Kay Court, Finchley Road
London

ENVIRONMENTAL NOISE SURVEY
AND PPG24 ASSESSMENT
REPORT 17356/PPG24.1

For :

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REPORT 17356/PPG24.1

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1.0 INTRODUCTION

A residential redevelopment is proposed at Kay Court, Finchley Road, London. Hann Tucker Associates have therefore been commissioned to undertake an environmental noise survey and carry out a PPG24 (Planning Policy Guidance 24: Planning and Noise) assessment.

This report presents the methodology and findings of our noise survey and PPG24 assessment.

2.0 OBJECTIVES

To establish, by means of fully automated environmental noise monitoring, the existing A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} environmental noise levels at 2No. positions around the site during a 48 hour period.

To establish, by means of fully automated environmental noise monitoring, the number of L_{max} noise events which exceed 82dBA between 23:00 and 07:00 hours.

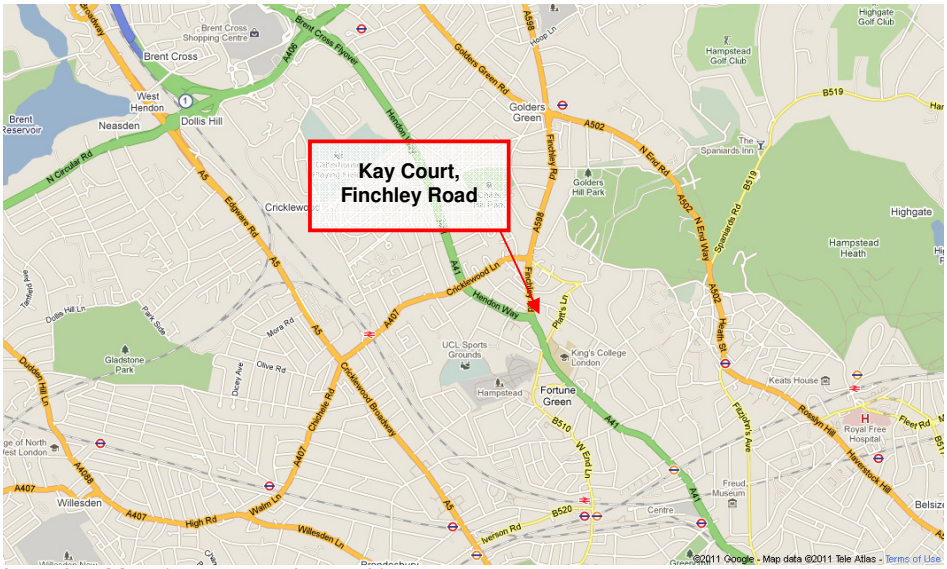
Based on the results of the noise survey data, to determine the Noise Exposure Category (NEC) the development site in accordance with Planning Policy Guidance (PPG) 24: Planning and Noise.

These objectives are as set out in our letter dated 16 May 2011 and written instructions received on 28 June 2011.

3.0 SITE DESCRIPTION

3.1 Location

The site is located at 368-372 Finchley Road, London and falls within the London Borough of Camden's jurisdiction. See Location Map below.



Location Map (maps.google.co.uk)

3.2 Description

368-372 Finchley Road is situated to the East of Finchley Road directly opposite Lyndale Avenue and just North of Hendon Way. The surrounding premises are predominantly residential. 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 14:30 hours on Monday 4 July 2011 to 14:30 hours on Wednesday 7 July 2011.

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 and 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 2No. positions around the development site. The measurement positions are described in the table below.

Position No	Description
1	The microphone was attached to a pole protruding out of a first floor window approximately 8m above ground level overlooking Finchley Road on the Western façade of the site.
2	The microphone was attached to a pole protruding out of a second floor window approximately 11m above ground level on the Eastern façade of the site.

The positions were selected in order to assess typical existing environmental noise levels and are shown on the plan below.

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	3824	LD calibration on 27/09/2010
Position 1 Type 1 ½" Condenser Microphone	PCB	377B02	107843	LD calibration on 27/09/2010

Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3825	LD calibration on 27/09/2010
Position 2 Type 1 ½" Condenser Microphone	PCB	377B02	107842	LD calibration on 27/09/2010
Type 1 Calibrator	Larson Davis	CAL200	3082	LD calibration on 21/01/2011

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

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 17356/TH1 to 17356/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 – PPG24

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.

Position	Daytime $L_{Aeq(16\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$
1	68dB	63dB
2	49dB	45dB

N.B. The above levels have been corrected for façade reflections where appropriate, for comparison with the free field levels stated in PPG24.

6.2 L_{eq} Noise Levels – Camden Development Policies DP28

In order to compare the results of our survey with the guidelines stated within the London Borough of Camden's Development Policies DP28 - 'Noise and Vibration', it is necessary to convert the measured $L_{Aeq(15\ minute)}$ noise levels into the daytime $L_{Aeq(12\text{-}hour)}$ (07:00-19:00 hours), evening $L_{Aeq(4\text{-}hour)}$ (19:00-23:00 hours), and night-time $L_{Aeq(8\text{-}hour)}$ (23:00-07:00 hours) noise levels.

Position	Daytime $L_{Aeq(12\text{-}hour)}$	Evening $L_{Aeq(4\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$
1	67dB	67dB	63dB
2	49dB	49dB	45dB

N.B. The above levels have been corrected for façade reflections where appropriate.

6.3 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	2	0
02:00-03:00	0	0
03:00-04:00	0	0
04:00-05:00	0	0
05:00-00:00	0	0
06:00-07:00	0	0

N.B. The above levels have been corrected for façade reflections where appropriate, for comparison with the free field levels stated in PPG24.

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 noise from the surrounding roads.

8.0 PPG24 ASSESSMENT

8.1 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)."*

8.2 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.

8.3 Measured NECs

With reference to the above noise exposure categories for road traffic noise sources, the measured noise levels (corrected to free field conditions where appropriate) fall within the following categories for daytime and night-time periods.

Noise Exposure Category		
Position	**Daytime**	**Night-time**
1	C	C
2	A	B

8.4 Discussion

With reference to the noise exposure categories for dwellings, as detailed in Section 8.1, when assessing planning application for sites which fall into NEC A, PPG24 advises 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.

With reference to the noise exposure categories for dwellings, as detailed in Section 8.1, 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.

With reference to the noise exposure categories for dwellings, as detailed in Section 8.1, when assessing planning applications for sites which fall into NEC C, PPG24 advises 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 an adequate level of protection against noise.

It should be recognised that PPG24 does not reflect the situation that in London noise levels and the demand for housing are both high, relative to the country in general. In our experience the majority of proposed residential sites in London fall into NEC C (or D) along at least one boundary. PPG24 unfortunately does not reflect the situation that higher noise levels are expected, and so the guidance is rather conservative. For these reasons it is common for planning permission to be granted for sites which partially fall into Noise Exposure Category C (or D).

Furthermore purchasers buying a property in London are able to exercise choice and accept a higher degree of noise, especially if acceptable internal noise levels can be achieved as discussed in the following sections.

Paragraph 8 of PPG24 states:

"Categories B and C deal with situations where noise mitigation measures may make development acceptable."

9.0 CAMDEN DEVELOPMENT POLICIES DP28

Section 3 of Camden Development Policies DP.28 - 'Noise and Vibration' states:

> *"In assessing applications, we will have regard to the Noise and Vibration Thresholds, set out below. These represent an interpretation of the standards in PPG24 and include an evening period in addition to the day and night standards in PPG24, which provide a greater degree of control over noise and vibration during a period when noise is often an issue in the borough."*

The following tables list these thresholds.

Table A: Noise levels on residential sites adjoining roads at which planning permission will not be granted.			
Noise description and location of measurement	**Period**	**Time (Hours)**	**Sites adjoining roads**
Noise at 1 metre external to a sensitive façade	Day	07:00-19:00	72 dB $L_{Aeq(12\text{-}hour)}$
Noise at 1 metre external to a sensitive façade	Evening	19:00-23:00	72 dB $L_{Aeq(4\text{-}hour)}$
Noise at 1 metre external to a sensitive façade	Night	23:00-07:00	66 dB $L_{Aeq(8\text{-}hour)}$

Table B: Noise levels on residential sites adjoining roads at and above which attenuation measures will be required.			
Noise description and location of measurement	**Period**	**Time (Hours)**	**Sites adjoining roads**
Noise at 1 metre external to a sensitive façade	Day	07:00-19:00	62 dB $L_{Aeq(12\text{-}hour)}$
Noise at 1 metre external to a sensitive façade	Evening	19:00-23:00	57 dB $L_{Aeq(4\text{-}hour)}$
Noise at 1 metre external to a sensitive façade	Night	23:00-07:00	52 dB $L_{Aeq(8\text{-}hour)}$
Individual noise events several times an hour	Night	23:00-07:00	>82 dB L_{AMax} (S time weighting)

With reference to Section 9.0 Table A and the measurements detailed in Section 6.2, all periods are quieter than the minimum levels at which planning permission will not be granted.

With reference to Section 9.0 Table B and the measurements detailed in Section 6.2, attenuation measures will be required by the Local Authority.

10.0 SUITABLE INTERNAL NOISE LEVELS

PPG24 and Camden Development Polices DP28 mainly 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 Proposed Criteria

On the basis of the above we would propose the following internal noise levels be adopted as <u>minimum</u> design targets in the <u>worst</u> 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 <u>minimum</u> standards for <u>worst</u> affected dwellings, the <u>typical</u> levels in <u>typical</u> 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 MITIGATION MEASURES

Provision exists to provide additional sound insulation as required. The external envelope of the new residences should incorporate suitably specified glazing and ventilation, so as to achieve the BS 8233 criteria summarised above.

At this stage of the design scheme the precise types of window to be used is not known. Nor have selections of acoustic vents been made.

The Local Planning Authority would expect to be provided with details of the sound insulation treatments when available. Therefore in granting consent it would be appropriate for planning condition to be imposed along the following lines, based on example condition 1 drawn from PPG24:

Construction work shall not begin until a scheme for protecting the dwellings against noise from road traffic has been submitted to and approved by the Local Planning Authority; for each applicable dwelling all works which form part of the scheme for that dwelling shall be completed before the dwelling is occupied.

12.0 ACHIEVABLE INTERNAL NOISE LEVELS

We have predicted the levels that would be achievable in the worst-case habitable room(s) 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

Note: The values in the above Table are the difference between dBA levels measured outside and inside typical dwellings, therefore 3dBA should be added to free field noise levels to determine outside levels.

A simple assessment based on the above indicates the following noise levels may be expected within the proposed worst case dwellings with conventional thermal double glazing.

Daytime $L_{Aeq(16\text{-}hour)}$ dBA	Night-time $L_{Aeq(8\text{-}hour)}$
38 dBA	33 dBA

These predicted worst case internal noise levels meet the proposed criteria. It is thus demonstrated that acceptable internal noise levels are achievable.

13.0 CONCLUSIONS

A detailed 48 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.

The worst case façades fall into Noise Exposure Category C. The remainder of the façades fall into Noise Exposure Category B and 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 conventional constructions.

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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.

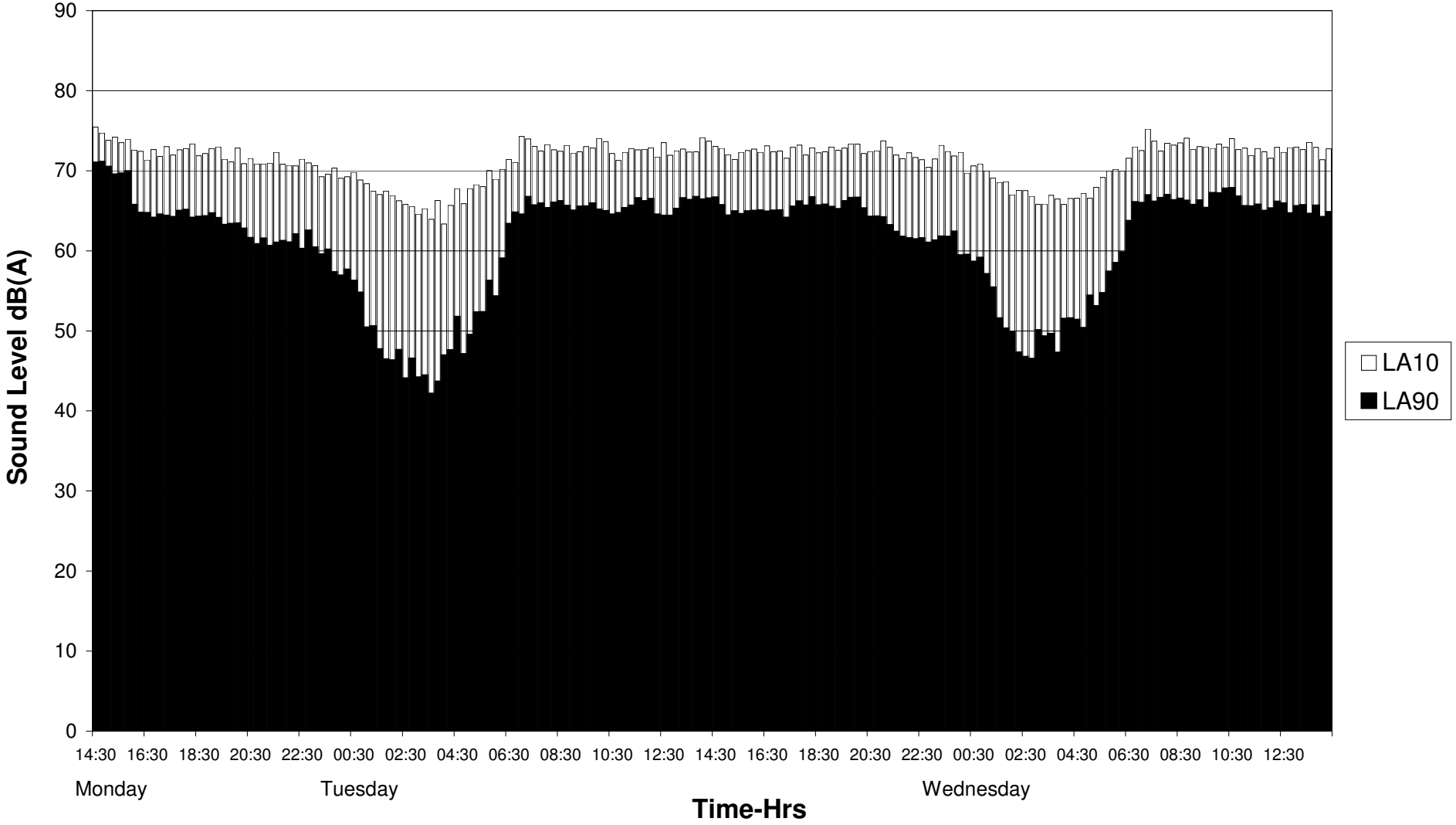
L_{max} : L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Kay Court, Finchley Road

Position 1

L_{A10} and L_{A90} Noise Levels

Monday 04/07/2011 - Wednesday 06/07/2011



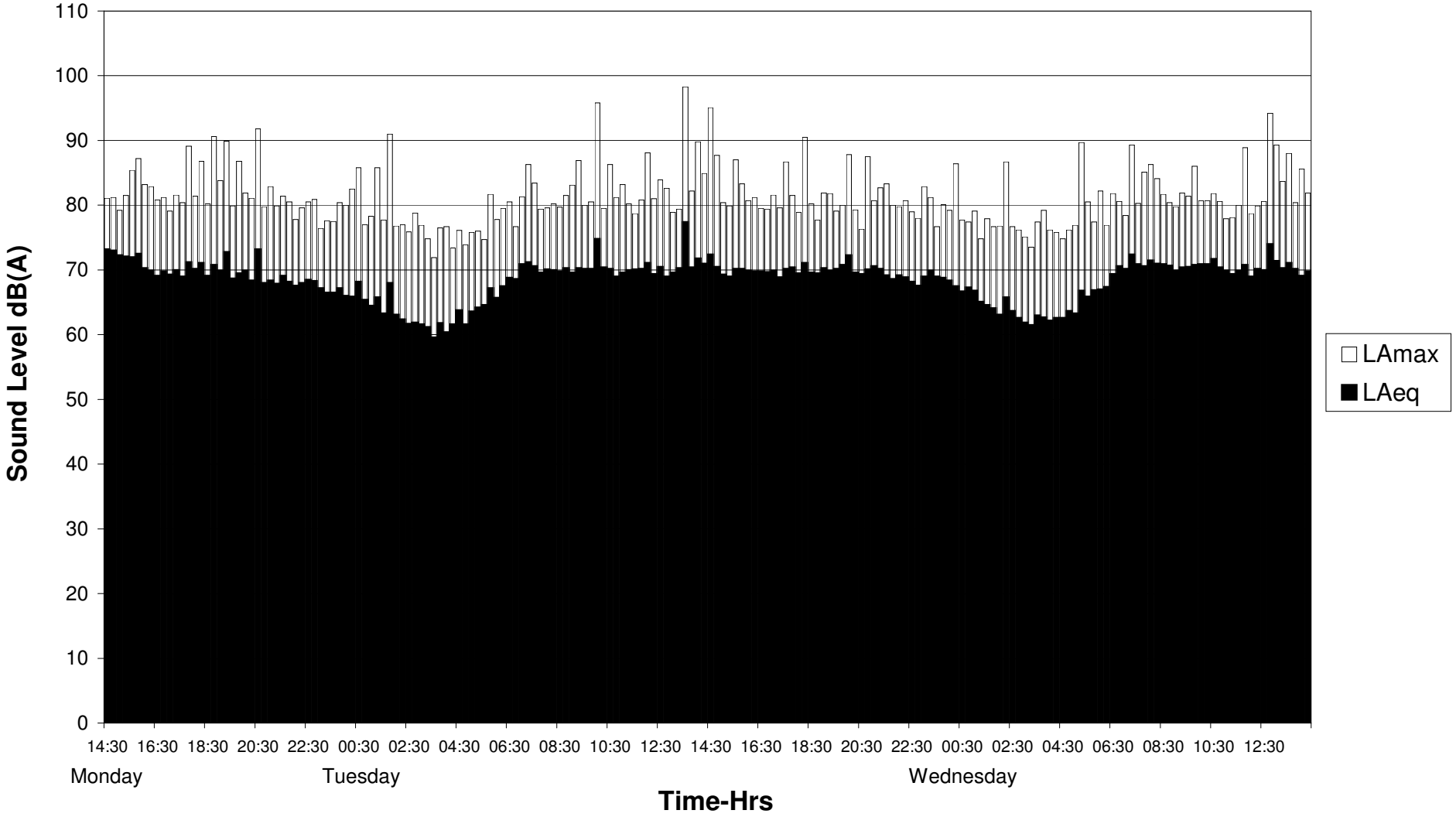
Time History Graph 17356/TH1

Kay Court, Finchley Road

Position 1

L_{Aeq} and L_{Amax} Noise Levels

Monday 04/07/2011 - Wednesday 06/07/2011



Time History Graph 17356/TH2

Kay Court, Finchley Road

Position 2

L_{A10} and L_{A90} Noise Levels

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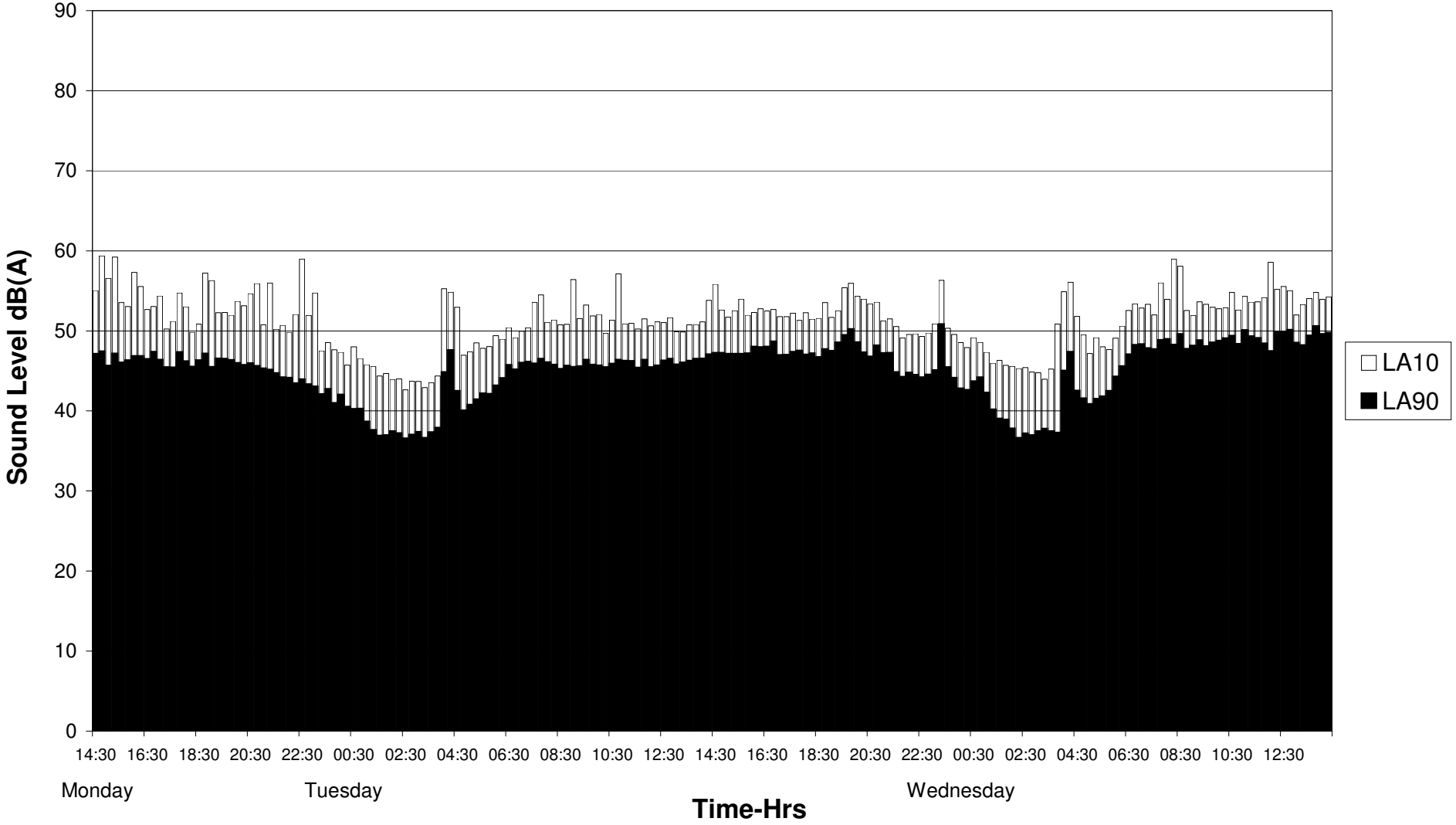


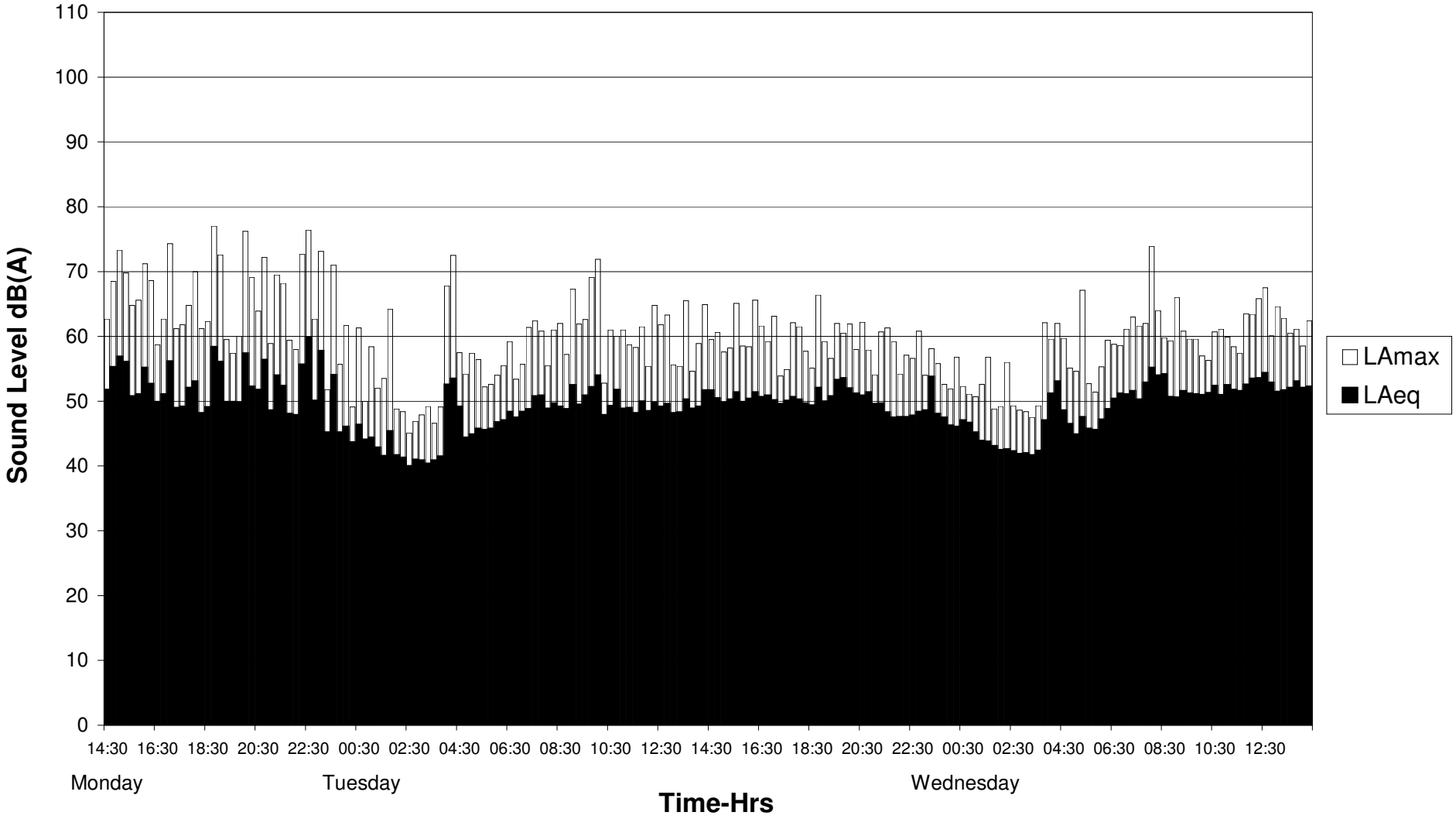
Time History Graph 17356/TH1

Kay Court, Finchley Road

Position 2

L_{Aeq} and L_{Amax} Noise Levels

Monday 04/07/2011 - Wednesday 06/07/2011



Time History Graph 17356/TH2