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17-21 EMERALD STREET,
LONDON

NOISE IMPACT ASSESSMENT

Report **14187-NIA-02**

Prepared on 19 October 2022

Issued For:

AGA Projects Ltd

Executive Summary

This noise impact assessment has been undertaken in order to assess a proposed plant installation for commercial use at 17-21 Emerald Street, London WC1N.

The proposed external plant installation comprises 4 Daikin condenser units, to be installed on the main roof of the office building.

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 the rear façades of residential properties facing onto Lamb's Conduit Street. 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 would be in use during daytime hours only
- The noise emissions data for the proposed units as obtained from available manufacturer information
- Plant and receiver locations are as established in this report and marked on the attached site plan

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.

Contents

List of Attachments

Document Revision	Date of Revision	Reasons for Revision	Revision By
0	18/10/2022	First Issue	Duncan Martin MIOA

1.0 INTRODUCTION

Clement Acoustics has been commissioned by AGA Projects Ltd to measure existing background noise levels at 17-21 Emerald Street, London WC1N. Measured noise levels have been used to determine noise emissions criteria for a proposed plant installation in agreement with the planning requirements of the London Borough of Camden.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures.

An acoustic terminology glossary is provided in Appendix A.

2.0 SITE DESCRIPTION

The site is an office building located on Emerald Street, with office accommodation on every floor and a plant area on the main roof.

Current proposals are to install 4 Daikin condenser units on the main roof of the building. The units will serve an air conditioning installation for ground floor office spaces, and will be in use during typical office working hours.

The surrounding area is predominantly commercial in nature, although potentially residential properties have been located on Lamb's Conduit Street to the southwest and Great James Street to the northeast.

The rear façade of a property facing onto Lamb's Conduit Street 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 than that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receiver should be confirmed by the client before the plant is installed or any noise mitigation measures are implemented.

Locations are shown in attached site plan 14187-NIA-02-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site plan 14187-NIA-02-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 on the main roof of the building, in the location shown on the attached site plan. The microphone was positioned away from reflective surfaces. [1]

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 13:50 on 12 October 2022 and 15:00 on 13 October 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 14187-NIA-02-SP1.

3.2 Weather Conditions

At the time of set-up and collection of the monitoring equipment, the weather conditions were dry with low wind speeds. It is understood that the weather conditions during the unattended survey remained similar.

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 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 plan 14187-NIA-02-SP1.

Measured noise levels are shown as a time history in Figure 14187-NIA-02-TH1, with average ambient and minimum background noise levels summarised in Table 4.1.

Time Period	Average ambient noise level $L_{eq:\,T}$	Minimum background noise level $L_{90:\,5min}$
Daytime (07:00 - 23:00)	54 dB(A)	45 dB(A)
Night-time (23:00 - 07:00)	48 dB(A)	43 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 are as follows:

> *"The 'A' weighted sound pressure level from the plant, when operating at its noisiest, shall not at any time exceed a value of 10 dB below the minimum external background noise, at a point 1 metre outside any window of any residential property."*

It is understood that the proposed plant units will be for office use, operational during daytime hours only.

Based on the results of the environmental noise survey and requirements of the Local Authority, 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)	35 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 units:

- 2 No. Daikin RZASG125MV1 condenser units
- 2 No. Daikin RXM35R9 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.

Plant Unit	Sound Pressure Levels (at 1 meter, dB) in each Frequency Band								
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Daikin RZASG125MV1 condenser unit	55	64	58	55	51	47	43	36	57
Daikin RXM35R9 condenser unit	52	53	51	49	45	40	36	28	51

Table 6.1: Manufacturer provided noise emissions levels

The proposed plant location is on the main roof of the building, around a central stair core structure which is shown on indicative site plan 14187-NIA-02-SP1.

6.2 Noise Impact Assessment

The closest receiver has been identified as window on the rear facade of a potentially residential property on Lamb's Conduit Street which is a minimum of 27 m from the proposed plant location.

Direct line of sight has been assumed between all proposed units and the receptor, which is considered particularly robust.

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.2. Detailed calculations are shown in Appendix B.

Receiver	Daytime Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	35 dB(A)	35 dB(A)

Table 6.2: Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.2 and Appendix B, the proposed plant installation would be expected to meet the requirements of the proposed criteria.

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 35 dB(A) as being acceptable internal resting conditions during daytime.

With loudest external levels of 35 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 6.3.

Receiver	Recommended Target – *For resting conditions in a bedroom, in BS 8233: 2014*	Noise Level at Receiver (due to plant installation)
Inside Residential Window	35 dB(A)	20 dB(A)

Table 6.3: Noise levels and BS 8233: 2014 criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 17-21 Emerald Street, London WC1N. 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 Local Authority.

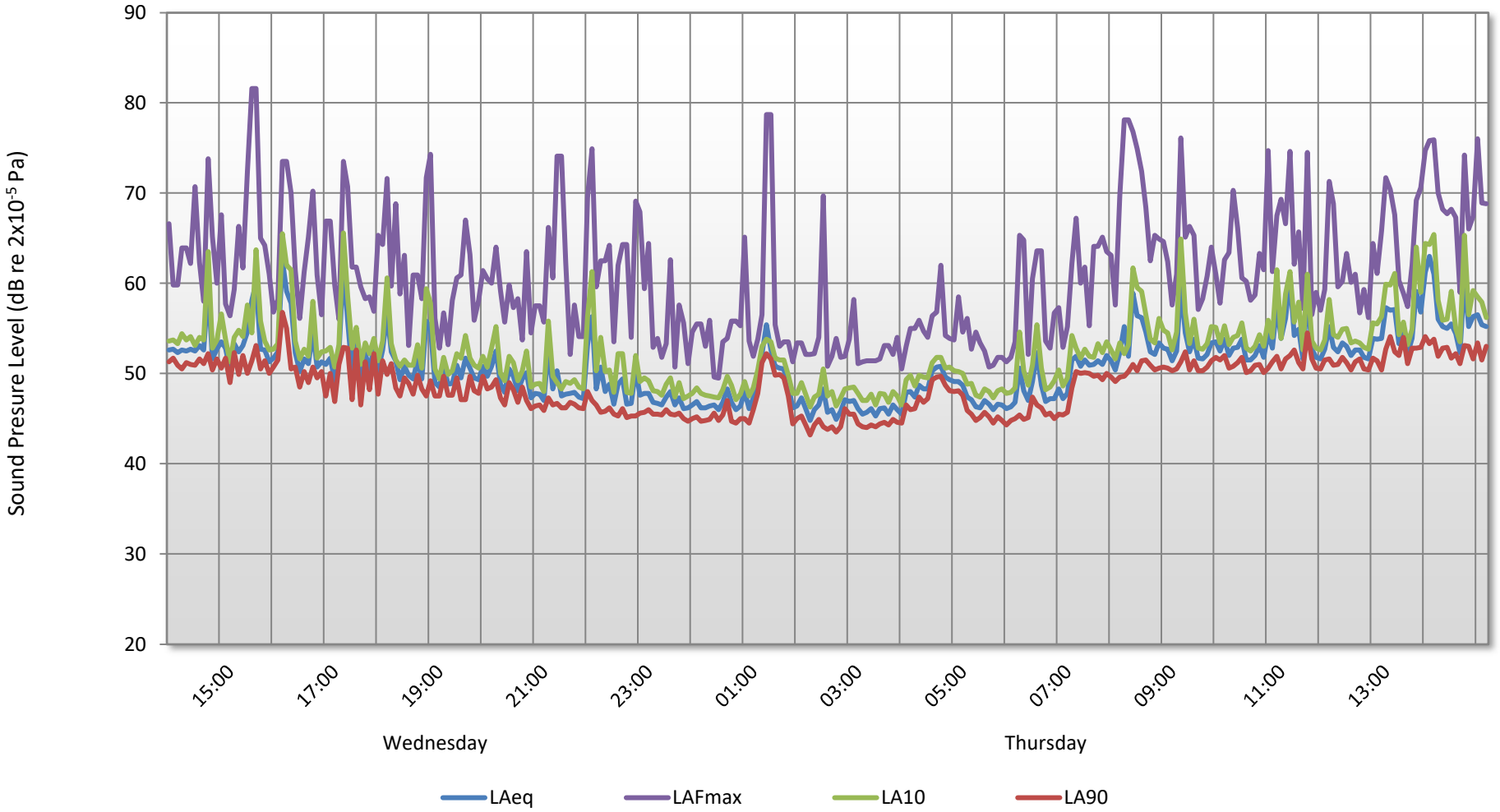
Author	**Duncan Martin** Director BSc (Hons) MIOA		19 October 2022
Reviewed	**Kenny Macleod** Senior Consultant BSc (Hons) MIOA		19 October 2022

14187-NIA-02-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 19 October 2022

17-21 Emerald Street, London

Position 1

Environmental Noise Time History
12 October 2022 to 13 October 2022



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.

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

14187

17-21 Emerald Street, London

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Receiver
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressure level at 1 metre									
Daikin RZASG125MV1 condenser unit	55	64	58	55	51	47	43	36	57
Daikin RZASG125MV1 condenser unit	55	64	58	55	51	47	43	36	57
Daikin RXM35R9 condenser unit	52	53	51	49	45	40	36	28	51
Daikin RXM35R9 condenser unit	52	53	51	49	45	40	36	28	51
Cumulative sound pressure level at 1 m	**60**	**67**	**62**	**59**	**55**	**51**	**47**	**40**	**61**
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (27 m) [1]	-29	-29	-29	-29	-29	-29	-29	-29	
Sound pressure level at receiver	**34**	**41**	**36**	**33**	**29**	**25**	**21**	**14**	**35**

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

Design Criterion	**35**

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window	34	41	36	33	29	25	21	14	35
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**19**	**26**	**21**	**18**	**14**	**10**	**6**	**-1**	**20**

Design Criterion	**35**