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specialist consultants

REPORT AS10925.181207.R1

30 PERCY STREET, LONDON

PLANT NOISE IMPACT ASSESSMENT

Prepared: 17 December 2018

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AS10925/SP1	Indicative Site Plan
AS10925/TH1-TH5	Environmental Noise Time Histories
Appendix A	Acoustic Terminology
Appendix B	Acoustic Calculations

1.0 INTRODUCTION

Planning approval is being sought for the installation of new plant at 30 Percy Street, London.

Clarke Saunders Associates has been commissioned by Taylor Project Services on behalf of Skagen Property Limited 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 SITE DESCRIPTION

The site is currently occupied by a five-storey commercial property and is bounded by Percy St to the south, a residential building to the north across a courtyard and further residential / commercial buildings to the east and west. Percy Street is a one-way, single-lane road with parking along either side and is comprised of townhouse style commercial and residential buildings.

3.0 SURVEY PROCEDURE & EQUIPMENT

A survey of the existing background noise levels was undertaken at roof level of the existing building at the location shown in site plan AS10925/SP1. Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 14:05 hours on Thursday 6th and 11:25 hours on Tuesday 11th December 2018.

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:

- NTi data logging sound level meter type XL2;
- 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 generally dry with light winds, which made the conditions suitable for the measurement of environmental noise. Periods of precipitation with stronger winds were evident on Thursday 6th December and Saturday 8th December. Any such periods have been excluded from background survey data used in the assessment.

Measurements were made following procedures in BS 7445:1991 (ISO1996-2:1987) *Description and measurement of environmental noise Part 2- Acquisition of data pertinent to land use* and BS4142:2014 *Methods for rating and assessing industrial and commercial sound*.

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

4.0 RESULTS & ANALYSIS

Figures AS10925/TH1-TH 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 with a contribution from building services plant on the roofs of buildings in the vicinity of the site.

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

Monitoring period	08:00 - 20:00 hours (hours of proposed plant operation)
Typical* $L_{A90,5mins}$	48 dB
Average $L_{Aeq,12hr}$	53 dB

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

**typical background calculated as 10th percentile of $L_{A90,5min}$ data measured during this period*

5.0 DESIGN CRITERIA

5.1 Local Authority Requirements

Camden Council adopted the new Local Plan on 3 July 2017 which describes 'noise thresholds' in Appendix 3.

Discussion with Edward Davis, Environmental Health Officer at Camden Council on Thursday 14th December 2017 has confirmed that:

Survey measurement procedures for fixed plant noise assessments and determination of the typical background noise level should follow the methodology set out in BS4142:2014 *Methods for rating and assessing industrial and commercial sound*. The subsequent assessment of fixed plant noise emissions does not need to be in accordance with BS4142:2014 where character penalties could be imposed. Instead the policy requires the plant noise emissions at the nearest residential receptor to be 10 dB below the typical background ($L_{A90,15min}$) during the proposed operational period, and if tonal, 15 dB below the typical background ($L_{A90,15min}$) during the proposed operational period.

The assessed plant is not expected to have tonal content. On this basis, the plant noise emissions criterion is shown in Table 5.1.

Time Period	Operational Period (0800 – 2000 hours)
Plant noise criterion	L_{Aeq} 38 dB

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

6.0 PREDICTED NOISE IMPACT

6.1 Proposed plant

The selected plant has been confirmed as:

- 1 no. Daikin Condensing Units Type RXYSCQ-4TV1
- 4 no. Daikin Condensing Units Type RXYSCQ-5TV1

The approximate location of the plant to be installed is shown in site plan AS10925/SP1.

Highest operational noise levels generated by the condensers have been confirmed by the manufacturer as follows:

Freq (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
RXYSCQ-4TV1	49	53	49	62	46	39	33	25	51
RXYSCQ-5TV1	51	53	52	53	46	41	34	26	52

Table 6.1 - Source noise data for the proposed condensers **[dB ref. 20µPa]**

6.2 Predicted noise levels

Following an inspection of the site, the nearest noise sensitive receiver is situated roof level at 31 Percy St, as shown on the indicative site plan AS10925/SP1. This window is at least 6 metres away from the proposed plant location. There is another nearby residential receiver opposite the rear of site at fourth floor level. The window is in the rear of the building on Windmill Street, overlooking Percy Mews.

The cumulative noise level at the nearest noise sensitive receiver has been calculated on the basis of manufacturer's plant data and drawings available at the time of writing.

Screening losses afforded by a barrier have been included in the prediction of the cumulative plant noise level at the nearest receiver. The screen, installed on the roof at the boundary between 30 and 31 Percy Street at a height of one metre above the flat roof on 30 Percy St, should be continuous and imperforate, with a minimum mass per unit area of 10kg/m^2.

Receptor	Predicted plant noise emissions at nearest receptors, $L_{Aeq,T}$, dB
31 Percy St	36
Rear of Windmill St	34

Table 1.1 - Predicted cumulative plant noise levels at receptors **[dB ref. 20 µPa]**

A summary of the calculations is shown in Appendix B.

Where appropriate, plant would be isolated using proprietary mounts to minimise structure-borne noise transmission.

7.0 CONCLUSION

An environmental noise survey has been undertaken at 30 Percy Street, London by Clarke Saunders Associates between Thursday 6th and Tuesday 11th December 2018.

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 air conditioning 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.

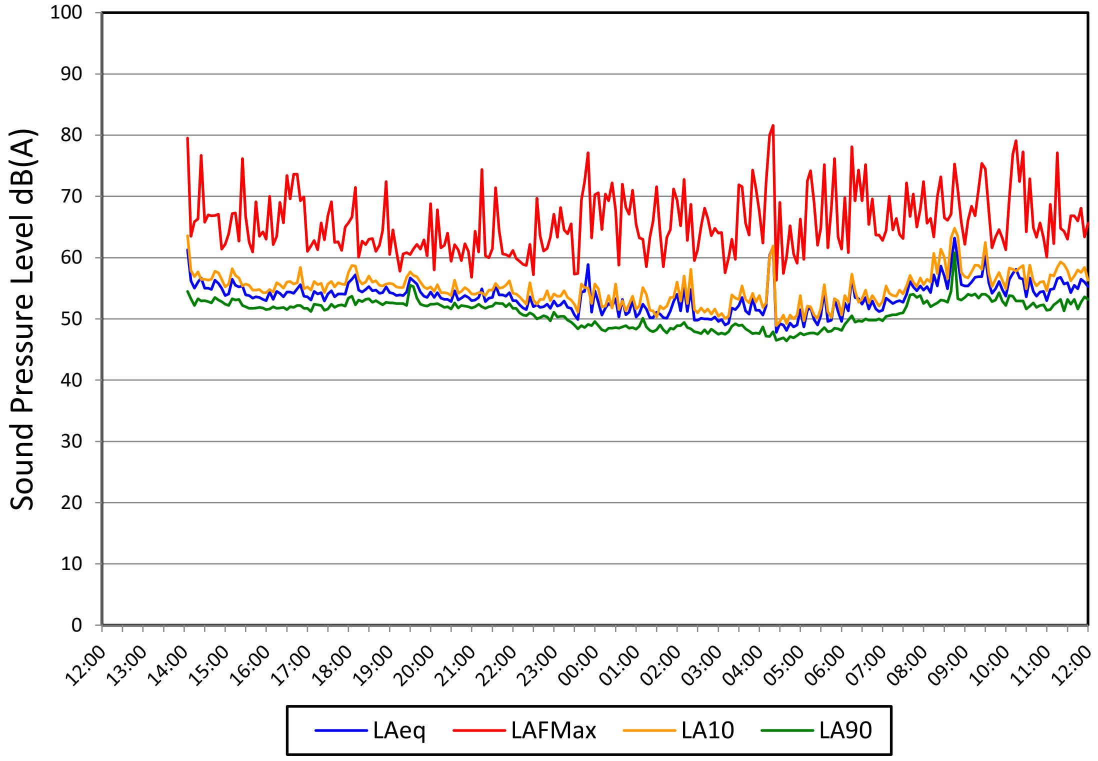
Dunstan Langrish MIOA

CLARKE SAUNDERS ASSOCIATES

Figure AS10925/SP1

30 Percy Street, London

Environmental Noise Time History

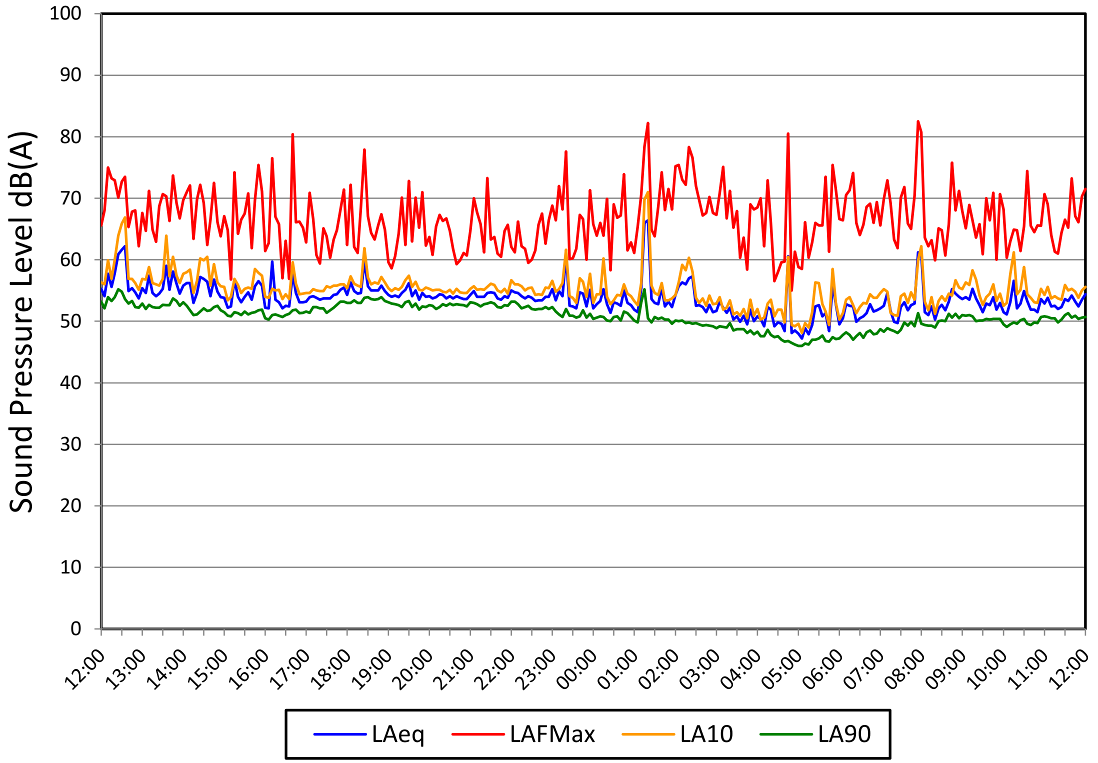


Thursday 06 December to Friday 07 December 2018

Figure AS10925/TH1

30 Percy Street, London

Environmental Noise Time History

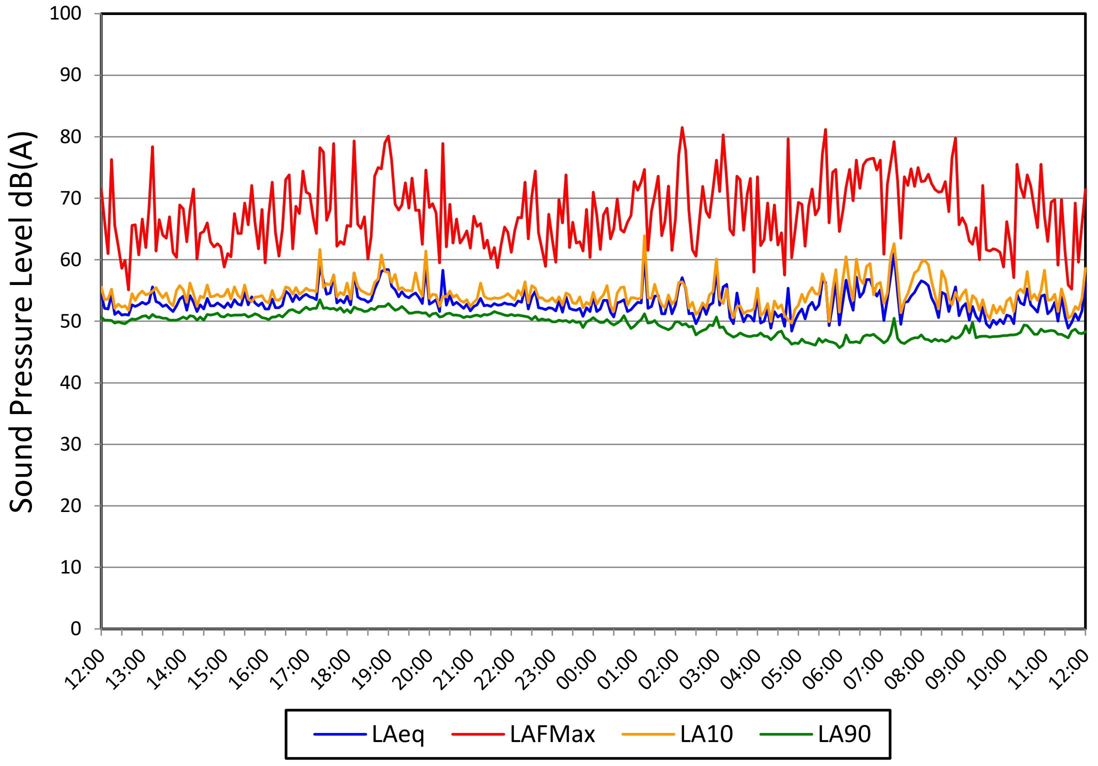


Friday 07 December to Saturday 08 December 2018

Figure AS10925/TH2

30 Percy Street, London

Environmental Noise Time History

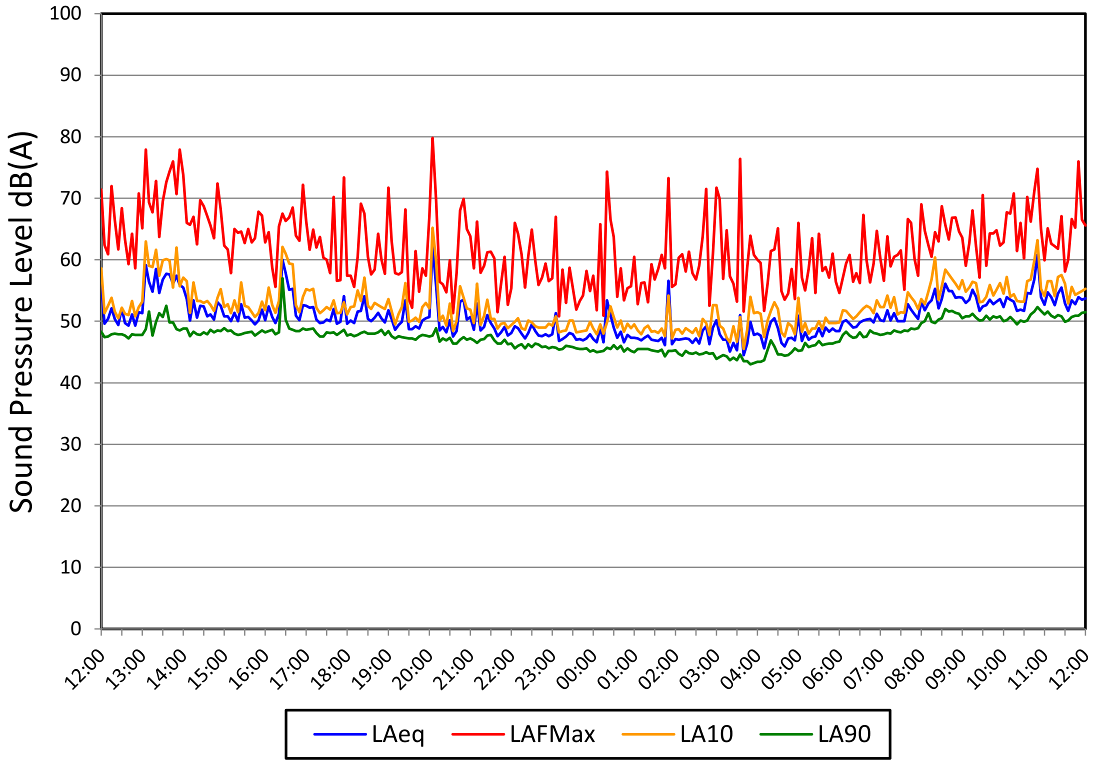


Saturday 08 December to Sunday 09 December 2018

Figure AS10925/TH3

30 Percy Street, London

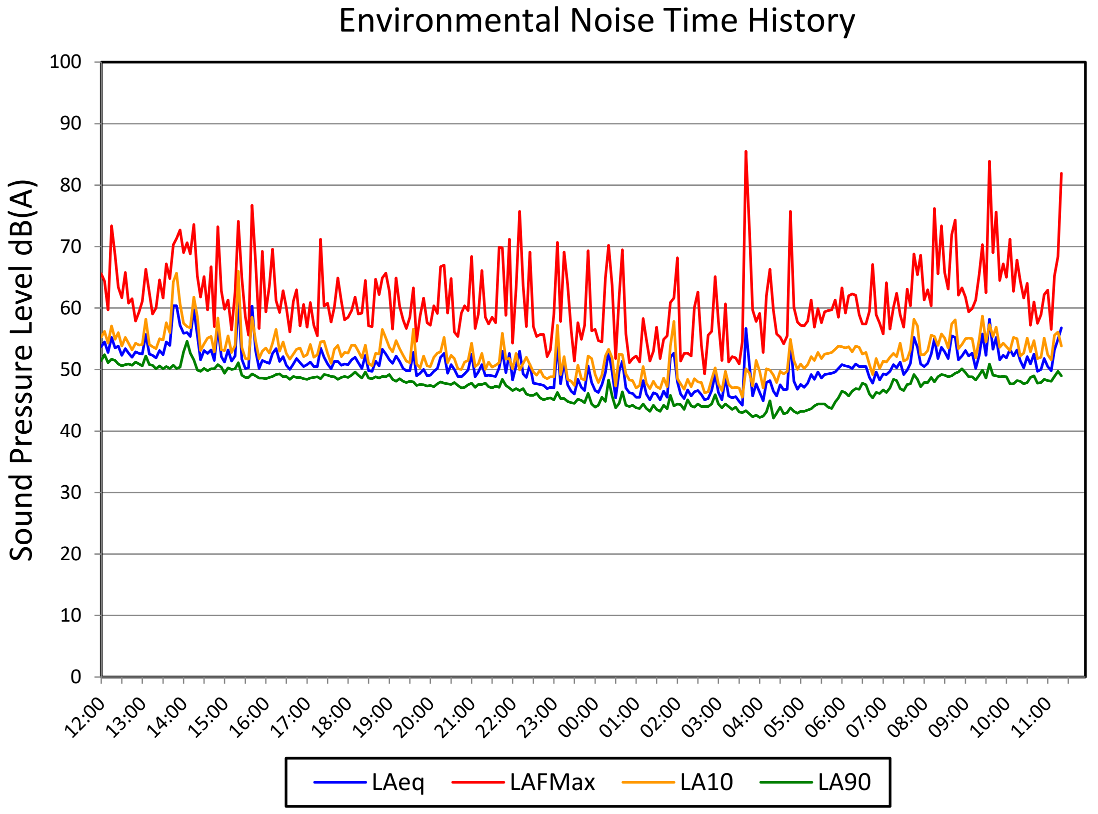
Environmental Noise Time History



Sunday 09 December to Monday 10 December 2018

Figure AS10925/TH4

30 Percy Street, London



Monday 10 December to Tuesday 11 December 2018

Figure AS10925/TH5

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.

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

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

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND SOUND

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

1.4 Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being 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 sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.

APPENDIX B - EXTERNAL PLANT NOISE EMISSIONS CALCULATIONS

			63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Chiller noise											
RXYSCQ-4TV1	SPL @	1m	49	53	49	62	46	39	33	25	59
RXYSCQ-5TV1	SPL @	1m	51	53	52	53	46	41	34	26	53
RXYSCQ-4TV1 units	1	no.	49	53	49	62	46	39	33	25	59
RXYSCQ-5TV1 nits	4	no.	57	59	58	59	52	47	40	32	59
Cumulative SPL at 1m			58	60	59	64	53	48	41	33	62
Propagation to top floor window rear Windmill Street											
Distance effect	*25*	*m*	-28	-28	-28	-28	-28	-28	-28	-28	
Total at Windmill St Rear / Overlooking Percy Mews			**30**	**32**	**31**	**36**	**25**	**20**	**13**	**5**	**34**
Mitigated propagation to roof window at 31 Percy Street											
1m high screen between 30 and 31 Percy St roofs			-6	-7	-8	-10	-12	-14	-17	-20	
Distance effect	*6*	*m*	-16	-16	-16	-16	-16	-16	-16	-16	
Total at 31 Percy Street Roof Window			**36**	**37**	**35**	**38**	**25**	**17**	**8**	**-3**	**36**

Office hours plant noise emissions criterion 38 dB(A)