59-61 Oak Grove
London NW2

ENVIRONMENTAL NOISE SURVEY
AND NOISE IMPACT ASSESSMENT
REPORT 19861/EIA1

For:

Pocket Living LLP
14 Floral Street
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27 January 2014

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REPORT 19861/EIA1

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Revision No.	Date	Description
1	27/01/2014	Minor alterations

1.0 INTRODUCTION

It is proposed to build a three storey including ground floor residential property on the site of 59-61 Oak Grove.

This report presents the methodology and findings of our noise survey and assessment in the context of the National Planning Policy Framework (NPPF).

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 selected accessible positions during a seventy-two hour survey.

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.

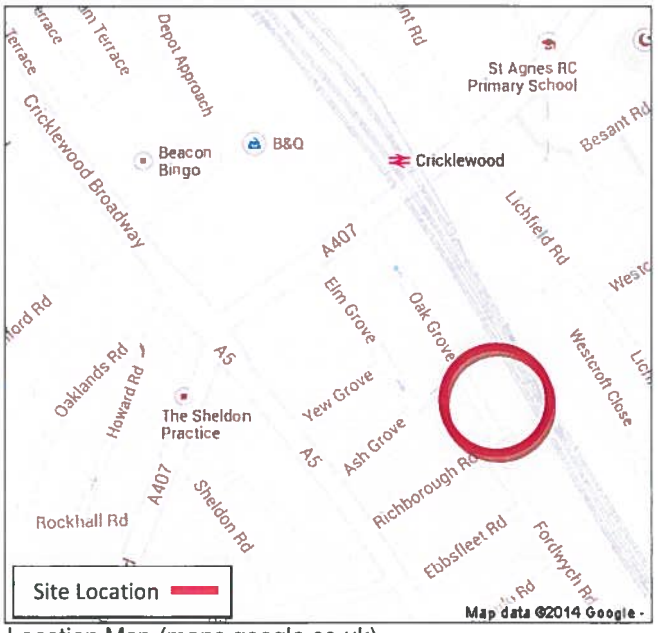
Based upon the results of the noise survey data and guidance of the NPPF, undertake a noise assessment to assess the suitability of the proposed development for residential use.

These objectives are as set out in Part 2.1 and 2.2 of our Outline Brief dated 10th December 2013 and Pocket Living LLP written instructions received on 19th December 2013.

3.0 SITE DESCRIPTION

3.1 Location

59-61 Oak Grove is within the administrative boundary of Camden. The dominant land use in the local vicinity is residential, however, there is some commercial. See Map below.



Location Map (maps.google.co.uk)

3.2 Description

The current site is waste ground predominantly made up of hardstanding with an automotive garage located to the north the railway lines to the east. Cricklewood station is approximately 200 metres to the north of the site and is served by the Thameslink route with additional trains running on the Midland Main Line through the station on a non-stop service. At Cricklewood railway station there are six railway lines which carry passenger trains only. The train lines run approximately north to south and are managed by First Capital Connect. At peak times, approximately ten trains will pass through Cricklewood station per hour whilst off peak this drops to around four. The railway lines are raised above ground level at a height of approximately 5 metres and noise from the trains on these lines is the dominant source in the area.

Location Map (Bluesky)

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 13:00 hours on Friday 3rd January 2014 to 13:00 hours on Tuesday 7th January 2014.

Owing 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. At the beginning and end of the survey period, however, the wind conditions were moderate and the sky was generally overcast. We understand that generally throughout the survey period the weather conditions were suitable to conduct a survey of this kind.

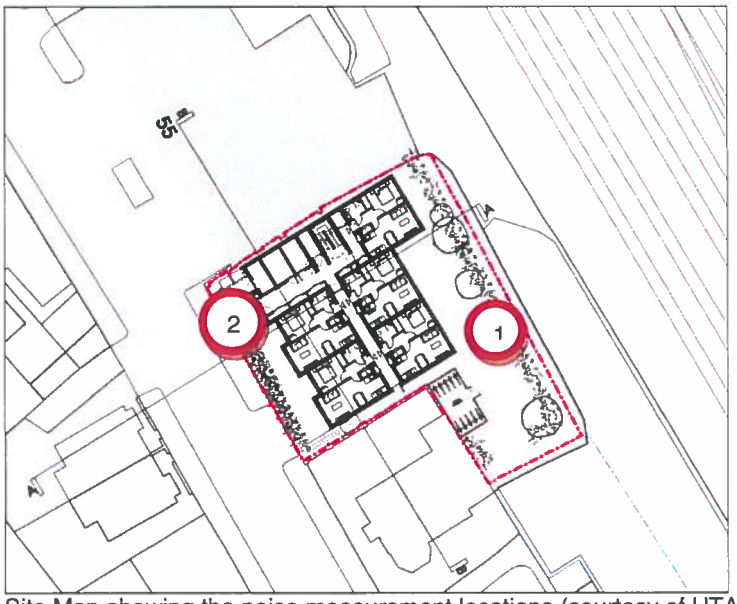
Measurements were taken continuously of the A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} sound pressure levels over 15 minute periods.

5.2 Measurement Positions

The noise level measurements were undertaken at two positions around the development site. The measurement positions are described in the table below.

Position No	Description
1	The microphone was positioned to the west of the site adjacent to Oak Grove at approximately three metres from the road kerb and forty metres from the nearest railway track. The microphone was approximately three metres from ground level and within the free field.
2	The microphone was positioned to the east of the site adjacent to the nearby railway lines at approximately twenty-five metres from the road kerb and seventeen metres from the nearest railway track. The microphone was approximately three metres from ground level and within the free field.

The microphone positions are shown on the plan below.



Site Map showing the noise measurement locations (courtesy of HTA)

5.2.1 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	3700	LD calibration on 05/04/2013
Position 1 Type 1 ½" Condenser Microphone	Larson Davis	2541	104981	LD calibration on 05/04/2013
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3157	LD calibration on 15/08/2012
Position 2 Type 1 ½" Condenser Microphone	Larson Davis	2541	2470596	LD calibration on 15/08/2012
Type 1 Calibrator	Larson Davis	CAL200	3082	LD calibration on 21/03/2013

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the survey. No significant changes were found to have occurred (no more than 0.2 dB).

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 19861/TH1.1 to 19861/TH2.2 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 suitable guidelines it is necessary to convert the measured $L_{Aeq(15\ minute)}$ noise levels into single figure daytime $L_{Aeq(12\text{-}hour)}$ (07:00-19:00 hours) and night-time $L_{Aeq(8\text{-}hour)}$ (23:00-07:00 hours) levels, as well as a single figure evening $L_{Aeq(4\text{-}hour)}$ (19:00-23:00 hours).

The daytime $L_{Aeq(12\text{-}hour)}$, evening $L_{Aeq(4\text{-}hour)}$ and night-time $L_{Aeq(8\text{-}hour)}$ noise levels for each position are presented in the Tables below.

Position	Daytime $L_{Aeq(12\text{-}hour)}$	Evening $L_{Aeq(4\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$
1	61 dB	59 dB	53 dB
2	59 dB	57 dB	52 dB

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 Night-time L_{max} Results

There were no L_{max} events which exceeded 82dBA during the night-time.

7.0 DISCUSSION OF NOISE CLIMATE

Owing 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. At the beginning and end of the survey period, however, the dominant noise source was noted to be that of trains to the east of the site.

8.0 NATIONAL PLANNING POLICY FRAMEWORK

8.1 Local Development Plan

The London Borough of Camden states the following in its '*Camden Development Policies 2010 – 2025*':

"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 contained in the PPG, which provide a greater degree of control over noise and vibration during a period when noise is often an issue in the borough.

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Table A: Noise levels on residential sites adjoining railways and roads at which planning permission will not be granted

Noise Description and Location of Measurement	*Period*	*Time*	*Sites Adjoining Railways*	*Sites Adjoining Roads*
Noise at 1 metre external to a sensitive façade	*Day*	*07:00 – 19:00*	*74 L_{Aeq},12h*	*72 L_{Aeq},12h*
Noise at 1 metre external to a sensitive façade	*Evening*	*19:00 – 23:00*	*74 L_{Aeq},12h*	*72 L_{Aeq},12h*
Noise at 1 metre external to a sensitive façade	*Night*	*23:00 – 07:00*	*66 L_{Aeq},12h*	*66 L_{Aeq},12h*

Table B: Noise levels on residential streets adjoining railways and roads at and above which attenuation measures will be required

Noise Description and Location of Measurement	*Period*	*Time*	*Sites Adjoining Railways*	*Sites Adjoining Roads*
Noise at 1 metre external to a sensitive façade	*Day*	*07:00 – 19:00*	*65 L_{Aeq},12h*	*62 L_{Aeq},12h*
Noise at 1 metre external to a sensitive façade	*Evening*	*19:00 – 23:00*	*60 L_{Aeq},12h*	*57 L_{Aeq},12h*
Noise at 1 metre external to a sensitive façade	*Night*	*23:00 – 07:00*	*55 L_{Aeq},12h*	*52 L_{Aeq},12h*
Individual noise events several times an hour	*Night*	*23:00 – 07:00*	*>82 dB LAmax (S time weighting)*	*>82 dB LAmax (S time weighting)*

8.2 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*
Air Traffic *0700 – 2300* *2300 – 0700*	*<57* *<48*	*57 - 66* *48 - 57*	*66 - 72* *57 - 66*	*>72* *>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)."*

8.3 Suitable Internal Noise Levels

The previous sections of this report consider the external noise levels. However, for the reasons explained above, it is the internal noise levels within the proposed dwellings that should be the overriding consideration. In this respect, the guidance provided in BS8233:1999.

8.3.1 BS8233

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}."*

8.3.2 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 WHO criteria should thus be regarded as preferred, rather than mandatory maxima to be achieved in all cases..

8.4 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).

In addition it is proposed that L_{Amax} noise levels in bedrooms should not regularly exceed approximately 45dBA more than several times per hour between 23:00 and 07:00 hours.

8.5 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.

8.6 Measured NECs

With reference to the above noise exposure categories for road and rail 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	B	B
2	B	B

8.7 Predicted NECs

Noise levels incident on a significant proportion of the proposed façades will be substantially less, as the buildings will effectively screen traffic noise.

Taking this into account, we predict the proposed development site falls within the following Noise Exposure Categories for daytime and night-time periods.

Noise Exposure Category		
Façade	**Daytime**	**Night-time**
North	B	B
South	B	B
East	B	B
West	B	B

8.8 Discussion

With reference to the Local Development Plan, as detailed in Section 8.1, the proposed development site falls below the criteria shown in "*Table B: Noise levels on residential streets adjoining railways and roads at and above which attenuation measures will be required*".

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.

9.0 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 double glazing.

Daytime $L_{Aeq(10\text{-}hour)}$ dBA	Evening $L_{Aeq(4\text{-}hour)}$ dBA	Night-time $L_{Aeq(8\text{-}hour)}$
32 dBA	30 dBA	24 dBA

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

12.0 CONCLUSIONS

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

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.

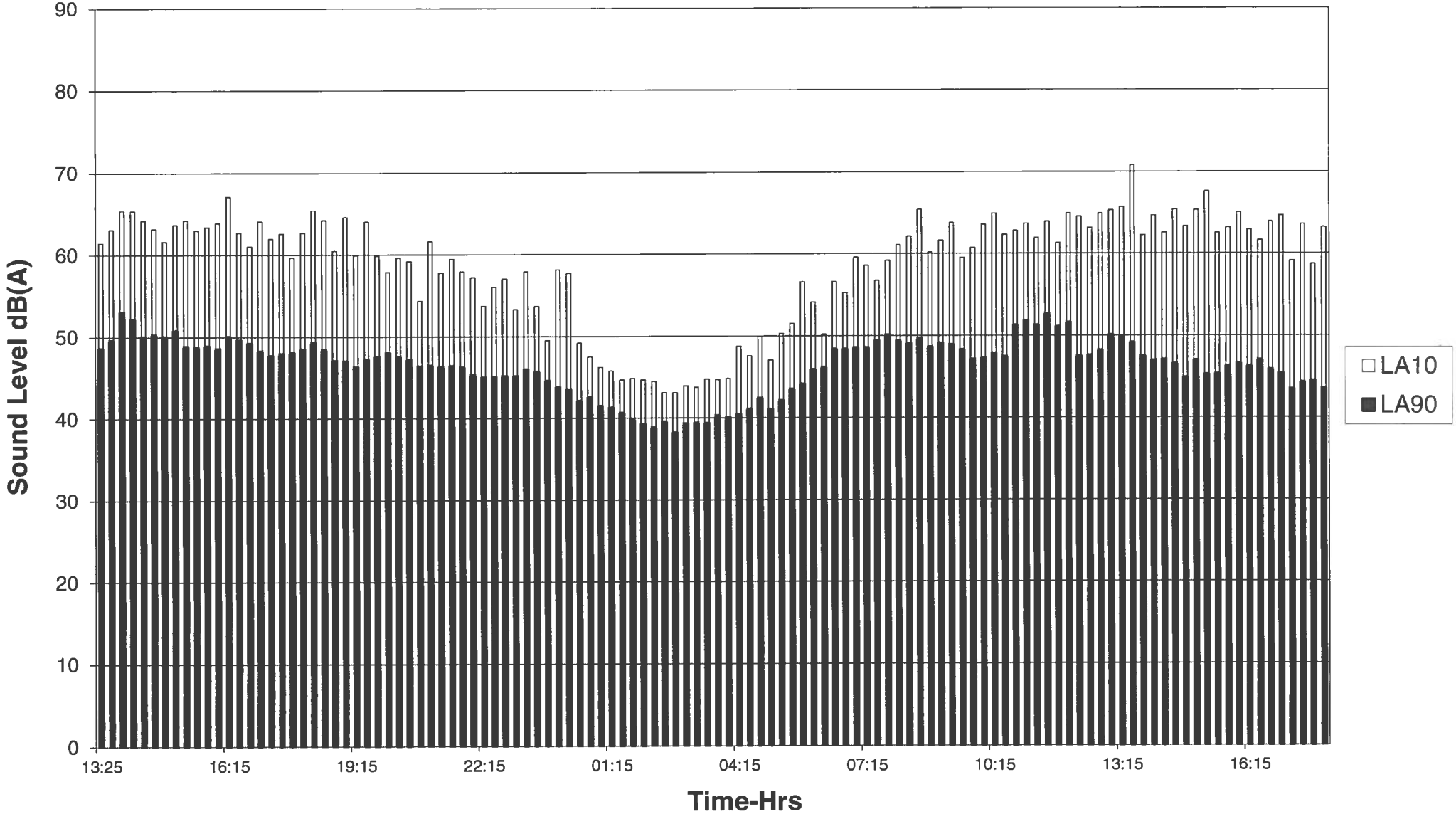
L_{eq} : The concept of L_{eq} (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise, such as aircraft noise, environmental noise and construction noise.

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.

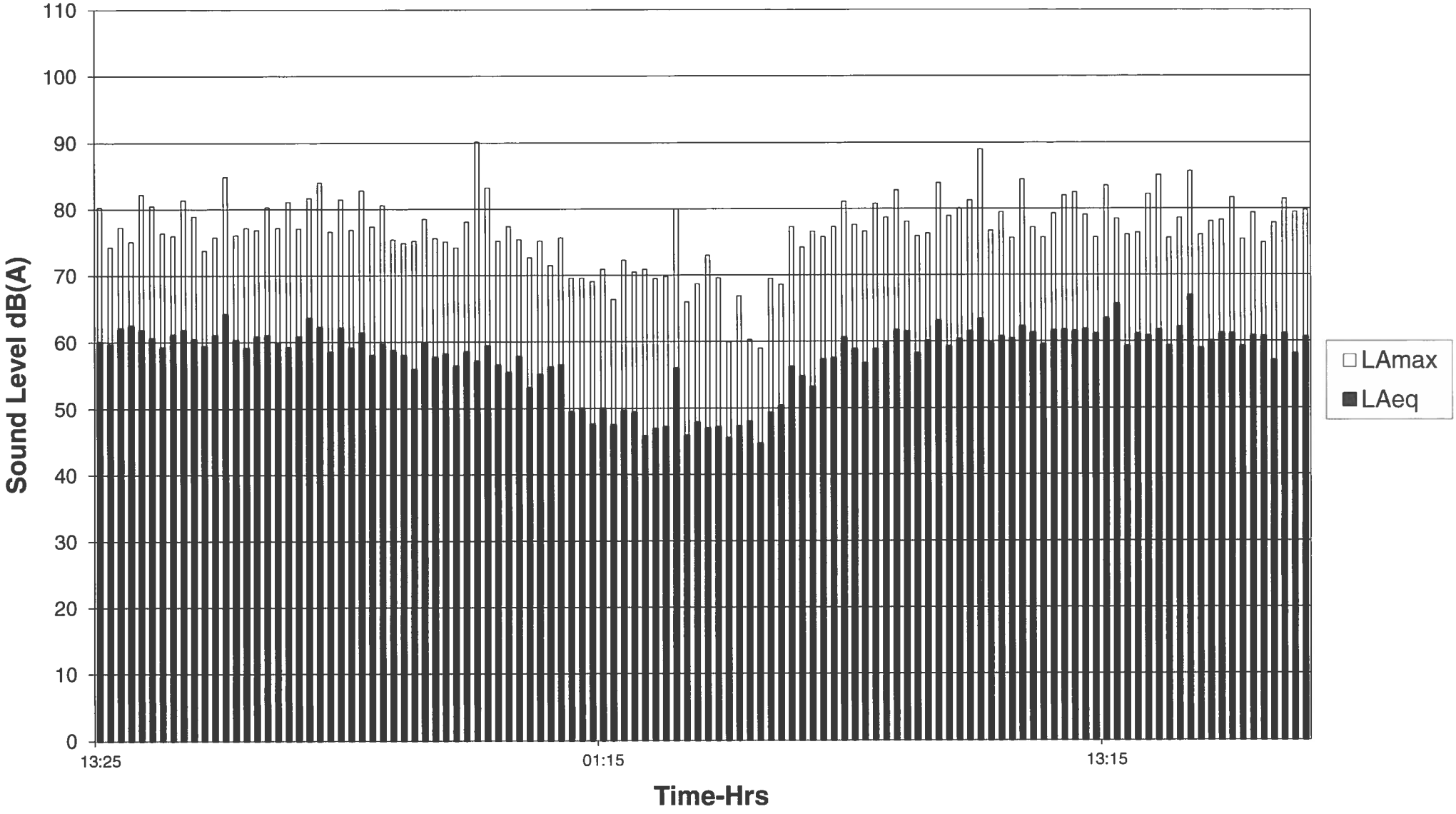
L_{max} : L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

59-61 Oak Grove, NW2
Position 1
L_{A10} and L_{A90} Noise Levels
Friday 03/01/2014 - Saturday 04/01/2014



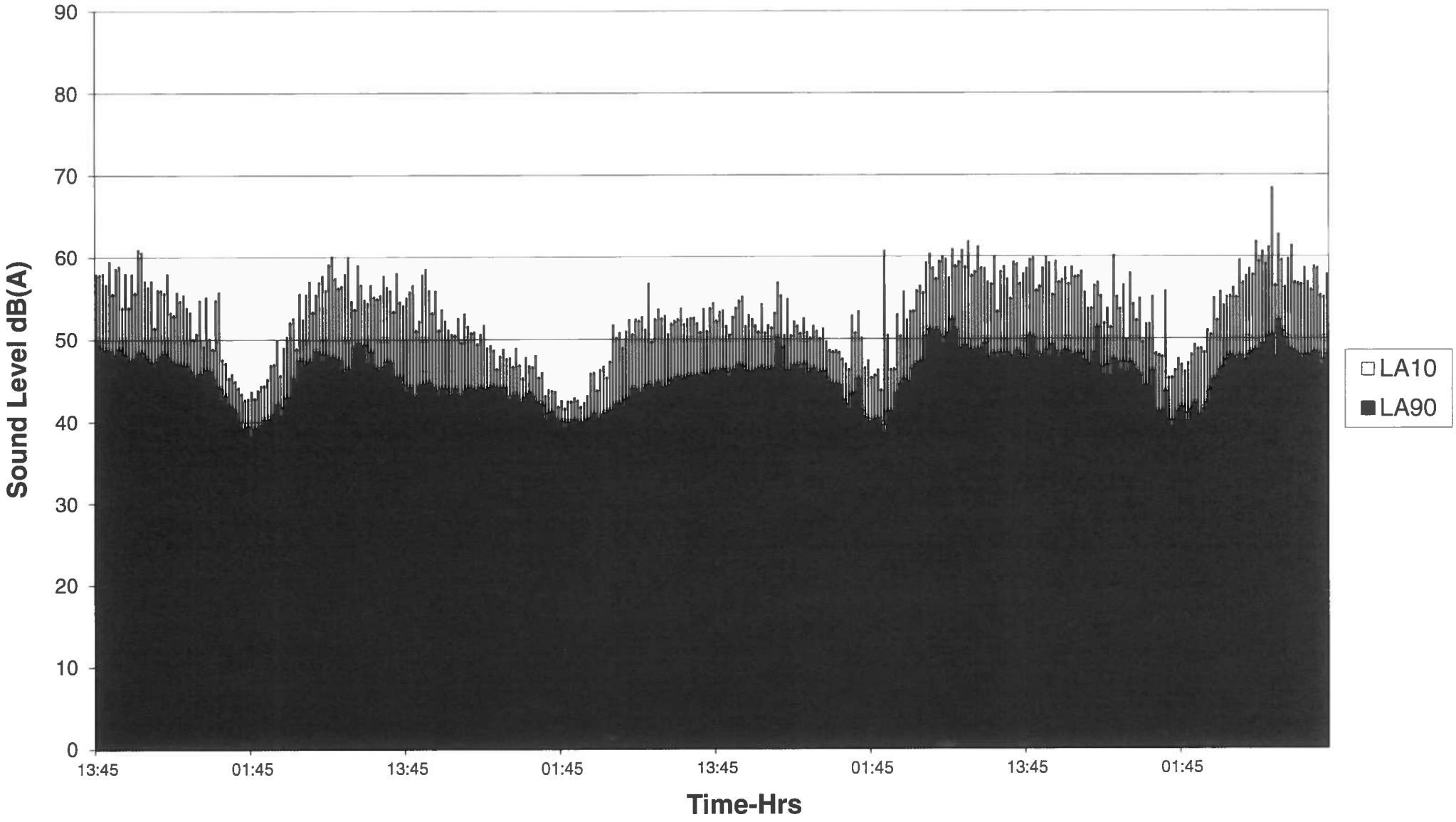
Time History Graph 19861/TH1.1

59-61 Oak Grove, NW2
Position 1
L_{Aeq} and L_{Amax} Noise Levels
Friday 03/01/2014 - Saturday 04/01/2014



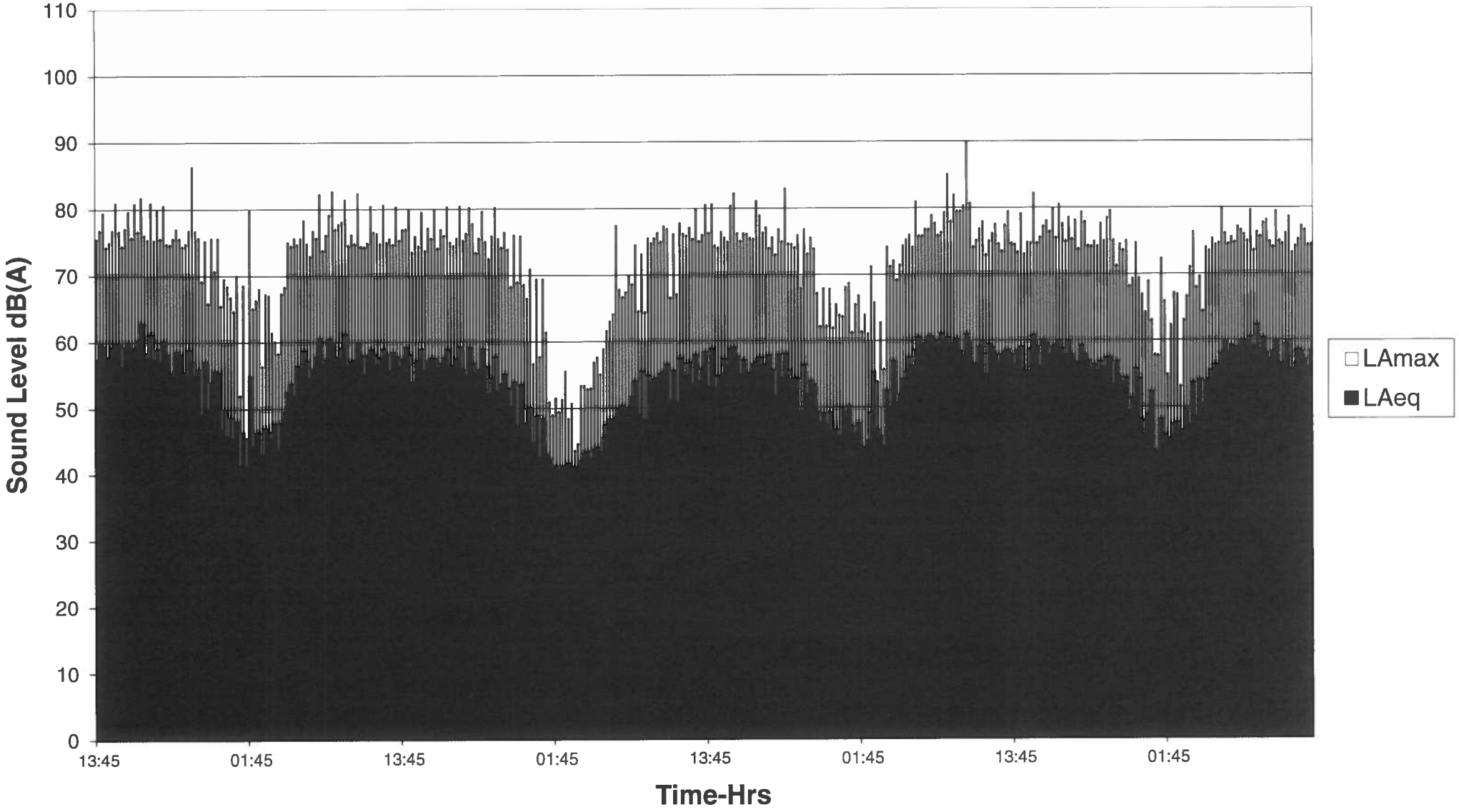
Time History Graph 19861/TH1.2

59-61 Oak Grove
Position 2
L_{A10} and L_{A90} Noise Levels
Friday 03/01/2014 - Tuesday 07/01/2014



Time History Graph 19861/TH2.1

59-61 Oak Grove
Position 2
L_{Aeq} and L_{Amax} Noise Levels
Friday 03/01/2014 - Tuesday 07/01/2014



Time History Graph 19861/TH2.2