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specialist consultants

REPORT AS9191.160817.NIA

11-12 GRENVILLE STREET
LONDON

PLANT NOISE IMPACT ASSESSMENT

Prepared: 18 August 2016

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List of Attachments

1.0 INTRODUCTION

Planning approval is being sought for the installation of new kitchen extract plant at 11-12 Grenville St, London as part of the conversion of the existing office building for a mixed residential/A3 use.

Clarke Saunders Associates has been commissioned by Watkins Payne Partnership 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 the second floor level of the existing building at the location shown in site plan AS9191/SP1. Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 13:18 hours on Wednesday 10th August and 12:58 hours on Friday 12th August 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 NL32;
- Rion sound level calibrator type NC-74.

The calibration of the sound level meter was verified before and after use. No significant 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 AS9191/TH1-TH3 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the measurement position.

The background noise climate at the property is determined by road traffic noise in the surrounding streets and building services plant on neighbouring roofs.

Measured minimum background noise levels are shown in Table 3.1.

Monitoring period	Minimum $L_{A90,5mins}$
07:00 - 19:00 hours	48dB 12/08/2016 07:08
19:00 - 23:00 hours	47dB 10/08/2016 22:53
23:00 - 07:00 hours	46dB 11/08/2016 02:13

Table 3.1 - Minimum measured background noise levels **[dB ref. 20µPa]**

4.0 DESIGN CRITERIA

4.1 Local Authority Requirements

The requirements of the Camden Council regarding plant noise are detailed within the Camden Council's Core Strategy 2010 and Development Management Policies 2010 (DP28).

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	00:00-24:00	5dB(A) $<L_{A90}$
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive facade	Day, evening and night	00:00-24:00	10dB(A) $<L_{A90}$
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	Day, evening and night	00:00-2400	10dB(A) $<L_{A90}$
Noise at 1 metre external to sensitive façade where L_{A90} >60dB	Day, evening and night	00:00-24:00	55dB(A) L_{Aeq}

Table 4.1 - London Borough of Camden's plant noise emissions criteria

The daytime, evening and night-time plant noise emissions criteria to be achieved at 1m from the nearest noise sensitive façade, based on non-tonal plant, are shown in Table 4.2.

Daytime (07:00-19:00)	Evening (19:00-23:00)	Night-time (23:00-07:00)
43dB(A)	42dB(A)	41dB(A)

Table 4.2 – Plant Noise Design Criteria

4.2 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 B $L_{Aeq,\ 8\ hour}$

Table 4.3- Excerpt from BS8233: 2014 **[dB ref. 20µPa]**

5.0 PREDICTED NOISE IMPACT

There are no plant proposed for the residential element of the development. A typical kitchen extract fan has been selected to demonstrate feasibility.

5.1 Proposed plant

The selected plant has been confirmed as:

- 1 no. T-Line 120 TLL 250 (40Hz)

The approximate location of the plant to be installed is shown in site plan AS9191/SP1.

Noise levels generated by the type T-Line 120 TLL 250 (40Hz) kitchen extract fan to be installed have been confirmed by the manufacturer as follows:

Freq (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
L_W (dB)	64	69	73	74	70	66	61	54	75

Table 5.1 - Source noise data for the type T-Line 120 TLL 250 (40Hz)

5.2 Predicted noise levels

The fan unit is to be located internally at ground floor level with the discharge outlet to be located on the roof.

Following an inspection of the site, the nearest noise sensitive receiver is situated on the 4th floor level of the proposed development, as shown on the indicative site plan AS9191/SP1. This window is at least 5 metres away from the proposed plant location.

The cumulative noise level at the nearest noise sensitive receiver has been assessed using the noise data above.

In order to achieve the criterion, reduction from an in line attenuator has been included. The required insertion loss is shown in the table below.

Freq (Hz)	63	125	250	500	1k	2k	4k	8k
Silencer Insertion Loss	3	5	9	13	15	16	11	9

Table 5.2 – Required silencer insertion losses **[dB ref. 20 µPa]**

The following table summarises predicted noise levels at 1m from the nearest noise sensitive residential façade from the proposed plant.

Predicted plant noise level at nearest residential receiver ($L_{Aeq,\,T}$)	24-hour design criterion ($L_{Aeq,\,T}$)
39dB(A)	41dB(A)

Table 5.3 – Predicted plant noise levels at nearest noise sensitive façade **[dB ref. 20µPa]**

The predicted levels are within the criteria set against Camden's Core Strategy 2010 and Development Management Policies 2010.

All plant having the potential to transmit vibration into the structure will be mounted on suitable manufacturer-selected isolation mounts in order to protect residential amenity.

A summary of the calculations are shown in Appendix B.

5.3 Comparison to BS8233:2014 Criteria

BS8233 assumes a loss of approximately 15dB for a partially open window. The external noise level shown in Table 5.3 would result in an internal noise levels that would meet the level shown in Table 4.1.

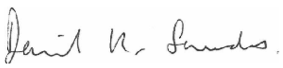
6.0 CONCLUSION

An environmental noise survey has been undertaken at 11-12 Grenville Street, London by Clarke Saunders Associates between Wednesday 10th August and Friday 12th August 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 a typical kitchen extract fan 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.



Daniel Saunders MIOA

CLARKE SAUNDERS ASSOCIATES

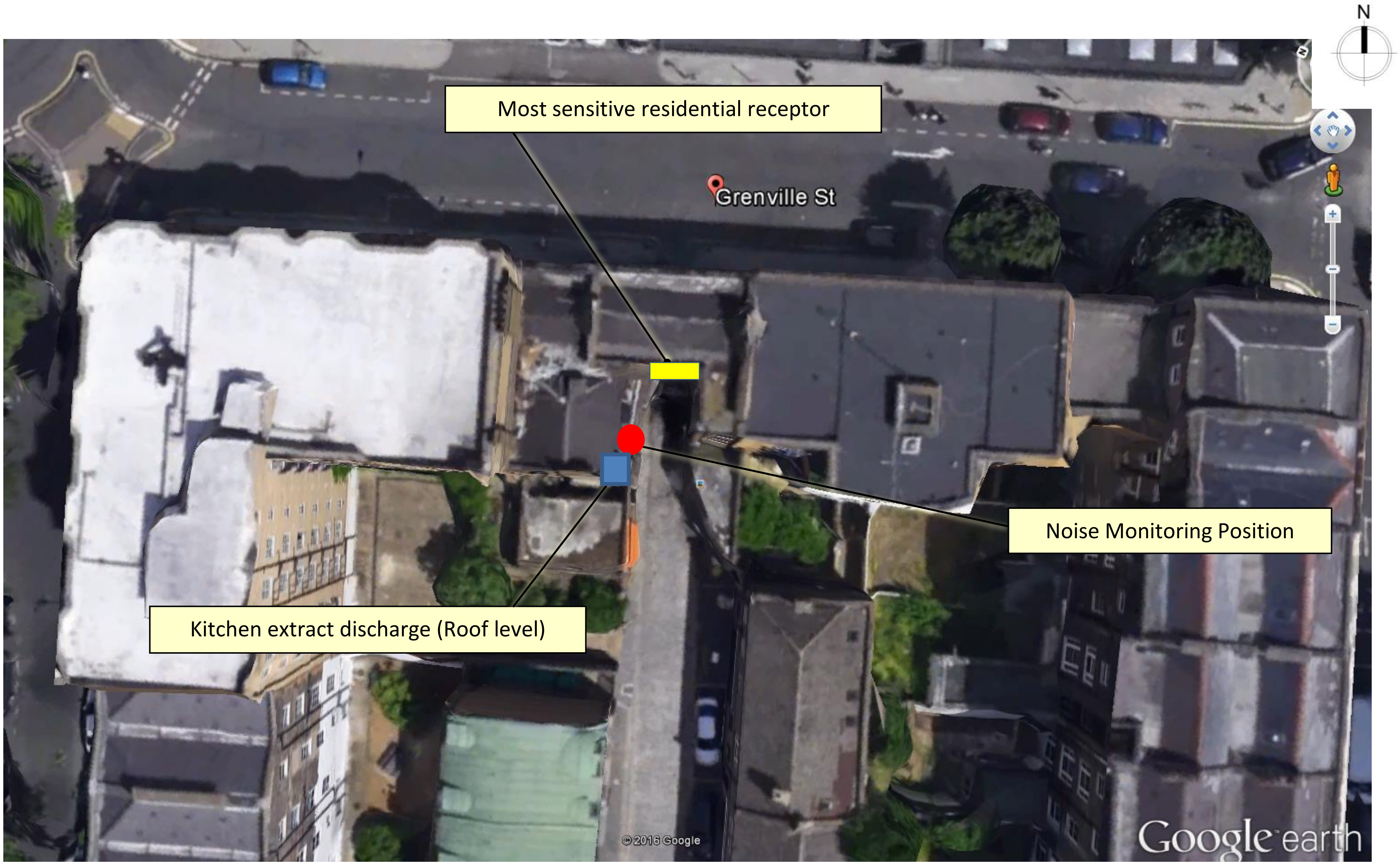
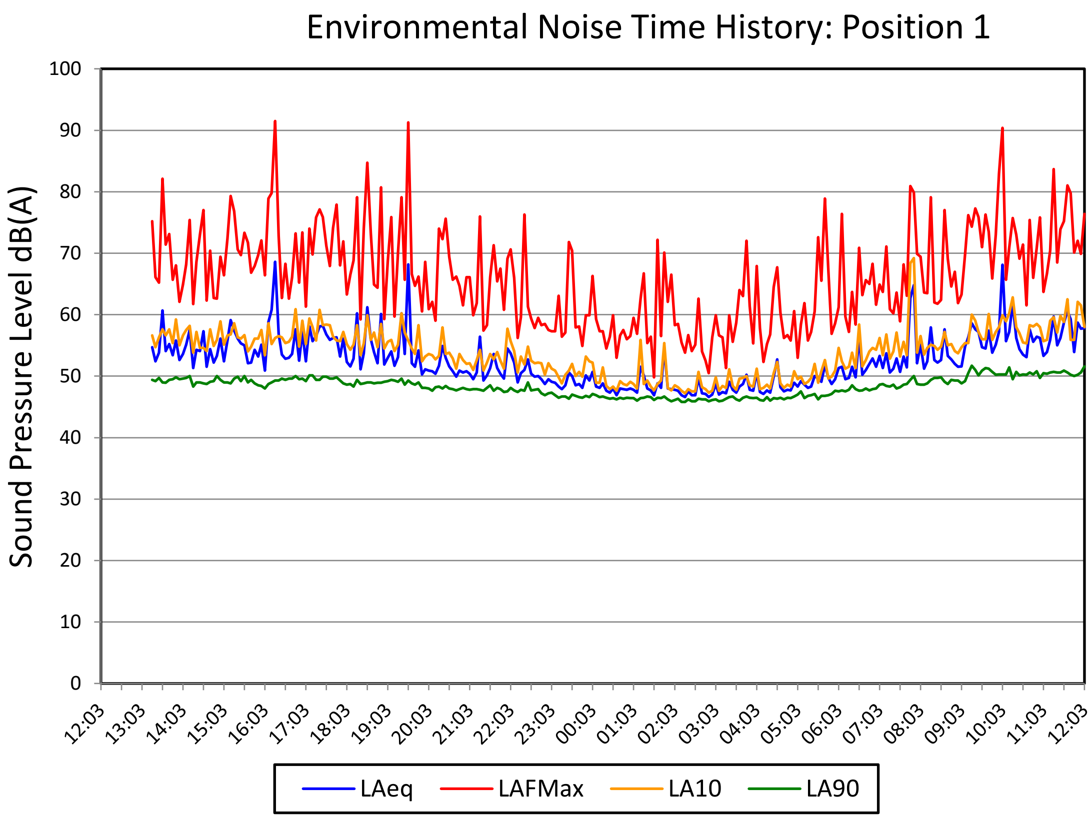


Figure AS9191/SP1

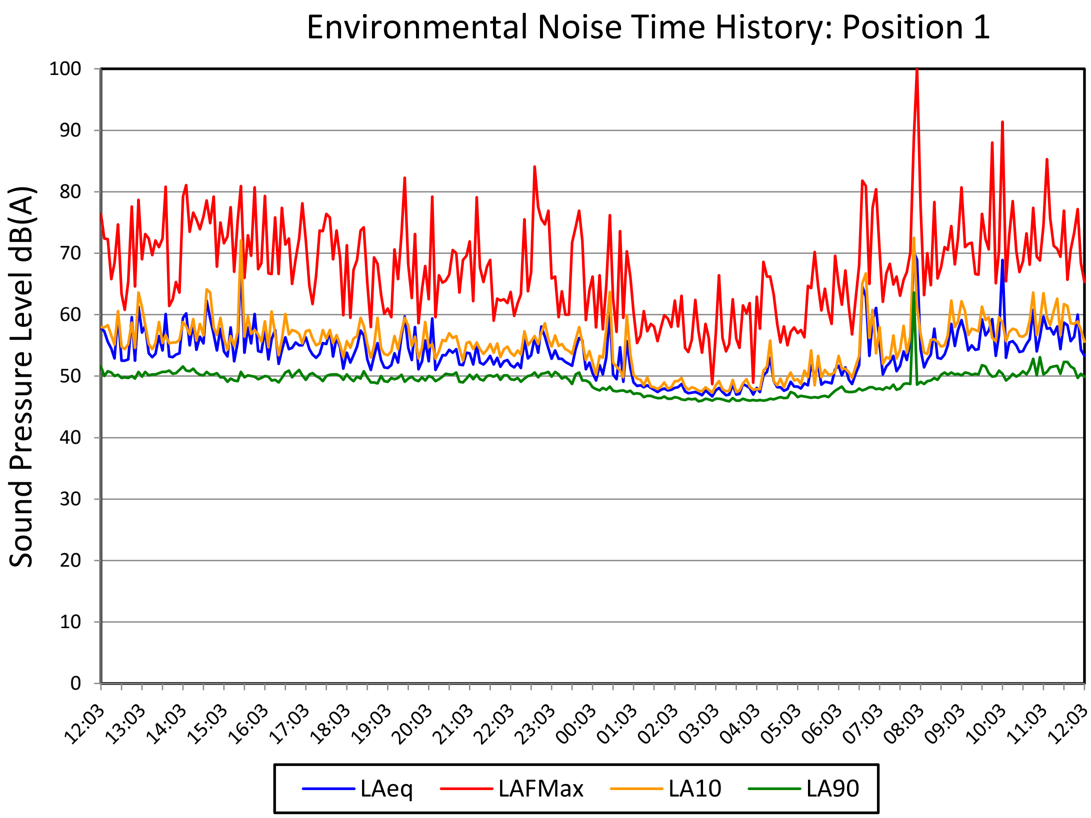
11-12 Grenville St, London



Wednesday 10 August to Thursday 11 August 2016

Figure AS9191/TH1

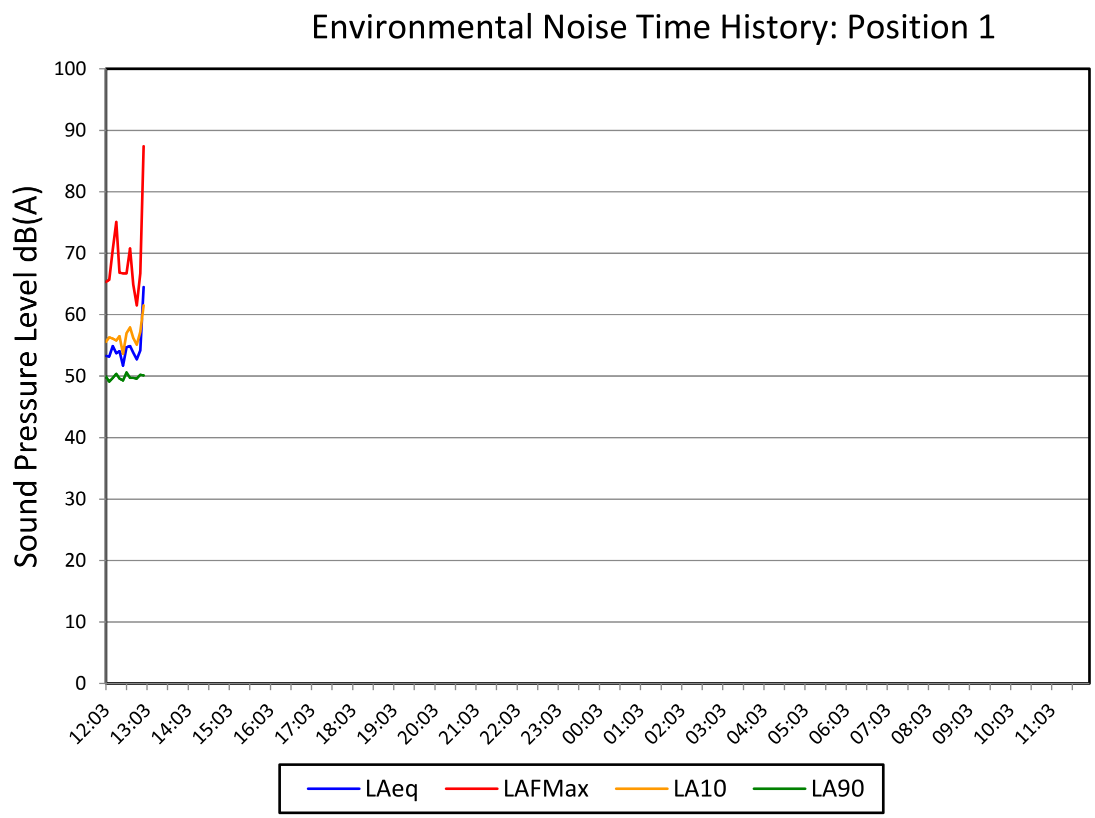
11-12 Grenville St, London



Thursday 11 August to Friday 12 August 2016

Figure AS9191/TH2

11-12 Grenville St, London



Friday 12 August to Saturday 13 August 2016

Figure AS9191/TH3

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND SOUND

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as ‘loudness’, its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.

Noise Sound that is unwanted by or disturbing to the perceiver.

Frequency The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of ‘pitch’, with low frequencies producing low ‘notes’ and higher frequencies producing high ‘notes’.

dB(A): Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the ‘A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated ‘A' weighted sound level is designated as dB(A) or L_A.

L_{eq} : 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 concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction.

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

L_{10} & L_{90} : Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. 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 a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise.

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

L_{max} : The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

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 has 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, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

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

1.3 Human Perception of Broadband Noise

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND SOUND

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

INTERPRETATION

Change in Sound Level dB	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

APPENDIX B
11-12 Grenville Street, London
Plant Noise Assessment

To Nearest Noise Sensitive Receiver

Daytime Operation	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**	**8 kHz**	**dB(A)**
Sound power data	64	69	73	74	70	66	61	54	
Sound power to Sound pressure	56	61	65	66	62	58	53	46	**67**
Distance loss	-14	-14	-14	-14	-14	-14	-14	-14	
Attenuator loss	-3	-5	-9	-13	-15	-16	-11	-9	
Directivity loss	0	0.25	0.25	0	-4	-7	-7	-7	
Specific Noise Level at Receiver	39	42	42	39	29	21	21	16	**39**