

**Kent Road Public School Development, Kent Road,
Marsfield**

**State Significant Development Application (SSDA) -
Acoustic Report**

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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged by the NSW Department of Education to undertake an assessment of noise impacts associated with the proposed alterations and additions at Kent Road Public School located at Herring Road, Marsfield.

This report has been prepared to address the acoustic requirements of the NSW Department of Planning SEAR's requirements, specifically:

11. Noise and Vibration

In addition to above, as part of the NSW Department of Planning consultation, additional comments have been provided by:

- NSW Environment Protection Authority (EPA); and
- City of Ryde Council.

In this report, we will:

- Identify nearby noise sensitive receivers and operational noise sources with the potential to adversely impact nearby development.
- Identify relevant Council, State and EPA noise emission criteria applicable to the development.
- Predict operational noise emissions and assess them against acoustic criteria.
- If necessary, determine building and/or management controls necessary to ensure ongoing compliance with noise emission goals.
- Identify and assess existing external noise impacts on the site (traffic noise) and provide advice regarding building shell construction to address this impact.

In addition, a preliminary review of construction noise/vibration impacts will be presented.

2 SITE DESCRIPTION AND PROPOSED WORKS

The Development Application (DA) seeks approval for the redevelopment of Kent Road Public School, including:

- Site preparation;
- Construction of three (3) new two (2) to three (3) storey buildings to allow for increased student population from 750 to 1,000, containing;
- 34 Homebase spaces;
- Canteen;
- Administration facilities;
- Staff facilities;
- Special program/counselling rooms;
- Construction of a new entry canopy;
- Reconfiguration of car drop off / pick up arrangements on Kent Road;
- Landscaping and fencing; and
- Tree removal.

ALC has been advised by the current management team of Kent Road Public School as to the existing typical operation of school hours, sporting, deliveries and out of school hours (OOSH) activities:

Table 2-1 – School Operation Parameters – Existing and Proposed

Item	Existing	SSDA Proposed
Typical School Hours	9.05am-3:10pm Monday to Friday	9.05am-3:10pm Monday to Friday (No Change)
Recess	11:10am-11:30am	11:10am-11:30am (No Change)
Lunch	1:00pm-1:55pm	1:00pm-1:55pm (No Change)
Vacation Care (Before and After)	7:00am-9:00am & 3:00pm-6:00pm	7:00am-9:00am & 3:00pm-6:00pm (No Change)
Other Out of School Hours Extra Curriculum Activities (i.e. Music Practice, Band Practice, Chess Class, Robotics Class, Dance Class) <u>All Activities Are Undertaken inside Hall, Library or Classrooms</u>	7:00am-9:00am & 3:00pm-6:00pm	7:00am-9:00am & 3:00pm-6:00pm (No Change)

Table 2-1 – School Operation Parameters – Existing and Proposed (Cont.)

Item		Existing	SSDA Proposed
Physical Education (Structured Learning Classes)		Anytime through 9.05am-3:10pm Monday to Friday	Anytime through 9.05am-3:10pm Monday to Friday (No Change)
School Sport (General Sporting Activities)	Kindergarten (On School Grounds)	10:00am-11:10am Friday Only	10:00am-11:10am Friday Only (No Change)
	Year 1 and 2 (On School Grounds)	12:00pm (midday)-1:00pm Friday Only	12:00pm (midday)-1:00pm Friday Only (No Change)
	Years 3, 4, 5 & 6 (Majority Students taken off site, some remain onsite)	2:00pm-3:10pm Friday Only	2:00pm-3:10pm Friday Only (No Change)
Assembly's	Kindergarten to Year 2 (School Hall)	2:00pm-3:10pm Monday Only	2:00pm-3:10pm Monday Only (No Change)
	Year 3 to 6 (School Hall)	9:05pm-11:10am Friday Only	9:05pm-11:10am Friday Only (No Change)
	Year 2-6 Morning Announcements (In Front of Library)	9:05am-9:15am Every Morning	9:05am-9:15am Every Morning (No Change)
Deliveries		7:00am-3:00pm (Kent Road)	7:00am-3:00pm (New Kent Road Loading Dock)
Saturday School		Not taking place	Not taking place (No Change)
Saturday Sports		Not taking place	Not taking place (No Change)
After Hours School Events (i.e. Fundraisers, Parent Teacher)		Parent Teacher Interviews – Last 2 Weeks of June Fundraisers - Rare	Parent Teacher Interviews – Last 2 Weeks of June Fundraisers – Rare (No Change)

Project site incorporates a new accessible parking and loading bay located along Kent Road.

The main pick up/drop off/bus stops are located along Kent Road which is to the south east of the site. These activities are all carried out on Public Roads.

The predominant noise source impacting the site is traffic noise from Herring Road and Kent Road which are both Sub-Arterial Roads.

It is noted that the northern boundary of the site is subject to a classified road reservation by the Road and Maritime Services (RMS). In the event the road is constructed, this report does not address the acoustic impacts associated with that proposal.

2.1 NEARBY NOISE RECEIVERS

Based on the site investigations the following nearby sensitive developments surround the site:

- Receiver 1: Residential dwellings located along Fitzpatrick Street which is south east of the site. Receiver 1 residences are located along the boundary of the site. Majority of these dwellings are multi-storey and would have a line of sight to the external playgrounds adjacent to the proposed works.
- Receiver 2: Residential dwellings located along Beverley Crescent which is south or south west of the site. Majority of these dwellings are multi-storey and would have a line of sight to the landscaped areas adjacent to the proposed works.
- Receiver 3: Residential dwellings located along Lucinda Road which is south west of the site. Majority of these dwellings are single storey and would have some elevated line of sight to the adjacent parking area along the boundary.
- Receiver 4: Residential dwellings located along Herring Road which is north of the site. All of these dwellings are multi-storey with a line of sight to the adjacent playground. Space on the RMS classified road reservation.

Refer to Figure 2-1 for detail and measurement locations.



Figure 2-1: Site Survey and Monitoring Positions.
Sourced from SixMaps NSW.

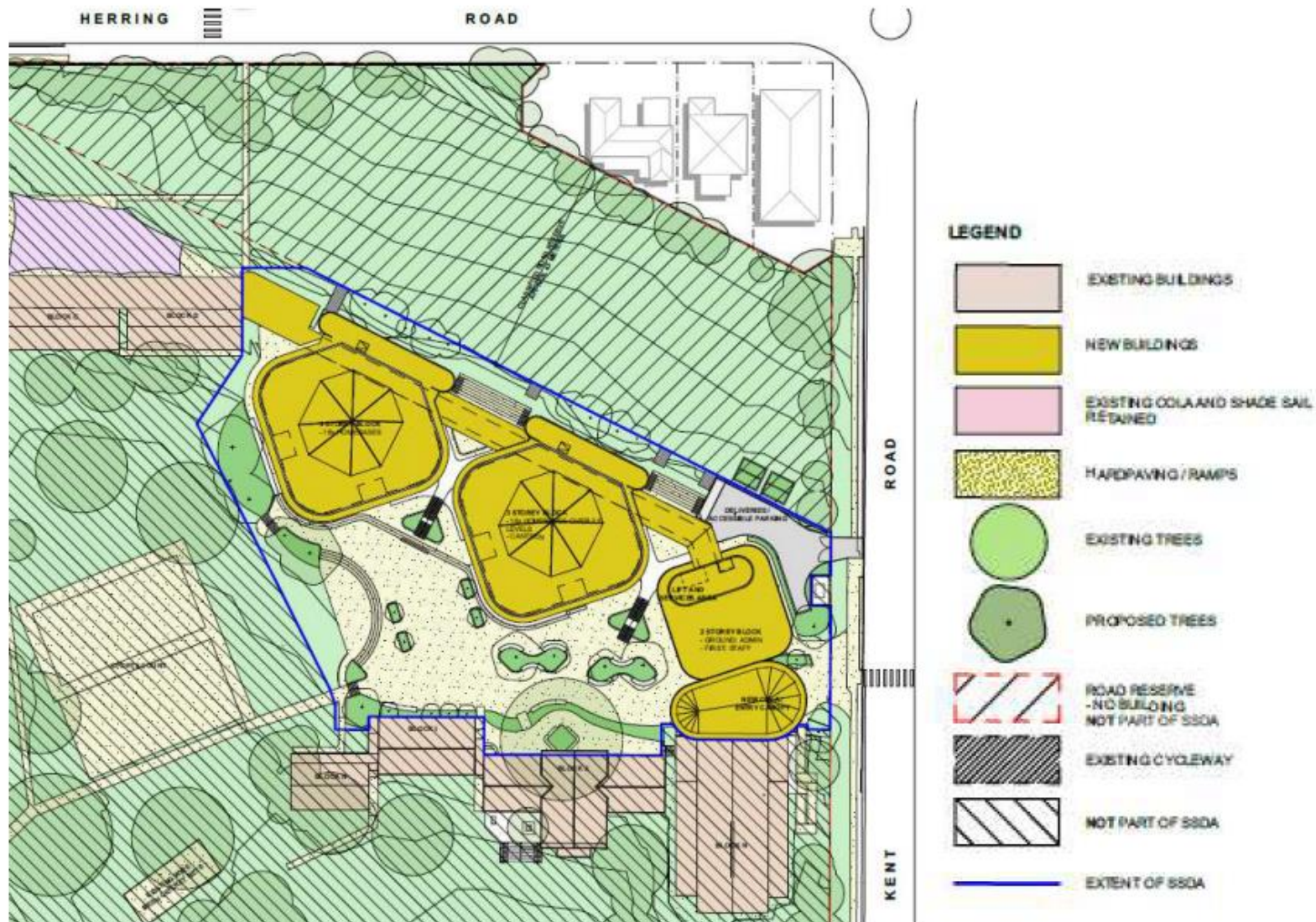


Figure 2-2: Proposed Works.

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

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_{Max} levels represent is the loudest noise event during a measurement period.

4 SURVEY OF AMBIENT NOISE LEVELS

Both long term unattended noise logging and attended noise measurements were conducted to quantify the existing acoustic environmental at the site.

4.1 UNATTENDED NOISE MEASUREMENTS

Unattended noise monitoring was conducted between Thursday 26th July 2018 and Tuesday 7th August 2018 using two Acoustic Research Laboratories noise monitors set on A-weighted fast response mode. The monitors were calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded. In addition, calibration certificates are provided in Appendix 3 – Equipment Calibration Certificates of this report.

Unattended noise monitors were installed at the following locations:

- Location M1 – Located along the common boundary of the Herring Road residences and Kent Road Public School. Noise logging conducted at this location is representative of the background noise levels at the nearest noise sensitive development to the site.
- Location M2 – Located along the common boundary of the Beverly Crescent residences and Kent Road Public School. Noise logging conducted at this location is a conservative representation of the background noise levels for the southern residential receivers.

The measured rating background noise level (L_{90} levels) and average (L_{eq}) noise levels are presented below. The L_{eq} /average noise levels at both locations are primarily a result of distant traffic movements on nearby roads to the north east and north west of the site (Kent Road and Herring Road). The background noise levels at the site are consistent with what is expected in a suburban area.

In each case, weather affected data was excluded from the assessment in accordance with the NSW EPA *Noise Policy for Industry (NPfI) 2017* (i.e. average wind speed ≥ 5 metres per second or during rain) procedures. All periods of weather effected data are highlighted in the logging graphs in Appendix 1 and Appendix 2.

Table 4-1 – Measured Unattended Ambient Noise Levels

Monitoring Location	Measured <u>Unattended</u> Noise Levels dB(A)		
	Day (7:00am-6:00pm)	Evening (6:00pm-10:00pm)	Night (10:00pm-7:00am)
Location M1 Beverley Crescent (See Figure 2-1)	41dB(A) L_{90} (7am-6pm) 51dB(A) L_{eq} (7am-6pm)	42dB(A) L_{90} (6pm-10pm) 47dB(A) L_{eq} (6pm-10pm)	36dB(A) L_{90} (10pm-7am) 45dB(A) L_{eq} (10pm-7am)
Location M2 Herring/Kent Road (See Figure 2-1)	45dB(A) L_{90} (7am-6pm) 58dB(A) L_{eq} (7am-6pm)	42dB(A) L_{90} (6pm-10pm) 55dB(A) L_{eq} (6pm-10pm)	32dB(A) L_{90} (10pm-7am) 49dB(A) L_{eq} (10pm-7am)

4.1.1 Discussion of Results

As Kent Road Public School is currently operating, unattended noise levels during certain times of the day have been affected, in particular these include before school times, recess time, lunch time and after school time due to the close proximity of these activities to the noise monitors.

However, as the RBL must exclude existing noise emissions from the site, analysis of the calculated background noise levels from the data has been undertaken to ensure the adopted levels are not significantly affected by existing emissions.

The following comparison table provides three (3) calculated levels for each of the monitoring locations. The first row is based on the monitoring data (besides removal of the relevant weather affected data), the middle row is the calculated result for Saturday and Sunday only. As previously mentioned above, Kent Road Public School does not undertake any extra circular activities or Saturday school over the weekend. Therefore, this result is a good indication of the RBL without the operation of the School. The final row is the calculated result with the removal of the peak external play times removed. In both monitoring locations clear identification of external playing can be carried out due to matching the increase in L_{90} and advised times of playing.

Table 4-2 – Comparison of Calculated Daytime Background Noise Levels $dB(A)L_{90}(7am-6pm)$

Logger Location	Data Range	Calculated Noise Level $dB(A)L_{90}$	Comments
Location M1 Beverley Crescent (See Figure 2-1)	Whole Week (Weather Only Excluded)	40.8	School operating noise at the logger location is only contributing a 0.8dB(A) increase. Assumed background noise level for Receiver 1, 2 and 3 is 41dB(A).
	Weekend Only (No School Noise)	40.0	
	Whole Week (External Play Times Removed)	40.5	
Location M2 Herring/Kent Road (See Figure 2-1)	Whole Week (Weather Only Excluded)	44.5	Noise receivers located near the intersection of Herring Road and Kent Road are impacts by existing local vehicle movements from these Sub-Arterial Roads. Noise Logger similar to the noise receivers is affected by vehicle movements and the contribution of school noise increase the background noise levels by 0.2dB(A) from school operation noise. along these roads.
	Weekend Only (No School Noise)	42.9	
	Whole Week (External Play Times Removed)	44.3	

The analysis indicates there is minimal, if any, impact on the calculated RBL from on-site emissions. Based on the comparison above, we propose to adopt the following RBL's for each receiver.

Table 4-3 – Adopted daytime Rating Background Level (RBL) for each Receiver

Receiver	Adopted Rating Background Noise Level dB(A)_{L₉₀(7am-6pm)}
Receiver 1 – Fitzpatrick Street Residences (See Figure 2-1)	41dB(A) _{L₉₀}
Receiver 2 – Beverley Crescent Residences (See Figure 2-1)	41dB(A) _{L₉₀}
Receiver 3 – Lucinda Road Residences (See Figure 2-1)	41dB(A) _{L₉₀}
Receiver 4 – Herring Residences (See Figure 2-1)	44dB(A) _{L₉₀}

4.2 ATTENDED MEASUREMENT RESULTS

Attended traffic noise measurements were conducted using a Norsonic 140 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonic Sound Calibrator type 1251. No significant drift was noted. In addition, calibration certificates are provided in Appendix 3 – Equipment Calibration Certificates.

Attended noise measurements were undertaken on the Monday 6th August 2018 at the following locations:

- Location 1 – Corner of Kent Road and Herring Road, approximately 3m from the kerb with 180° view of the road.
- Location 2 – South eastern corner of the project site along Kent Road, approximately 4m from the kerb with 180° view of the road.
- Location 3 – Front boundary of 14 Fitzpatrick Street, approximately 3m from the kerb with 180° view of the road.
- Location 4 – Front boundary of Beverley Crescent, approximately 3m from the kerb with 180° view of the road.
- Location 5 – Front boundary of Lucinda Road, approximately 3m from the kerb with 180° view of the road.
- Location 6 – North western boundary of the project site along Herring Road, approximately 4m from the kerb with 180° view of the road.

The measured averaged (L_{eq}) noise levels are presented below. The L_{eq} /average noise levels at all locations are primarily a result of either local or distant traffic movements surrounding the site (typically Herring and Kent Road).

In each case, weather affected data was excluded from the assessment in accordance with the NSW EPA *Noise Policy for Industry (NPfI) 2017* (i.e. average wind speed $\geq$ 5metres per second or during rain) procedures. All periods of weather effected data are highlighted in the logging graphs in Appendix A.

Table 4-4 – Measured Attended Traffic Noise Levels

Monitoring Location	Measured <u>Attended Traffic</u> Noise Levels dB(A)_{Leq(1hour)}	Comments
Location 1 Kent/Herring Road Intersection (See Figure 2-1)	64dB(A) _{Leq(1hour)}	Local traffic noise
Location 2 South Eastern Corner of School (Kent Road) (See Figure 2-1)	66dB(A) _{Leq(1hour)}	Local traffic noise
Location 3 Fitzpatrick Street (See Figure 2-1)	50dB(A) _{Leq(1hour)}	Local traffic and distant traffic movements (Kent Road)
Location 4 Beverley Crescent (See Figure 2-1)	47dB(A) _{Leq(1hour)}	Local traffic and distant traffic movements (Herring and Kent Road)
Location 5 Lucinda Road (See Figure 2-1)	50dB(A) _{Leq(1hour)}	Local traffic noise and distant traffic movements from Herring Road
Location 6 North Western Corner of School (Herring Road) (See Figure 2-1)	62dB(A) _{Leq(1hour)}	Local traffic noise

5 NOISE EMISSION CRITERIA

The following noise controls and guidelines are applicable to the site:

- NSW EPA document Noise Policy for Industry (NPfI) 2017.
- NSW EPA document Road Noise Policy (RNP) 2017.
- Appropriate guidelines for assessment of outdoor play areas.

5.1 CITY OF RYDE COUNCIL DEVELOPMENT CONTROL PLAN (DCP) 2014

The site is currently zoned as SP2 (Infrastructure) within the Ryde City Council LEP Land Zoning Maps (Map 05). There are no specific acoustic criteria within the development control plan relating to noise emissions from activities on this land zoning, or specifically to schools or educational institutions.

As there are no specific acoustic requirements contained within the DCP, noise emissions from site will be assessed with regard to:

- The NSW EPA *Noise Policy for Industry (NPfI) 2017* (applicable to noise generated by plant and equipment on site); and
- Association of Australian Acoustical Consultants (AAAC) guidelines for child care centres (for outdoor play areas). Note: this is a non-mandatory guideline developed for child care centre and is useful for guidance only when it comes to assessment of schools.

5.2 OUTDOOR PLAY AREAS

Outdoor play areas are not typically assessed with reference to the same acoustic criteria as other noise sources. The AAAC guidelines recommend a more lenient “background+10dB(A)” noise emission goal for use of outdoor areas to residential receivers, provided it is limited to no more than 2 hours per day.

In our opinion:

- Noise from school playgrounds and other typical use of a school should not be required to strictly comply with numerical acoustic criteria. Decisions of the Land and Environment Court reflect this (see *Meriden v Pedavoli*, discussed in section 6.1).
- However, for assistance, AAAC guideline of adopting a “background+10dB(A)” noise emission assessment goal for child care centres will be discussed, but in the context of providing a guideline, and is not a mandatory level of acoustic performance.

Table 5-1 – Playground Noise Emission Goals - Residential (Background + 10dB(A))

Noise Receiver	Background Noise Level – dB(A) L_{90} (7am-6pm)	Background+10dB(A) noise emission goal (7am-6pm)
Receiver 1 – Fitzpatrick Street Residences (See Figure 2-1)	41dB(A) L_{90}	51dB(A) $L_{eq(15min)}$
Receiver 2 – Beverley Crescent Residences (See Figure 2-1)	41dB(A) L_{90}	51dB(A) $L_{eq(15min)}$
Receiver 3 – Lucinda Road Residences (See Figure 2-1)	41dB(A) L_{90}	51dB(A) $L_{eq(15min)}$
Receiver 4 – Herring Residences (See Figure 2-1)	44dB(A) L_{90}	54dB(A) $L_{eq(15min)}$

5.3 NSW EPA DOCUMENT – “NOISE POLICY FOR INDUSTRY (NPfI) 2017” – MECHANICAL NOISE AND ONSITE VEHICLE NOISE

The NSW EPA *Noise Policy for Industry (NPfI) 2017*, has two criteria which need to be satisfied namely Intrusiveness and Amenity. These are described below:

- *Intrusiveness Criteria* - This guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{Aeq} descriptor not exceed the background noise level by more than 5 dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.
- *Amenity Criteria* - This guideline is intended to limit the absolute noise level from all “industrial” noise sources such as mechanical plant to a level that is consistent with the general environment.

The EPA’s NPfI sets out acceptable noise levels for various localities. Table 2.2 on page 11 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

Noise levels are to be assessed at the property boundary or most affected point within.

5.3.1 NSW EPA NPfI 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_{Aeq} descriptor do not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted below have been presented previously in section 4. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 5-2 – NSW EPA *NPfI* Intrusiveness Noise Emission Goals

Location	Period/Time	Measured Rating Background Noise Level dB(A)_{L90(Period)}	Intrusiveness Noise Emission Goal (BG+5) dB(A)_{L_{eq}(15 minutes)}
Receiver 1 – Fitzpatrick Street Residences	Day (7am-6pm)	41	46
Receiver 2 – Beverley Crescent Residences	Evening (6pm-10pm)	42	47
Receiver 3 – Lucinda Road Residences (See Figure 2-1)	Night (10pm-7am)	36	41
Receiver 4 – Herring Residences (See Figure 2-1)	Day (7am-6pm)	44	49
	Evening (6pm-10pm)	42	47
	Night (10pm-7am)	32	37

5.3.2 NSW EPA *NPfI* Project Amenity Criterion

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

The NSW EPA *NPfI* sets out acceptable noise levels for various localities. Table 2.2 on page 11 of the policy indicates 4 categories to distinguish different areas. They are rural, suburban, urban and urban/industrial interface. In accordance with the procedure nominated by the *NPfI* the site and the surrounding residential receivers are a suburban category, this is outlined below.

Table 5-3 – NSW EPA *NPfI* Project Amenity Noise Objective

Location	Period/Time	Project Amenity Noise Objective
Receivers 1, 2, 3 and 4 Suburban Receiver	Day (7am-6pm)	53 dB(A) _{L_{eq}(15 minutes)}
	Evening (6pm-10pm)	43 dB(A) _{L_{eq}(15 minutes)}
	Night (10pm-7am)	38 dB(A) _{L_{eq}(15 minutes)}

*Correction of the Amenity noise level has been applied for converting between a period (i.e. 7am-6pm) to a 15-minute interval criterion, in accordance the *NPfI* procedures.

5.3.3 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. 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.*

Based on the above the following noise objectives apply:

Table 5-4 – Sleep Arousal Criteria (Average/ L_{eq} Noise Levels)

Location	Rating Background Level dB(A) $L_{90(Period)}$	Rating Background Level + 5dB(A)	Governing Criteria dB(A) $L_{eq(15\text{ minutes})}$
Receiver 1 – Fitzpatrick Street Residences	36	41	41
Receiver 2 – Beverley Crescent Residences			
Receiver 3 – Lucinda Road Residences (See Figure 2-1)			
Receiver 4 – Herring Residences (See Figure 2-1)	32	37	37

Table 5-5 – Sleep Arousal Criteria (*Maximum/L_{Max}* Noise Events)

Location	Rating Background Level dB(A) _{L₉₀(Period)}	Rating Background Level + 15dB(A)	Governing Criteria dB(A) _{L_{Max}}
Receiver 1 – Fitzpatrick Street Residences Receiver 2 – Beverley Crescent Residences Receiver 3 – Lucinda Road Residences (See Figure 2-1)	36	51	52
Receiver 4 – Herring Residences (See Figure 2-1)	32	47	52

- 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.*

5.4 NOISE FROM INCREASED TRAFFIC GENERATION ON PUBLIC STREETS/DROP OFF ZONE

For land use developments with the potential to create additional traffic on public streets the development should comply with the NSW EPA *Road Noise Policy (RNP) 2011*.

Noise levels generated by traffic should not exceed the noise levels set out in the table below when measured at a nearby property.

Table 5-6 – Criteria for Traffic Noise Generated by New Developments

Road Type	Time of day	Permissible Noise Generation
Sub-arterial Roads (Herring Road and Kent Road)	Day (7am to 10pm)	60 dB(A) _{Leq(15hour)}
	Night (10pm to 7am)	55 dB(A) _{Leq(9hour)}

However, if existing noise levels exceed those in the table above, Section 3.4 of the Road Noise Policy is applicable, which states that an increase in the existing noise level of 2dB(A) would be considered a barely perceptible increase to the average person and would typically not reasonably require additional management.

5.5 CONSTRUCTION ACTIVITIES

5.5.1 Construction Noise

Relevant guidelines are:

- NSW Environmental Protection Authority (EPA) document – *“Interim Construction Noise Guideline (ICNG) 2009”*; and
- Australian Standard AS2436:2010 – *“Guide to noise and vibration control on construction, demolition and maintenance sites”*.

5.5.1.1 NSW Environmental Protection Authority (EPA) document – *“Interim Construction Noise Guideline (ICNG) 2009”*

This guideline nominates acceptable levels of noise emissions above the background noise level. For projects within the recommended standard hours the guideline recommends a noise level of 10dB(A) above the background for residential receivers – this level is referred to as the “noise effected level”. The noise emission goals for nearby development is as follows:

Table 5-7 – Noise Emission Goal – Residential Properties

Noise Receiver	Measured Background Noise Levels dB(A) $L_{90(7am-6pm)}$	Noise Effected Level BG + 10dB(A) $L_{eq(15min)}$	highly Affected Level dB(A) $L_{eq(15min)}$
Receiver 1 – Fitzpatrick Street Residences Receiver 2 – Beverly Crescent Residences Receiver 3 – Lucinda Road Residences (See Figure 2-1)	41	51	75
Receiver 4 – Herring Residences (See Figure 2-1)	44	54	75

Where noise from the construction works is above the “noise affected level”, the proponent should apply any feasible and reasonable work practices to minimise noise.

If noise emissions are likely to exceed 75dB(A) $L_{eq(15min)}$, the receiver is deemed to be “highly noise affected”. Introduction of management controls such as scheduling of noisy periods, or respite periods is recommended.

5.5.1.2 Australian Standard 2436-1981 “Guide to Noise Control on Construction Maintenance and Demolition Site”

Where compliance with DECCW cannot be achieved, noise emissions are to be managed in accordance with principles in AS2436:

- That reasonable suitable noise criterion is established (i.e. – adopt DECC/Council guidelines).
- That all practicable measures be taken on the building site to regulate noise emissions, including the siting of noisy static processes on parts of the site where they can be shielded, selecting less noisy processes, and if required regulating construction hours.
- The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the building site.

5.5.2 Construction Vibration

5.5.2.1 To Surrounding Receivers

Vibration caused by construction should 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 (amenity), the evaluation criteria 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

The criteria and the application of this standard are discussed in separate sections below.

5.5.2.1.1 Structure Borne Vibrations

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in Table 1.

It is noted that the peak velocity is the absolute 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 5-8 – 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

5.5.2.1.2 Assessing Amenity

Department of Environment and Conservation NSW “Assessing Vibration: A Technical Guideline” (Feb 2006) is based on the guidelines contained in BS 6472:1992. This guideline provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings.

The recommendations of this guideline should be adopted to assess and regulate vibration within the construction site.

Table 5-9 – EPA Recommended Vibration Criteria

		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
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0

6 OPERATIONAL NOISE EMISSION ASSESSMENT

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

- Noise from the outdoor play areas.
- Noise from internal (classroom) areas.
- Noise generation on Public Roads.
- Noise from mechanical plant, PA system and school bells.

6.1 NOISE FROM THE PLAYGROUND

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

- Number of students and position
 - Playground Area 1 – 250 students located along the northern playground of the site adjacent to Herring Road receivers (receiver 4).
 - Playground Area 2 – 250 students located along the southern playground of the site, adjacent to Receiver 1, 2 and 3.
 - Playground Area 3 – 500 students located in the new playground located in the centre of the site, adjacent to the new buildings.
- Playground noise measurements has assumed the following:
 - Passive Play to be 83dB(A) per student, one in two, based on measurements conducted Anzac Park Public School.
 - Active Play to be 86dB(A) per student, one in two, based on measurements conducted at Kent Road Public School.
- All play areas in operation at once.

Predicted noise levels are as follows:

Table 6-1 – Predicted Noise Emission from Playground.

Activity	Noise Receiver	Predicted Noise from Playground dB(A)_{Leq(15minute)}	“Background+10dB(A) noise emission goal – dB(A)_{Leq(15minute)}”	Comments
Actively Playing (Sporting Games)	Receiver 1 – Fitzpatrick Street Residences (See Figure 2-1)	54	51	Exceedance due to close proximity of play activities
	Receiver 2 – Beverley Crescent Residences (See Figure 2-1)	52	51	Marginal exceedance due to proximity
	Receiver 3 – Lucinda Road Residences (See Figure 2-1)	50	51	Yes
	Receiver 4 – Herring Residences (See Figure 2-1)	60	54	Exceedance due to close proximity of play activities
General Playing Activities	Receiver 1 – Fitzpatrick Street Residences (See Figure 2-1)	51	51	Yes
	Receiver 2 – Beverley Crescent Residences (See Figure 2-1)	49	51	Yes
	Receiver 3 – Lucinda Road Residences (See Figure 2-1)	47	51	Yes
	Receiver 4 – Herring Residences (See Figure 2-1)	57	54	Marginal exceedance due to close proximity of play activities

With respect to the above:

- For typical playground use noise emissions from general activities are typically compliant with a “background+10dB(A)” noise emission goal that is commonly adopted in the assessment of outdoor recreation spaces, with the exception of the Herring Residences where a small exceedance is predicted.
- Active play (sporting games) would produce higher noise emissions and complying or only marginal exceedances are predicted at all residences except for the Herring Residences where a 6dB(A) exceedance is predicted.

However, in our opinion, the exceedances would not warrant the adoption of additional mitigation for the following reasons:

- With respect to addressing exceedances, we note that in all instances each noise receiver is adjacent to existing playgrounds of Kent Road Public School. As the development proposal does not relocate existing playgrounds it is reasonable to compare the existing noise exposure to the future exposure. We provide the following comments:
 - Typically, an increase of 250 children from 750 children would result in an increase of approximately 1.2dB(A) compared to existing levels.
 - This would be a barely perceptible increase. We note that NSW EPA *NPfI* considers a residual increase of less than 2dB(A) to be negligible.
 - Therefore, we believe that the noise exposure will not be significantly be different to that currently experienced as a result of the proposed increase in student population.
- Noise from school playgrounds is not addressed in the Ryde Council DCP, nor is it a noise source intended to be governed by documents such as the EPA *Noise Policy for Industry* (NPfI) 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.
- Notwithstanding, a “background+10dB(A)” guideline has been included in this assessment to provide some assistance in quantifying noise impacts.
- The Herring Road residences are located in close proximity of two Sub-arterial roads with average traffic noise level between 63-65dB(A) which would carry medium to heavy traffic movements from 6:30am to 7:30pm every day. The impact on amenity predicted from school emissions is not significant compared to other environmental impacts.
- The residential dwellings overlook the playground as they are two storeys and typically sit on higher ground than the school playground. Therefore, an effective noise screen would be 8-12m high, which is not practical and has adverse visual and security impacts.

6.2 NOISE FROM INTERNAL AREAS (CLASSROOMS AND SCHOOL HALL)

We note that it is preferred that classrooms be naturally ventilated (by leaving the windows open).

Being an internal area, noise from classrooms should comply with a “background +5dB(A)” at nearby residences (as noise from internal areas is more controllable than noise from a playground).

As the new buildings are located in the centre of the site the nearest residential receiver is the properties bounding Herring Street (Approximately 50m).

During all uses of the classroom (teacher speaking, or during group work, audio visual learning and children speaking normally), noise emissions would comply with a background + 5dB(A) goal.

6.3 VEHICLE NOISE - NOISE GENERATED BY ADDITIONAL TRAFFIC ON PUBLIC ROADS / DROP OFF ZONE

Noise created as a result an increase in traffic on public roads is assessed with reference to the EPA Road Noise Policy.

Primary access/egress for children drop off is mainly Kent Road (north western side).

Predictions of noise generation are based on the following:

- An assumed sound power level of a car driving on a public road (at 40km/h) of 94dB(A).
- It is assumed that there is an increase of 107 vehicle movements per hour generated by the site during a peak period of use. (Source: Project Traffic Report – Transport and Traffic Planning Associates).

Noise emissions are predicted at the property boundary of the residences on Kent Road, as follows:

Table 6-2 – Noise Generated by Vehicles/Road Traffic

Time of Day	Receiver Location	Predicted Noise Level – dB(A) _{Leq(15min)}	Compliance
Daytime Peak Hour	Kent Road Residences	58dB(A) _{Leq(15min)}	Yes

Noise and a result of traffic noise generation is compliant with EPA guidelines.

6.4 NOISE FROM MECHANICAL PLANT, 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.

In regard to the school bell/PA system, the system should minimise noise spill to adjacent properties

- Speaker positioning/selection:
 - Detailed selection or locations of PA systems are unknown at this stage. However, to ensure compliance with the BG+10 criteria, we make the following comments;
 - An assumption has been made that speakers are going to installed on the façade of the new buildings.
 - Speakers installed on the new façade pf the school should not exceed the following maximum noise level when measured at 5m from the speaker (SPL @ 5m)
 - Northern Façade – 74dB(A) @ 5m distance.
 - Eastern Façade – 74dB(A) @ 5m distance.
 - Southern Façade – 75dB(A) @ 5m distance.
 - Western Façade – 79dB(A) @ 5m distance.

In addition to above, we provide the following design considerations when PA design is undertaken.

- 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 (i.e. playground) 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.
- Use of a noise limiter system:
 - By limiting the maximum possible signal sent to a speaker, this can reduce intermittent increased noise generation as a result of the system user excessively raising their voice or holding the microphone too close. The schools currently engaged contractor would most likely be able to provide such a system.
 - In all likelihood, the limiter system would require that the system be installed, and volume adjusted such that the School was satisfied that a sufficient noise level has been reached in the assembly area, and the noise limit then set based on that.

6.5 CUMULATIVE NOISE IMPACTS

There are multiple noise sources associated with the site – vehicle noise, playground noise and plant/equipment noise being the most significant. In addition, the individual impacts tend to affect different noise receivers (playgrounds impact Herring Road residences, vehicle noise impacts Kent Road). An issue of cumulative noise impact will not typically arise as the primary noise sources impact different locations and/or times.

Further:

- Playground noise has been assessed with reference to a background + 10dB(A) criteria (and will intermittently exceed this noise level at some locations).
- Plant and equipment noise is assessed with reference to the more stringent Noise Policy for Industry (essentially, a “background+5dB(A) assessment).
- The plant and equipment noise are required to be much quieter than the playground noise. Provided that plant noise emission goals are achieved, the cumulative impact of plant noise in addition to playground noise will not be significant (the overall noise level is a product of the playground noise, being the dominant noise source).

With respect to the cumulative impact of the various playgrounds, the cumulative impact of multiple playgrounds was considered, as stated in section A.1

With respect to the cumulative impact of road traffic noise and playground noise:

- Periods of peak traffic generation will not occur at times of peak playground use.

- Further, as noted above, the primary playground noise impact on Herring Road residences while the traffic noise impact is on Kent Road.

In light of the above, provided that the individual noise sources are appropriately managed, there will be no further impact as a result of cumulative noise.

6.6 RECOMMENDATIONS

We recommend the following acoustic treatments/management controls to ensure compliance with EPA and Council noise emission guidelines.

- Community use of the school:
 - Use of the internal spaces during evening time for community events is acceptable.
 - Use of external spaces not recommended. (in the event of the sports facilities is used for organised sporting completions we would expect that would be subject to a separate application and would which would include a noise emission assessment).
- It is recommended that a detailed design of the proposed School PA system is carried out at CC stage.
- If buses are waiting in local roads for pickups, engines should be switched off.
- 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 (NPfI) 2017*, with detailed design to be done at CC stage. This should include detailed acoustic review of any proposed PA system (speaker location, directionality, noise limiter etc).

7 CONSTRUCTION NOISE

7.1 NOISE IMPACTS

Predictions of noise levels from likely construction activities at the sensitive receivers identified have been made of the construction processes with the potential to produce significant noise.

It is noted that:

- Many of the noise sources are present over a small period of the day or may be present for a few days with a significant intervening period before the activity occurs again.
- The distance between the noise source and the receiver.

The A-weighted sound power levels for all the component parts of the above-described activities are outlined in the table below.

Table 7-1 – Sound Power Levels (SWL) of the Typical Construction Equipment

Stage	Activity	Sound Power Level (SWL) dB(A)
Excavation	Excavator (with bucket attachment)	107
	Bobcat	105
Construction	Angle Grinders	105
	Electric Saw	102
	Drilling	95
	Concrete Vibrator	100
	Cement Mixing Truck	105
	Concrete Pumps	105

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

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

7.1.1 Predicted Noise Levels

The following table presents the predicted noise levels from construction activities.

Table 7-2 – Predicted Construction Noise Level

Work Item	Receiver	Predicted Noise Level dB(A) $L_{eq, 15min}$	Noise Management Levels	Comments
Excavation	Receiver 1	57-63	51dB(A) $L_{eq(15 \text{ minute})}$ (Noise Affected Level)	A further detailed assessment is recommended to be undertaken at CC stage once further detailed knowledge of proposed construction methodologies are known.
	Receiver 2	54-62		
	Receiver 3	55-65		
	Receiver 4	50-65		
Construction	Receiver 1	45-51	75dB(A) $L_{eq(15 \text{ minute})}$ (Highly Noise Affected Level)	
	Receiver 2	42-50		
	Receiver 3	43-53		
	Receiver 4	38-53		

*Refer to figure 1 for receiver locations.

The predicted noise levels exceed the noise management level (BG +10) when close to each receiver.

Noise management for the excavation and construction of project site is required (for example, acoustic barrier, respite hours, noise monitoring, contingency plan, etc).

Details shall be determined at Construction Certificate stage (once a construction program and work methods have been determined) to ensure that the noise emission from the project site to residential receivers around is minimised.

7.1.2 Vibration Impacts

Primary vibration generating activities are bulk excavation (if in rock) and demolition. As there are no sensitive receivers adjacent to the demolition and bulk exaction areas the impacts of these works should be minimal.

Excavation in soil is not typically expected to create vibration levels exceeding EPA guidelines.

8 EXTERNAL NOISE INTRUSION ASSESSMENT

Onsite investigations indicate that the site is affected by traffic noise from the nearby traffic movements from Herring Road and Kent Road.

8.1 INTERNAL NOISE CRITERIA

Internal noise levels will be assessed based on the requirements of the following:

- NSW Department of Education document – “*Educational Facilities Standards and Guidelines (EFSG) 2017*”.
- NSW Environmental Protection Authority (EPA) document – “*Road Noise Policy (RNP) 2011*”.

8.1.1 NSW Department of Education document – “*Educational Facilities Standards and Guidelines (EFSG) 2017*”

NSW Department of Education Document Educational Facilities Standards and Guidelines (EFSG) 2017 states the following for internal noise levels.

11.02

INTERNAL NOISE LEVELS

MANDATORY

Internal Noise Level Assessment

Road Noise for general learning areas, music, drama, movement studios and halls shall be assessed consistent with the requirements of State Environmental Planning Policy (Infrastructure) 2007 - regulation 102. An assessment should be undertaken where directed for any site impacted by traffic noise. Generally it is recommended for all sites impacted by noise from roads with greater than 20,000 vehicles AADT and required for all sites impacted by noise from roads with greater than 40,000 vehicles AADT. The guideline internal noise levels presented in Acoustic Performance Guidelines (section 11.06) is to be used in the assessment.

Rail Noise for general learning areas shall be assessed consistent with the requirements of State Environmental Planning Policy (Infrastructure) 2007 - regulation 87, The internal noise level requirements for school classrooms presented in NSW DoEC Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects ('IGANRIP') is to be used in the assessment.

In addition, it states the following:

Table 8-1 – DoE EFSG Guidelines on internal noise levels and reverberation times

Room	Internal noise level (dB(A) _{Leq})
Computer Labs	40
Conference Room	35

Table 8-1 – DoE EFSG Guidelines on internal noise levels and reverberation times (Cont.)

Room	Internal noise level (dB(A) _{Leq})
Interview & Counselling Rooms	35
Kitchens	50
Libraries	35-40
Study Rooms	35
Teaching Spaces (Primary and Secondary)	35

8.1.2 NSW Environmental Protection Authority (EPA) document – “Road Noise Policy (RNP) 2011”.

Table 4 on page 12 of the *Road Noise Policy* states the following noise levels for classrooms.

Table 8-2 – Internal Noise Levels for Schools – Road Noise Policy

Land Use	Internal noise level (dB(A) _{Leq(1hour)})
School Classrooms	40

8.2 MEASURED NOISE LEVELS

Onsite noise measurements have been undertaken by this office for all sounding roads, as presented in section 4.2.

Table 8-3 – Measured Attended Traffic Noise Levels

Monitoring Location	Measured <u>Attended Traffic</u> Noise Levels dB(A) _{Leq(1hour)}	Comments
Location 1 Kent/Herring Road Intersection (See Figure 2-1)	64dB(A) _{Leq(1hour)}	Local traffic noise
Location 2 South Eastern Corner of School (Kent Road) (See Figure 2-1)	66dB(A) _{Leq(1hour)}	Local traffic noise
Location 6 North Western Corner of School (Herring Road) (See Figure 2-1)	62dB(A) _{Leq(1hour)}	Local traffic noise

8.3 RECOMMENDATIONS

We recommend:

- Windows of the new administration building facing Kent Road should be constructed using 6.38mm laminated glass (R_w 31).
- Windows of the new education building facing Kent, Herring or Road Reserve should be 6.38mm laminated glass (R_w 31).
- Windows along all remaining facades should be constructed using 6mm float (R_w 29).
- If windows are left open for natural ventilation purposes in learning spaces which face the Kent, Herring or Road Reserve exceedances above the noise criteria are expected. Therefore, we would recommend acoustically treated passive ventilation system could also be considered:
 - Use of Aeropac or Silence air acoustic ventilators would provide sufficient acoustic performance, however it would be necessary to consult with a mechanical engineer to determine the number of ventilators necessary to meet airflow requirements.
 - Use of an internally insulated acoustic transfer duct between building façade and a ceiling grill/bulkhead. In the event that a system such as this is implemented compliance with internal $L_{eq(1hour)}$ criteria is expected.
 - Alternatively, if a ceiling is proposed in the class rooms, air could be drawn into the classroom via louvres located above ceiling level (opening into the ceiling space), and then ducted (using insulated bulkheads) to ceiling grilles.

9 CONCLUSION

Acoustic Logic Consultancy (ALC) have been conducted a noise impacts assessment associated with the proposed Kent Road Public School project located at Herring Road, Marsfield. This assessment has been assessed with reference to relevant NSW Department of Planning SEAR's requirement, NSW EPA and NSW Department of Education acoustic guidelines.

An analysis of typical operational noise (classroom noise, vehicles and equipment) indicates that the site is capable of complying with relevant noise emission criteria.

An analysis of playground noise will exceed the ambient + 10dB(A) from time to time. Noise impacts from the playgrounds is keeping with typical school developments.

Acoustic treatments for control of noise generation have been presented in section 6.5 of this report. Detailed acoustic review of mechanical plant and public-address systems should be undertaken once design is further progressed (plant selections finalised etc). In-principal review indicates that noise emissions are capable of complying with EPA Noise Policy for Industry and Council requirements.

Review of road traffic noise impacting the site indicates that there are areas of the site where windows to internal area need to be closed in order to meet Department of Education internal noise levels. Recommended glass thicknesses have been specified in section 8.3. Mechanical engineer is to advise whether by closing the windows is a supplementary fresh air system is required.

Please contact us should you have any further queries.

Yours faithfully,

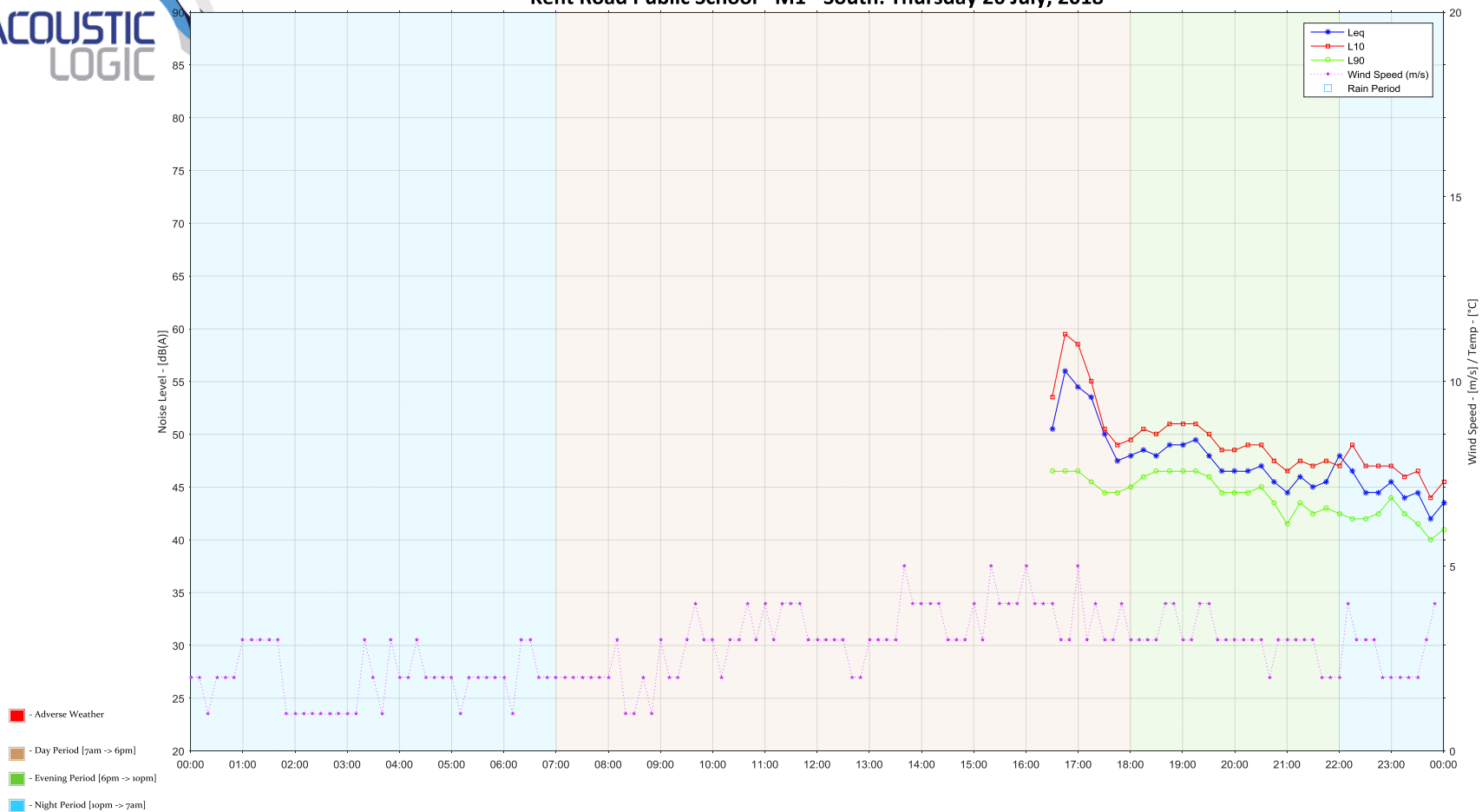


Acoustic Logic Consultancy Pty Ltd
Matthew Furlong

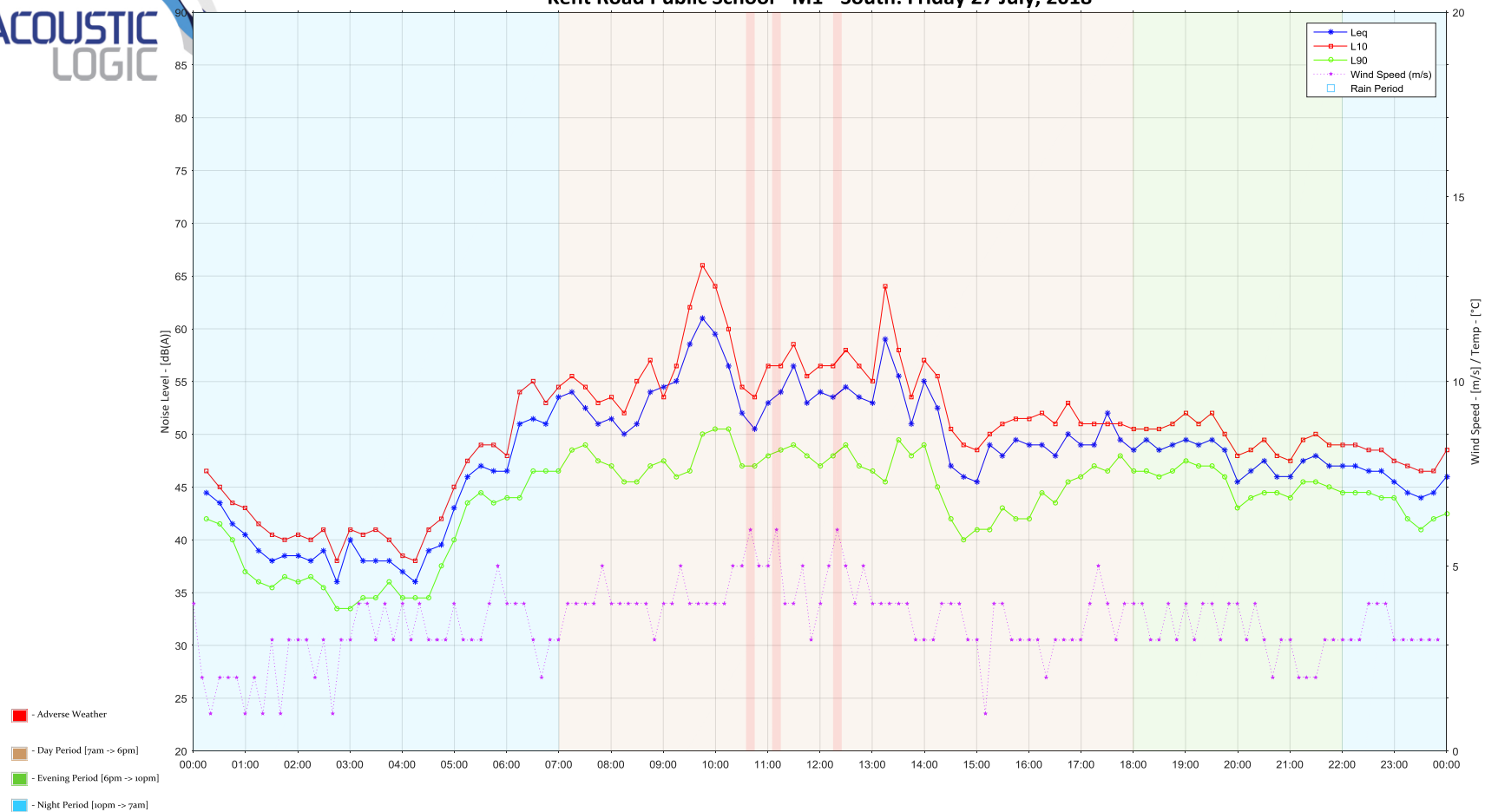
APPENDIX 1 – UNATTENDED NOISE MONITORING RESULTS LOCATION M1 SOUTH

**(WEATHER DATA HAS BEEN COLLECTED FROM SYDNEY OLYMPIC PARK
ARCHERY CENTRE WEATHER TOWER)**

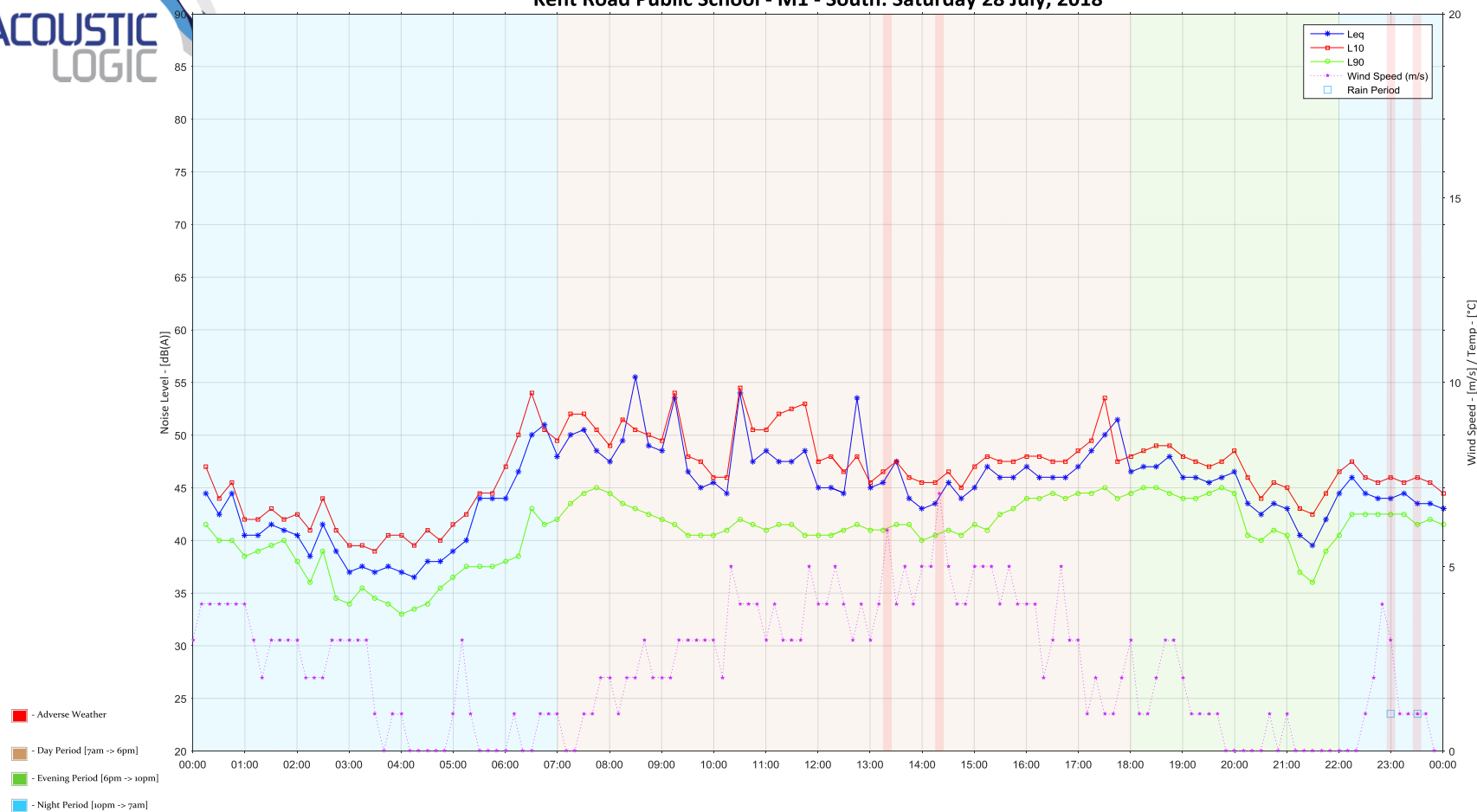
Kent Road Public School - M1 - South: Thursday 26 July, 2018



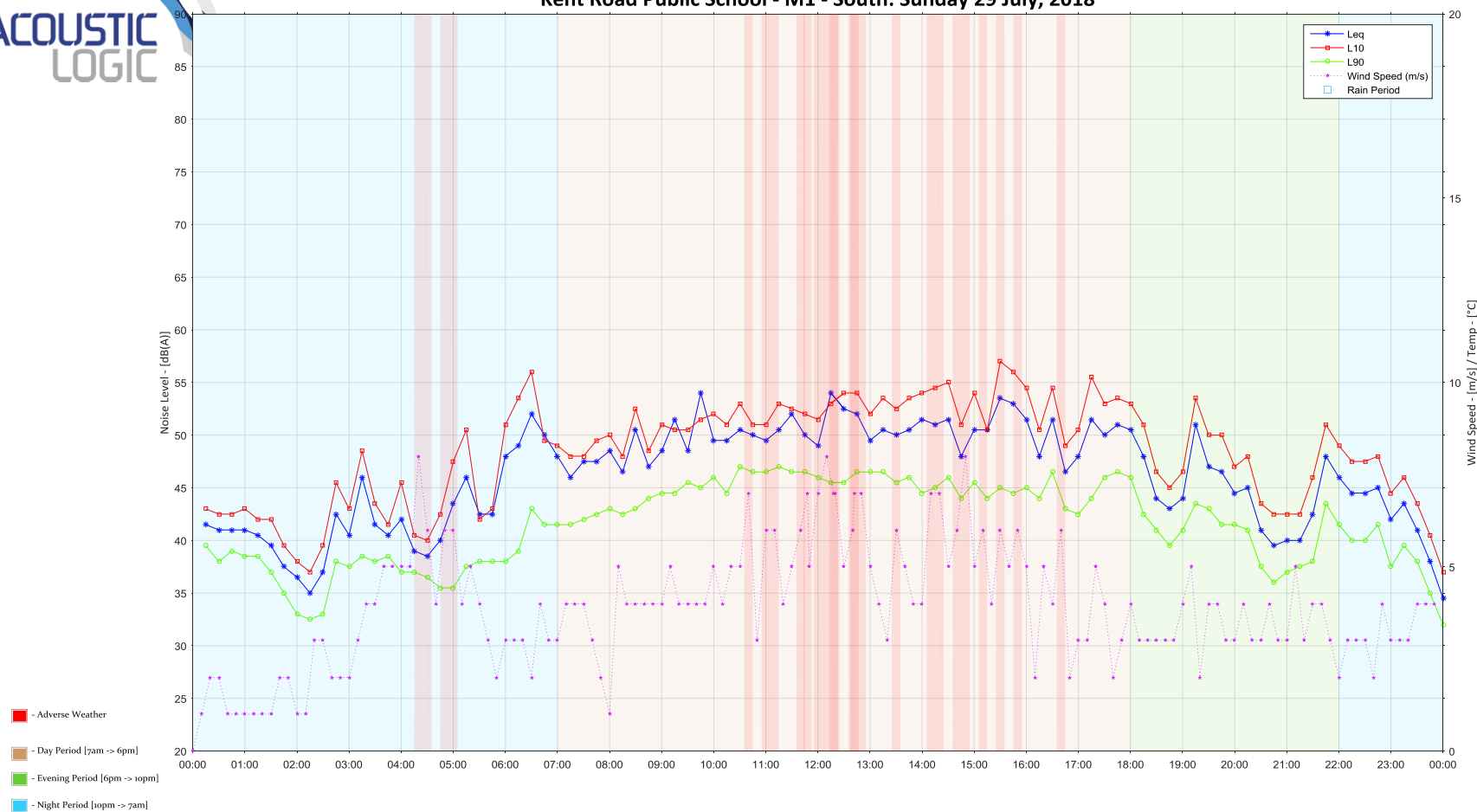
Kent Road Public School - M1 - South: Friday 27 July, 2018



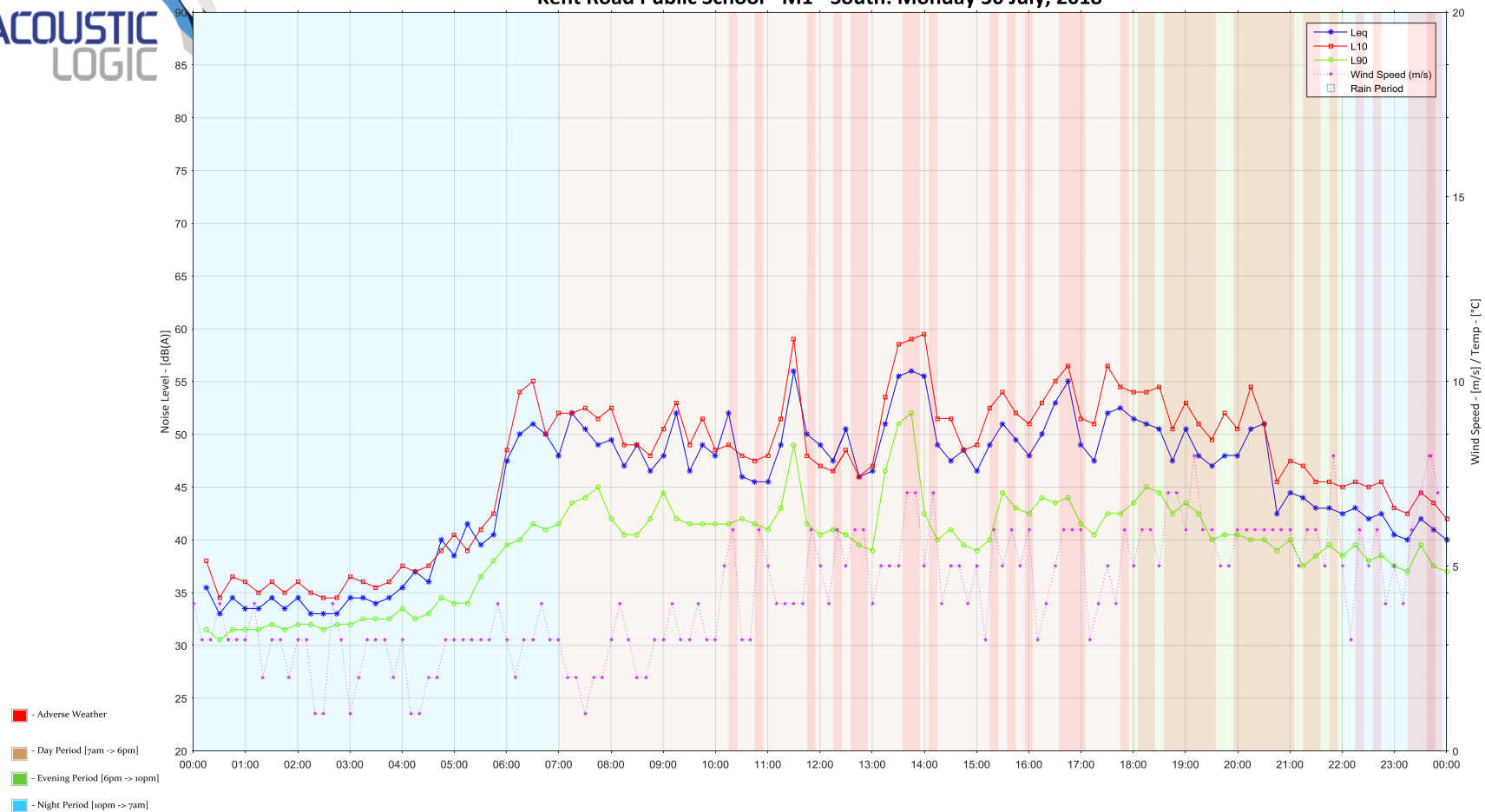
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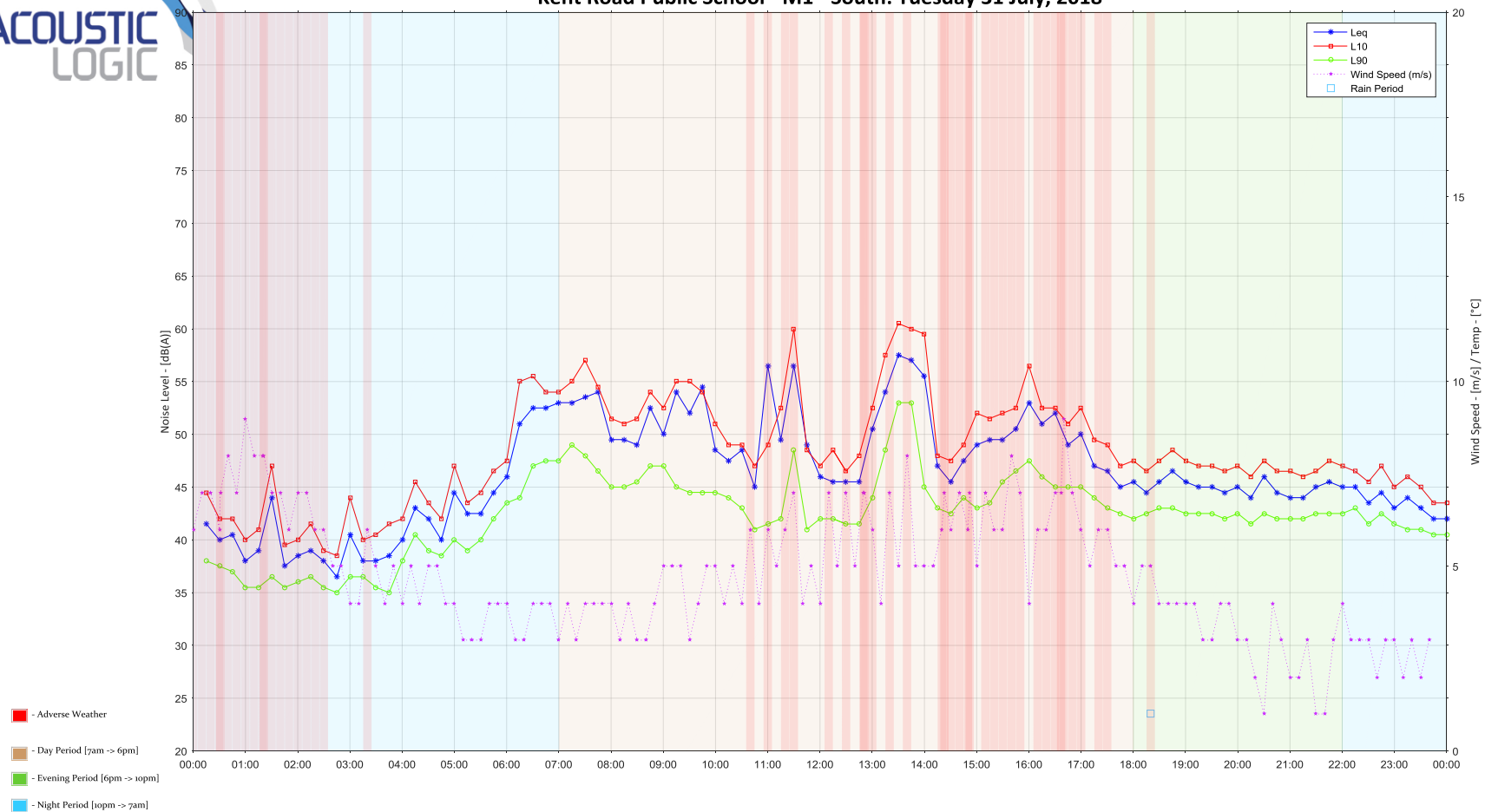
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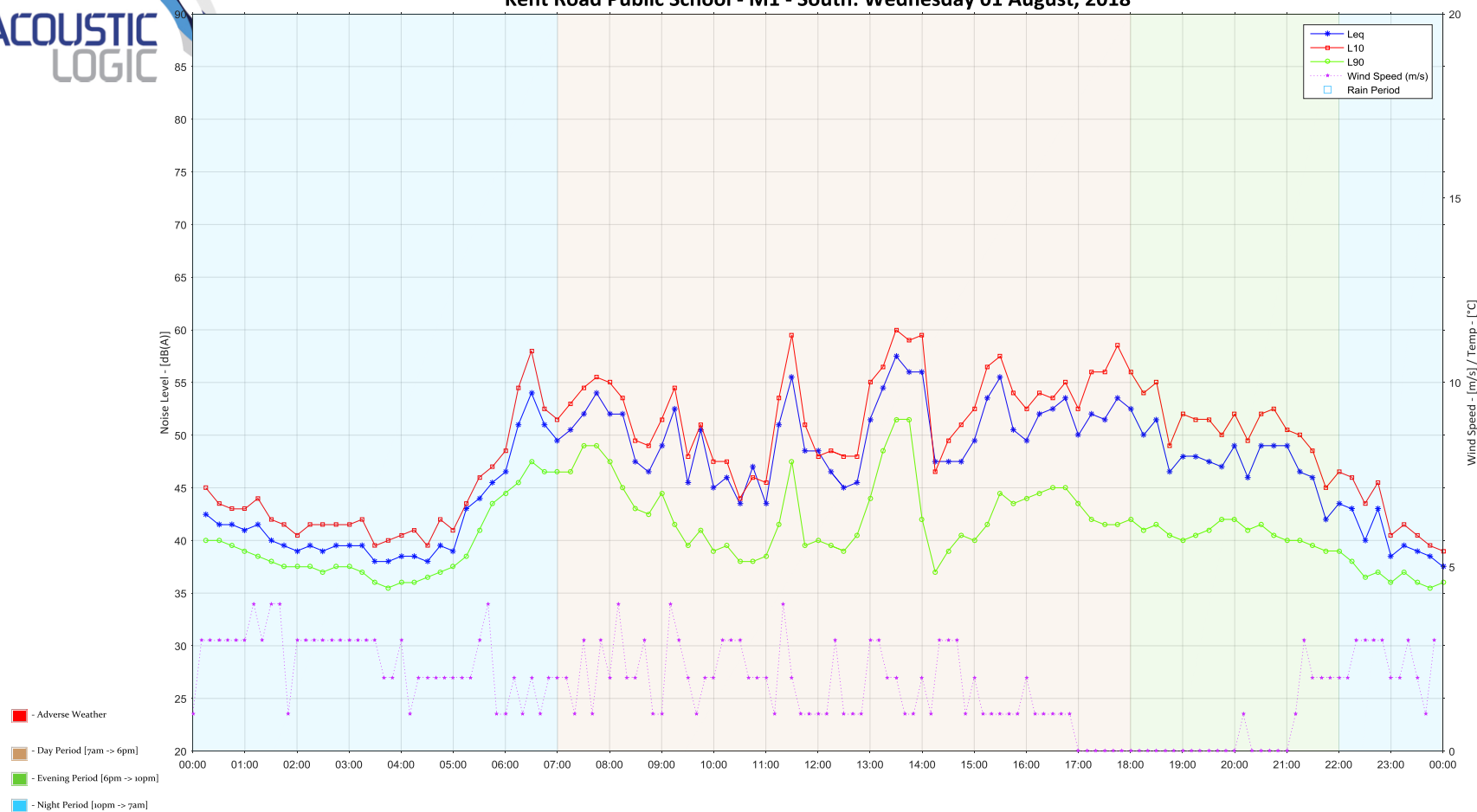
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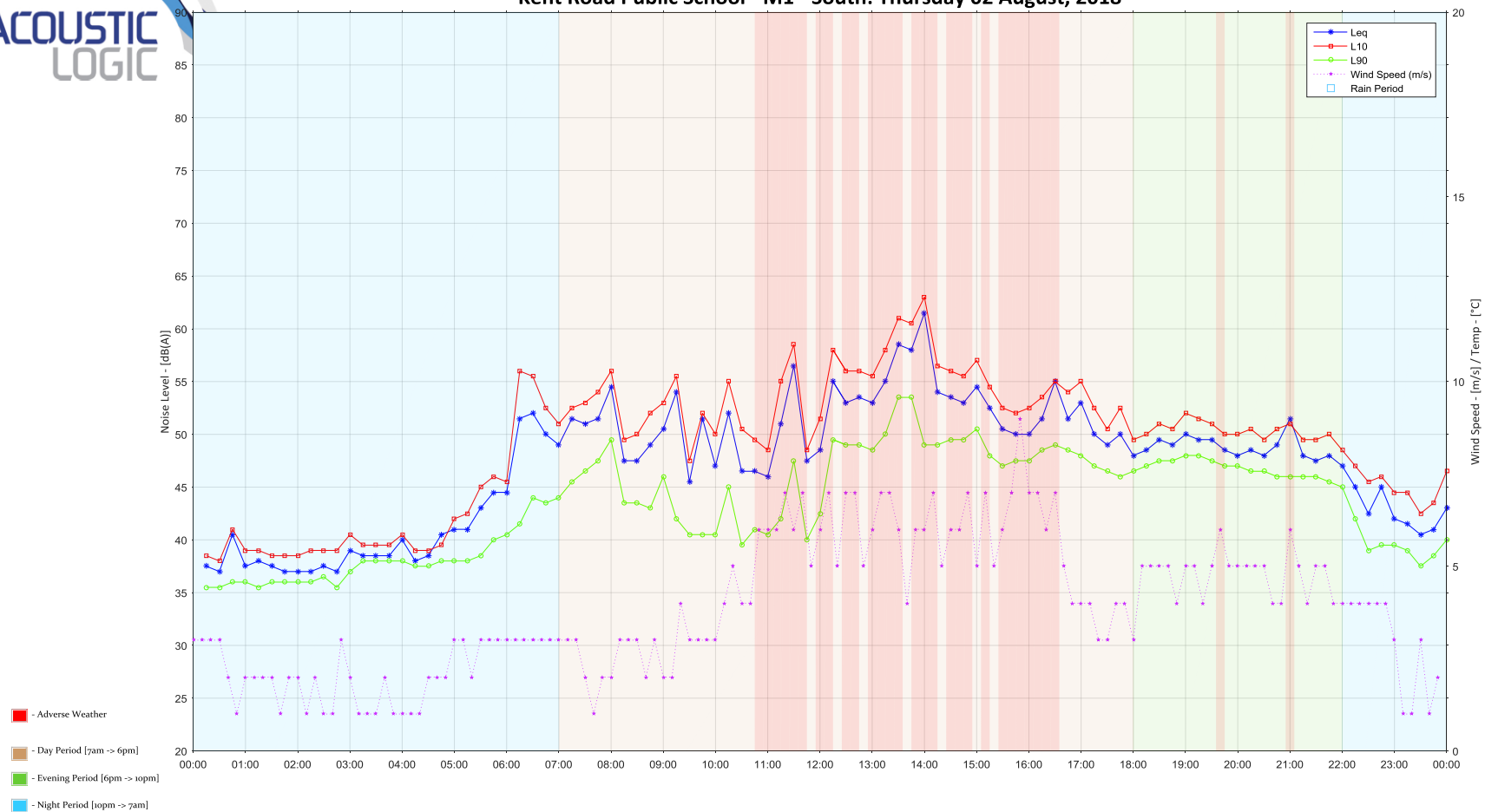
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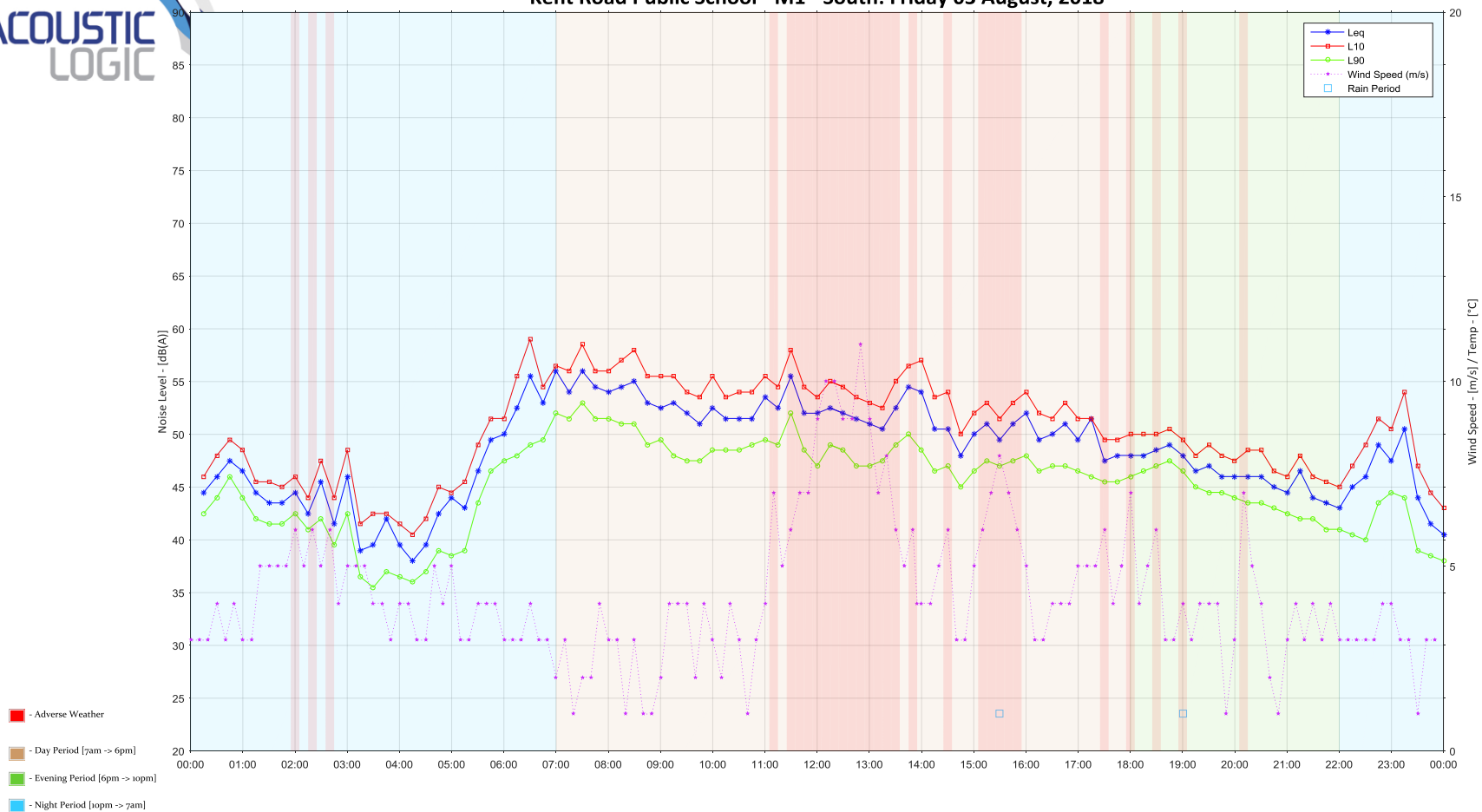
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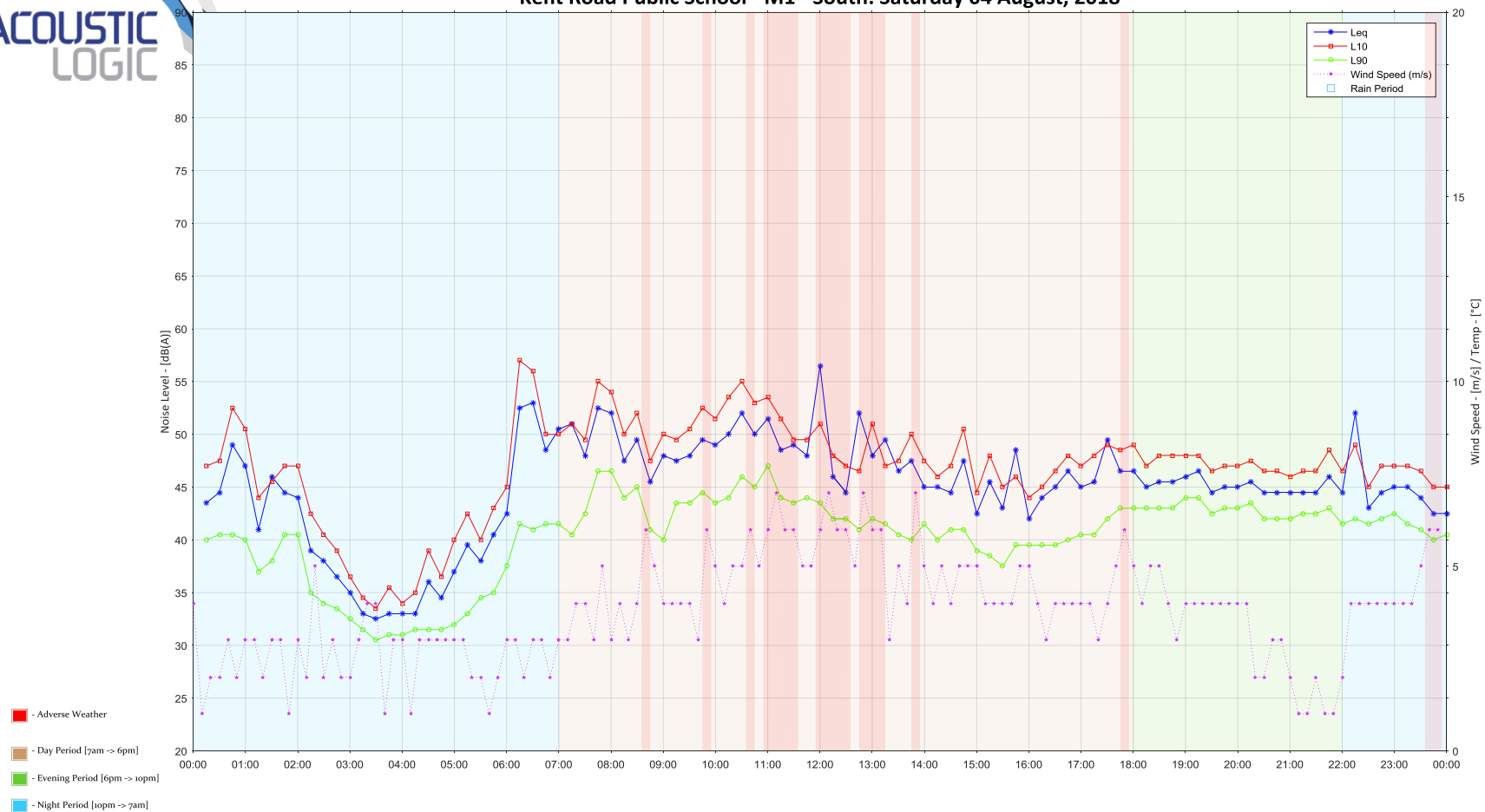
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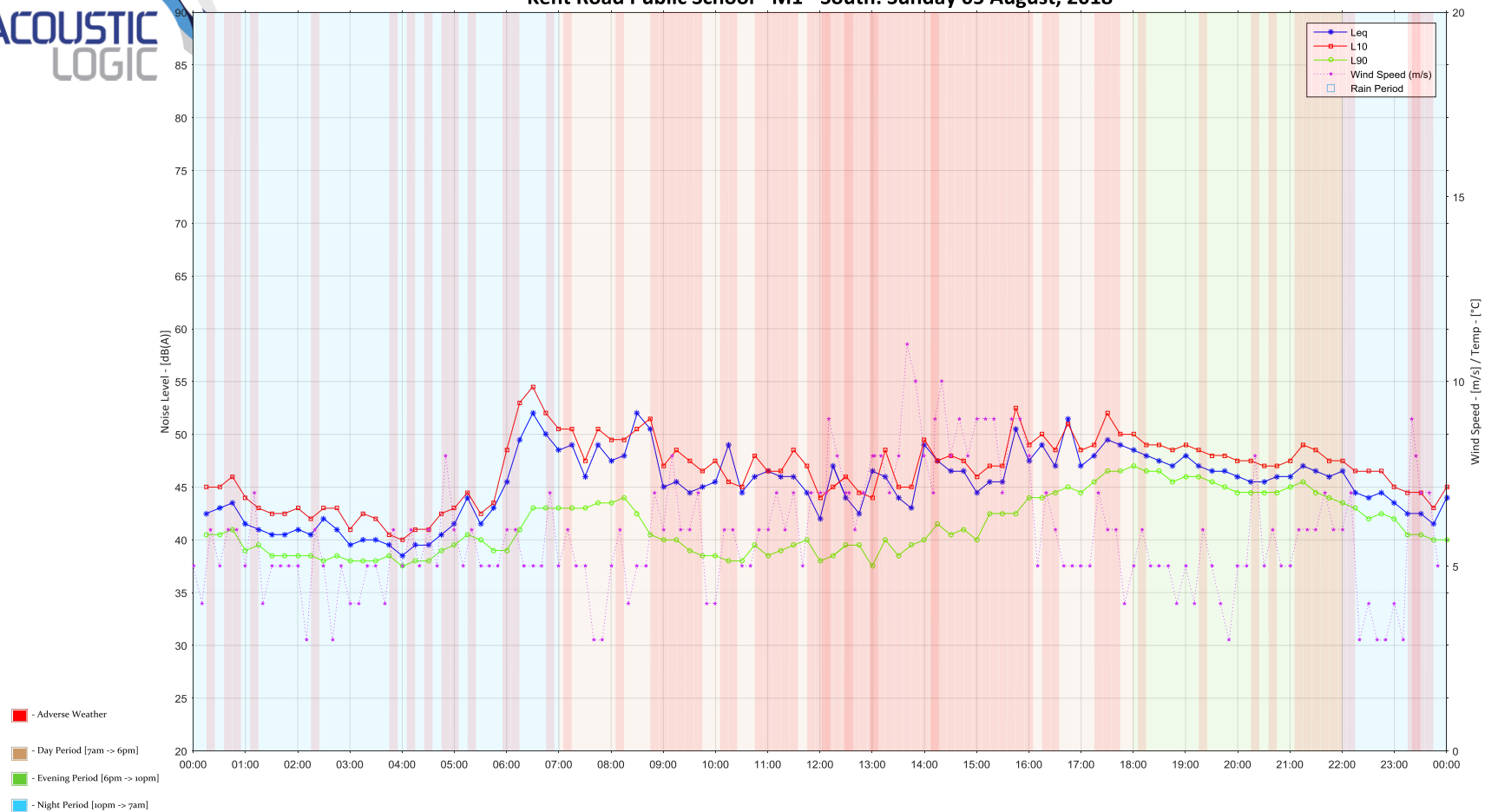
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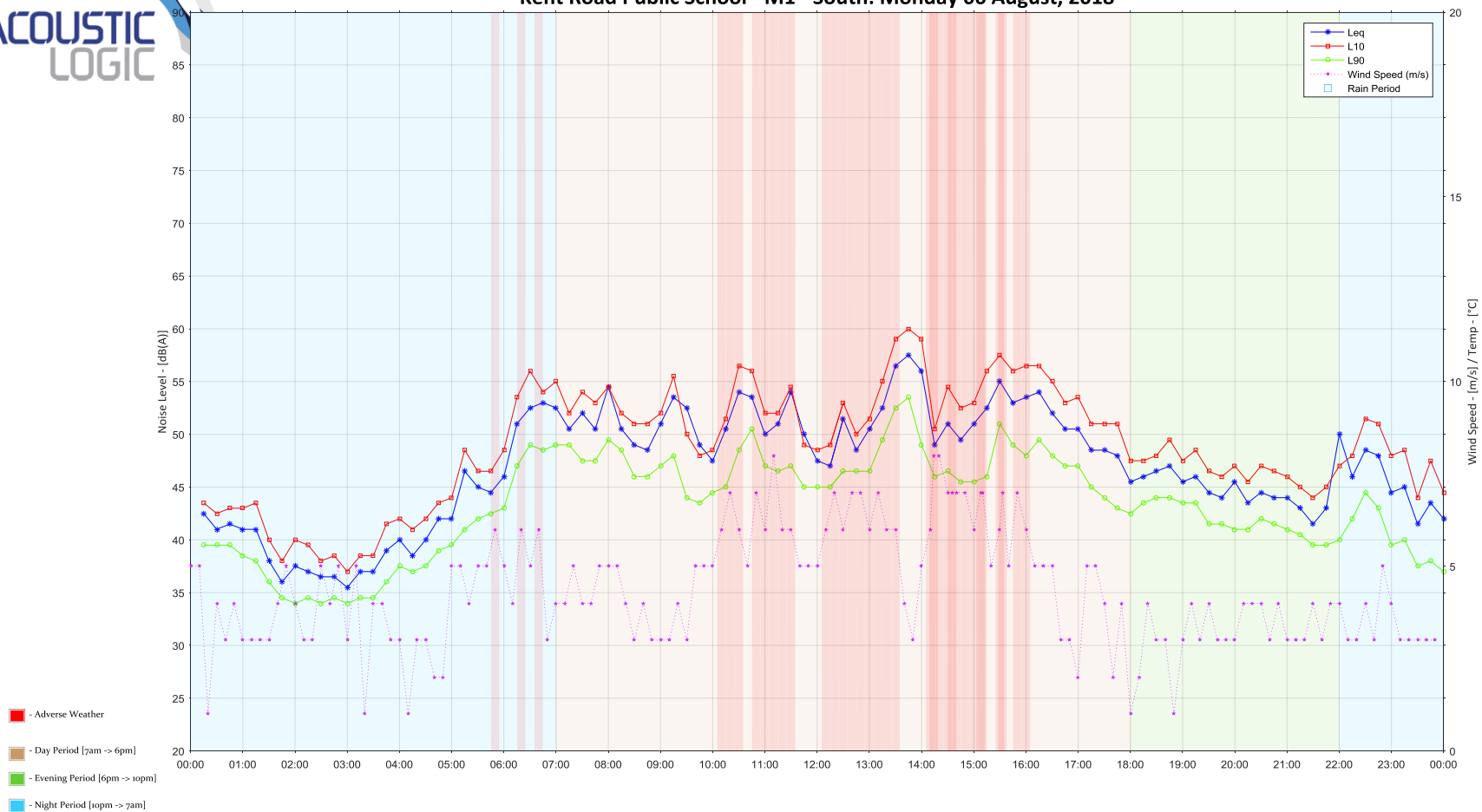
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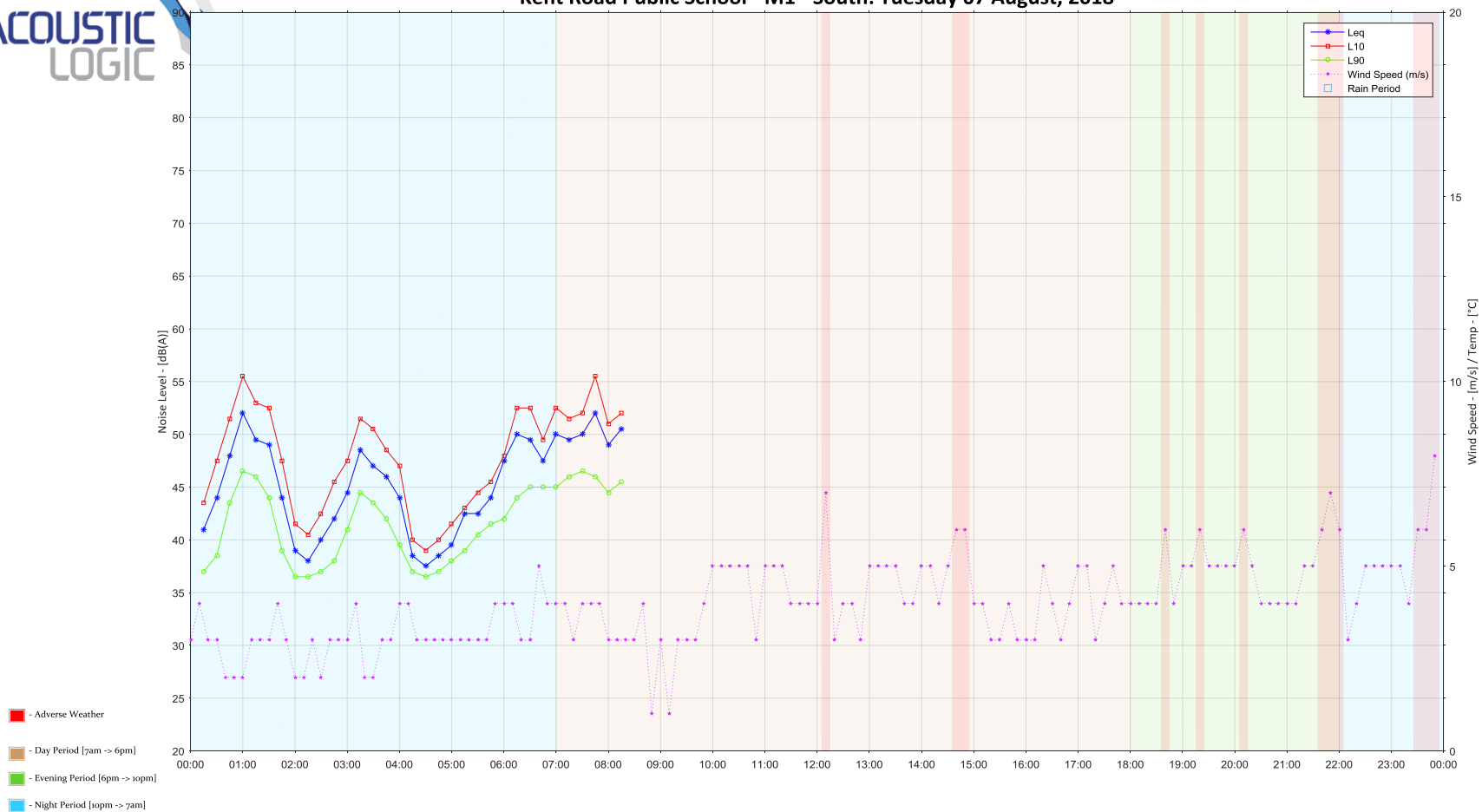
Kent Road Public School - M1 - South: Sunday 05 August, 2018



Kent Road Public School - M1 - South: Monday 06 August, 2018



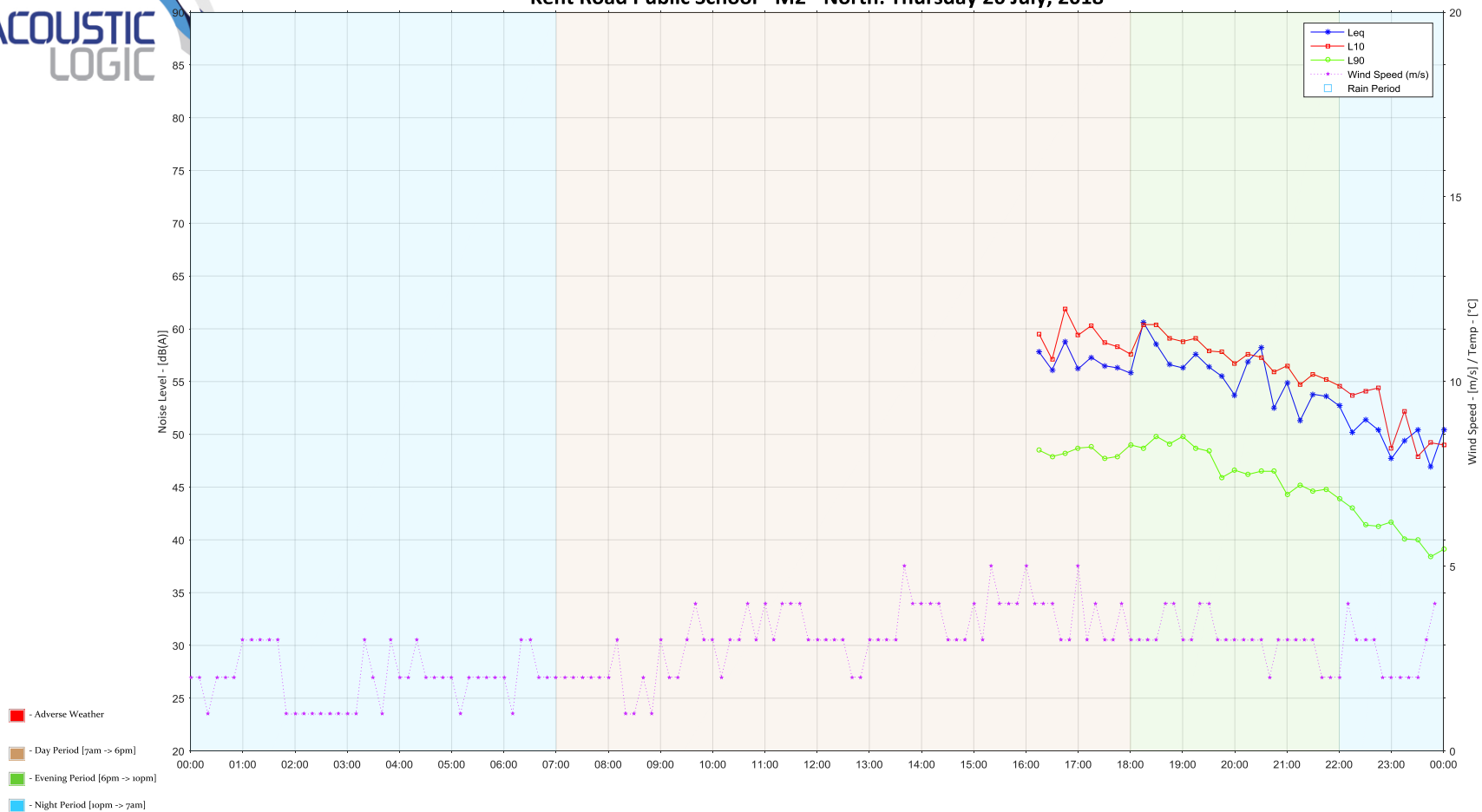
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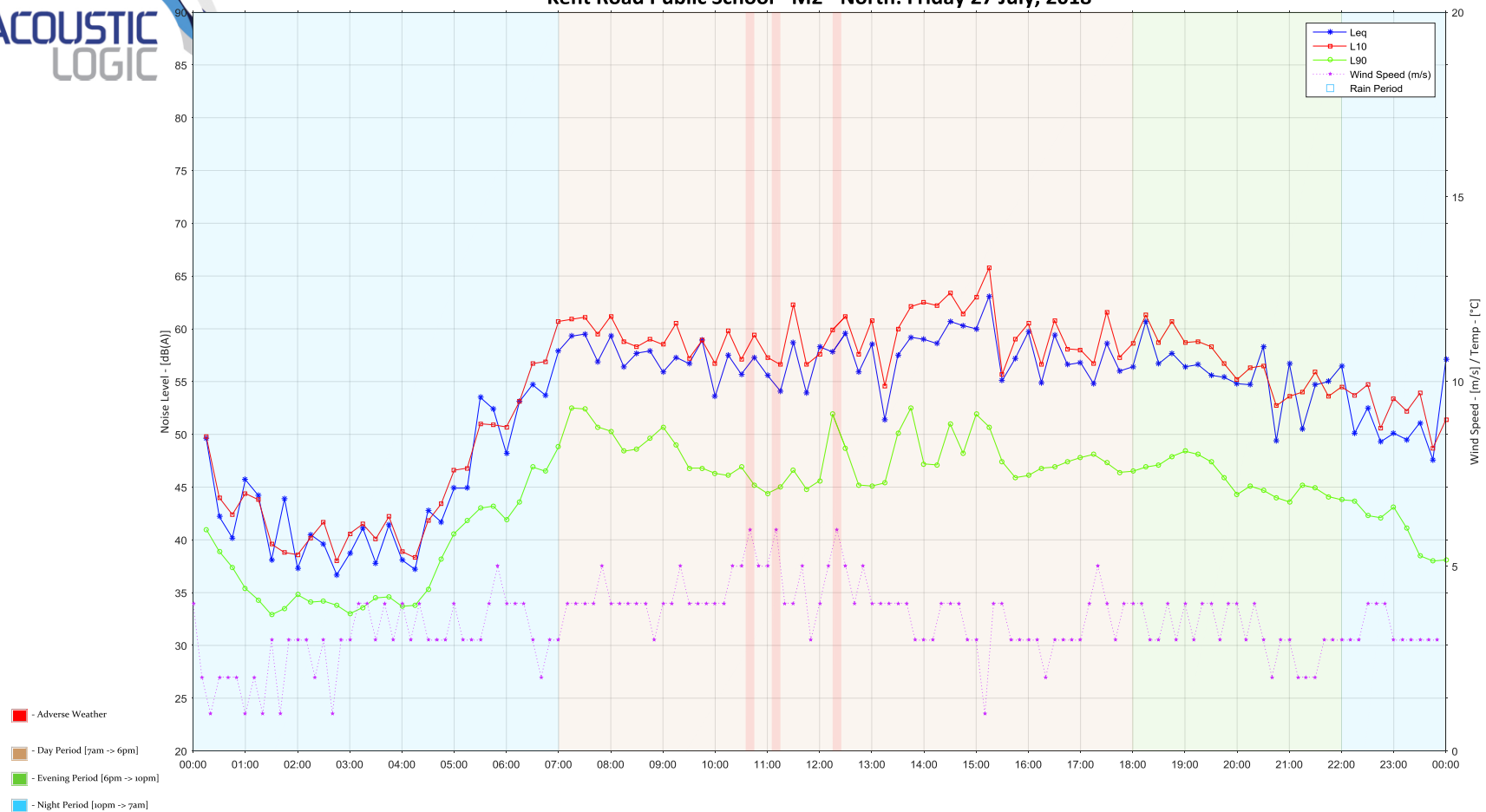
APPENDIX 2 – UNATTENDED NOISE MONITORING RESULTS LOCATION M2 NORTH

**(WEATHER DATA HAS BEEN COLLECTED FROM SYDNEY OLYMPIC PARK
ARCHERY CENTRE WEATHER TOWER)**

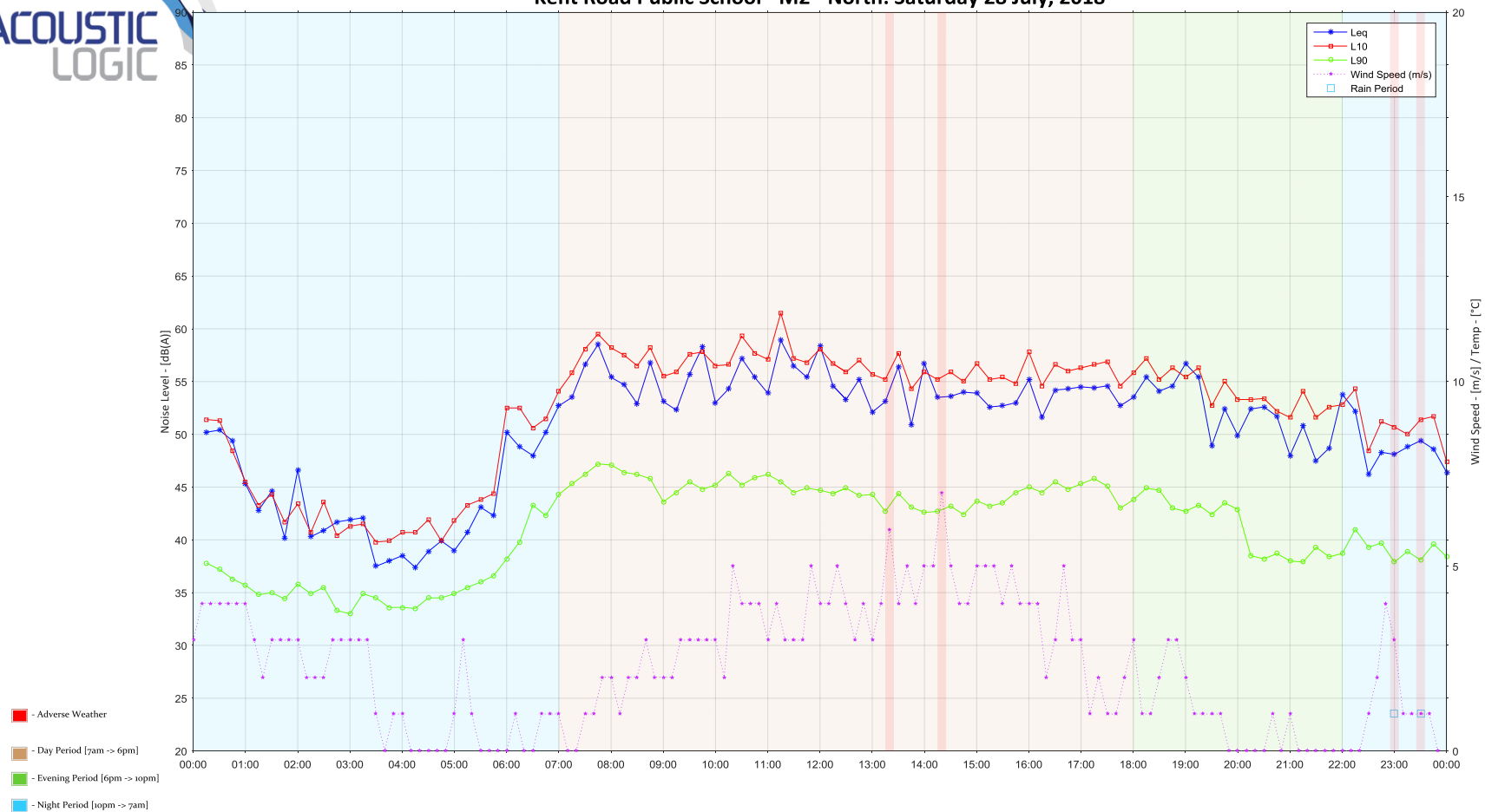
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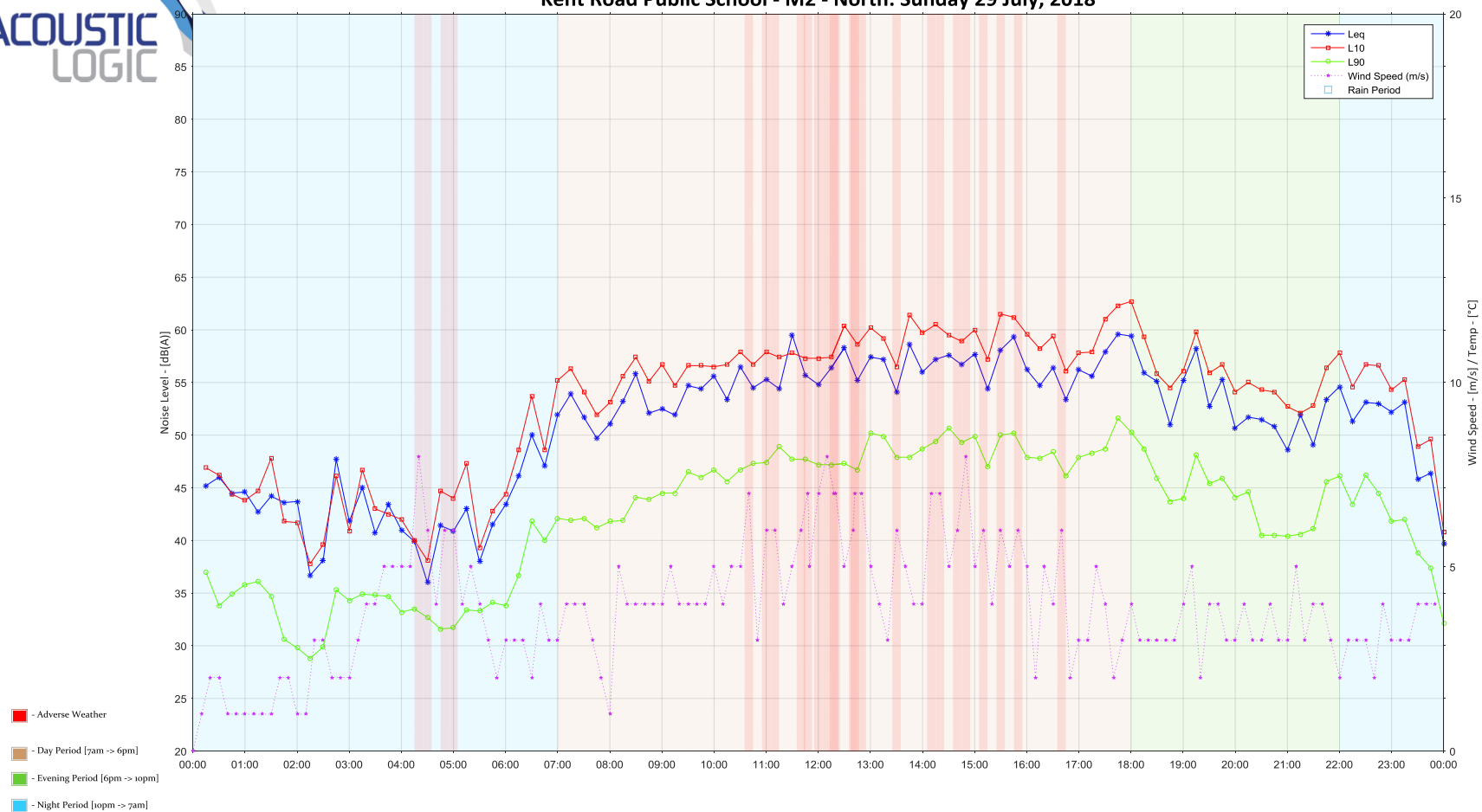
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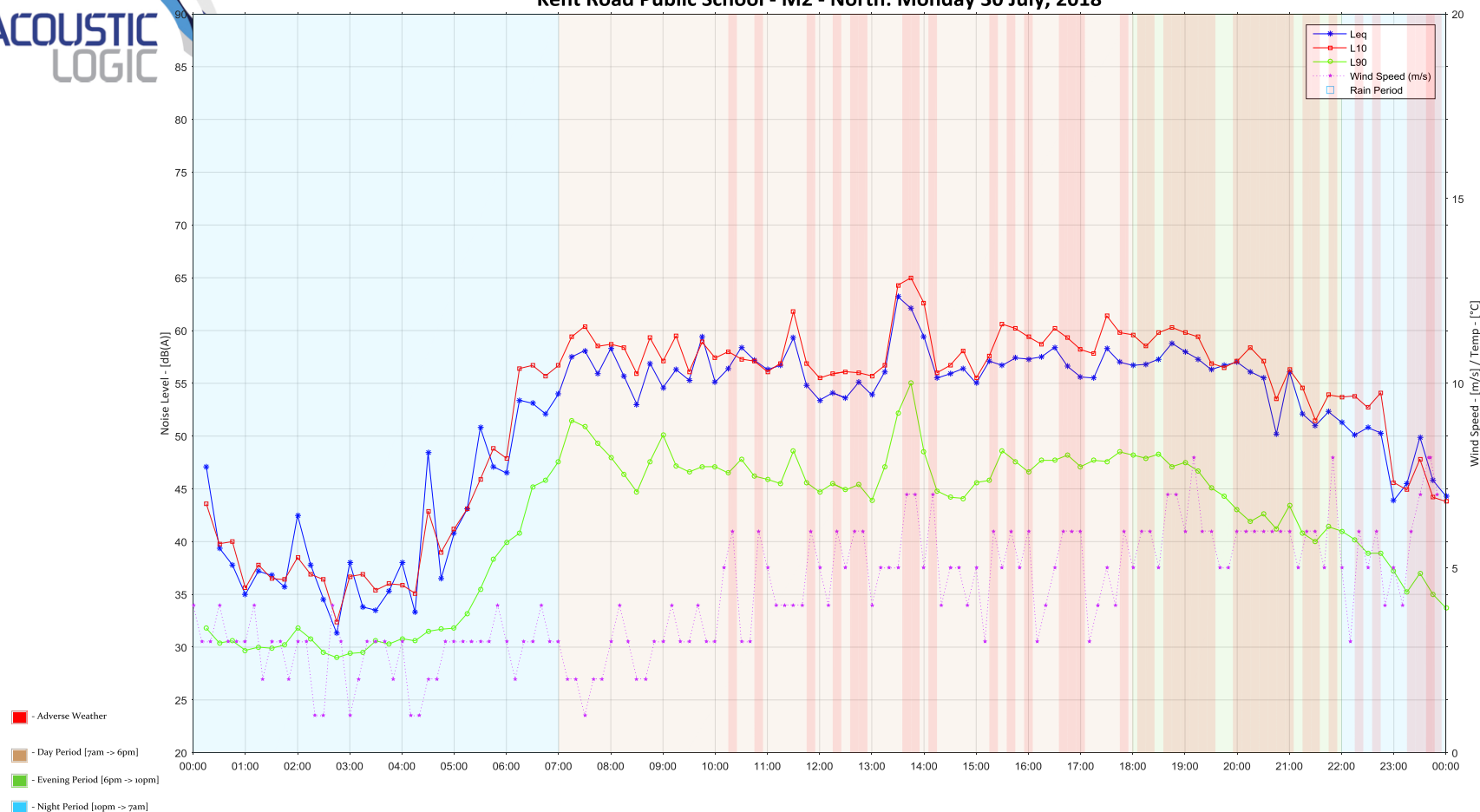
Kent Road Public School - M2 - North: Saturday 28 July, 2018



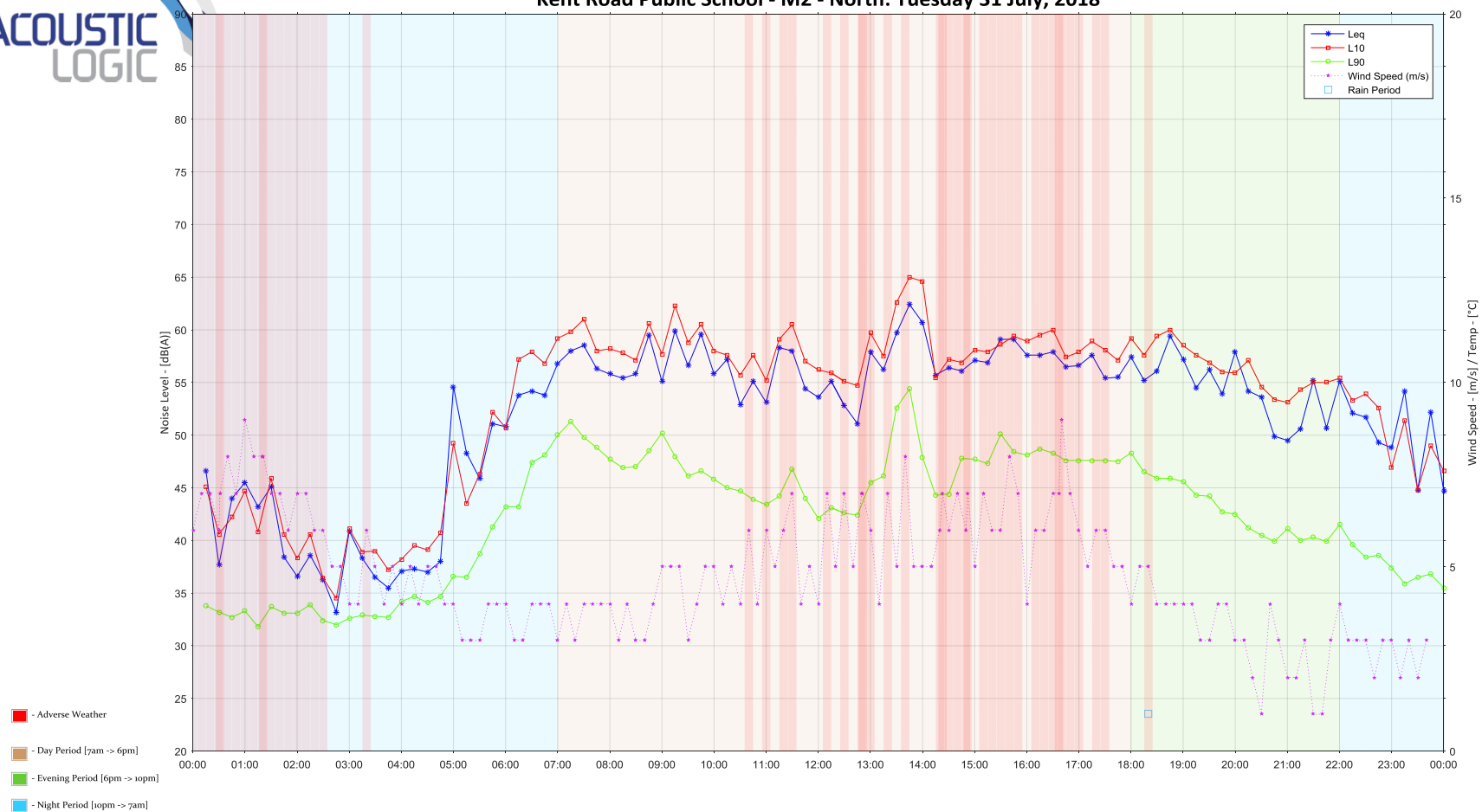
Kent Road Public School - M2 - North: Sunday 29 July, 2018



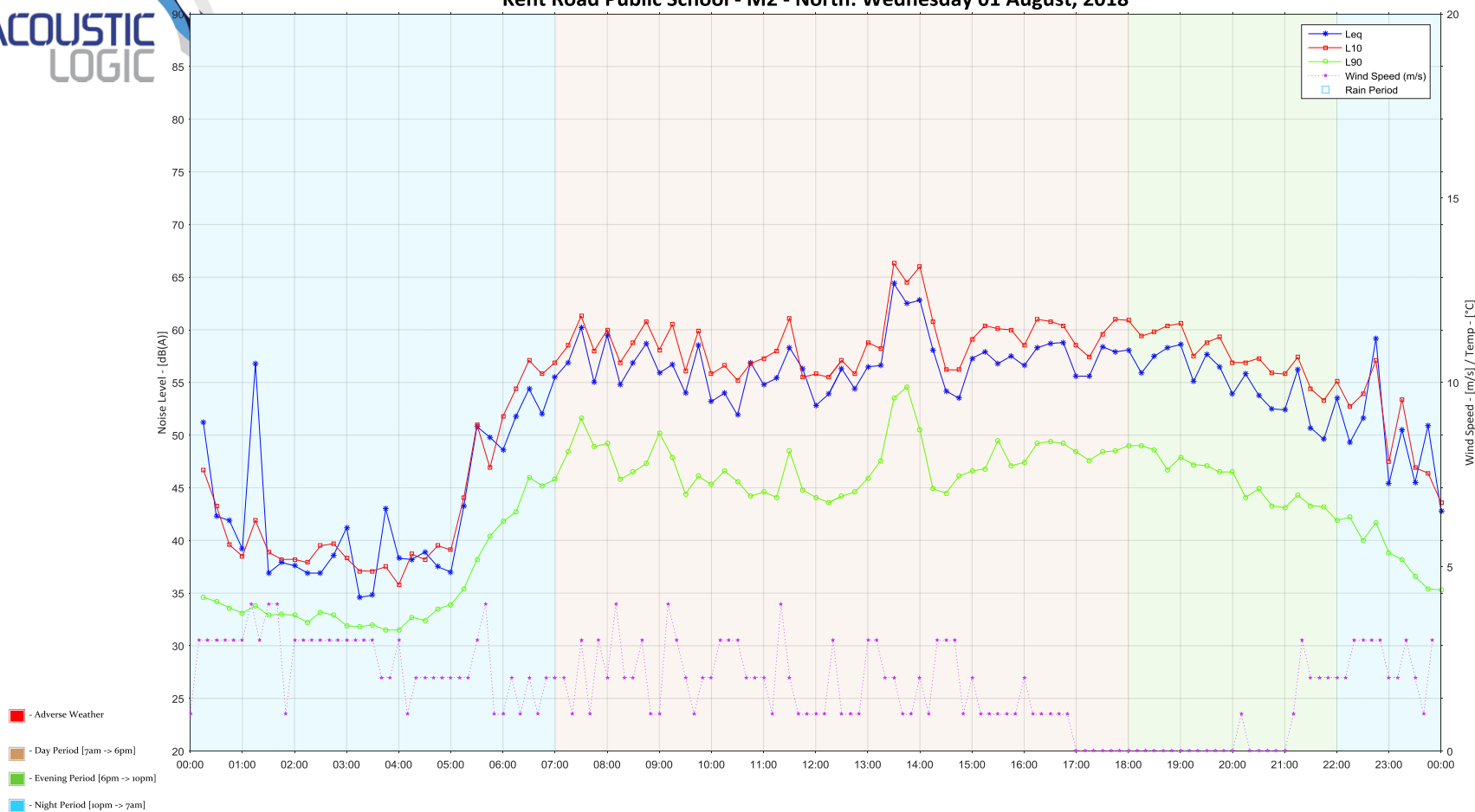
Kent Road Public School - M2 - North: Monday 30 July, 2018



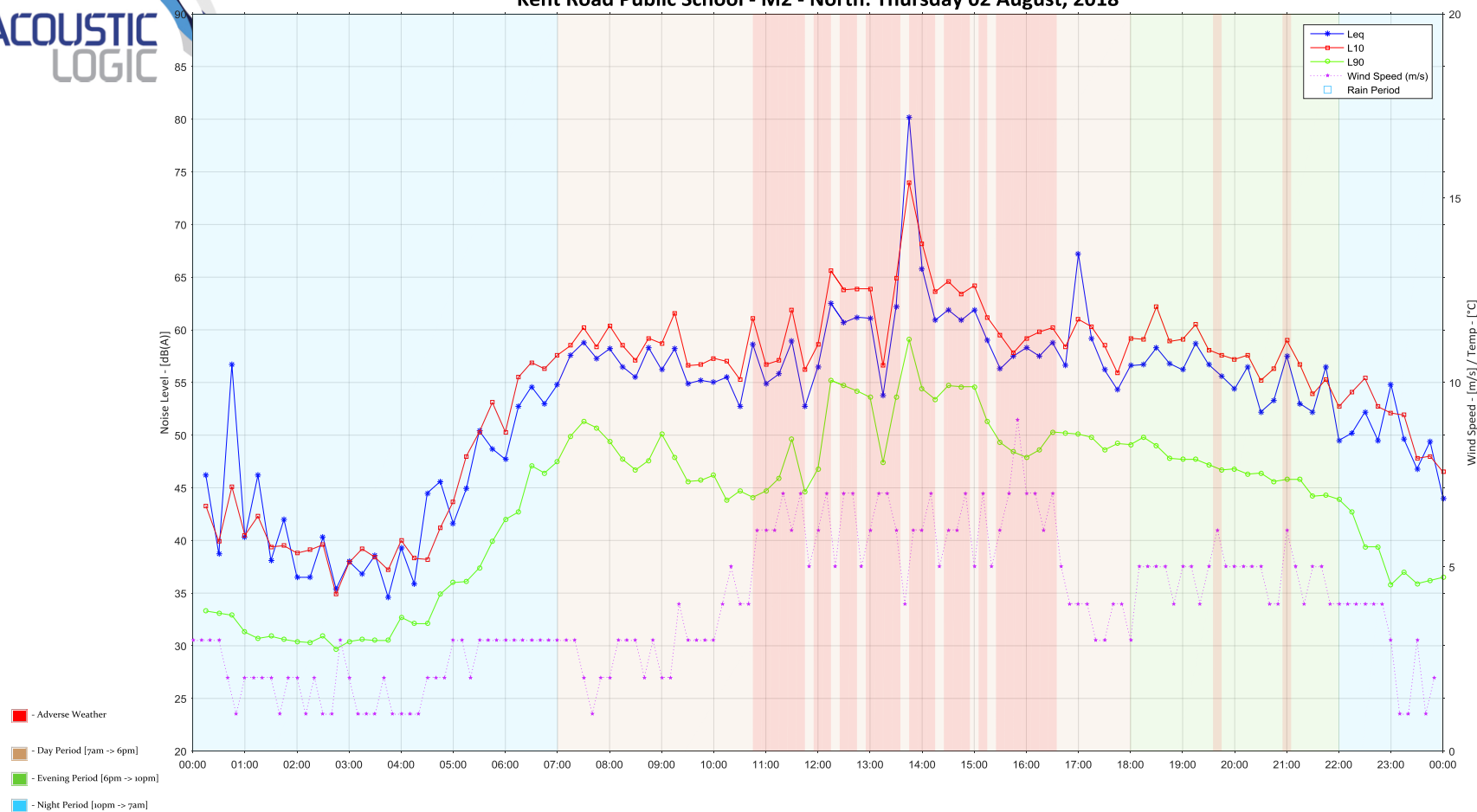
Kent Road Public School - M2 - North: Tuesday 31 July, 2018



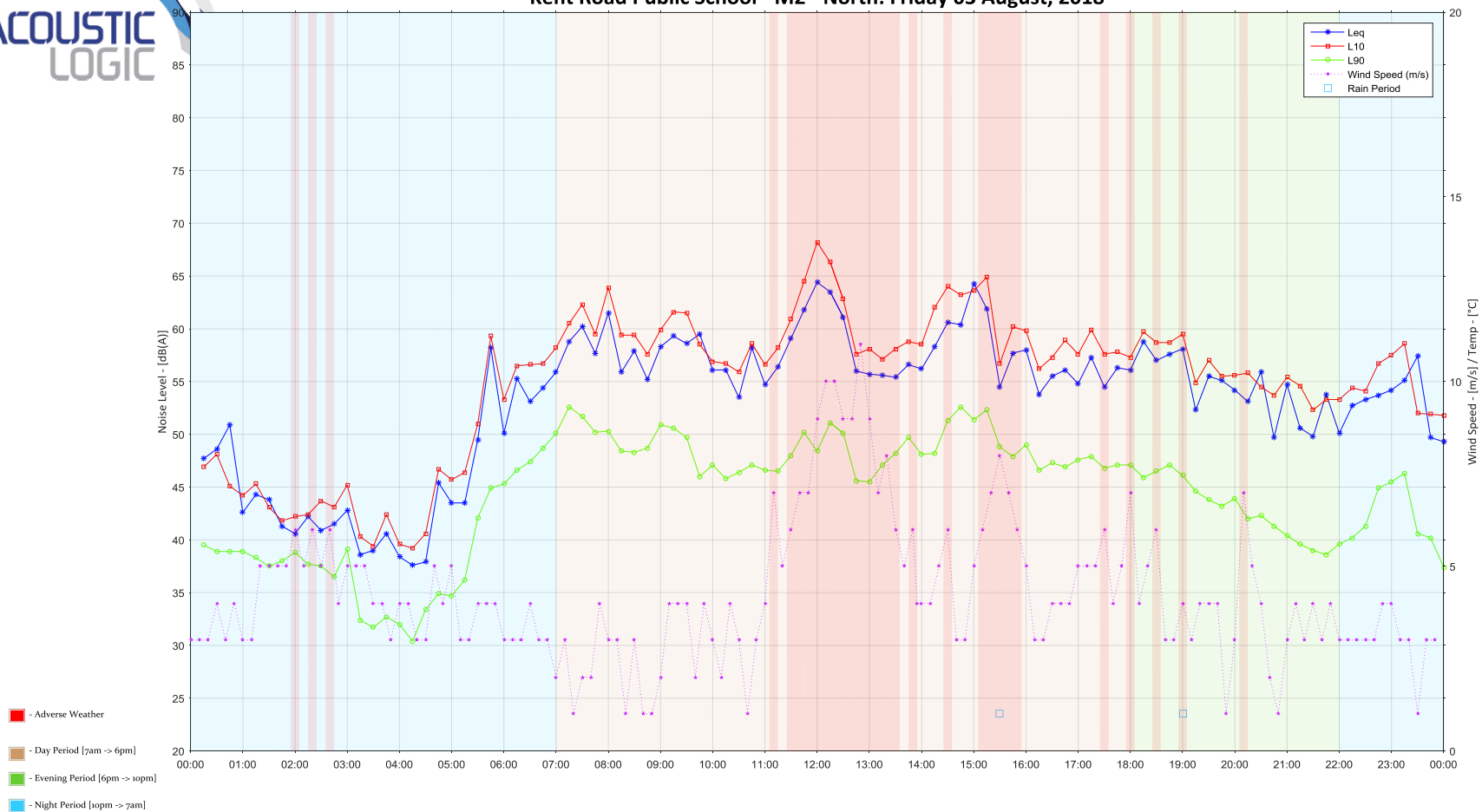
Kent Road Public School - M2 - North: Wednesday 01 August, 2018



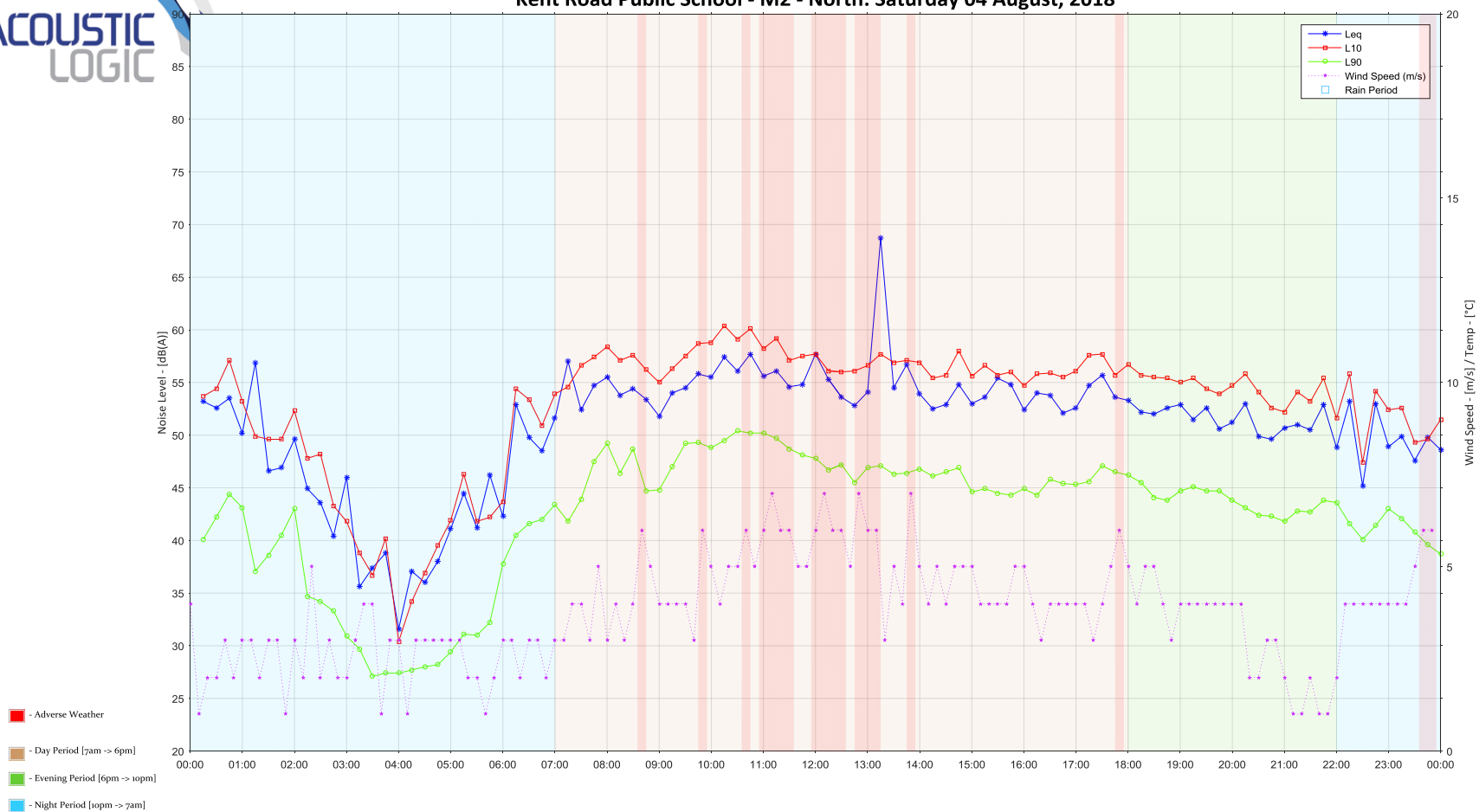
Kent Road Public School - M2 - North: Thursday 02 August, 2018



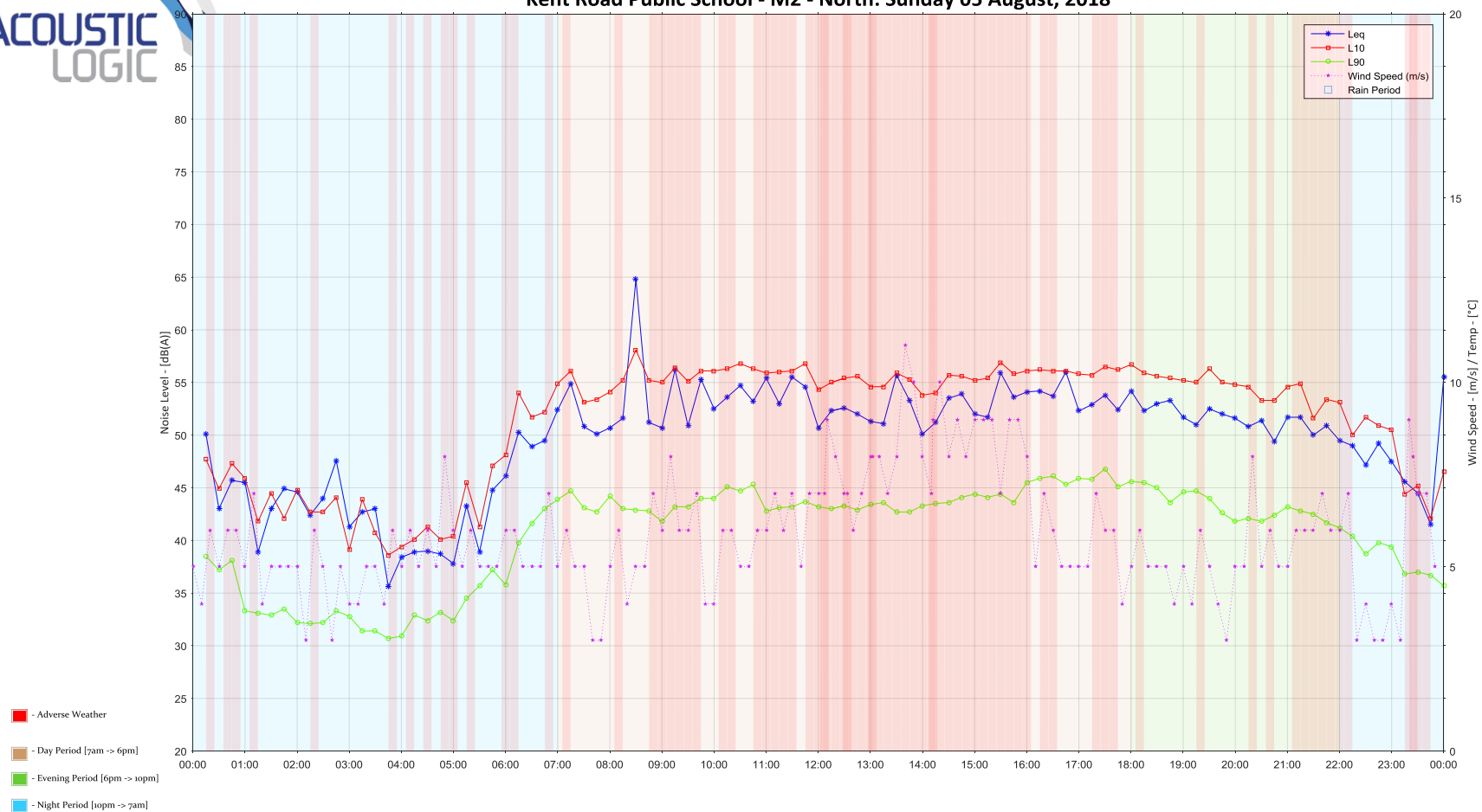
Kent Road Public School - M2 - North: Friday 03 August, 2018



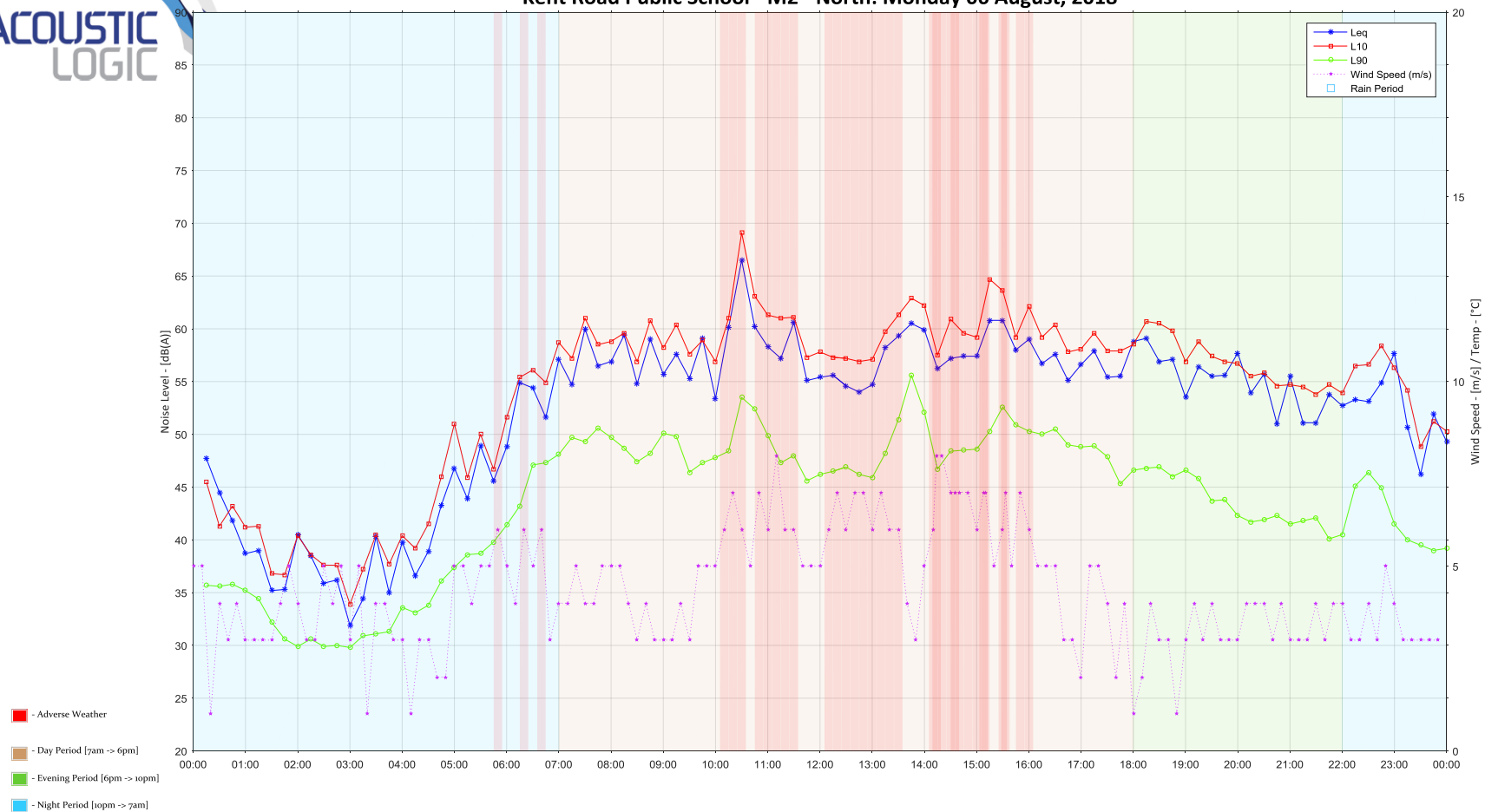
Kent Road Public School - M2 - North: Saturday 04 August, 2018



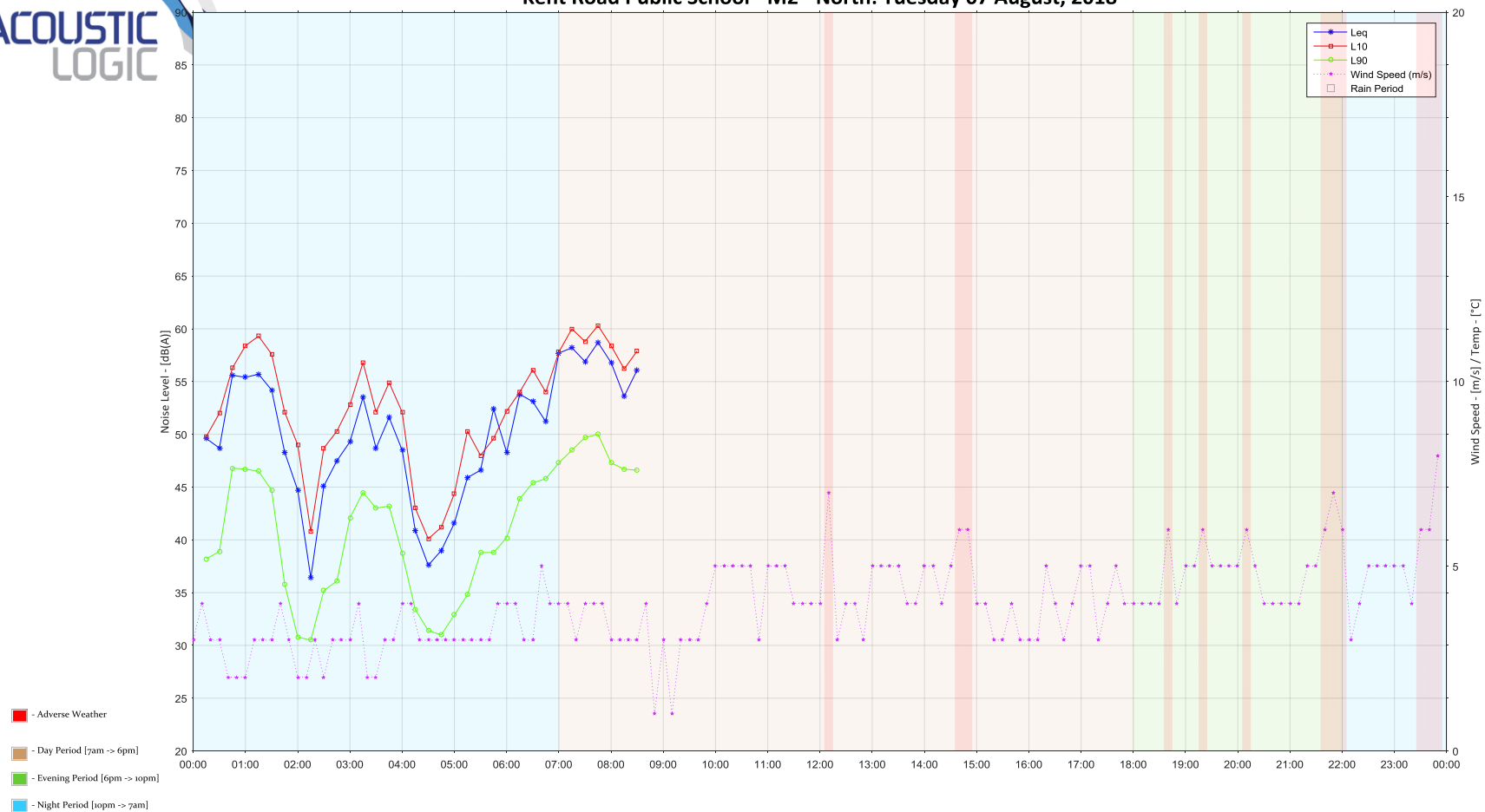
Kent Road Public School - M2 - North: Sunday 05 August, 2018



Kent Road Public School - M2 - North: Monday 06 August, 2018



Kent Road Public School - M2 - North: Tuesday 07 August, 2018



APPENDIX 3 – EQUIPMENT CALIBRATION CERTIFICATES



**Acoustic
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Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
AS 1259.1:1990 - AS 1259.2:1990
Calibration Certificate

Calibration Number **C17410**

Client Details Acoustic Logic Consultancy Pty Ltd
9 Sarah Street
Mascot NSW 2020

Equipment Tested/ Model Number : ARL EL-316
Instrument Serial Number : 16-306-032
Microphone Serial Number : 320767
Pre-amplifier Serial Number : 27403

Atmospheric Conditions

Ambient Temperature : 21.8°C
Relative Humidity : 35.4%
Barometric Pressure : 99.81kPa

Calibration Technician : Jason Gomes
Calibration Date : 22/08/2017

Secondary Check: Riley Cooper
Report Issue Date : 23/08/2017

Approved Signatory :

Juan Aguero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.16dB	Temperature	±0.05°C
12.5kHz	±0.2dB	Relative Humidity	±0.46%
16kHz	±0.29dB	Barometric Pressure	±0.017Pa
Electrical Tests			
31.5 Hz to 20 kHz	±0.12dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 1 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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Sound Level Meter
AS 1259.1:1990 - AS 1259.2:1990
Calibration Certificate

Calibration Number C17186

Client Details Acoustic Logic Consultancy Pty Ltd
9 Sarah Street
Mascot NSW 2020

Equipment Tested/ Model Number : ARL EL-215
Instrument Serial Number : 194490
Microphone Serial Number : N/A
Pre-amplifier Serial Number : 194490

Atmospheric Conditions

Ambient Temperature : 22.2°C
Relative Humidity : 41.4%
Barometric Pressure : 99.88kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 28/04/2017

Secondary Check: Riley Cooper
Report Issue Date : 01/05/2017

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.16dB	Temperature	±0.05°C
12.5kHz	±0.2dB	Relative Humidity	±0.46%
16kHz	±0.29dB	Barometric Pressure	±0.017Pa
Electrical Tests			
31.5 Hz to 20 kHz	±0.12dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 2 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.



This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

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CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: **SLM 22979 & FILT 4709**

Equipment Description: Sound Level Meter

Manufacturer: Norsonic

Model No: NOR-140 **Serial No:** 1405929

Microphone Type: 1225 **Serial No:** 208208

Preamplifier Type: 1209 **Serial No:** 15792

Filter Type: 1/3 Octave **Serial No:** 1405929

Comments: All tests passed for class 1.
(See over for details)

Owner: Acoustic Logic Consultancy
9 Sarah Street
Mascot, NSW 2020

Ambient Pressure: 1013 hPa ± 1.5 hPa

Temperature: 23 °C $\pm 2^\circ$ C **Relative Humidity:** 44% $\pm 5\%$

Date of Calibration: 20/06/2018 **Issue Date:** 20/06/2018

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: 

AUTHORISED SIGNATURE: 
Jack Kiehl

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to
Australian/national standards.



Accredited Lab. No. 9262
Acoustic and Vibration
Measurements



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