St Andrews Place
Camden, London, W1

COMBINED ENVIRONMENTAL NOISE SURVEY
AND PLANT NOISE ASSESSMENT
REPORT 12070/CENS1

For :

Royal College of Physicians
11 St Andrew Place
Regents Park
London
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21 December 2004

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1.0 INTRODUCTION

New items of air conditioning plant have been proposed at Numbers 1, 2, 5, 6, 7 and 8 St Andrews Place, Camden. The site is in close proximity to residential properties. Hann Tucker Associates have therefore been commissioned to undertake a detailed daytime environmental noise survey of the site and propose suitable plant noise criteria based on the results of the survey and the requirements of the Local Authority.

This report presents the results of the survey. Survey data has also been used in conjunction with Camden Borough noise emission criteria in order to assess the impact of noise emissions from the new items of plant on nearby residential facades.

2.0 OBJECTIVES

To establish, by means of detailed 3 hour fully manned environmental noise monitoring, the existing A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} environmental noise levels at selected accessible positions around the proposed development site.

Based on the results of the noise survey, and in conjunction with the Local Authority, to recommend suitable plant noise emission criteria.

To assess the proposed new items of plant with respect to the proposed plant noise emission criteria.

3.0 SITE DESCRIPTION

Numbers 1 to 8 St Andrews Place, London run from West to East respectively, with Number 1 located on the corner of Park Square East and St Andrews Place (cul-de-sac).

The Royal College of Physicians is located on the North side of St Andrews Place. To the East of the site are residential properties backing on to Albany Street. Residential properties are also located to the South of the site surrounding a small car park.

Both Albany Street to the East and Outer Circle to the West are noted to be very busy roads, which join the equally busy Euston Road to the South of the site. Traffic was the dominant noise source during the survey.

4.0 ACOUSTIC TERMINOLOGY

The acoustic terms used in our Report are as follows:

dB : Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.

dB(A) : The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level.
Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.

L_{10} & L_{90}: If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.

It is common practice to use the L_{10} index to describe traffic noise, as being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic noise.

L_{eq} : The concept of L_{eq} (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise, such as aircraft noise, environmental noise and construction noise.

L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 1 hour).

The use of digital technology in sound level meters now makes the measurement of L_{eq} very straightforward.

L_{max} : L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

5.0 METHODOLOGY

5.1 Procedure

Fully manned environmental noise monitoring was undertaken between approximately 16:00 hours to 19:00 hours on Wednesday 1 December 2004.

Weather conditions during the survey period were fine. Surfaces were dry and there was little wind.

Measurements were taken continuously of the A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} sound pressure levels over 10 minute periods.

5.2 Measurement Positions

The noise level measurements were undertaken at 2 positions around the development site. The positions were selected in order to assess typical noise levels at the development site for subsequent use in setting plant noise emission criteria. The measurement positions are described below, and their approximate locations are indicated on the enclosed Site Plan 12070/SP1.

Position No	Description
1	The microphone was located at the rear of 1-8 St Andrews Place, near the car park. The microphone was mounted on a tripod at a height of approximately 1.5m. Noise levels at position 1 were dominated by traffic on the surrounding roads.
2	The microphone was located to the West of 1-8 St Andrews Place. The microphone was mounted on a tripod, which stood on the pavement at a height of 1.5m. Dominant noise at position 2 was noted to be traffic on Park Square East and the Outer Circle road.

5.3 Instrumentation

The instrumentation used during the manned survey is presented in the Table below:

Description	Manufacturer	Type
Type 1 Precision Sound Level Meter	Bruel and Kjær	2260
Type 1 ½" Condenser Microphone	Bruel and Kjær	4189
Type 1 Calibrator	Bruel and Kjær	4231
Pistonphone	Bruel and Kjær	4220

At each position the sound level meter was fitted with a Bruel and Kjær microphone windshield.

The sound level meter, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred.

6.0 RESULTS

The results have been plotted on Time History Graphs 12070/TH1 to 12070/TH4 enclosed presenting the ¼ hourly A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

Octave band spectral data for the lowest measured background A-weighted L_{90} levels at position 1 have been plotted on graph 12070/G1, which includes the predicted A-weighted L_{eq} octave band spectra for all items of plant in operation, at a distance of 1m from the nearest residential window.

7.0 DISCUSSION OF NOISE CLIMATE

During the survey period there was constant heavy traffic on nearby roads. At Position 1, the surrounding buildings screened a lot of the noise. Position 2 was subject to noise emissions from a constant flow of road traffic, and to a lesser extent pedestrians.

8.0 PLANT NOISE EMISSION CRITERIA

1-8 St Andrews Place lies within the London Borough of Camden's boundaries. We understand the requirements of Camden Borough Council are as follows:

1a *Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the background measurement (L_{A90}), expressed in dB(A) when all plant/equipment are in operation. Where it is anticipated that any plant/equipment will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps) special attention should be given to reducing the noise levels from that piece of plant/equipment at any sensitive façade to at least 10dB(A) below the L_{A90} expresses in dB(A).*

and

1b *For each of the octave band of centre frequencies 63Hz-8kHz inclusive, noise levels from all plant/equipment (measured in L_{Aeq}) when in operation shall at all times add not more than 1 decibel to the existing background noise level L_{A90} expresses in dB(A), in the same octave band as measured 1 metre external to sensitive facades.*

	Noise Emission Limit (dBA) at 1m from residential window
Position	Daytime (07:00 – 23:00)
1	46
2	53

The above criteria are derived from our surveyed results of minimum background L_{90} levels as presented in graphs 12070/TH1 and 12070/TH3 and in accordance to Camden Borough noise criteria section 1a (see above).

Graph 12070/G1 (enclosed) contains the lowest measured background L_{A90} spectrum, measured at Position 1.

9.0 PLANT NOISE ASSSESSMENT

We have assessed the noise impact of the atmospheric noise emissions from the 6No proposed items of building services plant located at three different locations around the development site, as described below and indicated on the attached site Plan 12070/SP1. It is understood that all 6No items of plant are to operate during daytime periods only.

We understand the manufacturers quoted sound pressure levels are as shown in Table 9.1 below.

Table 9.1

Manufacturer	Model	Sound Pressure Level dB(A) @1m	Quantity
Daikin	RXYQ10M	58dB(A)	6

Location 1

2No items of plant are to be located at roof level of 1 St. Andrews Place. The units are proposed to reach a height similar to the nearby roof wall so as to screen the noise from the units. For assessment purposes the units are assumed to be located at a distance of approximately 0.5m from the roof wall, and approximately 4.0m from the nearest affected residential window (Receiver 1), noted to be a window on the rear of a property on Park Square East.

Location 2

2No items of plant are to be located at basement level within a central open area of St. Andrews Place. The units are proposed to be located nearby existing plant units. For assessment purposes the 2No units are assumed to be located at a distance of approximately 25m from receiver 1 (as detailed above), and approximately 30m from Receiver 2 (as detailed below). There are screening effects due to the surrounding building, which have been applied to both receiver calculations.

Location 3

2No items of plant are to be located at basement level within a central open area of St. Andrews Place. The units are proposed to be located nearby existing plant units. For assessment purposes the 2No units are assumed to be located at a distance of approximately 35m from Receiver 1 (as detailed above), and approximately 20m from the nearest affected residential window (Receiver 2), noted to be to the rear of property along Albany Street. There are screening effects due to the surrounding building, which have been applied to both receiver calculations.

Our calculations indicate that at a distance of 1m from the residential window (Receiver 1), the total noise emissions due to all 6No items of plant should not exceed the daytime criteria of 46dBA.

Our calculations also indicate that at a distance of 1m from the residential window (Receiver 2), the total noise emissions due to all 6No items of plant should be comfortably below the daytime criteria of 46dBA.

Graph 12070/G1 (enclosed) contains the predicted L_{Aeq} spectrum for all items of plant in operation, at a distance 1m from the nearest residential window (Receiver 1). The graph shows a minimum difference of 5dB between the two spectra, which corresponds to an addition of 1dB to the background noise emissions at octave band centre frequencies 125Hz and 500Hz. The above therefore complies with the Camden Borough noise emission criteria in section 1b.

10.0 CONCLUSIONS

A detailed 3 hour fully manned environmental noise survey has been undertaken in order to establish the currently prevailing lower ground floor level environmental noise climate around the proposed development site.

Plant noise emission criteria have been recommended based on the results of the noise survey and in conjunction with the local authority.

A detailed plant noise assessment has been undertaken in order to assess the impact of new items of plant on the nearest affected facades in conjunction with the recommended plant noise emission criteria.

From detailed analysis of the proposed items of plant, we can conclude that at the nearest affected residential facades, the combined noise emissions due to all 6No. items of plant should be within the daytime for Camden Borough Council, as detailed in section 8.0.

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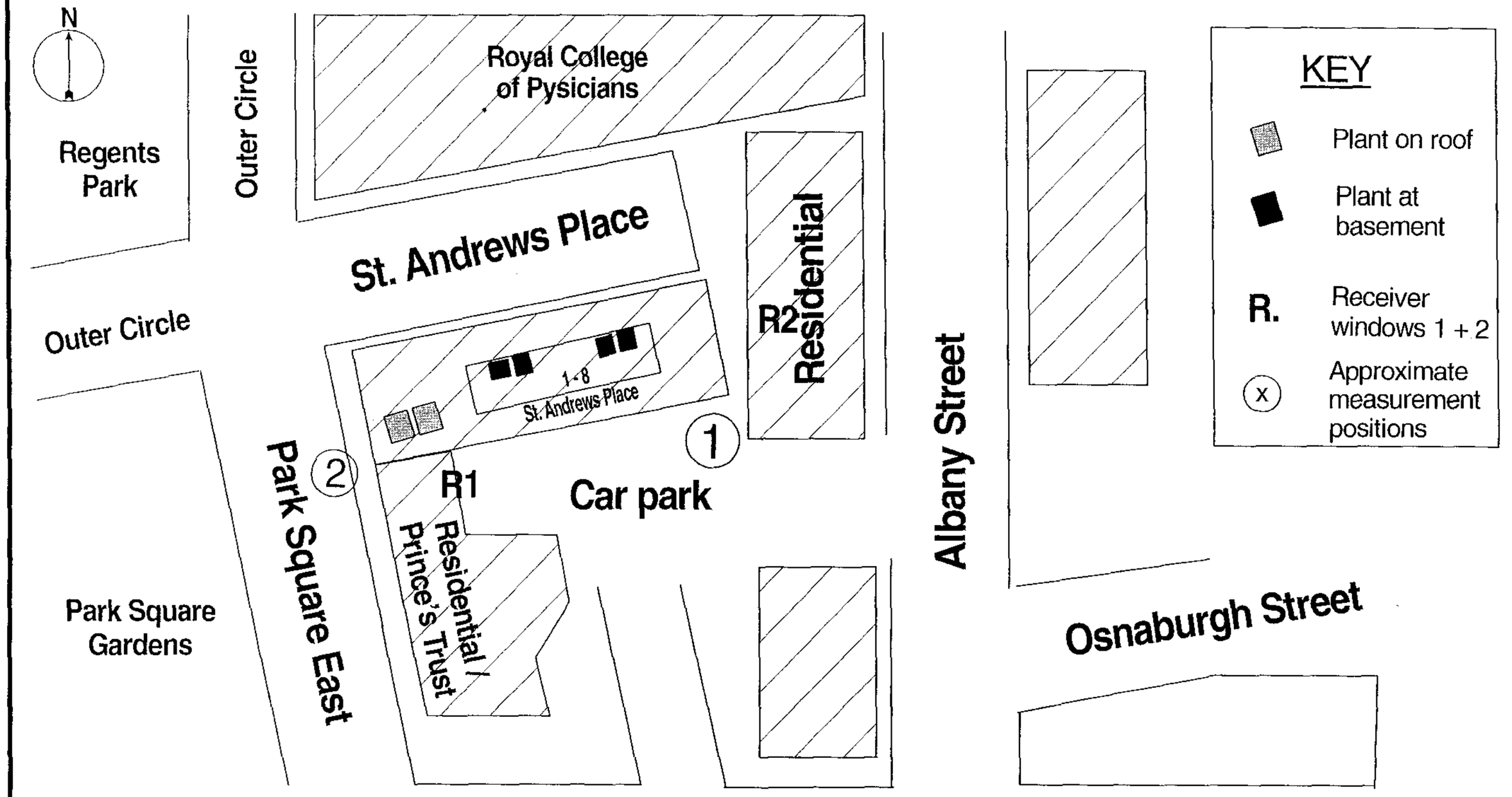

Site Plan Showing Approximate Measurement Positions	St. Andrews Place Camden London	12070/SP1	
		08/12/2004	N.T.S.

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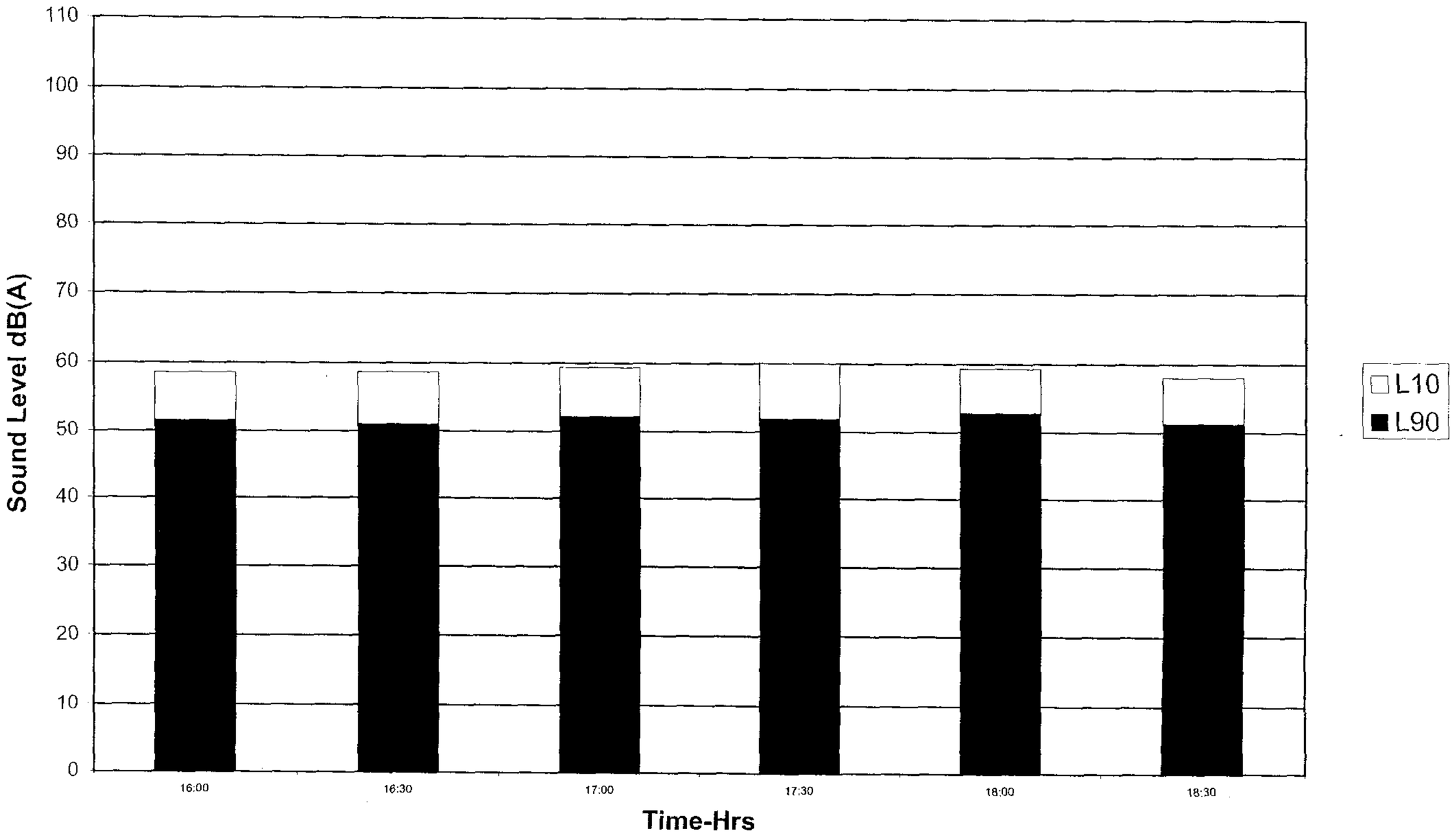
1 - 8 St. Andrews Place, Camden

L_{10} and L_{90} Noise Levels Measured at Ground Level Position 1

Wednesday 01/12/2004 (16:00 - 19:00 hours)

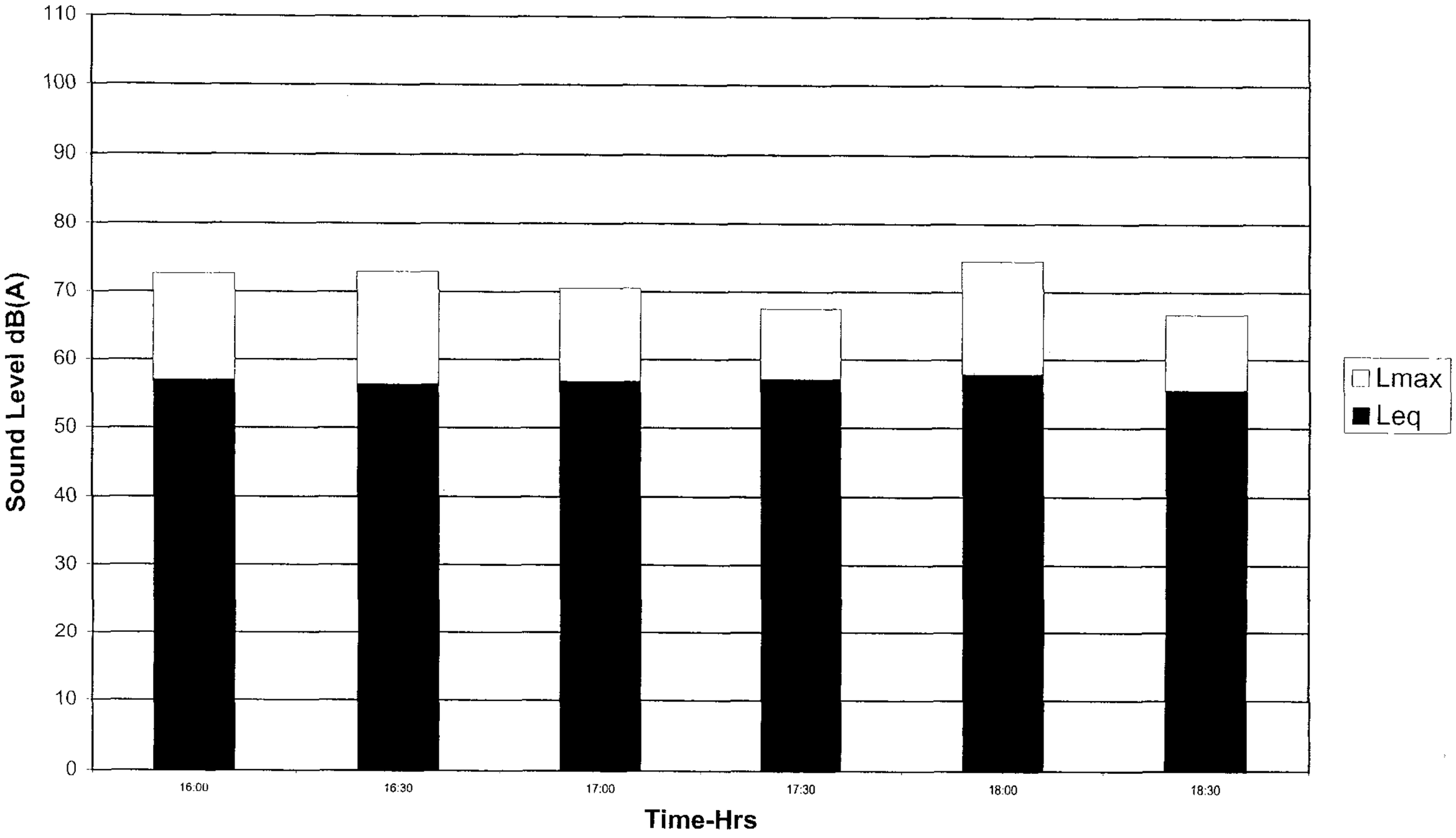


Time History Graph 12070/TH1

1 - 8 St. Andrews Place, Camden

L_{eq} and L_{max} Noise Levels Measured at Ground Level Position 1

Wednesday 01/12/2004 (16:00 - 19:00 hours)



Time History Graph 12070/TH2

1 - 8 St. Andrews Place, Camden

L_{10} and L_{90} Noise Levels Measured at Ground Level Position 2

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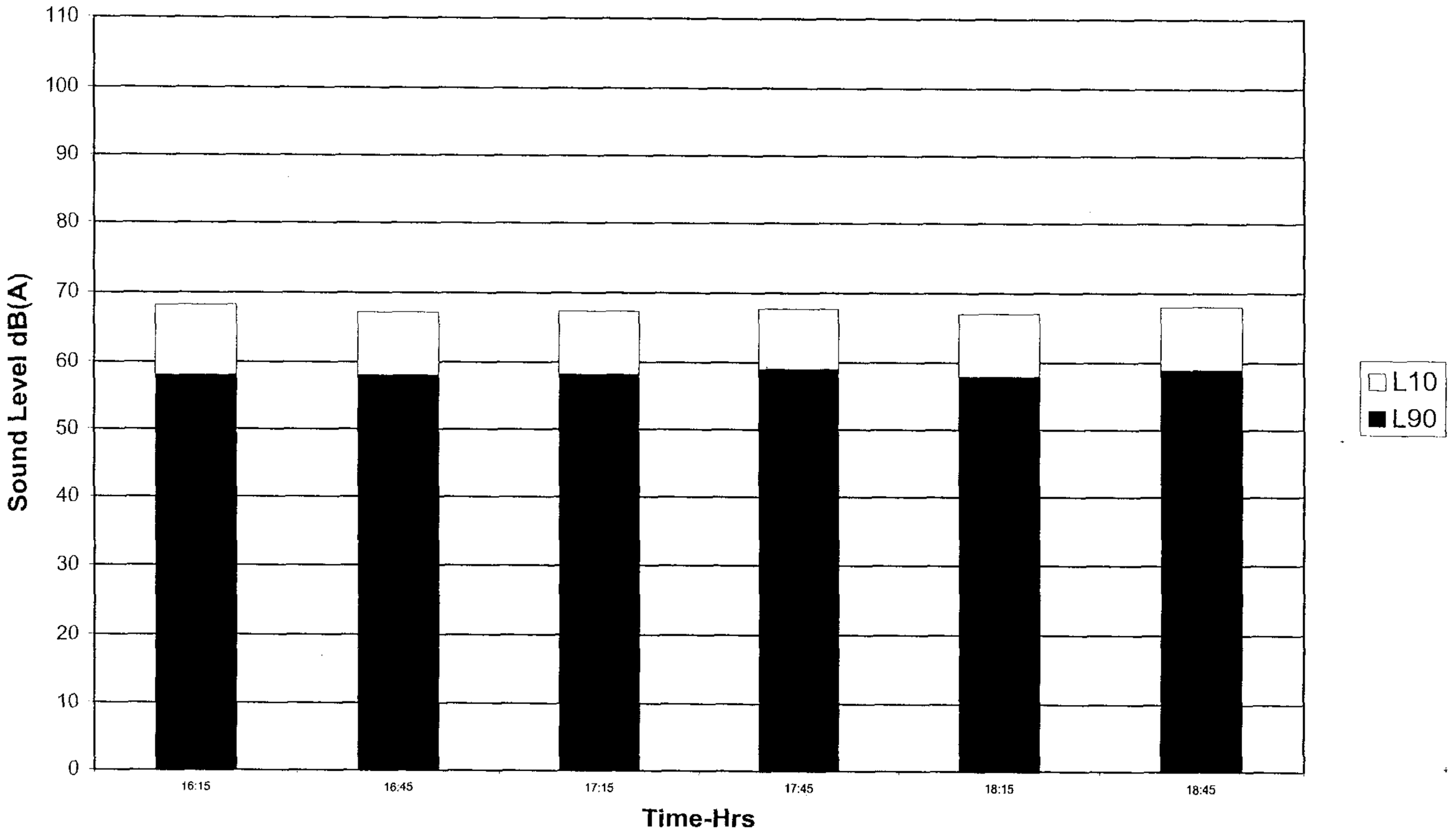
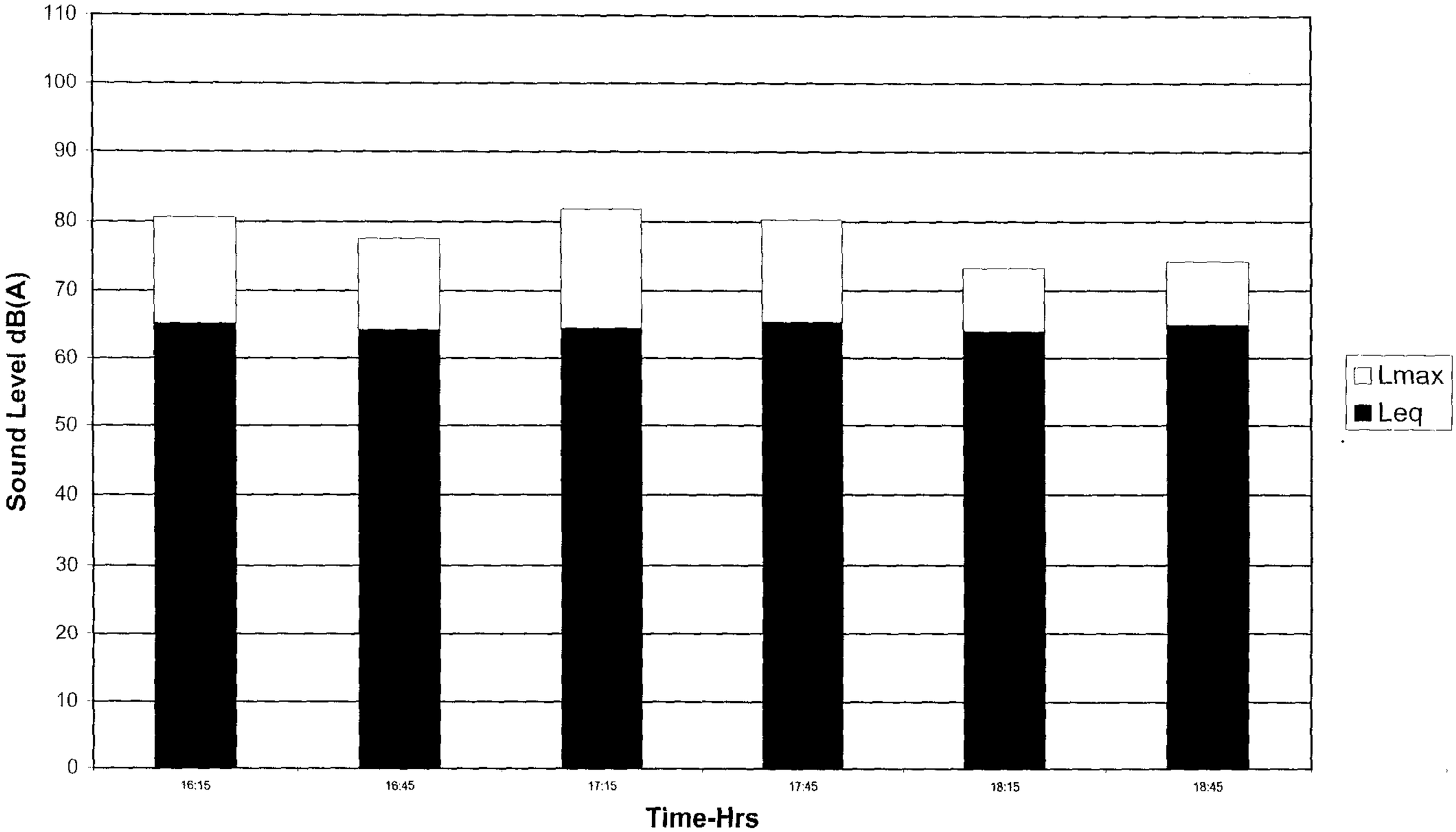


Time History Graph 12070/TH3

1 - 8 St. Andrews Place, Camden

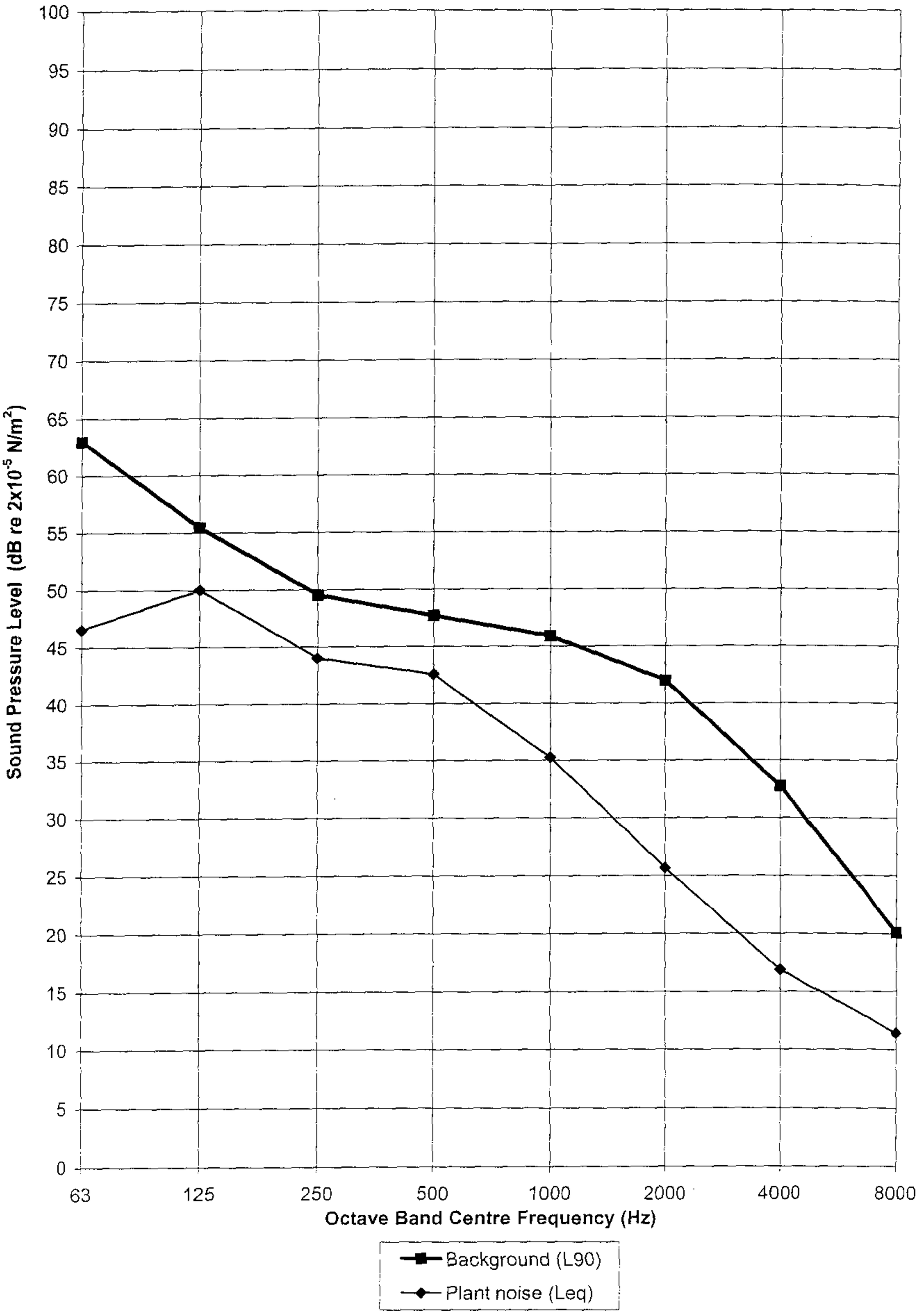
L_{eq} and L_{max} Noise Levels Measured at Ground Level Position 2

Wednesday 01/12/2004 (16:00 - 19:00 hours)



Time History Graph 12070/TH4

1-8 St. Andrews Place, Camden
L_{90} Octave Band Spectra
Position 1 01/12/2004



Graph 12070/G1