PREPARED: Wednesday, 28 August 201928/08/2019

Great James Street;

Noise Impact Assessment

CONTENTS

LIST OF ATTACHMENTS

Project Ref:	11358	**Title:**	Great James Street, Farringdon, London
Report Ref:	AS11358.190820.NIA	**Title:**	Great James Street; Noise Impact Assessment
Client Name:	Matrix Consult		
Project Manager:	Matt Sugden		
Report Author:	Matt Sugden		
Clarke Saunders Acoustics Winchester SO22 5BE	This report has been prepared in response to the instructions of our client. It is not intended for and should not be relied upon by any other party or for any other purpose.		

1.0 EXECUTIVE SUMMARY

1.1 Clarke Saunders Associates has been commissioned by Matrix Consult to undertake a noise impact assessment for items of building services plant to be installed to the exterior roof level of 15 Great James Street office redevelopment.

1.2 Calculations based on the locations and noise data for the proposed units show that the Local Authority's noise emission criteria can be met with no mitigation required.

2.0 INTRODUCTION

2.1 It is proposed to install a new condensing unit to the rooftop of 15 Great James Street, London, to serve B1 class use area within the building.

2.2 Environmental noise survey data has been collected and subsequently used to determine daytime and night-time noise emission limits for the new building services plant, in accordance with the planning requirements of the Local Authority, Camden Council.

3.0 SURVEY PROCEDURE AND EQUIPMENT

3.1 The approximate location of the plant to be installed is shown in site plan AS11358/SP1. This location will be screened from surrounding properties by a proposed new dormer window.

3.2 The nearest noise sensitive receivers are situated to the west of the property (Receptor A) and to the north (Receptor B).

3.3 In order to ensure an appropriately robust assessment, a survey of environmental noise levels was undertaken at third-floor level of 15 Great James Street at the two locations shown on site plan AS11358/SP1. Measurements of consecutive 5 minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 12:15 hours on Monday 12th August and 11:10 hours on Wednesday 14th August 2019.

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

- Norsonic data logging sound level meter type 118;
- NTI data logging sound level meter type XL2;
- Rion sound level calibrator type NC74;
- Norsonic sound level calibrator type 1253.

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

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

3.7 Measurements were made generally in accordance with BS 7445:1991 (ISO1996-2:1987) *Description and measurement of environmental noise Part 2- Acquisition of data pertinent to land use*.

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

4.0 RESULTS AND DISCUSSION

4.1 Figures AS11358/TH1-TH4 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the measurement positions.

4.2 The ambient noise climate at the property is determined by road traffic noise in the surrounding streets.

4.3 The measured minimum background and average noise levels are shown in the table below.

MEASUREMENT POSITION	MONITORING PERIOD	MINIMUM $L_{A90,5MINS}$	AVERAGE $L_{Aeq,T}$
LTM1	Daytime 07:00h – 23:00h	44 dB 13/08/2019 22:50h	60 dB
	Night Time 23:00h – 07:00h	40 dB 14/08/2019 03:30h	51 dB
LTM2	Daytime 07:00h – 23:00h	40 dB 13/08/2019 22:40h	50 dB
	Night Time 23:00h – 07:00h	37 dB 13/08/2019 02:45h	45 dB

Minimum measured background and average noise levels [dB ref. 20µPa]

5.0 DESIGN CRITERIA

5.1 LOCAL AUTHORITY REQUIREMENTS

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

5.3 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 or if tonal, 15 dB below the typical background ($L_{A90,15min}$) during the proposed operational period.

5.4 Noise generated by the proposed plant is not expected to have tonal content. The noise emissions criteria that should not be exceeded at the nearest noise sensitive receiver should, therefore, be set to the levels detailed in the table below;

5.5 *Proposed design noise criteria*

DAYTIME (07:00 - 19:00 HOURS)	NIGHT-TIME (23:00 - 07:00 HOURS)
L_{Aeq} 30 dB	L_{Aeq} 27 dB

5.6 It is not expected that the installed plant will run outside of daytime hours due to the function of the building.

6.0 PREDICTED NOISE IMPACT

6.1 PROPOSED PLANT

6.1.1 The selected plant has been advised by the mechanical designer as:

- 1 no. Mitsubishi condenser type PURY P550 YNW

6.2 For a robust assessment, calculations for the daytime period have been undertaken using highest operational noise levels generated by the condenser, advised by the manufacturer as follows.

6.3 *PURY P550 YNW sound pressure levels*

FREQUENCY (HZ)	63	125	250	500	1K	2K	4K	8K
Standard heating	78	68	71	69	63	61	56	54
Low noise mode	63	61	52	50	48	42	45	41

6.4 It is understood that, if the plant is required to run at night, it will do so on low noise mode.

6.5 PREDICTED NOISE LEVELS

6.6 Following an inspection of the site, Receptor A and Receptor B have been determined as being approximately 22m and 27m from the plant location, respectively.

6.7 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.

6.8 Screening losses afforded by the plant location have been included in the prediction of the cumulative plant noise level at the receivers. This screening is due to the existing pitched roof to the west of the installation location, and the proposed dormer directly to the north.

6.9 Plant will be isolated using proprietary mounts to minimise structure-borne noise transmission.

6.10 A summary of calculations is shown in Appendix B, with results shown below.

6.11 *Predicted plant noise emissions*

RECEPTOR	PREDICTED DAYTIME EMISSIONS	PREDICTED NIGHT TIME EMISSIONS
Receptor A	L_{Aeq} 29 dB	L_{Aeq} 14 dB
Receptor B	L_{Aeq} 30 dB	L_{Aeq} 14 dB

6.12 Comparison with the environmental noise survey data shows these levels to be at least 10dB lower than the corresponding daytime and night-time background noise levels and, consequently, compliant with Camden's requirements.

7.0 CONCLUSION

7.1 An environmental noise survey has been undertaken at 15 Great James Street, London by Clarke Saunders Associates between Monday 12th August and Wednesday 14th August 2019.

7.2 The environmental noise survey data collected has been used to set design criteria for the control of plant noise emissions to noise sensitive properties, in accordance the London Borough of Camden's requirements.

7.3 Data for the proposed Mitsubishi condensing unit have been used to predict the noise impact of the new plant on neighbouring residential properties in two locations.

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

Matt Sugden

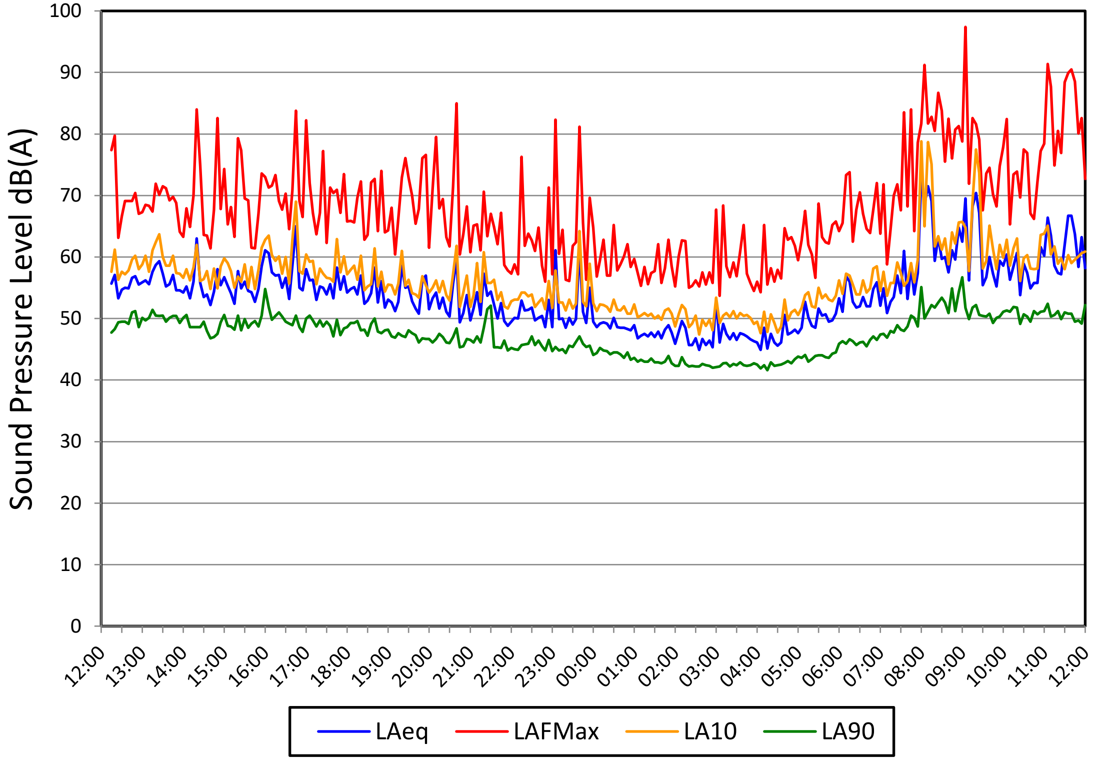
Matt Sugden MIOA

CLARKE SAUNDERS ACOUSTICS

Figure AS1135/SP1

15 Great James Street, Farringdon, London

Environmental Noise Time History: LTM1

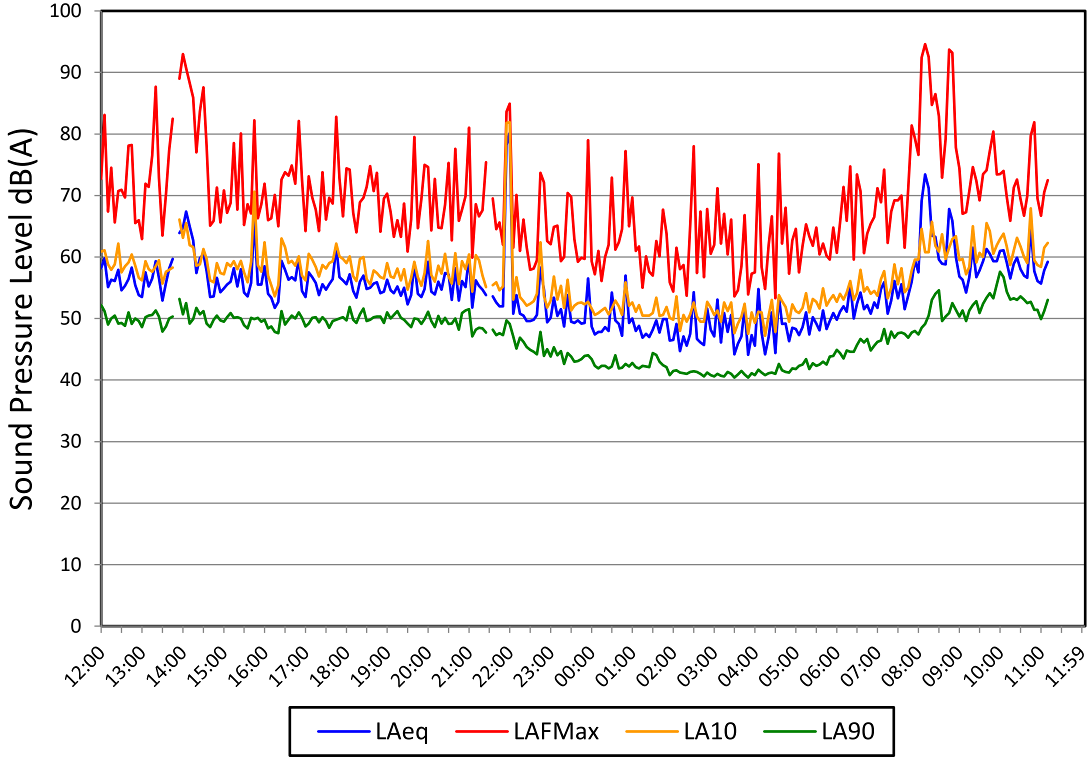


Monday 12 August to Tuesday 13 August 2019

Figure AS11358/TH1

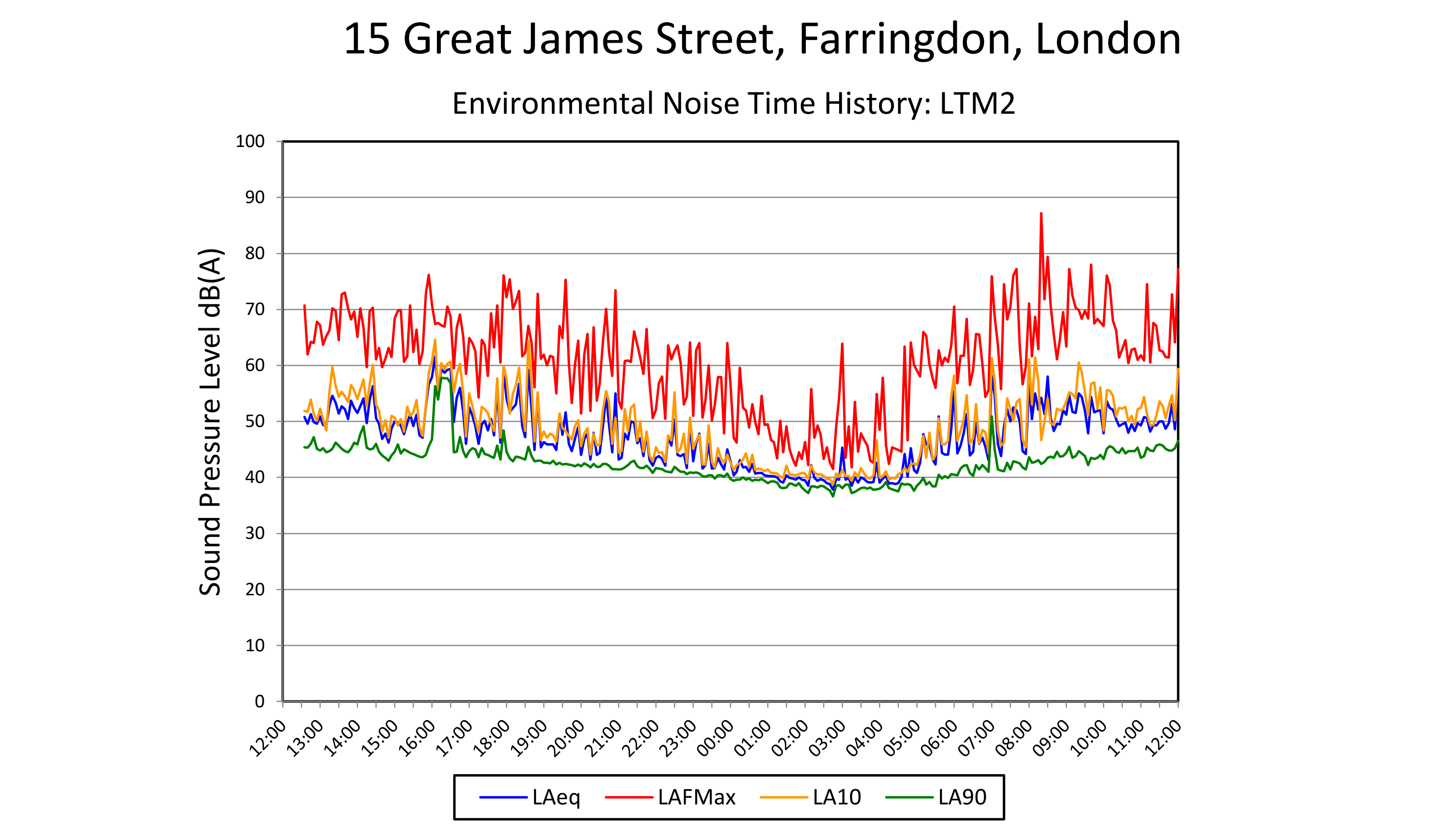
15 Great James Street, Farringdon, London

Environmental Noise Time History: LTM1



Tuesday 13 August to Wednesday 14 August 2019

Figure AS11358/TH2

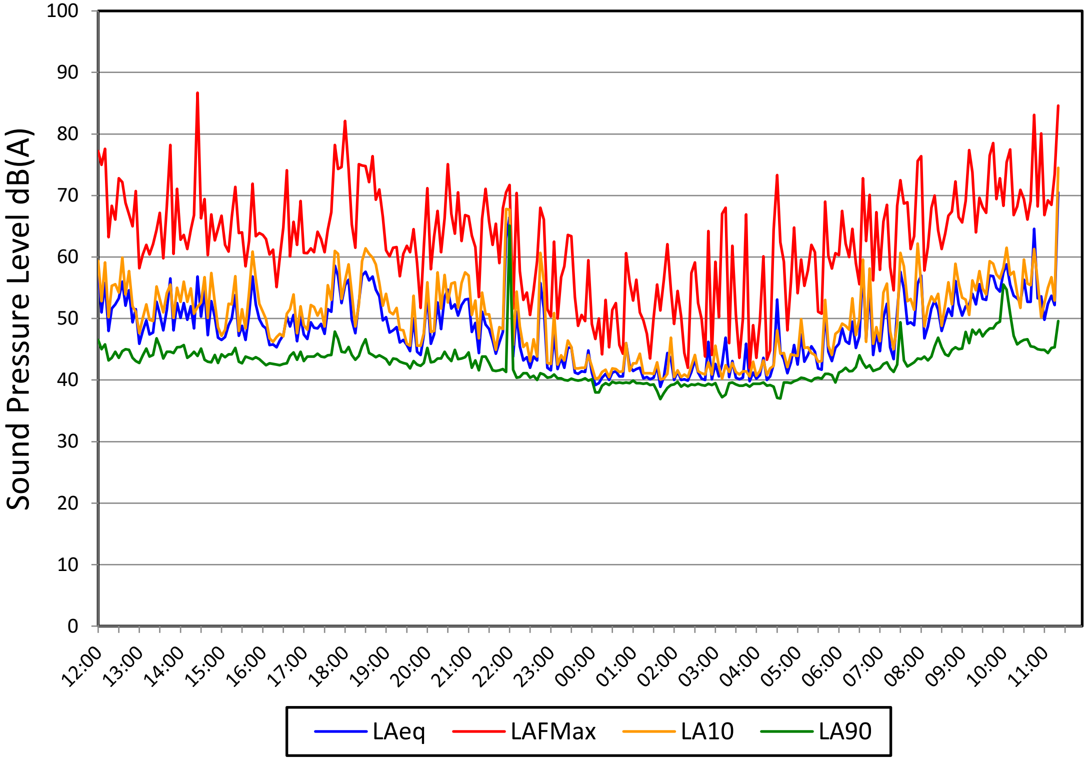


Monday 12 August to Tuesday 13 August 2019

Figure AS11358/TH3

15 Great James Street, Farringdon, London

Environmental Noise Time History: LTM2



Tuesday 13 August to Wednesday 14 August 2019

Figure AS11358/TH4

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

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

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
AS11358 - 15 Great James Street, Farringdon, London
Plant Noise Assessment

Receptor A

Daytime Operation		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PURY-E P550 YNW	Lp	78	68	71	69	63	61	56	54	**70**
Number of units	1	0	0	0	0	0	0	0	0	
TOTAL SPL Emissions		**78**	**68**	**71**	**69**	**63**	**61**	**56**	**54**	**70**
Screening Loss		-7	-9	-11	-14	-16	-19	-20	-20	
Distance Loss	22m	-27	-27	-27	-27	-27	-27	-27	-27	
Sound Pressure Level at Receptor	$L_{eq\ 1hr}$	**44**	**32**	**33**	**28**	**20**	**15**	**9**	**7**	**29**

Daytime Criterion 30dB(A)

Receptor A

Night time Operation		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PURY-E P550 YNW	Lp	63	61	52	50	48	42	45	41	**54**
Number of units	1	0	0	0	0	0	0	0	0	
TOTAL SPL Emissions		**63**	**61**	**52**	**50**	**48**	**42**	**45**	**41**	**54**
Screening Loss		-7	-9	-11	-14	-16	-19	-20	-20	
Distance Loss	22m	-27	-27	-27	-27	-27	-27	-27	-27	
Sound Pressure Level at Receptor	$L_{eq\ 1hr}$	**29**	**25**	**14**	**9**	**5**	**0**	**0**	**0**	**14**

Night time Criterion 27dB(A)

Receptor B

Daytime Operation		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PURY-E P550 YNW	Lp	78	68	71	69	63	61	56	54	**70**
Number of units	1	0	0	0	0	0	0	0	0	
TOTAL SPL Emissions		**78**	**68**	**71**	**69**	**63**	**61**	**56**	**54**	**70**
Screening Loss		-7	-9	-11	-13	-16	-19	-20	-20	
Distance Loss	27m	-27	-27	-27	-27	-27	-27	-27	-27	
Sound Pressure Level at Receptor	$L_{eq\ 1hr}$	**44**	**32**	**33**	**29**	**20**	**15**	**9**	**7**	**30**

Daytime Criterion 30dB(A)

Receptor B

Night time Operation		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PURY-E P550 YNW	Lp	63	61	52	50	48	42	45	41	**54**
Number of units	1	0	0	0	0	0	0	0	0	
TOTAL SPL Emissions		**63**	**61**	**52**	**50**	**48**	**42**	**45**	**41**	**54**
Screening Loss		-7	-9	-11	-13	-16	-19	-20	-20	
Distance Loss	27m	-27	-27	-27	-27	-27	-27	-27	-27	
Sound Pressure Level at Receptor	$L_{eq\ 1hr}$	**29**	**25**	**14**	**10**	**5**	**0**	**0**	**0**	**14**

Night time Criterion 27dB(A)