THE DROVES
SOLAR FARM

The Droves Solar Farm

Chapter 10: Noise and Vibration

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10 Noise and Vibration

10.1 Introduction

10.1.1 This chapter of the Environmental Statement (ES) presents the findings of the Environmental Impact Assessment (EIA) of effects on Noise and Vibration as a result of the Scheme.

10.1.2 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.

10.1.3 The information presented within this chapter has been informed by the information provided in **ES Chapter 5: The Scheme [APP/6.1]**.

10.1.4 The following aspects have been considered within the Noise and Vibration assessment process:

- An assessment of potential effects upon all Noise-Sensitive Receptors (NSRs) (see Table 10.2), during the construction and decommissioning phases of the Scheme;
- An assessment of potential effects upon NSRs during the operational phase of the Scheme, from the operation of the National Grid Substation, Customer Substation, Battery Energy Storage System (BESS) and Conversion Units; and
- An assessment of potential effects upon Public Rights of Way (PRoW) during the construction, operational, and decommissioning phases of the Scheme.

10.1.5 This Noise and Vibration chapter has been prepared by Hoare Lea (See **ES Appendix 1.1: Statement of Competence [APP/6.4]**).

10.2 Consultation

Scoping Opinion

10.2.1 On 8 November 2024, the Applicant submitted a Scoping Opinion Request to PINS (see **ES Appendix 2.1: EIA Scoping Opinion Request [APP/6.4]**) in support of a request for a Scoping Opinion from the Planning Inspectorate on behalf of the Secretary of State pursuant to Regulation 10 of the EIA Regulations.

10.2.2 A Scoping Opinion (see **ES Appendix 2.2: Scoping Opinion [APP/6.4]**) was adopted by the Planning Inspectorate on 18 December 2024.

10.2.3 The issues raised in the Scoping Opinion (see **ES Appendix 2.2: Scoping Opinion [APP/6.4]**) relating to Noise and Vibration are summarised and responded to within **ES Appendix 10.1: Consultation and Legislation, Planning Policy and Guidance**

[APP/6.4] which demonstrates how the matters raised in the Scoping Opinion are addressed in this ES.

Statutory Consultation and Preliminary Environmental Information Report (PEIR)

10.2.4 Statutory consultation was held between 21 May 2025 and 9 July 2025. Relevant statutory responses to the PEIR relating to Noise and Vibration and how these have been addressed through the ES are set out within **ES Appendix 10.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]**.

Further engagement specific to noise and vibration was not considered to be required following the PEIR responses. A summary of all consultations with different stakeholders is detailed within **ES Appendix 10.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]**.

10.3 Legislation, Planning Policy and Guidance

10.3.1 A summary of applicable legislation, planning policy and other guidance documents against which the Scheme will be considered relating to noise and vibration is set out in **ES Appendix 10.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]**.

10.4 Assessment Assumptions and Limitations

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

- The distance between noise sources and receptors used to inform the construction and operational assessment have been measured from scale plans and mapping-based measurement tools
- The Scheme will use the existing A1065 road for access to the Site. New crossings for micro-access across the Site will be limited where possible and existing farm tracks and crossings will be used as far as practicable
- Electrical plant associated with energy generation would likely be distributed around the Solar PV Site. As the exact equipment used and its location is not determined in detail at this stage, the assessment is based on a reasonable worst-case assumption that a centralised inverter approach is likely to be used as this results in the highest potential noise levels based on experience of similar developments
- The Scheme will include different items of electrical plant, some of which have associated cooling equipment. As the final plant specification and approach is not known at this stage, an assessment of potential noise emissions based on an indicative plant layout and specification has been undertaken. Specifically, **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]**) has considered potential plant elements associated with centralised field inverters and Battery Energy Storage

System compound and the potential noise emissions associated, based on manufacturer data and experience of similar recent developments

- Noise modelling is undertaken on a conservative basis, assuming all plant is running at the same time, continuously, and at full capacity. It also does not account for the screening from the solar panels themselves. In addition, although some of the plant may be in outdoor enclosures, their sound reduction has been ignored for the purpose of this robust assessment in the absence of detailed information on their acoustic performance
- For the potential works which would be required for construction and decommissioning, in the absence of further details at this stage, reasonable worst-case working locations were considered, and typical noise emissions of construction plant items were referenced from BS 5228-1 (**ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]**). These were used to predict the average sound pressure level for the daily construction working period over different phases of the construction for respective receptors.

10.5 Assessment Methodology

10.5.1 This section sets out the scope and methodology for the assessment of the impacts of the Scheme on Noise and Vibration.

Sources of Information

10.5.2 The following sources of information that have been reviewed in the preparation of this chapter:

- Ordnance Survey (OS) data and satellite imagery have been used to identify Noise-Sensitive Receptors (residential, healthcare, commercial, industrial, if applicable) within 1km of the Site boundary, i.e. the Study Area
- A noise survey has been undertaken from 21 November 2024 to 4 December 2024 (c.14 days) consisting of long-term unattended measurements at two locations and short-term attended measurements at four locations to establish the acoustic environment of the area, details are provided in **ES Appendix 10.2: Noise Survey [APP/6.4]**
- **ES Figure 5.1: Concept Masterplan [APP/6.3]** has been used to inform indicative zones and locations for noise emitting plant in the Scheme, e.g., National Grid Substation, Customer Substation, Battery Energy Storage System, Conversion Units

Study Area

10.5.3 The assessment considers Noise-Sensitive Receptors, such as residential and PRoW, in the vicinity of the Site, and considers effects along the construction and operational traffic routes.

10.5.4 The assessment focuses on the nearest residential receptors surrounding the Site, with the understanding that where effects are managed to acceptable levels at these closest high-sensitive receptors then effects will also be acceptable at further away receptors, such as the educational and healthcare receptors found at further distances. Similarly, construction noise and vibration impacts will be localised for the respective closest NSRs given the temporary nature of these activities. Operational noise emissions from the proposed Customer Substation, National Grid Substation, and Battery Energy Storage System would likely be higher and the nearest properties to this area, within a radius of around 1000m, have been considered.

10.5.5 The Study Area for Noise and Vibration effects is therefore 1km from the Order limits and focuses on the effects at the nearest Noise-Sensitive Receptors with the understanding that these are key receptors for the assessment of effects and the level of effects on Noise-Sensitive Receptors at further distances would be lower. As such, assessment of all Noise-Sensitive Receptors within the Study area is not required.

10.5.6 The Study Area only includes receptors in the Breckland Council (BC) area as no receptors were found to be closer than 1000m to the Order limits within the KLWNC's boundary.

Potential Impacts

10.5.7 Embedded mitigation measures have been incorporated into the design and construction of the Scheme and are set out in Section 10.7 below. Prior to the implementation of any mitigation (embedded or additional), the Scheme has the potential to have an effect on noise and vibration receptors (either adverse or beneficial) during the construction, operational and decommissioning phases in the following ways:

- Noise impact during construction, decommissioning, and operational phases from National Grid Substation, Customer Substation, Battery Energy Storage System, and Conversion Units
- Vibration impacts from construction and decommissioning phases only from the construction and decommissioning of the National Grid Substation, Customer Substation, Battery Energy Storage System, and Conversion Units
- Noise and vibrational impacts on ecological receptors across construction, operational, and decommissioning phases from National Grid Substation, Customer Substation, Battery Energy Storage System, and Conversion Units, (as presented in **ES Chapter 7: Ecology and Biodiversity [APP/6.2]**)
- Noise impact from traffic generated during the construction, decommissioning, and operational phases
- Noise and vibrational impacts from construction and decommissioning phases of Grid Infrastructure and overhead/underground cables
- Noise and vibrational impacts from construction and operational phases on Public Right of Way

10.5.8 Noise from the decommissioning phase and decommissioning traffic is expected to be similar or less than the construction phase. As such, as a quantitative assessment of construction traffic noise has been undertaken, then decommissioning traffic noise is subject to similar management or control procedures and therefore can be assessed qualitatively with justifications. As such, potential effects from decommissioning activity and traffic noise have been scoped in; however, likely significant effects from decommissioning are outlined relative to the effects from the construction phase assessment.

10.5.9 Some of the construction activities, such as piling operations, drilling or vibratory rolling techniques, have the potential to generate vibration levels in close proximity to sensitive receptors. These activities may be undertaken for construction of PV Panels, Battery Energy Storage System, Customer Substation, Grid Connection Infrastructure, and the National Grid Substation; as such, vibration effects from the construction and decommissioning phases have been assessed.

10.5.10 Ecological receptors within the Scheme and study area do not include any protected species. An assessment of noise and vibration (indirect effects) on ecological receptors is presented in **ES Chapter 7: Ecology and Biodiversity [APP/6.2]** and this is therefore not considered further in this ES chapter.

Elements Scoped Out

10.5.11 The following elements have been scoped out of the assessment, as agreed in the Scoping Opinion from PINS (**ES Appendix 2.2: Scoping Opinion [APP/6.4**) and the Environmental Health Department of BC, as summarised in **ES Appendix 10.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]**.

10.5.12 The Design Manual for Roads and Bridges (DMRB) (Ref 10-1) advises that significant vibration impacts from traffic using the road network is unlikely and references BS 5228-2 (Ref 10-2) which does not consider vibration from vehicle movements as a notable source. Whilst occasional momentary vibration can arise when heavy vehicles pass dwellings at very short separation distances (i.e. 10 m or less), this is not sufficient to constitute a risk of significant effects and therefore vibration impacts associated with road traffic during all phases of the Scheme are scoped out of the EIA.

10.5.13 Negligible vibration effects during the operational phase of the Scheme are expected, based on the nature of the proposed equipment, with either no moving parts or small parts such as fans which would only generate low amounts of vibration, which would in turn not be perceptible beyond a short distance of less than a few metres. This aspect is therefore scoped out of the EIA.

10.5.14 Due to the nature of the Battery Energy Storage System, National Grid Substation, and Customer Substation plant (i.e., transformers, inverters, batteries etc.), plant operation is unlikely to have any notable vibration effects at the receptors. Similarly, the decommissioning phase is unlikely to include activities which produce high vibration levels of significant impact and certainly no greater than the effects from the construction phase.

As such, vibration effects from all components of the Scheme for the operational and decommissioning phases have been scoped out of the EIA.

10.5.15 The Grid Connection Infrastructure, such as overhead lines, can generate corona discharge noise at low levels in certain weather conditions. However, given the limited extent of this infrastructure, which includes the additional pylons and overhead lines as worst-case, and its likely location relative to noise-sensitive receptors, this is unlikely to create significant noise or vibration effects during operation in this instance. Furthermore, underground cables of the Grid Connection Infrastructure are not expected to generate any noise or vibration effects, therefore, noise and vibration effects from the operation of Grid Connection Infrastructure are scoped out of the EIA.

10.5.16 Receptors of low/negligible sensitivity, such as agriculture, industrial/commercial buildings, even with high impact, are unlikely to experience significant effects based on the significance of criteria matrix, and are, therefore, scoped out of the EIA.

10.5.17 Table 10.1 below presents a summary of the aspects scoped into the EIA.

Table 10.1 Summary of Noise and Vibration Assessment Scope

Aspect	Construction	Operation	Decommissioning
Noise – Customer Substation, National Grid Substation, Battery Energy Storage System, Solar PV Site	Scoped In	Scoped In	Scoped In
Vibration – Customer Substation, National Grid Substation, Battery Energy Storage System, Solar PV Site	Scoped In	Scoped Out	Scoped In
Noise and Vibration – Ecological Receptors	Scoped In (**ES Chapter 7: Ecology and Biodiversity [APP/6.2]**	Scoped In (**ES Chapter 7: Ecology and Biodiversity [APP/6.2]**)	Scoped In (**ES Chapter 7: Ecology and Biodiversity [APP/6.2]**)
Noise – Traffic	Scoped In	Scoped In	Scoped In
Vibration – Traffic	Scoped Out	Scoped Out	Scoped Out
Noise and Vibration – Grid Connection Infrastructure (overhead / underground cables, connection towers)	Scoped In	Scoped Out	Scoped Out

Noise and Vibration – Low Sensitivity Receptors	Scoped Out	Scoped Out	Scoped Out
Noise – Public Rights of Way Receptors	Scoped In	Scoped In	Scoped Out

Impact Assessment Methodology

10.5.18 The noise and vibration assessment follows the approach to undertaking EIA as explained in **ES Chapter 2: EIA Process and Methodology [APP/6.1]**. The methodology for attributing sensitivity of receptors, magnitude of impacts and the significance of effects in relation to noise and vibration is described further below in this chapter of the ES.

Sensitivity of Receptor

10.5.19 The sensitivity of likely impacted receptors, defined depending on the vulnerability, recoverability and value/importance of the receptor, to potential effects arising from the Scheme is assessed in line with the below, as detailed in Table 10.2.

Table 10.2 Sensitivity Criteria of Identified Noise-Sensitive Receptors

Sensitivity	Description
High	Residential, healthcare, education receptors
Medium	Public or recreational receptors, public right of way
Low/Negligible	Commercial, industrial, non-residential receptors

10.5.20 All residential receptors in this assessment are considered to be of high sensitivity for noise and vibration effects. Healthcare and educational receptors were found to be further away than the representative residential receptors assessed, as such, assessment of the nearest residential receptors in this case is sufficient to present the worst-case effects for all receptors of high sensitivity.

10.5.21 PRoW are located within the Order limits close to the indicative locations of the Customer Substation, National Grid Substation, and Battery Energy Storage System. These have been considered as Noise-Sensitive Receptors in the context of the noise assessment with medium sensitivity.

10.5.22 Other potential receptors in the Study Area include some agriculture or industrial facilities, which are considered to have a low or negligible sensitivity to noise. Because of their reduced sensitivity, this would result in non-significant effects even with moderate or major magnitude of impact; they are therefore not included in the EIA assessment.

Magnitude of Impact

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

- Extent
- Duration
- Frequency
- Reversibility

10.5.24 The magnitude of impact is the level of change caused by the Scheme and is defined in Table 10.4 and Table 10.5. These criteria are determined based on relevant guidance and standards as well as professional judgement.

10.5.25 Ultimately, the methodologies for determining the magnitude of impact are derived to relate to national and local policy, as set out in **ES Appendix 10.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]**. In particular, levels of effects are related to the NPSE (Ref 10-3) thresholds; see Table 10.3. In deriving the magnitude criteria, due consideration has been given to qualitative requirements in the NPPF and the NPPG categorisations on noise (Ref 10-4).

Table 10.3 Relating the magnitude of impact terminology to key NPSE phrases

Magnitude of Impact	Description
Negligible	No Observed Effect Level (NOEL)
Low	Lowest Observed Adverse Effect Level (LOAEL)
Medium	Significant Observed Adverse Effect Level (SOAEL)
High	No corresponding term (> SOAEL)

Construction and Decommissioning Phase

10.5.26 Noise and vibration from onsite construction and decommissioning activities have been assessed with the guidance of BS 5228 Parts 1 and 2 (Ref 10-2). This provides guidance on a range of considerations relating to construction noise and vibration including general control measures, estimating likely levels and example criteria. All construction noise effects can be characterised as temporary, short-term adverse.

10.5.27 Construction noise magnitude criteria are set out in Table 10.4. The criteria is based on construction noise over the working day as outlined in **ES Chapter 5: The Scheme [APP/6.1]** to be Monday to Friday 07:00 to 18:00 and Saturday 08:00 to 13:30. However,

some work outside these times or night-time work may be required, e.g., HDD, concrete pour in foundations etc, and as such, night-time criteria has also been provided.

10.5.28 Table 10.4 is based on the guidance values set out in BS 5228-1 (Annex E) (Ref 10-2) and the measured baseline noise levels in the area (in quiet areas) apply to sustained construction activities occurring during the weekday daytime or Saturday morning periods, with more stringent criteria considered for works outside of these times. Some properties located closest to the A47 experience higher baseline noise levels and therefore the criteria of Table 10.4 may be relatively stringent, but this will be considered on a case-by-case basis accounting for the context of the impact. For construction activities which may be expected to occur for less than four weeks in a year, the magnitude of the corresponding effects would reduce.

10.5.29 Whilst most construction activities will be carried out during daytime, there is the possibility that some activities associated with possible trenchless construction works, including HDD, may need to be carried out at night. As indicated below, in Table 10.4, the applicable criteria would normally reduce by 20 dB for night-time work; however, consideration of the duration of the works is also a relevant consideration.

10.5.30 Table 10.4 therefore sets out additional criteria that would apply to trenchless work which would only be undertaken in proximity to any particular location for short periods of less than 1 week.

10.5.31 Details of the exact construction method, plant and duration are not available at this stage of the Scheme's evolution. Potential noise levels are therefore assessed based on conservative assumptions (see Assessment Assumptions and Limitations section), considering potential emission noise levels from typical activities based on the type and scale of development. As noted in Section 10.7 of this chapter, it is assumed that construction activities and construction vehicle movements would be restricted to daytime periods on weekdays and Saturdays with most activities interrupted at other times. Predicted noise levels are calculated over the full working day period, however, based on professional judgement, predicted magnitude of impact may be reduced where the duration of works is short, e.g., half a day or less of a working day, at the closest point to receptors, or when prior notice is given to residents for short duration of noisy work.

10.5.32 Potential levels of noise associated with different construction activities, for different distances, are evaluated in **ES Appendix 10.3: Noise Modelling and Assessment [APP/6.4]**. This appendix also sets out the separation distances of the Noise-sensitive Receptors around the Site from the areas where the respective elements of Customer Substation and National Grid Substation with associated Grid Infrastructure, Battery Energy Storage System and Solar PV Site may be constructed, as detailed in **ES Figure 5.1: Concept Masterplan [APP/6.3]**.

10.5.33 The Concept Masterplan shows indicative zones and demarked fields for the various elements of the Scheme, such as Customer Substation and National Grid Substation with Grid Connection Infrastructure, Battery Energy Storage System, and Solar PV Site. It is understood that the works for the respective elements and associated grid infrastructure

will be undertaken at these indicative zones only, whereas general works such as access road construction or HDD may be undertaken at any location at this stage and will be finalised at a later design stage of the Scheme. Therefore, assessment of noise from construction activities has been separated for these elements and propagation distances from respective zones have been used to determine worst-case noise levels at the nearest receptors, for example, noise from construction activities such as earthworks or installation works for the National Grid Substation have been calculated from the closest point of the nearest indicative siting zone as detailed in **ES Figure 5.1: Concept Masterplan [APP/6.3]** and the **Works Plan [APP/2.3]**. **ES Chapter 5: The Scheme [APP/6.1]** outlines the selected fields for respective components of the Scheme.

10.5.34 Some construction activity and associated plant could generate significant vibration. The magnitude of Peak Particle Velocity (PPV) has been estimated for these activities based on reasonable worst-case working locations using BS 5228-2 guidance. The criteria of Table 10.4 for the assessment of the magnitude of construction vibration are based on the guidance in Section B.2 of BS 5228-2 which provides advice on human response to vibration. BS 5228-2 also advises that any risk of building damage, even for sensitive buildings, would only occur at much stronger vibration levels, therefore the proposed criteria would also provide protection in this regard.

10.5.35 The prediction method of CRTN (Ref 10-5) has been used to calculate the possible noise effects of construction related traffic passing to and from the Site, as well as noise effects anticipated from operational traffic along local surrounding roads. This is assessed with reference to the DMRB: see criteria in Table 10.4.

Table 10.4 Classification of Magnitude of Impact – Construction Noise and Vibration

Effect magnitude	Construction noise [1] over working day	Night-time activity (<1 week)	Construction vibration (PPV)	Traffic noise increase
High	>75 dB L_{Aeq}	>60 dB L_{Aeq}	>10 mm/s	>5 dB
Medium	≤75 dB L_{Aeq} >65 dB L_{Aeq}	≤ 60 dB L_{Aeq} >55 dB L_{Aeq}	<10 mm/s >1 mm/s	3 to 5 dB
Low	≤65 dB L_{Aeq} >55 dB L_{Aeq}	≤55 dB L_{Aeq} >45 dB L_{Aeq}	<1 mm/s ≥0.3 mm/s	1 to 3 dB

[1] This assumes construction during weekday daytime or Saturday mornings for a sustained period of 1 month or more. For sustained works during evening, Sundays, Bank Holidays or Saturday afternoons, the criteria would be reduced by 10 dB, and for night-time works by 20 dB.

Negligible	≤55 dB L_{Aeq}	≤45 dB L_{Aeq}	<0.3 mm/s	<1 dB

Operational Noise

10.5.36 The impact of operational noise is assessed on the basis of the BS 4142 standard (Ref 10-6), which provides an objective method for rating the potential effect of noise from fixed plant installations based on the background noise levels that prevail on a site. The potential character of the noise from the electrical plant items, in particular Inverters and Transformers, is taken into account by incorporating a penalty in line with BS 4142 guidance.

10.5.37 **ES Appendix 10.3: Noise Modelling and Assessment [APP/6.4]** details the assumptions made for the noise modelling of the operational noise from electrical and mechanical plant associated with the Conversion Units, National Grid Substation and Customer Substation, and Battery Energy Storage System, based on manufacturer or representative noise emission information, including Transformers, Inverters, battery unit, Power Conversion Systems (PCS) units, and associated cooling equipment. Potential noise from solar tracking motors was also considered but was established to have negligible levels of noise emissions and therefore did not require inclusion in the noise model. Noise modelling was undertaken on the basis of neglecting screening effects from the PV Panels and Battery Energy Storage System Units to provide a worst-case assessment.

10.5.38 Although the Scheme will mainly operate during the daytime, in which background levels tended to be more elevated, daylight periods may extend to early morning periods of the night (05:00 to 07:00) and evening periods during the summer months. Furthermore, the Battery Energy Storage System, Customer Substation and National Grid Substation could operate at any time depending on associated requirements. Therefore, as a worst-case, noise from the Scheme has been considered against both daytime and night-time background levels. All elements have also been assumed to operate at full duty, which is likely to be conservative, particularly at night where lower temperatures mean cooling loads would reduce. Table 10.3.6 of **ES Appendix 10.3: Noise Modelling and Assessment [APP/6.4]** presents the assumed noise emission levels and spectrum for each plant included in the noise model, based on representative manufacturer information.

10.5.39 One of the highest potential sources of operational noise are the Transformers and PCS Inverters associated with the Battery Energy Storage System, which may be due in part to the conservative assumptions made as the basis of the modelling. As noise from these and the other Inverters and Transformers are likely to be the main noise source from the Scheme, a penalty of +2 dB for a slightly audible tonal character has been applied to the calculated noise levels in accordance with BS 4142 (see **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]**). The resulting rated noise levels are then compared with background noise levels for the Noise-sensitive Receptors considered (Table 10.2.4 in **ES Appendix 10.2: Noise Survey [APP/6.4])** and the associated magnitude of change is assessed using the criteria of Table 10.4 and is set out in detail in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]**).

10.5.40 A contextual analysis is fundamental in BS 4142, and this requires consideration of factors such as the nature of the area and, particularly at night-time, the absolute level of the noise. An external free-field noise rating level criterion of L_{Ar} 35 dB is proposed at NSR locations in cases where the background levels are low (below 30 dB L_{A90}). This would provide satisfactory external amenity during the daytime and suitable internal noise levels at night with windows open for ventilation, even taking into account the potential character of the noise, and similar criteria were applied for other solar farm developments. This was proposed in consultation with BC's Environmental Health Department. The response to the PEIR from BC is set out in **ES Appendix 10.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]** which confirms that the proposed criteria are acceptable. The resulting assessment criteria are set out in Table 10.5.

Table 10.5 Classification of Magnitude of Impact - Operational Noise

Sensitivity	Description
High	Rating level L_{Ar} above 35 dB, and/or 10 dB or more above background, depending on the context.
Medium	Rating level L_{Ar} above 35 dB, and/or 5 dB, or more above background, depending on the context.
Low	Rating level L_{Ar} less than 5 dB above background, or below the background, depending on the context; or rating level does not exceed 35 dB.
Negligible	Rating level L_{Ar} 5 dB or more below background, depending on the context.

10.5.41 In addition to the guidance in BS 4142 and following consultation with BC, reference has been made to the DEFRA/University of Salford method for the assessment of low frequency noise (2005) (Ref 10-7). This is relevant when undertaking an assessment of noise from the proposed Customer Substation equipment which includes Transformers with emission of noise at a frequency of 100 Hz and multiples thereof. This method is based on the comparison of predicted internal noise levels within residential properties in 1/3 octave frequency bands with a criterion curve that extends between frequencies of 10 Hz and 160 Hz.

10.5.42 For the purposes of the assessment presented in this chapter, an exceedance of the DEFRA/University of Salford low frequency noise criterion curve is considered significant in EIA terms, whereas if noise levels are below the DEFRA/University of Salford criterion curve in all 1/3 octave bands (and hereto 1/1 octave bands), low frequency noise levels are considered not significant in EIA terms. At 100 Hz, the DEFRA/University of Salford criterion curve is a level of 38 dB (linear, internal within dwellings) on the basis that the source may operate at any time including the night-time.

10.5.43 Operational noise impacting on PRoW will be assessed against an absolute noise level criterion of 55 dB(A), whereby exceedance of this threshold will result in high magnitude of impact and level below this limit results in a medium or lower magnitude of impact.

Categorising Scale of Effect

10.5.44 The predicted significance of the effect is determined through a standard method of assessment and based on professional judgement, considering both the sensitivity of the receptor and the magnitude of the impact.

10.5.45 There are four categories demonstrating the scale of effect:

- Negligible
- Minor
- Moderate
- Major

10.5.46 The significance of effect with respect to Sensitivity of Receptor and Magnitude of Impact is presented in Table 10.6.

10.5.47 The nature of effects is defined as adverse and either: short-term (construction phase) or long-term (operational phase).

Table 10.6 Significance of Effect Matrix

Magnitude of Impact	Sensitivity of Receptor			
	High	Medium	Low	Negligible
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Minor	Negligible
Low	Minor	Minor	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Determining Significance of Effect

10.5.48 The significance of effects for noise and vibration has been determined following the broad principles set out in **ES Chapter 2: EIA Process and Methodology [APP/6.1]**, in that the sensitivity of the receptor (which for the purposes of this assessment is high for residential and medium for public rights of way) is combined with the magnitude to determine the impact significance.

10.5.49 For the assessment of the likely significant environmental effects associated with noise and vibration, only effects that are assessed as 'Major' and 'Moderate' are considered significant in EIA terms.

10.5.50 All effects categories above are adverse in nature. NPPG, in terms of noise, states:

"Adverse effects are understood as noise impacts that result in harm or significant disturbance to people, affecting their health and quality of life" (Ref 10-4).

10.5.51 This takes into consideration multiple factors such as number of noise occurrences, time of day, and sensitivity of the affected receptors, frequency, and context. The descriptions set out in planning guidance and described in **ES Appendix 10.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]** and Table 10.3 provide further descriptions of the potential effects and their significance. The significance of effect categories are defined as following:

- Major: Adverse effect from noise leading to extensive change in behaviour and psychological effects, such as, regular sleep disturbance, noise induced stress, intrusive and/or disruptive noise at all times, and diminished quality of life.
- Moderate: Adverse effect from noise causing material change in behaviour and/or attitude, such as, closing windows, periods of noise intrusion/disruption, potential sleep disturbance. Quality of life diminished due to change in acoustic character of the area.
- Minor: Adverse effect from noise which can be heard but is not dominant/intrusive and causes small changes in behaviour and/or attitude, such as, turning up volume of television, closing windows for some of the time due to noise. Affects the acoustic character of the area such that there is a small change in the quality of life.
- Negligible: Some effect from noise which can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but does not diminish/change the quality of life.

10.6 Baseline Conditions

The Order limits

10.6.1 The Scheme is located within the administrative areas of NCC and BC who are the host authorities, and adjacent to the administrative boundary of the Borough Council of KLWN. A full description of the Order limits is provided in **ES Chapter 5: The Scheme [APP/6.1]**.

Existing Baseline

10.6.2 The Site is located in a predominately rural area of generally low population density, comprising mostly of agricultural fields except for neighbouring settlements of South Acre and Castle Acre to the north, West Acre to the north-west, Narford to the west, and the town of Swaffham to the south.

10.6.3 The baseline noise environment was observed to be varied but typical of the rural location of the Site, with a range of natural noise sources and a varying influence of road traffic from the A47 to the south and A1065 to the east of the Site. Residential properties located to the north of the Site near the village of South Acre and other residential properties located around the Site experienced reduced levels of traffic noise.

10.6.4 Traffic noise, in particular from the A47, also represents a notable influence in the area, which can be dominant for properties located in proximity to the A17 and to some extent A1065, while more distant or minimal for other properties located further away.

10.6.5 It is considered that noise from agricultural activities will also represent a contribution at times given the nature of the area, although this may be for limited periods particularly during evening and night-time periods.

10.6.6 Assessment of vibration effects from construction activities is independent of baseline levels and based on absolute limits as shown in Table 10.4; as such, no baseline survey or conditions are required to inform the construction vibration assessment.

Desk Study

10.6.7 The assessment has considered Noise-Sensitive Receptors, such as residential and Public Right of Way, in the vicinity of the Site, identified using OS data and satellite imagery, and considered effects along the construction phase and operational phase traffic routes.

10.6.8 The assessment focuses on the nearest residential receptors surrounding the Site, with the understanding that where effects are managed to acceptable levels at these closest high-sensitive Noise-Sensitive Receptors then effects will also be acceptable at further away receptors, such as the educational and healthcare receptors found at further distances. Similarly, construction noise and vibration impacts will be localised for the respective closest NSRs given the temporary nature of these activities. Operational noise emissions from the proposed Customer Substation, National Grid Substation, and Battery Energy Storage System areas could be relatively higher and the nearest properties to this area, within a radius of around 1km, have been considered.

10.6.9 Distance of effect from vibration is typically much smaller than noise. Vibration effects from construction activities such as piling or trenchless drilling (for example, HDD), will be assessed within the same Study Area of 1km from Noise-Sensitive Receptors, but generally effects are not expected to be significant at distances of more than 100m.

10.6.10 Dwellings exposed to traffic noise along the construction traffic route, which is described in **ES Chapter 9: Transport and Access [APP/6.2]**, were also considered in terms of how the traffic noise levels they currently experience may change during the construction phase, and the changes in traffic levels to the local surrounding roads due to the operation of the proposed Scheme, including replacement and maintenance activities, are also considered in the assessment.

Surveys

10.6.11 A Baseline Noise Survey was undertaken in November 2024, consisting of long-term noise monitoring from 21 November 2024 to 4 December 2024 (c.14 days) at two locations and further short-term measurements around the Site at four representative locations to characterise the noise environment of the local area. The survey methodology and measurement locations were discussed and agreed in consultation with the BC the survey and results are detailed in **ES Appendix 10.2: Noise Survey [APP/6.4]**. The survey was undertaken in line with guidance in BS 4142 as agreed in consultation with the Environmental Health Department of BC.

10.6.12 This survey demonstrated that in the daytime, background levels of 25 to 35 dB $L_{A90,\ 15min}$ could be typically experienced at properties neighbouring the Solar PV Site, with higher noise levels of 53-54 dB $L_{A90,15min}$ for locations exposed to traffic noise on roads carrying higher traffic such as the A47 to the south. Locations to the north of the Solar PV Site experienced a quieter environment during the daytime due to their increased distance from road traffic. During quieter evening periods, levels measured at the fixed positions tended to decrease to 20-34 dB $L_{A90,15min}$ as activity levels decreased, and regularly below 30 dB $L_{A90,15min}$ at night-time. This is considered typical of properties neighbouring the Solar PV Site and of this type of rural area.

Future Baseline

10.6.13 This section considers changes to the baseline conditions as far as changes can be established, described above, 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 Process and Methodology [APP/6.1].**

10.6.14 In absence of the Scheme, the noise characteristics at the nearest Noise-Sensitive Receptors considered in this EIA are expected to remain dominated by the agricultural and anthropological noise in the local area and are not expected to change significantly.

10.7 Embedded Mitigation

10.7.1 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.

10.7.2 The following embedded mitigation measures have been incorporated into the Scheme's design for each component of the Scheme; this is also illustrated in **Figure 5.1: Concept Masterplan [APP/6.3]**.

10.7.3 The design of the Scheme has been developed with consideration of the distance between the proposed Customer Substation, National Grid Substation and Battery Energy Storage System areas and other noise-generating plant and receptors, such as residential properties and PRoW including minimum separation buffers.

Embedded Construction Phase Mitigation

10.7.4 The following embedded mitigation measures have been incorporated into the Scheme's design for the construction phase, including good practice measures detailed below which will be implemented as part of a site-specific **oCEMP [APP/7.6]** which will be secured through a DCO requirement, to manage the effects of noise and vibration during construction activities, and will be required of all contractors:

- As proposed in **ES Chapter 5: The Scheme [APP/6.1]**, activities that may give rise to audible noise at the surrounding properties and heavy goods vehicle deliveries to the Site would be limited to the hours 07:00 to 18:00 Monday to Friday and Saturday 08:00 to 13:30 unless otherwise approved in advance by BC (except in case of an emergency). Those activities that are unlikely to give rise to noise audible at the Site boundary, or light vehicle traffic accessing the Site such as that involved with staff mobilisation, may continue outside of the stated hours
- The embedded mitigation contained in the **oCEMP [APP/7.6]** includes a commitment to liaise directly with local residents, and the wider community, e.g., notifying them when particular noisy activities will occur and their duration
- The Site contractors shall be required to employ the BPM of reducing noise emissions from plant, machinery, and construction activities, as advocated in BS 5228-1. This includes: selection of quieter equipment where reasonably practicable; all plant not in use to be switched off; minimising use of tonal reverse alarms and using broadband alarms where practicable; mobile plant and stationary plant items to be routed or located to maximise separation distance from noise-sensitive receptors (where practicable), accounting for site-specific constraints; all equipment used would be maintained in good working order; and associated noise attenuation such as engine casing and exhaust silencers shall remain fitted at all times
- Local residents will be informed of any percussive piling or earthworks construction activities planned as part of the reporting of information to local residents

10.7.5 The above measures are included within the **oCEMP [APP/7.6]** which has been submitted with this DCO Application. The final measures and management plan for noise will be included as part of the detailed CEMP, in consultation with BC, and is secured through a requirement of the **dDCO [APP/3.1]**.

10.7.6 An **oCTMP [APP/7.7]** is included as part of this DCO Application whilst a detailed CTMP is secured by a requirement of the **dDCO [APP/3.1]** to control the movement of vehicles, access routes, hours of movement, and types of vehicles to and from the Site.

10.7.7 The detailed management plans would be produced substantially in accordance with the mitigation/management measures detailed in the outline management plans.

Embedded Operation Phase Mitigation

10.7.8 The following embedded mitigation measures have been incorporated into the Scheme's design for the operational phase:

- Placement of National Grid Substation, Customer Substation, and Battery Energy Storage System, in Fields 27 & 24, has been selected to maximise separation distances to residential receptors as far as reasonably possible
- Acoustic barrier of 3.5m height is proposed along the western boundaries of Field 27 and partially along the western side of Field 24, between the Battery Energy Storage System Compound and the PRoW
- Minimum separation distance of 15m between for Conversion Units in the Solar PV Site to the PRoW
- Minimum separation distance of 250m for Conversion Units in the Solar PV Site to residential receptors

10.7.9 An **outline Operational Environmental Management Plan (oOEMP) [APP/7.8]** is submitted with this DCO Application and includes measures to monitor and maintain the equipment, including noise production, and a complaints procedure for members of the public to report noise disturbance at residential properties, as well as the embedded mitigation measures above and additional measures presented in Section 10.9 Additional Mitigation Measures. The complaints procedure will be managed in consultation with Breckland Council and the process reviewed annually. The production of a detailed OEMP, substantially in accordance with the **oOEMP [APP/7.8],** is secured by a requirement of the **dDCO [APP/3.1]**.

10.7.10 Maintenance during the operational phase including ad-hoc replacements of defective PV panels will be carried out on a small scale typically by using light service vehicles (e.g., 4x4 or Panel Vans) and limited HGV use. Programmed replacements and upgrades of PV Panels or Battery Energy Storage System components will also be phased. These measures are outlined in the **outline Operational Traffic Management Plan (oOTMP) [APP/7.9]** submitted with this DCO Application. The **oOTMP [APP/7.9]** forms the basis of the detailed OTMP which is secured through by a requirement of the **dDCO [APP/3.1]**.

Embedded Decommissioning Phase Mitigation

10.7.11 The following embedded mitigation measures have been incorporated into the Scheme's **outline Decommissioning Strategy (oDS) [APP/7.10]**:

- Activities that may give rise to audible noise at the surrounding properties and heavy goods vehicle deliveries to the Site would be limited to the hours 07:00 to 18:00 Monday to Friday and Saturday 08:00 to 13:30 unless otherwise approved in advance by BC (except in case of an emergency). Those activities that are unlikely to give rise to noise audible at the Site boundary, or light vehicle traffic accessing the Site such as that involved with staff mobilisation, may continue outside of the stated hours
- The embedded mitigation contained in the detailed DS will include the commitment to liaise directly with local residents, and the wider community, e.g., notifying them when particular noisy activities will occur and their duration
- The Site contractors shall be required to employ the Best Practicable Means (BPM) of reducing noise emissions from plant, machinery, and construction activities, as

advocated in BS 5228-1. This includes: selection of quieter equipment where reasonably practicable; all plant not in use to be switched off; minimising use of tonal reverse alarms and using broadband alarms where practicable; mobile plant and stationary plant items to be routed or located to maximise separation distance from noise-sensitive receptors (where practicable), accounting for site-specific constraints; all equipment used would be maintained in good working order; and associated noise attenuation such as engine casing and exhaust silencers shall remain fitted at all times

- The National Grid Substation and Grid Infrastructure such as the Overhead Lines will remain in situ upon decommissioning and will not be decommissioned under the DS

10.7.12 The above embedded measures and additional measures presented in Section 10.9 Additional Mitigation Measures will be applied during the decommissioning phase and have been included in the **oDS [APP/7.10]** which is submitted as part of this DCO Application.

10.8 Assessment of Likely Effects

10.8.1 This section of the Noise and Vibration chapter identifies and characterises potential effects arising during the construction, operational and decommissioning phases of the Scheme.

10.8.2 Taking into account the embedded mitigation measures as detailed in Section 10.7, the potential for the likely effects of the Scheme on Noise and Vibration receptors has been assessed using the methodology detailed in Section 10.5 of this chapter. In the sections below, effects during the construction, operational and decommissioning phases of the Scheme are assessed for Noise and Vibration receptors scoped into this assessment.

10.8.3 Any additional mitigation required to reduce these effects is then set out in Section 10.9 below. Thereafter, an assessment is made of the significance of any residual effects after all mitigation measures have been accounted for.

Construction Phase

Construction Noise Effects

Residential Receptors

10.8.4 Table 10.3.1 and Table 10.3.2 in **Appendix 10.3: Construction and Noise Modelling [APP/6.4]** show the predicted sound levels at the closest receptors surrounding the Site for each construction activity during the construction phase. Almost all receptors are at large distances to the respective elements of Battery Energy Storage System, Customer Substation, National Grid Substation and Grid Connection Infrastructure, as well as from the Order limits such that they are not expected to be exposed to sound levels above 65 dB L_{Aeq} from construction activities. There are two exceptions to this: noise from road upgrading work of the A47-to-A1065 slip roads, which are calculated to generate temporary noise levels of up to 78dB L_{Aeq} at 'The Splashes' receptors (cluster of residential

properties); and piling works at the Solar PV Site which can take place up to the edge of the Solar PV Site and, at its closest point, may be approximately 85m from Keepers Cottage, generating levels of 69dB L_{Aeq} during piling.

10.8.5 All other construction activities, including: road works, Temporary Construction Compound activity, earthworks, piling of foundations, civil and installation works for the Battery Energy Storage System, Customer Substation, National Grid Substation, and Grid Connection Infrastructure, generate levels below 65dB L_{Aeq} and will therefore have low to negligible magnitude of impact, corresponding to short-term Minor to Negligible Adverse effects for high-sensitive residential receptors, which is considered **not significant** in EIA terms.

10.8.6 The road upgrading works near 'The Splashes' receptors (cluster of residential properties, high sensitivity receptors) are predicted to correspond to potential levels of up to 78dB L_{Aeq} at the closest point. Although, based on the criteria in Table 10.4, this corresponds to high magnitude of impact, due to the very short-duration of works, and given that, with prior notice, residents are generally tolerant of road work noise, the impact from these works in practice is considered to be of low magnitude of impact which is associated with short-term Minor Adverse effects on the 'The Splashes', which is **not significant** in EIA terms.

10.8.7 Piling work for the Ground Mounted PV Modules at the nearest point to Keepers Cottage (a residential property, a high sensitivity receptor) will generate level up to 69dB L_{Aeq}, which represents a medium magnitude of impact (Table 10.4). The work undertaken at the closest point would last for a period of less than 1 month and then move away, however, due to the impulsive nature of the piling and the layout of the Solar PV Site around this property, it is considered on balance that this would represent a short-term Moderate Adverse effect on Keepers Cottage, which is **significant** in EIA terms.

10.8.8 Specific construction activities associated with Cabling works (e.g. HDD or other trenchless techniques) could be required outside of the assumed daytime construction hours (i.e. evenings, Sundays, Bank Holidays or at night), as the drilling work may need to continue through the night, such that a continuous operation can be completed. Once a bore has been started, it is not possible to stop until it is completed, hence the potential need for some night-time working. Despite the short duration of the works, this may be associated with potentially significant effects. Currently, the locations where trenchless works may be required are unknown within the Order limits as this level of detail is subject to the detailed design. As such, it is assumed that Cabling work may take place anywhere within the Order limits. Although other trenchless techniques such as micro-bore or pipe jacking could be used, the impacts associated with HDD represent a worst-case scenario and have formed the basis of the assessment.

10.8.9 Table 10.3.2 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** demonstrates that distances of 25m, 50m, 100m, 200m, 250m, 300m and 400m from the HDD drilling rig would correspond to noise levels of 79, 72, 65, 59, 57, 55 and 52dB L_{Aeq} respectively. For work undertaken during normal daytime hours, this would correspond to a high or medium magnitude of impact for receptors within 100m distance, and low or negligible magnitude of impact for further distances when the relative short duration (less than 1 month) of the works is taken into account, as a relaxation of 10dB to the criteria is

acceptable for works duration less than 1 month (see footnote in Table 10.4). For other cable trenching works, i.e., activities associated with trenching and cable laying, a distance of 50m results in 64dB L_{Aeq}, which corresponds to high to medium magnitude of impact for receptors within 50m and low to negligible magnitude of impact for receptors further than 50m from Site boundary.

10.8.10 In both above cases, only one receptor (Keepers Cottage) is within this distance; as such, with the exception of Keepers Cottage, all residential receptors are expected to have low to negligible impact for daytime work and based on high-sensitive residential receptors, this corresponds to short-term Minor Adverse to Negligible effects which are **not significant** in EIA terms.

10.8.11 Keepers Cottage is approximately 48m from the Order limits; if HDD or cable trenching works are undertaken during daytime at the closest point to this receptor, sound levels of up to 73dB L_{Aeq} are predicted. However, considering the short duration (less than one month) of these works at such a distance, this reduces the magnitude of impact. This would result in medium impact which is reduced to low impact on the high-sensitive receptor and short-term Minor Adverse effects which is **not significant** in EIA terms.

10.8.12 If HDD works did continue over the night-time period, in the absence of additional mitigation, properties located within 200m could experience a high magnitude of impact, and those within 200m to 300m would experience a medium magnitude of impact due to the night-time works. For receptors located more than 300m away this would represent a low to negligible magnitude of impact. As such, four receptors are within 300m of the Order limits and may experience medium to high magnitude of impact from potential night-time HDD works: Keepers Cottage, Finger Hill Cabin, Glebe Cottages, and South Acre Hall. However, such work continuing during the night is expected to be of short duration (<1 week), therefore the effects at all high-sensitive receptors identified with the exception of Keepers Cottage can be reduced to Minor Adverse which is **not significant** in EIA terms. Without additional mitigation, the adverse effects at Keepers Cottage, a high sensitive receptor, would experience a high magnitude of impact even when considering the short duration 10dB relaxation of night-time criterion, due to its much closer proximity to the Order limits than the other residential receptors, resulting in a short-term Moderate Adverse effect which is **significant** in EIA terms.

Public Rights of Way (PRoW)

10.8.13 PRoW are considered as medium sensitive receptors for the assessment of construction noise. **ES Chapter 5: The Scheme [APP/6.1]** outlines a minimum separation buffer for construction to PRoW as 15m. As construction can take place anywhere within the marked zones adjacent to PRoW, the 15m buffer distance is used to assess the worst-case impact, assuming constructions activities will not take place within 15m of PROW. **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** shows a predicted level in excess of 75dB L_{Aeq} for all of construction activity for Battery Energy Storage System, Solar PV Site, Customer Substation, National Grid Substation and Grid Connection Infrastructure. However, this assumes that a PRoW user was to pass by the area of activity during the time when these specific localised construction works occur at a distance of 15m; this has

a low probability of occurring. Furthermore, the construction noise criteria of Table 10.4 relate to noise levels averaged over the working day. PRoW users would pass locations of the construction activity within few minutes and therefore experience average levels below 75dB L_{Aeq}, even under worst-case assumptions as they pass the Order limits. This would represent at most a medium to low magnitude of impact (Table 10.4) when considering short duration of exposure on the PRoW receptors (medium sensitivity receptors) which would result in a short-term Minor Adverse effect which is **not significant**.

Construction Vibration Effects

Residential Receptors

10.8.14 Table 10.3.3 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** presents predicted vibration levels at various distances from construction activities such as percussive piling, vibratory compacting, and HDD works. The works associated with construction of the Solar PV Site could include percussive piling and ground compaction which could take place at any point within the Solar PV Site. Vibratory compacting and piling will take place for the Battery Energy Storage System, Customer Substation, and National Grid Substation construction as well; however, these zones are at sufficient distances (>1km) to any receptor to have negligible magnitude of impact. Table 10.3.3 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** shows vibration levels from all activities to be below 1mm/s at distance greater than 30m. The nearest NSR to the Solar PV Site is Keepers Cottage at approximately 80m and therefore an impact of negligible magnitude is expected from percussive piling at this nearest high-sensitive NSR and therefore vibration from all activities at all high-sensitive NSRs corresponds to Negligible Adverse effects and **not significant** in EIA terms.

10.8.15 Construction of the Access Tracks or upgrading of roads may involve ground compaction. Table 10.3.3 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** shows the resultant vibration levels above 1mm/s at 25m for these works. The nearest NSR is 'The Splashes' (cluster of residential properties) at 13m to the Highway Works off the A47, which would experience worst-case vibration levels above 1mm/s associated with a medium magnitude of impact and translates to short-term Moderate Adverse effects for 'The Splashes', without additional mitigation, which are **significant** in EIA terms.

10.8.16 HDD works are commonly considered to be similar to vibratory piling in terms of vibration generation. Table 10.3.3 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** indicates that vibration from such activities falls to or below 1mm/s within approximately 30m. It is estimated that for distances of 100m or more, which are relevant for most receptors, levels would reduce to less than 0.3mm/s, corresponding to Negligible effects. The closest potential high-sensitive NSR (Keepers Cottage) is located 80m from the Solar PV Site boundary and could experience levels of 0.3mm/s, which is associated with low magnitude of impact on a high sensitive receptor and therefore short-term Minor Adverse effects which are **not significant** in EIA terms.

Public Rights of Way (PRoW)

10.8.17 For PRoW receptors (medium sensitivity), ground compaction within 15m (the worst-case distance) could lead to higher vibration levels above 1mm/s. Figure 10.3.1 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** shows the location of PRoW within the Scheme, as piling works can take place anywhere within the Order limits any of the PRoW can be impacted as a worst-case at 15m closest distance. This would result in a medium magnitude of impact which would also result in a short-term Minor Adverse effect for a medium sensitivity receptor which is **not significant** in EIA terms.

Construction Traffic Effects

10.8.18 Traffic associated with the construction works may also give rise to potential noise effects. **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** details the construction traffic noise assessment which explains that typical construction traffic levels associated with the construction of the Scheme would be less than 90 Heavy Goods Vehicles (HGV) movements and 500 vehicles (non-HGV) movements on the main transport road of A1065. When compared to the baseline traffic levels on the A1065 of around 8,000 vehicles per day (including approximately 400-500 HGVs), the construction traffic would represent a negligible influence (<0.5 dB) in terms of noise for residential properties located along the A1065, based on the guidance in CRTN. Traffic movements associated with HGV traffic is also considered on smaller roads such as the South Acre Road, West Acre Road, River Road, and Narford Lane. As shown in Table 10.3.5 in **ES Appendix 10.3: Construction and Noise Modelling [APP6.4]**, noise levels at receptors 5m from any given road as a worst-case show a passing predicted level to be 53dB L_{Aeq} at the highest (West Acre Road), below 65dB L_{Aeq} at all receptors. Therefore, all movements to and from the Site represent a negligible magnitude of impact corresponding to Negligible Adverse effects for high-sensitive residential receptors, which is **not significant** in EIA terms.

Overall Conclusions of Construction Phase Effects

10.8.19 In conclusion, there is a potential for construction noise from daytime Solar PV pilling works, night-time HDD works, and daytime road upgrade works, under worst-case assumptions and in the absence of any additional mitigation, to correspond to short-term Moderate Adverse noise and vibration effects on some high-sensitive residential receptors which would therefore be **significant** in EIA terms.

Operational Phase Effects

Operational Noise

Residential Receptors

10.8.20 The assessment of operational noise from mechanical and electrical equipment within the Scheme (set out in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]**) demonstrates that the worst-case predicted Rating Levels are up to 7dB above daytime background noise levels and up to 11 dB above night-time background levels at the most

affected receptor (Keepers Cottage, being the closest). However, the rated noise levels are below the threshold of 35 dB(A) (Table 10.4) at all receptors except Keepers Cottage. According to BS 4142 and considering the context of the Scheme in the area, and the criteria of Table 10.4, this would correspond to a medium magnitude of impact at Keepers Cottage (Table 10.3.8 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]**), which is associated with a Moderate Adverse effect and is **significant** in EIA terms. At all other NSRs, a negligible to low impact is predicted which is associated with Negligible to Minor Adverse effects and is **not significant** in EIA terms.

10.8.21 A comparison of low frequency predicted noise levels at each receptor was undertaken as requested in consultation with BC. As detailed in Table 10.3.10 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]**, the worst case predicted noise levels are below the low frequency criteria considered, even when applied on a conservative basis, and therefore there are no additional significant effects of low-frequency noise.

Public Rights of Way (PRoW)

10.8.22 PRoW have also been assessed with regards to operational noise levels. Figure 10.3.1 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** shows noise levels from the Battery Energy Storage System and Customer Substation not exceeding 55 dB(A) at any PRoW in the Order limits. Conversion Units are to be located at least 15m from any PRoW as an embedded mitigation measure, as detailed in Section 10.7. Calculated noise levels from Conversion Units are predicted to be 54 dB(A) at 15m as such noise from any Conversion Unit will not exceed the PRoW criterion. This represents a medium impact magnitude at most and given the medium sensitivity this is associated with a Minor Adverse effect which is **not significant** in EIA terms.

Operational Traffic

10.8.23 As stated in **Paragraph 9.4.11** in **ES Chapter 9: Transport and Access [APP/6.2]**, replacement or upgrade activities will be undertaken on a small scale using light service vehicles (e.g., 4x4 or panel vans), limited HGV traffic will be used for the ad-hoc replacement of batteries, inverters, and transformers associated with the substations and the Battery Energy Storage System. Furthermore, construction HGV traffic noise assessment was based on 16 HGV movements per day at most, which resulted in negligible effects, therefore, on this basis the magnitude of impact from the fewer expected HGV movements for operational replacement and maintenance activities is considered negligible for all high-sensitive receptors which is associated with Negligible Adverse effects and **not significant** in EIA terms.

Overall Conclusions of Operational Phase Effects

10.8.24 In conclusion, there is a potential for operational noise from Conversion Units at Keepers Cottage, under worst-case assumptions and in the absence of any additional mitigation, to correspond to Moderate Adverse noise effects on some high-sensitive residential receptors which would therefore be **significant** in EIA terms.

Decommissioning Phase Effects

Decommissioning Noise and Vibration

10.8.25 Decommissioning noise and vibration is likely to involve activities of similar or reduced intensity as for the construction phase and therefore result in comparable noise and vibration effects in the most part; however, construction of Access Tracks, trenchless work, or piling are unlikely to be required for the decommissioning phase, and the National Grid Substation along with the associated Grid Connection Infrastructure is also expected to remain in situ. Although the decommissioning phase will involve removal of the PV Arrays, the potential impacts could be, as worst-case, similar to those of the construction phase, depending on the technique used.

Residential Receptors

10.8.26 The decommissioning phase impacts correspond to medium magnitude of impact on Keepers Cottage, a high-sensitive residential receptor, would therefore represent short-term Moderate Adverse and **significant** effect, in EIA terms, without additional mitigation. For other residential receptors, there would be low to negligible impact for daytime work and based on high-sensitive residential receptors this corresponds to short-term Minor Adverse to Negligible effects which are **not significant** in EIA terms.

Public Rights of Way (PRoW)

10.8.27 Decommissioning noise and vibration would still represent at most a medium magnitude of impact on the PRoW receptors (medium sensitivity) which would result in a short-term Minor Adverse effect which is **not significant** in EIA terms.

Decommissioning Traffic

10.8.28 Decommissioning traffic noise and vibration is likely to be of less or similar volume as the predicted construction traffic during the construction phase. As negligible effects are predicted from construction traffic, decommissioning traffic effects are also expected to be Negligible and **not significant** in EIA terms.

Overall Conclusions of Decommissioning Phase Effects

10.8.29 In conclusion, the worst-case effect during the decommissioning phase is similar to the construction phase and would have a medium magnitude of impact on the high sensitive receptor (Keepers Cottage) thus corresponding to short-term Moderate Adverse effects which would therefore be **significant** in EIA terms.

10.9 Additional Mitigation Measures

Additional Construction Phase Mitigation Measures

10.9.1 The additional mitigation measures have been incorporated into the Scheme's design for the construction phase have been outlined below. The proposed measures have been

included in the **oCEMP [APP/7.6]** and have been based on effects from worst-case assumptions of the Concept Masterplan (**ES Figure 5.1 Concept Masterplan [APP/6.3]**).

- Where practicable, trenchless works that are likely to result in significant noise effects at nearby residential receptors will be restricted to daytime working hours on weekdays (i.e. 07:00 to 18:00, Monday to Friday)
- Local residents shall be notified in advance of any night-time construction activities likely to generate significant noise levels, e.g. HDD or other trenchless works within 300m
- Trenchless works will be completed in the shortest practical timescale
- No trenchless work will be carried out at locations within 100m of a residential property (i.e. Keepers Cottage) during night-time hours without the agreement of the property resident
- No trenchless works will be carried out at night-time at locations less than 50m from any residential property; these measures are specific to Keepers Cottage only as no other receptor is within 100m of the main Site area boundary where trenchless works are expected

10.9.2 For residential properties located within 300m of trenchless work areas that could experience significant night-time noise levels due to night-time works (i.e., high to medium impact), the following measures, as detailed in the **oCEMP [APP/7.6]**, will be considered and employed as necessary to mitigate any significant effects:

- Use of alternative techniques such as micro-bore or pipe jacking
- Crossing points requiring potential HDD and associated work areas will be identified and located to maximise distance from dwellings as much as reasonably practicable
- Residents likely to be significantly affected by noise from trenchless works will be kept informed of the likely period during which the work will take place, the times and durations of planned works and the measures that are being taken to minimise noise. On completion of the trenchless works at a particular location, local residents will be informed that the works are complete and noise effects due to trenchless works will cease
- Monitoring noise from the works and minimising the noisiest drilling work at night where possible and safe to do so
- Offering affected residents temporary re-housing for the duration of the night-time drilling works
- Any plant and equipment required for operation at night (23:00 - 07:00), e.g. generators or dewatering pumps, shall be silenced or suitably shielded to ensure that the night-time lower threshold of 45dB L_{Aeq} shall not be exceeded at the nearest noise-sensitive receptors
- Temporary noise barriers will be installed around trenchless compounds in order to provide screening for sources located at low heights (note however that it is likely to

be impractical to provide noise barriers that are high enough to screen an entire HDD drilling rig, for example)

10.9.3 Where percussive piling is undertaken for the foundations of the PV Arrays within 400m of sensitive receptors, this should be restricted to no more than two periods of four hours each with at least one hour of no piling between these four-hour periods and restricted to the hours of 07:00 to 18:00 Monday to Friday and 08:00 to 13:30 on Saturdays. In addition, piling works within 130m of Keepers Cottage will be further controlled to reduce noise levels to not exceed 65dB L_{Aeq} over the working day, through use of quieter piling techniques and/or use of localised screening (if practicable).

10.9.4 Prior notice to the residents on the time and duration of the construction vibratory works on the highway slip roads should be provided, these activities are expected to be of very short duration at the nearest point to the respective NSR and will decrease as activity moves further away. Therefore, predicted worst-case vibration levels (~2 mm/s) for short duration and with prior notice are likely to be acceptable.

10.9.5 These mitigation measures will be refined once areas of construction activities (such as HDD routes and Temporary Construction Compound locations) are finalised. These measures will then be fully implemented through the detailed CEMP which is secured by a requirement of the **dDCO [APP/3.1]** and which must be substantially in accordance with the oCEMP.

Additional Operational Mitigation Measures

10.9.6 The effects associated with operational noise are Moderate Adverse in scale at Keepers Cottage; therefore, additional mitigation measures are required to reduce the level of effects to acceptable levels. However, the assessment was based on worst-case and precautionary assumptions, such as neglecting screening from different elements of the Scheme and operation at full duty at all periods of day and night.

10.9.7 The final design of the Scheme would be developed to generally maximise the distance between the proposed noise-generating equipment and noise-sensitive residential receptors wherever reasonably practicable. Selection of the final mechanical and electrical plant would be made on the basis of different considerations including noise. The detailed design of the Scheme, including final plant locations and selections, will be secured through a requirement of the DCO. This would require total rated noise levels L_{Ar}, including the applicable character correction, not to exceed an operational noise limit of 35dB L_{Ar} at residential receptors, as assessed in line with BS 4142.

10.9.8 Table 10.3.8 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** shows an exceedance to the 35dB L_{Ar} criterion at Keepers Cottage only (by 4 dB), as such, additional mitigation for operational phase is only required for Keepers Cottage. Table 10.3.7 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** shows the main noise contributor at this NSR to be the Conversion Units, specifically those located in proximity to and surrounding the NSR, based on the indicative layout modelled on the indicative Concept Masterplan (**ES Figure 5.1 Concept Masterplan [APP/6.3]**).

10.9.9 A mitigation engineering exercise provided for in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** shows that, based on the worst-case assumptions described above, where all Conversion Units within 500m of Keepers Cottage are attenuated by 8dB, the calculated rated levels (with a +2dB tonal penalty) do not exceed 35dB at any time, resulting in low magnitude impacts at most. Actual noise levels from the Solar PV Site would depend on the final choice of technology retained (for example, a centralised inverter approach may not be retained), location of any plant and its specifications.

10.9.10 Based on the above assessment, the 35dB rated noise criterion can be achieved in practice based on the indicative layout using the following example measures:

- All Conversion Units within 500m of Keepers Cottage will be limited to noise emission levels of 83dB L_{WA} (Sound Power Level) by using a quieter Conversion Unit model within this area or attenuate the Conversion Units within 500m by 8dB from the currently assumed level of 91dB L_{WA}, via means of screening/barrier, enclosure, or appropriate plant silencer kit, to achieve the above criterion at Keepers Cottage.

10.9.11 Therefore, the additional mitigation for the operational phase involves finalising the design of the Scheme, plant selection and/or use of additional screening/enclosures (if required) to achieve rated noise levels not exceeding 35dB at all neighbouring residential properties. This noise limit will be secured through a requirement of the DCO. The design and management of plant noise, as well as monitoring measures, is outlined in the **oOEMP [APP/7.8]** and would be secured in the detailed OEMP.

10.9.12 The production of a detailed OEMP is secured by a requirement of the **dDCO [APP/3.1]**.

Additional Decommissioning Phase Mitigation Measures

10.9.13 As the decommissioning phase will result in similar effects as the construction phase for the relevant activities, such as removal of the piles near Keepers Cottage, similar additional mitigation measures outlined for construction activities close to that receptor (such as localised screening) can be employed for the decommissioning phase where relevant. This would be sufficient, even as a worst-case, to reduce the level of effects. These measures have been outlined in the **oDS [APP/7.10]**, which will serve as the framework for the detailed DS which is secured by a requirement of the **dDCO [APP/3.1]**.

10.10 Residual Effects

10.10.1 This section summarises the residual effects of the Scheme on following the adoption of embedded and additional mitigation (if additional mitigation is proposed).

Residual Effects for Construction Phase

10.10.2 Following implementation of the additional mitigation measures proposed above, the magnitude of impacts for piling works at Keepers Cottage would reduce from medium magnitude of impact to low at most.

10.10.3 Other construction noise and vibration impacts, including noise and vibration from road upgrade works near 'The Splashes', and trenchless works on residential receptors, would reduce to low magnitude of impact at most.

10.10.4 Therefore, residual noise and vibration effects from construction activities on highly sensitive residential receptors would reduce to low or negligible magnitude of impact in all cases, which is associated with short-term Minor Adverse effects at most which is **not significant** in EIA terms.

Residual Effects for Operational Phase

10.10.5 Following implementation of the additional mitigation measures proposed above, the medium magnitude of impact predicted at Keepers Cottage would reduce to a minor magnitude. At other receptors, the impacts would also reduce in practice but could remain negligible to low as a worst-case scenario. Therefore, residual operational noise impacts on a highly sensitive residential receptor would reduce to negligible or low magnitude in all cases, which is associated with Minor Adverse effects at most which is **not significant** in EIA terms.

Residual Effects for Decommissioning Phase

10.10.6 Where the additional mitigation measures above are employed, residual noise and vibration effects on Keepers Cottage would reduce from medium to low magnitude of impact. The noise and vibration impact on other residential receptors would reduce in practice but could remain negligible to low as a worst-case scenario. Therefore, residual noise and vibration impacts of decommissioning activities on a highly sensitive residential receptor would reduce to negligible or low magnitude of impact in all cases, which is associated with short-term Minor Adverse effects at most which is **not significant** in EIA terms.

10.11 Cumulative Effects Assessment

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

10.11.2 As set out in **ES Chapter 2: EIA Process and Methodology [APP/6.1]**, 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 17: In-Combination Effects [APP/6.2]**
- Cumulative effects: effects generated by the Scheme and other planned or approved developments on the same receptor (presented in **ES Volume 2, Chapters 6 – 17 [APP/6.2]**)

In-Combination Effects

10.11.3 In-combination effects occur when receptors are subject to effects under more than one environmental topic. As such, the effects presented in **ES Chapters 6 – 17 [APP/6.2]** (regardless of whether they are classed as significant or not significant) have been reviewed to identify receptors subject to one or more types of effect to ensure that the interrelationship between each of the aspects of the environment likely to be affected by the Scheme has been properly evaluated and considered.

10.11.4 These has been summarised and tabulated to demonstrate where these effects have the potential to occur and is presented in **ES Chapter 17: In-Combination Effects [APP/6.2]**.

Cumulative Effects

10.11.5 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.

10.11.6 A long list of cumulative developments/allocations can be found in **ES Appendix 2.4: Cumulative Schemes [APP/6.4]**.

Relevant Developments

10.11.7 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 10.7. Other schemes further than 1km from the Order limits are not considered to have cumulative effects on Noise-Sensitive Receptors within the noise and vibration study area given the large separation distance.

Table 10.7 Short List Developments/Allocations relevant to Noise and Vibration

Short List Ref	Planning Ref	Description	Distance from the Scheme
1	EN0110010	High Grove Solar – the development comprises the installation of solar photovoltaic (PV) generating panels, on-site energy storage facilities, grid connection infrastructure and ancillary works. with a generating capacity of approximately 720MW.	<1km

10.11.8 The Noise and Vibration assessment has been based on the Study Area of 1km around the Order limits and has demonstrated that beyond this distance, construction and operational effects from the Scheme become negligible. High Grove Solar Farm (Ref: EN0110010 (Ref 10-8)), currently in the pre-application stage, has been identified within

1km of the Scheme, therefore potential cumulative effects from the Scheme and High Grove Solar Farm have been considered.

10.11.9 The Statutory Consultation figures of the High Grove Solar Farm show this site to the south of the Scheme. This area is likely to include PV Arrays but may also include a Battery Energy Storage System or substation with associated grid infrastructure as a worst-case scenario. Potential cumulative effects for the construction, operational, and decommissioning phases have therefore been considered.

Cumulative Effects Assessment

Construction Phase

10.11.10 The High Grove Solar Farm is expected to complete construction by October 2033 based on timescales stated within their PEIR (Ref 10-9), whereas the construction phase of the Scheme is planned to commence in Q4 of 2033, as such an overlap of the two construction phases is not expected. Although unlikely, as a worst-case assumption when considering possible delays and timescale changes, it may be possible for construction to overlap for a short-term period. As a worst-case scenario, where construction may take place simultaneously, only receptors to the south of the Scheme and 'The Off Barn' receptor to the east can potentially have cumulative effects. Other high-sensitive residential receptors are at sufficient distances (>1 km) from the High Grove Solar Farm boundary to have likely negligible noise impact and therefore will have Negligible cumulative effects from the construction activity, and **not significant**. Construction vibration impacts are localised such that no cumulative interaction is likely to occur at such distances.

10.11.11 For 'The Off Barn' and 'The Splashes' southern high-sensitive receptors, **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]** shows highest predicted levels from construction activities within the main Scheme area to be more than 10dB below the low impact criteria in Table 10.4. As a result, even if construction noise from High Grove Solar Farm was at the low impact criteria threshold i.e., 65dB(A), it is considered that no additional cumulative significant effects would arise at these and other similar receptors to the south of the Scheme.

10.11.12 Night-time HDD works were predicted to have noise levels below the low impact criteria (Table 10.4) beyond 300m from any HDD activity. Where high-sensitive receptors are within this distance from the Scheme, they are at sufficient distance from the High Grove Solar Farm site that no additional significant cumulative effects would be anticipated, even in the case of simultaneous night-time work (which is very unlikely given the short duration of drilling works).

10.11.13 Therefore, the worst-case residual impacts of construction noise and vibration on highly sensitive residential receptors remain at low magnitude, with short-term Minor Adverse effects which are **not significant** in EIA terms.

10.11.14 PRoW located within the Scheme area only are at sufficient distances to the High Grove Solar Scheme to have no additional cumulative effects. The impact of construction noise

and vibration therefore remain of medium impact magnitude on medium sensitivity receptors with short-term Minor Adverse effects which are **not significant** in EIA terms.

10.11.15 **ES Chapter 9: Transport and Access [APP/6.2]** considers that, based on information submitted for the High Grove Solar Farm within the associated PEIR for that scheme, it is considered unlikely that there will be any interaction between the two schemes given the intended construction programmes which do not overlap. Furthermore, should the construction period overlap, traffic flows associated with cumulative schemes are inherently accounted for within the growth factors to generate the future baseline 2031 traffic flow and would not be affected. This would also be the case for the associated traffic noise effects which would remain Negligible in impact and effects at all high-sensitive receptors and **not significant** in EIA terms.

Operational Phase

10.11.16 Figure 10.3.1 in **ES Appendix 10.3: Construction and Noise Modelling [APP/6.4]**, shows that the predicted noise levels of the Scheme south of the Order limits are very low. Specifically, predicted operational noise levels at 'The Splashes', West Acre Road or Hall Farm, are more than 10dB below the absolute 35dB(A) significance criteria and as such will not contribute to increasing cumulative noise levels. Predicted impact levels to the highly sensitive residential receptors located to the south represent a low or negligible impact magnitude (**Table** 10.5). Cumulative operational noise contributions from High Grove Solar Farm are not expected to elevate these impacts and will still result in Minor to Negligible Adverse effects which are **not significant** in EIA terms.

10.11.17 The predicted rating level from the Scheme at 'The Off Barn' high-sensitive receptor is 34dB(A) after implementation of additional mitigation measures outlined in Section 10.7, which would represent Minor Adverse effects in isolation as a worst-case. The preliminary assessment for Statutory Consultation of the High Grove Solar Farm shows only Solar PV Arrays (and associated Inverter units) to be located within 1km of 'The Off Barn' receptor. This assessment shows predicted noise levels for High Grove Solar Farm at 'The Off Barn' to be 36dB(A) before mitigation, which would correspond to medium impact and moderate adverse effects based on their assessment criteria (based on a threshold of 5dB above background for day and night corresponding to 35dB(A) and 33dB(A) rated limits respectively[2]). High Grove Solar Farm have stated their commitment for additional mitigation to achieve these non-significant criteria and as such, are committed to reducing their rating levels to 33dB(A) at most.

10.11.18 Considering a committed level of 33 to 35dB(A) from High Grove Solar Farm and predicted level of 34dB(A) from the Scheme, should both schemes be consented, this would theoretically result in a combined cumulative rating level of 36 to 37dB(A) which is up to 5dB(A) above day-time background level at this property (as set out in **ES Appendix 10.2:**

[2] Representative background of monitoring position LT3 and BS4142 assessment criteria outlined for nearest receptor of ESR15 in High Grove Solar Farm PEIR: Chapter 11: Noise - HGS-PEIR-Chapter-11-Noise-and-Vibration.pdf - [accessed 18/09/2025]

Noise Survey [APP/6.4]) and up to 2dB above the absolute threshold of 35dB(A) set out in **Table** 10.5. A higher difference with night-time background noise levels would result but this assumes operation of the PV Panels at night which is generally unlikely as discussed above. This would nevertheless correspond to medium magnitude of impact on a highly sensitive receptor and a Moderate Adverse effect which is considered **significant** in EIA terms.

10.11.19 However, it is considered unlikely that noise levels from both schemes would add up in this way in practice, due to propagation effects and the worst-case assumptions made, such as in particular operation of the PV Panels from High Grove Solar Farm at night. Furthermore, High Grove Solar Farm have stated in their preliminary assessment for Statutory Consultation a commitment to reduce noise effects at the receptor by means of additional mitigation, and this should include consideration of cumulative effects where applicable. It is therefore understood that High Grove Solar Farm will take this into account as part of their final design considerations which would be secured through a requirement of the DCO in the instance where both schemes are approved. The Applicant is also committed to collaboration with High Grove Solar Farm in relation to the design of both schemes.

10.11.20 Therefore, it is considered likely that noise levels can be controlled through the implementation of additional mitigation measures to suitable levels at 'The Off Barn' receptor when considered cumulatively with the High Grove Solar Farm, such that residual levels would represent at most a minor impact at 'The Off Barn' high-sensitive receptor, resulting in Minor Adverse effects at most which is considered **not significant** in EIA terms.

Decommissioning Phase

10.11.21 Decommissioning effects are likely to be of less or similar effects as construction as a worst-case, due to similar nature of work and scale, therefore, as no significant cumulative effects are anticipated for the construction phase, then decommissioning phase cumulative effects at all high-sensitive receptors are expected to remain short-term Minor Adverse and **not significant** in EIA terms.

10.12 Conclusion

10.12.1 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, operational and decommissioning phases of the Scheme. Following the implementation of embedded and additional mitigation as detailed in Sections 10.7 and 10.9 respectively, residual effects have been identified in relation to noise and vibration during the construction, operational and decommissioning phases.

10.12.2 Table 10.8 sets out a summary of the residual noise and vibration environmental effects.

Table 10.8 Summary of Residual Effects for Noise and Vibration

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring requirement
Construction Phase								
Residential Properties	High	Construction Noise from Battery Energy Storage System, National Grid Substation, Customer Substation, Solar PV Site, and Grid Infrastructure	Low	Control of working hours, BPM of noise control, notifications for noisy works, measures to be outlined in **oCEMP [APP/7.6]** and secured through a requirement of DCO.	Short-term Minor Adverse	N/A	Short-term Minor Adverse	N/A
	High	Noise from Solar PV Pilling works	Medium		Short-term Moderate Adverse	Restrict pilling work hours, use of quieter piling techniques and localised screens, measures to be implements as part of the **oCEMP [APP/7.6]** and secured through a requirement of DCO.	Short-term Minor Adverse	In the event of a complaint, noise monitoring to be undertaken during pilling works at closest point to receptor.

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring requirement
	High	Noise from Trenchless work including HDD at night	Medium		Short-term Moderate Adverse	Trenchless works restricted to daytime hours where possible, plant operating at night to be silenced / screened, measures to be implements as part of the **oCEMP [APP/7.6]** and secured through a requirement of DCO.	Short-term Minor Adverse	Monitoring noise from night-time trenchless or HDD works at closest receptor if within 300m of receptors.
	High	Construction Traffic Noise – Change in noise levels on main roads and HGV movement on access roads	Negligible	Control hours of traffic movements, notification of out of hours traffic, measures outlined in **oCTMP [APP/7.7**] and secured through a	Negligible	N/A	Negligible	N/A

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring requirement
				requirement of DCO.				
	High	Construction Vibration from Solar PV pilling and road upgrade works	Medium	Control of working hours, BPM of vibration control, measures to be outlined in **oCEMP [APP/7.6]** and secured through a requirement of DCO.	Short-term Moderate Adverse	Prior notice of works on highway slip road, and work to be completed in shortest duration where possible, measures to be implements as part of the **oCEMP [APP/7.6]** and secured through a requirement of DCO.	Short-term Minor Adverse	In the event of a complaint vibration monitoring to be undertaken at receptor closest to activity area throughout vibratory works.
PRoW	Medium	Construction Noise on PRoW	Medium	Control of working hours, notification of noise or vibratory works for PRoW users, measures outlined in **oCEMP**	Short-term Minor Adverse	N/A	Short-term Minor Adverse	N/A
	Medium	Construction Vibration on PRoW	Medium		Short-term Minor Adverse	N/A	Short-term Minor Adverse	N/A

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring requirement
				[APP/7.6] and secured through a requirement of DCO.				
Operational Phase								
Residential	High	Operational noise from Battery Energy Storage System, National Grid Substation, Customer Substation and Solar Conversion Units on all NSRs	Medium	Strategic placement of noise sources, acoustics barriers, and minimum separation distance embedded in design, measures to be outlined in **oOEMP [App7.8]** and secured as a requirement of DCO.	Short-term Moderate Adverse	Further attenuation of solar conversion units within 500m of Keepers Cottage, mitigation measure to be implemented as part of the **oOEMP [App/7.8]** and secured as a requirement of DCO.	Short-term Minor Adverse	In the event of a complaint, noise monitoring to be undertaken for compliance monitoring to the agreed criteria, monitoring protocol to be reviewed with Breckland Council.

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring requirement
	High	Operational Traffic noise on all NSRs	Negligible	Minimise HGV traffic, operational traffic managed through measures outlined in **oOTMP [APP/7.9]** and secured through a requirement of DCO.	Negligible	N/A	Negligible	N/A
PRoW	Medium	Operational noise and vibration from Battery Energy Storage System, National Grid Substation, Customer Substation, and Solar Conversion Units	Low	Acoustic barriers and separation distances incorporated in design, embedded measures outlined in **oOEMP [APP/7.9]** and secured though a	Short-term Minor Adverse	N/A	Short-term Minor Adverse	N/A

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring requirement
				requirement of DCO.				
Decommissioning Phase								
Residential	High	Decommissioning noise from activities similar or less than construction phase	Medium	Similar measures as those outlined for construction phase to manage noise and vibration; control of working hours, employ BPM, measures outlined in **oDS [APP/7.10]**	Short-term Minor Adverse	N/A	Short-term Minor Adverse	N/A
	High	Decommissioning vibration similar or less than construction phase	Medium		Short-term Minor Adverse	N/A	Short-term Minor Adverse	N/A
PRoW	Medium	Decommissioning noise on PRoW from activities similar or less than construction phase	Low		Short-term Minor Adverse	N/A	Short-term Minor Adverse	N/A

References

Ref 10-1	Highways England (2019): Design Manual for Roads and Bridges (DMRB) – LA111 – Noise and Vibration, Nov 2019.
Ref 10-2	BSI (2014), BS 5228:2009-A1:2014, Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration.
Ref 10-3	Department for Environment, Food and Rural Affairs (2010), Noise Policy Statement for England (NPSE).
Ref 10-4	National Planning Pratice Guidance: Noise: Noise - GOV.UK
Ref 10-5	HMSO Department of Transport (1988), Calculation of Road Traffic Noise (CRTN)
Ref 10-6	BSI (2019), BS 4142: 2014-A1 2019: Methods for rating and assessing industrial and commercial sound.
Ref 10-7	Department of Environment, Food & Rural Affairs (DEFRA) and University of Salford (2005), Method for the assessment of low frequency noise.
Ref 10-8	High Grove Solar Farm Scoping Figures submitted to the Planning inspectorate: EN0110010-000006-High Grove Solar Scoping Report Figures Part 4.pdf
Ref 10-9	High Grove Solar Farm PEIR Chapter 11: Noise submitted to the Planning inspectorate. HGS-PEIR-Chapter-11-Noise-and-Vibration.pdf

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