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Noise and Vibration Consultants

CARPENTERS ARMS, 68/70 WHITFIELD STREET, LONDON
MECHANICAL PLANT NOISE ASSESSMENT REPORT

On behalf of:

Mitchells and Butlers Retail Ltd

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd has been commissioned by Mitchells & Butlers Retail Ltd to carry out a plant noise impact assessment in connection with the proposed refurbishment at the Carpenters Arms, Whitfield Street, London, W1T.

1.2 The assessment considers noise emission from the proposed kitchen extract and air supply units (these items will replace existing plant), two new proposed air-conditioning (AC) units and the two existing AC units.

1.3 The objective of the noise assessment is to determine the noise impact from the proposed and existing plant items on the nearest residential premises and nearby offices. The assessment has been carried out in line with the noise standards required for planning and licensing applications by the London Borough of Camden (LBC).

1.4 We understand that the operating hours of the existing and proposed mechanical plant will be from around 10:00 until 23:00 hours.

1.5 The assessment has included:

- A noise level survey of existing plant items;
- A night-time background noise survey outside the nearest noise sensitive properties;
- An assessment of the noise impact from the proposed and existing mechanical plant at the nearest noise sensitive properties; and
- Outline recommendations for noise control measures.

1.6 Noise levels referred to in the text of this report have been rounded to the nearest decibel, as fractions of decibels are imperceptible. A description of noise units and noise characteristics is provided in Appendix I.

2.0 DESCRIPTION OF THE PREMISES

2.1 The Carpenters Arms public house is located at 68-70 Whitfield Street, London in the London Borough of Camden. The public house is located at the junction of Whitfield Street and Howland Street. The surrounding area is commercial almost in its entirety, with office buildings surrounding the Carpenters Arms premises.

2.2 The nearest non-residential premises are a medical laboratory and offices from buildings with main entrances at 60 Whitfield Street (Medical Centre) and 85 Tottenham Court Road respectively. These premises have windows overlooking the flat roof.

2.3 The nearest residential premises are further away at Montagu House at 109-113 Whitfield Street and the flat of the custodian of The American Church in London, adjacent to Whitfield Gardens. The former are approximately 80m north and the latter 100m south from the Carpenters Arms. Neither residential property has a line of sight to the mechanical plant serving the public house.

2.4 The Carpenters Arms is a three storey property with trading area on the ground floor, kitchen on the first floor and staff accommodation at first and second floor level. There is a flat roof at first floor level, where mechanical plant from the public house is located.

2.5 The proposed refurbishment work in the public house includes the relocation of the kitchen from first to second floor, a new trading area on the first floor and new customer toilet facilities on the second floor. The kitchen extract and air supply units, which are currently located at the flat roof just outside the kitchen, will be relocated approximately 2 metres above their current location. The two proposed additional AC units will be installed on the flat roof next to the existing AC units, which will remain at their current location. Proposed and existing plant items are located between 2 and 7 metres from the nearest commercial premises window (at the Medical Centre).

2.6 The proposed and existing external plant items considered in this report comprise:

- Kitchen Extract Fan: Systemair MUB042 500E4-E2 (replacement item);
- Kitchen Air Supply Fan: Auherhaan-Klimaattechniek DD-11-9-9 (replacement item);
- Two new proposed Daikin RXS50B AC units; and
- Two existing Daikin R125 FJY1 AC units.

2.7 There are a number of other plant items in the vicinity of the premises which generate noise, serving nearby commercial and office premises, including an extract duct and AC unit.

3.0 NOISE LEVEL SURVEYS

3.1 A noise survey was carried out on Monday 30 October 2006. Noise measurements were recorded between 22:45 and 23:10 hours, approximately 1m outside the laboratory windows to the south of the flat roof. It was observed during the noise survey at the flat roof that the medical laboratory was occupied.

3.2 The operation of existing plant at the Carpenters Arms was controlled to enable existing plant noise levels and background noise levels to be measured. The AC unit at ground floor level operated intermittently (see Appendix II) and the extract unit from the adjacent building operated continuously.

3.3 Background noise measurements were also recorded at the nearest residential locations between 23:16 - 24:00 hours. These times are deemed representative of the latest proposed operational times of the mechanical plant. A number of five minute measurements were recorded approximately 1.2m above ground level at the following locations:

- Location 1: South end of Montagu House on 109-113 Whitfield Street.
- Location 2: South-west corner of the American Church in London adjacent to Whitfield Gardens.

3.4 The above locations are representative of the nearest residential windows and the approximate locations are shown in Figure 1.

3.5 All mechanical plant from the Carpenters Arms was switched off during the background noise measurements at Locations 1 and 2.

3.6 The instrumentation used to carry out the noise measurements was a B&K Type 2260 Sound Level Meter (serial no. 2520468). The calibration level was checked before and after use with a B&K Type 4231 Sound Calibrator (serial no. 2528310). There was no variation in the calibration level noted.

3.7 The weather conditions for the surveys were mild, dry and wind speed less than 5m/s. These therefore represented reasonable conditions for noise measurement.

4.0 RESULTS OF NOISE SURVEYS

Background noise measurements at residential locations

4.1 The noise climate at Location 1 was due to road traffic and pedestrians. The lowest recorded levels were 50 dB L_{A90} and 62 dB L_{Aeq}.

4.2 At Location 2, noise levels were mainly due to road traffic noise and the lowest recorded levels were 50 dB L_{A90} and 64 dB L_{Aeq}.

4.3 Background noise levels are therefore relatively high at the nearest residential locations.

Noise measurements outside the medical laboratory

4.4 Subjectively it was clear that the main noise sources were the kitchen extract and air supply units at the Carpenters Arms; and the AC unit at ground floor.

4.5 The measured L_{Aeq} level, when only the kitchen extract and air supply were operating, was 59 dB. When only the AC unit at the ground floor was operating, the recorded L_{Aeq} level was also 59dB. When all the mechanical plant on the flat roof was operating simultaneously (including one of the existing Daikin R125 FJY1 AC units) the measured L_{Aeq} noise level was 61 dB.

4.6 When all the mechanical plant was switched off, the measured L_{Aeq} noise level was 53 dB.

4.7 The overall results of the background noise level survey and the measurements at the flat roof are shown in Appendix II.

5.0 ACOUSTIC CRITERIA

5.1 We have contacted the Environmental Health Department of the London Borough of Camden (LBC) to agree appropriate acoustic criteria for the assessment of plant noise. We were provided with the Camden New Planning Conditions document from August 2001 which states the following:

- Noise levels from mechanical plant in operation should be 5dB below existing background noise levels L_{A90}, 1m outside the noise sensitive façades. If the noise by the plant is a distinguishable, discrete continuous note and/or distinct impulses, the noise by that piece of equipment should be 10dB below the existent background noise level at the sensitive façade.
- For each of the octave band of centre frequencies 63Hz-8KHz inclusive, noise levels from all plant/equipment (measured in L_{Aeq}) when in operation shall at all times add not more than 1 dB to the existing background noise level L_{A90}, in the same octave band as measured 1 metre external to sensitive facades
- Noise levels inside offices should normally be below 45dB L_{Aeq}.

5.2 According to the measured background noise levels at Locations 1 and 2, cumulative noise levels from mechanical plant should therefore not exceed 40dB L_{Aeq} outside residential premises.

5.3 In order to ensure that mechanical plant noise contribution inside offices with open windows does not exceed 45 dB L_{Aeq}, the maximum noise level from mechanical plant should not exceed 55 dB L_{Aeq} outside office windows (a façade with an open window typically provides 10-15 dB attenuation of external noise).

6.0 NOISE ASSESSMENT

Noise impact at residential premises

6.1 Cumulative noise levels from proposed and existing mechanical plant will be negligible at the nearest residential premises and well within the Council's required acoustic criteria This is due to the considerable acoustic screening provided by intervening buildings surrounding the flat roof and the large distance from the plant to residential locations.

Noise impact at medical laboratory/offices

6.2 A calculation of the cumulative noise level from proposed and existing mechanical plant, outside the medical laboratory, has been carried out using manufacturer's noise data for the new equipment provided by Daikin and the client, and the existing plant noise levels recorded on site.

6.3 Our calculations have shown that noise levels from mechanical plant will be above the required noise limit by 7-8 dB. The most significant plant items are the proposed kitchen extract and supply fans. Noise mitigation measures will therefore be required and options for possible noise control are discussed in Section 7.0.

6.4 It should be noted that the nearest office/commercial windows are currently exposed to noise levels from road traffic and plant noise from other sources that exceed the LBC criterion of 55dB L_{Aeq}. For example, the measured noise levels show that the AC unit serving other premises produces 57dB L_{Aeq} (when corrected for residual background noise) outside the medical laboratory window.

7.0 RECOMMENDATION OF NOISE CONTROL MEASURES

7.1 The established noise criterion for offices (in this case medical laboratory) will be met providing the following recommendations are put into practice.

7.2 All exposed ductwork and fan motors serving the kitchen extract and supply, should be acoustically lagged. We recommend acoustic lagging, such as MuftiLagA of minimum thickness of 50mm and mass/unit area of 10kg/m^2 (as supplied by Hodgson & Hodgson Group Ltd; see http://www.acoustic.co.uk/literature/muftilag.pdf).

7.3 It is recommended that the terminations from the kitchen extract and air supply are oriented away from nearby office/commercial windows.

7.4 We also recommend that atmospheric attenuators (silencers) are fitted to inlet and discharge terminations of the kitchen plant items. Such attenuators should provide minimum attenuation of 5dB between 63 and 250 Hz. We understand that there is scope to reduce the number of proposed AC units to one. It is strongly recommended that idea is adopted. However, this will not have a positive impact unless the recommendations of sections 7.1, 7.2 and 7.3 are applied.

7.5 We also recommend that all plant be installed using appropriate anti-vibration mounts and flexible couplings to ensure that structure-borne noise transmission to the building is minimised.

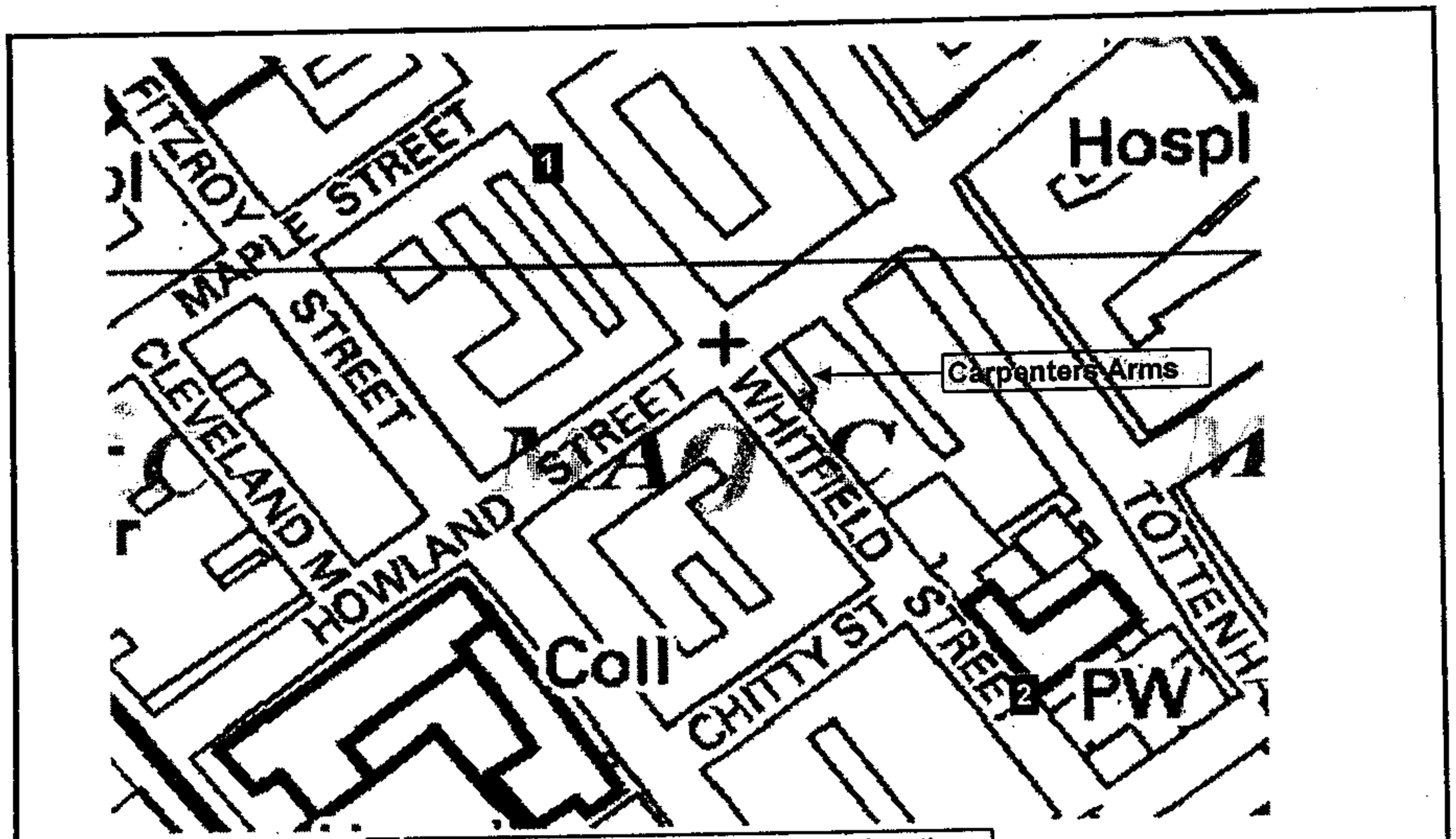
7.6 The standard of workmanship employed will be crucial in ensuring a good acoustic standard of the above measures.

8.0 SUMMARY AND CONCLUSIONS

8.1 This report has assessed the noise impact of the existing and proposed external plant items at Carpenters Arms, London. This has involved carrying out noise surveys and calculations.

8.2 It has been found that noise levels from proposed (and existing) mechanical equipment will be negligible at the nearest residences and well within the limits required by the Council.

8.3 However, due to its proximity to the medical laboratory's windows, plant noise levels from the kitchen extract and supply systems should be reduced in order to meet the Council's established noise criterion for offices. We have therefore given recommendations for noise control.



Background noise level monitoring locations

Figure 1. Site Location Plan	Report No. 4242.1v1	HEPWORTH ACOUSTICS Noise and Vibration Consultants

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Appendix I – Noise units and indices

a) Sound Pressure Level and the decibel (dB)

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).

b) 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 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

c) Glossary of Terms

When a noise level is constant and does not fluctuate over time, 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, including statistical parameters, are used. The indices used in this report are described below.

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, LAeq 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. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

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

Appendix II – Results of noise survey

Date: Monday 30 October 2006

Equipment: Bruel & Kjaer Modular Precision Sound Analyzer 'Type 2260' (serial no. 2520468)

Weather: Mild, dry and wind speed less than 5m/s

At flat roof, approximately 1m outside the medical laboratory window

Time (hours)	Noise Levels (dB)			Plant items operating
	L_{Amax}	L_{Aeq}	L_{A90}	
22:45 – 22:50	66.3	61.4	60.4	Kitchen extract and air supply; and one AC unit from The Carpenters Arms. AC unit at Ground Floor
22:52 – 22:57	67.3	58.5	57.4	AC unit at Ground Floor
23:03 – 23:07	60.3	52.6	51.2	None
23:08 – 23:10	62.9	58.9	58.0	Kitchen extract and air supply

Note: The extract from the adjacent building was running throughout the measurements.

Location 1: South end of Montagu House at 109-113 Whitfield Street

Time (hours)	Noise Levels (dB)			Comments
	L_{Amax}	L_{Aeq}	L_{A90}	
23:16 – 23:21	72.0	58.2	52.8	Road traffic, pedestrians
23:31 – 23:36	66.4	56.5	50.2	
23:47 – 23:52	68.3	56.2	51.0	Road traffic, pedestrians, plastic cover from scaffolding

Location 2: South-west corner of the American Church in London adjacent to Whitfield Gardens

Time (hours)	Noise Levels (dB)			Comments
	L_{Amax}	L_{Aeq}	L_{A90}	
23:23 – 23:28	71.9	57.9	50.8	Road traffic, pedestrians, helicopter, tree rustle
23:39 – 23:44	68.8	54.3	50.6	Road traffic, siren
23:55 – 00:00	63.9	54.2	49.6	Road traffic, aircraft, car horn, car engine started