



CROSSRAIL INFORMATION PAPER

D26 – SURFACE RAILWAY NOISE AND VIBRATION

This paper provides a summary of both the assessment of surface railway noise associated with the operation of Crossrail, and the undertakings the Promoter proposes to adopt in terms of the measures to be put in place to control the effects of surface noise and vibration from the operation of Crossrail trains. It also explains how people living along the Crossrail route may perceive changes in noise as a result of changes to the rail service.

It will be of particular relevance to those in proximity to the surface railway sections of Crossrail.

This is not intended to replace or alter the text of the paper itself or any commitments contained in it, and it is important that you read the paper in order to have a full understanding of the subject. If you have any queries about this paper or about how groundborne noise and vibration might affect you, please contact either your regular Petition Negotiator at CLRL or the Crossrail helpdesk, who will be able to direct your query to the relevant person at CLRL. The helpdesk can be reached at:

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APPROVED

Version 2 – 20/11/07



1. Introduction

1.1 This Information Paper provides a summary of both the assessment of surface railway noise associated with the operation of Crossrail, and the undertakings the Promoter proposes to adopt in terms of the measures to be put in place to control the effects of surface noise and vibration from the operation of Crossrail trains. It also explains how people living along the Crossrail route may perceive changes in noise as a result of changes to the rail service. More detailed technical explanations of these matters are presented in a Technical Note which has been developed primarily for use by local authority environmental health officers but is also available on request. This Information Paper does not apply to fixed installations which are covered by the Information Paper on fixed installations, Information Paper D25, Noise From Fixed Installations.

2. Surface Railway Noise

2.1 The predicted change in railway noise at any given location depends upon a number of factors including whether trains have been brought closer to a noise sensitive location (e.g. residential property), the speed of the rolling stock, the size and type of rolling stock, and the number of train passes at any given period.

3. Measurement and Prediction of Railway Noise

3.1 Railway noise is conventionally measured and assessed using the L_{Aeq} index. The L_{Aeq} is a measure of the mean square sound pressure during a period of time, in what is referred to as A weighted decibels or dB(A).

3.2 For Crossrail, the noise assessment has addressed two different but related aspects:

- The assessment of impact based upon noise change over the daytime (07:00 to 23:00 hours, ie 16 hours), and night-time (23:00 to 07:00 hours, ie 8 hours) periods; a significant impact was deemed to occur if a change of 3 dB(A) or more was predicted.
- The assessment of potential eligibility for noise insulation (NI) under the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996, where various criteria are assessed for the daytime (06:00 to 24:00 hours, ie 18 hours) and the night-time (00:00 to 06:00 hours, ie 6 hours) periods.

3.3 The overall effect of additional services associated with Crossrail is predicted to be relatively small, as it is proposed that the services would mostly use existing lines where on the surface.

3.4 Research into the effects on the population exposed to railway noise, indicates that it is the least annoying of all the transportation sources.

4. Summary of the Assessment of Surface Railway Noise Impacts

4.1 As described in the Crossrail Environmental Statement (ES¹), the Crossrail scheme runs along the surface from Maidenhead to Royal Oak Portal (the western section of the scheme); from Pudding Mill Lane Portal to Shenfield (the northeastern section); and, on its southeast section where it surfaces three times, firstly, between Victoria Dock Portal and the existing Connaught Tunnel, then between Connaught Tunnel and the North Woolwich Portal and finally, between Plumstead Portal and Abbey Wood.

4.2 The assessment of the western and northeastern sections of the scheme identified no significant noise and vibration impacts from the operation of Crossrail. The assessment of operational railway noise for the southeastern section identified that, following mitigation, there are likely to be adverse impacts on an estimated 20 properties. Seven of these properties are likely to qualify for noise insulation under the Noise Insulation (Railways and other Guided Transport Systems) Regulations 1996 as amended (from hereon referred to as 'the Regulations'). The majority of the properties are located around Abbey Wood station. The ES identifies the use of permanent noise barriers as a means to mitigate the operational noise impacts along the southeast section. These would be located primarily between Plumstead Portal and just east of Abbey Wood station. It is estimated that the residents of 55 properties, located primarily around Abbey Wood Station, would experience significant reductions in railway noise as a result of these barriers.

5. The Control of Surface Railway Noise

5.1 In circumstances prescribed by the Noise Insulation (Railways and other Guided Transport Systems) Regulations 1996 as amended, predicted changes to existing noise levels may, in the case of dwellings and other buildings used for residential purposes, lead to mitigation in the form of the provision of noise insulation.

5.2 The Regulations set out a requirement to carry out or make a grant toward the provision of insulation works in eligible buildings, where noise levels from new surface railway, or additional tracks that will be located next to an existing surface railway, exceed certain thresholds and triggers set out in the Regulations.

5.3 The new surface sections of the railway will be designed and constructed using continuously welded rail to the greatest extent practicable with the objective of reducing noise and vibration due to the operation of the surface railway.

5.4 The design of new surface railway, or alteration of existing surface railway tracks will endeavour to achieve, in all reasonably foreseeable circumstances,

¹ The term 'Environmental Statement' refers to the Environmental Statement deposited with the Crossrail Bill in February 2005, the four Environmental Statements accompanying the Additional Provisions, the four Supplementary Environmental Statements submitted during the passage of the Bill, and their Non-Technical Summaries and errata, which together comprise the Crossrail Environmental Statement. The term 'the Main ES' refers specifically to the Environmental Statement produced (with its Non-Technical Summary) in February 2005. See <http://billdocuments.crossrail.co.uk/>.

predicted² operational noise level increase less than 3 dB $L_{Aeq,T}$ at the nearest sensitive receptor identified in the ES when calculated in relation to the periods of a day (07:00 to 23:00) and of a night (23:00 to 07:00), although as mentioned in paragraph 4.2 there will be cases where noise will exceed this. The design will include consideration of mitigation measures such as noise barriers.

5.5 The Regulations, and hence this information paper, do not apply to stationary trains, station activities, shunting or groundborne noise.

6. The Control of Vibration from the Surface Railway

6.1 The design of the new surface railway, or altered railway, in accordance with the guidance set out in British Standard 6472:1992 “Guide to evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)”, will endeavour to achieve, in all reasonably foreseeable circumstances, predicted operational vibration, expressed as vibration dose value (VDV), at sensitive receptors identified in the ES, no greater than the levels presented in Table 1.

Table 1: Operational Surface Railway Vibration Criteria

In the Absence of Appreciable Existing Levels of Vibration		Appreciable Existing Levels of Vibration ^{1,2}
VDV $ms^{-1.75}$ Daytime (07:00 – 23:00)	VDV $ms^{-1.75}$ Night-time (23:00 – 07:00)	% Increase in VDV
0.31	0.18	40

Notes:

1. Highest impact category used, daytime or night-time.
2. There is an appreciable existing level of vibration where daytime and night-time vibration dose values (VDVs) exceed $0.22 ms^{-1.75}$ and $0.13 ms^{-1.75}$ respectively.

6.2 Where, when carrying out that design work, vibration at sensitive receptors as identified in the ES, arising from any section new, additional or altered surface railway, is predicted to exceed the levels set out in Table 1, endeavours shall be made to include mitigation measures (for example under-ballast mats) in the design, which are predicted to result in compliance with the levels in Table 1 in all reasonably foreseeable circumstances.

7. Maintenance of the Surface Railway and Rolling Stock Wheels

7.1 For those parts of the surface railway that are part of the National Rail network that will be modified by Crossrail, maintenance of them will remain the responsibility of Network Rail. For any parts of the surface railway for the maintenance of which a person other than Network Rail is the nominated undertaker, they are to be maintained in accordance with Railway Group and Network Rail Company Standards. With regard to the generation of vibration and

² Predictions of operational railway noise will be carried out using the calculation procedure set out in Calculation of Railway Noise (1995) or whichever is the latest edition of that work at the time of modelling.

groundborne noise at the wheel/rail interface, the wheels of the Crossrail rolling stock will be maintained, as a minimum, at the level defined by the maintenance requirements necessary to meet the undertaking on this issue set out in Information Paper D10, Groundborne Noise and Vibration.