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**175-177 Cleveland Street, Redfern**

**DA Acoustic Assessment**

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## 1 INTRODUCTION

This report presents our assessment of the acoustic impacts associated with the proposed mixed use development at 175-177 Cleveland Street, Redfern.

In this report we will:

- Conduct an external noise impact assessment (primarily traffic and train noise) and recommend acoustic treatments in order to control traffic noise intrusion into the development
- Assess likely noise emissions from the operation of the development. These noise emissions will be assessed against acoustic controls typically adopted by Council. If necessary, acoustic treatments will be recommended in order to ensure that the amenity of nearby residents is not affected.

This report is based on architectural drawings of project number 2014067, revision D2, dated 22/06/2015 and provided by JPR Architects.

## 2 SITE DESCRIPTION

The subject site is located along Cleveland Street in Redfern. The site is bounded to the north by Cleveland Street, to the east by Woodburn Street and to the west by Eveleigh Street. A four-storey residential development and a two-storey commercial development bound the site to the south. Cleveland Street is a six lane road which carries high volumes of traffic (more than 40,000 daily vehicles according to the RMS). Eveleigh Street and Woodburn Street are both local two-lane streets with low traffic volumes.

A major rail corridor is also located approximately 40m south-east of the project site.

The proposed development will be a seven storey mixed use building, with hotel and residential apartments on all levels, a commercial tenancy on level 2 and a two level basement carpark:

Figure 1 below illustrates the site boundary and measurement locations.

The nearest potentially affected residential receivers are:

- The apartment building located to the east of the subject site across Eveleigh Street.
- Residents located to the south of the subject site at 6-8 Woodburn Street.
- Patrons from the hotel across Woodburn Street, to the east of the site.
- Residents across Cleveland Street.



**Figure 1: Site Survey and Monitoring Location**

- Unattended noise measurement location
- Attended noise measurement locations
- Subject site

### 3 ENVIRONMENTAL AND TRAFFIC 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 traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

## 4 EXTERNAL NOISE INTRUSION ASSESSMENT

### 4.1 OBJECTIVES

#### 4.1.1 Sydney Development Control Plan 2012

Section 4.2 of the Sydney DCP 2012 relates to objectives and provisions for residential flat developments. Part 4.2.3.11 of this section of DCP 2012 outlines the following acoustic controls for new developments affected by traffic noise:

*(7) The repeatable maximum  $L_{Aeq(1hour)}$  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  $L_{Aeq(1hour)}$  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).*

Map 16 of the traffic volume maps for the Infrastructure SEPP on the RTA website, classifies Cleveland Street and the surrounding areas as roads with > 40,000 AADT and hence mandatory under clause 102 of the State Environmental Planning Policy (SEPP Infrastructure) 2007.



#### 4.1.2 State Environmental Planning Policy (SEPP Infrastructure) 2007

Clause 102 of the NSW SEPP for road traffic noise stipulates,

*“This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:*

*(a) a building for residential use,*

*If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following  $L_{Aeq}$  levels are not exceeded:*

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

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

Clause 87 of the NSW SEPP for rail traffic noise stipulates,

*This clause applies to development for any of the following purposes that is on land in or adjacent to a rail corridor and that the consent authority considers is likely to be adversely affected by rail noise or vibration:*

*(a) a building for residential use,*

*If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following  $L_{Aeq}$  levels are not exceeded:*

*(a) in any bedroom in the building – 35 dB(A) at any time between 10.00 pm and 7.00 am,*

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

#### 4.1.3 Australian Standard AS 2107:2000

Australian Standard 2107 – “*Recommended Design Sound Levels and Reverberation Times for Building Interiors*”, will be used to establish the internal noise level criteria for the commercial space and reception area within the development.

**Table 1 – Recommended Design Internal Noise Levels**

Space /Activity Type	Recommended design Sound Level dB(A) <sub>L<sub>eq</sub></sub>	
	Satisfactory	Maximum
Small Retail Stores (General)	45	50
Reception Areas	40	45

#### 4.1.4 Summarised Project Criteria

A summary of the projects internal noise level criteria incorporating all relevant legislative requirements are detailed in the table below.

**Table 2 – Internal Noise Level Criteria**

Location	Period	Criteria
Bedroom	Night (10pm – 7am)	35dB(A) <sub>Leq (worst 1hr)</sub>
Living Areas	All Time (24 hour)	40dB(A) <sub>Leq (worst 1hr)</sub>
Retail Shops	When in use	45-50dB(A) <sub>Leq (worst 1hr)</sub>
Reception Area	When in use	40-45dB(A) <sub>Leq (worst 1hr)</sub>

#### 4.2 ENVIRONMENTAL NOISE MEASUREMENTS

Measurement of external noise was conducted using long term unattended noise monitoring and short term attended noise measurements.

Long term monitoring was conducted using an unattended noise monitor installed within the existing building, along the northern boundary of the site. The monitor was installed with a clear unrestricted view of Cleveland Street. Monitoring was conducted between 28<sup>th</sup> March, 2014 and 4<sup>th</sup> April, 2014 using an Acoustic Research Laboratories noise monitor, set to an A-weighted fast response mode. 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 1.

Attended short term measurements of traffic noise was also undertaken by this office, to validate the unattended noise monitoring. These measurements were undertaken on the 4<sup>th</sup> April 2014 between 4:30pm and 5:30pm, a period of peak traffic activity along Cleveland Street. Measurements were conducted using a Norsonics type 140 Precision 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.

The cumulative traffic and train noise levels impacting the site were determined based on the unattended logging data and attended noise measurements. In determination of acoustic treatments, the measured levels are adjusted for distance and orientation. The measured noise levels are presented in the table below.

**Table 3 – Measured Traffic Noise Levels**

Location	Traffic Noise Levels dB(A) <sub>Leq(period)</sub>	
	Daytime (7am-10pm)	Night time (10pm-7am)
Cleveland Street (approx. 4m from the curb)	70	66

### 4.3 RECOMMENDED CONSTRUCTIONS

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 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.

In all cases, the selected glazing type (refer below) reduces internal noise levels to within the nominated criteria for the various space types.

#### 4.3.1 Glazing Constructions

The following tables list the recommended glazing assemblies for this project to achieve the internal traffic noise requirements. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. **(Mohair Seals are unacceptable).**

The glazing thicknesses recommended are those needed to satisfy acoustic requirements and do not take into account other requirements such as structural, safety or other considerations. These additional considerations may require the glazing thickness to be increased beyond the acoustic requirement.

**Table 4 – Recommended Glazing Constructions**

Level	Space	Facade	Glazing Thickness	Acoustic seals
Ground Floor	Reception/Lobby	All	6.38mm laminated	Yes
	Hotel Suites	Eveleigh Street	6mm float	Yes
	Residential Apartments	Woodburn Street	6.38mm laminated	Yes
		Internal Courtyard	6mm float	Yes
Level 1	Hotel Suites	Cleveland Street	Double Glazing: 10.38mm laminated/100mm air gap/6mm	Yes
		Eveleigh Street	6mm float	Yes
		Internal Courtyard	6mm float	Yes
	Residential Apartments	Woodburn Street	6.38mm laminated	Yes
		Internal Courtyard	6mm float	Yes
	Commercial	All	6.38mm laminated	Yes
Levels 2-4	Hotel Suites	Cleveland Street	10.38mm laminated	Yes
		Eveleigh Street	6mm float	Yes
		Internal Courtyard	6mm float	Yes
	Residential Apartments	Woodburn Street	6.38mm laminated	Yes
		Internal Courtyard	6mm float	Yes
Level 5	Hotel Suites	Cleveland Street	10.38mm laminated	Yes
		Eveleigh Street	10.38mm laminated	Yes
		Internal Courtyard	6mm float	Yes
	Residential Apartments	Woodburn Street	10.38mm laminated	Yes
Level 6	Residential Apartments	Woodburn Street	10.38mm laminated	Yes

In addition to meeting the minimum glazing thickness requirements given, the design of the window mullions, perimeter seals and the installation of the windows/doors in the building openings shall not reduce the STC/R<sub>w</sub> rating of the glazing assembly below the values nominated in the table above. **Note that mohair type seals will NOT be acceptable for the windows requiring acoustic seals.**

The window/door suppliers should provide evidence that the systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum listed STC/R<sub>w</sub> requirements. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples.

**Table 5 – Minimum STC/R<sub>w</sub> of Glazing (with Acoustic Seals)**

Glazing Assembly	Minimum STC/R <sub>w</sub> of Installed Window
6mm float	29
6.38mm laminated	31
10.38mm laminated	35
Double Glazing: 10.38mm laminated/100mm air gap/6mm	45

#### **4.3.2 External Doors**

Any glass door should be constructed using glazing thickness set out in Table 4. Full perimeter acoustic seals around the doors are required.

#### **4.3.3 Roof / Ceiling**

The proposed concrete slab roof is acoustically acceptable. No details of ceiling construction or corner junctions are required as the necessary acoustic performance is achieved by the concrete. Penetrations in all sleeping area ceilings (such as for light fittings etc.) must be acoustically treated and sealed gap free with a flexible sealant.

#### **4.3.4 External Walls**

Masonry walls are acoustically acceptable and will not require any additional treatments.

#### 4.4 VENTILATION REQUIREMENTS

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 (ie – allowable level in bedrooms becomes 45dB(A), and 50dB(A) in living rooms).

All habitable rooms with glazing only facing into the internal courtyard of the development will be able to achieve the internal noise goals with windows open.

All other habitable spaces within the development 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 subject development should be assessed to ensure that the amenity of nearby land users is not adversely affected.

Potential noise sources which should be assessed are:

- Noise generated by future mechanical plant and equipment servicing the proposed development (typically air conditioners and car park ventilation fans).

### 5.1 BACKGROUND NOISE MONITORING

Background noise levels at the site have been measured based on the unattended noise logging undertaken by this office as outlined in section 4.2.

The measured background noise levels have been corrected for meteorological conditions (excessive wind and/or rain), as required by section 3.4 of the EPA Industrial Noise Policy. Weatherzone data for observations recorded at Observatory Hill, indicate little to no rain during the unattended monitoring period. Exceedances of the 5m/s average wind speed limit of the EPA and periods of rain were noted and corrected for in determining the background noise levels.

Measured background noise levels are presented below. Refer to Appendix 1 for unmanned noise monitoring data, which also highlights areas of inclement weather conditions.

**Table 6 - Measured Background Noise Levels**

Location	Background noise level dB(A) $L_{90}(\text{period})$		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night (10pm – 7am)
Monitor Location – Refer to Figure 1	51	49	45

### 5.2 MEASURED BACKGROUND NOISE SPECTRUM

A background noise measurement was also conducted on site to determine the existing background noise spectrum. A 15 minute measurement was conducted on the 4<sup>th</sup> April 2014, between 4.30pm and 5.30pm.

**Table 7 – Background Noise Single Octave Band Levels, dB**

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Background Noise Spectrum	60	63	59	53	51	50	46	41	34	56

The attended measurement period was not affected by inclement weather (i.e. wind speed > 5 m/s or any rain).



### 5.3 NOISE EMISSION CRITERIA

Acoustic criteria typically adopted by the City of Sydney Council require that:

- Noise emissions (plant noise), comply with the noise emission requirements of the EPA Industrial Noise Policy.
- Noise emissions (noise generally) not exceed background noise levels by more than 3dB when measured in octave bands between 31.5Hz and 8,000Hz.

These requirements are outlined below.

#### 5.3.1 Mechanical Plant Noise (EPA Industrial Noise Policy)

Noise sources covered by this code will be mechanical services noise. Both the Intrusiveness and the Amenity criteria (as set out below) must be complied with.

##### 5.3.1.1 INP - Intrusiveness Assessment

Intrusiveness criteria permit noise generation to be no more than 5dB(A) above existing background noise levels.

**Table 9 – Intrusiveness Assessment**

Location	Time of Day	Background noise Level – dB(A)L <sub>90</sub>	Intrusiveness Noise Objective dB(A)L <sub>eq(15min)</sub> (Background + 5dB)
Monitor Location – 175-177 Cleveland Street, Redfern	Day Time (7am - 6pm)	51	56
	Evening (6pm - 10pm)	49	54
	Night (10pm - 7am)	45	50

### 5.3.1.2 INP - Amenity Assessment

The Amenity criteria set additional criteria based on the land use of the noise sensitive receivers.

Amenity criteria are as follows:

**Table 10 – Amenity Criteria**

Receiver Location	Land Type	Time of Day	Amenity Noise Objective dB(A) $L_{eq}(\text{Period})$
All Potentially Affected Residential Properties	Urban	Day Time (7am – 6pm)	60
		Evening (6pm – 10pm)	50
		Night (10pm-7am)	45
Commercial	All	When in use	65

### 5.3.2 Noise Generally (City of Sydney “Background + 3dB” requirement)

Based on the measured background noise levels and spectrums set out in section 5.1, the corresponding noise emission goals are as follows:

**Table 11 – “Background + 3 dB” Noise Emission Goals**

Time of Day	Criteria	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Day (7am-6pm)	51BG+3	58	61	57	51	49	48	44	39	32	54
Evening (6pm-10pm)	49BG+3	56	59	55	49	47	46	42	37	30	52
Night (10pm-7am)	45BG+3	52	55	51	45	43	42	38	33	26	48

## **5.4 RECOMMENDATIONS**

Separate DA to be lodged for fit out of tenancy ground floor retail. Acoustic report will be required if needed prior to fit out.

### **5.4.1 Noise Emissions from External Mechanical Plant**

Mechanical plant items are not typically selected at selected at DA stage.

Detailed review of these condensers and all other external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to the levels set out in this section of this report.

All plant can be satisfactorily attenuated to levels complying with noise emission criteria through appropriate location and (if necessary) standard acoustic treatments such as noise screens, enclosures, in-duct treatments (silencers/lined ducting) or similar.

## 6 CONCLUSION

Potential noise impacts associated with the proposed residential development at 175-177 Cleveland Street, Redfern have been assessed.

Noise impacts from environmental noise sources (traffic noise) on future occupants of the development have been assessed in accordance with the Sydney DCP 2012 and SEPP acoustic requirements. The acoustic mitigation measures to ensure compliance with these guidelines, have been set out in section 4.3.

Noise emissions objectives for the site have also been determined, based on on-site noise logging and noise emission guidelines typically adopted by Council. This is outlined in section 0 above.

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

Yours faithfully,

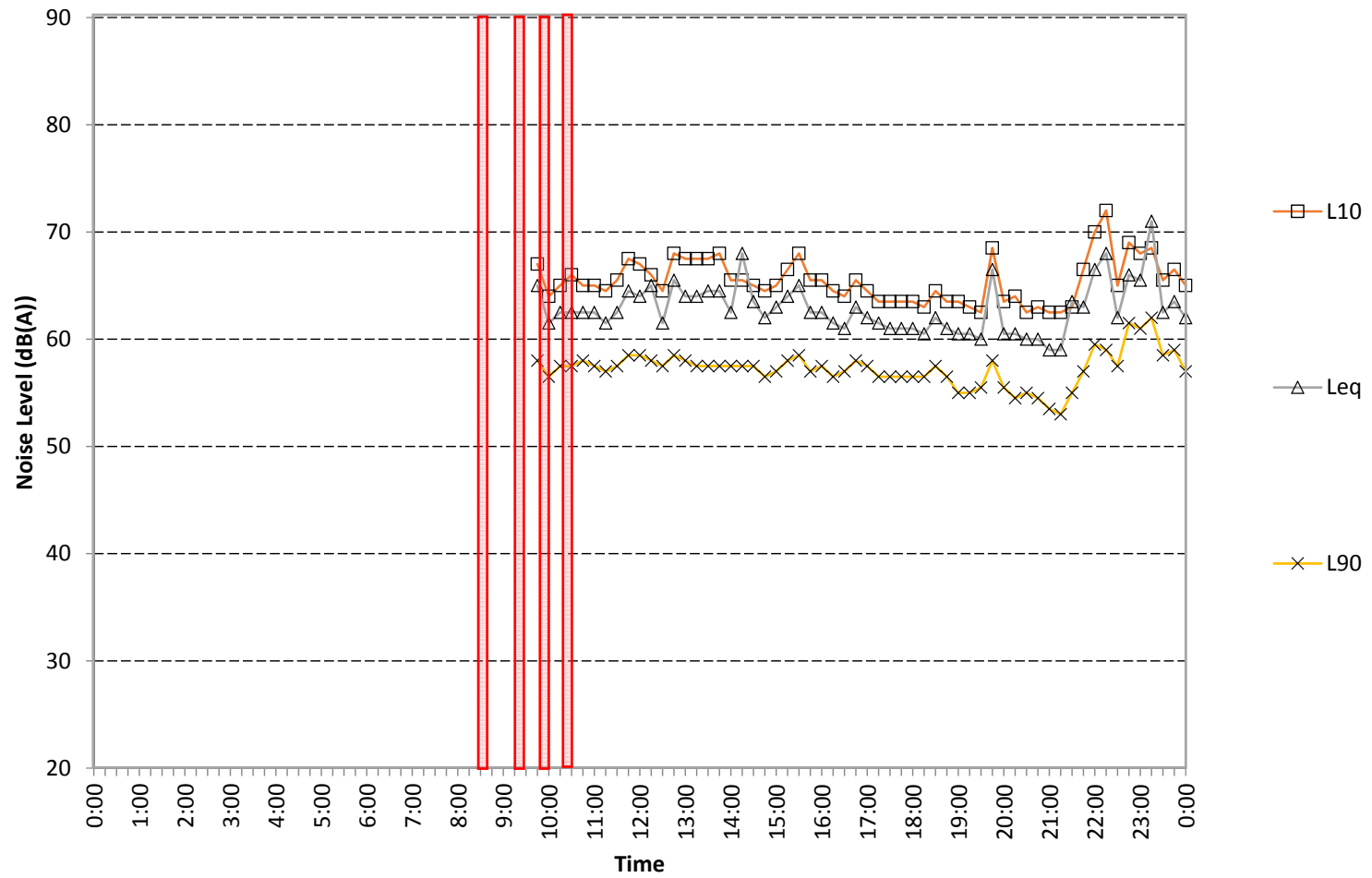
A handwritten signature in black ink, appearing to read 'Justin Leong', with a stylized flourish at the end.

Acoustic Logic Consultancy Pty Ltd  
Justin Leong

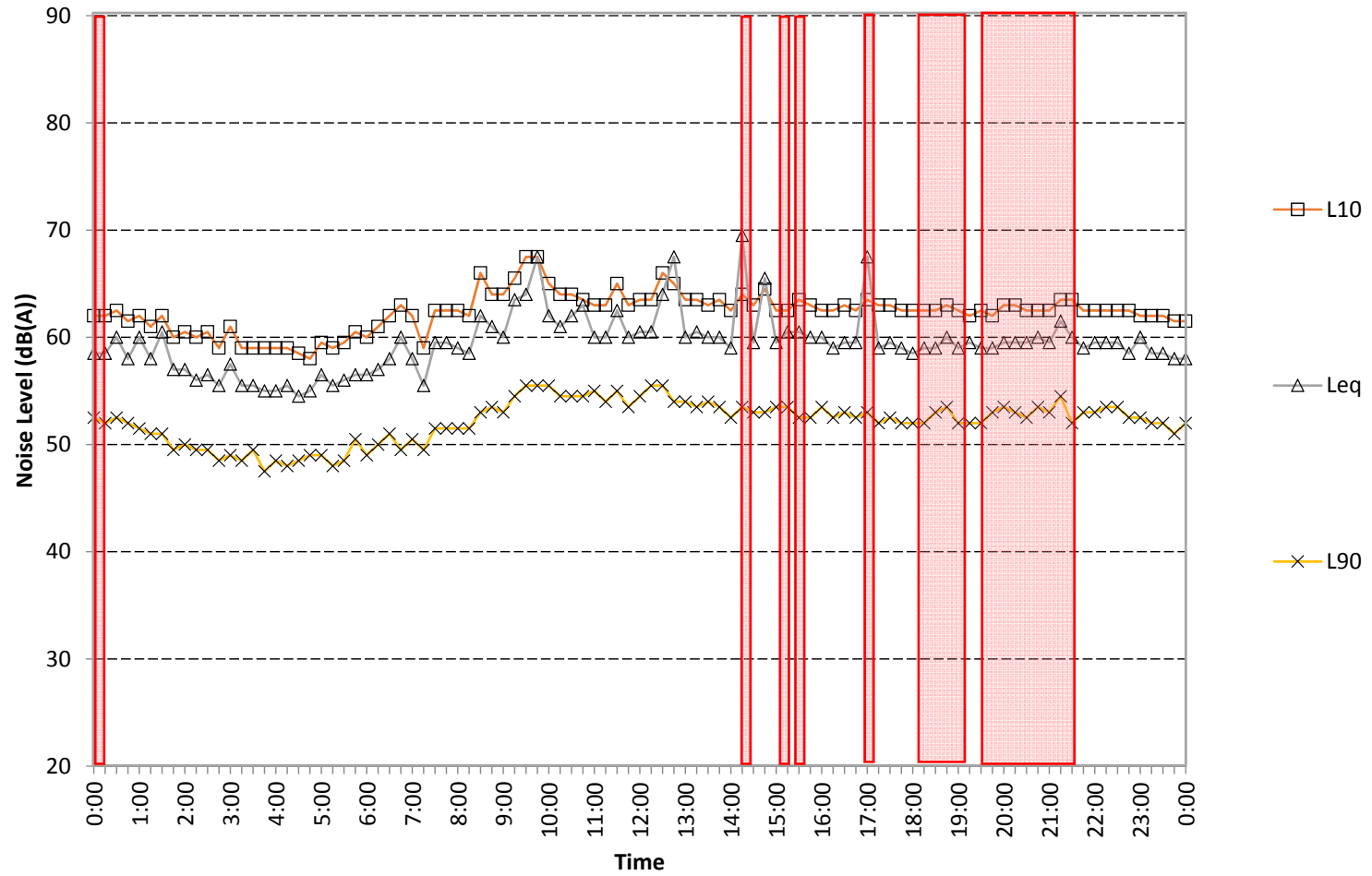
## **APPENDIX 1: NOISE LOGGING DATA**

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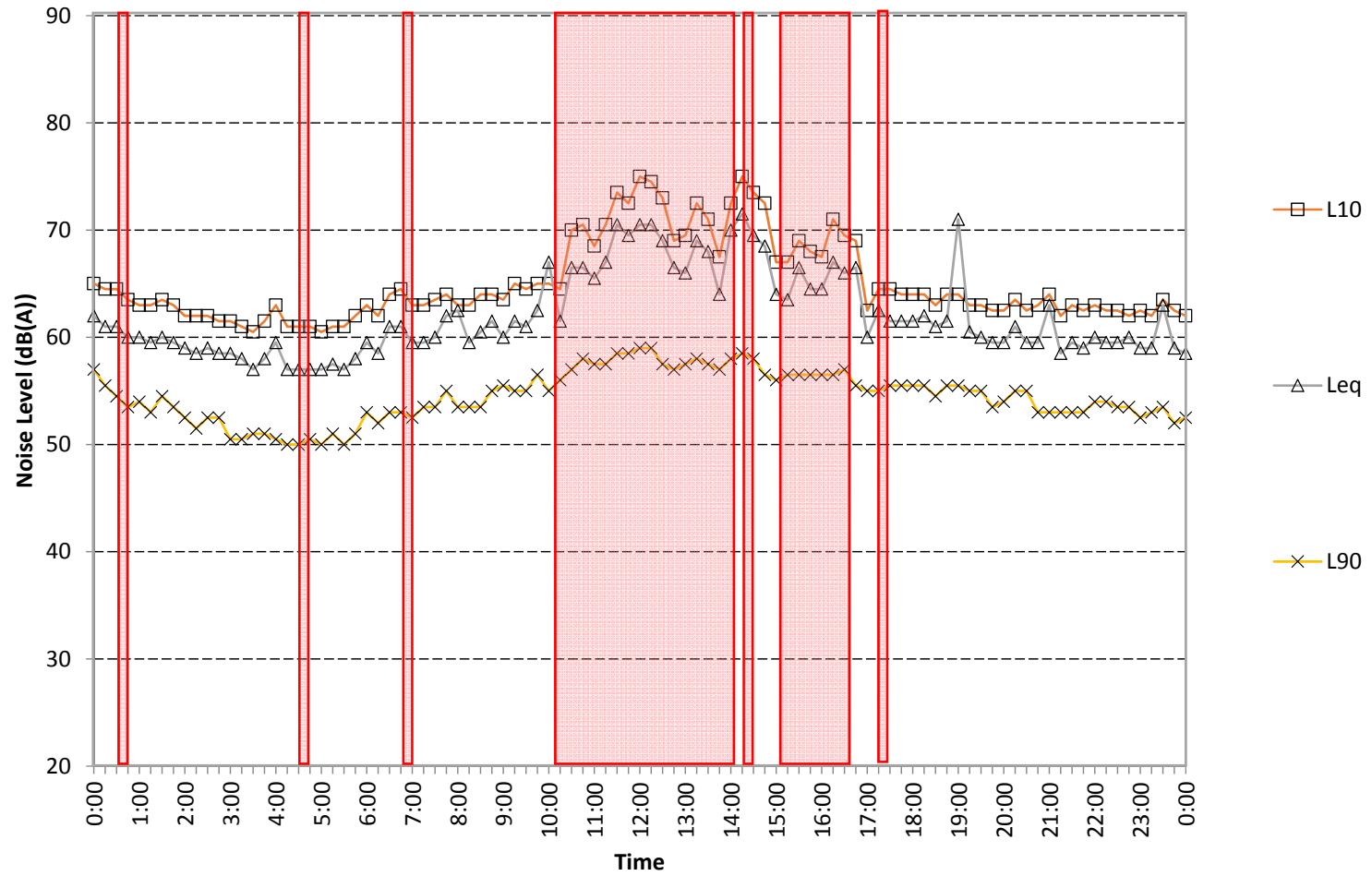
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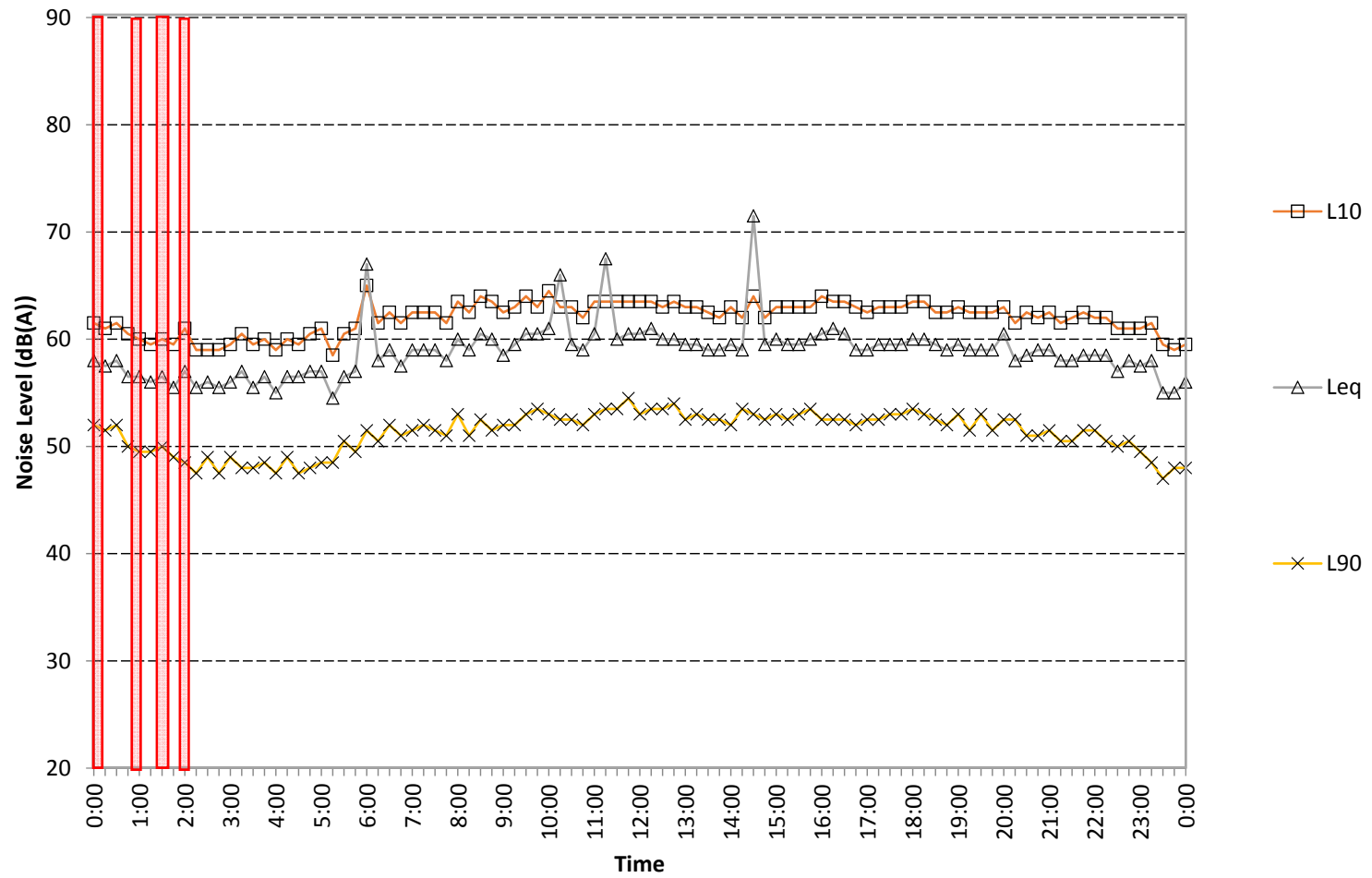


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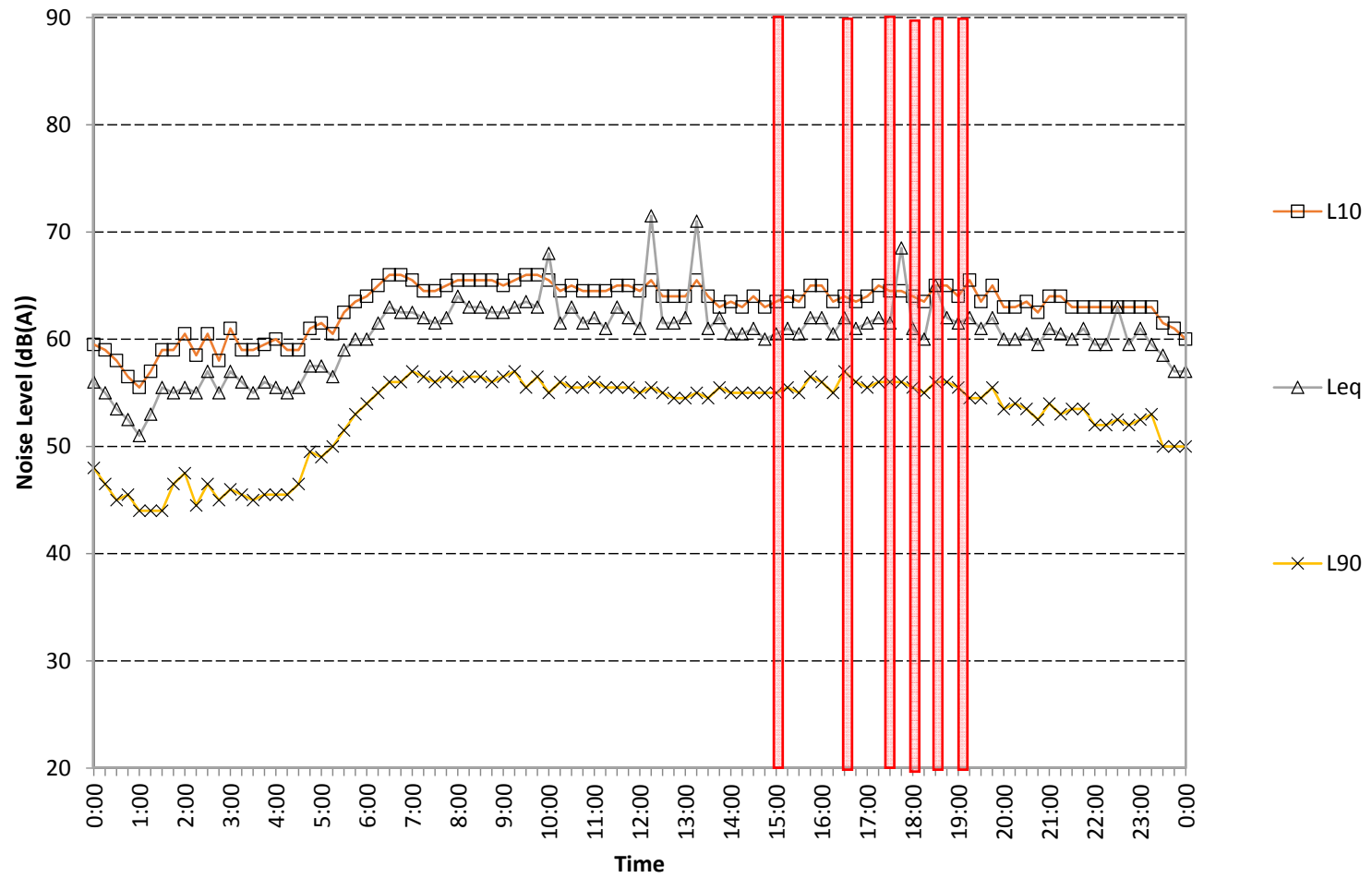




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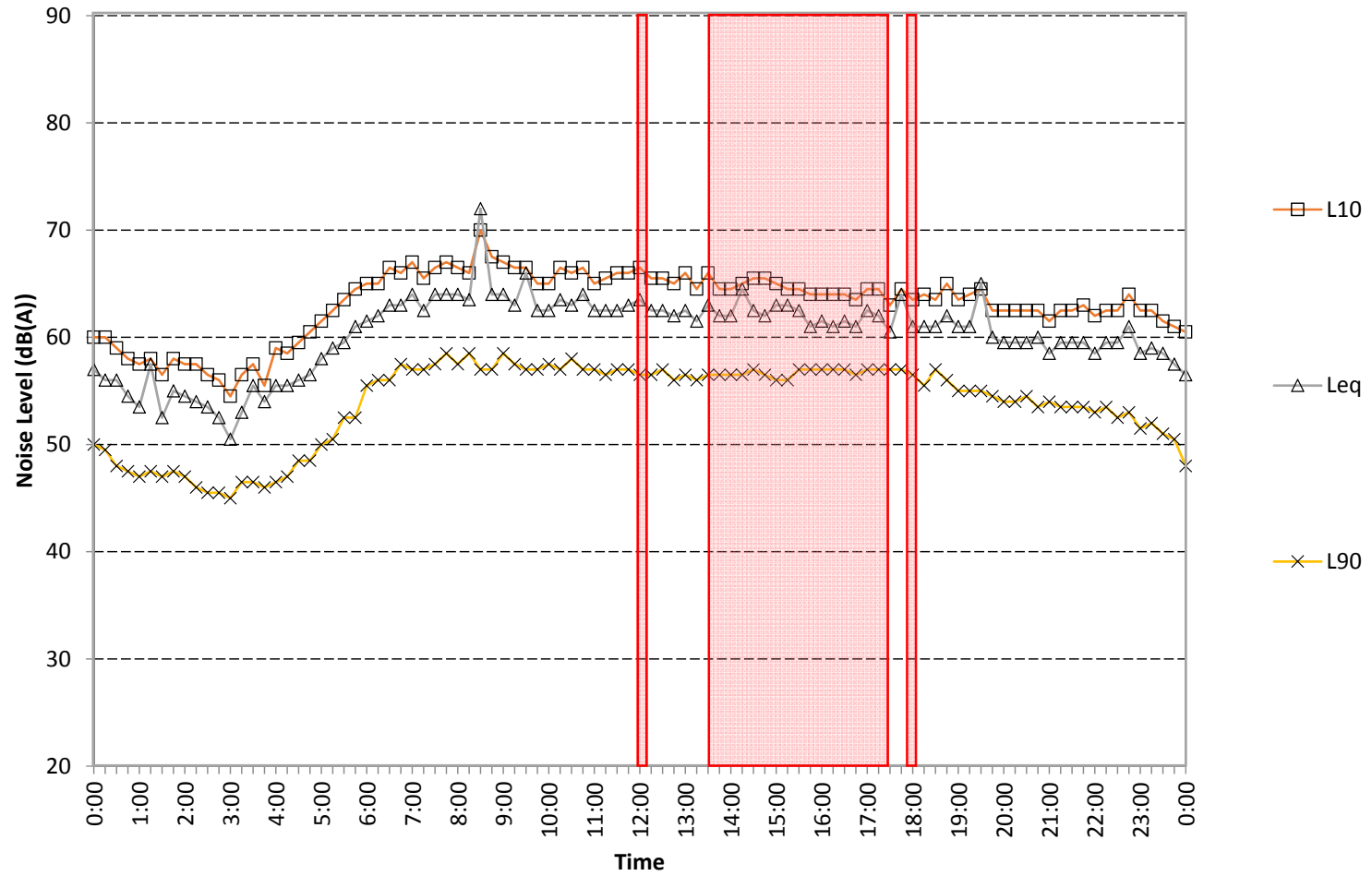


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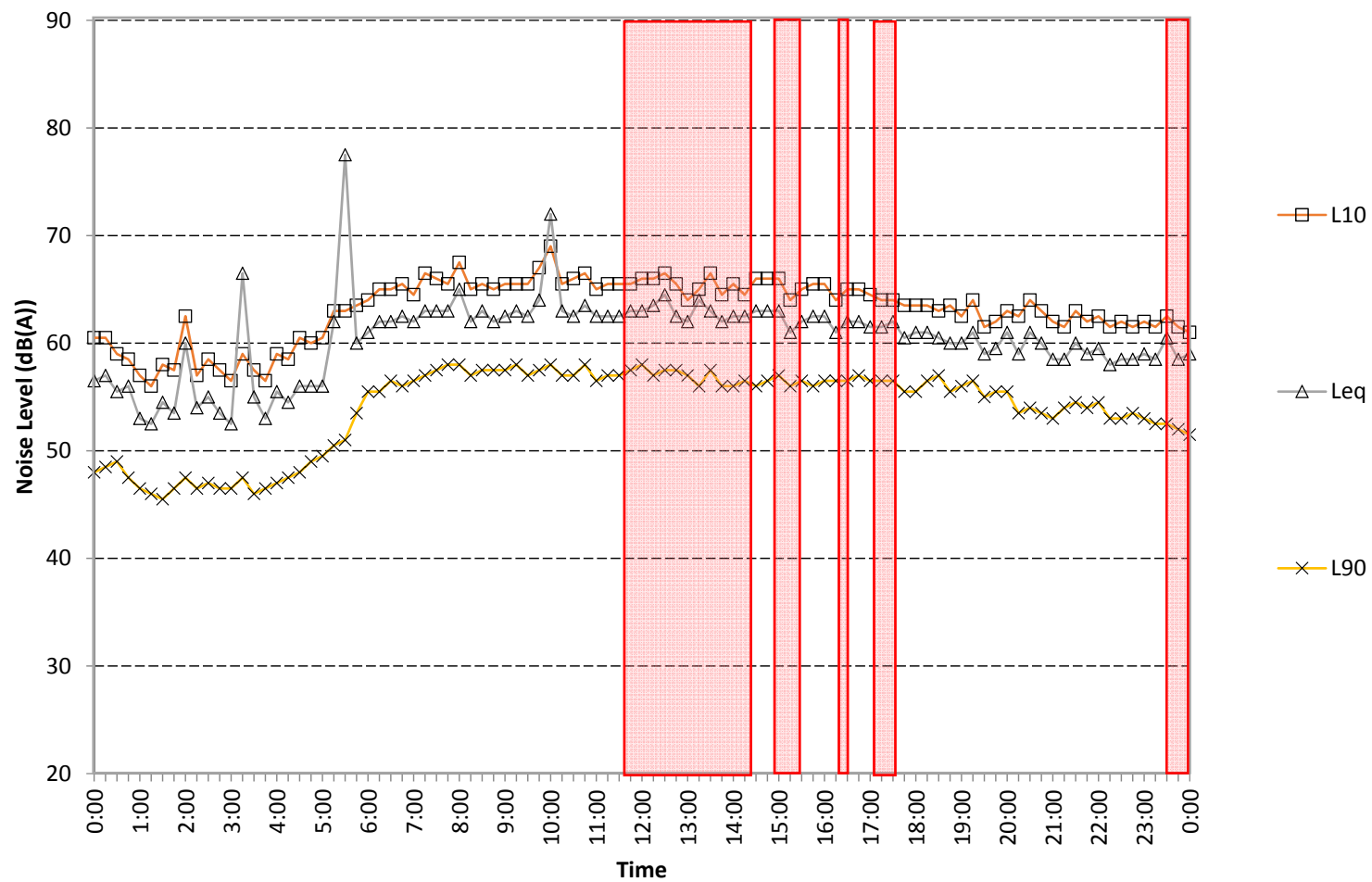


# 175 cleveland st

Wednesday April 2, 2014



**175 cleveland st**  
Thursday April 3, 2014



# 175 cleveland st

Friday April 4, 2014

