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Prepared for: McCONNEL SMITH & JOHNSON Pty Ltd

INGHAM HEALTH RESEARCH INSTITUTE BUILDING, LIVERPOOL CAMPUS

DEVELOPMENT APPLICATION

NOISE IMPACT ASSESSMENT

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1. INTRODUCTION

This report presents our assessment of potential noise impacts associated with a proposed IHRI development on the Liverpool Campus.

In this report we will:

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

- Identify external noise emissions which will be generated by the site (primarily mechanical plant noise) and recommend noise emission goals to be achieved by the development.

In each case, we will identify acoustic criteria to be used for assessment.

2. SITE DESCRIPTION

The proposed development is located at Campbell Street Liverpool. The Southern and Eastern façade facing the Campbell Street, which is a two lane roadway carrying medium volumes of traffic. While the western and northern facades are bounded by the existing commercial buildings. A site survey revealed that the main noise source impacting upon the subject site will be traffic from the Campbell Street. Detailed site map refer to Figure 1 below.

Figure 1 – Site Map and Noise Measurement Location

3. TRAFFIC NOISE IMPACT ASSESSMENT

The investigation of external noise (primarily traffic noise) intrusion into this proposed development is carried out for the following reasons, namely:

1. High levels of traffic noise heard within sensitive spaces may be disruptive to general day to day activities such as speech communication. Therefore, such noise needs to be reduced to a level where it is not intrusive upon normal activities.

As part of this investigation, traffic noise was measured at the subject site. The results of these measurements will be used to determine the treatments required to reduce noise levels to within the project acoustic objective.

4. TRAFFIC NOISE MEASUREMENTS

Unattended noise measurements were conducted on site over a period of seven days in order to characterise the existing noise environment. The unattended noise measurement results have been presented in Appendix 1.

4.1 TIME OF MEASUREMENTS

Unattended noise measurements were conducted at the subject site between the period 28th April and 11th May 2010.

4.2 MEASUREMENT POSITION

Unattended noise measurements were conducted by microphone located in the existing building on site. The microphone location is approximately 14m distance from the Campbell Street with a full view of the road.

4.3 MEASUREMENT EQUIPMENT

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 noise monitor was calibrated at the beginning and the end of the measurement period using a Rion NC-73 sound level 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.

4.4 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 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 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.

4.5 MEASURED TRAFFIC NOISE LEVELS

The measured traffic noise levels have been summarised in Table 1 which was determined from the unattended noise measurements presented in Appendix 1.

Table 1 -Measured Traffic Noise Levels dB(A)

Location	Time Period	Measured Noise Level dB(A)$L_{eq(1\ hour)}$
Campbell Street	7am to 10pm	66*

*Note: Calculated CORTON noise level impacting on the proposed future building façade.

5. EXTERNAL TRAFFIC NOISE INITRUSION CRITERIA

Internal noise level criteria for the future development have been developed in conjunction with The Australian Standard AS2107:2000 *Recommended Noise Levels and Reverberation Times for Building Interiors'.* The recommended internal noise level criteria for the future areas of the development are detailed in the table below.

Table 2 - Traffic Noise Criteria for All Spaces inside Development

SPACE/ACTIVITY TYPE	NOISE LEVEL L_{eq} dB(A)
Meeting rooms	40
Open plan office areas	45
Private Offices	40
General office areas	40
Laboratories	45
Seminar Room	40

6. RECOMMENDED CONSTRUCTIONS

Internal noise levels will primarily be as a result of noise transfer through the windows and doors as these are relatively light building elements that offer less resistance to the transmission of sound. Noise transfer through the masonry elements will not be significant and need not be considered further.

The constructions necessary to achieve the noise levels are detailed below. The predicted noise levels have been based on the expected 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.

6.1 GLAZED WINDOWS AND DOORS

The following constructions are recommended to comply with the traffic noise objectives stated in Section 5. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria listed in Table 3 below.

Table 3 - Glazing Requirements

Façade	Levels	Glazing Requirements	Acoustic Seals
All Façade	All Levels	6.38mm laminated	Yes

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

It is 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 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 4 for all rooms. 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 all these windows are assumed as aluminium awning windows and mohair seals in windows and doors are not acceptable where acoustic seals are required.

Table 4 - Minimum STC of Glazing

Glazing Assembly	Acoustic Seals	Minimum STC of Installed Window
6.38mm laminated	Yes	31

6.2 EXTERNAL WALLS

Roof and External walls composed of concrete or masonry elements will not require acoustic treatment.

6.3 ROOF CONSTRUCTION

Roof composed of concrete elements or light weight construction over the future development area will not require additional acoustic treatment to comply with internal noise level criteria.

7. EXTERNAL NOISE EMISSION ASSESSMENT

Detailed mechanical equipment selection and layouts are not available at this stage. The external noise emission criteria are set up in this section of the report to ensure that the amenity of nearby land users is not adversely affected.

7.1 EXTERNAL NOISE EMISSION OBJECTIVES

The external noise emission from the project site shall comply with the requirements of the DECC Industrial Noise Policy guidelines. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The DECC Industrial Noise Policy has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion.

7.1.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential and commercial receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels were determined by long term, continuous noise monitoring conducted on site. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 5 - Intrusiveness Criteria

Time of day	Background Noise Level - dB(A)L_{90}	Intrusiveness Criteria dB(A)L_{eq}
Day	49	54
Evening	44	49
Night	41	46

7.1.2 Amenity Objectives

Noise emission objectives for "suburban" receivers based on the Industrial Noise Policy "Amenity Criteria" are presented below. Amenity criteria are assessed using the $L_{eq(Period)}$ descriptor – ie noise from the a particular noise source is average over the **entire daytime/evening/night time period**. Acoustic criteria are as follows:

Table 6 - DECC Amenity Objectives

Location	Time of Day	Amenity Noise Objective dB(A)$L_{eq(Period)}$	
		Residential	Commercial
All Potential Affected Neighbouring Boundaries	Day Time (7am – 6pm)	55	65
	Evening (6pm – 10pm)	45	65
	Night (10pm-7am)	40	65

7.2 PROPOSED NOISE OBJECTIVES

Tables below provide a summary of our recommended assessment criteria applicable to the subjected site. The intrusiveness and amenity criteria for this project have been determined using the DECC guidelines and measured background noise levels.

Table 7 - Noise Objectives for Nearest Residential Receiver

Time of day	Measured Background Noise Level dB(A)L_{90}	Intrusiveness Criteria dB(A)L_{eq}	Amenity Criteria dB(A)L_{eq}	**Noise Emission Objective dB(A)L_{eq}**
Day	49	54	55	**54**
Evening	44	49	45	**45**
Night	41	46	40	**40**

Table 8 -Noise Objectives for Nearest Commercial Receiver

Time of day	Noise Emission Objective dB(A)L_{eq}
Day	65
Evening	65
Night	65

7.3 NOISE EMISSIONS FROM THE SITE

7.3.1 Mechanical services

As detailed plant selections are not available at this stage it is not possible to carry out a detailed examination of the ameliorative measures that may be required to achieve the noise targets.

Plant will be acoustically treated to prevent noise emissions from adversely impacting the surrounding properties. This may include selecting the quietest plant practicable, or treating the plant with enclosures, barriers, duct lining and silencers, etc as required to comply with the sound level requirements as detailed in this report. A detailed assessment of noise emissions associated with services within the building will be conducted at CC stage of the development.

Experience with similar projects indicates that it would be possible to achieve Council requirements with appropriate treatment of the plant. This treatment would be determined at the Construction Certificate stage.

7.3.2 Construction noise and vibration

A detailed construction noise and vibration management plan will be formulate at later stages. The objective of this management plan will be to minimise noise and vibration emission from the site in accordance to the DECC construction noise guidelines and assist in maintaining a satisfactory acoustic environment around the site.

The principal issues, which will be addressed in the management plan, will be the:

- Identification of the noise and vibration standards which will be applicable to this project.
- Formulation of a strategy for construction to comply with the standards identified in the above point.
- Establishment of direct communication networks between affected groups namely Liverpool Council, Construction group and Acoustic Logic Consultancy Pty Ltd.

8. CONCLUSION

This report presents our assessment of potential traffic noise impacts on the proposed IHRI development on the Liverpool Campus in accordance with the requirements of AS NZS 2107-2000 *"Recommended Design Sound Levels and Reverberation Times for Building Interiors"*. It is concluded that with the installation of the proposed constructions detailed in Section 6 of this report, noise levels within the development will achieve the requirements set out in this report.

External noise emissions objectives from the project site have been determined based on the noise emission guidelines stated in DECC Industrial Noise Policy, and have been presented in section 7.

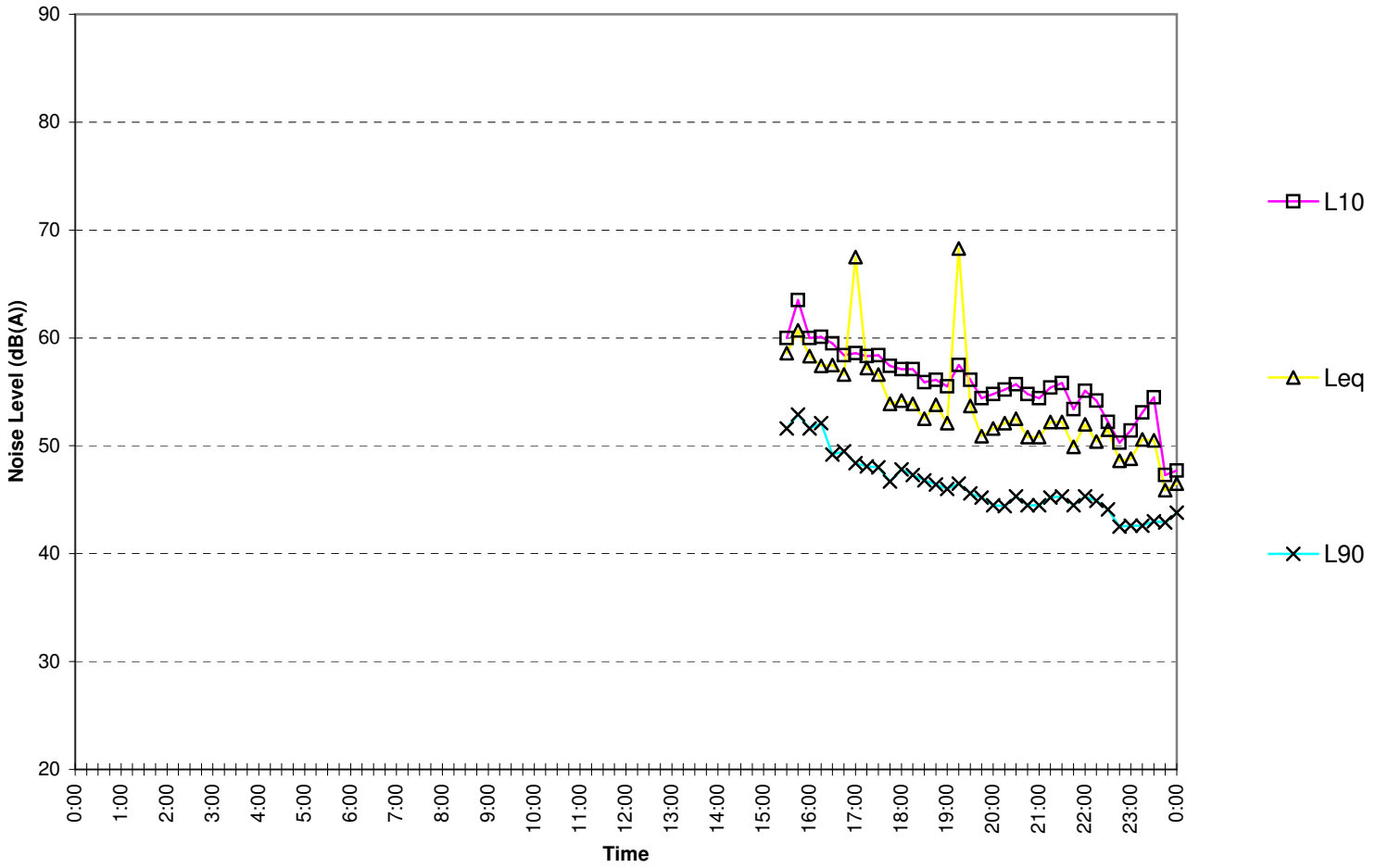
Report prepared by

ACOUSTIC LOGIC CONSULTANCY PTY LTD
Muhammad Ahmed Shah

9. APPENDIX 1
UNATTENDED NOISE MONITORING RESULTS

IHRI LIVERPOOL CAMPUS

Wednesday April 28,2010



IHRI LIVERPOOL CAMPUS

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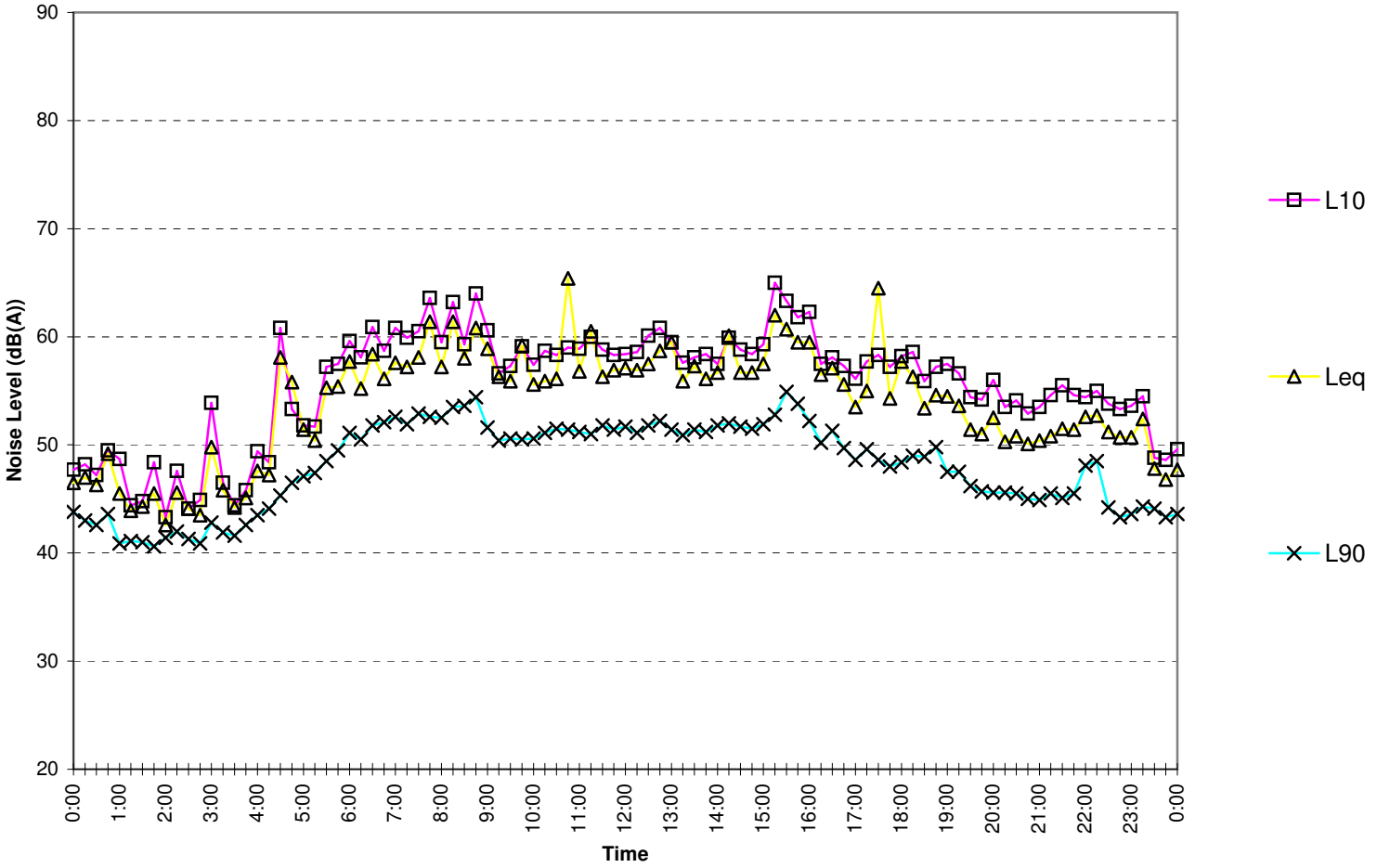

IHRI LIVERPOOL CAMPUS

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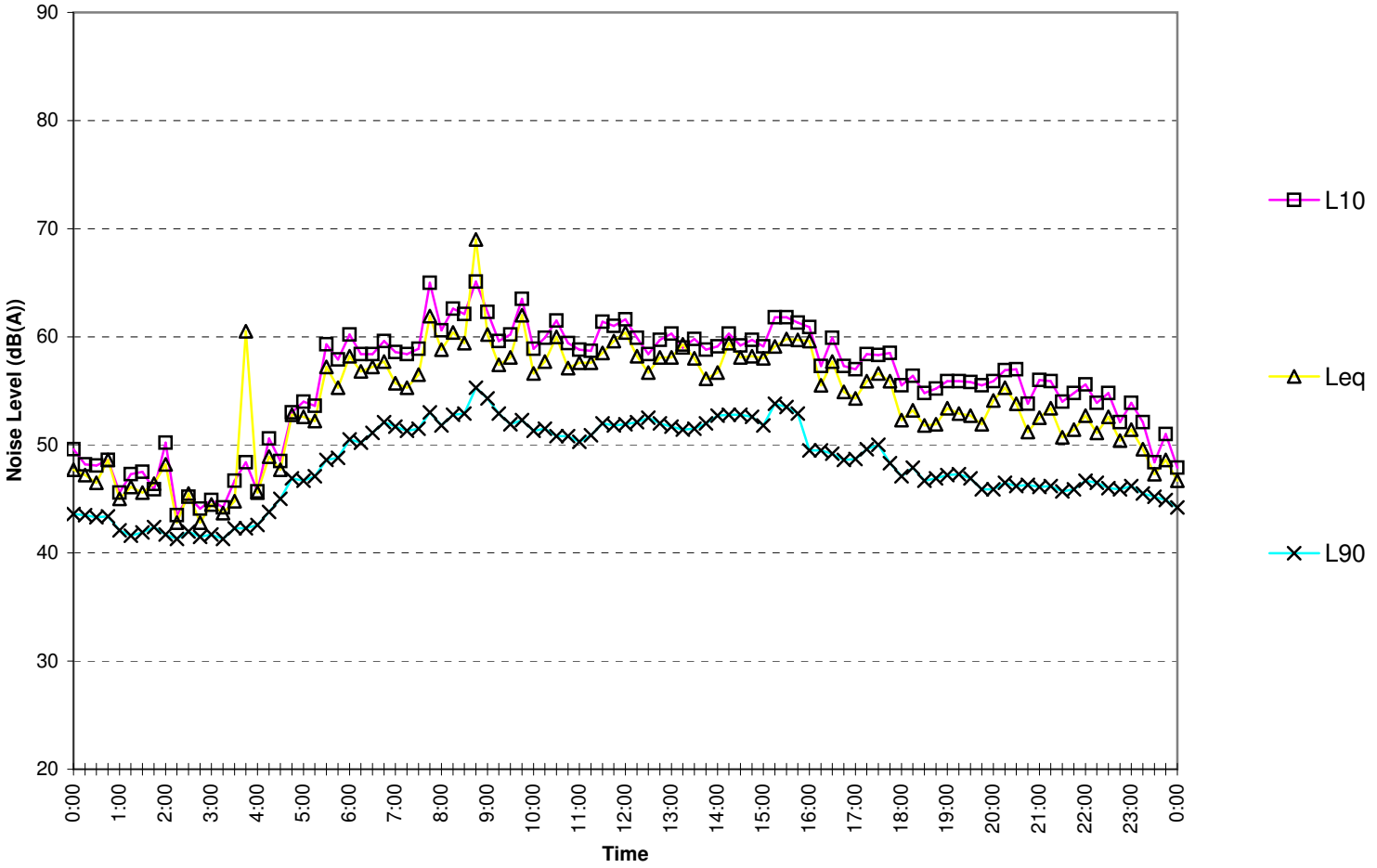

IHRI LIVERPOOL CAMPUS

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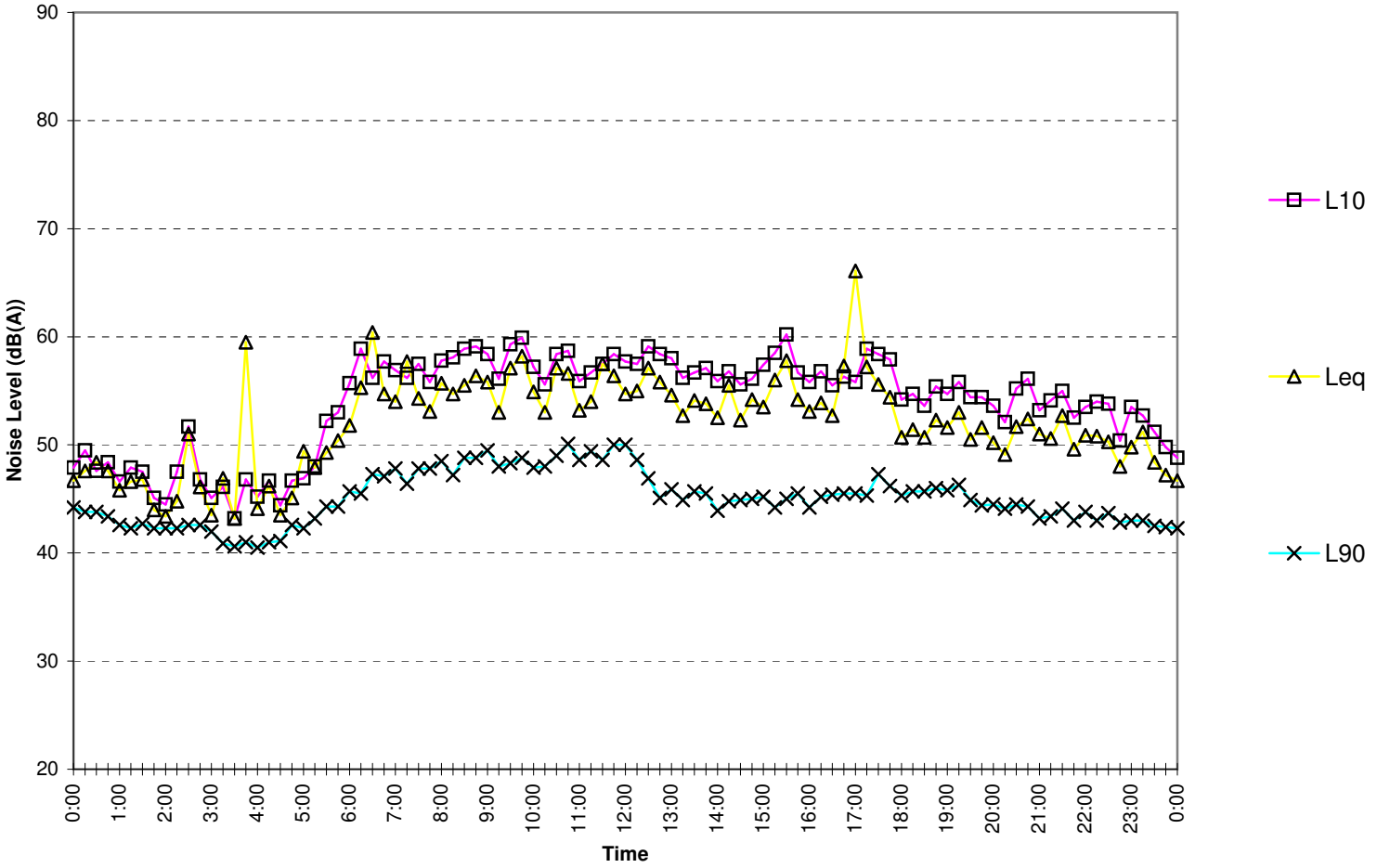

IHRI LIVERPOOL CAMPUS

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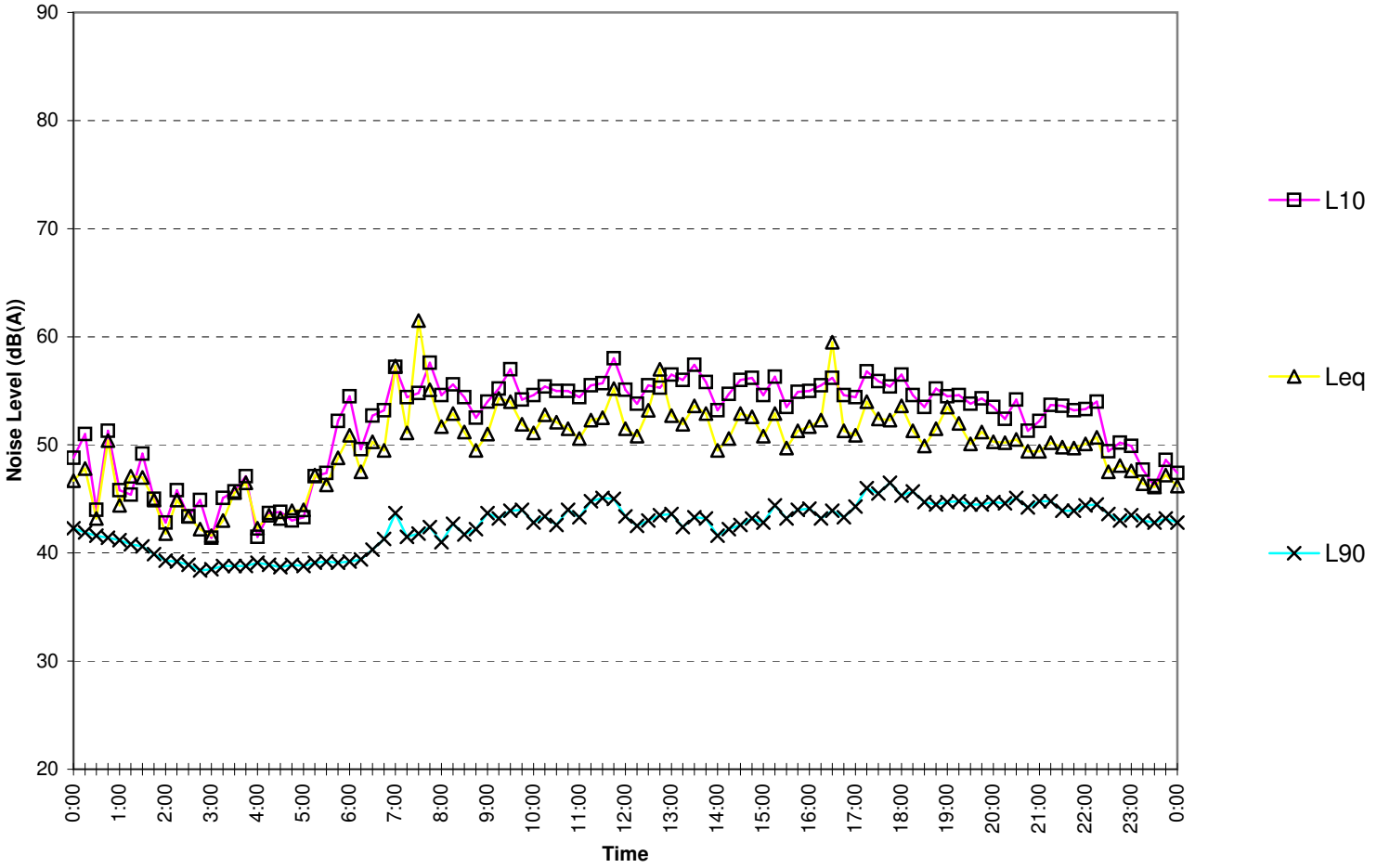

IHRI LIVERPOOL CAMPUS

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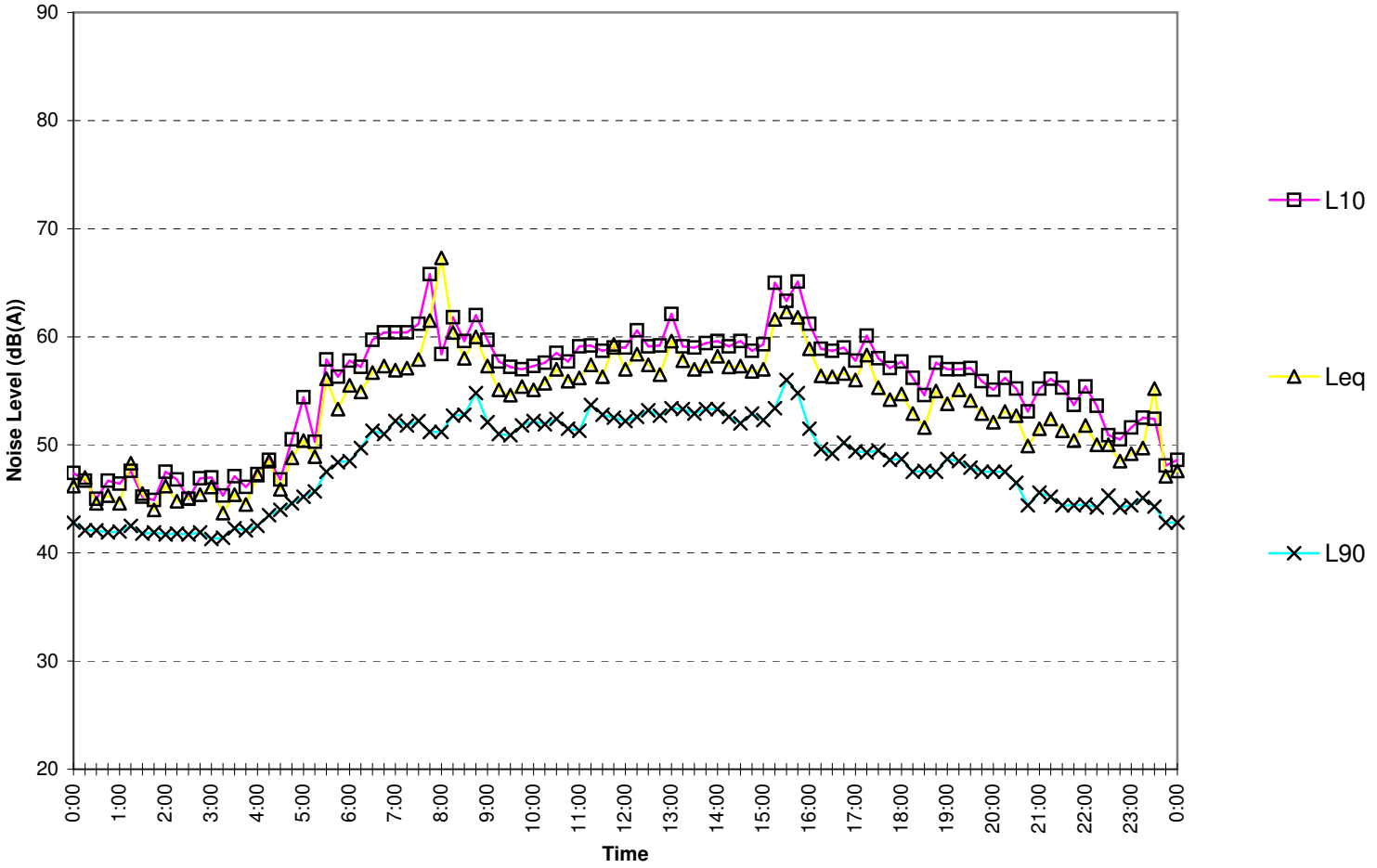

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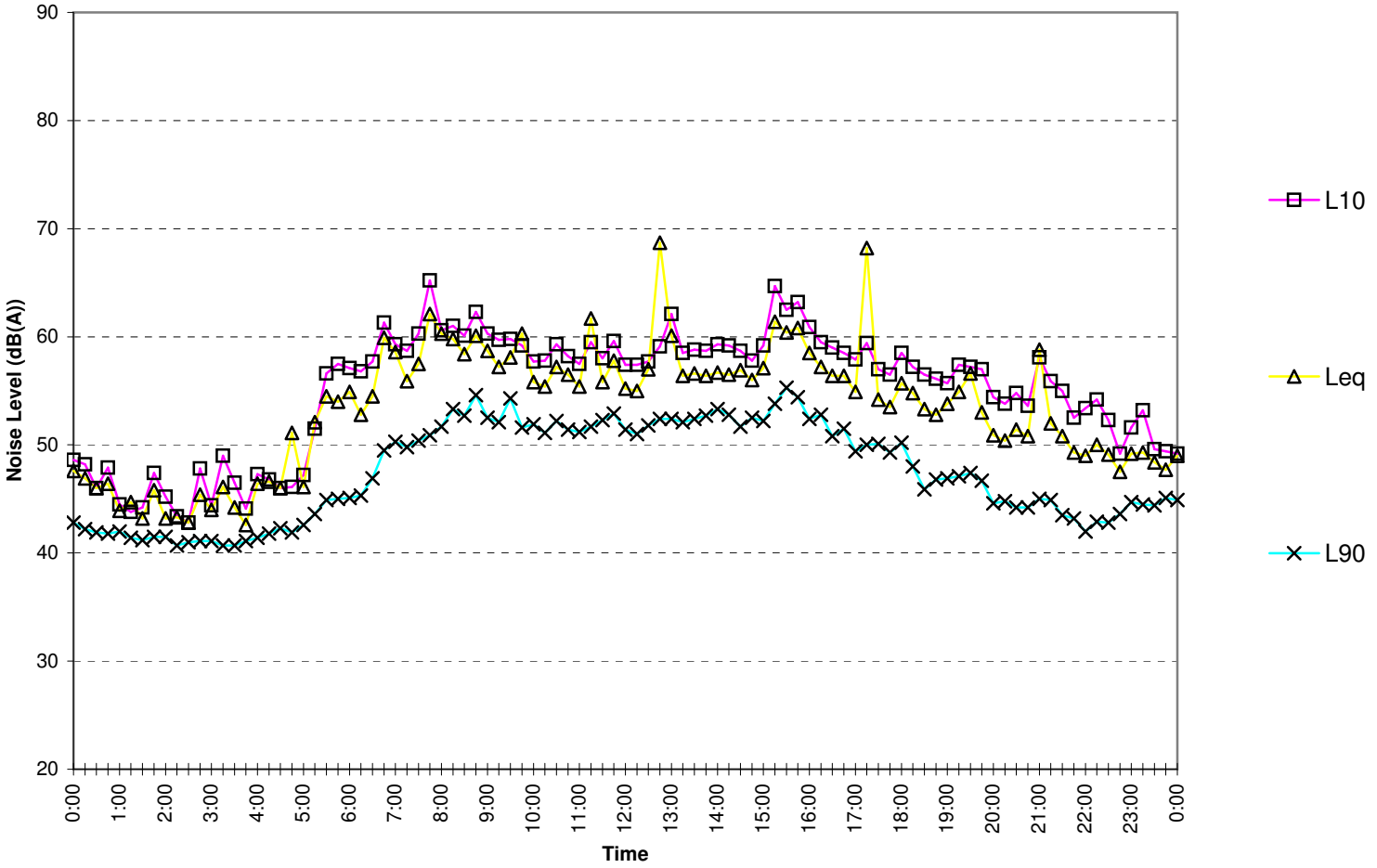

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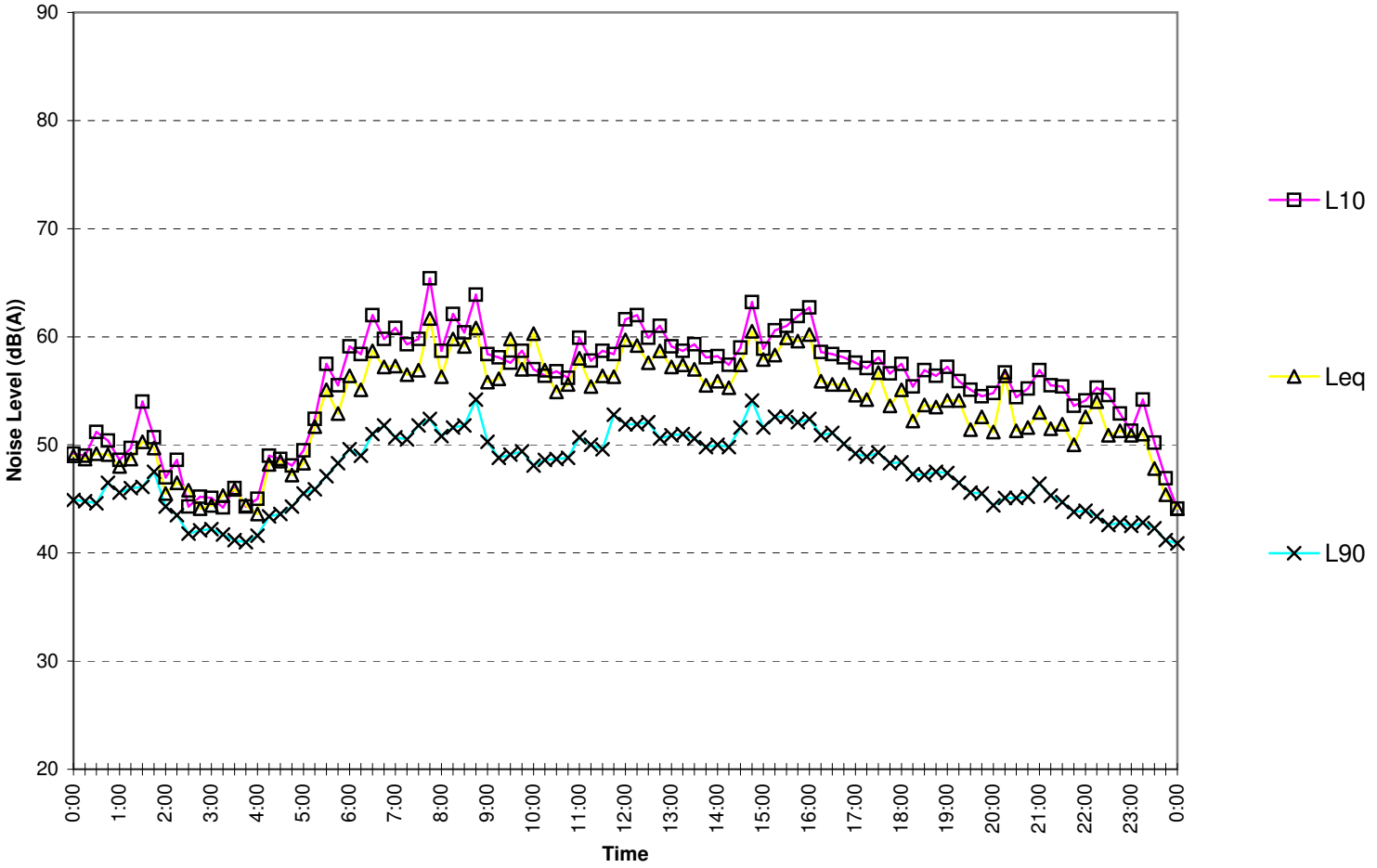

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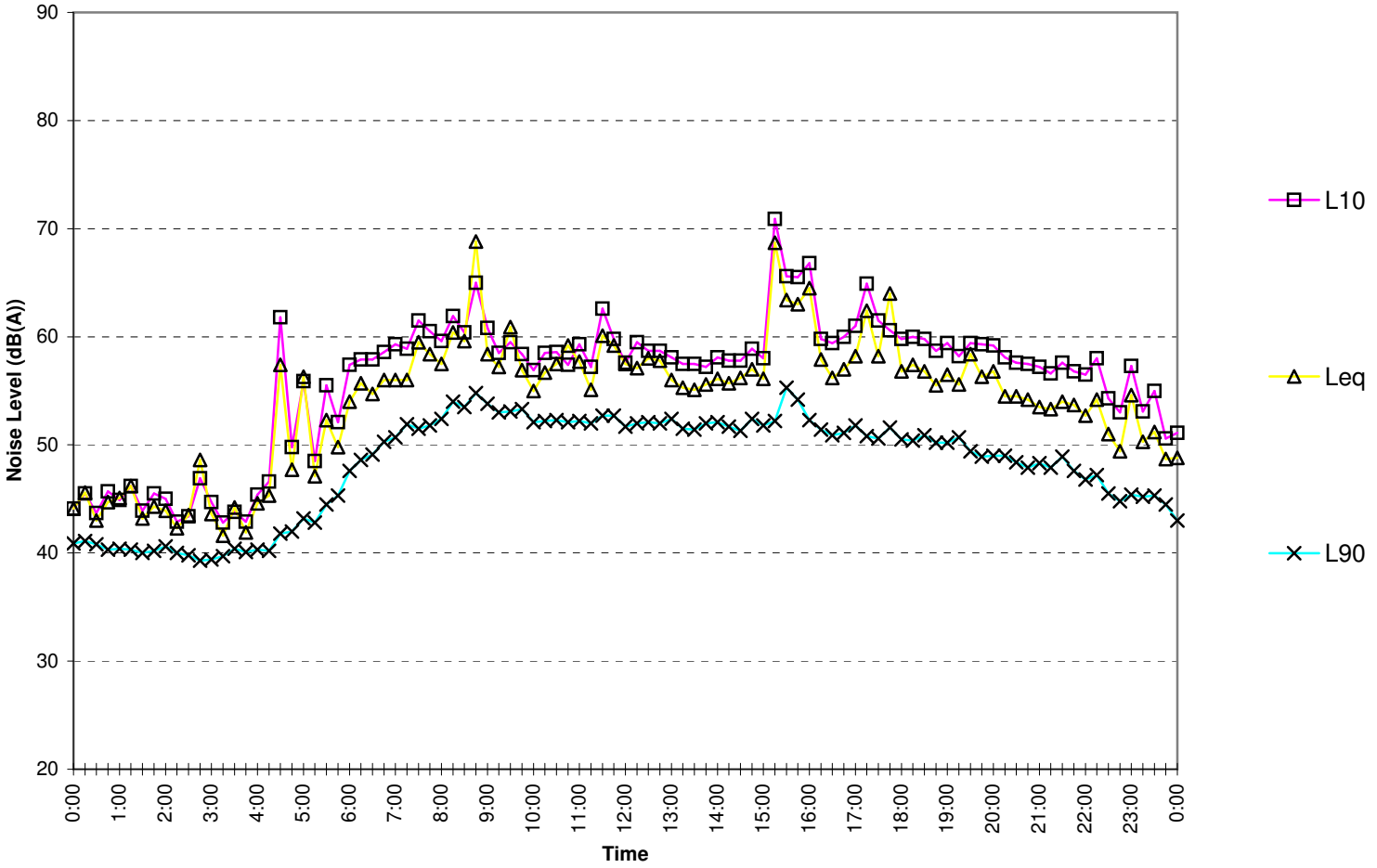

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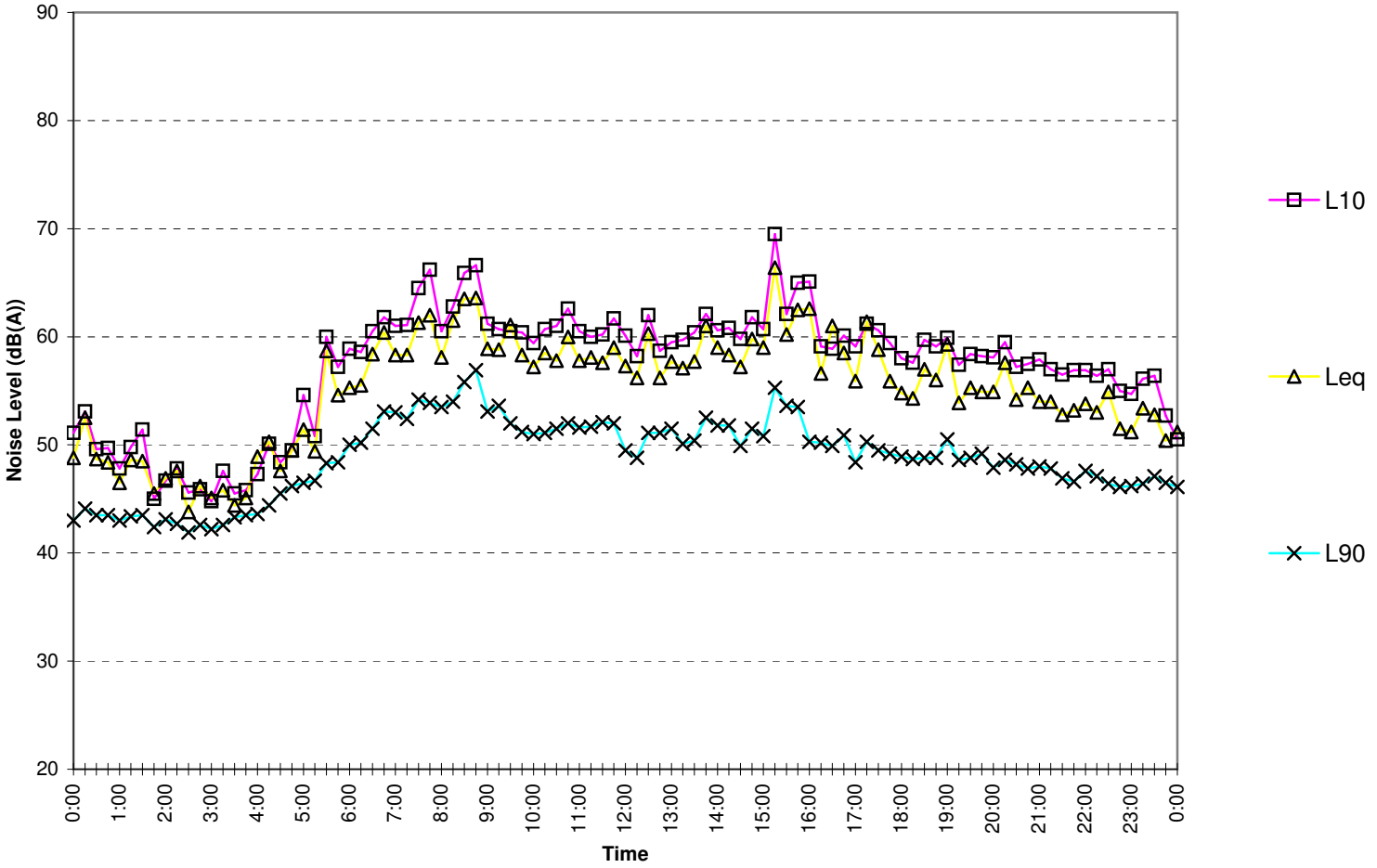

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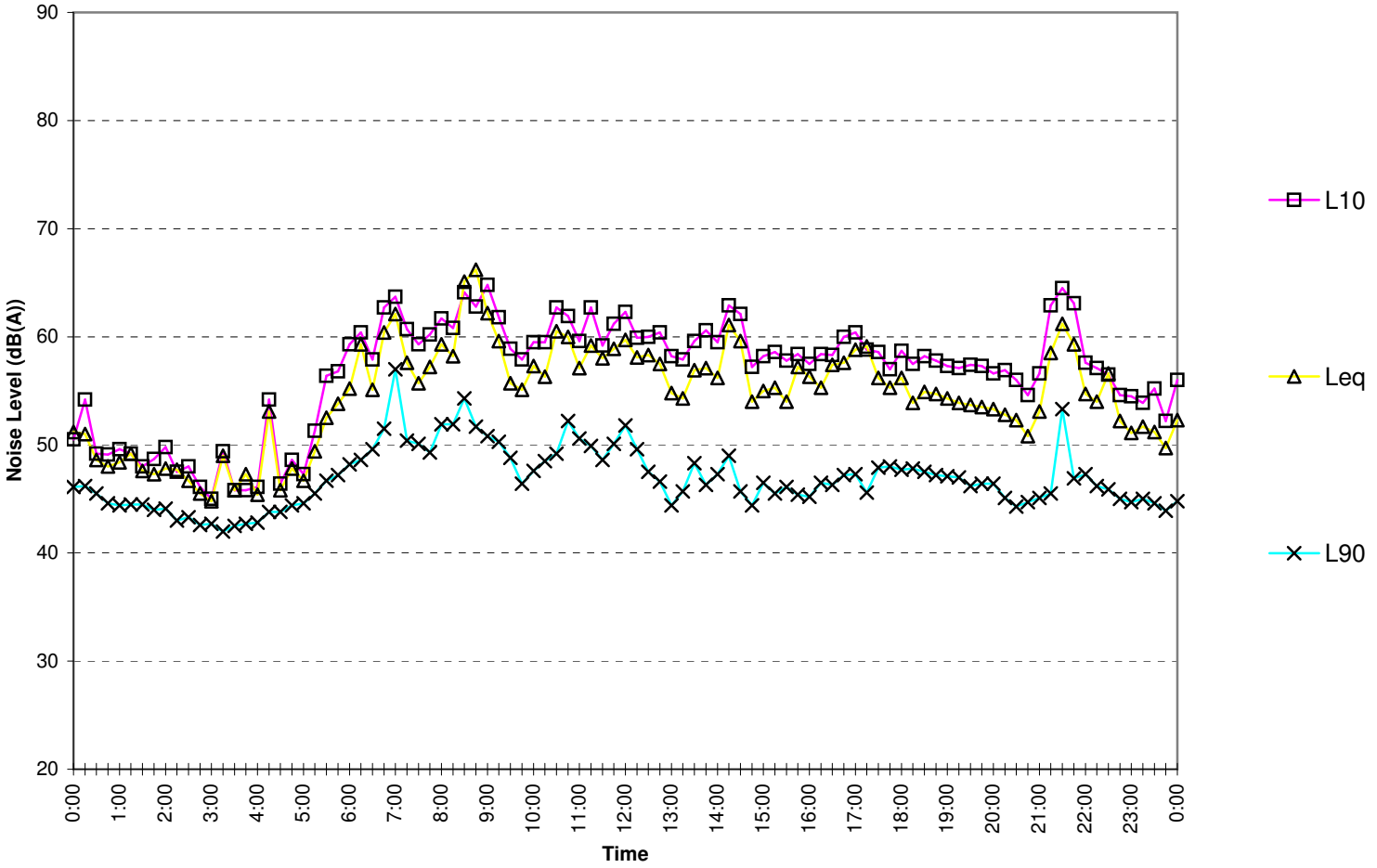

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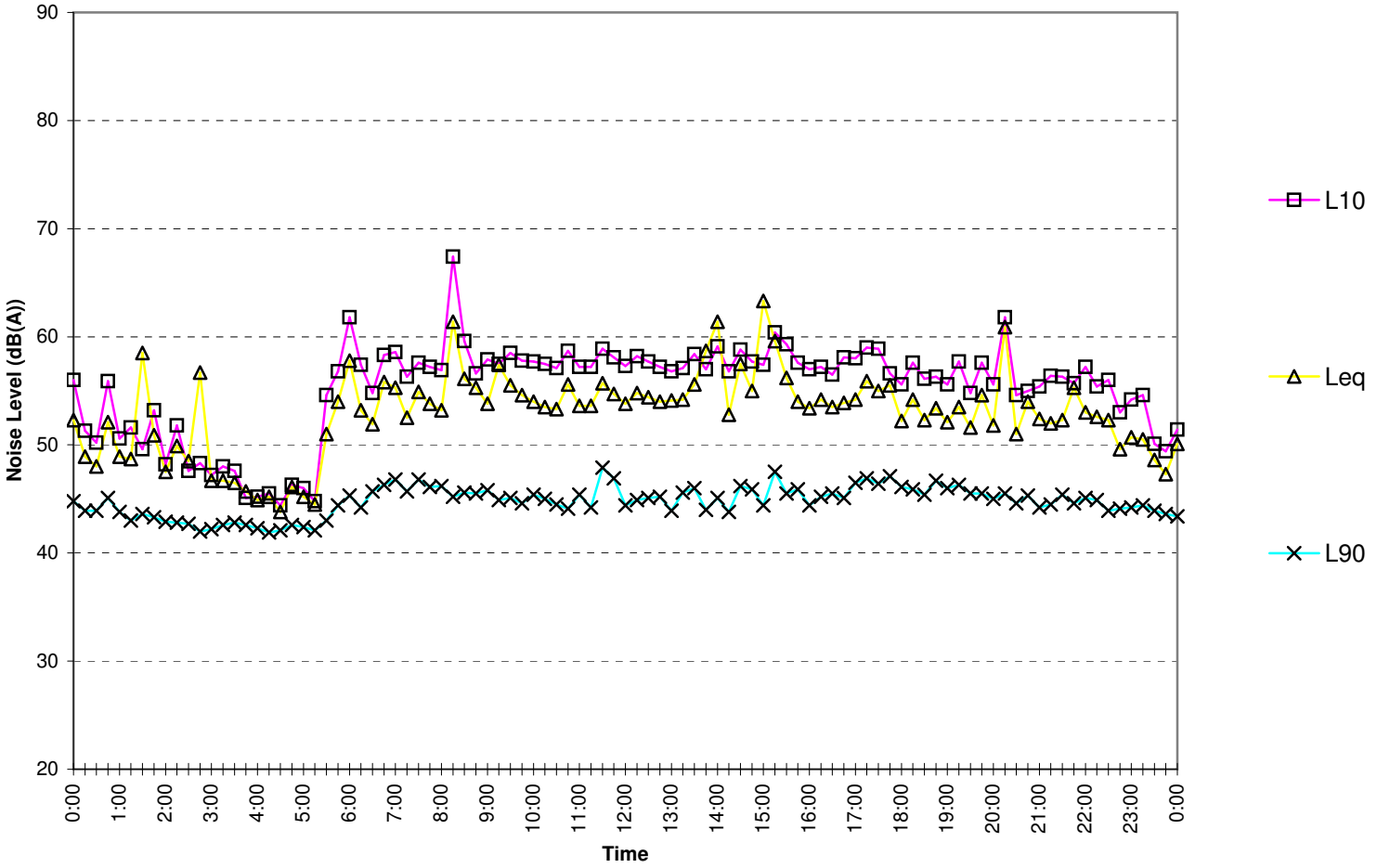

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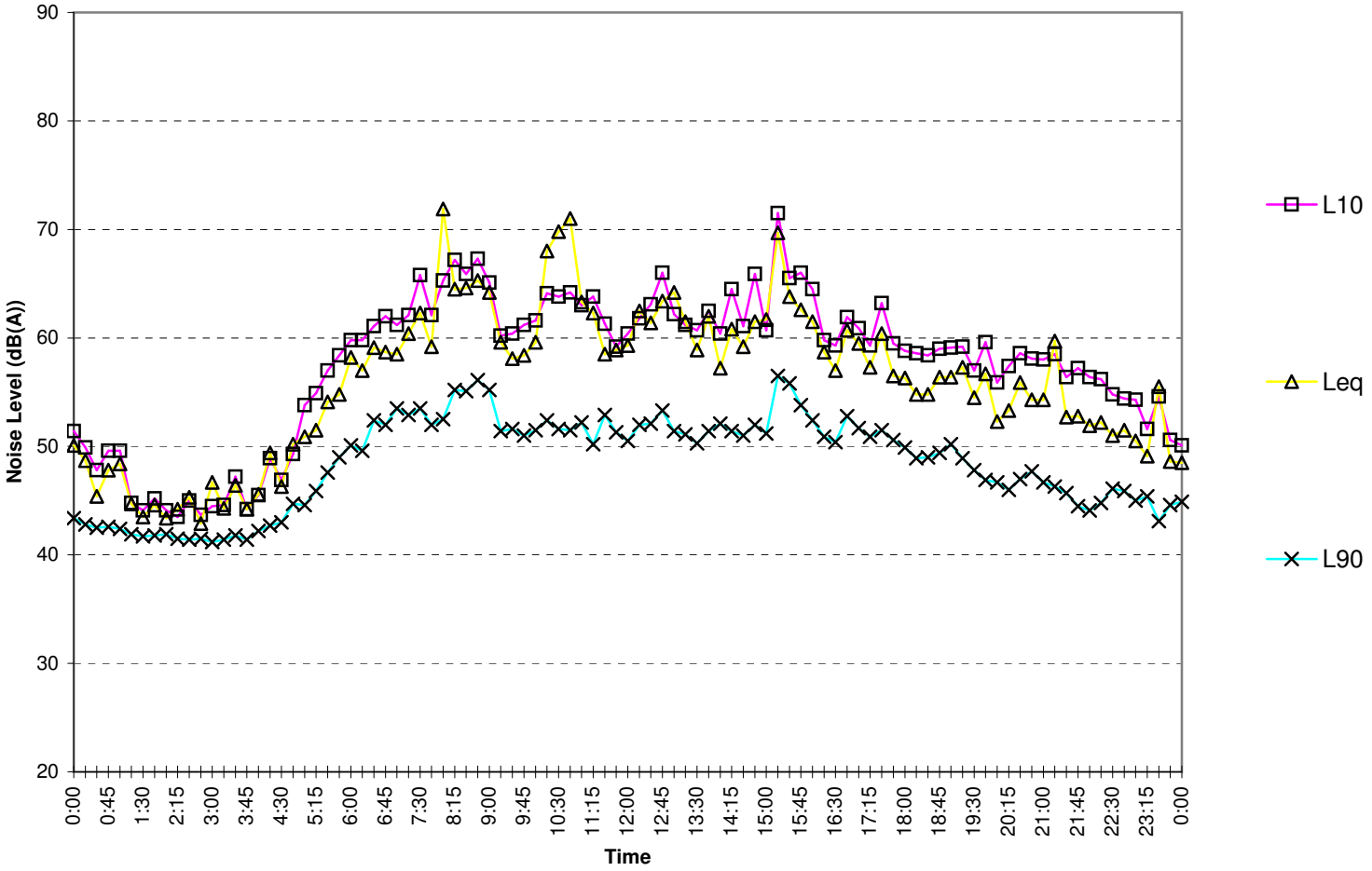

IHRI LIVERPOOL CAMPUS

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