

Design Note

Project UCL Institute of Education Phase 1
Subject External Noise from New Plant
Project no 035833
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Revision	Description	Issued by	Date	Approved (signature)
00	Building Services noise limits	NS	25/04/2017	BFB

Introduction

Buro Happold Acoustics have been appointed by UCL Estates to provide acoustics consultancy on the proposed Phase 1 refurbishment works of the Institute of Education building, 20 Bedford Way, London.

The scheme is understood to consist of lecture / seminar rooms, meeting rooms, ISD, a media lab, breakout / social learning areas and other associated spaces, and is located primarily across Levels 2 and 3 of the existing building. Some of these spaces will be positioned adjacent to a new plant room, where particular attention will need to be paid with regards to noise control.

This report relates to the noise impact on the neighbouring receptors and sets appropriate noise limits to meet the local planning requirements.

BREEAM Pol 05 credit

In addition to meeting the local planning requirements regarding environmental noise impact, the development aims to achieve the BREEAM Pol 05 credit relating to noise pollution. The purpose of this credit is to reduce the likelihood of noise arising from fixed installations on the new development affecting nearby noise-sensitive buildings.

Noise survey details

Introduction

Environmental noise surveys were carried out on the 4th and 10th October as well as 8th December 2016 to assess the existing noise levels around the site and at the nearest noise sensitive receptors.

Attended noise measurements were undertaken around the site during the daytime. The measurements were undertaken around the perimeter of the IoE building, and at the locations representative of the nearest noise sensitive receptors, named as 'NSR' in the figure below.

The aerial view of the site below (courtesy of google maps) shows the measurement locations and the location of the nearest noise sensitive receptors.

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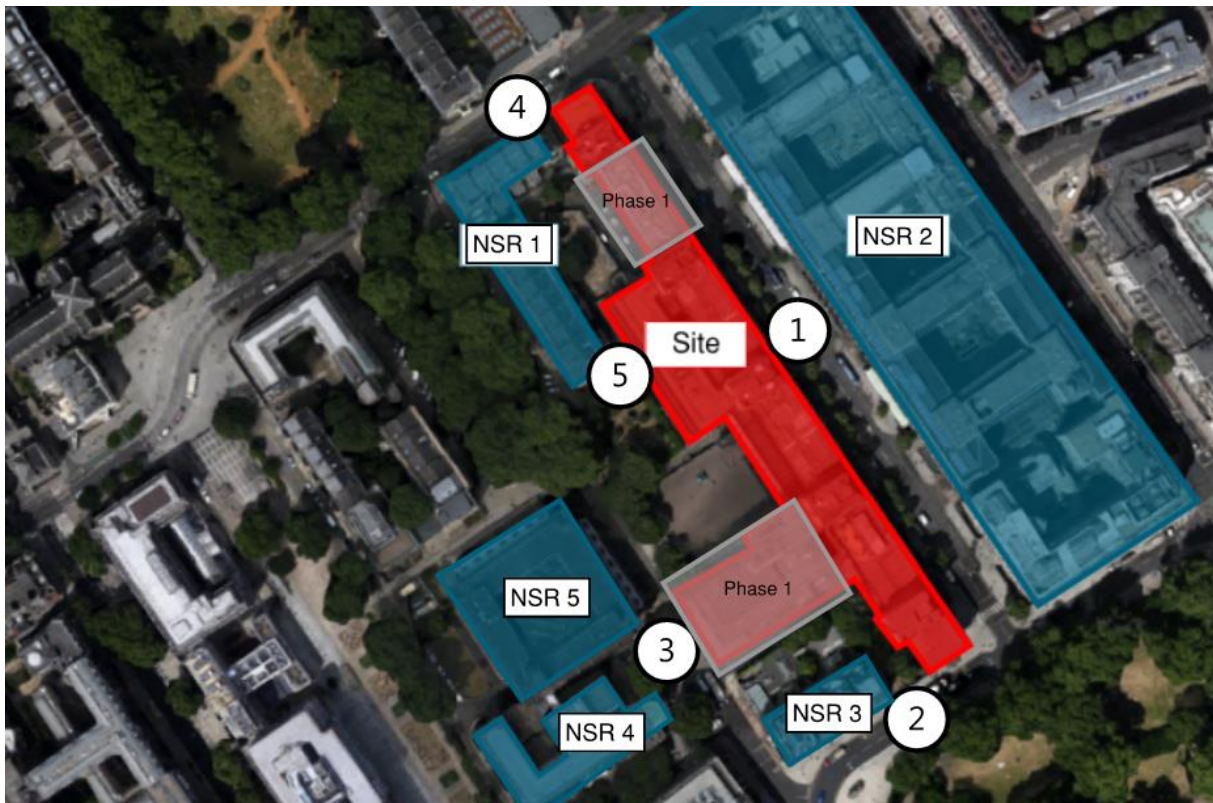


Figure 1 Noise monitoring locations relative to noise sensitive receptors (NSRs)

Noise survey results

A summary of the results of the noise survey exercises are shown in the table below. The values are as follows:

- $L_{Aeq,15mins}$ – the average A-weighted sound pressure level within a 15-minute period
Typically thought of as the average ambient noise level at a particular time, and likely to be due to a combination of various noise sources, near and far.
- $L_{AF,max}$ – the maximum instantaneous A-weighted sound pressure level measured during a 15-minute period.
Typically corresponding to a short-duration event with a very high SPL, for example motorbike passing by, car horn etc.
- $L_{A90,15mins}$ – the A-weighted sound pressure level exceeded for 90% of the measurement period
i.e. a level which would be perceived as a constant, background noise level. Typically, largely unaffected by local traffic pass-by or by transient events. More usually attributable to constantly-running building services plant or distant road traffic. What you would hear when there is no local traffic present (or other readily-identifiable noise source).
- $L_{A10,15mins}$ – the A-weighted sound pressure level exceeded for 10% of the measurement period
i.e. a level which would be perceived as the higher portion of the levels at any particular time. Typically determined by local traffic pass-by or transient events. What you would hear when a number of road traffic vehicles pull away from traffic lights, for example.

The 'typical' values reported in the following table are averages of each descriptor during the relevant measurement period. For the L_{Aeq} , the averaging is logarithmic. For the statistical values, the averaging was chosen to show the typical value for the range identified. Although not a mathematical average, the typical value has been represented by the mean of the measured levels. The time period, T, was typically set to 15 minutes. All values are in dB (A).

Noise measurements (4 th and 10 th Oct 2016) (dB)						
Period	Start time	End time	L _{Aeq,T}	L _{AF,max}	L _{A90,T}	Comments
Location 1						
Day	04/10/2016 15:24	04/10/2016 15:40	66	78	57	Medium traffic on the front road, students walking / talking
	04/10/2016 16:40	04/10/2016 16:55	67	90	59	
	10/10/2016 17:40	10/10/2016 17:55	66	89	60	Peak time, large number of pedestrians and cars, however traffic jam meant cars were at a standstill most of the time.
Typical			66	88	59	

Noise measurements (4 th and 10 th Oct 2016) (dB)						
Period	Start time	End time	L _{Aeq,T}	L _{AF,max}	L _{A90,T}	Comments
Location 2						
Day	04/10/2016 15:57	04/10/2016 16:12	67	84	59	Traffic from Russel Square, buses and cars. Students talking / walking
	10/10/2016 17:58	10/10/2016 18:13	65	83	59	High traffic, however at standstill most of the time.
Typical			66	83	59	
Location 3						
Day	04/10/2016 16:13	04/10/2016 16:28	58	77	53	No circulation, calm, few students walking / talking
	10/10/2016 18:34	10/10/2016 18:49	50	66	47	Very calm, pedestrians and occasional cyclists.
Typical			56	74	50	
Location 4						
Day	04/10/2016 16:29	04/10/2016 16:44	66	85	60	Medium traffic, students talking / walking
	10/10/2016 18:16	10/10/2016 18:31	66	84	61	High traffic, however mostly stopped at traffic lights.
Typical			66	84	61	

Noise measurements (8 th December 2016) (dB)						
Period	Start time	End time	L _{Aeq,T}	L _{AF,max}	L _{A90,T}	Comments
Location 5						
Day	16:38	16:53	48	59	46	No individual distinguishable noise sources were noted during the survey and the noise climate was subjectively noted to be quiet. Any noise from the adjacent construction site was excluded.
	16:53	17:08	48	65	46	
	17:08	17:23	48	60	46	
	17:23	17:38	48	58	46	
Typical			48	61	46	

Table 1 Results of noise surveys

Discussion

As can be seen from the results above, noise levels surrounding the 20 Bedford Way site are variable. Most of the areas exposed to road traffic (locations 1, 2 and 4) experience a noise impact of approximately 66 dB(A) $L_{Aeq,T}$. This noise level is representative of that at the elevations of Noise Sensitive Receptors (NSRs) which are exposed to road traffic on Bedford Way (NE), Russell Square (SE) and Gordon Square (NW), namely NSR1, NSR2 and NSR3 respectively.

However, there is considerable disparity between the noise levels recorded at the 'rear' of the IOE building (shielded from Bedford Way by the building itself) and all other façades. These quieter areas are experiencing a noise impact of approximately 10-18 dB less, at 48-56 dB(A) $L_{Aeq,T}$ at locations 5 and 3 respectively.

Locations 3 and 5 are most representative of the NSR 4 and NSR 5 as well as the rear of NSR 1 and NSR 3.

Plant noise break-out

Introduction

Any external plant needs to be controlled in order to ensure that the future associated noise from fixed noise sources associated with the development do not increase the existing noise levels at nearby noise-sensitive receptors to an unreasonable degree.

Design criteria

In order to comply with the planning requirements of Camden Council, noise emissions from new plant should be a minimum of 5dB below the lowest measured background noise level, L_{90} , as measured in the locality of the nearest or most exposed noise-sensitive development.

For the purpose of this assessment, measurement location 3 and 5 was considered to be representative of the closest NSR to the currently proposed noise sources associated with new building services.

External Plant Noise Limits

The lowest measured background noise levels were recorded on site at locations 3 and 5, as presented in the section above:

- $L_{A90,T}$ 50 dB (A) at position 3; and
- $L_{A90,T}$ 46 dB (A) at position 5.

The closest noise sensitive receptors are as shown in Figure 1. In order to meet the planning requirements, any noise associated with the plant of the new development shall be controlled such that its level at the nearest noise sensitive receptors is not more than 5 dB below the measured L_{A90} levels, as follows:

- $L_{Aeq,T}$ 45 dB(A) at NSR 3, NSR 4 and south-eastern edge of NSR 5; and
- $L_{Aeq,T}$ 41 dB(A) at NSR 1 and the northern façades of NSR 5.

The cumulative noise output of all plant items operating simultaneously needs to be assessed in accordance with BS 7445 and controlled such that when measured at these NSRs the impact associated with the development does not exceed the targeted values given above during the day.

It is understood that at this stage of the design no night time plant operation has been confirmed. Therefore, the criteria above are applicable to daytime operation only. Should any plant operating at night be considered at later stages, the assessment is to be completed for that period in a similar manner. For clarity, this means establishing the night-time background noise level $L_{90,T}$ and setting the cumulative noise limit for all new plant at 5dB below it (as measured at nearest NSR in terms of $L_{Aeq,T}$).

The location of the plant fresh air connection (the currently proposed only source of noise) is as indicated in the figures below. It is located at Level 2 (underground) and as such is somewhat contained.

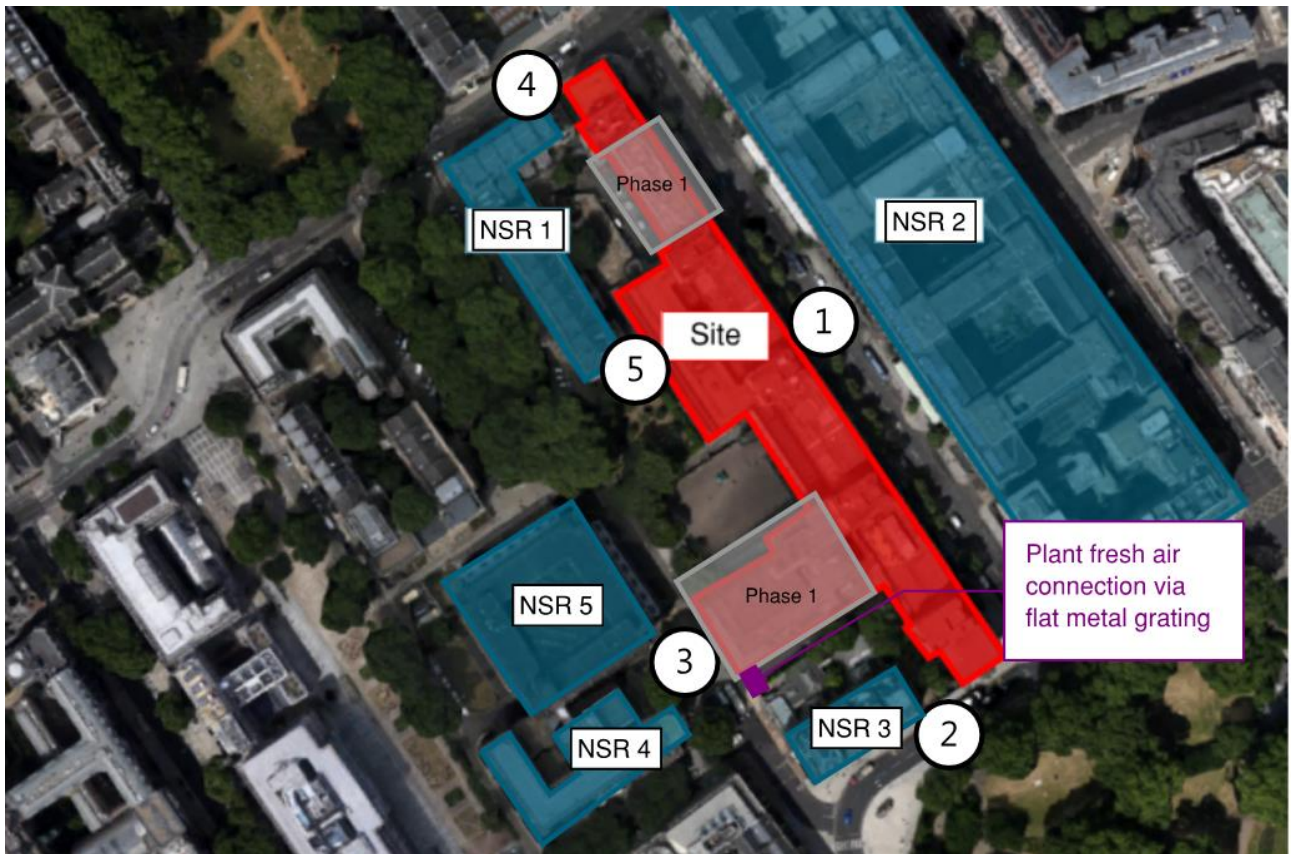


Figure 2 Plant fresh air connection. View from Thornhaugh Street

BREEAM compliance – Pol 05 credit

BREEAM Pol 05 requirements are presented below.

Requirement	
1	<p>Where there are, or will be, no noise-sensitive areas or buildings within 800m radius of the assessed development.</p> <p>Noise-sensitive areas are defined as landscapes or buildings where the occupiers are likely to be sensitive to noise created by the new plant installed in the assessed building, including but not limited to:</p> <ol style="list-style-type: none"> 1. Residential areas 2. Schools, colleges and other teaching establishments 3. Libraries 4. Places of worship 5. Wildlife areas, historic landscapes, parks and gardens.
2	<p>OR alternatively, where the building does have noise-sensitive areas or buildings within 800m radius of the development, one credit can be awarded as follows:</p> <ol style="list-style-type: none"> 1. Where a noise impact assessment in compliance with BS 7445 has been carried out and the following noise levels measured/determined: <ol style="list-style-type: none"> 1. Existing background noise levels at the nearest or most exposed noise-sensitive development to the proposed development or at a location where background conditions can be argued to be similar. 2. The rating noise level resulting from the new noise source.
3	<p>The noise impact assessment must be carried out by a suitably qualified acoustic consultant holding a recognised acoustic qualification and membership of an appropriate professional body</p> <p>Suitably qualified acoustician is defined as an individual who holds a recognised acoustic qualification and membership of an appropriate professional body.</p> <p>The primary professional body for acousticians in the UK is the Institute of Acoustics.</p>
4	<p>The noise level from the proposed site/building, as measured in the locality of the nearest or most exposed noise-sensitive development, is a difference no greater than +5dB during the day (07:00 to 23:00) and +3dB at night (23:00 to 07:00) compared to the background noise level.</p>
5	<p>Where the noise source(s) from the proposed site/building is greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with criterion 4.</p>

Since the requirements of the local authority with regards to limiting plant noise are more stringent, BREEAM criteria can automatically be met when the local planning requirements are satisfied.