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154-158 WEEDINGTON ROAD
LONDON

NOISE IMPACT ASSESSMENT

Report **16326-NIA-01**

Prepared on 24 February 2021

Issued For:

Kentish Town Baitul Aman Mosque Charity

154-158 Weedington Road

London

NW5 5NU

Executive Summary

This noise impact assessment has been undertaken in order to assess a proposed plant installation for commercial use at 154-158 Weedington Road, London NW5 4NU.

The proposed plant installation comprises the following plant units:

- 2 No. of Mitsubishi PUMY-P200YKM2R 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 London Borough of Camden.

Calculations were undertaken for the nearest identified receivers, identified as two first floor windows of the adjacent apartment block. 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 will be in use between the hours of 12:00 – 20:00
- 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

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

Document Revision	Date of Revision	Reasons for Revision	Revision By
0	24/02/2020	First Issue	Daniel Hagan AMIOA

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Kentish Town Baitul Aman Mosque Charity to measure existing background noise levels at 154-158 Weedington Road, London NW5 4NU. 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 bound by Weedington Road to the front (south) and an existing block of flats to the rear (north). The nature of the surrounding area is a mix of commercial and residential properties.

Current proposals are to install two condenser units at the rear of the site, one positioned either side of the external wall.

Two separate dwellings in the adjacent apartment block 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 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 16326-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 16326-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 wall at ground floor level to the rear of the building. The microphone was positioned less than 1 m from the wall [1]

Table 3.1: Description of unattended monitoring locations

Note [1]: 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 11:00 on 23 November 2020 and 11:00 on 24 November 2020.

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 16326-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

Weather conditions during the survey period have been obtained from the internet resource www.wunderground.com, which identified London City Airport as the nearest weather station. Wunderground.com indicates no precipitation, light winds and generally cloudy conditions.

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 drawing 16326-SP1.

Measured noise levels are shown as a time history in Figure 16326-TH1, with average ambient and typical background noise levels summarised in Table 4.1.

Time Period	Average ambient noise level $L_{eq: T}$	Typical background noise level $L_{90: 15min}$
Daytime (07:00 - 23:00)	49 dB(A)	38 dB(A)
Night-time (23:00 - 07:00)	38 dB(A)	37 dB(A)
Proposed Operating Hours (12:00 - 20:00)	51 dB(A)	38 dB(A)

Table 4.1: Average ambient and typical background noise levels

5.0 NOISE CRITERIA

In this instance, the London Borough of Camden criteria for noise emissions 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)"

Based on the results of the environmental noise survey between the proposed operating hours and requirements of the Local Authority, Table 5.1 presents the proposed plant noise emission criteria:

Period	Plant Noise Emission Limit $L_{eq: T}$
Proposed Operating Hours	28 dB(A)

Table 5.1: Plant noise emission limit

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 2 No. Mitsubishi PUMY-P200YKM2R 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 metre, dB) in each Frequency Band								
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
PUMY-P200YKM2R	63	61	61	58	57	52	49	41	61

Table 6.1: Manufacturer provided noise emissions levels

The proposed plant locations are located to the rear of 154 – 158 Weedington Road, which are shown on indicative site plan 16326-SP1.

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 the plant. The enclosure should provide sufficient attenuation to achieve a maximum sound pressure level of 43 dB(A) when measured at 1 m in all directions.

Based on the information provided, an enclosure meeting the sound reduction indices as stated in Table 6.3 should be suitable to achieve this.

Mitigation	*Required Attenuation (dB) in each Frequency Band*							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Louvred Enclosure	8	10	17	24	25	25	23	24

Table 6.3: Required attenuation from mitigation

6.3 Noise Impact Assessment

The closest receivers have been identified as the windows overlooking the rear façade of 154 – 158 Weedington Road, which can be seen in 16326-SP1. Distances between the proposed units and the windows as mentioned in Table 6.4 can be found in Appendix B.

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 proposed plant)
First Floor Window Adjacent to Proposed Right Side Unit	28 dB(A)	28 dB(A)
First Floor Window Closest to Proposed Left Side Unit		27 dB(A)

Table 6.4: Noise levels and criterion at noise sensitive receivers

As presented in Table 6.4 and Appendix B, the proposed plant installation with acoustic enclosures 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 35 dB(A) as being acceptable internal resting conditions during daytime.

With loudest external levels of 28 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 6.5.

Receiver	Recommended Target – *For resting conditions in a bedroom, in BS 8233: 2014*	Noise Level at Receiver (due to plant installation)
First Floor Window Adjacent to Proposed Right Side Unit	35 dB(A)	13 dB(A)
First Floor Window Closest to Proposed Left Side Unit		12 dB(A)

Table 6.5: Noise levels and criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 154-158 Weedington Road, London NW5 4NU. 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.

Author	**Dan Hagan** Assistant Consultant BSc (Hons) AMIOA		24 February 2021
Reviewed	**Kenny Macleod** Consultant BSc (Hons) MIOA		24 February 2021
Approved	**John Smethurst** Director BSc (Hons) MIOA		24 February 2021

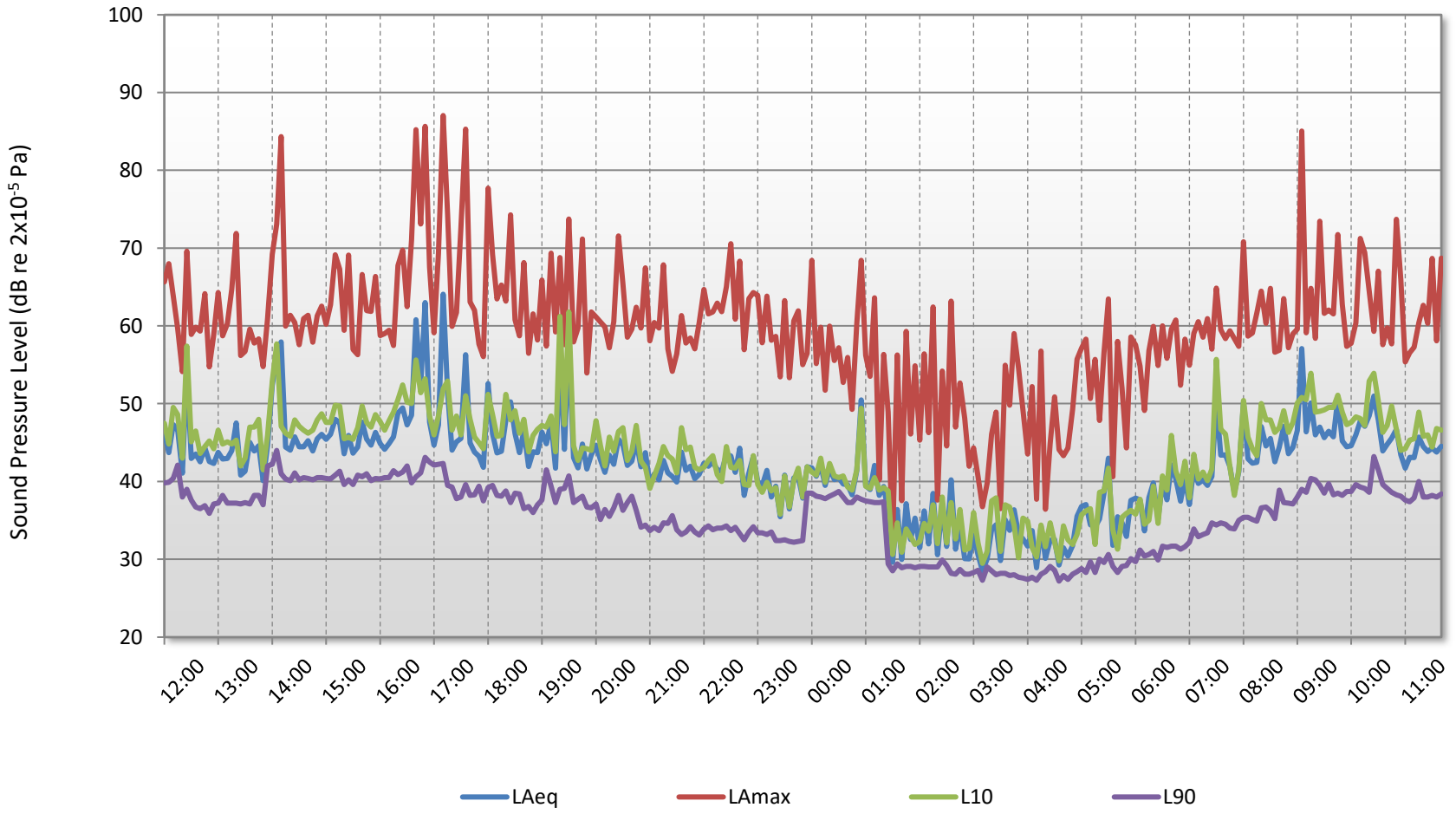
16326-SP1 Indicative site plan indicating noise monitoring position, nearest noise sensitive receivers and proposed plant unit locations

Date: 24 February 2021

154-158 Weedington Road, London

Environmental Noise Time History

23 November 2020 to 24 November 2020



16326-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 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 B1

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154-158 Weedington Road, London

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: First Floor Window Adjacent to Right Side Plant Unit
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressure level at 1 metre									
Mitsubishi PUMY-P200YKM2R2 (Right Side of Rear Wall)	63	61	61	58	57	52	49	41	61
Proposed Louvred Enclosure, dB	-8	-10	-17	-24	-25	-25	-23	-24	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (6 m) [1]	-16	-16	-16	-16	-16	-16	-16	-16	
Sound Pressure Level at Receiver, dB	42	38	31	21	19	14	13	4	28
Mitsubishi PUMY-P200YKM2R2 (Left Side of Rear Wall)	63	61	61	58	57	52	49	41	61
Proposed Louvred Enclosure, dB	-8	-10	-17	-24	-25	-25	-23	-24	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (17 m) [1]	-25	-25	-25	-25	-25	-25	-25	-25	
Sound Pressure Level at Receiver, dB	33	29	22	12	10	5	4	-5	19
Cummalitve sound pressure level at receiver	**43**	**39**	**32**	**22**	**20**	**15**	**14**	**5**	**28**

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

Design Criterion	**28**

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	43	39	32	22	20	15	14	5	28
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**28**	**24**	**17**	**7**	**5**	**0**	**-1**	**-10**	**13**

Design Criterion	**30**

APPENDIX B2

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154-158 Weedington Road, London

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: First Floor Window Closest to Left Side Unit
Source: Proposed plant installation

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Manufacturer provided sound pressure level at 1 metre									
Mitsubishi PUMY-P200YKM2R2 (Left Side of Rear Wall)	63	61	61	58	57	52	49	41	61
Proposed Louvred Enclosure, dB	-8	-10	-17	-24	-25	-25	-23	-24	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (9 m) [1]	-19	-19	-19	-19	-19	-19	-19	-19	
Sound Pressure Level at Receiver, dB	39	35	28	18	16	11	10	1	24
Mitsubishi PUMY-P200YKM2R2 (Right Side of Rear Wall)	63	61	61	58	57	52	49	41	61
Proposed Louvred Enclosure, dB	-8	-10	-17	-24	-25	-25	-23	-24	
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (9 m) [1]	-19	-19	-19	-19	-19	-19	-19	-19	
Sound Pressure Level at Receiver, dB	39	35	28	18	16	11	10	1	24
Cumulative sound pressure level at receiver	**42**	**38**	**31**	**21**	**19**	**14**	**13**	**4**	**27**

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

Design Criterion	**28**

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	42	38	31	21	19	14	13	4	27
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**27**	**23**	**16**	**6**	**4**	**-1**	**-2**	**-11**	**12**

Design Criterion	**30**