

194-214 Oxford Street & 2 Nelson Street, Bondi Junction NSW

## SSDA Noise and Vibration Impact Assessment

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Attention To	Westgate BJ Pty Ltd

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## EXECUTIVE SUMMARY

This Noise and Vibration Impact Assessment has been prepared by Acoustic Logic to accompany a State Significant Development Application (SSDA) for a shop top housing development at 194-214 Oxford Street, 2 Nelson Street and part of Osmund Lane, Bondi Junction. The site is made up of nine (9) lots. The legal description of the site is outlined in Table 1.

**Table 1 – Legal Description**

<b>Property Address</b>	<b>Title Description</b>
194 Oxford Street Bondi Junction	Lot 10 in DP260116
196 Oxford Street Bondi Junction	Lot 11 in DP260116
198 Oxford Street Bondi Junction	Lot 12 in DP260116
200 Oxford Street, Bondi Junction	Lot 13 in DP260116
204 Oxford Street Bondi Junction	Lot 16 in DP68010 Lot 1 inn DP79947
214 Oxford Street, Bondi Junction	Lot 1 in DP708295
2 Nelson Street Bondi Junction	Lot 1 in DP583228
Part of Osmund Lane	Lot 1 in DP1300781

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD – 77175998).

This report concludes that the proposed development is suitable and warrants approval subject to the implementation of the following mitigation measures.

### **Noise Intrusion to the Development**

There are several sources of noise surrounding the proposed development, including adjacent roadways. These require assessment under the State Environment Planning Policy (Transport & Infrastructure), namely Syd Enfield Drive.

A series of attended and unattended (long term) noise measurements were undertaken at the site to determine the environmental noise levels and noise exposure of the future development. Detailed analysis was undertaken to predict noise levels to the future façades of the building and allow assessment of potential noise impact to future residents within the development.

Based on the assessment, it was determined that upgraded façade constructions would be required to achieve the internal noise level requirements nominated in the Transport & Infrastructure SEPP – preliminary constructions have been provided which would allow compliance with these criteria.

## **Noise Emissions to Surrounding Receivers**

The primary source of noise emissions from the site will be from mechanical plant, and in particular anything which is located externally. Long term unattended noise measurements were undertaken to determine existing background noise levels representative of surrounding residential receivers.

Based on these measurements, project noise trigger levels for the site were developed in line with the requirements of the NSW EPA Noise Policy for Industry – this guideline considered both the audibility of a noise source (i.e. its increase over the background noise level) as well as cumulative noise impacts to external receivers (the ‘amenity’ level).

As the detailed mechanical design has not yet progressed, it has been recommended that a detailed acoustic review be undertaken as part of the design development to ensure the relevant project noise trigger levels are achieved. Notwithstanding, compliance is both practical and reasonable with the incorporation of standard acoustic treatments (internal duct lining, attenuators etc.).

## **Construction Noise and Vibration Emission**

Noise and vibration from construction activities have the potential to impact surrounding development throughout the course of construction. The NSW EPA Interim Construction Noise Guideline provides a framework to assess these impacts and provides recommendations for the control of noise and vibration levels from construction activities.

Noise and vibration management levels have been developed within this report based on the EPA guidelines using long term unattended monitoring data, as well as Australian Standards relating to vibration. These levels provide a threshold by which potential impacts can be predicted, and mitigation methods developed to reduce the effects.

A preliminary assessment of construction noise and vibration has been undertaken within the report. Based on the assessment, reasonable and feasible mitigation measures will need to be implemented throughout the course of construction to ensure any impacts are minimised to surrounding receivers.

# 1 INTRODUCTION

Following a design excellence competition, development consent was granted to DA-400/2021 (herein, referred to as the parent development consent) which authorised demolition of existing buildings and the construction of a shop top housing development comprising ground floor retail and 10 storeys of residential apartments above the retail podium, across two tower buildings (herein referred to as Building A and Building B). Subsequently, a DA (DA-360/2023) was approved on 28 August 2024 which amended the Basement Levels 4, 3, 2 and 1 and the Ground Floor Level of the approved development under the parent development consent.

The proposed SSDA generally seeks approval for the redevelopment of 194-214 Oxford Street, 2 Nelson Street and part of Osmund Lane, Bondi Junction, proposing to retain key design principles in accordance with the parent consent. The proposal will provide additional residential dwellings, in accordance with the in-fill affordable housing provisions under the *State Environmental Planning Policy (Housing) 2021* and incorporate a 30% increase in Gross Floor Area (GFA) and building height.

The development of the site has physically commenced pursuant to the development consent, with demolition and excavation completed. Construction Certification has been obtained and construction is intended to continue for the lower portion of the building (up to Level 8).

Simultaneously with the construction of the lower parts of the building, the proponent seeks approval for new works to the remaining levels of the building (above level 9) as well as the internal fit out and servicing for the whole of the building (Basement to Level 16).

It is intended that the relationship between the approval of the SSDA and the existing consents be managed through the imposition of a condition pursuant to s 4.17(1)(b) of the EP&A Act and lodgement of a Notice of Modification pursuant to cl. 67 of the EP&A Regulation to ensure consistency across all development consents.

Specifically, this SSDA seeks development consent for:

## **PROPOSED NEW WORKS:**

- Construction of Levels 9 – 16 of the residential towers including Buildings A (Western Tower) and Building B (Eastern Tower) comprising:
  - Building A (Western Tower, Residential Levels 9 – 13) – with a maximum height of 42.5m
  - Building B (Eastern Tower, Residential Levels 9 – 16) – with a maximum height of RL 54.0m
  - Communal open space on rooftop (Building A)
  - Plant and lift overrun
  - Public Domain Works
- Internal fit out of Levels 09 – 16

## Proposed Amendments to Existing Parent Development Consent

- Internal fit out from Levels 01 – 04
- Internal fit out from Ground Level to Level 08
- The allocation of 1,708m<sup>2</sup> of affordable housing on Levels 1,2 and 3 of Building A and Building B

- Additional services to overall development including an additional plant area at ground floor and an addition of a second substation
- Basement services, including additional parking spaces and updated storage and waste storage areas
- Awning over the ground retail along Oxford St and addition of a glazing window to create visual continuation from the neighbouring retail.

## **CUMULATIVE DEVELOPMENT (EXISTING PARENT DEVELOPMENT CONSENT AND SUBJECT SSDA)**

- Construction of a shop-top housing development, comprising a podium with ground floor retail, two residential towers (Building A and Building B) as well as four levels of basement parking and associated public domain works.
  - The delivery of a total of 11,288m<sup>2</sup> of GFA
  - 467m<sup>2</sup> of retail GFA
  - 85 apartments, equating to a total residential GFA of 10,792m<sup>2</sup> including 1,708m<sup>2</sup> (17 apartments) of affordable housing GFA
  - 29m<sup>2</sup> GFA for communal amenities, incl. WC, steam room and sauna
  - The apartments will comprise the following mix:
    - 1 bedroom (2%)
    - 2 bedroom 35 (42%)
    - 3 bedroom 48 (56%)
  - 4 levels of basement for 138 car parking spaces and 45 motorbike parking spaces, with vehicular access from Osmund Lane
  - Storage areas and services
  - Communal open space and associated landscaping.

## PURPOSE OF THIS REPORT

The purpose of the project is to facilitate the delivery of (market and affordable) housing at a strategically located site and to deliver a built form outcome that is consistent with the outcomes of the design competition.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 25/10/2024 and issued for the an SSDA (SSD-77175998). Specifically, this report has been prepared to respond to the SEARs requirement issued below:

**Table 2 – SEARs Requirements SSD-77175998**

<b>Item</b>	<b>Description of Requirement</b>	<b>Section Reference (this report)</b>
12	Provide a noise and vibration assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented	This report forms the Noise and Vibration Impact Assessment (NVIA)

## THE SITE

The site is located at 194-214 Oxford Street and 2 Nelson Street, Bondi Junction within the Waverley LGA. The site is comprised of multiple allotments and is legally described as:

- 194-214 Oxford Street:
  - Lot 10, 11, 12, 13 & 16 / DP 260116,
  - Lot 1 / DP 708295,
  - Lot 1 / DP 79947, and
- 2 Nelson Street
  - Lot 1 / DP 583228
- Part of Osmund Lane (Lot 1 in DP1300781)

The land size is 2,480m<sup>2</sup> (2,599.1m<sup>2</sup> including the land beneath Osmund Lane) with a northern frontage to Sydney Enfield Drive, an eastern frontage to Nelson Street, a southern frontage to Oxford Street and western frontage to York Road.

## **SURROUNDING CONTEXT**

The immediate urban context surrounding the site is characterised by a mix of commercial, retail, residential, and recreational land uses with Centennial Park located to the west and south-west of the site.

The site is in proximity to the Bondi Junction shopping and transport hub to the east, comprising Bondi Junction Westfield Shopping Centre, a pedestrian shopping mall and Bondi Junction Train Station. The site is located within the Western Precinct of Bondi Junction. The site is closely located to two (2) bus stops recognised as ID 202260 'Oxford St before York Rd' approximately 57m from the site and ID 202238 'Oxford St after York Rd' approximately 96m from the site. The site is in proximity to the Bondi Junction Train Station being within 800m from the site (5-minute walk).

The lot at 2 Nelson Street contains a local landscape heritage item I506 'Norfolk Pine-Landscape'. The remainder of the site has recently been demolished in accordance with the existing development consents.

The site will be progressively developed under the existing approvals and the remaining works will be the subject of this application.



Figure 1: Local Context



Figure 2: The Site

## 2 METHODOLOGY

### 2.1 REFERENCED DOCUMENTS

This assessment was conducted using drawings provided by SJB Architects, job number 6289, dated 28/02/2025.

### 2.2 PLANNING GUIDELINES

Internal noise intrusion criteria have been determined to satisfy the requirements below:

- NSW Government Department of Planning document – Planning Secretary’s Environmental Assessment Requirements (SEARS), SSD-77175998, dated 23/10/2024,
- NSW Department of Planning, Industry, and Environment – ‘*State Environmental Planning Policy (Transport and Infrastructure)*’ (SEPP) 2021, and
- NSW Department of Planning, Industry, and Environment – ‘Development near Rail Corridors or Busy Roads – Interim Guideline’.

External noise and vibration emission noise trigger levels have been determined to satisfy the requirements below:

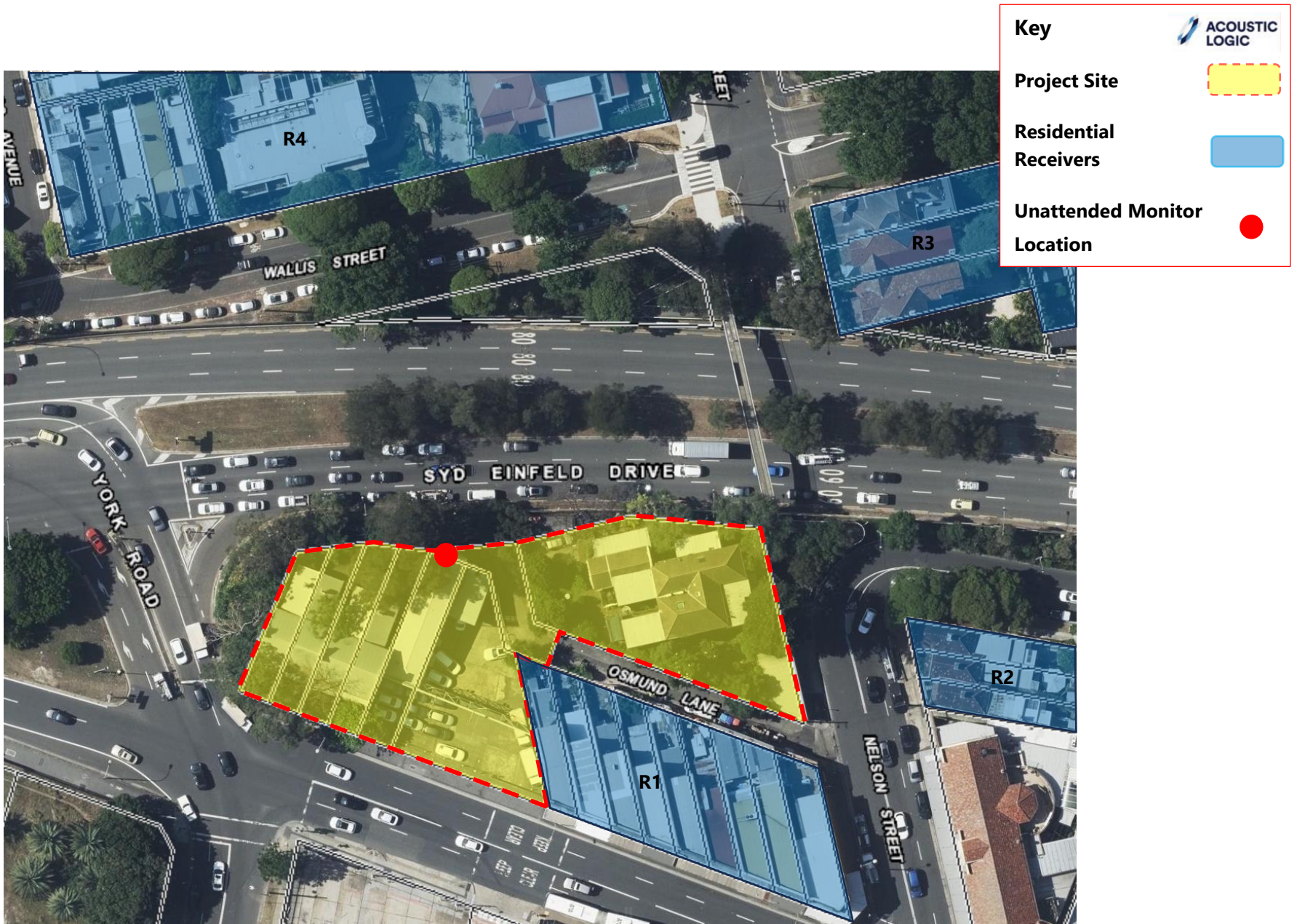
- NSW Government Department of Planning document – Planning Secretary’s Environmental Assessment Requirements (SEARS), SSD-77175998, dated 23/10/2024, Requirement 12,
- NSW Environment Protection Authority (EPA) Document – ‘*Noise Policy for Industry*’ (NPfI) 2017,
- Australian Standard 2436-1981 & Australian Standard 2436-2010,
- Department of Environment and Climate Change NSW – ‘*Interim Construction Noise Guideline (ICNG)*’, dated July 2009,
- Department of Environment and Conservation NSW – ‘*Assessing Vibration: A Technical Guideline*’, dated February 2006,
- German Standard DIN 4150-3 (2016) – ‘Vibration in Buildings - Part 3: Effects on Structures’, and
- British Standard BS 6472:1992 ‘Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80Hz)’.

### 2.3 NEAREST SENSITIVE RECEIVERS

The following table lists the nearest sensitive receivers surrounding the site. An aerial photo of the site indicating nearby noise sensitive receivers and measurement locations is presented in Figure 3.

**Table 3 – Sensitive Receivers**

<b>Receiver (Refer Figure 3)</b>	<b>Land Use</b>	<b>Comment</b>
R1	Residential	Shop top housing along Oxford Street maintained south east of the project site
R2	Residential	Residential dwellings across Nelson Street maintained east of the project site
R3	Residential	Residential dwellings across Syd Enfield Drive maintained north east of the project site.
R4	Residential	Residential dwellings along Wallis Street maintained north of the project site



**Figure 3: Site Map with Local Context**

## 2.4 NOISE DESCRIPTORS

Environmental noise constantly varies in level from moment to moment, so it is not possible to accurately determine prevailing noise conditions by measuring a single, instantaneous noise level.

To quantify ambient noise, a 15-minute measurement interval is typically utilised. Noise levels are monitored continuously during this period, and then statistical and integrating techniques are used to characterise the noise being measured.

The principal measurement parameters obtained from the data are:

**L<sub>eq</sub>** - represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. **L<sub>eq</sub>** is important in the assessment of noise impact as it closely corresponds with how humans perceive the loudness of time-varying noise sources (such as traffic noise).

**L<sub>90</sub>** – This is commonly used as a measure of the background noise level as it represents the noise level heard in the typical, quiet periods during the measurement interval. The **L<sub>90</sub>** parameter is used to set noise emission criteria for potentially intrusive noise sources since the disturbance caused by a noise source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the **L<sub>90</sub>** level.

**L<sub>10</sub>** is used in some guidelines to measure noise produced by an intrusive noise source since it represents the average of the loudest noise levels produced at the source. Typically, this is used to assess noise from licenced venues.

**L<sub>max</sub>** is the highest noise level produced during a noise event and is typically used to assess sleep arousal impacts from short term noise events during the night. It is also used to assess internal noise levels resulting from aircraft and railway ground vibration induced noise.

**L<sub>1</sub>** is sometimes used in place of **L<sub>max</sub>** to represent a typical noise level from a number of high-level, short-term noise events.

### 3 AMBIENT NOISE SURVEY

Acoustic survey has been carried out by setting up an unattended noise monitor to record the existing ambient and background noise levels for 12 days.

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 10<sup>th</sup> percentile noise levels during operation time period) are presented in Table 1.

#### 3.1 MEASUREMENT POSITION

The unattended noise monitor was located on the northern boundary of the site near Syd Einfeld Drive. Detailed monitor location has been marked in Figure 3 above. The picture of noise monitor is detailed below:

Attended measurements were undertaken around the site on Oxford Street, York Road, and Syd Einfeld Drive. All measurements were taken approximately 5m from the kerb.



### 3.1.1 Measurement Period

Unattended noise monitoring was conducted from the 3<sup>rd</sup> to the 15<sup>th</sup> of June 2021.

Attended measurements were undertaken on site on the 15<sup>th</sup> of June 2021 between 4:00 and 4:30pm

### 3.1.2 Measurement Equipment

#### Unattended noise monitor

Equipment used consisted of one 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 A.

#### Attended Noise Measurement

Noise measurements were obtained using a Norsonic type SA140 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonics Sound Calibrator type 1251. No significant drift was noted.

### 3.1.3 Summarised Long Term Noise Measurement Results

**Table 4 - Measured Background Noise Levels RBL**

<b>Time of day</b>	<b>Rating Background Noise Level dB(A)<sub>L90(Period)</sub></b>
Day (7am – 6pm)	58
Evening (6pm – 10pm)	57
Night (10pm – 7am)	39

### 3.1.4 Summarised Traffic Noise Levels

**Table 5 - Measured Traffic Noise Levels**

<b>Time</b>	<b>Measured Traffic Noise Level</b>
Day (7am-10pm)	69dB(A) $L_{eq}$ (15hr)
Night (10pm-7am)	65dB(A) $L_{eq}$ (9hr)

## 4 ASSESSMENT AND FINDINGS

### 4.1 EXTERNAL NOISE INTRUSION ASSESSMENT

This section of the report details the acoustic assessment of traffic noise intrusion to the proposed development.

As the development site is located approximately 90 metres from the nearest rail tunnel a vibration assessment is not mandated by NSW Department of Planning.

#### 4.1.1 Assessment Criteria

An external noise intrusion assessment has been conducted based off the requirements of the following acoustic noise criteria/standards:

- NSW Department of Planning and Environment's document 'State Environmental Planning Policy (SEPP) (Transport and Infrastructure) 2021', and
- NSW Department of Planning's 'Developments near Rail Corridors or Busy Roads – Interim Guideline' (DNRCBR).

##### 4.1.1.1 NSW Department of Planning, Industry, and Environment – 'State Environmental Planning Policy (Transport and Infrastructure)' (SEPP) 2021

The guidelines and criteria listed in the SEPP are summarised and listed below.

##### 4.1.1.2 NSW Department of Planning, Industry, and Environment – 'Development near Rail Corridors or Busy Roads – Interim Guideline'

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

*"The following provides an overall summary of the assessment procedure to meet the requirements of clauses 87 and 102 of the Infrastructure SEPP. The procedure covers noise at developments for both Road and Rail.*

- *If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*
  - *in any bedroom in the building: 35dB(A) at any time 10pm-7am*
  - *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."*

##### 4.1.1.3 Summary of Criteria

The summarised criteria for the development are summarised below.

**Table 6 – Summarised Criteria for Internal Noise Levels**

Space /Activity Type	Maximum Internal Noise Criteria
Sleeping Areas	35 dB(A) <sub>Leq(9hour)</sub>
Living Areas	40 dB(A) <sub>Leq(15hour)</sub>

#### **4.1.2 Evaluation of Noise Intrusion**

Internal noise levels will primarily be as a result of noise transfer through the windows and doors and roof, as these are relatively light building elements that offer less resistance to the transmission of sound.

The predicted noise levels through the windows, doors and roof are discussed below. The predicted noise levels have been based on the measured level and spectral characteristics of the external noise, the area of building elements exposed to traffic and train noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

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

Indicative external building shell constructions are provided in the following sections to comply with the established internal noise criteria. Alternative construction to those indicated may also be acceptable, pending review from the project acoustic consultant. It is recommended that finalised construction requirements are confirmed as part of the detailed design of the project, once apartment layouts and construction methodology has been confirmed.

#### **4.1.3 Glazing Requirements**

The window glazing proposed for this project is listed below. The windows will be satisfactory provided they meet the criteria listed below.

The proposed glazing thickness will satisfy all acoustic requirements of AS2021. 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.

It is noted that most 'corner' rooms contain much larger areas of glazing. Corner rooms and non-corner rooms have been differentiated below based on glazed area.

Where a unit faces two facades, the façade that requires thicker glazing should apply to all glazing of that room.

**Table 7 – Complying Glazing Constructions for Windows**

<b>Facade</b>	<b>Levels</b>	<b>Space</b>	<b>Glazing Thickness</b>	<b>Acoustic seals</b>	
Syd Einfeld Drive York Road Oxford Street	1-5	Bedrooms (<8m <sup>2</sup> glazed area)	12.38mm laminate	Yes	
		Bedrooms (>8m <sup>2</sup> glazed area)	12.5mm V-Lam	Yes	
		Living Areas (<12m <sup>2</sup> glazed area)	12.38mm laminate	Yes	
		Living Areas (>12m <sup>2</sup> glazed area)	10.38mm laminate/ 100mm air gap / 6mm float	Yes	
	6-10	Bedrooms (<8m <sup>2</sup> glazed area)	10.38mm laminate	Yes	
		Bedrooms (>8m <sup>2</sup> glazed area)	12.38mm laminate	Yes	
		Living Areas (<12m <sup>2</sup> glazed area)	10.38mm laminate	Yes	
		Living Areas (>12m <sup>2</sup> glazed area)	12.38mm laminate	Yes	
	10-16	Bedrooms (<8m <sup>2</sup> glazed area)	10.38mm laminated	Yes	
		Bedrooms (>8m <sup>2</sup> glazed area)	10.38mm laminated	Yes	
		Living Areas (<12m <sup>2</sup> glazed area)	10.38mm laminated	Yes	
		Living Areas (>12m <sup>2</sup> glazed area)	10.38mm Laminated	Yes	
	Osmund Lane and Nelson Street Right Tower Only	1-5	Bedrooms (<8m <sup>2</sup> glazed area)	10.38mm laminate	Yes
			Bedrooms (>8m <sup>2</sup> glazed area)	12.38mm laminate	Yes
			Living Areas (<12m <sup>2</sup> glazed area)	10.38mm laminate	Yes
			Living Areas (>12m <sup>2</sup> glazed area)	12.38mm laminate	Yes
6-10		Bedrooms (<8m <sup>2</sup> glazed area)	10.38mm laminate	Yes	

		Bedrooms ( $>8\text{m}^2$ glazed area)	10.38mm laminate	Yes
		Living Areas ( $<12\text{m}^2$ glazed area)	10.38mm laminate	Yes
		Living Areas ( $>12\text{m}^2$ glazed area)	10.38mm laminate	Yes
	10-16	Bedrooms ( $<8\text{m}^2$ glazed area)	10.38mm Laminated	Yes
		Bedrooms ( $>8\text{m}^2$ glazed area)	10.38mm laminate	Yes
		Living Areas ( $<12\text{m}^2$ glazed area)	10mm Float	Yes
		Living Areas ( $>12\text{m}^2$ glazed area)	10mm Float	Yes

In addition to complying with the minimum scheduled glazing thickness, the  $R_w$  rating of the glazing fitted into operable frames and fixed into the building opening should not be lower than the values listed in Table 8 in all areas. Where nominated, this will require the use of acoustic seals around the full perimeter of operable frames and the frame will need to be sealed into the building opening using a flexible sealant. Note that mohair seals in windows and doors are not acceptable where acoustic seals are required. The proposed suppliers should provide evidence that the window systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum  $R_w$  requirements listed in Table 8, and that they will be constructed and installed in a manner equal to the test samples.

**Table 8 – Minimum  $R_w$  of Glazing**

<b>Glazing Assembly</b>	<b>Minimum <math>R_w</math> of Installed Window</b>	<b>Acoustic Seals</b>
6mm float	29	Yes
10mm Float	33	Yes
10.38mm laminate	35	Yes
12.38mm laminate	37	Yes
12.5mm V-Lam Hush	38	Yes
10.38mm laminate/ 100mm air gap / 6mm float	43*	Yes

\*Note: Where double glazed systems are constructed using two separate single glazed systems, each individual system should meet its own required  $R_w$  value.

#### **4.1.3.1 External Doors**

Any glass door or glazed panels set into solid doors should be constructed using glazing thickness outlined in the above section. Full perimeter acoustic seals around the doors are required.

Any timber external doors (this includes apartment entry doors along external corridor areas) shall be a minimum 40mm solid core timber with Raven RP10 to the top and sides and Raven RP38 to the underside of the door.

#### **4.1.3.2 External Walls**

Proposed concrete wall is acoustically acceptable and does not require any additional treatments.

There should not be vents on the internal skin of external walls. All penetrations in the internal skin of external walls should be acoustically sealed.

#### **4.1.3.3 Roof/Ceiling Construction**

Proposed concrete slab roof is acoustically acceptable and does not require any additional treatments. No details of ceiling construction or corner junctions are required as the necessary acoustic performance is achieved by the concrete.

## 5 NOISE EMISSION ASSESSMENT

Noise emissions from the site have been assessed for noise emissions from mechanical plant in operation (in principle).

### 5.1 NOISE EMISSIONS CRITERIA

#### 5.1.1 SEARs Requirements (SSD-77175998)

##### 12 Noise and Vibration

*Provide a noise and vibration assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.*

#### 5.1.2 NSW EPA Noise Policy for Industry (NPfI) 2017

The NSW EPA Noise Policy for Industry (NPfI) 2017, has two criteria which need to be satisfied: namely the Intrusiveness noise level criteria and the Project Amenity noise level criteria. The Project Noise Trigger Levels are then established based on the lower of the intrusiveness and project amenity levels.

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

##### 5.1.2.1 Intrusiveness Noise Level 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 do 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 Section 4. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

**Table 9 – Project Intrusiveness Criterion**

<b>Location</b>	<b>Time of day</b>	<b>Rating Background Noise Level dB(A) <math>L_{90}(\text{period})</math></b>	<b>Project Intrusiveness Noise Level dB(A) <math>L_{eq}(15\text{min})</math></b>
Residential Receivers	Day	58	63
	Evening	57	62
	Night	39	44

### 5.1.3 Project Amenity Noise Level Criteria

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 NSW EPA Noise Policy for Industry sets out acceptable noise levels for various localities. Table 2.2 on page 11 of the policy indicates 3 categories to distinguish different residential areas. They are rural, suburban, urban. This site is categorised by urban receivers.

For the purposes of this condition:

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

The project amenity noise level is calculated by taking the recommended amenity noise level (as presented in table 2.2 of the policy), subtracting 5dB(A) and then adding 3dB(A) to convert from  $L_{Aeq, period}$  to a  $L_{Aeq, 15 \text{ minute}}$  descriptor. The project amenity noise level criteria are presented in the table below.

**Table 10 – Project Amenity Noise Levels**

Location	Period/Time	Project Amenity Noise Levels dB(A) $L_{Aeq(15min)}$
Nearby residences – Urban Receivers	Day (7am-6pm)	58
	Evening (6pm-10pm)	48
	Night (10pm-7am)	43
Commercial Receivers	When in use	63

#### 5.1.3.1 Sleep Disturbance 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 event assessment should be undertaken.

**Table 11 – Sleep Arousal Criteria for Residential Receivers**

Receiver	Rating Background Noise Level (Night) dB(A) $L_{90}$	Emergence Level
Residential Receivers Night (10pm – 7am)	39 dB(A) $L_{90}$	44 dB(A) $L_{eq, 15min}$ ; 54 dB(A) $L_{Fmax}$

### 5.1.3.2 Project Noise Trigger Levels

The project noise trigger level (as outlined in section 2.1 of the policy) is the lower of the intrusiveness and project amenity noise levels. The project noise trigger levels are presented in the table below.

**Table 12 – Project Noise Trigger Levels (NPfl)**

Receiver(s)	Time Period	Assessment Background Noise Level dB(A) $L_{90}$	Project Amenity Criteria dB(A) $L_{eq(15min)}$	Intrusiveness Criteria $L_{eq(15min)}$	NPfl Criteria for Sleep Disturbance
Residential Receiver	Day (7am – 6pm)	59	<b>58</b>	63	N/A
	Evening (6pm-10pm)	57	<b>48</b>	62	N/A
	Night (10pm-7am)	39	<b>43</b>	44	<b>44 dB(A)<math>L_{eq, 15min}</math>; 54 dB(A)<math>L_{Fmax}</math></b>
Commercial Receivers	When in use	N/A	<b>63</b>	N/A	N/A

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

## 5.2 NOISE FROM MECHANICAL PLANT (IN PRINCIPLE)

Detailed plant selection and location has not been undertaken at this stage. Satisfactory levels will be achievable through appropriate plant selection, location and if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of Section 5.1.3.2.

Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels.

Notwithstanding the above, an assessment of preliminary plant layouts and locations is presented below, noting that it is likely for layouts or equipment types to vary during the detailed design phase of the project.

- Ground Floor Plant:
  - All fans are located within fan room enclosures of the ground floor as nominated within the architectural documentation.
  - Indicatively, fans may require attenuation treatment to meet NPfl requirements are surrounding sensitive receivers.
  - To ensure compliance with NPfl requirements during the day, evening and night time, additional review is recommended following final plant selection and review.

### 5.3 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

A preliminary assessment of construction noise and vibration impacts during the main building works of the mixed-use development to be located at 194-214 Oxford Street and 2 Nelson Street, Bondi Junction has been undertaken. The assessment includes:

- Identification of the noise and vibration guidelines which will be applicable to this project.
- Identification of potentially affected nearby sensitive receivers.
- Identification of likely noise sources and vibration generating activities.
- Formulation of a strategy to address the guidelines identified including mitigation treatments.

A detailed construction staging program is yet to be finalised, however we have assumed there will be excavation and piling. Construction work (and the associated typical loudest plant/equipment) would be expected to comprise of:

- Bulk excavation.
- Bored or CFA piling of foundations.
- Erection of building structure (powered hand tools for formwork, concrete pump, vibrators).
- Façade Installation (powered hand tools).
- Landscaping (front end loaders etc).

The following work hours are the recommended standard working hours stipulated in the NSW Interim Construction Noise Guideline:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and/or Public Holidays: No work

### 5.4 NOISE MANAGEMENT LEVELS

Noise associated with construction activities on the site will be assessed in accordance with the NSW EPA Interim Construction Noise Guideline.

**5.4.1 NSW Environmental Protection Authority (EPA) document – ‘Interim Construction Noise Guideline’ (“ICNG”) July 2009**

The “quantitative” assessment procedure, as outlined in the Interim Construction Noise Guideline (ICNG) will be used. The quantitative assessment method requires: Determination of noise generation goals (based on ambient noise monitoring); Prediction of operational noise levels at nearby development; and if necessary, recommendation of noise controls 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:

- *“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 ambient levels by more than 10dB(A)<sub>Leq(15min)</sub>.
- *“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)<sub>Leq(15min)</sub> at nearby residences.

In addition to the above management levels for residential receivers, the ICNG nominates a Management Level of 70dB(A) <sub>Leq(15min)</sub> at commercial receiver facades (typical office, retail). And a Management Level of RBL + 5 dB(A) for any work done outside of standard hours.

A summary of the above recommended noise levels from the ICNG is presented below.

**Table 13 – Noise Emission Goal at Residential Property Boundaries**

<b>Location</b>	<b>“Noise Affected” Level - dB(A)<sub>Leq(15min)</sub> Standard Hours</b>	<b>“Highly Noise Affected” Level - dB(A)<sub>Leq(15min)</sub></b>
Residential Receivers	68	75

Where noise from the construction works is above the “noise affected” level, the proponent should apply any feasible and reasonable work practices to minimise noise. The “noise affected level is representative of a level where there may be some community reaction to noise.

If noise emissions are likely to exceed 75 dB(A)<sub>Leq(15min)</sub> “highly noise affected” at the boundary of surrounding affected residential receivers, the receiver is deemed to be “highly noise affected”. The “highly noise affected” level is representative of a level where strong community reaction to noise is expected. Introduction of management controls such as scheduling of noisy periods, or respite periods is then recommended. Refer to Section 5.6.3 for specific recommendations.

Section 4.1.2 and 4.1.3 of the EPA Interim Construction Noise Guideline also nominates management levels for other sensitive land uses (other than residences). Criteria relevant to this assessment is detailed below.

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

The Australian Standard AS2436 states that where all reasonable and available measures have been taken to reduce construction noise, mitigation strategies may be put in place to reduce levels noise levels to within a reasonable and acceptable level.

For the control and regulation of noise from construction sites, AS2436:1981 nominates the following:

- a. *That reasonable suitable noise criterion is established,*
- b. *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 construction hours, and*
- c. *The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the construction site.*

The guideline reflects on feasible and reasonable mitigation strategies, management controls and public liaising in the effort to reach realistic compromises between construction sites and potential noise affected receivers.

Based on these criteria the following procedure will be used to assess noise emissions:

- Predict noise levels produced by typical construction activities at the sensitive receivers.
- Adopt management conditions as per AS2436 in the event of a non-compliance.

### 5.5 VIBRATION OBJECTIVES

Vibration caused by construction at any residence or structure outside the subject site will be assessed with reference to:

- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures*; and
- For human exposure to vibration, Department of Environment and Conservation NSW "Assessing Vibration: A Technical Guideline" (Feb 2006) is based on the guidelines contained in BS 6472:1992 *Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80Hz)* for low probability of adverse comment.

The criteria and the application of this standard are discussed in separate sections below.

#### 5.5.1 Structure Borne Vibrations (Building Damage Criteria)

German Standard DIN 4150-3 (2016-12) provides a guideline for acceptable levels of vibration velocity in building foundations, to assess the effects of vibration on structures. The table give guidance on the maximum accepted values of velocity at the foundation and in the plane of the highest floor of various types of buildings, to prevent any structural damage.

The table below lists the peak particle velocity, which is the maximum absolute value of the velocity signals for the three orthogonal components. This is measured as a maximum value of any of the three orthogonal component particle velocities when measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

**Table 14 – DIN 4150-3 (2016-12) Safe Limits for Building Vibration**

TYPE OF STRUCTURE		PEAK PARTICLE VELOCITY (mms <sup>-1</sup> )			
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

**5.5.2 Assessing Amenity**

The NSW EPA's *Assessing Vibration – a technical guideline* is based on the guidelines contained in British Standard BS 6472-1992 'Guide to Evaluate Human Exposure to Vibration Buildings (1Hz to 80Hz)'. This guideline provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings.

The recommendations of this guideline should be adopted to assess and manage vibration from the site. Where vibration exceeds, or is likely to exceed, the recommended levels then an assessment of reasonable and feasible methods for the management of vibration should be undertaken.

**Table 15 – BS 6472 Vibration Criteria**

		RMS acceleration (m/s <sup>2</sup> )		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	Time	Preferred	Maximum	Preferred	Maximum	Preferred	Maximum
<b>Continuous Vibration</b>							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices	Day or night-time	0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
<b>Impulsive Vibration</b>							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices	Day or night-time	0.64	1.28	13	26	18	36
Workshops		0.64	1.23	13	26	18	36

**Note 1: Continuous vibration relates to vibration that continues uninterrupted for a defined period (usually throughout the daytime or night-time), e.g., continuous construction or maintenance activity. (DECC, 2006).**

**Note 2: Impulsive vibration relate to vibration that builds up rapidly to a peak followed by a damped decay and that may or may not involve several cycles of vibration (depending on frequency and damping), with up to three occurrences in an assessment period, e.g., occasional loading and unloading, or dropping of heavy equipment. (DECC, 2006).**

## 5.6 CONSTRUCTION NOISE EMISSIONS ASSESSMENT

### 5.6.1 Noise Levels of Typical Construction Activities

Typically, the most significant sources of noise or vibration generated during a construction project will be demolition, excavation, structural works and piling.

A summary of the equipment/processes which typically generate the highest noise levels during demolition, excavation and construction are summarised below.

**Table 16 – Sound Power Levels of the Proposed Equipment**

<b>Equipment / Process</b>	<b>Sound Power Level – dB(A)*</b>
Rock Hammering	120
Augered Piling Rig	111
Excavator (in clay/soil)	110
Concrete Pump	108
Trucks	107
Materials Handling (Forklifts etc)	100
Crane (Electric)	95
Powered Hand Tools	95

The noise levels presented in the above table are derived from the following sources, namely:

1. On-site measurements
2. Table A1 of Australian Standard 2436-2010, and
3. \*Data held by this office from other similar studies

Noise levels take into account correction factors (for tonality, intermittency where necessary).

### 5.6.2 Predicted Noise Levels

The predicted noise levels during demolition, excavation and construction will depend on:

- The activity undertaken.
- The distance between the work site and the receiver. For many of the work areas, the distance between the noise source and the receiver will vary depending on which end of the site the work is undertaken. For this reason, the predicted noise levels will be presented as a range.

Predicted noise levels are presented in the following tables. Predictions take into account noise reduction as a result of distance, and barrier effects where applicable.

**Table 17 – Predicted Noise Generation to R1 Residential Receivers Bounding Site**

<b>Activity</b>	<b>Predicted Level – dB(A) <math>L_{eq}(15min)</math> (External Areas)</b>	<b>Comment</b>
Rock Hammering	75-98	Generally exceeds highly noise affected management level.
Augered Piling Rig	66-89	Exceeds highly noise affected management level only when working close to the southeastern boundary.
Excavator	65-88	
Concrete Pump	66-86	
Trucks	62-85	
Materials Handling (Forklifts etc)	55-78	
Powered Hand Tools	50-73	Meets highly noise affected management level at all times. Exceeds noise affected management level only when working close to the southeastern boundary.
Crane (Electric)	63	Within ICNG noise management levels at all times.

**Table 18 – Predicted Noise Generation to R2 Residential Receivers Bounding Site**

<b>Activity</b>	<b>Predicted Level – dB(A) <math>L_{eq}(15min)</math> (External Areas)</b>	<b>Comment</b>
Rock Hammering	72-84	Generally exceeds highly noise affected management level.
Augered Piling Rig	63-75	Meets highly noise affected management level at all times. Exceeds noise affected management level only when working close to the eastern boundary.
Excavator	62-74	
Trucks	59-71	
Concrete Pump	60-68	Within ICNG noise management levels at all times.
Materials Handling (Forklifts etc)	52-64	
Powered Hand Tools	47-59	
Crane (Electric)	51	

**Table 19 – Predicted Noise Generation to R3 & R4 Residential Receivers Bounding Site**

<b>Activity</b>	<b>Predicted Level – dB(A) <math>L_{eq}(15min)</math> (External Areas)</b>	<b>Comment</b>
Rock Hammering	71-79	Exceeds highly noise affected management level only when working close to northern boundary.
Augered Piling Rig	62-70	Meets highly noise affected management level at all times. Exceeds noise affected management level only when working close to the northern boundary.
Excavator	61-69	
Concrete Pump	59-62	Within ICNG noise management levels at all times.
Trucks	58-66	
Materials Handling (Forklifts etc)	51-59	
Powered Hand Tools	46-54	
Crane (Electric)	49	

### 5.6.3 Recommendations

Exceedances to the “*Noise Affected Management Level*” (NAML) and “*Highly Noise Affected Noise Management Level*” (HNAML) are possible when high noise generating works occur close to project boundaries. In light of the above, the following recommendations are made:

- A detailed noise management plan should be developed by the main contractor that describes in detail the construction phases, programme, processes, and equipment used, noise impact assessment and proposed mitigation and management.
- Quiet work methods/technologies:
  - Materials handling/vehicles:
    - Trucks and bobcats to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.
    - Avoid careless dropping of construction materials into empty trucks.
    - Trucks, trailers and concrete trucks (if feasible) should turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).
- Site Induction:
  - A copy of the Noise Management Plan is to be available to contractors. The location of the Noise Management Plan should be advised in any site induction.
  - Site induction should also detail the site contact is to be notified in the event of noise complaint.

The above assessment and recommendations made are preliminary and based on initial information regarding the general construction requirements for the site.

## **6 SUMMARY OF MITIGATION MEASURES.**

A summary of the mitigation measures for the proposed development is described below, along with other measures to be implemented during the design, construction, commissioning and operation of the proposed development.

### **6.1 EXTERNAL NOISE INTRUSION**

- Analysis indicates that the building façade requires upgrading to minimise noise intrusion from the surrounding roads. The treatments are indicated within Section 4.1.2.

### **6.2 OPERATIONAL NOISE**

#### **6.2.1 Pre Construction**

- A detailed noise emissions assessment of all ventilation or other plant items should be undertaken at construction certificate stage once equipment items are selected and locations are finalised. The assessment should indicate any treatment required to comply with the trigger levels identified in Section 5.1.3.2 and this treatment should be implemented.

#### **6.2.2 During Operation – Management Controls**

- Construction and maintenance (including the collection of waste) is to occur between the following hours (unless specific approval is obtained otherwise):
  - General construction and site maintenance – 7am to 6pm Monday to Friday and 8am to 1pm Saturdays.
  - Waste collection – 7am to 6pm Monday to Friday.

### **6.3 CONSTRUCTION NOISE AND VIBRATION MANAGEMENT**

Prior to the commencement of site construction activities, the proponent/ main contractor should:

- Assess the noise and vibration impacts based on the proposed construction methodologies.
- Develop and adopt a project specific construction noise and vibration management plan in accordance with Section 5.4 as well as adopt any recommendations in Section 5.6.3 to management and regulate construction.

## 7 CONCLUSION

This report presents our assessment of external noise intrusion and environmental noise emissions for the proposed residential development to be located at 194-214 Oxford Street, Bondi Junction.

Provided that the treatments set out in Section 4 of this report are incorporated, internal noise levels shall satisfy the requirements of the following documents:

- NSW Government Department of Planning document – Planning Secretary's Environmental Assessment Requirements (SEARS), SSD-77175998, dated 23/10/2024,
- NSW Department of Planning, Industry, and Environment – '*State Environmental Planning Policy (Transport and Infrastructure)*' (SEPP) 2021, and
- NSW Department of Planning, Industry, and Environment – '*Development near Rail Corridors or Busy Roads – Interim Guideline*'.

Provided that the levels set out in Sections 5.1.3.2 and 5.4 of this report are employed, external noise and vibration emission levels shall satisfy the requirements of the following documents:

- NSW Government Department of Planning document – Planning Secretary's Environmental Assessment Requirements (SEARS), SSD-77175998, dated 23/10/2024, Requirement 12,
- NSW Environment Protection Authority (EPA) Document – '*Noise Policy for Industry*' (NPfI) 2017,
- Australian Standard 2436-1981 & Australian Standard 2436-2010,
- Department of Environment and Climate Change NSW – '*Interim Construction Noise Guideline (ICNG)*', dated July 2009,
- Department of Environment and Conservation NSW – '*Assessing Vibration: A Technical Guideline*', dated February 2006,
- German Standard DIN 4150-3 (2016) – '*Vibration in Buildings - Part 3: Effects on Structures*', and
- British Standard BS 6472:1992 '*Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80Hz)*'.

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

Yours faithfully,

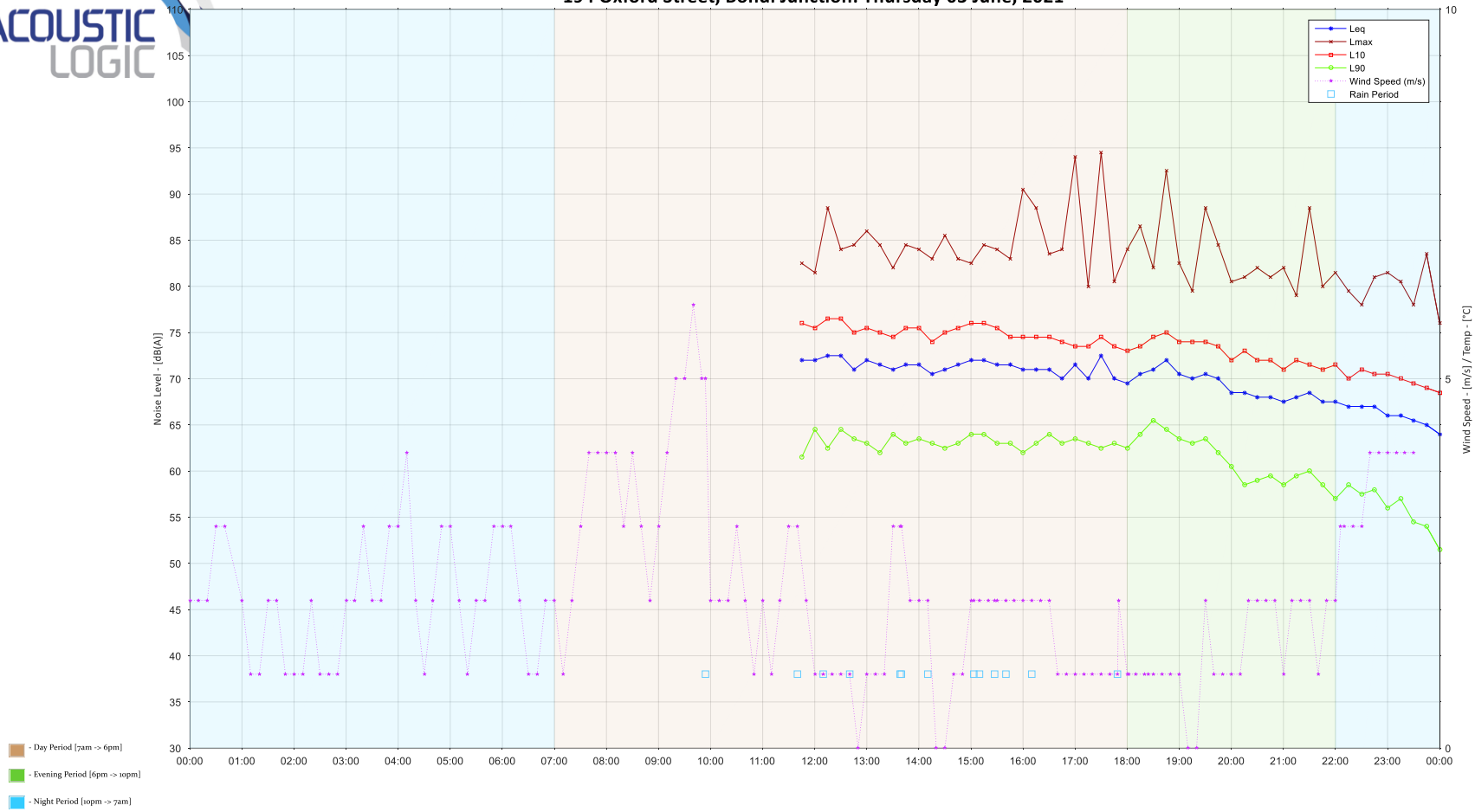


Acoustic Logic Pty Ltd  
Andrew Pham

**APPENDIX A – UNATTENDED NOISE MONITORING DATA**

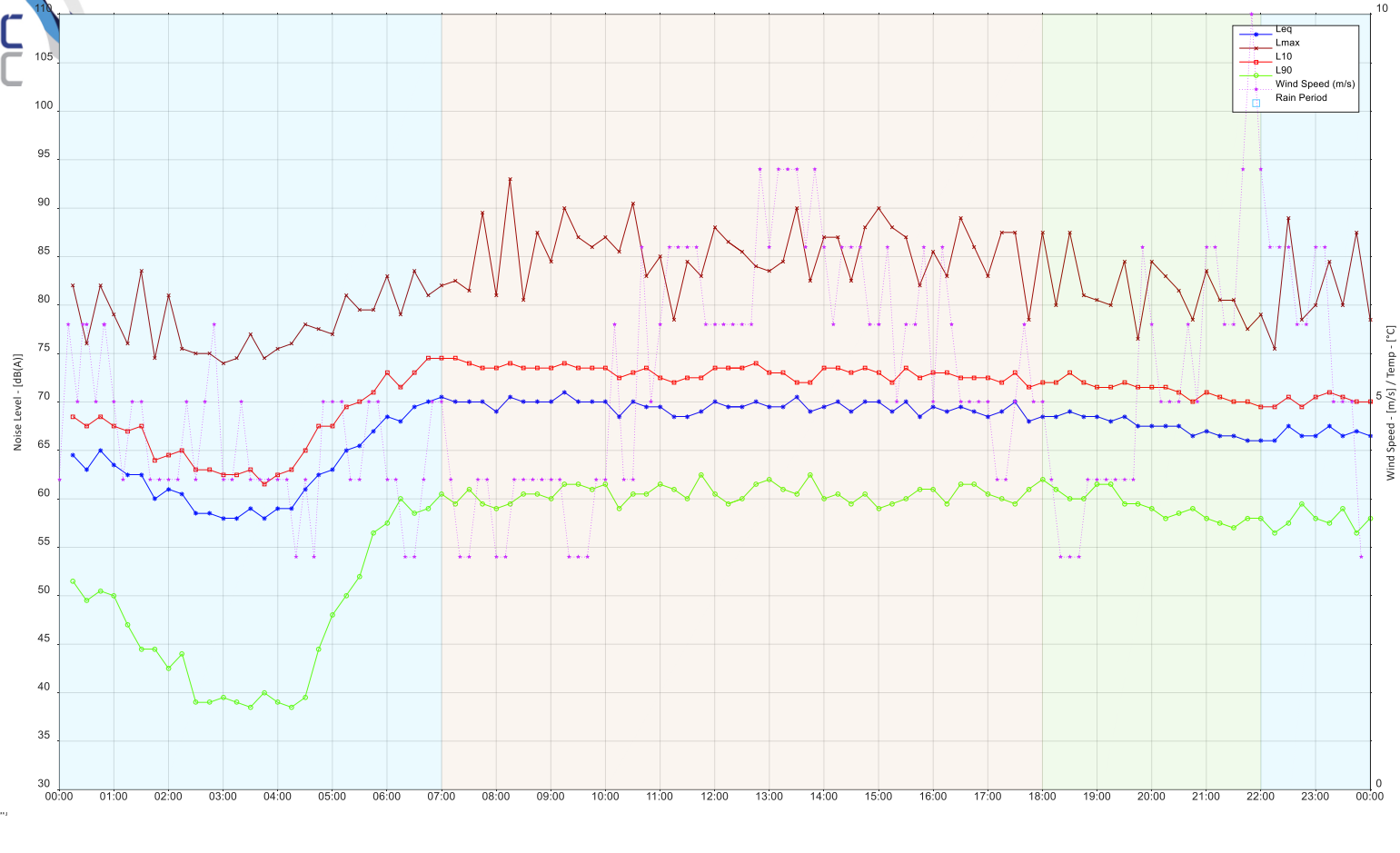


### 194 Oxford Street, Bondi Junction: Thursday 03 June, 2021



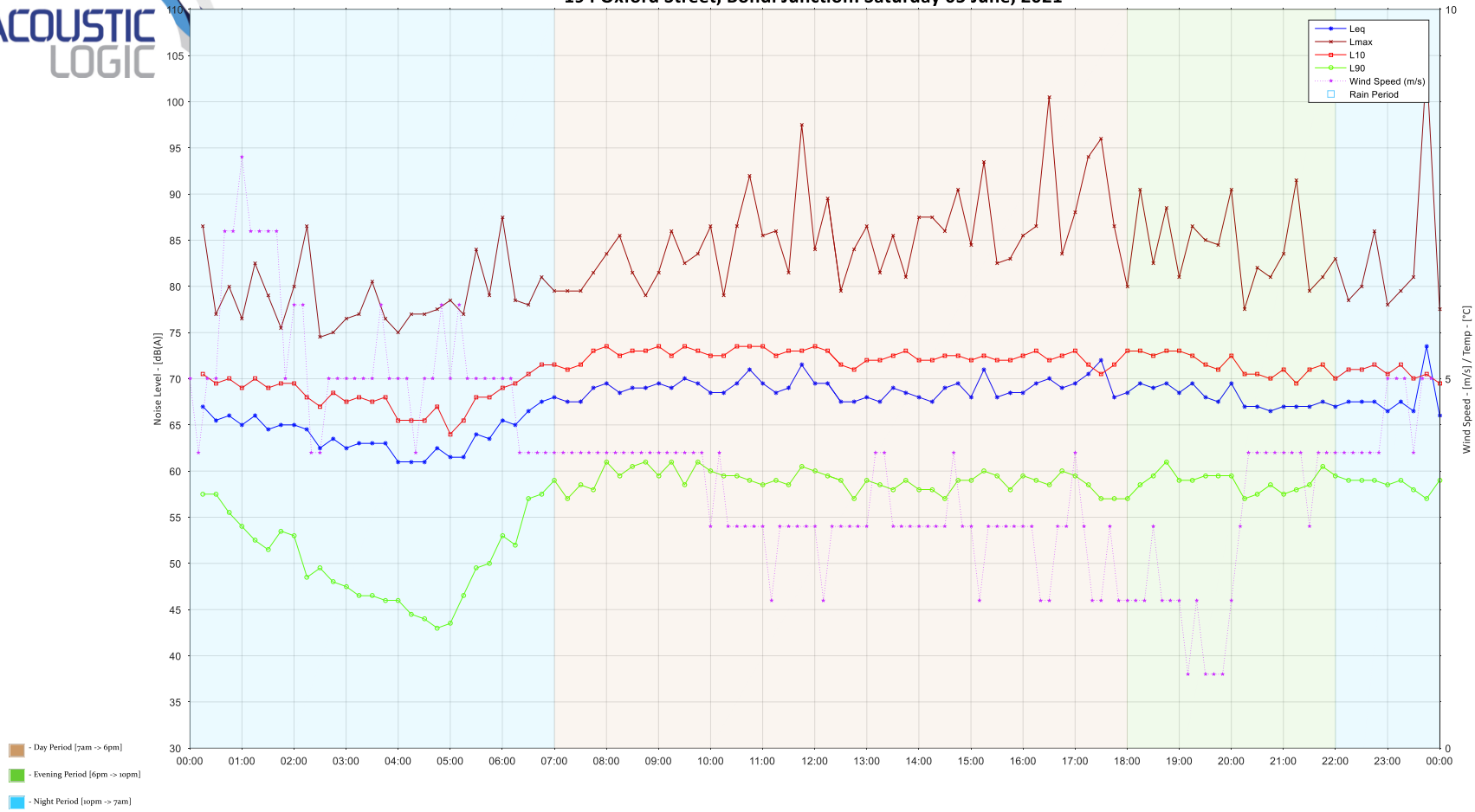


194 Oxford Street, Bondi Junction: Friday 04 June, 2021

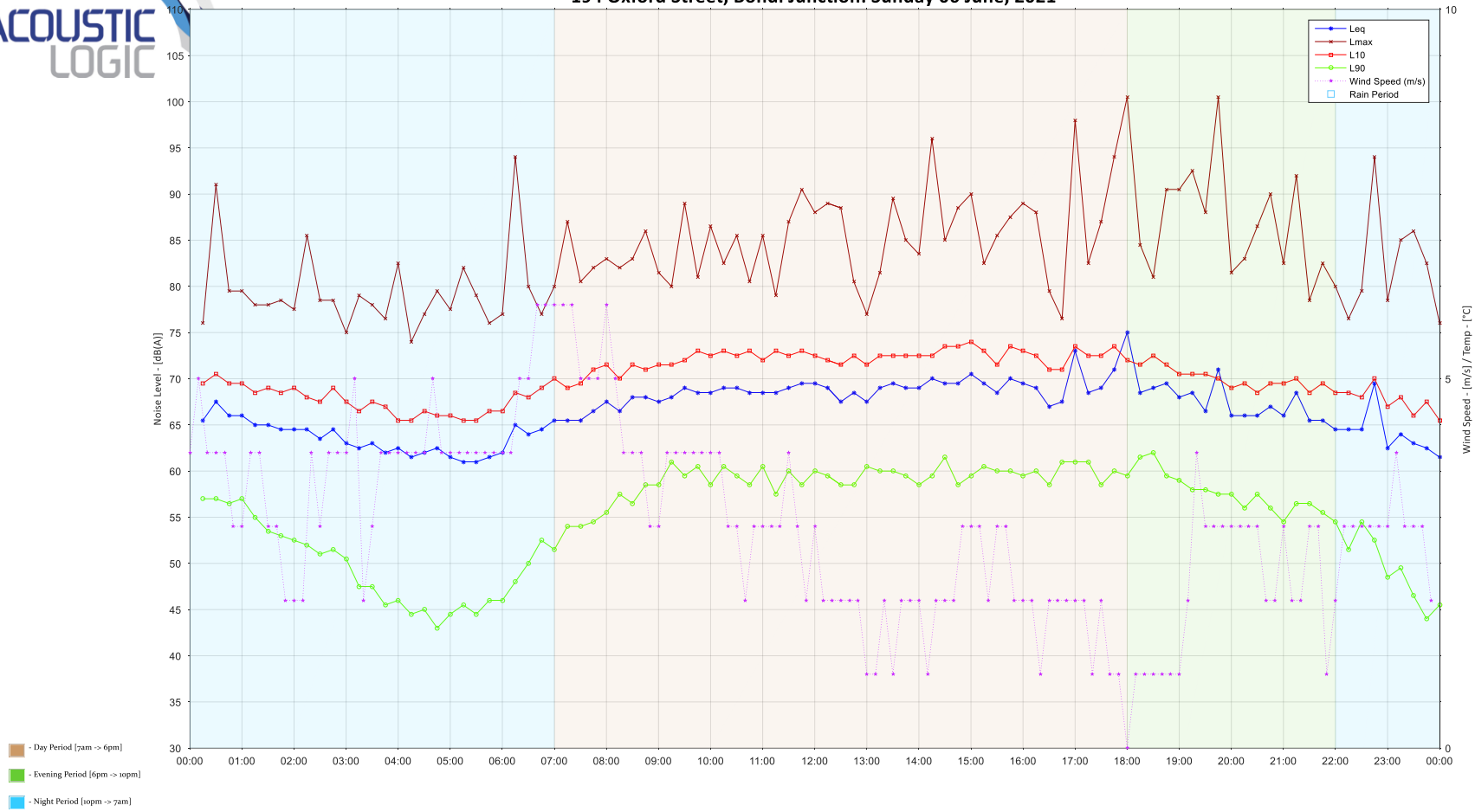




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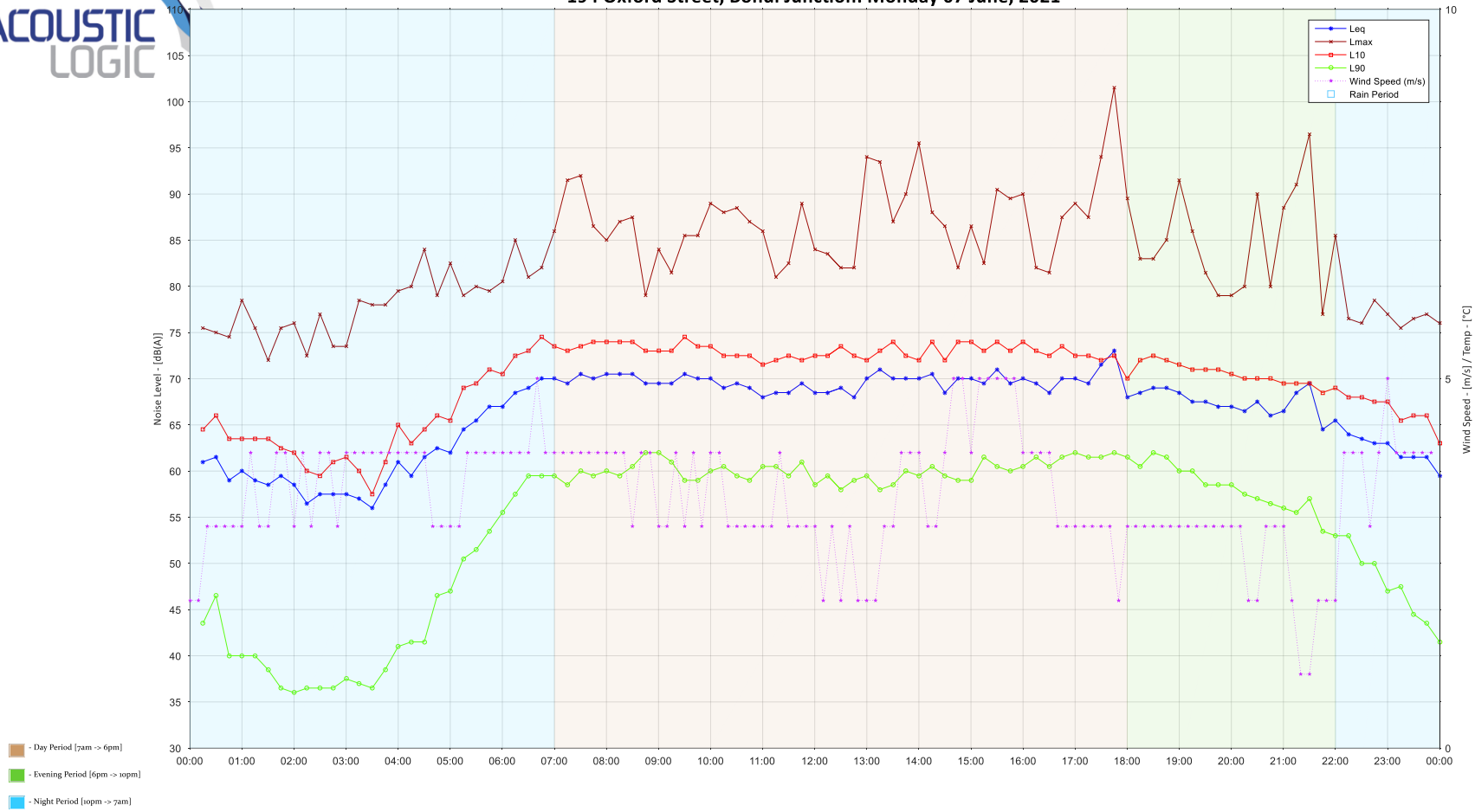


### 194 Oxford Street, Bondi Junction: Sunday 06 June, 2021



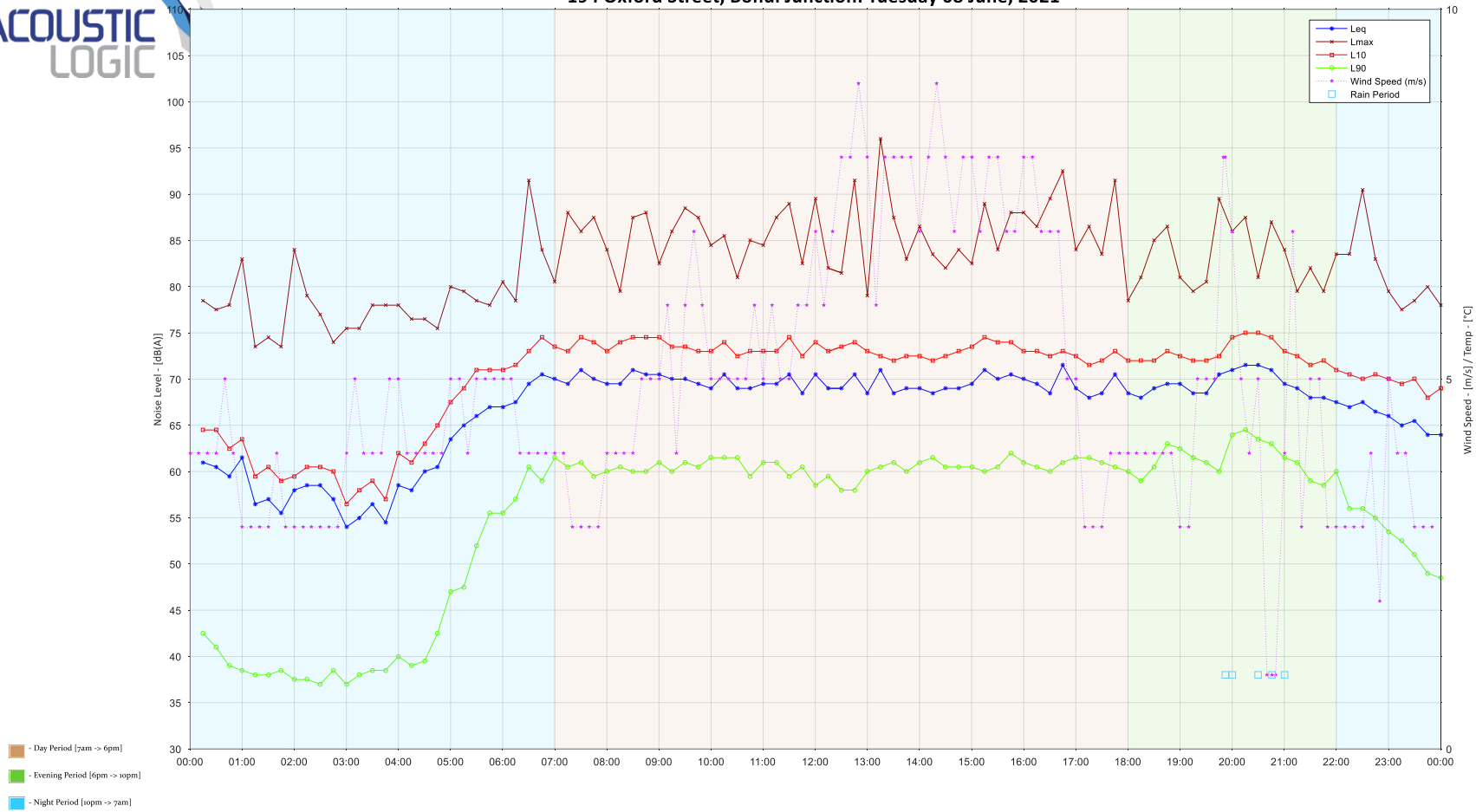


### 194 Oxford Street, Bondi Junction: Monday 07 June, 2021



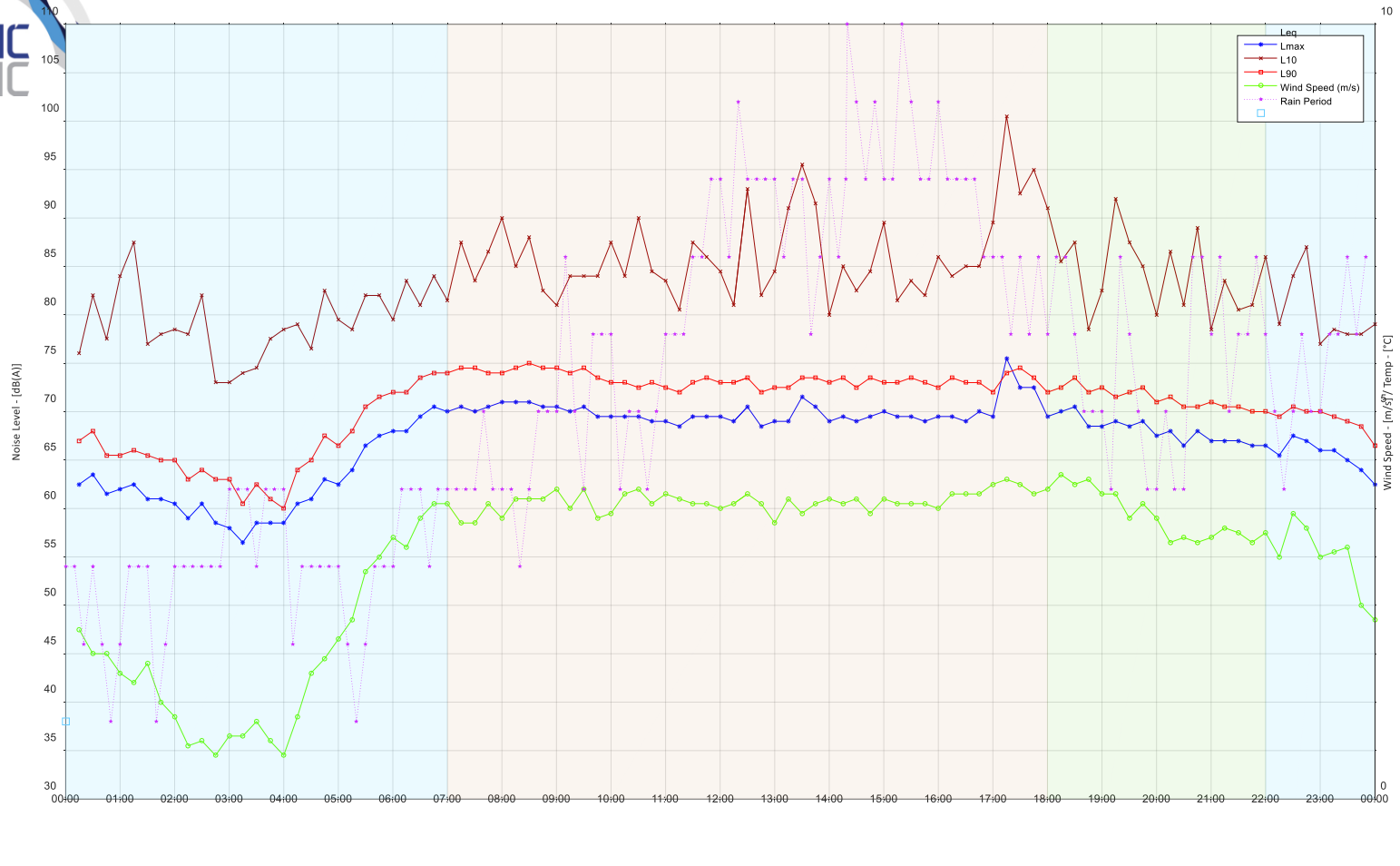


### 194 Oxford Street, Bondi Junction: Tuesday 08 June, 2021



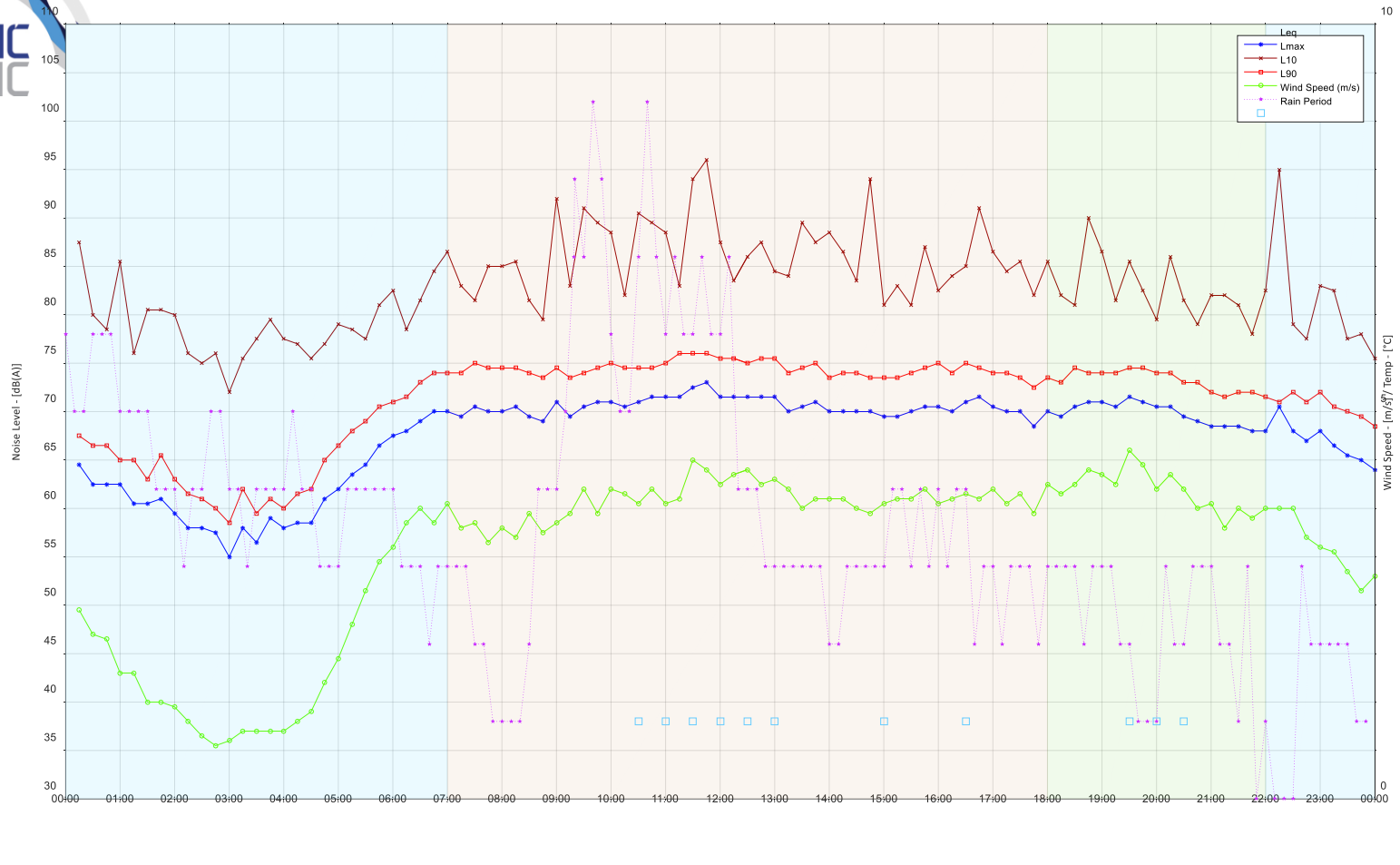


### 194 Oxford Street, Bondi Junction: Wednesday 09 June, 2021



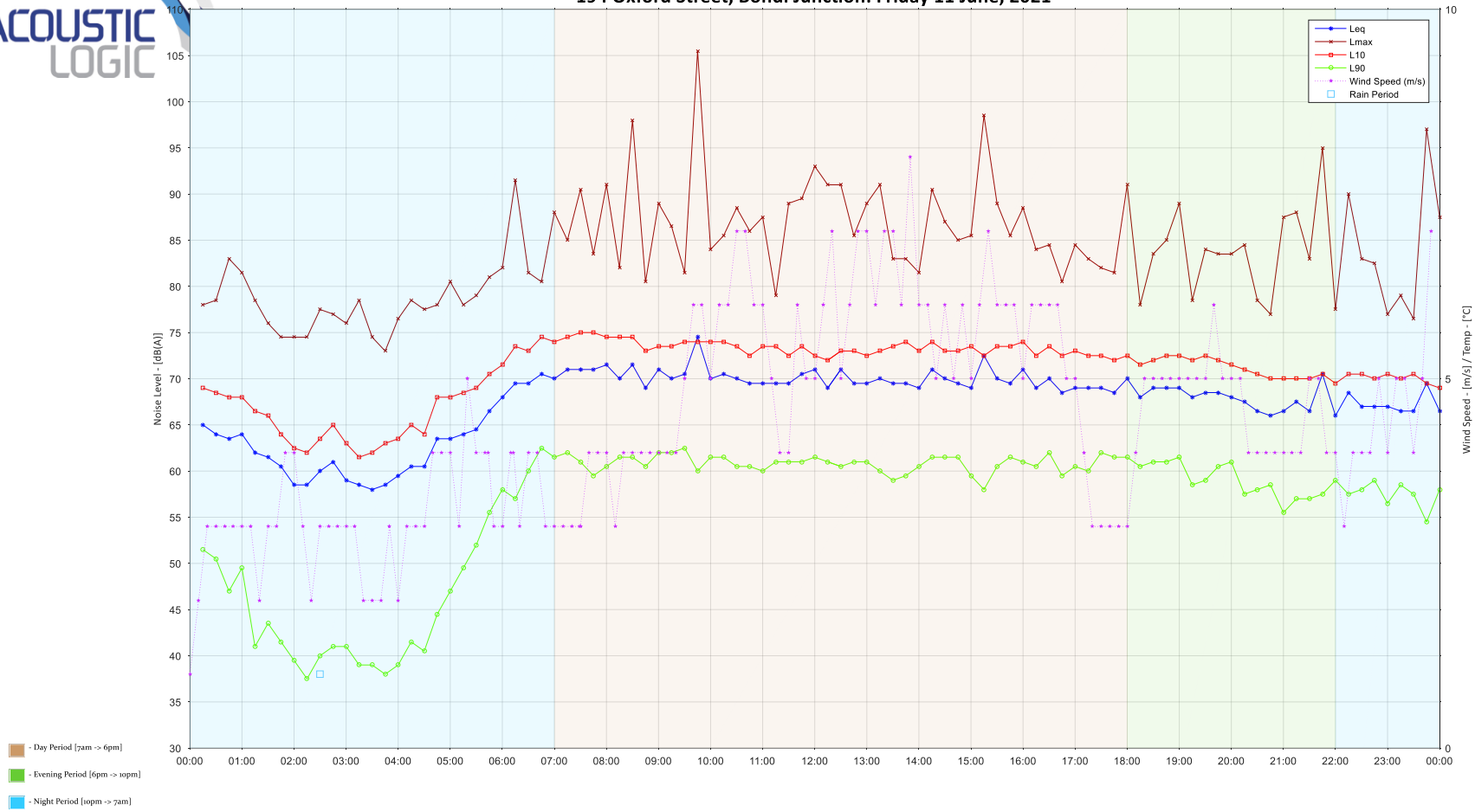


### 194 Oxford Street, Bondi Junction: Thursday 10 June, 2021



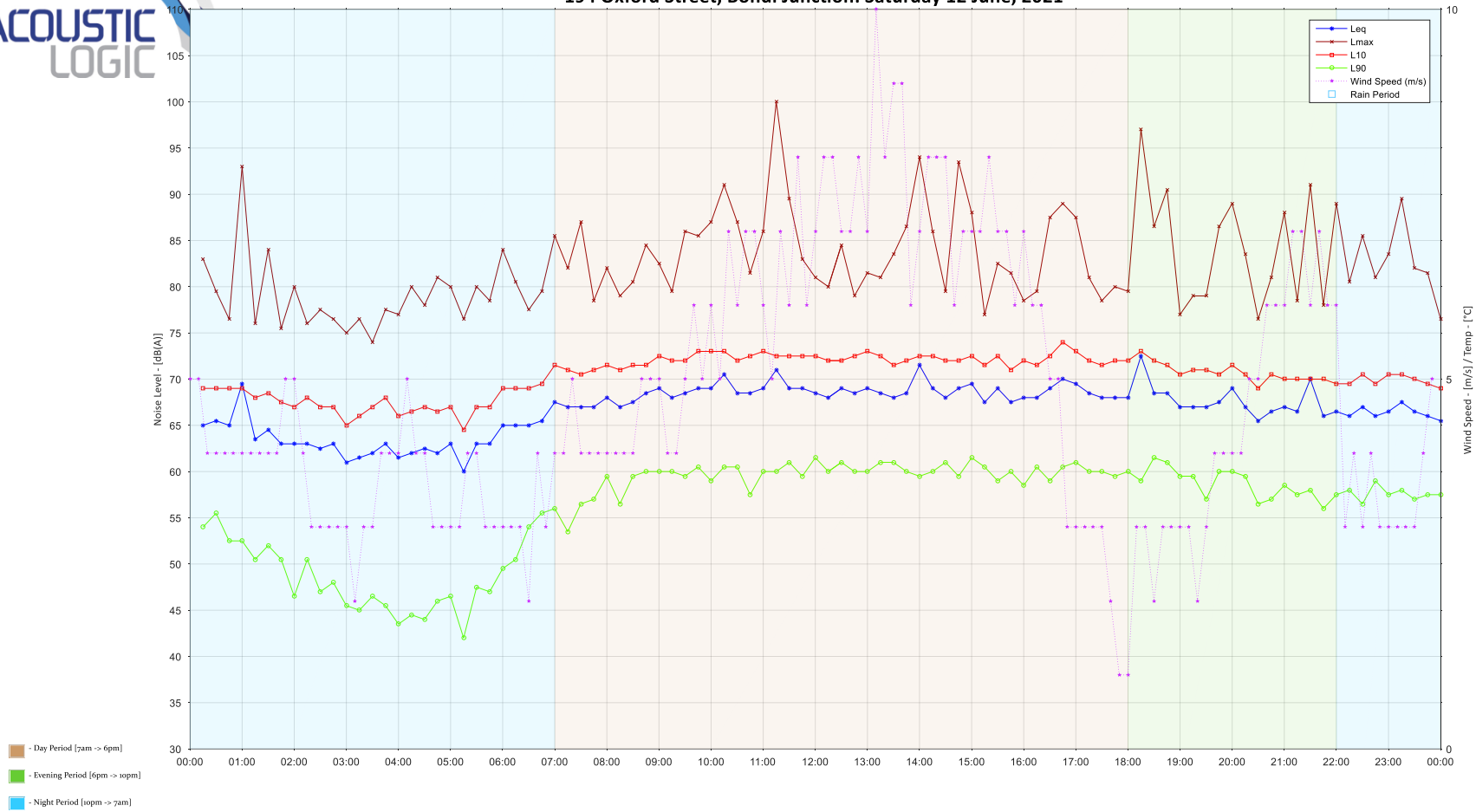


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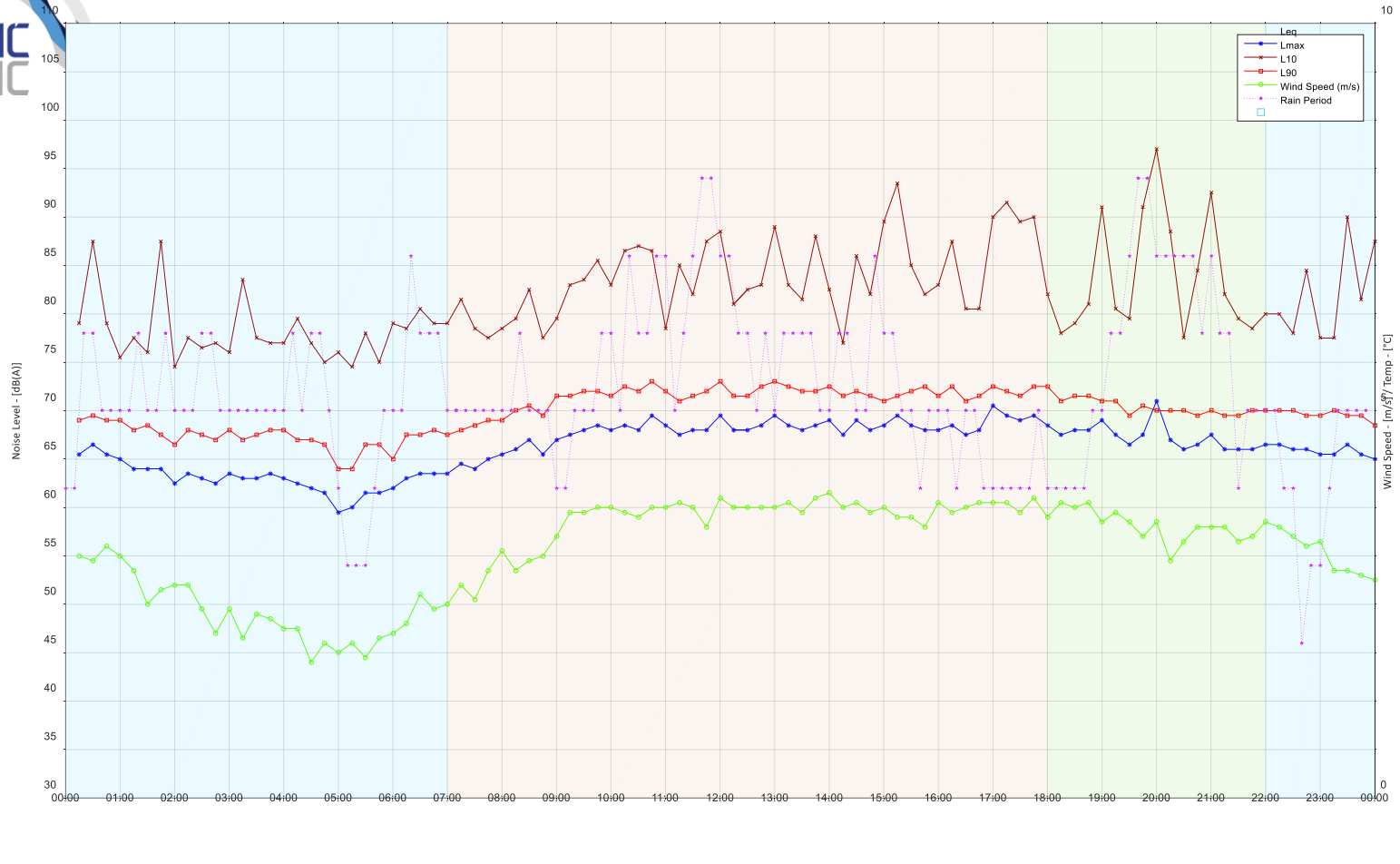


### 194 Oxford Street, Bondi Junction: Saturday 12 June, 2021

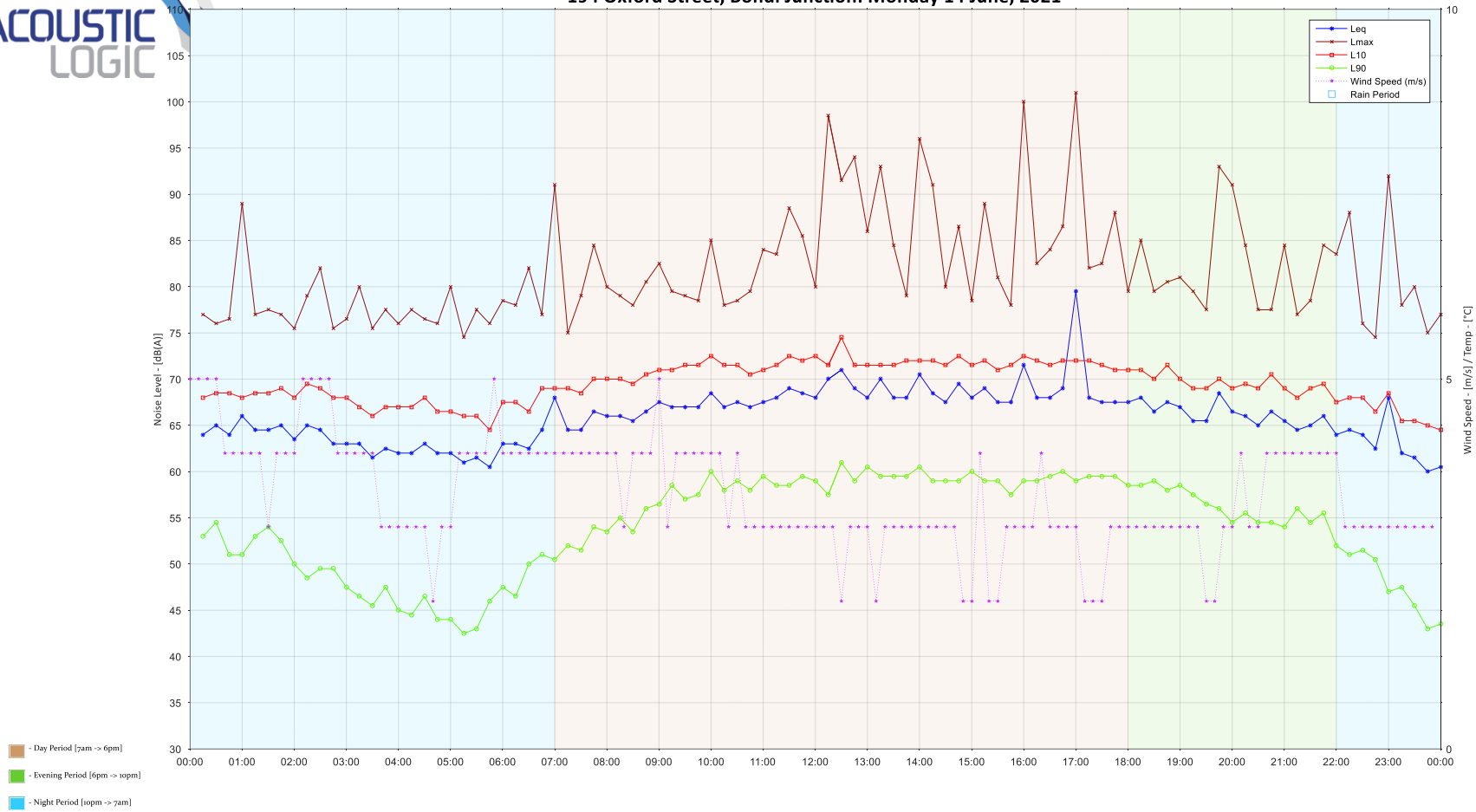




### 194 Oxford Street, Bondi Junction: Sunday 13 June, 2021



### 194 Oxford Street, Bondi Junction: Monday 14 June, 2021





### 194 Oxford Street, Bondi Junction: Tuesday 15 June, 2021

