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22 February 2012

Ms Amanda Brown
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Sent by email only: amanda.brown@pds.uk.com

Dear Ms Brown

NOISE IMPACT ASSESSMENT FOR KITCHEN EXTRACTION FLUE
152 CHAPELTOWN ROAD, LEEDS, LS7 4EE

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Limited (ENS) has been commissioned to assess the potential impact of noise associated with the operation of a restaurant kitchen extraction flue at 152 Chapeltown Road, Leeds. The assessment has been undertaken to accompany an application for a change of use from a sandwich bar to a restaurant at the ground floor of the property. An annotated site location plan is contained in Appendix 1.

1.02 The property consists of commercial use at ground floor level, overlain by two floors of residential accommodation. The kitchen flue runs internally to the property, with the ductwork lagged and boxed out through Bedroom 3 at 1st floor and Bedroom 5 at 2nd floor. The efflux point is above roof level, towards the rear of the property. The property is bound by Chapeltown Road to the west, Back Grange View to the east, and attached properties to the north and south (the property immediately to the south is understood to be vacant, whilst the next two properties to the south are understood to have been converted into a night club).

1.03 A part of previous works at the site, ENS undertook a sound insulation test of the separating floor between ground floor and 1st floor, which showed the sound insulation performance to be appropriate for ground floor small scale commercial kitchen activity. As such, the focus of this report is the kitchen extraction flue.

1.04 Typically, in the UK, noise from mechanical ventilation systems is assessed using noise rating (NR) curves. NR is a graphical method for assigning a single number rating to a noise spectrum.

1.05 The methodology employed to assess the potential noise impact of the extraction flue was as follows:

- In order to assess the potential noise impact of breakout noise from the ductwork on the internal amenity of a habitable room through which the ductwork passes, the noise level in Bedroom 3 (1st floor) with the extraction system operating was assessed against the ambient noise climate in Bedroom 1 (no ductwork).
- In order to assess the potential noise impact of the extraction system efflux point (atmospheric termination) on the amenity of local receptors, the external noise level with the extraction system operational was assessed against the external noise level in the absence of extraction system noise emissions.

1.06 It is understood that the extraction system may operate up to 23:00 hours, which is classed as daytime operation in relation to noise (daytime period 07:00 to 23:00 hours). Representative noise monitoring was, therefore, undertaken during the late evening period.

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2.00 NOISE SURVEY RESULTS

2.01 In order to assess the potential noise impact of the extraction system, noise measurements were taken on the evening of Monday 13 February 2012.

2.02 For the purpose of the assessment, three monitoring positions (MP1, MP2 and MP3) were adopted. MP1 was located in Bedroom 3 on the 1st floor, MP2 was located in Bedroom 1 on the 1st floor and MP3 was located externally to Bedroom 5 on the 2nd floor by extending a boom through a dormer window.

2.03 Measurements at MP1 and MP2 were taken in a reverberant sound field at approximately 1.2 metres above floor level in the centre of the room. MP3 was taken in a free field environment.

2.04 Noise measurements were undertaken using a Bruel & Kjaer 2260 sound level meter and consisted of logged measurements (with logging intervals of 1 minute), with A-weighted broadband parameters and linear one–third octave band L_{eq} levels recorded. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, with no drift in calibration level noted. A 90 mm windshield was fitted for all measurements. Weather conditions throughout the external measurement session were considered suitable for surveying, with an average wind speed of less than 5 metres per second.

2.05 For reference, the ambient noise climate in the vicinity of the site was characterized by local and distant road traffic noise.

2.06 A summary of the noise measurement data (rounded to the nearest decibel) is contained in the following table, with a glossary of acoustic terms contained in Appendix 2 for reference. Unrepresentative data was excluded using Bruel & Kjaer Evaluator software.

Table 2.1 – Summary of noise measurement data

Date	MP	Time	L_{Aeq} (dB)	L_{A90} (dB)	NR curve (dB)	Comment
13/2/12	1	20:50-20:56	34	32	NR 26	Bedroom 3. Internal noise measurement, with extraction system on and operating at normal duty level. Noise climate subjectively broadband in nature.
13/2/12	2	21:22-21:32	36	30	NR32	Bedroom 1. Internal noise measurement, no ductwork in this room. Window closed and wall trickle vent open.
13/2/12	3	21:49-21:59	54	43	NR 52	External to Bedroom 5 on boom adjacent to efflux point. Extraction system not operating. Distant and local traffic main noise sources.
13/2/12	3	22:01-22:06	53	45	NR 50	External to Bedroom 5 on boom adjacent to efflux point. Extraction system operating at normal duty level. Distant and local traffic main noise sources.

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3.00 ASSESSMENT OF RESULTS

3.01 With reference to the noise monitoring results, in relation to internal noise amenity with respect to ductwork noise breakout:

- The measured ambient noise levels in Bedroom 3 with the extraction system operational, of 34 dB $L_{Aeq,T}$ and NR 26, are conducive with good resting conditions during the daytime (BS 8233:1999 design range is 30 to 40 dB $L_{Aeq,T}$, and NR 30 is typically applied to daytime internal noise levels).
- It is apparent that the internal noise level in Bedroom 3 with the extraction system operational is comparable to that in Bedroom 1 (where there is no extraction system, but which is subject to road traffic noise).

3.02 On the basis of the above, the extraction system is not considered to be detrimental to the amenity of the residential accommodation with respect to noise.

3.03 With reference to the noise monitoring results, in relation to noise amenity with respect to noise emissions from the extraction system efflux point:

- The ambient noise climate is dominated by distant and local traffic noise both with and without the extraction system operational. As can be seen from the monitoring results, both the broadband $L_{Aeq,T}$ and NR values are consistent with and without the extraction system operational.
- In close proximity to the efflux point, the operation of the extraction system raises the background noise level ($L_{A90,T}$) by of the order of 2 dB. This level of increase is not considered significant and should also be considered in the context that the impact will decrease relative to the prevailing background noise level with increasing distance from source (distance attenuation of a point source is 6 dB per doubling of distance).

3.04 On the basis of the above, the extraction system is not considered to be detrimental to the amenity of the local area with respect to noise.

4.00 CONCLUSIONS

4.01 Based on the noise measurements and assessment undertaken, noise emissions associated with the operation of the kitchen extraction flue are not considered to be detrimental to either the internal amenity of the overlying residential accommodation, or, the amenity of the local area.

If you have any queries concerning the above please do not hesitate to contact me.

Yours sincerely

Richard Pennell
For Environmental Noise Solutions Limited

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APPENDIX 1 – DRAWINGS

APPENDIX 2 – GLOSSARY OF ACOUSTIC TERMS

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 µPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 µPa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\ max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_W)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).