

Table 1: Construction^{1,2} and Operational Groundborne Noise Criteria

Building	Level/Measure
Residential buildings	40dB L _{Amx,S}
Offices ³	40dB L _{Amx,S}
Hotels ³	40dB L _{Amx,S}
Theatres	25dB L _{Amx,S}
Large Auditoria/Concert Halls	25dB L _{Amx,S}
Sound recording studios	30dB L _{Amx,S}
Churches	35dB L _{Amx,S}
Courts, lecture theatres	35dB L _{Amx,S}
Small Auditoria/halls	35dB L _{Amx,S}
Schools Colleges	40dB L _{Amx,S}
Hospitals, laboratories	40dB L _{Amx,S}
Libraries	40dB L _{Amx,S}

Notes

1. Excluding the groundborne noise from the passage of the tunnel boring machine (TBM) (refer to section 2.4 in the main text below).
2. Significance with respect to the construction railway/ is assessed subject to paragraph 2.11.
3. Significance criteria not included in the Scope and Methodology set out in Appendix A2, Vol. 5 of the Crossrail Environmental Statement, added here for clarification.

2.4 These criteria will be adopted as the performance specification for the railway as the detailed design is developed. They do not apply to the noise of the tunnel boring machine (TBM) passage, including other tunnelling related activities, which is short-term and transitory and which was therefore qualitatively described in the Crossrail Environmental Statement and assessed as likely to have no significant impact.

2.5 The potential impact for construction and operation of the railway is set out in the Environmental Statement. The assessment assumes that where necessary, the potential impact is mitigated. For the temporary railway during construction the mitigation measures available were assumed to be:

- use of new rail (smooth track without corrugations or discrete irregularities) installed at the start of the works with joints achieving variation in rail height of not more than 2mm;
- where appropriate the use of resilient rail pads to fasten rails to the sleepers, or adequate elasticity to the support of the track system, between the rail foot and the sleeper, or tunnel invert, in order to reduce the transmission of vibration and groundborne noise from the passage of rail vehicles;
- a speed limit on construction trains of 15km/h;
- all diesel locomotives used will be fitted with efficient exhaust silencers; and
- a maintenance programme that ensures the condition of the track does not deteriorate over time thereby causing noise in breach of the agreed threshold.

2.6 The findings of the assessment (reported in the Environmental Statement) show that adoption of these measures is likely to result in the criteria for the performance specification for residential buildings, offices, hotels, schools, colleges, hospitals, laboratories and libraries not being breached at any location during the construction of Crossrail.

2.7 The nominated undertaker will endeavour to ensure that the groundborne noise from the operation of the temporary construction railway that is experienced by any theatre, large auditorium/concert hall, studio, church, court, lecture theatre or small auditorium/hall, does not exceed levels greater than those it is already subject to by the presence of London Underground, other railway and road transport operations, or the levels listed in Table 1, whichever is the higher noise level during the periods for which the buildings are in use.

2.8 During operation, the following measures were assumed to be available:

- standard trackform design to use continuously welded rail;
- the rails in tunnels will be supported on resilient track support systems, and track installation will be carried out using modern technology to achieve very much more accurately laid and smoother track than exists in traditional tube tunnels;
- floating slab track or similar technology, where it is predicted that standard trackform would result in the criteria in Table 1 being breached.

2.9 The nominated undertaker will be required to design the permanent track support system so that the level of groundborne noise near the centre of any noise-sensitive room is predicted in all reasonably foreseeable circumstances not to exceed the levels in Table 1. The nominated undertaker will be required to install the permanent track using a standard rail and/or track support system for the Crossrail tunnel sections. In any location where the standard system is predicted during detailed design to cause levels of groundborne noise exceeding the relevant assessment criterion an enhanced track support system will be installed.

2.10 The nominated undertaker will put in place measures that will ensure that the track of the underground sections and the wheels of the vehicles operating the Crossrail passenger service are maintained in a state which under all reasonably foreseeable circumstances will lead to adequate control of groundborne noise and vibration arising from the railway. Prior to opening, the nominated undertaker will ensure that the rails of the underground sections of Crossrail are conditioned by grinding, or other suitable means, and are appropriately maintained thereafter.

2.11 The findings of the assessment (reported in the Environmental Statement) show that adoption of these measures is likely to result in the criteria for the performance specification not being breached at any location during the operation of Crossrail.

2.12 The nominated undertaker will provide to the local authorities, through which the Crossrail tunnels pass details of the type of rail and/or track support system proposed and its predicted performance with respect to vibration and groundborne noise.