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REPORT AS9064.160622.NIA

DUNSTAN HOUSE, 14A ST CROSS STREET, LONDON

NOISE IMPACT ASSESSMENT

Prepared: 22 June 2016

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List of Attachments

1.0 INTRODUCTION

Planning approval is being sought for the installation of new plant at Dunstan House, 14A St Cross Street, London.

Clarke Saunders Associates has been commissioned by Taylor Project Services to undertake an environmental noise survey in order to measure the prevailing background noise climate at the site. The background noise levels measured will be used to determine daytime and night-time noise emission limits for new building services plant in accordance with the planning requirements of Camden Council.

2.0 SURVEY PROCEDURE & EQUIPMENT

A survey of the existing background noise levels was undertaken at fifth floor roof level of the existing building at the location shown in site plan AS9064/SP1. Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 12:40 hours on Thursday 9th and 12:50 hours on Monday 13th June 2016.

These measurements will allow suitable noise criteria to be set for the new building services plant, dependent on hours of operation.

The following equipment was used during the course of the survey:

- Rion data logging sound level meter type NL52;
- Rion sound level calibrator type NC-74.

The calibration of the sound level meter was verified before and after use. No calibration drift was detected.

The weather during the survey was dry with light winds, which made the conditions suitable for the measurement of environmental noise.

Measurements were made generally in accordance with ISO 1996-2:2007 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels*.

Please refer to Appendix A for details of the acoustic terminology used throughout this report.

3.0 RESULTS

Figures AS9064/TH1-TH5 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the measurement position.

4.0 DISCUSSION

The background noise climate at the property is determined by some roof-mounted plant on the adjacent, road traffic noise in the surrounding streets.

Measured minimum background and average noise levels are shown in Table 4.1 below.

Monitoring period	Minimum $L_{A90,10mins}$
07:00 - 23:00 hours	45 dB 7:40-7:45, 12/6/16
23:00 - 07:00 hours	43 dB 2:05-2:10, 11/6
24 hours	43 dB

Table 4.1 - Minimum measured background and average noise levels **[dB ref. 20µPa]**

5.0 DESIGN CRITERIA

5.1 Local Authority Requirements

Camden Council currently requires new plant to be 5dB below the background level. In addition, the background level must not be exceeded by more than 1dB in any octave band between 63Hz and 8kHz.

Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (L_{A90}), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the L_{A90}, expressed in dB(A).

It is not expected that tonal noise will be generated by the proposed plant units at the receiver and so the plant noise emissions criteria that should not be exceeded at the nearest noise sensitive receiver should be set to the proposed levels detailed in Table 5.1.

Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	24 hours
L_{Aeq} 40 dB	L_{Aeq} 38 dB	L_{Aeq} 38 dB

Table 5.1 - Proposed design noise criteria **[dB ref. 20µPa]**

5.2 BS8233:2014 Guidance on sound insulation and noise reduction for buildings

The guidance in this document indicates suitable noise levels for various activities within residential and commercial buildings.

The relevant sections of this standard are shown in the following table:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16 hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16 hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 hour}$	30 dB $L_{Aeq, 8 hour}$

Table 5.2 - Excerpt from BS8233: 2014 **[dB ref. 20µPa]**

6.0 PREDICTED NOISE IMPACT

6.1 Proposed plant

The selected plant has been confirmed as:

- 1 no. Daikin Condensing Unit Type REYQ12T

The approximate location of the plant to be installed is shown in site plan AS9064/SP1.

Noise levels generated by the type REYQ12T condenser to be installed have been confirmed by the manufacturer as follows:

Freq (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
Lp @ 1m (dB)	59	66	60	62	53	50	44	37	61

Table 6.1 - Source noise data for the type REYQ12T condenser **[dB ref. 20µPa]**

6.2 Predicted noise levels

Following an inspection of the site, the nearest noise sensitive receiver is situated on Saffron Hill at 6th floor level, as shown on the indicative site plan AS9064/SP1. This window is at least 28 metres away from the proposed plant location. The plant is to be installed behind a louvered screen. However, to ensure a robust, pessimistic assessment, no loss has been allowed for the louvre.

The cumulative noise level at the nearest noise sensitive receiver has been assessed according to the guidelines set out in BS4142:1997 *Method for rating industrial noise affecting mixed residential and industrial areas* as guidance, using the noise data above.

Predicted level at 1m from receiver, dB(A)	Criterion , dB(A)
32	38

Table 6.2 - Predicted noise level and criteria at nearest noise sensitive location **[dB ref. 20 µPa]**

A summary of the calculations are shown in Appendix B.

6.3 Comparison to BS8233:2014 Criteria

BS8233 assumes a loss of approximately 15dB for a partially open window. The external noise level shown in Table 6.2 would result in an internal noise levels that would meet the level shown in Table 5.2.

7.0 CONCLUSION

An environmental noise survey has been undertaken at Dunstan House, 14A St Cross Street, London by Clarke Saunders Associates between Thursday 9th and Monday 13th June 2016.

Measurements have been made to establish the current background noise climate. This has enabled a 24-hour design criterion to be set for the control of plant noise emissions to noise sensitive properties, in accordance with Camden Council's requirements.

Data for the new Daikin condensing units have been used to predict the noise impact of the new plant on neighbouring residential properties.

Compliance with the noise emission design criterion has been demonstrated. No further mitigation measures are, therefore, required for external noise emissions.

Jamie Duncan
Jamie Duncan (Jun 22, 2016)

Jamie Duncan MIOA

CLARKE SAUNDERS ASSOCIATES

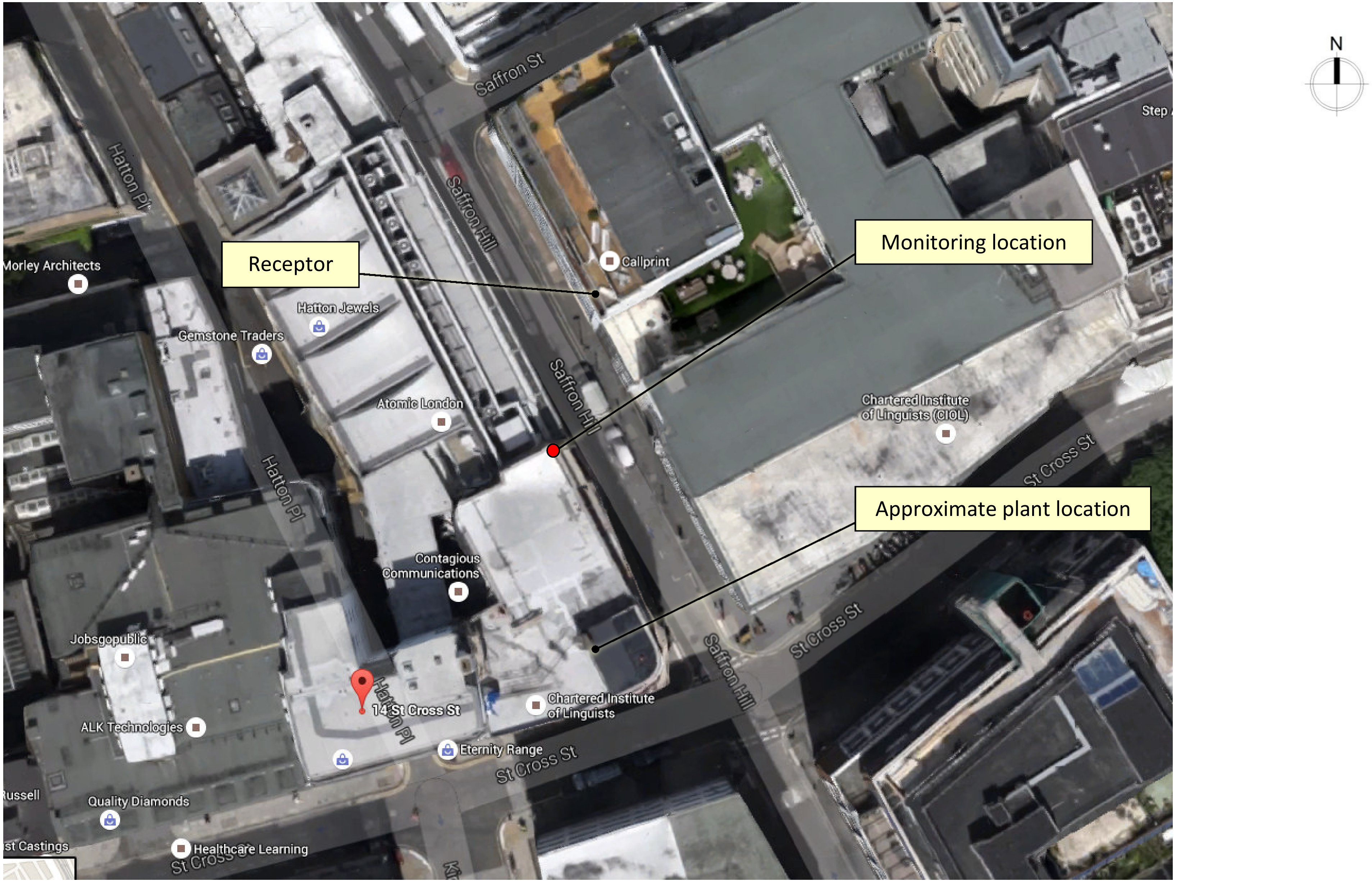
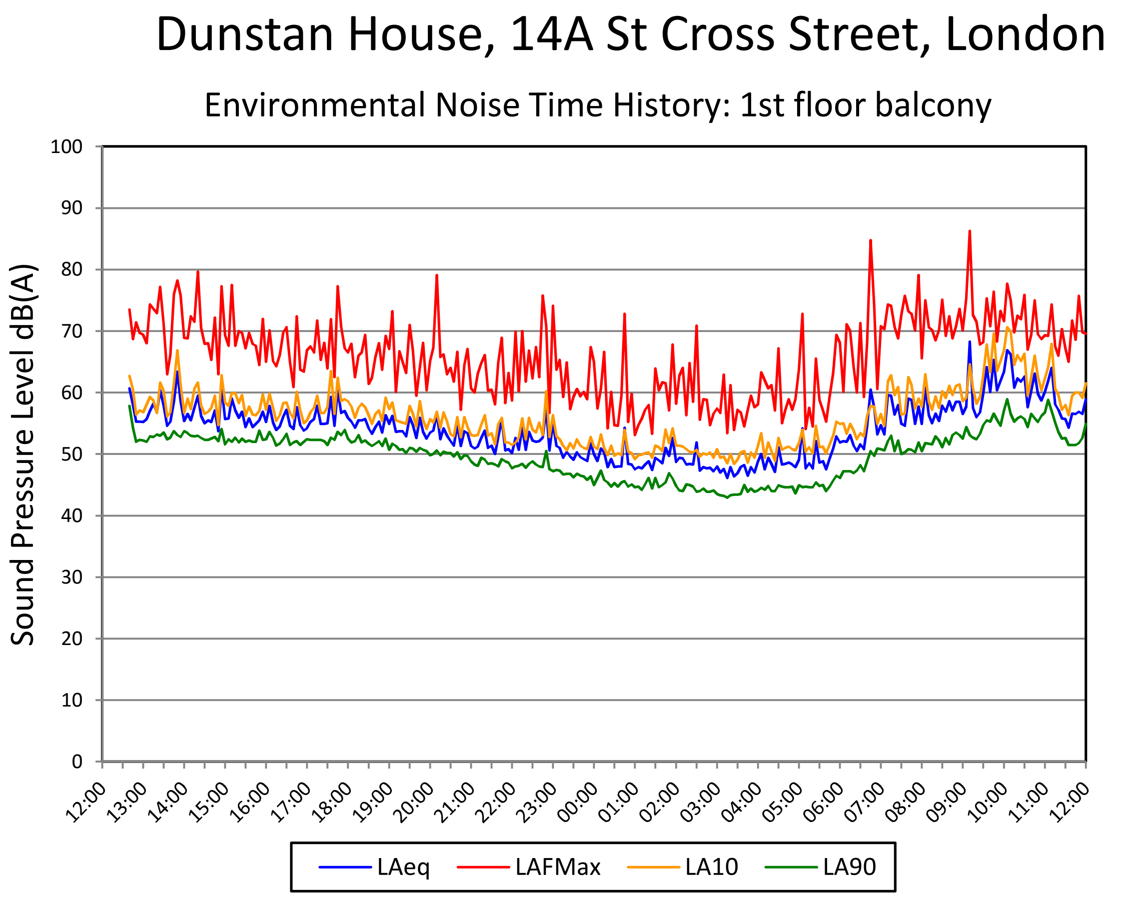


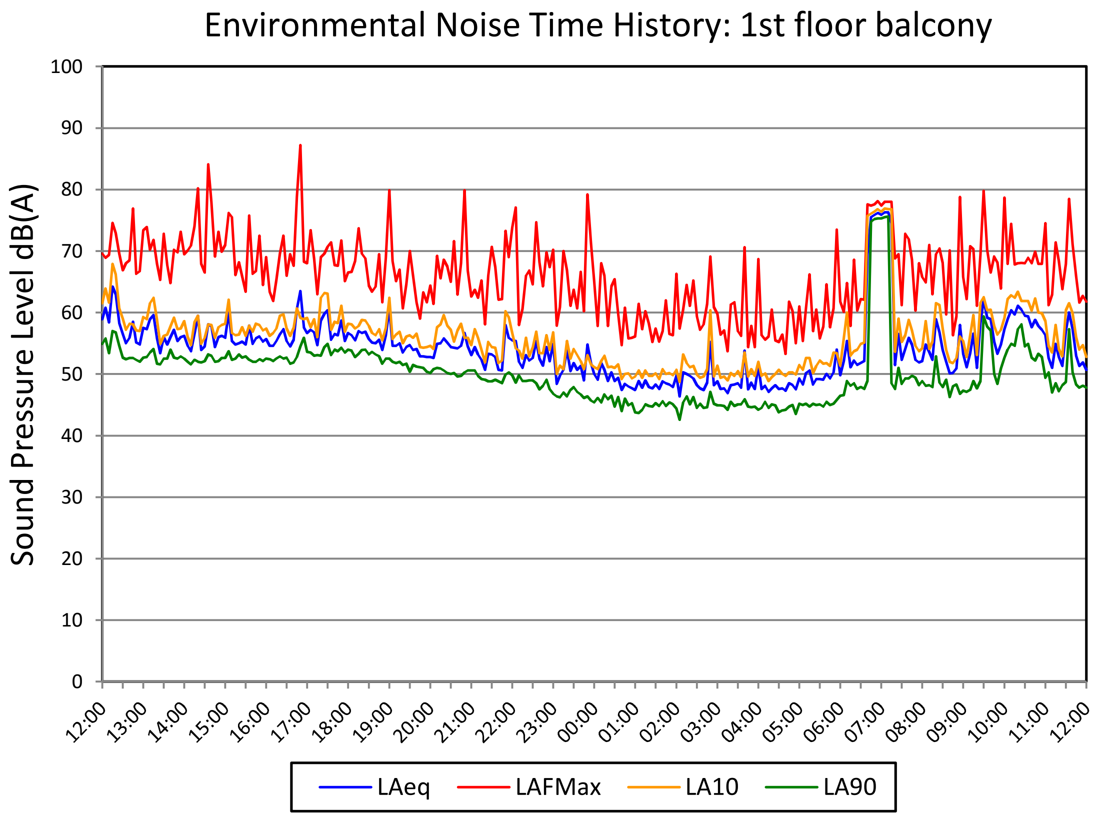
Figure AS9064/SP1



Thursday 09 June to Friday 10 June 2016

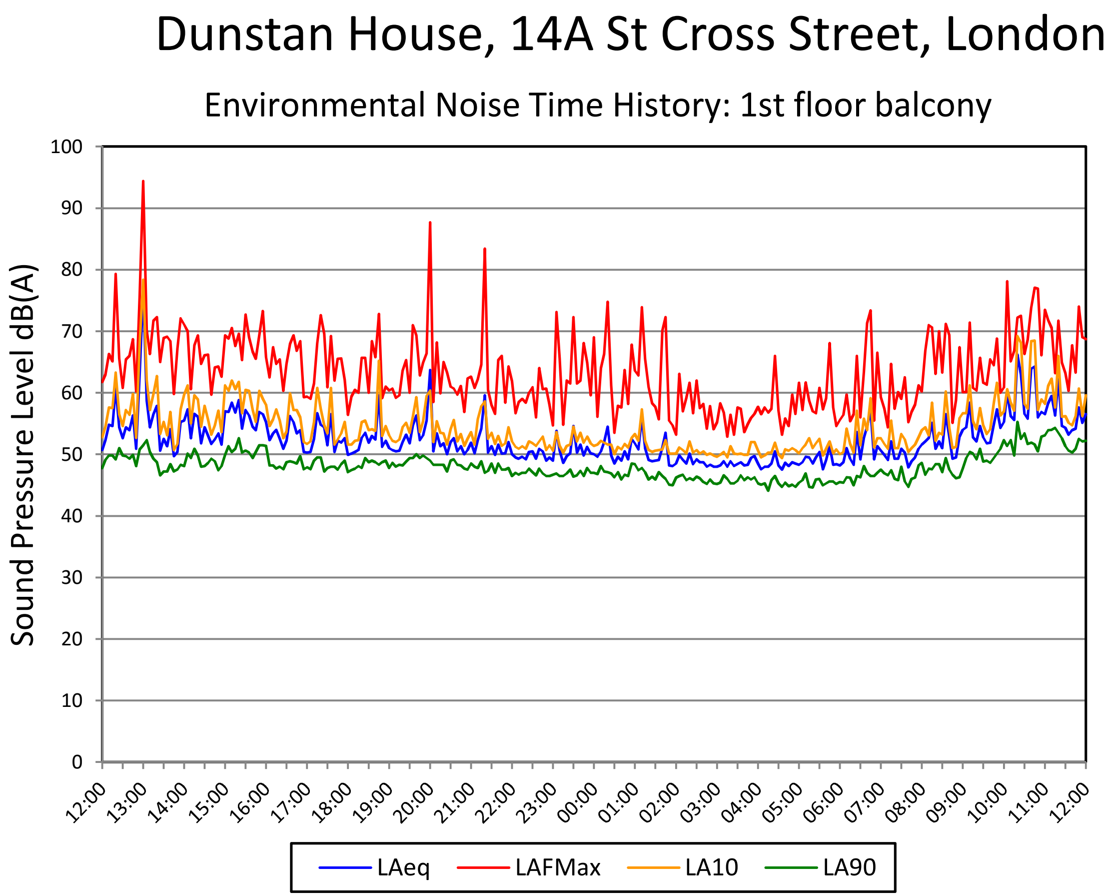
Figure AS9064/TH1

Dunstan House, 14A St Cross Street, London



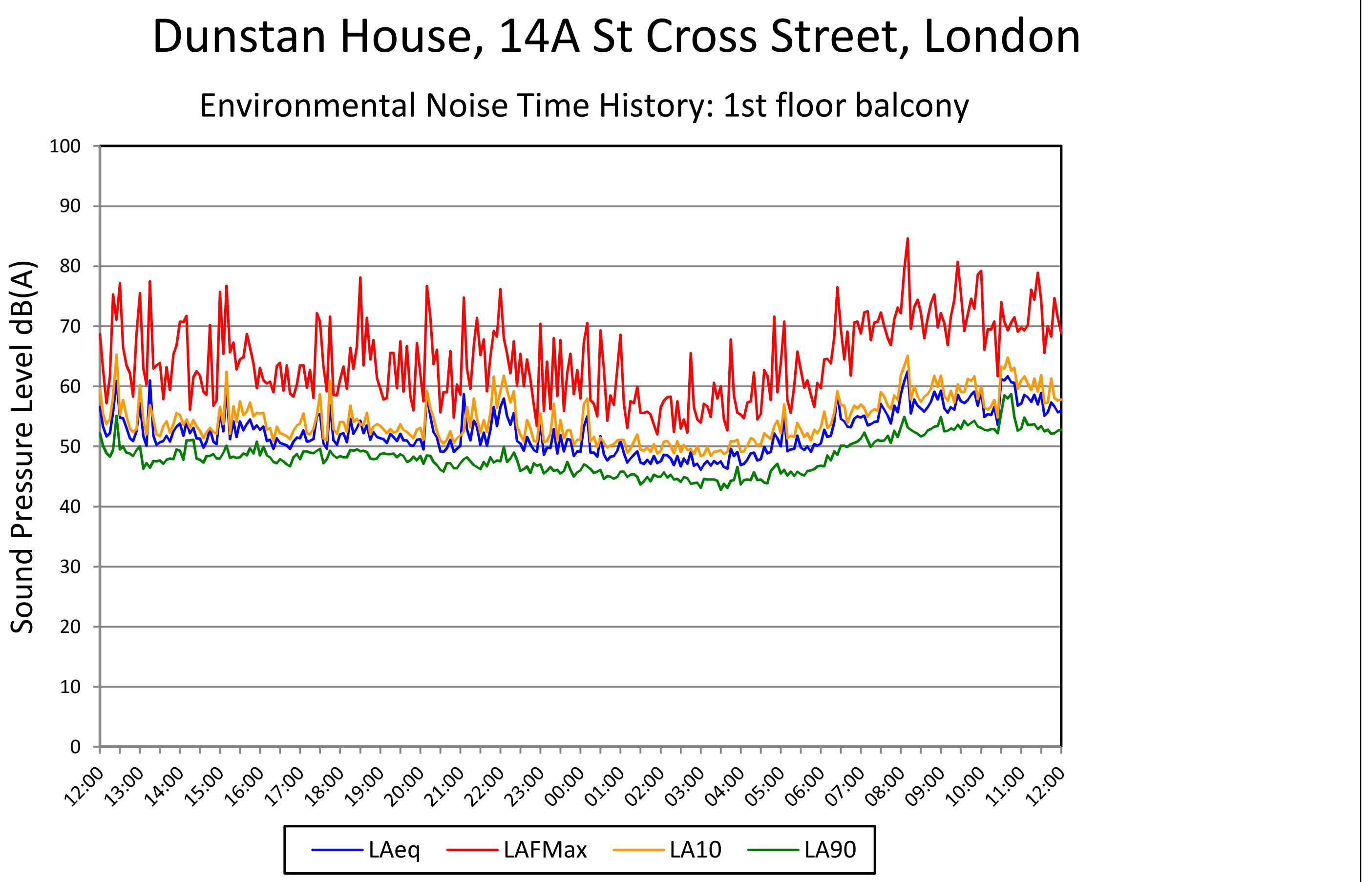
Friday 10 June to Saturday 11 June 2016

Figure AS9064/TH2



Saturday 11 June to Sunday 12 June 2016

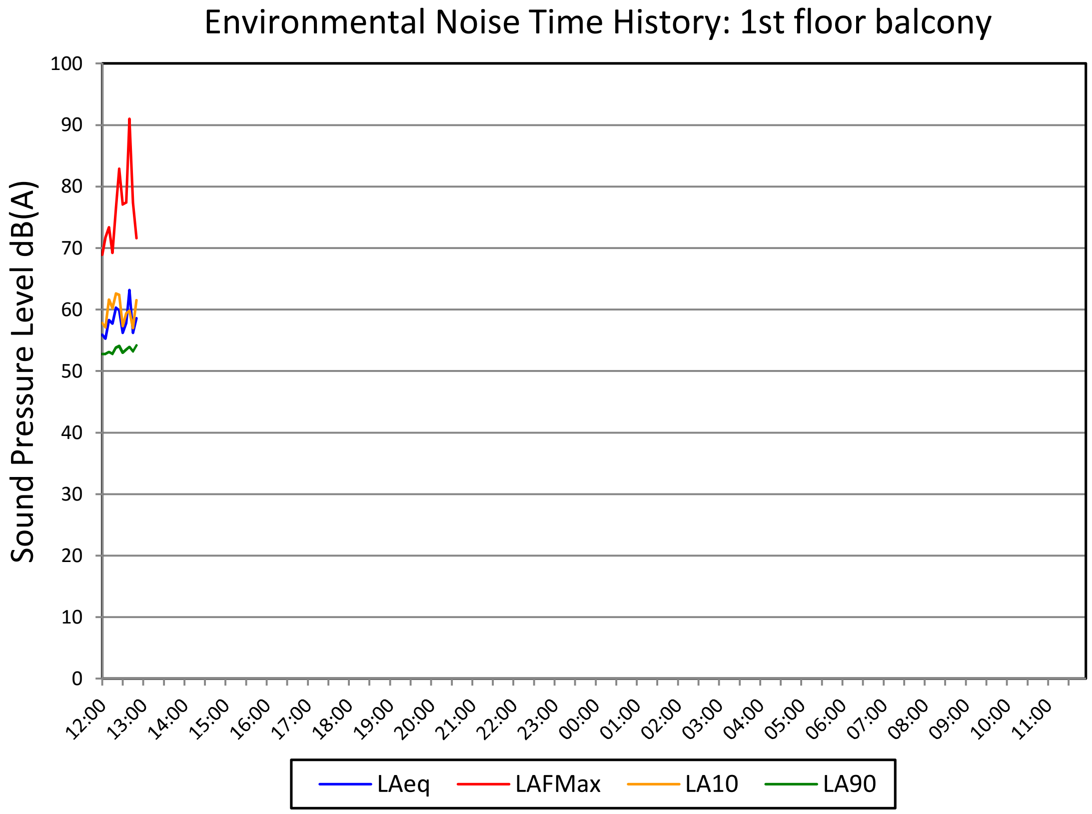
Figure AS9064/TH3



Sunday 12 June to Monday 13 June 2016

Figure AS9064/TH4

Dunstan House, 14A St Cross Street, London



Monday 13 June to Tuesday 14 June 2016

Figure AS9064/TH5

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND NOISE

1.1 Acoustic Terminology

The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and any variations in its level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

dB (A): The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level.

L_{10} & L_{90} : If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the `average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.

It is common practice to use the L_{10} index to describe traffic noise, as being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic noise.

L_{eq} : The concept of L_{eq} (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise, such as aircraft noise, environmental noise and construction noise.

L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc).

The use of digital technology in sound level meters now makes the measurement of L_{eq} very straightforward.

Because L_{eq} is effectively a summation of a number of noise events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute noise limit.

L_{max} : L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

D The sound insulation performance of a construction is a function of the difference in noise level either side of the construction in the presence of a loud noise source in one of the pair of rooms under test. *D*, is therefore simply the *level difference* in decibels between the two rooms in different frequency bands.

D_w D_w is the *Weighted Level Difference* The level difference is determined as above, but weighted in accordance with the procedures laid down in BS EN ISO 717-1.

$D_{nT,w}$ $D_{nT,w}$ is the *Weighted Standardised Level Difference* as defined in BS EN ISO 717-1 and represents the *weighted level difference*, as described above, corrected for room reverberant characteristics.

C_{tr} C_{tr} is a spectrum adaptation term to be added to a single number quantity such as $D_{nT,w}$, to take account of characteristics of a particular sound.

$L'_{nT,w}$ $L'_{nT,w}$ is the *Weighted Standardised Impact Sound Pressure Level* as defined in BS EN ISO 717-2 and represents the level of sound pressure when measured within room where the floor above is under excitation from a calibrated tapping machine, corrected for the receive room reverberant characteristics.

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND NOISE

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation have agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, eg. 250 Hz octave band runs from 176 Hz to 353 Hz. The most commonly used bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that noise levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) is not twice as loud as 50 dB(A) sound level. It has been found experimentally that changes in the average level of fluctuating sound, such as traffic noise, need to be of the order of 3 dB(A) before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10 dB(A) is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in traffic noise level can be given.

INTERPRETATION

Change in Sound Level dB(A)	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

1.4 Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in noise level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a 3 metre high barrier exists between a noise source and a listener, with the barrier close to the listener, the listener will perceive the noise source is louder, if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the noise source would seem quieter than it was if he were standing. This may be explained by the fact that the "effective screen height" is changing with the three cases above, the greater the effective screen height, in general, the greater the reduction in noise level.

Where the noise sources are various roads, the attenuation provided by a fixed barrier at a specific property will be greater for roads close to the barrier than for roads further away.

APPENDIX B

EXTERNAL PLANT NOISE EMISSIONS CALCULATIONS

Calculation 1:

			63	125	250	500	1000	2000	4000	8000	dB(A)
Daikin REYQ12T	Lp	1 m	59	66	60	62	53	50	44	37	61
Number of units		1	0	0	0	0	0	0	0	0	
Distance Loss		28 m	-29	-29	-29	-29	-29	-29	-29	-29	
Level At Receiver			*30*	*37*	*31*	*33*	*24*	*21*	*15*	*8*	32

24-hour plant noise design criterion 38 dB(A)