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XXIV OLD BUILDINGS, LINCOLNS INN, LONDON

PLANNING COMPLIANCE REPORT

Report 16130.PCR.01

Prepared on 05 July 2017

For:

XXIV Old Buildings

Lincolns Inn

London WC2A 3UP

Site Address	Report Date	Revision History
XXIV Old Buildings, Lincolns Inn, London, WC2A 3UP	05/07/2017	-

CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by XXIV Old Buildings, Lincolns Inn, London, WC2A 3UP to undertake an environmental noise survey at XXICV Old Buildings, Lincolns Inn, London. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for the installation of a single condenser unit in compliance with the 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 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 site as shown in Site Plan 16130.SP1. The choice of 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 04/07/2017 and 05/07/2017

Initial inspection of the site revealed that the background noise profile at the monitoring location was dominated by road traffic noise from Chancery Lane to the East.

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 16130.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)	42
Night-time (23:00-07:00)	41

Table 3.1: Minimum measured background noise levels

4.0 NOISE CRITERIA

The criterion for 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 the equipment will have a noise that has a distinguishable, discrete continuous noise (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 façade to at least 10dB(A) below the LA90 level.'' – London Borough of Camden – Noise Strategy

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 receiver	37dB(A)	36dB(A)

Table 4.1: Proposed Noise Emissions Criteria

As the proposed air condenser units could be used during the night-time period, the night-time criterion of 36dB (A) will be used to ensure that the amenity of the closest noise sensitive receiver will be protected.

5.0 DISCUSSION

It is understood that the plant installation is comprised of the following unit as shown in 16130.SP1.

- 1 No. Fujitsu AOYG12LMCA Condenser unit

The closest noise sensitive receiver to the condenser units, as shown in 16130.SP1, will be an office window on the property located directly to the South, at a distance of approximately 4 meters away from the installation location.

The sound pressure levels for the condenser unit at 1m as provided by the manufacturer are shown in Table 5.1.

	Sound Pressure level (dB) in Octave frequency bands (Hz)							
Plant Unit	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Fujitsu AOYG12LMCA Sound Pressure Level at 1m	*No spectral data available – 50 dB(A)*							

Table 5.1: Manufacturer's Sound Pressure Level

5.1 Objective overview

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 satisfy the noise emissions criteria, provided that the following noise control strategy is adopted:

A barrier should be installed to ensure that the line of sight between the condenser unit and the office window 4m to the South is obstructed.

The barrier can be formed of 20mm timber panels backed with 50mm water and fire resistant mineral wool held in place with wire netting.

Receiver - Nearest Noise Sensitive Window	**Criterion**	**Noise Level at Receiver (Office Window)**
Operating hours of plant units	36dB(A)	35dB(A)

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

6.0 CONCLUSION

An environmental noise survey has been undertaken at XXIV Old Buildings, Lincolns Inn, London, WC2A 3UP by KP Acoustics Ltd. between 04/07/2017 and 05/07/2017.

The results of the survey have enabled criteria to be set for noise emissions. Using manufacturer noise data, noise levels have been predicted at the nearby noise sensitive receiver for compliance with current requirements.

Calculations show that noise emissions from the plant installation would meet the requirements of the London Borough of Camden provided that a timber barrier is installed to obstruct the direct line of site between the proposed external condenser unit and the nearby noise sensitive receiver.

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

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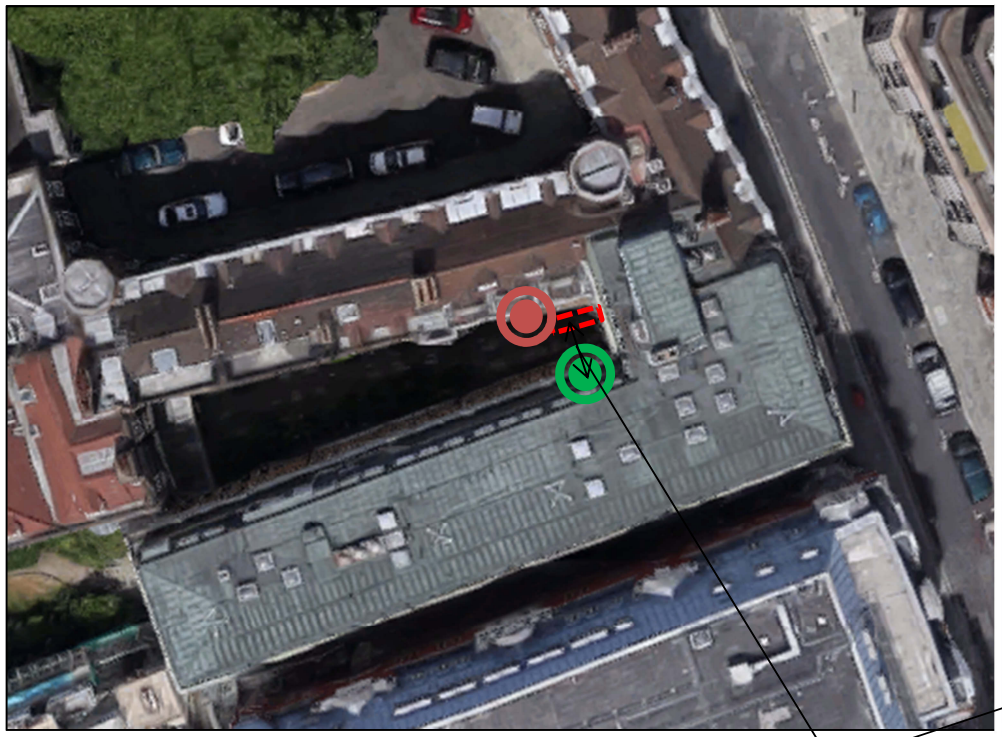

Approx. 4m

Plant installation location (NTS)

Noise Survey Monitoring Position

Closest noise-sensitive receiver

Title:

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

(*Image Source: Google Maps & Buy a Plan*)

Date: 05 July 2017

FIGURE 16130.SP1

KP acoustics

24 Old Buildings, Lincolns Inn, London
Environmental Noise Time History
4th July to 5th July 2017

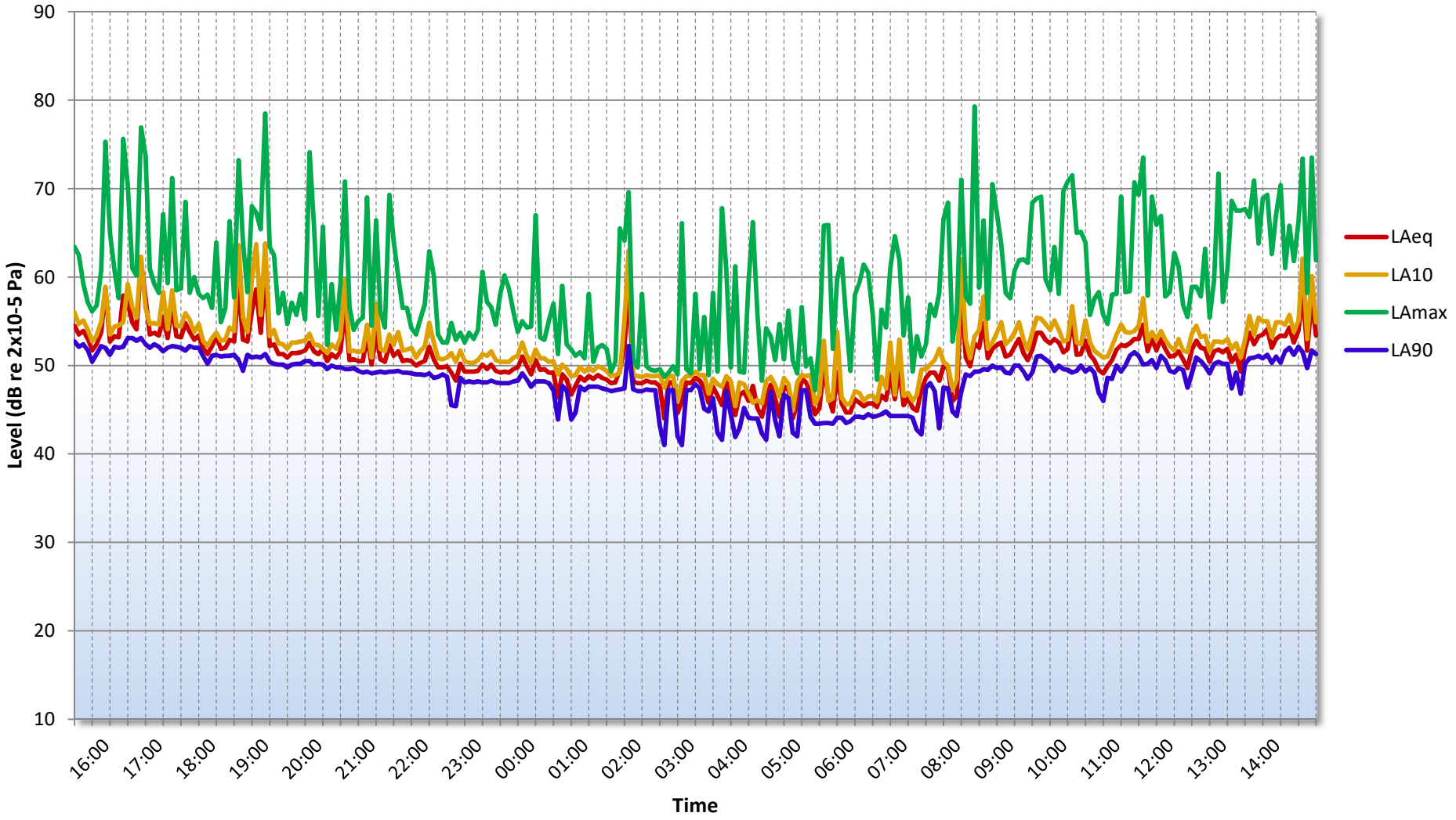

Figure 16130.TH1

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

XXIV Old Buildings, Lincolns Inn, London

Plant Unit Emissions Calculations

Source: External condenser unit	*Frequency, Hz*								
Receiver: Closest office window	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Fujitsu AOYG12LMCA at sound pressure level at 1m	No Spectral data available - 50 dB(A)								50
Correction for surface reflection									3
Attenuation provided by distance to receiver (min. 4m)									-12
Attenuation provided by timber barrier									-6
Sound pressure level of Fujitsu AOYG12LMCA Condenser unit									**35**
Sound pressure level 1m from nearest noise sensitive receiver									**35**

Design Criterion **36**

Receiver: Inside Nearest office window

	Frequency, Hz								
Source: Plant Unit	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Sound pressure level outside window									35
Minimum attenuation from partially open window, dB									10
Sound pressure level inside nearest residential noise sensitive window									**25**