ArupTransport

Tyne and Wear Passenger Transport Authority

New Tyne Crossing

Proof of Evidence on Noise and Vibration

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1. QUALIFICATIONS AND EXPERIENCE

1.1 My name is Christopher James Manning. I hold a Bachelor of Science degree in Special Physics from the University of London and a Master of Science degree in Noise and Vibration Studies from the University of Southampton. I am a Chartered Engineer, a Member of the Institution of Mechanical Engineers and a Fellow of the Institute of Acoustics.

1.2 I am a Director of Ove Arup & Partners Ltd with particular responsibilities for noise and vibration consultancy within the firm. I have more than thirty years experience in the fields of transportation and environmental noise and vibration control, and have acted as an expert witness on many occasions.

1.3 I was responsible for the Noise and Vibration assessment carried out as part of the Environmental Impact Assessment for the New Tyne Crossing.

1.4 My evidence covers noise and vibration from temporary construction activities, long term operational issues from fixed plant and road traffic using the new highways and increases in traffic on existing roads.

2. CONSTRUCTION ISSUES

Regulatory Framework

2.1 Construction noise and vibration has been assessed using the guidance contained in BS5228 and, for construction vibration, additional guidance contained in BS6472 and BS7385. Extracts from these documents are included at the Appendices.

2.2 There are no regulatory limits on construction noise and vibration, however, their control is governed by the Control of Pollution Act 1974.

Existing Conditions

2.3 The strategy for assessing construction noise impacts has regard to ambient noise levels in deriving assessment categories. An ambient noise survey was therefore conducted, at locations identified in Figures 6.1 and 6.2 (extracted from the Environmental Statement) at Appendix A and the results recorded in Appendix B, Table CM1.

2.4 The method of assessing construction vibration impacts is based on absolute values independent of ambient vibration levels and it was not therefore necessary to survey ambient vibration levels.

Assessment Method

2.5 The prediction of construction noise levels followed the methodology of BS5228 using plant sound power levels from the database in that Standard and our own database where this provided more up to date information.

2.6 At this stage in the outline design process, it is not possible to define fully the construction practices. The construction methodology is the responsibility of the Concessionaire. Consequently, it is not possible to prepare detailed inventories of construction plant for use in noise and vibration predictions.

2.7 In order to undertake indicative calculations of construction noise and vibration it was necessary to make assumptions, based on professional experience from similar schemes, of the number of events that would occur within the assessment period, the noise and vibration levels and the duration of the events. This approach represents a realistic worst case. The activities and plant that were assumed would be used and that generate noise and/or vibration sufficient to require consideration are shown at Appendix C.

2.8 These predicted construction noise levels were then compared to significance criteria as detailed in Table CM2 at Appendix B. These criteria have been based on those applied for other recent major infrastructure construction projects within the UK and have been subject to scrutiny at Public Inquiry and through Government Select Committee.

2.9 This methodology identifies potential noise impact in 5 dB steps, consistent with the accuracy of the assumptions and prediction methods at this early stage of a project.

2.10 A significant construction noise effect is then identified where a predicted noise impact would occur at a noise sensitive receptor (eg school, library, church) or a group of five or more residential properties.

2.11 Predictions of construction vibration were based on the same assumptions (at Appendix C) using the methodology of BS5228, Part 4, for non-percussive piling and published empirical predictions for other potential sources of vibration.

2.12 Construction vibration criteria were used to asses the potential for disturbance to occupiers and users of buildings and, separately, to assess the risk of damage to structures. Criteria for assessing disturbance are presented in Table CM3 at Appendix B and for potential damage a trigger level of 10mm/s ppv (just below the zero probability of damage threshold of BS7385, Part 2).

2.13 Vibration can also impact on certain sensitive equipment and processes, but none of these have been identified. Any such situations would need to be dealt with specifically rather than using a generic impact assessment.

Findings

2.14 Significant construction noise effects were identified at a number of properties (see Table CM4 Appendix B).

2.15 The majority of these are due to the tunnel cut and cover works both north and south of the River Tyne and, to the south the complex bridge, earth and road works.

2.16 Vibration from cut and cover operations, bridge, earth and road works will be well below damage risk limits for structures, though some vibration might be felt by occupants of residential properties up to 100 metres from the works. The significant effects listed in Table CM4 are therefore predominantly due to noise.

2.17 Demolition of existing buildings to make way for the tunnel works are unlikely to have a significant effect due to their small scale, location and relatively short duration. Dredging operations are not predicted to give rise to significant noise and vibration effects. The nearest residential properties are more than 200 metres away and the dredging activity is not atypical of the area.

2.18 Construction of the casting basin may give rise to significant noise and vibration depending on the method of piling, location and depth. This could have a significant effect on office elements of the nearby industrial/commercial buildings. There would be no significant noise and vibration impacts on residential property.

2.19 Whilst some modifications to works and hence construction methods/programme may have been considered since the time the Environmental Statement was prepared, these are unlikely to substantially change the construction noise and vibration findings.

2.20 A step change in the level of detail, assumptions and predictions will only take place when the Concessionaire is on board.

2.21 A Code of Construction Practice (as appended to Paul Johnson s proof of evidence) has been prepared which will be contractually binding on The Concessionaire, requiring him to prepare method statements and carry out detailed noise and vibration predictions for submission to the relevant Local Authority to obtain prior consent for work packages under Section 61 of the Control of Pollution Act.

Mitigation

2.22 The main strategy for mitigating construction noise and vibration effects will be based on the following principles:

- selection of quietest practicable method and plant for each stage of the works;
- local screening;
- location of stationary plant to minimise impacts;
- timing of particularly noisy works to minimise disturbance;
- restrictions on working hours; and
- liaison with occupants of affected properties.

2.23 It is a requirement of the Control of Pollution Act 1974 that Best Practicable Means (BPM) are used to minimise noise and vibration disturbance from construction works. For example, percussive driving is the piling method that generally causes the greatest noise disturbance and other techniques may be appropriate, such as continuous flight auger (CFA). Where the use of BPM as it relates to the method of working cannot prevent disturbance, it may be necessary to provide additional mitigation.

2.24 The Code of Construction Practice confirms the need to employ BPM and also contains trigger levels for provision of noise insulation and for temporary re-housing.

3. OPERATIONAL ISSUES

Regulatory Framework

3.1 The Department of Transport (now published by Highways Agency) document Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment (Section 3 Part 7: Traffic Noise and Vibration) provides guidance on defining a study area and methodology for assessing operational noise and vibration impacts.

3.2 Road traffic noise levels are calculated in accordance with Department of Transport (now DTLR) publication 'Calculation of Road Traffic Noise' (CRTN) 1988.

3.3 This calculation method is also approved for determining eligibility under the Land Compensation Act 1973: Noise Insulation Regulation 1975 as amended 1988 for residential property affected by new or altered highways.

3.4 Fixed plant associated with the ventilation building is controlled by the Environmental Pollution Act 1990.

Existing Conditions

3.5 An ambient noise survey to determine existing conditions was undertaken in accordance with the Stage 3 guidelines provided in DMRB (Appendix D). The results of the ambient noise survey are presented in Table CM1 at Appendix B. The majority of the baseline noise surveys were carried out during 2000 by Newcastle City Council, as lead authority for the Tyne and Wear Passenger Transport Authority, and the results were reviewed by and discussed with Arup Acoustics. Additional data were recorded by Arup in 2001. The noise measurement locations are shown in Figures 6.1 and 6.2 (extracted from the Environmental Statement) at Appendix A.

3.6 Traffic noise is the dominant source of ambient noise in the study area except in the immediate vicinity of the existing ventilation building. Therefore, the acoustic descriptor used to define the majority of the noise levels is the $L_{A10,18\ hour}$. For practical reasons, some measurements were recorded on the basis of the shortened measurement procedure described in CRTN rather than continuous measurement over 18 hour periods. In accordance with the shortened measurement procedure, these measurements were undertaken between 1000 hrs and 1700 hrs.

3.7 The proposed scheme would involve the provision of an additional ventilation building. Noise levels for the existing building were monitored at 15 Ferry Street. Sample noise levels were monitored during the day with the ventilation system running in the normal mode, and with the system on full. Background noise measurements (not affected by the influence of ventilation noise) were made during the night at 15°Ferry Street and 59 Commercial Street. The acoustic descriptor for ventilation noise levels was the equivalent continuous noise level, $L_{Aeq,T}$.

Assessment Method

3.8 The fundamental recommendation of the DMRB with regard to traffic noise is that the assessment of environmental impacts should be based on a comparison between the noise levels that would be caused by the scheme and those that would arise if the scheme were not implemented. The assessment for this scheme examined noise levels at the opening year and

at the design year (the year for which traffic flows are expected to be a maximum within a period of 15 years after opening to traffic).

3.9 Significance criteria were based on this DMRB guidance, having regard to ambient noise level bands based on the survey data, magnitude of change in noise levels, and the number of properties affected, and are presented in Table CM5 at Appendix B.

3.10 DMRB also recommends a procedure for assessing airborne vibration based on the likely percentage of people 'bothered' by this issue and this procedure was followed.

3.11 Assessment of the ventilation plant was made using the guidance of BS4142, 1997 to develop significance criteria.

3.12 Whilst it is not a requirement of the Environmental Assessment process to determine eligibility for residential properties under the Noise Insulation Regulations 1975 as amended 1988, an indication of how many properties might be eligible under these Regulations may be informative in assessing the effects. Predicted traffic noise levels were therefore compared to a preliminary estimate of prevailing levels to estimate the number of properties that might qualify for noise insulation grants as a result of the scheme.

3.13 It was not considered appropriate to propose assessment criteria for operational ground-borne vibration in the Environmental Statement, as ground-borne vibration was considered highly unlikely to be significant. Ground-borne vibration from road traffic is dependent on the smoothness of the road surface and is accepted only to be significant if there are irregularities in that surface. The surface of the new roads would be smooth with no irregularities of sufficient size to give rise to perceptible ground-borne vibration.

Findings

3.14 Representative noise levels for "do minimum and "do something" scenarios for years 2006 and 2021 are presented in Figures 6.5 and 6.6 (extracted from the Environmental Statement) at Appendix A. A full set of assessment results is presented in Table CM5 at Appendix B. This table shows the number of noise sensitive properties affected, categorised by the magnitude of the change and existing ambient noise level bands.

3.15 In general the scheme would not give rise to significant operational noise effects, with the majority of properties experiencing changes in noise levels of less than 3 dB. All such changes are rated "negligible".

3.16 Properties in Priory Road are the exception, where, due to reduced traffic flow along that road, reductions in noise levels of 3-4 dB are predicted which is a beneficial improvement.

3.17 An assessment was also made of indirect noise effects on existing roads where there were predicted traffic increases of ≥25% or decreases of ≤-20% outside the area assessed in accordance with DMRB. These were listed in Table CM7 at Appendix B and the roads identified in Figure 6.7 (extracted from the Environmental Statement) at Appendix A.

3.18 This assessment needs to be viewed with caution since it reflects only changes in predicted traffic volume along a given road. Further examination of the traffic model shows much of this growth is generated by future development. I have visited the area shown in Figure 6.7 at Appendix A, and am satisfied that indirect traffic noise impacts from the scheme will be negligible.

3.19 The Environmental Statement indicated that some properties in Mitford Street, Brinkburn Street and Meldon Street to the north of the Tyne and Regent Road and Epinay Walk might qualify under the Noise Insulation Regulations as a result of the scheme. This was because existing traffic noise levels in these areas were either at or close to the specified level, the scheme adding 1 - 2 dB to trigger eligibility. The new ventilation building is not predicted to cause a significant noise effect. The detailed selection of fans and design of the building should be undertaken to comply with the guidance of BS4142.

Mitigation

3.20 The alignment of the A19 was selected, as far as was practicable, to minimise the adverse noise effects of the scheme by taking account of the natural landforms and the corridor of disturbance resulting from existing trunk roads and industrial facilities.

3.21 There are no properties predicted to experience a significant adverse effect (noise level increase in excess of 3 dB) as a direct result of the scheme. There is therefore no requirement to provide additional mitigation for operational noise arising from the assessment of impact.

3.22 Where practical, it is considered good practice to use mitigation to control noise levels where there might otherwise be an increase that would trigger the requirement for an insulation grant under the Noise Insulation Regulations. A full Noise Insulation Regulations assessment would be undertaken at detailed design stage, and there may therefore arise further recommendations for mitigation at this point. Such mitigation might take the form of barriers, earth bunds or low noise road surfaces.

4. CONCLUSIONS

4.1 There will be some temporary noise and vibration effects as a result of the construction of the New Tyne Crossing. These are mitigated by having a Code of Construction Practice which will be contractually binding on the Concessionaire, requiring him to exercise Best Practical Means to minimise noise and vibration levels and to obtain prior consent for all work packages by submitting method statements and predicted noise and vibration levels to the Local Authorities.

4.2 Operational noise and vibration will have no significant effect on the area. Fixed plant will be designed to meet standards agreed with the Local Authorities and there will be no residual effects from changes in road traffic.

4.3 A number of objections to the scheme have been received and, where these raise noise and vibration issues, I have responded to these in Appendix E.

4.4 I conclude that the information I have provided addresses the matters raised in paragraph 9 of the Office of the Deputy Prime Minister s Statement of Matters concerning the impact of noise and vibration, and that these matters will be adequately mitigated by the project.