Yorkshire GREEN Project

Environmental Impact Assessment

Preliminary Environmental Information Report
Volume two: Chapter 14: Noise and Vibration

October 2021

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Contents

14. Noise and Vibration

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14. Noise and Vibration

14.1 Introduction

14.1.1 This chapter presents the preliminary assessment of the likely significant effects of the Project with respect to noise and vibration. The preliminary assessment is based on information obtained to date. It should be read in conjunction with the Project description provided in **Chapter 3: Description of the Project** and with respect to relevant parts of the following chapters:

- **Chapter 6: Landscape and Visual Amenity** (environmental measures required to reduce noise effects during both the construction phase and operational phase potentially resulting in visual effects for sensitive receptors);
- **Chapter 8: Biodiversity** (all phases of the Project potentially resulting in noise and vibration effects on ecological resources);
- **Chapter 12: Traffic and Transport** (the noise assessments rely on traffic flows to predict changes in traffic noise level); and
- **Chapter 7: Historic Environment** (the historic environment is considered a sensitive resource that could potentially be affected by noise and vibration from the Project).

14.1.2 This chapter describes:

- introduction to the Project, and sources of noise and vibration (**Section 14.1**);
- the legislation, policy and technical guidance that has informed the assessment (**Section 14.2**);
- consultation and engagement that has been undertaken and how comments from consultees relating to noise and vibration have been addressed (**Section 14.3**);
- the methods used for baseline data gathering (**Section 14.4**);
- overall baseline (**Section 14.5**);
- embedded measures relevant to noise and vibration (**Section 14.6**);
- the scope of the assessment for noise and vibration (**Section 14.7**);
- the methods used for the assessment (**Section 14.8**);
- the preliminary assessment of noise and vibration effects (**Section 14.9**);
- preliminary assessment of cumulative (inter-project) effects (**Section 14.10**);
- a summary of the preliminary significance conclusions (**Section 14.11**); and
- an outline of further work to be undertaken for the Environmental Statement (ES) (**Section 14.12**).

Project overview

14.1.3 In summary Yorkshire GREEN comprises the following new infrastructure within the draft Order Limits:

- Shipton North and South 400kV cable sealing end compounds (CSECs);
- The YN 400kV overhead line (north of proposed Overton Substation);
- Overton 400/275kV Substation;
- Two new sections of 275kV overhead line south of proposed Overton Substation: the XC 275 kV overhead line to the west and the SP 275kV overhead line to the east;
- Tadcaster Tee West and East 275kV CSECs; and
- Monk Fryston 400kV Substation (adjacent to the existing substation).

14.1.4 Works to existing infrastructure within the draft Order Limits would comprise:

- Replacement of one pylon on the 2TW/YR 400kV overhead line;
- Works to the existing XC/XCP Monk Fryston to Poppleton overhead line comprising a mixture of decommissioning, replacement and realignment east of Moor Monkton and reconductoring works south of Moor Monkton. This overhead line would be reconfigured at its southern end to connect into the new substation at Monk Fryston;
- Replacement of one pylon on the Tadcaster Tee to Knaresborough (XD/PHG) 275kV overhead line route;
- Reconfiguration and removal of a short span of the Monk Fryston to Eggborough 400kV 4YS overhead line to connect this overhead line into the new substation at Monk Fryston; and
- Minor works at Osbaldwick Substation comprising the installation of a new circuit breaker and isolator along with associated cabling, removal and replacement of one gantry and works to one existing pylon. All works would be within existing operational land.

14.1.5 Please refer to **Chapter 3: Description of the Development** and **Figures 1.1** and **1.2** for an overview of the different components of the Project.

Noise sources

14.1.6 This section provides a description of noise sources associated with the Project, to aid interpretation of the noise and vibration chapter.

14.1.7 As described in **Chapter 3: Description of the Project**, the nature of the construction works and the construction methodologies are typical for trenching and construction of structures and buildings. The noise generated will reflect this. Construction noise sources are therefore not addressed further in this introductory section.

14.1.8 Details regarding potential construction sources are detailed in **Section 14.8** and **Section 14.9**.

14.1.9 For the operational stage, substations and overhead lines are potential sources of noise. Substations may contain new reactive plant such as Super Grid Transformers (SGTs), plus associated cooling systems, along with passive plant such as switchgear. Reactive plant can give rise to a characteristic tonal noise, described as a ‘hum’. The

noise commonly has tonal components that are harmonics of the 100Hz acoustic fundamental frequency which is twice the 50Hz alternating current (AC) frequency at which the UK electricity supply system operates. Where sited close to noise sensitive receptors, reactive plant is commonly supplied with an enclosure designed to provide noise reduction.

14.1.10 Switchgear can operate for two purposes, as an emergency operation where it protects the system from faults (unplanned), or to de-energise parts of the system for maintenance (planned). The noise from switchgear is mechanical in nature and only occurs during a switching event with the noise generally described as a 'click'; it is not tonal in nature. Typically, the total number of switching events is less than 100 in a year, although events tend to occur in 'clusters', with a few events on one day then nothing for months. Given the rare occurrence of switchgear events, it is proposed to scope out operational noise due to switchgear at all substations.

14.1.11 The coolers for SGTs are designed to engage only at times of high load for the transformer, typically at above 75% of design full load. Such conditions usually occur only during exceptional events, for example extreme weather combined with faults elsewhere on the system, requiring an SGT to carry a higher than normal load. These conditions would usually persist for a short duration and as such cooler operations can typically be regarded as an exceptional event. At this stage detailed rating and loading information has not been determined so further information will be presented in the ES. Noise from cooling systems is readily controlled using conventional and readily available noise control measures. It is anticipated that noise due to the operation of coolers would be not significant.

14.1.12 For overhead lines, noise (where observed) is usually generated by a mechanism called corona discharge. Most transmission line conductors are designed to operate below the threshold at which corona discharge is predicted to occur in dry conditions with uncontaminated conductors, so usually operate quietly in dry weather conditions. However, noise can sometimes occur in dry conditions, where it is referred to as 'dry noise'; it is normally described as a crackle.

14.1.13 The highest noise levels generated in operation for overhead lines generally occur during rainfall. Noise generated under these circumstances is referred to as 'wet noise' which is generally described as a crackle, but which can be accompanied by a tonal 'hum'. More information about the noise associated with overhead lines is provided in **Section 14.8**.

14.1.14 In relation to the operation of CSECs, the only potential noise sources are the overhead line components. Therefore, the operational noise assessment of CSECs is not referred to again in this chapter, but instead addressed as part of the overhead line operational assessment.

14.1.15 For the Project and this preliminary operational noise assessment, the details provided in **Table 14.1** have been assumed.

Table 14.1 – Operational noise sources taken forward in the operational noise assessment

Component	Noise Sources
Proposed Overton Substation	Four SGTs.

Component	Noise Sources
Proposed Monk Fryston Substation	Four SGTs.
Osbaldwick Substation	Switchgear only. Due to the minor nature of the works at Osbaldwick Substation, the effects as a result of the works are considered negligible and scoped out from further assessment. Further details are provided in **Table 14.12**.
Overhead lines	Assessed as described in **Section 14.8**.

14.1.16 Principal components of the Project have been developed through engineering design with a consideration for noise. The overhead line conductor bundles, fixtures and fittings, and substation design and locations, for example, have a degree of embedded measures designed for noise and vibration control. Further details on embedded measures can be found in **Section 14.6**.

Limitations and assumptions

14.1.17 The information provided in this Preliminary Environmental Information Report (PEIR) is preliminary, the final assessment of likely significant effects will be reported in the ES. The PEIR has been produced to fulfil National Grid's consultation duties and enable consultees to develop an informed view of the likely significant effects of the Project, and comment on this during statutory consultation before the design of the Project is finalised and taken forward to submission of the application for development consent.

14.1.18 To date, no noise surveys have taken place, limiting the baseline data to a desk study. Noise surveys are currently planned and being mobilised for Quarter 4 of 2021, with further detail provided in **Section 14.4**. The ES will be produced after completion of baseline surveys and will provide baseline noise levels for the relevant assessments.

14.1.19 Limited data is available for this PEIR stage, and therefore minimal assessment has been conducted at this stage. This PEIR chapter builds on the Scoping Report and provides a full assessment methodology for each individual noise and vibration assessment. Full assessments will be provided as part of the ES.

14.1.20 The Project has been based on the principal that measures have been 'embedded' into the Project design to remove potential significant effects (**Section 4.6**). This approach is informed by the iterative design process. Additionally, the Project would ensure that standard good practice construction measures are adopted, through the implementation of an Outline Construction Environmental Management Plan (CEMP). The preliminary appraisal of potential effects therefore assumes that both design mitigation and good practice measures are in place.

14.2 Relevant legislation, planning policy and technical guidance

14.2.1 This section identifies the legislation, planning policy and technical guidance that has informed the assessment of effects with respect to noise and vibration. Further information on policies relevant to the Project is provided in **Chapter 5: Legislation and Policy Overview**.

Legislation

14.2.2 A summary of the relevant legislation is given in **Table 14.2**.

Table 14.2 – Legislation relevant to the noise and vibration assessment

Legislation	Legislative Context
The Environmental Protection Act 1990[1] (as amended by the Noise and Statutory Nuisance Act 1993[2]) (particularly Section 79) (EPA)	The EPA sets out: the definition of statutory nuisance due to noise; the duty on local authorities to investigate and abate nuisance; and the defence against abatement because "best practicable means" has been employed to minimise noise (including vibration) for business premises. The EPA sets out the means for a person affected by noise nuisance to seek abatement through the courts. The Noise and Statutory Nuisance Act sets out an extension of powers to abate noise nuisance to a wider range of sources than the Environmental Protection Act 1990.
The Control of Pollution Act 1974 (particularly Sections 60 and 61) (CoPA)[3]	Sets out the Section 60 notice which a local authority can serve so as to impose requirements upon relevant construction activities with regard to the control of noise. Under Section 61 of the CoPA, the party that intends to carry out works to which Section 60 applies may apply to the local authority for consent and *"an application under this section shall contain particulars of –* *The works, and method by which they are to be carried out; and* *The steps proposed to be taken to minimise noise resulting from the works."*
Planning Act 2008[4]	In respect of noise nuisance, the Act confers statutory authority unless there is a provision in a granted DCO to the contrary.

Planning policy

14.2.3 A summary of the relevant national and local planning policy is given in **Table 14.3**.

[1] The Environmental Protection Act 1990 [online]. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents/made [Accessed 16 February 2021]
[2] Noise and Statutory Nuisance Act 1993 [online]. Available at: https://www.legislation.gov.uk/ukpga/1993/40/contents/made [Accessed 16 February 2021]
[3] The Control of Pollution Act 1974 [online]. Available at https://www.legislation.gov.uk/ukpga/1974/40/contents/made [Accessed 16 February 2021].
[4] Planning Act 2008 [online]. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents/made [Accessed 16 February 2021].

Table 14.3 – Planning policy relevant to the noise and vibration assessment

Policy	Policy Context
National planning policy	
Overarching National Policy Statement for Energy (EN-1)[5]	Section 5.11: Sets out how noise should be assessed where noise impacts are likely to arise from the Project. EN-1 refers to the relevant British Standards for the assessment of operational noise and construction noise (where 'noise' is used as an umbrella term for noise and vibration) and refers to further information provided in the technology specific National Policy Statements e.g., EN-5[7] Paragraph 5.11.8 requires applicants to demonstrate good design through measures such as selection of the quietest cost-effective plant; containment of noise within buildings; optimisation of plant layout to minimise noise emissions; and the use of landscaping, bunds or noise barriers to reduce noise transmission. Paragraph 5.11.8 requires applicants to demonstrate good design through measures such as selection of the quietest cost-effective plant; containment of noise within buildings; optimisation of plant layout to minimise noise emissions; and the use of landscaping, bunds or noise barriers to reduce noise transmission. Paragraph 5.11.9 states that the Secretary of State (SoS) should not grant development consent unless it is satisfied that the proposals will meet the three aims of the Noise Policy Statement for England (NPSE) [6]. Paragraph 5.11.12 sets out potential mitigation measures.
National Policy Statement for Electricity Networks Infrastructure (EN-5)[7]	Section 2.9 provides details specific considerations for the assessment of noise from high voltage transmission lines as they have the potential to generate noise under certain conditions, known as 'corona discharge' and caused when the conductor surface electrical stress threshold is exceeded. Generally, transmission line conductors are designed to be operated below this threshold but there are a number of factors which can lead the threshold to be exceeded, such as: accidental damage to transmission lines; wet or humid weather conditions; and

[5] Department of Energy and Climate Change (2011). *Overarching National Policy Statement for Energy (EN-1)*. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf [Accessed 25 August 2021].
[6] DEFRA (2010). *Noise Policy Statement for England (NPSE)*. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/ system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf [Accessed 25 August 2021].
[7] Department of Energy and Climate Change (2011). Na*tional Policy Statement for Electricity Networks Infrastructure (EN-5)*. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/37050/1942-national-policy-statement-electricity-networks.pdf [Accessed 31 March 2021].

	the accumulations of surface contaminants. EN-5 requires that the noise assessment method addresses these particular issues and in particular considers the effect of rain on operational noise effects.
National Planning Policy Framework (NPPF)[8]	Para. 174 states that the planning system should contribute to and enhance the natural and local environment by, (amongst other considerations), preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution. Para. 185 states that planning policies and decisions should mitigate and reduce to a minimum other adverse impacts and avoid noise giving rise to significant adverse impacts on health and the quality of life from noise from new development; and Tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value should be identified and protected. Para. 187 states that planning policies and decisions should ensure that new development can be integrated effectively with existing business and community facilities, with existing businesses not having unreasonable restrictions placed on them as a result of new development permitted after the business was established. Where the operation of an existing business or community facility could have a significant adverse effect on a new development, the application should provide suitable mitigation before the development is complete. This should be taken into account when considering whether proposed development is an acceptable use of land.
Noise Policy Statement for England (NPSE)[6]	Para. 1.6 sets out the long-term vision of Government noise policy, i.e. to "*promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.*" Para. 1.7 states that the NPSE vision is supported by aims to effectively manage and control environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development by avoiding significant adverse impacts, mitigating and minimising adverse impacts and contributing to the improvement of health and quality of life. Para. 2.20 states that to identify "significant adverse" and "adverse" impact in line with the three aims of NPSE, there

[8] Ministry of Housing, Communities & Local Government (2021). *National Planning Policy Framework*. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf [Accessed 25 August 2021].

	are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organization: No Observed Effect Level (NOEL): This is the 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 Lowest Observed Adverse Effect Level (LOAEL): This is the level above which adverse effects on health and quality of life can be detected. Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life occur. Para 2.24 states that where an impact lies somewhere between LOAEL and SOAEL, all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur. Para 2.22 notes that the NPSE states "*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. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.*"
Planning Practice Guidance - Noise[9]	The PPG-N relates in terms of a noise hierarchy the levels of perception to noise exposure with expected outcomes and required actions.
Local planning policy	
Selby District Local Plan, 2005[10]	Policy ENV2A: Environmental Pollutiion and Contaminatd Land "*Proposals for development which would give rise to, or would be affected by, unacceptable levels of noise, … will not be permitted unless satisfactory remedial or preventative measures are incorporated as an integral element in the scheme. Such measures should be carried out before the use of the site commences.*"

[9] Ministry of Housing, Communities & Local Government (2019). *Planning Practice Guidance – Noise*. [online]. Available at: https://www.gov.uk/guidance/noise--2 [Accessed 25 August 2021].
[10] Selby District Council (2005). *Selby District Local Plan Adopted February 2005 Part 1 – General Policies*. [online]. Available at: https://www.selby.gov.uk/sites/default/files/Documents/local_plan_chapter4.pdf [Accessed 25 August 2021].

Selby District Core Strategy Local Plan, 2013[11]	Policy SP17: Low carbon and renewable energy Infrastructure supporting development proposals for new sources of renewable energy and low-carbon energy generation must be designed and located to protect the environment and local amenity or demonstrate that the wider environmental, economic and social benefits outweigh any harm caused to the environment and local amenity and minimise impacts on local communities. Policy SP19: Design quality Proposals will be expected to have regard to the local character, identity and context of its surroundings and should prevent development from contributing to or being put at unacceptable risk from or being adversely affected by unacceptable levels of noise pollution.
Selby Draft Local Plan – Preferred options, 2021[12]	Preferred Approach SG9: Design of new development Proposals should protect residential amenity by ensuring proposals do not have adverse impact from disturbance from noise or vibration. Preferred Approach NE9: Pollution and contaminated land Proposals which could give rise to, or would be affected by, noise pollution will not be permitted unless satisfactory remedial or preventative measures are incorporated as an integral element in the scheme before the use of the site commences.
Leeds City Council Saved UDP Review, 2006[13]	Policy N49: Protection Design of new development, including landscaping, should minimise its potential adverse impact.
Saved Policies of the York Local Plan, 2005[14]	Policy GP1: Design Development proposals will be expected to ensure that residents living nearby are not unduly affected by noise or, disturbance. Policy GP4a: Sustainability Development should minimise pollution, including that relating to noise. Policy E7: B1 Office Development in Existing Buildings Development which would give rise to substantially increased levels of noise will normally not be permitted, but the expansion of existing industry or processing or other established industries in north Yorkshire may be allowed.

[11] Selby District Council (2013). *Selby District Core Strategy Local Plan.* [online]. Available at: https://www.selby.gov.uk/sites/default/files/Documents/CS_Adoption_Ver_OCT_2013_REDUCED.pdf [Accessed 25 August 2021].
[12] Selby District Council (2021). *Selby District Council Local Plan Preferred Options Consultation 2021*. [online]. Available at: https://www.selby.gov.uk/sites/default/files/Local_Plan_Preferred_Options_29-01-2021_%28Web%20Version%29.pdf [Accessed 25 August 2021].
[13] Leeds City Council (2006). *Leeds Unitary Development Plan (Review 2006)*. [online] Available at: https://www.leeds.gov.uk/docs/FPI_UDP_001%20Volumen%201%20Written%20Statement.pdf [Accessed 25 August 2021].
[14] City of York (2005). *City of York Draft Local Plan Incorporating the 4th Set of Changes.* [online]. Available at: https://www.york.gov.uk/downloads/file/2822/the-local-plan-2005-development-control-local-plan-full-document-and-appendices [Accessed 25 August 2021].

City of York draft Local Plan – Publication Draft, 2018[15]	Policy DP2: Sustainable Development Development will help conserve and enhance the environment through limiting environmental nuisance including noise, and vibration emissions. Policy CC1: Renewable and Low Carbon Energy Generation and Storage Renewable and low carbon energy generation developments will be encouraged and supported and will need to consider the impact the scheme may have on local communities and residential amenity resulting from development, construction and operation such as noise. Policy ENV2: Managing Environmental Quality Development will not be permitted where future occupiers and existing communities would be subject to significant adverse noise, vibration or fumes/emissions impacts without effective mitigation measures. Such proposals must be accompanied by evidence that the impacts have been evaluated and the proposal will not result in loss of amenity or damage to human health, to either existing or new communities.
City of York draft Local Plan – Publication Draft, 2018[16]	Policy D1: Placemaking Ensure design considers residential amenity so that residents living nearby are not unduly affected by noise or disturbance.
Upper Poppleton and Nether Poppleton Neighbourhood Plan, 2016-2036[17]	Makes reference to Section 109 of the NPPF which requires the planning system to contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution. This is now Section 174 in the July 2021 revision of NPPF[8]
Harrogate District Local Plan, 2014-2035[18]	Policy HP4: Protecting Amenity Proposals should be designed to ensure that they will not result in significant adverse impacts on the amenity of occupiers and neighbours, including from vibration, noise and other disturbance. The individual and cumulative impacts of development proposals on amenity will be considered.

[15] City of York (2018). *City of York – Local Plan – Publication Draft – February 2018*. [online]. Available at: https://www.york.gov.uk/downloads/file/1314/cd001-city-of-york-local-plan-publication-draft-regulation-19-consultation-february-2018- [Accessed 25 August 2021].
[16] City of York (2019). *City of York – Local Plan – Proposed Modifications – June 2019*. [online]. Available at: https://www.york.gov.uk/downloads/file/1828/ex-cyc-20-proposed-modifications-june-2019 [Accessed 25 August 2021].
[17] City of York Council (2017). Upper Poppleton and Nether Poppleton Neighbourhood Plan, 2016 – 2036. https://www.york.gov.uk/downloads/file/2832/upper-and-nether-poppleton-neighbourhood-plan-submission-document-2016- Accessed 15 February 2021
[18] Harrogate Borough Council (2020). *Harrogate Borough Council Local Plan 2014 – 2035*. [online]. Available at: https://www.harrogate.gov.uk/downloads/file/1937/heritage-and-placemaking-and-natural-environment-chapters-8-and-9 [Accessed 25 August 2021].

Hambleton Local Development Framework Core Strategy Development Plan Document, 2007[19]	Policy CP1: Sustainable Development Provides support for proposals where they promote and encourage or protect and enhance the health, economic and social well-being, amenity and safety of the population. Policy CP2: Access Seeks to ensure that communities and the environment are not adversely affected by the actions of natural or other forces and takes account of the need to mitigate development from the consequences of noise.
Hambleton Local Development Framework: Development Policies, 2008[20]	Policy DP1: Protecting Amenity All development proposals must adequately protect amenity, including with regard to noise and disturbance. Policy DP44: Very Noisy Activities "*Noise sensitive development will not be permitted in areas where potential for harmful noise levels is known to exist. Development likely to generate harmful noise levels will be directed to appropriate locations away from known noise sensitive locations."*
Hambleton Local Plan – Publication Draft, 2019[21]	Policy E2: Amenity "*All proposals will be expected to provide and maintain a high standard of amenity for all users and occupiers, including both future occupants and users of the proposed development as well as existing occupants and users of neighbouring land and buildings, in particular those in residential use. A proposal will therefore be required to ensure:* *…* *c. there are no adverse impacts in terms of noise (particularly with regards to noise sensitive uses and noise designations), including internal and external levels, timing, duration and character;* *…* *Where mitigation is necessary to ensure that the above requirements are met their compatibility with all other relevant policy requirements will be considered when determining the acceptability of the proposal.*"

[19] Hambleton District Council (2007). *Hambleton Local Development Framework: Core Strategy Development Plan Document.* [online]. Available at: https://www.hambleton.gov.uk/downloads/file/1667/core-strategy-local-development-framework-development-plan-document [Accessed 25 August 2021].

[20] Hambleton District Council (2008). *Hambleton Local Development Framework: Development Policies*. [online]. Available at: https://www.hambleton.gov.uk/downloads/file/1684/development-policies-dpd [Accessed 25 August 2021].

[21] Hambleton District Council (2019). *Hambleton Local Plan – Publication Draft July 2019*. [online]. Available at: https://democracy.hambleton.gov.uk/documents/s15267/Hambleton%20Local%20Plan%20Publication%20Draft.pdf [Accessed 25 August 2021].

Technical guidance

14.2.4 A summary of the technical guidance for noise and vibration is given in **Table 14.4**.

Table 14.4 – Technical guidance relevant to the noise and vibration assessment

Technical Guidance Document	Context
Institute of Environmental Management and Assessment (IEMA) (2014) Guidelines for Environmental Noise Impact Assessment[22]	Presents guidelines on how the assessment of noise effects should be presented within the Environmental Impact Assessment (EIA) process. The IEMA guidelines cover aspects such as: scoping, baseline, prediction and example definitions of significance criteria.
BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise (BS 5228-1)[23]	Provides guidance on the assessment and control of noise from construction sites, along with suggestions for the derivation of guideline levels for impact assessment.
BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration (BS 5228-2)[24]	Provides guidance on the assessment and control of vibration from construction sites, along with suggestions for the derivation of guideline vibration levels.
BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration (BS 7385-2)[25]	Guidance on the levels of groundborne vibration which could have the potential to lead to the damage of building structures.
BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound[26]	The standard is used to rate and assess sound of an industrial nature including, but not limited to, assessing sound from proposed, new, modified or additional sources of industrial sound, and sound at proposed new dwellings. It contains guidance on the monitoring and assessment of industrial and commercial sound sources (including fixed installations comprising mechanical and electrical plant and equipment) affecting sensitive receptors.
ISO 9613:1996 Acoustics – Attenuation of sound during propagation outdoors: Part 2 General Method of Calculation (ISO 9613-2)[27]	Defines a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at distances from a source.

[22] Institute of Environmental Management and Assessment (2014). *Guidelines for Environmental Noise Impact Assessment*. IEMA, London.
[23] British Standards Institute (2008). *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1 - Noise*. BSI, London.
[24] British Standards Institute (2008). *BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 2 - Vibration*. BSI, London.
[25] British Standards Institute (1993). *BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.* BSI, London.
[26] British Standards Institute (2014*). BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound*. BSI, London.
[27] International Organization for Standardization (1996). *ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors: Part 2 General Method of Calculation*. ISO, London

Technical Guidance Document	Context
Technical Report TR(T)94 (2018) A Method for Assessing the Community Response to Overhead Line Noise[28] (Withdrawn)	Now withdrawn; the general approach is still followed but the specific methods have now been superseded. Describes a methodology for the assessment of operational noise due to overhead power lines accounting for the effects of corona discharge which occurs when there is increased electrical surface stress on the conductor such as during wet weather conditions. The approach followed the principles of BS 4142:1990 but took into account the following factors: local ground conditions; the rainfall rate probability; the effect of rate of rainfall on background sound levels; rain-induced operational noise; and low frequency noise.
National Grid Policy Statement PS(T)134[29] (2021) Operational Audible Noise Policy for Overhead Lines	Applies to environmental noise due to the operation of new overhead power lines, reconductoring, diversion and uprating projects for overhead lines operated at 275kV and 400kV. The policy describes a three-tier assessment process and sets noise impact criteria taking into account worst-case wet noise (Tier 1), wet noise and dry noise in combination (Tier 2), and dry noise and wet noise separately following the principles of BS4142:2014 (Tier 3). PS(T)134 supersedes TR(T)94 which has been withdrawn as a live National Grid technical report.
National Grid Technical Report TR(E)564[30] (2021) Development of Method for Assessing the Impact of Noise from Overhead Lines (New Build, Reconductoring, Diversion and Uprating)	Documents the need for a clear policy stance on acceptable noise levels from overhead lines and explains how the noise criteria presented in PS(T)134 were developed, taking into account the UK noise policy context and UK national and international guidance, including World Health Organisation guidelines and evidence for health effects.
National Grid Technical Guidance Note TGN(E)322 (2021) [31] Operational Audible Noise Assessment Process for Overhead Lines (New Build, Reconductoring, Diversion and Uprating)	Provides guidance on the practical implementation of PS(T)134. Section 2.5 DCO Application/Environmental Impact Assessments (EIAs) states: "*The principles of the Tier 1 to 3 approach… …shall be used for these types of*

[28] National Grid (2018). *Technical Report TR(T)94. A Method for Assessing the Community Response to Overhead Line Noise*. [online] Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN020015/EN020015-000933-5.16.2.6_App%2016.6_TR(T)94%20A%20Method%20for%20Assessing%20the%20Community%20Response%20to%20Overhead%20Line%20Noise.pdf [Accessed 26 August 2021].
[29] National Grid (2021). *Policy Statement PS(T)134 - Operational Audible Noise Policy for Overhead Lines*. National Grid, London.
[30] National Grid (2021). *Technical Report TR(E)564 - Development of Method for Assessing the Impact of Noise from Overhead Lines (New Build, Reconductoring, Diversion and Uprating)*. National Grid, London.
[31] National Grid (2021). *Technical Guidance Note TGN(E)322 - Operational Audible Noise Assessment Process for Overhead Lines (New Build, Reconductoring, Diversion and Uprating)*. National Grid, London.

Technical Guidance Document	Context
	applications, however the method of reporting the noise impact requires a different approach." The policy suite therefore allows for noise impact (and hence significance of effect) to be reported according to the specific requirements of an EIA submitted as part of a DCO application.
Department for Transport (1988) Calculation of Road Traffic Noise (CRTN)[32]	Describes procedures for calculating noise from road traffic.
Highways England (2018) Design Manual for Roads and Bridges: LA111 - Noise and Vibration (DMRB)[33]	Guidance document provides methodology for the assessment of noise from road traffic, particularly from new and altered roads. Also provides modifications to CRTN and a methodology for the assessment of noise and vibration from construction traffic.
TRL (2002) Transport and Road Research Laboratory – Converting the UK traffic noise index $L_{A10,18hr}$ to EU Noise indices for noise mapping (TRL PR/SE/451/02)[34]	A method for converting the road traffic noise indexes described in CRTN to produce outputs in the form of European Union indices, in particular *TRL Method 2* which outlines the conversion of the $L_{A10,\ 18hr}$ noise indices to the $L_{Aeq,\ 16hr}$ and $L_{Aeq,8hr}$ indices.
World Health Organization (WHO) (1999) Guidelines for Community Noise[35]	Presents guideline noise levels for community noise in specific residential environments, e.g., outdoor living areas.
WHO (2009) Night Noise Guidelines for Europe[36]	Presents guideline noise levels for community noise at night.
WHO (2018) Environmental Noise Guidelines for the European Region[37]	Provides recommendations for protecting human health from exposure to environmental noise from various sources.

14.3 Consultation and engagement

Overview

14.3.1 The assessment has been informed by consultation responses and ongoing stakeholder engagement. An overview of the approach to consultation is provided in **Section 4.4** of **Chapter 4: Approach to Preparing the PEIR**.

[32] Department for Transport (DfT) (1988). *Calculation of Road Traffic Noise*. HMSO, London.
[33] Highways England (2019). *Design Manual for Roads and Bridges, LA 111 – Noise and Vibration (Revision 2)* [online]. Available at: https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364 [Accessed 30 July 2020].
[34] TRL and Casella Stanger (2002). *Method for Converting the UK Road Traffic Noise Index LA10,18h to the EU Noise Indices for Road Noise Mapping.* [online] Available at: https://webarchive.nationalarchives.gov.uk/ukgwa/20130402151656/ http:/archive.defra.gov.uk/environment/quality/noise/research/crtn/documents/noise_crtn.pdf [Accessed 25 August 2021].
[35] World Health Organization (1999). *Guidelines for community noise*. WHO, Geneva.
[36] World Health Organization (2009). *Night noise guidelines for Europe*. WHO, Copenhagen.
[37] World Health Organization (2018). *Environmental Noise Guidelines for the European Region*. [online]. Available at: https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf [Accessed 26 August 2021].

Scoping Opinion

14.3.2 A Scoping Opinion was administered by the Planning Inspectorate on 28 April 2021. A summary of the relevant responses received in the Scoping Opinion in relation to noise and vibration and confirmation of how these have been addressed within the assessment to date is presented in **Table 14.5**.

14.3.3 The information provided in the PEIR is preliminary and not all of the Scoping Opinion comments have been addressed at this stage. However, all comments will be addressed within the ES.

Table 14.5 – Summary of EIA Scoping Opinion responses for noise and vibration

Consultee	Consideration	How addressed in this PEIR
Planning Inspectorate	The ES should include appropriate figures to illustrate the study area adopted for vibration impacts and the receptors within the defined study area.	The extent of the vibration Study Area is still being defined. The vibration Study Area adopted will be illustrated in the figures accompanying the ES.
Planning Inspectorate	The Scoping Report does not include any information to describe the vibration characteristics of the existing or proposed substations during operation of the Proposed Development. The Inspectorate also notes that operational vibration associated with vehicles and machinery is identified within Chapter 7 Biodiversity, as a potentially significant effect to protected and/or notable species that will be taken forward for assessment in the ES. In addition, the Inspectorate notes that there are existing residential receptors located within 100m of the existing substation at Osbaldwick.	The vibration effects from plant and apparatus within the substation once in operation are expected to be negligible. It is expected that SGTs would be mounted on anti-vibration pads. An explanation as to why vibration is not expected to cause significant effects is given in **Table 14.12**.
Planning Inspectorate	The Inspectorate does not consider that sufficient information has been provided to conclude that operation of the Proposed Development would not give rise to significant vibration effects during operation. An assessment of likely significant operational vibration effects on protected and/or notable species, and from the works to the existing Osbaldwick substation on residential receptors within 100m should be presented in the ES, or the ES should set out a justification as to why significant effects are not likely to occur.	An explanation as to why vibration is not expected to cause significant effects during operation of the Project is given in **Table 14.12**. This justifies the approach to scope out of the EIA vibration effects during operation.
Planning Inspectorate	The Scoping Report references the potential for new receptors to contribute to ambient noise levels. The ES should also identify whether there is potential for new sensitive receptors	At this stage, a long list of developments to be considered in the cumulative effects assessment (CEA) has

Consultee	Consideration	How addressed in this PEIR
	(e.g. new residential receptors) to be introduced into the study area. It is noted that North Yorkshire County Council's consultation response states that there are a number of undetermined planning applications in proximity to the proposed Monk Fryston substation, which would potentially introduce new residential receptors.	been compiled and refined to a short list (see **Section 4.9, Chapter 4: Approach to Preparing the PEIR**). This includes the undetermined planning applications at Monk Fryston and identified potential new receptors. A more detailed CEA will be included in the ES.
Planning Inspectorate	A list of potential receptors is identified; it is noted that this appears to be primarily comprise of residential receptors and a school, grouped as community receptors, and does not include any receptors located in the Leeds local authority area. The list of potential receptors should be reviewed and updated as further baseline data is gathered and decisions are made, including routeing of construction vehicles and location of the substations and construction compounds, to ensure that all sensitive receptors that may experience significant effects are included within the assessment.	The list of potential receptors will be reviewed and relevant local authorities will be consulted on the list of potential receptors, having regard to the routing of construction vehicles and the location of construction compounds.
Planning Inspectorate	There is no reference to other receptor types that may be sensitive to noise and vibration impacts, such as ecological receptors. The ES must include an assessment of noise and vibration impacts on ecological receptors, where significant effects are likely to occur. Any such assessment should cross refer to findings of other relevant aspect chapters, such as Biodiversity and Historic Environment. The ES should clearly explain any assumptions made regarding the assessment of likely significant effects from noise and vibration on sensitive ecological receptors.	Ecological surveys are currently ongoing. Should these identify ecological receptors which are likely to experience significant effects from changes in levels of noise and vibration then such effects will be assessed in the ES with relevant mitigations proposed, if deemed necessary.
Planning Inspectorate	Effort should be made to agree the monitoring locations with relevant consultation bodies, e.g. Environmental Health departments within the six local authorities. Noise monitoring close to construction compound locations should be representative of the closest sensitive receptors. Noise monitoring should be carried out in accordance with relevant technical standards such as BS 7445 – Description and measurement of environmental noise.	Proposed monitoring locations and survey methods are set out in **Section 14.4 .** Relevant local authority Environmental Health departments will be consulted on proposed monitoring locations before surveys are undertaken where practical given the Project's timescales and access.

Consultee	Consideration	How addressed in this PEIR
Planning Inspectorate	The construction noise assessment must include consideration of noise associated with continuous activities such as cable jointing that may be required during the night-time period.	A construction noise assessment will be undertaken for all periods where construction works are likely to take place and will be assessed following the methodology set out in **Section 14.8**.
Planning Inspectorate	No information has been presented regarding the potential for noise emissions to be associated with CSECs. The ES should include a description of the assessment methodologies applied and how significant effects as a result of changes in noise levels have been determined, where relevant.	The assessment methodology for the installation of CSECs is presented in **Section 14.8**, with assessment to be included as part of the ES once more details are available. The operational noise of CSECs is covered by the overhead line noise assessment as the only potential noise sources from CSECs are the overhead line components. Therefore, the operational noise assessment of CSECs is not referred to again in this chapter, but instead is addressed as part of the overhead line operational assessment.
Planning Inspectorate	The ES should include information regarding planned maintenance arrangements during the operational phase of the Proposed Development, including any noise and vibration impacts arising and maintenance requirements required to mitigate potential noise impacts.	Information regarding planned maintenance during operation will be included in the ES and noise and vibration associated with that maintenance will be addressed. It is not anticipated that there will be likely significant effects.
Planning Inspectorate	On the basis that the fixtures and fittings used within the Proposed Development conform to the Technical Specification and Type Registration processes outlined in chapter 14 and therefore would result in no audible noise generation, the Inspectorate agrees that further assessment of this matter as part of the operation of the Proposed Development can be scoped out of the ES.	Whilst this is noted and the assessment of fixtures and fittings for overhead lines has been scoped out of the ES, please refer back to paragraph 14.7.22 to 14.7.28 of the Scoping Report to see information on audible noise generation potential from overhead line fixtures and fittings.

Consultee	Consideration	How addressed in this PEIR
North Yorkshire County Council	As is to be expected at this stage the detail is vague in parts, for example embedded environmental measures proposes within the outline CEMP (Section 14.5), categorised receptors by community (Section 14.6, Table 14.4), and uncertainty regarding construction compound location(s). However, overall, the applicant has identified the relevant technical guidance and methodologies for assessment.	The ES will provide further detail of the embedded mitigation measures following detailed assessment and modelling based on the location of the construction compounds and likely activities taking place in construction areas.
North Yorkshire County Council	By way of observation in relation to the new substation at Monk Fryston, I am unable to locate consideration for undetermined applications that are of relevance when considering the likelihood of significant impacts, notably the adjacent gas peaking site (application ref: 2020/0594/FULM) and conversion of stables to residential dwelling (application ref: 2021/0075/FUL). It should be acknowledged that the review of existing noise sources and nearby sensitive receptors is subject to change.	At this stage, a long list of developments to be considered in the CEA has been compiled and refined to a short list (**Section 4.9, Chapter 4: Approach to Preparing the PEIR**). This includes the undetermined planning applications at Monk Fryston. A more detailed CEA will be included in the ES. The future baseline used for the assessment to be reported in the ES will take into account potential changes in ambient conditions which are likely to occur in the absence of the Project for which sufficient information is available.

Technical engagement

14.3.4 Technical engagement with relevant consultees in relation to noise and vibration is planned. Discussions with the relevant local authorities are due to take place to consult on monitoring locations (more information is provided in **Section 14.4**). Following the monitoring, engagement with respect to the outcomes of the monitoring will take place with the relevant consultees, local authorities, and affected parties as applicable.

14.4 Data gathering methodology

Study Area

14.4.1 This section sets out the methodology and approach to selecting the Study Area for baseline data gathering and survey work. The geographical Study Area for the assessment is defined in **Section 14.7**.

14.4.2 The approach to defining the draft Order limits is set out in **Chapter 2: Project Need and Alternatives**. This has been used to inform the spatial scope of the noise and vibration assessment.

14.4.3 For the purposes of identifying potential survey locations for the noise assessment, the initial Study Area defined in **Section 14.7** (draft Order limits plus a 1km buffer) has been used as a starting point. This has then been refined for the construction and the operational stages and specific elements of the Project, considering the particular noise source anticipated to impact the local area, as described in this section.

14.4.4 This initial Study Area (draft Order limits plus a 1km buffer) is large and comprises predominantly agricultural land. Ambient and background noise levels are likely to be low at all sensitive receptors except those that front an A-road or are in close proximity to a motorway, the East Coast Main Line (ECML) railway or near to industrial sites.

Construction noise

14.4.5 The need for, and extent of, baseline data gathering for construction is dependent on the assessment methodology (i.e. whether measured baseline data is used), source (what is to be constructed, and how), the proximity of sensitive receptors and their likely existing noise environment. The following paragraphs set out information on these factors and explain how they influence the data gathering area.

14.4.6 Sources considered for construction noise assessment are new substations, CSECs and 275kV/400kV overhead lines and realigned and reconductored 275kV overhead lines, along with the associated construction compounds. The locations actually selected for noise measurement are dependent on the type of development as set out in the following paragraphs.

14.4.7 Construction noise baseline measurements will be carried out at the locations of new substations, new CSECs and temporary construction compounds. Monitoring will be carried out at the nearest representative noise sensitive receptors surrounding these proposed Project elements because these will be most exposed to any noise from the Project.

14.4.8 It is not proposed to carry out baseline noise monitoring for construction noise assessment along the route of new, realigned and reconductored 275kV/400kV overhead line. For the assessment of construction noise along the overhead lines, the lowest 'Category A' (BS 5228-1:2009 + A1:2014[23]) acoustic environment will be assumed, which will provide a worst-case assessment. Where baseline measurements are carried out for the assessment of operational noise, data will be used for the construction noise assessment, where considered suitable.

14.4.9 The works proposed at the existing Osbaldwick Substation include a new circuit breaker and isolator along with installation of associated underground cabling, and the removal and dismantling of an existing gantry to free up space for new equipment. A new gantry, similar in size but placed at a slightly different location, would then be installed on the existing National Grid operational land and within the substation footprint. It is not proposed to carry out baseline noise monitoring for construction and instead assume the lowest 'Category A' acoustic environment, providing a worst-case assessment.

Operational noise

14.4.10 The need for, and extent of, baseline data gathering for operation is dependent on the assessment methodology (i.e. whether measured baseline data is used), the source (what is to be operational, and how) and the proximity of noise sensitive receptors. The following paragraphs set out information on these factors and explain how they influence the data gathering area.

14.4.11 Locations of sources considered for operational noise are the new substations and new and realigned 275kV/400kV overhead lines. The locations actually selected for noise measurement are dependent on what is being constructed as set out in the following paragraphs.

14.4.12 For discreet locations (i.e. substations), baseline data to inform the operational noise assessment will be gathered at the nearest noise sensitive receptors surrounding these proposed Project elements.

14.4.13 At the proposed Monk Fryston Substation, where there is an existing substation that will form part of the total noise climate with the Project once in place, measurements will be taken close to the existing infrastructure to characterise the sound.

14.4.14 For new 275kV/400kV overhead lines, baseline data is proposed to be gathered at a location representative of the nearest noise sensitive receptors for each of the three new sections of overhead line, to inform the operational noise assessment.

14.4.15 Operational noise for reconductored lines has been scoped out from further assessment as it is anticipated that the 275kV XC/XCP overhead lines once reconductored are unlikely to result in a significant change in electrical stress (the conductor surface voltage gradient, which is determined by the operating voltage and geometrical configuration of the conductor system and pylon) and therefore changes in audible noise levels from this existing overhead line would be negligible. Therefore, no baseline data is proposed to be gathered for reconductored lines.

14.4.16 Operational noise from Osbaldwick Substation is proposed to be scoped out from further assessment as only minor changes are to be made. The proposed changes at Osbaldwick Substation would not result in an increase in noise emissions from the site and therefore the closest noise sensitive receptors (NSRs) would not experience change during everyday operation of the site. Noise from the additional equipment (circuit breaker and isolator) would occur as a result of a planned or unplanned event, and is expected to be a short duration click and low level whirring for a duration of a few seconds. It is anticipated that the number of activation events (both planned and unplanned) would be less than 100 a year. Therefore, no baseline data is proposed to be gathered for Osbaldwick Substation.

14.4.17 The vibration Study Area has been defined as a 100m area from any likely significant vibration source, such as compaction or piling works. However, for gathering baseline data, no vibration monitoring is proposed, as baseline vibration will be negligible compared to construction levels and will be assessed as an absolute (not relative) value.

14.4.18 Reference may be made to potential receptors outside of the noise Study Area – such as receptors located along potential construction traffic routes or receptors of special interest (such as designated tranquil areas or precision engineering premises). Where this is the case, those potential receptors will also be considered as part of the noise and vibration assessment. The Study Area for the noise and vibration assessment will be updated as the Project is refined.

14.4.19 For both the PEIR and the ES, this Study Area will be used to identify key noise and vibration sensitive receptors for noise and vibration predictions and assessment on the basis of proximity and sensitivity.

Desk study

14.4.20 A summary of the organisations that have supplied data, together with the nature of that data is outlined in **Table 14.6**.

Table 14.*6* – Data sources used to inform the noise and vibration assessment

Organisation	Data Source	Data Provided
British Standard Institute	BS 5228-1:2009 + A1:2014[23]	Noise data for construction noise prediction.
British Standard Institute	BS 5228-2:2009 + A1:2014[24]	Vibration data for construction vibration prediction.
Google	Google® Earth Pro Version 7.3.2.5776[38]	Satellite imagery for establishing location of existing noise sensitive receptors and current baseline conditions.
National Grid	National Grid network route map[39] data	Approximate locations for the national electricity transmission network.
Defra	Defra Magic Map[40]	Local footpaths, listed buildings, habitats and species which can be used when identifying receptors.
Extrium	Extrium England Noise and Air Quality Viewer[41]	Defra Round 3 Road noise mapping and railway mapping data.
Narda Safety Test Solutions	EFC400 modelling data	Modelling data for overhead line audible noise.
National Grid	TS 2.03 Technical Specifications – Power Transformers and Reactors[42]	Defines the guaranteed maximum sound power level for SGTs.

Survey work

14.4.21 To date, no site surveys have been undertaken, however, surveys are planned to be undertaken to inform the ES. In lieu of a baseline survey, predicted noise and vibration levels within this PEIR have been assessed against criteria in the form of absolute levels taken from industry standards and guidance.

[38] Google (2021). *Google Earth Pro version 7.3.4.8248*. [online]. Available at: https://www.google.com/earth/download/gep/agree.html?hl=en-GB [Accessed 26 August 2021].
[39] National Grid (2021). *Network route maps*. [online]. Available at: https://www.nationalgrid.com/uk/electricity-transmission/network-and-infrastructure/network-route-maps [Accessed 26 August 2021].
[40] DEFRA (2021). *Magic Map Application.* [online]. Available at: https://magic.defra.gov.uk/MagicMap.aspx [Accessed 26 August 2021].
[41] Extrium (2021). *England Noise and Air Quality Viewer*. [online]. Available at: http://www.extrium.co.uk/noiseviewer.html [Accessed 26 August 2021].
[42] National Grid (2015). *TS2.03 Technical Specifications – Power Transformers and Reactors*. National Grid, London.

14.4.22 Baseline sound surveys are currently being planned and mobilised for Quarter 4 of 2021, with the purpose being:

- obtain and understand the background and ambient baseline sound environment at locations where operational noise may be observed to provide context to the assessment of operational noise in accordance with BS 4142:2014 + A1:2019[26];
- obtain background and ambient baseline sound measurements at the site of, and at representative sensitive receptors close to the two proposed substations, whilst taking account of noise from the existing Monk Fryston Substation;
- obtain background and ambient baseline sound measurements at representative NSRs near to the route of the proposed 400kV and 275kV overhead lines;
- obtain background and ambient sound measurements at the site of, and at representative sensitive receptors close to CSECs and associated infrastructure (Shipton North/South 400kV CSECs and Tadcaster Tee West/East 275kV CSECs); and
- obtain background and ambient sound measurements near to the proposed construction compounds.

14.4.23 Baseline sound monitoring is proposed to be undertaken at 14 locations as long-term unattended surveys with attended observations during a period outside of local school holidays.

14.4.24 It is proposed that all ambient and background sound measurements will be undertaken by suitably qualified personnel.

14.4.25 It is also proposed that noise monitoring equipment will be set to measure for intervals of 15 minutes in accordance with BS 4142:2014 + A1:2019[26], which states:

> *'8.1.3 Ensure that the measurement time interval is sufficient to obtain a representative value of the background sound level for the period of interest. This should comprise continuous measurements of normally not less than 15 min intervals, which can be continuous or disaggregated'.*

14.4.26 A meteorological station is proposed to be set up in conjunction with the noise monitoring equipment, also set to 15-minute intervals, so the data will be concurrent and available for data analysis. It will monitor local wind speeds and direction, precipitation, and air temperature during the ambient and background sound monitoring surveys. The results of the meteorological surveys will be used in the analysis of the ambient and background sound data to ensure that only data collected under appropriate weather conditions will be used in defining the baseline sound levels. This approach is advocated within BS 4142:2014 + A1:2019[26] and BS 5228-1:2009 + A1:2014[23].

14.4.27 It is proposed that by default ambient and background sound measurements are undertaken in accordance with BS 4142:2014 + A1:2019[26] and BS 7445-1:2003[43], i.e. with microphones mounted to a minimum height of 1.2 to 1.5m above ground level and no less than 3.5m from any reflecting surface other than the ground.

14.4.28 Sound levels will be measured using integrating averaging sound level meters (SLMs) conforming to Class 1 as defined by BS EN 61672-1:2013[44]. The SLMs will be field calibrated before and at the end of each survey period by applying an acoustic

[43] British Standards Institute (2003). BS 7445-1:2003 Description and measurement of environmental noise. Part 1: Basic quantities and procedures. BSI, London.
[44] British Standards Institute (2013). BS EN 61672-1:2013 Electroacoustics. Sound level meters. Specifications. BSI, London.

calibrator, conforming to BS EN 60942:2003[45], to the microphone to check the sensitivity of the measuring equipment. Any drift in calibration levels will be noted upon collection, and measurements repeated in the event that excessive (i.e., greater than 0.5dB) drift is observed.

14.4.29 BS 5228-1:2009 + A1:2014[23] describes the 'ABC method' for assessing construction noise, explained in **Section 14.8**, demonstrating how assuming low background and ambient noise levels can form the basis for a worst-case assessment. Therefore, using this assumption of low background and ambient levels where baseline data is not proposed to be undertaken, all receptors will be protected by an assessment that considers the worst-case.

14.4.30 It is proposed to scope out surveys for the following:

- vibration monitoring, as baseline vibration will be negligible compared to construction levels and will be assessed as an absolute (not relative) value;
- noise monitoring within the vicinity of the existing 275kV XC overhead line, as it is proposed to scope out operational noise effects from the reconductoring of this overhead line;
- monitoring of existing road traffic noise as this will be determined through calculation using traffic flow data; and
- noise monitoring within the vicinity of the existing Osbaldwick Substation as there are minimal changes proposed to the operation of the substation and the construction noise assessment will be based on a worst case low ambient noise level.

14.4.31 If comprehensive measurement data cannot be obtained, or measurements are not proposed to be undertaken, the following assumptions will be made about baseline sound levels of the area:

- for the assessment of operational noise from the proposed overhead lines, a very low daytime background noise level of 30dB will be assumed and a very low night-time background noise level of 25dB will be assumed;
- for assessment of construction noise along the existing overhead lines, the lowest 'Category A' (BS 5228-1:2009 + A1:2014[23], specifically Appendix E) acoustic environment will be assumed; and
- road traffic noise levels will be determined using CRTN[32] and modelling or calculation of basic noise level (BNL).

14.4.32 In the interest of collecting baseline data for the assessment of construction and operation of substations, construction of CSECs, construction works associated with the construction compounds and the operation of new overhead lines, the monitoring locations set out in **Figure 14.1** and **Table 14.7** are proposed. The monitoring locations to be taken forward and reported in the ES will be dependent on the outcomes of discussions with relevant local authorities and landowners.

[45] British Standards Institute (2003). BS EN 60942:2003 Electroacoustics. Sound calibrators. BSI, London.

Table 14.7 – Proposed monitoring locations

Reference	Description of Location	Reason for Monitoring	Receptors represented by monitoring location (see Section 14.7 Potential Receptors)
MF1	Field to the east of the existing Monk Fryston substation (south of existing farm)	To gather background and ambient noise levels for the construction and operational assessments of the proposed Monk Fryston Substation and gather characterisation data from the existing Monk Fryston Substation.	SEL02
MF2	Field located on the west side of the A162, just south of the junction of A162 and Betteras Hill Road	To gather background and ambient noise levels for the operational assessment of the proposed Monk Fryston Substation.	SEL01 SEL04
MF3	Pollums House Farm	To gather background and ambient noise levels for the operational assessment of the proposed Monk Fryston Substation.	SEL03
MF4	Field south of Red Hill Lane, to the west of The Orangery at Lumby Hall	To gather background and ambient noise levels for the operational assessment of the proposed Monk Fryston Substation.	SEL05
TD1	Field southwest of junction of Garnet Lane and A659, south of Toulston Polo Ground and Tadcaster Grammar School	To gather background and ambient noise levels for the construction assessment of the CSECs and temporary construction compounds.	SEL10
HE1	Field located off Red House Lane, near Thickpenny Farm	To gather background and ambient noise levels for the operational assessment of the new overhead line.	HAR06
OV1	Overton Grange	To gather background and ambient noise levels for the operational assessment of the proposed Overton Substation and new overhead line.	HAM02

Reference	Description of Location	Reason for Monitoring	Receptors represented by monitoring location (see Section 14.7 Potential Receptors)
SK1	Field located to the west of Mercure York Fairfield Manor (located approximately the same distance from A19 and existing overhead line as YOR01)	To gather background and ambient noise levels for the operational assessment of the new overhead line.	YOR01
SK2	Field located off the A19, just south of the property located north of Skelton	To gather background and ambient noise levels for the operational assessment of the proposed Overton Substation.	YOR02
SH1	Field located close to the junction of A19 and Station Lane, south of Shipton by Beningbrough	To gather background and ambient noise levels for the construction assessment of the temporary construction compounds and the operational assessment of the proposed Overton Substation.	HAM03
SH2	Field on Station Lane/Station Road, opposite the Sidings Hotel	To gather background and ambient noise levels for the operational assessment of the proposed Overton Substation, also can also be used for construction assessment of the temporary construction compounds.	HAM04
SH3	Field located behind properties on South Garth	To gather background and ambient noise levels for the operational assessment of the proposed Overton Substation.	HAM05 HAM06
SH4	Hall Moor Farm	To gather background and ambient noise levels for the operational assessment of the new overhead line.	
SH5	Newlands Farm	To gather background and ambient noise levels for the operational assessment of the new overhead line, also can also be used for construction	HAM07

Reference	Description of Location	Reason for Monitoring	Receptors represented by monitoring location (see Section 14.7 Potential Receptors)
		assessment of the temporary construction compounds.	

14.4.33 Long-term measurements will be unattended and are proposed to consist of at least 5 days of continuous monitoring, including a weekend.

14.5 Overall baseline

Current baseline

14.5.1 Due to COVID-19 restrictions, no noise surveys have been undertaken to date, however, these are currently being planned and mobilised for Quarter 4 of 2021, as detailed above. Therefore, determination of the existing noise and vibration baseline has been undertaken based on a desk-based study for this PEIR. For the ES, baseline noise surveys will be conducted, which will establish a clear understanding of the existing baseline.

14.5.2 There may be areas where the assessment is based on an assumed baseline level, for reasons explained in paragraph 14.4.31.

Overview

14.5.3 Land use in the noise Study Area, which also encompasses the vibration Study Area, is predominantly rural. It is anticipated that the baseline ambient noise levels will generally be of a low magnitude except where close to major roads, the ECML railway or near to industrial sites. Given the geographical extent of the noise Study Area, the description of the current baseline ambient noise conditions is given going from north to south.

North West of York

14.5.4 The Study Area starts to the west of Wigginton and Haxby, with the existing 400kV 2TW/YR overhead line. Two new 400kV CSECs are proposed, named Shipton North and South, located northeast of Shipton by Beningbrough. From these CSECs, the new YN 400kV overhead line would connect into the proposed Overton Substation. From the proposed Overton Substation, two new sections of 275kV line are proposed, which would connect to the existing XC/XCP lines to Monk Fryston (renamed at the XC overhead line) and the XCP line to Poppleton (renamed as to SP overhead line).

14.5.5 The area described above is sited on the outskirts of York at a location approximately 6km north-west of the city centre. The baseline ambient noise conditions in this area will be influenced by road traffic noise from the A19 and the A1237, train movements on the ECML railway, with contributions from traffic on local roads and trains on the York – Leeds railway line. Given the area's predominantly agricultural land uses, few other sources of ambient noise are likely to be present.

14.5.6 The current 275kV XC/XCP (Poppleton to Monk Fryston) overhead line would be split into two new overhead lines with two new sections which would connect into the proposed Overton Substation from the south and therefore no longer exist under the Project, with the exception of the section to Poppleton, which would be renamed SP. This starts on the outskirts of York city centre and the current baseline noise conditions are influenced by a combination of road traffic sources including the A59, the A1237 and the A19 and rail noise from the ECML railway with contributions from the local road network.

Tadcaster

14.5.7 An additional interface connection between the existing 275kV XC and 275kV XD overhead lines is proposed. In this area, it is expected that baseline ambient conditions are mostly influenced by road traffic noise from the A1(M) and the A64.

Monk Fryston Substation

14.5.8 The current baseline noise environment in the vicinity of the new Monk Fryston Substation is likely to be influenced by road traffic noise from the A1(M), A63 and A162, noise related to mineral extraction activities from the quarry on Betteras Hill Road (including heavy vehicles on local roads) and operational noise from the existing Monk Fryston Substation. There is a local railway route located 1km to the east of the proposed Monk Fryston Substation, but a review of online train timetables and Extrium noise viewer suggest that trains along this route run infrequently (around four passenger trains per day, with some freight trains avoiding the ECML railway equating to roughly two trains per hour during the day and one train per hour at night) and therefore railway noise from this line is not expected to significantly contribute to the acoustic environment.

Future baseline

14.5.9 It is expected that road traffic noise will steadily increase due to the natural growth in road traffic flows over time. As outlined in **Section 12.4**, with regards to the traffic modelling, the future baseline will consider traffic growth as a result of new development based on growth factors from Department for Transport models. Ongoing engagement with local planning authorities will also identify any potential development which could also contribute to increases in future baseline ambient noise levels.

14.6 Embedded measures

14.6.1 As part of the design process, several embedded environmental measures have been adopted to reduce the potential for adverse noise and vibration effects. These embedded environmental measures will evolve over the development process as the EIA progresses and in response to consultation. They will be fed iteratively into the assessment process.

14.6.2 Embedded environmental measures include all measures usually assumed to be in place during construction and operation and are generally regarded as industry standard or best practice. This includes production of an Outline CEMP that will detail the best practice methods to be adopted during the construction phase, in addition to the environmental management measures.

14.6.3 A range of environmental measures have been embedded into the Project as outlined in **Section 3.4**. **Table 14.8** outlines how these embedded measures will influence the noise and vibration assessment.

Table 14.8 – Summary of the embedded environmental measures

Receptor	Potential Changes and Effects	Embedded Measures	Compliance Mechanism
Construction			
All noise sensitive receptors	Potential adverse effects from construction noise from mobile and static plant along the construction route	Plant to consist of modern machinery fitted with efficient silencers, where possible, designed to minimise noise levels that are generated during operations.	Outline CEMP secured by DCO requirement.
All noise sensitive receptors	Potential adverse effects from construction noise from static compressors and generators along the construction route	All compressors and generators to be 'sound reduced' models fitted with properly lined and sealed acoustic covers which are to be kept closed whenever the machines are in use. Additionally, ancillary pneumatic percussive tools to be fitted with mufflers or suppressers.	Outline CEMP secured by DCO requirement.
All noise sensitive receptors	Potential adverse effects from construction noise from mobile and static plant along the construction route	The plant would be properly maintained in accordance with the manufacturers' instructions to ensure that the occurrence of malfunctions, which can give rise to elevated noise levels, is reduced and any malfunctions that do occur are swiftly repaired.	Outline CEMP secured by DCO requirement.
All noise sensitive receptors	Potential adverse effects from construction noise from mobile and static plant along the construction route	Machines in intermittent use shall be shut down in the intervening periods between work or, where this is impracticable, throttled down to a minimum.	Outline CEMP secured by DCO requirement.
All noise sensitive receptors	Potential adverse effects from construction noise from mobile and static plant along the construction route	Where practicable, plant with directional noise characteristics to be positioned to minimise noise at nearby properties.	Outline CEMP secured by DCO requirement.
All noise sensitive receptors	Potential adverse effects from construction noise from static plant	Static equipment and machinery to be sited as far as is practicable from inhabited buildings.	Outline CEMP secured by DCO requirement.

Receptor	Potential Changes and Effects	Embedded Measures	Compliance Mechanism
	along the construction route		
Operation			
Monk Fryston noise sensitive receptors	Potential adverse effects from the operation of a new substation	Locating the proposed Monk Fryston Substation adjacent to the existing substation to minimise the potential for new receptors being exposed to operational noise from the four SGTs.	DCO works plans, Order Limits and Limits of Deviation (LoDs).
Noise sensitive receptors close to proposed substations	Potential adverse effects from the operation of new substations	Sourcing SGTs and defining mitigation requirements (such as noise enclosures) within the proposed Overton Substation and Monk Fryston Substation to National Grid technical specifications which include requirements regarding audible noise including confirmation by type testing and sample testing.	DCO requirement.
All noise sensitive receptors	Potential adverse effects from the operation of the Project	Locating the proposed substations, associated infrastructure, CSECs and new and realigned sections of overhead line away from noise sensitive receptors where possible.	DCO works plans, Order Limits and LoDs.
Vibration sensitive receptors close to proposed substations	Potential adverse effects from the operation of new substations	SGTs and, if required, standby generators, within the substation would be mounted on anti-vibration mountings, meaning the vibration from plant and apparatus within the substation would be very low level.	DCO requirement.

14.7 Scope of the assessment

The Project

14.7.1 All elements of the Project are considered as part of the assessment except for the operation associated with the existing 275kV XC/XCP overhead line, overhead line fixtures and fittings and the operation of Osbaldwick Substation. Justification for the scoping out of these elements is provided in **Table 14.12**.

Spatial scope

14.7.2 The approach to defining the draft Order limits is set out in **Chapter 3: Description of the Project**. This has been used to inform the spatial scope of the noise and vibration assessment. The study area has been refined through the process of gathering

preliminary environmental information. The 1km buffer described in the Scoping Report has therefore been refined within this PEIR.

14.7.3 For the purposes of identifying potential receptors for the noise assessment, the noise Study Area was redefined depending on the Project element and whether it was for the construction noise or operational noise assessment, as follows:

- construction noise, including construction compounds: up to 300m from any construction activity or extent of identification of significant effects if this is beyond 300m. This is based on other recent major infrastructure projects, such as High Speed 2 (HS2);
- construction traffic noise: where an increase or decrease in road traffic volumes or traffic types caused by the construction of the Project would be likely to cause a change in noise level exceeding 1dB $L_{Aeq,T}$ during either the daytime (07:00 – 23:00) or night-time (23:00 – 07:00), as advocated in DMRB;
- operational noise from new overhead lines: up to 200m from the draft Order Limits or extent of identification of significant effects if this is beyond 200m; and
- operational noise from substations: up to 1km from the draft Order Limits.

14.7.4 For the purposes of identifying potential receptors for the vibration assessment, a vibration Study Area has been defined as a 100m area from any likely significant vibration source, such as compaction or piling works.

14.7.5 Reference may be made to potential receptors outside of the Study Areas defined above, such as receptors of special interest (such as designated tranquil areas or precision engineering premises). Where this is the case, those potential receptors will also be considered as part of the noise and vibration assessment. The Study Areas for the noise and vibration assessment may still be updated as the Project is refined, reviewed and amended in response to such matters and to feedback from consultation where appropriate.

Temporal scope

14.7.6 The temporal scope of the assessment of noise and vibration is consistent with the period over which the Project would be carried out and therefore covers the construction period, currently proposed to take place between 2024 and 2028, with some elements of the Project becoming operational in 2027, and the operational period thereafter.

14.7.7 Site based construction noise and vibration for the Project will be assessed at a point when the maximum plant is on use on site. Where there are different phases to the works, the maximum plant for each phase will be taken into consideration in the assessment. Noise from road traffic associated with construction will be assessed during the year of construction that sees the peak traffic flow week.

14.7.8 Whilst the assessments will focus on points in time, consideration will be given to the duration of the effect as relevant to the different phases and activities within those phases (e.g. some construction effects last for only days whilst some may last for weeks).

14.7.9 The Project is expected to have a life span of more than 80 years. If decommissioning is required at this point in time, then activities and effects associated with the decommissioning phase are expected to be of a similar level to those during the construction phase works, albeit with a lesser duration. Therefore, the likely significance of effects relating to the construction phase assessment will be applicable to the

decommissioning phase and decommissioning effects are not discussed further in this chapter.

Potential receptors

14.7.10 The spatial and temporal scope of the assessment enables the identification of receptors which may experience a change as a result of the construction and/or operation of the Project.

14.7.11 The principal noise and vibration receptors that have been identified as being potentially subject to effects are summarised in **Table 14.9**.

Table 14.9 – Noise and vibration receptors subject to potential effects

Receptor	Reason for Consideration
Residential – residences, including private gardens where appropriate	These dwellings, occurring within the Study Area of the Project, have the potential to experience a change as a result of the Project and potentially adverse effects. This will be further defined in the ES.
Community services – e.g. schools (during daytime periods), places of worship	These sites, occurring within the Study Area of the Project, have the potential to experience adverse effects as a result of the Project. This will be further defined in the ES.
Commercial – e.g. offices, retail, entertainment venues and eateries, leisure facilities	These sites, occurring within the Study Area of the Project, have the potential to experience adverse effects as a result of the Project. This will be further defined in the ES.
Leisure areas – e.g. local nature reserves	These sites, occurring within the Study Area of the Project, have the potential to experience adverse effects as a result of the Project. This will be further defined in the ES.
Terrestrial ecology – e.g. designated sites include Special Protection Areas and Sites of Special Scientific Interest	These sites and species have the potential to experience adverse effects as a result of the Project and are reported in **Chapter 8: Biodiversity**.
Historic environment – e.g. scheduled monuments, listed buildings	These sites and buildings have the potential to experience adverse effects as a result of the Project and are reported in **Chapter 7: Historic Environment**.

14.7.12 Based on the information set out in **Section 14.8**, potential receptors have been selected based on their location relative to the Project components. Generally, the potential receptors are residential dwellings which are considered to have a 'medium' sensitivity to noise and vibration. Potential receptors have been identified as individual dwellings or 'community receptors' as appropriate. Where community receptors have been used, the consideration of individual dwellings representative of the wider community will take place for the ES. The locations of the identified receptors and their

location relative to the draft Order Limits are shown in **Figure 14.2** and these are summarised by local authority administrative area in **Table 14.10**.

Table 14.10 – Potential receptors identified

Local Authority	ID	Community/receptor	British National Grid Reference	
			X	Y
Selby	SEL 01	Betteras Hill Road, Hilam	449421	429186
	SEL 02	The Bungalow, York Road	448899	429351
	SEL 03	Pollums House Farm	447898	429476
	SEL 04	Selby Road, South Milford	449303	429701
	SEL 05	Lumby	448639	430342
	SEL 06	Newthorpe	446943	432277
	SEL 07	Coldhill Lane	446786	435278
	SEL 08	Lead Mill Farm	446974	437273
	SEL 09	Hazlewood	445924	439950
	SEL 10	Red Brick Farm House, Moor Lane	446447	441750
	SEL 11	Remote properties west of Tadcaster	446730	442603
Harrogate	HAR 01	Easedike Farm	447463	445200
	HAR 02	Wighill	447821	446873
	HAR 03	Maran Lakes	448708	450317
	HAR 04	Tockwith Road	449350	451882
	HAR 05	Remote properties south of Moor Monkton	451124	455189
	HAR 06	Properties off Red House Lane, York	453229	456005
	HAR 07	East Lane, Moor Monkton	451291	456782
Hambleton	HAM 01	Overton Road	455312	455861
	HAM 02	Overton Grange	455096	456588

Local Authority	ID	Community/receptor	British National Grid Reference	
			X	Y
	HAM 03	Main Street	455453	457830
	HAM 04	The Sidings	455125	457985
	HAM 05	Mill House, York	455302	458115
	HAM 06	Shipton by Beningbrough	455374	458398
	HAM 07	Newlands Farm		
York	YOR 01	Grantchester, Stripe Lane	456606	456105
	YOR 02	Property on A19	456434	456769
	YOR 03	Osbaldwick	463970	451558

Likely significant effects

14.7.13 The effects on noise and vibration receptors which have the potential to be significant and have been taken forward for detailed assessment are summarised in **Table 14.11**.

Table 14.11 – Noise and vibration receptors scoped in for further assessment

Receptor	Likely significant Effects
Construction	
NSRs: • YOR 01 - 02	Construction traffic – potential for increased road traffic noise on local roads due to construction traffic accessing and leaving site.
NSRs: • SEL 02 • SEL 10 • HAM 07 • YOR 03	Potential for construction noise effects due to the construction of the proposed Overton Substation and Monk Fryston Substation, Shipton North/South 400kV CSECs, Tadcaster Tee West/East 275kV CSECs, the minor works being undertaken at Osbaldwick Substation, and new, realigned and replacement overhead line pylons.
NSRs: • SEL 10	Installing underground cables – potential construction noise and vibration effects due to drilling and potential piling requirements for the

Receptor	Likely significant Effects
• HAM 07	installation of underground cabling, Shipton North/South 400kV CSECs and Tadcaster Tee West/East 275kV CSECs.
NSRs and vibration sensitive receptors: • SEL 02 • SEL 10 • HAM 07	Piling works – potential for construction noise and vibration effects due to site piling activities at the proposed Overton Substation and proposed Monk Fryston Substation, new and replacement overhead pylons and Shipton North/South 400kV CSECs and Tadcaster Tee West/East 275kV CSECs.
NSRs: • SEL 02 • SEL 06 – 11I • HAR 01 – 07 • HAM 07 • YOR 01	Reconductoring and strengthening – potential for construction noise effects due to reconductoring and strengthening works along the existing 275kV XC/XCP overhead line.
NSRs: • SEL 03 • HAR 06 - 07 • HAM 01 • YOR 01	Dismantling works – potential construction noise and vibration effects due to the dismantling of existing pylons/overhead line.
NSRs: • SEL 03 • SEL 10 • HAM 03 - 04	Construction compounds – potential construction noise and vibration effects due to activities taking place within construction compounds.
Operation	
NSRs: • SEL 01 – 05 • HAM 02 – 06 • YOR 02	Operation of Monk Fryston and Overton Substations – potential for noise effects from new SGTS at the proposed Monk Fryston Substation and proposed Overton Substation.
NSRs: • SEL 10 • HAR 06 • HAM 07 • YOR 01	New overhead lines – potential for noise effects from new overhead lines.

14.7.14 The receptors/effects detailed in **Table 14.12** have been scoped out from being subject to further assessment because the potential effects are not considered likely to be significant.

Table 14.12 – Summary of effects scoped out of the noise and vibration assessment

Receptors/potential effects	Justification
Commercial receptors	As shown in **Table 14.13**, commercial receptors have a negligible sensitivity to noise and therefore are not considered further.
Operational noise from refurbished and reconductored 275kV XC/XCP overhead line	The reconfiguration of these lines would not result in a significant change in electrical stress and therefore audible noise levels during operation of these lines would also not result in a significant change. However, where realignment is expected to take place, proposals will be screened to determine whether there is any risk of likely significant effects by considering the change in distance between overhead line and receptors. In the unlikely event that any potential effects are identified, an assessment will be carried out and included within the ES.
Operational noise from new and existing overhead line fixtures and fittings	To be approved for use on the National Grid high voltage electricity transmission network, each fitting design must be Type Registered. Type registration comprises a series of tests on the fitting in question to ensure compliance with the relevant technical specification. These tests include performance requirements for corona inception and audible noise on all fittings along with wind tunnel testing of insulators for audible tones generated by Aeolian mechanisms. Once the fitting has been type registered and approved for use, a number of further tests are also carried out post-manufacture in the form of Sample Testing. This ensures the fitting conforms to the specification in the type registration document. The Technical Specification and Type Registration processes reduce the potential for audible noise and tones to occur from all types of fittings, including insulators. Where noise does occur, it is likely to be localised and of short duration. If due to a fault, actions can be taken to rectify it. Where noise from fittings does occur, which results in a complaint, appropriate actions can be taken to seek to remedy the cause of the noise, usually through cleaning or replacement of the relevant fitting. Therefore, noise from fixtures and fittings is scoped out of further assessment.
Operational vibration effects from substations	On substation sites there would not be any large items of rotating plant that may give rise to significant vibration. Reactive plant (which includes transformers) would be placed on anti-vibration pads to minimise the transfer of vibration to the ground. Residual vibrational effects are not likely to be perceptible or significant beyond a few meters from the source.

Receptors/potential effects	Justification
	Measurements on an operating Super Grid Transformer (SGT) at a substation in the UK determined peak particle velocity (PPV) vibration levels of 0.12mm/s at a distance of 6m from the SGT. BS 5228-2:2009+A1:2014[24] states that a vibration velocity of 0.14mm/s might be just perceptible in the most sensitive situations. Consequently, it is unlikely that vibration from a SGT would be perceptible beyond a few meters. Given the distances of receptors from the proposed Monk Fryston Substation and proposed Overton Substation and the existing Osbaldwick Substation, it is unlikely that plant within the substation would give rise to a vibration impact at the nearest sensitive receptor.
Operational noise from circuit breakers and isolators (switchgear)	It is proposed to scope out operational noise from new switchgear (circuit breakers and isolators) at all substations. In everyday operation this equipment is passive, in that there is nothing that gives rise to noise. When it does operate it is used for two purposes. One is regarded as emergency operation where it protects the system from faults (unplanned). The second is to de-energise parts of the system for maintenance (planned). The switchgear noise is mechanical in nature and only occurs during a switching event with the noise being generally described as a 'click'. It does not produce tonal noise (i.e. a 'hum'). Typically, the switchgear for the whole site operates less than 100 times per year in total (both planned and unplanned events). That operation lasts for a few seconds on each occasion, although switching events tend to occur in 'clusters', with a few events on one day then nothing for months. Therefore, operational noise from circuit breakers can be scoped out from all operational substation assessments.
Operational noise and vibration from plant at Osbaldwick Substation	Circuit breakers and isolators similar in operation to those proposed (described above) are already present at Osbaldwick Substation and are understood to operate without complaint from nearby residents. It is therefore proposed to scope noise from switchgear out of further assessment as stated above. As described in the section of this table 'Operational vibration from substations', substations will not give rise to levels of vibration that could give rise to likely significant effects. It is therefore proposed that operational noise and vibration are scoped out for Osbaldwick Substation.

14.8 Assessment methodology

14.8.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4: Approach to Preparing the PEIR**, and specifically in **Sections 4.7** to **4.10**. However, whilst this has informed the approach that has been used in this noise and vibration assessment, it is necessary to set out how this methodology has been applied,

and adapted as appropriate, to address the specific needs of this noise and vibration assessment.

Establishing baseline conditions

14.8.2 As set out in **Section 14.4**, no surveys have taken place to date, however, are currently being planned and mobilised to inform the assessments for the ES. In the absence of measured baseline levels, a worst case has been assumed of very low ambient and background levels for both construction and operational noise assessments for this PEIR.

Establishing receptor sensitivity

14.8.3 The EIA Regulations recognise that developments will affect different environmental elements to differing degrees, and that not all of these are of sufficient concern to warrant detailed investigation through the EIA process. The EIA Regulations identify those environmental resources that warrant investigation as those that are *'likely to be significantly affected by the development'*.

14.8.4 The EIA Regulations do not define significance and it is necessary to state how this is defined for EIA. The significance of an effect resulting from a development during construction or operation is most commonly assessed by reference to the sensitivity (or value) of a receptor and the magnitude of the effect. This approach provides a mechanism for identifying areas where mitigation measures may be required and to identify the most appropriate measures to alleviate the risk presented by the development.

14.8.5 The precise determination of the sensitivity of a receptor relies on professional judgement.

14.8.6 **Table 14.13** details the basis for assessing receptor sensitivity which has been produced on the basis of experience of assessing similar facilities, and on professional judgement.

Table 14.*13* – Establishing the sensitivity of receptors

Sensitivity	Examples
High	Vulnerable subgroups including hospitals and pre-schools, care homes, hospices, recording studios.
Medium	Dwellings, schools, hotels.
Low	Areas used primarily for leisure activities, including PRoW, sites of historic or cultural importance.
Negligible	All other areas such as those used primarily for industrial, commercial or agricultural purposes.

14.8.7 The precise determination of impact magnitudes for construction and operational noise effects are based on relevant guidance and professional judgement. For example, DMRB[33] provides criteria which may be directly transposed to different impact magnitude categories for road traffic noise (both construction and operational).

However, the assessment methodology for operational site noise in BS 4142:2014 + A1:2019[26] does not readily transpose for the Project in this way.

14.8.8 The overall significance of effect rating is based on the evaluation of significance matrix presented in **Table 14.14**.

Table 14.*14* – Significance of effect matrix for construction noise and vibration and operational noise from substations

Level of significance to sensitivity of receptor/ resource	Magnitude of change			
	High	**Medium**	**Low**	**Negligible**
High	Major (significant)	Moderate/Major (significant)	Minor/Moderate (potentially significant)	Minor (not significant)
Medium	Moderate/Major (significant)	Minor/Moderate (potentially significant)	Minor (not significant)	Negligible/Minor (not significant)
Low	Minor/Moderate (potentially significant)	Minor (not significant)	Negligible/ Minor (not significant)	Negligible (not significant)

Construction noise assessment methodology

14.8.9 The increase in traffic noise due to construction traffic on the local road network will be predicted using methodologies described in CRTN[32] (as advocated by DMRB[33]). The magnitude of impact of noise due to construction traffic on local roads will be assessed with reference to the methodology set out in DMRB[33].

14.8.10 Construction noise (including noise due to slow-moving construction traffic noise on haul roads) will be predicted and assessed using the methodologies described in BS 5228-1:2009 + A1:2014[23]. Table E.1 in Annex E of BS 5228-1:2009 + A1:2014[23] (reproduced in **Table 14.15**) and Table 3.12 of DMRB[33] (reproduced in **Table 14.16**) will be used to determine the threshold of significance. The determination of magnitude of impact for construction noise will be assessed with reference to the methodology set out in BS 5228-1:2009 + A1:2014[23].

14.8.11 It is understood that 24-hour working would be implemented during the construction works for the proposed Overton Substation and proposed Monk Fryston Substation and overnight (t24-hour) working used to install the overhead lines crossing the ECML railway, major roads and other infrastructure to minimise daytime closures of these transport links. For the remainder of the Project, at this stage it is assumed that construction work would be limited to daytime hours but would take place seven days a week. Construction noise for the relevant periods will be assessed as part of the ES.

14.8.12 For both types of methodologies, the duration of the proposed works will be considered as a factor in the determination of significant effects.

Table 14.15 – Example threshold of potential significant effect at dwellings

Assessment Category and Threshold Value Period	Threshold Value in Decibels (dB) ($L_{Aeq,T}$)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night-time (23:00 – 07:00)	45	50	55
Evenings and weekends[D)]	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

NOTE 1: A potential significant effect is indicated if the $L_{Aeq,T}$ *noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level*

NOTE 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ *noise level for the period increases by more than 3dB due to site noise.*

NOTE 3: Applied to residential receptors only

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values

D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays

Table 14.16 – Construction time period – LOAEL and SOAEL

Time Period	LOAEL	SOAEL
Day (07:00 – 19:00 weekday and 07:00 – 13:00 Saturdays)	Baseline noise levels $L_{Aeq,T}$	Threshold level as determined by BS 5228-1 Section E3.2 and Table E.1 BS 5228-1[23].
Night (23:00 – 07:00)	Baseline noise levels $L_{Aeq,T}$	Threshold level as determined by BS 5228-1 Section E3.2 and Table E.1 BS 5228-1[23].
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	Threshold level as determined by BS 5228-1 Section E3.2 and Table E.1 BS 5228-1[23].

14.8.13 Construction noise impacts at non-residential noise sensitive receptors will be considered on an individual and representative receptor basis and relevant local authorities will be consulted on the screening and assessment criteria.

14.8.14 Construction vibration effects will be assessed for sensitive receptors within 100m of any vibration causing construction activities (such as piling). Sensitive receptors may include precision engineering premises, healthcare premises and old dwellings with poorly constructed foundations. Railways and buried services such as gas and water mains may also be assessed in the ES, if they are identified as present and in need of assessment due to their presence in the geographic scope of the assessment and their vibration sensitivity.

14.8.15 A quantitative assessment of construction vibration will be undertaken at the ES stage in line with the methodology provided in BS 5228-2:2009 + A1:2014[24].

Determination of significance – construction noise

14.8.16 **Table 14.17** provides the criteria that will determine the impact magnitudes for construction noise, based on the guidance provided in BS 5228-1:2009 + A1:2014[23].

Table 14.17 – Impact magnitudes of construction noise

Magnitude	Description
High	Levels very much greater than baseline and very disruptive
Medium	Levels greater than baseline and disruptive
Low	Levels equal to or greater than baseline, but not disruptive
Negligible	Levels less than baseline

14.8.17 **Table 14.18** provides the proposed impact magnitude categories for assessing construction traffic noise, determined based on the guidance contained within DMRB[33] and using professional judgement. This is based on BNL calculations of the construction traffic.

Table 14.18 – Establishing the magnitude of impact of construction traffic at receptors

Magnitude	Increase in BNL of closest public road used for construction traffic, dB
High	Greater than or equal to 5.0.
Medium	Greater than or equal to 3.0 and less than 5.0.
Low	Greater than or equal to 1.0 and less than 3.0.
Negligible	Less than 1.0.

14.8.18 The determination of significance will be calculated using the information provided in **Table 14.13** to determine the sensitivity of receptors and the information in **Table 14.17** and **Table 14.18** to determine the magnitude of impact. This will then be compared to the significance of effect matrix provided in **Table 14.14** to determine the significance of effect.

Operational noise assessment methodology

Proposed new 275kV and 400kV overhead lines

14.8.19 Detailed operational noise predictions for the new 275kV and 400kV overhead lines have not yet been carried out. For the ES, this noise will be assessed following the principles of BS 4142:2014 + A1:2019[26] using the noise prediction method described in National Grid Policy Statement PS(T)134[29] and its supporting technical guidance[30,31].

14.8.20 PS(T)134[29] describes methods for predicting the environmental impact at receptors due to audible noise caused by new, reconductored, diverted or uprated overhead transmission lines. The method uses internationally recognised line noise prediction methodology to calculate noise emission levels based on operating voltage, conductor design and pylon geometry. Noise propagation modelling according to ISO 9613-2:1996[27] will be carried out to predict noise levels at noise sensitive receivers along the route of the proposed new lines.

14.8.21 The highest noise levels generated by an overhead line generally occur during rainfall. Noise generated under these circumstances is referred to as 'wet noise' and can be described as a crackle, which is sometimes accompanied by a tonal ‘hum’. Noise which occurs during dry weather conditions is referred to as ‘dry noise’ and can be described as a crackle. The tonal hum which sometimes occurs during wet weather conditions is typically more annoying than crackle alone. Consequently, people tend to have a higher tolerance for dry noise than wet noise before finding it annoying, although this varies from person to person. It should be noted that neither wet noise nor dry noise would occur all the time.

14.8.22 According to the requirements of BS 4142:2014 + A1:2019[26], PS(T)134[29] applies a +3dB character correction to dry noise to account for the subjective ‘crackle’, while a +6dB character correction is applied to predicted wet noise levels to account for the additional ‘hum’ from the audible noise during worst case wet weather conditions.

14.8.23 National Grid Technical Report TR(E)564[30] explains the reasoning behind the noise criteria set out in PS(T)134[29]. Noise criteria have been set taking account of the UK policy context and evidence from multiple sources, including the World Health Organisation[35,36,37] and BS 4142:2014 + A1:2019[26], for noise and associated health impacts. The criteria have been developed by National Grid based on health impact data associated with the night-time period. The night-time period is considered more sensitive than the daytime as background sound levels are normally lower and people are trying to sleep.

14.8.24 The overhead line noise assessment process that will be used for the ES follows a three-tier ‘screening’ approach based on predicted noise source level and receptor distance. If predicted noise levels fail the Tier 1 test, a Tier 2 assessment would be undertaken and if predicted noise levels fail the Tier 2 test, a Tier 3 assessment would be undertaken. The three-tier approach comprises the following steps designed to screen receptors out of further assessment where there would be no adverse impact:

- **Tier 1**: A primary screening step based on ‘worst-case’ absolute wet noise effects and the pre-determined assessment criteria set out in PS(T)134[29], reproduced in **Table 14.19**;
- **Tier 2**: A further screening step based on combined absolute wet noise and dry noise effects and recalculated assessment criteria. This step takes account of the fact that wet noise occurs during periods of wet weather and therefore does not occur all the time; and
- **Tier 3**:Full assessment following the principles of BS 4142:2014 + A1:2019[26] for both wet noise and dry noise.

14.8.25 For the assessment of wet noise, knowledge of typical rainfall rates based on Meteorological Office data for the Project area is required. Miller curves[46] will be used to estimate the background noise level due to the effect of rainfall for the ES.

14.8.26 The Tier 1 (wet noise) assessment will be carried out against the relevant criteria presented in PS(T)134[29]. Based on these criteria and for the purpose of this stage of the assessment, for residential receptors the LOAEL will be 34dB(A) and the SOAEL will be 44dB(A).

Table 14.19 – Tier 1 noise criteria

Use	No adverse impact Screened out	Further assessment necessary Tier 2 assessment required
Vulnerable groups	< 29dB(A)	≥ 29dB(A)
Residential	< 34dB(A)	≥ 34 (A)
Schools and hotels	< 39dB(A)	≥39 (A)

14.8.27 If a Tier 2 assessment is needed, this will determine whether the combined wet and dry noise impact is acceptable, or whether further assessment (Tier 3) is required.

14.8.28 A Tier 2 assessment requires:

- recalculation of the predicted noise level at the façade of the NSR (accounting for the duration of wet and dry weather); and recalculation of the noise criteria (accounting for the duration of wet and dry weather).

14.8.29 The Tier 1 assessment assumes that wet noise occurs 100% of the time, which is typically not the case with wet weather conditions occurring with lower frequency and duration than dry weather conditions. Therefore, by taking into account the duration of wet and dry weather conditions in the location of interest, the predicted noise levels will be lower than those calculated during Tier 1 as overhead line noise is lower in dry weather conditions.

14.8.30 The predicted noise levels for a Tier 2 assessment will be calculated according to guidance provided in TGN(E)322[31]. Developing new Tier 2 criteria requires the logarithmic calculation to take into account the percentage of time that dry and wet noise is likely to occur. TGN(E)322[31] presents the combined noise criteria to be used in Tier 2 and Tier 3 assessments, which are reproduced here in **Table 14.10**.

Table 14.20 – Tier 2 and Tier 3 noise criteria

Use	Rainfall (annual average wet hours)	No Adverse Impact (dB(A))	Adverse Impact (dB(A))	Significant Adverse Impact (dB(A))
Vulnerable groups	450	< 31.9	31.9 – 41.9	> 41.9
	600	< 31.8	31.8 – 41.8	> 41.8
	750	< 31.8	31.8 – 41.8	> 41.8

[46] Miller L N, (1978). Sound Levels of Rain and of Wind in the Trees, Noise Control and Engineering, vol 11, no 3, pp 101-109

Use	Rainfall (annual average wet hours)	No Adverse Impact (dB(A))	Adverse Impact (dB(A))	Significant Adverse Impact (dB(A))
	900	< 31.8	31.8 – 41.8	> 41.8
	1050	< 31.7	31.7 – 41.7	> 41.7
	1200	< 31.7	31.7 – 41.7	> 41.7
Residential	450	< 36.9	36.9 – 46.9	> 46.9
	600	< 36.8	36.8 – 46.8	> 46.8
	750	< 36.8	36.8 – 46.8	> 46.8
	900	< 36.8	36.8 – 46.8	> 46.8
	1050	< 36.7	36.7 – 46.7	> 46.7
	1200	< 36.7	36.7 – 46.7	> 46.7
Schools & Hotels	450	< 41.9	41.9 – 51.9	> 51.9
	600	< 41.8	41.8 – 51.8	> 51.8
	750	< 41.8	41.8 – 51.8	> 51.8
	900	< 41.8	41.8 – 51.8	> 51.8
	1050	< 41.7	41.7 – 51.7	> 51.7
	1200	< 41.7	41.7 – 51.7	> 51.7

14.8.31 There is no requirement to add character correction penalties to the noise levels above, as penalties have already been applied. A 6dB tonal penalty has been applied to the wet noise levels and a 3dB character penalty has been applied to the dry noise levels.

14.8.32 If an adverse or significant adverse impact is identified after the Tier 2 assessment, a Tier 3 assessment will be carried out, which takes into account background noise levels in the area of interest.

14.8.33 Dry noise and wet noise would be assessed separately using two different methods based on the principles of BS 4142:2014 + A1:2019[26], as detailed in TGN(E)322[31], and explained in the following paragraphs.

14.8.34 To conduct a Tier 3 dry noise assessment, an assessment in line with BS 4142:2014 + A1:2019[26] is carried out.

14.8.35 Tier 3 criteria are based on the assessment of impact criteria set out in BS 4142:2014 + A1:2019[26] and are shown in **Table 14.21**.

Table 14.21 – Impact magnitudes of operational noise

Assessment Level	Impact	Action
≥ 10dB	Significant adverse impact	Unacceptable (avoid)

Assessment Level	Impact	Action
5 – 9dB	Adverse impact	Mitigate and minimise
0 – 4dB	Minor impact	May be acceptable depending on the context in which the noise occurs
≤ 0dB	Low impact	Acceptable (no action necessary)

Determination of significance – overhead line noise

14.8.36 Receptor sensitivities provided in TGN(E)322[31] for the purposes of DCO and EIA projects are provided in **Table 14.13**.

14.8.37 For Tier 1 and Tier 2 assessments, the magnitude of effect categories are based on resulting noise levels at the NSR for wet noise (Tier 1) and both dry and wet noise (Tier 2), with the significance of effect matrix from TGN(E)322[31] presented in **Table 14.22**. The noise criteria have been developed based on health impact data associated with the night-time period[47] and are presented in **Table 14.23**. Dark blue denotes a significant impact, light blue a potentially significant impact and white an impact considered not significant.

Table 14.22 – Significance of effect matrix for Tier 1 and Tier 2 assessments

Significance of Effect	Sensitivity of Receptor			
Magnitude	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible
No effect	Negligible	Negligible	Negligible	Negligible

Table 14.23 - Noise criteria for Tier 1 and Tier 2 assessments and resulting significance of effect[48]

Significance of Effect	Weather Condition	Sensitivity of Receptor			
Magnitude		**High**	**Medium**	**Low**	**Negligible**
High	Wet	>44	>44	>44	>44

[47] When assessing the impact of noise on non-residential schools (where people do not sleep), the noise criteria should be increased by 5dB as the relevant criteria for this type of receptor relates to the daytime period only.
[48] Whilst this table suggests a moderate significance of effect on low sensitivity receptors with a high magnitude of effect (based on health data for exposure to noise over a full 16-hour period), the effect is likely to be lower as lower sensitivity receptors are likely to be used by people for shorter durations than 16 hours and for lower durations than patients in hospitals, residential properties and schools. These areas are also less likely to be used during wet weather conditions when the highest noise levels from an overhead line occur.

Significance of Effect	Weather Condition	Sensitivity of Receptor			
Magnitude		**High**	**Medium**	**Low**	**Negligible**
	Dry	>47	>47	>47	>47
Medium	Wet	39 - 44	39 – 44	39 – 44	39 – 44
	Dry	42 - 47	42 – 47	42 – 47	42 – 47
Low	Wet	34 - 39	34 – 39	34 – 39	34 – 39
	Dry	37 - 42	37 – 42	37 – 42	37 – 42
Negligible	Wet	29 - 34	29 – 34	29 – 34	29 – 34
	Dry	32 - 37	32 – 37	32 – 37	32 – 37
No effect	Wet	<29	<29	<29	<29
	Dry	<32	<32	<32	<32

14.8.38 For a Tier 3 assessment, the magnitude of effect categories are based on the difference between overhead line rating noise level and the background sound level in the area with or without the effect of noise from rainfall. The significance of effect matrix for Tier 3 assessments is presented in **Table 14.24**, with the magnitude of effect categories shown in **Table 14.25**. Dark blue denotes a significant impact, light blue a potentially significant impact and white an impact considered not significant.

Table 14.24 – Significance of effect matrix for Tier 3 assessments

Significance of Effect	Sensitivity of Receptor			
Magnitude	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible
No effect	Negligible	Negligible	Negligible	Negligible

Table 14.25 – Noise criteria for Tier 3 assessments and resulting significance of effect

Significance of Effect	Sensitivity of Receptor			
Magnitude	**High**	**Medium**	**Low**	**Negligible**
High	≥ 10dB	≥ 10dB	≥ 10dB	≥ 10dB

Significance of Effect	Sensitivity of Receptor			
Magnitude	**High**	**Medium**	**Low**	**Negligible**
Medium	5 – 9dB	5 – 9dB	5 – 9dB	5 – 9dB
Low	0 – 4dB	0 – 4dB	0 – 4dB	0 – 4dB
Negligible	≤ 0dB	≤ 0dB	≤ 0dB	≤ 0dB
No effect	≤ 0dB	≤ 0dB	≤ 0dB	≤ 0dB

Noise from overhead line fixtures and fittings

14.8.39 PS(T)134[29] only considers noise from discharge activity on conductors. Noise may also arise from discharges on insulators and fittings, but this noise is minimised by the use of preferred, type registered designs.

14.8.40 Under normal operating conditions pylon fittings, such as dampers, spacers, clamps and insulators are designed not to generate audible noise when in operation.

14.8.41 Pylon fittings, such as insulators, dampers, spacers and clamps are designed and procured in accordance with a series of National Grid Technical Specifications. The technical specifications define National Grid functional and performance requirements for new equipment associated with electricity transmission.

14.8.42 To be approved for use on the National Grid high voltage electricity transmission network, each fitting design must be Type Registered. Type registration comprises a series of tests on the fitting in question to ensure compliance with the relevant technical specification. These tests include performance requirements for corona inception (an electrical breakdown of the air occurs around the conductor leading to a crackly noise) and audible noise on all fittings along with wind tunnel testing of insulators for audible tones generated by Aeolian mechanisms (sound resulting from the passage of air over objects).

14.8.43 Once a fitting has been type registered and approved for use, a number of further tests are also carried out post-manufacture in the form of Sample Testing. This ensures the fitting conforms to the specification in the Type Registration documentation.

14.8.44 The Technical Specification and Type Registration processes reduce the potential for audible noise and tones to occur from all types of fittings, including insulators. Where noise does occur, it is likely to be localised and of short duration. Where noise from fittings does occur, which results in a complaint, appropriate actions can be taken to seek to remedy the cause of the noise, usually through cleaning or replacement of the relevant fitting.

14.8.45 Noise from fixtures and fittings is therefore scoped out of further assessment.

Substations

14.8.46 Operational noise from substations will be assessed using BS 4142:2014+A1:2019[26].

14.8.47 BS 4142:2014 + A1:2019[26] provides a methodology and criteria for assessing new or existing industrial sound sources by comparing the operational sound (rating level) at the location of a sensitive receptor, with the background sound levels that are currently experienced without the development.

14.8.48 The rating level is defined as the specific sound level, with the addition of character corrections to consider certain acoustic features that could potentially increase the significance of impact. A penalty will be applied to the specific sound level if a tonal, impulsive, intermittent or other characteristic is present or is expected to be present for new or modified sound sources.

14.8.49 The assessment methodology outlined in BS 4142:2014+A1:2019[26] indicates that the greater the difference of the rating level in comparison with the background sound level (L_{A90}) the greater the significance of the impact, thus:

- a difference of +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- a difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and
- the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant impact. A low impact is defined when the rating level does not exceed the measured background sound level.

14.8.50 BS 4142:2014+A1:2019[26] emphasises the requirement to fully understand the context in which the sound occurs and therefore context will be considered in the assessment process before determining the potential significant effect resulting from the impacts identified. For this reason, defining a semantic scale for magnitude of change, or values for the purposes of identifying LOAEL and SOAEL are not considered possible at this stage but will be reported in appropriate detail in the ES once baseline surveys have been completed.

Determination of significance – operational substations

14.8.51 **Table 14.26** below provides the proposed impact magnitude categories for assessing operational noise from substations, based on the results of the initial estimate of impact to be undertaken in accordance with BS 4142:2014 + A1:2019[26]. The final determination of impact magnitude depends on consideration of the context, as required by the method detailed in BS 4142:2014 + A1:2019[26].

Table 14.26 – Proposed indicative impact magnitude categories for assessing operational site noise

Impact Magnitude	Initial Estimate of Impact
High	Rating levels significantly exceeding receptor background sound levels.
Medium	Rating levels moderately exceeding receptor background sound levels.
Low	Rating levels just exceeding receptor background sound levels.
Negligible	Rating levels equal to, or lower than, background sound levels.

14.8.52 The determination of significance will be calculated using the information provided in **Table 14.13** to determine the sensitivity of receptors, and the information in **Table 14.26** and professional judgement on the consideration of context to determine the magnitude

of impact. This will then be compared to the significance of effect matrix provided in **Table 14.14** to determine the significance of effect.

14.9 Preliminary assessment of noise and vibration effects

Preliminary assessment of construction noise and vibration

14.9.1 This section reports the preliminary assessment of significance for temporary noise and vibration effects from the construction of the Project.

14.9.2 The assessment methodology set out in **Section 14.8** has been applied to predict indicative noise and vibration levels arising from the Project, where data is available.

Construction noise

14.9.3 At this stage, there is insufficient data to conduct a noise assessment for site-based construction activities. However, the outline construction programme has been provided in **Table 14.27,** with an indication of the plant expected for individual sites and stages, with indicative timescales.

14.9.4 Preliminary construction road traffic data is available, so an assessment of construction road traffic noise has been carried out based on that early information.

14.9.5 Construction noise assessments will be carried out for the ES. Details of the planned assessments are provided below.

14.9.6 Separate assessments of temporary noise effects will be undertaken for the different elements of the construction phase and reported in the ES, which include:

- the construction, deconstruction and operation of the construction compounds;
- the construction works for the new and reconfigured 275kV/400kV overhead lines;
- the construction works for substations;
- the construction works for CSECs; and
- construction road traffic noise.

14.9.7 To date, only preliminary calculations of construction road traffic noise effects have been undertaken, with this and other assessments to be reported in the ES.

14.9.8 Where works are expected to take place in close proximity to each other and durations overlap, a combined construction noise assessment will be undertaken.

14.9.9 Noise levels at sensitive receptors will be calculated according to the method presented in BS 5228-1:2009 + A1:2014[23]. Noise propagation is affected by a number of factors, including the distance between the source and receiver, influence from screening and the duration of the activity.

Construction programme

14.9.10 To inform the construction noise assessments, the construction programme presented in **Table 14.27** will be used as a basis of activities, approximate duration and the plant expected to be used on site as part of the activity. More details will be included in the assessment as they become available and will be presented as part of the ES.

Table 14.27 – Indicative construction programme

Activity	Approximate Duration	Plant
Proposed Overton Substation		
Groundworks and site Civil works	9 months	Excavators, road building equipment, aggregate and muck delivery/removal lorries, compactors, lighting towers, generators, concrete batching plant.
Construction of substation plant and stage 1 commission (offline)	14 months	Lighting towers, mobile working platforms, generators.
Installation and stage 1 commissioning of SGTs	20 months	Lighting towers, mobile working platforms, generators.
Reinstatement works and landscaping	4 months	Compactors, aggregate and muck delivery/removal lorries, excavators, generators, lighting towers.
Proposed Monk Fryston Substation		
Groundworks and site Civil works	9 months	Excavators, road building equipment, aggregate and muck delivery/removal lorries, compactors, lighting towers, generators, concrete batching plant.
Construction of substation plant and stage 1 commission (offline)	14 months	Lighting towers, mobile working platforms, generators.
Installation and stage 1 commissioning of SGTs	16 months	Lighting towers, mobile working platforms, generators.
Reinstatement works and landscaping	4 months	Compactors, aggregate and muck delivery/removal lorries, excavators, generators, lighting towers.
Tadcaster CSECs		
Construction works	6 months	Excavators, road building equipment, aggregate and muck delivery/removal lorries, compactors, lighting towers, generators, concrete batching plant.
Reinstatement works and landscaping	5 months	Compactors, aggregate and muck delivery/removal lorries, excavators, generators, lighting towers.
Shipton CSECs		
Construction works	6 months	Excavators, road building equipment, aggregate and muck

Activity	Approximate Duration	Plant
		delivery/removal lorries, compactors, lighting towers, generators, concrete batching plant.
Reinstatement works and landscaping	5 months	Compactors, aggregate and muck delivery/removal lorries, excavators, generators, lighting towers.
Works to overhead lines		
Site setup and enabling works	16 months	Excavators, aggregate and muck deliver/removal lorries, compactors, lighting towers, generators, concrete batching plant.
Works to the existing 400kV 2TW/YR overhead line and new 400kV YN overhead line	21 months	Lighting towers, mobile working platforms, generators, delivery lorries, piling equipment.
Construction of new 275kV overhead lines, works to existing XC/XCP Monk Fryston to Poppleton overhead line and Tadcaster Tee to Knaresborough (XD/PHG) overhead line	29 months	Lighting towers, mobile working platforms, generators, delivery lorries, piling equipment.
Works to 4YS 400kV overhead line and connections into the proposed Monk Fryston Substation	4 months	Lighting towers, mobile working platforms, generators, delivery lorries.
Reinstatement works and landscaping	19 months	Compactors, aggregate and muck delivery/removal lorries, excavators, generators, lighting towers.
Osbaldwick Substation		
Install and commission circuit breaker	6 months	Lighting towers, generators, mobile working platforms.
Commissioning and testing	**16 months**	**N/A**

Construction road traffic noise

14.9.11 **Table 14.28** presents the results of the construction road traffic noise predictions, calculated in accordance with CRTN[32]. The assessment is based on the difference between the future baseline scenario and the future 'with development' scenario.

14.9.12 The predictions have been carried out at a location 10m from the edge of the nearside carriageway (known as the basic noise level in CRTN[32]) based on 18-hour Annual Average Weekday Traffic (AAWT) worst-case road traffic provided in **Chapter 12: Traffic and Transport**. Noise impacts due to road traffic noise will result from the change in traffic flow and composition assuming that speeds remain the same with and without development. The change in the basic noise level will therefore represent the

change in noise level at nearby noise sensitive receptors regardless of their location relative to the road.

14.9.13 An assessment has been carried out with reference to the criteria set out in **Table 14.18**. At this stage, the number of receptors within the impact categories has not been established. For the PEIR, **Table 14.28** presents the magnitude of impact expected due to construction road traffic for the road sections that will carry this traffic.

14.9.14 It is proposed that 24-hour working will be conducted at the substations. Overnight working is proposed for the installation of overhead lines crossing the ECML railway, major roads and other infrastructure. The effect of construction road traffic noise from night-time working will be assessed at the ES stage if found to be potentially significant.

Table 14.28 – Noise predictions and impact assessment for construction road traffic

Road Name	Receptor Location	Future Year (FY) (no development) $L_{A10, 18h}$ at 10m	FY (with development) $L_{A10, 18h}$ at 10m	FY (with development) – FY (no development) difference (dB)	Negligible Impact	Low Impact	Medium Impact	High Impact
A63	Between Rawfields Lane and A162	72.0	72.2	0.2	Yes	No	No	No
A64	Between A64 and A659	73.3	73.6	0.3	Yes	No	No	No
A64	Between Paradise Lane and A659	70.0	70.9	0.9	Yes	No	No	No
A659	Between Tower Crescent and Station Road	63.1	63.5	0.4	Yes	No	No	No
A1237	Between Askham Bryan Lane and Borad Lane	72.1	72.3	0.2	Yes	No	No	No
A59	Between Cat Lane and Newlands Lane	73.5	73.6	0.1	Yes	No	No	No
Common Croft Lane	Between Broad Lane and Lords Lane	72.8	72.9	0.1	Yes	No	No	No

Road Name	Receptor Location	Future Year (FY) (no development) $L_{A10, 18h}$ at 10m	FY (with development) $L_{A10, 18h}$ at 10m	FY (with development) – FY (no development) difference (dB)	Negligible Impact	Low Impact	Medium Impact	High Impact
A59	Between Low Road and Pool Lane	73.5	73.6	0.1	Yes	No	No	No
A1237	Between A1237 and Esk Drive	73.4	73.6	0.2	Yes	No	No	No
A19	Between Fairfields Drive and Stripe Lane	64.6	65.9	1.3	No	Yes	No	No
Overton Road	Between Stripe Lane and A19	51.7	56.6	4.9	No	No	Yes	No
B1363	Between Mill Lane and A1237	71.8	72.0	0.2	Yes	No	No	No
A1079	Between A64 and Osbaldwick Link Road	68.6	68.7	0.1	Yes	No	No	No
A64	Between Common Lane and Forest Lane	79.6	79.6	0.0	Yes	No	No	No
A63	Between Westfield Lane and A1246 Turn Off	69.1	69.4	0.3	Yes	No	No	No

Road Name	Receptor Location	Future Year (FY) (no development) $L_{A10, 18h}$ at 10m	FY (with development) $L_{A10, 18h}$ at 10m	FY (with development) – FY (no development) difference (dB)	Negligible Impact	Low Impact	Medium Impact	High Impact
A168	Between A58 and Walton Road	68.2	68.5	0.3	Yes	No	No	No
A1(M)	Between A659/A168 and A64	85.0	85.0	0.0	Yes	No	No	No
A1(M)	Between A53 and M62	86.0	86.0	0.0	Yes	No	No	No
M1	Between A63 and A1(M)	83.0	83.0	0.0	Yes	No	No	No

14.9.15 Four roads (Church Lane, Osbaldwick Link Road, Station Road and B1222) currently have no baseline traffic data available and therefore these locations have not been assessed in the PEIR. An assessment will be included in the ES.

14.9.16 The results outlined in **Table 14.28** generally show a low to negligible magnitude of change, with the exception of Overton Road, which shows an increase of 4.9dB representing a medium magnitude of change.

14.9.17 The sensitivity of the noise sensitive receptors identified is considered to be **medium** for residential receptors and schools in line with **Table 14.13**.

14.9.18 With the exception of Overton Road, the magnitude of change is calculated to be **low/negligible** and the sensitivity of receptors is **medium**. The effect is direct, temporary and of minor adverse significance, which is **Not Significant** in EIA terms.

14.9.19 For Overton Road, the magnitude of change is defined as **medium** and the sensitivity of receptors **medium**. The effect is direct, temporary and of minor/moderate adverse impact, which is **Potentially Significant** in EIA terms, and will be investigated further at the ES stage. The receptor location HAM01 represents the receptors that may be affected by this.

Construction Vibration

14.9.20 For the ES, separate assessments of temporary vibration effects will be undertaken for different elements of the construction phase, which include:

- the construction of the construction compounds;
- piling works for pylon foundations;
- the substation construction; and
- construction road traffic.

14.9.21 The above effects will be assessed separately due to the difference in location. Where in close proximity to each other and where there is an overlap in duration, a combined construction vibration assessment will be undertaken.

14.9.22 Vibration levels at the sensitive receptors will be calculated according to the method presented within BS 5228-2:2009 + A1:2014[23]. Vibration propagation is affected by a number of factors, including the distance between the source and receiver, ground conditions and the nature of the vibration source.

14.9.23 To date, no vibration assessment has taken place due to the limited nature of data available. A full vibration assessment will be included as part of the ES.

Preliminary assessment of operational noise and vibration

New and realigned operational 275kV/400kV overhead lines

14.9.24 Whilst the overhead line design is still under consideration, a preliminary assessment of overhead line noise has been undertaken following the methodology described in **Section 14.8** using typical configurations for: a single 275kV line, a twin 275kV line and a twin 400kV line. Information is provided to give an indication of the scope of adverse impacts. Final selections of design and conductor may vary from those used at this preliminary stage and could result in an increase or decrease in noise levels compared with those which formed the basis of the assessment below.

14.9.25 A Tier 1 assessment has been undertaken, indicating the distance from the overhead line centreline at which an adverse impact may be likely, and if NSRs fall within this distance, a Tier 2 assessment is necessary. The modelling of overhead line noise has been provided by National Grid. The results of the Tier 1 assessment are presented in **Table 14.29**.

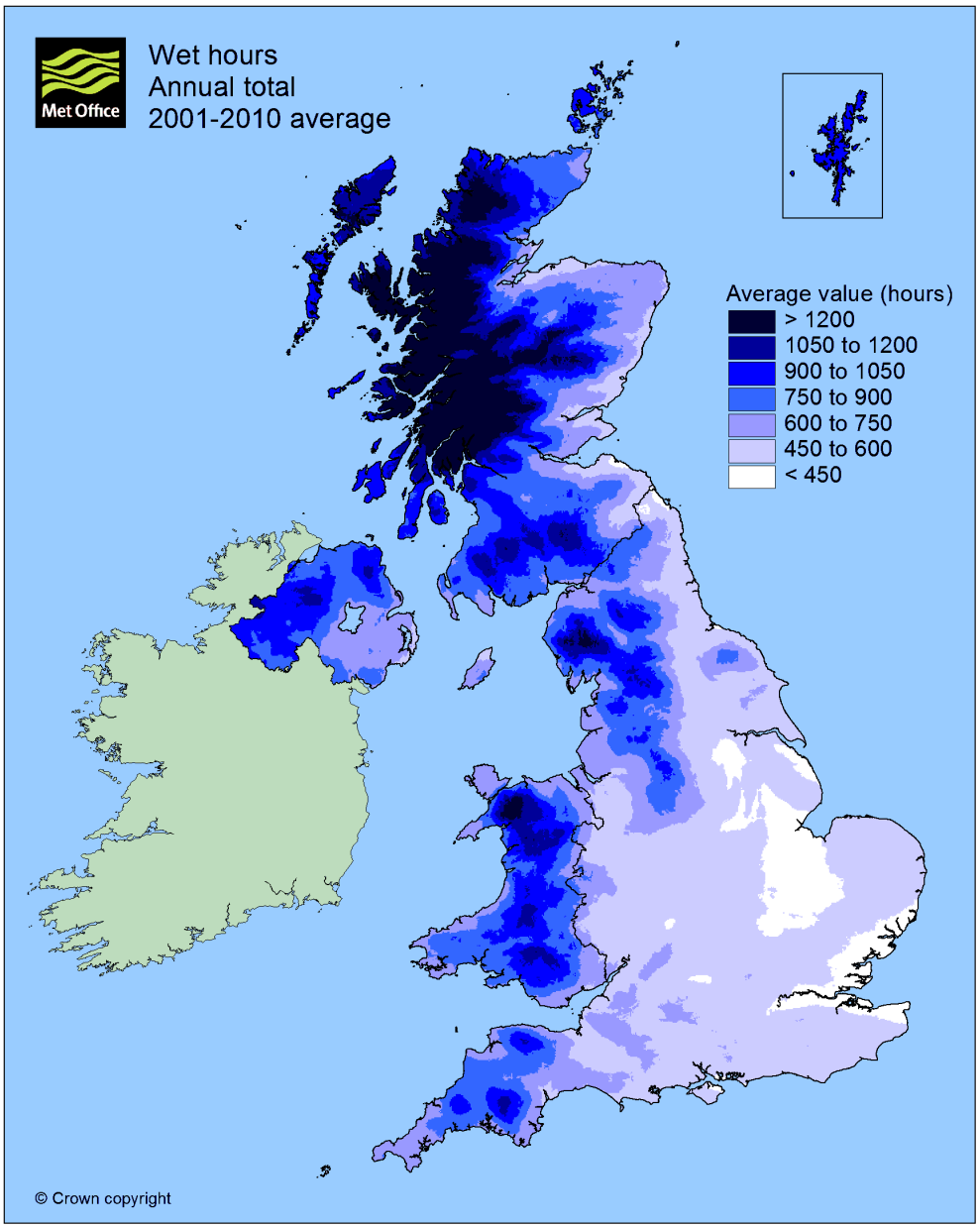
Table 14.29 – Tier 1 assessment results

Distance at which no further assessment is necessary (m)	Single 275kV line	Twin 275kV line	Twin 400kV line
Vulnerable subgroups	200	66	> 200
Residential	100	25	> 200
Schools and hotels	44	0	134

14.9.26 Residential NSRs fall within the distances presented above, so a Tier 2 assessment has been conducted. No vulnerable sub-groups have been identified at this stage – further investigations will be carried out and any change in the impacts resulting from newly identified receptors will be reported in the ES.

14.9.27 For the area of the Project, the rainfall rate charts (shown in **Figure 14.3**), show that the rainfall rate is 450 – 600 hours/year. To conduct an assessment based on the worst-case scenario for rainfall rate, a rate of 600 hours/year has been assumed, and Miller curves created based on this assumption.

Figure 14.3 – Average wet hours rainfall chart



14.9.28 A summary of the results from the assessment is presented in **Table 14.30**.

Table 14.30 – Tier 2 assessment results – residential receptors

	Single 275kV line	Twin 275kV line	Twin 400kV line
Distance at and beyond which no adverse impact is indicated (m)	0	0	22
Distances between which an adverse impact is indicated (m)	No adverse impacts predicted	No adverse impacts predicted	0 – 21
Distances between which a significant adverse impact is indicated (m)	No significant adverse impacts predicted	No significant adverse impacts predicted	No significant adverse impacts predicted

14.9.29 The sensitivity of residential receptors is defined as **medium**. All residential receptors fall outside of 21m of the 400kV line, so the predicted effect is of negligible impact and therefore considered **Not Significant** in EIA terms.

14.9.30 It is important to note that this is a preliminary assessment of operational overhead line noise, and the line design and geometry are still subject to change, which could in turn affect the results presented above. This will be reassessed at the ES stage with the latest design information available at the time.

Operational substation noise

14.9.31 The operation of the new substations has not been assessed at this PEIR stage due to limited information available. For the ES, an assessment of the operational sound generated by the substations will be reported using the prediction methodology within ISO 9613-2:1996[27] and assessed in accordance with BS 4142:2014 + A1:2019[26]. If full details of the substation plant are not available at ES stage, a limiting noise level will be proposed that should ensure that any adverse impacts are minimised. The proposal would be based on knowledge of similar equipment and make reference to baseline noise measurements around the identified substation areas.

14.9.32 It will be assumed that a tonal penalty from the substation low frequency 'hum' would be applied to form a rating level, but that none of the other corrections would be required (i.e. impulsivity, intermittency or other sound characteristics). Given that the substations will include design parameters to minimise noise emission, it is not considered likely that a tonal correction of more than +6dB will be required. This may be lower dependent on the specific noise level of the source.

14.9.33 The starting point for the operational substation noise assessment will be the four SGTs proposed at both the proposed Monk Fryston Substation and proposed Overton substation, which, as described in paragraph 14.1.9, are expected to be the main sources of noise from the new substations.

14.9.34 The National Grid Technical Specification TS 2.03[42] defines the guaranteed maximum sound power level (L_W) for SGTs as 92dB(A) L_W for a 240MVA SGT and 95dB(A) L_W for a 1100MVA SGT. At present, the power rating of the SGTs has yet to be decided. The assessment of operational sound generated by the substations will be included as part of the ES, when more detail should be available.

14.9.35 BS 4142:2014 + A1:2019[26] states *'The standard is not applicable to the assessment of low frequency noise.'* However, the ANC technical guidance note on BS 4142:2014 + A1:2019[49] states that *'BS 4142 does not necessarily exclude such a wide range* [10 – 160 Hz]. *It would be reasonable to use BS 4142 down to 50 Hz and possibly lower as part of a tonality assessment, for example.'* The technical guidance note goes on to say that in connection to this:

- *'where low frequency sound clearly arises from the assessment site it could be considered as part of an assessment (see Annexes C and D of BS 4142);*
- *where low frequency noise is the dominant component of the specific sound source, the applicability of BS 4142 should be considered and justified if necessary; and*
- *care should be taken when identifying sources (at Section 4) that low frequency sources are correctly apportioned.*'

14.9.36 The rating correction for low frequency noise is useful for assessment but additional technical approaches are needed to inform adequate mitigation design. The issue of low frequency noise will be considered further and reported at ES stage for noise modelling considerations, assessment of the operational substations and design of mitigation.

14.10 Preliminary assessment of cumulative (inter-project) effects

14.10.1 In accordance with Planning Inspectorate Advice Note 17[50] a long list of 'other development', including allocations, has been reviewed and screened to establish those other developments which could result in significant effects in cumulation with the Project. The process followed is described in **Section 4.9** and a long list of developments considered is provided in **Appendix 4C** of the PEIR.

14.10.2 **Table 4.5, Chapter 4: Approach to Preparing the PEIR** lists all the short listed developments identified to date, which will be kept under review as the Project progresses. A detailed assessment of the likely significant cumulative effects will be provided in the ES. At this stage of the Project the other developments which have the potential for significant effects in cumulation with the Project in relation to noise and vibration comprise the following.

- An agricultural unit in Shipton by Beningborough (20/01004/FUL).
- Various developments close to the existing Monk Fryston Substation (proposed motorway services on the A1(M) near Lumby (2019/0547/EIA), potential minerals development (NY/2020/0204/SCO), a gas peaking plant (2020/0594/FULM) and energy storage projects (2021/0633/FULM, 2021/0789/FULM).
- Proposed developments close to Osbaldwick Substation (energy storage project (19/01840/FULM) and office/industrial development (21/00092/FULM).
- Extensions or additional works at existing quarries at Jackdaw Quarry, Stutton (NY/2021/0098/A27).
- Proposed housing allocation at Tadcaster (TAD2 105 dwellings).

[49] Association of Noise Consultants (2020). *BS 4142:2014 + A1:2019 Technical Note*. [online]. Available at: https://www.association-of-noise-consultants.co.uk/wp-content/uploads/2020/07/ANC-BS-4142-Guide-March-2020.pdf [Accessed 27 August 2021].

[50] Planning Inspectorate (2019) Advice Note 17: Cumulative Effects Assessment Relevant to Nationally Significant Infrastructure Projects [online]. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/ (Accessed 13 October 2021).

14.11 Preliminary significance conclusions

A summary of the results of the preliminary noise and vibration assessment is provided in **Table 14.31**.

Table 14.31 – Preliminary summary of significance of effects: construction

Receptor and Summary of Predicted Effects	Sensitivity/importance/value of receptor[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
Construction				
NSRs close to proposed roads for construction traffic (with the exception of Overton Road) – increased noise levels from construction road traffic	Medium	Low	Not Significant (minor)	Calculations in line with CRTN[32] completed and no increase in traffic levels greater than 3dB identified, indicating a negligible/low magnitude of change.
NRSs close to Overton Road between Stripe Lane and A19 – increased noise levels from construction road traffic	Medium	Medium	Potentially Significant (adverse)	Calculations in line with CRTN[32] completed and a 4.9dB increase predicted, indicating a potentially significant effect.
Operation				
NSRs further than 21m from operational 400kV overhead line – potential increased noise levels from new overhead line	Medium	Negligible	Not Significant (minor)	The Tier 2 assessment based on National Grid modelling results shows that where residential receptors are further than 21m from the overhead line centreline, no adverse impacts are predicted.
NSRs within 21m of operational 400kV overhead line – potential	Medium	Low/Medium	Potentially Significant (adverse)	The Tier 2 assessment based on National Grid modelling results shows

Receptor and Summary of Predicted Effects	Sensitivity/importance/value of receptor[1]	Magnitude of Change[2]	Significance[3]	Summary Rationale
increased noise levels from overhead line				that where residential receptors are within 21m from the overhead line centreline, adverse impacts are predicted.

1. The sensitivity/importance/value of a receptor is defined using the criteria set out in **Section 14.8** and is defined as low, medium or high.
2. The magnitude of change experienced by a receptor resulting from activities relating to the development is defined using the criteria set out in **Section 14.8** and is defined as negligible, low, medium or high.
3. The significance of the environmental effect is based on the combination of the sensitivity/importance/value of a receptor and the magnitude of change and is expressed as major (significant), moderate (potentially significant) or minor/negligible (not significant), subject to the evaluation methodology outlined in **Section 14.8**.

14.12 Further work to be undertaken

14.12.1 The information provided in this PEIR is preliminary, the final assessment of likely significant effects will be reported in the ES. This section describes the further work to be undertaken to support the noise and vibration assessment presented in the ES.

Baseline

14.12.2 A noise survey will be conducted, as described in **Section 14.4**. Where possible, it will comprise long-term unattended measurements in 14 locations over a period of at least 5 days including a weekend to obtain ambient and background measurements at locations likely to be affected by the construction of CSECs and the temporary construction compounds, locations likely to be affected by the construction and operation of the new substations, and locations likely to be affected by the operation of new overhead line sections.

14.12.3 Comment will be made as to any potential implications of the COVID-19 pandemic conditions where relevant, including in relation to road traffic numbers on nearby roads.

Assessment

14.12.4 The assessments undertaken for the PEIR will be reviewed following stakeholder consultation feedback and further design refinement. The following assessments will then either be updated or undertaken where they have not been undertaken for this PEIR:

- updated construction traffic noise;
- construction noise (including noise due to slow-moving construction traffic on haul roads);
- construction vibration;
- operational noise for the proposed new 275kV and 400kV overhead lines;
- operational noise of the proposed substations at Monk Fryston and Overton; and
- CEA.

Environmental measures

14.12.5 To date, no additional measures have been identified as being necessary, however this is a preliminary assessment which has not included prediction of noise from the new substations. If, following stakeholder consultation feedback, further design refinement and further assessment, it is identified that additional measures are required, these will be detailed as part of the ES.

14.12.6 The most likely form of mitigation for plant at the new substations would be noise enclosures around SGTs.

14.12.7 For the overhead lines, mitigation options are more limited. Noise would depend on the final alignment within the Order Limits and on the conductor selections. However, both these factors must be primarily chosen to enable the engineering constraints to be met, thus limiting scope for noise to influence the final alignment or the selections. Preliminary assessment indicates that any potential significant effects are likely to be limited to NSRs very close to the overhead line, so the need for additional

environmental measures is likely to be limited. This is a result of the route corridor for the overhead line having been chosen to maximise separation between the overhead line and receptors wherever practical.

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