Energy, Environment & Design

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Our Ref: EED13325-102-C-1.1.5
Your Ref:

Date: 2 October 2014

Head of Development Management
Planning Department
London Borough of Camden
5 Pancras Square
London
N1C 4AG

Dear Sir/Madam

Re: One Bedford Avenue, Accessible Terraces – S73 Application, Noise Assessment

A planning application was submitted in June 2013 for the redevelopment of One Bedford Avenue (referred to as 'the Site') for: '*Erection of an eight storey building plus basement level for a mixed use development comprising retail use (Class A1) at part basement and ground floor levels and office use (Class B1) at part ground and first to seventh floor levels with associated plant in basement and roof, following complete demolition of existing retail/office buildings at 1 Bedford Avenue and 251-258 Tottenham Court Road', (hereafter known as the 'Development)*'.

In support of the Section 73 Application to create accessible terraces on levels 4 to 7 at One Bedford Avenue, Waterman Energy, Environment and Design Ltd have been commissioned to undertake an assessment of the potential noise effects associated with their use by future occupants of the development.

This letter report presents the findings of the assessment and is an addendum to the Noise Report submitted as a part of the initial planning application entitled Noise Assessment and dated May 2013 (Document Ref.: EED13325-100-R-4.2.3-LE).

Background Information

The proposed accessible terraces are only to be used as breakout amenity space to the private office accommodation, accessible only from the offices on each level and by those tenants who's demise connects directly to the terrace on each level. The terraces are not intended to provide entertainment or event space for the building due to the limited area of space available and would not include facilities for amplified music.

The exact hours of use are currently unknown, however, it is reasonably assumed that the external terraces will, at worst, only be used during daytime hours of 07:00 to 21:00 hours, accommodating for flexible working hours of future tenants of the development.

A review of the land uses immediately surrounding the Site has identified residential apartments immediately across Morwell Street and at Bedford Square, which could be impacted by use of the terraces. The location of the closest residential premises to the accessible terraces are presented in in Annex A.

As part of the initial planning application for the proposed redevelopment of One Bedford Avenue (Planning Consent ref. 2013/3880/P December 2013), Waterman undertook a comprehensive baseline noise survey on the Site and at locations representative of nearby existing noise sensitive receptors to establish and quantify prevailing noise levels

Measured noise levels were revealed to be high at, and around the Site, but considered commensurate of the Site's central London urban location. The noise climate of the area was dominated by vehicular movements on the surrounding highway network. Contributory noise from

human activities in the area, building services plant and passing aircraft was also evident and influenced the local noise climate to an extent.

A summary of the long term measured ambient (L_{Aeq}) and background (L_{A90}) noise levels at Morwell Street, considered representative of the noise climate experienced at the closest residential premises at Morwell Street and Bedford Square are tabulated below in Table 1.

Table 1: Baseline Noise Measurements

Monitoring Location	Period	Duration	$L_{Aeq,T}$ dB		$L_{A90,T}$ dB	
			Range	Ave[1]	Range	Ave[2]
Morwell Street	Day	12hr	54 - 64	58	53 - 56	56
	Evening	4hr	53 - 68	57	52 - 54	53
	Night	8hr	52 - 66	57	51 - 58	53

Notes: [1] Logarithmic average over the day/evening/night survey periods; [2] Arithmetic average over the day/evening/night survey periods; All figures rounded to nearest whole decibel.

Noise Guidelines

There are various advice documents available relating to the assessment of general and specific sources of environmental noise. Most of the advice is couched in terms of absolute noise levels, although some is based upon a comparison between the "source" and "ambient" levels.

To ensure a well-balanced and considered appraisal is undertaken, reference to the following credited guidance on noise have been used to quantify the likely noise effects associated with use of the terraces on the amenity of adjacent residential receptors.

World Health Organisation, Guidance for Community Noise, 2000

The WHO document[1] provides guidance as to desirable levels of noise in specific environments and the critical effects such noise might exert. The guidelines seek to protect the most vulnerable and sensitive of the population, with the WHO guideline values for community noise set at the level of the lowest adverse health effect below which the occurrence rates of particular 'effects' (such as annoyance, speech interference and sleep disturbance) can be assumed to be negligible. The WHO guidelines can therefore be considered to represent a potentially stringent set of criteria on which to base assessment of environmental noise.

This document states that to enable casual conversation indoors during the daytime, defined as 07:00 to 23:00 hours when the accessible terraces are reasonably assumed to be occupied, the sound level of interfering noise should not exceed 35 $dBL_{Aeq,T}$. No L_{AFmax} criterion is applicable during the daytime period.

With regards to outdoor living areas the WHO document states that *'To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 $dBL_{Aeq,T}$ on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor level should not exceed 50 $dBL_{Aeq,T}$. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.'*

BS 8233 Guidance on Sound Insulation and Noise Reduction for Buildings, 2014

BS 8233: 2014[2] builds on the guidance in WHO documents and recommends desirable internal ambient noise levels within different room spaces, including residential dwellings. For living rooms the standard is defined as a limit of 35 $dBL_{Aeq,16hr}$. For bedrooms the limits are 35 $dBL_{Aeq,16hr}$ and 30 $dBL_{Aeq,8hr}$ during the daytime (07:00-23:00) and night-time (23:00-07:00) period, respectively. As

[1] World Health Organisation (WHO), *'Guidelines for Community Noise'*, WHO, Geneva, 2000.
[2] British Standards Institute (BSI) (2014); 'BS 8233 '*Guidance on sound insulation and noise reduction for buildings*', BSI.

partially open windows reduce noise levels by typically 15 dB, the living room internal standard correspond to external level of 50 $dBL_{Aeq,16hr}$ and the bedroom internal standards correspond to external levels of 50 $dBL_{Aeq,16hr}$ and 45 $dBL_{Aeq,T}$, respectively.

Following the above guidance, Table 2 below summarises the advocated daytime internal noise levels.

Table 2: Summary of Recommended Guideline Daytime Indoor Noise Levels

Organisation	Location	Daytime $L_{Aeq,16hr}$ (07:00-23:00)
WHO, 2000	Living room	35
BS 8233: 2014	Living rooms	35
	Dining room/area	40
	Bedroom	35

Noise Level Change

As the surrounding receptors are currently exposed to a certain level of environmental noise and to reflect more conventional environmental noise impact assessment methodologies, it is important to consider the changes in the existing noise climate as a result of proposals (over and above the noise climate currently experienced) and the corresponding significance of effect on people.

The draft Institute of Acoustics (IOA) and the Institute of Environmental Management and Assessment (IEMA) *'Guidelines for Environmental Noise Impact Assessment'*[3] have been used to establish a category of noise impact at the nearest sensitive properties to the proposal. Table 3 below contains the parties' findings, which are considered to represent the best available criteria for assessing overall changes in noise level.

Table 3: Impact Scale for Comparison of Changes in Noise Levels

Change in Noise Level, dB(A)	Descriptor	Significance
0.0 – 0.9	No change	No impact
1.0 – 2.9	Barely perceptible	Minor impact
3.0 – 4.9	Noticeable	Moderate impact
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial impact
≥10	More than a doubling or halving of loudness	Major impact

The criteria above reflect key benchmarks that relate to human perception of sound. For noise which is very similar in all respects except magnitude, a change or difference of 1 dB is considered to be just perceptible under controlled laboratory conditions, whilst the smallest change or difference under environmental conditions that is generally noticed by an individual over a period of time is about 3 dB. A change of 10 dB (A) corresponds roughly to a halving or doubling in the perceived loudness of a sound.

The effect predicted noise levels generated by proposals will have on the existing ambient noise climate, together with comparison against 'absolute' noise level criteria, shown to be in general agreement with each other, are considered to provide a good indication as to the significance of potential noise impacts and have accordingly been adopted in assessment. Indeed, it is considered that compliance with advocated design targets and no significant increase in the existing ambient noise level will ensure that development noise impacts are controlled to an acceptable level so as to protect people from harm and undue noise disturbance.

[3] IEMA/IOA (2002), '*Draft Guidelines for Noise Impact Assessment*'.

Noise Impact Assessment

In many situations, as in this instance, the total noise exposure over a period of time is made up from the total contribution of different individual events that may occur at any given time.

The maximum steady noise level for reliable speech conversation at a distance of 1m is 57dB(A) for normal voice and 62dB(A) for raised voice.

Based on the Accessible Terrace report prepared by Bennett Associates, levels 4-6 are predicted to be limited to a maximum occupant capacity of 27 persons and level 7 to a maximum occupant capacity of 9 persons. This is based on an occupant density of 1.5 m^2/person that reasonably allows for circulation.

To identify the "greatest" environmental impact that might reasonably be expected assessment has been based on a simple (and worst case) assumption that each of the terraces will be in concurrent use at 50% capacity, equating to 45 persons out on the terraces at any one time. Of the 45 people on the terraces half could potentially be talking at any one time, with it assumed that 12 people (50%) could be speaking with a raised voice and the remaining 12 people (50%) with a normal voice.

In completing the calculations, corrections have been made for the attenuation of sound over distance and site specific screening effects, as appropriate. Sound attenuation due to atmospheric absorption effects has been deemed to be negligible such that there is no excess attenuation. The calculations are set out in full in Annex B to this technical note.

The predicted noise level associated with the use of the accessible terraces at the nearest noise sensitive properties are presented as Tables 4. Comparison is made with credited absolute noise criteria within BS 8233 and WHO guidance documents for outdoor and indoor living areas.

Table 4: Summary of Assessed Specific Noise Level at the Closest Receptors

Assessment Parameter	Noise Sensitive Receptor	
	Morwell Street	Bedford Square
Lp normal/raised voice at 1m[(1)]	57	62
Number Correction (12no raised voices / 12no normal voices)	+11	+11
Total noise level at source	74	
Distance attenuation (14m / 30m)[(2)]	-21	-30
Screening attenuation[(3)]	-5	0
Correction for speech directivity	-3	-3
Specific receiver noise level	45	41
WHO/BS8233 outdoor target values	50-55	
Predicted Receiver Internal Noise Level (partially open window)	32	28
WHO/BS8233 daytime internal target values	35	
Target criteria met?	Yes	Yes

Notes: [(1)] Source of information BS 8233:1999 'Sound insulation and noise reduction – Code of practice'; [(2)] Shortest distance attenuation (20*log r1/r2) used in assessment; [(3)] Screening attenuation determined using Maekawa path difference method; [(4)] the sound attenuation provided by a partially open window is typically between 10 to 15 dB, depending on the extent of opening. An average 13 dB reduction has been assumed in assessment.

The assessment results presented in Annex A and summarised in Table 4 indicate that for a worst case scenario noise at the nearest residential properties specifically attributable to use of the terraces satisfy both external and internal noise criteria advocated within the WHO and BS 8233 guidance documents, both with windows closed and open. As such no adverse impacts are anticipated.

In assessing the effect noise from the terrace will have on existing ambient (L_{eq}) noise levels at the nearest residential properties, the predicted cumulative noise level from the terraces was logarithmically added to the ambient (L_{eq}) noise level and then compared with the significance scale

presented in Table 3. This was undertaken for both a worst case (the lowest ambient value) and a more representative case (the average value). The results are presented below in Table 5.

Table 5: Predicted Change in the Ambient Noise Level at the Nearest Receptors, $dBL_{Aeq,T}$

Assessment Parameter	Morwell Street		Bedford Square	
	Average case	Worst case	Average case	Worst case
Predicted noise level, $dBL_{Aeq,T}$	45	45	41	41
Ambient noise level, $dBL_{Aeq,5min}$	57	53	57	53
Change	+0.3	+0.6	+0.1	+0.3
Significance	No impact	No impact	No impact	No impact

Using the approach we conclude the impact will, at worst, during the quietest times of the daytime be imperceptible to an observer.

Conclusion

In summary, it is concluded that the proposed use of the terrace areas at floor levels 4 to 7 as breakout amenity space to the private office accommodation is acceptable in terms of noise and can proceed without adversely prejudicing the local noise climate and external and internal amenity of local residents and that noise need not be considered a determining factor in determining the S73 application.

We trust that the content of this letter report be clear and of assistance. Should you wish to discuss any point in more detail then please do not hesitate to contact us.

Yours faithfully

Laurence Evans
Principal Acoustic Consultant
For and On Behalf of Waterman Energy, Environment & Design

Enc: Annex A – Figure 1

Annex B – Calculations

ANNEX A – FIGURE 1

ANNEX B - CALCULATIONS

Site: Accessible Terrace, One Bedford Avenue, London
Client: Exemplar Properties (Bedford) Ltd
Job No.: EED13325-102
Date: 29/09/2014
Originator: LE Checked: MM Authorised: MM

													13	27
Receptor	Activity	Noise level, dBA	Measurement distance (m)	No. of people speaking	No. correction	Corrected source noise level, dBA	Total source noise level, dBA	Receiver distance (m)	Distance correction	Screening correction	Speech directivity	External receiver noise level, dBA	Atten. partially open window	Atten. closed window
Morwell Street	Normal voice	57	1.0	12	11	68	74	11	-21	-5	-3	45	32	18
	Raised voice	62	1.0	12	11	73								
Bedford Square	Normal voice	57	1.0	12	11	68	74	31	-30	0	-3	41	28	14
	Raised voice	62	1.0	12	11	73								

BARRIER ATTENUATION CALCULATION

Frequency,Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
Barrier Attenuation	4.8	4.8	4.8	4.9	4.9	4.9	5.0	5.0	5.1	5.1	5.2	5.3	5.5	5.8	5.8	6.0	6.3	6.6	7.0	7.4	7.9	8.4	9.1	9.7

Frequency,Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
1/3 octave Plant noise	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Attenuated Plant noise	-4.8	-4.8	-4.8	-4.9	-4.9	-4.9	-5.0	-5.0	-5.1	-5.1	-5.2	-5.3	-5.5	-5.6	-5.8	-6.0	-6.3	-6.6	-7.0	-7.4	-7.9	-8.4	-9.1	-9.7

Frequency,Hz	63	125	250	500	1000	2000	4000	8000	dB(A)
1/1 octave Plant noise	61.1359	65.1052	59.0569	49.0502	41.7034	36.5013	31.182	23.3262	*54.1*
Attenuated Plant noise	56.3	60.2	54.1	43.8	36.1	30.2	23.7	14.3	*49.0*
									5.1

Source to screen (m)	1	Direct path	11
Receiver to screen (m)	8	Sreened path	11
Source height (m)	5.6	Path difference	0.01
Receiver height (m)	0		
Screen height (m)	5.1		

LINE OF SIGHT PROTECTION :
PROVIDED

CALCULATIONS			
Receiver height - source height	-5.6	-0.622 <	Rec
Source to screen + Rec to screen	9	-0.5	Scr
Screen height - Source height	-0.5		
Screen height - Rec height	5.1