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15 CHESTER TERRACE, LONDON

NOISE IMPACT ASSESSMENT

Report **14765-NIA-01-RevA**

Prepared on 08 May 2019

Issued For:

Devonshire Developments Ltd

2 Wellington Road

London

NW8 9SP

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Devonshire Developments Ltd to measure existing background noise levels at 15 Chester Terrace, London. Measured noise levels have been used to determine noise emissions 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 move an existing conditioning unit from the roof of the property to the basement lightwell at the front of the property.

The closest receiver has been identified as the front facing first-floor window of the adjacent house. This window has direct line of sight to the proposed plant location.

This nearest noise sensitive receiver was 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 14765-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

Measurements were undertaken at one position as shown on indicative site drawing 14765-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 balcony at the front of the building. The microphone was positioned 1 m in front of the window and as such the monitoring position is not considered free-field according to the guidance of BS 4142: 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 traffic noise during the installation and collection of equipment.

Continuous automated monitoring was undertaken for the duration of the survey between 10:00 on 12 April 2019 and 15:25 on 15 April 2019.

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 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 14765-SP1.

Measured noise levels are shown as a time history in Figure 14765-TH1, with average ambient and typical background noise levels summarised in Table 4.1.

	Average ambient noise level $L_{eq: T}$	Typical background noise level $L_{90: 5min}$
Daytime (07:00 - 23:00)	58 dB(A)	44 dB(A)
Night-time (23:00 - 07:00)	51 dB(A)	31 dB(A)

Table 4.1: Average ambient and typical background noise levels

5.0 NOISE CRITERIA

The London Borough of Camden general criteria for noise emissions is shown in the following table, which is taken from Policy D28 of the Local Authority's Core Strategy:

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBLAeq'

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Based on a visual inspection of the spectral noise data, it is concluded that the proposed plant does not exhibit the tonal characteristics described in the second and third rows of the table, therefore the criterion of 5dB(A) below background noise will be used.

It is understood that in a similar application recently undertaken in a neighbouring property that the typical (median) existing background level (LA90) was considered representative and the application accepted.

It is understood that the proposed plant unit will be for residential use which is operational at any time. The noise emissions criterion of 26 dB(A), the value 5 dB below the typical (median) measured background noise level during the night time hours, will therefore be used for the purpose of this assessment.

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 1 No. Daikin Europe NV REYQ10P8Y1B condenser unit

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 meter, dB) in each Frequency Band								
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**dB(A)**
Daikin Europe NV REYQ10P8Y1B	61	63	61	57	53	46	43	37	59

Table 6.1: Manufacturer provided noise emissions levels

The proposed plant location is the basement lightwell to the front of the property. The proposed plant location has direct line of sight to the first-floor window of the adjacent house which is shown on indicative site plan 14765-SP1. This has been identified as the closest receiver which is a minimum of 6 m 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 47 dB(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	-9	-14	-17	-27	-31	-31	-28	-28

Table 6.2: Required attenuation from mitigation

In addition to the acoustic enclosure, further noise reduction should be provided by use of an acoustic barrier. We would recommend a timber screen of imperforate (solid) construction with a minimum mass per unit area of 25 Kg / m^2. The barrier should be tall enough to fully screen the enclosed plant from line of sight to the nearest receiver.

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	26 dB(A)	26 dB(A)

Table 6.3: Noise levels and criterion at noise sensitive receivers

As presented in Table 6.3 and Appendix B, the proposed plant installation with acoustic enclosure and barrier screen 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 26 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 6.4.

Receiver	Recomended Target – *For resting/sleeping conditions in a bedroom, in BS 8233: 2014*	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	10 dB(A)

Table 6.4: Noise levels and criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 15 Chester Terrace, 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.

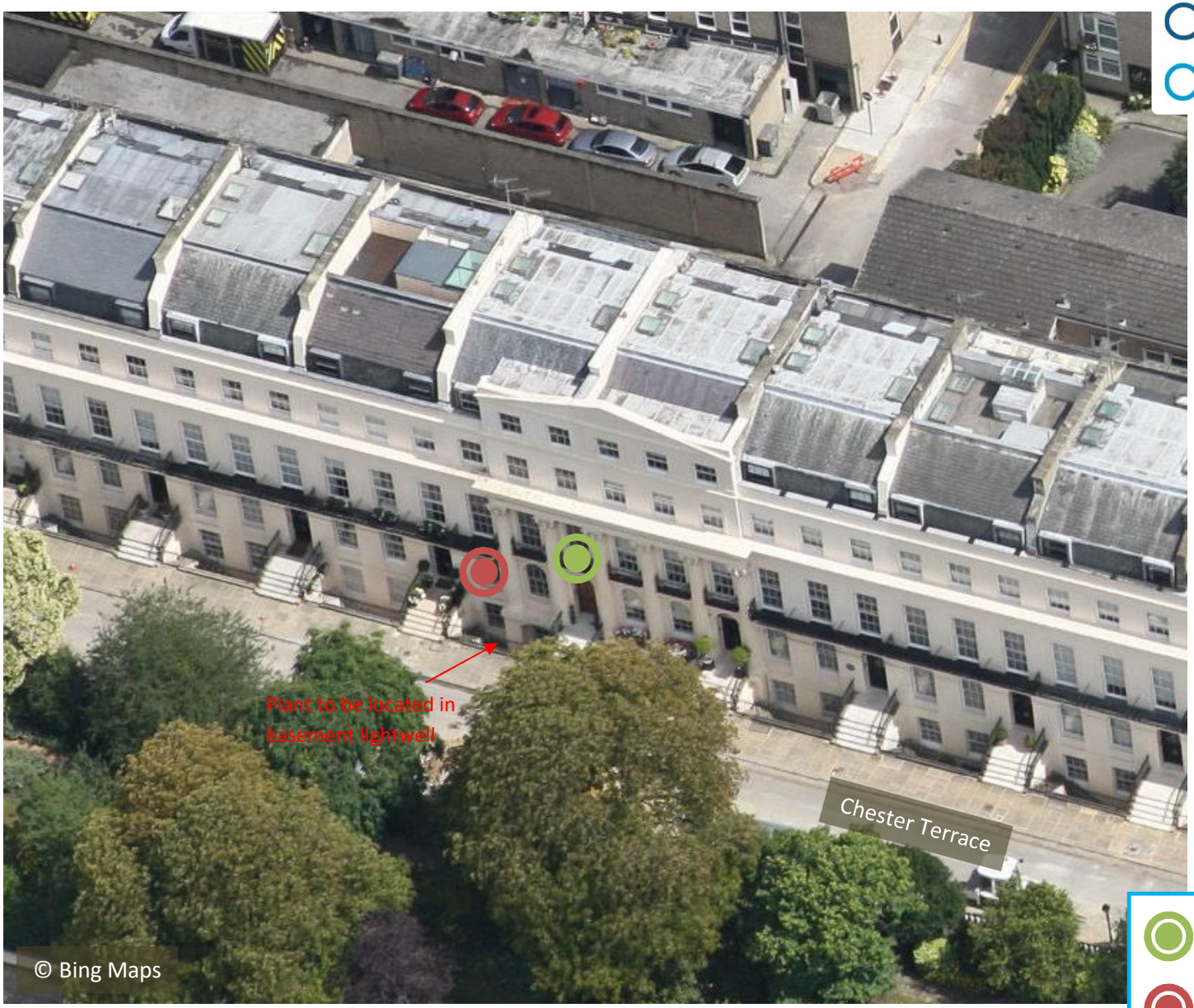
Calculations show that noise emissions from the proposed plant units should meet the requirements of the London Borough of Camden with the recommended mitigation installed as stated herein.

Report by

Matt Markwick MIOA

Checked by

Duncan Martin MIOA



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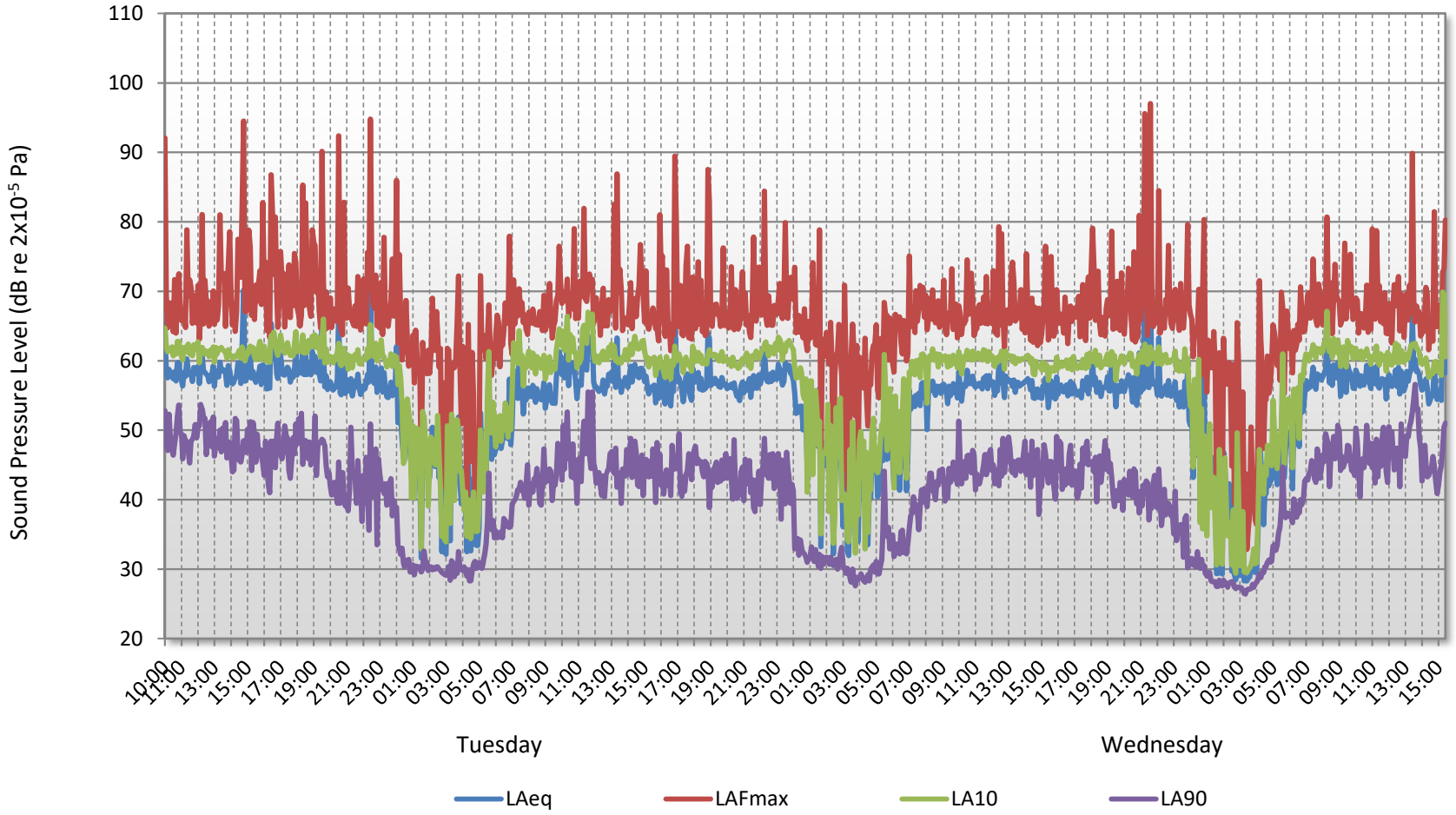
Noise Survey Position

Noise Sensitive Receiver

14765-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver **Date:** 8 May 2019

15 Chester Terrace, London

Environmental Noise Time History
12 April 2019 to 15 April 2019



14765-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

14765

15 Chester Terrace, 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 power level									
Daikin Europe NV REYQ10P8Y1B	61	63	61	57	53	46	43	37	59
Correction for reflections, dB	9	9	9	9	9	9	9	9	
Distance correction to receiver, dB (8 m)	-18	-18	-18	-18	-18	-18	-18	-18	
Attenuation required by Acoustic enclosure, dB	-9	-14	-17	-27	-31	-31	-28	-28	
Screening due to Proposed Timber Barrier, dB	-1	-2	-3	-5	-5	-5	-5	-5	
Sound pressure level at receiver	**42**	**38**	**32**	**16**	**8**	**1**	**1**	**0**	**26**

Design Criterion	**26**

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	42	38	32	16	8	1	1	0	26
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**27**	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**10**

Design Criterion	**30**