel stud with 75mm thick 11kg/m^3 glasswool insulation.
  - Internal Lining: Two layers of 16mm Fyrcheck.
- **Music Office & Meeting Room - –** Rw 45 wall which could consist of the following:
  - External lining: One layer of 9mm Fibre Cement Sheeting
  - Wall Cavity: Minimum 92mm steel stud with 75mm thick 11kg/m^3 glasswool insulation.
  - Internal Lining: One layer of 16mm Fyrcheck.

6.2.3 Roof/Ceiling System

The current architectural revision shows a concrete roof over the Fiona Hall. Concrete roof systems will be acoustically acceptable and will not require further acoustic upgrades.

In the event the concrete roof system is replaced with a lightweight system, a review of the proposed roof/ceiling system is recommended to ensure project noise levels are achieved.

6.3 UPGRADES TO FIONA WING – INDICATIVE RECOMMENDATIONS

Noise measurements conducted at the project site by this office indicate external traffic noise levels at the south-eastern façade of the Fiona Wing to be approximately 55dB(A)L_{eq}.

It is recommended to apply minimum 6mm thick glazing with acoustic rating of R_w 29 on all facades. The lightweight wall on facades should be minimum Rw 45 rating which can be equal to 92mm steel stud with one layer of 9mm FC sheet externally and one layer of 16mm Fyrchek plasterboard internally, infill the cavity by 75mm thick 11kg/m^3 glasswool insulation.

6.4 MECHANICAL VENTILATION

With respect to natural ventilation of the buildings, 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 educational buildings becomes 50dB(A)).

For the new Fiona Hall, all windows on the southern (facing New South Head Road) and western (facing the driveway) facades must be closed in order to meet acoustic requirements. A mechanical engineer is to confirm if supplementary ventilation (to meet Australian Standard AS1668.2 requirements will be required to these rooms.

Note: **These windows are still permitted to be operable.**

7 CONCLUSION

The report presents an acoustic assessment of potential noise impacts associated with the proposed alterations and additions to the existing Ascham School located on New South Head Road, Edgecliff.

A noise intrusion assessment has been conducted against the requirements of the following documents/guidelines:

- Woollahra Council *Development Control Plan (DCP) 2015 – Chapter F2 Educational Establishments*
- Department of Planning *Development Near Rail Corridors and Busy Roads – Interim Guideline*

This report shows compliance with internal noise goals is achievable with typical building shell constructions. A detailed review of minimum requirements is to be conducted at detailed design stage once the building shell is finalised to achieve internal noise goals outlined in Section 6.1.

Noise emissions from the development have been assessment against and shown to comply with the requirements of:

- NSW Department of Planning and Environment's document – '*State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017*'.
- NSW Environmental Protection Authority (EPA) document – *'Noise Policy for Industry (NPfI)'*.

Noise from the use of the hall has been shown to meet the requirements of the Educational SEPP during typical use (as per scenarios detailed in Section 5.2.1).

We note that a detailed review of mechanical plant and equipment is to be conducted once equipment selections and layouts have been finalised to ensure noise emissions are compliant with the requirements of Section 5.

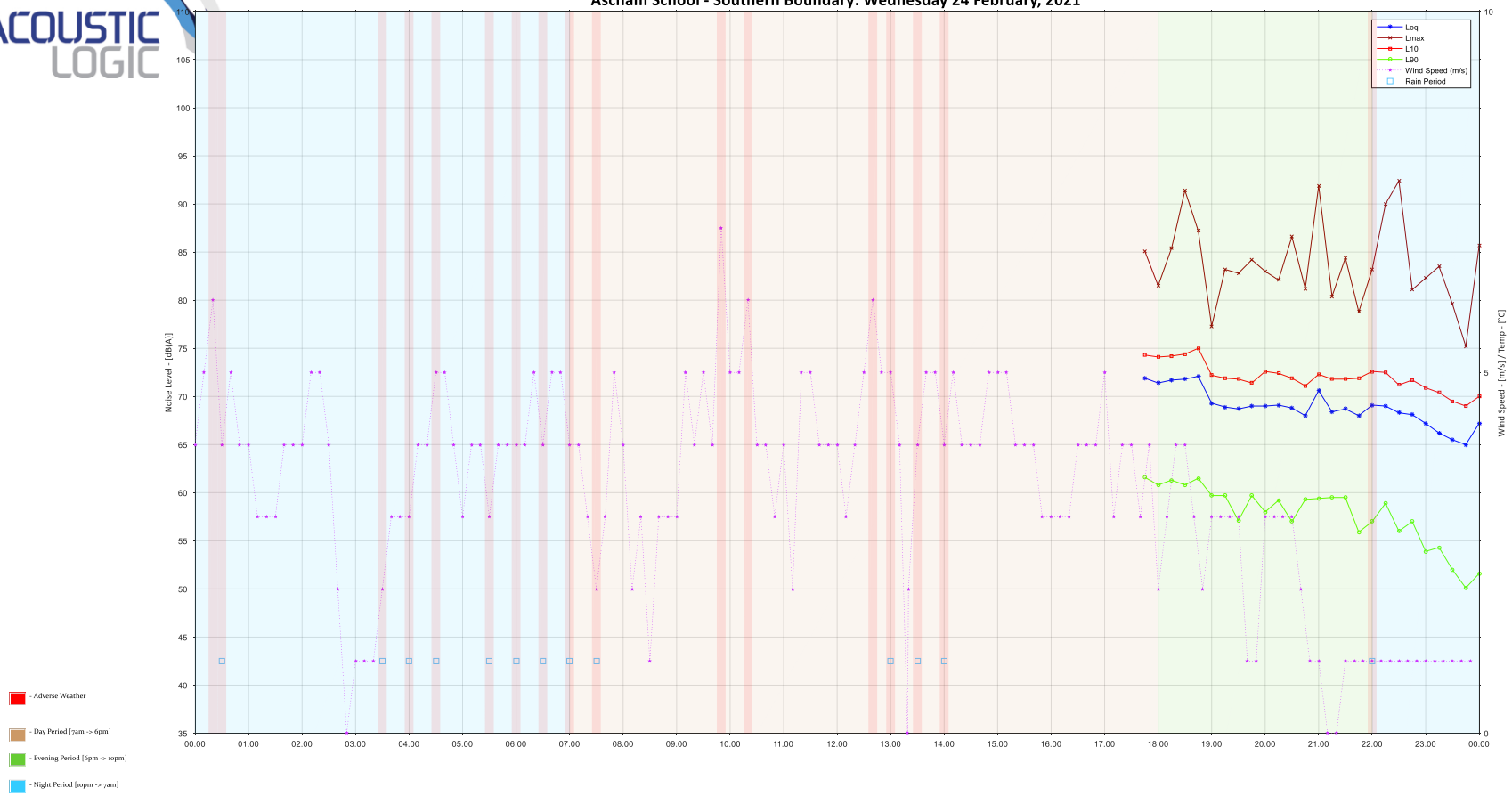
We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

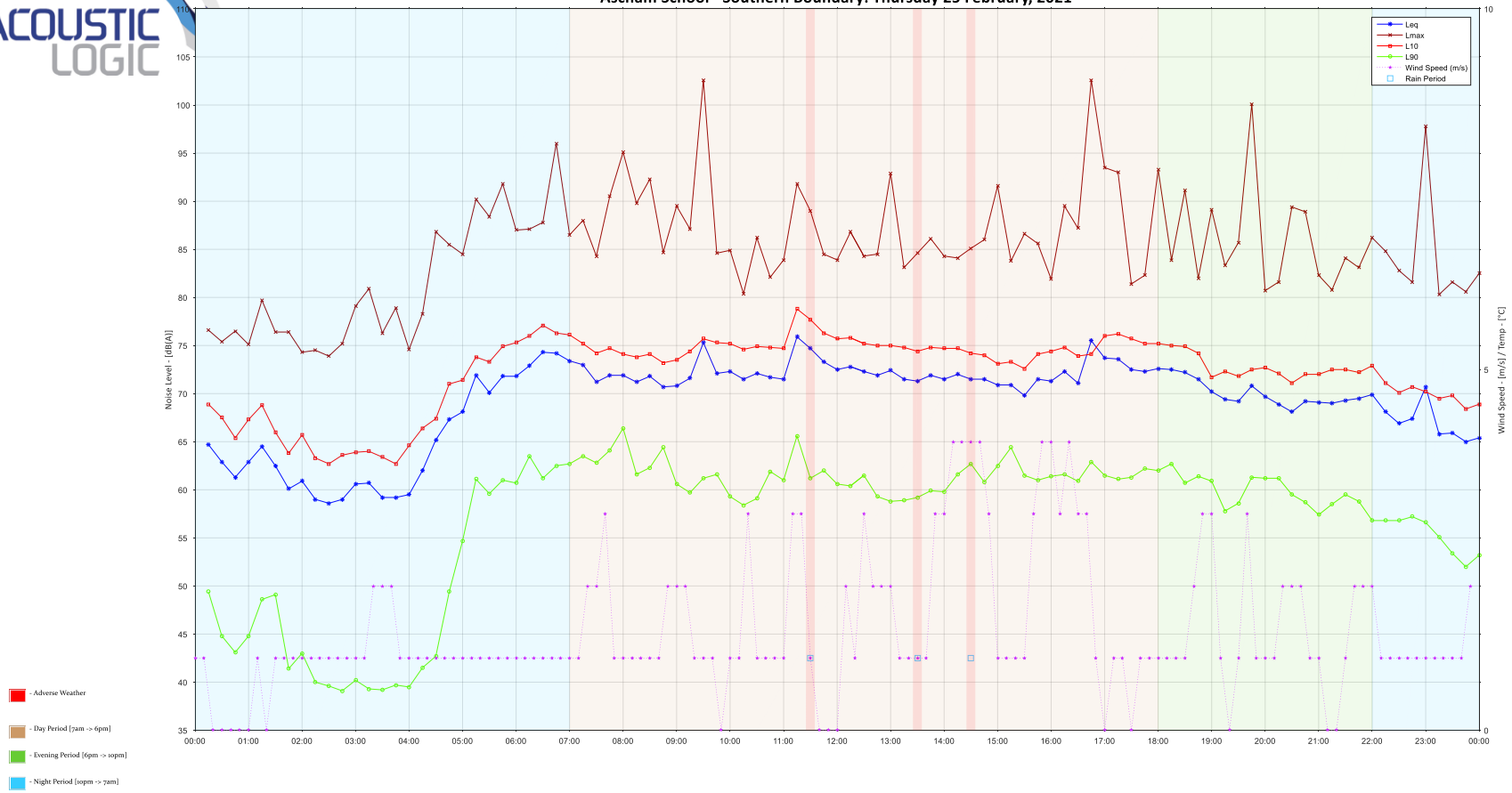
Acoustic Logic Pty Ltd
Artie Rattananikom

APPENDIX A – NOISE MONITORING RESULTS, NOISE MONITOR LOCATION L1 (SOUTHERN BOUNDARY, ADJACENT TO ENTRY DRIVEWAY)

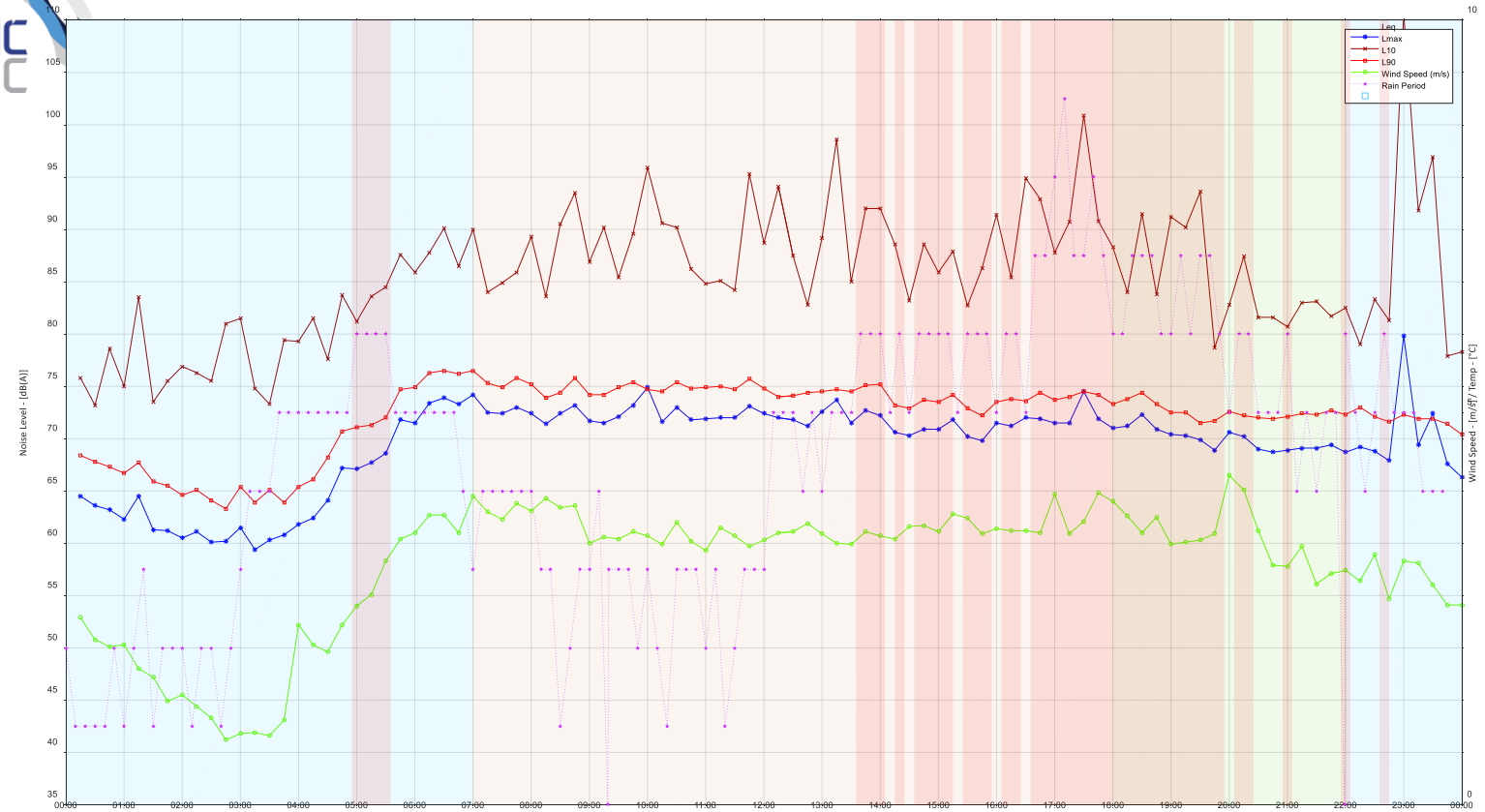
Ascham School - Southern Boundary: Wednesday 24 February, 2021



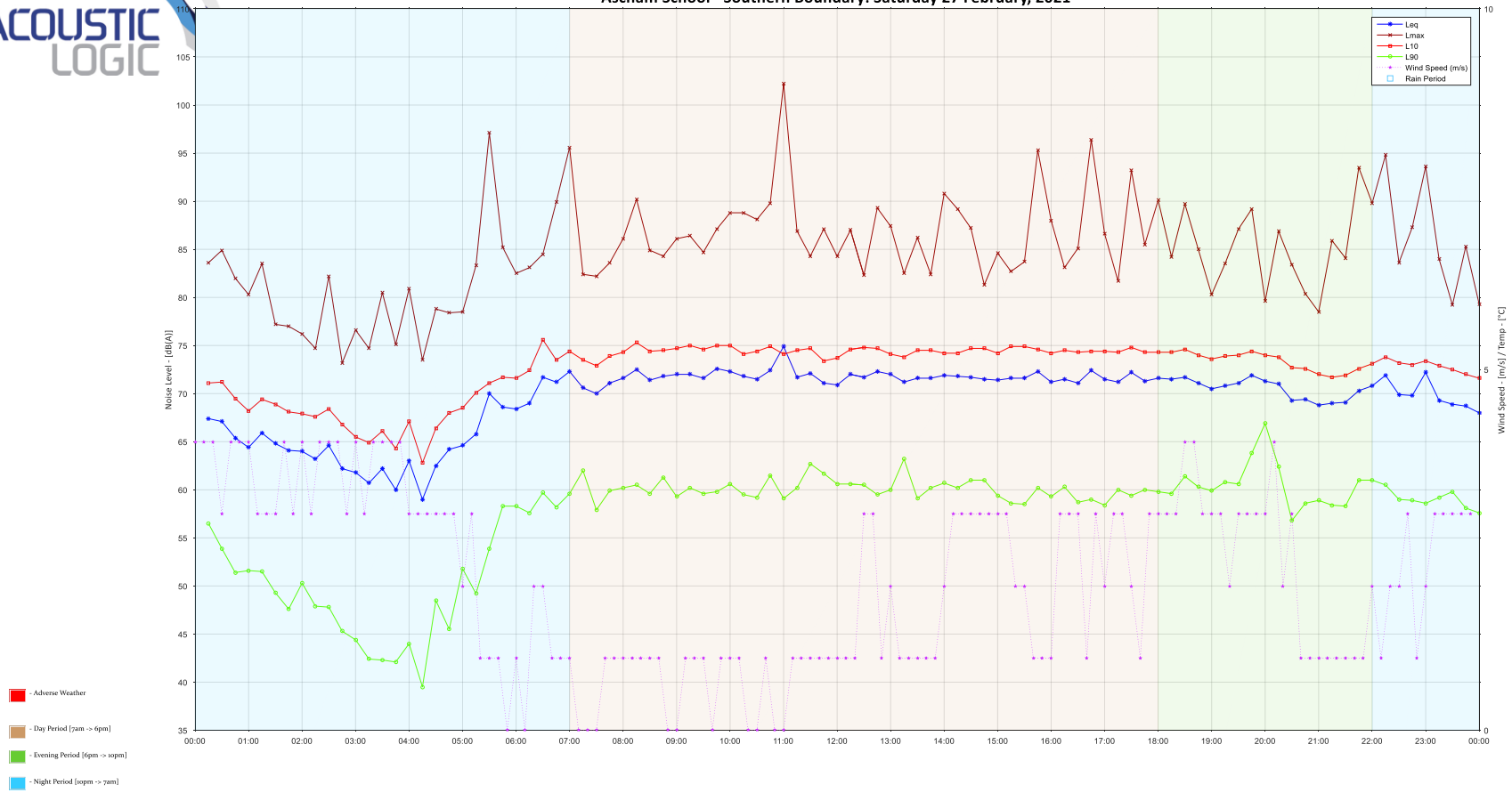
Ascham School - Southern Boundary: Thursday 25 February, 2021



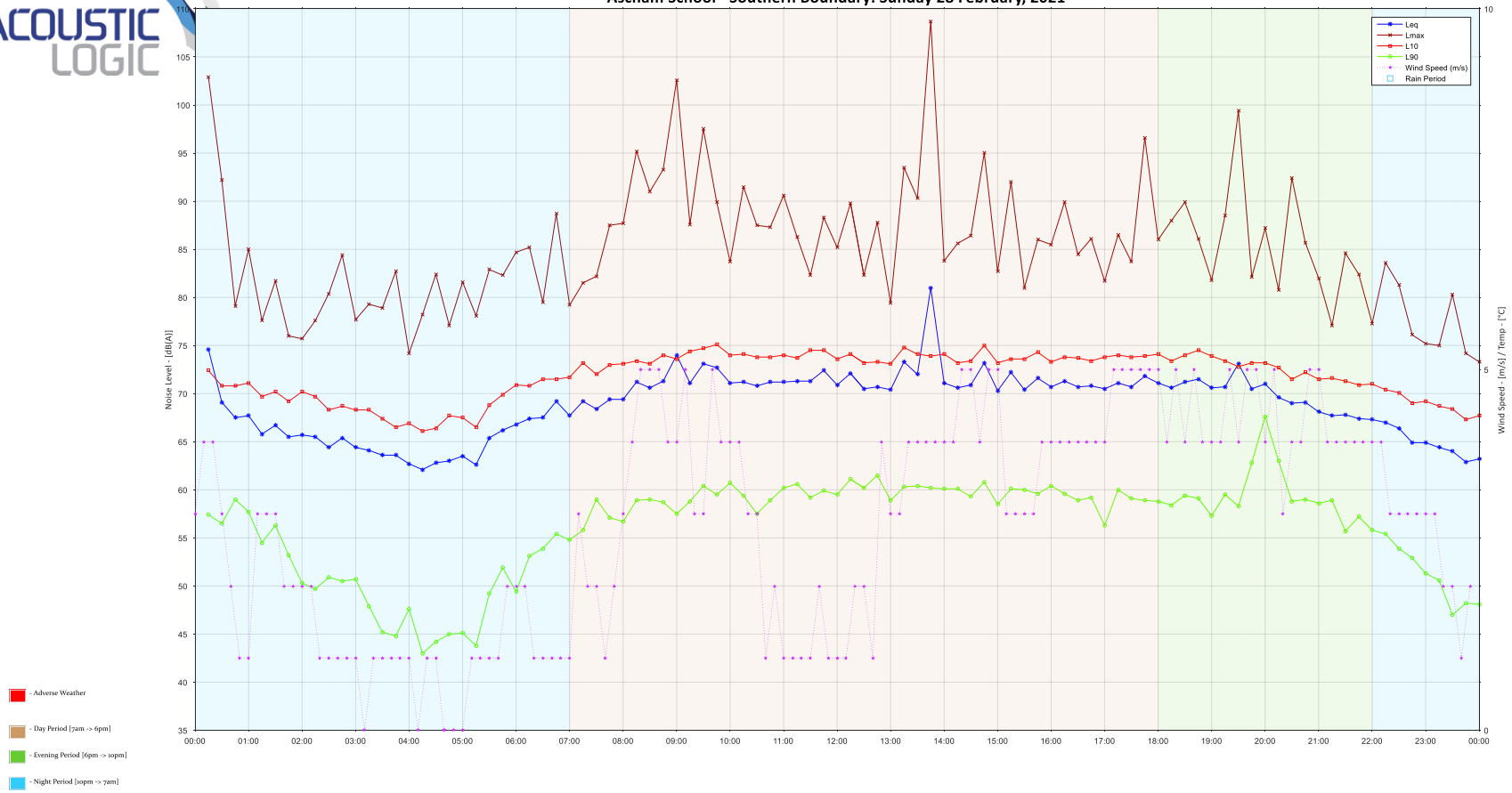
Ascham School - Southern Boundary: Friday 26 February, 2021



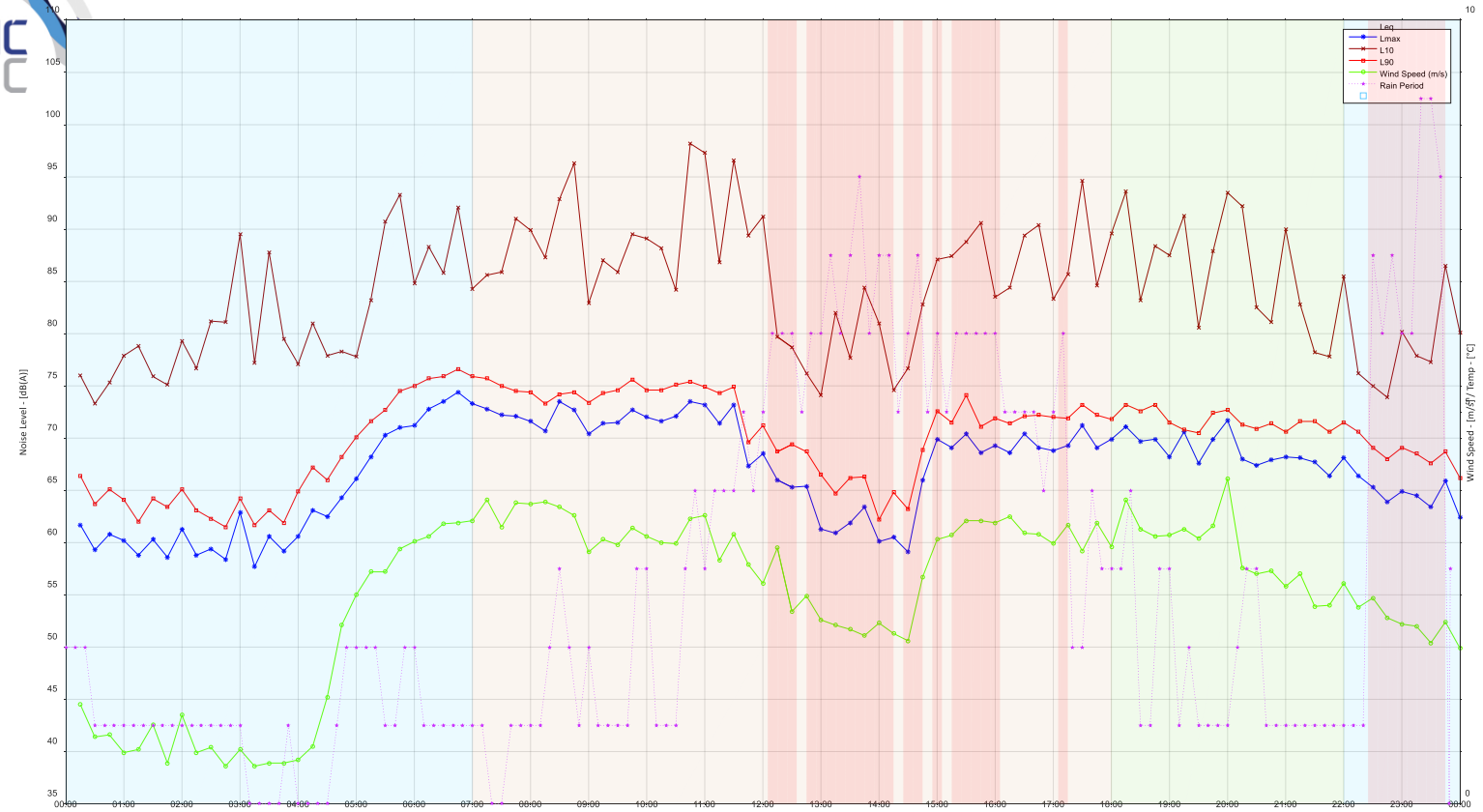
Ascham School - Southern Boundary: Saturday 27 February, 2021



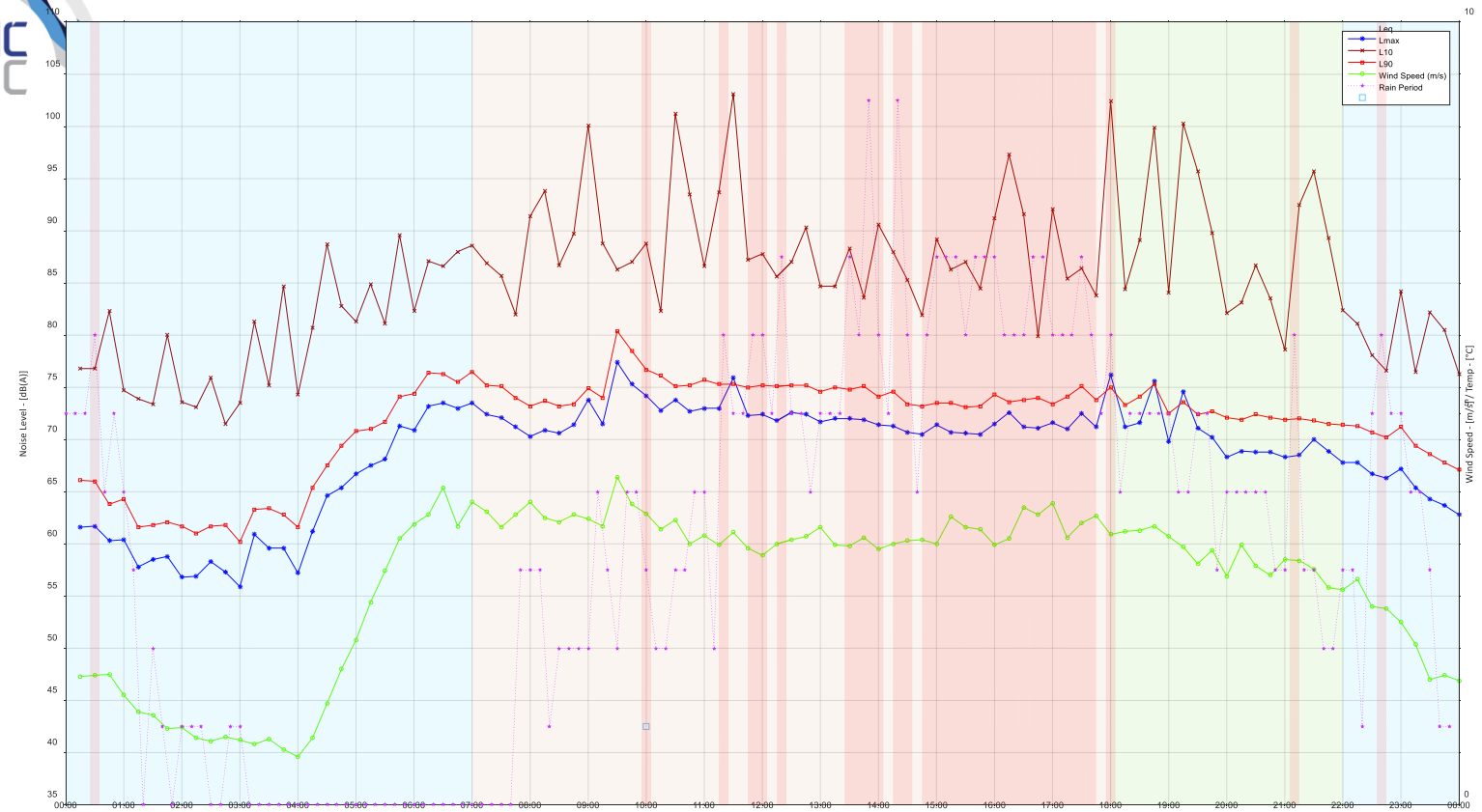
Ascham School - Southern Boundary: Sunday 28 February, 2021



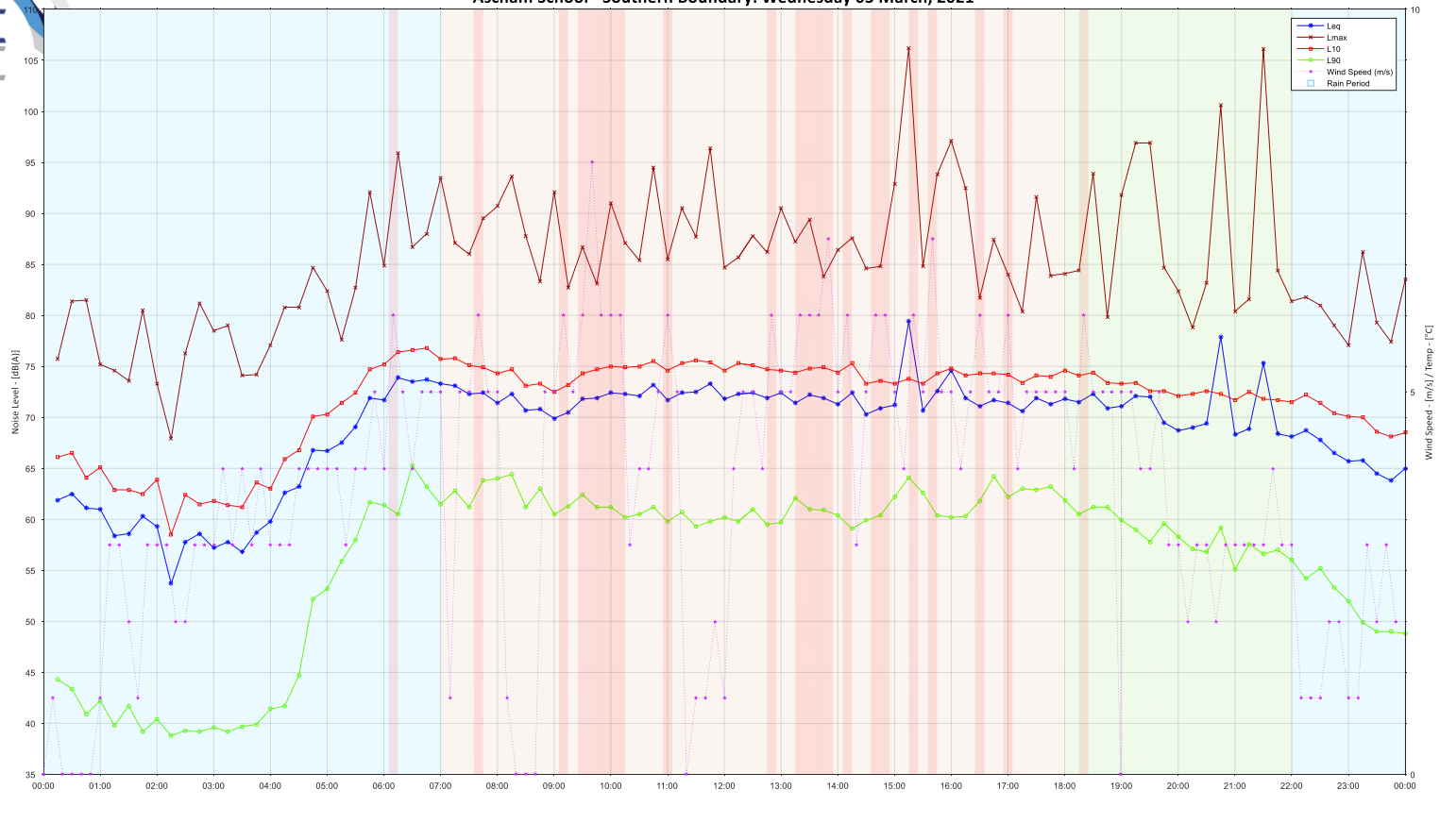
Ascham School - Southern Boundary: Monday 01 March, 2021

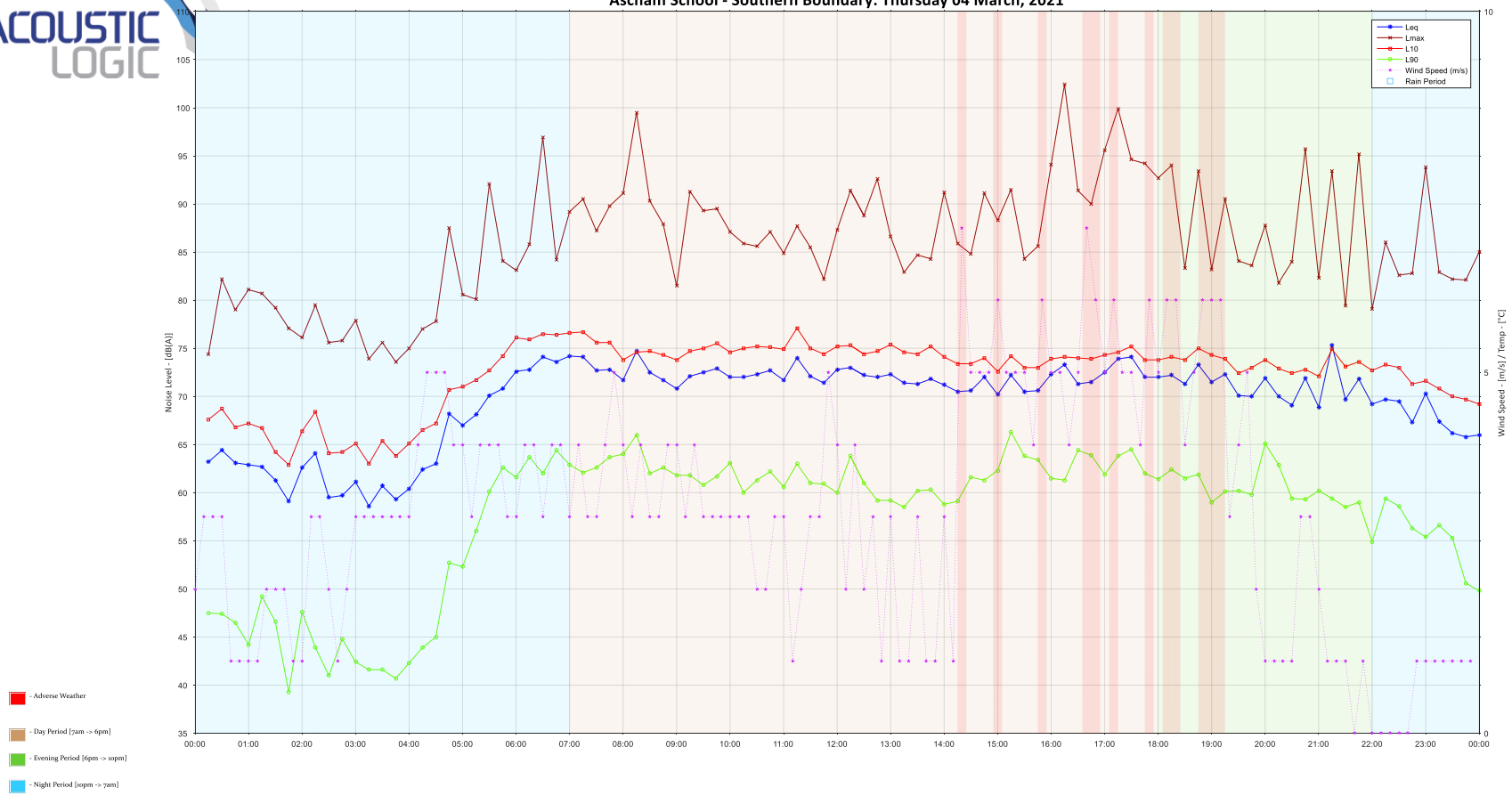


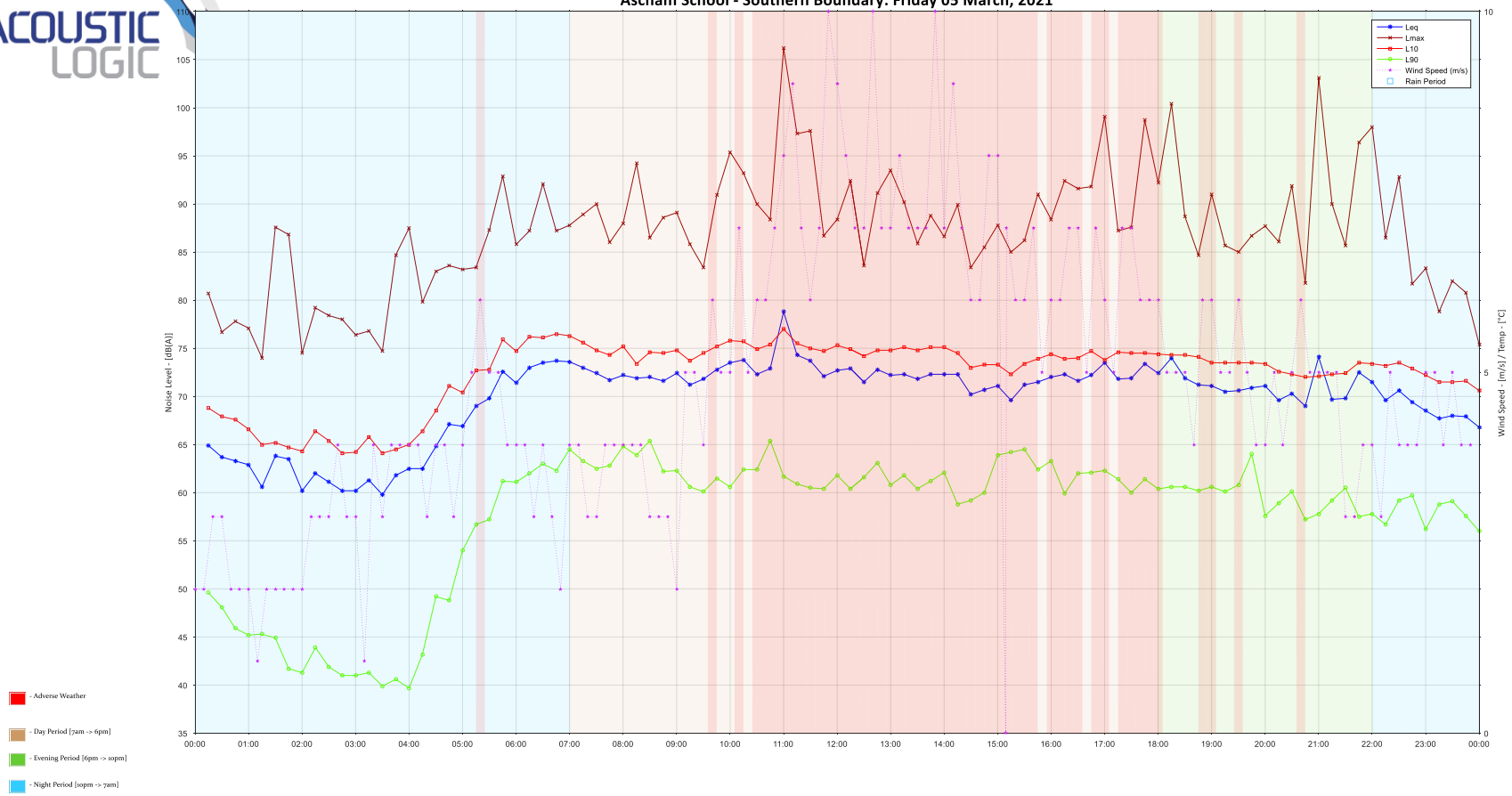
Ascham School - Southern Boundary: Tuesday 02 March, 2021

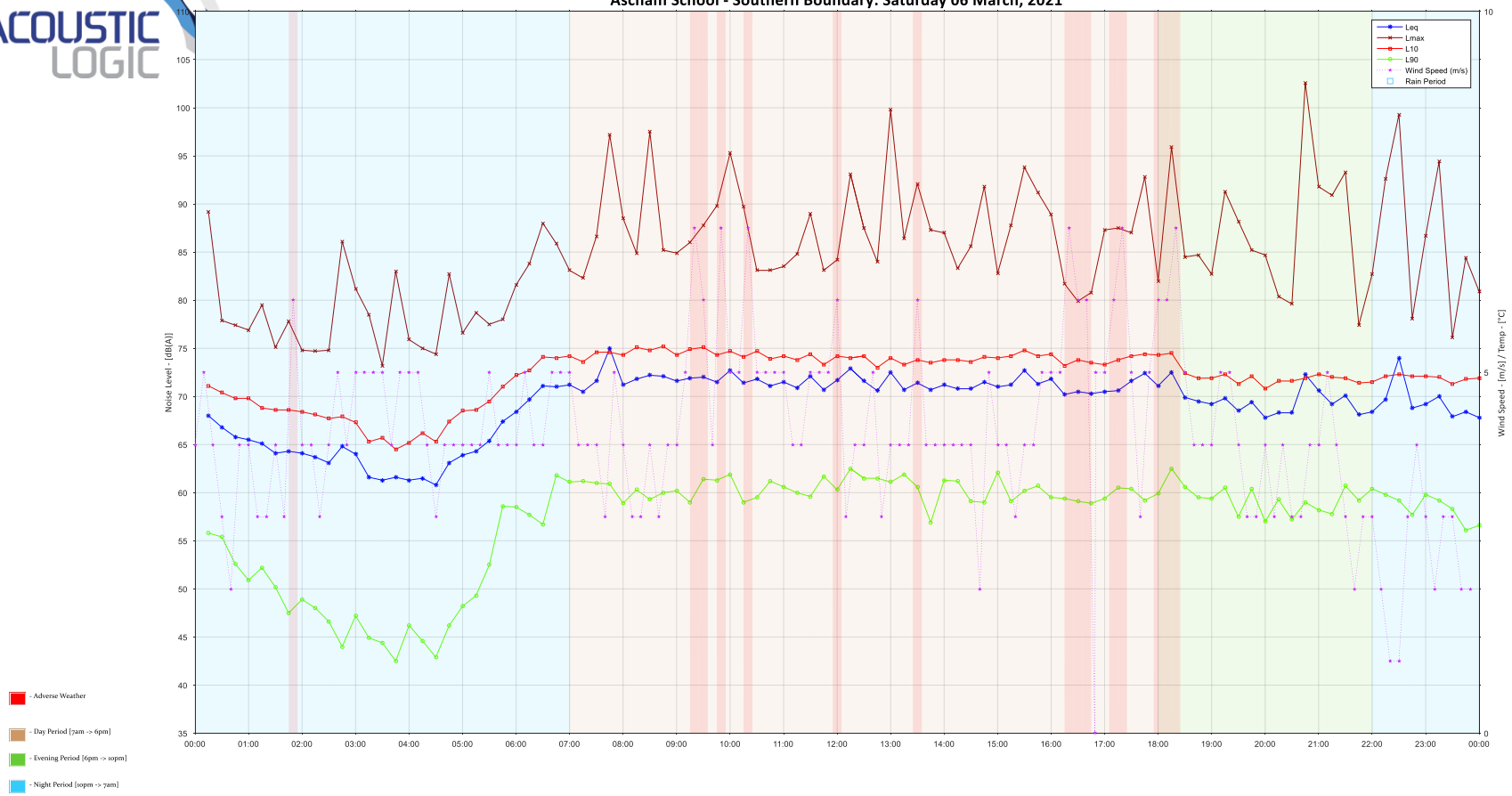


Ascham School - Southern Boundary: Wednesday 03 March, 2021

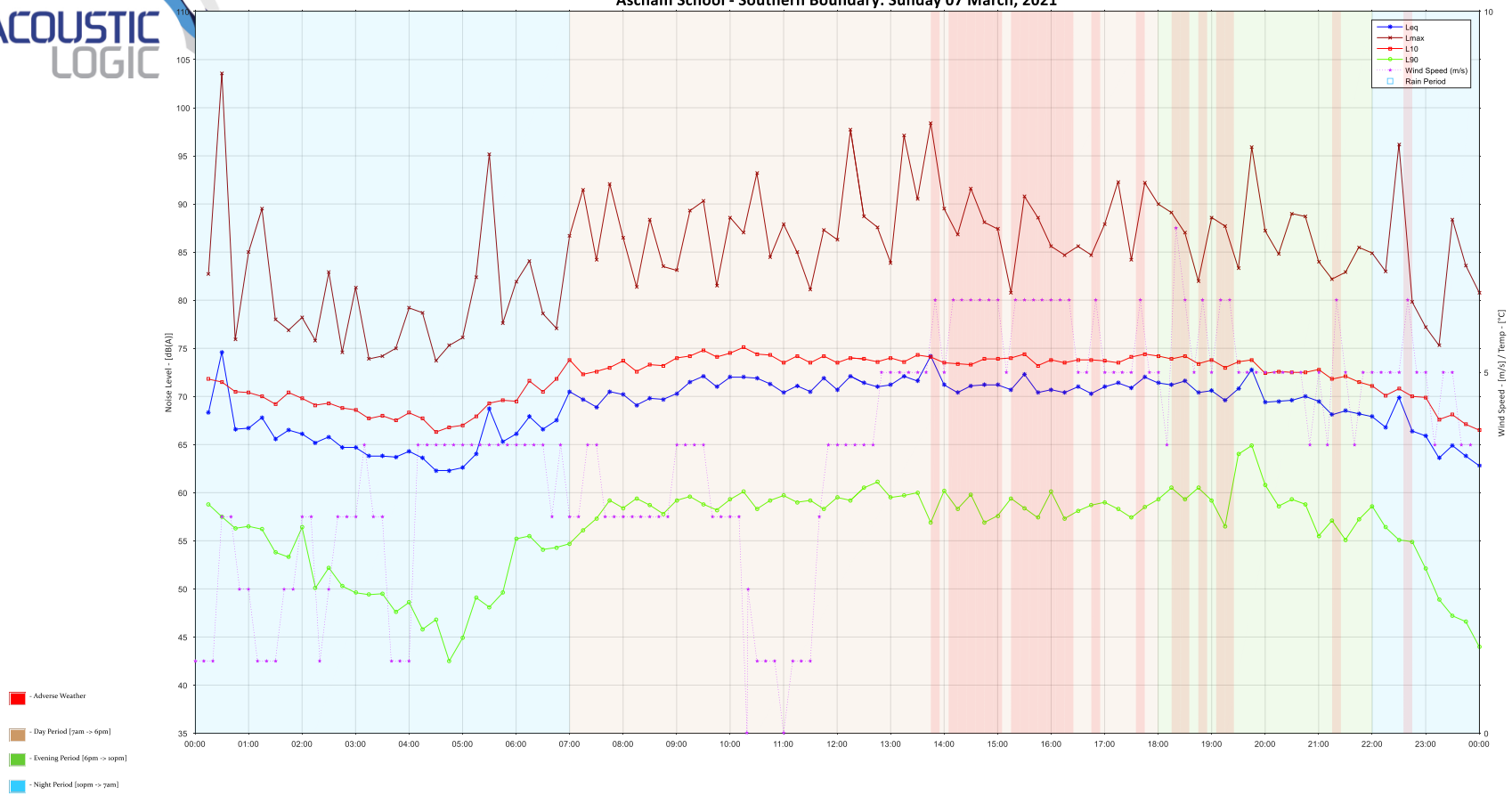


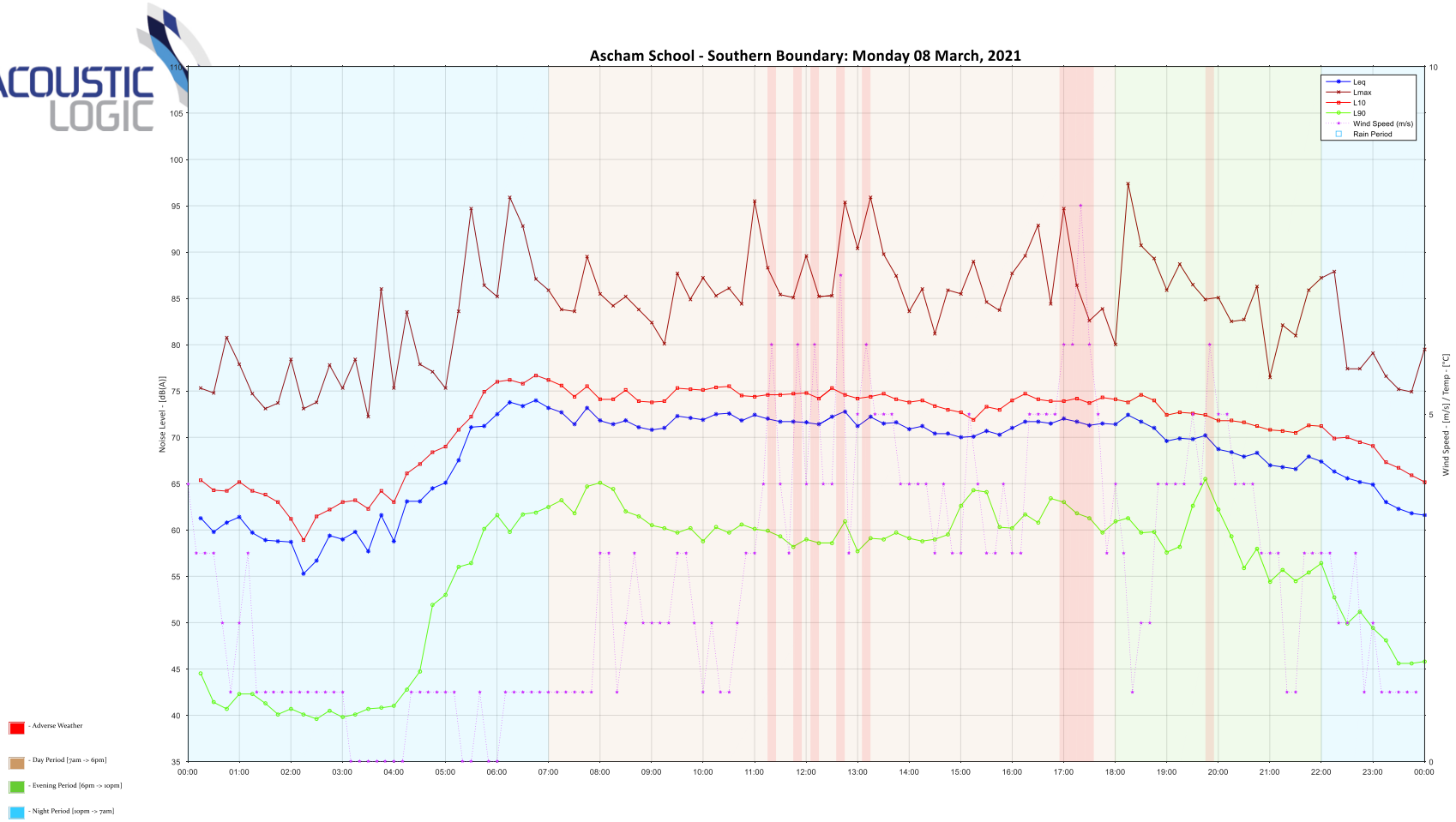

Ascham School - Southern Boundary: Thursday 04 March, 2021
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Ascham School - Southern Boundary: Friday 05 March, 2021
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

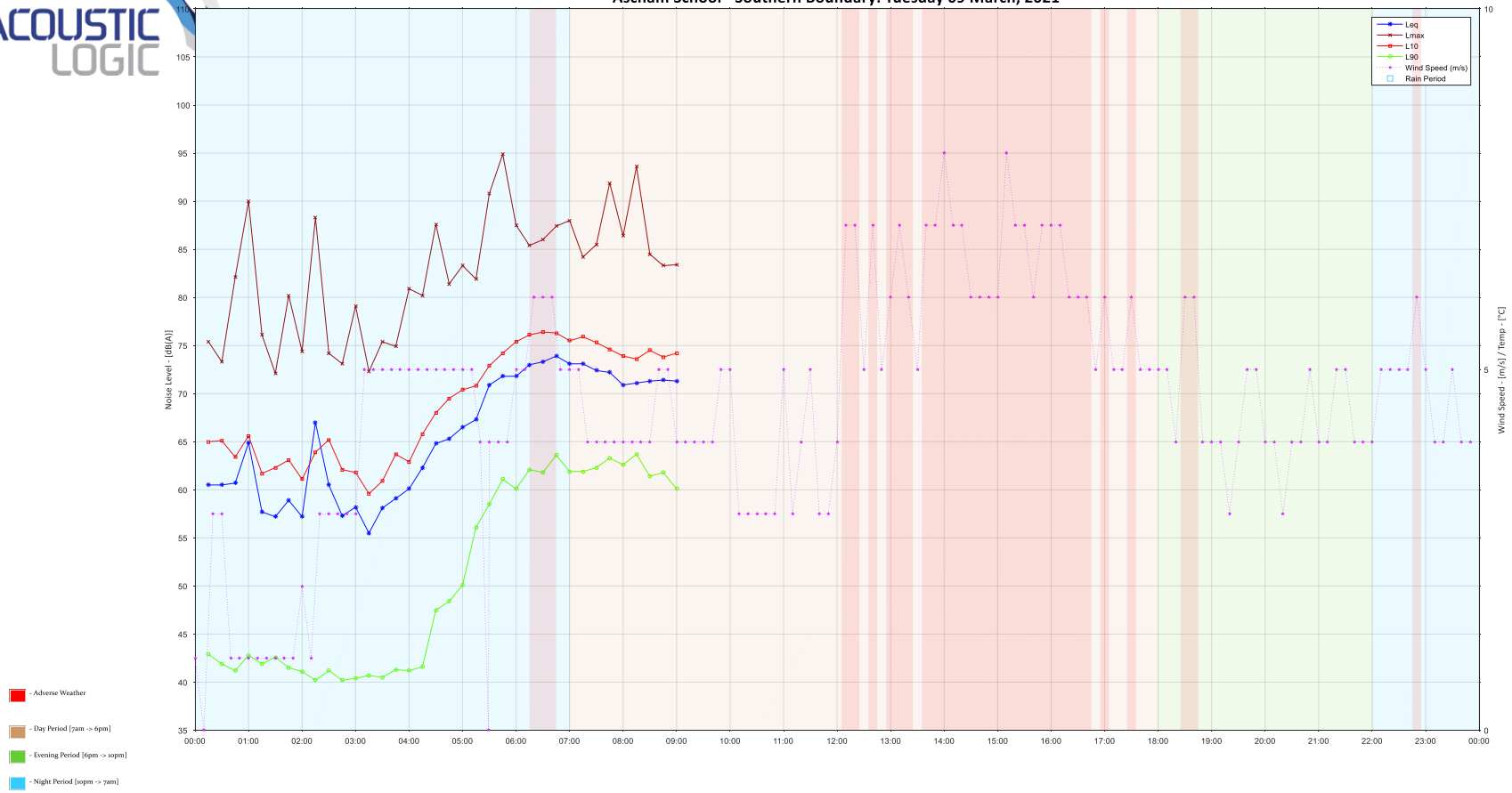

Ascham School - Southern Boundary: Saturday 06 March, 2021
Leq
Lmax
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

Ascham School - Southern Boundary: Sunday 07 March, 2021



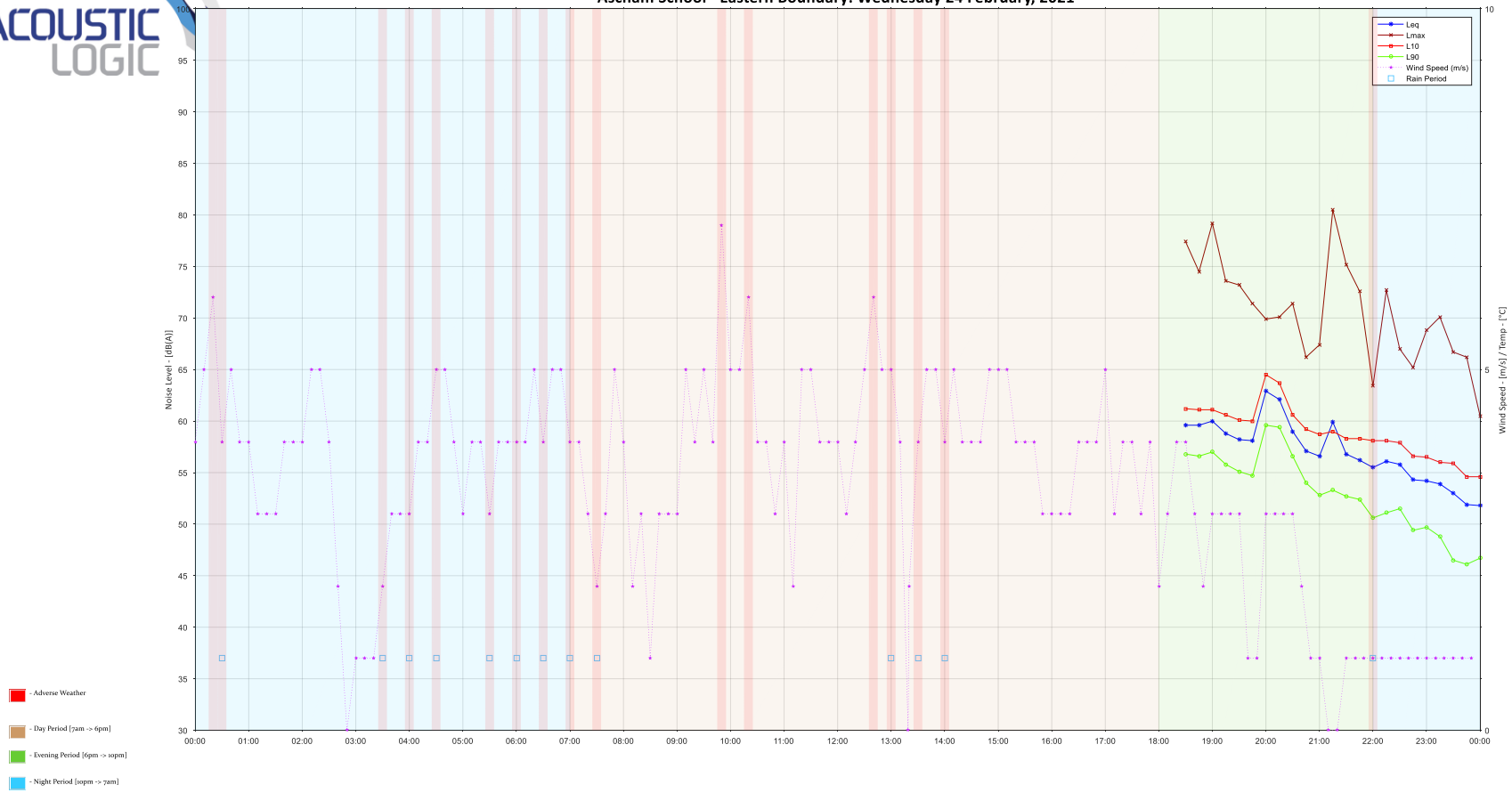

Ascham School - Southern Boundary: Monday 08 March, 2021
Leq
Lmax
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

Ascham School - Southern Boundary: Tuesday 09 March, 2021



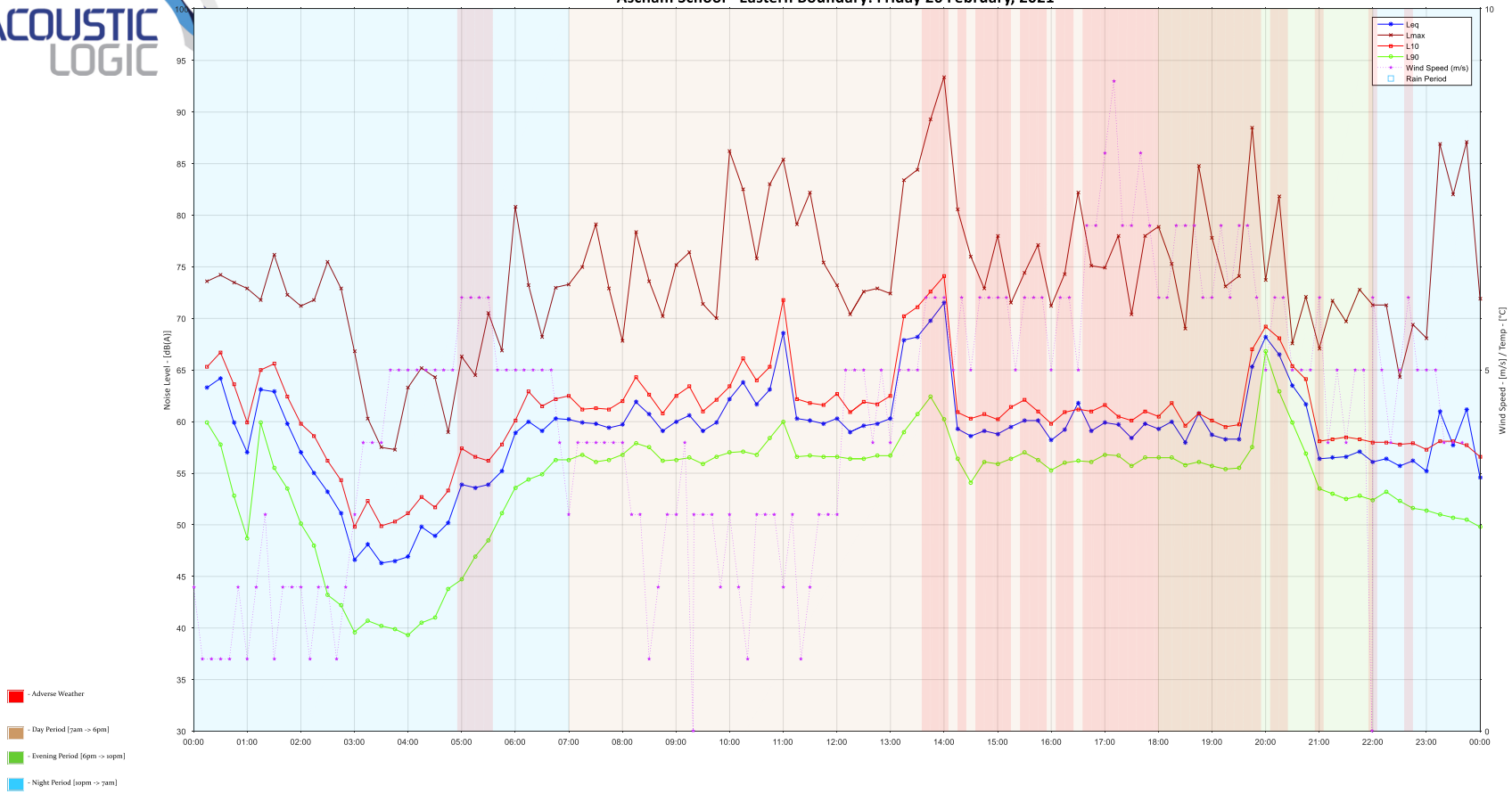
APPENDIX B – NOISE MONITORING RESULTS, NOISE MONITOR LOCATION L2 (EASTERN BOUNDARY)

Ascham School - Eastern Boundary: Wednesday 24 February, 2021

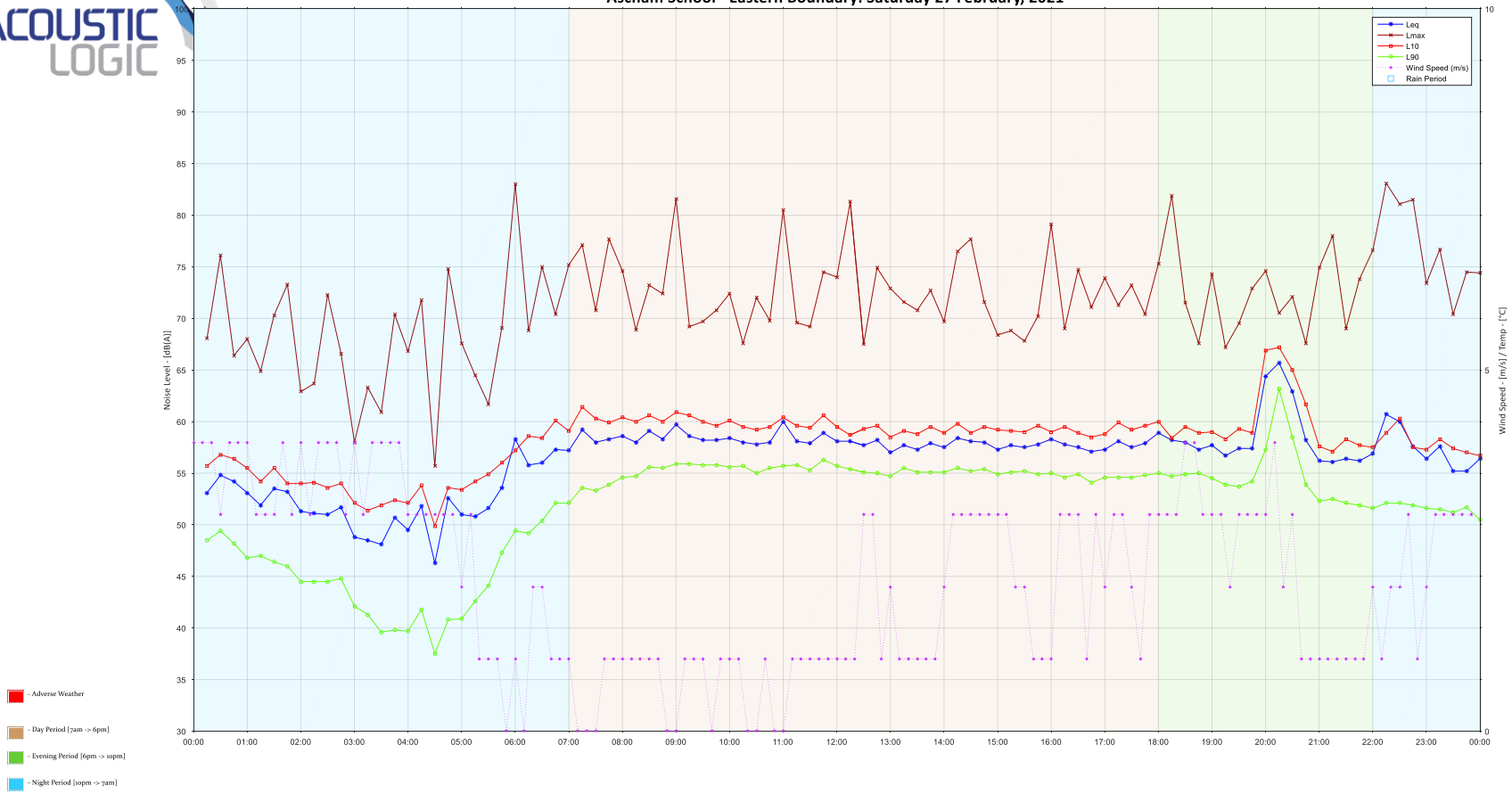


Ascham School - Eastern Boundary: Thursday 25 February, 2021

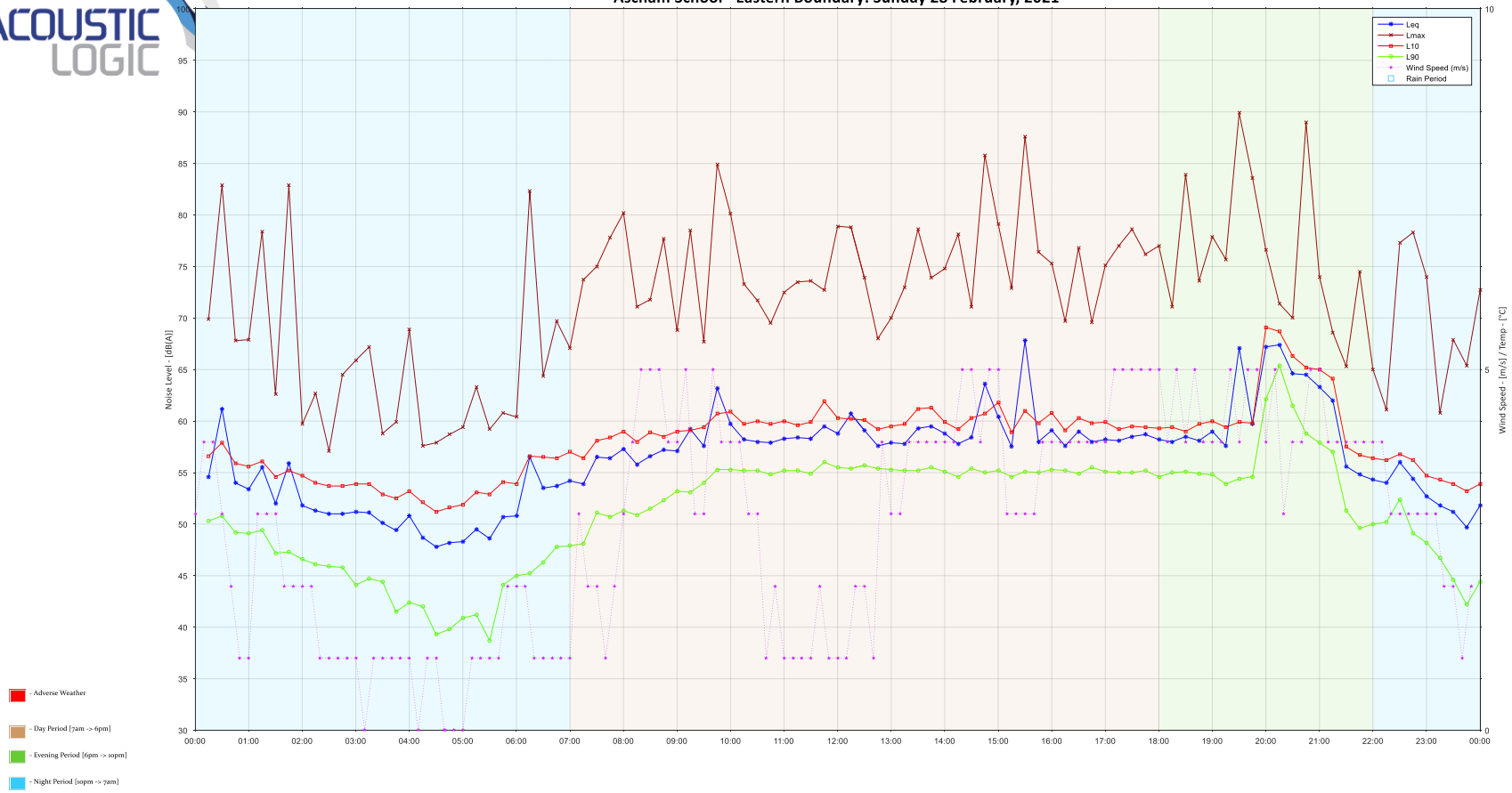
Ascham School - Eastern Boundary: Friday 26 February, 2021



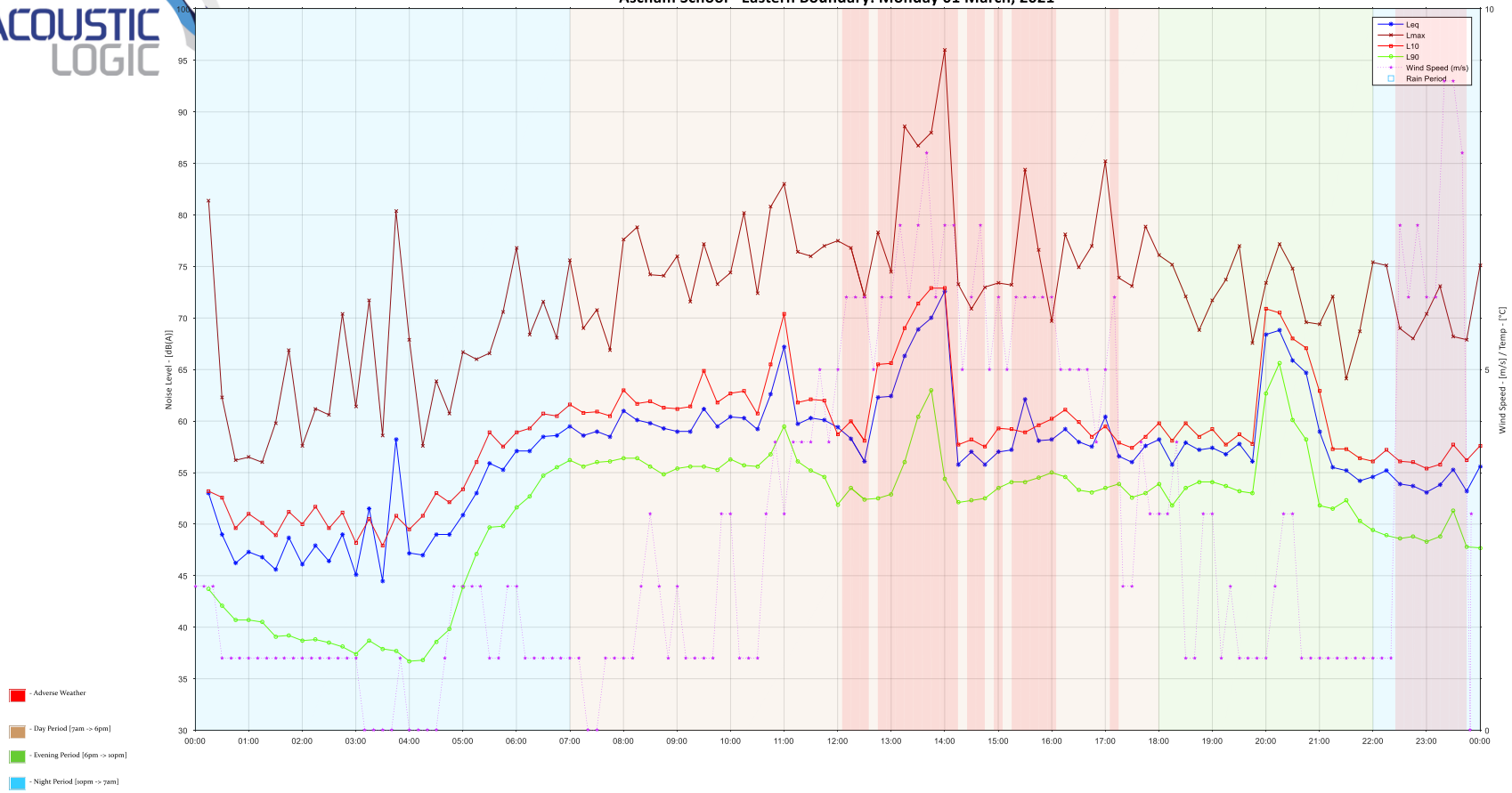
Ascham School - Eastern Boundary: Saturday 27 February, 2021



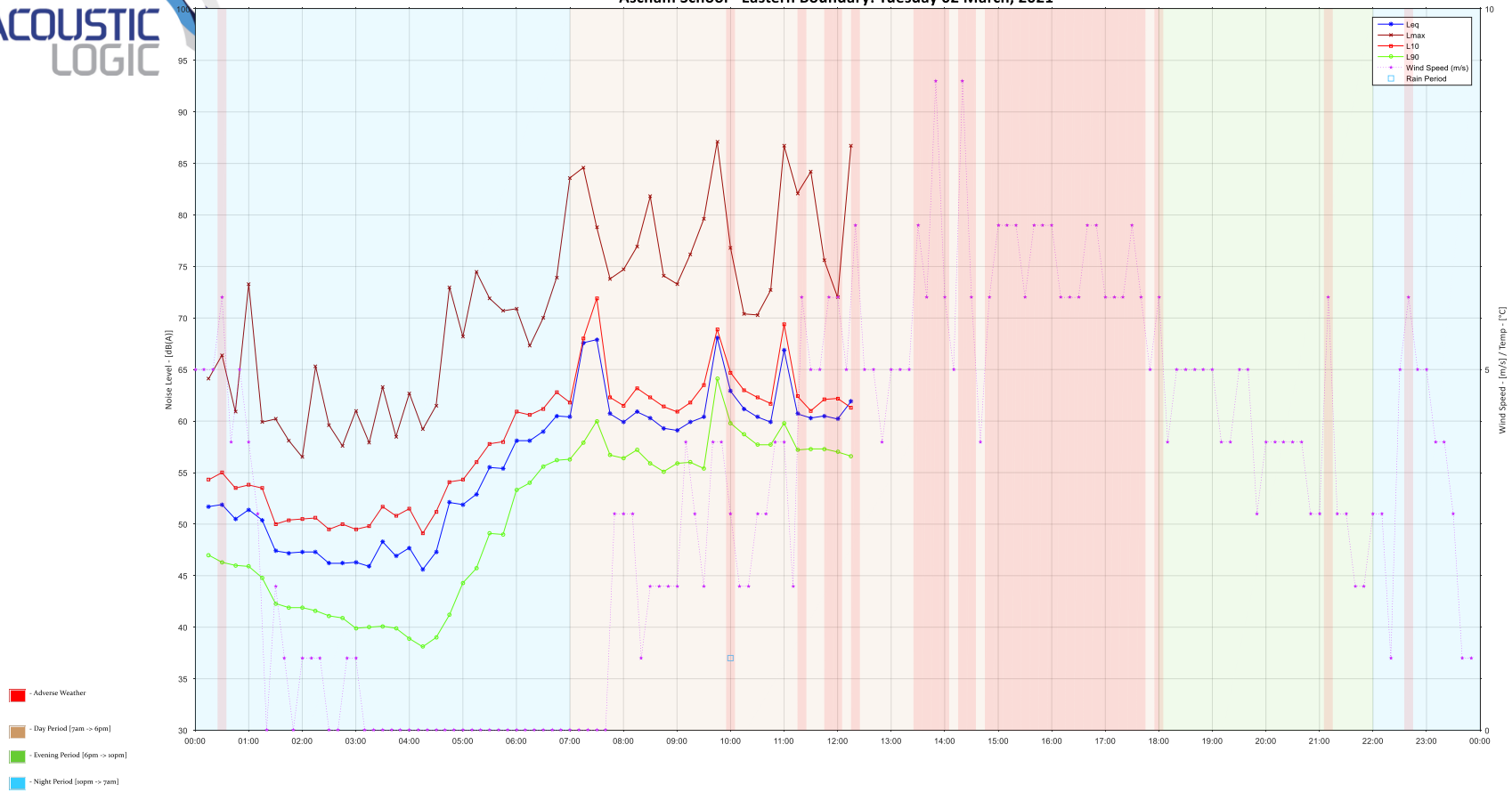
Ascham School - Eastern Boundary: Sunday 28 February, 2021



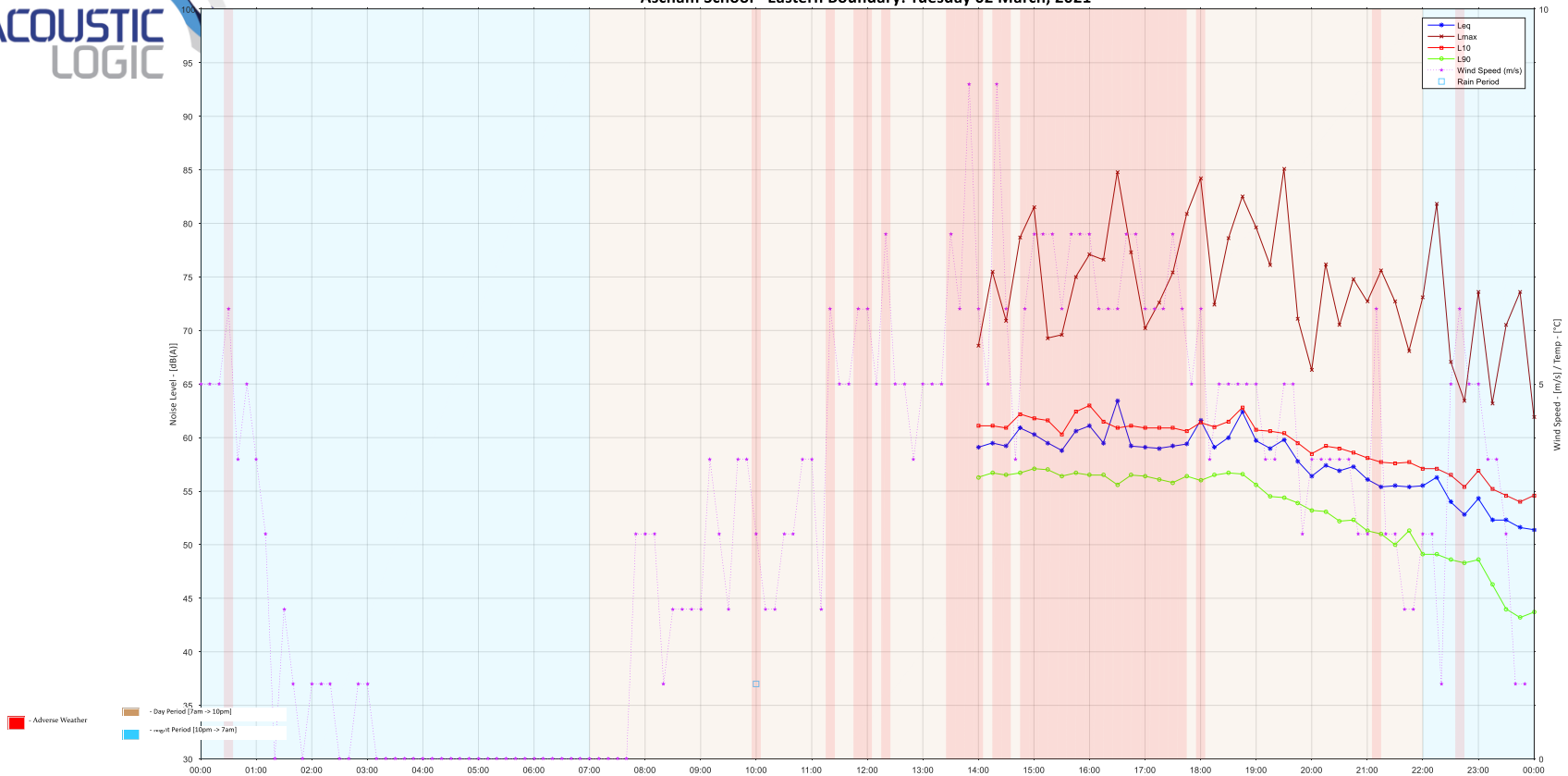
Ascham School - Eastern Boundary: Monday 01 March, 2021



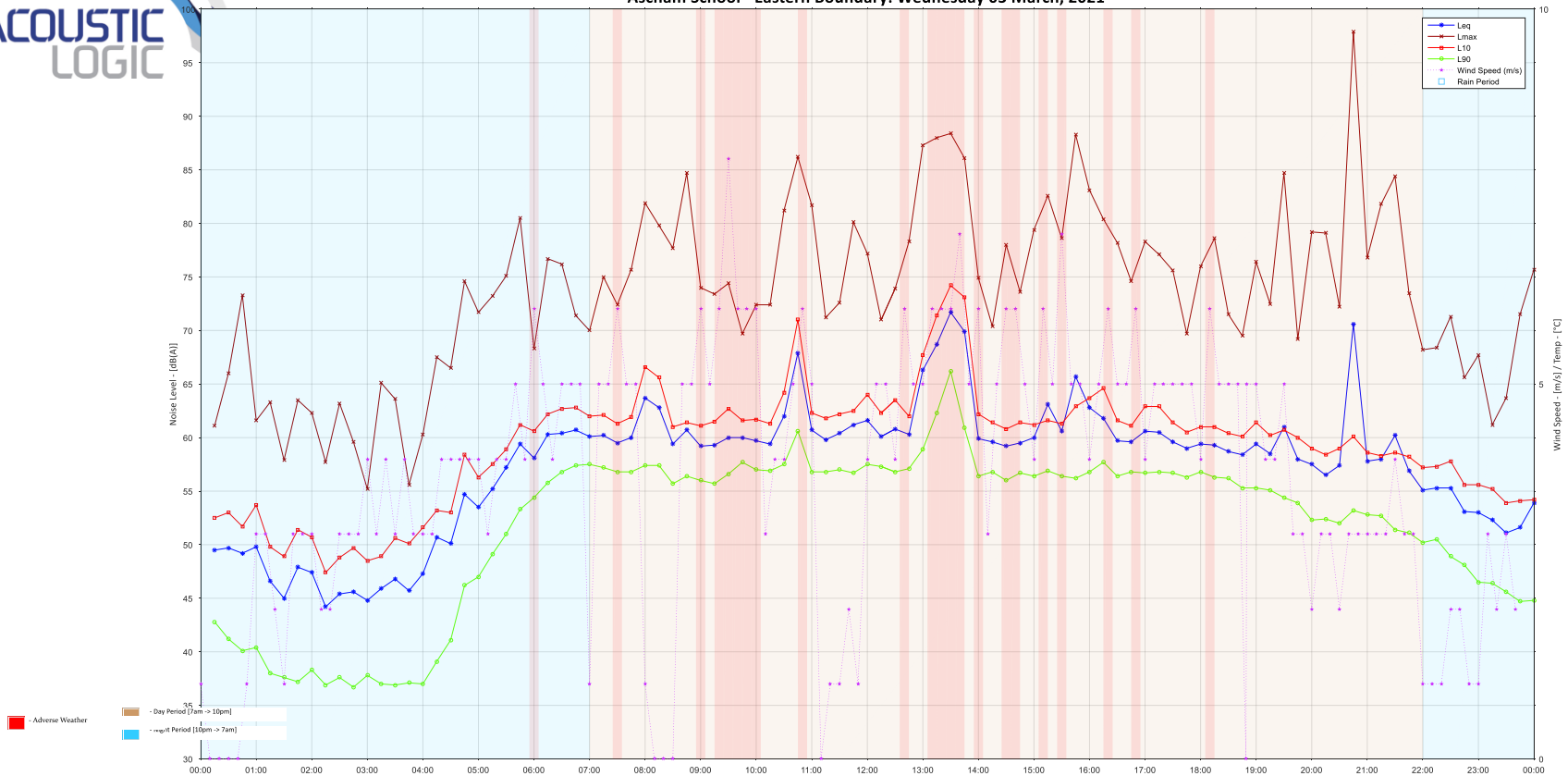
Ascham School - Eastern Boundary: Tuesday 02 March, 2021

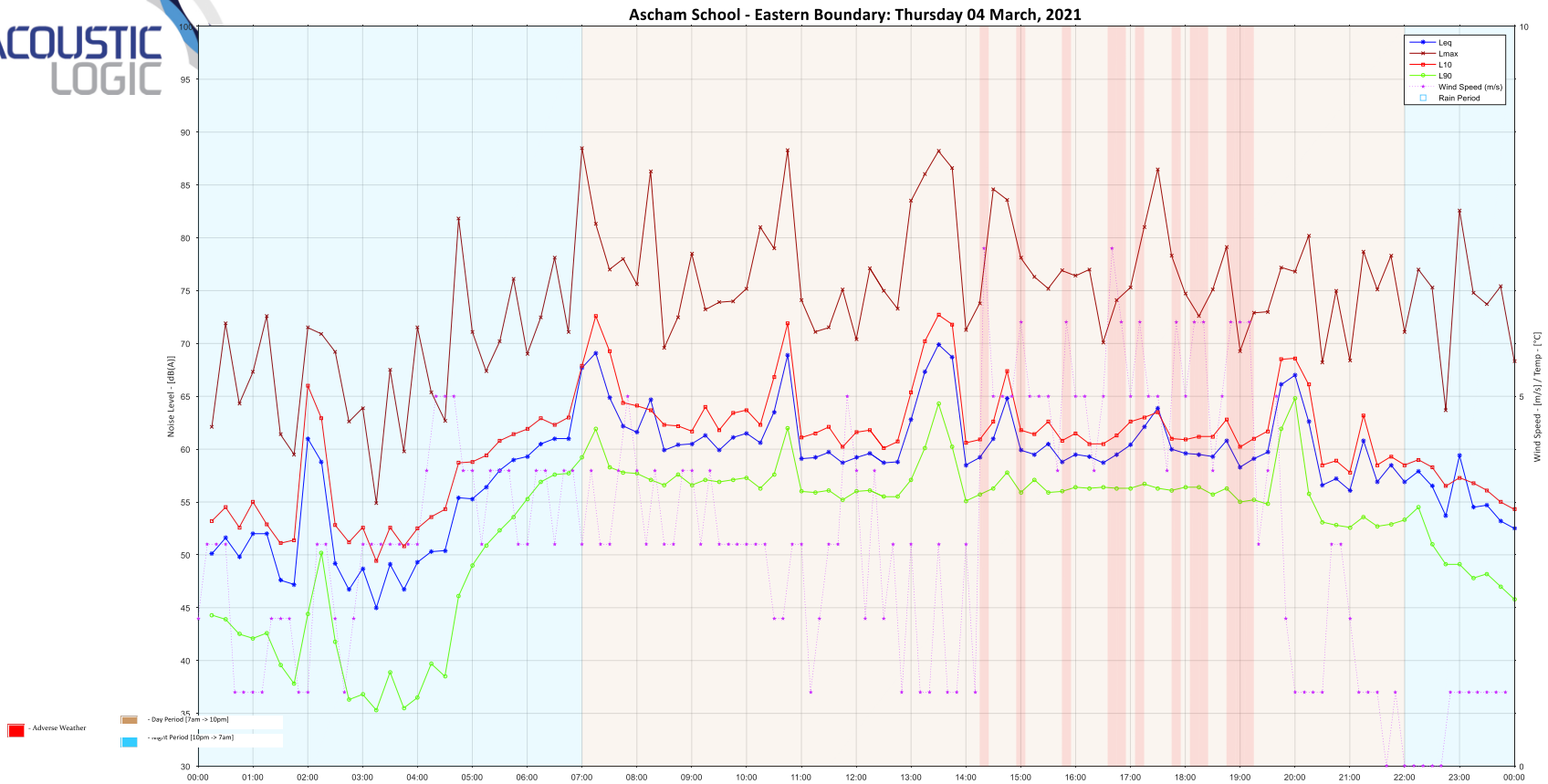


Ascham School - Eastern Boundary: Tuesday 02 March, 2021

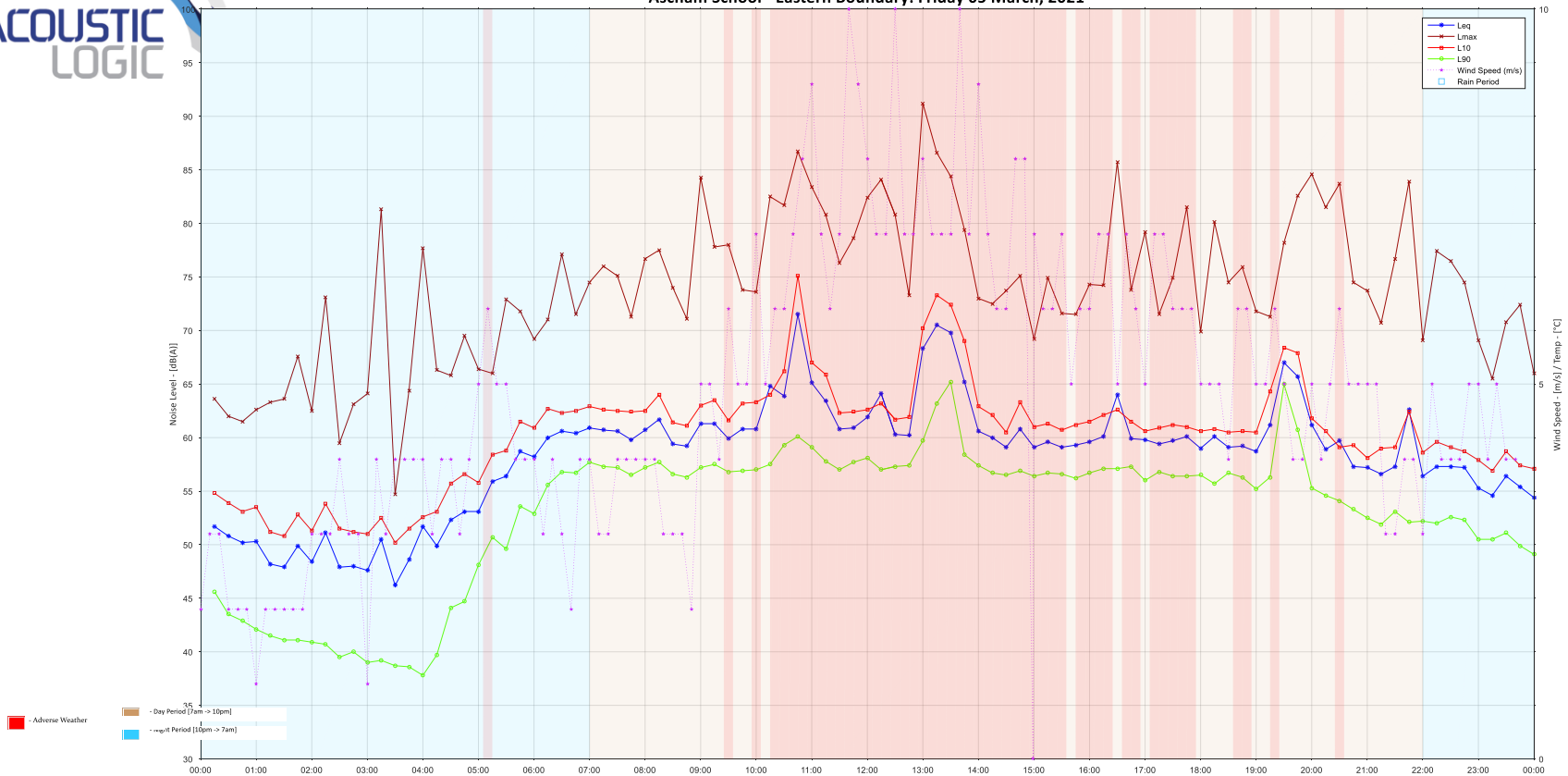


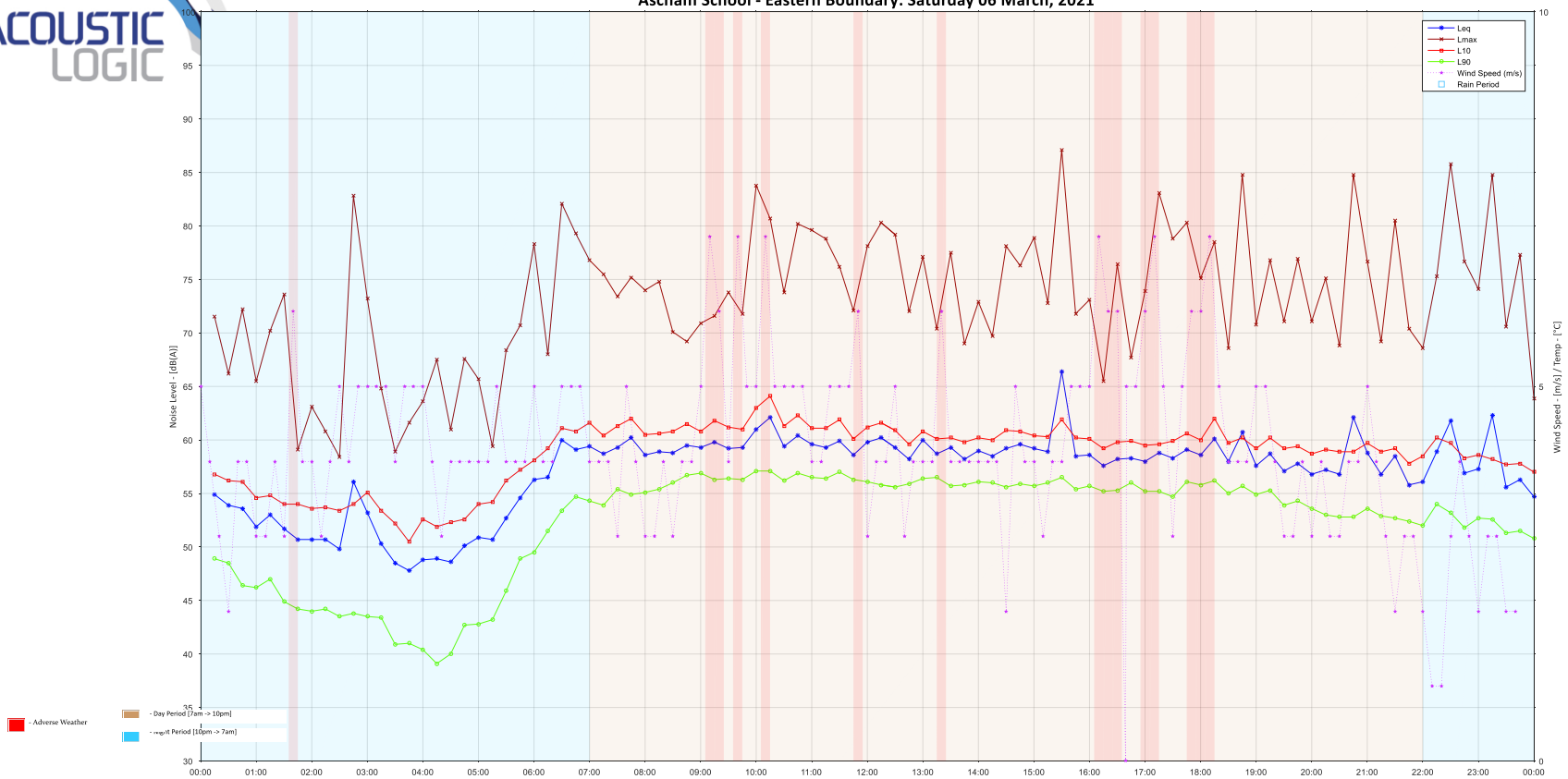
Ascham School - Eastern Boundary: Wednesday 03 March, 2021



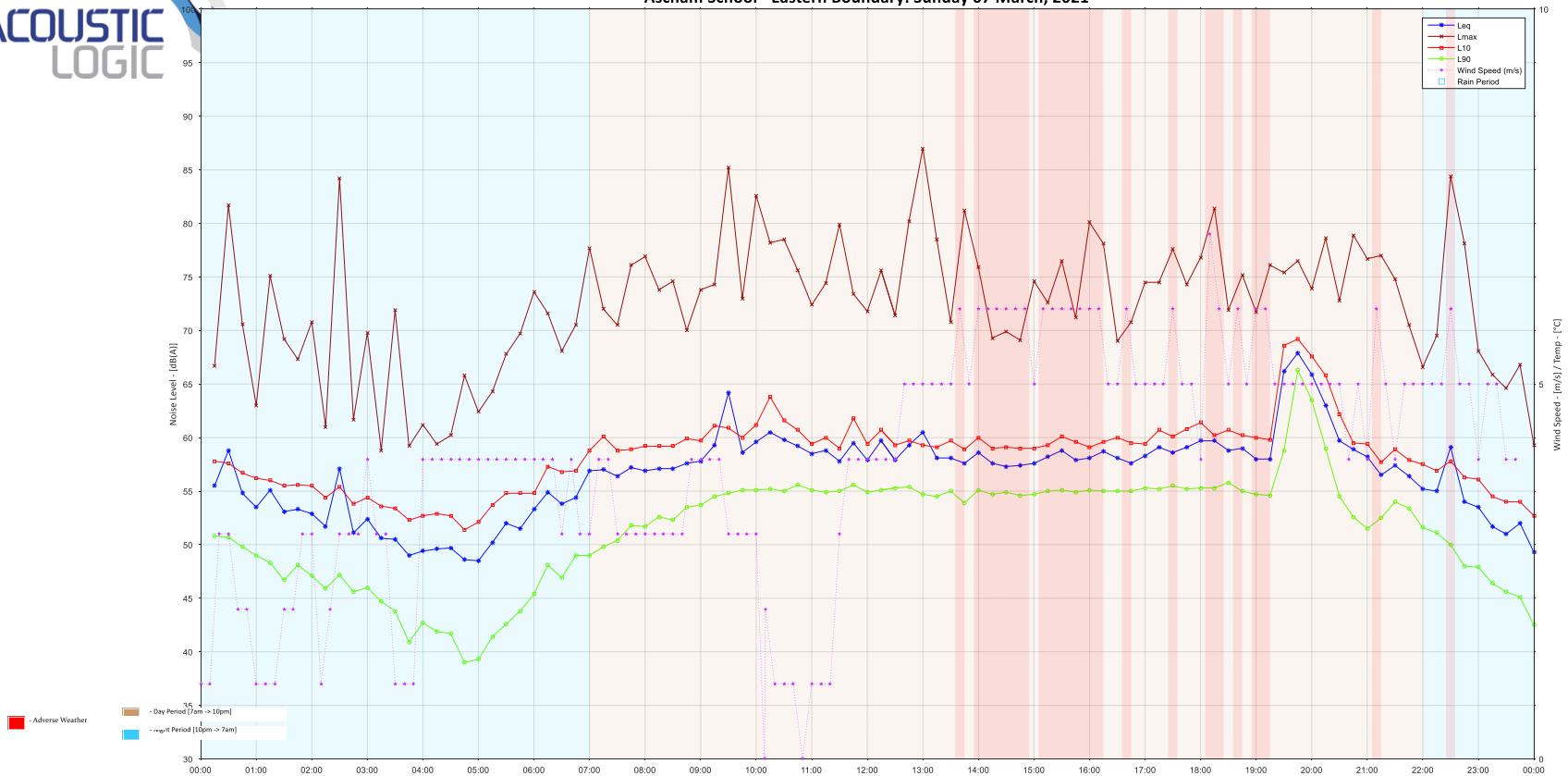

Ascham School - Eastern Boundary: Thursday 04 March, 2021
Leq
Lmax
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 10pm]
- Night Period [10pm -> 7am]

Ascham School - Eastern Boundary: Friday 05 March, 2021

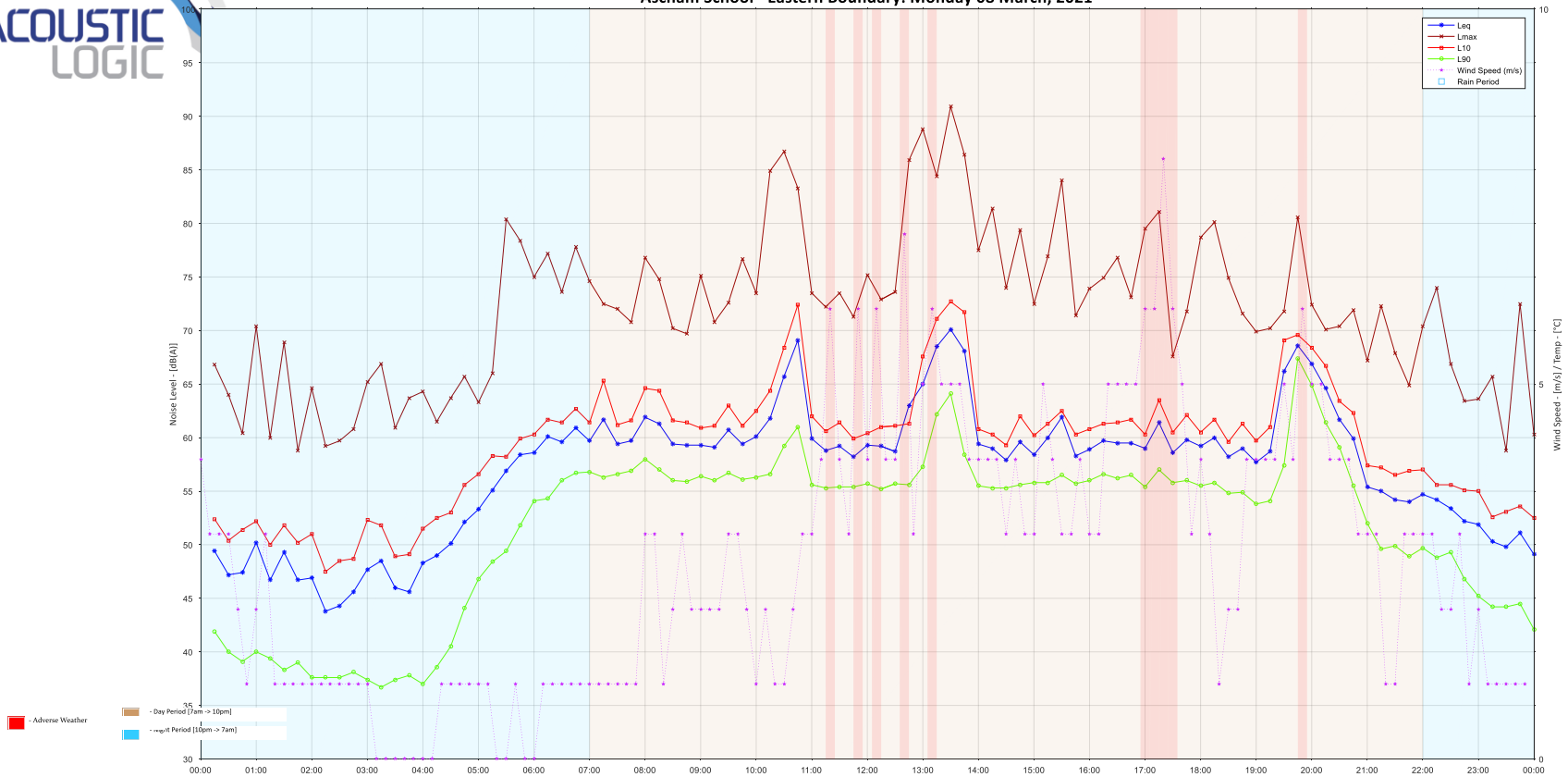



Ascham School - Eastern Boundary: Saturday 06 March, 2021
Leq
Lmax
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 10pm]
- Night Period [10pm -> 7am]

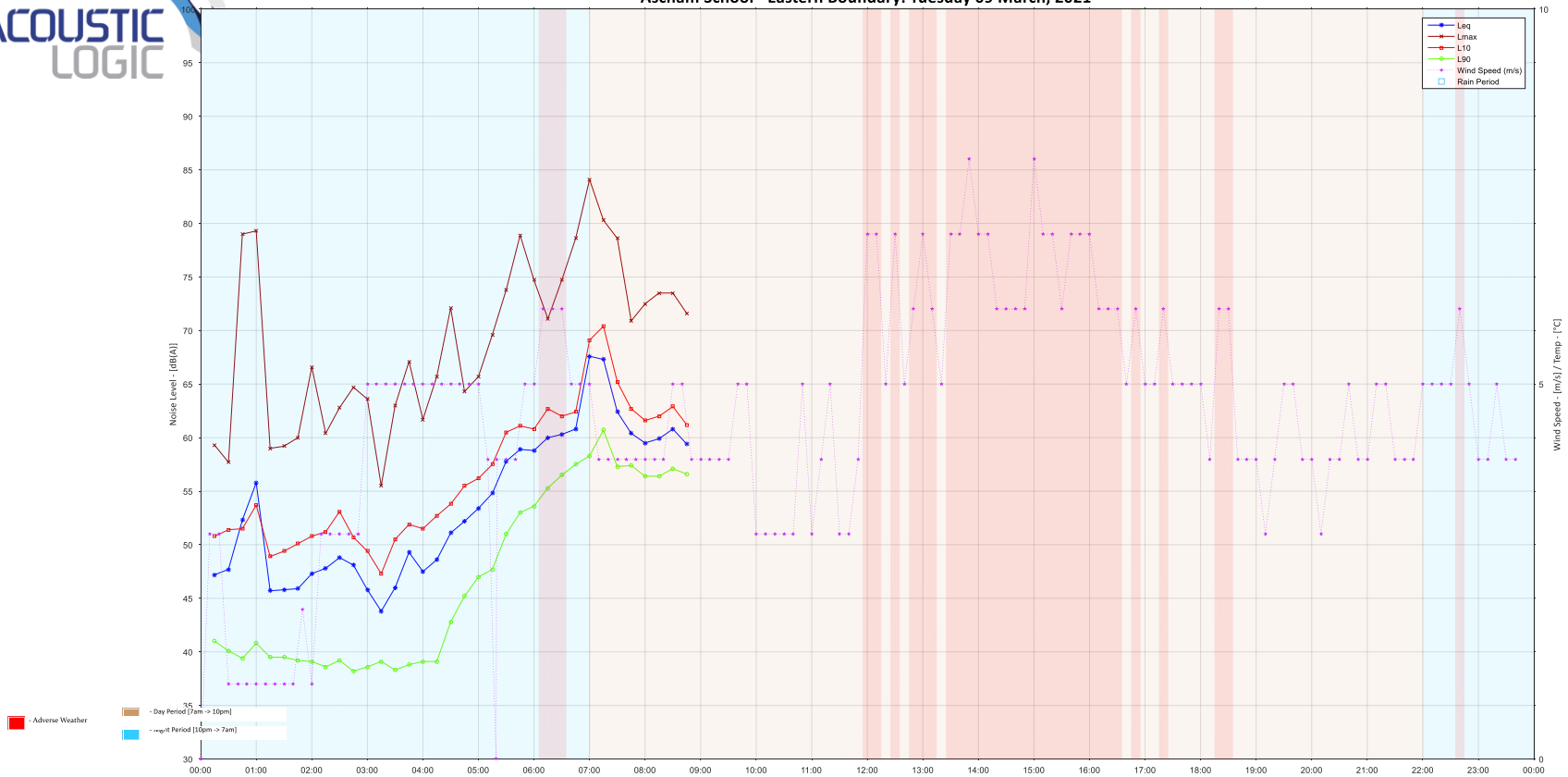
Ascham School - Eastern Boundary: Sunday 07 March, 2021



Ascham School - Eastern Boundary: Monday 08 March, 2021



Ascham School - Eastern Boundary: Tuesday 09 March, 2021



APPENDIX C – GLAZING MARKUP FOR FIONA HALL BUILDING

ACOUSTIC LOGIC

Glazing Mark Up Key

- 6.38mm Laminated (Rw31)
- 10.38mm Laminated (Rw35)
- 10.68mm Laminated/114mm Air-Cavity/6mm Float (Rw45)

Author: AR Date: 16/06/21

BVN

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1	16/02/2021	FOR INFORMATION
2	01/03/2021	FOR INFORMATION
3	04/03/2021	FOR INFO - 50% DA
4	25/03/2021	FOR INFO - PRE DA
5	26/04/2021	FOR INFO - PRE DA
6	11/06/2021	FOR DA

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CONSULTANT: QUANTITY SURVEYOR
QS1 PTY LTD
TEL (02) 9693 1418

CONSULTANT: FIRE ENGINEER
BCA LOGIC
TEL (02) 9411 5360

CLIENT
Ascham School
ASCHAM SCHOOL

PROJECT
ASCHAM FIONA DEVELOPMENT
188 NEW SOUTH HEAD RD, EDGECLIFF

BVN PROJECT NUMBER
1911025

DRAWING KEY

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 2000 5000

SCALE
1 : 200@A1

STATUS
DEVELOPMENT APPLICATION

DRAWING
FLOOR PLAN LOWER GROUND

AR-B-00-01 ISSUE 6

C:\REVIT_LOCAL2020\AR_1911025_AFD_FIONA BUILDING_Chloe_Naughton.rvt 11/06/2021 1:10:20 PM

ACOUSTIC LOGIC

Glazing Mark Up Key

- 6.38mm Laminated (Rw31)
- 10.38mm Laminated (Rw35)
- 10.68mm Laminated/114mm Air-Cavity/6mm Float (Rw45)

Author: AR Date: 16/06/21

NO BUILDING WORKS
REFURBISHMENT OF EXISTING
NEW BUILDING WORKS
EXISTING WALLS & SLABS
NEW WALLS & SLABS
NOTE - REFER LANDSCAPING DRAWINGS FOR LANDSCAPING WORKS

DOWER HOUSE
EX. HERITAGE GATES
EXISTING CARPARK ZONE
NO. 170/SP86720
FOUR STOREY
BRICK BUILDING
NO. 2A OCEAN AVENUE
THREE STOREY
BRICK RESIDENCE
NO. 5 OCEAN AVENUE/SP742
TWO STOREY
BRICK RESIDENCE
NO. 172-180
THREE STOREY
BRICK BUILDING
NO. 210/DP33456
TWO STOREY
BRICK SHOPS
NO. 212/DP33456
TWO STOREY
BRICK SHOPS
RESOURCE 45 42.1 m²
STAFF ROOM 07 87.8 m²
CARPORT 15 40.8 m²
LIFT 36 6.3 m²
STORE
STORE
ACC. WC 184 4.8 m²
MECHANICAL PLANT ROOM
CLASSROOM 03 61.2 m²
CLASSROOM 27 39.0 m²
CLASSROOM 26 62.5 m²
NEW DROP-OFF PICK-UP PAVILION ABOVE (INDEPENDENT STRUCTURE)
NEW WET WEATHER PAVILION OVER. (INDEPENDANT STRUCTURE)
NOTE: NEW LANDSCAPE ELEMENTS. REFER TO LANDSCAPE ARCHITECT DOCUMENTATION
TOILETS 21.0 m²
EX. STORE
EX. TOILETS
PE STORE 66 7.8 m²
STORE
WC
MEETING ROOM 68 12.3 m²
EX. COURTYARD WITH NEW CANOPY OVER (INDEPENDENT STRUCTURE)
NEW WALL OPENING
EXISTING LAWN
NEW WALL OPENINGS
REFURBISHMENT WORKS TO INTERIOR OF FIONA WING BUILDING
ACC. PARKING
RECEPTION 69 39.3 m²
NEW RECEPTION PAVILION OVER. (INDEPENDENT STRUCTURE)
GENERAL LANDSCAPING WORKS - REFER LANDSCAPING DRAWINGS FOR DETAILS
NEW WALL OPENING
EX. CLASSROOM
EX. VERANDAH
CIRC.
LIFT
STORE
EX. CLASSROOM
EX. FOYER
EX. CLASSROOM
NEW TWO-WAY LIFT
EX. OFFICE
EX. WC
EX. OFFICE
DEMOLISHED ANNEXE BUILDING
COVERED WALKWAY
LIFT
NEW HALL 142 268.4 m²
SITE BOUNDARY
OCEAN AVE
NEW SOUTH HEAD ROAD

C:\REVIT_LOCAL2020\AR_1911025_AFD_FIONA BUILDING_Chloe_Naughton.rvt 11/06/2021 1:11:06 PM

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Ascham School
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188 NEW SOUTH HEAD RD, EDGECLIFF

BVN PROJECT NUMBER
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0 2000 5000

SCALE
1 : 200@A1

STATUS
DEVELOPMENT APPLICATION

DRAWING
FLOOR PLAN GROUND

AR-B-00-02 ISSUE 6