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31 July 2024

19368-NIA-01

Noise Impact Assessment

Project Number
19368

Issued For
Enzo Mirto

EXECUTIVE SUMMARY

This noise impact assessment has been undertaken in order to assess a proposed plant installation for commercial use at 67 Whitfield Street, Fitzrovia.

The proposed plant installation comprises 1 No. Daikin RZA-D SkyAir Condenser Unit along with a ventilation system that includes 1 No. Helios GBW 560/4 AX box fan and 1 No. FlaktWoods ePowerBox 67-500-3-4 fan.

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with the requirements of the London Borough of Camden.

Calculations were undertaken for the nearest receiver, identified as a residential window located above the restaurant. It should be noted that if there are closer receivers that Clement Acoustics is not aware of, a reassessment will be necessary, and this should therefore be confirmed by the Client.

It has been demonstrated that compliance with the established criterion is feasible, dependent on the following material considerations:

- The plant could be in use between 09:00 and 23:00 only
- The noise emissions data for the proposed units, as obtained from available manufacturer information
- Plant and receiver locations are as established in this report and marked on the attached site plan
- Mitigation is applied as recommended in this report, in the form of duct attenuators and a louvered enclosure

If there is any deviation from the above, Clement Acoustics must be informed, in order to establish whether a reassessment is necessary.

Clement Acoustics has used all reasonable skill and professional judgement when preparing this report. The report relies on the information as provided to us at the time of writing and the assumptions as made in our assessment.

This report is designed to be suitable to discharge typical plant noise planning conditions, as per our original scope of work. The report should not be relied upon for further reasons, such as the detailed design of mitigation measures.

CONTENTS

LIST OF ATTACHMENTS

Issue	Date of Issue	Author	Reviewed	Authorised
0	31/07/24			
		MD Atif Uddin Assistant Consultant BSc (Hons)	**Duncan Martin** Director BSc (Hons) MIOA	**Duncan Martin** Director BSc (Hons) MIOA

Issue	Comment
0	First Issue

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Enzo Mirto to measure existing background noise levels at 67 Whitfield Street, Fitzrovia. Measured noise levels have been used to determine noise emissions 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.

An acoustic terminology glossary is provided in Appendix A.

2.0 SITE DESCRIPTION

The site is bound by Whitfield Street to the northeast, Chitty Street to the southeast and commercial units to the northwest. The surrounding area is predominantly commercial in nature.

Current proposals are to install 1 No. Daikin RZA-D SkyAir Condenser Unit along with a ventilation system that includes 1 No. Helios GBW 560/4 AX box fan and 1 No. FlaktWoods ePowerBox 67-500-3-4 fan. It is understood that the plant will be used for commercial purposes by a restaurant and will be operational between 09:00 and 23:00

A window located within the same building above the premises have been identified as the nearest affected receiver. This nearest noise sensitive receiver was identified through observations on-site. If there are any receivers closer than that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receiver should be confirmed by the client before the plant is installed or any noise mitigation measures are implemented.

Locations are shown in attached site plan 19368-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 19368-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest affected receiver.

The microphone was mounted on a pole attached to a fence, 2 m from the ground.

The position was considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore not been applied.

Continuous automated monitoring was undertaken for the duration of the survey between 10:53 on 18 July 2024 and 10:18 on 19 July 2024.

The measurement procedure generally complied with ISO 1996-2: 2017: '*Description, measurement and assessment of environmental noise'*.

3.2 Weather Conditions

At the time of set-up and collection of the monitoring equipment, the weather conditions were cloudy and dry with light winds. It is understood that the weather conditions during the unattended survey were generally dry with light to medium winds.

It is considered that the weather conditions did not significantly adversely affect the measurements and are therefore considered suitable for the measurement of environmental noise.

3.3 Equipment

The equipment calibration was verified, by means of a field verification check, before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 977 Class 1 Sound Level Meter
- Rion Type NC-74 Class 1 Calibrator

4.0 RESULTS

4.1 Unattended Noise Survey 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 19368-SP1.

Measured noise levels are shown as a time history in Attachment 19368-TH1, with average ambient and minimum background noise levels summarised in Table 4.1.

Time Period	Average ambient noise level $L_{Aeq:\ T}$, dB	Minimum background noise level $L_{A90:\ 5min}$, dB
Daytime (07:00 - 23:00)	58.5	54.1
Night-time (23:00 - 07:00)	53.8	46.0
Operation Times (09:00 - 23:00)	58.6	54.1

Table 4.1 Average ambient and minimum background noise levels

5.0 NOISE CRITERIA

5.1 Relevant Local Policy

The assessment and recommendations in this report have been undertaken in accordance with Policy D14 of the London Plan 2021, which contains the following relevant sections:

"D14. In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:

5) mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses".

5.2 Local Authority Criteria

The London Borough of Camden's Local Plan (2017) states noise emissions criteria. The most relevant noise emissions criteria stated in the document is for Industrial and Commercial noise, which covers sources such as extract fans, air conditioning units and condensers. These types of sources are comparable to the proposed condensers at the property and therefore these requirements will be used.

The Local Plan states the following:

> *"The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance:*
>
> - *NOEL – No Observed Effect Level*
> - *LOAEL – Lowest Observed Adverse Effect Level*
> - *SOAEL – Significant Observed Adverse Effect Level*
>
> *Three basic design criteria have been set for proposed developments, these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The design criteria outlined below are defined in the corresponding noise tables. The values will vary depending on the context, type of noise and sensitivity of the receptor:*
>
> - *Green – where noise is considered to be at an acceptable level.*
> - *Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.*
> - *Red – where noise is observed to have a significant adverse effect."*

The document states that plant noise emissions should be rated against the background level outside the NSR bedroom window in accordance with British Stand 4142:2014 'Methods for rating assessing industrial and commercial sound' (BS 4142).

Camden state that the following noise rating correspond to the stated NOEL, LOAEL and SOAEL:

- *LOAEL (Green) – 'Rating Level' 10 dB below background, and no events exceeding 57 dB L_{Amax}*
- *LOAEL to SOAEL (Amber) – 'Rating Level' between 9 dB below and 5 dB above background or noise events between 57 dB and 88 dB L_{Amax}*
- *SOAL (Red) – 'Rating level' greater than 5 dB above background and/or events exceeding 88 dB L_{Amax}*

Based on the results of the environmental noise survey and guidance provided by the London Borough of Camden, Table 5.1 presents the proposed plant noise emission criteria to be achieved at 1 m from the nearest noise sensitive receiver that would constitute a LOAEL.

Period	Plant Noise Emission Limit $L_{Aeq:T}$, dB	Effect Level
Operation Times (9:00 - 23:00)	44	LOAEL

Table 5.1 Plant noise emission limits

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 1 No. Daikin RZA-D SkyAir Condenser Unit
- 1 No. Helios GBW 560/4 AX box fan
- 1 No. FlaktWoods ePowerBox 67-500-3-4 fan

It should be noted that the Daikin RZA-D SkyAir range includes multiple units. The worst case stated sound pressure level for units in the range, for a Daikin RZA250D7Y1B unit, is 63 dB(A) at 1 m. It should be confirmed that the selected unit does not have a louder noise emission level than this.

As only provided an overall broadband sound pressure level is provided, spectral noise emissions for this proposed plant unit have been derived from those of a similar unit (Daikin RZASG140MV1) by shifting the noise emission curve to match the overall level.

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

Unit	Noise Emissions (dB) in each Frequency Band, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Daikin RZA-D SkyAir[1]	74	82	77	74	70	66	62	55	76
Helios GBW 560/4 AX[2]	71	71	73	76	77	74	70	61	81
FlaktWoods ePowerBox 67-500-3-4[2]	66	63	62	63	57	53	48	42	63

Table 6.1 Manufacturer provided noise emissions levels

[1] Sound pressure level at 1 m

[2] Induct sound power level

The proposed plant location is in the southeastern façade of the restaurant which is shown on indicative site plan 19368-SP1.

6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0, it is recommended that silencers are fitted within the ducts and that an enclosure is installed around the Daikin unit. The enclosure should provide sufficient attenuation to achieve a maximum sound pressure level of 53 dB(A) when measured at 1 m in all directions.

Based on the information provided, mitigation meeting the sound reduction indices as stated in Table 6.2 should be suitable to achieve this.

Mitigation	Required Attenuation (dB) in each Frequency Band, Hz							
	63	125	250	500	1k	2k	4k	8k
Duct Attenuator (Helios duct)	5	11	21	33	37	36	27	18
Duct Attenuator (FlaktsWoods duct)	5	11	19	29	36	37	29	18
Louvred Enclosure (Daikin Unit)	4	5	8	17	24	28	25	20

Table 6.2 Required attenuation from mitigation

N.B. All mechanical plant and associated pipe and ductwork should be suitably isolated from the building structure. Therefore, appropriate specifications for anti-vibration mounts should be sought from the manufacturer/supplier.

6.3 Noise Impact Assessment

The closest receiver has been identified as a first floor window on the southeastern façade of the same building which is a minimum of 3 m from the existing weather louvre of the al Fresco area.

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	Design Criterion	Noise Level at Receiver (due to proposed plant)	Assessment Findings
Nearest Residential Property	44 dB(A)	44 dB(A)	LOAEL Rating

Table 6.3 Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.3 and Appendix B, the proposed plant installation with the mitigation described herein 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 35dB(A) as being acceptable internal resting conditions during daytime.

With loudest external levels of 44 dB(A), acceptable internal conditions would be met by taking the attenuation of the window itself into consideration. According to BS 8233: 2014, a typical building facade with a partially open window offers 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 6.4.

Receiver	Recommended Target – For resting conditions in a bedroom, in BS 8233: 2014	Noise Level at Receiver (due to plant installation)
Inside Residential Window	35 dB(A)	29 dB(A)

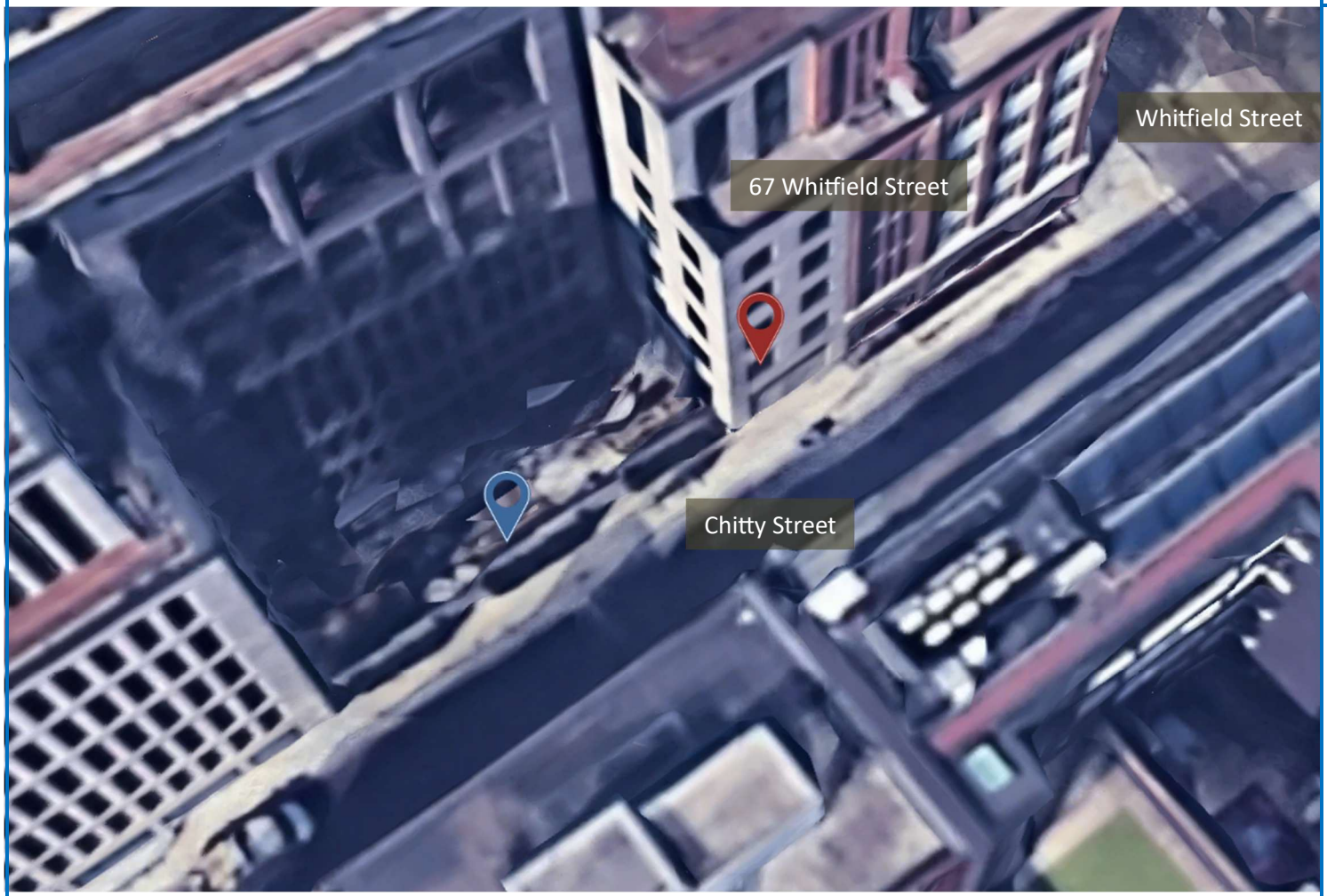
Table 6.4 Noise levels and BS 8233: 2014 criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 67 Whitfield Street, Fitzrovia. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant 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 units should meet the requirements of the London Borough of Camden with the recommended mitigation installed as stated herein.



N

Not to scale

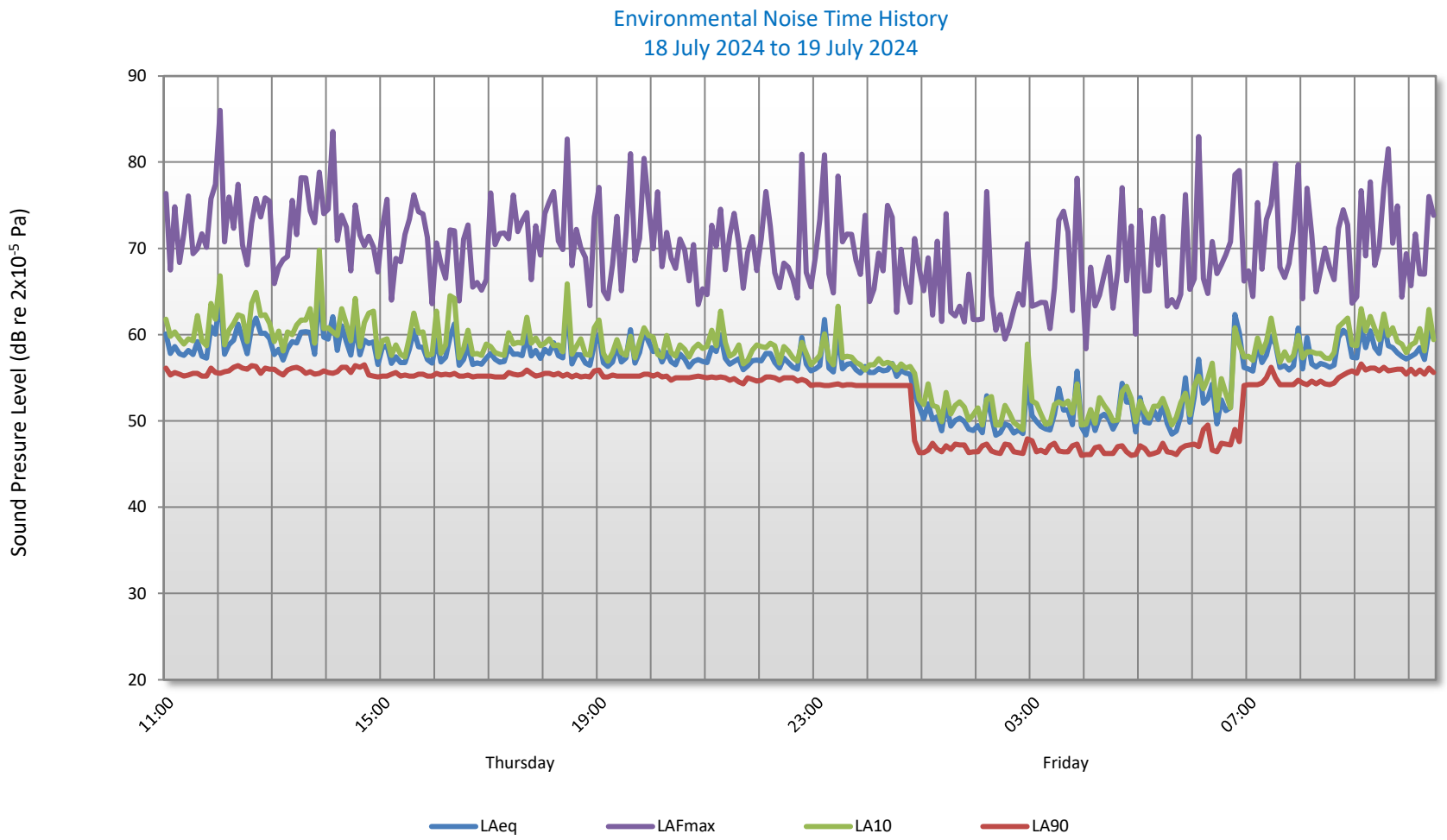
Description:
Indicative site plan showing noise monitoring position and nearest sensitive receiver

Date	31 July 2024
Reference	19368-SP1
Project Name	67 Whitfield Street, Fitzrovia
Image ©	Google Earth

Key:	
	Unattended Noise Survey Position
	Noise Sensitive Receiver


THE
POETS'
PARK
Approximate Location of unit and vents

67 Whitfield Street, Fitzrovia



19368-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 10 dB 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 3 dB for each doubling of distance.

APPENDIX A

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

Acoustic Calculations

19368

67 Whitfield Street, Fitzrovia

Receiver: Residential Window Above Restaurant

External Plant Noise Emissions Calculation

Description	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Manufacturer provided sound power level									
Helios GBW 560/4 AX, dB	71	71	73	76	77	74	70	61	81
Installation Effects, dB (Axial)	3	6	7	8	8	6	5	3	
System Losses in duct, dB	-7	-8	-9	-8	-7	-7	-7	-7	
Attenuator Losses, dB (35%, 1500 mm)	-5	-11	-21	-33	-37	-36	-27	-18	
End Reflection, dB	-7	-3	-1	0	0	0	0	0	
Sound Power at Exhaust Grille, dB	**54**	**53**	**47**	**39**	**35**	**29**	**33**	**37**	**44**
Calculated sound pressure level 1 m from grille, quarter spherical radiation	50	50	45	38	35	30	34	38	
Calculated Reverberant SLP in undercover area, dB	59	59	54	47	44	39	43	47	
Sound Power at Louvred Façade (façade area 7.7 m^2), dB	**68**	**68**	**63**	**56**	**53**	**48**	**52**	**56**	**62**
Inside to outside correction, dB	-6	-6	-6	-6	-6	-6	-6	-6	
Directivity Correction, dB	-1	-5	-8	-7	-7	-7	-7	-7	
Sound Power to Pressure correction assuming Quarter Spherical radiation, dB	-5	-5	-5	-5	-5	-5	-5	-5	
Distance Correction, dB (3 m)*	-9	-9	-9	-9	-9	-9	-9	-9	
Sound Pressure Level from Helios fan at receiver	48	43	36	29	26	21	25	29	35
FlaktWoods ePowerBox 67-500-3-4, dB	45	71	73	71	71	65	61	56	74
Installation Effects, dB (Axial)	3	6	7	8	8	6	5	3	
System Losses, dB	-1	-1	-1	-1	-2	-3	-3	-3	
Attenuator Losses, dB (30%, 1200 mm)	-5	-11	-19	-29	-36	-37	-29	-18	
End Reflection, dB	-12	-7	-3	-1	0	0	0	0	
Sound Power at Intake Grille, dB	**54**	**57**	**56**	**44**	**38**	**28**	**28**	**28**	**50**
Calculated sound pressure level 1 m from grille, quarter spherical radiation	50	54	54	43	38	29	29	29	
Calculated Reverberant SLP in undercover area, dB	59	63	63	52	47	38	38	38	
Sound Power at Louvred Façade (façade area 7.7 m^2), dB	**68**	**72**	**72**	**61**	**56**	**47**	**47**	**47**	**66**
Inside to outside correction, dB	-6	-6	-6	-6	-6	-6	-6	-6	
Directivity Correction, dB	-1	-5	-8	-7	-7	-7	-7	-7	
Sound Power to Pressure correction assuming Quarter Spherical radiation, dB	-5	-5	-5	-5	-5	-5	-5	-5	
Distance Correction, dB (3 m)*	-9	-9	-9	-9	-9	-9	-9	-9	
Sound Pressure Level from FlaktWoods fan at receiver	48	48	45	34	29	20	20	20	39
Daikin RZA-D SkyAir, dB	66	63	62	63	57	53	48	42	63
Required attenuation, dB	-4	-5	-8	-17	-24	-28	-25	-20	
Resulting sound pressure level at 1 m	**62**	**58**	**54**	**46**	**33**	**25**	**23**	**22**	**49**
Calculated Reverberant SLP in undercover area, dB	71	67	63	55	42	34	32	31	
Sound Power at Louvred Façade (façade area 7.7 m^2), dB	**80**	**76**	**72**	**64**	**51**	**43**	**41**	**40**	**67**
Inside to outside correction, dB	-6	-6	-6	-6	-6	-6	-6	-6	
Directivity Correction, dB	-1	-5	-8	-7	-7	-7	-7	-7	
Sound Power to Pressure correction assuming Quarter Spherical radiation, dB	-5	-5	-5	-5	-5	-5	-5	-5	
Distance Correction, dB (3 m)*	-9	-9	-9	-9	-9	-9	-9	-9	
Sound Pressure Level from Daikin unit at receiver	60	52	45	37	24	16	14	13	41
Total Sound pressure level at receiver	**60**	**53**	**48**	**39**	**31**	**24**	**26**	**29**	**44**

***Distance loss calculated assuming Plane Source attenuation (source dimensions: length = 3.5 m, height = 2.2 m)**

Design Criterion	44

Appendix B

BS 8233 Assessment Calculation

Description	Frequency, Hz								dB(A)
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	
Sound pressure level outside window	60	53	48	39	31	24	26	29	44
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**45**	**38**	**33**	**24**	**16**	**9**	**11**	**14**	**29**

Design Criterion	**30**