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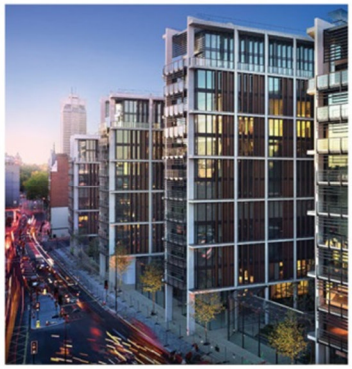

REPORT AS9425.161212.NIA

FARRINGDON POINT,
29-35 FARRINGDON ROAD,
LONDON

NOISE IMPACT ASSESSMENT

Prepared: 09 February 2017

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List of Attachments

1.0 INTRODUCTION

Planning approval is being sought for the installation of replacement plant at Farringdon Point, 29-35 Farringdon Road, London.

The existing plant is situated within a four-sided rooftop plant enclosure. It is understood that four condensing plant items are to be replaced with two new condensing units, whilst ten units will be retained.

Following liaison with Camden Council EHO Edward Harris, it has been established that it is not possible to assess the noise emissions on a like-for-like basis, as the cumulative noise level from the new plant is greater than that of the plant to be replaced. It has been requested, therefore, that the replacement plant should be assessed in accordance with standard Camden Council 'new plant' assessment procedures.

On this basis, Clarke Saunders Associates has been commissioned by ThirdWay Interiors Ltd to undertake an environmental noise survey 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 and, subsequently, to assess the noise impact of the proposed plant on nearby noise sensitive receptors.

2.0 SURVEY PROCEDURE & EQUIPMENT

A survey of the existing background noise levels was undertaken at rooftop level of the existing building at the location shown in site plan AS9425/SP1. The background noise climate at this position is considered to be representative of the most affected noise sensitive receptor in the locality, (discussed in Section 6.2). Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 14:50 hours on Friday 9th December and 11:00 hours on Wednesday 14th December 2016.

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

- Norsonic data logging sound level meter type 118;
- Norsonic sound level calibrator type 1253.

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 AS9425/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

All existing plant within the rooftop enclosure was operational during the survey. Given that this plant is (presumably) already consented, noise emissions thereof forms part of the background noise climate at the receptor.

However, despite the presence of the existing Farringdon Point rooftop plant, the 24 hour background noise climate at the property is largely determined by some existing roof-mounted plant to the south on the opposite side of Greville Street, with a contribution from road traffic noise in the surrounding streets during the day.

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

Monitoring period	Minimum $L_{A90,5mins}$
07:00 - 23:00 hours	59 dB
23:00 - 07:00 hours	58 dB
24 hours	58 dB

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

5.0 DESIGN CRITERIA

5.1 Local Authority Requirements

Camden Council has confirmed the following assessment criteria:

'the external noise level emitted from plant, machinery/ equipment will be lower than the lowest existing background noise level by at least 5dB(A), by 10dB(A) where the source is tonal, as assessed according to BS4142:2014 at the nearest and/or most affected noise sensitive premises, with all machinery operating together at maximum capacity.'

It should be noted that it is not possible to complete an objective assessment of any tonality associated with the proposed plant items at the receptor in accordance with *BS4142:2014*, as the plant has not yet been installed at site.

However, following examination of the manufacturer's octave band sound data, (reproduced in Table 6.1), it would appear unlikely that cumulative plant sound emissions would be assessed as at all tonal at the receptor.

Therefore, it seems appropriate that cumulative plant noise emissions should achieve 5dB below the existing background, rather than 10dB below.

On this basis, the 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} 54 dB	L_{Aeq} 53 dB	L_{Aeq} 53 dB

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

6.0 PREDICTED NOISE IMPACT

6.1 Proposed plant

The selected new plant has been confirmed as:

- 2 no. Mitsubishi Condensing Units Type PURY-P550YSLM-A1

The approximate location of the plant to be installed is shown in site plan AS9425/SP1.

Noise levels generated by the condensing units on full power mode have been confirmed by the manufacturer as follows:

Freq (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
Lp @ 1m (dB)	78	71	67	63	57	51	45	39	64

Table 6.1 – Manufacturer's source noise data for the PURY-P550YSLM-A1 condensing units **[dB ref. 20µPa]**

6.2 Predicted noise levels

Following an inspection of the site, the nearest noise sensitive receiver is a vertical skylight architectural feature situated on the corner of Greville Street and Farringdon Road, overlooking the rooftop level of Farringdon Point, as shown on the indicative site plan AS9425/SP1. The skylight does not currently feature any openable windows. The nearest glazing is at least 8 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. Screening losses afforded by the existing 2 metre high plant enclosure have been included in the prediction of the cumulative plant noise level at the nearest receiver.

The predicted level is shown in the following table, along with the criterion for 24 hour operation.

Predicted cumulative plant noise level at receptor	Criterion for 24 hour plant operation
L_{Aeq} 47 dB	L_{Aeq} 53 dB

Table 6.2 – Predicted cumulative plant noise level at receptor **[dB ref. 20µPa]**

A summary of the calculations are shown in Appendix B.

All other air handling and extract plant will be fitted with acoustically specified splitter silencers in order that the cumulative noise level does not exceed the 24-hour design noise criterion.

7.0 CONCLUSION

An environmental noise survey has been undertaken at Farringdon Point, 29-35 Farringdon Road, London by Clarke Saunders Associates between Friday 9th and Wednesday 14th December 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 Mitsubishi units have been used to predict the noise impact of the new plant on nearby noise sensitive receptors.

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

Ben Alexander

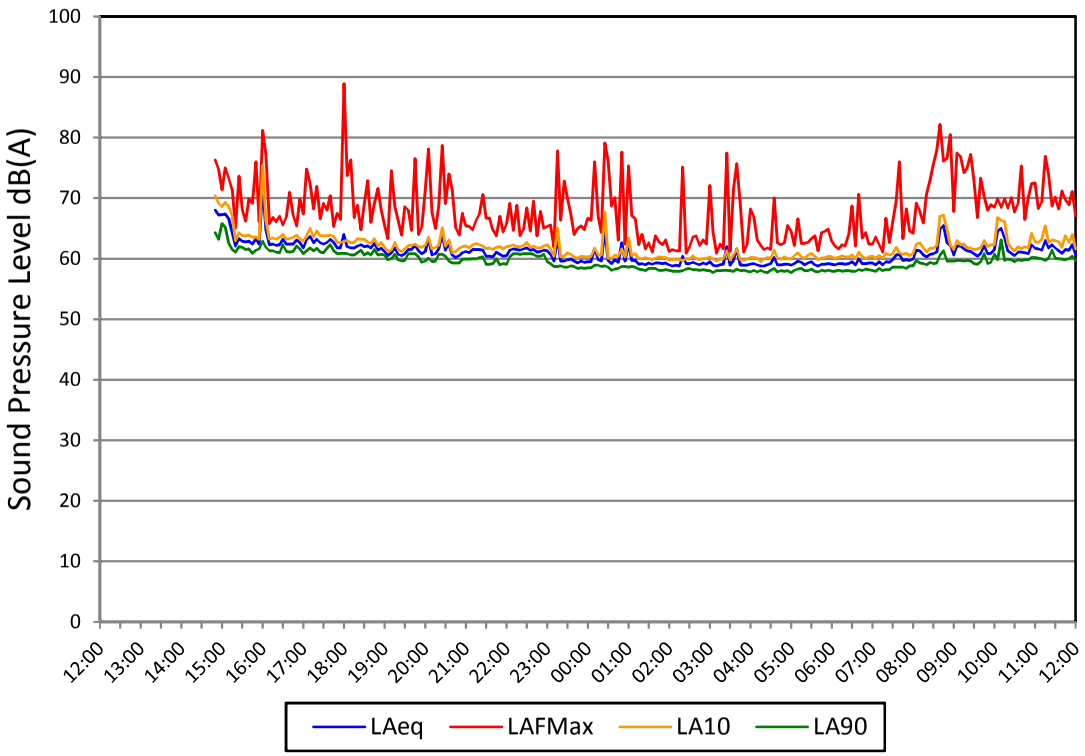
Ben Alexander AMIOA

CLARKE SAUNDERS ASSOCIATES

Figure AS9425/SP1

Farringdon Point, 29-35 Farringdon Road, London

Environmental Noise Time History

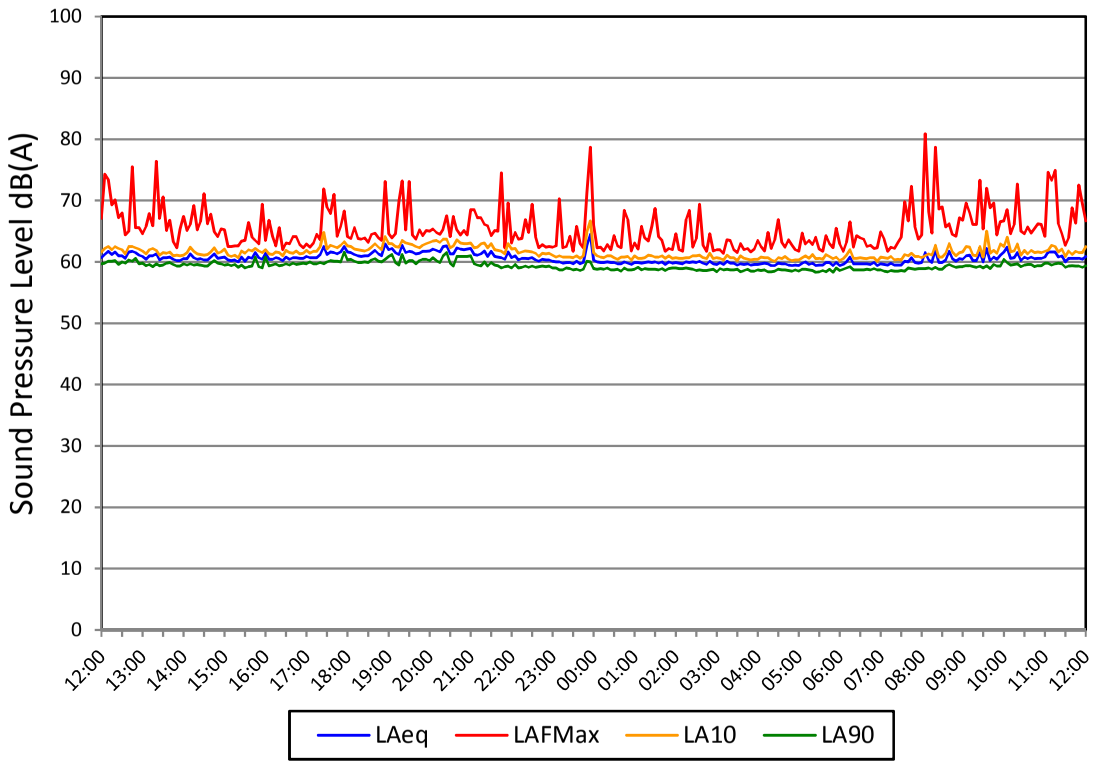


Friday 09 December to Saturday 10 December 2016

Figure AS9425/TH1

Farringdon Point, 29-35 Farringdon Road, London

Environmental Noise Time History

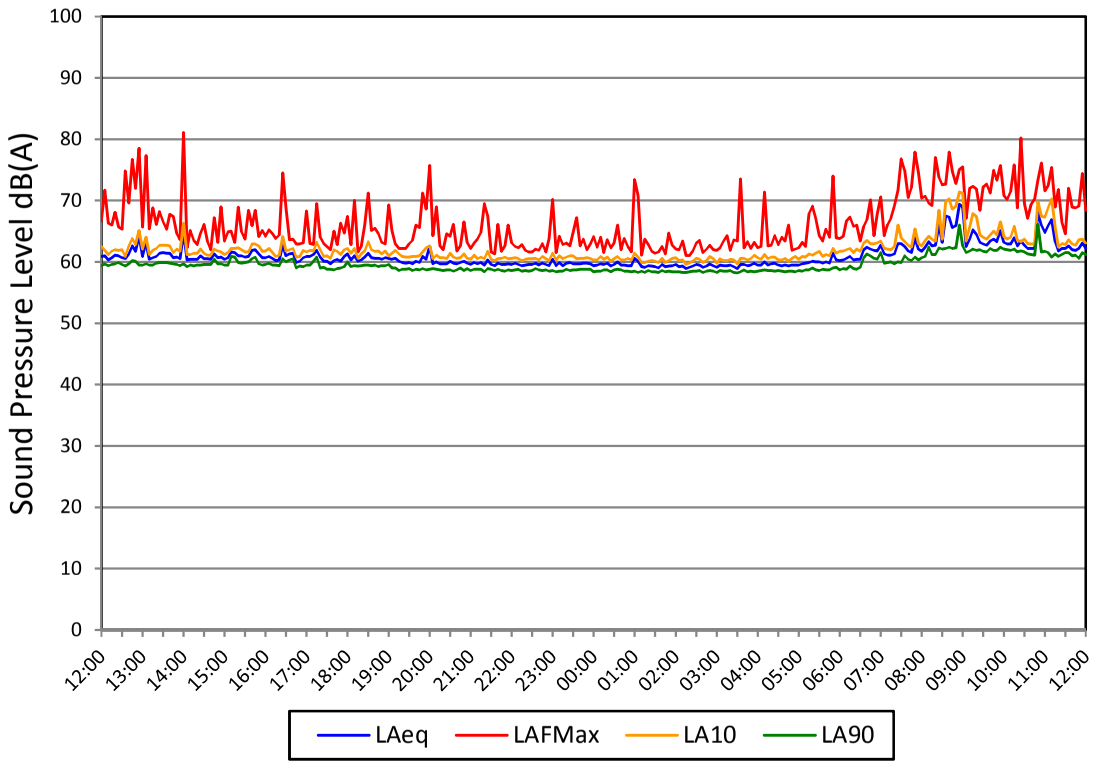


Saturday 10 December to Sunday 11 December 2016

Figure AS9425/TH2

Farringdon Point, 29-35 Farringdon Road, London

Environmental Noise Time History

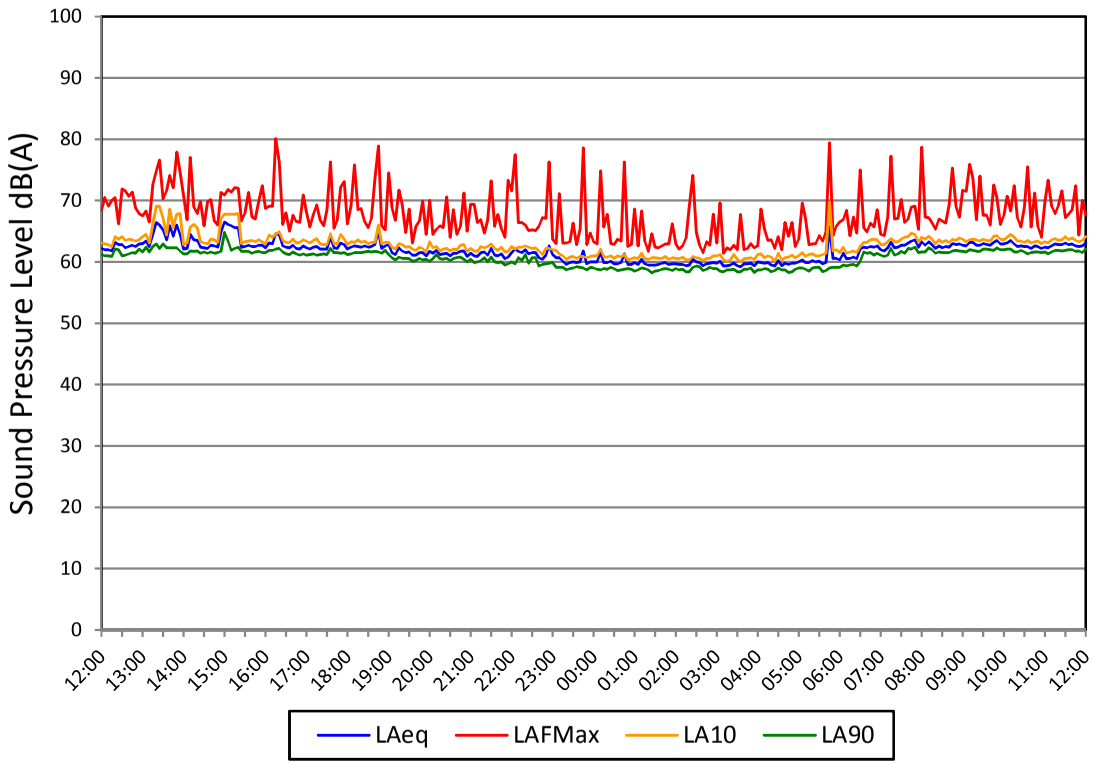


Sunday 11 December to Monday 12 December 2016

Figure AS9425/TH3

Farringdon Point, 29-35 Farringdon Road, London

Environmental Noise Time History

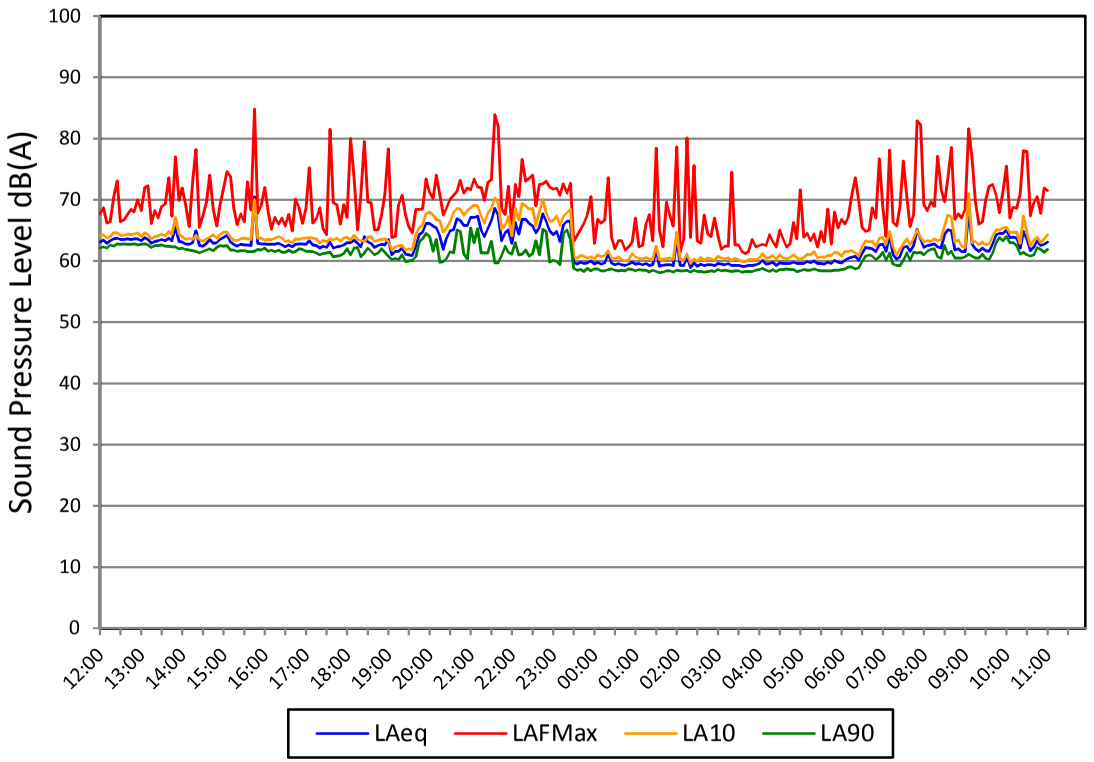


Monday 12 December to Tuesday 13 December 2016

Figure AS9425/TH4

Farringdon Point, 29-35 Farringdon Road, London

Environmental Noise Time History



Tuesday 13 December to Wednesday 14 December 2016

Figure AS9425/TH5

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND SOUND

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.

1.1 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

1.2 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 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.

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND SOUND

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

1.3 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
AS9425 - Farringdon Point, 29-35 Farringdon Road, London
External Plant Noise Calculations

Cumulative Plant Noise Emissions To Most Affected Receptor

		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
MITSUBISHI PURY -P550YSLM	Lp @ 1m	78	71	67	63	57	51	45	39	64
Number of Plant	2	3	3	3	3	3	3	3	3	
Radiation Correction		3	3	3	3	3	3	3	3	
Total		84	77	73	69	63	57	51	45	70
Distance Loss	To 8m	-18	-18	-18	-18	-18	-18	-18	-18	
Screening Losses from Existing Enclosure		-5	-5	-5	-6	-6	-7	-9	-11	
Level at receiver		**61**	**54**	**50**	**45**	**39**	**31**	**24**	**16**	**47**

Camden Council criterion for 24 hour plant operation **53**