The Ribbon Hotel

Extended Hours Construction Noise Assessment

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EXECUTIVE SUMMARY

A construction noise assessment has been carried out for the proposed extension of construction hours associated with the Ribbon development, Sydney. The potential impacts from these activities have been assessed in accordance with the requirements of the City of Sydney Council. The results of the assessment have been used to develop controls that will be used to manage impacts from these activities.

The report identifies any potential noise impacts from construction activities proposed by the site contractor. The objective of this study is to investigate if construction works may be undertaken during the after-hours period without having a negative acoustic impact and to protect the amenity of the sensitive receivers surrounding the site.

ALC have concluded from this assessment that based on the activities proposed during this extended hours period, construction noise emissions during this period can comply with the construction noise emission requirements of City of Sydney Council and the EPA's Interim Construction Noise Guidelines.

1 INTRODUCTION

This report presents our assessment of potential noise impacts associated with the proposed extended hours of construction works to be carried out on the Ribbon development, Sydney.

This report addresses noise impacts associated with construction works proposed outside the standard approved hours of construction categorized as 2-4 in Council's *"Construction Hours/Noise Within the Central Business District – Code of Practice (1992)"* guideline, and formulation of suitable acoustic/ameliorative treatments and management controls to ensure compliance with the relevant noise emission goals including the EPA's Interim Construction Noise Guidelines.

The proposed construction hours associated with this assessment involve an extension from the approved construction period to midnight, 6 days a week (Monday to Saturday).

ALC confirms that noise impacts from the proposed works during the extended construction hours period, can comply with Council's criteria during this periods, and will not result in an additional noise impact above the ambient acoustic environment.

Furthermore, ALC notes that with the extension of construction hours, the overall noise exposure to sensitive receivers surrounding the site will be significantly reduced due to the shortening of the construction program.

2 SITE DESCRIPTION

The proposed Ribbon development is located within the Darling Harbour precinct on the existing IMAX Theatre site. The site is surrounded by the Western Distributor to the north and south. The Western Distributor carries high volumes of traffic during all times of the day and night.

The following noise sources are potentially impact on the project site:

- Traffic Noise from the Western Distributor.

Noise potentially generated by the site will consist primarily of noise from the proposed mechanical plant serving the project site.

The nearest potentially affected noise receivers are:

- Commercial areas within Darling Harbour.
- The Park Royal Hotel receiver to the east of the site (approximately 130m from the site)

Refer to Figure 1 below, which is an aerial photo of the existing development.

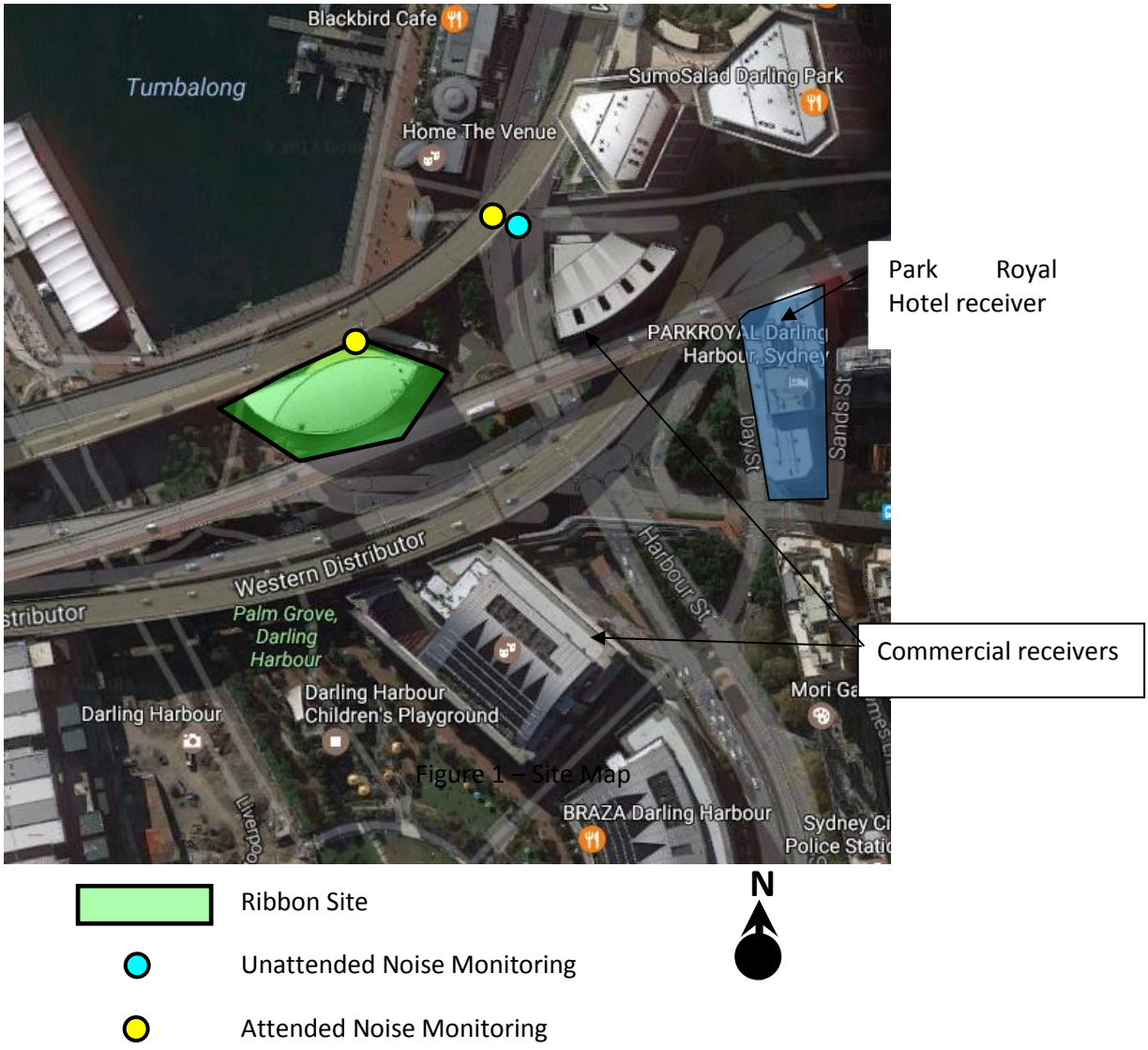


Figure 1 – Site Map

2.1 SURROUNDING SENSITIVE RECEIVERS

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

Receiver 1. Commercial/retail receiver to the east and south of the site.

Receiver 2. Park Royal Hotel receiver located approximately 130m to the east of the site.

3 EXTENSION OF CONSTRUCTION HOURS PROPOSAL

The existing approved construction hours for the site are as per the City of Sydney *"Construction Hours/Noise within the Central Business District Code of Practice (1992)"* guideline and are as follows;

It is proposed to extend these construction hours to include:

1. Start time – 6am, 6 days per week

2. Finish time - Midnight, 6 days a week.

Sundays will not be included the extended hours period.

Construction works during this period will not include high noise generating appliances including hydraulic/nematic hammers, angle grinding and concrete sawing or rock sawing.

3.1 CONSTRUCTION WORKS

The construction activities which will be assessed in this document including the proposed works as detailed below. Specific works are as described below.

3.1.1 Construction Works

The proposed construction works on the site will include construction activities associated with the inground pilling and building works.

Table 1 – Proposed Construction Works

CONSTRUCTION ACTIVITY	EQUIPMENT /PROCESS
Piling	Piling Rig (Augered)
	Electric Saw
	Drilling
	Hammering
	Concrete Vibrator
	Cement Mixing Truck
	Concrete Pumps
	Crane

*Note: Activities include highest noise generating activities associated with the activities to be conducted during the proposed extended hours periods

3.1.2 Deliveries

Deliveries are proposed to undertaken during the extended hours period. The delivers are proposed during the extended hours period such that the access to and from the CBD roadways and the Western Distributor will be reduced during these times and will not effectively result in an increased traffic volume during the proposed night time hours.

As the expected to access the site the maximum truck movements during the night time periods is 1 truck entry and exit, which will result in no material change to the surrounding receivers based on the existing traffic numbers on the Western Distributor.

3.1.3 Site Access

Access to the site will be provided in accordance with the existing site management plan.

3.2 SOUND POWER LEVELS

Noise impact will be determined from all processes and equipment, which are involved in the activities outlined above by defining the levels of sound, which they generate.

The A-weighted sound power levels for all the component parts of the above-described activities are outlined in the tables below.

Table 2 – Construction Activities – Sound Power Levels

CONSTRUCTION ACTIVITY	EQUIPMENT /PROCESS	SOUND POWER LEVEL - dB(A)
Piling	Piling	111
Construction	Angle Grinders	114
	Electric Saw	111
	Drilling	94
	Hammering	110
	Concrete Vibrator	100
	Cement Mixing Truck	105
	Concrete Pumps	107
	Crane	105

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

1. On-site measurements
2. Table D2 of Australian Standard 2436-1981
3. Data held by this office from other similar studies.

3.3 CONSTRUCTION NOISE OBJECTIVES

Criteria relating to construction noise within council's *"Construction Hours/Noise Within the Central Business District Code of Practice (1992)"* guideline are detailed below;

Table 3 - Categories of Working Hours and Noise Criteria

Day	Time Zone	Category	Noise Criteria
Monday to Friday	00.00 – 07.00	4	Background + 0dB(A)
	07.00 – 08.00	1	Background + 5dB(A)
	08.00 – 19.00	1	Background + 5dB(A) + 5dB(A)
			To be determined on a site basis
	19.00 – 23.00	2	Background + 3dB(A)
	23.00 – 24.00	4	Background + 0dB(A)
Saturday	00.00 – 07.00	4	Background + 0dB(A)
	07.00 – 08.00	1	Background + 5dB(A)
	08.00 – 17.00	1	Background + 10dB(A)
	17.00 – 23.00	2	Background + 3dB(A)
	23.00 – 24.00	4	Background + 0dB(A)
Sundays and Public Holidays	00.00 – 07.00	4	Background + 0dB(A)
	07.00 – 17.00	3	Background + 3dB(A)
	17.00 – 24.00	4	Background + 0dB(A)

In addition, the following requirements are adopted.

- Australian Standard 2436-1981 "Guide to Noise Control on Construction Maintenance and Demolition Site". The requirements stipulated in Section 3 of the standard will be followed.

Section 3 of AS 2436 states that care shall be taken in applying criteria that normally would be used to regulate noise emitted from industrial, commercial and residential premises to construction, particularly for those activities which are transitory and of short duration. For the control and regulation of noise from construction sites AS2436 nominates the following:

- That reasonable suitable noise criterion is established.

- That all practicable measures be taken on the building site to regulate noise emissions, including the siting of noisy static processes on parts of the site where they can be shielded, selecting less noisy processes, and if required regulating construction hours.

- The undertaking of noise monitoring where non-compliance occurs to assist in the management and control of noise emission from the building site.

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.
- Noise emissions during the night time period at residential locations should achieve the background + 3dB(A) criteria for Category 2 hours.

3.4 EPA –CONSTRUCTION NOISE GUIDELINE

The Interim Construction Noise Guideline outlines that the transmission of noise generated by various construction/demolition activities will primarily occur via two paths:

- Airborne Noise
- Ground-borne Noise

3.4.1 Airborne Noise Transmission Criteria for Residential Receivers

Table 2 of the Interim Construction Noise Guideline outlines the management levels for noise at residences depending on the hours of construction. The management levels are outlined in the table below.

Table 4 – Noise Management Levels for Residential Receivers

Time of Day	Management Level dB(A)$L_{eq(15mins)}$
Recommended standard hours: Monday to Friday(7am – 6pm); Saturdays (8am – 1am) and no works on Sunday or public holidays	Noise affected RBL* + 10dB
Outside recommended standard hours	Noise affected RBL* + 5dB

Based on the noise levels detailed above compliance with the City of Sydney Councils Central DCP represents compliance with the requirements of the EPA's Interim Construction Noise Guideline.

3.5 BACKGROUND NOISE MONITORING

Existing ambient noise levels at the worst affected receivers have been adopted from monitoring previously conducted by this office at the site. An unattended noise monitor was located on the roof of the subject building.

3.5.1 Measurement Equipment

Unattended noise monitoring was conducting using 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 the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

3.5.2 Measurement Period

The unattended noise monitoring was undertaken from the 15th and the 23rd May, 2012. Detailed noise data is attached in Appendix 1.

Additional supplementary attended noise measurements have been conducted at the site to confirm that the previous monitoring is accurate as detailed by the attended measurement locations in Figure 1 above. Based on the attended noise levels recorded at the site the previously obtained noise logging is acoustically accurate and acceptable for the purpose of this extended hours assessment.

3.5.3 Meteorological conditions during monitor period

Section 3.4 of the NSW Environment Protection Authority (EPA) Industrial Noise Policy document outlines the following with regards to meteorological impacts on noise monitoring;

"Noise monitoring should not be conducted (or the data should be excluded) when average wind speeds (over 15-minute periods or shorter) at microphone height are greater than 5 m/s, or when rainfall occurs."

However, the same section of this policy also outlines that;

"Exceptions to this rule are allowed, provided the proponent is able to show that the wind-induced noise on the microphone, and sound levels due to rain, are at least 10 dB below the noise levels (that is, background and/or ambient) under investigation."

Weather conditions during the monitoring period have been assessed and the periods of inclement weather are highlighted in Appendix 1. Other than periods when there was precipitation (where the data was completely excluded), the weather conditions measured at the nearest weather station (Observatory Hill) includes wind speeds which will not impact the recorded background noise levels on site.

This is due to the reason that the subject site is located in a built-up area with multi-storey buildings, flat terrain and restricted flora and will not be affected by noise generated by wind blowing through leaves etc during the periods with winds speeds of upto 10m/s.

3.5.4 Measured noise levels

Measured background noise levels for the periods outside the approved hours of construction are presented below. As mentioned above, noise impacts from the proposed activities will be assessed against the night-time criterion (category 4), which represents a worst case.

Table 5 – Measured Background Noise Level

Time of Day	Measured Background Noise Levels dB(A)L_{90}
19.00 – 23.00	64
23.00 – 24.00	64
6.00 – 7.00	58

Construction noise affected data has been omitted from the background noise levels established above.

3.6 CONSTRUCTION NOISE OBJECTIVE

The construction noise objectives for this assessment have been established from the background noise monitoring in conjunction with the requirements of City of Sydney Council guidelines.

Table 6 – Construction Noise Objectives

Category		Background Noise Level dB(A) L_{90}	Construction Noise Objective dB(A) L_{10}
2 and 3		64	67
4	23.00 – 24.00	64	64
4	6.00 – 07.00	58	58

4 CONSTRUCTION NOISE PREDICTIONS

Noise emissions from the proposed construction works on the Ribbon site are predicted below, for the potentially worst affected receiver at the Park Royal Hotel.

Predicted noise levels are presented below;

Table 7 – Predicted Construction Noise Levels – Park Royal Hotel *(Category 2 until 11pm)*

Activity	Predicted Noise Level dB(A) $L_{10\ 15min}$	Construction Noise Criteria dB(A) $L_{10\ 15min}$	Complies
Piling	57	67	Yes
General Construction Activities*	56	67	Yes

*Note: Construction activities conducted during category 3 and 4 periods are to exclude any hydraulic/pneumatic hammering, rock/concrete sawing and angle grinding.

Table 8 – Predicted Construction Noise Levels – Park Royal Hotel *(Category 4 until midnight)*

Activity	Predicted Noise Level dB(A) $L_{10\ 15min}$	Construction Noise Criteria dB(A) $L_{10\ 15min}$	Complies
Piling	57	64	Yes
General Construction Activities*	56	64	Yes

*Note: Construction activities conducted during category 3 and 4 periods are to exclude any hydraulic/pneumatic hammering, rock/concrete sawing and angle grinding.

Table 9 – Predicted Construction Noise Levels – Park Royal Hotel
(Category 4 – 6am to 7am)

Activity	Predicted Noise Level dB(A) $L_{10\ 15min}$	Construction Noise Criteria dB(A) $L_{10\ 15min}$	Complies
Piling	57	58	Yes
General Construction Activities*	56	58	Yes

*Note: Construction activities conducted during category 3 and 4 periods are to exclude any hydraulic/pneumatic hammering, rock/concrete sawing and angle grinding.

4.1 DISCUSSION

Noise associated with construction works during extended construction hours have been assessed against a worst case scenario of piling and general construction works being undertaken on the site during the proposed category 3 and 4 periods.

On this basis, the proposed construction works will comply with the Sydney City Council noise emission criteria and the EPA's Interim Construction Noise Guideline.

5 RECOMMENDED MANAGEMENT CONTROLS

The following management controls are recommended to ensure that noise emanating from the site during construction works comply with the noise emission criteria.

- Construction activities conducted during category 4 periods are to exclude any hydraulic/nematic hammering, rock/concrete sawing.
- Construction activities conducted during category 2 periods are to exclude any hydraulic/nematic hammering, rock/concrete sawing or angle grinding.
- Deliveries are to be undertaken during normal construction hours in compliance with the exiting site construction management plan.
- No radios (cars or otherwise) are to be played external to the building envelope.

6 STATEMENT OF INTENT TO COMPLY

An afterhours contact number of the Site Manager will be advertised outside the building site, so that residents and other interested parties may contact him/her, should they believe a noise breach is occurring.

It is acknowledged that in order for the site to successfully work during extended hours a careful and structured work methodology needs to be developed and implemented to ensure on site workers understand the conditions (such as keeping all external facade openings closed) which allow for works to be conducted during the extended hours periods. The calculated levels assume that such a noise management plan is implemented. The measures, which need to be observed and rigorously followed, are outlined clearly under each calculation table.

It is further acknowledged that a programme of liaison with representatives of the potentially affected receiver locations will need to be established and maintained throughout the duration of the project.

7 CONCLUSION

This report presents the assessment of construction noise impacts associated with the proposed extension of construction hours for works associated with the Ribbon development, Sydney including the period until midnight Monday to Saturday.

Predicted noise levels from the worst case construction works indicate that noise emissions will comply with council's "Construction Hours/Noise within the Central Business District – Code of Practice (1992)" guideline requirements for category 2 and 4 periods and the EPA's Interim Construction Noise Guidelines.

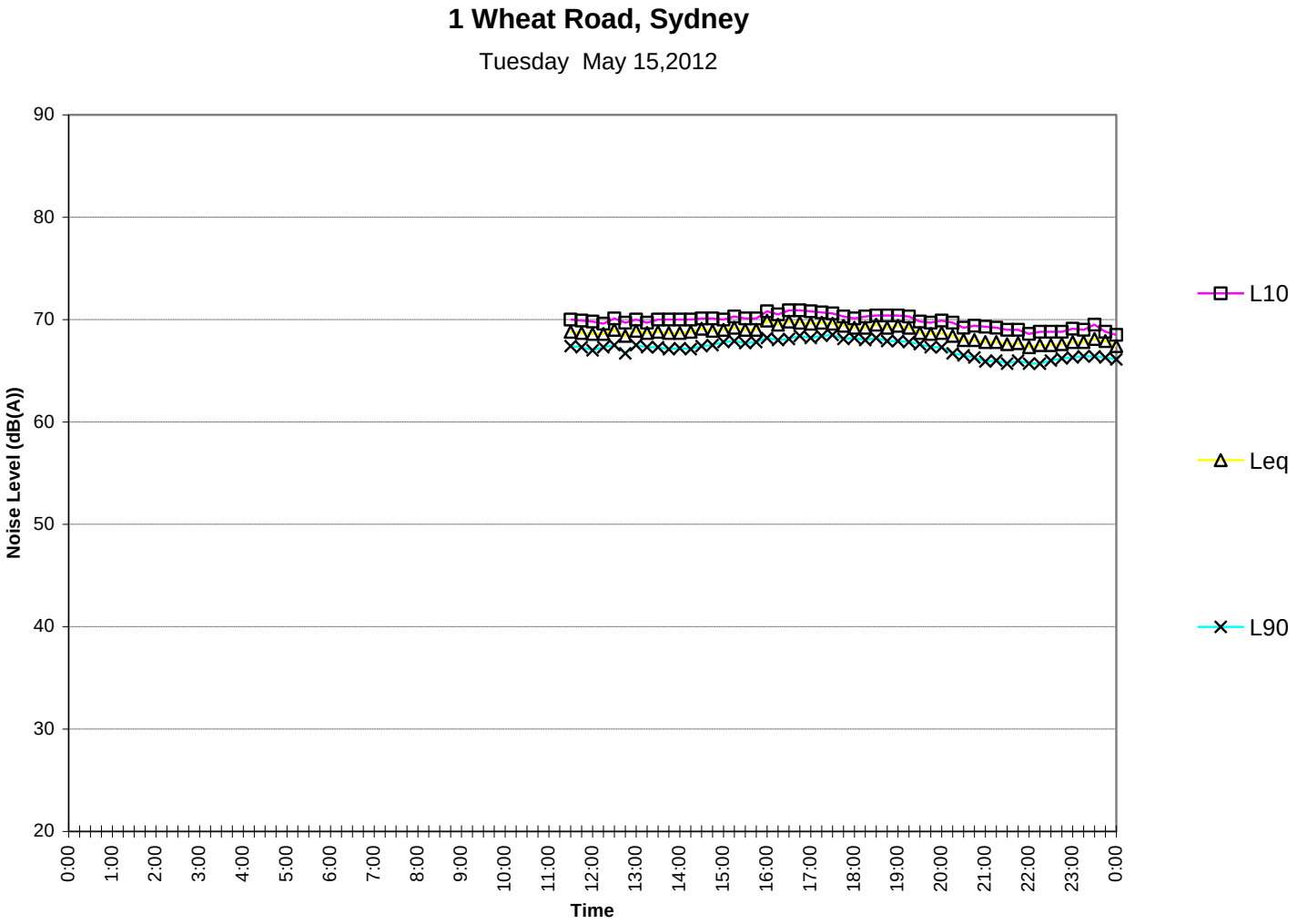
We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Ben White

Appendix 1

Unattended Noise Logging Data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60
50
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30
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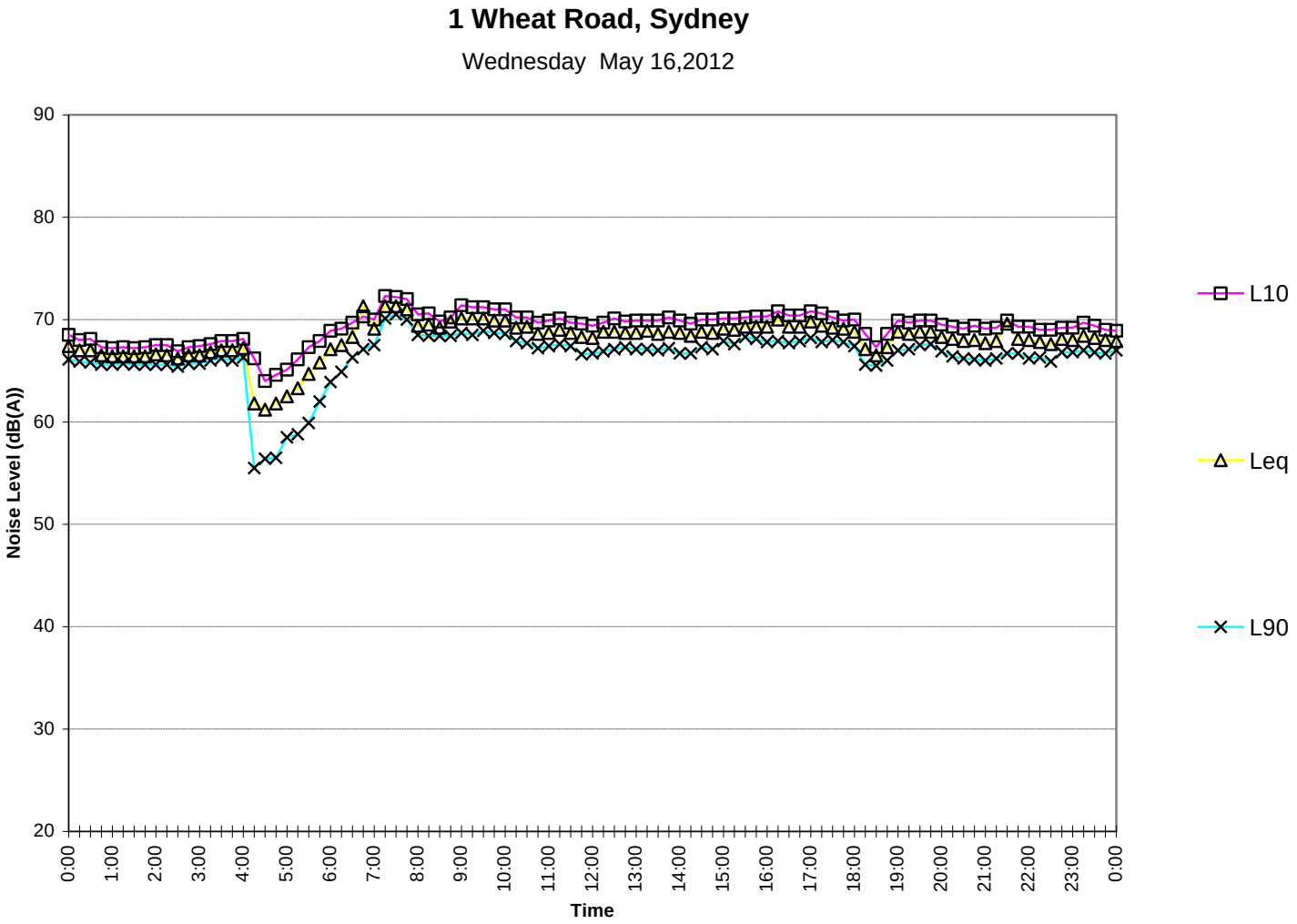
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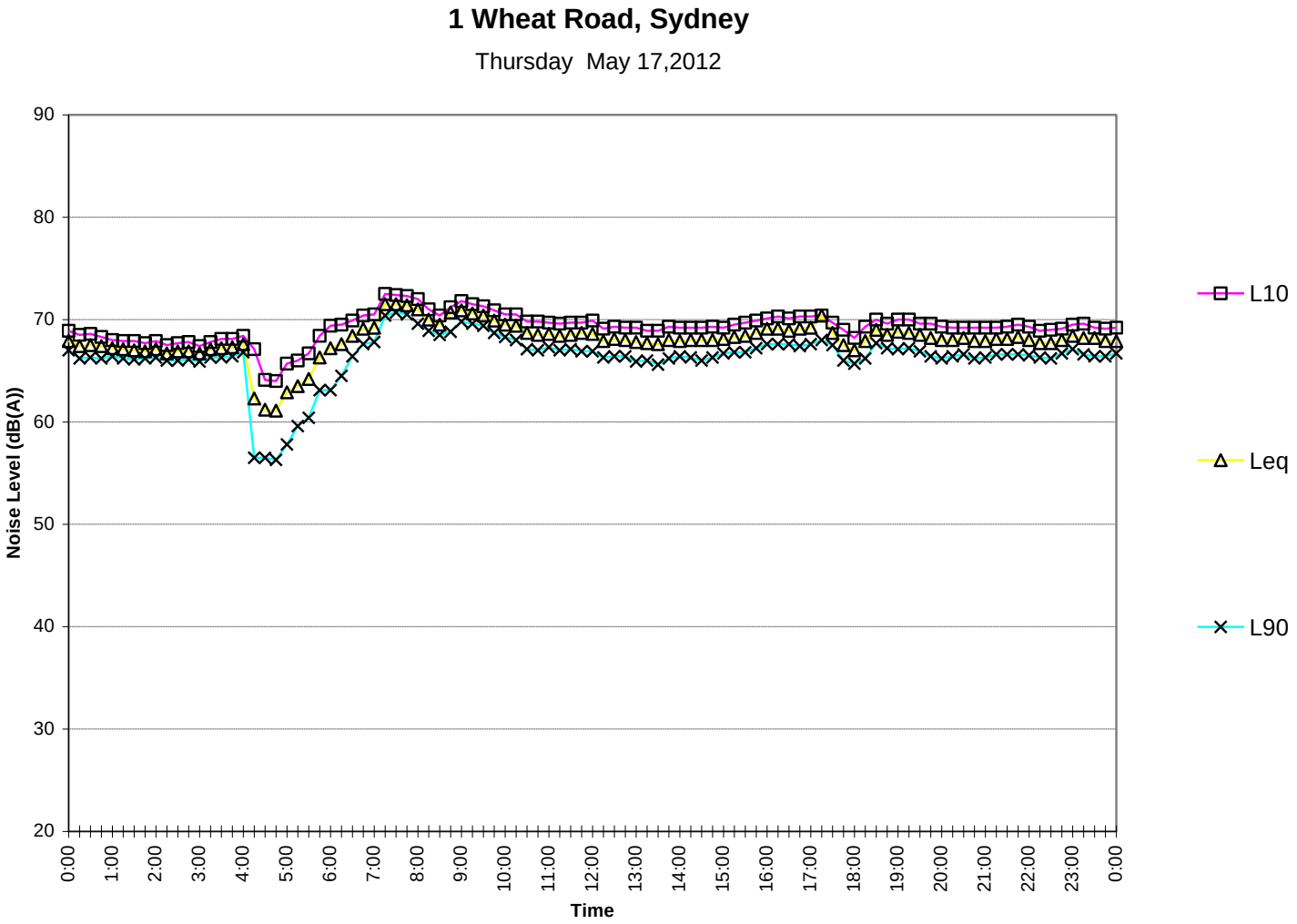
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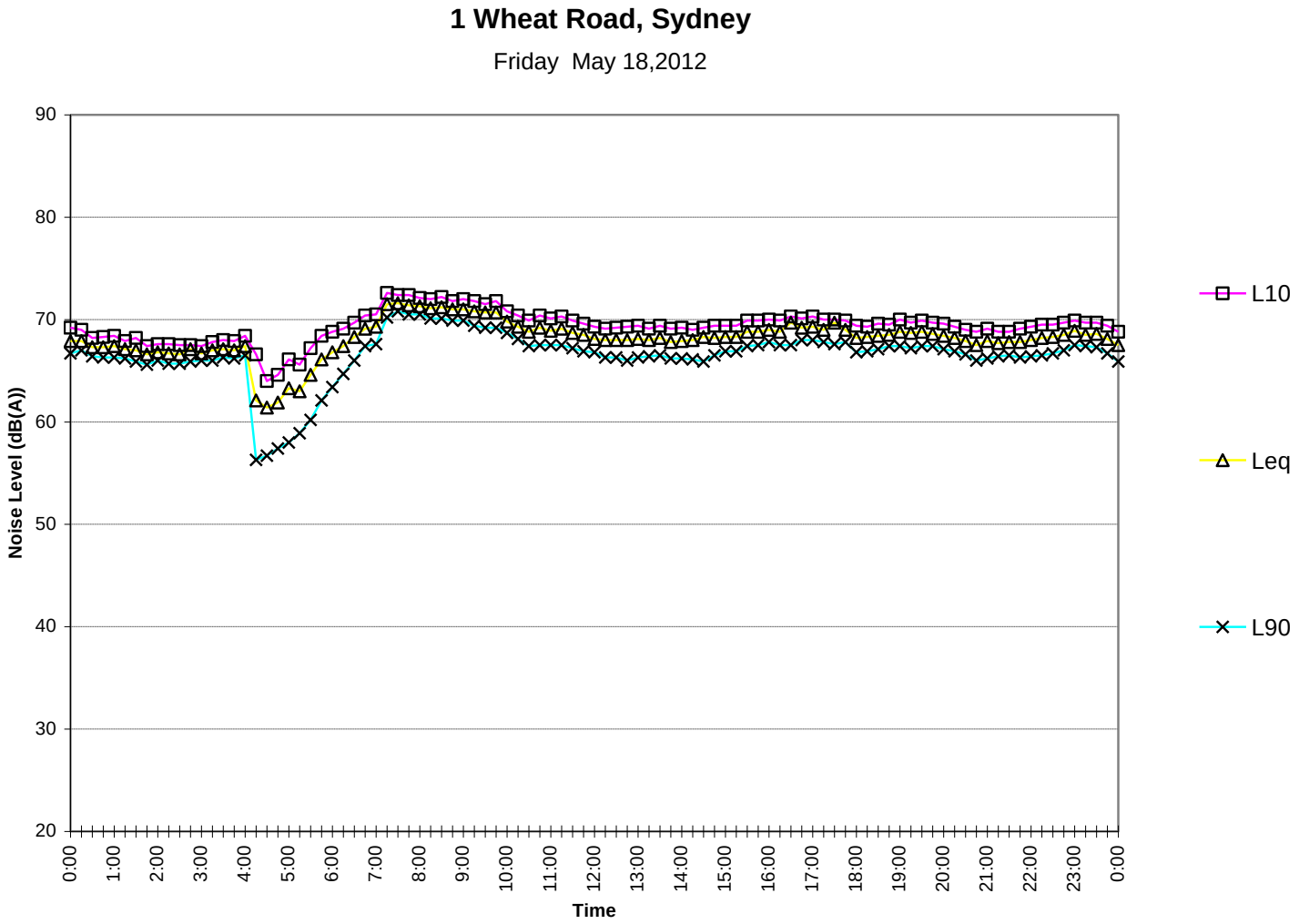
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Friday May 18,2012
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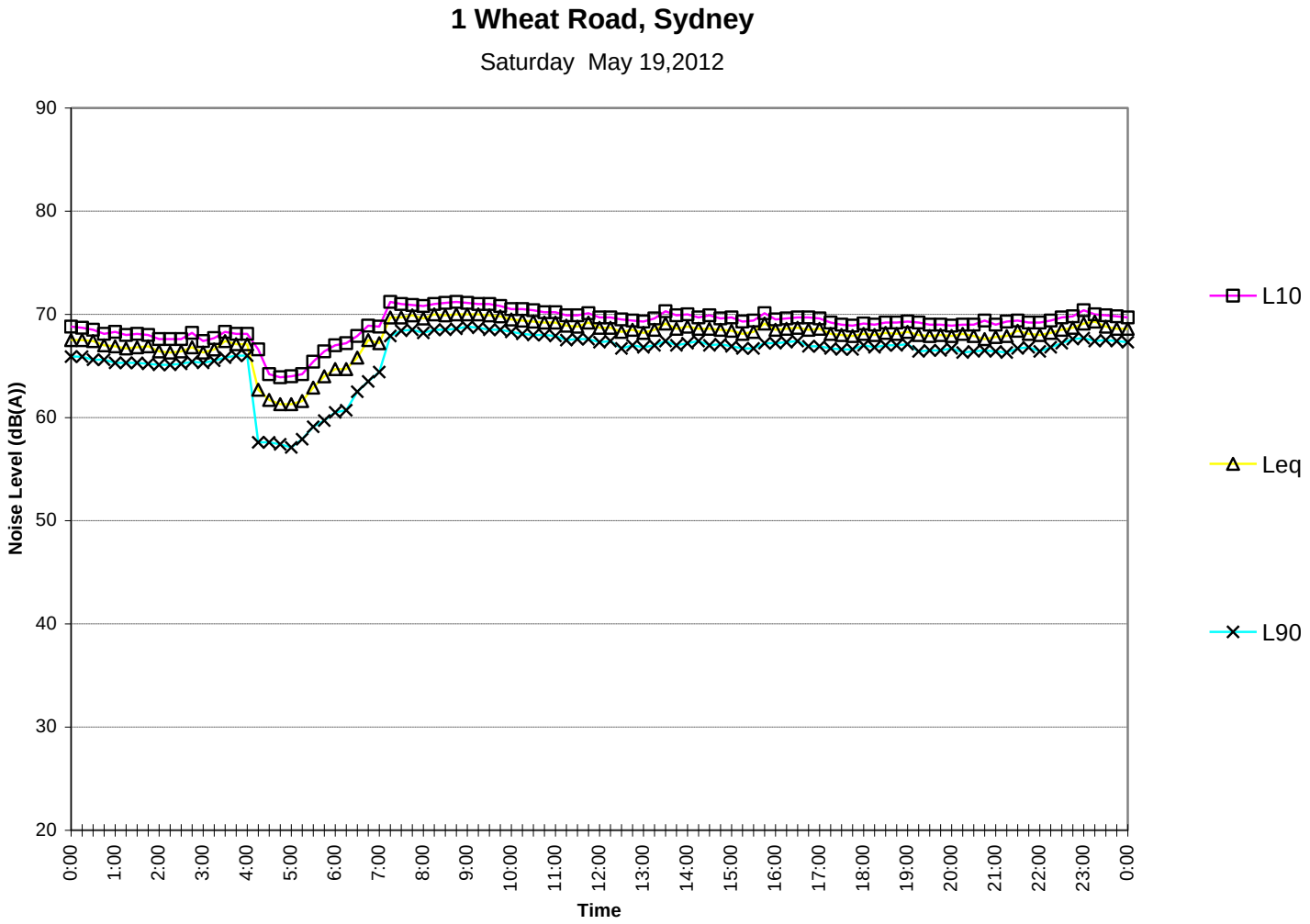
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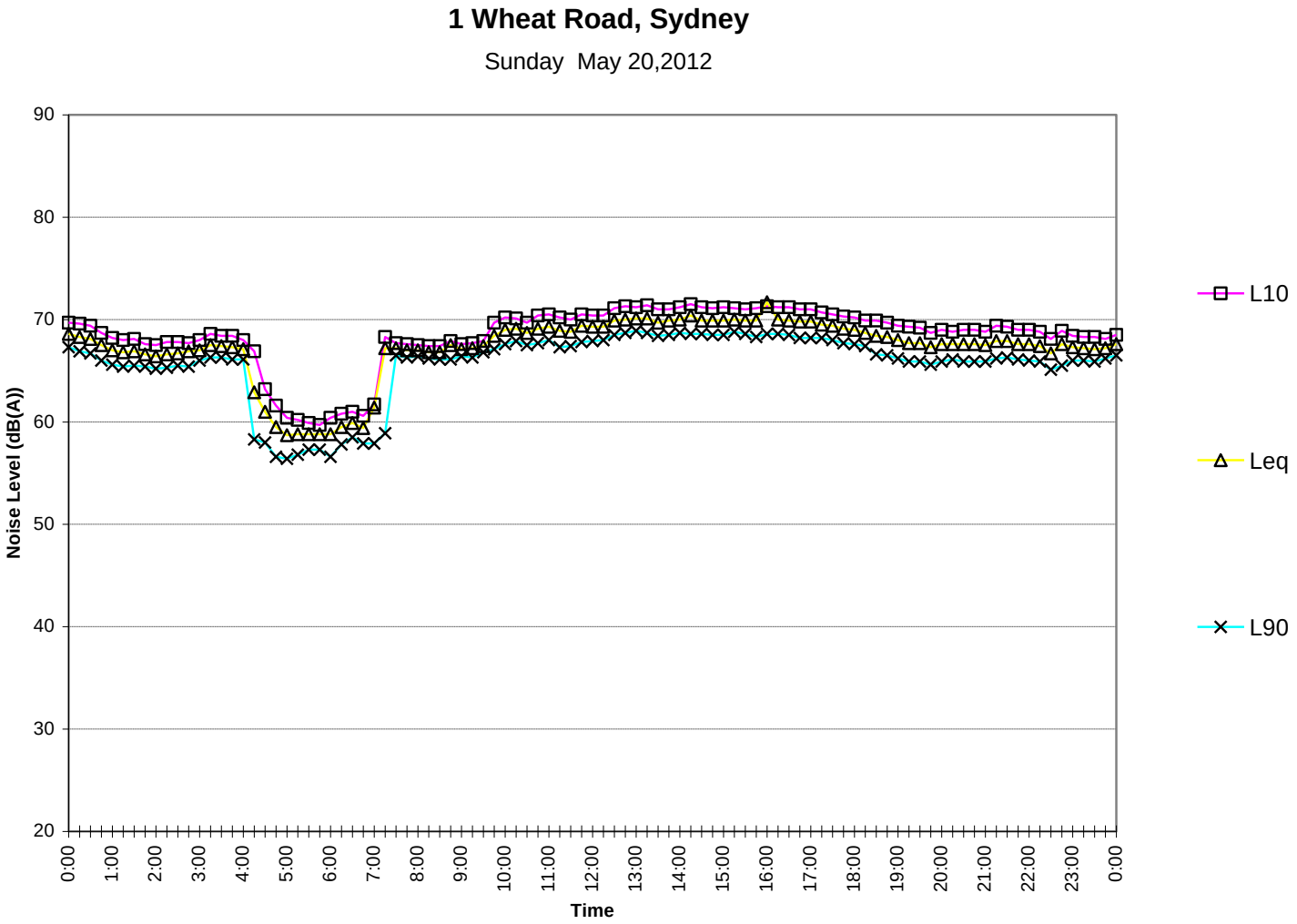
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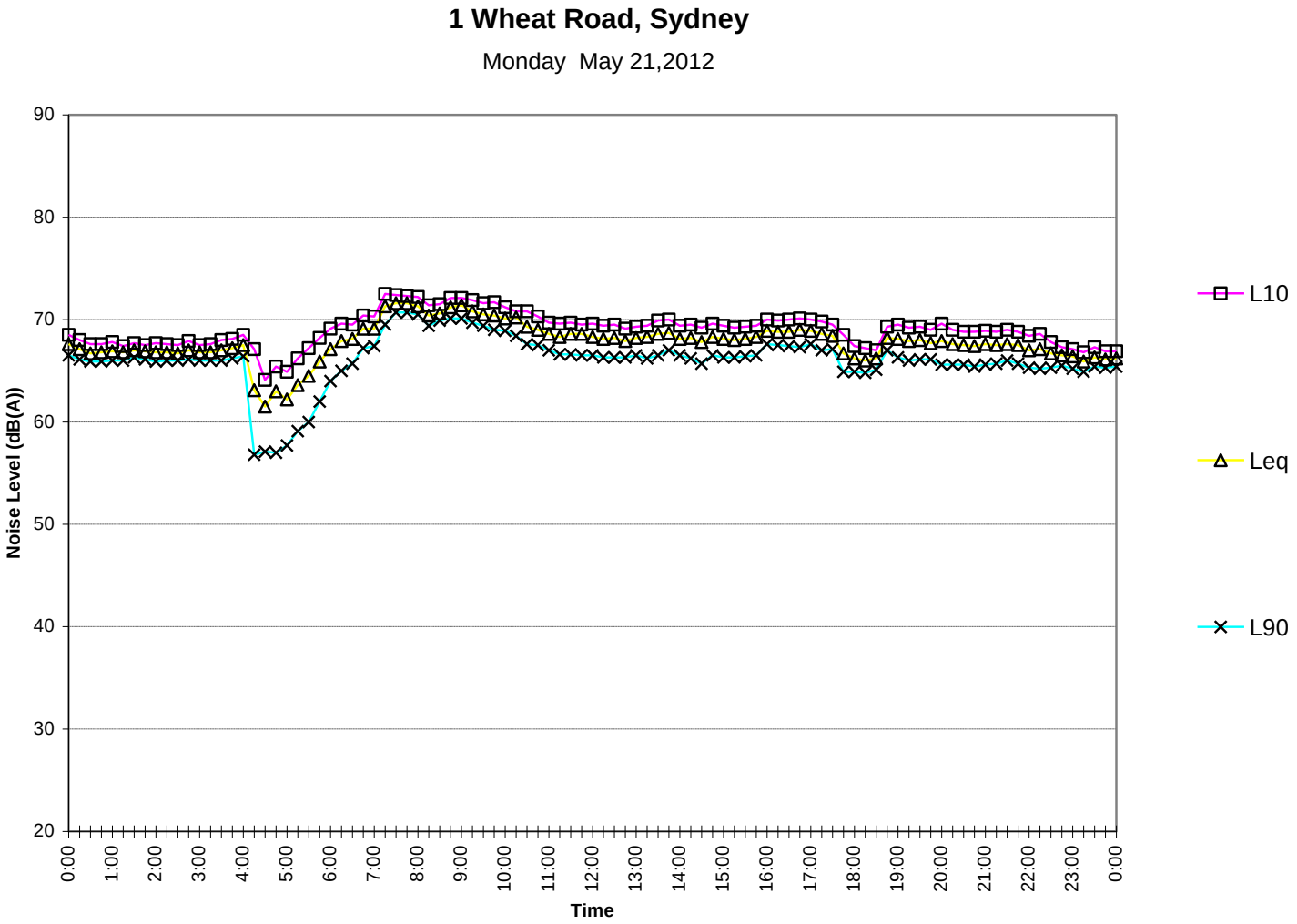
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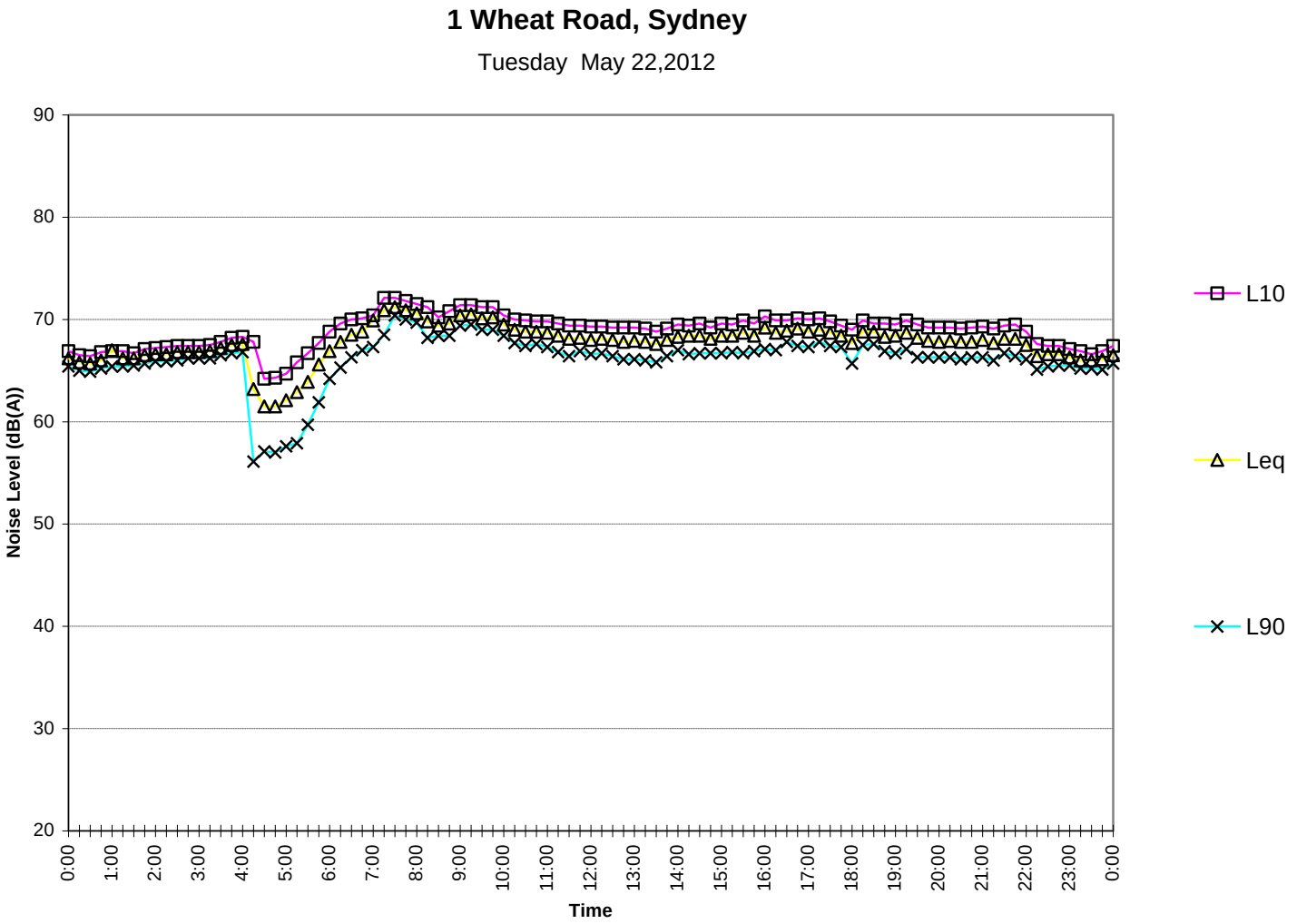
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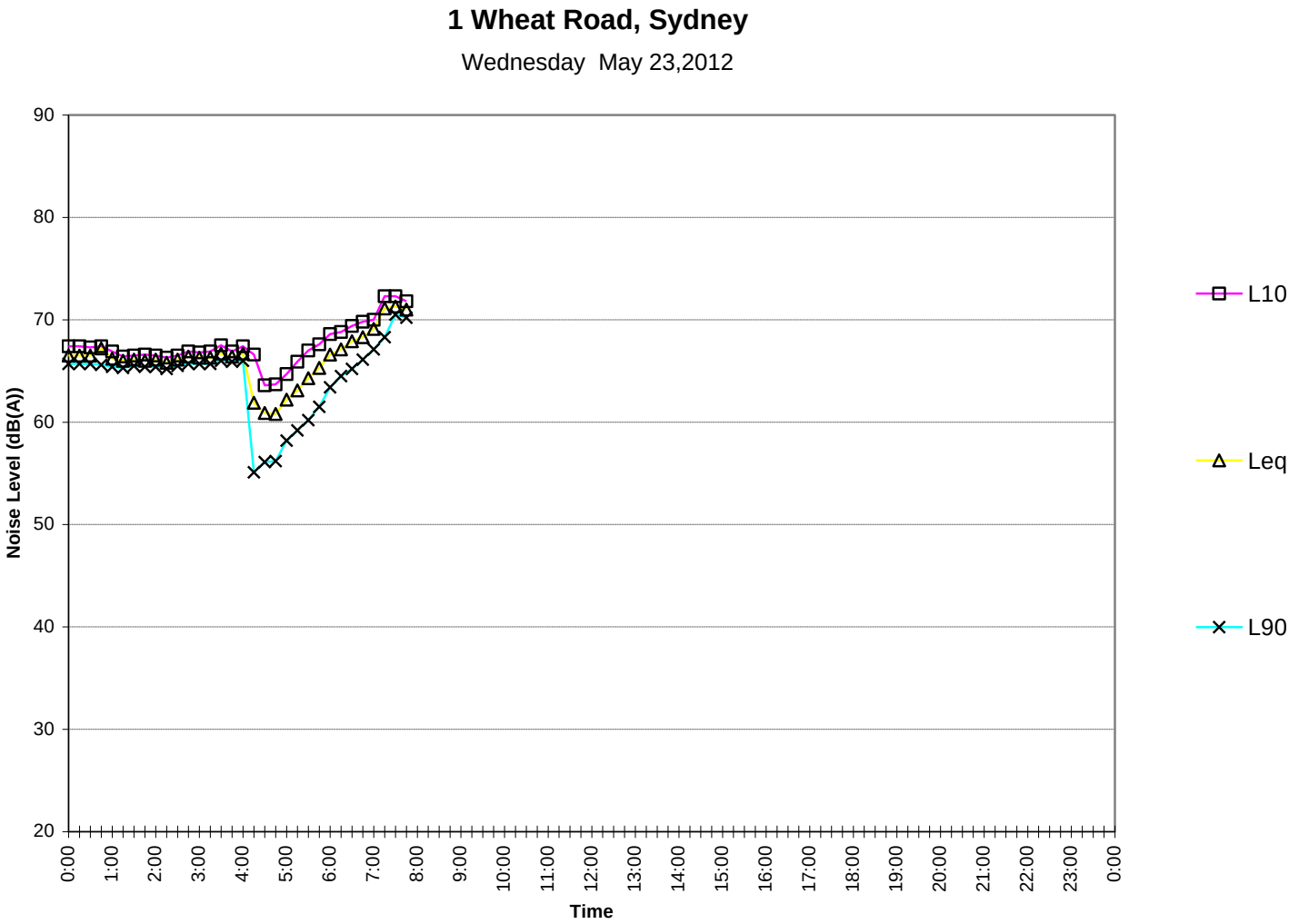
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