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113 HAMPSTEAD ROAD, LONDON

PLANNING COMPLIANCE REPORT

Report 14466.PCR.01 RevC

Prepared on 24 November 2016

For:

Eyelevel Interiors 168 Ltd

20 Willow Green

The Hyde

London

NW9 5GP

Site Address	Report Date	Revision History
113 Hampstead Road, London	16/06/2016	14/09/2016 RevA 28/09/2016 RevB 24/11/2016 RevC

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1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Eyelevel Interiors 168 Ltd, 20 Willow Green, The Hyde, London, NW9 5GP, to undertake an environmental noise survey at 113 Hampstead Road, London. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for a plant unit installation in order to ensure that the amenity of the nearest noise sensitive receivers is preserved.

This report presents the overall methodology and results from the environmental survey followed by calculations to demonstrate the feasibility of the plant unit already installed to satisfy the emissions criterion at the closest noise-sensitive receiver and outline mitigation measures as appropriate.

2.0 ENVIRONMENTAL NOISE SURVEY AND EQUIPMENT

2.1 Procedure

Automated noise monitoring was undertaken at the position shown in Site Plan 14466.SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver relative to the operations on site. The duration of the survey was between 15/06/2016 and 16/06/2016.

Weather conditions were generally dry with light winds, therefore deemed suitable for the measurement of environmental noise.

The measurement procedure complied with ISO 1996-2:2007 Acoustics “Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels”.

The equipment calibration was verified before and after use and no abnormalities were observed.

2.2 Equipment

The equipment calibration was verified before and after the survey and no calibration irregularities were observed.

The equipment used was as follows.

- Svantek Type 957 Class 1 Sound Level Meter
- B&K Type 4231 Class 1 Calibrator

3.0 RESULTS

The results from the continuous noise monitoring are shown as a time history of L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} averaged over 5 minute sample periods in Figure 14466.TH1.

Minimum background noise levels are shown in Table 3.1.

	Minimum background noise level $L_{A90: 5min}$ dB(A)
Daytime (07:00-23:00)	41
Night-time (23:00-07:00)	41

Table 3.1: Minimum measured background noise levels

4.0 NOISE CRITERIA

In order to ensure that the amenity of the nearest noise sensitive receiver is preserved, this report will aim to demonstrate inaudibility at the nearest noise sensitive receiver. In order to achieve inaudibility, noise received as a result of the newly installed plant unit should not exceed a level 10dB below the measured minimum background L_{A90}.

We therefore propose to set the noise criteria as shown in Table 4.1 in order to comply with the above requirement.

	Daytime (07:00 to 23:00)	**Night-time (23:00 to 07:00)**
Noise criterion at nearest residential receiver (10dB below minimum L_{A90})	31dB(A)	31dB(A)

Table 4.1: Proposed Noise Emissions Criteria

As the unit already installed will be used during day and night time hours, we would utilise the night-time noise emissions criterion.

5.0 DISCUSSION

The location of the kitchen extract is as shown in indicative site plan 14466.SP1.

The closest noise sensitive receivers to this location are the windows of the residences to the above the site, at a minimum distance of 1m.

It is understood that the installation comprises the following fan unit and two silencers:

- 1 No. Helios GigaBox centrifugal fan 250
- 2 No. CDA 560 X 1D Silencers

As can be observed from the 14466.TH1 the background noise level (L_{90}) is reduced by 12dB when the unit is switched off at 03:27am, from 55dB(A) to 43dB(A). We would therefore need a set of noise control measures in order to ensure that the contribution from the plant unit complies with the set criterion. The proposed fan unit's noise emissions sound pressure level is 36dB(A) at 1 meter. Therefore, we would propose the following mitigation measures.

5.1 Proposed Mitigation Measures for Plant

Kitchen Extract System

In order to reduce noise emissions from the kitchen extract system to within the criterion specified in Section 4.0, an acoustic enclosure, to attenuate the noise break out of the fan, and an additional silencer should be installed. The enclosure and the silencer should provide the attenuation characteristics as shown in Table 5.2 below.

	Attenuation Level
Unit	**dB(A)**
Proposed Acoustic Enclosure	8
Proposed Silencer	12

Table 5.2 Required Attenuation Levels of Proposed Acoustic Enclosure

Providing that an acoustic enclosure and a silencer of the above specifications are installed, noise emissions would be fully compliant with the criterion specified in Section 4.0.

5.2 Objective overview

Taking all acoustic corrections into consideration, the noise levels expected at the closest residential window would be as shown in Table 5.3.

Receiver - Nearest Noise Sensitive Window	**Criterion**	**Noise Level at Front Receiver**
Operating hours	31 dB(A)	30 dB(A)

Table 5.3: Predicted noise levels and criterion at nearest noise sensitive location

As shown in Appendix B and Table 5.3, transmission of noise to the nearest sensitive windows due to the effects of the plant installation fully satisfies the emissions criteria stated within this report, provided that an enclosure and a second silencer are installed.

It is the professional opinion of KP Acoustics that this level is not going to pose any negative impact on the amenity of nearby residential receivers. Furthermore, the value of 30dB(A) is to be considered outside of the building. Windows may be closed or partially closed leading to further attenuation, as follows.

Further calculations have been undertaken to assess whether the noise emissions from the installed unit would be expected to meet the recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receivers.

British Standard 8233:2014 '*Sound insulation and noise reduction for buildings – Code of Practise*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS8233:2014 recommends 30-35dB(A) for internal resting/sleeping conditions.

With calculated external levels of 30dB(A), the residential window would not need to provide any additional attenuation, in order for 'Good-Reasonable' conditions to be achieved. According to BS8233:2014, even a partially open window offers 10-15dB attenuation, thus leading to an acceptable interior noise level that meets the criterion.

Receiver	**Recommended Design Range –** ***For resting/sleeping conditions in a bedroom, in BS8233:2014***	**Noise Level at Front Receiver (due to plant installation)**
Inside Nearest Residential Space	30-35 dB(A)	20 dB(A)

Table 5.4: Noise levels and criteria inside nearest residential space

Predicted levels are shown in Table 5.4. It can therefore be stated that, as well as demonstrating inaudibility outside the nearest receiving window, the emissions from the plant unit installation would be expected to comfortably meet the most stringent recommendations of the relevant British Standard, even with neighbouring windows partially open.

6.0 CONCLUSION

An environmental noise impact survey has been undertaken at 113 Hampstead Road, London, by KP Acoustics Ltd between 15/06/2016 and 16/06/2016. The results of the survey have enabled criteria to be set for noise emissions. Using measured noise data, noise levels are predicted at the nearby noise sensitive receivers for compliance with current requirements.

Calculations show that noise emissions from the kitchen extract would satisfy the set criterion and demonstrate inaudibility at the nearest noise sensitive receiver, providing that the mitigation measures stipulated in Section 5.1 are implemented.

Further calculations have been undertaken with regards to the relevant British Standard and it has been ensured that the amenity of nearby residential receivers will be protected.

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Noise survey monitoring position

Closest noise-sensitive receiver

Title:

Indicative site plan showing noise monitoring position and closest noise sensitive receiver's position

Date: 24 November 2016

FIGURE 14466.SP1

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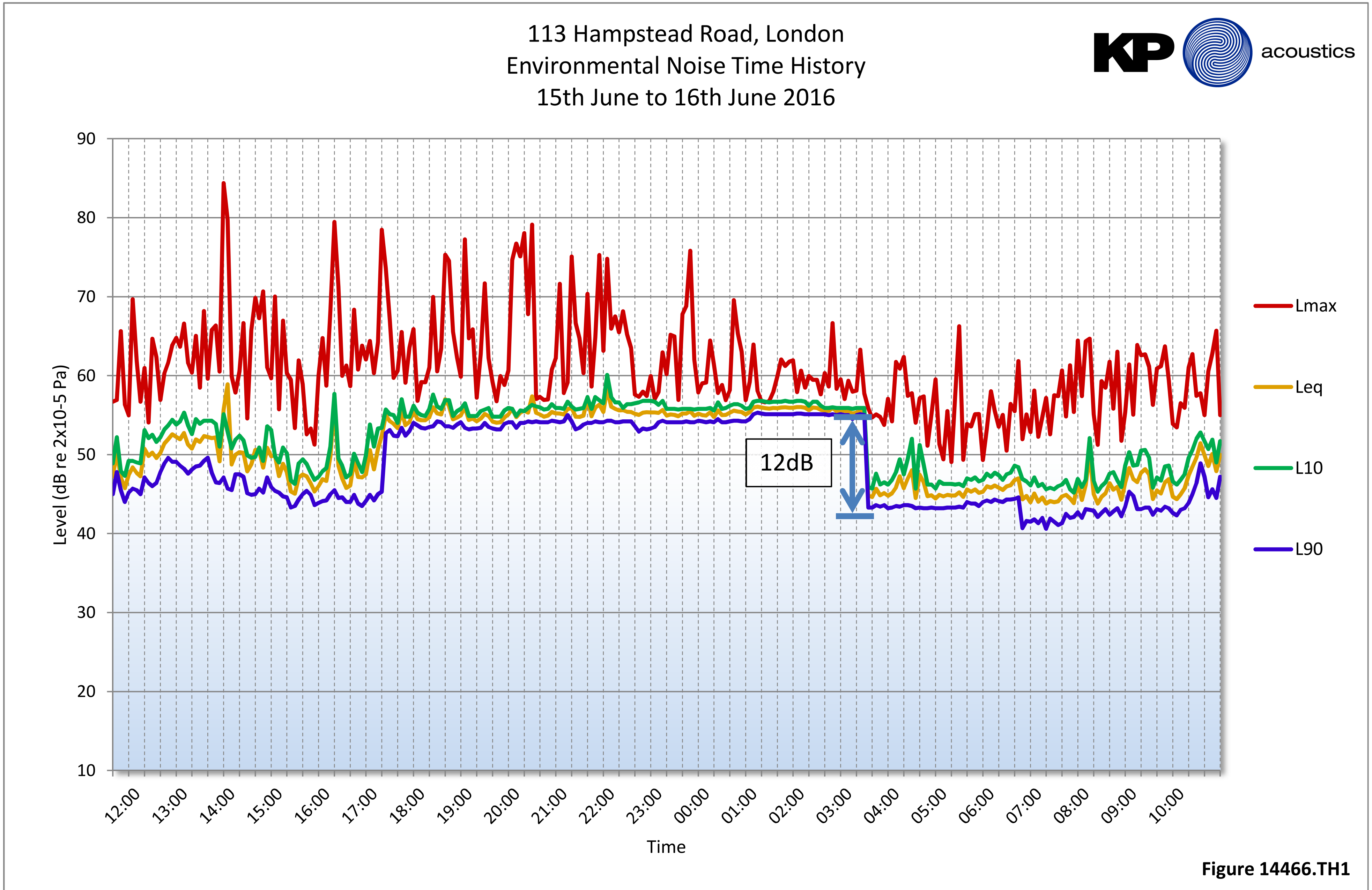

Figure 14466.TH1

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.