

# 216 SHAFTESBURY AVENUE, LONDON

## NOISE IMPACT ASSESSMENT

Report **12317-NIA-01 RevA**

Prepared on 05 May 2017

Issued For:

**Prime Gelato Limited**

**Kemp House**

**160 City Road**

**London EC1V 2NX**



**Contents**

---

1.0 INTRODUCTION ..... 1

2.0 SITE DESCRIPTION ..... 1

3.0 ENVIRONMENTAL NOISE SURVEY ..... 1

3.1 Procedure ..... 1

3.2 Equipment ..... 2

4.0 RESULTS ..... 2

5.0 NOISE CRITERIA ..... 3

6.0 DISCUSSION ..... 3

6.1 Proposed Installation ..... 3

6.2 Proposed Mitigation Measures ..... 4

6.3 Noise Impact Assessment ..... 5

6.4 British Standard Requirements ..... 5

7.0 CONCLUSION ..... 6

**List of Attachments**

---

12317-SP1	Indicative Site Plan
12317-TH1	Environmental Noise Time History
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Calculations

---

## 1.0 INTRODUCTION

---

Clement Acoustics has been commissioned by Prime Gelato Limited to measure existing background noise levels at 212 Shaftesbury Avenue Rear Courtyard, London WC2H 8EG. 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 3 no. air condenser units to the rear façade of the shop to service the property for chillers and air conditioning systems.

The nearest affected receiver has been identified as the rear of the residential flats located on Grape Street, which is approximately 7m away. Locations are shown in attached site plan 12317-SP1.

## 3.0 ENVIRONMENTAL NOISE SURVEY

---

### 3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 12317-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the site.

The surroundings and position used for the monitoring position was as follows:

- Position 1: The microphone was mounted on a ground floor storey at the rear of the building. The position was considered not to be free-field, and a correction for reflections has therefore been applied. Noise levels at Position 1 were dominated by urban sounds, such as plant and road traffic noise from the surrounding roads during the installation and collection of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 11:00 on the 19 April 2017 and 10:00 on the 21 April 2017.

Weather conditions were generally dry with light winds, therefore 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 977 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 12317-SP1.

The measured noise levels are shown as a time history in Figure 12317-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)	66 dB(A)	53 dB(A)
Night-time (23:00 - 07:00)	58 dB(A)	44 dB(A)

**Table 4.1: Minimum background noise levels**

## 5.0 NOISE CRITERIA

---

In order to present a robust assessment and protect the amenity of nearby residential receivers, we propose to set noise emissions criteria 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.”*

It is understood that the proposed plant will be used for chiller units that will be operating 24-hours a day. In order to be robust we therefore propose to set the noise criteria at 34 dB(A), the value 10dB 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:

- 1 no. LG MU3M21.UE2 air condenser units
- 1 no. UKColdStore NFR250DL
- 1 no. UKColdstore NFR075DL
- 1 no. Tecumseh CAJ2446Z

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)
LG MU3M21.UE2 *	58	56	52	50	48	42	40	30	53
UKColdStore NFR250DL*	60	58	54	52	50	44	42	32	55
UKColdStore NFR250DL*	56	54	50	48	46	40	38	28	51
Tecumseh CAJ2446Z*	65	63	59	57	55	49	47	37	60

**Table 6.1: Manufacturer Noise Emissions Levels**

*\*The spectral data has been extrapolated from known data for a similar unit, shifted to match the overall level provided by the manufacturer*

The proposed plant location is on the first floor roof at the rear of the building which is shown on indicative site plan 12317-SP1.

The closest receiver has been identified as the window on the rear windows of the residential flats on Grade Street which is a minimum of 7m 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 51dB(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 6.2 should be suitable to achieve this.

Required Attenuation (dB) in each Frequency Band								
Mitigation	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Louvred Enclosure	4	5	8	17	29	32	30	28

**Table 6.2: Required Attenuation from Mitigation**

### 6.3 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 6.3. Detailed calculations are shown in Appendix B.

Receiver	Night Time Hours Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	34 dB(A)	34 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 '*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 34dB(A), acceptable internal conditions would be met with 4dB attenuation. 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	Design Range – For resting/sleeping conditions in a bedroom, in BS8233:2014	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	20 dB(A)

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

## 7.0 CONCLUSION

---

An environmental noise survey has been undertaken at 212 Shaftesbury Avenue, London WC2H 8EG. 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

**Andrew Thomas AMIOA**

Checked by

**Duncan Martin MIOA**

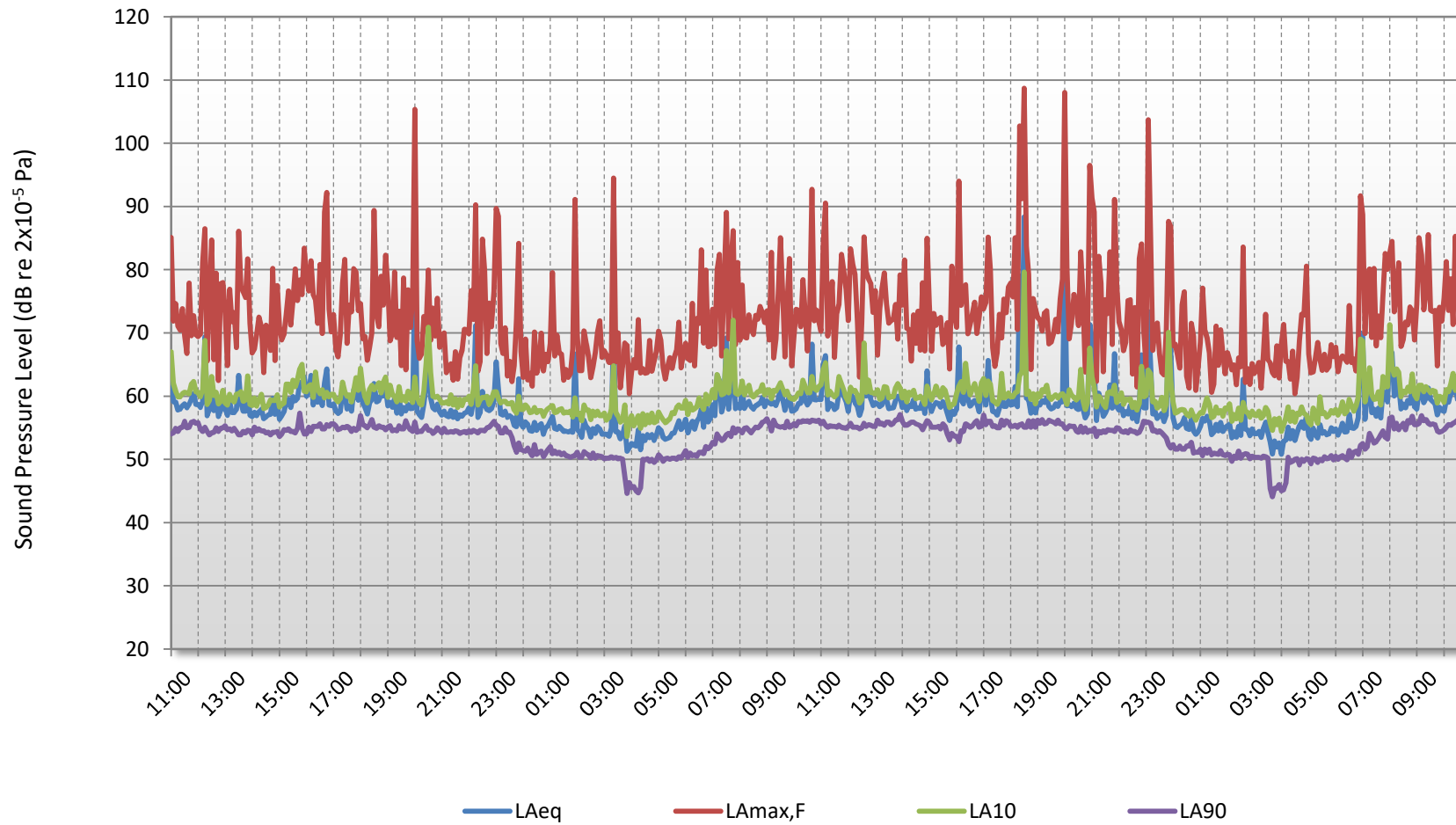




### 216 Shaftesbury Avenue, London

Environmental Noise Time History

19 April 2017 to 21 April 2017



## 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

12317

216 Shaftesbury Avenue, 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>									
LG MU3M21.UE2*	58	56	52	50	48	42	40	30	53
UK Coldstore - NFR250DL*	60	58	54	52	50	44	42	32	55
UK Coldstore - NFR075DL*	56	54	50	48	46	40	38	28	51
Tecumseh CAJ2446Z*	65	63	59	57	55	49	47	37	60
<b>Combined sound pressure level</b>	<b>67</b>	<b>65</b>	<b>61</b>	<b>59</b>	<b>57</b>	<b>51</b>	<b>49</b>	<b>39</b>	<b>62</b>
Correction for reflections, dB	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (7m)	-17	-17	-17	-17	-17	-17	-17	-17	
Proposed louvred enclosure	-4	-5	-8	-17	-29	-32	-30	-28	
<b>Sound pressure level at receiver</b>	<b>49</b>	<b>46</b>	<b>39</b>	<b>28</b>	<b>14</b>	<b>5</b>	<b>5</b>	<b>0</b>	<b>34</b>

\*Spectral levels extrapolated from a similar unit

Design Criterion

34

### 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	49	46	39	28	14	5	5	0	34
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>34</b>	<b>31</b>	<b>24</b>	<b>13</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>

Design Criterion

30