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130 CHARING CROSS ROAD, LONDON

NOISE IMPACT ASSESSMENT

Report 16245.NIA.01.Rev. A

Prepared on 25 July 2017

For:

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CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Jacqueline Jackson, 2 Maiden Road, London, E15 4EZ, to undertake an environmental noise survey at 130 Charing Cross Road, London, WC2H 0LA. The measured noise levels will be used to investigate and assess the noise impact from the proposed Commercial use A5 at Ground Floor Level to the neighbouring residential property at First Floor Level, in agreement with the planning requirements of London Borough of Camden.

2.0 PROCEDURE AND EQUIPMENT

2.1 Environmental Noise Survey

Measurements of existing environmental noise were undertaken at the Charing Cross Road, as shown on Site Plan 16245.SP2. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver.

Continuous automated monitoring was undertaken for the duration of the survey between 12:10pm on 23/06/2017 and 12:10pm on 26/06/2017.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise.

The measurement procedure complied with ISO 1996-2:2007 Acoustics *“Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels”.*

The equipment calibration was verified before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 957 Class 1 Sound Level Meter
- B&K Type 4231 Class 1 Calibrator

3.0 RESULTS

3.1 Environmental Noise Survey

The L_{Aeq}: 5min, L_{Amax}: 5min, L_{A10}: 5min and L_{A90}: 5min acoustic parameters were measured and are shown as a time history in Figure 16245.TH2.

Minimum background (L_{A90}) levels monitored at the Charing Cross Road Elevation for the duration of the survey are shown in Table 3.1.

	Minimum background noise level $L_{A90:\ 5min}$ dB(A)
Daytime (07:00am-11:00pm)	52
Night-time (11:00pm-07:00am)	50
Night-time opening hours (11:00pm-04:00am)	50

Table 3.1: Minimum measured background noise levels at front elevation

Measured ambient noise levels are shown in Table 3.3.

	Levels dB(A)
Daytime $L_{Aeq,16hour}$	72
Night-time $L_{Aeq,8hour}$	72

Table 3.3 Site average noise levels for daytime and night time at front elevation

4.0 BREAKOUT NOISE ASSESSMENT

4.1 Manual Measurements

Manual measurements have been undertaken within a similar establishment (Class A5 - Hot food takeaways) in full operation. It is understood that noise generated within the proposed Ground Floor Class A5 use (Hot food takeaways) would not include amplified music playback, or live music.

Table 4.1 shows spectral noise levels with background music measured within a similar Class A5 - Hot food takeaway establishment, which will be used in this assessment.

	Sound Pressure Level (dB) in each Frequency Band (at 1m)							
Source	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Measured noise level including background music	74	71	69	68	63	60	56	51

Table 4.1 Sound Pressure Level with background music measured within a Class A5 use

4.2 Breakout Noise Criterion

As per the Council's requirements, it must be demonstrated that noise generated inside the premises will be at least 10dB below the minimum background noise in the area at 1m from the closest noise sensitive receiver's façade.

It is understood that the opening hours of the proposed Ground Floor Class A5 use are from 7:00am until 01:00am on Monday to Wednesday, 7:00am until 04:00am on Thursday to Saturday and from 7:00am until 00:00am on Sunday.

Based on the above, the criterion shown in Table 4.2 is therefore proposed. Note that compliance to the above criterion would inherently demonstrate compliance to BS4142:2014 '*Methods for rating and assessing industrial and commercial sound*'.

	Night-time opening hours (23:00pm - 04:00am)
Noise criterion at nearest residential receiver window located to the front façade (10dB below minimum L_{A90})	40dB(A)

Table 4.2 Proposed Criterion for noise emissions at 1m from receiver's façade.

4.3 Prediction for Noise Breakout Through the External Façades

Further to discussions with the Client, it is understood that the non-glazed element of the existing external front façade is comprised of a masonry. It is also understood that the glazing systems on the windows located to the front façade at the Ground Floor level are comprised of single glazed panes.

Using a typical source level of 75 dB(A), L_{eq} to represent internal noise within the proposed Ground Floor (Class A5 use - Hot food takeaways) operations including generated noise from the proposed fan's casing breakout, and taking into account the measured D_w rating of the aforementioned existing external façade, which would provide a minimum performance of 26dB, D_w, Table 4.3 shows the predicted sound level at 1m from the nearest window of the identified receiver. This has been compared against the measured minimum background noise. Detailed calculations are shown in Appendix B1.

Source	Receiver	Breakout Noise Criterion outside receiver's window at Night-time	Noise Level at Receiver (1m from window)
Front façade of the proposed Ground Floor Commercial use A5	Front façade of the First Floor residential building	40 dB(A)	38dB(A)

Table 4.3: Predicted noise level at 1m from the closest noise sensitive window

As shown in Table 4.3, the predicted noise level at the receiver is below the set noise criterion. Therefore any breakout noise from the proposed Class A5 use at 1m from the residential windows would be masked by the existing noise profile of the area.

4.4 Prediction of Noise Breakout through Direct Transfer

Further to discussions with the Client, it is understood that the existing party floor system between the proposed Class A5 use at Ground Floor Level and the residential unit at the First Floor level comprises the following elements:

- 200mm Concrete slab (density unknown)
- 900mm void
- 2x15mm plasterboard
- 100mm void
- 6mm plasterboard ceiling tile & grid

The above construction has been modelled with proprietary sound insulation software (Insul) and has been found to provide an airborne sound insulation figure in the region of 45dB, D_w. Using a typical source level of 75 dB(A), L_{eq} to represent internal noise within the proposed Ground Floor (Class A5 use - Hot food takeaways) operations including generated noise from the proposed fan's casing breakout, Table 4.4 shows the predicted noise level within the nearest noise sensitive receiver. Detailed calculations are shown in Appendix B2.

Receiver	**Design Range –** ***For resting/sleeping conditions in bedrooms , as shown in BS8233:2014***	Noise Level at Receiver (Within First Floor Living Room)
Nearest Noise Sensitive receiver (1st Floor Bedroom Flat)	30 dB(A)	28 dB(A)

Table 4.4: Predicted noise level within the First Floor Living Room Flat

As shown in Table 4.4, the internal noise levels as a result of direct transfer would not exceed those recommended by BS8233:2014, with no additional mitigation measures in place.

4.5 BS8233 Assessment

Further calculations have been undertaken to assess whether the noise emissions from the Class A5 use operations at Ground Floor Level would be expected to meet the recognised British Standard BS8233:2014 recommendations, in order to further ensure the amenity of nearby noise sensitive receiver.

British Standard BS8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' gives recommendations for acceptable internal noise levels in different types of buildings. Assuming worst case conditions of the closest window being for sleeping/resting space, BS8233 recommends 30-35 dB(A) as being acceptable internal rest conditions.

According to BS8233:2014, even a partially open window offers 10-15dB attenuation, thus leading to a further reduced interior noise level.

Source	Receiver	Conditions Design Range – *For sleeping/resting conditions in a bedroom, in BS8233:2014*	Noise Level Inside Receiver
Front façade of the proposed Ground Floor Class A5 use (Hot food takeaways)	Front façade of the First Floor residential building	30 dB(A)	28 dB(A)

Table 4.5: Noise levels and criteria inside nearest residential spaces

Predicted levels are shown in Table 4.5, with detailed calculations shown in Appendix B1. It can therefore be stated that, as well as complying with the set criterion, the noise emissions due to the Ground Floor establishment (Class A5 use - Hot food takeaways) operations would be expected to comfortably meet London Borough of Camden criterion and the most stringent recommendations of the relevant British Standard.

5.0 CONCLUSION

An environmental noise survey has been undertaken at 130 Charing Cross Road, London, WC2H 0LA. The results of the survey have enabled the assessment of noise propagation from the proposed Ground Floor Class A5 use to the nearest noise sensitive receiver.

Noise break-out measurements have also been undertaken in order to assess the performance of the external building fabric.

It has been demonstrated that the breakout noise from operations within the proposed Class A5 use (Hot food takeaways) at Ground Floor level would fully comply with London Borough of Camden criterion and the requirements of the relevant British Standard.

No other measures would be deemed necessary in order to protect the amenity of the nearest noise sensitive receiver.

Report by

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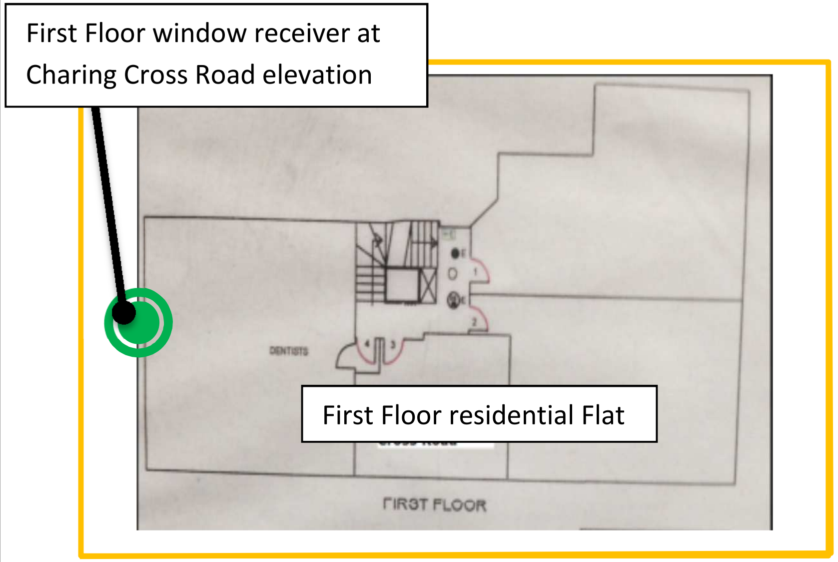

Noise Survey Monitoring Position

Closest Noise Sensitive Receiver

Title:

Indicative site plan showing noise monitoring position and closest noise sensitive receiver

(ref. Google Maps)

Date: 25 July 2017

FIGURE 16245.SP1

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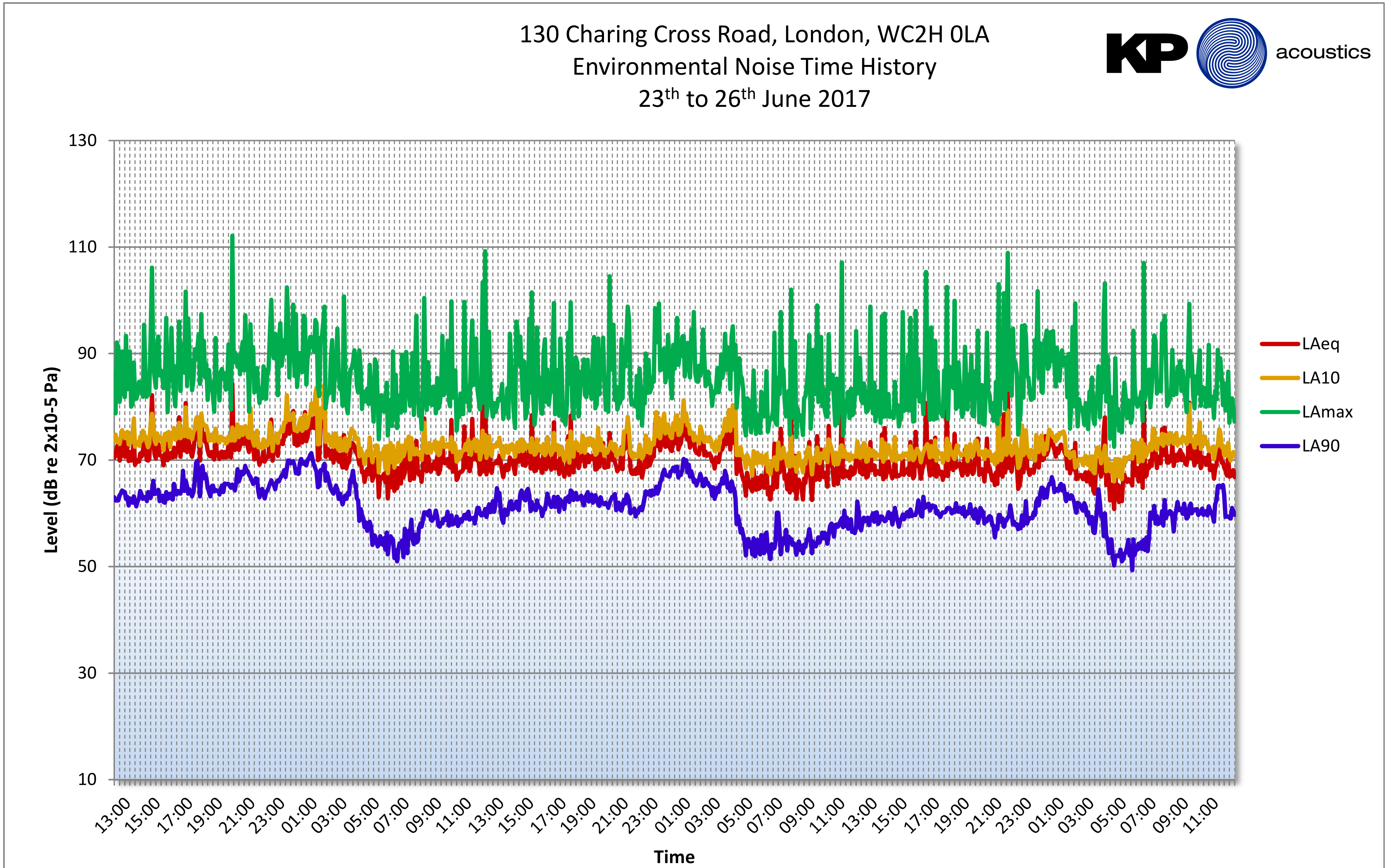

Figure 16245.TH2

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B1

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Noise Impact Assessment Calculation

The main model was designed around the following formula:
SPL2=SPL1 - SRI + 10log(S) + 10log(Q/4πr^2) - 6

where:
SPL2 is the sound pressure level at the receiver's facade
SPL1 is the sound pressure level within the source room
S is the area of the main wall
Q/4pr^2 are the directivity and distance corrections
SRI is the sound reduction index of the break-out facade
The 6dB term occurs because there is no reverberant sound field in the open

Receiver Level due to break out noise from the proposed Ground Floor Class A5 use, front façade

Expected SPL inside the proposed commercial area (dBA)	75
Approximate area S of the facade looking onto the closest residence (sq.m)	9
Correction for area 10log(S)	9
On-site SRI (dB)	26
Distance r to closest residence (m)	2
Directivity factor Q for wall transmission	2
Combined correction for directivity and distance (dB)	-14
Predicted Sound Pressure Level at 1m from receiver's window (dBA)	**38**
London Borough of Camden's Criterion (dBA)	**42**
Correction for a semi-open window	-10
Predicted Sound Pressure Level inside receiver (dBA)	**28**
BS8233 internal levels Criterion (dBA)	**30**

APPENDIX B2

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PREDICTION OF NOISE THROUGH DIRECT TRANSFER

Acoustic Calculation used for Indoor Transmission:

$$SPL_{outdoor} = SPL_{indoor} - SRI_{composite} + 10\log_{10} S + 10\log\left(\frac{Q}{4\pi r^2}\right) - 6dB$$

Source: Proposed Class A5 use at Ground Floor Level	*Frequency, Hz*								
Receiver: Residential Flat at First Floor Level	***63***	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Measured Sound Pressure Levels									
Overall typical noise level within the proposed Class A5 use at Ground Floor Level									75
Sound reduction index of the existing party floor system, dB									-45
Correction for total floor area (S = 16m^2)									12
Correction for directivity (Q) and distance (r) (Q=2, r = 1m)									-8
Non reverberant correction									-6
Predicted sound pressure level within the nearest residential receiver									**28**

Design Criterion	**30**