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34 DOWNSHIRE HILL, LONDON

NOISE IMPACT ASSESSMENT

Report **10095-NIA-01**

Prepared on 5 May 2015

Issued For:

Lea Schwartz

34 Downshire Hill

London

NW3 1NU

committed to CSCS Platinum award

ISO 17025

ISO 9001

Institute of Acoustics sponsoring organisation

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Lea Schwartz of 34 Downshire Hill, London NW3 1NU and David McGahon of Mclaren Excell to measure existing background noise levels at 34 Downshire Hill, London NW3 1NU. The measured noise levels will be used to determine noise emission criteria for the proposed plant installation 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 SITE DESCRIPTION

Current proposals are to install two external air conditioning condenser units for residential use at 34 Downshire Hill, London NW3 1NU. The proposed units will be installed on the roof of the property towards the rear as shown in attached site plan 10095-SP1. It is understood that an enclosure is to be placed around the units.

Following an onsite inspection, the adjacent neighbouring property is the nearest residential receiver with the top floor windows the closest to the condenser units.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 10095-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the site.

Continuous automated monitoring was undertaken for the duration of the survey between 17:25 on 23 April 2015 and 04:00 on 26 April 2015. Weather conditions were generally dry with light winds, therefore suitable for the measurement of environmental noise.

Background noise levels at the monitoring positions consisted mainly of noise pedestrians in the area. It was noted that building works within the property were being carried out during the daytime period of the survey. The only occurrence of this was on the 24 April 2015 between 08:00 –

17:00. To ensure that the calculations are at their most robust this data has been removed from the average ambient noise level and minimum background noise level.

The measurement procedure generally complied with BS7445:1991. *Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*.

3.2 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 957 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

4.0 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 drawing 10095-SP1.

The measured noise levels are shown as a time history in Figure 10095-TH1.

	Average ambient noise level $L_{Aeq:\ 5min}$ dB(A)	Minimum background noise level $L_{A90:\ 5min}$ dB(A)
Daytime (07:00 - 23:00)	54 dB(A)	43 dB(A)
Night-time (23:00 - 07:00)	50 dB(A)	40 dB(A)

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

In order to provide a suitably robust assessment and protect the amenity of residential premises in the area, we propose to set noise emissions criteria as follows:

> *"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."*

As the proposed plant units are within a residential dwelling, there operational hours could be at any time period. We therefore propose to set the noise criteria at 30 dB(A), the value 10 dB below the minimum calculated background noise during the night time hours which is the lowest measured level.

6.0 DISCUSSION

6.1 Proposed Installation

The proposed plant installation is comprised of the following:

- 2 No. Dakin Condenser Unit type 3MXS68G.

Noise emissions for the proposed plant units, as provided by the manufacturer, are shown in Table 6.1. Loudest modes of operation have been used in order to present a robust assessment.

	Sound Power Level (dB) in each Frequency Band							
Unit	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Dakin 3MXS68G	54	59	52	45	44	42	40	35

Table 6.1: Manufacturer Noise Emissions Levels

The proposed plant location is on the roof of the property in the location shown on indicative site plan 10095-SP1. The plant units will be placed within an open top enclosure for aesthetic reasons, although this will not have an acoustic rating.

The closest receiver has been identified as the top floor window of the neighbouring property which is a minimum of 8m from the proposed plant location.

6.2 Noise Impact Assessment

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.2. Detailed calculations are shown in Appendix B.

Receiver	Night Time Hours Criterion	Noise Level at Receiver (due to proposed plant)
Neighbouring Top Floor Window	30 dB(A)	29 dB(A)

Table 6.2: Noise levels and criteria at noise sensitive receivers

As shown in Table 6.2 and Appendix B, the proposed plant installation would be expected to meet the requirements of the set criteria, without the need for particular mitigation measures.

6.3 British Standard Requirements

Further calculations have been undertaken to assess whether the noise emissions from the proposed plant unit would be expected to meet 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 acceptable internal resting/sleeping conditions during night-time.

With loudest external levels of 29 dB(A), acceptable internal conditions would be met without taking the attenuation of the window itself into consideration. According to BS8233:1999, a partially open window offers 10-15 dB attenuation.

It can therefore be predicted that, in addition to meeting the requirements of the set criteria, the emissions from the proposed plant would be expected to meet the most stringent recommendations of the relevant British Standard, with neighbouring windows partially open. Predicted levels are shown in Table 6.3.

Receiver	'Good' Conditions Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:1999*	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	19 dB(A)

Table 6.3: Noise levels and criteria inside nearest residential space

6.4 Enclosure

It is understood that an open-topped enclosure is to be fitted around the air conditioning units. This has been done for aesthetic reasons and will not contribute acoustic reduction.

To ensure the surrounding enclosure does not increase the noise level at the receiver position stated in table 6.2 due to reflections of hard surfaces, we would recommend that all hard reflective surfaces facing the units have acoustic absorptive material applied. This will ensure reflections inside the enclosure are kept to a minimum.

7.0 CONCLUSION

An environmental noise survey has been undertaken at 34 Downshire Hill, London NW3 1NU. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant units in accordance with the requirements of the London Borough of Camden.

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

Calculations show that noise emissions from the proposed plant units would meet the requirements of the London Borough of Camden without the need for particular mitigation measures.

Report by	Checked by
Stefan Flexen	**Duncan Martin MIOA**

Noise Survey Position

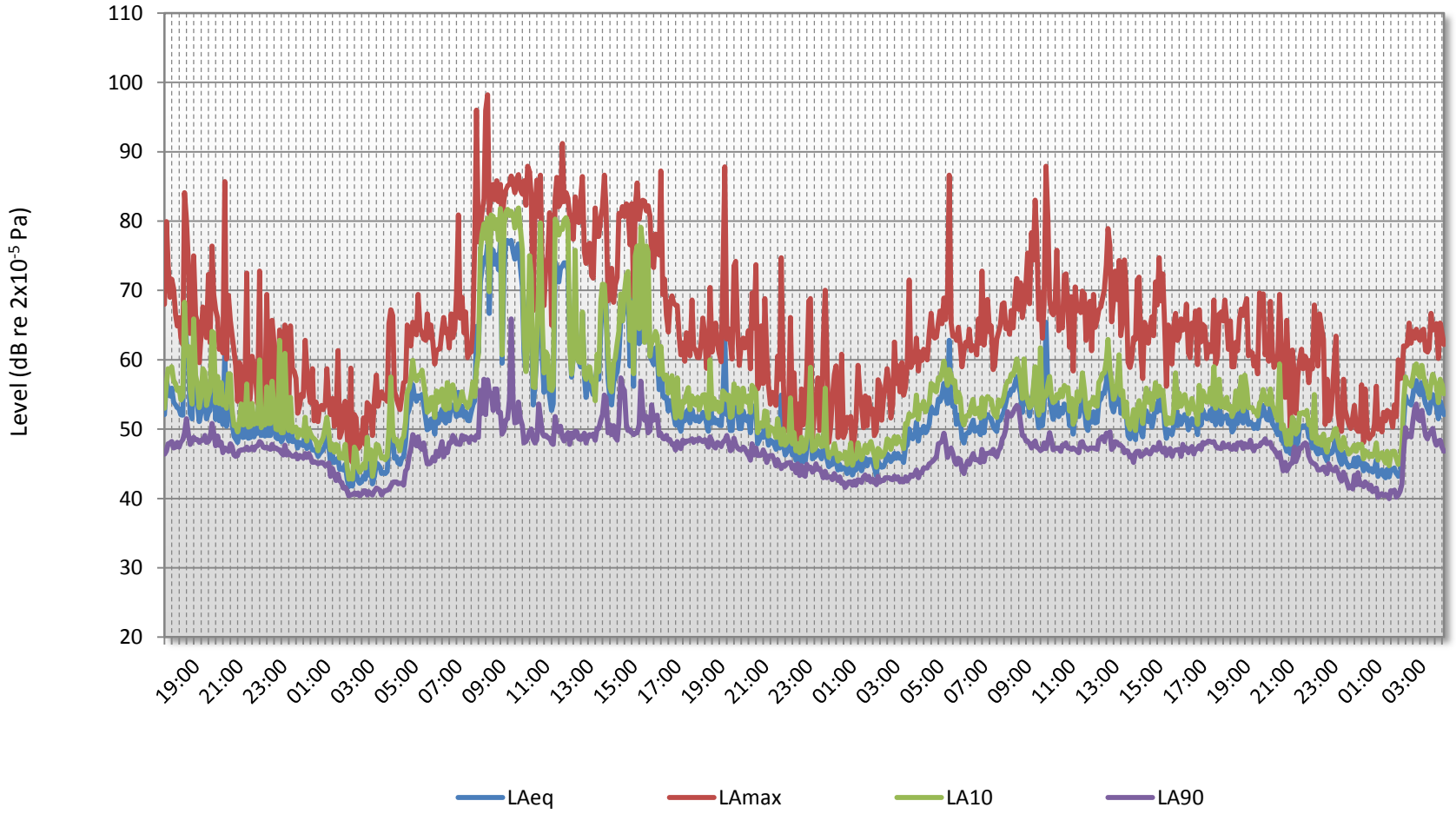
Nearest Residential Receiver

10095-SP1 Indicative site plan showing noise monitoring position and nearest noise sensitive receiver

Date: 6 May 2015

34 Downshire Hill, London

Environmental Noise Time History
23 April 2015 to 26 April 2015



10095-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

10095

34 Downshire Hill, London NW3 1NU

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									
Unit 1 - Daikin 3MXS68G Condenser Unit	54	59	52	45	44	42	40	35	51
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Screening from intermediate roof edge, dB	-4	-5	-7	-9	-12	-15	-15	-15	
Distance correction to receiver, dB (8m)	-18	-18	-18	-18	-18	-18	-18	-18	
Sound pressure level at receiver due to Unit 1	**35**	**39**	**30**	**21**	**17**	**12**	**10**	**5**	**27**
Manufacturer provided sound pressure level at 1 metre									
Unit 2 - Daikin 3MXS68G Condenser Unit	54	59	52	45	44	42	40	35	51
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Screening from intermediate roof edge, dB	-4	-5	-7	-9	-12	-15	-15	-15	
Distance correction to receiver, dB (9m)	-19	-19	-19	-19	-19	-19	-19	-19	
Sound pressure level at receiver due to Unit 2	**34**	**38**	**29**	**20**	**16**	**11**	**9**	**4**	**26**
Cumulative Level due to All Units	**38**	**41**	**33**	**23**	**20**	**15**	**13**	**8**	**29**

Design Criterion	**30**

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	38	41	33	23	20	15	13	8	29
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	
Sound pressure level inside nearest noise sensitive premises	**28**	**31**	**23**	**13**	**10**	**5**	**3**	**0**	**19**

Design Criterion	**20**