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REPORT AS7558.130903.NIA

CAFFE NERO
239-240 TOTTENHAM COURT ROAD
LONDON

NOISE IMPACT ASSESSMENT

Prepared: 3rd September 2013

Caffè Nero
3 Neal Street
London
WC2H 9PU

CONTENTS

List of Attachments

1. INTRODUCTION

Retrospective planning approval is being sought for the two condensing units installed in the courtyard to the rear of Caffè Nero, 239-240 Tottenham Court Road, London.

Clarke Saunders Associates has been commissioned by Caffè Nero 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 first floor level in the courtyard at the rear of the building at the location shown in site plan AS7558/SP1. This monitoring location is considered worst case as it was screened from the road traffic on Morwell Street and therefore exposed to lower noise levels than the nearest noise sensitive receiver.

Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 14:30 hours on Tuesday 20th August 2013 and 11:40 hours on Friday 23rd August 2013.

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:

- Rion data logging sound level meter type NL52;
- 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 generally 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* and BS4142:1997 *Method for rating industrial noise affecting mixed residential and industrial areas*.

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

3. RESULTS

Figures AS7558/TH1-TH3 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 level at the nearest residential receiver is determined by road traffic on Morwell Street with a contribution from road traffic and pedestrian activity on Tottenham Court Road and plant servicing other commercial properties in the vicinity. The plant is situated within the underpass that allows vehicle access to the courtyard at the rear of Caffe Nero, also within the courtyard is a plant room servicing adjacent shops.

The plant units serve refrigerators which require 24 hour operation, however the plant may turn off and on as cooling is necessary.

Despite the plant being operational during the survey, there are periods when the units were not operating allowing measurements of L_{A90} background noise levels without the contribution from the plant for which this application is being made.

Minimum background noise levels measured over the proposed plant operational hours are shown in Table 4.1 below.

Period	Minimum $L_{A90,5mins}$
24 hour	46 dB 03:50, 21/08/13

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

5. PLANT NOISE EMISSIONS DESIGN CRITERIA

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

	Night-time criterion, L_{Aeq}
Noise at 1 metre external to a sensitive façade	41 dB
Noise that has a distinguishing discrete continuous note (whine, hiss, screech, hum) or distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	36 dB

Table 5.1 – Plant noise criteria at nearest noise sensitive façade [dB ref. 20µPa]

6. PREDICTED NOISE IMPACT

6.1 Proposed plant

The selected plant has been confirmed as:

- 2 no. Daikin Condensing Unit Type RZQ140D9V1B;

The approximate location of the installed plant is shown in site plan AS7558/SP1.

Maximum noise levels generated by the units have been confirmed by the manufacturer. Only a single figure sound power level has been supplied. A spectrum of a similar type and size unit has been assumed.

Lw	63	125	250	500	1000	2000	4000	8000
RZQ140D9V1B	37	38	54	58	58	55	50	40

Table 6.1 - Source noise data for the Daikin condenser [dB ref. 10^{-12} W]

6.2 Predicted noise levels

Following an inspection on site, the nearest noise sensitive receiver is thought to be on Morwell Street. As the receiver location cannot be confirmed a worst case scenario has been assumed with the receiver directly opposite the courtyard entrance, as shown in our indicative site plan AS7558/SP1.

The cumulative noise level at the nearest noise sensitive receivers has been calculated using the noise data above. The plant is not considered to be tonal or to display characteristics requiring comparison with the lower design criterion described in Table 5.1.

The overall prediction is given in the table below, with the design criterion for 24-hour operation.

Predicted noise level 1m from the nearest window due to the new plant	Design criterion
L_{Aeq} 38 dB	L_{Aeq} 41 dB

Table 6.2 – Predicted noise level 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 Caffè Nero, 239-240 Tottenham Court Road, London by Clarke Saunders Associates between Tuesday 20th August and Friday 23rd August 2013.

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 noise sensitive properties during its operational hours, in accordance with Camden Council's requirements.

Data for the Daikin condensing units has 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, therefore, required for external noise emissions.

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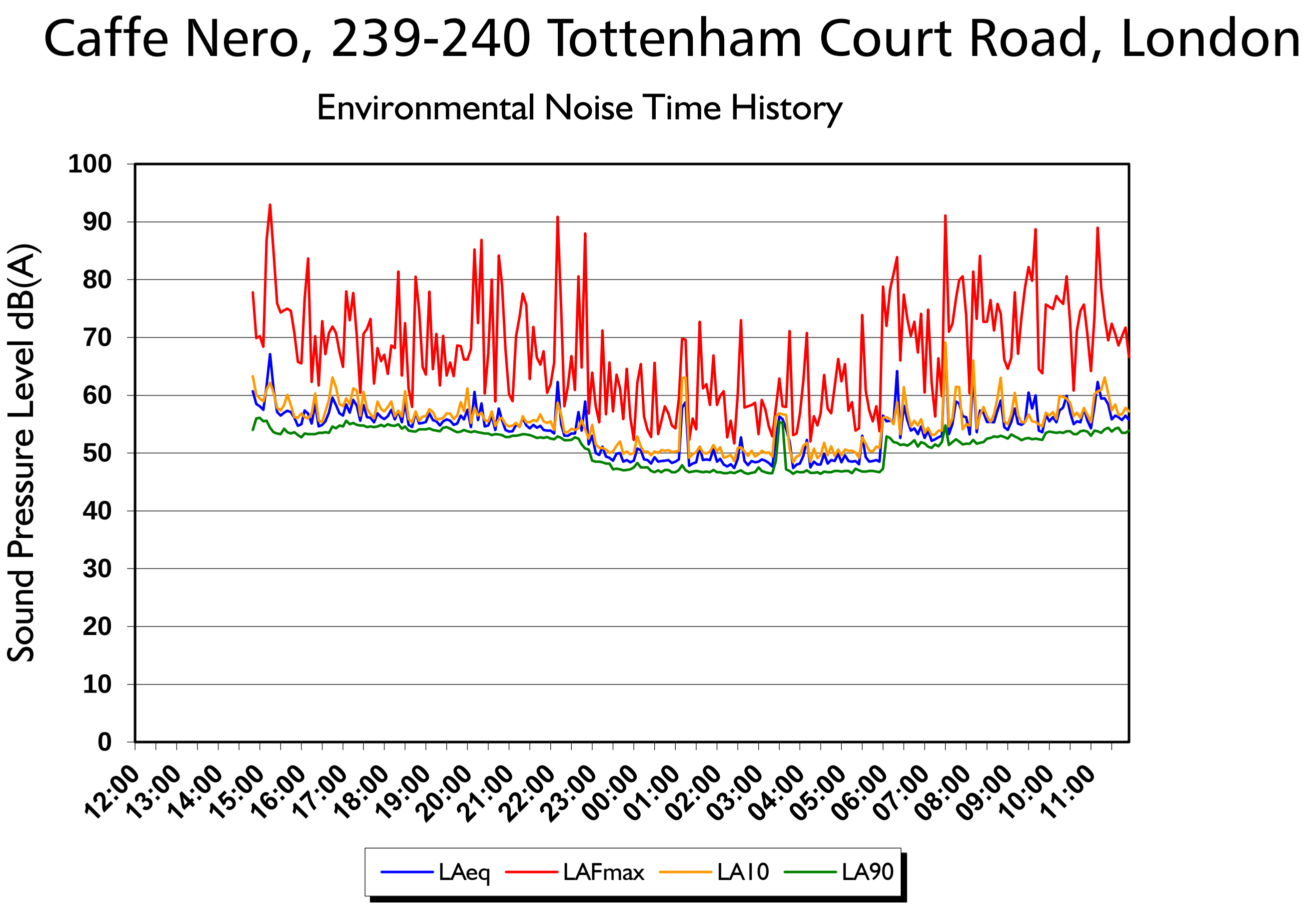
Project:
Caffe Nero, 239-240 Tottenham Court Road, London

Title:
Indicative Site Plan

Figure:
AS7558/SP1

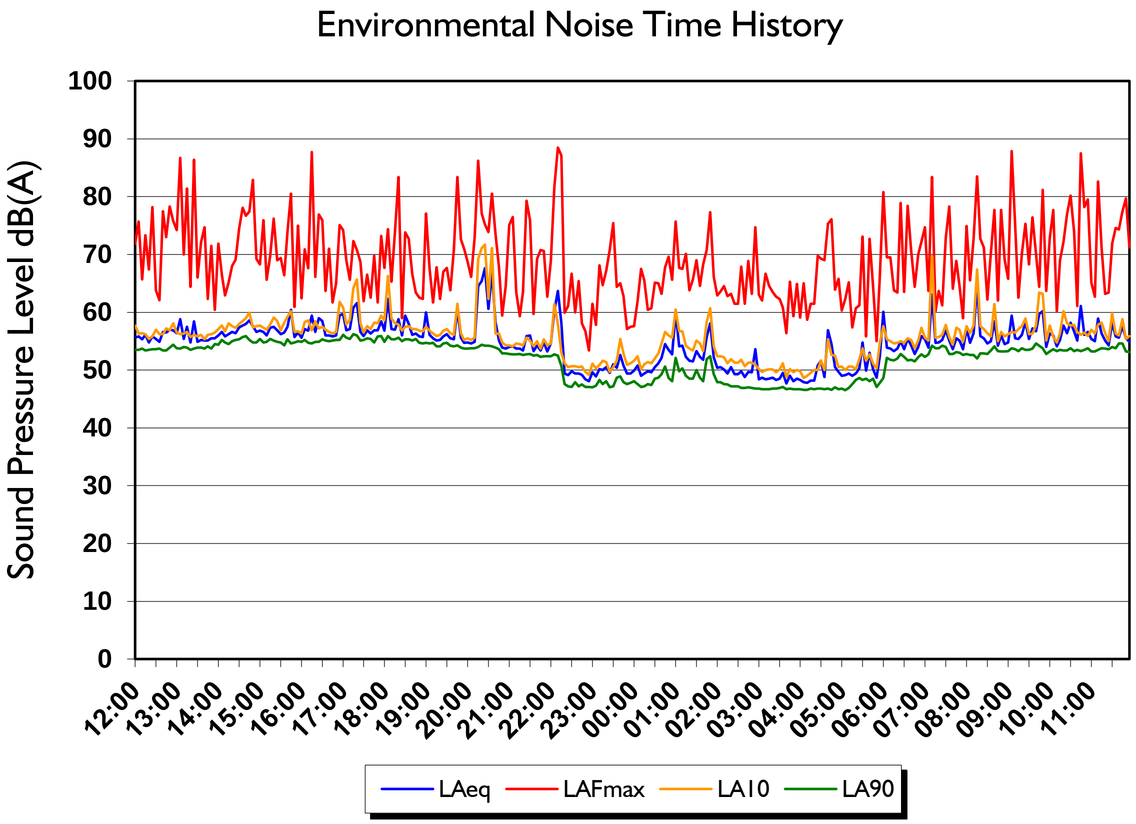
Date:
3rd September 2013



Tuesday 20 August to Wednesday 21 August 2013

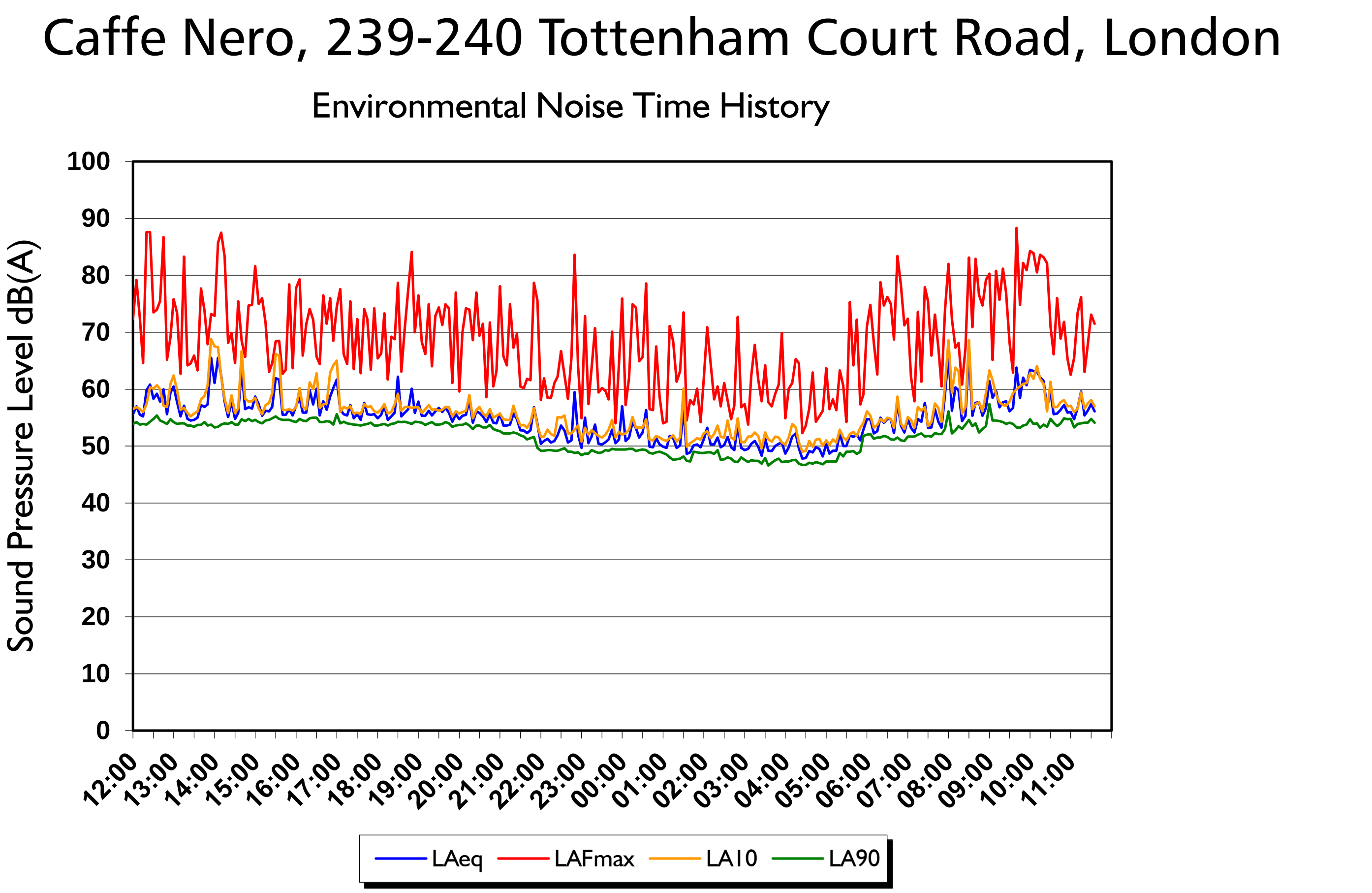
Figure AS7558/TH1

Caffe Nero, 239-240 Tottenham Court Road, London



Wednesday 21 August to Thursday 22 August 2013

Figure AS7558/TH2



Thursday 22 August to Friday 23 August 2013

Figure AS7558/TH3

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

PLANT NOISE EMISSIONS CALCULATION

Assessment to noise-sensitive properties

Calculation 1:

Daikin RZQ140D9V1B

		63	125	250	500	1k	2k	4k	8k	dB(A)
Sound Power Level		44	45	61	65	65	62	57	47	
Number of Units	2	3	3	3	3	3	3	3	3	
Distance Correction	12 m	-22	-22	-22	-22	-22	-22	-22	-22	
Propagation Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Directivity		0	0	0	-1	-5	-8	-8	-8	
Night-time Diversity (50% duty)		-3	-3	-3	-3	-3	-3	-3	-3	
Sound Pressure Level at Receiver		17	19	35	38	34	28	23	13	38

Design criterion at noise-sensitive receiver **41**