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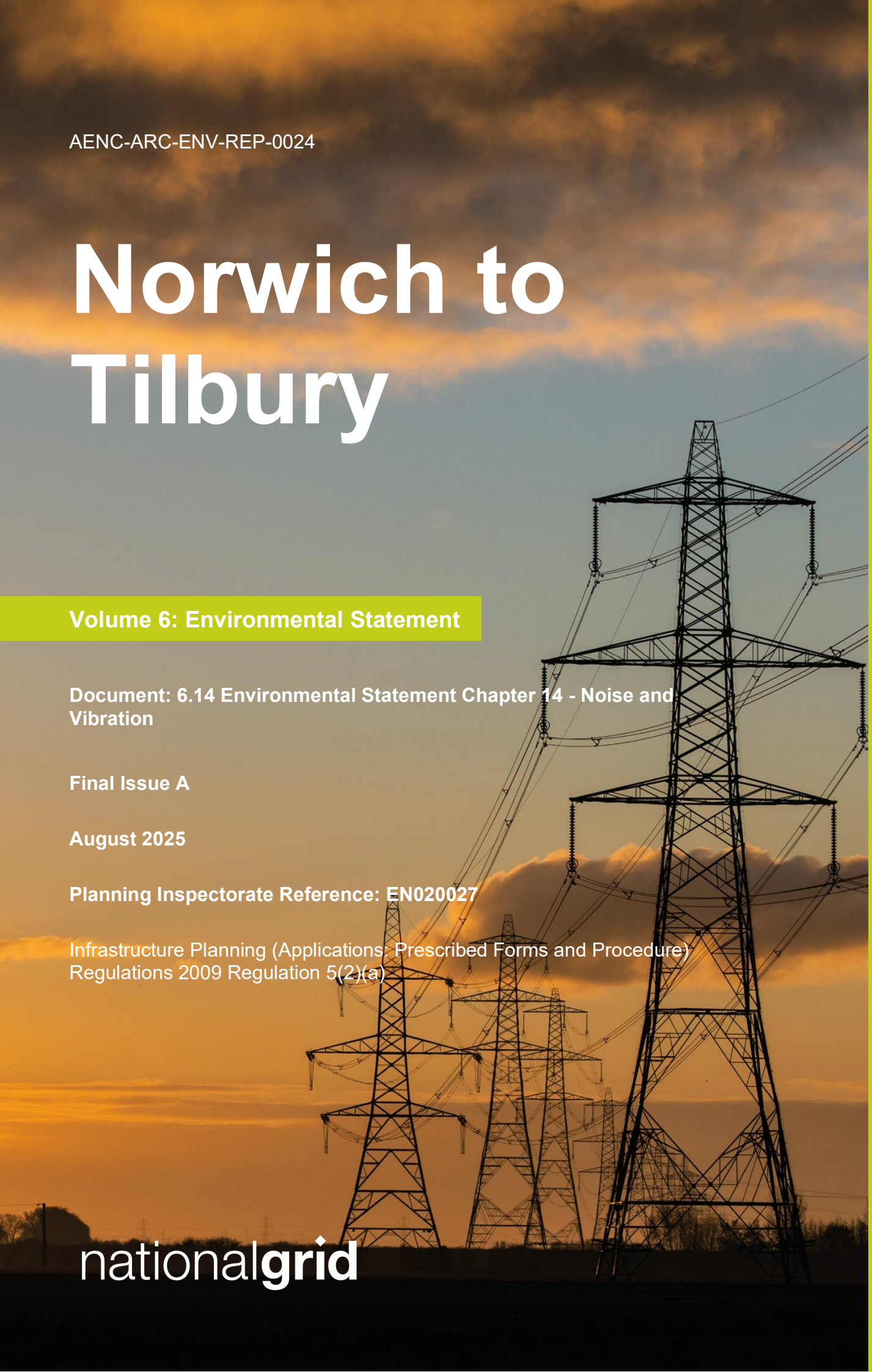

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14. Noise and Vibration

14.1 Introduction

14.1.1 This chapter of the Environmental Statement (ES) (Volume 6 of the Development Consent Order (DCO) application) details the assessment of the potential residual effects of Norwich to Tilbury (the 'Project') from Noise and Vibration on noise and vibration sensitive receptors (NSRs). This chapter covers effects from the following, during construction and operation (and maintenance):

- Construction noise
- Construction vibration on people within buildings
- Construction vibration on buildings and structures
- Construction traffic noise
- Noise from proposed overhead lines during operation
- Noise from the proposed new East Anglia Connection Node (EACN) Substation and Tilbury North Substation during operation
- Vibration during operation
- Noise and vibration from substantial maintenance activities.

14.1.2 There are interrelationships related to the likely residual effects from Noise and Vibration and other environmental topics. Therefore, please also refer to the following ES chapters:

- Chapter 8: Ecology and Biodiversity (document reference 6.8)
- Chapter 10: Health and Wellbeing (document reference 6.10)
- Chapter 11: Historic Environment (document reference 6.11)
- Chapter 15: Socio-economics, Recreation and Tourism (document reference 6.15)
- Chapter 16: Traffic and Transport (document reference 6.16).

14.1.3 This chapter is supported by the following figures and appendices:

- Figure 14.1: Baseline Noise Data (document reference 6.14.F1)
- Figure 14.2: Construction Noise Assessment Outputs (document reference 6.14.F2)
- Figure 14.3: Construction Vibration Assessment Outputs (document reference 6.14.F3)
- Appendix 14.1: Construction Noise and Vibration Data (document reference 6.14.A1)
- Appendix 14.2: Construction Traffic Noise Assessment (document reference 6.14.A2)

- Appendix 14.3: EACN Substation Operational Noise Assessment (document reference 6.14.A3)
- Appendix 14.4: Tilbury North Substation Operational Noise Assessment (document reference 6.14.A4)
- Appendix 14.5: Operational Noise from Overhead Lines (Informative) (document reference 6.14.A5).

14.2 Regulatory and Planning Policy Context

National Policy Statement (NPS)

14.2.1 Chapter 2: Key Legislation and Planning Policy Context (document reference 6.2) sets out the key overarching policy relevant to the Project. The Overarching National Policy Statement for Energy (EN-1) (NPS EN-1) (Department for Energy Security and Net Zero (DESNZ), 2024a) is the key overarching policy relevant to the Project. This is supported by National Policy Statement for Electricity Networks (EN-5) (NPS EN-5) (DESNZ, 2024b).

14.2.2 Full consideration of the relevant NPSs for the Project and this chapter can be found in the Policy Compliance Document (document reference 5.7).

Overarching NPS for Energy (EN-1)

14.2.3 NPS EN-1 contains the following paragraphs relating to Noise and Vibration which have been considered within this chapter.

14.2.4 Paragraphs 5.12.1 to 5.12.5 state:

'Excessive noise can have wide-ranging impacts on the quality of human life and health such as annoyance, sleep disturbance, cardiovascular disease and mental ill-health. It can also have an impact on the environment and the use and enjoyment of areas of value such as quiet places and areas with high landscape quality.

The Government's policy on noise is set out in the Noise Policy Statement for England. It promotes good health and good quality of life through effective noise management. Similar considerations apply to vibration, which can also cause damage to buildings. In this section, in line with current legislation, references to "noise" below apply equally to assessment of impacts of vibration [...]

Noise resulting from a proposed development can also have adverse impacts on wildlife and biodiversity. Noise effects of the proposed development on ecological receptors should be assessed by the Secretary of State in accordance with the Biodiversity and Geological Conservation section of this NPS at Section 5.4. […]

Factors that will determine the likely noise impact of a proposed development include:

- *the inherent operational noise from the proposed development, and its characteristics*
- *the proximity of the proposed development to noise sensitive premises (including residential properties, schools, and hospitals) and noise sensitive areas (including certain parks and open spaces)*

- *the proximity of the proposed development to quiet places and other areas that are particularly valued for their soundscape or landscape quality*
- *the proximity of the proposed development to sites where noise may have an adverse impact on protected species or other wildlife, including migratory species'.*

14.2.5 Paragraphs 5.12.6 to 5.12.8 identify the information to be included within noise assessments, as follows:

'Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment […]

- *a prediction of how the noise environment will change with the proposed development*
  - *in the shorter term, such as during the construction period*
  - *in the longer term, during the operating life of the infrastructure*
  - *at particular times of the day, evening and night (and weekends) as appropriate, and at different times of year*
- *an assessment of the effect of predicted changes in the noise environment on any noise-sensitive receptors, including an assessment of any likely impact on health and quality of life / well-being where appropriate, particularly among those disadvantaged by other factors who are often disproportionately affected by noise-sensitive areas*
- *if likely to cause disturbance, an assessment of the effect of underwater or subterranean noise*
- *all reasonable steps taken to mitigate and minimise potential adverse effects on health and quality of life'.*

14.2.6 Paragraph 5.12.7 states that '*The nature and extent of the noise assessment should be proportionate to the likely noise impact*'.

14.2.7 Paragraph 5.12.8 states that '*Applicants should consider the noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation*'.

14.2.8 Paragraph 5.12.16 of NPS EN-1 (DESNZ, 2024a) states '*A development must be undertaken in accordance with statutory requirements for noise. Due regard must be given to the relevant sections of the Noise Policy Statement for England, the NPPF, and the government's associated planning guidance on noise'.*

NPS for Electricity Networks Infrastructure (EN-5)

14.2.9 NPS EN-5 (DESNZ, 2024b) includes the following relating to Noise and Vibration, specifically from overhead lines, which has been considered within this chapter. Paragraphs 2.9.26 to 2.9.38 state:

'All high voltage transmission lines have the potential to generate noise under certain conditions.

Line noise is most commonly caused by corona noise when the conductor surface electric stress exceeds the inception level for corona discharge activity which is released as acoustic energy and radiates into the air as sound. Transmission line conductors are normally designed to operate below this threshold.

Surface contamination on a conductor or accidental damage during transport or installation can cause local enhancement of electric stress and initiate discharge activity leading to the generation of additional noise.

The highest noise levels generated by a line generally occur during rain.

Water droplets may collect on the surface of the conductor and initiate corona discharges with noise levels being dependent on the level of rainfall. Fog may also give rise to increased noise levels, although these levels are lower than those during rain.

After a prolonged spell of dry weather without rain to wash the conductors, contamination may accumulate at sufficient levels to result in increased noise. After heavy rain, these discharge sources are washed away, and the line will resume normal quieter operating sound.

Surface grease on conductors can also give rise to audible noise effects as grease is able to move slowly under the influence of an electric field, tending to form points which then initiate discharge activity. Surface grease is likely to occur along the entire length of a conductor. Hence there may be many potential discharge sources and, consequently, a high noise level.

This will only occur if substandard grease has been used during manufacture or if the conductor has been overheated by carrying excessive electrical load. This can be mitigated through good design or by replacement.

Transmission line audible noise is generally categorised as "crackle" or "hum", according to its tonal content.

Crackle may occur alone, but hum will usually occur only in conjunction with crackle. Crackle is a sound containing a random mixture of frequencies over a wide range, typically 1kHz to 10kHz. No individual pure tone can be identified for any significant duration. Crackle has a generally similar spectral content to the sound of rainfall. Hum is only likely to occur during rain when rates of rainfall exceed 1mm/hr. Hum is a sound consisting of a single pure tone or tones.

Noise may also arise from discharges on overhead line fittings such as spacers, insulators, and clamps. Such noise should be mitigated through good design.

Audible noise effects can also arise from substation equipment such as transformers, quadrature boosters and mechanically switched capacitors.

Transformers are installed at many substations and generate low frequency hum. Whether the noise can be heard outside a substation depends on several factors, including transformer type and the level of noise attenuation present (either engineered intentionally or provided by other structures).'

14.2.10 Paragraphs 2.9.39 to 2.9.40 state:

'For the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards [for example, BS 4142] are satisfactory.

For the assessment of noise from overhead lines, the applicant must use an appropriate method to determine the sound level produced by the line in both dry and wet weather conditions, in addition to assessing the impact on noise-sensitive receptors'.

14.2.11 Paragraph 2.9.43 states '*The Secretary of State is likely to regard it as acceptable for the applicant to use a methodology that demonstrably addresses these criteria'*.

14.2.12 When considering mitigation measures, Paragraph 2.10.9 states '*Applicants must consider the following measures:* [including] *the selection of quieter cost-effective plants*'.

Other National Legislation and Policy

14.2.13 Although the Project will be considered against National Policy stated above, the assessment has also been undertaken in accordance with, and with reference to, the following national legislation and policy:

- The Control of Pollution Act 1974
- Environmental Protection Act 1990
- National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2024)
- Planning Practice Guidance for Noise (PPGN) (UK Government, 2019)
- Noise Policy Statement for England (NPSE) (Defra, 2010).

Regional and Local Policy

14.2.14 Chapter 2: Key Legislation and Planning Policy Context (document reference 6.2), the Planning Statement (document reference 5.6) and Policy Compliance Document (document reference 5.7) set out relevant regional and local policy.

14.2.15 Key regional and local policy relevant to Noise and Vibration, that has informed the assessment within this ES (Volume 6 of the DCO application), comprises:

- Greater Norwich Local Plan (Broadland District Council, South Norfolk Council, Norwich City Council and Norfolk County Council adopted 2024)
- South Norfolk Council Development Management Policies Document (South Norfolk Council, adopted 2015)
- Babergh and Mid Suffolk Joint Local Plan – Part 1 (Babergh District Council / Mid Suffolk District Council, November 2023)
- North Essex Authorities' Shared Strategic Section 1 Plan (adopted 2021) (Tendring, Colchester and Braintree)
- Tendring District Local Plan 2013-2033 and Beyond, Section 2 (Tendring District Council, adopted January 2022)
- Colchester Borough Local Plan 2017-2033 Section 2 (Colchester City Council, adopted July 2022)
- The Braintree District Local Plan 2013 – 2033 Section 2 (Braintree District Council, adopted July 2022)
- Chelmsford Local Plan, Our Planning Strategy 2013 to 2036 (Chelmsford City Council, adopted May 2020)
- Basildon District Local Plan Saved Policies (Basildon Council, September 2007, updated October 2018)

- Brentwood Local Plan 2016 – 2033 (Brentwood Borough Council, adopted March 2022)
- Thurrock Local Development Framework, Core Strategy and Policies for Management of Development (Thurrock Council, adopted January 2015).

Guidance

14.2.16 Relevant guidance, specific to Noise and Vibration, that has informed this ES (Volume 6 of the DCO application), comprises:

- British Standard (BS) 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (British Standards Institution (BSI), 2014a) (BS 5228-1)
- BS 5228-2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (BSI, 2014b) (BS 5228-2)
- BS 7385-2:1993. Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration (BSI, 1993)
- Calculation of Road Traffic Noise (CRTN) (Department of Transport, 1988)
- Design Manual for Roads and Bridges [DMRB] LA 111: Noise and Vibration, Revision 2 (National Highways, 2020) (DMRB LA 111)
- ISO 9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors (International Organization for Standardization, 2024) (ISO 9613)
- BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BSI, 2019) (BS 4142)
- BS 4142:2014+A1:2019 Technical Note, 2020 (Association of Noise Consultants, 2020)
- BS 8233:2014. Guidance on sound insulation and noise insulation for buildings (BSI, 2014c) (BS 8233)
- Guidelines for Community Noise (World Health Organization (WHO), 1999)
- Night Noise Guidelines for Europe (WHO, 2009) (NNGE).

14.3 Scope of the Assessment

14.3.1 The scope of the assessment has been informed by the Environmental Impact Assessment (EIA) Scoping Report (document reference 6.19) and EIA Scoping Opinion (document reference 6.20) provided by the Planning Inspectorate in 2022 on behalf of the Secretary of State. The scope has also been informed through consultation and engagement with relevant consultees. A summary of the scope of the Noise and Vibration assessment is provided in Appendix 5.2: Scope of the Assessment (document reference 6.5.A2).

14.3.2 In addition, the EIA Scoping Opinion, together with a response from National Grid against each point raised by the Planning Inspectorate relevant to Noise and Vibration, is provided in Appendix 5.1: National Grid's response to the EIA Scoping Opinion (document reference 6.5.A1).

Project Engagement and Consultation

14.3.3 Consultation and engagement with relevant stakeholders has informed the assessment presented in this chapter. Responses to representations received during the statutory consultation in summer 2024 and subsequent consultations in 2025 are provided in Appendix K and Appendix M of the Consultation Report (document reference 5.1).

14.3.4 A summary of discussions and how these have influenced the Project, scope and the approach to the assessment are provided in Table 14.1.

Table 14.1 Engagement undertaken relevant to Noise and Vibration

Reference	Comment	National Grid's Response
Babergh District Council, Mid Suffolk Council, Thurrock Council, Norfolk County Council, Suffolk County Council, Essex County Council, Braintree District Council, Chelmsford City Council, Basildon Council, Colchester City, Historic England, September 2022.	A letter was issued to Local Planning Authorities setting out the proposed methodology and scope of the ES (Volume 6 of the DCO application). There was general agreement with the proposed scope of assessment. However, further details were requested regarding potential operational noise effects.	Generally, the stakeholders agreed with the scope and methodology of the assessment – the assessment is presented in this ES (Volume 6 of the DCO application). Potential effects of construction noise and vibration, construction traffic noise, and operational (and maintenance) noise from the proposed EACN Substation have been scoped into the assessment.
Tendring District Council and Essex County Council, July 2023.	A technical note was shared with the Environmental Health Office (EHO) to agree the approach to undertaking an operational noise impact assessment of the proposed EACN Substation within Tendring District together with using background noise monitoring data gathered for another project in the vicinity. Essex County Council deferred authority to Tendring District Council, who agreed that the proposed approach was acceptable.	Assessment approach agreed with Tendring District Council – the assessment is presented in this ES (Volume 6 of the DCO application).

14.4 EIA Approach and Methods

14.4.1 This section describes the methodology used to establish the existing and future baseline together with the methodology/approach used to undertake the assessment on Noise and Vibration. The overarching approach is also described in Chapter 5: EIA Approach and Method (document reference 6.5).

Data Sources

14.4.2 The baseline has been informed by a desk study which has drawn on the following key information sources:

- Strategic noise mapping (Department for Environment, Food and Rural Affairs (Defra), 2017)
- AddressBase Plus data (Ordnance Survey, 2024)
- Construction schedule and plant information based on similar National Grid projects (e.g. Hinkley Connection, Richborough Connection, and Bramford to Twinstead Reinforcement projects)
- Construction traffic data outputs from the Traffic and Transport assessment (document reference 6.16)
- Project design information, as described in Chapter 4: Project Description (document reference 6.4) and Figure 4.1: Proposed Project Design (document reference 6.4.F1)
- National Grid specification operational noise data for proposed substation plant
- Existing noise survey data from the Five Estuaries Offshore Wind Farm Environmental Statement Volume 6, Part 3, Chapter 9: Airborne Noise and Vibration, and Volume 6, Annex 9.1: Onshore Airborne Noise Baseline Noise Survey.

Study Area

14.4.3 The Study Areas used for the Noise and Vibration assessments are outlined in the EIA Scoping Report (document reference 6.19) and were agreed in the EIA Scoping Opinion (document reference 6.20). The Study Areas for the various Noise and Vibration assessments are also shown on Figure 14.1: Baseline Noise Data (document reference 6.14.F1) and summarised in the following paragraphs.

Construction Noise Study Area

14.4.4 The Study Area for construction noise effects includes NSRs within 300 m of construction works associated with the Project, excluding traffic on the public highway which is considered separately. This is based on guidance in BS 5228-1 (BSI, 2014a) and DMRB LA 111 (National Highways, 2020).

Construction Traffic Noise Study Area

14.4.5 Noise from construction traffic on the existing road network has been assessed for each applicable road understood to be affected by the Project. The assessment considers the change in Basic Noise Level (BNL), calculated in line with the

methodology described in technical memorandum CRTN (Department of Transport, 1988), with a subsequent assessment of the effects on NSRs within 50 m of routes. Potential significant effects are identified in accordance with the methodology described in DMRB LA 111.

Construction Vibration Study Area

14.4.6 The Study Area for construction vibration effects, based on guidance from BS 5228-2 (BSI, 2014b) and DMRB LA 111 (National Highways, 2020), comprises 100 m from the closest construction activity with the potential to generate vibration effects at NSRs.

Operational Noise from Substations Study Area

14.4.7 The Study Area for operational noise effects from new substations, based on guidance from ISO 9613, is 1 km from the EACN Substation and Tilbury North Substation, with a particular focus on the nearest NSR. There are no proposed additional sources of operational noise (e.g. transformers) during normal operation at Norwich Main and Bramford Substations as part of the Project and as such are no considered in the assessment of operational noise.

Operational Maintenance Study Area

14.4.8 The Study Area for operational effects from substantial maintenance activities is the same as for construction noise and vibration – 300 m for noise and 100 m for vibration.

Assessment Methodology

14.4.9 This section sets out the methodology used for assessing the effects on Noise and Vibration for those aspects scoped into the assessment, as set out within the EIA Scoping Report (document reference 6.19) and agreed in the EIA Scoping Opinion (document reference 6.20). The scope of the Noise and Vibration assessment is provided in Appendix 5.2: Scope of the Assessment (document reference 6.5.A2).

14.4.10 The assessment in this chapter assumes that all mitigation – embedded (design measures), standard mitigation, and any additional mitigation measures where required (as defined in Chapter 4: Project Description (document reference 6.4) are in place before assessing the effects. This is in accordance with guidance from the Institute of Environmental Management and Assessment as part of preparing a proportional assessment (IEMA, 2024) and the EIA Scoping Report (document reference 6.19).

14.4.11 This section sets out the sensitivity of various NSRs, the criteria for determining magnitude of impacts for the various noise and vibration sources based on appropriate guidance, the criteria for determining the significance of noise and vibration effects, and the limitations and assumptions of the assessment.

Value/Sensitivity

14.4.12 The sensitivity of NSRs is determined partly on property type, for example residential properties are of a higher sensitivity than factories and offices.

14.4.13 Although all residential NSRs are sensitive to noise and vibration, there are also cases where the sensitivity of an NSR may depend on the pre-existing noise climate. For example, NSRs falling within existing high noise areas (such as Noise Important Areas (NIAs)) may be more sensitive to increases in noise than those outside NIAs. Consideration would be given to such instances as part of the assessment of construction effects.

14.4.14 The sensitivity of residential NSRs is factored into the assessment methodologies. However, additional consideration of sensitivity may be required in certain cases for non-residential NSRs. The criteria used to determine the value and sensitivity of non-residential NSRs specific to Noise and Vibration are set out in Table 14.2. These values are based on standard good practice with reference to Guidelines for Community Noise (WHO, 1999) and Night Noise Guidelines for Europe (WHO 2009) guidance.

Table 14.2 Criteria for determining value / sensitivity – non-residential NSRs

Sensitivity/value	Impact
High	Schools and education premises, hospitals, clinics, care homes, places of worship, community centres, libraries.
Medium	Areas primarily used for leisure activities including Public Rights of Way, sports facilities and sites of historic or cultural importance, camp sites, hotels, gardens, parks.
Low	Offices, cafes/bars with external areas.
Negligible	Industrial or retail premises.

Impact Magnitude

14.4.15 The assessment of Noise and Vibration effects makes reference to '*Lowest Observed Adverse Effect Levels' (*LOAELs) and '*Significant Observed Adverse Effect Levels' (*SOAELs), as defined by the NPSE (Defra, 2010) and PPGN (UK Government, 2019). Paragraph 2.22 of the NPSE states that:

'It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times'.

14.4.16 The LOAELs and SOAELs for the various sources of Noise and Vibration are therefore defined with reference to applicable guidance documents.

Construction Noise Impact Magnitude

14.4.17 Construction noise levels at NSRs have been calculated in accordance with the methodology described in Annex F of BS 5228-1 (BSI, 2014a) for the various proposed construction activities. The predicted noise levels at NSRs have been compared against the criteria described in Section E.3.2 of BS 5228-1 (the 'ABC' method). The Category 'A' construction noise thresholds represent the lowest assessment criteria (typically used to assess effects in rural areas) and are proposed to be used throughout the Project as a worst case.

14.4.18 The construction noise LOAEL and SOAEL have been established in accordance with the criteria detailed in Table 14.3.

Table 14.3 Construction noise LOAEL and SOAEL values (decibels (dB))

Time Period	LOAEL	SOAEL
Weekdays 7:00am to 7:00pm, and Saturdays 7:00am to 1:00pm	50 dB $L_{Aeq,T}$	65 dB $L_{Aeq,T}$
Weekdays 7:00pm to 11:00pm, Saturdays 1:00pm to 11:00pm, and Sundays 7:00am to 11:00pm	50 dB $L_{Aeq,T}$	55 dB $L_{Aeq,T}$
Night-time 11:00pm to 7:00am	40 dB $L_{Aeq,T}$	45 dB $L_{Aeq,T}$

14.4.19 The magnitude of impact of construction noise has been determined against the criteria specified by DMRB LA 111 (National Highways, 2020), as presented in Table 14.4.

Table 14.4 Magnitude of impact from construction noise

Magnitude	Construction Noise Level
Large	Above or equal to SOAEL +5 dB
Medium	Above or equal to SOAEL and below SOAEL +5 dB
Small	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

Construction Traffic Noise Impact Magnitude

14.4.20 Noise from construction traffic on the public highway has been calculated in accordance with CRTN (Department of Transport, 1988) and assessed against the criteria detailed in DMRB LA 111 (National Highways, 2020). The BNL from roads within the construction traffic Study Area have been calculated in accordance with CRTN for the '*do-nothing*' and '*do-something*' scenarios in the construction year.

14.4.21 The calculated BNL values for the '*do-nothing*' and '*do-something*' scenarios in the construction year have been compared to determine the magnitude of the impact in accordance with criteria specified by DMRB LA 111, as presented in Table 14.5.

Table 14.5 Magnitude of impact from construction traffic noise

Magnitude	Increase in BNL of Closest Public Road Used for Construction Traffic (dB)
Large	Greater than or equal to 5.0
Medium	Greater than or equal to 3.0 and less than 5.0

Magnitude	Increase in BNL of Closest Public Road Used for Construction Traffic (dB)
Small	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

Construction Vibration Impact Magnitude (Humans)

14.4.22 Construction vibration levels have been calculated and assessed in accordance with the methodologies and criteria described in BS 5228-2 (BSI, 2014).

14.4.23 Construction vibration effect thresholds for humans, and associated LOAEL and SOAEL values, are presented in Table 14.6.

Table 14.6 Construction vibration effect levels

Vibration Level mm/s Peak Particle Velocity (PPV)	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments (LOAEL).
1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents (SOAEL).
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

14.4.24 The magnitude of impact of construction vibration would be determined against the criteria specified by DMRB LA 111 (National Highways, 2020), as presented in Table 14.7.

Table 14.7 Magnitude of impact from construction vibration

Magnitude	Construction Vibration Level
Large	Above or equal to 10 mm/s PPV
Medium	Above or equal to SOAEL and below 10 mm/s PPV
Small	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

Construction Vibration Impact Magnitude (Structures)

14.4.25 Construction vibration levels have been calculated and assessed in accordance with the methodologies and criteria described in BS 5228-2 (BSI, 2014b).

14.4.26 It is not considered appropriate to use impact magnitude values for potential damage to structures from construction vibration. Rather, a fixed threshold of 12.5 mm PPV has been adopted, at which the probability of damage tends towards zero based on the guidance of BS 5228-2. Structures or buildings where the predicted vibration level exceeds or is approaching 12.5 mm PPV, based on anticipated typical worst-case vibration-generating activities, have been highlighted such that specific mitigation measures may be considered by the Main Works Contractor(s) to reduce vibration levels at these locations on a case-by-case basis.

Operational Substation Noise Impact Magnitude

14.4.27 Operational noise levels from substations at NSRs within in the Study Area have been calculated in accordance with ISO 9613 (ISO 2024) and assessed in accordance with BS 4142 (BSI, 2019). The BS 4142 assessment methodology provides an initial estimate of effect by comparing the noise rating level of proposed plant against the background sound level at NSRs. The magnitude of impact of operational noise, based on the criteria of BS 4142, is shown Table 14.8.

Table 14.8 Magnitude of impact from operational noise

Magnitude	Comparison of Sound Rating Level and Background Sound Level
Large	Rating level > 10 dB above the background sound level
Medium	Rating level between 5 and 9 dB above background sound level
Small	Rating level between 0 and 4 dB above background sound level
Negligible	Rating level below background sound level

14.4.28 Although the above criteria have been used to assess the magnitude of impact, it is standard good practice to aim for a sound rating level not to exceed the background sound level, such that the impact is ‘low’ (as defined in BS 4142 (BSI, 2019)), or negligible in terms of the impact magnitude definition defined in Table 14.8.

14.4.29 Consideration has also been given to context, as defined in BS 4142, for the determination of significance; in particular, absolute noise levels.

14.4.30 The assessment of operational noise from EACN and Tilbury North Substations presented in this chapter is indicative, based on current design information. Further detailed assessments of operational noise from the proposed substations would be undertaken as part of the detailed design phase. The detailed assessments would include any specific mitigation measures that may be required. The assessments presented in this chapter therefore focused on providing a likely indication of potential effect, based on currently available design information, and outlining potential mitigation options where required.

Operational Maintenance Noise and Vibration Impact Magnitude

14.4.31 Operational maintenance impact magnitudes for noise and vibration from substantial maintenance activities are as per those described above for construction noise and vibration.

Significance

14.4.32 Likely significant effects have been assessed using professional judgement considering the sensitivity (or value) of the receptor within the Study Area, and the magnitude of change (impact) likely to be caused by Project activities. These factors are combined to give an overall significance of effect. Effects assessed to be of moderate or greater magnitude are considered to be significant.

Significance for Residential NSRs

14.4.33 Significance of effects at residential NSRs is directly proportionate to magnitude of impact.

14.4.34 The significance of construction noise and vibration is determined based on magnitude of impact and the duration of exceedance. Significant effects are deemed to occur where there is at least a medium magnitude impact for a period of at least ten days in any 15 consecutive days or 40 days in any consecutive six months.

14.4.35 The significance of construction traffic noise effects has also been determined based on the magnitude of the change in noise level and the duration of exceedance. A magnitude of change of at least 3 dB (medium magnitude) (or 1 dB (small magnitude) in a NIA) for a period of ten days in any 15 consecutive days, or 40 days in any consecutive six months is considered to be significant.

14.4.36 The significance of operational noise is determined based on magnitude of impact. Significant effects are deemed to occur where there is at least a medium magnitude impact.

14.4.37 Significance has been derived using the matrix set out in Chapter 5: EIA Approach and Method (document reference 6.5). This has been supplemented by professional judgement which, where applicable, has been explained to give the rationale behind the values assigned. Effects assessed to be of moderate or greater magnitude are considered to be significant.

Limitations of Assessment

14.4.38 This section describes the potential limitations of the assessment:

- The assessment is based on currently available information for the Project
- All assessments are indicative, based on current design information:
  - Further detailed assessments of construction noise and vibration effects would be undertaken by the Main Works Contractor(s) and, where necessary, specific mitigation measures would be determined and implemented based on their assessment
  - Further detailed assessments of operational noise effects would be undertaken by National Grid and/or the developer of the two new substations, and specific mitigation measures would be determined and implemented, where necessary, based on the results of their assessment.

14.4.39 Whilst there are limitations to the assessment and further assessment work is required, the assessment based on currently available information is considered to be robust for this stage of the DCO process. Further assessment is secured by Requirement 4 in the Outline Code of Construction Practice (CoCP) (document reference 7.2) as described in Section 14.6.

Key Parameters for Assessment and Assumptions

14.4.40 This section describes the key parameters and assumptions that have been used/made when undertaking the assessment presented within this chapter. The assumptions this chapter is based on are listed below:

- The noise and vibration assessments are based on Project design information, as described in Chapter 4: Project Description (document reference 6.4) and shown on Figure 4.1: Proposed Project Design (document reference 64.F1)
- The construction noise assessment considers the proposed core working hours as described in Chapter 4: Project Description (document reference 6.4)
- The construction noise assessment considers activities that may occur outside of the core working hours where the duration of the activity is likely to exceed the temporal criteria for significance
- It is assumed as a worst-case that trenchless crossing construction may occur in either direction
- The construction Noise and Vibration assessment assumes that piling may be required for all pylon foundations, and that the piling technique would be percussive, as a worst-case assumption
- It is assumed that third-party data are accurate
- The construction traffic noise assessment is based on construction traffic data provided by the Project Traffic and Transport consultant.

14.5 Baseline Conditions

Existing Baseline

14.5.1 Baseline conditions have been gathered from both desk-based information (see Section 14.4) and noise survey information and presented with reference to the section of the Project within which they are located.

Route Wide Noise Climate

14.5.2 The noise climate and baseline environment varies throughout the length of the Project, with relatively high baseline noise levels expected close to major transport routes, such as main roads and railways, and relatively low baseline noise levels in more rural areas.

14.5.3 The Order Limits pass in proximity to a number of larger built-up areas including (north to south): Mulbarton, Diss (in Section A), Gislingham, Stowmarket, Needham Market (in Section B), Capel St Mary, East Bergholt, Ardleigh (in Section C), Aldham (in Section D), Coggeshall, Silver End (Section E), Little Waltham, Broomfield, Chelmsford, Great Oxney Green, Margaretting (in Section F), Ingatestone, Billericay,

Hutton, Dunton (in Section G), Horndon on the Hill, Stanford-le-Hope, Southfields, Linford, Chadwell St Mary, Thurrock, and West Tilbury (in Section H).

14.5.4 The Order Limits also cross over or are located close to a number of main transport routes, including the following roads (north to south): A140; A1066; A143; A14; A1071; A12; A1124; A120; A131; A1060; A414; A129; A127; A128; and A13, and the following railway lines (north to south): the Great Eastern Main Line, the Shenfield-Southend line, and the London, Tilbury and Southend line. These features are shown on Figure 14.1: Baseline Noise Data (document reference 6.14.F1).

14.5.5 NIAs are determined via strategic noise maps and highlight the residential areas experiencing the highest 1% of noise levels from road and rail sources in England. There are 36 NIAs located within the 300 m Study Area (refer to Figure 14.1: Baseline Noise Data (document reference 6.14.F1).

Table 14.9 NIAs within Study Area

NIA identification number	Associated Road/Railway	Responsible Authority	Project Section(s)
5020	A140 (Road)	Norfolk	Section A
11345	A1071 (Road)	Suffolk	Section C
4797	A12 (Road)	National Highways	Section C
4796	A12 (Road)	National Highways	Section C
6099	A12 (Road)	National Highways	Section C
4794	A12 (Road)	National Highways	Section C
4793	A12 (Road)	National Highways	Section C
4791	A12 (Road)	National Highways	Section C
4786	A12 (Road)	National Highways	Section C
6097	A12 (Road)	National Highways	Section C/D
12065	A12 (Road)	National Highways	Section C/D
4783	A12 (Road)	National Highways	Section D
12051	A1124 (Road)	Essex	Section D
12052	A1124 (Road)	Essex	Section D
12053	A1124 (Road)	Essex	Section D
12054	A1124 (Road)	Essex	Section D
4754	A120 (Road)	National Highways	Section D

NIA identification number	Associated Road/Railway	Responsible Authority	Project Section(s)
12047	A120 (Road)	National Highways	Section D
4752	A120 (Road)	National Highways	Section E
13893	A131 (Road)	Essex	Section F
5355	A12 (Road)	National Highways	Section F/G
5357	A12 (Road)	National Highways	Section F/G
5356	A12 (Road)	National Highways	Section F/G
RI_591	Great Eastern Main Line (Rail)	Rail Safety and Standards Board	Section G
6170	A12 (Road)	National Highways	Section F/G
5707	A12 (Road)	National Highways	Section G
13451	A129 (Road)	Essex	Section G
5664	A127 (Road)	Essex	Section G
5665	A127 (Road)	Essex	Section G
13464	A127 (Road)	Essex	Section G
13479	A128 (Road)	Thurrock	Section H
13478	A13 (Road)	Thurrock	Section H
5562	A13 (Road)	Thurrock	Section H
5694	A1013 (Road)	Thurrock	Section H
5693	A1089 (Road)	National Highways	Section H
5692	A1013 (Road)	Thurrock	Section H

Baseline Noise Conditions in Vicinity of the Proposed EACN Substation, Tendring (Project Section C)

14.5.6 The area around the proposed EACN Substation in Tendring District (Project Section C) is predominantly rural in nature with several relatively isolated dwellings in the vicinity, as shown in Figure 14.1: Baseline Noise Data (document reference 6.14.F1). The nearest NSRs are residential dwellings off Little Bromley Road and Hungerdown Lane to the west. There are also settlements at Hungerdown Lane to the north, Great Bromley to the south-west, Little Bromley to the south-east, with a built-up area of Lawford to the north-west.

14.5.7 There are no major sources of noise in the immediate vicinity of the site, with the main transport routes being the A120 approximately 3 km to the south, the A12 approximately 5 km to the west, and the Great Eastern Main Line Railway approximately 1.5 km to the west. The main source of noise in the area is therefore likely to be road traffic on local roads. Ambient and background noise levels are therefore considered likely to be relatively low.

14.5.8 The baseline noise survey was conducted in the locality of the proposed EACN Substation, in autumn 2022 as part of the Five Estuaries Offshore Wind Farm project. Details of the operational noise assessment for the proposed EACN Substation, including baseline noise data, are included in Appendix 14.3: EACN Substation Operational Noise Assessment (document reference 6.14.A3). The background noise levels in the vicinity of the proposed EACN Substation are between 26 and 34 dB L_{A90} during daytime periods and 21 and 25 dB L_{A90} during night-time periods. These background levels are typical of a predominantly rural area.

Baseline Noise Conditions in Vicinity of the Proposed Tilbury North Substation, Tilbury (Project Section H)

14.5.9 Baseline noise surveys were conducted in February 2025 at three locations in the vicinity of the proposed Tilbury North Substation, representative of nearby NSRs. Details and results of the noise survey are provided in Appendix 14.4: Tilbury North Substation Operational Noise Assessment (document reference 6.14.A4).

14.5.10 Average ambient noise levels at nearby NSRs range from 46 to 50 dB $L_{Aeq,16h}$ during daytime periods and 42 to 47 dB $L_{Aeq,8h}$ during night-time periods.

14.5.11 Typical background sound levels at nearby NSRs range from 36 to 46 dB L_{A90} during daytime periods and 33 to 40 dB L_{A90} during night-time periods.

14.5.12 The measured ambient and background sound levels are typical of a semi-rural area close to main transport routes. The main sources of noise in the area are from road traffic on the A13 and A1013 to the north, and the A1089 to the west.

Vibration Baseline

14.5.13 Acceptable levels of vibration during construction are higher than those that would be acceptable during normal conditions. It is therefore assumed that existing vibration levels at NSRs are negligible compared to the construction vibration threshold values. Construction vibration effects are therefore assessed against fixed thresholds, rather than relative thresholds informed by an assessment of the baseline.

Future Baseline

14.5.14 The future baseline relates to known or anticipated changes to the current baseline in the future which should be assessed as part of the Project in the ES (Volume 6 of the DCO application).

14.5.15 No significant changes to the future Noise and Vibration baseline are anticipated along most of the Project alignment owing to its largely rural and agricultural nature. There are, however, localised areas where the future baseline may change that are pertinent to the Noise and Vibration assessment. This is including the Lower Thames Crossing project, the Chelmsford North East bypass, and the onshore components of the Five Estuaries and North Falls Offshore Wind Farm projects, close to the proposed EACN Substation.

14.5.16 The construction Noise and Vibration assessment methodologies assume worst-case assessment criteria (the lower Category 'A' threshold from BS 5228-1) and are therefore unaffected by changes to the baseline.

14.5.17 The operational noise assessments for the proposed EACN Substation as part of the Project, and the proposed substations for the proposed Five Estuaries and North Falls Offshore Wind Farm projects, are assessed against a fixed baseline for all projects and consider the potential cumulative effects accordingly. This approach has been agreed between the three projects, and with Tendring District Council.

14.5.18 The proposed Tilbury North Substation has been assessed against baseline survey data collected in February 2025. The proposed Tilbury North Substation is located approximately 300 m to the east of the proposed Lower Thames Crossing project, south of the A13. The proposed Lower Thames Crossing project has the potential to increase background noise levels in the vicinity of the proposed Tilbury North Substation and nearby NSRs. Increased background noise levels would serve to reduce the effect of noise from the proposed Tilbury North Substation. The assessment of operational noise from the proposed Tilbury North Substation is based on the existing background noise levels which are expected to be lower than those following the opening of the proposed Lower Thames Crossing. The assessment presented is therefore expected to be the worst case.

14.6 Proposed Mitigation

14.6.1 The approach to mitigation including a description of the mitigation hierarchy is set out in Chapter 5: EIA Approach and Method (document reference 6.5). Three types of mitigation have been incorporated into the Project and assessment: embedded, standard and additional environmental mitigation.

Embedded Mitigation

14.6.2 Environmental appraisal has been an integral part of the Project design from the outset, which has meant that the Project has been able to avoid environmentally sensitive features as far as reasonably practicable.

14.6.3 National Grid has also embedded measures into the design of the Project to avoid or reduce significant effects that may otherwise be experienced during construction and operation (and maintenance) of the Project.

14.6.4 Embedded measures are those that are intrinsic to and built into the design of the Project, which are presented in Table 4.2 of Chapter 4: Project Description (document reference 6.4). Embedded measures relevant to Noise and Vibration include:

- The route alignment and siting have been designed as far as practicable to avoid sensitive Noise and Vibration features as set out in the Corridor and Preliminary Routeing and Siting Study (National Grid, 2022). This included avoiding settlements and residential areas, passing predominantly through rural areas, with the majority of nearby NSRs being isolated dwellings and small settlements
- The Project would include triple Araucaria conductors (or alternative technology that performs to the same or better standard in relation to noise on standard

lattice pylons) for new transmission infrastructure[1]. Due to its geometrical configuration, the triple Araucaria design is the least electrically stressed conductor system that National Grid uses. It is the best design for reducing the effects of line crackle (corona discharge) and would reduce the generation of noise from the proposed overhead lines during operation

- Substations – noise control measures: The proposed new substations would include any required noise mitigation measures by design. This may include, plant selection, siting, screening, and enclosures, as appropriate
- Substations – vibration control measures: Plant with moving parts, such as cooling equipment and transformers, would be expected to be mounted on suitable anti-vibration mounts to protect the plant from potential vibration effects and to attenuate vibration generated by the plant.

Standard Mitigation

Construction Noise and Vibration Mitigation

14.6.5 Standard mitigation measures, comprising management activities and techniques, would be implemented during construction of the Project to limit effects through adherence to good site practices and achieving legal compliance.

14.6.6 The Outline Code of Construction Practice (CoCP) (document reference 7.2) contains relevant standard/good practice measures and best practicable means (BPM) relating to Noise and Vibration. Note: measures have been assigned references, for example (GG01). For ease of cross reference, these align with the references provided in Table 6.1 of the Outline CoCP (document reference 7.2). These measures include but are not limited to the following:

- NV01: Main Works Contractor(s) will be required to follow good construction practices and BPM as outlined in British Standard 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites Part 1: Noise (BS 5228-1) and Part 2: Vibration (BS 5228-2) for the control of noise and vibration, respectively. BS 5228-1 and BS 5228-2 have Approved Code of Practice status (in England) under the powers conferred by Sections 71(1)(b), (2) and (3) of the Control of Pollution Act 1974, as enacted under The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015
- NV02: BPM measures will be identified within the CoCP and may include, but is not limited to, housing continuous noisy plant in acoustic enclosures, siting semi-static equipment as far as reasonably practicable away from occupied buildings and fitting equipment with suitable enclosures or screening
- NV03: In certain instances where construction noise and/ or vibration may cause a significant adverse effect at nearby NSRs, applications for prior consent under Section 61 of the Control of Pollution Act 1974 may be submitted to the relevant LPA to ensure that BPM are applied to control noise and vibration
- NV04: Where there is potential for works to generate vibration at, or approaching, levels exceeding 12.5 mm PPV at buildings or structures (or lower levels if the

[1] Where modifications for existing transmission overhead lines are required, like for like conductors are proposed.

building or structure is deemed particularly sensitive to vibration), pre and post work condition surveys will be conducted. Any damage (cosmetic or otherwise) deemed to be caused by the works will be rectified

- NV05: An Outline Noise and Vibration Management Plan to set out the framework for how noise and vibration will be controlled and managed has been prepared (as shown in Appendix F [of the Outline CoCP (document reference 7.2)]). The Main Works Contractor(s) will conduct detailed construction noise and vibration assessments to determine whether any additional measures, including site-specific BPM, may be required. A Noise and Vibration Management Plan will be prepared by the Main Works Contractor(s) prior to the commencement of construction, and updated and managed during the construction phase as appropriate
- NV06: Avoid unnecessary revving of engines and switch off equipment when not required
- NV07: Keep internal haul roads well maintained and avoid steep gradients, where practicable
- NV08: Use rubber linings in, for example, chutes and dumpers to reduce impact noise, where practicable
- NV09: Minimise drop height of materials
- NV10: Start-up plant and vehicles sequentially rather than all together where such items are located near NSRs
- NV11: Continuous noisy plant should be housed in acoustic enclosures, where practicable and efficacious
- NV12: Exhaust silencing and plant muffling equipment should be fitted and maintained in good working order
- NV13: Static plant known to generate significant levels of vibration should be fitted with vibration dampening features
- NV14: Each item of plant used should be selected to comply with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument (SI) 2001/1701 as transposed into UK legislation by the Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001/1701
- NV15: Consideration will be given to the recommendations set out in Annex B of BS 5228-1, noise sources, remedies, and their effectiveness
- NV16: Equipment will be well maintained and where practicable should be used in the mode of operation that minimises noise
- NV17: Plant and equipment will be shut down when not in use
- NV18: Semi-static equipment will be sited and orientated as far as is reasonably practicable away from occupied buildings and, where feasible, will be fitted with suitable enclosures or screened using noise barriers
- NV19: Materials will be handled in a manner that minimises noise

- NV20: All appropriate personnel will be instructed on BPM measures to reduce noise and vibration as part of their induction training and followed up by 'toolbox' talks
- NV23: For the construction of pylon foundations, non-percussive piling methods will be used where practicable
- GG17: Any activity carried out or equipment located within a temporary construction compound that may produce a noticeable nuisance, including but not limited to dust, noise, vibration, and lighting, will be located away from sensitive receptors such as residential properties or ecological sites where reasonably practicable (see Appendix B: Site Waste Management Plan, Appendix D: Dust Management Plan and Appendix F: Noise and Vibration Management Plan of the Outline CoCP (document reference 7.2) for further details).
- GG29: Working areas will be appropriately fenced. The type of fencing installed will depend on the area to be fenced and will take into consideration the level of security required in relation to the surrounding land and public access, rural or urban environment and arable or stock farming. For some locations the fence used may also serve to provide acoustic and visual screening of the work sites and reduce the potential for disturbance of users in the surrounding areas. Fencing will be regularly inspected and maintained and removed as part of the demobilisation unless otherwise specified
- GG30: Members of the community, local businesses and local stakeholders will be kept informed regularly of the works through active community liaison. This will typically include the notification of ‘noisy activities’, heavy traffic periods and start and end dates of key phasing. A contact number will be provided which members of the public can use to raise any concerns or complaints about the Project. All construction-related complaints will be logged by the Main Works Contractor(s) in a complaints register, together with a record of the responses given and actions taken.

14.6.7 The Outline CoCP (document reference 7.2) outlines specific mitigation measures to reduce construction noise and vibration, however, specific BPM to reduce construction noise and vibration would be determined by the Main Works Contractor(s) following their detailed assessment but would typically include the use of alternative methods and screening.

14.6.8 The Outline CoCP (document reference 7.2) is secured by Requirement 4 in the Draft DCO (document reference 3.1) which requires the Main Works Contractor(s) to prepare the CoCP to discharge the Requirement.

14.6.9 In addition to the above commitments, the Main Works Contractor(s) would conduct detailed construction noise assessments to determine whether there are likely to be any new or different significant adverse effects at NSRs and therefore whether additional measures, including site-specific BPM, may be required. The Outline Noise and Vibration Management Plan (NVMP), appended to the Outline CoCP (document reference 7.2) would be updated into an NVMP, incorporating the findings of the Main Works Contractor(s) detailed assessment and associated site-specific mitigation.

14.6.10 Examples of construction noise mitigation measures are provided in Table 14.10, together with the attenuation values that these typically achieve. Specific mitigation measures would be determined by the Main Works Contractor(s) following their detailed construction noise assessment.

Table 14.10 Examples of construction noise mitigation measures

Example Mitigation	Likely Attenuation
Screening	5 dB where activities are partially obscured and 10 dB where activities are totally obscured
Specified use of quieter plant	5 to 10 dB
Suitable material handling methods. Do not drop materials from excessive heights	Up to 15 dB
Alternative methods for pylon construction e.g. use of pad foundation	Up to 20 dB
Use an acoustic shed with adequate ventilation around trenchless crossing machinery	Up to 15 dB
Use of temporal restrictions	Avoiding temporal significance criteria being exceeded

14.6.11 Examples of construction vibration mitigation measures are provided in Table 14.11, together with the attenuation values that these typically achieve. Specific mitigation measures would be determined by the Main Works Contractor(s) following their detailed construction vibration assessment.

Table 14.11 Examples of construction vibration mitigation measures

Example Mitigation	Likely Attenuation
Alternative methods for pylon construction, for example use of pad foundation or press-in piles	Would not generate material levels of vibration, therefore removing impact
Reducing energy per blow	Depends on the energy reduction but could be set relative to the impact thresholds. However, this may increase the duration of activities
Pre-boring for piled foundations	Dependent on ground conditions

Operational Noise and Vibration Mitigation

14.6.12 Standard noise and vibration mitigation measures would be incorporated into the substation designs. This commitment is captured in the Outline Code of Construction Practice (CoCP) (document reference 7.2). These measures include but are not limited to the following *(note: measures have been assigned references, for example (GG01). These align with the references provided in Table 5.1 of the Outline CoCP (document reference 7.2) for ease of cross-reference)*:

- GG13: The Project would include triple Araucaria conductors (or alternative technology that performs to the same or better standard on standard lattice pylons)[2]
- NV21: The proposed new substations will include any required noise mitigation measures by design. This may include plant selection, siting, screening, and enclosures, as appropriate
- NV22: Plant with moving parts at substations, such as cooling equipment and transformers, will be expected to be mounted on suitable anti-vibration mounts to protect the plant from potential vibration impacts and to attenuate vibration generated by the plant.

Maintenance Noise and Vibration Mitigation

14.6.13 Mitigation measures to be used during substantial maintenance activities are as per those described above for construction noise and vibration mitigation.

Additional Mitigation

14.6.14 Additional mitigation comprises measures over and above any embedded and standard mitigation measures, where assessment identifies a requirement to further reduce significant environmental effects.

14.6.15 No additional mitigation measures, beyond the embedded and standard measures identified above, are required. As detailed above, the Main Works Contractor(s) would conduct detailed construction noise assessments to determine whether there are likely to be any new or different significant adverse effects at NSRs and therefore whether additional measures, including site-specific BPM, may be required.

14.7 Residual Effects

14.7.1 The likely significant effects of the Project have been assessed using current available data relating to both the construction and operation (and maintenance) phases of the Project. The residual effects are outlined below. As previously stated, this section assumes that all mitigation - embedded (design measures) and standard mitigation - are in place before assessing the effects. This is in accordance with guidance from IEMA as part of preparing a proportional assessment (IEMA, 2024). No additional mitigation measures have been identified as required at this stage.

Construction

14.7.2 There are a number of sources of noise and vibration during construction. The nature and duration of the works varies with a combination of relatively short duration works and long duration works at fixed stationary locations, and intermittent linear works. Stationary works are those that would occur at a relatively fixed location for the duration of the specific activity, such as proposed substations, or temporary construction compounds. Linear works are those that would move along the route, such as cabling or overhead line works, with works lasting for a relatively short duration at any specific location.

[2] Where modifications for existing transmission overhead lines are required, like-for-like conductors are proposed.

14.7.3 For the purposes of this assessment, it is assumed that there is potential for works to exceed the temporal requirement for significance of ten days in any 15 consecutive days, or 40 days in any consecutive six months, as a reasonable worst case and to highlight potential noise and/or vibration 'hot-spots'. However, in practice some works may be of a shorter duration. Where a shorter duration is highly likely, and is therefore not expected to be significant, this has been stated. It is, however, assumed that works during weekend periods would consider temporal restrictions as part of the consideration of BPM such that significant adverse effects from noise and vibration would not be expected purely due to weekend working. Significant effects may still occur, however, where there is also an exceedance of SOAEL values during both weekday and weekend daytime periods for a significant duration at an NSR, without mitigation.

14.7.4 Anticipated works are as follows:

- Setup of temporary construction compounds and bellmouth and temporary access route construction
- Operation of temporary construction compounds
- Substation construction
- Construction of underground cables
- Trenchless crossings for example horizontal directional drilling (HDD)
- Construction of pylons and overhead lines
- Modification works to existing pylons and overhead lines
- Removal of existing pylons and overhead lines
- Third-party works.

14.7.5 Construction noise and vibration data and calculations are provided in Appendix 14.1: Construction Noise and Vibration Data (document reference 6.14.A1) and Appendix 14.2: Construction Traffic Noise Assessment (document reference 6.14.A2). Results are also shown on Figure 14.2: Construction Noise Assessment Outputs (document reference 6.14.F2) and Figure 14.3: Construction Vibration Assessment Outputs (document reference 6.14.F3).

Construction Noise – Daytime

14.7.6 Although mitigation, in the form of BPM, would be employed for all works to reduce the effects of construction noise, for the purposes of this assessment, no specific mitigation (such as screening) is included. This is so that construction noise 'hot-spots' can be identified where specific mitigation may be required to avoid significant adverse effects.

14.7.7 The NSRs where there are significant effects from construction noise are also shown on Figure 14.2: Construction Noise Assessment Outputs (document reference 6.14.F2).

14.7.8 The assessment indicates that there are potential significant adverse effects at 144 NSRs during daytime works.

14.7.9 Of the 144 identified potential significant adverse effects during daytime periods:

- 33 relate to highway remediation works
- 21 relate to the construction of new pylons

- Nine relate to underground cable construction
- 18 relate to the construction of temporary construction compounds
- Ten relate to haul road construction
- One relates to pylon removal
- Four relate to conductor stringing
- One relates to earthworks
- 47 relate to potential cumulative effects of multiple nearby activities, with no one activity exceeding the threshold in isolation.

14.7.10 There are no identified significant adverse effects in relation to the following works, principally due to the distance between the works locations and NSRs:

- The operation of temporary construction compounds
- Substation construction
- Modification works to existing pylons and overhead lines
- Third-party works.

14.7.11 With the use of mitigation in the form of BPM, the magnitude of impact of construction noise is expected to be **negligible to small** at all nearby residential and **low to medium** sensitivity non-residential NSRs, and **negligible** at all nearby high-sensitivity non-residential NSRs during daytime periods. The residual effect of construction noise is therefore **not significant** at all nearby NSRs during daytime periods.

Construction Noise – Night-Time[3]

14.7.12 As noted above, although mitigation in the form of BPM would be employed for all works to reduce the effects of construction noise, for the purposes of this assessment, no specific mitigation (such as screening) is included. This is so that construction noise 'hot-spots' can be identified where specific mitigation may be required to avoid significant adverse effects.

14.7.13 The NSRs where there are significant effects from construction noise are also shown on Figure 14.2: Construction Noise Assessment Outputs (document reference 6.14.F2).

14.7.14 The assessment indicates that there are potential significant adverse effects at 25 NSRs during night-time works.

14.7.15 Of the 25 NSRs identified as being potentially affected by significant adverse effects during night-time period:

- 10 relate to trenchless crossing of the A12 in Section C
- 15 relate to trenchless crossings of the River Stour and Higham Road in Section C.

[3] 11pm – 7am

14.7.16 With the use of mitigation in the form of BPM, the magnitude of impact of construction noise is expected to be **negligible to small** at all nearby residential and **low to medium** sensitivity non-residential NSRs, and **negligible** at all nearby high-sensitivity NSRs from potential night-time construction works. The residual effect of construction noise is therefore **not significant** at all nearby NSRs due to potential night-time works.

Construction Noise – Weekends and Bank Holidays

14.7.17 Weekend and bank holiday working is proposed during the construction phase. For the purposes of this assessment, it is assumed that construction activities during these periods would be similar to weekday daytime periods as a worst case. However, the impact magnitudes are higher due to the increased sensitivity of weekend periods and the associated lower noise level threshold for potential significant effects during these periods. It is, however, assumed that works during weekend periods would consider temporal restrictions as part of the consideration of BPM such that significant adverse effects from noise and vibration would not be expected purely due to weekend working.

14.7.18 Based on the above assumptions, significant adverse effects for works during weekends and bank holidays would only occur (in terms of temporal exceedance) where there are also potential significant adverse effects during weekday periods, without mitigation, as identified in paragraph 14.7.9. However, with appropriate mitigation in the form of BPM, significant adverse effects at these locations are not expected from works during weekday and banks holiday periods.

14.7.19 Additionally, with appropriate mitigation in the form of BPM, the weekend and bank holiday noise level threshold would only be expected to be exceeded at the locations identified in paragraph 14.7.9 above. As such, with appropriate consideration of temporal restrictions during weekend and bank holiday periods at these locations (as part of BPM), significant adverse effects can be avoided. With appropriate mitigation measures, the effects of construction noise during weekend and bank holiday periods would be **not significant**.

Construction Vibration

14.7.20 Although mitigation, in the form of BPM, would be employed for all works to reduce the effects of construction vibration, for the purposes of this assessment, no specific mitigation (such as the use of alternate methods) is included. This is so that construction vibration ‘hot-spots’ can be identified where specific mitigation may be required to avoid significant adverse effects.

14.7.21 The majority of construction activities are not expected to generate significant levels of vibration. However, activities that may generate significant levels of vibration include:

- Ground compaction – this may be required during activities such as the construction of temporary access routes
- Percussive or vibratory piling – this may be required for activities such as the foundation works of new pylons.

14.7.22 The assessment of construction vibration considers the effects of vibration:

- On people within buildings
- On buildings and structures.

Construction Vibration Effects on People Within Buildings

14.7.23 The outputs of the construction vibration assessment are shown on Figure 14.3: Construction Vibration Assessment Outputs (document reference 6.14.F3).

14.7.24 The assessment indicates that the construction vibration SOAEL may be exceeded at 74 NSRs without mitigation. Of these, 72 relate to potential compaction activities associated with highway works, haul road construction, and the construction of temporary construction compounds. These activities would be expected to be of relatively short duration (typically less than a day) and construction vibration from compaction activities would therefore cause a **minor effect** at these NSRs and be **not significant.**

14.7.25 The remaining two affected NSRs relate to potential piling activities associated with pylon construction without BPM mitigation measures; namely:

- Pylon RB8 affecting 1, The Vale, Swainsthorpe, NR14 8PL (grid reference 621235, 301105) (Section A)
- Pylon TB141 affecting Windmill House, Chelmsford Road, Great Waltham, Chelmsford, Essex, CM3 1AB (grid reference 570159, 212882) (Section F).

14.7.26 With the use of mitigation in the form of BPM, the magnitude of impact of construction vibration is expected to be **negligible to small** at all nearby residential and **low to medium** sensitivity non-residential NSRs, and **negligible** at all nearby high-sensitivity NSRs. The residual effect of construction vibration effects on people in buildings is therefore **not significant** at all nearby NSRs.

Construction Vibration Effects on Buildings and Structures

14.7.27 The assessment indicates that there are five structures or buildings where there is the potential for damage due to construction vibration from potential compaction activities, namely:

- War Memorial, Church Road, Little Bromley, CO11 2PP (grid reference 609889, 228147) (Section C)
- Haywain, The Haywain, Bentley Road, Little Bromley, CO11 2PL (grid reference 610156, 227908) (Section C)
- Jasmine Cottage, Bentley Road, Little Bentley, CO7 8SS (grid reference 611137, 226669) (Section C)
- Pellens Cottage, Bentley Road, Little Bentley, CO7 8SS (grid reference 611272, 226569) (Section C)
- St Margarets Cottage, Botney Hill Road, Billericay, CM12 9SJ (grid reference 565553, 191847) (Section G).

14.7.28 No structures or buildings have been identified where there is the potential for damage from vibration from potential piling activities.

14.7.29 The above identified locations will be reviewed by the Main Works Contractor(s) in their specific detailed assessments prior to the start of works, with mitigation measures put in place where required to avoid potential significant effects. Additionally, the Main Works Contractor(s) will review all works locations to determine whether any other buildings or structures may be affected by vibration from construction activities.

14.7.30 With the use of mitigation in the form of BPM, the vibration magnitude threshold for potential damage to buildings or structures is not expected to be exceeded due to any proposed construction works at any NSRs. The residual effect of construction vibration effects on buildings and structures is therefore **not significant** at all NSRs.

Construction Traffic Noise

14.7.31 During construction, there would be additional vehicle traffic (including Heavy Goods Vehicles) on the local road network, travelling to and from the work sites. An assessment of potential noise impacts from construction traffic is presented in Appendix 14.2: Construction Traffic Noise Assessment (document reference 6.14.A2). Where applicable, the assessment considers the cumulative effect of construction traffic from other projects.

14.7.32 The assessment indicates that construction traffic noise impacts are **negligible or small** on most routes. The impact of noise from construction traffic is therefore **not significant** on most routes.

14.7.33 There is, however, one route where there is the potential for a **large adverse magnitude** impact; namely:

- Link PAR 30 - Bentley Road (Section C).

14.7.34 With regard to Link PAR 30, there are 16 NSRs within 50 m of the route. Effects at these NSRs have the potential to be significant without mitigation. Of these, one NSR has the potential for effects to be more significant due its proximity (approximately 1 m) to Bentley Road; namely:

- Jasmine Cottage, Bentley Road, Little Bentley, CO7 8SS (National Grid Reference (NGR) 611137, 226669).

14.7.35 Jasmine Cottage is located immediately adjacent to Bentley Road at a distance of approximately 1 m from the carriageway edge. The predicted noise increase at this specific property is 11.4 dB due to the increase in construction traffic, which is a large magnitude adverse impact. Additionally, the absolute noise level would be above the construction noise SOAEL, principally due to the small distance between the property and the carriageway.

14.7.36 Illustrative construction traffic mitigation measures on Bentley Road are identified in the Outline Construction Traffic Management Plan (document reference 7.3) and includes temporary speed limits which may serve to reduce construction traffic noise. However, **major significant adverse effects** from construction traffic noise would still be expected on Bentley Road.

Operation (and Maintenance)

Substation Operational Noise

14.7.37 Indicative assessments of operational noise from the proposed substations, based on current design information, are presented in Appendix 14.3: EACN Substation Operational Noise Assessment (document reference 6.14.A3) and Appendix 14.4: Tilbury North Substation Operational Noise Assessment (document reference 6.14.A4).

14.7.38 With embedded and standard mitigation measures, the impact of operational noise from the proposed substations on all nearby NSRs, has been assessed as having a **negligible or small magnitude** impact, during both daytime and night-time periods, taking account of context. This would result in a residual negligible to minor adverse effect at all nearby NSRs, which is considered to be **not significant.**

14.7.39 The assessment is indicative for the purpose of demonstrating that significant adverse effects can be avoided. The assessment is based on early design information and standard noise mitigation measures. Further detailed design would be undertaken by the developers, including consideration of specific noise mitigation measures.

Substation Operational Vibration

14.7.40 The proposed substations would include vibration mitigation measures as part of the design. This is principally to protect the equipment itself from potential external vibration but would also serve to isolate vibration from the equipment. Experience from other National Grid substation sites indicates that vibration levels are **negligible**, even in close proximity to plant items and transformers. The effects of vibration from the operation of the proposed substations would be **not significant** at all nearby NSRs with standard vibration mitigation measures incorporated in the design.

Operational Noise from Overhead Lines

14.7.41 Operational noise from overhead lines is scoped out of the ES (Volume 6 of the DCO application), in accordance with the EIA Scoping Opinion (document reference 6.20), on the basis that a low noise conductor system is proposed. However, information on noise from overhead lines is provided in Appendix 14.5: Operational Noise from Overhead Lines (Informative) (document reference 6.14.A5).

14.7.42 Where modifications for existing transmission overhead lines are required, like for like conductors are proposed. There would be no material change in noise levels and therefore this is considered to be **not significant**.

Operational Maintenance

14.7.43 Routine operational maintenance is not expected to generate high levels of noise or vibration and would generally involve relatively short-term activities. The impacts of noise and vibration from routine maintenance activities would be expected to be lower than those during construction and therefore, have a **negligible to small** impact at all nearby residential and **low to medium** sensitivity non-residential NSRs, **and negligible** impact at all nearby high-sensitivity NSRs, resulting in a negligible to minor effect, which is considered to be **not significant**.

14.7.44 Noise and vibration effects from more substantial maintenance activities, such as reconductoring or transformer replacement, would be expected to be similar to those during the construction phase. In these circumstances the Main Works Contractor(s) would undertake detailed noise and vibration assessments and determine BPM to reduce the effects of noise and vibration at nearby NSRs. Noise and vibration from substantial maintenance activities would therefore have a **negligible to small** impact at all nearby residential and **low to medium** sensitivity non-residential NSRs, and **negligible** impact at all nearby high-sensitivity NSRs, resulting in a **negligible to minor** effect, which is considered to be **not significant.**

14.8 Monitoring

Construction

14.8.1 The Main Works Contractor(s) would conduct detailed construction noise assessments to determine whether there are likely to be any new or different significant adverse effects from those reported above and therefore whether additional measures, including site-specific BPM, may be required. The Outline NVMP, appended to the Outline CoCP (document reference 7.2) (which is secured through Requirement 4 in the draft DCO (document reference 3.1)), would also be developed into an NVMP by the Main Works Contractor(s), incorporating the findings of their detailed assessment and associated site-specific mitigation. Further detailed assessment is secured through the Outline CoCP (document reference 7.3) mitigation measure NV05.

14.8.2 Works would be conducted in accordance with measures set out in the Outline CoCP (document reference 7.2), and the NVMP.

Operation (and Maintenance)

EACN Substation Operational Noise

14.8.3 The assessment of operational noise is based on currently available design information specification data, incorporating standard noise mitigation measures. Further noise assessment would be undertaken based on detailed design information to inform the specific noise mitigation measures. Further detailed assessment is secured through NV21 within the Outline CoCP (document reference 7.2).

14.8.4 A tripartite agreement would be put in place between National Grid and the Five Estuaries and North Falls Offshore Wind Farm projects to explain how the effects of operational noise would be managed and any complaints investigated.

North Tilbury Substation Operational Noise

14.8.5 The assessment of operational noise is based on currently available design information specification data, incorporating standard noise mitigation measures. Further noise assessment would be undertaken based on detailed design information to inform the specific noise mitigation measures. Further detailed assessment is secured through NV21 within the Outline CoCP (document reference 7.2).

Operational Maintenance

14.8.6 Noise and vibration effects from routine and more substantial maintenance activities would be mitigated through the use of BPM and may be supported by proportionate noise and vibration assessments, if applicable.

14.9 Sensitivity Testing

14.9.1 Sensitivity testing has been undertaken as described in Chapter 5: EIA Approach and Method (document reference 6.5) to determine if delays or an extension to the construction programme, changes to the design within the Limits of Deviation (LoD) or if any of the design scenarios presented in Table 4.4 in Chapter 4: Project Description (document reference 6.4) would affect the assessment.

Flexibility in Construction Programme

14.9.2 There are not expected to be any additional or different residual effects from noise and vibration due to flexibility in the construction programme.

Flexibility in Design

14.9.3 This section provides an indication of the likely implications on Noise and Vibration due to potential proposed flexibility in the design including proposed LoD, and, where applicable, how they have been addressed in the assessment.

Lateral LoD for Underground Cables

14.9.4 The assessment of construction noise and vibration from the construction of underground cables assumed that the cables may be located anywhere within the LoD. A worst-case assessment is therefore presented.

Lateral LoD for Overhead Lines

14.9.5 Where construction works are located further from NSRs, noise and vibration levels would reduce. However, where construction works are located closer to NSRs, noise and vibration levels would increase. This may lead to additional significant effects without mitigation. However, with mitigation in the form of BPM, the effects of construction noise and vibration would be expected to be **not significant** at all NSRs. Locations where this may apply would be determined by the Main Works Contractor(s) detailed construction noise and vibration assessments, secured through NV05 within the Outline CoCP (document reference 7.2), and the specific mitigation measures would be determined accordingly. These would be detailed in the NVMP as required.

14.9.6 The lateral LoD for overhead lines would not lead to any additional significant effects for operational noise as significant effects would not be expected, even directly underneath the line. Operational noise from overhead lines is scoped out of the ES (Volume 6 of the DCO application), in accordance with the EIA Scoping Opinion (document reference 6.20), on the basis that a low noise conductor system is proposed. However, information on noise from overhead lines is provided in Appendix 14.5: Operational Noise from Overhead Lines (Informative) (document reference 6.14.A5).

Lateral LoD for Substations

14.9.7 If the substation (or associated plant) is located further from NSRs (all else being equal), noise levels would reduce. However, if the substation is located closer to NSRs (all else being equal), noise levels would increase. This may lead to additional significant effects, without mitigation. This would be considered during detailed design where appropriate, secured through NV21 within the Outline CoCP (document reference 7.2), with mitigation measures put in place to ensure that the effects of operational noise are **not significant** (including cumulatively with the Five Estuaries and North Falls Offshore Wind Farm projects in the case of the EACN).

14.9.8 With regards to construction noise and vibration, due to the relatively large distance between the proposed LoD and the nearest NSR, this flexibility is not expected to lead to any additional significant adverse effects from substation construction works.

Vertical and Longitudinal Limits of Deviation (LoD)

14.9.9 Vertical limits of deviation would have no effect on the noise and vibration during either construction or operation (and maintenance). During construction further noise assessment would be undertaken based on detailed design information to inform the specific noise mitigation measures. Further detailed assessment is secured through NV05 within the Outline CoCP (document reference 7.2). Increased height of the pylons would not have any operational (or maintenance) effects beyond those assessed.

Flexibility Within the Order Limits

14.9.10 There are 19 locations where design scenarios have been identified within Chapter 4: Project Description (document reference 6.4). The effects of the design scenarios on Noise and Vibration in comparison with the Project have been assessed below.

14.9.11 For the following locations, due to the relatively large distance between the proposed LoD and the nearest NSR, this flexibility in the design is not expected to lead to any additional significant adverse effects:

- Anglian Water Sewage Works south of Tabernacle Lane
- Mineral extraction site north-west of Kelvedon
- Lions Hall Minerals Site east of the A131 and to the west of Lyonshall Wood Ancient Woodland
- Chelmsford Bypass east of the A131 and to the west of Lyonshall Wood Ancient Woodland
- BPA pipeline crossing west of Langdon Hills Golf and Country Club. The LoD are considered as described above for overhead lines
- Lower Thames Crossing (LTC) south of the proposed new Tilbury North Substation.

14.9.12 For the following location, the assessment considers a worse case as the assessment assumes the works can take place within the LoD as described above for underground cables and overhead lines:

- Silica sands mineral site west of the proposed new EACN
- South of proposed new Tilbury North Substation.

14.9.13 For the following locations, the assessment considers a worse case as the assessment assumes the works can take place within the LoD as described above for underground cables:

- Black Brook north of Langham
- Great Horkesley south of School Lane (west of Great Horkesley).

14.9.14 For the following location, the assessment considers a worse case as the assessment assumes the works can take place within the LoD as described above for overhead lines Flying Trade Group and Crown Quarry east and west of the A12

- Southfields development south of the A1013.

14.9.15 For the Crest Nicholson housing development south of the A127, both haul road options are considered in the assessment of construction noise and vibration as a worst case and therefore has no affect on the outcome of the assessment.

14.9.16 For the River Stour crossing west of Stratford St Mary the works would be undertaken within the LoD as described above for underground cables and assumes all options are taken forward as a worst case. Should there be a higher intensity of construction equipment on one crossing as opposed to being spread across two crossings this would have no additional effect. Further detailed assessment is secured through NV05 within the Outline CoCP (document reference 7.2) to ensure no significant effects.

14.9.17 For the Tilbury North Access at the proposed new Tilbury North Substation, both options are considered in the assessment of construction noise and vibration as a worst case.

14.9.18 For Thurrock Airfield low height pylons west of Langdon Hills Golf and Country Club, and the Walthams standard height pylons to the south of the River Chelmer, the potential pylon types do not have a material effect on the outcome of construction noise and vibration, or operation (and maintenance) noise effects.

Abbreviations

Abbreviation	Full Reference
ANC	Association of Noise Consultants
BNL	Basic Noise Level
BPM	Best Practicable Means
BS	British Standard
BSI	British Standards Institution
CoCP	Code of Construction Practice
CRTN	Calculation of Road Traffic Noise
CTMP	Construction Traffic Management Plan
dB	Decibels
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
DMRB	Design Manual for Roads and Bridges
EACN	East Anglia Connection Node
EIA	Environmental Impact Assessment
ES	Environmental Statement
ISO	International Organization for Standardization
Leq	Equivalent Continuous Sound Level
LOAEL	Lowest Observed Adverse Effect Level
LoD	Limits of Deviation
mm/s	Millimetres per second (A metric of vibration level from construction activities)
NIA	Noise Important Areas
NSR	Noise Sensitive Receptors
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NPSE	Noise Policy Statement for England
NVMP	Noise and Vibration Management Plan
PPGN	Planning Practice Guidance for Noise

Abbreviation	Full Reference
PPV	Peak Particle Velocity (a metric of vibration from construction activities)
SOAEL	Significant Observed Adverse Effect Level

Glossary

Term	Definition
A-Weighted	The A-Weighting corrects for variation in the ear's ability to hear different frequencies and provides a good representation of how sound is perceived by the human ear.
Basic noise level	A reference noise level at 10 m from the nearside carriageway, calculated as a function of traffic flow, percentage of Heavy Goods Vehicles, average speed, road gradient and road surface.
Best Practicable Means	A term used under the Control of Pollution Act 1974 and Environmental Protection Act 1990 to refer to measures which are '*reasonably practicable, having regard to local conditions and circumstances, to the current state of technical knowledge and to financial implications*', concerning the mitigation of noise and other potential nuisance.
Cable	An insulated conductor designed for underground installation.
Cable Sealing End	Structures used to transfer transmission circuits between underground cables and overhead lines.
Cable Sealing End Compound	Electrical infrastructure used as the transition point between overhead lines and underground cables. A compound on the ground acts as the principal transition point.
Code of Construction Practice	The Code of Construction Practice (CoCP) sets out the standards and procedures to which a developer (and its contractors) must adhere in order to manage the potential impacts of construction works.
Conductor	The overhead wire that carries electricity from one place to another. For example, the line between two pylons.
Construction Compounds	Temporary compounds installed during the construction phase of the Project. Each compound may contain storage areas including laydown areas, soils storage and areas for equipment and fuel, drainage, generators, car parking and offices and welfare areas (temporary modular buildings).
Construction Environmental Management Plan	A Construction Environmental Management Plan (CEMP) is a document which provides a consistent approach to the control of construction activities for the Project. It would allocate responsible persons, indicators for completion and site-specific control measures for where and when the measures would apply for environmental actions and commitments.
Construction routes	These are the roads on the local road network that would be used by construction vehicles between the strategic road network and the access points within the Order Limits.

Term	Definition
Construction Traffic Management Plan	Plan detailing the procedures, requirements and standards necessary for managing the traffic effects during construction of the Project so that safe, adequate and convenient facilities for local movements by all transport modes are maintained throughout the construction process.
Corona discharge	An electrical discharge caused by the ionisation of fluid such as air surrounding a conductor carrying a high voltage. It represents a local region where the air (or other fluid) has undergone electrical breakdown and become conductive. A corona occurs at locations where the strength of the electric field (potential gradient) around a conductor exceeds the dielectric strength of the air.
Decibel (dB)	Unit for measuring sound levels.
Development Consent Order	A statutory instrument which grants consents and other rights to build a Nationally Significant Infrastructure Project, as defined by the Planning Act 2008.
Do-nothing	A scenario which assumes that the Project does not go ahead, usually as part of a comparison with the 'Do-something' scenario.
Do-something	A scenario which assumes that the Project does go ahead, usually as part of a comparison with the 'Do- nothing' scenario.
Embedded design measures	Measures for the protection of the environment that are embedded (intrinsic) with the design.
Environmental Statement (ES)	The main output from the EIA process, an ES is the report required to accompany an application for development consent (under the Infrastructure Planning (EIA) Regulations 2017) to inform public and stakeholder consultation and the decision on whether a project should be allowed to proceed. The EIA Regulations set out specific requirements for the contents of an ES for Nationally Significant Infrastructure Projects.
Equivalent Continuous Sound Level (L_{eq})	Equivalent continuous sound level is a notional steady sound level that causes the same sound energy to be received as that due to the actual and possibly fluctuating sound over a period of time T. It can also be used to relate periods of exposure and noise level. For example, halving or doubling the period of exposure is equivalent in sound energy to a decrease or increase of 3 dB in the sound level for the original period.
Frequency Weighting Networks	Frequency weighting networks, which are generally built into sound level meters, attenuate the signal at some frequencies and amplify it at others. The A-weighting network approximately corresponds to human frequency response to sound. Sound levels measured with the A-weighting network are expressed in dB(A). Other weighting networks also exist, such as C-weighting which is nearly linear (i.e. unweighted) and other more specialised weighting networks. Variables such as L_p and L_{eq} that can be measured using such weightings are expressed as L_{pA} / L_{pC}, L_{Aeq} / L_{Ceq} etc.

Term	Definition
Haul Roads	Another term used for the temporary access route, which is a temporary route built to carry construction vehicles within the Order Limits.
Heavy Goods Vehicle	Goods vehicles weighing more than 3500 kg.
Horizontal Directional Drilling	Trenchless method for the installation of pipes, in a shallow arc using a surface-launched drilling rig. In particular, it applies to large-scale crossings in which a fluid-filled pilot bore is drilled without rotating the drill string, and this is then enlarged by a washover pipe and back reamer to the size required for the product pipe.
Impact magnitude	This is the scale of change which a given impact may cause. This is compared to the baseline state and consideration is given to how the change relates to accepted thresholds and standards.
Impact significance	The level of significance is defined by the magnitude of impact in relation to the sensitivity/value of the environmental receptor.
Insulator	Used to attach the conductors to the pylons preventing electrical discharge to the steelwork.
$L_{A10,T}$	$L_{A10,T}$ refers to the level exceeded for 10% of the measurement period, T. L_{A10} is widely used as a descriptor of traffic noise.
$L_{A90,T}$	$L_{A90,T}$ index represents the noise level exceeded for 90% of the measurement period, T, and is used to indicate quieter times during the measurement period. It is usually referred to as the background noise level.
$L_{Aeq,T}$	The A-weighted L_{eq} sound level measured over a specified period of time, T.
$L_{AFmax,T}$	$L_{AFmax,T}$ is maximum A-weighted sound level during the measurement period, T.
Limits of Deviation	LoD allow for adjustment to the final positioning of the permanent infrastructure, for example, to avoid localised constraints or unknown or unforeseeable issues that may arise. This could include previously unidentified poor ground conditions may require a pylon to be moved slightly for geotechnical reasons, such as ground stability. The horizontal LoD define the parameters within which the position on the ground of proposed permanent infrastructure may deviate from the position shown on the plans. This applies to both linear (for example overhead line and underground cables) and non-linear (for example, substations and CSE compounds) proposed infrastructure. Vertical LoD limit the maximum vertical height, or the depth below ground, of any new infrastructure.
Local Planning Authority	The public authority whose duty it is to carry out specific planning functions for a particular area.
Lowest Observed Adverse Effect Level	This is the level of noise above which adverse effects on health and quality of life can be detected.

Term	Definition
L_W (Sound power levels)	These are used to describe the noise output of a noise source.
Magnitude of change	A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration.
Mitigation	The action of reducing the severity and magnitude of change (impact) to the environment. Measures to avoid, reduce, remedy or compensate for significant adverse effects.
National Planning Policy Framework	The National Planning Policy Framework sets out the government's planning policies for England and how these should be applied. The Planning Practice Guidance to support the framework is published online and regularly updated.
No Observed Effect Level	This is the noise level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
Noise	Unwanted sound.
Noise Important Area	Determined via strategic noise maps, Noise Important Areas highlight the residential areas experiencing the highest 1% of noise levels from road and rail sources in England.
Noise and vibration sensitive receptor (NSR)	A location that is sensitive to noise and/or vibration. The sensitivity of a receptor to Noise and Vibration varies depending on the receptor type.
Order Limits	The maximum extent of land within which the authorised development may take place.
Overhead Line	Conductor (wire) carrying electric current, strung from pylon to pylon.
Overhead line refurbishment	Repair and renewal of conductors, earthwire, fittings and insulators and, where necessary, remedial works to the pylon and foundations.
Peak Particle Velocity	A measurement of vibration level, being the maximum rate of displacement of the vibration propagation medium (such as the ground) for a given event, such as the impact of a piling hammer, at specific locations.
Percentile or Statistical Levels	Calculation of the noise level which is exceeded for a certain percent of a total period. Background noise is often defined as the A-weighted sound pressure level exceeded for 90% of the specified period T, expressed $L_{90,T}$. Road traffic noise is often characterised in terms of $L_{A10,18h}$.
Piling	Piling is the process of installing piles into the ground as part of a construction project. It involves driving, drilling, or boring long structural elements (piles) deep into the soil to provide foundational support for structures.

Term	Definition
Pylons	Structures that support the overhead line (conductors). There are two types of pylons; suspension (line), where the conductors are simply suspended from the pylon; and tension (angle) which are generally used at a change in direction or the end of a line section.
Rating Level	The A-weighted, L_{eq}, sound pressure level of the sound in question at the assessment location over time period T, adjusted for any character, such as tonality, impulsiveness, or intermittency.
Receptor	The physical resource or user group that would respond to an effect e.g. somebody or something adversely affected by a pollutant.
Residual effects	The consequence of an 'impact' of construction, operation and decommissioning of the Proposed Development after mitigation measures have been applied.
Scoping Report	Report determining the content and extent of matters that should be covered in the Environmental Impact Assessment.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptors to the specific type of change or development proposed and the value related to that receptor.
Significance	A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic.
Significant observed adverse effect level (SOAEL)	This is the level of noise above which significant adverse effects on health and quality of life occur.
Sound	Sound is vibrations travelling through a medium (usually air) that can be perceived by the ears.
Substation	Substations are used to control the flow of power through the electricity system. They are also used to change (or transform) the voltage from a higher to lower voltage to allow it to be transmitted to local homes and businesses.
Time weighting	Sound level meters use various averaging times for the measurement of Route Mean Square sound pressure level. The most commonly used are fast (0.125 s averaging time), slow (1 s averaging time) and impulse (0.035 s averaging time). Variables that are measures with time weightings are expressed as L_{AFmax} etc.
Trenchless crossing	A crossing installation method that has limited above ground disturbance which is used to avoid a sensitive feature such as an environmental feature.
Underground cabling	An insulated conductor carrying electric current designed for underground installation. Underground cables link together two Cable Sealing End compounds.

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National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com