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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed mixed-use development to be constructed at 1-11 Oxford Street, Paddington.

This document addresses noise impacts associated with traffic noise from Oxford Street and South Dowling Street.

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

- City of Sydney Council Development Control Plan (+DCP) 2012;
- NSW Department of Planning's – '*Developments near Rail Corridors or Busy Roads – Interim Guideline*';
- NSW Department of Planning and Environment's document – '*State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007*';
- Australian and New Zealand AS/NZS 3671:1989 '*Acoustics—Road traffic noise intrusion—Building siting and construction*';
- Australian and New Zealand AS/NZS 2107:2000 '*Recommended design sound levels and reverberation times for building interiors*'; and
- NSW, Environmental Protection Agency document *Noise Policy for Industry (NPfI)* – 2017.

This assessment has been conducted using Tonkin Zulaikha Greer's architectural drawings for, see details below.

Table 1 – Architectural Drawing List

Drawing Number	Revision	Drawing Title	Date
PP-02	A	Basement 02 Plan	12/11/2018
PP-03	A	Basement 01 Plan	
PP-04	A	Ground Floor Plan	
PP-05	A	First Floor Plan	
PP-06	A	Second Floor Plan	
PP-07	A	Third Floor Plan	
PP-08	A	Fourth floor Plan	
PP-09	A	Fifth Floor Plan	
PP-10	A	Sixth Floor Plan	
PP-11	A	Roof Plan	
PP-14	A	North Elevation	
PP-15	A	Western Elevation	

2 SITE DESCRIPTION

The proposed development will be seven stories high, with two basement levels. The basement levels will accommodate building and staff facilities, as well as a loading bay, with turn table, for delivery and rubbish trucks. The entrance to the loading bay is located on ground floor, off South Dowling Street at the rear of the development. The first floor will accommodate the hotel's lobby area and main entrance, as well as multiple retail spaces. Levels one through to six will accommodate hotel rooms, with a food and beverage facility located on the top storey (level 7).

Acoustic investigation has been carried out by this office in regard to the developments surrounding the proposed development, which has been detailed below:

- Oxford Street to the north-east, further this are existing multi-storey commercial buildings.
- South Dowling Street to the north-west, further this are existing multi-storey commercial buildings.

Oxford Street carries a high volume of traffic, mostly light passenger traffic and state transit buses. South Dowling Street carries a low volume of traffic, mostly light passenger traffic.

The nearest noise sensitive receivers around the project site include:

- Receiver 1 – Multistorey commercial buildings located at 2-20 Oxford Street, Paddington, situated across Oxford Street to the north-east of the project site;
- Receiver 2 – Multistorey residential development located at 13-15 Oxford Street, Paddington, adjoining the project site to the east;
- Receiver 3 – Residential townhouse complex located along Marshall Street and Rose Terrace, Paddington, situated to the south of the project site;
- Receiver 4 – Multistorey commercial buildings located at 319-331 South Dowling Street, Darlington, situated across South Dowling Street to the west of the project site;
- Receiver 5 – Beauchamp Hotel located at 267 Oxford Street, Darlington situated across South Dowling Street to the north-west of the project site;

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



- Unattended Noise Monitor
- Attended Noise Measurement

Figure 1: Site Survey and Monitoring Positions
Sourced from SixMaps NSW 2018

- Residential Receiver
- Commercial Receiver

3 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment is categorised by high background noise levels during the day and evening due to traffic movements along Oxford Street. Low background noise levels during the night as most of the volume of traffic have finished for the day.

Acoustic monitoring was conducted at the site to establish the background noise levels which will be used as basis for this assessment.

3.1 ENVIRONMENTAL 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.

3.2 BACKGROUND NOISE LEVELS

Background noise levels which will be used as a basis for this assessment are detailed in the following sections.

3.2.1 Measurement Equipment

Unattended noise monitoring was conducted using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning 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.

Attended short term measurements of traffic noise which 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.

3.2.2 Measurement Location

An unattended noise monitor was installed on level 2 of the existing building, above the retail awning on ground floor. The monitor was 4 meters from the kerb, 7 meters above ground and had full view of Oxford Street. For a detailed location refer to Figure 1.

Attended noise measurements were at the following locations, see Figure 1 for marked locations):

4. Rose Terrace - Background noise measurement was conducted between Marshall Street and Rose Terrace, within the middle of the neighbouring residential townhouses. The measurement was conducted between the hours of 10pm and 7am, night time.

5. Rose Terrace - Background noise measurement was conducted between Marshall Street and Rose Terrace, within the middle of the neighbouring residential townhouses. The measurement was conducted between the hours of 7am and 6pm, day time.

3.2.3 Measurement Period

Unattended noise monitoring was conducted from Wednesday the 23rd to Wednesday the 30th of May 2018.

Attended noise measurements 4 was undertaken between the hours of 7am and 6pm (Day Time) on Wednesday, 23rd of May 2018. Attended noise measurement 5 was undertaken between the hours of 10pm and 7am (Night Time) on Wednesday 21/11/2018.

3.2.4 Measured Background Noise Levels

The background noise levels established from the unattended noise monitoring are detailed in the Table below.

3.2.4.1 Unattended Noise Measurements

NSW EPA's 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.

Appendix 1 provides the results of the unattended noise monitoring. Weather affected data was excluded from the assessment. The processed Rating Background Noise Levels (lowest 10th percentile noise levels during operation time period) are presented in Tables below.

Table 2 – Unattended Noise Monitor, Rating Background Noise Level

Date	Measured Rating Background Noise Level dB(A)L ₉₀		
	Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
Wednesday, 23 May 2018	-	60	51
Thursday, 24 May 2018	63	60	50
Friday, 25 May 2018	63	61	52
Saturday, 26 May 2018	61	61	52
Sunday, 27 May 2018	58	58	50
Monday, 28 May 2018	63	59	50
Tuesday, 29 May 2018	63	59	51
Wednesday, 30 May 2018	63	60	-
Median	63	60	51

Table 3 – Attended Traffic Noise Measurements

Location	Period	Measured Background Noise Level dB(A)L ₉₀
4. Rose Terrace	Day (7am-6pm)	48
5. Rose Terrace	Night (10pm-7am)	40

3.2.4.2 Summarised Rating Background Noise Levels

Summarised rating background noise levels for each receiver are presented below.

Table 4 -Summarised Rating Background Noise Level

Location	Time of day	Rating Background Noise Level dB(A)L ₉₀
Project Site: <i>1-11 Oxford Street, Paddington</i>	Day	63
	Evening	60
	Night	51
Receiver 3: Rose Terrace	Day	48
	Night	40

4 EXTERNAL NOISE INTRUSION ASSESSMENT

Site investigation indicates that the major external noise sources around project site are traffic noise impacts from Oxford Street.

4.1 NOISE INTRUSION CRITERIA

A traffic noise intrusion assessment has been conducted based off the requirements of the following acoustic noise criteria/standards;

- City of Sydney Council Development Control Plan (DCP) 2012;
- NSW Department of Planning's – '*Developments near Rail Corridors or Busy Roads – Interim Guideline*';
- NSW Department of Planning and Environment's document – '*State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007*';
- Australian and New Zealand AS/NZS 3671:1989 '*Acoustics—Road traffic noise intrusion—Building siting and construction*'; and
- Australian and New Zealand AS/NZS 2107:2000 '*Recommended design sound levels and reverberation times for building interiors*'.

4.1.1 City of Sydney Council Development Control Plan (DCP) - 2012

Section 4.2.3.11: Acoustic Privacy

- (1) *"A Noise Impact Assessment prepared by a suitably qualified acoustic consultant may be required when submitting a development application for commercial and retail uses which may affect the acoustic privacy of the adjacent residential use.*
- (2) *Where necessary, a residential development is to include acoustic measures to reduce the impact of noise from external sources.*
- (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)."*

4.1.2 NSW Department of Planning and Environment's Document – 'Developments near Rail Corridors or Busy Roads – Interim Guideline' (Rail and Traffic Noise Intrusion)

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 L_{Aeq} 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."*

4.1.3 NSW Department of Planning and Environment's document – 'State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007'

RTA Map No. 16 of the traffic volume maps referenced by the SEPP (INFRASTRUCTURE) on the RTA website (see below), classifies the section of Oxford Street where the development is located adjacent to as a road where a noise intrusion assessment is recommended under clause 102 of the SEPP Infrastructure 2007. See RTA average annual daily road traffic volume map number 5 and the approximate location of the site below.

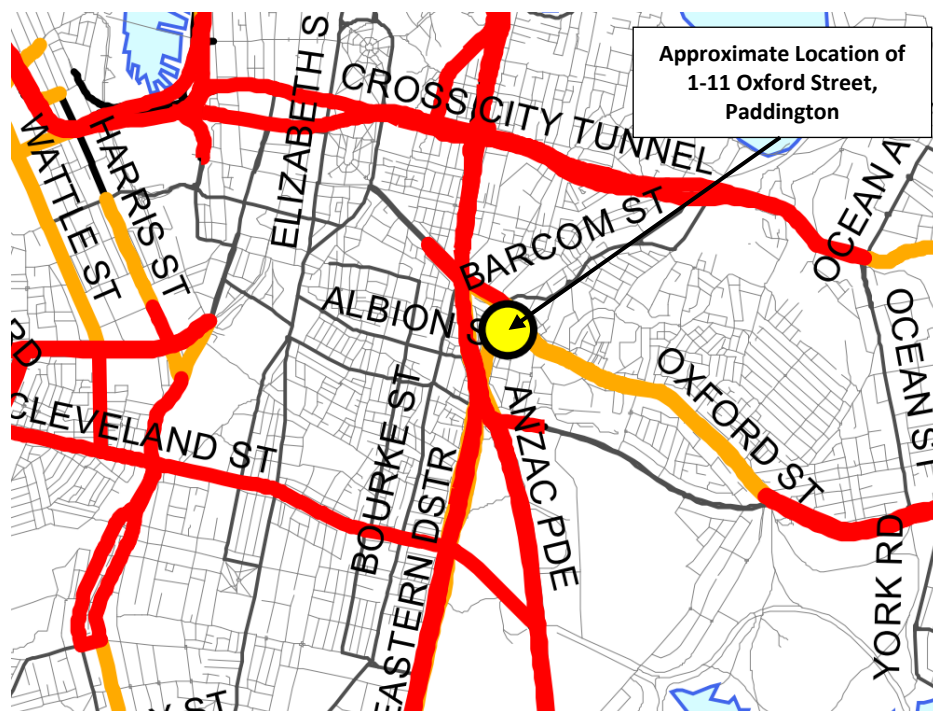


Figure 2 – RTA Map No. 16 and Approximate Location of Proposed Development

Clause 102

- 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 L_{Aeq} 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."

4.1.4 Australian and New Zealand AS/NZS 3671:1989 'Acoustics—Road traffic noise intrusion—Building siting and construction' (Traffic Noise Intrusion)

Australian Standard AS 3671-1989 notes the following in relation to traffic noise:

- Internal noise levels should be determined in accordance with the relevant standard.
- Australian Standard AS/NZS 2107:2016 'Acoustics – Recommended design sound levels and reverberation times for building interiors', is the industry adopted standard.
- A suitable descriptor should be adopted relevant to the use of the development. As AS2107:2016 adopts the L_{eq} descriptor, ALC shall also use this descriptor.
- AS3671 does not specifically recommend a time interval. On this basis, ALC have adopted the interval used by the EPA Road Noise Policy for main/arterial roads, that being:
 - Day – 7am to 10pm (15 hour); and
 - Night – 10pm to 7am (9 hour).

Internal noise levels have been selected in accordance with AS 2107:2016.

4.1.5 Australian and New Zealand AS/NZS 2107:2016 'Recommended design sound levels and reverberation times for building interiors' (Rail and Traffic Noise Intrusion)

Australian Standard AS 2107-2016: 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 AS 2107-2016, gives the following maximum internal noise levels for commercial buildings and residential buildings near major roads.

Table 5 – Recommended Design Sound Level

Space /Activity Type	Recommended Maximum Design Sound Level dB(A) L_{eq}
Living Areas	35-45 dB(A) L_{eq}
Sleeping Areas	35-40 dB(A) $L_{eq(nighttime)}$
Bathrooms	45-55 dB(A) L_{eq}
Hotel Bars	< 50 dB(A) L_{eq}
Foyers & Reception	45-50 dB(A) L_{eq}
Cafe	40-50 dB(A) L_{eq}
Small Retail	< 50 dB(A) L_{eq}

4.1.6 Summary of Criteria

The governing project criteria is presented in the table below.

Table 6 – Summary of Internal Noise Level Criteria

Location / Space	Traffic Noise Intrusion Criteria		
	SEPP 2007	City of Sydney D.C.P	Australian Standard 2107:2016
Bedroom	35 dB(A) $L_{eq}(9\text{hour})$	35 dB(A) $L_{eq}(\text{worst } 1\text{hr})$	40 dB(A) $L_{eq}(9\text{hour})$
Habitable Space	40 dB(A) $L_{eq}(15\text{hour})$	45 dB(A) $L_{eq}(\text{worst } 1\text{hr})$	45 dB(A) $L_{eq}(15\text{hour})$
Bathrooms	-	-	45-55 dB(A) $L_{eq}(\text{when in use})$
Hotel Bars	-	-	< 50 dB(A) $L_{eq}(\text{when in use})$
Foyers & Reception	-	-	45-50 dB(A) $L_{eq}(\text{when in use})$
Cafe	-	-	40-50 dB(A) $L_{eq}(\text{when in use})$
Small Retail	-	-	< 50 dB(A) $L_{eq}(\text{when in use})$

4.2 EXTERNAL NOISE MEASUREMENTS

4.2.1 Measurement Equipment

Unattended noise monitoring was conducted using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning 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.

Attended short term measurements of traffic noise which 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.

4.2.2 Measurement Location

An unattended noise monitor was installed on level 2 of the existing building, above the retail awning on ground floor. The monitor was 4 meters from the kerb, 7 meters above ground and had full view of Oxford Street. For a detailed location refer to Figure 1.

Attended noise measurements were at the following locations, see Figure 1 for marked locations):

1. Oxford Street, Ground - Noise measurement conducted on Oxford Street, along the north-eastern side of the site. The geophone had a 180° view of the roadway, and was positioned 1-meter from the kerb at a height of 1.5 meters.

2. Oxford Street, Level 2 - Noise measurement was conducted on Oxford Street, outside a level 2 window on the north-eastern side of the building. The geophone had a 180° view of the roadway, and was positioned 4-meter from the kerb at a height of 8 meters.

3. South Dowling Street - Noise measurement was conducted on South Dowling Street, along the north-western side of the site. The geophone had a 180° view of the roadway, and was positioned 3-meter from the kerb at a height of 1.5 meters.

4. Rose Terrace - Noise measurement was conducted between Marshall Street and Rose Terrace, within the middle of the neighbouring residential townhouses. The geophone had a 90° view of each of the roadways, and was positioned 4-meter from each kerb at a height of 1.5 meters.

4.2.3 Measurement Period

Unattended noise monitoring was conducted from Wednesday the 23rd to Wednesday the 30th of May 2018.

Attended noise measurements 1-4 were undertaken between the hours of 4:30pm and 5:30pm (Traffic Peak) on Wednesday, 23rd of May 2018.

4.2.4 Measured Traffic Noise Measurements

Attended and Unattended noise measurements have been summarised below for each location.

Table 7 – Unattended Traffic Noise Measurements (9Hr and 15Hr)

Date	Measured Traffic Noise Level dB(A) _{Leq}	
	Day (7am-10pm)	Night (10pm-7am)
Wednesday, 23 May 2018	-	69
Thursday, 24 May 2018	74	69
Friday, 25 May 2018	73	71
Saturday, 26 May 2018	73	70
Sunday, 27 May 2018	71	67
Monday, 28 May 2018	73	69
Tuesday, 29 May 2018	72	69
Wednesday, 30 May 2018	73	-
Logarithmic Average	73	69

Table 8 – Unattended Traffic Noise Measurements (Worst 1 Hr)

Date	Measured Traffic Noise Level dB(A) _{Leq}	
	Day (Worst 1hr)	Night (Worst 1hr)
Wednesday, 23 May 2018	-	77
Thursday, 24 May 2018	73	75
Friday, 25 May 2018	72	75
Saturday, 26 May 2018	75	72
Sunday, 27 May 2018	75	75
Monday, 28 May 2018	70	74
Tuesday, 29 May 2018	71	75
Wednesday, 30 May 2018	71	-
Logarithmic Average	75	72

Table 9 – Attended Traffic Noise Measurements

Location	Measured Traffic Noise Level dB(A) _{Leq} (15min)
1. Oxford Street, Ground	74
2. Oxford Street, Level 2	75
3. South Dowling Street	69
4. Rose Terrace (Traffic Peak)	52

Note: Attended Traffic measurements were taken during the afternoon peak (4:30pm to 5:30pm) on Wednesday the 23rd of May 2018.

4.3 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.

4.4 RECOMMENDED CONSTRUCTIONS

4.4.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-Ion type acoustic seals. **(Mohair Seals are unacceptable)**.

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

The recommended constructions are listed in the table below.

Table 10 – Recommended Glazing Construction

Level	Space	Recommended Construction	Acoustic Seals
Ground Floor	Foyer	6.38mm Laminate	Yes
	Lobby	6.38mm Laminate	Yes
	Restaurant	10.38mm Laminate	Yes
Level 1-2	Hotel Rooms facing Oxford Street	10.38mm Laminate*	Yes
Level 3	Hotel Rooms facing Oxford Street	12.38mm Laminate	Yes
Level 4-5	Hotel Rooms facing Oxford Street	12.38mm Laminate	Yes
	Corner room with curved facade	10.38mm Laminate / 100mm Airgap / 6mm Float	Yes
Level 1-3	Hotel Rooms facing South Dowling Street	10.38mm Laminate*	Yes
Level 1-5	Hotel Rooms facing the rear	6.38mm Laminate	Yes
All Remaining Areas		5mm Toughened	Yes

* - in the event the glazing cannot be upgraded within the level 1 and 2 heritage façade, a second layer of 6mm thick glazing will need to be fitted internally, leaving a 100mm airgap between it and the existing window.

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 11 for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 11 - Minimum R_w of Glazing (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
5mm Toughened	28
6mm Toughened	29
6.38mm Laminate	31
10.38mm Laminate	35
12.38mm Laminate	37
10.38mm Laminate / 100mm Airgap / 6mm Float	46

4.4.2 External Lining

External roof/wall constructions which will be constructed from concrete or masonry elements will not require any further acoustic upgrading. External roof constructions which will be constructed from light-weight materials will require further acoustic upgrading. See below table for recommended light-weight construction.

Table 12 – Light Weight External Construction

Space	Internal Lining	Construction	External Lining
Hotel Room	2x13mm SoundChek or Fyrcek Plasterboard	75mm Min Hebel / Stud wall construction with 75mm thick 11kg/m ³ glasswool insulation	External 3mm Alucobond or copper lining as per architectural detail.
All Other Areas	1x13mm Plasterboard		

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

4.4.3 Entry Doors

Entry doors will be via internal corridors and as such constructions will be formulated pursuant to the Building Code of Australia.

4.4.4 Mechanical Ventilation

With respect to natural ventilation of the dwelling, the NSW Department of Planning document “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 (i.e. – allowable level in bedrooms becomes 45dB(A), and 50dB(A) in living rooms).

All living spaces along Oxford Street and South Dowling Street of the development will require to have their windows closed in order to meet acoustic requirements. A mechanical engineer is to confirm if supplementary ventilation (to meet Australian Standard AS1668.2 requirements) will be required to these rooms.

5 NOISE EMISSION ASSESSMENT

Noise emissions from the site have been assessed for noise emitted from base building mechanical plant and patron activity.

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

- NSW Department of Industry Liquor & Gaming Criteria 2017;
- City of Sydney Development Control Plan (DCP) 2012; and
- NSW, Environmental Protection Agency document *Noise Policy for Industry (NPfI)* – 2017.

5.1 NOISE CRITERIA

5.1.1 NSW Department of Industry Liquor & Gaming Criteria 2017

The Liquor & Gaming provides guidelines for assessing noise emissions due to activity noise including people talking, functions and music. The guidelines are:

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

5.1.2 City of Sydney Council Development Control Plan (DCP) 2012

The criteria set out below are those that, in our experience, are typically adopted by City of Sydney Council.

Activity Noise to Residential Areas

Noise from the use when assessed as an $L_{A10(15mins)}$ enters any residential use through an internal to internal transmission path is not to be exceeded the existing internal $L_{A90(15mins)}$ (from external sources excluding the use) in any Octave Band Centre Frequency (31.5Hz to 8kHz inclusive) when assessed within a habitable room at any affected residential use between 7am and 12midnight.

Activity Noise to Commercial Areas

The $L_{A10(15 mins)}$ noise level emitted from the use must not exceed the background noise level ($L_{A90(15 mins)}$) 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.

Due to access restrictions, attended measurements of background noise levels within the surrounding premises could not be conducted. Instead measurements of the background noise levels were taken externally in order to assess noise to the building facade. In our experience, if the above criteria is met at the nearest external façade of the receiver, this criteria is also achieved internally.

5.1.3 NSW EPA Noise Policy for Industry (NPfI) - 2017

The NPfI provides guidelines for assessing noise impacts from developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The NPfI has two requirements which both have to be complied with, namely an intrusiveness criterion and an amenity criterion.

5.1.3.1 Intrusiveness Criterion

Section 2.3: Project Intrusiveness Noise Level

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

Table 13 – NPfI Intrusiveness Criteria

Receiver	Time of day	Background Noise Level dB(A) L_{90}	Intrusiveness Criteria (Background + 5dB(A))
Residential Receiver 2	Day (7am - 6pm)	63	68
	Evening (6pm - 10pm)	60	65
	Night (10pm - 7am)	51	56
Residential Receiver 3	Day (7am - 6pm)	48	53
	Night (10pm - 7am)	40	45

5.1.3.2 Amenity Criterion

Section 2.4: Amenity Noise Levels and Project Amenity Noise Levels

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

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

Table 2.2 on page 11 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. The subject site has been assessed against noise emission criteria in accordance with the ‘urban’ category.

Table 14 – NPfl Amenity Criteria

Type of Receiver	Time of day	Recommended Acceptable Noise Level dB(A) L_{eq}
Residential (urban)	Day	58
	Evening	48
	Night	43
Commercial	When in Use	63

5.1.4 Criteria Summary

5.1.4.1 Noise Emissions from Patrons and Music

The following criteria applies to the nearest external façade of the most sensitive receiver. If the below criteria is met, the criteria detailed in section 5.1.2 is sequentially achieved internally

Table 15 – Noise Emission Criteria at Receiver 2 (Externally)

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-wt
Day ($dB_{LA10,15min}$)	69	69	64	61	59	59	55	48	40	63
Evening ($dB_{LA10,15min}$)	67	67	61	59	56	57	52	45	37	60
Night ($dB_{LA10,15min}$)	57	57	52	49	47	47	43	36	28	51

Table 16 – Noise Emission Criteria at Receiver 3 (Externally)

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-wt
Day ($dB_{LA10,15min}$)	59	54	47	43	44	40	32	23	59	48
Evening ($dB_{LA10,15min}$)	56	56	51	44	40	41	37	29	20	45
Night ($dB_{LA10,15min}$)	51	51	46	39	35	36	32	24	15	40

Table 17 – Noise Emission Criteria at Commercial Receivers (Externally)

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-wt
When in Use ($dB_{LA10,15min}$)	66	66	73	68	61	57	58	54	46	66

5.1.4.2 Noise Emission from Building Services

Receiver	Time of day	Noise Emission Criteria (Externally) dB(A) L_{eq}
Residential Receiver 2	Day (7am - 6pm)	58
	Evening (6pm - 10pm)	48
	Night (10pm - 7am)	43
Residential Receiver 3	Day (7am - 6pm)	53
	Evening (6pm - 10pm)	48
	Night (10pm - 7am)	40
Commercial Receiver	When in use	63

5.2 NOISE EMISSION ASSESSMENT

5.2.1 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 to the closest residential receiver should comply with the requirements of section 5.1.

5.2.2 Loading Dock Noise

The proposed loading dock is located within the second level basement, which is completely enclosed by masonry walls except entry door which is a roller shutter. The roller shutter entry is located off South Dowling Street on the ground floor. A Truck lift then transports the idling truck to basement level 2. The nearest noise receiver for this loading dock entry is the hotel rooms located directly above and residential receiver 2.

The potential noise sources associated with the loading dock are listed in table below along with the noise emission levels. The emission levels have been obtained from noise monitoring carried out at similar retail loading dock facilities. Noise measurements were obtained using a Norsonics SA 110 with (serial number 24692) or CEL-593 Type 1 sound level analysers (serial number C1. T 116962), set to fast response. The sound level analysers were calibrated before and after the measurements using a Rion NC-73 calibrator. No significant drift was recorded.

Assessment has been based on rigid trucks up to 6m in length and the loading dock operation during day and evening only.

Table 18 - Noise Source Emission Levels

Noise Source	Sound Power Level dB(A)	Type of Noise Source
Truck Idle	99	Quasi-Steady
Trucks Manoeuvring	103	Intermittent
Truck reversing alarm	108 including 5 dB(A) tonality correction	Intermittent
Truck Air Brakes	114	Intermittent
Dock Leveller	88	Intermittent
Loading Dock Door Operation	85	Intermittent
Waste Truck compacting load	103	Quasi-Steady

5.2.2.1 Recommendations

Recommended acoustic treatments of loading dock are below:

- No loading dock operation between 10pm and 7am Monday to Saturday or 10pm to 8am Sunday or public holidays.
- To control noise emission to the hotel rooms above, the slab structure between the first floor and loading areas shall be minimum 250mm thick concrete slab.

5.2.3 Ground Floor Restaurant

A larger open plan restaurant is located on ground floor, with views onto Oxford Street. The restaurant is 260 square meters. The worst affected receiver during night time operations will be the residential receivers on Oxford Street (Receiver 2).

For the purpose of this assessment it has been assumed:

- the restaurant is at full capacity with background music playing
- The internal sound pressure level is 80dB(A)Leq. This noise level is based on ALC experience and assumes a noise absorptive ceiling has been installed as per recommendations detailed in section 5.2.3.1.

Table 19 – Predicted Restaurant Noise Emission to Receiver 2 (Externally)

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-wt
Predicted Noise Level (dBL_{A10,15min})	19	19	22	19	21	17	10	-11	-26	21
Night (dBL_{A10,15min})	57	57	52	49	47	47	43	36	28	51
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.2.3.1 Recommendations

Recommended acoustic treatments of the ground floor restaurant are below:

- Install 10.38mm Laminated glazing within all glazed elements along the Oxford Street façade.
- Background music is to not exceed 65dB(A)Leq sound pressure level.
- Keep all doors closed, with the exception of ingress and egress, between the hours of 10pm and 7am.
- Noise absorptive ceiling to be installed within the restaurant area. It is recommended a perforated ceiling with noise absorptive material installed behind. Absorptive material to have an NRC equal or greater than 0.7.

5.2.4 Basement 1 Courtyard

A courtyard is proposed to be constructed within the shell of the building. This area is open to the elements but is screened on every side from basement 01 through to the third level by the proposed building and rear existing façade (which is proposed to be retained).

The area is proposed to be used as a breakout space for the basement level venue 01 space and ground floor restaurant. The worst affected receiver during night time operations will be the residential receivers on South Dowling Street (Receiver 3).

For the purpose of this assessment it has been assumed:

- the courtyard area is occupied by 100 patrons
- Each person will have a sound power level of 75dB(A)_{L10}, with 1 in every 2-people speaking. This is typical of people speaking with partially raised voice in an area with no background music.
- Recommendations outline in section 5.2.4.1 have been implemented.

Table 20 – Predicted Basement 1 Courtyard Noise Emission to Receiver 3 (At façade)

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-wt
Predicted Noise Level (dBL _{A10,15min})	26	26	32	31	35	32	25	16	2	36
Criteria Night (10pm-7am) (dBL _{A10,15min})	51	51	46	39	35	36	32	24	15	40
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.2.4.1 Recommendations

- Between the hours of 10:00pm and 7:00am:
 - No amplified or live music is to be played in the courtyard
 - Patrons are to be limited to a maximum of 100 people

5.2.5 Level 7, Food & Beverage

A Food and Beverage area, and potential Wellness Centre, is proposed to be constructed on level 7 of the hotel. This area is proposed to operate between the hours of 7:00am and 12:00am, with a maximum capacity of 150 people. The area will be enclosed with sliding glass doors. The worst affected receiver during night time operations will be the residential receivers on South Dowling Street (Receiver 3) and on Oxford Street (Receiver 2).

For the purpose of this assessment it has been assumed:

- the roof top area is at full capacity (150 patrons) with background music playing
- Each person will have a sound power level of 80dB(A)_{L10}, with 1 in every 2-people speaking. This is typical of people speaking with raised voice with background music.
- Recommendations outline in section 5.2.5.1 have been implemented

Table 21 – Predicted Level 7 F+B Area Noise Emission to Receiver 2 (At façade)

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-wt
Predicted Noise Level (dBL_{A10,15min})	37	37	43	40	44	38	30	19	5	44
Criteria Night (10pm-7am) (dBL_{A10,15min})	57	57	52	49	47	47	43	36	28	51
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 22 – Predicted Level 7 Internal F+B Area Noise Emission to Receiver 3 (At façade)

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-wt
Predicted Noise Level (dBL_{A10,15min})	29	29	35	32	35	30	22	11	-3	35
Criteria Night (10pm-7am) (dBL_{A10,15min})	51	51	46	39	35	36	32	24	15	40
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.2.5.1 Recommendations

Recommended acoustic treatments of the Level 7 F+B Area:

- Install 6.38mm Laminated glazing within all glazed elements around the roofed F+B area.
- The level 7 external deck area is to have a minimum 1-metre high solid balustrade around the perimeter.
- Background music is to not exceed 65dB(A)_{Leq} sound pressure level.
- Between the hours of 10:00pm and 7:00am:
 - All patrons are to move to the roofed area and all glazed sliding doors are to be closed.
 - OR
 - The maximum number of patrons within the entire level 7 area is to be limited to 80 people.

6 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed mixed-use development to be located at 1-11 Oxford Street, Paddington.

Provided that the treatments set out in section 4.4 of this report are employed, internal noise levels shall comply with the requirements below:

- City of Sydney Council Development Control Plan (DCP) 2012;
- NSW Department of Planning's – '*Developments near Rail Corridors or Busy Roads – Interim Guideline*';
- NSW Department of Planning and Environment's document – '*State Environmental Planning Policy (SEPP) (INFRASTRUCTURE) 2007*';
- Australian and New Zealand AS/NZS 3671:1989 '*Acoustics—Road traffic noise intrusion—Building siting and construction*'; and
- Australian and New Zealand AS/NZS 2107:2000 '*Recommended design sound levels and reverberation times for building interiors*'.

External noise emissions criteria have been setup in this report to satisfy the requirements from the following documents;

- NSW Department of Industry Liquor & Gaming Criteria 2017;
- City of Sydney Development Control Plan (DCP) 2012; and
- NSW, Environmental Protection Agency document *Noise Policy for Industry (NPfI)* – 2017.

Recommendations have been provided in section 5 to ensure noise emission comply with the requirements of the above noise emission criteria.

Noise emission from plant service project building will be determined at CC stage.

Please contact us should you have any further queries.

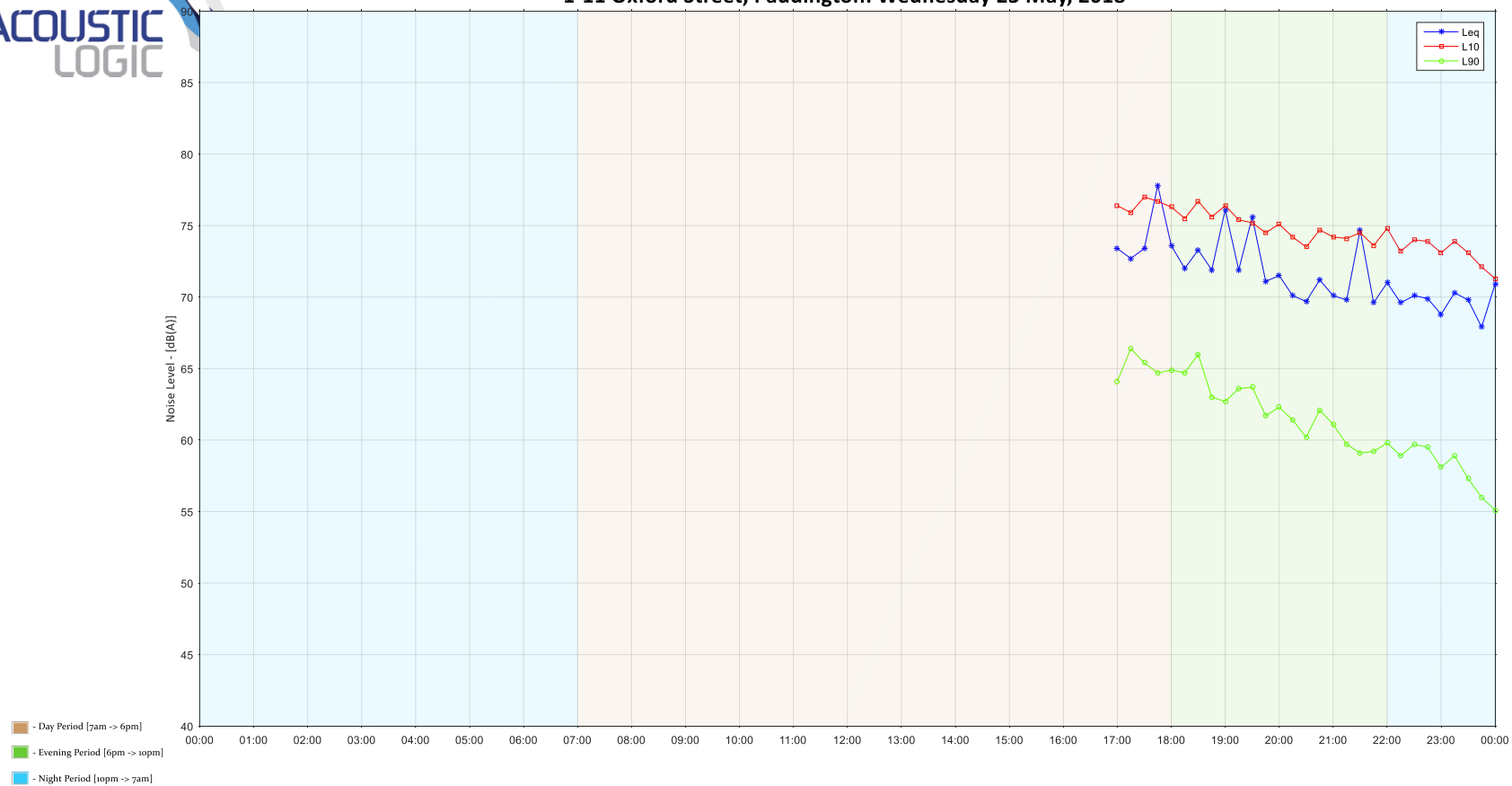
Yours faithfully,



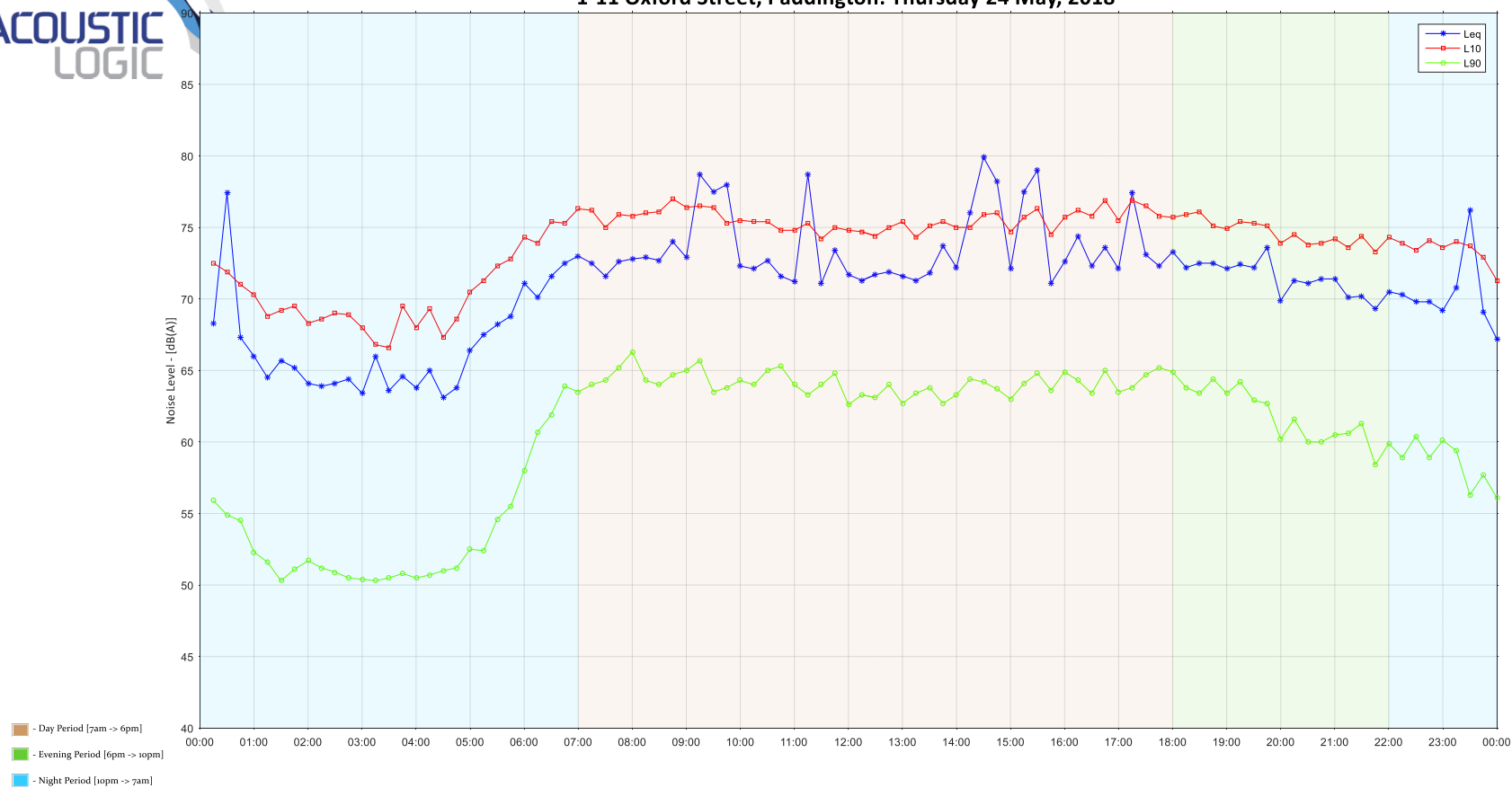
Acoustic Logic Consultancy Pty Ltd
Jenna MacDonald

APPENDIX ONE: UNATTENDED NOISE MONITORING DATA

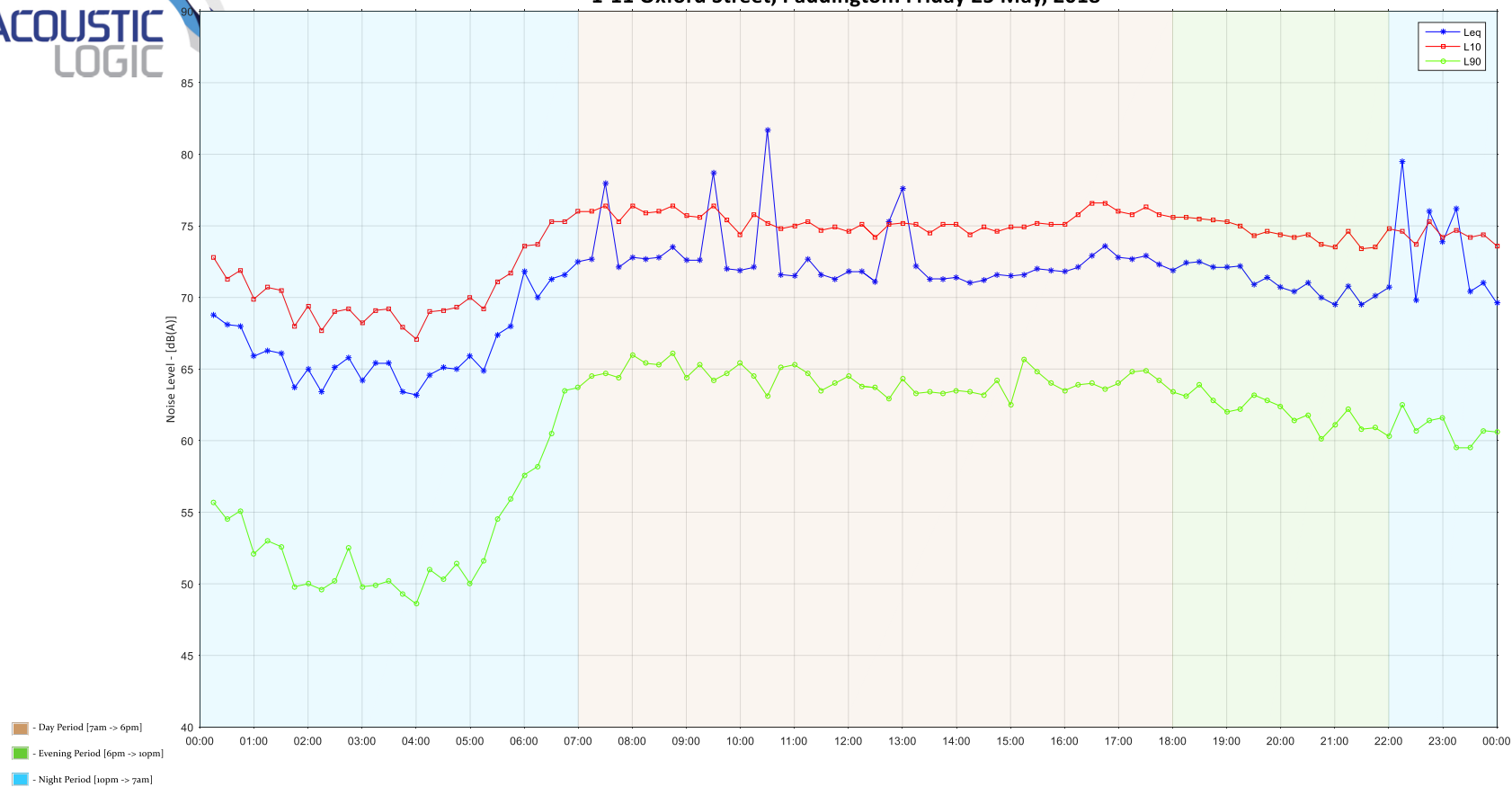
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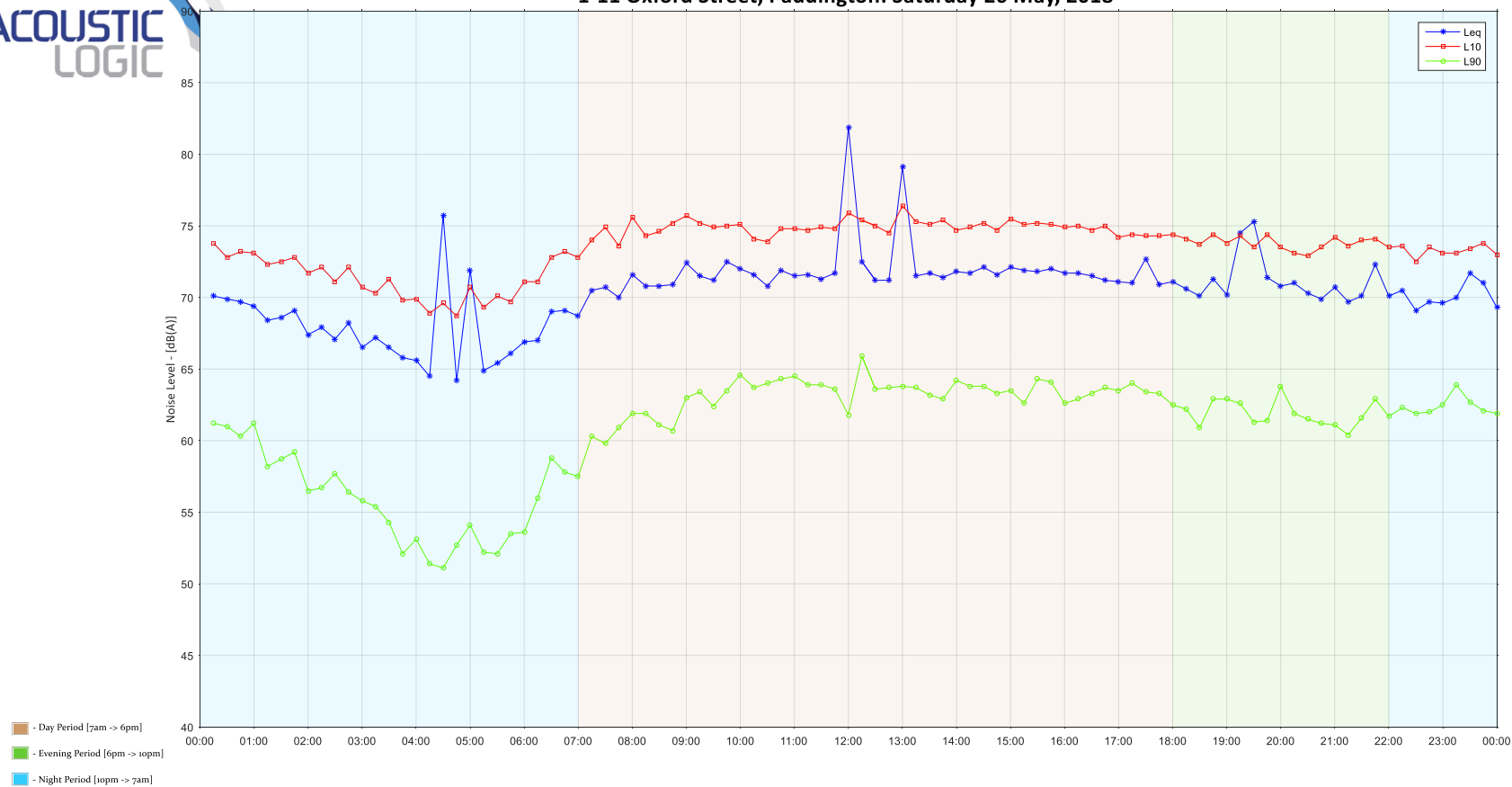
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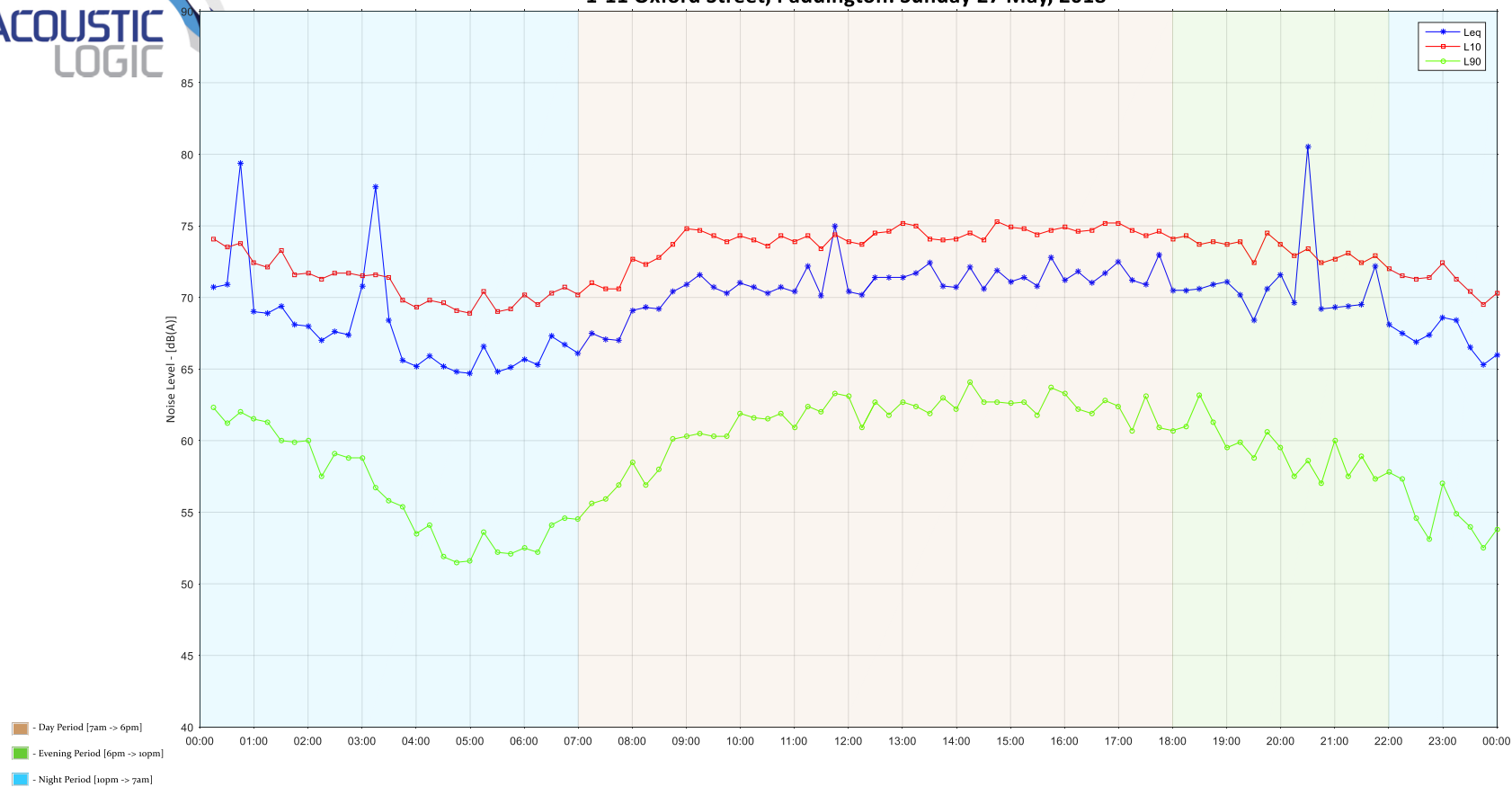
1-11 Oxford Street, Paddington: Friday 25 May, 2018



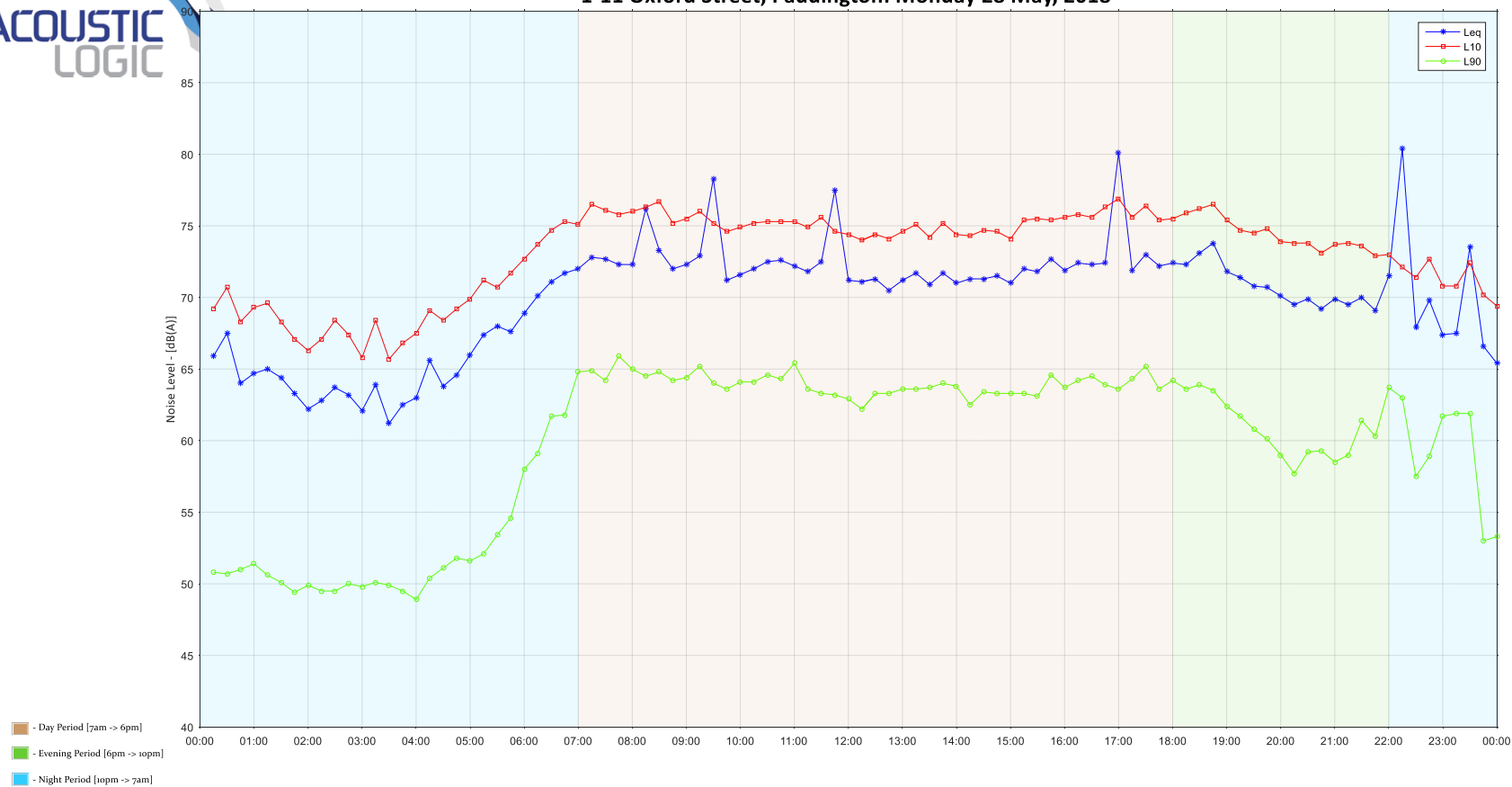
1-11 Oxford Street, Paddington: Saturday 26 May, 2018



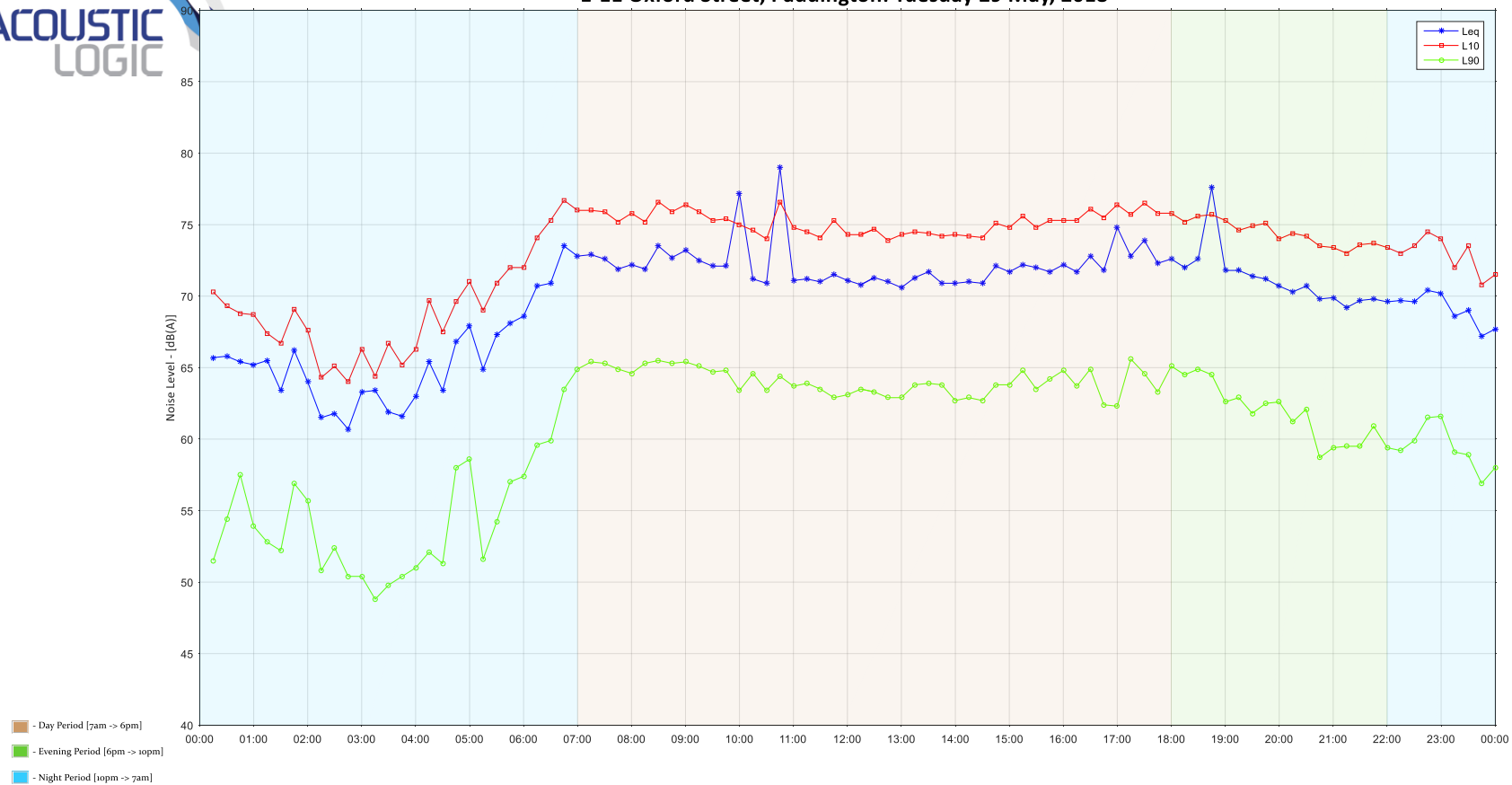
1-11 Oxford Street, Paddington: Sunday 27 May, 2018



1-11 Oxford Street, Paddington: Monday 28 May, 2018



1-11 Oxford Street, Paddington: Tuesday 29 May, 2018



1-11 Oxford Street, Paddington: Wednesday 30 May, 2018

