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238 WEST END LANE, WEST HAMPSTEAD,

NOISE IMPACT ASSESSMENT

Report **12408-NIA-01**

Prepared on 16 June 2017

Issued For:

Rose Kitchener
5 Carlisle Road
London
NW6 6TL

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 Rose Kitchener to measure existing background noise levels at 238 West End Lane, West Hampstead. The measured noise levels have been used to determine noise emission criteria for a proposed plant installation in agreement with the planning requirements of the Local Authority.

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 an extractor fan externally to service the kitchen at 238 West End Lane, West Hampstead. Proposals are for the duct run to be installed on the rear facade and terminate above roof level. It is understood that the kitchen extract will be used during daytime hours.

The first floor flats have been identified as the nearest affected receivers. Locations are shown in attached site plan 12408-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 12408-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the site.

The surroundings and position used for the monitoring location were as follows:

- Position 1: The microphone was mounted on a ground floor window at the rear of the building. The position was considered not to be free-field, and a correction for reflections has therefore been applied. Noise levels at Position 1 were dominated by traffic noise during the installation and collection of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 14:50 on 19 May 2017 and 14:00 on 22 May 2017.

Weather conditions were generally dry with light winds, therefore suitable for the measurement of environmental noise.

The measurement procedure generally complied with BS 7445:1991: '*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 12408-SP1.

The measured noise levels are shown as a time history in Figure 12408-TH1, with ambient and background noise levels summarised in Table 4.1.

	Average ambient noise level $L_{Aeq:\ 5min}$ dB(A)	Minimum background noise level $L_{A90:\ 5min}$ dB(A)
Daytime (07:00 - 23:00)	53 dB(A)	35 dB(A)
Night-time (23:00 - 07:00)	41 dB(A)	34 dB(A)

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

The *Local Authority* general criteria for noise emissions are 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."*

It is understood that the proposed extract unit will be operational during day time hours. We therefore propose to set the noise criteria at 25 dB(A), the value 10 dB below the minimum measured background noise level during the day time hours.

6.0 DISCUSSION

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 1 No. Helios GBD 560/4

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 worst case assessment.

	Sound Power Levels in each Frequency Band							
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Helios GBD 560/4 Extract	51	71	73	76	77	74	70	61
Helios GBD 560/4 Casing Breakout	42	62	61	51	50	48	44	37

Table 6.1: Manufacturer Noise Emissions Levels

The proposed plant location is on the first floor roof at the rear of the building which is shown on indicative site plan 12408-SP1.

The closest receiver has been identified as the window on the rear facade of a residential property opposite which is a minimum of 6m from the flue terminus and 2m from the casing breakout.

6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0 the following recommendations have been made.

An inline silencer should be installed directly after the fan unit in the duct run. In order for the outlet to meet the criteria it should be ensured the chosen silencer has minimum spectral sound reductions as shown in Table 6.2.

	Required Attenuation (dB) in each Frequency Band							
Mitigation	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
In-line Silencer	9	18	30	48	50	50	50	40

Table 6.2: Required Attenuation from Mitigation

Cladding should also be installed around the fan casing. In order to meet the criteria it should be ensured that the cladding meetings the spectral sound reduction indices as shown in Table 6.3

	Required Attenuation (dB) in each Frequency Band							
Mitigation	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Fan Case - Cladding	26	28	28	32	34	33	36	36

Table 6.3: Required Attenuation from Mitigation

Due to the close proximity of the ducting to a residential window consideration has also been given to the impact of in-duct noise due to the close proximity of the duct to residential receivers. The ducting should be constructed out of a 20 gram galvanised sheet steel. This is expected to be improved the attenuation provided by the ducting.

6.3 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 6.3. Detailed calculations are shown in Appendix B.

Receiver	Daytime Hours Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	25 dB(A)	25 dB(A)

Table 6.3: Noise levels and criteria at noise sensitive receivers

As presented in Table 6.3 and Appendix B, the proposed plant installation with acoustic enclosure would be expected to meet the requirements of the proposed criteria.

6.4 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 '*Guidance on sound insulation and noise reduction for buildings*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS 8233:2014 recommends 30dB(A) as being acceptable internal resting/sleeping conditions during night-time.

With loudest external levels of 25dB(A), acceptable internal conditions would be met without taking the attenuation of the window itself into consideration. According to BS 8233:2014, a typical building facade with a partially open window offers 15dB 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 6.4.

Receiver	Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:2014*	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	10 dB(A)

Table 6.4: Noise levels and criteria inside nearest residential space

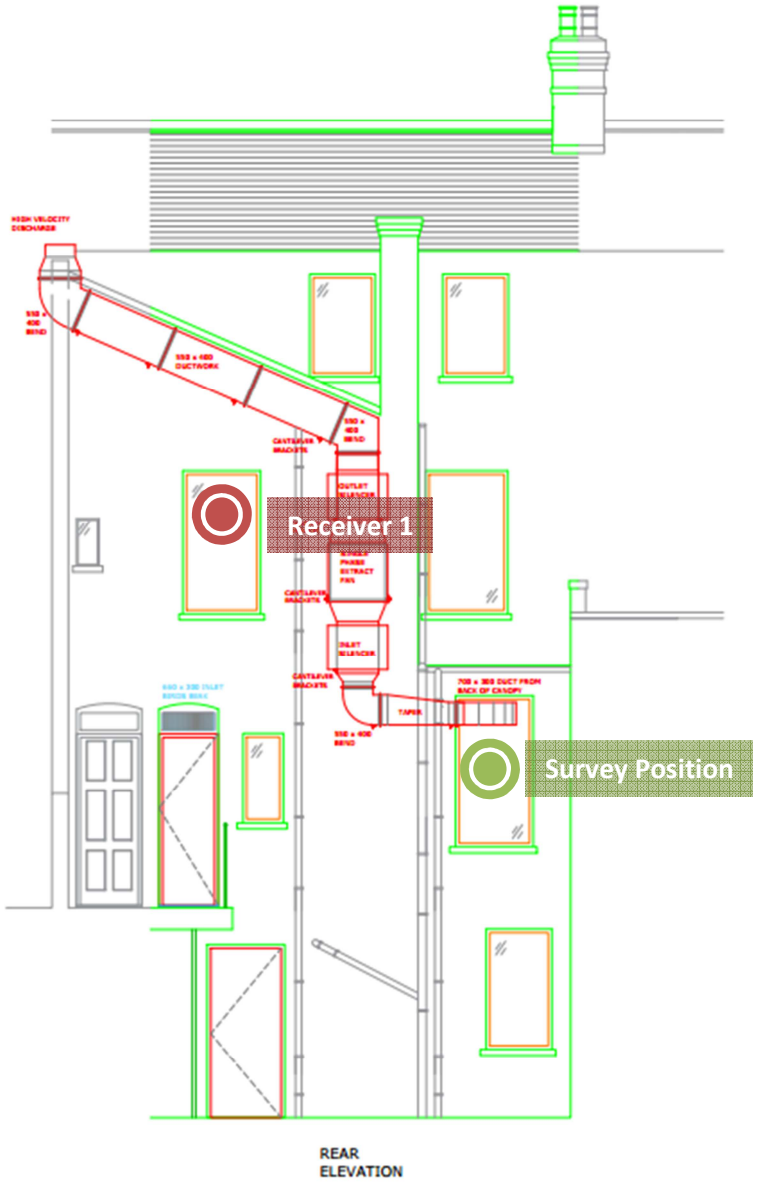
7.0 CONCLUSION

An environmental noise survey has been undertaken at 238 West End Lane, West Hampstead, London. 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 Local Authority.

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

Calculations show that noise emissions from the proposed plant units should meet the requirements of the Local Authority with the recommended mitigation installed as stated herein.

Report by	Checked by
Andrew Thomas AMIOA	**Duncan Martin MIOA**



Noise Survey Position

Noise Sensitive Receiver

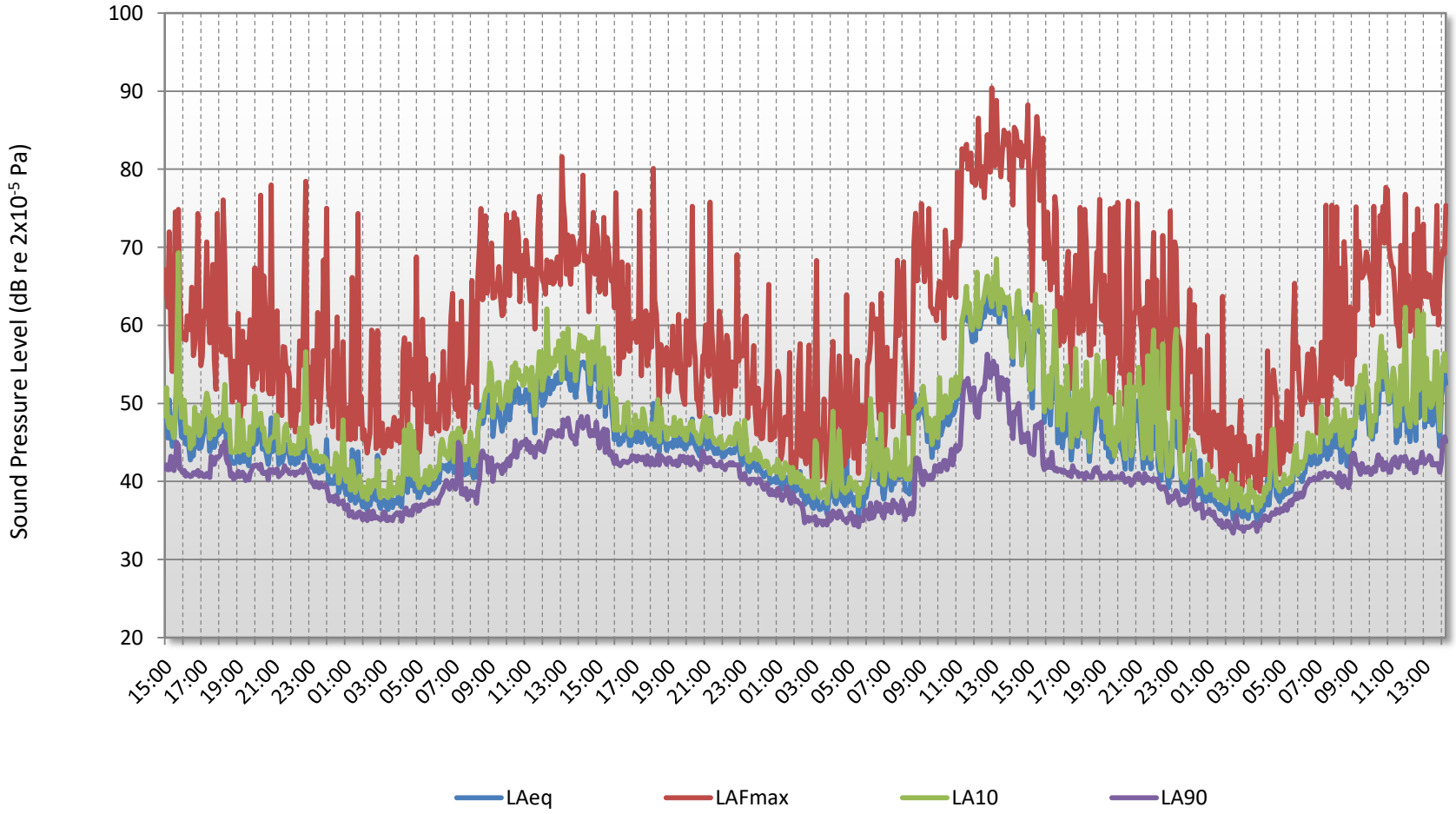
12408-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 16 June 2017

clement acoustics

West End Lane, West Hampstead

Environmental Noise Time History

19 June 2017 to 22 June 2017



12408-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

12408

238 West End Lane, West Hampstead, 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									
Helios GBD 560/4 - Flue	51	71	73	76	77	74	70	61	82
Correction for A-weighting	26	16	9	3	0	-1	1	-1	
Correction for power to pressure inc reflections	-8	-8	-8	-8	-8	-8	-8	-8	
System Losses, dB	-7	-5	-3	-2	-3	-4	-4	-4	
End Reflection, dB	-7	-3	-1	0	0	0	0	0	
Proposed Silencer, dB	-9	-18	-30	-48	-50	-50	-50	-40	
Distance correction to receiver, dB (6m)	-16	-16	-16	-16	-16	-16	-16	-16	
Sound pressure level at receiver	**31**	**37**	**24**	**5**	**0**	**0**	**0**	**0**	**22**
Manufacturer provided sound power									
Helios GBD 560/4 - Casing Breakout	42	62	61	51	50	48	44	37	65
Correction for A-weighting	26	16	9	3	0	-1	1	-1	
Correction for power to pressure inc reflections	-8	-8	-8	-8	-8	-8	-8	-8	
Proposed Cladding, dB	-26	-28	-28	-32	-34	-33	-36	-36	
Distance correction to receiver, dB (2m)	-6	-6	-6	-6	-6	-6	-6	-6	
Sound pressure level at receiver	**28**	**36**	**28**	**8**	**2**	**0**	**0**	**0**	**23**
Combined sound pressure level at receiver	**33**	**40**	**29**	**10**	**4**	**3**	**3**	**3**	**25**

Design Criterion	**25**

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window	31	37	24	5	0	0	0	0	22
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**16**	**22**	**9**	**0**	**0**	**0**	**0**	**0**	**10**

Design Criterion	**30**