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# AVIATION HOUSE, 125-129 KINGSWAY, LONDON

## NOISE IMPACT ASSESSMENT

Report **14318-NIA-01**

Prepared on 28 November 2018

Issued For:

**Kentex Services**

**Pilgrims House**

**Unit 3, Links Business Centre**

**Old Woking Road, Old Woking**

**Surrey, GU22 8BF**

(PO No. 13420-B-44828)



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14318-SP1	Indicative Site Plan
14318-TH1-2	Environmental Noise Time Histories
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## 1.0 INTRODUCTION

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Clement Acoustics has been commissioned by Kentex Group to measure existing background noise levels at Aviation House, 125-129 Kingsway, London. The measured noise levels have been used to determine noise emission criteria for an existing 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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The premises have been recently refurbished to comprise commercial offices, including the installation at basement level of a bank of heat pump units to serve the air conditioning system for the building.

Noise complaints have been received from the residential flats overlooking the plant which have been identified as the nearest affected receivers. This nearest noise sensitive receivers (complainants) were identified through observations on-site. If there are any receivers closer to that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receptor should be confirmed by the client before the plant is installed or any noise mitigation measures are implemented.

Locations are shown in attached site plan 14318-SP1.

## 3.0 ENVIRONMENTAL NOISE SURVEY

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### 3.1 Procedure

Measurements were undertaken at two positions as shown on indicative site drawing 14318-SP1. The choice of these positions was based both on accessibility and on collecting representative noise data in relation to the site.

The surroundings and position used for each monitoring location was as follow:

- Position 1 - Source: The microphone was mounted on a scaffold structure in the basement yard area adjacent to the installed plant at the rear of the building. The position was considered to be free-field according to guidance found in BS4142:2014, and a correction for reflections has therefore not been applied. Dominant noise levels at Position 1 were dominated by the installed plant during the installation and collection of equipment.
- Position 2 - Receiver: The microphone was mounted on a 4<sup>th</sup> storey balcony at the rear of the building, overlooking the plant and opposite the complainant's flat. The position was considered to be free-field according to guidance found in BS4142:2014, and a correction for reflections has therefore not been applied. Dominant noise levels at Position 2 the monitoring position were dominated by traffic from surrounding roads and noise from installed plant during the installation and collection of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 14:00 on 21 November 2018 and 13:45 on 22 November 2018.

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.

- 2 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 14318-SP1.

The measured noise levels at the receiver position (position 2) are shown as time histories in Figures 14318-TH1-2, with ambient and background noise levels for the receiver summarised in Table 4.1.

**Note – periods during which the plant under assessment was operating have been discounted to ensure an accurate representation of the ambient and minimum background noise at the receiver.**

	Average ambient noise level $L_{eq:T}$	Minimum background noise level $L_{90:5min}$
Daytime (07:00 - 23:00)	59 dB(A)	52 dB(A)
Night-time (23:00 - 07:00)	54 dB(A)	50 dB(A)
<i>Proposed Operating Hours</i> (06:00 – 23:00)	56 dB(A)	52 dB(A)

**Table 4.1: Minimum background noise levels at the receiver**

## 5.0 NOISE CRITERIA

The *London Borough of Camden* general criteria for noise emissions are understood to be 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 unit(s) will be in operation during office hours, operational (between 06:00 and 23:00). We therefore propose to set the noise criteria at 42 dB(A), the value 10 dB below the minimum measured background noise level during the operating hours.

## 6.0 PLANT NOISE IMPACT ASSESSMENT

### 6.1 Proposed Installation

The plant installation comprises the following:

- 5 No. LG Multi V5 heat pump 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. These levels have also been compared to the measurements taken on site at position 1 to verify that the most robust assessment possible is undertaken

Unit	Sound Pressure Levels (at 1 metre, dB) in each Frequency Band								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
LG Multi V5 Heat Pump	66	66	63	59	54	45	46	48	66

**Table 6.1: Manufacturer noise emissions levels**

The plant location is located at basement level in the yard to the rear of the building which is shown on indicative site plan 14318-SP1.

The closest receiver has been identified as the window on the rear facade of a residential property opposite which is a minimum of 15m 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 66dB(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.

Mitigation	Required Attenuation (dB) in each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Louvred Enclosure	-6	-6	-7	-12	-20	-22	-18	-16

**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	Operating Hours Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	42 dB(A)	42 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 42dB(A), the window would need to offer an additional 12dB of attenuation for acceptable internal conditions to be met. 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	Recommended 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)	27 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 Aviation House, 125-129 Kingsway, London. The results of the survey have enabled criteria to be set for noise emissions from the installed 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 highest noise levels, due to the proposed plant, at the nearby noise sensitive receivers.

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

Report by

**Matt Markwick MIOA**

Checked by

**Florian Clement MIOA**

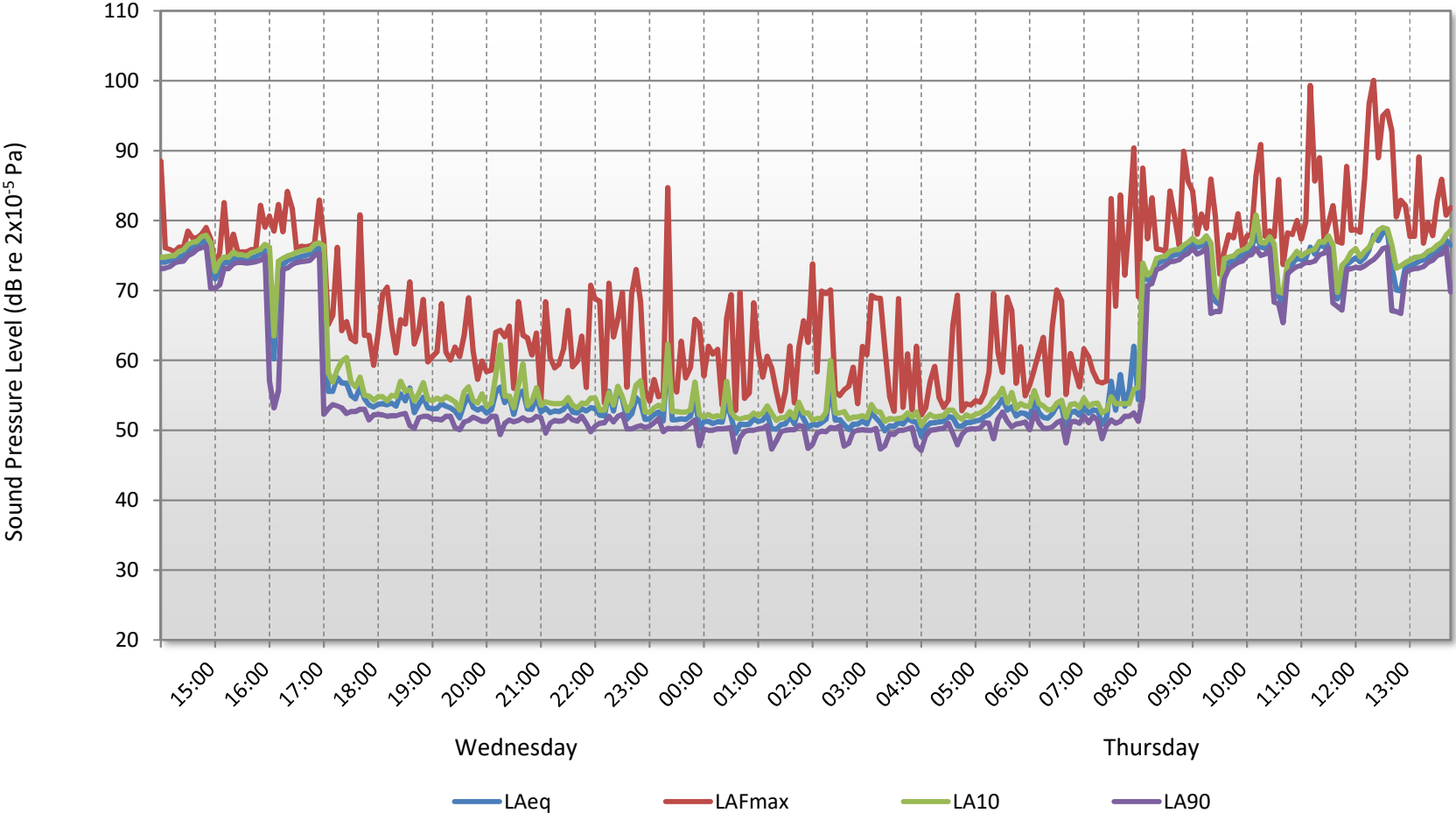




# Aviation House, 125-129 Kingsway, London - Position 1 - Basement Noise Source

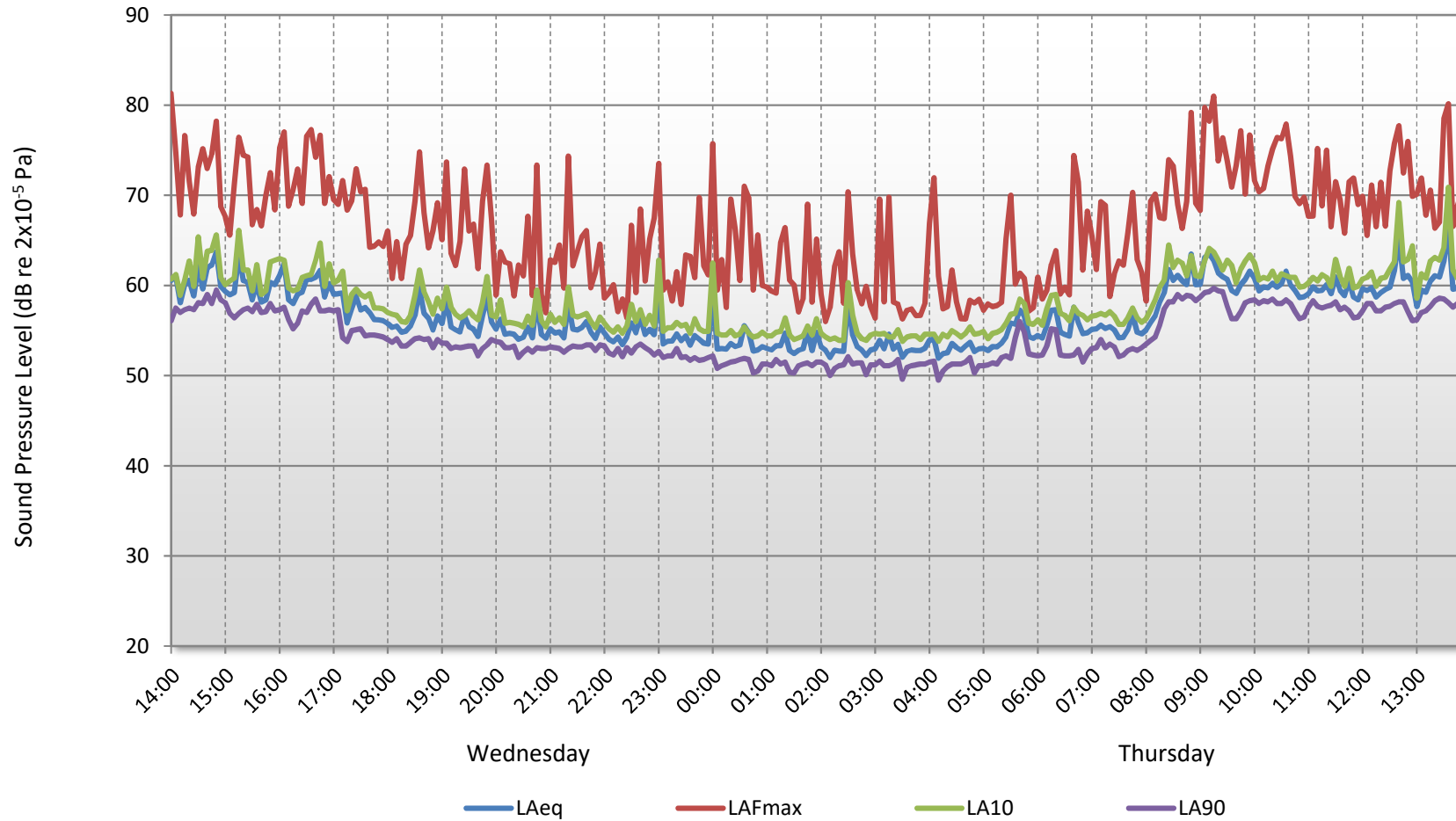


Environmental Noise Time History  
21 November to 22 November 2018



Aviation House, 125-129 Kingsway,  
London - Position 2 - Reciever

Environmental Noise Time History  
21 November 2018 to 22 November 2018



## 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

14318

Aviation House, 125-129 Kingsway, 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	
Manufacturer provided sound pressure level at 1 metre									
Unit Type	66	66	63	59	54	45	46	48	61
Correction for number of units (5 No.), dB	7	7	7	7	7	7	7	7	
Correction for reflections, dB	9	9	9	9	9	9	9	9	
Attenuation required by proposed enclosure, dB	-6	-6	-7	-12	-20	-22	-18	-16	
Distance correction to receiver, dB (15m)	-24	-24	-24	-24	-24	-24	-24	-24	
<b>Sound pressure level at receiver</b>	<b>52</b>	<b>52</b>	<b>48</b>	<b>39</b>	<b>26</b>	<b>15</b>	<b>20</b>	<b>24</b>	<b>42</b>

Design Criterion	42
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### 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									
	52	52	48	39	26	15	20	24	42
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>37</b>	<b>37</b>	<b>33</b>	<b>24</b>	<b>11</b>	<b>0</b>	<b>5</b>	<b>9</b>	<b>27</b>

Design Criterion	30
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