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15-17 Leeke Street
London

7 July 2023

18460-NIA-01

Noise Impact Assessment

Project Number
18460

Issued For
Darenth Valley Building Services

EXECUTIVE SUMMARY

This noise impact assessment has been undertaken in order to assess a proposed plant installation for commercial use at 15-17 Leeke Street.

The proposed plant installation comprises 4 condenser 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 Camden Council.

Calculations were undertaken for the nearest identified receivers, identified as 14-16 Leeke Street (Receiver 1) and the Travelodge on Wicklow Street (Receiver 2). 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 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

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	07/07/23	[redacted] **Andrew Thomas** Principal Consultant BSc (Hons) MIOA	[redacted] **Duncan Martin** Director BSc (Hons) MIOA	

Issue	Comment
0	First Issue

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Darenth Valley Building Services to measure existing background noise levels at 15-17 Leeke Street. Measured noise levels have been used to determine noise emissions criteria for a proposed plant installation in agreement with the planning requirements of Camden Council.

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 in a busy area of London, approximately 60 m to the east of Grays Inn Road. The property is a commercial unit which forms apart of a larger commercial building. To the north, west and south are more commercial units, to the east is the train line.

Current proposals are to install four condenser units at first floor level, towards Leeke Street.

14-16 Leeke Street (Receiver 1) and the Travelodge on Wicklow Street (Receiver 2) have been identified as the nearest affected receivers. These nearest noise sensitive receivers were identified through observations on-site. If there are any receivers closer than those 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 18460-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 18460-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 1st floor flat roof to the east of the building, in the direction of the residential dwellings. The microphone was positioned 1 m in front of a wall. The position was not considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore been applied. Based on the presence of the reflective surface and the nature of

surrounding noise sources, a correction for reflections of 3 dB has been applied, in line with the recommendations of the standard.

Continuous automated monitoring was undertaken for the duration of the survey between 13:00 on 13 June 2023 and 14:00 on 15 June 2023.

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

3.2 Weather Conditions

Weather conditions were observed and noted during the set-up and collection of the monitoring equipment.

Wind speeds and temperatures were measured using a digital anemometer and thermometer, while other weather elements were determined through subjective observations.

The noted weather conditions are summarised in Table 3.1.

Position No.	Wind Speed	Wind Direction	Temperature	Cloud Cover	Comments
Meter Set-Up [13 June 2023]					
1	<1 m/s	N/a	27 °C	40 %	Dry
Meter Collection [15 June 2023]					
1	3 m/s	East	27 °C	10 %	Dry

Table 3.1 Noted weather conditions during surveys

It is understood that the weather during the unattended survey remained in similar conditions.

It is considered that the weather conditions were 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 957 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 18460-SP1.

Measured noise levels are shown as a time history in Figure 18460-TH1, with average ambient and typical background noise levels summarised in Table 4.1.

Position	Time Period	Average ambient noise level $L_{Aeq:\ T}$, dB	Typical background noise level $L_{A90:\ 5min}$, dB
1	Daytime (07:00 - 23:00)	60	48
	Night-time (23:00 - 07:00)	56	43

Table 4.1 Average ambient and typical 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 ASHP 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' (BS4142).

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}*

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises 4 No. Daikin RXM71R condenser units.

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.

Unit	Sound Pressure Level (at 1 m, dB) in each Frequency Band, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Plant unit	47	56	49	46	43	36	34	27	48

Table 6.1 Manufacturer provided noise emissions levels

British Standard 4142: 2014 +A1 2019 *'Methods for rating and assessing industrial and commercial sound'* provides guideline penalties that can be applied to noise emissions to account for tonality, impulsivity and intermittency. Where a sound source is neither tonal nor impulsive, but is still distinctive against the residual acoustic environment, a penalty may still be applied.

The available penalties for different characteristics are summarised in Table 6.2.

Characteristic	Comments	Maximum Penalty
Tonality	Can be converted to 2 dB for a tone which is just perceptible, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible	+6 dB
Impulsivity	Can be converted to 3 dB for impulsivity which is just perceptible, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible	+9 dB
Intermittency	When the sound has identifiable on/off conditions	+3 dB
Distinctiveness	Intended for sources that are neither tonal nor impulsive, but distinctive against background noise sources	+3 dB

Table 6.2 Available penalties according to BS 4142: 2014

The proposed plant units will be generally broadband and continuous in nature and therefore no penalty has been applied.

The proposed plant location is on the first floor flat roof of the building, which is shown on indicative site plan 18460-SP1.

6.2 Noise Impact Assessment

The closest receivers have been identified as follows:

- Receiver 1: 14-16 Leeke Street – Residential Dwelling
  - Approximately 45 m from the proposed plant
  - Assumed to have partial acoustic screening from the pitched roof adjacent to the plant location
- Receiver 2: Wicklow Street Travelodge
  - Approximately 43 m from the proposed plant
  - Assumed to have acoustic screening from the plant offered by the building envelope of 4 Leeke Street

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	Background Noise Level	Noise Level at Receiver (due to proposed plant)	Local Authority Rating
Receiver 1	43 dB(A)	25 dB(A)	**LOAEL**
Recevier 2		21 dB(A)	**LOAEL**

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 would be expected to present a receiver noise level at least 18 dB below the measured background noise level, therefore indicative of the Lowest Observable Adverse Effect Level. This is in turn deemed an acceptable level, according to the requirements of Camden Council.

6.3 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 25 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 – For sleeping conditions in a bedroom, in BS 8233: 2014	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	10 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 15-17 Leeke Street. 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 Camden Council.

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 are expected to present an acceptable level, according to the requirements of Camden Council.

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N

Not to scale

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

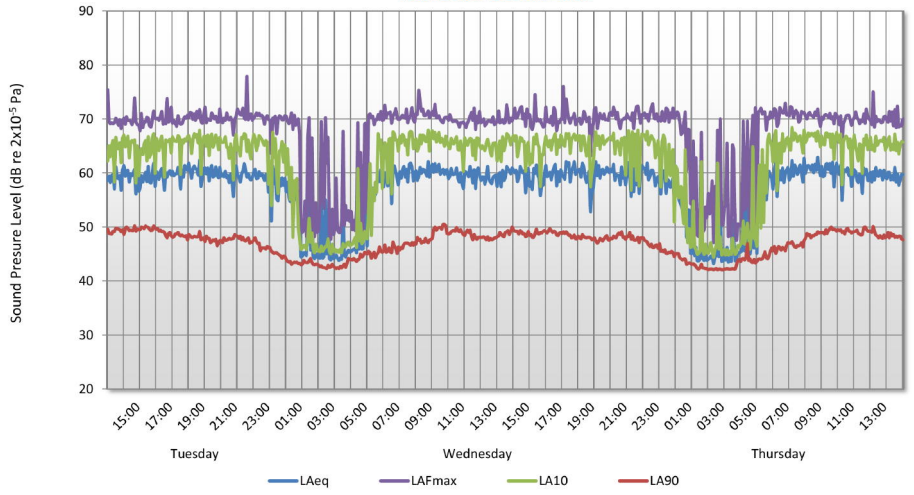
Date	07 July 2023
Reference	18460 SP1
Project Name	15-17 Leeke Street, London
Image ©	Google Earth

Key:	
	Unattended Noise Survey Position
	Noise Sensitive Receiver
	Plant Location

15-17 Leeke Street, London

Position 1

Environmental Noise Time History
13 June 2023 to 15 June 2023



18460-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

18460

15-17 Leeke Street, London

Receiver 1: 14-16 Leeke Street

External Plant Noise Emissions Calculation

Description	Frequency, Hz 63	125	250	500	1000	2000	4000	8k	dB(A)
Manufacturer provided sound pressure level at 1 metre									
Daikin RXM71R	47	56	49	46	43	36	34	27	48
Correction for Quantity of Units (4)	6	6	6	6	6	6	6	6	
Correction for reflections, dB	6	6	6	6	6	6	6	6	
Partial screening from the pitched roof adjacent to the plant	-2	-2	-2	-3	-3	-4	-5	-6	
Distance correction to receiver, dB (45 m) [1]	-33	-33	-33	-33	-33	-33	-33	-33	
Sound pressure level at receiver	**24**	**33**	**26**	**22**	**19**	**11**	**8**	**0**	**25**

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

Design Criterion	33

BS 8233 Assessment Calculation

Description	Frequency, Hz 63	125	250	500	1k	2k	4k	8k	dB(A)
Sound pressure level outside window	24	33	26	22	19	11	8	0	25
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**9**	**18**	**11**	**7**	**4**	**-4**	**-7**	**-15**	**10**

Design Criterion	30

Receiver 2: Travelodge - Wicklow Street

External Plant Noise Emissions Calculation

Description	Frequency, Hz 63	125	250	500	1k	2k	4k	8k	dB(A)
Manufacturer provided sound pressure level at 1 metre									
Daikin RXM71R	47	56	49	46	43	36	34	27	48
Correction for Quantity of Units (4)	6	6	6	6	6	6	6	6	
Correction for reflections, dB	6	6	6	6	6	6	6	6	
Screening Correction due to No.4 Leeke Street	-4	-5	-6	-7	-9	-12	-14	-17	
Distance correction to receiver, dB (43 m) [1]	-33	-33	-33	-33	-33	-33	-33	-33	
Sound pressure level at receiver	**22**	**31**	**23**	**18**	**13**	**4**	**-1**	**-10**	**21**

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

Design Criterion	33

BS 8233 Assessment Calculation

Description	Frequency, Hz 63	125	250	500	1k	2k	4k	8k	dB(A)
Sound pressure level outside window	22	31	23	18	13	4	-1	-10	21
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**7**	**16**	**8**	**3**	**-2**	**-11**	**-16**	**-25**	**6**

Design Criterion	30