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LILLIAN PENSON HALL,
15-25 TALBOT SQUARE, LONDON

NOISE IMPACT ASSESSMENT

Report **16399-NIA-02 - RevC**

Prepared on 14 December 2023

Issued For:

LPH Paddington Ltd

Executive Summary

This noise impact assessment has been undertaken in order to assess proposed plant replacement works to Lillian Penson Hall, 15-25 Talbot Square, London.

The proposed plant installation comprises 29 No. Toshiba Condenser Units, to be installed on the main roof of the building. These units have been designed to replace the existing roof top plant, which is now old and inefficient. This will help to improve the buildings EPC Rating to "B" and enable the client to realise their aspiration to reduce carbon emissions.

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 Westminster City Council.

Calculations were undertaken for the nearest identified receiver, identified as the windows on the rear façades of the adjacent buildings (assumed to be residential properties). Onsite receivers have been identified as bedrooms within the existing student accommodation itself.

It has been demonstrated that compliance with the established criterion is feasible, dependant 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
- Mitigation is applied as recommended in this report, in the form of 'acoustic kits' for all units, as well as screening around all plant units

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

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16399-NIA-02-TH1 & TH2	Environmental Noise Time Histories
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Mitigation Details

Issue	Date of Issue	Author	Reviewed	Authorised
RevD	10/11/2023	**Jamie Newton** Senior Consultant BEng (Hons) MIOA	**Duncan Martin** Director BSc (Hons) MIOA	**John Smethurst** Director BSc (Hons) MIOA

Issue	Comment
0	First issue
RevA	Minor amendments to wording based on client feedback
RevB	Further minor amendments based on feedback received
RevC	Amendments and reassessment due to change in condenser units and locations
RevD	Amendments to clarify screen heights

1.0 INTRODUCTION

Clement Acoustics has been commissioned by LPH Paddington Ltd to measure existing background noise levels at Lillian Penson Hall, 15-25 Talbot Square, London. Measured noise levels have been used to determine noise emissions criteria for a proposed plant installation in agreement with the planning requirements of Westminster City 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 Conduit Place to the northwest, Conduit Passage to the southwest, and neighbouring buildings to the northeast and southeast. Talbot Square lies to the southeast. The surrounding area is mixed commercial and residential in nature.

Current proposals are to install 29 No. Toshiba condenser units on the main roof to serve the student accommodation.

The closest offsite receivers have been identified as the windows on the rear façades of the adjacent buildings (assumed to be residential properties) have been identified as the nearest affected offsite receivers. These nearest noise sensitive receivers were identified through observations on-site as well as via satellite imaging online. Onsite receivers have been identified as bedrooms within the existing student accommodation itself.

Locations are shown in attached site plan 16399-NIA-02-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at two positions as shown in Figure 3.1 below. The choice of these positions was based both on accessibility and on collecting representative noise data in relation to the nearest affected receiver.

Figure 3.1: Indicative site plan indicating noise monitoring positions and nearest noise sensitive receivers (image © Google)

The surroundings and position used for each monitoring location are described in Table 3.1.

Position No.	Description
1	The microphone was mounted on a 1st storey window at the front of the building overlooking Talbot Square. The microphone was positioned 1 m in front of the window. [1]
2	The microphone was mounted on a 1st storey window at the rear of the building overlooking Conduit Place. The microphone was positioned 1 m in front of the window. [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 as follows:

- Position 1: Between 09:30 on 4 January 2023 and 09:10 on 6 January 2023,
- Position 2: Between 09:45 on 4 January 2023 and 10:05 on 6 January 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

At the time of set-up and collection of the monitoring equipment, the weather conditions were generally dry with light winds. It is understood that the weather conditions during the unattended survey remained dry with light winds.

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.

- 2 No. Svantek Type 957 Class 1 Sound Level Meters
- 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 locations shown in site drawing 16399-NIA-02-SP1.

Measured noise levels are shown as time histories in Figures 16399-NIA-02-TH1 and 16399-NIA-02-TH2, 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 $L_{90:\ 5min}$
POSITION 1		
Daytime (07:00 - 23:00)	56 dB(A)	40 dB(A)
Night-time (23:00 - 07:00)	49 dB(A)	35 dB(A)
POSITION 2		
Daytime (07:00 - 23:00)	56 dB(A)	44 dB(A)
Night-time (23:00 - 07:00)	52 dB(A)	42 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 Policies D13 and D14 of the London Plan 2021, which contain the following relevant sections:

"D13 - Agent of change

> *(C) New noise and other nuisance-generating development proposed close to residential and other noise-sensitive uses should put in place measures to mitigate and manage any noise impacts for neighbouring residents and businesses.'*

D14 - Noise. 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:

(1) avoiding significant adverse noise impacts on health and quality of life;

(2) reflecting the Agent of Change principle as set out in Policy D13 Agent of Change [see above] ..."

The adopted Westminster City Plan 2019-2040 contains the following policy, which has been considered throughout this assessment:

"*33. C Development should prevent adverse effects of noise and vibration and improve the noise environment in compliance with the council's Noise Thresholds, with particular attention to:*

2. *minimising noise from plant machinery and internal activities*".

The above policies from the adopted plan and adopted city plan have been considered when determining suitable criteria for noise emissions from plant.

5.2 Local Authority Criteria

The Westminster City Council criteria for noise emissions are summarised in Figure 5.1.

Required Standards

Minimising noise from plant machinery and internal/external activities
Development including plant or machinery, or proposed uses that cause noise from amplified/unamplified music or human voices both internally and externally, even when windows and doorways are open, should achieve the following standards:

Table 3: Noise and vibration criteria for plant machinery and internal/external activities.

Existing External Ambient Noise Level	Tonal or Intermittent Noise/Noise Source	Noise level that should not be exceeded at the nearest Noise sensitive Receptor*[1]
Exceeds WHO Guideline levels L_{Aeq} 55 dB over periods of day-time (7am–11pm) and L_{Aeq} 45 dB at night-time (11pm–7am)	Does not contain tones or intermittent noise sufficient to attract attention	10 dB below the minimum external background noise level
	Contains tones or intermittent noise sufficient to attract attention	15 dB below the minimum external background noise level
	Noise emitted from emergency plant or an emergency life supporting generator	10 dB above the lowest background noise level within a 24-hour period.
Does not exceed WHO Guideline levels. L_{Aeq} 55 dB over periods of daytime (7am–11pm) and L_{Aeq} 45 dB night-time (11pm–7am).	Does not contain tones or intermittent noise sufficient to attract attention	5 dB below the minimum external background noise level.
	Contains tones or intermittent noise sufficient to attract attention	10 dB below the minimum external background noise level
	Noise emitted from emergency plant or an emergency life supporting generator	10 dB above the lowest background noise level within a 24 hour period
Below 30 dB $L_{A90,15min}$ at the nearest noise sensitive receptors Both day-time (7am–11pm) and night-time (11pm–7am)	Noise contains and/or does not contain tones or intermittent noise	Site specific standards that avoid noise disturbance to nearest noise sensitive receptors may be considered

*[1] Measured at the nearest noise sensitive receptor 1m from the most affected façade, relative to the existing external background noise level in this location and including assessment at the quietest time during which the plant operates or when there is internal activity at the development site. The background noise level should be expressed in terms of the lowest $L_{A90,15min}$ during day time or night time (depending on the hours of use being applied for).
29

Figure 5.1: Summary of City of Westminster criteria for plant noise emissions

The ambient noise levels, as shown in Table 4.1 exceed the WHO Guideline levels of L_{Aeq} 55 dB during daytime hours and L_{Aeq} 45 dB during night-time hours.

It is understood that the proposed plant units will be to serve the student accommodation, and could be operational any time over a 24 hour period.

Based on the results of the environmental noise survey, the nature of the proposed plant and requirements of Westminster City 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 $L_{eq:T}$
POSITION 1	
Daytime (07:00 - 23:00)	30 dB(A)
Night-time (23:00 - 07:00)	25 dB(A)
POSITION 2	
Daytime (07:00 - 23:00)	34 dB(A)
Night-time (23:00 - 07:00)	32 dB(A)

Table 5.1: Plant noise emission limits

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises:

- 28 No. Toshiba MMY-MAP0806FT8P-UK condenser units
- 1 No. Toshiba MMY-AP2616FT8P-UK condenser unit

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)
Toshiba MMY-MAP0806FT8P-UK	56	60	62	60	56	49	38	34	61
Toshiba MMY-AP2616FT8P-UK	63	68	68	65	62	53	43	38	65

Table 6.1: Manufacturer provided noise emissions levels

The proposed plant locations are on the main roof at of the building which is shown on indicative site plan 16399-NIA-02-SP2.

6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0, it is recommended that 'noise reduction kits' are installed around all condenser units. It is understood that these provide up to 8 dB noise level reduction. Details of typical kits of this nature are shown in Appendix B.

Based on the information provided by Ambient Acoustics, these 'kits' provide the sound reduction indices as stated in Table 6.2.

Mitigation	*Attenuation Provided (dB) in each Frequency Band*							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Acoustic Kit	3	4	6	7	10	10	8	7

Table 6.2: Attenuation provided by mitigation

Furthermore, it is understood that all plant units will be shielded by screening. It is recommended that these screens extend to a height of 0.1 m above the height of the unit and 'kit' combined (understood to be 2.7 m total, including brackets), therefore a screen height of 2.8 m.

The screen could be built from any material to provide a mass of 15 kg/m^2. This could be provided by galvanised steel (thickness 1.9 mm), which is understood to be the proposal at this stage.

The proposed location of the screening is indicated in 16399-NIA-02-SP2.

6.3 Noise Impact Assessment and 3D Noise Model

The closest offsite receivers have been identified as the windows on the rear façades of the adjacent buildings (assumed to be residential properties) which are a minimum of 12 m from the proposed plant locations. Onsite receivers are discussed in Section 6.4.

Screening to these nearest noise sensitive receptors is provided by the building envelope.

In order to assess the cumulative noise impact of proposed plant units, noise emissions have been assessed by developing a noise map.

The proposed site has been imposed on the existing site layout, and proposed buildings and local existing buildings have been modelled.

The proposed plant noise emissions have been modelled using condenser units as point sources placed in the proposed plant locations.

The above source type is considered appropriate, based on the dimensions of each source and the distance between the source and receiver.

The sound power levels of condenser units have been calculated based on the manufacturer's stated spectral sound pressure levels at the stated distance.

The noise model was constructed using the proprietary noise modelling software package CadnaA utilising the following assumptions and parameters:

- Noise sources are as described in Table 6.1
    - All units treated with a noise reduction kit, as described in Section 6.2
- Screens placed at positions and heights as stated
- Presence of reflecting surfaces
    - All ground and building façades assumed to be reflective
- Attenuation due to atmospheric absorption
- Receivers placed at appropriate heights (representative of affected windows)
- Calculations are performed in spectral frequency bands between 63 Hz and 8 kHz.

Figure 6.1 shows a 3D view of the modelled development and receivers placed at the residential receivers.

Figure 6.1: 3D view of the constructed noise model

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.3. Receiver reference numbers are defined on attached site plan 16399-NIA-02-SP1 and Figure 3.1.

Receiver	Night Time Hours Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property 3	25 dB(A)	24 dB(A)
Nearest Residential Property 4		24 dB(A)
Nearest Residential Property 5	32 dB(A)	27 dB(A)

Table 6.3: Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.3, the proposed plant installation with 'noise reduction kits' and screening 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 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 30 dB(A) as being acceptable internal sleeping conditions during night-time.

With loudest external levels of 30 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 reference numbers are defined on site plan 16399-NIA-02-SP1.

Receiver	Recommended Target – *For sleeping conditions in a bedroom, in BS 8233: 2014*	Noise Level at Receiver (due to plant installation)
Inside Residential Window 1 (Onsite)	30 dB(A)	14 dB(A)
Inside Residential Window 2 (Onsite)		17 dB(A)
Inside Residential Window 3 (Offsite)		9 dB(A)
Inside Residential Window 4 (Offsite)		9 dB(A)
Inside Residential Window 5 (Offsite)		12 dB(A)

Table 6.4: Noise levels and BS 8233: 2014 criteria inside nearest residential space

7.0 CONCLUSION

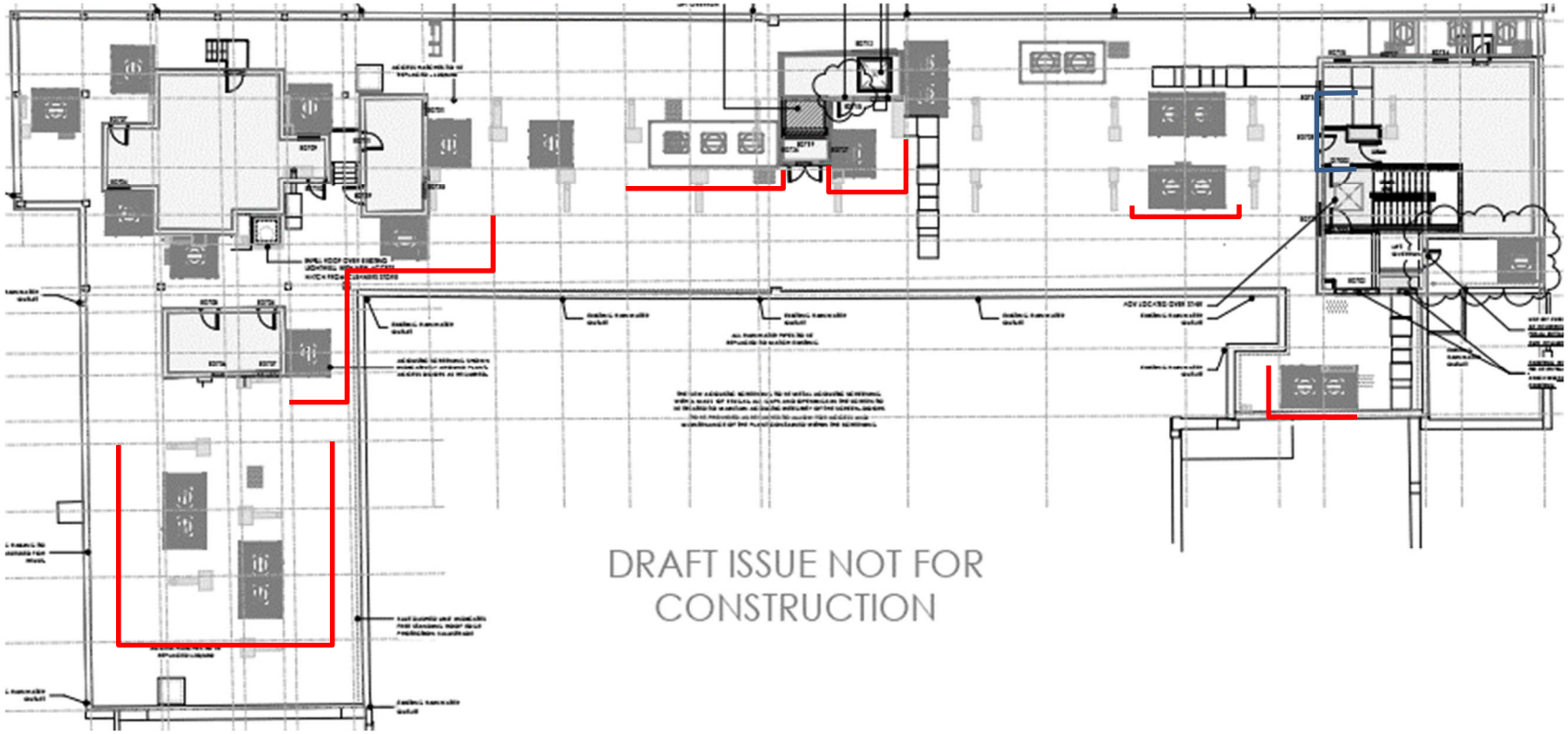
An environmental noise survey has been undertaken at Lillian Penson Hall, 15-25 Talbot Square, London. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant in accordance with the requirements of Westminster City Council.

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 should meet the requirements of Westminster City Council with the recommended mitigation installed as stated herein.

16399-NIA-02-SP1 Indicative site plan indicating noise monitoring positions and nearest noise sensitive receivers (image © Google)

Date: 14 December 2023



Increased Height Screen Required

16399-NIA-02-SP2 Indicative site plan indicating proposed location of screening
(image © FaulknerBrowns Architects)

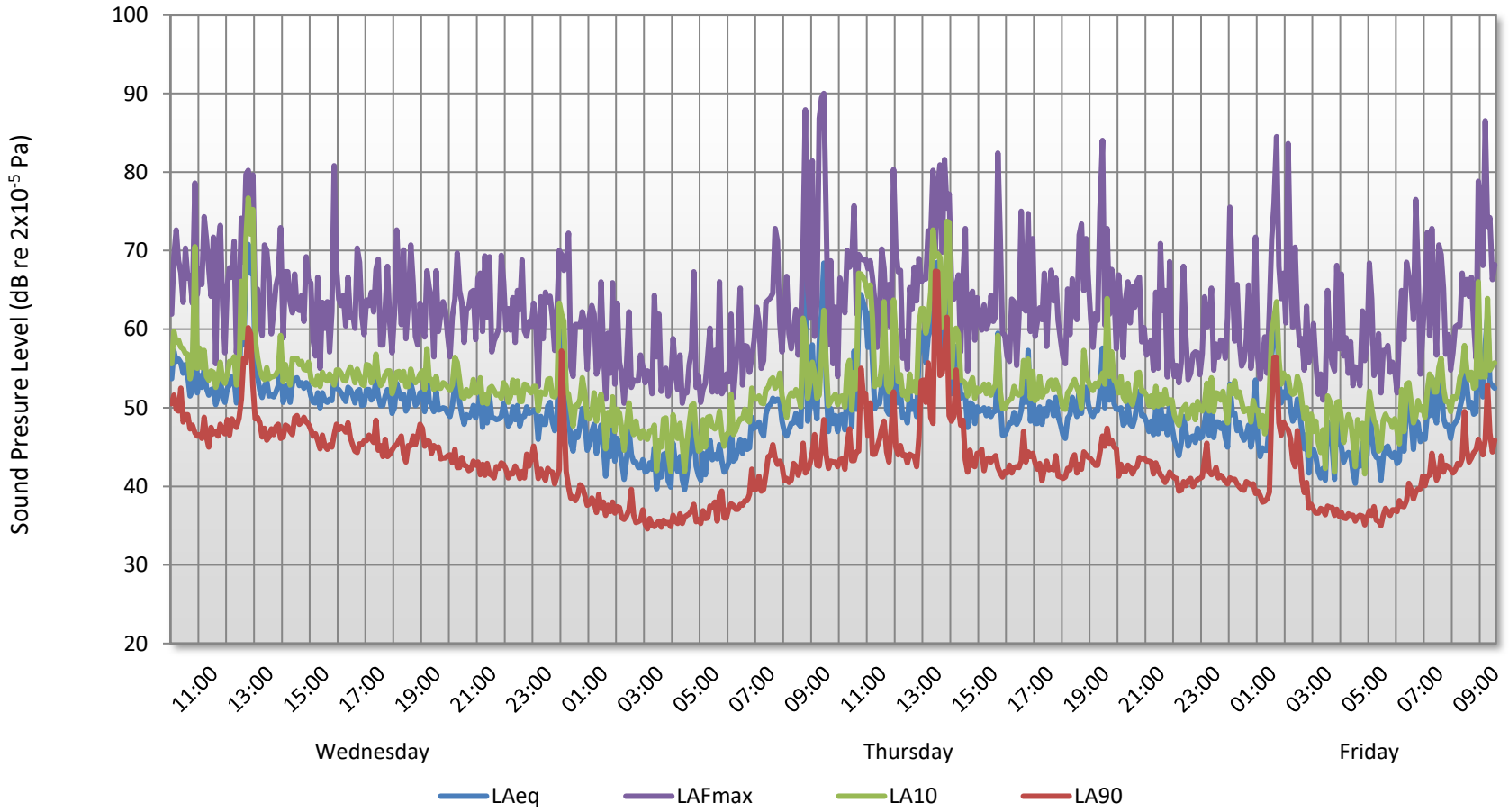
Date: 14 December 2023

Citi View @ Paddington, 15-25 Talbot Square

Position 1

Environmental Noise Time History

04 January 2023 to 06 January 2023



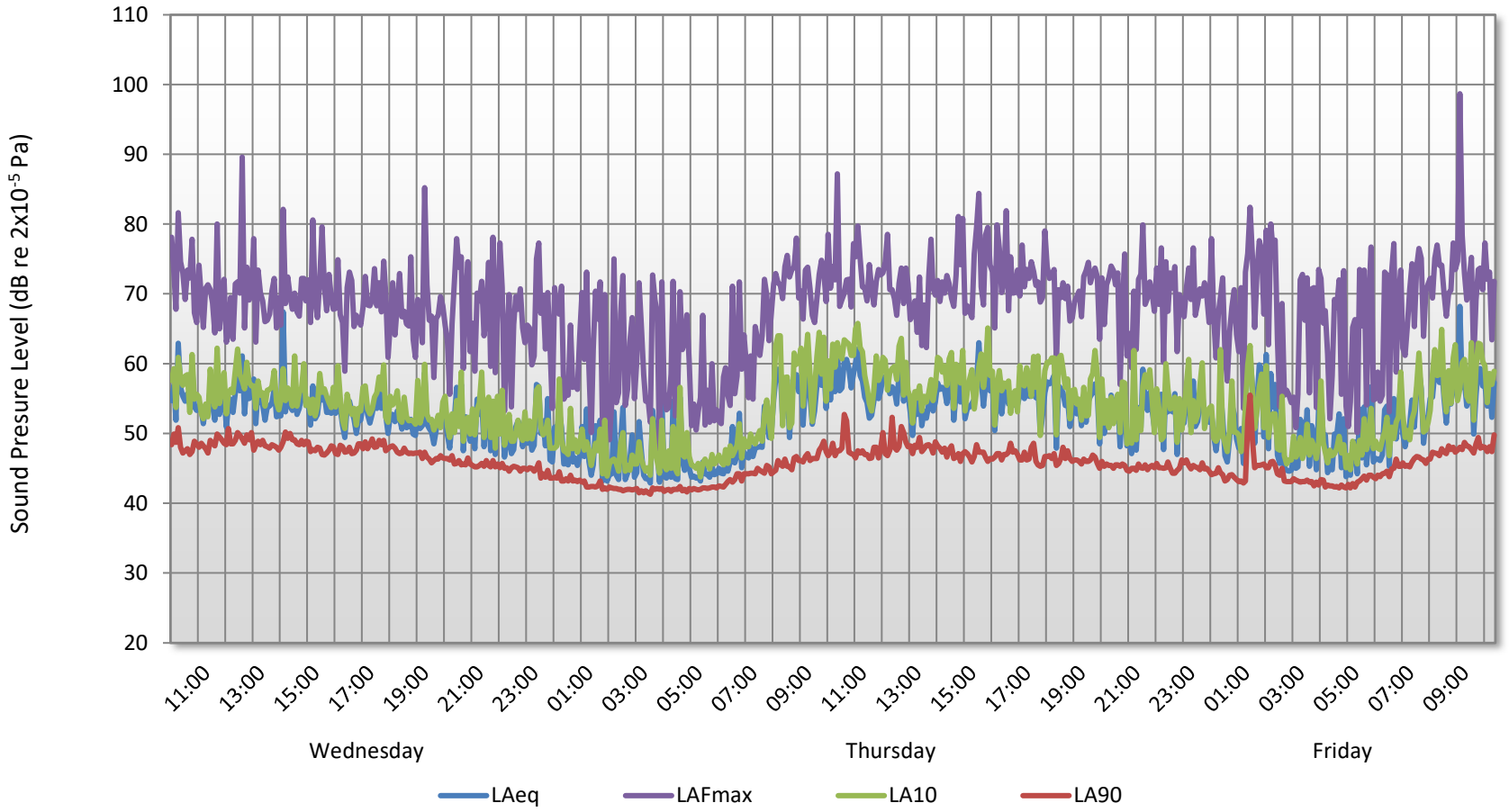
16399-TH1

Citi View @ Paddington, 15-25 Talbot Square

Position 2

Environmental Noise Time History

04 January 2023 to 06 January 2023



16399-TH2

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.

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Acoustic Kits

Up to an 8dBA Noise Reduction

Example of a CAHV Acoustic Kit

Mitsubishi Electric offer a range of Acoustic Kits designed for noise reduction. An industry first, these kits offer up to an 8dBA noise level reduction and are available to use with both our CAHV and CHU Ecodan models.

The sound levels of our kit are already class leading, but with local planning regulations tightening with regards to equipment sound levels, especially in urban environments or in residential areas close to commercial estates, Acoustic Kits can provide the answer.

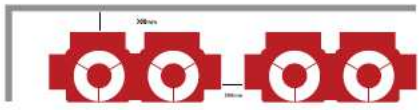
Noise level requirements at neighbouring facades also need to be met in order for planning permission to be granted and to further assist with this, as well as the option of Acoustic Kits, the CAHV systems also have a built in noise reduction input to help in the most extreme cases.

Both 'full kits' and 'top only' kits are available. The 'full kit' comprises of left, right and rear louvres with top attenuator(s). The 'top only' kit has top attenuator(s) only. If space is an issue then the 'top only' kit is still able to reduce the noise level by up to 4dBA.

The sound pressure level is calculated from an average of the noise at a height of 1m above the unit and at a distance of 1m from the front, sides and rear of the unit. All noise measurements are performed in an anechoic chamber.

Installation

Due to the wrap around coil of our units, the louvres are attached to three sides of the unit. Therefore, when installing multiple module systems, a 300mm gap between each louvre is required. See CAHV example below:



1 full kit per outdoor unit is required, unless specifying top attenuator only. In this case, space units as normal.

Supply and / or Installation

Please contact Ambient Acoustics directly for supply and installation costs. Installation costs will vary depending on location and quantity of units.

Ambient Acoustics Ltd
PO Box 1585, Wedmore, Somerset, BS28 4WZ
Tel: 01934 712802
Fax: 01934 710420
Email: sales@ambientacoustics.co.uk

Ambient Acoustics is an independent supplier of acoustic attenuation products, all warranties and liabilities rest with Ambient Acoustic Ltd. The acoustic kits have been tested and approved by Mitsubishi Electric UK.

Appendix B Acoustic Kit **Date:** 14 December 2023