



High Grove Solar

**Preliminary Environmental
Information Report**

**Chapter 11 Noise and
Vibration**

April 2025

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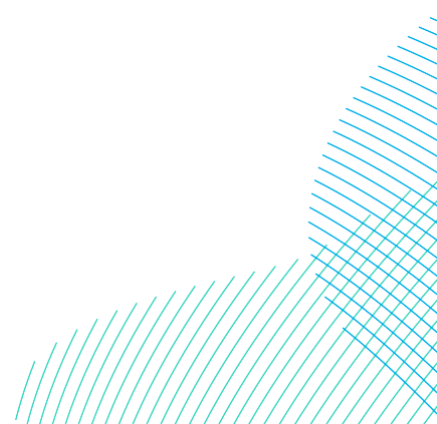
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11 Noise and Vibration

11.1 Introduction

- 11.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the preliminary assessment of the likely significant effects from noise and vibration arising from the construction, operation and decommissioning of the Proposed Development.
- 11.1.1.2 This chapter sets out the relevant legislation, policy, standards and guidance applied to the assessment process; consultation undertaken to inform the assessment; assessment methodology; the relevant baseline conditions upon which the assessment is based; embedded and good practice mitigation considered in place before the assessment is undertaken; the likely significant effects that may arise as a result of the Proposed Development considering embedded and good practice mitigation; and any further mitigation requirements to avoid or reduce the likely significant effects; the remaining residual effects following further mitigation; and any monitoring required for remaining significant effects.
- 11.1.1.3 The following matters have been assessed as part of this chapter:
- The potential impact of noise and vibration from the construction activities upon existing sensitive receptors.
 - The potential impact of noise from the proposed operation including any plant that forms part of the Proposed Development on existing sensitive receptors (ESR).
- 11.1.1.4 Understanding intra-project effects between topics is an integral part of the Environmental Impact Assessment (EIA) process and they have been considered within this chapter. The conclusions of the following topic assessments are considered relevant to the receptors considered within this assessment, and as such are taken into account in the overall assessment for noise and vibration:
- Chapter 6 Biodiversity
- 11.1.1.5 This chapter is supported by the following figures:
- Figure 11.1 Existing Sensitive Receptor Plan
 - Figure 11.2 Operational Noise Contour Plot
 - Figure 11.3 Construction Noise Buffer Plan
- 11.1.1.6 This chapter is supported by the following appendices:
- Appendix 11.1 Noise Data
 - Appendix 11.2 Noise Assessment Results

11.2 Relevant legislation, policy, standards and guidance

- 11.2.1.1 This section identifies the relevant legislation, planning policy, standards and guidelines which have informed this assessment, including the methodology and identification of mitigation.

11.2.2 Legislation

Table 11-1 Noise and vibration - Legislation

Legislation	Relevance to assessment
The Environmental Protection Act 1990 [1] (as amended by the Noise and Statutory Nuisance Act 1993) [2] (EPA) The EPA sets out: the definition of statutory nuisance due to noise; the duty on local authorities to investigate and abate nuisance; and the defence against abatement because “<i>best practicable means</i>” has been employed to minimise noise (including vibration) for business premises. The EPA sets out the means for a person affected by noise nuisance to seek abatement through the courts. The Noise and Statutory Nuisance Act sets out an extension of powers to abate noise nuisance to a wider range of sources than the Environmental Protection Act 1990.	This PEIR chapter provides a preliminary assessment of noise and vibration which includes assessment in accordance with national guidance with the aim of identifying and mitigating noise and vibration impacts to avoid nuisance complaints. Should the Proposed Development be consented, the development will be granted immunity for prosecution under statutory nuisance legislation with respect to noise and vibration. The design of the Proposed Development has taken into consideration noise and vibration and recommended measures have been proposed to remove significant effects to avoid statutory nuisance. Whilst this PEIR concludes that there are no significant effects, a determination of if a statutory nuisance will arise is beyond the scope of this document. As part of the DCO application the Applicant will submit a Statement of Statutory Nuisance, which will consider whether the Proposed Development engages one or more of the matters listed as statutory nuisances in the EPA and if so, how it is proposed to mitigate them
The Control of Pollution Act 1974 (CoPA) [3] The CoPA gives the local authority power to serve a notice under Section 60 imposing requirements in relation to noise as to the way in which construction works are to be carried out. Under Section 61 of the CoPA, the party that intends to carry out works to which Section 60 applies may apply to the local authority before works begin, for consent.	This PEIR chapter provides a preliminary assessment of noise and vibration which includes the assessment of construction phase effects in Section 11.8.
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017	This PEIR chapter provides a preliminary assessment of noise and vibration which includes identifying potential significant effects.

Legislation	Relevance to assessment
Regulation 5 Environmental Impact Assessment process [4]	
“(2) The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors— (c) land, soil, water, air and climate;”	
Schedule 4	
“(1) A description of the development, including in particular – (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases. (5) A description of the likely significant effects of the development on the environment resulting from, inter alia— (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste.”	

11.2.3 Policy

Table 11-2 Noise and vibration - Policy

Policy	Relevance to assessment
Overarching National Policy Statement for Energy (NPS EN-1), 2024 [5] Sets out the national policy for energy infrastructure and has influence on the decisions by the SoS on applications for energy development. Section 5.12 addresses noise and vibration, outlining approach to assessment of impacts and determining requirement for mitigation (if required). EN-1 refers to the relevant British Standards for the assessment of operational noise and construction noise (where 'noise' is used as an umbrella term for noise and vibration) and refers to further information provided in the technology specific National Policy Statements e.g., EN-3 and EN-5. EN-1 refers to the following paragraphs of relevance: Paragraph 5.12.5 lists the factors that will determine the likely noise impact of a proposed development and where noise impacts are likely to arise, paragraph 5.12.6 details what should be included in the noise assessment. Paragraph 5.12.15 requires applicants to demonstrate good design through measures such as selection of the quietest cost-effective plant; containment of noise within buildings; optimisation of plant layout to minimise noise emissions; and the use of landscaping, bunds or noise barriers to reduce noise transmission. Paragraph 5.12.17 states that the Secretary of State (SoS) should not grant development consent unless it is satisfied that the proposals will meet the three aims of the Noise Policy Statement for England (NPSE) [6]. Paragraph 5.12.14 sets out potential mitigation measures.	This PEIR chapter provides a preliminary assessment of noise and vibration which includes identifying potential significant effects and mitigation measures to minimise the residual effects.
NPS for Renewable Energy Infrastructure (EN-3), 2024 [7] Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered to be low	This PEIR chapter provides a preliminary assessment of noise and vibration which includes identifying potential significant effects

Policy	Relevance to assessment
carbon infrastructure and crucial for achieving net-zero goals, therefore it is designated Critical National Priority infrastructure under Sections 2.17, 2.18, and 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects.	and mitigation measures to minimise the residual effects.
Section 2.5.2 states “Proposals for renewable energy infrastructure should demonstrate good design, particularly in respect of landscape and visual amenity, opportunities for co-existence/co-location with other marine uses, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage”	
Section 2.7.40 states “Applicants should include in the ES a noise assessment of the impacts on amenity in case of excessive noise from the project in line with guidance set out in Section 5.12 in EN-1.”	
NPS for Electricity Networks Infrastructure (EN-5), 2024 [8] NPS EN-5 addresses policy for energy transmission.. Section 2.9.37 states that “<i>noise effects can also arise from substation equipment such as transformers. Transformers generate low frequency hum and depends on transformer type and level of attenuation present (either engineered intentionally or provided by other structures). For the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards are satisfactory.</i>”	This PEIR chapter provides a preliminary assessment of noise and vibration which includes identifying potential significant effects and mitigation measures to minimise the residual effects.
National Planning Policy Framework (NPPF), 2024 [9] Paragraph 187 states that “the planning system should contribute to and enhance the natural and local environment by (amongst other considerations) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution.” Paragraph 198 states that “planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution. This involves, in particular, mitigating and reducing to a minimum, potential adverse impacts resulting from noise; avoiding noise that gives rise to significant adverse impacts on health and the quality of life In addition, tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value should be identified and protected.”	This PEIR chapter provides a preliminary assessment of noise and vibration which includes identifying potential significant effects and mitigation measures to minimise the residual effects.

Policy	Relevance to assessment
Paragraph 200 states that “planning policies and decisions should ensure that new development can be integrated effectively with existing business and community facilities, with existing businesses not having unreasonable restrictions placed on them as a result of new development permitted after the business was established. Where the operation of an existing business or community facility could have a significant adverse effect on a new development, the application should provide suitable mitigation before the development is complete. This should be taken into account when considering whether proposed development is an acceptable use of land.”	
Noise Policy Statement for England (NPSE, 2010) [6] Paragraph 1.6 sets out the long-term vision of Government noise policy, i.e. to “promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.” Paragraph 1.7 states that the NPSE vision is supported by aims to effectively manage and control environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development by: • avoiding significant adverse impacts; • mitigating and minimising adverse impacts; and • where possible, contributing to the improvement of health and quality of life. Paragraph 2.20 states that to identify “significant adverse” and “adverse” impact in line with the three aims of NPSE, there are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organization: • No Observed Effect Level (NOEL): This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise. • Lowest Observed Adverse Effect Level (LOAEL): This is the level above which adverse effects on health and quality of life can be detected. Extending these concepts leads to the concept of Significant Observed Adverse Effect Level (SOAEL): This is the level above which significant adverse effects on health and quality of life occur. Paragraph 2.24 states that where an impact lies somewhere between LOAEL and SOAEL, 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 (paragraph 1.8). This does not mean that such adverse effects cannot occur.	This PEIR chapter provides a preliminary assessment of noise and vibration which includes identifying potential significant effects and mitigation measures to minimise the residual effects.

Policy	Relevance to assessment
Paragraph 2.22 notes that the NPSE states “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. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”	
Breckland Council Local Development Plan [10] The Breckland Council Local Development Plan (LDP), was adopted in 2023 and forms the local development strategy in the area. With regards to energy developments, Policy ENV 10 Renewable Energy Development, states: “The Council supports proposals for new renewable energy and low carbon development, subject to consideration of the impact of the development and whether this can be made acceptable. Proposals will be considered having regard to the extent to which there are: ii. adverse effects on residential amenity by virtue of outlook / overbearing impact, traffic generation, noise, vibration, overshadowing, glare or any other associated detrimental emissions, during construction, operation and decommissioning;” Policy COM 03 Protection of Amenity states: “For all new development consideration will need to be given to general amenity impact issues, especially residential amenity. Development will not be permitted which causes unacceptable effects on the residential amenity of neighbouring occupants, or does not provide for adequate levels of amenity for future occupants. In assessing the impact of development on the living conditions of occupants, regard will be had to the following amenity considerations: 7. Odour, noise, vibration or other forms of nuisance such as artificial light pollution, insects and vermin;”	This PEIR chapter provides a preliminary assessment of noise and vibration which includes identifying potential significant effects and mitigation measures to minimise the residual effects.

11.2.4 Standards and guidance

Table 11-3 Noise and vibration - Standards and guidance

Standards	Relevance to assessment
Planning Practice Guidance – Noise, 2019 [11] (NPPG)	The NPPG provides guidance in the form of a noise exposure hierarchy, which details the levels of perception to noise exposure and the expected outcomes and required actions. The noise exposure hierarchy is part of the methodology set out in Section 11.5 and presented in Table 11-9.
Institute of Environmental Management and Assessment (IEMA) (2014) Guidelines for Environmental Noise Impact Assessment [12]	Presents guidelines on how the assessment of noise effects should be presented within the EIA process. The IEMA guidelines cover aspects such as: scoping, baseline, prediction and example definitions of significance criteria. The guidelines have been used to define the methodology for the preliminary assessment as set out in Section 11.5.
British Standard 4142:2014+A1:2019 Methods for rating and assessing Industrial and Commercial Sound [13] (BS 4142)	BS 4142:2014+A1:2019 <i>Methods for rating and assessing industrial and commercial sound</i> is used to rate and assess sound of an industrial nature including, but not limited to, assessing sound from proposed, new, modified, or additional sources of industrial sound, and sound at proposed new dwellings. It contains guidance on the monitoring and assessment of industrial and commercial sound sources (including fixed installations comprising mechanical and electrical plant and equipment) affecting sensitive receptors. The standards have been used to define the methodology for the preliminary assessment as set out in Section 11.5.
British Standard 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings [14] (BS 8233)	BS8233:2014 presents design criteria for noise within habitable rooms in new residential developments to avoid adverse impacts on sustainability for the intended use. In summary, these are: • Resting in Living Rooms: 35 dB $L_{Aeq,16h}$ (daytime) • Dining in Dining Rooms / Areas: 40 dB $L_{Aeq,16h}$ (daytime)

Standards	Relevance to assessment
	Sleeping or resting in Bedrooms: 35 dB $L_{Aeq,16h}$ (daytime) / 30 dB $L_{Aeq,8h}$ (night-time). The standards have been used to define the methodology for the preliminary assessment as set out in Section 11.5.
British Standard 5228-1:2009+A1:2014 “Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise” [15] (BS 5228-1)	Construction noise assessment based on the guidance within BS5228-1. Provides guidance on the assessment and control of noise from construction sites, along with suggestions for the derivation of guideline levels for impact assessment. The standards have been used to define the methodology for the preliminary assessment as set out in Section 11.5.
British Standard 5228-2:2009+A1:2014 “Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration” [16] (BS5228-2)	Construction vibration assessment based on the guidance within BS5228-2. Provides guidance on the assessment and control of vibration from construction sites, along with suggestions for the derivation of guideline levels for impact assessment. The standards have been used to define the methodology for the preliminary assessment as set out in Section 11.5.
World Health Organisation (1999) Guidelines for community noise [17]	Presents guideline noise levels for community noise in specific residential environments, e.g., outdoor living areas. The guidelines have been used to define the methodology for the preliminary assessment as set out in Section 11.5.
International Organisation for Standardisation (2024) Acoustics — Attenuation of sound during propagation outdoors [18]	Noise modelling and calculations have been undertaken in accordance with this standard.
Defra NANR45 Procedure for Assessment of Low Frequency Noise Complaints (NANR45) [19]	Assessment of low frequency noise. The guidance been used to define the methodology for the preliminary assessment as set out in Section 11.5.
Highways England (2020) Design Manual for Roads and Bridges: LA111 – Noise and Vibration (DMRB) [20]	Guidance document provides methodology for the assessment of noise from road traffic, particularly from new and altered roads. Also provides modifications to Calculation of Road Traffic Noise (CRTN) and a methodology for the assessment of noise and vibration from

Standards	Relevance to assessment
Department for Transport (1988) Calculation of Road Traffic Noise (CRTN) [21]	construction traffic. The guidance been used to define the methodology for the preliminary assessment as set out in Section 11.5. Describes procedures for calculating noise from road traffic. The guidance been used to define the methodology for the preliminary assessment as set out in Section 11.5.
BS 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures [22]	1) Details standardised guidance for the measurement of environmental noise. The pertinent details of BS 7445-1:2003 adopted in this assessment are as follows: • instrumentation to measure equivalent continuous A-weighted sound pressure level conforming to Type 1 as given in BS EN 61672-1:2013 Electroacoustics. Sound level meters - specifications.¹; • all equipment calibrated and the calibration shall follow manufacturer's instructions. All sound monitoring equipment is calibrated at an accredited laboratory at a minimum interval of 24 months. To maintain confidence in recorded sound levels, sound level meters were field calibrated prior to and after use with the recommended manufacturer's calibrator. No significant drift (i.e., greater than 0.5 dB) in calibration was recorded; and • minimise the influence of reflections by, whenever possible, undertaking measurements at least 3.5 m from any reflective surface other than the ground. Preferred measurement height is 1.2 m to 1.5 m above the ground.
Professional Practice Guidance on Planning and Noise, New Residential Development, 2017 (ProPG). [23]	This Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

¹ British Standards Institution (2013). BS 61672-1:2013 Electroacoustics. Sound level meters – specifications. BSI, London.

11.3 Consultation

11.3.1 Scoping opinion

11.3.1.1 An EIA Scoping Report was submitted to the Planning Inspectorate on 6 September 2024, and a Scoping Opinion was published by the Planning Inspectorate on 17th October 2024. A summary of the key comments received and how these have been addressed in this assessment or will be addressed in the Environmental Statement (ES) is presented below:

- Beachamwell Parish Council noted concerns around the effects on PRowS both from the potential noise and visual impact. PRow receptors are considered to be low in sensitivity due to the transient, temporary nature of users of PRow. A 5m offset from noise generating infrastructure and PRow, National Trails and the National Cycle Network has been included into the design of the Proposed Development (as detailed in Chapter 2 The Proposed Development). Therefore, significant noise effects on PRow receptors are not expected and not assessed further within the noise assessment. Visual impacts on users of PRow are considered in PEIR Chapter 10 Landscape and Visual.
- The Planning Inspectorate noted that the ES should consider the potential for tracker panels to cause noise emissions which could be perceptible to sensitive receptors and should either assess these accordingly where significant effects are likely to occur, or provide evidence of noise emission levels to demonstrate that significant effects would not occur at sensitive receptors. At this stage the Applicant is seeking flexibility regarding the type of panel technology and the assessment presented in this PEIR accounts for this. An example tracker unit is the Soltec Tracker which has a Sound Pressure Level of 50.1 dB at 1m distance. At a distance of 10m the noise level would be approximately 30 dB. Although the current version of BS4142 does not define 'low' background noise, the previous version of BS 4142:1997 described a background sound level of 30 dB as being 'low' and that other guidance should be considered when assessing noise impact. At 3m distance the noise level would be approximately 40 dB, which means that if tracker units are at least 3m apart there will be no cumulative effect in relation to noise levels. Tracker units are not continuously in operation and therefore noise levels are likely to be lower. On this basis, tracker units are not considered to result an increase in noise level when compared with the fixed panel option and therefore are not considered further within the noise assessment.
- The Planning Inspectorate noted that the ES should clearly describe the construction activities insofar as is reasonably possible for all project elements; this will be particularly pertinent for the Noise and vibration assessment. Construction activities are considered in detail in Section 11.8.1 of this report. The Scoping Report proposes to scope out an assessment of noise impacts from construction and decommissioning traffic on the basis that traffic movements

would be temporary and of relatively low volume and intensity. The inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES. Construction traffic flows have increased since EIA Scoping, however, they are still considered to be below the threshold for consideration in this noise assessment and of relatively low volume. Noise from traffic is therefore scoped out of further assessment. For more information on traffic flows, see PEIR Chapter 13 Traffic and Transport.

- The Planning Inspectorate noted that the Scoping Report proposed to scope out an assessment of vibration impacts from construction and decommissioning traffic on the basis that perceptible vibration due to traffic only occurs where construction traffic passes very close by and notes that this would only occur for short periods. Subject to confirmation within the ES that construction traffic would not pass in proximity to large numbers of properties or any heritage receptors, the inspectorate agrees this matter can be scoped out. Should the final traffic routes pass in proximity to large numbers of properties or heritage receptors, the ES should provide an assessment of effects from construction traffic vibration. As stated in the EIA Scoping Report, vibration effects from traffic would not be expected, even at relatively short distances. Perceptible vibration (that is perceptible vibration and not significant vibration) due to construction traffic is also unlikely, except where construction traffic passes very close (i.e. within a few metres) of residential properties however this would only occur for short periods. A CTMP will include measures specific to travel planning and HGV movements to ensure impacts are controlled. A draft outline Construction Traffic Management Plan (oCTMP) is available for review at statutory consultation. Therefore, significant effects due to vibration caused by traffic are unlikely and are **scoped out** of further assessment.
- The Inspectorate is content that, provided that the ES can confirm no buildings would be located within 10m of any construction activities, significant effects are unlikely, and that vibration impacts on buildings can be scoped out of the ES. On the basis that Best Practicable Means will be included in the oCEMP to manage noise and vibration emissions and given the short duration of construction activities at any one location (less than one month), the Inspectorate is content that significant effects on human receptors are also unlikely and that this matter can be scoped out of the ES. No construction works with the potential to generate vibration will take place within 10m of any nearby sensitive receptors, therefore vibration impacts from construction on buildings is scoped out of further assessment. Best Practicable Means will be included in the outline Construction Environmental Management Plan (oCEMP), therefore the vibration impact from construction on human receptors is **scoped out** of further assessment. A draft oCTMP is available for review at statutory consultation.
- The Inspectorate is content that noise and vibration from operational traffic can be scoped out following confirmation of vehicle types and numbers are below guidance threshold levels. Operational traffic would be minimal, limited to occasional visits taking place by a handful of operatives. The majority of these

trips will be by cars or vans, rather than HGVs. Noise and vibration from operational traffic is scoped out of further assessment.

- The Planning Inspectorate confirmed that vibration from operational activities can be **scoped out** from further assessment.
- The Planning Inspectorate requested that the ES provide a gazetteer identifying the name/type of receptor. A List of Environmental Sensitive Receptors (ESRs) is provided within Section 11.5.2 of this document and presented in Figures 11.1 – 11.3.

11.3.1.2 Full responses to comments received as part of the Scoping Opinion will be provided as part of the ES submitted with the application for development consent.

11.3.2 Stakeholder engagement

11.3.2.1 The following stakeholders have been engaged with regards to noise and vibration as part of the assessment process so far:

- Environmental Health Officer (EHO) – Breckland Council

11.3.2.2 The outputs of the engagement undertaken are presented in Table 11-4.

Table 11-4 Noise and vibration - Engagement undertaken

Stakeholder	Date engaged	Matters raised	Response
Breckland Council EHO	26 September 2024	Proposed survey and assessment methodology	The proposed noise monitoring positions were agreed on 12 November 2024. The Breckland Council EHO requested that frequency analysis be included in the third octave bands 40 – 160 Hz and assessed in accordance with NANR45. [19] The Breckland Council EHO also agreed that should third-octave band frequency data not be available, typical frequency spectra could be applied. Third octave band data for the candidate electrical infrastructure is not available, therefore typical frequency spectra for the different types of plant have been used. The low frequency noise assessment can be found in Section 11.8.9.

11.4 Study area

11.4.1 Study area guidance

11.4.1.1 DMRB LA 111 [20] provides a methodology for the assessment of noise and vibration from construction traffic and states that where the need for further assessment has been established, a noise/vibration study area shall be defined to include all:

- 1) Noise/vibration sensitive receptors that are potentially affected by construction noise/vibration.
- 2) Noise/vibration sensitive receptors in areas where there is a reasonable expectation that a construction noise/vibration assessment will be undertaken.

11.4.1.2 The ESRs in relation to the assessment of likely significant noise and vibration effects due to the Proposed Development comprise the following:

- Existing residential receptors – individual dwellings.
- Existing non-residential receptors – Non-residential community facilities such as schools, hospitals, places of worship, and noise sensitive commercial properties.

11.4.1.3 The impacts of noise and vibration on ecological receptors are assessed in Chapter 6 Biodiversity.

11.4.2 Construction noise study area

11.4.2.1 The study area for construction noise effects includes ESRs within 300m of the draft Order Limits. This is based on guidance within BS 5228-1 [15] and DMRB LA 111 [20].

11.4.3 Operational noise study area

11.4.3.1 Based on previous solar experience and professional judgement, the study area for operational noise includes ESRs within 500m of the draft Order Limits.

11.5 Assessment methodology

11.5.1 Baseline sources of information

Desktop sources

11.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- Satellite aerial imagery.

Survey

11.5.1.2 A baseline noise survey has been undertaken and used to inform the existing baseline conditions assessed in this PEIR. Details of the baseline noise survey can be found in Section 11.6.1.

11.5.1.3 No further surveys are planned as part of the noise and vibration assessment.

11.5.2 Sensitive receptors

11.5.2.1 The draft Order Limits are located within the open countryside between Swaffham and Dereham in Norfolk in the East of England. The land use within the draft Order

Limits is predominantly arable farming. The nearest identified ESRs within 500m to the Proposed Development are listed below in Table 11-5 and can be identified in Figure 11.1 of this PEIR.

11.5.2.2 ESRs considered for inclusion in the assessment are as follows:

- Existing residential receptors

11.5.2.3 No existing non-residential noise ESRs have been identified within the study areas.

Table 11-5 Identified Existing Sensitive Receptors (ESR)

Receptor	Location	Type of Receptor	Distance from the draft Order Limits (m)
ESR1	2 West Acre Road	Residential	10
ESR2	39 New Sporle Road	Residential	300
ESR3	The splashes – Immigration Centre	Residential	50
ESR4	75 Sporle Road	Residential	175
ESR5	Sporle Road	Residential	30
ESR6	Hill View	Residential	300
ESR7	Procession Lane	Residential	65
ESR8	13 Palgrave Road	Residential	110
ESR9	12 Palgrave Road	Residential	150
ESR10	10 Palgrave Road	Residential	200
ESR11	8 Palgrave Road	Residential	250
ESR12	6 Palgrave Road	Residential	250
ESR13	4 Palgrave Road	Residential	210
ESR14	Palgrave Hall	Residential	85
ESR15	Great Palgrave	Residential	230
ESR16	4 St. Mary's View	Residential	100
ESR17	45 Hill's Close	Residential	270
ESR18	Highview	Residential	330
ESR19	Property off A47	Residential	10
ESR20	Wood Farm Cottages	Residential	25
ESR21	Wood Farm	Residential	30
ESR22	Lyons Green	Residential	250
ESR23	Lower Farm	Residential	250
ESR24	Willow Farm	Residential	35
ESR25	Hyde Hall Cottages	Residential	80
ESR26	Home Farm	Residential	55
ESR27	Beeston Road	Residential	15
ESR28	High Green Farm	Residential	85
ESR29	Greenbanks Hotel	Residential	15
ESR30	Manor Drift	Residential	320
ESR31	Property off Dereham Road	Residential	100
ESR32	Property off Swaffam Road	Residential	270
ESR33	Property off Dereham Road	Residential	20
ESR34	Property off Dereham Road	Residential	190
ESR35	Poplars	Residential	130
ESR36	The Fire Pit Camp	Residential	70
ESR37	1 Hulver Street	Residential	35

Receptor	Location	Type of Receptor	Distance from the draft Order Limits (m)
ESR38	Hulver Street	Residential	35
ESR39	Hulver Street	Residential	20
ESR40	Hulver Street	Residential	20
ESR41	Hulver Street	Residential	60
ESR42	Property off Dereham Road	Residential	70
ESR43	Bradenham Lane	Residential	40
ESR44	Oakleigh	Residential	20
ESR45	White House Farm	Residential	140
ESR46	Park Farm	Residential	85
ESR47	25 Park Lane	Residential	160
ESR48	Oak Manor Nursing Home	Residential	145
ESR49	New Church Farm	Residential	30
ESR50	Shipdham Lane	Residential	10
ESR51	Herne Lane	Residential	55
ESR52	Herne Lane	Residential	15
ESR53	Daffy Green	Residential	50
ESR54	Daffy Green Farm	Residential	110
ESR55	Property off Comar Lane	Residential	190
ESR56	High House Farm	Residential	100
ESR57	Top Farm	Residential	120
ESR58	Hollyhocks	Residential	60
ESR59	4 Bradenham Road	Residential	80
ESR60	High Green Farm	Residential	235
ESR61	Southend	Residential	235
ESR62	Grounds Farm	Residential	290
ESR63	Park Farm	Residential	340
ESR64	Ashill	Residential	10
ESR65	Panworth Hall Farm	Residential	280
ESR66	Coburn Lane	Residential	260
ESR67	83 Hills Lane	Residential	200
ESR68	Hunts Farm	Residential	20
ESR69	Hillside Mews	Residential	25
ESR70	52 Hills Road	Residential	10

11.5.3 Assigning receptor sensitivity

- 11.5.3.1 The sensitivity of the receptors has been considered on a scale of high, moderate, low or negligible as described in Table 11-6 based on experience, the assessment of similar facilities, and professional judgement.

Table 11-6 Sensitivity of receptor

Sensitivity	Receptor Type
High	Receptor/resource has little ability to absorb change without fundamentally altering its present character or is of international or national importance. For example, hospitals, residential care homes, and internationally and nationally designated nature conservation Sites which are also known to contain noise sensitive species (i.e., noise may change breeding habits or threaten species in some other way).

Sensitivity	Receptor Type
Moderate	Receptors/resource has moderate capacity to absorb change without significantly altering its present character. For example, residential dwellings, offices, schools, and play areas. Locally designated nature conservation Sites which are also known to contain noise sensitive species (i.e., noise may change breeding habits or threaten species in some other way).
Low	Receptor/resource is tolerant of change without detriment to its character or is of low or local importance. For example, industrial estates.
Negligible	Receptor/ resource is not sensitive to noise.

11.5.4 Assigning magnitude of impact

11.5.4.1 The magnitude of impact has been considered as the change experienced from the current baseline conditions at a receptor, and has been considered on a scale of high, moderate, low or negligible.

Construction noise

11.5.4.2 The methodology used to determine the magnitude of change for construction noise is shown below in Table 11-7 and Table 11-8.

Table 11-7 Magnitude of construction noise impact

Magnitude of Change	Criteria
High	Noise levels exceed the assessment category threshold level for the duration of the construction works.
Moderate	Noise levels exceed the assessment category threshold level for periods of more than one month, but for significantly less than the whole duration of the construction works.
Low	Noise levels exceed the assessment category threshold level for periods of less than one month.
Negligible	Noise levels do not exceed the assessment category threshold level during any period.

Table 11-8 Thresholds of significant impact from construction noise at residential receptors in accordance with the ABC method of BS5228-1

Assessment Category Threshold Value Period (L_{Aeq})	Threshold Value in Decibels (dB)		
	Category A ^{*1}	Category B ^{*2}	Category C ^{*3}
Daytime (0700 to 1900 hours) and Saturdays (0700 to 1300 hours)	65	70	75
*1 Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value.			
*2 Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.			
*3 Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.			

- 11.5.4.3 In accordance with BS 5228-1 [15], the construction phase assessment has been undertaken on the assumption that no mitigation will be in place. Required mitigation is then identified and set out within Section 11.9.

Operational Noise

- 11.5.4.4 The assessment of operational noise effects has been undertaken according to the methodology set out in BS 4142:2014 [13].
- 11.5.4.5 The baseline noise measurements were used to determine representative daytime and night-time background noise levels at the assessed receptors.
- 11.5.4.6 Noise from operational plant such as substations, inverters, transformers and battery storage units has been predicted using noise modelling software and plant emissions data provided by the Applicant.
- 11.5.4.7 The assessment considers the level by which the Proposed Development's BS 4142 Rating Level exceeds the prevailing background noise levels, as well as the context in which the sound would occur. BS 4142 states that a difference of around +10 dB is a likely indication of potential significant adverse impact depending on context, a difference of around +5 dB is likely indication of potential adverse impact depending on context.
- 11.5.4.8 Where the Rating Level does not exceed the background sound level the impact is considered to be low. For Rating Levels that are above the background sound level and less than a +5dB difference, this is a likely indication that the impact is less likely to be adverse or significant adverse depending on context.
- 11.5.4.9 The assessment also considers the context of the sound. Where the initial estimate of the effect needs to be modified due to context, all pertinent factors are considered, including:
- The absolute level of the sound.
 - The character and level of the residual sound compared to the character and level of the specific sound.
 - The sensitivity of the receptor, including whether dwellings already incorporate design measures that secure good internal and/or outdoor conditions, such as: façade insulation treatment, ventilation and/or cooling that will reduce the need to have windows open to provide rapid or purge ventilation and acoustic screening.
 - The time of day. During the night-time, occupants are likely to be indoors and therefore an assessment of internal noise levels, taking into account noise reduction provided by the building facades is more relevant than external noise levels. During the daytime, occupants are equally as likely to be indoors or outdoors, therefore, internal noise levels and external amenity noise levels should be considered.

- 11.5.4.10 Where background and rating levels are low, BS 4142:2014 [13] states that the absolute level might be as, or more relevant than the margin by which the Rating Level exceeds the background noise level.
- 11.5.4.11 As such, the assessment of operational noise has been organised as follows:
- Initial assessment in accordance with BS 4142:2014.
 - Absolute (internal) noise levels assessed in accordance with BS 8233:2014 and WHO [17], which takes into account building envelope insulation.
 - Change in noise level assessment in accordance with IEMA [12]. Predicted (with development) ambient noise levels to determine the magnitude of change in noise level expected due to the Proposed Development, including absolute (external) noise levels.
- 11.5.4.12 The NPPG [11] provides guidance in the form of a noise exposure hierarchy, which details the levels of perception to noise exposure and the expected outcomes and required actions. The noise exposure hierarchy is presented in Table 11-9.

Table 11-9 PPG Noise Exposure Hierarchy

Table 1 PPG Noise Exposure Hierarchy			
Perception	Examples of Outcomes	Increasing Effect Level	Action
Not Present	No Effect	No Observed Effect	No Specific Measures Required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and not intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and not disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid

Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent
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11.5.4.13 11.5.4.13 Table 11-10 below presents the operational noise assessment criteria that has been designed in accordance with the relevant national guidance and how this has been adapted to determine a magnitude of change.

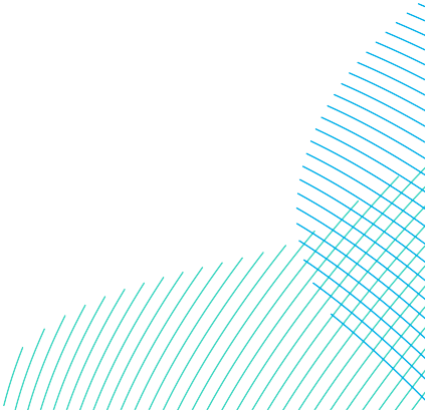


Table 11-10 Method for Assessing the Magnitude of Impact

Magnitude of Change	Effect Level - Increasing Effect Level	Noise Level Criteria	Justification for Effect Level- Action Required
Negligible	No Observed Effect Level (NOEL) – <i>No Observed Effect</i>	Difference between Rating Level ($L_{Ar,Tr}$) dB and existing background level $L_{A90,T}$ dB is less than (NOEL) or equal to (NOAEL) 0dB depending on context	Justification for Effect Level: Below low impact threshold in BS4142:2014 Action Required: None
	and		
	No Observed Adverse Effect Level (NOAEL) – <i>No Observed Adverse Effect</i>	Noise levels are less than (NOEL) or equal to (NOAEL) the following: Living Rooms: 35 dBL _{Aeq,16hours} Kitchens, Dining Rooms, and Studies: 40 dBL _{Aeq,16hours} Bedrooms Rooms: 35 dBL _{Aeq,16hours} 30dB L _{Aeq,8hr} $L_{AFmax,2min}$ noise levels do not exceed: 45dB L_{AFmax} based on 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Less than threshold values in Table 4 in BS8233:2014 and Table 1 in World Health Organisation (1999) Guidelines on Community Noise [17] Action Required: None
		Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of ≤ 1 dB.	Justification for Effect Level: Within negligible short-term impact classification range in Table 7.14 in IEMA [12] 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: None
		Daytime external noise levels are below 45 dBL _{Aeq,16hours}	Justification for Effect Level: Below 'moderate annoyance' WHO 1999 guideline for outdoor living area [17] Action Required: None
Low		Difference between Rating Level ($L_{Ar,Tr}$) dB and existing background	Justification for Effect Level:

Magnitude of Change	Effect Level - Increasing Effect Level	Noise Level Criteria	Justification for Effect Level- Action Required
	Lowest Observed Adverse Effect Level (LOAEL) – <i>Observed Adverse Effect</i>	sound level $L_{A90,T}$ dB is between 1-4dB, depending on context.	Within less likely for adverse or significant adverse impact to occur impact threshold in BS4142:2014 Action Required: Where practical, mitigate and reduce to a minimum the exceedance over 0dB above background threshold
		Noise levels are between: Living Rooms: 35-40 $dB_{L_{Aeq,16hours}}$ Kitchens, Dining Rooms, and Studies: 40-45 $dB_{L_{Aeq,16hours}}$ Bedrooms Rooms: 35-40 $dB_{L_{Aeq,16hours}}$ 30-35dB $L_{Aeq,8hr}$ $L_{AFmax,2min}$ noise levels do not exceed 45dB L_{AFmax} based on 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Exceed threshold guidelines in Table 4 of BS8233:2014 and World Health Organisation (1999) Guidelines on Community Noise by no greater than 5dB to achieve reasonable internal conditions as defined by Note 7 to Table 1 in BS8233:2014 Action Required: Mitigate and reduce to a minimum the exceedance over the threshold
		Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of 1.0-2.9dB.	Justification for Effect Level: Within minor short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Daytime external noise levels are between 45 and 50 $dB_{L_{Aeq,16hours}}$	Justification for Effect Level: Below 'moderate annoyance' WHO 1999 guideline. Action Required: None
Moderate	Significant Observed Adverse Effect Level (SOAEL) – <i>Significant Observed Effect</i>	Difference between Rating Level ($L_{Ar,Tr}$) dB and existing background	Justification for Effect Level: Within adverse impact threshold in BS4142:2014.

Magnitude of Change	Effect Level - Increasing Effect Level	Noise Level Criteria	Justification for Effect Level- Action Required
		sound level $L_{A90,T}$ dB is between 5-9dB, depending on context.	Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Noise levels are between: Living Rooms: 40-45 $dB_{L_{Aeq,16hours}}$ Kitchens, Dining Rooms, and Studies: 45-50 $dB_{L_{Aeq,16hours}}$ Bedrooms Rooms: 40-45 $dB_{L_{Aeq,16hours}}$ 35-40dB $L_{Aeq,8hr}$ 45-55dB $L_{AFmax,2min}$ based on 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Exceeds BS8233:2014 $L_{Aeq,T}$ reasonable criteria by 5dB or exceeds $L_{AFmax,2min}$ (10th highest sample) Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of 3.0-4.9dB.	Justification for Effect Level: Within moderate short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Daytime external noise levels are between 50 and 55 $dB_{L_{Aeq,16hours}}$	Justification for Effect Level: Above 'moderate annoyance' but below 'serious annoyance' WHO 1999 guideline Action Required: Additional mitigation required to achieve effect of LOAEL or less.

Magnitude of Change	Effect Level - Increasing Effect Level	Noise Level Criteria	Justification for Effect Level- Action Required
High	Significant Observed Adverse Effect Level (SOAEL) – <i>Unacceptable Observed Effect</i>	Difference between Rating Level ($L_{Ar,Tr}$) dB and existing background sound level $L_{A90,T}$ dB is equal to or greater than 10dB, depending on context.	Justification for Effect Level: Within significant adverse impact threshold in BS4142:2014 Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Noise levels exceed: Living Rooms: 45 dBL _{Aeq,16hours} Kitchens, Dining Rooms, and Studies: 50 dBL _{Aeq,16hours} Bedrooms Rooms: 45 dBL _{Aeq,16hours} 40dB L _{Aeq,8hr} L _{AFmax,2min} noise levels exceeds 55dB L _{AFmax} based on 10th highest L _{AFmax,2min} sample)	Justification for Effect Level: Exceeds BS8233:2014 L _{Aeq,T} reasonable criteria by 10dB or exceeds L _{AFmax,2min} (10th highest sample) by 10dB or more. Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Daytime external noise levels are greater than 55 dBL _{Aeq,16hours}	Justification for Effect Level: Above 'serious annoyance' WHO 1999 guideline. Action Required: Additional mitigation required to achieve effect of LOAEL or less.

11.5.5 Significance criteria

- 11.5.5.1 The significance of effect is informed by the magnitude of change due to the Proposed Development and the evaluation of the sensitivity of the affected receptor. The significance of effect is determined using professional judgement and Table 11-11 as a tool to assist this process.
- 11.5.5.2 Whilst Table 11-11 provides ranges, the level of effect is confirmed as a single level and not a range, informed by professional judgement. For each effect, it is concluded whether the effect is 'beneficial' or 'adverse'.

Table 11-11 Effect significance matrix

Magnitude of Change	Sensitivity			
	High	Moderate	Low	Negligible
High	Major	Moderate-Major	Moderate	Minor
Moderate	Moderate-Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

- 11.5.5.3 Major and Moderate-Major effects are categorised as significant.
- 11.5.5.4 Moderate effects are categorised as significant or not significant dependent on relevant contextual factors and professional judgement can be taken into consideration to determine the effect as not significant.
- 11.5.5.5 Minor and Negligible effects are categorised as not significant.

11.5.6 Assumptions and limitations

Baseline

- 11.5.6.1 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 that ensure measurements were undertaken in such a way as to provide a representative sample of conditions, such as avoiding periods of adverse weather conditions, and school holiday periods (which are often considered to result in atypical sound levels). However, a small degree of uncertainty will always remain in the values taken from such a measurement survey.

Construction Noise

- 11.5.6.2 The assessment of construction noise has considered construction activities that have the potential to result in significant effects on identified ESRs, based on

previous experience of construction sites and professional judgement. These assessments are based on a reasonable representative worst-case scenario. Construction noise predictions have been undertaken using the computer modelling software SoundPLAN (v9.1), 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 assumptions are presented in Table 11-23.

- 11.5.6.3 Construction noise predictions in SoundPLAN have been undertaken using BS 5228:2014 [15] methodologies and sound sources associated with the proposed construction activities. These sound sources are taken to be representative of the plant and/or activities that will be used during the construction process of the Proposed Development. Noise predictions were carried out to represent a conservative scenario where construction plant is operational 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 reasonable likely worst case.
- 11.5.6.4 Piling will be required for the solar PV mounting structures. Push press piling will be the method implemented.
- 11.5.6.5 Noise effects during the decommissioning phase of the Proposed Development will be similar to or less than noise effects during the construction phase. The noise assessment presented for the construction phase is therefore considered representative (or an overestimate) of the decommissioning phase. As such a separate assessment for noise from the decommissioning phase is not included but the conclusions of the construction assessment can be taken as representative of effects during decommissioning.

Operational

- 11.5.6.6 A series of assumptions were made for the generation of the operational noise models as follows:
- Sound level data for operational noise-producing plant (i.e. inverters, transformers and BESS units) have been based on industry sound pressure level measurement data.
 - Surrounding ground conditions are rural farmland and have been modelled as soft ($G=0.8$).
 - Air temperature was assumed to be 10 degrees and humidity 70%, which are considered typical annual average weather conditions.
 - Three orders of reflections have been allowed for in the model.
 - Land topography (LiDAR 1m DTM) has been incorporated into the noise modelling.
 - All residential receptor points have been set at a standard height of 4.0 m above local ground levels to calculate worst-case (first floor) representative noise levels at ESRs.

- 11.5.6.7 Operational noise has been predicted with all plant being in maximum operation at all times of day. BESS cooling fans will operate dependent on ambient temperatures and would not be in a full mode of operation during cooler temperatures. Consequently, noise predictions represent a reasonable worst-case.
- 11.5.6.8 Sound level data for transformers in reduced modes of operation is not available from manufacturers and therefore not available for the purposes of this assessment. Noise predictions are based on inverters and cooling fans operating at full load so are likely to be overestimated. Consequently, this is considered to represent a worst-case assessment scenario.
- 11.5.6.9 All substations have been assessed as being permanently operational.

11.6 Baseline conditions

11.6.1 Existing baseline conditions

- 11.6.1.1 To establish the baseline noise levels at the ESRs, a background noise survey was undertaken between 6 and 12 December 2024, from 13 to 17 December 2024 and from 16 to 21 January 2025.
- 11.6.1.2 A-weighted L_{eq} and L_{90} noise levels have been measured to comply with the requirements of BS4142. A-weighted maximum sound pressure levels were also measured to provide additional information.
- 11.6.1.3 Noise measurements were carried out at ten monitoring locations agreed with Breckland Council which are in close proximity to the ESRs and therefore considered to be representative of the ESRs. Measurements covering typical weekday and weekend periods were captured at each location. The monitoring locations are shown on Figure 11.1 and are as follows:
- LT1: Unattended noise monitoring at the north of Swaffham. The microphone was positioned near to West Acre Road, within the Central Panel Area. Occasional road traffic from West Acre Road, faint traffic from the A47 and bird song were audible occasionally.
 - LT2: Unattended noise monitoring on a private access road to the north of the A47. The microphone was positioned near to the private access road, within the Central Panel Area. Distant road traffic from the A47 and bird song were occasionally audible.
 - LT3: Unattended noise monitoring to the south of Great Palgrave. The microphone was positioned within the Central Panel Area. Occasional road traffic noise from nearby access road and bird song were occasionally audible.
 - LT4: Unattended noise monitoring to the northeast of Sporle. The microphone was positioned outside the draft Order Limits. Distant road traffic was audible, bird song and aircraft noise were audible occasionally.
 - LT5: Unattended noise monitoring near to Googles Lane. The microphone was positioned in the north-west corner of the adjacent field, within the draft Order

Limits. Occasional road traffic on Googles Lane was audible, bird song and aircraft noise were audible occasionally.

- LT6: Unattended noise monitoring near to the A47. The microphone was positioned within parcel N-03, within the Northern Panel Area. Road traffic on the A47 was dominant, bird song and aircraft noise were audible occasionally.
- LT7: Unattended noise monitoring near to Dereham Road. The microphone was positioned in the north-east corner of the adjacent field, within the Northern Panel Area. Road traffic on Dereham Road was audible, bird song and aircraft noise were audible occasionally.
- LT8: Unattended noise monitoring near to Shipdham Lane. The microphone was positioned in parcel E3, within the Eastern Panel Area. Occasional road traffic on Shipdham Lane was audible, bird song and aircraft noise were audible occasionally.
- LT9: Unattended noise monitoring near to access road. The microphone was positioned in parcel S2, within the Southern Panel Area. Generally quiet with bird song and occasional bird scarers.
- LT10: Unattended noise monitoring near to Hills Road. The microphone was positioned in parcel S-18, within Southern Panel Area. Road traffic on Hills Lane was audible, bird song and aircraft noise were audible occasionally.

11.6.1.4 The noise measurements were made using Class 1, integrated sound level meters. The microphones were mounted on tripods 1.5m above the ground and more than 3.5m from any other reflecting surfaces with the diaphragms horizontal.

11.6.1.5 The monitoring equipment used is as follows:

- | | |
|--------------|----------|
| • Cube SLM | SN:12197 |
| • Fusion SLM | SN:10711 |
| • Cube SLM | SN:12198 |
| • Fusion SLM | SN:14937 |
| • Fusion SLM | SN:11619 |

11.6.1.6 The weather conditions during setup and collection of the survey are as follows:

- Wind speeds: 0-5 m/s
- No precipitation
- Sunny, scattered clouds
- Temperature: 9°C - 17 °C

11.6.1.7 A weather station was installed for the duration of the noise surveys so any periods of adverse weather conditions could be identified and omitted from noise data. Due to the time of year (December), adverse weather conditions were present during part of the survey. Data has subsequently been removed for the period from 6 December 2024 to 9 December 2024 for the monitoring positions LT1 – LT3 and LT5 and from 15 December 2024 to 17 December 2024 for

positions LT7 – LT9. It is considered that the remaining noise data is representative of the prevailing noise climate.

- 11.6.1.8 The sound level meters were calibrated to a reference level of 94dB at 1kHz both before and on completion of the noise survey. No drift in calibration over 0.5dB was recorded during the survey.
- 11.6.1.9 The monitoring procedures have followed guidance from BS 7445-1:2003 'Description and environment of environmental noise – Part 1: Guide to quantities and procedures' and BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' [13].

Existing measured noise levels

- 11.6.1.10 The results of each of the monitoring locations are presented in Table 11-12 to Table 11-21. The noise monitoring results and time history graphs are provided in full in Appendix 11.1.
- 11.6.1.11 To assess the operational phase, the measured sound levels presented in Tables Table 11-12 to Table 11-21 have been defined in 1-hour periods for daytime and the over 15-minute periods for night-time respectively, in accordance with reference periods required by BS 4142.

Table 11-12 Summary of Monitored Sound Levels – LT1

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	24 - 53	24 - 42	32 - 75	28 - 63	39 - 94	34 - 90
25th %ile	41	25	53	34	74	43
Median	45	27	56	41	77	57
75th %ile	46	31	59	51	80	75
Arithmetic Avg	43	29	55	43	75	60
Log Avg	-	-	60	53	-	-
Modal Value	45	24	-	-	-	-

Table 11-13 Summary of Monitored Sound Levels – LT2

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	22 - 51	24 - 44	32 - 73	34 - 68	45 - 96	43 - 95
25th %ile	41	29	46	41	56	47
Median	43	38	50	43	64	51
75th %ile	45	40	55	50	71	75
Arithmetic Avg	42	35	51	47	65	61

Log Avg	-	-	58	58	-	-
Modal Value	43	39	-	-	-	-

Table 11-14 Summary of Monitored Sound Levels – LT3

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	23 - 46	19 - 35	26 - 76	21 - 39	31 - 95	29 - 57
25th %ile	30	24	35	28	48	37
Median	33	28	42	31	56	41
75th %ile	36	29	49	33	67	45
Arithmetic Avg	34	27	43	30	57	41
Log Avg	-	-	56	32	-	-
Modal Value	31	29	-	-	-	-

Table 11-15 Summary of Monitored Sound Levels – LT4

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	25 - 44	19 - 39	29 - 65	23 - 42	37 - 87	34 - 57
25th %ile	32	24	36	29	43	39
Median	35	26	38	31	49	41
75th %ile	38	29	41	33	56	44
Arithmetic Avg	35	27	39	31	50	41
Log Avg	-	-	44	33	-	-
Modal Value	38	24	-	-	-	-

Table 11-16 Summary of Monitored Sound Levels – LT5

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	31 - 47	27 - 44	35 - 66	31 - 46	44 - 83	38 - 59
25th %ile	38	30	41	35	49	44
Median	40	36	44	40	57	46
75th %ile	42	40	47	42	63	49

Arithmetic Avg	40	36	45	39	57	47
Log Avg	-	-	49	41	-	-
Modal Value	39	29	-	-	-	-

Table 11-17 Summary of Monitored Sound Levels – LT6

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	25 - 65	23 - 59	58 - 70	47 - 68	70 - 89	68 - 87
25th %ile	46	25	64	55	73	71
Median	54	28	66	57	74	72
75th %ile	58	35	68	60	75	73
Arithmetic Avg	51	32	65	58	74	72
Log Avg	-	-	66	60	-	-
Modal Value	54	25	-	-	-	-

Table 11-18 Summary of Monitored Sound Levels – LT7

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	30 - 47	25 - 44	37 - 54	39 - 54	50 - 69	52 - 67
25th %ile	35	31	44	43	54	57
Median	41	33	47	44	59	60
75th %ile	45	38	50	47	64	62
Arithmetic Avg	40	34	47	45	59	59
Log Avg	-	-	48	46	-	-
Modal Value	45	33	-	-	-	-

Table 11-19 Summary of Monitored Sound Levels – LT8

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	22 - 43	21 - 38	24 - 53	23 - 47	28 - 76	32 - 70
25th %ile	25	26	37	31	51	40
Median	34	31	40	36	55	45
75th %ile	38	33	43	38	57	49

Arithmetic Avg	32	30	39	35	54	45
Log Avg	-	-	43	38	-	-
Modal Value	38	33	-	-	-	-

Table 11-20 Summary of Monitored Sound Levels – LT9

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	25 - 34	25 - 32	26 - 51	26 - 36	28 - 72	29 - 59
25th %ile	27	25	31	27	39	33
Median	30	27	35	29	51	35
75th %ile	31	29	38	31	57	41
Arithmetic Avg	29	27	34	29	49	38
Log Avg	-	-	38	30	-	-
Modal Value	27	25	-	-	-	-

Table 11-21 Summary of Monitored Sound Levels – LT10

	Background Sound Level, dB L _{A90,T}		Residual Sound Level, dB L _{Aeq,T}		Maximum Sound Level, dB L _{Afmax,T}	
	Day	Night	Day	Night	Day	Night
Range	21 - 48	18 - 41	25 - 58	21 - 63	34 - 78	29 - 80
25th %ile	28	22	35	27	46	39
Median	32	24	39	31	54	43
75th %ile	36	28	44	36	61	51
Arithmetic Avg	32	25	40	34	54	47
Log Avg	-	-	46	48	-	-
Modal Value	35	23	-	-	-	-

11.6.2 Future baseline

- 11.6.2.1 The Proposed Development is located in a rural area where noise levels remain fairly low due to the absence of any loud noises. The main source of noise affecting all receptors is road traffic. Whilst baseline traffic noise may increase slightly in future years, due to the rural nature of the location it is unlikely that this will be perceptible. If baseline noise levels do increase, this will further mask the noise of the Proposed Development and lower any perceived impact. Consequently, no future baseline assessment is considered necessary or relevant and therefore no future baseline noise levels are required.

11.6.2.2 In accordance with the methodology set out in Chapter 15 Cumulative Effects Assessment of this PEIR, the following developments are relevant to this assessment and have been considered present in the future baseline:

- Norfolk Vanguard (EN010079)
- Norfolk Boreas (EN010087)
- East Bilney Quarry (FUL/2023/0030 / C/3/2010/3028)
- Land to South of Field Lane (FUL/2023/0029)
- East Bilney Quarry (FUL/2023/0031)
- Land South of B1108 (FUL/2024/0041 / FUL/2020/0050)
- Dudgeon Onshore Substation (3PL/2012/0703/F)
- Land to the South of Lynn Road (FUL/2023/0047)

11.7 Design Principles, Embedded and good practice measures

11.7.1 Design Principles

11.7.1.1 The Proposed Development is being designed with regard to a set of design principles, as described in Chapter 2, paragraph 2.4.9.3 of this PEIR.

11.7.2 Embedded and good practice measures

11.7.2.1 Embedded measures are modifications to the design of a scheme that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

11.7.2.2 The Proposed Development is currently progressing through an iterative design process. Measures for the Proposed Development relevant to noise and vibration already committed to include:

- An appropriate buffer of at least 10m will be maintained between properties and construction works which have the potential to generate vibration.
- 132kV substations, BESS and inverters will be located at least 200m from residential properties (ESRs).
- Routing for HGVs through local villages will be minimised where reasonably practicable

11.7.2.3 In addition, a suite of draft outline management plans have been developed for the Proposed Development, those relevant to noise and vibration including:

- oCEMP
- Outline Decommissioning Environmental Management Plan (oDEMP)

- oCTMP

- 11.7.2.4 These management plans incorporate good practice measures, as well as any further mitigation identified during the EIA.
- 11.7.2.5 Draft outline versions of these management plans are provided with this PEIR for review during statutory consultation. These will be updated and submitted with the DCO application to secure the commitments contained within. Appropriate Requirements will be included in the DCO application to ensure these management plans will be developed to full versions and submitted to the relevant planning authority for approval. This will take place prior to the commencement of relevant works and measures described in them are implemented.
- 11.7.2.6 Measures to control noise as defined in Annex B of BS 5228:2009+A1:2014 Part 1 [15] and Section 8 of BS 5228:2009+A1:2014 Part 2 [16] will be adopted where reasonably practicable. These measures represent 'Best Practicable Means' (BPM) (as defined by Section 72 of the Control of Pollution Act 1974) to manage noise and vibration emissions from construction activities. An Environmental Clerk of Works will also be required to be appointed to advise and supervise the mitigation measures during construction and decommissioning.
- 11.7.2.7 The Applicant will organise and undertake construction activities on site in a manner which demonstrates that BPM to control noise and vibration during activities is being adopted at all times. In particular the Applicant is expected to meet the requirements of BS5228, 'Code of practice for noise and vibration control on construction and open sites' [15] and [16]. Notwithstanding this general requirement and the other provisions set out in this report, the Applicant will specifically be required to:
- Maintain all equipment in good working condition and take care that all mufflers or other noise dampening features are correctly fitted and maintained.
 - Staff will be trained in the correct use of equipment to ensure, inter alia, that it is only used for the purpose for which it has been designed.
 - Assessments will be made at the construction site boundary to ascertain impact of noise and/or vibration on local residents during these periods of work; if deemed above acceptable levels – as reported in the PEIR, liaison with the Applicant and adjoining properties will be undertaken to agree any further mitigation to be implemented.

11.8 Assessment of effects

11.8.1 Construction and Decommissioning Noise

- 11.8.1.1 Noise and vibration impacts during the construction phase would be caused by works activities associated with site preparation, plant installation, cable laying and commissioning.

- 11.8.1.2 Noise effects during the decommissioning phase of the Proposed Development would be similar or less than noise effects during the construction phase. The noise assessment presented for the construction phase is therefore considered representative (or an overestimate) of the decommissioning phase. As such a separate assessment for noise from the decommissioning phase is not included in this PEIR.
- 11.8.1.3 The levels of noise received at the ESRs closest to the Proposed Development would depend on the sound power levels of the machines used, the distance to the properties, the presence of screening or reflecting surfaces and the ability of the intervening ground to absorb the propagating noise.
- 11.8.1.4 Based on the ambient noise levels measured, the appropriate category value has been determined for each of the ESRs, as detailed in Table 11-22. Details of the noise survey carried out at the ESRs are set out in Section 11.6.

Table 11-22 Construction Noise Assessment Criteria

Monitoring Location	Existing Sensitive Receptor Location	Average Measured Daytime Noise Levels dB $L_{Aeq,T}$	Appropriate ABC Category Value in accordance with BS 5228-1	Noise Level at which construction phase activities may cause a significant effect at the receptor dB L_{Aeq}
LT1	ESR1, ESR2	60	A	65
LT2	ESR4 – ESR7, ESR19	58	A	65
LT3	ESR8 - ESR15,	56	A	65
LT4	ESR3, ESR16 – ESR18	44	A	65
LT5	ESR20 – ESR23	49	A	65
LT6	ESR24 – ESR32	66	A	65
LT7	ESR33 – ESR49	48	A	65
LT8	ESR50 – ESR57	43	A	65
LT9	ESR58 – ESR65	38	A	65
LT10	ESR66 – ESR70	46	A	65

- 11.8.2 Activities within the draft Order Limits that could give rise to construction noise impacts would include (but are not limited to):
- Installation of hybrid packs (including inverter units, DC-DC converters and BESS), standalone inverter units, standalone BESS units, customer switchgear and storage containers.
 - Solar PV mounting structure installation
 - Substation construction
 - Construction of supporting infrastructure, such as fencing and access tracks, for example.

- Cable installation (which will involve trenching or in targeted locations, horizontal directional drilling (HDD)).

- 11.8.3 The activities in Table 11-22 have the potential to generate short-term increases in noise levels above those recommended in BS 5228-1. Potential plant that can be used to undertake the construction works are shown in Table 11-23. The duration for each activity is not currently known, but it has been assumed that each activity would not take more than one month at any one location. Construction noise predictions have been undertaken to present a worst-case scenario where all plant is operational concurrently.
- 11.8.4 The construction of the solar PV modules would occur at locations in close proximity to the edge of the draft Order Limits and therefore are likely to represent the worst-case construction activities in terms of noise impact at the ESRs. BESS, inverters and the 132kV substations would be located at greater distances from the ESRs and therefore there is likely to be less impact in terms of noise.
- 11.8.5 Two methods of cable installation have been assumed for assessment purposes, the main method of cable installation is assumed to be open-cut trenching as the likely worst case for assessment, with HDD methods only being employed where open cut trenching cannot be used in discreet locations which will be identified as the design progresses. Cable plough trenching could also be employed, but is not included within the assessment as does not represent a worst case in respect of noise impacts.

Table 11-23 Construction Activity Plant and Noise Data

Activity	Plant Item	BS 5228-1 Ref	Number of Plant Items	Sound Power Level, dBA	Cumulative Activity Sound Power Level, dBA
PV module construction	Articulated Dump Truck	C.5 16	1	104	110.9
	Wheeled mobile telescopic crane	C.4 38	1	106	
	Diesel Generator	C.4 85	1	94	
	Steel Piling pressed in	C.12 1	1	96	
	Cement mixer truck	C.4 18	1	103	
	Dumper	C.4 15	1	105	
Cable installation – open cut trenching	Tracked excavator	C.4 63	1	105	108.9
	Wheeled backhoe loader	C.4 66	1	97	
	Dumper	C.4 9	1	105	

Activity	Plant Item	BS 5228-1 Ref	Number of Plant Items	Sound Power Level, dBA	Cumulative Activity Sound Power Level, dBA
Cable installation - HDD	Telescopic handler	C.4.55	1	98	112.6
	Vibratory roller	C.5 27	1	95	
	Directional drill (generator)	C.2 44	1	105	
	Water pump	C.2 45	1	93	
	Tracked excavator	C.2 14	1	107	
	Drilling rig	C.3 15	1	110	

- 11.8.6 Each of the construction activities listed in Table 11-23 have been modelled as point sources in a model absent of ground topography data and with a ground absorption coefficient of zero to represent the worst-case. A stand-off distance (buffer zone) has been calculated which would reduce the predicted noise level to below the lower noise threshold cut-off of 65dB (ABC method – Category A) as detailed in Section E.3.2 of BS 5228-1. The Category A construction noise thresholds represent the lowest assessment criteria (typically used to assess the effects in rural areas) and have been used throughout the assessment as indicated in Table 11-22.
- 11.8.7 Noise generated by the construction phase of the Proposed Development may have a short-term, adverse effect at the above ESRs. However, the construction activities would be transient as the works would progress through the draft Order Limits.
- 11.8.8 Table 11-24 provides the buffer zones required for each activity to achieve noise levels below the threshold of the onset of significant adverse impact which will be applied to the construction of the Proposed Development.

Table 11-24 Construction Activity buffer zones

Activity	Cumulative activity sound power level, dBA	Minimum buffer zone in meters to achieve <65dBA
Solar PV Module Construction	111.6	56
Cable Installation	108.9	44
HDD	112.6	63

PV Module Construction Noise Assessment

- 11.8.8.1 Figure 11.3 identifies the buffer zones for ESRs associated with the construction of the solar PV modules. ESRs which fall within the buffer zone are likely to exceed the assessment category threshold level for periods of less than one month resulting in a low magnitude of change. When combined with a Moderate sensitivity, the effect would be Minor Adverse, which is **Not Significant**.

- 11.8.8.2 ESRs outside the buffer zone are likely to experience a negligible magnitude of change, which combined with a Moderate sensitivity, results in a Negligible effect, which is **Not Significant**.
- 11.8.8.3 Receptors (ESR1, ESR5, ESR20, ESR21, ESR26, ESR27, ESR29, ESR33, ESR37, ESR38, ESR39, ESR40, ESR43, ESR44, ESR49, ESR50, ESR51, ESR52, ESR64 and a number of receptors along Hills Road (located between 51 Hills Road to 69 Hills Road), Saham Toney have been identified as falling within the buffer zone for PV module construction and would therefore experience a Minor Adverse effect, which is **Not Significant**.

Cable Route Construction Noise Assessment

- 11.8.8.4 Figure 11.3 identifies ESRs that potentially fall within the cable installation and HDD buffers as defined in Table 11-24.
- 11.8.8.5 ESRs located adjacent to the A47 north of Necton and ESR50 have been identified as potentially being impacted by construction noise as a result of the construction of the cable route. Due to the nature of cable route construction, it is unlikely that noise levels would exceed the assessment category threshold level for a period of more than one month at any of the affected ESRs. Therefore, the magnitude of change is Low, combined with a Moderate sensitivity, resulting in a Minor Adverse effect, which is **Not Significant**.

11.8.9 Operation

- 11.8.9.1 During the operational phase, it is possible that noise could be generated by the operation of electrical plant and equipment, such as inverters or transformers.
- 11.8.9.2 The noise generating activities of the Proposed Development in operation have been assessed using electrical infrastructure and associated sound levels presented in Table 11-25.
- 11.8.9.3 To predict low frequency noise typical frequency spectra have been applied to each of the plant items presented in Table 11-25. Details of the frequency spectra can be found in Appendix 11.1.

Table 11-25 Operational Source Noise Levels

Description	Equipment	Sound Power Level, dBA
Single Inverter Container	Single 2.5MW SMA Inverter	87.0
Hybrid Packs	4-4.6 MW SMA Inverter	87.0
	Battery Container	90.0
	DC-DC Converter	87.0
Substation	Transformers	92.0

- 11.8.9.4 Noise modelling software SoundPLAN 9.1 has been used to calculate the operational noise levels at the ESRs.
- 11.8.9.5 The locations of the ESRs are shown in Figure 11.1. The electrical infrastructure locations and modelled noise contours are presented in Figure 11.2 and the specific noise levels at each receptor are presented in Appendix 11.1.

- 11.8.9.6 The noise levels have been modelled as a worst-case scenario with all equipment operating at 100% capacity, therefore the modelled noise levels are applicable for the daytime and night-time assessments.
- 11.8.9.7 The following sections present initial noise assessment results in accordance with national guidance. The assessment results will be discussed, taking into account context and professional judgement in the 'Summary of Significance' section below.

BS4142:2014+A1:2019 Assessment

- 11.8.9.8 BS 4142:2014+A1:2019 (BS 4142) includes guidance on the application of additional weighting to be applied in cases where the industrial noise is considered to be 'tonal', 'impulsive' or 'intermittent' at the ESR.
- 11.8.9.9 All proposed plant has been assumed to operate continuously to represent a worst-case and therefore no penalty for impulsivity or intermittency has been applied.
- 11.8.9.10 To determine whether a tonal penalty should be applied, the one-third octave objective method as described in Annex C of BS 4142 has been utilised. The results of the analysis are presented in Appendix 11.2. The results of the analysis show that the predicted noise at the nearest ESRs is unlikely to contain any tones and therefore no tonal penalty has been applied.
- 11.8.9.11 In accordance with BS 4142, the noise rating level for the noise sources associated with the Proposed Development at the receptors, have been compared with the corresponding background noise levels during the daytime and night-time.
- 11.8.9.12 The results of the BS 4142 assessment are presented in Appendix 11.2 Table 1 indicates that during the operational phase, the predicted rating levels likely to be generated by the Proposed Development would exceed the background noise levels at most of the ESRs during the night-time period. A number of predicted rating levels would also exceed the background levels at ESRs during the daytime.
- 11.8.9.13 However, Section 11 of BS 4142 states:
- "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background, This is especially true at night."*
- 11.8.9.14 Although the current version of BS 4142 [13] does not define a low background noise level, the previous version of BS 4142 (1997) suggests that background sound levels of circa 30dB are considered very low. Therefore, for the majority of cases presented in Appendix 11.2 Table 1, existing background noise levels would be considered low in accordance with BS 4142.
- 11.8.9.15 BS 8233 provides guidance on internal noise levels which are considered acceptable and takes into account the sound insulation of the building envelope. Assessment of internal absolute levels during the night-time are considered more relevant in evaluating the impact of noise on occupants as the occupants are more likely to be indoors during this period.

BS 8233 – noise intrusion assessment

- 11.8.9.16 Internal noise levels at ESRs from all potential noise associated with the Proposed Development have been assessed with windows open, where a reduction of 10dB has been assumed for a partially open window, and with windows closed where an assumption of 30dB has been used. These worst-case assumptions have been based on guidance within ProPG [23].
- 11.8.9.17 Results of the assessment are presented in Appendix 11.2 Tables 2 and 3 which, indicate that internal noise levels for an open window scenario, from all potential noise sources during the daytime are predicted to be below the BS 8233:2014 and WHO 1999 guidance levels at all ESRs except for ESR25 and ESR49. During the night-time period, internal noise levels are predicted to be below the relevant guidance at the majority of ESRs, with the following exceptions: ESR1, ESR5, ESR7, ESR8, ESR14, ESR24, ESR25, ESR26, ESR29, ESR33, ESR36, ESR46, ESR49, ESR52, ESR56.

Change in noise level assessment

- 11.8.9.18 This change in noise level assessment compares the existing ambient noise climate (based on the existing measured L_{Aeq}), with the combined existing ambient noise climate and the predicted noise level from the Proposed Development. The difference between the 'existing' ambient noise level and the combined 'worst-case proposed' noise level is presented in Appendix 11.2 Tables 4 and 5.
- 11.8.9.19 The results presented in Appendix 11.2 Tables 4 and 5 show all ESRs during the daytime will experience up to a low adverse change in noise level in accordance with IEMA 2014 guidance. During the night-time some of the ESRs will experience a significant adverse change in noise level in accordance with IEMA 2014 guidance, including the following: ESR8, ESR9, ESR10, ESR11, ESR12, ESR13, ESR14, ESR15, ESR16, ESR17, ESR18, ESR49, ESR51, ESR52, ESR56, ESR57, ESR58, ESR59, ESR60, ESR61, ESR62, ESR63, ESR65.

Summary of Effect Levels

- 11.8.9.20 Initial operational noise assessment results are presented in the section above. A summary of the initial effect level outcomes from the assessments are presented in Table 11-26 below. The noise effect levels are defined in Table 11-9.

Table 11-26 Summary of Noise Assessment Effect Levels

Receptor	BS 8233 Assessment		Change in Noise		BS 4142 Assessment	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
ESR1	NOEL	LOAEL	NOEL	NOEL	NOEL	UOAE
ESR2	NOEL	NOEL	NOEL	NOEL	NOEL	UOAE
ESR3	NOEL	NOEL	LOAEL	UOAE	LOAEL	UOAE
ESR4	NOEL	NOEL	NOEL	NOEL	NOEL	NOEL
ESR5	NOEL	LOAEL	NOEL	NOEL	NOEL	LOAEL
ESR6	NOEL	NOEL	NOEL	NOEL	NOEL	NOEL

Receptor	BS 8233 Assessment		Change in Noise		BS 4142 Assessment	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
ESR7	NOEL	LOAEL	NOEL	NOEL	NOEL	LOAEL
ESR8	NOEL	LOAEL	NOEL	UOAE	SOAEL	UOAE
ESR9	NOEL	NOAEL	NOEL	UOAE	SOAEL	UOAE
ESR10	NOEL	NOEL	NOEL	UOAE	SOAEL	UOAE
ESR11	NOEL	NOEL	NOEL	UOAE	SOAEL	UOAE
ESR12	NOEL	NOEL	NOEL	UOAE	SOAEL	UOAE
ESR13	NOEL	NOEL	NOEL	UOAE	SOAEL	UOAE
ESR14	NOEL	LOAEL	NOEL	UOAE	SOAEL	UOAE
ESR15	NOEL	NOEL	NOEL	UOAE	SOAEL	SOAEL
ESR16	NOEL	NOEL	NOEL	UOAE	NOAEL	UOAE
ESR17	NOEL	NOEL	NOEL	UOAE	NOAEL	UOAE
ESR18	NOEL	NOEL	NOEL	UOAE	NOAEL	UOAE
ESR19	NOEL	NOEL	NOEL	NOEL	NOEL	NOEL
ESR20	NOEL	NOEL	NOEL	LOAEL	NOEL	SOAEL
ESR21	NOEL	NOEL	NOEL	LOAEL	NOEL	SOAEL
ESR22	NOEL	NOEL	NOEL	LOAEL	NOEL	SOAEL
ESR23	NOEL	NOEL	NOEL	LOAEL	NOEL	SOAEL
ESR24	NOEL	LOAEL	NOEL	NOEL	NOEL	UOAE
ESR25	LOAEL	SOAEL	NOEL	NOEL	NOEL	UOAE
ESR26	NOEL	LOAEL	NOEL	NOEL	NOEL	UOAE
ESR27	NOEL	NOEL	NOEL	NOEL	NOEL	UOAE
ESR28	NOEL	NOEL	NOEL	NOEL	NOEL	UOAE
ESR29	NOEL	LOAEL	NOEL	NOEL	NOEL	UOAE
ESR30	NOEL	NOEL	NOEL	NOEL	NOEL	UOAE
ESR31	NOEL	NOEL	NOEL	NOEL	NOEL	UOAE
ESR32	NOEL	NOEL	NOEL	NOEL	NOEL	UOAE
ESR33	NOEL	LOAEL	NOEL	LOAEL	NOEL	SOAEL
ESR34	NOEL	NOEL	NOEL	NOEL	NOEL	SOAEL
ESR35	NOEL	NOEL	NOEL	NOEL	NOEL	SOAEL
ESR36	NOEL	LOAEL	NOEL	LOAEL	NOEL	SOAEL
ESR37	NOEL	NOEL	NOEL	NOEL	NOEL	SOAEL
ESR38	NOEL	NOEL	NOEL	NOEL	NOEL	SOAEL
ESR39	NOEL	NOEL	NOEL	NOEL	NOEL	LOAEL
ESR40	NOEL	NOEL	NOEL	NOEL	NOEL	LOAEL
ESR41	NOEL	NOEL	NOEL	NOEL	NOEL	LOAEL
ESR42	NOEL	NOEL	NOEL	NOEL	NOEL	SOAEL
ESR43	NOEL	NOEL	NOEL	NOEL	NOEL	LOAEL
ESR44	NOEL	NOEL	NOEL	NOEL	NOEL	SOAEL
ESR45	NOEL	NOEL	NOEL	NOEL	NOEL	SOAEL
ESR46	NOEL	LOAEL	LOAEL	LOAEL	NOEL	UOAE
ESR47	NOEL	NOEL	NOEL	NOEL	NOEL	SOAEL

Receptor	BS 8233 Assessment		Change in Noise		BS 4142 Assessment	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
ESR48	NOEL	NOEL	NOEL	NOEL	NOEL	SOAEL
ESR49	LOAEL	SOAEL	LOAEL	SOAEL	LOAEL	UOAE
ESR50	NOEL	NOEL	NOEL	LOAEL	NOEL	LOAEL
ESR51	NOEL	NOEL	LOAEL	SOAEL	LOAEL	SOAEL
ESR52	NOEL	LOAEL	LOAEL	SOAEL	LOAEL	SOAEL
ESR53	NOEL	NOEL	NOEL	LOAEL	NOEL	NOAEL
ESR54	NOEL	NOEL	NOEL	LOAEL	NOEL	LOAEL
ESR55	NOEL	NOEL	NOEL	LOAEL	NOEL	LOAEL
ESR56	LOAEL	SOAEL	UOAE	UOAE	UOAE	UOAE
ESR57	NOEL	NOEL	LOAEL	SOAEL	LOAEL	SOAEL
ESR58	NOEL	NOEL	LOAEL	UOAE	SOAEL	UOAE
ESR59	NOEL	NOEL	NOAEL	SOAEL	SOAEL	SOAEL
ESR60	NOEL	NOEL	LOAEL	UOAE	SOAEL	UOAE
ESR61	NOEL	NOEL	LOAEL	UOAE	UOAE	UOAE
ESR62	NOEL	NOEL	LOAEL	UOAE	UOAE	UOAE
ESR63	NOEL	NOEL	LOAEL	UOAE	SOAEL	UOAE
ESR64	NOEL	NOEL	NOEL	LOAEL	LOAEL	LOAEL
ESR65	NOEL	NOEL	NOAEL	SOAEL	SOAEL	SOAEL
ESR66	NOEL	NOEL	NOEL	NOEL	NOEL	UOAE
ESR67	NOEL	NOEL	NOEL	NOEL	NOAEL	UOAE
ESR68	NOEL	NOEL	NOEL	NOEL	LOAEL	UOAE
ESR69	NOEL	NOEL	NOEL	NOEL	LOAEL	UOAE
ESR70	NOEL	NOEL	NOEL	NOEL	LOAEL	UOAE

Determination of significance

11.8.9.21 Table 11-27 presents a summary of the determination of effect significance for each of the ESRs assessed.

11.8.9.22 The magnitude of change is determined by the worst-case daytime or night-time effect. The effect significance is determined by the combination of the magnitude of change and the sensitivity when applying the matrix defined in Table 11-11.

Table 11-27 Determination of Effect Significance

Receptor	Magnitude of change			Sensitivity	Effect Significance		
	BS8233	Change in noise	BS4142		BS8233	Change in noise	BS4142
ESR1	Low	Negligible	High	Moderate	Minor	Negligible	Moderate-Major
ESR2	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR3	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR4	Negligible	Negligible	Negligible	Moderate	Negligible	Negligible	Negligible
ESR5	Low	Negligible	Low	Moderate	Minor	Negligible	Minor
ESR6	Negligible	Negligible	Negligible	Moderate	Negligible	Negligible	Negligible
ESR7	Low	Negligible	Low	Moderate	Minor	Negligible	Minor
ESR8	Low	High	High	Moderate	Minor	Moderate-Major	Moderate-Major
ESR9	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR10	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR11	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR12	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR13	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR14	Low	High	High	Moderate	Minor	Moderate-Major	Moderate-Major
ESR15	Negligible	High	Moderate	Moderate	Negligible	Moderate-Major	Moderate
ESR16	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR17	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR18	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR19	Negligible	Negligible	Negligible	Moderate	Negligible	Negligible	Negligible
ESR20	Negligible	Low	Moderate	Moderate	Negligible	Minor	Moderate

Recep- tor	Magnitude of change			Sensitiv- ity	Effect Significance		
	BS8233	Change in noise	BS4142		BS8233	Change in noise	BS4142
ESR21	Negligible	Low	Moderate	Moderate	Negligible	Minor	Moderate
ESR22	Negligible	Low	Moderate	Moderate	Negligible	Minor	Moderate
ESR23	Negligible	Low	Moderate	Moderate	Negligible	Minor	Moderate
ESR24	Low	Negligible	High	Moderate	Minor	Negligible	Moderate-Major
ESR25	Moderate	Negligible	High	Moderate	Moderate	Negligible	Moderate-Major
ESR26	Low	Negligible	High	Moderate	Minor	Negligible	Moderate-Major
ESR27	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR28	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR29	Low	Negligible	High	Moderate	Minor	Negligible	Moderate-Major
ESR30	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR31	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR32	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR33	Low	Low	Moderate	Moderate	Minor	Minor	Moderate
ESR34	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible	Moderate
ESR35	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible	Moderate
ESR36	Low	Low	Moderate	Moderate	Minor	Minor	Moderate
ESR37	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible	Moderate
ESR38	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible	Moderate
ESR39	Negligible	Negligible	Low	Moderate	Negligible	Negligible	Minor
ESR40	Negligible	Negligible	Low	Moderate	Negligible	Negligible	Minor
ESR41	Negligible	Negligible	Low	Moderate	Negligible	Negligible	Minor
ESR42	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible	Moderate
ESR43	Negligible	Negligible	Low	Moderate	Negligible	Negligible	Minor
ESR44	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible	Moderate
ESR45	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible	Moderate
ESR46	Low	Low	High	Moderate	Minor	Minor	Moderate-Major
ESR47	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible	Moderate
ESR48	Negligible	Negligible	Moderate	Moderate	Negligible	Negligible	Moderate
ESR49	Moderate	Moderate	High	Moderate	Moderate	Moderate	Moderate-Major

Receptor	Magnitude of change			Sensitivity	Effect Significance		
	BS8233	Change in noise	BS4142		BS8233	Change in noise	BS4142
ESR50	Negligible	Low	Low	Moderate	Negligible	Minor	Minor
ESR51	Negligible	Moderate	Moderate	Moderate	Negligible	Moderate	Moderate
ESR52	Low	Moderate	Moderate	Moderate	Minor	Moderate	Moderate
ESR53	Negligible	Low	Negligible	Moderate	Negligible	Minor	Negligible
ESR54	Negligible	Low	Low	Moderate	Negligible	Minor	Minor
ESR55	Negligible	Low	Low	Moderate	Negligible	Minor	Minor
ESR56	Moderate	High	High	Moderate	Moderate	Moderate-Major	Moderate-Major
ESR57	Negligible	Moderate	Moderate	Moderate	Negligible	Moderate	Moderate
ESR58	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR59	Negligible	Moderate	Moderate	Moderate	Negligible	Moderate	Moderate
ESR60	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR61	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR62	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR63	Negligible	High	High	Moderate	Negligible	Moderate-Major	Moderate-Major
ESR64	Negligible	Low	Low	Moderate	Negligible	Minor	Minor
ESR65	Negligible	Moderate	Moderate	Moderate	Negligible	Moderate	Moderate
ESR66	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR67	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR68	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR69	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major
ESR70	Negligible	Negligible	High	Moderate	Negligible	Negligible	Moderate-Major

11.8.9.23 Table 11-28 below provides a discussion where required of the context and professional judgement that has been taken into account when determining the significance of noise effects on the ESRs assessed.

Table 11-28 Summary of Significance

Receptors	Significance	Comments
ESR4, ESR6, ESR19	Not Significant	No noise impact anticipated.

Receptors	Significance	Comments
ESR1, ESR24 - ESR26, ESR29	Not Significant	Daytime noise levels are below the existing background noise levels. Existing background noise level at night-time is considered very low in accordance with BS4142, therefore absolute noise levels are likely to be more relevant. The change in ambient noise level due to the Proposed Development is negligible. Noise intrusion levels at night-time are predicted to exceed the guidelines within BS8233 during a windows open scenario, however, existing ambient noise levels suggest that windows are likely to be closed at night to prevent noise disturbance.
ESR2, ESR27, ESR28, ESR30 - ESR32	Not Significant	Daytime noise levels are below the existing background noise levels. Existing background noise level at night-time is considered very low in accordance with BS4142, therefore absolute noise levels are likely to be more relevant. The change in ambient noise level due to the Proposed Development is negligible and noise intrusion levels are predicted to be below the relevant guidelines within BS8233.
ESR3	Not Significant	Minor exceedance of the daytime existing background noise level, therefore considered a low impact. Existing background noise level at night-time is considered very low in accordance with BS4142, therefore absolute noise levels are likely to be more relevant. The change in ambient noise level due to the Proposed Development is however considered to be high during the night-time. Noise intrusion levels are predicted to be below the relevant guidelines within BS8233. Existing ambient night-time noise levels are very low therefore the change in noise due to the development is likely to be noticeable if occupants are outdoors. However, during the night-time, occupants are likely to be indoors and therefore their sensitivity to noise change is reduced.
ESR5 – ESR7	Not Significant	Daytime noise levels are below the existing background noise levels. Minor exceedance of existing background noise level during the night-time. Minor exceedance of noise intrusion criteria during the night-time with windows open, however existing night-time ambient noise suggest that windows are likely to be closed at night to prevent noise disturbance.
ESR8 – ESR18, ESR58 – ESR63, ESR65	Not Significant	Daytime and night-time existing background noise levels are considered very low and therefore absolute noise levels are likely to be more relevant. The change in ambient noise level due to the Proposed Development is however considered to be high during the night-time. Noise intrusion levels are predicted to be below the relevant guidelines within BS8233. Existing ambient night-time noise levels are very low therefore the change in noise due to the development is likely to be noticeable if occupants are outdoors. However, during the night-time, occupants are likely to be indoors and therefore their sensitivity to noise change is reduced.
ESR20 – ESR23, ESR33 – ESR48, ESR50, ESR53 – ESR55	Not Significant	Daytime noise levels are below the existing background noise levels. Existing background noise level at night-time considered very low in accordance with BS4142, therefore absolute noise levels are likely to be more relevant. The change in ambient noise level due to the Proposed Development is low during the night-time and noise intrusion levels are predicted to be below the relevant guidelines within BS8233.
ESR49	Significant	Minor exceedance of existing daytime background noise level. Night-time existing background noise level is considered low in accordance with BS4142, therefore absolute noise levels are likely to be more relevant. The change in ambient noise level due to the development is low during the daytime and moderate during the night-time. Noise intrusion levels are

Receptors	Significance	Comments
ESR51, ESR52, ESR57, ESR64	Not Significant	predicted to exceed the relevant guidelines within BS8233 during the daytime and by at least 5dB during night-time. Minor exceedance of the daytime existing background noise level, therefore considered a low impact. Existing background noise level at night-time is considered very low in accordance with BS4142, therefore absolute noise levels are likely to be more relevant. The change in ambient noise level due to the Proposed Development is however considered to be moderate during the night-time. Noise intrusion levels are predicted to be below the relevant guidelines within BS8233. Existing ambient night-time noise levels are very low therefore the change in noise due to the Proposed Development is likely to be noticeable if occupants are outdoors. However, during the night-time, occupants are likely to be indoors and therefore their sensitivity to noise change is reduced.
ESR56	Significant	Minor exceedance of existing daytime background noise level. Night-time existing background noise level is considered low in accordance with BS4142, therefore absolute noise levels are likely to be more relevant. The change in ambient noise level due to the Proposed Development is low during the daytime and high during the night-time. Noise intrusion levels are predicted to exceed the relevant guidelines within BS8233 during the daytime and by at least 5dB during night-time. Noise intrusion levels are predicted to exceed the relevant guidelines within BS8233 during the night-time.
ESR67 – ESR70	Not Significant	Daytime and night-time existing background noise levels are considered very low and therefore absolute noise levels are likely to be more relevant. The change in ambient noise level due to the Proposed Development is considered to be negligible during both the daytime and night-time periods. Noise intrusion levels are predicted to be below the relevant guidelines within BS8233.

Assessment of Low Frequency Noise

- 11.8.9.24 The assessment of low frequency noise has been undertaken following the guidance presented in NANR45: Procedure Revision 1, December 2011 Acoustics Research Centre, University of Salford 'Procedure for the assessment of low frequency noise complaints' [19].
- 11.8.9.25 The guidance provides reference noise thresholds for low frequency noise between the frequencies of 10 – 160Hz. It should be noted that the reference values are internal noise levels and therefore do not take into account the noise reduction afforded by the building envelope. As requested by Breckland Council, the third octave bands between 40 – 160 Hz inclusive have been considered. The reference values for frequency bands 40 – 160 Hz are reproduced in Table 11-29.

Table 11-29 NANR45 Reference Values

Frequency (Hz)	40	50	63	80	100	125	160
L _{eq} (dB)	49	43	42	40	38	36	34

11.8.9.26 Third octave band noise levels have been predicted at each of the ESRs. Table 11-30 below identifies the ESRs that exceed the reference values stated in Table 11-29 in bold.

Table 11-30 Predicted Noise Low Frequency Noise Levels

Receptor	Predicted Sound Pressure Level Leq (dB)						
	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz
ESR25	44.7	43.6	42.9	40.9	35.0	34.8	34.8
ESR29	44.6	43.4	42.7	40.7	34.6	34.3	34.2
ESR46	43.8	42.7	42.1	40	35.3	32.2	32.1
ESR49	45.9	44.7	44.1	42	36.9	35.9	35.8

11.8.9.27 As shown in Table 11-30, noise levels are predicted to exceed the threshold values in some of the frequency bands by up to +2 dB. As stated above, the threshold criteria defined in NANR45 are noise levels which should not be exceeded internally. It is reasonable to assume that the building envelope is likely to provide at least 10dB noise reduction in each of the frequency bands, therefore internal noise levels are likely to meet the thresholds detailed in NANR45.

11.8.9.28 Therefore, assuming a conservative reduction of -10 dB per third octave band due to the noise insulation provided by the existing building envelope at each of the ESRs detailed in Table 11-30, it is considered that low frequency noise should not affect the outcomes presented in Table 11-28.

11.8.10 Decommissioning

11.8.11 As the effects are anticipated to be similar to or less than construction no separate decommissioning assessment has been undertaken, and results are as reported under construction.

11.9 Additional mitigation

11.9.1.1 The assessments summarised in Table 11-28 identify two ESRs which are potentially significant in EIA terms for operational noise. The Applicant has committed to revise the design of the Proposed Development to relocate electrical infrastructure away from the ESRs predicted to experience significant effects and maintain the offsets from the non-significant ESRs, This would therefore result in a **Not Significant** effect. The revised layout will be assessed at ES stage.

11.10 Residual effects

11.10.1 Construction

11.10.1.1 Significant effects have not been identified, therefore the residual effects remain the same as assessed in Section 11.8.

11.10.2 Operation

11.10.2.1 With the application of additional mitigation as identified in Section 11.9, residual effects will be Not Significant.

11.10.3 Decommissioning

11.10.3.1 It is considered that noise effects during the decommissioning phase of the Proposed Development would be similar or less than noise effects during the construction phase. Therefore, the decommissioning assessment is based on the construction assessment.

11.10.3.2 Significant effects have not been identified, therefore the residual effects remain the same as assessed in Section 11.8.

11.11 Monitoring

11.11.1.1 There is unlikely to be any requirement for noise and vibration monitoring during the construction, operation or decommissioning phases. However, once the construction/decommissioning methods are defined, this can be agreed within a CEMP/DEMP.

11.12 Opportunities for enhancement

11.12.1.1 There is no scope for enhancement in terms of noise and vibration.

11.13 Summary

11.13.1.1 Table 11-31 presents a summary of the noise and vibration assessment, detailing further mitigation requirements and residual effects.

Table 11-31 Noise and vibration - Preliminary assessment summary

Receptor and Sensitivity	Embedded and good practice measures	Description of impact and magnitude	Significance of effect	Additional mitigation	Residual effect
Construction and decommissioning					
Residential (moderate)	BPM secured by the oCEMP.				
	An appropriate buffer of at least 10m will be maintained between properties and construction works which have the potential to generate vibration.	Temporary, adverse, low	Minor adverse, Not Significant	None required	Minor adverse, Not Significant
	Routing for HGVs through local villages will be minimised as far as reasonably practicable				
Operation					
Residential (moderate)	132kV substations, BESS and inverters will be located at least 200m from residential properties.	Adverse, low	Major-moderate, Significant	Revise the design of the Proposed Development to relocate electrical infrastructure away from the ESRs predicted to experience significant effects and maintain the offsets from the non-significant ESRs at ES stage	Minor adverse, Not Significant

References

- [1] UK Government, *The Environmental Protection Act*, 1990.
- [2] UK Government, *Noise and Statutory Nuisance Act*, 1993.
- [3] UK Government, *The Control of Pollution Act*, 1974.
- [4] UK Statutory Instruments 2017 No. 572, "The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017," [Online]. Available: <https://www.legislation.gov.uk/ukSI/2017/572>. [Accessed June 2024].
- [5] Department for Energy Security and Net Zero, "Overarching National Policy Statement for Energy (EN-1)," January 2024. [Online]. Available: <https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1>. [Accessed 13 September 2024].
- [6] Department for Environment, Food and Rural Affairs (, *Noise Policy Statement for England*, 2010.
- [7] Department for Energy Security and Net Zero, "National Policy Statement for Renewable Energy Infrastructure (EN-3)," January 2024. [Online]. Available: <https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3>. [Accessed 13 September 2024].
- [8] Department for Energy Security and Net Zero, "National Policy Statement for Electricity Networks Infrastructure (EN-5)," January 2024. [Online]. Available: <https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf>. [Accessed 13 September 2024].
- [9] Department for Levelling Up, Housing and Communities, "National Planning Policy Framework," 2024. [Online]. Available: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>. [Accessed 15 May 2024].
- [10] Breckland Council, "Breckland Local Plan," September 2023. [Online]. Available: https://www.breckland.gov.uk/media/16659/Adopted-Breckland-Local-Plan/pdf/Appendix_4_-_Breckland_District_Council_Local_Plan.pdf?m=1704795365193. [Accessed 13 September 2024].
- [11] Ministry of Housing, Communities & Local Government, *Planning Practice Guidance, Noise.*, 2019.
- [12] Institute of Environmental Management and Assessment, *Guidelines for Environmental Noise Impact Assessment. IEMA, London.*, 2014.
- [13] British Standards Institute, *BS 4142:2014:2014 + A1:2019 Methods for rating and assessing industrial and commercial sound. BSI London, UK*, 2014.
- [14] British Standards Institution, *BS 8223:2014, Guidance on sound insulation and noise reduction on buildings. BSI: London, UK*, 2014.
- [15] British Standards Institution, *BS 5228-1:2009 + A1:2014 Code of construction practice for noise and vibration control on construction and open sites – Part 1: Noise. BSI, London.*, 2014.
- [16] British Standards Institution, *BS 5228-2:2009 + A1:2014 Code of construction practice for noise and vibration control on construction and open sites – Part 2: Vibration. BSI, London.*, 2014.
- [17] World Health Organization, *Guidelines for community noise. WHO, Geneva*, 1999.
- [18] International Organisation for Standardisation, *Acoustics - Attenuation of sound during propagation outdoors (ISO 9613-2:2024)*, 2024.

- [19] D. D. W. D. M. A. Dr. Andy Moorhouse, *Procedure for the assessment of low frequency noise compliants*, 2005.
- [20] Highways England, "Design Manual for Roads and Bridges, LA 111 – Noise and Vibration (Revision 2)," 2019.
- [21] L. Department for Transport (DfT) (1988). Calculation of Road Traffic Noise. HMSO. [Online].
- [22] British Standards Institute, *British Standards Institute (2003); BS 7445 - Description and measurement of environmental noise - Part 1: Guide to quantities and procedures*, BSi, London, 2003.
- [23] Institute of Acoustics, *Professional Practice Guidance on Planning & Noise, New Residential Development.*, 2017.

