SKELLY&COUCH

P1093 – 5 Lincoln's Inn Fields
Noise Impact Assessment

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Skelly & Couch LLP
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1) Introduction

5 Lincoln's Inn Fields is a Grade II listed townhouse. The building is to be refurbished in order to provide residential accommodation.

It is proposed that some areas of the building including the Gym, WC's and Kitchen are mechanically ventilated. There will also be comfort cooling to some areas.

The closest noise-sensitive locations to the building are to the South-East and to healthcare accommodation at the rear of the building.

2) Environmental Noise Survey

2.1 Measurement Procedure

In order to establish the existing noise conditions, a 24-hour environmental noise survey of the site (postcode – WC2 A3) was undertaken between 12:00am on Thursday 29th and 12:00am on Friday 30th of April 2010. The survey was undertaken at the south facade of the building facing Lincoln's Inn Fields and the measurement location is indicated in Figure 1. This survey location was selected as on account of being the nearest location to the noise sensitive windows that could be accessed safely and securely.

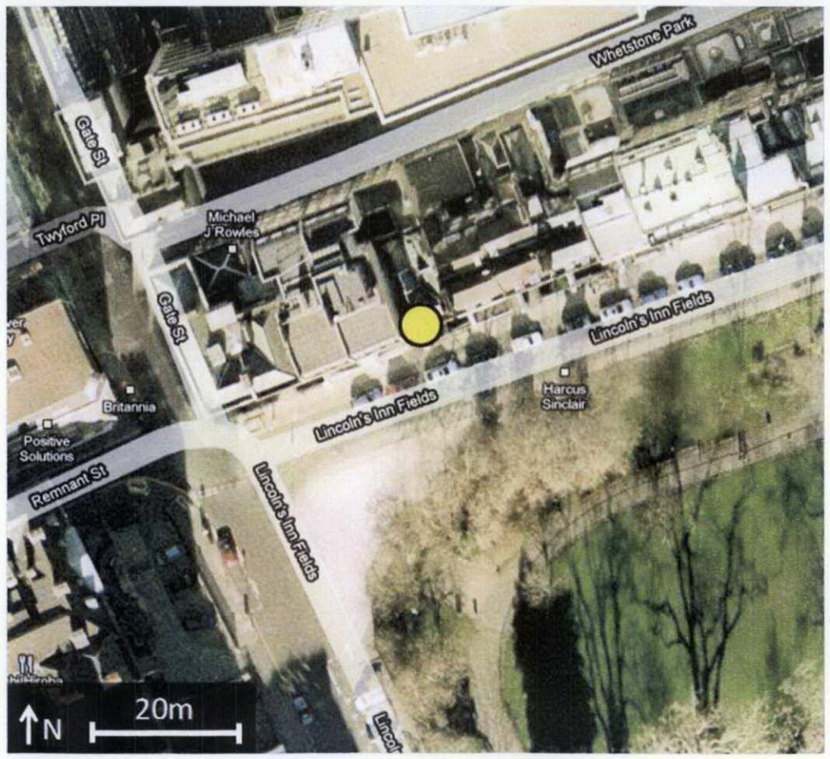

Figure 1: Measurement Locations

2.2 Site Description

The site is located on Lincoln's Inn Fields in the London Borough of Camden. The main sources of noise affecting the site are traffic on Lincoln's Inn Fields and, to a lesser degree, Whetstone Park. The A40 is approximately 100m to the North of the site and the A4200 approximately 60m to the West. Traffic noise from these roads will also add to the noise level at the site. The majority of the properties around the Lincoln's Inn Fields square and to the North of the property are commercial buildings.

2.3 Measurement Results

Figure 2 shows a graph of data from the 24-hour noise survey. Leq is the average noise level, L1,L10,L90 and L99 are the noise levels that are exceeded for 1%,10%,90% and 99% of the time respectively.

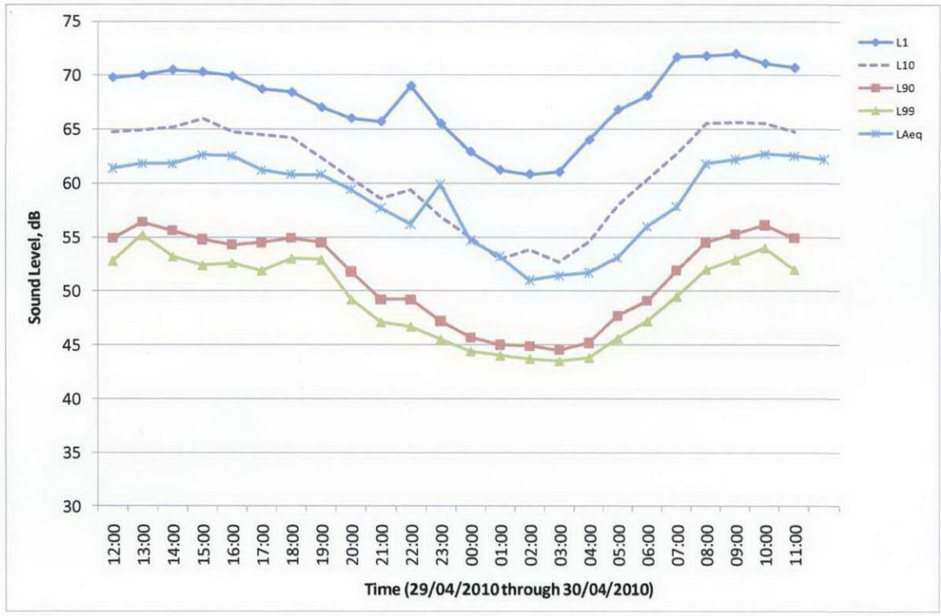

Figure 2: Results of 24-hour survey

The lowest measured background noise level is LA90,1hr=44.5dB between 3am and 4am on 30th April.

3) Target Noise Levels

3.1 Planning Requirement

The relevant planning requirement relates to noise break-out from new plant and machinery to existing noise sensitive locations.

Section 1.52 of the Camden Council Unitary Development Plan states the following requirement:

> *Noise that has a distinguishable discrete continuous note (as is probably the case here) at 1 metre external to a sensitive facade should be 10dB(A) below LA90 (background noise level).*

The lowest measured background level is LA90,1hr=44.5dB.

3.1 Closest Noise Sensitive Locations

The closest noise sensitive locations (other than the building itself) are windows to the hotel on the opposite side of Whetstone Park (see Figure 4). The neighbouring property (see Figure 3) is an office building and so these windows can be considered noise sensitive locations during normal working hours. The neighbouring property has windows that are closer to the plant but do not have a line of site to it and are therefore less affected.

Figures 3 and 4 show the proposed plant location and the distance to the two noise sensitive locations.

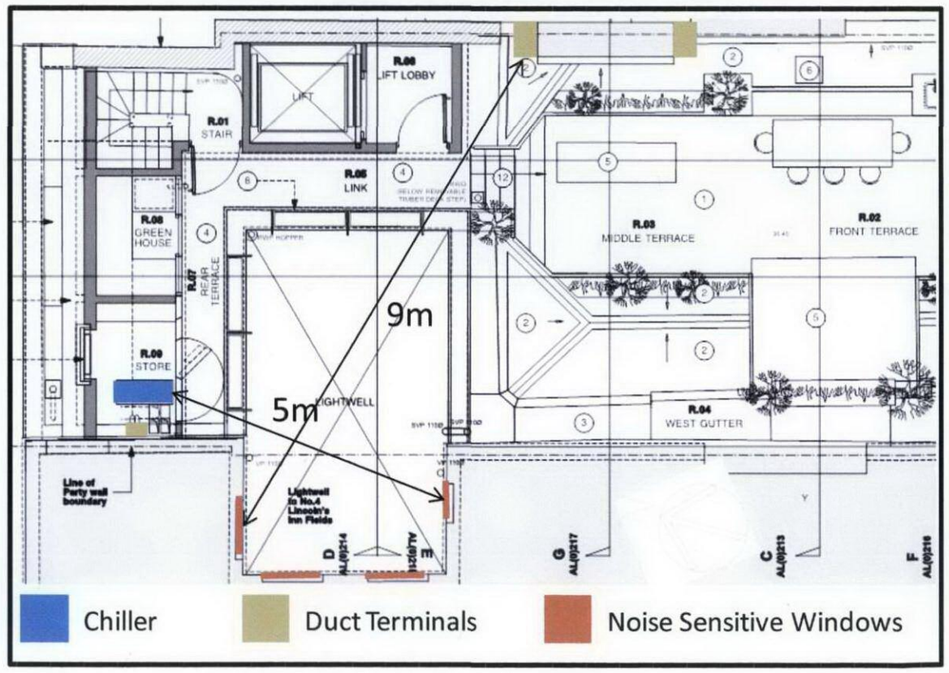

Figure 3: Rooftop Plant Location and Nearest Neighbouring Windows

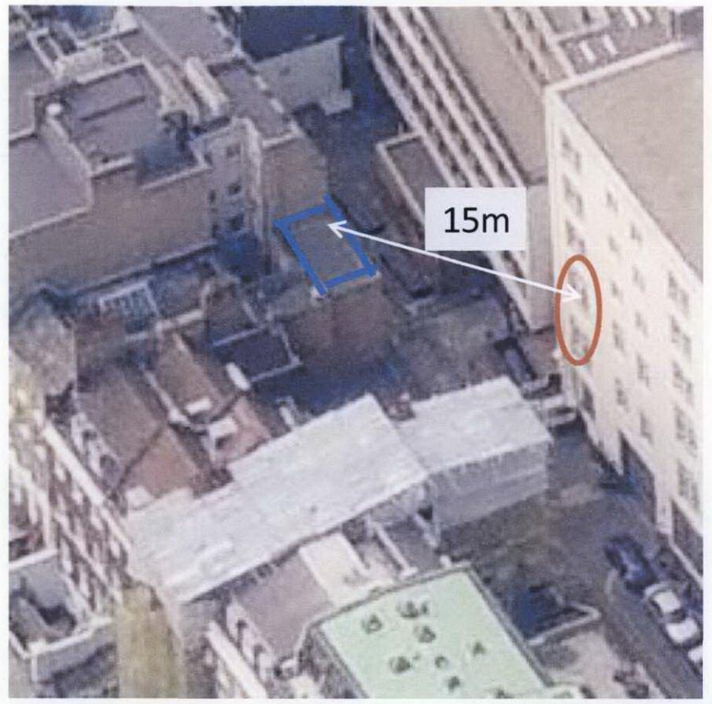

Figure 4: Rooftop and Hotel Window Location

4) Noise Assessment

4.1 Plant Description

The only significant item of plant to be located on the roof is a single chiller unit. The unit will be housed inside a plant room with an air intake louvre on the East facade. The exhaust air will be ducted vertically to the roof of the plant room.

The chiller unit is currently proposed to be a Mitsubishi PUMY-EP125-YHM-A, which has the following noise levels at 1m:

	63Hz	125Hz	250Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	A-weight
Lp @ 1m	56.2 dB	50.7 dB	48.9 dB	48.8 dB	44.5 dB	40.1 dB	34.9 dB	36.1 dB	**49.8 dB**

All other ventilation plant is located internally with duct outlets at roof level. Suitable duct attenuators have been specified where necessary to limit the sound pressure level at the nearest facade to below 34.5dB(A).

4.2 Assessment at Hotel Window

The hotel windows are 15m from the chiller location. The calculated plant noise level at this window will be no more than 29.5dB(A), which is 5dB(A) below the target noise level.

No additional noise control measures are required to meet the target level at the hotel window.

Noise from ventilation duct terminals is not significant.

4.3 Assessment at Neighbouring Window

The neighbouring window is 5m from the chiller location. The plant noise level at this window is calculated to be:

	63Hz	125Hz	250Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	A-weight
Lp At Window	44.2 dB	38.7 dB	36.9 dB	36.8 dB	32.5 dB	28.1 dB	22.9 dB	24.1 dB	**37.8 dB**

This is at least 10dB(A) below the background noise level between the hours of 6am and 11pm. It is expected that these offices will not be occupied outside of these hours and so no further attenuation is required.

5) Glossary of Acoustic Terminology

Frequency
The rate of vibration of the air molecules which transmit the sound. Measured in cycles per second or Hertz, Hz. The human ear is sensitive to sound in the range 20Hz – 20kHz.

The frequency spectrum is commonly divided into a series of octave bands. The 8 standard octave bands are centred on the following frequencies: 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz.

dB, Decibel
Decibels are used to measure the magnitude of sound on a logarithmic scale. In subjective terms, a 3dB increase in sound level is just noticeable and a 10dB increase in sound level is perceived as a doubling of loudness.

Sound Pressure Level, Lp
A measure of the instantaneous sound pressure at a point in space expressed on a logarithmic (i.e. decibel) scale that is arranged so that the zero-point (0dB) corresponds to the threshold of human hearing.

A-weighting
The A-weighting is a standard method of weighting sound levels at different frequencies to simulate the sensitivity of the human ear to sounds of different frequencies. Using this weighting allows the full frequency spectrum of data to be represented by a single figure.

A-weighted parameters are given a subscript "A" – for example L_{Aeq} or L_{AF90}. Alternatively, A-weighed values are sometimes expressed in dB(A) units.

Time-weighting
Sound level meters generally use a time-weighting system whereby the measured value is actually an average over a short period of time. This is used so that the measurement display does not jump about so rapidly that it cannot be read. The most commonly used time-weighting is the "fast" time weighting where readings are averaged over 0.125 seconds.

Values using a "fast" time weighting are given a subscript "F" – for example L_{AF90}.

Equivalent Continuous Noise Level, $L_{eq,T}$
This is an energy average of a varying sound level over a particular period of time, T. Using this type of averaging allows the full set of data of sound level versus time to be summarised as a single average value.

Equivalent continuous noise levels are given the subscript "eq" – for example L_{Aeq}. The equivalent continuous level is not dependent on which time-weighting was used because it is itself an average value.

N% EXCEEDENCE SOUND PRESSURE LEVEL, $L_{AFN,T}$
This is the A-weighted sound pressure level which is exceeded for N% of the time during a measurement period T. The subscript F denotes the time-weighting.

$L_{AF10,T}$ (the level exceeded for 10% of the time) is commonly used as a measure of traffic noise.
$L_{AF90,T}$ (the level exceeded for 90% of the time) is commonly used as a measure of background noise.