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# 12 PILGRIMS LANE, LONDON

## NOISE IMPACT ASSESSMENT

Report 17451-NIA-01-RevA

Prepared on 30 June 2022

Issued For:  
**The Owner of 12 Pilgrims Lane**



## Executive Summary

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This noise impact assessment has been undertaken in order to assess a proposed plant installation for residential use at 12 Pilgrims Lane, London.

The proposed plant installation comprises the following plant units:

- 3 No. Daikin Air Source Heat Pumps
- 1 No. Recotherm Air Handling Units

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 identified receiver, identified as 10 Pilgrims Lane. 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, dependant on the following material considerations:

- The plant could be in use at any time over a 24-hour period
- 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 a louvred enclosure to enclose all proposed units

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.

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## List of Attachments

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17451-SP1 & SP2	Indicative Site Plans
17451-TH1	Environmental Noise Time History
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Calculations

Document Revision	Date of Revision	Reasons for Revision	Revision By
0	06/06/2022	First Issue	Daniel Hagan AMIOA
RevA	30/06/2022	Amended Client Name	

## 1.0 INTRODUCTION

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Clement Acoustics has been commissioned by the owner of 12 Pilgrims Lane to measure existing background noise levels at 12 Pilgrims Lane, London NW3 1SN. 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

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The site is located on Pilgrim's Lane, with the surrounding area being predominantly residential in nature.

Current proposals are to install three air source heat pumps [ASHP] and one air handling units [AHU] at the southern façade of the dwelling.

10 Pilgrim's Lanes has been identified as the nearest affected receiver. This nearest noise sensitive receiver was identified through observations on-site. If there are any receivers closer to 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 17451-SP1.

### 3.0 ENVIRONMENTAL NOISE SURVEY

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#### 3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 17451-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 surroundings and position used for the monitoring location are described in Table 3.1.

Position No.	Description
1	The microphone was mounted on a tripod at the southern corner of the garden. The microphone was positioned 1.5 m above the ground <sup>[1]</sup>

**Table 3.1: Description of unattended monitoring locations**

**Note [1]:** 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 11:30 on 30 May 2022 and 12:15 on 31 May 2022.

The measurement procedure generally complied with BS 7445: 1991: '*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*'.

The locations of the measurement positions are shown on attached site plan 17451-SP1.

#### 3.2 Weather Conditions

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

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

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### 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 17451-SP1.

Measured noise levels are shown as a time history in Figure 17451-TH1, with average ambient and typical background noise levels summarised in Table 4.1.

Time Period	Average ambient noise level	Typical background noise level
	$L_{eq:T}$	$L_{90:5min}$
Daytime (07:00 - 23:00)	48 dB(A)	39 dB(A)
Night-time (23:00 - 07:00)	47 dB(A)	32 dB(A)

**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 general criteria for noise emissions, as stated in the ‘Camden Local Plan (2017)’ are 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’ (BS 4142) 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).”*

It is understood that the proposed unit will be for residential use and could be in operation at all times.

Based on the results of the environmental noise survey and requirements of 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:

Period	Plant Noise Emission Limit $L_{eq,T}$
Daytime (07:00 - 23:00)	29 dB(A)
Night-time (23:00 - 07:00)	22 dB(A)

**Table 5.1: Plant noise emission limits**

## 6.0 PLANT NOISE IMPACT ASSESSMENT

### 6.1 Proposed Installation

The proposed plant installation comprises the following:

- 2 No. Daikin RXYSQ10TY1 [ASHP]
- 1 No. Daikin EDLA14D3W1 [ASHP]
- 1 No. Recotherm Aeris 50 [AHU]

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.

Plant Unit	$L_w / L_p @ 1m$	Sound Pressure Levels (at 1 meter, dB) in each Frequency Band								dB(A)
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
RXYSQ10TY1	$L_p @ 1m$	65	58	54	53	50	47	41	33	55
EDLA14D3W1 [1]	$L_p @ 1m$	62	50	54	48	45	41	36	30	51
Recotherm Aeris 50 Supply Inlet	$L_w$	60	61	60	61	58	53	50	48	63
Recotherm Aeris 50 Extract Outlet	$L_w$	65	66	61	64	65	61	56	54	68

**Table 6.1: Manufacturer provided noise emissions levels**

**Note [1] Only the broadband sound power level was available for this unit. Therefore, this value has been converted to sound pressure level and spectral data from a similar sized unit has been used.**

The fan casing of the AHU is understood to be located within the building envelope and therefore has not been considered in this assessment.

The proposed plant location is at the southern façade of the dwelling which is shown on site plan 17451-SP2.



## 6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0, it is recommended that an enclosure is installed around all three ASHP. The enclosure should provide sufficient attenuation to achieve a maximum cumulative sound pressure level for all three units, of 41 dB(A) when measured at 1 m in all directions.

The AHU atmospheric inlet and outlet should be attenuator in the form of in-line duct attenuators. When measured at 1 m from the grille, the attenuator should provide sufficient attenuation to achieve a maximum sound pressure level of 36 dB(A) for the inlet and outlet separately, or 39 dB(A) cumulatively.

Based on the information provided, attenuators and an enclosure meeting the sound reduction indices and insertion losses as stated in Table 6.2 should be suitable to achieve this.

Mitigation	Required Attenuation (dB) in each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
ASHP Louvred Enclosure <i>Sound Reduction Index</i>	13	15	22	29	36	38	37	38
Aeris Supply Inlet Attenuator <sup>[1]</sup> <i>Insertion Losses</i>	4	9	17	28	34	32	21	14
Aeris Extract Outlet Attenuator <sup>[1]</sup> <i>Insertion Losses</i>	6	11	23	36	43	41	29	18

**Table 6.2: Required attenuation from mitigation**

[1] Attenuators to be installed on the atmospheric side of the fans, as close as possible to the fan.

## 6.3 Noise Impact Assessment

The closest receiver has been identified as the window on the facade of No. 10 Pilgrim's Lane, which is a minimum of 11 m from the proposed plant location.

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	Night-time Hours Criterion	Noise Level at Receiver (due to proposed plant)
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Nearest Residential Property	22 dB(A)	22 dB(A)
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**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 acoustic enclosure and attenuators 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 30 dB(A) as being acceptable internal sleeping conditions during night-time.

With loudest external levels of 22 dB(A), acceptable internal conditions would be met without 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 – <i>For sleeping conditions in a bedroom, in BS 8233: 2014</i>	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	7 dB(A)

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

## 7.0 CONCLUSION

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An environmental noise survey has been undertaken at 12 Pilgrims Lane, London NW3 1SN. 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.

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30 June 2022

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30 June 2022

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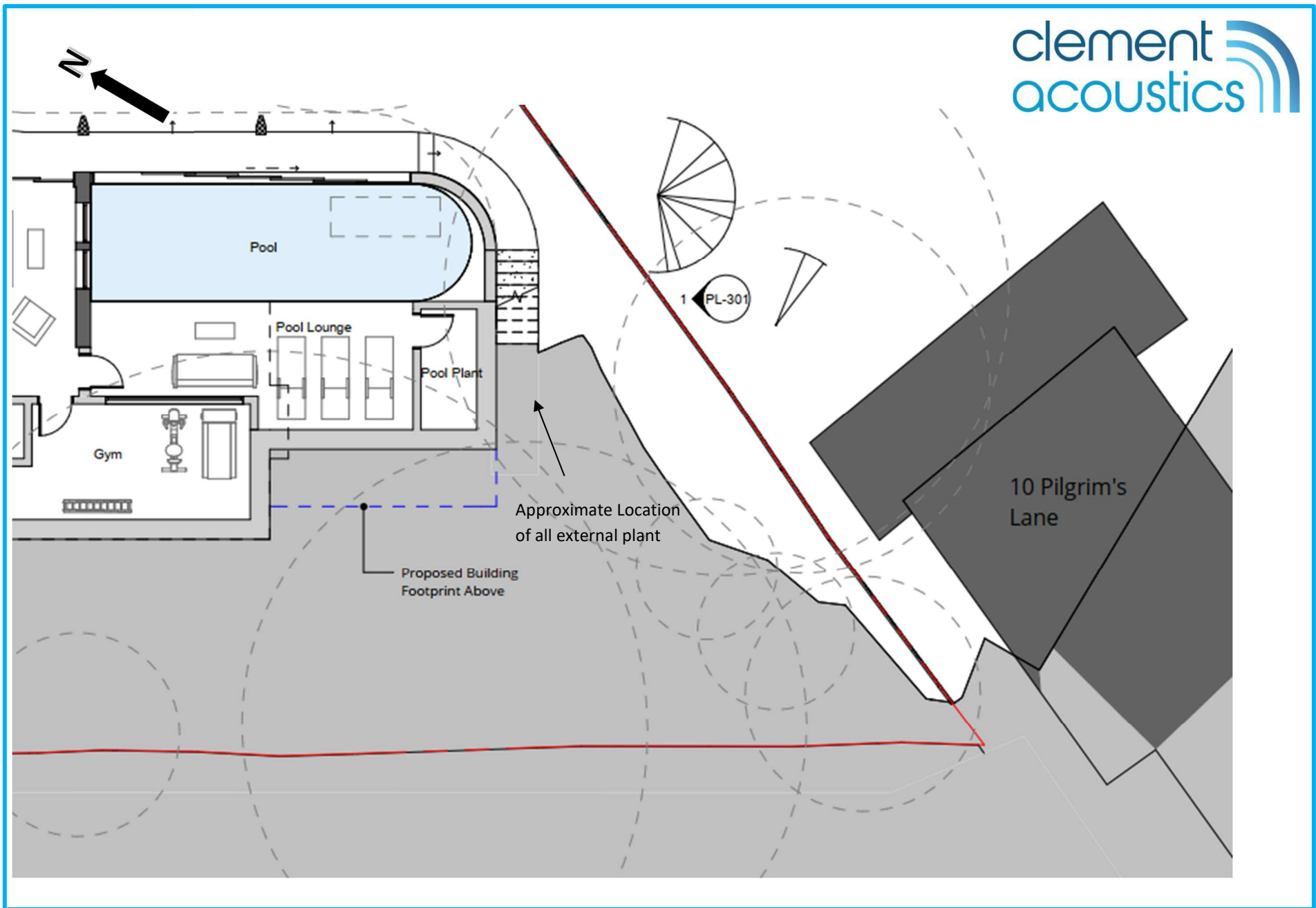
30 June 2022



-  Noise Survey Position
-  Noise Sensitive Receiver

**17451-SP1** Indicative site plan indicating noise monitoring position, nearest noise sensitive receiver and proposed plant location

**Date:** 30 June 2022



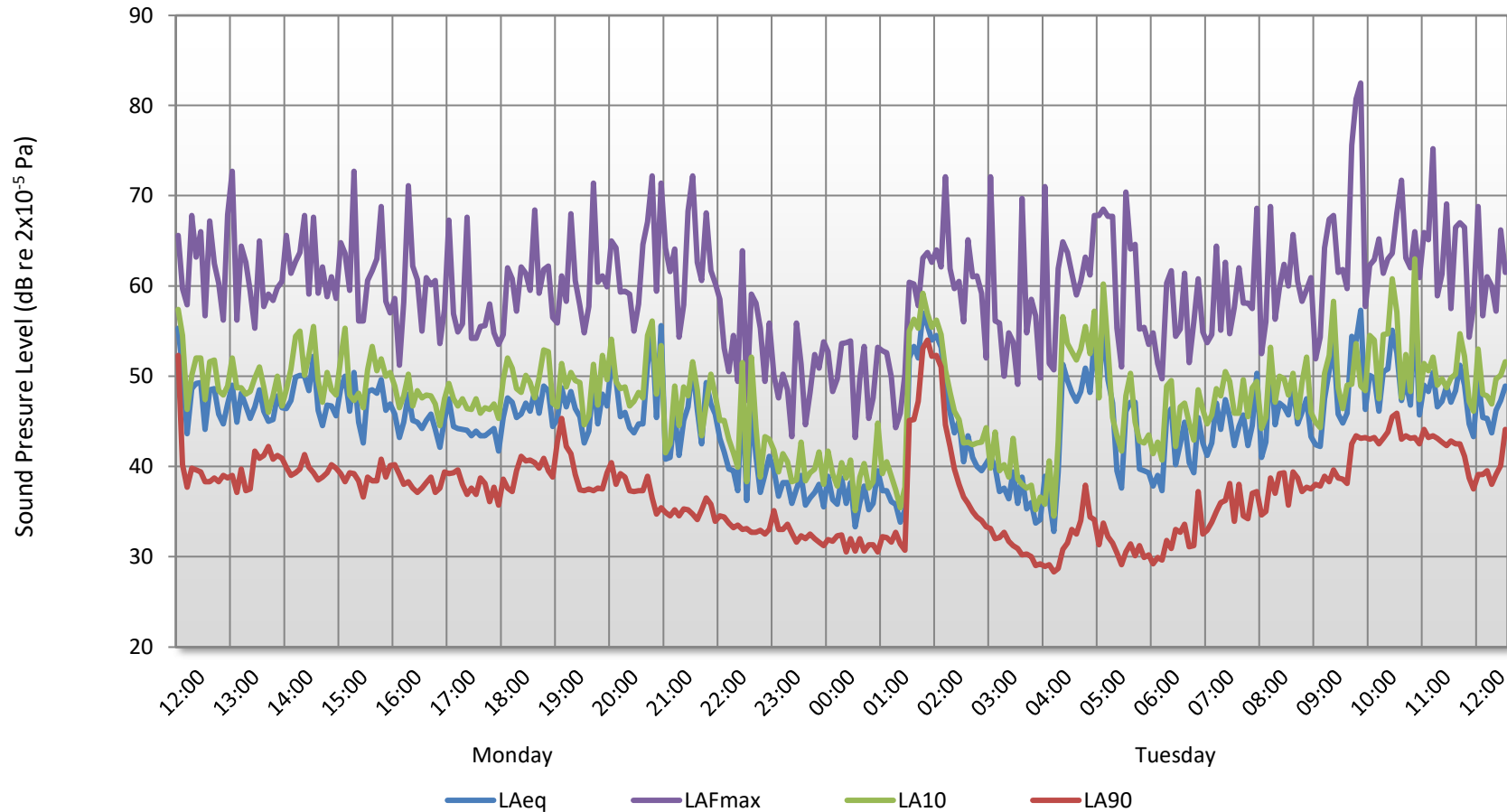
17451-SP1 site plan indicating plant locations

Date: 30 June 2022

# 12 Pilgrim's Lane, London

## Position 1

Environmental Noise Time History  
30 May 2022 to 31 May 2022



## 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<sub>eq</sub>**

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<sub>eq</sub>. The L<sub>eq</sub> is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

### **L<sub>10</sub>**

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<sub>90</sub>**

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<sub>max</sub>**

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.

### 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

17451  
12 Pilgrims Lane, London

### EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: 10 Pilgrims Lane

Source: Proposed plant installation

	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
<b>Manufacturer provided sound pressure level at 1 metre</b>									
Daikin RXYSQ10TY1	65	58	54	53	50	47	41	33	55
Correction for no. of Units	3	3	3	3	3	3	3	3	
<b><u>Attenuation from proposed louvred enclosure, dB</u></b>	<b>-13</b>	<b>-15</b>	<b>-22</b>	<b>-29</b>	<b>-36</b>	<b>-38</b>	<b>-37</b>	<b>-38</b>	
Correction for reflections, dB	6	6	6	6	6	6	6	6	
Combined Sound Pressure Level for RXY Units at 1 m	61	52	41	33	23	18	13	4	40
<b>Manufacturer provided sound pressure level at 1 metre</b>									
Daikin EDLA14D3W1	62	50	54	48	45	41	36	30	51
<b><u>Attenuation from proposed louvred enclosure, dB</u></b>	<b>-13</b>	<b>-15</b>	<b>-22</b>	<b>-29</b>	<b>-36</b>	<b>-38</b>	<b>-37</b>	<b>-38</b>	
Correction for reflections, dB	6	6	6	6	6	6	6	6	
Sound Pressure Level for EDLA Unit at 1 m	55	41	38	25	15	9	5	-2	33
<b>Manufacturer provided sound power level</b>									
Aeris 50 Air Handling Unit - Supply Inlet	60	61	60	61	58	53	50	48	
Conversion to Sound Pressure Level w/ Correction for Reflection	-8	-8	-8	-8	-8	-8	-8	-8	
<b><u>Attenuation from proposed attenuator, dB</u></b>	<b>-4</b>	<b>-9</b>	<b>-17</b>	<b>-28</b>	<b>-34</b>	<b>-32</b>	<b>-21</b>	<b>-14</b>	
End Reflection, dB	-7	-3	-1	0	0	0	0	0	
Directivity, dB	1	2	3	4	5	6	6	6	
Sound Pressure Level for Supply Inlet at 1 m	42	43	37	29	21	19	27	32	36
<b>Manufacturer provided sound power level</b>									
Aeris 50 Air Handling Unit - Extract Outlet	65	66	61	64	65	61	56	54	
Conversion to Sound Pressure Level w/ Correction for Reflection	-8	-8	-8	-8	-8	-8	-8	-8	
<b><u>Attenuation from proposed attenuator, dB</u></b>	<b>-6</b>	<b>-11</b>	<b>-23</b>	<b>-36</b>	<b>-43</b>	<b>-41</b>	<b>-29</b>	<b>-18</b>	
End Reflection, dB	-7	-3	-1	0	0	0	0	0	
Directivity, dB	1	2	3	4	5	6	6	6	
Sound Pressure Level for Extract Outlet at 1 m	45	46	32	24	19	18	25	34	36
Cummulative Sound Pressure Level for All Units at 1 m	62	54	44	35	26	23	29	36	43
Distance correction to receiver, dB (11 m) <sup>[1]</sup>	-21	-21	-21	-21	-21	-21	-21	-21	
<b>Sound pressure level at receiver</b>	<b>41</b>	<b>33</b>	<b>23</b>	<b>14</b>	<b>6</b>	<b>2</b>	<b>8</b>	<b>15</b>	<b>22</b>

[1] Distance loss calculated assuming Point Source attenuation (typically used where distance is more than 3x the largest source dimension)

Design Criterion	22
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### BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window

Source: Proposed plant installation

	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Sound pressure level outside window	41	33	23	14	6	2	8	15	22
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
<b>Sound pressure level inside nearest noise sensitive premises</b>	<b>26</b>	<b>18</b>	<b>8</b>	<b>-1</b>	<b>-9</b>	<b>-13</b>	<b>-7</b>	<b>0</b>	<b>7</b>

Design Criterion	30
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