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Development Application Acoustic Assessment

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Project ID	20200473.1
Document Title	Development Application Acoustic Assessment
Attention To	Australian Arms Unit Trust

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	11/06/2020	20200473.1/1106A/R0/MB	MB		
1	7/07/2020	20200473.1/0707A/R1/MB	MB		GW

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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) has been engaged to conduct an acoustic assessment of potential noise impacts associated with the mixed use development known as the Australian Arms Hotel located at 351 High Street, Penrith.

This document addresses noise impacts associated with the following:

- Noise intrusion to project site from adjacent roadways;
- Noise emissions from traffic generation and vehicle movements;
- Noise emissions from gym usage;
- Noise emissions from Conference Centre
- Noise emissions from food and beverage services usage; and
- Noise emissions from mechanical plant to service the project site (in principle).

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

- Penrith City Council Development Control Plan (DCP) 2014;
- NSW Department of Planning – 'Developments near Rail Corridors or Busy Roads – Interim Guideline';
- Australian Standard AS2107:2016 – '*Recommended Design Sound Levels and Reverberation Times for Building Interiors*';
- NSW Department of Environment and Heritage, Environmental Protection Agency document – '*Noise Policy for Industry*' (NPI) 2017; and
- NSW Department of Industry – Liquor & Gaming (L&GNSW).

This assessment has been conducted using the NRA Collaborative architectural drawings for DA Submission, see detailed below.

Table 1 – Architectural Sheet Information

Architect	Drawing Number	Drawing Title	Date
The NRA Collaborative	DA-003	Development Statistics & Areas	15/05/2020
	DA-2000	Basement 02	15/05/2020
	DA-2001	Basement 01	15/05/2020
	DA-2002	Ground Floor	15/05/2020
	DA-2003	Level 1	15/05/2020
	DA-2004	Level 2	15/05/2020
	DA-2005	Level 3	15/05/2020
	DA-2006	Level 4	15/05/2020
	DA-2007	Level 5	15/05/2020
	DA-2008	Level 6	15/05/2020
	DA-2009	Roof Plan	15/05/2020
	DA-4000	North Elevation	15/05/2020
	DA-4001	West Elevation	15/05/2020
	DA-4002	South Elevation	27/03/2017
	DA-4003	East Elevation	15/05/2020

2 SITE DESCRIPTION

The proposed development comprises of the following:

- 2 levels of basement car parking
- Internal loading dock access on the ground floor via Lawson Lane
- Ground floor commercial spaces including restaurant and administration offices
- Conference centre, gym and bar located on level 1
- Hotel rooms from level 1 to level 6
- Mechanical plant located on roof level

Investigation has been carried out by this office in regards to the existing properties and noise impacts surrounding the proposed development, which is detailed below:

- Existing residential premises located on High Street approximately 115 metres from the project site.
- Existing commercial blocks surrounding the project site along High Street and Lawson Street.
- Place of worship located along High Street approximately 70 metres from the project site.
- Medical facilities to the west of the project site along Lawson Street.

The nearest noise receivers around the site include:

- **R1 –** Residential Receiver 1 – Residential tenancy located at 338 High Street, Penrith.
- **C1 –** Commercial Receiver 1 – Commercial tenancies located at 333-335 High Street, Penrith
- **C2 –** Commercial Receiver 2 – Multi-storey commercial tenancies located at 331 High Street, Penrith
- **C3 –** Commercial Receiver 3 – Commercial tenancy located at 16 Lawson Street, Penrith
- **C4 –** Commercial Receiver 4 – Commercial tenancies located at 35 Lawson Street, Penrith
- **C5 –** Mixed-Use Receiver 1 – Mixed used development including commercial tenancies and pathology centre
- **PW1 –** Place of Worship Receiver 1 – St Nicholas of Myra church located at 326 High Street, Penrith

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

Attended Noise Monitoring

Unattended Noise Monitoring

Figure 1 - Site Map

3 NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}. The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

4 AMBIENT NOISE SURVEY

NSW EPA's Rating Background Noise Level (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.

Appendices in this report present results of unattended noise monitoring conducted at the project site. Weather affected data was excluded from the assessment. The processed RBL (lowest 10th percentile noise levels during operation time period) are presented in Table 2.

4.1.1 Measurement Position

One unattended noise monitor was located on site with 180 degree view of Lawson Street. Refer to Figure 1 for detailed location.

4.1.2 Measurement Period

Unattended noise monitoring was conducted from Monday 18th of May 2020 to Friday 29th of May 2020. Attended noise measurements were undertaken between the hours of 9:00am and 10:00am on the 29th of May 2020.

4.1.3 Measurement Equipment

Equipment used consisted of an Acoustic Research Laboratories Pty Ltd noise logger. The logger was set to A-weighted fast response and was programmed to store 15-minute statistical noise levels throughout the monitoring period. The monitor was calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted. Noise logger data is provided in Appendix 1.

4.1.4 Summarised Rating Background Noise Levels

Summarised rating background noise levels for the project site and immediate surroundings are presented below.

Table 2 – Measured Noise Levels

Monitor	Time of day	Rating Background Noise Level dB(A)$_{L90(Period)}$
Australian Arms Hotel	Day (7am – 6pm)	51
	Evening (6pm – 10pm)	43
	Night (10pm – 7am)	39
	Late Night (10pm – 12am)	40

5 EXTERNAL NOISE INTRUSION ASSESSMENT

Site investigation indicates that the major external noise sources around project site are from traffic movements along High Street and Lawson Street, adjacent to the southern and western boundary of the site.

5.1 NOISE INTRUSION CRITERIA

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

- Penrith City Council Development Control Plan (DCP) 2014;
- NSW Department of Planning – 'Developments near Rail Corridors or Busy Roads – Interim Guideline'; and
- Australian Standard AS2107:2016 – '*Recommended Design Sound Levels and Reverberation Times for Building Interiors.*'

5.1.1 Penrith City Council Development Control Plan (DCP) 2014

Chapter C12 Noise and Vibration

12.1 Road Traffic Noise, C. Controls, 1) Noise impact statements – specific requirements

a) Where a site is likely to be affected by unacceptable levels of road traffic noise, the applicant is required to provide a Noise Impact Statement prepared by a qualified acoustic consultant in accordance with the requirements set out in the DA Submission Requirements Appendix of this DCP.

b) The Noise Impact Statement should demonstrate acoustic protection measures necessary to achieve an indoor environment meeting residential standards, in accordance with EPA and Department of Planning Criteria, as well as relevant Australian Standards.

5.1.2 NSW Department of Planning – *Development near Rail Corridors or Busy Roads – Interim Guideline*

Section 3.5 of the NSW Department of Planning's 'Development near Rail Corridors and Busy Roads (Interim Guideline)' states:

> *"The following provides an overall summary of the assessment procedure to meet the requirements of clauses 87 and 102 of the Infrastructure SEPP. The procedure covers noise at developments for both Road and Rail.*
>
> - *If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*
>
> - *in any bedroom in the building: 35dB(A) at any time 10pm-7am*
> - *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."*

5.1.3 Australian and New Zealand AS/NZS 2107:2016 *'Recommended design sound levels and reverberation times for building interiors'*

AS2107:2016: Recommended design sound levels and reverberation times for building interiors specifies allowable internal noise levels for internal spaces within residential and commercial buildings. Table 1, in Section 5 of AS2107:2016, gives the following maximum internal noise levels for commercial buildings and residential buildings near major roads.

Table 3 – Recommended Design Sound Levels

Space /Activity Type	Recommended Design Sound Levels
Sleeping Areas	35-40 dB(A)$L_{eq(10pm-7am)}$
Living Areas	35-45 dB(A)$L_{eq(anytime)}$
General Office Areas	40-45 dB(A)$L_{eq(when\ in\ use)}$
Conference Rooms	35-40 dB(A)$L_{eq(when\ in\ use)}$
Gym	< 50 dB(A)$L_{eq(when\ in\ use)}$
Restaurants	40-50 dB(A)$L_{eq(when\ in\ use)}$

5.1.4 Summarised External Noise Intrusion Criteria

The internal noise criteria adopted for each internal space is therefore summarised below based on the relevant State, Council and Australian Standard requirements.

Table 4 – Adopted Internal Noise Levels

Space / Activity Type	Required Internal Noise Level
Sleeping Areas	35 dB(A)$L_{eq(10pm-7am)}$
Living Areas	40 dB(A)$L_{eq(anytime)}$
General Office Areas	45 dB(A)$L_{eq(when\ in\ use)}$
Conference Room	40 dB(A)$L_{eq(when\ in\ use)}$
Gym	45 dB(A)$L_{eq(when\ in\ use)}$
Restaurant	50 dB(A)$L_{eq(when\ in\ use)}$

5.2 EXTERNAL NOISE MEASUREMENTS

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

5.2.1 Measurement Equipment

Attended short term measurements of traffic 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.

Unattended noise monitoring was conducting using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to continuously store statistical noise levels as well as audio files 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.

5.2.2 Measurement Location

One unattended noise monitor was located on site with 180 degree view of Lawson Street. Refer to Figure 1 for detailed location.

Two attended noise measurements were conducted along Lawson Street and at the intersection of Lawson Street and High Street. The sound level meter had an unobstructed view of traffic and was approximately 2m from the kerb. Refer to Figure 1 for detailed location.

5.2.3 Measurement Period

Unattended noise monitoring was conducted from Monday 18th of May 2020 to Friday 29th of May 2020. Attended noise measurements were undertaken between the hours of 9:00am and 10:00am on the 29th of May 2020.

5.2.4 Attended Noise Measurements

Attended noise measurements have been summarised below for each location.

Table 5 – Attended Noise Measurement

Location	Measure Noise Level dB(A) $L_{Aeq\ (15\ minute)}$
Lawson Street Measurement was conducted 2m from kerb	62 dB(A)$L_{eq(15min)}$
Intersection of High Street & Lawson Street Measurement was conducted 2m from kerb	68 dB(A)$L_{eq(15min)}$

5.2.5 Unattended Noise Measurements

Attended noise measurements have been summarised below for each location.

Table 6 – Unattended Noise Measurement

Location	Time of Day	Measured Noise Level
Australian Arms Hotel See Figure 1 for details	Daytime 7am – 10pm	61 dB(A) $L_{eq\ (15hr)}$
	Night Time 10pm – 7am	56 dB(A) $L_{eq\ (9hr)}$

5.2.6 Summarised External Noise Levels

The following noise levels for the site have been established based on short term attended measurements and long-term noise monitoring.

Table 7 – Predicted Traffic Noise Levels at Façade

Location	Time of Day	Noise Level – L_{eq}
Level 1 Façade facing Lawson Street	Daytime 7am – 10pm	57 dB(A) $L_{eq\ (15hr)}$
	Night Time 10pm – 7am	52 dB(A) $L_{eq\ (9hr)}$
Ground Level Façade facing Lawson Street	Daytime 7am – 10pm	62 dB(A) $L_{eq\ (15hr)}$
	Night Time 10pm – 7am	57 dB(A) $L_{eq\ (9hr)}$

5.3 RECOMMENDED CONSTRUCTIONS

Assessment of façade requirements to achieve required indoor noise levels have been undertaken. Dimensions of rooms, setbacks of roadways, window openings and floor areas have been utilised.

5.3.1 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. (**Mohair Seals are unacceptable**).

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 detailed in Table 8.

Table 8 – Recommended Glazing Construction

Room	Glazing Thickness	Acoustic Seals
All Hotel Rooms	6.38mm Laminated	Yes
Ground Floor Restaurant	6.38mm Laminated	Yes
Conference Room	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 9 for all areas. 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 9 – Minimum R_w of Glazing Assembly (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
6.38mm Laminated	31

Note: Façade constructions to be reviewed at CC stage based on construction drawings. The glazing types listed above are indicative and for authority approvals purposes only.

5.3.2 External Roof/Ceiling Construction

External roof construction will be constructed from concrete elements, therefore; acoustic upgrading is not required. In the event that any penetrations are required thru the external skin, an acoustic sealant should be used to minimise all gaps.

5.3.3 External Wall Construction

External wall construction will be constructed from of masonry, therefore acoustic upgrading is not required. There should not be vents on the internal skin of external walls. In the event that any penetrations are required thru the external skin, an acoustic sealant should be used to minimise all gaps.

5.3.4 Entry Doors

All doors shall have glazing thicknesses equal to those recommended in Section 5.3.1 and are to have Raven RP10 to the top and sides and Raven RP38 to the underside of a swing door.

Note that mohair seals in windows and doors <u>are not acceptable</u> where acoustic seals are required.

6 NOISE EMISSION CRITERIA

The noise emission from the project site shall comply with the requirements of the following documents.

- Penrith City Council Development Control Plan (DCP) 2014;
- NSW Department of Environment and Heritage, Environmental Protection Agency document – '*Noise Policy for Industry*' (NPI) 2017; and
- NSW Department of Industry – Liquor & Gaming (L&GNSW).

6.1 PENRITH CITY COUNCIL DEVELOPMENT CONTROL PLAN (DCP) 2014

The Penrith City Council (DCP) 2014 does not have any noise emission objectives for commercial premises. Therefore, the NSW Department of Industry Liquor & Gaming (L&GNSW) and NSW EPA Noise Policy for Industry (NPfI) will be adopted.

6.2 NSW LIQUOR AND GAMING (PATRON NOISE)

When assessing noise emissions from licensed premises, noise emissions must comply with the acoustic requirements generally imposed by the NSW L&G. These guidelines relate to noise generated by patrons and by music. The requirements are set out below:

- *The L_{10} noise level emitted from the premises shall not exceed 5dB above the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) between the hours of 7.00am to 12.00 midnight when assessed at the boundary of the nearest affected residential premises.*
- *L_{10} noise level emitted from the premises shall not exceed the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) after midnight when assessed at the boundary of the nearest affected residential premises.*
- *After midnight, noise emissions from the Place of Pubic Entertainment are to be inaudible within any habitable rooms in nearby residential properties.*

The following assessment criteria have been determined based on the noise levels measured. These apply when measured outside the open window of a residential facade.

Table 10 – Noise Emission Objectives Criterion (dB(A) $L_{10,15min}$)

Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
7:00am – 6:00pm (BG+5dB)	62	62	61	53	52	52	48	41	33	**56**
6:00pm – 10:00pm (BG+5dB)	54	54	53	45	44	44	40	33	25	**48**
10:00pm – Midnight (BG+5dB)	51	51	50	42	41	41	37	30	22	**45**
Midnight – 7:00am (BG+0dB)	50	50	49	41	40	40	36	29	21	**44**

6.3 NSW NOISE POLICY FOR INDUSTRY (VEHICLE, PLANT NOISE & PATRON NOISE TO NON-RESIDENTIAL RECEIVERS)

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 both have to be complied with, namely an intrusiveness criterion and an amenity criterion.

6.3.1 Intrusiveness Criterion

Section 2.3: Project Intrusiveness Noise Level

"The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment.

Table 11 – NPfI Project Intrusiveness Criteria

Receiver	Time of day	Background Noise Level dB(A)L_{90}	Intrusiveness Criteria dB(A)$L_{eq(15min)}$
Residential Receivers	Day (7am - 6pm)	51	56
	Evening (6pm - 10pm)	43	48
	Night (10pm - 7am)	39	44

6.3.2 Amenity Criterion

Section 2.4: Amenity Noise Levels and Project Amenity Noise Levels

"To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance.

The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location."

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. The subject site has been assessed against noise emission criteria in accordance with the 'Suburban' category.

Table 12 – NPfI Project Amenity Criteria

Type of Receiver	Time of Day	Recommended Acceptable Noise Level dB(A)$L_{eq(15min)}$
Residential (Urban)	Day (7am - 6pm)	58
	Evening (6pm - 10pm)	48
	Night (10pm - 7am)	43
Commercial	When in Use	63
Place of Worship	When in Use	38 (Internally)

6.3.3 Sleep Disturbance Criterion

The NPfI states the following with regards to sleep disturbance, 'Maximum noise level event assessment':

> *"The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages. Where the subject development/premises night-time noise levels at a residential location exceed:*
>
> - *$L_{Aeq,15min}$ 40 dB(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 the greater,*
>
> *a detailed maximum noise level event assessment should be undertaken.*
>
> *The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy.*
>
> *Other factors that may be important in assessing the extent of impacts on sleep include:*
>
> - *how often high noise events will occur;*
> - *the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development.*
> - *whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)*
> - *current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.*
>
> *Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response.*
>
> *The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels."*

Table 13 – NPfI Sleep Disturbance Criteria

Receiver	Period	Background Noise Level dB(A)L_{90}	Sleep Disturbance Criteria
Residential Receivers	Night 10:00pm – 7:00am	39 dB L_{A90}	44 dB $L_{Aeq,15min}$
			54 dB L_{AFmax}

6.3.4 Summarised Noise Emission Criteria

Noise emission criteria to all residential receivers surrounding the development has been summarised below:

Table 14 – Summarised Noise Emission Criteria (Vehicle & Plant Noise)

Receiver	Time of day	Governing Project Criteria
Residential	Day (7am - 6pm)	56 dB(A) $L_{eq,15min}$
	Evening (6pm - 10pm)	48 dB(A) $L_{eq,15min}$
	Night (10pm - 7am)	43 dB(A) $L_{eq,15min}$
		54 dB(A) L_{Fmax}
Commercial	When in Use	63 dB(A) $L_{eq,15min}$
Place of Worship	When in Use	38 (Internally) $L_{eq,15min}$

Table 15 – Summarised Noise Emission Criteria (Patron Noise)

Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
7:00am – 6:00pm (BG+5dB)	62	62	61	53	52	52	48	41	33	**56**
6:00pm – 10:00pm (BG+5dB)	54	54	53	45	44	44	40	33	25	**48**
10:00pm – Midnight (BG+5dB)	51	51	50	42	41	41	37	30	22	**45**
Midnight – 7:00am (BG+0dB)	50	50	49	41	40	40	36	29	21	**44**

In addition to complying with this spectrum after midnight, the noise source must be inaudible within any habitable rooms in nearby residential properties.

6.4 NOISE EMISSION FROM RESTAURANT AND LOUNGE BAR

The proposed Australian Arms Hotel comprises of a lounge bar and licenced restaurant located along the western boundary of the project site. The lounge bar and restaurant is assumed to have amplified music playing and patrons are expected to predominantly be seated in this area. For the purposes of this assessment, the following will be assumed:

- The average sound power per patron is 80dB(A)L_{10}, with one in every two patrons speaking at once.
- Lounge bar and restaurant operating with 200 patrons.
- Music (amplified) is played at background noise levels, (sound pressure of 70dB(A)L_{10}. No amplified or live music is permitted in any of the external areas.
- Music (amplified) is not permitted in any external areas.
- No operation of lounge bar after midnight and before 7am.
- The external façade (windows/doors) is to be closed at all times with the exception of ingress and egress.
- If the restaurant is to operate during the night time period, no music (amplified) is to be played internally and/or externally.
- All recommendations outlined in section 7 of this report have been implemented.

6.4.1 Predicted Patron & Music Noise Levels to All Receivers

The predicted noise levels from patron use of the proposed licenced restaurant and lounge bar is presented in the following tables. Predicted noise levels consider size of dining areas, areas of building openings on the facades and distance to nearby receivers.

Table 16.1 -Predicted Patron Noise Emissions to Hotel Room Receivers – 10pm to Midnight

Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Predicted Noise Level	41	41	44	39	38	37	37	25	22	42
10:00pm – Midnight Criteria	51	51	50	42	41	41	37	30	22	**45**
Complies	✓	✓	✓	✓	✓	✓	✓	✓	✓	Yes

Table 16.2 -Predicted Patron Noise Emissions to Hotel Room Receivers – 12am to 7am

Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Predicted Noise Level	15	15	20	31	36	37	36	24	29	42
10:00pm – Midnight Criteria	50	50	49	41	40	40	36	29	21	**44**
Complies	✓	✓	✓	✓	✓	✓	✓	✓	✓	Yes

Table 17.1 -Predicted Patron Noise Emissions to Residential Receiver 1 – 10pm to Midnight

Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Predicted Noise Level	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
10:00pm – Midnight Criteria	51	51	50	42	41	41	37	30	22	**45**
Complies	✓	✓	✓	✓	✓	✓	✓	✓	✓	Yes

Table 17.2 -Predicted Patron Noise Emissions to Residential Receiver 1 – 12am to 7am

Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Predicted Noise Level	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
12:00am – 7:00am	50	50	49	41	40	40	36	29	21	**44**
Complies	✓	✓	✓	✓	✓	✓	✓	✓	✓	Yes

Table 18 -Predicted Patron Noise Level (Commercial Receivers)

Noise Source	Receiver Location	Predicted Noise Level dB(A)$L_{eq(15min)}$	EPA NPI Criteria dB(A)$L_{eq(15min)}$	Complies?
Patron Noise & Background Music	C1	<20	≤ 63	Yes
	C2	<20	≤ 63	Yes
	C3	31	≤ 63	Yes
	C4	32	≤ 63	Yes
	C5	31	≤ 63	Yes

Table 19 -Predicted Patron Noise Level (Place of Worship)

Noise Source	Receiver Location	Predicted Noise Level (Internal) dB(A)$L_{eq(15min)}$	EPA NPI Criteria (Internal) dB(A)$L_{eq(15min)}$	Complies?
Patron Noise & Background Music	PW1	<20	≤ 38	Yes

Noise emissions to places of worship are predicted to internal areas. Typically, a reduction of 10 dB(A) from external noise levels to internal spaces is used which is a conservative estimate. This recommended reduction has been used to calculate the internal noise levels within the place of worship located at 326 High Street, Penrith.

6.5 NOISE EMISSIONS FROM CONFERENCE CENTRE AND PRE-FUNCTION ROOM

The proposed development comprises of a conference centre and pre function room located to the west on level 1. The acoustic environment within these areas are assumed to be predominantly from speech noise. For the purposes of this assessment, the following will be assumed:

- The average sound pressure level within the conference and function room will be 85 dB(A)L_{eq}.
- Conference centre and pre-function room will not be operational from 10:00pm to 7am
- All recommendations in Section 7 are implemented.

6.5.1 Predicted Noise from Conference Centre to All Receivers

The predicted noise levels from patron use of the proposed conference centre and pre-function room is presented in the following tables. Predicted noise levels consider size of building openings on the facades and distance to nearby receivers.

Table 20 – Predicted Conference Centre and Pre-Function Room Noise Levels

Receiver	Time of day	Predicted Noise Levels dB $L_{Aeq,15min}$	Criteria dB $L_{Aeq,15min}$	Complies
Level 1 Hotel Rooms with façade along Lawson Lane	Evening (6pm – 10pm)	47	≤ 48	Yes
R1	Evening (6pm – 10pm)	<20	≤ 48	Yes
C1	When in use	44	≤ 63	Yes
C2	When in use	<20	≤ 63	Yes
C3	When in use	37	≤ 63	Yes
C4	When in use	38	≤ 63	Yes
C5	When in use	38	≤ 63	Yes
PW1	When in use	<20	≤ 38 (Internal)	Yes

6.6 VEHICLE NOISE

6.6.1 Loading Dock

The proposed development has an internal loading dock located on the northern boundary of the building. This is expected to be used by food delivery trucks, vans, garbage trucks and other services. Of these, the garbage truck utilising the loading dock will be the loudest activity and therefore will be used as the worst case for the purposes of this assessment.

In addition to the above, the following will be assumed:

- The garbage truck has a sound power level of 105dB(A)L_{eq}.
- Garbage trucks and other heavy vehicles will not use the loading dock between the hours of 6:00pm and 7:00am.
- All recommendations outlined in section 7 of this report have been implemented.

6.6.2 Car Park

The proposed development comprises of 2 levels of basement parking with access along Lawson Lane at the northern boundary of the site. For the purposes of this assessment, the following is assumed:

- All vehicles are travelling at 10km/hr while entering and exiting the car park.
- Each vehicle has a sound power level of 84dB(A)L_{eq}.
- A person slamming a vehicle door has a sound power level of 92dB(A)L_{max}.
- A car starting has a sound power level of 91dB(A)L_{max}.
- Half capacity of the carpark enter/leave in a period of 1 hour.
- Car park will be operational during all time periods.
- All recommendations outlined in section 7 of this report have been implemented.

6.6.3 Cumulative Predicted Vehicle Noise Levels

The predicted noise levels from patron use of the proposed licenced restaurant and lounge bar is presented in the following tables. Predicted noise levels consider size of building openings on the facades and distance to nearby receivers.

6.6.3.1 Vehicle Movement Noise Predictions dB(A)Leq

Table 21 – Predicted Vehicle Movement Noise Levels

Receiver	Time of day	Predicted Noise Levels dB $L_{Aeq,15min}$	Criteria dB $L_{Aeq,15min}$	Complies
Hotel Rooms with façade along Lawson Lane	Day (7am – 6pm)	53	≤ 56	Yes
	Evening (6pm – 10pm)	41	≤ 48	Yes
	Night (10pm - 7am)	41	≤ 43	Yes

Table 22 – Predicted Vehicle Movement Noise Levels (Cont.)

Receiver	Time of day	Predicted Noise Levels dB $L_{Aeq,15min}$	Criteria dB $L_{Aeq,15min}$	Complies
R1	Day (7am – 6pm)	<20	≤ 56	Yes
	Evening (6pm – 10pm)	<20	≤ 48	Yes
	Night (10pm - 7am)	<20	≤ 43	Yes
C1	When in use	<20	≤ 63	Yes
C2	When in use	49	≤ 63	Yes
C3	When in use	49	≤ 63	Yes
C4	When in use	46	≤ 63	Yes
C5	When in use	47	≤ 63	Yes
PW1	When in use	<20	≤ 38 (Internal)	Yes

6.6.3.2 Sleep Disturbance Predictions dB(A)Lmax

Table 23 – Sleep Disturbance Noise Levels

Receiver	Time of day	Predicted Noise Levels dB L_{AFmax}	Criteria dB L_{AFmax}	Complies
R1	Night (10pm - 7am)	21	≤ 54	Yes
Hotel Rooms	Night (10pm - 7am)	51	≤ 54	Yes

6.7 GYM OPERATION NOISE

The proposed development has an internal gym on level 1 located at the eastern boundary of the site. The acoustic environment within this areas is assumed to be predominantly from speech noise and background music noise. Given the varied nature of any future gym operation (i.e. bodybuilding/personal training/crossfit etc) it is not possible to conduct a suitably detailed assessment. A preliminary assessment is presented with the typical noise sources. For the purposes of this assessment, the following will be assumed:

- Background amplified music with a sound power level of 75 dB(A)$L_{eq(15min)}$.
- The façade is closed at all times.
- Any impact noise transmission from activities within the gym will vary depending on the type of operation proposed. An assessment of impact noise transmission is to be undertaken by the operator prior to CC.
- All recommendations in Section 7 are implemented.

6.7.1 Predicted Noise Levels

The predicted noise levels from operation is presented in the following tables. Predicted noise levels are based on the dimensions of the building, distance attenuation, noise transmission characteristics of building materials and barrier effects where applicable.

Table 24 – Predicted Gym Noise Levels

Receiver	Time of day	Predicted Noise Levels dB $L_{Aeq,15min}$	Criteria dB $L_{Aeq,15min}$	Complies
Hotel rooms directly above gym	Evening (6pm – 10pm)	27	≤ 48	Yes
	Night (10pm - 7am)	27	≤ 43	Yes
C1	When in use	25	≤ 63	Yes
C2	When in use	21	≤ 63	Yes

6.8 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 to the closest residential receiver should comply with the requirements outlined in Section 5 of this report, and should be reviewed at CC stage, once equipment selections have been made.

7 RECOMMENDATIONS

The following is recommended to achieve the noise levels detailed in Section 6

7.1 RESTAURANT & LOUNGE BAR

- Patron numbers within the lounge bar and restaurant are not to exceed 200.
- Lounge bar is not to operate from midnight to 7:00am unless subject to an additional noise impact assessment.
- Restaurant may be operational within the night time period provided that there is no amplified music internally or externally.
- Amplified music generally within the venue is to be background only, with a maximum sound pressure level of 70 dB(A) $L_{10(15min)}$.
- Music is not to be played in any external areas.
- All glazing elements will be constructed from minimum 6.38mm laminated glazing with acoustic seals. Minimum R_w of 31.
- The external façade (windows/doors) is to be closed at all times with the exception of ingress and egress.
- Signs are to be displayed at the entry / exit of the venue reminding patrons to minimise noise when departing the premises, especially after 10pm. It is noted that existing staff and security arrangements for the site would be able to enforce the above.

7.2 LOADING DOCKS & VEHICLE MOVEMENTS

- Loading dock shall not be used by heavy vehicles between the hours for 6:00pm and 7:00am. It is recommended that deliveries using heavy vehicles or garbage collected be scheduled during the day time period from 7am to 6pm.
- Vehicle engines should be switched off during loading and unloading within the dock.
- The car park is to be sign posted within a speed limit of no more than 10km/hr.
- Car park may remain operational during all time periods.

7.3 GYM OPERATIONS

- Background amplified music is not to exceed a sound power level of 75 dB(A)$L_{eq(15min)}$.
- All glazing elements will be constructed from minimum 6.38mm laminated glazing with acoustic seals. Minimum R_w of 31.
- The external façade (windows/doors) is to be closed at all times.

- Once gym operation and activities are confirmed, appropriate flooring treatment is to be determined to ensure that the acoustic criteria detailed in Section 5 are achieved. Indicative flooring requirements are discussed below:
    - Typical gym areas (i.e. walkways, amenities, reception etc) to incorporate minimum 3mm rubber underlay (Acoustic Supplies Vibramat, or equivalent).
    - Rowing/Running machines and similar to be mounted using Embelton NRD mount or equivalent.
    - Weights areas:
        - Free weights areas to have a vibration isolated floor system. This is to consist of multiple layers rubber flooring (indicatively 75mm thick) or a cfc or plywood platform vibration isolated from the building structure using Embelton Spring mounts (25mm static deflection) or similar. Sample testing on site will be required to determine the extent of flooring.
        - Other weights areas (pin loaded or similar) should incorporate a spring vibration isolator below the weight stack or should be located on a vibration isolated platform similar to the free weights area.
        - Gym staff to ensure that careless usage of weights (drop from knee of similar) is minimised through management (membership cancellation etc).
    - Sample testing of proposed activities/sample floor finishes and a review of the operators management plan is to be reviewed by the project acoustic consultant prior to tenancy fit out/operation.

7.4 CONFERENCE CENTRE & PRE-FUNCTION ROOM

- The average sound pressure level within the conference room and pre-function room is not to exceed 85 dB(A)L_{eq}.
- All glazing elements will be constructed from minimum 10.38mm laminated glazing with acoustic seals. Minimum R_w of 35.
- The external façade (windows/doors) is to be closed at all times with the exception of ingress and egress.
- Entry doors should be minimum 10.38mm glazing with acoustic seals around perimeter
- The conference centre and the pre-function room shall not operate between the hours of 10:00pm and 7:00am.

7.5 MECHANICAL PLANT

- Any additional mechanical plant that may be proposed to service the premises are to be assessed with reference to the NSW EPA Noise Policy for Industry. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels.

8 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with Australian Arms Hotel located at 351 High Street, Penrith.

Provided that the recommendations presented in Section 7 are adopted, internal noise levels for the development will comply with the acoustic requirements of the following documents:

- Penrith City Council Development Control Plan (DCP) 2014;
- Australian Standard AS2107:2016 – '*Recommended Design Sound Levels and Reverberation Times for Building Interiors*';
- NSW Department of Planning's – 'Developments near Rail Corridors or Busy Roads – Interim Guideline;'

External noise emissions criteria have been established in this report to satisfy the requirements from the following documents provided that the recommendations presented in Section 7 are adopted:

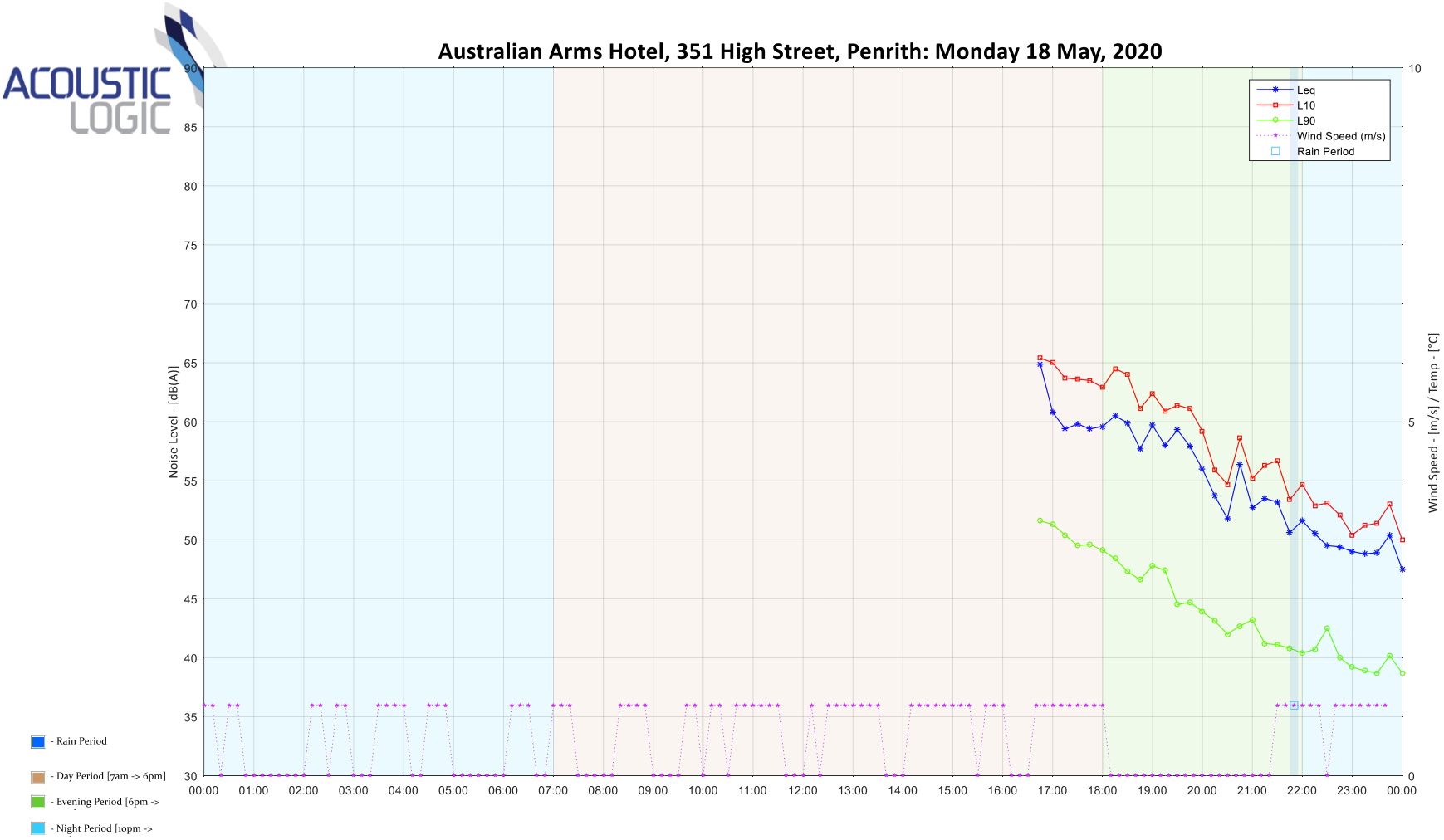
- Penrith City Council Development Control Plan (DCP) 2014;
- NSW Department of Industry – Office of Liquor & Gaming (OLGR); and
- NSW Department of Environment and Heritage, Environmental Protection Agency document – '*Noise Policy for Industry*' (NPI) 2017.

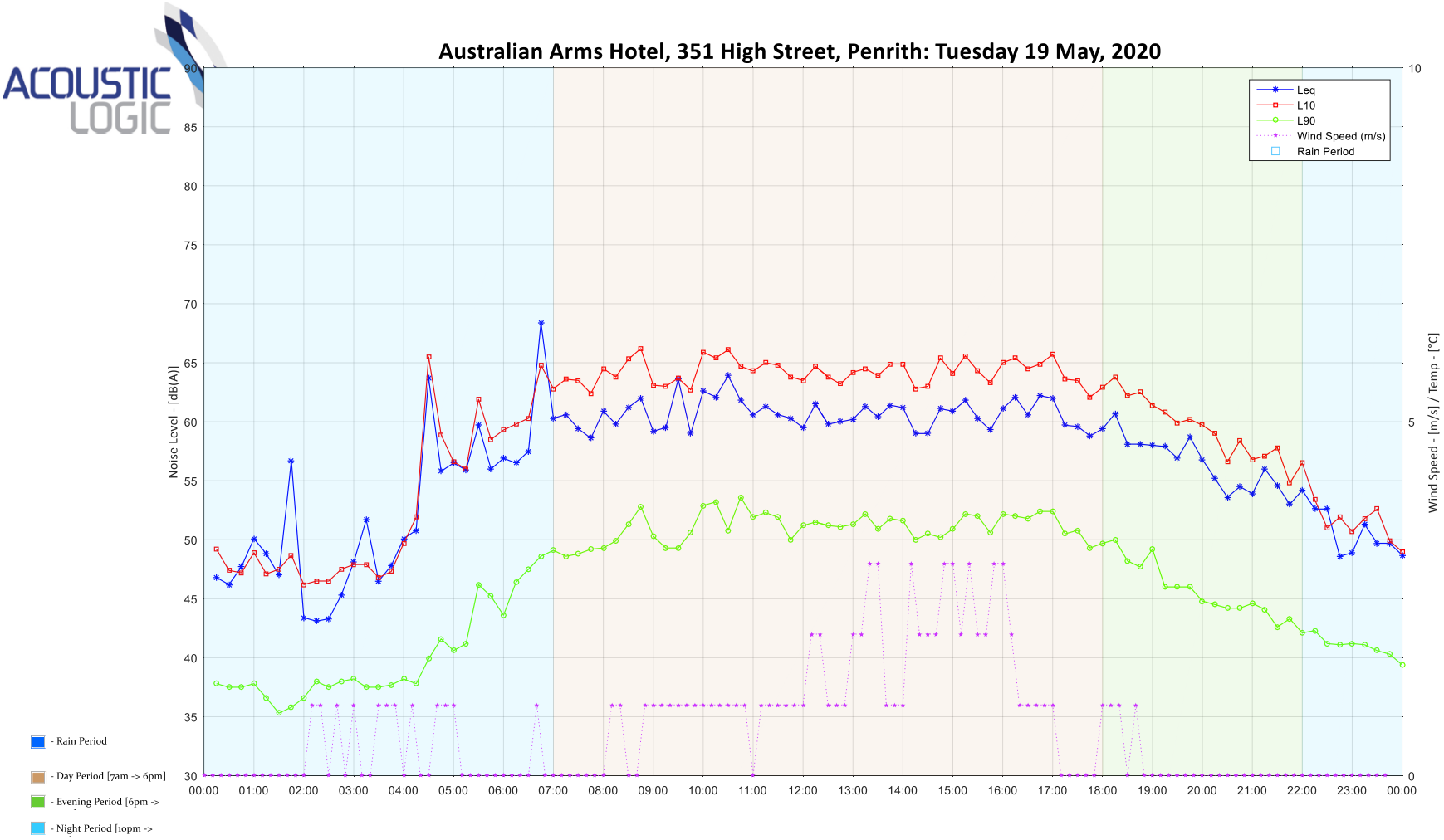
We trust this information is satisfactory. Please contact us should you have any further queries.

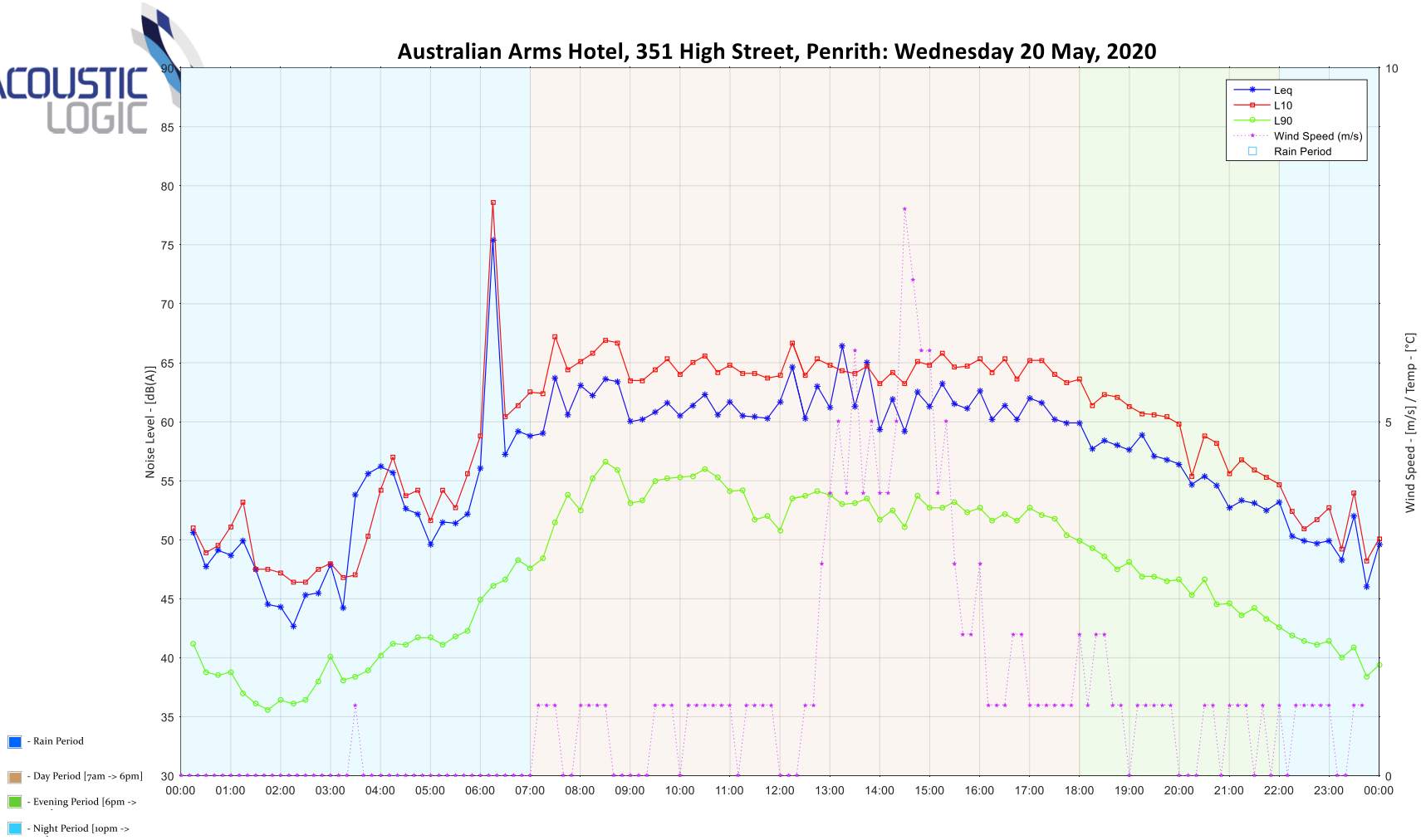
Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Myck Bambalan

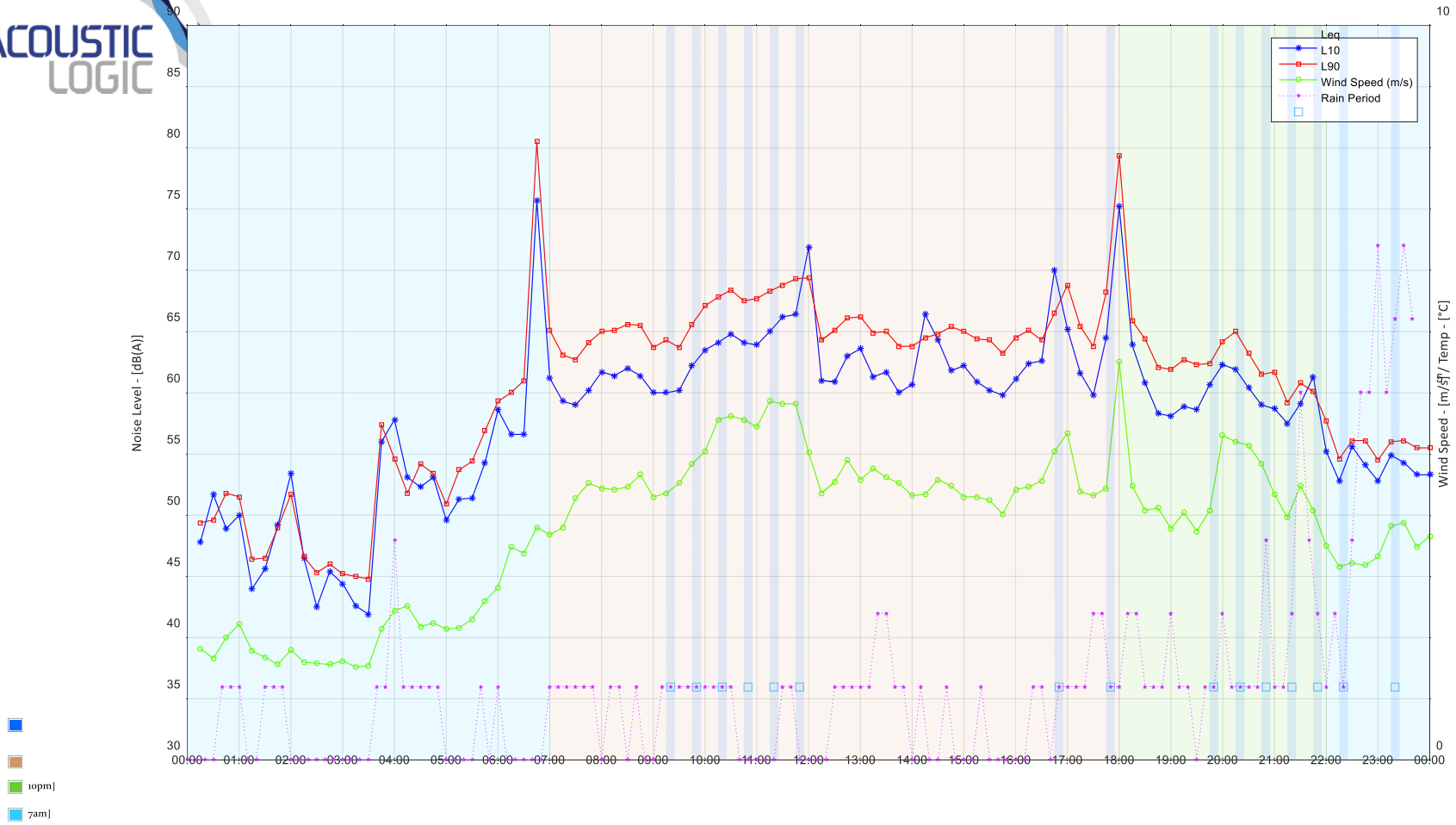
APPENDIX 1 – UNATTENDED NOISE MONITORING

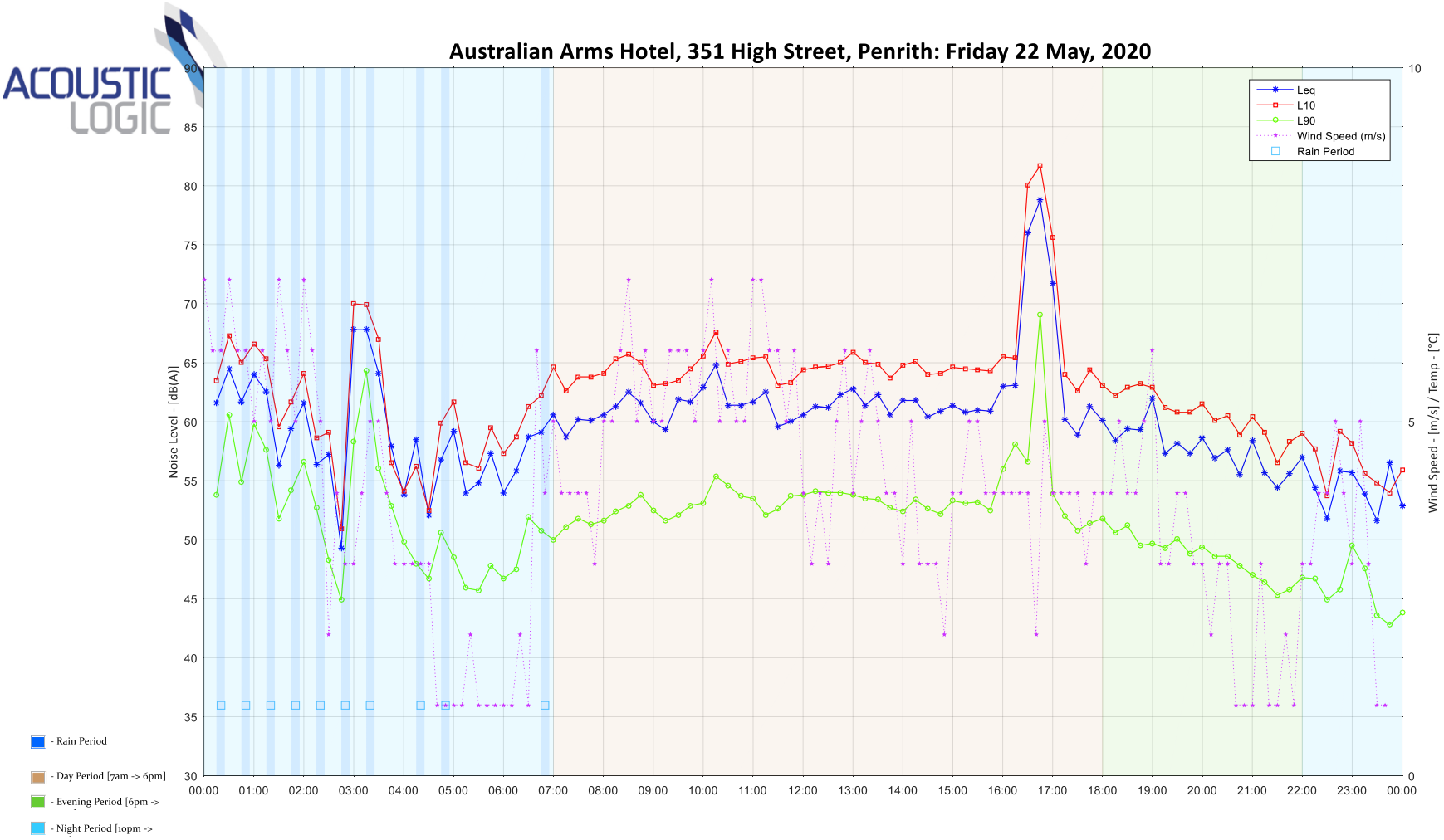


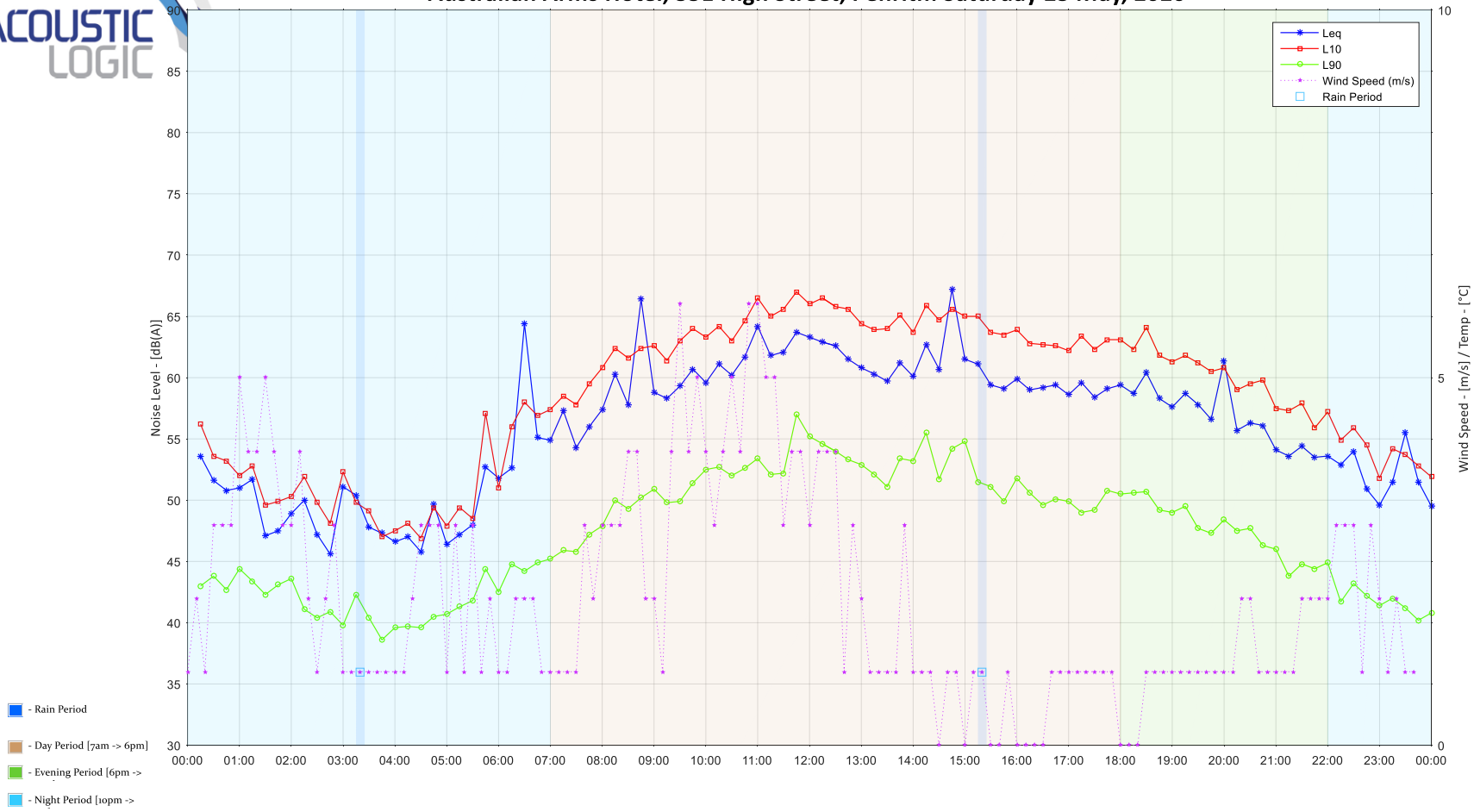


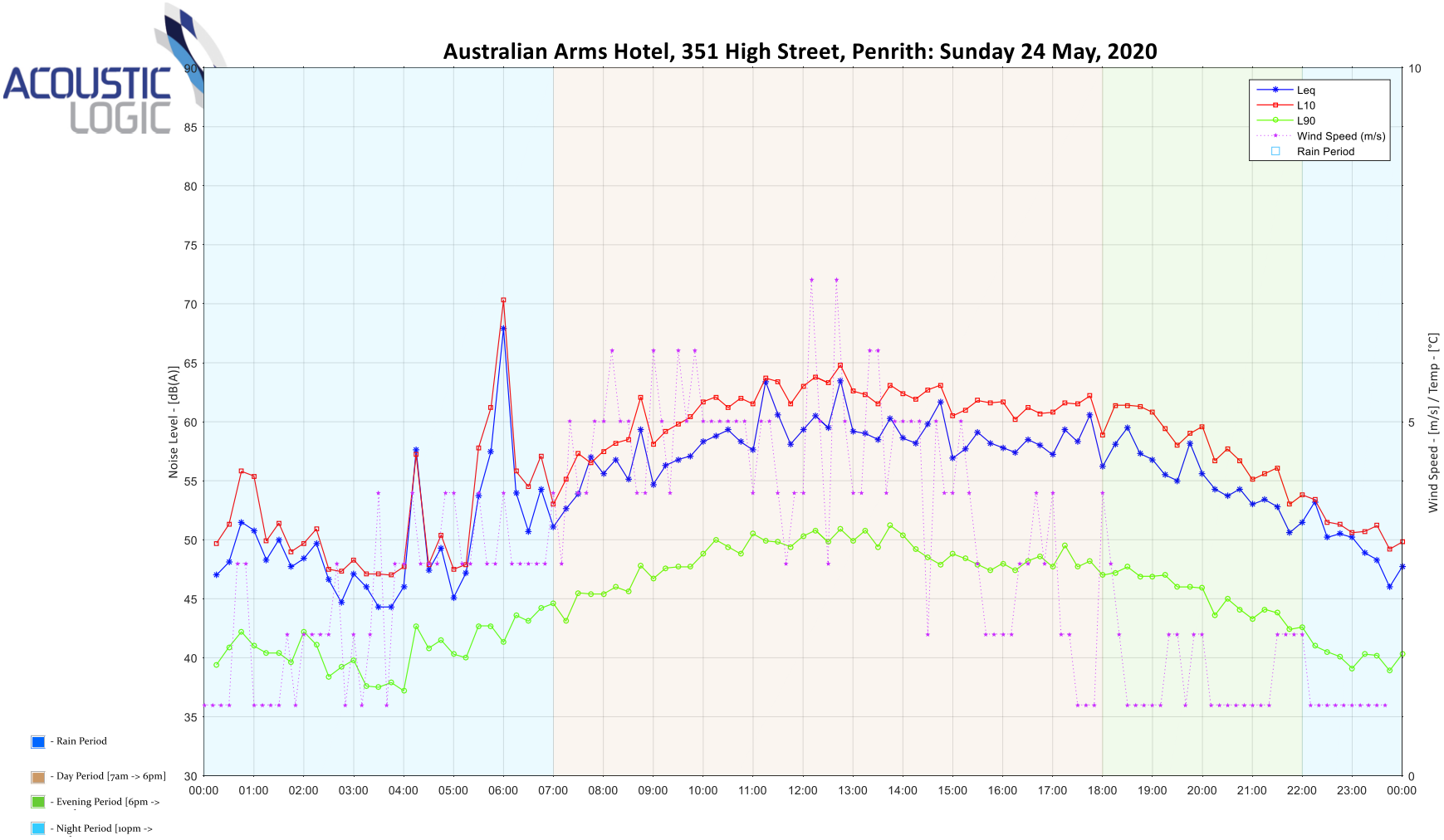


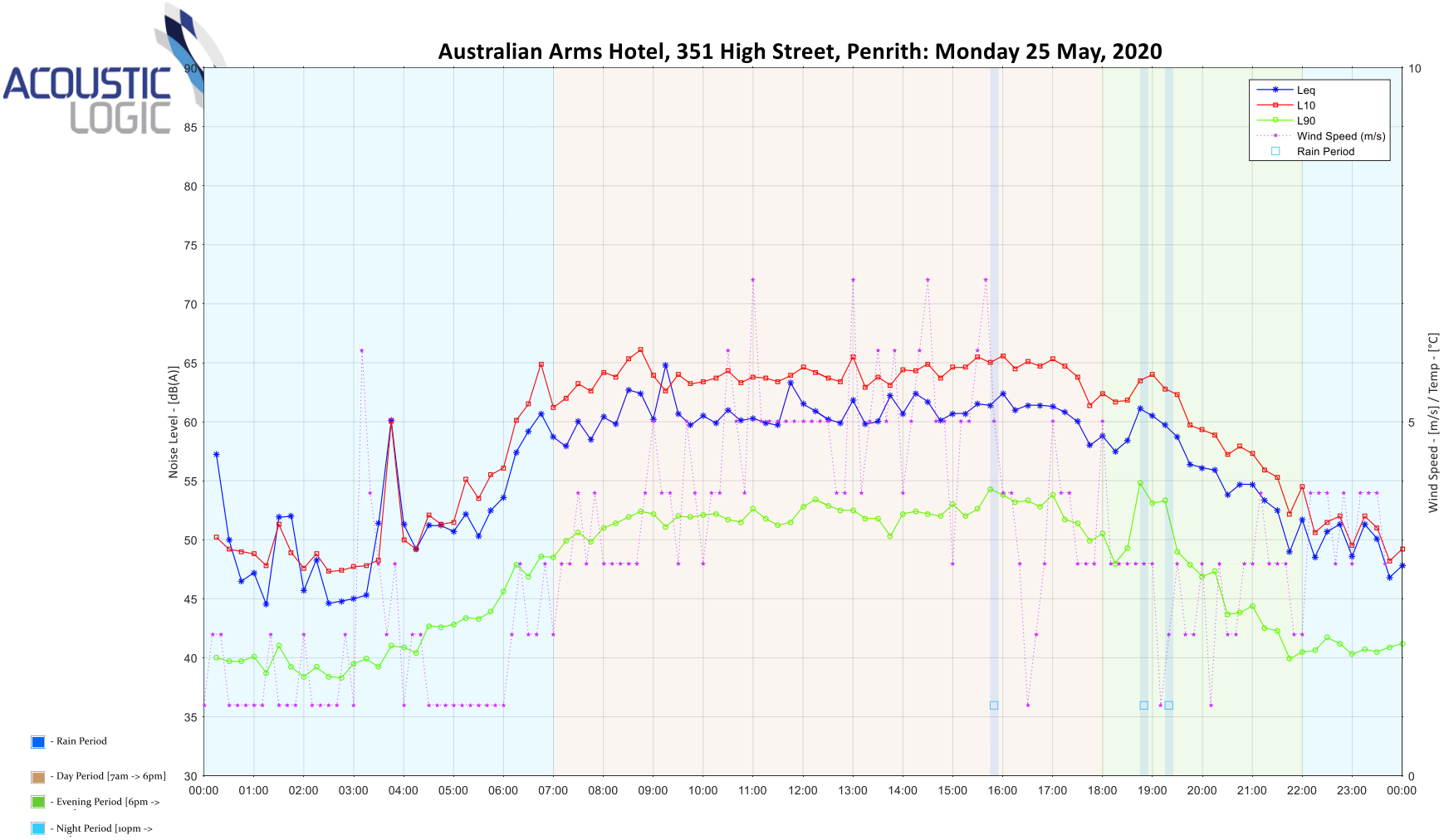
Australian Arms Hotel, 351 High Street, Penrith: Thursday 21 May, 2020

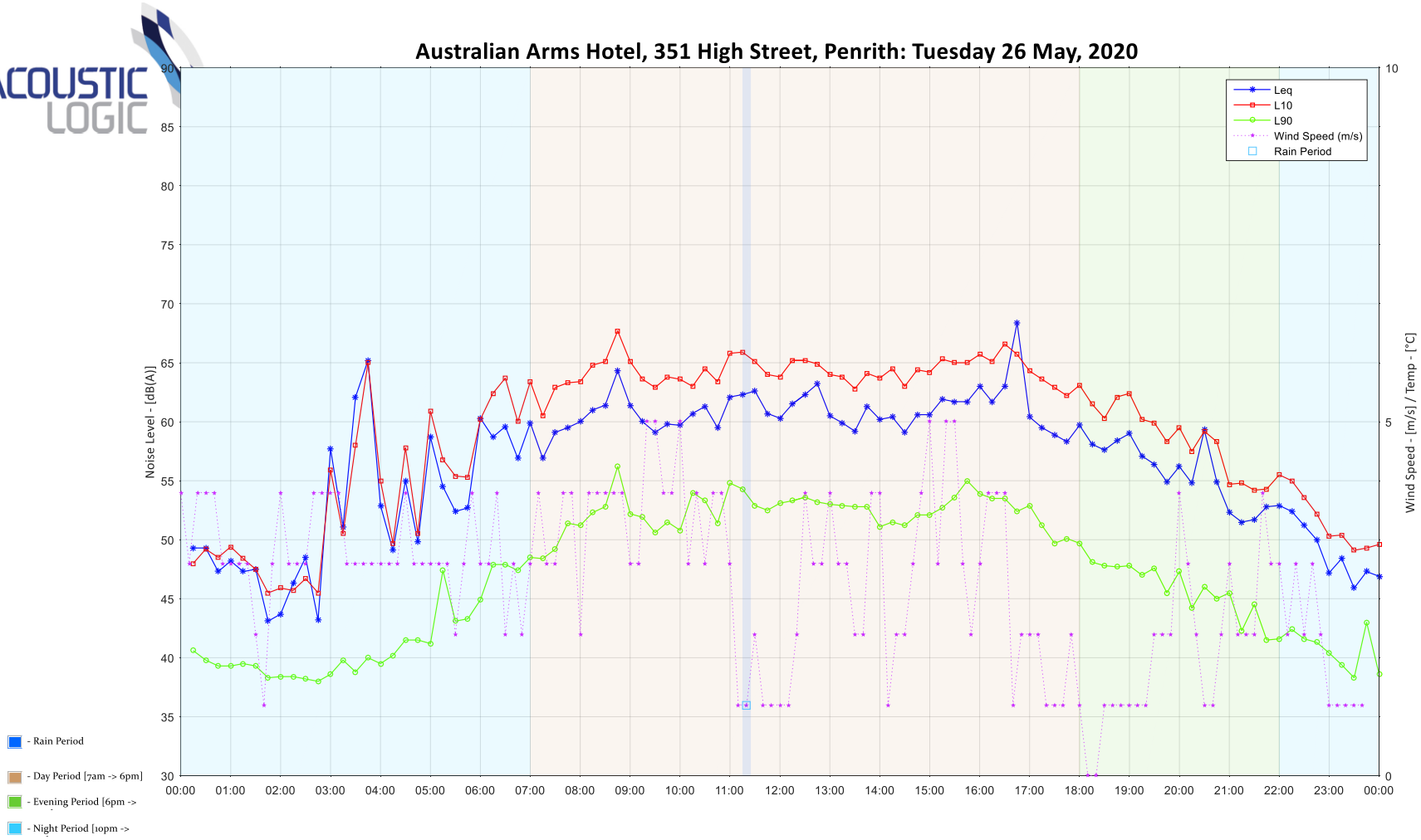


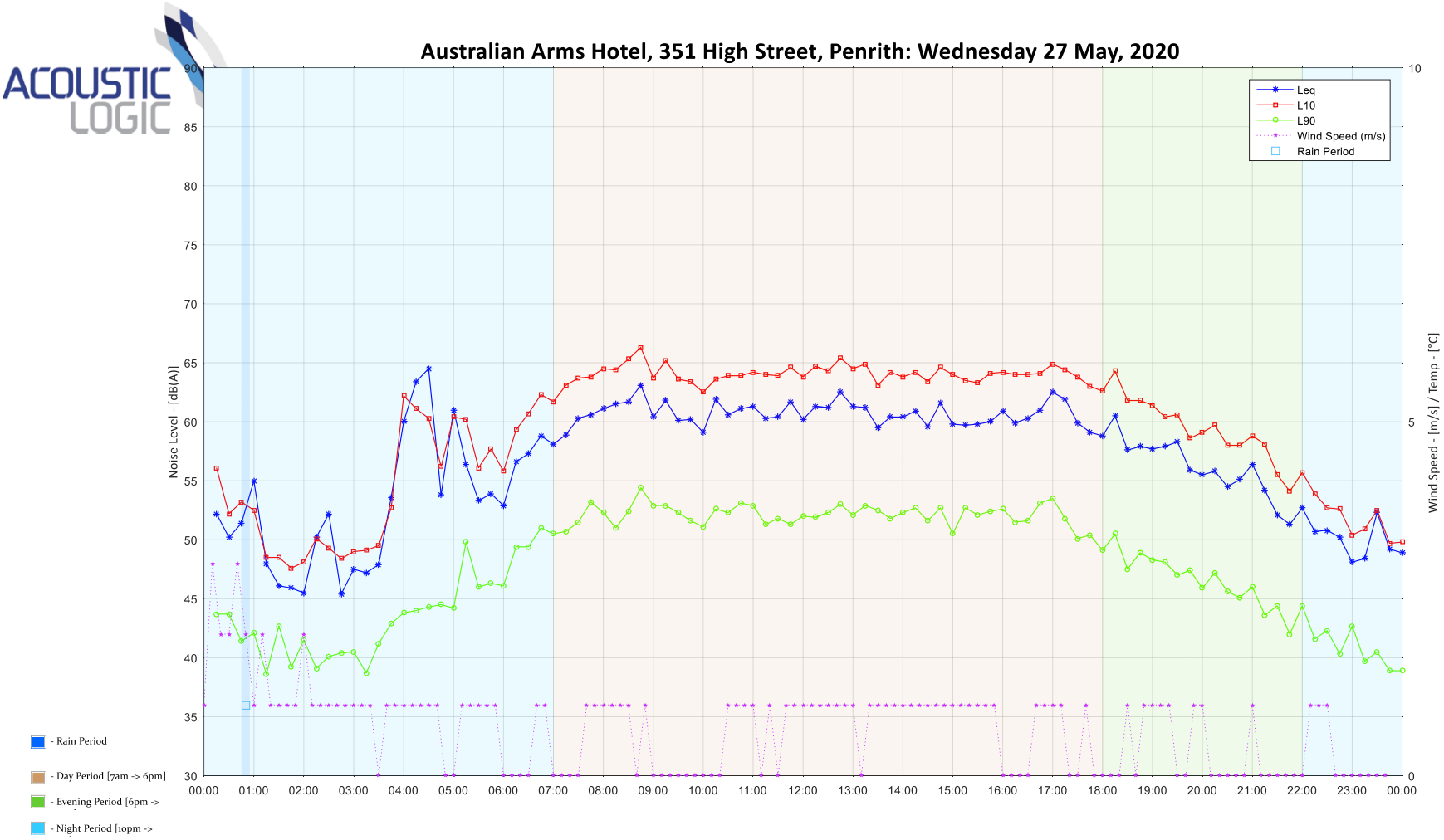


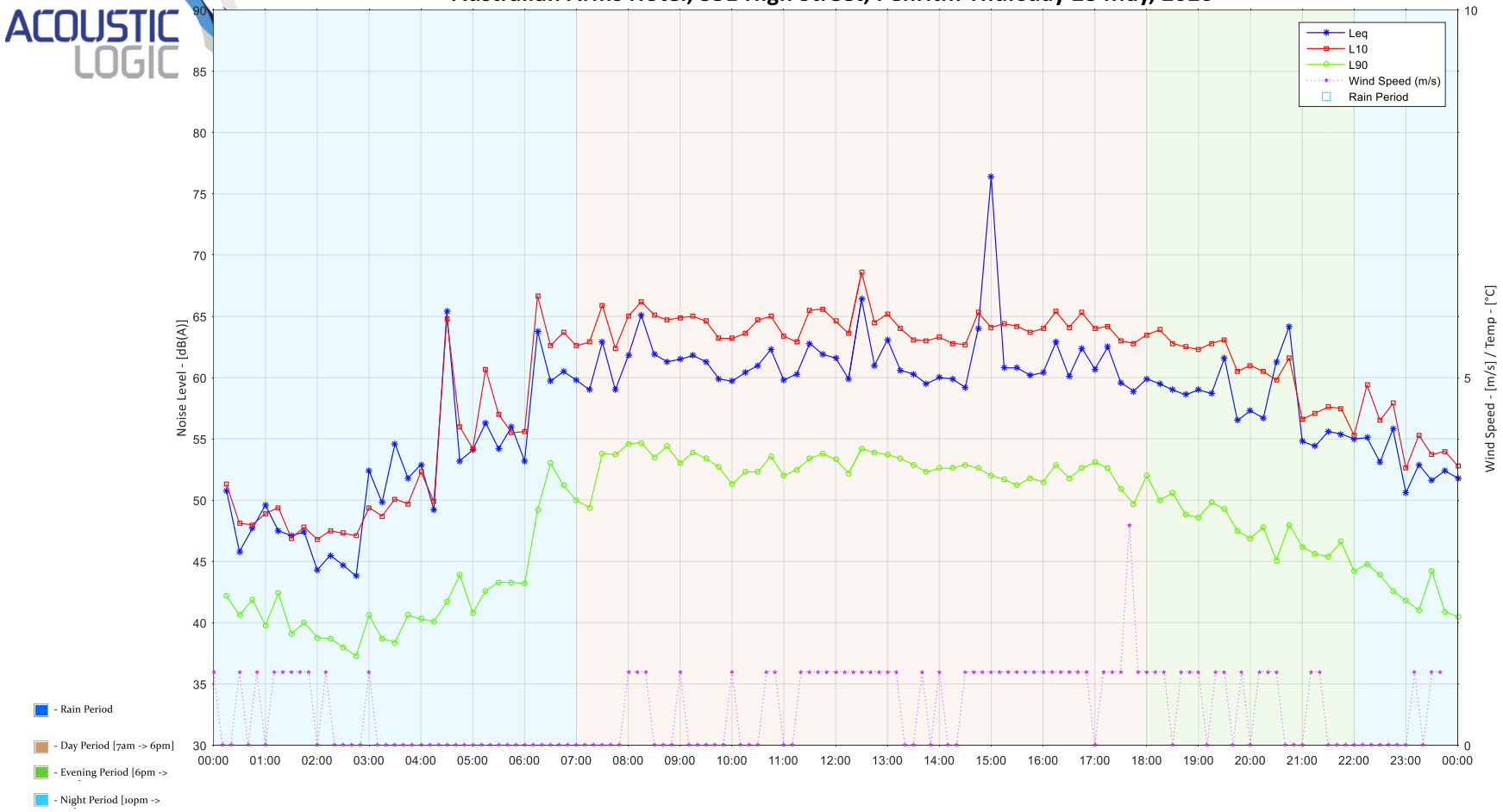












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