Meridian Solar Farm

EN010169

Volume 6

Environmental Statement

6.1 ES Chapter 13: Noise and Vibration (Rev 1) (Clean)

APFP Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

October 2026

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13. Noise and Vibration

13.1. Introduction

13.1.1. This chapter of the Environmental Statement (ES) presents the findings of an assessment of the likely significant effects on Noise and Vibration as a result of the Scheme. For more details about the Scheme, refer to **ES Chapter 2: The Scheme** (Doc Ref. 6.1).

13.1.2. This chapter identifies and proposes measures to address the potential impacts and likely significant effects of the Scheme, with regards to Noise and Vibration, during the construction, operational and decommissioning phases of the Scheme.

13.1.3. This chapter is supported by the following figures (Doc Ref. 6.2):

- **ES Figure 13-1: Study Area, Receptor and Noise Monitoring Positions;**
- **ES Figure 13-2: Operational Phase Plant Noise Contours, without Mitigation (1.5 m);**
- **ES Figure 13-3: Operational Phase Plant Noise Contours, with Mitigation (1.5 m);**
- **ES Figure 13-4: Operational Phase Plant Noise Contours, without Mitigation (4 m);** and
- **ES Figure 13-5: Operational Phase Plant Noise Contours, with Mitigation (4 m).**

13.1.4. This chapter is supported by the following technical appendices (Doc Ref. 6.3):

- **ES Appendix 13-1: Noise and Vibration – Legislation, Policy and Guidance;**
- **ES Appendix 13-2: Baseline Noise Surveys**; and
- **ES Appendix 13-3: Construction and Operational Noise Modelling.**

13.1.5. This chapter assesses noise and vibration effects on human receptors and does not include the assessment of noise and vibration on ecological or heritage receptors. Where relevant, the impacts of noise and vibration on heritage receptors are assessed in **ES Chapter 8: Cultural Heritage** (Doc Ref. 6.1), impacts of noise and vibration on ecological receptors are assessed in **ES Chapter 9: Ecology and Biodiversity** (Doc Ref. 6.1).

13.2. Legislation and Planning Policy

13.2.1. Full details of the legislation, policy, and guidance of relevance to the assessment of Noise and Vibration are provided in **ES Appendix 13-1: Noise and Vibration - Legislation, Policy and Guidance** (Doc Ref 6.3).

13.3. Stakeholder Engagement

13.3.1. A request for an EIA Scoping Opinion, provided in **ES Appendix 1-1: EIA Scoping Report** (Doc Ref. 6.3), was sought from the Secretary of State through the Planning Inspectorate in 2024 as part of the EIA Scoping Process. A summary of consultation responses in relation to noise and vibration are presented in Table 13-1.

Table 13-1: Scoping Opinion responses in relation to noise and vibration

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
Planning Inspectorate ID 3.7.1	The Inspectorate is content to scope out operational ground-borne vibration from further assessment.	Operational ground-borne vibration has been scoped out of the assessment	Section 13.4 of this chapter.
Planning Inspectorate ID 3.7.2	Operational effects – noise associated with cable connections: The ES should consider the potential for significant noise effects from overhead lines, where cable routes are near residential receptors.	A Tier 2 assessment of overhead line noise effects has been undertaken where the Grid Connection Route is near residential receptors.	Overhead line noise assessments can be found in Section 13.8, Section 13.9 and Section 13.10 of this chapter.
Planning Inspectorate ID 3.7.3	The Inspectorate is content to scope out operational traffic noise from further assessment. However, the ES description of development should confirm the operational vehicle types and numbers (with reference to thresholds within guidance) to justify this position.	As a worst-case scenario, maintenance staff would generate up to 20 vehicle movements per day. In addition, there is expected to be 2 movements per day for deliveries. Replacement of infrastructure is expected to generate up to a maximum of 40 HGVs (or 80 two-way HGV movements) per day, and up to 75 staff car trips (150 two-way	Information provided in the response.

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
		movements) per day. This is considerably lower than the level of vehicle trips generated during the peak construction phase, equating to approximately 20% of both the HGV and LGV/car movements generated during peak construction. This number of vehicle movements would not result in a material increase in noise on any road link.	
Planning inspectorate ID 3.7.4	Decommissioning effects – road traffic noise: The Inspectorate does not agree to scope out an assessment of decommissioning. The ES should provide information on the likely trip generation during decommissioning and confirm the assessment conclusions for the decommissioning phase, based on reasonable assumptions. Further details on the specific mitigation measures	An assessment of noise and vibration effects during the decommissioning phase has been undertaken and is reported in this chapter. This assessment considers likely trip generation during decommissioning based on reasonable assumptions and applies the same methodology as the construction phase, ensuring a robust comparison. Details of the mitigation	Decommissioning phase assessments are found in Section 13.8, Section 13.9 and Section 13.10 of this chapter. **Outline Decommissioning Environmental Management Plan (ODEMP)** (Doc Ref. 7.12)

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
	required to avoid likely significant effects should also be provided.	measures are provided in this chapter and incorporated in the **ODEMP** (Doc Ref. 7.12).	
Planning Inspectorate ID 3.7.5	The Inspectorate is content to scope out the assessment of noise effects on ecological receptors from the Noise and Vibration ES aspect chapter but advises the Applicant to provide clear cross-referencing in the Noise and Vibration ES aspect chapter to where these assessments are located.	An assessment of potential impacts and likely significant effects from noise disturbance on ecological receptors is provided within Section 9.8 of **ES Chapter 9: Ecology and Biodiversity** (Doc Ref. 6.1).	Section 9.8 of **ES Chapter 9: Ecology and Biodiversity** (Doc Ref. 6.1).
Planning Inspectorate ID 3.7.6	The ES should explain how the study area, including for construction traffic routes, and sensitive receptors have been selected with reference to the extent of the likely impacts.	Details on how the Study Area, including construction traffic routes, and sensitive receptors have been defined is provided in Section 13.4 of this chapter.	Section 13.4 of this chapter.
Planning Inspectorate ID 3.7.7	The ES should identify any cultural heritage receptors which could be impacted by noise and vibration from the Proposed Development and assess any	Cultural heritage receptors are identified and likely significant effects on such receptors have been assessed in Section 8.9 of	Section 8.9 of **ES Chapter 8: Cultural Heritage** (Doc Ref. 6.1)

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
	likely significant effects on such receptors.	**ES Chapter 8: Cultural Heritage** (Doc Ref. 6.1).	
Planning Inspectorate ID 3.7.8	The ES should explain how the baseline noise monitoring locations were identified and determined to be representative, with reference to relevant information including noise modelling/ contour mapping. The location of monitoring locations should be depicted on a supporting plan.	Details of the baseline noise monitoring locations and a figure showing their locations are provided along with noise contour mapping.	Section 13.4 of this chapter. **ES Figure 13-1: Study Area, Receptor and Noise Monitoring Positions** (Doc Ref. 6.2) **ES Figure 13-2: Operational Phase Plant Noise Contours, without Mitigation (1.5 m)** (Doc Ref. 6.2) **ES Figure 13-3: Operational Phase Plant Noise Contours, with Mitigation (1.5 m)** (Doc Ref. 6.2) **ES Figure 13-4: Operational Phase Plant Noise Contours, without Mitigation (4 m)** (Doc Ref. 6.2) **ES Figure 13-5: Operational Phase Plant Noise Contours, with Mitigation (4 m)** (Doc Ref. 6.2)

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
Planning Inspectorate ID 3.7.9	Given the design life of the Proposed Development is expected to be 40 years, care should be taken in the assessment not to underplay potential operational effects in this regard.	Operational noise effects are assessed as permanent.	Section 13.8 of this chapter.
Planning Inspectorate ID 3.7.10	The ES should confirm the working hours and identify any need for works outside of these hours, including night-time working. Working hours should be consistent with those specified in the dDCO/CEMP. The assessment of the operational phase should reflect the hours of operation of the Proposed Development (assumed by the Inspectorate to be 24 hours a day, 365 days a year).	Core construction work hours are provided in this chapter and align with the working hours in the **OCEMP** (Doc Ref. 7.10). Operational noise effects assume 24 hour 365 day operation.	Section 13.4 and Section 13.8 of this chapter. **Outline Construction Environmental Management Plan (OCEMP)** (Doc Ref. 7.10)
The Parish Council	The Parish Council would like to see much more clarity on the effects of construction, this should include, but not be limited	Details on working hours, numbers of workers on-site, numbers of vehicles using the roads and duration of the	Details can be found in paragraphs 13.4.45 to 13.4.48 and are presented in full within

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
	to, working hours, numbers of workers on-site, numbers of vehicles using the roads and how long construction would be expected to take.	construction programme are provided within the ES.	**ES Chapter 2: The Scheme** (Doc Ref. 6.1).
South Holland District Council (SHDC)	Please provide Council Environmental Protection with appropriate contact details in event of complaints.	Details of a complaints strategy and a communications strategy to inform noise and vibration sensitive receptors of works taking place are secured in the **OCEMP** (Doc Ref. 7.10).	**OCEMP** (Doc Ref. 7.10)
SHDC	Ensure Council Environmental Protection Team & all relevant Noise sensitive receptors (NSR) in the immediate area are informed of any proposed works outside of normal working hours.		
SHDC	Maintain sound barriers in good order.	No acoustic barriers are proposed to mitigate operational noise. Barriers required to mitigate construction noise will be well maintained in accordance with the **OCEMP** (Doc Ref. 7.10).	**OCEMP** (Doc Ref. 7.10)
SHDC	Vibration, ensure Council Environmental Protection Team	Details of a complaints strategy and a communications strategy	**OCEMP** (Doc Ref. 7.10)

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
	and all Vibration Sensitive Receptors in immediate area are informed of operations.	to inform noise and vibration sensitive receptors of works taking place are secured in the **OCEMP** (Doc Ref. 7.10).	

13.3.2. On the 20 June 2025, the Applicant corresponded with South Holland District Council's (SHDC) Environmental Health team to share details of the baseline noise monitoring regime and methodology for review. Details of the correspondence with SHDC are presented in Table 13-2.

Table 13-2: Direct stakeholder engagement relating to noise and vibration

Stakeholder	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
SHDC Environmental Protection Team	Request to clarify where additional monitoring would be undertaken	Additional monitoring locations identified during the ES are presented and differentiated through the use of colour. These have been included alongside the original PEIR and ES monitoring locations to clarify the extent of supplementary monitoring undertaken.	Presented in **ES Figure 13-1: Study Area, Receptor and Noise Monitoring Positions** (Doc Ref. 6.2).
SHDC Environmental Protection Team	The purpose of the additional noise monitoring was not set out, so it is difficult for us to comment regarding its sufficiency. Our greatest area of concern was RG29, which relates to ML14. Why has this area not been selected for additional monitoring? The monitoring point was not central to the receptors, nor to the proposed noise sources. We have identified this as a point where we would like to see additional sound monitoring data, ideally at the northern and southern end of the receptor, or in a direct line	Since submission of the PEIR, the illustrative masterplan has been updated with the substation located in land parcel D moved north, so it is no longer adjacent to RG29. As such, the potential operational noise effect at RG29 is substantially reduced compared to the PEIR operational noise assessment. Monitoring location ML14 was deemed to be suitably representative of baseline sound conditions at receptors within RG29. Langary Gate Road is the	Presented in **ES Figure 2-2: Indicative Solar Development Area and Inter-Array Layout Plan** (Doc Ref. 6.2) and **ES Figure 13-1: Study Area, Receptor and Noise Monitoring Positions** (Doc Ref. 6.2).

Stakeholder	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
	between the proposed noise sources and the receptors.	dominant noise source that influences baseline conditions at both ML14 and RG29. ML14 is located approximately 90m from Langary Gate Road, whereas the nearest property in RG29 is located approximately 25m from Langary Gate Road. As such, noise levels measured at ML14 are likely to be lower than the 'actual' noise levels at RG29, making the use of ML14 data a conservative approach. Given the updated masterplan and the conservative nature of the baseline data applied, additional monitoring at RG29 was not considered necessary	
SHDC Environmental Protection Team	When will the unattended 7 day noise monitoring be undertaken? We have concerns regarding the current time of year in relation to this. The current period (through to early September) is likely to be "skewed" by both harvesting periods and the use of	Unattended noise monitoring was undertaken in February, July and August of 2025. Operational noise is assessed using the L_{A90} background sound level, which is the level of sound that is exceeded for 90% of the	Presented in **ES Figure 13-1: Study Area, Receptor and Noise Monitoring Positions** (Doc Ref. 6.2) and **ES Appendix 13-2:**

Stakeholder	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
	audible bird scarers in the proposed monitoring areas close to farmland. The pea and grain harvest is generally quite disruptive in terms of short term noise and continues for 24 hours a day, 7 days a week. So although most properties will only be affected say 2 nights of the year, if that's 2/7th of your monitoring data, it will not be representative (affected 0.5% of the time vs 28% of the time). Without monitoring visits how will you know to disregard this? We recommend where activity is likely that the monitoring should either be in person, or with additional audio files if appropriate.	time and represents the "relative quietness" of a location. Bird scarers typically generate intermittent, impulsive sounds, which are unlikely to influence the L_{A90} background sound level, as this statistical metric represents the level exceeded for 90% of the measurement period and is resistant to intermittent noise. The effect of bird scarer noise on the L_{Aeq} (average sound energy level) is also likely to be negligible unless occurring with high frequency during the measurement period. Regarding harvesting activities, any sustained influence on measured noise levels has been identified as atypical increases in noise levels. Where atypical increases were identified, the affected periods were excluded from the background noise analysis to ensure the dataset	**Baseline Noise Surveys** (Doc Ref. 6.3)

Stakeholder	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
		remains representative of typical conditions at nearby receptor groups.	
SHDC Environmental Protection Team	We have reservations regarding the set up if the unattended monitoring with regards to microphone height, which seems unduly low, what is the reasoning regarding this?	The microphone height of 1.5m above ground level has been selected in accordance with standard industry guidance and best practice for environmental noise monitoring. Specifically, this height aligns with the guidance set out in BS 7445-1[1] and BS 4142[2] which state that the microphone should typically be placed at a height of 1.2 m to 1.5 m for free-field measurements.	**ES Appendix 13-2: Baseline Noise Surveys** (Doc Ref. 6.3)

[1] British Standards Institution (2003); BS 7445-1 – Description and measurement of Environmental Noise – Part 1: Guide to quantities and procedures.
[2] British Standards Institution (2014+A1:2019); BS 4142 – Methods for rating and assessing industrial and commercial sound.

13.3.3. Further pre-application engagement was undertaken through the publication of the Preliminary Environmental Information Report (PEIR) as part of the statutory consultation. Table 13-3 outlines the main matters raised by statutory consultees during the statutory and targeted consultations relating to noise and vibration and how these have been addressed through the ES.

Table 13-3: Key matters raised by prescribed or statutory consultees in relation to Noise and Vibration

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
SHDC Environmental Protection Team	In terms of operational noise, we have serious concerns about the impact to some receptors, particularly RG29, where their current soundscape, with a very low baseline noise level, will be significantly adversely impacted based on the current modelling. We appreciate that the noise is technically reversable, but given the schemes 40 year lifespan we do consider this to be permanent in the lifetimes of those receptors who live there, and good acoustic design should be applied to the scheme to reduce this impact prior to production of the Environmental Statement. Where possible, similar consideration to reducing impact should be given to RG07, RG09, RG27 & RG34.	In response to statutory consultation feedback, the locations of substation compounds, Battery Energy Storage System (BESS) and other noise generating plant have been moved to minimise the operational noise effects identified in the PEIR. The position of noise-generating plant, as identified on the Illustrative Masterplan, now avoids significant effects at RG07, RG09, RG27, RG29 and RG34.	Assessment of operational noise effects are presented in Section 13.8 and Section 13.10. Commitment to operational noise limits is presented in Section 13.9. Illustrative masterplan figure is presented in **ES Figure 2-2: Illustrative Solar Development Area and Inter-Array Connections Layout Plan** (Doc Ref. 6.2).
SHDC Environmental Protection Team	Given the number of bungalows in the area of RG29, consideration should be given to noise mapping at	The assessment is based on external noise and vibration levels at a premises and does not make	Presented in **ES Figure 13-2: Operational Phase Plant Noise Contours,**

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
	1.5m and the presence of buildings with non-standard construction should also be considered.	any assumptions about the construction of a building. Operational noise mapping at 1.5m height is provided to show noise propagation at first floor height, to represent living rooms or bedrooms, including those in non-typical residences. This approach ensures that potential effects on sensitive receptors, such as bungalows and other properties, are appropriately considered.	**without Mitigation (1.5 m)** (Doc Ref. 6.2) and **ES Figure 13-3: Operational Phase Plant Noise Contours, with Mitigation (1.5 m)** (Doc Ref. 6.2).
SHDC Lead Planning Officer	Concerns over the ability of single-track rural roads to handle construction traffic and of "significant" long-term noise pollution from the proposed substation.	An assessment of ikely significant effects on traffic and transport receptors are included within **ES Chapter 15: Traffic and Access** (Doc Ref. 6.1). The use of single-track roads has been minimised as far as practicable. Prior to mitigation, operational noise effects at RG04 and RG05 are predicted to be significant. However, with measures secured	**ES Chapter 15: Traffic and Access** (Doc Ref. 6.1). Assessment of operational noise effects is presented in Section 13.8 and Section 13.10 of this chapter. Commitment to operational noise limits is

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
		through the **Outline Operational Environmental Management Plan (OOEMP)** (Doc Ref. 7.11), Requirements 13 and 18 of the **Draft DCO** (Doc Ref. 3.1), and, where necessary, the use of low-noise substation transformers and BESS units at Land Parcel B, residual effects at all receptors are predicted to be not significant.	presented in Section 13.9.
	Concerns were raised regarding noise in a rural area.	Noise effects on residential amenity have been assessed for all phases of the Scheme. Following implementation of mitigation, including working hour restrictions, the **OCEMP** (Doc Ref. 7.10), the **OCTMP** (Doc Ref. 7.13), and operational controls secured through the **OOEMP** (Doc Ref. 7.11) and **Draft DCO** Requirements 13 and 18 (Doc Ref. 3.1), residual effects are, at worst, minor adverse and not significant for most receptors. RG53 may experience significant	Presented in Section 13.8 and Section 13.10 of this chapter.

Consultee	Summary of main matters raised	How has the matter been addressed?	Location of response in the ES
		effects during night-time HDD activities, although these are likely overestimated due to uncertainty in plant selection and the potential that HDD works may not be required following detailed design. Significant effects also remain along Langary Gate Road due to construction and decommissioning traffic.	
SHDC Environmental Protection Team	[*In relation to the targeted consultation…*] The methods employed to date have been satisfactory and provided a similar approach is undertaken when including these additional areas within the Scheme we do not have any location specific comments at this stage. However, we do consider that there may be a need for additional noise monitoring in this area.	Monitoring locations shown within **ES Figure 13-1** (Doc Ref. 6.2) are considered to be sufficient to inform the noise and vibration assessment presented within this chapter. Noise monitoring locations ML26, ML27 and ML28 provide representative locations for the area where the Grid Connection Route has been extended to connect to the Weston Marsh B Substation.	**ES Figure 13-1: Study Area, Receptor and Noise Monitoring Positions** (Doc Ref. 6.2)

13.4. Assessment Methodology

13.4.1. This section sets out the scope and methodology for the assessment of the noise and vibration impacts of the Scheme.

Scope of the Assessment

13.4.2. The following potential effects have been agreed to be considered as part of the noise and vibration assessment for the Scheme.

13.4.3. During the construction phase:

- Construction noise;
- Construction vibration; and
- Construction traffic noise.

13.4.4. During operation (and maintenance):

- Solar farm, Substation and Battery Energy Storage System (BESS) infrastructure noise;
- 400 kV overhead line noise; and
- Equipment replacement works.

13.4.5. During decommissioning activities:

- Decommissioning noise;
- Decommissioning vibration; and
- Decommissioning traffic noise.

13.4.6. Through the EIA Scoping process, the Planning Inspectorate agreed that the following potential impacts do not need to be considered in detail as part of the EIA for the Scheme:

13.4.7. During operation (and maintenance):

- Operational traffic noise; and
- Operational vibration.

13.4.8. Additional matters that are scoped out of the assessment are covered below.

13.4.9. The Inter-Array Connections are the electrical transmission connection between the land parcels of the Solar Development Area and will include a 132 kV overhead line between Land Parcel C and D, and an underground cable between

Land Parcels A and B. The National Grid Technical Report TR(E)564[3] indicates that historically 132 kV overhead lines, have been described as practically quiet with modelling data demonstrating that there would be no material level of noise emissions from 132 kV overhead lines. On this basis, an assessment of 132 kV overhead line noise has been scoped out.

13.4.10. Traffic vibration is mainly caused by heavy vehicles, and rarely by small vehicles (cars), if at all. Vibrations are induced as a result of the presence of irregularities in the road surface, for instance potholes, cracks etc. Typically, construction/ decommissioning traffic vibration is scoped out with reference made to DMRB LA 111[4], which states:

"Operational vibration is scoped out of the assessment methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects."

13.4.11. Although the DMRB LA 111 quote references operational vibration, it can be applied to general road use. If normal road conditions are assumed to be well maintained (smooth and free from irregularities), then traffic induced vibration would not lead to significant adverse effects. As such, the assumption that no significant adverse effects would occur can be applied to construction/ decommissioning traffic vibration under normal road conditions and an assessment is scoped out.

Study Area

13.4.12. The study area is defined to include construction, operational and decommissioning noise and vibration receptors likely to be at risk from direct and indirect impacts that may arise from the Scheme. The extent of the study area reflects the anticipated zone of influence for each phase, based on the nature of activities and relevant guidance.

13.4.13. For construction and decommissioning noise effects, the area for which impacts are expected is considered to be 300 m from the Site, based on guidance from

[3] National Grid (2021) Technical Report TR(E)564 Development of Method for Assessing the Impact of Noise from Overhead Lines (New Build, Reconductoring, Diversion and Uprating).
[4] Highways England (2020); Design Manual for Roads and Bridges (DMRB) LA 111 – Noise and Vibration.

BS 5228-1[5], which states construction noise predictions are generally reliable up to 300 m. This ensures all receptors that could experience likely significant effects are captured in the assessment.

13.4.14. Although BS 5228-2 does not contain any information on defining a vibration study area, reference is made to DMRB LA 111 states that

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

13.4.15. As such, the construction and decommissioning noise study area of 300 m is sufficient to encompass the construction and decommissioning vibration study area.

13.4.16. For operational noise effects, the study area has been defined based on the likely extent of noise impact. A 300 m buffer has been applied to the Solar Development Area to assess operational noise from fixed plant, and a 200 m buffer has been applied to the Grid Connection Route to assess operational noise from overhead lines (OHL). These distances have been determined using professional judgement and experience on comparable projects, ensuring that all potential impacts are appropriately captured.

13.4.17. For road traffic noise during construction and decommissioning, a study area of 50 m either side of construction traffic routes (see **ES Chapter 15: Traffic and Access** (Doc Ref. 6.1)) has been defined with reference to DMRB LA 111.

13.4.18. The combination of the study areas defined above is considered to represent the Zone of Influence.

Impact Assessment Methodology

13.4.19. To assess the potential Noise and Vibration impacts of the Scheme, it is necessary to determine the baseline conditions. The baseline conditions are the current (at the time of writing the ES) conditions of the Site and surroundings within the defined study area.

Sensitive Receptors

13.4.20. Potential sensitive receptors (i.e. buildings whose occupants may be disturbed by adverse noise and vibration levels, and structures that are sensitive to

[5] BSI (2014). Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration.

vibration) have been identified and taken into consideration when assessing the effects associated with noise and vibration levels from the construction, operational and decommissioning phases of the Scheme.

13.4.21. The type of noise-sensitive receptors that may experience significant effects due to the construction, operation, and decommissioning of the Scheme are identified in Table 13-4 as either residential or non-residential receptors.

13.4.22. The approach to the assessment of non-residential receptors differs from that adopted for residential receptors. Government policy for noise in the Noise Policy Statement for England (NPSE)[6] is based on relationships between noise and health/quality of life, and noise insulation of a typical dwelling and these are not considered applicable to non-residential receptors.

13.4.23. Non-sensitive locations include those where no human or other noise-sensitive activity takes place, or where such activity would not be affected by noise from the Scheme, such as barns, outbuildings, or industrial facilities.

Table 13-4 Receptor Types

Receptor Group	Receptors in Group
Residential	Individual dwellings and private open spaces (e.g. gardens).
Non-residential	Non-residential community facilities such as schools, hospitals, places of worship and noise sensitive commercial properties.

13.4.24. The effects of noise and vibration generated during the construction, operational and decommissioning phases of the Scheme are considered at nearby sensitive receptors. Several receptors that may potentially be affected have been considered for assessment. When considering groups of properties as a single receptor, noise and vibration is assessed at the nearest receptor to the Scheme (i.e. the receptor that will experience the highest levels of noise and vibration). Although noise and vibration may be perceivable at other receptors in each identified receptor group, effects will not be significant if they are suitably controlled at the identified receptors.

13.4.25. Noise sensitive receptors within the study areas have been identified through a desktop study of aerial imagery and mapping and are presented in **ES Figure 13-**

[6] Department for Environment, Food and Rural Affairs (2010); Noise Policy Statement for England (NPSE).

1: Study Area, Receptor and Noise Monitoring Positions (Doc Ref. 6.2) and are summarised below in Table 13-5.

Table 13-5 Sensitive Receptors

Receptor ID	Receptor Name	Receptor Type	Relevant Part of the Scheme
RG01	Little Lodge Farm	Residential	Solar Development Area
RG02	Cloot House	Residential	Solar Development Area
RG03	Spalding Road	Residential	Solar Development Area and Underground Inter-Array Connection
RG04	Barrier Bank	Residential	Solar Development Area and Grid Connection Route
RG05	Queens Bank	Residential	Solar Development Area
RG06	Queens Bank	Residential	Solar Development Area
RG07	Martins Road	Residential	Solar Development Area
RG08	Eaugate Road	Residential	Solar Development Area
RG09	Martins Farm Cottages	Residential	Solar Development Area
RG10	Drove Road and Back Bank	Residential	Solar Development Area
RG11	Eaugate Road and Queens Bank	Residential	Solar Development Area and Overhead Inter-Array Connection
RG12	Gull Bank	Residential	Solar Development Area and Overhead

Receptor ID	Receptor Name	Receptor Type	Relevant Part of the Scheme
			Inter-Array Connection
RG13	Eaugate Road and Hobbeach Drove	Residential	Solar Development Area and Overhead Inter-Array Connection
RG14	Back Bank and Broad Gate	Residential	Overhead Inter-Array Connection
RG15	Back Bank	Residential	Overhead Inter-Array Connection
RG16	Green Bank and Chapel Hill Road	Residential	Overhead Inter-Array Connection
RG17	Farrow Road, Chapel Gate and Broadgate	Residential	Overhead Inter-Array Connection
RG18	Broadgate	Residential	Overhead Inter-Array Connection
RG19	Chapel Gate and Coopers Close	Residential	Overhead Inter-Array Connection
RG20	Paddocks Equestrian Centre	Non-residential	Overhead Inter-Array Connection
RG21	St John the Baptist Parish Church	Non-residential	Overhead Inter-Array Connection
RG22	The Elizabethan Village Hall	Non-residential	Overhead Inter-Array Connection
RG23	Chapel Gate	Residential	Overhead Inter-Array Connection
RG24	Partridge Grove	Residential	Overhead Inter-Array Connection
RG25	Kennels on Dog Drove North	Non-residential	Overhead Inter-Array Connection

Receptor ID	Receptor Name	Receptor Type	Relevant Part of the Scheme
RG26	Dog Drove North	Residential	Overhead Inter-Array Connection
RG27	Holbeach Drove Gate	Residential	Solar Development Area and Overhead Inter-Array Connection
RG28	Hoviet House	Residential	Solar Development Area
RG29	Langary Gate Road	Residential	Solar Development Area
RG30	West Drove North	Residential	Solar Development Area
RG31	Gedney Hill Golf Club	Non-residential	Solar Development Area
RG32	Gedney Hill Special Needs Est	Non-residential	Solar Development Area
RG33	Holbeach Drove Gate	Residential	Solar Development Area
RG34	Langary Gate Farm	Residential	Solar Development Area
RG35	North Road	Residential	Solar Development Area
RG36	Travellers Rest	Residential	Solar Development Area
RG37	New Fen Dike	Residential	Solar Development Area
RG38	Greengates	Residential	Grid Connection Route
RG39	Moulton Chapel Road and Broad Gate	Residential	Grid Connection Route

Receptor ID	Receptor Name	Receptor Type	Relevant Part of the Scheme
RG40	Moulton Chapel Road, Footes Drove and Broad Gate Drove	Residential	Grid Connection Route
RG41	Moulton Chapel Road	Residential	Grid Connection Route
RG42	Delgate Bank	Residential	Grid Connection Route
RG43	Poplar Farm	Residential	Grid Connection Route
RG44	Mereside and Trinity Cottage	Residential	Grid Connection Route
RG45	Orchard House and The Cottage Residential	Residential	Grid Connection Route
RG46	Sycamores and The Yews	Residential	Grid Connection Route
RG47	Austendyke Road and Delgate Bank	Residential	Grid Connection Route
RG48	Austendyke Road	Residential	Grid Connection Route
RG49	Tointon Farm	Residential	Grid Connection Route
RG50	Willow Cottage and Cedar Lodge	Residential	Grid Connection Route
RG51	Broad Gate	Residential	Grid Connection Route
RG52	Bassoodon Boarding Cattery/Kennel and Broadgate Stables Equestrian Centre	Non-residential	Grid Connection Route
RG53	Broad Gate	Residential	Grid Connection Route
RG54	Delgate Bank	Residential	Grid Connection Route

Receptor ID	Receptor Name	Receptor Type	Relevant Part of the Scheme
RG55	Broad Lane	Residential	Grid Connection Route
RG56	Broad Gate	Residential	Grid Connection Route
RG57	Ward Farm Livery	Residential	Grid Connection Route
RG58	High Road, Blether Road, Beggars Bush Lane and Broadgate	Residential	Grid Connection Route
RG59	Holbeach Road	Residential	Grid Connection Route
RG60	Cross Gate	Residential	Grid Connection Route
RG61	Baytree Owl and Wildlife Centre Animal / Bird / Marine Sanctuary	Non-residential	Grid Connection Route
RG62	Wisemans Gate	Residential	Grid Connection Route
RG63	Wisemans Gate	Residential	Grid Connection Route
RG64	The Chase	Residential	Grid Connection Route
RG65	Shepherds Farm	Residential	Grid Connection Route
RG66	Hall Gate	Residential	Grid Connection Route
RG67	Fun Farm Children's Amusement Centre	Non-residential	Grid Connection Route
RG68	Cobblestones, Nutshell, Herons Way and Sunnyfield House	Residential	Grid Connection Route

Receptor ID	Receptor Name	Receptor Type	Relevant Part of the Scheme
RG69	Cowhirne Cottage	Residential	Grid Connection Route

13.4.26. Non-residential receptors RG20, RG25, RG31, RG52 and RG61 were identified within the PEIR and RG67 has been included at the request of SHDC. These locations primarily function as commercial, leisure, or animal-related facilities and are not considered noise-sensitive in terms of human occupancy. Under BS 8233[7] and other relevant guidance, noise-sensitive receptors are those where people live or spend prolonged periods requiring protection from environmental noise (e.g., homes, schools, hospitals). As these non-residential sites do not meet that definition, predicted effects have not been assessed in this ES.

13.4.27. In addition to receptors identified in Table 13-5, noise and vibration effects on users of Public Rights of Ways (PRoW) identified within the noise and vibration study area are considered.

Baseline Sound Monitoring

13.4.28. Baseline sound monitoring was undertaken in February 2025 and July to August 2025 in the vicinity of the Solar Development Area, Grid Connection Route, and Inter-Array Connections to establish existing ambient sound levels around these components of the Scheme.

13.4.29. The monitoring procedures followed guidance from BS 7445-1 and BS 4142. All sound measurements included ambient sound level ($L_{Aeq,T}$) and background sound level ($L_{A90,T}$) indicators. Full baseline sound monitoring methodology and detailed results are presented in full within **ES Appendix 13-2: Baseline Noise Surveys** (Doc Ref. 6.3).

13.4.30. Sound monitoring locations are presented in **ES Figure 13-1: Study Area, Receptor and Noise Monitoring Positions** (Doc Ref. 6.2) and summarised in Table 13-6. Based on their surroundings and relative distance to nearby dominant sound sources, the monitoring locations have been allocated as

[7] British Standards Institution (2014); BS 8233 – Guidance on sound insulation and noise reduction for buildings.

representative of the local noise environment at each of the various sensitive receptors identified above in Table 13-5.

13.4.31. The approach to baseline sound monitoring is to undertake attended measurements at receptors affected by noise sources that are only operational during the daytime (i.e. construction noise) and unattended monitoring for a period of at least a week to define baseline sound conditions at receptors affected by a continuous operational noise source. The Preliminary Environmental Information Report (PEIR) applied attended measurements at some receptors affected by operational noise. These attended surveys were updated with unattended monitoring so diurnal baseline sound levels could be defined.

13.4.32. For the purposes of defining baseline conditions at the identified sensitive receptors, the attended measurements undertaken to support the PEIR have been incorporated to supplement the unattended monitoring dataset. Where more than one monitoring location could reasonably represent a receptor group, the lower measured noise levels have been used to define the baseline conditions. This provides a conservative approach by making sure that the baseline sound levels used in the ES do not understate the potential for noise effects.

13.4.33. A weather station was installed along with noise monitors so that weather conditions were logged during the surveys. This allows for periods of adverse weather conditions to be identified and noise data for these periods to be excluded.

Table 13-6 Summary of Sound Monitoring Locations

Location Reference	Monitoring Period	Type of Survey and Stage	Representative of Receptors
ML01	23/07/2025 to 30/07/2025	Unattended monitoring undertaken at ES	RG01
ML02	06/02/2025 to 12/02/2025	Unattended monitoring undertaken at PEIR	RG02
ML03	16/07/2025 to 23/07/2025	Unattended monitoring undertaken at ES	RG03
ML04	07/02/2025 to 13/02/2025	Unattended monitoring undertaken at PEIR	RG03

Location Reference	Monitoring Period	Type of Survey and Stage	Representative of Receptors
ML05	09/07/2025 to 16/07/2025	Unattended monitoring undertaken at ES	RG04
ML06	07/02/2025	Attended monitoring undertaken at PEIR	RG05
ML07	13/02/2025 to 19/02/2025	Unattended monitoring undertaken at PEIR	RG05, RG06, RG08
ML08	23/07/2025 to 30/07/2025	Unattended monitoring undertaken at ES	RG07
ML09	16/07/2025 to 23/07/2025	Unattended monitoring undertaken at ES	RG09, RG10
ML10	13/02/2025 to 19/02/2025	Unattended monitoring undertaken at PEIR	RG11
ML11	14/02/2025	Attended monitoring undertaken at PEIR	RG15, RG16, RG17, RG18, RG21
ML12	23/07/2025 to 30/07/2025	Unattended monitoring undertaken at ES	RG14, RG15, RG16, RG17, RG18, RG19, RG20, RG21, RG22, RG23
ML13	23/07/2025 to 30/07/2025	Unattended monitoring undertaken at ES	RG27
ML14	20/02/2025 to 26/02/2025	Unattended monitoring undertaken at PEIR	RG24, RG28, RG29, RG30, RG31, RG32
ML15	27/02/2025	Attended monitoring undertaken at PEIR	RG30, RG31, RG32
ML16	30/07/2025 to 06/08/2025	Unattended monitoring undertaken at ES	RG33
ML17	20/02/2025 to 26/02/2025	Unattended monitoring undertaken at PEIR	RG34
ML18	27/02/2025	Attended monitoring undertaken at PEIR	RG35
ML19	23/07/2025 to 30/07/2025	Unattended monitoring undertaken at ES	RG36, RG37, RG35

Location Reference	Monitoring Period	Type of Survey and Stage	Representative of Receptors
ML20	27/02/2025	Attended monitoring undertaken at PEIR	RG37
ML21	16/07/2025 to 23/07/2025	Unattended monitoring undertaken at ES	RG38, RG39, RG40, RG41, RG42
ML22	16/07/2025 to 23/07/2025	Unattended monitoring undertaken at ES	RG43, RG44, RG45, RG46
ML23	09/07/2025 to 16/07/2025	Unattended monitoring undertaken at ES	RG47, RG48, RG49, RG50
ML24	16/07/2025 to 23/07/2025	Unattended monitoring undertaken at ES	RG54, RG55
ML25	09/07/2025 to 16/07/2025	Unattended monitoring undertaken at ES	RG51, RG52, RG53, RG56, RG57
ML26	09/07/2025 to 16/07/2025	Unattended monitoring undertaken at ES	RG58, RG59, RG61, RG62, RG67
ML27	09/07/2025 to 16/07/2025	Unattended monitoring undertaken at ES	RG60
ML28	23/07/2025 to 30/07/2025	Unattended monitoring undertaken at ES	RG63, RG64, RG65, RG66, RG68, RG69
ADD01	16/07/2025 to 23/07/2025	Additional unattended monitoring undertaken at ES	RG12, RG13
ADD02	30/07/2025 to 06/08/2025	Additional unattended monitoring undertaken at ES	RG25, RG26
ADD03	30/07/2025 to 06/08/2025	Additional unattended monitoring undertaken at ES	RG33

Assessment Methodology

Defining an Effect

13.4.34. The assessment presented in this chapter follows NPSE guidance, which does not follow the standard EIA methodology set out in **ES Chapter 4: Overview of the EIA Process** (Doc Ref. 6.1).

13.4.35. The NPSE sets definitions for 'significant adverse effects' and 'adverse effects' using the concepts:

- Lowest Observed Adverse Effect Level (LOAEL) – the level above which, as an average response, adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) – the average response level above which, as an average response, significant adverse effects on health and quality of life occur.

13.4.36. Paragraph 2.22 of the NPSE recognises SOAELs are contextual to the situation:

"*It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times.*"

13.4.37. Noise levels exceeding the SOAEL should be avoided within the context of Government policy on sustainable development.

13.4.38. For noise levels between the LOAEL and SOAEL, the NPSE states in paragraph 2.24 that:

"It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development … This does not mean that such adverse effects cannot occur."

13.4.39. All noise effects are local, only affecting nearby sensitive receptors, and are direct in nature; however, defining a likely effect and whether it is significant or not depends on the nature of a noise source. Likely effects have been defined

based on guidance set out in the NPSE and Planning Practice Guidance: Noise (PPGN)[8].

13.4.40. A new source of noise is assessed by the absolute noise level it generates at sensitive receptors. Where an exceedance of the defined SOAEL for each noise source occurs, it is an indication of a likely significant effect. However, for the assessment of construction traffic noise where an existing noise source (road traffic noise) is changed, the assessment of the effect level due to the change in noise refers to guidance within the IEMA Guidelines[9] and consideration of the absolute noise level based on guidance set out in the NPSE and PPGN.

13.4.41. Government policy for noise is based on community exposure and response relationships between noise and health/quality of life, and the noise insulation of a typical dwelling. Consequently, an assessment based on LOAELs and SOAELs cannot be applied to non-residential sensitive receptors. As such, the approach to the assessment of non-residential receptors differs from that adopted for residential receptors. Non-residential receptors are assessed on a case-by-case basis by considering the applicable design criteria for good internal noise levels.

13.4.42. The LOAEL and SOAEL used for this assessment are set out in the following sections.

Construction and Decommissioning Phases

Overview of Works

13.4.43. For the purposes of assessing noise and vibration, the construction programme has been summarised into six scenarios that represent high Noise Generating Activities (NGA). These activities are most likely to generate likely significant effects and are as follows:

- NGA1 – Enabling works and construction of access and site tracks;
- NGA2 – Construction of BESS and substation compounds;
- NGA3 – Construction of Solar Development Areas, including solar stations and ground mounted solar Photovoltaic (PV) panel arrays;

[8] Ministry of Housing, Communities & Local Government (2019); Planning Practice Guidance: Noise (PPGN).
[9] Institute of Environmental Management and Assessment & Institute of Acoustics (2014); Guidelines for Noise Impact Assessment.

- NGA4 – Open trench underground cable installation;
- NGA5 – Horizontal Directional Drilling (HDD) underground cable installation; and
- NGA6 – Construction of overhead line.

13.4.44. Detailed information on construction of the Scheme can be found in **ES Chapter 2: The Scheme** (Doc Ref. 6.1).

13.4.45. Based upon the construction programme, the Scheme is anticipated to take between 3-4 years to build.

13.4.46. The core working hours are defined as:

- Monday to Friday: 07:00-19:00 – All activities.
- Saturday: 08:00-13:30 – All activities.

13.4.47. It is anticipated there would be no Sunday or Bank Holiday working unless crucial to construction. The following operations may take place outside the core working hours:

- The installation and removal of conductors, pilot wires and associated protective netting (included but not limited to) across highways, or watercourses;
- The jointing of underground cables;
- The continuation of any work activity commenced during the core working hours to a point where they can securely and or safely be paused;
- Any highway works requested by the Local Highway Authority to be undertaken on a Saturday or Sunday or outside the core working hours;
- The testing or commissioning of any electrical plant installed as part of the authorised development including undertaking of any identified corrective activities;
- The completion of works disrupted or interrupted by severe weather conditions;
- Activity necessary in the instance of an emergency where there is a risk to persons or property;
- Security monitoring;
- Non-intrusive and intrusive surveys;
- Oil processing of transformers or reactors in substation sites;

- Delivery of abnormal indivisible loads and any highway works requested by the Local Highway Authority to be undertaken outside the core working hours;
- Mechanical and electrical installation works within buildings once erected and enclosed;
- Concrete pours for foundations;
- Continuous activities associated with trenchless cable installation; and
- Night working for cable or overhead line installation within public highways.

13.4.48. Works outside of core working hours will be required to comply with the restrictions stated in the **OCEMP** (Doc Ref. 7.10) and any other restrictions agreed with the relevant planning authorities pursuant to the consent process under Section 61 of the Control of Pollution Act 1974[10].

Prediction Methodology

13.4.49. Noise levels experienced by sensitive receptors during construction and decommissioning works depend upon several variables, the most significant of which are:

- The noise generated by plant or equipment used on-site, generally expressed as Sound Power Levels (L_w) or the vibration generated by the plant;
- The periods of use of the plant on-site, known as the 'on-time';
- The distance between the noise and/or vibration source and the receptor;
- The noise attenuation due to ground absorption, air absorption and barrier effects;
- In some instances, the reflection of noise due to the presence of hard surfaces, such as the sides of buildings; and
- The time of day or night the works are undertaken.

[10] Her Majesty's Stationery Office (1974); Control of Pollution Act.

Construction and Decommissioning Phase Noise Criteria

13.4.50. The construction and decommissioning phase noise criteria has been based on guidance from the Association of Noise Consultants Construction Noise Guide[11] (ANC Guide). The ANC Guide was issued in 2021 and, although it is primarily aimed at providing a consistent approach to Section 61 applications, it also represents the most modern interpretation of example assessment methods in Annex E of BS5228-1 and the latest industry standard.

13.4.51. The ANC Guide was issued in 2021 and, although it is primarily aimed at providing a consistent approach to Section 61 applications, it also represents the most modern interpretation of example assessment methods in Annex E of BS 5228-1 and the latest industry standard.

13.4.52. The LOAEL and SOAEL levels for construction and decommissioning noise are defined, as per the ANC Guide, in Table 13-7.

Table 13-7 Construction and Decommissioning Noise LOAEL and SOAEL

Time Period	Threshold Value $L_{Aeq,1hr}$ dB	
	LOAEL	SOAEL
Day (07:00-19:00) Saturday (07:00-13:00)	65	75
Evening (19:00-23:00) Weekends (13:00-23:00 Saturdays and 07:00-23:00 Sundays)	55	65
Night (23:00 – 07:00)	45	55
Note: The values apply to a location one metre from a residential building façade containing a window, ignoring the effect of the acoustic reflection from that façade. As per standard practice where ambient noise levels exceed the relevant LOAEL value defined in this table, the LOAEL is set at the ambient sound level and the SOAEL is set 5 dB higher.		

[11] Association of Noise Consultants (2021); Construction Noise Guide: A Good Practice Guide to the Preparation, Submission and Management of Section 61 Consents.

13.4.53. The significance of effects for construction and decommissioning noise, in accordance with Table 13-7 are presented below in Table 13-8.

Table 13-8 Significance of Effect for Construction and Decommissioning Noise

Effect Category	Noise Level ($L_{Aeq,T}$ dB)
Major	Above or equivalent to the SOAEL +5 dB
Moderate	Above or equivalent to the SOAEL but below the SOAEL +5 dB
Minor	Above or equivalent to the LOAEL but below the SOAEL
Negligible	Below the LOAEL

Construction and Decommissioning Phase Traffic Noise Criteria

13.4.54. Baseline traffic noise levels at assessed receptors have been calculated using the methodology set out in CRTN[12], based on existing traffic flows along the construction route for the assumed peak construction year of 2031. The predicted change in traffic noise during construction has been calculated from the percentage increase in overall traffic and Heavy Goods Vehicle (HGV) movements associated with construction activities.

13.4.55. For the construction phase traffic noise, the LOAEL and SOAEL are provided in Table 13-9.

Table 13-9 Construction Traffic Noise LOAEL and SOAEL

Time Period	LOAEL	SOAEL
All time periods	1.0 dB $L_{A10,18hr}$	3.0 dB $L_{A10,18hr}$

13.4.56. The magnitude of effects for construction traffic noise, as defined in the IEMA Guidelines, are presented in Table 13-10.

Table 13-10 Significance of Effect for Construction Road Traffic Noise

Effect Category	Increase in Basic Noise Level of Closest Public Road Used for Construction Traffic, $L_{A10,18hr}$ (dB)
Major	Greater than or equal to 5.0

[12] Department of Transport (1988); Calculation of Road Traffic Noise (CRTN).

Effect Category	Increase in Basic Noise Level of Closest Public Road Used for Construction Traffic, $L_{A10,18hr}$ (dB)
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

Construction and Decommissioning Phase Vibration Criteria

13.4.57. The level of vibration at the assessed receptors has been estimated using the method in Table E.1 of BS 5228-2[13] which is based on the distance to receptor and a scaling factor.

13.4.58. BS 5228-2 provides guidance on the perception of vibration within occupied buildings, offering a simple approach to assessing both annoyance and the potential for cosmetic damage arising from construction vibration. Table B.1 of Annex B in BS 5228-2 sets out indicative Peak Particle Velocity (PPV) levels and their potential impact on people, which is reproduced in Table 13-11.

Table 13-11 BS 5228-2 Guidance on Effects of Vibration Levels

Vibration Level A), B), C)	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequences associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.
A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.	

[13] British Standards Institution (2009+A1:2014); BS 5228-2 – Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.

Vibration Level [A), B), C)]	Effect
B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available. C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and / or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.	

13.4.59. For residential or light commercial buildings, a peak component particle velocity of 15 mm/s at 4 Hz, increasing to 20 mm/s at 15 Hz and to 50 mm/s at 40 Hz are considered the limits for transient vibration above which cosmetic damage can occur, as defined in Table B.2 of BS 5228-2.

13.4.60. For Construction phase vibration, the LOAEL and SOAEL are provided in Table 13-12.

Table 13-12 Construction Vibration LOAEL and SOAEL

Time Period	LOAEL	SOAEL
All time periods	0.3 mm/s PPV	1.0 mm/s PPV

13.4.61. The magnitude of effects for construction vibration, in accordance with Table 13-12 are presented below in Table 13-13.

Table 13-13 Significance of Effect for Construction Vibration

Category	Vibration Level
Major	Above or equal to 10 mm/s PPV
Moderate	Above or equal to 1.0 mm/s PPV and below 10 mm/s PPV
Minor	Above or equal to 0.3 mm/s PPV and below 1.0 mm/s PPV
Negligible	Below 0.3 mm/s PPV

13.4.62. The Scheme is intended to be decommissioned after 40 years. It is expected that the vibration impacts resulting from the decommissioning of the Scheme will be equivalent to but no worse than the impacts arising from construction vibration.

As such, vibration effects identified in the assessment of construction vibration are applicable to the decommissioning phase.

Operational Phase

Operational Phase Plant Noise Criteria

13.4.63. The main sources of operational noise, as shown in **ES Figure 13-1** (Doc Ref. 6.2), that are considered in the assessment of fixed plant noise are:

- Onsite Substations;
- BESS; and
- Inverters / Transformers associated with solar stations.

13.4.64. Noise predictions of the operational Scheme have been undertaken using CadnaA®[14] (v2025), which implements the calculation procedures of ISO 9613-2[15] to predict the propagation of noise away from the Scheme in all directions and to quantify resultant noise levels at the identified noise sensitive receptor locations.

13.4.65. Operational noise from fixed plant has been assessed following BS 4142 guidance, whereby the rating level of noise emissions from fixed plant are compared against the background level of the pre-development noise climate. Source data for operational plant noise emissions is presented in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3).

13.4.66. The relevant parameters for this assessment are as follows:

- Background sound level ($L_{A90,T}$) – defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting, F, and quotes to the nearest whole number of decibels;
- Specific sound level ($L_{Aeq,Tr}$) – the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr; and
- Rating level ($L_{Ar,Tr}$) – the specific sound level plus any adjustment made for the characteristic features of the noise.

[14] CadnaA®, registered trademark of Datakustik GmbH (Munich, Germany).

[15] British Standards Institution (2024); BS ISO 9613-2 – Attenuation of sound during propagation outdoors – Part 2: A general method of calculation.

13.4.67. BS 4142 allows for, as an absolute worst case, a cumulative +15 dB correction to be applied to the specific sound level based upon the presence or expected presence of the following:

- Tonality - a penalty of 2 dB is applied for a tone which is just perceptible at the receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible;
- Impulsivity - a penalty of 3 dB is applied for impulsivity which is just perceptible at the receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible. An impulse is defined as the sudden onset of a sound;
- Intermittency - a penalty of 3 dB can be applied if the intermittency of the specific sound is readily identifiable against the residual acoustic environment at the receptor i.e. it has identifiable on/off conditions; and
- Other sound characteristics - a penalty of 3 dB can be applied where the specific sound features characteristics that are neither tonal nor impulsive but are readily distinctive against the residual acoustic environment.

13.4.68. BS 4142 states the following regarding the assessment of impacts, comparing the rating level of the new noise source with the existing background sound level:

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

13.4.69. BS 4142 advises that, where rating levels and background sound levels are low, which is the case in rural areas such as those surrounding the Scheme, the

assessment of operational noise should take into context the absolute noise level. The ANC Guide to BS 4142[16] provides context to this by stating:

- "*BS 4142 does not define 'low' in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB L_{A90}, and low rating levels as being less than about 35 dB $L_{Ar,Tr}$.*"

13.4.70. Section 11 (page 42) of the ANC Guide suggests that:

"*…similar values would not be unreasonable in the context of BS 4142, but the assessor should make a judgement and justify it where appropriate*".

13.4.71. BS 4142 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low, only that the absolute levels may be more important than the difference between the two values. Where the background levels are low, the absolute levels might suggest a more acceptable outcome than would otherwise be suggested by the difference between the values (existing and proposed noise rating levels). As such, where background noise levels are identified as being below the 'very low' threshold of 30 dB $L_{A90,T}$, a LOAEL of 35 dB $L_{Ar,Tr}$ during the daytime and a LOAEL of 30 dB $L_{Ar,Tr}$ during the night-time has been adopted with respect to the operational noise assessment.

13.4.72. BS 8233 and the World Health Organisation (WHO) 'Guidelines for Community Noise'[17] provide guidance levels for internal noise within dwellings of 30 dB $L_{Aeq,T}$ for good sleeping conditions at night. In accordance with examples in Annex A of BS 4142, it is assumed that a partially open window in a building's envelope will attenuate external noise by approximately 10 dB. Consequently, an external SOAEL of 40 dB $L_{Ar,Tr}$ has been adopted for the night-time.

13.4.73. The assessment criteria for noise from fixed plant installations is summarised in Table 13-14.

[16] ANC Acoustics & Noise Consultants BS4142:2014+A1:2019 Technical Note, Version 1.0 March 2020

[17] World Health Organization (1999); Guidelines for Community Noise.

Table 13-14 Operational Plant Noise LOAEL and SOAEL

Time Period	LOAEL	SOAEL
Daytime (07:00-23:00)	Less than or equal to the typical background level ($L_{A90,T}$), with a minimum of 35 dB $L_{Ar,Tr}$	Greater than 10 dB above the background sound level, with a minimum of 45 dB $L_{Ar,Tr}$
Night-time (23:00-07:00)	Less than or equal to the typical background sound level ($L_{A90,T}$), with a minimum of 30 dB $L_{Ar,Tr}$	Greater than 10 dB above the background sound level, with a minimum of 40 dB $L_{Ar,Tr}$

13.4.74. The significance of effects for operational plant noise, in accordance with Table 13-14 are presented below in Table 13-15.

Table 13-15 Significance of Effect for Operational Phase Plant Noise

Effect Category	Noise Level ($L_{Ar,Tr}$ dB)
Major	Above or equal to SOAEL +5 dB
Moderate	Above or equal to SOAEL and less than SOAEL +5 dB
Minor	Above or equal to LOAEL and less than SOAEL
Negligible	Below LOAEL

Operational Phase Overhead Line Noise Criteria

13.4.75. A Tier 1 (wet noise) assessment was carried out in the PEIR using criteria presented in PS(T)134[18]. The results of the Tier 1 assessment identified that a Tier 2 assessment should be undertaken as part of the ES.

13.4.76. A Tier 2 assessment requires recalculation of the predicted noise level at the façade of the noise sensitive receptors (accounting for the duration of wet and dry weather); and recalculation of the noise criteria (accounting for the duration of wet and dry weather). The predicted noise levels for a Tier 2 assessment have been calculated according to guidance provided in TGN(E)322[19].

[18] National Grid (2021); Policy Statement PS(T)134 – Operational Audible Noise Policy for Overhead Lines.
[19] National Grid (2021); Technical Guidance Note TGN(E)322 – Operational Audible Noise Assessment Process for Overhead Lines (New Build, Reconducting, Diversion and Uprating).

13.4.77. TGN(E)322 presents the combined noise criteria to be used in Tier 2 assessment for different annual average rainfall. Annual average rainfall for South Holland is less than 450 wet hours (see **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3)). As such, the following criteria presented in Table 13-16 will be applied to assess overhead line noise. These criteria include tonal correction penalties.

Table 13-16 Tier 2 Overhead Line Noise Criteria for Different Receptors

Use	Rainfall (Annual Average Wet Hours)	No Adverse Impact (dBA)	Adverse Impact (dBA)	Significant Adverse Impact (dBA)
Vulnerable Subgroups	450	< 31.9	31.9-41.9	> 41.9
Residential	450	< 36.9	36.9-46.9	> 46.9
Schools and Hotels	450	< 41.9	41.9-51.9	> 51.9

13.4.78. The significance of effects for overhead line noise, with reference to residential noise criteria in Table 13-16, are presented below in Table 13-17. Details on overhead line noise calculations are presented in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3).

Table 13-17 Significance of Effect for Overhead Line Noise

Effect Category	Noise Level ($L_{Ar,Tr}$ dB)
Major	>56.9
Moderate	>46.9-56.9
Minor	36.9-46.9
Negligible	<36.9

13.4.79. The Tier 2 assessment determines whether the combined wet and dry noise impact is acceptable. Where the Tier 2 assessment suggests that there may be the potential for an adverse impact, a Tier 3 assessment is required.

Non-Residential Receptors

13.4.80. The following non-residential receptors within the study area have been considered in accordance with BS 8233 and BB93[20]:

- RG21 (St John the Baptist Parish Church).
- RG22 (The Elizabethan Village Hall).
- RG32 (Gedney Hill Special Needs Est).

13.4.81. The internal design criteria appropriate to each receptor (based on the building type) has been applied and the external noise level thresholds have been calculated based on typical façade attenuation. These thresholds represent the maximum external noise levels that would not be expected to exceed the internal design criteria for the receptor and are presented in Table 13-18.

Table 13-18 Internal Noise Criteria and External Thresholds for Non-Residential Receptors

Receptor	Relevant BS 8233 or BB93 Category	Design Range, $L_{Aeq,T}$ dB	Typical Façade Attenuation, dB	Derived External Noise Threshold, $L_{Aeq,T}$ dB
RG21	Place of worship (BS 8233)	30-35	30	65
RG22	Meeting room (BS 8233)	35-45	30	75
RG32	Teaching space intended specifically for students with special hearing and communication needs (BB93)	30-35	30	65

13.4.82. The effects of noise and vibration effects on PRoW users are also considered. Due to the short—term nature of exposure of PRoW users to noise and vibration emissions, the potential for likely significant effects to occur is assessed qualitatively.

[20] Department for Education (2015); BB93 – Acoustic Design of Schools: Performance Standards.

Significance of Effect

13.4.83. The following terminology has been used to define noise and vibration effects:

- Adverse - detrimental or negative effects to an environmental resource or receptor;
- Negligible – imperceptible effects to an environmental resource or receptor; or
- Beneficial – advantageous or positive effects to an environmental resource or receptor.

13.4.84. Where adverse or beneficial noise and vibration effects are identified, these are described using the following scale:

- Minor – slight, very short or highly localised effect;
- Moderate – limited effect (by extent, duration or magnitude), which may be important at a local scale; or
- Major – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

13.4.85. Generally, effects classed from negligible to minor are considered to be not significant, whereas effects classed from moderate to major are considered significant. However, final determination of whether effects are likely to be significant have been made following the classification of effects and using professional judgment. These include consideration of the duration, frequency and likelihood of noise and vibration effects and whether they are temporary or permanent and the area and number of receptors affected.

13.4.86. All potential noise and vibration effects during the construction and decommissioning phases will be temporary and noise effects during the operational phase will be reversible long-term.

13.4.87. Assessment of effects on receptors has firstly been determined with inclusion of embedded mitigation measures. Following this, the mitigation hierarchy has been implemented to avoid, reduce or compensate for predicted significant effects on receptors. Once appropriate mitigation has been formulated for each receptor, assessment of the significance of residual effects has been determined.

13.5. Assessment Assumptions and Limitations

Baseline Assumptions and Limitations

13.5.1. Relevant future developments within the study area are presented as part of the cumulative assessment presented in Section 13.11 of this chapter. No major developments (e.g. highway or railway schemes, industrial facilities) in the study area that are likely to result in a material change to the local baseline noise environment are currently approved/under construction and may be in place prior to the Scheme commencing. As no material changes to the ambient sound environment are expected, the measured ambient sound levels (taken in February, July and August 2025, see Table 13-19) are considered as representative of the future baseline scenarios and are assumed to remain valid for the assessment period.

13.5.2. Any measurement of existing ambient or background sound levels will be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation, and other factors. Hence, any measurement survey can only provide a sample of the ambient levels. Every effort has been made such that measurements were undertaken in such a way as to provide a representative sample of conditions, e.g. avoiding periods of adverse weather conditions. However, a small degree of uncertainty will always remain in the values taken from such a measurement survey. A precautionary approach is adopted when analysing such data to ensure a robust assessment.

Noise Model Assumptions

13.5.3. A series of assumptions were made for the generation of the construction and operational noise modelling and are as follows:

- Digital noise modelling of the operational Scheme has been based on the reasonable worst-case parameters set out in the drawings, plans and details;
- Sound level data for operational noise-producing plant (i.e. BESS, Inverters, Transformers and Solar Stations) have been based on industry sound pressure level measurement data (see **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3));
- Surrounding ground conditions are rural farmland and have been modelled as soft (G=0.8);

- Air temperature was set to 10 degrees Celsius and humidity 70%, which are typical annual average weather conditions for Lincolnshire based on historical weather data;
- Two orders of reflection were modelled; and
- Land topography has been incorporated into the noise modelling.

Construction Phase Noise and Vibration Assumptions and Limitations

13.5.4. The assessment of construction noise and vibration has considered construction activities that have the potential to result in significant effects on identified receptors, based on information presented in **ES Chapter 2: The Scheme** (Doc Ref. 6.1), previous experience of co-located solar and BESS construction sites, and professional judgment. These assessments are based on a reasonable worst-case scenario. Construction noise predictions have been undertaken using the computer modelling software CadnaA® (v2025), based on an example schedule of plant items that are typically used in such developments for the purposes of carrying out a quantitative assessment at this stage. Construction plant is summarised in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3).

13.5.5. Construction noise predictions in CadnaA® have been undertaken using BS 5228-1 methodologies. Construction sound sources are taken to be representative of the plant and/or activities that will be used during the construction of the Scheme. Noise predictions were carried out to represent a conservative scenario where construction plant is active nearest to the identified receptors and does not take into account quieter periods when limited activities take place or at further distances. Consequently, noise predictions may overestimate construction noise levels and are therefore considered to be a reasonable likely worst-case.

13.5.6. Where cable crossings have the option for being either open cut or trenchless, the trenchless Horizontal Direction Drilling (HDD) method has been assessed as the worst-case scenario, as HDD activities may require 24/7 working so can take place during the sensitive night period.

13.5.7. Due to uncertainty in the overhead line routing of neighbouring cumulative developments (Grimsby to Walpole and Weston Marsh to East Leicestershire overhead lines), the Scheme needs to consider the alternative option of undergrounding the proposed 400kV overhead line between High Road and the proposed Weston Marsh B Substation. For the purposes of this assessment, it

has been assumed that undergrounding of the proposed 400kV overhead line (facilitated through Work Number 14 of the **Draft DCO** (Doc Ref. 3.1)) could occur at any location within the Scheme boundary north of High Road. Therefore, there is potential for HDD works to take place anywhere within this area in addition to HDD locations identified in Table 13-24. Should undergrounding be required in the northern section of the Grid Connection Route, the same construction methodologies and design parameters as defined for the section of the underground cable section between the Cable Sealing End Compounds (CSEC) would be applied.

13.5.8. The solar PV mounting structures will be installed on galvanised steel piles that are driven into the ground and solar stations will be installed on concrete pile foundations. To present a worst-case scenario in terms of noise and vibration, it is assumed that driven piling will be used.

13.5.9. Solar PV structure piling vibration calculations have been based on the prediction methodology provided in Table E.1 of BS 5228-2, where a K_P of 1.5 has been used for the ground conditions (representative of stiff cohesive soils, medium dense granular soils or compacted fills) and a nominal hammer energy of 1500 J per blow has been used to represent a typical rig used for piling of PV mounting structures.

13.5.10. Driven piling is assumed to be used for construction of the BESS compounds, Substation compounds and 400 kV overhead line pylons as a worst-case scenario from a vibration perspective. Driven piling vibration calculations based on regression analysis of driven piling data (presented in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3) from Table D.2 of BS 5228-2.

Operational Phase Assumptions and Limitations

Operational Phase Plant Noise

13.5.11. Noise source data for fixed plant has been obtained from manufacturer specifications where available. Where manufacturer specifications were not available, noise source data has been derived from experience of comparable solar schemes.

13.5.12. Operational phase plant noise has been predicted with all plant being in maximum operation at all times of day. Cooling fans on inverters and battery units will operate dependant on the ambient temperatures and would not be operating at 100% during cooler temperatures. Consequently, noise predictions represent a reasonable worst-case and are likely to overestimate actual impacts.

13.5.13. There may be requirement for component replacement works in the Solar Development Area during the operational phase of the Scheme if any infrastructure needs replacing. These works would be phased and would therefore be considerably less intrusive than construction activities. As such, construction phase predictions are considered representative of any potential component replacement works that may occur in the future.

Operational Phase Overhead Line Noise

13.5.14. The Electric Power Research Institute's (EPRI) AC Transmission Line Reference Book – 200 kV and Above (Third Edition, 2005) provides a method for predicting the noise level at varying distances from the line under varying climatic conditions. The EPRI method has been applied when calculating overhead line noise. Noise effects from the overhead line route presented in **ES Figure 2-4: Illustrative Grid Connection Route Layout Plan** (Doc Ref. 6.2) have been calculated.

13.5.15. The calculation for overhead line conductor noise uses the EPRI method of calculation which assumes a moderately aged conductor, which is appropriate for the assessment of the Scheme for the lifetime of its operation. Assumptions when calculating overhead line noise include a flat terrain between the source and receptor calculation point. In Tier 2 of the TGN(E)322 assessment, no acoustic absorption due to the ground is included to ensure a worst-case assessment.

13.5.16. In accordance with the preliminary design, the pylon heights vary between 44.5 m and 58.6 m above ground. A 7.4 m vertical limit of deviation has also been set. Overhead line noise has been calculated using the smaller pylon size with a crossarm length of 6.7 m as conductors located closer together result in a higher likelihood of corona discharge and higher levels of noise.

13.5.17. The Met Office average rainfall hours map for 2001-2010 (reproduced in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3)) has been used to estimate rainfall hours at the Site. This data is assumed to be representative of current rain hours at the Site and has been used in overhead line noise calculations.

Decommissioning Phase Assumptions and Limitations

13.5.18. Decommissioning noise modelling has not been undertaken due to the similarities in process between construction and decommissioning activities. However, commentary is provided on the likely level of decommissioning noise

on the basis that construction and decommissioning phase plant would be the same but without the need for piling or drilling for trenchless crossings.

Cumulative Assessment Assumptions and Limitations

13.5.19. Two cumulative assessment scenarios are set out in **ES Chapter 4: Overview of the EIA Process** (Doc Ref. 6.1) which are considered to capture the worst-case cumulative effects. For this chapter, the below scenario is considered in relation to the cumulative schemes assessment:

- Scenario 1: Construction periods and the peak construction of the Scheme and the Grimsby to Walpole DCO, Outer Dowsing Offshore Wind Farm DCO, the Weston Marsh to East Leicestershire (WEML) DCO and Ossian Wind Farm DCO overlap in 2031.

13.6. Baseline Conditions

13.6.1. This section describes the baseline environmental characteristics for the Scheme and surrounding areas with specific reference to noise and vibration.

Current Baseline

13.6.2. The land use within the Scheme is primarily agricultural. Other surrounding land uses within the Scheme boundary are woodland, residential and aviation.

13.6.3. The dominant sources of sound in the area are road traffic on:

- A16;
- A151;
- Hull's Drove;
- B1357 Moulton Chapel Road;
- Holbeach Drove Gate;
- B1165 Austendike Road; and
- James Road.

13.6.4. Additionally, RAF Wittering is located approximately 25 km south-west of the Scheme and is serving as the headquarters for the RAF Support Force and a flying training facility.

13.6.5. Results of baseline noise monitoring at locations illustrated in **ES Figure 13-1: Study Area, Receptor and Noise Monitoring Positions** (Doc Ref. 6.2) are

presented in Table 13-19. More detailed results are presented in **ES Appendix 13-2: Baseline Noise Surveys** (Doc Ref. 6.3).

Table 13-19 Baseline Noise Monitoring Results

Location Reference	Survey Type	Sound Level Indicator	Daytime (07:00-23:00)	Night-time (23:00-07:00)
ML01	Unattended	$L_{Aeq,15min}$ dB	48	35
		$L_{A90,15min}$ dB	29	21
ML02	Unattended	$L_{Aeq,15min}$ dB	51	40
		$L_{A90,15min}$ dB	39	36
ML03	Unattended	$L_{Aeq,15min}$ dB	67	60
		$L_{A90,15min}$ dB	47	43
ML04	Unattended	$L_{Aeq,15min}$ dB	74	69
		$L_{A90,15min}$ dB	60	40
ML05	Unattended	$L_{Aeq,15min}$ dB	67	59
		$L_{A90,15min}$ dB	41	33
ML06	Attended	$L_{Aeq,15min}$ dB	67	N/A
		$L_{A90,15min}$ dB	54	N/A
ML07	Unattended	$L_{Aeq,15min}$ dB	57	45
		$L_{A90,15min}$ dB	35	21
ML08	Unattended	$L_{Aeq,15min}$ dB	55	48
		$L_{A90,15min}$ dB	29	21
ML09	Unattended	$L_{Aeq,15min}$ dB	65	60
		$L_{A90,15min}$ dB	38	26
ML10	Unattended	$L_{Aeq,15min}$ dB	48	34
		$L_{A90,15min}$ dB	34	20
ML11	Attended	$L_{Aeq,15min}$ dB	57	N/A
		$L_{A90,15min}$ dB	39	N/A
ML12	Unattended	$L_{Aeq,15min}$ dB	51	41

Location Reference	Survey Type	Sound Level Indicator	Daytime (07:00-23:00)	Night-time (23:00-07:00)
		$L_{A90,15min}$ dB	28	20
ML13	Unattended	$L_{Aeq,15min}$ dB	57	48
		$L_{A90,15min}$ dB	33	18
ML14	Unattended	$L_{Aeq,15min}$ dB	53	40
		$L_{A90,15min}$ dB	37	24
ML15	Attended	$L_{Aeq,15min}$ dB	55	N/A
		$L_{A90,15min}$ dB	42	N/A
ML16	Unattended	$L_{Aeq,15min}$ dB	64	58
		$L_{A90,15min}$ dB	37	20
ML17	Unattended	$L_{Aeq,15min}$ dB	56	41
		$L_{A90,15min}$ dB	38	24
ML18	Attended	$L_{Aeq,15min}$ dB	57	N/A
		$L_{A90,15min}$ dB	42	N/A
ML19	Unattended	$L_{Aeq,15min}$ dB	47	35
		$L_{A90,15min}$ dB	27	20
ML20	Attended	$L_{Aeq,15min}$ dB	59	N/A
		$L_{A90,15min}$ dB	47	N/A
ML21	Unattended	$L_{Aeq,15min}$ dB	66	58
		$L_{A90,15min}$ dB	37	26
ML22	Unattended	$L_{Aeq,15min}$ dB	54	44
		$L_{A90,15min}$ dB	28	28
ML23	Unattended	$L_{Aeq,15min}$ dB	68	60
		$L_{A90,15min}$ dB	38	26
ML24	Unattended	$L_{Aeq,15min}$ dB	68	60
		$L_{A90,15min}$ dB	32	30

Location Reference	Survey Type	Sound Level Indicator	Daytime (07:00-23:00)	Night-time (23:00-07:00)
ML25	Unattended	$L_{Aeq,15min}$ dB	56	49
		$L_{A90,15min}$ dB	33	29
ML26	Unattended	$L_{Aeq,15min}$ dB	64	57
		$L_{A90,15min}$ dB	40	31
ML27	Unattended	$L_{Aeq,15min}$ dB	56	48
		$L_{A90,15min}$ dB	39	33
ML28	Unattended	$L_{Aeq,15min}$ dB	56	47
		$L_{A90,15min}$ dB	32	25
ADD01	Unattended	$L_{Aeq,15min}$ dB	51	46
		$L_{A90,15min}$ dB	32	21
ADD02	Unattended	$L_{Aeq,15min}$ dB	58	46
		$L_{A90,15min}$ dB	30	23
ADD03	Unattended	$L_{Aeq,15min}$ dB	72	66
		$L_{A90,15min}$ dB	40	21

Future Baseline

13.6.6. Consideration has been given to how the baseline noise and vibration conditions would evolve in the absence of the Scheme, known as the 'future baseline' scenario. The future baseline scenarios are set out in **ES Chapter 4: Overview of the EIA Process** (Doc Ref. 6.1).

13.6.7. Cumulative developments covered in Section 13.11 of this chapter would mostly influence areas in their close proximity and would not influence noise levels in the wider area around the Scheme as operational traffic associated with cumulative developments is minimal.

13.6.8. Although the wider area around the Scheme would not be influenced by cumulative developments, it is expected that natural growth in traffic may increase future baseline noise levels. However, a material increase is unlikely, as

a 25% rise in traffic (assuming traffic composition remains consistent) would typically result in only a 1 dB increase.

13.6.9. In the absence of the Scheme, future baseline noise levels may be higher than those measured in February, July and August 2025. Any perceptible changes to baseline noise are likely to be localised to the immediate area of a new development. As baseline sound data informs the noise assessment criteria, lower levels of baseline sound result in more conservative assessment criteria. Consequently, use of measured baseline data is considered a precautionary and robust approach of defining future baseline conditions.

13.6.10. The assessment of construction traffic noise effects accounts for the future peak construction year, which includes natural traffic growth. However, the operational noise assessment assumes that the measured baseline data is representative (i.e. no higher) than future baseline conditions, which represents a worst-case scenario.

13.6.11. No cumulative developments in Section 13.11 would generate perceptible levels of vibration outside the respective site boundaries. As such, future baseline vibration conditions would be unchanged from the existing baseline.

13.7. Embedded Mitigation

13.7.1. This section contains the mitigation measures relevant to this chapter that are already incorporated into the Scheme design and the management plans submitted with the DCO Application, as described in **ES Chapter 2: The Scheme** (Doc Ref. 6.1). Through iterative assessment, potential impacts have been predicted and opportunities to mitigate them identified with the aim of preventing or reducing impacts as much as reasonably practicable. This approach provides opportunity to prevent or reduce potential adverse impacts from the outset. This embedded mitigation and mitigation by design approach has been taken into account when evaluating the significance of the potential impacts.

Construction and Decommissioning Phases

13.7.2. Measures to control construction or decommissioning phase noise are defined in Annex B of BS 5228-1 and measures to control construction or decommissioning phase vibration are defined in Section 8 of BS 5228-2. These embedded measures represent Best Practicable Means (BPM) (as defined in Section 72 of the Control of Pollution Act 1974) and are secured within the **OCEMP** (Doc Ref. 7.10) and the **ODEMP** (Doc Ref. 7.12), which are secured by the DCO requirements.

13.7.3. Best Practicable Means that would be implemented during construction and decommissioning works and secured through the **OCEMP** (Doc Ref. 7.10) and **ODEMP** (Doc Ref. 7.12) are presented below:

- Ensuring that all appropriate processes, procedures and measures are in place to minimise noise before works begin and throughout the construction programme.
- All contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2) which will form a prerequisite of their appointment.
- Where reasonably practicable, noise and vibration are controlled at source (e.g. the selection of inherently quiet plant and low vibration equipment), review of the construction programme and methodology to consider quieter methods, consideration of the location of equipment on-site and control of working hours.
- Use of modern plant, complying with applicable UK noise emission requirements.
- Hydraulic techniques for breaking concrete or rocks to be used in preference to percussive techniques, where reasonably practicable.
- Drop heights of materials will be minimised.
- Plant and vehicles will be sequentially started up rather than all together.
- Off-site pre-fabrication where reasonably practicable.
- Use of screening locally around significant noise producing plant and activities.
- Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturer's specifications.
- All construction plant and equipment to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use.
- Loading and unloading of vehicles, dismantling of site equipment or moving equipment or materials around the Order limits to be conducted in such a manner as to minimise noise generation, as far as reasonably practicable.

- All vehicles used on-site shall incorporate reversing warning devices as opposed to the typical tonal reversing alarms to minimise noise disturbance were reasonably practicable.
- Provision of information to the relevant local authority and local residents to advise of potential noisy works that are due to take place.
- Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use.
- Plant will always be used in accordance with manufacturers' instructions. Care will be taken to locate site equipment away from noise-sensitive areas. Where practicable, loading and unloading will also be carried out away from such areas.

13.7.4. Due to uncertainty in the overhead line routing of neighbouring cumulative developments (Grimsby to Walpole and Weston Marsh to East Leicestershire overhead lines), the Scheme needs to consider the alternative option of undergrounding the proposed 400kV overhead line between High Road and the proposed Weston Marsh B Substation, which is facilitated through Work Number 14 of the **Draft DCO** (Doc Ref. 3.1). Sensitive receptors located within 100 m of any potential HDD works would be likely to experience significant noise effects even following implementation of reasonable and practicable mitigation. Accordingly, no HDD works will take place within 100 m of a residential receptor north of High Road, which is secured through the **OCEMP** (Doc Ref. 7.10).

13.7.5. A construction noise monitoring scheme shall be developed, as per the requirements of the **OCEMP** (Doc Ref. 7.10) submitted alongside the DCO application, following appointment of a principal contractor and prior to commencement of construction works. Monitoring during the decommissioning phase will be undertaken in accordance with the **ODEMP** (Doc Ref 7.12) submitted with the DCO Application.

13.7.6. The effect of noise and vibration on nearby sensitive receptors can be minimised through a good communication strategy. Prior to construction works being undertaken, liaison will be undertaken with occupiers of sensitive receptors that may be adversely affected by construction noise and vibration.

13.7.7. Noise complaints will be monitored and reported to the Applicant for immediate investigation and action. A display board will be installed on-site, and a website will be set up. These will include contact details for the Community Liaison Officer or alternative with whom nuisance or complaints can be lodged. A logbook of complaints will be prepared and managed by the Site Manager.

13.7.8. The communication strategy and noise complaint system will be secured through the DCO as part of the **OCEMP** (Doc Ref 7.10) and **ODEMP** (Doc Ref 7.12) submitted with the DCO Application.

13.7.9. Where high noise generating works are required to be undertaken outside of core daytime working hours, they will comply with the restrictions stated in the **OCEMP** (Doc Ref. 7.10), and consents will be sought from the relevant local authority under Section 61 of the Control of Pollution Act 1974 for the proposed construction works, excluding non-intrusive surveys, as relevant. The Section 61 application will set out the specific method of working, calculations of noise levels at nearby receptors, the actual working hours required, noise monitoring locations, details of communication measures and the mitigation measures implemented to minimise noise and vibration impacts.

13.7.10. As the exact methodology for trenchless crossing activities will not be finalised until a principal contractor is appointed, a hierarchy of mitigation measures is contained in the **OCEMP** (Doc Ref. 7.10) so that significant noise effects do not occur due to potential night-time works:

- Significant noise effects may occur at receptors within 250 m of a trenchless crossing site. Where trenchless activities may occur within 250 m of sensitive receptors at night, the option for open cut cable laying will be explored as an alternative to trenchless methods;
- The potential for the use of quieter equipment than listed in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3) will be explored by the Principal Contractor; and
- Depending on the location, plant and timing of works, temporary acoustic fencing will be installed around noise generating plant, as reasonably practicable, to screen receptors from noise emissions.

13.7.11. Consideration has been given to traffic routing, timing, and access points to the Scheme to minimise noise impacts at existing receptors as detailed in **ES Chapter 15: Traffic and Access** (Doc Ref. 6.1). Construction traffic will be managed through the **Outline Construction Traffic Management Plan (OCTMP)** (Doc Ref. 7.13), which is secured through the **Draft DCO** (Doc Ref. 3.1). Appropriate routing of construction and decommissioning traffic on public roads and along access tracks will be pursuant to the **OCTMP** (Doc Ref. 7.13).

Operational Phase

13.7.12. As set out within the **OOEMP** (Doc Ref. 7.11), embedded mitigation measures that will be applied for the operational phase of the Scheme include the below:

- The potential for the use of low-noise equipment, where reasonably practicable, is one of the criteria evaluated when determining appropriate equipment for use on the Solar Development Areas;
- The location and orientation of Solar Stations and On-Site Substation and BESS compound have been placed away from large concentrations of receptors such that operational noise emissions from electrical equipment are less impactful. Based on industry best practice, solar stations will be located at least 250 m from residential properties, as set out within the **Design Parameters** (Doc Ref.7.4). **Works Plans** (Doc Ref. 2.3) establish the location of On-Site Substation and BESS compounds; and
- Transformers may be standalone units or pre-assembled with inverters and switchgear to form a single contained unit (i.e. they are enclosed).

13.7.13. Plant that will be used in the Scheme has not yet been finalised. Consequently, a conservative approach has been taken when defining sound data for noise sources and it may be possible that quieter plant can be incorporated into the final design. Quieter plant would be the most effective way of controlling noise emissions.

13.7.14. Although the indicative Scheme layout has been optimised to minimise noise levels at sensitive receptors, there is a requirement to retain some flexibility where infrastructure will be located on-site. Consequently, if there is a decision in the future to move noise generating infrastructure closer to sensitive receptors than shown in **ES Figure 13-1: Study Area, Receptors and Noise Monitoring Positions** (Doc Ref. 6.2), the Applicant commits that noise at sensitive receptors will be no higher than the levels presented in Table 13-28. This is secured through Requirement 18 of the **Draft DCO** (Doc Ref. 3.1).

13.8. Assessment of Potential Impacts and Likely Significant Effects

13.8.1. The Scheme as outlined in **ES Chapter 2: The Scheme** (Doc Ref. 6.1) has been considered in assessing the potential impacts and likely significant effects of the Scheme, whilst considering the embedded mitigation described within this chapter.

Construction Phase

Construction Phase Noise Effects

13.8.2. Noise predictions have been undertaken for NGA1, NGA2, NGA3, NGA4 and NGA6 works which will be undertaken during core daytime working hours.

13.8.3. NGA5 includes the potential for Horizontal Directional Drilling (HDD) and these activities are typically undertaken on a continuous basis until each drilling operation is complete. As such, this activity has been assessed during night-time periods to represent a worst-case.

13.8.4. It is likely that construction activities will be carried out in phases, however confirmation on phasing is not finalised at this time. Noise predictions have therefore assumed that all phases are being constructed at the same time which simulates a worst-case scenario to ensure a robust assessment. Where the representative measured daytime ambient noise level exceeds the LOAEL (65 dB) the LOAEL and SOAEL are defined as per the methodology outlined in Table 13-7.

13.8.5. For the following tables in the construction noise assessment, non-residential receptors are highlighted grey. As the LOAEL and SOAEL are only applicable to residential receptors, the LOAEL for these receptors is marked 'N/A'. Where the SOAEL is used to define the threshold for significant effects at residential receptors, the external noise threshold, as defined in Table 13-18, has been used for non-residential receptors.

NGA1- Enabling works and construction of access and site tracks

13.8.6. The results of construction noise predictions for NGA1 (enabling works and construction of access and site tracks) are summarised in Table 13-20. The construction noise LOAEL and SOAEL or external noise threshold are defined for each residential receptor in Table 13-20.

13.8.7. Non-residential receptors are shaded in grey to indicate where the SOAEL is not used to identify likely significant effects due to construction noise. As discussed in paragraph 13.4.26, noise predictions at RG20, RG25, RG31, RG52, RG61 and RG67 have been provided for information only.

Table 13-20 Construction Noise Predictions - NGA1

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
Non-residential receptors without assessment criteria				
RG20	51	N/A	N/A	52
RG25	58	N/A	N/A	55
RG31	53	N/A	N/A	64

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
RG52	56	N/A	N/A	59
RG61	64	N/A	N/A	67
RG67	64	N/A	N/A	66
Below LOAEL / 5 dB or more below the external noise threshold for non-residential receptors				
RG01	48	65	75	64
RG04	67	67	77	61
RG05	57	65	75	64
RG10	65	65	75	61
RG12	51	65	75	62
RG13	51	65	75	61
RG14	51	65	75	59
RG15	51	65	75	58
RG16	51	65	75	56
RG17	51	65	75	53
RG18	51	65	75	54
RG19	51	65	75	53
RG21	51	N/A	65	53
RG22	51	N/A	75	54
RG23	51	65	75	55
RG24	53	65	75	55
RG26	58	65	75	59
RG27	57	65	75	63
RG28	53	65	75	62
RG37	47	65	75	61

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
RG38	66	66	76	61
RG39	66	66	76	60
RG41	66	66	76	65
RG43	54	65	75	57
RG46	54	65	75	58
RG47	68	68	78	59
RG49	68	68	78	66
RG50	68	68	78	64
RG51	56	65	75	57
RG54	68	68	78	64
RG55	68	68	78	55
RG56	56	65	75	63
RG57	56	65	75	59
RG58	64	65	75	64
Above or equal to LOAEL and below SOAEL / 5 dB below the external noise threshold for non-residential receptors				
RG02	51	65	75	72
RG03	67	67	77	67
RG06	57	65	75	70
RG07	55	65	75	73
RG08	57	65	75	68
RG09	65	65	75	66
RG11	48	65	75	72
RG29	53	65	75	73
RG30	53	65	75	65

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
RG32	53	N/A	65	63
RG33	64	65	75	65
RG34	56	65	75	67
RG35	47	65	75	65
RG40	66	66	76	67
RG42	66	66	76	73
RG44	54	65	75	69
RG45	54	65	75	73
RG48	68	68	78	71
RG53	56	65	75	66
RG59	64	65	75	74
RG62	64	65	75	74
RG63	56	65	75	66
RG64	56	65	75	71
RG65	56	65	75	71
RG66	56	65	75	67
RG68	56	65	75	68
RG69	56	65	75	65
Above or equal to SOAEL / above or equal to the external noise threshold				
RG36	47	65	75	75
RG60	56	65	75	75

13.8.8. For NGA1, there is potential for exceedances of the SOAEL to occur at RG36 and RG60 whilst these works occur. This is equivalent to a moderate adverse effect and is **significant**.

13.8.9. There are several receptors that are predicted to experience noise levels exceeding the LOAEL but below the SOAEL or the external noise threshold. At this stage of the process, the duration of exposure to noise is not known as works will be mobile, covering the extent of the Scheme, and transient in nature. However, occupants of nearby receptors can be more tolerant of high noise events if they are regularly communicated with and kept informed of timings and duration of high noise generating events. Paragraph 6.3 of BS5228-1 states that:

"*Local residents might be willing to accept higher levels of noise if they know that such levels will only last for a short time.*"

13.8.10. The communication strategy, which will be secured through the DCO as part of the **OCEMP** (Doc Ref. 7.10) submitted alongside the DCO Application, will ensure that occupants of affected properties will be notified of the timings and duration of works. Consequently, the assessment of construction noise as a result of NGA1 identifies noise effect at all receptors (with the exception of RG36 and RG60) as, at worst, minor adverse and **not significant**.

NGA2 – Construction of BESS and substation compounds

13.8.11. The results of construction noise predictions for NGA2 (construction of BESS and substation compounds) are summarised in Table 13-21. The construction noise LOAEL and SOAEL are defined for each receptor in Table 13-21. Where the SOAEL is not being used to assess construction noise effects, non-residential receptors are highlighted in grey.

Table 13-21 Construction Noise Predictions - NGA2

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
Non-residential receptors without assessment criteria				
RG25	58	N/A	N/A	41
RG31	53	N/A	N/A	42
Below LOAEL / 5 dB or more below the external noise threshold for non-residential receptors				
RG01	48	65	75	43
RG02	51	65	75	44

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
RG03	67	67	77	51
RG04	67	67	77	61
RG05	57	65	75	54
RG06	57	65	75	53
RG07	55	65	75	51
RG08	57	65	75	44
RG11	48	65	75	39
RG17	51	65	75	38
RG18	51	65	75	38
RG19	51	65	75	39
RG21	51	N/A	65	37
RG22	51	N/A	75	38
RG23	51	65	75	40
RG24	53	65	75	41
RG26	58	65	75	45
RG27	57	65	75	46
RG28	53	65	75	41
RG29	53	65	75	50
RG30	53	65	75	44
RG32	53	N/A	65	42
RG33	64	65	75	54
RG34	56	65	75	45
RG38	66	66	76	48
RG40	66	66	76	19

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
Above or equal to LOAEL and below SOAEL / 5 dB below the external noise threshold for non-residential receptors				
None				
Above or equal to SOAEL / above or equal to the external noise threshold				
None				

13.8.12. For NGA2, noise predictions indicate that all receptors will be 5 or more dB below the external noise threshold and below the LOAEL. As such, construction noise effects as a result of NGA2 are equivalent to a negligible effect and are **not significant**.

NGA3 – Construction of Solar Development Areas, including solar stations and ground mounted solar PV panel arrays

13.8.13. The results of construction noise predictions for NGA3 (construction of Solar Development Areas, including solar stations and ground mounted solar PV panel arrays) are summarised in Table 13-22. The construction noise LOAEL and SOAEL are defined for each receptor in Table 13-22. Where the SOAEL is not being used to assess construction noise effects, non-residential receptors are highlighted in grey.

Table 13-22 Construction Noise Predictions – NGA3

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
Non-residential receptors without assessment criteria				
RG20	51	N/A	N/A	52
RG25	58	N/A	N/A	55
RG31	53	N/A	N/A	65
Below LOAEL / 5 dB or more below the external noise threshold for non-residential receptors				

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
RG04	67	67	77	51
RG10	65	65	75	59
RG11	48	65	75	63
RG12	51	65	75	58
RG13	51	65	75	57
RG14	51	65	75	56
RG15	51	65	75	55
RG16	51	65	75	53
RG17	51	65	75	53
RG18	51	65	75	51
RG19	51	65	75	54
RG21	51	N/A	65	51
RG22	51	N/A	75	54
RG23	51	65	75	55
RG24	53	65	75	54
RG26	58	65	75	60
RG27	57	65	75	64
RG28	53	65	75	64
RG37	47	65	75	62
Above or equal to LOAEL and below SOAEL / 5 dB below the external noise threshold for non-residential receptors				
RG01	48	65	75	66
RG02	51	65	75	70
RG03	67	67	77	68
RG05	57	65	75	66

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
RG06	57	65	75	65
RG07	55	65	75	70
RG08	57	65	75	66
RG09	65	65	75	65
RG29	53	65	75	72
RG30	53	65	75	66
RG33	64	65	75	66
RG34	56	65	75	68
RG35	47	65	75	67
RG36	47	65	75	72
Above or equal to SOAEL / above or equal to the external noise threshold				
RG32	53	N/A	65	65

13.8.14. For NGA3, there is potential for exceedance of the external noise threshold at RG32. This is equivalent to a moderate adverse effect and is **significant**.

13.8.15. Several receptors during NGA3 are predicted to experience noise levels exceeding the LOAEL but below the SOAEL. Consequently, the assessment of construction noise as a result of NGA3 identifies noise effect at all receptors (except RG32) as, at worst, minor adverse and **not significant.**

NGA4 – Open trench underground cable installation

13.8.16. The results of construction noise predictions for NGA4 (open trench underground cable installation) are summarised in Table 13-23. The construction noise LOAEL and SOAEL are defined for each receptor in Table 13-23. Where the SOAEL is not being used to assess construction noise effects, non-residential receptors are highlighted in grey.

Table 13-23 Construction Noise Predictions – NGA4

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
Non-residential receptors without assessment criteria				
None				
Below LOAEL / 5 dB or more below the external noise threshold for non-residential receptors				
RG01	48	65	75	38
RG02	51	65	75	37
RG03	67	67	77	55
RG04	67	67	77	43
RG05	57	65	75	50
RG06	57	65	75	48
RG07	55	65	75	41
RG08	57	65	75	38
RG11	48	65	75	33
Above or equal to LOAEL and below SOAEL / 5 dB below the external noise threshold for non-residential receptors				
None				
Above or equal to SOAEL / above or equal to the external noise threshold				
None				

13.8.17. For NGA4, noise predictions indicate that all receptors will be 5 or more dB below the external noise threshold and below the LOAEL. As such, construction noise effects as a result of NGA4 are equivalent to a negligible effect and are **not significant**.

NGA5 – Horizontal Directional Drilling (HDD) underground cable installation

13.8.18. For NGA5 (HDD underground cable installation), HDD activities may last for up to three days and involve activities at a drill site and reception pit. At this stage of the Scheme, locations that may require trenchless cable installation methods

have been identified within **ES Appendix 2-1: Watercourse Crossing Schedule** (Doc Ref. 6.3).

13.8.19. Where the proposed 400 kV overhead line in the Grid Connection Route crosses over existing lower voltage overhead line (11 kV and 33 kV), flexibility has been maintained for the third-party assets may need to be diverted underground. Where these assets cross drains, HDD has been assumed for a worst-case noise assessment for an additional six locations. In addition, an area of flexibility where undergrounding of the 400kV Grid Connection may be required has been identified north of High Road up to the Weston Marsh B Substation within Work Number 14 of the **Draft DCO** (Doc Ref. 3.1).

13.8.20. All identified HDD locations are displayed in **ES Figure 2-3: Indicative Watercourse Crossing Locations** (Doc Ref. 6.2).

13.8.21. For the purposes of the noise assessment, HDD has been identified as the worst-case trenchless cable installation method due to potential requirements for night-time working. Potential HDD locations are listed in Table 13-24 with approximate distances to the nearest sensitive receptor identified. As HDD locations are indicative at this stage of the application, the distances are calculated at the potential HDD location in the Grid Connection Route as a reasonable worst-case. Potential use of HDD for undergrounding the 400kV Grid Connection within Work Number 14 has been discussed from paragraph 13.8.28 onwards.

Table 13-24 Potential HDD Locations and Distance to Nearest Receptor

HDD ID	Description	Approximate Distance to Nearest Receptors
HDD1	Under the A16, between land parcels A and B	600 m
HDD2	Under Queens Bank Road between the Solar Development Area and the 400 kV Substation and BESS Compound	435 m
HDD3	Under existing overhead line between gantries 4SV15 and 4SV16	260 m
HDD4	Existing overhead line diverted under drain south of Whirl Gate Road	510 m
HDD5	Existing overhead line diverted under drain north of Whirl Gate Road	480 m

HDD ID	Description	Approximate Distance to Nearest Receptors
HDD6	Existing overhead line diverted under drain south of Austendike Road	120 m
HDD7	Existing overhead line diverted under two drains on the east and west side of Delgate Bank road	170 m
HDD8	Existing overhead line diverted under a drain approximately half way between Broad Gate and Delgate Bank roads	240 m
HDD9	Existing overhead line diverted under two drains to the east of Broad Gate road	90 m
HDD10	Under South Holland Drain and Langary Gate Road between areas of land parcel D	330 m
HDD11	Under Martins Road between areas of land parcel C	140 m

13.8.22. It is noted that HDD operations will only occur during the construction phase (cable installation) and will not occur during the decommissioning phase (as cables can be pulled back through the ducting from discrete locations without the need for HDD).

13.8.23. HDD activities will occur at two pits per crossing: a launch pit and a reception pit. As drilling activities at the launch pit will generate the highest level of noise, calculations of noise have been based on a reasonable worst-case assumption that all potential HDD sites are entry pits.

13.8.24. The most onerous noise criteria of 55 dB $L_{Aeq,T}$ is used for HDD sites as the drilling is continuous during the daytime and night-time once started. Calculations of HDD noise (**ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3)) indicate that significant effects (an exceedance of SOAEL) may occur at sensitive receptors within 250 m of activities during the night-time. Consequently, the assessment of HDD noise focuses on receptors within 250 m of a potential drill site location. Results of noise calculations at receptors within 250m of a potential drill site are presented in Table 13-25.

Table 13-25 Construction Noise Predictions – NGA5

HDD ID	Nearest Receptor	Approximate Distance, m	Calculated Noise Level, $L_{Aeq,T}$ dB
HDD6	RG48	120	62
HDD7	RG54	170	57
HDD8	RG53	240	55
HDD9	RG53	90	65
HDD11	RG07	140	59

13.8.25. HDD activities are not predicted to exceed the SOAEL during daytime; however, if works occur in the evening, at night, on Saturdays beyond core hours, or at any time on Sundays, receptors within 250 m may experience exceedances of SOAEL. Consequently, noise effects as a result of NGA5 are predicted to be, on a worst-case basis, major adverse and **significant** at RG48 and RG53. Noise effects at RG07 and RG54 are identified as moderate adverse and **significant**.

13.8.26. The hierarchy of mitigation measures for HDD activities, as outlined in paragraph 13.7.10, states that noise from HDD operations will be reduced as far as practicable. This hierarchy, detailed in Table 3-10 of the **OCEMP** (Doc Ref. 7.10), includes provision for acoustic fencing which, where implemented, could achieve up to 10 dB attenuation where plant is fully screened.

13.8.27. For all works that are undertaken outside core work periods, they will comply with the restrictions stated in the **OCEMP** (Doc Ref. 7.10) and a Section 61 consent (Control of Pollution Act) would be applied for and will contain details on the methodology, mitigation, communication strategy and monitoring. If Section 61 consent is not applied for, it will be open for the local authority to serve a notice pursuant to Section 60 of that Act specifying actions to control noise if it considers it appropriate to do so, in accordance with the terms of that provision. It is not a pre-requisite for Section 61 consent to be in place at any time for the purposes of construction or operation of the Scheme, although it is common practice for such applications to be made in advance.

Qualitative Assessment of Potential HDD Works North of High Road (Works Number 14 Flexibility)

13.8.28. As set out in Section 13.5, uncertainty in the routing of neighbouring cumulative developments mean that undergrounding north of High Road (facilitated through Works Number 14 of the **Draft DCO** (Doc Ref. 3.1)) may be required.

Should this occur, trenchless installation techniques may be undertaken at locations not currently identified. HDD is identified as the worst-case trenchless crossing technique in terms of noise due to the potential requirement for 24-hour working outside of core work hours.

13.8.29. At this stage, the location of any potential HDD works cannot be defined. Therefore, a qualitative assessment has been undertaken based on the worst-case noise outcomes identified for NGA5. This assumes comparable construction methodologies, plant, duration (up to three days per crossing), and the potential for continuous drilling, including night-time working where required.

13.8.30. The most onerous SOAEL for 24-hour working is 55 dB $L_{Aeq,T}$ for the night-time period. Calculations of HDD noise (**ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3)) indicate that moderate adverse significant effects (an exceedance of the night-time SOAEL) may occur at sensitive receptors within 250 m of HDD activities and major adverse significant effects may occur within 100 m of HDD activities. On this basis, a precautionary distance-based approach has been applied to the potential undergrounding area north of High Road.

13.8.31. For the purposes of this qualitative assessment:

- Sensitive receptors located more than 250 m from any potential HDD works would not be expected to require additional mitigation beyond the embedded measures set out in the **OCEMP** (Doc Ref. 7.10).
- Potential HDD works located between 100 m and 250 m from a sensitive receptor may require temporary acoustic fencing to fully screen noise-generating plant in order to avoid significant noise effects, which is secured through the **OCEMP** (Doc Ref. 7.10).
- Sensitive receptors located within 100 m of any potential HDD works would be likely to experience significant noise effects even following implementation of reasonable and practicable mitigation. Accordingly, no HDD works will take place within 100 m of a residential receptor north of High Road, which is secured through the **OCEMP** (Doc Ref. 7.10).

13.8.32. Through the application of this distance-based screening approach and embedded mitigation hierarchy (paragraph 13.7.10), the flexibility for potential undergrounding north of High Road would not give rise to any additional likely significant effects from those identified for NGA5.

NGA6 – Construction of overhead line

13.8.33. The results of construction noise predictions for NGA6 (construction of overhead lines along the Grid Connection Route and Inter-Array Connections) are summarised in Table 13-26. The construction noise LOAEL and SOAEL are defined for each receptor in Table 13-26. Where the SOAEL is not being used to assess construction noise effects, non-residential receptors are highlighted in grey.

Table 13-26 Construction Noise Predictions – NGA6

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
Non-residential receptors without assessment criteria				
RG20	51	N/A	N/A	49
RG25	58	N/A	N/A	55
RG31	53	N/A	N/A	46
RG52	56	N/A	N/A	57
RG61	64	N/A	N/A	59
RG67	64	N/A	N/A	60
Below LOAEL / 5 dB or more below the external noise threshold for non-residential receptors				
RG03	67	67	77	42
RG04	67	67	77	55
RG05	57	65	75	45
RG06	57	65	75	48
RG07	55	65	75	63
RG08	57	65	75	53
RG09	65	65	75	53
RG10	65	65	75	51
RG11	48	65	75	59
RG12	51	65	75	54

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
RG14	51	65	75	55
RG15	51	65	75	60
RG17	51	65	75	58
RG18	51	65	75	52
RG21	51	N/A	65	58
RG22	51	N/A	75	56
RG23	51	65	75	63
RG24	53	65	75	55
RG27	57	65	75	57
RG28	53	65	75	48
RG29	53	65	75	52
RG30	53	65	75	47
RG32	53	N/A	65	46
RG33	64	65	75	55
RG34	56	65	75	46
RG38	66	66	76	58
RG39	66	66	76	57
RG40	66	66	76	64
RG41	66	66	76	60
RG43	54	65	75	55
RG46	54	65	75	55
RG47	68	68	78	57
RG48	68	68	78	66
RG49	68	68	78	62
RG50	68	68	78	60

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
RG51	56	65	75	55
RG54	68	68	78	63
RG55	68	68	78	53
RG56	56	65	75	61
RG57	56	65	75	57
RG58	64	65	75	55
RG59	64	65	75	63
RG60	56	65	75	61
RG62	64	65	75	59
RG63	56	65	75	54
RG64	56	65	75	57
RG65	56	65	75	57
RG66	56	65	75	53
RG68	56	65	75	54
RG69	56	65	75	54
Above or equal to LOAEL and below SOAEL / 5 dB below the external noise threshold for non-residential receptors				
RG13	51	65	75	70
RG16	51	65	75	70
RG19	51	65	75	66
RG26	58	65	75	69
RG42	66	66	76	66
RG44	54	65	75	68
RG45	54	65	75	67
RG53	56	65	75	65

Receptor Reference	Representative Measured Daytime Ambient Noise Level, $L_{Aeq,16h}$ dB	LOAEL, dB	SOAEL or External Noise Threshold, dB	Indicative Free-field Construction Noise Level, $L_{Aeq,T}$ dB
Above or equal to SOAEL / above or equal to the external noise threshold				
None				

13.8.34. For NGA6, construction noise predictions at sensitive receptors indicate that the SOAEL will not be exceeded, however, the LOAEL is predicted to be exceeded at eight receptors. Therefore, construction noise effects as a result of NGA6 are predicted to be, at worst, minor adverse and **not significant**.

Construction Phase Traffic Noise Effects

13.8.35. The potential changes in noise from road traffic along links affected by construction traffic as a result of the Scheme have been considered by calculating a CRTN Basic Noise Level (BNL) at 10m adjacent to roads within the CRTN Annual Average Weekday Traffic (AAWT) range and comparing the change. Table 13-27 presents the results of the assessment. Refer to **ES Chapter 15: Traffic and Access** (Doc Ref. 6.2) for more information on the road links presented in Table 13-27. Traffic data used in road traffic noise calculations are presented in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3).

Table 13-27 Construction Traffic Noise Assessment

Ref	Road Link	2031 Baseline BNL (dB)	2031 Baseline + Scheme BNL (dB)	Change in BNL (dB)	Effect Level
L1	A16 Spalding Bypass (North-East of Spalding)	74.8	74.9	0.1	Negligible
L2	Cross Gate	51.0	51.0	0.0	Negligible
L3	A151 Holbeach Road	70.5	70.6	0.1	Negligible
L4	A151 Weston Bypass	71.6	71.7	0.1	Negligible
L5	A151 High Road	70.7	70.7	0.0	Negligible

Ref	Road Link	2031 Baseline BNL (dB)	2031 Baseline + Scheme BNL (dB)	Change in BNL (dB)	Effect Level
L6	Stone Gate	51.1	51.1	0.0	Negligible
L7	A16 Spalding Bypass (East of Spalding)	74.4	74.5	0.1	Negligible
L8	Broadgate	55.8	55.8	0.0	Negligible
L9	Delgate Bank (North)	48.1	48.1	0.0	Negligible
L10	Long Lane	58.4	58.4	0.0	Negligible
L11	B1165 Austendike Road	62.9	63.1	0.2	Negligible
L12	Delgate Bank (Central)	51.2	51.2	0.0	Negligible
L13	West Gate	51.1	51.1	0.0	Negligible
L14	A16 Spalding Bypass (South-East of Spalding)	73.4	73.6	0.2	Negligible
L15	A16 Cowbit Road	73.9	74.0	0.1	Negligible
L16	B1357 Moulton Chapel Road	65.3	65.3	0.0	Negligible
L17	Delgate Bank (South)	48.3	48.3	0.0	Negligible
L18	A16 Crowland Bypass (Near Crowland Airfield)	73.7	73.8	0.1	Negligible
L19	Queen's Bank	50.9	50.9	0.0	Negligible
L20	Cloot Drove	45.8	45.8	0.0	Negligible
L21	Barrier Bank	62.8	63.4	0.6	Negligible
L22	James Road	62.4	63.0	0.6	Negligible

Ref	Road Link	2031 Baseline BNL (dB)	2031 Baseline + Scheme BNL (dB)	Change in BNL (dB)	Effect Level
L23	Hull's Drove (West)	66.6	67.3	0.7	Negligible
L25	Hull's Drove (East)	64.8	65.4	0.6	Negligible
L28	Chapel Gate	47.9	47.9	0.0	Negligible
L29	Dog Drove North	48.1	48.1	0.0	Negligible
L30	Holbeach Drove Gate	64.8	64.8	0.0	Negligible
L31	B1166 Long Lane	60.7	62.0	1.3	Minor Adverse
L33	A16 Crowland Bypass (East of Crowland)	74.1	74.2	0.1	Negligible
L34	A16 (South of Crowland)	74.0	74.1	0.1	Negligible
L35	A16 (North of Peterborough)	73.7	73.8	0.1	Negligible

13.8.36. Changes in road traffic noise due to construction traffic on the roads presented in Table 13-27 are identified as, at worst, minor adverse and **not significant**.

13.8.37. Changes in road traffic noise have only been calculated from roads with flows of greater than 1,000 AAWT as CRTN calculations are unreliable for traffic flows under this threshold. Consequently, a qualitative assessment of potential construction traffic noise effects has been undertaken based on average hourly construction traffic flows. Traffic data for low-flow roads are presented in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3).

13.8.38. On low-flow roads, there are forecast to be approximately one light vehicle movement and one heavy vehicle movement per hour on Eaugate Road and Chapel Hill. Construction traffic may cause disturbance, but the flows are not considered to be of sufficient magnitude to result in an adverse effect i.e., *"Noise can be heard, but does not cause any change in behaviour, attitude or other psychological response"* (referenced from PPGN) noise hierarchy table –

reproduced in **ES Appendix 13-1: Noise and Vibration – Legislation, Policy and Guidance** (Doc Ref. 6.3). Consequently, construction traffic noise effects on the above identified low-flow roads are considered to be, at worst, negligible and **not significant**.

13.8.39. Higher levels of construction traffic are forecast on Martins Road and Langary Gate Road. Whilst they still represent low-flow roads, approximately 22 light vehicle and 13 heavy vehicle movements per hour are forecast on Martins Road and approximately 15 light vehicle and 8 heavy vehicle movements per hour are forecast on Langary Gate Road.

13.8.40. Construction traffic will access Martins Road via Hull's Drove. Receptor RG09 (Martins Farm) is the only receptor located on Martins Road; however, the site access points (MR-01 and MR-02 presented in **ES Figure 2-5: Construction, Operational and Decommissioning Accesses** (Doc Ref. 6.2) are located approximately 100m before RG09. Considering the distance between the site access points and RG09, construction traffic noise effects on Martins Road are considered to be minor adverse and **not significant**.

13.8.41. Construction traffic will access Langary Gate Road via B1166 Long Lane and represents a noticeable increase over the current baseline conditions on this low-flow local road. The frequency of vehicle movements is such that short-term increases in ambient noise levels are likely to be perceptible to local residents, particularly during periods of elevated construction activity. Consequently, construction traffic noise effects on Langary Gate Road are considered to be moderate adverse and **significant**.

Construction Phase Vibration Effects

13.8.42. It is generally accepted that, without detailed understanding of the media, waveform and frequency distribution, ground-borne vibration prediction methods are *"beset with complexities and uncertainties"*[21]. However, it is unlikely that typical construction and decommissioning working routines would generate levels of vibration at local receptors at a level where cosmetic damage would be expected to be sustained or cause adverse effects for local residents. The level of impact at different receptors will be dependent upon several factors including the distance between the works and receptor, ground conditions and the specific activities being undertaken. Consequently, vibration effects are defined

[21] Hiller, D. M., and G. I. Crabb, (2000); Groundborne Vibration Caused by Mechanised Construction Works. TRL Report 429.

with reference to information in guidance documents identified in the following paragraphs.

13.8.43. Surface plant, such as cranes, compressors and generators are not recognised as sources of high levels of ground-borne vibration. Reference to Figure C2 of the 'Control of Vibration and Noise During Piling'[22] confirms that PPVs significantly less than 5 mm/s are generated by such machinery, even at distances of only 10 m. For example, the indication is that a bulldozer would generate a PPV of approximately 0.6mm/s and a 'heavy lorry on [a] poor road surface' would generate a PPV of less than 0.1mm/s at 10m. These values are well below levels at which cosmetic building damage are predicted to occur; the lower levels being 15mm/s for predominantly transient vibrations and 7.5mm/s for continuous vibrations at the base of residential or lighter framed commercial buildings. The aforementioned values are also below the 1.0mm/s SOAEL (see Table 13-12) where it is likely that vibration in residential environments will result in complaints but can be tolerated if prior warning and explanation is given to residents.

13.8.44. Driven piling is assumed to be used for construction of the BESS compounds, Substation compounds and pylons supporting the 400kV overhead line (NGA2 and NGA6) as a worst-case scenario from a vibration perspective. Regression analysis of driven piling data (see **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3)) identifies that the SOAEL (1.0 mm/s) is potentially exceeded at receptors within 60 m of driven piling activities. Receptors between 60 m and 250 m of driven piling activities would experience vibration levels of up to 0.3 mm/s and exceed the LOAEL.

13.8.45. Percussion piling is assumed to be used for the installation of the PV mounting structures (NGA3). Vibration predictions method identifies that the SOAEL is potentially exceeded at receptors within 22 m and the LOAEL is potentially exceeded at receptors between 22 m and 52 m from percussion piling.

13.8.46. Potential HDD activities in NGA5 would generate similar levels of vibration to bored piling. Bored piling calculations are based on regression analysis of Continuous Flight Auger (CFA) piling data (presented in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3)) from Table D.6 of BS 5228-2 and identifies that the SOAEL would potentially be exceeded at

[22] Selby, A.R. (1997). "Control of vibration and noise during piling." Brochure publication, British Steel, UK

receptors within 13 m of HDD activities and the LOAEL would potentially be exceeded at receptors between 13 m and 37 m of HDD activities.

13.8.47. The highest levels of vibration that would be generated by open-trench cable laying activities (NGA4) would be the use of a vibratory roller during reinstatement. Vibratory rollers may generate adverse levels of vibration (i.e., exceeding the LOAEL at 0.3 mm/s) at receptors within 50 m and significant levels of vibration (i.e., exceeding the SOAEL at 1.0 mm/s) within 25 m.

NGA1 – Enabling works and construction of access and site tracks

13.8.48. The use of vibratory plant is not anticipated during enabling works or access track construction. Activities are likely limited to non-vibratory earthmoving and compaction equipment, and as such, construction vibration effects as a result of NGA1 are considered negligible and **not significant**.

NGA2 – Construction of BESS and substation compounds

13.8.49. The closest receptor to any piling activity associated with the construction of the BESS or Substation compounds is RG33, at an approximate distance of 340 m. At this distance, vibration levels below 0.3 mm/s are predicted, and therefore construction vibration effects as a result of NGA2 are considered negligible and **not significant** at all receptors.

NGA3 – Construction of Solar Development Areas, including solar stations and ground mounted solar PV panel arrays

13.8.50. The minimum distance between any percussion piling works for the installation of PV mounting structures (NGA3) and the nearest receptor is approximately 20 m away at RG29. At this distance, predicted vibration levels may exceed the SOAEL. For a PPV level above 1.0 mm/s (equivalent to the SOAEL), BS 5228-2 states that:

"*It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents*".

13.8.51. For PPV vibration levels exceeding the SOAEL, prior warning will be provided on the timings and duration of vibration generating activities. These measures are set out in the **OCEMP** (Doc Ref. 7.10) and secured through the **Draft DCO** (Doc Ref. 3.1). Vibration predictions are based on a worst-case piling location within the Solar Development Area, and represent short-duration exposure of less than a day when piling occurs at the closest location of PV mounting structures to the receptor. In line with best practice, prior warning is considered an effective mitigation measure to offset significant effects. Accordingly, it is

anticipated that residual construction vibration effects are assessed as minor adverse and are **not significant**.

13.8.52. Receptors RG07 and RG36 are located between 22 m and 52 m, which may experience piling induced vibration exceeding the LOAEL but below the SOAEL. All other receptors are situated beyond 52 m and are predicted to experience vibration below the LOAEL. Accordingly, piling-induced vibration for NGA3 is predicted to result in minor adverse effects at RG07 and RG36, which are **not significant**.

NGA4 – Open trench underground cable installation

13.8.53. The closest receptor to any vibratory rolling associated with the reinstatement of land after cable laying activities is RG03, at an approximate distance of 120 m. At this distance, vibration levels below 0.3 mm/s are predicted, and therefore construction vibration effects as a result of NGA4 are considered negligible and **not significant** at all receptors.

NGA5 – Horizontal Directional Drilling (HDD) underground cable installation

13.8.54. The nearest receptor to the potential HDD works is approximately 90 m away. The predicted vibration level at this distance would be below 0.3 mm/s and therefore, construction vibration effects as a result of NGA5 are considered negligible and **not significant** at all receptors.

NGA6 – Construction of overhead line

13.8.55. Receptors located between 60 m and 250 m of the overhead line pylons include RG40 RG41, RG42, RG44, RG45, RG46, RG48, RG49, RG53, RG54, RG56 and RG59 which are therefore predicted to experience piling induced vibration of up to 0.3 mm/s. All other receptors located further than 250 m from the overhead line pylons are predicted to experience vibration below 0.3 mm/s.

13.8.56. As these predicted construction vibration levels for NGA6 exceed the LOAEL but remain below the SOAEL, construction vibration effects as a result of NGA6 are predicted to be, at worst, minor adverse and **not significant**.

Construction Noise and Vibration Effects on Public Rights of Way Users

13.8.57. Noise is assessed based on the effect on health and quality of life. It is acknowledged that short-term exposure to noise can cause disturbance to PRoW users and result in adverse noise effects. Planning Practice Guidance Noise identifies an adverse noise effect as "*Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.*" This

is considered to describe the level of noise effect that may be perceived by PRoW users.

13.8.58. However, given the linear nature of PRoWs, the range of noise impacts along them that forms the ambient noise environment, and the transient usage of a PRoW, a material change in the experience of using the PRoW as a whole as a result of noise emissions from the Scheme, which could affect PRoW users' health or quality of life, is not anticipated. As such, construction noise and vibration effects on PRoW users are identified as **not significant**.

13.8.59. The NPSE provides a means for noise effects to be identified. It allows for adverse effects on health and quality of life to occur where all reasonable steps have been taken to reduce these effects whilst taking into account sustainable development. In accordance with the NPSE, all reasonable steps to minimise the effects of noise on PRoW users will be taken during the Construction phase of the Scheme. These measures are set out in the **OCEMP** (Doc Ref. 7.10).

Operational Phase

Operational Phase Plant Noise Effects

13.8.60. For the purpose of this assessment, all operational plant is assumed to operate continuously so there will not be any noticeable impulsive or intermittent characteristics from plant noise emissions experienced at the surrounding receptors. Transformers can have tonal features, although noise emissions from central inverters will be dominated by the cooling fans such that any tonal features of the transformers will not be noticeable. However, overall plant noise emissions will likely be experienced at receptors as a distinctive continuous and steady hum, therefore a +3 dB correction to account for noise that is 'distinctive against the residual acoustic environment' has been applied in determining the rating level as per BS 4142 guidance in Paragraph 13.4.67.

13.8.61. Details of the operational noise modelling methodology are provided in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3).

13.8.62. Operational noise predictions and the assessment of noise effects are presented in Table 13-28. The predicted rating level ($L_{Ar,Tr}$ dB) at each receptor is compared to the defined LOAEL and SOAEL levels defined in Table 13-14 to determine the noise effect. Receptors have been grouped depending on whether they are 'Below LOAEL', 'Above or equal to LOAEL and below SOAEL' or 'Above or equal to SOAEL'.

13.8.63. Predicted noise contours for the operational plant noise scenario during the daytime have been generated at a height of 1.5 m to represent typical ground

floor living areas and are presented in **ES Figure 13-2: Operational Phase Plant Noise Contours, without Mitigation (1.5 m)** (Doc Ref. 6.2) and **ES Figure 13-3: Operational Phase Plant Noise Contours, with Mitigation (1.5 m)** (Doc Ref. 6.2). For the operational plant noise scenario during the night-time, predicted noise contours have been generated at a height of 4 m to represent the typical bedroom spaces and are presented in **ES Figure 13-4: Operational Phase Plant Noise Contours, without Mitigation (4 m)** (Doc Ref. 6.2) and **ES Figure 13-5: Operational Phase Plant Noise Contours, with Mitigation (4 m).** (Doc Ref. 6.2).

Table 13-28 Operational Phase Plant Noise Effects

Receptor Reference	Representative Night-time Background Sound Level, $L_{A90,15min}$ dB	LOAEL / SOAEL (Night-time) dB	Predicted Rating Noise Level, $L_{Ar,Tr}$ dB
Below LOAEL			
RG02	36	36/46	32
RG03	43	43/53	38
RG09	26	30/40	29
RG10	26	30/40	23
RG11	20	30/40	27
RG12	21	30/40	21
RG13	21	30/40	21
RG14	20	30/40	18
RG15	20	30/40	17
RG16	20	30/40	15
RG17	20	30/40	21
RG18	20	30/40	20
RG19	20	30/40	22
RG20	20	N/A	13
RG21	20	N/A	21
RG22	20	N/A	21
RG23	20	30/40	22
RG24	24	30/40	23

Receptor Reference	Representative Night-time Background Sound Level, $L_{A90,15min}$ dB	LOAEL / SOAEL (Night-time) dB	Predicted Rating Noise Level, $L_{Ar,Tr}$ dB
RG25	23	N/A	24
RG26	23	30/40	28
RG28	24	30/40	27
RG30	24	30/40	29
RG31	24	N/A	29
RG32	24	N/A	28
RG35	20	30/40	29
RG37	20	30/40	24
Above or equal to LOAEL and below SOAEL			
RG01	21	30/40	30
RG06	21	30/40	39
RG07	21	30/40	36
RG08	21	30/40	31
RG27	18	30/40	30
RG29	24	30/40	34
RG33	20	30/40	36
RG34	24	30/40	33
RG36	20	30/40	31
Above or equal to SOAEL			
RG04	33	33/43	45
RG05	21	30/40	42

13.8.64. Operational phase plant noise at residential receptors is predicted to exceed the SOAEL at RG04 and RG05. As such, operational phase plant noise effects at residential receptors are identified as, at worst, moderate adverse and are **significant**.

13.8.65. Non-residential receptors RG20, RG21, RG22, RG25, RG31 and RG32 are not operational during the night-time and are therefore not considered sensitive during this period, however, predictions indicate that the rating noise level for all non-residential receptors in Table 13-28 would be below the representative daytime background noise level, according to Table 13-19. As such, operational phase plant noise effects at non-residential receptors are identified as negligible and **not significant**.

13.8.66. The LOAEL is exceeded at nine receptor locations (as detailed in Table 13-28 above) and minor adverse (**not significant**) levels of noise are identified. The NPSE states that:

"*…all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development … This does not mean that such adverse effects cannot occur.*"

13.8.67. Reasonable steps to reduce noise are covered in Section 13.7 and have been applied in noise predictions. Consequently, although adverse levels of noise are identified at some receptors, NPSE requirements are complied with through provision of embedded mitigation and no additional mitigation measures are warranted for receptors where exceedances of the LOAEL are identified.

Operational Phase Overhead Line Noise Effects

13.8.68. A Tier 2 assessment of overhead line noise has been undertaken. Full details of the overhead line noise calculations and results are presented in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3).

13.8.69. With reference to assessment criteria in Table 13-17, the results of overhead line noise calculations indicate that there is potential for moderate adverse effects to occur at sensitive receptors within approximately 180 m of the overhead line and major adverse effects would occur at sensitive receptors within approximately 10 m.

13.8.70. Ten residential receptors have been identified between 10 m and 180 m of the overhead line. The ten receptors are identified in the following receptor groups from Table 13-5: RG40, RG42, RG44, RG45, RG48, RG53 and RG54 with the highest level of overhead line noise calculated as 51 dB $L_{Ar,Tr}$ at RG44. Noise effects at these receptors are moderate adverse and **significant**. No receptors are identified within 10 m.

13.8.71. At all other receptors, overhead line noise effects are, at worst, minor adverse and **not significant**.

Maintenance

13.8.72. During the proposed 40-year operational life of the Scheme, site-wide replacement of the solar PV panels, inverters, batteries and other equipment may be required in line with the design life of these components, as explained in **ES Chapter 2: The Scheme** (Doc Ref. 6.1). Site-wide replacement of these components will be similar to those assessed in NGA 2 and NGA 3; however these activities will be planned to occur in stages, which means that replacement activities will be of much lower intensity compared to the construction phase.

13.8.73. For the purposes of the noise and vibration assessment, fixed plant maintenance works are assumed (as a worst-case scenario) to be similar to those assessed in NGA3 but without any requirement for high noise generating activities such as piling. As such, noise and vibration levels during maintenance works would be lower than those during the construction phase. Consequently, noise and vibration effects during maintenance works would be negligible and therefore **not significant**.

13.8.74. Where maintenance is required for servicing the overhead lines, minimal surface plant such as Mobile Elevated Working Platforms (MEWPs) or cranes may be used to access the line. As no high noise generating plant would be required for overhead line maintenance, the noise and vibration effects of maintenance would be significantly lower than that of NGA6 (construction of overhead lines) and therefore effects at nearby receptors are estimated to be negligible and **not significant**.

13.8.75. Maintenance would be phased and would therefore be considerably less intensive than during construction. The volume of daily HGV/coach and car/LGV movements is anticipated to represent approximately 20% of the movements generated during peak construction of the Site. As such, noise effects due to maintenance traffic would be negligible and **not significant**.

Operational Noise Effects on Public Rights of Way Users

13.8.76. As discussed in paragraphs 13.8.57 to 13.8.59, the linear nature of PRoWs, the variation in ambient noise along their length, and their transient use mean that a material change in the overall experience of using a PRoW due to Scheme noise emissions is not anticipated. Therefore, operational noise effects on PRoW users are assessed as negligible and **not significant**.

13.8.77. The NPSE provides a means for noise effects to be identified. It allows for adverse effects on health and quality of life to occur where all reasonable steps have been taken to reduce these effects whilst taking into account sustainable development. In accordance with the NPSE, all reasonable steps to minimise the

effects of noise on PRoW users will be taken during the construction phase of the Scheme. These measures are set out in the **OOEMP** (Doc Ref. 7.11).

Decommissioning Phase

Decommissioning Phase Noise Effects

13.8.78. The Scheme is intended to be decommissioned after 40 years. Noise effects during the decommissioning phase are expected to be similar to, or lower than, those identified for the construction phase. Decommissioning will use comparable plant and equipment but for shorter durations and with less intensive activity. Notably, decommissioning will not involve HDD or piling, which generates the highest construction noise levels. As such, overall noise during decommissioning is predicted to be lower than that assessed for construction.

13.8.79. Where breaking is required to remove the concrete foundations for the 400 kV overhead line pylons and gantries, the resulting decommissioning noise effects are considered comparable to those identified in the construction noise assessment for NGA6, as the predicted noise levels from piling activities during construction are similar to those generated by concrete breaking during decommissioning based on plant noise data presented in BS 5228-1.

13.8.80. In accordance with the **ODEMP** (Doc Ref. 7.12), Best Practicable Means (BPM) will be applied to minimise noise and vibration at noise sensitive receptors. As set out in Table 3-8 of the **ODEMP** (Doc Ref. 7.12), this will include the use of quiet and well-maintained plant, hydraulic rather than percussive methods where practicable, minimising drop heights, sequential start-up of machinery, and use of localised acoustic screening. Works will be undertaken within the standard core hours, and any noisy or out-of-hours activities will be subject to Section 61 consent under the Control of Pollution Act 1974.

13.8.81. Considering the reduced scope and duration of works, the absence of HDD activities, and the application of the above measures, noise effects during decommissioning are predicted to be no greater than minor adverse and therefore **not significant**.

Decommissioning Phase Traffic Noise Effects

13.8.82. Decommissioning traffic is generally expected to be lower than construction on most routes, due to reduced deliveries of plant and materials. As such, and with standard site management measures in place, traffic noise effects on the roads identified in Table 13-27 are predicted to be no greater than minor adverse and are **not significant**.

13.8.83. For low-flow roads, such as Eaugate Road and Chapel Hill, construction traffic was predicted to be minimal during construction (approximately one light vehicle and one heavy vehicle per hour). As decommissioning flows are expected to be similar or lower than those predicted for construction, noise effects are expected to be negligible and **not significant.**

13.8.84. Martins Road will be used to access the PV arrays and substation in Land Parcels B and C for decommissioning. Decommissioning traffic for removing panels, mounting structures, and equipment is expected to be similar to construction, resulting in minor adverse and **not significant** noise effects.

13.8.85. Langary Gate Road will be used to access the solar PV arrays at Land Parcel D. Decommissioning traffic could be similar to construction flows, with short-term noise increases comparable to construction, resulting in moderate adverse and **significant** effects.

Decommissioning Phase Vibration

13.8.86. Decommissioning activities are generally expected to generate lower levels of vibration than construction, as high-vibration activities such as driven piling, percussion piling, and HDD will not be required.

13.8.87. During decommissioning works, vibratory rollers may be used for land reinstatement and can generate vibration levels approaching or exceeding the LOAEL (0.3 mm/s) for receptors within 50 m from the source and the SOAEL (1.0 mm/s) for receptors up to 25 m from the source.

13.8.88. For the Solar Development Area and Grid Connection Route the nearest sensitive receptors are:

- RG29: approximately 20 m from potential vibratory rolling; and
- RG36: 22 m from potential vibratory rolling.

13.8.89. All other receptors in the study area are further than 50 m away from any potential vibratory rolling activities and therefore will experience vibration below the LOAEL.

13.8.90. Given the short duration of these activities (i.e. less than a day) affecting individual receptors, prior warning to affected parties is considered an effective mitigation measure to offset the potential significant effects at RG29 and RG36. Accordingly, it is anticipated that that vibration at nearby sensitive receptors would be, at worst, minor adverse and **not significant** for decommissioning activities.

13.8.91. Vibration during decommissioning works would be controlled and managed through measures secured in the **ODEMP** (Doc Ref. 7.12).

PRoW Users

13.8.92. No significant effects on PRoW users are identified as per the construction noise and vibration assessment. All reasonable steps to minimise the effects of noise on PRoW users will be taken during the decommissioning phase of the Scheme. These measures are set out in the **ODEMP** (Doc Ref. 7.12).

13.9. Additional Monitoring, Mitigation and Enhancement Measures

13.9.1. Additional mitigation or enhancement measures are required where significant adverse effects are identified after considering the embedded mitigation measures.

Construction Phase Noise and Vibration

13.9.2. Significant construction noise effects are predicted at RG36 and RG60 as a result of NGA1, at R32 as a result of NGA3 and at RG07, RG48, RG53, and RG54 due to NGA5. These are considered to be precautionary significant effects as construction noise assumptions are conservative and likely to over-estimate noise levels. However, to minimise the potential for exceedances of SOAEL, temporary, mobile acoustic screening around construction activities within 15 m of a sensitive receptor would be implemented as an additional mitigation measure, as set out in the **OCEMP** (Doc Ref. 7.10). Guidance in BS 5228-1 states that:

"*...as a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver.*"

13.9.3. Following implementation of the proposed screening, it is assumed that noise levels at receptors RG36, RG60 and RG32 would reduce by a minimum working allowance of 5 dB. On this basis, construction noise from NGA1 (RG36 and RG60) and NGA3 (RG32) would be reduced to approximately 70 dB and 60 dB $L_{Aeq,T}$ respectively and therefore below the SOAEL. The assumed 5 dB attenuation represents a conservative scenario, reflecting instances where plant or equipment may extend above the barrier and therefore benefit from only partial screening. Residual construction noise effects at NGA1 and NGA3 are considered to represent a minor adverse effect and are therefore **not significant**.

13.9.4. The hierarchy of mitigation measures for HDD activities, as outlined in paragraph 13.7.10, states that noise from HDD operations will be reduced as far as practicable. This hierarchy, detailed in Table 3-10 of the **OCEMP** (Doc Ref. 7.10), includes the potential use of barriers to provide mitigation.

13.9.5. Where plant can be fully screened so that the barrier completely hides the sources from the receiver, a reduction of noise of 10 dB can be applied. As HDD works can be fully screened due to plant being partially underground and within a constrained area, the use of barriers for noise mitigation is effective and a reduction in noise of 10 dB can be achieved.

13.9.6. The implementation of noise barriers would reduce construction noise from NGA5 at receptors RG07, RG48 and RG54 to below the SOAEL, thereby reducing the effect at these receptors to minor adverse and **not significant**. Provision of barriers for HDD works near RG53 during HDD activities would reduce the predicted noise levels to 55 dB $L_{Aeq,T}$. While noise levels would not exceed the SOAEL during the evening period or on Sundays, noise levels would be equal to the SOAEL during night-time period. Consequently, residual noise effects at RG53 during NGA5 are assessed as moderate adverse and therefore **significant**.

13.9.7. While significant traffic noise effects are identified on Langary Gate Road, there is not a practicable solution to effectively mitigate the levels of construction traffic noise along such a low-flow, minor road. As such, residual construction traffic noise effects remain moderate adverse and **significant**. Further information on the residual effect of decommissioning traffic noise is presented in Section 13.10.

13.9.8. No significant vibration effects are identified and as such, no additional mitigation measures are required.

Operational Phase Noise

13.9.9. As a result of operational phase noise from fixed plant, moderate adverse (**significant**) effects are predicted at RG04 and RG05 due to a combination of noise emissions from the 400 kV substation transformers and BESS containers at Land Parcel B.

13.9.10. Embedded mitigation measures cover flexibility during the detailed design of the Scheme and may be sufficient to avoid significant effects. However, if necessary, modifications can be made to plant to reduce noise emissions and are considered as additional mitigation.

13.9.11. Transformers designed for low noise output (e.g. special core clamping, optimised magnetic design, vibration isolation) will be considered for the substation transformers in land parcel B. 'Low noise' versions of these transformers can reduce the emitted noise by up to 8 dB per transformer.

13.9.12. Utilisation of BESS containers with 'low noise' air-cooled heat exchanger designs will be considered in the BESS compound. 'Low noise' versions of BESS containers can reduce the noise emitted from each unit by up to 8 dB.

13.9.13. After incorporating the above mitigation measures into the 400 kV substation and BESS compound, operational plant noise levels at RG04 and RG05 are predicted to reduce to 39 and 35 dB $L_{Ar,Tr}$ respectively and as a result, predicted noise effects after additional mitigation are below the SOAEL. Consequently, noise effects at RG04 and RG05 are predicted to be minor adverse and **not significant** after incorporation of additional mitigation.

13.9.14. Although there is a requirement for flexibility in the design, the **Draft DCO** (Doc Ref. 3.1) commits to achieving operational noise levels no greater than noise predictions. To accommodate this requirement but retain flexibility in the design, operational noise limits are defined based on the highest predicted operational noise levels. Modelling will be undertaken at detailed design phase to confirm the noise levels at sensitive receptors will be no higher than those established. Operational noise limits are defined in Table 13-29. The measures to achieve this are secured in the **OOEMP** (Doc Ref. 7.11) and Requirements 13 and 18 of the **Draft DCO** (Doc Ref. 3.1).

Table 13-29 Operational Noise Limits

Receptor Reference	Noise Limit, $L_{Ar,Tr}$ dB
RG01	30
RG02	32
RG03	38
RG04	39
RG05	35
RG06	39
RG07	36
RG08	31
RG09	29

Receptor Reference	Noise Limit, $L_{Ar,Tr}$ dB
RG10	23
RG11	27
RG12	21
RG13	21
RG14	18
RG15	17
RG16	15
RG17	21
RG18	20
RG19	22
RG20	13
RG21	21
RG22	21
RG23	22
RG24	23
RG25	24
RG26	28
RG27	30
RG28	27
RG29	34
RG30	29
RG31	29
RG32	28
RG33	36
RG34	33
RG35	29
RG36	31

Receptor Reference	Noise Limit, $L_{Ar,Tr}$ dB
RG37	24

Overhead Line Noise

13.9.15. Measures can be applied during the detailed design of the overhead line infrastructure to reduce noise. The most effective solution for reducing noise from high-voltage lines is through the use of multiple subconductors and by increasing spacing between subconductors. This would reduce corona discharge and so reduce noise. Similarly, a reduction in noise can also be achieved with a larger conductor diameter.

13.9.16. Use of hydrophilic coatings can also be effective at reducing noise in wet conditions, water droplets on the conductor's surface can increase corona noise. Hydrophilic coatings allow water to spread into a thin film rather than forming noise-generating droplets, which cause increased corona noise.

13.9.17. Increasing the distance between conductor groups reduces the electrostatic stress between them, which lowers the electric field and lessens corona formation. Having a longer crossarm length than 6.7m applied in overhead line noise calculations can reduce noise.

13.9.18. It is conservatively estimated that adoption of noise reducing design measures can reduce overhead line noise by 10 dB. The worst affected receptor, RG44, is calculated as experiencing noise levels of 41 dB $L_{Ar,Tr}$. With reference to criteria in Table 13-17, this would result in a worst-case minor adverse effect which is **not significant**.

13.9.19. As detailed information about the overhead line design is subject to detailed design, a commitment to undertake a Tier 3 assessment in accordance with guidance provided in TGN(E)322 is secured in the **OOEMP** (Doc Ref. 7.11). This assessment will be undertaken with reference to baseline noise measurements presented in **ES Appendix 13-2: Baseline Noise Surveys** (Doc Ref. 6.3).

Decommissioning Phase Noise and Vibration

13.9.20. While significant traffic noise effects are identified on Langary Gate Road during decommissioning, there is not a practicable solution to effectively mitigate the levels of decommissioning traffic noise along such a low-flow, minor road. As such, residual decommissioning traffic noise effects remain moderate adverse and **significant**. Further information on the residual effect of decommissioning traffic noise is presented in Section 13.10.

13.9.21. No further significant noise or vibration effects are identified during the decommissioning phase and as such, no additional mitigation measures are required.

13.10. Residual Effects

13.10.1. Table 13-30 provides a summary of residual effects of noise and vibration on sensitive receptors following the implementation of mitigation during the construction, operational and decommissioning phases of the Scheme.

13.10.2. The assessment of construction phase activities accounts for potential direct effects due to construction noise and vibration emissions, and indirect effects due to construction traffic noise. No likely significant residual effects are identified during the construction phase with the exception of likely significant construction noise effects at RG53 as a result of night-time HDD activities and likely significant construction traffic noise effects at receptors along Langary Gate Road.

13.10.3. RG53 is predicted to experience likely significant effects during HDD activities in the night-time. At this stage, the exact plant for intended for use, especially in the Grid Connection Route where HDD is likely to be on a smaller scale, is unknown. As such, construction noise effects are likely to be overestimated. Furthermore, subject to detailed design, the Grid Connection may oversail the third-party assets, assumed to be undergrounded in this assessment, and, therefore, these works may not be required.

13.10.4. Assuming that that no HDD works will take place within 100 m of a residential receptor north of High Road, and temporary acoustic fencing are implemented if required for any works within 250m (secured through the **OCEMP** (Doc Ref. 7.10)), the qualitative assessment of potential HDD works north of High Road to avoid conflict with other cumulative schemes is not predicted to have a likely significant effect on any residential receptors in the locality.

13.10.5. Significant residual effects are identified on Langary Gate Road during the construction of the Scheme. While barriers could be used to reduce road traffic noise levels, they are not considered a practicable or proportionate means of mitigating construction traffic noise, as vehicle movements occur along public highways and dispersed access routes where barriers would present safety, access and visual constraints, provide limited benefit and be disproportionate given the temporary and transient nature of construction traffic. Restrictions on HGV deliveries will be managed through a Delivery Management System (DMS), implemented in accordance with the provisions of the **OCTMP** (Doc Ref. 7.13).

The **OCTMP** (Doc Ref. 7.13) will control routing, timing and scheduling of vehicle movements to avoid network peak hours, minimise congestion, and reduce associated noise and disturbance at sensitive receptors. These measures represent all practicable means of managing construction traffic and associated effects. However, despite the application of these controls, residual effects are predicted to remain significant at certain receptors due to the proximity of the site access and the intensity of temporary construction traffic flows during peak periods of activity.

13.10.6. The operational phase accounts for direct noise effects as a result of Solar Development Area and Grid Connection Route infrastructure associated with the Scheme. No likely significant residual effects are identified during the operational phase.

13.10.7. The assessment of decommissioning phase activities accounts for potential direct effects due to decommissioning noise and vibration emissions, and indirect effects due to decommissioning traffic. No likely significant residual construction noise or vibration effects are identified during the decommissioning phase. Likely significant residual effects are identified at receptors along Langary Gate Road as a result of decommissioning traffic. As decommissioning phase traffic noise is likely to be similar to construction phase traffic noise, no practicable mitigation can be applied to reduce the significance of the effect and therefore remain significant (as described in paragraph 13.10.5).

13.10.8. Whilst the Scheme results in significant adverse noise effects during the construction phase, all reasonably practicable measures have been applied to reduce impacts on nearby communities in line with best practice. This can be achieved through appropriate design and the locations of noise generating plant. Measures to effectively manage and control noise emissions throughout the lifespan of the Scheme are secured in the **OOEMP** (Doc Ref. 7.11) and through Requirement 18 of the **Draft DCO** (Doc Ref. 3.1).

Table 13-30: Summary of Residual Effects in relation to noise and vibration

Receptor	Description of Impact	Significance of Effect Without Additional Mitigation	Additional Mitigation/ Enhancement Measure	Residual Effect
Construction Phase				
RG36, RG60	NGA1 construction noise (enabling works and construction of access and site tracks)	Moderate adverse and significant	Acoustic screening in accordance with the **OCEMP** (Doc Ref. 7.10)	Minor adverse and not significant
RG02, RG03, RG06, RG07, RG08, RG09, RG11, RG29, RG30, RG32, RG33, RG34, RG35, RG40, RG42, RG44, RG45, RG48, RG53, RG59, RG62, RG63, RG64, RG65, RG66, RG68, RG69		Minor adverse and not significant	None	Minor adverse and not significant
All other receptors		Negligible and not significant	None	Negligible and not significant
All receptors	NGA2 construction noise (construction of BESS and substation compounds)	Negligible and not significant	None	Negligible and not significant
RG32	NGA3 construction noise (construction of Solar Development	Moderate adverse and significant	Acoustic screening in accordance with the **OCEMP** (Doc Ref. 7.10)	Minor adverse and not significant

Receptor	Description of Impact	Significance of Effect Without Additional Mitigation	Additional Mitigation/ Enhancement Measure	Residual Effect
RG01, RG02, RG03, RG05, RG06, RG07, RG08, RG09, RG29, RG30, RG33, RG34, RG35, RG36	Areas, including solar stations and ground mounted solar PV panel arrays)	Minor adverse and not significant	None	Minor adverse and not significant
All other receptors		Negligible and not significant	None	Negligible and not significant
All receptors	NGA4 construction noise (open trench underground cable installation)	Negligible and not significant	None	Negligible and not significant
RG53	NGA5 construction noise (Horizontal Directional Drilling underground cable installation)	Major adverse and significant	Acoustic screening in accordance with the **OCEMP** (Doc Ref. 7.10)	Moderate adverse and **significant**
RG48		Major adverse and significant	Acoustic screening in accordance with the **OCEMP** (Doc Ref. 7.10)	Minor adverse and not significant
RG07, RG54		Moderate adverse and significant	Acoustic screening in accordance with the **OCEMP** (Doc Ref. 7.10)	Minor adverse and not significant
RG03, RG05, RG42, RG44, RG45, RG46, RG47, RG51, RG52, RG57		Minor adverse and not significant	None	Minor adverse and not significant

Receptor	Description of Impact	Significance of Effect Without Additional Mitigation	Additional Mitigation/ Enhancement Measure	Residual Effect
All other receptors		Negligible and not significant	None	Negligible and not significant
RG13, RG16, RG19, RG26, RG42, RG44, RG45, RG53	NGA6 construction noise (construction of overhead line)	Minor adverse and not significant	None	Minor adverse and not significant
RG03, RG04, RG05, RG06, RG07, RG08, RG09, RG10, RG11, RG12, RG14, RG15, RG17, RG18, RG21, RG22, RG23, RG24, RG27, RG28, RG29, RG30, RG32, RG33, RG34, RG38, RG39, RG40, RG41, RG43, RG46, RG47, RG48, RG49, RG50, RG51, RG54, RG55, RG56, RG57, RG58, RG59, RG60, RG62, RG63, RG64, RG65, RG66, RG68, RG69		Negligible and not significant	None	Negligible and not significant
Langary Gate Road	Construction traffic noise	Moderate adverse and significant	None	Moderate adverse and **significant**
Martins Road, B116 Long Lane		Minor adverse and not significant	None	Minor adverse and not significant

Receptor	Description of Impact	Significance of Effect Without Additional Mitigation	Additional Mitigation/ Enhancement Measure	Residual Effect
All other road links		Negligible and not significant	None	Negligible and not significant
All receptors	NGA1 construction vibration (enabling works and construction of access and site tracks)	Negligible and not significant	None	Negligible and not significant
All receptors	NGA2 construction vibration (construction of BESS and substation compounds)	Negligible and not significant	None	Negligible and not significant
RG07, RG29, RG36	NGA3 construction vibration (construction of Solar Development Areas, including solar stations and ground mounted solar PV panel arrays)	Minor adverse and not significant	None	Minor adverse and not significant
All other receptors		Negligible and not significant	None	Negligible and not significant
All receptors	NGA4 construction vibration (open trench underground cable installation)	Negligible and not significant	None	Negligible and not significant

Receptor	Description of Impact	Significance of Effect Without Additional Mitigation	Additional Mitigation/ Enhancement Measure	Residual Effect
All receptors	NGA5 construction vibration (Horizontal Directional Drilling underground cable installation)	Negligible and not significant	None	Negligible and not significant
RG40 RG41, RG42, RG44, RG45, RG46, RG48, RG49, RG53, RG54, RG56 and RG59	NGA6 construction vibration (construction of overhead line)	Minor adverse and not significant	None	Minor adverse and not significant
All other receptors		Negligible and not significant	None	Negligible and not significant
PRoW users	Construction noise and vibration	Not significant	None	Not significant
Operational Phase				
RG04, RG05	Operational phase plant noise	Moderate adverse and significant	Commitment to achieve noise limits secured in the **OOEMP** (Doc Ref. 7.11) and Requirements 13 and 18 of the **Draft DCO** (Doc Ref. 3.1). If necessary, utilisation of 'low noise' versions of substation transformers	Minor adverse and not significant

Receptor	Description of Impact	Significance of Effect Without Additional Mitigation	Additional Mitigation/ Enhancement Measure	Residual Effect
			and BESS at Land Parcel B.	
RG01, RG06, RG07, RG08, RG27, RG29, RG33, RG34, RG36		Minor adverse and not significant	None	Minor adverse and not significant
RG02, RG03, RG09, RG10, RG11, RG12, RG13, RG14, RG15, RG16, RG17, RG18, RG19, RG20, RG21, RG22, RG23, RG24, RG25, RG26, RG28, RG30, RG31, RG32, RG35, RG37		Negligible and not significant	None	Negligible and not significant
RG40, RG42, RG44, RG45, RG48, RG53, RG54	Operational phase overhead line noise	Moderate adverse and significant	Adoption of noise reducing design measures, where practicable.	Minor adverse and not significant
All receptors	Maintenance	Negligible and not significant	None	Negligible and not significant
PRoW users	Operational noise	Negligible and Not significant	None	Negligible and not significant
Decommissioning Phase				

Receptor	Description of Impact	Significance of Effect Without Additional Mitigation	Additional Mitigation/ Enhancement Measure	Residual Effect
All receptors	Decommissioning noise	Negligible to minor adverse and not significant	None	Negligible to minor adverse and not significant
Langary Gate Road	Decommissioning traffic noise	Moderate adverse and significant	None	Moderate adverse and **significant**
All other road links		Minor adverse and not significant	None	Minor adverse and not significant
RG29, RG36	Decommissioning vibration	Minor adverse and not significant	None	Minor adverse and not significant
All other receptors		Negligible and not significant	None	Negligible and not significant
PRoW users	Decommissioning noise and vibration	Not significant	None	Not significant

13.11. Cumulative Effects

13.11.1. Cumulative effects are the combined effects of several development schemes (in conjunction with the Scheme) which may, on an individual basis be insignificant but, cumulatively, have a significant effect. Cumulative effects with other development schemes are also referred to as inter-project cumulative effects. An assessment of the likely significant inter-project cumulative effects in relation to noise and vibration is provided below.

13.11.2. The assessment of cumulative effects has considered other committed developments outlined within **ES Appendix 4-1: List of Cumulative Schemes** (Doc Ref. 6.3).

13.11.3. The Zone of Influence (ZoI) for the consideration of cumulative effects for noise and vibration is equivalent to those listed in paragraphs 13.4.12 to 13.4.17 and is presented in **ES Figure 13-1: Study Area, Receptor and Noise Monitoring Positions** (Doc Ref. 6.2).

13.11.4. The cumulative developments presented in Table 13-31 have been given consideration owing to their proximity to the Scheme or potential for impacts on the same sensitive receptors as the Scheme. The anticipated significance of potential construction and operational phase cumulative effects are presented in Table 13-31.

13.11.5. Cumulative development traffic data and results are presented in **ES Appendix 13-3: Construction and Operational Noise Modelling** (Doc Ref. 6.3). The addition of cumulative development traffic to the future baseline and Scheme traffic is predicted to result in changes to effects only on B1165 Austendike Road and Hull's Drove (West), where the significance of effect increases from negligible to minor adverse. However, the overall effect remains **not significant**.

13.11.6. As decommissioning of the Scheme is not anticipated until 40 years after the expected operation date, there is no certainty about what activities at cumulative developments may be occurring at that time. As such, cumulative effects during decommissioning are not considered in this section and, as a reasonable worst-case, similar cumulative effects would be anticipated during decommissioning as those identified during the construction phase.

Table 13-31: Cumulative Effects Assessment in relation to Noise and Vibration

ID	Application Reference	Cumulative Scheme Description	Distance from the Scheme (m)	Assessment of Cumulative Effects
5	EN020036	The Grimsby to Walpole project will be a new c140 km long 400 kV overhead line and 5 new substations stretching from a new substation to the west of Grimsby in the north to a new substation at Walpole near Wisbech in the south. Three further substations will be built, two to the south west of Mablethorpe and one to the north east of Spalding.	Overlapping Order Limits	**Construction:** The redline boundary of the cumulative development (ID5) overlaps the Grid Connection Route of the Scheme. Whilst there may be potential for overlapping construction activities, neither the Scheme nor cumulative development (ID5) identify significant noise or vibration effects during overhead line installation activities. No significant construction traffic effects along the Grid Connection Route of the Scheme nor cumulative development (ID5) are identified. As such cumulative construction noise and vibration effects are anticipated to be, at worst, minor adverse and **not significant**. **Operation:** The cumulative development (ID5) red line boundary overlaps with the Grid Connection Route. Operational noise from overhead lines associated with the cumulative development (ID5) was scoped out of assessment due to being

ID	Application Reference	Cumulative Scheme Description	Distance from the Scheme (m)	Assessment of Cumulative Effects
				"practically quiet"[23]. Receptor RG68 is located approximately 165 m north of the Weston Marsh B Substation footprint and no significant noise effects are predicted to arise from the operation of the Scheme. Operational noise from the cumulative development's (ID5) substation will be subject to its own design and regulatory controls and therefore is not expected to result in significant operational noise effects. As such, cumulative operational noise effects are anticipated to be no greater than minor adverse and **not significant**.
8	EN0210006	Ossian Offshore Wind Farm Ltd is intending to develop transmission infrastructure to connect the Ossian Offshore Wind Farm Array (located in Scottish waters and subject to application for consent under section	Overlapping Order Limits	**Construction**: The construction activities for cumulative development (ID8) may occur close to receptors RG43 to RG69 (Table 13-5) along the Grid Connection Route. However, there is no information available at the time of

[23] National Grid (2024) Grimsby to Walpole EIA Scoping Report. Available at: https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020036-000004-EN020036%20-%20Scoping%20Report%20Volume%201%20Main%20Report.pdf [Accessed 23 February 2026]

ID	Application Reference	Cumulative Scheme Description	Distance from the Scheme (m)	Assessment of Cumulative Effects
		36 of the Electricity Act 1989) to National Grid at substations in Lincolnshire (LCS and Weston Marsh). The Ossian Offshore Wind Farm Array comprises the installation of high voltage direct current offshore export cables (to the extent that these are located in English waters), landfall structures, HVDC onshore export cables and onshore converter stations, and all other development integral to construction, operation and maintenance including access. It is proposed that the lifetime of the Ossian Offshore Wind Farm Array will be 35 years, at which point it will be decommissioned.		writing this assessment on the timing of these construction works for ID8. The only significant construction effects predicted for the Scheme relate to HDD activities; however, given their short duration (likely to be a matter of days) and currently unknown locations, it is unlikely that HDD works for the Scheme and cumulative development (ID8) would overlap. As no other significant construction effects (including construction traffic noise, noise or vibration) are anticipated along the Grid Connection Route, cumulative construction noise and vibration effects are expected to be, at worst, minor adverse and **not significant.** **Operation**: No detailed information is available at the time of writing this assessment regarding the precise locations of the proposed converter stations. Any operational plant will be required to comply with relevant noise guidance and standards to ensure that significant adverse effects are avoided at nearby receptors. Should either converter station be located within approximately

ID	Application Reference	Cumulative Scheme Description	Distance from the Scheme (m)	Assessment of Cumulative Effects
				200 m of the Scheme's overhead line within the Grid Connection Route, the cumulative operational noise implications of both developments would need to be assessed and appropriately managed by the cumulative development (ID8). As such, cumulative operational noise effects are anticipated to be, at worst, minor adverse and **not significant.**
13	EN0210007	Weston Marsh to East Leicestershire is a new circa 60 kilometre 400kV overhead electricity transmission line which connects into the Weston Marsh substation infrastructure (to be constructed under the Grimsby to Walpole Project), in the Spalding region of Lincolnshire, and runs west to a new 400kV transmission substation (WMEL-B) near Wartnaby in Leicestershire, via a new 400kV transmission substation (WMEL-A) near Corby Glen in Lincolnshire.	Overlapping order limits	**Construction**: Construction of cumulative development (ID13) may occur in proximity to receptors RG59 to RG69 (Table 13-5) and, for a worst-case assessment, is assumed to overlap with construction of the Scheme. As substation construction activities associated with cumulative development (ID13) are expected to be more substantial than those required for the Scheme overhead line, they would be likely to dominate the cumulative construction noise environment. All construction activities would be controlled through their own construction management measures and regulatory requirements such that significant effects

ID	Application Reference	Cumulative Scheme Description	Distance from the Scheme (m)	Assessment of Cumulative Effects
				would be avoided. As no significant construction noise, vibration or construction traffic noise effects are predicted from the Scheme at these receptors, cumulative construction effects are anticipated to be, at worst, minor adverse and **not significant**. **Operation**: Current information indicates that the alignment of the proposed overhead line for cumulative development (ID13) will run in parallel to the overhead line of the Scheme, however, operational overhead line noise for the cumulative development has been scoped out of assessment due to the design being practically quiet[24]. As such, cumulative operational noise effects are anticipated to be, at worst, minor adverse and **not significant.**
15	H09-0501-23	Erection of Agricultural Machinery Assembly Facility, Research and	0	**Construction**: Cumulative development (ID15) is not an

[24] National Grid (2025) Weston Marsh to East Leicestershire EIA Scoping Report. Available at: https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN0210007-000012-EN0210007%20Scoping%20Report%20Main%20Report.pdf [Accessed 23 February 2026]

ID	Application Reference	Cumulative Scheme Description	Distance from the Scheme (m)	Assessment of Cumulative Effects
		Training Facility, Ground Mounted Solar Array and Associated Infrastructure.		EIA development, and the scale is such that cumulative construction noise effects are anticipated to be, at worst, minor adverse and **not significant.** **Operation**: Condition 9 of the Decision Notice for cumulative development (ID15) states that *"Before the first operation of the assembly building hereby permitted, a report prepared by a qualified noise consultant shall be submitted to and approved in writing by the Local Planning Authority. This report shall identify any measures or works necessary to ensure that there is no possible nuisance caused to nearby residential properties. Those measures and works so approved by the Local Planning Authority shall be implemented in full before the development hereby granted is first brought into use"*. As condition 9 of cumulative development (ID15) states that no possible noise nuisance to nearby residential receptors will be caused, and no significant effects as a result of the operation of the Scheme are predicted, cumulative operational noise is anticipated

ID	Application Reference	Cumulative Scheme Description	Distance from the Scheme (m)	Assessment of Cumulative Effects
				to be, at worst, minor adverse and **not significant.**
16	H02-0875-22	King Prawn Hatchery, Grow Out and Processing Facility.	0	**Construction**: Cumulative development (ID16) is not an EIA development, and the scale is such that cumulative construction noise effects are anticipated to be negligible and **not significant**. **Operation**: Condition 7 of the Decision Notice for cumulative development (ID16) states that *"Noise from fixed plant and machinery shall not exceed the background noise level by more than 5 dB(A) when measured as a 15 minute L(A)eq at any residential boundary…"*. As RG03 is the nearest residential receptor to cumulative development (ID16), and no significant effects as a result of the operation of the Scheme are predicted at RG03, cumulative operational noise is anticipated to be negligible and **not significant**.
17	H13-0570-22	Demolition of straw bale building & erection of industrial units, change of	275	Cumulative development (ID17) is not an EIA development, and the scale is such that

ID	Application Reference	Cumulative Scheme Description	Distance from the Scheme (m)	Assessment of Cumulative Effects
		use of area of domestic garden to commercial use including areas of new concrete surfacing, palisade security fencing and gates.		cumulative construction and operational noise effects are anticipated to be negligible and **not significant**.