Athlone House, Hampstead

ENVIRONMENTAL NOISE SURVEY
AND PPG24 ASSESSMENT
REPORT18436/PPG24 01 Revised

For:

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CONTENTS

Page

1.0 INTRODUCTION

A Planning application is being submitted to Camden Borough Council for a replacement residence at Athlone House.

New items of building services will need to be installed. Hann Tucker Associates have therefore been commissioned to undertake an environmental noise survey at the site and specify the plant noise emission criteria taking into account the current background noise levels from the local environment, and to assess site noise levels to residential planning requirements.

This report presents the survey methodology and findings. The survey data may be used as the basis for various acoustic assessment purposes.

This report has followed the PPG24 standard as Camden Council requires more details than that asked for in the current NPPF guidelines.

2.0 OBJECTIVES

To establish, by means of detailed 72 hour 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 2No. selected secure and accessible positions at the site.

To measure L_{eq}, L_{90}, L_{10} and L_{max} octave band spectra noise levels for typical daytime and night-time periods at the measurement position in order to obtain a more detailed description of the noise climate.

Based on the results of the noise survey, and in conjunction with the Local Authority, to recommend suitable plant noise emission criteria and to determine the Noise Exposure Category (NEC) the development site in accordance with Planning Policy Guidance (PPG) 24: Planning and Noise.

3.0 SITE DESCRIPTION

3.1 Location

The site is located off Hampstead Lane and falls within Camden's jurisdiction. See Location Map below.

Location Map (maps.google.co.uk)

3.2 Description

The Athlone House site comprises of a large residential building with three other residential blocks 50m to the east. The site is bound by Hampstead lane to the north, and wooded park land to all other sides. See Site Plan below.

Site Plan (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 11:00 hours on 03 August 2012 to 11:00 hours on 06 August 2012.

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 calm. The sky was generally clear. We understand that generally throughout the survey period the weather conditions were similar to this. 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 at 2 positions around the development site. The measurement positions are described in the following table and shown on the plan below.

Position No	Description
1	The sound level meter was attached to a top corner of a steel shipping container currently used as security office, towards the northern site boundary in a free field location.
2	The sound level meter was attached to a metal railing in front of the east face of the property, towards the southern site boundary in a free field location.

Plan Showing Unmanned Measurement Positions (maps.google.co.uk)

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	3802	LD calibration on 18/08/2010
Position 1 Type 1 ½" Condenser Microphone	PCB	377B02	107040	LD calibration on 18/08/2010
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3542	LD calibration on 24/02/2012
Position 2 Type 1 ½" Condenser Microphone	PCB	377B02	104675	LD calibration on 24/02/2012
Type 1 Calibrator	Larson Davis	CAL200	3082	LD calibration on 02/03/2012

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes was/were found to have occurred.

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

6.0 RESULTS

The results have been plotted on Time History Graphs 18436/TH1 to 18436/TH4 enclosed presenting the 15 minute A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

6.1 L_{eq} Noise Levels

In order to compare the results of our survey with the guidelines stated within PPG24, it is necessary to convert the measured $L_{Aeq(15\ minute)}$ noise levels into single figure daytime $L_{Aeq(16\text{-}hour)}$ (07:00-23:00 hours) and night-time $L_{Aeq(8\text{-}hour)}$ (23:00-07:00 hours) levels.

The daytime $L_{Aeq(16\text{-}hour)}$ and night-time $L_{Aeq(8\text{-}hour)}$ noise levels for each position are presented in the tables below.

Date	Position 1		Position 2	
	Daytime $L_{Aeq(16\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$	Daytime $L_{Aeq(16\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$
03/08/2012	60 dB	55 dB	48 dB	44 dB
04/08/2012	60 dB	56 dB	53 dB	44 dB
05/08/2012	60 dB	55 dB	48 dB	43 dB
Arithmetic Average	60 dB	55 dB	50 dB	44 dB

6.2 Night-Time L_{max} Results

The following Table presents the number of L_{max} events which exceeded 82dBA during the night-time period.

Time	No of Events	
	Position 1	Position 2
23:00-00:00	0	0
00:00-01:00	1	0
01:00-02:00	0	0
02:00-03:00	0	0
03:00-04:00	1	0
04:00-05:00	0	0
05:00-06:00	0	0
06:00-07:00	0	0

7.0 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 5dBA less than the existing background measurement (L_{A90}), expressed in dBA 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 10dBA below the L_{A90}, expressed in dBA."

As the proposed plant has been judged to contain no tonal element and 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)	
Daytime (07:00 – 23:00)	Night-Time (23:00 – 07:00)
30	27

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

8.0 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 Hampstead Lane.

9.0 PPG24 ASSESSMENT

9.1 PPG24 Planning Policy Guidance

Annex 1 of PPG24 states the following:

Noise Exposure Categories for Dwellings

When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories (NECs) the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then take into account the advice in the appropriate NEC, as below:

NEC	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Recommended Noise Exposure Categories for New Dwellings Near Existing Noise Sources

Noise Levels Corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB				
Noise Source	Noise Exposure Category			
	A	B	C	D
Road Traffic 07.00 – 23.00 23.00 – 07.00	<55 <45	55 - 63 45 - 57	63 - 72 57 - 66	>72 >66
Rail Traffic 0700 – 2300 2300 – 0700	<55 <45	55 - 66 45 - 59	66 - 74 59 - 66	>74 >66
Mixed Sources 0700 – 2300 2300 – 0700	<55 <45	55-63 45-57	63-72 57-66	>72 >66

In addition to the above, PPG 24 also states that during the night (23:00 - 07:00 hrs):

> *"Sites where individual noise events regularly exceed 82dB L_{Amax} several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq(8\text{-}hour)}$ (except where the $L_{Aeq(8\text{-}hour)}$ already puts the site into NEC D)."*

9.2 Local Authority Discretion

The table in the previous section contains the recommended range of traffic noise levels for each NEC covering daytime and night-time periods. However, paragraph 9 of the main text of PPG24 states:

The table in Annex 1 contains a recommended range of noise levels for each NEC covering day and night-time periods. However, in some cases it may be appropriate for local planning authorities to determine the range of noise

levels which they wish to attribute to any or each of the NECs. For example, where there is a clear need for new residential development in an already noisy area, some or all NECs might be increased by up to 3dBA above the recommended level. In other cases, a reduction of up to 3dBA may be justified.

9.3 Measured NECs

With reference to the above noise exposure categories for road traffic noise sources, the measured noise levels fall within the following categories for daytime and night-time periods.

Position	Noise Exposure Category	
	Daytime (07:00 – 23:00)	Night-Time (23:00 – 07:00)
1	B	B
2	A	A

9.4 Discussion

With reference to the noise exposure categories for dwellings, as detailed in Section 9.1, when assessing planning application for sites which fall into NEC B, PPG24 advises noise should be taken into account when determining planning applications, and where appropriate, conditions imposed to ensure an adequate level of protection against noise.

The NEC measured at the location of the property falls into NEC A, PPG24 advises that noise need not be considered as a determining factor in granting planning permission.

10.0 SUITABLE INTERNAL NOISE LEVELS

PPG24 and the previous sections of this report consider the external noise levels. However noise levels within the proposed dwellings should be the overriding consideration.

10.1 BS 8233

PPG24 states in Annex 6: Paragraph 8 that *"Guidance on suitable internal noise levels can be found in BS 8233: 1987".*

BS 8233: 1987 has been withdrawn and replaced by British Standard 8233: 1999: "Sound insulation and noise reduction for buildings". Section 7.6.1 of BS 8233: 1999 states that reasonable resting and sleeping conditions in living rooms and bedrooms can be achieved by the following target $L_{Aeq,T}$ internal noise levels:

Room Type	$L_{Aeq,T}$	
	Good	Reasonable
Living Room	30dB	40dB
Bedrooms	30dB	35dB

The Standard also states *"For a reasonable standard in bedrooms at night, individual noise events (measure with F time-weighting) should not normally*

exceed 45dB L_{Amax}."

10.2 World Health Organisation

The World Health Organisation document on "Guidelines for Community Noise" states the following guideline values for community noise in specific environments.

Specific Environment	Critical Health Effect(s)	L_{Aeq}	$L_{Amax,fast}$
Dwelling, indoors	Speech intelligibility and moderate annoyance	35dB	-
Inside Bedrooms	Sleep disturbance, night-time	30dB	45dB

The document also states *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dBA L_{Amax} more than 10-15 times per night, (Vallet & Varnet 1991)."*

The above levels are however the subject of much controversy, as indicated by one of the feature articles in the January/February 2003 edition of the Institute of Acoustics' publication.

In our opinion the above criteria for bedrooms should thus be regarded as preferred, rather than mandatory maxima to be achieved in all cases.

10.3 Local Unitary Development Plan

We are not aware that Camden Council has any internal design criteria in their current planning policy.

10.4 Proposed Criteria

On the basis of the above we would propose the following internal noise levels be adopted as minimum design targets in the worst affected dwellings.

Room Type	Period	Criterion
Living Areas	Daytime (07:00-23:00 hours)	40dB $L_{Aeq, 16hr}$
Bedrooms	Night-time (23:00-07:00 hours)	35dB $L_{Aeq, 8hr}$

The above levels correspond to "reasonable", as defined in BS 8233. If these criteria are adopted as minimum standards for worst affected dwellings, the typical levels in typical flats will approach, and in many cases exceed, "good" as defined in BS 8233.

Note: The criteria termed "reasonable" in BS8233: 1999 would generally be considered to be pretty stringent and acceptable. It would in fact be fair to substitute the word "reasonable" for "acceptable". To expect "good" in the worst case dwellings would thus be consistent with BS 8233: 1999. If the worst case was designed to "good" this would lead to "over design" for other dwellings – which could be undesirable for various reasons (including cost and acoustic privacy between dwellings).

If planning permission is granted, planning conditions should be imposed to ensure an adequate level of protection against external noise, and the above

criteria would form a reasonable basis for a condition.

11.0 ACHIEVABLE INTERNAL NOISE LEVELS

We have predicted the levels that would be achievable in the worst-case habitable rooms closest to the dominant noise source.

Annex 6 of PPG24 states the following:

"Typical noise reduction of a dwelling façade with windows set in brick/block wall."

Difference Between External and Internal Noise Levels			
Noise Source	**Single Glazing**	**Thermal Double Glazing**	**Secondary Glazing**
Road Traffic	28dBA	33dBA	34dBA
Civil Aircraft	27dBA	32dBA	35dBA
Military Aircraft	29dBA	35dBA	39dBA
Diesel Train	28dBA	32dBA	35dBA
Electric Train	30dBA	36dBA	41dBA

A simple assessment based on the above indicates the following noise levels may be expected within the proposed worst case dwellings with single glazing. We have used the levels measured at position 2 as these are representative of the new buildings façade location.

Daytime $L_{Aeq(16\text{-hour})}$ dBA	Night-time $L_{Aeq(8\text{-hour})}$
22 dBA	16 dBA

These predicted worst case internal noise levels meet the proposed criteria.

We can also predict that with windows open, by using a 10-15dBA reduction in our measured levels to calculate this as in BS8233, that the predicted levels still meet the proposed criteria.

It is thus demonstrated that acceptable internal noise levels are achievable.

12.0 CONCLUSIONS

A detailed 24 hour environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the site.

From the measured environmental noise levels the corresponding noise exposure category of the site has been determined.

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

The worst case position falls into Noise Exposure Category B. At the proposed building location the position falls into Noise Exposure Category A. With reference to the noise exposure categories for dwellings, noise should be taken into account when determining planning applications and, where appropriate conditions imposed to ensure an adequate level of protection against noise.

Appropriate internal noise criteria have been proposed. These are achievable using single glazing and with open windows.

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Appendix A

The acoustic terms used in this report are explained below:

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.

dBA : 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 dBA level.

Because of being a logarithmic scale noise levels in dBA do not have a linear relationship to each other. For similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA 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.

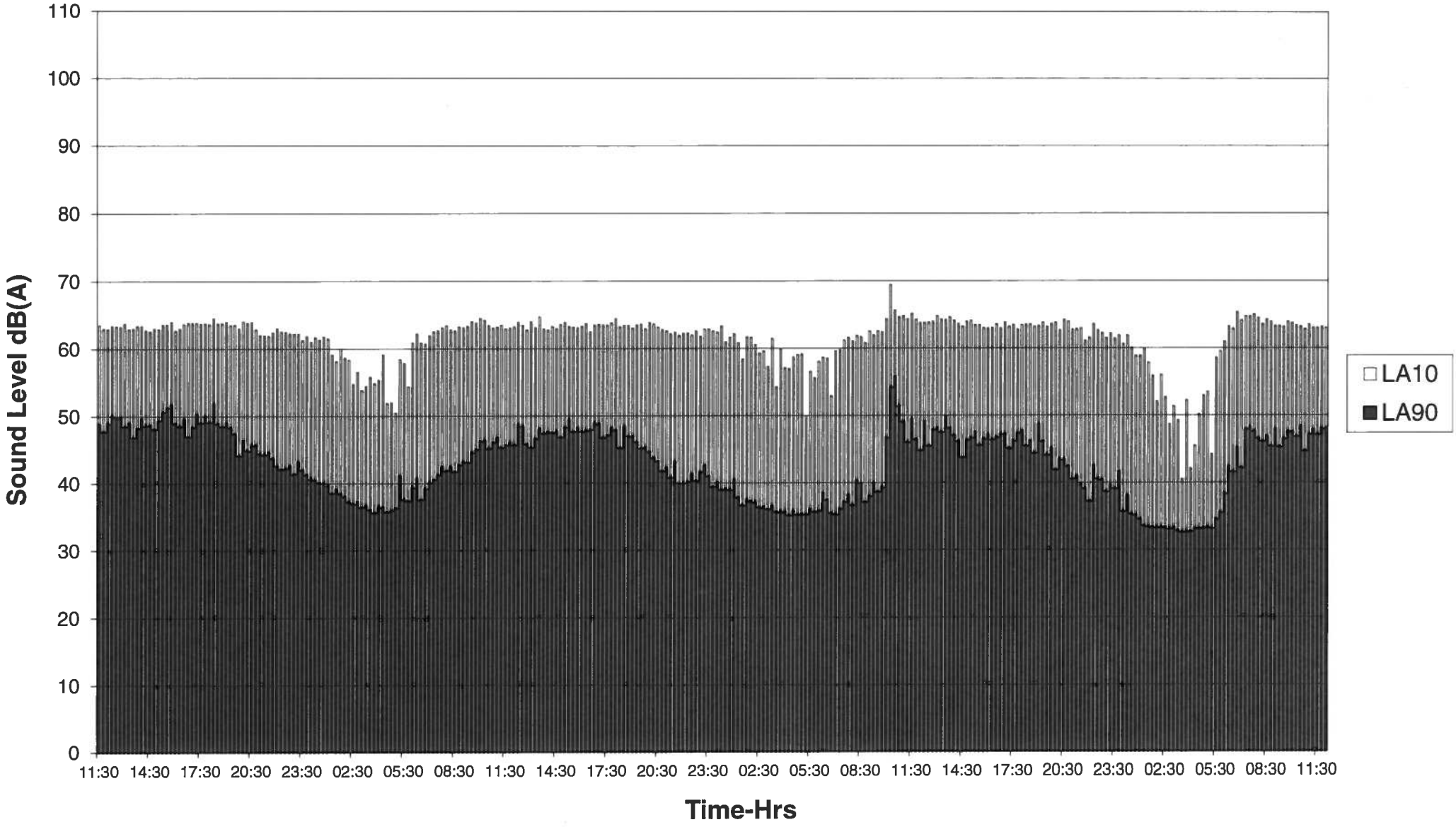
L_{eq} : The concept of L_{eq} (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise, such as aircraft noise, environmental noise and construction noise.

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.

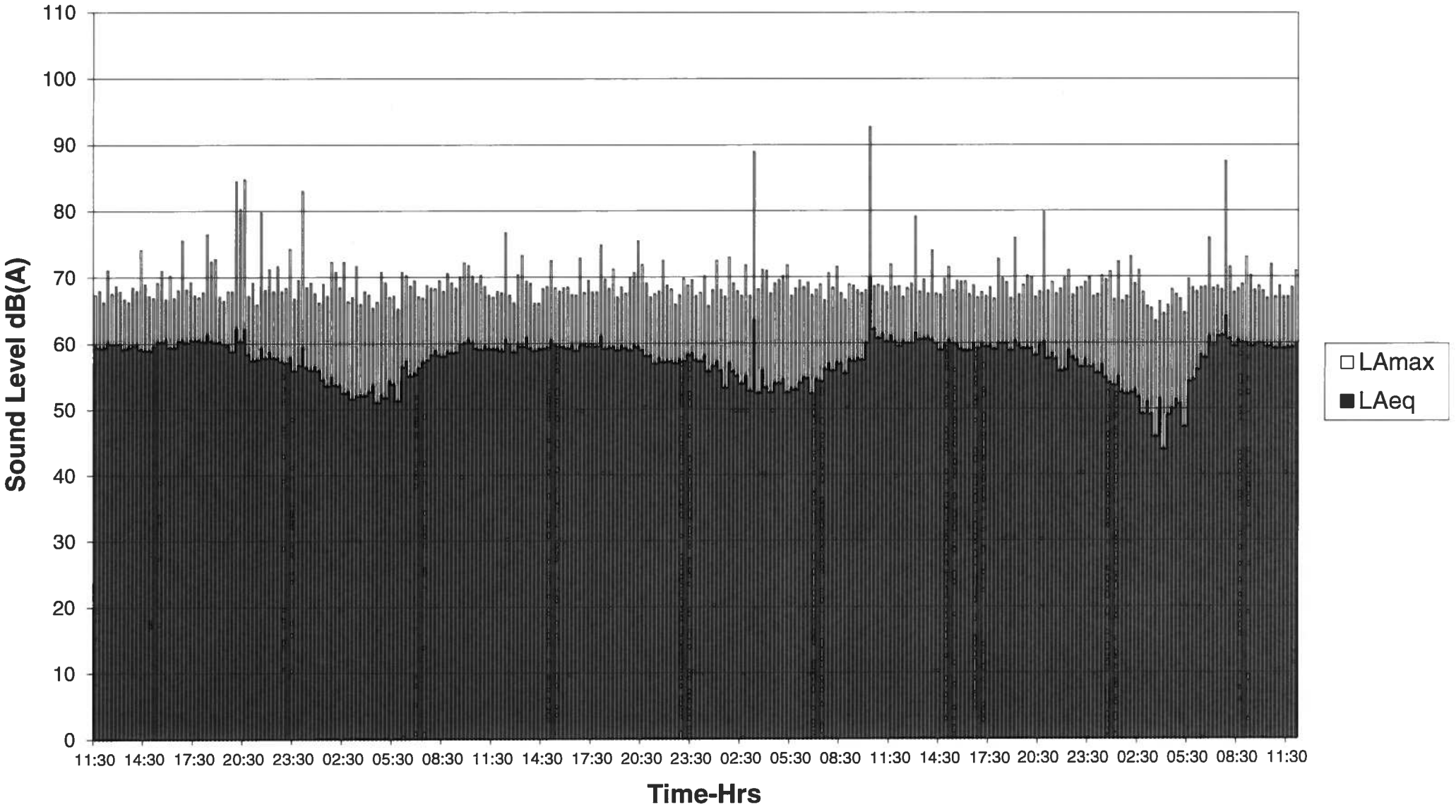
L_{max} : L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Athlone House
Position 1
L_{A10} and L_{A90} Noise Levels
Friday 03/08/2012 - Monday 06/08/2012



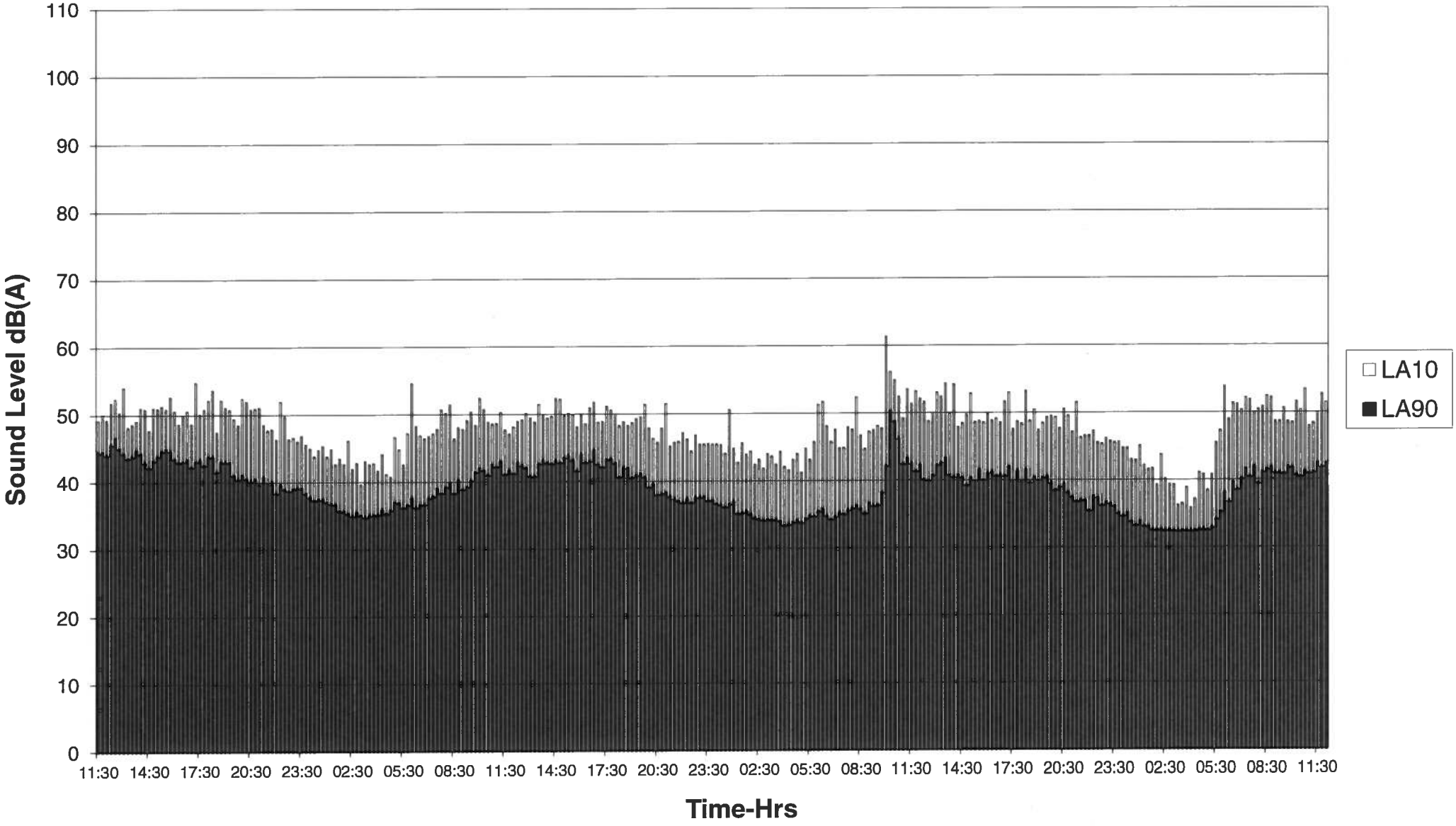
Time History Graph 18436/TH1

Athlone House
Position 1
L_{Aeq} and L_{Amax} Noise Levels
Friday 03/08/2012 - Monday 06/08/2012



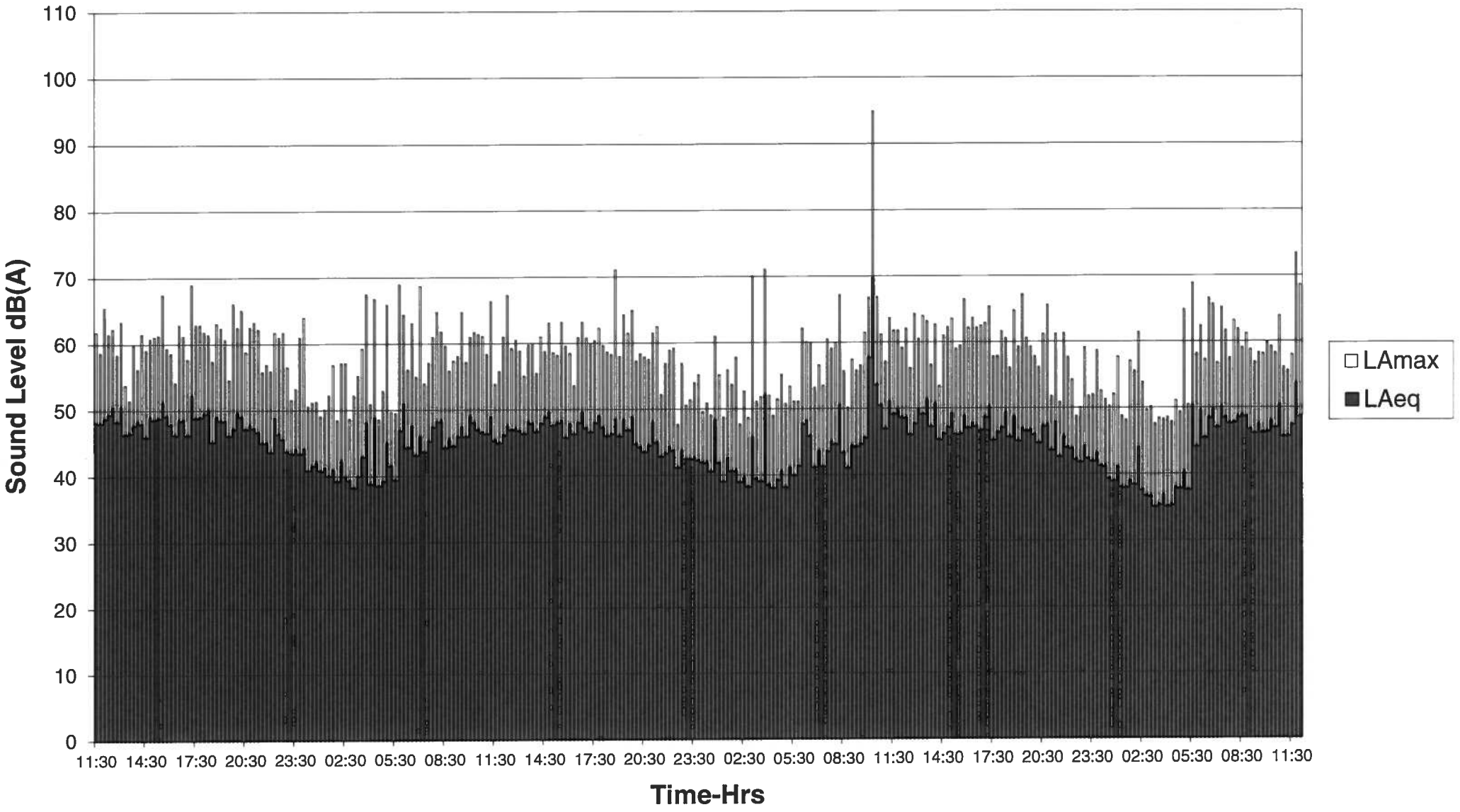
Time History Graph 18436/TH2

Athlone House
Position 2
L_{A10} and L_{A90} Noise Levels
Friday 03/08/2012 - Monday 06/08/2012



Time History Graph 18436/TH3

Athlone House
Position 2
L_{Aeq} and L_{Amax} Noise Levels
Friday 03/08/2012 - Monday 06/08/2012



Time History Graph 18436/TH4