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12 Grange Gardens
London

Planning Compliance Report
Report 29437.PCR.01.RevA

Uzain Holdings Limited
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Report 29437.PCR.01 Revision History			
First Issue Date: 07/11/2024			
A	22/11/2024 – minor wording changes based on client comments	D	
B		E	
C		F	
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KP acoustics

Contents

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned to undertake a noise impact assessment of existing plant unit installations serving the building at 12 Grange, London, NW3 7XG.

A 24-hour environmental noise survey has been undertaken on site in order to prepare a noise impact assessment in accordance with BS4142:2014 '*Method for rating and assessing industrial and commercial sound*' as part of the planning requirements of the Local Authority. The external plant units are understood to be switched off for the duration of the unattended survey in order to establish a representative snapshot of the local background noise during the daytime and night-time.

Manual measurements were undertaken at each of the external plant items whilst operating at their expected duty.

This report presents the methodology and results from the environmental survey, followed by calculations in accordance with the Local Authority criteria to provide an indication as to the likelihood of the noise emissions from the plant unit installations having an adverse impact on 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 surrounded by residential properties to all sides. The site is located on a quiet cul-de-sac (dead-end road).

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

Initial inspection of the site revealed that the background noise profile at all monitoring locations were generally quiet, with the dominant source being aircraft noise overhead and lawnmowers from adjacent properties.

It was observed that the neighbouring property, 11 Grange Gardens, also has an external condenser unit opposite the location of Plant Item 1. It is likely that 11 Grange Gardens' plant unit would operate at a similar time as Plant Item 1.

It should also be noted that whilst the all condenser units at 12 Grange Gardens were operating, the noise emissions from the plant items were not audible over the ambient noise levels of the surrounding area.

2.2 Environmental Noise Survey Procedure

An unattended environmental noise survey was undertaken on the site as shown in Figure 2.2.

Continuous automated monitoring was undertaken for the duration of the noise survey between 13:19 on 17/10/2024 and 13:19 on 18/10/2024.

The environmental noise measurement position, 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.

2.3 Manual Noise Measurement Procedure

Manual noise measurements were undertaken at Positions A to D shown in Table 2.1 and Figure 2.2. Measurements were undertaken during the period of 10:30-11:00 on 16 October 2024.

2.4 Measurement Positions

Measurement positions are as described in Table 2.1 and shown in Figure 2.2.

Icon	Descriptor	Location Description
1	Noise Measurement Position 1	The microphone was installed on a tripod at ground floor level, near the eastern boundary, as shown in Figure 2.2. The microphone was located within 1.5 metres of the nearest surface and therefore includes local reflections.
A	Manual Noise Measurement Position A	Handheld measurements undertaken approximately 12m from the external plant item, as shown in Figure 2.2 The microphone was located within 1.5 metres of the nearest surface and therefore includes local reflections.
B	Manual Noise Measurement Position B	Handheld measurements undertaken approximately 1m from the external plant item, as shown in Figure 2.2. The microphone was located within 1.5 metres of the nearest surface and therefore includes local reflections.

Icon	Descriptor	Location Description
C	Manual Noise Measurement Position C	Handheld measurements undertaken approximately 1m from the external plant item, 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 (NSR1)	Ground and 1st Floor windows to the front of 11 Grange Gardens, overlooking 12 Grange Gardens. 11 Grange Gardens, residential house to the west of the site.
	Nearest noise sensitive receptor (NSR2)	1st Floor windows to the rear of 11 Grange Gardens, overlooking 12 Grange Gardens. 11 Grange Gardens, residential house to the west of the site.
	Nearest noise sensitive receptor (NSR3)	Western façade. Ground and 1st Floor windows. 1 Mansion Gardens, residential house to the east of the site.
	Nearest noise sensitive receptor (NSR4)	Rear façade. 1st Floor windows. 5 Mansion Gardens, residential house to the north of the site.
	Plant installation locations	Plant installations are outlined in Section 5.1.

Table 2.1 Measurement positions and descriptions

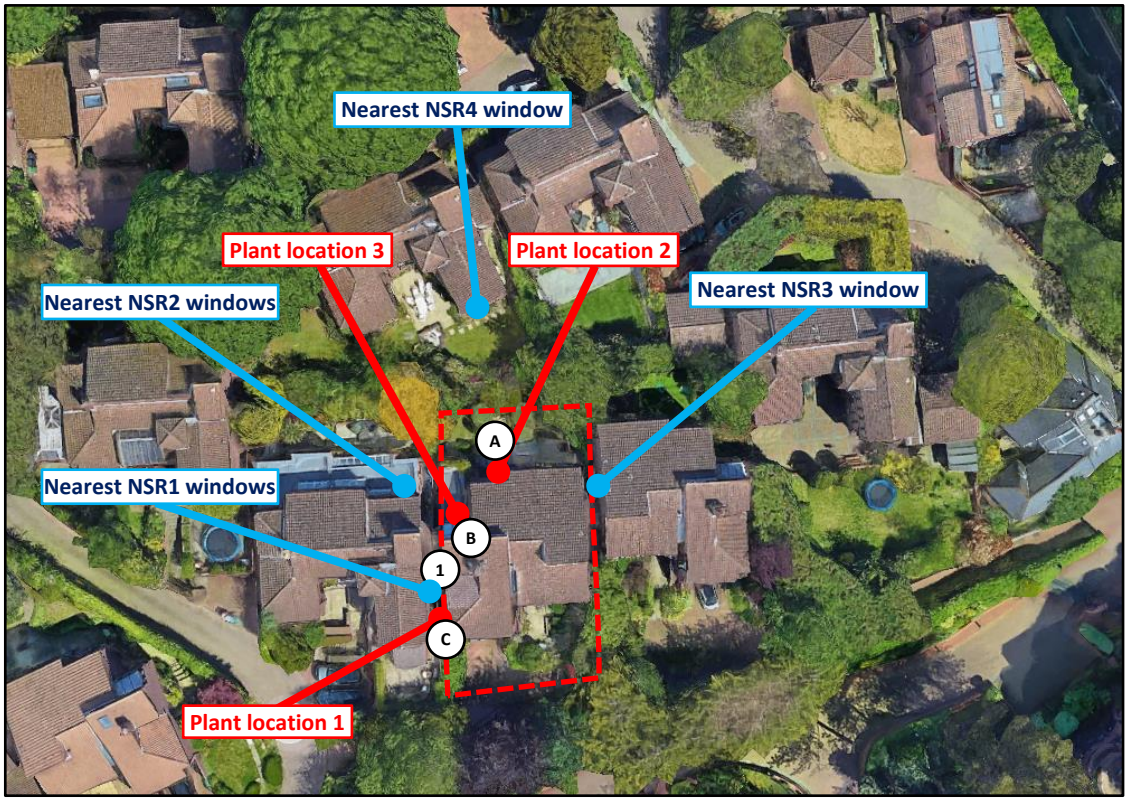

Figure 2.1 Site measurement positions (Image Source: Google Maps)

The choice of the positions were based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receivers and the plant installations.

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*'.

2.5 Equipment

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

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 6	Svantek Type 977A Class 1 Sound Level Meter	59632	26/01/2024	1507642-1
	Free-field microphone PCB 377B02	345743		
	Preamp PCB 426E01	082149		
	Svantek External windshield	-	-	-
Noise Kit 36	Svantek Type 971 Class 1 Sound Level Meter	74376	09/08/2023	74376
	Free-field microphone ACO 7052E	56751		
	Preamp SV18	41606		
	Svantek External windshield	-	-	-
SLM1	NTi Audio, XL2-TA, Precision integrating sound level meter & analyser	A2A-09521-E0	10/05/2023	UCRT23/1633, 1636 & 1635
	NTi Audio windshield	-	-	-

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 unattended 24hr survey. Measured levels are shown as a time history in Figure 29437.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 based on the guidance of BS4142 Section 8.1.4 from the $L_{A90,5min}$ levels measured during the environmental noise survey undertaken on site, as shown in 29437.Daytime L90.TH1 and 29437.Night-time L90.TH1 attached.

Time Period	Representative background noise level L_{A90} dB(A)
Daytime (07:00-23:00)	35
Night-time (23:00-07:00)	34

Table 3.1 Representative background noise levels

Measured ambient noise levels are shown in Table 3.2 for daytime and night-time.

Time Period	Ambient noise level L_{Aeq} dB(A)
Daytime $L_{Aeq,16hour}$	56
Night-time $L_{Aeq,8hour}$	37

Table 3.2 Site ambient noise levels for daytime and night-time

Please note that measurements at Noise Measurement Position 1 are 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 and Table 3.2 to obtain a free-field measurement as per ISO1996 Part 2.

Further manual measurements have been undertaken to measure the noise levels for each plant item individually. It is understood that the external plant units were running at their normal operational duty at the time of measurement. The results of these measurements are as follows:

Attended Measurement Location	Measurement Description	Measurement Period	All Plant Items Switched ON $L_{Aeq,T}$ (dB)
A	Taken approximately 1m from Plant Item 2	10:30-10:34	43
B	Taken approximately 1m from Plant Item 3 on the first floor flat roof.	10:35-10:41	50

Attended Measurement Location	Measurement Description	Measurement Period	All Plant Items Switched ON $L_{Aeq,T}$ (dB)
C	Taken approximately 1m from Plant Item 1 within the rear garden	10:42-10:47	43

Table 3.3 Manual measurements for the individual plant items

Please note that measurements at Noise Measurement Positions A, B and C were 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 BS4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'

British Standard BS4142:2014 '*Methods for rating and assessing industrial and commercial sound*' describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes:

- Sound from industrial and manufacturing processes
- Sound from fixed installations which comprise mechanical and electrical plant and equipment
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises, and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes.

This Standard compares the Rating Level due to the noise source/s under assessment for a one-hour period during the daytime (07:00 – 23:00 hours) and a fifteen-minute period during the night-time (23:00 – 07:00 hours) with the existing background noise level in terms of an L_{A90} when the noise source is not operating.

It should be noted that the Rating Level is the Specific Sound Level in question ($L_{Aeq,\ Tr}$), including any relevant acoustic feature corrections, as follows:

- **Tonality** – '*For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0dB and +6dB for tonality. Subjectively, this can*

be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible'

- **Impulsivity** – '*A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible'*
- **Intermittency** – '*If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied'*
- **Other sound characteristics** – '*Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied'*

Once the Rating Level has been obtained, the representative background sound level is subtracted from the Rating Level to obtain an initial estimate of the impact, as follows:

- Typically, the greater this difference, the greater the magnitude of the impact
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context
- A difference of around +5 dB could be an indication of an adverse impact, depending on the context
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context

NOTE: Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

The initial estimate of the impact may then be modified by taking consideration of the context in which the sound occurs.

4.2 Local Authority Guidance

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

"Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion.

Period	Assessment Location	Rating Level Acceptability Range		
		Green: noise is considered to be at an acceptable level	**Amber:** 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:** noise is observed to have a significant adverse effect.
Daytime (07:00-23:00)	Garden used for main amenity (free field) and Outside living or dining or Bedroom window (façade)	10dB below background	9 dB below and 5dB above background	5dB above background
Night-time (23:00-07:00)	Outside bedroom window (façade)	10dB below background and no events exceeding 57dB L_{Amax}	9db below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	5dB above background and/or events exceeding 88dB L_{Amax}

Table 4.1 Camden noise criteria for plant and machinery

5.0 NOISE IMPACT ASSESSMENT

5.1 Plant Installations

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

- 3No. Daikin Multi Inverter Condensers 5MXM90N

The installation locations of the plant items are shown in Figure 2.2 above and Figure 5.1 below.

The noise levels of each plant unit have been measured in situ. It is understood that the external plant items were running at representative duty. The calculated noise levels measured for each of the units are shown in Table 5.1. The noise levels presented have been calculated based on the plant items switched ON and the measured background ambient noise level with plant items switched OFF.

Plant Item Reference	Attended Measurement Location	Unit	Measured SPL@1m $L_{Aeq,T}$ (dBA) (Plant ON)	Measured Ambient Noise Level $L_{Aeq,T}$ (dBA) (Plant OFF)	Calculated Plant Rating SPL@1m (dBA)
Plant Item 1	C	Daikin Multi Inverter Condenser 5MXM90N	43	41	39
Plant Item 2	A	Daikin Multi Inverter Condenser 5MXM90N	43	44	34
Plant Item 3	B	Daikin Multi Inverter Condenser 5MXM90N	50	45	48

Table 5.1 Calculated Plant Unit Noise Emission Levels

It is understood that the plant items were operating at representative duty during the manual measurements. It should be noted that the plant items, at the time of measurement, were not audible over the prevailing background noise. Therefore, it is not practicable to determine the specific plant noise levels in-situ.

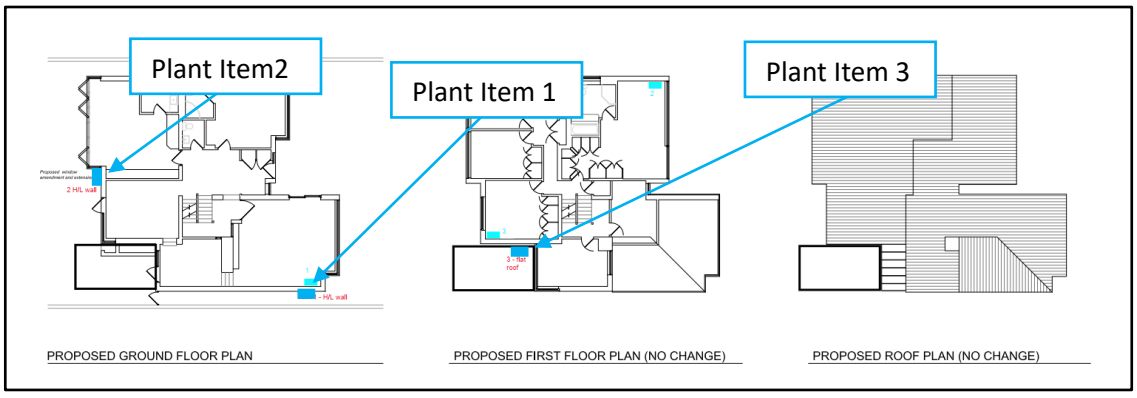

Figure 5.1 Location of plant installations

Plant Item 1 is located externally on the eastern façade of 12 Grange Gardens, towards the front of the property, approximately 2.5m above the ground, overlooking the side passage and 11 Grange Gardens. It should be noted that this plant item is out of line of site of NSR2, NSR3 and NSR4 due to screening from the building envelope. Plant Item 1 is located approximately 3 metres from NSR 1, 16 metres from NSR2, 9 metres from NSR3 and 31 metres from NSR4. It was observed that 11 Grange Gardens also has an external condenser unit

installed directly opposite Plant Item 1. It is likely that 11 Grange Gardens' unit would operate at similar times as Plant Item 1.

Plant Item 2 is located externally on the northern façade of 12 Grange Gardens, at the rear of the property, approximately 2.5m above the ground, overlooking the rear garden. It should be noted that this plant item is out of line of site of NSR1, NSR2 and NSR3 due to screening from the building envelope. Plant Item 2 is located approximately 13 metres from NSR 1, 9 metres from NSR2, 9 metres from NSR3 and 16 metres from NSR4.

Plant Item 3 is located externally on the first-floor flat roof of 12 Grange Gardens, towards the rear of the property. It should be noted that this plant item is out of line of site of NSR1, NSR 3 and NSR 4 due to screening from the building envelope. Plant Item 3 is located approximately 8 metres from NSR1, 6 metres from NSR 2, 12 metres from NSR3 and 19 metres from NSR4.

5.2 Calculations

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

No acoustic feature corrections have been applied as per BS4142, as the units are not considered to be tonal, impulsive, or intermittent.

Receiver	Cumulative Rating Level at 1m From the Closest Noise Sensitive Window	Representative Background Sound Level	Difference	Camden Council Impact Level
NSR1	29	34	-5	Amber
NSR2	22	34	-12	Green
NSR3	9	34	-25	Green
NSR4	24	34	-10	Green

Table 5.2 Predicted noise levels at the nearest noise sensitive locations

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive windows due to the effects of the plant unit installations are predicted to have a '*green*' impact on the noise sensitive receptors. However, an '*amber*' impact is predicted at NSR1's front ground and first floor windows, due to Plant Item 1's noise emissions. However, due to the low

background noise levels measured onsite and the observations made (See Section 2.1), we would propose these are reasonable and recommend no mitigation measures.

If a '*green'* impact is considered necessary for all plant items, then Plant Item 1 should be housed within an acoustic enclosure capable of achieving 4dB attenuation in order for it to comply with the Local Authority '*green'* impact requirements.

6.0 CONCLUSION

An environmental noise survey has been undertaken at 12 Grange Gardens, London, NW3 7XG, by KP Acoustics Ltd between 13:19 on 17/10/2024 and 13:19 on 18/10/2024. The results of the survey have enabled criteria to be set for noise emissions.

Manual measurements have been undertaken at each plant item operating at its representative duty.

Whilst on site it was observed that the noise levels produced by all the external plant units operating at 12 Grange Gardens were not audible over the prevailing background noise levels. It was also noted that 11 Grange Gardens has their own external condenser unit directly opposite Plant Item 1. We would assumed that the plant item serving 11 Grange Gardens operates at a similar time to Plant Item 1.

The measured rating level was compared with the representative background noise level to assess the likelihood of impact considering the environmental noise context of the area as per the requirements of Local Authority.

It has been concluded that noise emissions from the plant units would not have an adverse impact on the nearest residential receivers. Transmission of noise to the nearest noise sensitive windows due to the effects of the plant unit installations are predicted to have a green impact. However, an amber impact is predicted at the front residential windows of NSR1 (11 Grange Gardens). Due to the low background noise levels measured and the observations on site, we would propose these are reasonable and recommend no mitigation measures.

If a 'green' impact level is considered necessary for this, then Plant Item 1 should be housed within an acoustic enclosure capable of achieving 5 dB attenuation in order for it to comply with the Local Authority 'green' impact requirements.

12 Grange Gardens, London - Position 1
Environmental Time History
17/10/2024 to 18/10/2024

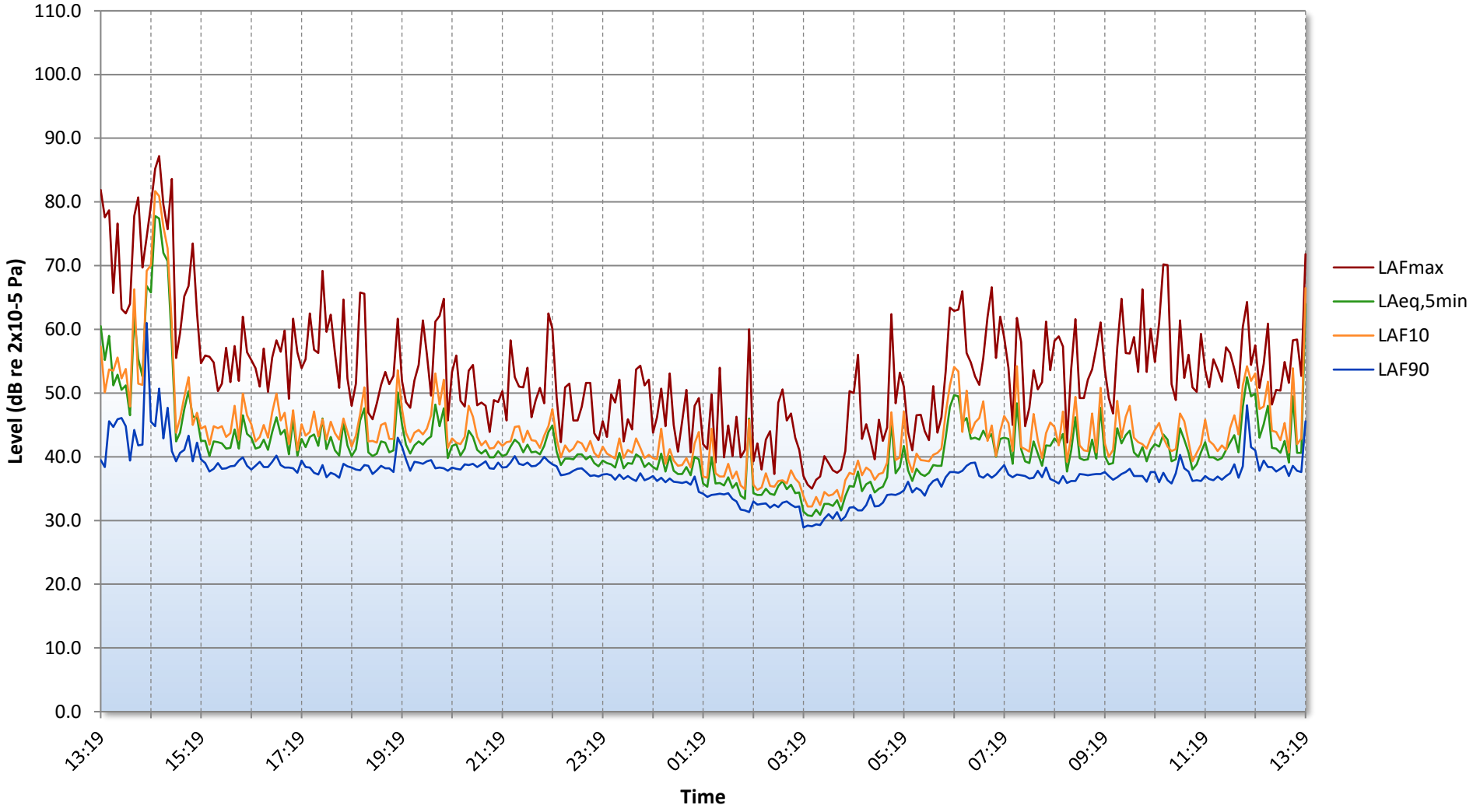

Figure 27402.TH1

12 Grange Gardens, London - Position 1
Representative Daytime Background Noise Level
17/10/2024 to 18/10/2024

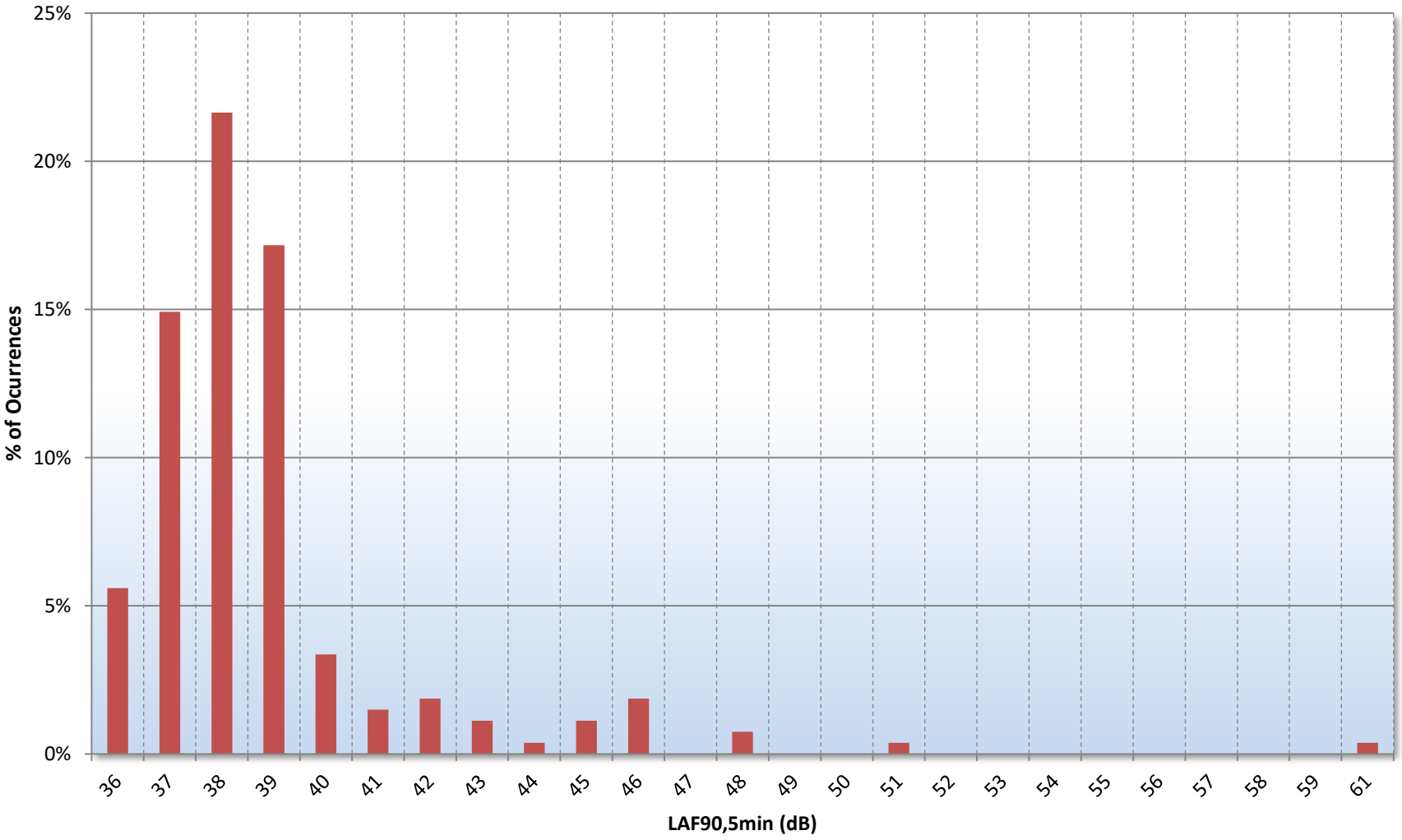

Figure 27402.Daytime L90.TH1

12 Grange Gardens, London - Position 1
Representative Night-time Background Noise Level
17/10/2024 to 18/10/2024

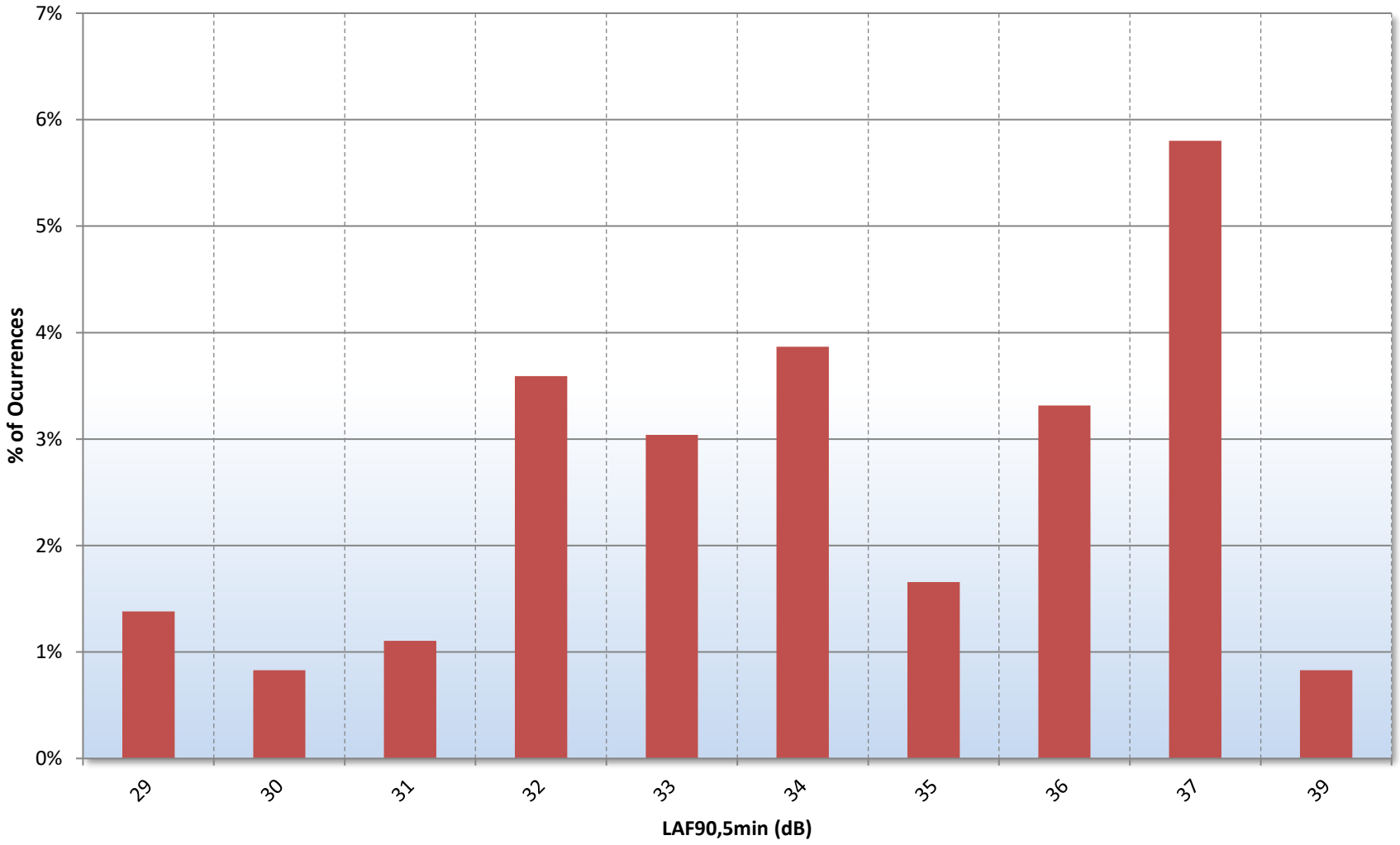

Figure 27402.Night-time L90.TH1

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

12 Grange Gardens, London

PLANT NOISE EMISSIONS CALCULATIONS

NSR1									
Source: 12 Grange Road Condenser Units **Receiver: 11 Grange Gardens, Ground & First Floor Front Windows**	***Frequency, Hz***								***dB(A)***
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	
Daikin 5MXM90N (Sound Pressure Level @1m) (Plant Item 1)	**47**	**42**	**44**	**34**	**31**	**25**	**20**	**17**	**39**
Minimum attenuation due to building envelope, dB	0	0	0	0	0	0	0	0	
Minimum attenuation provided by distance (3m), dB	-10	-10	-10	-10	-10	-10	-10	-10	
Total Rating Noise Level of Plant Unit Installation 1 at Receiver	**37**	**32**	**34**	**24**	**21**	**15**	**10**	**7**	**29**

NSR2									
Source: 12 Grange Road Condenser Units **Receiver: 11 Grange Gardens, First Floor Rear Windows**	***Frequency, Hz***								***dB(A)***
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	
Daikin 5MXM90N (Sound Pressure Level @1m) (Plant Item 2)	**35**	**36**	**36**	**32**	**29**	**23**	**23**	**16**	**34**
Minimum attenuation due to building envelope, dB	-6	-8	-9	-12	-17	-20	-24	-25	
Minimum attenuation provided by distance (9m), dB	-19	-19	-19	-19	-19	-19	-19	-19	
Minimum attenuation required by proposed acoustic enclosure, dB	-	-	-	-	-	-	-	-	
Predicted Noise Level at the NSR from Plant Item 2 Only, dB	**10**	**9**	**7**	**0**	**-7**	**-17**	**-20**	**-28**	**3**
Daikin 5MXM90N (Sound Pressure Level @1m) (Plant Item 3)	**55**	**54**	**50**	**47**	**41**	**34**	**34**	**34**	**48**
Minimum attenuation due to building envelope, dB	-6	-7	-9	-12	-14	-17	-19	-20	
Minimum attenuation provided by distance (6m), dB	-16	-16	-16	-16	-16	-16	-16	-16	
Minimum attenuation required by proposed acoustic enclosure, dB	-	-	-	-	-	-	-	-	
Predicted Noise Level at the NSR from Plant Item 3 Only, dB	**34**	**31**	**25**	**20**	**11**	**2**	**-1**	**-2**	**22**
Total Rating Noise Level of Plant Unit Installations 2 & 3 at Receiver	**34**	**31**	**25**	**20**	**11**	**2**	**-1**	**-2**	**22**

APPENDIX B

12 Grange Gardens, London

PLANT NOISE EMISSIONS CALCULATIONS

NSR3									
Source: 12 Grange Road Condenser Units **Receiver: 1 Mansions Gardens Ground and First Floor**	***Frequency, Hz***								***dB(A)***
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	
Daikin 5MXM90N (Sound Pressure Level @1m) (Plant Item 1)	**47**	**42**	**44**	**34**	**31**	**25**	**20**	**17**	**39**
Correction due to surface reflections (1), dB	3	3	3	3	3	3	3	3	
Minimum attenuation due to building envelope, dB	-15	-19	-23	-25	-25	-25	-25	-25	
Minimum attenuation provided by distance (9m), dB	-19	-19	-19	-19	-19	-19	-19	-19	
Predicted Noise Level at the NSR from Plant Item 1 Only, dB	**16**	**7**	**5**	**-7**	**-10**	**-16**	**-21**	**-24**	**-1**
Daikin 5MXM90N (Sound Pressure Level @1m) (Plant Item 2)	**35**	**36**	**36**	**32**	**29**	**23**	**23**	**16**	**34**
Minimum attenuation due to building envelope, dB	-13	-16	-20	-22	-22	-22	-22	-22	
Minimum attenuation provided by distance (9m), dB	-19	-19	-19	-19	-19	-19	-19	-19	
Predicted Noise Level at the NSR from Plant Item 2 Only, dB	**3**	**1**	**-4**	**-9**	**-12**	**-18**	**-18**	**-25**	**-6**
Daikin 5MXM90N (Sound Pressure Level @1m) (Plant Item 3)	**55**	**54**	**50**	**47**	**41**	**34**	**34**	**34**	**48**
Minimum attenuation due to building envelope, dB	-10	-14	-18	-20	-20	-20	-20	-20	
Minimum attenuation provided by distance (12m), dB	-22	-22	-22	-22	-22	-22	-22	-22	
Predicted Noise Level at the NSR from Plant Item 3 Only, dB	**23**	**19**	**10**	**5**	**-1**	**-8**	**-8**	**-8**	**8**
Total Rating Noise Level of All Plant Unit Installations at Receiver	**24**	**19**	**11**	**6**	**0**	**-7**	**-7**	**-8**	**9**

APPENDIX B

12 Grange Gardens, London

PLANT NOISE EMISSIONS CALCULATIONS

NSR4									
Source: 12 Grange Road Condenser Units **Receiver: 5 Mansions Gardens, First Floor Rear Windows**	***Frequency, Hz***								***dB(A)***
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	
Daikin 5MXM90N (Sound Pressure Level @1m) (Plant Item 1)	**47**	**42**	**44**	**34**	**31**	**25**	**20**	**17**	**39**
Correction due to surface reflections (1), dB	3	3	3	3	3	3	3	3	
Minimum attenuation due to building envelope, dB	-14	-18	-22	-25	-25	-25	-25	-25	
Minimum attenuation provided by distance (31m), dB	-30	-30	-30	-30	-30	-30	-30	-30	
Predicted Noise Level at the NSR from Plant Item 1 Only, dB	**6**	**-3**	**-5**	**-18**	**-21**	**-27**	**-32**	**-35**	**-11**
Daikin 5MXM90N (Sound Pressure Level @1m) (Plant Item 2)	**35**	**36**	**36**	**32**	**29**	**23**	**23**	**16**	**34**
Correction due to surface reflections (1), dB	3	3	3	3	3	3	3	3	
Minimum attenuation provided by distance (16m), dB	-24	-24	-24	-24	-24	-24	-24	-24	
Predicted Noise Level at the NSR from Plant Item 2 Only, dB	**14**	**15**	**15**	**11**	**8**	**2**	**2**	**-5**	**13**
Daikin 5MXM90N (Sound Pressure Level @1m) (Plant Item 3)	**55**	**54**	**50**	**47**	**41**	**34**	**34**	**34**	**48**
Correction due to surface reflections (1), dB	6	6	6	6	6	6	6	6	
Minimum attenuation due to building envelope, dB	-1	-2	-3	-5	-7	-10	-14	-18	
Minimum attenuation provided by distance (19m), dB	-26	-26	-26	-26	-26	-26	-26	-26	
Predicted Noise Level at the NSR from Plant Item 3 Only, dB	**34**	**32**	**27**	**23**	**15**	**5**	**1**	**-3**	**24**
Total Rating Noise Level of All Plant Unit Installations at Receiver	**34**	**32**	**27**	**23**	**15**	**7**	**4**	**-1**	**24**