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REPORT AS7295.130104.NIA

222 GRAYS INN ROAD
LONDON

NOISE IMPACT ASSESSMENT

Prepared: 4th January 2013

Peldon Rose Ltd
Sterling House
42 Worple Road
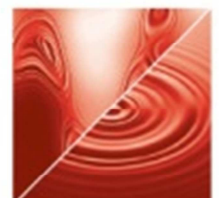**London**
SW19 4EQ

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1.   INTRODUCTION

Planning approval is being sought for the installation of new plant at roof level at 222 Grays Inn Road, London.

Alan Saunders Associates has been commissioned by Peldon Rose Ltd 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.   SURVEY PROCEDURE & EQUIPMENT

A survey of the existing background noise levels was undertaken at roof level of the building at the location shown in site plan AS7295/SP1 in an environment representative of the nearest receiver. Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10}, L_{A90} and spectral sound pressure levels were taken between 11:50 hours on Thursday 13th December and 14:05 hours on Friday 14th December 2012.

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:

- 1 no. Svantek data logging sound level meter type SVAN 958;

- 1 no. Svantek sound level calibrator type SV 30A.

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.   RESULTS

Figures AS7295/TH1 – TH2 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the measurement position.

4.   DISCUSSION

The background noise climate at the property is determined by plant on adjacent buildings with a contribution from road traffic noise in the surrounding streets.

Minimum background levels are shown in Table 4.1 below.

Monitoring period	Minimum $L_{A90,5mins}$
07:00 - 23:00 hours	52 dB 21:30 – 21:35, 13/12/12
23:00 - 07:00 hours	50 dB 02:55 – 03:00, 14/12/12
24-hour	50 dB

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

5.   DESIGN CRITERION

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).

6.   NOISE IMPACT

6.1   Plant

The selected roof mounted plant has been confirmed as:

- 2 no. Denco Condensing Unit DCRA 26 - 6

- 6 no. Denco Condensing Unit DCRA 32 - 6

The location of the plant is shown in site plan AS7295/SP1.

Noise levels of the condenser units to be installed have been confirmed by the manufacturer as follows:

Freq (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
DCRA 26 - 6 L_p @ 3m (dB)	-	69	64	59	55	54	50	49	63
DCRA 32 - 6 L_p @ 3m (dB)	-	71	66	61	57	56	52	51	65

Table 6.1 – Source noise data of proposed condensing units   **[dB ref. 20µPa]**

The spectral data for these items of plant do not display any tonal characteristics. As no source data is available for the 63Hz band, it has been assumed that the spectral level is the same as for the 125Hz band.

6.2   Noise levels at nearest receiver

Following an inspection of the site, the nearest noise sensitive receiver is situated at 3rd floor level of No. 121 Grays Inn Road. This receiver is afforded significant screening as it is four storeys lower relative to the source position and the source is set well back from the road on the roof of 222 Grays Inn Road.

The 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.

Freq (Hz)	63	125	250	500	1k	2k	4k	8k	dB(A)
Criterion	60	58	53	50	49	45	33	22	45
Predicted level @ 1m from receiver	53	51	44	36	30	28	24	23	41

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

The full calculations are shown in Appendix B.

7.   CONCLUSIONS

An environmental noise survey has been undertaken at 222 Grays Inn Road, London by

Alan Saunders Associates between Thursday 13th December and Friday 14th December 2012.

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

Data for the new condensing units has been used to predict the noise impact of the new plant on nearby residential properties.

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

Ben Alexander
ALAN SAUNDERS ASSOCIATES

Monitoring Location

Proposed Plant Location

Nearest Noise Sensitive Receiver

122 Grays Inn Rd, Bloomsbury, London Borough of C

Image © 2012 Bluesky

Google earth

alan saunders associates | acoustics
mail@alansaunders.com
www.alansaunders.com
T+44(0)1962 872130
F+44(0)1962 872131
westgate house
romsey road
winchester
SO22 5BE

Project:
222 Grays Inn Road, London
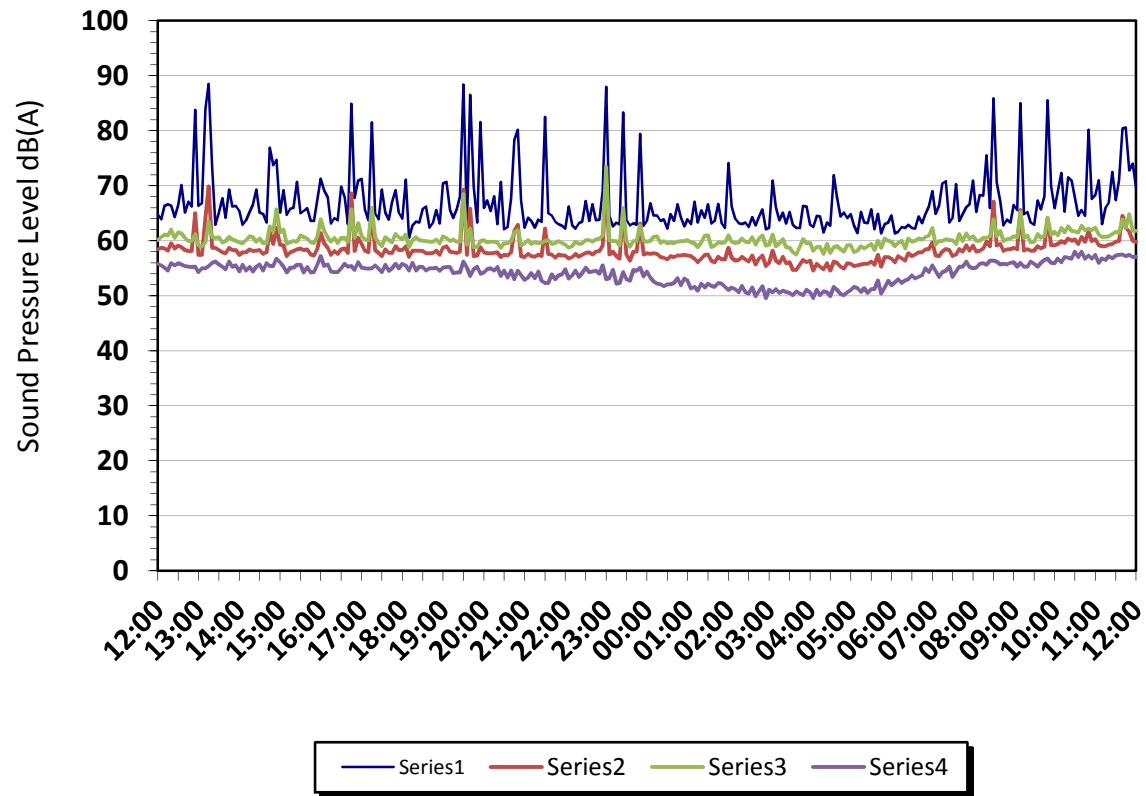
Title:
Indicative Site Plan

Figure:
AS7295/SP1

Date:
4th January 2013

222 GRAYS INN ROAD, LONDON

Environmental Noise Time History
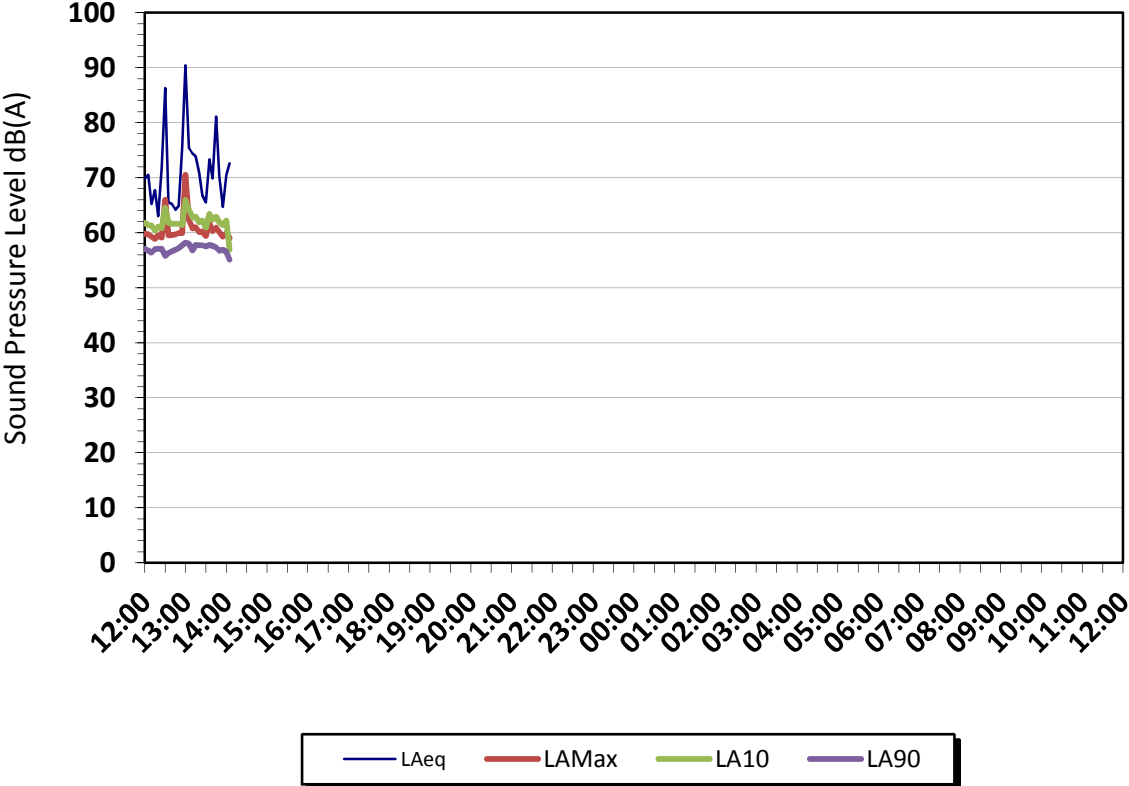
Thursday 13th - Friday 14th December 2012

Figure AS7295/TH1

222 GRAYS INN ROAD, LONDON

Environmental Noise Time History

Sound Pressure Level dB(A)

LAeq   LAMax   LA10   LA90

Friday 14th December 2012

Figure AS7295/TH2

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND NOISE

1.0   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

2.0   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

3.0   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

4.0   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)
Denco DCRA 26 - 6	Lp	3 m	69	69	64	59	55	54	50	49	63
Number of units		2	3	3	3	3	3	3	3	3	3
Distance Loss		27 m	-19	-19	-19	-19	-19	-19	-19	-19	
Screening			-8	-10	-12	-15	-17	-18	-18	-18	
Level At Receiver			*45*	*43*	*36*	*28*	*22*	*20*	*16*	*15*	33

Calculation 2:

			63	125	250	500	1000	2000	4000	8000	dB(A)
Denco DCRA 32 - 6	Lp	3 m	71	71	66	61	57	56	52	51	65
Number of units		6	8	8	8	8	8	8	8	8	8
Distance Loss		26 m	-19	-19	-19	-19	-19	-19	-19	-19	
Screening			-8	-10	-12	-15	-17	-18	-18	-18	
Level At Receiver			*52*	*50*	*43*	*35*	*29*	*27*	*23*	*22*	40

Calculation 3:

	63	125	250	500	1000	2000	4000	8000	dB(A)
Calc 1 Level At Receiver	45	43	36	28	22	20	16	15	33
Calc 2 Level At Receiver	52	50	43	35	29	27	23	22	40
Cumulative Level At Receiver	*53*	*51*	*44*	*36*	*30*	*28*	*24*	*23*	41
Criteria	**60**	**58**	**53**	**50**	**49**	**45**	**33**	**22**	**45**