202 Uxbridge Road
London
W12 7JP

Tel: +44(0)203 475 2280
Fax: +44(0)203 475 2281

info@clementacoustics.co.uk

www.clementacoustics.co.uk

# 47 FARRINGDON ROAD, LONDON

## NOISE IMPACT ASSESSMENT

Report **13378-NIA-01 RevA**

Prepared on 19 March 2018

**Issued For:**

**Apollo Interiors Ltd**

**AGB Building**

**Astwick Road, Stotfold**

**Hitchin**

**SG54BA**

## Contents



## List of Attachments

## 1.0 INTRODUCTION

Clement Acoustics has been commissioned by Apollo Interiors Ltd to measure existing background noise levels at 47 Farringdon Road, 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 five Panasonic CU-4E27PBE condenser units with four existing units (2 Daikin RX71GV and 2 Fuji AOY G24) on the east wall flanking the ground floor.

The plant units will be operational during dental practice opening hours, as follows:

- Monday - Friday: 08:00 - 17:30,
- Saturdays: 08:00 - 13:00.

Apollo Interiors Ltd has confirmed the closest affected residential receiver is 50m away from the proposed plant location.

Locations are shown in attached site plan 13378-SP1.

## 3.0 ENVIRONMENTAL NOISE SURVEY

### 3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 13378-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 1st storey flat roof at the rear of the building. The microphone was positioned 1m in front of the wall and as such the monitoring position is not considered free-field according to the guidance of BS8233:2014. 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. Noise levels at the monitoring position were dominated by noise due to existing plant units during the installation and collection of equipment. The effects of existing plant units will be minimised by basing noise emission criteria on minimum background noise levels. As shown in the attached time history, there are periods of plant inactivity, which will drive the minimum background noise level and resulting criterion.

Continuous automated monitoring was undertaken for the duration of the survey between 02 March 2018 at 14:30 and 05 March 2018.

Weather conditions were high winds and snowing heavily, therefore not 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 957 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 13378-SP1.

The measured noise levels are shown as a time history in Figure 13378-TH1, with ambient and background noise levels summarised in Table 4.1.

| | Average ambient noise level $L_{eq:\ T}$ dB(A) | Minimum background noise level $L_{90:\ 5min}$ dB(A) |
|---|---|---|
| Daytime (07:00 - 23:00) | 66 dB(A) | 51 dB(A) |
| Night-time (23:00 - 07:00) | 65 dB(A) | 48 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 '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."*

Although plant units will only be operational during dental practice opening hours, this assessment will be based on the minimum measured background noise level during night-time hours, in order to present a particularly robust assessment.

## 6.0 NOISE IMPACT ASSESSMENT

### 6.1 Proposed Installation

The proposed plant installation comprises the following:

- 5 No. Panasonic CU-4E27PBE 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 meters, dB) in each Frequency Band | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Unit | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz | dB(A) |
| Panasonic CU-4E27PBE | 54 | 53 | 49 | 50 | 47 | 44 | 40 | 32 | 52 |

**Table 6.1: Manufacturer Noise Emissions Levels**

Spectral data was not available from the manufacturer of the unit. Representative spectral data for the proposed plant was therefore taken from a similar unit with the same overall level.

The proposed plant location is on the first floor roof at the rear of the building which is shown on indicative site plan 13378-SP1.

The closest receiver has been identified as the window on the north facade of a residential property to the south, which is a minimum of 50m 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 | Night Time Hours Criterion | Noise Level at Receiver (due to proposed plant) |
|---|---|---|
| Nearest Residential Property | 38 dB(A) | 28 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 with acoustic enclosure 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 30dB(A) as being acceptable internal resting/sleeping conditions during night-time.

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 6.3.

| Receiver | Recomended Target – *For resting/sleeping conditions in a bedroom, in BS8233:2014* | Noise Level at Receiver (due to plant installation) |
|---|---|---|
| Inside Residential Window | 30 dB(A) | Negligible |

**Table 6.3: Noise levels and criteria inside nearest residential space**

## 7.0 CONCLUSION

An environmental noise survey has been undertaken at 47 Farringdon Road, 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.

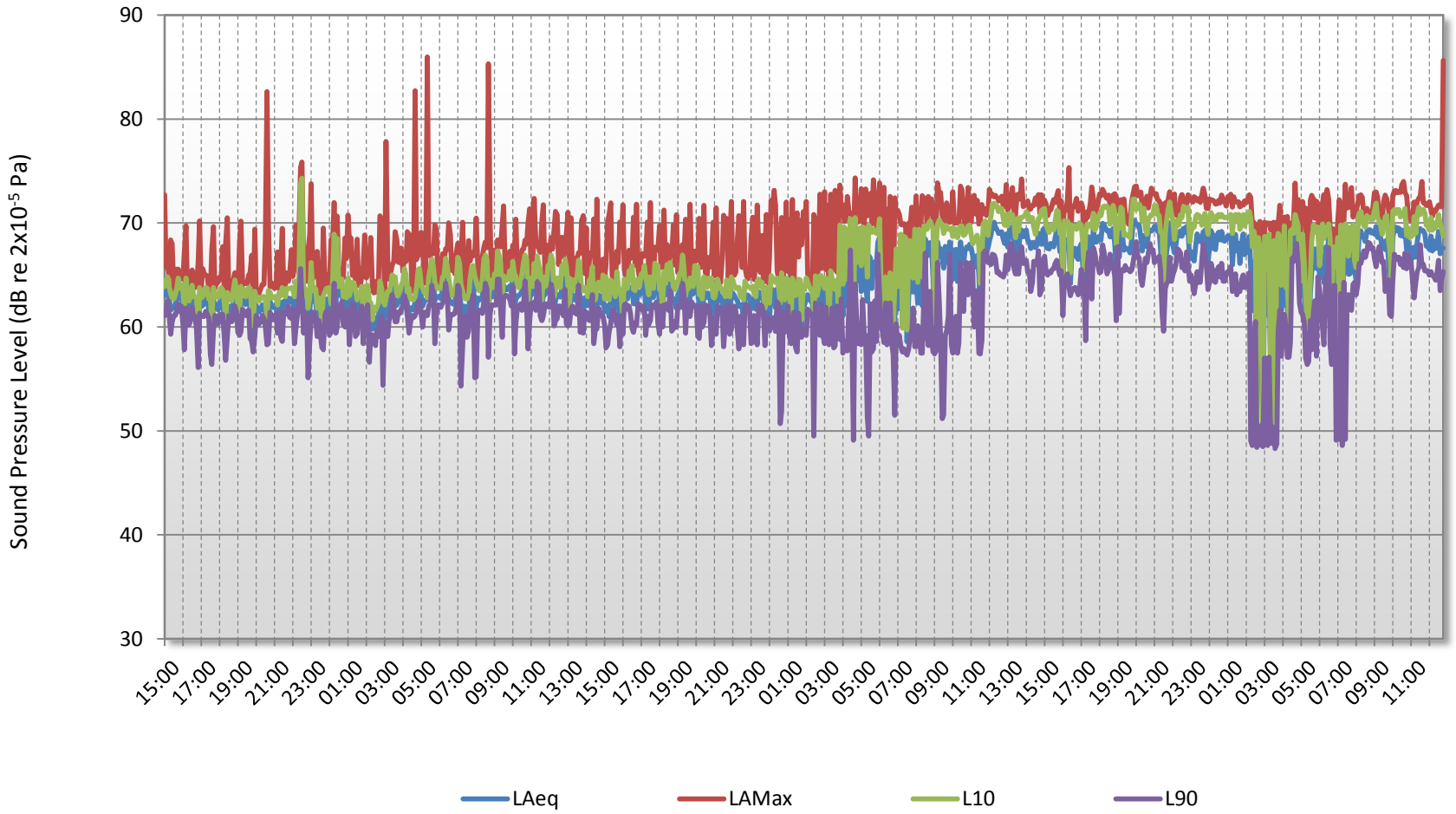
Calculations show that noise emissions from the proposed plant units should meet the requirements of the London Borough of Camden with the recommended mitigation installed as stated herein.

| Report by | Checked by |
| --- | --- |
| **Lewis Hart AMIOA** | **Duncan Martin MIOA** |


**13378-SP1** Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 19 March 2018

## 47 Farringdon Rd, London

Environmental Noise Time History
02 March 2018 to 05 March 2018




13378-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 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

## 13378

## 47 Farringdon Road, 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** | | | | | | | | | |
| Panasonic CU-4E27PBE | 54 | 53 | 49 | 50 | 47 | 44 | 40 | 32 | 52 |
| Correction for number of units (5) | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | |
| Correction for reflections, dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Distance correction to receiver, dB (50m) | -34 | -34 | -34 | -34 | -34 | -34 | -34 | -34 | |
| **Sound pressure level at receiver** | **30** | **29** | **25** | **26** | **23** | **20** | **16** | **8** | **28** |

| | |
|---|---|
| **Design Criterion** | **38** |

### 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 | 30 | 29 | 25 | 26 | 23 | 20 | 16 | 8 | 28 |
| Minimum attenuation from partially open window, dB | -15 | -15 | -15 | -15 | -15 | -15 | -15 | -15 | |
| **Sound pressure level inside nearest noise sensitive premises** | **15** | **14** | **10** | **11** | **8** | **5** | **1** | **-7** | **13** |

| | |
|---|---|
| **Design Criterion** | **30** |