

New Marsden Park Public School
Noise & Vibration Impact Assessment

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TABLE OF CONTENTS

1	INTRODUCTION	5
1.1	OVERVIEW	5
1.2	RESPONSE TO SEARS	6
2	SITE DESCRIPTION AND PROPOSED WORKS	7
2.1	SITE DESCRIPTION	7
2.2	NEARBY NOISE RECEIVERS	7
2.3	PROPOSED SCHOOL OPERATION	8
3	NOISE DESCRIPTORS	12
4	SURVEY OF AMBIENT NOISE	13
4.1	UNATTENDED NOISE MEASUREMENTS	13
5	OPERATIONAL NOISE EMISSION CRITERIA	14
5.1	EDUCATIONAL SEPP	15
5.2	EPA NOISE POLICY FOR INDUSTRY	16
5.2.1	Amenity Assessment	16
5.2.2	Sleep Arousal Assessment	17
5.2.3	Summarised NPI Project Noise Trigger Levels	18
5.3	ROAD NOISE POLICY (RNP)	18
5.4	DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS –INTERIM GUIDELINE (DEPARTMENT OF PLANNING 2008)	18
6	OPERATIONAL NOISE EMISSION ASSESSMENT	19
6.1	NOISE FROM INTERNAL SPACES	19
6.1.1	Community Hall	19
6.2	NOISE FROM MECHANICAL PLANT, SCHOOL BUILDINGS PUBLIC ADDRESS SYSTEM AND SCHOOL BELL	20
6.3	TRAFFIC GENERATION	20
6.4	CAR PARK USAGE	21
6.4.1	Early Morning Use	21
6.4.2	Peak Daytime & Evening Use	22
6.5	WASTE REMOVAL	22
6.6	NORMAL SCHOOL EXTERNAL ACTIVITIES	23
6.7	NON-SCHOOL USES, AND AFTER HOURS SCHOOL ACTIVITIES	24
7	OPERATIONAL VIBRATION EMISSION ASSESSMENT	24
8	NOISE INTRUSION ASSESSMENT	25
8.1	TRAFFIC NOISE LEVELS	25
8.2	RECOMMENDED TREATMENT	25
9	CONSTRUCTION NOISE ASSESSMENT	26
9.1	SITE DESCRIPTION	26
9.2	RECEIVER LOCATIONS	26
9.3	NOISE AND VIBRATION GUIDELINES	27
9.3.1	EPA Interim Construction Noise Guideline	27
9.3.2	Vibration	28
9.4	ACTIVITIES TO BE CONDUCTED AND THE ASSOCIATED NOISE SOURCES	30
9.5	NOISE PREDICTIONS	30
9.6	DISCUSSION – NOISE	31

9.7	DISCUSSION - VIBRATION.....	31
9.8	RECOMMENDATIONS.....	31
9.9	CONTROL OF CONSTRUCTION NOISE AND VIBRATION – PROCEDURAL STEPS.....	32
9.10	ADDITIONAL NOISE AND VIBRATION CONTROL METHODS.....	33
9.10.1	Selection of Alternate Appliance or Process	33
9.10.2	Acoustic Barriers.....	33
9.10.3	Material Handling.....	33
9.10.4	Treatment of Specific Equipment.....	33
9.10.5	Establishment of Site Practices.....	33
9.10.6	Combination of Methods	33
9.11	ADDRESSING COMPLAINTS	34
10	SUMMARY OF RECOMMENDATIONS.....	35
11	CONCLUSION.....	36
	APPENDIX ONE – UNATTENDED NOISE MONITOR LOCATION 1 – NORTH EAST	37
	APPENDIX TWO – UNATTENDED NOISE MONITOR LOCATION TWO – SOUTH WEST	48
	APPENDIX THREE – UNATTENDED NOISE MONITOR LOCATION THREE – NORTH WEST	59

1 INTRODUCTION

1.1 OVERVIEW

This Noise & Vibration Impact Assessment has been prepared by Acoustic Logic Consultancy (ALC) on behalf Schools Infrastructure NSW (SINSW) (the Applicant). It accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD-9809) for the Marsden Park New Primary School at the corner of Northbourne Drive (to the east) and a proposed future road (to the north) within the Elara Estate, Marsden Park (the site). The site is legally described as Lot 2889 in Deposited Plan 1230906. The development footprint does not include a portion of the site to the west as this is reserved for a future alternative use.

The Marsden Park New Primary School will cater for 1,000 primary school students at completion. The proposal seeks consent for:

- Construction Stage 1 (Temporary School): a temporary school facility constructed within the western portion of the development site located on the future sports grounds. This temporary school facility is to accommodate a maximum of 500 students at any given time. Should the permanent school progress as per the program, the temporary school will not be required.
- Construction Stage 2 (Construction of Permanent School Facility): a permanent consolidated two storey courtyard building with capacity to accommodate a maximum of 1,000 students. This new school building is to comprise
 - 40 teaching spaces;
 - A canteen;
 - Library;
 - Multipurpose hall;
 - Office and administration space;
 - Staff and student amenities; and
 - Out of school hours care accommodation.
- Multi-purpose sporting facilities and outdoor play spaces;
- Associated site landscaping and public domain improvements;
- An on-site car park for 48 parking spaces and a drop-off and pick-up area; and
- Construction of ancillary infrastructure and utilities as required.

This report has been prepared to assess the potential acoustic impacts of the development. In this report, we will:

- Identify nearby noise sensitive receivers and operational noise sources with the potential to adversely impact the nearby development.
- Identify relevant noise emission criteria applicable to the development.
- If necessary, determine building and/or management controls necessary to mitigate potential noise impacts.
- Provide a preliminary review of construction noise and vibration impacts from the proposed development.

The proposed layout of the school buildings provides a semi-enclosed open play area, with active play areas being located to the north and west portions of the development. Currently proposed layout of school buildings and outdoor areas is detailed in Figure 3.

This assessment has been based on the architectural drawings provided by Mode Architects (Project Number: 19154, Revision 1, Dated 27.06.2019).

1.2 RESPONSE TO SEARS

This report addresses the requirements detailed by the Secretary's Environment Assessment Requirements (SEARs) for SSD 9809. Table 1 presents the relevant SEAR's requirements and relevant reference within this report. It accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD 9809) for the new Marsden Park Public School located within the Marsden Park Precinct of the Northwest Priority Growth Area.

Table 1 - SEARs and Report Reference

SEARs Item	Requirement	Report Reference
6. Environmental Amenity	Assess amenity impacts on the surrounding locality, including solar access, visual privacy, visual amenity, overshadowing and acoustic impacts.	Sections 5-9
	Identify any proposed use of the school outside of school hours (including weekends) and assess the resultant amenity impacts on the immediate locality and proposed mitigation measures.	Sections 2 & 5-6
	Detail amenity impacts including solar access, acoustic impacts, visual privacy, view loss, overshadowing and wind impacts. A high level of environmental amenity for any surrounding residential land uses must be demonstrated.	Sections 5-9
13. Noise and Vibration	Identify and provide a quantitative assessment of the main noise and vibration generating sources during demolition, site preparation, bulk excavation, construction. Outline measures to minimise and mitigate the potential noise impacts on surrounding occupiers of land.	Section 9
	Identify and assess operational noise, including consideration of any public-address system, school bell, mechanical services (e.g. air conditioning plant), use of any school hall for concerts etc. (both during and outside school hours) and any out of hours community use of school facilities, and outline measures to minimise and mitigate the potential noise impact on surrounding occupiers of land. <u>Relevant Policies and Guidelines:</u> • NSW Noise Policy for Industry 2017 (EPA) • Interim Construction Noise Guideline (DECC) • Assessing Vibration: A Technical Guideline 2006 • Development Near Rail Corridors and Busy Roads – Interim Guideline (Department of Planning 2008)	Sections 5-9

2 SITE DESCRIPTION AND PROPOSED WORKS

2.1 SITE DESCRIPTION

The proposed location of Marsden Park Public School is within the Marsden Park precinct of the Northwest Priority Grown Area. The land is currently identified in Schedule 6 (Marsden Park Precinct) of the NSW Department of Planning & Environment *Blacktown City Council Growth Centre Precincts Development Control Plan* as proposed for school use.

Surrounding land uses and potential noise impacts associated with the site are as follows;

- Richmond Road bounds the precinct to the east, with the proposed school site being approximately 350m from the roadway at the closest point. Richmond Road is currently listed as a recommended road under SEPP (Infrastructure), indicating that it carries an annual average daily traffic volume of between 20, 000 and 40, 000 vehicles per day;
- Roadways immediately surrounding the site generally consist of local roadways and through traffic for the future residential development;
- Future residential development surrounds the site on the north, south and west of the school. Residents in this location would typically be dual storey detached dwellings. As construction has not yet begun on these residences, noise impact will generally be limited to ongoing operational noise associated with the school development (as opposed to construction noise/vibration).
- Aged care and child care facilities are proposed east of the site, although there is no further detail currently available regarding density or operation. As with the future residential receivers, noise impact from the school would typically be limited to ongoing operational noise impacts.
- South of the site within the Stockland Elara development are the closest existing residential receivers. Residents at this site are typically within dual storey single dwellings and will be most exposed to construction noise impacts from the school. Once the school and remaining lots of the precinct have been constructed, it is unlikely that noise impacts from ongoing operational use of the school would affect residents at this location.

A site map detailing the site and measurement locations is presented in Figures 2 & 3.

2.2 NEARBY NOISE RECEIVERS

Based on the site investigations, the following receivers are those most likely to be potentially impacted by the proposed school development. Given that construction and development within the area is ongoing, the receivers impacted by construction noise will be separate from those impacted by ongoing operational noise.

Receivers Impacted by Operational Noise

Receiver 1: Future residential receivers surrounding the site to the north, south and west. Residential development at this location would typically be dual storey detached housing.

Receiver 2: Proposed aged care facility to the east.

Receiver 3: Proposed child care facility to the east.

Receivers Impacted by Construction Noise and Vibration

Receiver 4: Existing single dwelling houses located with earlier stages of the Stockland Elara development.

Refer to Figures 2 & 3 for detail and measurement locations.

2.3 PROPOSED SCHOOL OPERATION

The following table describes the general operation of the school as currently proposed.

Table 2- School Uses and Operating Times

Item	Use	Times
General	The proposed Marsden Park Public School will cater for students K- Year 6, with a capacity of 1000 students	General operating hours for the school will be Monday – Friday 8am - 5pm.
Community Hall	Intended use by school during school hours. Occasional evening use for music performance, presentations, parent/teacher nights.	Maximum Operating time till 10pm
OOSH	Out of school hours (OOSH) use of the school facilities.	Weekdays Mornings 6.30am – 9am; and Afternoons 3pm – 6.30pm
Library	Intended use by school only. School hours only.	Potential for occasional weeknight evening use for presentations, parent/teacher nights.
Community Use of School	Provision is to be made for the potential use of the Community Hall and sporting facilities out of school hours, predominantly on weekends. There is no specific proposal for the frequency or type of use for the community at this time.	No specific proposal has currently been presented.





Figure 2 – Future Site Context & Noise Measurement Locations



Unattended Noise Monitor

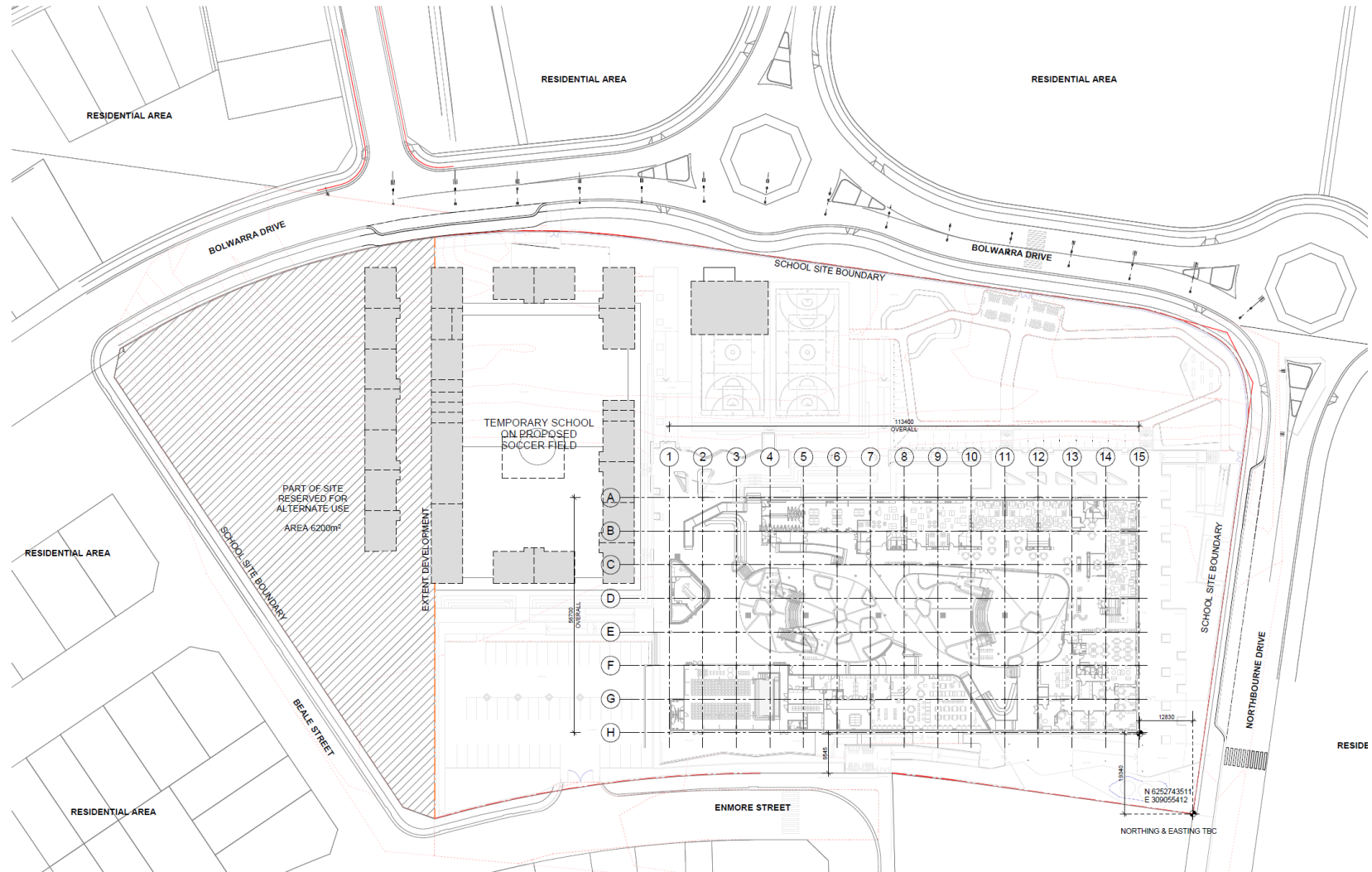


Figure 3 – Proposed School Layout Including Temporary School

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 particular 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 traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

L_1 levels represent is the loudest 1% noise events during a measurement period.

The L_{max} level represents the loudest noise event during a measurement period.

4 SURVEY OF AMBIENT NOISE

Long term unattended noise monitoring was conducted to quantify the existing acoustic environment at the site. It is noted that the area is under significant development and the acoustic environment is likely to change in the area as construction is completed on additional stages of the Marsden Park Precinct.

4.1 UNATTENDED NOISE MEASUREMENTS

Unattended noise monitoring surrounding site was conducted between Tuesday 15th of January to Thursday 24th of January using three Acoustic Research Laboratories noise monitors set on A-weighted fast response mode. All monitors were calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded.

Unattended noise monitors were installed at the following locations (refer to Figures 1 & 2 for detailed locations):

- **Location 1 (North-East)** – Noise monitor was installed along the boundary fencing to the north east of the proposed school site. The noise monitor was approximately 350m from Richmond Road, which was the predominant background noise source in the area.
- **Location 2 (South-West)** – Noise monitor was installed at the boundary of Lot 2919 within the Stockland Elara Boulevard development to the south west of the proposed school site. The noise monitor was approximately 500m from Richmond Road, which was the predominant background noise source in the area.
- **Location 3 (North-West)** – Noise monitor was installed along the boundary fencing to the adjacent residential subdivision to the north west of the proposed school site. The noise monitor was approximately 600m from Richmond Road, which was the predominant background noise source in the area.

The measured rating background noise level (RBL's) (L_{90} levels) are presented in Table 3. Unattended measurements have been undertaken as per the procedures outlines in Fact Sheet A & B of the NSW EPA Noise Policy for Industry.

Weather affected data (rain fall and wind speeds above 5m/s) have been excluded from the assessment as per fact sheet A and B. Where interval periods (day, evening and night) have 18% (8 samples), 13% (2 samples) or 11% (4 samples) respectively, these periods have been excluded from the assessment.

Detailed graphs of the measured noise levels from the unattended noise monitors are presented in the appendices of this report.

Rating Background Noise Levels

Table 3 – Measured Rating Background Noise Levels

Monitoring Location	Measured Unattended Noise Levels dB(A) L_{90}		
	Early Morning (6:30am-7:00am)	Day (7:00am-6:00pm)	Evening (6:00pm-10:00pm)
Location 1 North East	38	38	39
Location 2 South West	40	40	38
Location 3 North West	36	36	36

5 OPERATIONAL NOISE EMISSION CRITERIA

The SEARS requires a consideration of noise emissions including any public address system, school bell, mechanical services (e.g. air conditioning plant), use of any school hall for concerts etc. (both during and outside school hours) and any out of hours community use of school facilities, and outline measures to minimise and mitigate the potential noise impacts on surrounding occupiers of land.

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 L_{Aeq} of 5 dB(A) above background noise when measured at any lot boundary.

Guidelines referenced in the SEARS, as well as other guidelines are provided below:

- EPA Noise Policy for Industry 2017 (applicable for plant/equipment noise)
- EPA Road Noise Policy (for the assessment of noise from traffic generation by the site).
- Assessing Vibration: A Technical Guideline (EPA, 2006)
- Development Near Rail Corridors and Busy Roads –Interim Guideline (Department of Planning 2008) (to assess noise from traffic on the subject development)

We note that the 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 impact to surrounding receivers.

In our experience it is common in the assessment of noise generation by schools that compliance with acoustic guidelines (in particular noise from playgrounds and during pick up/drop off) is not required (and for schools located in residential areas, it is in fact generally not achievable). The NSW Educational SEPP requires noise emissions from school buildings to be limited, and there is no requirement related to external uses.

An outline of relevant acoustic criteria is presented below.

5.1 EDUCATIONAL SEPP

The following table outlines the criteria to assess noise emissions from school buildings:

Table 4- NSW Educational SEPP Criteria

Location	Time of Day	Rating Background Noise Level dB(A)L₉₀	Education SEPP Criteria dB(A) L_{eq(15min)} (Background + 5dB)
Residents Located to the North	Day Time (7am – 6pm)	38	43
	Evening (6pm-10pm)	39	44
Residents Located to the South	Day Time (7am – 6pm)	40	45
	Evening (6pm-10pm)	38	43
Residents Located to the West	Day Time (7am – 6pm)	36	41
	Evening (6pm-10pm)	36	41
Aged Care and Childcare Centre Located to the East	Day Time (7am – 6pm)	38	43
	Evening (6pm-10pm)	39	44

5.2 EPA NOISE POLICY FOR INDUSTRY

Noise sources covered by this code are mechanical services and plant noise. Section 2.4.3 of the Noise Policy for Industry addresses the effect of changing land use. In the case of the Marsden Park Precinct, the further development of residential subdivisions surrounding the proposed school will significantly affect the background noise levels. The following changes would be expected to impact the existing background noise levels;

- Shielding from Richmond Road provided by dwelling houses (and incorporated boundary fencing) between the school site and roadway;
- Introduction of local roadways surrounding the site, expected to carry a mixture of local and through traffic;
- New mechanical plant servicing surrounding residential/commercial dwellings.

When considering effects of changing use, the NSW EPA Noise Policy for Industry states the following:

When land uses in an area are undergoing significant change, for example, residential subdivision with associated development of local and regional roads, the background noise levels would be expected to change, sometimes significantly. The impact of noise from an existing industry on a proposed new residential area should be made using the recommended amenity noise level for the residential land use, not the project intrusiveness level. Where impacts exceed the amenity noise level, consideration should be given to how these impacts can be avoided or mitigated, such as modifying the location of the proposed residential development, placing screening land uses in-between the proposed residences and existing industry, or ensuring residences are built in a manner that provides acceptable indoor noise amenity.

Considering the above, noise emission requirements as detailed in the Noise Policy for Industry will be determined with reference to the amenity noise levels.

5.2.1 Amenity Assessment

The intent of the amenity noise level is to limit the absolute noise level to that is consistent with the prevailing land use.

The EPA's NPI sets out acceptable noise levels for various localities based on land zoning. The recommended noise amenity area for the residential subdivision proposed surrounding the site would be 'suburban residential'.

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 project site are presented in Table 5.

Table 5 – EPA NPI Project Amenity Noise Levels

Type of Receiver	Time of day	Recommended Noise Level dB(A) $L_{eq(15min)}$	Project Amenity Noise Level dB(A) $L_{eq(15min)}$
Residential – Suburban	Day	55	53
	Evening	45	43
	Night	40	38
Commercial premises	When in use	65	63

5.2.2 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. 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 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 5 dB, whichever is the greater, and/or
 - L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is greater,*a detailed maximum noise level event assessment should be undertaken.*
- Step 2 - If there are noise events that could exceed the average/maximum criteria detailed in the tables 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 65-70dB(A) are not likely to affect health and wellbeing significantly.*

5.2.3 Summarised NPI Project Noise Trigger Levels

Table 6 – Summarised NPI Project Noise Trigger Levels

Receiver	Time of Day	Rating Background Noise Level	Amenity Level dB(A) $L_{eq}(15min)$	Sleep Arousal
Residents Located to the North	Early Morning (6.30am – 7am)	38 dB(A) $L_{90}(period)$	38 dB(A) $L_{eq}(15min)$	43 dB(A) $L_{eq}(15min)$ 53 dB(A) L_{Fmax}
	Daytime (7am – 6pm)	38 dB(A) $L_{90}(period)$	53 dB(A) $L_{eq}(15min)$	-
	Evening (6pm – 10pm)	39 dB(A) $L_{90}(period)$	43 dB(A) $L_{eq}(15min)$	-
Residents Located to the South	Early Morning (6.30am – 7am)	40 dB(A) $L_{90}(period)$	38 dB(A) $L_{eq}(15min)$	45 dB(A) $L_{eq}(15min)$ 55 dB(A) L_{Fmax}
	Daytime (7am – 6pm)	40 dB(A) $L_{90}(period)$	53 dB(A) $L_{eq}(15min)$	-
	Evening (6pm – 10pm)	38 dB(A) $L_{90}(period)$	43 dB(A) $L_{eq}(15min)$	-
Residents Located to the West	Early Morning (6.30am – 7am)	36 dB(A) $L_{90}(period)$	38 dB(A) $L_{eq}(15min)$	41 dB(A) $L_{eq}(15min)$ 52 dB(A) L_{Fmax}
	Daytime (7am – 6pm)	36 dB(A) $L_{90}(period)$	53 dB(A) $L_{eq}(15min)$	-
	Evening (6pm – 10pm)	36 dB(A) $L_{90}(period)$	43 dB(A) $L_{eq}(15min)$	-
Aged Care and Childcare Centre Located to the East	When in Use	-	63 dB(A) $L_{eq}(15min)$	N/A

5.3 ROAD NOISE POLICY (RNP)

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

All roadways immediately surrounding Marsden Park Public School would be defined as either collector or sub-arterial roads.

The applicable assessment criteria for residential receivers are (measured at the façade of dwellings):

- Sub-arterial – 60 dB(A) $L_{eq,15hr}$ (7am to 10pm) and 55 dB(A) $L_{eq,9hr}$ (10pm to 7am)

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 2 dB(A) or less are minor, and by implication do not require mitigation.

5.4 DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS –INTERIM GUIDELINE (DEPARTMENT OF PLANNING 2008)

The guideline recommends a maximum noise level within classrooms of 40 dB(A) $L_{eq,1hr}$.

6 OPERATIONAL NOISE EMISSION ASSESSMENT

An assessment of operational noise emissions is presented below. The following noise sources are assessed:

- Noise from internal areas
- Noise from mechanical plant, PA system and school bells.
- Traffic generation
- Carpark Use
- Waste Removal
- External activities

6.1 NOISE FROM INTERNAL SPACES

The administration and teaching spaces generate low to medium levels of noise. The teaching spaces are typically at least 30m from any residential receiver and emissions from these spaces would be expected to readily comply with the SEPP (Education) requirements.

6.1.1 Community Hall

A community hall located in the south-west portion of the site may be used for presentations and performances. The hall has door openings to the internal courtyard of the school as well as to residents to the south. In addition, there are glazed folding doors on both the norther and southern façade of the hall (closest to nearest residents). Noise emissions to the surrounding properties have been calculated based on the following assumptions:

- Hall internal noise level of 80 dB(A) $L_{eq,15min}$ representing the sound level during a music performance.
- Doors located on the southern elevation of the hall (facing residents) are either open or closed, with doors having a minimum acoustic rating of $R_w 20$ when closed.

Table 7 – Predicted Noise Levels from Community Hall Use

Doors Open/Closed	Receiver Location	Predicted Noise Level	Noise Objective (Education SEPP - BG + 5 dB(A))	Comments
Doors Open Fully	Residents Located to the North East	40 dB(A) $L_{eq(15min)}$	≤ 43 dB(A) $L_{eq(15min)}$	Achieves Noise Objective
	Residents Located to the South West	49 dB(A) $L_{eq(15min)}$	≤ 45 dB(A) $L_{eq(15min)}$	Marginal Exceedance of Noise Objective
	Residents Located to the North West	35 dB(A) $L_{eq(15min)}$	≤ 41 dB(A) $L_{eq(15min)}$	Achieves Noise Objective
Doors Open to 25% of Total Area	Residents Located to the North East	35 dB(A) $L_{eq(15min)}$	≤ 43 dB(A) $L_{eq(15min)}$	Achieves Noise Objective
	Residents Located to the South West	43 dB(A) $L_{eq(15min)}$	≤ 45 dB(A) $L_{eq(15min)}$	Achieves Noise Objective
	Residents Located to the North West	30 dB(A) $L_{eq(15min)}$	≤ 41 dB(A) $L_{eq(15min)}$	Achieves Noise Objective

The background + 5 dB(A) noise emissions criterion is only exceeded at residents to the south of the school when doors are fully open. Closing the southern façade would achieve compliance with noise objectives at all receivers, including during the evening period.

Any community use of the hall should not occur past 9:45 pm (which would allow for occupants to be cleared).

6.2 NOISE FROM MECHANICAL PLANT, SCHOOL BUILDINGS PUBLIC ADDRESS SYSTEM AND SCHOOL BELL

Detailed acoustic design of mechanical plant cannot be undertaken at approval stage, as plant selections and locations are not finalised. However, detailed acoustic assessment of all ventilation or other plant items should be undertaken at CC stage, once equipment items are selected and location is finalised.

Given the proposed buildings are remote from existing and future residential buildings, it is both possible and practical to treat noise from the operation of the proposed mechanical equipment to comply with the EPA NPI criteria detailed in Table 5 using standard acoustic treatments such as lined ductwork, silencers, screens and the like.

With regard to the school bell/PA system, the system should minimise noise spill to adjacent properties. General design principles which could be used to manage this noise include the following:

- Speaker positioning/selection:
 - Speaker location and direction can be used to reduce noise spill to neighbouring properties while still maintaining suitable noise levels within the school grounds (typically 70-75dB(A)).
 - Broadly speaking, more speakers, closer to the noise receiver is a more effective way to provide coverage of the external areas while reducing noise spill to neighbouring properties.
 - Similarly, highly directional speakers (angled downwards) will also reduce noise spill. Speakers with a drop of at least 5dB(A) for mid-frequencies noise for each 10 degrees in the horizontal plane outside of the coverage area should be considered.

6.3 TRAFFIC GENERATION

Two car parks are proposed for the site, with 48 spaces to be accessed from Enmore Street. Bus drop off for students will be located along Northbourne Drive near the main entrance to the school. These roads act as local collector roads and would be classed as “sub-arterial” under the RNP. The noise levels generated by traffic movements associated with the school would not cause a significant increase in traffic noise on these roads and would therefore not adversely impact receivers along nearby traffic routes.

A transport study has been prepared by *GHD* to address potential impacts associated with the new school (document reference: 2128414). This report predicts the likely traffic generation and peak hour vehicle movements to the school (pick up and drop off). Traffic volumes have only been considered for a school population of 1,000 children, as a student population of

Table 8 – Predicted Traffic Volumes for School Pick Up/Drop Off

Student Numbers	Predicted Traffic Volumes AM/PM Peak Period
1000	306 Car Trips per hour (Inbound/Outbound)

At 306 movements per hour, the noise level at the building line of the nearest residences along any of the surrounding roadways will be less than 60dB(A)_{Leq1hr}. As such, compliance with the Road Noise Policy allowable noise level as detailed in section 6.3 is achieved (which permits 60dB(A)_{Leq} as an average noise level over a 15-hour period).

6.4 CAR PARK USAGE

A carpark is proposed to be located on the south western portion of the site with access from Enmore Road and will accommodate 48 parking spaces, typically for use only by teaching or administration staff of the school. SEPP (Education) criteria is not applicable to the assessment of the carpark, and will be assessed to the requirements of the NSW EPA Noise Policy for Industry (refer Table 6 for summarised noise levels). The key operational periods and assumptions considered as part of this assessment are early morning use prior to 7am, typical peak usage during the daytime (arrival/departure), and use of the carpark outside of regular hours (6pm – 10pm).

6.4.1 Early Morning Use

Early morning (before school) use of the carpark between 6.30 – 7.00am would generally be a low volume of car park usage, however it may sporadically be used for either OOSH care teachers or regular staff entering the school. Given the low volume of car park usage expected, the average ($L_{eq(15min)}$) noise levels emitted would be expected to readily comply with NPI trigger levels.

As the assessment period falls within the night time period (10pm – 7am), an assessment of sleep disturbance is presented to the nearest residences south of the site, located across Enmore Road (refer Figures 1-3), detailed in Table 9.

For the assessment of sleep disturbance, it is the instantaneous peak noise level at the nearest habitable window which is first assessed. Predicted noise levels to the closest receiver have been based on the sound power level of noise sources associated with the carpark and distance attenuation. A range of levels is presented based on the location of a vehicle within the carpark relative to the residential receiver. Typical peak noise events from carpark use and their associated sound power levels are:

- Car Door Closing - 95 dB(A) SWL
- Car Engine Starting - 90 dB(A) SWL

Table 9 – Sleep Disturbance Assessment for Early Morning Carpark Usage

Receiver	Noise Source	Predicted Noise Level	NPI Sleep Disturbance Trigger Level
Residents to the South (Across Enmore Road)	Car Door Closing	53 – 58 dB(A) L_{Fmax}	≤ 55 dB(A) L_{Fmax}
	Car Engine Starting	48 – 53 dB(A) L_{Fmax}	

Depending on the location within the carpark, the L_{max} sleep disturbance trigger level is exceeded from car doors closing during early morning use of the car park and as such a more detailed assessment is required. It is noted that parking spaces located in the northern half of the carpark would be below the trigger level, and as such it would typically not be required to undertake a further detailed assessment for these spaces. In consideration of the above, we note:

- Based on the predicted external noise levels, the internal noise level within any habitable room of a nearby resident would be less than 50 dB(A) L_{Fmax} , even with doors or windows open.
- As detailed in Section 5.2.2, internal noise levels between 50-55 dB(A) L_{Fmax} are unlikely to wake people from sleep.
- Further, given that school access from the carpark is at the north eastern corner of the carpark, it is highly likely that any vehicles which do enter the carpark would park in the northern half. Sleep disturbance trigger levels are only exceeded when a vehicle is entered or exited (door closing)
 - It is noted that noise levels at residences from activity in the northern portion of the site are predicted to be between 53-55 dB(A) L_{Fmax} , which does not exceed the NPI sleep disturbance trigger level.

As the number of events which may exceed the sleep disturbance trigger level is minimal, and that the maximum predicted internal noise level from any potential peak noise event would be unlikely to impact sleep during the early morning period, noise impact from use of the carpark during this time would be considered insignificant.

6.4.2 Peak Daytime & Evening Use

During regular school times, it has been assumed that the carpark would be utilised to full capacity (i.e. all 48 spaces used) and that it all cars would arrive/depart within a 1 hour period. Outside of the AM/PM peak period where school staff would be arriving/departing the school it is not expected that there would be any significant usage of the carpark.

Outside of regular school operation (6pm – 10pm), it would also be expected that the car park may be in use on an infrequent basis as part of out of school hours activities such as parent teacher interviews. The assessment has considered the same assumptions as daytime usage of the carpark, although it would be expected that actual use during this time would be proportionally lower.

The above assumptions are consistent with the proposed school operation, and present a conservative assessment of the likely use. Predicted noise levels from carpark operation are presented in [Table 10](#). A summary of the assumptions and noise levels for the assessment is as follows;

- Car Travelling at 10 km/h- 84 dB(A) SWL
- 48 vehicles entering/exiting the carpark within a 1 hour period.

Table 10 – Assessment of Noise Emissions from Carpark During Day & Evening Periods

Receiver	Noise Source	Predicted Noise Level	NPI Project Noise Trigger Level
Residents to the South (Across Enmore Road)	Vehicles Manoeuvring Within Carpark	42 dB(A) $L_{eq(15min)}$	≤ 53 dB(A) $L_{eq(15min)}$ (Daytime Period)
			≤ 43 dB(A) $L_{eq(15min)}$ (Evening Period)

Predicted noise levels from the carpark do not exceed the NPI project noise trigger levels for the day and evening period, even with conservative assumptions for use.

6.5 WASTE REMOVAL

Waste collection should be scheduled to occur during the day time period only (7:30am – 6pm) to avoid disturbance to nearby residents outside of these hours. In particular, there should be no collection of waste during the night time period (10pm – 7:00am).

6.6 NORMAL SCHOOL EXTERNAL ACTIVITIES

Sporting fields are located on the northern portion of the school and are separated from nearby residents by distance buffers. Residents to the north would be most exposed to noise and are provided with a minimum of 50m distance between any sporting court. Additionally, the internal courtyard of the school is semi enclosed and would provide significant shielding to the surrounding land uses.

The expected external school activities include:

- Use of all external spaces immediately before school commencing and recess/lunch periods.
- Use of courts and oval for sports lessons during the normal school day, plus occasional afternoon (3pm and 6pm) use or weekend use between for sports tournaments/competitions.

There are no criteria to be met regarding normal activities conducted by the school. Notwithstanding, noise levels from these facilities during operation will be predicted at the surrounding properties.

Noise emissions from the use of the outdoor play areas is predicted based on the following assumptions/information:

- Number of students:
 - Primary School – 1000 Students
- General Playground noise measurements:
 - Primary School - noise level per student of 83dB(A) one in two, based on measurements conducted Anzac Park Public School.
- All play areas in operation at once.
- Sports courts noise measurements – Use of sports courts for competitive sports is a potentially more intensive use of these spaces compared to typical playground use. As a part of studies of play ground noise emission, ALC have undertaken measurements noise created on sports courts. In our experience, noise from an intensive use of *one* sports court (competitive basketball, a louder than typical sporting activity) is approximately 61dB(A) $L_{eq,15min}$ when standing 10m from the edge of the court. This data is then used to predict noise levels at nearby properties (the relative position between the court and the receivers).

The most impacted residential receivers from general playground activity would be those to the north within the proposed residential subdivision (outside of the Elara estate). These receivers have a relatively unobstructed view of the play areas and the courts. The remainder of the residential receivers would have much lower levels of noise exposure due to shielding from school buildings or additional distance between the outdoor areas and residences.

The predicted noise levels at the most impacted residential receivers to the west and north are:

- General recess/lunch – 61 dB(A) $L_{eq,15min}$
- Sports with fields and courts in use - 61dB(A) $L_{eq,15min}$

The predicted noise levels exceed the rating background level by 23-25 dB(A). The level of impact at all other residences will be significantly lower due to the screening effects provide by the school buildings, and because of additional distance attenuation.

With respect to the above for playground use it is typical to apply a less stringent indicator of noise impact than “background + 5 dB(A)” given that it is present for short periods through the day and it is regarded as “community” noise.

With the exception of the proposed residences to the north that have an unobstructed view of the fields and play areas, noise emissions are typically compliant with a “background+10dB(A)” noise emission indicator.

However, in our opinion, the higher exceedances for the most exposed residences are not unreasonable for the following reasons:

- Noise from school playgrounds a noise source intended to be governed by documents such as the EPA Noise Policy for Industry (NPI) 2017. It is common (and almost unavoidable) in school development that a playground is located in close proximity to residential development. In this regard we note that in *Meriden v Pedavoli* [2009 NSWLEC 183] the NSW Land and Environment Court noted “All noise that emanates from the normal activities at a school is not offensive”. The Court had regard to the fact that there was other school development in the local government area in which playgrounds adjoin residential development and the fact the proposed use was permissible in the zone. This is consistent with the proposed development.
- As noted above, a playground located near a residential boundary is a common scenario in school developments. At the subject site, the main play areas are located well away from residential receivers.
- Given that there is already significant distance separation between the play areas and residences, the only way of minimising noise impact is to erect noise barriers around the school, However, these barriers have other negative impacts which, while technically feasible, may not be a reasonable response to a level of impact that typically occurs with schools placed within residential zonings and appears to be a generally accepted level of impact.

6.7 NON-SCHOOL USES, AND AFTER HOURS SCHOOL ACTIVITIES

After hour school activities would largely relate to use of the school hall as assessed above. There could also be other “quiet” activities that may occur externally or within the buildings that would not result in significant emissions. This would include parent/teacher nights, election activities, etc. Where music practice occurs within a school classroom outside of normal hours the windows of the rooms should be kept closed.

External activities by non-school uses are not proposed at this stage. If uses are proposed in the future they should be assessed for noise impact and appropriate mitigation and management implemented to prevent adverse impacts on surrounding properties. As part of the assessment appropriate assessment criteria should be developed depending on the frequency of use, time of day, type of activity, etc. Given that the surrounding area is undergoing development including a nearby arterial road it is likely that background noise levels will increase in the future and background noise monitoring at that time may enable an expanded range of uses subject to further assessment prior to that occurring.

7 OPERATIONAL VIBRATION EMISSION ASSESSMENT

There would be no vibration impact from the proposal as there would be no vibration sources that would produce perceptible vibration on any surrounding property.

8 NOISE INTRUSION ASSESSMENT

The school is not impacted by any local environmental noise source except for future local traffic on the surrounding streets. The most impacted façade would be that facing Northbourne Drive as all other façades are screened from traffic noise sources and/or have significant distance separation.

8.1 TRAFFIC NOISE LEVELS

As roadways surrounding the school have not yet been constructed, traffic noise levels have been predicted based on volumes detailed in the traffic report prepared by *GHD* to address potential impacts associated with the new school (document reference: 2128414).

8.2 RECOMMENDED TREATMENT

The following is recommended to meet the recommended internal noise levels:

- All classrooms or learning spaces facing Northbourne Drive are to have minimum 6.38mm glazing fitted to operable frames with acoustic seals, with the overall rating achieving a minimum acoustic rating of R_w 30.
- All other classrooms facing adjacent roadways (north, south & west facades) are to have minimum 6mm glazing fitted to operable frames with acoustic seals, with the overall rating achieving a minimum acoustic rating of R_w 27.
- Glazing requirements and any lightweight building elements are to be confirmed once building setbacks and layouts have been finalised.

9 CONSTRUCTION NOISE ASSESSMENT

An assessment of likely construction noise impacts has been undertaken. The assessment includes:

- Identification of the noise and vibration guidelines which will be applicable to this project.
- Identification of potentially impacted nearby sensitive receivers.
- Identify likely sources of noise and vibration generation and predicted noise levels at nearby development.
- Formulation of a strategy to address the guidelines identified and including mitigation treatments.

9.1 SITE DESCRIPTION

A detailed overview of the construction staging and options is presented in the *Preliminary Construction Management Plan* for the project, prepared by Ontoit (document reference: MPNPSPCMP-1/10677), which is summarised below. There are two options for the construction of the school with one option including installation of temporary demountable buildings prior to the construction of the main school building.

Construction works for the proposed school will consist primarily of site establishment works, general construction activities and completion landscaping/external works. The proposal consists of a number of buildings including a hall, general teaching areas and administrative offices.

There are no below ground / basement levels proposed, meaning that significant excavation and piling will not be required. Additionally, a majority of site works (land clearing/grading) has already been completed as part of precinct works. Construction works (and typical loudest plant/equipment) expected for the project are as follows:

- Erection of building structure (powered hand tools for formwork, concrete pump, vibrators, crane);
- Internal fit out.
- Landscaping (front end loaders etc);

Standard work hours have been assumed as detailed in the NSW EPA Interim Construction Noise Guideline:

- Monday to Friday: 7am – 6pm
- Saturday: 8am – 1pm
- Sundays or Public Holidays: No work.

9.2 RECEIVER LOCATIONS

Sensitive receiver locations for the construction phase of the development would generally be limited to existing residents of the Marsden Park Precinct Elara subdivision south of the school site, as detailed in Section 2.2.

9.3 NOISE AND VIBRATION GUIDELINES

9.3.1 EPA Interim Construction Noise Guideline

The EPA Interim Construction Noise Guideline (ICNG) assessment requires:

- Determination of noise management levels (based on ambient noise monitoring);
- Review of generated noise levels at nearby development;
- Recommendation of noise controls strategies when noise management levels are exceeded.

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

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

A summary of the above noise management levels from the ICNG is presented below in Table 11. In order to present a conservative assessment, the lowest daytime rating background noise level determined from monitoring has been used as a basis for calculation of the 'Noise Affected Level'.

Table 11 – Noise Management Levels - Residential

Location	"Noise Affected" Level - $\text{dB(A)}_{\text{Leq}(15\text{min})}$	"Highly Noise Affected" Level - $\text{dB(A)}_{\text{Leq}(15\text{min})}$
All Residential Receivers	46	75

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

9.3.2 Vibration

Vibration caused by construction at any residence or structure outside the subject site must be limited to:

- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures; and*
- For human exposure to vibration, the evaluation levels presented in the British Standard BS 6472:1992 *Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80Hz)* for low probability of adverse comment.

9.3.2.1 Structure Borne Vibrations (Building Damage Levels)

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The vibration levels presented in DIN 4150-3 (1999-02) are detailed in Table 4.

It is noted that the peak velocity is the value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 12 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration

TYPE OF STRUCTURE		PEAK PARTICLE VELOCITY (mms^{-1})			
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

The surrounding commercial/industrial buildings would be considered a Type 1 structure, whilst nearby residences would be classified as a type 2 structure.

9.3.2.2 Assessing Amenity

The NSW EPA document "*Assessing Vibration: A Technical Guideline*" provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings and is used in the assessment of vibration impact on amenity. Relevant vibration levels are presented below.

Table 13 – EPA Recommended Vibration Levels

		RMS acceleration (m/s ²)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	Time	Preferred	Maximum	Preferred	Maximum	Preferred	Maximum
Continuous Vibration							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices		0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices		0.64	1.28	13.0	26.0	18.0	36.0
Workshops		0.64	1.28	13.0	26.0	18.0	36.0

9.4 ACTIVITIES TO BE CONDUCTED AND THE ASSOCIATED NOISE SOURCES

For this project, the most significant sources of noise or vibration generated during construction will be building structure works. The following table presents assessment noise levels for typical construction equipment expected to be used during the construction of the proposal.

Table 14 - Sound Power Levels of the Typical Equipment

Equipment / Process	Sound Power Level dB(A)*
Concrete Pump	110
Trucks	100
Bobcat	105
Crane (electric)	85
Powered Hand Tools	95-100

The noise levels presented in the above table are derived from the following sources, namely:

- Table A1 of Australian Standard 2436-2010.
- Data held by this office from other similar studies.

Noise levels take into account correction factors (for tonality, intermittency where necessary).

9.5 NOISE PREDICTIONS

The predicted noise levels during excavation and construction will depend on:

- The activity undertaken.
- The distance between the work site and the receiver. The distance between the noise source and the receiver will vary depending on which end of the site the work is undertaken. For this reason, the predicted noise levels will be presented as a range.

Predicted noise levels are presented in the following tables. Predictions take into account the expected noise reduction as a result of distance only.

Table 15 – Predicted Noise Generation to Residential Receivers South of Site

Activity	Predicted Level dB(A) $L_{eq(15min)}$ (External)	Comment
Concrete Pump	52 – 56	Exceeds Noise Affected Management Level (NAML)
Trucks	42 – 46	Within NAML
Bobcat	47 – 51	Exceeds NAML
Crane (electric)	< 40	Within NAML
Powered Hand Tools (Externally)	42 – 46	Within NAML

9.6 DISCUSSION – NOISE

Without mitigation noise at the sensitive receivers around the site will exceed the noise management level. Noise emissions from construction activities are expected to be significantly below the highly noise affected noise management level at all times.

The greatest noise impact will be at the residences immediately to the north of the site and the child care centre. The residences to the east will be relatively lightly impacted.

Therefore, “reasonable and feasible” mitigation should be applied in accordance with the “Control of Construction Noise and Vibration – Procedural Steps” outlined below. Additional time management also be required to manage noise impacts to the residences to the north and the child care centre.

9.7 DISCUSSION - VIBRATION

There are no significant sources of vibration envisaged. Given the distance from nearby receivers, vibration impacts on all receivers is expected to be within the recommended levels detailed in Section 9.3.2.

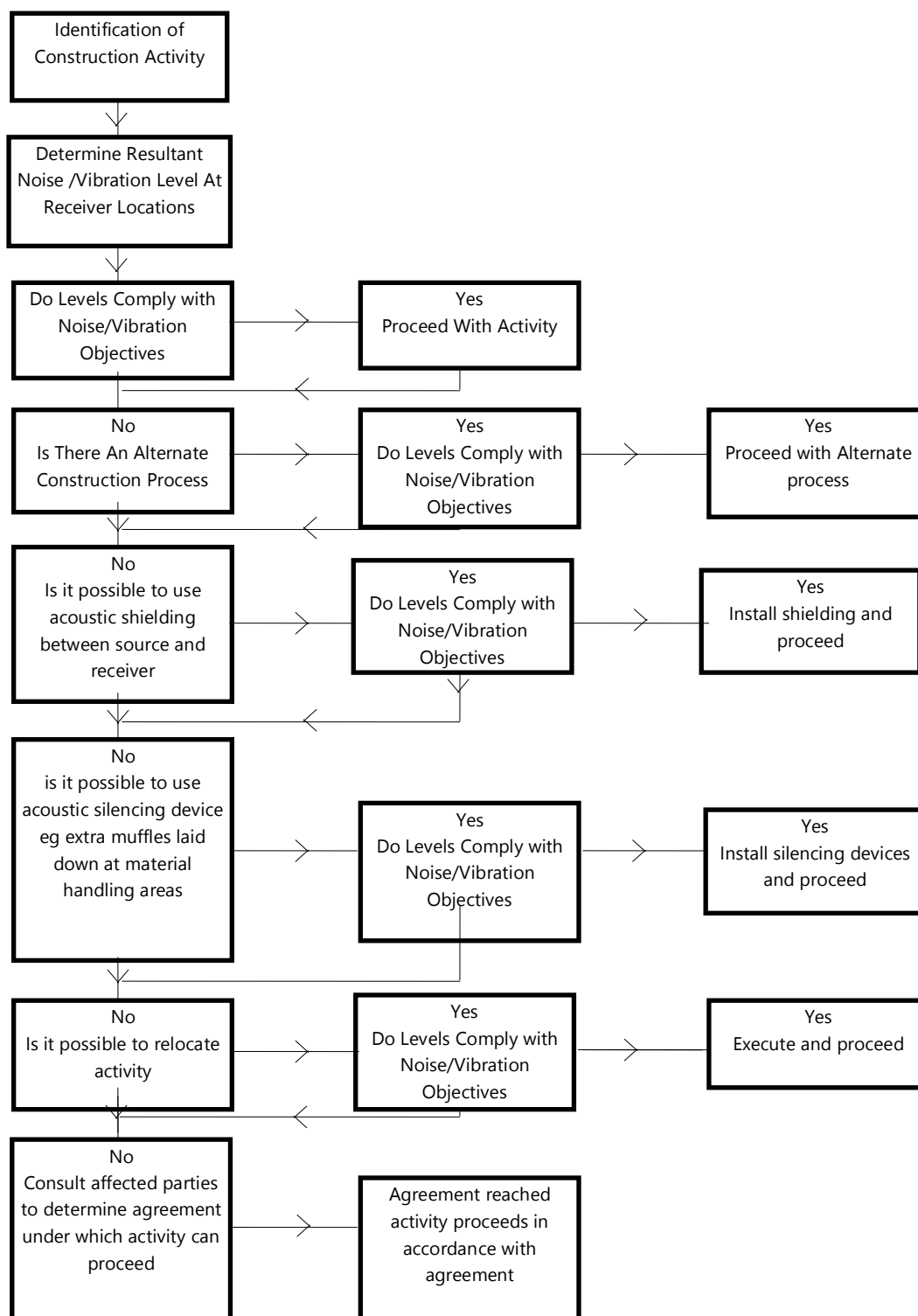
9.8 RECOMMENDATIONS

In light of the above, the following recommendations are made:

- Where feasible for the construction process, locate the concrete pump to the northern end of the site to maximise the distance to existing residents. If possible, consideration may be given to localised barriers close to concrete pumps to further minimise noise impact.
- Quiet work methods/technologies:
 - Materials handling/vehicles:
 - Trucks and bobcats to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.
 - Avoid careless dropping of construction materials into empty trucks.
 - Trucks, trailers and concrete trucks (if feasible) should turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).
- Complaints handling - In the event of complaint, the procedures outlined in Sections 9.9, 9.10 and 9.11 should be adopted.
- A detailed noise management plan should be developed by the main contractor that describes in detail the construction phases, programme, processes and equipment used, noise impact assessment and proposed mitigation and management.
- Site Induction:
 - A copy of the Noise Management Plan is to be available to contractors. The location of the Noise Management Plan should be advised in any site induction.
 - Site induction should also detail the site contact is to be notified in the event of noise complaint.

9.9 CONTROL OF CONSTRUCTION NOISE AND VIBRATION – PROCEDURAL STEPS

The flow chart presented below illustrates the process that will be followed in assessing construction activities.



9.10 ADDITIONAL NOISE AND VIBRATION CONTROL METHODS

In the event of complaints, there are a number of noise mitigation strategies available which can be considered.

The determination of appropriate noise control measures will be dependent on the particular activities and construction appliances. This section provides an outline of available methods.

9.10.1 Selection of Alternate Appliance or Process

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. Undertaking this activity using bulldozers, ripping and/or milling machines will result in lower noise levels. This measure has the potential to reduce noise emissions by 10 dB(A) or more.

9.10.2 Acoustic Barriers

Given the position of adjacent development, it is unlikely that noise screens will provide significant acoustic benefit for commercial or residential receivers but will provide noticeable improvement for those on ground level.

The placement of barriers at the source is generally only effective for static plant. Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuated by placing barriers at the source.

Barriers can also be placed between the source and the receiver.

The degree of noise reduction provided by barriers is dependent on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15dB(A) can be effected. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8dB(A) may be achieved. Where no line of sight is obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance that is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10mm or 15mm thick plywood (radiata plywood) would be acceptable for the barriers.

9.10.3 Material Handling

The installation of rubber matting over material handling areas can reduce the sound of impacts due to material being dropped by up to 20dB(A).

9.10.4 Treatment of Specific Equipment

In certain cases it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

9.10.5 Establishment of Site Practices

This involves the formulation of work practices to reduce noise generation. A more detailed management plan will be developed for this project in accordance to the construction methodology outlining work procedures and methods for minimising noise.

9.10.6 Combination of Methods

In some cases, it may be necessary that two or more control measures be implemented to minimise noise.

9.11 ADDRESSING COMPLAINTS

Should ongoing complaints of excessive noise or vibration levels occur immediate measures shall be undertaken to investigate the complaint, the cause of the exceedances and identify the required changes to work practices.

If a noise complaint is received the complaint should be recorded. Any complaint form should list:

- The name and address of the complainant (if provided);
- The time and date the complaint was received;
- The nature of the complaint and the time and date the noise was heard;
- The name of the employee who received the complaint;
- Actions taken to investigate the complaint, and a summary of the results of the investigation;
- Required remedial action, if required;
- Validation of the remedial action; and
- Summary of feedback to the complainant.

A permanent register of complaints should be held.

10 SUMMARY OF RECOMMENDATIONS

We recommend the following acoustic treatments/management controls are implemented to mitigate acoustic impact as much as practicable:

- Operation of the school should be limited to the activities and times of operation indicated in Table 2 of this report, subject to additional mitigation of noise for certain activities and operating times as indicated below.
- External activities by non-school uses are not proposed at this stage. If uses are proposed in future they should be assessed for noise impact and appropriate mitigation and management implemented to prevent adverse impacts on surrounding properties. As part of the assessment appropriate assessment criteria should be developed depending on the frequency of use, time of day, type of activity, etc.
- Detailed acoustic review of all external plant items should be undertaken following equipment selection and duct layout design. All plant items will be capable of meeting noise emission requirements of Council and the EPA Noise Policy for Industry (2017), with detailed design to be done at CC stage.
- External speakers for PA and bells should be designed to minimise noise spill, be directional facing away from residential receivers to comply with EPA Noise Policy for Industry (2017) guidelines (refer Sections 5.2 and 6.2).
- Waste removal times should be scheduled between 7:30am and 6pm.
- The school hall doors and other large ventilation openings should be closed after 6pm where the activity involves amplified loud music or speech. Use of unscreened external areas for noise producing activities should be limited to normal school hours.
- Any eastern windows (facing Northbourne Drive) should have minimum 6.38mm glass fitted into openable frames to give a minimum R_w of 30.
- All other facades facing adjacent roadways should have minimum 6mm glass fitted into openable frames to achieve minimum R_w 27.
- Doorways to the southern façade of the Community Hall should have a minimum acoustic rating of R_w 20.
- The proposal would not produce adverse vibration impacts on nearby structures or impact the amenity of the surrounding properties.
- Construction noise impacts should be managed as outlined in Section 9.8.

11 CONCLUSION

Noise emissions associated with the proposed Marsden Park Public School have been assessed with reference to relevant EPA and relevant acoustic guidelines.

The following noise emission sources have been addressed:

- Noise from internal areas
- Noise from mechanical plant, PA system and school bells.
- Traffic generation
- Carpark Usage
- Waste Removal
- External activities
- Construction activities

Recommendations have been made to ensure that noise emissions from the school do not adversely impact the surrounding properties. Provided the recommendations are adopted the proposed school will not adversely impact the acoustic amenity of surrounding receivers.

Please contact us should you have any further queries.

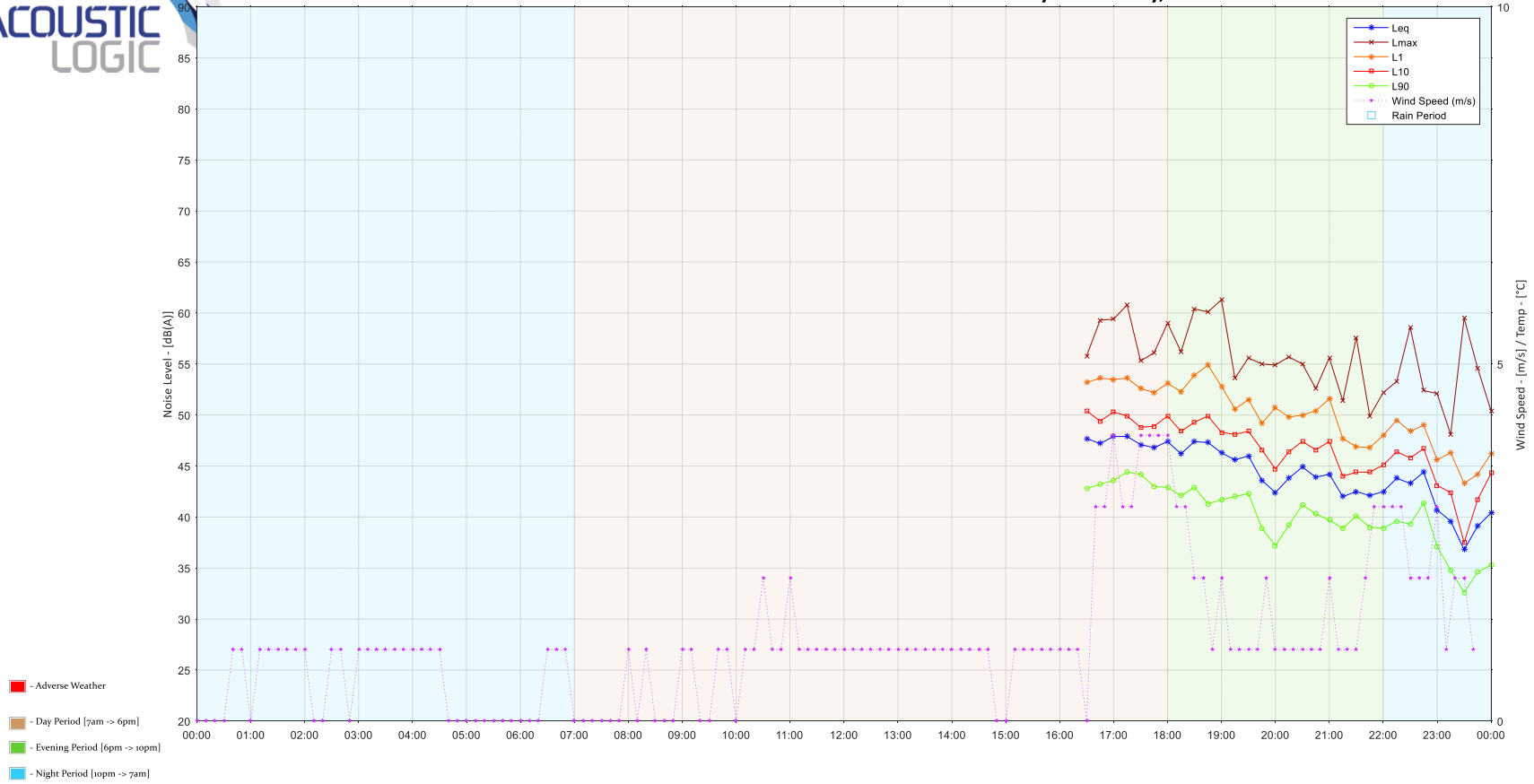
Yours faithfully,

A handwritten signature in black ink, appearing to read 'Alex Washer', is positioned above the printed name.

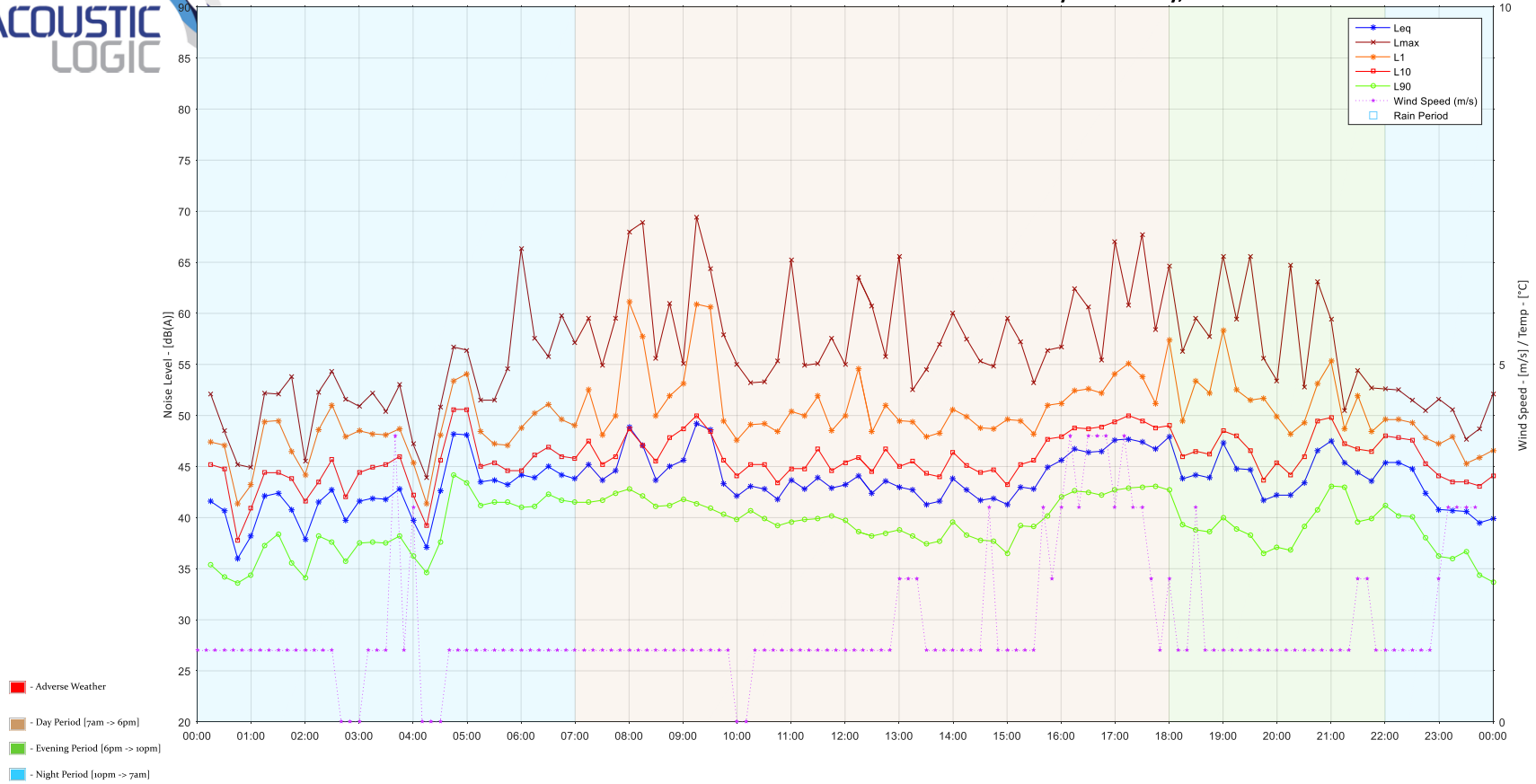
Acoustic Logic Consultancy Pty Ltd
Alex Washer

APPENDIX ONE – UNATTENDED NOISE MONITOR LOCATION 1 – NORTH EAST

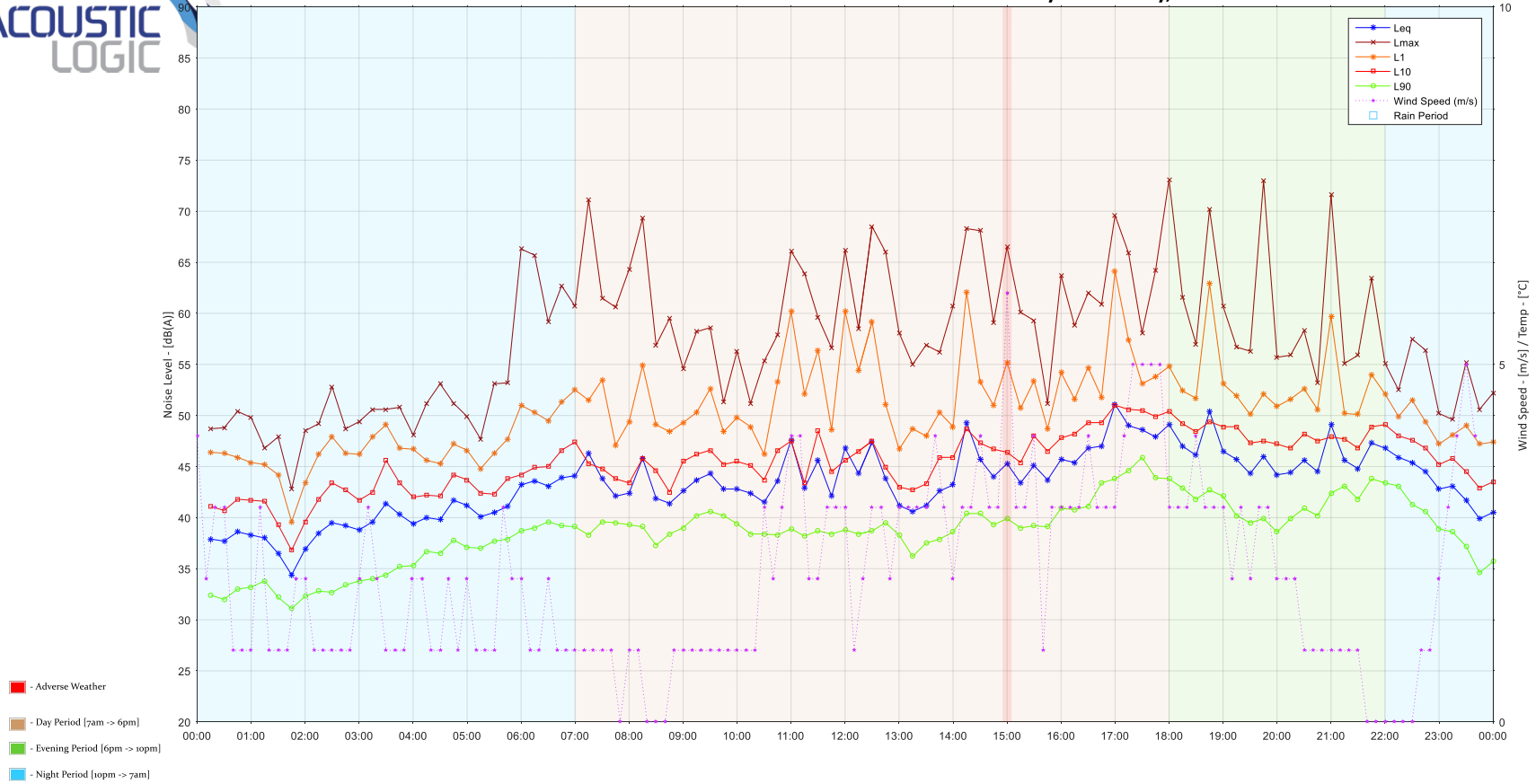
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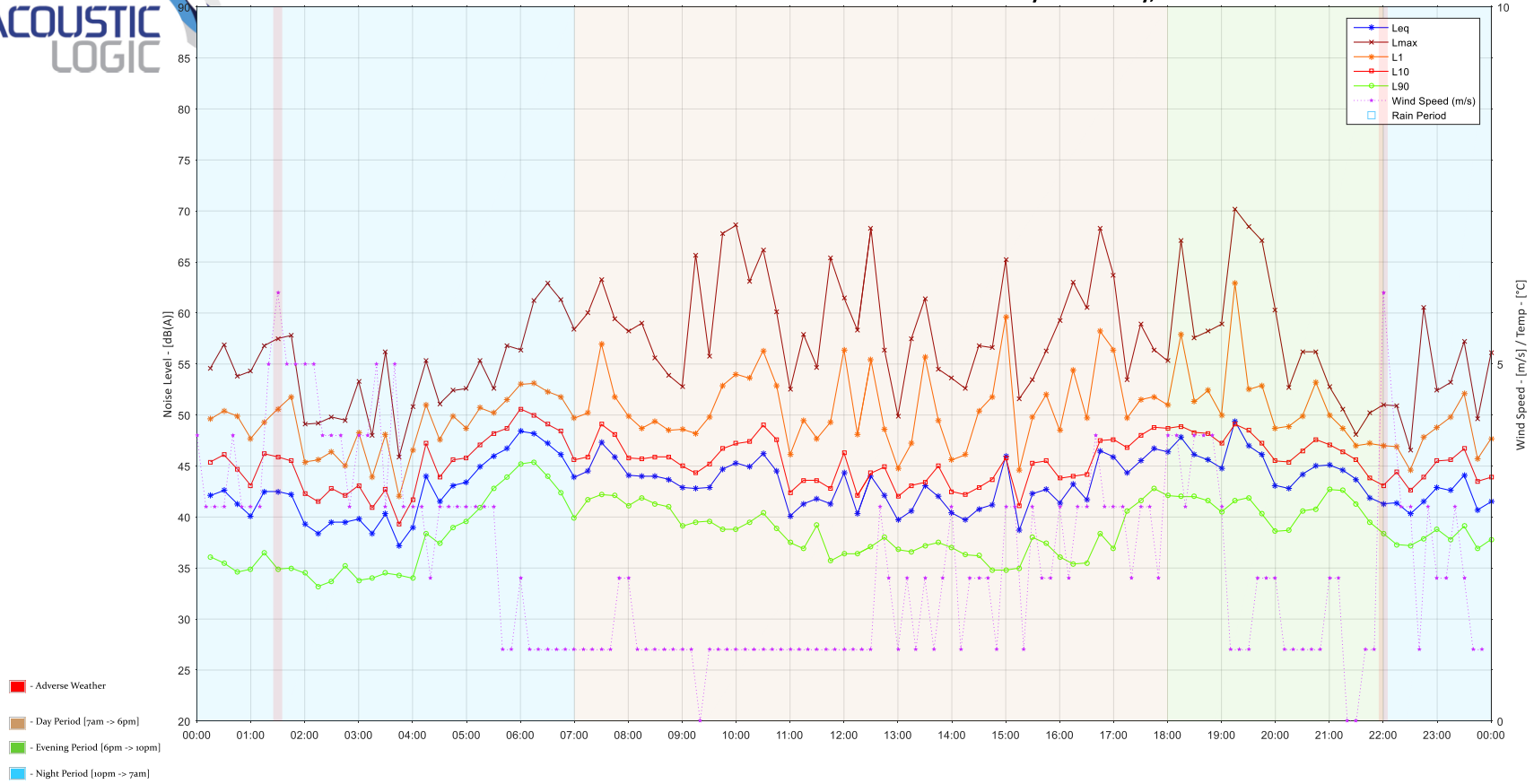
Marsden Park Public School - Location 1 North East: Wednesday 16 January, 2019



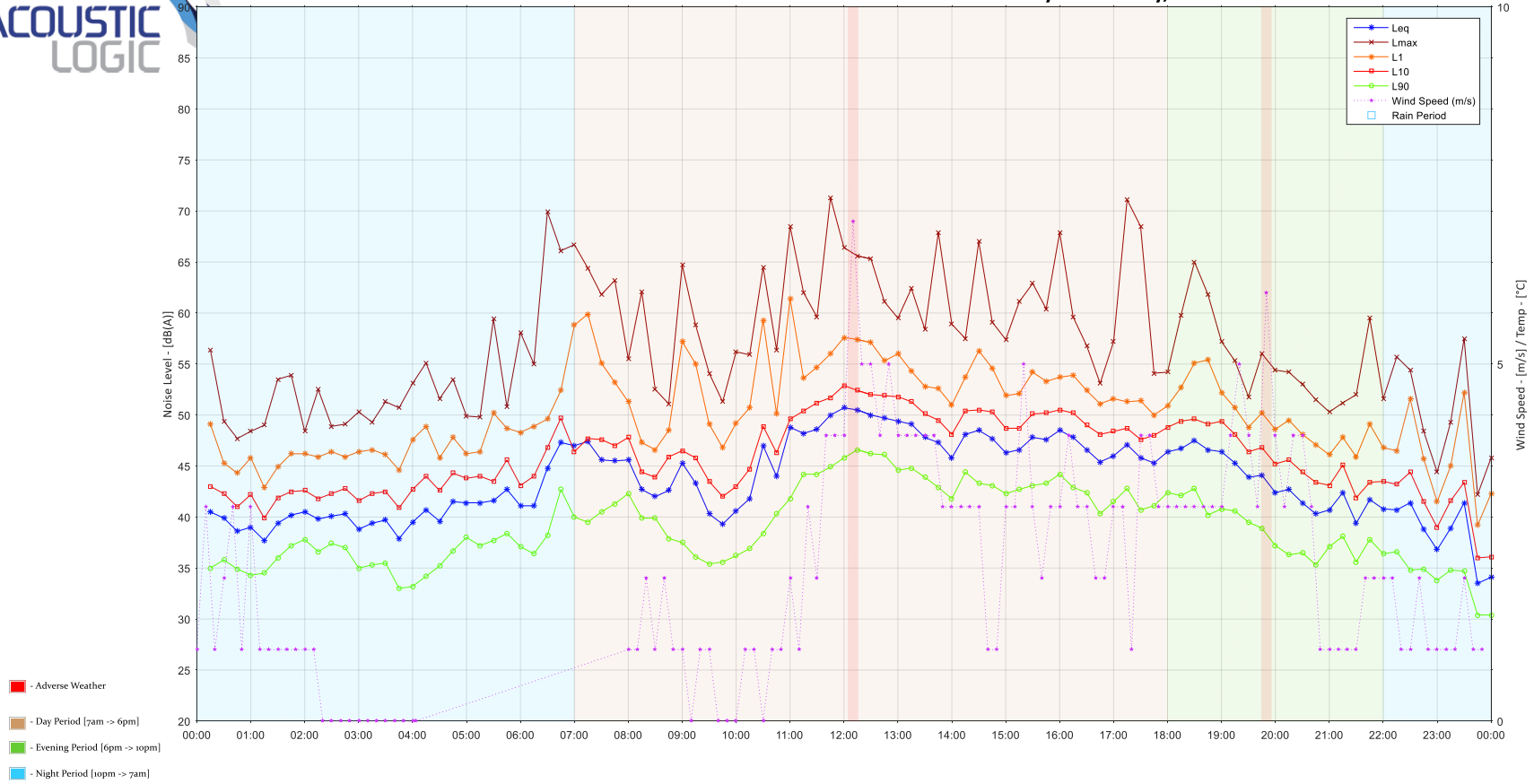
Marsden Park Public School - Location 1 North East: Thursday 17 January, 2019



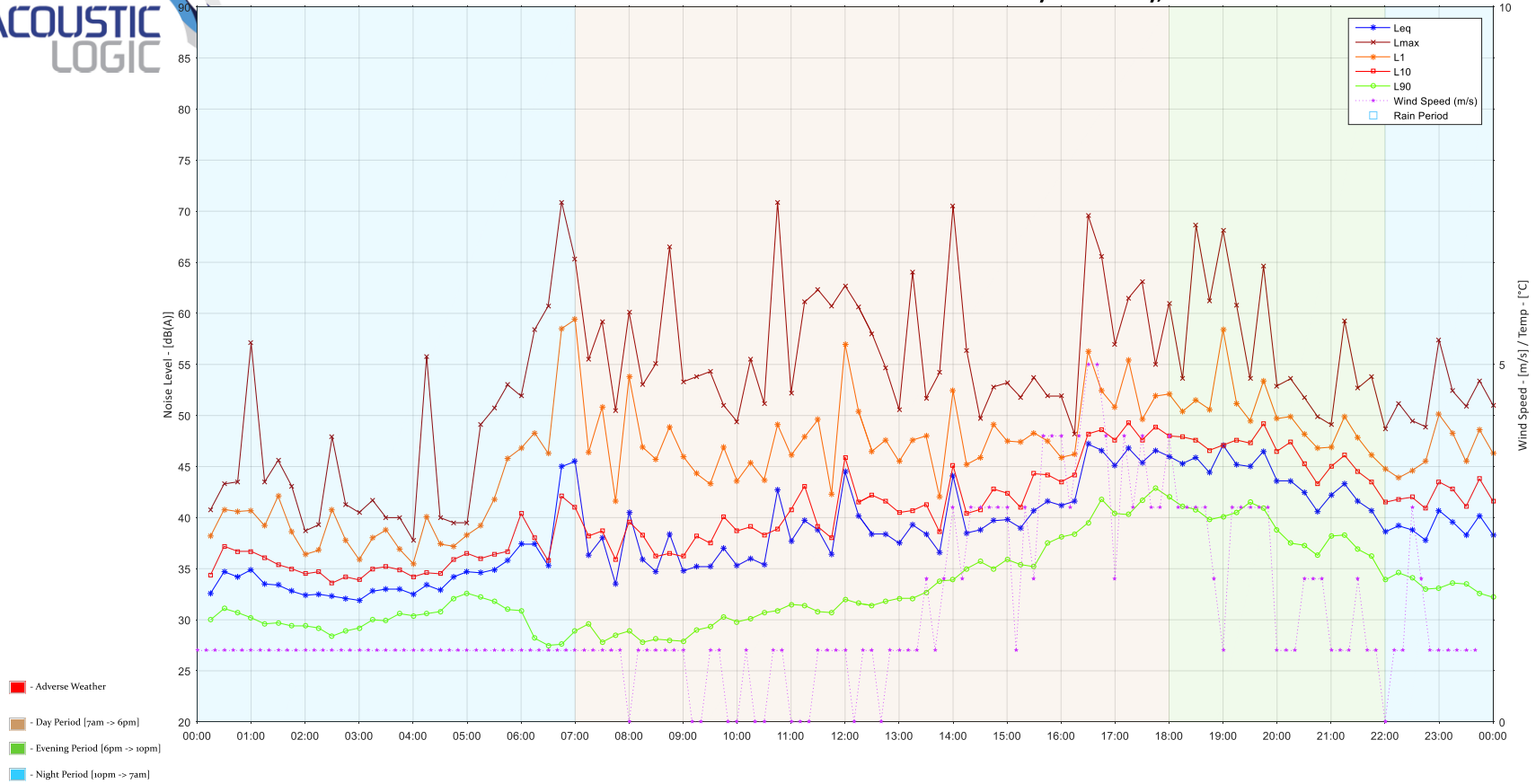
Marsden Park Public School - Location 1 North East: Friday 18 January, 2019



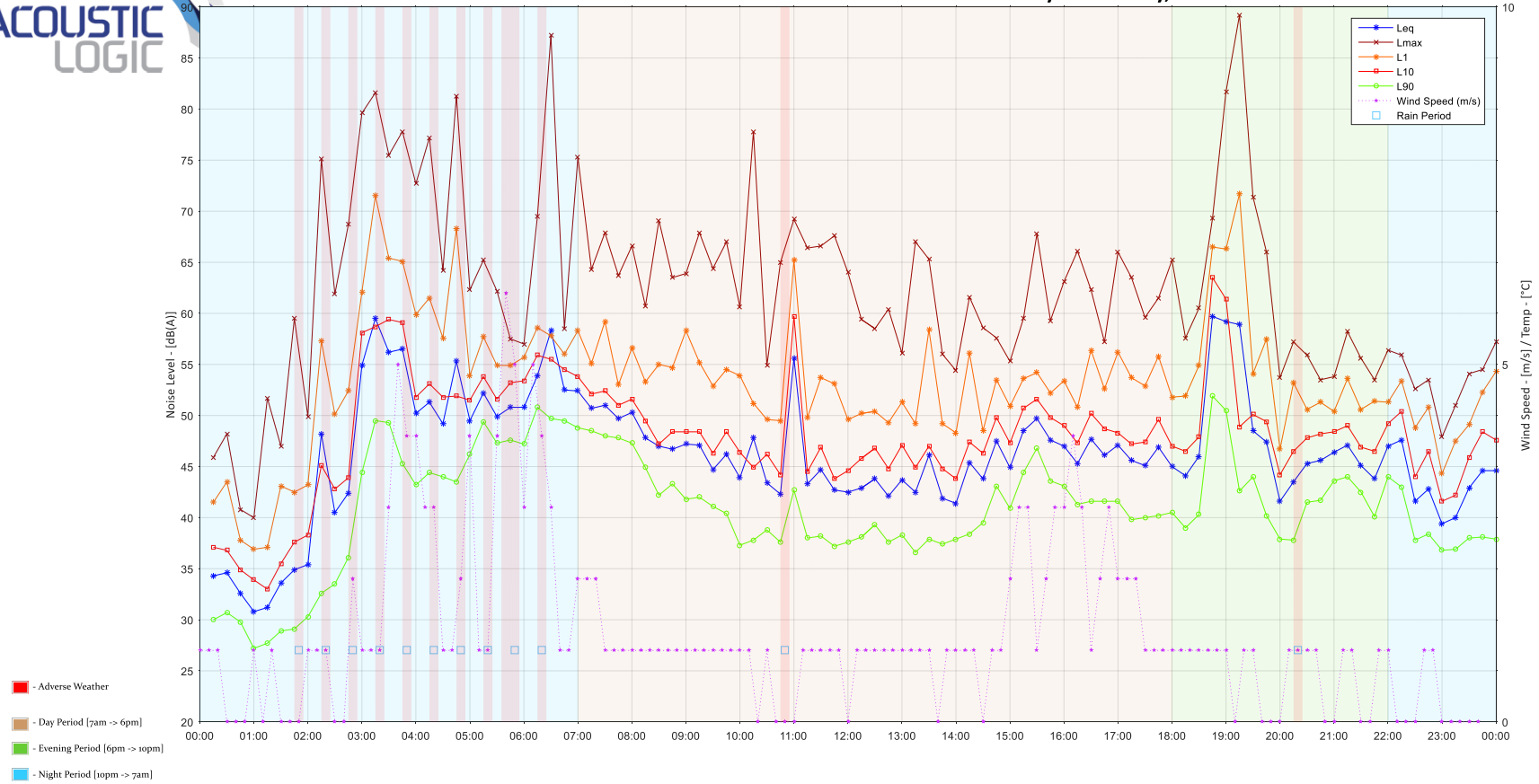
Marsden Park Public School - Location 1 North East: Saturday 19 January, 2019



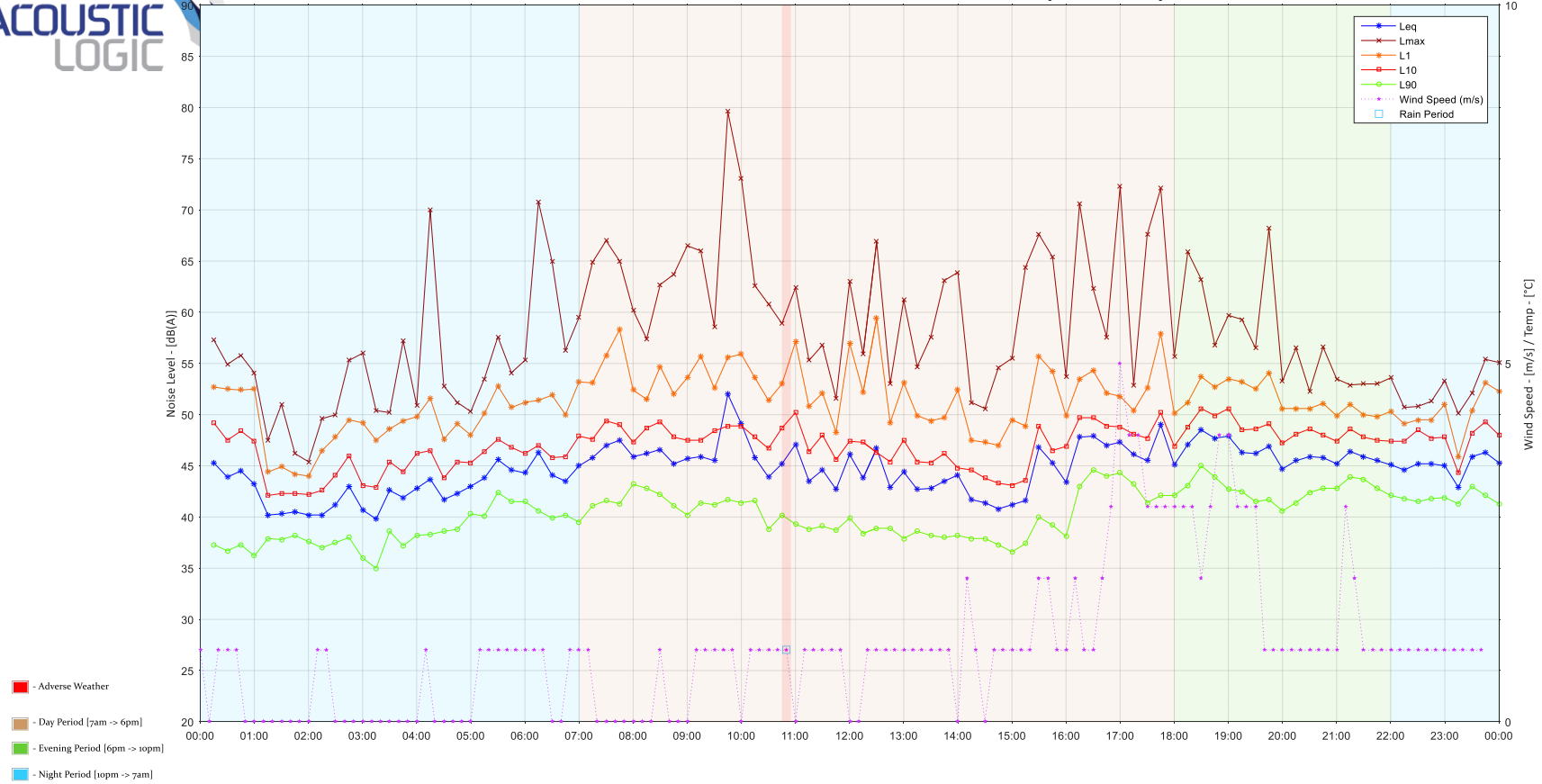
Marsden Park Public School - Location 1 North East: Sunday 20 January, 2019



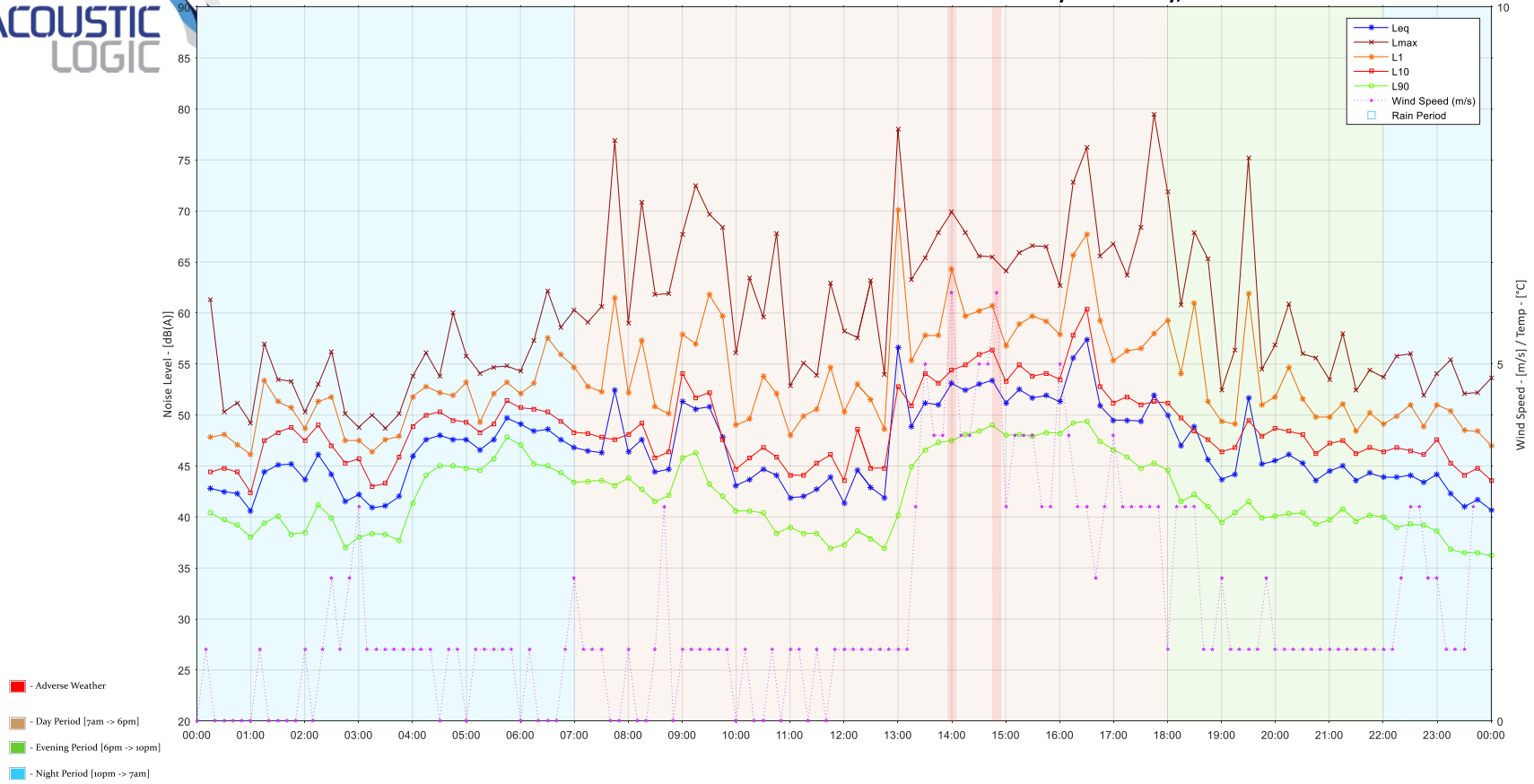
Marsden Park Public School - Location 1 North East: Monday 21 January, 2019



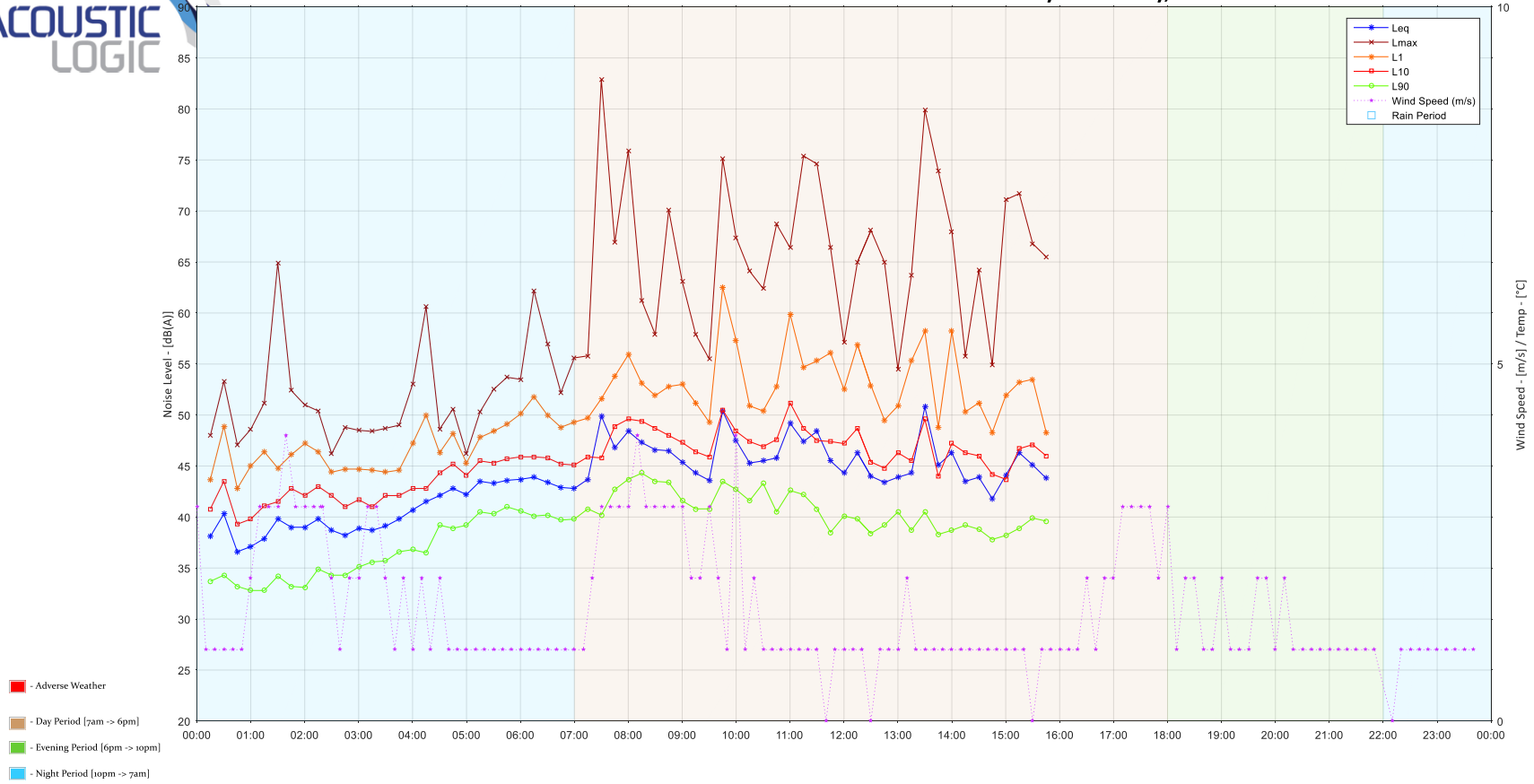
Marsden Park Public School - Location 1 North East: Tuesday 22 January, 2019



Marsden Park Public School - Location 1 North East: Wednesday 23 January, 2019

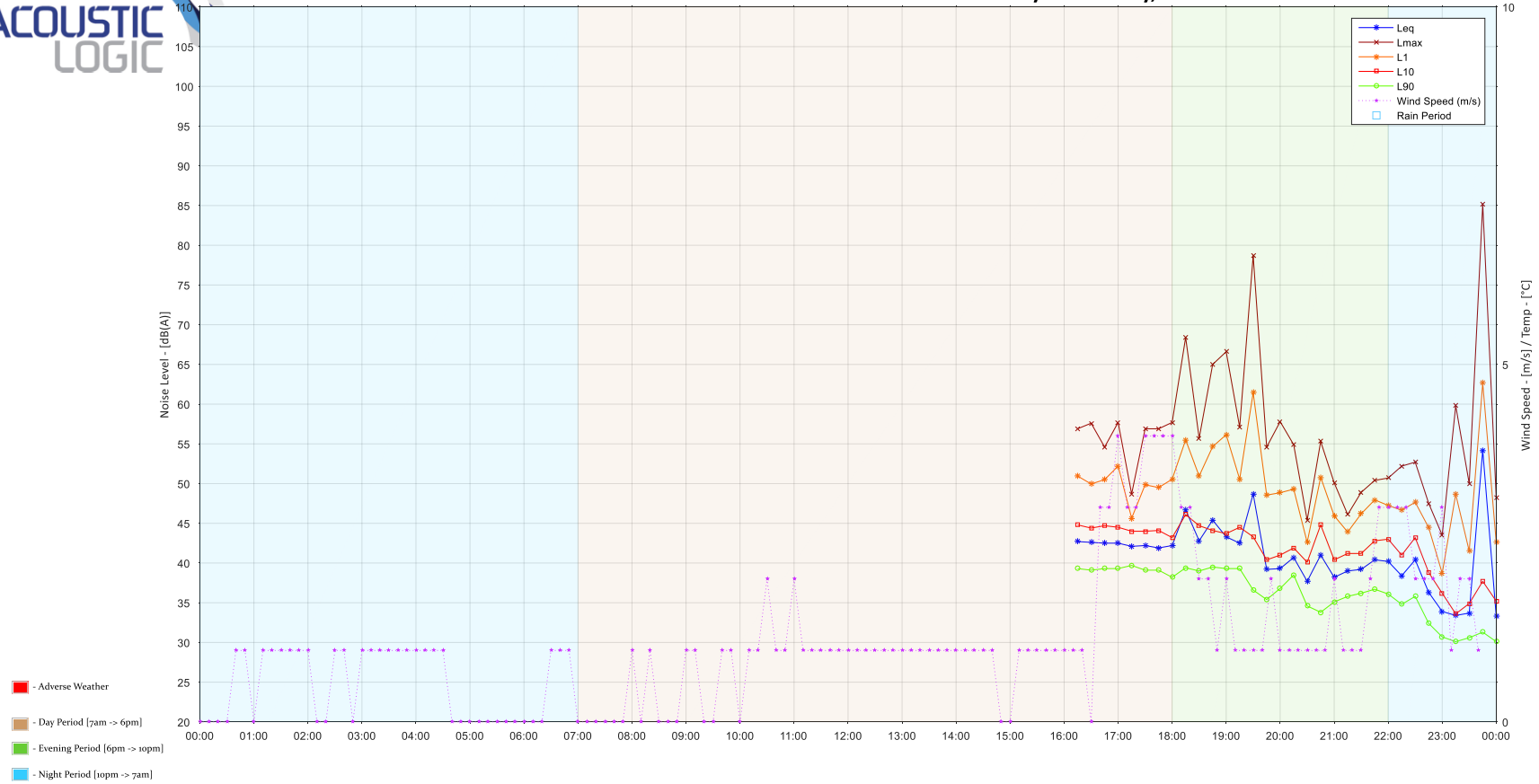


Marsden Park Public School - Location 1 North East: Thursday 24 January, 2019

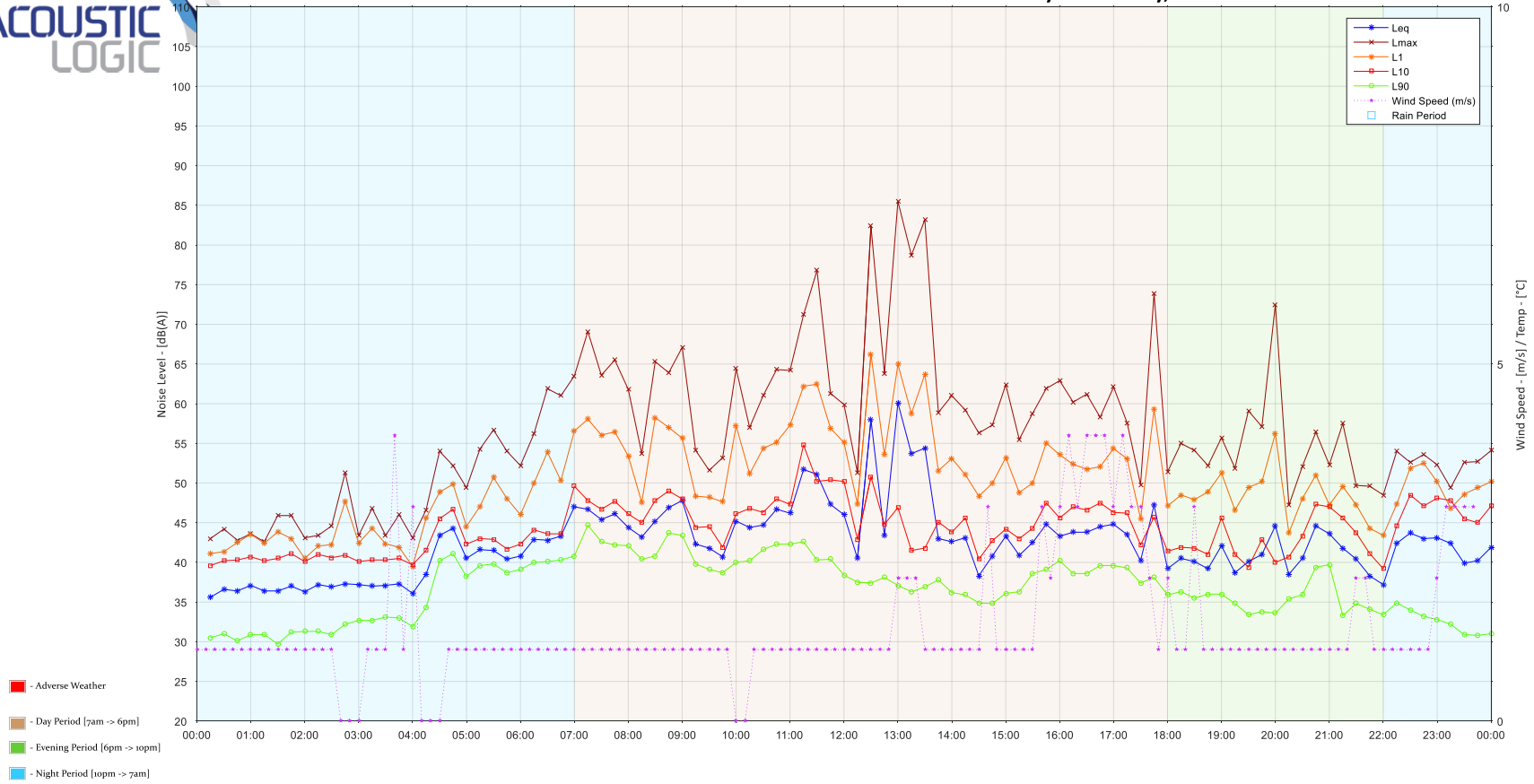


APPENDIX TWO – UNATTENDED NOISE MONITOR LOCATION TWO – SOUTH WEST

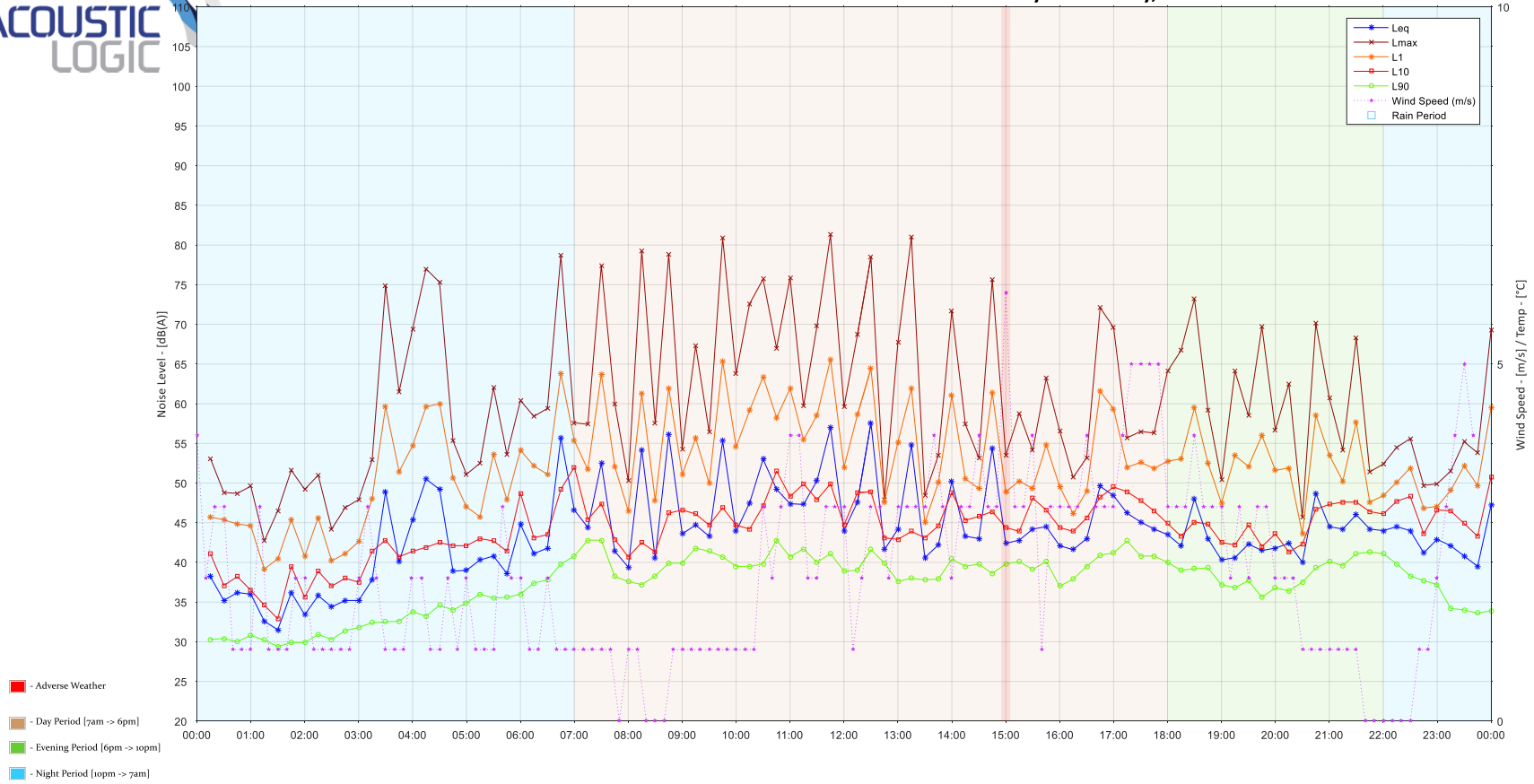
Marsden Park School - Location Two South-West: Tuesday 15 January, 2019



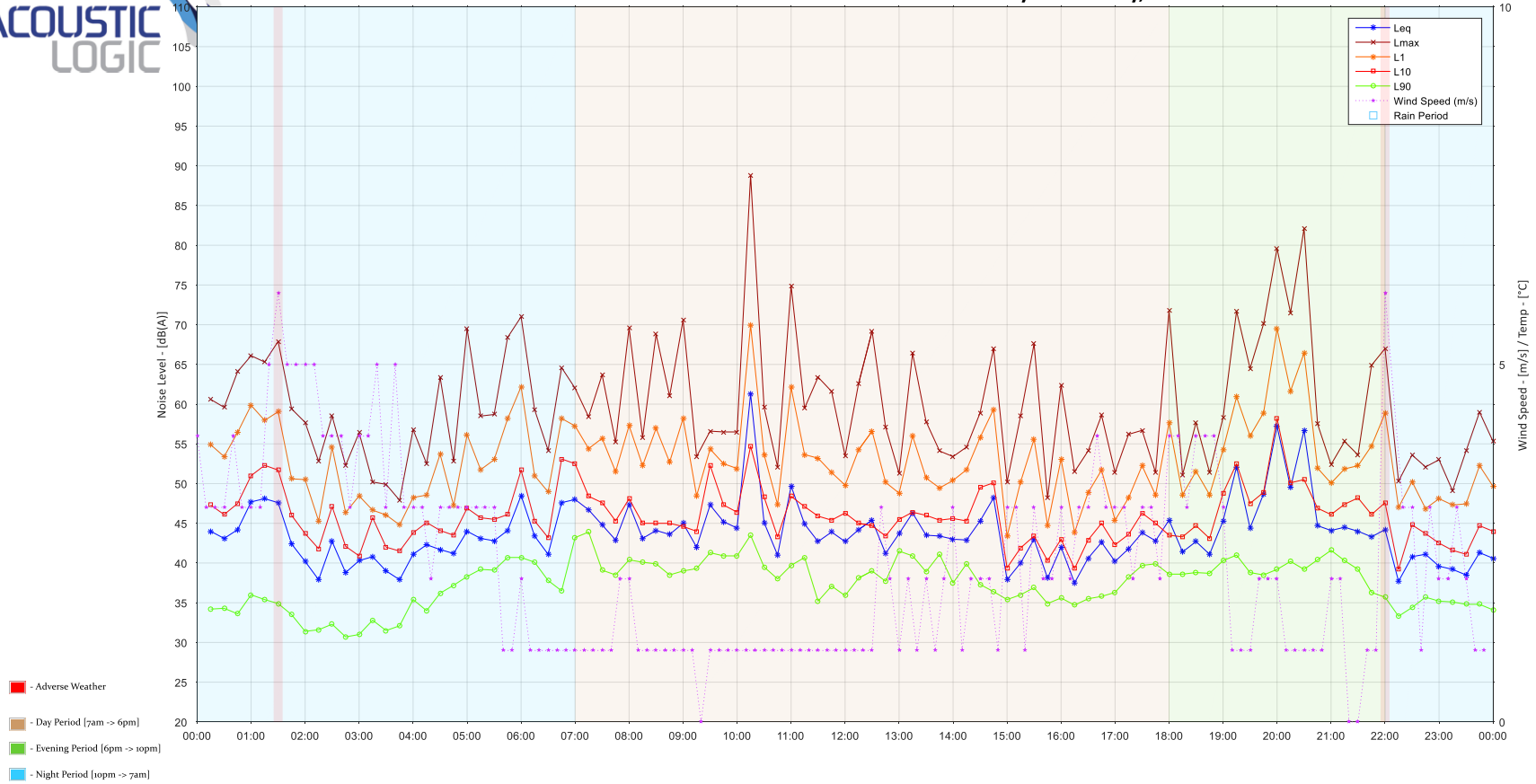
Marsden Park School - Location Two South-West: Wednesday 16 January, 2019



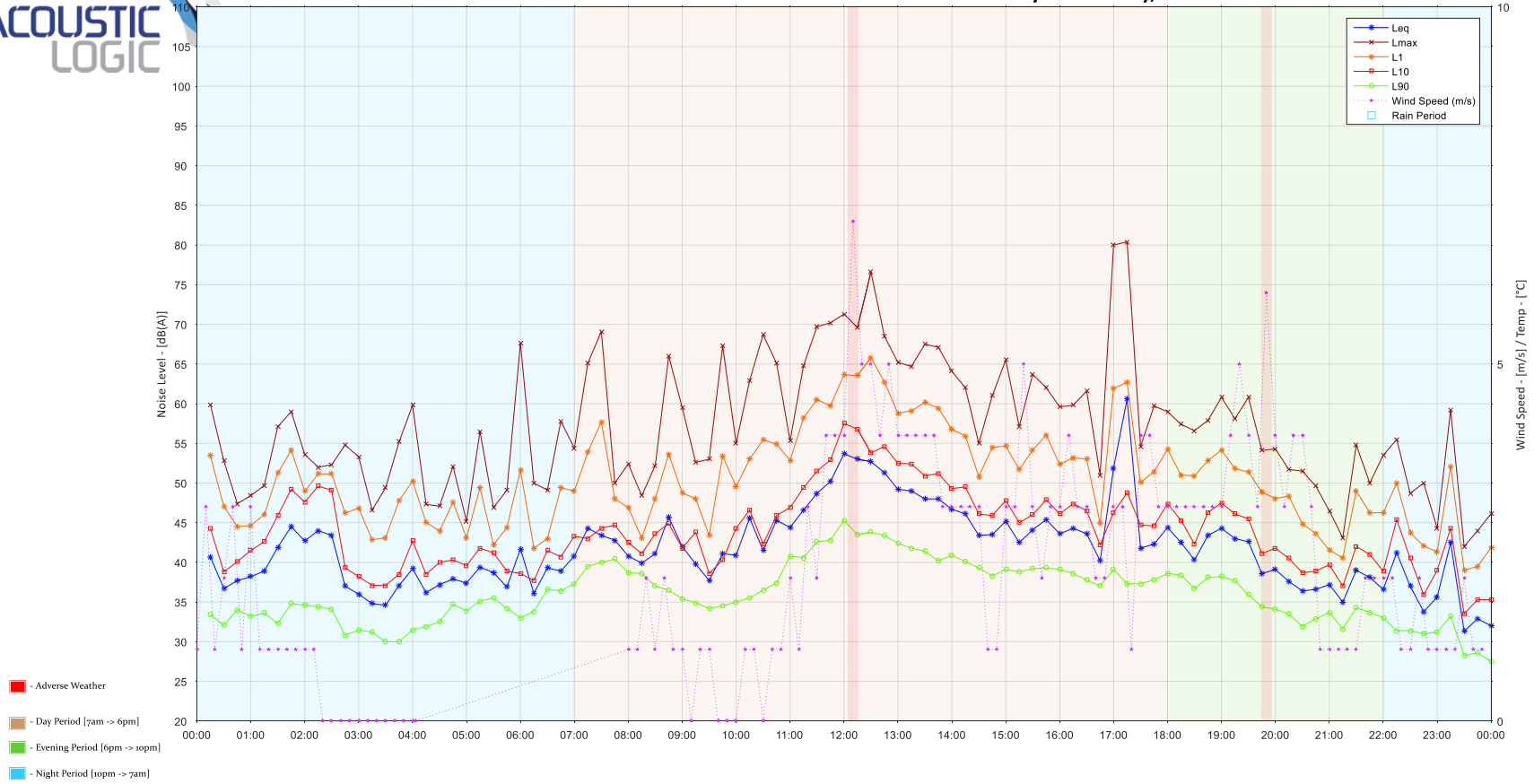
Marsden Park School - Location Two South-West: Thursday 17 January, 2019



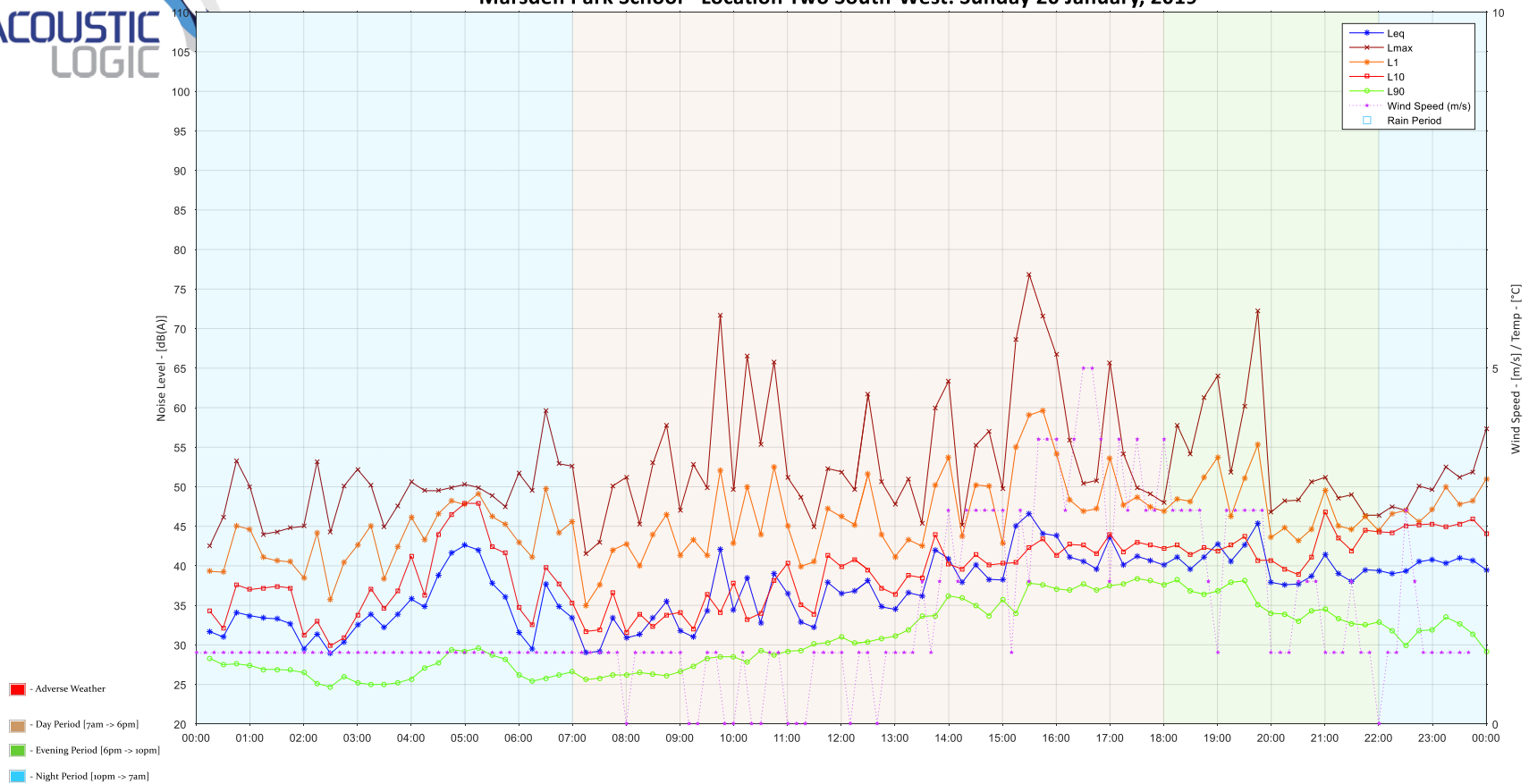
Marsden Park School - Location Two South-West: Friday 18 January, 2019



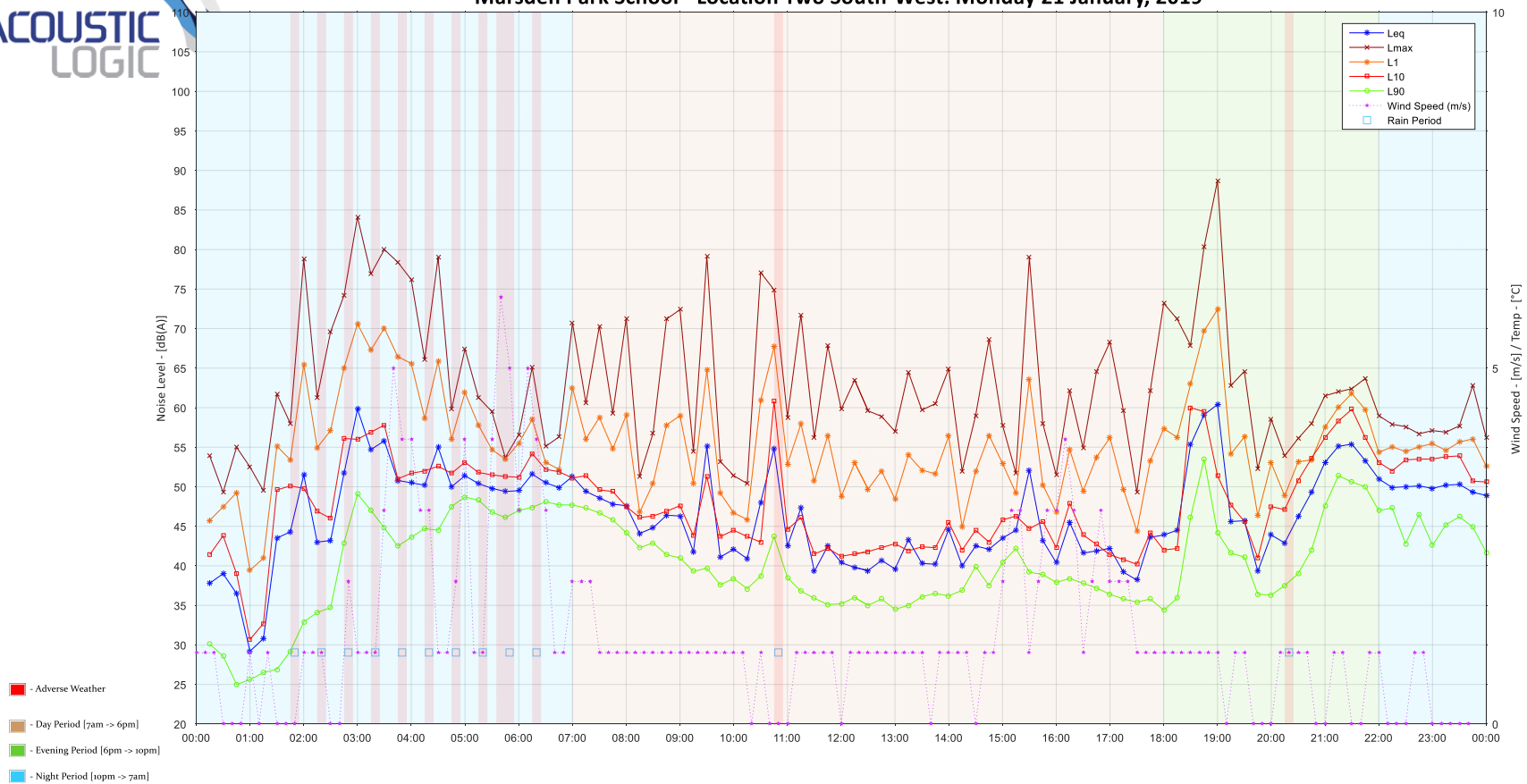
Marsden Park School - Location Two South-West: Saturday 19 January, 2019



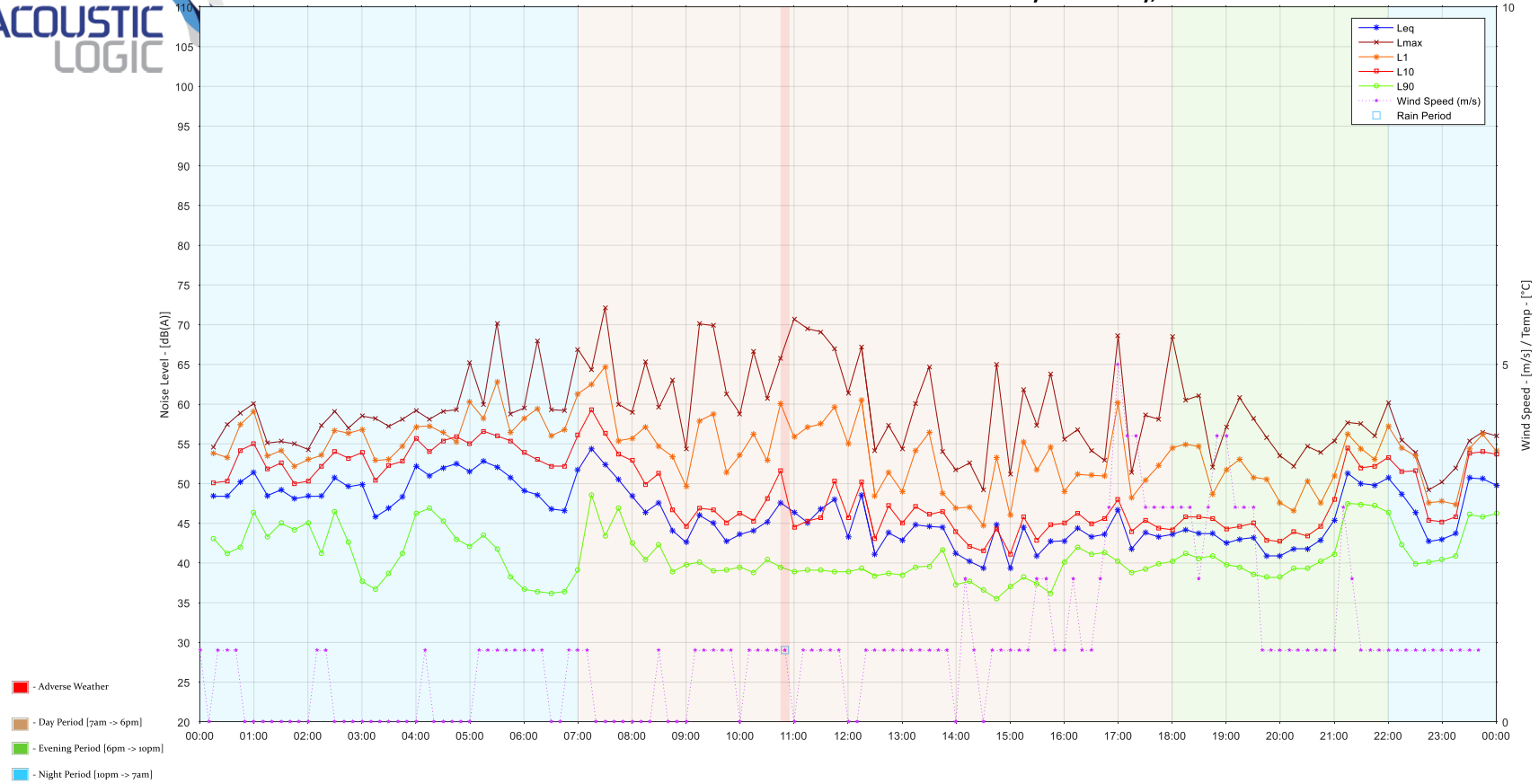
Marsden Park School - Location Two South-West: Sunday 20 January, 2019



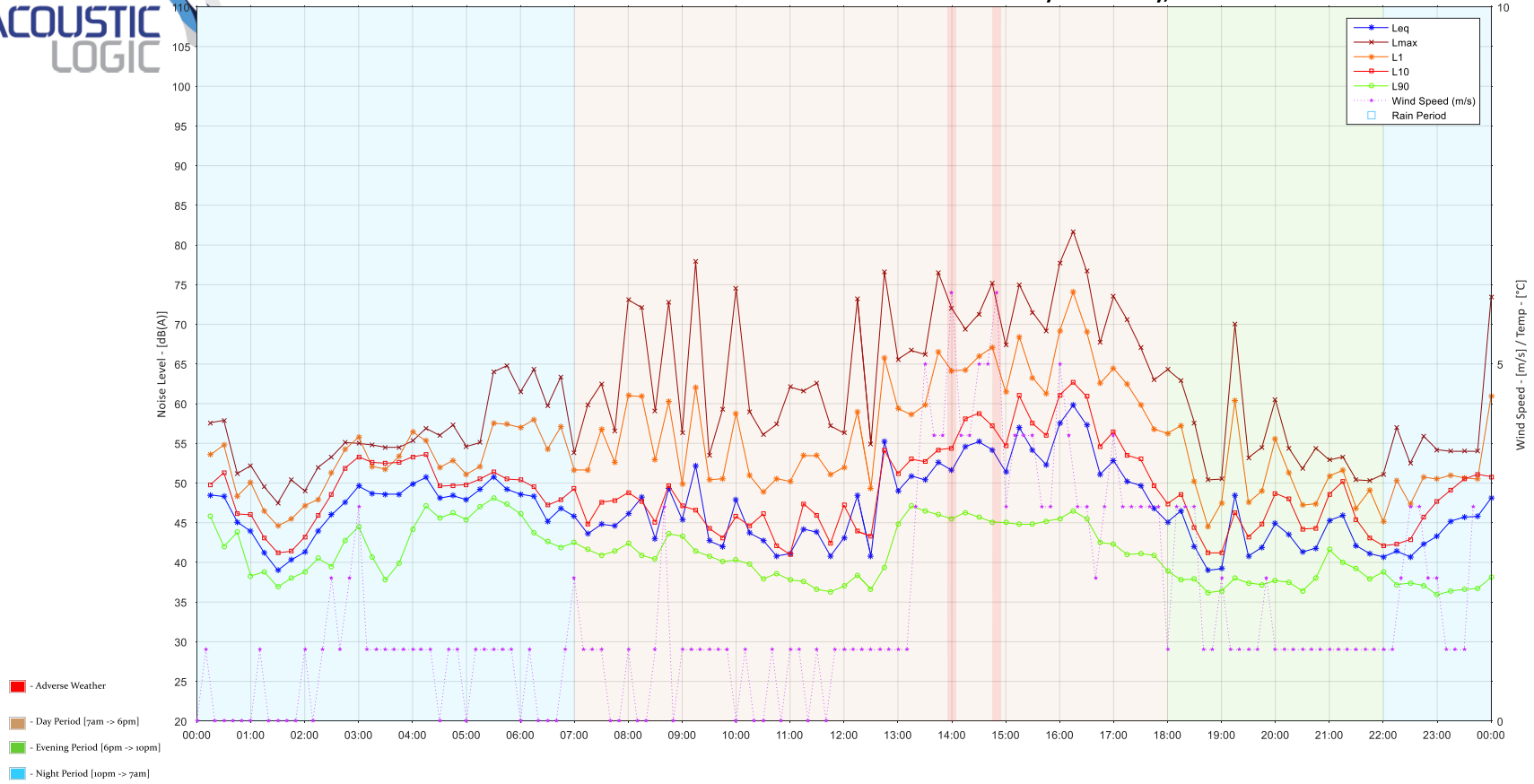
Marsden Park School - Location Two South-West: Monday 21 January, 2019



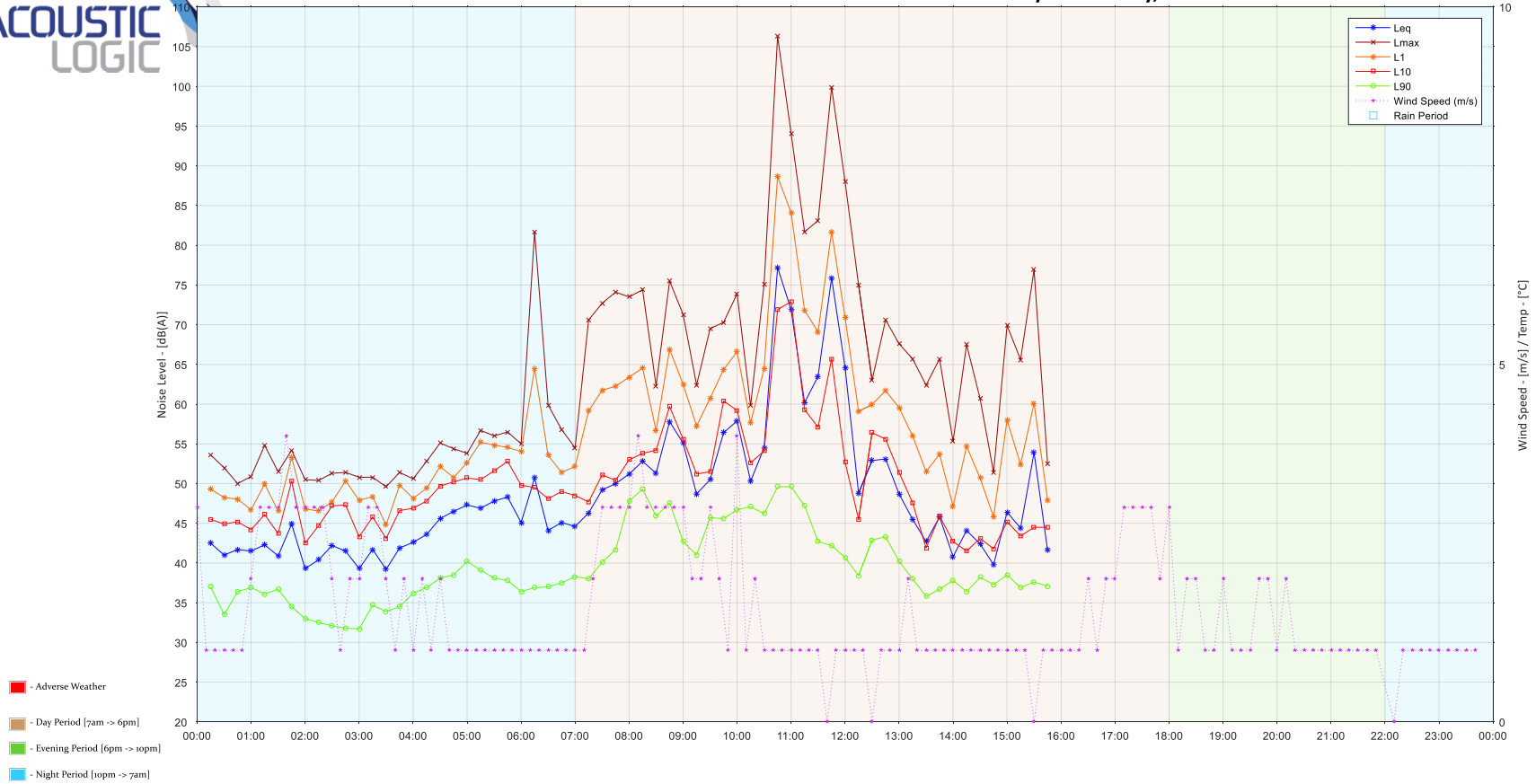
Marsden Park School - Location Two South-West: Tuesday 22 January, 2019



Marsden Park School - Location Two South-West: Wednesday 23 January, 2019



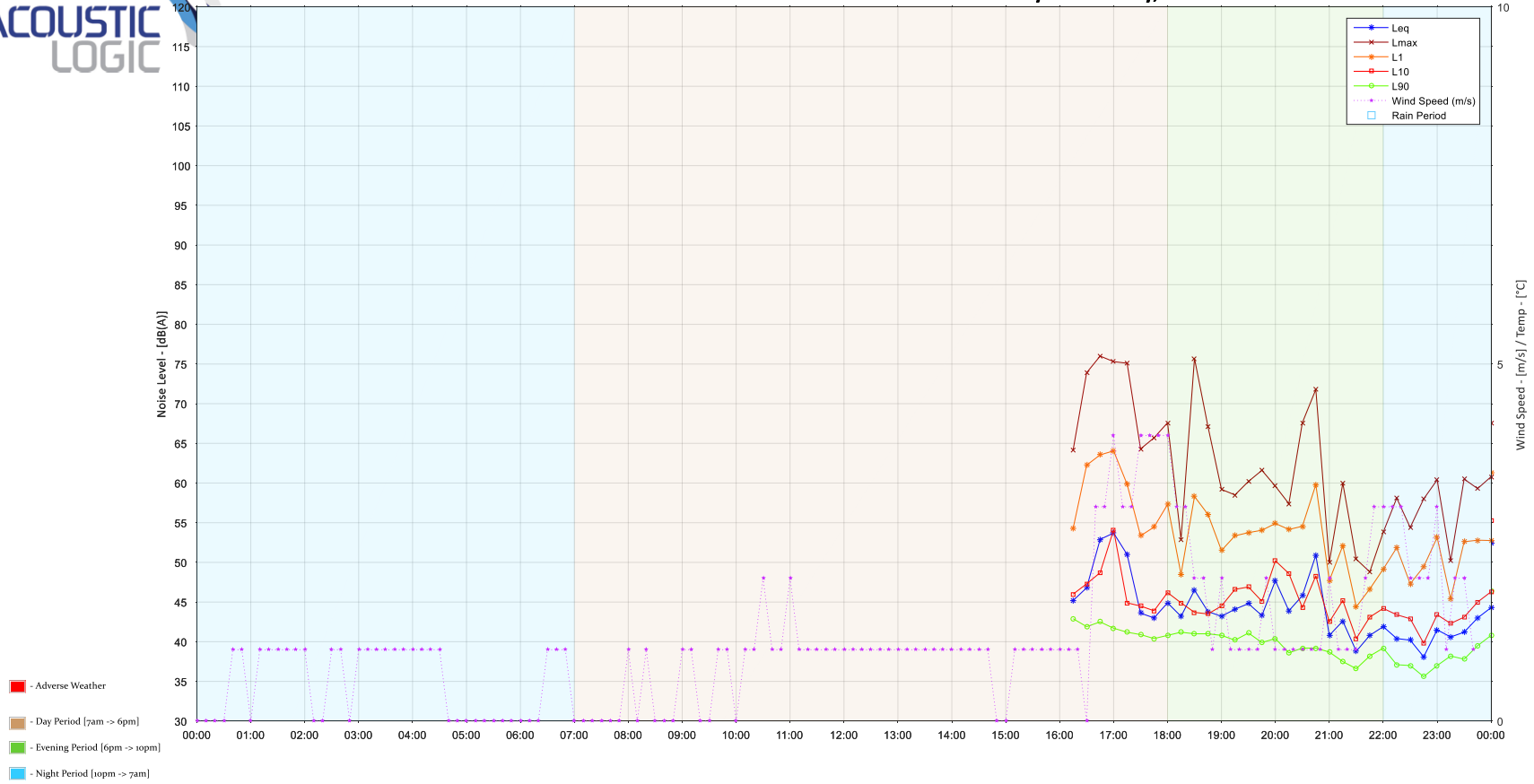
Marsden Park School - Location Two South-West: Thursday 24 January, 2019



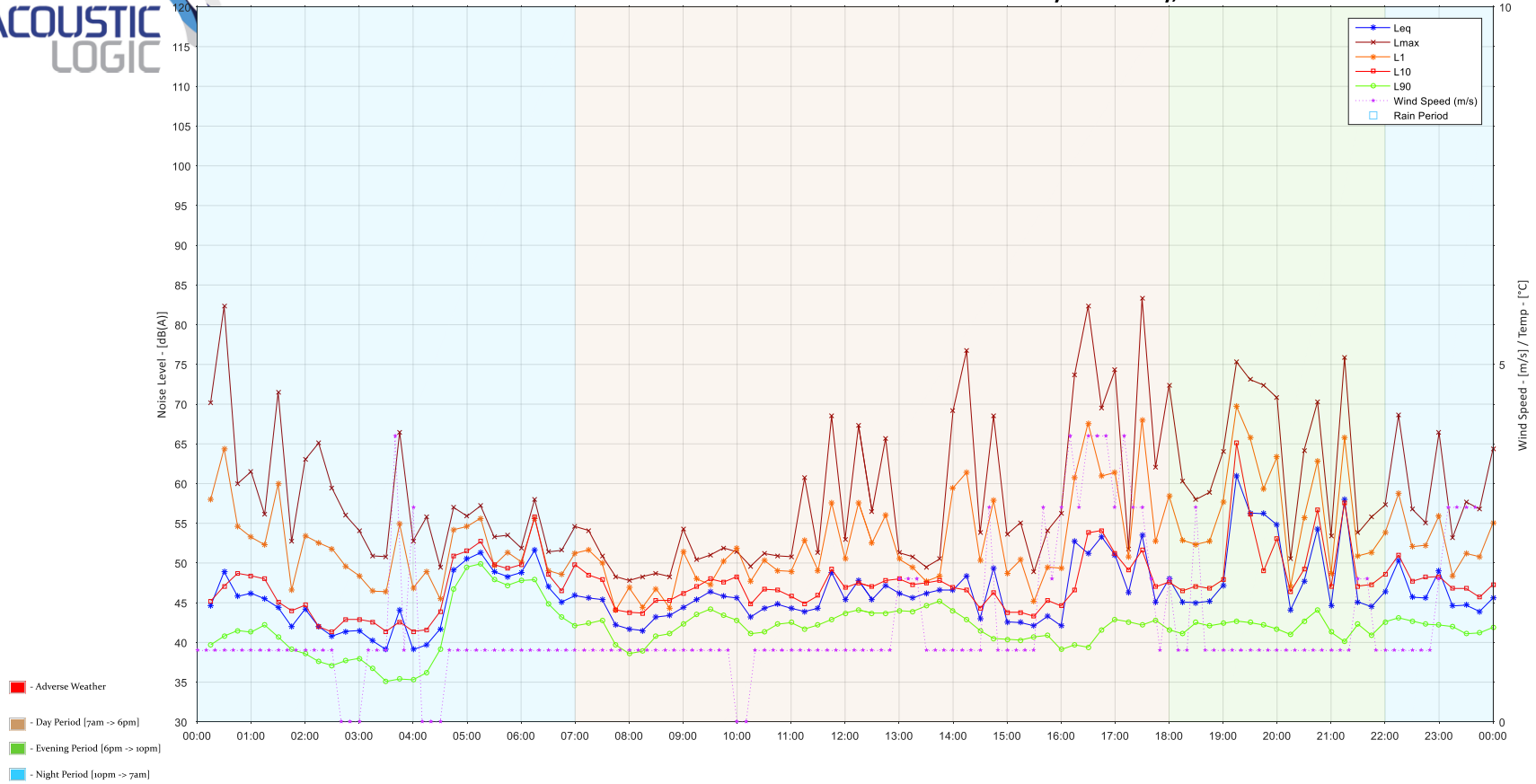
APPENDIX THREE – UNATTENDED NOISE MONITOR LOCATION THREE – NORTH WEST



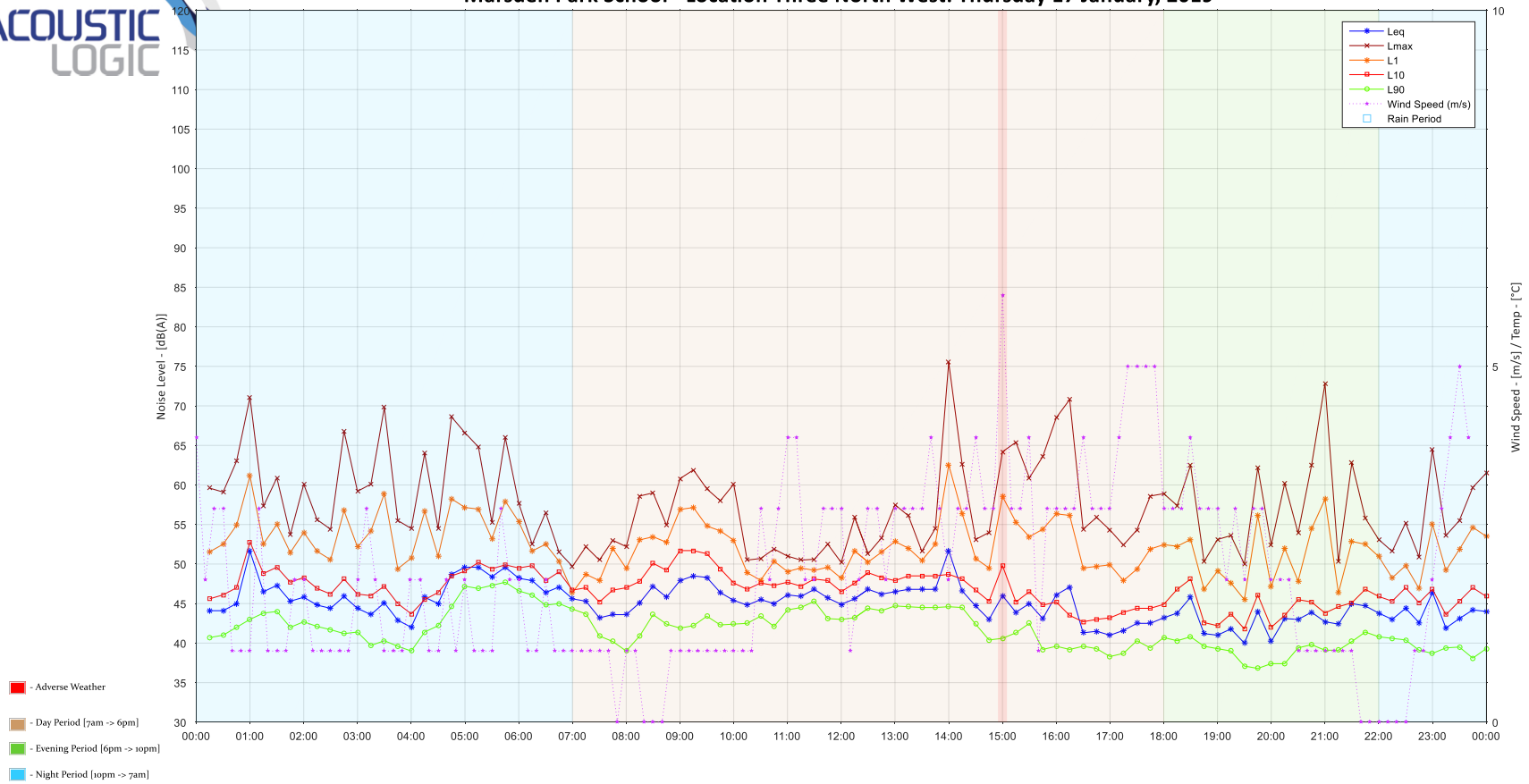
Marsden Park School - Location Three North West: Tuesday 28 January, 2019



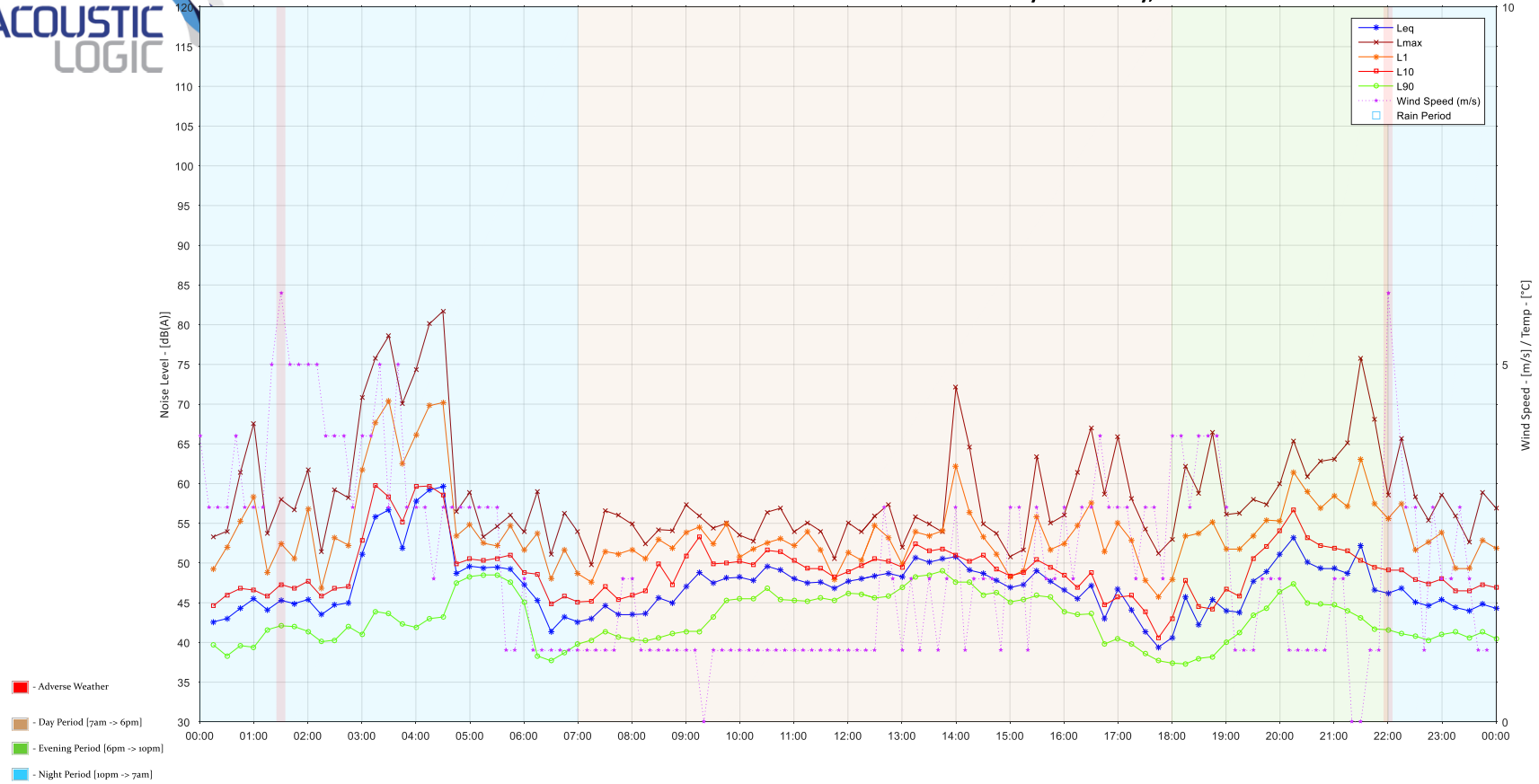
Marsden Park School - Location Three North West: Wednesday 16 January, 2019



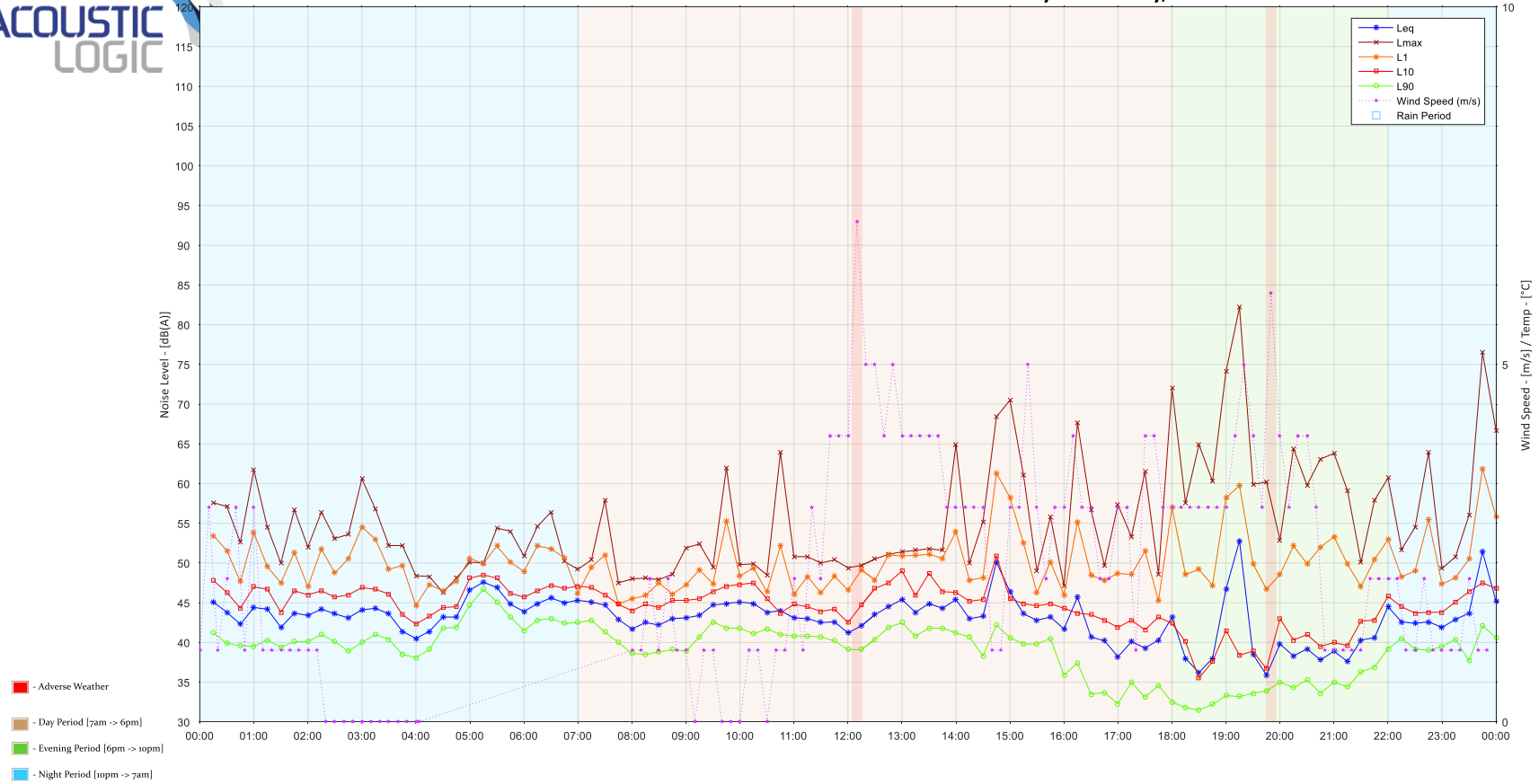
Marsden Park School - Location Three North West: Thursday 17 January, 2019



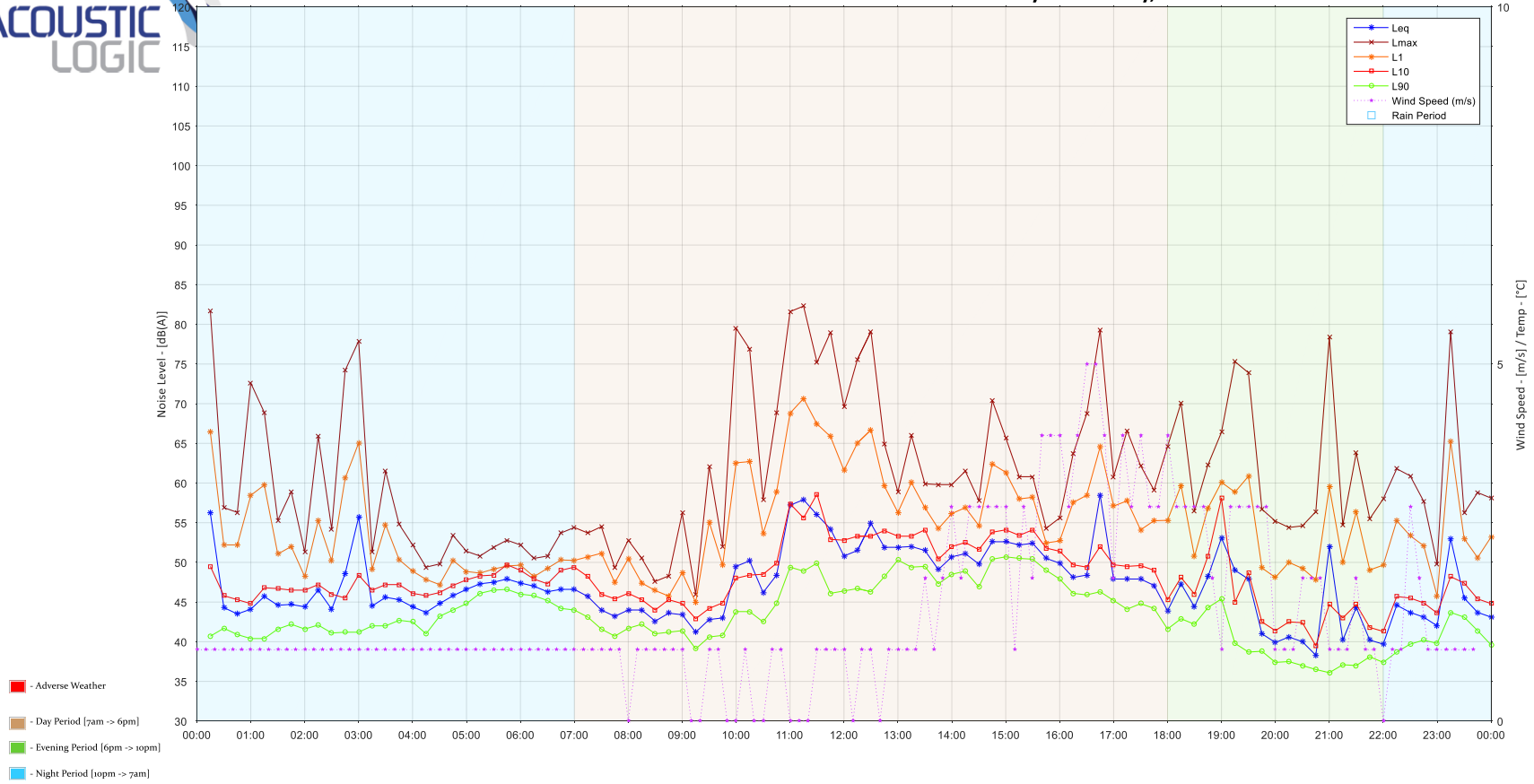
Marsden Park School - Location Three North West: Friday 18 January, 2019



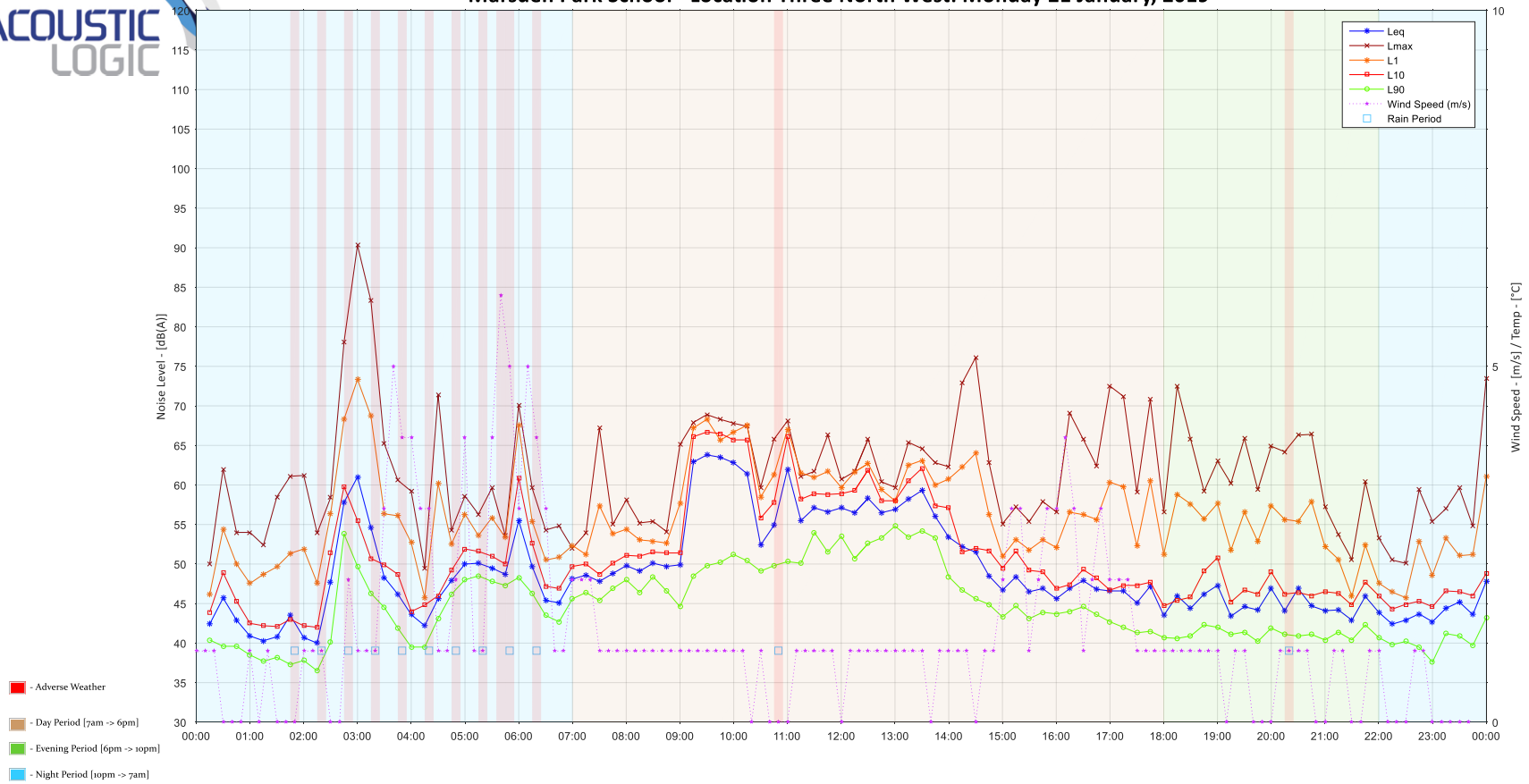
Marsden Park School - Location Three North West: Saturday 19 January, 2019



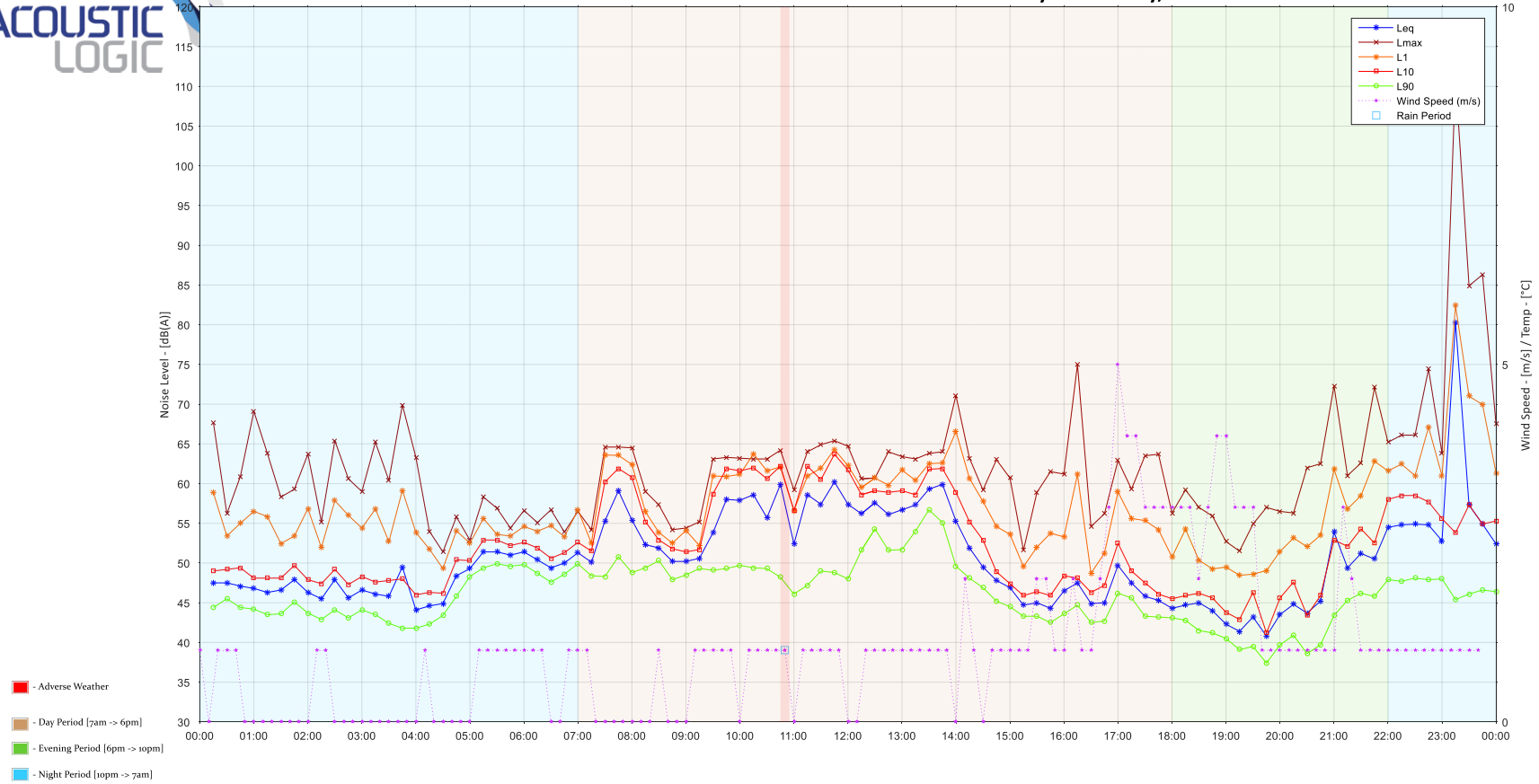
Marsden Park School - Location Three North West: Sunday 20 January, 2019



Marsden Park School - Location Three North West: Monday 21 January, 2019



Marsden Park School - Location Three North West: Tuesday 22 January, 2019



Marsden Park School - Location Three North West: Wednesday 23 January, 2019

