KP Acoustics Ltd.
info@kpacoustics.com
1 Galena Road, W6 0LT London, UK
+44 (0) 208 222 8778
www.kpacoustics.com

16 Gresham Gardens
London

Planning Compliance Report
Report 27346.PCR.01

Hodgkinson Design
29 Alexander Street
W2 5NU
London

<table>
<tr><th colspan="4">Report 27346.PCR.01
Revision History</th></tr>
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Written by:	Checked by:	Approved by:
Conor FitzGerald Graduate Acoustic Consultant	**Oliver Packman MIOA** Senior Acoustic Consultant	**Daniel Stuart MIOA** Senior Acoustic Consultant

Disclaimer

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Contents

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Hodgkinson Design, 29 Alexander Street, London, W2 5NU to undertake a noise impact assessment of a proposed plant unit installation serving the building at 16 Gresham Gardens, NW11 8PB, London.

A 24 hour environmental noise survey has been undertaken on site and the background noise levels measured will be used to determine daytime and night-time noise emission criteria for an air conditioning unit in agreement with the planning requirements of Barnet Council.

This report presents the overall methodology and results from the environmental survey, followed by calculations to demonstrate the feasibility of the plant unit installation to satisfy the emissions criterion at the closest noise-sensitive receiver. Mitigation measures will be outlined as appropriate.

2.0 SITE SURVEYS

2.1 Site Description

As shown in Figure 2.1, the site is bounded by residential properties to the north, residential gardens to the west, residential properties to the south, and Gresham gardens road to the east.

Figure 2.1 Site Location Plan (Image Source: Google Maps)

Initial inspection of the site revealed that the background noise profile at the monitoring location was typical of an urban cityscape environment, with the dominant source being road traffic noise from the road.

2.2 Environmental Noise Survey Procedure

Continuous automated monitoring was undertaken for the duration of the noise survey between 10:00 on 16/10/2023 and 10:00 on 17/10/2023.

The environmental noise measurement position, proposed plant installation locations, and the closest noise sensitive receiver relative to the plant installations are described within Table 2.1 and shown within Figure 2.2.

Icon	Descriptor	Location Description
1	Noise Measurement Position 1	The microphone was installed on a window on the 1st floor of the south east façade, as shown in Figure 2.2. The microphone was located within 1.5 metres of the nearest surface and therefore includes local reflections.
	Nearest noise sensitive receptor	Ground Floor window. Residential house to the south.
	Proposed plant installation location	Proposed plant installations are outlined in Section 5.1.

Table 2.1 Measurement positions and descriptions

Figure 2.1 Site measurement positions (Image Source: Google Maps)

The choice of the position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver and the proposed plant installation.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-

2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.2.

<table>
<tr><th colspan="2">Measurement instrumentation</th><th>Serial no.</th><th>Date</th><th>Cert no.</th></tr>
<tr><td rowspan="4">Noise Kit 38</td><td>NTI Audio XL2 Class 1 Sound Level Meter</td><td>A2A-23182-E1</td><td rowspan="3">12/09/2023</td><td rowspan="3">UK-23-104</td></tr>
<tr><td>Free-field microphone NTI Acoustics MC230A</td><td>A25833</td></tr>
<tr><td>Preamp NTI Acoustics MA220</td><td>13818</td></tr>
<tr><td>NTI Audio External Weatherproof Shroud</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="2">Larson Davis CAL200 Class 1 Calibrator</td><td>17148</td><td>21/03/2023</td><td>UCRT23/1363</td></tr>
</table>

Table 2.2 Measurement instrumentation

3.0 RESULTS

The $L_{Aeq: 5min}$, $L_{Amax: 5min}$, $L_{A10: 5min}$ and $L_{A90: 5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 27346.TH1.

Representative background noise levels are shown in Table 3.1 for daytime and night-time.

It should be noted that the representative background noise level has been derived from the most commonly occurring $L_{A90,5\ min}$ levels measured during the environmental noise survey undertaken on site, as shown in 27346.Daytime L90.TH1 and 27346.Night-time L90.TH1 attached.

Time Period	Representative background noise level L_{A90} dB(A)
Daytime (07:00-23:00)	37
Night-time (23:00-07:00)	34

Table 3.1 Representative background noise levels

Please note that measurement taken at the Noise Measurement Position was located at a distance less than 1.5 metres from the nearest reflective surface and therefore a 3dB correction has been applied to the results in Table 3.1 to obtain a free-field measurement as per ISO1996 Part 2.

4.0 NOISE ASSESSMENT GUIDANCE

4.1 Local Authority Guidance

The guidance provided by The London Borough of Barnet for noise emissions of new plant in this instance is as follows:

"The level of noise emitted from the proposed plant hereby approved shall be at least 5dB(A) below the background level, as measured from any point 1 metre outside the window of any room of a neighbouring residential property. If the noise emitted has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or distinct impulse (bangs, clicks, clatters, thumps), then it shall be at least 10dB(A) below the background level, as measured from any point 1 metre outside the window of any room of a neighbouring residential property."

4.2 Noise Emissions Criterion

The proposed plant unit could be used at any time of the day or night. To comply with Barnet Council's guidance, the criterion would be as shown in Table 4.1.

Time Period	Maximum Plant Noise Emissions Criterion at Nearest Residential Receiver
Night-time (23:00 to 07:00)	29dB(A)

Table 4.1 Noise emissions criterion based on local authority guidance

5.0 NOISE IMPACT ASSESSMENT

5.1 Proposed Plant Installations

It is understood that the proposed plant installation is comprised of the following units:

- 1 No. Daikin 3MXM-N Air Conditioning Unit

The proposed installation location for the Air conditioner will be at the south west façade of the property, in the access path to the garden, as shown in Figure 2.2 above.

The noise emission levels as provided by the manufacturer for the unit are shown in Table 5.1.

Unit	Descriptor	Octave Frequency Band (Hz)								Overall (dBA)
		63	125	250	500	1k	2k	4k	8k	
Daikin 3MXM-N (Cooling)	SPL@1m (dB)	51	51	49	47	43	37	31	24	48

Unit	Descriptor	Octave Frequency Band (Hz)								Overall (dBA)
		63	125	250	500	1k	2k	4k	8k	
Daikin 3MXM-N (Heating)	SPL@1m (dB)	51	52	50	47	43	37	31	26	49

Table 5.1 Plant Units Noise Emission Levels as provided by the manufacturer

The closest noise sensitive receiver to the proposed installation location has been identified as being a residential window at the top floor of 18 Gresham Gardens, located approximately 5 metres from the proposed plant installation location, as shown in Figure 2.2.

5.2 Calculations

Taking all acoustic corrections into consideration, the noise level contribution expected at the closest residential window from the air conditioning unit would be as shown in Table 5.2. Detailed calculations are shown in Appendix B.

Receiver	Criterion	Noise Level at 1m From the Closest Noise Sensitive Window
North west facade. Top floor window. Residential house to the south west.	29dB(A)	29dB(A)

Table 5.2 Predicted noise level and criterion at nearest noise sensitive location

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive windows due to the effects of the air conditioning unit installation satisfies the emissions criterion of the Barnet Council, providing that the mitigation measures outlined in Section 6 are implemented.

6.0 NOISE CONTROL MEASURES

In order to achieve the specific sound level and subsequent rating level shown in the assessment above, the following noise control strategy should be adopted.

6.1 Condenser Units

In order to control the noise emissions from the 1no. Daikin 3MXM-N unit installed, we would recommend that a plant acoustic enclosure is installed which should provide the minimum insertion loss levels shown in Table 6.1.

Unit	Insertion Loss Levels (dB) in each Octave Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Louvres of acoustic enclosure	4	5	8	10	13	16	12	10

Table 6.1 Insertion loss figures to be provided by acoustic enclosure

6.2 Suitable Suppliers

We would recommend the following suppliers of the aforementioned enclosure:

- Environmental Equipment Corporation
- IAC
- Noico Ltd
- Waterloo Acoustics
- Allaway Acoustics
- Wakefield Acoustics
- Environ

6.3 Anti-Vibration Mounting Strategy

In the case of all plant units, appropriate anti-vibration mounts should be installed in order to ensure that vibrations do not give rise to structure-borne noise. Appendix C outlines detailed advice in order to ensure that the system installer selects the appropriate anti-vibration mount for the installation.

It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail.

7.0 CONCLUSION

An environmental noise survey has been undertaken at 16 Gresham Gardens, London, NW11 8PB, by KP Acoustics Ltd between 10:00 on 16/10/2023 and 10:00 on 17/10/2023. The results of the survey have enabled criteria to be set for noise emissions.

Using manufacturer noise data, noise levels are predicted at the nearby noise sensitive receivers for compliance with current requirements.

Calculations show that noise emissions from the Air Conditioning unit installation would meet the requirements of Barnet Council, providing that the mitigation measures outlined in Section 6 are implemented. The proposed plant installation would result in a low adverse impact on the closest residential receiver, in accordance with BS4142:2014.

Further calculations have been undertaken with regards to the relevant British Standard and it has been ensured that the amenity of nearby residential receivers will be protected.

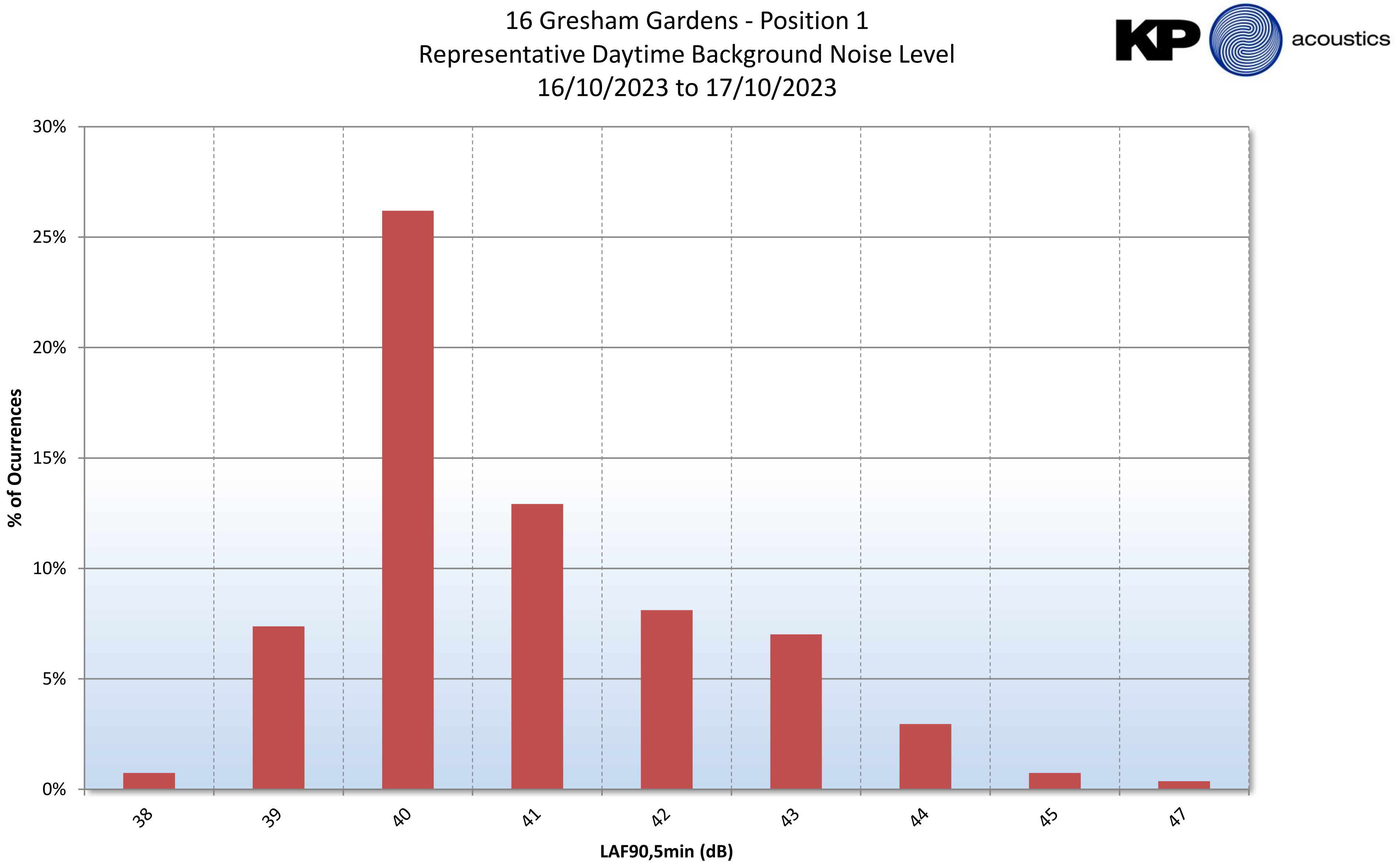

Figure 27346.Daytime L90.TH1

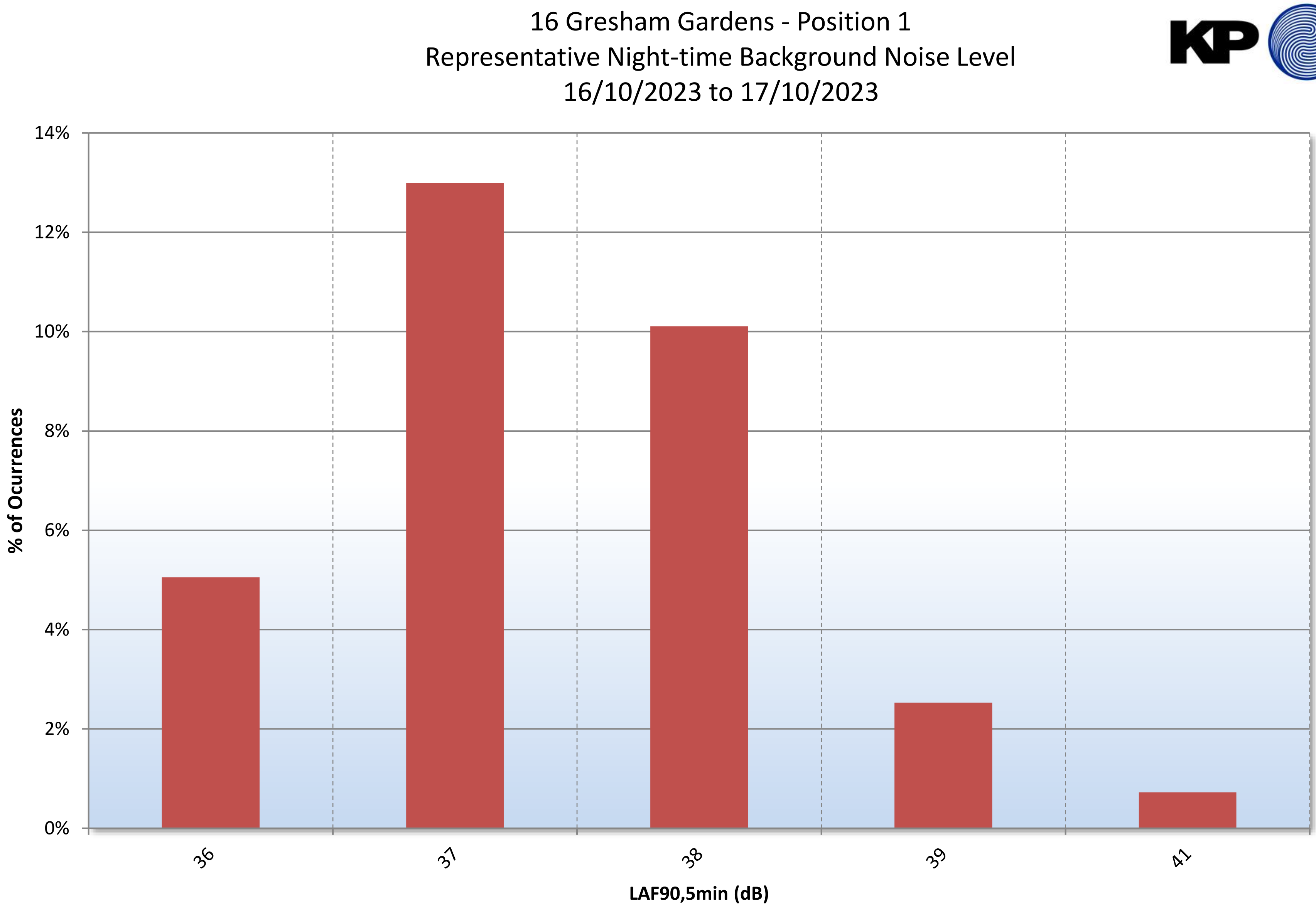

Figure 27346.Night-time L90.TH1

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where 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 no 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 no 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 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

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 a single source and 4 sources produce a 6dB 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

Hearing perception is 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 guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B

16 Gresham Gardens, London

PLANT NOISE EMISSIONS CALCULATIONS

Source: Daikin 3MXM-N Air Conditioning Unit Receiver: top floor window north facade 18 Gresham Gardens	*Frequency, Hz* *63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Daikin 3MXM-N (Sound Pressure Level @1m, Heating)	51	52	50	47	43	37	31	26	49
Correction due to surface reflections (3), dB	9	9	9	9	9	9	9	9	
Minimum attenuation provided by distance (5m), dB	-14	-14	-14	-14	-14	-14	-14	-14	
Minimum attenuation provided by barrier dB	-5	-5	-5	-5	-4	-4	-3	-1	
Minimum attenuation required by enclosure dB	-4	-5	-8	-10	-13	-16	-12	-10	
Resultant Noise level at receptor dB	37	37	32	27	21	12	11	10	29
Total Rating Noise Level of all Plant Unit Installations at Receiver	**37**	**37**	**32**	**27**	**21**	**12**	**11**	**10**	**29**
						Design Criterion			**29**

APPENDIX C

ANTI-VIBRATION MOUNTING SPECIFICATION REFERENCE DOCUMENT

1.0 General

1.1 All mountings shall provide the static deflection, under the equipment weight, shown in the schedules. Mounting selection should allow for any eccentric load distribution or torque reaction, so that the design deflection is achieved on all mountings under the equipment, under operating conditions.

1.2 It is the supplier's responsibility to ensure that all mountings offered are suitable for the loads, operating and environmental conditions which will prevail. Particular attention should be paid to mountings which will be exposed to atmospheric conditions to prevent corrosion.

1.3 All mountings shall be colour coded, or otherwise marked, to indicate their load capacity, to facilitate identification during installation.

Where use of resilient supports allows omission of pipe flexible connections for vibration/noise isolation, it shall be the Mechanical Service Consultant's or Contractor's responsibility to decide whether such devices are required to compensate for misalignment or thermal strain.

2.1 Type A Mounting (Caged Spring Type)

2.1.1 Each mounting shall consist of cast or fabricated telescopic top and bottom housings enclosing one or more helical steel springs as the principle isolation elements, and shall incorporate a built-in levelling device. The housing should be designed to permit visual inspection of the springs after installation, i.e. the spring must not be totally enclosed.

2.1.2 The springs shall have an outside diameter of not less than 75% of the operating height, and be selected to have at least 50% overload capacity before becoming coil-bound.

2.1.3 The bottom plate of each mounting shall have bonded to it a rubber/neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.1.4 Mountings incorporating snubbers or restraining devices shall be designed so that the snubbing, damping or restraining mechanism is capable of being adjusted to have no significant effect during the normal running of the isolated machine.

2.1.5 All nuts, bolts or other elements used for adjustment of a mounting shall incorporate locking mechanisms to prevent the isolator going out of adjustment as a result of vibration or accidental or unauthorised tampering.

2.2 Type B Mounting (Open Spring Type)

2.2.1 Each mounting shall consist of one or more helical steel springs as the principal isolation elements, and shall incorporate a built-in levelling device.

2.2.2 The springs shall be fixed or otherwise securely located to cast or fabricated top and bottom plates, shall have an outside diameter of not less than 75% of the operating height, and shall be selected to have at least 50% overload capacity before becoming coil-bound.

2.2.3 The bottom plate shall have bonded to it a rubber/ neoprene pad designed to attenuate any high frequency energy transmitted by the springs.

2.3 Type C Mounting (Rubber/Neoprene Type)

Each mounting shall consist of a steel top plate and base plate completely embedded in oil resistant rubber/neoprene. Each mounting shall be capable of being fitted with a levelling device, and should have bolt holes in the base plate and a threaded metal insert in the top plate so that they can be bolted to the floor and equipment where required.

3.0 Plant Bases

3.1 **Type A Bases (A.V. Rails)**

An A.V. Rail shall comprise a steel beam with two or more height-saving brackets. The steel sections must be sufficiently rigid to prevent undue strain in the equipment and if necessary should be checked by the Structural Engineer.

3.2 **Type B Bases (Steel Plant Bases)**

Steel plant bases shall comprise an all-welded steel framework of sufficient rigidity to provide adequate support for the equipment, and fitted with isolator height saving brackets. The frame depth shall be approximately 1/10 of the longest dimension of the equipment with a minimum of 150 mm. This form of base may be used as a composite A.V. rail system.

3.3 **Type C Bases (Concrete Inertia Base: for use with steel springs)**

These shall consist of an all-welded steel pouring frame-work with height saving brackets, and a frame depth of approximately 1/12 of the longest dimension of the equipment, with a minimum of 100 mm. The bottom of the pouring frame should be blanked off, and concrete (2300 kg/m^3) poured in over steel reinforcing rods positioned 35 mm above the bottom. The inertia base should be sufficiently large to provide support for all parts of the equipment, including any components which over-hang the equipment base, such as suction and discharge elbows on centrifugal pumps.