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The Ribon

Noise Impact Assessment

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DOCUMENT CONTROL REGISTER

Project Number	20120410.1
Project Name	The Ribon
Document Title	Noise Impact Assessment
Document Reference	20120410.1/2407A/R1/BW
Issue Type	Email
Attention To	Grocon Constructors Pty Ltd Mr Justin Clark

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	4/06/2012	20120410.1/0406A/R0/BW	BW		BW
1	24/07/2012	20120410.1/2407A/R1/BW	BW		BW

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1 INTRODUCTION

This report presents our assessment of potential environmental noise impacts associated with the 1 Wheat Road, Sydney commercial development to be located within the Darling Harbour precinct Sydney.

In this report we will:

- Identify environmental noise sources which may impact on the site and recommend acoustic treatments to reduce these impacts to acceptable levels.

- Identify potential noise sources generated by the site, and determine noise emission goals for the development to meet Council acoustic requirements to ensure that nearby developments are not adversely impacted.

Traffic noise intrusion into the development has been assessed in accordance with AS 2107 "Recommended Design Sound Levels and Reverberation Times for Building Interiors" and Sydney City Council requirements.

2 SITE DESCRIPTION

The proposed 1 Wheat Road, Sydney 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.

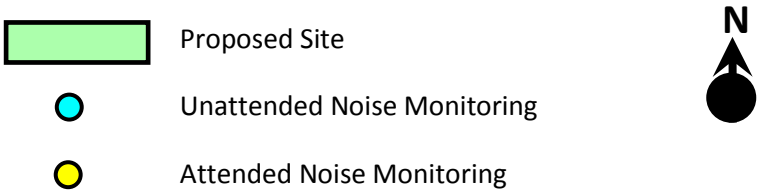
Noise potentially generated by the site will consist primarily of noise from the proposed mechanical plant serving the project site.

The nearest potentially affected noise receivers are:

- Commercial areas within Darling Harbour.

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

Figure 1 – Site Map



3 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic 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. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of 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 interval.

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 measurement 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 traffic noise.

Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

4 TRAFFIC NOISE INTRUSION ASSESSMENT

This section of the report presents the internal environmental noise assessment conducted into the proposed development.

Significant noise sources in the vicinity of the site are as follows:

- Traffic noise on the Western Distributor.

4.1 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic 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. These parameters are used to measure how much annoyance would be caused by a particular noise source.

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Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

4.2 ACOUSTIC OBJECTIVES

The Central Sydney DCP 1996 does not outline any internal acoustic requirements with respect to commercial developments. In the absence of any relevant criteria in the City of Sydney DCP, Australian Standard AS/NZS2107:2000 "*Recommended Design Sound Levels and Reverberation Times for Building Interiors*", will be used to determine recommended design sound levels for shop buildings. Table 1 below, details the criteria applicable to this development and the Green Star council.

Table 1 – Internal Noise Level Criteria

Space/ Activity Type	Recommended design sound level	
	AS2107:2000	Green Star
Commercial Developments	45 dB(A) $L_{eq(9\ hour)}$	40 dB(A) $L_{eq(9\ hour)}$

Based on the above the Green Star criteria will be used as the most stringent noise criteria for the project for the 9 hour period of 8am to 5pm.

4.3 ATTENDED TRAFFIC NOISE MEASUREMENTS

As part of the noise impact assessment attended traffic noise measurements were conducted at the site at the locations shown above in Figure 1.

The noise measurements were obtained using a Norsonic 140 Sound Level Analyser, set to A-weighted fast response. The sound level meter was calibrated before and after the measurements using a Norsonic 1251 Sound Level Calibrator. No significant drift was recorded.

Attended traffic noise levels where conducted on the 23rd May, 2012 during a typical peak morning period of 8.30am to 9.30am.

4.4 UNATTENDED TRAFFIC NOISE MEASUREMENTS

Unattended traffic noise measurements were conducted at the site as detailed in figure 1. The unattended noise monitoring was conducted at a high level to obtain potentially worst case noise level of the proposed development overlooking the Western Distributor.

Unattended noise measurements were obtained using an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The noises monitors were 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. There were no significant periods of adverse weather conditions during the measurement period.

The unattended noise level measurements were conducted between from 15th and the 23rd May, 2012. The results of unattended noise logging are included in Appendix A. The logger was located at a location which was not affected by other noise sources such as plant and equipment.

4.5 TRAFFIC NOISE MEASUREMENT RESULTS

Measurements were performed generally in accordance with the Australian Standard AS1055 – Description and Measurement of Environmental Noise – General Procedures.

The traffic noise levels were determined based on the logging data and attended measurements and are presented below. In determination of acoustic treatments, the measured level is adjusted for distance, barrier attenuation and orientation where applicable.

Table 2 – Attended Noise Levels dB(A) Leq

LOCATION	TRAFFIC NOISE LEVEL dB(A) $L_{eq(15\ min)}$
	Day time 7am-10pm
Western Distributor	75 dB(A) $L_{eq(15\ min)}$

Table 3 – Unattended Measured Noise Levels dB(A) Leq (time period) – Green Star

LOCATION	TRAFFIC NOISE LEVEL dB(A) L_{eq}
	Day time
Western Distributor	74 dB(A) $L_{eq\ (9\ hour)}$

4.6 RECOMMENDATIONS

Noise intrusion into the proposed commercial development has been assessed using the measured external noise level reported above as the basis. Recommendations have been determined taking into account the orientation of windows, barrier effects (where applicable), the total area of glazing, facade transmission loss and room sound absorption characteristics.

Recommended treatments are set out below.

4.6.1 Glazing

The table below indicates the glazing types that will be required to achieve the recommended internal noise levels.

Table 4 – Recommended Glazing Constructions

Level	Façade	Glazing	Seals
All Levels	All Façade orientations	6.38mm laminate / 200mm air gap / 6mm OR 10.38mm laminated / 150mm air gap/ 6mm	Yes

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

In addition to complying with the minimum scheduled glazing thickness, the STC rating of the glazing fitted into openable frames and fixed into the building opening should not be lower than the values listed in Table 5. Where nominated, this will require the use of acoustic seals around the full perimeter of openable 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.

Table 5 – Minimum STC of Glazing

Glazing Assembly	Acoustic Seals	Minimum STC of Installed Window
6.38mm laminate / 200mm air gap / 6mm	Yes	46
10.38mm laminated / 150mm air gap/ 6mm	Yes	46

4.6.2 External Walls & Roof

Noise intrusion through the external masonry walls will be negligible and will not contribute to internal noise levels. Similarly, noise intrusion through the concrete slab roof construction will not be significant.

4.6.3 Roof/Ceiling

Any roof of concrete construction will not require upgrading in order to satisfy the project acoustic objectives.

4.6.4 External Walls

External walls are of masonry construction and do not require upgrading in order to satisfy the project acoustic objectives.

5 EXTERNAL NOISE EMISSION ASSESSMENT

Noise emissions from the site 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 mechanical plant.

The nearest potentially affected noise receivers are:

- Commercial properties within the Darling Harbour Precinct.

5.1 BACKGROUND NOISE MONITORING

5.1.1 Time of Measurement

The unattended noise monitor was installed from 15th and the 23rd May, 2012.

5.1.2 Measurement Equipment

Unattended noise monitoring was conducted using an Acoustic Research Laboratories Pty Ltd series 315 noise monitor. The monitor was programmed to store 15-minute statistical noise levels throughout the unmanned monitoring period. Equipment was calibrated at the beginning and the end of the measurement using a Rion NC-74 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode. See Figure 1 for location.

Measured background noise levels are presented below. Refer to Appendix 1 for unmanned noise monitoring data.

Table 6 – Measured Background Noise Levels

Location	Background noise level dB(A)L_{90}	
Riley Street	Daytime (7am-Midnight)	Over night (Midnight-7am)
	64	56

5.2 ACOUSTIC OBJECTIVES

Noise emission controls typically applied by the City of Sydney Council are set out below.

The emission of noise associated with the use of the premises including the operation of any mechanical plant and equipment shall comply with the following criteria:

(i) (i) The LAeq, 15 minute noise level emitted from the use must not exceed the background noise level LA90, 15 minute by more than 5dB when assessed at the boundary of any affected residence.

(ii) (ii) The LAeq, 15 minute noise level shall be adjusted for modifying factors in accordance with Appendix 2 of the Noise Guide For Local Government published by DECCW.

(iii) (iii) The background noise level shall be measured in the absence of noise emitted from the use in accordance with Australian Standard AS 1055.1-1997-Description and measurement of environmental noise.

(iv) (iv) The use of the premises shall be controlled so that any emitted noise is at a level so as not to create an "offensive noise" as defined in the Protection of the Environment

Operations Act 1997 to any affected residence.

An LAeq, 15 minute noise level emitted from the use must not exceed the LA90, 15 minute noise level by more than 3dB in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) when assessed inside any commercial premises provided that;

(i) The LAeq, 15 minute noise level and the LA90, 15 minute noise level shall both be measured with all external doors and windows of the commercial premises closed;

(ii) (ii) The LA90, 15 minute noise level shall be measured in the absence of noise emitted from the use but with the ventilation equipment (including air-conditioning equipment) normally servicing the commercial premises operating.

(iii) The use of the premises shall be controlled so that any emitted noise is at a level so as not to create an "offensive noise" as defined in the Protection of the Environment Operations Act 1997 to any affected residence.

(iv) In this clause, the term “noise level emitted from the use” means the contributing noise level from the use in isolation to any other ambient noise and account must therefore be taken of the LAeq, 15 minute when the use is not in operation.

(v) In circumstances where this development application refers to a modification or addition to an existing use, the background noise level referred to in this clause pertains to the LA90, 15 minute noise level measured in the absence of all noise from the site.

5.3 RECOMMENDATIONS

5.3.1 External Mechanical Plant

Detailed equipment selection and mechanical layouts are not available at this stage. Acoustic treatments should be determined in order to control plant noise emissions such that compliance with council criteria as detailed in the section above is achieved.

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.

Experience with similar developments indicates that acoustic treatment of the buildings mechanical equipment and services will be both possible and practical.

6 CONCLUSION

This report presents the results from the acoustic assessment of noise impacts associated with 1 Wheat Road, Sydney development Darling Harbour.

Noise impacts on the site (noise generated by traffic movements on the Western Distributor) have been assessed with reference to relevant Australian Standards, Green Star and Council codes.

External noise emission criteria have been setup in Section 5 of this report based on the requirements of Sydney City Council. Detailed plant noise emission shall be designed to comply with this criterion during CC stage.

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

Yours faithfully,

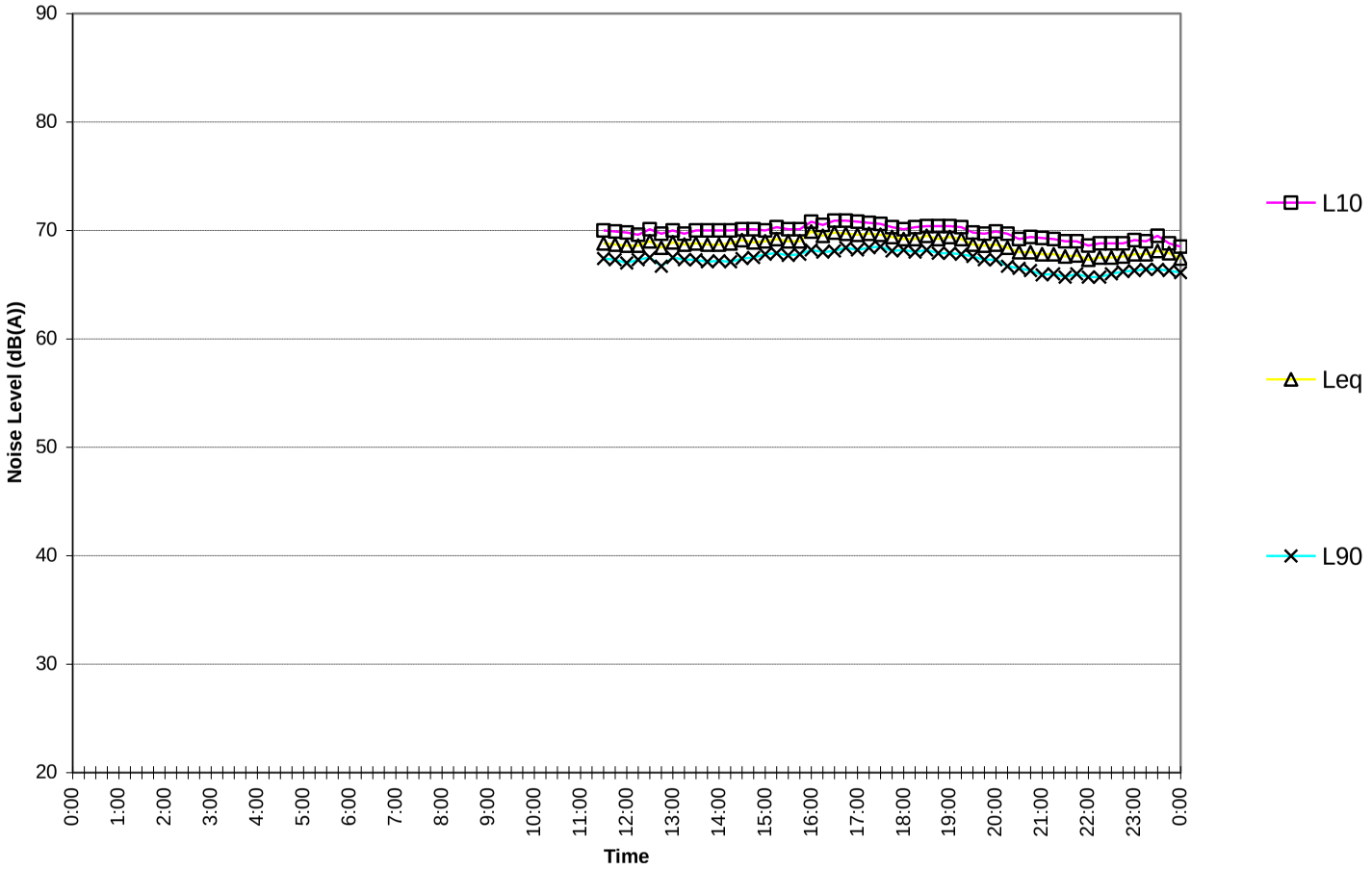
Acoustic Logic Consultancy Pty Ltd
Ben White

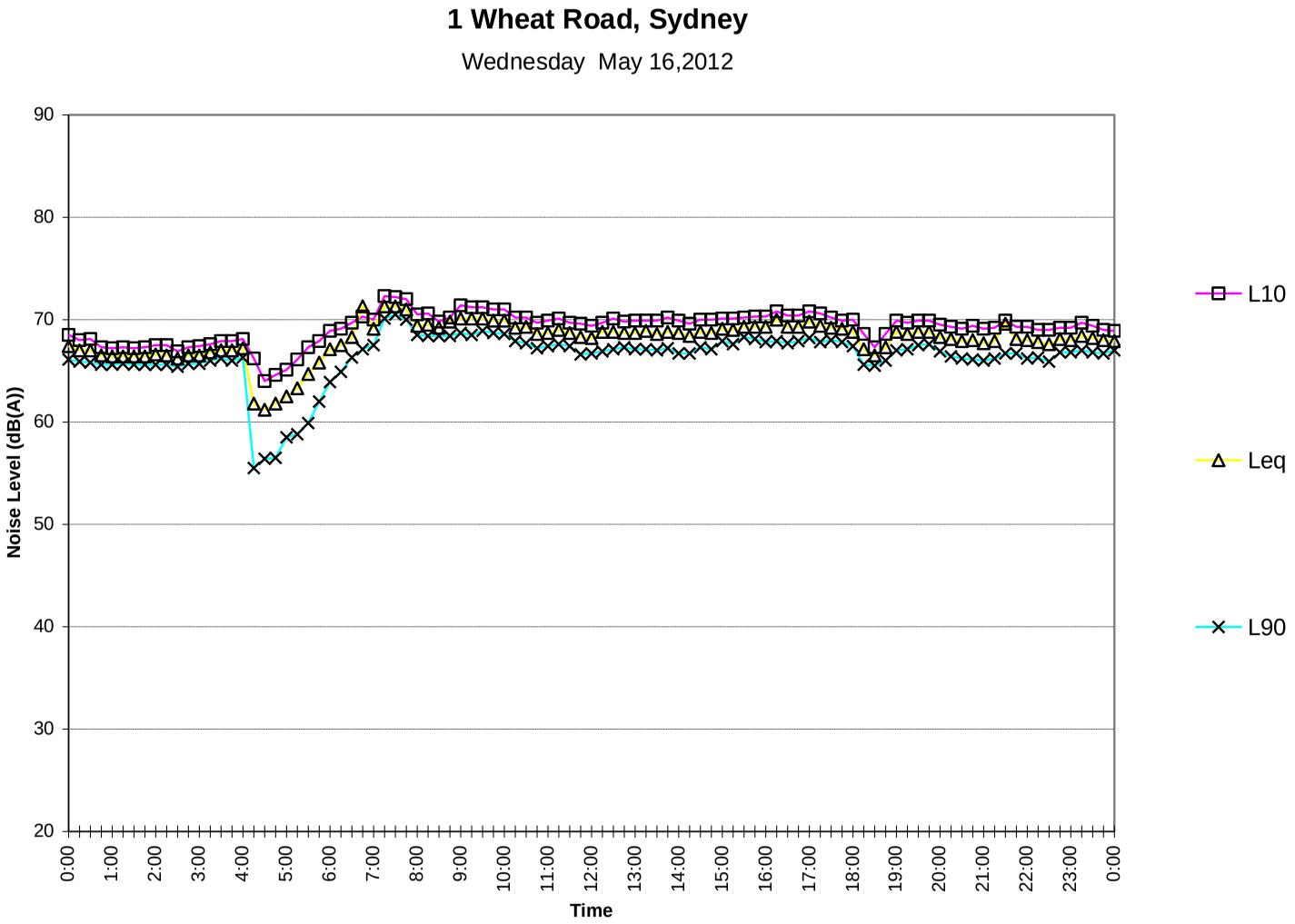
APPENDIX 1

Noise Monitoring Data

1 Wheat Road, Sydney

Tuesday May 15,2012

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Wednesday May 16,2012
Noise Level (dB(A))
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80
70
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50
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30
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2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
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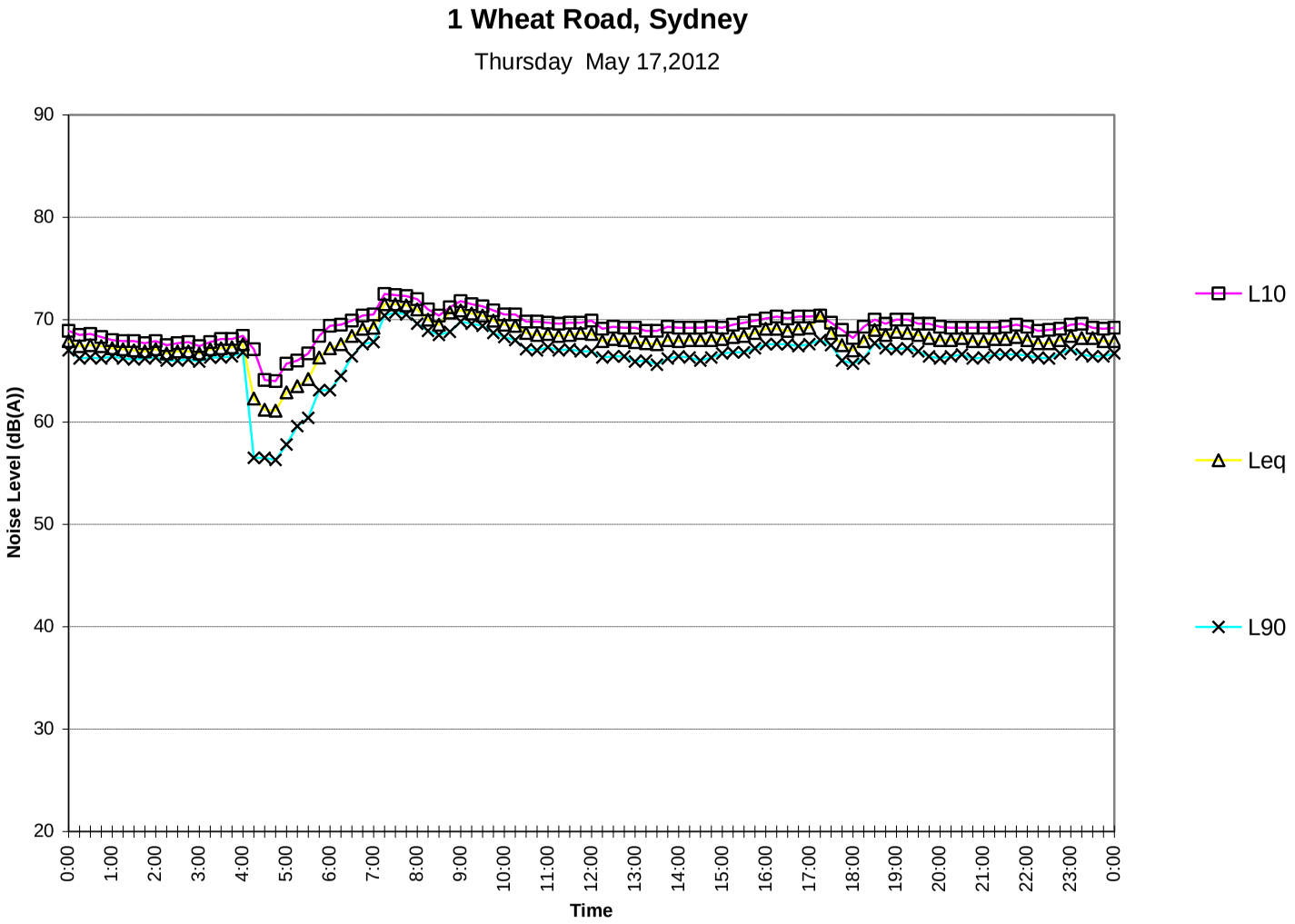
Leq
L90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Thursday May 17,2012
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50
40
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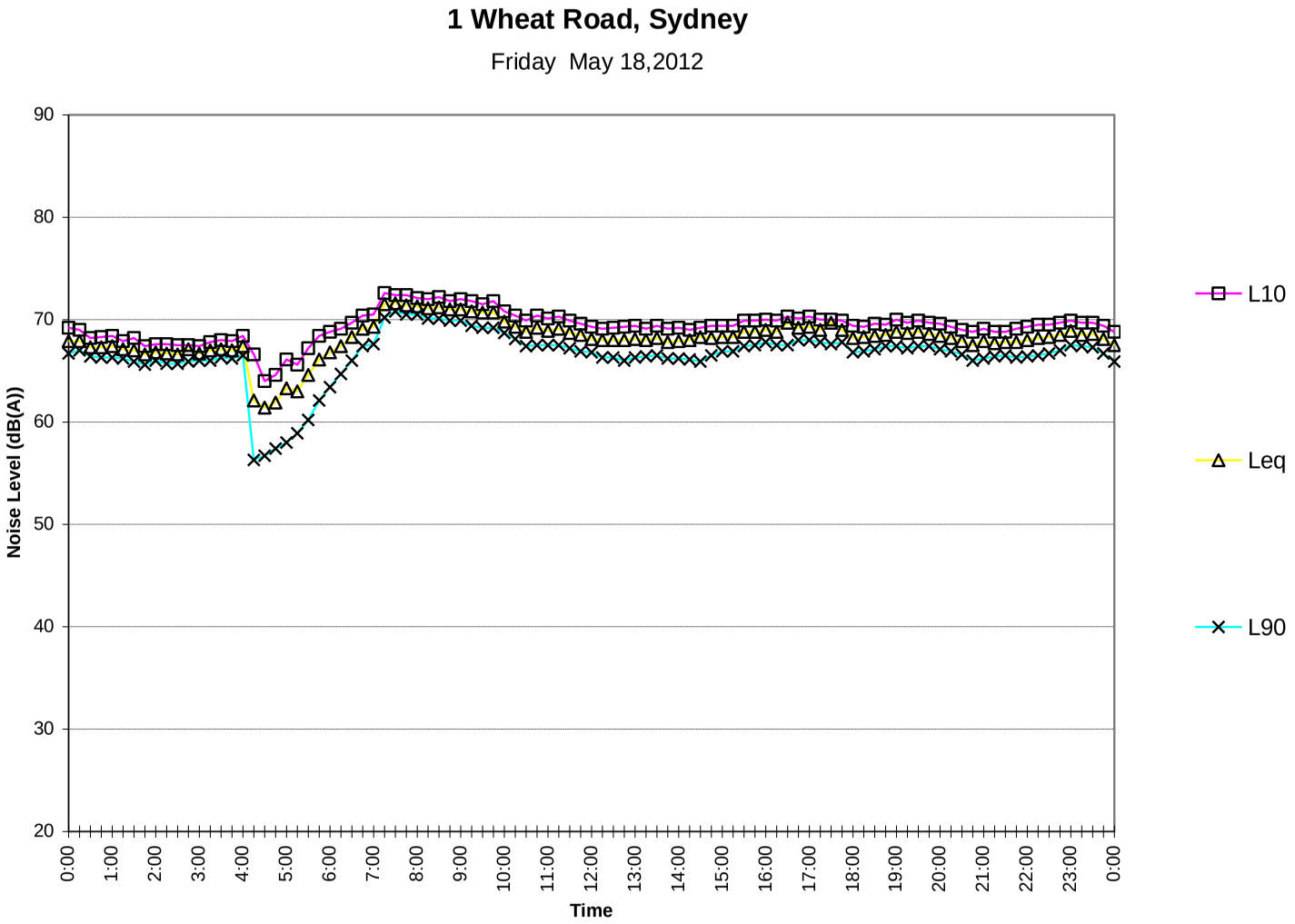
Time
L10
Leq
L90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Friday May 18,2012
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Time
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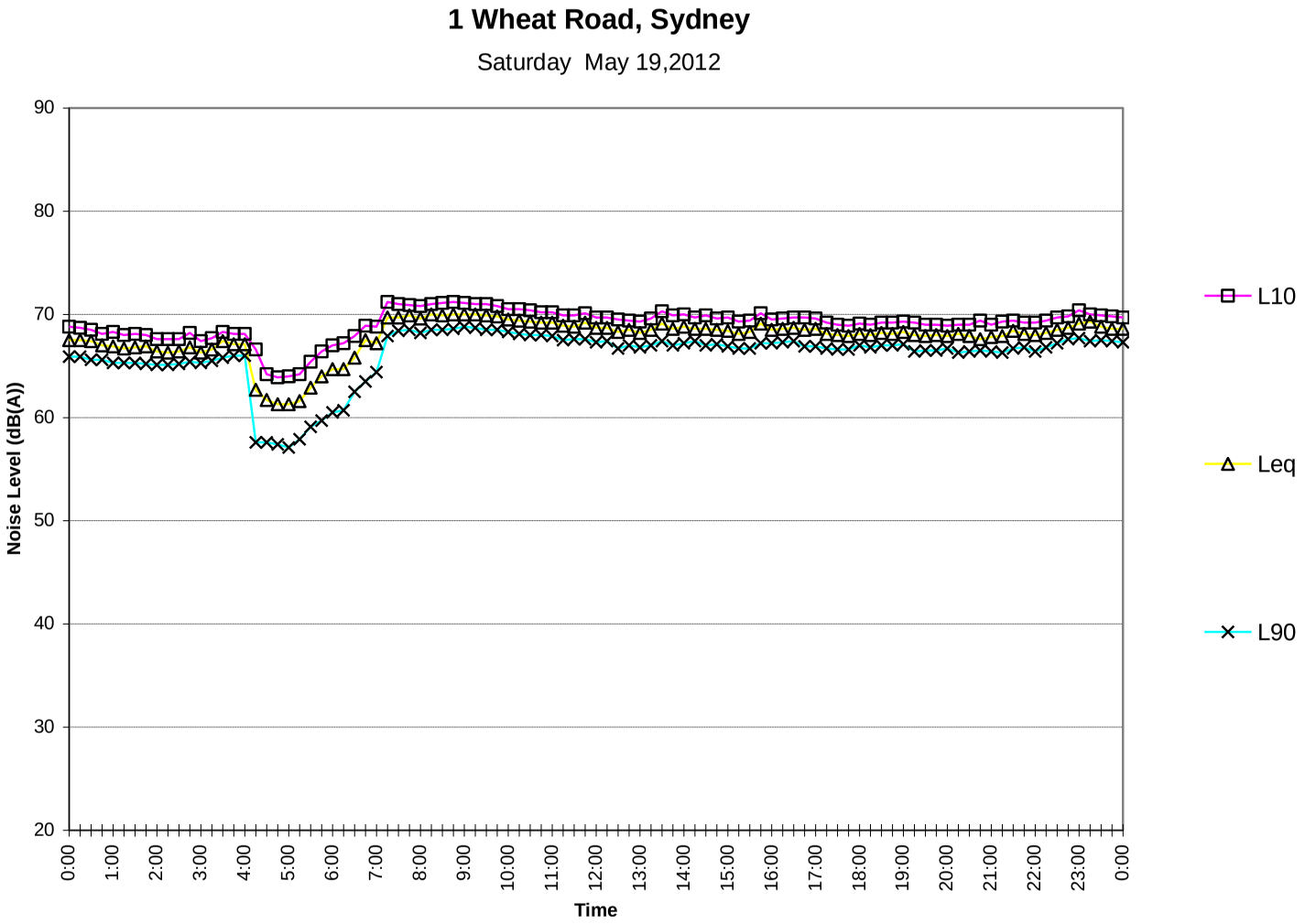
L90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Saturday May 19,2012
Noise Level (dB(A))
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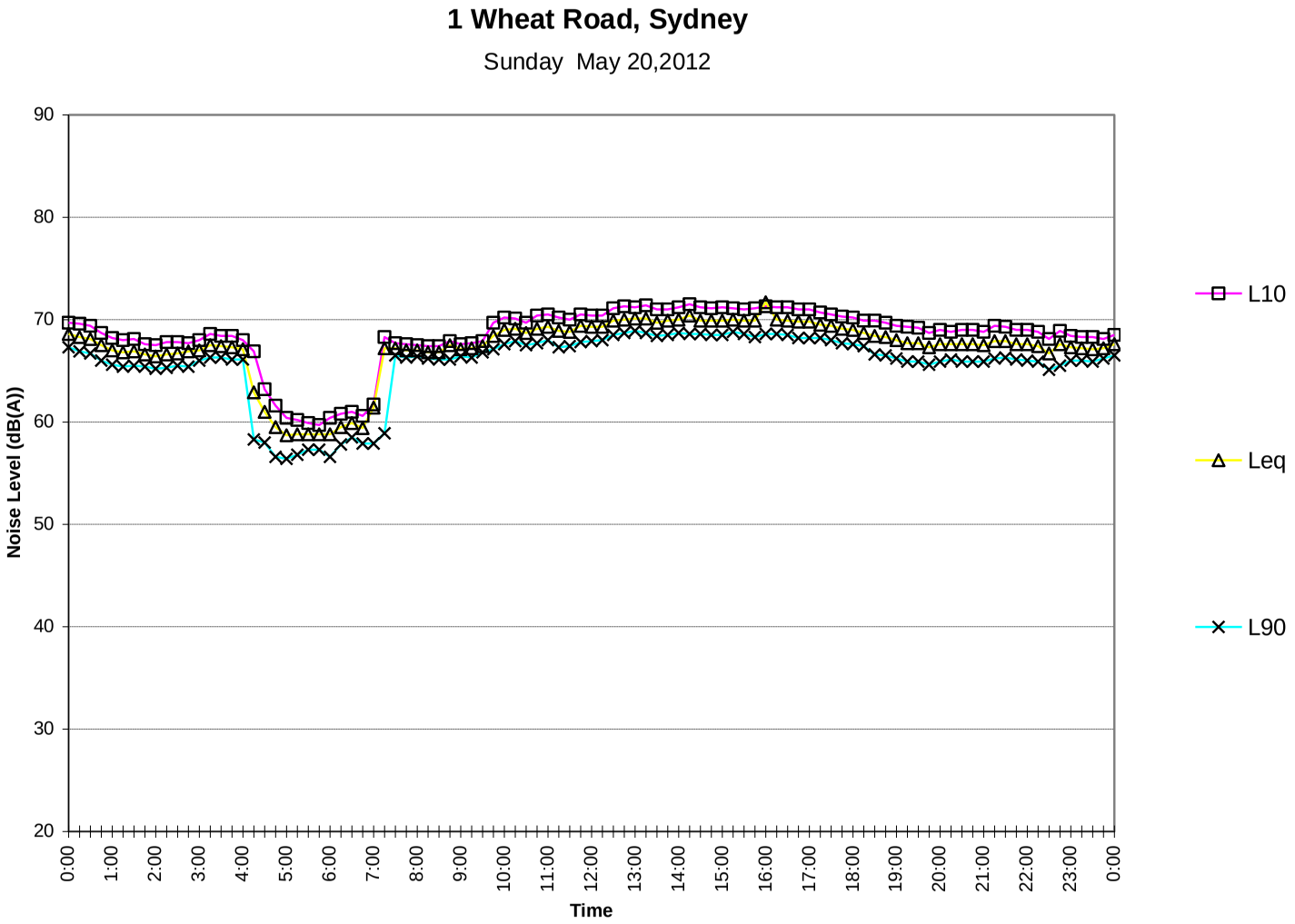
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Sunday May 20,2012
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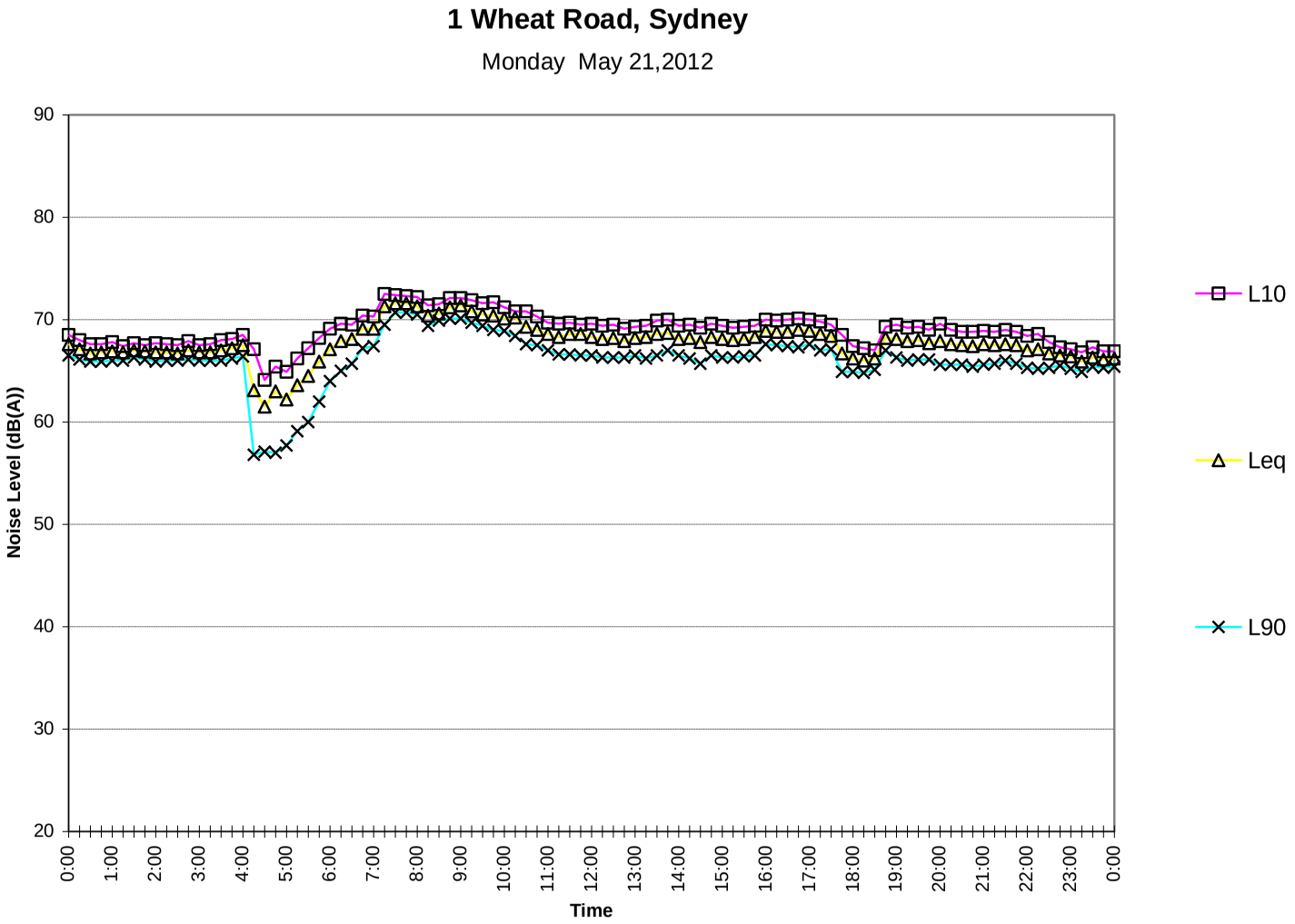
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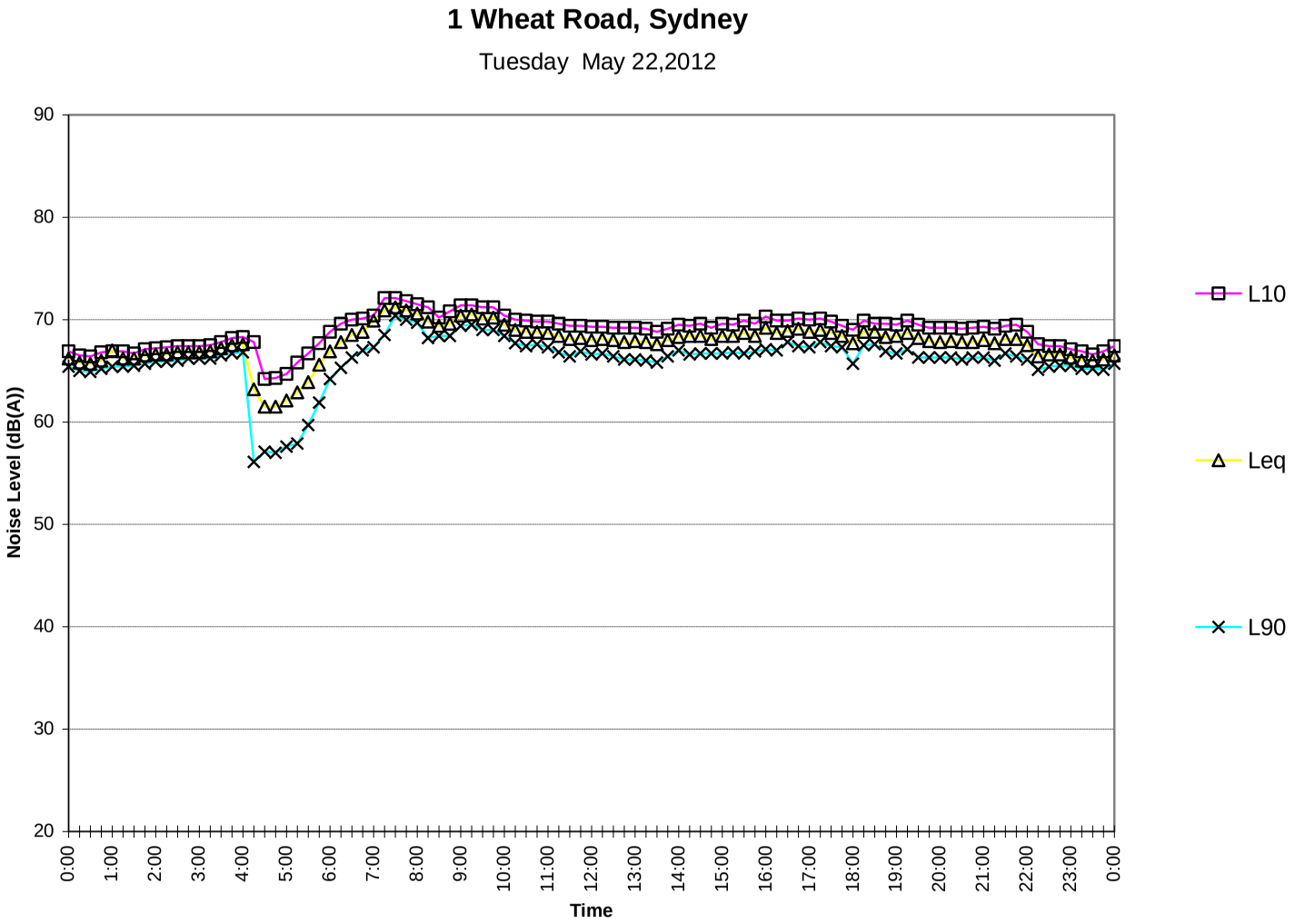
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Tuesday May 22,2012
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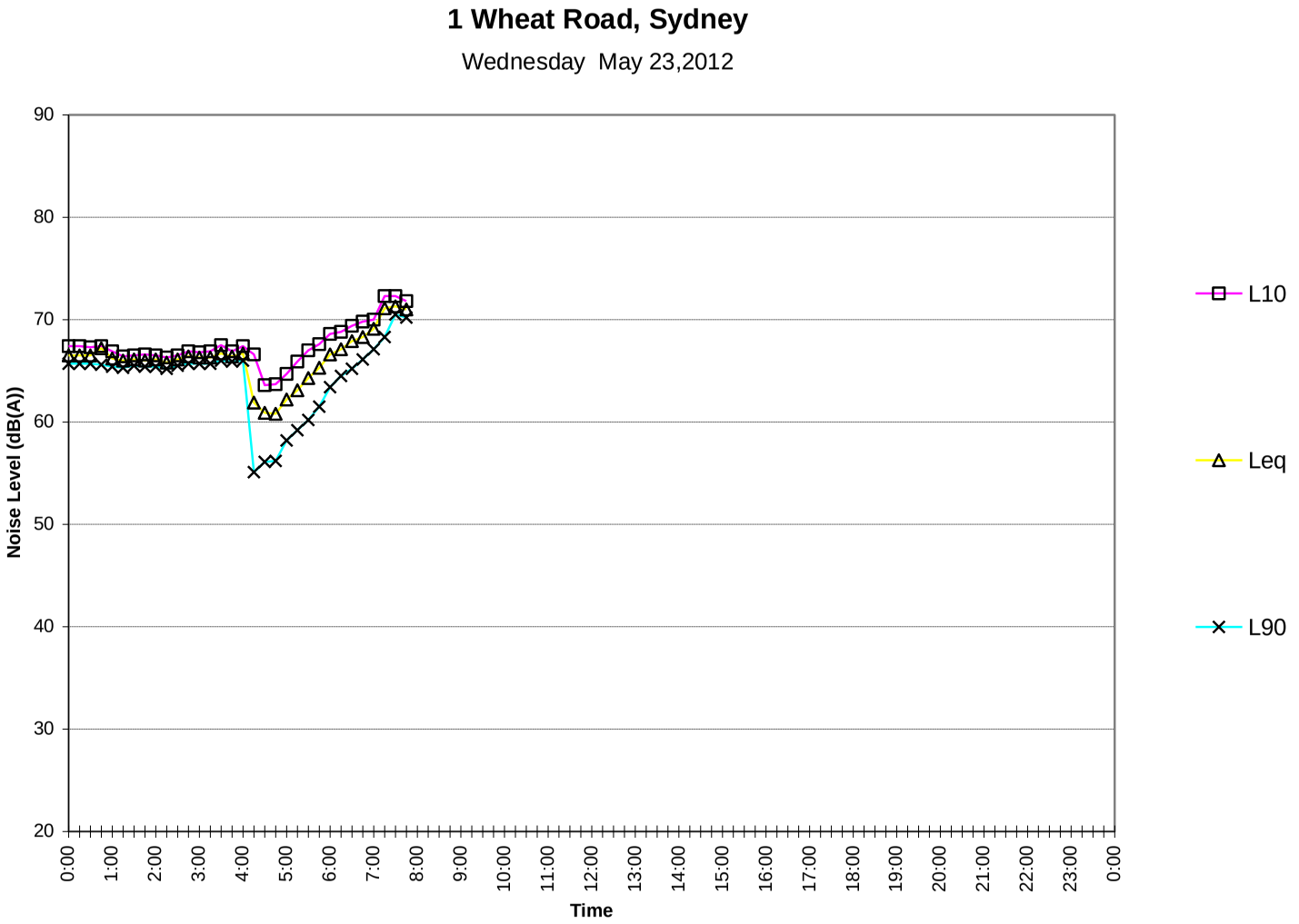
1 Wheat Road, Sydney
Wednesday May 23,2012
Noise Level (dB(A))
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