

TECHNICAL NOTE

Job Name: Parker House, London
Job No: 27474/001
Note No: SS N1
Date: 26th February 2013
Prepared By: M Brownstone (PBA) for Michael Holland (EC Harris)
Subject: **Sub-Station Noise**

Item	Subject
1.	<p>Introduction</p> <p>Peter Brett Associates LLP (PBA) has been commissioned to assess the potential noise emissions from a 500kVA transformer that is proposed as part of the Parker House development in Camden, London.</p> <p>This technical note sets out the findings of this assessment.</p>
2.	<p>Description</p> <p>A 500kVA sub-station is proposed at ground floor level, within the Parker House development.</p> <p>The sub-station is to be located in a room approximately 4 metres wide, 4 metres long and 2.5 metres high. All of the internal surfaces of the room are assumed to be acoustically hard, in this instance, they are assumed to be concrete.</p> <p>The proposed sub-station is shown on the Paul Davis and Partners drawing <i>Proposed Workshop & Rear of little House Elevations</i> (drawing number 1588(PL)216 rev.P1).</p> <p>The sub-station room will have two louvered doors, each measuring approximately 1.6 metres by 2 metres.</p> <p>The closest receptor is taken to be the external amenity space directly above the sub-station room.</p>

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
27474/001	-	25.02.13	M Brownstone		D Walker	

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TECHNICAL NOTE

	<p>No noise data is available for the specific transformer proposed at the site. However, data has been provided for a self-cooled 500kVA transformer manufactured by MGM Transformer Company. It is understood that this is a similar type of transformer to the one proposed at Parker House. The noise level for this transformer is quoted as 60dB. No detail is provided as to whether this value is A-weighted, nor whether it is a sound power level or sound pressure level at a specific distance.</p> <p>For the purposes of this assessment, it is assumed that the quoted noise level is an A-weighted sound pressure level, measured at a distance of 1 metre from the transformer. As there is no frequency data for the transformer, it has been assumed that the A-weighted spectrum is flat, which is likely to over-estimate the noise at lower frequencies.</p>
3.	<p>Background Noise Levels</p> <p>The background noise levels at and around the site were established for the PBA noise report <i>Parker House, Camden – Noise Assessment</i> (reference 27474/001 R001/rev00, dated November 2012).</p> <p>The lowest background noise level measured at the site was 44dB, measured during the night-time at the rear of the site, rounded to the nearest decibel, as required in British Standard 4142. Although British Standard 4142 does not require the assessment to be undertaken against the lowest background noise level, doing so will ensure that the assessment outcome is robust.</p>
4.	<p>Guidance</p> <p>British Standard 4142</p> <p>The assessment of fixed plant is normally undertaken in accordance with British Standard 4142: 1997 <i>Method For Rating Industrial Noise Affecting Mixed Industrial and Residential Areas</i>, which sets out a method for determining the level of noise of an industrial nature, together with procedures for assessing whether the noise is likely to give rise to complaints from people living nearby.</p> <p>The method requires the background level ($L_{A90,T}$) to be subtracted from the ‘rating level’, ($L_{A,r,T,r}$); the rating level is the $L_{Aeq,T}$ noise level for a particular source, adjusted to take account of any distinctive acoustic characteristics. For example, where the noise:</p> <ul style="list-style-type: none"> ▪ contains a distinguishable, discrete, continuous note; ▪ contains distinct impulses; and ▪ is irregular enough to attract attention <p>The correction for distinctive acoustic characteristics in BS4142 is +5dB(A).</p>

TECHNICAL NOTE

Table 2.1: BS 4142 Assessment for the Likelihood of Complaints

$L_{Ar,Tr} - L_{A90,T}$ (dB)	Advice
+ 10	Complaints likely
+ 5	Marginal significance
- 10	Complaints unlikely

The rating method in BS 4142 indicates that the greater the difference between the rating level and the background noise level, the greater the likelihood of complaints. The method of assessment is based on a reference time period of one hour during the daytime and five minutes during the night-time.

For the purposes of this assessment, the target criterion is for the rating noise level to not exceed the background noise level. Taking into account the potential distinctive acoustic characteristic of the transformer, which is likely to generate a 'hum', and the background noise level at the site, the target noise level based on BS4142 is taken to be 39dB, measured as an $L_{Aeq,T}$ noise level. This will ensure that once the 5dB penalty is applied, the rating level will not exceed the background noise level.

British Standard 8233:1999

In addition to assessing the sub-station noise in accordance with the BS4142 method, the noise emission level has been assessed against the guidance in BS8233 Sound insulation and noise reduction for buildings – Code of Practice. This standard recommends noise level criteria for habitable rooms, such as living rooms and bedrooms, and external spaces. The recommended internal criteria are shown in Table 2.2 below.

Table 2.1: BS 8233 recommended internal ambient noise levels

Criterion	Typical Situations	Design Range $L_{Aeq,T}$ (dB)	
		Good	Reasonable
Reasonable resting /sleeping conditions	Living rooms	30	40
	Bedrooms ¹	30	35

¹ For a reasonable standard in bedrooms at night, individual noise events (measured with fast time-weighting) should not normally exceed 45 dB L_{AFmax} .

For gardens and balconies, it advises that a desirable steady noise level is 50 dB $L_{Aeq,T}$ with 55 dB $L_{Aeq,T}$ regarded as the upper limit, consistent with the World Health Organisation guidelines.

To ensure that the sub-station does not contribute to an exceedance of the external criteria, the target noise level, based on BS8233, is taken to be 40dB.



TECHNICAL NOTE

	<p>World Health Organisation, Guidelines for Community Noise, 1999</p> <p>Community noise is considered to include noise from road, rail and air traffic, industries, construction and public work, and the neighbourhood.</p> <p>The WHO <i>Guidelines for Community Noise</i> provides guideline values for specific health effects of noise and for specific environments. The Guidelines can therefore be used to assess noise in outdoor amenity areas such as gardens, balconies and open spaces.</p> <p>The guidelines advise that the sound pressure level on balconies, terraces and outdoor living areas should not exceed 50-55 dB $L_{Aeq,T}$, which is the same as the advice in BS8233.</p>																										
5.	<p>Assessment</p> <p>The noise level due to the transformer has been calculated at the external amenity area above the sub-station. The distance between the substation door and a receiver located 1.5 metres above the roof of the sub-station building, is approximately 4 metres. The acoustic screening effect of the edge of the building has also been taken into account.</p> <p>The sound reduction indices of the louvred doors have been calculated to ensure that the sub-station achieves the criterion determined for this assessment, which is 39dB, and are based on the conservative assumption that the A-weighted spectrum for the transformer is flat.</p> <p>The sound reduction indices that the louvred doors should achieve are set out in Table 5.1. This values apply to the entire door construction, i.e. they are composite sound reduction indices.</p> <p>Table 5.1: Required Sound Reduction Indices, dB</p> <table border="1" data-bbox="354 1205 1393 1323"> <thead> <tr> <th rowspan="2">Item</th> <th colspan="8">Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)</th> </tr> <tr> <th>63</th> <th>125</th> <th>250</th> <th>500</th> <th>1000</th> <th>2000</th> <th>4000</th> <th>8000</th> </tr> </thead> <tbody> <tr> <td>Louvred Door</td> <td>14</td> <td>14</td> <td>9</td> <td>5</td> <td>10</td> <td>9</td> <td>7</td> <td>5</td> </tr> </tbody> </table> <p>Providing the louvred doors achieve the sound reduction indices set out in Table 5.1, the noise level at the amenity area above the sub-station will be no higher than 39dB.</p> <p>The closest dwelling is approximately 8 metres from the sub-station. The internal noise level at this location is predicted to be no higher than 24-29dB, which would be classed as 'good' when assessed in accordance with the guidance in BS8233.</p>	Item	Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)								63	125	250	500	1000	2000	4000	8000	Louvred Door	14	14	9	5	10	9	7	5
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6.	<p>Conclusion</p> <p>On the basis of the above assessment, it is concluded that, provided adequate attenuation is provided by the louvered doors, noise levels generated by the sub-station are unlikely to be materially detrimental to the occupants of the adjacent residential dwellings and external amenity areas.</p>																										