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THE NETWORK BUILDING, 3RD FLOOR, 97 TOTTENHAM COURT ROAD, LONDON

NOISE IMPACT ASSESSMENT

Report **8584-NIA-01**

Prepared on 11 November 2013

Issued For:

Working Environments

Monza House, Unit 4

Third Avenue

Millbrook Trading Estate

Southampton,

SO15 0LD

committed to CSCS Platinum award

ISO 17025

ISO 9001

Institute of Acoustics sponsoring organisation

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1.0 INTRODUCTION

Clement Acoustics Ltd has been commissioned by Working Environments, Monza House, Unit 4, Third Avenue, Millbrook Trading Estate, Southampton, SO15 0LD to measure existing background noise levels at The Network Building, 3rd Floor, 97 Tottenham Court Road, London W1T 4TP. Measured noise levels will be used to determine noise emission criteria for a proposed external air conditioning condenser unit 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 undertaken at the position shown in Site Plan 8584-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 11:00 on 5 November 2013 and 11:00 on 6 November 2013.

Background noise levels at the monitoring position were dominated by road traffic noise from surrounding roads and some existing plant units serving other services within the building.

Weather conditions were generally 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 $L_{Aeq:\ 5min}$, $L_{Amax:\ 5min}$, $L_{A10:\ 5min}$ and $L_{A90:\ 5min}$ acoustic parameters were measured at the location shown in Site Plan 8584-SP1. The measured levels are shown as a time history in Figure 8584-TH1.

Minimum background levels are shown in Table 3.1 below:

	Minimum background noise level $L_{A90:\ 5min}$ dB(A)
Daytime (07:00 - 23:00)	52
Night-time (23:00 - 07:00)	49

Table 3.1: Minimum background noise levels

4.0 NOISE CRITERIA

In order to provide a robust assessment we propose to set noise emissions criteria according to the following requirement:

> "*The 'A' weighted sound pressure level from the plant, when operating at its noisiest, shall not at any time exceed a value of 10 dB below the minimum external background noise, at a point 1 metre outside any window of any residential property*."

We therefore propose to set the noise criteria as shown in Table 4.1 to comply with the above.

	Noise Emissions Criteria at Receiver [*10dB Below Minimum L_{A90}*]
Daytime (07:00 - 23:00)	42
Night-time (23:00 - 07:00)	39

Table 4.1: Proposed Noise Emissions Criteria

As the proposed unit is expected to be operated only during office hours, the daytime criterion of 42 dB(A) will be used for the purpose of this assessment.

5.0 DISCUSSION

The proposed plant installation comprises one new air conditioning condenser unit, selected as follows:

		Sound Pressure Level (dB) in each Frequency Band							
Unit	**Element**	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Mitsubishi Mr Slim PUHZ.RP35VHA4	Outdoor Unit	50	54	47	40	42	35	30	29

Table 5.1 Manufacturer's Sound Pressure Levels at 1m

The proposed units will be located on the roof of the building at the location indicated in the site plan 8584-SP1.

The nearest noise sensitive receiver has been identified as the top floor window of the adjacent building to the South as shown in indicative site plan 8584-SP1. The minimum distance from the proposed unit to the receiver is approximately 27m. As shown in Appendix B, at a distance of 27m, the received noise would be expected to fall well within both the day and night time criteria. This does not take into account any further mitigation caused by the barrier effect provided by the edge of the building envelope. It is not therefore deemed necessary to recommend any additional mitigation.

6.0 NOISE IMPACT ASSESSMANT

6.1 Noise Emissions to External Spaces

With all corrections applied, the noise level at the receiver would be as shown in Table 6.1, with detailed calculations shown in Appendix B.

Receiver	**Daytime Criterion**	**Noise Level at Receiver** [*due to proposed plant installation*]
Nearest Noise Sensitive Window	42 dB(A)	26 dB(A)

Table 6.1: Noise levels and criteria at nearest noise sensitive receiver

As shown in Appendix B and Table 6.1, transmission of noise to the nearest sensitive window due to the effects of the proposed plant installation would be expected to meet the set noise emissions criteria.

6.2 Noise Emissions to Internal Spaces

In addition to the above assessment, further calculations will aim to assess whether the noise emissions from the proposed plant units would be expected to meet recognised British Standard recommendations for maximum internal noise levels.

British Standard 8233:1999 '*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, BS8233:1999 recommends 30dB(A) as being 'Good' internal resting/sleeping conditions.

With external levels of 26 dB(A), the 'good' internal conditions are already met without taking into account attenuation from the window. According to BS8233:1999, a partially open window offers a minimum of 10dB attenuation, which results in an internal level of 16dB.

It can therefore be predicted that noise emissions from the proposed plant would be expected to comfortably meet the most stringent recommendations for internal noise in accordance with BS8233:1999, even with neighbouring windows partially open. Predicted levels are shown in Table 6.2, with detailed calculations shown in Appendix B.

Receiver	'Good' Conditions Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:1999*	Noise Level at Receiver (due to plant installation)
Inside Receiver	30 dB(A)	16 dB(A)

Table 6.2 Noise levels and criteria inside nearest residential property

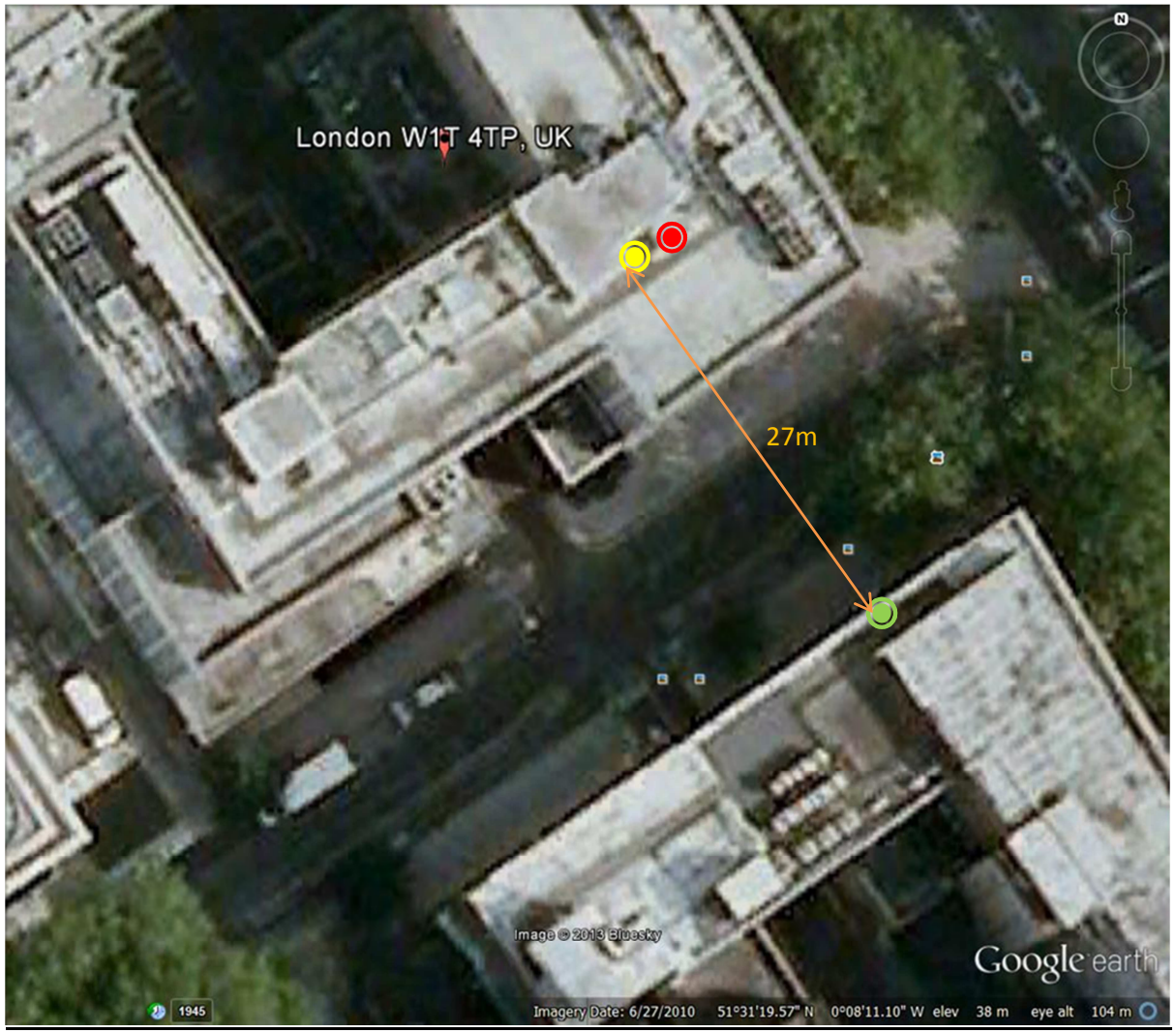
7.0 CONCLUSION

An environmental noise survey has been undertaken at The Network Building, 3rd Floor, 97 Tottenham Court Road, London. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant in order to meet the requirements of the local authority.

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

Calculations show that noise emissions from the proposed plant unit would meet the local authorities requirements as well as the recommendations of the relevant British Standard, without the need for any additional mitigation measures.

Report by	Checked by
Matt Markwick	**Florian Clement MIOA**



Nearest Receiver

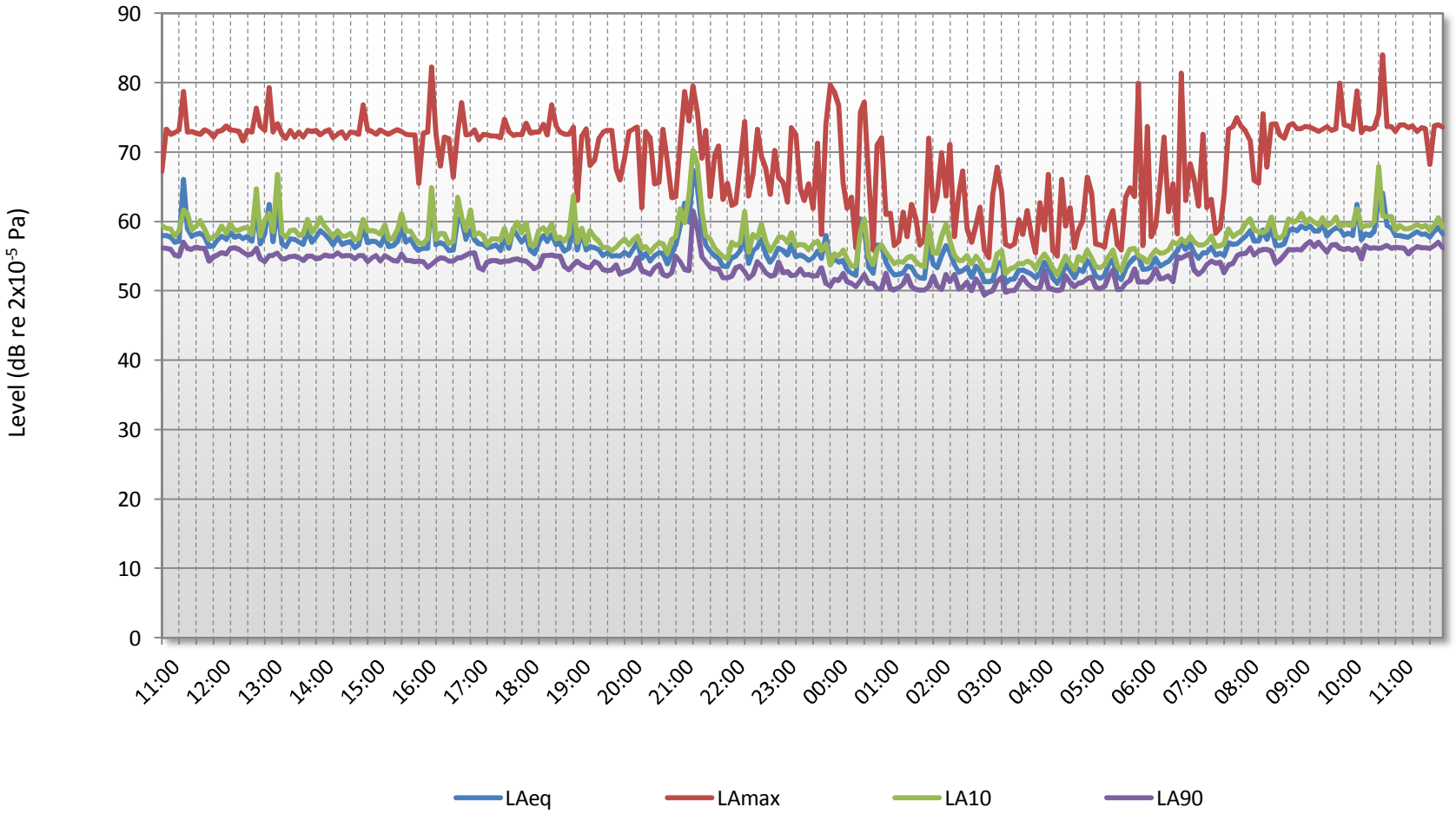
Monitoring Position

Proposed Plant Location

8584.SP1 Indicative site plan showing noise monitoring position and nearest noise sensitive receiver **Date:** 12 November 2013

THE NETWORK BUILDING, 97 TOTTENHAM COURT, LONDON

Environmental Noise Time History
5 November to 6 November 2013



8584-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

8584

The Network Building, 3rd Floor, 97 Tottenham Court Road, London

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Receiver
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressure level at 1 metre									
Mitsubishi Mr Slim PUHZ.RP35VHA4	50	54	47	40	42	35	30	29	46
Correction for reflections, dB	9	9	9	9	9	9	9	9	
Distance correction to receiver, dB (27m)	-29	-29	-29	-29	-29	-29	-29	-29	
Sound pressure level at receiver	**30**	**34**	**27**	**20**	**22**	**15**	**10**	**9**	**26**

Design Criterion	**42**

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window
Source: Cumulative level of plant units

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window	30	34	27	20	22	15	10	9	26
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	
Sound pressure level inside nearest noise sensitive premises	**20**	**24**	**17**	**10**	**12**	**5**	**0**	**0**	**16**

Design Criterion	**30**