MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

42 Honeysuckle Drive, Newcastle

Revised DA Acoustic Assessment

SYDNEY
9 Sarah St
MASCOT NSW 2020
(02) 8339 8000

ABN 11 068 954 343
www.acousticlogic.com.au

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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 proposed mixed-use development including commercial/retail uses and hotel accommodation to be constructed at 42 Honeysuckle Drive, Newcastle. This assessment is to accompany an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD-10378).

The following documents have been referenced in our assessment of noise and vibration associated with the development:

- NSW Department of Planning & Environment *Planning Secretary's Environmental Assessment Requirements (SEAR's) (Application Number: SSD-10378, dated 6th November 2019);*
- Newcastle City Council *Development Control Plan (DCP) 2012;*
- NSW Environmental Protection Authority (EPA) *Noise Policy for Industry (NPfI) 2017;* and
- NSW EPA *Interim Construction Noise Guideline (ICNG) 2009.*

This assessment has been conducted using the Bates Smart Architects architectural drawings, 18th September 2020 for DA submission.

The proposed development will consist of the following:

- Parking from Ground to Third Floor.
- Commercial (Gym and Café) tenancies on Ground Floor;
- Hotel Lounge and Library on First Floor.
- Hotel accommodation from Third to Eighth Floor;
- Commercial (Office) tenancies from First to Eighth Floor (excluding Third floor);
- Hotel Bar on First Floor.

2 RESPONSE TO SEARS

The environmental noise and vibration assessment is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD-10378. The table below identifies the SEARs that have been issued to the development located at 42 Honeysuckle Drive, Newcastle, as of 6th November 2019. The relevant section reference within this report has also been provided.

Table 1 – SEAR's and Relevant Reference

SEAR's Item	Report Reference
6. Noise The EIS shall:	
• Identify any sensitive receivers to noise in the vicinity of the site	Section 3
• Identify the main noise generating sources and activities at all stages of construction, and any noise sources during operation	Section 7
• Outline measures to minimise and mitigate the potential noise impacts on surrounding occupiers of land	Section 6 and 7
• Identify the likely noise impacts and acoustic measures required to ensure acceptable internal amenity, noting the proximity to the operational areas of the Port of Newcastle.	Section 5

This report will address the following, based on the requirements above:

- Assessment of external noise impacts on the development (traffic and environmental noise), and building shell treatment required (external walls, roof/ceiling and glazing thickness) to control internal noise levels.
- Establish noise emission goals and provide recommendations of building treatments and/or management controls to ensure noise from the operation of the site and base building mechanical services (in principle) are compliant with the NSW EPA *Noise Policy for Industry*.
- Identify EPA and Australian Standard criteria for noise and vibration impacts associated with construction works for the proposed development.

3 SITE DESCRIPTION

The project site for the proposed mixed-use development is 42 Honeysuckle Drive, Newcastle. Onsite acoustic investigation has been carried out by this office regarding the surrounding acoustic environment around the project site, which has been detailed below.

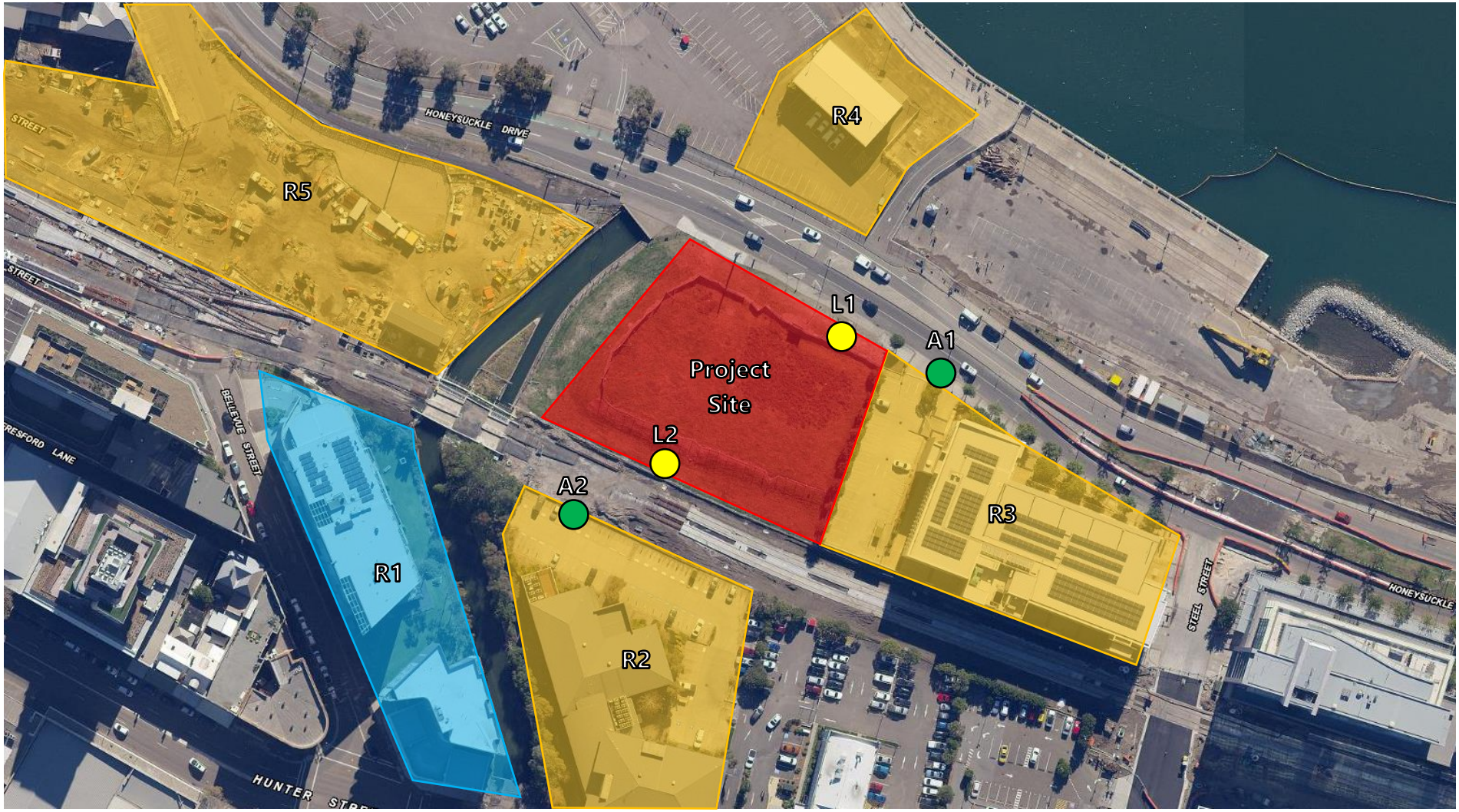
- Honeysuckle Drive along the northern boundary of the project site, with existing parking/commercial facilities further north of Honeysuckle drive. The Port of Newcastle is beyond this.
- Existing multi-storey commercial building located along the eastern boundary with the associated on-grade carpark located between the proposed building and the adjacent commercial building.
- Newcastle Light Rail System located along the southern boundary of the site with multi-storey residential/commercial buildings located beyond this.
- Newcastle Light Rail stabling yard located to the west of the site separated by a water canal connecting to the Port of Newcastle.

Honeysuckle Drive carries a low to medium volume of traffic, and Newcastle Light Rail network has a light rail movement approximately every twelve to eight minutes.

The nearest noise sensitive receivers surrounding the project site include:

- **Receiver R1** – Existing residential flat building located at 25 Bellevue Street, Newcastle, situated south-west of the project site across the Newcastle Light Rail line.
- **Receiver R2** – Existing commercial building located at 710 Hunter Street, Newcastle, situated south of the project site across the Newcastle Light Rail Line.
- **Receiver R3** – Existing commercial building located at 36 Honeysuckle Drive, Newcastle, situated along the eastern common boundary of the project site.
- **Receiver R4** – Existing commercial building located at 50 Honeysuckle Drive, Newcastle, situated north of the project site across Honeysuckle Drive.
- **Receiver R5** – Newcastle Light Rail Stabling Yards located to the west of the site, separated by a water canal.

A site map with the locations of the receivers detailed above is shown in Figure 1.



Unattended Noise Monitor

Attended Noise Measurement

Figure 1 – Site Map and Receiver Locations
Sourced from SixMaps NSW

Residential Receiver

Commercial Receiver

Project Site

4 EXISTING ACOUSTIC ENVIRONMENT

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

The L_{90} measurement parameter is a statistical level that represents the average minimum noise levels over the measurement intervals.

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.

4.1 BACKGROUND NOISE LEVELS

Long term unattended noise monitoring was conducted to quantify the existing acoustic environment at the site.

4.1.1 Measurement Equipment

Unattended noise monitoring for background noise levels was conducted using one 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 of the measurement period using a Rion NC-73 calibrator; no significant drift was detected at the end of the measurement period. All measurements were taken on A-weighted fast response mode.

4.1.2 Measurement Location

The noise monitor was installed on the southern boundary of the project site in direct line of sight of the metro line. Refer to Logger Location L2 in Figure 1 for more detail.

4.1.3 Measurement Period

Unattended noise monitoring was conducted from Thursday 8th October 2020 to Thursday 15th October 2020.

4.1.4 Measured Background Noise Levels

The measured Rating Background Noise Level (RBL) is presented in the table below. Where adverse weather (rain or wind speeds greater than 5m/s) was observed, affected data was removed when obtaining the rating background noise levels. We note that this typically did not occur during the most quiet periods of the day.

Table 2 – Unattended Noise Monitoring RBL Results

Logger Location	Time of Day	Measured Rating Background Noise Level dB(A)$L_{90(period)}$
Logger Location L1 – Northern Boundary of 42 Honeysuckle Drive, Newcastle	Day (7:00am-6:00pm)	$50^{(1)}$ **corrected to 49**
	Evening (6:00pm-10:00pm)	45
	Night (10:00pm-7:00am)	39
Logger Location L2 - Southern Boundary of 42 Honeysuckle Drive, Newcastle	Day (7:00am-6:00pm)	$48^{(1)}$ **corrected to 48**
	Evening (6:00pm-10:00pm)	46
	Night (10:00pm-7:00am)	39

Table Notes:

1. This office has been advised that construction activities were undertaken on the project site during the day during the monitoring period (typically 7am-5pm Monday to Friday, 8am-1pm Saturdays). On this basis, noise levels outside of these times during the shoulder periods of the Day have been adopted to obtain a rating background noise level, as presented in the table above.

5 NOISE INTRUSION ASSESSMENT

5.1 NOISE INTRUSION CRITERIA

The major external noise sources impacting the project site is traffic noise from Honeysuckle Drive, rail noise from the adjacent light rail network and environmental noise from the nearby operational harbour. A noise intrusion assessment of these external sources has been conducted based on the requirements of the following standards/guidelines:

- Newcastle City Council *Development Control Plan (DCP) 2012*.
- Australian Standard AS2107:2016 *Recommended Design Sound Levels and Reverberation Times for Building Interiors*.

5.1.1 Newcastle City Council Development Control Plan (DCP) 2012

Section 3.09 of the Newcastle City Council DCP states that no specific controls are applicable for tourist and visitor accommodation (including hotel or motel accommodation).

We note that the NSW Department of Planning and Environment *State Environmental Planning Policy (Infrastructure) 2007* is applicable to residential development, but not for hotel accommodation. As such, the recommended design sound levels in the Australian Standard AS2107:2016 *Recommended design sound levels and reverberation times for building interiors* will be adopted, detailed below.

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

The standard specifies allowable internal noise levels for internal spaces within buildings based on the building type and type of occupancy/activity.

As per Table 1 in Section 5 of AS2107-2016, recommended design sound levels applicable to the development are outlined in the table below.

Table 3 – AS2107:2016 Recommended Design Sound Level

Building Type	Space /Activity Type	Recommended Design Sound Level [1]
Residential (Hotels and Motels in inner city areas or entertainment districts or near major roads)	Sleeping Areas (Night Time)	35-40dB(A)$L_{eq(9hr)}$
Public	Libraries (Reading Areas)	40-45dB(A)$L_{eq(anytime)}$
Office	General Office Areas	40-45dB(A)$L_{eq(anytime)}$
	Open Plan Office	40-45dB(A)$L_{eq(anytime)}$
	Reception Areas	40-45dB(A)$L_{eq(anytime)}$
	Meeting Room (Small)	40-45dB(A)$L_{eq(anytime)}$

Table Notes:

1. The greater value of the ranges presented above will be adopted as a compliant level.

5.1.3 Summarised Internal Noise Level Criteria

Based on the information above, internal noise level requirements are summarised in the table below. Hotel accommodation is to be capable of achieving both day and night criteria.

Table 4 – Summarised Internal Noise Level Criteria

Room Type/Occupancy	Criteria
Hotel Accommodation (Sleeping Areas, Night)	40dB(A)$L_{eq(10pm-7am)}$
Library	45dB(A)$L_{eq(anytime)}$
General Office/Open Plan Office/Reception Areas	45dB(A)$L_{eq(anytime)}$
Meeting Rooms	45dB(A)$L_{eq(anytime)}$

5.2 EXTERNAL NOISE MEASUREMENTS

5.2.1 Measurement Equipment

Unattended noise monitoring for noise impacts from traffic and the adjacent metro line was conducted using two Acoustic Research Laboratories Pty Ltd noise logger. The loggers were programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning of the measurement period using a Rion NC-73 calibrator; no significant drift was detected at the end of the measurement period. All measurements were taken on A-weighted fast response mode.

Attended short term measurements of traffic noise and noise from the metro 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.

5.2.2 Measurement Location and Measurement Period

The noise monitors were installed at the following locations:

- **Logger Location L1**
    - Noise monitor installed on the northern boundary of the project site. Refer to Figure 1 for more detail.
    - Unattended noise monitoring conducted from Thursday 8th October 2020 to Friday 16th October 2020.
- **Logger Location L2**
    - Noise monitor installed on the southern boundary of the project site. Refer to Figure 1 for more detail.
    - Unattended noise monitoring conducted from Thursday 8th October 2020 to Thursday 15th October 2020.
- **Attended Measurement Location A1**
    - Refer to Figure 1.
    - Attended measurement conducted on Monday 19th October 2020.

  Attended Measurement Location A2
    - Refer to Figure 1.
    - Attended measurement conducted on Thursday 8th October 2020.

5.2.3 Measurement Results

The results of unattended noise monitoring and attended measurements are summarised in the tables below.

Table 5 –External Unattended Noise Measurement Results

Location	Measured Noise level $dB(A)L_{eq(period)}$	
	Day[1] (7:00am-10:00pm)	**Night (10:00pm-7:00am)**
Logger Location L1 – Northern Boundary of 42 Honeysuckle Drive, Newcastle	49	44
Logger Location L2 - Southern Boundary of 42 Honeysuckle Drive, Newcastle	57	54

Table Notes:

1. This office has been advised that construction activities were undertaken on the project site during the day during the monitoring period (typically 7am-5pm Monday to Friday, 8am-1pm Saturdays). On this basis, noise levels outside of these times during the shoulder periods of the Day have been adopted.

Table 6 – External Attended Noise Measurement Results

Measurement Location	Measured Noise level $dB(A)L_{eq(period)}$
Attended Measurement Location A1	$63dB(A)L_{eq(15min)}$
Attended Measurement Location A2	$69dB(A)L_{eq(pass\text{-}by)}$ $78dB(A)\ SEL_{(pass\text{-}by)}^{(1,2)}$

Table Notes:

1. This assessment has assumed a worst case of 400 light rail vehicles hour during the day (typically 16-17 light rail vehicles per hour), and 250 light rail vehicles during the night (approximately 10-11 light rail vehicles per hour). Based on the current timetables available on the Transport for NSW website, these values are significantly conservative, and it is highly unlikely that they would be exceeded with the current light rail infrastructure.
2. The noise level in the table above is based on the loudest measurement of multiple light rail vehicle pass-bys on each track.

5.3 NOISE INTRUSION ANALYSIS

Noise intrusion into the proposed development was assessed using the measured noise levels presented above. Calculations were undertaken taking into account the 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.

5.4 RECOMMENDED CONSTRUCTIONS

5.4.1 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. (**Mohair/Mohair + Fin 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 7 below.

Table 7 - Minimum Glazing Thickness

Facade	Space	Glazing Construction	Acoustic Seals
All	Commercial	6.38mm Laminated	Yes
	Library	6.38mm Laminated	Yes
	Meeting	6.38mm Laminated	Yes
West (Facing Canal)	Hotel Accommodation	6mm Float	Yes
East (Facing Internal Roof Area)	Hotel Accommodation	6mm Float	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 8 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 8 - Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
6mm Float	29
6.38mm Laminate	31
10mm Float	33

5.4.2 External Wall Construction

This office has been advised of the following typical constructions for the modular hotel rooms:

Table 9 - Minimum Glazing Thickness

External Lining	Studwork	Internal Lining
Typically minimum 1.2mm Steel with 3mm Aluminium Cladding (or equivalent)	75mm Steel Stud with 75mm thick 11kg/m^3 glasswool insulation in stud cavity	2 x 12.5mm Fire Rated Plasterboard

The above system will be sufficient reduce external noise impacts to acceptable levels as per the requirements outlined in Section 5.1. In the event that any penetrations are required through the external skin, an acoustic sealant should be used to minimise all gaps.

5.4.3 External Roof/Ceiling Construction

As per the architectural drawings, a lightweight sheet metal roof is to be constructed over the modular hotel rooms. With the consideration that the roof/ceiling systems for the modular hotel rooms are to be constructed in the same manner as the lightweight walls above, this system will easily satisfy internal noise level requirements from external noise impacts. In the event that any penetrations are required through the external skin, an acoustic sealant should be used to minimise all gaps.

6 NOISE EMISSION ASSESSMENT

6.1 NOISE EMISSION CRITERIA

A noise emission assessment has been conducted based on the requirements of the following guidelines/standards:

- Newcastle City Council *Development Control Plan (DCP) 2012*.
- NSW Environmental Protection Authority (EPA) *Noise Policy for Industry (NPfI) 2017*.
- NSW Office of Liquor and Gaming (OLG) Requirements.

6.1.1 Newcastle City Council Development Control Plan (DCP) 2012

Section I (*Acoustic Privacy)* of Section 3.03 of the DCP states the following:

Acceptable Solutions

The following controls apply to all forms of residential development

1. *All noise generating equipment such as air conditioning units, swimming pool filters, fixed vacuum systems, and driveway entry shutters are designed to protect the acoustic privacy of residents and neighbours. All such noise generating equipment must be acoustically screened. The noise level generated by and equipment does not exceed an LA_{eq} (15min) of dB(A) above the background noise at the property boundary.*

6.1.2 NSW EPA Noise Policy for Industry (NPfI) 2017

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.

6.1.2.1 Intrusiveness Criterion

The intrusiveness 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 5dB(A). The relevant noise criteria based on the background noise levels obtained in the Muller Acoustic Consulting assessment (detailed in Section 4.1) is summarised in the table below.

Table 10 – NPfI Intrusiveness Criteria

Receiver	Time of day	Background Noise Level dB(A)$L_{90(Period)}$	Intrusiveness Criteria (Background + 5dB(A)$L_{eq(15minute)}$
R1 (Residential)	Day (7:00am-6:00pm)	$48^{(1)}$ corrected to 48	53
	Evening (6:00pm-10:00pm)	46	51
	Night (10:00pm-7:00am)	39	44

6.1.2.2 Amenity Criterion

The amenity 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.

ALC will assess noise emissions in accordance with the 'Urban' category.

Table 11 – NPfI Project Amenity Criteria

Type of Receiver	Time of day	Recommended Project Amenity Noise Level dB(A)$L_{eq(15\text{-}minutes)}$
Residential (Urban)	Day (7:00am-6:00pm)	58
	Evening (6:00pm-10:00pm)	48
	Night (10:00pm-7:00am)	43
Commercial	When in Use	63

6.1.3 NSW Office of Liquor and Gaming (OLG) Requirements.

When assessing noise emissions from licensed premises, noise emissions must comply with the acoustic requirements generally imposed by the NSW OLG. These guidelines relate to noise generated by patrons and by music. The typical requirements imposed in licensing conditions 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.

- The 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 Public entertainment are to be inaudible within any habitable rooms in nearby residential properties.

The following assessment criteria have been determined based on noise levels obtained by this office. Measurements were conducted within the vicinity of the project site to obtain background noise spectrums for the day, evening and night period. These apply when measured outside the open window of a residential façade.

Table 12 – OLG Noise Emission Objectives to Receiver R1 (Operational Noise) dB(A) $L_{10(15min)}$

Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Day (7am - 6pm) (BG+5 dB(A))	62	64	57	65	52	48	39	28	20	**53**
Evening (6pm-10pm) (BG+5 dB(A))	58	60	53	51	48	44	35	24	16	**51**
Early Night (10pm –12am) (BG + 5 dB(A))	56	58	51	49	46	42	33	22	18	**47**
Early Morning (6am-7am) (BG + 0dB(A))	43	45	38	36	33	29	20	9	5	**34**

6.2 SUMMARISED NOISE EMISSION CRITERIA

Noise emissions from the use of the development are to comply with the following criteria:

Table 13 – Noise Emissions Criteria (NPI) – Mechanical Plant Noise

Receiver	Time Period	Assessment Background Noise Level dB(A)L_{90}	Intrusiveness Criteria $L_{eq(15min)}$	Project Amenity Criteria dB(A) $L_{eq\ (15min)}$
Nearby Residences – Suburban Receiver	Day	48	**53***	**58**
	Evening	46	51	**48***
	Night	39	44	**43***
Commercial	When in Use	-	-	**63***

Table Note: *Project noise rigger levels are indicated by the bolded values in the table above.

Table 14 – Operational Noise Emission Objectives –

Licensed Premises Operational Noise dB(A) $L_{10(15min)}$

Receiver Type	Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Residential	Day (7am - 6pm) (BG+5 dB(A))	62	64	57	65	52	48	39	28	20	**53**
	Evening (6pm-10pm) (BG+5 dB(A))	58	60	53	51	48	44	35	24	16	**51**
	Early Night (10pm –12am) (BG + 5 dB(A))	56	58	51	49	46	42	33	22	18	**47**
	Early Morning (6am-7am) (BG -10dB(A))	43	45	38	36	33	29	20	9	5	**34**
Commercial	When in Use	-	-	-	-	-	-	-	-	-	**63**

6.3 MECHANICAL PLANT NOISE

Detailed plant selection has not been undertaken at this stage. An acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to meet the criteria established in Section 6.1. Compliance with noise emission goals with be achievable through appropriate plant selection location. Where necessary, standard acoustic treatments such as ducting lining, acoustic silences and enclosures/screens can also be used.

6.4 LOADING DOCK & CARPARK

A detailed review of the loading dock and carpark has been conducted by this office. We note that noise from the use of the loading dock and carpark will be compliant with the requirements outlined in Section 5.1 provided recommendations in Section 5.4 are adopted.

It is not recommended that the loading dock is in operation between 10:00pm to 7:00am.

6.5 GROUND FLOOR GYM AND CAFÉ

A preliminary review of the proposed ground floor gym and café has been undertaken. In principle, the proposed gym and café are more than capable of complying with the requirements outlined in Section 5.1.

A detailed acoustic review should be undertaken once detailed layouts, operational hours, number of patrons and selection of mechanical plant are known.

6.6 LEVEL 1 BAR AND OUTDOOR TERRACE AREA

A detailed assessment of the Level 1 Bar and outdoor terrace has been conducted by this office. The following assumptions have been made in our assessment:

- Operating hours of the bar is between 6:00am to 12:00am midnight.
- Amplified music will be played within the indoor bar/lounge area (up to 80dB(A) spatially averaged sound pressure level).
- Background music will be played at the outdoor terrace (75dB(A) total sound power level from two speakers)
- A maximum of 200 patrons will be permitted in the indoor bar/lounge area at any one time.
- A maximum of 50 patrons will be permitted in the outdoor terrace area at any one time.
    - Outdoor terrace is assumed to not be in use during the early morning (6am-7am) period.
    - Door between the outdoor terrace and bar is assumed to be closed at all times.
- The average sound power level per patron has been taken as 77dB(A)L_{10} sound power level (SWL), with the following spectrum:

Table 15 – Noise Spectrum for Patron Speech Sound Power Level

Frequency	31.5	63	125	250	500	1000	2000	4000	8000	A-wt
Patron Speech	61	61	66	69	73	74	69	60	47	77

We note that worst affected receivers (of each receiver type) as per Figure 1 will be Receiver 1 (Residential) and Receiver 4 (Commercial). Receiver 1 and 4 will be in direct line of sight of the Level 1 Bar and outdoor terrace.

The predicted noise levels from venue operation are presented in the tables below. Predicted noise levels are based on the dimensions of the building and include losses due to distance attenuation and barrier effects and have been calculated on the assumption that the recommendations in Section 6.7 are implemented.

Table 16 – Predicted Noise Levels to Receiver 1

Noise Source	Time of Day		Octave Band Noise Levels, dB									
			31.5Hz	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	A-wt
Operational Noise (Indoor Patrons and Amplified Music, Outdoor Patrons and Background Music)	Day (7am-6pm)	Predicted Noise Level $L_{10(15min)}$*	36	36	38	37	40	41	36	27	18	**44**
		Criteria	62	64	57	65	52	48	39	28	20	**53**
		Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Evening (6pm-10pm)	Predicted Noise Level $L_{10(15min)}$*	35	35	37	35	38	39	34	24	16	**42**
		Criteria	58	60	53	51	48	44	35	24	16	**51**
		Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Early Night (10pm-12am)	Predicted Noise Level $L_{10(15min)}$*	35	35	36	33	35	36	31	22	17	**39**
		Criteria	56	58	51	49	46	42	33	22	18	**47**
		Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Early Morning (6am-7am)	Predicted Noise Level $L_{10(15min)}$*	28	28	26	19	14	16	10	<5	<5	**19**
		Criteria	43	45	38	36	33	29	20	9	5	**34**
		Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table Note: *Predicted noise levels have been made on the assumption the recommendations in Section 7 are implemented.

Table 17 – Predicted Noise Levels to Receiver 4

Receiver	Period/Time	Predicted Noise Level $dB(A)L_{eq(15min)*}$	Criteria $dB(A)L_{eq(15min)}$	Complies
Receiver 4	When in Use	50	63	Yes

6.7 RECOMMENDATIONS

Based on the information above, we recommend the following.

- Loading dock not to be used between 10pm-7am.
- Ground Floor Gym and Café:
    - A detailed acoustic review should be undertaken once detailed layouts, operational hours, number of patrons and selection of mechanical plant are known
- Level 1 Bar Outdoor Terrace:
    - Operating hours of the bar is limited to 6:00am to 12:00am Midnight.
    - Amplified music within the bar/lounge areas is limited to 80dB(A) as a spatially averaged sound pressure level.
    - Background music at the outdoor terrace is limited to 75dB(A) as a total sound power level of the speakers. No music permitted during the early morning (6am-7am).
    - Maximum number of patrons to the outdoor terrace as follows:
        - Day (7am-6pm): 50 patrons
        - Evening (6pm-10pm): 30 patrons
        - Early Night (10pm-12am): 15 patrons
        - Early Morning (6am-7am): No patrons permitted
    - Doors and windows to the bar are to remain closed.
    - Façade glazing for the bar to be constructed from minimum 10mm float glass.
    - Speakers for the proposed areas are to be vibration isolated from the building structure using Embelton NRD mounts or similar.
    - Disposal of bottles/waste should be done prior to 10pm, or after 7am.
- Mechanical plant in general:
    - Acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to meet the criteria established in Section 6.1.
    - Compliance with noise emission goals will be achievable through appropriate plant selection location or standard acoustic treatments such as ducting lining, acoustic silences and enclosures/screens can also be used where necessary.

7 CONSTRUCTION NOISE

7.1 NOISE MANAGEMENT LEVEL

The requirements for noise emissions from construction works associated with the proposed development is to is based on the following guidelines/standards:

- NSW Environmental Protection Authority (EPA) *Interim Construction Noise Guideline (ICNG) 2009.*
- Australian Standard AS2436:2010 *Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites.*

7.1.1 NSW Environmental Protection Authority (EPA) Interim Construction Noise Guideline (ICNG) 2009

The EPA *ICNG* assessment requires:

- Review of operational noise levels at nearby development.
- If necessary, recommendation of noise control strategies in the event that compliance with noise emission goals is not possible.

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest **residences** for construction during the recommended standard hours:

- "*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 affected level occurs when construction noise exceeds the rating background noise level by more than 10dB.
- "*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.

In addition to the above, the ICNG provides management levels for construction noise impacts on commercial receiver (noise levels assessed externally to the most affected occupied point of the premises).

Table 18 summarises the noise management levels discussed above.

Table 18 – EPA Interim Construction Noise Guideline Management Level

Receiver	**Noise Management Level**	
Residential	**Noise Affected Level (BG+ 10)**	**Highly Noise Affected Level**
	63dB(A)$L_{eq(15min)}$	75dB(A)$L_{eq(15min)}$
Commercial (Office, Retail)	70 dB(A)$L_{eq(15min)}$	
Industrial	75 dB(A)$L_{eq(15min)}$	

7.1.2 Australian Standard AS2436:2010 "Guide to Noise Control on Construction, Maintenance and Demolition Sites

Australian Standard AS2436 does not provide specific noise management targets. The guideline focuses on strategies for developing feasible and reasonable mitigation methodologies, management controls and community liaison to reach realistic compromises between the needs of construction activities and potentially affected receivers.

For the control and regulation of noise from construction sites AS2436:2010 *Guide to noise control on construction, maintenance and demolition sites* nominates the following:

- That reasonable suitable noise management objectives are established.
- That all practicable measures be taken on the building site to regulate noise emissions, including the siting of noisy static processes to locations of the site where they can be shielded, selecting less noisy processes, and if required regulating demolition hours, and
- The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the demolition site.

Based on the above, the following procedure is to be used in the assessment of construction noise impacts on nearby development:

- Predict noise levels produced by typical construction activities at noise sensitive receivers.
- If noise levels exceed noise goals at receiver locations, investigate and implement all feasible and reasonable techniques to limit noise emissions.
- If the noise goal is still exceeded after applying all practical engineering controls to limit noise emissions, investigate management and other techniques to mitigate noise emissions.

7.2 NOISE SOURCES DURING CONSTRUCTION

With respect to noise generating sources and activities during construction works for the proposed development, we note the following:

- The construction activities with the greatest potential for noise and vibration impacts on surrounding receivers include use of the following:
    - Noise:
        - Hammering (Excavator with Hydraulic Hammer, Jack Hammering)
        - Rock Saws and Concrete Saws
        - Concrete Muncher
    - Vibration
        - Hammering (Excavator with Hydraulic Hammer, Jack Hammering)
        - Piling
- Vibration impacts on nearby development is not expected to be significant due to the following:
    - Approximately 25m between the project site east boundary and the nearest occupied commercial building.
    - Approximately 55m between the project site south western boundary and the nearest occupied residential building, separated by the water canal.

- The works above are typically used during the early stages of works in demolition and excavation.
- Typical measures to minimise and mitigate potential noise impacts on surrounding occupiers include the following:
    - Construction of hoarding around the site perimeter to provide noise screening to low level receivers.
    - As much as practicable, use of alternative equipment (i.e. saws/munchers as opposed to hydraulic hammering). We note that while munchers are typically a lower sound power level, saws are equally as loud but are generally used for shorter periods.
    - Work vehicles, trailers and concrete trucks should turn off their engines when on site (unless needed to remain on during concrete pumping).
    - Use of silencing devices in the form of engine shrouding or industrial silencers fitted to exhausts may be considered.
    - In the event continuous exceedances of the "highly noise affected level" are predicted, respite periods may be considered.
- In the event of complaints, attended measurements of noise, or vibration monitoring may be considered where access is permitted.
- A detailed assessment of noise and vibration in a construction noise and vibration management plan is to be conducted once construction plans, construction equipment, and construction methodology are finalised. Reasonable and feasible control measures are to be adopted as per the ICNG.

8 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed mixed-use development to be located at 42 Honeysuckle Drive, Newcastle. This report has been prepared to address the requirements of the Secretary's Environmental Assessment Requirements (SEARs) for SSD-10378. Based on the information provided above we conclude the following:

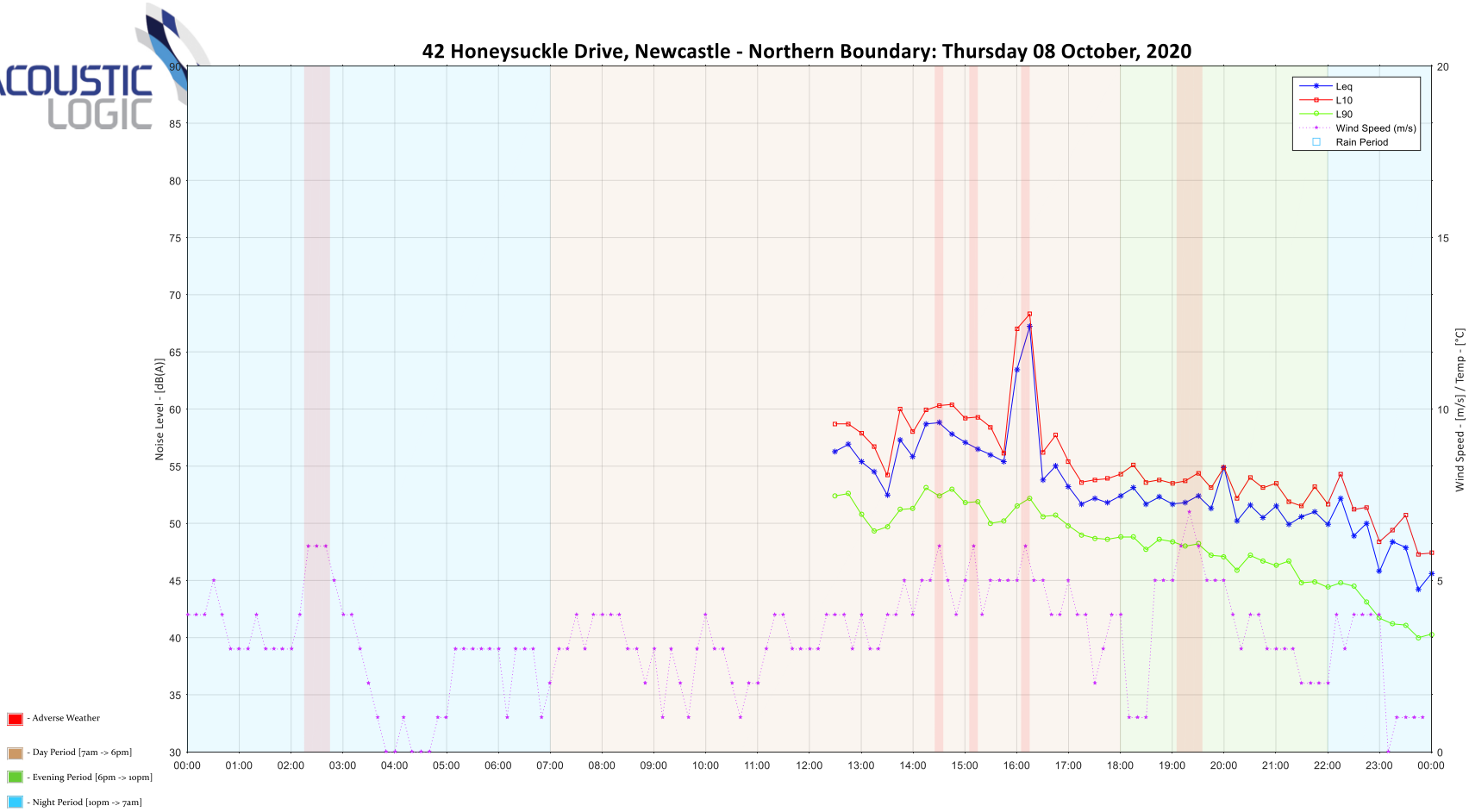
- Provided that the treatments set out in Section 4 of this report are installed, internal noise levels will be compliant with the requirements of:
    - Newcastle City Council *Development Control Plan (DCP) 2012*.
    - Australian Standard AS2107:2016 *Recommended Design Sound Levels and Reverberation Times for Building Interiors*.
- External noise emissions criteria have been set up which satisfy the requirements of:
    - Newcastle City Council *Development Control Plan (DCP) 2012*.
    - NSW Environmental Protection Authority (EPA) *Noise Policy for Industry (NPfI) 2017*.
    - NSW Office of Liquor and Gaming (OLG) Requirements.
- Recommendations have been made for the operation of the Level 1 Bar/Lounge and Outdoor terrace.
- Preliminary assessment of the Ground Floor Gym and Café indicates they are more than capable of complying with the relevant acoustic criteria; however, a detailed assessment should be conducted once detailed layouts, operational hours, number of patrons and selection of mechanical plant are known
- Noise management levels have been established based on the requirements of the NSW EPA *Interim Construction Noise Guideline*.
    - Construction activities with the greatest potential for noise and vibration impacts on surrounding development has been identified.
    - Typical methods to minimise and mitigate noise impacts have been discussed.
    - Further assessment is required once construction plans and methodology (equipment and processes to be used) are determined.

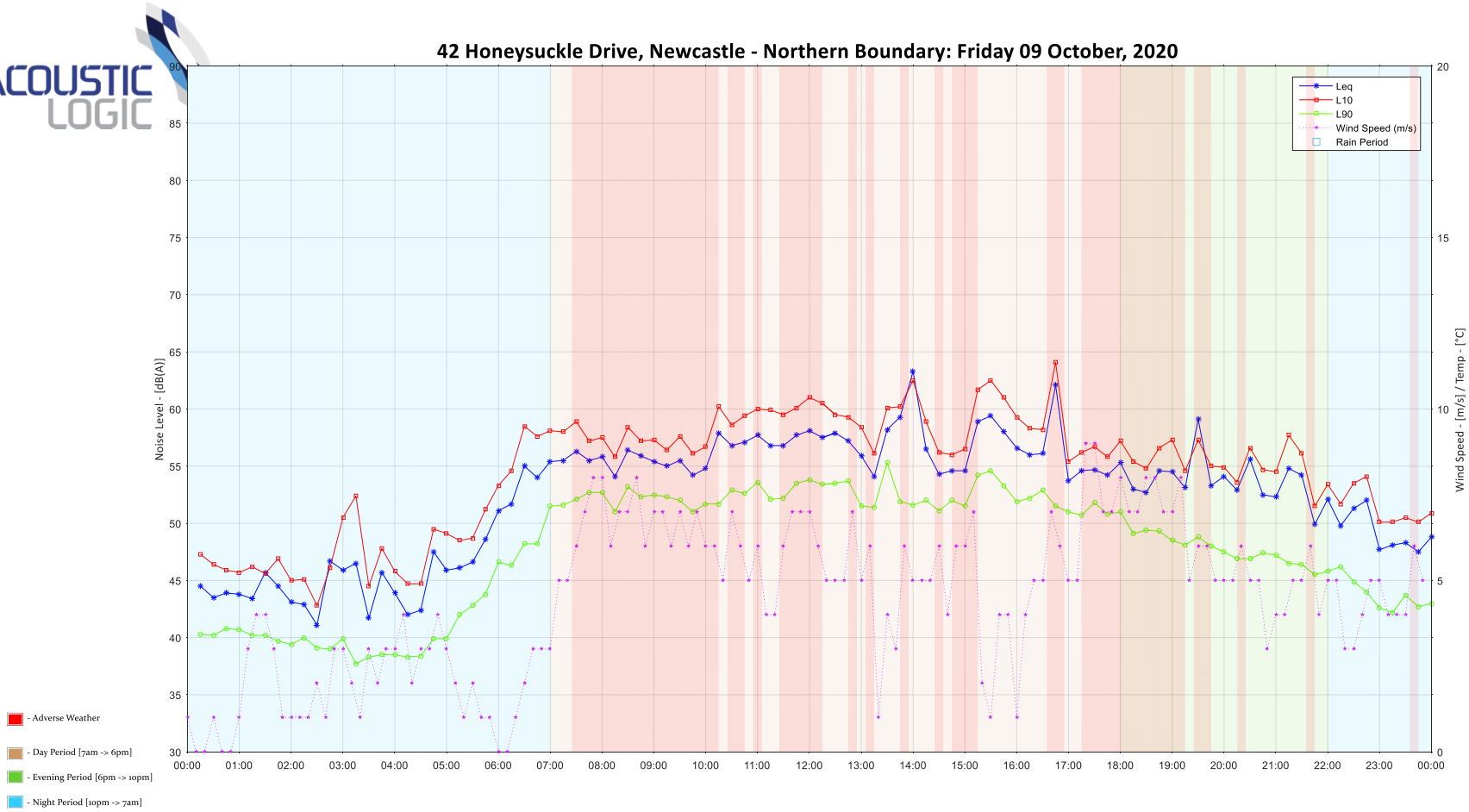
We trust this information is satisfactory. Please contact us should you have any further queries.

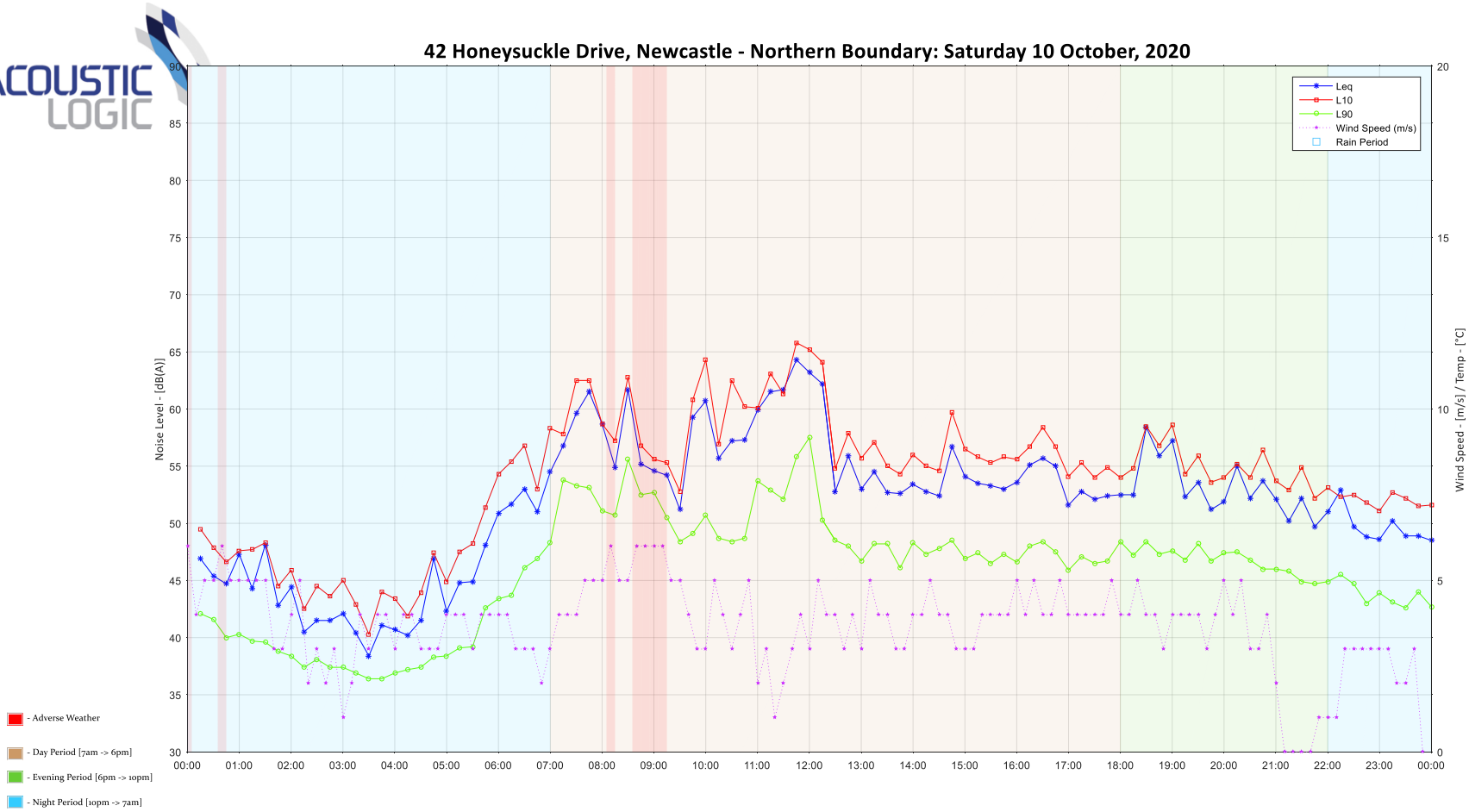
Yours faithfully,

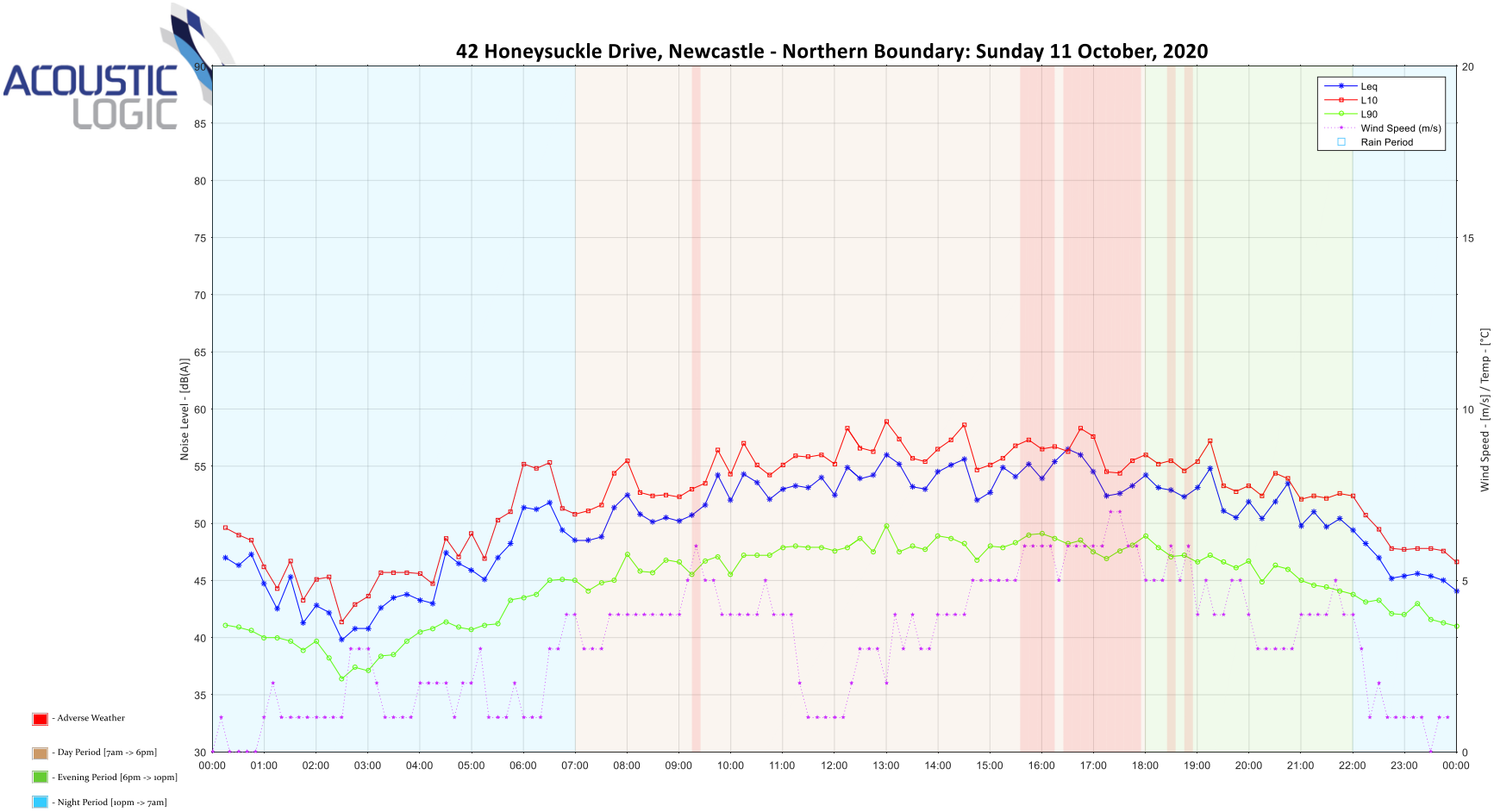
Acoustic Logic Consultancy Pty Ltd
Artie Rattananikom

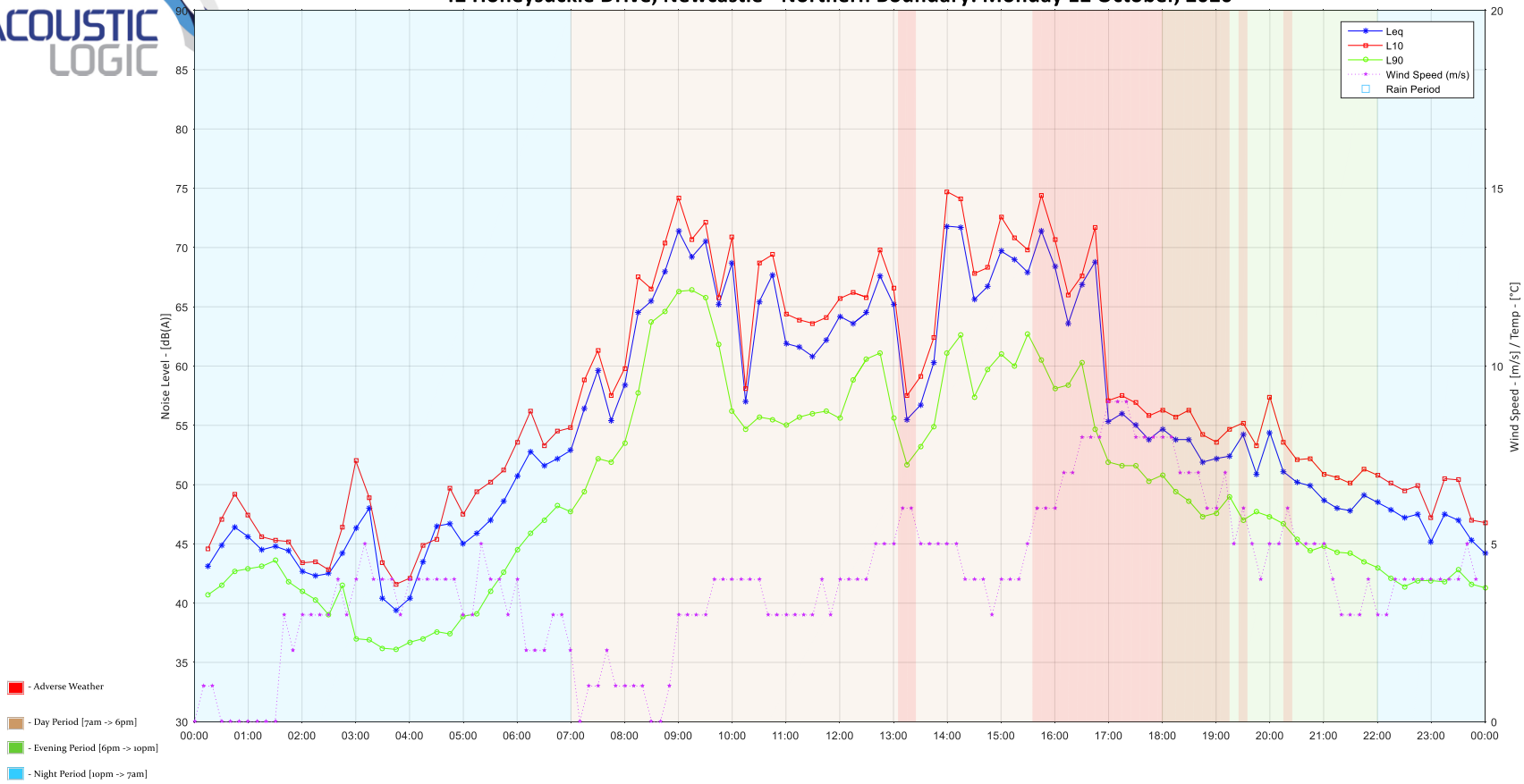
APPENDIX A – NOISE MONITORING RESULTS – LOGGER LOCATION L1 – NORTHERN BOUNDARY OF 42 HONEYSUCKLE DRIVE, NEWCASTLE

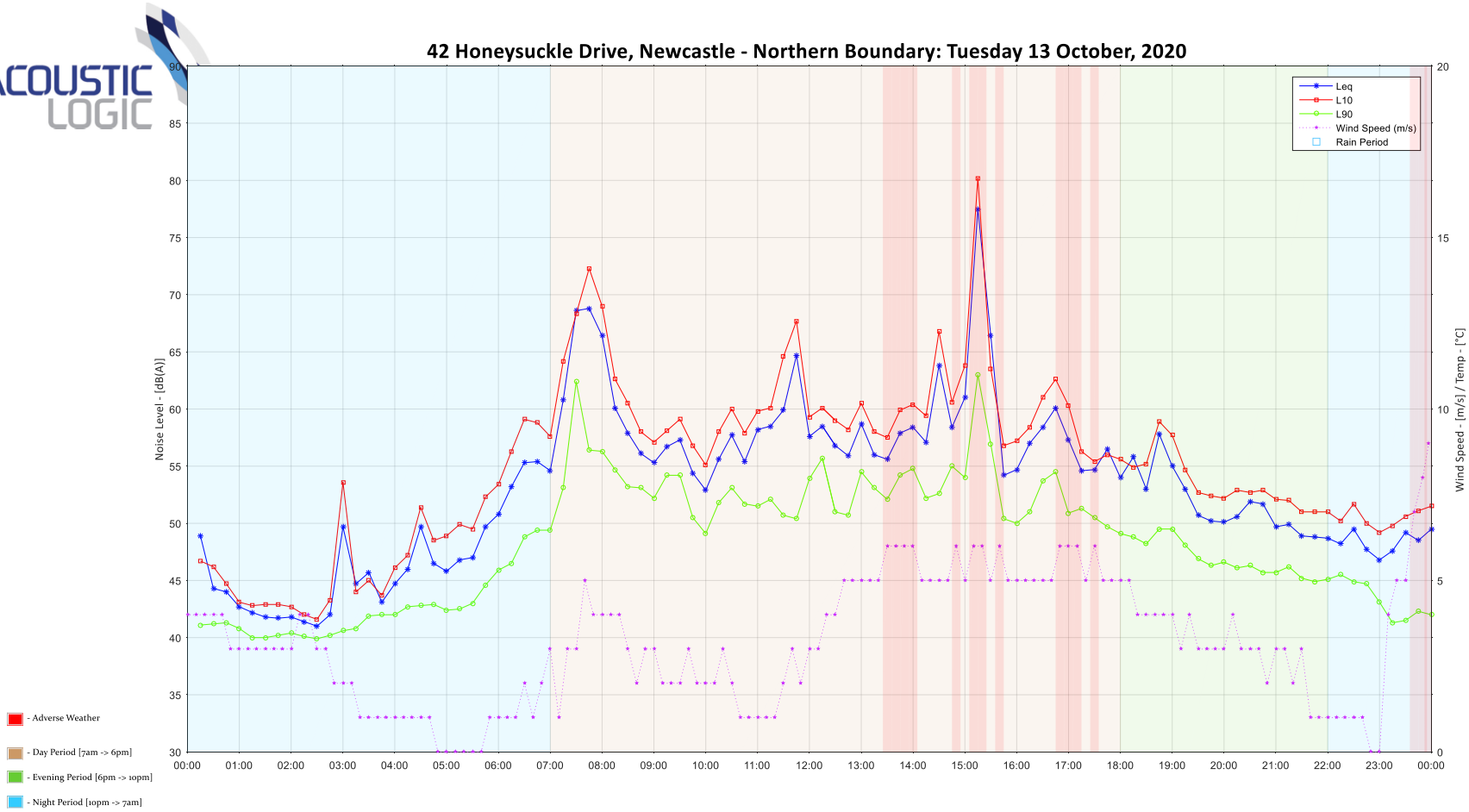

42 Honeysuckle Drive, Newcastle - Northern Boundary: Thursday 08 October, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

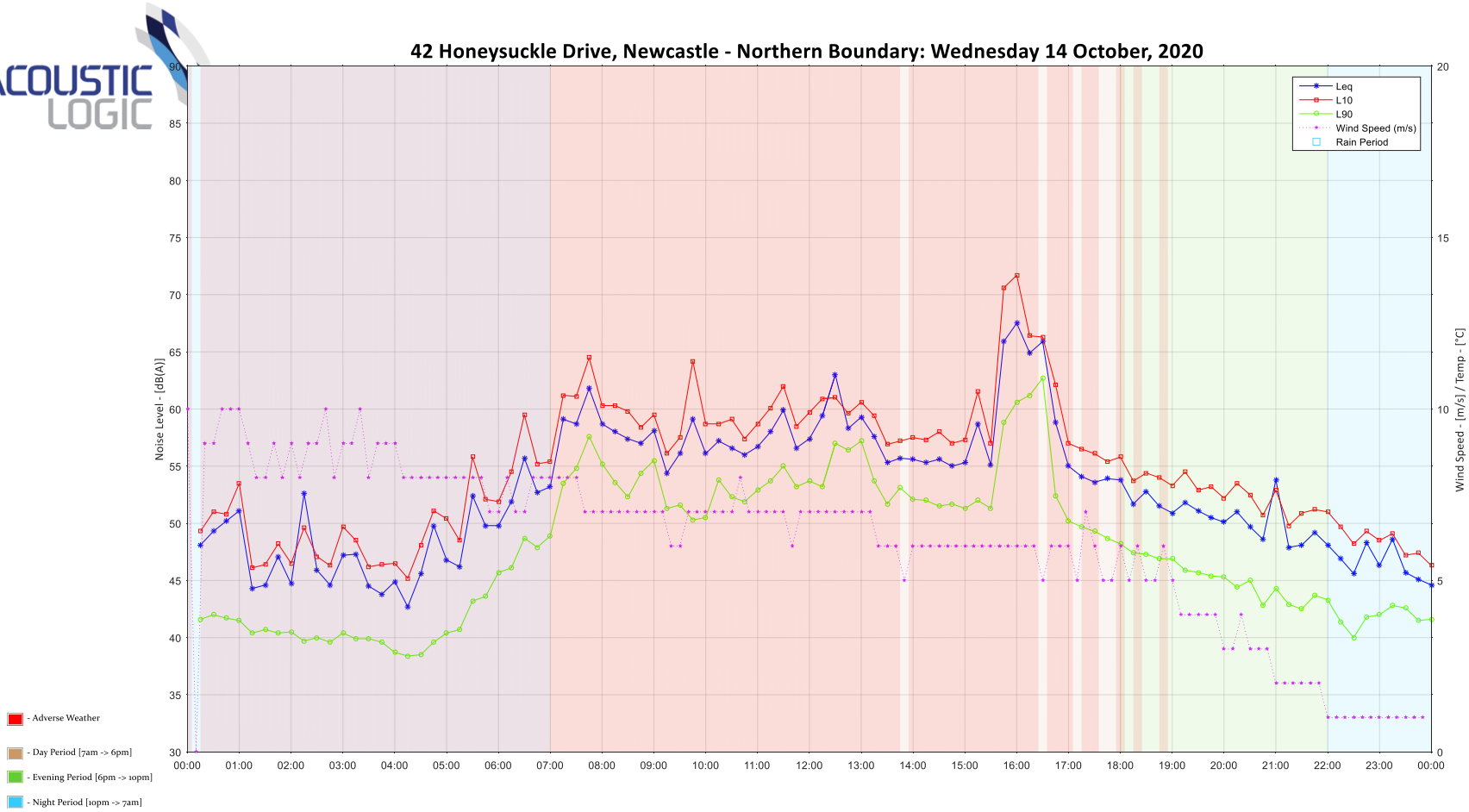

42 Honeysuckle Drive, Newcastle - Northern Boundary: Friday 09 October, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

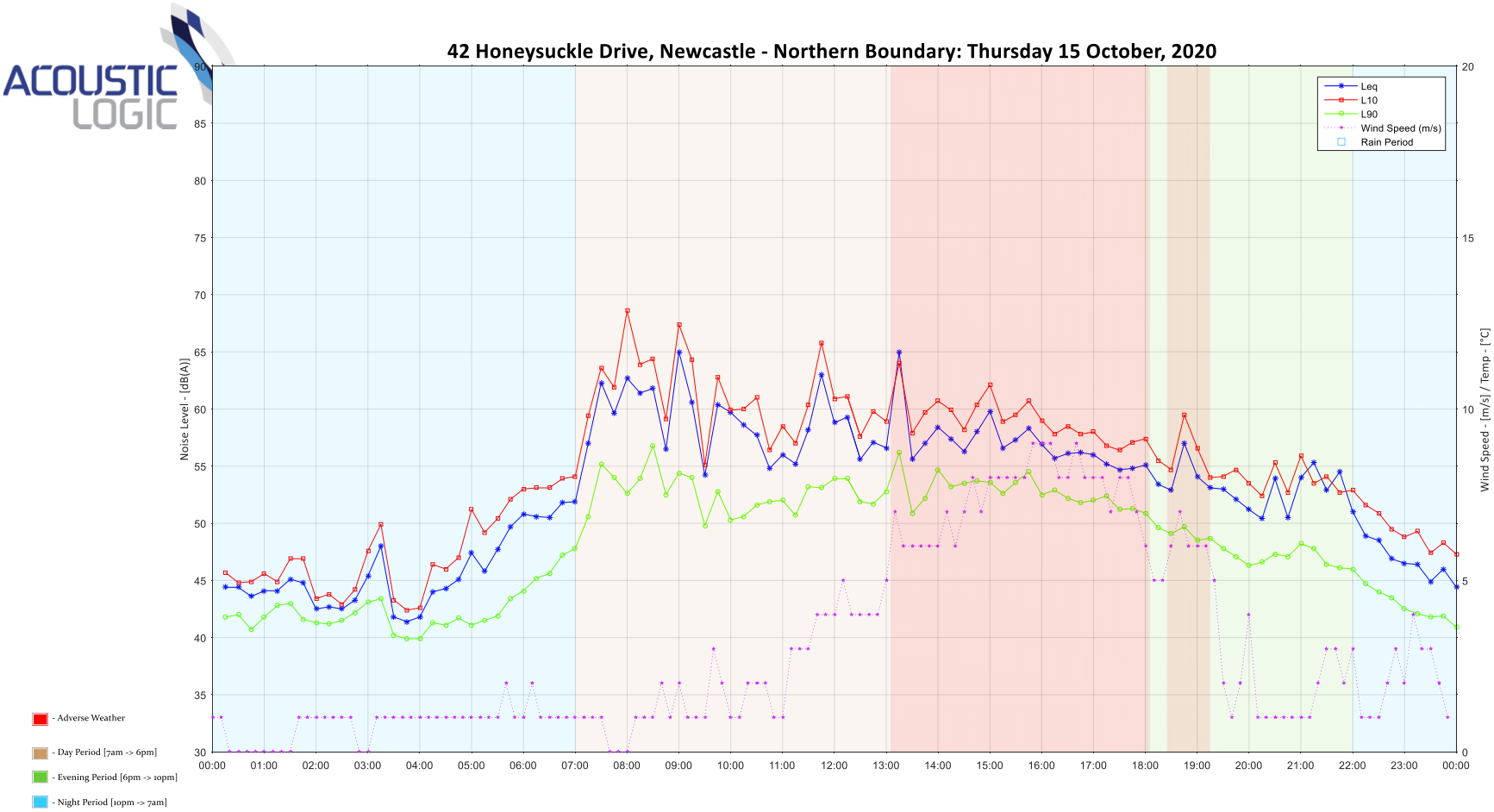

42 Honeysuckle Drive, Newcastle - Northern Boundary: Saturday 10 October, 2020
Leq
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

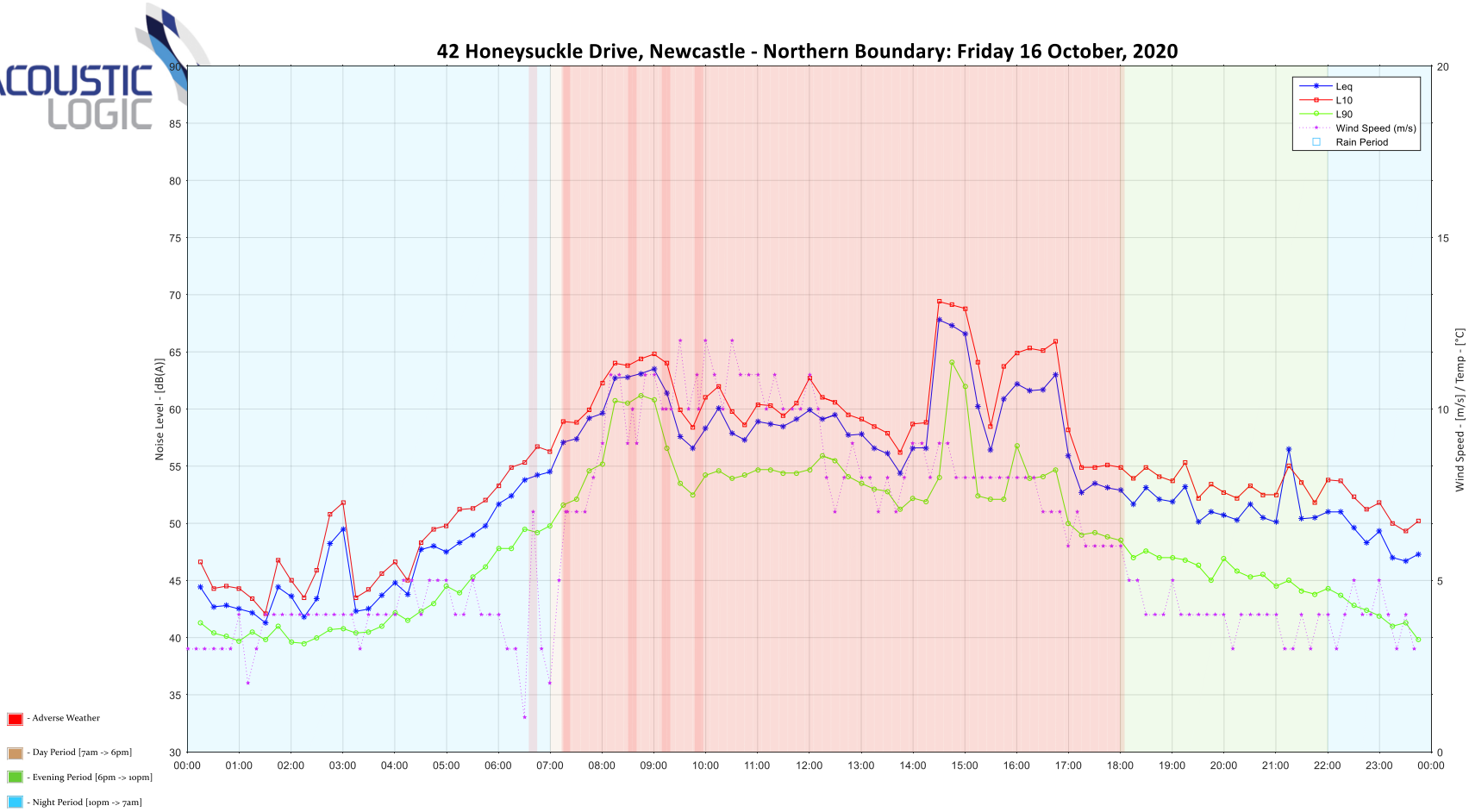

42 Honeysuckle Drive, Newcastle - Northern Boundary: Sunday 11 October, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


42 Honeysuckle Drive, Newcastle - Northern Boundary: Monday 12 October, 2020
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]

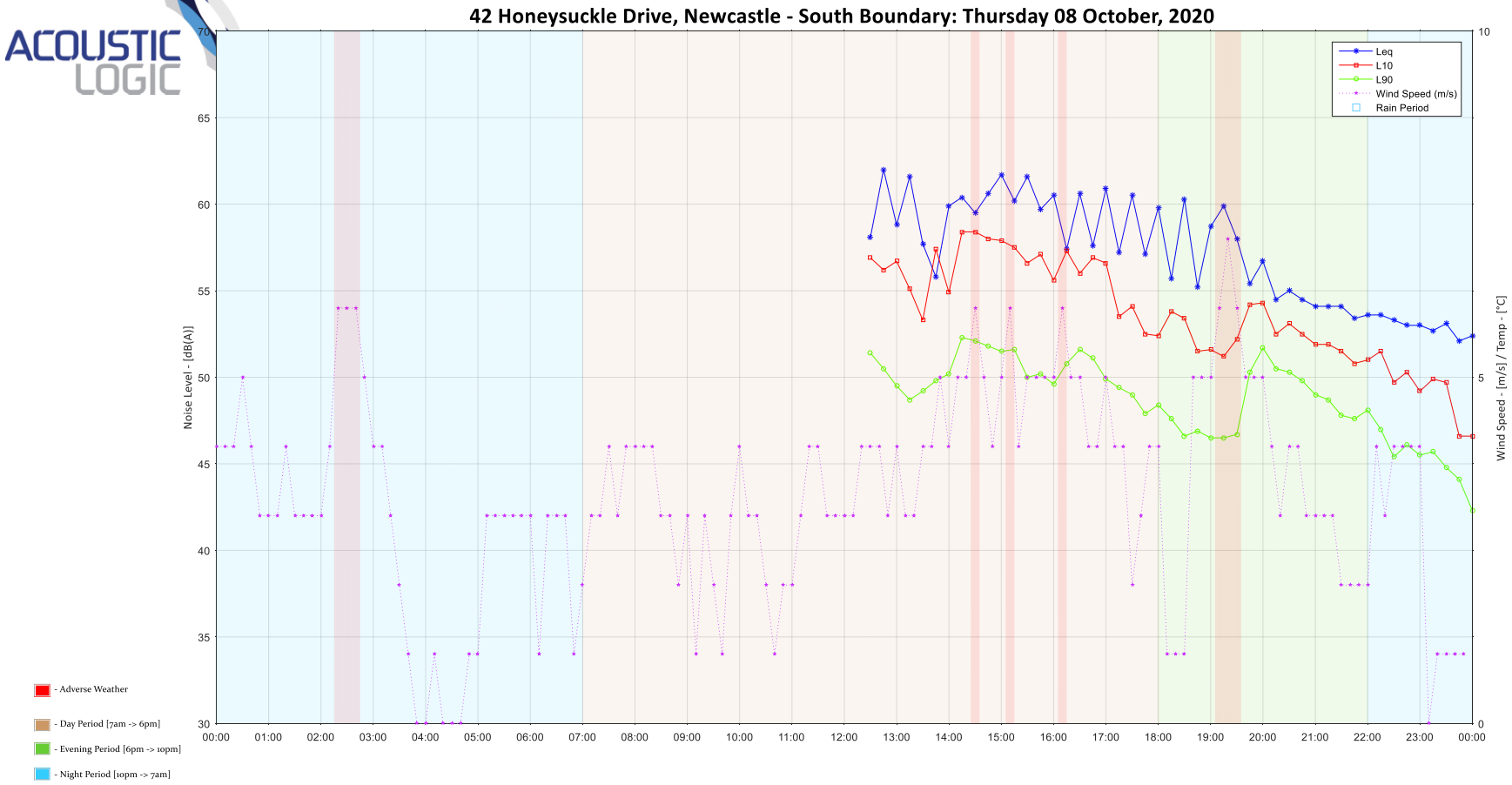

42 Honeysuckle Drive, Newcastle - Northern Boundary: Tuesday 13 October, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

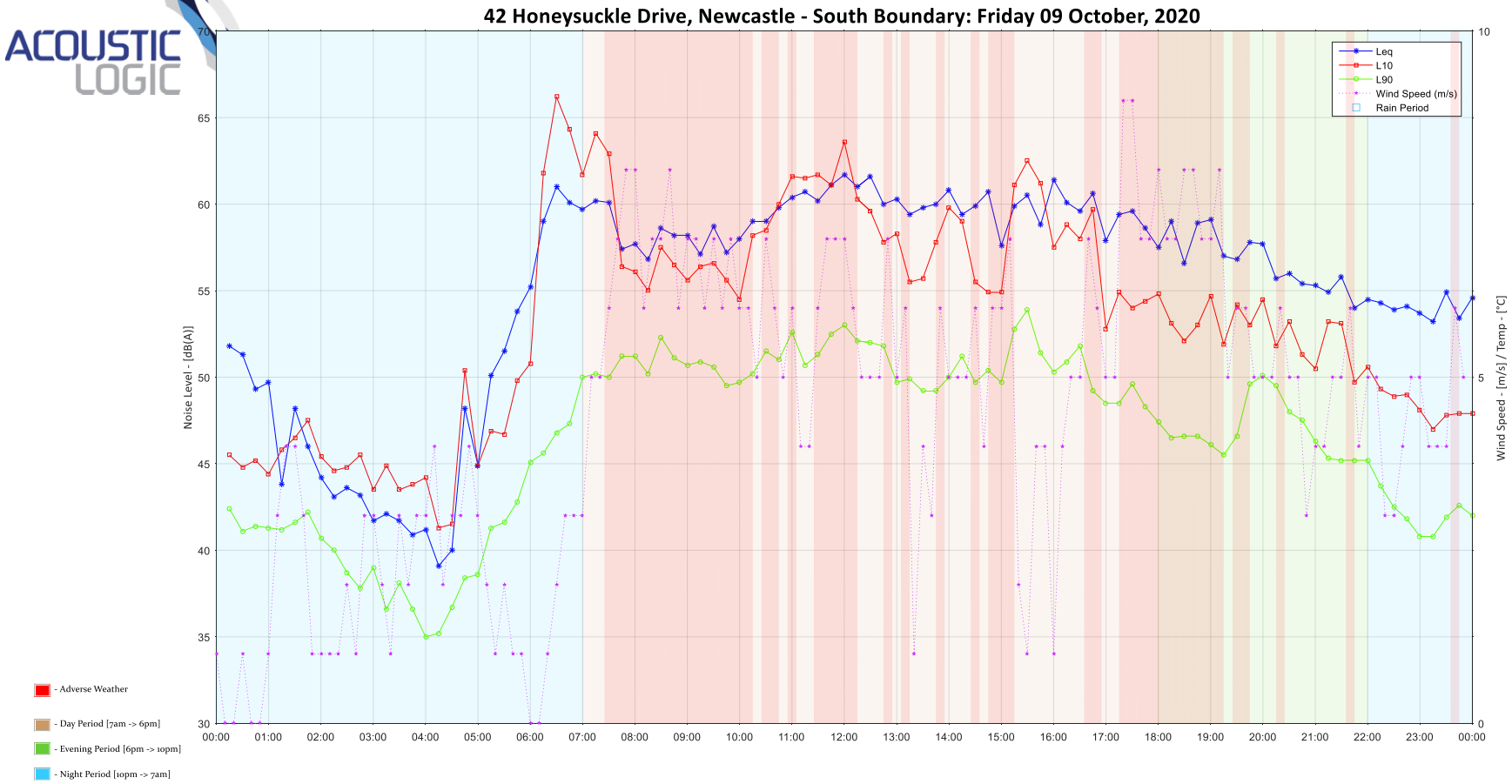

42 Honeysuckle Drive, Newcastle - Northern Boundary: Wednesday 14 October, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

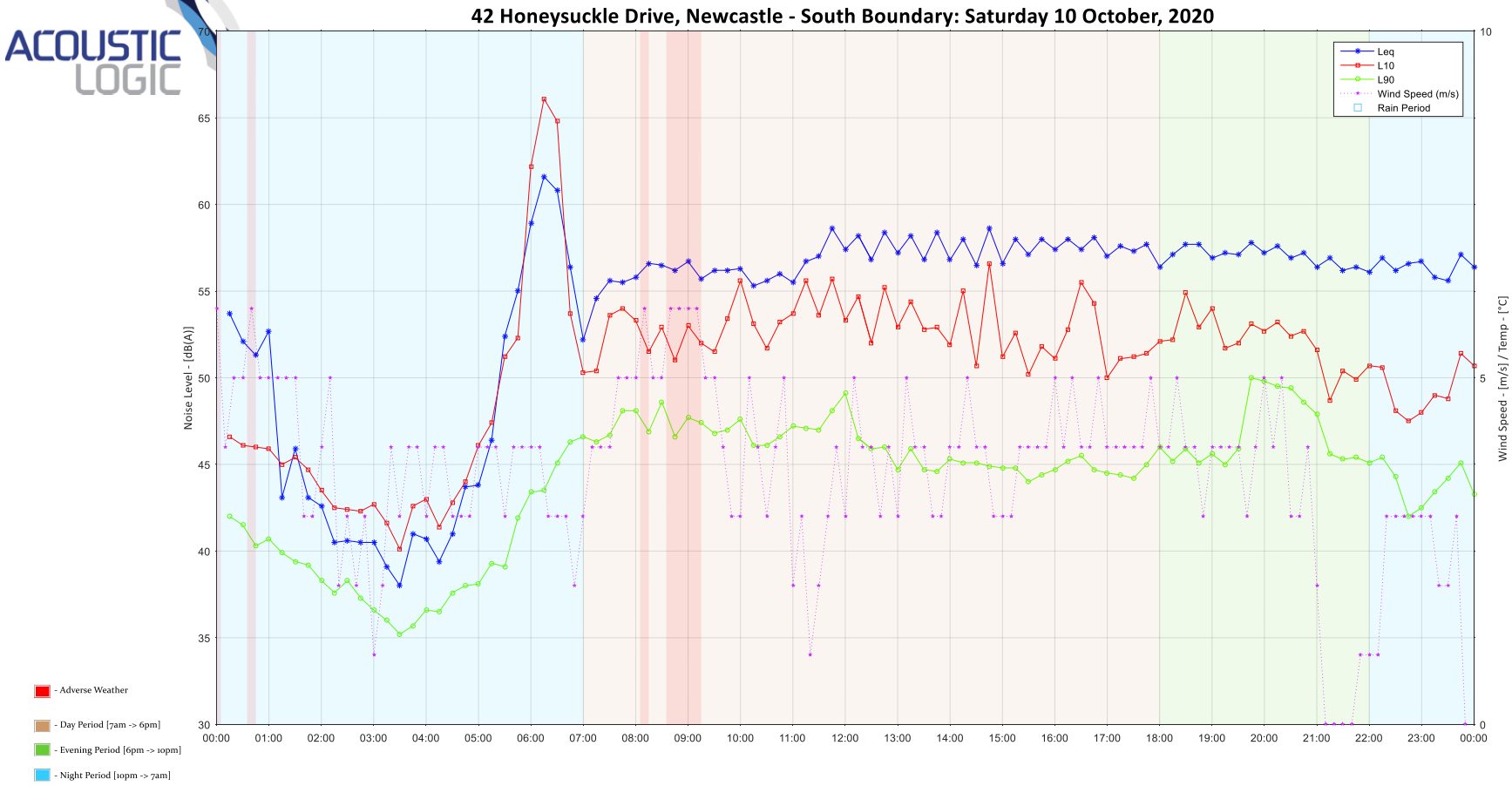

42 Honeysuckle Drive, Newcastle - Northern Boundary: Thursday 15 October, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


42 Honeysuckle Drive, Newcastle - Northern Boundary: Friday 16 October, 2020
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]

APPENDIX B – NOISE MONITORING RESULTS – LOGGER LOCATION L2 – SOUTHERN BOUNDARY OF 42 HONEYSUCKLE DRIVE, NEWCASTLE


42 Honeysuckle Drive, Newcastle - South Boundary: Thursday 08 October, 2020
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]


42 Honeysuckle Drive, Newcastle - South Boundary: Friday 09 October, 2020
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]


42 Honeysuckle Drive, Newcastle - South Boundary: Saturday 10 October, 2020
Leq
L10
L90
Wind Speed (m/s)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
70
65
60
55
50
45
40
35
30
10
5
0
00:00
01:00
02:00
03:00
04:00
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20:00
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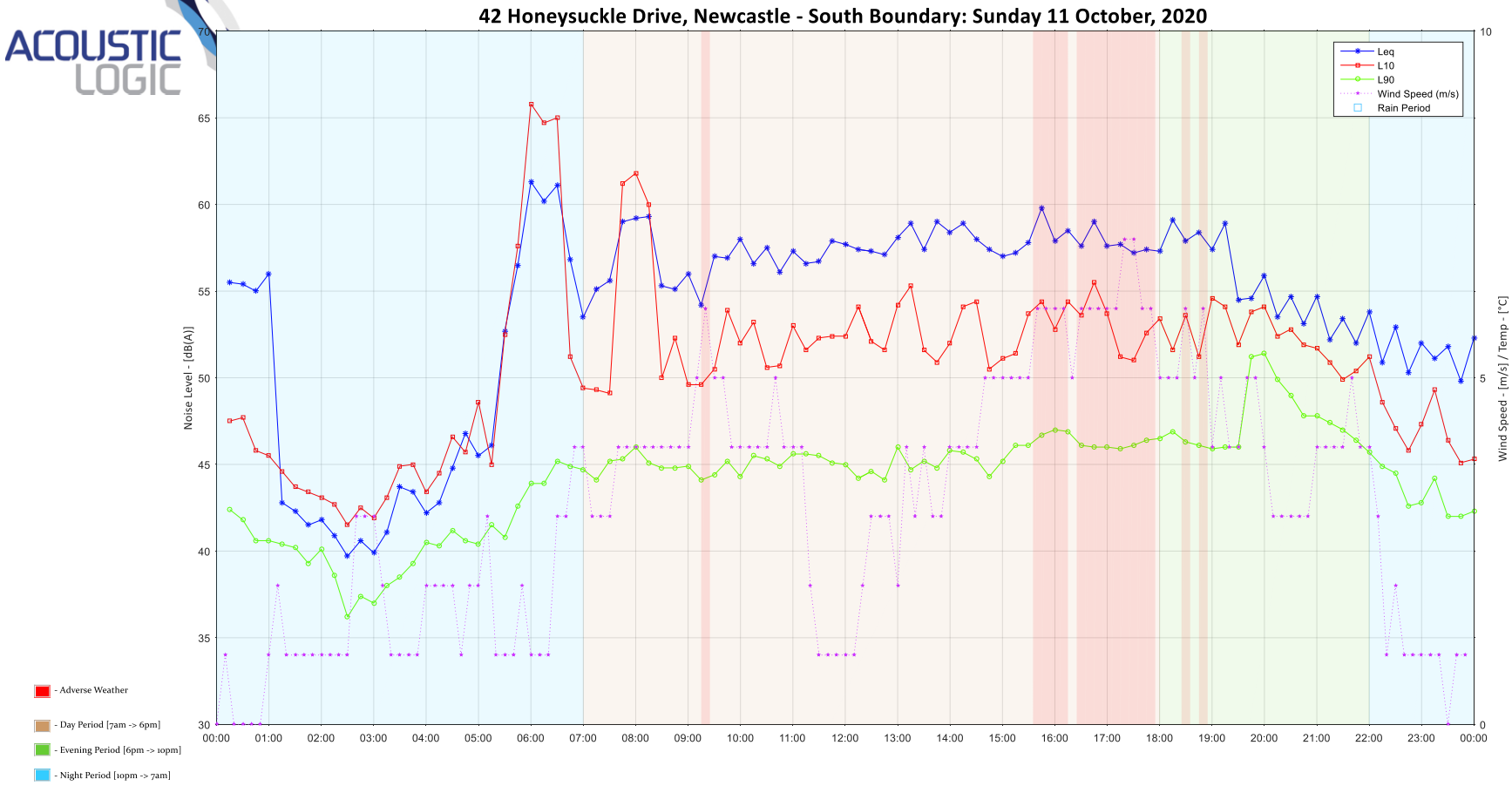
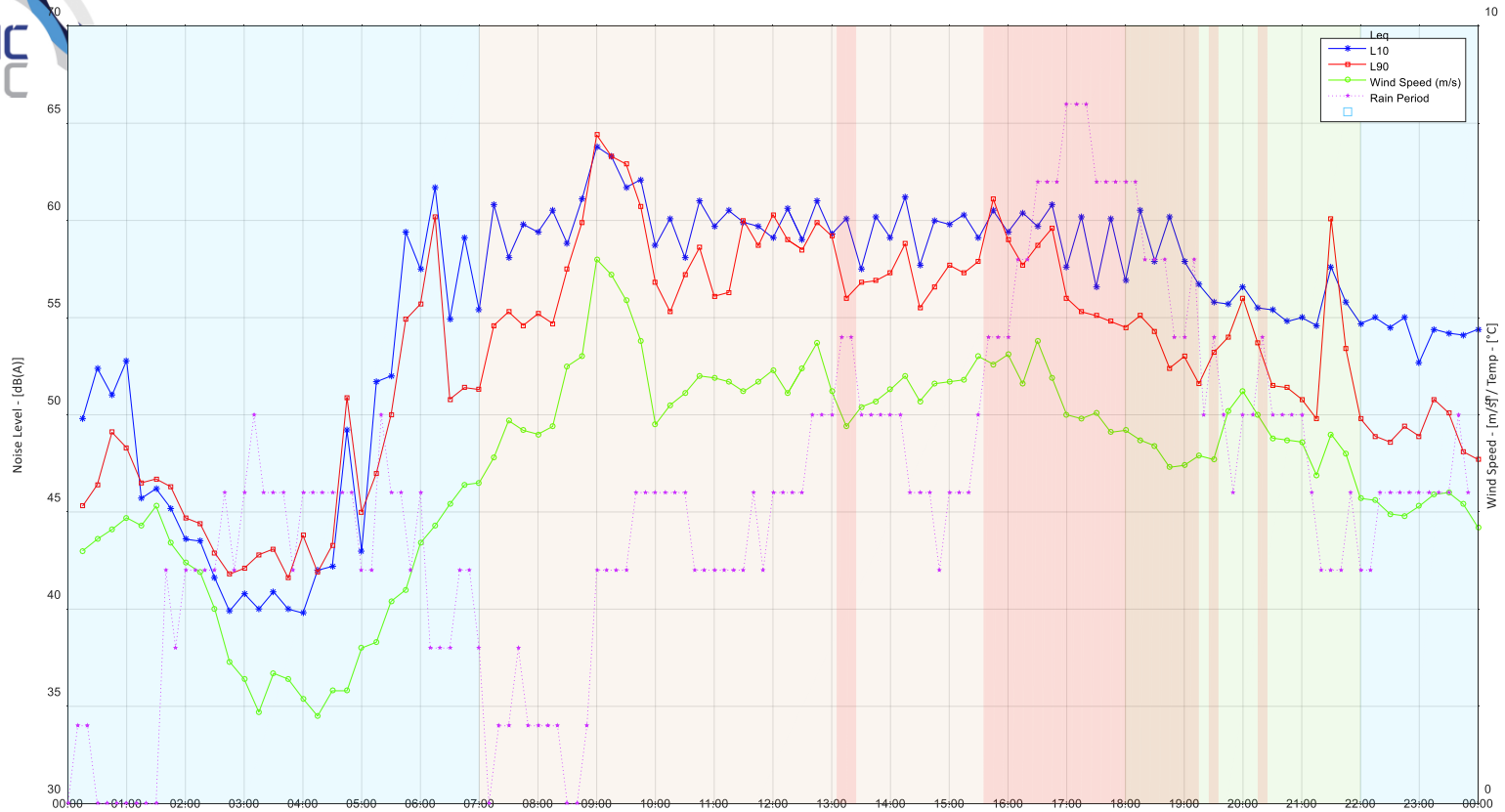
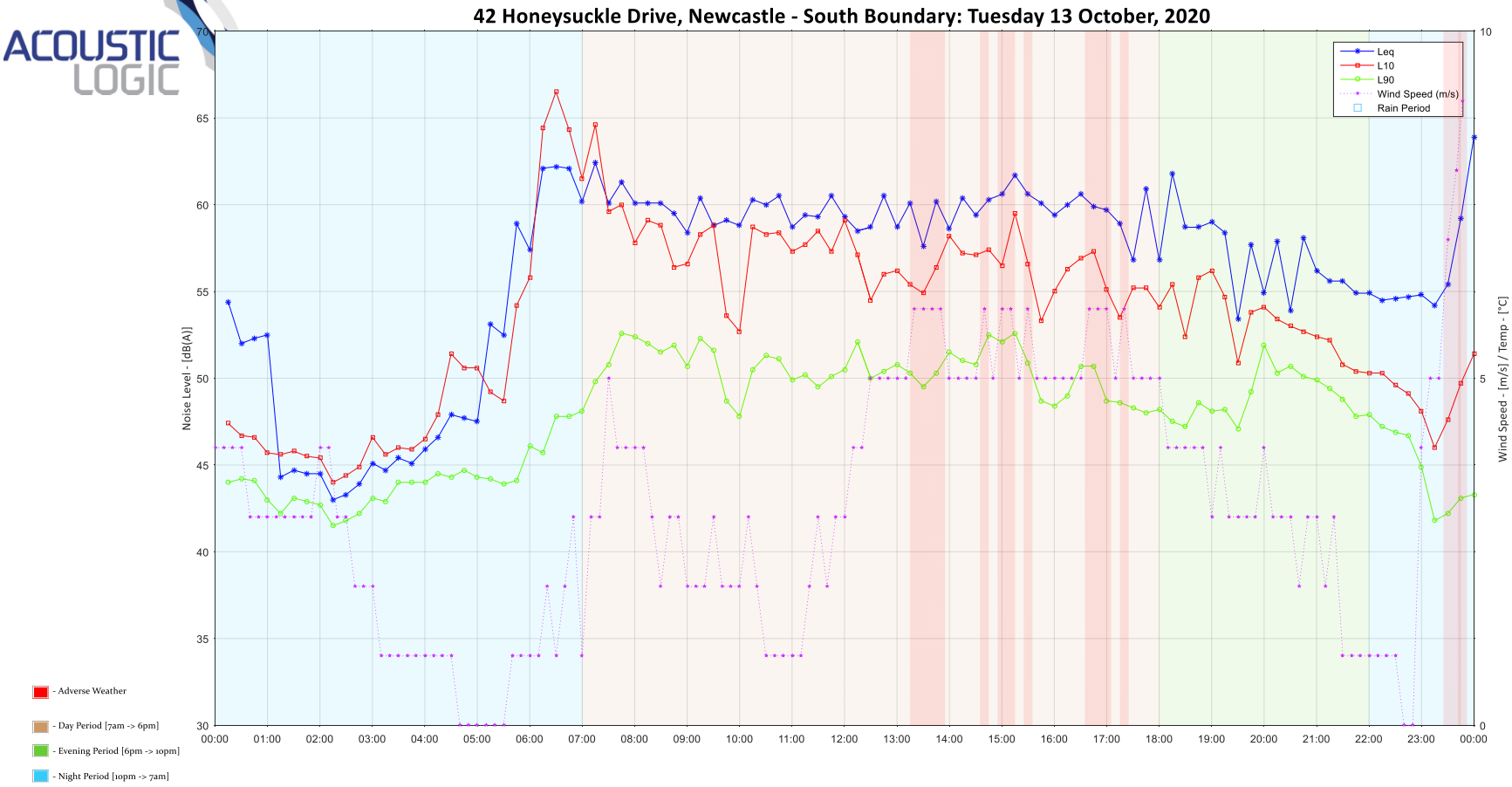
00:00
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

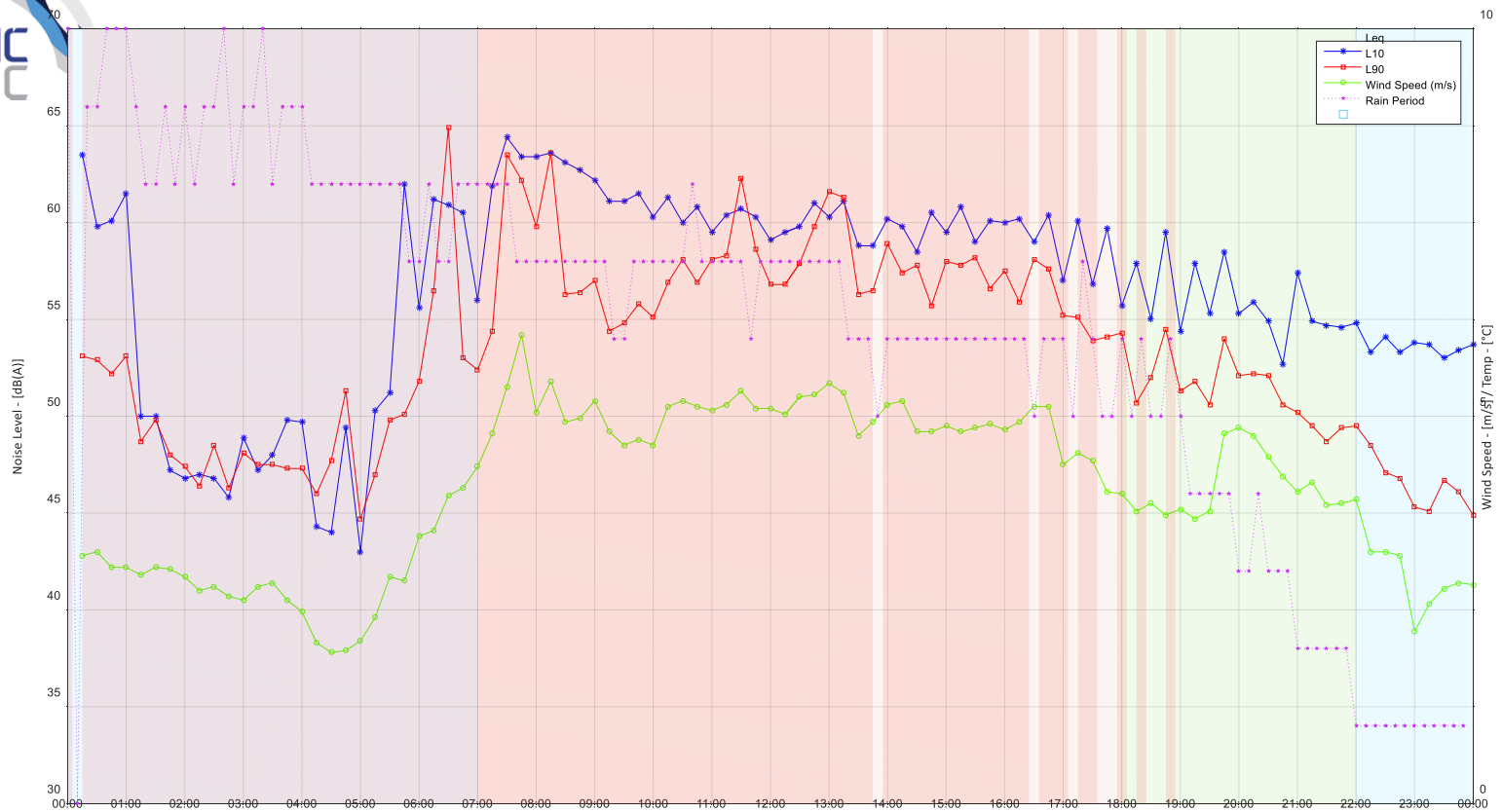

42 Honeysuckle Drive, Newcastle - South Boundary: Sunday 11 October, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

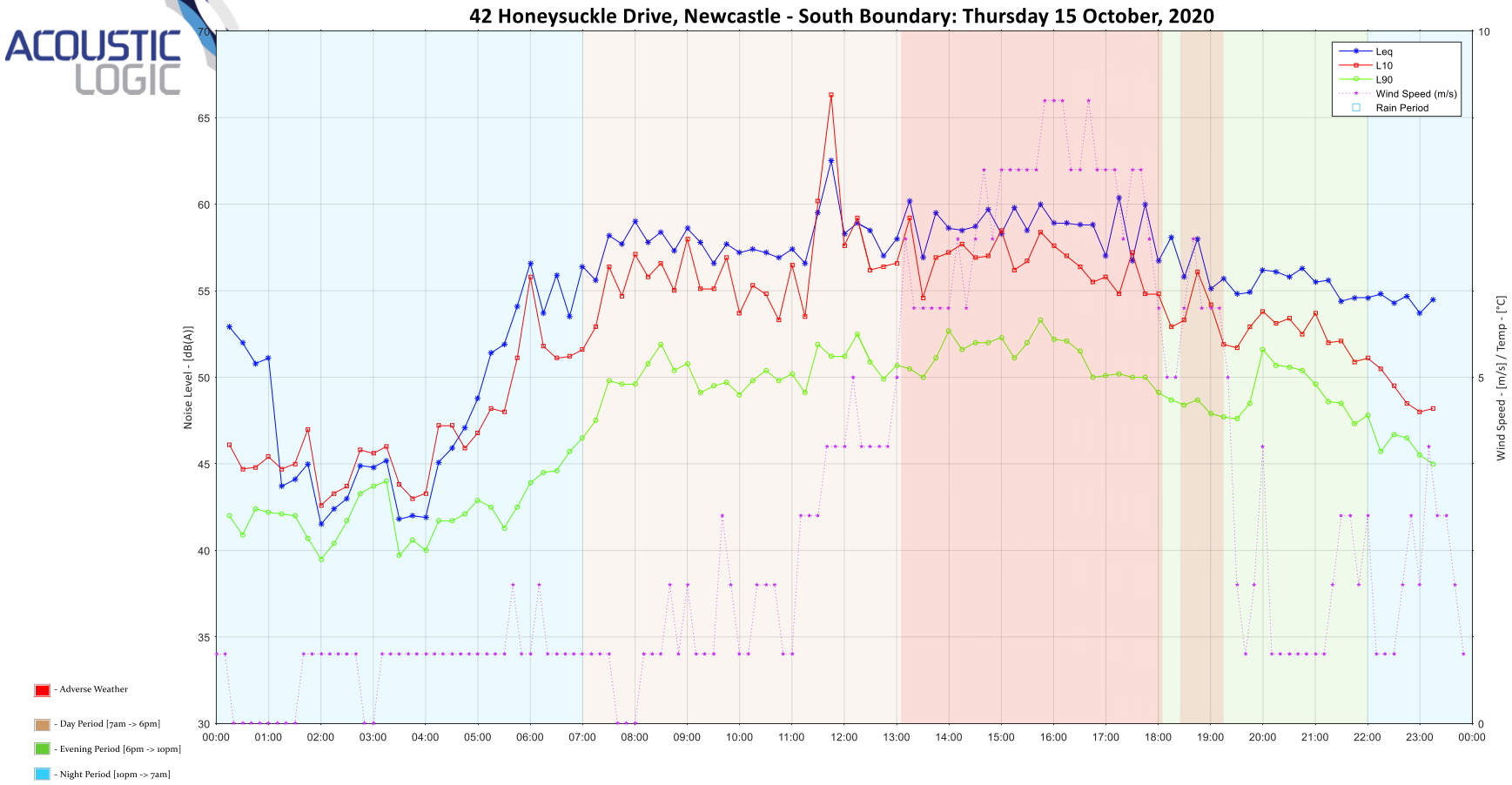
42 Honeysuckle Drive, Newcastle - South Boundary: Monday 12 October, 2020




42 Honeysuckle Drive, Newcastle - South Boundary: Tuesday 13 October, 2020
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]

42 Honeysuckle Drive, Newcastle - South Boundary: Wednesday 14 October, 2020




42 Honeysuckle Drive, Newcastle - South Boundary: Thursday 15 October, 2020
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]