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51 FAIRFAX ROAD, LONDON

NOISE IMPACT ASSESSMENT

Report **12150-NIA-01 RevE**

Prepared on 23 March 2017

Issued For:

Drawing and Planning

Mercham House

25-27 The Burroughs

Hendon, London

NW4 4AR

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 Drawing and Planning to measure existing background noise levels at 51 Fairfax Road, London. The measured noise levels have been used to determine noise emission criteria for an installed 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

The installed kitchen extract fan is understood to service the ground and basement floor restaurant during the proposed opening hours. The extract terminus is located 1m above roof level and the extract fan itself will be located within the restaurant building envelope.

The closest window to the flue terminus is at 3rd floor level, approximately 3m below the height of the termination point. All locations are shown on proposed elevations and sections in 12150-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 12150-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 16:00 on 27 February and 10:30 on 1 March 2017.

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 traffic noise from surrounding roads and train movements on the line directly above the restaurant, during both daytime and night time hours.

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 12150-SP1.

The measured noise levels are shown as a time history in Figure 12150-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)	63 dB(A)	48 dB(A)
Night-time (23:00 - 07:00)	49 dB(A)	43 dB(A)
Operating Hours (08:00 – 21:00)	64 dB(A)	48 dB(A)

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

Condition 11 of the Decision Notice states the following with regards to plant noise emissions:

> *"Prior to commencement of the development, details shall be submitted to and approved in writing by the Council, of the external noise level emitted from plant/machinery/equipment and mitigation measures as appropriate. The measures shall ensure that the external noise level emitted from plant, machinery/equipment will be lower than the lowest existing background noise level by at least 10dBA, by 15dBA where the source is tonal, as assessed according to BS4142:2014 at the Page 4 of 5 2015/3916/nearest and/or most affected noise sensitive premises, with all machinery operating together at maximum capacity."*

It is understood that the plant unit will be operational between the hours of 08:00 and 21:00.

In order to present as robust an assessment as possible, we therefore propose to set the noise criteria at 33 dB(A), the value 15 dB below the minimum measured background noise level during the day time hours. It should be noted that the proposed plant installation is not considered tonal.

6.0 DISCUSSION

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 1 No. Helios Gigabox 500/4 Casing breakout and 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. As the fan is located internally, only ducted outlet noise emissions need to be considered.

	A-weighted Sound Power Level (dB) in each Frequency Band							
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Helios Gigabox 500/4 Extract	54	61	73	74	74	73	69	60

Table 6.1: Manufacturer Noise Emissions Levels

The flue terminus is 1m above the roof level of the building.

The closest noise sensitive receiver has been identified as follows:

- Receiver 1 – Third floor flat window approximately 3m away from the flue extract.

6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0, it is understood that the fan provider have stated that the silencer they proposed will attenuate between 15-18dB and is approximately 1800mm long.

It is therefore assumed that the silencer has the spectral attenuation stated in Table 6.2. This is based on an 1800mm length silencer with 50% free area.

	Required Attenuation (dB) in each Frequency Band							
Mitigation	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
In-line Silencer	4	9	16	29	34	28	18	11

Table 6.2: Required Attenuation from Mitigation

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	Day Time Hours Criterion	Noise Level at Receiver (due to proposed plant)
Receiver 1	33 dB(A)	28 dB(A)

Table 6.3: Noise levels and criteria at noise sensitive receiver

As presented in Table 6.3 and Appendix B, the proposed plant installation would be expected to meet the strictest requirements of the criteria, with the proposed 1.8m silencer.

It should be noted that this is assessed to the criterion for tonal noise emissions, although the noise source is not considered tonal.

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 '*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, BS8233:2014 recommends 30dB(A) as being acceptable internal resting/sleeping conditions during night-time.

According to BS8233:2014, 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	'Good' Conditions 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)	14 dB(A)

Table 6.4: Noise levels and criteria inside nearest residential space

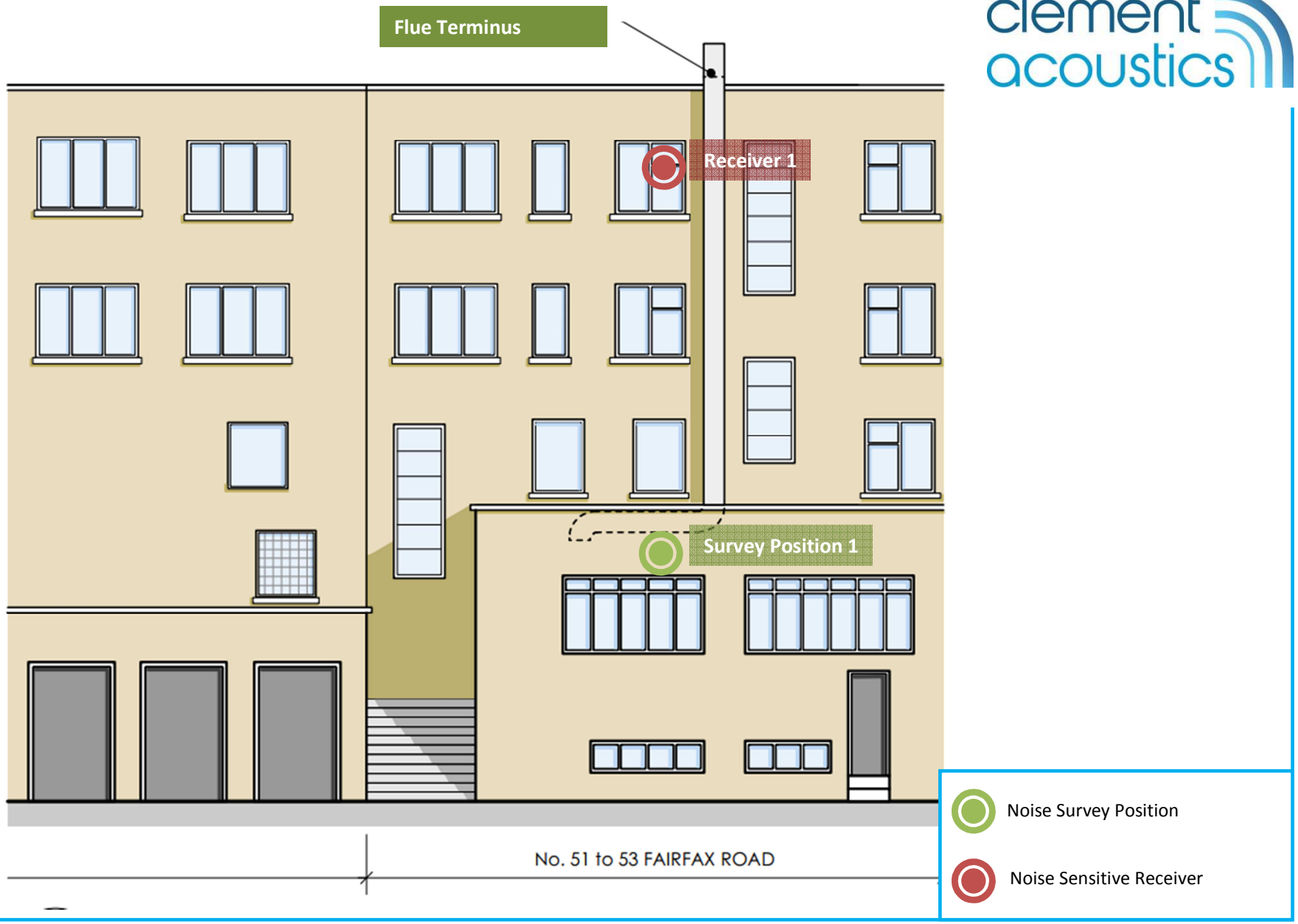
7.0 CONCLUSION

An environmental noise survey has been undertaken at 51 Fairfax Road, 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.

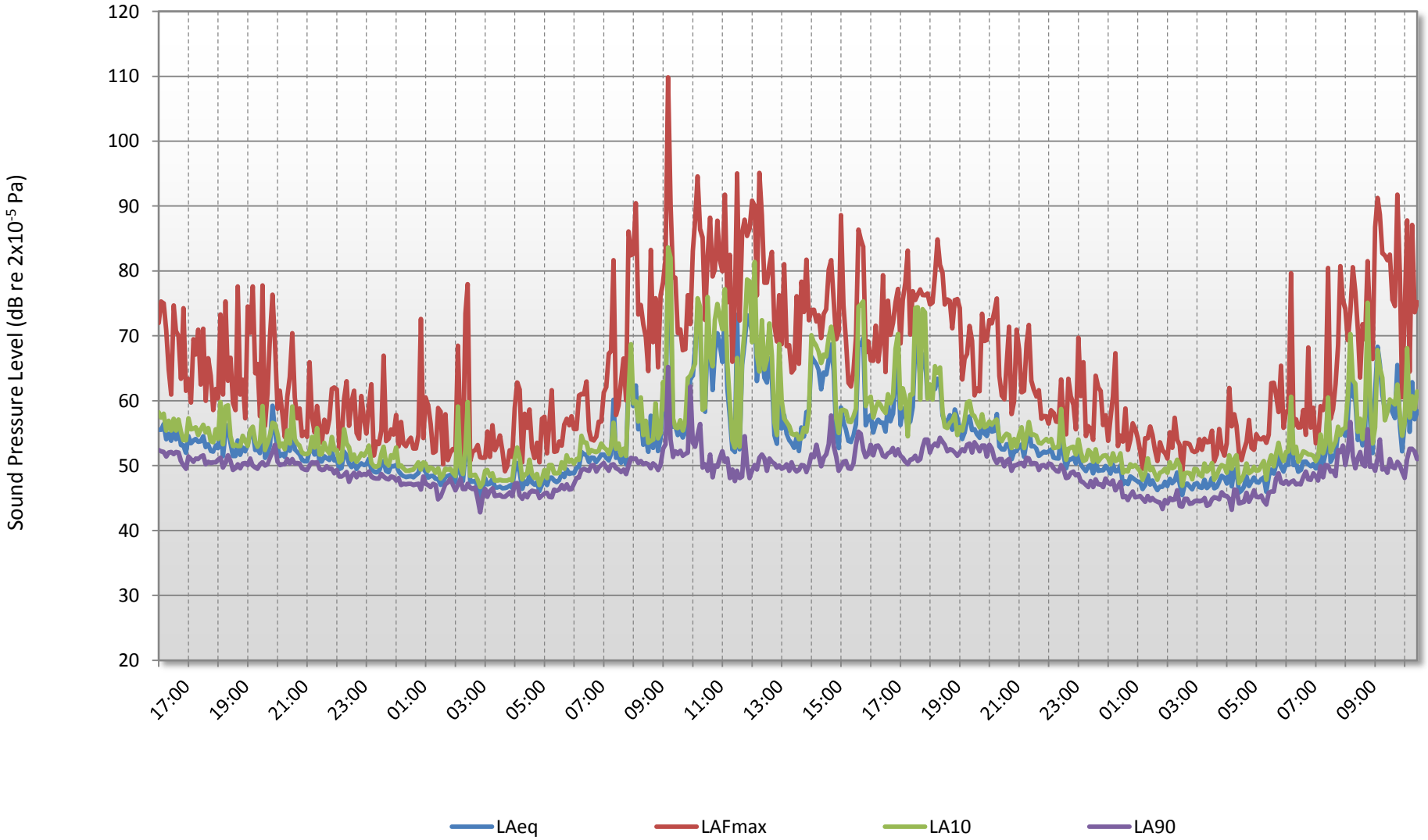
Report by	Checked by
Andrew Thomas AMIOA	**Duncan Martin MIOA**



12150-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 23 March 2017

51 Fairfax Road, London

Environmental Noise Time History
27 February to 1 March 2017



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

12150

51 Fairfax 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 A-weighted sound power - Extract									
Gigabox 500/4 - Flue Extract	51	61	73	74	74	73	69	60	80
Proposed Attenuator Performance	-4	-9	-16	-29	-34	-28	-18	-11	
Bend Correction	0	0	0	-1	-2	-3	-3	-3	
Duct Loss	-11	-9	-5	-2	-2	-2	-2	-2	
Grille End Reflections	-9	-5	-2	0	0	0	0	0	
Correction for Sound Power to Pressure	-11	-11	-11	-11	-11	-11	-11	-11	
Directionality Correction	-1	-2	-3	-7	-9	-8	-8	-8	
Distance correction to receiver, dB (3m)	-10	-10	-10	-10	-10	-10	-10	-10	
Sound pressure level at receiver	**5**	**16**	**27**	**14**	**7**	**11**	**17**	**15**	**28**

Design Criterion	**33**

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	5	16	27	14	7	11	17	15	28
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**-10**	**1**	**12**	**0**	**0**	**0**	**2**	**0**	**14**

Design Criterion	**30**