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THE FREEMASON'S ARMS, HAMPSTEAD

KITCHEN VENTILATION SYSTEM POST-INSTALLATION NOISE ASSESSMENT

On behalf of:

Mitchells & Butlers Leisure Retail Ltd

Report No P19-533-R03v1
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KITCHEN VENTILATION SYSTEM POST-INSTALLATION NOISE ASSESSMENT

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Mitchells & Butlers Leisure Retail Ltd to carry out a post installation noise assessment of the kitchen ventilation system installed at The Freemason's Arms, 32 Downshire Hill, Hampstead, London NW3 1NT.

1.2 Planning permission for the new kitchen ventilation system was previously granted by Camden Council in their letter dated 16th December 2020, application reference 2020/4249/P. This included the following conditions relevant to acoustics:

3. Noise levels at a point 1 metre external to sensitive facades shall be at least 10dB(A) less than the existing background measurement (LA90), 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 15dB(A) below the LA90, expressed in dB(A).

4. Prior to the commencement of the use of the equipment, automatic time clocks shall be fitted to the equipment/machinery hereby approved, to ensure that the plant/equipment does not operate between 11:30am[sic] *and 9am. The timer equipment shall thereafter be permanently retained and maintained and retained in accordance with the manufacturer's recommendations.*

5. The plant shall be installed in accordance with the details and mitigation specified in the approved Kitchen ventilation system noise impact assessment by Hepworth Acoustics dated August 2020. Within 1 month of installation a post-installation noise assessment shall be submitted to and approved by the Local Authority. Details should include confirmation of the plant's compliance with the noise criteria and any additional steps to mitigate noise to be taken if required. Such steps shall be implemented and permanently retained as such.

6. Prior to use, machinery, plant or equipment and ducting at the development shall be mounted with proprietary anti-vibration isolators and fan motors shall be vibration-isolated from the casing and adequately silenced and maintained as such.

1.3 The aim of this report is to deliver the post-installation noise assessment referred to in Condition 5 above. We will also comment on conformity to Conditions 3, 4, and 6. We assume the time in Condition 4 is supposed to read 11:30pm, not 11:30am, but please inform us if this assumption is incorrect.

1.4 The site is bounded by Downshire Hill to the south east. To the south west are private residences. To the north east is the pub's beer garden and car park. To the north west is the back gardens of 1 – 3 Willow Road. The rear elevation of 1 – 3 Willow Road has a view towards the rear of The Freemasons Arms and the flat roof where the kitchen ventilation system is located. The nearest habitable room window to the mechanical plant is around 16 metres away, at the rear elevation of 3 Willow Road, based on our survey on site. Other façades are further away, and hence will be affected less.

1.5 All recommendations are given for acoustics reasons only. Compliance with other requirements (e.g. fire, ventilation, structure, etc.) must be checked by others.

1.6 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 EQUIPMENT NOISE ASSESSMENT

2.1 Source noise measurements were taken one metre from the equipment at 15:00 on Thursday 28th October 2021 for a duration of 15 minutes. All equipment was operating normally.

2.2 The source noise measurements were taken in 'free-field' conditions with the microphone at approximately 1.5 metres above roof level.

2.3 Individual noise samples were carried out using a Brüel & Kjær 2250 Type 1 Sound Analyser (serial no. 3011626) fitted with a windshield. The calibration level of the meter was checked before and after the survey with a Brüel & Kjær Type 4231 sound calibrator (serial no. 2412667). No significant calibration deviation was observed.

2.4 The weather conditions throughout the noise survey were dry, clear, with wind speeds below 5 m/s, and temperatures of 11^{0}C. These were considered suitable conditions for the survey.

2.5 The measured source sound pressure level was 58 dB $L_{Aeq,15mins}$ at 1 metre from the equipment. The noise from the equipment whilst in operation was constant, not tonal, and not impulsive. The dominant noise source was case-radiated noise from the kitchen supply and extract fans. The noise at the kitchen extract exhaust and the kitchen supply inlet was sufficiently controlled. Environmental noise from sources outside of the site was not audible over the fan noise at the measurement position, 1 metre from the equipment.

2.6 The source noise levels on the flat roof, and the background noise levels outside the nearest residence, were previously measured at around 22:00 on Thursday 17th October 2019. This determined that the background noise outside the nearest residence, in the absence of the operational noise, at this time of the evening was 47 dB $L_{A90,15mins}$. This is likely to be around the quietest time of the equipment's operating hours, therefore this represents a worst-case scenario. The source sound pressure levels at 1 metre from the equipment were measured on the same occasion to be 68 dB $L_{Aeq,T}$ when running at full speed. The full results and methodology of these previous noise measurements are described in our report reference P19-533-R02, dated August 2020.

2.7 The current equipment noise level outside the nearest residence is calculated to be 37 dB $L_{Aeq,T}$. The calculation is shown in Table 1:

Table 1: Equipment noise assessment

Description	dB(A)
Source sound pressure level @ 1 metre, L_P	58
Distance attenuation with hemispherical propagation	-24 (16 metres from source)
Receiver façade reflection	+3
Equipment sound pressure level outside residence (dB L_{Aeq})	37
Lowest measured background noise level, 21:00 – 22:00 (dB L_{A90})	47
Comparison ($L_{Aeq} - L_{A90}$)	-10

2.8 As can be seen from Table 1, the source noise levels are noticeably lower than were measured previously, and the equipment noise is now 10 dB(A) below background levels outside the nearest residence. This therefore complies with the noise requirements in Condition 3, so on this basis no further noise mitigation is required.

3.0 RECOMMENDATIONS

3.1 No further noise mitigation is required to meet the noise limits stated in Condition 3 of the planning permission.

3.2 To comply with Condition 6 of the planning permission, the supply and extract fans should be mounted on suitable proprietary vibration isolators. There should be no rigid connections between the fans and the building structure. We recommend checking on site that the fan motors are correctly vibration-isolated from the fan casing.

3.3 We understand that the timer required to comply with Condition 4 of the planning permission has been installed.

4.0 SUMMARY AND CONCLUSION

4.1 Mitchells & Butlers have appointed Hepworth Acoustics to conduct a post-installation noise assessment of the kitchen ventilation system installed at The Freemason's Arms, Downshire Hill, Hampstead, London NW3 1NT, as required by Condition 5 of the planning permission for the installation.

4.2 A noise survey has been undertaken at the site and the noise from the kitchen ventilation system has been measured.

4.3 Using the results of the noise survey, the noise impact of the kitchen ventilation system outside the nearest residence has been assessed.

4.4 Based on our assessment, the noise emitted from the kitchen ventilation system is in compliance with the noise requirements of Condition 3.

4.5 Comments have also been provided regarding conformity with the requirements of Conditions 4 and 6 of the planning permission.

Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

$L_{Aeq,T}$ This is the A–weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, T. In other words, $L_{Aeq,T}$ is the level of a continuous noise which has the same total (A–weighted) energy as the real fluctuating noise, measured over the same time period.

$L_{A90,T}$ This is the A–weighted noise level exceeded for 90% of the time period, T. $L_{A90,T}$ is used as a measure of background noise.

L_P This is the sound pressure level of a sound source, in decibels. The reference power is 20 µPa.