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53A NEAL STREET, LONDON

NOISE IMPACT ASSESSMENT

Report 3594.NIA.01

Prepared on 7 December 2009

For:

Blackstone Inc Ltd

6 Hogarth Road

Earls Court

London

SW5 0PT

CONTENTS

List of Attachments

1.0 INTRODUCTION

Practical Acoustics has been commissioned by Blackstone Inc Ltd, 6 Hogarth Road, Earls Court, London SW5 0PT to measure existing background noise levels at 53a Neal Street, Covent Garden, London, WC2H 9PJ. The measured noise levels will be used to determine noise emission criteria for the proposed plant units in agreement with the planning requirements of the London Borough of Camden.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Procedure

Measurements were taken at the position shown in Site Plan 3594.SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receivers.

Continuous automated monitoring was undertaken for the duration of the survey between 12:30 on 27 November 2009 and 11:30 on 30 November 2009.

Weather conditions were dry with light winds, 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 use and no abnormalities were observed.

The equipment used was as follows.

- Svantek Type 957 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

3.0 RESULTS

The $L_{Aeq:\ 15min}$, $L_{Amax:\ 15min}$, $L_{A10:\ 15min}$ and $L_{A90:\ 15min}$ acoustic parameters were measured and are shown as a time history in Figure 3594.TH1.

Background noise levels were dominated by traffic noise from Neal Street.

Minimum measured background levels are shown in Table 3.1.

	Minimum Background Noise $L_{A90:\ 15min}$ dB(A)
Daytime (7:00-23:00)	46
Night-time (23:00-7:00)	45

Table 3.1: Minimum background noise levels

4.0 NOISE CRITERIA

The London Borough of Camden's criteria for noise emissions of new plant installations are as follows:

"Design measures should be taken to ensure that specific plant noise levels at a point 1 metre external to sensitive façades are at least 5dB(A) less than the existing background measurement (L_{A90}) when the equipment is in operation. Where it is anticipated that equipment will have a noise that has distinguishable, discrete continuous note[...], special attention should be given to reducing the noise at any sensitive façade by at least 10dB(A) below the L_{A90} level."

In order to provide a more robust assessment, it is proposed that criteria are set at 10dB below the exiting minimum background noise levels, as shown in Table 4.1.

	Daytime	**Night-time**
Noise criterion at nearest residential receiver (10dB below minimum L_{A90})	36 dB(A)	35 dB(A)

Table 4.1: Proposed Noise Emissions Criteria

As the units are only expected to be used during normal shop opening hours, the daytime criterion of 36dB(A) will be used in this assessment.

5.0 DISCUSSION

The proposed plant to be installed is a Mitsubishi Air Conditioning Unit type PUHZ-RP71VHA4. The manufacturer's spectral sound pressure level, measured at 1m under free-field conditions, is as shown in Table 5.1.

	Sound Pressure Level (dB) in each Frequency Band								
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**dB(A)**
Mitsubishi Unit type PUHZ-RP71VHA4[1]	57	55	50	44	43	39	32	28	48

Table 5.1 Manufacturer spectral sound pressure levels for proposed unit

[1] Manufacturer's heating sound pressure levels have been used, as they provide a worst case scenario

The proposed unit will be installed on a flat roof, above 53 Neal Street and the neighbouring property. The closest residential window is approximately 5m from the proposed plant location, although a distance separation of 4m has been used in order to provide a more robust assessment.

Current proposals include the specification of a purpose-built acoustic enclosure, which offers spectral sound reductions as shown in Table 5.2.

	Attenuation (dB) in each Frequency Band							
Enclosure Type	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
environmodula Enclosure type 1.2.25AC	-12	-13	-20	-29	-36	-37	-39	-39

Table 5.2: Spectral attenuation from proposed acoustic enclosure

Taking into account all necessary acoustic corrections including reflections from the surround hard surfaces, the resulting noise level at the window of the nearest noise sensitive receiver would be as shown in Table 5.3. Detailed calculations are shown in Appendix B.

Receiver	Daytime Criterion	Level at Receiver (due to proposed plant)
Nearest Residential Window	36 dB(A)	22 dB(A)

Table 5.3: Noise levels and criteria at nearest noise sensitive receivers

As shown in Appendix B, the predicted plant noise emissions would be expected to meet the requirements set out by the London Borough of Camden with proposed mitigation measures in place.

In order to ensure the amenity of nearby residential receivers, an additional calculation has been undertaken in order to assess whether the noise emissions from the proposed plant unit would be expected to meet the recommendations of recognised British Standard BS8233:1999.

British Standard 8233:1999 '*Sound insulation and noise reduction for buildings – Code of Practise*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS8233:1999 recommends 30dB(A) as being 'Good' internal resting/sleeping conditions.

With external levels of 22dB(A) at the closest window, noise emissions from the proposed plant would be expected to meet 'good' conditions without taking attention from the window itself into consideration. According to BS8233:1999, a partially open window offers between 10-15dB attenuation.

It can therefore be predicted that, as well as meeting the requirements of the London Borough of Camden, the emissions from the proposed plant would be expected to be within the most stringent recommendations of the relevant British Standard. Predicted levels are shown in Table 5.4, with detailed calculations shown in Appendix B.

Receiver	'Good' Conditions Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:1999*	Maximum Noise Level at Receiver (due to proposed plant)
Inside Nearest Residence	30 dB(A)	13dB(A)

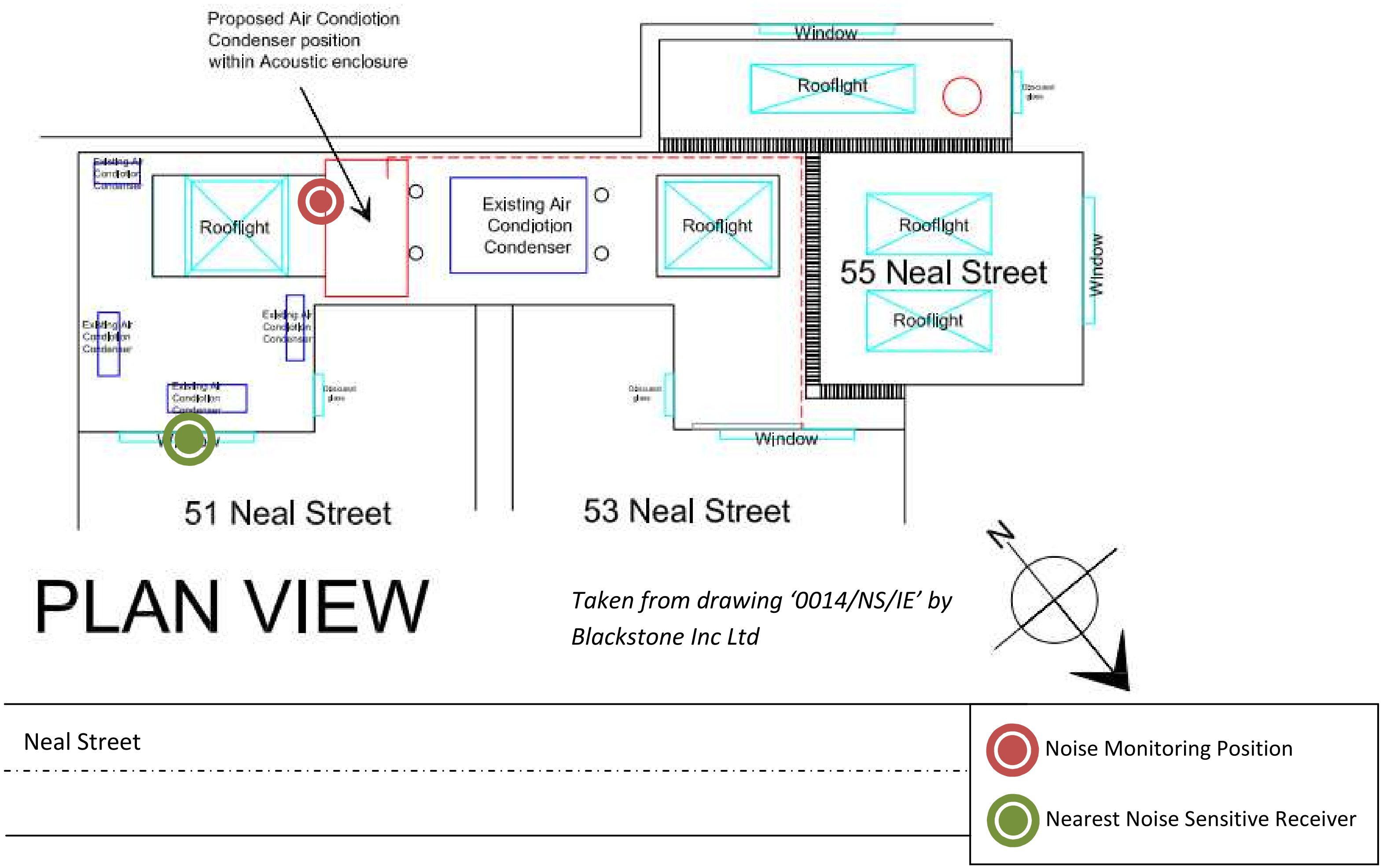
Table 5.4: Noise levels and criteria inside nearest residential space

6.0 CONCLUSION

An environmental noise survey has been undertaken at 53a Neal Street, Camden. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant in accordance with the London Borough of Camden's planning conditions.

A noise impact assessment has then been undertaken using manufacturer noise data to predict noise levels at the nearby noise sensitive receivers due to the current proposals.

Calculations have shown that with currently proposed mitigation measures, the noise emissions of the proposed installation will be within the requirements of the London Borough of Camden for the nearest noise sensitive receiver.



Title:
Indicative site plan showing noise monitoring position and noise sensitive receiver

Date: 7 December 2009

FIGURE 3594.SP1

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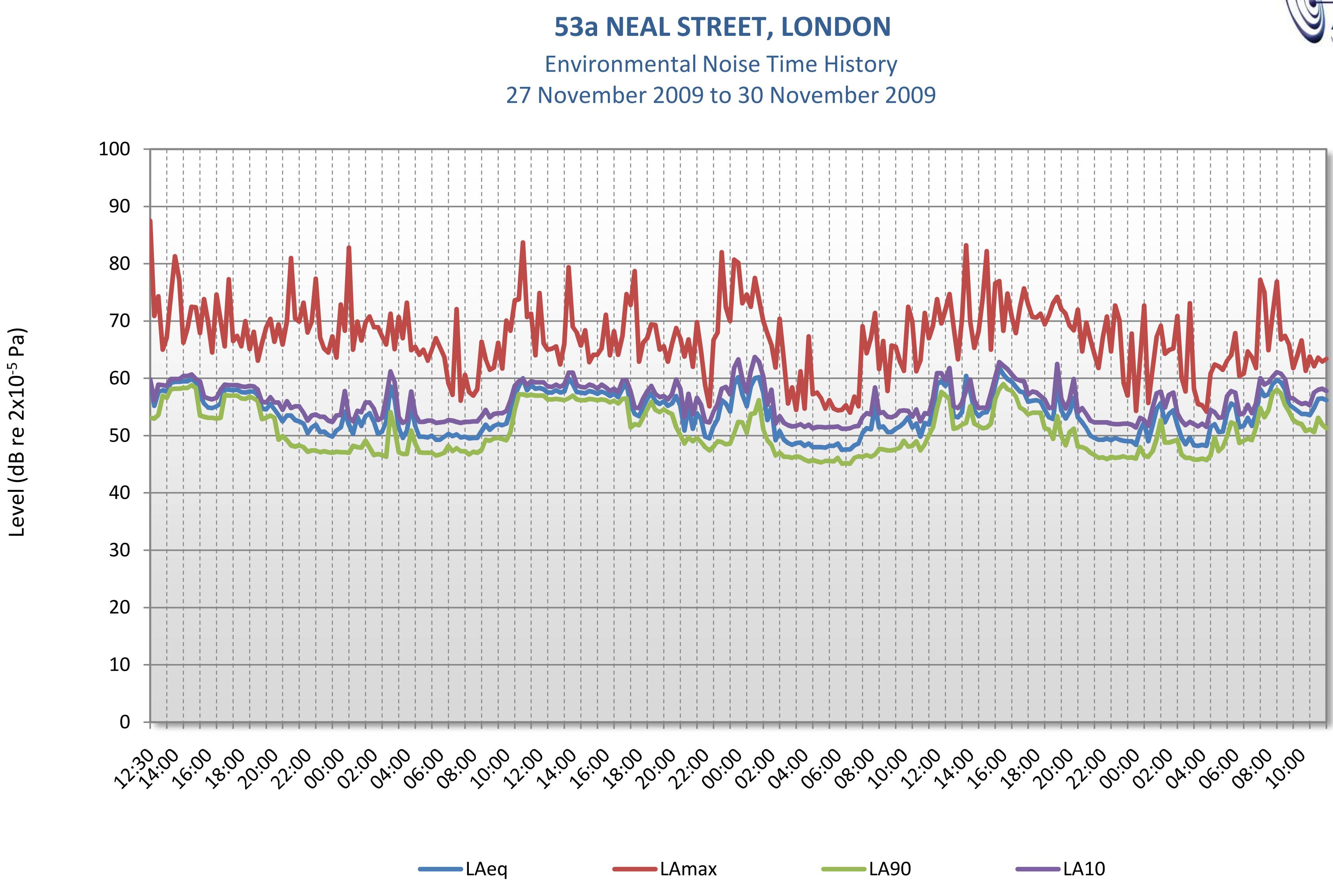

Figure 3594.TH1

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and 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 not 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 not 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 10 such octave bands whose centre frequencies are defined in accordance with international standards.

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 one alone and 10 sources produce a 10dB 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

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception 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 reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B

53a NEAL STREET, LONDON

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Source: Mitsubishi Air Conditioning Condenser Unit

		Frequency, Hz								
		63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Manufacturer's sound pressure level at 1m										
Mitsubishi Air Conditioning unit, type PUHZ-RP71VHA4		57	55	50	44	43	39	32	28	48
Correction for reflections, dB		6	6	6	6	6	6	6	6	
Attenuation from proposed acoustic enclosure, dB		-12	-13	-20	-29	-36	-37	-39	-39	
Minimum distance correction, dB	4m	-12	-12	-12	-12	-12	-12	-12	-12	
Cumulative sound pressure level at nearest residential window		**39**	**36**	**24**	**9**	**1**	**0**	**0**	**0**	**22**

Design Criterion	**36**

Receiver: Inside Nearest Residential Window
Source: Mitsubishi Air Conditioning Unit

	Frequency, Hz								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Sound pressure level outside window	39	36	24	9	1	0	0	0	22
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	
Sound pressure level inside nearest noise sensitive window	**29**	**26**	**14**	**0**	**0**	**0**	**0**	**0**	**13**

Design Range	**30-35**