

# 104 CLEVELAND STREET, FITZROVIA, LONDON

## NOISE IMPACT ASSESSMENT

Report 11101-NIA-01

Prepared on 11 May 2016

Issued For:

**PURA Ltd**

**36 Gloucester Avenue**

**Primrose Hill**

**London**

**NW1 7BB**



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11101-SP1	Indicative Site Plan
11101-TH1	Environmental Noise Time History
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## 1.0 INTRODUCTION

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Clement Acoustics has been commissioned by PURA Ltd to measure existing background noise levels at 104 Cleveland Street, Fitzrovia, London W1T 6NU. 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

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Current proposals are to install 1 no. Mitsubishi MXZ-4D83VA air conditioning unit to the flat roof of 104 Cleveland Street.

The nearest noise affected receiver has been identified as the window on the front façade of 106 Cleveland Street, Fitzrovia, London approximately 2m away. Locations are shown in attached site plant11101-SP1.

## 3.0 ENVIRONMENTAL NOISE SURVEY

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### 3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 11101-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the site.

Continuous automated monitoring was undertaken for the duration of the survey between 12:50 on the 6 May 2016 and 10:30 on the 9 May 2016.

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

Background noise levels at the monitoring positions consisted predominately of urban sounds (i.e. traffic noise from surrounding roads) during both installation and collection of the equipment.

The measurement procedure generally complied with BS7445:1991. *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 971 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

## 4.0 RESULTS

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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 11101-SP1.

The measured noise levels are shown as a time history in Figure 11101-TH1, with ambient and background noise levels summarised in Table 4.1.

	Average ambient noise level	Minimum background noise level
	$L_{Aeq: 5min}$ dB(A)	$L_{A90: 5min}$ dB(A)
Daytime (07:00 - 23:00)	56 dB(A)	42 dB(A)
Night-time (23:00 - 07:00)	51 dB(A)	40 dB(A)

**Table 4.1: Minimum background noise levels**

## 5.0 NOISE CRITERIA

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It is understood that the noise emission criteria for the London Borough of Camden, is as follows:

*“Measures shall ensure that the external noise level emitted from plant, machinery/ equipment will be lower than the lowest existing background noise level by at least 10dBA, as assessed according to BS4142:1997 at the nearest and/or most affected noise sensitive premises, with all machinery operating together at maximum capacity. Approved details shall be implemented prior to occupation of the development and thereafter be permanently retained.”*

It is understood that the proposed plant will be used for residential use and could therefore be in operation at any time. We therefore propose to set the noise criteria at 30 dB(A), the value 10 dB below the minimum measured background noise level during the night time hours.

## 6.0 DISCUSSION

### 6.1 Proposed Installation

The proposed plant installation comprises the following:

- 1x Mitsubishi MXZ-4D83VA air 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.

Unit	Sound Pressure Levels at 1m (dB) in each Frequency Band								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Mitsubishi MXZ-4D83VA	48	50	49	51	44	40	36	28	51

**Table 6.1: Manufacturer Noise Emissions Levels**

The proposed plant location is on the first floor roof at the rear of the building which is shown on indicative site plan 11101-SP1.

The closest receiver has been identified as the window on the front façade of a residential property adjacent which is a minimum of 2m from the proposed plant location.

### 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 48dB when measured at 1 m in all directions. Based on the information provided, an enclosure meeting the sound reduction indices as stated in Table 6.2 should be suitable to achieve this.

Mitigation	Required Attenuation (dB) in each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Louvred Enclosure	3	3	4	9	17	19	15	13

**Table 6.2: Required Attenuation from Mitigation**

### 6.3 Noise Impact Assessment

Taking into account all necessary acoustic corrections including screening from the building’s envelope, the resulting noise level at the identified residential windows would be as shown in Table 6.3. Detailed calculations are shown in Appendix B.

Receiver	Night Time Hours Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	30 dB(A)	30 dB(A)

**Table 6.3: Noise levels and criteria at noise sensitive receivers**

As presented in Table 6.3 and Appendix B, the proposed 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 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 ‘*Sound insulation and noise reduction for buildings – Code of Practice*’ gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS8233:2014 recommends 30 dB(A) as being acceptable internal resting/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 BS8233:2014, 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	Indoor Ambient Design Criterion – For resting/sleeping conditions in a bedroom, in BS8233:2014	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	16 dB(A)

**Table 6.4: Noise levels and criteria inside nearest residential space**

## 7.0 CONCLUSION

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An environmental noise survey has been undertaken at 104 Cleveland Street, Fitzrovia, London W1T 6NU. 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  
**Josie Nixon TechIOA**

Checked by  
**Andrew Thomas AMIOA**



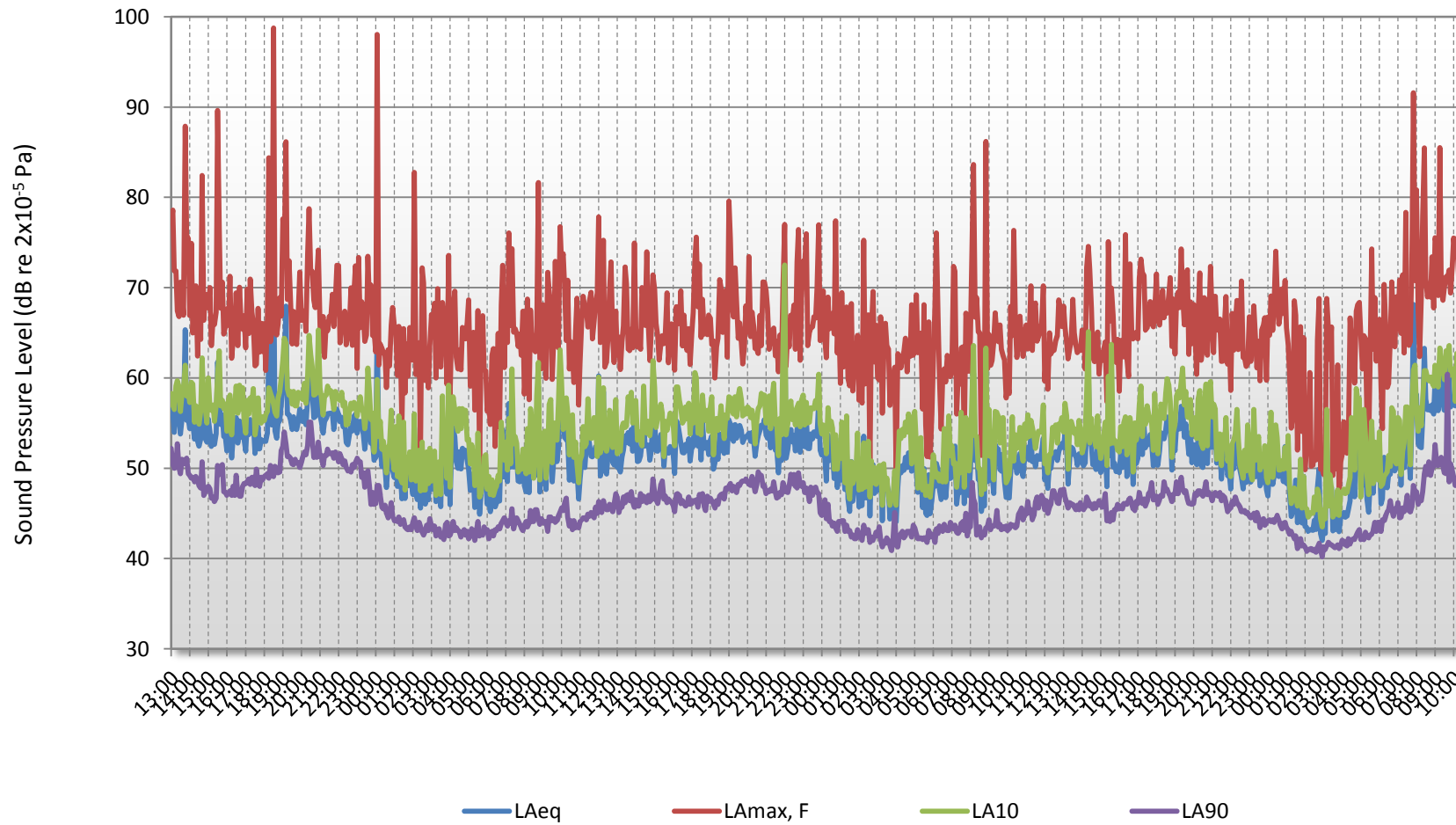
- Proposed Air Conditioner
- Noise Survey Position
- Noise Sensitive Receiver



### 104 CLEVELAND STREET, FITZROVIA, LONDON

Environmental Noise Time History

6 May to 9 May 2016



## 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

11101

104 Cleveland Street, Fitzrovia, London

### EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Receiver

Source: Proposed plant installation

	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
<b>Manufacturer provided sound pressure level at 1 metre</b> Mitsubishi MXZ-4D83VA	48	50	49	51	44	40	36	28	51
Attenuation provided by Acoustic Enclosure	-3	-3	-4	-9	-17	-19	-15	-13	
Correction for reflections, dB	6	6	6	6	6	6	6	6	
Distance correction to receiver, dB (2m)	-6	-6	-6	-6	-6	-6	-6	-6	
Barrier attenuation	-5	-8	-10	-13	-16	-16	-16	-16	
<b>Sound pressure level at receiver</b>	<b>40</b>	<b>39</b>	<b>35</b>	<b>29</b>	<b>11</b>	<b>5</b>	<b>5</b>	<b>0</b>	<b>30</b>

Design Criterion 30

### BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window

Source: Proposed plant installation

	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Sound pressure level outside window	40	39	35	29	11	5	5	0	30
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
<b>Sound pressure level inside nearest noise sensitive premises</b>	<b>25</b>	<b>24</b>	<b>20</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>

Design Criterion 30