# East Pye Solar

## Environmental Statement

## Volume 1: Chapter 12 – Noise and Vibration

**Revision 1**

**March 2026**

**Planning Inspectorate Reference: EN0110014**

**Document Reference: APP/6.1.12**

**APFP Regulation 5(2)(a)**

# Contents



## Tables

# 12 Noise and Vibration

## 12.1 Introduction

12.1.1 This chapter of the Environmental Statement (ES) presents the findings of the Environmental Impact Assessment (EIA) of effects of noise and vibration as a result of the Scheme.

12.1.2 This chapter identifies and proposes measures to address the potential impacts and likely significant effects on noise and vibration, during the construction, operational and decommissioning phases.

12.1.3 The information presented within this chapter has been informed by the Scheme information provided in **ES: Chapter 4 The Scheme [EN0110014/APP/6.1.4]**.

12.1.4 The following aspects have been considered within the noise and vibration assessment process considers:

- The potential impacts and likely significant effects of noise and vibration on human receptors during construction, operation and maintenance, and decommissioning phases of the Scheme.
- Where relevant, the impacts of noise and vibration on ecological receptors are assessed in **ES: Chapter 8 Ecology and Biodiversity [EN0110014/APP/6.1.8].**

12.1.5 This Chapter is supported by the following figures:

- **ES: Figure 12.1 Sound and Meteorological Survey Locations [EN0110014/APP/6.2.12.1]**
- **ES: Figure 12.2 Noise and Vibration Sensitive Receptors [EN0110014/6.2.12.2]**

12.1.6 This Chapter is supported by the following appendices

- **ES: Appendix 12.1 Baseline Sound Survey Report [EN0110014/APP/6.3.12.1]**
- **ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]**

12.1.7 This noise and vibration chapter has been prepared by appropriately qualified experts. For further details, refer to the **ES: Appendix 1.2 Statement of Expertise [EN0110014/APP/6.3.1.2]**.

12.1.8 A glossary of abbreviations can be found in **ES: Chapter 0 Contents, Glossary and Abbreviations [EN0110014/APP/6.1.0].**

## 12.2 Consultation

12.2.1 The Scheme has been subject to consultation throughout the DCO preparation period. A request for an EIA Scoping Opinion was sought from the Secretary of State (SoS) through the Planning Inspectorate (PINS) in January 2025. A Scoping Opinion was adopted by PINS in February 2025 (included in **ES: Appendix 2.2 EIA Scoping Opinion [EN0110014/APP/6.3.2.2]**).

12.2.2 The issues raised in the Scoping Opinion relating to noise and vibration are summarised and responded to within **Table 12-1 Relevant Scoping Opinion Comments from the Statutory Bodies relating to Noise and Vibration** which demonstrates how the matters raised in the Scoping Opinion are addressed in this ES.

## Table 12-1 Relevant Scoping Opinion Comments from the Statutory Bodies relating to Noise and Vibration

| Consultee and Date | Comment and Scoping Opinion ID No. | How has the comment been addressed in the ES chapter | Location of response in ES Chapter |
|---|---|---|---|
| **The Planning Inspectorate, Scoping Opinion, December 2024** | 3.18.1 – Noise and vibration effects on sensitive ecological receptors during construction and decommissioning phases<br><br>The Scoping Report states that the potential effects of noise levels associated with construction and decommissioning activities on sensitive ecological receptors is addressed in Chapter 8: Ecology and Biodiversity of the Scoping Report. The Inspectorate is content with this approach. The ES should provide clear cross referencing in the Noise and Vibration ES aspect chapter to where these assessments are located. | Cross-referencing to other chapters of the ES is provided within this Chapter, as appropriate. | **ES: Chapter 8 Biodiversity and Ecology [EN0110014/APP/6.1.8]** |
| **The Planning Inspectorate, Scoping Opinion, December 2024** | 3.18.2 – Noise effects on sensitive ecological receptors during operations<br><br>The Scoping Report proposes to scope this matter out on the basis that the magnitude of operational noise levels are unlikely to affect ecological receptors. On this basis, the Inspectorate is content that this matter can be scoped out of further assessment. However, the ES description of development should confirm the operational equipment types and numbers (with reference to distance from noise sources to the sensitive ecological receptors) to justify this position. | The description of the Scheme in ES Chapter 4 includes operational equipment types and numbers, with distances to sensitive ecological receptors provided in ES Chapter 8 Biodiversity and Ecology. | **ES: Chapter 4 The Scheme [EN0110014/APP/6.1.4]**<br><br>**ES: Chapter 8 Biodiversity and Ecology [EN0110014/APP/6.1.8]** |
| **The Planning Inspectorate, Scoping Opinion,** | 3.18.3 – Vibration from traffic all phases<br><br>The Scoping Report proposes to scope this matter out. Paragraph 11.8.2 of the Scoping | A screening assessment for vibration from traffic was provided within the PEIR. The assessment following the screening assessment is presented within the ES. | **Section 12.8 Assessment of Likely Effects** |

| Consultee and Date | Comment and Scoping Opinion ID No. | How has the comment been addressed in the ES chapter | Location of response in ES Chapter |
|---|---|---|---|
| **December 2024** | Report states that 'if road surfaces do not contain irregularities, then vibration effects should not result at receptors'. The condition of the road has not been assessed and the vehicle routes and site access have not been confirmed within this chapter to justify why vibration from traffic at all phases should be scoped out. The ES should provide evidence to confirm that ground-borne vibration generated from HGV movements (including along access routes) during construction, operation and decommissioning would not result in significant effects on sensitive receptors or include an assessment of the Likely Significant Effects (LSE), unless otherwise agreed with relevant consultation bodies. | | |
| **The Planning Inspectorate, Scoping Opinion, December 2024** | 3.18.4 – Vibration from operational equipment<br><br>The Scoping Report proposes to scope this matter out on the basis that operational equipment would generate insignificant levels of vibration at vibration sensitive receptors. On this basis, the Inspectorate is content that this matter can be scoped out of further assessment. However, the ES description of development should confirm the operational equipment types and numbers (with reference to distance from noise sources to the sensitive receptors) to justify this position. | Chapter 4 The Scheme confirms the operational equipment to be used, The noise limits at sensitive receptors are set out in the **Outline Operational Environmental Management Plan (OEMP) [EN0110014/APP/7.2]** | **ES: Chapter 4 The Scheme [EN0110014/APP/6.1.4]**<br><br>**Outline OEMP [EN0110014/APP/7.2]** |
| **The Planning Inspectorate, Scoping Opinion,** | 3.18.5 – Operational noise and vibration from panels<br><br>The Scoping Report proposes to scope this matter out on the basis that operational noise | Although it was agreed that this assessment could be scoped out by PINS, SNC has since requested an assessment of operational noise from solar panel tracking | **Section 12.8 Assessment of Likely Effects** |

| Consultee and Date | Comment and Scoping Opinion ID No. | How has the comment been addressed in the ES chapter | Location of response in ES Chapter |
|---|---|---|---|
| **December 2024** | and vibration effects from solar panels are anticipated insignificant. On this basis, the Inspectorate is content that this matter can be scoped out of further assessment.<br>Panel replacement may occur sporadically throughout the lifecycle of the scheme. It is anticipated that all of the panels will be replaced at least once throughout the lifecycle of the scheme. The activities involved in the replacement of the panels will comprise less intense activities compared to the construction period, which has already been considered and therefore does not require further assessment. | motors. An assessment is presented within this Chapter. | |
| **The Planning Inspectorate, Scoping Opinion, December 2024** | 3.18.6 – Operational noise and vibration from cable route corridor<br><br>The Scoping Report proposes to scope this matter out on the basis that operational noise and vibration from cable being underground are not expected to be perceptible from the cable routes. On this basis, the Inspectorate is content that this matter can be scoped out of further assessment. | The assessment of underground cable noise has been scoped out of the ES. | Not applicable |
| **The Planning Inspectorate, Scoping Opinion, December 2024** | 3.18.7 – Decommissioning noise<br><br>The Scoping Report proposes to scope out an assessment of decommissioning phase noise effects as these are likely to be similar or less significant than effects during construction. Limited information is provided regarding the activities proposed for the decommissioning phase. In the absence of information such as evidence demonstrating that decommissioning activities would not result in | This ES chapter includes consideration of decommissioning noise. | **Section 12.8 Assessment of Likely Effects** |

| Consultee and Date | Comment and Scoping Opinion ID No. | How has the comment been addressed in the ES chapter | Location of response in ES Chapter |
|---|---|---|---|
| | noise effects greater than construction or clear agreement with relevant statutory bodies, the Inspectorate is not in a position to scope these matters from the assessment. Accordingly, the ES should include an assessment of these matters or provide information demonstrating agreement with the relevant consultation bodies and the absence of LSE. | | |
| **The Planning Inspectorate, Scoping Opinion, December 2024** | 3.18.8 – Decommissioning vibration<br><br>The Scoping Report proposes to scope this matter out on the basis that piling is not anticipated to be required during decommissioning. On this basis, the Inspectorate is content that this matter can be scoped out of further assessment. | The assessment of piling noise during decommissioning has been scoped out of the ES. | Not applicable |
| **The Planning Inspectorate, Scoping Opinion, December 2024** | 3.18.9 – Baseline conditions – sensitive receptors and noise survey locations<br><br>The Inspectorate notes that the figure showing proposed noise survey locations and the tables of identified noise and vibration sensitive receptors does not currently include the Cable Route Corridor (CRC). The Applicant must ensure that the noise monitoring provides adequate coverage across the entire area within the Zone of Influence (ZOI) of the proposed development. As noted above, the ES should report on the predicted effects at all noise and vibration sensitive receptors within the project's ZOI. The Applicant is advised to seek to agree the noise survey locations with relevant consultation bodies. | Monitoring locations (**Figure 12.1 [EN0110014/APP/6.2.12.1]**) are considered representative of all receptors in the ZOI as detailed in **Section 12.6** and were agreed with SNC. Based on the results of the sound surveys, the lowest threshold value for construction noise has been applied to all receptors in accordance with the methodology detailed in Annex E3.2 of BS 5228-1:2009+A1:2014. | Section 12.2.4. |

| Consultee and Date | Comment and Scoping Opinion ID No. | How has the comment been addressed in the ES chapter | Location of response in ES Chapter |
|---|---|---|---|
| **Alpington and Yelverton Parish Council Scoping Opinion Response January 2025** | *"The development will cause significant waste, noise, and light pollution over its 60-year lifespan, with road networks unsuitable for heavy construction traffic"* | **ES: Chapter 12 Noise and Vibration [EN0110014/APP/6.1.12]** presents the assessment of noise effects from the Scheme. | **Section 12.8 Assessment of Likely Effects** |
| **Brooke Parish Council, BEPS – Residents Action Group, Shelton and Hardwick Parish Council Scoping Opinion Response February 2025** | *"…They have also admitted, in a landscape with ancient woodland, endangered species and particularly barbastelle maternity roosts, that this project is likely to cause significant irreversible and totally unacceptable damage to ecology including (sic.):*<br>*…*<br>*Noise and/or visual disturbance to species using the Sites (during construction, operation (panel replacement), and decommissioning);*<br>*…*<br>*Disturbance and pollution (indirect effects such as noise and vibration, dust, pollution, surface water run-off during construction, operation (panel replacement), and decommissioning)17"* | Cross-referencing to **ES: Chapter 8 Ecology and Biodiversity [EN0110014/APP/6.1.8]** is provided within this Chapter, where appropriate. | For construction and decommissioning noise impacts see Section 12.8 Assessment of Likely Effects<br><br>For cumulative effects see Section 12.11 Cumulative Effects Assessment |
| **Brooke Parish Council, BEPS – Residents Action Group, Shelton and Hardwick Parish Council Scoping Opinion Response February 2025** | *"These developments, particularly the excessive number of proposed NSIP solar farms are likely to have significant cumulative impacts on all aspects of the EIA, particularly ecology including common species, tourism, landscape and visual amenity, cultural heritage, transport (including PRoW), noise and vibration and particularly on human (mental) health, economic and wellbeing for all phases of the project. The cumulative* | **ES: Chapter 12 Noise and Vibration [EN0110014/APP/6.1.12]** presents the assessment of noise and vibration effects from the Scheme including cumulative effects.<br><br>**Section 12.11** of this Chapter presents the cumulative assessment. | **Section 12.11 Cumulative Effects Assessment** |

| Consultee and Date | Comment and Scoping Opinion ID No. | How has the comment been addressed in the ES chapter | Location of response in ES Chapter |
|---|---|---|---|
| | *impact of all these schemes should be scoped in from the start."* | | |
| **Brooke Parish Council, BEPS – Residents Action Group, Shelton and Hardwick Parish Council Scoping Opinion Response February 2025** | *"Construction activities are likely to be carried out Monday to Friday 07:00-18:00 and between 08:00 and 13:30 on Saturdays, which means there will be a significant impact on restaurants, tourism and holiday lets, preventing some from being able to trade at all due to construction disturbance, noise and vibration."* | **ES: Chapter 12 Noise and Vibration [EN0110014/APP/6.1.12]** presents the assessment of noise and vibration effects from the Scheme.<br>**ES: Chapter 14 Socio-economics [EN0110014/APP/6.1.14]** presents the socio-economic assessment of the Scheme. | **Section 12.8 Assessment of Likely Effects** for noise and vibration effects.<br><br>Section 14.8 of **ES: Chapter 14 Socio-economics [EN0110014/APP/6.1.14]** for socio-economic effects. |
| **Brooke Parish Council, BEPS – Residents Action Group, Shelton and Hardwick Parish Council Scoping Opinion Response February 2025** | *"Due to the proximity of homes and tourism businesses to all of the proposed sites, all aspects of noise and vibration should be scoped in to the EIA"* | **ES: Chapter 12 Noise and Vibration [EN0110014/APP/6.1.12]** presents the assessment of noise effects from the Scheme. The noise and vibration effects which have been scoped out of the EIA are justified and have been agreed with PINS. | **Section 12.8 Assessment of Likely Effects** |
| **Great Moulton Parish Council Scoping Opinion Response Undated** | *"Have the cumulative effects of multiple developments been considered? Particularly with reference to the environment, particularly on ecology including common species, tourism, landscape and visual amenity, cultural heritage, transport, PRoW, noise and vibration and on human (mental) health, economic and wellbeing for all phases of the project."* | **ES: Chapter 19 In-Combination Effects Assessment [EN0110014/APP/6.1.19]** presents the assessment of In-Combination effects.<br><br>**Section 12.11** of this Chapter presents the cumulative assessment of noise and vibration impacts. | **ES: Chapter 19 In-Combination Effects Assessment [EN0110014/APP/6.1.19]** presents the assessment of in-combination effects.<br><br>**ES: Chapter 12 Noise and Vibration [EN0110014/APP/6.1.12] Section 12.11 Cumulative Effects Assessment** |

| Consultee and Date | Comment and Scoping Opinion ID No. | How has the comment been addressed in the ES chapter | Location of response in ES Chapter |
|---|---|---|---|
| **Great Moulton Parish Council**<br>**Scoping Opinion Response**<br>**Undated** | *"Assessments on operational noise and vibration from panels and supporting infrastructure should be provided"* | **ES: Chapter 12 Noise and Vibration [EN0110014/APP/6.1.12]** presents the assessment of noise effects from the Scheme. | **Section 12.8 Assessment of Likely Effects** |
| **Natural England Scoping Opinion Response**<br>**February 2025** | *"1.1 Regulation 11 of the Infrastructure Planning Regulations 2017 - (The EIA Regulations) sets out the information that should be included in an ES to assess impacts on the natural environment. This includes:*<br>*…*<br>*Expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation etc.) resulting from the operation of the proposed development*<br>*…"* | **ES: Chapter 12 Noise and Vibration [EN0110014/APP/6.1.12]** presents the assessment of noise effects from the Scheme. | **Section 12.8 Assessment of Likely Effects** |

### Statutory Consultation and Preliminary Environmental Information Report (PEIR)

12.2.3 Statutory consultation was held between 18 June 2025, and 6 August 2025. Relevant responses to the PEIR relating to Noise and Vibration and how these have been addressed through the ES are set out within **Consultation Report Appendix 10 Section 47 Applicant Response Table [EN011004/APP/5.11]** and **Consultation Report Appendix 11 Section 42 Applicant Response Table [EN011004/APP/5.12]**.

### Further Engagement

12.2.4 Further engagement has been undertaken as part of stakeholder engagement specific to Noise and Vibration, as detailed within **Table 12-2 Summary of Further Engagement Undertaken**.

**Table 12-2 Summary of Further Engagement Undertaken**

| Consultee and Date | Summary of Matter | Response |
|---|---|---|
| SNC EHO – 11 November 2025 | Discussion of statutory consultation response, outlining issues relating to noise mitigation, assessment methodology relating to receptor sensitivity and assignment of significance criteria.<br><br>The EHO requested that an assessment of noise within outdoor amenity areas is undertaken. The assessment should be based on a location within 5 meters of the rear of a residential property, where residents sit on their patios. | The ES chapter includes a response to all SNC statutory consultation comments.<br><br>Noise modelling has been carried out at a height of 1.5 meters above ground during the daytime, with receptor positions placed to represent outdoor amenity areas. As such, the general assessment methodology already accounts for noise levels within outdoor amenity spaces, and no additional assessment is required. |

### Targeted Consultation

12.2.5 A further round of targeted consultation was undertaken between 22 October 2025 and 26 November 2025 following changes to the development boundary area of the Scheme presented in the PEIR and during Stage Two Statutory Consultation. Further detail regarding the targeted consultation is provided in **ES: Chapter 1 Introduction [EN0110014/APP/6.1.1]**.

## 12.3 Legislation, Planning Policy and Guidance

12.3.1 A summary of applicable legislation, planning policy and other guidance documents against which the Scheme is considered relating to noise and

vibration is set out in **ES: Appendix 2.3 Legislation, Planning Policy and Guidance [EN0110014/APP/6.3.2.3]**.

12.3.2 An overview of the legislation, planning policy and guidance against which the Scheme will be considered for the noise and vibration assessment is set out below.

## Legislation and Regulations

12.3.3 The key legislation for the assessment includes:

- The Environmental Protection Act 1990 (Ref 12-1)
- Control of Pollution Act 1974 Part III (Ref 12-2)

## Planning Policy

### National Planning Policy

12.3.4 National Policy Statements (NPS) set out the primary policy tests against which the application for a Development Consent Order (DCO) for the Scheme will be considered in accordance with section 104 Planning Act 2008. Listed below are the details of the elements of NPS considered relevant to the noise and vibration assessment.

- Overarching NPS for Energy (EN-1) (Ref 12-3)
- NPS for Renewable Energy Infrastructure (EN-3) (Ref 12-4)
- The NPS for Electricity Networks Infrastructure (EN-5) (Ref 12-5)

12.3.5 The National Planning Policy Framework (NPPF) (Ref 12-6) as revised in December 2024 sets out national planning policies that reflect priorities of the Government for operation of the planning system and the economic, social, and environmental aspects of the development and use of land. The NPPF has a strong emphasis on sustainable development, with a presumption in favour of such development. The NPPF has the potential to be considered important and relevant to the Secretary of State's (SoS) consideration of the Scheme.

- Draft National Planning Policy Framework 2025 (Ref 12-7)
- National Planning Practice Guidance (PPG) (Ref 12-8)
- Noise Policy Statement for England (NPSE) (Ref 12-9)

### Local Planning Policy

12.3.6 The Scheme is located within the administrative areas of Norfolk County Council (NCC) and South Norfolk Council (SNC) who are the host authorities. Local plan policies which are relevant to noise and vibration and have informed the noise and vibration assessment are detailed below.

- Greater Norwich Local Plan (GNLP) (Ref 12-10), including Policy 3: Environmental Protection and Enhancement and Policy 2: Sustainable Communities.

### Other Guidance

12.3.7 The assessment has been carried out in with reference to the following other guidance documents.

- BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound (Ref 12-11)
- BS 8233:2014 Guidance on Sound Insultation and Noise Reduction for Building (Ref 12-12)
- Building Bulletin 93 (BB93) Acoustic Design of Schools: Performance Standards (Ref 12-13)
- The World Health Organization (WHO) Guidelines for Community Noise (Ref 12-14)
- Professional Practice Guidance on Planning & Noise (ProPG) (Ref 12-15)
- NANR45 revision 1: Procedure for the Assessment of Low Frequency Noise Complaints (Ref 12-16)
- BS ISO 9613-2:2024 Acoustics. Attenuation of Sound During Propagation Outdoors - Engineering Method for the Prediction of Sound Pressure Levels Outdoors (Ref 12-17)
- BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures (Ref 12-18)
- BS EN 61672-1:2013 Electroacoustics. Sound level meters – Specifications (Ref 12-19)
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1 Noise (Ref 12-20)
- 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 2 Vibration (Ref 12-21)
- The Calculation of Road Traffic Noise (CRTN) (Ref 12-22)
- Method for Converting the UK Road Traffic Index $L_{A10,18hour}$ to the EU Noise Indices for Road Noise Mapping' (Ref 12-23)
- Design Manual for Roads and Bridges (DMRB) Design Manual for Road and Bridges LA 111 Traffic Noise and Vibration (Ref 12-24)
- Groundborne Vibration Caused by Mechanised Construction Works (Ref 12-26)
- Transportation and Construction Vibration Guidance Manual Technical Advisory, Vibration TA V-04-01-R0201MA April 2020 (Ref 12-27)

## 12.4 Assessment Assumptions and Limitations

12.4.1 The noise and vibration assessment has considered the following assumptions and limitations:

- Distances between noise sources and receptors used in both the construction and operational assessments were derived from scaled design drawings and digital mapping tools.
- For construction and decommissioning activities, and in the absence of more refined information on the exact working arrangements, a set of reasonable worst-case scenarios has been adopted. Likely working areas have been identified, and representative noise levels for typical construction equipment have been taken from BS 5228-1 (Ref 12-20) (as detailed in **ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]**). This data has been applied to estimate the average sound pressure levels over a standard working day for each construction phase at the identified receptors.
- Electrical equipment required for energy generation is expected to be positioned across the Sites. Because the exact plant types and their final locations are still to be confirmed, the operational noise assessment has adopted a reasonable worst-case assumption that a centralised inverter system is to be implemented. This approach is widely used on similar schemes and typically represents the scenario that produces the highest potential noise levels.
- A range of electrical plant will form part of the operational Scheme, including equipment fitted with cooling systems. Detailed plant specifications are not available at this stage, and potential noise emissions based on example equipment data have been assessed using an example plant layout which has been based on achieving the **Outline Operational Environmental Management Plan (Outline OEMP) [EN0110014/APP/7.2]** noise requirements. **ES**: **Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]** presents the example assessment of noise from items such as PV and Battery Energy Storage System (BESS) inverters, transformers and BESS enclosures.
- The operational noise modelling has been carried out using a deliberately conservative approach, whereby all plant is assumed to operate simultaneously, continuously, and at maximum output, with the exception of the BESS, which uses real world examples of reduced sound levels associated with lower fan duty as a method of mitigation. No allowance has been made for any acoustic screening that may be provided by the solar panels. Additionally, although certain items of plant could be housed within outdoor enclosures, no sound reduction from these structures has been included due to equipment not being selected at this time. This ensures the assessment remains robust at this design stage and represents a worst-case scenario.

- The operational noise model assumes up to two reflections. This is a proportionate approach based on the type of sound sources, the potential impact of reflections, and the scale of the Scheme.
- The operational noise model assumes a ground factor of 1. This is based on the typical ground coverage around the Order Limits, and guidance provided within ISO 9613-2 (Ref 12-17).

12.4.2 Operational hours for static plant have been assumed to be as follows:

- National Grid Substation and Project Substations operate 24 hours a day.
- Due to the on-demand operational nature of the BESS, the facility has been modelled as operating continuously over a 24-hour period. This represents a conservative approach, as in practice most BESS typically discharge for approximately 2 to 4 hours, with trickle charging occurring during the remaining periods of the day. As a result, cooling fans would only operate as required, and therefore lower sound levels may be experienced over the course of a day.
- Solar inverters have been modelled as operating between 04:00 and 23:00 to represent worst-case summer daylight conditions. This is a robust and conservative assumption, as in practice solar inverters will only operate during periods of daylight, which typically occur for a shorter duration than the modelled hours for the majority of the year.

## 12.5 Assessment Methodology

12.5.1 This Section sets out the scope and methodology for the assessment of the impacts of the Scheme on noise and vibration.

### Sources of Information

12.5.2 The following sources of information have been consulted in the preparation of this Chapter:

- Baseline environmental sound survey.
- Ordnance Survey (OS) topographic mapping data.
- OS AddressBase data for receptor identification and verification.
- Example manufacturer-provided plant and equipment noise emission data.
- BS 5228-1 Annex C (Ref 12-20) construction activity sound level source data.
- 18-hour Annual Average Weekday Traffic (AAWT) construction traffic flow data supplied by the transport consultant.
- The assessment of construction and decommissioning activities has been based on the **Works Plans [EN0110014/APP/2.3]**.

# Study Area

## Construction Activity Noise

12.5.3 Guidance provided within DMRB LA 111 (Ref 12-24) indicates that construction noise impacts are not expected to occur at distances of 300 m or more from construction activity. In relation to this, DMRB LA 111 (Ref 12-24) guidance states:

*'A study area of 300m from the closest construction activity is normally sufficient to encompass noise sensitive receptors.'*

12.5.4 Consequently, and in our professional judgement, a Study Area of 300 m from the construction activity is appropriate for assessing construction noise. In areas where night-time works may be required the Study Area has been increased to 515 m, based on a review of where impacts are likely to occur.

## Construction Vibration

12.5.5 In relation to construction vibration impacts, DMRB LA 111 (Ref 12-24) advises in paragraph 3.29 in Note 1 that:

'*A study area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors.*'

12.5.6 On this basis, a Study Area of 100 m from vibration-generating construction activity has been adopted.

## Construction Traffic Noise

12.5.7 To evaluate the potential impact of construction-related traffic noise, a Study Area has been established in accordance with the guidance provided in DMRB LA 111 (Ref 12-24). Specifically, Section 3.8 of the guidance states:

'*A construction traffic study area shall be defined to include a 50m width from the kerb line of public roads*'

12.5.8 On this basis, a Study Area from the centre of roads of 50 m from defined construction routes on public roads has been adopted.

## Construction Traffic Vibration

12.5.9 To evaluate the potential impact of construction-related traffic vibration, a Study Area has been established which includes areas within 50 m from defined construction routes on public roads, access tracks and haul routes has been adopted. This is based on professional judgement and impacts not being expected at distances beyond this.

## Operational Noise

12.5.10 The Study Area for operational activity varies depending on the specific conditions associated with a particular sound source. Typically, as sound attenuates over distance, an assessment at the nearest Noise Sensitive Receptor (NSR) is usually sufficient to identify the significance of impact, on the basis that impacts at receptors located further from the Order Limits than the nearest NSR will be exposed to lower noise levels from the Scheme. An example of an exception to this would be where a particular receptor located close to a source is highly screened, but a receptor located further from the source has no screening.

12.5.11 The assessment of low frequency sound has been undertaken at receptors closest to the Project Substations, new National Grid Substation and BESS areas. Noise levels at receptors located further away have been reviewed, but impacts have not been reported unless they were determined to have a greater than negligible impact.

12.5.12 In this instance, the assessment reports the impact at High and Medium sensitivity receptors, including Public Rights of Way (PRoW), located within 500 m of the Order Limits. Noise levels at receptors located further than 500 m from the Order Limits have been reviewed, but impacts have not been reported unless they were determined to have a greater than negligible impact.

### Decommissioning Activity Noise

12.5.13 Decommissioning activity noise is considered to be similar in scale and type to construction activity noise and the same Study Area is proposed. The DMRB LA 111 (Ref 12-24) guidelines state:

'*A study area of 300m from the closest construction activity is normally sufficient to encompass noise sensitive receptors.*'

12.5.14 A Study Area of 300 m from the Order Limits is deemed appropriate for assessing decommissioning activity noise.

### Decommissioning Traffic Noise

12.5.15 To evaluate the potential impact of decommissioning-related traffic noise, a Study Area has been established in accordance with the guidance provided in DMRB LA 111 (Ref 12-24). Specifically, Section 3.8 of the guidance states:

'*A construction traffic study area shall be defined to include a 50m width from the kerb line of public roads*'

12.5.16 On this basis, a Study Area from the centre of roads of 50 m from defined decommissioning routes on public roads has been adopted.

## Potential Impacts

12.5.17 Embedded mitigation measures being incorporated into the design and construction of the Scheme are set out in **Section 12.7 Embedded Mitigation**. Prior to the implementation of any mitigation (embedded or additional), the Scheme has the potential to affect (beneficially or adversely), during the construction, operation and decommissioning phases in the following ways:

- Potential noise and vibration effects arising from construction and decommissioning phase activities (e.g. site preparation, installation of plant, construction of substations and structures, laying of cables and vehicle movements.).
- Potential noise effects arising from the operational plant over the lifetime of the Scheme.

12.5.18 Further to statutory consultation **Table 12-3 Noise and Vibration Scoping Summary** provides a summary of the agreed topics included in the ES chapter, as outlined in the Scoping Report and Scoping Opinion (**ES: Appendix 2.1 EIA Scoping Report [EN0110014/APP/6.3.2.1]** and **ES Appendix 2.2 EIA Scoping Opinion [EN0110014/APP/6.3.2.2]**).

**Table 12-3 Noise and Vibration Scoping Summary**

| Topic | Construction | Operation | Decommissioning |
|---|---|---|---|
| Noise – Project Substations, National Grid Substation, BESS, Solar PV Arrays | **Scoped In** | **Scoped In** | **Scoped In** |
| Noise – Solar PV Tracking Motors | N/A | **Scoped In** | N/A |
| Noise – Maintenance and Replacement of Project Substations, National Grid Substation, BESS, Solar PV Arrays | N/A | Scoped Out | N/A |
| Vibration – Project Substations, National Grid Substation, BESS, Solar PV Arrays | **Scoped In** | Scoped Out | Scoped Out |
| Noise and Vibration – Ecological Receptors | Scoped out of this chapter, considered within **ES: Chapter 8 Ecology and Biodiversity [EN0110014/APP/6.1.8]** | Scoped out of this chapter, considered within **ES: Chapter 8 Ecology and Biodiversity [EN0110014/APP/6.1.8]** | Scoped out of this chapter, considered within **ES: Chapter 8 Ecology and Biodiversity [EN0110014/APP/6.1.8]** |
| Noise – Traffic | **Scoped In** | Scoped Out | **Scoped In** |
| Vibration – Traffic | **Scoped In** | Scoped Out | Scoped Out |
| Noise & Vibration – Grid Connection Infrastructure | **Scoped In** | Scoped Out | Scoped Out |

| Topic | Construction | Operation | Decommissioning |
|---|---|---|---|
| (overhead / underground cables, connection towers) | | | |
| Noise and Vibration – Low and Very Low Sensitivity Receptors | Scoped Out | Scoped Out | Scoped Out |
| Noise – Public Rights of Way | Scoped Out | **Scoped In** | Scoped Out |

## Scoped Out

12.5.19 The following topics are proposed to be scoped out of the ES, as agreed in the Scoping Opinion from PINS (**ES: Appendix 1.2 East Pye Scoping Opinion [EN0110014/APP/6.3.1.2]**) and the Environmental Health Departments of NNC and SNC:

- **Noise – Maintenance and Replacement of the Project Substations, National Grid Substation, BESS, Solar PV Arrays:** Panel replacement may occur sporadically throughout the lifecycle of the Scheme. It is anticipated that all the panels will be replaced at least once, and the BESS may be replaced up to five times throughout the lifecycle of the Scheme. The activities involved in the maintenance of plant and replacement of the panels and BESS will comprise less intense activities compared to the construction period, which has already been considered and therefore does not require further assessment.
- **Vibration – Project Substations, National Grid Substation, BESS, Solar PV Arrays (operational and decommissioning):** Operational equipment is expected to generate insignificant vibration levels at sensitive receptors. On this basis, vibration impacts have been scoped out of the ES. A low frequency noise assessment has been undertaken. The ES description of development **ES: Chapter 4 The Scheme [EN0110014/APP/6.1.4]** confirms the operational equipment types and quantities.
- **Noise and Vibration – Ecological Receptors (all phases):** noise and vibration impacts on sensitive ecological receptors from all phases are addressed in **ES: Chapter 8 Ecology and Biodiversity [EN0110014/APP/6.1.8]** and are not repeated in this ES chapter. However, the ES description of development **(ES: Chapter 4 The Scheme [EN0110014/APP/6.1.4])** includes operational equipment details and their distances from ecological receptors.
- **Noise – Traffic (operation and maintenance phase only):** Traffic associated with routine servicing and maintenance is limited and unlikely to cause significant noise effects. Therefore, operational traffic noise is scoped out of the ES.
- **Vibration – Traffic (operation and maintenance phase only):** Maintenance vehicles are likely to operate infrequently throughout a

typical week. Maintenance works are likely to only occur using small light goods vehicles, which will not cause perceptible vibration within high sensitivity receptor buildings. Therefore, vibration from operational and maintenance vehicles has been scoped out of the ES.

- **Noise and Vibration – Grid Connection Infrastructure (overhead / underground cables, connection towers (operation and maintenance, and decommissioning):** Underground cables will not generate perceptible noise or vibration during operation. After decommissioning, cables remain underground with no residual effects and the National Grid Substation will be permanently installed, so this has been scoped out of the ES.
- **Noise and Vibration – Low and Very Low Sensitivity Receptors (all phases):** Agricultural and industrial buildings are considered to have a low sensitivity to noise and vibration, and construction near these is unlikely to be prolonged. It is not anticipated that construction or decommissioning phases will yield vibration levels sufficient enough to damage properties. Effects are not considered significant and have been scoped out of the ES.
- **Noise and Vibration – Public Rights of Way (construction and decommissioning phases):** Noise and vibration from construction and decommissioning near PRoW is expected to be localised, short-term, and within normal working hours. Temporary exposure for footpath users is not considered significant and has been scoped out of the ES.

## Impact Assessment Methodology

12.5.20 The noise and vibration assessment follows the approach to undertaking EIA as explained in **ES: Chapter 2 EIA Methodology [EN0110014/APP/6.1.2]**. The methodology for attributing sensitivity of receptors, magnitude of impacts and the significance of effects in relation to noise and vibration is described further in this chapter of the ES.

12.5.21 The approach that has been adopted to comply with noise and vibration related legislation, planning policy, and industry standard guidance.

### Definition of Impacts in Terms of Noise and Vibration

12.5.22 PPG (**Ref 12-8**) provides advice regarding how to determine the impact of noise, including whether a significant adverse effect or adverse effect is occurring or likely to occur and whether a good standard of amenity can be achieved. It provides more descriptive detail for the definitions of the No Observed Effect Adverse Level (NOAEL), Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) (**Table 12-4**) but refrains from using numerical values.

12.5.23 **Table 12-4 Noise Exposure Hierarchy and Effect Levels** summarises the noise exposure hierarchy, based on the likely average response of those affected by potential noise and vibration impacts.

**Table 12-4 Noise Exposure Hierarchy and Effect Levels**

| Response | Examples of Outcomes | Action |
|---|---|---|
| Very Noticeable Improvement | Causes a material change in behaviours and/or attitude e.g. individuals engage in activities which may have been avoided in the past. Quality of life enhanced due to change in character of the area. | No specific measures required. |
| Noticeable Improvement | Improved noise climate results in small changes in behaviour and/or attitude e.g. turning down the volume of television, speaking more quietly, opening windows. Affects the character of the area such that there is a perceived change in the quality of life. | |
| Just Noticeable Improvement | Noise impact can be heard but does not result in any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life. | |
| **No Observed Effect Level (NOEL)** | | |
| Not present | No Effect | No specific measures required. |
| **No Observed Adverse Effect Level (NOAEL)** | | |
| 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 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. | 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. | Avoid. |
| Very disruptive and harmful | 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. | Prevent. |

12.5.24 The impact of the Scheme in noise and vibration terms has been assessed with consideration to the proposed LOAELs and SOAELs based on the guidance set out in PPG and other relevant policy and standards.

### Construction Activity and Decommissioning Activity Noise

12.5.25 BS 5228-1:2009+A1:2014 (Ref 12-20) and DMRB LA 111 (Ref 12-24) have been used to determine impacts and effects related to construction and decommissioning activity noise.

12.5.26 BS 5228-1:2009+A1:2014 (Ref 12-20) does not provide specific limits for construction noise, but it does define methods of assessing the significance. The standard also provides information on construction noise and vibration reduction measures promoting a 'Best Practicable Means' (BPM) approach to control noise and vibration. A method for determining the sound levels associated with construction activities is also detailed and considers the numbers and types of equipment operating, their associated Sound Power Level ($L_W$), and the distance to receptors, along with the effects of any screening.

12.5.27 Based on the guidance detailed in Table E.1 of BS 5228-1:2009+A1:2014, **Table 12-5 Threshold of Potential Significant Effect at Dwellings** below defines the threshold of potential significant effects at dwellings.

#### Table 12-5 Threshold of Potential Significant Effect at Dwellings

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

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

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

**Note 3** – Applied to residential receptors only.

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

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

C) Category C: Threshold values to use when the ambient noise levels (when round to the nearest 5 dB) are higher that category A values.

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

12.5.28 DMRB LA 111 (Ref 12-24) establishes impact levels based on the ambient sound level and threshold level, as defined in BS 5228-1:2009+A1:2019 (Ref 12-20).

### Construction and Decommissioning Activity and Traffic Vibration

12.5.29 The effects of human response to whole body vibration in buildings are defined in BS 6472-1: 2008 (Ref 12-25) in terms of Vibration Dose Value (VDV). However, for human response to construction-related vibration, it is considered more appropriate to use the Peak Particle Velocity (PPV) measure, as suggested in BS 5228-2:2009+ A1:2014 (Ref 12-21) with reference to the guidance values presented in Table B.1 for the assessment of the significance of vibration effects.

### Construction and Decommissioning Traffic Noise

12.5.30 The assessment of noise due to construction and decommissioning traffic is based on the changes in traffic noise levels at NSRs due to a change in the volumes of road traffic generated by the construction and decommissioning of the Scheme.

12.5.31 Changes in noise levels have been calculated by comparing anticipated construction and decommissioning traffic flows with the 2028 future baseline traffic flows. The year 2028 has been selected as it represents the anticipated start of construction and provides a robust basis for assessing both construction and decommissioning traffic. Using the 2028 baseline for both construction and decommissioning assessments is considered representative of a worst-case scenario, as traffic volumes are likely to increase beyond 2028 due to population growth.

12.5.32 The assessment presented in this Chapter uses short-term assessment criteria taken from Table 3.2 of DMRB LA 111 (Ref 12-24) to assess the temporary construction and decommissioning impact from traffic noise.

### Operational Noise from Solar PV Sites, BESS and Substations

12.5.33 Operational noise impacts from plant, which consists of static equipment associated with the Solar PV Sites, BESS and Project Substations including Transformers, Solar/ BESS Inverters, and BESS enclosure have been assessed in accordance with guidance outlined in BS 4142:2014+A1:2019 (Ref 12-12) at residential receptors. Non-domestic high and medium sensitivity receptors have been assessed against internal sound levels presented in relevant standards such as BS 8233:2014 (Ref 12-12) and BB93 (Ref 12-13).

12.5.34 The assessment is based on the commitment to achieve the noise requirements in the **Outline OEMP [EN0110014/APP/7.2]**. This has resulted in a set of example solar inverter, BESS inverter, BESS enclosures and transformer locations which demonstrates how the noise requirements could

be achieved. The example locations are indicated within the noise modelling outputs (**ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]**.

12.5.35 An assessment of low frequency noise from the Project Substations and National Grid substation at high sensitivity receptors has been undertaken with reference to NANR45 (Ref 12-16). The assessment is inclusive of low frequency sound produced by BESS inverters and BESS enclosures.

## Sensitivity of Receptor

### Human Receptors

12.5.36 This chapter considers the noise and vibration impacts on human receptors.

12.5.37 The study area has been reviewed, and the review has identified the sensitivity of receptors as detailed in **Table 12-6 Sensitivity Criteria of Identified Receptor**.

**Table 12-6 Sensitivity Criteria of Identified Receptor**

| Sensitivity | Description |
|---|---|
| High | Residential, including private gardens where appropriate.<br>Schools and Nurseries during the daytime.<br>Hospitals/residential care homes.<br>Places of worship. |
| Medium | Commercial Buildings (including Bars/Cafes/Restaurants where external noise may be intrusive, Retail units).<br>Public Rights of Way<br>Offices |
| Low | Sports grounds when spectator noise is a normal part of the event.<br>Industrial, Factories and working environments with existing high noise levels. |
| Negligible | Agricultural Buildings |

### Ecological Receptors

12.5.38 The impact of noise and vibration on ecological receptors is assessed and presented within **ES: Chapter 4 The Scheme [EN0110014/APP/6.1.4]** and **ES: Chapter 8 Ecology and Biodiversity [EN0110014/APP/6.1.8]**.

## Magnitude of Impact

12.5.39 The categorisation of the magnitude of impact takes into account the following factors:

- Extent
- Duration

- Frequency; and

Reversibility

### Construction Activity and Decommissioning Activity Noise

12.5.40 **Table 12-7 Construction and Decommissioning Noise Impact Levels for Noise Sensitive Receptors** defines the noise adverse impact levels at NSR due to construction and decommissioning.

#### Table 12-7 Construction and Decommissioning Noise Impact Levels for Noise Sensitive Receptors

| Magnitude of Impact | Construction Sound Level $L_{Aeq,T}$ (dB) at Residential Receptor |
|---|---|
| High | Above or equal to the Threshold Level* + 5 dB |
| Medium | Above or equal to the Threshold Level* and below the Threshold Level* + 5 dB |
| **SOAEL** | |
| Low | Above or equal to the Ambient Sound Level and below the Threshold Level* |
| **LOAEL** | |
| Negligible | Below the Ambient Sound Level |
| *Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1. | |

### Construction Activity and Traffic Vibration

12.5.41 **Table 12-8 Construction Vibration Impact Levels** defines the adverse vibration impact levels due to construction vibration.

#### Table 12-8 Construction Vibration Impact Levels

| Magnitude of Impact | Vibration Level PPV mm/s | Description of Effects |
|---|---|---|
| High | > 10 | Vibration is likely to be intolerable for any more than a very brief exposure. |
| Medium | 1.1 to 10 | Increasing likelihood of complaint in residential environments but can be tolerated at the lower end of the scale if prior warning and explanation has been given to residents. |
| **SOAEL** | | |
| Low | 0.3 to 1.0 | Increasing likelihood of perceptible vibration in residential environments. |
| **LOAEL** | | |
| Negligible | < 0.3 | Vibration is unlikely to be perceptible in even the most sensitive situations for most vibration frequencies associated with construction. |

12.5.42 **Table 12-8** provides assessment criteria which relates to the human perception of vibration. BS 5228-2 (Ref 12-21) advises that for standard

structures, higher levels of vibration above 10 mm/s PPV are required to result in damage to buildings.

12.5.43 For particularly sensitive and fragile buildings and structures, lower levels of vibration can result in building damage. Further information provided within CT-HWANP-RT-13-069.25.3 Transportation and Construction Vibration Guidance Manual (Ref 12-27), Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123 of the Transit Noise and Vibration Impact Assessment Manual (Ref 12-29), DIN 4150-3:1999 Structural Vibration Part 3: Effects of Vibration on Structures (Ref 12-30) and SN640 312:1989 Effect of Vibrations on Buildings (Ref 12-31) suggests that a conservative vibration limit of 3 mm/s PPV is likely to ensure that building damage would not occur, depending on the fragility of the structure. Assessment of particularly sensitive structures is therefore made against this criterion, with significant effects potentially occurring to fragile structures at vibration levels above 3 mm/s PPV.

### Construction and Decommissioning Traffic Noise

12.5.44 **Table 12-9 Change in Noise Levels Due to Construction and Decommissioning Traffic** defines the adverse impact levels due to construction traffic noise.

**Table 12-9 Change in Noise Levels Due to Construction and Decommissioning Traffic**

| Magnitude of Impact | Change in Basic Noise Level $L_{A10,18hr}$ (dB) at Noise Sensitive Receptor |
|---|---|
| High | ≥ 5.0 |
| Medium | ≥3.0 and <5.0 |
| Low | ≥1.0 and <3.0 |
| Negligible | < 1.0 |

12.5.45 DMRB LA 111 (Ref 12-24) outlines LOAEL and SOAEL values for operational traffic noise in terms of absolute sound levels. These are reproduced in **Table 12-10 Construction Traffic Noise LOAELs and SOAELs** and are considered to be applicable to the assessment of construction traffic noise levels.

**Table 12-10 Construction Traffic Noise LOAELs and SOAELs**

| Time Period | LOAEL | SOAEL |
|---|---|---|
| Daytime (06:00 – 00:00) | 55 dB $L_{A10,18hour}$ façade incident | 68 dB $L_{A10,18hour}$ façade incident |
| Night-time (23:00 – 07:00 | 40 dB $L_{night,outside}$ free-field | 55 dB $L_{night,outside}$ free-field |

### Operational Noise from Solar PV, BESS, and Substations

12.5.46 Based on guidance provided within BS 4142 (Ref 12-11), the proposed preliminary LOAEL and SOAEL values for domestic receptors are provided in **Table 12-11 Proposed LOAEL and SOAEL for Operational Plant Noise - Domestic Receptors**

**Table 12-11 Proposed LOAEL and SOAEL for Operational Plant Noise - Domestic Receptors**

| Magnitude of Impact | Rating Level ($L_{Ar,Tr}$ dB) at Noise Sensitive Domestic Receptor |
|---|---|
| High | Greater than 10 dB above the typical background sound level, depending on context. |
| **SOAEL** | |
| Medium | Greater than 5 and less than or equal to 10 dB above the typical background sound level, depending on context. |
| **LOAEL** | |
| Low | Greater than 0 and less than or equal to 5 dB above the typical background sound level, depending on context. |
| **NOAEL** | |
| Negligible | Equal to or less than the typical background sound level, depending on context. |

12.5.47 Based on guidance provided within BS 8233:2014 (Ref 12-12) for offices and religious buildings and BB93 (Ref 12-13) for nurseries, where applicable. These documents provide benchmarks for acceptable indoor ambient noise levels to ensure a satisfactory acoustic environment for occupants.

12.5.48 The proposed LOAEL and SOAEL values for non-residential receptors are provided in Table 12-12 Proposed LOAEL and SOAEL for Operational Plant Noise - Non-Residential Receptors.

**Table 12-12 Proposed LOAEL and SOAEL for Operational Plant Noise - Non-Residential Receptors**

| Receptor Type | Internal Ambient Sound Level dB $L_{Aeq,T}$ | Magnitude of Impact |
|---|---|---|
| Executive Office | **SOAEL** | |
| | >40 | Medium |
| | **LOAEL** | |
| | >35 and ≤40 | Low |
| | ≤35 | Negligible |
| Place of Worship | **SOAEL** | |

| Receptor Type | Internal Ambient Sound Level dB $L_{Aeq,T}$ | Magnitude of Impact |
|---|---|---|
| | >35 | Medium |
| | **LOAEL** | |
| | >30 and ≤35 | Low |
| | ≤30 | Negligible |
| Nursery | **SOAEL** | |
| | >40 | Medium |
| | **LOAEL** | |
| | >35 and ≤40 | Low |
| | ≤35 | Negligible |

12.5.49 Operational noise impacts on PRoWs have been assessed in accordance with guidance outlined in WHO Guidelines for Community Noise (Ref 12-14). Based on WHO guidance, the proposed LOAEL and SOAEL values for PRoWs (Medium sensitivity) are provided in **Table 12-13 Proposed LOAEL and SOAEL for Operational Plant Noise - PRoW** (Medium Sensitivity).

**Table 12-13 Proposed LOAEL and SOAEL for Operational Plant Noise - PRoW (Medium Sensitivity)**

| Magnitude of Impact | Calculated Sound Level Along Footpath $L_{Aeq,T}$ |
|---|---|
| High | >55 dB $L_{Aeq,T}$ |
| **SOAEL** | |
| Medium | >50 and ≤55 dB $L_{Aeq,T}$ |
| **LOAEL** | |
| Low | ≤50dB $L_{Aeq,T}$ and above the ambient sound level |
| Negligible | Below the ambient sound level or ≤50 dB $L_{Aeq,T}$ whichever is lower |

## Categorising Scale of Effect

12.5.50 The scale of effect that the Scheme may have on an impacted receptor will be influenced by a combination of the sensitivity of the identified receptor and the magnitude of impact.

12.5.51 The method for determining the significance of noise and vibration effects follows the overarching approach set out in **ES: Chapter 2 EIA Methodology [EN0110014/APP/6.1.2]**. In summary, the sensitivity of the receptor (considered high for residential properties and medium for public rights of way in this assessment) is combined with the magnitude of impact to establish the overall level of significance.

12.5.52 There are four categories demonstrating the scale of effect:

- Negligible;
- Minor;
- Moderate; and
- Major.

12.5.53 The significance of effect with respect to sensitivity of receptor and magnitude of impact are presented in **Table 12-14 Scale of Effect**.

**Table 12-14 Scale of Effect**

| Magnitude of Impact | Sensitivity | | | |
|---|---|---|---|---|
| | High | Medium | Low | Negligible |
| High | Major Adverse | Moderate Adverse | Minor Adverse | Negligible |
| Medium | Moderate Adverse | Moderate Adverse | Minor Adverse | Negligible |
| Low | Minor Adverse | Minor Adverse | Negligible | Negligible |
| Negligible | Negligible | Negligible | Negligible | Negligible |

12.5.54 Operational effects are those that are associated with operation activities during the generating lifetime of the Scheme, which is anticipated to be up to 60 years. Timescales associated with these effects are as follows:

- Short term – endures for up to 12 months;
- Medium term – endures for 1 to 5 years;
- Long term – endures for more than 5 years;
- Reversible long-term effects – long-term effects, which endure throughout the 60 year operational lifetime of the Scheme, but which cease once the Scheme has been decommissioned; and
- Permanent effects – effects which cannot be reversed following decommissioning.

12.5.55 For the purpose of identifying likely significant environmental effects within the context of the EIA relating to noise and vibration, only effects assessed as 'Major' or 'Moderate' are treated as significant, however the significance is also dependent on contextual factors as detailed below.

### Construction and Decommissioning Activity Noise

12.5.56 Based on guidance provided within BS 5228-1 (Ref 12-20), significant effects due to construction and demolition activity noise could occur when major or moderate effects are anticipated to exceed:

- A period of 10 or more days of working in any 15 consecutive days; or
- For a total number of days exceeding 40 in any 6 consecutive months.

### Construction Activity and Decommissioning Activity Vibration

12.5.57 Based on guidance provided within BS 5228-2 (Ref 12-21), significant effects due to construction vibration could occur when major or moderate effects are anticipated to exceed:

- A period of 10 or more days of working in any 15 consecutive days; or
- For a total number of days exceeding 40 in any 6 consecutive months.

### Construction and Decommissioning Traffic Noise

12.5.58 Where the impact in noise terms is medium or high, the assessment determining whether an effect is significant or not will take into account the following factors at the worst affected receptors:

- Absolute sound level with reference to relevant criteria in **Table 12-10 Construction Traffic Noise LOAELs and SOAELs**;
- The acoustic context of the area and likely perception of change by the receptor; and
- Anticipated duration of the effect.

### Operational Noise from Solar PV Sites, BESS and Substations

12.5.59 BS 4142 (Ref 12-11) notes that context should be taken into account within the assessment, and therefore the context has been taken into account when determining whether the overall outcome is significant at residential receptors. Contextual factors which have been considered include:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and
- The sensitivity of the receptor.

12.5.60 NANR45 (Ref 12-16) criteria applied to residential and educational receptors (high sensitivity), are provided in **ES: Appendix 2.3 Legislation, Planning Policy and Guidance [EN0110014/APP/6.3.2.3]**.Where the predicted levels exceed NANR45 (Ref 12-16) criteria, this may be considered as being above the SOAEL and therefore the significance of operational noise is modified to be significant. Anything equal to or below the threshold would be considered as below the SOAEL and the significance of operational noise would not require modification.

# 12.6 Baseline Conditions

## The Order Limits

12.6.1 The Scheme is located within the administrative areas of Norfolk County Council (NCC) and South Norfolk Council (SNC) who are the host authorities. A full description of the Order limits is provided in **ES: Chapter 4 The Scheme [EN0110014/APP/6.1.4]**.

## Existing Baseline

### Receptors

12.6.2 **Table 12-15 Sensitivity of Identified Receptor** presents the nearest noise-sensitive receptors (NSR) relative to the Scheme within the Study Area. The determination of sensitivity is considered by their existing use.

12.6.3 An aerial photograph of the location of the identified nearest noise-sensitive receptors can be seen in **ES: Appendix 12.1 Baseline Sound Survey Report [EN0110014/APP/6.3.12.1]** and **ES: Figure 12.2 Noise and Vibration Sensitive Receptors [EN011014/APP/6.2.12.2]**.

12.6.4 The sensitivities of identified receptors are shown below in **Table 12-15 Sensitivity of Identified Receptor**.

**Table 12-15 Sensitivity of Identified Receptor**

| Receptor Reference | Receptor Description | Use | Sensitivity |
|---|---|---|---|
| **Site 1 and BESS Site** | | | |
| NSR1A | Dwellings on Potters Crescent | Residential dwelling | High |
| NSR1B | Dwellings on High Green | Residential dwelling | High |
| NSR2A and NSR2B | Woodlands Farm and Frith Farm | Residential dwelling | High |
| NSR3A and NSR3B | Dwellings on Station Road | Residential dwelling | High |
| NSR4 | Dwellings on Broadgate Lane | Residential dwelling | High |
| NSR5A | Dwellings on Broadgate Lane | Residential dwelling | High |
| NSR5B | Commercial and agricultural facilities on Broadgate Lane | Commercial and agricultural facility | Medium |

| Receptor Reference | Receptor Description | Use | Sensitivity |
|---|---|---|---|
| NSR6 | Great Moulton FP12,14,15,16,17,18<br>Great Moulton RB18-19<br>Tivetshall St Margaret FP2-3 | Public Rights of Way | Medium |
| **Site 2** | | | |
| NSR7 | Dwellings on Lodge Road | Residential dwelling | High |
| NSR8 | Dwellings on Ipswich Road | Residential dwelling | High |
| NSR9 | Dwellings on Frith Way | Residential dwelling | High |
| NSR10 | Red House Farm Bed & Breakfast on Station Road | Dwelling and Hotel | High |
| NSR11 | Existing businesses along Station Road | Commercial facility | Medium |
| NSR12 | Great Moulton FP11<br>Pulham Market FP6<br>Tivetshall St Margaret BR7,9<br>Tivetshall St Margaret FP4,5,8,10<br>Tivetshall St Margaret RB6<br>Wacton FP43<br>Wacton RB31,40 | Public Rights of Way | Medium |
| **Site 3** | | | |
| NSR13 | Plumtree Cottage, Spring Lane | Residential dwelling | High |
| NSR14 | Springwood, Spring Lane | Residential dwelling | High |
| NSR15 | Dwellings on Barondale Lane | Residential dwelling | High |
| NSR16 | Grange Farm | Residential dwelling | High |
| NSR17 | Dwellings on Lundy Green | Residential dwelling | High |
| NSR18 | Commercial and agricultural facilities on Spring Lane | Commercial and agricultural facility | Medium |
| NSR19 | Hempnall FP24,25,26,28,29 | Public Rights of Way | Medium |
| **Site 4** | | | |
| NSR20 | Mill Farm, Hempnall Road | Residential dwelling | High |
| NSR21 | Dwellings on Brick Kiln Lane | Residential dwelling | High |
| NSR22 | Dwellings on Norwich Road | Residential dwelling | High |
| NSR23 | Dwellings on Brands Lane | Residential dwelling | High |
| NSR24 | Dwellings on Hall Lane | Residential dwelling | High |

| Receptor Reference | Receptor Description | Use | Sensitivity |
|---|---|---|---|
| NSR25 | Dwelling in Tasburgh | Residential dwelling | High |
| NSR26 | St Michael's Church | Religious facility | High |
| NSR27 | Long Stratton FP1-7<br>Morningthorpe FP1 | Public Rights of Way | Medium |
| **Site 5** | | | |
| NSR28 | Dwellings on Bungay Road | Residential dwelling | High |
| NSR29 | Commercial facilities on Bungay Road | Commercial Facility | Medium |
| NSR30 | Jack in the Box Nursery | Nursery | High |
| NSR31 | Beech Farm, The Street | Residential dwelling | High |
| NSR32 | Dwellings on The Street | Residential dwelling | High |
| NSR33 | Church Farm House, The Street | Residential dwelling | High |
| NSR34 | St Catherine's Church | Religious facility | High |
| NSR35 | Hall Farm Cottage and Commercial Facilities | Residential dwelling and commercial facility | High |
| NSR36 | Hempnall FP33<br>Morningthorpe FP5,6,7,9,10,11,12,17,31,32 | Public Rights of Way | Medium |
| **Site 6** | | | |
| NSR37 | Firs Field Farm, Bungay Road | Residential dwelling and agricultural facility | High |
| NSR38 | Dwellings on Silver Green Road | Residential dwelling | High |
| NSR39 | Agricultural Facility on Silver Green Road | Agricultural facility | Negligible |
| NSR40 | Dwellings on Silver Green | Residential dwelling | High |
| NSR41 | Agricultural Facility on Alburgh Road | Agricultural facility | Negligible |
| NSR42 | Hempnall FP14 | Public Right of Way | Medium |
| **Site 7** | | | |
| NSR43 | Dwellings on Church Hill | Residential dwelling | High |
| NSR44 | Dwellings on The Green | Residential dwelling | High |
| NSR45 | Thetford Farm House on The Green | Residential dwelling | High |

| Receptor Reference | Receptor Description | Use | Sensitivity |
|---|---|---|---|
| NSR46 | Woodton Farm, Fylands Road | Residential dwelling | High |
| NSR47 | Oakdene Cottage, Shotesham Road | Residential dwelling | High |
| NSR48 | Dwellings on Springwood Lane | Residential dwelling | High |
| NSR49 | Dwellings on Pymars Lane | Residential dwelling | High |
| NSR50 | Agricultural facility on Pymars Lane | Agricultural facility | Negligible |
| NSR51 | Grove Farm, Fairstead Lane | Residential dwelling | High |
| NSR52 | Dwellings on Fairstead Lane | Residential dwelling | High |
| NSR53 | Limetree Farm, Fairstead Lane | Residential dwelling | High |
| NSR54 | Dwellings on Quaker Lane | Residential dwelling | High |
| NSR55 | Dwellings in Tasburgh | Residential dwelling | High |
| NSR56 | Dwellings on Ipswich Road | Residential dwelling | High |
| NSR57 | Hempnall BR30<br>Hempnall FP1-5<br>Morningthorpe FP1<br>Saxlingham Nethergate FP9-14,27,28<br>Saxlingham Nethergate RB17<br>Tasburgh FP2<br>Woodton RB10 | Public Rights of Way | Medium |
| **Site 8** | | | |
| NSR58 | Dwellings on Brooke Road | Residential dwelling | High |
| NSR59 | Dwellings on Baxter's Lane | Residential dwelling | High |
| NSR60 | Dawsons Farm, Wash Lane | Residential dwelling | High |
| NSR61 | Dwellings on Wash Lane | Residential dwelling | High |
| NSR62 | Market Lane Farm | Residential dwelling | High |
| NSR63 | Shotesham FP16-18, 22 | Public Rights of Way | Medium |
| **Site 9** | | | |
| NSR64 | Dwellings on High Green | Residential dwelling | High |
| NSR65 | Dwellings on Littlebeck Lane | Residential dwelling | High |
| NSR66 | Dwellings on Mill Lane | Residential dwelling | High |
| NSR67 | Highfield Farm, Highfield Lane | Residential dwelling | High |

| Receptor Reference | Receptor Description | Use | Sensitivity |
|---|---|---|---|
| NSR68 | Old House Farm, Woodton Road | Residential dwelling | High |
| NSR69 | Dwellings on Honeypot Lane | Residential dwelling | High |
| NSR70 | Brooke FP6 | Public Right of Way | Medium |
| **Site 10** | | | |
| NSR71 | Gerrins Farm | Residential dwelling | High |
| NSR72 | Dwellings on Upgate Road | Residential dwelling | High |
| NSR73 | Upgate Farm | Residential dwelling | High |
| NSR74 | Commercial facilities on Harvey's Lane | Commercial facility | Medium |
| NSR75 | Dwellings on Harvey Lane | Residential dwelling | High |
| NSR76 | Dwellings in Woodton | Residential dwelling | High |
| NSR77 | Dwellings on Norwich Road | Residential dwelling | High |
| NSR78 | Dwellings on Seething Road | Residential dwelling | High |
| NSR79 | Hedenham RB9<br>Seething RB13<br>Woodton RB3 | Public Rights of Way | Medium |

### Surveys

12.6.5 Details of the baseline sound survey and measurement positions can be seen in **ES: Appendix 12.1 Baseline Sound Survey Report [EN0110014/APP/6.3.12.1]**.and as set out in **Table 12-16 Noise and Vibration Sensitive Receptors and Associated Sound Survey Measurement Position**.

**Table 12-16 Noise and Vibration Sensitive Receptors and Associated Sound Survey Measurement Position**

| Receptor Reference | Receptor Description | Associated Measurement Position |
|---|---|---|
| **Site 1 and BESS Site** | | |
| NSR1A | Dwellings on Potters Crescent | MP44 |
| NSR1B | Dwellings on High Green | MP44 |
| NSR2A and NSR2B | Woodlands<br>and<br>Frith Farms | MP43 |

| Receptor Reference | Receptor Description | Associated Measurement Position |
|---|---|---|
| NSR3A and NSR3B | Dwellings on Station Road | MP43 |
| NSR4 | Dwellings on Broadgate Lane | MP41 |
| NSR5A | Dwellings on Broadgate Lane | MP42 |
| NSR5B | Commercial and agricultural facilities on Broadgate Lane | MP42 |
| **Site 2** | | |
| NSR7 | Dwellings on Lodge Road | MP45 |
| NSR8 | Dwellings on Ipswich Road | MP46 |
| NSR9 | Dwellings on Frith Way | MP49 |
| NSR10 | Red House Farm Bed & Breakfast on Station Road | MP47 |
| NSR11 | Existing businesses along Station Road | MP47 |
| **Site 3** | | |
| NSR13 | Plumtree Cottage, Spring Lane | MP38 |
| NSR14 | Springwood, Spring Lane | MP39 |
| NSR15 | Dwellings on Barondale Lane | MP39 |
| NSR16 | Grange Farm | MP38 |
| NSR17 | Dwellings on Lundy Green | MP38 |
| NSR18 | Commercial and agricultural facilities on Spring Lane | MP39 |
| **Site 4** | | |
| NSR20 | Mill Farm, Hempnall Road | MP29 |
| NSR21 | Dwellings on Brick Kiln Lane | MP30 |
| NSR22 | Dwellings on Norwich Road | MP28 |
| NSR23 | Dwellings on Brands Lane | MP27 |
| NSR24 | Dwellings on Hall Lane | MP27 |
| NSR25 | Dwelling in Tasburgh | MP26 |
| NSR26 | St Michael's Church | MP31 |
| **Site 5** | | |
| NSR28 | Dwellings on Bungay Road | MP34 |
| NSR29 | Commercial facilities on Bungay Road | MP34 |

| Receptor Reference | Receptor Description | Associated Measurement Position |
|---|---|---|
| NSR30 | Jack in the Box Nursery | MP34 |
| NSR31 | Beech Farm, The Street | MP31 |
| NSR32 | Dwellings on The Street | MP31 |
| NSR33 | Church Farm House, The Street | MP31 |
| NSR34 | St Catherine's Church | MP31 |
| NSR35 | Hall Farm Cottage and Commercial Facilities | MP33 |
| **Site 6** | | |
| NSR37 | Firs Field Farm, Bungay Road | MP35 |
| NSR38 | Dwellings on Silver Green Road | MP37 |
| NSR39 | Agricultural Facility on Silver Green Road | MP37 |
| NSR40 | Dwellings on Silver Green | MP36 |
| NSR41 | Agricultural Facility on Alburgh Road | MP35 |
| **Site 7** | | |
| NSR43 | Dwellings on Church Hill | MP18 |
| NSR44 | Dwellings on The Green | MP17 |
| NSR45 | Thetford Farm House on The Green | MP17 |
| NSR46 | Woodton Farm, Fylands Road | MP15 |
| NSR47 | Oakdene Cottage, Shotesham Road | MP14 |
| NSR48 | Dwellings on Springwood Lane | MP14 |
| NSR49 | Dwellings on Pymars Lane | MP19 |
| NSR50 | Agricultural facility on Pymars Lane | MP19 |
| NSR51 | Grove Farm, Fairstead Lane | MP21 |
| NSR52 | Dwellings on Fairstead Lane | MP21 |
| NSR53 | Limetree Farm, Fairstead Lane | MP22 |
| NSR54 | Dwellings on Quaker Lane | MP23 |
| NSR55 | Dwellings in Tasburgh | MP23 |
| NSR56 | Dwellings on Ipswich Road | MP24 |
| **Site 8** | | |
| NSR58 | Dwellings on Brooke Road | MP10 |
| NSR59 | Dwellings on Baxter's Lane | MP11 |

| Receptor Reference | Receptor Description | Associated Measurement Position |
|---|---|---|
| NSR60 | Dawsons Farm, Wash Lane | MP13 |
| NSR61 | Dwellings on Wash Lane | MP13 |
| NSR62 | Market Lane Farm | MP12 |
| **Site 9** | | |
| NSR64 | Dwellings on High Green | MP6 |
| NSR65 | Dwellings on Littlebeck Lane | MP9 |
| NSR66 | Dwellings on Mill Lane | MP8 |
| NSR67 | Highfield Farm, Highfield Lane | MP8 |
| NSR68 | Old House Farm, Woodton Road | MP7 |
| NSR69 | Dwellings on Honeypot Lane | MP7 |
| **Site 10** | | |
| NSR71 | Gerrins Farm | MP2 |
| NSR72 | Dwellings on Upgate Road | MP1 |
| NSR73 | Upgate Farm | MP1 |
| NSR74 | Commercial facilities on Harvey's Lane | MP3 |
| NSR75 | Dwellings on Harvey Lane | MP3 |
| NSR76 | Dwellings in Woodton | MP5 |
| NSR77 | Dwellings on Norwich Road | MP5 |
| NSR78 | Dwellings on Seething Road | MP4 |

## Ambient and Background Sound Levels

12.6.6 Based on the results of the environmental sound surveys, the logarithmic average of measured ambient sound levels over the total measurement period have been calculated, to inform the assessment of construction and decommissioning activity. The night-time ambient sound levels have been presented at measurement positions where there is a requirement to assess night-time construction works (as defined in **ES: Chapter 2 The Scheme [EN0110014/APP/6.1.2]** for works crucial to construction or in an emergency). A statistical analysis of the background sound levels measured during the sound survey has been undertaken and forms the basis of the operational noise assessment.

12.6.7 The statistical analysis of the $L_{A90,15minutes}$ has been carried out in accordance with BS 4142:2014+A1:2019 (Ref 12-11). The ambient and the chosen

background sound levels for the daytime, night-time and early morning periods are represented in **Table 12-17 Ambient and Typical Background Sound Levels**. The histograms which inform the statistical analysis are presented in **ES: Appendix 12.1 – Baseline Sound Survey Report [EN0110014/APP/6.3.12.1].**

**Table 12-17 Ambient and Typical Background Sound Levels**

| Measurement Position | Ambient Sound Level, *T* | | Typical Background Sound Level ($L_{A90,15minutes}$ dB) | | |
|---|---|---|---|---|---|
| | Daytime (T = 07:00 – 23:00 hours) | Night-time (T = 23:00 to 07:00 hours) | Daytime (07:00 – 23:00 hours) | Night-time (23:00 – 07:00 hours) | Early Morning (04:00 – 07:00 hours) |
| MP1 | 52 | - | 36 | 27 | 32 |
| MP2 | 49 | - | 36 | 31 | 32 |
| MP3 | 54 | - | 41 | 28 | 37 |
| MP4 | 58 | - | 46 | 29 | 36 |
| MP5 | 54 | 49 | 45 | 29 | 36 |
| MP6 | 48 | - | 34 | 23 | 24 |
| MP7 | 49 | - | 33 | 28 | 28 |
| MP8 | 50 | - | 34 | 24 | 27 |
| MP9 | 45 | - | 32 | 22 | 24 |
| MP10 | 44 | - | 30 | 20 | 25 |
| MP11 | 47 | 47 | 28 | 19 | 22 |
| MP12 | 46 | 40 | 28 | 18 | 21 |
| MP13 | 44 | 37 | 29 | 22 | 25 |
| MP14 | 43 | - | 29 | 20 | 26 |
| MP15 | 52 | - | 30 | 22 | 24 |
| MP16 | 46 | 43 | 29 | 19 | 23 |
| MP17 | 45 | - | 30 | 21 | 24 |
| MP18 | 50 | 42 | 34 | 20 | 20 |
| MP19 | 51 | - | 33 | 21 | 23 |
| MP20 | 48 | - | 30 | 22 | 25 |
| MP21 | 48 | - | 30 | 23 | 24 |
| MP22 | 50 | - | 36 | 26 | 27 |
| MP23 | 49 | - | 45 | 26 | 33 |
| MP24 | 50 | - | 38 | 24 | 26 |
| MP25 | 56 | - | 51 | 26 | 37 |
| MP26 | 55 | - | 44 | 27 | 36 |
| MP27 | 49 | - | 37 | 30 | 35 |
| MP28 | 56 | 51 | 52 | 28 | 38 |
| MP29 | 53 | - | 47 | 29 | 30 |
| MP30 | 48 | - | 40 | 31 | 35 |
| MP31 | 50 | - | 38 | 21 | 34 |
| MP32 | 50 | 43 | 35 | 25 | 33 |

| Measurement Position | Ambient Sound Level, *T* | | Typical Background Sound Level ($L_{A90,15minutes}$ dB) | | |
|---|---|---|---|---|---|
| | Daytime (T = 07:00 – 23:00 hours) | Night-time (T = 23:00 to 07:00 hours) | Daytime (07:00 – 23:00 hours) | Night-time (23:00 – 07:00 hours) | Early Morning (04:00 – 07:00 hours) |
| MP33 | 51 | - | 41 | 27 | 33 |
| MP34 | 51 | 51 | 41 | 23 | 32 |
| MP35 | 51 | 51 | 40 | 22 | 31 |
| MP36 | 49 | - | 38 | 22 | 33 |
| MP37 | 49 | - | 37 | 27 | 29 |
| MP38 | 45 | 34 | 31 | 22 | 25 |
| MP39 | 45 | - | 34 | 22 | 27 |
| MP40 | 47 | - | 30 | 23 | 26 |
| MP41 | 54 | - | 41 | 31 | 32 |
| MP42 | 49 | - | 35 | 30 | 33 |
| MP43 | 53 | - | 38 | 29 | 32 |
| MP44 | 54 | - | 33 | 28 | 29 |
| MP45 | 50 | 40 | 38 | 29 | 34 |
| MP46 | 56 | - | 46 | 35 | 36 |
| MP47 | 56 | - | 37 | 27 | 32 |
| MP48 | 50 | 43 | 37 | 31 | 33 |
| MP49 | 49 | - | 38 | 28 | 29 |
| MP50 | 60 | 55 | 52 | 25 | 31 |
| MP51 | 48 | - | 42 | 27 | 35 |

## 12.7 Embedded Mitigation

12.7.1 Likely environmental effects have been or will be avoided, minimised, mitigated or reduced through design measures and/or management of the Scheme, as outlined in this section. Proposed environmental enhancements are also described where relevant.

12.7.2 The following embedded mitigation measures have been incorporated into the Scheme's design.

### Future Baseline

12.7.3 This section considers changes to the baseline conditions, described above, as far as changes can be established, that might occur in the absence of the Scheme coming forward during the time period over which the Scheme would be in place. The future baseline scenarios are set out in **ES: Chapter 2 EIA Methodology [EN0110014/APP/6.1.2]**.

12.7.4 Future baseline sound levels may increase due to factors such as population growth and associated rises in road traffic. However, for ambient sound to

increase by 3 dB, road traffic volumes would need to double or significantly change composition. Given this, and as existing levels represent a worst-case scenario (i.e. without future growth), future baseline changes have not been considered in the assessment.

## Embedded Construction and Decommissioning Phase Mitigation

12.7.5 The following embedded mitigation measures have been incorporated into the Scheme's design for the construction and decommissioning phases.

12.7.6 The Scheme layout has been designed to maximise the distance between key noise-generating activities and NSRs, helping to minimise potential noise impacts associated with construction and decommissioning activities and vehicles using access routes.

12.7.7 Working hours agreed with the Local Planning Authority will be adhered to, as detailed in Section 12.8 (further details can be found in **ES: Chapter 4 The Scheme [EN0110114/APP/6.1.4])**. Construction working arrangements relating to noise and vibration, such as access routing, working hours and construction vehicle types, are secured by the **Outline CEMP [EN0110114/APP/7.1], Outline CTMP [EN0110114/APP/7.6]** and **Outline DEMP [EN0110114/APP/7/3]**.

12.7.8 Contractors would be required to ensure that works are carried out in accordance with BPM as stipulated in the Control of Pollution Act (CoPA) (Ref 12-2). A full explanation of measures to control construction noise and vibration will be incorporated within the CEMP that will be substantially in accordance with the **Outline CEMP [EN0110114/APP/7.1]** and secured by DCO Requirement. Measures to mitigate noise and vibration will also be detailed in all construction method statements.

12.7.9 A full explanation of measures to control decommissioning noise and vibration will be incorporated within the DEMP that will be substantially in accordance with the ODEMP and secured by DCO Requirement. Measures to mitigate noise and vibration will also be detailed in all decommissioning method statements.

12.7.10 Effective co-ordination and time management of construction and decommissioning operations is important in avoiding noise and vibration impacts on surrounding uses. Early communication with the surrounding off-site receptors would assist with reducing potential for and in managing any complaints arising during the construction works associated with the Scheme.

12.7.11 The proposals included in the **Outline CEMP [EN0110114/APP/7.1]** in regard to general noise mitigation would be in accordance with BPM as

specified in BS 5228-1 (Ref 12-20) and would comprise the following, where practicable:

- Using 'silenced' plant and equipment, as appropriate.
- Switching off engines where vehicles are standing for a significant period of time.
- Fitting acoustic enclosures to suppress noisy equipment, as appropriate.
- Operating plant at low speeds and incorporating automatic low speed idling.
- Selecting less noisy equipment where practicable, such as: electrically-driven rather than internal combustion powered plant hydraulic powered rather than pneumatic equipment; and wheeled rather than tracked vehicles.
- Properly maintaining all plant (greased, blown silencers replaced, saws kept sharpened, teeth set and blades flat, worn bearings replaced etc.).
- Where necessary and appropriate, use temporary screening or enclosures for static noisy plant to reduce impacts.
- Certifying plant to meet any relevant EC Directive standards.
- Undertaking awareness training of all contractors in regard to BS 5228 (Parts 1 and 2) (Ref 12-20)(Ref 12-21) as a prerequisite of their appointment.

12.7.12 The precise locations and requirements for trenchless drilling (e.g. Horizontal Directional Drilling (HDD)) works will only be confirmed once a principal contractor is appointed. To manage the risk of significant noise effects, particularly during potential night-time activity, a staged approach to mitigation will be applied in accordance with the **Outline CEMP [EN0110014/APP/7.1]**. Mitigation measures to be implemented include:

- The principal contractor will review alternative plant and equipment options and may adopt quieter machinery than that modelled in **ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]**, where reasonably practicable.
- To reduce noise propagation, temporary acoustic barriers will be installed around the trenchless drilling working areas where appropriate. Where the screening fully obstructs line of sight between the source and receptors, reductions of approximately 5 to 10 dB may be achievable.

12.7.13 Section 61 consent will be sought from the relevant local authority where works are anticipated to generate significant noise effects outside of standard working hours. The consent, where granted, will define noise limits, monitoring requirements and mitigation measures to be implemented during construction. The purpose of the submission is to demonstrate that noise and vibration have been controlled as far as reasonably practicable.

12.7.14 In line with the commitments set out in **ES: Chapter 11 Transport and Access [EN010168/APP/6.1.11]**, and the **Outline CTMP [EN010168/APP/7.6]**, construction traffic associated with the Scheme will be managed through measures secured within the DCO. These measures aim to minimise unnecessary vehicle movements and reduce noise exposure at sensitive receptors during construction.

### Embedded Operation and Maintenance Phase Mitigation

12.7.15 The following embedded mitigation measures have been incorporated into the **Outline OEMP [EN0110014/APP/7.2]**:

- Solar inverters will only operate during daytime and early morning hours (between 04:00 hours and 07:00 hours) to reduce noise during night-time hours;
- A 4m high acoustic fence will be included around the BESS enclosures.
- Reduced fan speed duty has been included in the assessment for BESS during night-time and early morning periods and will be controlled via an automated timer system.
- Cooling fans associated with BESS enclosures have been assumed as being orientated away from nearby receptors. The directivity of the Enclosures provides localised screening and maximises directionality such that noise propagates away from receptors.
- Acoustic silencers, attenuators or acoustic enclosures have been included for the assessment of BESS Inverters to reduce sound levels at source.
- Inverters can be designed to mitigate tonal elements during the detailed design stage.

12.7.16 The Order Limits layout has been designed to maximise the distance between work areas including BESS, Project Substations and the National Grid Substation to nearby noise sensitive receptors, which forms part of the embedded mitigation.

## 12.8 Assessment of Likely Effects

12.8.1 This Section identifies and characterises potential impacts arising during the construction, operation and maintenance and decommissioning phases of the Scheme.

12.8.2 Taking into account the embedded mitigation measures as detailed in **Section 12.7 Embedded Mitigation**, the potential for the likely effects of the Scheme on noise and vibration sensitive receptors has been assessed using the methodology as detailed in **Section 12.5 Assessment Methodology** of this Chapter. In the sections below, effects during the construction, operation

and maintenance and decommissioning phases of the Scheme are assessed for noise and vibration sensitive receptors scoped into the ES chapter.

12.8.3 Any additional mitigation required to reduce these effects is then set out in **Section 12.9 Additional Mitigation Measures** below. Thereafter, an assessment is made of the significance of any residual effects after all mitigation measures have been accounted for.

## Construction Phase

### Construction Activity Noise – Project Substations, National Grid Substation, BESS, Solar PV Arrays

12.8.4 Construction noise levels have been calculated at the closest identified NSRs based on the construction activities and programme set out in **ES: Chapter 4 The Scheme [EN0110114/APP/6.1.4], the Works Plans [EN0110014/APP/2.3],** and in accordance with BS 5228-1 (Ref 12-20).

12.8.5 The core construction working hours (not including start-up and shut-down works) are defined as:

- Monday to Friday from 07:00 to 18:00 (daylight hours permitting)
- Saturday from 08:00 to 13:30 (daylight hours permitting); and
- No Sunday or Bank Holiday working unless crucial to construction (for example, for trenchless crossings which must be continuous activity and the arrival and departures of workers and the delivery of AIL) or in an emergency.

12.8.6 Where practicable, construction deliveries would be coordinated to avoid HGV movements during the typical peak morning (08:00 to 09:00) and peak afternoon (17:00 to 18:00) hours.

12.8.7 To assess the realistic 'worst-case' scenario for the assessment of the Scheme's likely significant effects resulting from construction noise, the key activities assessed are:

- Construction of the BESS area, including installation of the conversion units;
- Installation of Solar PV panels, anticipated to involve equipment such as pile-driven or screw mounted piling and excavators; and
- Construction of the Project Substations.

12.8.8 A summary of the calculated construction sound levels at a representative selection of NSRs within the Study Area can be seen in **ES**: **Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]**. A summary of the assessment outcomes has been provided for each construction activity, excluding horizontal directional drilling, in **Table 12-18 Construction Activity Noise Assessment**.

**Table 12-18 Construction Activity Noise Assessment**

| Construction Activity | Receptors below the LOAEL (Negligible Impacts) | Receptors Between the LOAEL and SOAEL (Low Impacts) | Receptors Above the SOAEL (Medium and High Impacts) |
|---|---|---|---|
| **Solar PV and BESS Works** | | | |
| Site Compound | 4 | 2 | 0 |
| Earthworks (BESS) | 1 | 0 | 0 |
| M&E Installation Works (BESS) | 1 | 0 | 0 |
| Piling (Solar PV) | 1 | 38 | 1 |
| **Substations, National Grid Substation Works, and Grid Infrastructure** | | | |
| Enabling Works (Earthworks & Piling) | 0 | 5 | 0 |
| Civil Works & Concrete Pour | 3 | 2 | 0 |
| M&E Installation Works | 3 | 2 | 0 |

12.8.9 The results presented in **Table 12-18 Construction Activity Noise Assessment** identify that construction activity noise levels are unlikely to exceed the daytime threshold level of 65 dBA $L_{Aeq,T}$ when determined at all receptors except one (NSR29, commercial facilities on Bungay Road). This indicates that noise from construction activities is likely to fall below the SOAEL at all properties except NSR29.

12.8.10 At NSR29, the calculated construction noise level is above the SOAEL during Solar PV piling works when they are taking place close to the receptor. However, noise from the piling works are not expected to exceed the temporal threshold required to result in a significant effect, as it is expected that piling works would progress at a sufficient rate.

12.8.11 NSR29 has a medium sensitivity, and the anticipated impact is **high**. Construction activity noise during these works may therefore cause **short term, moderate effects**, which is considered **not significant.**

12.8.12 At other receptors, some construction activities are expected to result in noise levels at NSRs which fall between the LOAEL and SOAEL. At high sensitivity receptors, the magnitude of impact would be **negligible to low**. Construction activity noise will likely cause **short term**, **negligible to minor adverse effects**, and are considered **not significant**.

12.8.13 In relation to Access Roads, calculations indicate that the SOAEL would be exceeded when properties are within 30 m of an Access Road. As it is unlikely

that Access Roads are located within such distances, it is considered that at high sensitivity receptors, the magnitude of impact would be **negligible to low**. Construction activity noise relating to access roads will likely cause **short term**, **negligible to minor adverse effects**, and are considered **not significant**.

### Construction Activity Noise – Horizontal Directional Drilling

12.8.14 For the noise assessment, HDD has been treated as the highest impact trenchless installation method because it can generate elevated noise levels and may need to be undertaken during night-time hours. It may be possible to undertake HDD during daytime hours only, but an assessment of both scenarios have been presented to demonstrate the reasonable worst-case likely effects. Other methods other than HDD may be used, which are expected to generate lower levels of noise.

12.8.15 Where HDD works take place, they are expected to run for periods of up to two days and typically include operations at both a drilling compound and a corresponding reception pit. Properties within the study area have been assessed. In some instances at night, potential significant effects could occur at distances beyond the study area and so the study area has been increased to include those properties which could experience a significant effect.

12.8.16 The indicative HDD sites and the receptors located within the Study Area, where notable noise impacts could arise, are summarised in **Table 12-19 Construction Activity Noise Assessment – HDD**.

**Table 12-19 Construction Activity Noise Assessment – HDD**

| Period | Receptors below the LOAEL (Negligible Impacts) | Receptors Between the LOAEL and SOAEL (Low Impacts) | Receptors Above the SOAEL (Medium and High Impacts) |
|---|---|---|---|
| HDD Works | | | |
| Monday to Friday from 07:00 to 18:00<br>And Saturday from 08:00 to 13:30 | 2 | 15 | 1 |
| Night-time | 0 | 3 | 15 |

12.8.17 The HDD activity noise calculations do not account for screening effects as outlined in embedded mitigation, as the amount of screening provided is situational on a case by case basis. Sound levels could be reduced by up to 10 dB when accounting for screening, reducing the scale of effects outlined above.

12.8.18 The assessment indicates that the SOAEL is exceeded during the daytime hours at one receptor only. There will be 15 receptors that may exceed the SOAEL. Calculations in **ES**: **Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]** indicate that the predicted sound level at the worst affected receptor, NSR45, is 66 dB $L_{Aeq,T}$. It is anticipated that, if required, HDD will take place over 1-2 days within one drilling location and therefore, in accordance with BS 5228 (Ref 12-20), temporary accommodation or noise insulation measures are not required to be offered to the residents due to the short term nature of the works.

12.8.19 If there is a requirement to work outside of normal working hours (i.e. for HDD and or emergency works), this will be controlled through the prior approval process in Section 61 of CoPA (Ref 12-2) via SNC. This will be based on the specific construction activities that are required for evening and/or night-time periods.

12.8.20 The outcome of the HDD construction noise assessment indicates that at high sensitivity receptors, the magnitude of impact may be **negligible to high**. However, due to the works being less than 10 days the effects of construction are reduced and will likely cause **short term, negligible to major adverse effects**, considered **not significant** as discussed in paragraph 12.5.56.

**Construction Activity Vibration – Project Substations, National Grid Substation, BESS, Solar PV Arrays**

12.8.21 **ES: Appendix 12.2 – Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]** identifies predicted vibration levels associated with construction activities including percussive piling, and general site works.

12.8.22 Percussive piling may be required for the installation of the Battery Energy Storage System, Project Substations and the National Grid Substation. However, at Frith Farm, which is the closest receptor, these works, would take place at distances of at least 200 m, such that vibration levels at receptors would be negligible. This is based on vibration levels from piling being 0.3 mm/s or below at distances of 100 m as described in Table 13 of **ES: Appendix 12.2 – Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]**. Therefore, construction vibration effects from these activities would not be perceptible. At high sensitivity receptors, the magnitude of impact from construction activity vibration relating to the BESS and substations is **negligible**. The effects are likely to be **short term**, **negligible** and **not significant**.

12.8.23 Piling activity within proximity of a receptor (NSR29) associated with the construction of the solar arrays, could have a separation distance of approximately 45 m which would result in vibration levels of 1.0 mm/s. At other receptors which are further from works, vibration levels would be lower. At high and medium sensitivity receptors, the magnitude of impact from

construction activity vibration relating to piling of solar panels is **negligible to low**. The effects are likely to be **short term**, **negligible to minor adverse** and **not significant**.

12.8.24 Construction of access tracks or upgrades to existing tracks may involve ground compaction. Predicted vibration levels from these activities are not expected to exceed 1.0 mm/s at distances of 45 m. For high sensitivity receptors at such distances, the magnitude of impact from construction activity vibration relating to construction of access roads is **negligible to low**. The effects are likely to be **short term**, **negligible to minor adverse** and **not significant**.

12.8.25 Vibration levels from HDD activities are predicted to fall below 1 mm/s at distances greater than 10 m, reducing to below 0.3 mm/s at distances greater than 20 m. The closest potential receptor is NSR45, located approximately 65 m from CRC10, where vibration levels of less than 0.3 mm/s are predicted. At high sensitivity receptors, the magnitude of impact from construction activity vibration relating to HDD is **negligible**. The effects are likely to be **short term**, **negligible** and **not significant**.

### Construction Traffic Noise

12.8.26 The likely change in road traffic noise levels as a direct result of the construction of the Scheme have been determined by comparing the predicted sound levels for the future baseline scenarios, with the future baseline plus construction traffic scenarios, based on traffic flow information provided by the Transport Consultant (refer to **ES: Chapter 11 Transport and Access [EN0110014/APP/6.1.11]**). The calculations reflect the anticipated change in traffic flows on the assessed routes and are related to the resultant impact within **Table 12-20 Construction Traffic Noise** Assessment.

### Table 12-20 Construction Traffic Noise Assessment

| Road | Do Minimum Construction Year Traffic Flows (2029) | | Do Minimum Construction Year (2029) + Peak Construction Year Traffic Flows | | Calculated Relative Change in Traffic Noise ($L_{A10,18hour}$ dB) | Magnitude of Impact |
|---|---|---|---|---|---|---|
| | AAWT 18 Hour | Total HGV | AAWT 18 Hour | Total HGV | | |
| A140 (N-B1527) | 22737 | 4378 | 23032 | 4445 | 0.1 | Negligible |
| B1527 | 5940 | 802 | 6110 | 840 | 0.2 | Negligible |
| A140 (S-B1527) | 23277 | 4776 | 23498 | 4843 | 0.1 | Negligible |
| Bungay Rd | 2910 | 507 | 2910 | 507 | 0.0 | Negligible |
| Fairstead Ln (W) | 92 | 17 | 192 | 39 | 3.5 | Medium |
| Norwich Rd | 1397 | 146 | 1397 | 146 | 0.0 | Negligible |
| Broaden Ln | 1386 | 139 | 1386 | 139 | 0.0 | Negligible |
| Littlebeck Ln | 114 | 26 | 142 | 32 | 0.9 | Negligible |
| Shotesham Rd | 148 | 33 | 230 | 53 | 2.0 | Low |
| B1332 (North) | 7864 | 1464 | 7995 | 1470 | 0.0 | Negligible |
| Harvey Ln | 525 | 116 | 591 | 130 | 0.5 | Negligible |
| B1527 (Woodton) | 1056 | 238 | 1228 | 288 | 0.8 | Negligible |
| B1332 (South) | 8391 | 1348 | 8526 | 1418 | 0.2 | Negligible |
| Alburgh Rd | 1237 | 269 | 1275 | 277 | 0.1 | Negligible |
| The St | 1618 | 227 | 1639 | 232 | 0.1 | Negligible |
| Lodge Rd | 192 | 49 | 192 | 49 | 0.0 | Negligible |
| B1134 | 3437 | 693 | 3535 | 731 | 0.2 | Negligible |
| The Grn | 76 | 28 | 76 | 28 | 0.0 | Negligible |
| Wash Ln | 76 | 28 | 76 | 28 | 0.0 | Negligible |
| Baxter's Ln | 159 | 31 | 159 | 31 | 0.0 | Negligible |
| A140 (S-B1134) | 16509 | 4167 | 16652 | 4234 | 0.1 | Negligible |
| Spring Lane | 843 | 168 | 871 | 174 | 0.1 | Negligible |
| The Krons | 1111 | 178 | 1211 | 200 | 0.5 | Negligible |
| Fairstead Ln (E) | 1671 | 254 | 1671 | 254 | 0.0 | Negligible |
| Fylands Rd | 132 | 28 | 157 | 31 | 0.5 | Negligible |
| Bussey's Loke | 58 | 8 | 83 | 11 | 1.4 | Low |
| Heath Rd | 444 | 68 | 474 | 76 | 0.4 | Negligible |
| Market Ln | 36 | 6 | 52 | 10 | 2.0 | Low |
| Wood Ln | 837 | 181 | 837 | 181 | 0.0 | Negligible |
| Edge's Ln | 49 | 7 | 49 | 7 | 0.0 | Negligible |

12.8.27 The construction traffic noise assessment identifies 26 roads with negligible impact, 3 roads with a low impact, and 1 road with a medium impact when considering the change in Basic Noise Level.

12.8.28 Receptors on Fairstead Lane may be subject to a potential medium adverse impact when assessed against DMRB LA 111 (Ref 12-24) criteria. However, this increase is primarily a result of the low baseline traffic flows on this road. In such circumstances, CRTN (Ref 12-22) advises that calculations of noise levels where flows are below 1,000 vehicles per 18-hour day are unreliable. It is therefore considered more appropriate to consider the absolute sound level rather than the change in ambient sound level alone.

12.8.29 The nearest, worst affected high-sensitivity receptor on the construction traffic route along Fairstead Lane is located approximately 30 m from the curb. Based on the baseline 18-hour AAWT, the existing $L_{A10,18hour}$ is calculated to be 43.9 dB. A 3.5 dB increase would therefore result in a future level of 47.3 dB $L_{A10,18hour}$.

12.8.30 Based on the LOAELs and SOAELs presented within **Table 12-10 Construction Traffic Noise LOAELs and SOAELs**, absolute road traffic noise levels at the receptor are expected to be below the LOAEL.

12.8.31 Based on the change in noise levels as detailed in **Table 12-20 Construction Noise** Assessment effects of construction traffic in EIA terms and the additional contextual factors, the assessment indicates that at high sensitivity receptors, the magnitude of impact would be **negligible to low**. Construction traffic noise will likely cause **short term**, **negligible to minor adverse** effects, and are considered **not significant**.

### Construction Traffic Vibration

12.8.32 BS 5228-2:2009+A1:2014 (Ref 12-21) cites findings from the Transport Research Laboratory Report 429, Groundborne Vibration Caused by Mechanised Construction Works (Ref 12-28). Figure 46a of the TRL report shows that ground vibration generated by HGV movements typically reaches around 1 mm/s PPV at a distance of approximately 10 m, reducing to roughly 0.3 mm/s PPV at around 50 m.

12.8.33 The Transportation and Construction Vibration Guidance Manual Technical Advisory, Vibration TA V-04-01-R0201MA (Ref 12-28) provides data for vibration measurements undertaken across a large portion of transit ways where the maximum levels of HGV vibration are presented at known distances away from the source. At a distance of 5 m, a maximum of 2 mm/s PPV was recorded.

12.8.34 Actual vibration levels during construction depend on several factors, including ground composition, HGV speeds and the quality of road/track. For this assessment, and assuming typical HGV speeds on the access roads, vibration at receptors which are approximately 5-10 m from access roads

could result in vibration levels of up to 2 mm/s PPV during HGV passbys, which would be above the SOAEL. The associated impact could therefore be medium. Based on this impact occurring at high sensitivity receptors which are within 5-10 m of the access road, construction traffic could therefore cause **short-term moderate adverse** effects, which are **significant**.

12.8.35 At distances of approximately 10 m or more, the vibration level is expected to be 1 mm/s PPV or below during HGV passbys, which is below the SOAEL. The associated impact could therefore be negligible to low. Based on this impact occurring at high sensitivity receptors which are 10 m or more away from access roads, construction traffic could therefore cause **short-term, negligible to minor adverse** effects, which are **not significant**.

12.8.36 In relation to abnormal loads, vehicles are proposed to pass along The Street through Saxlingham Nethergate which has a number of listed buildings. Some of these buildings are located near to the carriageway edge and there is therefore potential for vibration levels to exceed 2 mm/s PPV. Properties which are within 5 m of the road edge include:

- The Old School on The Street
- Manor Famhouse on Broaden Lane

12.8.37 Based on traffic data obtained at ATC6 and ATC7 as reported within **ES: Chapter 11 Transport and Access [EN0110014/APP/6.1.11]**, a number of rigid vehicles with four or more axles or articulated lorries passed along The Street and Broaden Lane during the traffic survey. Properties which front these roads are therefore already likely to be exposed to comparable levels of vibration which would be generated by abnormal loads required for the Scheme.

## Operational Phase

### Operational Noise - Project Substations, National Grid Substation, BESS, Solar PV Arrays

#### Residential Receptors

12.8.38 Sound data for each item of plant has been obtained from an example manufacturer and provided by the Applicant. The data has been used to create sound maps showing the daytime and early morning specific sound level emissions from the on-site fixed plant associated with the Scheme. The sound maps can be seen in **ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.2.12.2].** Sound power levels associated with the fixed plant can be seen in **Table 12-21 Operational Sound Power** Data.

**Table** 12-21 Operational Sound Power Data

**Table 12-21 Operational Sound Power Data**

| Description | Sound Power Level $L_w$ dBA |
|---|---|
| Solar Inverter (per inverter) | 91 |
| BESS enclosures – Daytime (per battery) | 77 |
| BESS enclosures reduced fan speed duty - night-time and early morning (per battery) | 72 |
| BESS Inverter (per inverter) | 83 |
| 132kV Substation | 85 |
| 400kV Substation | 85 |
| Solar Tracking Motor (per motor) | 50 |

12.8.39 As the plant operates continuously, no corrections for intermittency are necessary. The Scheme is not expected to produce any other noticeable sound characteristics or be impulsive. Corrections for acoustic features have therefore not been applied.

12.8.40 **Table 12-22 Summary of Operational Plant Noise Assessment for High Sensitivity Receptors** presents the operational preliminary assessment outcomes at nearby NSRs at a height of 1.5 m during the daytime and 4 m during the night-time and early morning periods, to represent a first-floor bedroom window.

**Table 12-22 Summary of Operational Plant Noise Assessment for High Sensitivity Receptors**

| Effect Level | Number of Receptors Daytime (07:00 to 23:00) | Number of Receptors Early Morning (04:00 to 07:00) | Number of Receptors Night (23:00 to 04:00) |
|---|---|---|---|
| Below NOAEL | 62 | 41 | 61 |
| Between NOAEL and LOAEL | 0 | 14 | 1 |
| Between LOAEL and SOAEL | 0 | 7 | 0 |
| Above SOAEL | 0 | 0 | 0 |

12.8.41 The quantitative results are presented in **ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]**.

12.8.42 During the daytime, the rating level from on-site operations at all assessed residential NSRs is anticipated to be below the prevailing background sound level. This is below the NOAEL threshold. Consequently, for operational noise during daytime hours at residential receptors with high sensitivity, the magnitude of impact is considered negligible, with effects anticipated to be **long term**, **negligible adverse**, and **not significant**.

12.8.43 During the early morning period, the rating levels at 41 residential receptors are equal to or below the background sound level. This is below the NOAEL threshold. Consequently, for operational noise during the early morning period at these residential receptors with high sensitivity, the magnitude of impact is considered negligible, with effects anticipated to be **long term**, **negligible adverse**, and **not significant**.

12.8.44 During the early morning period, the rating level at 14 residential receptors has been calculated to be 1 to 5 dB above the background sound level. This is above the NOAEL and below the LOAEL. Consequently, for operational noise during the early morning period at these residential receptors with high sensitivity, the magnitude of impact is considered low, with effects anticipated to be **long term**, **minor adverse**, and **not significant**. This is above the criteria proposed by the Local Planning Authority. Additional mitigation measures have therefore been identified in **Section 12.9 Additional Mitigation Measures**.

12.8.45 During the early morning period, the rating level at seven receptors has been identified as being between 6 and 8 dB above the background sound level. This is above the LOAEL and below the SOAEL. Consequently, for operational noise during the early morning period at these residential receptors with high sensitivity, the magnitude of impact is considered medium, with effects anticipated to be **long term**, **moderate adverse**, and **significant**. This is above the criteria proposed by the Local Planning Authority. Additional mitigation measures have therefore been identified in **Section 12.9 Additional Mitigation Measures**.

12.8.46 During night-time hours, the rating level at 61 receptors is equal to or below the background sound level. This is below the NOAEL. Consequently, for operational noise during the night-time period at these residential receptors with high sensitivity, the magnitude of impact is considered negligible, with effects anticipated to be **long term**, **negligible adverse**, and **not significant**.

12.8.47 During the night-time, the rating level at one receptor (NSR3B) exceeds the background sound level by 2 dB. This is above the NOAEL and below the LOAEL. Consequently, for operational noise during the night-time period at this residential receptor with high sensitivity, the magnitude of impact is considered low, with effects anticipated to be **long term**, **minor adverse**, and **not significant**. However, this is above the criteria proposed by the Local Planning Authority. The reason for this exceedance is due to noise emissions from the BESS Site.

12.8.48 The noise modelling of the BESS Site includes the embedded mitigation outlined in **Section 12.7 Embedded Mitigation**. BESS enclosures can only be mitigated at source by controlling fan speed duty or adding manufacturer provided attenuators. All reasonable mitigation options have been considered at this stage of the design. The BESS enclosures are expected to be the dominant noise source after mitigation of all other sources.

12.8.49 Based on a worst-case scenario, the assessment assumes that all the BESS enclosures and BESS inverters are operating at the worst case design duty. However, in reality, this is unlikely to be the case. The cooling fans associated with the systems will only operate on demand when cooling is required. During the night, when ambient temperatures are lower, it is likely that the cooling fans may operate at a lower duty than the levels outlined in the calculations or may not even run at all in the colder months. It is therefore likely that sound levels at the noise sensitive receptors will be lower than indicated within this assessment, reducing the potential noise impact and at times, complying with the Local Authority proposed criteria.

12.8.50 BS 4142:2014+A1:2019 (Ref 12-11) states '*for a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low'*. It goes on to say that *'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'.*

12.8.51 The assessment indicates that both background sound levels and rating levels are low at the assessment locations.

12.8.52 At NSR3B, the specific sound levels presented indicate that indoor ambient noise levels are likely to be approximately 23 dB(A) within a bedroom during the night-time (worst case) when considering a 10 dB sound reduction for a partially open window for ventilation, which would be considered as good acoustic conditions within a bedroom at night and is below BS 8233 (Ref 12-12) guidelines.

12.8.53 Based on potential mitigation options being exhausted, sound levels being lower than presented and consideration of the absolute sound levels, the likelihood of impact at NRS3B is low and in any event is assessed as not significant in EIA terms.

### Low Frequency Noise – High Sensitivity Receptors

12.8.54 An assessment of low frequency noise during daytime hours at the first-floor windows (worst case) has been provided based on the worst-case receptor locations within proximity to the NG substation, Project Substations and BESS.

12.8.55 The results of the assessment are presented in **ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]**.

12.8.56 The results of the low frequency noise assessment indicate that calculated sound levels at the worst-case high sensitivity receptors are below NANR45 (Ref 12-16) criteria. The assessment therefore requires no modification to the outcome of significance.

### Non-Residential Receptors

12.8.57 An assessment of the potential noise impact resulting from operational plant associated with the Scheme has been undertaken on non-residential receptors.

12.8.58 To estimate the internal sound levels likely to be experienced within occupiable rooms, the assessment assumes a 10 dB reduction of external sound levels through a partially openable window. This assumption aligns with standard industry practice.

12.8.59 The results of the assessment of medium and high sensitivity, non-residential receptors are presented in **Table 12-23 Operational Plant Noise Assessment - Non-Residential Receptors**.

**Table 12-23 Operational Plant Noise Assessment - Non-Residential Receptors**

| Receptor | Receptor Use | Internal Ambient Sound Level dB $L_{Aeq,T}$ | Magnitude of Impact | Significance of Effect |
|---|---|---|---|---|
| **Site 1 and BESS Site** | | | | |
| NSR5B | Commercial and Agricultural Facility/ Office | 26 | Negligible | Negligible |
| **Site 2** | | | | |
| NSR11 | Commercial Facility/ Office | 17 | Negligible | Negligible |
| **Site 3** | | | | |
| NSR18 | Religious Facility/ Place of Worship | 16 | Negligible | Negligible |
| **Site 4** | | | | |
| NSR26 | Religious Facility/ Place of Worship | 13 | Negligible | Negligible |
| **Site 5** | | | | |
| NSR29 | Commercial Facility/ Office | 22 | Negligible | Negligible |
| NSR30 | Nursery/ Nursery | 18 | Negligible | Negligible |
| NSR34 | Religious Facility/ Place of Worship | 18 | Negligible | Negligible |
| **Site 10** | | | | |
| NSR74 | Commercial Facility/ Office | 13 | Negligible | Negligible |

12.8.60 Noise associated with the operation and maintenance phase on medium and high sensitivity non-residential receptors is below the LOAEL and it has been determined to have a negligible magnitude of impact and **long term**, **negligible** adverse effects on the identified NSRs, which is **not significant**.

### Public Rights of Way

12.8.61 Noise emissions from the solar inverters along nearby PRoW have been assessed.

12.8.62 The assessment considers daytime sound levels along PRoWs, as these routes are primarily used for recreation and access during daylight hours. Details of the calculated sound levels along the PRoWs is provided in

12.8.63 **Table 12-24 Operational Plant Noise Assessment -** PRoW.

**Table 12-24 Operational Plant Noise Assessment - PRoW**

| Receptor | Description | Predicted Sound Level on PRoW dB $L_{Aeq,T}$ | Magnitude of Impact | Significance of Effects (Medium Sensitivity Receptor) |
|---|---|---|---|---|
| **Site 1 and BESS Site** | | | | |
| NSR6 | Great Moulton FP12,14,15,16,17,18<br>Great Moulton RB18-19<br>Tivetshall St Margaret FP2-3 | <50 | Negligible | Negligible |
| **Site 2** | | | | |
| NSR12 | Great Moulton FP11<br>Pulham Market FP6<br>Tivetshall St Margaret BR7,9<br>Tivetshall St Margaret FP4,5,8,10<br>Tivetshall St Margaret RB6<br>Wacton FP43<br>Wacton RB31,40 | <40 | Negligible | Negligible |
| **Site 3** | | | | |
| NSR19 | Hempnall FP24,25,26,28,29 | <40 | Negligible | Negligible |
| **Site 4** | | | | |
| NSR27 | Long Stratton FP1-7<br>Morningthorpe FP1 | <40 | Negligible | Negligible |
| **Site 5** | | | | |
| NSR36 | Hempnall FP33<br>Morningthorpe FP5,6,7,9,10,11,12,17,31,32 | ≤50 | Low | Negligible |
| **Site 7** | | | | |
| NSR57 | Hempnall BR30<br>Hempnall FP1-5<br>Morningthorpe FP1<br>Saxlingham Nethergate FP9-14,27,28<br>Saxlingham Nethergate RB17 | <50 | Negligible | Negligible |

| Receptor | Description | Predicted Sound Level on PRoW dB $L_{Aeq,T}$ | Magnitude of Impact | Significance of Effects (Medium Sensitivity Receptor) |
|---|---|---|---|---|
| | Tasburgh FP2<br>Woodton RB10 | | | |
| **Site 8** | | | | |
| NSR63 | Shotesham FP16-18, 22 | <50 | Low | Negligible |
| **Site 9** | | | | |
| NSR70 | Brooke FP6 | <40 | Negligible | Negligible |
| **Site 10** | | | | |
| NSR79 | Hedenham RB9<br>Seething RB13<br>Woodton RB3 | <50 | Negligible | Negligible |

12.8.64 Operational noise associated with the Scheme along PRoWs (medium sensitivity) are below the LOAEL and have been determined to have a **negligible to low** magnitude of impact and **long term**, **negligible adverse** effects on the identified NSRs, which would be considered **not significant**.

### PV Tracker Motors

12.8.65 Operational noise from solar PV tracking motors has been considered within the overall noise assessment, as requested during statutory consultation with SNC. Due to the scale of the Scheme and limitations of the modelling software, it is not practicable to model every individual tracking motor. Furthermore, the locations of panels and motors have not yet been finalised. Instead, an example worst-case scenario has been assessed to demonstrate that cumulative operational noise from tracking motors and typical operational plant associated with the Scheme will be negligible. This approach is considered proportionate and robust for a development of this nature.

12.8.66 Example tracking motors have been modelled within Site 8A, which has been identified as a potential closest point from solar arrays to a high sensitivity receptor, with a distance of approximately 90 m from the potential panels to the receptor (NSR60). The assessment is based on a sound power level of 50 dBA and 241 tracking motors distributed evenly across Site 8A, based on an assumption of one tracking motor per 100 m along each solar array. Calculated specific sound levels at the nearest noise-sensitive receptor, are approximately 11 dBA. This is considerably below typical background sound levels at all receptors and does not influence the overall specific sound levels. The assessment indicates that at all receptors, the magnitude of impact would be **negligible**. Operational noise from tracking motors will likely cause **long term**, **negligible adverse** effects, and are considered **not significant**.

### Maintenance and Replacement

12.8.67 Whilst noise and vibration from maintenance has been scoped out of the assessment, it has been requested by the Local Planning Authority to provide guarantees for controlling noise from new plant and machinery. Any replacement plant would be expected to achieve noise emissions equal to or lower than the originally installed equipment. This is included in the **Outline OEMP [EN0110014/APP/7.2].** On this basis, maintenance and replacement activities are not expected to give rise to significant noise effects.

### Decommissioning Phase

12.8.68 The Scheme is planned to be decommissioned after an operational period of approximately 60 years. Noise and vibration effects during decommissioning are anticipated to be similar to, and no greater than, those generated during the construction works and associated construction traffic. It is understood that cables will remain in the ground, which will require less activity than that presented within the construction phase.

12.8.69 No piling activities are expected to be required during decommissioning. Consequently, no notable vibration impacts are predicted for this phase of the Scheme.

12.8.70 The construction phase assessment therefore acts as a suitable, and in some cases conservative, representation of decommissioning impacts. For this reason, a standalone noise and vibration assessment for the decommissioning phase has not been produced. As a result, it is anticipated that noise and vibration from the decommissioning phase will be not significant in EIA terms.

## 12.9 Additional Mitigation Measures

### Additional Construction Phase Mitigation Measures

12.9.1 No additional mitigation measures have been proposed beyond the embedded mitigation already incorporated into the proposed construction methodology.

### Additional Operational Phase Mitigation Measures

12.9.2 The assessment of operational noise from solar inverters indicates that, during early morning periods, predicted noise levels could result in the NOAEL and LOAEL being exceeded, which could result in significant effects. The assessment was based on worst-case and precautionary assumptions, such as neglecting screening from different elements of the Scheme and operation at design duty at all periods of day and night. For the outcome of the assessment to not be significant, noise levels at the receptor should be

designed to achieve less than the LOAEL. Also, to achieve the criteria of the local authority, additional mitigation will be applied to not exceed the NOAEL where practicably possible.

12.9.3 Mitigation could include procuring low-noise inverter models, acoustic enclosures, relocation or reorientation of plant, or installation of noise barriers, subject to further detailed design. Example details of the sound reduction requirements needed to reduce noise levels below the NOAEL threshold for the solar inverters associated with each Site are provided in **Table 12-25 Sound Reduction Requirements for Solar Inverters**.

**Table 12-25 Sound Reduction Requirements for Solar Inverters**

| Site | Sound Reduction Requirement dB |
|---|---|
| Site 3 | 3 to 6 |
| Site 7 | 1 to 9 |
| Site 8 | 1 to 7 |
| Site 9 | 2 to 3 |

12.9.4 Mitigation measures outlined are included within the **Outline OEMP [EN0110014/APP/7.2]**. In addition to this, the resultant noise levels at receptors will be required achieve the levels set out within the **Outline OEMP [EN0110014/APP/7.2]**.

## Additional Decommissioning Phase Mitigation Measures

12.9.5 Many of the activities undertaken during the construction phase will be repeated for the decommissioning phase with the exception of piling, therefore no additional mitigation measures beyond the incorporation of best practice controls are considered necessary to mitigate the effects of noise or vibration during the decommissioning phase.

## Additional Mitigation Summary

12.9.6 To avoid significant effects, additional mitigation should be considered within the detailed CEMP in relation to NSR29 from Solar PV piling works, when design and construction information becomes available.

12.9.7 As no other significant effects have been identified above for receptors during the construction and decommissioning phase of the Scheme once embedded mitigation is taken into account, no additional mitigation measures for the Scheme are required in respect of those phases.

12.9.8 Additional example mitigation has been outlined for the operation and maintenance phase of the scheme in order to reduce sound levels such that effects are not significant. Noise emissions from the Scheme will be controlled via measures and noise requirements within the **Outline OEMP [EN0110014/APP/7.2]**.

## 12.10 Residual Effects

12.10.1 This section summarises the residual effects of the Scheme on following the adoption of embedded and additional mitigation.

### Residual Effects for Construction and Decommissioning

12.10.2 As there are no significant effects identified the effects will remain unchanged as those reported above in the assessment of likely effects.

### Residual Effects for Operational Phase

12.10.3 Further to the inclusion of example additional mitigation measures relating the control of solar inverter noise, the summary of the operational noise assessment can be seen below in **Table 12-26 Summary of Residual Operational Plant Noise Assessment for Residential Receptors**.

**Table 12-26 Summary of Residual Operational Plant Noise Assessment for Residential Receptors**

| Effect Level | Number of Receptors Daytime (07:00 to 23:00) | Number of Receptors Early Morning (04:00 to 07:00) | Number of Receptors Night (23:00 to 04:00) |
|---|---|---|---|
| Below NOAEL | 62 | 61 | 61 |
| Between NOAEL and LOAEL | 0 | 1 | 1 |
| Between LOAEL and SOAEL | 0 | 0 | 0 |
| Above SOAEL | 0 | 0 | 0 |

12.10.4 Further to the example additional mitigation measures outlined, this would reduce the sound levels to below the NOAEL at all properties during the daytime. Consequently, for operational noise during the daytime period at residential receptors, the magnitude of impact is considered negligible, with effects anticipated to be **long term**, **negligible adverse**, and **not significant**.

12.10.5 During the night-time and early morning period, 1 receptor is anticipated to be exposed to a rating level which is 2 dB and 1dB above the background sound level respectively. This is above the NOAEL and below the LOAEL. This is due to noise emissions from the BESS site. Consequently, for operational noise during the night-time and early morning period at this receptor, the magnitude of impact is considered low, with effects anticipated to be **long term**, **minor adverse**, and **not significant**.

## 12.11 Cumulative Effects Assessment

12.11.1 This section presents an assessment of cumulative effects between the Scheme and other existing and/or approved developments.

12.11.2 As set out in **ES: Chapter 2 EIA Methodology [EN0110014/APP/6.1.2]**, a Cumulative Effects Assessment (CEA) has been undertaken as part of the EIA in accordance with PINS Advice on Cumulative Effects Assessment (September 2024) and has considered two types of cumulative effects.

- In combination effects: the combined effect generated by individual effects on a particular receptor (presented within **ES: Chapter 19 In-Combination Effects [EN0110014/APP/6.1.19]**; and
- Cumulative effects: effects generated by the Scheme and other planned or approved developments on the same receptor (presented in **ES Chapters 6-18)**.

### Cumulative Effects

12.11.3 Cumulative effects may arise as a result of effects associated with the Scheme combining with effects associated with other developments. The list of developments has been narrowed down to focus on those developments which are most likely to give rise to cumulative effects. A long-list was generated which was then refined following consultation with relevant local planning authorities, this short-list forms the basis of this assessment.

12.11.4 The shortlist of cumulative developments/allocations can be found in **ES: Appendix 2.4: Cumulative Schemes [EN0110014/APP/6.3.2.4].**

#### Relevant Developments

12.11.5 Those developments which have the potential to result in cumulative effects on Noise and Vibration within the associated study area are set out in **Table 12-27 Short List Developments/Allocations Relevant to Noise and Vibration**. The remaining schemes are not considered to have cumulative effects on within the noise and vibration study area.

**Table 12-27 Short List Developments/Allocations Relevant to Noise and Vibration**

| Planning Ref | Description | Distance from the Scheme |
|---|---|---|
| 2024/3817 | Land to the North of Station Road Tivetshall St Margaret Norfolk | 0 |
| 2025/1689 | Land North of Carr Lane, Great Moulton, Norwich | 900 |

# Cumulative Effects Assessment

## Construction Phase

12.11.6 Potential cumulative construction noise and vibration effects could occur in the event that construction activities from multiple schemes operate simultaneously. The list of cumulative schemes has been reviewed.

12.11.7 It has been found that, for all of the cumulative schemes considered, potential cumulative construction noise impact on existing noise-sensitive receptors are unlikely to be significant due to distances and screening from existing buildings. Further, significant cumulative construction effects are unlikely to occur as it is expected that each development is anticipated to have a CEMP in place. Therefore, the cumulative impact is **negligible** and **not significant**.

## Operation and maintenance phase

12.11.8 A review of the nearby schemes where a cumulative impact could occur due to both schemes operating simultaneously has been undertaken. **Table** 12-28 Discussion on Operational Phase Cumulative Effects provides a discussion on the likely cumulative effects from schemes that are within proximity to the Scheme.

### Table 12-28 Discussion on Operational Phase Cumulative Effects

| Planning Ref | Comment |
|---|---|
| 2024/3817 | The proposed solar scheme is located in the field adjacent to the BESS site. A noise impact assessment has been provided as part of the application. The noise impact assessment authored by Inacoustic (ref 25-014) demonstrates that the shared receptor NSR3A could be exposed to specific sound levels 29 dBA $L_{Aeq,T}$ from the Scheme and 33 dBA $L_{Aeq,T}$ as a result of the committed development. The cumulative sound level from both schemes will likely result in 34 dBA $L_{Aeq,T}$. As no corrections are applied to the rating level, this would result in rating levels that are considered between the NOAEL and LOAEL. It should be noted that the Inacoustic report does not account for screening from the panels, which could result in up to 5 dB for partial screening and as a result, the specific sound levels from the scheme would likely be less than presented in the report. |
| 2025/1689 | The proposed development is located approximately 900 m to the north of the NG substation site. As such, the intervening distance would result in substantial attenuation of sound from the scheme before reaching any receptors that could be common to both schemes. Consequently, noise contributions from the Scheme at any shared receptors would be very low and materially below levels at which they could interact cumulatively with noise from the committed development. On this basis, the potential for cumulative |

| | |
|---|---|
| | operational noise effects between the two developments is considered negligible. |

12.11.9 As a result of the cumulative assessment, it indicates that at high sensitivity receptors, the magnitude of impact would be minor. Operational noise associated from cumulative schemes will likely cause **long term**, **minor adverse** effects, and are considered **not significant**.

### Decommissioning Phase

12.11.10 Decommissioning is likely to occur from 2091 onwards. It is therefore not possible to comment on cumulative effects from this Scheme as there is no readily-available information on decommissioning timescales relating to other schemes on the cumulative schemes list. In any case, significant cumulative decommissioning effects are unlikely to occur as it is expected that each development is anticipated to have a DEMP in place. Therefore, the cumulative impact is **negligible** and **not significant**.

## 12.12 Conclusion

12.12.1 This chapter has set out and assessed the likely effects of the Scheme in relation to Noise and Vibration. Likely effects have been assessed for the construction, operation and decommissioning phases of the Scheme. Following the implementation of embedded mitigation and example additional mitigation as detailed in **Section 12.7 Embedded Mitigation** and **Section 12.9 Additional Mitigation Measures** respectively, no residual effects have been identified in relation to Noise and Vibration during the construction, operation and maintenance and decommissioning phases.

12.12.2 **Table 12-29 Summary of Residual Effects for Noise and Vibration** sets out a summary of the Noise and Vibration environmental effects.

### Table 12-29 Summary of Residual Effects for Noise and Vibration

| Receptor | Sensitivity | Description of Impact | Magnitude of Impact | Scale and Nature of Effect | Significant/Not Significant |
|---|---|---|---|---|---|
| **Construction phase** | | | | | |
| Residential and Education Buildings<br>**Receptors identified in ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]** | High | Construction Activity Noise – Project Substations, National Grid Substation, BESS, Solar PV Arrays | Negligible to Low | Negligible to Minor Adverse | Not Significant |
| | | Construction Noise – Horizontal Directional Drilling | Negligible to High | Negligible to Major Adverse | Not Significant |
| | | Construction Activity Vibration – Project Substations, National Grid Substation, BESS, Solar PV Arrays | Negligible to Low | Negligible to Minor Adverse | Not Significant |
| | | Construction Traffic Noise | Negligible to Low | Negligible to Minor Adverse | Not Significant |
| | | Construction Traffic Vibration | Negligible to Low | Negligible to Minor Adverse | Not Significant |

| Receptor | Sensitivity | Description of Impact | Magnitude of Impact | Scale and Nature of Effect | Significant/Not Significant |
|---|---|---|---|---|---|
| **Operation and maintenance phase** | | | | | |
| Residential and Education Buildings<br>**Receptors identified in ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]** | High | Operational Noise - Project Substations, National Grid Substation, BESS, Solar PV Arrays | Negligible to Low | Negligible to Minor Adverse | Not Significant |
| Offices and Commercial Units<br>**Receptors identified in ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]** | Medium | Operational Noise - Project Substations, National Grid Substation, BESS, Solar PV Arrays | Negligible | Negligible | Not Significant |
| PRoW<br>**Receptors identified in ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]** | Medium | Operational Noise - Project Substations, National Grid Substation, BESS, Solar PV Arrays | Negligible to Low | Negligible | Not Significant |
| All | Low-High | PV Tracker Motors | Negligible | Negligible | Not Significant |
| **Decommissioning phase** | | | | | |

| Receptor | Sensitivity | Description of Impact | Magnitude of Impact | Scale and Nature of Effect | Significant/Not Significant |
|---|---|---|---|---|---|
| Residential and Education Buildings<br>**Receptors identified in ES: Appendix 12.2 Noise Modelling and Calculations [EN0110014/APP/6.3.12.2]** | High | Construction Activity Noise – Project Substations, National Grid Substation, BESS, Solar PV Arrays | Negligible to Low | Negligible to Minor Adverse | Not Significant |
| | | Construction Traffic Noise | Negligible to Low | Negligible to Minor Adverse | Not Significant |
| | | Construction Traffic Vibration | Negligible to Low | Negligible to Minor Adverse | Not Significant |

# 12.13 References

Ref 12-1 UK Government (1990) *Environmental Protection Act 1990 (as amended)*.

Ref 12-2 UK Government (1974) *The Control of Pollution Act 1974.*

Ref 12-3 Department for Energy Security and Net Zero (2025) *Overarching National Policy Statement for Energy (EN-1).*

Ref 12-4 Department for Energy Security and Net Zero (2025) *The National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3).*

Ref 12-5 Department for Energy Security and Net Zero (2025) *The National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5).*

Ref 12-6 Department for Levelling Up, Housing and Communities (2024) *National Planning Policy Framework (NPPF)*.

Ref 12-7 Department for Levelling Up, Housing and Communities (2025) Draft *National Planning Policy Framework*.

Ref 12-8 Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities (2019) *Guidance on Noise* https://www.gov.uk/guidance/noise--2 > accessed 17th December 2025.

Ref 12-9 Department for Environment, Food and Rural Affairs (2010) *Noise Policy Statement for England (NPSE)*.

Ref 12-10 Broadland District Council, Norwich City Council, South Norfolk Council (2024) *The Greater Norwich Local Plan*.

Ref 12-11 British Standards Institute (BSI) (2019) *British Standard 4142:2014 +A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound*.

Ref 12-12 British Standard Institute (BSI) (2014) *British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'*.

Ref 12-13 Schools Committee of the Association of Noise Consultants and the Institute of Acoustics (2015) *Building Bulletin 93 Acoustic Design of Schools: Performance Standards*.

Ref 12-14 World Health Organization (WHO) (1999) *Guidelines for Community Noise*.

Ref 12-15 Institute of Acoustics (IOA), Chartered Institute of Environmental Health (CIEH) and Association of Noise Consultants (ANC) (2017) *Professional Practice Guidance on Planning and Noise*.

Ref 12-16 Department for Environment, Food and Rural Affairs (Defra) (2005) *NANR45: Procedure for the assessment of low frequency noise complaints*.

Ref 12-17 British Standards Institute (2024) *BS ISO 9613:2024 Acoustics – Attenuation of Sound During Propagation Outdoors Part 2: General Method of Calculation*.

Ref 12-18 British Standards Institute (BSI) (2003) *British Standard 7445: Part 1:2003 Description and Measurement of Environmental Noise. Guide to Quantities and Procedures*.

Ref 12-19 British Standards Institute (BSI) (2013) *BS EN 61672-1:2013 - Electroacoustics. Sound level meters – Specifications*.

Ref 12-20 British Standards Institute (BSI) (2014) *5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise*.

Ref 12-21 British Standards Institute (BSI) (2014) *5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration*.

Ref 12-22 Department for Transport Welsh Office (1988) *The Calculation of Road Traffic Noise (CRTN)*.

Ref 12-23 Department for the Environmental, Food and Rural Affairs (Defra), Transport Research Laboratory (TRL) and Casella Stanger (2006) *Method for Converting the UK Road Traffic Noise Index LA10,18h to the EU Noise Indices for Road Noise Mapping*.

Ref 12-24 Standards for Highways (2020) *Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration*.

Ref 12-25 British Standard Institute (BSI) (2008) *BS 6472-1:2008 'Guide to Evaluation of Human Exposure to Vibration From Buildings – Part 1: Vibration Sources Other Than Blasting*.

Ref 12-26 Transport Research Laboratory (2000) *Groundborne Vibration Caused by Mechanised Construction Works TRL429.*

Ref 12-27 California Department of Transportation (2013) *Transportation and Construction Vibration Guidance Manual, CT-HWANP-RT-13-069.25.3.*

Ref 12-28 California Department of Transportation (2020) *Transportation and Construction Vibration Guidance Manual, Technical Advisory, TA-V-04-01-R0201MA.*

Ref 12-29 Federal Transit Administration (2018) *Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123*

Ref 12-30 Deutsches Institut für Normung e. V. (1999) *DIN 4150-3 Structural Vibration – Part 3: Effects of Vibration on Structures*

Ref 12-31 Association of Swiss Highway Engineers (1978) *SN 640 312:1989 Effect of Vibrations on Buildings*