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2	19/02/2020	20191070.1/1902A/R2/KNM	KNM		JD

TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed learning centre development to be constructed at 6A Watsford Road, Campbelltown.

This document addresses noise impacts associated with the following:

- Train noise impacts from the nearby T8 rail corridor;
- Train vibration impacts from the nearby T8 rail corridor; and
- Noise emissions from operation of the building (in principle).

ALC have utilised the following documents and regulations in the assessment of noise emanating from the development:

- Campbelltown City Council document – '*Campbelltown (Sustainable City) Development Control Plan 2015*';
- NSW Department of Education document – '*Educational Facilities Standards and Guidelines (EFSG)*'
- NSW Department of Planning and Environment's document – *'State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007'*;
- NSW Department of Planning and Environment's document – *'Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects'*
- NSW Environmental Protection Authority (EPA) document – *'Noise Policy for Industry (NPfI) 2017'*.

This assessment has been conducted using the preliminary issue architectural drawings for D.A Submission, provided by Koturic + Co. - Architects, see details below.

Table 1 - Architectural Sheet Information

Drawing Author	Drawing Number	Drawing Title	Revision	Date
Koturic + Co. - Architects	A-01	SITE PLAN	D	April 2019
	A-02	LOWER GROUND FLOOR PLAN	D	
	A-03	GROUND FLOOR PLAN	D	
	A-04	FIRST FLOOR PLAN	D	
	A-05	ROOF PLAN	C	
	A-06	ELEVATIONS	C	
	A-07	SECTIONS	C	

2 SITE DESCRIPTION

The site is located at 6A Watsford Road, Campbelltown. The proposed development will include construction of a two-storey learning centre, including a lower ground floor for 11 car spaces and an indoor sport/recreational area.

Onsite acoustic investigation has been carried out by this office on the surrounding acoustic environments. The major noise item around the proposed development is the T8 rail corridor, south-east of the site.

The nearest noise receivers around the project site include:

- Receiver 1 –Commercial receivers located at 4 & 6 Watsford Road, situated along the south-western boundary of the project site;
- Receiver 2 – Industrial receiver located at 8 Watsford Road, situated along the north-eastern boundary of the project site;
- Receiver 3 – Commercial receivers located at 5 & 7 Watsford Road, situated north of the project site, across Watsford Road.
- Receiver 4 – Industrial receiver located at 3 Watsford Road, situated north-western of the project site, across Watsford Road.

A site map, measurement description and surrounding receivers are presented in Figure 1 below.

Figure 1 – Site Survey and Monitoring Positions
Sourced from SixMaps NSW

	Project Site		Unattended Noise Monitor
	Commercial Receiver		Attended Measurement
	Industrial Receiver		

3 EXISTING ACOUSTIC ENVIRONMENT

Acoustic monitoring was conducted near the site to establish the background noise levels which will be used as basis for this assessment.

3.1 ENVIRONMENTAL 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_{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 environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

3.2 BACKGROUND NOISE LEVELS

Background noise levels which will be used as a basis for this assessment are detailed in the following sections.

3.2.1 Measurement Equipment

Background noise monitoring was undertaken with one (1) unattended noise monitor provided Acoustic Research Laboratories Pty Ltd. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

3.2.2 Measurement Location

One (1) unattended noise monitor was installed on site towards the eastern boundary as indicated in Figure 1.

3.2.3 Measurement Period

Unattended noise monitoring was conducted from Thursday 12th September 2019 to Thursday 19th September 2019.

3.2.4 Measured Background Noise Levels

The background noise levels established from the unattended noise monitoring are detailed in the Table below.

3.2.4.1 Unattended Noise Measurements

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

Appendix B provides detailed results of the unattended noise monitoring. Weather affected data was excluded from the assessment. The processed Rating Background Noise Levels (lowest 10th percentile noise levels during operation time period) are presented in the table below.

Table 2 - Monitored Rating Background Noise Level

Date	Background Noise Levels dB(A)$L_{90(period)}$		
	Day (7:00am-6:00pm)	**Evening (6:00pm-10:00pm)**	**Night (10:00pm-7:00am Next Day)**
12 September, 2019	-	44	40
13 September, 2019	43	43	43
14 September, 2019	43	41	41
15 September, 2019	43	46	42
16 September, 2019	43	42	41
17 September, 2019	50	45	41
18 September, 2019	48	46	39
19 September, 2019	47	45	-
Median	**43**	**45 (1) (Adjusted to 43)**	**41**

Table Notes:

1. Adjusted as per the discussion below.

3.2.4.2 Discussion of Unattended Noise Monitoring Results

Based on site investigations, and attended and unattended noise measurements, we note the following:

- The NSW EPA *Noise Policy for Industry* recognises that the RBL obtained from long term monitoring for the evening or night periods can sometimes be higher than the RBL for the daytime period. This can be caused by increased noise from insects or frogs, or temperature inversion conditions during winter.

- The NPfI generally recommends that the project intrusiveness level for evening be set at no greater than the project intrusiveness level for daytime, and the project intrusiveness level for night be set at no greater than the project intrusiveness level for day or evening.

- Therefore, the background noise level which will be adopted during the evening period (i.e. 6:00pm-10:00pm) will be adjusted to match the measured background noise level during the day period (7:00am-6:00pm).

3.2.4.3 Summarised Rating Background Noise Levels

Based on the discussion above, the acoustic environment for the project site are as below.

Table 3 - Summarised Rating Background Noise Level

Location	Time of day	Rating Background Noise Level dB(A)$L_{90(Period)}$
6A Watsford Road, Campbelltown (See Figure 1)	Day (7:00am-6:00pm)	43
	Evening (6:00pm-10:00pm)	43 (1)
	Night (10:00pm-7:00am)	41

Table Notes:

1. Adjusted as per the discussion above.

4 EXTERNAL NOISE INTRUSION ASSESSMENT

Site investigation indicates that the major external noise sources around project site is train noise from the adjacent T8 rail corridor. Noise intrusion from this source will be assessed in accordance with criteria nominated in section 4.1 below.

4.1 NOISE INTRUSION CRITERIA

A noise intrusion assessment has been conducted based off the requirements of the following acoustic noise criteria/standards;

- Campbelltown City Council document – '*Campbelltown (Sustainable City) Development Control Plan 2015';*
- NSW Department of Education document – '*Educational Facilities Standards and Guidelines (EFSG)'*
- NSW Department of Planning and Environment's document – *'State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007';*
- NSW Department of Planning and Environment's document – *'Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects'*

4.1.1 Campbelltown (Sustainable City) Development Control Plan 2015

As the Campbelltown City Council document – 'Campbelltown (Sustainable City) Development Control Plan 2015' does not stipulate any specific noise criteria for the development of a learning centre, the NSW Department of Education document – '*Educational Facilities Standards and Guidelines (EFSG)'* will be used in this assessment.

4.1.2 Educational Facilities Standards and Guidelines (EFSG)

EFSG states the following in relation to internal noise levels:

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.

4.1.3 State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007

Regulation 87 of the SEPP Infrastructure states the following:

87 Impact of rail noise or vibration on non-rail development

> *(1) This clause applies to development for any of the following purposes that is on land in or adjacent to a rail corridor and that the consent authority considers is likely to be adversely affected by rail noise or vibration:*
>
> > *(a) a building for residential use,*
> >
> > *(b) a place of public worship,*
> >
> > *(c) a hospital,*
> >
> > *(d) an educational establishment or child care centre.*
>
> *(2) Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Director-General for the purposes of this clause and published in the Gazette.*
>
> *(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*
>
> > *(a) in any bedroom in the building--35 dB(A) at any time between 10.00 pm and 7.00 am,*
> >
> > *(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)--40 dB(A) at any time.*

4.1.4 Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects

The NSW Department of Planning and Environment's document – *'Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects'* states the following in relation to internal noise levels for educational institutions:

Table 2: Airborne rail traffic noise trigger levels for sensitive land uses other than residential

Sensitive land use	Noise trigger levels dB(A)	
	New rail line development	**Redevelopment of existing rail line**
	Development increases existing rail noise levels by 2 dB(A) or more in L_{Aeq} in any hour ***and*** resulting rail noise levels exceed:	
Schools, educational institutions – internal	40 $L_{Aeq(1h)}$	45 $L_{Aeq(1h)}$
Places of worship – internal	40 $L_{Aeq(1h)}$	45 $L_{Aeq(1h)}$
Hospitals	60 $L_{Aeq(1h)}$	60 $L_{Aeq(1h)}$
Hospitals – internal	35 $L_{Aeq(1h)}$	35 $L_{Aeq(1h)}$
Passive recreation	L_{Aeq} as per residential noise level values in Table 1 (does not include maximum noise level component)	
Active recreation (e.g. golf course)	65 $L_{Aeq(24h)}$	65 $L_{Aeq(24h)}$

Table 3: Ground-borne (internal) noise trigger levels

Receiver	Time of day	Noise trigger levels dB(A)
		Development increases existing rail noise levels by 3 dB(A) or more ***and*** resulting rail noise levels exceed:
Residential	Day (7 am–10 pm)	40 L_{Amax} (slow)
	Night (10 pm–7 am)	35 L_{Amax} (slow)
Schools, educational institutions, places of worship	When in use	40–45 L_{Amax} (slow)

4.1.5 Summarised Internal Noise Criteria

Summarised internal noise criteria is summarised below.

Table 4 - Summarised Internal Noise Criteria

Space /Activity Type	Internal Noise Requirement dB(A)
Educational Institutions	Airborne Noise 40 $L_{Aeq(1\ hour)}$
	Ground-borne Noise 40-45 $L_{Amax(slow)}$

4.2 EXTERNAL NOISE MEASUREMENTS

This section of the report details noise measurements conducted at the site to establish train and surrounding environmental noise levels impacting the development.

4.2.1 Measurement Equipment

Attended short term measurements of train noise were undertaken by this office to supplement the unattended noise monitoring. 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.

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

4.2.2 Measurement Location

One (1) unattended noise monitor was installed on site towards the eastern boundary as indicated in Figure 1. The unattended noise monitor was installed approximately 3m from the southern boundary which had a 90º view of the adjacent T8 rail corridor, due to the existing wall.

Attended noise measurements were conducted along the southern boundary of the site as well as opposite the rail corridor inside the commuter car park. Refer to Figure 1 for detailed locations. Noise measurements inside the project site had 90° or less view of the rail corridor and was conducted at varying distances from the boundary. Noise measurements at the commuter carpark had direct view of the rail corridor.

4.2.3 Measurement Period

Unattended noise monitoring was conducted from Thursday 12th September 2019 to Thursday 19th September 2019.

Attended noise measurements were undertaken between the hours of 4:00pm and 5:00pm on Thursday 12th September 2019.

4.2.4 Measured Train Noise Measurements

Results of the attended and unattended noise measurements have been summarised below for all locations.

4.2.4.1 Unattended Noise Monitoring

Results of the unattended noise monitoring conducted inside the project site has been summarised below. Further detailed results can be found in Appendix A of this report.

Table 5 - Unattended Noise Monitor – Train Noise Measurements

Date	Measured Train Noise Level dB(A)$L_{eq(Period)}$	
	Day (7:00am-10:00pm)	Night (10:00pm-7:00am)
12 September, 2019	-	60
13 September, 2019	62	60
14 September, 2019	60	60
15 September, 2019	58	60
16 September, 2019	59	60
17 September, 2019	61	58
18 September, 2019	61	63
19 September, 2019	62	-
Logarithmic Average	**61**	**60**

4.3 NOISE INTRUSION ANALYSIS

Train noise intrusion into the proposed development was assessed using the measured noise levels presented above.

Calculations were undertaken taking into account the location of measurements, orientation of windows, barrier effects *(where applicable)*, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted.

4.4 RECOMMENDED CONSTRUCTIONS

4.4.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-Lon type acoustic seals. (**Note: Mohair Seals are not considered acoustic seals**).

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

The recommended constructions are listed in Table 6 below.

Table 6 - Glazing Thickness Requirements

Façade	Level	Space	Glazing Construction	Acoustic Seals
All	Ground Floor	All	6.38mm Laminated	Yes
All	First Floor	All	6.38mm Laminated	Yes

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

In addition to complying with the minimum scheduled glazing thickness, the R_W rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 7 for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 7 - Minimum RW of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_W of Installed Window
6.38mm Laminated	31

4.4.2 Roof/Ceiling Construction

Roof construction for the proposed development will be a light weight sheet metal construction. Further acoustic treatment is required, see table below for details. Roof construction of masonry systems (e.g. concrete slab) will also be acoustically acceptable without additional treatment.

Table 8 - Light Weight Roof Construction

Space	Internal Lining	Truss System	External Lining
All	1 x 13mm Plasterboard	Minimum 250mm Timber Truss with 75mm thick 11kg/m^3 glasswool insulation in truss cavity	0.5mm Sheet Metal (Colorbond or similar)

If any penetrations are required through any of the external lining of any of the systems above for other building services, all gaps should be filled with acoustic sealant to ensure compliance with internal noise level requirements.

4.4.3 External Wall Construction

Proposed external wall constructions will be from light weight cladding systems. Further acoustic treatment is required, see table below for details. Wall construction of masonry systems (e.g. double brick) will also be acoustically acceptable without additional treatment.

Table 9 - Light Weight Wall Construction

Space	Internal Lining	Truss System	External Lining
All	1 x 13mm Standard Plasterboard	70mm Steel Stud with 75mm thick 11kg/m^3 glasswool insulation in cavity	1 x 9mm Fibre Cement Sheeting

If any penetrations are required through any of the external lining of any of the systems above for other building services, all gaps should be filled with acoustic sealant to ensure compliance with internal noise level requirements.

5 RAILWAY VIBRATION

A rail vibration assessment has been conducted based off the requirements of the following acoustic noise criteria/standards;

- British Standard BS 7385:1990 Part 2 *'Evaluation and measurement for vibration in buildings – part 2'*;
- Australian Standard AS2670:1990 *'Vibration and Shock – Guide to the evaluation of human exposure to whole body vibration';*
- NSW Department of Environment and Conservation's document *'Assessing Vibration: A Technical Guideline';* and

5.1.1 Tactile Vibration

Human comfort is normally assessed with reference to the British Standard BS 7385 Part 2 1993 or Australian Standard AS 2670.2 1990.

The Interim Guideline references the DECCW *Assessing Vibration- A technical guideline* which recommends that habitable rooms should comply with the criteria therein which is in line with the requirements of British Standard BS 6472:1992 "Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)".

British Standard BS 6472:1992 "Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)" is recommended by the RIC's and SRA's Interim Guidelines for Councils "Consideration of rail noise and vibration in the planning process" as this standard includes guidance for the assessment of human response to building vibration including intermittent vibrations such as that caused by trains.

Human response to vibration has been shown to be biased at particular frequencies, which are related to the orientation of the person. This standard provides curves of equal annoyance for various orientations. These curves are applied as correction filters such that an overall weighted acceleration level is obtained. As the orientation of the resident is unknown or varying the weighting filter used is based on the combined base curve as given in ISO 2631 & Australian Standard 2670 "Evaluation of Human Exposure to Vibration and Shock in Buildings (1 to 80Hz)" which represents the worst case of the X, Y and Z axes. Filtered measurements are made in all three co-ordinate axes and the highest value axis used.

This standard assesses the annoyance of intermittent vibration by using the Vibration Dose Value (VDV). Alternatively, the VDV may be estimated by the eVDV which is derived by a simpler calculation using an empirical factor. The VDV or eVDV is calculated for the two periods of the day being the "Daytime" (7am-10pm) and "Night time" (10pm-7am). The overall value is then compared to the levels in Table 10.

Table 10 - Acceptable Vibration Dose Values for Intermittent Vibration (m/s1.75)

Place	**Daytime** Preferred Value	**Daytime** Maximum Value	**Night-time** Preferred Value	**Night-time** Maximum Value
Schools or Educational Facilities	0.40	0.80	0.40	0.80

5.1.2 Structure Borne Noise

Vibration measurements were also carried out at locations of the proposed nearest façade to the rail corridor. The structure borne noise generated by the vibration has been predicted below based on the measured vibration level from 1Hz to 10KHz.

Table 11 - Predicted Structure Borne Noise dB(A) LMax

Location	Predicted Structure Borne Noise Level	Criteria	Compliance
Ground Floor (Eastern Facade)	39-44	40-45 $L_{Amax(slow)}$	Yes

5.2 RAIL VIBRATION MEASUREMENTS

Rail noise measurements were conducted in line with the future proposed south eastern facade, which is the potentially worst affected façade.

Attended train vibration measurements were conducted on Thursday, 12th September 2019. A Svantek 958 Vibration Analyser was used for the vibration measurements. The analyser was fitted with three Svantek SV80 accelerometers.

The measured vibration levels, duration of train pass-by and the number of rail movements per hour were used to determine the overall vibration dose (VDV) at the proposed development for both daytime and night time periods. The results are presented the table below.

Table 12 – Measured Vibration Dose Values

Time Period	Calculated VDV $m/s^{1.75}$	Criteria VDV $m/s^{1.75}$	Compliance
Day (7am – 10pm)	<0.1	0.40 to 0.80	Yes
Night (10pm -7am)	<0.1	0.40 to 0.80	Yes

In the event the future train use increases, say by 10%, predicted eVDV will not increase significantly and will not impact any requirement for vibration isolation treatments.

The calculated levels comply with the tactile vibration requirements listed above.

5.3 FINDINGS

Measurements above indicated that the overall vibration dose (VDV) at the proposed development for both daytime and night time period fully comply with the requirements of British Standard BS 7385 Part 2 1993 or Australian Standard AS 2670.2 1990.

6 MECHANICAL NOISE ASSESSMENT

6.1 PROJECT CRITERIA

6.1.1 Campbelltown (Sustainable City) Development Control Plan 2015

As the Campbelltown City Council document – 'Campbelltown (Sustainable City) Development Control Plan 2015' does not stipulate any specific noise criteria for the development of a learning centre, the NSW Department of Education document – '*Educational Facilities Standards and Guidelines (EFSG)*' will be used in this assessment.

6.1.2 Educational Facilities Standards and Guidelines (EFSG)

Generally, noise emission to the environment from mechanical services noise sources (such as air conditioners) are the subject of a development consent conditions. In NSW the development consent conditions will refer to the Industrial Noise Policy (INP) or Local Council requirement.

Where no condition regarding noise sources exists for a school development, noise emission from such sources should be designed, in-principle, to satisfy the requirements of the Industrial Noise Policy.

Note: Industrial Noise Policy has been superseded by Noise Policy for Industry (NPfI).

6.1.3 Noise Policy for Industry (NPfI)

The NPfI provides guidelines for assessing noise impacts from developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The NPfI has two requirements which must both be complied with, namely an amenity criterion and an intrusiveness criterion.

6.1.4 SEARs – Condition 8

The Planning Secretary's Environmental Assessment Requirements state the following:

8. Noise and Vibration

> *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)*
- *Development Near Rail Corridors and Busy Roads – Interim Guideline (Department of Planning 2008).*

6.1.4.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5 dB(A).

Table 13 - NPfI Intrusiveness Criteria

Receiver	Time of day	Background Noise Level $dB(A)L_{90(Period)}$	Intrusiveness Criteria (Background + $5dB(A)L_{eq(15minute)}$
Residential	Day (7:00am-6:00pm)	43	48
	Evening (6:00pm-10:00pm)	43	48
	Night (10:00pm-7:00am)	41	46

6.1.4.2 Amenity Criterion

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

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

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

Table 14 - NPfI Project Amenity Criteria

Type of Receiver	Time of day	Recommended Project Acceptable Noise Level $dB(A)L_{eq(15\text{-}minutes)}$
Residential (Suburban)	Day (7:00am-6:00pm)	53
	Evening (6:00pm-10:00pm)	43
	Night (10:00pm-7:00am)	38
Commercial	When in use	63
Industrial	When in use	68

6.1.5 Summarised Plant Noise Emission Criteria

Summary for noise emission criteria for all plant associated with the development has been summarised below.

Table 15 - Summary of Noise Emission Criteria (Plant Noise)

Receiver	Time of day	Intrusiveness Criteria (Background + 5dB(A)$L_{eq(15\text{-}minute)}$	Project Amenity Criteria dB(A)$L_{eq(15\text{-}minute)}$
Residential Receivers	Day (7:00am-6:00pm)	48	53
	Evening (6:00pm-10:00pm)	48	43
	Night (10:00pm-7:00am)	46	38
Commercial Receivers	When in use	-	63
Industrial Receivers	When in use	-	68

6.2 MECHANICAL PLANT NOISE

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services plant to the closest receivers should comply with the noise emission criteria stipulated above.

7 OPERATIONAL NOISE ASSESSMENT

To address condition 8 of the SEARs, general operational noise, such as teaching and children speaking noise, have been assessed to predict the noise levels at surrounding receivers. We have been informed that there will be no PA systems, school bells nor any out of hours community use (e.g. concerts) which may impact surrounding receivers with noise.

The assessment will be conducted against the Noise Policy for Industry 2017, as referenced in Condition 8.

7.1 PROJECT CRITERIA

7.1.1 SEARs – Condition 8

The Planning Secretary's Environmental Assessment Requirements state the following:

8. Noise and Vibration

> *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)*
- *Development Near Rail Corridors and Busy Roads – Interim Guideline (Department of Planning 2008).*

As outlined in Figure 1 there are purely industrial and commercial receivers surrounding the project site. The summarised noise emission criteria for general operational noise emissions is as follows:

Table 16 - Summary of Noise Emission Criteria (Operational Noise)

Receiver	Time of day	Project Amenity Criteria dB(A)$L_{eq(15\text{-minute})}$
Commercial Receivers	When in use	63
Industrial Receivers	When in use	68

7.2 NOISE SOURCE DATA

Noise Levels generated from indoor activities (i.e. lessons) are 70 dB(A) Sound Pressure Level based on our measurement results of similar sites.

7.3 PREDICTED NOISE EMISSIONS

The predicted noise emissions have been conducted under the following assumptions:

- Windows are open at 5% of the respective room floor area for natural ventilation
- All laboratories, student lounges and learning spaces are occupied at the same time and have an internal SPL of 70 dB(A) within each space. It should be noted that this is quite a conservative approach as it is unlikely for all these rooms to be occupied at the same time with a relatively loud sound pressure level as 70 dB(A).
- The indoor recreational space is occupied with an assumed SPL of 85dB(A). It is noted the external façade of this space is concrete.

Table 17 – Predicted Cumulative Indoor Teaching Noise Levels

Noise Receiver	Predicted Noise Levels dB(A) L_{eq}	Criteria dB(A) L_{eq}	Compliance
Receiver 1 *Commercial*	50	≤ 63	Yes
Receiver 2 *Industrial*	< 60	≤ 68	Yes
Receiver 3 *Commercial*	< 50	≤ 63	Yes
Receiver 4 *Industrial*	< 50	≤ 68	Yes

8 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed learning centre development to be located at 6A Watsford Road, Campbelltown. Based on the information provided above, we conclude the following:

Provided that the recommendations set out in Section 4 of this report are employed, internal noise levels should satisfy requirements outlined in:

- Campbelltown City Council document – '*Campbelltown (Sustainable City) Development Control Plan 2015*';
- NSW Department of Education document – '*Educational Facilities Standards and Guidelines (EFSG)*'
- NSW Department of Planning and Environment's document – *'State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007'; and*
- NSW Department of Planning and Environment's document – *'Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects'*.

Structure borne noise impacts from the rail corridor have been assessed in this report, we can confirm that the proposed building can comply with the following documents below:

- British Standard BS 7385:1990 Part 2 *'Evaluation and measurement for vibration in buildings – part 2'*;
- Australian Standard AS2670:1990 *'Vibration and Shock – Guide to the evaluation of human exposure to whole body vibration'; and*
- NSW Department of Environment and Conservation's document *'Assessing Vibration: A Technical Guideline'*.
- NSW Department of Planning and Environment's document – *'Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects'*.

External noise emissions criteria have been setup in this report and operational noise (cumulative noise of teaching, children talking, recreational facility etc.) within the development has been assessed to satisfy the requirements from the following:

- SEARs - Condition 8
- NSW Environmental Protection Authority (EPA) document – *'Noise Policy for Industry (NPfI)'*.

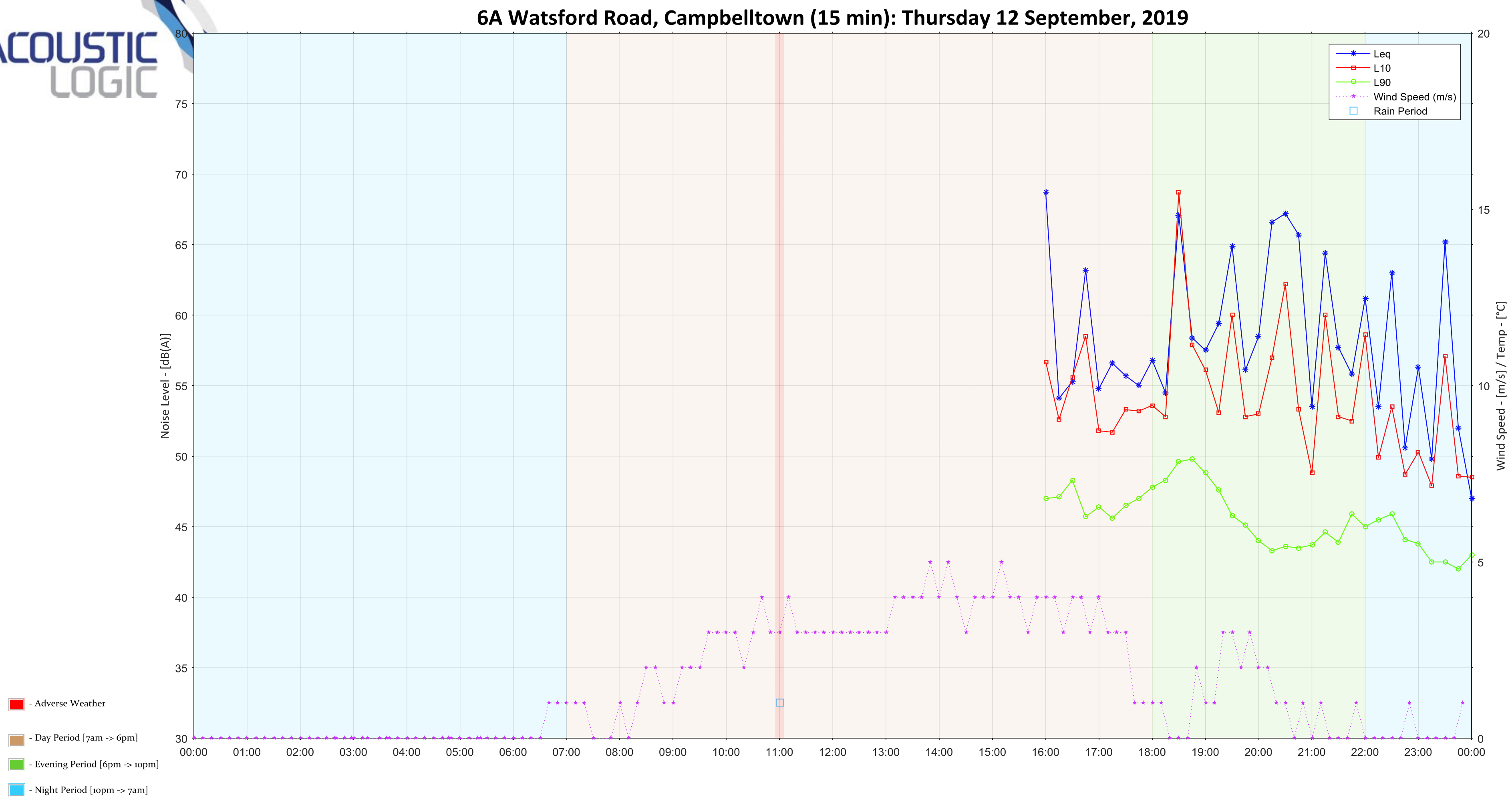
Detailed acoustic control measures for the plant servicing the proposed development are to be determined later during CC stage.

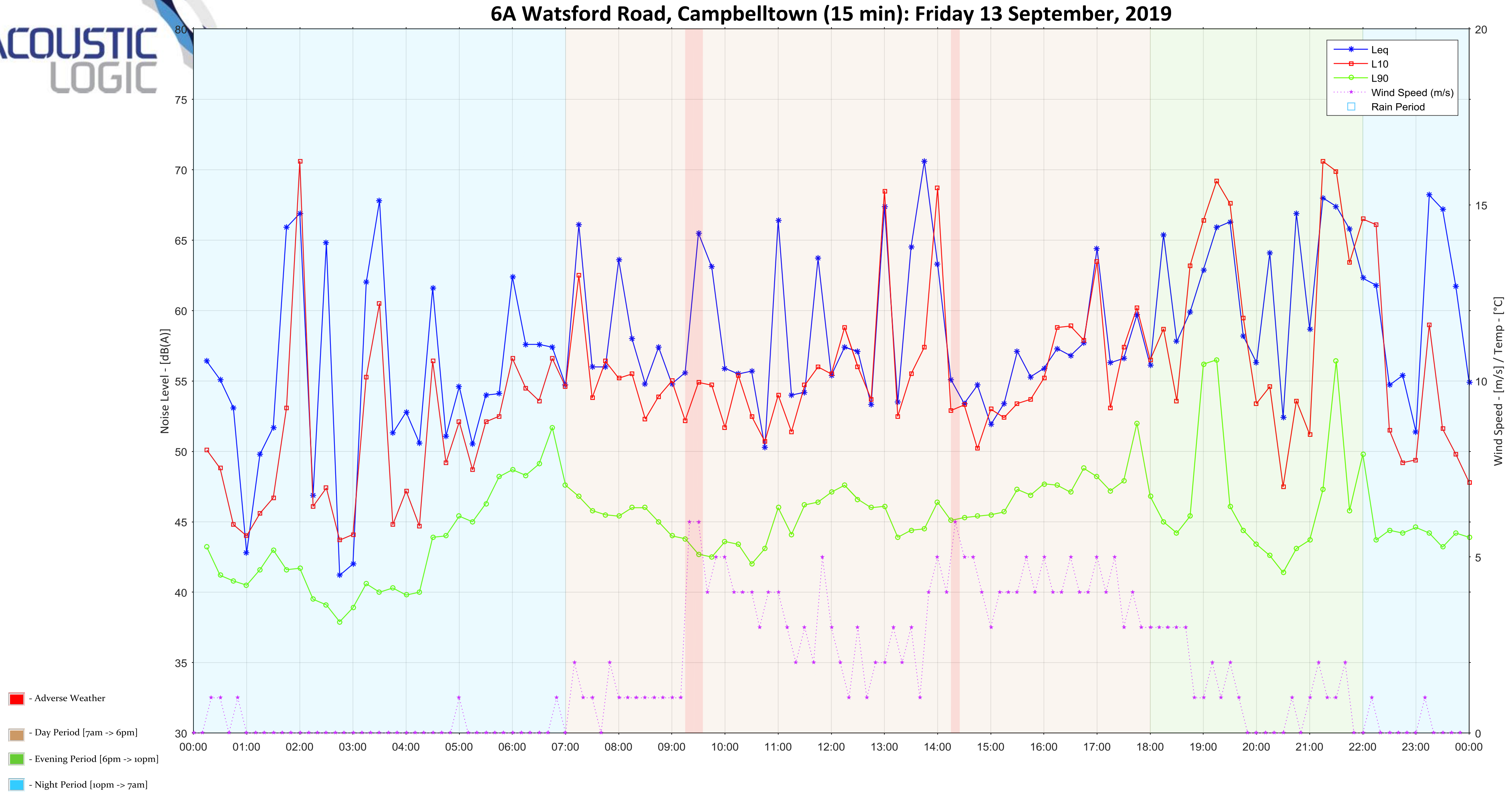
We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

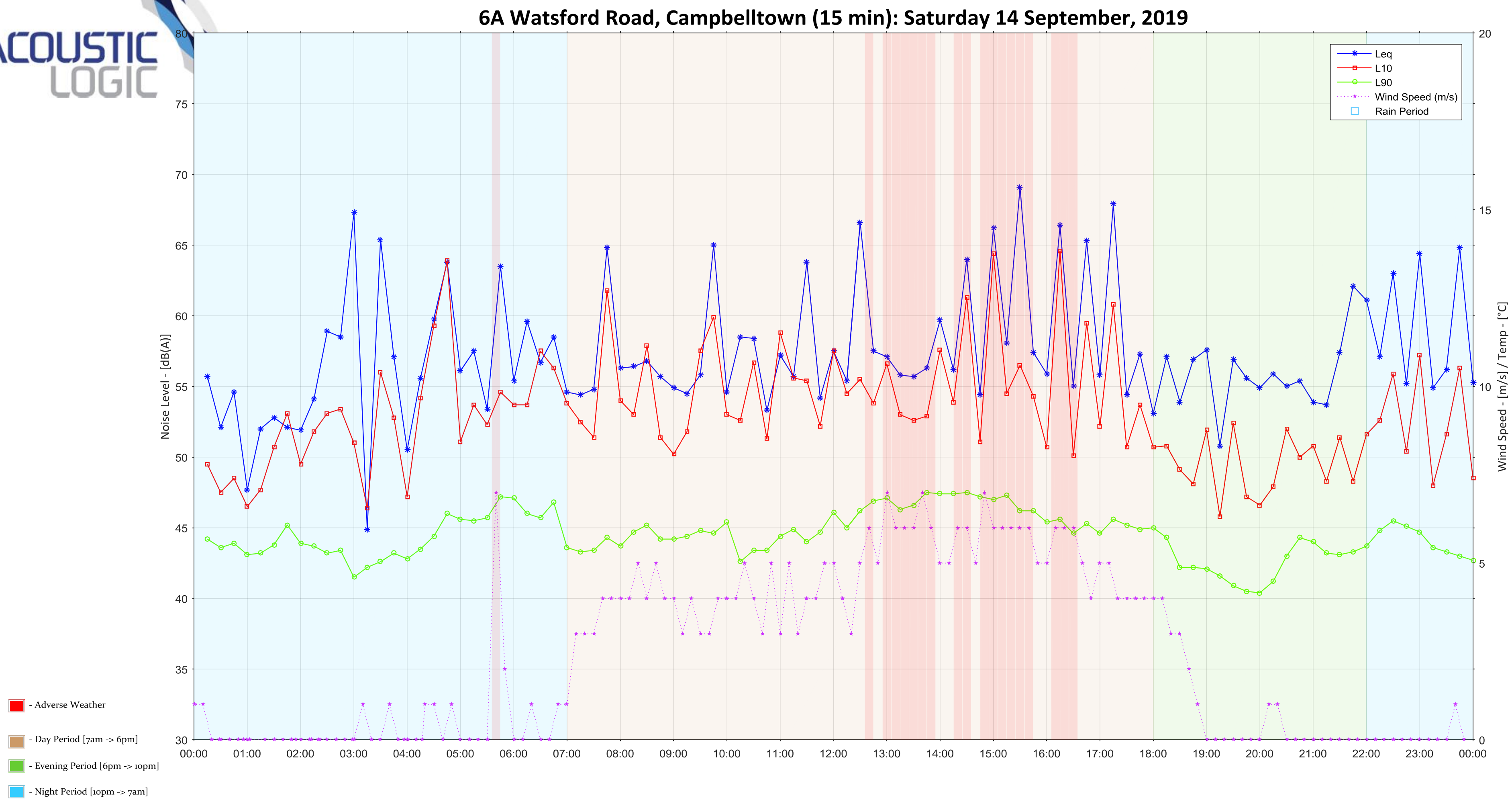
Acoustic Logic Consultancy Pty Ltd
Kanin Mungkarndee

APPENDIX A – UNATTENDED NOISE MONITORING

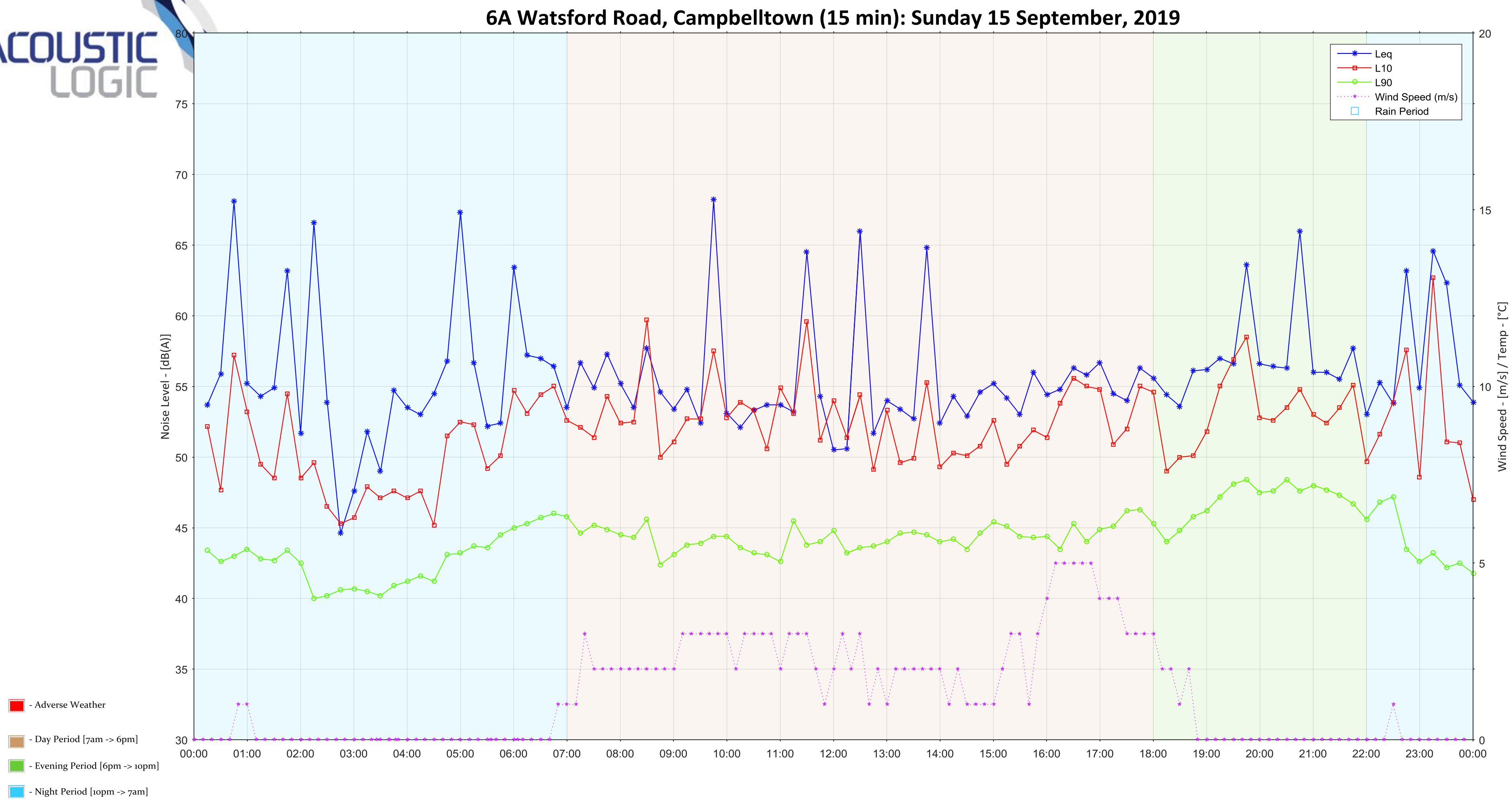

6A Watsford Road, Campbelltown (15 min): Thursday 12 September, 2019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]



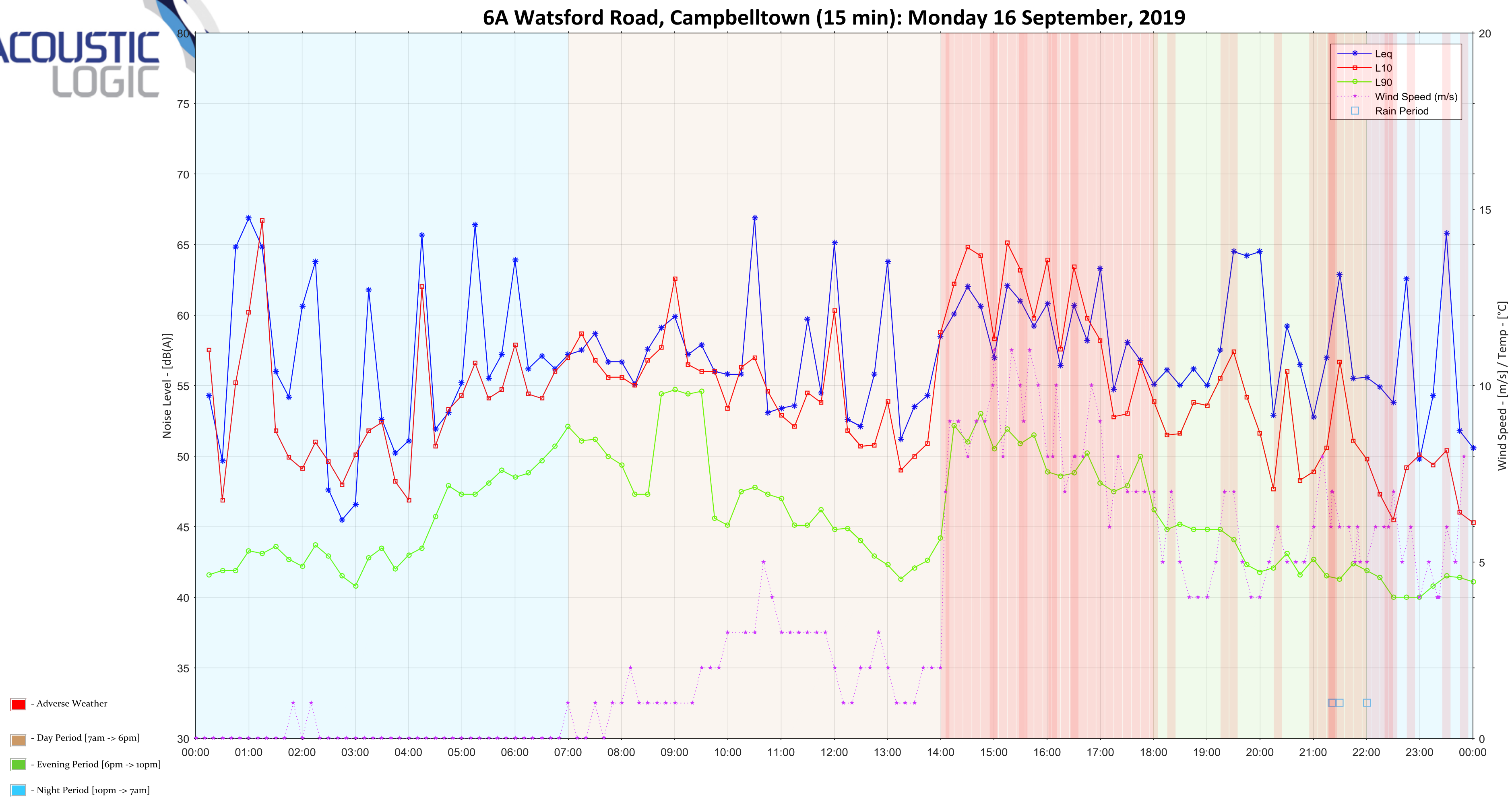
6A Watsford Road, Campbelltown (15 min): Friday 13 September, 2019
Leq
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]



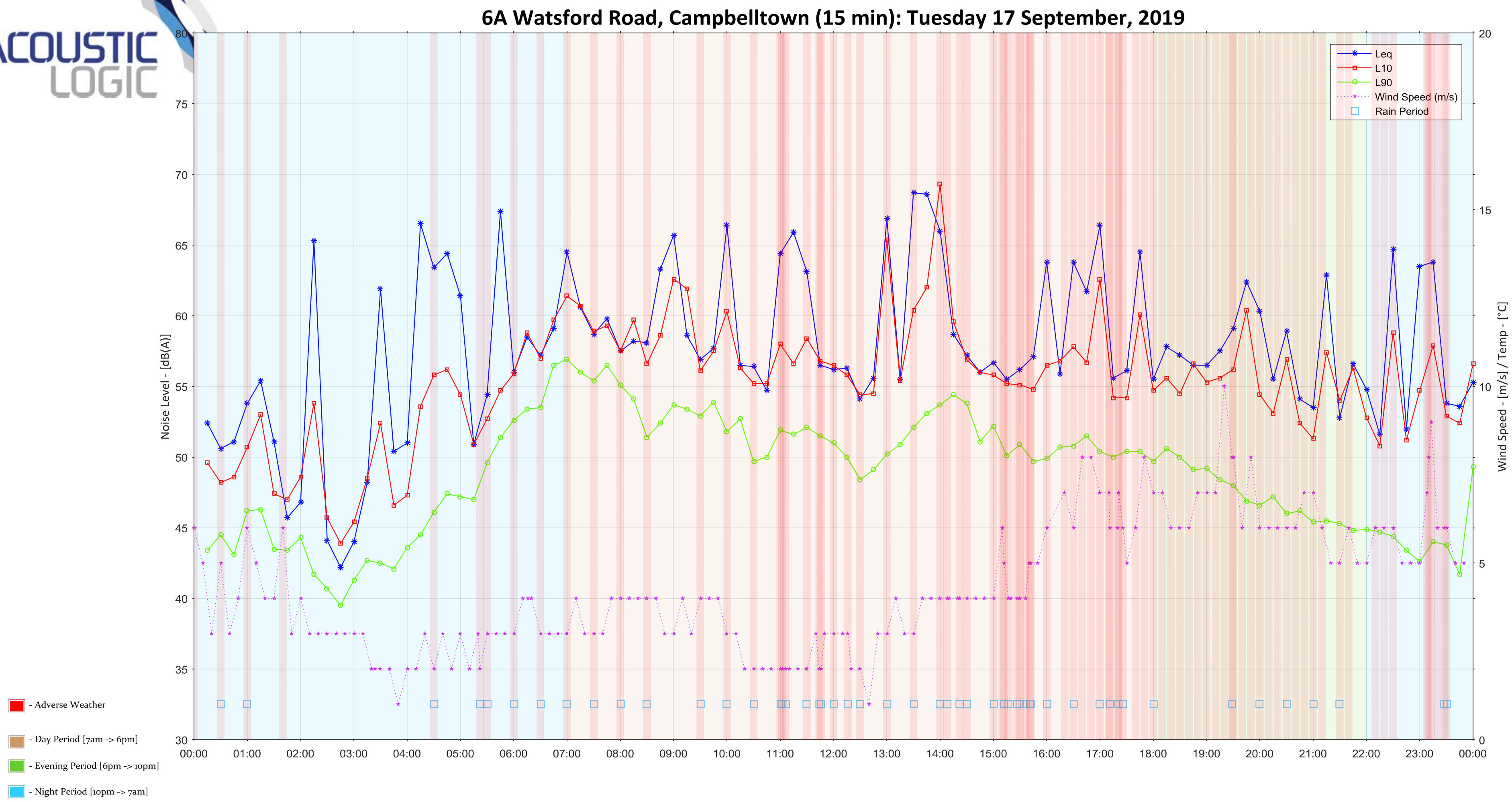
6A Watsford Road, Campbelltown (15 min): Saturday 14 September, 2019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]



6A Watsford Road, Campbelltown (15 min): Sunday 15 September, 2019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]



6A Watsford Road, Campbelltown (15 min): Monday 16 September, 2019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


6A Watsford Road, Campbelltown (15 min): Tuesday 17 September, 2019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
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10:00
11:00
12:00
13:00
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18:00
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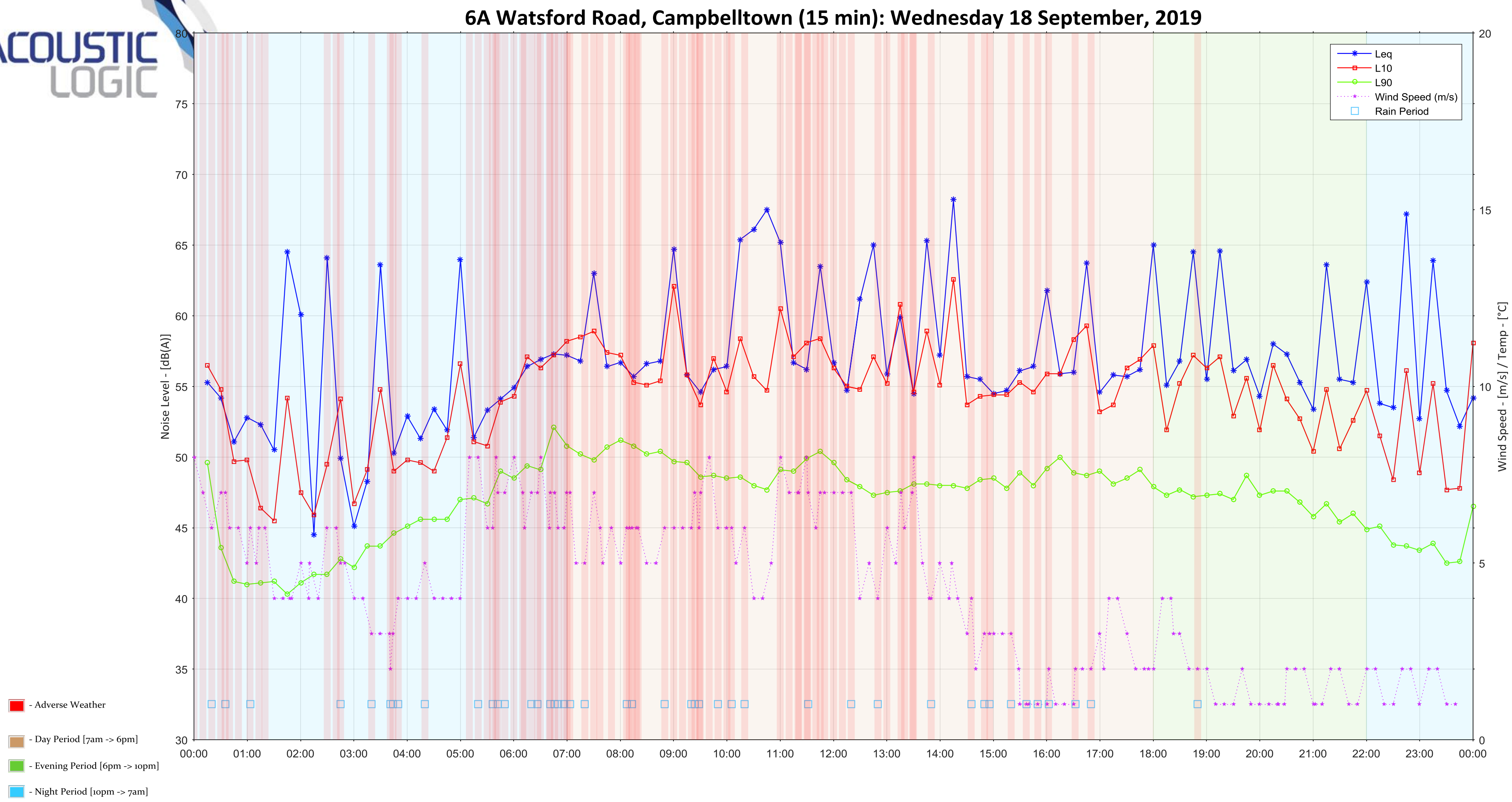
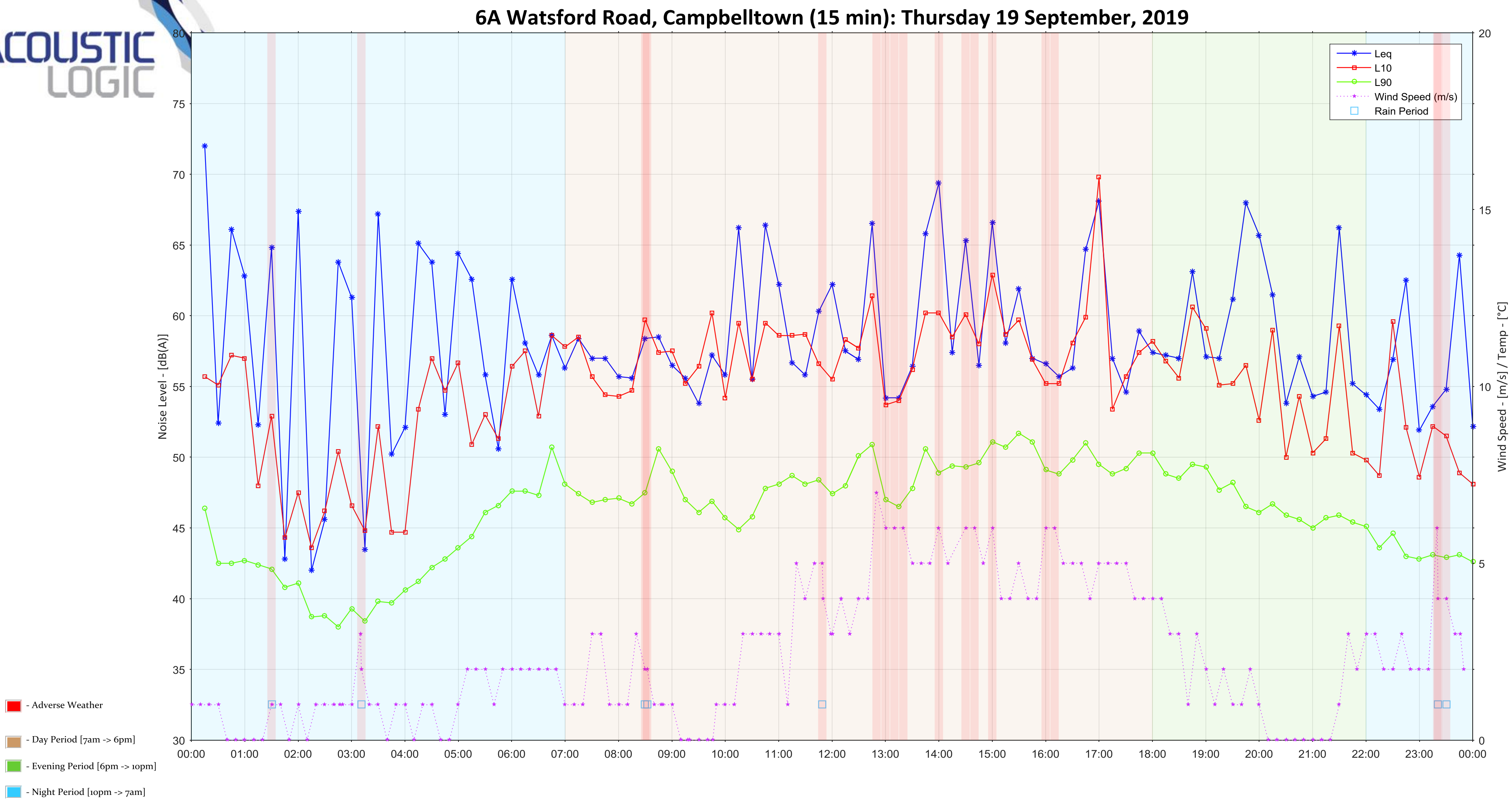
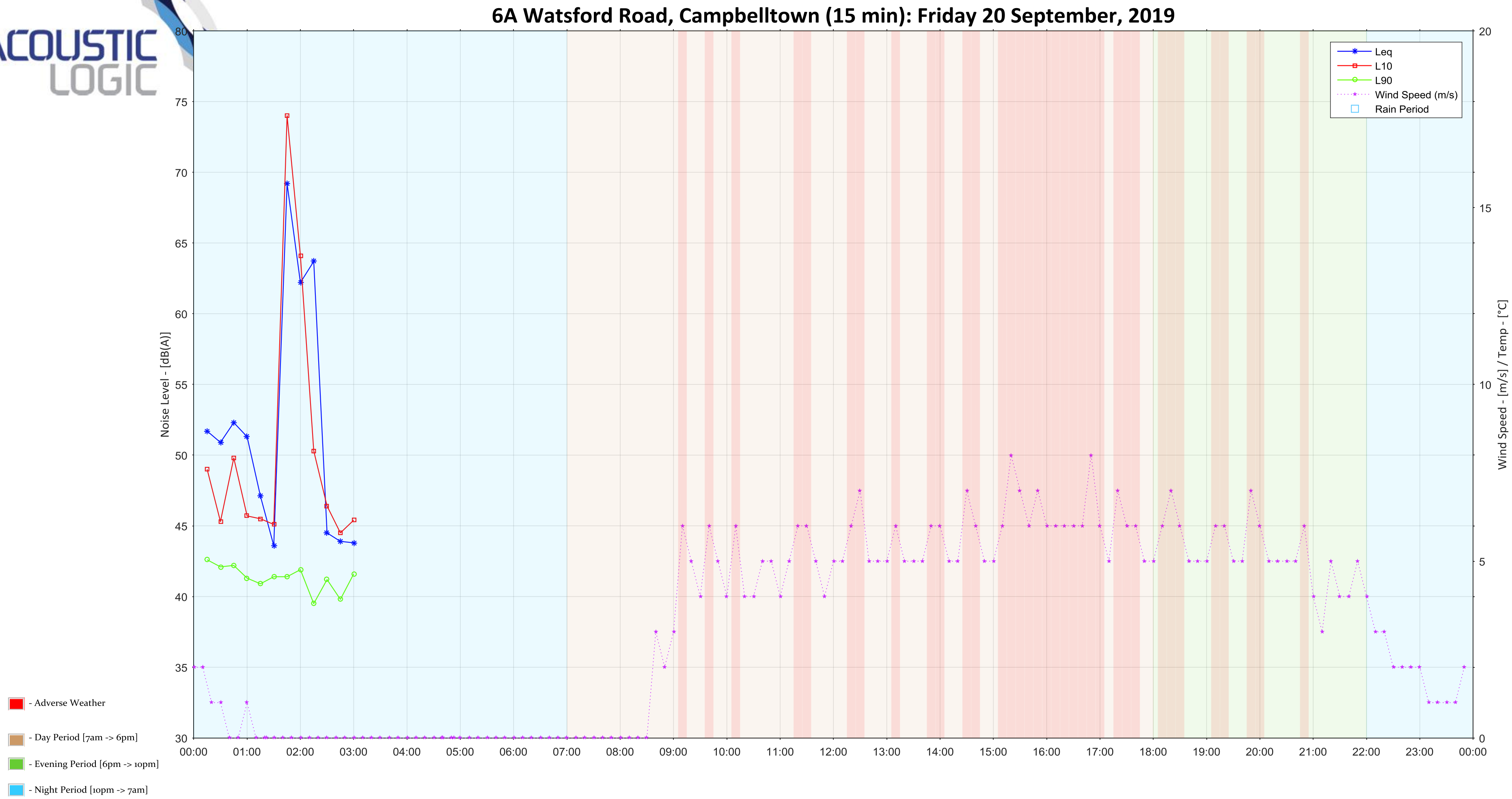
20:00
21:00
22:00
23:00
00:00



6A Watsford Road, Campbelltown (15 min): Wednesday 18 September, 2019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]



6A Watsford Road, Campbelltown (15 min): Thursday 19 September, 2019
Leq
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
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


6A Watsford Road, Campbelltown (15 min): Friday 20 September, 2019
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]