



**Gravesham Borough Council
Noise & Vibration Peer Review
Lower Thames Crossing – PEIR**

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1 Introduction

Bureau Veritas (BV) has been appointed by Gravesham Borough Council (the Council) to peer review the noise and vibration chapter of the Preliminary Environmental Information Report (PEIR) for the proposed Lower Thames Crossing (LTC) road scheme. Highways England (the Applicant) is seeking a Development Consent Order (DCO) for this major highways development, which is partially within the boundary of The Council.

The current proposals for the LTC comprise a new road link (three lanes in each direction) connecting the A2 in Kent, east of Gravesend with the M25, south of junction 29. The proposed highway will pass under the Thames via two 16m diameter tunnels, with a length of approximately 4km. The aim of this new highway connection will be to reduce congestion at the existing Thames crossing (bridge and tunnel) at Dartford.

Construction of the new highway, and all associated junctions and road improvements, is expected to take approximately seven years, with a provisional opening year of 2027.

The primary purpose of this report is to ensure that the preliminary noise and vibration information submitted by the applicant, and subsequently the proposals for further detailed assessment, follows an appropriate methodology and makes reference to – and utilises as far as possible – the custom and practice guidance that is available locally and nationally for such an assessment of this scale and nature.

2 Methodology

A number of methodologies can be applied to the peer review of noise and vibration assessments. In brief, the assessment, or proposals for such, should comply with:

- the need to clearly set the defined existing conditions at the Site;
- the extent to which the development is likely to impact on the environment; and
- an assessment of the significance of such impacts as benchmarked against relevant and available criteria.

The whole assessment should be made against prevailing planning policies set by Government, local and regional bodies.

The following primary documents have been reviewed:

- LTC Preliminary Environmental Information Report - Volume 1 (Chapter 13)
- LTC Preliminary Environmental Information Report - Volume 3 (Figures 13.1 - 13.3)
- LTC 13a Map book 1: General Arrangements
- LTC 13b Map book 2: Land use plans

The review has also included consideration of information provided by the applicant within the EIA Scoping Report (SR) (October 2017) submitted by the Applicant, and the subsequent scoping response issued by the Council (01 December 2017), and the Scoping Opinion issued by the Planning Inspectorate (PINS) (December 2017).

Primary Regulations, standards and best practice guidance referred to in this review include:

- The National Policy Statement for National Networks (December 2014) [NPSNN]
- The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [EIA Regs]



- The Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 7 Noise and Vibration HD 213/11 –Rev 1 [DMRB]
- Calculation of Road Traffic Noise 1988 [CRTN]
- British Standard 5228-1:2009+A1:2014 ‘ Code of practice for noise and vibration control on construction and open sites – Part 1: Noise [BS5228-1]
- British Standard 5228-2:2009+A1:2014 ‘ Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration [BS5228-2]

The noise and vibration assessment has thus been peer reviewed in order to inform the Council around issues that may constitute the need for:

- any further clarification: namely those issues for which further detail would provide for additional transparency and/or a clearer understanding on such as assessment methods, assumptions, data, etc;

or

- an omission: those issues deemed within the peer review to be lacking within the preliminary assessment which, if not addressed within the subsequent Environmental Statement (ES), may prevent the planning authority from making an informed decision related to the impacts of the proposed development.

3 Peer Review Findings

3.1 Scoping

Table 1 below provides a summary of the comments by the Council within their scoping response, and commentary on whether, and to what extent, these comments have been acknowledged or addressed within the PEIR.

Table 1: Scoping Responses by the Council

Item	Commentary
Consideration of Noise Important Areas (NIA) within GBC, including any new NIAs that result from the latest round of noise mapping in accordance with the Environmental Noise Directive (END)	<p>Current NIAs are listed in PIER Vol 1 Section 13.4, and shown in PIER Figure 13.1 (Vol. 3).</p> <p>The latest Noise Action Plan for Roads was published by Defra as Draft in October 2018, and is expected to be published as Final by January 2019. New NIA designations are not yet published, but are expected to be available by the time that the DCO application is submitted. It is expected therefore that the assessment presented in the ES will be cognisant of new NIAs, if applicable.</p> <p>The assessment methodology described in PIER Vol 1 Section 13.3 makes no reference to how the impact on NIAs will be assessed (i.e. methods to be employed), with reference to future traffic growth associated with the scheme and committed and future development.</p> <p>As a minimum, it is expected that road noise levels at NIAs are no higher than predicted within the latest round of noise mapping, as the development has the opportunity to introduce new noise mitigation through the design stages.</p>

<p>12.4.6 - More long term baseline noise measurement points required on the western side of the route.</p>	<p>There have been no long term baseline noise measurements along the western side of the route, based on the PEIR Vol 3 Figure 13.2. All measurements (16 no.) to date are daytime only (CRTN Shortened Measurement Procedure). PEIR Vol 1 Table 13.2 states that further noise surveys will be conducted during both daytime and night-time periods, including weekday/weekend periods.</p>
<p>12.6.3 - Current traffic associated with Bluewater Shopping Centre, and future traffic associated with London Resort (if built)</p>	<p>It is expected that traffic associated with Bluewater Shopping Centre is included in the baseline and future scenario traffic forecasts. PIER Vol 1 para 2.24.4 identifies that future scenario traffic data for the detailed assessment noise modelling will include committed schemes only.</p> <p>It is expected that the traffic noise impact of London Resort (if built) or other significant planned projects would need to be assessed as part of the respective planning application for each scheme.</p>
<p>12.6.9 - Operational and construction noise levels triggers agreed by the Council</p>	<p>As previously agreed by GBC, the proposed threshold values are considered reasonable and appropriate.</p>
<p>12.7 - Material transport by rail or water should be considered to reduce road transport. The use of a rail head connected to the North Kent Line in Kent should be considered.</p>	<p>Although PIER Vol 1 Table 13.2 (page 418) states: <i>“Material transportation within the construction phase will use road, rail and water-based transportation systems where appropriate”</i>, this contradicts the statement in PIER Vol 1 para 2.18.30 which states that rail transport of excavated material has been deemed unsuitable.</p> <p>Further discussion on this issue is provided below (see Section 3.2.2e)</p>
<p>12.8.2 - Unpredictable vibration issues associated with chalk substrata.</p>	<p>The SR para 12.7.18 states that potential vibration impacts will be assessed in accordance with BS5228-2, which is the correct standard. PEIR Vol 1 Table 13.15 states that predictive calculation in accordance with the above standard will be carried out once the Project specific construction information is known. No limit values are stated.</p> <p>BV consider that the prediction of groundborne vibration is extremely complex in terms of the number of variables. Whilst prediction following the standard algorithms in BS5228-2 should be carried out, the measures incorporated in the CoCP will be more critical to the control and management of vibration during piling and tunnelling works. Given the susceptibility of chalk substrata to lead to vibration issues, the CoCP should include provisions for trial vibration monitoring during the early stages of works, and an appropriate complaints response process.</p>
<p>12.9 - Mitigation to include low noise surfacing, noise barriers and pumping equipment or ventilation equipment.</p>	<p>PEIR Vol 1 Table 13.16 defines the noise mitigation measures that will be considered for the operational phase, which satisfies the request.</p>

3.2 PEIR

3.2.1 Baseline

- a) As stated in Table 1, additional baseline noise surveys will be conducted to inform the ES. This should include long-term unattended measurements (minimum 4 days) to allow for the variation in local meteorological conditions. It is understood that no additional consultation has been held with GBC Environmental Health department to agree monitoring locations and durations. It is expected that additional monitoring will include locations west of the proposed highway, at residential areas at Singlewell, Riverview Park and Chalk.
- b) Long-term surveys are required to understand both the road noise levels and the diurnal pattern. Further related comment is provided in Section 3.2.3b below.

3.2.2 Construction Phase

Construction Noise Assessment

- a) PEIR Vol 1 para 13.3.16 states that only preliminary construction information is currently available, and therefore the assessment presented in PEIR Vol 1 Table 13.15 is of a qualitative nature. A detailed assessment, using noise prediction modelling will be undertaken once further information becomes available. This assessment should consider potential intra-project effects associated with various construction sites that may be active at the same time, including construction compounds.
- b) PEIR Table 13.15 discusses “the potential for temporary changes in noise levels around areas identified for the potential jetty”. It is not clear from the information provided whether there is an option for a jetty on the south bank of the Thames Estuary, and this looks more feasible on the north bank, given the physical barriers that are the North Kent Railway and Thames Medway Canal.
- c) PEIR Vol 1 para 2.18.15 identifies that a concrete batching plant (continuous operation) may be required at one or both of the tunnel portal construction compounds. As identified in PEIR Vol 1 Table 13.15, noise from this operation as well as that of a tunnel segment production facility will result in noise impacts over an extended duration. Likewise, if slurry Tunnel Boring Machines (TBMs) are required, operation of the slurry treatment plant would be continuous. PEIR Vol 1 Plate 2.6 indicates that the tunnelling phase will provisionally be from Q3 2021 to Q4 2026, albeit that it is expected that tunnel boring and lining would only take place for a portion of this period (not defined in the PEIR). Given the number and proximity of residential receptors south of the River Thames, impacts are likely to be less significant if these operations were to occur within the north tunnel portal compound.

Vibration Assessment

- d) This issue is discussed in Table 1 above. The assessment of potential impacts from tunnel boring operations should consider both vibration and ground borne noise. There have been a number of research papers^{1,2} produced on the potential noise and vibration effects of tunnelling which should be considered.

Temporary Road Noise Assessment

- e) PEIR Vol 1 Table 13.15 identifies potential noise impacts associated with temporary construction traffic required for deliveries and to transport excavated material off site. It is understood that the final solution for the transport of excavated material is still to be decided, although it must be expected that some road transport will be required. It is recommended that the assessment presented in the ES should consider a worst-case scenario (in accordance with the Rochdale Envelope principle approach as stated at PEIR Vol 1 para 2.1.16), as well as

¹ Anderson, D. and Hiller, D. Noise and vibration issues in tunnels.

² Hiller, D. and Hope, V. Groundborne vibration generated by mechanised construction activities, Proc. Institution of civil engineers, Geotechnical Engineering, 1998.

the likely scenario (mix of road and river), so that an informed decision can be made at the DCO Examination stage.

3.2.3 Operational Phase

Permanent Road Noise Assessment

- a) Whilst it is understood that a full assessment will be presented in the ES in accordance with the Detailed Assessment methodology defined within DMRB, no preliminary indication of the potential road noise impacts at night is presented within the PEIR. Furthermore there was no consideration of night time noise effects presented in the SR, which is a requirement of DMRB para 7.7.
- b) Understanding the diurnal pattern of the future traffic flow will be critical to the assessment of night-time noise impacts. Due to the significant volume of HGV traffic likely to use the new highway at night to connect to and from Dover port, it is unlikely that TRL³ Method 3 would be appropriate. The assessment of future scenario road noise at night should be assessed using Method 1, which relies on hourly traffic data. The method to be adopted is not stated in the PEIR.
- c) PEIR Vol 3 Figure 13.3 shows the operational noise effects within the DMRB study area (600m from the carriageway edge). However, it appears that the presented boundary lines, and therefore the receptors they cover, are not consistent. For example, Sheet 3 of this figure presents the preliminary 'Potential Short Term Operational Road Traffic Noise Impacts' along the proposed highway to the east of Gravesend. Where the route bends, the boundary line does not remain parallel, so that the actual area of impact identified is much less (approximately 470m) than the 600m required. This results in a misleading representation of the scale of the adverse noise impact, which should include many more properties in Chalk.
- d) No reference is made to tunnel portal reflection effects in the PEIR. However, as there are no receptors within 100m of the proposed tunnel portal, the reflection effects would not be perceptible and therefore a detailed analysis of such effects is not required (DMRB para 4.8).

Permanent Road Vibration Assessment

- e) In the SR, the Applicant sought to scope out further assessment of operational vibration effects, however it is noted that the PINS (Scoping Opinion Section 4.7 ID 1) rejected this approach, requesting that operational ground borne vibration be assessed within the ES. The report referenced within PEIR Vol 1 para 13.3.23 describes measurements of vibration propagation from cut and cover tunnels and not tunnels bored through the bedrock, which may have a solid connection (higher vibration transmissibility) to building foundations. It is acknowledged however that vibration generated by a new operational road, both at surface level and within tunnels, is unlikely to generate significant ground vibration, due to the lack of discontinuities in the road surface. Therefore, due to the low probability of adverse effects, further detailed prediction and assessment of vibration from road traffic in the operational phase is not considered to be necessary.

³ Abbott, P.G. and Nelson, P.M. (2002). Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping. Transport Research Laboratory, Crowthorne

4 Conclusions and Recommendations

Based on the information presented within the PEIR, Bureau Veritas are led to conclude that, whilst it would have been useful to have been provided with an initial indication of night time road noise impacts at this stage, the approach if followed to the full DMRB methodology will provide a robust assessment within the ES. Additional baseline noise monitoring is required to determine existing road noise levels at receptors, and to derive the diurnal pattern for road traffic noise along the strategic road network, which should align with the forecast hourly traffic data. Additional monitoring should include locations west of the proposed highway, at residential areas at Singlewell, Riverview Park and Chalk.

The assessment information available within the PEIR limits the extent to which actual impacts can be appraised. However, key decisions regarding the construction phase will clearly significantly influence the degree of adverse impacts, notably the material excavation strategy and tunnel drive (enabling plant) location.