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115-119 GOLDHURST TERRACE, LONDON

PLANNING COMPLIANCE REPORT

Report 13720.PCR.01 Rev.A

For:

Hive1 Limited

3 Belsize Place

London

NW3 5AL

Site Address	Report Date	Revision History
115-119 Goldhurst Terrace, London	13/06/2016	Rev.A – 20/06/2016

Registered in England Company No. 7947892
KP Acoustics is the Trading Name of KP Acoustics Limited

CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Hive1 Limited, 3 Belsize Place, London, NW3 5AL, to undertake an environmental noise survey at 115-119 Goldhurst Terrace, London. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for a plant unit installation in agreement with the planning requirements of Camden Borough Council.

This report presents the overall methodology and results from the environmental survey followed by calculations to demonstrate the feasibility of the plant unit installation 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 13720.SP1. The choice of this position was based on security, 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 16/05/2016 and 17/05/2016. Additional manual measurements were taken in order to verify results to the at the nearest noise sensitive receiver.

Initial inspection of the site revealed that the background noise profile at the monitoring location was largely dominated by road traffic noise from the surrounding roads.

The weather during the course of the survey was generally dry with wind speeds within acceptable tolerances and therefore 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*".

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.

- NTi XL2 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 13720.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)	37
Night-time (23:00-07:00)	28

Table 3.1: Minimum measured background noise levels

4.0 NOISE CRITERIA

The criterion of The London Borough of Camden for noise emissions of new plant in this instance is as follows:

"The Council considers that for new developments involving noisy plant/equipment or other uses, design measures should be taken to ensure that noise levels predicted at a point 1 metre external to sensitive facades are at least 5dB(A) less than the existing background measurement (LA90) when the equipment is in operation. Where it is anticipated that equipment will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses in the noise (bangs, clicks, clatters, thumps), special attention should be given to reducing the noise levels from plant and equipment at any sensitive facade to at least 10dB(A) below the LA90 level."

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})	32	23

Table 4.1: Proposed Noise Emissions Criteria

As the air conditioning units will potentially activate during night-time, we would utilise the night-time noise emissions criteria.

5.0 DISCUSSION

The location of the external plant is as shown in indicative site plan 13720.SP1.

The plant is proposed to be installed on a balcony at the top level of the property. The most representative noise sensitive receivers to this location are the front windows of the adjacent residences at a minimum distance of 7m. Screening attenuation is provided by the balcony parapet.

It is understood that the external plant installation comprises the following units:

- 1 no. Fujitsu AOYG18LAT3

The sound pressure levels as provided by the manufacturer for the units are shown in Table 5.1.

	Sound Pressure Level (dB) in each Frequency Band (at 1m)							
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Fujitsu AOYG18LAT3	56	57	44	46	42	37	32	24

Table 5.1: Manufacturers Sound Pressure Level at 1m

5.1 Objective overview

Taking all acoustic corrections into consideration, including distance and screening corrections, the noise levels expected at the closest residential window would be as shown in Table 5.2. Detailed calculations are shown in Appendix B.

Receiver - Nearest Noise Sensitive Window	**Criterion**	**Noise Level at Front Receiver**
Operating hours	23 dB(A)	23 dB(A)

Table 5.2: Predicted noise levels and criterion at nearest noise sensitive location

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive windows due to the effects of the plant installation fully satisfies the emissions criteria set by the London Borough of Camden.

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 23dB(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 proposed unit installation 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 during night-time and daytime respectively.

With calculated external levels of 23dB(A), the residential window would not need to provide any additional attenuation, in order for recommended 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	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)	13 dB(A)

Table 5.4: Noise levels and criteria inside nearest residential space

Predicted levels are shown in Table 5.4, with detailed calculations shown in Appendix B. It can therefore be stated that, as well as complying with the requirements of Camden Borough Council, 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 115-119 Goldhurst Terrace, London, by KP Acoustics Ltd between 16/05/2016 and 17/05/2016. The results of the survey have enabled criteria to be set for noise emissions. Using manufacturer noise data, noise levels are predicted at the nearby noise sensitive receivers for compliance with current requirements.

Calculations show that noise emissions from the proposed plant unit installations would meet the requirements of the London Borough of Camden.

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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Title:

Indicative site plan showing noise monitoring position and noise sensitive receiver. Ref- Google Earth

Date: 20 June 2016

FIGURE 13720.SP1

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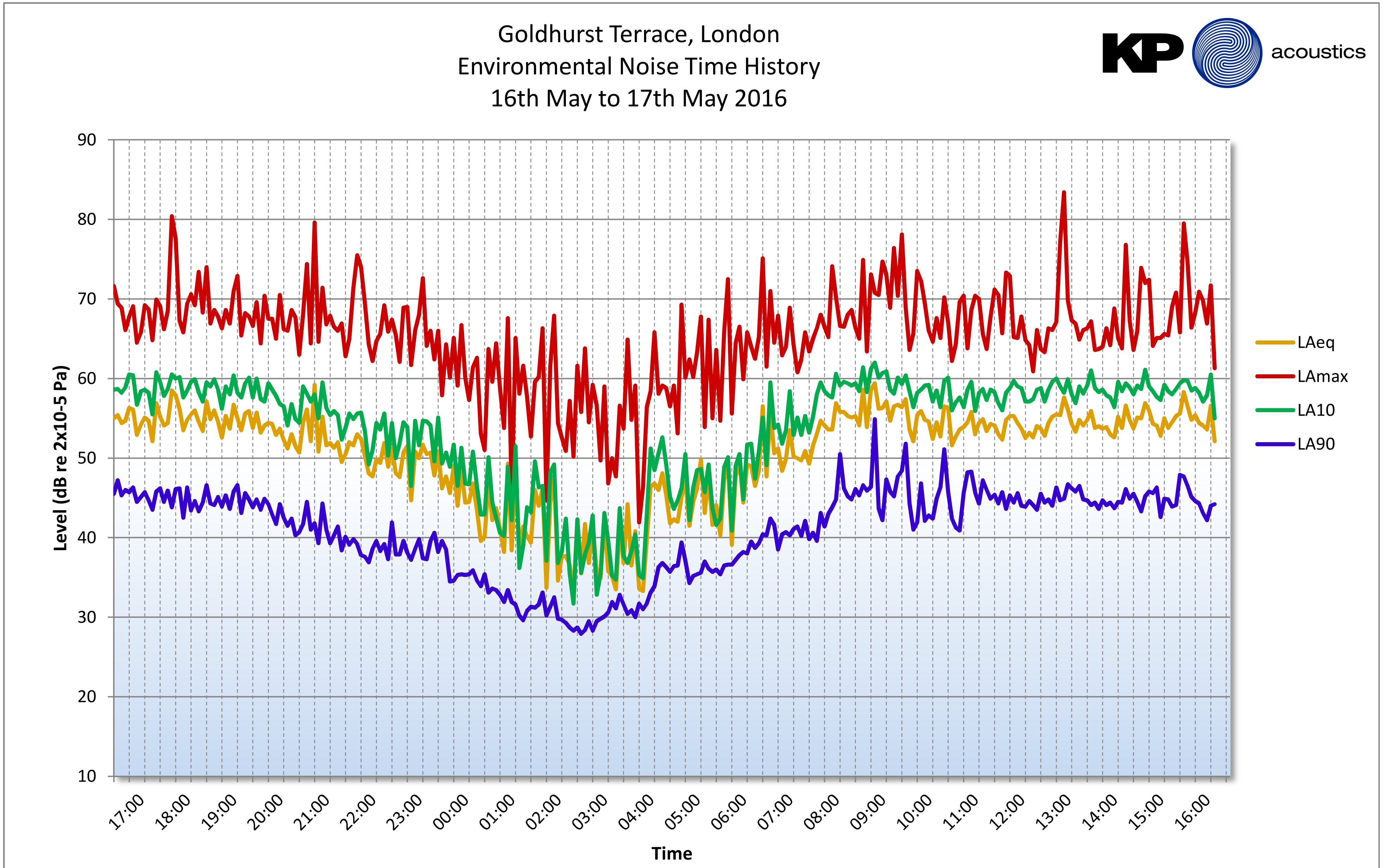

Figure 13720.TH1

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.

APPENDIX B

115-119 Goldhurst Terrace, London

Condenser Unit Emissions Calculations

Source: Condenser Unit	*Frequency, Hz*								
Receiver: Closest Residential Receiver	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Manufacturers Sound Pressure Level									
Fujitsu AOYG18LAT3 Sound Pressure Level at 1m	56	57	44	46	42	37	32	24	
Correction for reflections (1 no.)	3	3	3	3	3	3	3	3	
Attenuation provided by distance to receiver (min. 7m)	-17	-17	-17	-17	-17	-17	-17	-17	
Attenuation provided by parapet	-7	-8	-10	-12	-12	-12	-12	-12	
Sound pressure level 1m from nearest residential receiver	**35**	**35**	**20**	**20**	**16**	**11**	**6**	**0**	**23**

Design Criterion	**23**

Receiver: Inside Nearest Residential Window

	Frequency, Hz								
Source: Condenser Unit	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Sound pressure level outside window									23
Minimum attenuation from partially open window, dB									-10
Sound pressure level inside nearest noise sensitive window									**13**