HEPWORTH ACOUSTICS
Noise and Vibration Consultants

PRINCE OF WALES FEATHERS, LONDON

PLANT NOISE ASSESSMENT

On behalf of:

Mitchells & Butlers Plc

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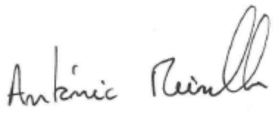

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd has been commissioned by Mitchells & Butlers to carry out a noise impact assessment of the proposed relocation of external condensing units at the Prince of Wales Feathers, 89 Warren Street, London W1T 5LD.

1.2 The assessment is required in connection with the planning application for the refurbishment of the roof garden, including the relocation of three existing external condensers from the roof garden to a second floor flat roof.

1.3 This assessment has considered the most noise-sensitive time during the proposed operational period of the plant.

1.4 The assessment has included:

- A site inspection to identify the location of the nearest residence;
- A background noise survey at a location representing the nearest noise sensitive window;
- An assessment of the noise impact from proposed plant at the nearest noise sensitive window; and
- Outline recommendations for noise control measures where necessary.

1.5 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 SITE DESCRIPTION

2.1 8 Warren Street is a 3-storey building occupied by the Prince of Wales Feathers, including customer areas at ground and first floor as well as ancillary areas in the upper floors.

2.2 The building further includes a first floor flat roof, currently closed to customers, where several plant items are located, including three air conditioning outdoor unit condensers, mounted laterally to the façade of a single storey extension of the main building.

2.3 The proposal is to refurbish the first floor flat roof into a roof garden, to be used by customers, and includes the relocation of the three condensers to the flat roof of the building extension.

2.4 The existing condensers are three Daikin RY45DA7V1 units. Manufacturer noise data is not available for these condensers. However, during a daytime visit to the site, measurements of the units in operation were taken close to the condensers, i.e. approximately 1m from the units, which have been measured at approximately 52 dB(A). The measured noise level is consistent with the manufacturer quoted noise levels for similar external condensers, e.g. Daikin RP71L7V1 / RP100L:7V1.

2.5 The surrounding area is mainly residential and commercial in use. The nearest and most exposed noise sensitive windows to the proposed condensers location are to on the upper floor rear elevation of 18 Fitzroy Court. It is noted that rear windows of 9A Warren Street are slightly closer to the proposed location of the condensers but benefit from screening by the pub building, and hence will be significantly less affected.

2.6 This assessment is based on Pembrook Design planning drawing no. 2903.11.

2.7 We have been advised by the pub manager that the air conditioning is only switched on when the pub requires cooling during particularly busy periods or hot days. However, it does not operate beyond midnight. The assumed operational period has been therefore from 09:00 hours to midnight.

3.0 BACKGROUND NOISE SURVEY

3.1 Background noise levels at the site were measured on the first floor roof of the site at a location representative of the nearest residential windows, Location 1 shown in Figure 1.

3.2 Continuous noise monitoring was undertaken between 14:45 hours on Tuesday 27 and 11:00 hours on Wednesday 28 January 2015. Noise levels were measured in sequential fifteen-minute sample periods for the entire duration of the survey.

3.1 The continuous noise monitoring was carried out using a Rion NL-31 Type 1 sound level meter (serial no. 01120834). The calibration level of the meter was checked before and after the surveys with a Brüel & Kjaer Type 4203 sound calibrator (serial no. 1771163) with no variation in level observed. All noise measurements were recorded with the microphone fixed on a tripod at a height of approximately 1.5m above roof level and in free-field conditions. A windshield was fitted to the microphone during all noise measurements.

3.2 The weather conditions throughout the survey were dry, with wind speeds below 5 m/s. Some light rain was registered towards the end of the survey, but when background noise levels were already elevated and therefore this does not affect the outcome of the subsequent assessment.

3.3 The noise survey results are detailed in graphical form in Appendix II and are summarised in Table 1 below:

Table 1 – Summary of measured ambient / background noise levels (dB)

Date		Noise level	
		L_{Aeq}	L_{A90}
Operational period (09:00-00:00 hrs)	Range	58-65	56-60
	Average*	60	58

* L_{Aeq} logarithmic average / L_{A90} arithmetic average

3.4 The measured noise levels were mainly influenced by plant noise both from the premises and by others and road traffic noise on the surrounding highways.

3.5 The lowest background noise level measured during the operational period was 56 dB L_{A90}.

3.6 It is noted that background noise levels were reduced by about 4dB after midnight. However, this reduction is not due to the external condensers being switched off but other plant items, which can be confirmed as these start to dominate again at 05:00 hours, when the condensers were not in operation.

4.0 ACOUSTIC CRITERIA

4.1 A copy of Table E of the London Borough of Camden Local Development Framework, adopted November 2010, which establishes noise levels from plant and machinery above which planning permission will not be granted, is presented in Table 2 below:

Table 2 – Noise levels from plant and machinery at above which planning permission will not be granted (apart from residential includes offices, workshops and open spaces)

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	00:00-24:00	5dB(A)<L_{A90}
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade	Day, evening and night	00:00-24:00	10dB(A)<L_{A90}
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	Day, evening and night	00:00-24:00	10dB(A)<L_{A90}
Noise at 1 metre external to sensitive façade where L_{A90}>60dB	Day, evening and night	00:00-24:00	55dB L_{Aeq}

4.2 Due to the intermittent operation of the plant, it has been considered in the following assessment that the condensers contain acoustic features that attract attention. Thus, to comply with the Camden's policy, the L_{Aeq} noise level from the proposed plant is required to be 10 dB below the lowest measured background noise level L_{A90} of 56 dB during operational periods, i.e. 46 L_{Aeq}.

5.0 NOISE ASSESSMENT

5.1 The noise level from the condensers has been predicted at the nearest adjoining sensitive windows at the rear elevation of 18 Fitzroy Court. This has been compared with the lowest measured L_{A90} background noise to assess potential noise impact in accordance with the Local Authority's criteria.

5.2 Predicted condensers noise levels at the nearest windows are shown in Table 3. Predicted noise levels take account of attenuation provided by distance as well as a +3dB façade correction.

Table 3 – Summary of the calculations of noise levels from the condensers at the nearest noise sensitive window

Plant item		**Noise level**
Daikin RV45DA7V1	Sound pressure level @ 1m – dB(A) for 1no. unit	52
	Sound pressure level @ 1m – dB(A) for 3no. units	57
	Distance correction of 5.6m from the condensers to the nearest window – dB	-15
	Facade reflection	+3
	Noise level at receiver – dB(A)	**45**

5.3 It is calculated that the cumulative plant noise level at the nearest noise sensitive windows will not exceed 45 dB L_{Aeq} and will therefore be in compliance with the London Borough of Camden criteria.

6.0 SUMMARY AND CONCLUSIONS

6.1 This report has assessed the noise impact of the proposed relocation of three external condenser units at the Prince of Wales Feathers, 8 Warren Street, London W1T 5LD.

6.2 A site noise survey has been undertaken at a location representing the nearest noise sensitive locations.

6.3 The predicted noise level from the proposed plant has been assessed at the nearest sensitive windows.

6.4 The predicted plant noise level has been compared with the lowest measured background noise level to assess compliance with London Borough of Camden acoustic criteria.

6.5 It has been predicted that noise levels from the three condensers at the proposed location will be compliant with the London Borough of Camden's noise criteria at the nearest noise sensitive windows.

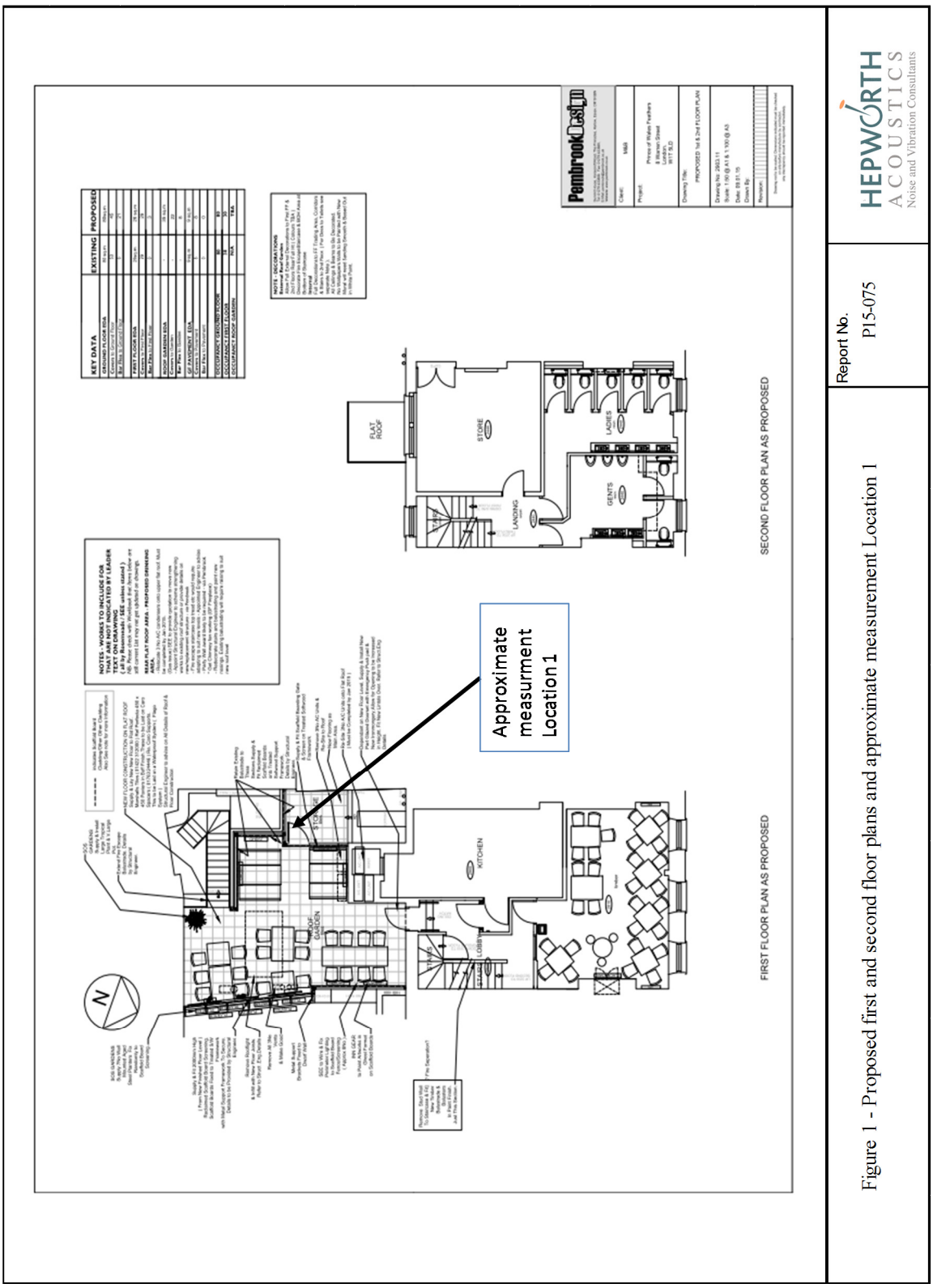

Figure 1 - Proposed first and second floor plans and approximate measurement Location 1

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_{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 surveys

Dates:	14:45 hours on Tuesday 27 to 11:00 on Wednesday 28 January 2015
Equipment:	Rion NL-31 Type 1 integrating sound level meter
Weather:	Dry with wind speeds below 5m/s. Light rain Wednesday morning.