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REPORT AS5474.100311.PNE

10 JAMESTOWN ROAD
CAMDEN

PLANT NOISE EMISSIONS ASSESSMENT

Prepared: 12th March 2010

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CONTENTS

List of Attachments

1. INTRODUCTION

The site at 10 Jamestown Road, Camden is being redeveloped for retail, commercial and residential use. As part of the proposed redevelopment external roof mounted plant is to be installed.

Alan Saunders Associates has been commissioned by Barr Gazetas to undertake an environmental noise survey in order to measure the prevailing background noise climate at the site. The measured background noise levels will be used to determine noise emissions criteria for new building services plant in accordance with the planning requirements of the London Borough of Camden.

A noise emissions assessment has also been undertaken for the proposed plant in accordance with the Local Authority's requirements.

2. SURVEY PROCEDURE & EQUIPMENT

A survey of existing background noise levels was undertaken at roof level at the location shown on site plan AS5474/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 Monday 6th October and 12:00 hours on Wednesday 8th October 2008.

The following equipment was used for the survey:

- 1 no. Norsonic data-logging sound level meter type 118
- 1 no. GRAS environmental microphone
- Norsonic sound level calibrator type 1253

The calibration of the sound level meter was checked before and after use. No calibration drift was observed.

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 BS7445:1991 *Description and measurement of environmental noise Part 2- Acquisition of data pertinent to land use*.

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

3. RESULTS

Figures AS5474/TH1-TH2 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the measurement location.

4. DISCUSSION

The background noise climate at the site is determined by road traffic noise from Camden High Street. The minimum background noise levels measured during the survey are shown in Table 4.1.

Monitoring period	Minimum background noise level $L_{A90,5min}$
Daytime 07:00 - 19:00	53
Evening 19:00 – 23:00	52
Night-time 23:00 - 07:00	44

Table 4.1 - Minimum measured background noise levels (dB ref. 20μPa)

5. PLANT NOISE EMISSIONS DESIGN CRITERIA

The requirements of the London Borough of Camden regarding plant noise are detailed within the London Borough of Camden's Replacement Unitary Development Plan.

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	00:00-24:00	5dB(A) <L_{A90}
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive facade	Day, evening and night	00:00-24:00	10dB(A) <L_{A90}
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	Day, evening and night	00:00-2400	10dB(A) <L_{A90}
Noise at 1 metre external to sensitive façade where L_{A90} >60dB	Day, evening and night	00:00-24:00	55dB(A) L_{Aeq}

Table 5.1 - London Borough of Camden's plant noise emissions criteria

The following table details the daytime, evening and night-time plant noise emissions criteria to be achieved at 1m from the nearest noise sensitive facade.

Daytime criterion	Evening criterion	Night-time criterion
43	42	34

Table 5.2 – Plant noise emissions criteria at nearest noise sensitive façade (dB ref. 20μPa)

6. PREDICTED NOISE IMPACT

6.1 Proposed Plant

The following roof mounted plant has been confirmed by Barr Gazetas:

- 1 no. office supply and extract heat recovery air handling unit
- 4 no. Mitsubishi heat pump units type PURY-P300YHM-A
- 1 no. ventilation extract fan

It is assumed that the air handling plant will be fitted with atmospheric acoustically specified silencers such that the cumulative plant noise level does not exceed the plant noise emissions criteria.

The potential impact of air handling unit casing breakout noise has, therefore, been determined on the basis of the fans contained therein. Manufacturer's data for the supply and extract fans (both of inline centrifugal design) is shown below:

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Supply Fan (Ziehl Abegg type ER35C-4DN.D7.1R) intake/discharge	74/76	78/80	83/85	83/85	80/82	76/78	72/74	67/69
Extract Fan (Ziehl Abegg type ER35C-4DN.C7.1R) intake/discharge	72/74	76/78	81/83	81/83	77/79	73/75	69/71	64/66

Table 6.1 - Octave band sound power levels for AHU casing breakout (dB ref. 10pW)

Manufacturer's noise data for the Mitsubishi PURY-P300YHM-A heat pump is shown below.

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Lp @ 1m (standard mode)	65	64	61	56	53	49	45	43

Table 6.2 - Octave band sound pressure levels for Mitsubishi PURY-P300YHM-A heat recovery unit in standard mode (dB ref. 20μPa)

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Lp @ 1m (night mode)	61	60	49	45	42	39	40	38

Table 6.3 - Octave band sound pressure levels for Mitsubishi PURY-P300YHM-A heat recovery unit in night mode (dB ref. 20μPa)

Manufacturer's data for casing radiated noise generated by the Nuaire EST5-X extract fan is understood to be 40dB(A) sound pressure level at three metres. The following octave band sound pressure levels have been assumed based on a typical fan breakout spectrum:

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Lp @ 3m	49	48	47	33	24	15	7	3

Table 6.4 - Octave band sound pressure levels for Nuaire EST5-X extract fan (dB ref. 20μPa)

6.2 Predicted noise levels

Following an inspection of the site, the nearest noise sensitive residential receivers are understood to be situated directly opposite on Jamestown Road, approximately 17m from the edge of the existing building, and 22m from the rooftop plant items.

The AHU and heat pumps will be located behind a weather louvred screen. Acoustic losses through the screen will be minimal and have been ignored within calculations.

The full calculation of noise emission is shown in Appendix B.

The following table summarises the daytime/evening and night-time predicted noise levels at 1m from the nearest noise sensitive residential facade. The night-time noise level is based on an assumption that the Mitsubishi heat recovery units would operate in night-mode after twilight hours, and that the AHU and extract fan would operate during office hours only.

Daytime/evening noise level ($L_{Aeq, T}$)	Night-time noise level ($L_{Aeq, T}$)
40	29

Table 6.5 - Predicted plant noise levels at nearest noise sensitive façade (dB ref. 20μPa)

The predicted levels are within the criteria set against Camden's Replacement UDP. All tenant extract plant will be attenuated in order that the cumulative noise level does not exceed the noise criterion for the relevant time of day.

7. CONCLUSIONS

An environmental noise survey has been undertaken at 10 Jamestown Road, Camden by Alan Saunders Associates between Monday 6th October and Wednesday 8th October 2008.

Measurements have been made to establish the current background noise climate. This has enabled plant noise emissions criteria to be set in accordance with the requirements of the London Borough of Camden.

The proposed plant's noise emissions are expected to meet the Local Authority's requirements provided that the heat recovery units are screened and operate in night mode after twilight hours.

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ALAN SAUNDERS ASSOCIATES

Approximate location of Mitsubishi PURY-P300YHM-A heat pumps and AHU

Approximate location of Nuaire EST5-X extract fan

Monitoring position

Nearest noise sensitive residential façade

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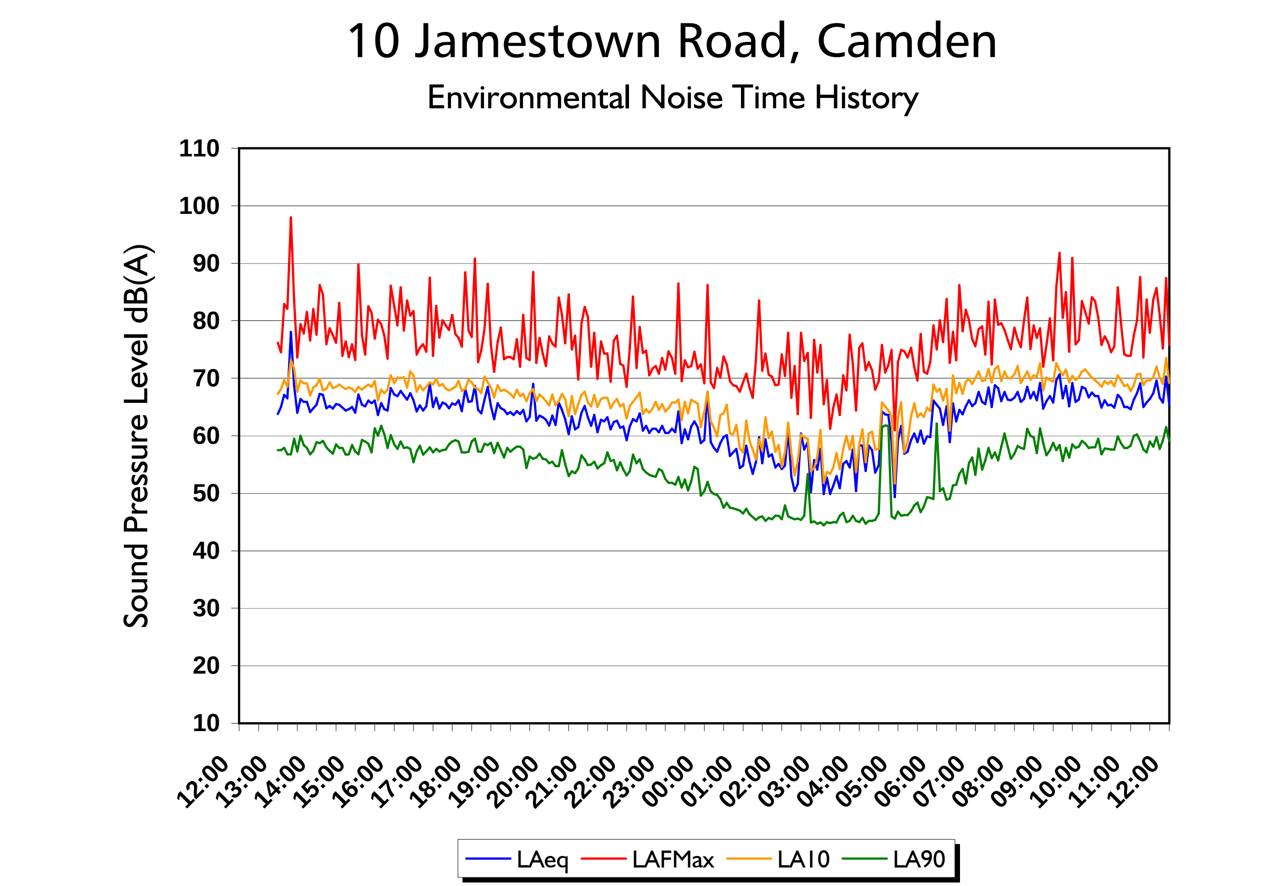
Project:
10 Jamestown Road, Camden

Title:
Indicative site plan

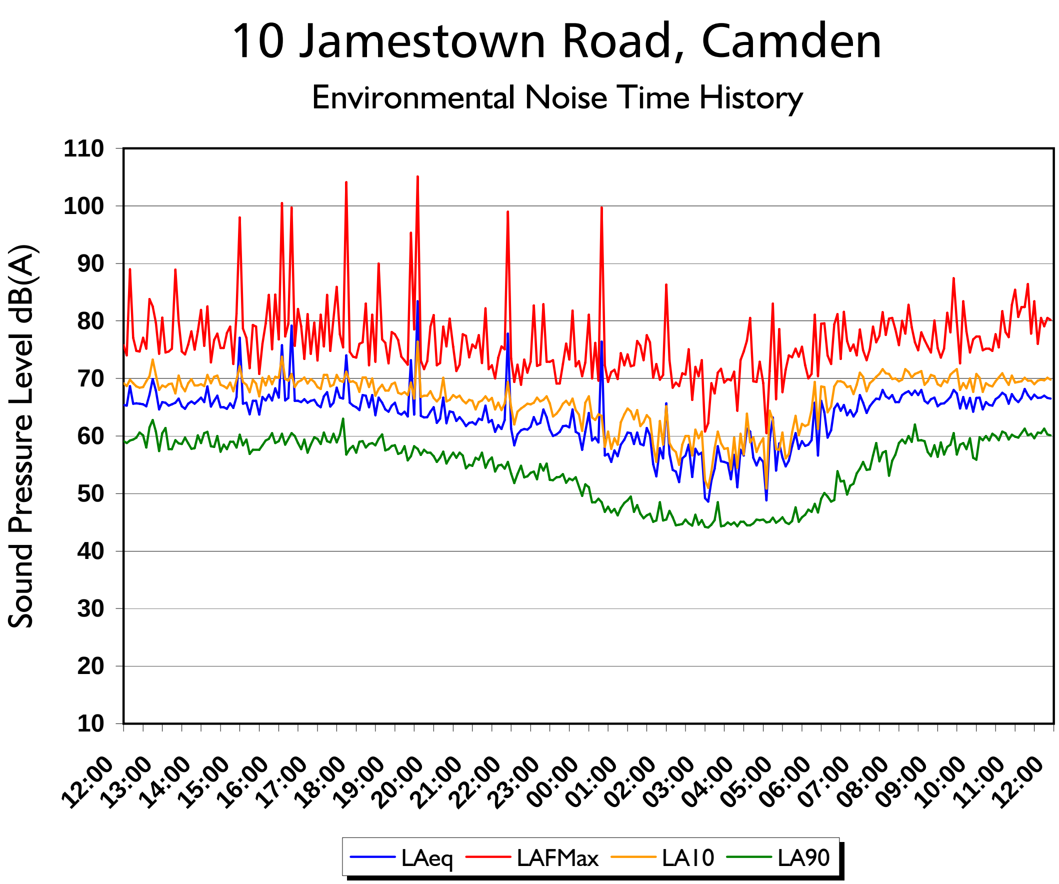
Figure:
AS5474/SP1

Date:
11th March 2010



Monday 06 October to Tuesday 07 October 2008

Figure AS5474/TH1



Tuesday 07 October to Wednesday 08 October 2008

Figure AS5474/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 - Noise Emission Calculation

To nearest noise sensitive receivers directly opposite on Jamestown Road

		Frequency	*63Hz*	*125Hz*	*250Hz*	*500Hz*	*1000Hz*	*2000Hz*	*4000Hz*	*8000Hz*	*dB(A)*
Outdoor Units (24 hour operation)											
Mitsubishi heat recovery unit type PURY-P300YHM-A	Sound pressure level @ 1m (standard mode)		65	64	61	56	53	49	45	43	59
	Sound pressure level @ 1m (night mode)		61	60	49	45	42	39	40	38	50
	Number of units	4	6	6	6	6	6	6	6	6	
	Distance loss to receiver (m)	22	-27	-27	-27	-27	-27	-27	-27	-27	
	Screen		0	0	0	0	0	0	0	0	
	Sound pressure level at noise sensitive façade (daytime/evening)		44	43	40	35	32	28	24	22	38
	Sound pressure level at noise sensitive façade (night-time)		40	39	28	24	21	18	19	17	29
Office AHU (daytime/evening only)											
Supply fan	Intake sound power level		74	78	83	83	80	76	72	67	
Ziehl-Abegg ER35C-4DN.D7.1R	Discharge sound power level		76	80	85	85	82	78	74	69	
Extract fan	Intake sound power level		72	76	81	81	77	73	69	64	
Ziehl-Abegg ER35C-4DN.C7.1R	Discharge sound power level		74	78	83	83	79	78	71	66	
	Total sound power within AHU casing		80	84	89	89	86	83	78	73	
	Assumed casing TL (insulated steel sandwich panel)		15	18	18	17	23	30	40	40	
	Casing breakout sound power level		65	66	71	72	63	53	38	33	
	Hemispherical radiation correction		-8	-8	-8	-8	-8	-8	-8	-8	
	Distance loss to receiver (m)	22	-27	-27	-27	-27	-27	-27	-27	-27	
	Sound pressure level at noise sensitive façade		30	31	36	37	28	18	3	-2	36
Ventilation Extract Fan (daytime/evening only)											
Nuaire extract fan type EST5-X	Lp @ 3m		49	48	47	33	24	15	7	3	40
	Distance loss to receiver (m)	22	-17	-17	-17	-17	-17	-17	-17	-17	
	Sound pressure level at noise sensitive façade		32	31	30	16	7	0	0	0	23
	Cumulative sound pressure level at noise sensitive facade (daytime/evening)		**45**	**44**	**42**	**39**	**34**	**29**	**24**	**22**	40
	Cumulative sound pressure level at noise sensitive facade (night-time)		**40**	**39**	**28**	**24**	**21**	**18**	**19**	**17**	29