Appendix 8.19

Uncertainty and Limitations of the Assessment

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Introduction

Throughout the assessment process, measures have been taken to minimise as far as possible any uncertainty in the consideration of the potential noise and vibration impacts and effects that may arise as a result of the construction and operation of the proposed Northampton Gateway development.

While it is not feasible to remove all uncertainty involved when assessing the possible impact of a development that doesn't yet exist for scenarios up to 25 years in the future, it is considered that the approaches taken have resulted in a technically robust outcome based on the available data.

Further information regarding the consideration of uncertainty and accuracy for the different elements of the assessment process is given below.

Baseline Conditions – Noise Surveys

The initial approach to the baseline noise surveys was to secure a minimum of two weeks of unattended monitoring at 15 different locations around the SRFI and Roade Bypass sites with daily checks on weather conditions during the surveys so that any major periods of unusable data were identified. The length of the surveys was deemed sufficient to gain data representative of typical conditions, reducing the uncertainty that would otherwise be associated with shorter-term surveys. The unattended monitoring was supplemented by two sets of short-term attended monitoring at eight locations, and three short-term measurements in accordance with the methodology set out in Calculation of Road Traffic Noise (CRTN), the results of which were used in the verification of the road traffic noise model.

Following a review of the data collected from the unattended surveys, it was found that wind conditions during the measurements at seven of the locations were largely atypical, i.e. a majority of broadly north-easterly winds. This was particularly important given the effect that wind direction has on the background sound levels in the area due to the differences that can occur in the propagation of road traffic noise from the M1. Consequently, the unattended surveys were repeated at the seven locations for a further two weeks to obtain sufficient data under broadly south-westerly wind conditions. This additional monitoring enabled a more robust dataset to be produced.

The noise monitoring equipment used for the surveys conformed to the Class 1 specification from BS EN 61672-1:2003[1], with all sound level meters within 2 years of laboratory calibration, and all acoustic calibrators within 1 year of laboratory calibration. Monitoring equipment underwent field calibration before and after every unattended survey and every set of attended measurements. In all cases, no significant drift in calibration was observed.

Baseline Conditions – Vibration Surveys

Attended vibration measurements of freight and passenger train movements were undertaken at two locations representative of the closest receptors to the Northampton

[1] BS EN 61672-1:2013 Electroacoustics - Sound level meters, Part 1: Specifications

Loop line. During the first set measurements at one of the locations, only two freight train passes were measured. Consequently, measurements were repeated at this location on a different day in order to obtain a larger sample of freight train passes and, hence, reduce uncertainty in the results.

Receptors

It is impractical to predict the potential noise impact and effects from the various elements of the Proposed Development at every nearby noise-sensitive property. Instead, as is common practice, representative receptors were carefully selected based on their location relative to the different sources of noise within the development, and their location with respect to other noise-sensitive properties nearby. A total of 67 receptors were used in the assessment of the potential noise impact from the Proposed Development.

With regard to the Roade Bypass, Ordnance Survey AddressBase data were used to give a further indication of the number of noise-sensitive properties in the vicinity that could be affected, further reducing the uncertainty associated with the assessment of its impact.

Derivation of Background Sound Levels used for Operational Assessment

The unattended noise survey measurements were carefully analysed and processed to arrive at background sound levels representative of typical conditions at the survey locations. In order to minimise uncertainty, the following steps were taken to process the raw measurement data:

- Data were removed where periods of moderate or heavy rainfall and/or high winds were identified;
- Data were removed where sound from the dawn chorus was identified as being a significant influence on the measured levels; and
- The data were divided into measurements made during broadly south-westerly winds and broadly north-easterly winds.

Using the two datasets of measurement data under different wind conditions, the following steps were taken to derive representative background sound levels:

- The modal value of the background sound level at each survey location was identified for both wind conditions; and
- The lower quartile value of the background sound levels at each survey location was identified for both wind conditions. When the lower-quartile value was more than 2 dB(A) lower than the modal value, this suggested that the modal value may not accurately represent the typical background sound level. In that situation, the lower quartile value was also used in the analysis as an additional sensitivity check.

Finally, the modal and lower quartile values were corrected where required so as to be representative of the background sound levels expected at the receptors (rather than at the actual measurement locations). A combination of predictions and comparison with the appropriate short-term attended noise measurements was used to do so (see Appendix 8.11). Operational sound was assessed under both wind conditions.

Construction Noise Predictions

Prior to the appointment of a construction contractor, detailed information regarding the programme and methods of construction is not known.

The predictions of construction noise were based on detailed work undertaken for a similar development, which included SRFI and bypass sites. This reduced the uncertainty regarding whether the activities and equipment considered were representative of those that might be used in the construction of a development of this type.

BS 5228-1:2009+A14:2014[2] states that calculations of construction noise propagation may be made in octave frequency bands to a provide more accurate indication of the attenuation provided by any barriers between the sources and receptors. However, it does not provide a method for the precise calculation of octave frequency band barrier attenuation. Therefore, the calculation method from ISO 9613-2:1996[3] has been utilised to model the propagation of construction noise sources and, hence, increase the accuracy of the results.

Railway Noise and Vibration

The number of trains used for the prediction of the potential impact from railway noise and vibration included passenger and freight train growth for the future scenarios as detailed in Appendix 8.3, including the additional freight trains serving the SRFI. This information has been provided by the project rail consultant based on currently available information, including studies by Network Rail and the Department for Transport. It is noted that the growth forecasts are complicated by the opening of HS2 Phase 1 in 2026 and the likely reconfiguration of West Coast Main Line operations, for which full details are not yet available. All other information regarding railway operations, including train types and speeds, has been provided by the rail consultant.

While two types of freight locomotive have been assumed for the predictions of railway noise (see Appendix 8.3), it is likely that other types of locomotive that produce lower levels of noise will be used for some of the freight movements. However, it is not possible to accurately identify how many movements this may affect. This means that worst-case and robust assumptions have been considered for this aspect.

The results of the railway noise model were verified for the baseline scenario using the relevant survey measurements as shown in Appendix 8.4.

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[2] BS 5228-1:2009+A1:2014 – Code of Practice for noise and vibration control on construction and open sites, Part 1: Noise

[3] ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of calculation, ISO (1996)

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Road Traffic Noise

The transport consultant has provided the following information regarding the road traffic data used for prediction of road traffic noise for the baseline and future scenarios:

The traffic data used in the assessment comes from Northamptonshire County Council's (NCC's) strategic transport model, the Northamptonshire Strategic Transport Model (NSTM2). The NSTM2 allows for traffic re-assignment, congestion, and the cumulative impacts of committed and allocated future developments and highway infrastructure improvements to be taken into account in the traffic data used for assessment purposes. The NSTM2 is operated and maintained on NCC's behalf by WSP Ltd. The model has recently undergone a major update, which included calibration and re-validation of the base model traffic flows to observed traffic survey data, to ensure that it was fit for the purpose of assessing the Proposed Development impact.

WSP Ltd prepared a Local Model Validation Report (LMVR) specific to the NSTM2 for the Northampton Gateway SRFI development. The LMVR demonstrates that the base model NSTM2 is an appropriate base from which the forecast year scenarios were developed for assessment of the development traffic impacts. Both NCC, as local highway authority, and Highways England approved the use of the NSTM2 for assessment of the development traffic impacts.

The results from the road traffic noise model were verified for the baseline scenario using the appropriate survey measurements as shown in Appendix 8.4.

Operational Sound from SRFI Activities

The number of HGVs travelling on the roads within the SRFI have been supplied by the transport consultant and have been divided by the warehouse or facility they are expected to serve based on estimates of the facility operating at full capacity. The number and type of train movements travelling on the tracks within the SRFI have been supplied by the rail consultant, as well as details of the expected rail terminal operations. Further details are provided in Appendix 8.5.

Measured data of operational sources have been used wherever possible. This approach has reduced the uncertainty that would otherwise be involved with using manufacturer's data or data from third-party sources such as conference papers where the activities being carried out during the measurements may be unclear. Measured data included:

- HGV manoeuvring and loading activities at the warehousing;
- Gantry crane sources during container movement activities;
- Reach stacker activity during container movements activities; and
- Telehandler movement.

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Assessment of Noise within Residences

As detailed façade sound insulation performance of noise-sensitive receptors is not known, the typical attenuation for sound passing through an open window has been assumed when assessing the possible levels of sound within properties due to sources associated with the Proposed Development, especially as part of the consideration of context. This means that worst-case and robust assumptions have been considered for this aspect and reduces the uncertainty of different residential facades attenuating sound by different amounts.