

A30 Chiverton to Carland Cross Environmental Statement

**Volume 6 Document Ref 6.4 ES Appendix 11.3
Detailed approach to assessment of effects**

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Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure)
Regulations 2009 (as amended)
APFP Regulation 5(2)(a)

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11.3 Detailed Approach to Assessment of Effects

Types of receptor

Residential receptors: direct effects – exceeding the SOAEL¹

- 11.3.1 Where the predicted total noise or vibration increases the baseline noise such that it exceeds the trigger value for onset of a significant observed adverse effect (refer to Table 11-1), then a likely significant noise or vibration effect has been identified on that receptor.
- 11.3.2 Such situations are significant observed adverse effects in terms of government noise policy. For clarity, in the assessment of effects in Section 11.10 of this report, the term 'significant observed adverse effect' is used to describe these effects. This is to distinguish them from effects that are considered to be significant in the environmental impact assessment (EIA) but which are not significant in terms of government noise policy.
- 11.3.3 With reference to PPG-Noise, significant observed adverse effects would generally be on residents inside buildings where the resulting noise or vibration could disrupt activities. Significant observed adverse effects can be avoided by mitigation in the scheme (e.g. noise barriers), mitigation at the receptor (i.e. noise insulation) or a combination of both.

Residential receptors: direct effects – between LOAEL² and SOAEL

- 11.3.4 Where the predicted total level of noise or vibration, including noise from the scheme, is between the trigger values for the onset of an adverse observed effect and a significant observed adverse effect (refer to Table 11-1 and Table 11-2), people's perception of the level of effect is generally indicated by the increase in noise or vibration from what it would be without the scheme. People living in a local community when such a change in noise occurs, may consider it an adverse effect on the acoustic character of the area and hence may perceive it as a change in the quality of life.
- 11.3.5 People who do not experience the acoustic character of an area before a change occurs will consider noise or vibration, where it occurs, based on the absolute level, not the change in level. Their perception of the magnitude of any effect is therefore likely to be lower than those who experience the change. For example, this applies to proposed future residential development that would be occupied following opening of the scheme.
- 11.3.6 For operational noise, consistent with best practice and guidance given in DMRB HD213/11, the magnitude of the impact on a community due to noise change is categorised as negligible, minor, moderate or major. Such impacts can be adverse or beneficial.
- 11.3.7 For construction noise, potential adverse effects are identified where assessment criteria are exceeded. The assessment criteria are defined by the relevant British Standard, BS5228 Part 1 and are set based on the existing ambient noise level

¹ Significant Observed Adverse Effect Level

² Lowest Observed Adverse Effect Level

(the lower the existing level, the lower the trigger level for the assessment category) and are also set at lower levels for evening and then lower levels again for night time.

11.3.8 Taking into account the local context, adverse noise or vibration effects may be deemed to be significant in EIA terms (although not in terms of government noise policy terms). In considering whether the level of effect is significant in EIA terms, the following criteria have been taken into account:

- the change in noise levels (and resulting noise effect on receptors);
- for operational noise, if the change in noise level is near the top or bottom of the DMRB HD 213/11 impact magnitude range;
- the level of noise exposure once the scheme is in operation, particularly if above SOAEL;
- for operational noise, the relationship difference between short-term and long-term changes
- acoustic context in respect of the level and character of the existing noise environment;
- any unique features of the source or receiving environment in the local area;
- circumstances of receptor – e.g. whether sensitive facades are exposed to noise impact;
- designated sites – the proportion of the resource affected by noise impact;
- combined exposure to noise and vibration;
- for construction, the duration of the adverse or beneficial effect; and
- the effectiveness of mitigation measures that are provided.

11.3.9 The evidence used to inform the significance decisions reported in the operational assessment is presented in the Tables 11.12 - 11-15. Results for all receptors in the long-term (the permanent impact) are shown in Appendix 11.5, i.e. absolute noise levels for the Do Minimum and Do Something scenarios and the change in noise levels.

Non-residential receptors: direct effects

11.3.10 Medical buildings, educational buildings and community facilities, along with buildings having specific noise and vibration sensitive resources, are called non-residential sensitive receptors in this assessment.

11.3.11 Assessment of the level of effect of noise or vibration on a non-residential receptor should consider the above criteria, in addition to the following factors:

- the receptor's generic sensitivity to noise or vibration, which is dependent on the use of the receptor; and
- the receptor's specific sensitivity to noise or vibration, for example, the location, construction and layout of a school. This would include matters such as whether the most sensitive parts of the school are closest to and face the scheme or are further from and on the opposite side of a building to the scheme; and the noise insulation performance of the building.

11.3.12 The assessment has considered the noise and vibration exposure at each non-residential receptor and the receptor's generic sensitivity. On a worst-case basis, it assumes that the receptor is the most sensitive it can be. For example, that the most sensitive use in the building is on the side facing the route.

All receptors: indirect effects

11.3.13 The assessment has considered likely noise or vibration effects from temporary or permanent changes in traffic on existing roads caused by the scheme – i.e. indirect effects. The assessment is based on evaluating the likely change in noise or vibration levels at receptors alongside each road, based on the anticipated change in traffic type and numbers. In determining whether effects are significant, the assessment has considered the magnitude of the change, and the particular use, and hence noise sensitivity of any non-residential receptor.

Construction airborne noise

Direct effects - noise

- 11.3.14 Temporary direct impacts from airborne noise may be caused, for example, by construction activities associated with site clearance, earthworks and pavements.
- 11.3.15 Likely significant effects and significant observed adverse effects have been assessed at the closest noise sensitive receptors to the proposed locations for the main construction activities.
- 11.3.16 The assessments have been undertaken at locations that are representative of a number of dwellings or other sensitive receptors. For groups of properties, receptors are chosen to be representative of the worst case (most exposed) location in the group of properties. Where a receptor has multiple uses, the assessment has been made based on the most sensitive use.
- 11.3.17 Construction noise levels have been predicted as the logarithmic average over a calendar month as an $L_{Aeq,T}$. The predictions consider the variation in the programme and the working area for the period assessed. The assessment results present the range of monthly noise levels for a specified assessment location.
- 11.3.18 The predictions are presented as façade levels relating to a position 1m from the building. The assessment considers monthly noise levels but levels would vary day-to-day. Highest daily levels may sometimes be around 5dB higher than the monthly level but would also be substantially lower on other days in that month.
- 11.3.19 Many of the construction processes would move progressively along the line of route. For these processes, noise levels have been considered for the worst case, i.e. when the process is closest to the receptor, and point furthest from the receptor within the same month to derive an average monthly noise level.

Indirect effects - noise

- 11.3.20 Indirect impacts of airborne noise could be caused by temporary changes to road or traffic patterns on the existing road network during construction.
- 11.3.21 It is not expected that temporary haul roads will be required for this scheme, or that noise from construction traffic would give rise to substantial traffic noise increases given that the scheme is already heavily trafficked by HGVs.

Construction vibration

Direct effects - vibration

- 11.3.22 Vibration from construction has been assessed to ensure there is no risk of causing damage to existing buildings and then to assess the response of people to the vibration where they live and work.
- 11.3.23 Temporary direct effects due to groundborne vibration are only caused by a limited number of construction activities such as some types of piling and vibro-compaction.

Indirect effects - vibration

- 11.3.24 Indirect impacts of vibration from construction traffic using the highway network can potentially arise from two sources:
- groundborne vibration produced by the movement of heavy vehicles over irregularities in the road surface; and
 - airborne vibration arising from low frequency noise emitted by vehicle engines and exhausts.
- 11.3.25 It is not expected that temporary haul roads will be required for this scheme, or that airborne vibration would be substantially increased given the scheme is already heavily trafficked by heavy vehicles.

Operational noise

- 11.3.26 Noise levels have been calculated for the scheme including incorporated mitigation, i.e. the earthworks, structures and other measures that are designed to mitigate noise, as well as landscaping or other features included for other reasons, but which also reduce wayside noise.
- 11.3.27 A geographical information system (GIS) has been used to construct a three dimensional noise model of the study area. The model includes terrain data, buildings (and other structures that might screen or reflect noise), ground cover types and road links. Each road link is attributed with information on traffic flow, speed, proportion of heavy goods vehicles (HGVs) and road surface type, from which noise levels were calculated according to CRTN using proprietary noise modelling software.
- 11.3.28 To respond to government policy and the DMRB HD213/11 approach to assessment based on changes in noise levels, noise contour maps have been calculated for the outdoor noise level in terms of the free-field $L_{Aeq,16hr}$ scale at a height of 4m above local ground level. The Figures (11.1-11.4) show the total noise levels in 2038.
- 11.3.29 The details of the prediction results and the assessment of direct and indirect effects are presented in Appendix 11.5. The summary tables of noise change specified in HD 213/11 are also shown in Appendix 11.5.

Operational vibration

- 11.3.30 DMRB HD213/11 requires that the effects of vibration are considered where appropriate. In the case of groundborne vibration, the likelihood of perceptible vibration being caused is particularly dependent upon the smoothness of the road

surface. Research has shown that wayside vibration is only caused by heavy vehicles travelling at speed over large discontinuities in the road surface.

11.3.31 It is a requirement of new highway construction specification that the surface would be smooth and free from any discontinuities of this magnitude (25mm). Paragraph A5.26 of DMRB HD213/11 states that:

“Such vibrations are unlikely to be important when considering disturbance from new roads and an assessment will only be necessary in exceptional circumstances.”

11.3.32 No such exceptional circumstances, such as low vibration laboratories or other facilities requiring very low vibration environments have been identified in the vicinity of the scheme, that are not already in the vicinity of a major highway, and hence no impacts or effects from groundborne vibration from traffic are predicted.

11.3.33 DMRB HD213/11 covers the potential for airborne noise from heavy goods vehicles to cause vibration nuisance close to main roads. As an indication of the scale of impact, paragraph A6.21 states that:

“For a given level of noise exposure the percentage of people bothered very much or quite a lot by vibration is 10% lower than the corresponding figure for noise nuisance.”

11.3.34 It also notes that airborne vibration is expected to affect a very small percentage of people at exposure levels below 58dBL_{A10,18hr} and the significance of any change in airborne traffic vibration can be considered proportional to the significance of changes in traffic noise. The assessment of airborne vibration can therefore be considered to be included within the assessment of airborne noise.

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