Fairfax House
London

ENVIRONMENTAL NOISE SURVEY
AND PLANT NOISE ASSESSMENT
REPORT 19879/PNA1

For:

Dorrington Fulwood Limited
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1.0 INTRODUCTION

Some new items of plant are proposed as part of a refurbishment of Fairfax House in London.

The plant noise emissions from new mechanical installations are subject to the requirements of the Local Authority. Hann Tucker Associates have therefore been commissioned to carry out a survey and establish the suitability of the proposed plant.

This report presents the survey methodology and findings. The survey data may be used as the basis for an impact assessment.

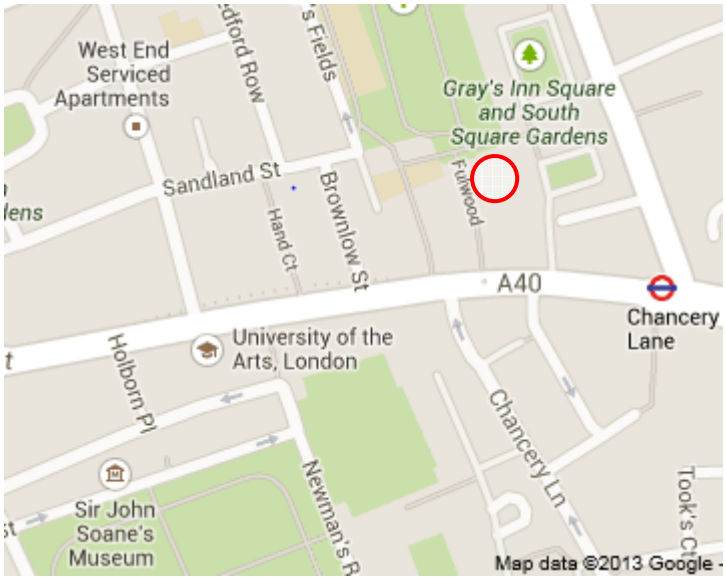
2.0 OBJECTIVES

To establish, by means of a detailed daytime and night time fully automated 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 site.

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

3.0 SITE LOCATION

The site is located in Fulwood, London WC1V, south of Grays Inn Square and falls under Camden Council's jurisdiction. See Location Map below.



Location Map (maps.google.co.uk)

4.0 ACOUSTIC TERMINOLOGY

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

5.0 METHODOLOGY

5.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 10:30 hours on Tuesday 17 December 2013 to 14:00 hours on Wednesday 18 December 2013.

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However at the beginning and end of the survey period the wind conditions were moderate and the sky was generally overcast. These conditions are considered suitable for obtaining representative measurement results.

Measurements were taken continuously of the A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} sound pressure levels over 15 minute periods.

5.2 Measurement Positions

The noise level measurements were undertaken in two positions at Fairfax House as follows:

Position No	Description
1	The microphone was attached to a metal guard rail approximately 1.0m from the roof of the 5th Floor. It was considered to be in a free field and overlooking the offices opposite on Fulwood.
2	The microphone was attached to a metal guard rail approximately 1.0m from the roof of the 3rd Floor Terrace. It was considered to be in a free field and was overlooking the offices to the east of the site.

These positions were selected in order to assess typical noise levels at the development site for subsequent use in setting plant noise emission criteria.

5.3 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Latest Verification
Position 1 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3824	LD calibration on 16/10/2012
Position 1 Type 1 ½" Condenser Microphone	Larson Davis	2541	107843	LD calibration on 16/10/2012
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	108306	LD calibration on 19/11/2012
Position 2 Type 1 ½" Condenser Microphone	Larson Davis	2541	3700	LD calibration on 05/04/2013
Type 1 Calibrator	Larson Davis	CAL200	3082	LD calibration on 21/03/2013

The sound level meters, including the extension cables, were calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.1dB).

The sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. The microphone was fitted with a Larson Davis windshield.

6.0 RESULTS

The results have been plotted on Time History Graphs 19879/TH1 to 19879/TH2 enclosed presenting the 15 minute A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} levels at the measurement positions throughout the duration of the survey.

The lowest measured $L_{A90(15min)}$ noise levels are recorded in the following table.

Lowest Measured $L_{A90\ 15min}$ dB(A)		
Position	**Daytime (07:00-23:00 hours)**	**Night Time (23:00 –07:00 hours)**
1	49	47
2	51	50

7.0 DISCUSSION OF NOISE CLIMATE

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However at the beginning and end of the survey period the dominant noise source was noted to be road traffic from the surrounding area.

8.0 PLANT NOISE EMISSION CRITERIA

We understand that the requirements of Camden Council are as follows:

> *"Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (LA90), 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 LA90, expressed in dB(A)."*

On the basis of the above and the survey results we thus propose the following plant noise emission limits to be achieved at 1m from the façades of the nearest neighbouring buildings:

	Plant Noise Emission Criteria (dB re $2x10^{-5}$ Pa)	
Position	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
1	44	42
2	46	45

It should be noted that the above plant noise emission limits are subject to approval from Camden Council.

9.0 PLANT NOISE ASSESSMENT

We understand that the following items of plant are to be installed on the 3 Floor Terrace and the 5 Floor Roof of Fairfax House.

Location	Plant Description	Qty	Plant Make	Model Number
5rd Floor Roof	External Condensers	4	Mitsubishi	PURY-P400YJM-A
3rd Floor Terrace	External Condensers	4	Mitsubishi	PURY-P400YJM-A

These condensers will only operate during the daytime periods.

9.1 Plant Noise Emissions

The manufacturer's stated noise data for these condensers is 61dBA at a distance of 1m. In our opinion the above units do not usually exhibit any tonal characteristics.

9.2 Location of Plant

We understand that the condensers are to be installed in two locations as per the attached drawing. Due to the varied heights of these installations of condensers we do not consider that they are additive acoustically. In both cases, however the nearest neighbouring noise sensitive window is a floor below the proposed installation areas of the condensers and hence a nominal barrier effect is likely to be achieved by the roof edge.

9.3 Plant Noise Impact Assessment

The following tables present our calculations relating to the proposed plant installations:

9.3.1 5 Floor Condensers

	Calculation (dBA)
Condenser Sound Pressure Level	61dBA
Distance Loss(Hemispherical radiation pattern) 10m	-14dB
Barrier effect of roof	-2dB
Additive effect of 4 units.	+6dB
Calculated Noise Level at Window	51dBA

The above table indicates that the plant noise emission criterion at Position 1 of 44dBA is likely to be exceeded.

9.3.2 3 Floor Terrace Condensers

	Calculation (dBA)
Condenser Sound Pressure Level	47dBA
Distance Loss(Hemispherical radiation pattern) 10m	-14dB
Barrier effect of roof	-2dB
Additive effect of 3 units.	+6dB
Calculated Noise Level at Window	37dBA

The above table indicates that the plant noise emission criterion at Position 2 of 46dBA should be comfortably achieved.

10.0 PROPOSED MITIGATION MEASURES

We propose that the condensers on the 5 Floor Roof should be installed behind an imperforate screen (solid) and have a minimum mass per unit area of at least 10kg/m^2. (Note: This could typically be achieved with 1.3mm galvanised steel sheet). This screen should extend up to the height of the installed condensers and across the condensers as detailed on the attached sketch. This should provide a barrier effect of at least 10dBA and hence the plant noise emission criterion at Position 1 should be achieved.

11.0 CONCLUSIONS

A detailed daytime and night time fully automated noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the development site.

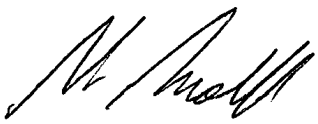
Plant noise emission criteria have been recommended based on the results of the noise survey and in conjunction with the requirements of the Local Authority.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive windows.

The assessment indicates that the noise levels from the new equipment proposed for installation on the 3 Floor Terrace achieve the requirements of the Local Authority at the nearest noise sensitive window.

Our calculations, however, indicate that the condensers to be located on the 5 Floor Roof are likely to exceed the requirements of the Local Authority. We have therefore proposed mitigation measures for these units in the form of an imperforate barrier to limit noise transfer to the nearest noise sensitive windows.

Our calculations indicate that with the mitigation measures installed for the 5 Floor Roof plant the Local Authority plant noise emission limits should be achieved and we can see no acoustic reason why this scheme should not be granted planning permission.



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Appendix A

The acoustic terms used in this 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.

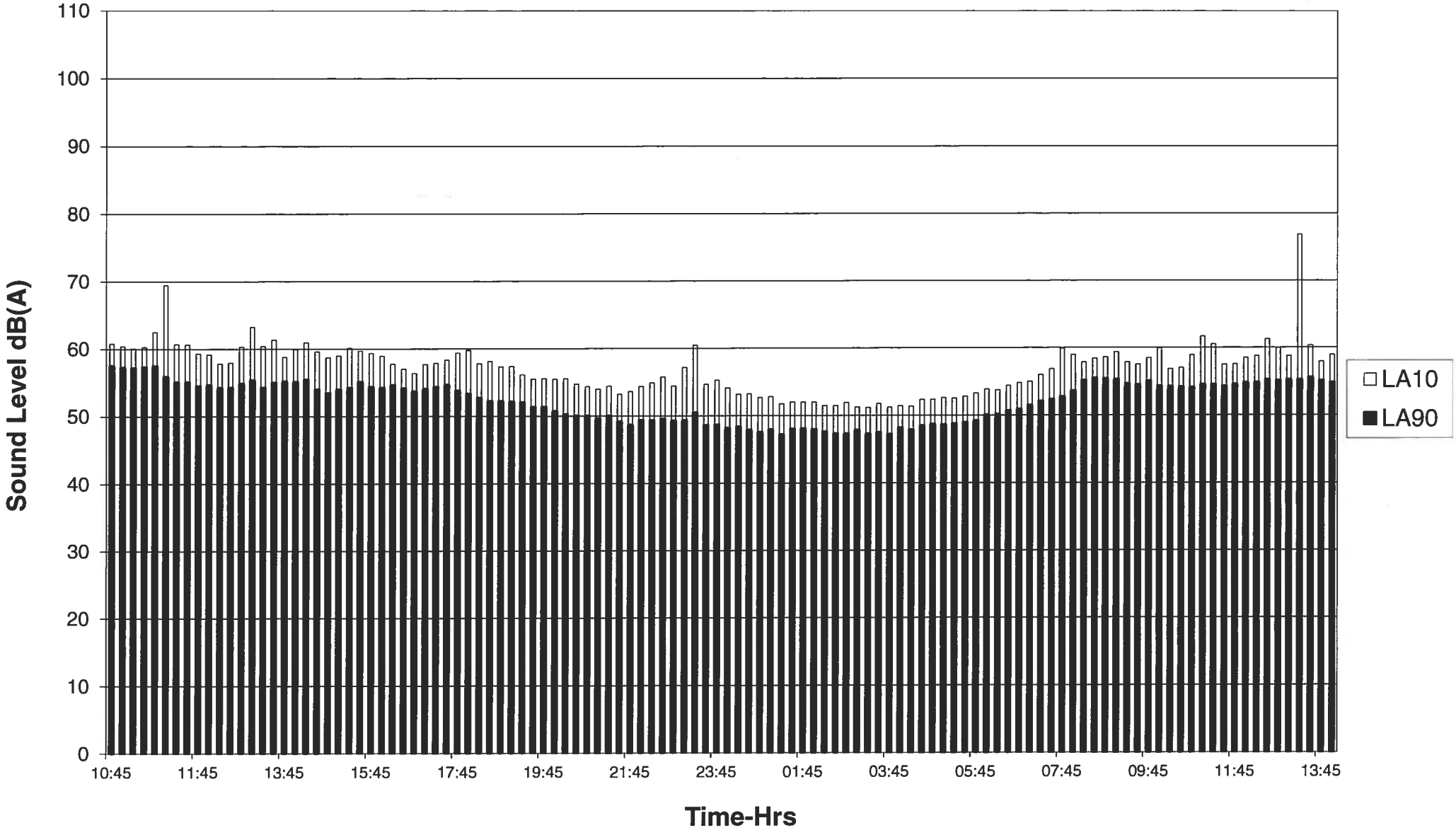
L_{max} : L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Fairfax House, WC1V

Position 1

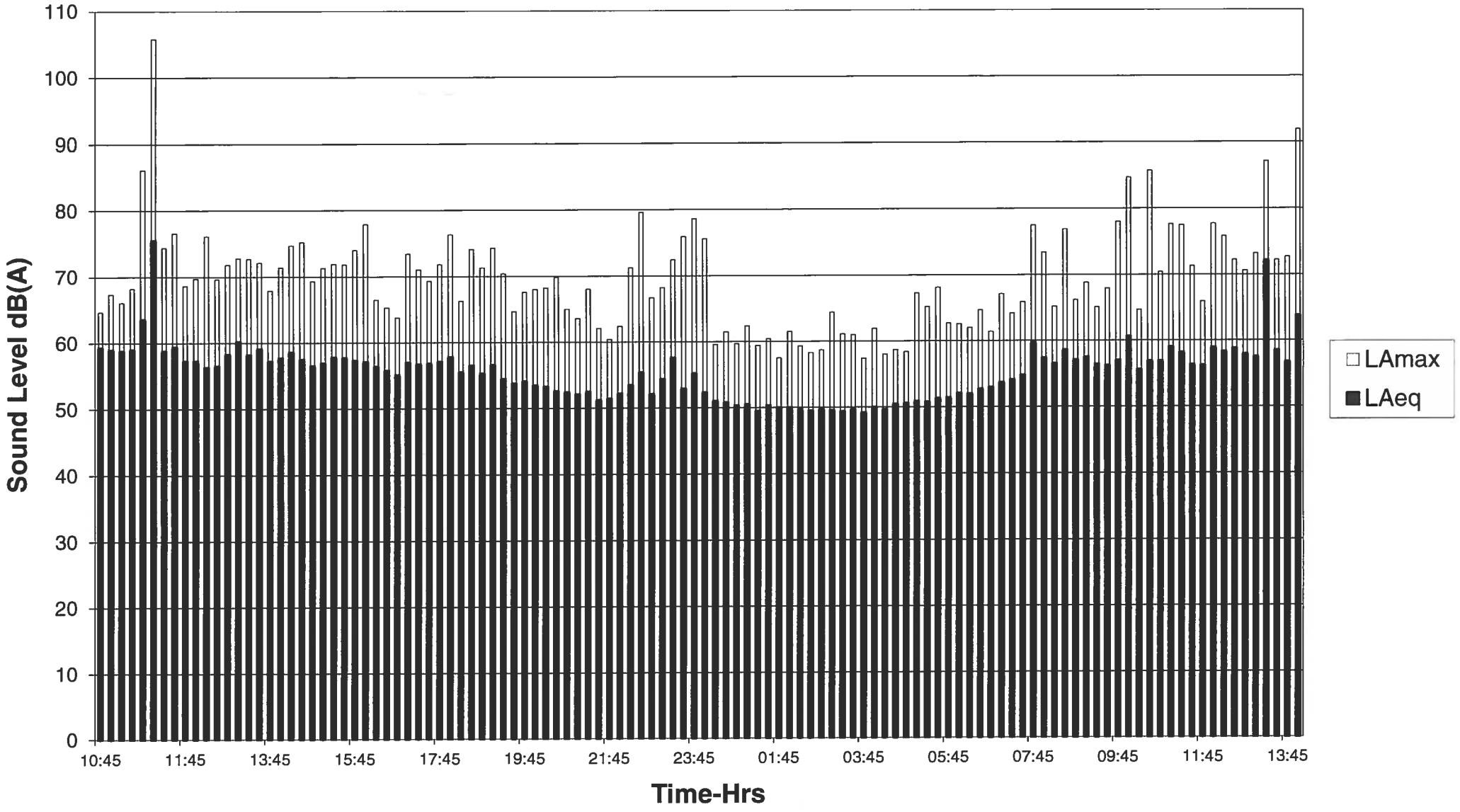
L_{A10} and L_{A90} Noise Levels

Tuesday 17/12/2013 - Wednesday 18/12/2013



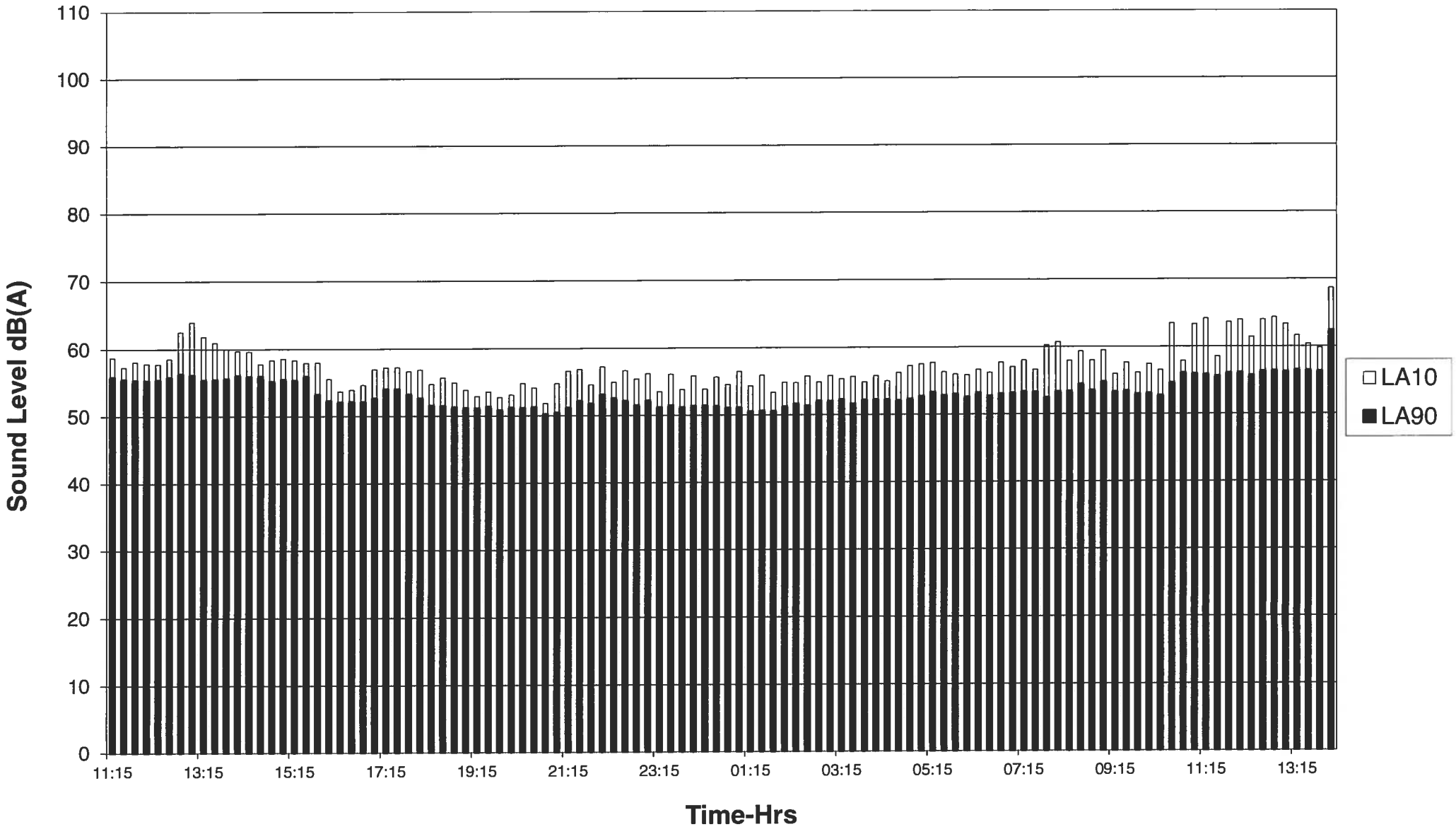
Time History Graph 19879/TH1

Fairfax House
Position 1
L_{Aeq} and L_{Amax} Noise Levels
Tuesday 17/12/2013 - Wednesday 18/12/2013



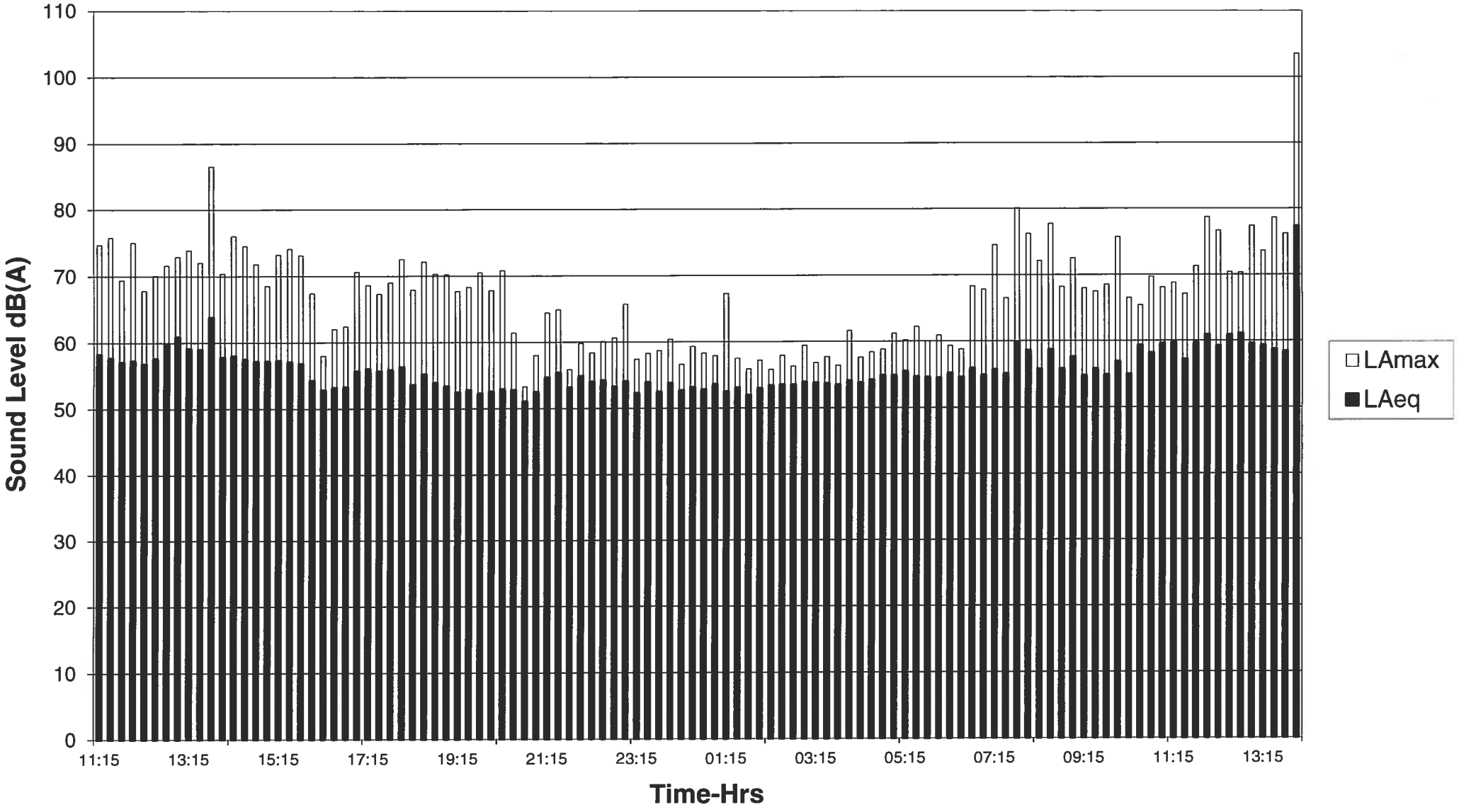
Time History Graph 19879/TH2

Fairfax House, WC1V
Position 2
L_{A10} and L_{A90} Noise Levels
Tuesday 17/12/2013 - Wednesday 18/12/2013



Time History Graph 19879/TH3

Fairfax House
Position 2
L_{Aeq} and L_{Amax} Noise Levels
Tuesday 17/12/2013 - Wednesday 18/12/2013



Time History Graph 19879/TH4