

7 NOVEMBER 2006

GLASGOW AIRPORT RAIL LINK BILL (“THE BILL”)

STRATHCLYDE PARTNERSHIP FOR TRANSPORT (“THE PROMOTER”)

THE PROMOTER’S POLICY ON RAILWAY NOISE AND VIBRATION

Introduction

1. The purpose of this Policy is to set out the Promoter’s policy for mitigating noise and vibration effects during operation of the Glasgow Airport Rail Link (“the Railway”) i.e. after it has been built and train services have begun. This adds to the commitments made during the environmental impact assessment as reported in the Promoter’s Environmental Statement. In this document and the explanatory notes the term “Promoter” refers to the current promoter (Strathclyde Partnership for Transport) and anyone who succeeds them as the “Authorised Undertaker” in relation to the powers of the Bill.
2. Noise and vibration effects and temporary mitigation measures during construction (i.e. before train services have begun) are covered in the separate Policy Paper on the Promoter’s Code of Construction Practice.
3. There are no statutory requirements for mitigating noise from railways in Scotland. However, the Promoter takes this issue seriously and proposes to implement the principles contained in the railway noise insulation regulations which apply in England and Wales. This Policy also sets out the noise threshold levels and unacceptable limits which will apply when Glasgow Airport Rail Link (“GARL”) rail services commence.
4. The Promoter has committed to two sets of noise threshold levels and unacceptable limits. One set relates to the new branch line which will run from a point close to Paisley St. James station to the new station at Glasgow Airport. The other set relates to the existing railway corridor between Glasgow Central Station and the point close to Paisley St. James station where the branch line will leave the existing Inverclyde line. The reasons for there being two sets of noise threshold levels and unacceptable limits are set out in the Explanatory Notes to this Policy.
5. It is not the Promoter’s intention that the noise and vibration levels set in this Policy should simply be treated as maximum permissible levels during operation of GARL train services (and that any noise and vibration levels below the limits would be acceptable). Rather, the Promoter’s intention is that it will strive to reduce noise and vibration levels from GARL train services to as low a level (i.e. beneath the maximum permissible levels) as is reasonably practicable in the circumstances.

6. Noise and vibration levels will be minimised wherever reasonably practicable by mitigation measures at source (i.e. within railway land) and/ or at the receiver (i.e. at noise and/or vibration sensitive premises near to the railway). There are practical limitations as to what mitigation can be achieved in any particular case and the Explanatory Notes to this Policy also help to explain these.
7. The Promoter will reassess the impacts of noise and vibration at particular noise sensitive premises during the detailed design of the Railway to ensure the design incorporates reasonably practicable mitigation measures that take into account the circumstances of each case in accordance with this Policy.
8. Once the Railway is operational (i.e. GARL train services have begun), a noise and vibration monitoring programme will be implemented to check the effectiveness of mitigation measures and ensure that maintenance programmes minimise unnecessary increases in noise and vibration due to wear and tear to train wheels and railway tracks. The results of such monitoring would be made available both to the relevant local authorities (Glasgow City Council and Renfrewshire Council) and publicly by the Promoter.
9. It is intended that the Bill, which is currently awaiting approval by the Scottish Parliament, will include a requirement for the Promoter to use all reasonably practicable means to comply with this Policy. The Promoter shall also be subject to a commitment that this Policy shall not subsequently be amended or superseded so as to reduce the standards of noise and vibration protection and mitigation contained in this version of the Policy. It is also the Promoter's intention that, if the Bill is passed by the Scottish Parliament and therefore becomes law, the relevant local authorities would be given power to enforce compliance with this Policy through their existing statutory powers as Planning authority for their areas.
10. However, it must be remembered that the Bill seeks authorisation for the Railway to be built and maintained. Operation of the Railway will be subject to separate regulation under the Railways Act 1993, and nothing in this Policy can override that. (The Promoter has produced a Paper on Railway Regulation¹ and refers to that for its terms regarding the regulation of railways in the UK generally and Scotland in particular).

Noise thresholds and unacceptable limits- the Branch Line

11. The following absolute noise levels ('Threshold levels' and 'Unacceptable limits') apply only to the new branch line which will run from a point close to Paisley St. James station to the new station at Glasgow Airport ("the Branch Line"). In all cases these are the noise levels (in decibels (dB)) predicted at the most exposed windows to noise sensitive rooms in noise sensitive buildings, and are free-field² noise levels.

Branch Line noise <u>Threshold Levels</u> :	Day - L _{Aeq} , (0700-2300 hours) 55 dB ³
	Night - L _{Aeq} , (2300-0700 hours) 45 dB
	Night - L _{Amax} 60 dB ⁴

¹ This has been lodged with the Scottish Parliament in connection with the Bill and is currently available to download at <http://shandwick.fs-server.com/spt/uploaded/ufile500.pdf>

² See paragraph 1 of the Explanatory Notes to this Policy.

³ See paragraphs 1 and 2 of the Explanatory Notes to this Policy.

⁴ See paragraphs 1 and 2 of the Explanatory Notes to this Policy.

Branch Line noise Unacceptable Limits: Day - $L_{Aeq, (0600-0000 \text{ hours})}$ 69 dB⁵
Night - $L_{Aeq, (0000-0600 \text{ hours})}$ 64 dB
Night - L_{Amax} 70 dB

12. The Explanatory Notes to this Policy explain the justification for adopting the noise levels and limits sets out above, and compare them to the most recent railway Private Bill approved in Scotland.

Noise thresholds and unacceptable limits- the existing Railway

13. The following 'Threshold levels' and 'Unacceptable limits' apply only to the existing railway corridor between Glasgow Central Station and the point close to Paisley St. James station where the Branch Line will leave the existing Inverclyde line. As with the 'Threshold levels' and 'Unacceptable limits' for the Branch Line, these are the noise levels (in decibels (dB)) predicted at the most exposed windows to noise sensitive rooms in noise sensitive buildings, and are free-field⁶ noise levels.

Noise impact Threshold Levels: Day - $L_{Aeq, (0700-2300 \text{ hours})}$ 58 dB⁷
Night - $L_{Aeq, (2300-0700 \text{ hours})}$ 48 dB
Night - L_{Amax} 60 dB⁸

Noise impact Unacceptable Limits: Day - $L_{Aeq, (0600-0000 \text{ hours})}$ 69 dB⁹
Night - $L_{Aeq, (0000-0600 \text{ hours})}$ 64 dB
Night - L_{Amax} 70 dB

14. The Explanatory Notes to this Policy explain the justification for adopting the noise levels and limits sets out above, and compare them to other recent railway projects in Scotland.

Breach of Noise Threshold Levels and Unacceptable Limits

15. Where train noise from the Railway¹⁰ is below the noise impact Threshold Levels there would be no significant impact, and no mitigation measures would therefore be required.
16. Where train noise from the Railway exceeds (or is predicted by the Promoter to exceed¹¹) any of the (day or night) noise impact Threshold Levels, noise impacts will vary from negligible to substantial depending on the existing baseline noise levels. Mitigation plans will be developed to reduce the adverse impact of noise, according to the extent to which the pre-existing day or night ambient noise levels (i.e. the existing baseline noise levels before GARL train services begin) is increased by GARL train services. The mitigation measures will be implemented if they are reasonably practicable (and acceptable to the persons affected by the railway noise).

⁵ See paragraphs 1 and 2 of the Explanatory Notes to this Policy.

⁶ See paragraph 1 of the Explanatory Notes to this Policy.

⁷ See paragraphs 1 and 2 of the Explanatory Notes to this Policy.

⁸ See paragraphs 1 and 2 of the Explanatory Notes to this Policy.

⁹ See paragraphs 1 and 2 of the Explanatory Notes to this Policy.

¹⁰ Note that the "Railway" does not for these purposes include the existing railway tracks between Paisley St James Station and Glasgow Central Station, for the reasons set out in paragraphs 20 and 21 of the Explanatory Notes to this Policy.

¹¹ See paragraphs 3 and 4 of the Explanatory Notes to this Policy.

17. If train noise from the Railway exceeds (or is predicted by the Promoter to exceed¹²) any of the (day or night) noise impact Unacceptable Limits, substantial impacts would be expected depending on the existing baseline noise levels. Mitigation measures will be offered and implemented if they are reasonably practicable (and acceptable to the persons affected by the railway noise). However, in the case of the night time L_{Amax} threshold for the existing Railway, there would require to be more than 10 actual or predicted exceedances of the L_{Amax} thresholds in a single night due to noise from the Railway for mitigation measures to be offered¹³. In the case of the Branch Line, there would only require to be 1 or more actual or predicted exceedances of the L_{Amax} thresholds in a single night due to noise from the Railway for mitigation measures to be offered.

Noise Mitigation- overall approach

18. The Promoter's overall approach is to consider noise mitigation measures (and the possibility of payment of financial compensation) in the following order:-
- (a) firstly, through the design of the track and track bed, the Promoter will use the Best Practicable Means¹⁴ 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, and, specifically in this case, The Arches (theatre, nightclub and performing arts venue) and other noise and vibration sensitive properties located beneath Central Station), including, where practicable, the selection of appropriate rolling stock; then
 - (b) where these measures are not sufficient to mitigate significant impacts on sensitive receptors, the Promoter will, if effective and reasonably practicable, offer noise insulation (e.g. double glazing); then
 - (c) where provision of noise insulation is not reasonably practicable or acceptable to affected parties, the Promoter will consult with them and where necessary offer appropriate financial compensation¹⁵; and then
 - (d) finally, if no other reasonably practicable mitigation measures can be taken at source (i.e. within the railway corridor) and/or at individual properties, (and the payment of financial compensation is not appropriate) where reasonably practicable the Promoter will provide noise barriers to mitigate noise between the track and sensitive receptors¹⁶.
19. As noise barriers will be a "last resort" on the Railway¹⁷, consultation with residents will therefore be undertaken to ensure that, where reasonably practicable, installation of suitable forms of noise mitigation, including noise

¹² See paragraphs 3 and 4 of the Explanatory Notes to this Policy.

¹³ See paragraph 16 of the Explanatory Notes to this Policy.

¹⁴ Best Practicable Means are defined in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environmental Protection Act 1990 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".

¹⁵ See paragraph 30 of this Policy.

¹⁶ See paragraphs 23 to 26 of the Explanatory Notes to this Policy.

¹⁷ For some of the reasons set out in paragraph 23 of the Explanatory Notes to this Policy.

insulation, would be agreed during the detailed design development for the Railway.

20. Noise insulation would be offered in accordance with The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (“the Noise Insulation Regulations”) which apply in England and Wales, including the eligibility criteria contained in those Regulations¹⁸. (Note that these Regulations do not apply in Scotland but the Promoter would, in effect, comply with the terms of the Regulations as if they did apply in Scotland).

Train Horn Noise

21. If train horn noise from GARL train services exceeds the (day or night) noise impact Threshold Levels and/or noise impact Unacceptable Limits, then noise mitigation measures (or the possibility of payment of financial compensation) will be considered and offered on the same basis as other train noise as previously specified in this Policy. However, unlike the other forms of train noise to which this Policy applies, it has to be understood that the Promoter cannot control how often and where train horns are sounded nor indeed how loud the horns actually are¹⁹. In other words the Promoter cannot take measures to reduce the noise at source, so the only possible mitigation measures would be noise insulation, financial compensation or noise barriers.
22. Train operating companies (e.g. First ScotRail) and their drivers would also be expected to comply with the requirements of the Rail Safety and Standards Board (RSSB) with regard to the types and specifications of train horns and the circumstances in which they may be used and the operator of the Railway²⁰ will take reasonably practicable measures within its power to minimise the use and loudness of train horns consistent with safe operation of the Railway.

Train Vibration

23. The movement of operating trains may give rise to perceptible levels of ground vibration in adjacent occupied properties. Vibration Dose Value (VDV)²¹ is a measure of the accumulated level of ground vibration over a period, and, through the application of British Standard 6472:1992²², is a standard metric for predicting the likelihood of adverse comments from building occupants²³. 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}
24. Track forms will be designed adjacent to sensitive receptor buildings using Best Practicable Means to keep within the guideline levels²⁴. The Promoter will implement reasonably practicable mitigation measures within the railway corridor

¹⁸ See paragraphs 17 to 22 of the Explanatory Notes to this Policy.

¹⁹ See paragraphs 27 to 32 of the Explanatory Notes to this Policy.

²⁰ See footnote 30 in the Explanatory Notes to this Policy.

²¹ See paragraph 1 of the Explanatory Notes to this Policy.

²² BS6472: 1992 Guide to Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz).

²³ See paragraph 1 of the Explanatory Notes to this Policy.

²⁴ For example by selecting appropriate low noise/ low vibration track beds, rail heads, track formations, and, where possible appropriate train wheel profile. See also paragraph 33 of the Explanatory Notes to this Policy.

where vibration from the Railway exceeds (or is predicted to exceed) the Vibration Dose Values for low probability of adverse comment contained in British Standard 6472:1992 and reproduced above. In situations where existing conditions exceed the above vibration values (for example below Central Station), Best Practicable Means will be used to mitigate any additional vibration effects from GARL train services.

Station Public Address Systems

25. There are no formal statutory regulations covering noise levels from station public address systems²⁵. However the operator of the station 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.

Monitoring and Maintenance

26. 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 and/or vibration due to wear and tear to train wheels and railway tracks. Noise and vibration monitoring would be done at various appropriate locations along the Railway, but these locations would include locations (i) within The Arches (theatre, nightclub and performing arts venue), (ii) at or near the existing private road accesses onto railway land at Fochabers Drive and the East end of Cardonald Station, (iii) at Ladykirk Drive/Chirnside Road, (iv) at or near Urrdale Road (and the bridge/underpass through which the Railway passes under the M8 there).
27. To confirm the effectiveness of any noise and vibration mitigation measures, a monitoring scheme will include initial surveys within 6 months of opening of the Railway, then further surveys every 6 months during the next 3 years and annual surveys for the next 2 years.
28. The results of the monitoring scheme would be publicised in a readily accessible format for members of the public to access, including publication on the Railway operator's website and information brochures/newsletters/pamphlets relating to the Railway. The Promoter would also ensure that the noise and vibration monitoring data collected during the monitoring scheme was timeously passed to Network Rail and the relevant train operating companies (e.g. First ScotRail) so they could investigate any suspected breaches of noise and vibration limits and/or complaints about station public address systems or the use of train horns.

Enforcement of this Policy

29. The Promoter²⁶ will use all reasonably practicable means to ensure that this Policy (including any future amendments to it and including the noise and vibration standards within it) will be applied as a minimum set of standards on noise and vibration from the Railway. Nor will this Policy be amended or amended or superseded so as to reduce the standards of mitigation and protection contained in it.

²⁵ See paragraphs 35 to 37 of the Explanatory Notes to this Policy.

²⁶ See footnote 30 to the Explanatory Notes to this Policy.

30. The GARL Bill will make the planning permission conferred on the Promoter by the Town and Country Planning (General Permitted Development) (Scotland) Order 1992 subject to a deemed planning condition requiring the authorised undertaker to comply with this Policy.

Compensation

31. Noise and vibration are 'physical factors'²⁷ which may give rise to compensation if they result in the value of a property being reduced. The Promoter has produced a separate Policy Paper on Compulsory Purchase and Compensation²⁸ which is referred to in this regard.

²⁷ Under the Land Compensation (Scotland) Act 1973 noise and vibration are included as Physical Factors for which financial compensation may be payable as a result of a public works such as a new railway.

²⁸ This has been lodged with the Scottish Parliament in connection with the Bill and is currently available to download at <http://shandwick.fs-server.com/spt/uploaded/ufile495.pdf>

EXPLANATORY NOTES TO THE PROMOTER'S POLICY PAPER IN RESPECT OF NOISE AND VIBRATION

Noise and Vibration Terminology

1. "Free-field" means away from acoustically reflective surfaces, except the ground.

" $L_{Aeq, T}$ " 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.

" L_{AMax} " is a measure of the peak noise level, A-weighted. (In layman's terms with regard to the GARL project, this is the highest noise level in an individual property during pass-by of a train).

"Day" is generally defined as 0700-2300 hours (WHO guidelines for Community Noise and BS 8233:1997), except in the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 that apply in England and Wales, where it is defined as 0600 hours to midnight. Consequently, when selecting the time periods for the assessment of the threshold limits i.e. noise levels at which an effect can be detected and where mitigation may be offered depending on the impact of the GARL on existing noise levels, the guidance of the WHO guidelines for Community Noise and BS 8233:1999 has been followed; whereas in selecting the time periods for the setting Unacceptable noise limits i.e. noise levels above which the offer of mitigation is automatically triggered, the requirements of the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 have been followed.

"Vibration Dose Value" (VDV) is the vibration metric recommended in British Standard BS6472:1992 for the assessment of the impact on humans of 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 $m/s^{1.75}$. Using VDV levels is the recommended method in Planning Advice Note (PAN) 56: Planning and Noise (1999).

Noise Levels and "Loudness" of common noise events

2. **Examples of Noise Levels on a Decibel Scale**

Noise Level, dB(A)* Typical noise source/ example

0	Threshold of hearing – lowest sound an average person could hear
30	Quiet bedroom at night
40	Whispered conversation at 2 metres
50	Conversational speech at 1 metre
60	Busy general office
70	Loud radio indoors
80	Lorry at 30 kilometres per hour at 7 metres

*The dB(A) scale is a particular way of measuring the different frequencies in sound, designed to match how the human ear perceives sound, called the 'A'-weighting. (A-weighting is a frequency weighting that replicates the frequency response of the ear).

The Decibel scale is logarithmic, which means that noise levels do not add up or change according to simple linear arithmetic. For example, adding two equal noise sources results in a doubling of sound *energy*, which gives a combined noise level that is only 3dB higher than the individual levels e.g.

So, 60dB + 60dB = 63dB (not 120dB).

However, it takes a 10 decibel increase or decrease in noise level for the perceived loudness of a noise to double or increase.

Assessment of Noise And Vibration Effects

3. The Promoter's environmental consultants, Faber Maunsell ("FM") have, in accordance with accepted practice, undertaken an assessment of the impacts of noise and vibration as reported in the Environmental Statement²⁹ ("the ES"). This has been undertaken by (i) identifying various representative noise sensitive receptors along the proposed route of the Railway, (ii) comparing predicted levels from construction work associated with the new branch line and the third mainline track against background levels and impact assessment criteria, (iii) comparing predicted levels from operation of the new branch line and the third mainline track against background levels and impact assessment criteria (iv) assessing the impact of any likely changes in road traffic noise on the M8 as a consequence of the Railway, and (v) outlining measures to mitigate potentially significant construction and operational noise and vibration impacts to achieve these criteria. These measures will be further refined as the detailed design and consultation processes progress, in accordance with this Policy.
4. The assessment has been based on a detailed analysis of the proposed time table of train movements for each of the five principal components of the route (see table 12 of the Noise & Vibration Annex to the ES). This assessment is approximately equivalent to a typical average service frequency of 4 trains per hour each way during the daytime (0700 – 2300) and 3 trains each way at night between 2300 and 2345 and also 4 trains per hour each way between 0539 and 0700. This assumed level of service is, given current circumstances and knowledge, a reasonable worst case scenario. (While the assessment referred to has been carried out for the Promoter, it could be checked independently if required by any affected party using the same timetabling information).

Noise impact thresholds and unacceptable noise limits: Comparisons between GARL and the Waverley Railway Project

5. Construction of the Waverley Railway Project was approved by the Scottish Parliament in 2006, by means of the Waverley Railway (Scotland) Act 2006 which received Royal Assent on 24 July 2006. Accordingly it is the most recent railway

²⁹ See the Environmental Statement which accompanies the Bill (Chapter 4.10 of Volume 1 (the Non Technical Summary) and Chapter 13 of Volume 2 (Main Report)).

project in Scotland whose noise and vibration standards can be compared to those adopted by the Promoter in this Policy for the GARL project.

6. The route of the railway approved by the Waverley Railway (Scotland) Act 2006 will run from Newcraighall, on the southeastern edge of Edinburgh, to Tweedbank, between Galashiels and Melrose in the Scottish Borders. It will therefore run predominantly through open countryside, small towns and villages where the existing baseline noise levels will generally be relatively low. This is due to factors such as low population density and the lack of intensive industrial activity, and relatively low levels of road traffic. Since the closure of the original Waverley Railway in 1969, there has also been no railway noise at all along the route of the new railway, so the construction of the new railway will introduce railway noise to areas where there has been none since at least 1969.
7. In contrast the GARL project will run firstly through the middle of a heavily built up city (Glasgow) along a busy existing railway corridor, and then through the middle of a large town (Paisley), crossing over a busy motorway (the M8) to reach Glasgow Airport. In each of these locations the existing baseline noise levels will generally be relatively high. This is due to factors such as high population density intensive industrial activity, high levels of road traffic and aircraft/airport noise. Between Glasgow Central and Paisley St. James Stations, properties adjacent to the GARL route will also already experience some level of railway noise from the existing Glasgow to Inverclyde and Glasgow to North and South Ayrshire railway services.

8. The noise threshold levels adopted for the Waverley Railway Project (WRP) are as follows:

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

However, the formal WRP Noise and Vibration Policy also makes it clear that no noise mitigation measures will be considered unless these threshold levels are breached by more than 3 decibels (dB) and depend also upon the extent to which the existing baseline noise level is increased. Accordingly these thresholds are effectively 58dB (day) and 48 dB (night).

9. The noise threshold levels adopted for the GARL project are as follows:

Branch Line: Day - $L_{Aeq, (0700-2300 \text{ hours})}$ 55 dB
 Night - $L_{Aeq, (2300-0700 \text{ hours})}$ 45 dB
 Night - L_{Amax} 60 dB

Existing Line: Day - $L_{Aeq, (0700-2300 \text{ hours})}$ 58 dB
 Night - $L_{Aeq, (2300-0700 \text{ hours})}$ 48 dB
 Night - L_{Amax} 60 dB

10. The GARL noise impact threshold levels do not stipulate a requirement that they must be breached by 3 decibels (dB) or more before mitigation measures will be considered. Therefore the Promoter will consider mitigation where these levels are breached. However, as with the WRP thresholds, what mitigation measures are considered and whether they are indeed offered will depend upon the extent to which the existing baseline noise level is increased by train noise from GARL. For example existing ambient noise levels in many areas for the GARL project

currently exceeds 55dB threshold. In these situations the Promoter's assessment has shown that substantial impacts would be experienced only when ambient noise levels are increased by 3 decibels due to GARL. This is consistent with the WRP Policy.

11. Accordingly, for the Branch Line, the Promoter is adopting thresholds which are effectively 3 decibels (dB) lower than the WRP standards, except in the situation where existing ambient noise levels along the Branch Line already exceed the threshold. In this situation the same thresholds will apply to the Branch Line as WRP (i.e. a 3 decibel increase, due to GARL, above ambient levels will be required). For those sections of the GARL project within/alongside the existing rail corridor the same thresholds as for WRP are being applied.
12. The formal WRP Noise and Vibration Policy does not contain a night time L_{Amax} threshold level. That may have been because construction of the new railway will introduce railway noise to areas where there is currently none, as explained above. For the GARL project the Promoter has set a night time L_{Amax} threshold level of 60 decibels (dB). This is derived from the World Health Organisation (WHO) Guidelines for Community Noise (1999) and British Standard BS8233:1999 and relates to the noise levels at which sleep disturbance is likely.
13. The WRP noise impact unacceptable limits (excluding the night time L_{Amax} level, which is explained below) are as follows:

Day - $L_{Aeq, (0600-0000 \text{ hours})}$ 66 dB
Night - $L_{Aeq, (0000-0600 \text{ hours})}$ 61 dB

The noise impact unacceptable limits set in The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (further explained below) are:

Day - $L_{Aeq, (0600-0000 \text{ hours})}$ 68 dB
Night - $L_{Aeq, (0000-0600 \text{ hours})}$ 63 dB

Both the WRP noise impact unacceptable limits and the equivalent limits set by the 1996 Regulations require the limits, and existing baseline noise levels, to be exceeded by at least 1 decibel (dB).

Accordingly the noise impact unacceptable limits set for the GARL project (which are the same for the Branch Line and the Existing Line) are:

Day - $L_{Aeq, (0600-0000 \text{ hours})}$ 69 dB
Night - $L_{Aeq, (0000-0600 \text{ hours})}$ 64 dB

In other words the noise impact unacceptable limits set for the GARL project are exactly the same as those specified in the 1996 Regulations, as, even though they do not formally apply in Scotland, the Promoter has committed to applying the principles of those Regulations.

14. While the WRP noise impact unacceptable limits are 3 decibels (dB) less than the limits set by the 1996 Regulations, the Promoter believes this simply reflects the fact that construction of the new Waverley Railway will introduce railway noise to areas where there is currently none and where there is in most case a low baseline noise level, as explained above. Accordingly it appears that the promoter of the Waverley Railway Project deliberately set lower noise impact

unacceptable limits than would otherwise have been the case under the 1996 Regulations. The Promoter, in setting such limits for the GARL project, has committed to applying the same limits as set out in the 1996 Regulations, which is justified in the light of the considerably higher baseline noise levels, including existing railway noise, in the areas through which GARL trains will pass.

15. The Promoter has also set a night time L_{Amax} noise impact unacceptable limit of 70 decibels (dB). Again this is derived from the World Health Organisation (WHO) Guidelines for Community Noise (1999) and British Standard BS8233:1999 and relates to the noise levels at which sleep disturbance is likely. For some reason the WRP Noise and Vibration Policy contains a night time L_{Amax} noise impact unacceptable limit of 82 decibels (dB), which the Promoter believes may indicate reliance on superseded guidance and research reported in the Mitchell Committee Report into Railway Noise and the Insulation of Dwellings (1991). However the Promoter is happy to commit to a lower night time L_{Amax} noise impact unacceptable limit for the GARL project as it believes that 70 decibels (dB) is the correct limit in this regard.
16. With regard to the WHO criteria (both in terms of the L_{Aeq} and L_{Amax}) it should be noted that they represent the lowest noise levels below which the occurrence of particular effects can be assumed to be negligible. Noise levels higher than the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached. In 1998 the UK Department of Environment (DETR) requested the National Physical Laboratory (NPL) together with the Institute of Sound and Vibration Research (ISVR) at Southampton University, review noise standards used for assessing the health impact of environmental noise. The outcomes of this research confirmed that the WHO guideline criteria are interpreted as taking a precautionary approach, and that social, political and historic factors are at least as important in setting noise criteria. In addition, there is no evidence that anything other than a small minority of the population exposed at the WHO guideline noise levels find them to be particularly onerous in the context of their daily lives. Consequently, with regard to the L_{Amax} criteria at night, the Promoter has taken into account that the locality is already subject to train noise at night and set an additional criterion, namely that for those sections of the GARL route which pass along the existing rail corridor the mitigation actions shall not be activated until the numbers of exceedences of this limit due to GARL train movements exceeds 10 a night. This is based not only on the foregoing factors, but also on specific information, contained within the WHO Guidelines for Community Noise, that for a good sleep the criterion of 45 dB L_{Amax} should not be exceeded more than 10 to 15 times a night. In contrast, with regard to the Branch Line where the majority of the locality is free from existing train noise, the Promoter has chosen to implement noise mitigation should the night time criterion of L_{Amax} be exceeded by train noise from GARL services only once a night.

Noise Insulation Regulations

17. The terms of The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (“the Noise Insulation Regulations”) are complex and technical. However, in summary, the installation of “noise insulation” in terms of the Noise Insulation Regulations, means the installation of secondary glazing and associated ventilation measures, or, if that is not practicable, the replacement of existing glazing with double glazing. It can also include, in certain circumstances,

the provision of a second door behind an external door, or replacement of the external door with a new external door with better noise insulation properties than the existing door.

18. It is the duty of the authority responsible for constructing the Railway³⁰ to offer to install suitable noise insulation (whether secondary glazing, new double glazing or replacement doors) in terms of the Noise Insulation Regulations to affected residents who qualify for it. Alternatively, the authority can offer to make financial grants to such residents to pay for the required noise insulation measures. The Promoter undertakes to give a minimum of 21 days notice that such offer(s) are about to be made, in order that affected residents have sufficient time to consider their options in this regard.
19. Eligibility criteria are contained in the Noise Insulation Regulations, to be read in conjunction with the noise impact Unacceptable Limits (i.e. the noise levels above which residents would qualify for noise insulation measures in this Policy Paper)³¹. However to be eligible for suitable noise insulation measures, the relevant building must be residential and located within 300 metres of the railway in question. Accordingly, business premises are not eligible for noise insulation measures under the Noise Insulation Regulations nor are residents who live more than 300 metres away from the new railway.
20. The Noise Insulation Regulations apply on a mandatory basis to new railways and on a discretionary basis to altered/relocated railway tracks. They do not apply to existing and unaltered railway tracks.
21. Accordingly in the case of GARL it is intended that the Noise Insulation Regulations will apply to the new third track between Shields Junction (near Glasgow Central station) and Arkleston Junction (near Paisley Gilmour Street station) and elements of track which is to be relocated/altered in connection with that. The Noise Insulation Regulations will also be applied to the Branch Line (i.e. the new branch line which will run from a point close to Paisley St. James station to the new station at Glasgow Airport). However they will not apply to the existing railway tracks between Glasgow and Paisley St James station (except insofar as those are altered or relocated as part of the GARL project).
22. The Promoter is content to apply the Noise Insulation Regulations (as amended to the extent set out in this Policy) as if they applied in Scotland, and to install measures to mitigate operational railway noise where required. However the Promoter would like to stress that the result of its preliminary assessment of likely noise impacts is that any increases in operational railway noise are likely to be

³⁰ The term “responsible authority” appears in Regulation 2(1) (the Definitions section) of The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 applicable to railways in England and Wales, and is defined in Regulation 2(1) as the “person managing the works in question”. The person responsible for constructing the railway will be the authorised undertaker under the Bill, i.e. the Promoter.

³¹ See paragraph 13 of these Explanatory Notes for a comparison of the Promoter’s criteria and those set out in the Noise Insulation Regulations. To qualify for noise insulation measures by right, the noise impact unacceptable limits of 69dB (day) or 64dB (night) must be breached and the other criteria in the Noise Insulation Regulations relating to proximity of residential buildings to the railway etc must also be met. Note that the effect of the Promoter’s overall mitigation approach for the GARL project (see paragraph 17 of this Policy) may be that noise insulation may be offered by the Promoter (i.e. at the discretion of the “responsible authority”) if noise levels between the Promoter’s noise impact threshold levels and the noise impact unacceptable limits are predicted or actually experienced. However the offer of such noise insulation would not be mandatory i.e. the Promoter would not be compelled to offer it in such circumstances.

negligible or minor, and the installation of noise mitigation measures unlikely to be required. The Promoter's findings in this regard (from Section 4.10 ("Noise and Vibration") of the ES Volume 1 "Non Technical Summary") are reproduced here:

"4.10. Noise and Vibration

This section considered the noise and vibration impacts from the construction and operation of GARL. The assessment sought to:

- Establish the existing background noise and vibration levels at representative, sensitive locations,*
- Assess the noise and vibration impacts of the construction work associated with the new branch line and the third mainline track,*
- Assess the noise and vibration impacts of the operation of the new branch line and the third mainline track,*
- Assess the impact of any changes in road traffic noise from the M8 as a consequence of the scheme, and,*
- Describe the measures to mitigate potentially significant construction and operational noise and vibration impacts.*

Ambient noise and vibration levels have been measured at locations agreed with local authority officers close to the existing and proposed railway lines. Existing and future railway noise prediction were undertaken to the requirements of the 'Calculation of Railway Noise' (CRN) issued by the Department of Transport, 1995, subject to limitations arising from the data available.

The assessment predicted that the increase in noise during the operation of GARL will be negligible or minor and unlikely to give rise to justifiable complaint from local residents. No mitigation to control operational noise is therefore considered necessary. In addition, the impact on road traffic noise on the M8 from operation of the scheme is assessed as being insignificant."

Noise Barriers

23. Railway noise mitigation measures can include noise insulation and noise barriers. However noise barriers will not always be appropriate as there are other

considerations to be taken into account, e.g. those contained in the table below:

Track Safety:	There are Her Majesty's Railway Inspectorate 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 sight 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.

24. Whilst it is anticipated that noise barriers may offer a solution in some locations along the Railway, there may be certain locations where local conditions do not permit noise barriers. In fact the Promoter considers that there are few areas along the route of the Railway where noise barriers could actually be fitted, for some of the reasons outlined above. For example, it is highly unlikely to be appropriate to fit noise barriers along any of the route of the Branch Line, due to the substantially adverse visual impact such visually prominent barriers would probably have if sited along the top of the embankment, viaduct and bridge over the M8.
25. To understand why possible locations for noise barriers cannot yet be determined it must be remembered that much of the GARL route is along an existing and very heavily used railway corridor, to which access is by necessity restricted. The identification of suitable sites for noise barriers will take detailed assessment. Site surveys, including intrusive ground investigation, will be required to establish suitability for the deep foundations that noise barriers need. Also, risk assessments relating to signal sighting, trespass and vandalism, plus an assessment of the impact on maintenance access will be needed. As the GARL project has yet to enter the detailed design stage the signal sighting assessments cannot be carried out at this stage. It is therefore not currently possible to reliably assess the suitability of any sites on the GARL route in terms of noise barrier installation locations and their suitability.
26. Consultation with residents will therefore be undertaken to ensure that, where reasonably practicable, installation of other suitable forms of noise mitigation, including noise insulation, would be agreed during the detailed design process for the Railway. (Noise barriers will be a "last resort" on the GARL project for the reasons stated above, unlike the Waverley Railway Project where the availability of access to the majority of the proposed route and the nature and topography of much of the land involved was such that many noise barriers were capable of

being “designed in” at an early stage of design). However, there may be circumstances, which will vary along the GARL route, which militate against use of some of the three types of mitigation, but it is considered very unlikely that none of the mitigation types will be reasonably practicable.

Train Horn Noise

27. Train drivers are required to sound the train’s horn to warn of their approach in certain situations. The rules regarding when and where a driver must sound the train horn are set by the Rail Safety and Standards Board (RSSB) and are based on legal duties to protect the health and safety of workers and members of the public on and around railways. The original standards for the warning horns fitted to trains originated in the 1960s³² and were based on the objective of giving a clearly audible warning at a distance of 400 metres from a train.
28. Train horns are used in a number of situations including:
 - (a) Warning people that a train is about to move (usually in stations and sidings);
 - (b) When approaching anyone on or near the line;
 - (c) As a train enters and leaves a tunnel;
 - (d) When approaching some public foot crossings where there is no other form of warning available;
 - (e) Any situation where the driver sees a potential hazard such as people standing near the edge of a platform;
 - (f) As an emergency warning.
29. The RSSB’s rules relating to the use of train horns have been changed recently³³, resulting in a significant reduction in locations where use of the horn is required, such as stations and tunnels. The standards relating to the audibility of the horns have also been changed to reduce the maximum noise, and have taken into account both the need for a safety control measure to alert anyone who may be on or near the line and recognising that any noise will have an impact on line side residents. The older rolling stock running along the existing track is more likely to be fitted with louder horns than the more recently constructed rolling stock likely to serve the Railway, which will be fitted with horns meeting the current quieter, though still loud, RSSB requirements.
30. However, given current technology, the use of train horns is an unavoidable component of safe systems of work on the railway.
31. It should be borne in mind that the GARL route will largely follow an existing railway corridor along which train horns are already sounded at various locations. The only “new” section of the route is the Branch Line (Paisley St. James to Glasgow Airport) which is unlikely to include features where the sounding of a train horn will be mandatory and regular. However sounding for emergency and health and safety needs during temporary periods of track maintenance cannot be ruled out. Consequently, overall the Railway is unlikely to result in the introduction of the routine sounding of train horns at new locations previously unaffected by such noise.

³² The original rules were the Rail Safety and Standards Board, Railway Group Standard GM/RT2180.

³³ The new rules are the Rail Safety and Standards Board, Railway Group Standard GM/RT2484.

32. Based on the likely increase in train movements shown in the ES it is predicted that as a worst case the Railway could increase the number of train horn soundings at an existing location where horns are used by slightly more than double the number at present. (At most locations the predicted increase in train movements and therefore possible train horn soundings is less than double). This worst case scenario is predicted to give rise to an increase in overall train horn noise levels of approximately 3 dBA $L_{eq,t}$. This predicted increase in train horn noise level can be put in context by considering that humans, under laboratory conditions, are generally only capable of noticing changes in noise levels of 3 dB or more.

Train Vibration

33. Track forms will be designed adjacent to sensitive receptor buildings using Best Practicable Means to keep within the guideline levels, for example by selecting appropriate low noise/ low vibration track beds, rail heads, track formations, and, where possible, appropriate train wheel profiles. There are however certain limitations to this, such as that operational railway requirements may not permit certain types of lower noise and vibration track bed, rail head, track formation, wheel profile, and that train wheel profiles may depend upon which rolling stock is actually to be used and may not be capable of being changed to suit the GARL route. In situations where existing conditions already exceed the guideline levels (for example below Central Station), Best Practicable Means will be used to mitigate any additional vibration effects from GARL train services.
34. The Promoter would like to stress that the result of its preliminary assessment of likely vibration impacts is that any increases are not likely to be significant. The Promoter's findings in this regard (from Section 4.10 ("Noise and Vibration") of the ES Volume 1 "Non Technical Summary") are reproduced below:

"The assessment also concluded that vibration from increased railway movements would not give rise to justifiable complaints from local residents or result in any structural damage, of even a cosmetic nature, at residential property. In addition, potential vibration issues associated with construction were examined in the Murray Business Area that may interfere with sensitive machinery. However, calculations showed that the levels of vibration that would be generated would not be significant. However, it was considered that construction traffic might generate some vibration in this area and therefore during construction attention to maintaining the quality of road surfaces would be important."

Station Public Address Systems

35. There are no formal statutory regulations covering noise levels from station public address (PA) systems. Network Rail currently have informal internal guidelines which apply when such systems are renewed or upgraded. These include aims to ensure the PA system is at least 10dB louder than ambient noise levels, that the PA system must be adjustable as ambient noise levels change, and that it must be audible in all parts of the station where passengers are likely to wait. This includes ticket halls/concourses, walkways, subways and footbridges, waiting rooms and all sections of platform where passengers normally congregate. Disability Discrimination Act requirements are also relevant, as blind or partially sighted passengers in particular need to rely heavily on station PA systems for train travel information.

36. So far as complaints about noise from station PA systems are concerned, these would be directed to the operator of the station concerned. This is generally the Train Operating Company, as would be the case for Glasgow Airport station, as the operator is responsible for controlling the volume of announcements. Network Rail would generally only have some liability in connection with such complaints if the equipment, which would be owned by them, was found to be faulty. However Network Rail would have a more direct role in dealing with such complaints at Managed Stations, which include Glasgow Central, as they take the role of station operator at those stations.
37. It is difficult to foresee station PA systems noise being a significant issue on the GARL project, as the Airport station will be well removed from most residential properties, as is Glasgow Central and (to a slightly lesser extent) Paisley Gilmour Street. In any case the Promoter does not expect the station PA systems at Glasgow Central and (to a slightly lesser extent) Paisley Gilmour Street to be altered in any way as a result of the GARL Bill and is not seeking to do so through the Bill. However the operator of the Railway will seek to establish appropriate sound levels for the Airport station Public Address system and will seek to address complaints, if they are received from occupiers of nearby noise sensitive premises, as far as is practicable within railway safety requirements.

Monitoring and Maintenance

38. As the detailed design of those elements whose maintenance and repair might affect noise and vibration from the GARL project have yet to be finalised (e.g. track bed, rail head, track formation and wheel /profile), it is not possible to give a detailed schedule for monitoring and maintenance at this stage, as to do so risks under or over estimating the required scale, scope and timing of such a programme. Instead the Promoter wishes to establish in principle that such a scheme will be implemented and to commit to establishing the specific details of such a scheme when the details of those elements whose maintenance and repair might affect noise and vibration from the GARL project have been finalised. However, some particular locations at which noise and vibration monitoring should take place have been specified in this Policy at the specific request of the Bill Committee³⁴.
39. The Waverley Railway Project Noise and Vibration Policy commits to annual monitoring and maintenance surveys of the railway indefinitely. That may well be appropriate in the largely quiet small towns, villages and open countryside through which the new Waverley Railway will run, and where there is no existing railway noise. However Network Rail have confirmed to the Promoter that they do not consider such indefinite annual surveys to be appropriate to the GARL project, where existing noise levels are much higher, there is existing train noise and where trains will run partly on new tracks and partly on existing tracks, all of which will require to be maintained together in the same maintenance programme. Accordingly Network Rail have confirmed to the Promoter that they consider it more appropriate for the GARL-specific monitoring and maintenance scheme to last for approximately 6 years, after which the Railway will in any case be subject to the same monitoring and maintenance regime as the rest of the existing national rail network.

³⁴ See the Consideration Stage Report on the Glasgow Airport Rail Link Bill, Scottish Parliament Glasgow Airport Rail Link Bill Committee, 30 October 2006, (paragraphs 88, 113 and 194), available at www.scottish.parliament.uk/business/committees/glasgowAirLinkBill/reports/gar06-02-Vol01-00.htm

40. While the operator of the Railway will not be Strathclyde Partnership for Transport³⁵, the Promoter can confirm that it would expect the eventual operator of the Railway and/or owner of the rail infrastructure to share the noise and vibration data collected with each other and to timeously publicise the results of the monitoring and maintenance scheme in a readily accessible format for members of the public to access. It is the Promoter's assumption that such information could and would be published on a readily accessible website by either the eventual operator of the Railway and/or owner of the rail infrastructure and also published in paper format along with other information about the Railway. In this way any suspected breaches of noise and vibration limits and/or complaints about station public address systems or the use of train horns could be reported to Network Rail and the relevant train operating companies (e.g. First ScotRail) for them to investigate and deal with as appropriate.

Enforcement

41. It is the Promoter's intention that this Policy (and any future amendment to it or replacement of it) shall form part of the Bill (i.e. the provisions of this Policy shall form part of a Glasgow Airport Rail Link Act if the Bill is passed by the Scottish Parliament and receives Royal Assent).
42. The operator of the Railway³⁶ will use all reasonably practicable means to ensure that this Policy (including any future amendments to it and including the noise and vibration standards within it) will be applied as a minimum set of standards on noise and vibration from the Railway. The Promoter's intention is that it will strive to reduce noise and vibration levels from GARL train services to as low a level (i.e. lower than the maximum permissible levels) as is reasonably practicable in the circumstances. Nor will this Policy be amended or amended or superseded so as to reduce the standards of mitigation and protection contained in it.
43. The Bill will also make the planning permission conferred on the Promoter by the Town and Country Planning (General Permitted Development) (Scotland) Order 1992 subject to a deemed planning condition requiring the Authorised Undertaker to comply with this Policy. (The "Authorised Undertaker" is the body who will be responsible for constructing and running the Railway in due course).
44. The effect of this is that a legal requirement to comply with this Policy will apply just as it would if the Railway were being constructed in accordance with planning permission obtained from the local Planning authorities in the usual way (and as if compliance with this Policy were a condition of that planning permission).
45. The two local authorities (Glasgow City Council and Renfrewshire Council) will therefore be able to enforce compliance with this Policy using their normal powers as Planning authorities for their areas in accordance with existing Planning and Environmental health legislation. If householders who live near to the Railway or other members of the public are concerned in the future about possible breaches of this Policy, they would therefore also be able to report their concerns to the relevant local authority, who would have all their usual investigative and enforcement powers under existing Planning and Environmental health legislation with which to deal with any suspected breach.

³⁵ See footnote 30 to these Explanatory Notes.

³⁶ See footnote 30 to these Explanatory Notes.

46. However it must be remembered that the Bill seeks authorisation for the Railway to be built, not for its operation (i.e. running the GARL train services on it once it is constructed). Operation of the Railway will be (and must be) subject to entirely separate regulation under the Railways Act 1993, and nothing in the Bill or this Policy can override that. (The Promoter has produced a Paper on Railway Regulation³⁷ and refers to that for its terms regarding the regulation of railways in the UK generally and Scotland in particular).

³⁷ This has been lodged with the Scottish Parliament in connection with the Bill and is currently available to download at <http://shandwick.fs-server.com/spt/uploaded/ufile500.pdf>