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# 27 TOTTENHAM STREET, LONDON

## NOISE IMPACT ASSESSMENT

Report **11184-NIA-01**

Prepared on 12 May 2016

**Issued For:**

**Praxis Construction Limited**

**Southgate Office Village**

**Block C, 284b Chase Road**

**London N16 6HF**

committed to CSCS Platinum award

ISO 17025

ISO 9001

Institute of Acoustics sponsoring organisation

## Contents



## List of Attachments

## 1.0 INTRODUCTION

Clement Acoustics has been commissioned by Praxis Construction Ltd to measure existing background noise levels at 27 Tottenham Street, London W1T 4RW. 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 2 no. Mitsubishi SCM60ZM-S and 1 no. Mitsubishi SCM80ZM-S air conditioning units for residential use to the rear wall of 27 Tottenham Street, London W1T 4RW.

The nearest noise affected receiver has been identified as the window on the ground floor of the rear façade of the adjacent property, 29 Tottenham Street, London. Receiver 1 is a minimum of 3m from the proposed plant location.

A secondary receiver has been identified as the window on the third floor of the rear façade of the adjacent property, 29 Tottenham Street, London. Receiver 2 is a minimum of 3m from the proposed plant location.

Locations are shown in attached site plan 11184-SP1.

## 3.0 ENVIRONMENTAL NOISE SURVEY

### 3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 11184-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 10:30 on the 05 May 2016 and 13:30 on the 06 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 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 11184-SP1.

The measured noise levels are shown as a time history in Figure 11184-TH1, with ambient and background noise levels summarised in Table 4.1.

| | Average ambient noise level $L_{Aeq:\ 5min}$ dB(A) | Minimum background noise level $L_{A90:\ 5min}$ dB(A) |
|---|---|---|
| Daytime (07:00 - 23:00) | 57 dB(A) | 45 dB(A) |
| Night-time (23:00 - 07:00) | 47 dB(A) | 40 dB(A) |

**Table 4.1: Minimum background noise levels**

## 5.0 NOISE CRITERIA

It is understood that Camden's typical requirements are 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(s) 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:

- Plant Group 1: 2 No. Mitsubishi SCM60ZM-S air condenser units
- Plant Group 2: 1 No. Mitsubishi SCM80ZM-S air condenser unit

*Note, as the locations of the proposed units had not been finalised at the time of writing, the client has instructed that locations should be assumed for the purpose of this report. These assumed locations would then be integrated into the final proposal. The assumed plant locations for the purpose of this assessment are shown in indicative site plan 11184-SP1. These locations must be adhered to in practice for this assessment to remain valid*.

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) |
| Mitsubishi SCM60ZM-S | 48 | 50 | 49 | 51 | 44 | 40 | 36 | 28 | 52 |
| Mitsubishi SCM80ZM-S | 53 | 55 | 54 | 52 | 49 | 44 | 40 | 33 | 54 |

**Table 6.1: Manufacturer Noise Emissions Levels**

The proposed plant locations are to the rear wall of the premises which is shown on indicative site plan 11184-SP1.

The nearest noise affected receiver has been identified as the window on the ground floor of the rear façade of the adjacent property, 29 Tottenham Street, London. Receiver 1 is a minimum of 3m from the proposed plant location of Plant Group 1.

Receiver 2 is a minimum of 3m from the proposed plant location of Plant Group 2 and has been identified as the window at third floor level of the rear façade of the adjacent property, 29 Tottenham Street, London.

## 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 at each location. The enclosure should provide sufficient attenuation to achieve a maximum sound pressure level of 40dB when measured at 1m in all directions from either plant group.

Based on the information provided, enclosures 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 | 6 | 8 | 11 | 23 | 30 | 32 | 28 | 29 |

**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) |
|---|---|---|
| Receiver 1 | 30 dB(A) | 30 dB(A) |
| Receiver 2 | | 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 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) | 15 dB(A) |

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

## 7.0 CONCLUSION

An environmental noise survey has been undertaken at 27 Tottenham Street, London W1T 4RW. 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.

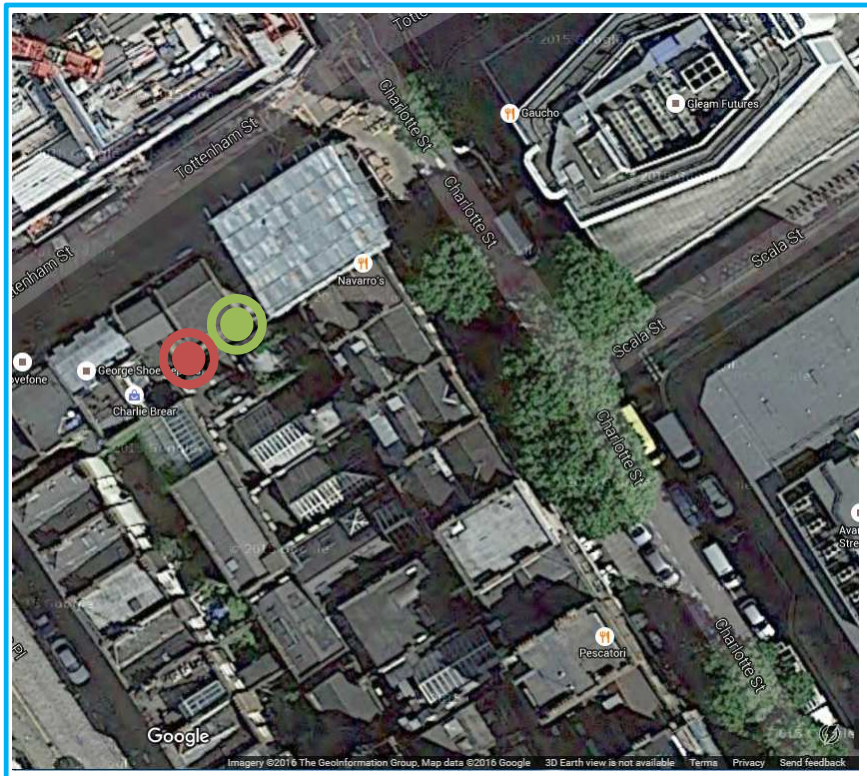
Calculations show that noise emissions from the proposed plant units should meet the requirements of the London Borough of Camden with the recommended mitigation installed as stated herein.

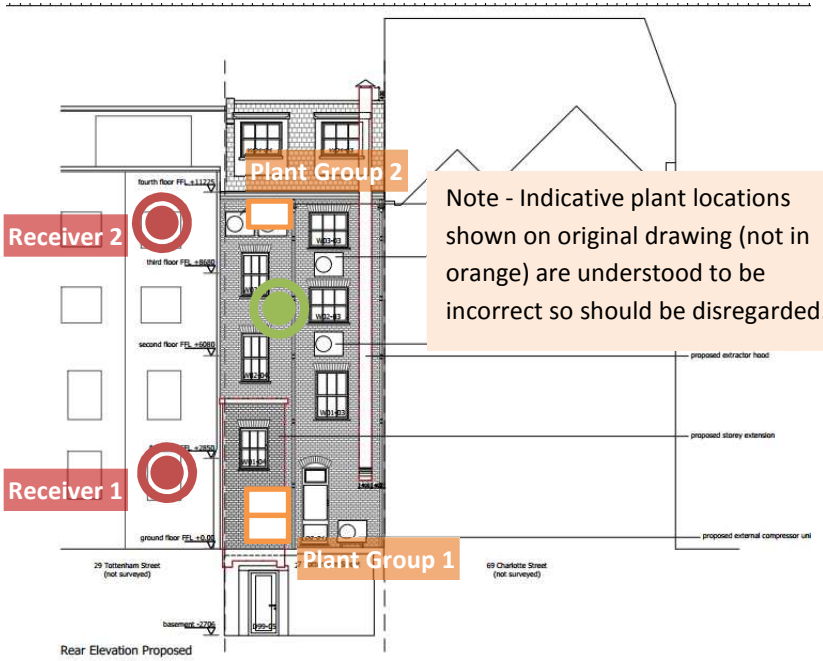
Report by

**Josie Nixon TechIOA**

Checked by

**Matt Markwick AMIOA**




Note - Indicative plant locations shown on original drawing (not in orange) are understood to be incorrect so should be disregarded.

Assumed plant positions

Noise Survey Position

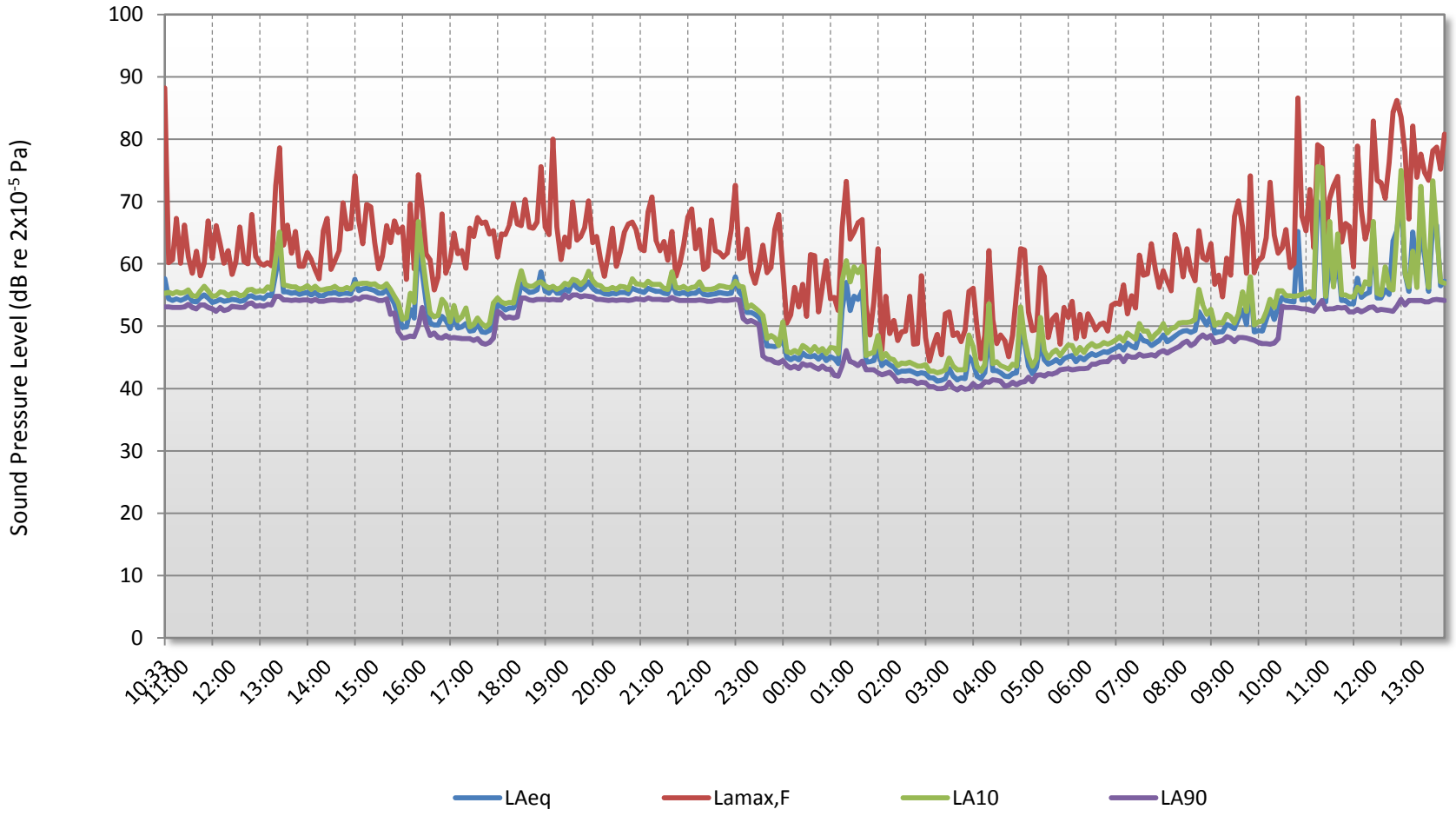
Noise Sensitive Receiver

**11184-SP1** Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 12 May 2016

## 27 TOTTENHAM STREET, LONDON

Environmental Noise Time History

05 MAY to 06 MAY 2016




11184-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

## 11184

## 27 Tottenham Street, London

### EXTERNAL PLANT NOISE EMISSIONS CALCULATION

**Receiver 1: Nearest Residential Receiver @3m**
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 SCM60ZM-S | 55 | 55 | 48 | 50 | 48 | 43 | 40 | 32 | 52 |
| Mitsubishi SCM60ZM-S | 55 | 55 | 48 | 50 | 48 | 43 | 40 | 32 | 52 |
| **Cumulative Sound Pressure** | **58** | **58** | **51** | **53** | **51** | **46** | **43** | **35** | **55** |
| Correction for reflections, dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Distance correction to receiver, dB (3m) | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 | |
| Attenuation provided by Acoustic Enclosure | -6 | -8 | -11 | -23 | -30 | -32 | -28 | -29 | |
| **Sound pressure level at receiver** | **45** | **43** | **33** | **23** | **14** | **7** | **8** | **-1** | **30** |

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

**Receiver 2: Nearest Residential Receiver @3m**
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 SCM80ZM-S | 53 | 55 | 54 | 52 | 49 | 44 | 40 | 33 | 54 |
| Correction for reflections, dB | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |
| Distance correction to receiver, dB (3m) | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 | |
| Attenuation provided by Acoustic Enclosure | -6 | -8 | -11 | -23 | -30 | -32 | -28 | -29 | |
| **Sound pressure level at receiver** | **40** | **40** | **36** | **22** | **12** | **5** | **5** | **-3** | **30** |

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

### 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 | 45 | 43 | 33 | 23 | 14 | 7 | 8 | -1 | 30 |
| Minimum attenuation from partially open window, dB | -15 | -15 | -15 | -15 | -15 | -15 | -15 | -15 | |
| **Sound pressure level inside nearest noise sensitive premises** | **30** | **28** | **18** | **8** | **-1** | **-8** | **-7** | **-16** | **15** |

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