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50 ROCHESTER PLACE, LONDON

PLANNING COMPLIANCE REVIEW

Report 15287.PCR.01

For:

Michael Anastassiades

122 Lower Marsh

London

SE1 7AE

Site Address	Report Date	Revision History
50 Rochester Place, London NW1 9JX	06/12/2016	

CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Michael Anastassiades, 122 Lower Marsh, London, SE1 7AE to undertake an environmental noise survey at 50 Rochester Place, London NW1 9JX.

The background noise levels measured will be used to determine daytime and night-time noise emission criteria for a proposed installation of plant units, in agreement with the planning requirements of 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 receivers 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 15287.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. Continuous automated monitoring was undertaken for the duration of the survey between 29 November and 30 November 2016.

Initial inspection of the site revealed that the background noise profile at the monitoring location was wholly 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 use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 958 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 Figures 15287.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)	35
Night-time (23:00-07:00)	35

Table 3.1: Minimum measured background noise levels

4.0 NOISE CRITERIA

We would propose to set the noise criteria for the noise emissions so that the A-weighted sound pressure level from the plant, when operating at its noisiest, shall not at any time exceed a value of 10dB below the minimum, external background noise, at a point 1 metre outside the window of the closest receiver.

We therefore propose to set the noise criterion 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})	25 dB(A)	25 dB(A)

Table 4.1: Proposed Noise Emissions Criterion

It is our professional opinion that the criterion of 25 dB (A) is exceptionally low. We would therefore suggest the adoption of 30dB (A) at 1m from a residential window. It is important to highlight that even with the window of the closest sensitive receiver partially open, the indoor criterion of 30 dB(A) as per BS8233:2014 can still be comfortably achieved.

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5.0 DISCUSSION

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

- 1 No. Mitsubishi PUHZ-ZRP140VKA/YKA Air Conditioning Unit

1 No. plant units is proposed to be installed at the roof of the property (as shown in SP1).

The closest noise sensitive receiver to this location will be a window located approximately 8 metres from the proposed installation.

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

	Sound Pressure Level (dB) in each Frequency Band							
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Mitsubishi PUHZ ZRP140VKA/YKA	58	56	55	49	45	42	37	29

Table 5.1 Manufacturer's Sound Pressure Levels at 1m

5.1 Objective overview

Taking all acoustic corrections into consideration, including distance corrections, the noise level 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**
Receiver 1 as shown in SP1	30 dB(A)	29 dB(A)

Table 5.2 Predicted noise level and criterion at nearest noise sensitive receivers

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

5.2 BS8233 Assessment

The predicted noise level of 29 dB(A) at the nearest noise sensitive receiver is to be considered outside of the window. The 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 plant units 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 30dB(A) as being the value for internal resting/sleeping conditions in night-time.

With a calculated external levels at nearest noise sensitive receiver of 29 dB(A), the residential windows itself would need to provide minimal 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 a further reduced interior noise level.

Receiver	Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:2014*	Noise Level within Nearest Residential Space
Closest to proposed plant unit installations	30 dB(A)	Non-significant

Table 5.4 Noise levels and criteria inside nearest residential spaces.

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 London Borough of Camden, the noise emissions from the plant unit installations 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 50 Rochester Place, London NW1 9JX, by KP Acoustics Ltd between 29 November and 30 November 2016. The results of the survey have enabled criteria to be set for noise emissions from proposed plant unit.

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 air conditioning unit installations would meet the requirements of London Borough of Camden.

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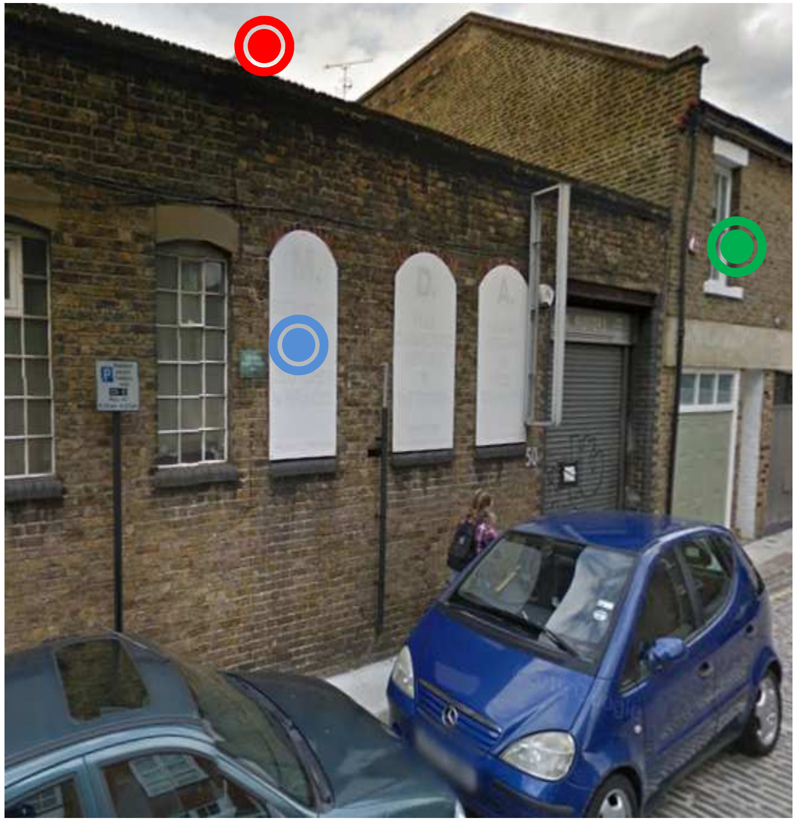

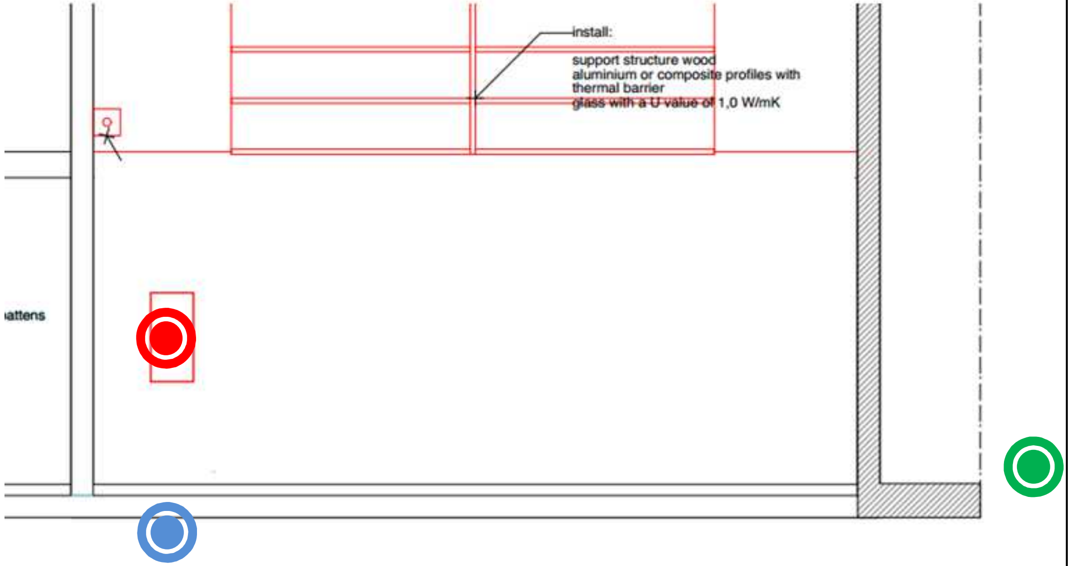

Plant unit location

Noise Survey Location

Closest noise-sensitive receiver

Title: Site plan showing noise monitoring position, closest noise sensitive receiver and proposed plant unit location.

Date: 6 December 2016

FIGURE 15287.SP1

KP acoustics

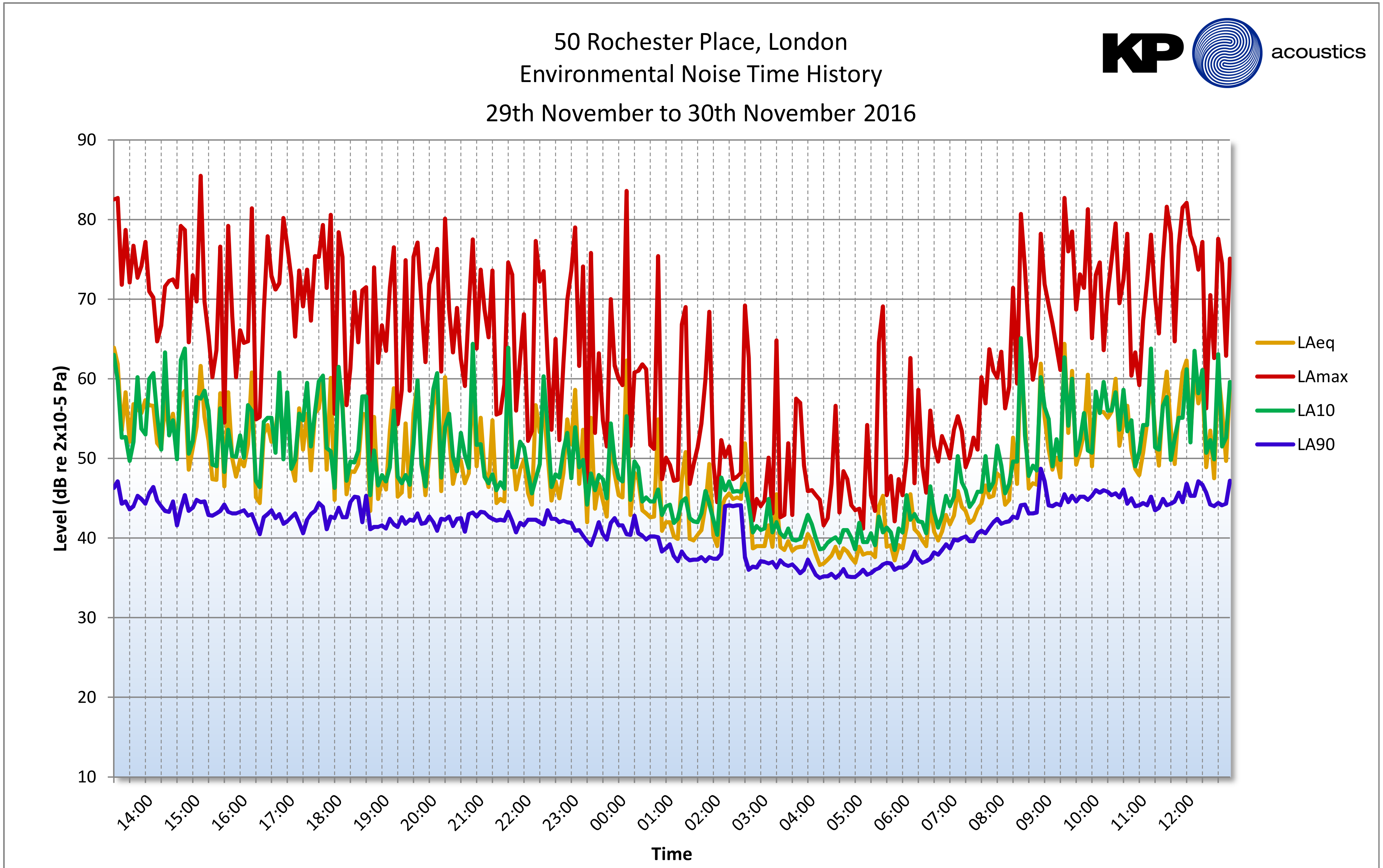

Figure 15287.TH1

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

50 ROCHESTER PLACE, LONDON

PLANT UNIT EMISSIONS CALCULATIONS - BASEMENT

Source: Plant unit installation at the roof Receiver 1: Nearest residential window	*Frequency, Hz*								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Manufacturer's sound pressure level at 1m									
Mitsubishi PUHZ-ZRP140VKA/YKA Air Conditioning Unit	58	56	55	49	45	42	37	29	53
Attenuation provided by distance dB (8m)	-18	-18	-18	-18	-18	-18	-18	-18	
Attenuation provided by building envelope dB	-5	-5	-5	-5	-5	-5	-5	-6	
Sound pressure level 1m from nearest receiver	**35**	**33**	**32**	**26**	**22**	**19**	**0**	**0**	**29**

Design Criterion	**35**

Source: Plant unit installation at the roof Receiver: Inside Nearest Residential Space	*Frequency, Hz*								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Sound pressure level outside window	35	33	32	26	22	19	0	0	29
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	-10
Sound pressure level inside nearest residential window	**25**	**23**	**22**	**16**	**12**	**0**	**0**	**0**	**19**