London office
1B(c) Yukon Road
London
SW12 9PZ
Tel: 0203 475 2280
Fax: 0203 475 2281
info@clementacoustics.co.uk

Manchester office
105 Manchester Road
Bury
BL9 0TD
Tel: 0161 850 2280
Fax: 0203 475 2281
info@clementacoustics.co.uk

17-21 EMERALD STREET,
LONDON

NOISE IMPACT ASSESSMENT

Report **14187-NIA-01-RevC**

Prepared on 18 June 2019

Issued For:

AGA Projects Ltd

77 St John's Road

Westcliff-on Sea

Essex

SS0 7JY

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by AGA Projects Ltd to measure existing background noise levels at 17-21 Emerald Street, London. The measured noise levels have been used to determine noise emission 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.

2.0 SITE DESCRIPTION

Current proposals are to install 2 No. Daikin RZQSG125L9V1B condenser units, and 2 No. Daikin 5MXS90E3V3B2 condenser units on the 3rd storey roof at the front of the building.

The 2nd storey window on the rear facade of a residential property opposite 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 receptor 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-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 14187-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the site.

The microphone was mounted on a pole on a 3rd storey flat roof at the rear of the building. 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. Dominant noise levels at the monitoring position were dominated by traffic noise during the installation and collection of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 11:00 on 17 October 2018 and at 11:00 on 18 October 2018.

Weather conditions were generally dry with light winds, therefore suitable for the measurement of environmental noise.

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 Equipment

The equipment calibration was verified 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
- Norsonic Type 1251 Class 1 Calibrator

4.0 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 14187-SP1.

The measured noise levels are shown as a time history in Figure 14187-TH1, with ambient and background noise levels summarised in Table 4.1.

	Average ambient noise level $L_{eq:\ T}$	Minimum background noise level $L_{90:\ 5min}$
Daytime (07:00 - 23:00)	53 dB(A)	46 dB(A)
Night-time (23:00 - 07:00)	49 dB(A)	45 dB(A)

Table 4.1: Minimum background noise levels

5.0 NOISE CRITERIA

The London Borough of Camden general criteria for noise emissions are as follows:

> *"The total noise from fixed plant associated with the application site, when at a point 1m external to the nearest noise sensitive residential facades shall be at least 10 dB(A) less than the existing background measurement (LA90), expressed in dB(A), when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that is distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses(bangs, clicks, clatters, thumps), then the noise levels from the plant/equipment at any sensitive façade shall be at least 15 dB(A) below background noise level."*

It is understood that the proposed plant units will be for commercial use, operational during daytime hours only. We therefore propose to set the noise criteria at 36 dB(A), the value 10 dB below the minimum measured background noise level during the daytime hours.

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 2 No. Daikin RZQSG125L9V1B condenser units,
- 2 No. Daikin 5MXS90E3V3B2 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.

	Sound Pressure Levels (at 1 meter, dB) in each Frequency Band								
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**dB(A)**
Daikin RZQSG125L9V1B	57	62	61	57	52	48	43	37	58
Daikin 5MXS90E3V3B2	57	53	52	51	48	42	38	32	52

Table 6.1: Manufacturer noise emissions levels

The proposed plant location is on the 3rd storey roof at the front of the building which is shown on indicative site plan 14187-SP1.

The closest receiver has been identified as the 2nd storey window on the rear facade of a residential property opposite which is a minimum of 24 m from the proposed plant location.

6.2 Noise Impact Assessment

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 Hours Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	36 dB(A)	34 dB(A)

Table 6.2: Noise levels and criteria 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 units 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/sleeping conditions during daytime.

With loudest external levels of 34 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 daytime resting conditions in a bedroom, in BS 8233: 2014*	Noise Level at Receiver (due to plant installation)
Inside Residential Window	35 dB(A)	19 dB(A)

Table 6.3: Noise levels and criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 17-21 Emerald Street, London. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant units 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 plant units should meet the requirements of the London Borough of Camden.

Report by

Kenny Macleod AMIOA

Checked by

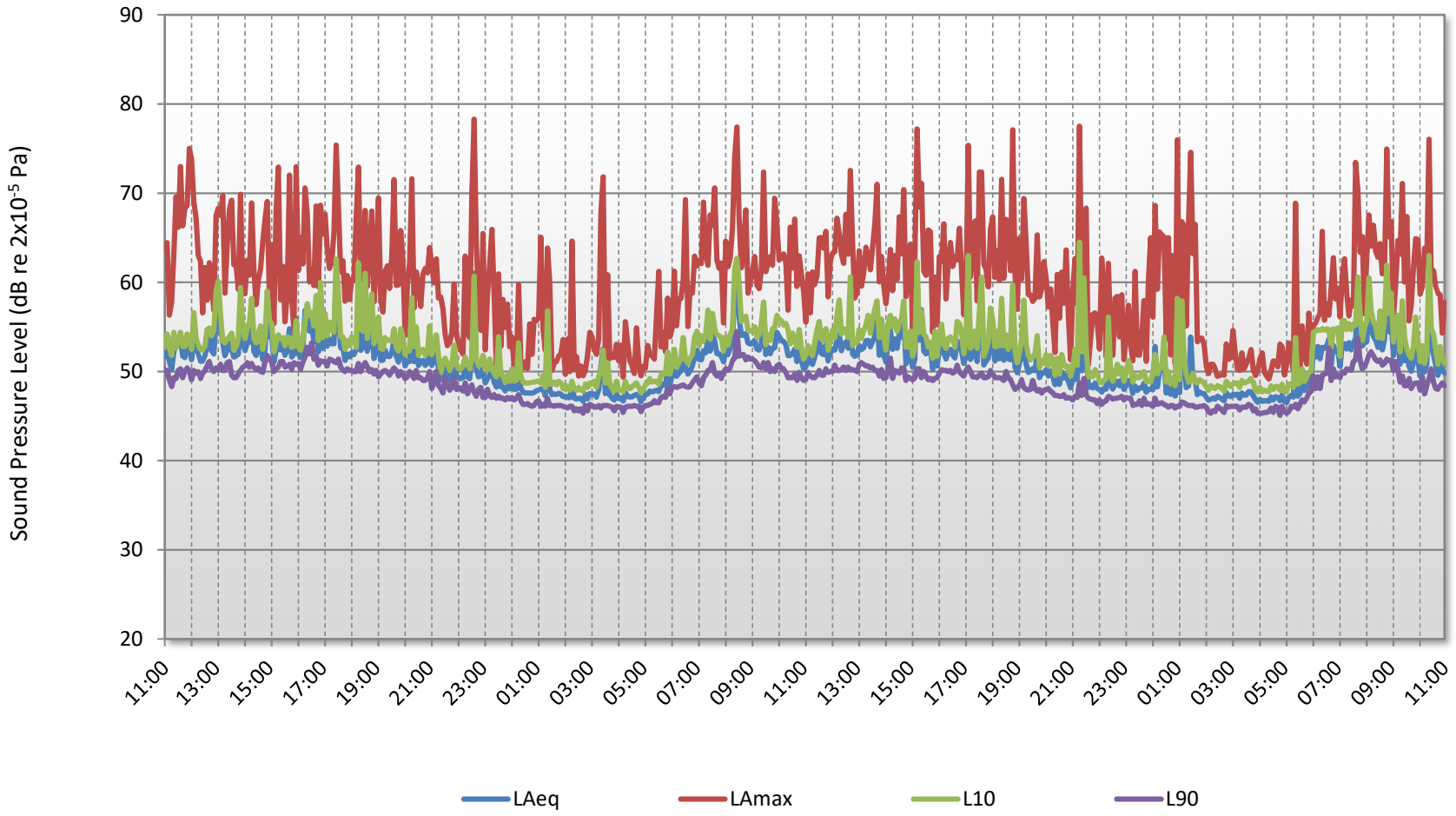
Duncan Martin MIOA

14187-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 18 June 2019

17-21 Emerald Street, London

Environmental Noise Time History

17 October 2018 to 19 October 2018



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 10dB 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

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 RZQSG125L9V1B	57	62	61	57	52	48	43	37	58
Correction for number of units, dB (2 No.)	3	3	3	3	3	3	3	3	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Correction due to screening from roof edge, dB	0	-1	-2	-4	-6	-8	-10	-13	
Distance correction to receiver, dB (24m)	-28	-28	-28	-28	-28	-28	-28	-28	
Total Sound pressure level	**35**	**39**	**37**	**32**	**25**	**18**	**11**	**2**	**33**
Daikin 5MXS90E3V3B2	57	53	52	51	48	42	38	32	52
Correction for number of units, dB (2 No.)	3	3	3	3	3	3	3	3	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Correction due to screening from roof edge, dB	0	-1	-2	-4	-6	-8	-10	-13	
Distance correction to receiver, dB (24m)	-28	-28	-28	-28	-28	-28	-28	-28	
Total Sound pressure level	**35**	**30**	**28**	**25**	**21**	**12**	**6**	**0**	**27**
Sound pressure level at receiver	**38**	**40**	**38**	**33**	**26**	**19**	**13**	**4**	**34**

Design Criterion	**36**

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	38	40	38	33	26	19	13	4	34
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**23**	**25**	**23**	**18**	**11**	**4**	**0**	**0**	**19**

Design Criterion	**35**