# Botley West Solar Farm

Environmental Statement

## Volume 1

## Chapter 13: Noise and Vibration

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## Approval for issue

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# Glossary

| Term | Meaning |
|---|---|
| The Applicant | SolarFive Ltd |
| The Project | The Botley West Solar Farm |
| A-weighting | A frequency weighting devised to attempt to account for the fact that human response to sound is not equally sensitive to all frequencies. It consists of an electronic filter in a sound level meter which attempts to build this variability into the indicative sound level reading so that it will correlate, approximately, with the human response. |
| Ambient sound level, $L_a = L_{Aeq,T}$ | The steady sound level which, over a period of time *T*, contains the same amount of A-weighted sound energy as the time varying sound over the same period. Also known as the equivalent continuous sound pressure level. |
| Background sound level, $L_{A90,T}$ | The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, *T*, measured using fast time-weighting, F, and quoted to the nearest whole number of decibels. |
| Baseline | The status of the environment without the Project in place. |
| Best Practicable Means | Adopting the best available methods to reasonably control noise and vibration. Section 72 of the Control of Pollution Act (CoPA, 1974) and Environmental Protection Act Part III (EPA, 1990) states the following:<br>"In that expression “practicable” means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications.<br>The means to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structures." |
| Basic Noise Level | A measure of traffic source noise prior to development. It is calculated from traffic flows, road speed, and Heavy Goods Vehicle (HGV) percentage. |
| Code of Construction Practice | A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes. |
| Cumulative Effects | The combined effect of the Project in combination with the effects from other proposed developments, on the same receptor or resource. |
| Decibel | A unit used to measure or compare the intensity of a sound by comparing it with a given reference level on a logarithmic scale. |
| Development Consent Order | An order made under the Planning Act 2008, as amended, granting development consent. |

| Term | Meaning |
|---|---|
| Direct Pipe<br>(Also described as Pipe Ramming) | This is a trenchless method for installing the cable. It will be used along the cable route where the open trench method is not suitable (e.g. crossing hedgerows).<br><br>The method involves the pushing of a steel pipe through the ground. With the material within the pipe excavated to allow for the electrical cable to pass through. |
| Effect | The term used to express the consequence of an impact. The significance of effect is determined by correlating magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria. |
| Environmental Impact Assessment | The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions. |
| EIA Scoping Report | A report setting out the proposed scope of the Environmental Impact Assessment process. |
| Environmental Statement | The document presenting the results of the Environmental Impact Assessment process. |
| Free-field | A situation in which the radiation from a sound source is entirely unaffected by the presence of any reflective boundaries. |
| Impact | Change that is caused by an action/project, e.g., land clearing (action) during construction which results in habitat loss (impact). |
| Intermittency | A measure of the ‘on/off’ nature of a sound source. |
| Impulsivity | A measure of the sharpness of sudden nature of a sound which is short in duration such as a gunshot or a blast. |
| Inter-related Effects | Inter-related effects arise where an impact acts on a receptor repeatedly over time to produce a potential additive effect or where a number of separate impacts, such as noise and habitat loss, affect a single receptor. |
| Local Authority | A body empowered by law to exercise various statutory functions for a particular area of the United Kingdom. This includes County Councils, District Councils and County Borough Councils. |
| Local Planning Authority | The local government body (e.g., Borough Council, District Council, etc.) responsible for determining planning applications within a specific area. |
| Maximum design scenario | The realistic worst-case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Project. |
| Noise | An unwanted or unexpected sound. |
| Peak Particle Velocity | An indicator of the magnitude of ground vibration which refers to the movement of molecular particles within the ground. |

| Term | Meaning |
|---|---|
| Pipe Ramming<br>(Also described as Direct Pipe) | This is a trenchless method for installing the cable. It will be used along the cable route where the open trench method is not suitable (e.g. crossing hedgerows).<br><br>The method involves the pushing of a steel pipe through the ground. With the material within the pipe excavated to allow for the electrical cable to pass through. |
| Power Converter Station (PCS) | A device for bidirectional conversion of electrical energy connected between the battery system and the grid and/or load. |
| Preliminary Environmental Information Report | A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses. |
| Rating Level | The specific sound level plus any adjustment for the characteristic features of the sound |
| Residual sound level, $L_r = L_{Aeq,T}$ | The ambient sound level at a receptor in the absence of influence from the sound source under assessment. |
| Scoping Opinion | Sets out the Planning Inspectorate's response (on behalf of the Secretary of State) to the Scoping Report prepared by the Applicants. The Scoping Opinion contains the range of issues that the Planning Inspectorate, in consultation with statutory stakeholders, has identified should be considered within the Environmental Impact Assessment process. |
| Sound | Fluctuations of pressure within a medium (gas, solid or fluid) within the audible range of loudness and frequencies which excite the sensation of hearing. |
| Sound power level, $L_w$ | The total sound energy emitted by a source per unit time. |
| Sound Pressure Level, $L_p$ | The amount of force a sound wave exerts on a surface area perpendicular to the direction of travel. A measure of the variation of sound level over a distance. |
| Specific sound level, $L_{s,} = L_{Aeq,Tr}$ | The equivalent continuous A-weighted sound pressure level produced by the specific noise source at the assessment location over a given reference time internal. |
| Study area | This is an area which is defined for each environmental topic which includes the Order Limits as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each topic is intended to cover the area within which an impact can be reasonably expected. |
| Substation | Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers. |
| The Project | The Botley West Solar Farm. |
| The Secretary of State for Energy Security and Net Zero | The decision maker with regards to the application for development consent for the Project. |

| Term | Meaning |
|---|---|
| The Site or Order Limits | The area of land encompassing the Project development and shown on the Site Location and Order Limits plan (Volume 2, Figure 1.1 of the ES). |
| Tonality | A measure of sound quality that correlates to how humans perceive certain frequencies of sound. A sound is considered tonal if the frequency spectrum contains a lot of sound energy at a single frequency. |
| Traffic Flows | Traffic flow describes the number of vehicles passing a reference point per unit of time (e.g., vehicles per hour). |
| Transboundary effects | Effects from a project within one state that affect the environment of another state(s). |
| Transformer | A component of a substation required to transform voltage from high to low, or the reverse, or perform any of several other important functions. Before being used, electric power may flow through several transformer substations at different voltage levels. A transformer substation includes transformers to change voltage levels between high transmission voltages and lower distribution voltages, or at the interconnection of two different transmission voltages |

# Abbreviations

| Abbreviation | Meaning |
|---|---|
| BNL | Basic Noise Level |
| BPM | Best Practicable Means |
| BS | British Standard |
| CEA | Cumulative Effects Assessment |
| CoCP | Code of Construction Practice |
| CoPA | Control of Pollution Act |
| CRTN | Calculation of Road Traffic Noise |
| CTMP | Construction Traffic Management Plan |
| DCO | Development Consent Order |
| DMRB | Design Manual for Roads and Bridges |
| EIA | Environmental Impact Assessment |
| EPA | Environmental Protection Act |
| ES | Environmental Statement |
| HDD | Horizontal Directional Drilling |
| HGV | Heavy Goods Vehicle |
| LOAEL | Lowest Observed Adverse Effect Level |
| MDS | Maximum Design Scenario |

| Abbreviation | Meaning |
|---|---|
| NPPF | National Planning Policy Framework |
| NPS | National Policy Statement |
| NPSE | Noise Policy Statement for England |
| OS | Ordnance Survey |
| PCS | Power Converter Station |
| PEIR | Preliminary Environmental Information Report |
| PINS | The Planning Inspectorate |
| PPG | Planning Practice Guidance |
| PPV | Peak Particle Velocity |
| PV | Photovoltaic |
| SOAEL | Significant Observed Adverse Effect Level |

# Units

| Unit | Description |
|---|---|
| % | Percentage |
| dB | Decibel |
| dB(A) | A-weighted Decibel |
| mm/s | Millimetres per second |
| km | Kilometre |
| $km^2$ | Square kilometre |
| m | Metre |
| min | Minute |
| h | Hours |
| ha | Hectare |
| ms | Milliseconds |

# 14 Noise and Vibration

## 14.1 Introduction

14.1.1 This chapter of the ES sets out the approach to the assessment of likely significant noise and vibration effects, of the Project, upon receptors. The application for development consent is being made to the Planning Inspectorate (PINS) under the Planning Act 2008. The proposal is to install and operate approximately 840MWe of solar generation in parts of West Oxfordshire, Cherwell and Vale of White Horse Districts, within the county of Oxfordshire (the Project).

14.1.2 This chapter of the Environmental Statement (ES) has been prepared by RPS for Photovolt Development Partners GmbH (PVDP) on behalf of SolarFive Ltd (the Applicant).

14.1.3 SolarFive is the 'special purpose vehicle' (SPV) for the Project and has been awarded a generation licence by Ofgem and offered a grid connection by National Grid Electricity Transmission (NGET) from October 2027. SolarFive is a licence holder under the Electricity Act 1989, and is also a company registered in England and Wales (company no. 12602740).

14.1.4 This ES has been prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (the EIA Regulations), and other required documents including a statement on pre-application consultation.

14.1.5 This ES Chapter has been prepared in accordance with the approach set out in the Scoping Report and subsequent Preliminary Environmental Information Report (PEIR).

14.1.6 The assessment presented is informed by the following technical chapters.

- Volume 1, Chapter 6: Project Description **[EN010147/APP/6.3]**; and
- Volume 1, Chapter 12: Traffic and Transport **[EN010147/APP/6.3]**.

14.1.7 This chapter also draws upon information contained within.

- Volume 2, Figure 13.1: Construction Phase Noise Study Area **[EN010147/APP/6.4]**;
- Volume 2, Figure 13.2: Construction Phase Vibration Study Area **[EN010147/APP/6.4]**;
- Volume 2, Figure 13.3: Operational Phase Noise Study Area **[EN010147/APP/6.4]**;
- Volume 3, Appendix 13.1: Baseline Sound Survey **[EN010147/APP/6.5]**;
- Volume 3, Appendix 13.2: Construction Phase Noise and Vibration **[EN010147/APP/6.5]**; and
- Volume 3: Appendix 13.3: Operational Phase Noise **[EN010147/APP/6.5]**.

14.1.8 The ES will accompany the application to PINS for development consent.

## 14.2 Legislative and Policy Context

14.2.1 This section of this ES sets out the legislation and policy which is relevant for the assessment of noise and vibration.

## Legislation

### Control of Pollution Act (CoPA) 1974

14.2.2 Section 60, Part III of the CoPA refers to the control of noise on construction sites. It outlines legislation by which local authorities can control noise from construction sites and prevent noise disturbance.

14.2.3 The CoPA provides a local authority with the power to serve a notice imposing requirements for the way in which construction works are to be carried out in their jurisdiction. This notice can specify:

- the plant or machinery permitted for use;
- the hours during which construction work may be undertaken;
- limits for the emission levels of noise and vibration due to the works at any time or spatial position on site; and
- any other change in circumstance.

14.2.4 Section 61, Part III of the CoPA refers to prior consent for work on construction sites. It provides a method by which a contractor can apply for consent to undertake construction works in advance.

14.2.5 Section 71, Part III of the CoPA refers to the preparation and approval of codes of practice for minimising noise.

14.2.6 British Standards (BS) 5228-1:2009+A1:2014 and BS 5228 2:2009+A1:2014 were approved within The Control of Noise (Code of Practice for Construction and Open Sites) Order 2015 as suitable guidance on appropriate methods for the control of noise from construction and open sites in exercise of the powers conferred on the Secretary of State by Sections 71(1)(b), (2) and (3) of the CoPA.

14.2.7 Section 72, Part III of the CoPA refers to Best Practicable Means (BPM), which is defined as:

*"In that expression, 'practicable' means reasonably practicable, having regards among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications'. Whilst 'Means' includes 'the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structures."*

### Environmental Protection Act (EPA) 1990

14.2.8 Section 79, Part III of the EPA contains a list of matters that amount to statutory nuisances and places a duty on local authorities to regularly inspect areas in their jurisdiction to determine where statutory nuisances may exist.

14.2.9 This section also considers and defines the concept of BPM which originates from Section 72, Part III of the CoPA.

14.2.10 The local authority must serve an abatement notice where it is satisfied that a statutory nuisance does exist or is likely to occur/recur. Section 80, Part III of the EPA provides local authorities with the power to serve an abatement notice to prohibit or restrict its occurrence or recurrence; and to carry out works or other actions necessary to abate the nuisance.

14.2.11 Section 82, Part III of the EPA allows a magistrates' court to act on a complaint made by any person on the grounds that they are aggrieved by a statutory nuisance, such as noise.

14.2.12 The procedures for appeals against abatement notices are detailed in the Statutory Nuisance (Appeals) Regulations 1995.

## Planning policy context

### National Policy Statements

14.2.13 There are currently six designated energy National Policy Statements (NPS), EN-1, EN-2, EN-3, EN-4, EN-5 and EN-6. Three of these policies relate to solar development, and are:

- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (Department for Energy Security & Net Zero 2023a);
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security & Net Zero 2023b); and
- NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security & Net Zero 2023c).

14.2.14 **Table 14.1**: sets out a summary of the policies within these NPSs, relevant to Noise and Vibration.

**Table 14.1: Summary of designated and draft NPS document requirements relevant to this chapter**

| Summary of NPS Requirement | How and where considered in the ES |
|---|---|
| **NPS EN-1** | |
| At the application stage of an energy NSIP, possible sources of nuisance under section 79(1) of the EPA 1990 and how they may be mitigated or limited should be identified by the applicant so that appropriate requirements can be included in any subsequent order granting development consent (see Section 5.7 [of NPS EN-1] on dust, odour, artificial light etc. and Section 5.12 [of NPS EN-1] on noise and vibration).<br><br>[Paragraph 4.15.5 of NPS-EN-1] | An assessment of the potential noise and vibration impacts during the construction phase of the Project is presented in Volume 3, Appendix 13.2: Construction Phase Noise and Vibration **[EN010147/APP/6.5]** of the ES. The noise sources and example mitigation measures are presented for each construction activity to be undertaken.<br><br>The noise impacts during the operational phase of the Project are assessed in Volume 3, Appendix 13.3: Operational Phase Noise **[EN010147/APP/6.5]** of the ES. This appendix includes details of the proposed plant strategy and potential noise mitigation measures to be incorporated as part of the design.<br><br>An assessment of the significance of the effects due to noise and vibration is presented in **Section 13.9** of this chapter. |
| At the application stage of an energy NSIP, possible sources of nuisance under section 79(1) of the EPA 1990 and how they may be mitigated or limited should be considered by the Secretary of State so that appropriate requirements can be included in | An assessment of the potential noise and vibration impacts during the construction phase of the Project is presented in Volume 3, Appendix 13.2: Construction Phase Noise and Vibration **[EN010147/APP/6.5]** of the ES. The noise and vibration sources which may cause nuisance and example mitigation measures are presented for each construction activity to be undertaken. |

| Summary of NPS Requirement | How and where considered in the ES |
|---|---|
| any subsequent order granting development consent (see Section 5.7 [of NPS EN-1] on dust, odour, artificial light etc. and Section 5.12 [of NPS EN-1] on noise and vibration).<br><br>[Paragraph 4.15.6 of NPS-EN-1] | Details of the embedded mitigation and commitments to be adopted as part of the Project are presented in **Section 13.8** of this chapter.<br><br>The noise impacts during the operational phase of the Project are assessed in Volume 3, Appendix 13.3: Operational Phase Noise **[EN010147/APP/6.5]** of the ES. This annex includes details of the proposed plant strategy and potential noise mitigation measures to be incorporated as part of the design.<br><br>An assessment of the significance of the effects due to noise and vibration is presented in **Section 0** of this chapter. |
| The Secretary of State should note that the defence of statutory authority is subject to any contrary provision made by the Secretary of State in any particular case in a Development Consent Order (section 158(3) of the Planning Act 2008). Therefore, subject to Section 5.7 and Section 5.12 [of NPS EN-1], the Secretary of State can disapply the defence of statutory authority, in whole or in part, in any particular case, but in so doing should have regard to whether any particular nuisance is an inevitable consequence of the development.<br><br>[Paragraph 4.15.7 of NPS-EN-1] | Noise and vibration impacts, and thereby the risk of nuisance, during the construction, operation and maintenance, and decommissioning phases of the Project will be controlled as best as reasonably practicable such that significant adverse effects are avoided, and adverse impacts are minimised. Details of the assessment of noise and vibration effects are outlined in **Section 0**, with details of embedded mitigation measures provided in **Section 14.8** of this chapter. |
| The nature and extent of the noise assessment should be proportionate to the likely noise impact.<br><br>[Paragraph 5.12.7 of NPS-EN-1] | A proportionate assessment of the potential noise impacts during the construction, operation, and decommissioning phases of the Project has been undertaken to ensure all potential impacts are mitigated such that significant adverse effects are avoided, and adverse impacts are minimised as best as reasonably practicable.<br><br>Emphasis is placed on night-time impacts due to trenchless techniques as part of the construction phase, as well as operational noise impacts due to the operation of the substations.<br><br>The assessment of operational noise has been undertaken to ensure that noise impacts due to the operation of the West Botley Solar Farm are mitigated sufficiently.<br><br>Details of the assessment of noise and vibration effects are outlined in **Section 0**, with details of embedded mitigation measures provided in **Section 13.8** of this chapter. |
| Applicants should consider the noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation.<br><br>[Paragraph 5.12.8 of NPS-EN-1] | An assessment of the potential noise impacts due to increased traffic flows on local highway networks during the construction phase of the Project is considered in Volume 3, Appendix 13.2: Construction Phase Noise and Vibration **[EN010147/APP/6.5]** of the ES. The significance of the resultant effects are considered in **Section 0** of this chapter. |

| Summary of NPS Requirement | How and where considered in the ES |
|---|---|
| Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. Further information on assessment of particular noise sources may be contained in the technology specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies.<br><br>[Paragraph 5.12.9 of NPS-EN-1] | The construction, operation and maintenance, and decommissioning phases of the Project have been assessed using the principles in the relevant BS and nationally accepted guidance.<br><br>Construction, operation and maintenance, and decommissioning noise and vibration effects are assessed in **Section 0** of this chapter.<br><br>In accordance with best practice, the noise and vibration assessment has been undertaken with reference to the following:<br>• BS 4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound' (British Standards Institution, 2019)<br>• BS 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (British Standards Institution, 2014a)<br>• BS 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' (British Standards Institution, 2014b)<br>• BS 7445:2003 – 'Description and measurement of environmental noise' (British Standards Institution, 2003)<br>• BS 8233:2014 – 'Guidance on sound insulation and noise reduction for buildings' (British Standards Institution, 2014c)<br>• Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1988)<br>• DMRB – LA111 – Noise and vibration (Highways England, Transport Scotland, Llwyodraeth Cymru, Department for Infrastructure, 2020).<br>• ISO 9613-2:1996 – Acoustics – 'Attenuation of sound during propagation outdoors – Part 2: General method of calculation'(International Organisation for Standards, 1996).<br><br>Details of the potential noise reduction achieved via the implementation of BPM during the construction and decommissioning phases of the Project can be found in Volume 3, Appendix 13.2: Construction Phase Noise and Vibration **[EN010147/APP/6.5]** of the ES.<br><br>Operational noise will be limited to a rating level which is up to 4dB greater than the background sound level at the nearest receptor. This operational noise criterion will be secured as a requirement of the DCO and agreed with the relevant stakeholders. The assessment outlined in Volume 3, Appendix 13.3: Operational Phase Noise **[EN010147/APP/6.5]** of the ES includes 3D acoustic modelling which predicts the level of operational phase noise from the Project at noise sensitive receptors. |
| Applicants should submit a detailed impact assessment and mitigation plan as part of any development plan, including the use of noise mitigation and noise abatement technologies during construction and operation. | Details of the potential noise reduction achieved via use of BPM during the construction and decommissioning phases of the Project can be found in Volume 3, Appendix 13.2: Construction Phase Noise and Vibration **[EN010147/APP/6.5]** of the ES. The necessary mitigation measures for the Project are outlined in the **Section 13.8** of this Chapter<br><br>Operational noise will be limited to a rating level which is up to 4dB greater than the background sound level at the nearest receptor. This operational noise criterion will be secured as a requirement of the DCO and agreed with the relevant stakeholders. The assessment outlined in |

| Summary of NPS Requirement | How and where considered in the ES |
|---|---|
| [Paragraph 5.12.12 of NPS-EN-1] | Volume 3, Appendix 13.3: Operational Phase Noise **[EN010147/APP/6.5]** of the ES includes 3D acoustic modelling which predicts the level of operational phase noise from the Project at noise sensitive receptors.<br><br>An assessment of the significance of the effects due to noise and vibration is presented in **Section 0** of this chapter. |
| The Secretary of State should consider whether mitigation measures are needed both for operational and construction noise over and above any which may form part of the project application. In doing so the Secretary of State may wish to impose mitigation measures. Any such mitigation measures should take account of the NPPF or any successor to it and the Planning Practice Guidance on Noise.<br><br>[Paragraph 5.12.13 of NPS-EN-1] | Details of the embedded mitigation measures adopted as part of the Project during the construction and operational phase are presented in **Section 13.8** of this chapter. |
| Mitigation measures may include one or more of the following:<br>• engineering: reducing the noise generated at source and/or containing the noise generated<br>• lay-out: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose-built barriers, or other buildings<br>• administrative: using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise limits/noise levels, differentiating as appropriate between different times of day, such as evenings and late at night, and taking into account seasonality of wildlife in nearby designated sites<br>• insulation: mitigating the impact on areas likely to be affected by noise including | The measures (commitments) to be adopted as part of the Project are detailed in **Section 13.8** of this chapter. Details of the potential noise reduction achieved via BPM during the construction and decommissioning phases of the Project can be found in Volume 3, Appendix 13.2: Construction Phase Noise and Vibration **[EN010147/APP/6.5]** of the ES.<br><br>Operational noise will be limited to a rating level which is up to 4dB greater than the background sound level at the nearest receptor. This operational noise criterion will be secured as a requirement of the DCO and agreed with the relevant stakeholders. The assessment outlined in Volume 3, Appendix 13.3: Operational Phase Noise **[EN010147/APP/6.5]** of the ES includes 3D acoustic modelling which predicts the level of operational phase noise from the Project at noise sensitive receptors. |

| Summary of NPS Requirement | How and where considered in the ES |
|---|---|
| through noise insulation when the impact is on a building. | |
| [Paragraph 5.12.14 of NPS-EN-1] | |
| The project should demonstrate good design through selection of the quietest or most acceptable cost-effective plant available; containment of noise within buildings wherever possible, taking into account any other adverse impacts that such containment might cause (e.g. on landscape and visual impacts; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission). | The Applicant is committed to good design principles to be adopted through the detailed design phase. These design principals are embedded into the project description, and set-out in Volume 1, Chapter 6: Project Description **[EN010147/APP/6.5]**. |
| [Paragraph 5.12.15 of NPS-EN-1] | |
| A development must be undertaken in accordance with statutory requirements for noise. Due regard must be given to the relevant sections of the Noise Policy Statement for England, the NPPF, and the government's associated planning guidance on noise. In Wales the relevant policy will be PPW and the TANs, as well as the Welsh Government's Noise and Soundscape Action Plan. | The noise impact criteria for each phase of the Project have been derived considering the requirements of the National Planning Policy Framework (NPPF) and the Noise Policy Statement for England (NPSE). Details of the relevant sections of NPPF and NPSE are provided in this chapter. |
| [Paragraph 5.12.16 of NPS-EN-1] | |
| The Secretary of State should not grant development consent unless they are satisfied that the proposals will meet the following aims, through the effective management and control of noise:<br>• Avoid significant adverse impacts on health and quality of life from noise<br>• Mitigate and minimise other adverse impacts on health and quality of life from noise<br>• Where possible, contribute to improvements to health and quality of life through the | Potential noise mitigation measures are provided in **Section 13.8** of this chapter. These embedded mitigation measures which will be adopted to control noise during the construction and operation phases of the Project are outlined in:<br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration **[EN010147/APP/6.5]**; and<br>• Volume 3, Appendix 13.3: Operational Phase Noise of the ES **[EN010147/APP/6.5]**.<br>Requirements to secure noise levels and mitigation measures, where applicable, are included in the DCO submitted by the Applicants.<br>An assessment of the significance of the effects due to Noise and Vibration is presented in **Section 0** of this chapter. |

| Summary of NPS Requirement | How and where considered in the ES |
|---|---|
| effective management and control of noise.<br><br>[Paragraph 5.12.17 of NPS EN-1] | |
| When preparing the Development Consent Order, the Secretary of State should consider including measurable requirements or specifying the mitigation measures to be put in place to ensure that noise levels do not exceed any limits specified in the development consent. These requirements or mitigation measures may apply to the construction, operation, and decommissioning of the energy infrastructure development.<br><br>[Paragraph 5.12.18 of NPS EN-1 | Details of the potential noise reduction achieved via BPM during the construction and decommissioning phases of the Project can be found in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES. The construction threshold values have also been derived in accordance with BS 5228-1:2009+A1:2014 (British Standards Institution, 2014a).<br><br>Operational noise will be limited to a rating level of which is up to 4dB greater than the background sound level at the nearest receptor. This operational noise criterion will be secured as a requirement of the DCO and agreed with the relevant stakeholders. The assessment outlined in **Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]** of the ES includes 3D acoustic modelling which predicts the level of operational phase noise from the Project at noise sensitive receptors. |
| **NPS EN-3** | |
| Proposals for renewable energy infrastructure should demonstrate good design to mitigate impacts such as noise.<br><br>[Paragraph 2.5.2 of NPS EN-3] | The Applicants will commit to good design principles to be adopted through the detailed design phase. Where the design process has identified any measures required to reduce noise, these have been incorporated into the Project and set out as Commitments (see **Section 13.8** of this chapter). |
| Applicants should include in an Environmental Statement a noise assessment of the impacts on amenity in the case of excessive noise from a project in line with guidance set out in Section 5.12 in EN-1.<br><br>[Paragraph 2.7.40 of NPS EN-3] | Construction, operation and maintenance, and decommissioning phases of The Project have been assessed using the principles in the relevant British Standards.<br><br>The assessment of noise and vibration impacts and significant effects arising from the Project is presented in **Section 0** with details provided in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES, and **Volume 3, Appendix 13.3: Operational Phase Noise** of the ES.<br><br>Noise impacts on wildlife are assessed in Volume 1, Chapter 9: Ecology and Nature Conservation **[EN010147/APP/6.3]**.<br><br>Mitigation measures are considered in **Section 13.8** of this chapter and the inter-related effects are considered in **Section 13.13** of this chapter. |
| The Secretary of State should consider the noise and vibration impacts according to Section 5.12 in EN-1 and be satisfied that noise and vibration will be adequately mitigated through requirements attached to the consent.<br><br>[Paragraph 2.7.98 of NPS EN-3]<br><br>The Secretary of State should not grant development consent unless | The construction, operation and maintenance, and decommissioning phases of the Project have been assessed using the principles in the relevant BS.<br><br>Operational noise will be limited to a rating level which is up to 4dB greater than the background sound level at the nearest receptor. This operational noise criterion will be secured as a requirement of the DCO and agreed with the relevant stakeholders. Details of the operational noise assessment and the derivation of these operational noise limits are outlined in **Volume 3, Appendix 13.3: Operational Phase Noise** of the ES. |

| Summary of NPS Requirement | How and where considered in the ES |
|---|---|
| it is satisfied that the proposals will meet the aims set out in 5.12 of EN-1.<br>[Paragraph 2.7.100 of NPS EN-3] | The significance of the effects following adoption of these measures is presented in **Section 0** of this chapter. |
| **NPS EN-5** | |
| Audible noise effects can also arise from substation equipment such as transformers, quadrature boosters and mechanically switched capacitors.<br>[Paragraph 2.9.37 of NPS EN-5] | All relevant noise emitting plant items have been assessed as part of the operational noise assessment detailed in **Volume 3, Appendix 13.3: Operational Phase Noise** of the ES.<br>The assessment has been undertaken assuming the maximum design scenario sound power levels for all plant items.<br>The significance of the effects following adoption of these measures is presented in **Section 13.9** of this chapter. |
| Transformers are installed at many substations and generate low frequency hum. Whether the noise can be heard outside a substation depends on a number of factors, including transformer type and the level of noise attenuation present (either engineered intentionally or provided by other structures).<br>[Paragraph 2.9.38 of NPS EN-5] | The tonality at low frequency arising from the operation of super grid transformers and other high voltage plant has been considered within the assessment. A noise emission spectrum for the transformers in 1/3-octave bands has been adopted to ensure that tonality at 100 Hz (and subsequent harmonics) is properly considered within the assessment. Full details are provided in **Volume 3, Appendix 13.3: Operational Phase Noise** of the ES. |
| For the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards are satisfactory.<br>[Paragraph 2.9.39 of NPS EN-5] | The assessment of operational noise impacts has been undertaken using the principles outlined in BS 4142:2014+A1:2019 – Methods for rating and assessing industrial and commercial sound (British Standards Institution, 2019).<br>Details of the assessment can be found in **Volume 3, Appendix 13.3: Operational Phase Noise** of the ES.<br>The significance of the effects following adoption of these measures is presented in **Section 0** of this chapter. |
| For the assessment of noise from overhead lines, the applicant must use an appropriate method to determine the sound level produced by the line in both dry and wet weather conditions, in addition to assessing the impact on noise-sensitive receptors.<br>[Paragraph 2.9.40 of NPS EN-5] | No overhead lines are proposed as part of the Project. All cables are proposed to be installed underground. |
| For instance, the applicant may use an appropriate noise modelling tool or tools for the prediction of overhead line noise and its propagation over distance, such as an ISO 9613-2 or Technical Report TR(T)94. | No overhead lines are proposed as part of the Project. All cables are proposed to be installed underground. |

| Summary of NPS Requirement | How and where considered in the ES |
|---|---|
| [Paragraph 2.9.41 of NPS EN-5] | |
| The Secretary of State should ensure that appropriate assessment methodologies have been used in the evidence presented to it, and that the appropriate mitigation options have been considered and adopted. Where the applicant can demonstrate that appropriate mitigation measures will be put in place, the residual noise impacts are unlikely to be significant. | The construction, operation and maintenance, and decommissioning phases of the Project have been assessed using the principles in the relevant BS.<br>Operational noise will be limited to a rating level which is up to 4dB greater than the background sound level at the nearest receptor. This operational noise criterion will be secured as a requirement of the DCO and agreed with the relevant stakeholders. The significance of the effects following adoption of these measures is presented in **Section 13.9** of this chapter. |
| [Paragraph 2.11.7 of NPS EN-3] | |
| NPS EN-5 provides guidance which primarily relates to noise from overhead transmission lines which is not relevant here.<br>Reference is also made to audible noise effects from substation equipment such as transformers. The guidance states that the relevant assessment methodologies should be adopted and that appropriate mitigation options should be considered and adopted where required.<br>[Paragraphs 2.9.37 and 2.9.38 of NPS EN-5] | Construction, operation and maintenance, and decommissioning phases of the Project have been assessed using the principles in the relevant BS.<br>Careful consideration has been given to the tonal components within the noise spectrum of the substation transformers at low frequency, with additional consideration also given to the associated harmonics at higher frequencies. Measures to control this will be outlined within an Operational Noise Management Plan, Volume 3, Appendix 13.3 Operational Phase Noise.<br>The assessment of the noise and vibration impacts arising due to the Project is presented in **Section 13.9** of this chapter with details provided in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES, and **Volume 3, Appendix 13.3: Operational Phase Noise** of the ES. |
| Audible noise effects can also arise from substation equipment such as transformers, quadrature boosters and mechanically switched capacitors.<br>[Paragraph 2.9.37 of NPS EN-3] | All relevant noise emitting plant items have been assessed as part of the operational noise assessment detailed in **Volume 3, Appendix 13.3: Operational Phase Noise** of the ES.<br>The assessment has been undertaken assuming upper-range sound power levels for all plant items where manufacturers' noise data is not available.<br>The significance of the effects following adoption of these measures is presented in **Section 0** of this chapter. |
| Transformers are installed at many substations and generate low frequency hum. Whether the noise can be heard outside a substation depends on a number of factors, including transformer type and the level of noise attenuation present (either engineered intentionally or provided by other structures).<br>[Paragraph 2.9.38 of NPS EN-5] | The tonality at low frequency arising from the operation of super grid transformers and other high voltage plant has been considered within the assessment. A noise emission spectrum for the transformers in 1/3-octave bands has been adopted to ensure the tonality at 100 Hz (and subsequent harmonics) is properly considered within the assessment. Full details are provided in **Volume 3: Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5].** |
| For the assessment of noise from substations, standard methods of | The assessment of operational noise impacts has been undertaken using the principles outlined in BS 4142:2014+A1:2019 – Methods for |

| Summary of NPS Requirement | How and where considered in the ES |
|---|---|
| assessment and interpretation using the principles of the relevant British Standards are satisfactory.<br><br>[Paragraph 2.9.39 of NPS EN-5] | rating and assessing industrial and commercial sound (British Standards Institution, 2019).<br><br>Details of the assessment can be found in **Volume 3: Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]** of the ES.<br><br>The significance of the effects following adoption of these measures is presented in **Section 0** of this chapter. |
| For the assessment of noise from overhead lines, the applicant must use an appropriate method to determine the sound level produced by the line in both dry and wet weather conditions, in addition to assessing the impact on noise-sensitive receptors.<br><br>[Paragraph 2.9.40 of NPS EN-5] | No overhead lines are proposed as part of the Project. All cables are proposed to be installed underground. |

## The National Planning Policy Framework

14.2.15 The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2019, 2021 and twice in 2023 (Department for Levelling Up, Housing and Communities, 2023). The NPPF sets out the Government's planning policies for England.

14.2.16 As stated in NPPF, paragraph 5, it does not contain specific policies relating to NSIP, and the main focus should be the NPSs. However, NPPF should be a material consideration.

14.2.17 **Table 14.2** sets out a summary of the NPPF policies relevant to this chapter.

### Table 14.2: Summary of NPPF requirements relevant to this chapter

| Policy | Key Provisions | How and where considered in the ES |
|---|---|---|
| 180 | Planning policies and decisions should contribute to and enhance the natural and local environment by:<br><br>[…]<br><br>e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.<br><br>[…] | Potential noise mitigation measures are provided in **Section 13.8** of this chapter. These embedded mitigation measures which will be adopted to control noise during the construction and operation phases of the Project are outlined in:<br><br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]; and<br><br>• Volume 3: Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5] of the ES.<br><br>Requirements to secure noise levels and mitigation measures, where applicable, are included in the DCO submitted by the Applicants. |

| Policy | Key Provisions | How and where considered in the ES |
|---|---|---|
| | | An assessment of the significance of the effects due to Noise and Vibration is presented in **Section 0** of this chapter. |
| 191 | Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:<br>a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;<br>b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and<br>c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.<br>[…]' | Potential noise mitigation measures are provided in **Section 13.8** of this chapter. These embedded mitigation measures which will be adopted to control noise during the construction and operation phases of the Project are outlined in:<br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]; and<br>• Volume 3: Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5] of the ES.<br>Requirements to secure noise levels and mitigation measures, where applicable, are included in the DCO submitted by the Applicants.<br>An assessment of the significance of the effects due to Noise and Vibration is presented in **Section 0** of this chapter. |

14.2.18 The Planning Practice Guidance (PPG) (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2021) supports the NPPF and provides guidance across a range of topic areas.

14.2.19 The noise section of the PPG provides outline guidance and refers to general guidance on noise policy and assessment methodology detailed in the NPPF, the NPSE, and British Standards. The NPSE sets out noise management policy in the form of the Government's long-term vision to manage noise and improve health and quality of life.

14.2.20 The following guidance is presented within the PPG on how noise impacts may be determined:

*'Plan-making and decision making need to take account of the acoustic environment and in doing so consider:*

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a standard of amenity can be achieved.'*

14.2.21 A noise exposure hierarchy is provided as supplementary guidance in tabular form and is recreated in **Table 14.3**:. The guidance outlines the need to avoid and prevent the occurrence of significant adverse effects due to noise.

**Table 14.3: Summary of noise exposure hierarchy from NPSE and PPG**

| Response | Examples of outcomes | Increasing effect level | Action |
|---|---|---|---|
| **No Observed Effect Level** | | | |
| Not present | No effect. | No Observed Effect. | No specific measures required. |
| **No Observed Adverse Effect Level** | | | |
| Present and not intrusive | Noise can be heard but does not cause any change in behaviour, attitude, or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life. | No Observed Adverse Effect. | No specific measures required. |
| **Lowest Observed Adverse Effect Level (LOAEL)** | | | |
| Present and intrusive | Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life. | Observed Adverse Effect. | Mitigate and reduce to a minimum. |
| **Significant Observed Adverse Effect Level (SOAEL)** | | | |
| Present and disruptive | The noise causes a material change in behaviour, attitude or other physiological response, e.g., avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area. | Significant Observed Adverse Effect. | Avoid. |
| Present and very disruptive | Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory. | Unacceptable Adverse Effect. | Prevent. |

## Local planning policy

14.2.22 The relevant local planning policies applicable to noise and vibration based on the extent of the study areas for this assessment are summarised in **Table 14.4**. All local planning policies have been applied to the study area as a whole.

## Table 14.4: Summary of local planning policy relevant to this chapter

| Policy | Key Provisions | How and where considered in the ES |
|---|---|---|
| **Cherwell Local Plan 2011-2031 (Part 1)** | | |
| ESD5 | Planning applications involving renewable energy development will be encouraged provided that there is no unacceptable adverse impact, including cumulative impact, on the following issues, which are considered to be of particular local significance in Cherwell:<br>- Residential amenity | The noise and vibration impacts due to the construction, operation and decommissioning of the Project have been assessed with reference to the principles outlined in the relevant British Standards. An assessment of the noise impacts due to construction traffic has been undertaken in line with the guidance within DMRB LA 111 (Highways England *et al.*, 2020).<br>The assessment is presented in **Section 13.9** of this chapter with full details of the methodology and results provided in the following Appendices:<br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5] of the ES; and<br>• Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5] of the ES. |
| **West Oxfordshire Local Plan 2023** | | |
| EH8 | Proposals which are likely to cause pollution or result in exposure to sources of pollution or risk to safety, will only be permitted if measures can be implemented to minimise pollution and risk to a level that provides a high standard of protection for health, environmental quality and amenity. The following issues require particular attention.<br><u>Noise</u><br>New development should not take place in areas where it would cause unacceptable nuisance to the occupants of nearby land and buildings from noise or disturbance. | The noise and vibration impacts due to the construction, operation and decommissioning of the Project have been assessed with reference to the principles outlined in the relevant British Standards. An assessment of the noise impacts due to construction traffic has been undertaken in line with the guidance within DMRB LA 111.<br>The assessment is presented in **Section 13.9** with full details of the methodology and results provided in the following Appendices:<br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5] of the ES; and<br>• Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]. |
| **Vale of White Horse District Council Local Plan 2031: Part Two** | | |
| Development Policy 25: Noise Pollution | Noise-generating development that would have an impact on environmental amenity or biodiversity will be expected to provide an appropriate scheme of mitigation that should take account of:<br>the location, design and layout of the Project.<br>existing levels of background noise<br>measures to reduce or contain generated noise, and<br>hours of operation and servicing. | The noise and vibration impacts due to the construction, operation and decommissioning of the Project have been assessed with reference to the principles outlined in the relevant British Standards. Operational noise impacts have been assessed with reference to the guidance in British Standard 4142:2014+A1:2019. Construction noise and vibration impacts have been assessed in accordance with: |

| Policy | Key Provisions | How and where considered in the ES |
|---|---|---|
| | Development will not be permitted if mitigation cannot be provided within an appropriate design or standard[a]<br><br>[a] Currently set out in British Standards 4142:2014 and 8233:2014. The Council is currently developing guidance relating to noise mitigation. | • British Standard 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'.<br>• British Standard 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.<br><br>An assessment of the noise impacts due to construction traffic has been undertaken in line with the guidance within DMRB LA 111.<br><br>The assessment is presented in **Section 13.9** of this ES with full details of the methodology and results provided in the following Appendices:<br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5] of the ES; and<br>• Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]. |

## 14.3 Consultation and Engagement

14.3.1 On 15 June 2023, the Applicant submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects for the construction, operation and maintenance, and decommissioning phases. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

14.3.2 Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 24 July 2023. Key issues raised during the scoping process specific to Noise and Vibration are listed in **Table 14.5**, together with details of how these issues have been addressed within the ES.

### Table 14.5: Summary of scoping responses

| Comment | How and where considered in the ES |
|---|---|
| **Planning Inspectorate** | |
| The Applicant proposes to scope out baseline vibration surveys on the basis that the initial desk-based review of the site locations and surrounding areas indicate that no significant existing sources of vibration exist in the vicinity of the site. Whilst no baseline has been provided for this section in the Scoping Report, considering the baseline presented in other sections of the Scoping Report and in the description of the existing site (Section 2 of the Scoping Report) the Inspectorate is content that there are no existing sources of vibration that require | Baseline vibration surveys have been scoped out of the ES, as agreed with PINS. |

| Comment | How and where considered in the ES |
|---|---|
| surveys. Therefore, the Inspectorate is content to scope out baseline vibration surveys of the existing site. | |
| The Applicant proposes to scope out an assessment of vibration impacts during the operational phase on the basis that vibration isolation measures will be included as part of the plant design. Based on the characteristics of the Project the Inspectorate agrees that operational vibration effects may be scoped out from further assessment. However, the ES should describe the potential sources of vibration arising from the operation of the Project and any measures proposed to control emissions. | The impacts of operational vibration have been scoped out of the ES, as agreed with PINS. However, as requested, the ES includes descriptions of any potential sources of vibration arising from the operation of the Project and any measures proposed to control emissions. |
| The Applicant proposes to scope out an assessment of decommissioning phase impacts as these are likely to be similar or less significant than impacts during construction. Limited information is provided regarding the activities proposed for the decommissioning phase. As noted in ID 3.6.2 above, indicative traffic numbers are not provided for either the construction or decommissioning phases and so there is little evidence to support the claim that the decommissioning phase impacts would be less significant than during construction. On the basis of the information provided, the Inspectorate does not agree to scope this matter out at this stage. | An assessment of the noise and vibration impacts during the decommissioning phase of the Project is presented in **Section 13.9** of this ES. This assessment has been undertaken with reference to the following guidance:<br>• British Standard 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'.<br>• British Standard 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration. |
| Impacts on ecological features are proposed to be assessed within the ecology aspect chapter of the ES. The Inspectorate is content with this approach. However, the noise and vibration aspect chapter should provide cross-references to the relevant sections of the ecology chapter where appropriate e.g., alignment of the ZOI. | Noise impacts on wildlife are assessed in **Volume 1, Chapter 9: Ecology and Nature Conservation [EN010147/APP/6.3]** of the ES**.** |
| The study area for noise is defined in Scoping Report paragraph 7.7.4, using arbitrary distances of 1 km, 300m and 100 m from the Project depending on the noise source. This does not include potential impacts from increased traffic noise and the distances are not justified. The ES should explain how the study area(s) and sensitive receptors have been selected with reference to extent of the likely impacts and relevant supporting evidence such as modelling and/or relevant guidance. | Any potential increase in traffic flows has been assessed in **Section 13.9 - Construction Phase - Noise Impacts Due to Additional Vehicle Movements on Local Highway Networks** of this ES, and **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES. The noise sensitive receptors have been defined using the methodology detailed in **Receptor Value and Sensitivity**. |
| Whilst the Inspectorate acknowledges that the methodology is proposed to follow relevant British Standards and guidance as listed in Scoping Report paragraph 7.7.14, the Scoping Report does not explain how these methodologies will be applied and how significant effects will be determined. No sensitive receptors, degree of sensitivity, impact magnitude or significance is defined in the Scoping Report relating to noise therefore it is unclear what will be assessed and how. The baseline only provides a very high-level description of land use and roads and it is unknown what surveys are proposed to inform the assessment. | Details of the assessment methodology and significance criteria are detailed in **Section 13.4** and **Section 13.5** of this chapter. Further, **Volume 3, Appendix 13.1 Baseline Sound Survey** of the ES sets out the method of baseline data collection of. The impact assessment is detailed in **Section 13.9** of this ES, with additional details in<br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5] of the ES; and |

| Comment | How and where considered in the ES |
|---|---|
| The ES should clearly set out the specific methodology employed to assess significant effects from noise and vibration with reference to guidance; the ES should not only rely on reference to guidance without explaining the methodology and its applicability in full. This should include explanation of how the baseline environment has been established with full survey details provided where they have been undertaken. The need for surveys and survey locations should be informed by consultation where appropriate. | • Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]. |
| **Cherwell District Council** | |
| Regarding the proposed baseline survey and impact assessment methodology, the following was response received:<br><br>*"Satisfied approach is acceptable."* | No changes to the methodologies outlined in the Scoping Report are proposed. |
| **Wootton Parish Council** | |
| Aspects are currently scoped out - **section 7.7.20** page 85 (of the PEIR). This is not acceptable and a full noise assessment should be carried out for both construction and operational phases. WPC feels strongly this should be 'scoped in' and an acoustic map created for entire site. | The aspects scoped out are those which, based on professional judgement and historic experience with similar schemes, are unlikely to give rise to significant effects and those considered by other topics (e.g. ecology).<br>• Operational noise, construction and decommissioning noise and vibration are all scoped into the assessment and are considered fully in **Section 13.9** with additional technical information provided in:<br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5] of the ES; and<br>• Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]. |
| **Begbroke Parish Council** | |
| The noise emitted is projected to be 69dB. This will be intolerable – especially to wildlife. | Impact thresholds have been identified based on the relevant guidance documents. Noise from construction, operation and decommissioning are all considered fully within the technical information provided in:<br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5] of the ES; and<br>• Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5].<br>• Ecological receptors are considered within Volume 1 Chapter 9: Ecology and Nature Conservation [EN010147/APP/6.3]. |
| Planning decisions should ensure that new development is appropriate for its location considering the effects of pollution on health, living conditions and | The potential effects on the health and amenity of noise sensitive receptors have been considered within: |

| Comment | How and where considered in the ES |
|---|---|
| the natural environment, as well as the potential sensitivity of the site or wider area to impacts that could arise from the development. | • Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5] of the ES; and<br>• Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]. |
| Avoid noise giving rise to significant adverse impacts on health and the quality of life and identify and protect tranquil areas which have remained undisturbed by noise and are prized for their recreational and amenity value for this reason. | The impact assessment (stated in **Section 13.9** of this ES) shows that significant adverse effects from noise and vibration will be avoided with the embedded mitigation measures implemented (stated in **Section 14.8 Mitigation and Enhancement Measures Adopted as Part of the Project** of this chapter). Further details are set-out within:<br>• Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5] of the ES; and<br>• Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]. |
| The proposal conflicts with Policies of the LP which, amongst other aims seek to not permit developments where noise generated would cause material disturbance or nuisance to occupiers of surrounding properties. | The Project has been developed in accordance with the local plan and national planning policies. The policies of the local plan have been discussed within **Volume 1 Chapter 13 Section 13.2 [EN010147/APP/6.3]**. The impact assessment (stated in **Section 13.9** of this ES) shows that significant adverse effects from noise and vibration will be avoided with the embedded mitigation measures implemented (stated in **Section 13.8** of this ES). |
| **Bladon Parish Council** | |
| Para 7.7.5 – The paragraph only lists a few of the villages surrounding the Site locations and does not include Bladon, Church Hanborough, Cassington, Begbroke or Wootton. | Relevant nearby sensitive receptors have been identified and considered within this assessment. OS address point data has been used to identify these receptors. These receptors are shown in **Volume 3, Appendix 13.1: Baseline Sound Survey [EN010147/APP/6.5]**. Bladon, Church Hanborough, Cassington, Begbroke and Wootton have been included. |
| **Cassington Parish Council** | |
| The village of Cassington and Jericho Farm also lie on the southern edge of the Central Site Area of the West Botley Utility-Scale Solar Power Station. | Relevant nearby sensitive receptors have been identified and considered within this assessment. OS address point data has been used to identify these receptors. These receptors are shown in **Volume 3, Appendix 13.1: Baseline Sound Survey [EN010147/APP/6.5].** Bladon, Church Hanborough, Cassington, Begbroke and Wootton have been included. |
| **Hanborough Parish Council** | |
| HPC notes the point made that vibration as such is not likely to be an issue for scoping. However, HPC considers that noise is likely to be an issue during all | The potential noise impacts during construction and operation have been considered within. |

| Comment | How and where considered in the ES |
|---|---|
| phases of the construction, operation and decommissioning of BWSF, and that the SR should ensure that a proper assessment will be necessary for the ES. HPC further considers that a separate study of noise in respect of decommissioning will be necessary, because the nature of the noise is likely to be different to that emanating from the construction phase.<br><br>There would be, for instance, no real requirement for pile driving noise at the end of the BWSF life: but HPC notes that no information would be available as to the methods of removing the BWSF structures if no separate scoping assessment is made. | • Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5] of the ES; and<br>• Volume 3, Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]. |

14.3.3 Following scoping, consultation and engagement with interested parties specific to Noise and Vibration has continued through consultation with the Environmental Health Officers at WODC, CDC and VWHDC.

**14.3.4** The PEIR was issued to inform the statutory consultation carried out on the Project between 30 November 2023 and 8 February 2024. It presented the preliminary findings of the EIA process for the Project at that time. The consultation responses specific to Noise and Vibration and the way in which they have been taken into account in this ES chapter are set out in **Table 14.6.**

### Table 14.6: Summary of consultation relevant to this chapter

| Respondent | Theme | Comment | Has this resulted in a change to the Scheme or the Applicant's evidence? | Applicant response |
|---|---|---|---|---|
| Cassington Parish Council | Noise & Vibration | Cassington Parish Council requested that noise from the operation of the Project be considered. | No | Noise from the operational phase of the Project is considered in Section 13.8, and Volume 3, Appendix 13.8 Operational Phase Noise. |
| Environment Agency | Noise & Vibration | Environment Agency have requested that the potential vibration effect from HDD be assessed on flood defences. | Yes | Continuous live monitoring of vibration during HDD close to water courses will be undertaken. Exact details of how this monitoring will be carried out will be determined at a later stage. The requirement for this monitoring can be secured through the DCO process. |

| Respondent | Theme | Comment | Has this resulted in a change to the Scheme or the Applicant's evidence? | Applicant response |
|---|---|---|---|---|
| Bladon Parish Council | Noise & Vibration | Bladon Parish Council have requested that noise from PCS units and site topography is considered. | No | As set-out in Volume 3, Appendix 13.3 Operational Phase Noise, noise from the PCS units, and topography has been included into the computer noise model which has been used to establish noise emissions from the PCS units. |

14.3.5 A summary of the key issues raised during consultation activities undertaken to date is presented in **Table 14.7**, together with how these issues have been considered in the production of this ES chapter.

## Table 14.7: Summary of consultation relevant to this chapter

| Date | Consultee and type of response | Issues Raised | How and where considered in the ES |
|---|---|---|---|
| April 2023 | Cherwell District Council | Consultation was sought via email to agree upon the proposed baseline sound survey and noise impact assessment methodologies. Cherwell District Council advised acceptability of the proposed approach. | No changes to the methodologies outlined during consultation have been proposed. |
| April 2023 | South Oxfordshire & Vale of White Horse District Council | Consultation was sought via email to agree upon the proposed baseline sound survey and noise impact assessment methodologies. Whilst clarification about the application was provided. At the time of writing, no response has yet been received. | N/A |
| April 2023 | West Oxfordshire District Council | Consultation was sought via email to agree upon the proposed baseline sound survey and noise impact assessment methodologies. At the time of writing, no response has yet been received. | N/A |
| February 2023 | Cassington Parish Council | In response to the PEIR, Cassington Parish Council requested that noise from the operation of the Project be considered. | Noise from the operational phase of the Project is considered in **Section 13.8**, and **Volume 3, Appendix 13.8 Operational Phase Noise**. |
| February 2023 | Environment Agency | In response to the PEIR, The Environment Agency have requested that the potential | The vibration effect of HDD has been considered at various distances from the HDD compound. In addition. Continuous live monitoring of vibration during HDD close to water courses will be undertaken. |

| Date | Consultee and type of response | Issues Raised | How and where considered in the ES |
|---|---|---|---|
| | | vibration effect from HDD be assessed on flood defences. | |
| February 2023 | Bladon Parish Council | In response to the PEIR, Bladon Parish Council have requested that noise from PCS units and site topography is considered. | As set-out in **Volume 3, Appendix 13.3 Operational Phase Noise [Doc Ref 7.5]**, noise from the PCS units, and topography has been included into the computer noise model which has been used to establish noise emissions from the PCS units. |
| July 2024 | Cherwell District Council | Response not received at time of writing | Response not received at time of writing |
| July 2024 | South Oxfordshire & Vale of White Horse District Council | Response not received at time of writing | Response not received at time of writing |
| July 2024 | West Oxfordshire District Council | Response not received at time of writing | Response not received at time of writing |

## 14.4 Assessment Methodology

14.4.1 This section of the ES sets out the methodology for the assessment of the potential noise and vibration impacts from the Project on surrounding sensitive receptors.

14.4.2 The methodology utilises technical guidance and best practice methods.

### Relevant Guidance

#### British Standard 5228

14.4.3 This BS comprises the following two parts.

- BS 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites' – Part 1: Noise.
- BS 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites' – Part 2: Vibration.

14.4.4 The Standard provides guidance, information, and procedures for the control of noise and vibration from demolition and construction sites. BS 5228- 1:2009+A1:2014 and BS 5228-2:2009+A1:2014 provide guidance on appropriate methods for minimising noise from construction and open sites under the relevant sections of the CoPA 1974.

14.4.5 There are no set standards for the definition of the significance of construction noise effects. However, noise example criteria are provided in BS 5228-1:2009+A1:2014 Annex E and vibration example criteria are provided in BS 5228-2:2009+A1:2014 Annex B.

14.4.6 BS 5228-1:2009+A1:2014 provides basic information and recommendations for methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels. It includes sections on:

- community relations;
- noise and persons on site;
- neighbourhood nuisance;
- project supervision; and
- the control of noise.

14.4.7 The annexes include information on legislative background, noise sources, remedies and their effectiveness (mitigation options); current and historic sound level data for on-site equipment and site activities; significance of noise effects; calculation procedures estimating sound emissions from sites and sound level monitoring; types of piling; and air overpressure.

14.4.8 BS 5228-2:2009+A1:2014 contains information and recommendations for basic methods of vibration control arising from construction and open sites where work activities/operations generate significant levels of vibration. It includes sections on community relations; vibration and persons on site; neighbourhood nuisance; project supervision; control of vibration and measurement. BS 5228-2:2009+A1:2014 refers to BS ISO 4866:2010; BS 7385-2:1993; BS 6472-1:2008, and BS 6472-2:2008 for further advice on the significance of vibration.

## Design Manual for Roads and Bridges (DMRB) – LA 111 – Noise and vibration

14.4.9 The DMRB LA 111 (Highways England *et al.,* 2020), provides guidance on methods for assessing noise and vibration from road traffic which can be applied to both the construction and operation phase assessments.

14.4.10 The magnitude of noise impacts is assessed using the predicted change in the Basic Noise Level (BNL) on the closest public roads to a receptor following the introduction of construction traffic.

14.4.11 The noise change is calculated using the methods outlined in the *'Calculation of Road Traffic Noise'* (Department for Transport, 1988) which considers:

- the change in traffic flow due to construction/operation traffic;
- vehicle speed; and
- the percentage of Heavy Goods Vehicles (HGVs).

14.4.12 Paragraph 3.19 of DMRB LA 111 states the following:

*'Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:*

- *10 or more days or nights in any 15 consecutive days or nights;*
- *a total number of days exceeding 40 in any 6 consecutive months.'*

14.4.13 The determination of construction noise and vibration impact criteria is defined in **Section 13.9** of this ES and **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES.

## British Standard 4142

14.4.14 BS 4142:2014+A1:2019 (British Standards Institution, 2019) provides a method for rating industrial and commercial sound and a method for assessing resulting impacts upon human receptors. The method is applicable to fixed plant installations, sound from industrial and manufacturing process and other associated activities.

14.4.15 In summary, this Standard provides guidance on determining '*rating sound levels*' by correcting the '*specific sound level*' from the site or operations under consideration to account for any distinctive acoustic characteristics such as tonality, impulsivity, and intermittency. The Standard provides the following corrections to be applied where each is appropriate.

- 'Tonality - For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.
- Impulsivity - A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.
- Intermittency - When the specific sound has identifiable on/off conditions, the specific sound level should be representative of the time period of length equal

to the reference time interval which contains the greatest total amount of on time. … If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

- Other sound characteristics - Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.'

14.4.16 An initial estimate of the impact of the source is obtained by subtracting the measured background sound level from the rating sound level of the proposed plant at the nearest noise-sensitive receptors.

14.4.17 The determination of operation phase noise impact criteria is defined in **Section 13.9** of this chapter and **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES.

## Scope of the Assessment

14.4.18 The scope of this ES has been developed in consultation with relevant statutory and non-statutory consultees as detailed in **Table 14.5** and **Table 14.7**. The assessment considers the various potential noise and vibration impacts associated with the Project on surrounding sensitive receptors.

14.4.19 Taking into account the scoping and consultation process, **Table 14.8** summarises the issues considered as part of this assessment.

**Table 14.8: Activities considered within this assessment**

| Activity | Potential effects scoped into the assessment |
|---|---|
| **Construction Phase** | |
| Construction activities required for the Project | Noise and vibration effects due to all construction activities along the cable corridor (including cable route options), solar photovoltaic (PV) array areas and substations including:<br>• Noise and vibration from the set-up and normal use of the construction compounds;<br>• Noise and vibration effects due to open cut trenching;<br>• Noise and vibration effects due to trenchless techniques at crossings (e.g. roads, railway lines, rivers etc.);<br>• Noise and vibration effects due to the construction and decommissioning of the solar PV array areas and associated plant such as transformers and substations; and<br>• Noise effects due to construction traffic on local highway networks. |
| **Operation and Maintenance** | |
| Operation of the Project Site | Noise effects due to the plant and equipment associated with the Project Site such as:<br>• Noise effects from the Power Converter Stations (PCS);<br>• Noise effects from the Project Substation. |
| **Decommissioning** | |
| Decommissioning activities required for the Project | Noise and vibration effects due to all decommissioning for solar photovoltaic (PV) array areas. |

14.4.20 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out is presented in **Table 14.9**.

**Table 14.9: Issues scoped out of the assessment**

| Issue | Justification |
|---|---|
| **Baseline data collection** | |
| Baseline vibration survey | Noise impacts are determined based upon analysis of predicted noise levels due to the Project relative to the existing baseline noise climate. The impact magnitude criteria for construction vibration are based upon absolute limits obtained from DMRB LA 111 and thus no baseline vibration data is required. |
| **Operation phase** | |
| Vibration effects due to the operation of the Project Site | Operational vibration would be controlled at source as part of the design. As such, significant effects are very unlikely to occur as a result of operational vibration. |

## Study Area

14.4.21 The study areas for the noise and vibration assessment of the Project focus on receptors where potential noise and vibration impacts are most likely to occur.

14.4.22 The study areas relevant to this assessment are defined as:

- The area of land to be temporarily or permanently occupied during the construction, operation and decommissioning of the Project.
- Noise sensitive receptors located within 300 m of the export cable corridor (including cable route options), solar PV array areas and substations, as presented in **Volume 2, Figure 13.1: Construction Phase Noise Study Area [EN010147/APP/6.4]**. This distance has been chosen based upon guidance with DMRB LA111. Note 1 of paragraph 3.5 of the guidance states: '*A study area of 300m from the closest construction activity is normally sufficient to encompass noise sensitive receptors*'. This approach has been reviewed in context with the Project Site Boundary and noise sensitive receptors and deemed to be appropriate.
- Vibration sensitive receptors located within 100 m of construction activities as presented in **Volume 2, Figure 13.2: Construction Phase Vibration Study Area [EN010147/APP/6.4]**. This distance has been chosen based on guidance within DMRB LA111. Note 1 of paragraph 3.29 of the guidance states: '*A study area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors*.' This approach has been reviewed in context with the Project Site Boundary, approximate working areas and vibration sensitive receptors and deemed to be appropriate.
- Noise sensitive receptors located within 1 km of any operational noise sources as presented in **Volume 2, Figure 13.3: Operational Phase Noise Study Area [EN010147/APP/6.4]**. The operational noise sources will be located in the Northern Site Area, Central Site Area, and Southern Site Area and thus it is from the boundary of the solar PV array areas that this study area is defined.
- The specific locations of the noise sensitive receptors have been identified in **Volume 3, Appendix 13.1**. Address points have been used within GIS mapping software to identify existing sensitive receptor locations. The receptor locations

identified are shown in **Volume 2, Figure 13.3: Operational Phase Noise Study Area [EN010147/APP/6.4]**.

### Methodology for Baseline Studies

#### Desk studies

14.4.23 Information on sources of noise and vibration within the study areas has been collected through a detailed review of existing studies and datasets, including mapping and free-to-view aerial and land-based photography.

#### Site-specific surveys

14.4.24 Site specific surveys were undertaken in May 2023 to inform the PEIR and this ES and these results have been used herein. In addition, further noise monitoring has been carried out in July 2024 to inform this ES.

14.4.25 The noise measurement positions were chosen to ensure through coverage of the Project Site Boundary, and so that a representative baseline sound level can be determined for each receptor.

14.4.26 Full details are presented in **Volume 3, Appendix 13.1: Baseline Sound Survey [EN010147/APP/6.5]** of the ES.

14.4.27 In summary, a series of long-term sound measurements were undertaken at locations representative of the nearest noise sensitive receptors to construction phase and operational phase noise sources proposed as part of the Project.

14.4.28 The survey comprised long-term sound monitoring at 22 locations within the Project Site Boundary. Short term noise monitoring was undertaken in a further three locations. These are presented in **Volume 3, Appendix 13.1: Baseline Sound Survey [EN010147/APP/6.5]** of the ES.

## 14.5 Assessment Criteria and Assignment of Significance

### Overview

14.5.1 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on and have been adapted from those used in the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al.,* 2020).

14.5.2 The approach to determining the significance of effects is a two-stage process that involves defining the magnitude of the impact and the sensitivity of the receptor. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Volume 1, Chapter 4: Approach to Environmental Assessment of the ES **[EN010147/APP/6.3]**.

### Receptor Value and Sensitivity

14.5.3 The criteria for defining sensitivity in this chapter are outlined in **Table 14.10** below.

**Table 14.10: Sensitivity criteria**

| Sensitivity/Value | Definition |
|---|---|
| Very High | Very high importance and rarity, international scale and very limited potential for substitution. |
| High | High importance and rarity, national scale and limited potential for substitution |
| Medium | High or medium importance and rarity, regional scale, limited potential for substitution |
| Low | Low or medium importance and rarity, local scale |
| Negligible | Very low importance and rarity, local scale |

## Magnitude of impact

14.5.4 The criteria for defining magnitude in this chapter are outlined in **Table 14.11** below.

**Table 14.11: Impact magnitude criteria**

| Magnitude of impact | | Definition |
|---|---|---|
| High | Adverse | Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements |
| | Beneficial | Large scale or major improvement or resource quality; extensive restoration or enhancement; major improvement of attribute quality |
| Medium | Adverse | Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements |
| | Beneficial | Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality |
| Low | Adverse | Some measurable change in attributes, quality or vulnerability, minor loss or, or alteration to, one (maybe more) key characteristics, features or elements |
| | Beneficial | Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring |
| Negligible | Adverse | Very minor loss or detrimental alteration to one or more characteristics, features or elements |
| | Beneficial | Very minor benefit to, or positive addition of one or more characteristics, features or elements |
| No change | | No loss or alteration of characteristics, features or elements; no observable impact in either direction. |

### Construction and decommissioning noise

14.5.5 Impact criteria for construction and decommissioning noise have been determined in accordance with the guidance in DMRB LA 111 and Annex E of British Standard 5228-1:2009+A1:2014.

14.5.6 The threshold levels which quantify the LOAEL and SOAEL have been derived from Example Method 2 in Annex E 3.3 of British Standard 5228- 1:2009+A1:2014 which states the following:

'*Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq}$, from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect*.'

14.5.7 Full details are provided in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of this ES. The LOAEL and SOAEL are defined in **Table 14.12** below, and the impact criteria are presented in **Table 14.13**.

**Table 14.12: Construction time period – LOAEL and SOAEL**

| Time Period | LOAEL | SOAEL |
|---|---|---|
| Weekdays (0700-1900 hours)<br>Saturdays (0700-1300 hours) | Baseline sound levels, $L_{Aeq,T}$ | Lowest threshold values as presented Table E.1 British Standard 5228-1:2009+A1:2014. |
| Evenings (1900-2300 hours)<br>Saturdays (1300-2300 hours)<br>Sundays (0700-2300 hours) | | |
| Night (2300-0700 hours) | | |

**Table 14.13: Construction and decommissioning noise impact magnitude criteria**

| Magnitude of impact | Construction noise level |
|---|---|
| High | $L_{Aeq,T} \geq$ SOAEL + 5 dB |
| Medium | SOAEL $\leq L_{Aeq,T} <$ SOAEL +5 dB |
| Low | LOAEL $\leq L_{Aeq,T} <$ SOAEL |
| Negligible | $L_{Aeq,T} <$ LOAEL |

14.5.8 The impact criteria for the relevant locations are presented in **Table 14.14** below.

**Table 14.14: Construction noise criteria**

| Magnitude of Impact | Threshold Value (dB) | | |
|---|---|---|---|
| | Weekdays (0700-1900) and Saturdays (0700-1300) | Evening (1900-2300) and Weekends (1300-2300 on Saturdays and 0700-2300 on Sundays) | Night (2300-0700) |
| **Northern Site Area** | | | |
| High | $L_{Aeq,T} \geq 70$ | $L_{Aeq,T} \geq 60$ | $L_{Aeq,T} \geq 50$ |
| Medium | $65 \leq L_{Aeq,T} < 70$ | $55 \leq L_{Aeq,T} < 60$ | $45 \leq L_{Aeq,T} < 50$ |
| Low | $54 \leq L_{Aeq,T} < 65$ | $48 \leq L_{Aeq,T} < 55$ | $43 \leq L_{Aeq,T} < 45$ |

| Magnitude of Impact | Threshold Value (dB) | | |
|---|---|---|---|
| | Weekdays (0700-1900) and Saturdays (0700-1300) | Evening (1900-2300) and Weekends (1300-2300 on Saturdays and 0700-2300 on Sundays) | Night (2300-0700) |
| Negligible | $L_{Aeq,T} < 54$ | $L_{Aeq,T} < 48$ | $L_{Aeq,T} < 43$ |
| **Central Site Area** | | | |
| High | $L_{Aeq,T} \geq 70$ | $L_{Aeq,T} \geq 60$ | $L_{Aeq,T} \geq 50$ |
| Medium | $65 \leq L_{Aeq,T} < 70$ | $55 \leq L_{Aeq,T} < 60$ | $45 \leq L_{Aeq,T} < 50$ |
| Low | $49 \leq L_{Aeq,T} < 65$ | $43 \leq L_{Aeq,T} < 55$ | $42 \leq L_{Aeq,T} < 45$ |
| Negligible | $L_{Aeq,T} < 49$ | $L_{Aeq,T} < 43$ | $L_{Aeq,T} < 42$ |
| **Southern Site Area** | | | |
| High | $L_{Aeq,T} \geq 70$ | $L_{Aeq,T} \geq 60$ | $L_{Aeq,T} \geq 50$ |
| Medium | $65 < L_{Aeq,T} < 70$ | $55 < L_{Aeq,T} < 60$ | $45 < L_{Aeq,T} < 50$ |
| Low | $48 < L_{Aeq,T} < 65$ | $46 < L_{Aeq,T} < 55$ | $43 < L_{Aeq,T} < 45$ |
| Negligible | $L_{Aeq,T} < 48$ | $L_{Aeq,T} < 46$ | $L_{Aeq,T} < 43$ |

14.5.9 As outlined in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES, the construction noise levels have been predicted by accounting for the estimated percentage of the construction period that each plant item is expected to operate. The resultant noise levels are thus the highest noise levels expected during the relevant period being assessed.

14.5.10 To aid clarity in this assessment, the 'Low' impact magnitude has been taken as the lowest impact magnitude for construction phase noise at receptors. Therefore, where receptors are shown to experience a low impact magnitude from construction phase noise, the true impact could be either low or negligible. Both the Medium, and High impact magnitude categories have been used where required.

### Construction and decommissioning traffic noise

14.5.11 There may be a change in local noise levels due to contributions from construction traffic on local road networks and temporary diversion networks during the construction of the Project.

14.5.12 The impact assessment takes account of the absolute level of the road traffic noise and the existing sound levels at the nearest receptors. Impact criteria for these changes have been obtained from the guidance in DMRB LA 111 and are presented in Table 14.15 below.

**Table 14.15: Construction time period – LOAEL and SOAEL**

| Magnitude of impact | Increase in BNL of closest public road used for construction traffic (dB) |
|---|---|
| High | BNL ≥ 5 |
| Medium | 3 ≤ BNL < 5 |
| Low | 1 ≤ BNL < 3 |
| Negligible | BNL < 1 |

### Construction and decommissioning vibration

14.5.13 Impact criteria for vibration from construction have been identified based on guidance provided in British Standard 5228-2:2009+A1:2014. The following outline criteria in **Table 14.16** in terms of peak particle velocity (PPV) can be used to identify potential significant impacts on nearby receptors.

**Table 14.16: Construction and decommissioning vibration impact magnitude criteria**

| Magnitude of impact | Vibration level, PPV, mm/s |
|---|---|
| High | PPV ≥ 10 |
| Medium | 3 ≤ PPV < 10 |
| Low | 0.3 ≤ PPV < 3 |
| Negligible | PPV < 0.3 |

14.5.14 Further comment is provided in Note C of Table B.1 in Annex B of British Standard 5228- 2:2009+A1:2014 which states the following:

*'Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6475-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.'*

### Operational noise

14.5.15 The significance of noise effects associated with the operation of the Project has been determined based upon the methodology outlined in British Standard 4142:2014+A1:2019. This methodology includes calculating the operational rating sound level $L_{Ar,Tr}$ predicted at nearby receptors due to the operation of the Project, defined as the operational specific sound level plus any acoustic character corrections due to tonality, impulsivity, intermittency, or any other distinct acoustic characteristics.

14.5.16 The rating sound level is then compared to the representative background sound level $L_{A90,T}$ at the nearest receptors which is obtained via measurements of the baseline

acoustic environment. The difference between the rating sound level and the representative background sound level is used to determine the impacts which can be assessed in accordance with Section 11 of British Standard 4142:2014+A1:2019, with consideration also required for the context in which the sound has been assessed.

*'Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration including the following:*

*[…]*

*Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.*

*[…]*

*The sensitivity of the receptor and whether the dwellings or other premises for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*

*i) façade insulation treatment;*

*ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*

*iii) acoustic screening.'*

14.5.17 Based on the above, the following impact criteria in **Table 14.17** have been defined for operational noise.

**Table 14.17: Operational noise impact magnitude criteria**

| Magnitude of impact | British Standard 4142:2014+A1:2019 semantic description | Difference Δ between rating sound Level $L_{Ar,Tr}$ and background sound level $L_{A90,T}$ (dB) |
|---|---|---|
| High | A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context. | Δ ≥ 10 |
| Medium | A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context. | 5 ≤ Δ < 10 |
| Low | Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context. | 0 ≤ Δ < 5 |
| Negligible | | -10 ≤ Δ < 0 |

## Significance of effect

14.5.18 The significance of the effect upon Noise and Vibration has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in **Table 14.18**. Where a range of significance levels is presented, the final assessment for each effect is based upon expert judgement.

14.5.19 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

14.5.20 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

**Table 14.18: Assessment matrix**

| Sensitivity of Receptor | Magnitude of Impact | | | | |
|---|---|---|---|---|---|
| | No Change | Negligible | Low | Medium | High |
| **Negligible** | Negligible | Negligible | Negligible or Minor | Negligible or Minor | Minor |
| **Low** | Negligible | Negligible or Minor | Negligible or Minor | Minor | Minor or Moderate |
| **Medium** | Negligible | Negligible or Minor | Minor | Moderate | Moderate or Major |
| **High** | Negligible | Minor | Minor or Moderate | Moderate or Major | Major |
| **Very High** | Negligible | Minor | Moderate or Major | Major | Substantial |

14.5.21 Where the magnitude of impact is 'no change', no effect would arise.

14.5.22 The definitions for significance of effect levels are described as follows.

- Substantial: Only adverse effects are normally assigned this level of significance. These effects are generally, but not exclusively, associated with sites or features of international importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of national importance may also enter this category.
- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category. Effects upon human receptors may also be attributed this level of significance.
- Moderate: These beneficial or adverse effects have the potential to be important and may influence the key decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.
- No change: No loss or alteration of characteristics, features or elements; no observable impact in either direction.

## Assumptions and limitations of the assessment

### Baseline sound survey

14.5.23 All sound surveys are limited by the instrumentation used to undertake the measurements. Uncertainty may arise as a result of the internal processes within the sound level meter to measure and process the measured data into the relevant noise indices. However, modern sound level meters are precision instruments.

14.5.24 The equipment used for the baseline sound survey are Class 1 instruments. According to British Standard EN 61672-1:2003, this has a sampling cycle of 100 milliseconds (ms) and a measurement range of A-weighted levels between 25 dB and 138 dB. The uncertainty due to fluctuations in temperature and humidity is ≤ 0.5 dB. The accuracy of the equipment used has been monitored via calibration both prior to and upon completion of the survey at each position.

14.5.25 There may be temporal and seasonal variations to the local sound climate. The temporal variation has been accounted for by undertaking long-term measurements over a period of one week at a time of year when baseline sound levels are considered likely to be typical of the annual average. The survey period adopted allows for statistical analysis of any temporal variations in the sound climate to reduce uncertainty in the derivation of representative sound levels at nearby receptors.

14.5.26 Any influence due to human error has been minimised by ensuring that all sound monitoring equipment was installed discreetly and securely. Installing the equipment securely minimises any movement of the microphone diaphragm with the wind and ensuring the equipment is discreet minimises interference with the equipment by the public. All measurements were undertaken at a minimum height of 1.5 m above local ground level and 3.5 m from other reflective surfaces to minimise interference from reflected sound waves.

### Construction noise and vibration assessment

14.5.27 A construction plant and equipment list has been formed based upon experience with similar schemes (see **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES) which includes details of the quantities, estimated percentage of operation during construction activities, and typical noise spectra for each item obtained from British Standard 5228:2009+A1:2014.

### Source data

14.5.28 The source data in **Table 14.19** has been obtained and used to inform the assessment of construction phase noise and vibration impacts and operation phase noise impacts at nearby noise sensitive human receptors.

**Table 14.19: Source Data Information**

| Project phase | Source data |
|---|---|
| Construction and decommissioning | Construction plant and equipment list has formed based upon the anticipated construction equipment for each stage of the construction works (i.e., site clearance, PV installation, etc.). Typical noise spectra have been obtained from British Standard 5228:2009+A1:2019. This is an accepted approach for the assessment of construction phase noise at human receptors. |
| Operation | Detailed source data for the operational phase equipment including the PCS units, and substations has been provided by the design team. This data has been utilised in the computer noise model and this assessment. |

| Project phase | Source data |
|---|---|
| Digital mapping and location data | The following OS digital mapping and location data have been used as part of this assessment:<br>• OS Mastermap;<br>• OS AddressBase Plus; and<br>• OS Terrain 5. |

### Prediction methods

14.5.29 Uncertainty and limitations may arise during the modelling process due to the sound propagation models used to inform the calculations. The sound levels at the nearest receptors have been calculated using the internationally accepted guidance within ISO 9613-2:1996 which is implemented by the 3D acoustic modelling software (SoundPLAN) used to predict noise levels from the Project. This standard claims an accuracy of ±3 dB for source heights up to 30 m and propagation distances between 100 m and 1 km.

14.5.30 The assessment of construction noise impacts has been undertaken using typical source noise levels obtained from British Standard 5228-1:2009+A1:2019. The actual noise levels of the plant items may vary to those used in the assessment. In cases where there are multiple noise spectra for the same equipment, the highest reasonable level has been selected for the assessment of impacts.

14.5.31 Vibration impacts due to HDD have been predicted based upon vibratory piling techniques assuming high hammer energies. Prediction methods for vibratory piling levels are outlined in British Standard 5228-2:2009+A1:2014 for distances up to 100 m. However, for vibratory piling techniques, prediction methods are only valid for hammer energies up to 10.5 kilojoules (kJ) per cycle. Library data has been used to inform the initial assessment of impacts and a hammer energy of around 13 kJ/cycle has been assumed. As such, alternative methods for the prediction of vibration impacts have been sought.

14.5.32 Vibration levels have been predicted at varying distances using a method by Heckman and Hagerty (1978). This method is conservative and has been known to overestimate the levels of vibration close to the source. This approach is considered acceptable, but other methods will also be explored once all information on piling plant and activities is available.

## 14.6 Baseline Environment Conditions

### Desk study

14.6.1 Information on Noise and Vibration within the study areas was collected through a detailed review of existing studies and datasets. These are summarised in **Table 14.20**.

**Table 14.20: Summary of desk study sources used**

| Title | Source | Year | Author |
|---|---|---|---|
| Emapsite_LandPack_Title_and_Tenure_844260_1080149_OS_Mastermap.dwg | Ordnance Survey | 2022 | Ordnance Survey |
| OS Terrain 5 | Ordnance Survey | 2022 | Ordnance Survey |
| OS AddressBase Plus | Ordnance Survey | 2022 | Ordnance Survey |

| Title | Source | Year | Author |
|---|---|---|---|
| Google Earth Imagery | Data SIO, NOAA, U.S Navy, NGA, GEBCO | 2023 | Google |

## Site-specific surveys

14.6.2 The baseline sound survey outlined above was undertaken at locations deemed suitably representative of the nearest noise sensitive receptors to the Project Site. These positions are presented alongside the survey results in **Table 14.21:** Baseline sound survey **.**

**Table 14.21: Baseline sound survey results**

| Position | Location | Measured Sound Level (dB) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Daytime | | Evening | | Night-time | |
| | | $L_{Aeq,16h}$ (0700-2300) | $L_{Aeq,12h}$ (0700-1900) | $L_{Aeq,1h}$ (1900-2300) | $L_{Aeq,12h}$ (1900-2300) | $L_{Aeq,8h}$ (2300-0700) | $L_{Aeq,15min}$ (2300-0700) |
| LT4 | Northeastern boundary near Eynsham Road. | 50 | 51 | 42 | 46 | 42 | 30 |
| LT5 | Southeastern boundary near the A420. | 53 | 53 | 48 | 52 | 49 | 32 |
| LT6 | Southwestern boundary near City Farm. | 64 | 64 | 46 | 61 | 56 | 32 |
| LT7 | Northwestern boundary near Church Road. | 53 | 54 | 42 | 49 | 46 | 27 |
| LT8 | On the boundary of Purwell Farm. | 47 | 48 | 34 | 46 | 43 | 29 |
| LT9 | Southeastern boundary near dwellings on Elms Road. | 46 | 47 | 36 | 44 | 40 | 31 |
| LT10 | Eastern boundary near Cassington Road. | 49 | 49 | 37 | 46 | 45 | 35 |
| LT11 | Northeastern boundary near Woodstock Road East. | 59 | 59 | 43 | 48 | 44 | 28 |
| LT12 | Northwestern boundary near Grove Road. | 48 | 49 | 39 | 43 | 42 | 29 |
| LT13 | Southeastern boundary near Banbury Road. | 53 | 54 | 41 | 48 | 46 | 30 |

| Position | Location | Measured Sound Level (dB) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Daytime | | Evening | | Night-time | |
| | | $L_{Aeq,16h}$ (0700-2300) | $L_{Aeq,12h}$ (0700-1900) | $L_{Aeq,1h}$ (1900-2300) | $L_{Aeq,12h}$ (1900-2300) | $L_{Aeq,8h}$ (2300-0700) | $L_{Aeq,15min}$ (2300-0700) |
| LT14 | Western boundary near Tew Lane (B4027) | 59 | 60 | 34 | 53 | 49 | 27 |
| LT15 | Northern boundary near Dornford Lane. | 49 | 50 | 36 | 48 | 49 | 28 |
| LT16 | North of Wharf Road | 46 | 46 | 41 | 45 | 35 | 44 |
| LT17 | West of Burleigh Road, and to the north of Burleigh Farm | 56 | 57 | 34 | 53 | 50 | 31 |
| LT18 | To the south of the A4095, and east of Cassington Road | 48 | 49 | 41 | 47 | 42 | 31 |
| LT19 | To the south west of Woodstock Road | 56 | 57 | 47 | 55 | 50 | 35 |
| LT20 | To the south of Bladon Roundabout | 59 | 60 | 53 | 57 | 53 | 39 |
| LT21 | To the east of Orchid Walk | 46 | 46 | 34 | 44 | 38 | 30 |
| LT22 | To the west of the A4260 | 67 | 68 | 44 | 64 | 64 | 38 |
| ST1 | To the south of Oaklands | - | 59 | 40 | - | - | - |
| ST2 | To the west of Cunmor Road | - | 64 | 41 | - | - | - |
| ST3 | To the west of the B4449 and north of Cassington Road. | - | 59 | 45 | - | - | - |

14.6.3 The results are presented as the following noise indices for use in the assessment of operational noise impacts:

- $L_{Aeq,16h}$ – 16-hour daytime ambient sound level used to characterise the average level over the period between 07:00 and 23:00;
- $L_{A90,1h}$ – 1-hour daytime background sound level used to characterise the level exceeded for 90% of a 1-hour period between 07:00 and 23:00;

- $L_{Aeq,8h}$ – 8-hour night-time ambient sound level used to characterise the average level over the period between 23:00 and 07:00; and
- $L_{A90,15min}$ – 15-minute night-time background sound level used to characterise the level exceeded for 90% of a 15-minute period between 07:00 and 23:00.

14.6.4 Representative ambient sound levels have been derived in accordance with the guidance presented in British Standard 4142:2014+A1:2019. The residual sound levels, $L_{Aeq,T}$, have been calculated by logarithmically-averaging the measured data over 16-hour and 8-hour periods for the day and night-time, respectively.

14.6.5 The representative background sound levels, $L_{A90,T}$, have been derived through statistical analysis of the measured background sound level data from the long-term surveys with reference to the guidance in British Standard 4142:2014+A1:2019 which states the following in Note 1 of paragraph 8.1.4:

*'A representative level should account for the range of background sound levels and should not automatically be assumed to be either the minimum or modal value.'*

14.6.6 Histograms of the cumulative frequency of occurrence plotted against the range of $L_{A90,T}$ levels during the relevant periods have been generated from the baseline survey data. Based on the above, an initial estimate of the representative background sound levels at each long-term measurement position have been derived. Values have been reviewed against the time-history graphs in Appendix A of **Volume 3, Appendix 13.1: Baseline Sound Survey [EN010147/APP/6.5]** of the ES and are considered acceptable.

14.6.7 The results have been presented as the following noise indices for use in the assessment of construction noise impacts:

- $L_{Aeq,12h}$ – 12-hour daytime ambient sound level used to characterise the average level over the period between 07:00 and 19:00;
- $L_{Aeq,4h}$ – 4-hour evening ambient sound level used to characterise the average level over the period between 19:00 and 23:00; and
- $L_{Aeq,8h}$ – 8-hour night-time ambient sound level used to characterise the average level over the period between 23:00 and 07:00.

14.6.8 As with the noise indices to inform the operational noise assessment, representative ambient sound levels have been derived by logarithmically averaging the measured data over 12-hour, 4-hour, and 8-hour periods for the day, evening, and night-time, respectively.

14.6.9 The indices derived from the short-term survey data correspond to the logarithmic average of the measured $L_{Aeq,T}$ data at each location, with the $L_{A90,T}$ presented corresponding to the minimum measured level as a worst-case scenario.

## Future baseline conditions

14.6.10 As the proportion of road traffic vehicles which are electrically powered increases, it is possible that traffic noise levels may reduce slightly due to the lower engine-noise levels on low-speed roads, although on open roads and motorways, the noise emissions from passing vehicles is predominantly due to tyre-road interaction and aerodynamic deflections over the vehicle surface.

14.6.11 The study areas comprise a mixture of fields and farmland with residential settlement areas and open roads. As such, it is not anticipated that the future baseline scenario will change significantly in the absence of the Project.

14.6.12 National planning policy (such as the NPPF, NPSE and PPG) require that all reasonable steps are taken to mitigate and minimise adverse noise effects on health. As such, any future developments will be required to demonstrate compliance with these requirements.

14.6.13 Climate change has the potential to change the baseline in the future, with warmer temperatures increasing the need for residents to open their windows. However, the assessment assesses noise externally, and so this potential change baseline would not affect the assessment outcome. Land use may change from arable farmland but, in the absence of the Project, is likely to continue as agriculture. As such, a similar future noise baseline is anticipated.

## Key receptors

14.6.14 **Table 14.22** identifies the receptors taken forward into the assessment. The sensitivity of the receptor has been identified based on the usage of the building, the methodology of which is detailed in **Section 14.5** of this document.

**Table 14.22: Key receptors taken forward to assessment**

| Receptor | Description | Sensitivity/value |
|---|---|---|
| Denmans Farm | Residential receptors considered in operational noise impact assessment for the Southern Site Area of the Project. | Medium |
| Jumpers Farm | | Medium |
| Heidersbach | | Medium |
| Tudor Court Park | | Medium |
| Sansoms Barn | Residential receptors considered in operational noise impact assessment for the Northern Site Area of the Project. | Medium |
| Hordley Cottages | | Medium |
| Weaveley Farm | | Medium |
| Lower Dornford Farm | | Medium |
| Upper Dornford Cottages | | Medium |
| Old Weaveley Farm | | Medium |
| Studys Castle | | Medium |
| Upper Dornford Barn | | Medium |
| Reeves Cottage | | Medium |
| Wooton Downs Cottages | | Medium |
| Threshers Barn | | Medium |
| Milford Bridge Cottage | | Medium |
| Field View Lane | | Medium |
| Mulberry Cottage | | Medium |
| Battimer | Residential receptors considered in operational noise impact assessment for the Central Site Area of the Project. | Medium |
| Burleigh House | | Medium |
| Elms Road | | Medium |
| Bladon House | | Medium |

| Receptor | Description | Sensitivity/value |
|---|---|---|
| Brackenwood | | Medium |
| Worton Rectory Farmhouse | | Medium |
| Goose Eye Farm | | Medium |
| Eynsham Road (South) | | Medium |
| Toll Cottage | | Medium |
| Purwell Farm | | Medium |
| Pelican House | | Medium |
| Burleigh Farm | | Medium |
| Eynsham Road | | Medium |
| Elms Road (South) | | Medium |
| New Barns Farm | | Medium |
| Heath Lane | | Medium |
| Manor Road | | Medium |
| Beyond | | Medium |
| Jericho Farm | | Medium |
| Bladon Pits | | Medium |
| Hall Farm Paddocks | | Medium |
| Campsfield Farmhouse | | Medium |
| The Beeches | | Medium |
| The Paddock | | Medium |
| Heath Lane (South) | | Medium |
| City Farm Cottages | | Medium |
| Evenlode Crescent | | Medium |
| Mill Farm | | Medium |
| Eynsham Hill | | Medium |
| Yarnton Nursing Home | | Medium |
| New Wintles Farm | | Medium |
| Burleigh Lodge | | Medium |

## 14.7 Key Parameters for Assessment

### Maximum design scenario

14.7.1 The maximum design scenarios identified in **Table 14.23** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the Project Design Envelope provided in **Volume 1, Chapter 6: Project Description [EN010147/APP/6.3]** of the

ES. Any other development scenario is considered to have less significant effects, based on details within the Project Design Envelope (e.g., different infrastructure layout), to that assessed here be taken forward in the final design scheme.

## Table 14.23: Maximum design scenario considered for the assessment of potential impacts

| Potential Impact Phase | Phase C | Phase O | Phase D | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| Noise and vibration impacts from construction and decommissioning activities | ✓ | ✗ | ✓ | **Construction Compounds**<br>• There are three construction compounds, one in the Southern Site Area, one in the Central Site Area and one in the Northern Site Area.<br>• Noise from the site clearance, construction and operation of the compounds has been assessed.<br>**Construction phase: cable corridor (including cable route options)**<br>• The 33/275kV cable route is approximately 22 km in length.<br>• The construction of the transformers and substations.<br>• The cable installation would be undertaken via open cut trenching, cable jointing, and trenchless methods (e.g. Horizontal Directional Drilling (HDD) & Direct Pipe (also described as Pipe Ramming)).<br>• HDD would be undertaken in 10 locations along the cable route.<br>• The construction compounds for HDD would be 30 m x 75 m for the entrance pit and 30 m x 25 m for the exit pit.<br>• The maximum burial depths for the cables would be approximately 2 m for open cut trenching and 30 m for HDD.<br>• HDD would require night-time working.<br>• The total construction period is anticipated to be approximately 24 months.<br>**Construction phase: solar array areas**<br>• The total developable area for solar arrays is approximately:<br>– 247.3 hectares (ha) in the Northern Site Area;<br>– 545.2 ha in the Central Site Area; and<br>– 46 ha (with NGET substation) or 50 ha (without NGET substation) for the Southern Site Area.<br>• The number of Solar PV modules will range from 1,800,000 to 2,200,000. | **Construction Compounds**<br>Typical equipment has been assumed to be used to establish and operate the construction compounds.<br>**Construction phase: cable corridor**<br>Trenchless techniques make use of equipment with higher noise emission levels than open cut trenching techniques and may require night-time works. This represents the maximum design scenario in terms of construction noise and vibration.<br>Impacts due to construction are likely to be greater during the night-time since the baseline sound levels at receptors are likely to be lower.<br>An assessment has been undertaken using typical spectra for the relevant noise-emitting plant items as presented in BS 5228-2:20009+A1:2014.<br>**Construction phase: solar array areas**<br>Pile driving for the PV panel supports will require a rig system that operates intermittently across the array areas. Noise levels have been obtained from manufacturer datasheets and BS 5228-1:2009+A1:2014 for the piling rig both idling and in operation.<br>The larger solar array areas are likely to require works of a longer duration.<br>**Decommissioning phase** |

| Potential Impact Phase | Phase C | Phase O | Phase D | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| | | | | • The modules would be mounted on a structure formed of a mix between galvanised steel and aluminium with stainless steel screws and clamps.<br>• The foundations would be installed using solar pile driving techniques. Piling will be undertaken at up to 3 locations simultaneously.<br>• The total number of piles would be between 780,000 and 1,600,000. Each pile would be buried to a depth of between 1.0 and 3.0 m.<br>**Decommissioning phase**<br>• Decommissioning is likely to operate within the parameters identified for construction (i.e., any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction). | Decommissioning is likely to operate within the parameters identified for construction. |
| Noise and vibration impacts from the operation of the Project | × | ✓ | × | **Operation phase**<br>• There would be around one PCS unit per 7 ha, each containing a 6 megavolt ampere (MVA) Medium Voltage (MV) transformer and two inverters, each with an apparent power of 3000 kilovolt amperes (kVA). The total number of PCS units is 156.<br>• The PCS units would have dimensions of:<br>– Height: 2.7 m – 3.5 m;<br>– Width: 12.0 m – 14.0 m; and<br>– Length: 2.2 m – 2.9 m<br>• The PCS units would operate during the daytime only. They will 'ramp up' between 5-7am and reach maximum operation by 7am.<br>• There would be 6 High Voltage (HV) transformers across the Project Site with a sound power level ranging between 73-86 dB(A) and indicative dimensions of:<br>– Height: 4.0 m – 6.0 m (including isolator);<br>– Width: 6.0 m – 10.0 m; and<br>– Length: 12.0 m – 18.0 m | **Operation phase**<br>An assessment of the operational noise impacts has been undertaken based upon an indicative layout.<br>Representative noise spectra for the PCS units and HV transformers have been applied to the broadband (single-figure) levels provided by the Applicant in units of dB(A). The PCS units are likely to 'ramp-up' in the early morning and thus consideration has been given to the likely impacts between 5-7 am.<br>The operational noise impacts have been assessed with reference to the guidance in BS 4142:2014+A1:2019. Acoustic character corrections applied to account for any distinct acoustic features associated with Project Site. The HV transformers would be tonal at low frequency which has been |

| Potential Impact Phase | Phase C | Phase O | Phase D | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| | | | | • The Project Substation would be situated in the Southern Site Area of the Project and will contain two 500 MVA HV transformers. Each transformer will have a sound power level of around 93 dB(A). The Project Substation footprint will have a footprint with approximate dimensions 1 ha (10,000 $m^2$)<br>• The National Grid Electricity Transmission (NGET) substation would also be situated in the Southern Site Area of the Project and would comprise three HV transformers with a sound power level of up to 95 dB(A). The NGET substation footprint would have dimensions of approximately 180 m x 150 m and a height of between 12 – 15 m. | |

[a] C=construction, O=operational and maintenance, D=decommissioning

## 14.8 Mitigation and Enhancement Measures Adopted as Part of the Project

14.8.1 The design process for the Project has been heavily influenced by the findings of early environmental appraisals and the EIA process. The Project has had several measures incorporated into the design to avoid or minimise environmental impacts.

14.8.2 The key aspects where the design has evolved are described in ES Volume 1, Chapter 5: Alternatives Considered **[EN010147/APP/6.3]**. These include measures required for legal compliance, as well as measures that implement the requirements of good practice guidance documents. The assessment has been undertaken on the basis that these measures are incorporated in the design and construction practices (i.e. they are 'embedded mitigation').

14.8.3 Embedded mitigation measures for the construction phase are set out in the ES Volume 1, Chapter 6: Project Description **[EN010147/APP/6.3]**, Appendix 6.1: Project Mitigation Measures and Commitments Schedule **[EN010147/APP/6.5]** and the various management plans outlined in this chapter **[EN010147/APP/7.6]**.

14.8.4 Implementation of embedded mitigation relied upon in the assessment will be secured in the DCO, including by ensuring the works described in Schedule 1 of the DCO are restricted to their corresponding works areas shown on the Works Plans **[EN010147/APP/2.3]**, a DCO requirement requiring compliance of detailed design of the Project to accord with the Outline Design Principles **[EN010147/APP/7.7]**, or through specific DCO requirements requiring compliance with a management strategy, plan, or other requirement document.

14.8.5 Consideration has been given to any ‘additional mitigation’ over and above the embedded mitigation that may be required and has the potential to mitigate any significant adverse effects identified following the assessment of the Project inclusive of its embedded mitigation. Where significant effects remain following the implementation of embedded mitigation and achievable further measures could lower the identified effect, the topic chapter identifies additional mitigation and explains how the additional mitigation is secured, for example via a specific DCO requirement, via a management plan, or document secured by a DCO requirement like the Project Mitigation Measures and Commitments Schedule **[EN010147/APP/6.5]**.

14.8.6 To the extent any likely significant effects are anticipated following the assessment of the Project after the implementation of embedded and additional mitigation, each topic chapter will report these as residual effects. Residual effects for all topics are summarised in Chapter 21: Summary of Significant Environmental Effects of the ES **[EN010147/APP/6.3]**.

14.8.7 Where relevant, measures have also been identified that may result in enhancement of environmental conditions. Enhancement measures are not required to mitigate significant effects of the Project and are not factored into the determination of residual effects. They are further measures which would have additional beneficial outcomes should they be implemented.

14.8.8 Both embedded and additional mitigation measures relevant to this chapter are summarised in **Table 14.24**.

## Table 14.24: Mitigation measures intended to be adopted as part of the Project

| Commitment number | Measure adopted | How the measure will be secured |
|---|---|---|
| **Embedded Mitigation** | | |
| **13.1** | The following noise control measures will be considered in the design of the Project.<br>• The orientation and layout of the substations will be designed to minimise noise levels at nearby receptors.<br>• Quieter equipment will be selected, where available and practicable, and mitigation measures such as acoustic barriers and enclosures will be specified where necessary. | The requirement for operational phase noise limits will be identified in the Outline Operational Management Plan **[EN010147/APP/7.6.2]**. These noise limits will be defined in more detail and implemented through the Detailed Operational Management Plan to be secured as a requirement of the DCO. |
| **13.2** | The core working hours for the construction of the Project will be 07:00 – 19:00 hours Monday to Saturday.<br>Activities carried out during mobilisation and maintenance will not generate significant noise levels (such as piling, or other such noisy activities). In circumstances outside of core working practices, specific works may have to be undertaken outside the core working hours (such as HDD). Vehicle movements may however be subject to unscheduled events outside these hours. | Construction hours will be set out in the Outline CoCP **[EN010147/APP/7.6.1]**, and secured through the DCO and agreed with relevant stakeholders. |
| **13.3** | A Construction Traffic Management Plan (CTMP) will be prepared and submitted with the application for development consent. A CTMP will be developed in accordance with the outline CTMP to be submitted with the application for development consent. The CTMP will set standards and procedures for:<br>• Managing the numbers and routing of HGVs during the construction phase;<br>• Managing the movement of employee traffic during the construction phase; and<br>• Details of measures to manage the safe passage of HGV traffic via the local highway network. | An Outline CTMP will be set out in the Outline CoCP **[EN010147/APP/7.6.1]**, and detailed fully in the Detailed CoCP to be secured as a requirement of the DCO. |
| **13.4** | A Construction Noise and Vibration Management Plan will be prepared as part of the CoCP. It will include measures to mitigate noise from construction activities associated with the Project. If required, this will include a bespoke method statement for HDD (and other high-noise emitting works) undertaken close to noise-sensitive receptors. | The requirement for the Construction Noise and Vibration Management Plan will be identified in the Outline CoCP **[EN010147/APP/7.6.1]**, and detailed fully in the Detailed CoCP to be secured as a requirement of the DCO. |
| **13.5** | An Operational Noise Management Plan will be prepared. The Plan will identify the noise limits for the operation of the Project and the measures for how these limits would be monitored. It will be informed by a full assessment of operational noise to be undertaken once the plant design is complete. | The requirement for operational phase noise limits will be identified in the Outline Operational Management Plan **[EN010147/APP/7.6.2]**. These noise limits will be defined in more detail and implemented through the Detailed Operational Management Plan |

| Commitment number | Measure adopted | How the measure will be secured |
|---|---|---|
| | | to be secured as a requirement of the DCO. |
| **13.6** | Best Practicable Means (as defined in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environmental Protection Act 1990) will be implemented during the design, construction, operation, and maintenance of all aspects of the Project to ensure that noise levels in all reasonably foreseeable circumstances that adverse and significant adverse effects are minimised. | This will be set-out in the Outline CoCP **[EN010147/APP/7.6.1]**, and Outline Operational Management Plan (EN010147/APP/7.6.2). Additional detail will be provided in the Detailed CoCP, and Detailed Operational Management Plan. This will be secured as a requirement of the DCO. |
| **Additional Mitigation** | | |
| **13.7** | A bespoke method statement will be required for HDD (and other high-noise emitting works) to be undertaken close to noise-sensitive receptors. This method statement will outline the proposed works to be undertaken and mitigation measures in place to ensure threshold levels are not exceeded. | Commitment to preparing a bespoke HDD method statement will be set out in the Outline CoCP **[EN010147/APP/7.6.1]**. The bespoke HDD method statement will be developed at detailed design stage, for inclusion within detailed CoCP. |
| **13.8** | Vibration monitoring will be undertaken for HDD works close to flood defences (e.g. HDD6). In addition, vibration monitoring will be carried out where the cable route is adjacent to a residential dwelling (e.g. Burleigh Lodge (HDD 3)). | The requirement for a vibration monitoring of HDD6, and HDD3 will be set out in a bespoke HDD method statement. The commitment to preparing a bespoke HDD method statement will be set out in the Outline CoCP **[EN010147/APP/7.6.1]**. The bespoke HDD method statement will be developed at detailed design stage, for inclusion within detailed CoCP. |

## 14.9 Assessment of effects

14.9.1 The impacts of the construction, operation and decommissioning phases of the Project have been assessed. The potential impacts arising from the construction, operation and maintenance and decommissioning phases of the Project are listed in **Table 14.23**, along with the maximum design scenario against which each impact has been assessed.

14.9.2 A description of the potential effect on receptors caused by each identified impact is given below.

## Impact

14.9.3 The impacts arising from the construction, operation and maintenance, and decommissioning phases of the Project have been assessed. The impacts arising from the construction, operation and decommissioning phases of the Project are identified in this Section of the assessment along with the maximum design scenario against which each impact has been assessed.

14.9.4 The assessment has been broken down as follows:

- Noise impacts during the preparation and use of the construction compounds.
- Noise and vibration impacts due to solar PV modules pile driving;
- Noise and vibration impacts due to HDD & Direct Pipe;
- Noise impacts due to open cut trenching along the cable route (including cable route options);
- Noise and vibration impacts due to the construction of the main substation and NGET substations;
- Noise impacts due to additional vehicle movements on local highway networks;
- Noise impacts during the operation; and,
- Noise and vibration impact during decommissioning. During decommissioning, all above ground infrastructure will be carefully. Foundations and all other below ground infrastructure, which are not practicable to remove without major disturbances, will be cut to 1m below the surface to enable future ploughing. All piles are to be removed. The 33kV and 275kV cables may be left in situ, depending on which method is likely to have the least environmental impact at the time but are likely to be removed.

### Construction Phase – Preparation and use of the construction compounds

#### Sensitivity of receptor

14.9.5 The closest receptors surrounding the Project Site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**

#### Magnitude of impact

14.9.6 The magnitudes at various distances from the construction compounds have been predicted using the computer noise model, and full details are included in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]**.

14.9.7 Each of the construction compounds has been included into the computer noise model, with the results set out in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]**. The results show that there are no receptors where the magnitude of the impact is above low (i.e. 65 dB(A) during the daytime).

### Significance of effect

14.9.8 The magnitude of the noise impact is **low**, and the sensitivity of the receptor is medium. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

## Construction phase - Noise and Vibration impacts due to solar PV modules pile driving

14.9.9 The solar PV modules are expected to be mounted upon a metal frame. This would be supported by galvanised steel piles or screws driven into the ground by impact piling to a depth of approximately 1.5 – 3.0 m.

14.9.10 The exact location and equipment to be adopted for the piling works is not yet known and thus predictions have been undertaken for construction noise levels from the boundary of the solar PV array area. It is understood that these activities would be undertaken during core construction hours and thus no night-time works are required.

14.9.11 This pile driving procedure has the potential to cause some noise and vibration, which may be audible outside of the Project Site Boundary. However, the pile driving will occur for a short period of time next to any one receptor, as the time period which is required to install the piles is short. The pile driver will then move away from this receptor, which will effectively reduce the noise and vibration from the pile driving activity which is received at the receptor.

14.9.12 Further details of the assessment are provided in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES.

### Sensitivity of the receptor

14.9.13 The majority of receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

### Magnitude of impact

14.9.14 The magnitude of the impact at various distances from the boundary of the solar PV array areas for each of the Northern, Central, and Southern Site Area is presented in **Table 14.25**: below.

**Table 14.25: Construction noise impact assessment – solar pile driving**

| Potential Magnitude of impact | Solar pile driving<br>Distance d to receptor (m) for magnitude of impact |
|---|---|
| High | $d < 1{,}344$ |
| Medium | $1344 \leq d < 2{,}113$ |
| Low | $2113 \leq d < 3{,}500$ |
| Negligible | $d > 3{,}500$ |

14.9.15 The assessment above has been undertaken based upon predicted noise emission levels from the boundary of the solar PV installation areas. The number of receptors per impact magnitude band equates to the total number of receptors affected across the whole site.

14.9.16 Due to the nature of the operations, all receptors would not be affected simultaneously across all sections. Moreover, the solar pile driving works would be very transient in nature and move across each of the PV installation areas thus receptors could be exposed to high noise levels built this would occur only for a short period of time.

14.9.17 The prediction of noise impacts has not accounted for screening provided by intervening buildings and thus the levels at receptors within built-up areas are likely to be at least 5 - 10 dB lower than those predicted.

14.9.18 The Outline CoCP **[EN010147/APP/7.6.1]** will include measures for the control of construction vibration including piling hammers with a lower maximum energy per cycle and cut-off trenches to interrupt the direct transmission path of vibrations between source and receiver and engagement with the local community throughout the construction period.

14.9.19 The assessment of impacts (see **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES) includes an assumption that these measures will reduce the total activity construction noise level for each activity by at least 5 dB. This represents a conservative reduction typically associated with that achieved by a barrier which only marginally intersects the direct path (i.e., line of sight) between a source and receiver. The actual noise reduction levels achieved via the methods outlined above may be much greater in practice.

14.9.20 The vibration impacts due to solar pile driving will depend on the location, equipment, and proximity to receptor. However, a typical specification for a solar pile driving hydraulic unit has been provided which has a maximum hammer energy of 1.1 kJ per blow. This is a relatively low hammer energy and is unlikely to give rise to adverse impacts, particularly since the works would not be undertaken in one location for the whole construction period.

14.9.21 The impact is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

### Significance of the effect

14.9.22 As discussed above, there are a number of residential institutions surrounding the Project Site. However, most are situated in the '**low**' impact magnitude band. The prediction of noise impacts has not accounted for screening due to built-up areas and thus the levels at residential institution receptors (e.g., care homes, assisted living facilities etc.) are likely to be at least 5 – 10 dB lower than those predicted.

14.9.23 The closest noise sensitive receptors to the PV installation area are residential in nature and thus, it is these receptors which have been considered in the assessment of significance.

14.9.24 Overall, the magnitude of the impact is low, and the sensitivity of the receptor is medium. The effect will, therefore, be of **minor adverse significance**, which is not significant.

## Construction Phase - Noise and vibration impacts due to HDD & Direct Pipe

### Sensitivity of receptor

14.9.25 The closest receptors surrounding the Project Site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**

### Magnitude of impact

14.9.26 The magnitudes at various distances from the proposed HDD locations have been predicted using the computer noise model, and full details are included in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]**.

14.9.27 HDD is proposed in 10 different locations across the site with there being 2 options for the cable crossing below the River Thames, and Wharf Stream. This assessment considers the potential noise impact of each HDD location in turn. The HDD entry points, where the majority of the noise producing equipment is located, are positioned over 500m from one-another, and so cumulative effects from noise from the HDD works are considered very unlikely to occur.

14.9.28 Each of the HDD construction compounds has been included into the computer noise model, with the results set-out in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]**. The results show the distances from the HDD compounds where the construction noise from the HDD works is low (i.e. 65dB(A) during the daytime, 55dB(A) during the evening and 45dB(A) during the night-time). This assessment identifies that there are a small number of receptors which could experience an impact magnitude above low should the HDD works occur in that location outside of the core working hours. In the event that the HDD works continue outside of the core working hours then temporary barriers will be installed around the HDD compound so as to reduce the noise emissions to be equal to or below a 'low' impact magnitude. This will be secured with the Outline CoCP **[EN010147/APP/7.6.1].**

14.9.29 Furthermore, the locations for the HDD works are situated sufficiently far from receptors such that no high impacts are predicted due to vibration. The locations of the HDD compounds is shown in HDD Compound plans and elevations **[EN010147/APP/7.3.7]**.There are some areas across the Project Site where Direct Pipe trenchless cross will be employed. This Direct Pipe methodology will be typically employed to enable cables to pass below hedgerows and other sensitive features, where open trench techniques are not desirable. Where possible the Direct Pipe method will be undertaken away from receptors, and any noisy works will be short duration, and during the daytime only.

14.9.30 The noise impact on residential receptors due to HDD and Direct Pipe is predicted to be of local spatial extent and short-term duration. The magnitude is up to **low.**

14.9.31 The vibration impact on residential receptors due to HDD and Direct Pipe is predicted to be of local spatial extent and short-term duration. The magnitude is up to **low.**

14.9.32 Continuous vibration monitoring will be undertaken nearby HDD 6 and HDD3 so that the potential effect on flood defences, water courses, and Burleigh Lodge can be monitored. Burleigh lodge is a residential premises located adjacent to the cable route at HDD 6. The locations of the HDD compounds is shown in HDD Compound plans and elevations **[EN010147/APP/7.3.7]**.

### Significance of effect

14.9.33 The magnitude of the noise impact is **low**, and the sensitivity of the residential receptors is medium. The effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

14.9.34 The magnitude of the vibration impact is **low**, and the sensitivity of the residential receptors is medium. The effect will, therefore, be of **minor adverse significance** which is not significant in EIA terms.

## Construction Phase - Noise Impacts Due to Open Cut Trenching Along the Cable Route

14.9.35 The majority of the cable route is likely to be constructed via open trenching techniques. It would be possible to use an alternative cable laying methodology, so long as the noise from the activities remained below 65dB(A) at receptors. The impact magnitude assessment has considered the works required to backfill the trench since the data provided shows this to be the highest noise-generating activity associated with open trench techniques.

14.9.36 There are cable route corridor options linking the northern, central section, southern sections. These options are also addressed in the assessment of HDD. Full details of these cable route corridor options are set out in Volume 1, Chapter 6: Project Description **[EN010147/APP/6.3]**.

14.9.37 The highest likelihood of a potential adverse impact occurs where construction activities take place closest to noise sensitive receptors.

14.9.38 For each of the cable route options, the maximum design scenario has been considered (i.e. where construction activities are proposed closest to the noise sensitive receptors).

### Sensitivity of receptor

14.9.39 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

### Magnitude of impact

14.9.40 The impacts due to construction noise have been predicted at distances from the boundary of the cable corridor (see **Volume 3: Appendix 13.3: Operational Phase Noise**) since exact locations of construction activities are not yet available. It is unlikely that the construction activities would be undertaken on the Project Site Boundary concurrently and thus the actual impacts are likely to be lower.

14.9.41 An assessment of the potential noise and vibration effects of open cut trenching has been assessed (including cable route options) in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5].** The assessment identifies that open cut trenching may occasionally result in construction phase sound levels to exceed 65 dB(A) during the daytime. However, the works are transient, common place for any utility, and are generally accepted by residents of dwellings close to main roads.

14.9.42 Due to this the construction works along the cable corridor, the impact is predicted to be of local spatial extent and short-term duration and the impact magnitude is **low**.

### Significance of effect

14.9.43 The magnitude of the impact for open cut trenching (including cable route options) is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will therefore be of **minor adverse significance** which is not significant in EIA terms.

## Construction Phase - Noise and Vibration Impacts Due to the Construction of the Main Substation and NGET Substation

14.9.44 An assessment of the likely noise and vibration impacts due to the construction of the substations has been undertaken for both the main substation and the NGET substation, both currently proposed to be located in the Southern Site Area of the Project. The maximum design scenario is represented by concurrent construction of the two substations.

14.9.45 An assessment of the construction phase noise from the NGET substation comprises the construction of the base for the substation. The assessment has of noise emissions from this activity is set-out in full in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES.

### Sensitivity of receptor

14.9.46 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is medium.

### Magnitude of impact

14.9.47 The assessment shows that noise from the construction of the substations when received at the nearest noise sensitive receptors is below 65dB(A) during the daytime, which is an indication of a **low** impact.

14.9.48 Theses construction works will be undertaken during normal working hours.

### Significance of effect

14.9.49 The magnitude of the noise impacts for the construction of the substations is deemed to be **low** and the sensitivity of the receptor is considered to be medium. The effect will therefore be of **minor adverse significance** which is not significant in EIA terms.

## Construction Phase - Noise Impacts Due to Additional Vehicle Movements on Local Highway Networks

14.9.50 The introduction of additional construction vehicles on local highways may increase noise levels at receptors close to the road. A construction traffic noise assessment has been undertaken and is detailed in **Volume 3, Appendix 13.2: Construction Phase Noise and Vibration [EN010147/APP/6.5]** of the ES.

### Sensitivity of receptor

14.9.51 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium sensitivity and high recoverability. The sensitivity of these receptors is **medium**.

### Magnitude of impact

14.9.52 The baseline traffic flows on the key highway links surrounding the Project Site, and thereby BNL, are relatively high. As such, the introduction of additional vehicular movements due to construction traffic does not significantly increase noise levels. The maximum increase predicted is +1 dB.

14.9.53 The Outline CoCP **[EN010147/APP/7.6.1]** will outline general construction principles and mitigation to implement the BPM for the control of construction noise. In addition, the Construction Traffic Management Plan (CTMP) will include measures to control construction traffic, such as reduced speed limits or a restriction on daily vehicular movements, where required.

14.9.54 The impacts due to construction traffic are predicted to be of local spatial extend and medium-term duration. The magnitude is **low**.

### Significance of effect

14.9.55 The magnitude of the noise impacts due to construction traffic is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will therefore be of **minor adverse significance** which is not significant in EIA terms.

## Noise and Vibration impacts during operation

14.9.56 An assessment of the likely noise impacts due to the operation of the Project has been undertaken in line with the guidance presented in BS 4142:2014+A1:2019. The assessment has been undertaken based on noise emission levels in the upper range for the plant items to be installed.

14.9.57 A 3D acoustic model has been constructed of the substation sites for the Project based on indicative engineering layouts and upper range noise emission levels for the proposed plant items. Full details of the operational noise assessment are presented in **Volume 3: Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]**.

14.9.58 The design will incorporate noise control measures, where practicable or feasible, to ensure compliance with the operational noise limits to be secured as part of the DCO. As such, indicative mitigation measures which may be incorporated as a primary mitigation measure (as part of the design) have been included within the assessment. These include acoustic enclosures around the HV transformers in the Southern Site Area but may also include:

- acoustic barriers; and
- quieter plant selections.

14.9.59 The results of the baseline scenario without mitigation and the scenario with mitigation measures included are provided in **Volume 3: Appendix 13.3: Operational Phase Noise [EN010147/APP/6.5]**.

### Sensitivity of receptor

14.9.60 The closest receptors surrounding the Project Site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

### Magnitude of impact

14.9.61 The assessment of noise impacts has been undertaken based upon the layout of the Project Site. The primary noise sources associated with the Project are PCS units housing solar inverters and medium voltage transformers. These PCS units will only operate when the PV panels produce electricity, which is only during the hours of daylight. Subsequently, the PCS units will only produce noise emissions during daylight hours.

14.9.62 There are also six high voltage transformers distributed between the three Site Areas forming the Project. These units are understood to operate continuously 24-hours a day and are situated within secondary substation areas.

14.9.63 The main substation site is to be located in the Southern Site Area and will comprise two HV transformers which will operate 24/7. Similarly, the NGET substation site will also be located in the Southern Site Area and will comprise three HV transformers. Both substation sites are proposed to operate 24/7.

14.9.64 The design incorporates good practice methods to reduce the noise emissions at receptors, these measures are included into the layout and include repositioning of PCS units to move them away from receptors, orientating equipment so the main noise from the PCS unit (e.g. from vents) faces away from receptors and selecting low noise equipment.

14.9.65 The design of the main and NGET substation sites will incorporate mitigation measures such as acoustic enclosures around the HV transformers to reduce noise levels and control the low frequency tonal component present in the noise emission spectrum of these units.

14.9.66 The results are presented in Table 14.26 to Table 13.28 below.

## Table 14.26: Operational noise results (Southern Site Area)

| Southern Site Area | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Receptor | Background Sound Level, $L_{A90,T}$ (dB) | | | Rating Level, $L_{Ar,Tr}$ (dB) | | | Difference Δ Between Rating Sound Level and Background Sound Level (dB) | | | Magnitude of Impact | | |
| | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM |
| Denmans Farm (N) | 43 | 37 | 38 | 36 | 14 | 33 | -7 | -23 | -5 | Negligible | Negligible | Negligible |
| Denmans Farm (W) | 43 | 37 | 38 | 26 | 18 | 32 | -11 | -19 | -6 | Negligible | Negligible | Negligible |
| Heidersbach | 37 | 32 | 38 | 28 | 22 | 25 | -11 | -10 | -13 | Negligible | Negligible | Negligible |
| Jumpers Farm (W) | 39 | 31 | 37 | 33 | 17 | 25 | -6 | -14 | -12 | Negligible | Negligible | Negligible |
| Jumpers Farm (E) | 39 | 31 | 37 | 35 | 27 | 30 | -4 | -4 | -7 | Negligible | Negligible | Negligible |
| Jumpers Farm (S) | 39 | 31 | 37 | 24 | 33 | 34 | -19 | 2 | -3 | Negligible | Low | Negligible |
| Tudor Court Park | 43 | 31 | 38 | 24 | 13 | 21 | -13 | -18 | -17 | Negligible | Negligible | Negligible |
| Upper Whitley Farm | 37 | 32 | 38 | 36 | 23 | 24 | -7 | -9 | -14 | Negligible | Negligible | Negligible |

## Table 14.27: Operational noise assessment results (Central Site Area)

| Central Site Area | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Receptor | Background Sound Level, $L_{A90,T}$ (dB) | | | Rating Level, $L_{Ar,Tr}$ (dB) | | | Difference Δ Between Rating Sound Level and Background Sound Level (dB) | | | Magnitude of Impact | | |
| | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM |
| Battimer | 43 | 32 | 33 | 35 | 17 | 30 | -8 | -15 | -3 | Negligible | Negligible | Negligible |

| Central Site Area Receptor | Background Sound Level, $L_{A90,T}$ (dB) | | | Rating Level, $L_{Ar,Tr}$ (dB) | | | Difference Δ Between Rating Sound Level and Background Sound Level (dB) | | | Magnitude of Impact | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM |
| Bladon House | 43 | 32 | 33 | 30 | 11 | 28 | -13 | -21 | -5 | Negligible | Negligible | Negligible |
| Bladon Pits | 41 | 31 | 36 | 28 | 13 | 25 | -13 | -18 | -11 | Negligible | Negligible | Negligible |
| Brackenwood | 41 | 31 | 36 | 30 | 13 | 27 | -11 | -18 | -9 | Negligible | Negligible | Negligible |
| Burleigh Farm | 35 | 31 | 35 | 30 | 10 | 27 | -5 | -21 | -8 | Negligible | Negligible | Negligible |
| Burleigh House | 41 | 31 | 36 | 34 | 13 | 32 | -7 | -18 | -4 | Negligible | Negligible | Negligible |
| City Farm Cottages | 46 | 32 | 39 | 26 | 13 | 23 | -20 | -19 | -16 | Negligible | Negligible | Negligible |
| Elms Road | 37 | 34 | 36 | 34 | 14 | 31 | -3 | -20 | -5 | Negligible | Negligible | Negligible |
| Elms Road (South) | 37 | 34 | 36 | 29 | 11 | 26 | -8 | -23 | -10 | Negligible | Negligible | Negligible |
| Evenlode Crescent | 46 | 32 | 44 | 29 | 19 | 26 | -17 | -13 | -18 | Negligible | Negligible | Negligible |
| Eynsham Hill | 46 | 32 | 39 | 29 | 24 | 27 | -17 | -8 | -12 | Negligible | Negligible | Negligible |
| Eynsham Road | 37 | 34 | 36 | 29 | 12 | 26 | -8 | -22 | -10 | Negligible | Negligible | Negligible |
| Eynsham Road (South) | 37 | 34 | 36 | 30 | 13 | 27 | -7 | -21 | -9 | Negligible | Negligible | Negligible |
| Goose Eye Farm | 38 | 30 | 36 | 32 | 15 | 28 | -6 | -15 | -8 | Negligible | Negligible | Negligible |
| Goose Eye Farm | 38 | 30 | 36 | 30 | 12 | 29 | -8 | -18 | -7 | Negligible | Negligible | Negligible |
| Hall Farm Paddocks | 46 | 32 | 36 | 32 | 18 | 29 | -14 | -14 | -7 | Negligible | Negligible | Negligible |
| Heath Lane | 39 | 29 | 38 | 25 | 12 | 24 | -14 | -17 | -14 | Negligible | Negligible | Negligible |
| Heath Lane (South) | 39 | 29 | 38 | 26 | 14 | 25 | -13 | -15 | -13 | Negligible | Negligible | Negligible |

| Central Site Area Receptor | Background Sound Level, $L_{A90,T}$ (dB) | | | Rating Level, $L_{Ar,Tr}$ (dB) | | | Difference Δ Between Rating Sound Level and Background Sound Level (dB) | | | Magnitude of Impact | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM |
| Jericho Farm | 37 | 34 | 36 | 29 | 17 | 26 | -8 | -17 | -10 | Negligible | Negligible | Negligible |
| Manor Road | 39 | 29 | 38 | 27 | 9 | 25 | -12 | -20 | -13 | Negligible | Negligible | Negligible |
| Mill Farm | 43 | 32 | 33 | 23 | 9 | 21 | -20 | -23 | -12 | Negligible | Negligible | Negligible |
| New Barns Farm | 38 | 30 | 36 | 31 | 6 | 11 | -7 | -26 | -28 | Negligible | Negligible | Negligible |
| New Wintles Farm | 46 | 32 | 39 | 12 | 15 | 27 | -34 | -15 | -9 | Negligible | Negligible | Negligible |
| Purwell Farm | 38 | 30 | 36 | 30 | 11 | 23 | -8 | -20 | -13 | Negligible | Negligible | Negligible |
| The Beeches | 41 | 31 | 36 | 20 | 11 | 22 | -21 | -21 | -11 | Negligible | Negligible | Negligible |
| The Paddock | 43 | 32 | 33 | 25 | 21 | 28 | -18 | -11 | -16 | Negligible | Negligible | Negligible |
| Toll Cottage | 46 | 32 | 44 | 30 | 14 | 26 | -16 | -23 | -13 | Negligible | Negligible | Negligible |
| Worton Rectory Farmhouse | 38 | 37 | 39 | 29 | 8 | 14 | -9 | -29 | -25 | Negligible | Negligible | Negligible |
| Yarnton Nursing Home | 38 | 37 | 39 | 16 | 17 | 30 | -22 | -15 | -3 | Negligible | Negligible | Negligible |

## Table 14.28: Operational noise assessment results (Northern Site Area)

| Northern Site Area<br>Receptor | Background Sound Level, $L_{A90,T}$ (dB) | | | Rating Level, $L_{Ar,Tr}$ (dB) | | | Difference Δ Between Rating Sound Level and Background Sound Level (dB) | | | Magnitude of Impact | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM | Day | Night | Early AM |
| Field View Lane | 45 | 31 | 39 | 22 | 8 | 19 | -23 | -23 | -20 | Negligible | Negligible | Negligible |
| Hordley Cottages | 37 | 33 | 34 | 33 | 13 | 29 | -4 | -20 | -5 | Negligible | Negligible | Negligible |
| Lower Dornford Farm | 40 | 31 | 38 | 28 | 9 | 24 | -12 | -22 | -14 | Negligible | Negligible | Negligible |
| Milford Bridge Cottage | 37 | 33 | 34 | 20 | 6 | 18 | -17 | -27 | -16 | Negligible | Negligible | Negligible |
| Mulberry Cottage | 40 | 31 | 38 | 24 | 10 | 20 | -16 | -21 | -18 | Negligible | Negligible | Negligible |
| Old Weaveley Farm | 45 | 31 | 39 | 29 | 18 | 26 | -16 | -13 | -13 | Negligible | Negligible | Negligible |
| Reeves Cottage | 45 | 31 | 39 | 34 | 13 | 29 | -11 | -18 | -10 | Negligible | Negligible | Negligible |
| Sansoms Barn | 37 | 33 | 34 | 28 | 10 | 24 | -9 | -23 | -10 | Negligible | Negligible | Negligible |
| Studys Castle | 37 | 33 | 34 | 26 | 21 | 24 | -11 | -12 | -10 | Negligible | Negligible | Negligible |
| Threshers Barn | 45 | 31 | 39 | 24 | 16 | 21 | -21 | -15 | -18 | Negligible | Negligible | Negligible |
| Upper Dornford Barn | 40 | 31 | 38 | 23 | 6 | 20 | -17 | -25 | -18 | Negligible | Negligible | Negligible |
| Upper Dornford Cottages | 40 | 31 | 38 | 27 | 7 | 23 | -13 | -24 | -15 | Negligible | Negligible | Negligible |
| Weaveley Farm | 45 | 31 | 39 | 32 | 13 | 28 | -13 | -18 | -11 | Negligible | Negligible | Negligible |
| Wooton Downs Cottages | 40 | 31 | 38 | 21 | 4 | 18 | -19 | -27 | -20 | Negligible | Negligible | Negligible |

14.9.67 The impact is predicted to be of local spatial extent and long-term duration. Overall, the magnitude of impact is **low**.

### Significance of effect

14.9.68 The magnitude of the operational noise impacts is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will therefore be of **minor adverse significance** which is not significant in EIA terms.

### Noise and Vibration Impacts During Decommissioning

14.9.69 Decommissioning is likely to operate within the parameters identified for construction. As such, decommissioning activities will be limited to within the construction working areas and require a duration which is no greater than the activities assessed as part of the construction phase.

14.9.70 The majority of cabling will be removed, and all above ground infra-structure will also be removed. No new trenching or drilling is anticipated. Link boxes may remain in situ.

14.9.71 The magnitude of the impact is low, the sensitivity of the residential receptors is medium. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

### Future monitoring

14.9.72 The assessment is based upon technical guidance, and noise emission data from the manufacturer. This data has been input into a complex computer noise model, to predict and noise emissions from the Project on receptors. There is therefore a high degree of confidence in the results of this assessment. Subsequently, no monitoring to test the predictions made within the impact assessment is considered necessary.

## 14.10 Cumulative Effects

14.10.1 The Noise and Vibration CEA methodology has followed the methodology set out in Volume **1, Chapter 4: Approach to Environmental Assessment [EN010147/APP/6.3]**. As part of the assessment, all projects and plans considered alongside the Project have been allocated into 'tiers' reflecting their current stage within the planning and development process.

- Tier 1
  - Under construction
  - Permitted application
  - Submitted application
  - Those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact
- Tier 2
  - Scoping report has been submitted
- Tier 3
  - Scoping report has not been submitted
  - Identified in the relevant Development Plan

– Identified in other plans and programmes.

14.10.2 This assessment is followed by all other relevant projects, identified by tier.

14.10.3 This tiered approach is adopted to provide a clear assessment of the Project alongside other projects, plans and activities.

14.10.4 Construction noise is variable in nature. As such, the cumulative effects of construction noise are generally no greater than those that arise for individual works since, most commonly, one construction project dominates the noise climate at a given receptor. The cumulative effect is thus likely to be equivalent to that for the construction activity with higher noise emission levels in isolation. As an example, two identical and concurrent construction projects in close proximity which use the same methods and equipment will result in a maximum increase in noise level at the nearest receptors of 3 dB (corresponding to a doubling in sound pressure level). This is unlikely to be the case, and for most projects, receptors are unlikely to be subjected to significant adverse cumulative effects above those identified for individual construction projects.

14.10.5 The specific projects, plans and activities scoped into the CEA, are outlined in **Table 14.29**.

## Table 14.29: List of other projects, plans and activities considered within the CEA

| Project/Plan | Status | Distance from the Project (nearest point, km) | Description of project/plan | Dates of construction (if applicable) | Dates of operation (if applicable) | Overlap with the Project |
|---|---|---|---|---|---|---|
| **Tier 1** | | | | | | |
| 20/01734/OUT | Pending | Adjacent | 2,200 dwellings and 40 ha of employment land | TBC | TBC | Yes |
| 20/01817/FUL | Permitted | Adjacent | Proposed Solar and Battery Energy Storage System (BESS) site 5 MW generating capacity on 9.1 ha of land. | TBC | TBC | Yes |
| 21/03522/OUT | Pending | Adjacent | The erection of up to 540 dwellings (Class C3), up to 9,000 sqm Gross External Area (GEA) of elderly/extra care residential floorspace (Class C2), a Community Home Work Hub (up to 200 sqm)(Class E), alongside the creation of two locally equipped areas for play, one Neighbourhood Equipped Area of Play (NEAP), up to 1.8 ha of playing pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, two community woodland areas, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works. All matters are reserved, save for the principal access points. | TBC | TBC | Unknown |
| 23/02098/OUT | Pending | Adjacent | Outline application, with all matters reserved, for a multi-phased (severable), comprehensive residential-led mixed use development comprising: Up to 215,000 square metres gross external area of residential floorspace (or c.1,800 homes which depending on the housing mix could result in a higher or lower number of housing units) within Use Class C3/C4 and large | TBC | TBC | Unknown |

| Project/Plan | Status | Distance from the Project (nearest point, km) | Description of project/plan | Dates of construction (if applicable) | Dates of operation (if applicable) | Overlap with the Project |
|---|---|---|---|---|---|---|
| | | | houses of multiple occupation (Sui Generis); Supporting social infrastructure including secondary school/primary school(s) (Use Class F1); health, indoor sport and recreation, emergency and nursery facilities (Class E(d)-(f)). Supporting retail, leisure and community uses, including retail (Class E(a)), cafes and restaurants (Class E(b)), commercial and professional services (Class E(c)), a hotel (Use Class C1), local community uses (Class F2), and other local centre uses within a Sui Generis use including public houses, bars and drinking establishments (including with expanded food provision), hot food takeaways, venues for live music performance, theatre, and cinema. Up to 155,000 net additional square metres (gross external area) of flexible employment uses including research and development, office and workspace and associated uses (Use E(g)), industrial (Use Class B2) and storage (Use Class B8) in connection with the expansion of Begbroke Science Park; Highway works, including new vehicular, cyclist and pedestrian roads and paths, improvements to the existing Sandy Lane and Begbroke Hill road, a bridge over the Oxford Canal, safeguarded land for a rail halt, and car and cycle parking with associated electric vehicle charging infrastructure; Landscape and public realm, including areas for sustainable urban drainage systems, allotments, biodiversity areas, outdoor play and sports facilities (Use Class F2(c)); Utility, energy, water, and waste water facilities and infrastructure; together with enabling, site | | | |

| Project/Plan | Status | Distance from the Project (nearest point, km) | Description of project/plan | Dates of construction (if applicable) | Dates of operation (if applicable) | Overlap with the Project |
|---|---|---|---|---|---|---|
| | | | clearance, demolition and associated works, including temporary meanwhile uses. The Proposed Development affects the setting of a listed building and includes potential alterations to public rights of way. The application is accompanied by an Environmental Statement | | | |
| **Tier 2** | | | | | | |
| P22/V2581/SCO | Scoping opinion provided | Adjacent | Request for a Scoping Opinion for a proposed 49.99 MW solar scheme. | TBC | TBC | Unknown |
| P22/V0144/SCR | Screening decision – positive | Adjacent | Request for an EIA Screening Opinion prior to the submission of an application for the installation of a solar photovoltaic array. | TBC | TBC | Unknown |
| **Tier 3** | | | | | | |
| N/A | N/A | Adjacent/ Within Redline | The NGET substation is not part of the Project but may be located within or adjacent to the Site. | To be confirmed | To be confirmed | To be confirmed |

## Maximum design scenario – cumulative effects assessment

14.10.6 The maximum design scenarios identified in **Table 14.30** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the Project Design Envelope provided in **Volume 1, Chapter 6: Project Description [EN010147/APP/6.3]** of the ES as well as the information available on other projects and plans, in order to inform a 'maximum design scenario'. Any other development scenario is considered to have less significant effects, based on details within the Project Design Envelope (e.g., different foundation type or substation layout), to that assessed here being taken forward in the final design scheme.

## Table 14.30: Maximum design scenario for the assessment of cumulative effects

| Potential cumulative effect | Phase C | Phase O | Phase D | Maximum Design Scenario | Justification |
|---|---|---|---|---|---|
| Noise and vibration impact from construction and decommissioning activities | ✓ | × | ✓ | Maximum design scenario as described for the Project (Table 14.23: Maximum design scenario considered for the assessment of potential impacts)assessed cumulatively with the following other projects/plans:<br>Tier 1<br>• 20/01734/OUT<br>– Construction will be undertaken concurrently with the Project Site;<br>• 20/01817/FUL<br>– Construction and decommissioning will be undertaken concurrently with the Project Site.<br>– Site will commence operation at the same time as the Project Site.<br>• 21/03522/OUT<br>– Construction and decommissioning will be undertaken concurrently with the Project Site.<br>• 23/02098/OUT<br>– Construction and decommissioning could be undertaken concurrently with the Project Site.<br>– Site will commence operation at the same time as the Project Site.<br>Tier 2<br>• P22/V2581/SCO<br>– Construction and decommissioning will be undertaken concurrently with the Project Site;<br>– Site will commence operation at the same time as the Project Site.<br>• P22/V0144/SCR<br>– Construction and decommissioning will be undertaken concurrently with the Project Site;<br>– Site will commence operation at the same time as the Project Site. | • Outcome of the CEA will be greatest when the greatest number of other schemes are considered.<br>• The CEA is receptor-led.<br>• Concurrent construction, where relevant, of the Project Site with proposed developments represents the maximum design scenario in this case. |

| Potential cumulative effect | Phase<br>C O D | Maximum Design Scenario | Justification |
|---|---|---|---|
| | | Tier 3<br>• NGET Substation<br>– Construction and decommissioning will be undertaken concurrently with the Project Site. | |
| Noise and vibration impact from the operation of the Project | × ✓ × | Tier 1<br>• 20/01817/FUL<br>– Construction and decommissioning will be undertaken concurrently with the Project Site;<br>– Site will commence operation at the same time as the Project Site.<br>Tier 2<br>• P22/V2581/SCO<br>– Construction and decommissioning will be undertaken concurrently with the Project Site;<br>– Site will commence operation at the same time as the Project Site.<br>• P22/V0144/SCR<br>– Construction and decommissioning will be undertaken concurrently with the Project Site;<br>– Site will commence operation at the same time as the Project Site.<br>Tier 3<br>• NGET Substation<br>Operation will be undertaken concurrently with the Project Site. | • Outcome of the CEA will be greatest when the greatest number of other schemes are considered.<br>• The CEA is receptor-led.<br>• Concurrent operation, where relevant, of the Project Site with proposed developments represents the maximum design scenario in this case. |

[a] C=construction, O=operational and maintenance, D=decommissioning

## 14.11 Cumulative effects assessment

14.11.1 A description of the significance of cumulative effects upon noise and vibration sensitive receptors arising from each identified impact is given below.

### Noise and vibration impacts from construction and decommissioning activities

#### Tier 1: 20/01734/OUT

#### Construction phase

##### Sensitivity of the receptor

14.11.2 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

##### Magnitude of impact

14.11.3 An ES has been submitted as part of the application for development reference 20/01734/OUT. Construction noise and vibration impacts are reported to give rise to minor adverse effects at all receptors except Cuckoo Wood Farm where a major adverse effect is predicted.

14.11.4 This receptor is situated sufficiently far from the Project Site Boundary such that no cumulative significant adverse effects are likely to occur at this receptor due to the construction activities required.

14.11.5 The ES for development ref 20/01734/OUT states that all construction activities will be governed by a Construction Environmental Management Plan outlining methods by which compliance with the construction noise thresholds may be achieved including quieter equipment, enclosures, and screening. This will aid in reducing noise levels and minimising significant effects.

14.11.6 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

##### Significance of effect

14.11.7 The magnitude of the cumulative impact is low, and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

#### Decommissioning

14.11.8 The development reference 21/03522/OUT is a residential scheme; therefore, it will not have a cumulative impact during decommissioning.

### Tier 1: 20/01817/FUL

## Construction phases

#### Sensitivity of the receptor

14.11.9 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

#### Magnitude of impact

14.11.10 No information is available detailing the proposed construction activities. However, the nearest receptors are situated approximately 750 m from the Project Site Boundary.

14.11.11 This development is similar to the Project but of a much smaller scale and thus works are likely to be much shorter in duration.

14.11.12 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

#### Significance of effect

14.11.13 The magnitude of the cumulative impact is low and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

## Operational phase

#### Sensitivity of the receptor

14.11.14 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

#### Magnitude of impact

14.11.15 No information is available detailing the proposed construction activities. However, the nearest receptors are situated approximately 750 m from the boundary of development ref 20/01817/FUL.

14.11.16 This development is similar to the Project but of a much smaller scale. The development ref 20/01817/FUL will be designed to adhere to the operational noise limits at the nearest receptors. The shared receptors with the Project are situated much further from the Project and thus noise impacts are unlikely.

14.11.17 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

#### Significance of effect

14.11.18 The magnitude of the cumulative impact is low, and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

### Decommissioning Phase

#### Sensitivity of the receptor

14.11.19 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

#### Magnitude of impact

14.11.20 No information is available detailing the proposed decommissioning activities. However, the nearest receptors are situated approximately 750 m from the boundary of development ref 20/01817/FUL.

14.11.21 This development is similar to the Project but of a much smaller scale and thus works are likely to be much shorter in duration.

14.11.22 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

#### Significance of effect

14.11.23 The magnitude of the cumulative impact is low and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

### Tier 1: 21/03522/OUT

### Construction phase

#### Sensitivity of the receptor

14.11.24 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

#### Magnitude of impact

14.11.25 Whilst the proposed development site is situated along the eastern boundary of the Project Site, the nearest receptors are situated within the ‘negligible’ impact magnitude band for construction noise.

14.11.26 The development ref 21/03522/OUT will likely operate under a Construction Environment Management Plan, and thus implement BPM to control construction noise impacts at nearby receptors.

14.11.27 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

#### Significance of effect

14.11.28 The magnitude of the cumulative impact is low and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

### Decommissioning

14.11.29 The development ref 21/03522/OUT is a residential scheme; therefore it will not have a cumulative impact during decommissioning.

## Tier 1: 23/02098/OUT

### Construction phase

#### Sensitivity of the receptor

14.11.30 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

#### Magnitude of impact

14.11.31 The development ref 23/02098/OUT will likely operate under a Construction Environment Management Plan, and thus implement BPM to control construction noise impacts at nearby receptors.

14.11.32 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

#### Significance of effect

14.11.33 The magnitude of the cumulative impact is low and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant.

### Decommissioning

14.11.34 The development ref: 23/02098/OUT is a residential scheme; therefore it will not have a cumulative impact during decommissioning.

## Tier 2: P22/V2581/SCO

### Construction phase

#### Sensitivity of the receptor

14.11.35 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

#### Magnitude of impact

14.11.36 The VWHDC agrees that the assessment of noise for development ref P22/V2584/SCO may be scoped out of the ES since it is unlikely to give rise to significant effects. The development ref: P22/V2584/SCO will likely operate under a Construction Environment Management Plan, and thus implement BPM to control construction noise impacts at nearby receptors.

14.11.37 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

### Significance of effect

14.11.38 The magnitude of the cumulative impact is low and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

## Operational phase

### Sensitivity of the receptor

14.11.39 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

### Magnitude of impact

14.11.40 The VWHDC agrees that the assessment of noise for development ref P22/V2584/SCO may be scoped out of the ES since it is unlikely to give rise to significant effects. A noise assessment will be submitted as part of the application detailing how noise from the Project will be controlled.

14.11.41 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

### Significance of effect

14.11.42 The magnitude of the cumulative impact is low and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

## Decommissioning

14.11.43 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

### Magnitude of impact

14.11.44 At the time of writing, information regarding the decommissioning of the proposed scheme is not available however it is unlikely that the decommissioning works will be undertaken in during the same period.

14.11.45 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

### Significance of effect

14.11.46 The magnitude of the cumulative impact is low and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

## Tier 2: P22/V0144/SCR

### Construction phase

#### Sensitivity of the receptor

14.11.47 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

#### Magnitude of impact

14.11.48 The local authority has requested that a full EIA be undertaken for development ref P22/V0144/SCR. It is not clear if noise and vibration has been scoped into the assessment.

14.11.49 The screening opinion request outline commitments to control construction noise and vibration during construction and decommissioning via planning conditions where required. As such, the site is likely to be required to comply with construction noise and vibration thresholds regardless of whether the EIA includes noise and vibration impacts.

14.11.50 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

#### Significance of effect

14.11.51 The magnitude of the cumulative impact is low and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

### Operational phase

#### Sensitivity of the receptor

14.11.52 The closest receptors surrounding the site are residential dwellings. These receptors are considered to be of medium vulnerability and high recoverability. The sensitivity of these receptors is **medium**.

#### Magnitude of impact

14.11.53 The screening opinion request outline commitments to control operational noise via planning conditions where required. As such, the site is likely to be required to comply with operational noise limits at the nearest receptors regardless of whether the EIA includes noise and vibration impacts.

14.11.54 The cumulative effect is predicted to be of local spatial extent and short-term duration. The magnitude is **low**.

#### Significance of effect

14.11.55 The magnitude of the cumulative impact is low and the sensitivity of the receptor is medium. The cumulative effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

### Tier 3: NGET Substation

14.11.56 The NGET substation could be delivered as part of the Project, and the potential effect has been assessed at receptors during the construction and operational phases of the scheme.

14.11.57 However, it is possible that the NGET substation will not be included as part of the Project, but will be delivered separately. It is therefore a potential cumulative effect.

14.11.58 The NGET substation has been assessed as part of the project, and so the potential effect has been assessed in full and has therefore not been reconsidered here.

## 14.12 Transboundary effects

14.12.1 As per the Scoping Report, it was concluded that the Project is unlikely to have a significant effect either alone or cumulatively on the environment in a European Economic Area State (EEA states) and therefore a transboundary assessment is not proposed to be undertaken.

## 14.13 Inter-related effects

14.13.1 Inter-relationships are the impacts and associated effects of different aspects of the Project on the same receptor. These are as follows.

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Project (construction, operation and maintenance, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases (e.g., construction noise effects from piling, operational substation noise, and decommissioning disturbance).
- Receptor led effects: Assessment of the scope for all effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on Noise and Vibration, (such as and adverse effect on human health), may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects.

14.13.2 A description of the likely interactive effects arising from the Project Noise and Vibration is provided in **Volume 1, Chapter 20: Cumulative Effects and Inter-relationships** of the ES **[EN010147/APP/6.3]**.

14.13.3 The assessment has shown that the Project does not include any significant adverse effects. Further, noise and vibration do not typically combine with any other potential impact to worsen the effect on sensitive receptors. Subsequently, when considering the interrelated effects, the significance of the effect is **minor adverse which is not significant**.

14.13.4 Table 14.31 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operational and maintenance and decommissioning phases of the Project, and also the inter-related effects (receptor-led effects that are predicted to arise for noise and vibration sensitive receptors.

**Table 14.31: Summary of likely significant inter-related effects**

| Description of impact | Phase C | O | D | Likely significant inter-related effects | Significance |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Noise and vibration impact from construction and decommissioning activities | ✓ | × | ✓ | Construction and decommissioning effects on sensitive receptors | Minor Adverse |
| Noise and vibration impact from the operation of the Project | × | ✓ | × | Operational phase effects on sensitive receptors | Minor Adverse |

## 14.14 Summary of impacts, mitigation measures and monitoring

14.14.1 Information on noise and vibration within the study areas was collected through desktop reviews of the Project Site and surrounding area, consultation with the relevant local authorities and the Planning Inspectorate and a baseline sound survey.

14.14.2 Information on noise and vibration within the study areas was collected through a desk-top study of the Project Site using available mapping and aerial photography, a site survey with noise baseline noise measurements, and consultation with the relevant Local Planning Authorities.

14.14.3 **Table 14.32** presents a summary of the potential environmental impacts, measures adopted as part of the Project and residual effects in respect to Noise and Vibration. The impacts assessed include:

- Noise and vibration impacts from construction and decommissioning activities; and
- Noise and vibration impacts from the operation of the Project.

14.14.4 Overall, it is concluded that there will be no significant effects arising from the Project during the construction, operation and maintenance or decommissioning phases.

14.14.5 **Table 14.33** presents a summary of the cumulative environmental impacts, mitigation measures and residual effects. The cumulative impacts assessed include:

- Noise and vibration impacts from construction and decommissioning activities; and
- Noise and vibration impacts from the operation of the Project.

14.14.6 It is concluded that there would be no significant cumulative effects from the Project alongside other projects/plans.

**Table 14.32: Summary of potential environmental effects, mitigation and monitoring.**

| Description of effect | Phase C | O | D | Commitment number | Magnitude of impact | Sensitivity of the receptor | Significance of effect | Further mitigation | Residual effect | Proposed monitoring |
|---|---|---|---|---|---|---|---|---|---|---|
| Noise and vibration impacts due to the preparation and use of the construction compounds. | ✓ | × | ✓ | 13.1, 13.5, 13.6, 13.7, 13.8, and 13.10. | C: Low<br>D: Low | C: Medium<br>D: Medium | C: Minor adverse<br>D: Minor adverse | N/A | C: Minor adverse<br>D: Minor adverse | N/A |
| Noise and vibration impacts due to solar pile driving. | ✓ | × | ✓ | 13.5, 13.6, 13.7, 13.8, and 13.10. | C: Low<br>D: Low | C: Medium<br>D: Medium | C: Minor adverse<br>D: Minor adverse | N/A | C: Minor adverse<br>D: Minor adverse | N/A |
| Noise and vibration impacts due to HDD. | ✓ | × | ✓ | 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, and 13.10. | C: High<br>D: Low | C: Medium<br>D: Medium | C: Major adverse<br>D: Minor adverse | Enclosures may be required around HDD compounds where the HDD works continue outside of the normal working hours.<br>Continuous monitoring of the vibration level during HDD operations close to flood defences. | C: Minor adverse<br>D: Minor adverse | Continuous monitoring of the vibration level during HDD operations close to flood defences |
| Noise impacts due to open cut trenching along the cable route. | ✓ | × | ✓ | 13.5, 13.6, 13.7, 13.8, and 13.10. | C: Low<br>D: Low | C: Medium<br>D: Medium | C: Minor adverse<br>D: Minor adverse | N/A | C: Minor adverse<br>D: Minor adverse | N/A |
| Noise and vibration impacts due to the construction of the main substation and | ✓ | × | ✓ | 13.5, 13.6, 13.7, 13.8, and 13.10. | C: Medium<br>D: Medium | C: Medium<br>D: Medium | C: Moderate adverse<br>D: Moderate adverse | N/A | C: Minor adverse<br>D: Minor adverse | N/A |

| Description of effect | Phase C O D | Commitment number | Magnitude of impact | Sensitivity of the receptor | Significance of effect | Further mitigation | Residual effect | Proposed monitoring |
|---|---|---|---|---|---|---|---|---|
| NGET substations; and | | | | | | | | |
| Noise impacts due to additional vehicle movements on local highway networks | ✓ × ✓ | 13.7 | C: Low<br>D: Low | C: Medium<br>D: Medium | C: Minor adverse<br>D: Minor adverse | N/A | C: Minor adverse<br>D: Minor adverse | N/A |
| Noise impacts during the Operational Phase | × ✓ × | 13.2, 13.8 | O: Low | O: Medium | O: Minor adverse | N/A | O: Minor adverse | N/A |

**Table 14.33: Summary of potential cumulative environmental effects, mitigation and monitoring.**

| Description of effect | Phase C O D | Commitment number | Magnitude of impact | Sensitivity of the receptor | Significance of effect | Further mitigation | Residual effect | Proposed monitoring |
|---|---|---|---|---|---|---|---|---|
| **Tier 1** | | | | | | | | |
| Noise and vibration impacts from construction and decommissioning activities | ✓ × ✓ | 13.1, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, and 13.10. | C: Low<br>D: Low | C: Medium<br>D: Medium | C: Minor adverse<br>D: Minor adverse | N/A | Noise and vibration impacts from construction and decommissioning activities | × |
| Noise and vibration impacts from the operation of the Project | × ✓ × | 13.2, 13.7, 13.8 | C: Low<br>D: Low | C: Medium<br>D: Medium | C: Minor adverse<br>D: Minor adverse | N/A | Noise and vibration impacts from the operation of the Project | × |

| Description of effect | Phase C | O | D | Commitment number | Magnitude of impact | Sensitivity of the receptor | Significance of effect | Further mitigation | Residual effect | Proposed monitoring |
|---|---|---|---|---|---|---|---|---|---|---|
| **Tier 2** | | | | | | | | | | |
| Noise and vibration impacts from construction and decommissioning activities | ✓ | × | ✓ | 13.1, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, and 13.10. | C: Low<br>D: Low | C: Medium<br>D: Medium | C: Minor adverse<br>D: Minor adverse | N/A | Noise and vibration impacts from construction and decommissioning activities | × |
| Noise and vibration impacts from the operation of the Project | × | ✓ | × | 13.2, 13.7, 13.8 | C: Low<br>D: Low | C: Medium<br>D: Medium | C: Minor adverse<br>D: Minor adverse | N/A | Noise and vibration impacts from the operation of the Project | × |

[a] C=construction, O=operational and maintenance, D=decommissioning

## 14.15 References


British Standards Institution (1993) '*British Standard 7385-2:1993 – Evaluation and measurement for vibration in buildings – Guide to damage levels from groundbourne vibration'*

British Standards Institution (2008), *'British Standard 6472-1:2008 – Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting'*

British Standards Institution (2008), *'British Standard 6472-2:2008 – Guide to evaluation of human exposure to vibration in buildings – Part 2: Blast-induced vibration'*

British Standards Institution (2014) 'British Standard 8233:2014– *'Guidance on sound insulation and noise reduction for buildings'.*

British Standards Institution (2014a) *'British Standard 5228-1:2009+A1:2014 (2014) Code of practice for noise and vibration control on construction and open sites - Part 1: Noise'*

British Standards Institution (2014b) '*British Standard 5228-2:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration'*

British Standards Institution (2019) 'British Standard 4142:2014+A1:2019 – *'Methods for rating and assessing industrial and commercial sound'*.

Control of Pollution Act 1974, Chapter 40, Part III

Department for Levelling Up, Housing and Communities (2019), *'Planning practice guidance: Noise'*

Department for Transport Welsh Office (1988), *Calculation of Road Traffic Noise*

Environmental Protection Act (1990), Chapter 43, Part III

Gange. M (2011), *'Low-frequency and Tonal Characteristics of Transformer Noise'*, Proceedings of ACOUSTICS 2011, Gold Coast, Australia

Highways England, Transport Scotland, Welsh Government, Department for Infrastructure Northern Ireland (2020) *Design Manual for Roads and Bridges – LA111: Noise and vibration, Revision 2.*

International Organisation for Standards (1996) *'ISO 9613-2:1996 – Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'.*

International Organisation for Standards (2010), *'ISO 4866:2010 – Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures'*

*National Grid (2021), 'Operational Noise Assessment for the Proposed Little Horsted 400 kV Substation', Available: https://planning.wealden.gov.uk/plandisp.aspx?recno=153380. Accessed November 2023*