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202 WEST END LANE, LONDON

NOISE IMPACT ASSESSMENT

Report **10375-NIA-01**

Prepared on 18 September 2015

Issued For:

Sami Khoueiry

202 West End Lane

London

NW6 1SG

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 Sami Khoueiry, 202 West End Lane, London NW6 to measure existing background noise levels at 202 West End Lane, London NW6. 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 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 reposition an existing restaurant kitchen extract flue from its current location, which terminates at first floor level to place the termination point at roof height.

A top floor flat has been identified as the nearest affected receiver to the flue, and a first floor flat has be identified as the closest receiver to the fan unit. Locations are shown in attached site plan 10375-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 10375-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 21 August 2015 at 14:20 and 23 August 2015 at 07:40.

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

Background noise levels at the monitoring positions consisted of noise from the kitchen extract during the restaurants operating hours (08:00 – 23:00).

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 10375-SP1.

The measured noise levels are shown as a time history in Figure 10375-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)	54 dB(A)	41 dB(A)
Night-time (23:00 - 07:00)	47 dB(A)	33 dB(A)
Restaurant Operating Hours (07:00 – 00:00)	54 dB(A)	44 dB(A)
Hours either side of Restaurant Operating Hours (07:00 & 00:00)	48 dB(A)	40 dB(A)

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

The London Borough of Camden criteria for noise emissions are as follows:

> *"The Council considers that for restaurants involving noisy plant/equipment or other uses, design measures should be taken to ensure that noise levels predicted at a point 1 metre external to sensitive facades are at least 5dB(A) less than the existing background measurement (LA90) when the equipment is in operation. Where it is anticipated that equipment will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses in the noise (bangs, clicks, clatters, thumps), special attention should be given to reducing the noise levels from plant and equipment at any sensitive facade to at least 10dB(A) below the LA90 level."*

It is understood that the existing kitchen extract is to be repositioned. The plant will be operational during the restaurant opening hours and one hour either side. We therefore propose to set the noise criteria at 35 dB(A), the value 5 dB below the minimum measured background noise level during hours either side of the operating hours.

Utilising the background noise during the one hour reference period will also avoid hours that were contaminated by plant noise.

6.0 DISCUSSION

6.1 Proposed Installation

The proposed plant installation comprises the following:

- Helios GBD 560/4/4 – Casing Breakout,
- Helios GBD 560/4/4 - Extract.

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 dB in each Frequency Band								
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**dB(A)**
Helios GBD 560/4/4 *[Casing Breakout]*	52	64	64	48	50	46	43	37	67
Helios GBD 560/4/4 *[extract]*	50	62	74	75	75	74	70	61	81

Table 6.1: Manufacturer Noise Emissions Levels

The proposed plant location is on the first floor roof at the rear of the building where the flue terminates approximately 1m above the top floor, as shown on indicative site plan 10375-SP1.

The closest receiver has been identified as the window on the top floor flat on the eastern facade which is adjacent to the termination point of the flue and is a minimum of 2m from the proposed flue terminus location. The first floor flat on the eastern façade is located closest to the casing breakout of the plant; this flat is approximately 1metre away from the proposed plant.

6.2 Proposed Mitigation Measures

The fan unit would require additional casing or acoustic cladding to the fan itself in order to reduce noise emissions due to the casing breakout levels, as shown in Table 6.2.

	Required Attenuation (dB) in each Frequency Band							
Mitigation Type	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Additional Fan Casing	22	24	22	27	28	25	27	27

Table 6.2: Spectral attenuation required by proposed fan casing

We would also recommend an in-line silencer is installed within the duct run. The attenuation levels in Table 6.3 would sufficiently reduce noise emissions to an acceptable level.

	Insertion Loss (dB) in each Frequency Band							
Mitigation	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
In-line Silencer	8	18	31	49	50	50	38	24

Table 6.3: Spectral attenuation required by proposed inline silencer

With the in-line silencer and additional fan casing installed, noise emissions from the flue terminus and casing breakout caused from the extract fan would bring the overall noise emissions to within the required criterion.

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 6.4. Detailed calculations are shown in Appendix B.

Receiver	Operating Hours Criterion	Noise Level at Receiver (due to proposed plant)
Receiver 1	35 dB(A)	34 dB(A)
Receiver 2		24 dB(A)
Receiver 3		34 dB(A)

Table 6.4: Noise levels and criteria at noise sensitive receivers

As presented in Table 6.4 and Appendix B, the proposed plant installation with acoustic enclosure would be expected to meet the requirements of the proposed criteria.

7.0 CONCLUSION

An environmental noise survey has been undertaken at 202 West End Lane, 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 London Borough of Camden.

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 London Borough of Camden with the recommended mitigation installed as stated herein.

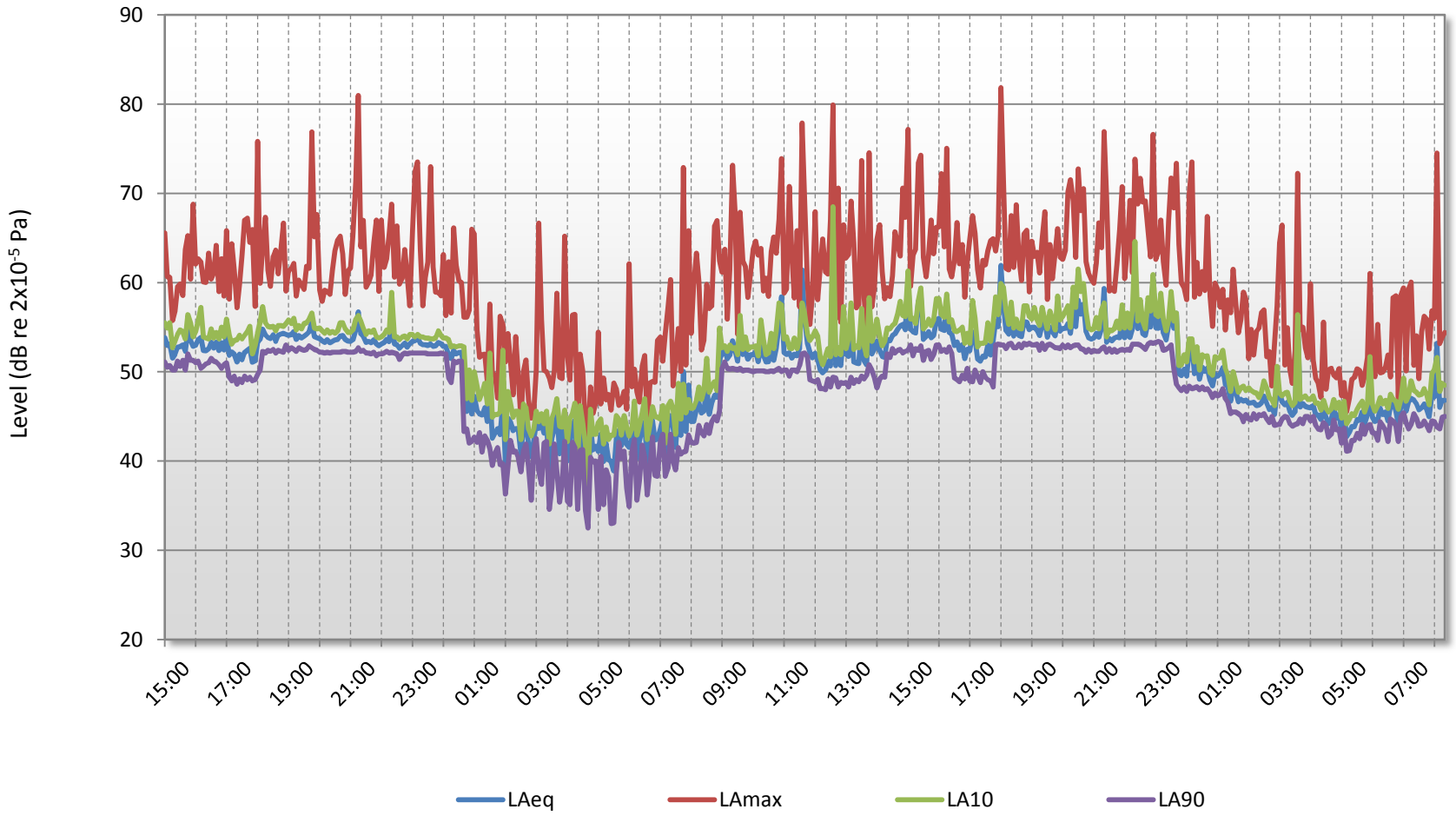
Report by	Checked by
Andrew Thomas	**Duncan Martin MIOA**

10375-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 18 September 2015

202 West End Lane, London

Environmental Noise Time History

21 August 2015 to 23 August 2015



10375-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

10375

202 West End Lane, London

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Receiver 1
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound power level									
Helios GBD 560/4/4 Casing Breakout	52	64	64	48	50	46	43	37	67
Correction to sound pressure level at 1 metre	-11	-11	-11	-11	-11	-11	-11	-11	
Attenuation from additional fan casing, dB	-22	-24	-22	-27	-28	-25	-27	-27	
Sound pressure level at receiver	**19**	**29**	**31**	**10**	**11**	**10**	**5**	**0**	**33**
Manufacturer provided sound power level									
Helios GBD 560/4/4 Extract	50	62	74	75	75	74	70	61	81
Correction to sound pressure level at 1 metre	-8	-8	-8	-8	-8	-8	-8	-8	
Attenuation from proposed silence, dB	-8	-18	-31	-49	-50	-50	-38	-24	
Distance correction to receiver, dB (11m)	-21	-21	-21	-21	-21	-21	-21	-21	
Sound pressure level at receiver	**13**	**15**	**14**	**0**	**0**	**0**	**3**	**8**	**19**
Cumulative sound pressure level at receiver	**20**	**29**	**31**	**10**	**11**	**10**	**7**	**9**	**34**

Design Criterion	**35**

Receiver: Receiver 2
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound power level									
Helios GBD 560/4/4 Casing Breakout	52	64	64	48	50	46	43	37	67
Correction to sound pressure level at 1 metre	-11	-11	-11	-11	-11	-11	-11	-11	
Attenuation from additional fan casing, dB	-22	-24	-22	-27	-28	-25	-27	-27	
Distance correction to receiver, dB (5m)	-14	-14	-14	-14	-14	-14	-14	-14	
Sound pressure level at receiver	**5**	**15**	**17**	**0**	**0**	**0**	**0**	**0**	**20**
Manufacturer provided sound power level									
Helios GBD 560/4/4 Extract	50	62	74	75	75	74	70	61	81
Correction to sound pressure level at 1 metre	-8	-8	-8	-8	-8	-8	-8	-8	
Attenuation from proposed silence, dB	-8	-18	-31	-49	-50	-50	-38	-24	
Distance correction to receiver, dB (8m)	-18	-18	-18	-18	-18	-18	-18	-18	
Sound pressure level at receiver	**16**	**18**	**17**	**0**	**0**	**0**	**6**	**11**	**22**
Cumulative sound pressure level at receiver	**16**	**20**	**20**	**3**	**3**	**3**	**7**	**11**	**24**

Design Criterion	**35**

Receiver: Receiver 3

Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound power level									
Helios GBD 560/4/4 Casing Breakout	52	64	64	48	50	46	43	37	67
Correction to sound pressure level at 1 metre	-11	-11	-11	-11	-11	-11	-11	-11	
Attenuation from additional fan casing, dB	-22	-24	-22	-27	-28	-25	-27	-27	
Distance correction to receiver, dB (11m)	-21	-21	-21	-21	-21	-21	-21	-21	
Sound pressure level at receiver	**0**	**8**	**10**	**0**	**0**	**0**	**0**	**0**	**14**
Manufacturer provided sound power level									
Helios GBD 560/4/4 Extract	50	62	74	75	75	74	70	61	81
Correction to sound pressure level at 1 metre	-8	-8	-8	-8	-8	-8	-8	-8	
Attenuation from proposed silencer, dB	-8	-18	-31	-49	-50	-50	-38	-24	
Distance correction to receiver, dB (2m)	-6	-6	-6	-6	-6	-6	-6	-6	
Sound pressure level at receiver	**28**	**30**	**29**	**12**	**11**	**10**	**18**	**23**	**34**
Cumulative sound pressure level at receiver	**28**	**30**	**29**	**12**	**11**	**10**	**18**	**23**	**34**

Design Criterion	**35**