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Western Sydney Schools

Alex Avenue Public School Environmental Noise and Vibration Impact Assessment

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1 INTRODUCTION

This environmental noise and vibration assessment has been prepared by Acoustic Logic Consultancy on behalf of the Schools Infrastructure NSW (the Applicant). It accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD 18_9368) for the new Alex Avenue Public School at the corner of Farmland Drive and future realignment of Pelican Road in Schofields (the site). The site is legally described as proposed Lots 1 and 2, being part of existing Lot 4 in DP1208329 and Lot 121 in DP1203646.

The new school will cater for approximately 1,000 primary school students and 70 full-time staff upon completion. The proposal seeks consent for:

- Construction of a 2-storey library, administration and staff building (Block A) comprising:
    - School administrative spaces including reception;
    - Library with reading nooks, makers space and research pods;
    - Staff rooms and offices;
    - Special programs rooms;
    - Amenities;
    - Canteen;
    - Interview rooms; and
    - Presentation spaces.
- Construction of four 2-storey classroom buildings (Block B) containing 40 homebases comprising:
    - Collaborative learning spaces;
    - Learning studios;
    - Covered outdoor learning spaces;
    - Practical activity areas; and
    - Amenities.
- Construction of a single storey assembly hall (Block C) with a performance stage and integrated covered outdoor learning area (COLA). The assembly hall will have OOSH facilities, store room areas and amenities;
- Associated site landscaping and open space including associated fences throughout and games courts;
- Pedestrian access points along both Farmland Drive and the future Pelican Road;
- Substation on the north-east corner of the site; and
- School signage to the front entrance.

All proposed school buildings will be connected by a covered walkway providing integrated covered outdoor learning areas (COLAs). School staff will use the Council car park for the adjacent sports fields pursuant to a Joint Use agreement. The proposed School pick up and drop off zone will also be contained within the future shared car park and will be accessed via Farmland Drive.

The purpose of this assessment is to address the SEARs related to noise and vibration impacts, including an assessment of noise emissions during the construction and operational phases of the project and potential impacts from surrounding environmental noise sources.

2 RESPONSE TO SEARS

The environmental noise and vibration is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD 18_9368. This table identifies the SEARs and relevant reference within this report.

Table 1- SEARs and Relevant Reference

SEARs Item	Report Reference
Item 5. Assess amenity impacts on the surrounding locality, including … and acoustic impacts.	Sections 5 to 12
Item 12 • Identify and provide a quantitative assessment of the main noise and vibration generating sources during site preparation, bulk excavation, construction. Outline measures to minimise and mitigate the potential noise impacts on surrounding occupiers of land . • 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 impacts on surrounding occupiers of land . Relevant Policies and Guidelines: •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)	Section 11 Section 6 to 10

In this assessment we will:

- Identify nearby noise sensitive receivers and operational noise sources with the potential to adversely impact nearby development.
- Identify relevant Council 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 mitigate potential noise impacts.

3 SITE DESCRIPTION AND SITE OPERATION

The site is located on the corner of Farmland Drive and the future alignment of Pelican Drive, Schofields.

The surrounding area includes future residential receivers to the south, west as well and north adjacent on Pelican and Farmland Drives. The site to the east will be a park and sports field that will buffer any residential receivers further to the east.

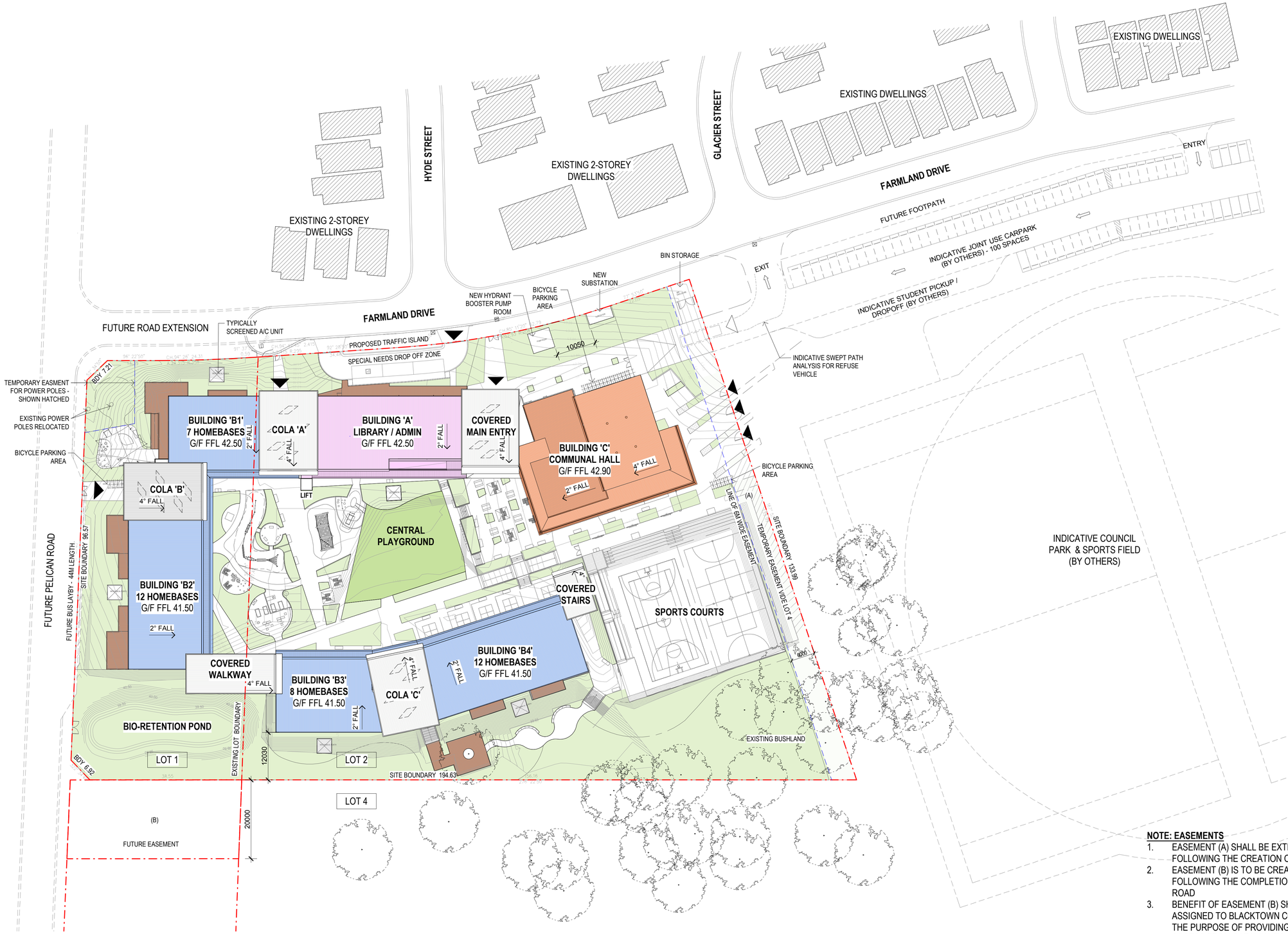
There is a future shared car park located to the north east of the proposed school (which is the subject of ongoing negotiations and is not part of this application) which is to be used for staff parking, a drop of zone and waste removal access.

The following table describes how the school is proposed to be used.

Table 2- School Uses and Operating Times

Item	Use	Times
GENERAL	The proposed Alex Avenue Public School will cater for students K- Year 6. The school will have the following capacity following completion of the development: • 70 full time staff • 1,000 students	General operating hours for the school will be Monday – Friday 8am - 5pm.
HALL	Intended use by the school only -no community use. Generally used during normal school hours only with occasional evening use for music performance, presentations, parent/teacher nights.	Weekdays - maximum operating time till 9:30pm with ½ hour pack down time to 10pm. Saturdays - 8am to 6pm plus 1 hr pack down time to 7pm. No use on Sundays and public holidays
OUTDOOR SPORTS COURTS	Intended to only be used by school during school operating hours. Occasional afternoon and weekend use for sports tournaments/competitions by community and school	Weekdays – available for use from 3pm until 6pm (allow for additional 1hr pack down until 7pm). Saturdays - between 8.00am and 6.00pm (allow for additional 1hr pack down until 7pm). Sundays and public holidays – no use of sports courts.
OOSH	Out of school hours (OOSH) use of the school facilities.	Weekdays at Mornings 6.30am – 9am and Afternoons 3pm – 6.30pm.
LIBRARY	Intended use by school only.	Normal school hours only.

The assessment is based on Group GSA drawings reference A0000, A1000-1, A1100-1, A1120-21, A3200-21, A3120, A7500-2 & AA-AR-1100. Figure 1 shows the proposed site plan.



1 SITE AND ROOF PLAN
1 : 500

NOTE: EASEMENTS

1. EASEMENT (A) SHALL BE EXTINGUISHED FOLLOWING THE CREATION OF EASEMENT (B)
2. EASEMENT (B) IS TO BE CREATED FOLLOWING THE COMPLETION OF PELICAN ROAD
3. BENEFIT OF EASEMENT (B) SHALL BE ASSIGNED TO BLACKTOWN COUNCIL FOR THE PURPOSE OF PROVIDING PUBLIC ACCESS FROM CATALINA TO PELICAN ROAD

0m 5m 10m 20m 30m

General Notes:
1. This drawing is the copyright of Group GSA Pty Ltd and may not be altered, reproduced or transmitted in any form or by any means in part or in whole without the written permission of Group GSA
2. Drawings to be printed in colour.
3. Do not scale drawings. Dimensions govern.
4. All dimensions are in millimetres unless noted otherwise.
5. All dimensions shall be verified on site before proceeding
6. Any areas indicated on this sheet are approximate and indicative only.

Amendments

Issue	Description	Date
A	FOR COORDINATION	27.03.2019
B	PROGRESS ISSUE	10.05.2019
C	GENERALLY AMENDED	22.05.2019
D	REVISED SUBMISSION	23.05.2019
E	FOR SSD SUBMISSION	31.05.2019
F	REVISED SSD ISSUE	13.06.2019

LEGEND

- Site boundary
- Extent of easement
- Existing neighbouring buildings
- Pedestrian entry
- Vehicular entry

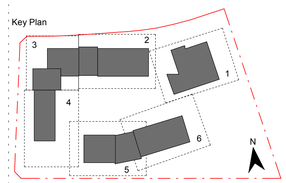
ZONES

- ADMIN / LIBRARY
- HALL / OSHC / CANTEEN
- HOME BASES

NOTES

1. Refer to Landscape Architect's plans for planting and fencing locations.
2. Refer to Civil Engineer's drawings for pavement and retaining wall details.
3. Refer to Bushfire Report for details on defendable space requirements.

Key Plan



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13/06/2019 3:28:34 PM

Project Title
ALEX AVENUE PUBLIC SCHOOL

Drawing Title
PROPOSED SITE AND ROOF PLAN

Scale @ A1	1 : 500
Drawing Created (date)	30/05/2019
Drawing Created (by)	DN
Plotted and checked by	DN
Verified	JS
Approved	MB

Project No	Drawing No	Issue
180645	AA-AR-1100	F

● Unattended noise logging location

Figure 2 – Site Location and Noise Measurement Locations

4 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.

5 SURVEY OF AMBIENT NOISE

Both long term unattended noise logging was conducted to quantify the existing acoustic environmental at the site. All monitoring and measurement locations are shown in Figure 2.

5.1 UNATTENDED, LONG TERM NOISE LOGGING

Unattended noise monitoring was conducted between 21st May and 4rd June 2019 using Acoustic Research Laboratories monitors set on A-weighted fast response mode. The monitors were field calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded.

The monitoring location was selected to represent the background noise level at the potentially most impacted receivers. The source of ambient noise was noted as being distant traffic noise.

The Doreen Street monitor could not be placed closer to the proposed school site due to local construction activity closer to Jerralong Drive. The monitoring location used would therefore be more closely representative of the “true” ambient level.

5.2 RESULTS

Measurement results are presented below. The Rating Background Noise Level has been determined using NPfI guidelines with periods affected by excessive wind or rain (as noted on the attached graphs) excluded from the calculation. The day by day and median background noise levels are presented in the following tables. Where no level is indicated these periods were either incomplete or the period was weather affected and invalid. It is noted that the Richmond RAAF weather station was used to obtain weather information.

It is further noted that while adverse weather was noted early in the night of the 27th the quietest period that sets the background level for that period typically occurs later in the night (during the early morning) when weather conditions were not adverse and the background noise level determined during this period (after excluding the weather affected period) was retained.

The wind data obtained on the night of the 28th and 30th exceeded 5 m//s however the noise data obtained does not show any increase due to weather (the background noise levels were close to the minimum recorded) and therefore has been retained.

Table 3 – Noise Monitoring Results Northern Boundary (Farmland Drive)

Date	Day L_{90}	Evening L_{90}	Night L_{90}
Tuesday - 21 May 2019	-	42	-
Wednesday - 22 May 2019	37	40	34
Thursday - 23 May 2019	37	37	31
Friday - 24 May 2019	38	41	30
Saturday - 25 May 2019	36	40	32
Sunday - 26 May 2019	38	39	32
Monday - 27 May 2019	-	-	31
Tuesday - 28 May 2019	39	40	31
Wednesday - 29 May 2019	-	-	-
Thursday - 30 May 2019	42	42	32
Friday - 31 May 2019	39	39	34
Saturday - 01 June 2019	-	40	34
Sunday - 02 June 2019	36	35	34
Monday - 03 June 2019	38	41	31
Tuesday - 04 June 2019	-	-	-

Table 4 - Noise Monitoring Results Southern Boundary (Doreen Street)

Date	Day L_{90}	Evening L_{90}	Night L_{90}
Tuesday - 21 May 2019	-	36	-
Wednesday - 22 May 2019	40	36	33
Thursday - 23 May 2019	39	34	30
Friday - 24 May 2019	39	39	28
Saturday - 25 May 2019	33	37	31
Sunday - 26 May 2019	36	36	35
Monday - 27 May 2019	-	37	30
Tuesday - 28 May 2019	41	38	32
Wednesday - 29 May 2019	-	37	-
Thursday - 30 May 2019	43	39	32
Friday - 31 May 2019	40	38	35
Saturday - 01 June 2019	39	39	34
Sunday - 02 June 2019	30	33	34
Monday - 03 June 2019	40	37	30
Tuesday - 04 June 2019	-	-	-
Wednesday – 05 June 2019	41	38	39
Thursday – 06 June 2019	-	-	-

Table 5 - Summary Long Term Noise Logging

Location	Time of Day	Rating Background Noise Level – dB(A)L_{90}
Farmland Drive	Day (7am-6pm)	38
	Evening (6pm-10pm)	40
	Night (10pm to 7am)	32
	Early Morning (6:30 to 7am)	45

Table 6 - Summary Long Term Noise Logging

Location	Time of Day	Rating Background Noise Level – dB(A)L_{90}
Doreen Street	Day (7am-6pm)	39
	Evening (6pm-10pm)	37
	Night (10pm to 7am)	32
	Early Morning (6:30 to 7am)	43

The monitoring results indicate that there is very little variation in background noise levels at the nearest receivers around the subject site.

6 OPERATIONAL NOISE EMISSION CRITERIA

The SEARS require 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. Noise assessment goals for the various noise sources can be inferred from other guidelines.

6.1 STATE ENVIRONMENTAL PLANNING POLICY (EDUCATIONAL ESTABLISHMENTS AND CHILD CARE FACILITIES) 2017

Schedule 2 " Schools-complying development" of the Educational SEPP provides the following complying development requirements relating to setbacks and noise emissions:

3 Side and rear setback

A building (whether a new building, or an existing building as a result of an addition or alteration) or any part of a building (including a basement or any other part of a building that is constructed below ground):
(a) that is 12m or less in height—must be located more than 5m from any side or rear property boundary with land in a residential zone or more than 1m from any side or rear property boundary with land in an industrial or a business zone, or
(b) that is more than 12m but less than 15m in height—must be located more than 8m from any side or rear property boundary with land in a residential zone or more than 2.5m from any side or rear property boundary with land in an industrial or a business zone, or (c) that is more than 15m but no more than 22m in height—must be located more than 10m from any side or rear property boundary with land in a residential zone or more than 4m from any side or rear property boundary with land in an industrial or a business zone.

6 Noise

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

It is noted that the "noise" complying development requirement for Universities and TAFE establishments includes an additional requirement for minimum setback between educational buildings and residential development. This implies such a setback (other than to comply with Clause 3) is not required to control noise emissions from school classroom buildings.

6.2 EPA NOISE POLICY FOR INDUSTRY (2017)

Noise sources generally covered by this code are mechanical services and plant noise. Both the intrusiveness and the amenity criteria (as set out below) must be complied with. Emissions from activities carried out prior to 7am and after 10pm should also be assessed for potential impacts on sleep for residential receivers.

6.2.1 Intrusiveness Assessment

Intrusiveness criteria aim to limit noise generation to no more than 5dB(A) above existing background noise levels. The intent is to limit the audibility of noise emissions above the prevailing background noise level.

6.2.2 Amenity Assessment

The amenity criteria set additional criteria based on the land use of the noise sensitive receivers and time of day. The intent is to limit the absolute noise level to that is consistent with the prevailing land use.

The applicable recommended amenity levels for residential receivers are Day -55 dB(A), Evening 45 dB(A) and Night – 40 dB(A). Given the residential receivers are not currently impacted by other "industrial" noise sources, nor are likely to in the future, the recommended levels can be adopted as trigger levels.

6.2.3 Sleep Arousal Assessment

In addition to the above, the NSW EPA *NPfI* provides an assessment procedure for assessing any potential sleep arousal impacts for when any noise is generated between 10:00pm and 7:00am (i.e. 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.*

6.2.4 Summary of NPfI Trigger Levels

Table 6 summarises the trigger levels determined using NPfI guidelines and the measured rating background noise levels. It is noted that where the evening or early morning RBLs were higher than the day RBL, the intrusiveness trigger level adopted was based on the day RBL. A general night time criterion is not required as there are no noise emissions during this period. It is noted that the early morning background noise level is higher than the "day" background noise level, as the background noise level is set by distant traffic noise, which is highest during the morning and afternoon peak periods and lowest (during the EPA "day" period) around lunch time.

Table 6 – Summary of NPfI Trigger Levels

Receiver	Time	Intrusiveness $L_{Aeq,15min}$	Amenity $L_{Aeq,period}$	Sleep $L_{Aeq,15min}$ / L_{AFmax}
Northern Boundary	Early Morning (6:30am-7am weekdays)	43	40	50/60*
	Day (7am-6pm)	43	55	-
	Evening (6pm-10pm)	43	45	-
Southern Boundary	Early Morning (6:30am-7am weekdays)	44	40	48/58*
	Day (7am-6pm)	44	55	-
	Evening (6pm-10pm)	42	45	-

*Actual RBL used to determine criteria

6.3 NSW ROAD NOISE POLICY (2011) (RNP)

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

According to the policy Pelican Drive would be defined as a Collector Road and Farmland Drive has some characteristics of a sub-arterial road and some of a local road. 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)
- Local – 60 dB(A) $L_{eq,1hr}$ (7am to 10pm) and 55 dB(A) $L_{eq,1hr}$ (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.

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

The guideline is used to assess the impact of adjacent road and rail corridors on noise sensitive development. The guideline recommends a maximum noise level within classrooms of 40 dB(A) $L_{eq,1hr}$.

7 SCHOOL USES - 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
- Waste Removal
- External activities

7.1 NOISE FROM INTERNAL SPACES

7.1.1 Learning and Admin 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 buildings, or the Block A Administration and Library Building, would not exceed the Educational SEPP criteria.

7.1.2 Hall

Block C contains the school hall that may be used for presentations and performances. The hall opens out to the south of the building to a covered outdoor area. The potentially most impacted receivers would be the residential receivers to the south.

Noise emissions to the surrounding properties was calculated based on the following:

- Hall internal noise level of 80 dB(A) $L_{eq,15min}$ representing the sound level during a music performance.
- East facing doors and ventilation openings closed.
- South facing door open and closed. Door to have minimum sound transmission loss of R_w 20 when closed.

The calculated noise levels are (south door open):

- Residences to the south – 40 dB(A) $L_{eq,15min}$

The calculated noise levels are (south door closed):

- Residences to the south – 21 dB(A) $L_{eq,15min}$

The background + 5 dB(A) noise emissions criteria are not exceeded at all times. Closing the south facing door (and other doors) during the evening is recommended when amplified music is proposed to be played within the hall.

7.2 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 NPfI criteria using standard acoustic treatments such as lined ductwork, silencers, screens and the like.

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

- 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.

7.3 TRAFFIC GENERATION

The school will use a carpark located on an adjacent site. The projected car spaces required by the school is a maximum of 80 (ref: Alex Avenue Primary School, Schofields Traffic Impact Assessment (Bitzios Consulting (14/12/2018, Table 6.1), which is less than the capacity of the carpark of approximately 100 vehicles. In addition, typically, the carpark will empty and fill a number of times when the sporting fields are in peak use, whereas the school carpark will typically fill and empty once per day.

Given the carpark has been approved with a greater number of vehicles than is required by the school, the level of impact generated by the school will be less than other uses supported by the carpark. It is assumed the carpark will be used during the evening for uses related to the sporting fields, so the occasional use of the carpark for school up to 10pm will not adversely impact the nearest residential receivers.

A school parent/pupil drop off bay is proposed within the carpark on the adjacent property. Given the distance to the nearest residential receiver is approximately 40m, no significant impact from the pupil drop off bay is anticipated.

A future bus lay-by is proposed on Pelican Drive (which is defined as a sub-arterial road in the RNP). There will also be other general traffic movements generated by the school. The Bitzios traffic assessment (Table 8.4) indicates traffic generation on Pelican Drive will be increased by approximately 25%, which will produce an imperceptible effect on daily averaged noise levels.

The primary period of traffic generation on Farmland Drive is the AM peak period. As identified in section 8.2 and 8.4 *Traffic Impact Assessment*, a total of 670 vehicle movements are expected to be generated by the site, with approximately 78% of these expected to use Farmland Drive. Assuming a 50/50 split of vehicles heading east/west on Farmland Drive, it would be expected that the noise level generated at the façade of the Farmland Drive residences would be 56dB(A)$L_{eq(1hr)}$. This is quieter than the 60dB(A)$L_{eq(1hr)}$ limit for road traffic noise generation on Farmland Drive identified in Section 6.3.

7.4 WASTE REMOVAL

Waste would be stored near the eastern boundary of the school adjacent to Block C. The waste removal truck would park approximately 35 m from the nearest residential building. Waste removal times should time to occur between 7am and 6pm. This distance separation and the proposed time restrictions adequately address noise impact from waste removal operations.

7.5 EXTERNAL ACTIVITIES

The expected external school activities include:

- Use of all external spaces immediately before school commencing and recess/lunch periods.
- Use of courts for sports lessons during the normal school day, plus occasional afternoon and Saturday use for sports tournaments/competitions.

There are no criteria to be met regarding normal activities conducted by the school, nor is its assessment a specific requirement of the SEARS. The external spaces are separated from any existing and future by significant distance buffers, as well as, for the receivers to the west and north, screening from structures.

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) (sound power level one in two students), 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 of the site having direct line of sight to parts of the playground and the courts. The remainder of the residential receivers would have much lower levels of noise exposure.

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

- General recess/lunch – 62dB(A) $L_{eq,15min}$
- Sports courts in use - 48dB(A) $L_{eq,15min}$

The predicted noise levels at the most impacted residential receivers to the south are:

- General recess/lunch – 52dB(A) $L_{eq,15min}$
- Sports courts in use - 40dB(A) $L_{eq,15min}$

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

- General recess/lunch – 52dB(A) $L_{eq,15min}$
- Sports courts in use - 45dB(A) $L_{eq,15min}$

The predicted noise levels at the most impacted residential receivers to the east are:

- General recess/lunch – 52dB(A) $L_{eq,15min}$
- Sports courts in use - 40dB(A) $L_{eq,15min}$

The predicted noise levels exceed the rating background level by up to 24 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 loss.

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.

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 (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.

- 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 and barrier 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.

- The school is adjacent to council operated sporting fields and are therefore “play” noise is already part of the normal noise environment.

7.6 AFTER HOURS SCHOOL ACTIVITIES

After hour school internal 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.

There would also be occasional use of the court facilities between 3 and 6pm on weekdays and on Saturdays which would generate noise levels similar to that predicted during sports events during normal school hours. It is noted that background noise levels at the site are typically lowest around midday and increase to around 6pm and then decrease again. Therefore, comparison against the rating background noise level (which is largely determined by the quieter period around lunch time) is conservative for the 3-6pm period.

7.7 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 locations are finalised.

Given the proposed buildings are mostly 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 NPfI criteria using appropriate siting and selection, standard acoustic treatments such as lined ductwork, silencers, screens and the like.

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

- 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.
    - Where possible speakers should be placed in locations that are screened from surrounding nearest receivers

8 COMMUNITY USES

8.1 SCHOOL BUILDINGS

Community use of the school buildings is not proposed.

8.2 COURTS

Use of sports facilities may occur between 3pm and 6pm weekdays (with additional hour for pack down) and on Saturdays between 8am and 6pm (with additional hour for pack down).

It is expected that noise emissions would be similar to that predicted for school sport. That is, noise levels would be around 40-48 dB(A) at the most impacted residential receivers.

As with school noise, noise from community sporting fields is typically not assessed using strict assessment guidelines, and the placement of sporting fields near residences is typical. Noise impacts are generally controlled by imposing time restrictions to prevent night use. In this case, for most sporting activities the "background plus 10 dB(A)" indicator would not be exceeded or would only marginally exceeded at the residential receivers. The time restrictions proposed for these activities are typical for suburban sporting fields.

The courts are located adjacent to Council operated sporting fields and the noise emitted by the courts would be of a similar character to the noise emitted from these fields during use.

9 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.

10 NOISE INTRUSION ASSESSMENT

The school is not impacted by any local environmental noise source except local traffic on the surrounding streets. The most impacted buildings would be those facing the future Pelican Drive. Noise levels were calculated based on:

- FHWA noise prediction model.
- Peak hour traffic volumes in the Bitzios report. (Note: as the school generally operates outside of peak traffic period this is conservative)
- Assuming 2% heavy vehicles and 98% passenger vehicles.
- Distance separation to the proposed Pelican Drive to the nearest school buildings with no screening.

The predicted noise level was 60 dB(A) $L_{eq,1hr}$. With standard windows the noise level in the classrooms would be expected to be reduced by at least 20 dB(A), meaning the 40 dB(A) criterion would be achieved. Noise levels at other buildings and facades would be lower and would clearly comply.

Therefore, specific measures to control noise intrusion are not required.

11 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.

11.1 SITE DESCRIPTION

Construction works for the proposed school will consist primarily of three construction phases, namely site 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. Construction works (and typical loudest plant/equipment) expected for the project are as follows:

- Clearing of the site and earthworks to level the site as required and excavate for footings and services (excavators, pneumatic hammers)
- Erection of building structure (powered hand tools for formwork, concrete pump, vibrators);
- Internal fit out.
- Landscaping (front end loaders etc);

Work hours for the site are proposed as follows:

- Monday to Friday: 7am – 6pm
- Saturday: 7:30am – 3:30pm
- Sundays or Public Holidays: No work.

11.2 RECEIVER LOCATIONS

Sensitive receiver locations are identified in Section 3.

11.3 NOISE AND VIBRATION GUIDELINES

11.3.1 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;
- If necessary, recommendation of noise controls strategies in the event that 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 10dB(A)$L_{eq(15min)}$.
- "*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 75dB(A)$L_{eq(15min)}$ at nearby residences.

A summary of the above noise management levels from the ICNG is presented below in Table 3.

Table 5 – Noise Management Levels - Residential

Location	"Noise Affected" Level - dB(A)$L_{eq(15min)}$	"Highly Noise Affected" Level - dB(A)$L_{eq(15min)}$
Residential Receivers (Northern Boundary – Farmland Drive)	48	75
Residential Receivers (Southern Boundary – Doreen Street)	49	75

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

11.3.2 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.

11.3.2.1 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 6 – 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.

11.3.2.2 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 7 – 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

11.4 ACTIVITIES TO BE CONDUCTED AND THE ASSOCIATED NOISE SOURCES

Typically, the most significant sources of noise or vibration generated during a construction project will be demolition, ground works and 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 8 - Sound Power Levels of the Typical Equipment

Equipment / Process	Sound Power Level dB(A)*
Dozer/Excavator	112
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).

11.5 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 9 – Predicted Noise Generation to Residential Receivers Northern Boundary of Site (Farmland Drive) and Eastern Boundary of site

Activity	Predicted Level dB(A) $L_{eq(15min)}$ (External)	Comment
Dozer/Excavator	60 - 78	Will exceed NML and occasionally the HNAML when operating near the northern site boundary
Concrete Pump	58 - 76	Will exceed NML
Trucks	48 - 66	Will generally exceed NML
Bobcat	53 - 71	Will generally exceed NML
Crane/hoist (electric)	33 - 51	Generally Within NML
Powered Hand Tools (Externally)	46 - 64	Will generally exceed NML

Table 9 – Predicted Noise Generation to Residential Receivers Southern Boundary and Western Boundary of Site

Activity	Predicted Level dB(A) $L_{eq(15min)}$ (External)	Comment
Dozer/Excavator	52 – 54	Will generally exceed NML
Concrete Pump	50 – 52	Will generally exceed NML
Trucks	40 – 42	Will comply with NML
Bobcat	45 – 47	Will comply with NML
Crane/hoist (electric)	25 – 27	Will comply with NML
Powered Hand Tools (Externally)	38 - 40	Will comply with NML

11.6 DISCUSSION – NOISE

Noise impacts at the residential receivers to the east of the site will generally by low with the loudest equipment only exceeding the NML by up to 10 dB(A).

The greatest noise impact will be at the residences immediately to the north of the site. Noise levels will generally exceed the NML but (except for brief periods where the loudest plant will be operating at the northern school boundary) will be less than the HNAL. Therefore, “reasonable and feasible” mitigation should be applied in accordance with the “Control of Construction Noise and Vibration – Procedural Steps” outlined below.

There are no existing residences close to the site to the west.

11.7 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 8.3.2.

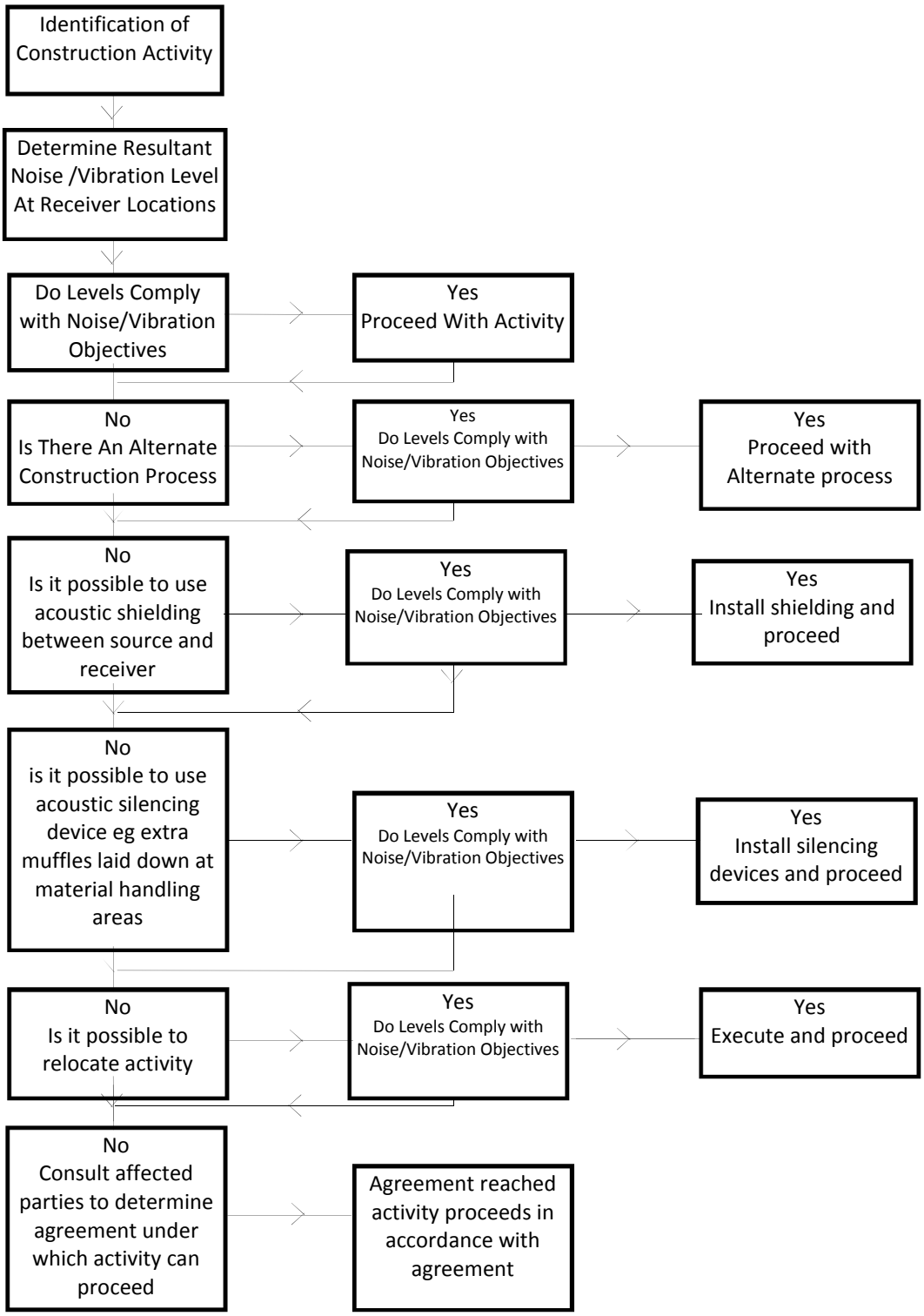
11.8 RECOMMENDATIONS

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

- Operation of large earthmoving equipment (bulldozers and excavators) between 7am and 8am within 30m of the northern site boundary should be avoided.
- Quiet work methods/technologies:
    - The primary noise generating activity at the site will be the ground work period. As much as practicable, use of quieter methods is adopted.
    - Concrete pump trucks should be located within the bounds of the site (rather than on nearby roads at the perimeter of the site) where possible.
    - 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).
- In respect of pneumatic/hydraulic hammering (if required) noise impacts should be addressed via the imposition of respite periods, typically limiting operation to:
    - 8am – 6pm, Monday to Friday
    - 8am to 1pm, Saturday
    - In any case maximum 3 hours operation with 1 hour uninterrupted respite.
- Noisy activities (exceeding the RBL by more than 5 dB(A)) should not be carried out after 1pm Saturdays. This would generally limit the activities to “quiet” trades such as internal fitout and maintenance activities.
- Complaints handling - In the event of complaint, the procedures outlined in Sections 8.9, 8.10 and 8.11 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.

11.9 CONTROL OF CONSTRUCTION NOISE AND VIBRATION – PROCEDURAL STEPS

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



11.10 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.

11.10.1 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.

11.10.2 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.

11.10.3 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).

11.10.4 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.

11.10.5 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.

11.10.6 Combination of Methods

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

11.11 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.

12 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.

- 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) Trigger Levels, with detailed design to be done at CC stage.

- External speakers for PA and bells should designed to minimise noise spill, be directional facing away from residential receivers to comply with EPA Noise Policy for Industry (2017) guidelines (refer Sections Summary of NPfI Trigger Levels6.2.4 and 7.2).

- Waste removal times should be scheduled between 7am and 6pm.

- Ground maintenance should only occur between 7am and 6pm, Monday to Saturday.

- The school hall doors and other large ventilation openings should be closed after 6pm where the activity involves amplified music.

- Where music practice occurs within a school classroom outside of normal hours the windows of the rooms should be kept closed.

- The proposal would not produce adverse vibration impacts on nearby structures or impact the amenity of the surrounding properties.

- The glazing to teaching spaces directly facing the future Pelican Drive should have a minimum R_w 22 transmission loss.

- Construction noise impacts should be managed as outlined in Section 11.

13 CONCLUSION

Noise emissions associated with the proposed Alex Avenue Primary School Schofields have been assessed with reference to relevant EPA and relevant acoustic guidelines.

The following noise emission sources have been addressed:

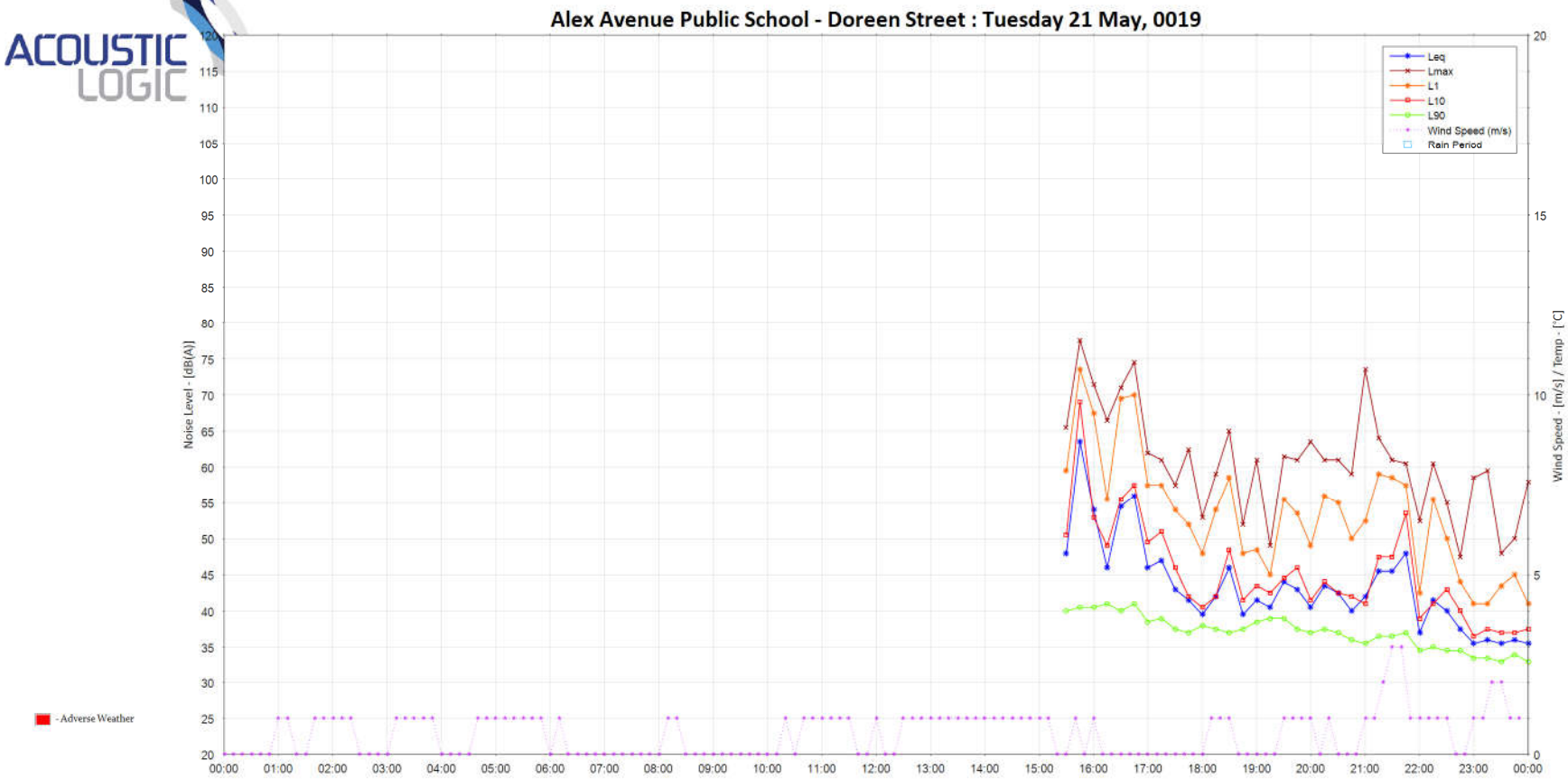
- Noise from internal areas
- Noise from mechanical plant, PA system and school bells.
- Traffic generation
- Waste Removal
- External activities
- Construction activities

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.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
George Kinezos

Appendix A – Noise Logging Data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L10
L90
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Rain Period
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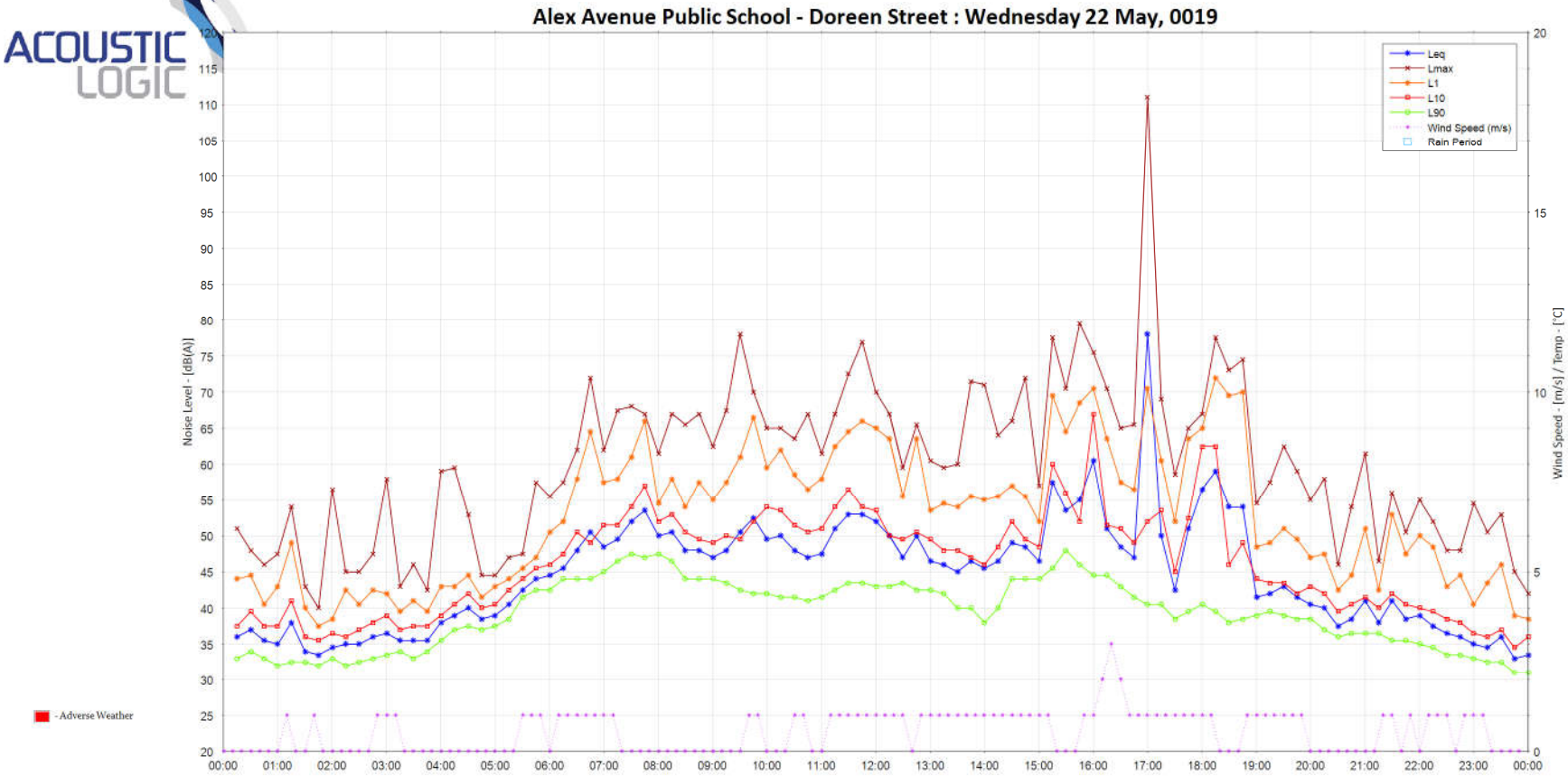
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather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Rain Period
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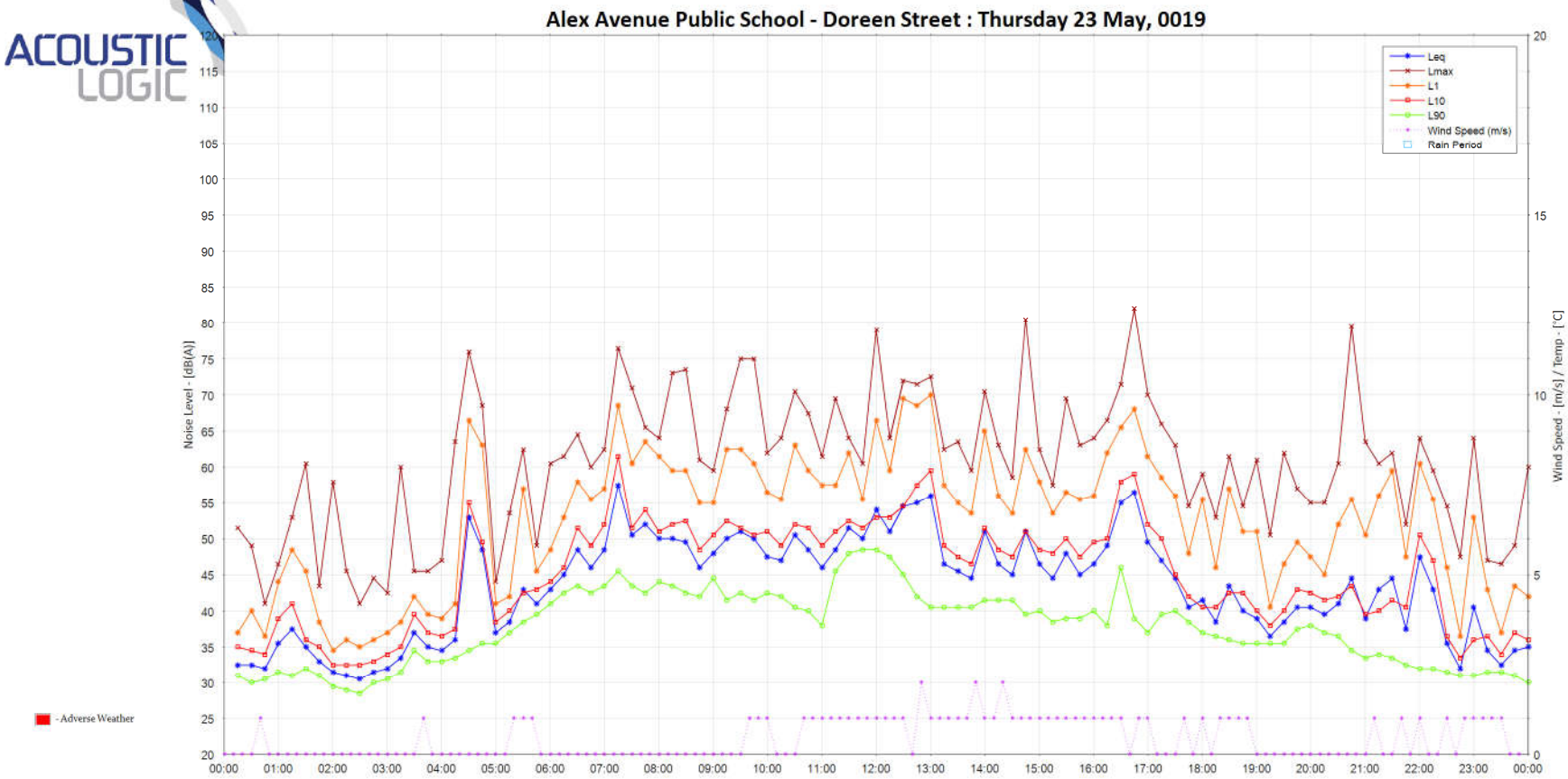
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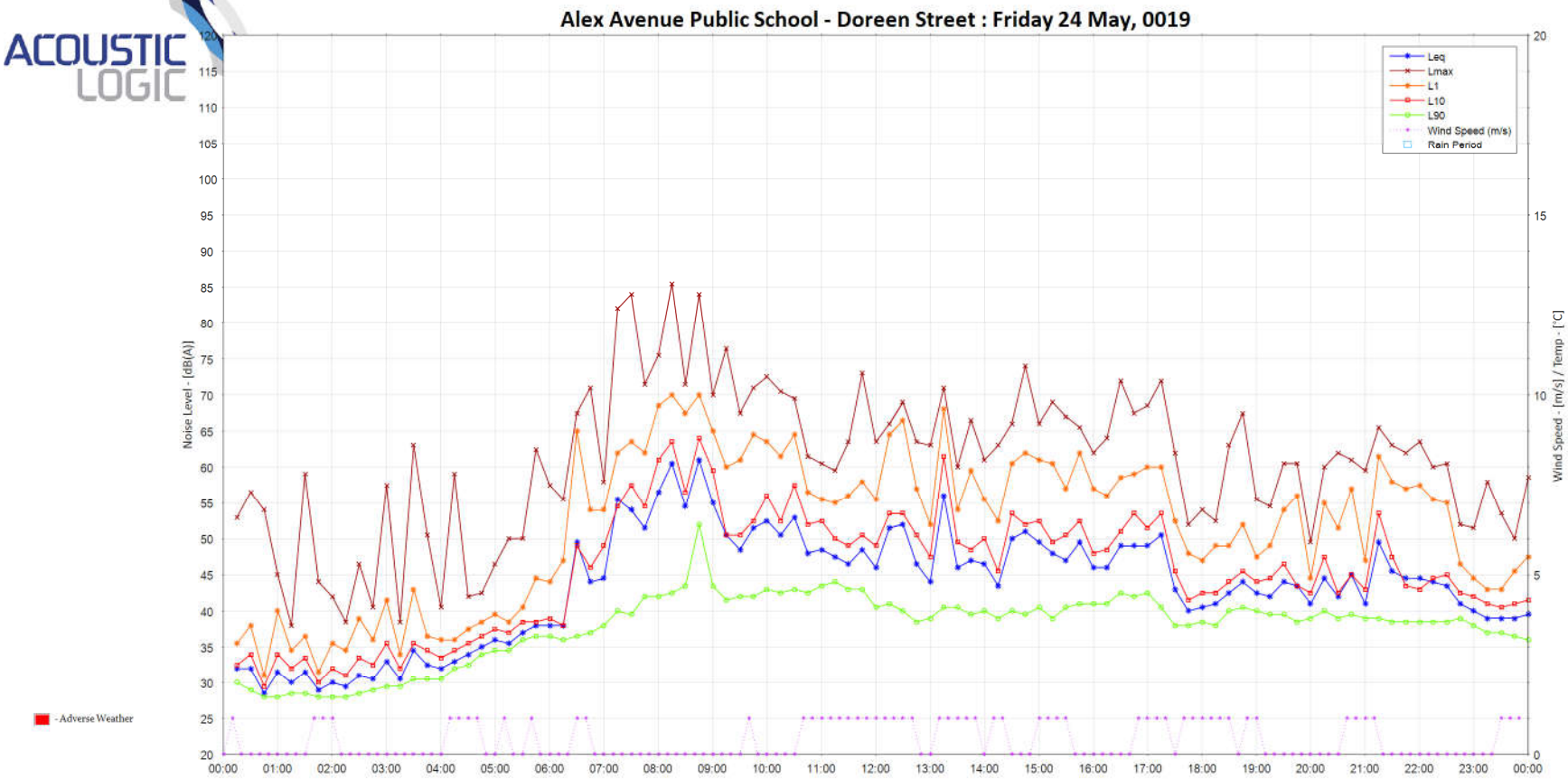
- Adverse Weather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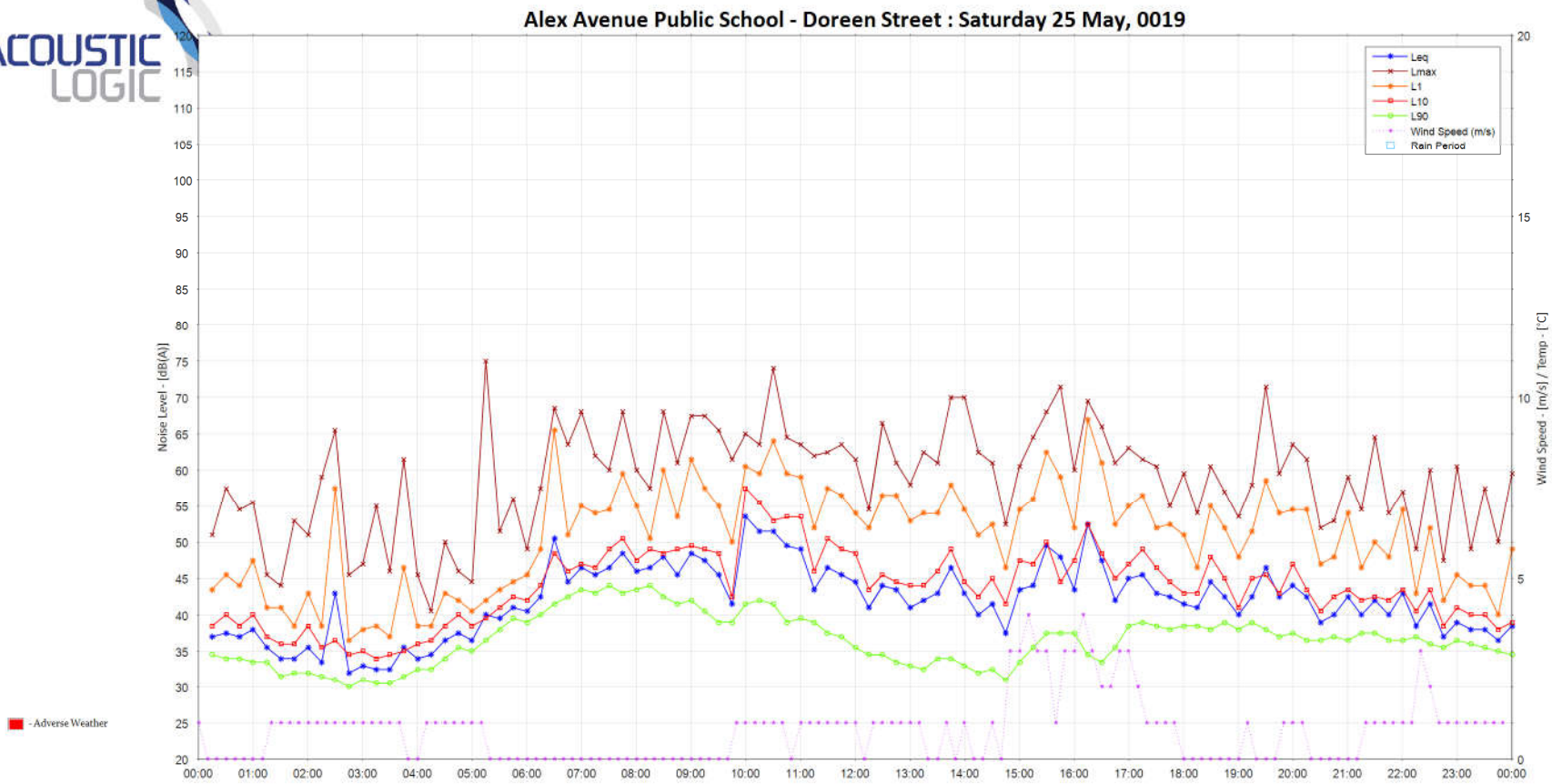
- Adverse Weather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Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
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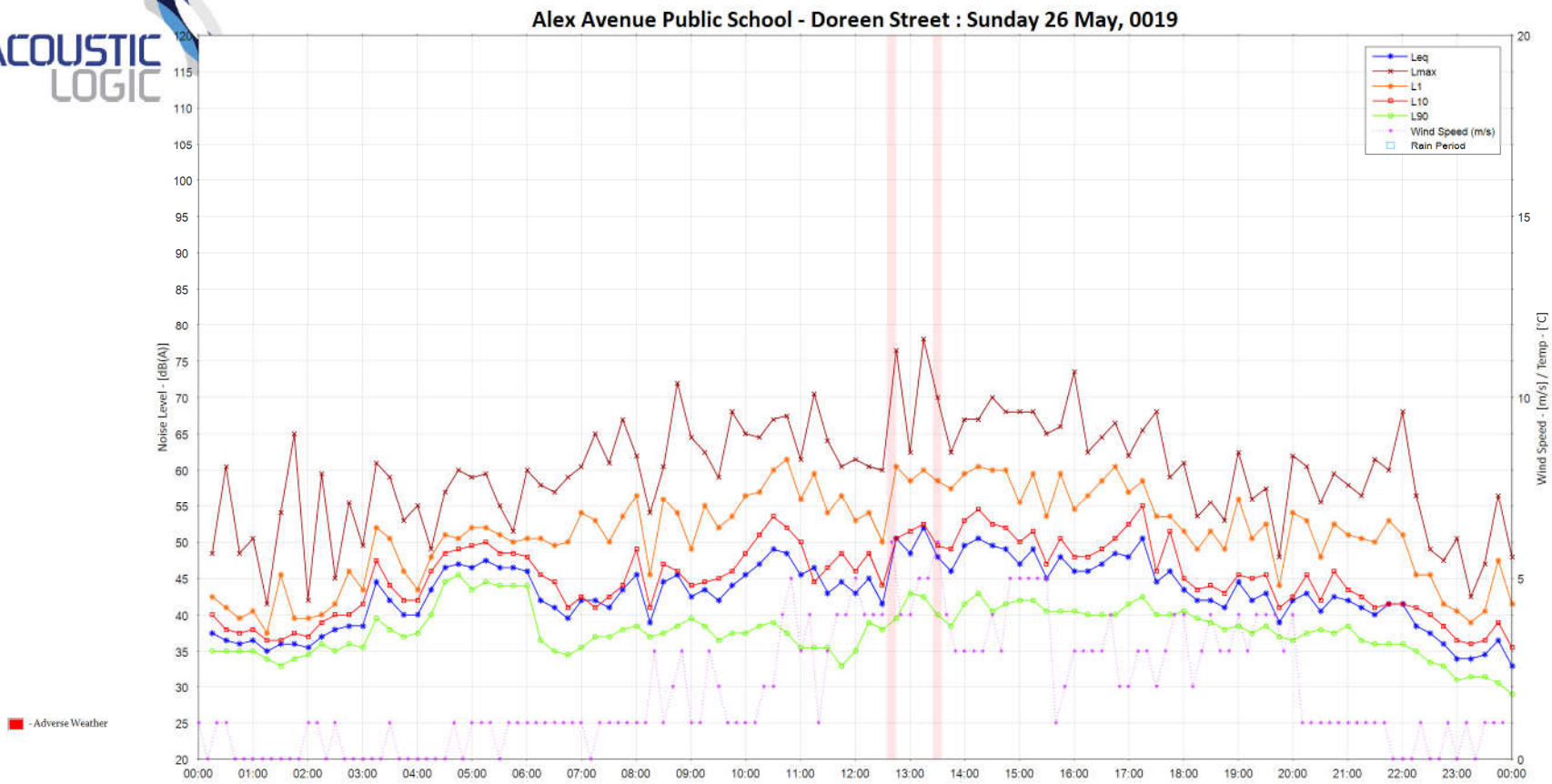
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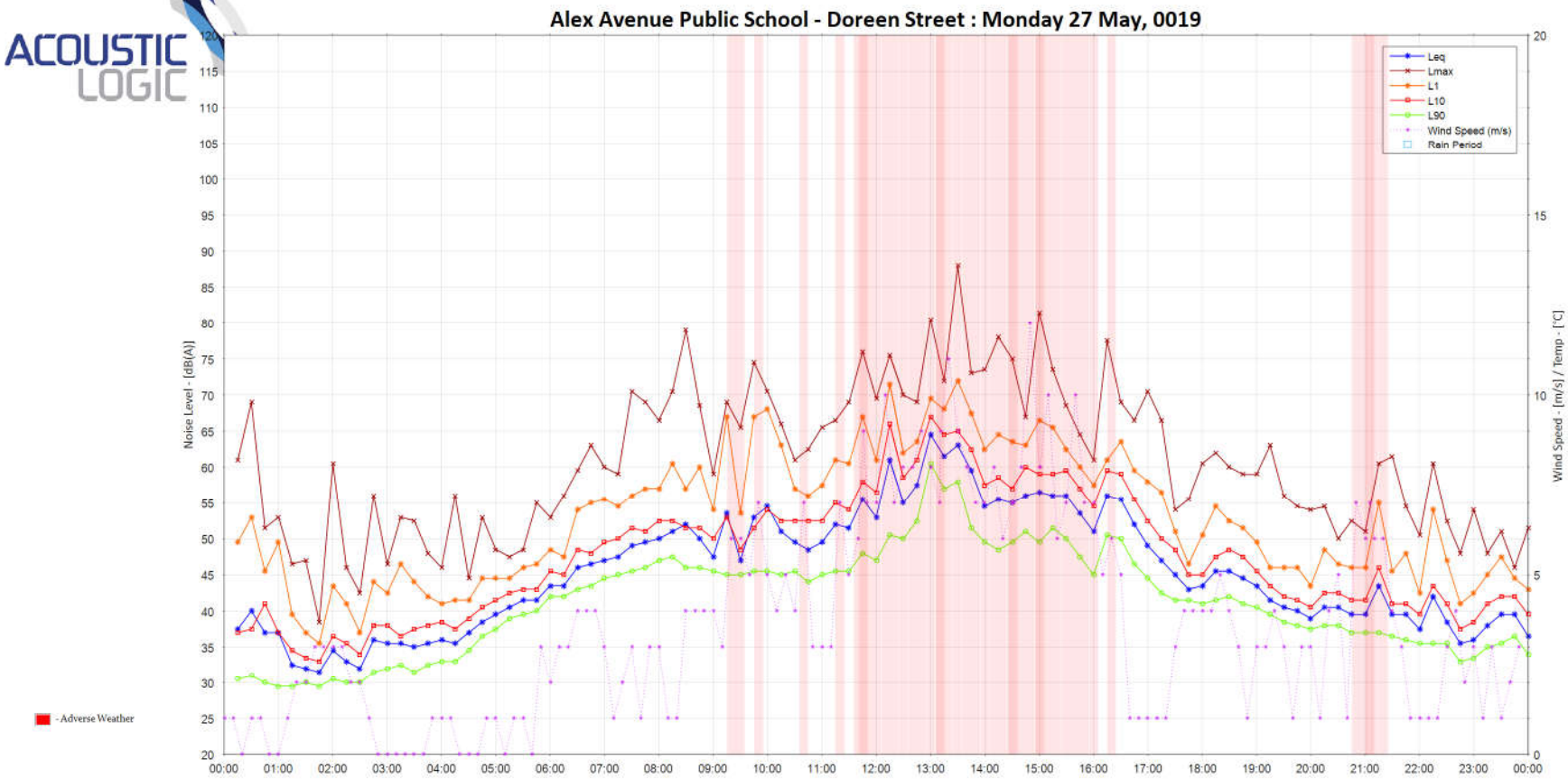
- Adverse Weather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Wind Speed (m/s)
Rain Period
- Adverse Weather
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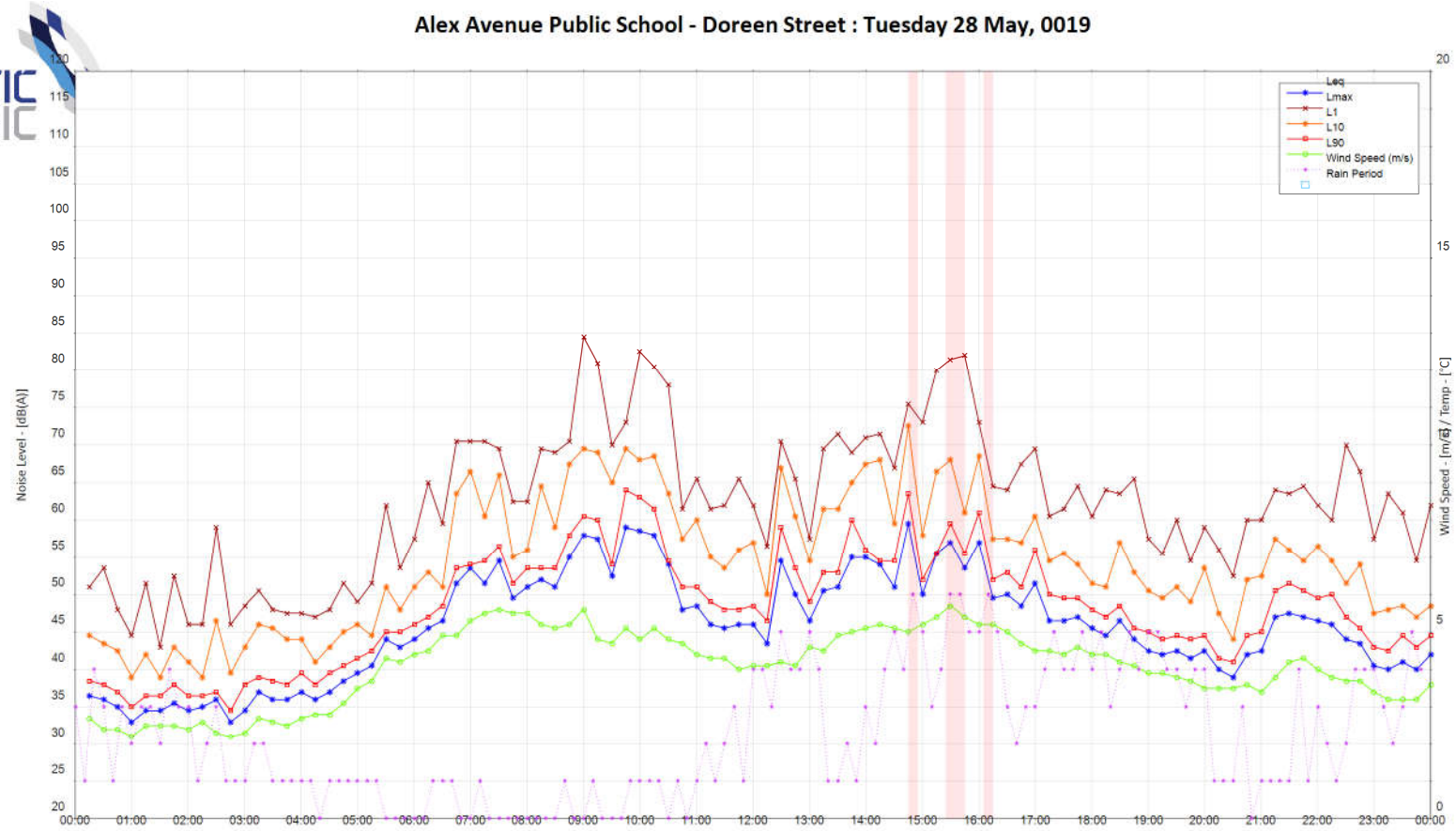
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L90
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Rain Period
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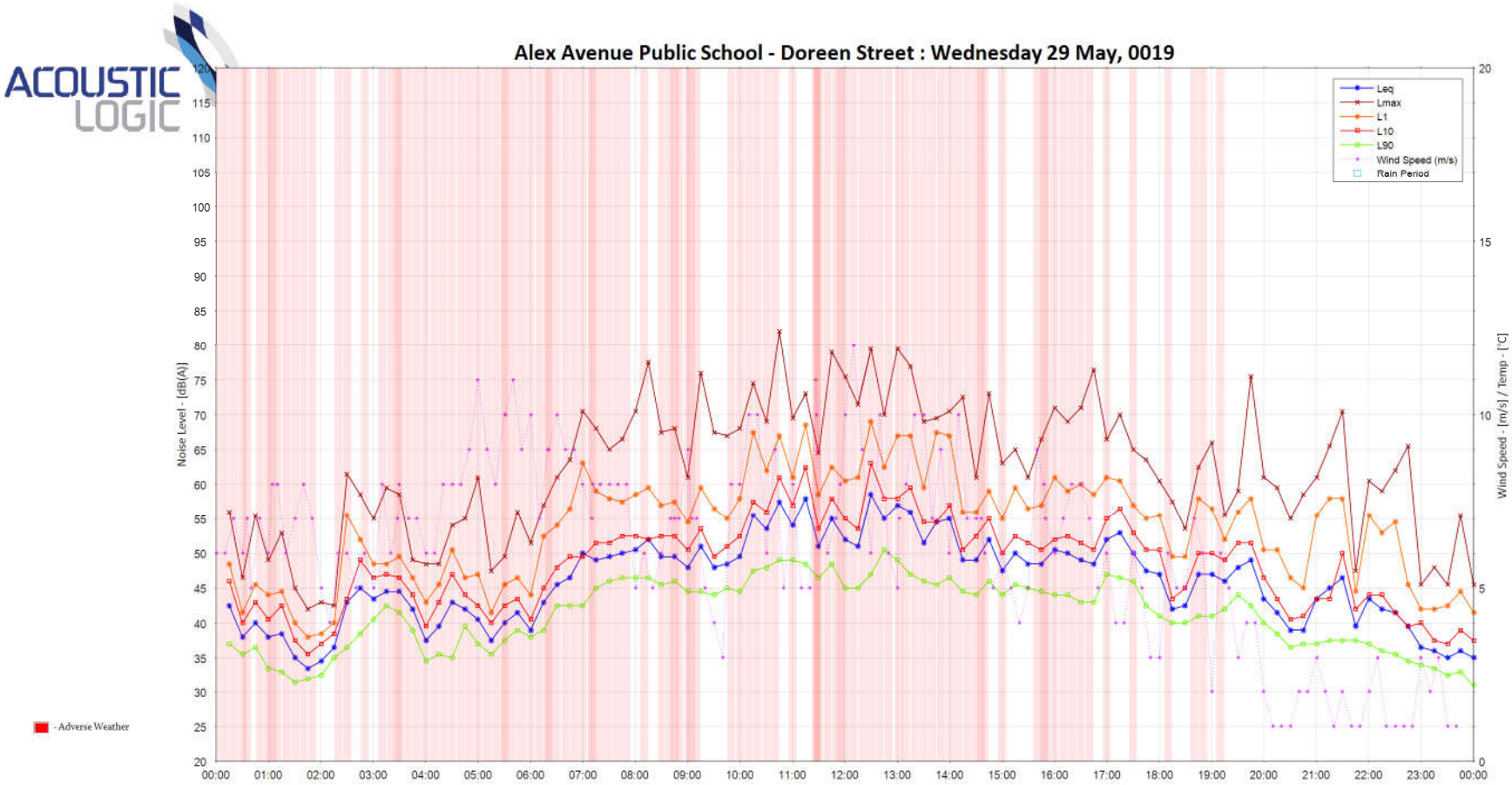
Alex Avenue Public School - Doreen Street : Wednesday 29 May, 0019
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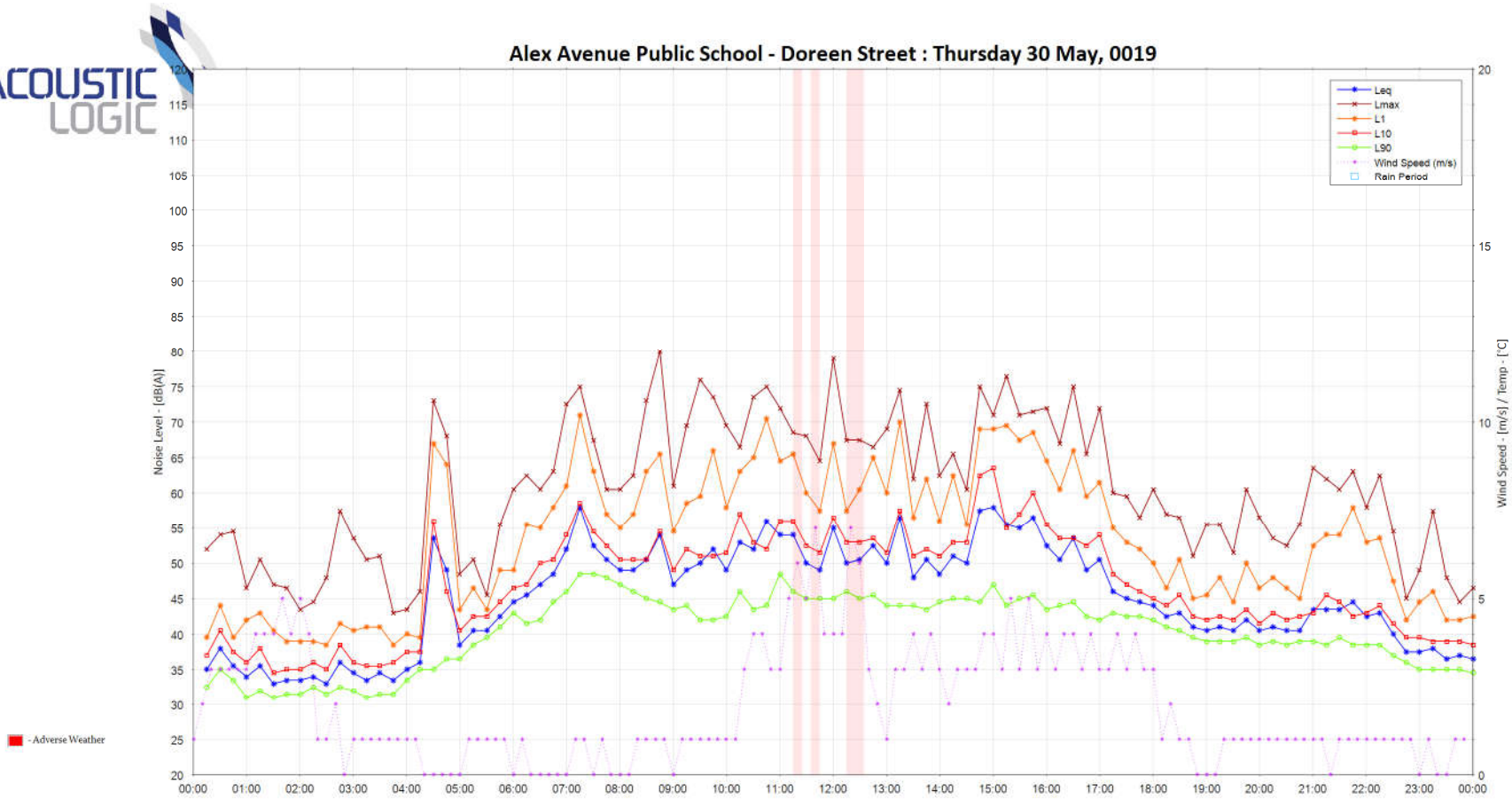
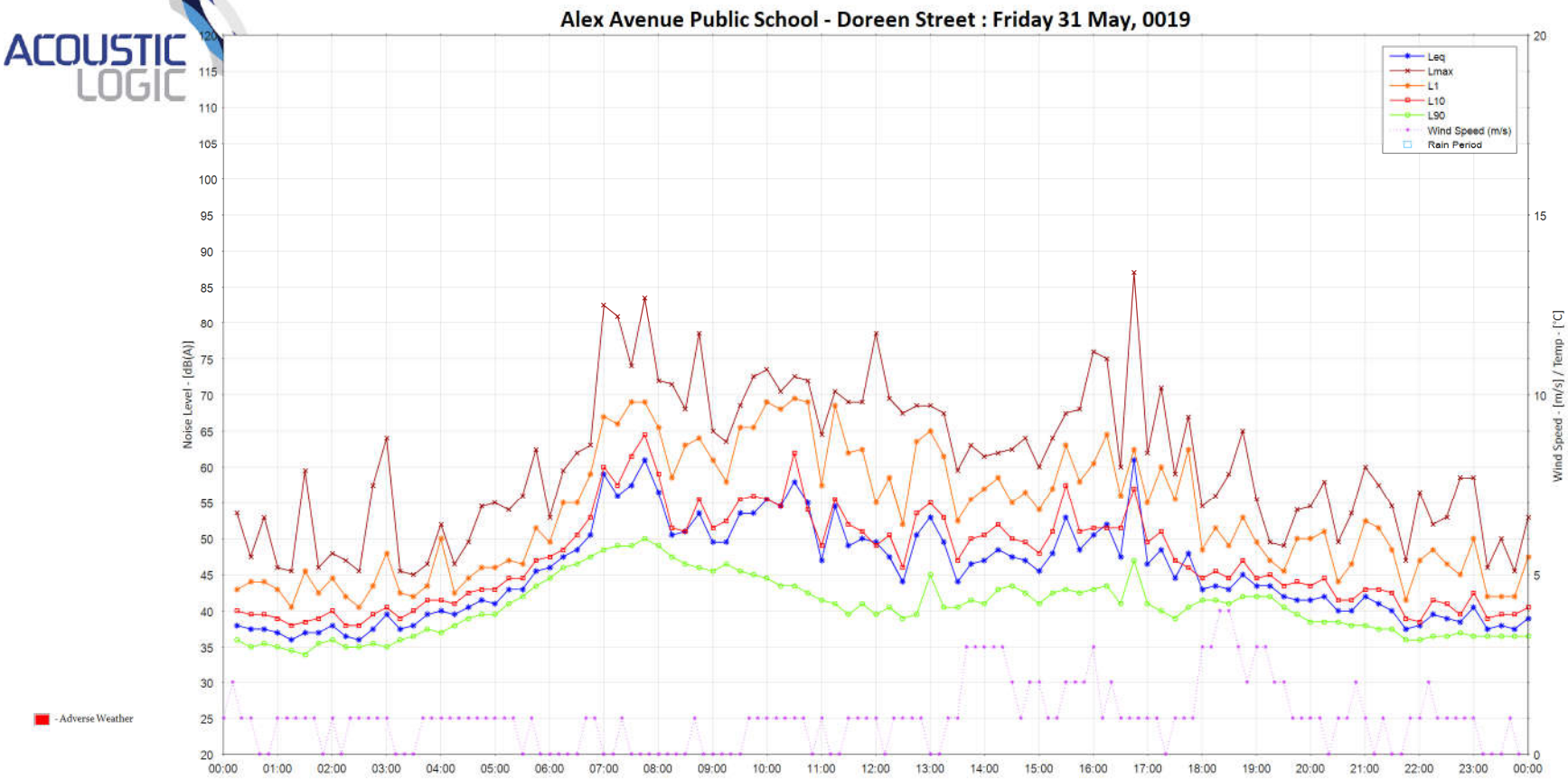
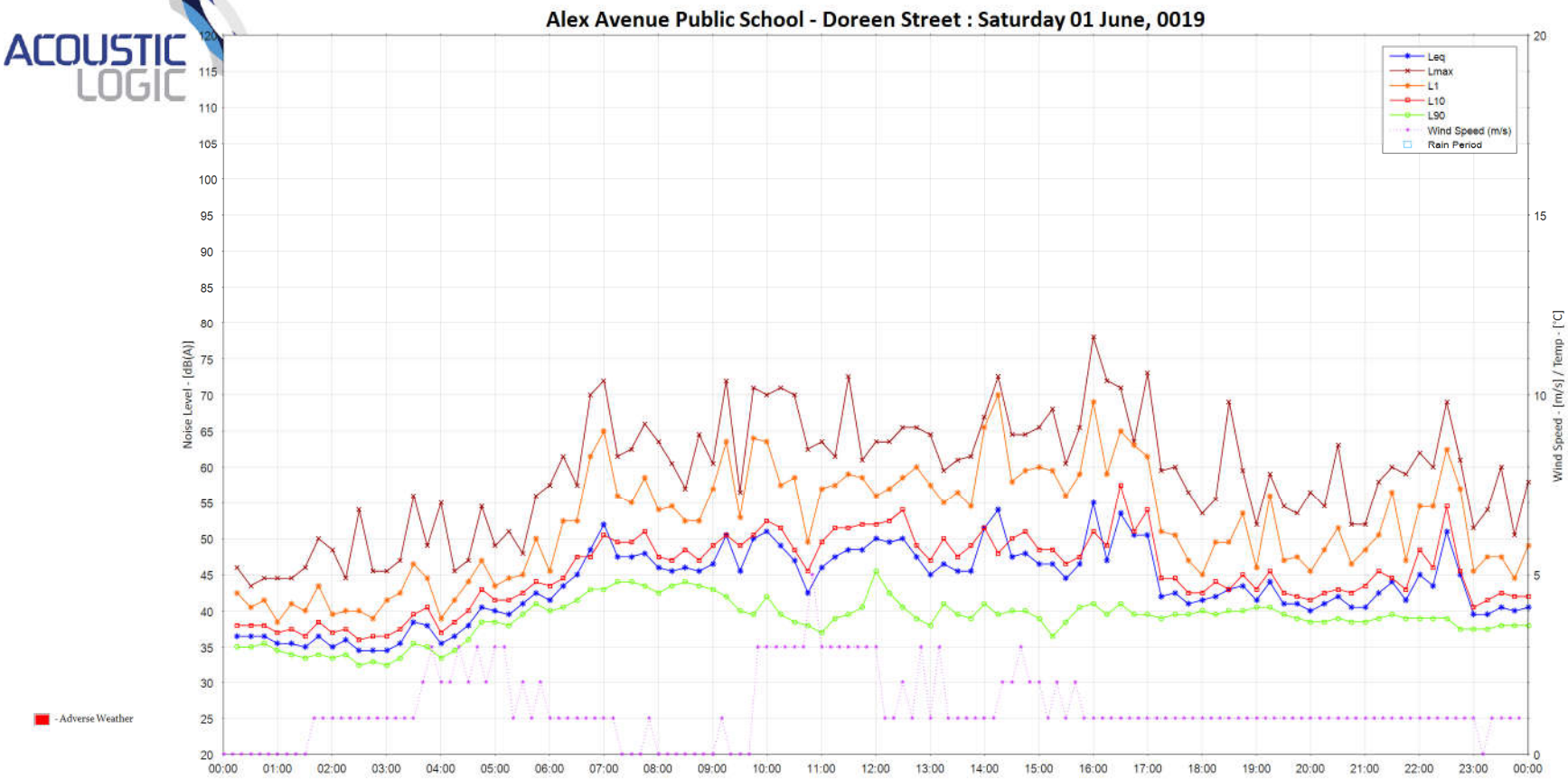
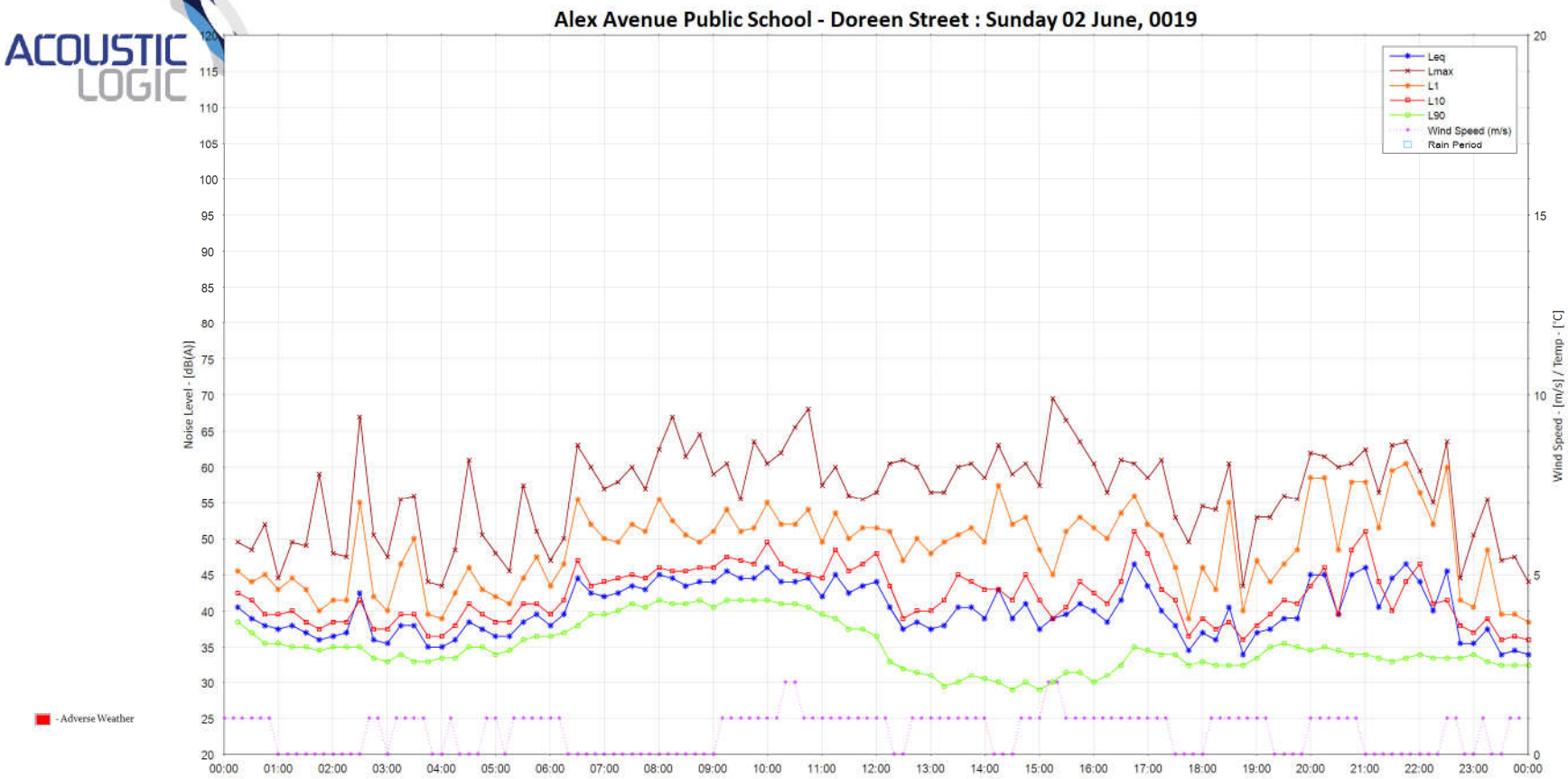
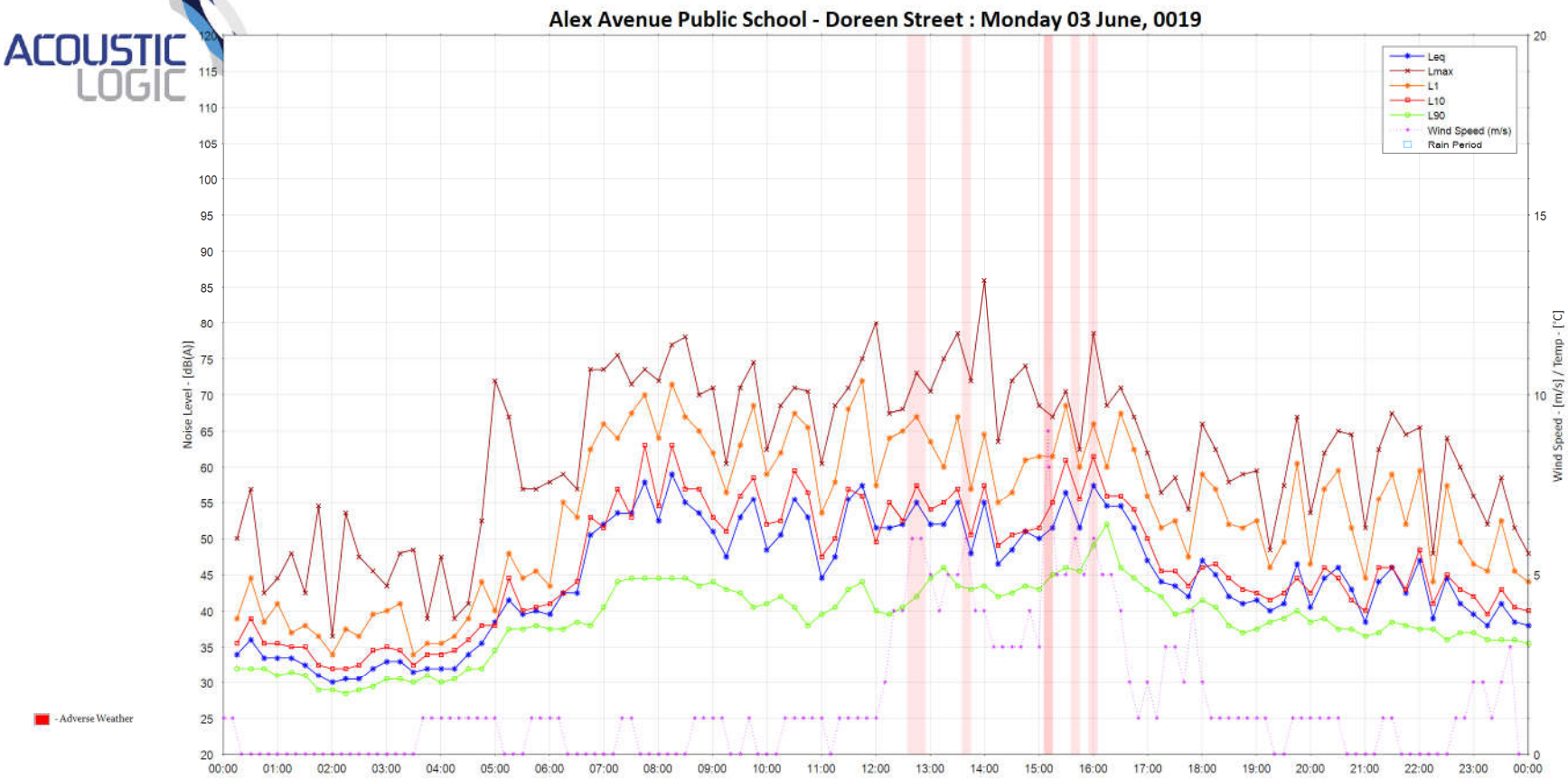
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather

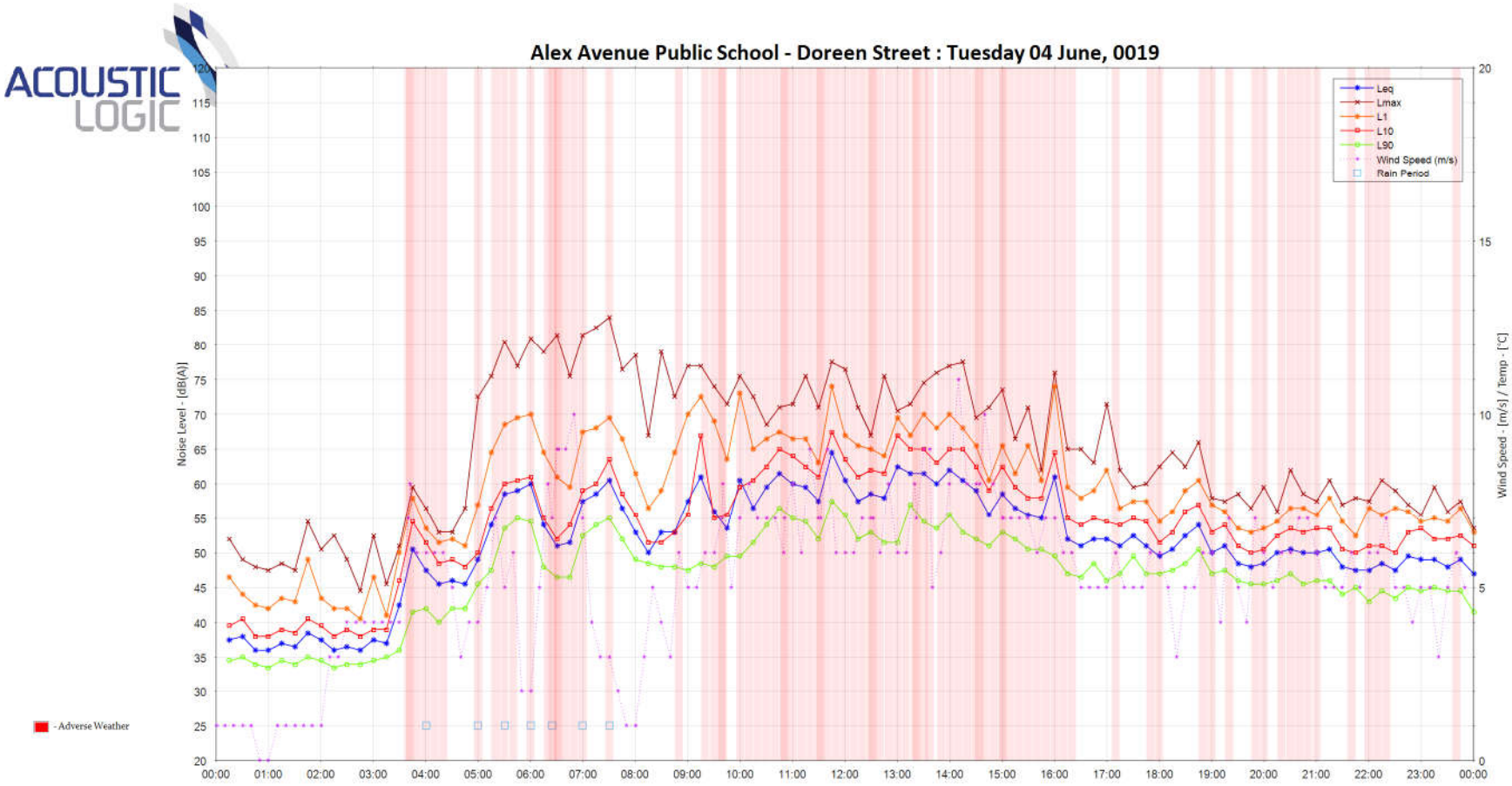

Alex Avenue Public School - Doreen Street : Thursday 30 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather

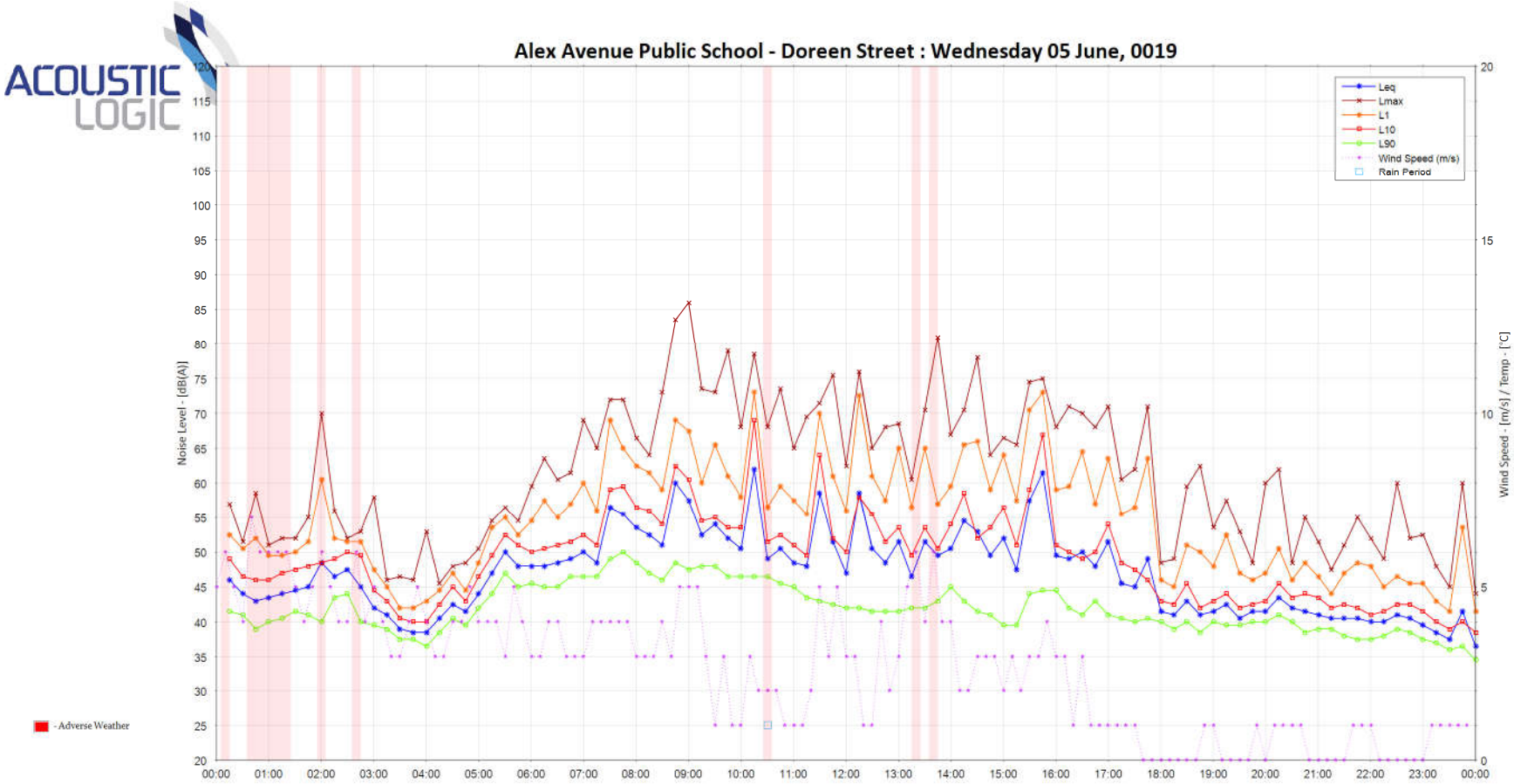

Alex Avenue Public School - Doreen Street : Friday 31 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather

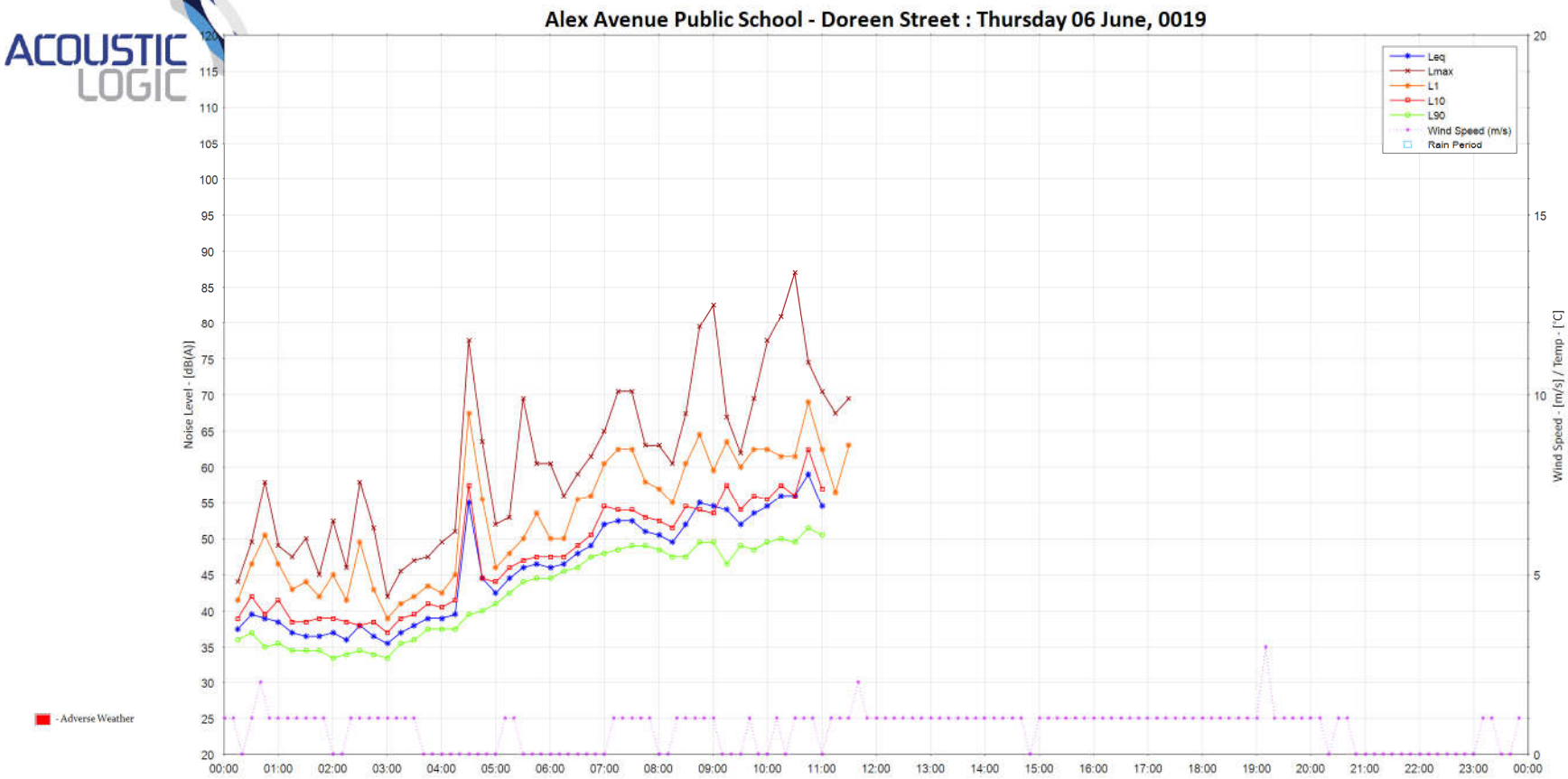

Alex Avenue Public School - Doreen Street : Saturday 01 June, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather

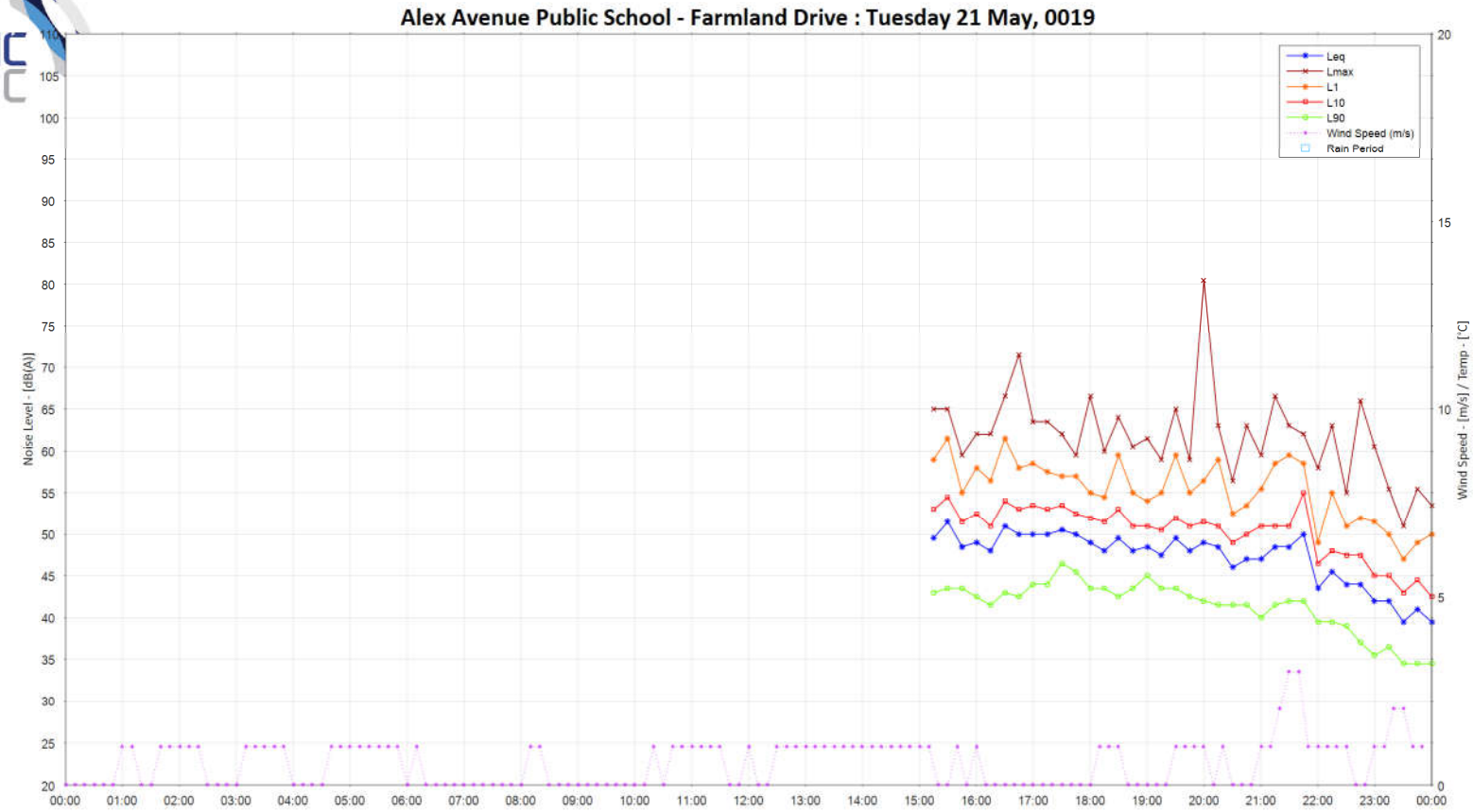

Alex Avenue Public School - Doreen Street : Sunday 02 June, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather


Alex Avenue Public School - Doreen Street : Monday 03 June, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather


Alex Avenue Public School - Doreen Street : Tuesday 04 June, 0019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather


Alex Avenue Public School - Doreen Street : Wednesday 05 June, 0019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather


Alex Avenue Public School - Doreen Street : Thursday 06 June, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather


Alex Avenue Public School - Farmland Drive : Tuesday 21 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
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23:00
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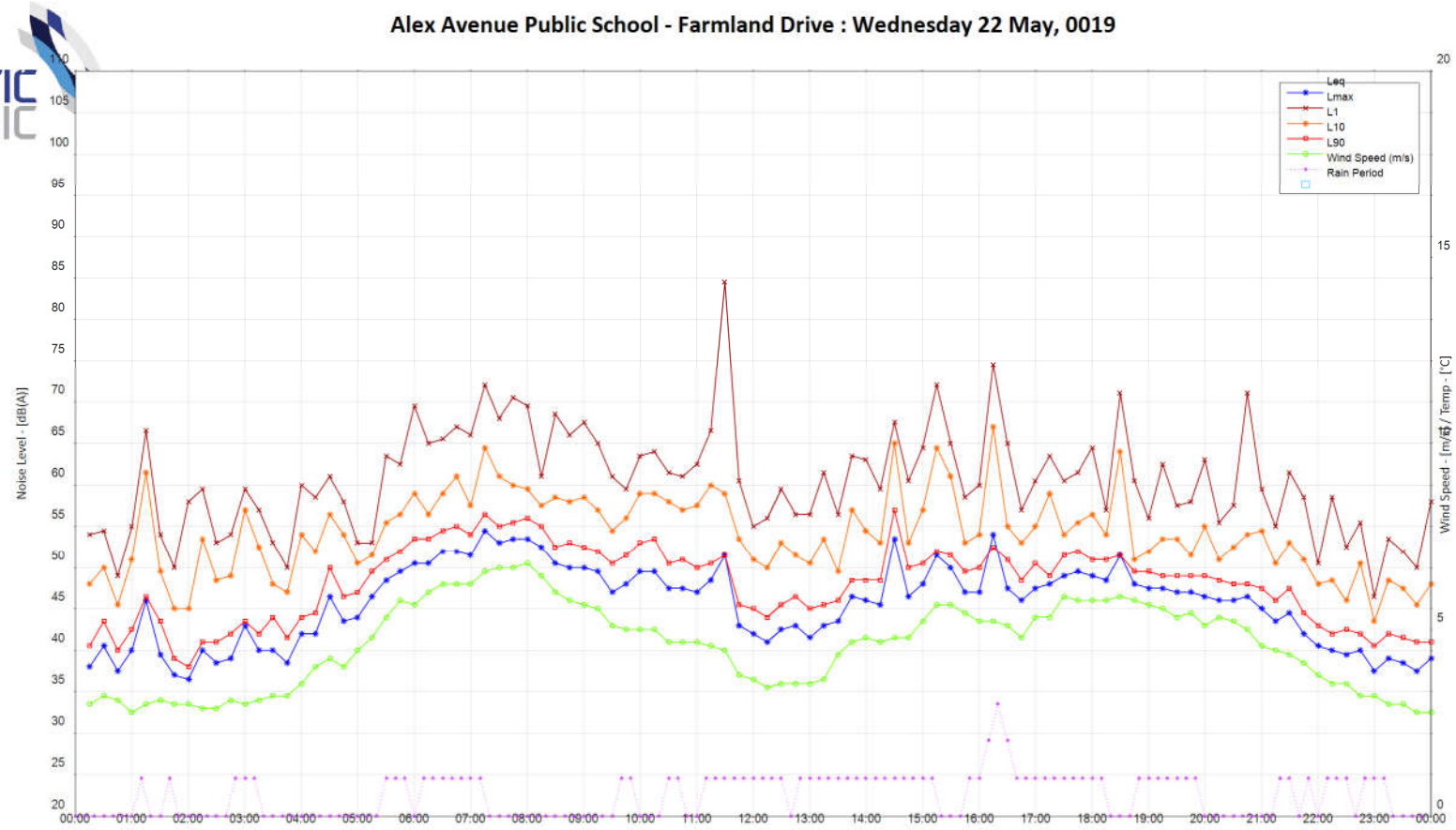
Alex Avenue Public School - Farmland Drive : Wednesday 22 May, 0019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
20
15
5
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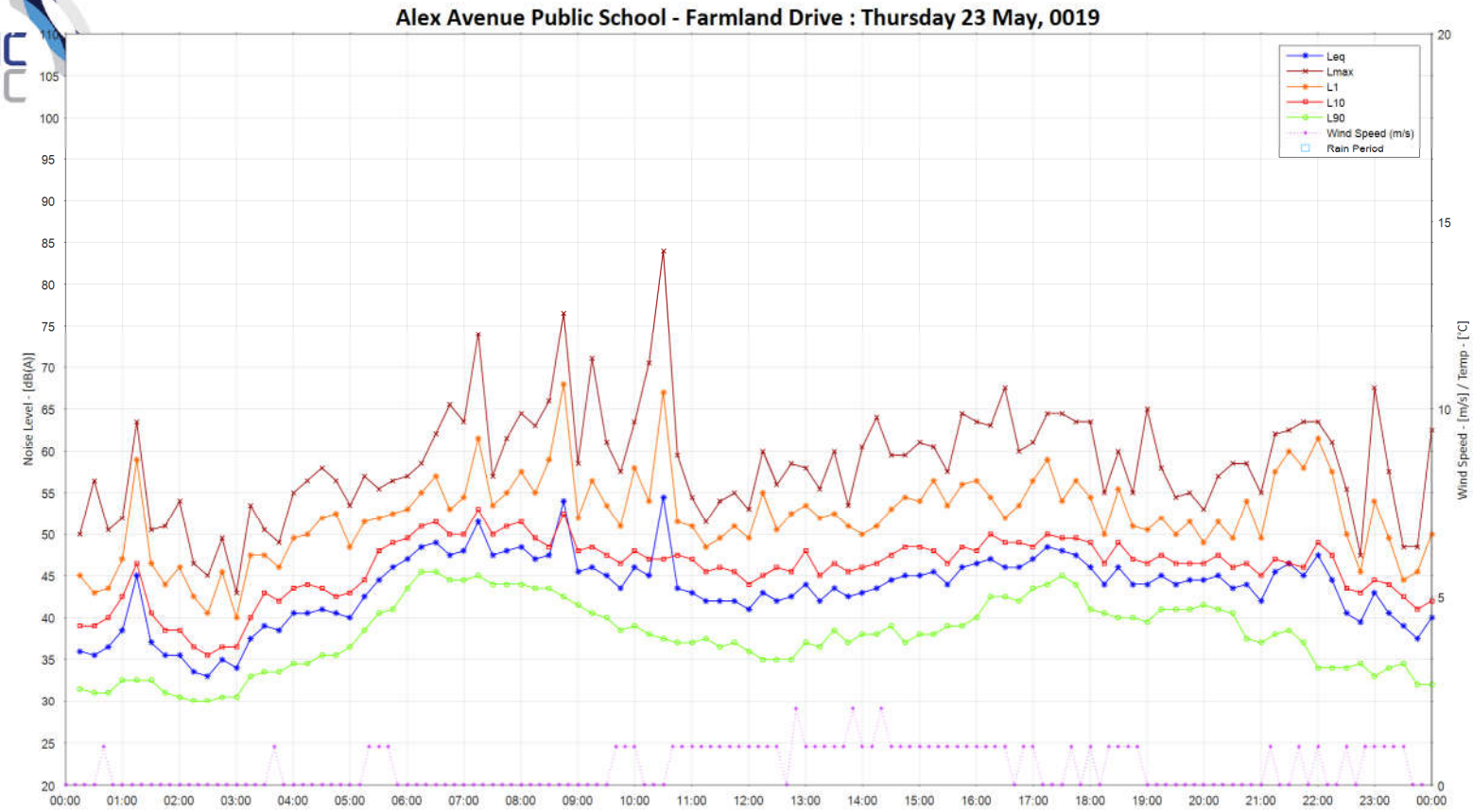
Alex Avenue Public School - Farmland Drive : Thursday 23 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
01:00
02:00
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04:00
05:00
06:00
07:00
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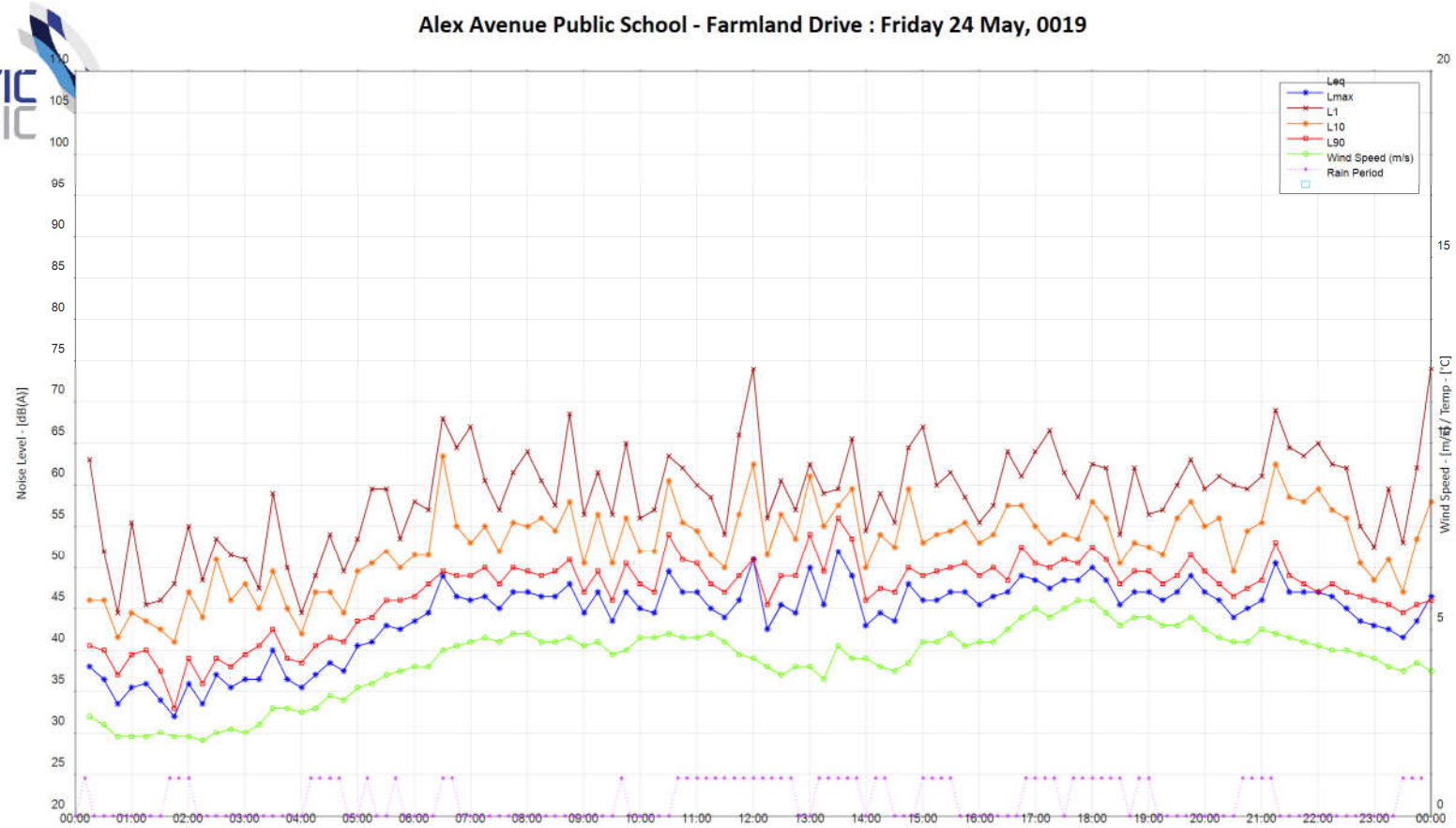
Alex Avenue Public School - Farmland Drive : Friday 24 May, 0019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
20
15
5
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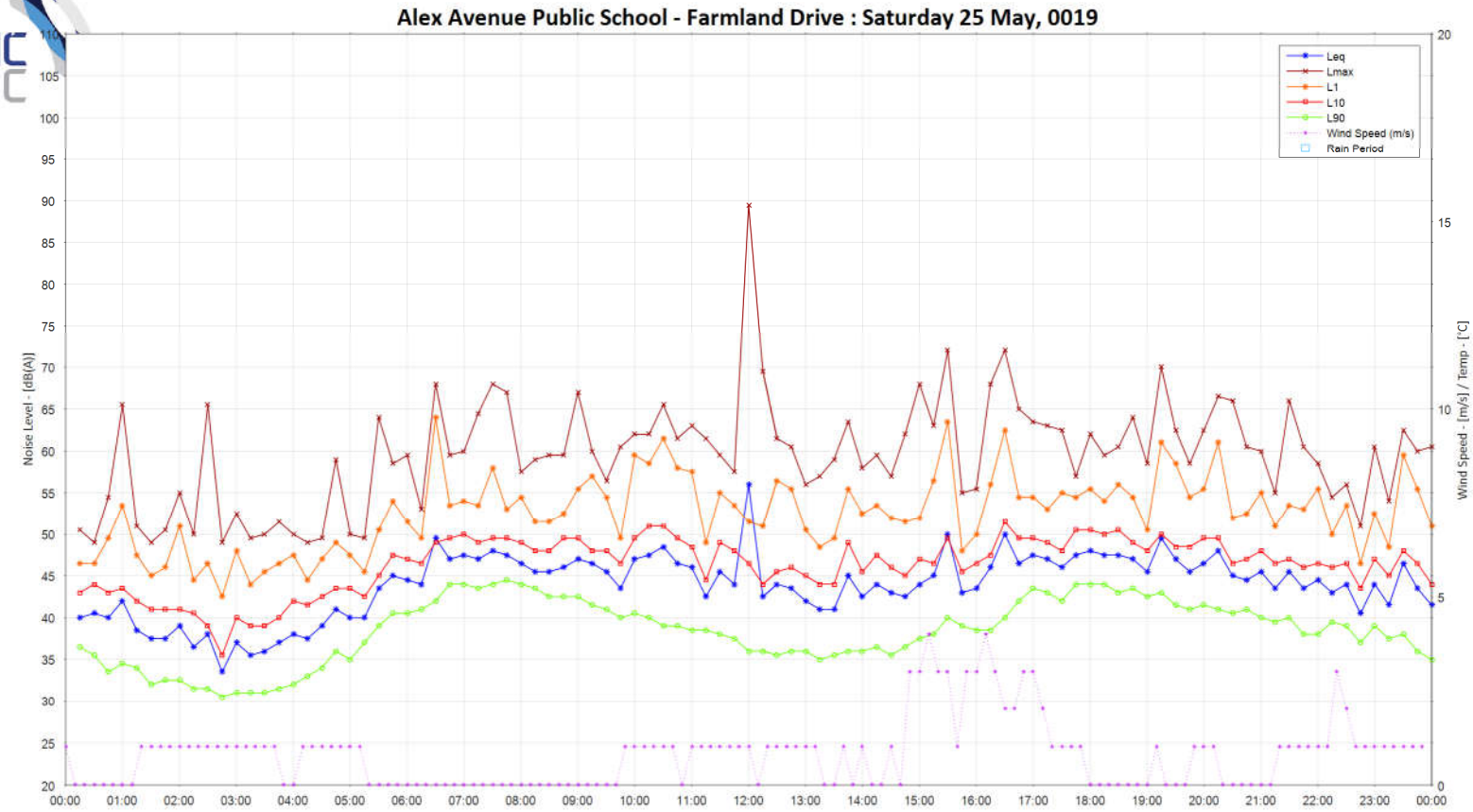
Alex Avenue Public School - Farmland Drive : Saturday 25 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
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23:00
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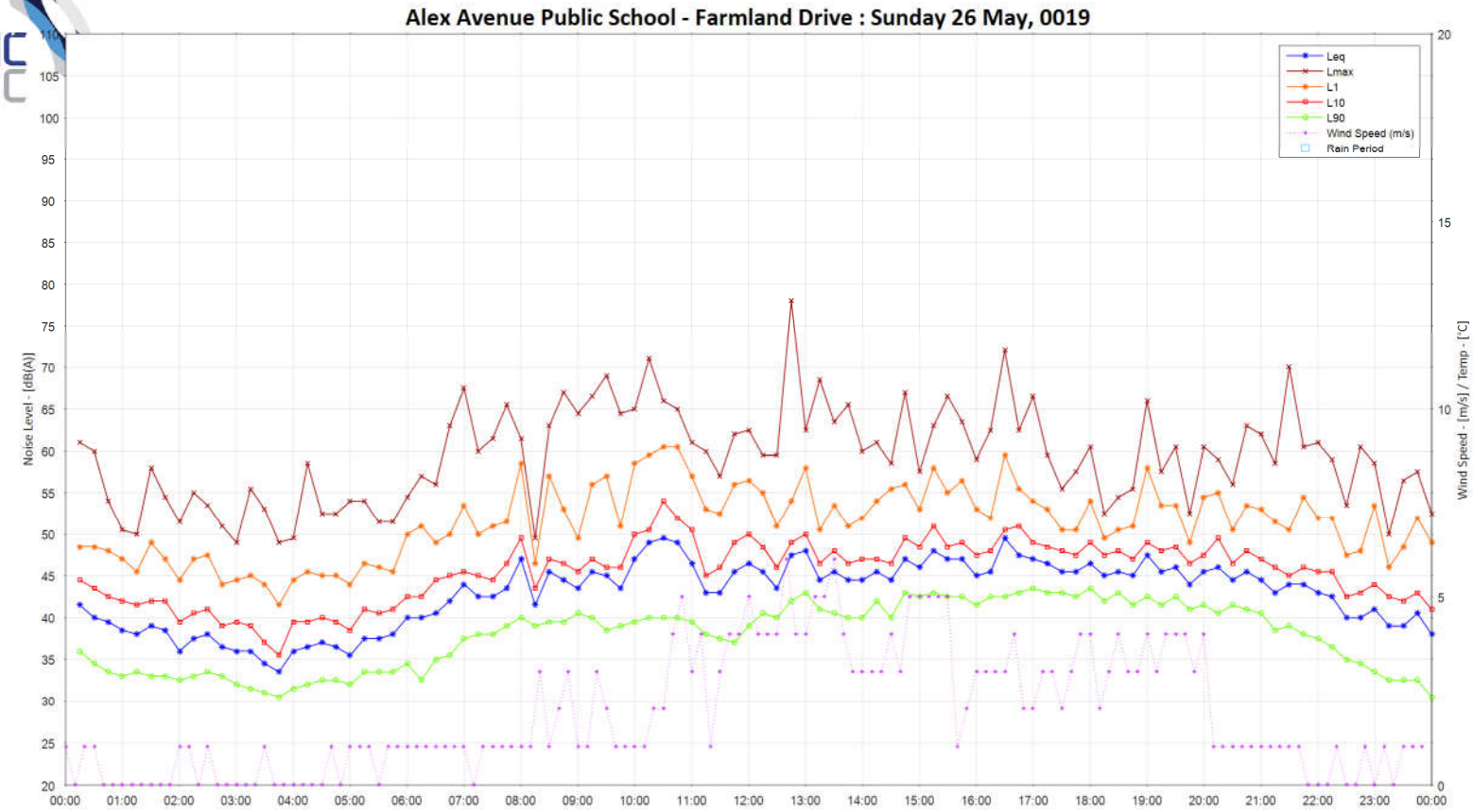
Alex Avenue Public School - Farmland Drive : Sunday 26 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
01:00
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05:00
06:00
07:00
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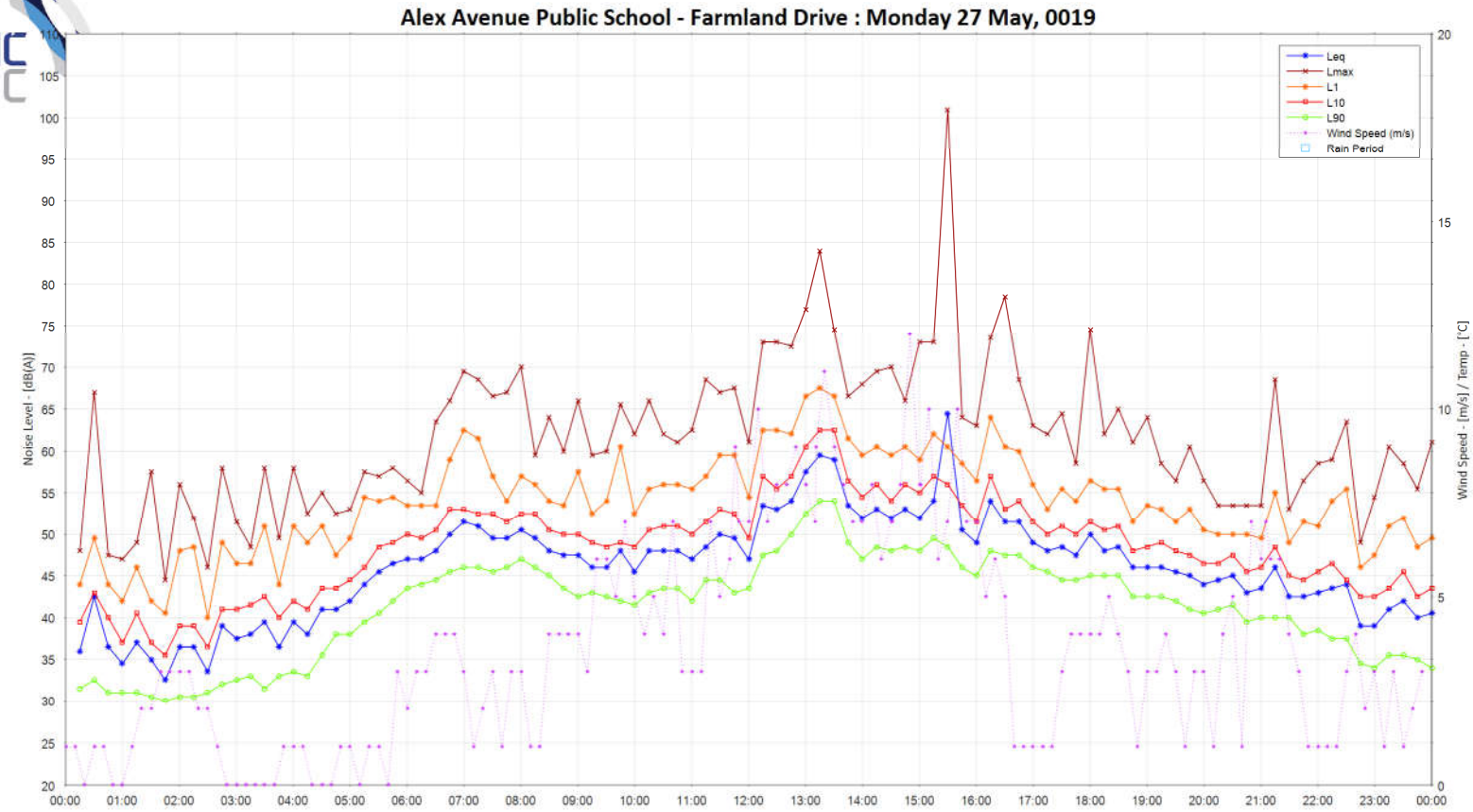
Alex Avenue Public School - Farmland Drive : Monday 27 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
01:00
02:00
03:00
04:00
05:00
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07:00
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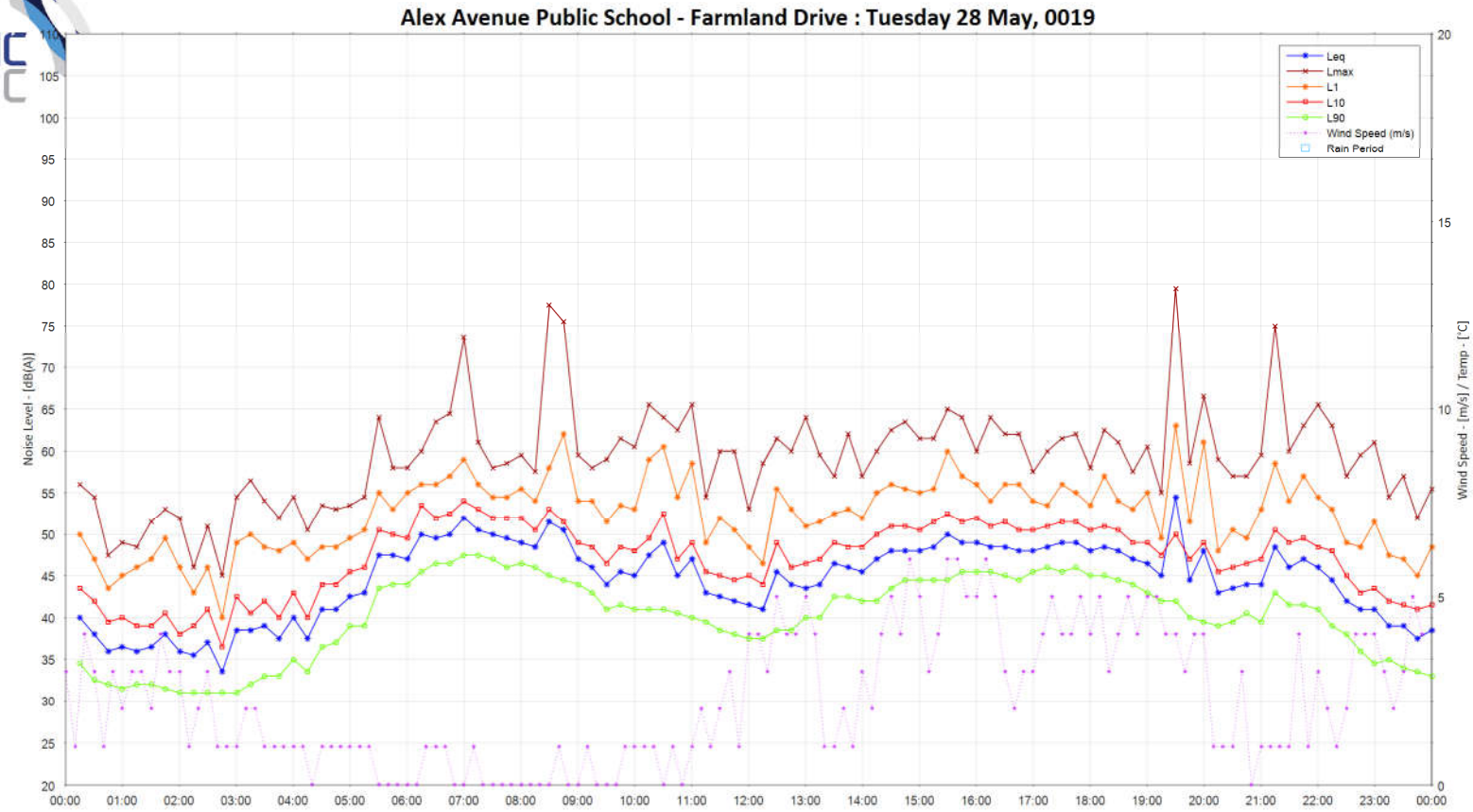
Alex Avenue Public School - Farmland Drive : Tuesday 28 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
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05:00
06:00
07:00
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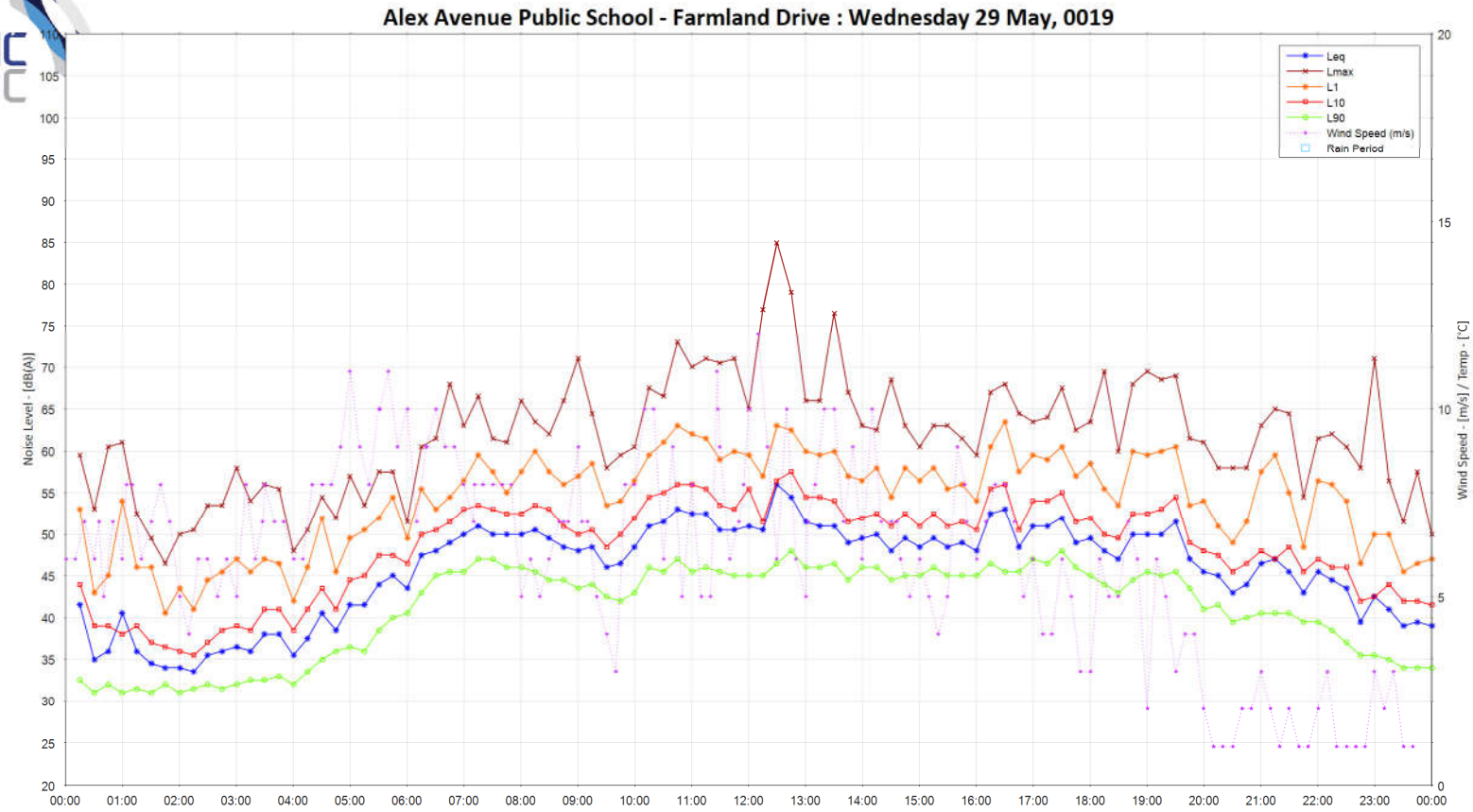
Alex Avenue Public School - Farmland Drive : Wednesday 29 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
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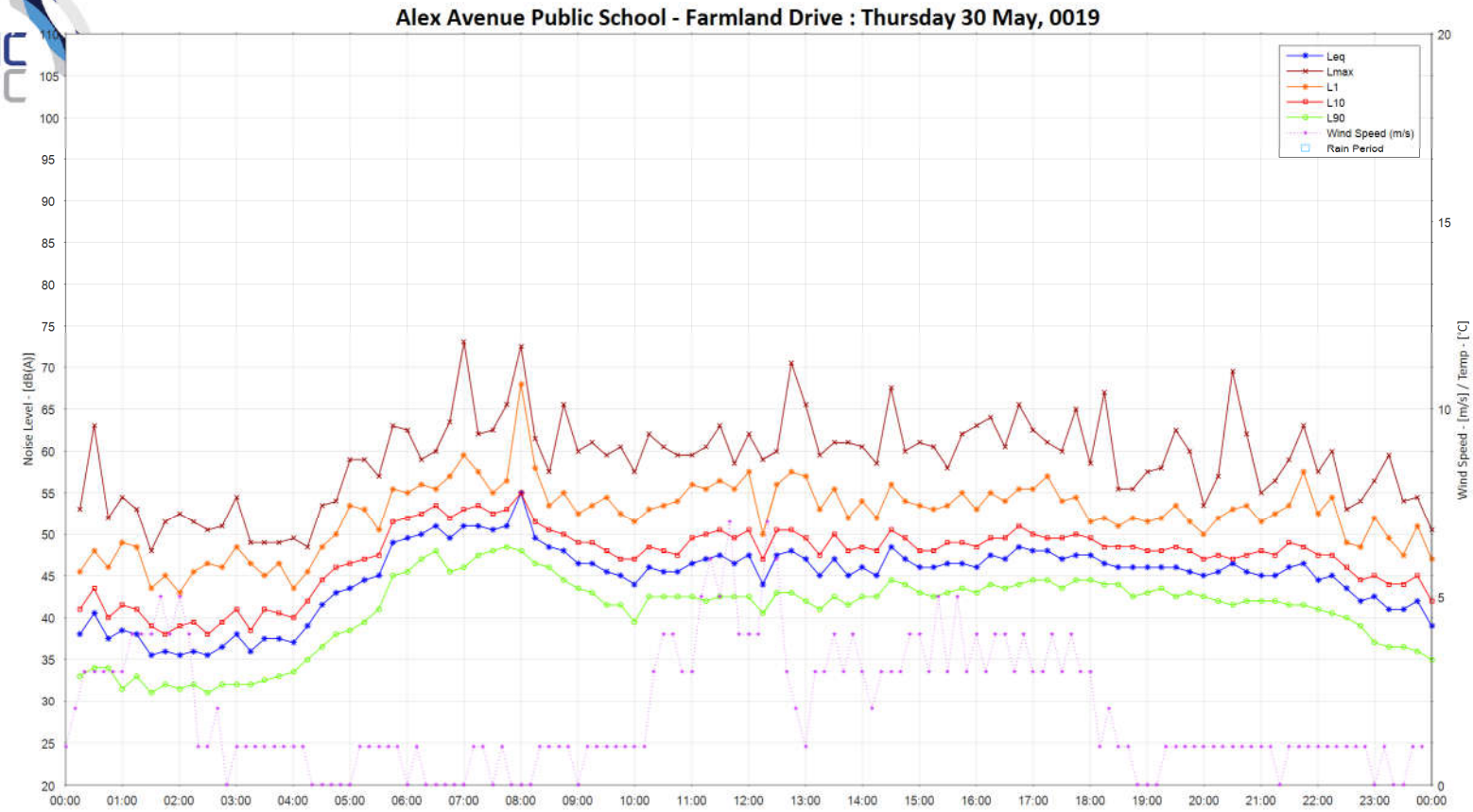
Alex Avenue Public School - Farmland Drive : Thursday 30 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
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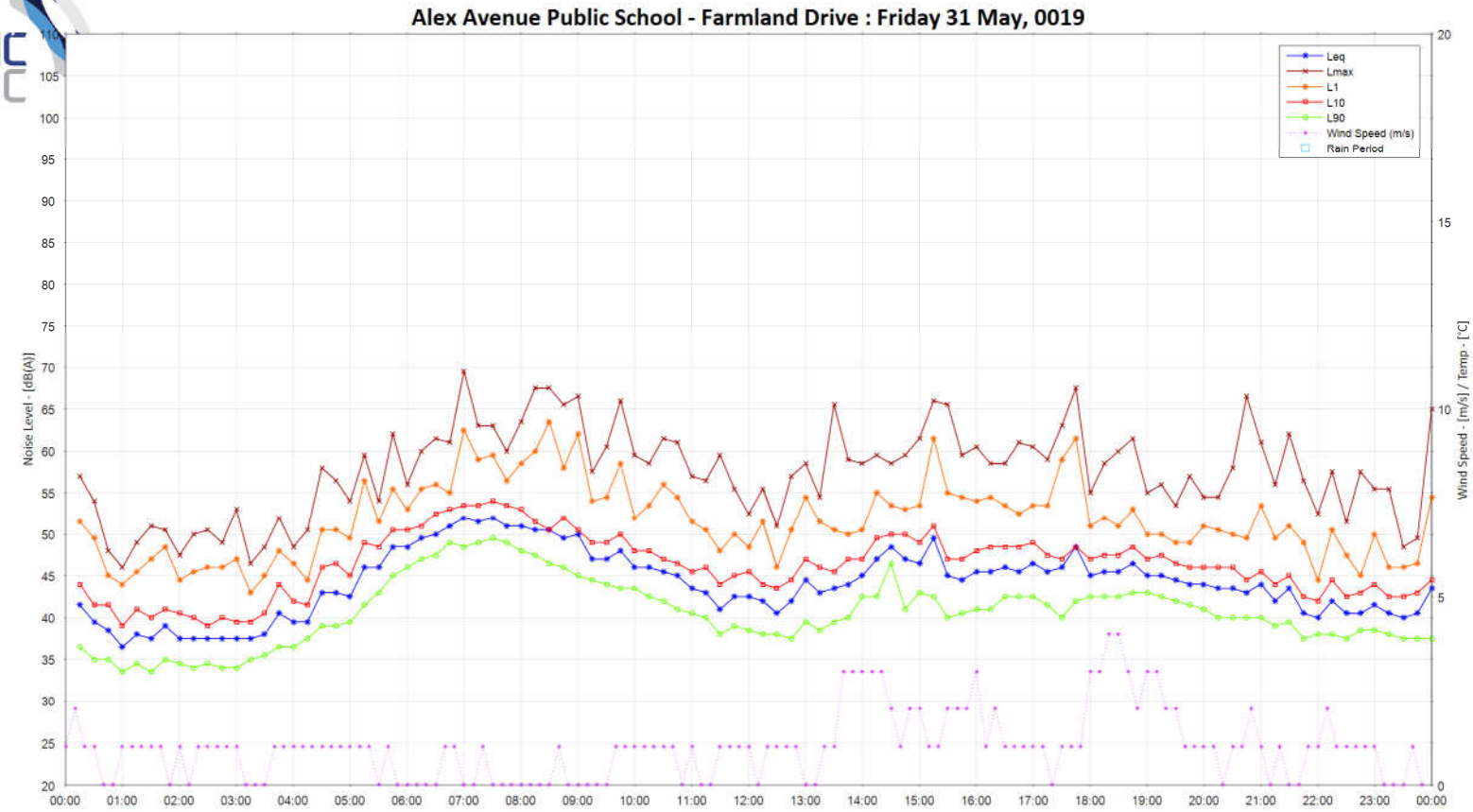
Alex Avenue Public School - Farmland Drive : Friday 31 May, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
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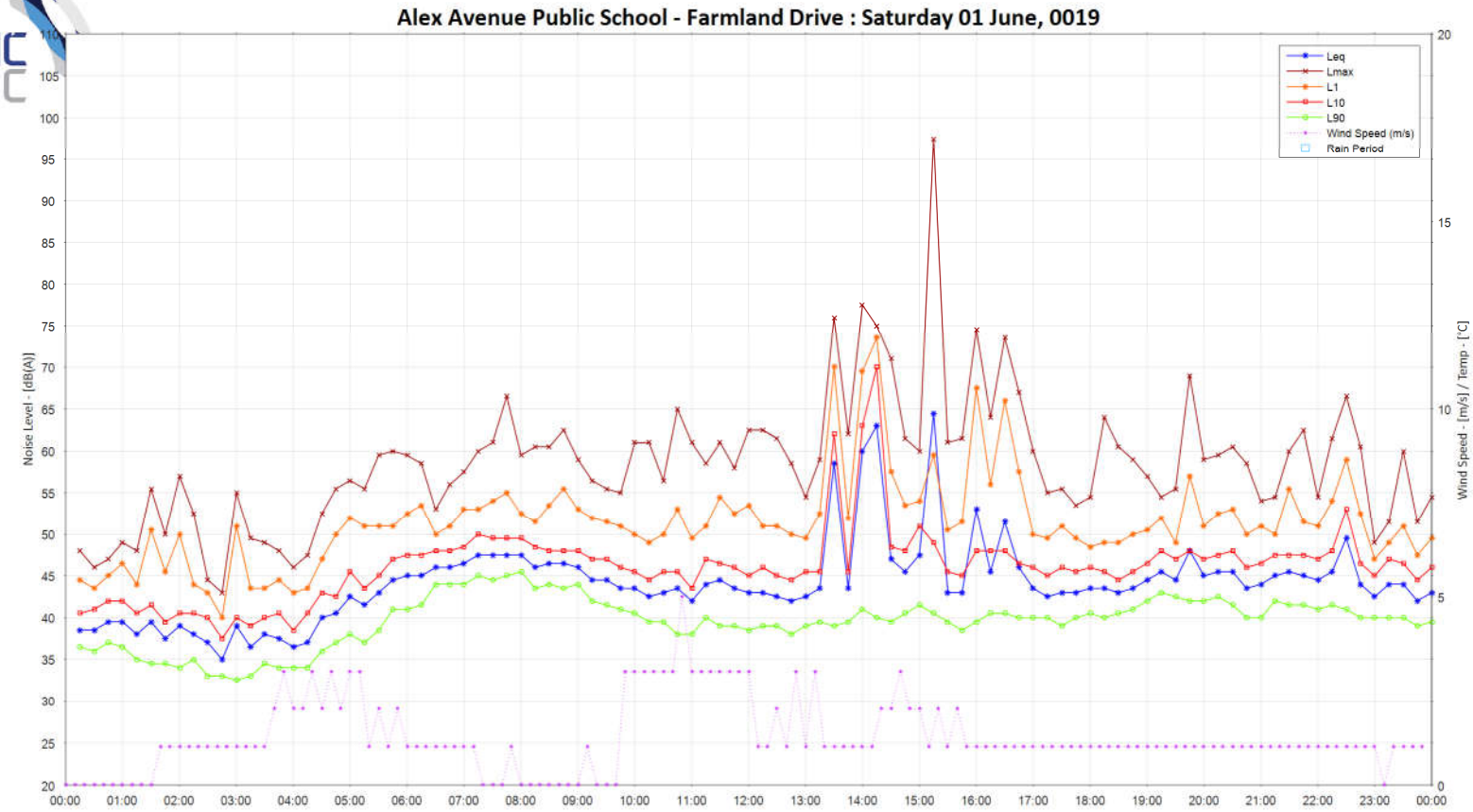
Alex Avenue Public School - Farmland Drive : Saturday 01 June, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
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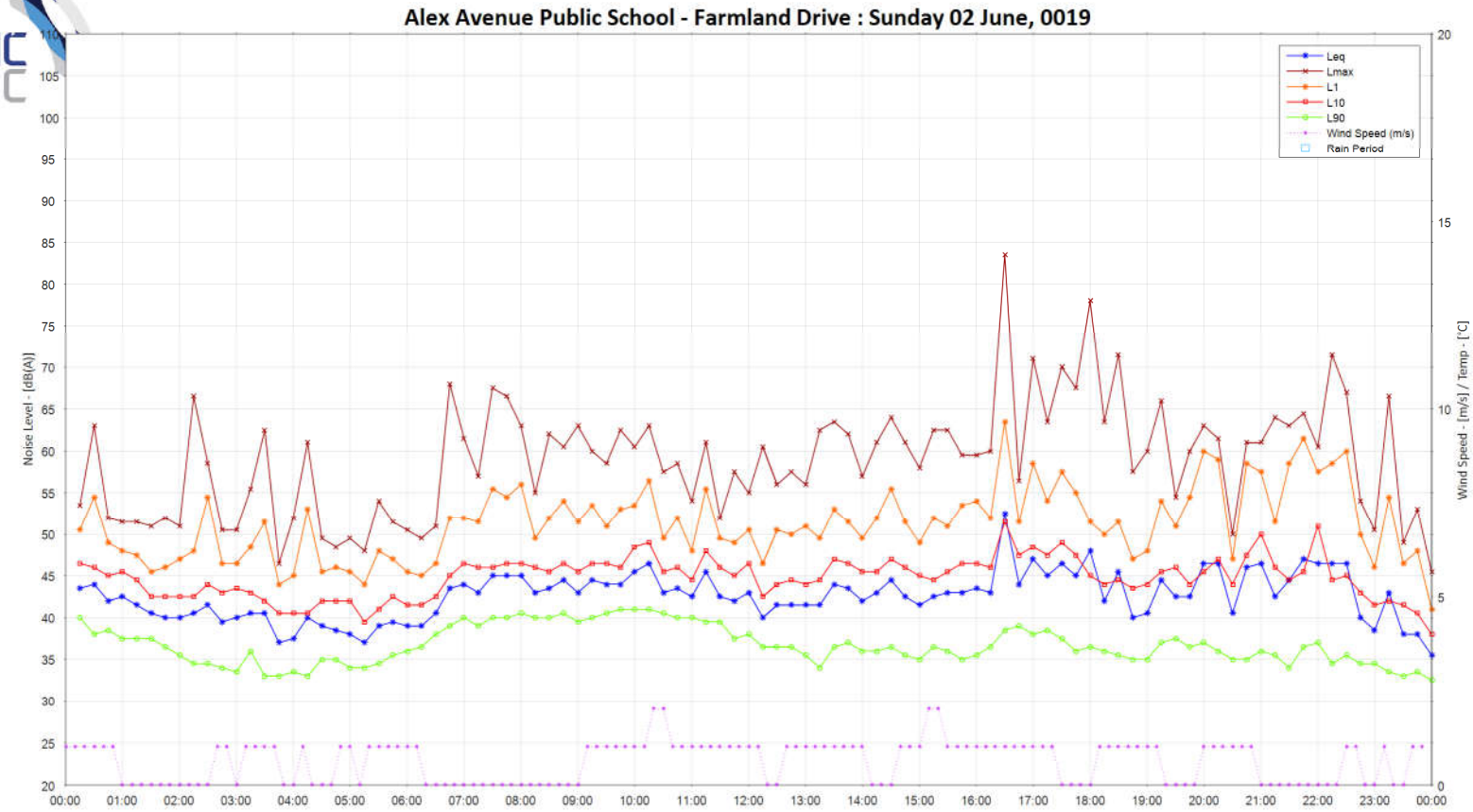
Alex Avenue Public School - Farmland Drive : Sunday 02 June, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
00:00
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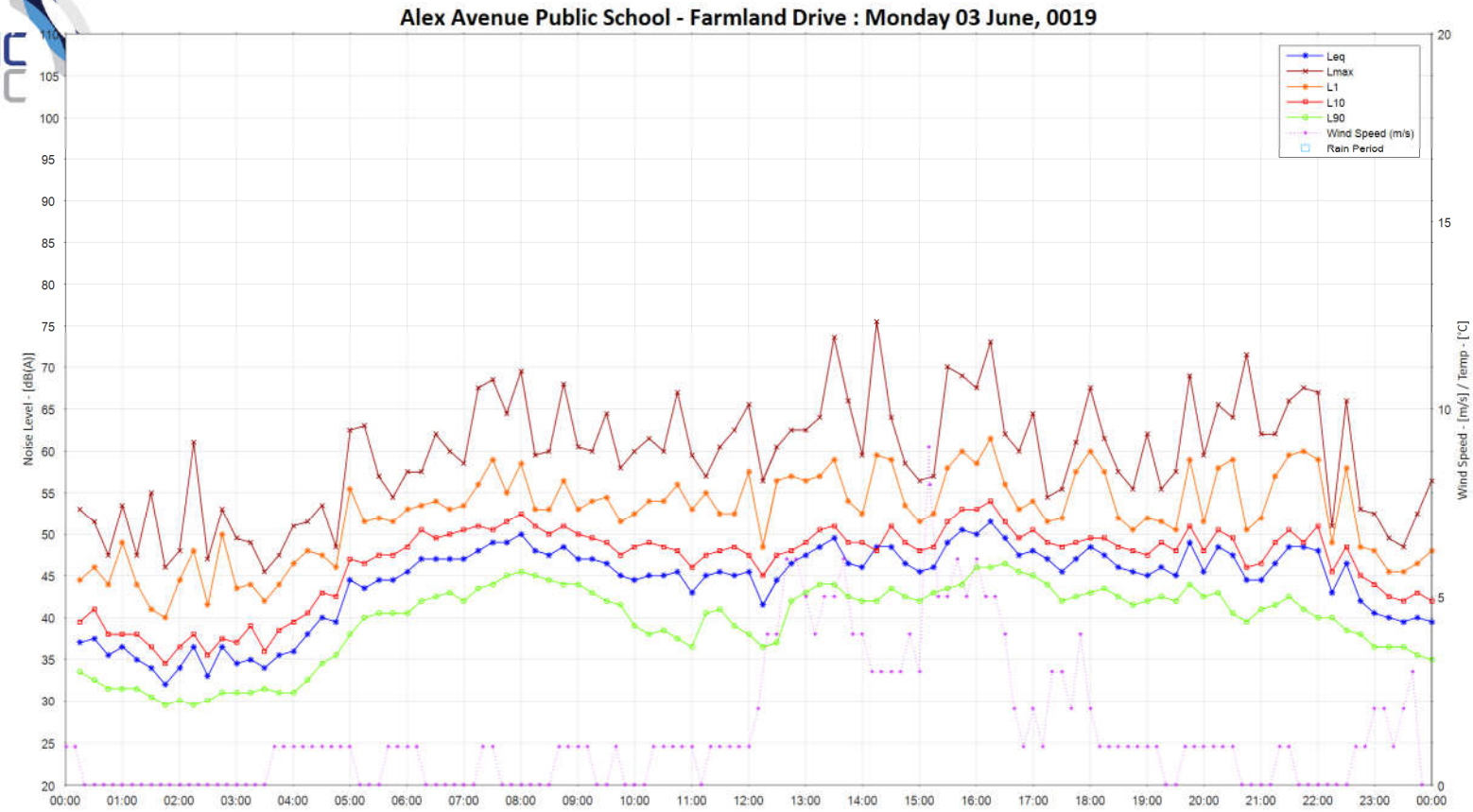
Alex Avenue Public School - Farmland Drive : Monday 03 June, 0019
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
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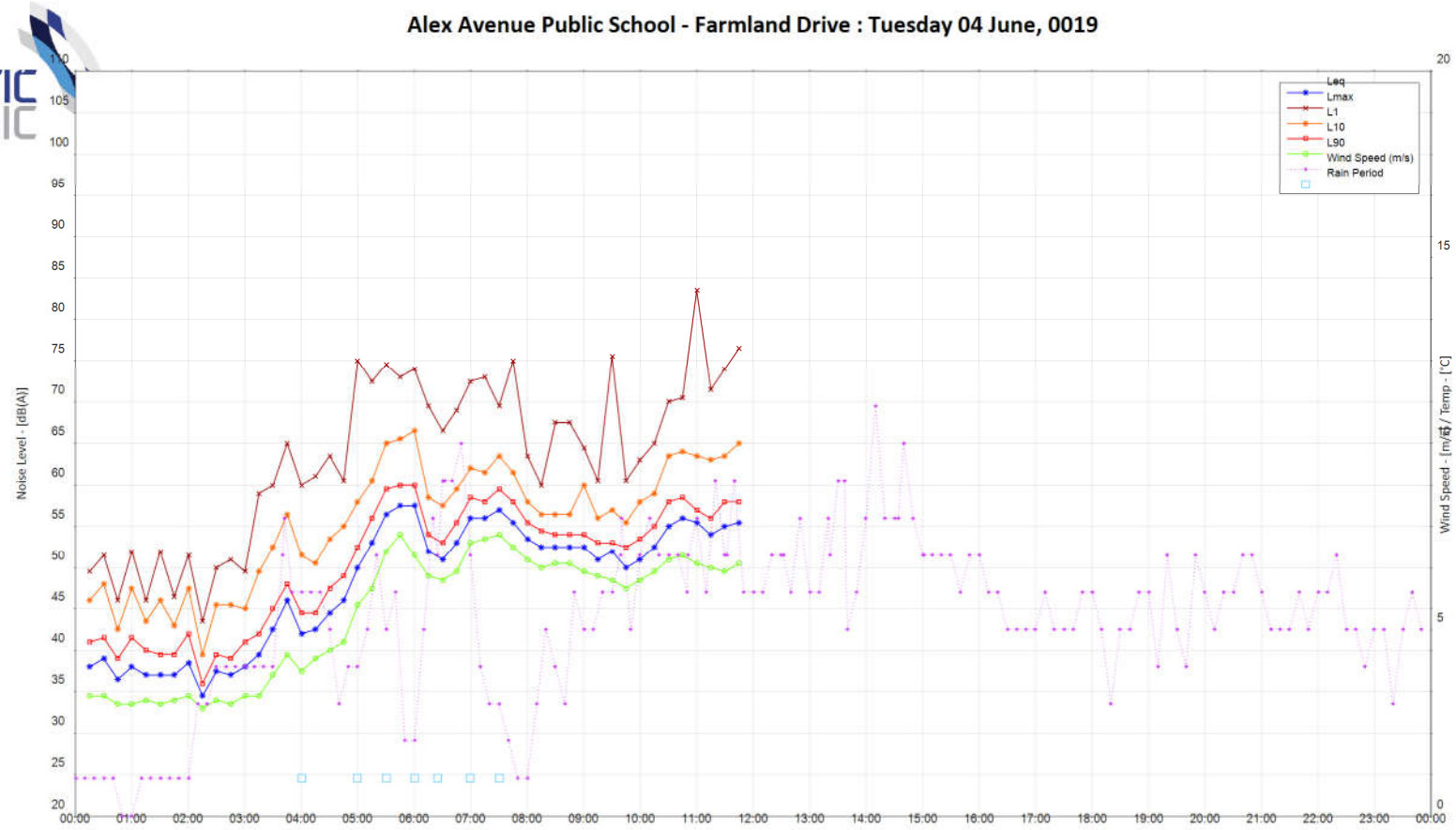
Alex Avenue Public School - Farmland Drive : Tuesday 04 June, 0019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
110
105
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85
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