

Appendix 13.2 Vibration Assessment Methodology

1. Measurements were made of vibration of train pass-by events using the RPS Vibration Monitoring system, which is comprised of:
 - a 3-dimensional array of Setra 141A accelerometers attached to a steel angle-iron spike;
 - an IO-Tech DBK18 analogue filter and preamp, which provided unity gain and a low-pass filter at 670 Hz;
 - an IO-Tech DAQBook 2001 16-bit, 200 kHz analogue to digital data-acquisition unit; and
 - a Dell laptop running bespoke Matlab vibration data-acquisition and analysis software.
2. A total of 18 pass-bys were measured using a sample duration of 10-seconds and a sampling frequency of 2500 Hz.
3. The accelerometer was attached to a heavy metal plate and arranged vertically, radially and tangentially to the source. The sample time histories were post-processed using proprietary software to obtain the VDV of each sample. Vibration levels at the ground and first floors levels of the proposed building have façade have been calculated using standard correction factors from the measured levels.
4. There are several lines surrounding the Application Site, all of which support passenger trains in and out of London Bridge station. No freight trains were observed during the survey period. The majority of the train pass-bys measured were from the lines to the west of the site running through South Bermondsey station. As the types of railway trains are similar for all of the lines and this line is the closest to the site, this is considered to be representative of the maximum vibration levels experienced on the site.
5. The assessment is based upon determining the number of train pass-bys that may be expected to occur during a day or night time period from assumed train timetables and calculating the VDV for a day using the measured samples and methods for manipulating V DVs provided by BS 6472. BS 6472 states:

“Where the vibration conditions are constant (or regularly repeated) throughout the day, only one representative period, in seconds, (of

duration t_1) need be measured. If the measured vibration dose value is VDV_{τ} , the total vibration dose value for the day, ($VDV_{b/d,day}$) will then be given by the following equation.”

$$VDV_{b/d,day} = (t_{day}/t_1)^{0.25} \times VDV_{b/d,\tau}$$

Where, t_{day} is the duration of exposure per day (s).

If, in a day, there are a total of N periods of various durations with vibration dose value, VDV_n , the total vibration dose value for the day is given by:

$$VDV = \left(\sum_{n=1}^{n=N} VDV_n^4 \right)^{0.25}$$

6. A situation is considered where the trains are represented by a combination of the measured train samples with the highest horizontal and vertical magnitude. In this context, the horizontal refers to the combined set of tangential and radial vibration measurements.