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Acoustic Assessment of Mechanical Equipment Serving Kua'Aina, 40 Goodge Street, London

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0. SUMMARY

- ACA Acoustics Limited have been commissioned to assess noise emissions from installed mechanical equipment serving a restaurant at 40 Goodge Street, London.

- The assessment is required in order to provide evidence that noise emissions from the new equipment complies with London Borough of Camden Council's acoustic requirements. London Borough of Camden Council's requirement, applicable at this site, is that noise from the new equipment shall be designed to 10dBA below the prevailing background level at 1m outside windows of the nearest affected noise-sensitive property.

- A sound level survey has been carried out in the vicinity to establish existing background noise levels. Whilst on site the author identified closest noise-sensitive properties to be upper floor flats directly above the site. Closest windows of these properties has been scaled to be approximately 3-4m from the closest equipment location.

- Lowest background sound levels are measured at LAF90 51dB to half-hour beyond the operating time of the equipment. Based on results of the sound level survey and London Borough of Camden Council's planning consent requirement, the overall noise limit for the equipment to outside nearest noise-sensitive windows is set at ≤41dBA.

- The equipment is installed and the restaurant operating. It was therefore deemed appropriate to measured existing sound levels from the equipment to outside closest noise-sensitive properties. Measured specific sound levels of the equipment, corrected for the influence of the prevailing ambient noise, was LAeq 58dB. This exceeds London Borough of Camden Council's criteria by 17dBA and further noise mitigation measures are required.

- Existing equipment sound levels are dominated by breakout from the casing and flexible connections of the two main supply and extract fans, along with some contribution from the refrigeration condensers. It is recommended noise control treatments are installed to these items such that the cumulative level does not exceed LAeq 41dB outside nearby noise-sensitive properties.

1. INTRODUCTION

Various items of mechanical equipment associated with ventilation, refrigeration and air conditioning have been installed to serve a restaurant at Kua'Aina, 40 Goodge Street, London.

The Planning Department of London Borough of Camden Council requires information in the form of an acoustic report regarding noise from the new equipment to support a retrospective planning application for the installed equipment and to investigate and mitigate existing noise complaints. The report is required to demonstrate that the new equipment will comply with London Borough of Camden Council's acoustic requirements applicable for plant or equipment affecting nearby noise-sensitive properties.

ACA Acoustics Limited has been commissioned to carry out an assessment of noise from the equipment and, where necessary, make recommendation to reduce noise and vibration levels from the equipment to comply with London Borough of Camden Council's planning requirements.

This report presents results of the noise survey and assessment and includes:

- Review of London Borough of Camden Council's noise requirements;
- Measurement of existing background sound levels;
- Measurement of existing specific noise from the installed equipment;
- Review of any noise control treatments necessary to the equipment to ensure compliance with the requirements of London Borough of Camden Council.

2. LONDON BOROUGH OF CAMDEN COUNCIL PLANNING CONSENT ACOUSTIC REQUIREMENTS

London Borough of Camden Council's policies relating to noise from new mechanical services equipment are contained within the Council's Local Development Framework; Policy DP28.

In Summary, London Borough of Camden's noise-related conditions are:

Noise level from plant and machinery at which planning permission will not be granted:	
Noise at 1m external to a sensitive façade;	*5dBA < LA90*
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1m external to a sensitive façade;	*10dBA < LA90*
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1m external to a sensitive façade;	*10dBA < LA90*
Noise at 1m external to sensitive façade where LA90 > 60dB	*55dB LAeq*

Table 1: London Borough of Camden Council noise-related planning conditions

Each of the above is applicable over a period of 60 minutes and measured at 1m external to noise-sensitive facades.

Measured sound levels of the installed equipment indicate a low-frequency 'hum' at 125Hz and 250Hz. In addition the characteristic of noise from the air conditioning and refrigeration condensers would typically be described as having distinct impulses as the units switch on and off as required by the system. Therefore to ensure that the assessment is robust and that the amenity of nearby occupiers is not detrimentally affected, the more onerous noise condition of 10dBA below the existing background noise is used for the assessment in this report.

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is at 40 Goodge Street, London. Goodge Street is primarily of commercial and retail properties over ground floor levels, with a number of residential apartments over upper floors above many buildings.

The equipment serving Kua'Aina restaurant has been installed on a rear flat roof area. Drawing showing layout of the installed equipment, provided by the client, is shown in Figure 1 below. Closest noise-sensitive windows are to upper-floor residential flats directly overlooking the flat roof area.

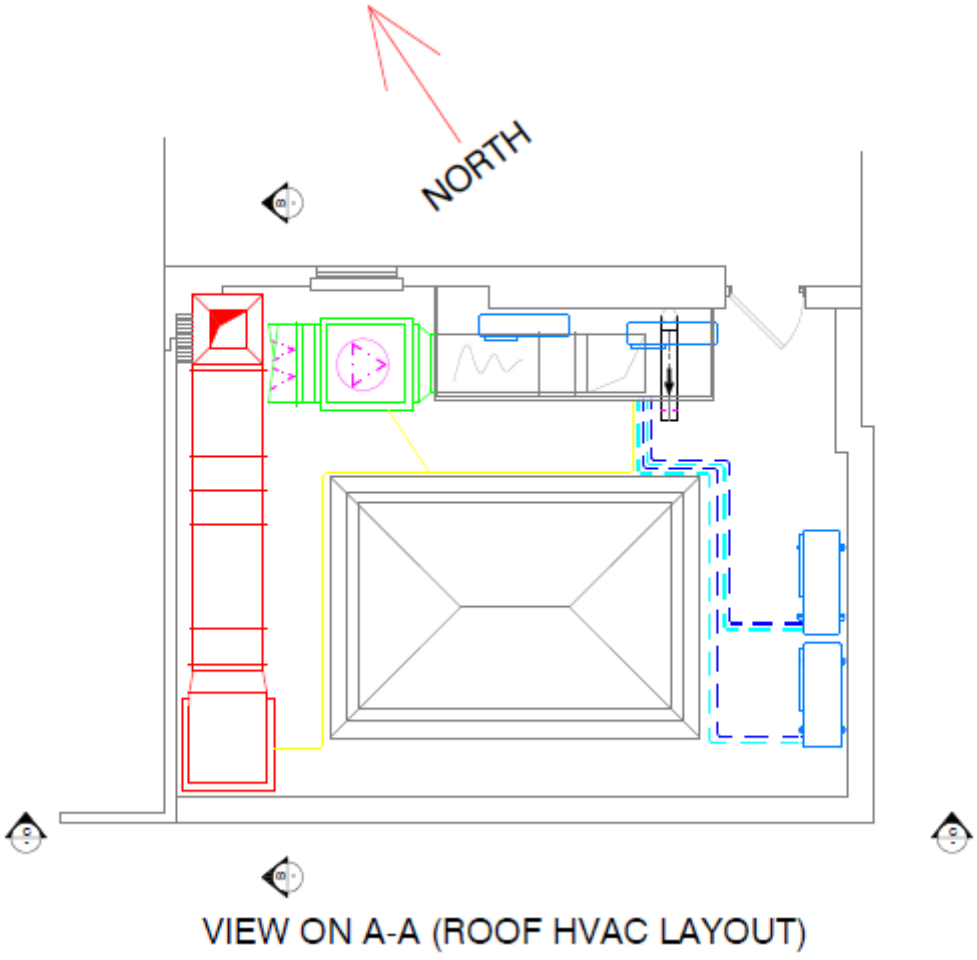

Figure 1: Equipment layout plan

4. SOUND LEVEL SURVEY

In order to assess noise from the mechanical services equipment in accordance with London Borough of Camden Council's requirements it is necessary to establish representative background sound levels at the nearest noise-sensitive properties. Details of the background sound level survey carried out by ACA Acoustics Limited are provided in Sections 4.1 to 4.3 below.

4.1 Noise Measurement and Assessment Procedure

The background sound level measurement position was selected at the rear of the property at the flat roof area adjacent to the closest non-associated noise-sensitive windows.

The site was not considered secure and therefore a manned sound level survey was carried out. As the restaurant is open and the equipment operational it was not possible to measured background sound levels in the absence of the equipment over the full operating period. Therefore it was deemed appropriate to measure background sound levels over a 40-minute period immediately after the equipment switched off on the evening of 14th May 2015.

4.2 Instrumentation

The following equipment was used during the noise survey; the sound level meter was calibrated before and after the survey measurements with no change noted:

Equipment	Serial Number
NTi Audio sound level meter type XL2 Class 1 complete with weatherproof and lockable outdoor environmental kit	A2A-06294-E0
NTi Audio calibrator type CAL200 94/114dB. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	11441
Microphone extension cable and telescopic boom arrangements	-

Table 2: Equipment used

4.3 Noise Measurement Results

Summary of measured background sound levels are shown in Table 3 on the following page.

Time Period	Lowest Recorded LA90	Camden Council Noise Limit
22:30 – 23:10	51dB	≤ 41dBA

Table 3: Summary background sound level survey results

The lowest measured background sound level once the equipment had switched off was LA90 51dB.

The limit to achieve London Borough of Camden Council's requirement outside nearby noise-sensitive windows is 41dBA; this is 10dBA below the lowest measured background noise level. At this level the equipment noise will not be disturbing or detrimental to the amenity of nearby occupants.

5. NOISE FROM MECHANICAL SERVICES EQUIPMENT

Various items of mechanical equipment have been installed to the rear flat roof area, including supply and extract ventilation fans, two air conditioning condensers and two refrigeration condensers.

As the equipment has been installed and is operating it was deemed appropriate to measure equipment sound levels to outside nearest noise-sensitive windows in-situ. Measurement of specific noise from the equipment was undertaken during the visit to site to measure background sound levels. Details of the instrumentation and measurement position are as set out in Section 4 above.

Summary of the measured sound levels with the equipment operating are shown in Table 4 below.

Time Period	LAeq	Residual LAeq (with equipment off)
21:45 – 22:30	59dB	52dB

Table 4: Summary specific sound level survey results with equipment operating

Correcting the measured energy-averaged value (LAeq) with the equipment operating for the residual LAeq once the equipment had switched off, equates to a specific sound level of the equipment to outside residential windows of LAeq 58dB. This level exceeds London Borough of Camden Council's criteria by 17dBA.

Existing equipment sound levels are dominated by breakout from the casing and flexible connections of the two main supply and extract fans, along with some contribution from the refrigeration condensers. It is recommended noise control treatments are installed to these items such that the cumulative level does not exceed LAeq 41dB outside nearby noise-sensitive properties.

Acoustical Control Engineers Limited have provided a detailed design (their reference 14357-Q1 dated 30th June 2015) which should be suitable to control noise from the dominant equipment items to achieve the recommended criteria. Full details of any alternative proposed noise control scheme, including detailed design drawings and manufacturer's certified performance tests should be submitted to ACA Acoustics Limited and approved prior to manufacture.

It is expected that once the dominant equipment items are attenuated then the noise levels will achieve the required criteria. However there remains a slim possibility that noise from lower-noise items, for example the air conditioning condensers, may slightly exceed the required criteria; suitable noise control treatments for these items can be identified if necessary at that stage.


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