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47-49 NEAL STREET, LONDON

PLANNING COMPLIANCE REPORT

Report 11410.PCR.01

For:

Oakley Interiors ltd

Pig Pen

24 Moor Park Lane

Farnham, Surrey

GU9 9JB

Site Address	Report Date	Revision History
47-49 Neal Street, London, WC2H 9PZ	23/06/2015	Initial report: 16/09/2014 Rev A: 23/06/2015

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1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Oakley Interiors ltd, Pig Pen, 24 Moor Park Lane, Farnham, Surrey, GU9 9JB to undertake an environmental noise survey at 47-49 Neal Street, London. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for the installation of an air conditioning unit in agreement with the planning requirements of Camden Council.

This report presents the overall methodology and results from the environmental survey followed by calculations to demonstrate the feasibility of the plant 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 on the proposed site at rear façade as shown in Site Plan 11410.SP1-2. 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 15:30 on 27/08/2014 and 15:00 on 28/08/2014.

Initial inspection of the site revealed that the background noise profile at the monitoring location was 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 generally complied with BS7445:1991 "*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*".

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 11410.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)	43
Night-time (23:00-07:00)	40
Operating hours (8:00 – 18:00)	49

Table 3.1: Minimum measured background noise levels

4.0 NOISE CRITERIA

The criterion of The London Borough of Camden for new plant in this instance states that noise emission level from proposed units at 1m from the nearest noise sensitive receiver (residential unit) should be at least 5 dB below background noise (L_{90}) from 00:00 to 24:00. If the noise has a distinguishable discrete continuous note or distinct impulses, the criterion would be a more restrictive 10dB below background noise.

All surrounding buildings at the proposed plant unit location are office/commercial spaces, which are not considered residential noise sensitive receivers. We would therefore refer to BS8233:2014 'Guidance on sound insulation and noise reduction for buildings' for indoor ambient noise as more representative criteria in this instance:

"For each space there might be a range of noise levels that are considered acceptable. […]

Activity	**Location**	**Design range, dB $L_{Aeq,T}$**
Speech, or telephone communications	Concourse, corridor, circulation space	45-55
Study and work requiring concentration	Staff/meeting room, training room	35-45
Spaces where acoustic privacy is required in shared spaces	Open plan office	45-50

Table 4.1: Design ranges in indoor ambient noise levels

Noise levels generally apply to steady sources, such as those due to road traffic, mechanical services or continuously running plant, and should be the noise level in the space during normal hours of occupation but excluding any noise produced by the occupants and their activities. The time period, T, should be appropriate for the activity involved. […] However, if the windows are intended to be opened to provide rapid ventilation and summer cooling, the insulation will reduce to about 10 dB or 15 dB".

Based on the above, we would recommend adopting the following design range for noise levels immediately outside the office windows:

	L_{Aeq} dB
Noise criterion at nearest receiver. Open plan offices.	50-55

Table 4.2: Proposed Noise Emissions Criterion from BS 8233.

5.0 DISCUSSION

It is understood that the plant installation is comprised of the following units:

- 1 No. Mitsubishi MUZ-SF35VE Outdoors Condenser Unit

The unit would be installed on the rear façade of 47-49 Neal Street at first Floor Level as shown in site plan 11410.SP1-2. The closest noise sensitive receiver to the plant unit location will be an opposite office window on the rear façade of 15 Neal's Yard at a direct distance of approximately 2m.

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

	Sound Pressure Level at 1m (dB) by octave frequency band (Hz)							
	63	125	250	500	1k	2k	4k	8k
Mitsubishi MUZ-SF35VE Condenser Unit	54	53	51	46	44	40	34	28

Table 5.1 Manufacturer's Sound Pressure Levels at 1m.

5.1 Objective overview

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive window fully satisfies the noise emissions criterion set.

Receiver - Nearest Noise Sensitive Window	**Criterion**	**Noise Level at receiver's window at 15 Neal's Yard (Office Window)**
Office hours (8:00-18:00)	50-55 dB(A)	52 dB(A)

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

Predicted levels are shown in Table 5.2, with detailed calculations shown in Appendix B. It can therefore be stated that the emissions from the air conditioning unit would be expected to comfortably meet the most stringent recommendations of the relevant British Standard.

6.0 CONCLUSION

An environmental noise survey has been undertaken at 47-49 Neal Street, London, by KP Acoustics Ltd between 28/08/2014 and 29/08/2014. 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 receiver for compliance with current requirements.

Calculations show that noise emissions from the proposed plant unit installation would meet the set requirements and ensure that the office/commercial spaces will be protected.

Report by
Victor Lindstrom
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Title:

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

Date: 16 September 2014

FIGURE 11410.SP1

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South Facing Rear View

North Facing Rear View

Proposed condenser unit location

Noise Survey Monitoring Position

Closest noise-sensitive receiver

Title:

Indicative site plan showing noise monitoring position, closest office noise sensitive receiver and proposed plant unit location

Date: 16 September 2014

FIGURE 11410.SP2

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47-49 Neal Street, London
Environmental Noise Time History
27th to 28th August 2014

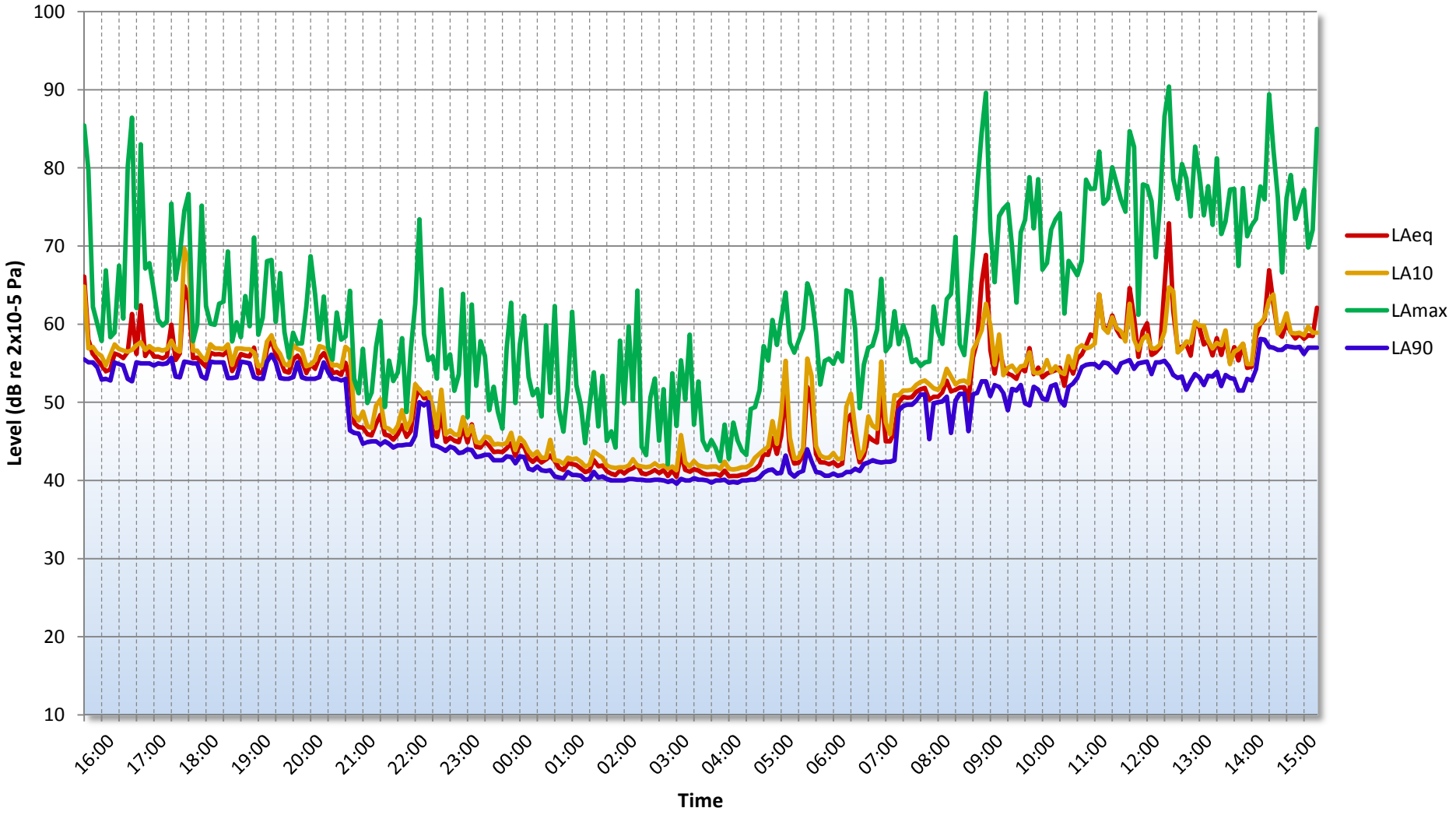

Figure 11410.TH1

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

47-49 NEAL STREET, LONDON

PLANT UNIT EMISSIONS CALCULATIONS

Source: Plant Unit Installation	*Frequency, Hz*								
Receiver: Office Window at rear façade of 15 neal's Yard	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Manufacturer's sound pressure level at 1m									
Mitsubishi MUZ-SF35VE Outdoor condenser unit	54	53	51	46	44	40	34	28	
Correction due to reflections	3	3	3	3	3	3	3	3	
Sound pressure level 1m from nearest sensitive receiver	**57**	**56**	**54**	**49**	**47**	**43**	**37**	**31**	**52**
						Design Criterion			**50-55**

Source: Plant Unit Installation	*Frequency, Hz*								
Receiver: Office Window at rear façade of 15 neal's Yard	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Sound pressure level outside window									52
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	-10
Sound pressure level inside nearest office window									**42**
								BS8233 Indoors Design Criterion	**40-45**