



THE DROVES
SOLAR FARM

The Drovers Solar Farm

Preliminary Environmental Information Report

Volume I, Chapter 10: Noise and Vibration

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10 Noise and Vibration

10.1 Introduction

- 10.1.1 This chapter of the PEIR presents the findings of a preliminary assessment of the likely significant effects in relation to noise and vibration. The information presented within this chapter has been informed by the design information of the Scheme provided in **Volume I, Chapter 5: Scheme Description**.
- 10.1.2 Information considered in this chapter includes relevant noise and vibration policy and guidance, baseline noise and vibration condition, sets out the methodologies and approaches intended to be used to inform the Noise and Vibration chapter of the Environmental Statement (ES) for the Scheme. This chapter details the likely effects arising from the Construction, Operational and Decommissioning Phases of the Scheme. The chapter also considers proposed avoidance, mitigation and compensation measures and any residual effects following the implementation of such measures.
- 10.1.3 Embedded mitigation measures are presented, where necessary, and discussed to minimise the impacts of the Scheme to an acceptable level (i.e. to a residual minor or negligible effect), during the Construction, Operational and Decommissioning Phases.
- 10.1.4 This chapter should be viewed as a preliminary assessment that will be refined in the ES, particularly as the results of further evaluation become available, consultation feedback and as the Scheme design evolves. Initial assumptions have been made based on the survey and background information available to date and professional judgement. The PEIR does not replicate or act as a draft ES but rather aims to enable consultees to understand the likely environmental effects of the Scheme and helps to inform consultation responses during the pre-application stage.

Consultation

- 10.1.5 The content and assessment methodology contained within this chapter has been informed by the Scoping Opinion from the Planning Inspectorate (PINS) dated 18 December 2024 (**Volume III, Appendix 2.2**) as well as further updated and informed following consultation with key stakeholders in relation to Noise & Vibration matters.
- 10.1.6 Consultation feedback received throughout the pre-application phase of the Scheme has been considered in preparing this PEIR chapter. Further detail on consultation undertaken is included at **Volume III, Appendix 10.1**.

Legislation, Planning Policy and Guidance

- 10.1.7 A review of the Legislation, Policy and Guidance that is relevant to the Noise & Vibration assessment of the Scheme is included at **Volume III, Appendix 10.1**. The review demonstrates that the Scheme has been developed in accordance with the requirements identified in the **Volume III, Appendix 10.1**.



10.2 Assessment Methodology

10.2.1 The noise & vibration assessment follows the general approach to undertaking environmental impact assessments as explained in **Volume I, Chapter 2: EIA Process and Methodology** of this PEIR, albeit it has been modified to take account of industry guidelines and best practice.

10.2.2 The approach to the assessment of the sensitivity of receptors, magnitude of impacts and the significance of effect in relation to noise and vibration is described in following sections.

Assessment Scope

10.2.3 The final assessment of likely significant effects will be reported in the ES. Table 10.1 below presents a summary of the aspects agreed to be scoped in to the PEIR, as set out in the Environmental Impact Assessment (EIA) Scoping Report, Scoping Opinion, and the Scoping Opinion Response (**Volume III, Appendix 2.1, 2.2 and 2.3**), which includes aspects proposed to be scoped out of the ES but included in the PEIR to further justify the lack of potential for significant effects (e.g. decommissioning effects). These will be amended as necessary for the ES as the design of the Scheme evolves and the results of evaluation within the PEIR are considered in the scope of the ES.

Table 10.1 Noise and Vibration Scoping Summary

Aspect	Construction	Operational	Decommissioning
Noise – Customer Substation (CS), National Grid Substation (NGS), Battery Energy Storage System (BESS), Solar Photovoltaic (PV) Arrays	Scoped In	Scoped In	Scoped In
Vibration – CS, NGS, BESS, PV Arrays	Scoped In	Scoped Out	Scoped In
Noise & Vibration - Ecological Receptors	Scoped In (Chapter 7)	Scoped In (Chapter 7)	Scoped In (Chapter 7)
Noise - Traffic	Scoped In	Scoped In	Scoped In
Vibration – Traffic	Scoped Out	Scoped Out	Scoped Out
Noise & Vibration – Grid Connection Infrastructure (overhead / underground cables, connection towers)	Scoped In	Scoped Out	Scoped In
Noise & Vibration - Low Sensitivity Receptors	Scoped Out	Scoped Out	Scoped Out



Noise & Vibration - Public Rights of Way Receptors	Scoped In	Scoped In	Scoped In
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- 10.2.4 Noise from decommissioning traffic during the Decommissioning Phase are expected to be similar or less than the Construction Phase. As such, as a quantitative assessment of construction traffic noise is undertaken, then decommissioning traffic noise is subject to similar management or control procedures and therefore can be assessed qualitatively with justifications. As such, decommissioning activity and traffic noise has been scoped in, however, likely significant effects from decommissioning are outlined in the PEIR relative to the effects from the construction assessment.
- 10.2.5 Some of the construction activities, such as piling operations, drilling or vibratory rolling techniques, can generate vibration levels in close proximity. These activities may be undertaken for construction of PV Panels, BESS, CS, Grid Connection Infrastructure, and NGS, as such vibration effects from construction and decommissioning have been assessed.
- 10.2.6 Ecological receptors within the Scheme do not include any protected species. An assessment of noise & vibration (indirect effects) on ecological receptors is presented in **Volume I, Chapter 7: Ecology and Biodiversity** and this is therefore not considered further in the present chapter.

Scoped Out

- 10.2.7 The following elements have been scoped out of the assessment, as agreed in the Scoping Opinion from PINS (**Volume III, Appendix 2.2**) and the Environmental Health Department of Breckland Council (BC), as summarised in **Volume III, Appendix 10.1**.
- 10.2.8 The Design Manual for Roads and Bridges (DMRB) [Ref 10-14] advises that significant vibration impacts from traffic using the road network is unlikely and references BS 5228-2 [Ref 10-13] 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. 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.
- 10.2.9 Due to the nature of the BESS, NGS, and CS plant (i.e., Transformers, Inverters, batteries etc.), with either no moving parts or small parts such as fans which would only generate low amounts of vibration, plant operation is unlikely to have generate perceptible vibration effects at the receptors. As such, vibration effects from all components of the Scheme (CS, NGS, BESS, PV Arrays) for the Operational Phase has been scoped out of the EIA.
- 10.2.10 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 the Operational Phase 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 proposed to be scoped out of the EIA.



- 10.2.11 Receptors of low 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.

Assessment, Study Area and Survey Work

- 10.2.12 Assessment of operational and construction noise effects have focused on the nearest Noise-Sensitive Receptors (NSR), including residential and Public Rights of Way (PRoW), within 1 km of the Solar PV Site boundary, considering the likely noise levels from the onsite NGS, CS and BESS, and based on professional judgment and experience of similar developments, which suggests that significant effects are unlikely beyond this distance.
- 10.2.13 Distance of effect from vibration is typically much smaller than noise. Vibration effects from construction activities such as piling or trenchless drilling (for example, Horizontal Directional Drilling or HDD), if applicable, will be assessed within the same Study Area of 1 km from NSRs, but generally effects are not expected to be significant at distances of more than 100 m.
- 10.2.14 A Baseline Noise Survey was undertaken in November 2024, consisting of long-term noise monitoring over 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 local planning authorities: the survey and results are detailed in **Volume III, Appendix 10.2**. The survey was undertaken in line with guidance in BS 4142 as agreed in consultation with the Environmental Health Department of Breckland Council.
- 10.2.15 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.
- 10.2.16 Dwellings exposed to traffic noise along the construction traffic route, which is described in **Volume I, Chapter 9: Transport and Access**, 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.

Determining Significance of Effect

- 10.2.17 The process for determining the significance of effects involves defining the magnitude of the potential effect and the sensitivity of the receptors.
- 10.2.18 The significance of effects for noise and vibration will be undertaken following the broad principles set out in **Volume I, Chapter 2: EIA Process and Methodology**, 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.



10.2.19 Topic-specific magnitude criteria are assigned based on relevant guidance and standards as well as professional judgement, as described in Table 10.3 and Table 10.4.

Receptor Sensitivity

10.2.20 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 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. Table 10.2 presents receptor sensitivity and description.

10.2.21 PRoW are located within the Site boundary close to the indicative locations of the CS, NGS, and BESS. These have been considered as noise-sensitive receptors in the context of this noise assessment.

10.2.22 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. These would result in non-significant effects even with major magnitude of impact; they are therefore not included in the EIA assessment.

Table 10.2 Receptor Sensitivity for Noise and Vibration

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

Magnitude of Impact

Construction and Decommissioning Noise

10.2.23 Noise and vibration from onsite construction and decommissioning activities have been assessed with the guidance of BS 5228 Parts 1 and 2 [Ref 10-13]. 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.

10.2.24 Construction noise magnitude criteria are set out in Table 10.3. The criteria is based on construction noise over the working day as outlined in **Volume I, Chapter 5: Scheme Description** 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., Horizontal Directional Drilling (HDD), cable trenching works, concrete pour in foundations etc. and as such, night-time criteria has also been provided.

10.2.25 Table 10.3 is based on the guidance values set out in BS 5228-1 (Annex E) [Ref 10-13] 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 10.3 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.

- 10.2.26 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 10.3, 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. Table 10.3 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.
- 10.2.27 Details of the exact construction method, plant and duration are not available at this stage of Scheme development. Potential noise levels are therefore assessed based on conservative assumptions (see Assumptions and Limitations section), considering potential emission noise levels from typical activities based on the type and scale of development. As noted in section 10.5 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.
- 10.2.28 Potential levels of noise associated with different construction activities, for different distances, are evaluated in **Volume III, Appendix 10.3**. This appendix also sets out the separation distances of the NSRs around the Site from the areas where the respective elements of CS & NGS with associated Grid Infrastructure, BESS, and Solar PV Arrays may be constructed, as illustrated in the Concept Masterplan (**Volume III, Appendix 5.1**).
- 10.2.29 The Concept Masterplan shows indicative zones and demarked fields for the various elements of the Scheme, such as CS and NGS with associated grid infrastructure, BESS, and Solar PV panel fields. 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 NGS have been calculated from the closest point of the nearest indicative siting zone as illustrated in the Concept Masterplan (**Volume III, Appendix 5.1**). **Volume I, Chapter 5: Scheme Description** outlines the selected fields for respective components of the Scheme.
- 10.2.30 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 10.3 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.
- 10.2.31 The prediction method of Calculation of Road Traffic Noise (CRTN) [Ref 10-15] 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 10.3. The Scheme will use



the existing A1065 road for access to the Site. New crossings for micro-access across Site areas will be limited where possible and exiting farm tracks and crossings will be used as far as practicable.

Table 10.3 Classification of Magnitude of Impacts - 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}	≤ 60 dB L _{Aeq}	<10 mm/s	3 to 5 dB
	>65 dB L _{Aeq}	>55 dB L _{Aeq}	≥1 mm/s	
Low	≤65 dB L _{Aeq}	≤55 dB L _{Aeq}	<1 mm/s	1 to 3 dB
	>55 dB L _{Aeq}	>45 dB L _{Aeq}	≥0.3 mm/s	
Negligible	≤55 dB L _{Aeq}	≤45 dB L _{Aeq}	<0.3 mm/s	<1 dB

Operational Noise

- 10.2.32 As noted in the Assumptions and Limitations section below, the potential noise from fixed electrical and mechanical plant potentially associated with the Scheme has been assessed on a worst-case basis, considering representative manufacturer selections and an indicative layout. The propagation of operational noise from this plant was modelled using the standard methodology set out in International Organisation for Standardisation (ISO) 9613-2 [Ref 10-11].
- 10.2.33 The resulting effect of operational noise is assessed on the basis of the BS 4142 [Ref 10-12], 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.
- 10.2.34 **Volume III, Appendix 10.3** details the assumptions made for the noise modelling of the operational noise from electrical and mechanical plant associated with the Solar PV Site, NGS and CS, and BESS, 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

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.



screening effects from the Solar PV panels and BESS containers to provide a worst-case assessment.

- 10.2.35 Although the plant associated with solar energy generation 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 energy storage equipment and substations 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 10.6 of **Volume III, Appendix 10.3** presents the assumed noise emission levels and spectrum for each plant included in the noise model, based on representative manufacturer information.
- 10.2.36 One of the highest potential sources of operational noise are the Transformers and PCS Inverters associated with the BESS, 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 +4 dB for a clearly audible tonal character has been applied to the calculated noise levels in accordance with BS 4142 (see **Volume III, Appendix 10.3**). The resulting rated noise levels are then compared with background noise levels for the noise-sensitive receptors considered (Table 10.8 in **Volume III, Appendix 10.2**) and the associated magnitude of change is assessed using the criteria of Table 10.3 and is set out in detail in **Volume III, Appendix 10.3**.
- 10.2.37 Table 10.7 in **Volume III, Appendix 10.3** presents the main noise contributors in the Scheme for each receptor. It shows the BESS and NGS to be the loudest noise sources in the Scheme, and Conversion Units to be dominant only in proximity to one receptor (Keepers Cottage) and has negligible noise contributions to all other NSRs. **Volume III, Appendix 10.3** describes the assumption which have been made in terms of the locations of the proposed sources of operational noise within the potential proposed areas shown within **Volume II, Figure 5.1 Concept Masterplan**. The assumed locations were selected to represent a worst-case scenario in terms of operational noise.
- 10.2.38 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 receptor 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 Breckland Council's Environmental Health Department and no comments were received. The resulting assessment criteria are set out in Table 10.4.



Table 10.4 Classification of Magnitude of Impact – Operational Noise

Effect Magnitude	Operational Noise
High	Rating level L_{Ar} above 35 dB, and 10 dB or more above background, depending on the context
Medium	Rating level L_{Ar} above 35 dB and 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

10.2.39 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 10-16]. This is relevant when undertaking an assessment of noise from the proposed NGS and CS equipment which includes 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.

10.2.40 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, 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.

10.2.41 Operational noise impacts on PRoW will be assessed against an absolute noise level criterion of 55 dB(A), derived based on the transient use of the path and the guidance of BS 8233 [Ref 10-17]. 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.

Significance of Effect

10.2.42 For receptors of high sensitivity, medium or high magnitudes of change correspond to moderate and major effects respectively which are considered to be significant within the meaning of the EIA Regulations and mitigation will be considered.

10.2.43 Receptors of medium sensitivity with high magnitude of impact corresponds to moderate significance effects in terms of EIA and will require additional mitigation consideration, medium or lower magnitudes result in non-significant effects in terms of EIA.

10.2.44 In this chapter, negligible or low magnitudes of change correspond to minor or negligible effects respectively and are not considered significant, but enhancement measures will be considered to minimise the effects, where possible.



Assumptions and Limitations

- 10.2.45 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, **Volume III, Appendix 10.3** considers different technology approaches which may be used, such as central or String Inverter options, based on representative manufacturer noise emission data. The assessment is based on a reasonable worst-case assumption that a centralised Inverter approach is used as this resulted in the highest potential noise levels based on the assumptions made.
- 10.2.46 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, **Volume III, Appendix 10.3** has considered potential plant elements associated with centralised field Inverters and BESS compound and the potential noise emissions associated, based on manufacturer data and experience of similar recent developments.
- 10.2.47 Noise modelling is also undertaken on a conservative basis which does not account for the screening from the solar panels themselves, BESS plant or other structures. 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.
- 10.2.48 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 (**Volume III, Appendix 10.3**). 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.

10.3 Study Area

- 10.3.1 The assessment considers NSRs, such as residential and PRoW, in the vicinity of the Site, and considers effects along the construction and operational traffic routes.
- 10.3.2 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 CS, NGS, and BESS areas could be relatively higher and the nearest properties to this area, within a radius of around 1000 m, have been considered.
- 10.3.3 The Study Area for noise and vibration effects is therefore 1 km from the Site boundary and focuses on the effects at the nearest NSRs with the understanding that these are key receptors for the assessment of effects and the level of effects on NSRs at further distances would be lower. As such, assessment of all NSRs within the Study area is not required.



10.4 Baseline Conditions

- 10.4.1 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.
- 10.4.2 A baseline Noise Survey, in line with BS 4142, was undertaken in November 2024. The survey consisted of two long- and four short-term measurements around the Site at representative locations to characterise the local acoustic environment. **Volume III, Appendix 10.4 Figure 10.3.1** illustrates the Site boundary, long- and short-term measurement locations, and the nearest NSRs within the Study Area surrounding the Site.
- 10.4.3 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.
- 10.4.4 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.
- 10.4.5 Assessment of vibration effects from construction activities is independent of baseline levels and based on absolute limits as shown in Table 10.3; as such, no baseline survey or conditions are required to inform the construction vibration assessment.
- 10.4.6 It is considered 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.

10.5 Embedded Mitigation

- 10.5.1 The PEIR assessment has been drafted with the incorporation of embedded mitigation measures outlined in this section, and indicative zones for each component of the Scheme illustrated in the Concept Masterplan (**Volume III, Appendix 5.1**). However, this is an iterative process and following on from the consultation process and design considerations from all technical specialists the design assessed within the ES may be amended. Such design changes, if required for noise implications, will be discussed in the ES.
- 10.5.2 The design of the Scheme has been developed with consideration of the distance between the proposed CS, NGS and BESS areas and other noise-generating plant and receptors, such as residential properties and PRow including minimum separation buffers.
- 10.5.3 The good practice measures detailed below will be implemented as part of a site-specific Noise Management Plan (NMP) to manage the effects of noise and vibration during construction activities, and will be required of all contractors:
- As proposed in **Volume I, Chapter 5: Scheme Description**, 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 NMP will include the commitment to liaise directly with local residents, and the wider community, e.g., notifying them when particular activities, potentially generating elevated noise or vibration levels in relative proximity, will occur and their duration; and
- 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.

- 10.5.4 The above measures within the NMP will be included within the outline Construction Environmental Management Plan (oCEMP) which will be submitted with application. The final NMP will be detailed and included as part of the CEMP, in consultation with Breckland Council, which will be secured through a Development Consent Order (DCO) requirement.
- 10.5.5 An outline Construction Traffic Management Plan (oCTMP) will be submitted with the application and a detailed CTMP will be secured by a requirement of the DCO to control the movement of vehicles, access routes, hours of movement, and types of vehicles to and from the Site.
- 10.5.6 Maintenance during the Operational Phase including ad-hoc replacements of defective Solar PV panels will be carried out on a small scale using light service vehicles, therefore, no HGV movements will be used in the maintenance of the Scheme. Programmed replacements and upgrades of PV panels or BESS components will also be phased. These measures will be outlined in an Operational Traffic Management Plan (OTMP) submitted with the application and secured through a requirement of the DCO.
- 10.5.7 The above embedded good practice measures and will also be applied in the Decommissioning Phase and will be included in the outline Decommissioning Environmental Management Plan (oDEMP), submitted with the DCO application, and a detailed DEMP will be secured by a requirement of the DCO.
- 10.5.8 The outline Operational Environmental Management Plan (oOEMP) will also be submitted with the application and will include measures to monitor and maintain equipment, including noise production, and a complaints procedure for members of the public to report noise disturbance at residential properties. The final Operational Environmental Management Plan will be secured as a requirement of the DCO.
- 10.5.9 The above embedded management measures have been derived on a conservative basis at this stage and will be further developed and refined in the ES following additional evaluation and consultation feedback.



10.6 Assessment of Likely Significant Effects

Construction Phase Effects

Construction Noise

Residential Receptors

- 10.6.1 Table 10.1 and Table 10.2 in **Volume III, Appendix 10.3** show the predicted sound levels at the closest receptors surrounding the Site for each construction activity. Almost all receptors are at large distances to the respective elements of BESS, CS, NGS and Grid Connection Infrastructure, as well as the Site boundary such that they are not expected to be exposed to sound levels above 65 dB L_{Aeq} from construction activities, with two exceptions; noise from road upgrading work of the A47-to-A1065 slip roads, which are calculated to generate levels of up to 78 dB L_{Aeq} at 'The Splashes' receptors (cluster of residential properties), and Solar PV Site piling works which can take place up to the edge of each marked solar fields and may be approximately 85 m from Keepers Cottage, generating levels of 69 dB L_{Aeq} during piling at the closest point. All other construction activities, including: road works, Temporary Construction Compound activity, earthworks, piling of foundations, civil and installation works for the BESS, CS, and NGS (including Grid Connection Infrastructure), generate levels below 65 dB L_{Aeq} (Table 10.3) and will therefore have low to negligible magnitude of impacts, corresponding to short-term **minor to negligible** adverse effects for **high-sensitive** residential receptors, which are considered **not significant**.
- 10.6.2 Piling work for PV Modules at the nearest point to Keepers Cottage (a high sensitivity receptor) will generate level up to 69 dB L_{Aeq} , which represents a medium magnitude of impact (Table 10.3). Although the work undertaken at the closest point would last for a period of less than 1 month and then move away, therefore likely reducing the magnitude of impact, 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 moderate **short-term adverse** effect on a **highly sensitive receptor**, and which is **significant** in EIA terms.
- 10.6.3 The road upgrading works near 'The Splashes' receptor are predicted to correspond to potential levels of up to 78 dB L_{Aeq} at the closest point. Although, based on the criteria in Table 10.3, this corresponds to high impact magnitude, 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 which is associated with short-term **minor adverse** effects on the high-sensitive receptors, and **not significant** in EIA terms.
- 10.6.4 Specific construction activities associated with cable laying 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 as the cable connection route within the Scheme has not been finalised. As such, it is assumed cable work may take place anywhere within the Site boundary. Although other trenchless techniques such as micro-bore or pipe jacking could be used, the impacts associated with HDD represent a worst-case scenario.



- 10.6.5 Table 10.2 in **Volume III, Appendix 10.3** demonstrates that distances of 25 m, 50 m, 100 m, 200 m, 300 m and 400 m from the HDD drilling rig would correspond to noise levels of 79, 72, 65, 59, 55 and 52 dB L_{Aeq} respectively. For work undertaken during normal daytime hours, this would correspond to a high or medium impact for receptors within 100 m distance, and low or negligible magnitude of impact for further distances when the relative short duration of the works is taken into account. For other cable trenching works, a distance of 50 m results in 64 dB L_{Aeq} , which corresponds to high to medium impact for receptors within 50 m and low to negligible impact for receptors further than 50 m from Site boundary. In both 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.
- 10.6.6 Keepers Cottage NSR is approximately 15 m from the Site boundary; if HDD or cable trenching works are undertaken at the closest point to this receptor, sound levels of up to 79 dB L_{Aeq} are predicted. However, considering the short duration (less than one month) of these works at such a distance, this reduces the impact level. This would result in medium impact on the high sensitive receptor and short-term **moderate** adverse effects which are **significant** in EIA terms. However, this is subject to cable trenching works taking place within 100 m of Keepers Cottage.
- 10.6.7 If HDD works did continue over the night-time period, in the absence of additional mitigation, properties located within 200 m could experience a high magnitude of impact, and those within 200 m to 300 m would experience a medium magnitude of impact due to the night-time works. For receptors located more than 300 m away this would represent a low to negligible magnitude of impact. Four receptors are within 300 m of the Site boundary and may experience medium to high 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 the high-sensitive **receptors** with the exception of Keepers Cottage are **minor** which is **not significant**, and without additional mitigation the adverse effects are of short-term **moderate** significance at Keepers Cottage which is **significant** in EIA terms.

Public Rights of Way

- 10.6.8 PRow are considered as **medium sensitive** receptors for the assessment of construction noise. **Volume I, Chapter 5: Scheme Description** outlines a minimum separation buffer for construction to PRow as 15 m. As construction can take place anywhere within the marked zones adjacent to PRow, the 15 m distance is used to assess the worst-case impact. **Volume III, Appendix 10.3** shows a predicted level in excess of 75 dB L_{Aeq} for all of the construction activity for BESS, Solar PV, CS, NGS 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 15 m; this has a low probability of occurring. Furthermore, the construction noise criteria of Table 10.3 relate to noise levels averaged over the working day. PRow users would therefore experience average levels below 75 dB L_{Aeq} , even under worst-case assumptions, as they pass the Site. This would represent at most a **medium magnitude of impact** on the PRow receptors (**medium sensitivity**) which would result in a short-term **minor adverse** significance of effect which is **not significant**.



Construction Vibration

Residential Receptors

- 10.6.9 Table 10.3 in **Volume III, Appendix 10.3** 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 Arrays could include percussive piling and ground compaction which could take place at any point within the designated Solar PV Site. Vibratory compacting and piling will take place for the BESS, CS, and NGS construction as well, however, these zones are at sufficient distances to receptor to have negligible impact. Table 10.3 of **Volume III, Appendix 10.3** shows vibration levels from all activities to be below 1 mm/s at distance greater than 30 m. The nearest NSR to the solar field boundaries is Keepers Cottage at approximately 70 m 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** effects and **not significant** in EIA terms.
- 10.6.10 Construction of the Access Tracks or upgrading of roads may involve ground compaction. Table 10.3 in **Volume III, Appendix 10.3** shows the resultant vibration levels above 1 mm/s at a distance of 25 m for these works. The nearest NSR is The Splashes at 13 m to the proposed slip road upgrade works off A47, which would experience worst-case vibration levels of 1.9 mm/s associated with a medium magnitude of impact. Although this would potentially translate to short-term moderate adverse impact based on the criteria of Table 10.3, there is a commitment (as part of the embedded measures described above at 10.5.3) to notify residents of such works. According to guidance in BS 5228-2, this is likely to reduce the impact. When considered in addition to the short duration of the works, this reduces the impact to **low** magnitude for these **high-sensitive** receptors, which results in minor adverse effects which is **not significant** in EIA terms.
- 10.6.11 HDD works are commonly considered to be similar to vibratory piling in terms of vibration generation. BS 5228-2 indicates that vibration from such activities falls to 1 mm/s or below within approximately 30 m. It is estimated that for distances of 100 m or more, which are relevant for most receptors, levels would reduce to less than 0.3 mm/s, corresponding to negligible effects. The closest potential high-sensitive NSR (Keepers Cottage) is located 70 m from the Solar PV Site boundary and could experience levels of 0.4 mm/s, which is associated with low magnitude of impact on highly sensitive receptors and therefore short-term **minor** adverse effects which are **not significant**.

Public Rights of Way (PRoW)

- 10.6.12 For PRoW receptors (medium sensitivity), ground compaction within 15 m (the worst-case distance) could lead to higher vibration levels marginally above 1 mm/s. **Figure 10.3.1** in **Volume III, Appendix 10.3** shows the location of PRoW within the Scheme, as piling works can take place anywhere within the Site any of the PRoW can be impacted as a worst-case at 15 m closest distance. This would result in a **medium magnitude** of impact which would also result in a short-term **minor adverse** significance of effect for a medium sensitivity receptor which is **not significant**.

Construction Traffic

- 10.6.13 Traffic associated with the construction works may also give rise to potential noise effects. **Volume III, Appendix 10.3** details the construction traffic noise assessment which explains that typical construction traffic levels associated with the construction of the Scheme would be



less than 500 vehicle (non HGV) movements and 90 Heavy Goods Vehicles (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 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, River Road, and Narford Lane. Noise levels at receptors 5 m from any given road as a worst-case show a passing predicted level to be 54 dB L_{Aeq} at the highest (Narford Lane), which represents a negligible impact based on the criteria of Table 10.3. Therefore, all movements to and from the Site represent a negligible impact corresponding to **negligible** adverse effect for **high-sensitive** residential receptors, which is **not significant**.

Operational Phase Effects

Operational Noise

Residential Receptors

- 10.6.14 The assessment of operational noise from mechanical and electrical equipment within the Scheme, based on the proposed design and assumptions set out earlier in this chapter, demonstrates that the worst-case predicted Rating Levels are up to 14 dB above daytime background noise levels and up to 20 dB above night-time background levels at the most affected receptor (Glebe Cottages). The rated noise levels are also above the threshold of 35 dB(A) considered in Table 10.4 at most locations considered. 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 high magnitude of impact. At some noise-sensitive properties further away from the BESS, to the east, southeast, and southwest of the Site boundary, such as West Acre Road, Hall Farm, and The Splashes, the predicted levels are lower, corresponding to low to negligible magnitude of impact as presented in Table 10.8 in **Volume III, Appendix 10.3**. However, a high magnitude of impact is predicted at four (**highly-sensitive**) NSRs; Glebe Cottages, Finger Hill Cabin, South Acre, and Keepers Cottage, which is associated with **major adverse** effects and is **significant in EIA terms**.
- 10.6.15 A comparison of low frequency predicted noise levels at each receptor was undertaken as requested in consultation with BC. As detailed in Table 10.10 of **Volume III, Appendix 10.3**, 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 impacts of low-frequency noise.

Public Rights of Way (PRoW)

- 10.6.16 PRoW have also been assessed with regards to operational noise levels. **Figure 10.3.1 of Volume III, Appendix 10.3** shows noise levels from all noise sources of the construction activities for the Scheme, which shows predicted levels exceeding 55dB(A) at PRoW adjacent to the assumed BESS area. This represents a high impact magnitude and given the medium sensitivity this is associated with a **moderate adverse** effect which is **significant**.

Operational Traffic

- 10.6.17 As stated in **Section 2.5 of Volume III, Appendix 10.3**, replacement or upgrade activities will be undertaken on a small scale using light service vehicles, no HGV will be used and on this basis the magnitude of impact for operational replacement and maintenance activities is



considered **negligible** for all **high-sensitive** receptors which is associated with **negligible** effects and **not significant** in EIA terms.

- 10.6.18 In conclusion, there is a potential for operational noise, under worst-case assumptions and in the absence of any additional mitigation, to correspond to **moderate** to **major** adverse noise effects on some **high-sensitive** residential receptor and PRow (**medium sensitivity**) which would therefore be **significant**.

Decommissioning Phase Effects

Decommissioning Noise and Vibration

Residential Receptors

- 10.6.19 Decommissioning 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 this phase, and the NGS is also expected to remain in situ. Although the Decommissioning Phase will involve removal of the Solar PV Array foundations, the potential impacts could be, as worst-case, similar to those of the Construction Phase, depending on the technique used, and accounting for the embedded mitigation measures. The corresponding medium magnitude of impact on Keepers Cottage, a **high-sensitive** residential receptor, would therefore represent short-term **moderate adverse** and **significant** effects 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)

- 10.6.20 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** significance of effect which is **not significant**.

Decommissioning Traffic

- 10.6.21 Decommissioning traffic is likely to be of less or similar volume as the predicted construction traffic. As negligible effects are predicted from construction traffic, decommissioning traffic noise effects are also expected to be **negligible** and **not significant**.

10.7 Additional Mitigation

Construction Phase Mitigation Measures

- 10.7.1 Where practicable, the construction work programme will be phased, which would reduce the combined effects arising from several noise emitting operations relative to the construction works of CS, NGS, Solar PV Panels, and BESS.
- 10.7.2 The effects associated with trenchless works (e.g. HDD as worst-case) will depend on the final working areas and techniques used. The worst-case noise levels predicted above for HDD work assumed a location for the drilling rig at ground level and not down in a pit and at the closest potential point to the noise-sensitive receptors identified. Furthermore, the assumed noise levels for this activity may not arise in practice based on many factors, including soil



condition and type of equipment used. It may also be possible to avoid regular drilling over consecutive nights. Therefore, the suitability of the proposed mitigation measures discussed below (based on a worst-case) will need to be determined at a later stage, in particular once the final location of any HDD works (if required) and the necessary equipment have been determined.

- 10.7.3 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 300 m. Trenchless works will be completed in the shortest practical timescale. No trenchless work will be carried out at locations within 100 m of a residential property (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 50 m from any residential property, these measures are specific to Keepers Cottage only as no other receptor is within 100 m of the Site boundary.
- 10.7.4 For residential properties located within 300 m of trenchless work areas that could experience significant night-time noise levels due to night-time works (i.e., noise levels in excess of 55 dB L_{Aeq} at night for more than 1 week, corresponding to a high to medium impact), the following measures will be investigated:
- 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 45 dB L_{Aeq} shall not be exceeded at the nearest noise-sensitive receptors; and
 - 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).
- 10.7.5 Where percussive piling is undertaken for the foundations of the Solar PV Arrays within 400 m 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 130 m of Keepers Cottage will be further controlled to reduce noise levels to not exceed



65 dB L_{Aeq} over the working day, through use of quieter piling techniques, and if possible, use of localised screening or a combination of these measures.

- 10.7.6 Although likely impact on PRow users is not considered significant, it would be beneficial to inform users of the PRow of any percussive piling or earthworks planned as part of the reporting of information to local residents.
- 10.7.7 The above additional mitigation measures are example measures based on effects from worst-case assumptions of the Concept Masterplan (**Volume II, Figure 5.1 Concept Masterplan**). Exact mitigation measures will be determined once respective zones and area of construction activity (i.e. HDD routes, Site Compound location etc.) are finalised, which can then be implemented in the Construction Environmental Management Plan (CEMP) which will be secured through a requirement of the DCO.

Operational Mitigation Measures

- 10.7.8 The effects associated with operational noise are potentially moderate to major in significance, therefore, further mitigation measures are required to reduce the level of effects to acceptable levels. However, the assessment was based on worst-case assumptions and some precautionary assumptions, such as neglecting screening from different elements of the Scheme and operation at full duty at all periods of day and night.
- 10.7.9 The design of the Scheme should 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, can 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 35 dB L_{Ar} at residential receptors, as assessed in line with BS 4142. Noise levels on PRow will also be controlled not to exceed a noise level of 55 dB L_{Aeq} .
- 10.7.10 Table 10.5 outlines an example of minimum attenuation requirement for each element of the Scheme, based on the worst-case assumptions described above, calculated to result in rated levels not exceed 35 dB at all residential noise sensitive receptors, resulting in low magnitude impacts at most.



Table 10.5: Example of Minimum Attenuation Levels Required for Respective Project Elements

Receptor	Minimum Attenuation Required, dB		
	NGS	Solar-CU	BESS
The Off Barn	3	-	-
Glebe Cottages	5	-	10
South Acre Hall	3	-	7
Finger Hill Cabin	3	-	10
Keepers Cottage	-	7	-
West Acre Rd / Hall Farm	-	-	-
The Splashes	-	-	-

10.7.11 In this example, a minimum attenuation of 10 dB would be required for the BESS, 5 dB for the NGS, and noise from Solar CU does not require mitigation except at Keepers Cottage which requires 7 dB of attenuation. Possible illustrative measures available for each element to achieve the above reductions are outlined to demonstrate how the noise limits can be achieved in practice.

10.7.12 Mitigation measures available for the Solar CUs include:

- A minimum separation distance of 250 m from Solar CUs to all residential receptors including Keepers Cottage
- Use of quieter CU models with up to 7 dB lower Sound Power Levels than assumed; and
- Installation of noise reduction kit/attenuators and/or enclosures on the CUs within 250 m to achieve up to 7 dB reduction in noise emissions.

10.7.13 One or a combination of the above mitigation measures can achieve the required attenuation to reduce the noise contribution level from Solar CUs.

10.7.14 Mitigation measures available for the BESS include and will be considered as part of the Scheme design prior to submission of the DCO Application:

- Increase where possible the separation distance between NSRs to the north, i.e., Glebe Cottages, South Acre, and Finger Hill Cabin, and the BESS area. For example, locating the BESS in Field 27 adjacent to the NGS would increase the separation distance by 500 m between the BESS and Glebe Cottages, potentially corresponding to reductions of approximately 5 or 6 dB at this location
- Use of quieter plant, specifically the BESS PCS Units (loudest plant), with Sound Power Levels up to 10 dB(A) lower
- Installation of Noise reduction kits/attenuators and/or enclosures on the PCS Units with up to 10 dB(A) reduction; and



- Installation of acoustic barriers/fencing around the BESS area and/or around the PCS skids (exact attenuation would require further modelling).

10.7.15 A combination of the above measures would be required to achieve the 10 dB attenuation; effectiveness of the mitigation measures would require further detailed modelling based on final design and plant selections.

10.7.16 Mitigation measures available for the NGS include:

- Use of quieter plant where possible, achieving a reduction of at least 5 dB on the assumed sound power levels
- Enclosure of the NGS i.e., Gas-insulated Substation, or at least enclosure of the noisiest source within buildings; and
- Installation of acoustic barriers/fencing of sufficient height around the NGS perimeter or around main noise sources.

10.7.17 Mitigation measures outlined above can be combined for optimisation; for example, should the BESS be moved to Field 27 adjacent to the NGS and an acoustic barrier is erected around the area, it could mitigate noise from both the BESS and NGS. Similarly, the prediction model did not include shielding effects from buildings or machinery, as such, if site building/enclosures are placed strategically, they can offer further shielding to the noise propagation from within these areas. Detailed modelling and assessment of the final layout would be required to fully specify the above mitigation measures, however, based on professional judgement at this stage, a combination of the above available measures is expected to be sufficient to achieve the necessary noise reductions.

10.7.18 Mitigation would also be required to reduce the level of effect on the PRow. Based on the worst-case assumptions made, to sufficiently reduce noise levels from the Solar CUs a minimum separation distance of 30 m would be required, and to reduce noise levels from the BESS on the neighbouring PRow by 10 dB(A) for example, the use of an acoustic barrier/fence on the BESS area boundary, combined with some of the above measures, would also be sufficient to reduce noise levels below 55 dB(A) for PRow users.

Decommissioning Mitigation Measures

10.7.19 As the Decommissioning Phase will result in similar effects in some instances 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 will be implemented in the DEMP which will be secured through a requirement of the DCO.

10.8 Residual Effects

Construction Phase

10.8.1 Following implementation of the additional mitigation measures proposed above, the magnitude of impacts for piling works at Keepers Cottage would reduce from medium to low at most, and the impact of trenchless works on residential receptors would reduce from



medium or high to low magnitude at most. Other construction noise and vibration impacts (including traffic) would potentially reduce but remain of negligible to low magnitude at most.

- 10.8.2 Therefore, residual noise and vibration impacts of construction activities and traffic on highly sensitive residential receptors would reduce to negligible or low magnitude in all cases, which is associated with short-term **minor adverse** effects at most which is **not significant** in EIA terms.
- 10.8.3 Following implementation of the additional mitigation measures proposed above, residual noise and vibration impacts of construction activities on medium sensitive PRow receptors would reduce in practice, but remain at most medium magnitude impacts which would result in a short-term **minor adverse** significance of effect which is **not significant**.

Operational Phase

- 10.8.4 Following implementation of the additional mitigation measures proposed above, the high magnitude of impact predicted at Glebe Cottages, Finger Hill Cabin, South Acre, and 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. Therefore, residual operational noise impacts on highly sensitive residential receptors 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.
- 10.8.5 The proposed measures would also reduce operational noise impacts on PRow (medium sensitivity) from a high magnitude to a low magnitude, which would correspond to **minor adverse** effects at most which is **not significant** in EIA terms.

Decommissioning

- 10.8.6 Where the additional mitigation measures above are employed, residual noise effects on Keepers Cottage would reduce from medium to low magnitude. The noise and vibration impacts of works on other residential receptors would reduce in practice but could remain negligible to low as a worst-case. Therefore, residual noise and vibration impacts of decommissioning activities and traffic on highly sensitive residential receptors would reduce to negligible or low magnitude in all cases, which is associated with short-term **minor adverse** effects at most which is **not significant** in EIA terms.
- 10.8.7 For PRow, residual noise and vibration impacts of decommissioning activities on medium sensitive PRow receptors would reduce in practice, but remain at most medium magnitude impacts which would result in a short-term **minor adverse** significance of effect which is **not significant**.

10.9 Cumulative Effects

- 10.9.1 The above assessment is based on the Study Area of 1 km around the Site boundary and has demonstrated that beyond this distance construction and operational effects from the Scheme become negligible. High Grove Solar Farm (Ref: EN0110010), currently in scoping stage, has been identified within 1 km of the Scheme, therefore potential cumulative effects from the Scheme and High Grove Solar Farm have been considered and will require detailed assessment in the ES when more details become available.



- 10.9.2 The scoping figure of the High Grove Solar Farm² shows this site to the south of the Scheme. This area is likely to include Solar PV Arrays but may also include a BESS or substation with associated grid infrastructure as a worst-case scenario. Potential cumulative effects for the Construction, Operation, and Decommissioning Phases will therefore need to be considered.

Construction Phase

- 10.9.3 It can be assumed at this stage that the noise and vibration levels created by the High Grove Solar Farm during construction will be comparable to those of the Scheme, as the closest area to the Scheme is of similar size and construction activities for solar development are typically similar. 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 as 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 very localised such that no cumulative interaction is likely to occur.
- 10.9.4 For the Off Barn receptor, **Volume III, Appendix 10.3** shows highest predicted levels from construction activities in the main Scheme area at this high-sensitive receptor to be below the negligible impact criteria in Table 10.3. As a result, it is considered no additional cumulative significant effects would arise at this and other similar receptors to the south of the Scheme.
- 10.9.5 Night-time HDD works were predicted to have noise levels below the low impact criteria (Table 10.3) beyond 300 m 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).
- 10.9.6 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**.
- 10.9.7 PRoW are located within the Scheme area only and 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**.
- 10.9.8 **Volume I, Chapter 9: Transport and Access** considers that, as no dedicated traffic flows are available for the cumulative schemes, traffic flows associated with cumulative schemes are inherently accounted for within the future baseline 2028 traffic flow and would not be affected. This would also be the case for noise effects which would remain **negligible in impact and effects** at all **high-sensitive receptors** and **not significant**.

Operational Phase

- 10.9.9 Figure 10.3.1 in **Volume III, Appendix 10.3**, shows that the predicted noise levels of the Associated Development south of the Site Boundary are very low. Predicted impact levels to the **high-sensitive receptors** located to the south represent a **low** or **negligible** impact

² High Grove Solar Farm Scoping Figures submitted to the Planning inspectorate: [EN0110010-000006-High Grove Solar Scoping Report Figures Part 4.pdf](#)



magnitude (Table 10.3). Cumulative noise levels from are not expected to elevate these impacts and will remain **minor to negligible effects** which are **not significant**.

- 10.9.10 Predicted levels at the Off Barn high-sensitive receptor after implementation of mitigation measures outlined in Section 10.7 would represent minor adverse effects as a worst-case. Should only Solar PV Arrays be located in the High Grove Solar Farm areas within approximately 1 km of the Off Barn then cumulative effects are expected to be negligible. However, should a noisier source of operational noise such as a BESS or large substation be in the areas near the Off Barn, then it is possible that cumulative effects that elevate the level of impact at this receptor may be predicted. As such, cumulative impact at this high-sensitive receptor can potentially be elevated to medium magnitude which is moderate adverse effect and significant in EIA terms. However, a detailed cumulative assessment is required with sufficient information on equipment location and specification to predict the level of effects. Should this information become available and has the potential to affect the Study Area, the effects will be defined and included in the ES.
- 10.9.11 This could be mitigated through consideration of cumulative noise as part of the detailed design of the Scheme which would be secured through a requirement of the DCO. It is considered likely that noise levels can be controlled to suitable levels at the Off Barn, including consideration of the neighbouring High Grove Solar Farm, such that residual levels would represent at most a minor impact at the Off Barn, a highly sensitive receptor, resulting in **minor adverse** effects at most which is **not significant** in EIA terms.

Decommissioning Phase

- 10.9.12 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**.



Table 10.6 Noise & Vibration Significance of Effects

Receptor Feature / Activity	Embedded Mitigation Measures	Nature and Duration of Effect	Sensitivity of Receptor	Magnitude of Impact	Preliminary Likely Significant Effects	Additional Mitigation Measures	Residual Effect Significance	
Construction Phase								
Construction Noise residential receptors	Construction Activity on Site (except as stated below)	Restricted working times, best practices, and CEMP	Adverse Short-Term	High	Negligible to Low	Negligible to Minor (Not Significant)	-	Negligible to Minor (Not Significant)
	Trenchless work including HDD (night)	Restricted working times, best practices, and CEMP	Adverse Short-Term	High	High - Medium	Major - Moderate (Significant)	Increase separation distance, use of alternative methods, interrupt drilling, temporary rehousing during drilling.	Minor (Not Significant)
	Solar PV Piling	Restricted working times, best practices, and CEMP	Adverse Short-Term	High	Medium	Moderate (significant)	Limit duration of piling, alternative techniques,	Minor (Not Significant)



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Receptor Feature / Activity	Activity	Embedded Mitigation Measures	Nature and Duration of Effect	Sensitivity of Receptor	Magnitude of Impact	Preliminary Likely Significant Effects	Additional Mitigation Measures	Residual Effect Significance
							localised screening	
Construction vibration - residential receptors	Construction Activities on Site	Restricted working times, best practices, and CEMP	Adverse Short-term	High	Negligible to Low	Negligible to Minor (Not Significant)	-	Negligible to Minor (Not Significant)
Construction Traffic Noise residential receptors	Traffic noise (HGVs)	Limiting delivery times to working hours, CEMP	Adverse Short-term	High	Negligible	Negligible (Not Significant)	-	Negligible (Not Significant)
Construction noise and vibration - PRow	Construction Activity on Site	Restricted working times, best practices, and CEMP	Adverse Short-term	Medium	Medium	Minor (Not Significant)	Inform PRow users of noise-generating works	Minor (Not Significant)
Operational Phase								
Residential receptors	Operation of BESS, NGS, CS and Solar-CUs	Iterative design for designated areas and zones.	Adverse Long-term	High	Medium to High	Moderate to Major (Significant)	Increase separation distance, quieter equipment, attenuation,	Minor (Not Significant) - Permanent



Receptor Feature /	Activity	Embedded Mitigation Measures	Nature and Duration of Effect	Sensitivity of Receptor	Magnitude of Impact	Preliminary Likely Significant Effects	Additional Mitigation Measures	Residual Effect Significance
							acoustic screening	
Residential Receptor	Operational Traffic	Phased replacement programme, small scale activity, no HGVs, measures outlined in OEMP.	Adverse Long-term	High	Negligible	Negligible (not Significant)	-	Negligible (not Significant)
PRoW	Operation of BESS, NGS, CS and Solar-CUs	Iterative design for designated areas and zones.	Adverse – Long-term	Medium	High	Moderate (Significant)	Localised screening if required.	Minor – (Not Significant)
Decommissioning Phase								
Decommissioning Noise – Keepers Cottage (residential)	Construction activities	Same best practice and embedded measures as construction and management plan in DEMP	Adverse – Short-term	High	Negligible to Medium	Moderate (Significant)	Increase separation distance, quieter equipment, attenuation, localised acoustic screening.	Minor (Not Significant)



Receptor / Feature	Activity	Embedded Mitigation Measures	Nature and Duration of Effect	Sensitivity of Receptor	Magnitude of Impact	Preliminary Likely Significant Effects	Additional Mitigation Measures	Residual Effect Significance
Decommissioning Noise and vibration – other residential receptors	All activity and traffic	Same best practice and embedded measures as construction and management plan in DEMP	Adverse – Short-term	High	Negligible to Medium	Negligible to Minor (Not Significant)	-	Negligible to Minor (Not Significant)
Decommissioning Noise and vibration – PRow	All activity and traffic	Same best practices and embedded measures as construction and DEMP	Adverse Short-term	Medium	Medium	Minor (Not Significant)	-	Minor (Not Significant)



References

- Ref 10-1 HMSO (1990): Environmental Protection Act, Part III.
- Ref 10-2 HMSO (1974): Control of Pollution Act, Part III.
- Ref 10-3 Ministry of Housing and Communities & Local Government (2024), National Planning Policy Framework (NPPF).
- Ref 10-4 Department for Environment, Food and Rural Affairs (2010), Noise Policy Statement for England (NPSE).
- Ref 10-5 Department for Energy Security & Net Zero, The Overarching National Policy Statement (NPS) for Energy (EN-1)
- Ref 10-6 Department for Energy Security & Net zero, National Policy Statement for Renewable Energy Infrastructure (EN-3)
- Ref 10-7 Department for Energy Security & Net zero, National Policy Statement for Electricity Networks infrastructure (EN-5)
- Ref 10-8 Institute of Acoustics, Chartered Institute of Environmental Health & Association of Noise Consultants (2017), Professional Practice Guidance on Planning and Noise (ProPG).
- Ref 10-9 Breckland Council - 'Adopted Core Strategy and Development Control Policies Development Plan Document' [accessed January 2025]
- Ref 10-10 Breckland Council - 'Adopted Site Specific Policies and Proposals [accessed January 2025]
- Ref 10-11 International Standards Organisation, ISO 9613-2:2014 'Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'
- Ref 10-12 BSI (2019), BS 4142: 2014-A1 2019: Methods for rating and assessing industrial and commercial sound.
- Ref 10-13 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 10-14 Highways England (2019): Design Manual for Roads and Bridges (DMRB) – LA111 – Noise and Vibration, Nov 2019.
- Ref 10-15 HMSO Department of Transport (1988), Calculation of Road Traffic Noise (CRTN)
- Ref 10-16 Department of Environment, Food & Rural Affairs (DEFRA) and University of Salford (2005), Method for the assessment of low frequency noise.
- Ref 10-17 BSI (2014), BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.



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