

Attachment D

Noise Impact Assessment

24-27 Darling Quarter, Darling Harbour

Noise Impact Assessment

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Attention To	Universal Hotels

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1 INTRODUCTION

This report presents our assessment of the likely noise impact on surrounding occupancies from operational activities associated with the proposed licensed venue located at 24-27 Darling Quarter, Darling Harbour.

This report will:

- Identify relevant noise emission criteria applicable to the project site.
- Identify nearby noise sensitive receivers and any project site noise sources with the potential to adversely impact nearby developments.
- Predict noise emissions and assess them against established acoustic criteria.
- If necessary, determine building and/or management controls necessary to ensure ongoing compliance with noise emission goals.

The following documents have been used in accordance with this assessment:

- City of Sydney Standard Conditions of Development Consent; and
- NSW EPA Noise Policy for Industry (NPfI) 2017.

2 SITE DESCRIPTION

The proposed venue consists of a bar, restaurant, gaming lounge and outdoor seating area.

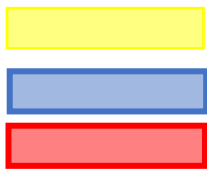
The maximum capacity of the venue is 1242 people including staff.

Sensitive receiver locations are presented in Figure 1 and detailed below. These locations will be used as a basis for this assessment.

- **R1:** Mixed use residential and commercial development located to the east.
- **C1:** Commercial office space located directly above project site.
- **C2/C3:** Darling Quarter – Commercial development consisting of various bars/restaurants and hospitality establishments which encompasses the project site.
- **C4:** Commercial development including Aware Super Theatre and various bars/restaurants and hospitality establishments to the south west.
- **C5:** International Convention Centre – Commercial development located to the west of the site.



Figure 1 - Project Site, Noise Receivers and Measurement Locations - Source: Six Maps



Project Site

Residential/Hotel Receivers

Commercial Receivers

Unattended Noise Monitors

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 L10, L90 and Leq.

The L10 and L90 measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L10 parameter is commonly used to measure noise produced by a particularly intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L90 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 L90 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 L90 level.

The Leq 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. Leq 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 BACKGROUND NOISE LEVELS

Attended and unattended background noise measurements were obtained in order to characterise the existing noise environment.

4.1 UNATTENDED NOISE MEASUREMENTS

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

Noise monitoring data was obtained during the period from 30th April to 7th May 2019. The existing background noise environment is dominated by traffic and industrial noise sources (mechanical plant).

Summarised rating background noise levels for the project site and immediate surroundings are presented below. Weather affected data has been removed in line with the recommendations of Fact Sheets A & B of the NSW EPA Noise Policy for Industry.

Summarised rating background noise levels are presented below.

Table 1 – Summary of Background Noise Levels

Noise Monitor Location	Rating Background Noise Level dB(A)L ₉₀ (period)			
	Daytime (7:00am to 6:00pm)	Evening (6:00pm to 10:00pm)	Late Evening 10:00am to 12:00am	After Midnight (12:00am to 7:00am)
Nearest Residential Buildings	64	62	60	58

4.2 BACKGROUND NOISE SPECTRUM MEASUREMENTS

In addition to the unattended noise monitoring, attended background noise measurements have been collected by this office at to characterise the background noise spectrum for surrounding receivers.

A external background noise spectrum representative of the area is presented in the table below.

Table 2 – Measured Background Noise Spectrums (External) – dB(A)L₉₀

Frequency	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Background Spectrum Measurement	67	67	65	63	57	53	48	46	39	60

In addition to the above, an internal background noise spectrum measured in nearby offices is presented in the table below.

Table 3 – Measured Background Noise Spectrums (Internal) – dB(A)L₉₀

Frequency	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Commercial Office Internal Background Noise Spectrum, Windows Closed.	48	47	43	41	32	30	24	15	15	36

5 NOISE EMISSION CRITERIA

Noise emission goals for the assessment of the general operation of the venue have been determined in accordance with the requirements of City of Sydney Council Standard Conditions of Development Consent.

5.1 CITY OF SYDNEY STANDARD CONDITIONS OF DEVELOPMENT CONSENT

Noise emission goals for the assessment of the general operation of the venue have been determined in accordance with the requirements of City of Sydney Council Standard Conditions of Development Consent.

NOISE – COMMERCIAL PLANT / INDUSTRIAL DEVELOPMENT

(a) *Noise from commercial plant and industrial development must not exceed a project amenity/intrusiveness noise level or maximum noise level in accordance with relevant requirements of the NSW EPA Noise Policy for Industry 2017 (NPfI) unless agreed to by the City's Area Planning Manager. Further:*

(i) *Background noise monitoring must be carried out in accordance with the long-term methodology in Fact Sheet B of the NPfI unless otherwise agreed by the City's Area Planning Manager.*

(ii) *Commercial plant is limited to heating, ventilation, air conditioning, refrigeration and energy generation equipment.*

(b) *An LAeq,15 minute (noise level) emitted from the development must not exceed the LA90, 15 minute (background noise level) by more than 3dB when assessed inside any habitable room of any affected residence or noise sensitive commercial premises at any time. Further:*

(i) *The noise level and the background noise level shall both be measured with all external doors and windows of the affected residence closed.*

(ii) *Background noise measurements must not include noise from the development but may include noise from necessary ventilation at the affected premise.*

(c) *Corrections in Fact Sheet C of the NPfI are applicable to relevant noise from the development measured in accordance with this condition, however duration corrections are excluded from commercial noise.*

NOISE - ENTERTAINMENT

- (a) *The LA10, 15 minute noise level emitted from the use must not exceed the background noise level (LA90, 15minute) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) by more than 5dB between the hours of 7.00am and 12.00 midnight when assessed at the boundary of any affected residence.*
- (b) *The LA10, 15 minute noise level emitted from the use must not exceed the background noise level (LA90, 15 minute) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) between the hours of 12.00 midnight and 7.00am when assessed at the boundary of any affected residence.*
- (c) *Notwithstanding compliance with (a) and (b) above, noise from the use when assessed as an LA10, 15 minute enters any residential use through an internal to internal transmission path is not to exceed the existing internal LA90, 15 minute (from external sources excluding the use) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) when assessed within a habitable room at any affected residential use between the hours of 7am and 12midnight. Where the LA10, 15 minute noise level is below the threshold of hearing, Tf at any Octave Band Centre Frequency as defined in Table 1 of International Standard ISO 226 : 2003- Normal Equal-Loudness-Level Contours then the value of Tf corresponding to that Octave Band Centre Frequency shall be used instead.*
- (d) *Notwithstanding compliance with (a), (b) and (c) above, the noise from the use must not be audible within any habitable room in any residential use between the hours of 12.00 midnight and 7.00am.*
- (e) *The LA10, 15 minute noise level emitted from the use must not exceed the background noise level (LA90, 15 minute) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) by more than 3dB when assessed indoors at any affected commercial premises.*

Note: The LA10, 15 minute noise level emitted from the use is as per the definition in the Australian Standard AS1055-1997 Acoustics – Description and measurement of environmental noise. The background noise level LA90, 15 minute is to be determined in the absence of noise emitted by the use and be representative of the noise sensitive receiver. Background noise monitoring must be carried out in accordance with the long-term methodology in Fact Sheet B of the NPfl unless otherwise agreed by the City's Area Planning Manager.

5.2 NSW ENVIRONMENTAL PROTECTION AUTHORITY (EPA) NOISE POLICY FOR INDUSTRY (NPFI) 2017

The NSW EPA 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 intrusiveness criterion and amenity criterion.

5.2.1.1 Intrusiveness Criteria

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). The intrusiveness criteria applicable to the development are presented in the table below.

Table 4– NPFI Intrusiveness Criteria

Time of Day	Rating Background Noise Level $dB(A)L_{90(15min)}$	Project Noise Trigger Level (Intrusiveness) $dB(A)L_{eq(15min)}$
Day (7am – 6pm)	64	69
Evening (6pm-10pm)	62	67
Night (10pm – 7am)	58	63

5.2.1.2 Amenity Criteria

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

The EPA’s NPfl 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 Section 4, the NPfl suggests the adoption of the ‘urban’ categorisation.

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

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

The amenity levels appropriate for the receivers surrounding the project site are presented in

The project amenity noise levels for relevant receivers are detailed in Table below:

Table 5 – NPfl Amenity Criteria

Type of Receiver	Time of day	Project Noise Trigger Level (Amenity) dB(A)_{Leq(15-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

5.2.1.3 Sleep Disturbance (Maximum Noise Level Event Assessment)

The potential for sleep disturbance from maximum noise level events from premises during the night-time period must be considered as the proposed operation extends into night-time hours. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages. Where the subject development night-time noise levels at a residential location exceed:

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

A detailed maximum noise level event assessment should be undertaken.

Table 6 - Sleep Arousal Emergence Criteria (Night)

Location	Rating Background Noise Level Night (12:00pm – 2:00am) - dB(A)L_{90}	Emergence Level
All Potentially Affected Residential Receivers	58	63 dB(A) $L_{eq, 15min}$ 73 dB(A) $L_{max, F}$

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night period.

5.3 SUMMARY OF NOISE EMISSION CRITERIA

The following table presents the resulting noise emission requirements for the site (internal and external), based on the requirements outlined above.

Table 7– Patron/Music Noise to Residential Receivers (dB(A)L₁₀) - Externally

Time of Day	Frequency (Hz)									A-wt.
	31.5	63	125	250	500	1k	2k	4k	8k	
7am – 6pm (BG+5dB(A))	76	76	74	72	66	62	57	55	48	69
6pm – 10pm (BG+5dB(A))	74	74	72	70	64	60	55	53	46	67
10pm-12am (BG+5dB(A))	72	72	70	68	62	58	53	51	44	65
12am-4am (BG+0dB(A))	65	65	63	61	55	51	46	44	37	58

Table 9 – Patron/Music Noise to Commercial Receivers When in Use (dB(A)L₁₀) - Internally

Time of Day	Frequency (Hz)									A-wt
	31.5	63	125	250	500	1k	2k	4k	8k	
When In Use (BG+3 dB(A))	51	50	46	44	35	33	27	18	18	39

Table 10 –NSW EPA NPfl Noise Emission Criteria – for Mechanical Plant

Receiver	Period	Amenity Criteria dB(A) L_{eq}	Intrusiveness Criteria (Background + 5dB(A))	Sleeping Disturbance
All Potentially Affected Residential	Day (7:00am-6:00pm)	58	69	N/A
	Evening (6:00pm-10:00pm)	48	67	N/A
	Night (10:00pm-7:00am)	43	63	48 dB(A)L_{eq, 15min}; 58 dB(A)L_{max, F}
Commercial	When in use	63	N/A	N/A

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

6 NOISE EMISSION ASSESSMENT

This section of the report examines the potential noise impacts from the proposed venue. The main potential sources will be patron noise and amplified music. Noise from the various activities associated with the proposal has been predicted to the closest affected commercial and residential receivers respectively as identified in Section 2. Note that other receivers are located further from the site and as such exposed to a lower level of noise. By demonstrating compliance at the closest receiver, noise from site operations will also be compliant at receivers located an additional distance from the site. Furthermore, predictions have been made for the most stringent time period. Compliance at these periods will ensure compliance at all times.

The noise predictions are based on typical noise levels likely to be generated from the venue. These emission levels are corrected for distance attenuation, barrier effects (where applicable) and the orientation of the respective receivers to determine the resultant noise level at the potentially affected properties.

6.1 ASSUMPTIONS ADOPTED WITH RESPECT TO NOISE EMISSION CALCULATIONS

Predicted noise levels within the venue are made based on the following assumptions:

- The total population for the premises as detailed in the plan of management, with an overall capacity of 1242 patrons. Up to 250 patrons have been considered externally.
- That music sound pressure levels within the venue (internally) are controlled as follows:
 - Up to 80 dB(A) L₁₀ at all operation times.
 - A typical music sound spectrum as follows:

Noise Source	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Amplified Music	76	82	78	77	76	71	62	64	80

- That typical patron vocal sound power levels are:
 - Up to 77dB(A)L₁₀, 1 in 2 speaking (raised voice).
 - A typical sound spectrum of a patron as follows:

Noise Source	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Raised Voice	62	70	70	76	73	68	59	47	77

6.2 PREDICTED NOISE EMISSIONS

Predicted noise levels are presented in the tables below.

Table 11 - Predicted Noise Emissions – Residential Receiver (R2) 12am to 4am (External)

Location	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Predicted Noise Levels dB(A) L ₁₀	30	30	38	38	44	41	36	27	15	45
Criteria dB(A) L ₁₀	65	65	63	61	55	51	46	44	37	58
Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 12 - Predicted Noise Emissions – Commercial Receiver above venue (Internal)

Location	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Predicted Noise Levels dB(A) L ₁₀	42	42	43	36	29	21	<20	<15	<15	32
Criteria dB(A) L ₁₀	51	50	46	44	35	33	27	18	18	39
Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

6.3 MECHANICAL PLANT

No mechanical plant has been proposed. Any additional mechanical plant items installed must comply with the requirements of the EPA Noise Policy for Industry 2017 as detailed in Section 5.3.

7 RECOMMENDATIONS

In order to ensure operational noise emissions compliant with criteria outlined in Section 5, the following management controls are to apply:

- Management should ensure that patrons depart the premises in a prompt and orderly manner at closing times.
- Prominent notices shall be placed to remind patrons that a minimum amount of noise is to be generated when leaving the premises.
- Speakers are to be vibration isolated using Embelton NRD mounts.
- A continuous ceiling to be installed within the internal area, constructed from 13mm thick plasterboard with 75mm thick insulation above. Minimum cavity between the ceiling and underside of the slab above to be 200mm.
- Music sound pressure levels to be controlled as follows:
 - Up to 75dB(A) L_{10} uniform sound pressure level during all operational hours (indoors).
 - External amplified music is played at a background noise level (55 dB(A) L_{10}) at 3m from the speakers.

8 CONCLUSION

Acoustic Logic has assessed noise impacts associated with the proposed licenced venue located at 24-27 Darling Quarter, Darling Harbour.

Provided that the recommendations in section 7 of this report are adopted, noise emissions will comply with the City of Sydney Standard Conditions of Development Consent and the NSW EPA Noise Policy for Industry 2017.

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

Yours faithfully,

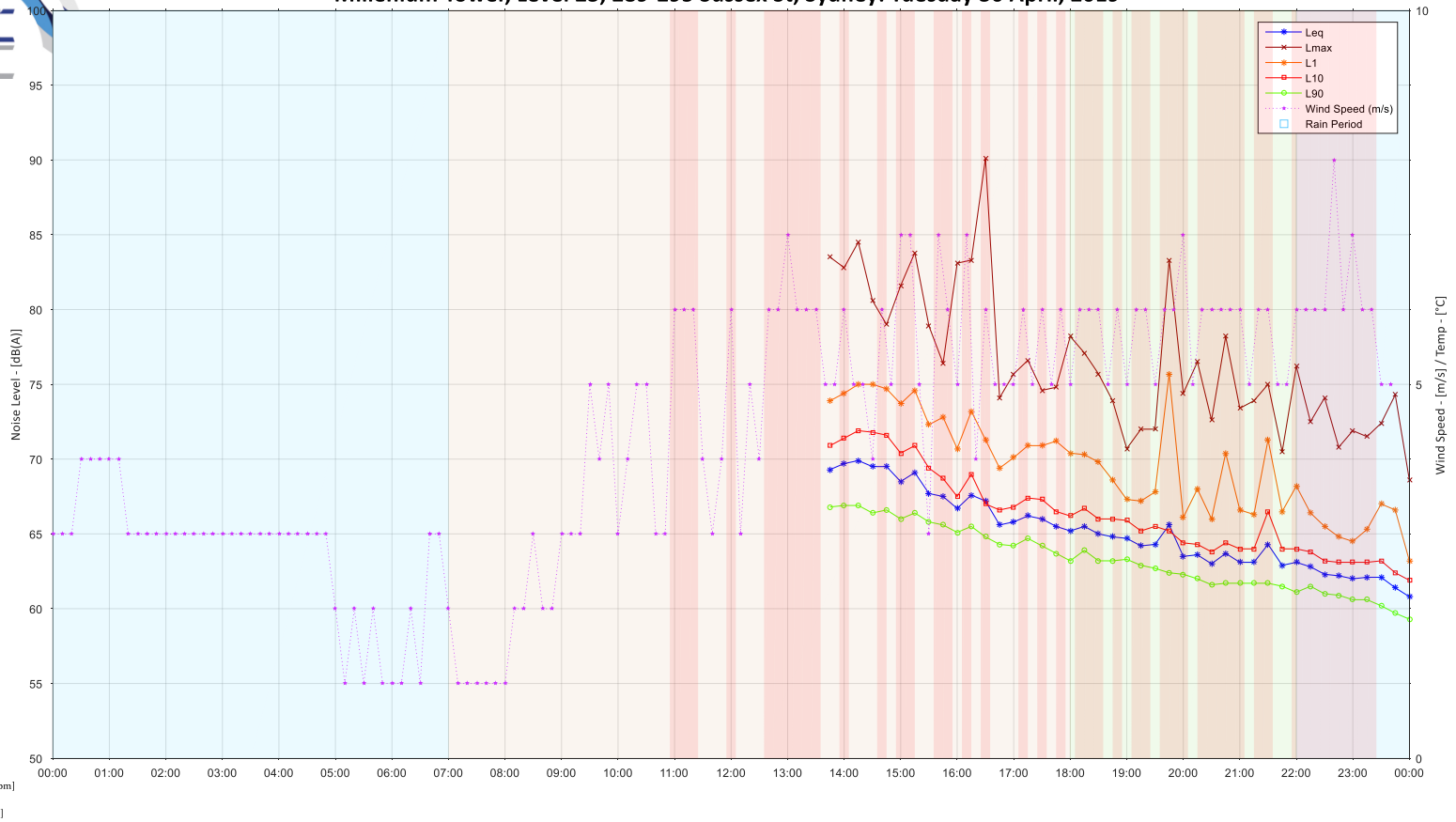
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Acoustic Logic Pty Ltd
Ross Ferraro

APPENDIX ONE – UNATTENDED NOISE MONITORING DATA



Millenium Tower, Level 23, 289-295 Sussex St, Sydney: Tuesday 30 April, 2019

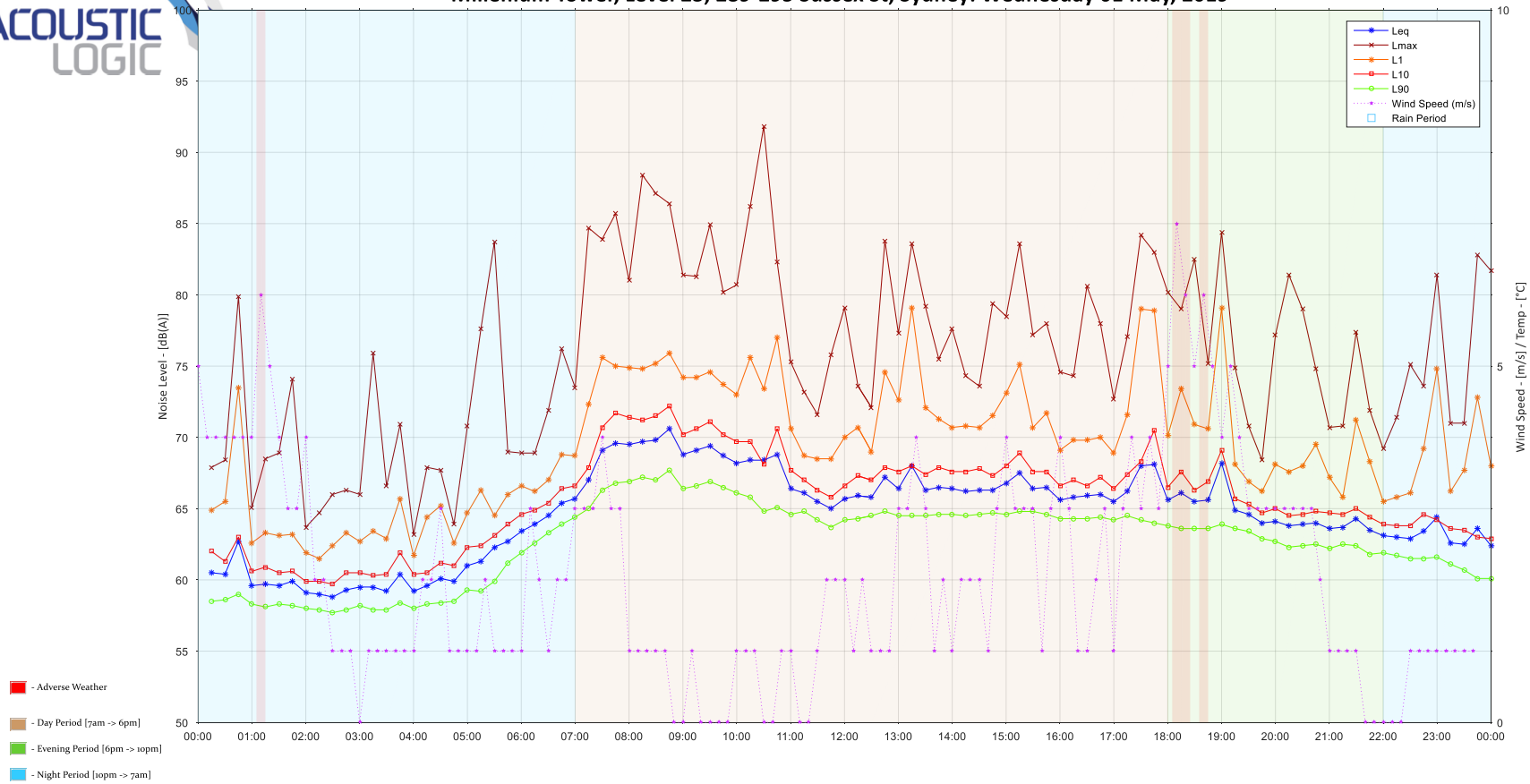


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Millenium Tower, Level 23, 289-295 Sussex St, Sydney: Wednesday 01 May, 2019

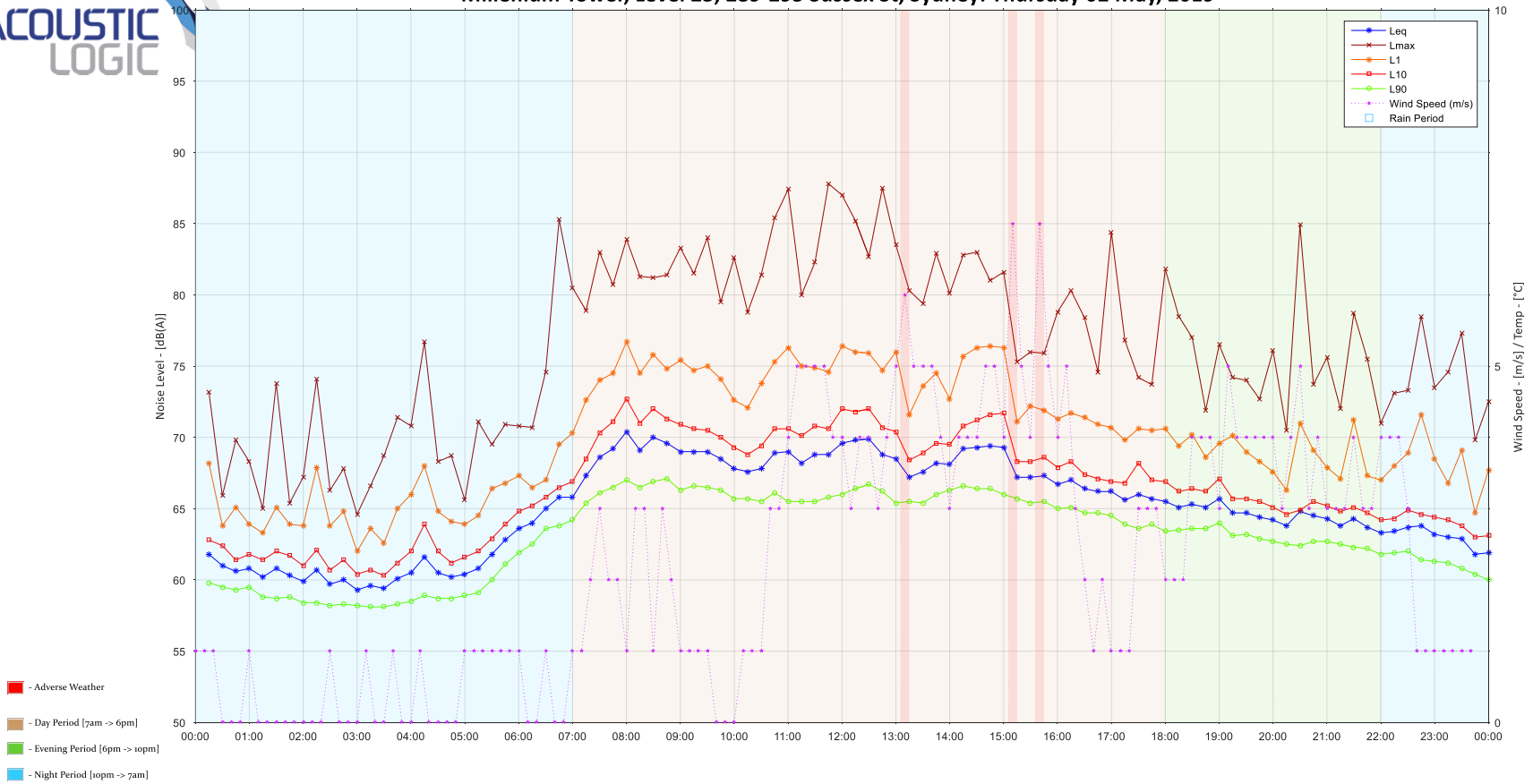
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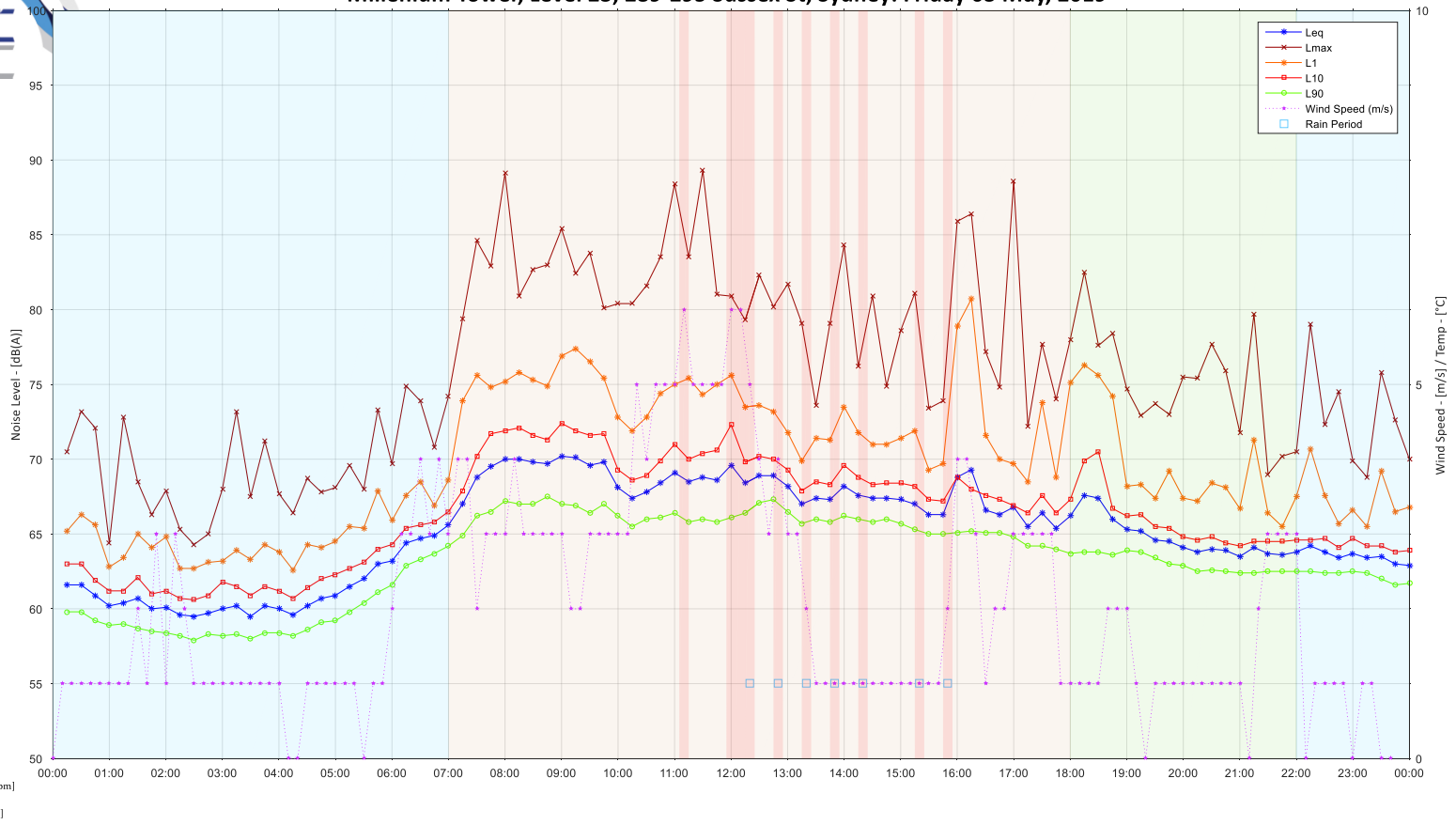
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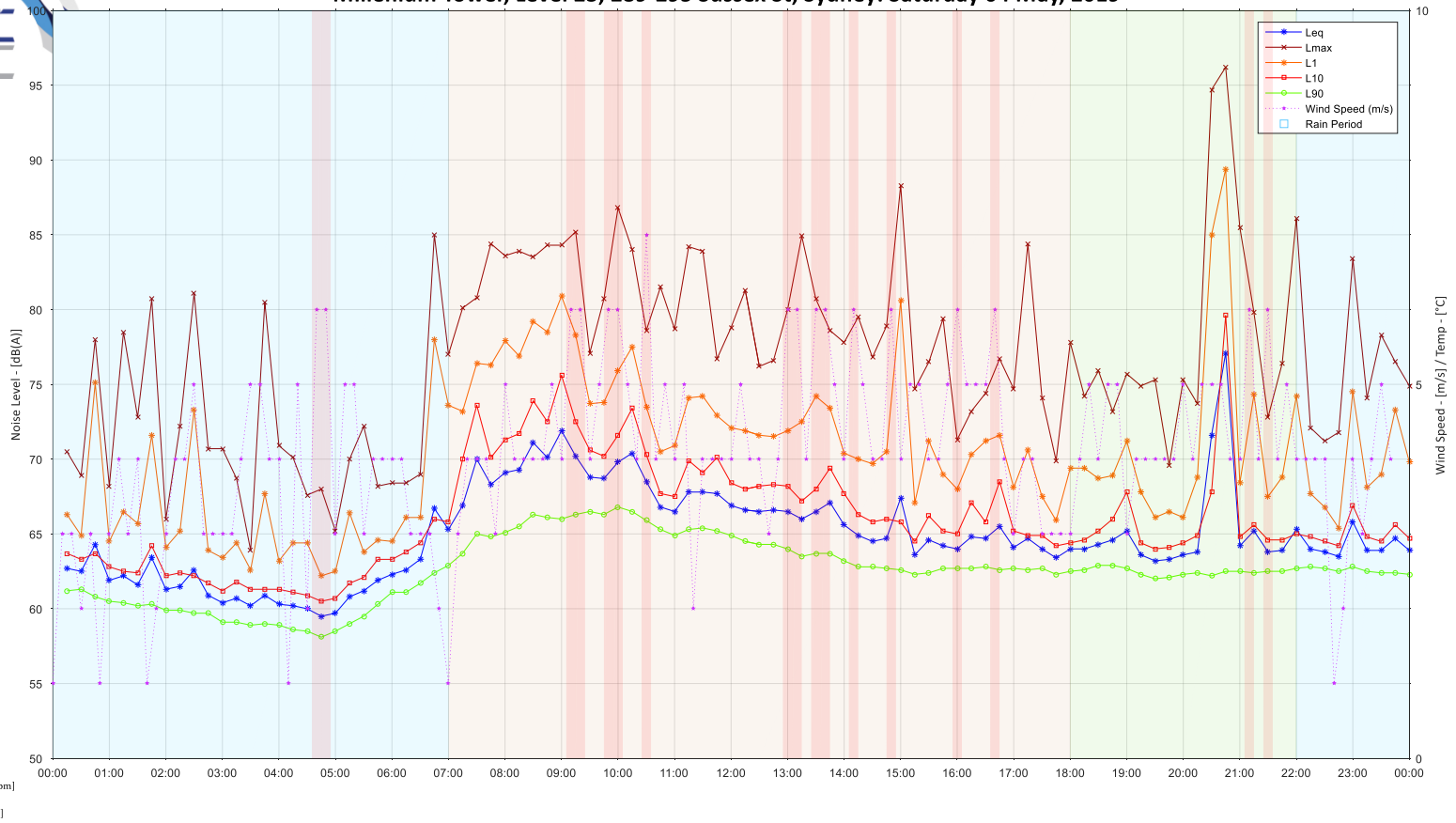
Millenium Tower, Level 23, 289-295 Sussex St, Sydney: Friday 03 May, 2019



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Millenium Tower, Level 23, 289-295 Sussex St, Sydney: Saturday 04 May, 2019

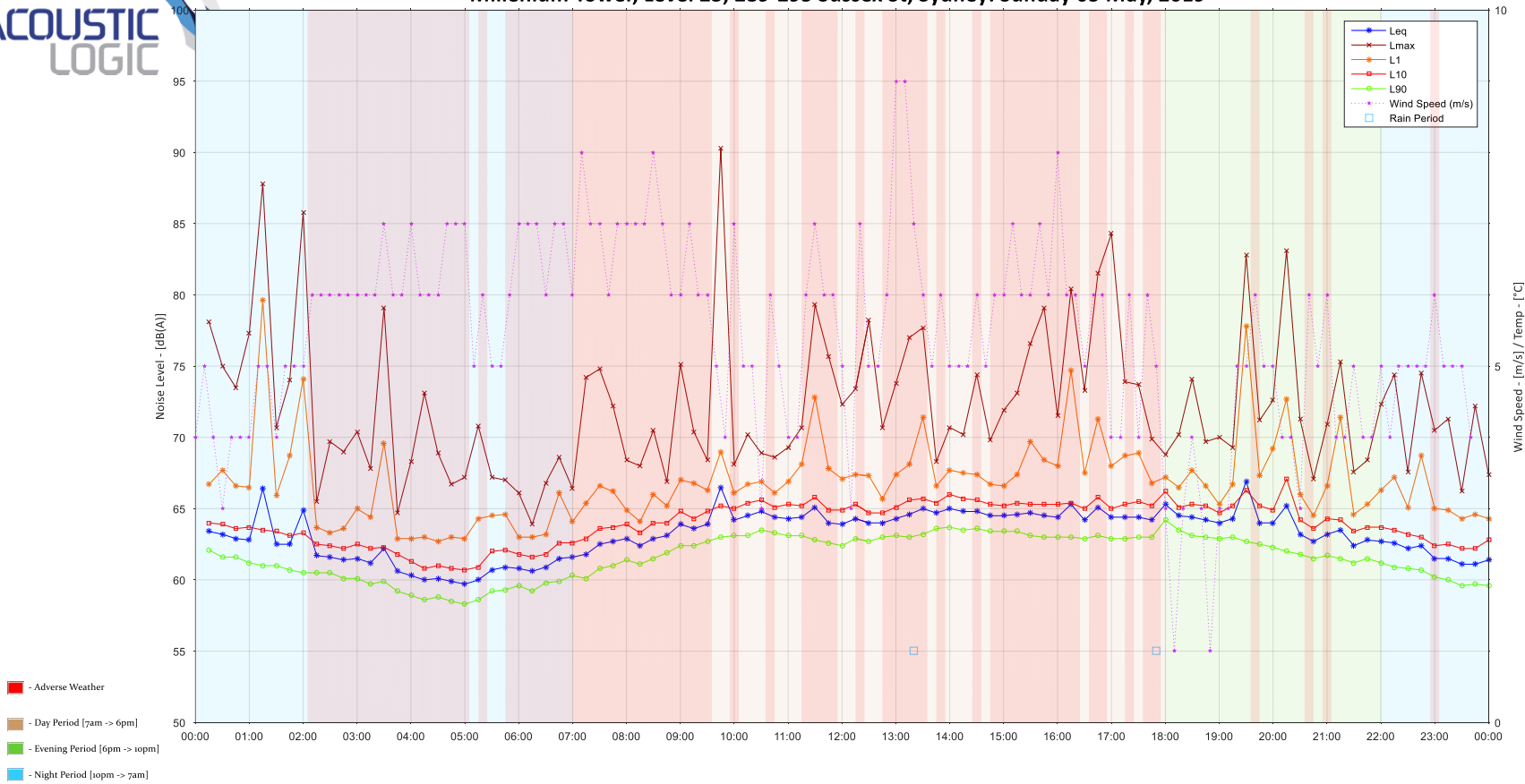


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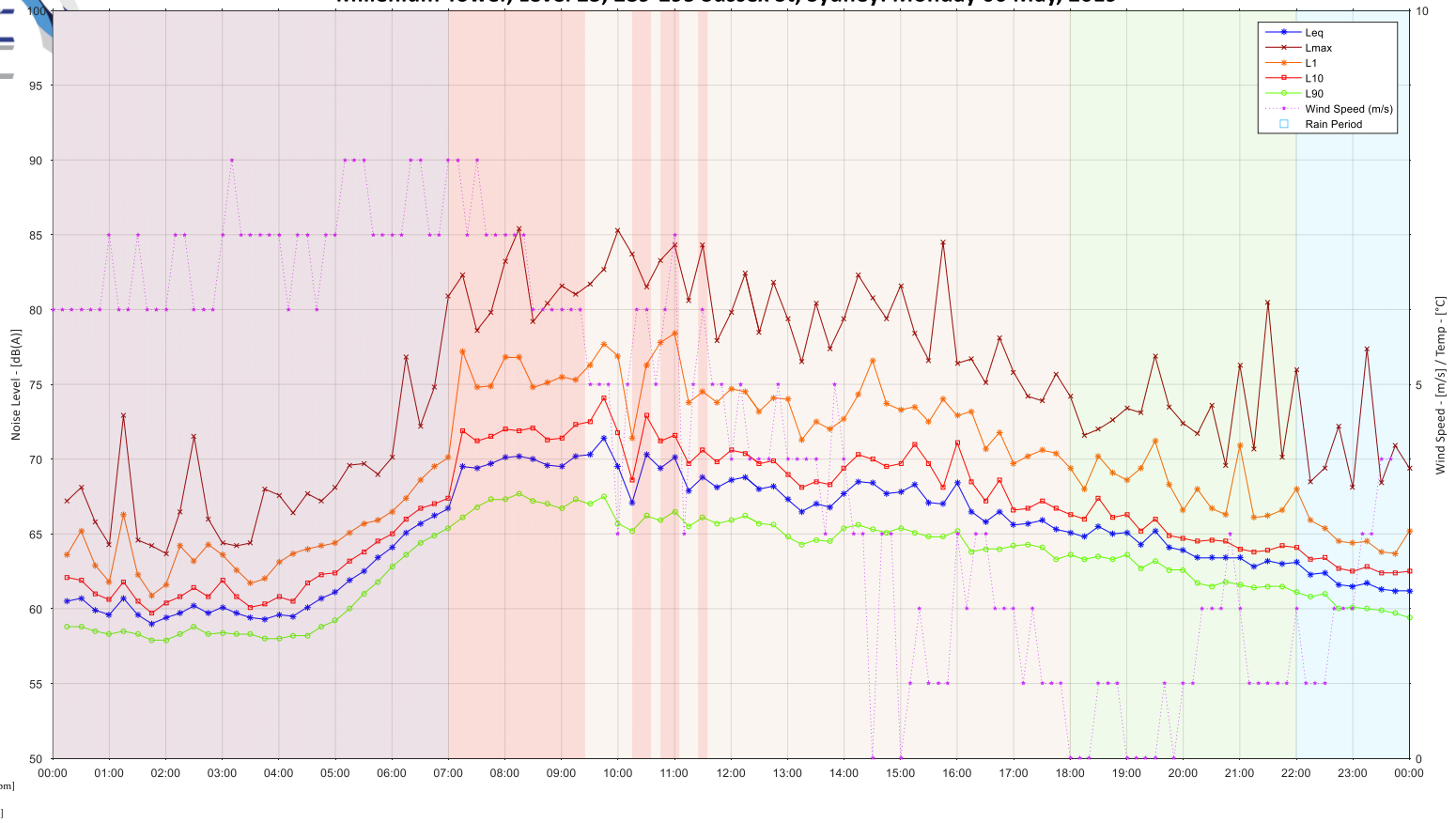
Millenium Tower, Level 23, 289-295 Sussex St, Sydney: Sunday 05 May, 2019

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Millenium Tower, Level 23, 289-295 Sussex St, Sydney: Monday 06 May, 2019



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Millenium Tower, Level 23, 289-295 Sussex St, Sydney: Tuesday 07 May, 2019

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