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Sirius Site, 2-60 Cumberland Street, The Rocks

Noise Impact Assessment

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TABLE OF CONTENTS

1 INTRODUCTION 4
2 SITE DESCRIPTION 6
2.1 SURROUNDING RECEIVERS 7
3 NOISE DESCRIPTORS 9
4 AMBIENT NOISE SURVEY 10
4.1.1 Measurement Position 10
4.1.2 Measurement Period 10
4.1.3 Measurement Equipment 10
4.1.4 Summarised Rating Background Noise Levels 11
5 EXTERNAL NOISE INTRUSION ASSESSMENT 12
5.1 NOISE INTRUSION CRITERIA 12
5.1.1 State Environmental Planning Policy (SEPP) (Infrastructure) 2007 12
5.1.2 NSW DPIE Developments near Rail Corridors or Busy Roads – Interim Guideline 13
5.1.3 Australian Standard AS2107:2016 Recommended Design Sound Levels and Reverberation Times for Building Interiors 13
5.1.4 City of Sydney Council DCP and LEP 2012 14
5.1.5 Summarised External Noise Intrusion Criteria 14
5.2 EXTERNAL NOISE MEASUREMENTS 15
5.2.1 Measurement Equipment 15
5.2.2 Measurement Location 15
5.2.3 Measurement Period 15
5.2.4 Attended Noise Measurements 15
5.2.5 Summarised Predicted External Noise Levels at New Façades 16
5.3 NOISE INTRUSION ANALYSIS 16
5.4 RECOMMENDED CONSTRUCTIONS 17
5.4.1 Glazed Windows and Doors 17
5.4.2 New Pod External Roof/Ceiling Construction 19
5.4.3 External Wall Construction 20
5.4.4 Mechanical Ventilation 20
6 NOISE EMISSION CRITERIA 21
6.1 NSW EPA NOISE POLICY FOR INDUSTRY (NPI) 2017 21
6.1.1 Intrusiveness Criterion 21
6.1.2 Project Amenity Criterion 21
6.1.3 Sleep Arousal Criteria 22
6.2 SUMMARISED NOISE EMISSION CRITERIA 23
7 NOISE EMISSIONS ASSESSMENT 23
7.1 MECHANICAL PLANT NOISE 23
8 CONCLUSION 24
APPENDIX ONE – UNATTENDED NOISE MONITORING 25
SIRIUS SITE, REAR COURTYARD EAST OF EXISTING BUILDING 25
SIRIUS SITE, ROOFTOP TERRACE 36

1 INTRODUCTION

Acoustic Logic Consultancy (ALC) has been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed alterations and additions at the Sirius Site, 2-60 Cumberland Street, The Rocks.

This document addresses noise impacts associated with the following:

- Noise intrusion to project site from adjacent roadways, 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:

- State Environmental Planning Policy (SEPP) (Infrastructure) 2007
- NSW Department of Planning, Industry and Environment (DPIE) document – Developments near Rail Corridors or Busy Roads – Interim Guideline
- Australian Standard AS2107:2016 – Recommended Design Sound Levels and Reverberation Times for Building Interiors
- City of Sydney Council DCP and LEP 2012, and
- NSW Environmental Protection Agency (EPA) – Noise Policy for Industry (NPI) 2017.

We note that the City of Sydney Council DCP is not a planning control requirement for the site and has been used as a guideline only.

We note that the site is in 'The Rocks Site' under SEPP State and Regional Development 2011 and is not subject to the City of Sydney Council LEP or DCP. It shall be noted that these controls are referenced as guidelines and do not strictly apply to the Sirius site.

This assessment has been conducted using the BVN architectural drawings for D.A Submission, see details below.

Table 1-1 – Architectural Sheet Information

Owner	Drawing Number	Drawing Title	Issue	Date
BVN	A-00-04	SITE CONTEXT PLAN	2	September 2020
	B-10-01	BASEMENT B2b-B2a	29	October 2020
	B-10-02	BASEMENT B1b-B1a	25	
	B-10-03	LEVEL 01-03	18	
	B-10-04	LEVEL 03-05	18	
	B-10-05	LEVEL 05-07	14	September 2020
	B-10-06	LEVEL 07-09	13	
	B-10-07	LEVEL 09-11		
	B-10-08	LEVEL 11-13	12	
	B-10-09	LEVEL 13-15		
	B-10-10	LEVEL 15-17		
	B-10-11	LEVEL 18-19	11	
	B-10-12	LEVEL 20-21		
	B-10-13	LEVEL 22-23	12	
	B-10-14	LEVEL 24-27	8	
	B-10-15	ROOF PLAN	5	
	C-10-00	EAST & WEST ELEVATIONS – STREETSCAPE	9	October 2020
	C-10-01	EAST & WEST ELEVATIONS – SIRIUS BUILDING	8	
	C-10-02	NORTH & SOUTH ELEVATIONS – OVERALL	6	September 2020
	C-10-03	NORTH & SOUTH ELEVATIONS – SIRIUS TOWER		
	C-10-04	EAST & WEST E;EVATIONS – CUMBERLAND BLDG	4	
	D-10-01	SECTIONS	7	October 2020
	D-10-02	SECTIONS	3	September 2020

2 SITE DESCRIPTION

The proposed development is for the restoration and refurbishment of the existing Sirius building, including alterations and additions. The existing building is proposed to be substantially retained and restored with integrity. New residential additions are proposed to be added to the existing structure in appropriate locations to maintain the legibility of the original architectural form, and new structures for commercial uses are proposed to be added at the Cumberland Street and Gloucester Walk frontages of the site.

The existing Sirius building has a varied height profile due to its modular form and due to the fall across the site when observed from Cumberland Street and from Gloucester Walk. The existing building rises from the north and south towards a central tower with a maximum height of 34.6m above ground level at Cumberland Street (equivalent to an 11-storey building). Due to the existing split-level apartments, the building is conveyed as having a greater number of levels (25 storeys).

The proposed alterations and additions to the existing building will increase the overall building height by 5.4m to a maximum building height of 40.9m above ground level at Cumberland Street. On the Cumberland Street entry side of the site, the building presents as thirteen (13) levels at the highest occupied level. When observed from Gloucester Walk, and due to the fall across the site, the building presents as fourteen (14) occupied levels.

The building incorporates two levels of basement car parking.

The proposed works include:

- Alterations and additions to the existing building to provide for:
    - Residential accommodation (a total of 76 apartments);
    - Commercial premises, including retail floorspace; and
    - Basement car parking.
- Provision of a through-site link between Cumberland Street and Gloucester Walk.
- Upgrades to Gloucester Walk including landscaping and pedestrian access.
- Improvements to Cumberland Street including landscaping and improved carpark entry.
- Associated works, including:
    - Minor demolition works;
    - Earthworks;
    - Structural upgrades;
    - Services upgrades; and
    - Landscaping works.

2.1 SURROUNDING RECEIVERS

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 receivers along the eastern and far western boundaries of the siriussirius; and
- Existing commercial developments and historical terraces along the eastern, southern and western boundaries of the site.

The nearest noise receivers around the site include:

- **R1*:** Residential Receiver 1 – Multi storey hotel development to the east at 25 George Street;
- **R2*:** Residential Receiver 2 – Multi storey hotel development to the east at 55 George Street;
- **R3:** Residential Receiver 3 – Multi storey residential developments to the west at 20-42 Lower Fort Street and 8-16 Trinity Avenue;
- **C1:** Commercial Receiver 1 – Multi storey commercial developments to the east at 36-88 George Street;
- **C2:** Commercial Receiver 2 – Multi storey commercial developments to the east at 29-47 George Street;
- **C3:** Commercial Receiver 3 – Multi storey commercial developments to the south and east along Argyle Street and George Street;
- **C4:** Commercial Receiver 4 – Multi storey commercial developments to the south at 86-96 Cumberland Street; and
- **C5:** Commercial Receiver 5 – Multi storey commercial development to the west underneath Bradfield Highway at 3 Cumberland Street.

*It is noted that hotels are not considered residential developments. Criteria for noise emissions shall be procured through a residential amenity + 5 ideology per Table 2.2 of the NSW EPA Noise Policy for Industry.

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

Project Site

Residential Receivers

Commercial Receivers

Figure 1 – Project Site
Source: NSW Six Maps

Unattended Noise Monitors

Attended Measurements

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 4-1.

4.1.1 Measurement Position

Two unattended noise monitors were installed on site, one in the rear courtyard and one on the rooftop terrace facing the Sydney Harbour Bridge. Refer to Figure 1 for detailed location.

4.1.2 Measurement Period

Unattended noise monitoring was conducted from Tuesday 21st January 2020 to Thursday 30th January 2020. Attended noise measurements were undertaken between the hours of 3:00pm and 4:00pm on Tuesday 21st January 2020 and between the hours of 4:00pm and 5:00pm on Thursday 30th January 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 One – Unattended Noise Monitoring.

4.1.4 Summarised Rating Background Noise Levels

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

Table 4-1 – Measured Noise Levels

Monitor	Time of day	Rating Background Noise Level dB(A) $L_{90(Period)}$
Sirius Site – Rear Courtyard (East of the existing building)	Day (7am – 6pm)	57
	Evening (6pm – 10pm)	55
	Night (10pm – 7am)	51
Sirius Site – Rooftop Terrace	Day (7am – 6pm)	69
	Evening (6pm – 10pm)	66
	Night (10pm – 7am)	56

On review of the monitoring data, the measured L_{90} noise levels during high wind speed days do not increase background noise levels significantly as periods with little to no wind. This demonstrates that even though wind speeds measured at Observatory Hill exceed EPA guidelines, either:

- The wind speed on site at this time was significantly lower than at Observatory Hill, and/or
- The wind on site was not sufficiently consistent to increase background noise levels compared to calm periods.

Therefore, only periods of adverse weather that were determined to have affected the noise data have been eliminated when determining the rating background noise level at the site, which is presented above.

5 EXTERNAL NOISE INTRUSION ASSESSMENT

Site investigation indicates that the major external noise sources around project site are from traffic movements along Bradfield Highway, adjacent to the 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;

- State Environmental Planning Policy (SEPP) (Infrastructure) 2007
- NSW Department of Planning, Industry and Environment (DPIE) document – Developments near Rail Corridors or Busy Roads – Interim Guideline
- Australian Standard AS2107:2016 – Recommended Design Sound Levels and Reverberation Times for Building Interiors, and
- City of Sydney Council DCP and LEP 2012.

5.1.1 State Environmental Planning Policy (SEPP) (Infrastructure) 2007

Roads and Maritime Services (RMS) Map No. 16 of the traffic volume maps referenced by the SEPP (Infrastructure) on the RMS website (see below), classifies the section of Bradfield Highway where the development is located adjacent to as a road where a noise intrusion assessment is mandatory under clause 102 of the SEPP (Infrastructure). See RTA average annual daily road traffic volume map number 16 and the approximate location of the site below.

Figure 5-1: RMS Map No. 16 and Approximate Location of Proposed Development

Clause 102: Impact of road noise or vibration on non-road development

(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:

a) in any bedroom in the building--35 dB(A) at any time between 10 pm and 7 am,

b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway) --40 dB(A) at any time.

5.1.2 NSW DPIE Developments near Rail Corridors or Busy Roads – Interim Guideline

Section 3.5

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 Standard AS2107:2016 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 5-1 – Recommended Design Sound Levels

Space /Activity Type	Recommended Maximum Design Sound Level
Sleeping Areas (night time)	40 dB(A)$L_{eq(10pm-7am)}$
Living Areas	45 dB(A)$L_{eq(anytime)}$

5.1.4 City of Sydney Council DCP and LEP 2012

4.2.3.11 Acoustic Privacy

(1) Where necessary, a residential development is to include acoustic measures to reduce the impact of noise from existing or planned external sources (for example busy roads, adjoining industries, live music venues and public parks and plazas in which people may congregate or host live music or events).

(2) Development is to incorporate measures that reduce the entry of noise from external sources into dwellings.

(7) The repeatable maximum LAeq (1 hour) for residential buildings and serviced apartments must not exceed the following levels:

(a) for closed windows and doors:

(i) 35dB for bedrooms (10pm-7am); and

(ii) 45dB for main living areas (24 hours).

(b) for open windows and doors:

(i) 45dB for bedrooms (10pm-7am); and

(ii) 55dB for main living areas (24 hours).

(8) Where natural ventilation of a room cannot be achieved, the repeatable maximum LAeq (1hour) level in a dwelling when doors and windows are shut and air conditioning is operating must not exceed:

(a) 38dB for bedrooms (10pm-7am); and

(b) 48dB for main living areas (24 hours).

We note that the site is in 'The Rocks Site' under SEPP State and Regional Development 2011 and is not subject to the City of Sydney Council LEP or DCP. It shall be noted that these controls are referenced as guidelines and do not strictly apply to the Sirius site.

5.1.5 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 5-2 – Adopted Internal Noise Levels

Space / Activity Type	Required Internal Noise Level
Residential Living Areas	40 dB(A) $L_{eq\ (anytime)}$
Residential Sleeping Areas (night time)	35 dB(A) $L_{eq\ (worst\ 1hr)\ (night\ time)}$

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 conducted 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

Two unattended noise monitors were installed on site, one in the rear courtyard and one on the rooftop terrace facing the Sydney Harbour Bridge. Refer to Figure 1 for detailed location.

An attended traffic noise measurement was conducted along Cumberland Street, located along the western boundary of the site. Refer to Figure 1 for detailed location. Three measurements were made to distinguish between the noise environment of the lower levels facing Cumberland Street and the higher levels with direct view of Bradfield Highway. The noise measurement locations had a 180° view of Cumberland Street and Bradfield Highway.

5.2.3 Measurement Period

Unattended noise monitoring was conducted from Tuesday 21st January 2020 to Thursday 30th January 2020. Attended noise measurements were undertaken between the hours of 3:00pm and 4:00pm on Tuesday 21st January 2020 and between the hours of 4:00pm and 5:00pm on Thursday 30th January 2020.

5.2.4 Attended Noise Measurements

Attended noise measurements have been summarised below for each location.

Table 5-3 – Attended Noise Measurements

Location	Measure Noise Level dB(A) $L_{Aeq\ (15\ minute)}$
Rooftop terrace of Sirius Site Measurement was conducted approximately 15m from kerb of Cumberland Street and 45m from Bradfield Highway	70 dB(A)$L_{eq(15min)}$
Cumberland Street, approximately 2m from kerb	63 dB(A)$L_{eq(15min)}$
Sirius Site Level 4 balcony, approximately 5m from kerb	63 dB(A)$L_{eq(15min)}$

5.2.5 Summarised Predicted External Noise Levels at New Façades

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

Table 5-4 – Predicted Traffic Noise Levels

Location	Time of Day	Noise Level – L_{eq}
Cumberland Street façade above and in line with Bradfield Highway	Daytime 7am – 10pm	71 dB(A) $L_{eq\ (worst\ 1hr)}$
	Night Time 10pm – 7am	70 dB(A) $L_{eq\ (worst\ 1hr)}$
Cumberland Street façade below Bradfield Highway	Daytime 7am – 10pm	64 dB(A) $L_{eq\ (worst\ 1hr)}$
	Night Time 10pm – 7am	63 dB(A) $L_{eq\ (worst\ 1hr)}$
Eastern façade facing Circular Quay	Daytime 7am – 10pm	60 dB(A) $L_{eq\ (worst\ 1hr)}$
	Night Time 10pm – 7am	57 dB(A) $L_{eq\ (worst\ 1hr)}$

5.3 NOISE INTRUSION ANALYSIS

Traffic noise intrusion into the proposed development was assessed using the measured traffic 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

Assessment of façade requirements to achieve required indoor noise levels has been undertaken. Dimensions of rooms, setbacks from roadways, window openings and floor areas have been used. Calculations have taken into consideration any barrier effects from the building structure.

All recommendations can be refined after architectural drawings have been finalised.

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 full perimeter acoustic seals equal to 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. Complying constructions are detailed in Table 5-5.

Table 5-5 – Complying Glazing Constructions

Area	Room	Glazing Thickness	Acoustic Seals
Cumberland Street façade level with and above Bradfield Highway	All Bedrooms	Vision Glass: 13.52mm lam/ 24mm airgap, 13.52mm lam **OR** 6.38mm lam/ 100mm airgap/ 6.38mm lam	Yes
	All Living Rooms	Vision Glass: 8mm/ 12mm airgap/ 11.14mm lam	Yes
Cumberland Street façade below Bradfield Highway	Bedrooms with Concrete External Façade	10.38mm lam	Yes
	Bedrooms with Lightweight External Façade	Vision Glass: 8mm/ 12mm airgap/ 11.14mm lam **OR** 12.38mm lam	Yes
	Living Rooms with Concrete External Façade	6.38mm lam	Yes
	Living Rooms with Lightweight External Façade	10.38mm lam	Yes
Eastern façade facing Circular Quay	Bedrooms	10.38mm lam	Yes
	Living Rooms	6.38mm lam	Yes

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

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 5-6 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 5-6 – Minimum R_w of Glazing Assembly (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
6.38mm laminated	31
10.38mm laminated	35
12.38mm laminated	37
Vision Glass: 8mm/ 12mm airgap/ 11.14mm laminated	42
Vision Glass: 13.52mm/ 24 airgap/ 13.52mm	44
6.38mm lam/ 100mm airgap/ 6.38mm lam	45

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

5.4.2 New Pod External Roof/Ceiling Construction

External roof construction consists of existing and new construction elements. For existing external roof constructions made of concrete elements, acoustic upgrading is not required. For new external roof constructions to be made of lightweight elements, acoustic treatment will be required.

The recommended roof/ceiling construction is shown in Figure 5-2 and Table 5-7 below.

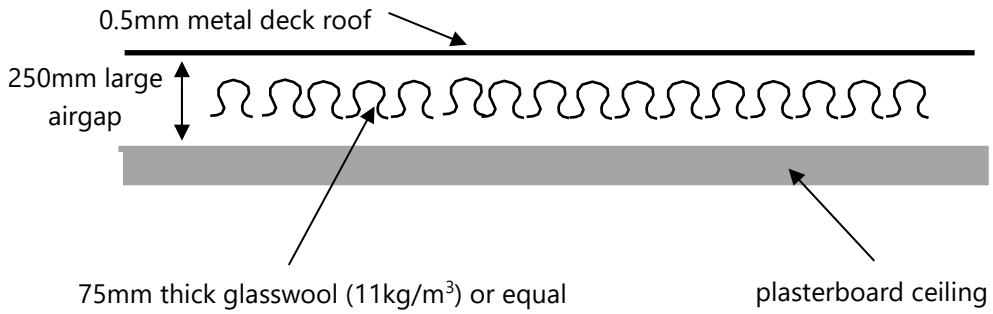

Figure 5-2 – Roof / Ceiling Construction

Table 5-7 – External Light Weight Roof Construction

Units	Space	Internal Lining	Truss System	External Lining
All lightweight roofing	All	2 x 16mm Fyrchek	Minimum of 250mm truss with 75mm thick 11kg/m^3 glasswool insulation in cavity	0.44mm metal deck roof

In the event that any penetrations are required thru the external skin, an acoustic sealant should be used to minimise all gaps.

5.4.3 External Wall Construction

External wall construction will be constructed from a combination of concrete and lightweight elements. For existing external wall systems constructed with concrete, no further acoustic upgrading is required. For new external wall constructions made of lightweight elements, acoustic treatment will be required.

For walls that are constructed with lightweight materials, see Table 5-8 below.

Table 5-8 – Light Weight External Wall Construction

<table>
<tr><th>Units</th><th>Space</th><th>Internal Lining</th><th>Stud System</th><th>External Lining</th></tr>
<tr><td rowspan="2">Façades below Bradfield Highway</td><td>Bedroom</td><td rowspan="2">1 x 13mm plasterboard for in-fill panels above windows.
2 x 13mm plasterboard for all other external walls</td><td rowspan="5">Min 90mm Stud with 75mm thick 11kg/m^3 glasswool insulation</td><td rowspan="5">1 x 9mm fibre cement sheet</td></tr>
<tr><td>Living Room</td></tr>
<tr><td rowspan="2">Façades in line with and above Bradfield Highway</td><td>Bedroom</td><td rowspan="2">2 x 13mm plasterboard</td></tr>
<tr><td>Living Room</td></tr>
<tr><td>Eastern façade facing Circular Quay</td><td>All Rooms</td><td>1 x 13mm plasterboard</td></tr>
</table>

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.

5.4.4 Mechanical Ventilation

With respect to natural ventilation of a dwelling, the NSW DPIE Development near Busy Roads and Rail Corridors - Interim Guideline dictates that:

> *"If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed.

- All façades will not be able to achieve required internal noise levels with windows or doors open.

Any supplementary ventilation system proposed to be installed should be acoustically designed to ensure that the acoustic performance of the acoustic treatments outlined above is not reduced and does not exceed noise emission criteria (as per Section 6.2 below) to nearby properties.

6 NOISE EMISSION CRITERIA

6.1 NSW EPA NOISE POLICY FOR INDUSTRY (NPI) 2017

The EPA NPI has two criteria which both are required to be satisfied, namely Intrusiveness and amenity. The NPI sets out acceptable noise levels for various localities. The policy indicates four categories to assess the appropriate noise level at a site. They are rural, suburban, urban and urban/industrial interface. Under the policy the nearest residential receivers would be assessed against the suburban criteria.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

6.1.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Table 4-1. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

6.1.2 Project Amenity Criterion

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

The EPA's NPI sets out acceptable noise levels for various localities. The recommended noise amenity area is based upon the measured background noise levels at the sensitive receiver. Based on the measured background noise levels detailed in Table 4-1, the Noise Policy for Industry suggests the adoption of the 'urban' categorisation.

The NPI requires project amenity noise levels to be calculated in the following manner;

$$L_{Aeq,15min} = \text{Recommended Amenity Noise Level} - 5\ dB(A) + 3\ dB(A)$$

The amenity levels appropriate for the receivers surrounding the site are presented in Table 6-1.

Table 6-1 – EPA Amenity Noise Levels

Type of Receiver	Time of day	Recommended Noise Level dB(A)$L_{eq(period)}$	Project Amenity Noise Level dB(A)$L_{eq(15\ minute)}$
Residential – Urban	Day	60	58
	Evening	50	48
	Night	45	43
Hotels	Day	65	63
	Evening	55	53
	Night	50	48
Commercial Premises	When in use	65	-

The NSW EPA Noise Policy for Industry (2017) defines;

- Day as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening as the period from 6pm to 10pm.
- Night as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

6.1.3 Sleep Arousal Criteria

The Noise Policy for Industry recommends the following noise limits to mitigate sleeping disturbance:

Where the subject development / premises night -time noise levels at a residential location exceed:

- *$L_{eq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *L_{Fmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level even assessment should be undertaken.

Table 6-2 – Sleep Arousal Criteria for Residential Receivers

Receiver	Rating Background Noise Level (Night) dB(A)L_{90}	Emergence Level
Residences Surrounding Site Night (10pm – 7am)	51 dB(A) L_{90}	56 dB(A)$L_{eq,\ 15min}$; 66 dB(A)L_{Fmax}

6.2 SUMMARISED NOISE EMISSION CRITERIA

Table 6-3 – EPA NPI Noise Emission Criteria (Residents Surrounding Project Site)

Time Period	Assessment Background Noise Level dB(A)L_{90}	Project Amenity Criteria dB(A) L_{eq}	Intrusiveness Criteria $L_{eq(15min)}$	NPI Criteria for Sleep Disturbance
Day	57	**58**	62	N/A
Evening	55	**48**	60	N/A
Night	51	**43**	56	**56 dB(A)$L_{eq,\ 15min}$; 66 dB(A)L_{Fmax}**

The project noise trigger levels are indicated by the bolded values in the table above.

Table 6-4 – EPA NPI Noise Emission Criteria (Hotels Surrounding Project Site)

Time Period	Assessment Background Noise Level dB(A)L_{90}	Project Amenity Criteria dB(A) L_{eq}	Intrusiveness Criteria $L_{eq(15min)}$	NPI Criteria for Sleep Disturbance
Day	57	63	**62**	N/A
Evening	55	**53**	60	N/A
Night	51	**48**	56	**56 dB(A)$L_{eq,\ 15min}$; 66 dB(A)L_{Fmax}**

The project noise trigger levels are indicated by the bolded values in the table above.

Table 6-5 – EPA NPI Noise Emission Criteria (Non-Residences Surrounding Project Site)

Type of Receiver	Time of day	Recommended Noise Level dB(A)$L_{eq(period)}$
Commercial premises	When in use	65

7 NOISE EMISSIONS ASSESSMENT

7.1 MECHANICAL PLANT NOISE

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

Noise emissions from all mechanical services plant to the closest residential receiver should comply with the noise emission criteria in Section 6.2.

8 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed alterations and additions at the Sirius Site, 2-60 Cumberland Street, The Rocks.

Provided that the recommendations presented in Section 5.3 are adopted, internal noise levels for the development will comply with the acoustic requirements of the following documents:

- State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007
- NSW Department of Planning, Industry and Environment (DPIE) document – Developments near Rail Corridors or Busy Roads – Interim Guideline
- Australian Standard AS2107:2016 Recommended Design Sound Levels and Reverberation Times for Building Interiors, and
- City of Sydney Council DCP and LEP 2012.

External noise emissions criteria have been established in this report to satisfy the requirements from the NSW Environmental Protection Agency (EPA) 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
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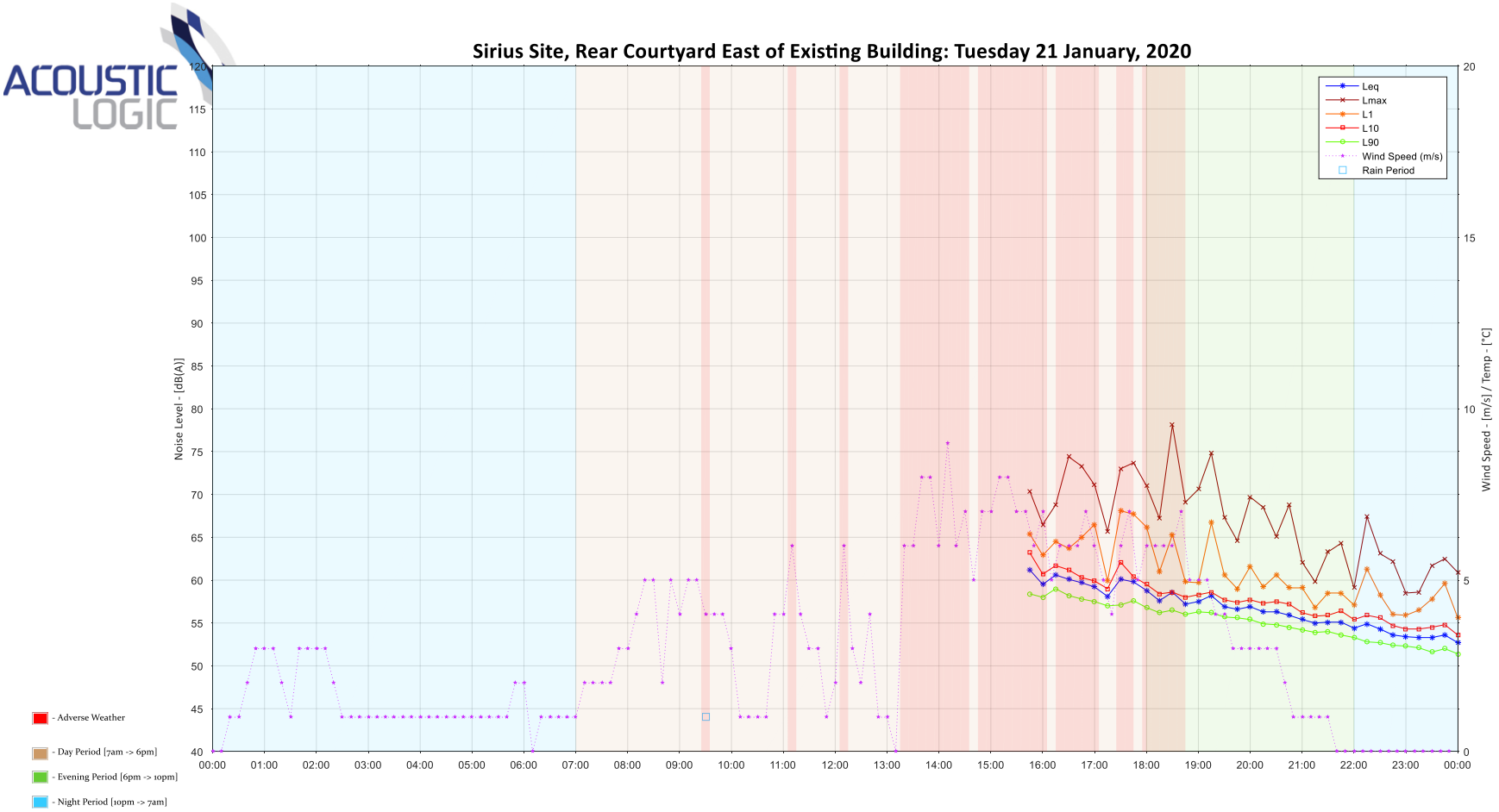
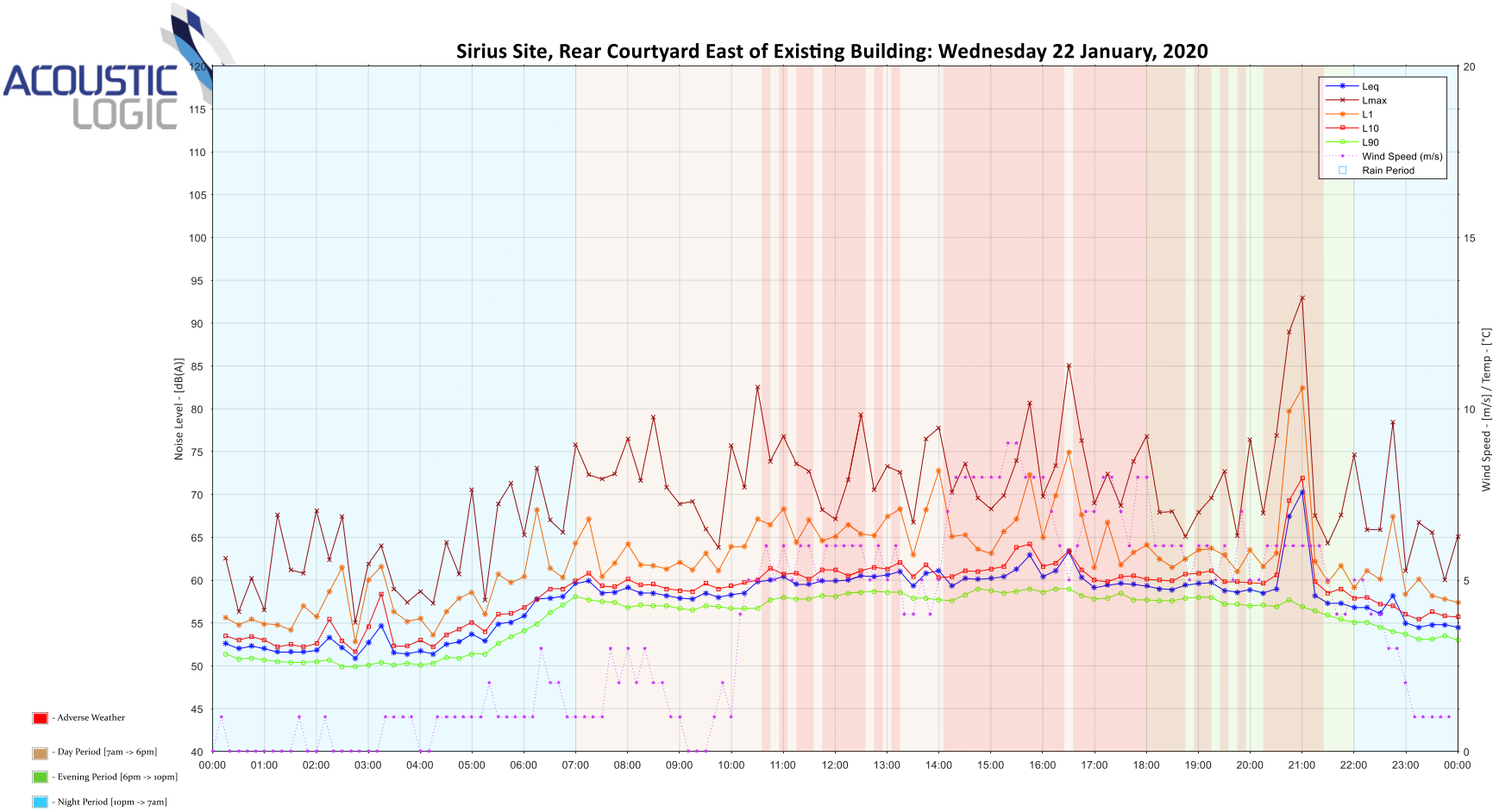
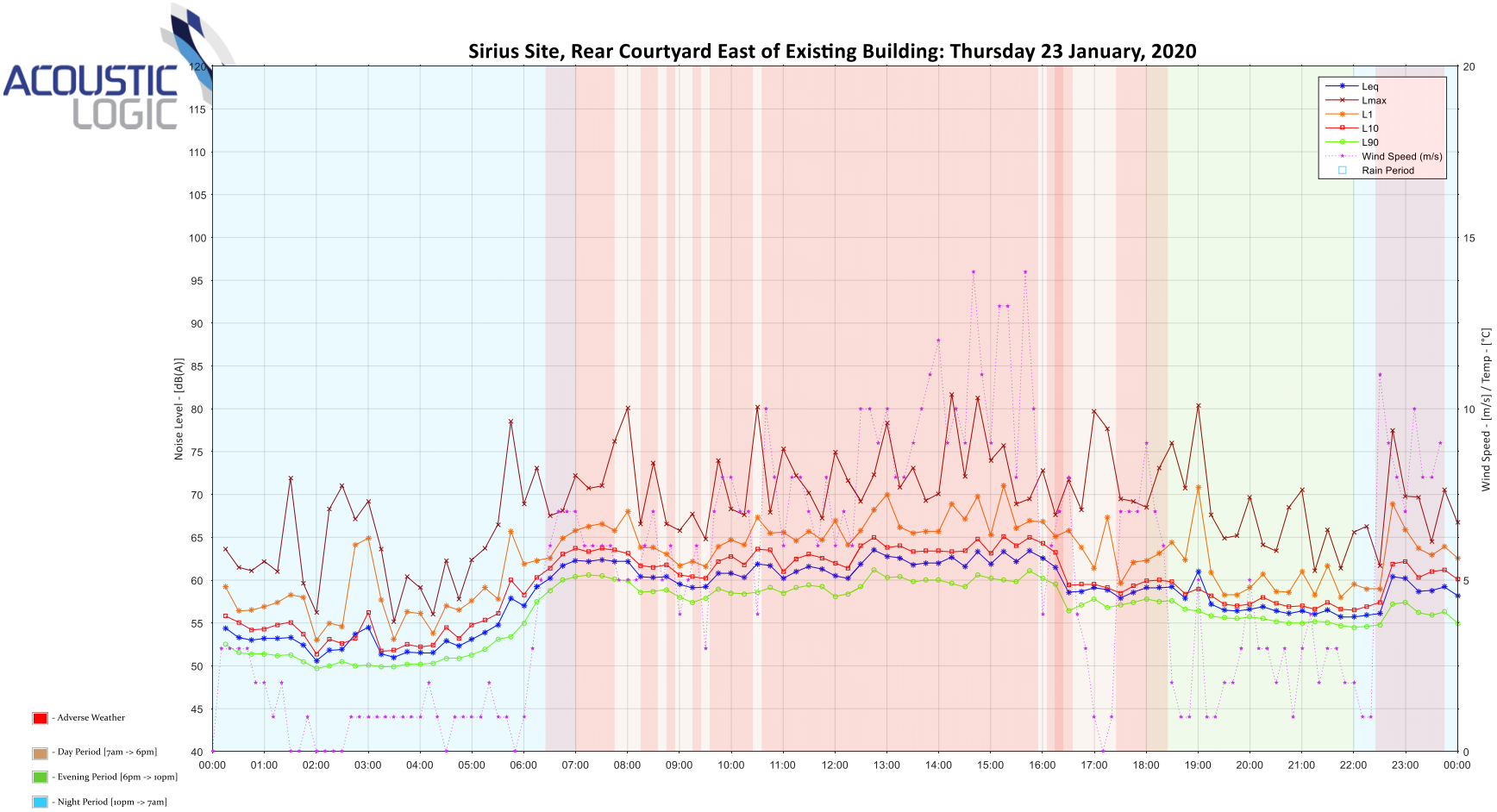
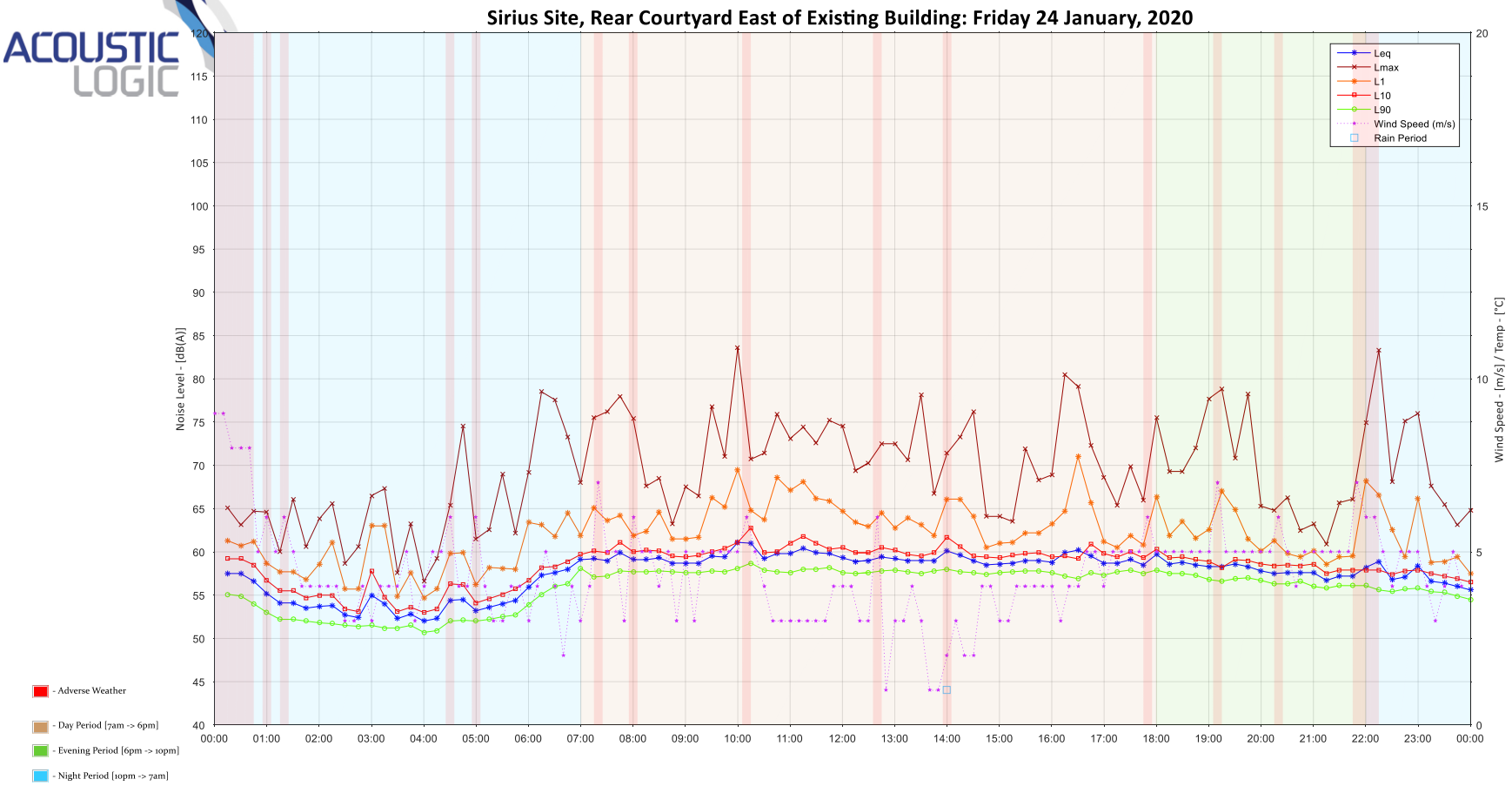
APPENDIX ONE – UNATTENDED NOISE MONITORING

SIRIUS SITE, REAR COURTYARD EAST OF EXISTING BUILDING

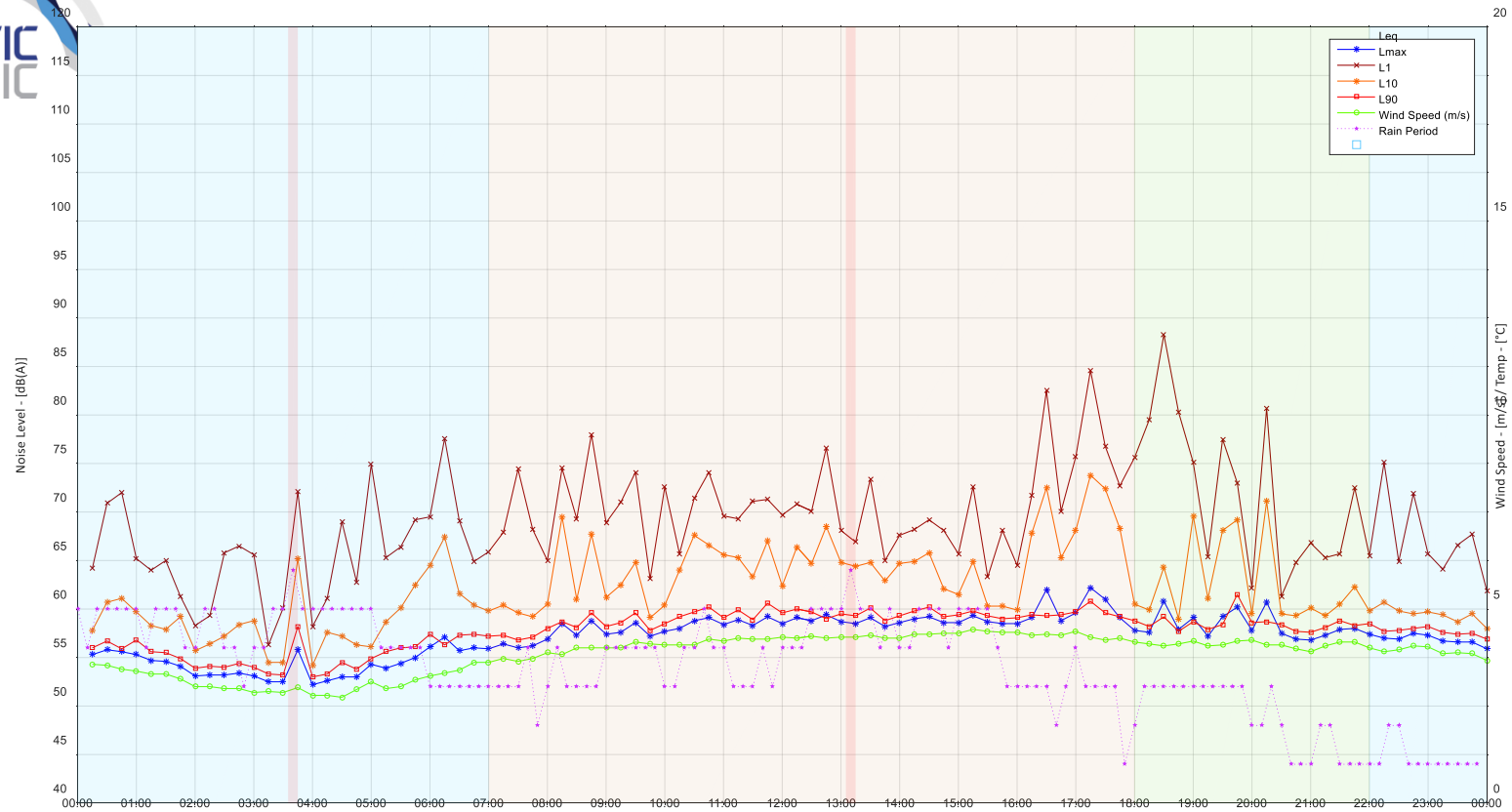

Sirius Site, Rear Courtyard East of Existing Building: Tuesday 21 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

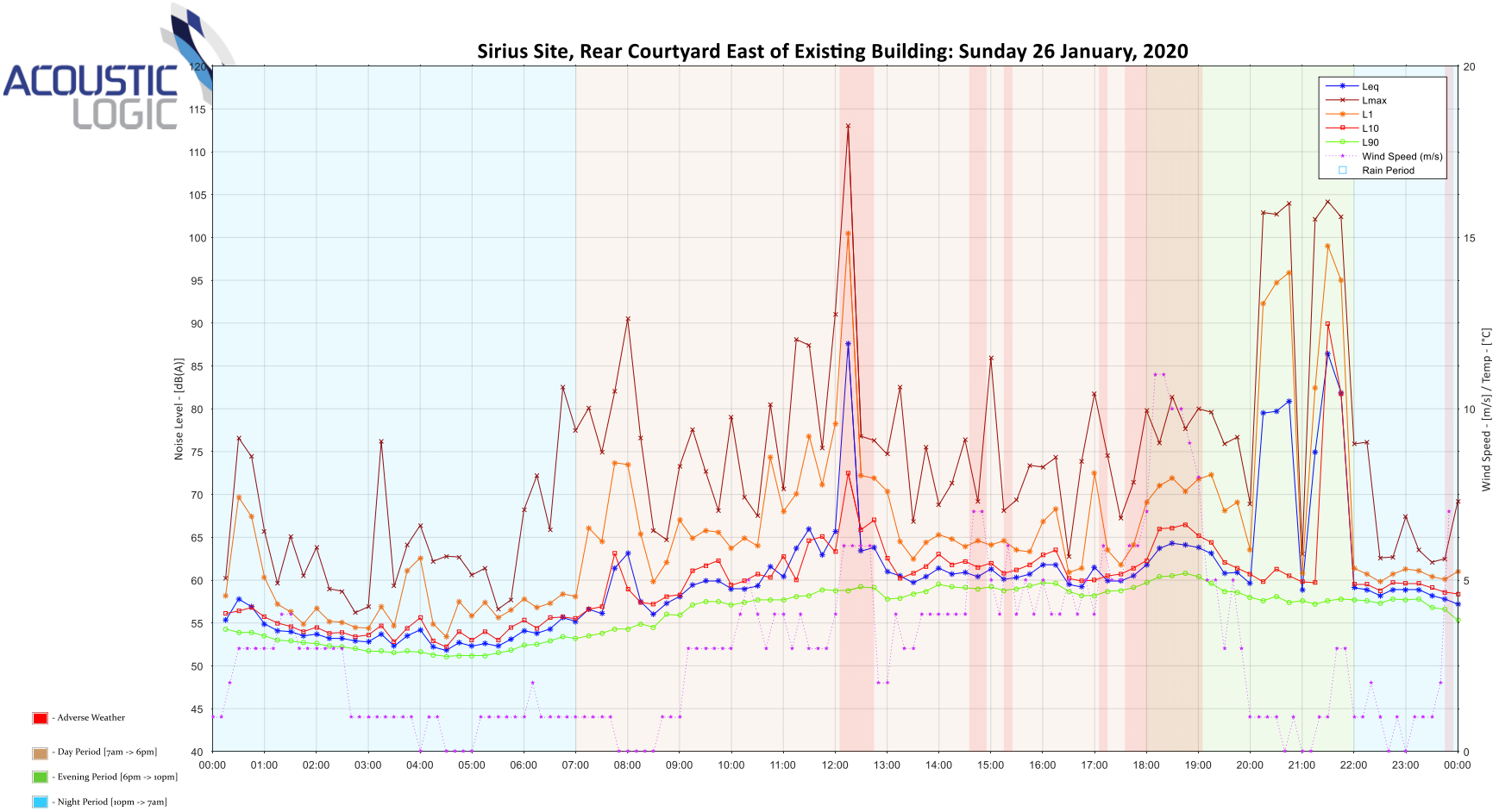

Sirius Site, Rear Courtyard East of Existing Building: Wednesday 22 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

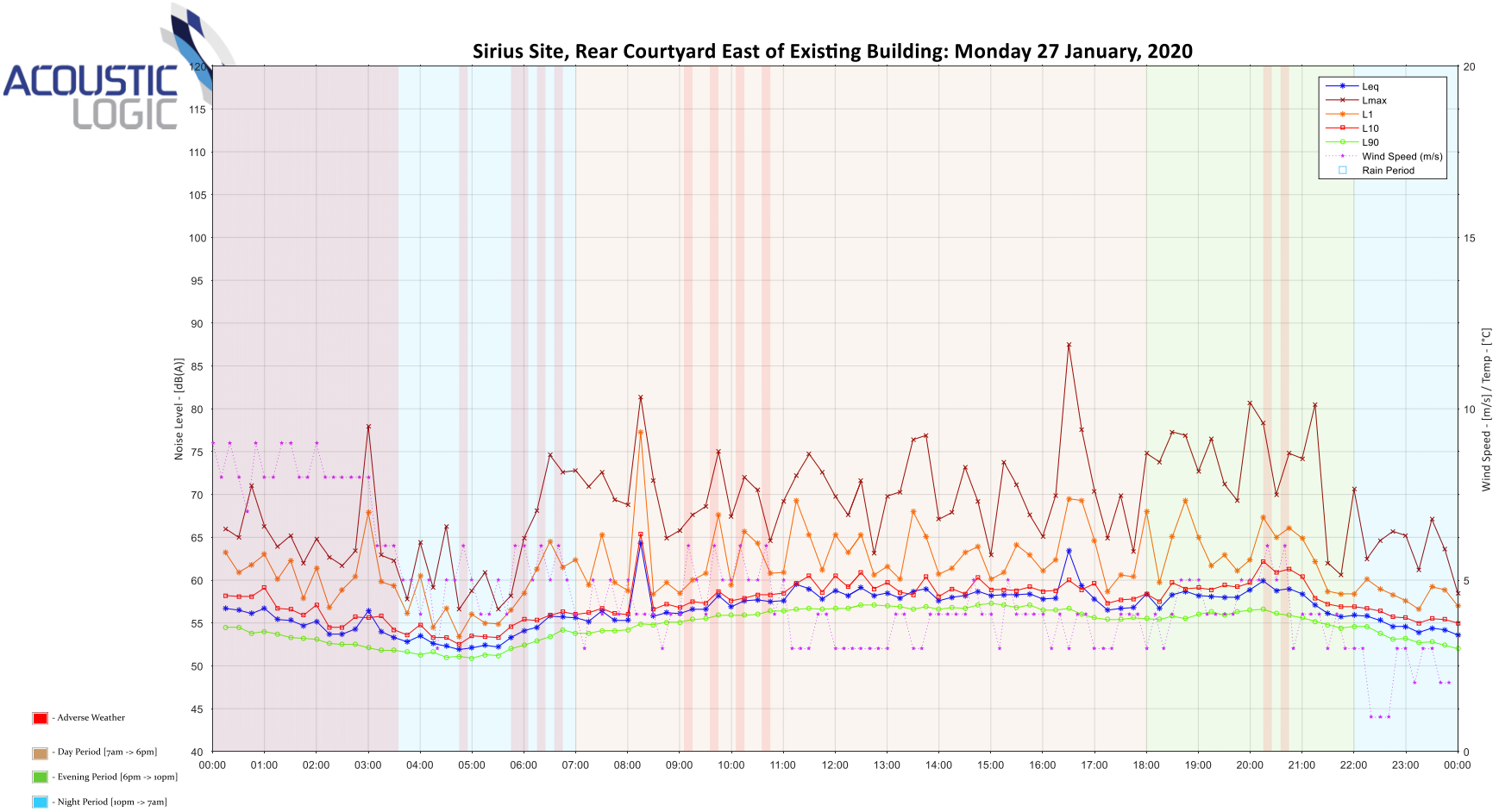

Sirius Site, Rear Courtyard East of Existing Building: Thursday 23 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

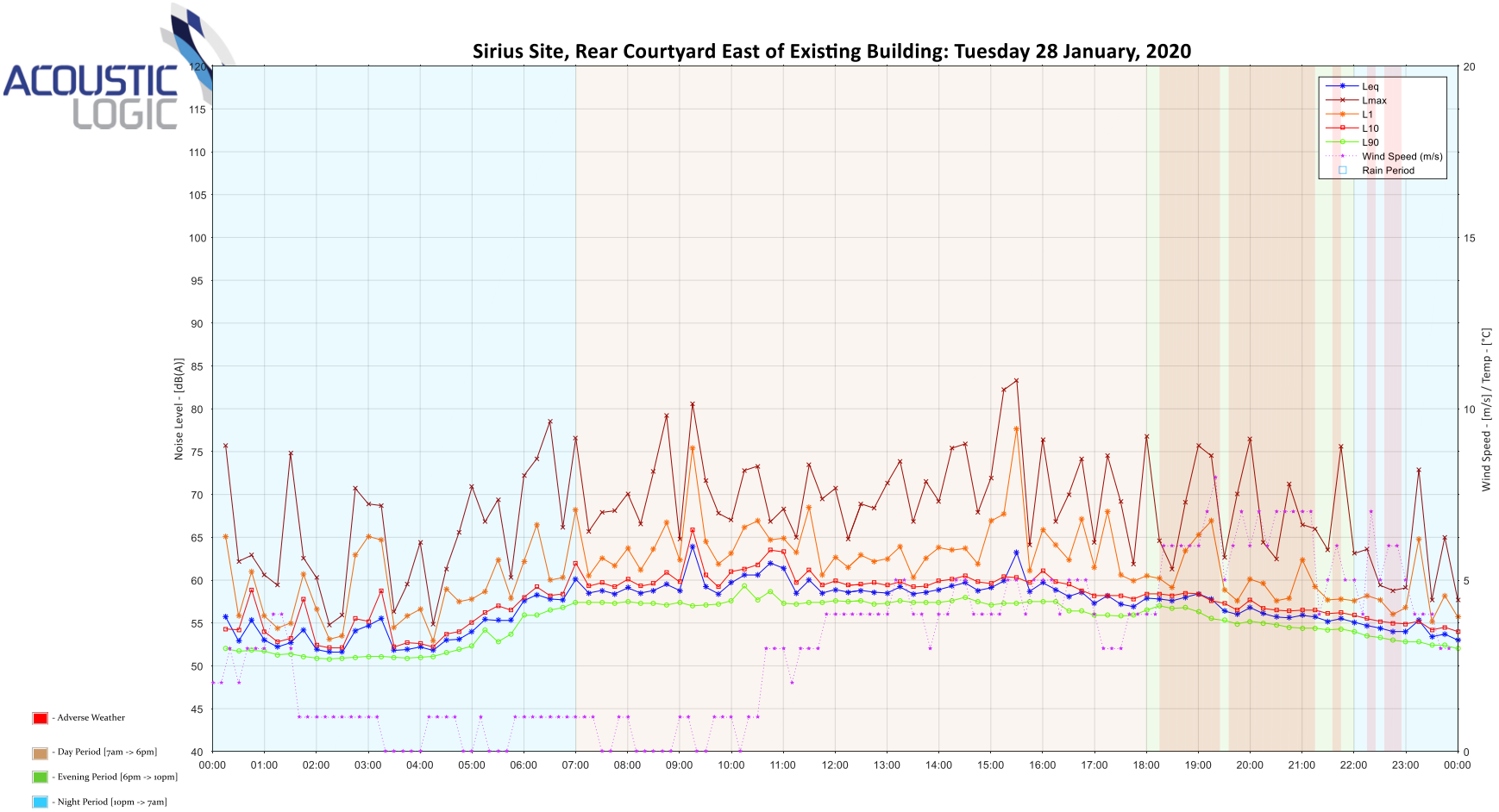

Sirius Site, Rear Courtyard East of Existing Building: Friday 24 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

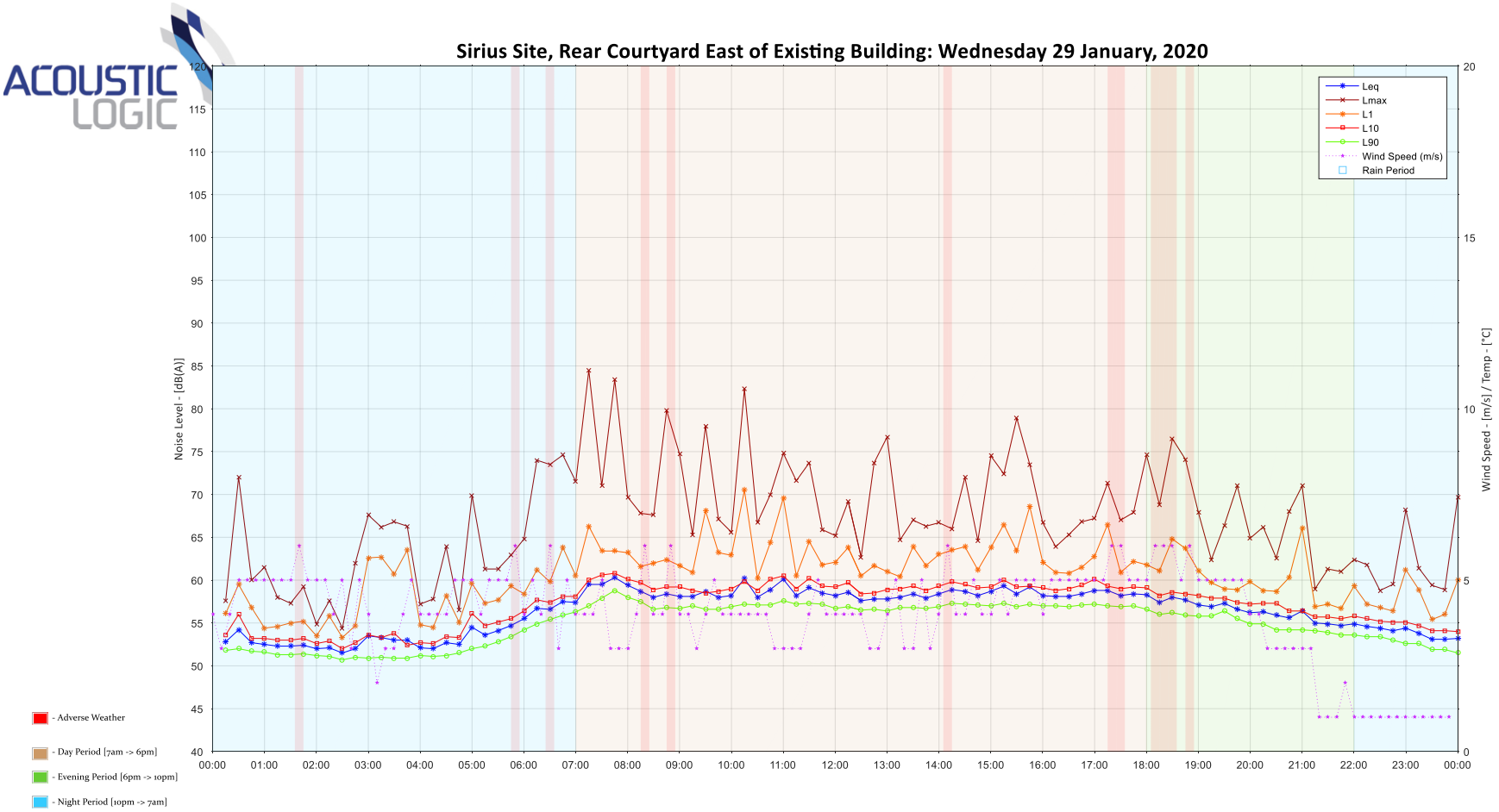
Sirius Site, Rear Courtyard East of Existing Building: Saturday 25 January, 2020



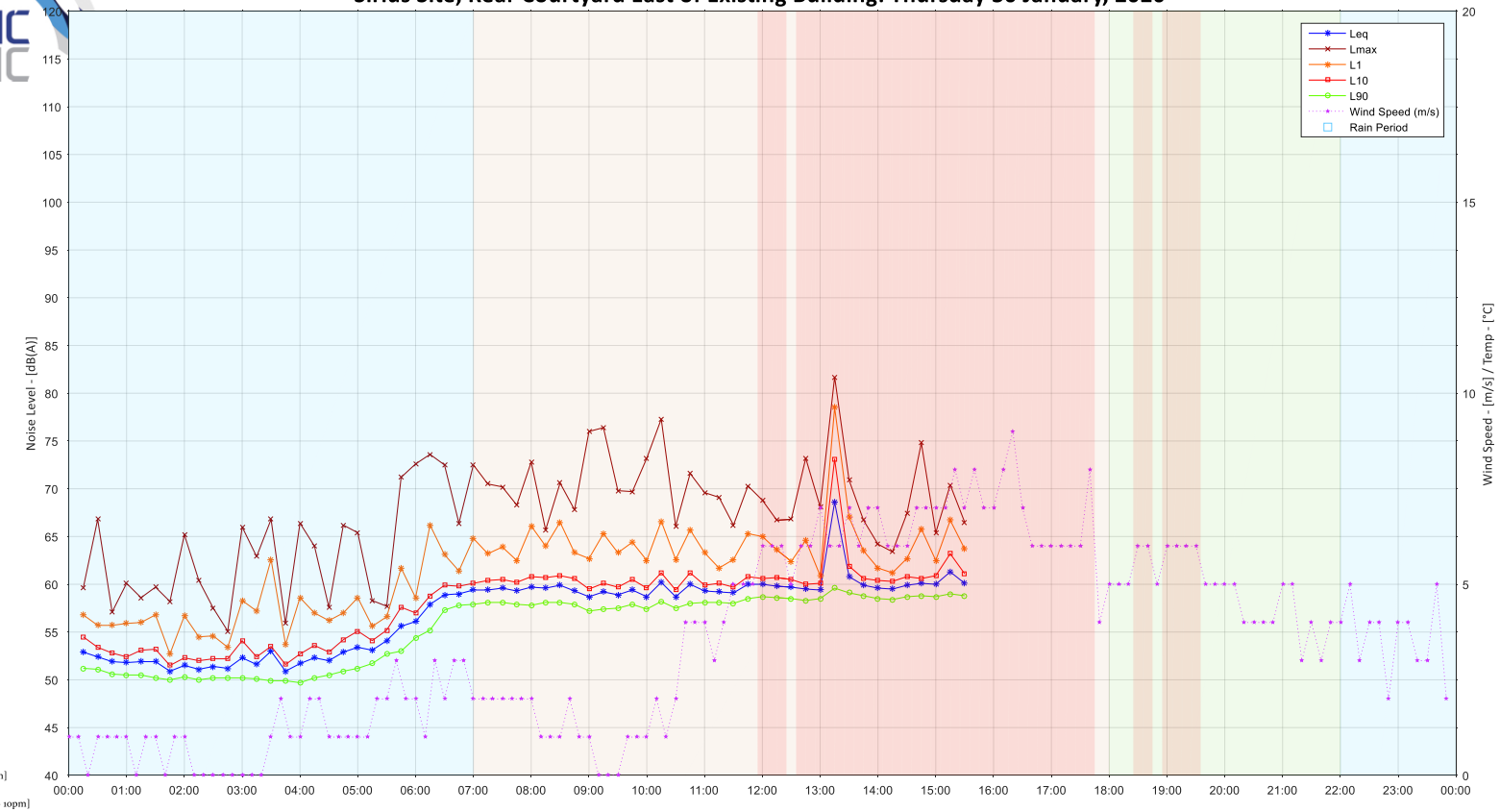

Sirius Site, Rear Courtyard East of Existing Building: Sunday 26 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Sirius Site, Rear Courtyard East of Existing Building: Monday 27 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Sirius Site, Rear Courtyard East of Existing Building: Tuesday 28 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

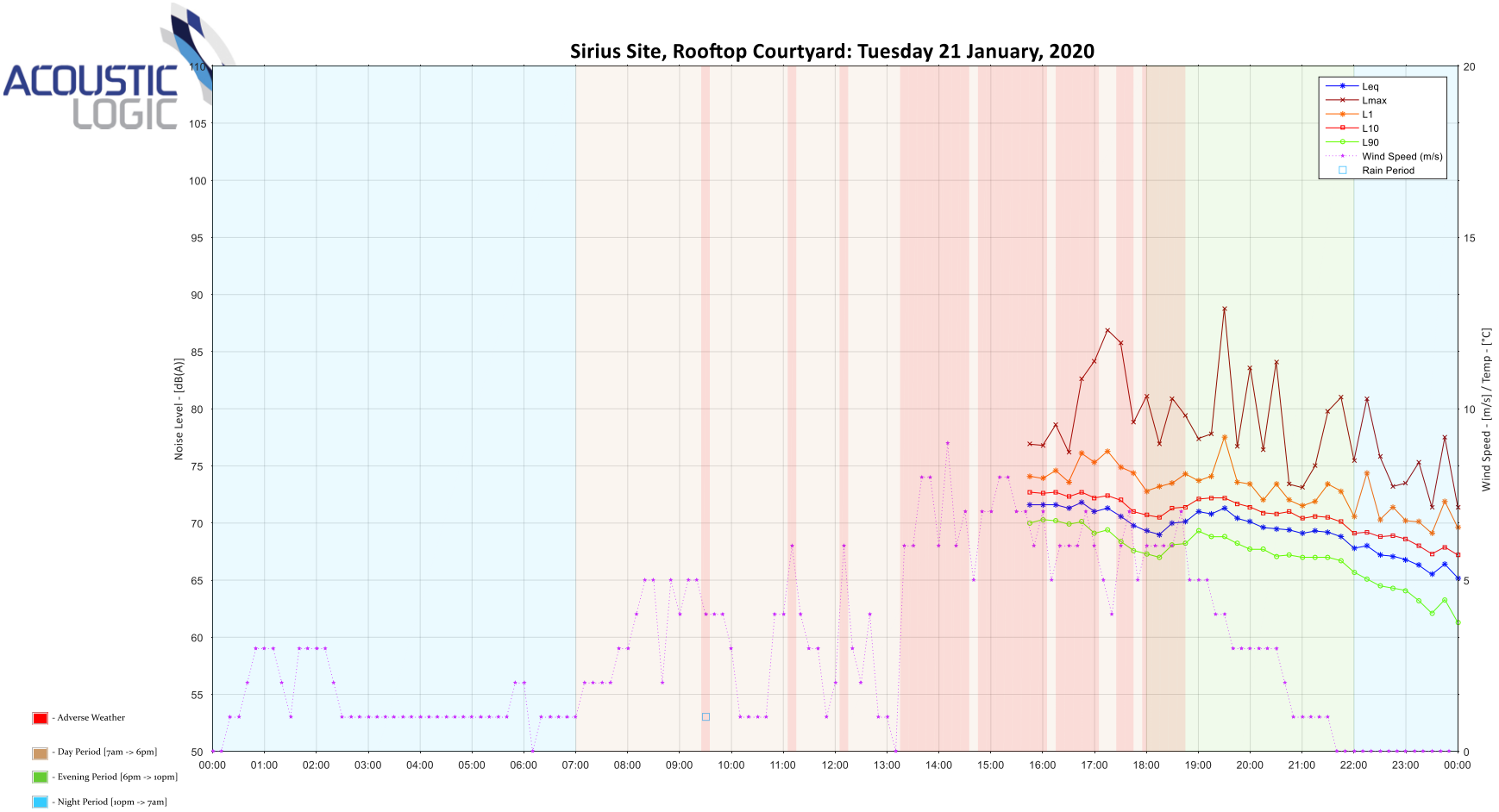

Sirius Site, Rear Courtyard East of Existing Building: Wednesday 29 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

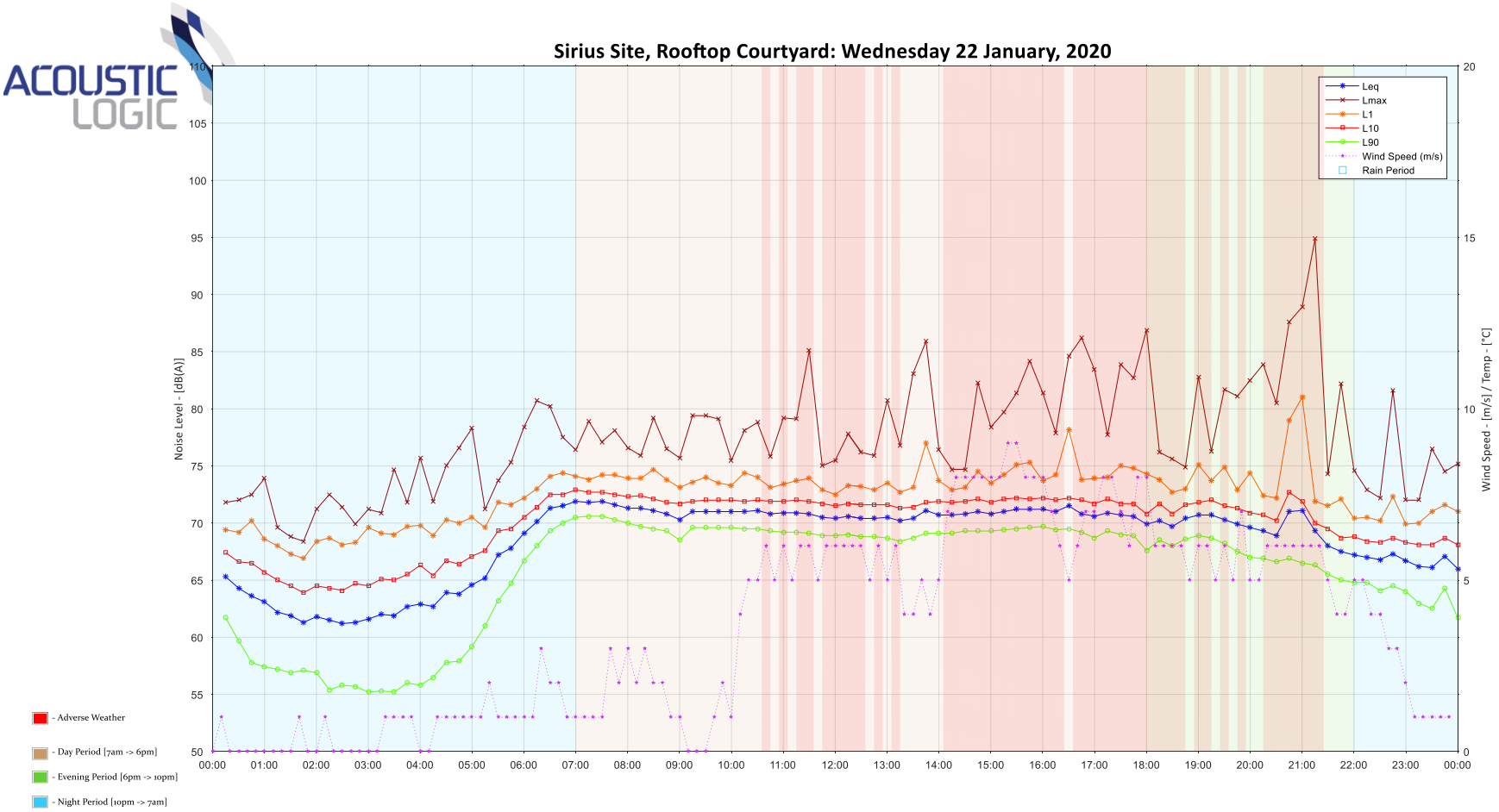
Sirius Site, Rear Courtyard East of Existing Building: Thursday 30 January, 2020

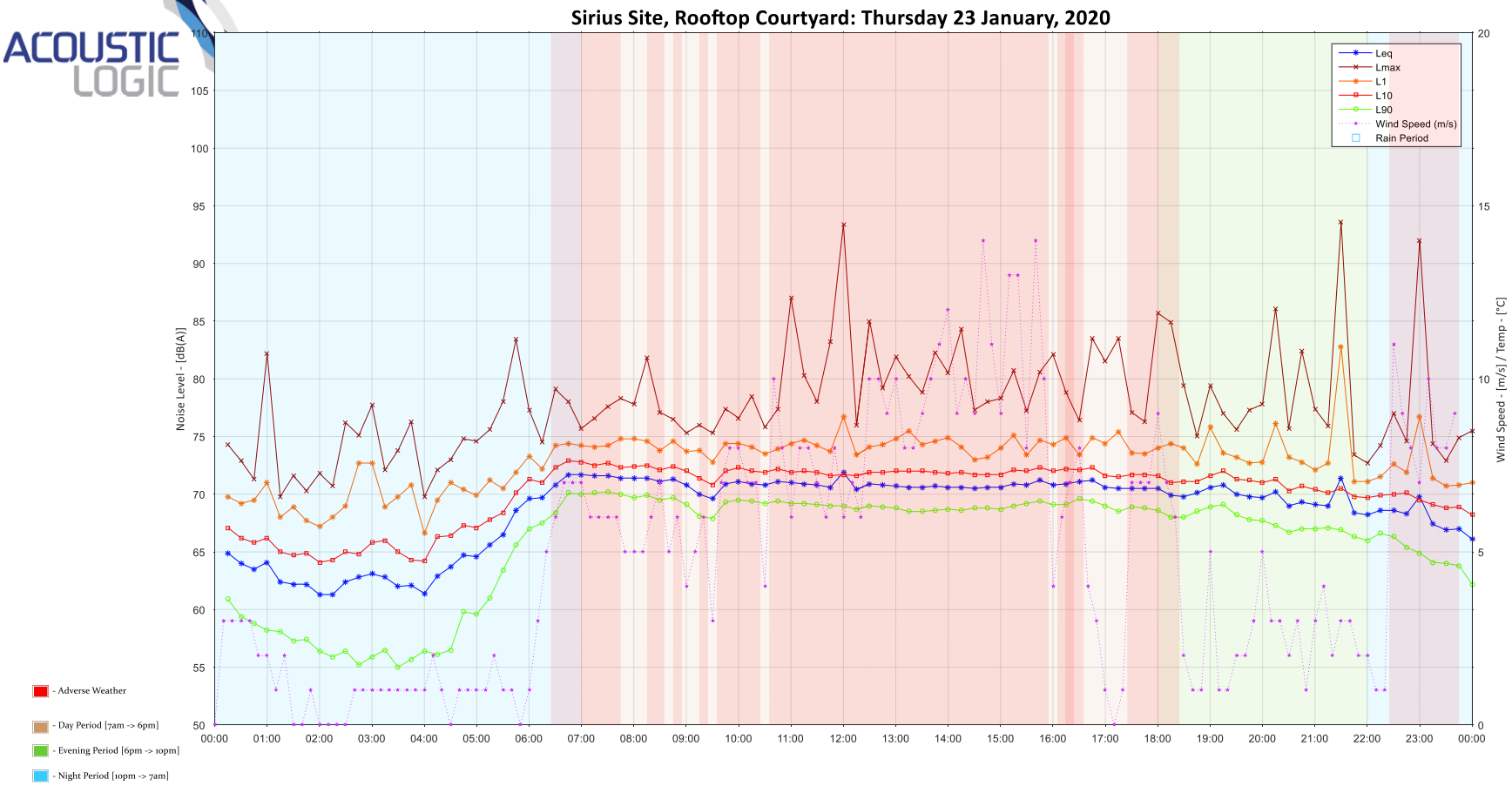


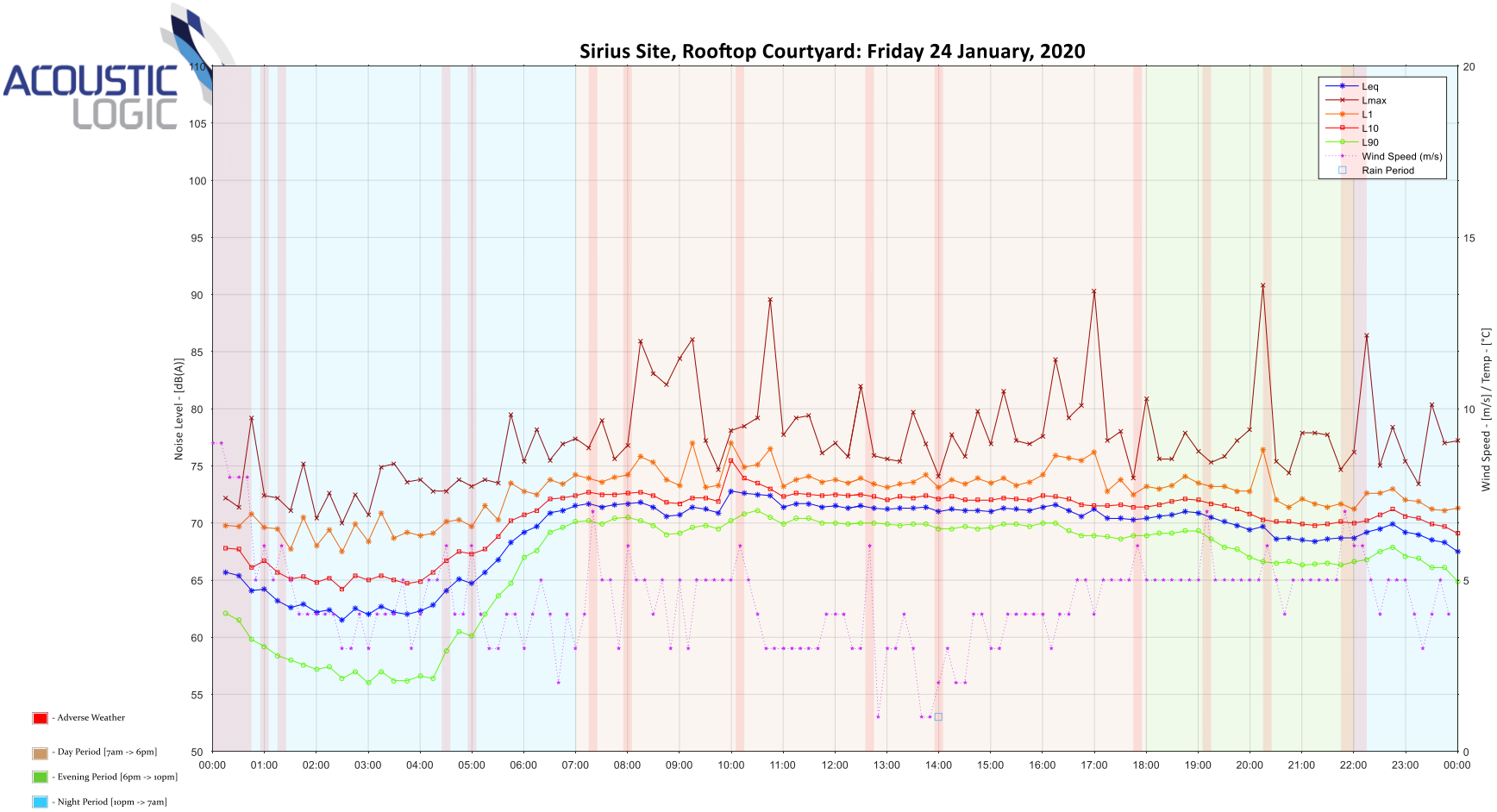
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

SIRIUS SITE, ROOFTOP TERRACE


Sirius Site, Rooftop Courtyard: Tuesday 21 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Sirius Site, Rooftop Courtyard: Wednesday 22 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Sirius Site, Rooftop Courtyard: Thursday 23 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Sirius Site, Rooftop Courtyard: Friday 24 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
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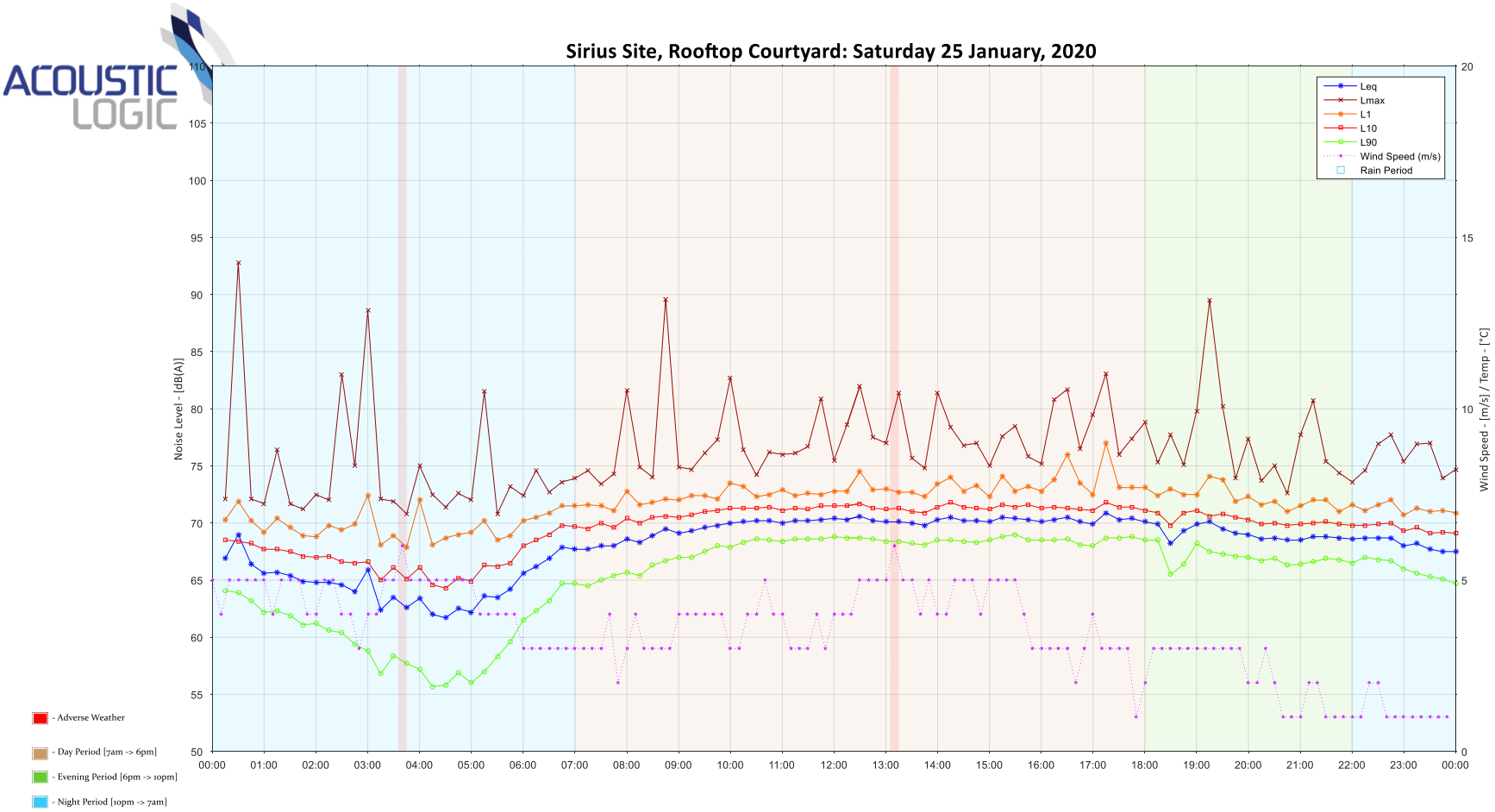
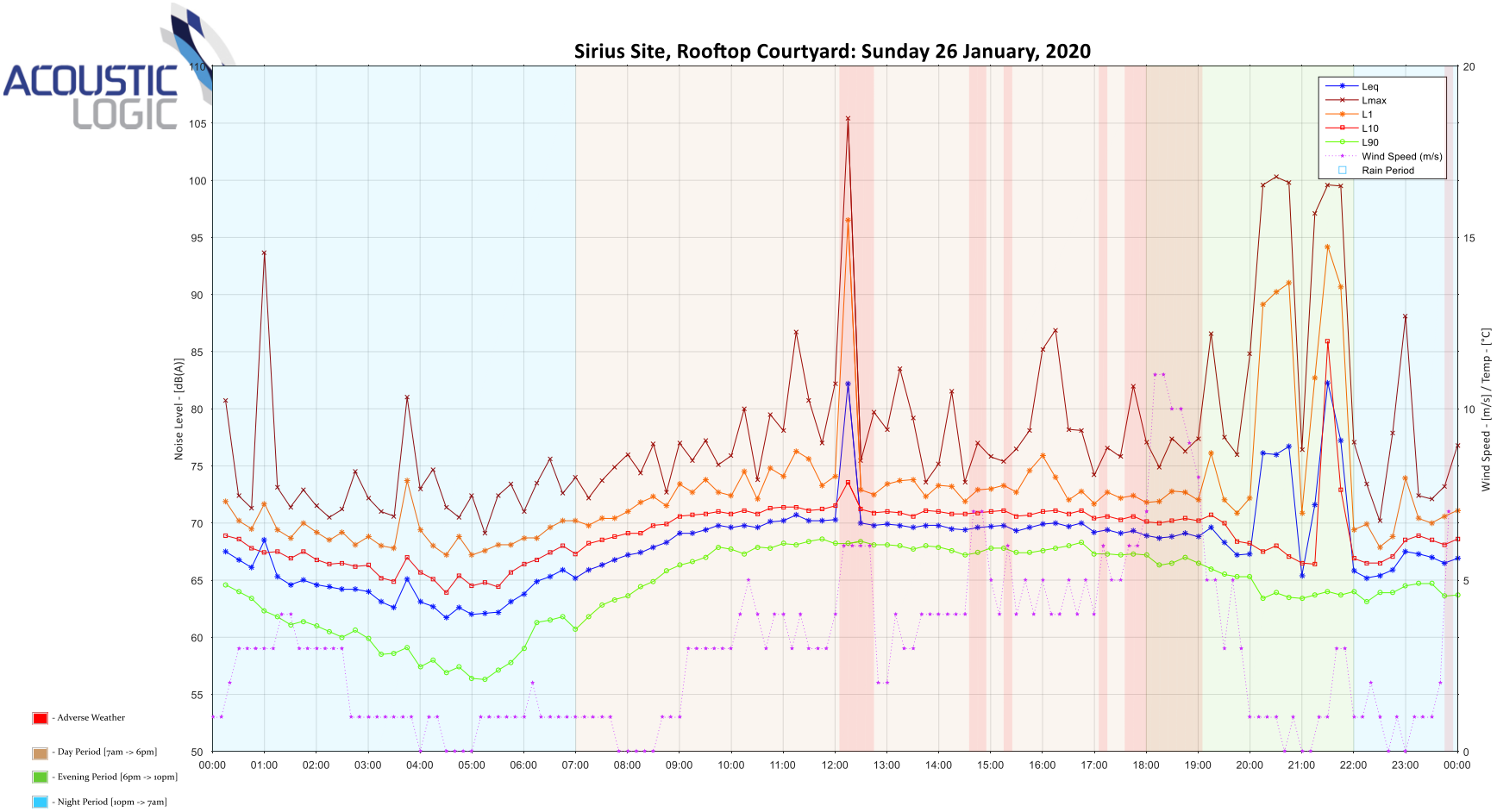
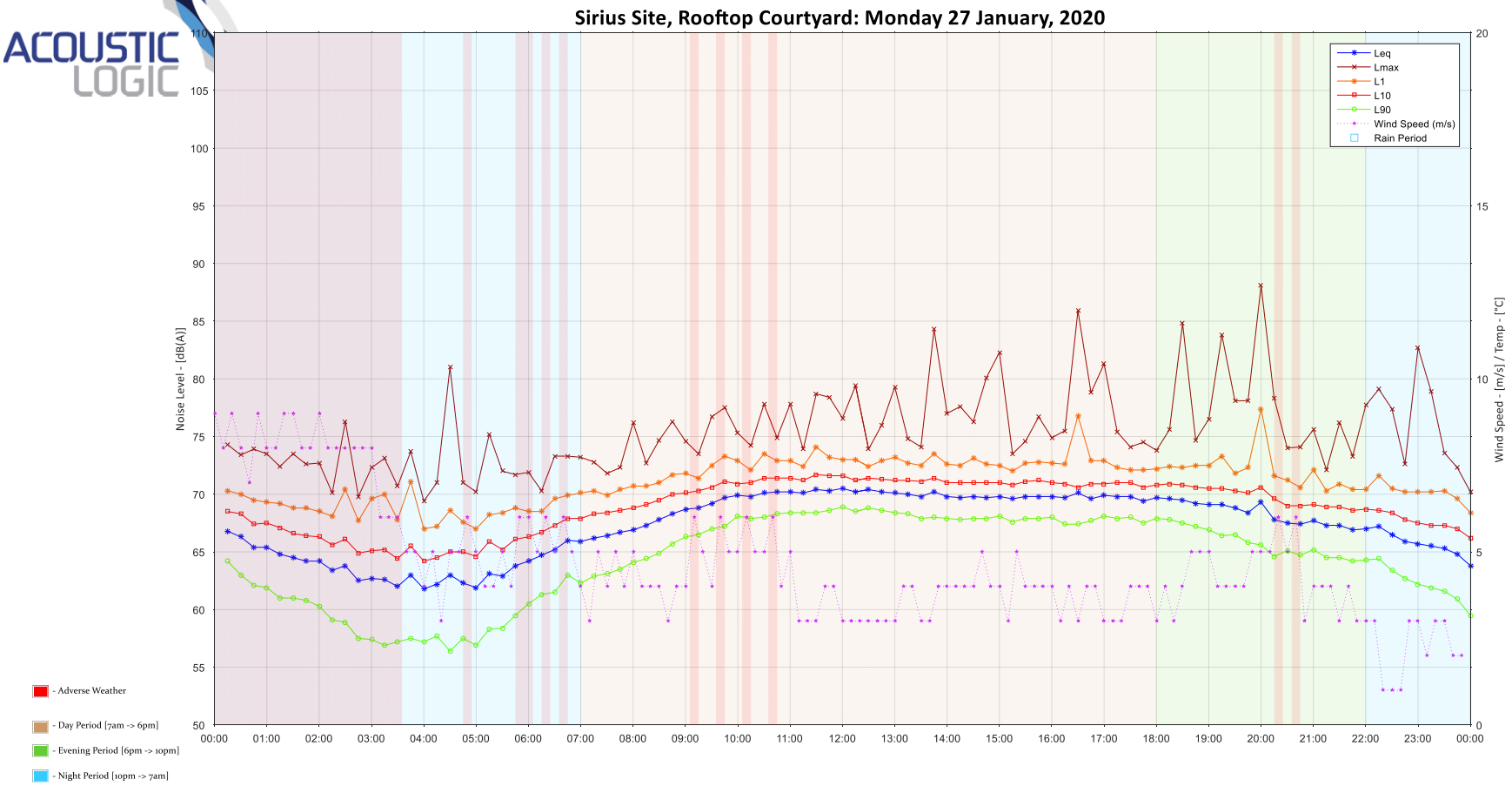
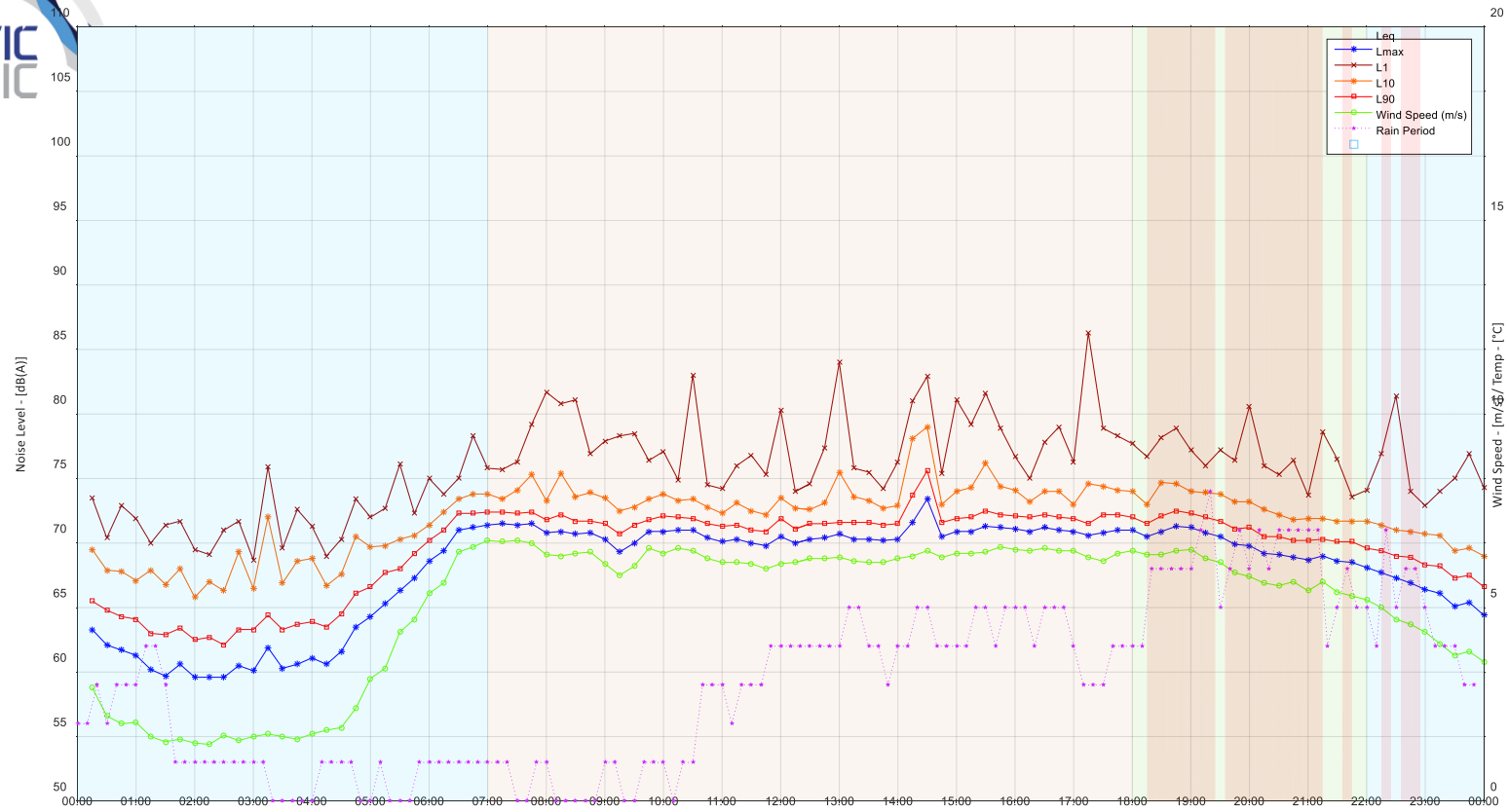
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

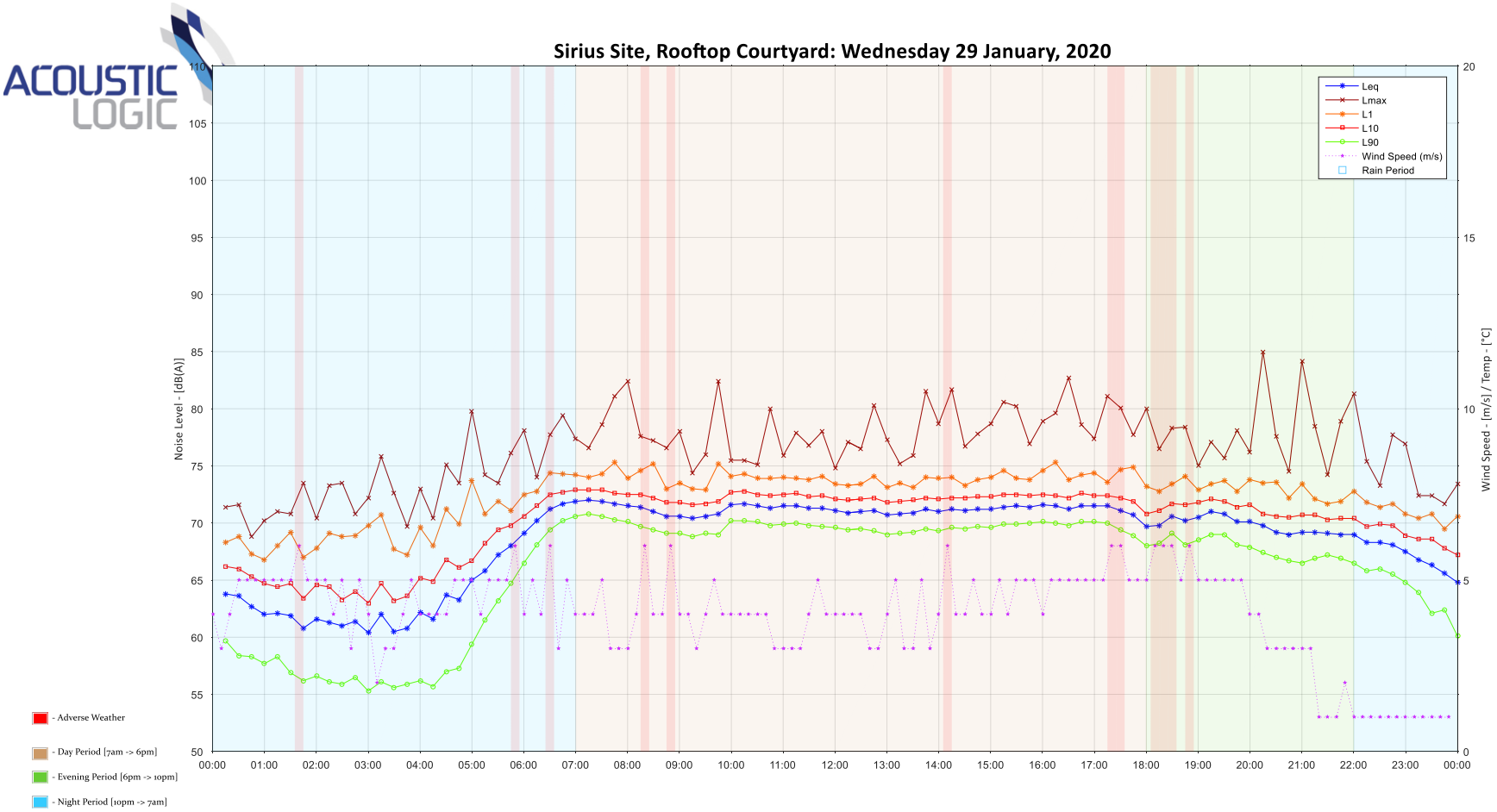

Sirius Site, Rooftop Courtyard: Saturday 25 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

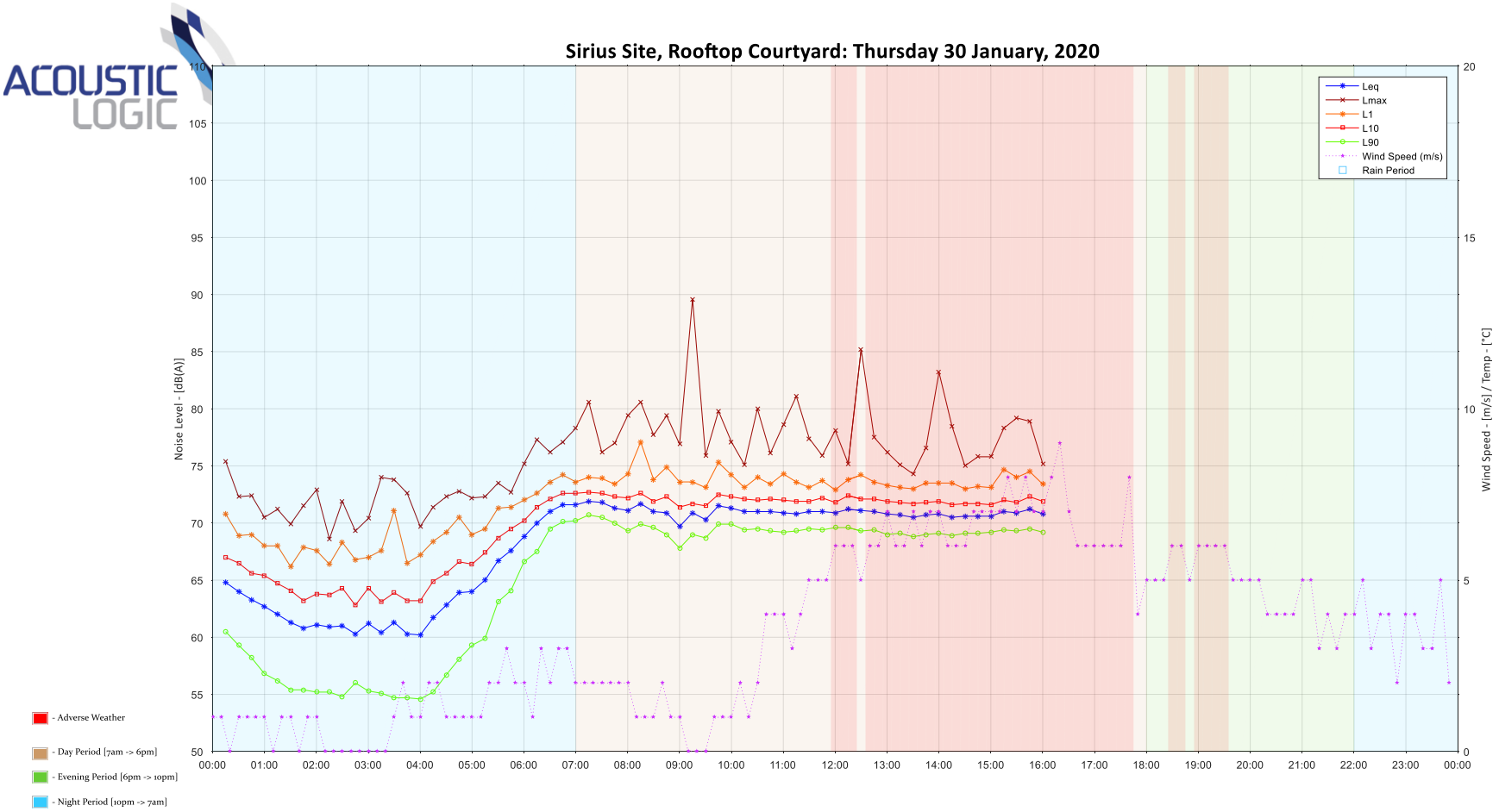

Sirius Site, Rooftop Courtyard: Sunday 26 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Sirius Site, Rooftop Courtyard: Monday 27 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]

Sirius Site, Rooftop Courtyard: Tuesday 28 January, 2020




Sirius Site, Rooftop Courtyard: Wednesday 29 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]


Sirius Site, Rooftop Courtyard: Thursday 30 January, 2020
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
Lmax
L1
L10
L90
Wind Speed (m/s)
Rain Period
- Adverse Weather
- Day Period [7am -> 6pm]
- Evening Period [6pm -> 10pm]
- Night Period [10pm -> 7am]