

**Waverley Railway (Scotland) Bill promoted by Scottish Borders Council
("Promoter")
Noise and Vibration Policy
August 2008**

Preface

This policy document has been updated from the version published on November 28th, 2005 to take account of the amendments requested by the Waverley Railway (Scotland) Bill Committee in their 2nd Report, 2006 (Session 1).

In summary the changes required are:

- 1) improving the monitoring regime; and
- 2) ensuring this Policy is legally enforceable through Section 46 of the Waverley Railway (Scotland) Act 2006.

The changes to the Policy have not reduced the standards of mitigation and protection provided for in the November 28th, 2005 version being amended.

1. Introduction

1.1 The purpose of this policy document is to set out the Promoter's policy for mitigating noise and vibration effects during operation of the railway. The policy builds on the commitments made during the environmental impact assessment as reported in the Environmental Statement. Effects during construction are covered in the Code of Construction Practice Policy Paper.

1.2 There are no statutory requirements for mitigating noise from railways in Scotland. However, the Promoter takes this issue seriously and proposes to implement the noise insulation regulations that apply in England and Wales and also to set noise design targets at considerably lower levels, to be achieved wherever reasonably practicable by mitigation measures taken at source (i.e. within railway land). There are practical limitations as to what mitigation can be achieved in any particular case and this document helps to explain these. The Promoter's overall approach is as follows: -

- Through the design of the track and track bed the Promoter will use the Best Practicable Means¹ to design the railway so as to avoid significant noise and vibration impacts at existing sensitive receptors (e.g. residential properties, educational buildings and places of worship).
- Where these measures are not sufficient to mitigate significant impacts the Promoter will, if effective and reasonably practicable, provide noise barriers to mitigate noise between the track and sensitive receptors.

¹ Best Practical Means are defined in Section 72 of the Control of Pollution Act 1974 as those measures which are "reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to financial implications".

- After considering all practicable mitigation measures that can be taken at source (i.e. within the railway corridor), including noise barriers, the Promoter will offer noise insulation where impacts on sensitive receptors are severe.
- The Promoter will consult with those parties who may be affected by noise and vibration explaining the mitigation measures that are proposed.
- The Promoter will reassess the impacts of noise and vibration during the detailed design of the Scheme to ensure the design incorporates mitigation measures in accordance with this policy.

1.3 Describing noise and vibration requires technical nomenclature. To assist the interested reader's understanding, the Promoter has prepared a Noise and Vibration Public Briefing Note which further explains noise and vibration units.

2. Assessment Of Noise And Vibration Effects

2.1 The Promoter's environmental consultants, Environmental Resources Management ("ERM") have, in accordance with accepted practice, undertaken an assessment of the impacts of noise and vibration as reported in the Environmental Statement². This has been undertaken by identifying various representative noise sensitive receptors (primarily residential properties) along the entire railway route, comparing predicted levels against impact assessment criteria, and outlining mitigation measures where necessary to achieve these criteria. The mitigation measures were refined in the Promoter's Supplementary Memorandum Responding to the Peer Review, August 2004. These measures will be further refined as the detailed design and consultation progress, in accordance with this policy.

2.2 The assessment has been based on an assumed service frequency of two trains per hour each way during the daytime (0700 – 2300) and two trains per hour each way at night between 2300 and 0030 and also between 0555 and 0700. This assumed level of service is, given current circumstances and knowledge, a reasonable worst case scenario.

3. Noise Mitigation

3.1 The requirements for noise mitigation relate to two sets of absolute noise levels termed 'Threshold' levels and 'Unacceptable' levels, as follows. In all cases these are the noise levels predicted at the most exposed windows to noise sensitive rooms in noise sensitive buildings, and are free-field³ noise levels.

Noise Impact Threshold levels:

Day - $L_{Aeq, (0700-2300 \text{ hours})}$	55 dB ⁴
Night - $L_{Aeq, (2300-0700 \text{ hours})}$	45 dB

² See chapter five of the Environmental Statement which accompanies the Bill.

³ Free-field means away from reflective surfaces, except the ground.

⁴ $L_{Aeq, T}$ is the A-weighted equivalent sound level over the period T. A-weighting is a frequency weighting that replicates the frequency response of the ear. $L_{Aeq, T}$ is a widely used noise parameter that represents a varying noise level by calculating the constant noise level that would have the same energy content over the measurement time period. It is the recommended parameter for train noise.

3.2 Where train noise is predicted to be more than 3dB⁵ above either of the threshold levels (i.e. day or night) mitigation measures at source will be considered to reduce the adverse impact of noise according to the extent to which the pre-existing ambient ($L_{Aeq, 1 \text{ hour}}$) noise level is increased, as follows:

- Increase of 3-5 dB - mitigation considered on a case by case basis, and implemented if reasonably practicable and acceptable to affected parties.
- Increase of greater than 5 dB – mitigation implemented if reasonably practicable and acceptable to affected parties.

3.3 Impacts of 3 dB above the thresholds are considered sufficiently significant to warrant the consideration of noise barriers. That is not to say that noise barriers will always be appropriate as there are other considerations including noise e.g.

Track Safety:	There are HMRI requirements to limit structures close to railway tracks so as to allow room for escape. This means that generally a noise barrier can be located no closer than approximately three metres from the track.
Sight lines:	On curves, noise barriers could compromise line of site ahead and so may be impracticable.
Visual Impact:	In highly visible locations noise barriers may not be desirable.
Creation of Crime Havens:	In built-up areas, such as near stations noise barriers could create areas where criminal activity could be hidden from view and thus be facilitated.
Construction and maintenance difficulties:	Noise barriers may require deep foundations or be unstable on sloped land. They may interfere with access or maintenance and they can attract graffiti in unfavourable locations.

3.4 Whilst it is anticipated that noise barriers will offer a solution in many of the locations identified there may be certain locations where local conditions do not permit noise barriers. Consultation with the residents will be undertaken to ensure that where practicable a suitable form of noise mitigation will be agreed during the detailed design process.

<i>Unacceptable impact levels:</i>	Day > $L_{Aeq, (0600-0000 \text{ hours})}$ 66 dB ⁶
	Night > $L_{Aeq, (0000-0600 \text{ hours})}$ 61 dB
	Night > L_{Amax} 82 dB ⁷

3.5 If, after consideration of measures at source, any of the relevant unacceptable levels is exceeded then noise insulation will be offered, provided the corresponding ambient noise level is routinely exceeded by at least 1dB. Noise

⁵ Exceedences of up to 3 dB are considered to be of marginal significance. In line with current guidance, 3 dB is taken as the limit of perception of change in environmental noise.

⁶ Day is generally defined as 0700-2300 hours, except in the Noise Insulation Regulations 1996 that apply in England and Wales, where it is defined as 0600 hours to midnight.

⁷ L_{Amax} is a measure of the peak noise level, A-weighted.

insulation would be provided in accordance with the Noise Insulation (Railways and Other Guided Systems) Regulations 1996 that apply in England and Wales.

4. Train Horn Noise

- 4.1 Train drivers are required to sound the train's horn to warn of their approach in certain situations. There are two tunnels where this may occur; Torwoodlee Tunnel (just North of Galashiels) and Bowshank Tunnel (approximately 5km North of Galashiels).
- 4.2 Given the vital safety requirement of train horns it is not considered viable to mitigate this noise source except through the use of noise insulation if the unacceptable levels given in section 3 are routinely exceeded. Train drivers will also be made aware of the residential areas that may be affected and will be instructed not to sound the horn unnecessarily.

5. Train Vibration

- 5.1 The movement of operating trains may give rise to perceptible levels of ground vibration in adjacent occupied properties. Vibration Dose Value (VDV)⁸ is a measure of the accumulated level of ground vibration over a period, and, through the application of BS6472⁹, is a standard metric for predicting the likelihood of adverse comments from building occupants. The standard gives the following VDV levels at or below which the probability of adverse comment is low.
- Day (0700 – 2300 hours) - 0.4 m/s^{1.75}
 - Night (2300 – 0700 hours) - 0.13 m/s^{1.75}
- 5.2 Trackforms will be designed adjacent to sensitive receptor buildings using Best Practicable Means to keep within the guideline levels.

6. Monitoring and Maintenance

- 6.1 The railway, and in particular the wheel and rail surfaces, will be maintained so as to minimise noise and vibration at sensitive receivers. A noise and vibration monitoring scheme will be implemented and the results will be used to inform wheel and track maintenance programmes in order to minimise unnecessary increases in noise or vibration. The monitoring scheme will include the carrying out of surveys initially at 6 monthly intervals the first being undertaken within 6 months of the railway opening for passenger use at locations agreed with the local planning authorities. The surveys will be carried out at 6 monthly intervals for a period of not less than three years following the railway opening for passenger use, and annually thereafter to confirm the effectiveness of the noise mitigation measures.
- 6.2 The results of the monitoring shall be published in an easily accessible format on the project's website and in the project newsletter and shall be made available,

⁸ Vibration Dose Value, VDV, is the vibration metric recommended in BS6472, 1992 for the assessment of annoyance from railway vibration. It is a measure of the overall vibration dose throughout a day or night period. It is highly weighted towards peaks and has the units m/s^{1.75}.

⁹ BS6472: 1992 Guide to Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz).

either in hard copy or in electronic format, to any person requesting the information.

- 6.3 The operator will establish appropriate sound levels for station Public Address systems and will seek to address complaints, if they are received from occupiers of noise sensitive premises, as far as is practicable within railway safety requirements.

7. Compensation

- 7.1 Noise and vibration are 'physical factors'¹⁰ which may give rise to compensation if they result in the value of a property being reduced. The Promoter has produced a separate policy on compensation.

¹⁰ Under the Land Compensations Act, 1973 noise and vibration are included as Physical Factors for which compensation may be payable as a result of a public works such as a new railway.