KP Acoustics Ltd
Britannia House
11 Glenthorne Road
London
W6 0LH

Tel: +44(0)208 222 8778
Fax: +44(0)208 222 8575
Email: info@kpacoustics.com
www.kpacoustics.com

EAGLE HOUSE, 4A PROCTER STREET, LONDON

PLANNING COMPLIANCE REVIEW

Report 15424.PCR.01

For:

Boom Cycle
2-8 Scrutton Street
London
EC2A 4RT

Site Address	Report Date	Revision History
Eagle House, 4A Procter Street, London	03/01/2017	

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KP Acoustics is the Trading Name of KP Acoustics Limited

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1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Boom Cycle, 2-8 Scrutton Street, London, EC2A 4RT, to undertake an environmental noise survey at Eagle House, 4A Procter Street, 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 The London Borough of Camden.

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 15424.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 proposed plant installation. The duration of the survey was between 15:14 on 5/08/2013 and 15:17 on 6/08/2013.

Please note that the aforementioned noise data have been undertaken by KP Acoustics Ltd for a similar project on the same address and in relation to the same nearest noise sensitive receiver. Therefore, as it is not expected that the noise sources have increased in relation to the noise sensitive receiver location, the noise data undertaken between 5/08/2013 and 6/08/2013 will be considered representative for the specific purpose of this assessment.

Initial inspection of the site revealed that the background noise profile at the monitoring location was wholly dominated by noise from an existing plant unit installation.

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.

- 1 No. 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 15424.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)	71
Night-time (23:00-07:00)	71
Operating Hours (07:00-21:00)	71

Table 3.1: Minimum measured background noise levels

Measured ambient noise levels are shown in Table 3.2.

	Levels dB(A)
Daytime $L_{Aeq,16hour}$	72
Night-time $L_{Aeq,8hour}$	72

Table 3.2 Site average noise levels for daytime and night time

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 proposed plant and machinery shall be operated so as to ensure that any noise generated is "not audible" outside the nearest residential premises. To demonstrate inaudibility, you will need to provide calculations that show that the plant noise level is 10dBA below the lowest background level (LA90 (15minutes)) 1m from the nearest residential window, over the proposed operating hours. Tonality must also be taken into consideration."

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)	Operating Hours (07:00 to 21:00)
Noise criterion at nearest residential receiver (10dB below minimum L_{A90})	61	61	61

Table 4.1: Proposed Noise Emissions Criteria

As the proposed units will only be used during the premises operating hours, the criterion of 61dB will be used for this assessment.

5.0 DISCUSSION

The locations of the proposed plant unit installations are as shown in indicative site plan 15424.SP1.

All units are proposed to be installed to the rear of the property in a yard area. The closest noise sensitive receiver to this location will be the windows of the residential units located directly above the plant unit installation. Line of sight between the proposed installation location and the aforementioned residential receivers will be fully screened by the building envelope.

It is understood that the installation comprises the following units:

- 2 No. Toshiba RAS-16BAV-E Heat pump Inverters

The sound pressure as provided by the manufacturers of the units are shown in Table 5.1.

	Sound Pressure (dB) in each Frequency Band							
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
RAS-16BAV-E Heat pump Inverters (Sound Pressure Levels at 1m)	60	57	53	50	44	40	38	30

Table 5.1 Manufacturer's Sound Pressure Level

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 Closest Receiver**
Operating hours	61 dB(A)	38 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.

Furthermore, the value of 38dB(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 plant 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 Practice*' 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 35 dB(A) as being the value for internal resting/sleeping condition during the daytime.

With calculated external levels of 38dB(A), the residential window would need to provide an additional attenuation in order for the 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	**Condition Design Range – *For resting/sleeping conditions in a bedroom/living room, in BS8233:2014***	**Noise Level at Receiver (due to plant installation)**
Inside Nearest Residential Space	35 dB(A)	28 dB(A)

Table 5.3: Noise levels and criteria inside nearest residential space

Predicted levels are shown in Table 5.3, with detailed calculations shown in Appendix B. It can therefore be stated that, as well as complying with the requirements of The London Borough of Camden, 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

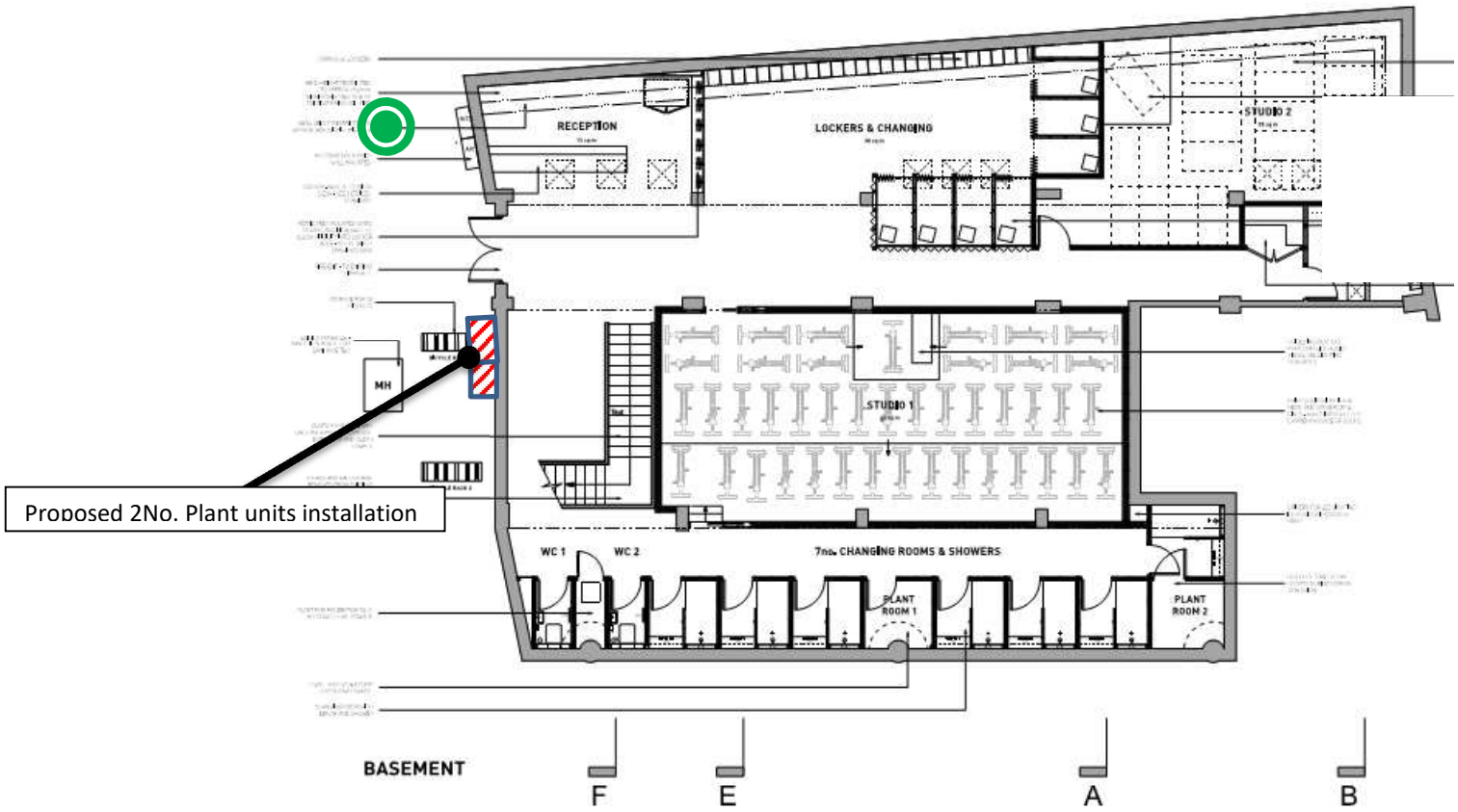
An environmental noise impact survey undertaken at the Unit 4A, Eagle House, Procter Street, London, by KP Acoustics Ltd between 5/08/2013 and 6/08/2013 have being used for the purpose of this assessment. The results of the survey have enabled criteria to be set for noise emissions. Using manufacturer 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 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.

Report by
Gonçalo Lemos MIOA
KP Acoustics Ltd.

Checked by
Kyriakos Papanagiotou MIOA
KP Acoustics Ltd.



Title:

Indicative site plan showing noise monitoring position

Date: 5 January 2017

FIGURE 15424.SP1

KP acoustics

Unit 4A, Eagle House, Procter Street, London
Environmental Noise Time History
8th April to 9th April 2013

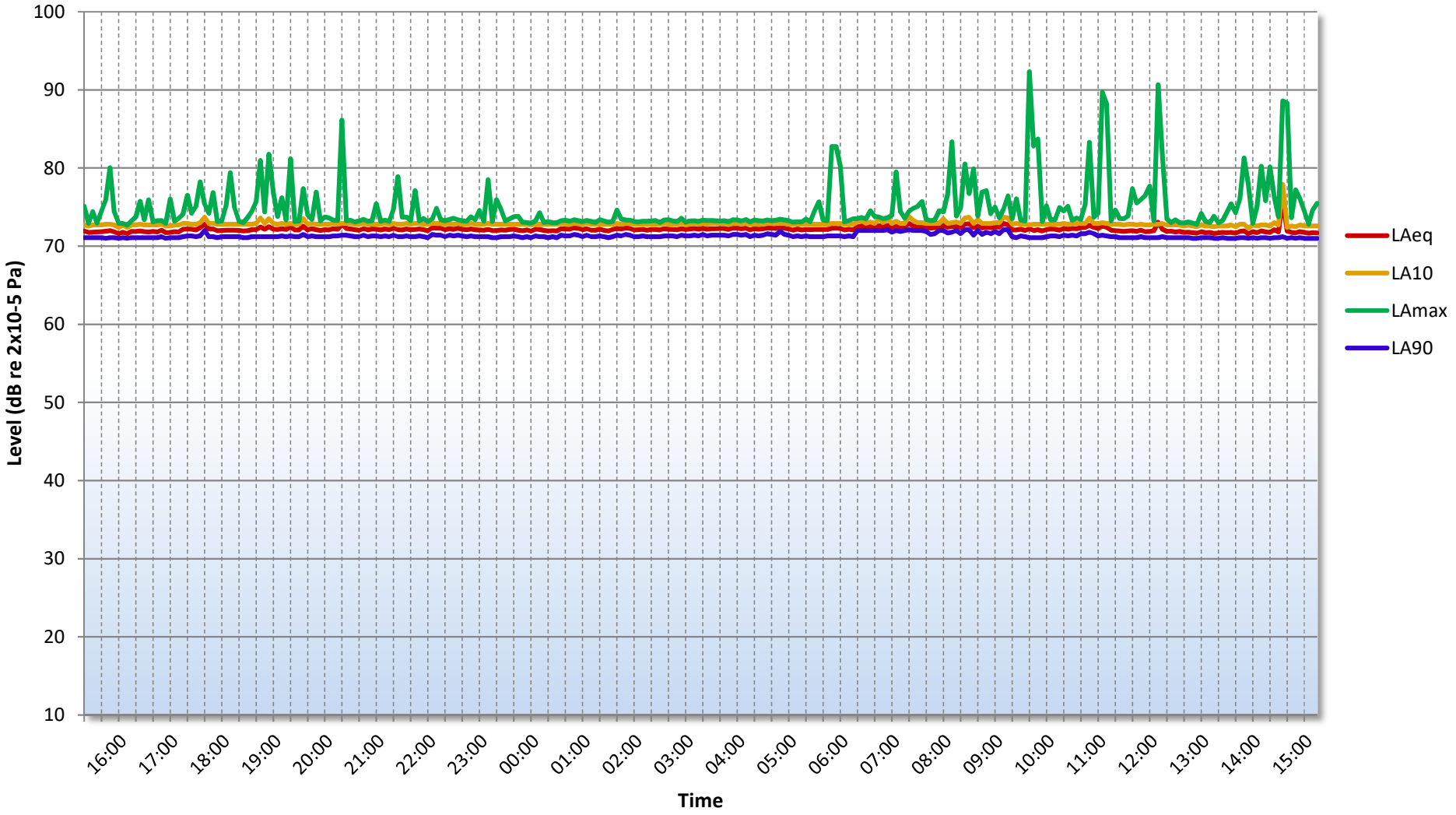


Figure 15424.TH1

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

UNIT 4A, EAGLE HOUSE, PROCTER STREET, LONDON

PLANT UNIT EMISSIONS CALCULATIONS

Source: Plant Unit Installation	*Frequency, Hz*								
Receiver: Residential properties located directly above the proposed installation location	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
2No. Toshiba RAS - 16BAV -E Heat pump Inverters	60	57	53	50	44	40	38	30	
Correction for number of units 2 No.	3	3	3	3	3	3	3	3	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Attenuation provided by distance (6m)	-16	-16	-16	-16	-16	-16	-16	-16	
Attenuation provided by the building envelope, dB	-1	-2	-3	-5	-5	-7	-7	-7	
Total Sound Pressure Level from Toshiba RAS- 16BAV-E Unit	**49**	**45**	**40**	**35**	**29**	**23**	**21**	**13**	**38**
Sound pressure level 1m from nearest residential receiver	**49**	**45**	**40**	**35**	**29**	**23**	**21**	**13**	**38**

Design Criterion	**61**

Receiver: Inside Nearest Residential Window

	Frequency, Hz								
Source: Plant Unit Installation	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Sound pressure level outside window	49	45	40	35	29	23	21	13	38
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	-10
Sound pressure level inside nearest office window	**39**	**35**	**30**	**25**	**19**	**13**	**11**	**3**	**28**