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specialist consultants

REPORT AS9423.161130.NIA.R1.1

184-192 DRUMMOND STREET, LONDON

NOISE IMPACT ASSESSMENT

Prepared: 19 December 2016

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List of Attachments

1.0 INTRODUCTION

Planning approval is being sought for the installation of new plant at 184-192 Drummond Street, London. This includes the replacement of some of the existing plant.

Clarke Saunders Associates has been commissioned by Workman LLP 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 rooftop level of the existing building at the location shown in site plan AS9423/SP1. Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 13:00 hours on Wednesday 30th November and 11:50 hours on Friday 2nd December 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:

- 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 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 AS9423/TH1-TH2 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the measurement position.

4.0 DISCUSSION

The background noise climate at the property is determined by some existing roof-mounted plant, and road traffic noise in the surrounding streets. The majority of the existing plant was not operational at the time of the survey.

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

Monitoring period	Minimum $L_{A90,5mins}$
07:00 - 23:00 hours	51 dB
23:00 - 07:00 hours	47 dB

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

5.0 DESIGN CRITERIA

5.1 Local Authority Requirements

Following liaison with Planning Officer Laura Hazelton, it has been advised Camden Council currently requires new plant to be 10dB below the background level.

> *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).*

The plant noise emissions 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)
L_{Aeq} 46 dB	L_{Aeq} 37 dB

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

6.0 PREDICTED NOISE IMPACT

6.1 Proposed plant

The selected plant has been confirmed as:

- 6 no. Panasonic Units Type U-25GF2E5.
- 1 no. Sanyo Units Type SGP-EZ240M2G2
- 4 no. Sanyo Units Type SGP-EZ150M2G2

The approximate location of the plant to be installed is shown in site plan AS9423/SP1.

Noise levels generated by the type U-25GF2E5 condenser to be installed have been confirmed by the manufacturer as follows:

Freq (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
Lp @ 1m (dB)	74	63	64	58	56	50	46	39	61

Table 6.1 - Source noise data for the type Panasonic condenser **[dB ref. 20µPa]**

Noise levels generated by the type EZ240M2G2 condenser to be installed have been confirmed by the manufacturer as follows:

Freq (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
Lp @ 1m (dB)	69	64	60	60	58	52	45	38	62

Table 6.2 - Source noise data for the type Sanyo condenser **[dB ref. 20µPa]**

Noise levels generated by the type EZ150M2G2 condenser to be installed have been confirmed by the manufacturer as follows:

Freq (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
Lp @ 1m (dB)	72	72	66	62	59	54	50	49	57

Table 6.3 - Source noise data for the type Sanyo condenser **[dB ref. 20µPa]**

6.2 Predicted noise levels

Following an inspection of the site, the nearest noise sensitive receivers are situated on Stanhope Street at 4th floor level and Drummond Street at 4th floor level, as shown on the indicative site plan AS9423/SP1. The window on Stanhope Street is at between 33 and 65 metres away from the proposed plant location, whilst the window on Drummond Street is 24m away at its closest.

The cumulative noise level at the nearest noise sensitive receiver has been assessed according to the guidelines set out in BS4142: 2014 *Methods for rating and assessing industrial and commercial sound* as guidance, using the noise data above. Screening losses afforded by the building edge and also the edge of the neighbouring property have been included in the prediction of the cumulative plant noise level at the nearest receiver.

Receiver Location	Predicted level at 1m from receiver	Design Criterion
Stanhope Street	L_{Aeq} 35 dB	L_{Aeq} 37 dB
Drummond Street	L_{Aeq} 36 dB	L_{Aeq} 37 dB

Table 6.4 - Proposed design noise criteria **[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 184-192 Drummond Street, London by Clarke Saunders Associates between Wednesday 30th November and Friday 2nd 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 Panasonic Type U-25GF2E5, Sanyo EZ240M2G2 and Sanyo EZ150M2G2 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 required for external noise emissions.

Alex Arnold

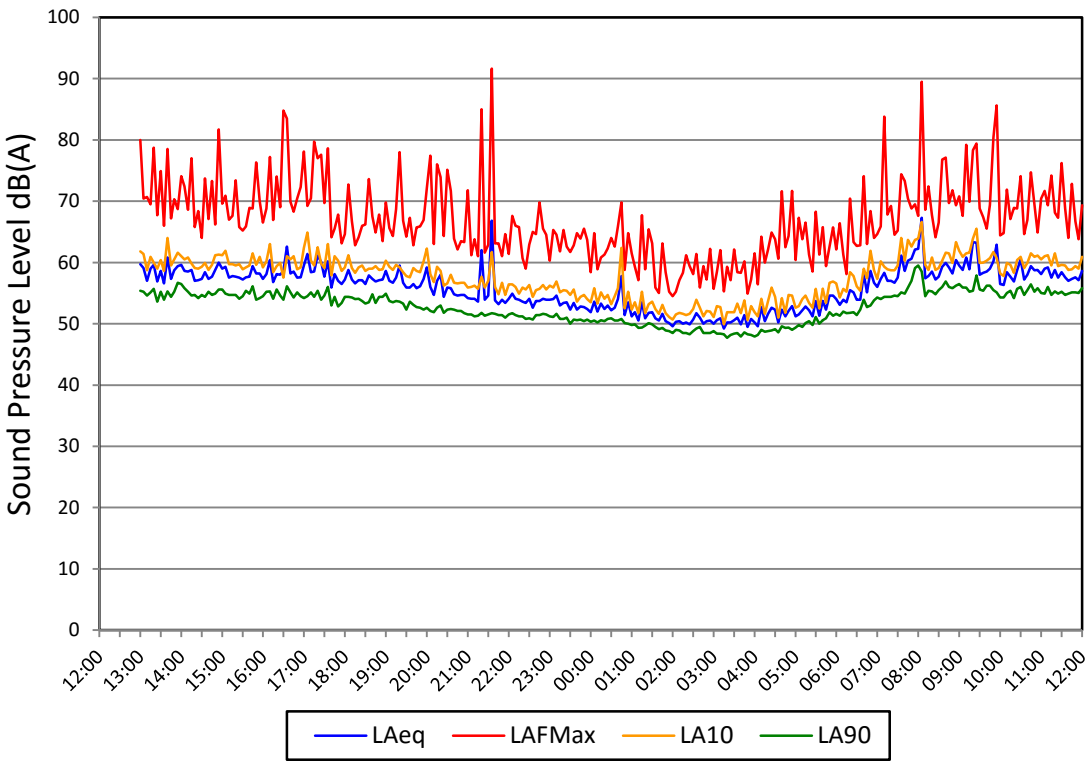
Alex Arnold MIOA

CLARKE SAUNDERS ASSOCIATES


Monitor A
Receptor B
Receptor A
Monitor
Receptor
Proposed
Plant
N
Nelson Bar
Schafer House
Guinness World Records
Stanhope St
Stanhope St
Stanhope St
Drummond St
Drummond St
Drummond St
Drummond St
Drummond St
Camden Jobtrain
Longford St
Triton Square
Whitefoord LLP

184-192 Drummond Street, London

Environmental Noise Time History

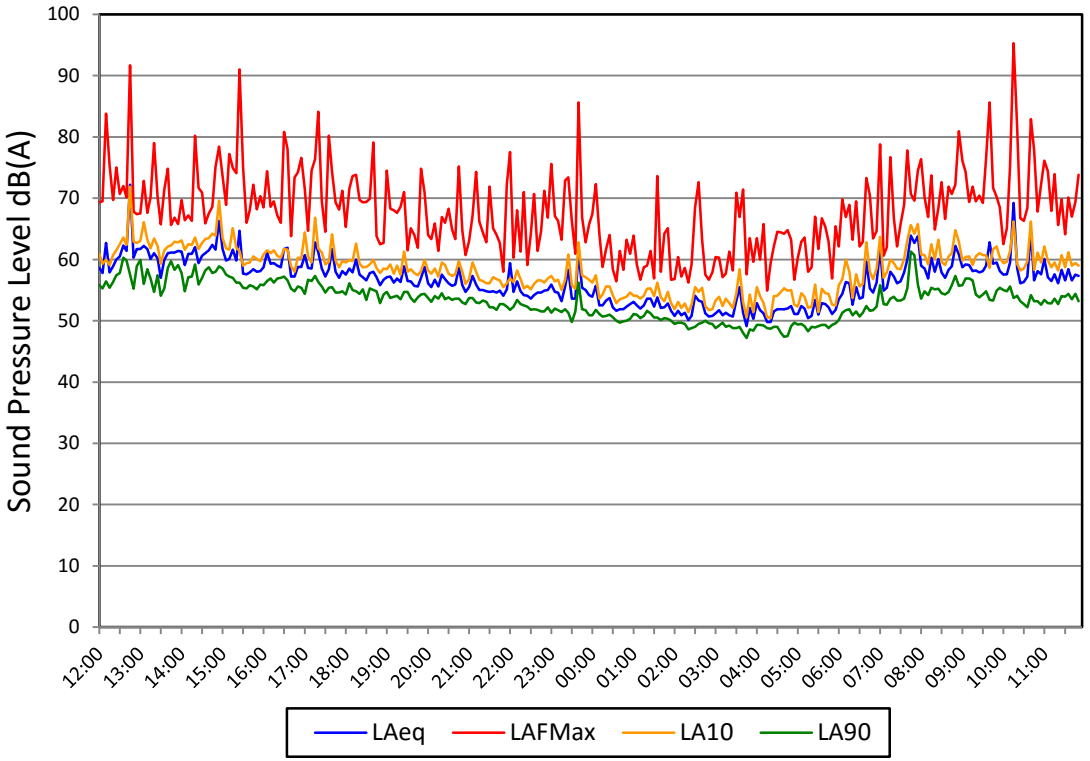


Wednesday 30 November to Thursday 01 December 2016

Figure AS9423/TH1

184-192 Drummond Street, London

Environmental Noise Time History



Thursday 01 December to Friday 02 December 2016

Figure AS9423/TH2

APPENDIX A

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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

EXTERNAL NOISE LEVEL CALCULATIONS

Calculation 1: Stanhope Street

			63	125	250	500	1000	2000	4000	8000	dB(A)
Panasonic U-25GF2E5	Lp	1 m	74	63	64	58	56	50	46	39	61
No of units	2		6	6	6	6	6	6	6	6	
Distance Loss		40 m	-32	-32	-32	-32	-32	-32	-32	-32	
Total			**48**	**37**	**38**	**32**	**30**	**24**	**20**	**13**	
Panasonic U-25GF2E5	Lp	1 m	74	63	64	58	56	50	46	39	61
No of units	4		6	6	6	6	6	6	6	6	
Distance Loss		33 m	-30	-30	-30	-30	-30	-30	-30	-30	
Total			**50**	**39**	**40**	**34**	**32**	**26**	**22**	**15**	
Sanyo SGP-EZ240M2G2	Lp	1 m	**69**	**64**	**60**	**60**	**58**	**52**	**45**	**38**	62
Distance Loss		44 m	-33	-33	-33	-33	-33	-33	-33	-33	
Total			**36**	**31**	**27**	**27**	**25**	**19**	**12**	**5**	
Sanyo SGP-EZ150M2G2	Lp	1 m	66	64	58	54	51	46	42	41	57
No of units	2		3	3	3	3	3	3	3	3	
Distance Loss		65 m	-36	-36	-36	-36	-36	-36	-36	-36	
Total			**33**	**31**	**25**	**21**	**18**	**13**	**9**	**8**	
Sanyo SGP-EZ150M2G2	Lp	1 m	66	64	58	54	51	46	42	41	57
No of units	2		3	3	3	3	3	3	3	3	
Distance Loss		39 m	-32	-32	-32	-32	-32	-32	-32	-32	
Total			**37**	**35**	**29**	**25**	**22**	**17**	**13**	**12**	
Cumulative Total			**52**	**43**	**43**	**37**	**35**	**29**	**25**	**19**	
Building edge screening			-5	-5	-5	-5	-5	-5	-5	-5	
Cumulative Noise Level at Receiver	**Lp**	**1 m**	**47**	**38**	**38**	**32**	**30**	**24**	**20**	**14**	**35**
									Proposed Design Criteria		**37**

Calculation 2: Drummond Street

			63	125	250	500	1000	2000	4000	8000	dB(A)
Panasonic U-25GF2E5	Lp	1 m	74	63	64	58	56	50	46	39	61
No of units	2		3	3	3	3	3	3	3	3	
Distance Loss		24 m	-28	-28	-28	-28	-28	-28	-28	-28	
Building edge screening loss			-5	-5	-5	-5	-5	-5	-5	-5	
Total			**44**	**33**	**34**	**28**	**26**	**20**	**16**	**9**	
Panasonic U-25GF2E5	Lp	1 m	74	63	64	58	56	50	46	39	61
No of units	4		3	3	3	3	3	3	3	3	
Distance Loss		30 m	-30	-30	-30	-30	-30	-30	-30	-30	
Building edge screening			-5	-5	-5	-5	-5	-5	-5	-5	
Total			**42**	**31**	**32**	**26**	**24**	**18**	**14**	**7**	
Sanyo SGP-EZ240M2G2	Lp	1 m	**69**	**64**	**60**	**60**	**58**	**52**	**45**	**38**	62
Distance Loss		25 m	-28	-28	-28	-28	-28	-28	-28	-28	
Building edge screening			-5	-5	-5	-5	-5	-5	-5	-5	
Total			**36**	**31**	**27**	**27**	**25**	**19**	**12**	**5**	
Sanyo SGP-EZ150M2G2	Lp	1 m	**66**	**64**	**58**	**54**	**51**	**46**	**42**	**41**	57
No of units	2		3	3	3	3	3	3	3	3	
Distance Loss		25 m	-28	-28	-28	-28	-28	-28	-28	-28	
Building edge screening			-5	-5	-5	-5	-5	-5	-5	-5	
Total			**36**	**34**	**28**	**24**	**21**	**16**	**12**	**11**	
Sanyo SGP-EZ150M2G2	Lp	1 m	66	64	58	54	51	46	42	41	57
No of units	2		3	3	3	3	3	3	3	3	
Distance Loss		25 m	-28	-28	-28	-28	-28	-28	-28	-28	
Building edge barrier screening			-5	-6	-7	-8	-10	-12	-15	-17	
Total			**36**	**33**	**26**	**21**	**16**	**9**	**2**	**-1**	
Cumulative Noise Level at Receiver	**Lp**	**1 m**	**47**	**40**	**38**	**33**	**31**	**25**	**20**	**15**	**36**
									Proposed Design Criteria		**37**