The Great Grid Upgrade

Sea Link

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Part 2 Suffolk
Chapter 9 Appendix 2.9.B
Suffolk Construction Noise and Vibration Data

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1. Construction Noise and Vibration Data

1.1 Introduction

1.1.1 This appendix presents the data used in the assessment of construction noise and vibration at noise and vibration sensitive receptors (NSR).

1.1.2 This appendix is presented in two sections:

- construction noise; and
- construction vibration.

1.2 Construction Noise Data

Introduction

1.2.1 This section details the approach to the assessment of construction noise impacts from the Proposed Project.

Assessment Methodology

1.2.2 Indicative construction plant and data associated with each proposed construction activity is provided in **Application Document 6.3.1.4.B Appendix 1.4.B Construction Plant Schedule**. The appendix also provides the average expected sound levels for each activity. For the purposes of this assessment, activities have been grouped into their respective construction areas, as follows:

- substation and converter station construction;
- cable construction;
- overhead line construction;
- overhead line dismantling;
- haul roads construction;
- compound construction;
- trenchless crossings; and
- compound operation during construction.

1.2.3 The worst-case activity within each area is considered.

1.2.4 Indicative distances within which Significant Observed Adverse Effect Levels (SOAEL) may be exceeded during daytime, evenings and weekends, and night-time periods, have been calculated based on the calculation methodology described in British Standard 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS 5228-1) (BSI, 2014).

1.2.5 Although best practicable means (BPM) will be implemented to reduce levels of construction noise affecting NSR, this initial assessment does not take account of

specific mitigation measures, such as screening. This is so that potential construction noise ‘hot-spots’ can be identified. Where required, Specific mitigation measures can be specified and put in place, secured by a requirement in the Development Consent Order (DCO), at those locations. The exception to the exclusion of screening within this initial assessment is specific plant and activities where screening would be expected as standard, such as fixed plant items (generators and compressors), and jackhammering activity. All other sources are unscreened for the purposes of this assessment.

1.2.6 Although the assessment assumes no specific mitigation measures, where screening is applied as part of BPM, noise levels would be expected to be reduced by between 5 and 10 decibels (dB). Other BPM measures may reduce noise levels further.

Construction Noise Threshold Distances

1.2.7 Indicative distances within which SOAEL may be exceeded during daytime, evenings and weekends, and night-time periods are provided in Table 1.1.

Table 1.1 Construction activity noise SOAEL distances without mitigation

Activity	Worst-case activity sound level at 10 m, dBA	Distance, m, within which SOAEL may be exceeded		
		Daytime (65 dBA)	Evening and weekends (55 dBA)	Night-time (45 dBA)
Converter station and substation construction	89	145	363	912
Cable construction	88	132	331	832
Overhead line construction	89	145	363	912
Overhead line dismantling	81	69	174	437
Haul roads construction	89	145	363	912
Compound Construction	81	69	174	437
Trenchless technique	71	28	69	174
Compound operation during construction	75	40	100	251

1.3 Construction Vibration Data

Introduction

1.3.1 The construction vibration assessment has been undertaken with reference to the methods and empirical data outlined in BS 5228:2009+A1:2014 Part 2 (BS 5228-2) (BSI, 2014).

1.3.2 The main significant sources of vibration during construction activities are expected to be ground compaction and piling. These processes may be required during the following activities:

- Ground compaction with vibratory roller:
  - setup of site compounds;
  - site preparation;
  - haul road construction; and
  - cable laying.
- Piling:
  - pylon foundations; and
  - substation foundations.

Prediction of Construction Vibration

1.3.3 Peak particle velocity (PPV) vibration levels in millimetres per second (mm/s) generated by ground compaction and piling activities can be predicted using the guidance and empirical formulae in Table E1 of BS 5228-2. The formulae are shown below.

Vibratory roller

Calculation

$$v_{res} = k_s\sqrt{n_d}\left[\frac{A}{x+L_d}\right]^{1.5} \qquad \text{(Equation 1)}$$

Where:

- V_{res} = Resultant PPV, in millimetres per second (mm/s).
- k_s = Scaling factor (and probability of predicted value being exceeded).
- n_d = Number of vibrating drums.
- A = Maximum amplitude of drum vibration, in millimetres (mm).
- x = Distance measured along the ground surface, in metres (m).
- L_d = vibrating roller drum width, in metres (m).

Assumptions

- Scaling factor of 75, representative of average conditions.

- Vibratory roller data based on Bomag BW 213, 1 drum of 2.13 m width and maximum amplitude of 1.1 mm.

Percussive piling

Calculation

$$v_{res} \leq k_p \left[\frac{\sqrt{W}}{r^{1.3}}\right] \quad \text{(Equation 2)}$$

Where:

- V_{res} = Resultant PPV, in millimetres per second (mm/s).
- K_p = Scaling factor (depending on soil conditions).
- W = Nominal hammer energy, in joules (J).
- r = Slope distance from the pile toe, in metres (m).

Assumptions

- Typical value of nominal hammer energy of 25 kJ.
- Scaling factor of 1.5 representative of typical soil conditions.

Vibration Prediction Threshold Distances

1.3.4 Equations 1 and 2 have been used to predict the minimum distances within which the vibration threshold values human comfort impacts from vibration in terms of SOAEL and potential cosmetic building damage may be exceeded (1.0 mm/s, and 12.5 mm/s PPV respectively). The calculated distances in Table 1.2 are used in the preliminary assessment to identify areas where NSR are potentially affected by construction vibration.

Table 1.2 Summary of representative background sound levels

Activity	Distance within which SOAEL may be exceeded, m	Distance within which cosmetic damage may occur, m
Ground compaction	18	<2
Percussive piling	70	<10

References

BSI. (2014). *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1: Noise.* London: BSI.

BSI. (2014). *BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration.* London: BSI.

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