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177 WEST END LANE,
LONDON

NOISE IMPACT ASSESSMENT

Report **17812-NIA-01**

Prepared on 02 September 2022

Issued For:

MAESTRO PROPERTIES LIMITED

Institute of Acoustics sponsoring organisation
committed to CSCS Platinum award
CQMS Safety Scheme
ISO 17025 Quality Assurance
CHAS Accredited Contractor
Constructionline
UKAS TESTING 7688

2 September 2022
17812-NIA-01

Executive Summary

This noise impact assessment has been undertaken in order to assess a plant installation for commercial use at 177 West End Lane, London.

The plant installation comprises the following plant units:

- 1 No. Mitsubishi SAF150E7 ventilation and heat exchange unit
  - Installed internally with intake and discharge ductwork to atmosphere
- 1 No. Mitsubishi SCM-80ZS-W condenser unit
  - Installed externally

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 London Borough Council.

Calculations were undertaken for the nearest identified receiver, identified as the rear façade of a residential property opposite. 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 between 08:00 and 18:00 only
- The noise emissions data for the plant 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 acoustic absorptive panels around the condenser unit

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.

2 September 2022
17812-NIA-01

Contents

List of Attachments

Document Revision	Date of Revision	Reasons for Revision	Revision By
0	02/09/2022	First Issue	Kenny Macleod MIOA

1.0 INTRODUCTION

Clement Acoustics has been commissioned by MAESTRO PROPERTIES LIMITED to measure existing background noise levels at 177 West End Lane, London. Measured noise levels have been used to determine noise emissions criteria for a plant installation in agreement with the planning requirements of Camden London Borough 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 bound by West End Lane to the east, and existing commercial and residential buildings to all other elevations. The surrounding area is mixed commercial/residential in nature.

The current plant installation comprises 1 No. Mitsubishi SAF150E7 ventilation and heat exchange unit (installed internally with intake and discharge ductwork to atmosphere) and 1 No. Mitsubishi SCM-80ZS-W condenser unit (installed externally) for use by the basement studio.

The second floor window on the rear façade of No. 177 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 17812-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 17812-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 pole attached to a drainpipe above first floor roof level. The microphone was positioned over 3.5 m away from vertical reflective surfaces. 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 13:25 on 19 August 2022 and 09:10 on 22 August 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*'.

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 19 August 2022					
1	< 4 m/s	W	22 °C	20 %	None
Meter Collection 22 August 2022					
1	3 m/s	N	20 °C	20 %	None

Table 3.1: Noted weather conditions during surveys

It is understood that the weather conditions during the unattended survey remained dry with light winds.

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 977 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 17812-SP1.

Measured noise levels are shown as a time history in Figure 17812-TH1, with average ambient and typical background noise levels summarised in Table 4.1.

It should be noted that the guidance of the latest revision of British Standard 4142: 2014 +A1 2019 *'Methods for rating and assessing industrial and commercial sound'*, as detailed in Section 8.1 of the standard is as follows:

'The objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.'

Therefore, the typical background noise level will be used for the purpose of this assessment.

Time Period	Average ambient noise level $L_{eq:\,T}$	Typical background noise level [1] $L_{90:\,5min}$
Daytime (07:00 - 23:00)	65 dB(A)	46 dB(A)
Night-time (23:00 - 07:00)	59 dB(A)	47 dB(A)
Operating Hours (08:00 - 18:00)	63 dB(A)	46 dB(A)

Table 4.1: Average ambient and typical background noise levels

Note [1]: The typical background noise level has been determined by excluding periods where existing plant is operational and the dominant noise source. The existing plant was observed to operate between 11:00 am and 02:30 am.

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 Camden London Borough Council general criteria for noise emissions are outlined in the Camden Local Plan (2017) and 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 (15 dB if tonal components are present) should be considered as the design criterion."*

It is understood that the plant units are for commercial use, operational between 08:00 and 18:00 only.

Based on the results of the environmental noise survey and requirements of Camden London Borough Council, 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 $L_{eq;T}$
Operating Hours (08:00 - 18:00)	36 dB(A)

Table 5.1: Plant noise emission limits

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Plant Installation

The plant installation comprises the following:

- 1 No. Mitsubishi SAF150E7 ventilation and heat exchange unit
  - Installed internally with intake and discharge ductwork to atmosphere
- 1 No. Mitsubishi SCM-80ZS-W condenser unit
  - Installed externally

Noise emissions for the 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	Noise Emissions Levels (dB) in each Frequency Band								
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Mitsubishi SAF150E7 Outside Air [1] Induct Sound Power Level	49	59	61	55	49	37	38	37	56
Mitsubishi SAF150E7 Exhaust Air [1] Induct Sound Power Level	49	59	61	55	49	37	38	37	56
Mitsubishi SCM-80ZS-W [2] Sound Pressure Level at 1 m	57	54	54	52	49	44	40	32	54

Table 6.1: Manufacturer provided noise emissions levels

Note [1]: Noise levels as provided by the manufacturer only include casing breakout data. Therefore, the ducted noise levels have been estimated using noise data taken from a comparable unit.
Note [2]: Noise levels as provided by the manufacturer do not include spectral data, as only the overall level is available. The octave band data for a comparable unit has therefore been used, shifted accordingly.

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 plant units are considered to be generally broadband and continuous in nature and therefore no penalty has been applied.

The plant locations are as follows (as shown on indicative site plan 17812-SP1):

- Intake grille: approximately 3 m above ground floor level on the rear façade of the building,
- Exhaust grille: approximately 0.5 m above ground floor level on the rear façade of the building,
- Condenser unit: at ground floor level in the rear garden of the property.

6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0, it is recommended that the two surfaces around the condenser (i.e., the fence and the studio glass façade) are lined with acoustic absorptive panels so as to reduce reflections. This could take the form of mineral wool enclosed in a perforated steel casing, and should be of sufficient thickness to ensure that Class A absorption is achieved.

Should the condenser need to be relocated to achieve this, it should be moved no more than 0.5 m from the building façade, to ensure that the same level of screening is still provided.

The lining should extend above and to the side of the condenser, as indicated in Figure 6.1 below.

Figure 6.1: Location of proposed acoustic panels (to extend behind condenser unit)

6.3 Noise Impact Assessment

The closest receiver has been identified as the second-floor window on the rear façade of the same building, which is a minimum of 4.5 m from the closest plant location (intake air grille).

Screening of the nearest noise sensitive receptor is provided by the building envelope. This is provided by the balcony of the residential receiver and the building fabric of the basement studio.

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.4. Detailed calculations are shown in Appendix B.

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

Table 6.4: Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.4 and Appendix B, the plant installation with acoustic enclosure 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 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 conditions during daytime.

With loudest external levels of 36 dB(A), acceptable internal conditions would be met by 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 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 6.5.

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)	21 dB(A)

Table 6.5: Noise levels and BS 8233: 2014 criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 177 West End Lane, London. The results of the survey have enabled criteria to be set for noise emissions from the plant installation in accordance with the requirements of Camden London Borough Council.

A noise impact assessment has then been undertaken using manufacturer noise data to predict the noise levels, due to the plant, at the nearby noise sensitive receivers.

Calculations show that noise emissions from the plant units should meet the requirements of Camden London Borough Council with the recommended mitigation installed as stated herein.

Author	**Kenny Macleod** Senior Consultant BSc (Hons) MIOA	[redacted]	2 September 2022
Reviewed	**Andrew Thomas** Principal Consultant BSc (Hons) MIOA		2 September 2022
Approved	**Duncan Martin** Director BSc (Hons) MIOA		2 September 2022

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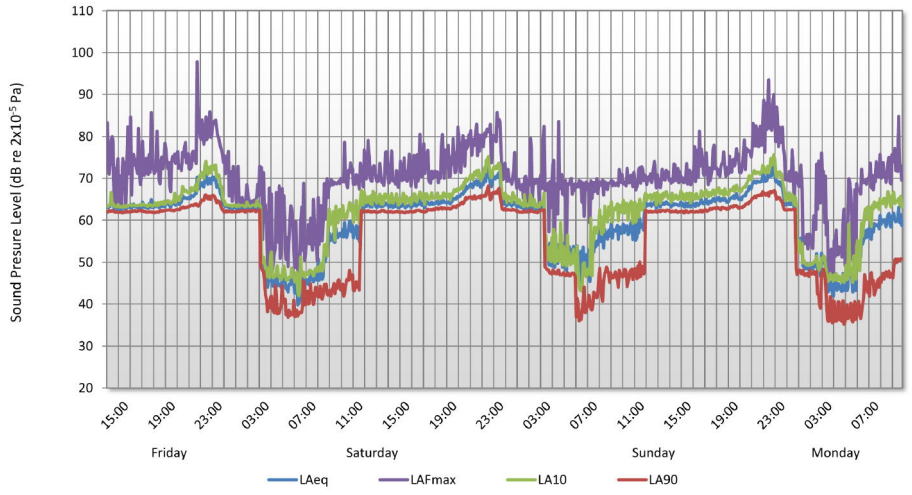
Noise Survey Position

Noise Sensitive Receiver

17812-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 2 September 2022

177 West End Lane, London

Environmental Noise Time History
19 August 2022 to 22 August 2022



17812-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.

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

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177 WEST END LANE, LONDON

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Receiver
Source: Plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Estimated noise emissions levels (from manufacturer data)									
Mitsubishi SAF150E7 - Outside Air (Induct Sound Power Level)	49	59	61	55	49	37	38	37	56
End reflection, dB	-14	-9	-5	-2	0	0	0	0	
Radiating correction, dB	-8	-8	-8	-8	-8	-8	-8	-8	
Directivity correction, dB	0	0	0	0	-4	-7	-7	-7	
Attenuation due to screening from external building fabric, dB	0	-1	-3	-5	-8	-11	-14	-17	
Distance correction to receiver, dB (4.5 m) [1]	-13	-13	-13	-13	-13	-13	-13	-13	
Sound pressure level at receiver	**14**	**28**	**32**	**26**	**15**	**-2**	**-4**	**-9**	**27**
Mitsubishi SAF150E7 - Exhaust Air (Induct Sound Power Level)	49	59	61	55	49	37	38	37	56
End reflection, dB	-14	-9	-5	-2	0	0	0	0	
Radiating correction, dB	-5	-5	-5	-5	-5	-5	-5	-5	
Directivity correction, dB	0	0	0	0	-4	-7	-7	-7	
Attenuation due to screening from external building fabric, dB	0	-1	-3	-5	-7	-10	-13	-17	
Distance correction to receiver, dB (7.5 m) [1]	-18	-18	-18	-18	-18	-18	-18	-18	
Sound pressure level at receiver	**12**	**27**	**31**	**25**	**15**	**-3**	**-5**	**-10**	**26**
Mitsubishi SCM-80ZS-W (Sound Pressure Level at 1 m)	57	54	54	52	49	44	40	32	54
Correction for reflections, dB (including Acoustic Absorptive Panels)	3	3	3	3	3	3	3	3	
Attenuation due to screening from external building fabric, dB	-3	-3	-3	-4	-4	-5	-6	-8	
Distance correction to receiver, dB (8 m) [1]	-18	-18	-18	-18	-18	-18	-18	-18	
Sound pressure level at receiver	**39**	**36**	**36**	**33**	**30**	**24**	**19**	**9**	**35**
Cumulative sound pressure level at receiver	**39**	**37**	**38**	**35**	**31**	**25**	**20**	**10**	**36**

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

Design Criterion	**36**

BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window
Source: Plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window	39	37	38	35	31	25	20	10	36
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**24**	**22**	**23**	**20**	**16**	**10**	**5**	**-5**	**21**

Design Criterion	**35**