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JENKINS HOTEL, CARTWRIGHT GARDENS, LONDON

NOISE IMPACT ASSESSMENT REPORT

Report 9081.NIA.01

For:

Stamos Yeoh Architects
1st Floor Old Town Hall
354 Mare Street
London
E8 1HR

Site Address	Report Date	Revision History
Jenkins Hotel, Cartwright Gardens, London	21/05/2012	

CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Stamos Yeoh Architects, to undertake an environmental noise survey at Jenkins Hotel, Cartwright Gardens, London. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for the proposed installation of air-conditioning units 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 at the position shown in Site Plan 9081.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 16:09 on 14/05/2012 and 15:19 on 15/05/2012.

Initial inspection of the site revealed that the background noise profile at the monitoring location was generally quiet, with noise mainly occurring from road traffic from the surrounding roads.

The weather during the course of the survey was generally dry, and 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.

- 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 9081.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)	44
Night-time (23:00-07:00)	40

Table 3.1: Minimum measured background noise levels

4.0 NOISE CRITERIA

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

"Noise emitted by all plant [...] shall not increase the lowest existing L_{A90} (10mins) level measured or predicted at 1.0m from the nearest residential window or at a height of 1.2m above any adjacent residential garden [...] at any time when the plant is operating."

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 (07:00 to 23:00)
Noise criterion at nearest residential receiver (10dB below minimum L_{A90})	34 dB(A)	30 dB(A)

Table 4.1: Proposed Noise Emissions Criteria

As the proposed unit can be used at any time, we would suggest adopting the night-time criterion in order to render the noise impact assessment more robust.

5.0 DISCUSSION

The location of the proposed plant installation is as shown in the indicative site plan 9081.SP1. The plant unit will be located on a brick wall, with no screening between the plant unit and the nearest noise sensitive receiver, which is a window approximately 1.5m from the proposed location of the plant unit.

It is understood that the plant installation comprises of one new air conditioning units, selected as follows:

- 1 No. Mitsubishi Electric PURYP-350YJMA Outdoor Units

The sound pressure levels as provided by the manufacturer for the unit 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
Mitsubishi Electric PURY-P350YJMA Outdoor Unit*	72	65	62	57	54	50	47	40

Table 5.1 Manufacturer's Sound Pressure Level at 1m

*** worst case operational modes have been used in order to provide a more robust assessment**

5.1 Objective overview

Taking all acoustic corrections into consideration, including distance 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 Receiver
Operating hours	30 dB(A)	dB(A)

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

As shown in Appendix B and Table 5.1, transmission of noise to the nearest sensitive windows due to the effects of the plant unit installation satisfies the emissions criteria set Camden Council, provided that an acoustic enclosure is used, and the glazing of the closest noise sensitive window is enhanced.

The enclosure should be formed of a heavy metal alloy, with a louvred panel providing the required ventilation. All inner-facing surfaces treated with an absorptive backing, formed from a 30-50mm layer of non-flammable absorbent layer, such as rock wool or glass fibre. The mineral wool treatment should be held in place by a strong, permeable (minimum 20% open area) facing.

The enclosure should entail an acoustic louvred panel in order to provide ventilation. As the main transmission path for noise, the louvred panel would need to be selected to meet the spectral reduction values shown in Table 5.3.

Mitigation Type	Attenuation (dB) in each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Complete Enclosure / Louvred Panel	12	13	16	18	24	24	20	19

Table 5.3: Required spectral attenuation from proposed acoustic enclosure/louvred panel

<u>For Indication Purposes Only</u>

A 300 mm deep acoustically treated louvred panel would typically be capable of meeting the attenuation specification shown in Table 5.3

In addition to the above, the glazing system of the adjacent noise sensitive receivers will require upgrading in order to achieve the noise emission criteria set out section 4.0. It is understood that the original sash windows may be retained. In this case, we would recommend the installation of a standard secondary glazing system (5mm-6mm) at a distance of 50mm(min.) from the existing window panes. This should be adopted in conjunction with the installation of an effective sash-window sealing system such as Ventrolla which would meet the spectral attenuation specification shown in Table 5.4.

Mitigation Type	Attenuation (dB) in each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Secondary Glazing System	20	25	29	34	41	45	53	53

Table 5.4: Spectral attenuation from proposed upgrade works with secondary glazing system

<u>For indication purposes only:</u>

Typically, if installed properly, a unit of the order of Existing Sash Windows / 50mm airspace / 6mm glass would be capable of achieving the sound reduction performance specification shown in Table 5.4.

6.0 CONCLUSION

An environmental noise impact survey has been undertaken at Jenkins Hotel, Cartwright Gardens, London, by KP Acoustics Ltd between 14/05/2012 and 15/05/2012. 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 installation would meet the requirements of Camden Council.

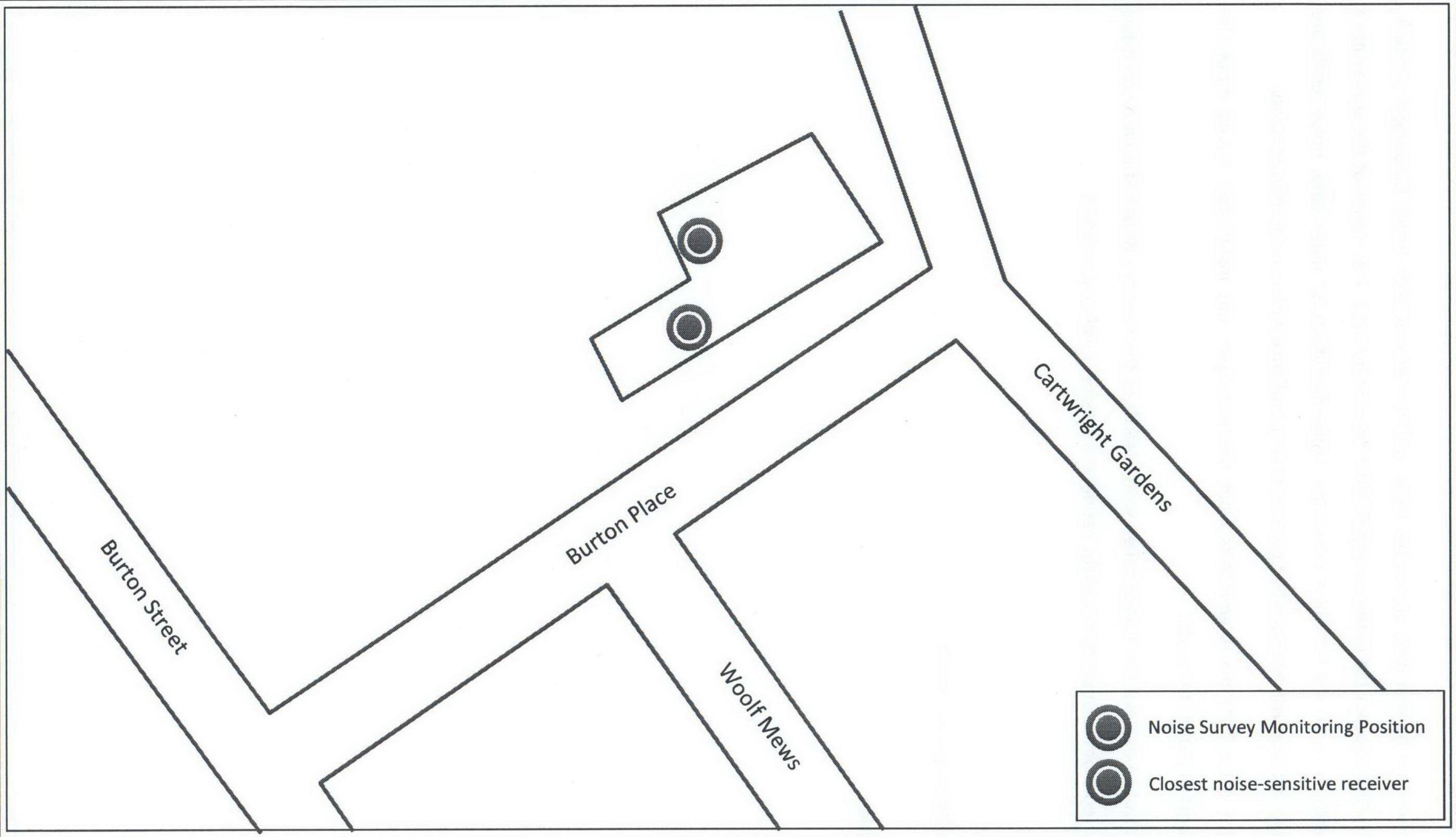
Further calculations have been undertaken with regards to the relevant British Standard and it has been ensured that the amenity of nearby residential receivers will be protected.

Report by

Kyriakos Papanagiotou MIOA

Director

KP Acoustics



Title:

Indicative site plan showing noise monitoring position

Date: 18 May 2012

FIGURE 9081.SP1

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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

Jenkins Hotel, Cartwright Gardens, London

PLANT EMISSIONS CALCULATION

Source: Mitsubishi Plant Unit	*Frequency, Hz*								
Receiver: Nearest Residential Window	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer's sound pressure level at 1m									
Mitsubishi PURYP350YJMA Air Conditioning Unit	72	65	62	57	54	50	47	40	60
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction (1.5m) , dB	-4	-4	-4	-4	-4	-4	-4	-4	
Attenuation provided by proposed enclosure, dB	-12	-13	-16	-18	-24	-24	-20	-19	
Attenuation provided by proposed upgraded glazing, dB	-20	-25	-29	-34	-41	-45	-53	-53	
Sound pressure level 1m from nearest residential receiver	**39**	**26**	**16**	**4**	**-12**	**-20**	**-27**	**-33**	**16**
								Design Criterion	**30**

Receiver: Inside Nearest Residential Window

	Frequency, Hz								
Source: Mitsubishi Unit	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window	39	26	16	4	-12	-20	-27		16
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10		
Sound pressure level inside nearest noise sensitive window	**29**	**16**	**6**	**-6**	**-22**	**-30**	**0**		**8**
								Design Range	**30**

Jenkins Hotel, Cartwright Garndens, London
Environmental Noise Time History
14th May to 15th May 2012

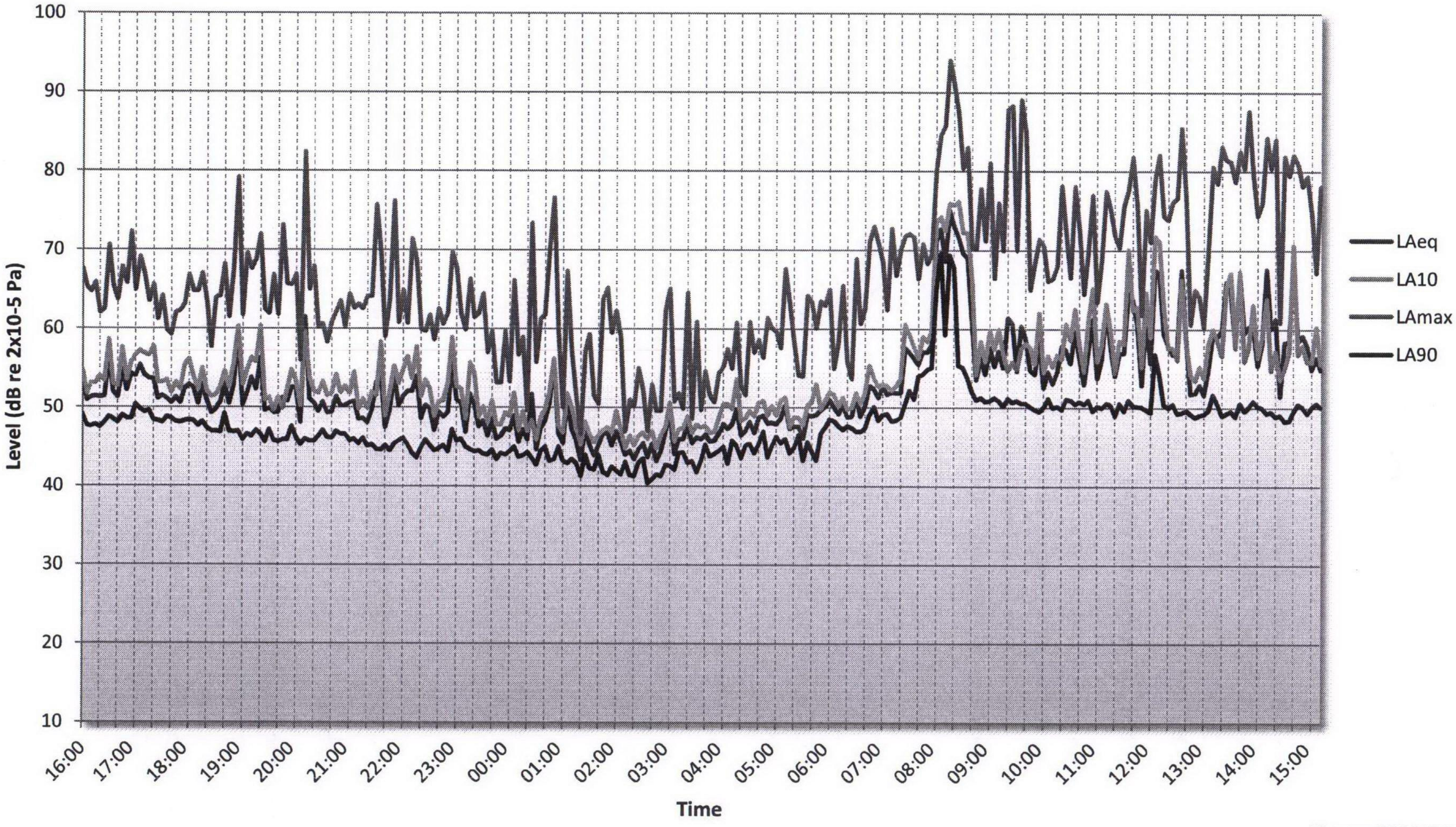

Figure 9081.TH1

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*.